

# **Instrument Messages and Functional Tests**

**Agilent Technologies**

**PSA Series Spectrum Analyzers**

**and**

**ESA Series Spectrum Analyzers**



**Manufacturing Part Number: E4440-90619**

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| Valid GSM burst not found . . . . .   | 80  |
| Valid NADC burst not found . . . . .  | 85  |
| Valid PDC burst not found. . . . .  | 85  |
| Valid PRACH burst not found. . . . .  | 83  |
| Valid signal not found . . . . .  | 91  |
| Valid signal not found. . . . .   | 73  |
| Video bandwidth fixed at 50MHz by Option 215 . . . . .  | 93  |
| Video shift off (no corresponding status bit) . . . . .   | 109 |
| Video Trigger cannot be active with Average Detector. . . . .   | 60  |
| Video Trigger cannot be used with Mkr Func due to Average Detector . . . . .  | 60  |
| Volume <name> formatted. . . . .  | 102 |
| Waiting for end of data acquisition to access floppy disk . . . . .   | 102 |
| WARNING: You are about to delete all of the contents of directory "x:\xxxxx\". Press Delete Now again to proceed or any other key to abort. . . . . | 102 |
| WARNING: You are about to delete all of the contents of directory xxxxxx. Press Delete Now again to proceed or any other key to abort. . . . .      | 102 |
| WBIF ADC Image Calibration Failed . . . . .   | 61  |
| WBIF Firmware Reset . . . . .   | 61  |
| WBIF Power On Test Failed . . . . .   | 61  |

WBIF Self Test Failed ..... 61

Wideband calibration not valid until Align Now, All performed. .... 74

Wrong density floppy inserted ..... 54

---

## **Instrument Messages**

### **Alphabetical Listing**



---

# **1 Instrument Messages**

## Instrument Messages Introduction

The analyzer can generate various messages that appear on the display during operation. There are four types of messages.

This chapter describes the following types of messages displayed on the analyzer:

- |                        |  |
|------------------------|--|
| User Error Messages    | Beginning on <a href="#">page 38</a> , User Error Messages appear when an attempt has been made to set a parameter incorrectly or an operation has failed (such as saving a file). These messages are often generated during remote operation when an invalid programming command has been entered. These messages appear in the status line at the bottom of the display. If you are using the default display colors, the message will appear in yellow. The message will remain until you preset the analyzer, press <b>ESC</b> , or another message is displayed on the status line. |
| Informational Messages | Beginning on <a href="#">page 97</a> , Informational Messages provide information that requires intervention. These messages appear on the status line at the bottom of the display. If you are using the default display colors, the message will appear in green (ESA) or yellow (PSA). The message will remain until you preset the analyzer, press <b>ESC</b> , or another message is displayed on the status line. The information provided in brackets, for example <filename> or <directory>, is a variable that represents a specific input provided previously.                 |
| Status Messages        | Beginning on <a href="#">page 102</a> , Status Messages appear on the right side of the analyzer display and/or set status bits in the SCPI Status Register system. These messages indicate a condition that may result in erroneous data being displayed. Most messages will only be displayed until the error condition is corrected. Multiple messages can be displayed and will be listed in the display area. In each case the name of the corresponding status bit is indicated in parenthesis. It will be noted if only a status bit is used (no message).                        |
| Pop-up Messages        | These messages indicate a condition that may require intervention. They appear in the middle of the display in a framed box. The message will remain until the appropriate intervention has taken place or the condition has been corrected.   |

## Error Queues

There are two types of error queues, front panel and remote interface. These two queues are viewed and managed separately. Refer to [Table 1-1](#). for more information on the characteristics of the Error Queue.

**Front panel**      A summary of the last 11 error messages preceded by an error number may be viewed in the Error Queue by pressing, **System** then **Show Errors**. When a remote interface initiates activity that generates an error, the messages are output to the remote bus. When output to the remote interface, they are preceded by an error number.

**Remote interface (SCPI)**      When a user error condition occurs in the analyzer as a result of SCPI (remote interface) activity, it is reported to both the front panel display error queue and the SCPI error queue. If it is a result of front panel activity, it reports to the front panel display error queue, and depending on the error, may also report to the SCPI error queue.

**Table 1-1. Characteristics of the Error Queue**

| Characteristic              | Front-Panel Display Error Queue                                   | SCPI Remote Interface Error Queue  |
|-----------------------------|---|--|
| Capacity (number of errors) | 11  | 30   |
| Overflow Handling           | Circular (rotating).<br>Drops oldest error as new error comes in. | Linear, first-in/first-out.<br>Replaces newest error with:<br>-350, Queue overflow |
| Viewing Entries             | Press: <b>System, Show Errors</b> <sup>a</sup>                    | Use SCPI query<br>SYSTem:ERRor?  |
| Clearing the Queue          | Press:<br><b>System, Show Errors, Clear Error Queue</b>           | Power up.<br>Send a *CLS command.<br>Read last item in the queue.                  |

a. Error history includes the date and time an error last occurred, the error number, the error message, and the number of times the error occurred.

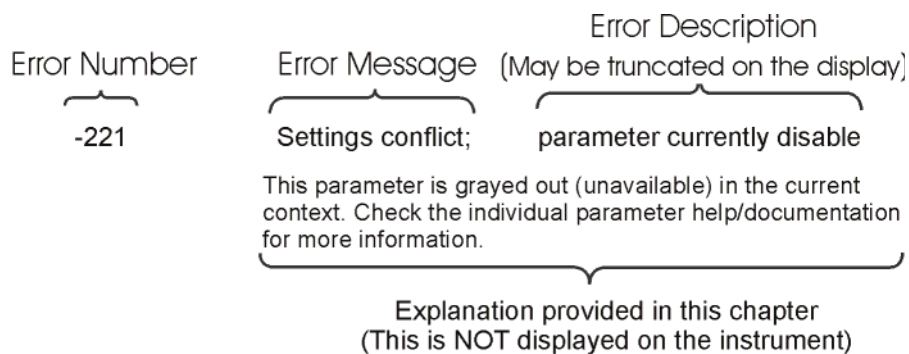
## Error Message Format

The system-defined error numbers are chosen on an enumerated (“1 of N”) basis. The error messages are listed in numerical order according to the error message number. Status and Informational messages without numbers will be listed in alphabetical order following the numerical listing.

In this chapter, an explanation is included with each error to further clarify its meaning. The last error described in each class (for example, -400, -300, -200, -100) is a “generic” error. There are also references to the IEEE Standard 488.2-1992, *IEEE Standard Codes, Formats, Protocols and Common Commands for Use with ANSI/IEEE Std 488.1-1987*. New York, NY, 1992.

Error messages are displayed at the bottom of the screen in the status line. If you are using the default display colors, the message will appear in green (ESA) or yellow (PSA). The error number is available through the remote interface and the show errors screen; it is not displayed in the status line.

**Figure 1-1. Error Message Example**



pk716b

## Error Message Types

Events do not generate more than one type of error. For example, an event that generates a query error will not generate a device-specific, execution, or command error.

- 499 to -400: Query Errors** These errors indicate that the analyzer output queue control has detected a problem with the message exchange protocol described in IEEE 488.2, Chapter 6. Errors in this class set the query error bit (bit 2) in the event status register (IEEE 488.2, section 11.5.1). These errors correspond to message exchange protocol errors described in IEEE 488.2, 6.5. In this case:
- Either an attempt is being made to read data from the output queue when no output is either present or pending, or
  - Data in the output queue has been lost.
- 399 to -300: Device-Specific Errors** An error number in the range –399 to –300 indicates that the analyzer has detected an error where some device operations did not properly complete, possibly due to an abnormal hardware or firmware condition. This is not an error in response to a SCPI query or command, or command execution. The occurrence of any error in this class will cause the device-specific error bit (bit 3) in the event status register to be set.
- 299 to -200: Execution Errors** These errors indicate that an error has been detected during analyzer execution.
- 199 to -100: Command Errors** These errors indicate that the analyzer parser detected an IEEE 488.2 syntax error. Errors in this class set the command error bit (bit 5) in the event status register (IEEE 488.2, section 11.5.1). In this case:
- Either an IEEE 488.2 syntax error has been detected by the parser (a control-to-device message was received that is in violation of the IEEE 488.2 standard. Possible violations include a data element which violates device listening formats or whose type is unacceptable to the device.), or
  - An unrecognized header was received. These include incorrect device-specific headers and incorrect or unimplemented IEEE 488.2 common commands.
- 64 to 799: Device-Specific Errors** These errors indicate that a device operation did not properly complete, possibly due to an abnormal hardware or firmware condition. These codes are also used for self-test response errors. Errors in this class set the device-specific error bit (bit 3) in the event status register (IEEE 488.2, section 11.5.1).
- The <error\_message> string for a positive error is not part of the SCPI standard. A positive error indicates that the analyzer detected an error within the GPIB system, within the analyzer firmware or hardware, during the transfer of block data, or during calibration.
- Greater than 10000: Measurement Applications Errors** These errors indicate that an error has been detected while executing measurements requiring a personality option such as the GSM Measurement Personality or those measurements found under the **MEASURE** front-panel key in SA mode.

## Instrument Messages

### Error Messages

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**NOTE** Error numbers are displayed in the error queue, *not* on the display.  
To see an error *number*, press **System, Show Errors**.

---

#### 0: No Error

0 No error  
The queue is empty. Either every error in the queue has been read, or the queue was cleared by power-on or \*CLS.

#### –499 to –400: Query Errors

---

**NOTE** Error numbers are displayed in the error queue, *not* on the display.  
To see an error *number*, press **System, Show Errors**.

---

–440 Query UNTERMINATED after indefinite response  
Indicates that a query was received in the same program message after a query requesting an indefinite response was executed (see IEEE 488.2, 6.3.7.5).

–430 Query DEADLOCKED  
Indicates that a condition causing a DEADLOCKED query error occurred (see IEEE 488.2, 6.3.1.7). For example, both the input buffer and the output buffer are full and the analyzer cannot continue. The analyzer automatically discards output to correct the deadlock.

–420 Query UNTERMINATED  
Indicates that a condition causing an UNTERMINATED query error occurred (see IEEE 488.2, 6.3.2.2). For example, the device was addressed to talk and an incomplete program message was received.

–410 Query INTERRUPTED  
Indicates that a condition causing an INTERRUPTED query error occurred (see IEEE 488.2, 6.3.2.7). For example, a query was followed by DAB or GET before a response was completely sent.

-400            Query Error

This is a generic query error for devices that cannot detect more specific errors. The code indicates only that a query error as defined in IEEE 488.2, 11.5.1.1.7 and 6.3 has occurred.

**-399 to -300: Device-Specific Errors**

---

**NOTE**        Error numbers are displayed in the error queue, *not* on the display.  
To see an error *number*, press **System, Show Errors**.

---

-340            Calibration failed

The instrument requires an **Align All Now**. Restore the alignment by pressing **System, Alignments, Align All Now**.

-330            Self-test failed;  
                  EEPROM checksum for <card>

The card identification header for a hardware card is incorrect. If the card is not properly identified, the instrument is likely to be non-functional. Report this error to the nearest Agilent Technologies sales or service office.

-330            Self-test failed;  
                  Incompatible Hardware (Third Converter) for E4

(E4447A only) The instrument has detected an incompatible Third Converter board. The upper-most frequency will be limited to 26.5 GHz, but the instrument will otherwise continue to function normally.

-321            Out of memory

An internal operation needed more memory than was available. Report this error to the nearest Agilent Technologies sales or service office.

-310            System error; Pretune DAC Calibration failed

System error; Pretune DAC Cal failed midpoint verification

System error

An internal system problem was detected. Report this error to the nearest Agilent Technologies sales or service office.

-300            Device-specific error

This is a generic device-dependent error for devices that cannot detect more specific errors. The code indicates only that a device-dependent error as defined in IEEE 488.2, 11.5.1.1.6 has occurred. Report this error to the nearest Agilent Technologies sales or service office.

**-299 to -200: Execution Errors**

---

**NOTE** Error numbers are displayed in the error queue, *not* on the display.

To see an error *number*, press **System, Show Errors**.

---

- 253 Corrupt media  
A removable media was found to be bad or incorrectly formatted. Any existing data on the media may have been lost.
- 250 Mass storage error; EEPROM write timeout on EEPROM  
Failure to initialize EEPROM. Report this error to the nearest Agilent Technologies sales or service office.
- 241 Hardware missing  
Hardware missing; no such SIO address  
Missing device hardware. For example, an option is not installed.
- 230 Data corrupt or stale  
Data corrupt or stale; EEPROM copy of <file>  
Data corrupt or stale; NRAM copy of <file>  
Possibly invalid data. A new measurement was started but not completed.
- 224 Illegal parameter value  
You have sent a parameter for this command that is not allowed. See the Function Reference.
- 223 Too much data; not all points entered  
Too much data; <description of the type of data exceeded>  
Indicates that a legal program data element of block, expression, or string type was received that contained more data than the device could handle due to memory or related device-specific requirements.
- 222 Data out of range  
A legal program data element was parsed but could not be executed because the interpreted value was outside the legal range defined by the device (see IEEE 488.2 11.5.1.1.5). The displayed results may be clipped.



-221

Settings conflict;...

...Averaging unavailable when Sig ID is on

When in external mixing, with signal identification on, Averaging Mode is not available as a selection.

...Cannot center unpreselected external mixer

Mixer type is Unpreselected. Preselector centering is not available for unpreselected mixers.

...Command incompatible with band pair marker

Using remote commands, you have tried to adjust the start or stop frequency of a span pair marker. You can adjust only the center and span.

...External mixing unavailable when preamp on

Internal preamp is on and you tried to select external mixing, which is not available.

...FFT unavailable when Sig ID is on

When in external mixing, with signal identification on, the Manual FFT function is not available as a selection

...Settings Conflict, Preamp unavailable in external mixing mode

With external mixing selected, you cannot use the internal preamp.

...Sig ID requires EXTERNAL mixing mode

The Input Mixer setting is set in internal and you tried to select signal identification which is not valid.

...Sig ID unavailable in Manual:FFT

When in external mixing, with FFT on, signal identification is not available as a selection.

...Sig ID unavailable when Averaging is on

When in external mixing, with Averaging Mode on, signal identification is not available as a selection.

...Sig ID unavailable when Signal Track is on

When in external mixing with signal tracking on, signal identification is not available as a selection.

Instrument Messages  
Instrument Messages

...Signal ID unavailable with Presel Mixer

Signal identification is not available with the preselected mixer selected.

...Signal Track unavailable when Sig ID is on

Signal tracking is not available as a selection when using external mixing with signal identification on.

Settings conflict; parameter currently disabled

This parameter is grayed out (unavailable) in the current context. Check the individual parameter help/documentation for more information.

-200 Execution Error

For devices that cannot detect more specific errors, this code indicates only that an execution error as defined in IEEE 488.2, 11.5.1.1.5 has occurred.

**-199 to -100: Command Errors**

---

**NOTE** Error numbers are displayed in the error queue, *not* on the display.  
To see an error *number*, press **System, Show Errors**.

---

-178 Expression data not allowed  
A legal expression data was encountered, but was not allowed by the device at this point in parsing.

-171 Invalid expression  
The expression data element was invalid (see IEEE 488.2, 7.7.7.2). For example, unmatched parentheses or an illegal character.

-170 Expression data error  
This error, as well as errors -171 through -179, is generated when parsing an expression data element. This particular error message is used if the device cannot detect a more specific error.

-168 Block data not allowed  
A legal block data element was encountered, but not allowed by the device at this point in the parsing.

-161 Invalid block data  
A block data element was expected, but was invalid (see IEEE 488.2, 7.7.6.2). For example, an END message was received before the end length was satisfied.

- 160           Block data error
- This error, as well as errors –161 through –169, is generated when parsing a block data element. This particular error message is used if the device cannot detect a more specific error.
- 158           String data not allowed
- A string data element was encountered, but not allowed by the device at this point in the parsing.
- 151           Invalid string data
- A string data element was expected, but was invalid (see IEEE 488.2, 7.7.5.2). For example, an END message was received before the terminal quote character.
- 150           String data error
- This error, as well as errors –151 through –159, is generated when parsing a string data element. This particular error message is used if the device cannot detect a more specific error.
- 148           Character data not allowed
- A legal character data element was encountered where prohibited by the device.
- 144           Character data too long
- The character data element contains more than twelve characters (see IEEE 488.2, 7.7.1.4).
- 141           Invalid character data
- Either the character data element contains an invalid character or the particular element received is not valid for the header.
- 140           Character data error
- This error, as well as errors –141 through –149, is generated when parsing a character data element. This particular error message is used if the device cannot detect a more specific error.
- 138           Suffix not allowed
- A suffix was encountered after a numeric element which does not allow suffixes.
- 134           Suffix too long
- The suffix contained more than twelve characters (see IEEE 488.2, 7.7.3.4).

## Instrument Messages

### Instrument Messages

- 131 Invalid suffix  
Attempt to send a SCPI command with a suffix that does not match the current units for the function.  
The suffix does not follow the syntax described in IEEE 488.2, 7.7.3.2, or the suffix is inappropriate for this device.
- 130 Suffix error  
This error, as well as errors -131 through -139, is generated when parsing a suffix. This particular error message is used if the device cannot detect a more specific error.
- 128 Numeric data not allowed  
A legal numeric data element was received, but the device does not accept one in this position for the header.
- 124 Too many digits  
The mantissa of a decimal-numeric data element contained more than 255 digits excluding leading zeros (see IEEE 488.2, 7.7.2.4.1).
- 123 Exponent too large  
The magnitude of an exponent was greater than 32000 (see IEEE 488.2, 7.7.2.4.1).
- 121 Invalid character in number  
An invalid character for the data type being parsed was encountered. For example, an alpha in a decimal numeric or a “9” in octal data.
- 120 Numeric data error; VGR  
Numeric data error  
This error, and errors -121 through -129, is generated when parsing a data element that appears to be numeric, including non-decimal numeric types. This message is used if the device cannot detect a more specific error.
- 114 Header suffix out of range  
The value of a header suffix attached to a program mnemonic makes the header invalid.
- 113 Undefined header  
The header is syntactically correct, but it is undefined for this specific device. For example, \*XYZ is not defined for any device.
- 112 Program mnemonic too long  
The header contains more than twelve characters (see IEEE 488.2, 7.6.1.4.1).

- 111 Header separator error  
A character which is not a legal header separator was encountered while parsing the header.
- 110 Command header error  
An error was detected in the header. This message is used when the device cannot detect the more specific errors described for errors -111 through -119.
- 109 Missing parameter  
Fewer parameters were received than required for the header. For example, the \*ESE common command requires one parameter, so receiving \*ESE is not allowed.
- 108 Parameter not allowed  
More parameters were received than expected for the header. For example, the \*ESE common command only accepts one parameter, so receiving \*ESE 0, 1 is not allowed.
- 105 GET not allowed  
A Group Execute Trigger was received within a program message (see IEEE 488.2, 7.7). Correct the GPIB controller program so that the GET does not occur within a line of GPIB program code.
- 104 Data type error  
The parser recognized a data element that is not allowed. For example, numeric or string data was expected, but block data was encountered.
- 103 Invalid separator  
The parser was expecting a separator and encountered an illegal character. For example, the semicolon was omitted after a program message unit.
- 102 Syntax error  
An unrecognized command or data type was encountered. For example, a string was received when the device does not accept strings.
- 101 Invalid character  
A syntactic command contains a character which is invalid for that type. For example, a header containing an ampersand, such as "SETUP&". This error might be used in place of error numbers -114, -121, -141, and some others.

Instrument Messages  
Instrument Messages

-100 Command error  
This is a generic syntax error for devices that cannot detect more specific errors. The code indicates only that a command error as defined in IEEE 488.2, 11.5.1.1.4 has occurred.

**64 to 799: Device-Specific Errors**

64 System, Alignments, Align All Now, Needed

102 Excessive 50 MHz RF input power is preventing internal alignments.  
There is too much 50 MHz energy at the RF port for alignments to run. Reduce input power to less than 0 dBm and run alignments again.

103 Sampling Oscillator Unlock; Failure acquiring SO frequency lock  
Report this error to the nearest Agilent Technologies sales or service office.

104 1st LO Unlock; Failure acquiring FracN LO frequency lock  
1st LO Unlock; Failure acquiring single loop FracN LO lock  
The first LO on has lost phase lock. Report this error to the nearest Agilent Technologies sales or service office.

105 2nd LO Unlock  
The second LO has lost phase lock. Report this error to the nearest Agilent Technologies sales or service office.

106 4th LO Unlock  
The fourth LO has lost phase lock. Report this error to the nearest Agilent Technologies sales or service office.

107 Sample Clock Unlock  
Report this error to the nearest Agilent Technologies sales or service office.

108 ESA Cal Oscillator Unlock  
Report this error to the nearest Agilent Technologies sales or service office.

108 PSA Parameter not allowed  
This error appears when POW:GAIN? is issued with parameters. The POW:GAIN? command to query the state of the preamplifier does not accept parameters.

109 Missing Parameter  
A necessary parameter was not provided in the command that was sent.

- 129 Meas Uncal  
The measurement is uncalibrated, usually due to sweeping a narrow RBW filter too quickly. Check the sweep time, span, and bandwidth settings, or press **Auto Couple**.
- 143 Final IF Overload  
Either increase input attenuation or decrease the input signal level.
- 163 Freq Count: Reduce Span/RBW ratio  
The span is too wide for the current resolution bandwidth. Either reduce the span or increase the RBW.
- 177 Diagnostic override of Firmware Control; :DIAGnostic:ABUS  
Diagnostic override of Firmware Control; :DIAGnostic:AMP  
Diagnostic override of Firmware Control; :DIAGnostic:LATCh  
Diagnostic override of Firmware Control; :DIAGnostic:MLATCh  
Diagnostic override of Firmware Control; :DIAGnostic:REGister:VALue  
Diagnostic override of Firmware Control; :DIAGnostic:SBUS  
Diagnostic override of Firmware Control; :DIAGnostic:SBUS:DBD  
Diagnostic override of Firmware Control; :DIAGnostic:SIO:PARAllel  
Diagnostic override of Firmware Control; :DIAGnostic:SIO:SERial
- 187 Directory already exists
- 190 Unable to save file, invalid path
- 191 File Operation Status; directory <name> created  
File Operation Status; <name> directory deleted  
File Operation Status; <name> directory renamed to <name>  
File Operation Status; <name> file copied  
File Operation Status; <name> file deleted  
File Operation Status; <name> file loaded  
File Operation Status; <name> file renamed to <name>  
File Operation Status; <name> file saved  
File Operation Status; Volume <name> formatted
- 196 Can't Auto-Couple Sweep Time in Zero Span

Instrument Messages  
Instrument Messages

- 197 Marker Freq Count HW Failure
- 201 Option not installed
- The desired operation cannot be performed because a required option is not installed. For example, pressing **Source** with no tracking generator installed in the ESA analyzer, or issuing a POW:GAIN command without Option 1DS or 110 installed in the PSA analyzer will generate this error.
- 202 No peak found
- No signal peak was found that meets the criteria under **Peak Search, Search Param Criteria**.
- 204 ESA only TG Frequency Limit
- The tracking generator has reached the limit of its allowable frequency range.
- 205 Ext Ref
- 205 Command not recognized
- Indicates that the command sent from the remote interface was not recognized. Check the programming guide for correct syntax.
- 206 Unable to initialize flatness data
- A failure occurred in setting the flatness data in the internal EEROM. Get in touch with your local Agilent Technologies sales and service office.
- 207 Unable to store flatness data
- A failure occurred in setting the flatness data in the internal EEROM. Get in touch with your local Agilent Technologies sales and service office.
- 208 Preselector is not available at this frequency.
- A preselector is available, but the marker is at a frequency which does not support preselection (~<3 GHz). Preselector centering can be performed only for frequencies above 3.025 GHz.
- 209 Preselector centering failed
- An attempt to center the preselector failed. You tried to center the preselector with the analyzer span too wide. Preselector centering can be performed only for spans below 1.123 GHz.
- 211 RBW limited to 1 kHz when Span > 5 MHz
- In spans greater than 5 MHz, narrow (digital) resolution bandwidths, below 1 kHz, are not available.
- 213 Span limited to 5 MHz when RBW < 1 kHz
- In narrow (digital) resolution bandwidths, below 1 kHz, spans greater than 5 MHz are not available.



- 214 ESA only    TG start freq is less than 9 kHz  
Tracking generator uncalibrated below 9 kHz.
- 215 ESA only    TG start freq is less than 1/2 res bw  
Tracking generator uncalibrated at start frequencies below 1/2 the current resolution bandwidth.
- 216            Invalid Baud Rate  
Attempt to use invalid baud rate. Refer to the programming language chapter of *Agilent Technologies ESA Series Spectrum Analyzer Programmer's Guide* for more information.
- 217            RS-232 Interface Error  
An error occurred on the serial interface.
- 219            Command not valid in this model  
Indicates that the command sent from the remote interface does not apply to this analyzer model number. For example, attempting to center the preselector in an analyzer without a preselector will generate this error.
- 220            Trace Menu is unavailable when Sig Ident is ON
- 221            Invalid option, unable to uninstall package  
You have attempted to remove a personality that is not currently installed. Verify command was entered correctly.
- 222            Command not valid when no measurement is active  
Indicates that the command sent from the remote interface must be issued while a measurement is running in the analyzer.
- 223            Neg. Trig Delay unavailable in Swept Mode, zero delay used.  
Trigger Offset unavailable in swept spans  
Trigger Offset is only available in Zero Span. Refer to "Trig" in your Agilent Spectrum Analyzer User's Guide for a description of this function.
- 224            Option not licensed.  
The selected option requires a license. Refer to the installation procedures in the user guide provided for this particular option.
- 226            Actual Trig Delay = Remote Trig Delay + Remote Trig Offset
- 228            Preselector centering failed - inadequate peak  
The signal on which the marker is placed is not a high enough level peak for centering the preselector. This can be the result of pressing **Presel Center** without first turning off the marker. You may have left the marker on and placed below the signal peak or in the noise.

Instrument Messages  
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- 229 3 – 26.5 GHz preselector bypassed, can't adjust  
The microwave preselector has been bypassed so it cannot be centered or adjusted. Pressing the key or send the SCPI commands for **Presel Center** or **Presel Adjust** will result in this error.
- 230 Unpreselected external mixing - no preselector  
If you are using an unpreselected mixer while doing external mixing then there is no preselector to center or adjust. Pressing the key or sending the SCPI commands for **Presel Center** or **Presel Adjust** will result in this error.
- 231 Preselector unavailable while in external mixing  
The internal preselectors cannot be used while in external mixing.
- 232 External mixing is off, can't adjust external preselector  
External mixing is turned off so the external mixer preselector is not available.
- 235 PSA 26.5 – 50 GHz preselector bypassed, can't adjust  
The millimeter wave preselector has been bypassed so it cannot be centered or adjusted. Pressing the key or send the SCPI commands for **Presel Center** or **Presel Adjust** will result in this error.
- 236 PSA License conflict: Options X and Y can not be licensed at same time  
This error is generated if you attempt to license two incompatible options together in the analyzer. For example, Options 115 and 117 are incompatible and will generate this error if both are licensed. The "X" and "Y" in this message are replaced with the actual options.
- 238 Trace smoothing: VBW filt or Average Detector; cannot use both
- 239 HW Diag is OFF
- 249 AC Coupled
- 332 Average Type incompatible for scale.  
Amplitude Scale command should be sent prior to the Average Type command.
- 601 PSA only  
612 ESA only File not found  
The analyzer could not find the specified file.
- 601 Floppy disk full  
The floppy disk is full. Clear some space by deleting unwanted files.

|                              |   |
|------------------------------|---|
| 602 PSA only<br>605 ESA only | Media is protected<br><br>A save was attempted to a write-protected device.   |
| 602                          | Floppy disk error<br><br>An unknown error has occurred while accessing the floppy disk.   |
| 603 PSA only<br>615 ESA only | File is corrupt<br><br>Corrupted file<br><br>The file that you were trying to load is corrupt.  |
| 604 PSA only<br>607 ESA only | File name error<br><br>File name error; Directory does not have a default file type<br>File name error; Directory does not support extenders<br>File name error; Empty filename<br>File name error; Illegal extender<br>File name error; Illegal filename character<br>File name error; Only one: is allowed<br>File name error; Only one extender character allowed<br><br>An invalid file name was specified. Use filenames with a maximum of 8 characters (letters and digits only), and use a 3-character extension. File names are not case-sensitive. This error also occurs if you try to delete a nonexistent file. |
| 615 PSA only<br>604 ESA only | File exists<br><br>File already exists<br><br>You attempted to save to a file that already exists. Either delete or rename the existing file or select a new name, then try again.  |
| 602 PSA only<br>605 ESA only | Media is protected<br><br>A save was attempted to a write-protected device.   |

- 605 Data corrupt or stale; EEPROM copy of <file>  
**WARNING:** Contact the factory if you see this error.  
This error indicates that a file stored in EEPROM has become corrupt and the Hamming codes are unable to repair the data.  
When the EEPROM file has been corrupted, the system will store default values into both the Non-Volatile RAM and EEPROM copies of the file. If this error occurs often, it may indicate that there is a problem with the physical memory.  
Data corrupt or stale; RAM copy of <file>  
This error indicates that a file stored in Non-Volatile RAM has become corrupt and the Hamming codes are unable to repair the data.  
When a Non-Volatile file has this error, the system will first try to verify the state of the data in EEPROM and if valid it will copy the data in EEPROM into the Non-Volatile ram copy of the file. When this happens, the system will remain calibrated. If this error occurs often, it may indicate that there is a problem with the physical memory.
- 606 Data questionable; EEPROM copy of <file>  
EEPROM error occurred. The EEPROM copy of an internal file is either corrupt or otherwise unusable. The system automatically updates the non-volatile RAM copy of the EEPROM copy using a default initialization. The actual EEPROM file is left as it is. Report this error to the nearest Agilent Technologies sales or service office.
- 606 Media is corrupt  
A save was attempted to a corrupt device.
- 604 PSA only  
607 ESA only File name error  
File name error; Directory does not have a default file type  
File name error; Directory does not support extenders  
File name error; Empty filename  
File name error; Illegal extender  
File name error; Illegal filename character  
File name error; Only one: is allowed  
File name error; Only one extender character allowed  
An invalid file name was specified. Use filenames with a maximum of 8 characters (letters and digits only), and use a 3-character extension. File names are not case-sensitive. This error also occurs if you try to delete a nonexistent file.
- 608 Mass storage error; EEPROM write timeout

- 609 Restoration of NVRAM data  
This error indicates that a file stored in Non-Volatile RAM has been corrected based on the Hamming codes stored with the file. After the correction, the file will contain the same data as when the instrument was shut off. If this error continues to occur on successive power cycles, it may indicate that there is a problem with the physical memory.
- 627 PSA only  
609 ESA only Media is not writable  
A save was attempted to a read-only device or device that could not be written to. Try a known-good disk.
- 610 File access is denied  
The file is protected or hidden and cannot be accessed.
- 611 File access IO busy;  
duplicate :SERVICE[:PRODUCTION]:CALIBRATE:BEGIN  
File access IO busy; :SERVICE[:PRODUCTION]:CALIBRATE:END  
without a BEGIN
- 601 PSA only  
612 ESA only File not found  
The analyzer could not find the specified file.
- 613 Flash memory is full  
The internal flash memory is full. Clear some space by deleting unwanted files. If your analyzer has a serial number less than US41440000 or MY41440000 and Option B72 has not been installed, you may also increase the flash memory size by purchasing Option B72.
- 763 PSA only  
614 ESA only Bad, missing, or unformatted disk  
Bad or missing floppy disk  
The floppy disk is not inserted properly, is not formatted, or the directory cannot be read. Insert a known good disk and try again.
- 615 PSA only  
604 ESA only File already exists  
File exists  
You attempted to save to a file that already exists. Either delete or rename the existing file or select a new name, then try again.

Instrument Messages  
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|                              |  |
|------------------------------|--|
| 603 PSA only<br>615 ESA only | File is corrupt<br>Corrupted file<br>The file that you were trying to load is corrupt.   |
| 617                          | Wrong density floppy inserted<br>The floppy disk has the wrong density. It should be 1.44 MB.  |
| 618                          | Illegal write access of Flash memory<br>Attempt to write to an unavailable area of internal flash memory.  |
| 619                          | Can't Auto-Couple RBW in Zero Span<br>You sent a remote command to set the RBW into auto while in zero span.   |
| 620                          | Can't Auto-Couple Sweep Time in Zero Span<br>You sent a remote command to set the sweep time to auto while in zero span.   |
| 622                          | External reference missing or out of range<br>The external frequency reference signal is missing, has too low an amplitude, or does not match the frequency value that you previously entered into instrument memory.  |
| 623                          | Printer not responding<br>Printer not responding; ioctl ERROR<br>Check the printer. It may not be connected properly or turned on.   |
| 625                          | Printer out of paper<br>Load paper in printer.   |
| 626                          | Print failed; Can't open print file desc<br>Print failed; DisplayExport can't create print file<br>Print failed; DisplayExport illegal print language<br>Print failed; DisplayExport insufficient RAM space<br>Print failed; DisplayExport undetermined error<br>Print failed; Error transferring image to printer<br>Print failed; Printer ioctl failed<br>Print failed; Unknown printer response |

- 627 PSA only  
609 ESA only      Media is not writable
- A save was attempted to a read-only device or device that could not be written to. Try a known-good disk.
- ERROR/NUMBER “609 Restoration of NVRAM data” IS ALREADY USED FOR HAPPENING ./storage/directory/NRAM\_Directory.cc  
HAP\_nramDataCorrected
- 651      Connect RF OUT to INPUT
- Attempt to align the tracking generator without its output connected. Connect the tracking generator RF OUT to the analyzer **INPUT**.
- 652      Connect Amptd Ref Output to Input
- For Agilent Technologies E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B only:* you must connect the **AMPTD REF OUTPUT** to the analyzer **INPUT** with the appropriate cable.
- 653      Auto Align not available when using Calibration Defaults
- The Auto Alignment system cannot be used until an **Align Now All** is executed by pressing **System, Alignments, Align Now, All**. On all Agilent Technologies ESA spectrum analyzer models except Agilent Technologies E4401B and E4411B, you must connect the **AMPTD REF OUT** to the **INPUT** with the appropriate cable to perform this alignment. *For Agilent Technologies E4401B and E4411B only:* disconnect any signals from the **INPUT** prior to performing this procedure.
- 701      Invalid printer response
- In attempting to identify the printer an invalid response was received. Check that you are using a supported printer. Be sure you are using the proper cable and that it is securely fastened.
- 702      Unsupported printer
- A printer which is recognized, but known to be unsupported was identified. This printer cannot be used with the analyzer. For example, a printer only supported by Microsoft Windows will generate this error.
- 703      Unknown printer
- In attempting to identify the printer, a valid response was received but the printer is not known to the analyzer. Use the **Custom** printer menu under **Print Setup** to configure the printer.
- 704      Printer interface error
- An error occurred while trying to print. Make sure the printer is turned on and properly connected.

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- 705 Printer Type is None
- The current printer type is set to **None**, so no print operations are possible. Change the type in the **Print Setup** menu and try again.
- 727 In <filename>: [DATA] header missing
- This message indicates that the data section of a file did not begin with the token **[DATA]**.
- 728 In <filename>, line <nnn>: separator missing
- The **[HEADER]** section of a file contains entries requiring an equal (=) sign, such as <keyword> = <value>. This message appears if the equal sign does not appear on the line.
- 729 In <filename>: error reading file
- Appears when loading data from a limit line or corrections disk file and a failure to the file occurs.
- 730 In <filename>, line <numeric\_value>: line too long
- When loading data from a limit line or corrections disk file, this message will appear if the length of any line in the file exceeds 255 characters.
- 731 In <command>: bad data count (<numeric\_value>): expected multiple of <numeric\_value>
- This message indicates that the data sent to a corrections or limit table via the **DATA** or **MERGE** commands does not have the expected length for the table. For example, this message would appear if an attempt were made to merge 7 numeric values into a limit table, since each logical entry requires 3 values (frequency, amplitude, and connected).
- 732 In <filename>, line <numeric\_value>: error parsing tokens
- This message may appear when loading data from a limit line or corrections disk file. It indicates a problem in the attempt to break a string of text into tokens. There may be too few tokens in the string. In other words, the file content must match the expected format. This typically happens when there are too few numeric values in the **[DATA]** section of a limit or corrections file.
- 733 In <filename>, line <numeric\_value>: <xxx> is not numeric
- This message may appear when loading data from a limit line or corrections disk file. It indicates that a non-numeric token <xxx> was found where a numeric token was expected. In other words, the file content must match the expected format.



- 734 Interpolation error: cannot compute log of  
<negative\_frequency\_value>
- Occurs when the frequency interpolation of a limit line is set to log and the start frequency of the instrument is negative. The <negative\_frequency\_value> is limited to – 80 MHz, so it may not match the frequency that caused the error.
- 735 In <filename>: bad amplitude unit <unit>
- This message indicates that unit <unit> is not recognized or supported.
- 736 Too many data values at <freq\_or\_time\_value>
- This message may appear when data is sent to a corrections or limit table using the **DATA** or **MERGE** commands. These tables limit the number of amplitudes associated with a frequency or time to 2 or less. This message will appear if an attempt is made to attach 3 or more values to a frequency or time.
- 751 Instrument state set to initial values
- Instrument state may be corrupt, state has been reset to initial values
- While trying to load a trace or state, the state information was found to be in error. This may be because the state had been stored on a later revision of analyzer firmware. A default set of state variables was loaded instead. There is nothing wrong with the analyzer.
- An error in the internal instrument state has been detected. The state has been reset to a default value.
- 752 Unable to load state from file
- Attempt to load a state from a file failed.
- 753 Unable to save state to file
- Attempt to save a state to a file failed. See the associated error messages for the cause (press **System, Show Errors**).
- For PSA: If this error occurs after a mode switch that takes longer than normal, you may need to free up some instrument memory. When you switch to a different measurement mode, the analyzer must temporarily store instrument state data. If you have less than 500 kB of available memory, the switching process can take over 1 minute and result in this error. Use the File key menu to delete any unnecessary files from instrument memory.
- 755 Unable to load state from register
- Attempt to load a state from an internal state register failed.

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- 756 Unable to save state to register  
Attempt to save a state to an internal state register failed. See the associated error messages for the cause (press **System, Show Errors**).
- 757 Unable to load user state, factory preset was done  
A user preset failed, so the factory preset values were used. Save a valid state into user preset and try again.
- 758 Unable to save user state  
Attempt to save a user preset state failed. See the associated error messages for the cause (press **System, Show Errors**).
- 759 Unable to load state saved from firmware Rev A.xx.xx; Restore Sys\nDefaults  
Unable to load state  
A saved state file from a newer firmware revision was attempted to be loaded into an older instrument.
- 760 ESA only Unable to query state  
Query of state over the remote interface was unsuccessful.
- 761 ESA only Unable to set state  
Attempt to set the state over the remote interface was unsuccessful.
- 762 ESA only Incorrect filename, allowable extensions are .trc or .csv  
Attempt to save a trace to a file with an incorrect extension.
- 762 ESA only Unable to load file  
A failure occurred while loading a file; the file was not loaded.
- 763 PSA only  
614 ESA only Bad, missing, or unformatted disk  
Bad or missing floppy disk  
The floppy disk is not inserted properly, is not formatted, or the directory cannot be read. Insert a known good disk and try again.
- 763 ESA only Incorrect filename, allowable extensions are .gif or .wmf  
Attempt to save a screen image to a file with an incorrect extension.
- 764 Unable to save file  
Attempt to save a file failed; the file was not saved. See the associated error messages for the cause (press **System, Show Errors**).

- 765           Unable to load file  
              Attempt to load a file failed; the file was not loaded.
- 766           Unable to format drive
- 767           Failed to Initialize ISTATE regions. Fatal LDS error  
              Attempt to initialize the instrument state has failed. Cycle instrument power. If this fails to correct the problem, contact your nearest Agilent Technologies service center.
- 768           Unable to load user state, required instrument mode is not installed  
              Attempt to load a state failed, because the state was saved with a measurement personality that is not currently loaded. Load the appropriate personality and try again.
- 769 ESA only   Invalid instrument mode  
              You have attempted to switch to an instrument mode that is currently not installed. Confirm that the mode name (for INST:SEL) or number (for INST:NSEL) was entered correctly and that the requested personality is actually installed in the instrument.
- 770           Incorrect filename, allowable extensions are .gif or .wmf  
              You sent a remote command to save a screen file but did not specify a valid extension.  
              Incorrect filename, allowable extension is .sta  
              You sent a remote command to save a state file but did not specify a valid extension.  
              Incorrect filename, allowable extensions are .trc or .csv  
              You sent a remote command to save a trace file but did not specify a valid extension.
- 770           Instrument mode requested is not supported  
              Instrument mode specified with: INST command is not valid. Refer to programming information.
- 771           Store Ref trace before turning on Normalize  
              Attempt to turn on Normalize with trace 3 being at the noise floor (PSA). A reference trace must be available for the Normalize function to be activated. Refer to “View/Trace” in the Agilent ESA Spectrum Analyzer User’s Guide where the **Normalize** key function is explained in detail.

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- 772           Cannot load a directory  
Cannot load a directory, please choose a file  
You have selected a directory instead of a file when attempting to perform the Load function under the **File** front-panel key.
- 773           Linear units unavailable with Normalize on  
Attempt to change amplitude units to an absolute unit which is not allowed with Normalize.
- 774           Linear scale unavailable with Normalize on  
Attempt to change Scale Type to LIN which is not allowed with Normalize.
- 780           No Peak Found  
No signal peak was found that meets the criteria under **Peak Search, Search Param Criteria**.
- 781           Video Trigger cannot be active with Average Detector  
You sent a remote command to do one of the following:
- Turn on video trigger while the Average Detector or a Marker Function is active.
  - Turn on the Average Detector or a Marker Function while Video Trigger is active.
- 782           Video Trigger cannot be used with Mkr Func due to Average Detector
- 783           Allowable span for current center frequency exceeded  
When rotating the knob or step up/down keys to change the Span, the value of the Center frequency is kept constant. Therefore, the span is limited by the frequency range of the instrument.
- 784           Allowable CF for current span exceeded  
When rotating the knob or step up/down keys to change the Center frequency, the value of the Span is kept constant. Therefore, the center frequency is limited by the frequency range of the instrument.
- 786           Cal file not initialized correctly, <filenumber>  
This indicates that an older LO board is loaded in, with uninitialized values for the milli-meter band edges in its EEPROM band edge cal file. This happening is will therefore only be visible in the service mode.

- 787           WBIF Self Test Failed
- Option 122 or 140 performs a loop-back self-test on power up. It does an ADC image calibration, then stores a sine wave in RAM and plays it out the DAC. It then measures the carrier power, image rejection and signal-to-noise ratio. If this test fails, the wideband digitizer hardware is either incorrectly installed or has a hardware failure. Call your Agilent Service representative.
- There is diagnostic information available. The self test can be run with DIAG:WBIF:TEST? This command returns 4 values: passed, carrier power, image rejection and signal to noise ratio.
- First look at the carrier power. If it is below  $-50$ , the LVDS cable is probably missing or faulty. If the carrier power is above 0 dBm, image rejection less than 40 but SNR more than 50, there is probably a bad ADC.
- 788           WBIF ADC Image Calibration Failed
- The wideband digitizer hardware uses two ADC's that must be kept in perfect synchronization to avoid unwanted images appearing in the spectrum. The instrument will occasionally perform an ADC Image Calibration (formerly known as Step Cal) to resynchronize the ADC's. This calibration is only known to fail if there is a hardware problem.
- 789           WBIF Firmware Reset
- The wideband digitizer hardware has a local microprocessor controlling the hardware trigger. If this microprocessor resets, it will automatically restart and begin taking data again, and will send this error message. While this should never happen, it is a self-recovering error that requires no action on the part of the user. If, however, it starts to occur frequently, contact your Agilent service representative to find out if there is a firmware upgrade to solve the problem.
- 791           Acquiring Data...
- WBIF Power On Test Failed
- An error occurred when the wide bandwidth IF hardware (Option 122 or 140) was tested during the power on process.
- 795           No trigger before timeout; auto-triggered
- 797           Awaiting Trigger, no AUTO Trig
- 801           Memory limit caused Data Acquisition to be truncated
- 805           doing Alignment...
- 838           Log Frequency Interpolation not Implemented
- This error message is displayed when you try to load a correction file that is using logarithmic frequency interpolation.

## Greater than 10000: Measurement Applications Errors

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**NOTE** Error numbers are displayed in the error queue, *not* on the display.  
To see an error *number*, press **System, Show Errors**.

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**10008 to 10522: Power Suite Error Messages** An error number in this range indicates the instrument has detected an error relating to the Power Suite functionality.

- 10008 Preferred resolution bandwidth not available.  
The calculated required resolution bandwidth for this measurement is not available.
- 10010 One or more harmonics past freq limit: number decreased.  
Highest harmonic was past the frequency limit of the analyzer, so the number of measured harmonics was decreased.
- 10011 First harmonic is past analyzer frequency limit.  
First harmonic was past the frequency limit, so no harmonics can be measured. The analyzer will simply measure the fundamental. If you have an Option AYZ it allows the use of Agilent 11970 Series, and Agilent 11974 external mixers to extend the frequency range to 110 GHz. Operation to 325 GHz is also possible with non-Agilent mixers.
- 10012 No Fundamental > 0 Hz found in given span.  
There were no frequencies greater than 0 Hz in the starting span, so the centre frequency at measurement entry will be used as the fundamental.
- 10013 No Fundamental > -50 dBm found in given span.  
There was no fundamental found, so the centre frequency at measurement entry will be used as the fundamental.
- 10020 Signal Tracking is not available when Noise Correction is on.  
If signal tracking is turned on while noise correction is on, it will be turned off. To use the signal tracking function, first turn noise correction off.
- 10138 Valid GSM burst not found in frame (Burst Type)  
No active GSM bursts that match the selected burst type have been detected in the RF input signal. Search was performed over a complete GSM frame.
- 10139 Valid GSM burst not found in specified timeslot (Burst Type)  
No active GSM bursts that match the selected burst type have been detected in the RF input signal. Search was performed over the specified timeslot.

- 10140 Valid GSM burst not found in frame (Ref Burst)  
No active GSM bursts that match the selected burst type have been detected in the RF input signal. Search was performed over the specified complete GSM frame using the Ref Burst type setting.
- 10141 Sync word not found in frame (Burst Type)  
One or more active GSM bursts that match the selected burst type have been detected in the RF input signal, but none contain the selected Training Sequence Code (TSC). The search was performed over the complete GSM frame.
- 10142 Sync word not found in specified timeslot (Burst Type)  
One or more active GSM bursts that match the selected burst type have been detected in the RF input signal, but none contain the selected Training Sequence Code (TSC). The search was only performed over the specified timeslot setting.
- 10143 Sync word not found in frame (Ref Burst)  
One or more active GSM bursts that match the selected burst type have been detected in the RF input signal, but none contain the selected Training Sequence Code (TSC). The search was only performed using the Reference Burst type and the Ref TSC settings over the complete GSM frame.
- 10144 Unknown demod status  
Demodulation is in an unknown state. Press **Preset**. If the error persists, get in touch with your service center.
- 10145 Opt AYX hardware required. Meas unavailable.  
Option AYX must be installed for this measurement to be enabled.
- 10146 Options B7D & B7E hardware required. Meas unavailable.  
The RF Communications Hardware (Option B7E) and Digital Signal Fast ADC (Option B7D) cards required to perform the demodulation are not present in the analyzer.
- 10147 Opt B7D bootrom requires upgrade.  
The (Option B7D) bootrom revision is not supported by the currently loaded personality version. Refer to the user's guide for the personality in use.
- 10148 Opt BAH DSP algorithm files not installed. Meas unavailable.  
Contact your Service Center.  
The Digital Signal Processor algorithm files required to perform the demodulation are not present in the analyzer.

Instrument Messages  
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- 10148 B7D DSP Code Fail. Reload Opt BAH. Contact your Service Center.  
The Digital Signal Processor algorithm files required to perform the demodulation are not present in the IDSP: drive.
- 10149 Opt BAH DSP algorithm code file requires upgrade.  
The Digital Signal Processing algorithm code file revision is not supported by the currently loaded personality version. Refer to the user guide for the personality in use for more information on installation/upgrade.
- 10150 Opt BAH DSP algorithm coef. file requires upgrade.  
The Digital Signal Processor algorithm coefficient file revision is not supported by the currently loaded personality version. Refer to the user guide for the personality in use.
- 10151 Opt BAH DSP algorithm files failed to load, aborting measure.  
The Digital Signal Processor algorithm files required to perform the demodulation are corrupt and cannot be loaded properly. Reinstall measurement personality.
- 10151 B7D DSP Code Fail. Reload Opt BAH. Contact your Service Center.  
The Digital Signal Processor algorithm files required to perform the demodulation are present in the IDSP: drive and cannot be loaded properly into DSP RAM. Reinstall measurement personality.
- 10152 Lost trigger, aborting measurement.  
The selected trigger source was present at the start of the measurement, but timed out before the measurement completed.
- 10153 DSP algorithm timeout, aborting measurement  
The Digital Signal Processor demodulation algorithm timed-out for an unknown reason. This message normally indicates a problem with the modulated signal.
- 10154 Measurement not defined for Out of Band.  
You have changed to an out-of-band frequency range. The band measurement only operates in the selected band.
- 10155 No Fast ADC hardware installed. Meas unavailable.  
The analyzer cannot use sweep times of less than 5 msec when Option B7D or Option AYX is not installed. Therefore, the measurement will not be executed.



- 10156 No Fast ADC hardware installed.  
The analyzer cannot use sweep times of less than 5 msec when Option B7D or Option AYX is not installed resulting in all the radio standards not being supported.
- 10156 The calibration data is invalid, and has been cleared.
- 10157 Tracking Generator hardware is not present. Meas unavailable.  
The measurement requires a built-in tracking generator.
- 10158 This operation requires a measurement to be active.
- 10159 Entire trace is below threshold level  
The measurement cannot operate properly because the trace has completely fallen below the threshold level. Change the threshold level to view trace.
- 10160 Valid burst not found  
Cannot find a valid burst, either because it is not fully on the display, or the level is too low to be detected properly.
- 10160 Upper Custom Mask is Invalid!  
The user-specified upper custom mask cannot be resolved into a limit line. The format may be bad.
- 10161 No Fast ADC hardware installed.  
Cannot use sweep times less than 5 ms, due to the lack of a fadc, therefore the meas will be severely restricted.
- 10161 Lower Custom Mask is Invalid!  
The user-specified lower custom mask cannot be resolved into a limit line. The format may be bad.
- 10162 Resolution BW <300 kHz.  
This error message is a warning that the resolution bandwidth has been set below 300 kHz. The test results will not meet GSM specifications.
- 10163 Cannot find the Power vs Time Limits File.  
The limit line definition file for the GSM standards has been deleted. This message is displayed while the **Measure** key is grayed out. Reinstall the GSM measurement personality.
- 10164 Band Measurement not defined for Out of Band.  
You are attempting to monitor the band but have set the frequency outside the band. Reset the band for the particular standard for which you are testing or use the channel setting which does not require a frequency to be set. (**Meas Setup, Method (Channel)**).

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- 10165 Carrier Not Present.
- 10166 Cannot update the list of cable types.  
The cable file may have been moved or deleted accidentally. Reinstall the measurement personality. This message is applicable to the GSM (Option BAH) and Distance to Fault (Option 225) measurement personality options.
- 10166 Cannot locate the file that contains the list of cable types.  
The cable file may have been moved or deleted accidentally. Reinstall the measurement personality. This message is applicable to the GSM (Option BAH) and Distance to Fault (Option 225) measurement personality options.
- 10167 The file containing the list of cable types has been updated.
- 10168 Cannot update the list of cable types on drive C:  
The file update failed.
- 10170 The Cable Fault Measurement is active. Mode Setup is disabled.  
Mode setup is not available in the cable fault utility.
- 10172 Sweep Time too fast (<2 sec)  
The sweep time must be set to 2 seconds or longer for the results to be valid.
- 10173 Carrier Not Present.
- 10177 There are no spurs to inspect.  
You have attempted to switch the **Inspect Spur** menu key to the **On** position after the measurement has finished, but found no spurs.
- 10178 Carrier Not Present.
- 10179 Carrier Present. Test Stopped!  
A carrier was found in the transmit band. Either disable the carrier or insert a bandpass filter for the receive bandwidth.
- 10180 Gate option not installed. Results may not be accurate.  
This measurement method requires the use of the time-gate (option 1D6) in order to gate the spectrum during the 50-90% part of the burst. If the gate option is not installed, the measurement will still run although this warning will be displayed.
- 10181 Upper Custom Mask is Invalid!  
The user-specified upper custom mask cannot be resolved into a limit line. The format may be bad.

- 10182 Lower Custom Mask is Invalid!  
The user-specified lower custom mask cannot be resolved into a limit line. The format may be bad.
- 10183 Resolution BW <300kHz.  
The test will not meet EDGE specifications because the resolution BW has fallen below 300 kHz.
- 10184 Cannot find the Power vs Time Limits File.  
Cannot find the limit line definition file for the EDGE standards. This message is displayed while the **Measure** key is grayed out.
- 10185 Gate option not installed. Results may not be accurate.
- 10186 Measurement does not support the current radio standard.  
The measurement you have chosen is currently greyed out. Select a radio standard which is supported or configure this measurement manually (**Mode Setup, Radio Std. None**).
- 10186 EDGE EVM only supports EDGE TCH burst type (Burst Type)
- 10187 Radio standard is not supported by the current measurement.  
The standard you have chosen is currently greyed out. Select a radio standard which is supported by the current measurement or configure this measurement manually (**Mode Setup, Radio Std. None**).
- 10187 EDGE ORFS only supports EDGE TCH burst type (Burst Type)
- 10188 EDGE PVT only supports EDGE TCH burst type (Burst Type)
- 10189 EDGE PVT only supports EDGE TCH burst type (Ref Burst)
- 10190 Select a valid Radio Standard/Measurement combination to enable.  
The Enable All Measurements menu key was pressed when it was disabled. To enable select a radio standard that is supported by the current measurement or a measurement that supports the current radio standard.
- 10190 EDGE ORFS only supports EDGE TCH burst type (Ref Burst)
- 10191 Mask unavailable for current Span - increase to display mask.  
The current span setting is either narrower than the mask width or so wide that there are too few display points to allow the mask to be drawn. Increase or decrease the span to display the mask.
- 10191 EDGE EVM only supports EDGE TCH burst type (Ref Burst)

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- 10192 Sweep Point/Span ratio below minimum - results may be inaccurate.  
The sweep point to span ratio is below the minimum required to ensure the bucket ratio is large enough to test DVB-T masks
- 10218 Hardkeys are disabled.  
Some of the forms (for example Receiver Spurious in GSM) do not allow you to close the form without either formally accepting or cancelling the form settings. For this reason, all of the hardkeys are disabled until you terminate the form.
- 10219 Awaiting trigger  
The measurement requires a trigger to be present. If the trigger does not occur or is delayed, this message will be displayed. Check your trigger settings.
- 10220 Preselector cannot be bypassed in this mode.  
The Option 123 allows the microwave preselector to be bypassed. This functionality is not available from within either the Phase Noise or Noise Figure application modes. If the preselector is set to off, it will immediately be forced back to On.
- 10227 Measurement suspended until carrier is turned off.  
The receive channel power and the receive spur measurements are specified with the attenuation set to 0 dB. To prevent overload, the frequency spectrum of interest is monitored for signal levels which exceed a specified threshold before setting the attenuator to 0 dB. If a carrier is found, this message is displayed and the completion of the measurement will not occur until the carrier is removed. The carrier check may be turned off using the properties form under the front-panel **Mode Setup** key. You may also change the signal threshold which determines a carrier on the properties form.
- 10228 Cannot correlate to input signal.  
This error is normally generated because of one of the following reasons:  
1. There is no carrier signal.  
2. Walsh channels other than the pilot are active.  
3. There is some other modulation problem that will prevent the measurement from being made.  
This problem must be corrected before the measurement can continue.
- 10229 The regression portion failed.  
This message occurs when (Option B7D) is not functioning properly. Demodulation measurements (modulation accuracy and code domain) might fail as a result of this error.

- 10230 DSP timed out, resetting DSP.  
Digital Signal Processor was unable to finish the selected measurement within the given period of time. Restart the measurement.
- 10231 Measurement failed for unknown reasons.  
Check instrument settings and restart measurement.
- 10232 RF Signal not found.  
This message is generated if there is no signal at the center frequency that is greater than 10 dB above the displayed average noise level.
- 10233 Level is low, results may degrade.  
The signal being measured is of low power. The results may not be as accurate as they would be if the signal level was higher.
- 10237 RF Board LO Unlocked. Contact service center.  
This message occurs if the local oscillator on the (Option B7E) is in an unlocked state. This indicates broken hardware.
- 10238 RF Board SR Osc Unlocked. Contact service center.  
This message occurs if the sample rate (SR) oscillator on Option B7E is in an unlocked state. This indicates broken hardware.
- 10239 Opt Freq Ref setting does not match external reference.  
This message is generated if Source is set to External on the properties form under the front-panel **Mode Setup** key and the frequency on the same form is set to a frequency that does not match the frequency of the signal being used as the external reference.
- 10240 RF Board RF Osc Unlocked. Contact service center.  
This message occurs if the reference oscillator on the (Option B7E) is in an unlocked state. This indicates broken hardware.
- 10241 RF Board could not detect any bursts in signal.  
This message is generated when the trigger is set to RF Burst and (Option B7E) cannot detect a burst.
- 10245 Error reading file: SPCLIMIT.CSV. Cannot use custom limits.  
The file could be missing or corrupt. Create a new limits file. Alternatively, the actual limits defined in the file might not allow the measurement to be executed. Redefine the limits or use the default limits. Restart the measurement.
- 10246 Error reading file: CDMASTUN.CSV. Please reinstall cdmaOne.  
The file is missing or corrupt. Please reinstall the cdmaOne personality.

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- 10247 Error reading file: CDPMDA. Please reinstall cdmaOne.  
The file is missing or corrupt. Please reinstall the cdmaOne personality.
- 10248 Error reading file: CDPPMCO. Please reinstall cdmaOne.  
The file is missing or corrupt. Please reinstall the cdmaOne personality.
- 10249 Error reading file: CDPPMDA. Please reinstall cdmaOne.  
The file is missing or corrupt. Please reinstall the cdmaOne personality.
- 10250 Error reading file: RHODMDA. Please reinstall cdmaOne.  
The file is missing or corrupt. Please reinstall the cdmaOne personality.
- 10251 Error reading file: RHOPMCO. Please reinstall cdmaOne.  
The file is missing or corrupt. Please reinstall the cdmaOne personality.
- 10256 Error reading file: OOBSTAB.CSV. Use Edit Table | Save Table.  
This error is generated when you try to load a table (using the **Load Table** key on page 2 of the edit table form menu) before a table has been saved. You must first save a table using the **Save Table** key before trying to load a table using the **Load Table** key.
- 10259 Table could not be saved.  
This message occurs if the C: drive is full or corrupt. Check the amount of space left on the drive.
- 10260 Table could not be loaded.  
When trying to load a table, the previous table has been somehow corrupted. Use the **Save Table** key to save a valid table. Then edit the valid table, save it, and try to load it again.
- 10264 Emission bandwidth not found. Consider increasing span.  
This error is normally generated when attempting occupied bandwidth measurements. The “X dB” value you entered (**Meas Setup, X dB**) to calculate the emission bandwidth is the difference between the highest point on the trace and the point “X dB” down on either side of the maximum. If the actual difference is less than the value entered, the emission bandwidth cannot be computed. Some responses to this situation are as follows:
1. Connect a signal to the input. (If there is no signal present, the difference between the trace minimum and maximum will generally be less than “X dB”.)
  2. Increase the span. (If the signal is wide, the shoulders of the signal might not be present on the screen, and again, the difference between the trace minimum and maximum will be less than “X dB”.)

3. Center the signal. (There must be a point on the trace that is “X dB” down from the maximum on both sides of that maximum.)

10286 Burst not found.

Either the signal being analyzed has insufficient power, the rising or falling edges cannot be detected, or the burst is less than 126 microseconds.

10287 Valid Bluetooth burst not found. (Check Packet Type)

The burst that has been found does not correspond to the currently selected Bluetooth packet type (the burst length may be too short).

10288 Option B7D or AYX FADC hardware required. Meas unavailable.

The measurement you are attempting requires either the DSP and Fast ADC (Option B7D) or the Fast ADC (Option AYX) card to perform the demodulation, but neither are present in the analyzer.

10289 Opt 106 demod hardware required. Meas unavailable.

A demod measurement was attempted with no Bluetooth FM demod card present (Option 106).

10290 Parameter unavailable in demod measurements.

You have selected (by remote SCPI command) either RF Amplitude sync or Video trigger while running one of the demod measurements.

10291 Opt B7E RF hardware required. RF Burst unavailable.

You have selected (by remote SCPI command) RF Burst Trigger with no digital demodulation RF card present (RF Communications Hardware (Option B7E)).

10320 Opt 106 hardware required. Preamble sync unavailable.

You have selected (by remote SCPI command) preamble sync with no Bluetooth FM demodulation card present (Option 106).

10321 Start Marker must be at least 1% < Stop Marker.

You have attempted to input a start marker value that will result in the difference between the start and stop markers being less than 1%.

10322 Stop Marker must be at least 1% > Start Marker.

You have attempted to input a stop marker value that will result in the difference between the start and stop markers being less than 1%.

10323 Unable to Calculate Result using Current Setup.

You have changed the setup parameters such that the marker lines used to measure the power cannot be displayed therefore accurate measurements cannot be made.

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- 10340 '10101010' pattern not detected - results may be inaccurate.  
This message is displayed if the measurement cannot detect the '10101010' pattern in the payload. The measurement will continue and carry out the calculations on the payload data supplied, but may not be correct.
- 10350 Payload data pattern '10101010' not present.  
This message is displayed when the "Payload Data" parameter is set to Auto and the measurement has not detected either of the required patterns in the payload.
- 10351 Required payload data pattern '10101010' not present.  
This message is displayed after successfully measuring and holding the '11110000' pattern if the measurement is restarted and the '10101010' data pattern is not detected.
- 10352 Required payload data pattern '11110000' not present.  
This message is displayed after successfully measuring and holding the '10101010' pattern if the measurement is restarted and the '11110000' data pattern is not detected.
- 10353 There is no valid result to hold.  
You have attempted to hold either  $\Delta f_1$  or  $\Delta f_2$  before it has been measured.
- 10360 Can't compute result - not enough transitions.  
This message is displayed when the measurement cannot find either a 111, 000, 101 or 010 pattern and is therefore unable to calculate the low or high frequency deviations.
- 10389 Valid EDGE burst not found in frame (Burst Type)  
No active EDGE bursts that match the selected burst type have been detected in the RF input signal. Search was performed over the complete EDGE frame.
- 10390 Valid EDGE burst not found in specified timeslot (Burst Type)  
No active EDGE bursts that match the selected burst type have been detected in the RF input signal. Search was performed over the specified timeslot.
- 10391 Valid EDGE burst not found in frame (Ref Burst)  
No active EDGE bursts that match the selected burst type have been detected in the RF input signal. Search was performed over the specified complete EDGE frame using the Ref Burst setting.



- 10392 B7D DSP Code Fail. Reload Opt. 202. Contact your Service Center  
The DSP algorithm files required to perform the demodulation are not present in the instrument ISDP: drive.
- 10393 Opt 252 DSP algorithm code file requires upgrade.
- 10394 Opt 252 DSP algorithm coef. file requires upgrade.
- 10395 B7D DSP Code Fail. Reload Opt. 202. Contact your Service Center.  
The DSP algorithm files required to perform the demodulation are present in the instrument ISDP: drive, but cannot be loaded properly into DSP RAM.
- 10396 EDGE Upgrade (252) unlicensed. Please contact your Agilent Sales Rep.
- 10400 Valid signal not found.  
This error is normally generated because of one of the following reasons:
1. There is no carrier signal.
  2. The carrier signal power has changed during the measurement, causing ADC to over/under range.
  3. There is some other modulation problem that will prevent the measurement from being made. This problem must be corrected before the measurement can continue.
- 10401 Valid burst not found in frame (Burst Type).  
No active bursts that match the Burst Type have been detected in the RF input signal. The search was performed over the complete frame.
- 10402 Valid burst not found in specified timeslot (Burst Type).  
No active bursts that match the Burst Type have been detected in the RF input signal. The search was only performed over the specified timeslot setting.
- 10403 Sync word not found in frame (TSC).  
One or more active EDGE bursts that match the Normal Burst Type have been detected in the RF Input signal, but none contain the selected Training Sequence Code (TSC). The search was performed over the complete EDGE frame.
- 10404 Sync word not found in specified timeslot (TSC).  
One or more active EDGE bursts that match the Normal Burst Type have been detected in the RF Input signal, but none contain the selected Training Sequence Code (TSC). The search was only performed over the specified timeslot setting.

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- 10409 Wideband calibration not valid until Align Now, All performed.  
Wideband calibration corrections cannot be applied to current demodulation results. Results will not meet specified demodulation performance levels until an Align Now, All has been performed.
- 10410 Measurement uncalibrated, wideband calibration required.  
Wideband calibration corrections cannot be applied to the current demodulation results. Results will not meet specified demodulation performance levels until **Wideband Cal** has been selected and successfully performed.
- 10411 Measurement uncalibrated, symbol rate exceeds +/-10% nominal.  
Wideband calibration corrections cannot be applied to current demodulation results, due to the **Symbol Rate** setting exceeding +/-10% of the nominal value. Results may not meet specified demodulation performance levels.
- 10412 Cal Data corrupt. Wideband cal failed. Using previous data.  
Wideband calibration procedure failed for an unknown reason. New calibration data was not saved. Previous wideband calibration data is being used, if available. However, it is not acceptable. Before re-attempting Wideband Cal, ensure connection between the **AMPTD REF OUT** and the **INPUT 50 Ω** is in place. If the error persists, get in touch with your service center.
- 10413 B7D DSP Code Install Fail Opt.229. Contact your Service Center.  
The Digital Signal Processor algorithm files required to perform the demodulation are not present in the analyzer. Reinstall the measurement personality and contact your service center.
- 10414 Opt 229 DSP algorithm code file requires upgrade.  
The Digital Signal Processing algorithm code file revision is not supported by the currently loaded personality version. Refer to the user guide for the personality in use for more information on installation/upgrade.
- 10415 Opt 229 DSP algorithm coef. file requires upgrade.  
The Digital Signal Processor algorithm coefficient file revision is not supported by the currently loaded personality version. Refer to the user guide for the personality in use for more information on installation/upgrade.
- 10416 B7D DSP Code Reload Fail Opt.229. Contact your Service Center.  
The Digital Signal Processor algorithm files required to perform the demodulation are corrupt and cannot be loaded properly. Reinstall the measurement personality and contact your service center.

- 10417 This operation requires a measurement to be active.  
The analyzer cannot perform this operation, because it requires a measurement to be running and no measurement is running.
- 10418 Demod Format setting does not allow this value for Points/Symbol.  
Invalid Points/Symbol selection attempted for the given Demod Format setting.
- 10419 Carrier Not Present.  
A carrier signal/burst is expected at the analyzer input. This signal cannot be found; however, the measurement will still run. Check input signal connection.
- 10420 Valid burst not found.  
This error only occurs when **RF Amptd** is selected for **Burst Sync**. It indicates that a valid burst envelope which meets the specified Burst Search Threshold was not found within the specified Burst Search Length. Note that the demodulation measurement will proceed by attempting to demodulate the signal without Burst Sync alignment. Possible causes may be:
1. Carrier signal is not actually bursted.
  2. Burst Search Threshold and/or Burst Search Length may need to be adjusted.
- 10421 Cannot lock to carrier.  
This error only occurs when attempting to demodulate OFFSET QPSK signals. It indicates that the demodulation algorithm is unable to lock to your signal. Possible causes may be:
1. There is no carrier signal.
  2. Carrier signal is present, but Demod settings do not match the modulation format of the OFFSET QPSK signal being measured.
  3. OFFSET QPSK signal is too noisy to achieve carrier lock.
- 10425 B7D DSP Code Install Fail Opt.231. Contact your Service Center.  
The Digital Signal Processor algorithm files required to for the 89600 VSA SW are not present in the analyzer. Reinstall the measurement personality and contact your service center.
- 10426 Opt 231 DSP algorithm code file requires upgrade.  
The Digital Signal Processing algorithm code file revision is not supported by the currently loaded personality version. Refer to the user guide for the personality in use for more information on installation/upgrade.

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- 10427 Opt 231 DSP algorithm coef. file requires upgrade.  
The Digital Signal Processor algorithm coefficient file revision is not supported by the currently loaded personality version. Refer to the user guide for the personality in use for more information on installation/upgrade.
- 10428 B7D DSP Code Reload Fail. Opt.231. Contact your Service Center.  
The Digital Signal Processor algorithm files required for the 89600 VSA SW are corrupt and cannot be loaded properly. Reinstall the measurement personality and contact your service center.
- 10450 Avg Mode changed to Repeat for Full Meas Type.  
Meas Type has been changed to Full. Exponential Average Mode is not available for Full Meas Type therefore Average Mode has been changed to Repeat.
- 10451 Avg Mode changed to Exp for Examine Meas Type.  
Meas Type has been changed to Examine. Repeat Average Mode is not available for Examine Meas Type therefore Average Mode has been changed to Exponential.
- 10452 Meas Type changed to Examine for Exp Avg Mode.  
Average Mode has been changed to Exponential. Full Meas Type is not available for Exponential Average Mode therefore Meas Type has been changed to Examine.
- 10453 Meas Type changed to Full for Repeat Avg Mode.  
Average Mode has been changed to Repeat. Examine Meas Type is not available for Repeat Average Mode therefore Meas Type has been changed to Full.
- 10454 Valid burst not found.  
Cannot find a valid burst, either because it is not fully on the display, or the level is too low to be detected properly.
- 10509 Did not find 4 signals > Peak Excursion.  
Require 4 Signals > PEAK EXCURSION above Threshold.  
Using the current instrument settings, the measurement cannot locate four signals with enough energy or resolution to perform an accurate measurement.

- 10510 Signals do not fit expected Intermod (TOI) pattern.  
Based on the current analyzer settings, the measurement cannot find two signals of high enough amplitude that can be resolved in such a manner that the third order products would lie within the measured span. You need to widen the span to include TOI products.
- 10511 100 spurs found. Additional spurs ignored.  
There are too many spurs for the table (the limit is 100), and any additional spurs that are found will be ignored
- 10512 No spurs have been found.  
You have started a measurement in examine meas type, in single or continual sweep mode, or full meas type in single sweep mode, but no spurs were found.
- 10513 No ranges are defined.  
There are no active ranges in the range table. You will need to activate at least one range.
- 10514 Avg Mode changed to Repeat for Full Meas Type  
Meas Type has been changed to Full. Exponential Average Mode is not available for Full Meas Type therefore Average Mode has been changed to Repeat.
- 10515 Avg Mode changed to Exp for Examine Meas Type  
Meas Type has been changed to Examine. Repeat Average Mode is not available for Examine Meas Type therefore Average Mode has been changed to Exponential.
- 10516 Meas Type changed to Examine for Exp Avg Mode  
Average Mode has been changed to Exponential. Full Meas Type is not available for Exponential Average Mode therefore Meas Type has been changed to Examine.
- 10517 Meas Type changed to Full for Repeat Avg Mode  
Average Mode has been changed to Repeat. Examine Meas Type is not available for Repeat Average Mode therefore Meas Type has been changed to Full.
- 10518 Invalid State Register  
There are only a limited number of instrument state registers/locations available.
- 10520 Command not supported  
Command may not be supported configuration or with the current settings of other related functions.

**10524 to 10561: Phase Noise Error Messages (Option 226)** An error number in this range indicates the instrument has detected an error relating to the Phase Noise personality.

- 10524 This measurement does not support the \*.CSV file format.  
You cannot load or save base instrument traces, as this is not supported by the Log

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Plot measurement.

- 10525 Invalid format: CSV files are not supported by this measurement.  
You cannot load or save base instrument traces, as this is not supported by the Log Plot measurement.
- 10525 Use View/Trace menu when loading or saving logarithmic traces.  
You cannot load CSV format trace files or save traces in the CSV format in the Log Plot measurement of the Phase Noise Measurement Personality.
- 10526 Cannot display Ref Trace because it has no data.  
Reference trace cannot be displayed, as there is currently no data assigned to it - use the functions under the Store Ref Trace menu, or load a trace to assign some data.
- 10527 Invalid Marker Trace. Marker moved to Raw Trace.  
Cannot place markers on the reference trace, because the reference trace is currently turned off or has no data.
- 10529 Failed to Load trace. Bad file format.  
The load trace operation could not be completed, as the input file was not in the expected format. You can only load traces that were previously saved using the 'Save Trace' feature.
- 10530 Trace file contains no compatible traces.  
The trace file may have been created by another version of the Phase Noise personality, which uses a different trace format that is incompatible with the version you are running. Please check you are running the most up to date version of the personality.
- 10531 Trace file was created by incompatible version of Opt. 226  
The trace file may have been created by another version of the Phase Noise personality, which uses a different trace format that is incompatible with the version you are running. Please check you are running the most up to date version of the personality.
- 10532 Cannot open trace file for writing. Save Failed.  
Cannot write the trace file to the destination filename. This could be because the disk is full, or possibly due to a filename error. If using a floppy disk, check there is a formatted disk in the drive.

- 10533            Cannot save Trace because it contains no data.  
                 Cannot save Ref Trace because it contains no data.  
                 Check the Ref Trace is turned on, and contains some valid trace data.
- 10534            Trace file saved successfully.  
                 The trace saving operation was successful.
- 10535            Carrier Not Present  
  
                 No Carrier > -50 dBm found at the analyzer input within the search span. Solution:  
                 Modify center frequency to be closer to actual carrier, or alternatively apply carrier of  
                 sufficient amplitude at the current center frequency.
- 10535            Cancellation trace is not set to Reference or has no data.  
  
                 When performing phase noise cancellation, you need to supply a reference trace that  
                 will be used to cancel out the background noise of the analyzer. The reference trace  
                 must be in Reference (View) mode, and selected by the Ref Trace parameter under the  
                 Cancellation menu.
- 10536            Cancellation disabled while measuring DANL Floor.  
  
                 Phase Noise cancellation does not make sense when measuring the DANL Floor, so  
                 for this reason it has been disabled.
- 10537            10537 Cancellation trace has different X-Scale to Smoothed  
                 trace.  
  
                 When performing phase noise cancellation, you need to supply a reference trace that  
                 will be used to cancel out the background noise of the analyzer. The reference trace  
                 must have been measured over the same range of offsets, and on the same instrument  
                 as the current measurement being performed.
- 10560            Carrier Not Present. Verify frequency and amplitude settings.  
  
                 No Carrier > -50 dBm found at the analyzer input within the search span. Solution:  
                 Modify center frequency to be closer to actual carrier, or alternatively apply carrier of  
                 sufficient amplitude at the current center frequency.
- 10561            Signal Tracking disabled when measuring DANL Floor (Removal).  
  
                 Measuring the DANL Floor with DANL Method set to Removal requires that you  
                 remove the signal and attach a load to the analyzer RF Input. Signal Tracking requires  
                 that the carrier be measured many times per measurement, so the two are inherently  
                 incompatible.

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**10601 to 10700: GSM and EDGE Error Messages (Options BAH and 202)** An error number in this range indicates the instrument has detected an error relating to the GSM or EDGE personality.

- 10602 Sync word not found  
An attempt to position a GSM trace into the mask, when not enough data was present. Try using the **Restart** key to clear the problem. This can be caused by a bad GSM burst, or the RF Sync Delay set too far.
- 10604 GSM burst out of limits  
The GSM signal did not fit into the mask in the Power vs. Time measurement.
- 10606 Insufficient pre-Trig for demod - decrease Trig Delay
- 10608 Incorrect RBW for demod - change RBW
- 10610 GSM Hopping enabled, waiting for valid burst
- 10612 Invalid GSM burst timing  
A GSM-like burst was acquired, but its timing is not valid. Ensure the correct **Burst Type** has been selected.
- 10614 Valid GSM burst not found  
In a GSM measurement, data was acquired but a GSM burst was not found, with the timeslot mode disabled.
- 10138 Valid GSM burst not found in frame (Burst Type).  
No active GSM bursts that match the selected Burst Type have been detected in the RF input signal. The search was performed over the complete GSM frame.
- 10139 Valid GSM burst not found in specified timeslot (Burst Type).  
No active GSM bursts that match the selected Burst Type have been detected in the RF input signal. The search was only performed over the specified timeslot setting.
- 10140 Valid GSM burst not found in frame (Ref Burst).  
No active GSM bursts that match the selected Burst Type have been detected in the RF input signal. The search was performed using the Ref Burst type setting over the complete GSM frame.
- 10616 Cannot synchronize frame trigger  
Cannot synchronize the frame trigger to the even second clock.
- 10618 Dynamic range not optimum
- 10620 Cannot synchronize to RF amplitude (burst error)



- 10622 GSM RF sync delay is out of range  
Change RF Sync Delay.
- 10624 Sync word not found  
In a GSM measurement using demodulation, the training sequence code (sync word) could not be found.
- 10141 Sync word not found in frame (Burst Type)  
One or more active GSM bursts that match the selected Burst Type have been detected in the RF Input signal, but none contain the selected Training Sequence Code (TSC). The search was performed over the complete GSM frame.
- 10142 Sync word not found in specified timeslot (Burst Type)  
One or more active GSM bursts that match the selected Burst Type have been detected in the RF Input signal, but none contain the selected Training Sequence Code (TSC). The search was only performed over the specified timeslot setting.
- 10143 Sync word not found in frame (Ref Burst)  
One or more active GSM bursts that match the selected Burst Type have been detected in the RF Input signal, but none contain the selected Training Sequence Code (TSC). The search was only performed using the Reference Burst type and Reference TSC settings over the complete GSM frame.
- 10626 Signal too noisy  
In a GSM measurement, indicates that a burst could not be found in a signal that appears noisy.
- 10628 Sync is RF Ampl (not Training Seq). Bits not accurate
- 10630 Marker X value not adjusted when right of Rise&Fall mark
- 10632 Incorrect trigger holdoff
- 10634 Break freq > FFT filter edge
- 10636 SCPI marker query not available in GSM Rise&Fall
- 10638 GSM Pwr Meas requires trig delay < -50  $\mu$ s. Delay set to -50  $\mu$ s
- 10640 Carrier frequency outside device's transmit band  
The entered channel/carrier frequency is not within the range of your current mode setup selection of standard and device.
- 10642 ADC overload -- Carrier not at expected frequency  
The carrier frequency of the signal may not match the instruments channel frequency setting.

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- 10644 Requested timeslot number not present  
The selected timeslot is not on. (Timeslot is referenced to the trigger point.)
- 10646 Tx Band Spur measurement not defined for mobiles  
Only base station testing is available.
- 10648 Carrier power too low for optimum dynamic range  
For better dynamic range, transmit band spur measurements require >10 dBm signal power at the RF input port.
- 10650 Unexpected carrier frequency (BMT only)  
The transmit band spur measurement only allows bottom (B), middle (M), and top (T) channel frequencies for each supported frequency band. The carrier frequency must be set to the bottom, middle or top frequency of the current frequency band.
- 10652 EVM Measurement only supports EDGE TCH burst type
- 10654 Unable to demodulate signal
- 10655 Input overload  
Excessive input power has been detected which will cause the ADC to clip the signal. Reduce the signal level, change the attenuator setting (under **Input** menu), or press **Restart** if the **RF Input Range** is **Auto**.
- 10656 Tx Band Spur measurement does not support this frequency band  
The transmit band spur measurement does not support all of the commercially available frequency bands. You need to change your selection under **Mode Setup, Radio, Band** to one of the supported bands.
- 10657 Pretrigger too long
- 10658 Valid GSM burst not found for selected timeslot  
In a GSM measurement, data was acquired but a GSM burst was not found, with the timeslot mode enabled.
- 10659 Sync not found on AM path  
The instrument failed to find the training sequence on the AM path.
- 10660 Sync not found on PM path  
The instrument failed to find the training sequence on the PM path.
- 10661 Sync not found on AM and PM path  
The instrument failed to find the training sequence on both the AM and the PM paths.

10662 Inconsistent sync word  
The instrument detected the training sequence, but the training sequence number is inconsistent between the AM path and the PM path.

**10701 to 10800: W-CDMA Error Messages (Option BAF)** An error number in this range indicates the instrument has detected an error relating to the W-CDMA personality.

10702 Signal too noisy

10704 Input power too low

The instrument only identifies a channel as active if it meets the default threshold criteria that it is within 20 dB of the highest power code channel. The threshold can be changed using the Active Set Threshold function in the Meas Setup menu.

10768 Cannot correlate to input signal

Cannot correlate to the input signal and no active channel is found. (from the composite EVM measurement) An active channel must meet the default threshold criteria that it is within 20 dB of the highest power code channel. The threshold can be changed using the active set threshold function in the Meas Setup menu.

10772 Burst not found.

Either the signal being analyzed has insufficient power, the rising or falling edges cannot be detected, or the burst is less than 126 microseconds.

10776 PSA Cannot sync DPCCH pilot.

Cannot synchronize measurement with DPCCH pilot for Power Control measurement, because the pilot signal cannot be found. Make sure DPCCH is present in the W-CDMA uplink signal, and that the slot format and scramble code are set correctly.

10778 PSA Valid PRACH burst not found.

Cannot synchronize measurement with PRACH channel for Power Control measurement, because the signal cannot be found. Make sure PRACH is present in the W-CDMA uplink signal, and that the preamble signature and scramble code are set correctly.

10780 Critical memory shortage occurred.

This error message appears when a critical memory shortage occurs, and the current measurement is aborted. To continue, restart the measurement by pressing the **Preset** key, or by exiting and then re-entering the current mode or the current measurement, or cycle the power.

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10788            Stored data length too short

Stored acquisition data length is too short. You need to perform one or more of the following actions:

- Use the same **Sync Type** setting that was used when the data was acquired.
- Use the same **Start Sync Slot** setting that was used when the data was acquired.
- Reduce the **Capture Interval** setting.

10790            Slot format auto-detection not supported by slot power meas

The slot format auto-detection (AUTO selected) is not supported by **Slot Power** measurement type. It is supported only by **Slot Phase** measurement type.

10792            Not enough memory. Decrease Capture Interval.

Not enough memory left and the measurement cannot continue. You need to reduce the **Capture Interval** setting and then restart the measurement to recover from this situation.

**10801 to 10900: cdma2000 Error Messages (Option B78)** An error number in this range indicates the instrument has detected an error relating to the cdma2000 personality.

10824            Signal too noisy

10826            Input power too low

The instrument only identifies a channel as active if it meets the default threshold criteria that it is within 20 dB of the highest power code channel. The threshold can be changed using the Active Set Threshold function in the Meas Setup menu.

10868            Can not get long code phase (RS-232)

For MS (mobile station) measurements, the long code phase information could not be obtained from the signal at the RS-232 port (from code domain power measurement or composite EVM measurement).

10872            Cannot correlate to input signal

Cannot correlate to the input signal and no active channel is found. (from composite EVM measurement) An active channel must meet the default threshold criteria that it is within 20 dB of the highest power code channel. The threshold can be changed using the active set threshold function in the Meas Setup menu.

**10901 to 10925: NADC Error Messages (Option BAE)** An error number in this range indicates the instrument has detected an error relating to the NADC personality.

- 10902            Sync word not found
- In an EVM measurement, the sync word is not found and the synchronization cannot be established when **Sync Word** is selected in the **Burst Sync** menu.
- 10904            Valid NADC burst not found
- A valid NADC burst is not found when the **Device** is MS.
- 10906            Signal too noisy
- The valid EVM measurement cannot be performed, because the input signal is too noisy.
- 10908            Burst Delay out of limit for EVM (2 ms)
- In an EVM measurement, the **Burst Delay** value must be less than 2 ms.

**10926 to 10950: PDC Error Messages (Option BAE)** An error number in this range indicates the instrument has detected an error relating to the PDC personality.

- 10926            Sync word not found
- In an EVM measurement, the sync word is not found and the synchronization cannot be established when **Sync Word** is selected in the **Burst Sync** menu.
- 10928            Valid PDC burst not found
- A valid PDC burst is not found when the **Device** is MS.
- 10930            Signal too noisy
- The valid EVM measurement cannot be performed, because the input signal is too noisy.
- 10932            Burst Delay out of limit for EVM (2 ms)
- In an EVM measurement, the **Burst Delay** value must be less than 2 ms.

**10951 to 10975: cdmaOne Error Messages (Option BAC)** An error number in this range indicates the instrument has detected an error relating to the cdmaOne personality.

- 10952            Signal exceeds maximum allowable power
- 10954            Input overload
- Excessive input power has been detected which will cause the ADC to clip the signal. Reduce the signal level, change the attenuator/max total power setting (under **Input** menu), or press **Restart** if the **RF Input Range** is **Auto**.

Instrument Messages  
Instrument Messages

- 10956 Channel center frequency outside device's transmit band.
- 10960 No power at carrier frequency  
No power was detected as a CW or a modulated signal.
- 10962 Cannot correlate to input signal  
A correlation failure with the pilot CDMA channel occurred during synchronous demodulation.

**10976 to 11000: Programming Code Compatibility Messages (Option 266)** An error number in this range indicates the instrument has detected an error relating to the Programming Code Compatibility Suite.

- 10976 CMD ERR, <name of offending command>  
When a command or command argument is not recognized by the parser a command error is generated.
- 10977 PARAMETER ERROR, <name of offending parameter>  
When an illegal parameter is sent following a command. For example, when the "GRAT" or "ANNOT" 8566 series commands are used with arguments other than ON, OFF, 1 or 0.
- 10978 INVALID ITEM, <offending item>  
The invalid item message appears when a value that is not part of the commands list of enumerated arguments is entered.
- 10979 INVALID SAVE REG, <invalid register>  
When the RCLS or RC commands are used to recall a state register that wasn't previously saved with the SAVES or SV commands.
- 10980 INVALID TRACE, <trace>  
When the argument to a trace command is not part of the predefined trace enumeration (TRA, TRB or TRC).
- 10981 CMD NOT SUPPORTED, <command>  
Command not supported errors are generated when a valid 8566 command that is not supported by Chameleon is executed.
- 10982 LOG FILE FULL, CLEAR FOR FURTHER ERROR LOGGING
- 10983 LOG FILE CLEARED

**12000 to 12999: Noise Figure Error Messages (Option 219)** An error number in this range indicates the instrument has detected an error relating to the Noise Figure personality.

- 12116            Two entries already exist at frequency.  
  
                  When specifying limit line point, if there are more than two points at the same frequency, the new limit point is discarded and the existing limit is used.
- 12219            Command not valid in this mode.  
  
                  Indicates that the command sent from the Remote interface does not apply for this DLP.
- 12303            User cal invalidated  
  
                  The existing user cal has been invalidated because of one of the following reasons:
- Meas mode changed
  - Freq outside cal range
  - Fixed LO changed
  - Sideband changed
- 12304            Alignment Failed  
  
                  Calibration failed because an error was encountered at some point during the calibration (for example gain < 0)
- 12305            Mode Setup Error  
  
                  A mode setup error occurred because of one of the following:
- System input frequency out of range
  - External LO frequency out of range
  - Stop freq must be less than fixed LO freq
  - Start freq must be greater than start IF freq
  - LO – Stop freq must be  $\geq$  min system input freq
  - Start freq must be greater than fixed LO freq
  - Stop IF freq must be less than fixed LO freq
  - Start – LO freq must be  $\geq$  min system input freq
  - Stop freq must be less than stop RF freq
  - Start freq must be greater than start RF freq
- 12307            Required Input attenuation not calibrated  
  
                  Corrected measurements have been requested and the required RF front-end setting of x dB has not been calibrated.
- 12308            Invalid frequency list for measurement mode  
  
                  A frequency within the frequency list cannot be used to make a measurement in the current mode.

Instrument Messages  
Instrument Messages

- 12309 No entries in frequency list  
A measurement was attempted with List frequency mode or a SCPI query of the frequency list table was made and the frequency list table is empty.
- 12310 No entries in ENR table  
A measurement was attempted or a SCPI query of an ENR table was made and there were no entries in the relevant ENR table (Common, Meas or Cal).
- 12311 No entries in Limit Line table  
An attempt is made to either display or test against a limit line table which has no entries.
- 12312 RF re-range required: Meas Restarted.  
During a continuous measurement, a change of RF front-end attenuation was required. To do this the measurement needs to be restarted.
- 12313 IF over range req. RF re-range: Meas Restarted.  
During a continuous measurement, an IF section over range condition occurred, requiring a change of RF front-end attenuation. To do this, the measurement needs to be restarted.
- 12314 No entries in loss table  
A measurement is attempted or a SCPI query of a before or after loss table is made and there are no entries in the relevant loss table
- 12316 T hot must be greater than T cold  
A spot T hot has been specified which is not greater than T cold.
- 12603 Illegal MSDOS name given  
An invalid filename has been specified. Use filenames with a maximum of 8 characters (letters and digits only) and use a 3 character extension. Note that lowercase and uppercase are perceived as the same.
- 12604 File already exists  
Attempt to store a file that already exists. Delete or rename the old file and try again
- 12605 Media is protected  
A store was attempted to a write-protected device.
- 12606 Media is not writable  
A store was attempted to a read-only device.
- 12612 File does not exist  
The file you were trying to recall could not be found.



- 12762 Incorrect filename, allowable extension CSV  
Attempt to load/store table data with an incorrect extension.
- 12768 Failed to load ENR data  
A problem occurred when trying to load or store table data.
- 12769 Failed to store ENR data  
A problem occurred when trying to load or store table data.
- 12770 Incorrect filename, allowable extension ENR  
Attempted to load/store table data with an incorrect extension.
- 12771 Failed to load Frequency List  
A problem occurred when trying to load or store table data.
- 12772 Failed to store Frequency List  
Attempt to load/store table data with an incorrect extension.
- 12773 Incorrect filename, allowable extension LST  
Attempt to load/store table data with an incorrect extension.
- 12774 Failed to load Limit line  
Attempt to load/store table data with an incorrect extension.
- 12775 Failed to store Limit line  
Attempt to load/store table data with an incorrect extension.
- 12776 Incorrect filename, allowable extensions LIM  
Attempt to load/store table data with an incorrect extension.
- 12778 Failed to store Trace  
A problem occurred when trying to load or store table data.
- 12779 Failed to load Loss data  
A problem occurred when trying to load or store table data.
- 12780 Failed to store Loss data  
A problem occurred when trying to load or store table data.
- 12781 Incorrect filename, allowable extension LOS  
Attempt to load/store table data with an incorrect extension.
- 12995 Noise Figure DLP requires Noise Source Control Hardware  
You have attempted to initiate the Noise Figure mode with the Noise Source Control hardware installed in your instrument. You must install the Noise Source Control hardware before running the Noise Figure mode.

Instrument Messages  
Instrument Messages

13214 Frequency Hopping enabled, waiting for valid burst  
The demodulated burst type has not been found in the originally demodulated slot location within the frame.

**13001 to 13100: 1xEV-DO Error Messages (Option 204)** An error number in this range indicates the instrument has detected an error relating to the 1xEV personality.

13024 Signal too noisy

13026 Input power too low

The instrument only identifies a channel as active if it meets the default threshold criteria that it is within 20 dB of the highest power code channel. The threshold can be changed using the Active Set Threshold function in the **Meas Setup** menu.

13070 Cannot correlate to input signal

Cannot correlate to the input signal and no active channel is found. (from composite EVM measurement) An active channel must meet the default threshold criteria that it is within 20 dB of the highest power code channel. The threshold can be changed using the active set threshold function in the **Meas Setup** menu.

13074 Valid 1xEV burst not found

In a 1xEV measurement, data was acquired but a 1xEV burst was not found, with the timeslot mode disabled.

13076 Critical memory shortage occurred

This error message appears when a critical memory shortage occurs, and the current measurement is aborted. To continue, restart the measurement by pressing the **Preset** key, or by exiting and then re-entering the current mode or current measurement, or cycle the power.

13080 PSA No Active slot is found

Occurs when **Meas Slot Type** is **Active** and the Active slot is not found during the capture interval. Synchronization occurs and the pilot is found but no results are included in peak/average calculation.

13082 PSA No Idle slot is found

Occurs when **Meas Slot Type** is **Idle** and the Idle slot is not found during the capture interval. Synchronization occurs and the pilot is found but no results are included in peak/average calculation.

13086 PSA      Memory shortage occurred; consider decreasing Capture Intvl  
  
This error message appears when memory shortage, related to long capture interval, occurs. The current measurement is aborted and all the results returned are invalid values. Decrease **Capture Intvl** and restart the measurement.

**13101 to 13200: Flexible Digital Modulation Analysis Error Messages (Option 241)** An error number in this range indicates the instrument has detected an error relating to the Flexible Digital Modulation Analysis personality.

13102          Valid signal not found  
  
The input signal cannot be demodulated because of inappropriate parameter settings or incorrect signal

13104          Valid burst not found  
  
The burst signal cannot be detected because of inappropriate parameter settings or incorrect signal.

13106          Sync word not found  
  
The sync word cannot be detected because of inappropriate parameter settings or incorrect signal.

13108          Points/Symbol changed to an even number because of demod format  
  
Offset QPSK allows only even values for points/symbol. The demod format was changed to OQPSK while the points/symbol was set to an odd value. Therefore, the points/symbol was re-set to an even number.

13110          Sync Pattern includes non-hex characters  
  
The sync pattern should only consist of hex characters. Invalid characters are converted to 0.

13112          Sync Word Length changed to new upper limit  
  
The upper limit of Sync word bits is 128. If the code word length (sync word length) exceeds this value, then the sync word length is cut off. This warning may happen only when the demod format is changed.

13114          Sync offset value not valid  
  
The sync offset value is too far off from a value that would be reasonable to measure valid portion of data. So the measurement gives up trying to apply the offset value.

Instrument Messages  
Instrument Messages

- 13116 Search Length is clipped to the upper value according to the dependency of IF Band Width
- Search length upper limits:  
IF Band Width  $\leq$  1 MHz, Limit = 0.1 sec  
1MHz  $<$  IF Band Width  $\leq$  10MHz, Limit = 0.05 sec  
10MHz  $<$  IF Band Width  $\leq$  20MHz, Limit = 0.025 sec  
20MHz  $<$  IF Band Width  $\leq$  40MHz, Limit = 0.013 sec  
40MHz  $<$  IF Band Width, Limit = 0.007sec
- 13118 Search Length is clipped to the lower value as allowed by current IF Band Width.
- Search length lower limits:  
IF Band Width  $\leq$  10MHz, Limit = 0.001 sec;  
10MHz  $<$  IF Band Width Limit = 0.1  $\mu$ sec
- 13120 Symbol Rate is clipped to its limit because of IF Path change.  
Upper limit of Symbol Rate is 10 MHz when IF Path is Narrow.
- 13122 IF BW is clipped to its limit because of IF Path change.  
Limit of IF BW depends on IF Path selection. If the value exceeds the limit, it is clipped to the limit. This message will not appear when IF BW is set to AUTO.
- 13124 Meas Interval is clipped to its upper limit because of points/symbol change.  
Upper limit of Meas Interval depends on points/symbol setting.
- 13126 Only one marker is available on Demod Bits trace.  
Only one marker is available on Demod Bits trace.

**13201 to 13300: Stimulus-Response Measurements Error Messages (Option 215)** An error number in this range indicates the instrument has detected an error relating to the Stimulus Response measurement personality.

- 13226 Connection could not be established with specified IP Address.  
A communication connection could not be established at the specified IP Address. Check that the IP address entered is correct and that the signal generator and PSA are both connected to the LAN or are connected to one another using a LAN cross-over cable. If you are using a LAN cross-over cable the IP address of both instruments must start with the same first two integers. For example, if the analyzer IP address is 156.121.102.33 then the source IP address must be 156.121.xxx.xxx.

- 13227            Freq range of ext src exceeded, PSA setting adjustments required.
- The calculated external source start or stop frequency exceeds the frequency range of the external source. You need to adjust the PSA settings so that the required source frequency is within its available range. You may need to adjust the PSA start frequency, the PSA stop frequency, the harmonic number (if on) and/or the frequency offset (if on). The sweep will start again once the required frequency range is in the range available to the source. See the Option 215 documentation for more information about making these settings adjustments.
- 13228            Unable to store reference trace.
- Unable to copy the data from trace 1 to trace 3. There is no data in trace 1.
- 13230            Hardware upgrade required. Option 215 disabled.
- Option 215 requires the gated sweep hardware. It has not been detected, so an update is required. You should contact the local sales engineer and order E444xAU Option 426.
- 13231            Freq band crossing not supported by Option 215
- Option 215 does not support sweeping across a spectrum analyzer hardware frequency band edge. For detailed frequency band information, refer to the “Getting Started” information in the Option 215 guide.
- 13232            Video bandwidth fixed at 50MHz by Option 215
- Option 215 forces the video bandwidth to be set to 50MHz when the external source control state is set to ON
- 13233            Agilent PSG-A Series Signal Generators not supported.
- Option 215 does not support the PSG-A signal generators. This includes model number E8241A, E8242A, E8251A and E8254A.
- 13234            Open/Short CAL not possible, freq band crossing detected
- You cannot perform a calibration if your PSA span includes frequencies in more than one frequency band. Please adjust either the PSA start frequency or its stop frequency to stay within a single frequency band. The frequency band ranges are listed in the external source control guide “Getting Started” chapter.

**13301 to 13400: WLAN Error Messages (Option 217)** An error number in this range indicates the instrument has detected an error relating to the WLAN measurement personality.

- 13338           Valid burst not found, extend search length  
The instrument cannot find a valid WLAN burst. You may need to extend the search length.
- 13340           Synchronization failed, check signal format  
The instrument cannot synchronize the signal. Make sure the signal format is correct
- 13342           Data is too short to measure  
There is not enough data for proper analysis.
- 13382           Measurement Input Overload  
The analyzer's ADC input is overdriven. You need to reduce the signal power at the input by using an external attenuator, or by increasing the internal input attenuation of the analyzer.
- 13384           Point Quantities Limited  
The capture point size exceeds the limit.
- 13386           Span Limited  
The span exceeds the limit.
- 13388           Meas Offset exceeds valid burst length  
The measurement offset exceeds the burst length detected. Default values are returned.

**13401 to 13500: Measuring Receiver Error Messages (Option 233)** An error number in this range indicates the instrument has detected an error relating to the Measuring Receiver measurement personality.

- 13436 PSA       Power meter connection failure  
Attempt to connect to the power meter has failed. Please make sure that the power meter is connected to the PSA and the connection settings are correct.
- 13438 PSA       Power meter connection time-out  
A time-out occurred while the instrument was attempting to establish a connection with the power meter.
- 13440 PSA       No cal factor for power sensor  
This message occurs when the power sensor model name is "NONE" or the calibration factor table is empty.
- 13442 PSA       Power meter zero and calibration required  
The power meter requires zeroing and calibration.

|           |  |
|-----------|--|
| 13444 PSA | Power meter zero required<br>The power meter requires zeroing.   |
| 13446 PSA | Power meter calibration required<br>The power meter requires calibration.  |
| 13448 PSA | Power meter zero failure<br>The power meter zero function has failed.  |
| 13450 PSA | Power meter calibration failure<br>The power meter calibration has failed.   |
| 13456 PSA | Power meter reading not available. Retrying to connect.<br>The Tuned RF Level measurement cannot read the power meter. The instrument is attempting to establish a connection.                                     |
| 13458 PSA | Power meter model is not supported<br>The power meter model used is not supported by this version of the firmware.   |
| 13460 PSA | Power sensor hardware is missing<br>There is no power sensor connected to the input of the power meter.  |
| 13462 PSA | RF frequency is beyond frequency range of cal factor table<br>The frequency of the input signal is either higher than the highest, or lower than the lowest frequency in the cal factor table of the power sensor. |
| 13464 PSA | Audio level is out of range<br>The <b>Audio Range</b> is not properly set. The input level is beyond the range.  |
| 13466 PSA | Audio data acquisition failure<br>Audio measurement failed to acquire data due to I/O error. Data was lost or DMA (direct memory access) aborted.  |

**13727 to 13753: EMC Analyzer Error Messages (Option 239)** An error number in this range indicates the instrument has detected an error relating to the EMC Analyzer personality.

|           |  |
|-----------|--|
| 13727 PSA | EMC Analyzer<br>This message occurs when the PSA spectrum analyzer is placed in the EMC Analyzer mode. |
|-----------|--|

Instrument Messages  
Instrument Messages

- 13729 PSA Connection with the Presel could not be established at the IP  
A communication connection could not be established at the RF preselector IP Address. Check to make sure that the IP Address that was entered is correct. Also make sure that the RF preselector and PSA are both connected to the LAN.
- 13731 PSA RF Presel model is not supported  
The connected RF preselector model is not supported.
- 13733 PSA Connection with Source could not be established at the IP  
A communication connection could not be established at the source IP Address. Check to make sure that the IP Address that was entered is correct. Also make sure that the source and PSA are both connected to the LAN.
- 13735 PSA Connection with Source could not be established at the IP/GPIB  
A communication connection could not be established at the source IP Address. Check to make sure that the IP Address that was entered is correct. Also make sure that the source and PSA are both connected to the LAN.
- 13737 PSA Source model is not supported  
The connected source model is not supported.
- 13739 PSA RF Presel conducted and radiated paths need to be aligned  
The RF preselector conducted and radiated paths need to be aligned.
- 13741 PSA RF Presel conducted paths needs to be aligned  
The RF preselector conducted paths need to be aligned.
- 13743 PSA RF Presel radiated paths need to be aligned  
The RF preselector radiated paths need to be aligned.
- 13745 PSA RF Presel input is overloaded  
The RF preselector input is overloaded.
- 13747 PSA RF Preselector alignment terminated by user  
You have terminated the RF preselector alignment
- 13749 PSA RF Preselector conducted band alignment fails  
The RF preselector conducted band is failing.
- 13751 PSA RF Preselector radiated band alignment fails  
The RF preselector radiated band is failing.



13753 PSA      Frequency crossing Conducted and Radiated Band is not supported

Option 239 does not support sweeping across Conducted and Radiated Bands. Refer to the “EMC Analyzer Guide” for further details.

## Instrument Messages Without Numbers

### Error Messages Without Numbers

Error            Attempt to change signal data failed.  
                  EMC message, NOT USED

Error            Awaiting valid signal.  
                  This indicates that software enhanced triggering is ON and 5 successive failures have been detected within a demod measurement

Error            Unable to retrieve signal (remote).  
                  EMC message NOT USED

Error            Unable to uninstall personality, file not deletable.  
                  This message occurs when you try to delete a personality which has been marked as non-deletable. The personality is marked non-deletable at the factory. Get in touch with your nearest service center for further assistance.

### Informational Messages

These messages simply provide information; you are not required to do anything. Information in brackets (such as <directoryname>), is a previously-provided input.

Informational messages appear at the bottom of the screen in the status line.

Informational    <directoryname> directory deleted  
                  The directory indicated has been successfully deleted.

Informational    <name1> directory renamed to <name2>  
                  <directoryname1> directory renamed to <directoryname2>  
                  Directory name1 has been successfully renamed to directory name2.

Informational    <filename> file copied  
                  The filename indicated has been successfully copied.

Informational    <filename> file deleted  
                  The filename indicated has been successfully deleted.

Informational    <filename> file loaded

## Instrument Messages

### Instrument Messages

|               |   |
|---------------|---|
|               | The filename indicated has been successfully loaded.  |
| Informational | <filename> file saved   |
|               | The filename indicated has been successfully saved.   |
| Informational | <filename> too many data entries  |
|               | This message may appear when loading data from a limit line or amplitude correction file. The [DATA] section of such a file can contain at most 200 lines of data. This message is displayed if that limit is exceeded.   |
| Informational | <filename1> file renamed to <filename2>   |
|               | <name1> file renamed to <name2>   |
|               | File name1 has been successfully renamed to file name2.   |
| Informational | Atten auto set to 15 dB   |
|               | Indicates that an input signal has been detected which is of sufficient level to damage the input circuitry and the input attenuator has been automatically set to 15 dB. If the signal level is reduced, the attenuator will stay at 15 dB. This overload protection occurs at an input power level of 13 dBm (68 dBmV for Option 1DP) $\pm$ 7 dB when the input attenuation is auto coupled and set to <15 dB. To return to the original measurement setup, reduce the input signal level and press <b>Amplitude</b> . Then press <b>Attenuation (Auto)</b> . |
|               | Overload protection is only available in the Agilent Technologies E4401B and E4411B.  |
| Informational | Auto ranging...   |
|               | Displayed during autoranging.   |
| Informational | B7D and/or B7E not found. Code Domain not available.  |
|               | Digital Signal Processing and Fast Analog to Digital Converter (Option B7D) and/or RF Communications Hardware (Option B7E) are not installed options on your analyzer. Code domain is therefore not available.  |
| Informational | B7D and/or B7E not found. Mod Acc not available.  |
|               | Digital Signal Processing and Fast Analog to Digital Converter (B7D) and/or RF Communications Hardware (B7E) are not installed options on your analyzer. Modulation accuracy is therefore not available.  |
| Informational | Carrier Not Present.  |
|               | A carrier signal/burst is expected at the analyzer input. This signal cannot be found; however, the measurement will still run. Check input signal connection.  |

- Informational Channel frequency outside device's transmit band.  
Reset channel number or frequency.
- Informational Default spur table values loaded.  
No spur table has been previously saved when the Out-of-Band Spurious measurement begins. Press **Meas Setup, Edit Table** to enter the frequency ranges of interest and press **Save Table** to save that information. This saved table will be loaded the next time the measurement is run.
- Informational Device = Mobile. Code Domain not available.  
Code Domain measurement is grayed out when the device is set to mobile under the **Mode Setup** front-panel key. Code Domain measurement is only accessible when the device is set to base and RF Communications Hardware (Option B7E) or Enhanced Memory Upgrade (Option B72) are installed.
- Informational Directory already exists  
Each directory and file must have a unique name. The directory name you have entered is currently being used on the selected drive. You may either enter a new name or rename the directory currently existent.
- Informational Device = Mobile. Mod Acc not available.  
Modulation accuracy measurement is grayed out when the device is set to mobile under **Mode Setup**, front-panel key. Modulation accuracy is only accessible when the device is set to base and RF Communications Hardware (Option B7E) or Enhanced Memory Upgrade (Option B72) are installed.
- Informational Directory already exists  
Each directory and file must have a unique name. The directory name you have entered is currently being used on the selected drive. You may either enter a new name or rename the directory currently existent. Refer to "File Menu Functions" in the *Agilent ESA Spectrum Analyzer User's Guide*.
- Informational ENR table will be extrapolated  
One or more calibration or measurement frequency points exceeds the currently loaded Cal or Meas ENR Table frequency ranges. The corresponding ENR tables lowest frequency ENR value will be re-used for frequencies less than the table range, and the highest frequency ENR value will be re-used for frequencies greater than the table range.
- Informational HW Average  
For Option 122 or 140 only. If frame triggering is on, this message shows if you turn on the hardware time averaging.

## Instrument Messages

### Instrument Messages

- Informational** Entire trace is below the threshold level.  
The measurement cannot operate properly because the trace has fallen completely below the threshold level. Change the threshold level to view signal.
- Informational** Invalid format: CSV files are not supported by this measurement.  
When utilizing the Phase Noise Personality: Option 226, the \*.CSV file format is not available.
- Informational** Invalid EDGE burst timing.  
The burst has manually been positioned off the display.
- Informational** Measurement halted. Press a measurement key to continue.  
This error occurs after you choose **Cancel** to refrain from setting the attenuator to 0 dB during the Receive Channel Power and Receive Spur measurements.
- Informational** No Fast ADC hardware installed. Meas unavailable.  
The analyzer cannot use sweep times of less than 5 milliseconds when Option B7D or Option AXX is not installed. Therefore the measurement will not be executed.
- Informational** Not enough frequency range to measure harmonics for channel.  
Selected harmonics are above the frequency range of the analyzer.
- Informational** One or more harmonics beyond freq limit: number decreased.  
The highest harmonic was beyond the frequency limit of the analyzer, so the number of measured harmonics was decreased.
- Informational** Option activated  
This message is displayed after entering the selected option's License Key.
- Informational** Please set RF input range (INPUT menu) to manual first.  
In order to manually set the reference level and/or the attenuation under the **Amplitude** front-panel key, the RF Input Range menu under the **Input** front-panel key must be set to **Man** (manual).
- Informational** Shutdown in process.  
The analyzer is responding to the **Standby** key selection, and is executing the shutdown procedure.

- Informational Table loaded successfully.
- When the **Load Table** key was pressed on the second page of the edit table form while in the out-of-band spurious measurement, the file was present. The information has been loaded into the measurement where it may be edited again. This message will also appear when the out-of-band spurious measurement is opened if a spur table has been previously saved.
- Informational Table saved successfully.
- This message appears after you press the **Save Table** key on the second page of the edit table for the out-of-band spurious measurement. It indicates that the current spur table has been written successfully to disk and is available to be loaded by means of the **Load Table** key.
- Informational The calibration data is invalid, and has been cleared.
- A parameter has changed that affects calibration. Therefore the calibration data has been reset, and for best results recalibration is recommended.
- Informational The file containing the list of cable types has been updated.
- The file update was successful.
- Informational This measurement does not support the \*.CSV file format.
- When utilizing the Phase Noise Personality: Option 226, \*.CSV (comma separated values) file format is not available.
- Informational This operation requires a measurement to be active.
- The analyzer cannot perform this operation, because it requires a measurement to be running and no measurement is running.
- Informational Tracking Peak Needed.
- This message is displayed when there has been a change in Resolution Bandwidth, Span, or Alignment since the previous Tracking Peak.
- The message does not apply to the E4401B or E4411B Spectrum Analyzer.
- Informational Turn on Multi Channel Estimator to measure Timing and Phase.
- This functionality is only needed for the Mod Accuracy measurement in 1xEV-DO measurement mode. In the Code Domain Power view of Mod Accuracy, timing and phase for each active channel are shown. To calculate these results, the **Multi Channel Estimator** must be set to **On** or the results will be invalid.
- Informational Use trigger delay to align bit p0 center on marker.
- Tells you where to manually align P0.

## Instrument Messages

### Instrument Messages

- Informational**      WARNING: You are about to delete all of the contents of directory "x:\xxxxx\". Press Delete Now again to proceed or any other key to abort.
- WARNING: You are about to delete all of the contents of directory xxxxxx. Press Delete Now again to proceed or any other key to abort.
- If you select a directory or subdirectory to delete, this popup message is displayed when you press **Delete Now**. (xxxxx in the message is the full path and directory name).
- Informational**      Waiting for end of data acquisition to access floppy disk
- Informational**      Volume <name> formatted
- The indicated disk has been successfully formatted.
- Informational**      Time resolution is low, reduce Meas Time or increase Trace Points
- Changing either Meas Time or Trace Points has increased the burst to mask uncertainty greater than 0.4 symbol. You should lower the Meas Time or increase Trace Points to reduce this uncertainty.

### Status Messages

These messages indicate conditions that can cause the display of incorrect data. The name of the corresponding status bit appears in parenthesis. Some messages display *only* the status bit (as noted).

Status messages appear in the upper right portion of the screen grid.

- Status**                \* (Invalid Data)
- The \* (Invalid Data) is displayed in the upper right-hand corner of the graticule to let you know that the display does not match the current settings. When doing a **Max Hold**, then switching to **View**, the asterisk will appear. This is due to the analyzer's auto-coupling rules (the Video Bandwidth and detector type will change when **View** is pressed). To avoid this situation, change the **Video BW** to **Man** (manual) and change the detector type to **Peak** before pressing **Max Hold**.
- Status**                50 MHz Osc Unlevel (50 MHz Osc Unleveled)
- The internal 50 MHz amplitude reference source has become unlevelled. This condition must be corrected before a valid alignment can be performed.
- Status**                ADC Align Failure *status bit only, no message*
- The alignment routine was unable to align the analog-to-digital converter (ADC).

- Status           Align Now All Needed (Align Needed)
- The instrument requires complete alignment. Press **System, Alignments, Align Now, All**. On all Agilent Technologies ESA spectrum analyzer models except Agilent Technologies E4401B and E4411B, you must connect the **AMPTD REF OUT** to the **INPUT** with the appropriate cable to perform this alignment. *For Agilent Technologies E4401B and E4411B only:* disconnect any signals from the **INPUT** prior to performing this procedure. If this message recurs, load defaults (**System, Alignments, Load Defaults**) and then perform **Alignment Now, All**.
- Status           Align Now RF Needed (Align Now RF Needed)
- The instrument requires RF alignment. Press **System, Alignments, Align Now, RF (EXT Cable)**. On all Agilent Technologies ESA spectrum analyzer models except Agilent Technologies E4401B and E4411B, you must connect the **AMPTD REF OUT** to the **INPUT** with the appropriate cable to perform this alignment. *For Agilent Technologies E4401B and E4411B only:* disconnect any signals from the **INPUT** prior to performing this procedure.
- Status           Align RF Skipped (Align RF Skipped)
- The RF alignment has been skipped because a 50 MHz signal was detected at the **INPUT**; alignment will resume when the 50 MHz signal is removed. The alignment will not work when there is too much input power at 50 MHz. The instrument may not continue to measure properly. To remove the message, remove the 50 MHz input signal, then perform an **Align Now, RF**. Press **System, Alignments, Align Now, RF**. On all Agilent Technologies ESA spectrum analyzer models except E4401B and E4411B, you must connect the **AMPTD REF OUT** to the **INPUT** with the appropriate cable to perform this alignment. *For Agilent Technologies E4401B and E4411B only:* disconnect any signals from the **INPUT** prior to performing this procedure.
- If this message occurs and you are going to make a measurement near 50 MHz, select **System, Alignments, Auto Align**, and **All but RF**.
- Status           Align RF Skipped, Align signal amplitude too low
- The RF alignment has been skipped because the calibration output power is too low.
- Status           DC Coupled
- Indicates the input of the analyzer is DC coupled (**Input/Output, Coupling (DC)**). This setting is necessary when measuring frequencies below 100 kHz on E4402B with Option UKB, E4404B, and E4405B analyzers. For E4407B analyzers with Option UKB, you must set the coupling to DC when measuring below 10 MHz. Take care to limit the input level to 0 Vdc and +30 dBm whenever you are in DC coupled mode.

## Instrument Messages

### Instrument Messages

|        |  |
|--------|--|
| Status | Demod ON: reduce span for audible detection<br><br>When the Demod function is active and the speaker is turned on, the ratio of the resolution bandwidth to span must be greater than 0.002 to properly demodulate and listen to the resulting audio signal. You must decrease the span to continue the measurement  |
| Status | Ext Ref ( <i>no corresponding status bit</i> )<br><br>The instrument's frequency reference has been set to <b>External Reference</b> . This message will appear even if an external reference is not connected to the instrument. The external reference frequency must also be entered.<br><br>Indicates that the frequency reference is being supplied by an external 10 MHz source. |
| Status | External LO frequency out of range<br><br>One or more external LO frequencies are out of range. Check that the LO frequency limits are set correctly and check the entered measurement frequencies and measurement mode.   |
| Status | Final IF Overload (IF/ADC Overrange)<br><br>The final IF section has been overloaded. Measurement results may be invalid. Either increase the input attenuation or decrease the input signal level.  |
| Status | First IF Overload (IF/ADC Overrange)<br><br>The first IF section has been overloaded. Measurement results may be invalid. Either increase the input attenuation or decrease the input level.   |
| Status | Flat corr off ( <i>no corresponding status bit</i> )<br><br>Indicates that the flatness corrections have been turned off.  |
| Status | FM Demod Align Failure <i>status bit only, no message</i><br><br>A failure has occurred during the FM Demod alignment. Measurement results may be invalid.   |
| Status | Freq corr off ( <i>no corresponding status bit</i> )<br><br>Indicates that the frequency corrections have been manually disabled. Press <b>System, Alignments, Freq Correct, (On)</b> to restore.  |
| Status | Freq Count: Reduce Span/RBW ratio<br><br>The span is too wide for the current resolution bandwidth. Either reduce the span or increase the RBW.  |
| Status | Freq outside cal range<br><br>The existing user cal has been invalidated because the current measurement frequencies lie partially or wholly outside the range of frequencies used for user-cal.   |



|        |  |
|--------|--|
| Status | <p>Frequency Reference Error (Freq Ref Unlocked)</p> <p>The frequency reference lock loop has unlocked or is near an unlock condition. This message can occur when either the internal or external reference is selected. If external reference is selected, assure the frequency of the external reference source exactly matches the entered value displayed on the reference menu key.</p> <p>The frequency reference has been tuned too far off of 10 MHz. This condition may be corrected by cycling power on the analyzer.</p> |
| Status | <p>IF Align Failure <i>status bit only, no message</i></p> <p>A failure has occurred during the IF alignment. Measurement results may be invalid.</p>  |
| Status | <p>IF Gain fixed</p> <p>The autoranging function of the analyzer has been turned off (<b>Amplitude, More, More, IF Gain (Fixed)</b>). This setting is useful when measuring signals that require fast measurement time, narrow resolution bandwidths (&lt; 1 kHz), and &lt; 70 dB of display range. For more information on this setting, refer to IF Gain key description in the <i>ESA Spectrum Analyzer User's Guide</i>.</p>   |
| Status | <p>IF Overload (IF/ADC Over Range)</p> <p>The IF section has been overloaded. Measurement results may be invalid.</p>  |
| Status | <p>Incompatible Hardware found for E4447A: Third Converter</p> <p>This message is displayed when the instrument (E4447A) is turned on (powered-up) if the Third Converter is not the correct part. The upper-most frequency will be limited to 26.5 GHz, but the instrument will otherwise continue to function normally. Press <b>ESC</b> to clear the message.</p>   |
| Status | <p>Input is internal (no corresponding status bit)</p> <p><i>This message applies to the Agilent Technologies E4401B and E4411B only.</i> Indicates the <b>50 MHz Amptd Ref</b> selection is <b>On</b>. With the 50 MHz amplitude reference on, the input is routed through an internal signal path.</p>   |
| Status | <p>LO - Stop freq must be &gt;= min system input freq</p> <p>The current measurement mode requires that the stop RF (input to DUT) frequency must be more than the minimum system input frequency away from the fixed LO frequency.</p>  |
| Status | <p>LO Align Failure (status bit only, no message)</p> <p>A failure has occurred during the alignment of the local oscillator (LO). Measurement results may be invalid.</p>   |

Instrument Messages  
Instrument Messages

|        |   |
|--------|---|
| Status | LO Out Unlevel (LO Out Unleveled)<br>Indicates the output of the local oscillator (LO) has become unleveled. This condition must be corrected to make valid measurements.   |
| Status | LO Unlevel (LO Unleveled)<br>Indicates the internal circuitry of the local oscillator (LO) has become unleveled. This condition must be corrected to make valid measurements.   |
| Status | LO Unlock (Synth Unlocked)<br>Indicates the phase locked circuitry of the local oscillator (LO) has become unlocked. This condition must be corrected to make valid measurements.   |
| Status | Log Corr Off (no corresponding status bit)<br>The log amplifier corrections have been turned off.   |
| Status | Marker Count:Widen Res BW<br>The ratio of the resolution bandwidth to span must be greater than 0.002 for the marker count function to work properly. Increase the resolution bandwidth or decrease the span to continue the measurement.   |
| Status | Meas Uncal (Oversweep)<br>The measurement is uncalibrated, usually due to sweeping a narrow RBW filter too quickly. Check the sweep time, span, and bandwidth settings, or press <b>Auto Couple</b> .   |
| Status | Measurement outside Internal Preamp range<br>The Internal Preamp is currently turned on, but the measurement is being performed outside the range of the preamp.  |
| Status | Measurement partially outside Internal Preamp range<br>The Internal Preamp is currently turned on, and the measurement range is being performed partly within and partly outside this range. It is recommended that you turn the preamp off to ensure consistent results across the entire measurement. |
| Status | Measuring Channel Segment...<br>The instrument is measuring the Channel Segment.  |
| Status | Measuring Offset A Positive Segment...<br>The instrument is measuring the offset A positive segment.  |
| Status | Measuring Offset B Positive Segment...<br>The instrument is measuring the offset B positive segment.  |
| Status | Measuring Offset C Positive Segment...<br>The instrument is measuring the offset C positive segment.  |

|        |   |
|--------|---|
| Status | Measuring Offset D Positive Segment...<br>The instrument is measuring the offset D positive segment.  |
| Status | Measuring Offset D Negative Segment...<br>The instrument is measuring the offset D negative segment.  |
| Status | Measuring Offset E Positive Segment...<br>The instrument is measuring the offset E positive segment.  |
| Status | Measuring Offset E Negative Segment...<br>The instrument is measuring the offset E negative segment.  |
| Status | Overload: Reduce Signal and press <ESC> (Input Overload Tripped)<br><br><i>This message applies to the Agilent Technologies E4401B and E4411B only. A signal has been applied to the input connector that caused the overload protection circuitry to engage. The input signal must be reduced. After the signal is reduced, press <b>ESC</b> to reset the overload detector so that you can continue using the analyzer.</i> |

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**CAUTION** Exposing the analyzer to high levels of input power over a prolonged period of time can damage the internal circuitry.

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|        |   |
|--------|---|
| Status | Peaking Signal (no corresponding status bit)<br>The instrument is executing a tracking generator peak.  |
| Status | Preferred resolution bandwidth not available.<br>The calculated required resolution bandwidth for this measurement is not available.                              |
| Status | RF Align Failure <i>status bit only, no message</i><br>A failure has occurred during the alignment of the RF section. Measurement results may be invalid.         |
| Status | Signal Ident On, Amptd Uncal (Signal Ident On)<br>Indicates that the amplitude measurement could be uncalibrated because the signal identification feature is on. |
| Status | Signal level is low.<br>Indicates the signal can be correlated, however the level is below that specified to ensure accurate measurement results.                 |

Instrument Messages  
Instrument Messages

|        |   |
|--------|---|
| Status | Source LO Unlevel (Source LO Unleveled)<br><br>The internal circuitry of the local oscillator (LO) in the tracking generator has become unleveled. This condition must be corrected to make valid measurements.   |
| Status | Source LO Unlock (Source Synth Unlocked)<br><br>The phase-locked circuitry of the local oscillator (LO) in the tracking generator has become unlocked. This condition must be corrected to make valid measurements.   |
| Status | Source Unlevel (Source Unleveled)<br><br>Indicates the source power is set higher or lower than the analyzer can provide, the frequency span extends beyond the specified frequency range of the tracking generator, or the calibration data for the source is incorrect.     |
| Status | Start freq must be greater than fixed LO freq<br><br>The current measurement mode requires that the start frequency must be greater than the fixed LO frequency.  |
| Status | Start freq must be greater than start RF freq<br><br>The current measurement mode requires that the start IF (output to DUT) frequency must be greater than the start RF (input to DUT) frequency.  |
| Status | Start - LO freq must be $\geq$ min system input freq<br><br>The current measurement mode requires that the start RF (input to DUT) frequency must be more than the minimum system input frequency away from the fixed LO frequency.   |
| Status | Stop freq must be less than fixed LO freq<br><br>The current measurement mode requires that the stop frequency must be less than the fixed LO frequency.  |
| Status | Stop freq must be less than stop RF freq<br><br>The current measurement mode requires that the stop IF (output to DUT) frequency must be less than the stop RF (input to DUT) frequency.  |
| Status | Stop IF freq must be less than fixed LO freq<br><br>The current measurement mode requires that the stop IF (output to DUT) frequency must be less than the fixed LO frequency.  |
| Status | System, Alignments, Align All Now Needed (Align Needed)<br><br>This message occurs only when <b>Auto Align</b> is set to <b>Alert</b> .<br><br>The instrument requires an <b>Align All Now</b> . Restore the alignment by pressing <b>System, Alignments, Align All Now</b> . |

|        |   |
|--------|---|
| Status | System input frequency out of range<br><br>One or more system input frequencies are out of range. If using a frequency list, check that all entries are valid for current measurement mode. |
| Status | System Alignments, Align Now, All Required<br><br>Internal alignment correction data has been lost. Press <b>System, Alignments, Align Now, All</b> to clear this message from the display. |
| Status | TG Align Failure (status bit only, no message)<br><br>A failure has occurred during the tracking generator (TG) alignment.  |
| Status | Video shift off (no corresponding status bit)<br><br>Indicates the video shift has been manually disabled; this will impair readings.   |

### Annunciator Bar Messages

|             |  |
|-------------|--|
| Annunciator | Align<br><br>This message appears in the left side of the annunciator bar in red. When this message appears it indicates that there is one or more condition that has affected the alignment. For the possible conditions and suggested resolutions, refer to <a href="#">Align Now All Needed (Align Needed) on page 103</a> , <a href="#">Align Now RF Needed (Align Now RF Needed) on page 103</a> , <a href="#">Align RF Skipped (Align RF Skipped) on page 103</a> , and <a href="#">System Alignments, Align Now, All Required on page 109</a> . |
| Annunciator | Ext Ref<br><br>This message appears in the right side of the annunciator bar in green. When this message appears it indicates that there is one or more condition that affects the reference source. For the possible conditions and suggested resolutions, refer to <a href="#">Ext Ref on page 104</a> .   |
| Annunciator | FreqRefUnlock<br><br>This message appears in the left side of the annunciator bar in red. When this message appears it indicates that there is one or more condition that results in a frequency reference error. For the possible conditions and suggested resolutions, refer to <a href="#">Frequency Reference Error (Freq Ref Unlocked) on page 105</a> .  |

## Instrument Messages

### Instrument Messages

|             |          |   |
|-------------|----------|---|
| Annunciator | Overload | <p>This message appears in the left side of the annunciator bar in red. When this message appears it indicates that there is one or more condition that causes a system overload. For the possible conditions and suggested resolutions, refer to the Status <a href="#">IF Overload (IF/ADC Over Range)</a> on page 105 and the Status <a href="#">overload</a> on page 107.</p>   |
| Annunciator | Uncal    | <p>This message appears in the left side of the annunciator bar in red. When this message appears it indicates that there is one or more condition that results in uncalibrated results. For the possible conditions and suggested resolutions, refer to <a href="#">Meas Uncal (Oversweep)</a> on page 106.</p>  |
| Annunciator | Unlevel  | <p>This message appears in the left side of the annunciator bar in red. When this message appears it indicates that there is one or more condition that affects the leveling of an internal signal, such as the local oscillator (LO) or the tracking generator (source). For the possible conditions and suggested resolutions, refer to <a href="#">50 MHz Osc Unlevel (50 MHz Osc Unleveled)</a> on page 102, <a href="#">LO Out Unlevel (LO Out Unleveled)</a> on page 106, <a href="#">Source LO Unlevel (Source LO Unleveled)</a> on page 108, and <a href="#">Source Unlevel (Source Unleveled)</a> on page 108.</p> |
| Annunciator | Unlock   | <p>This message appears in the left side of the annunciator bar in red. When this message appears it indicates that there is one or more condition that affects locking one or more of the local oscillators (LOs). For the possible conditions and suggested resolutions, refer to <a href="#">LO Unlock (Synth Unlocked)</a> on page 106.</p>   |

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## **2 Functional Tests**

## What You Will Find in Chapters 2, 3, and 4

This chapter describes the functional tests and provides information on how to perform them.

### What Are the Functional Tests?

Functional tests are tests of various instrument parameters that give a high degree of confidence that the analyzer is operating correctly. They are recommended as a check of analyzer operation for incoming inspection or after a repair. Measurement uncertainty analysis is not available for functional tests, and the analyzer is checked against limits that are wider than the published specifications. The functional tests are designed to test an analyzer operating within the temperature range defined by the analyzer specifications using a minimum set of test equipment. If a test does not pass, performance tests must be run to confirm a problem exists.

### Functional Test Versus Performance Verification

Functional tests use a minimum set of test equipment to check a much smaller range of parameters (and a limited number of data points for each parameter) than do performance verification tests. Functional tests use limits that are wider than the published specifications; measurement uncertainty analysis is *not* available for functional tests.

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**NOTE** If a functional test does not pass, you must run performance verification tests to confirm that a problem exists.

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Performance verification tests span a wide range of instrument parameters and provide the highest level of confidence that the instrument conforms to published specifications. These tests can be time consuming and require extensive test equipment.

### Chapters 2, 3, and 4 include the following:

- “Before Performing a Functional Test” on page 114 (what to do first).
- “Test Equipment” on page 115 (a list of the equipment required for *all* of the tests).
- PSA Functional Tests (*PSA only*, Chapter 3):
  - “Amplitude Accuracy at 50 MHz” on page 120
  - “Displayed Average Noise Level (DANL)” on page 125
  - “Frequency Readout Accuracy” on page 127
  - “Frequency Response (Flatness)” on page 129
  - “Amplitude Linearity” on page 133
  - “Second Harmonic Distortion (SHD)” on page 136



- **ESA Functional Tests** (*ESA only*, Chapter 4):
  - “Displayed Average Noise Level” on page 140
  - “EMI Detector Test” on page 158
  - “Frequency Readout Accuracy” on page 162
  - “Marker Count Accuracy” on page 165
  - “Frequency Response (Flatness)” on page 166
  - “Reference Level Accuracy” on page 171
  - “Resolution Bandwidth Switching Uncertainty” on page 176
  - “Scale Fidelity” on page 179
  - “Second Harmonic Spurious Responses” on page 182
  - “Tracking Generator Level Flatness: Models E4401B and E4411B E7401A, Options 1DN and 1DQ” on page 186
  - “Tracking Generator Level Flatness: E4402B, E4403B, E4404B, E4405B, E4407B and E4408B E7402A, E7403A, E7404A, and E7405A, Option 1DN” on page 189

Each functional test includes:

- Test limits (pass/fail criteria)
- A description of the test
- The equipment required for the test
- A figure showing how to connect the equipment
- Step-by-step instructions
- One or more tables in which to record the measurement results

## Before Performing a Functional Test

1. Ensure that you have the proper test equipment.
2. Switch on the unit under test (UUT) and let it warm up (in accordance with warm-up requirements in the instrument specifications).
3. Allow sufficient warm-up time for the required test equipment (refer to individual instrument documentation for warm-up specifications).
4. Ensure that the analyzer's frequency reference is set to Internal:
  - a. Press the **System, Reference** keys.
  - b. If the **Freq Ref** softkey does *not* have Int underlined, press the **Freq Ref** softkey until it is underlined.
5. Following instrument warm-up, perform the auto align routine:  
Press **System, Alignments, Align All Now**.

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**NOTE** Functional test accuracy depends on the precision of the test equipment used. Ensure that all of the test equipment is calibrated before running a functional test.

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## TEST EQUIPMENT

The table below summarizes the test equipment needed to perform all of the functional tests. Alternate equipment model numbers are given in case the recommended equipment is not available.

If neither the recommended nor the alternative test equipment are available, substitute equipment that meets or exceeds the critical specifications listed.

| Analyzer           | Item  | Critical Specifications       | Recommended Agilent Model | Alternate Agilent Model |
|--------------------|---|-------------------------------|---------------------------|-------------------------|
| <b>Adapters</b>    |   |                               |                           |                         |
| PSA ESA            | 3.5 mm (f) to 3.5mm (f)<br>(connector saver for 83630B) |                               | 5061-5311                 |                         |
| PSA ESA            | 3.5 mm (f) to N (f)                                     |                               | 1250-1745                 |                         |
| PSA                | 2.4 mm (f) to 3.5 mm (m)                                | E4446A, E4448A only           | 11901D                    |                         |
| PSA                | BNC (f) to SMA (m)                                      |                               | 1250-1200                 |                         |
| PSA                | BNC (m) to SMA (f)                                      |                               | 1250-1700                 |                         |
| ESA                | BNC (m) to SMA (f)                                      |                               | 1250-2015                 |                         |
| PSA ESA            | Type N (f) to BNC (m)                                   |                               | 1250-1534                 |                         |
| PSA                | Type N (f) to N (f)                                     |                               | 1250-1472                 | 1250-0777               |
| PSA ESA            | Type N (m) to 3.5 mm (f)                                |                               | 1250-1744                 |                         |
| PSA ESA            | Type N (m) to 3.5 mm (m)                                |                               | 1250-1743                 |                         |
| PSA                | Type N (m) to BNC (f)                                   |                               | 1250-1476                 |                         |
| ESA                | Type N (m) to BNC (f)                                   |                               | 1250-0780                 |                         |
| <b>Attenuators</b> |   |                               |                           |                         |
| PSA                | 10 dB Step Attenuator                                   | Range: 0 to 60 dB             | 355D                      |                         |
| PSA                | 20 dB Fixed Attenuator                                  | Accuracy: < 0.5 dB            | 8491A                     | 8491B                   |
| <b>Cables</b>      |   |                               |                           |                         |
| PSA ESA            | APC 3.5 mm (1 meter)                                    |                               | 8120-4921                 |                         |
| ESA                | APC 3.5 mm  | E4407B and E4408B E7405A only | 11500E                    |                         |
| ESA                | APC 3.5 mm  |                               | 11500D                    |                         |
| ESA                | Type-N, 152-cm (60-in)                                  |                               | 11500D                    |                         |
| ESA                | APC 3.5 mm  | E4407B and E4408B E7405A only | 11500E                    |                         |
| PSA ESA            | Cable, BNC (2 required)                                 | 120 cm (48 in.) BNC cable     | 10503A                    |                         |

Functional Tests  
Test Equipment

| Analyzer                       | Item                    | Critical Specifications   | Recommended Agilent Model | Alternate Agilent Model |
|--------------------------------|-------------------------|---|---------------------------|-------------------------|
| <b>Signal Source</b>           |                         |   |                           |                         |
| PSA                            | Synthesized Sweeper     | <i>Frequency: 10 MHz to 26.5 GHz</i><br><i>Harmonic level: &lt; -40 dBc</i><br><i>Amplitude range: 10 to -20 dBm</i><br><i>Frequency Accuracy: 0.02%</i>                          | 83630B                    | 83640B,<br>83650B       |
| PSA                            | Synthesized Sweeper     | <i>Frequency: 10 MHz to 50 GHz</i><br><i>Harmonic level: &lt; -40 dBc</i><br><i>Amplitude range: 10 to -20 dBm</i><br><i>Frequency Accuracy: 0.02%</i><br><br>E4446A, E4448A only | 83650B                    |                         |
| ESA                            | Synthesized Sweeper     | <i>Frequency: 10 MHz to 26.5 GHz</i><br><i>Harmonic level: &lt; -40 dBc</i><br><i>Amplitude range: 10 to -20 dBm</i><br><i>Frequency Accuracy: 0.02%</i>                          | 83640A/B                  | 836XX series            |
| <b>Miscellaneous Equipment</b> |                         |   |                           |                         |
| PSA ESA                        | Filter, 50 MHz Low Pass | <i>Cutoff Frequency: 50 MHz</i><br><i>Rejection at 65 MHz: &gt; 40 dB</i><br><i>Rejection at 75 MHz: &gt; 60 dB</i><br><i>Rejection at 80 MHz: &gt; 60 dB</i>                     | 0955-0306                 |                         |
| PSA                            | Power Meter             | <i>Power Reference Accuracy: ±1.2%</i><br>Compatible with power sensor  | E4418B                    | E4419B                  |
| ESA                            | Power Meter             | <i>Power Reference Accuracy: ±1.2%</i><br>Compatible with power sensor  | 438A                      |                         |
| PSA ESA                        | Power Sensor            | <i>Frequency Range: 50 MHz to 26.5 GHz</i><br><i>Amplitude Range: -25 to 10 dBm</i>   | 8485A                     | E4413A                  |
| ESA                            | Power Sensor            | <i>Frequency Range: 100 kHz to 3.0 GHz</i><br><i>Amplitude Range: -25 to 10 dBm</i>   | 8485A                     | E4413A                  |
| PSA                            | Power Sensor            | <i>Frequency Range: 50 MHz to 50 GHz</i><br><br>E4446A, E4448A only   | 8487D                     |                         |
| PSA ESA                        | Power Splitter, 3.5 mm  | <i>Nominal Insertion Loss: 6 dB</i><br><i>Tracking Between Ports: &lt; 0.25 dB</i>  | 11667B                    | 11667A                  |
| PSA                            | Power Splitter          | <i>Frequency Range: 50 MHz to 50 GHz</i><br><i>Tracking between ports: &lt; 0.25 dB</i><br><br>E4446A, E4448A only  | 11667C                    |                         |

| Analyzer | Item                   | Critical Specifications  | Recommended Agilent Model | Alternate Agilent Model |
|----------|------------------------|--|---------------------------|-------------------------|
| ESA      | Power Splitter, 3.5 mm | <i>Nominal Insertion Loss: 6 dB</i><br><i>Tracking Between Ports: &lt; 0.25 dB</i><br><br>E4401B, E4402B, E4403B,<br>E4404B, E4405B and E4411B<br>E7401A, E7402A, E7403A, and<br>E7404A only | 11667A                    |                         |
| ESA      | Power Splitter, 3.5 mm | <i>Nominal Insertion Loss: 6 dB</i><br><i>Tracking Between Ports: &lt; 0.25 dB</i><br><br>E4407B and E4408B E7405A only  | 11667B                    | 11667A                  |
| PSA      | Termination, 50Ω       | Type N (m) Connector<br><i>Frequency: 1 MHz to 4 GHz</i>   | 909A Option 012           |                         |
| ESA      | Termination, 50Ω       | Type N (m) Connector<br><i>Frequency: 1 MHz to 4 GHz</i>   | 908A                      |                         |

Functional Tests  
**Test Equipment**

---

## **3 PSA Functional Tests**

---

## Amplitude Accuracy at 50 MHz

### Test Limits

Amplitude Accuracy should remain within  $\pm 1.0$  dB of the measured source value across the range of source levels and changes in resolution bandwidth. Option 1DS (preamp option) should remain within  $\pm 1.3$  dB of measured values.

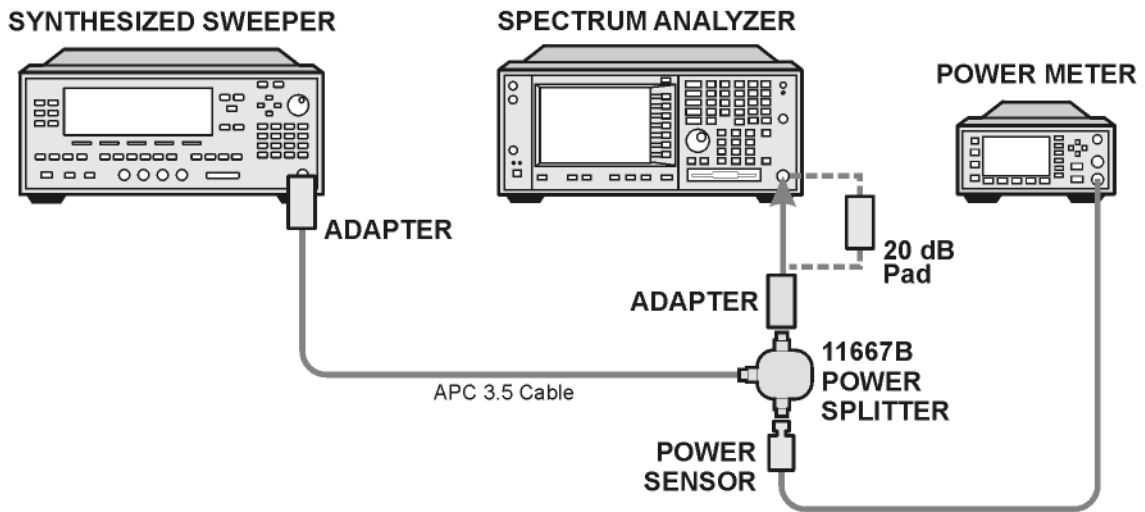
### Test Description

A synthesized sweeper is used as the signal source for the test. The source amplitude is varied using the signal source amplitude control. The resolution bandwidth is also varied on the spectrum analyzer. The source amplitude is measured by the power meter and spectrum analyzer at each setting, and the values compared. The difference between each pair of measurements indicates the amplitude accuracy.

| Item                | Critical Specifications                           | Recommended Agilent Model |
|---------------------|---|---------------------------|
| Adapter             | Type-N(m), to 3.5 mm(m)                           | 1250-1743                 |
| Adapter             | 3.5 mm(f) to 3.5 mm(f)                            | 5061-5311                 |
| Attenuator, 20 dB   | <i>Accuracy:</i> < 0.5 dB                         | 8491A                     |
| Cable               | APC 3.5 mm, 1 meter                               | 8120-4921                 |
| Power Meter         | Compatible with power sensor                      | E4418B                    |
| Power Sensor        | <i>Amplitude Range:</i> -25 dBm to 10 dBm         | 8485A                     |
| Power Splitter      | 3.5 mm<br>6 dB loss                               | 11667B                    |
| Synthesized Sweeper | <i>Typical Temperature Stability:</i> 0.01 dBc/°C | 83630B                    |



Figure 3-1. Amplitude Accuracy Test Setup



ee81a

## Procedure

1. Zero and calibrate the power meter.
2. Configure equipment as shown in [Figure 3-1.](#), with the power splitter connected to the spectrum analyzer input.

---

**CAUTION** To minimize stress on the test equipment connections, support the power sensor.

---

3. If the auto alignment for the analyzer has not been performed within the past 24 hours, press **System, Alignments, Align All Now** to perform the auto alignment routine.
4. Press **Preset** (Factory Preset) on the analyzer.
5. Set up the spectrum analyzer by pressing:

**Frequency, 50, MHz**  
**Span, 2, MHz**  
**Input/Output, RF Coupling (DC)**  
**Amplitude, Attenuation, 10, dB**  
**Sweep, Auto Swp Time, Accy**

6. Set up the synthesized sweeper by pressing:

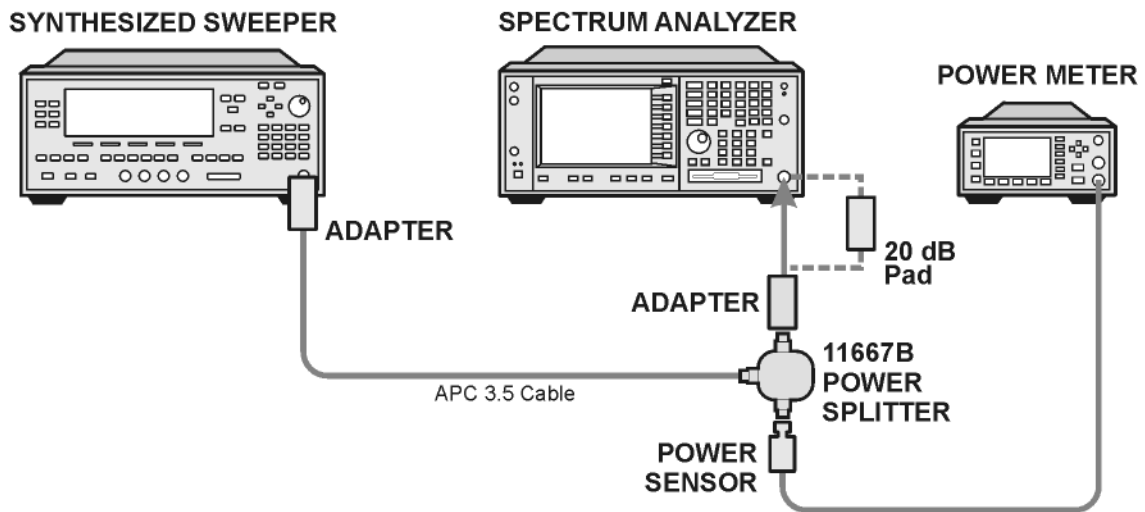
**CW, 50, MHz**  
**Power Level, -4, dBm**  
**RF (On)**

PSA Functional Tests  
Amplitude Accuracy at 50 MHz

7. On the spectrum analyzer, press:  
**BW/Avg, Average (On)**  
20, **Enter**
8. Perform the following steps for each row listed in [Table 3-1](#):
  - a. Set the synthesized sweeper amplitude to the value listed in the Nominal Source Amplitude column in [Table 3-1](#).
  - b. Set the Attenuation and Span as listed in each row of the table.
  - c. Record the source amplitude, as measured by the power meter, in the Power Meter Amplitude column of [Table 3-1](#).
  - d. On the spectrum analyzer, press **Restart, Peak Search**.
  - e. Wait for the spectrum analyzer to finish averaging.
  - f. Record the signal amplitude, as measured by the analyzer in the Measured Amplitude column of [Table 3-1](#).
  - g. Calculate the signal amplitude accuracy error using the following equation, and record the results under the Amplitude Accuracy Error column:

$$\text{Amplitude Accuracy Error} = \text{Meas\_amp} - \text{Power\_meter}$$

**Figure 3-2. Amplitude Accuracy Test Setup**



ee81a

**Table 3-1 Amplitude Accuracy Results**

| Nominal Source Amplitude (dBm) | Preamp (Option 1DS) | Attenuation (dB) | Span (MHz) | Measured Amplitude Meas_amp (dBm) | Power Meter Amplitude Power_meter (dBm) | Amplitude Accuracy Error (dB) | Test Limit (dB) |
|--------------------------------|---------------------|------------------|------------|-----------------------------------|---|-------------------------------|-----------------|
| -4                             | Off                 | 10               | 2          |                                   |   |                               | ± 1.0           |
| -9                             | Off                 | 10               | 1          |                                   |   |                               | ± 1.0           |
| -14                            | Off                 | 10               | 0.5        |                                   |   |                               | ± 1.0           |
| -4                             | Off                 | 20               | 0.1        |                                   |   |                               | ± 1.3           |
| -14                            | Off                 | 20               | 0.1        |                                   |   |                               | ± 1.3           |
| -4                             | Off                 | 30               | 0.1        |                                   |   |                               | ± 1.3           |
| -14                            | Off                 | 30               | 0.1        |                                   |   |                               | ± 1.3           |

### Testing Option 1DS (Preamp)

Instruments containing Option 1DS must have the preamp function turned on and tested. In order to enable this function, press **Amplitude, More 1 of 3, Int Preamp** (On).

#### Procedure

1. Connect the 20 dB pad between the input of the spectrum analyzer and the power splitter, as shown in [Figure 3-1](#).
2. Set the synthesized sweeper amplitude to the value listed in the Nominal Source Amplitude column in [Table 3-2](#).
3. Assure the spectrum analyzer input attenuation is set to 10 dB.
4. Set the Res BW and Span as listed in [Table 3-2](#).
5. Record the source amplitude, as measured by the power meter, in the Power Meter Amplitude column of [Table 3-2](#).
6. On the spectrum analyzer, press **Restart, Peak Search**.
7. Wait for the analyzer to finish averaging.
8. Record the signal amplitude as measured by the analyzer in the measured amplitude column of [Table 3-2](#).
9. Calculate the signal amplitude accuracy using the following equation:

$$\text{Amplitude Accuracy Error} = \text{Meas\_amp} + 20 \text{ dB} - \text{Power\_meter}$$

10. Record the results under the Amplitude Accuracy Error column of [Table 3-2](#).

**Table 3-2 Amplitude Accuracy Results (Option 1DS)**

| Nominal Source Amplitude (dBm) | Preamp (Option 1DS) | Res BW (kHz) | Span (kHz) | Measured Amplitude Meas_amp (dBm) | Power Meter Amplitude Power_meter (dBm) | Amplitude Accuracy Error (dB) | Test Limit (dB) |
|--------------------------------|---------------------|--------------|------------|-----------------------------------|---|-------------------------------|-----------------|
| -13                            | On                  | 1            | 106        |                                   |   |                               | 1.2             |

## Displayed Average Noise Level (DANL)

### Test Limits (with 0 dB input attenuation)

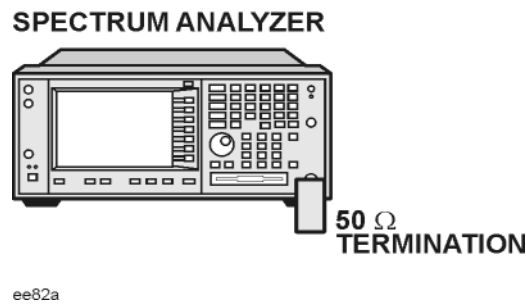
See [Table 3-3](#) for values.

### Test Description

The Displayed Average Noise Level (DANL) of the spectrum analyzer is measured across a 10 kHz frequency span at several center frequencies. The analyzer input is terminated into a 50Ω load. A test is performed to assure the measurement is not performed in the presence of a residual response. The measurement is then averaged, and the result is normalized to a 1 Hz bandwidth.

| Item        | Critical Specifications<br>(for this test) | Recommended<br>Agilent Model |
|-------------|--|------------------------------|
| Termination | 50Ω Type-N(m)                              | 909A Option 012              |

**Figure 3-3** DANL Test Setup



### Procedure

1. Configure the equipment as shown in [Figure 3-3](#).
2. Press **Preset** (Factory Preset) on the analyzer.
3. Set up the spectrum analyzer by pressing:

**FREQUENCY, Center Freq, 5. MHz**  
**Input/Output, RF Coupling, DC**  
**Span, 10 kHz**  
**AMPLITUDE, -70, dBm**  
**Amplitude, Attenuation, 0, dB**  
**BW/Avg, 1, kHz**  
**Video BW, 100 Hz**  
**Average (On), 20, Enter**

PSA Functional Tests  
**Displayed Average Noise Level (DANL)**

4. Press **Display**, then press the **Display Line** key.
5. Rotate the RPG knob and set the display line at the average amplitude of the displayed noise floor by visual inspection.
6. Confirm that the measurement will be performed on the spectrum analysis noise floor and not on a residual response within the displayed 10 kHz span.

**NOTE** Ignore the residual response if one appears when taking the measurement.

7. Enter the value of the display line as the Measured Average Noise Level at 5 MHz column in [Table 3-3](#).
8. Normalize the measured value to a 1 Hz BW by adding -30 dB to the measured value.

**NOTE** The -30 dB value is added because the formula used to calculate the value of the noise power in a 1 Hz BW when measured with a 1 kHz BW is:

$$\text{Noise} = 10 \text{ Log (BW 2/BW 1) where BW 2 is the 1 kHz BW we measure and BW 1 is 1 Hz BW we want to normalize to.}$$

Therefore,  $10 \text{ Log (1000)} = 30 \text{ dB}$ , so the noise floor will be 30 dB lower in a 1 Hz BW.

9. Enter the normalized value of the displayed average noise level in [Table 3-3](#).
10. The value of the normalized displayed average noise should be less than the specification value.
11. Change the analyzer center frequency to the next value listed in [Table 3-3](#)
12. Repeat steps 4 through 10 to fill in the remainder of [Table 3-3](#) for your analyzer frequency range.

**Table 3-3 Displayed Average Noise Level (DANL) Results**

| Center Frequency | Measured Average Noise Level (dBm) | Normalized Average Noise Level/(1 Hz BW) (dBm) | Test Limits (dBm) |
|------------------|------------------------------------|--|-------------------|
| 5 MHz            |                                    |  | -140              |
| 2 GHz            |                                    |  | -149              |
| 6 GHz            |                                    |  | -147              |
| 13 GHz           |                                    |  | -145              |
| 20 GHz           |                                    |  | -142              |
| 26.5 GHz         |                                    |  | -136              |
| 40 GHz           |                                    |  | -124              |
| 50 GHz           |                                    |  | -126              |

## Frequency Readout Accuracy

### Test Limits

Frequency Readout Accuracy is equivalent to the following equation:

$$\pm (0.25\% \times \text{span} + 5\% \times \text{RBW} + 2 \text{ Hz} + 0.5 \times \text{horizontal resolution})$$

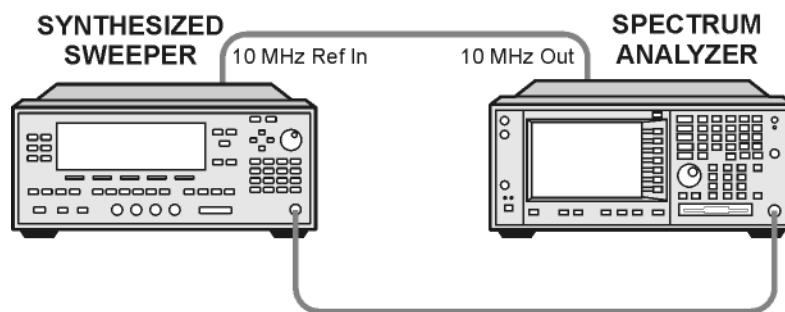
**NOTE** See results table for actual values.

### Test Description

The frequency readout accuracy is measured in several spans and center frequencies that allow both internal analyzer synthesizer modes and prefilter bandwidths to be tested. Frequency reference error is eliminated by using the same frequency standard for the analyzer and signal source.

| Item                | Critical Specification<br>(for this test)                                | Recommended<br>Agilent Model |
|---------------------|--|------------------------------|
| Adapter             | Type-N(m), to 3.5 mm(f)  | 1250-1744                    |
| Adapter             | 3.5 mm(f) to 3.5 mm(f)   | 5061-5311                    |
| Cable               | APC 3.5 mm, 1 meter  | 8120-4921                    |
| Cable               | BNC, 120 cm  | 10503A                       |
| Synthesized Sweeper | <i>Frequency</i> : Capable of 2 GHz (must have external reference input) | 83630B                       |

**Figure 3-4. Frequency Readout Accuracy Test Setup**



ee86a

## Procedure

1. Configure the equipment as shown in [Figure 3-4](#). Confirm the analyzer's built-in auto alignment has been performed within the past 24 hours.
2. Perform the following steps to set up the equipment:
  - a. On the synthesized sweeper, press **PRESET**, then set the controls as follows:
    - POWER LEVEL**, -10, dBm
    - CW**, 1505, MHz, RF (On)
  - b. On the spectrum analyzer, press **Preset**.
3. Set up the spectrum analyzer by pressing:
  - System, Reference**, 10, MHz, Ext (On)
  - Frequency**, 1505, MHz
  - Det/Demod, Detector, Sample**
  - Span**, 2990, MHz

---

**NOTE**      Ensure Ref Level is set to 0 dBm. In addition, ensure Resolution BW and Video BW are both set to Auto.

---

4. Press **Peak Search** on the analyzer to measure the frequency readout accuracy. If the instrument is functioning correctly, the marker reading in the active function block will be between the values listed in [Table 3-4](#). Record the marker value in the Marker Frequency Readout column in [Table 3-4](#).
5. On the spectrum analyzer, change the span and center frequency as listed in [Table 3-4](#).
6. Change the synthesized sweeper frequency to match the center frequency of the analyzer.
7. Repeat steps 4 through 6 until the Marker Frequency Readout column of [Table 3-4](#) is complete.

**Table 3-4      Frequency Readout Accuracy Results**

| Span (MHz) | Center Frequency (MHz) | Minimum       | Marker Frequency Readout | Maximum       |
|------------|------------------------|---------------|--------------------------|---------------|
| 2990       | 1505                   | 1.495 GHz     |                          | 1.515 GHz     |
| 127.2      | 1505                   | 1.5045 GHz    |                          | 1.5055 GHz    |
| 54.1       | 1505                   | 1.50480 GHz   |                          | 1.50520 GHz   |
| 7.95       | 1505                   | 1.504968 GHz  |                          | 1.505032 GHz  |
| 0.106      | 1505                   | 1.5049996 GHz |                          | 1.5050004 GHz |
| 1.98       | 517.59                 | 517.5829 MHz  |                          | 517.5971 MHz  |
| 1.98       | 832.50                 | 832.4928 MHz  |                          | 832.5071 MHz  |



## Frequency Response (Flatness)

### Test Limits

| Frequency Range      | Limit Relative to 50 MHz |
|----------------------|--------------------------|
| 3 Hz to 3 GHz        | ±1.5 dB                  |
| > 3 GHz to 6.6 GHz   | ±2.5 dB                  |
| > 6.6 GHz to 22 GHz  | ±3.0 dB                  |
| > 22 GHz to 26.5 GHz | ±3.5 dB                  |
| > 26.5 GHz           | ±3.5 dB                  |

### Test Description

The frequency response test measures the spectrum analyzer's amplitude error as a function of the tuned frequency. Measurements are made ranging from 50 MHz to the maximum frequency range of your analyzer. The signal source amplitude is measured with a power meter to eliminate error due to source flatness. The measured value is normalized to 50 MHz.

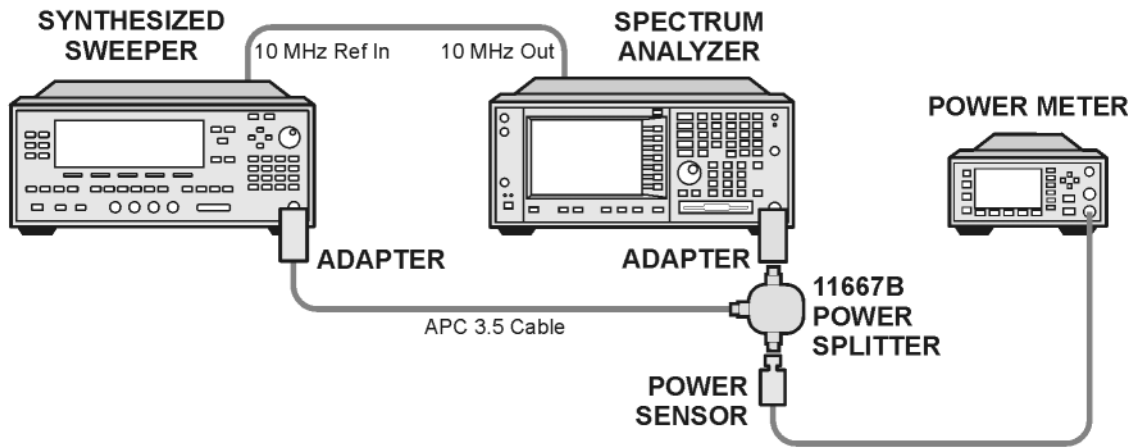
| Item                      | Critical Specifications (for this test)   | Recommended Agilent Model |
|---------------------------|---|---------------------------|
| Adapter                   | Type N(m) to 3.5 mm(m)  | 1250-1743                 |
| Adapter                   | Type N(m) to 3.5 mm(f)  | 1250-1744                 |
| Adapter <sup>a</sup>      | 2.4 mm(f) to 3.5 mm(m)  | 11901D                    |
| Adapter                   | 3.5 mm(f) to 3.5 mm(f)  | 5061-5311                 |
| Cable                     | 3.5 mm, 1 meter   | 8120-4921                 |
| Cables                    | BNC, 120 cm (48 in.)  | 10503A                    |
| Power Meter               | Compatible with power sensor  | E4418B                    |
| Power Sensor              | <i>Frequency Range: 50 MHz to 26.5 GHz</i>  | 8485A                     |
| Power Sensor <sup>a</sup> | <i>Frequency Range: 50 MHz to 50 GHz</i>  | 8487D                     |
| Power Splitter            | <i>Frequency Range: 50 MHz to 26.5 GHz</i><br><i>Tracking between ports: &lt; 0.25 dB</i> | 11667B                    |

PSA Functional Tests  
**Frequency Response (Flatness)**

| Item                             | Critical Specifications<br>(for this test)  | Recommended<br>Agilent Model |
|----------------------------------|---|------------------------------|
| Power Splitter <sup>a</sup>      | <i>Frequency Range: 50 MHz to 50 GHz</i><br><i>Tracking between ports: &lt; 0.25 dB</i> | 11667C                       |
| Synthesized Sweeper              | <i>Frequency Range: 50 MHz to 26 GHz</i>  | 83630B                       |
| Synthesized Sweeper <sup>a</sup> | <i>Frequency Range: 50 MHz to 50 GHz</i>  | 83650B                       |

a. Only used for higher frequency PSA models (E4446A, E4448A), but can be used for testing all PSA models.

**Figure 3-5. Frequency Response Test Setup**



ee83a

**Procedure**

1. Zero and calibrate the power meter and power sensor as described in the power meter operation manual.
2. Configure the equipment as shown in [Figure 3-5](#).

---

**NOTE** Connect the power splitter to the spectrum analyzer input using the appropriate adapter. Do not use a cable.

---

3. Assure the spectrum analyzer's built-in auto alignment has been performed within the last 24 hours.
4. Preset (Factory Preset) both the spectrum analyzer and the synthesized sweeper.
5. Set up the synthesized sweeper by pressing:

**CW, 50, MHz**  
**Power level, -8, dBm**

6. Set up the spectrum analyzer by pressing:

- Frequency, 50, MHz**
- Span, 50, kHz**
- Amplitude (ref level), -10, dBm**
- BW/Avg, Average (On), 10, Enter**

7. Adjust the synthesized sweeper output power for a power meter display of  $-14 \text{ dBm} \pm 0.1 \text{ dB}$ .

**NOTE** The power level of the synthesized sweeper remains unchanged for the duration of the test.

8. Press the **Peak Search** key on the signal analyzer to position the marker on the peak of the signal.
9. Refer to Table 3-5, “Frequency Response (Flatness) Results.” Enter the amplitude of the signal displayed on the spectrum analyzer into the  $\text{Meas}_{\text{Amp}}$  column of Table 3-5.
10. Enter the power meter reading into the  $\text{Power}_{\text{Meter}}$  column of Table 3-5.
11. Tune the synthesized sweeper and spectrum analyzer to the next frequency listed in Table 3-5.
12. Enter the power sensor calibration factor into the power meter.
13. For frequencies 3 GHz and above, press **Amplitude**, then **Presel Center** to center the preselector filter for an optimum amplitude measurement.
14. Repeat steps 8-13 and complete the remainder of Table 3-5 for the frequency range of your analyzer.
15. Compute the measurement error ( $\text{Meas}_{\text{Error}} = \text{Meas}_{\text{Amp}} - \text{Power}_{\text{Meter}}$ ).
16. Compute the flatness error normalized to 50 MHz:  
 $(\text{Meas}_{\text{Error}} - \text{Meas}_{\text{Error}} @ 50 \text{ MHz})$
17. Enter the computed flatness error value into the  $\text{Flat}_{\text{Norm}}$  column of Table 3-5.
18. Compare the value of  $\text{Flat}_{\text{Norm}}$  to the test limit.

**Table 3-5 Frequency Response (Flatness) Results**

| Center Frequency | Analyzer Amplitude<br>$\text{Meas}_{\text{amp}}$ | Power Meter Measurement<br>$\text{Power}_{\text{meter}}$ | Meas Error<br>$\text{Meas}_{\text{error}}$ | Flatness Normalized to 50 MHz<br>$\text{Flat}_{\text{Norm}}$ | Flatness Error Test Limits (dB) |
|------------------|--|--|--|--|---------------------------------|
| 50 MHz           |  |  |  | 0  | Ref                             |
| 1 GHz            |  |  |  |  | $\pm 1.5$                       |
| 2 GHz            |  |  |  |  | $\pm 1.5$                       |
| 3 GHz            |  |  |  |  | $\pm 1.5$                       |
| 3.5 GHz          |  |  |  |  | $\pm 2.5$                       |

PSA Functional Tests  
**Frequency Response (Flatness)**

**Table 3-5 Frequency Response (Flatness) Results**

| Center Frequency | Analyzer Amplitude<br>$Meas_{amp}$ | Power Meter Measurement<br>$Power_{meter}$ | Meas Error<br>$Meas_{error}$ | Flatness Normalized to 50 MHz<br>$Flat_{Norm}$ | Flatness Error Test Limits (dB) |
|------------------|------------------------------------|--|------------------------------|--|---------------------------------|
| 5 GHz            |                                    |  |                              |  | ±2.5                            |
| 6 GHz            |                                    |  |                              |  | ±2.5                            |
| 7 GHz            |                                    |  |                              |  | ±3.0                            |
| 10 GHz           |                                    |  |                              |  | ±3.0                            |
| 13 GHz           |                                    |  |                              |  | ±3.0                            |
| 14 GHz           |                                    |  |                              |  | ±3.0                            |
| 16 GHz           |                                    |  |                              |  | ±3.0                            |
| 22 GHz           |                                    |  |                              |  | ±3.0                            |
| 23 GHz           |                                    |  |                              |  | ±3.5                            |
| 25 GHz           |                                    |  |                              |  | ±3.5                            |
| 26.5 GHz         |                                    |  |                              |  | ±3.5                            |
| 28 GHz           |                                    |  |                              |  | ±3.5                            |
| 31.5 GHz         |                                    |  |                              |  | ±3.5                            |
| 42 GHz           |                                    |  |                              |  | ±3.5                            |
| 48 GHz           |                                    |  |                              |  | ±3.5                            |

## Amplitude Linearity

### Test Limits

The linearity error will be  $\leq \pm 1.0$  dB with  $\leq -10$  dBm at the mixer.

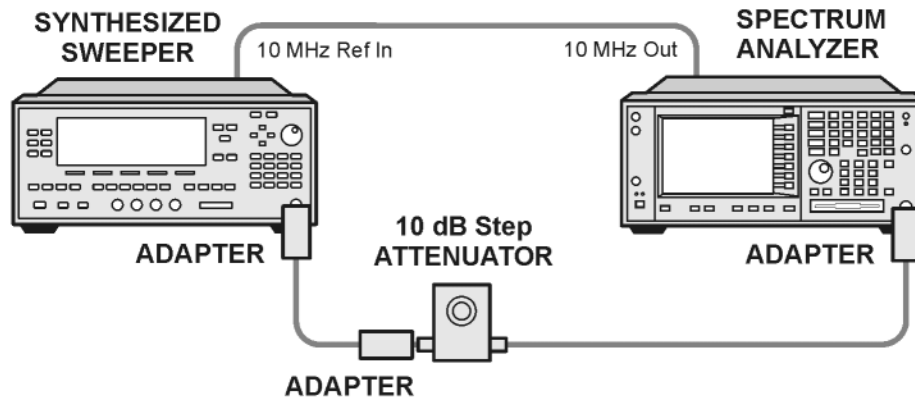
### Test Description

This test checks the amplitude linearity of the instrument by maintaining a constant reference level and measuring signals of different amplitudes over most of the display range. This test sets the input attenuator to 10 dB and the Reference Level to 0 dBm. The external attenuator is set to 0 dB, and the amplitude of the source is adjusted to set the displayed signal at the reference level.

The instrument's internal marker is used to measure the reference amplitude. The Marker Delta function is activated and the RF input is reduced using the external precision step attenuator. Signal input levels from 0 dBm to  $-50$  dBm are measured.

| Item                   | Critical Specifications<br>(for this test)   | Recommended<br>Agilent Model |
|------------------------|--|------------------------------|
| Adapter                | Type-N(m), to BNC(f)   | 1250-1476                    |
| Adapter                | 3.5 mm(f) to 3.5mm(f)  | 5061-5311                    |
| Adapter                | BNC(m) to SMA(f)   | 1250-1700                    |
| APC 3.5 mm (1 meter)   | APC 3.5 mm, 1 meter  | 8120-4921                    |
| Attenuator, 10 dB Step | <i>Range: 0-50 dB</i><br><i>Frequency: 50 MHz</i><br><i>Accuracy: <math>\pm 0.25</math> dB</i> | 355D                         |
| Cables (2 required)    | BNC, 120 cm (48 in.)   | 10503A                       |
| Synthesized Sweeper    | <i>Output Level Accuracy: 0 to <math>-15</math> dBm: <math>\pm 1.0</math> dB</i>               | 83630B                       |

Figure 3-6. Amplitude Linearity Setup



ee84a

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**NOTE** Averaging is used for all measurements to improve repeatability and reduce measurement uncertainty.

---

### Procedure

1. Configure the equipment as shown in [Figure 3-6](#).
2. Set up the synthesized sweeper by pressing:

**Frequency, 50, MHz**  
**Amplitude, -2, dBm**  
**RF On/Off, On**

3. Set up the spectrum analyzer by pressing:

**Preset (Factory Preset)**  
**Frequency, 50, MHz**  
**Span, Zero Span**

---

**NOTE** On the analyzer, ensure the reference level is 0 dBm and the attenuator is set to 10 dB.

---

**BW/AVG, 30, kHz**  
**Average, 10, Enter**  
**Marker (to turn on Marker function)**

4. Set the external 10 dB step attenuator to 0 dB.
5. Adjust the amplitude on the signal source until the marker amplitude on the analyzer reads 0 dBm  $\pm 0.2$  dB.
6. On the analyzer, press the Single key to trigger a 10 sweep average.
7. On the analyzer, activate the Marker Delta function by pressing **Marker, Delta**.
8. Perform the following steps for each attenuator setting listed in the table below:

- a. Select the next External attenuator setting.
- b. Press the **Single** key to trigger a 10 sweep average.
- c. Enter the delta marker value into [Table 3-6](#).
- d. Check delta marker reading against the test limits.

**Table 3-6 Amplitude Linearity Results**

| External Attenuator Setting | Minimum (dB) | Marker Delta Value (dB) | Maximum (dB) |
|-----------------------------|--------------|-------------------------|--------------|
| 0                           | N/A          | Reference               | N/A          |
| 10                          | -11.0        |                         | -9.0         |
| 20                          | -21.0        |                         | -19.0        |
| 30                          | -31.0        |                         | -29.0        |
| 40                          | -41.0        |                         | -39.0        |
| 50                          | -51.0        |                         | -49.0        |

## Second Harmonic Distortion (SHD)

### Test Limits

| Applied Frequency | Mixer Level | Distortion |
|-------------------|-------------|------------|
| 40 MHz            | -20 dBm     | < -55 dBc  |

### Test Description

This test checks the second harmonic distortion of the spectrum analyzer by tuning to twice the input frequency and examining the level of the distortion product. A low pass filter is inserted between the source and the spectrum analyzer to prevent the second harmonic from artificially raising the second harmonic product displayed on the analyzer.

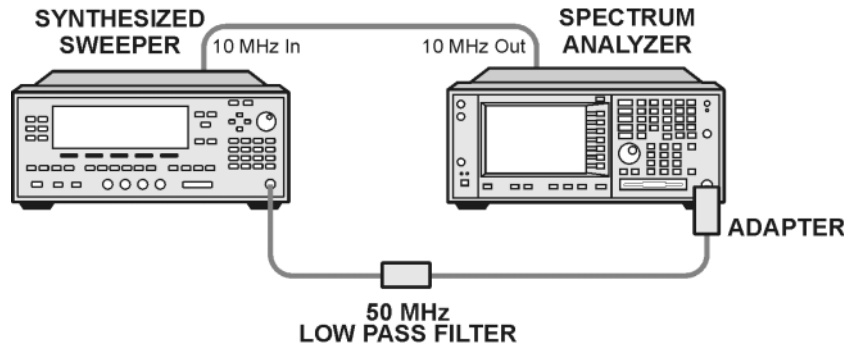
The power level at the input mixer is 20 dB higher than specified to allow the distortion product to be seen. For example, the instrument specification may state that with a -40 dBm signal at the input mixer, the distortion product should be suppressed by > -75 dBc.

The equivalent Second Harmonic Intercept (SHI) is 35 dBm (-40 dBm + 75 dBc). This test is performed with -20 dBm at the mixer and verifies the distortion product is suppressed by -55 dBc. This ensures the SHI is also 35 dBm (-20 dBm + 55 dBc).

| Item                    | Critical Specifications<br>(for this test)  | Recommended<br>Agilent Model |
|-------------------------|---|------------------------------|
| Adapter                 | Type-N(m) to BNC(f)   | 1250-1476                    |
| Adapter                 | BNC(m) to SMA(f)  | 1250-1700                    |
| Cable                   | APC 3.5 mm, 1 meter   | 8120-4921                    |
| Cable                   | BNC, 120 cm   | 10503A                       |
| Filter, 50 MHz Low Pass | <i>Cutoff Frequency: 50 MHz</i><br><i>Rejection at 65 MHz: &gt; 40 dB</i><br><i>Rejection at 75 MHz: &gt; 60 dB</i> | 0955-0306                    |
| Synthesized Sweeper     | <i>Frequency: 50 MHz</i><br><i>Spectral Purity: Better than -30 dBc</i>   | 83630B                       |



**Figure 3-7. Second Harmonic Distortion Test Setup**



ee85a

### Procedure

1. Configure the equipment as shown in [Figure 3-7](#).
2. Press **Preset** (Factory Preset) on the spectrum analyzer and the synthesized sweeper.
3. Set up the spectrum analyzer by pressing:
  - Frequency, 40, MHz**
  - Amplitude, -10, dBm**
  - Span, 1 MHz**
4. Set up the synthesized sweeper by pressing:
  - CW Frequency, 40, MHz**
  - Level, -10, dBm**
  - RF (On)**
5. On the analyzer, press **Peak Search**.
6. Adjust the synthesized sweeper amplitude for a spectrum analyzer display of  $-10 \text{ dBm} \pm 0.1 \text{ dBm}$ .
7. On the analyzer, activate the marker delta function by pressing the **Marker** and **Delta** keys.
8. Set the analyzer Center Frequency to 80 MHz.
9. Press **BW/Avg, Average**, and enter the number 20, using the numeric keypad. Then, press **Enter** to begin the twenty sweep averaging routine and read the Marker Delta value. Enter the displayed value under the Measured Second Harmonic Distortion (dBc) heading in [Table 3-7](#).

**Table 3-7. Second Harmonic Distortion Results**

| Applied Frequency (MHz) | Measured Second Harmonic Distortion (dBc) | Specification (dBc) |
|-------------------------|---|---------------------|
| 40                      |   | < -55               |

PSA Functional Tests  
**Second Harmonic Distortion (SHD)**

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## **4 ESA Functional Tests**

## Displayed Average Noise Level

### Test Limits

| Frequency Range       | Model (50 $\Omega$ Input)                             | Maximum (50 $\Omega$ Input) | TR Entry |
|-----------------------|---|-----------------------------|----------|
| 10 MHz to 500 MHz     | E4401B, E4411B E7401A                                 | - 119 dBm                   | 1        |
| 501 MHz to 1.0 GHz    | E4401B, E4411B E7401A                                 | - 117 dBm                   | 2        |
| 1.01 GHz to 1.5 GHz   | E4401B E7401A   | - 114 dBm                   | 3        |
|                       | E4411B  | - 113 dBm                   | 3        |
| 10 MHz to 1.0 GHz     | E4402B, E4403B E7402A                                 | - 117 dBm                   | 4        |
|                       | E4404B, E4405B, E4407B, E4408B E7403A, E7404A, E7405A | - 116 dBm                   | 5        |
| 1.01 GHz to 2.0 GHz   | E4402B, E4403B E7402A                                 | - 116 dBm                   | 6        |
|                       | E4404B, E4405B, E4407B E7403A, E7404A, E7405A         | - 116 dBm                   | 7        |
|                       | E4408B  | - 115 dBm                   | 8        |
| 2.01 GHz to 3.0 GHz   | E4402B, E4403B E7402A                                 | - 114 dBm                   | 9<br>8   |
|                       | E4404B, E4405B, E4407B, E4408B E7403A, E7404A, E7405A | - 112 dBm                   | 10<br>9  |
| 3.01 GHz to 6.0 GHz   | E4404B, E4405B, E4407B, E4408B E7403A, E7404A, E7405A | - 112 dBm                   | 11<br>10 |
| 6.01 GHz to 6.7 GHz   | E4404B E7403A   | - 111 dBm                   | 12<br>11 |
| 6.01 GHz to 12.0 GHz  | E4405B, E4407B E7404A, E7405A                         | - 111 dBm                   | 13<br>12 |
|                       | E4408B  | - 110 dBm                   | 14       |
| 12.01 GHz to 13.2 GHz | E4405B E7405A   | - 107 dBm                   | 15<br>13 |
|                       | E4407B, E4408B E7405A                                 | - 107 dBm                   | 16<br>14 |
| 22.01 GHz to 26.5 GHz | E4407B  | - 106 dBm                   | 17       |
|                       | E4408B  | - 101 dBm                   | 18       |

| Frequency Range       | Model (50 $\Omega$ Input) | Maximum (50 $\Omega$ Input) | TR Entry |
|-----------------------|---------------------------|-----------------------------|----------|
| 22.01 GHz to 26.5 GHz | E7405A                    | - 106 dBm                   | 15       |

| Frequency Range     | Model (75 $\Omega$ Input) | Maximum (50 $\Omega$ Input) | TR Entry |
|---------------------|---------------------------|-----------------------------|----------|
| 10 MHz to 500 MHz   | E4401B                    | - 66 dBmV                   | 19       |
| 10 MHz to 500 MHz   | E4411B                    | - 65 dBmV                   | 20       |
| 501 MHz to 1.0 GHz  | E4401B, E4411B            | - 60 dBmV                   | 21       |
| 1.01 GHz to 1.5 GHz | E4401B                    | - 56 dBmV                   | 22       |
| 1.01 GHz to 1.5 GHz | E4411B                    | - 53 dBmV                   | 23       |

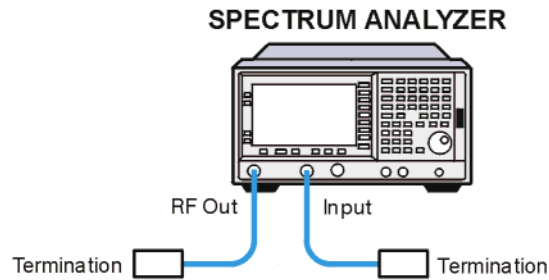
## Test Description

The Displayed Average Noise Level is measured within the frequency range specified. The analyzer input is terminated in either 50  $\Omega$  or 75  $\Omega$ , depending on analyzer options.

The test tunes the analyzer frequency across the band, uses the marker to locate the frequency with the highest response, and then reads the average noise in zero span.

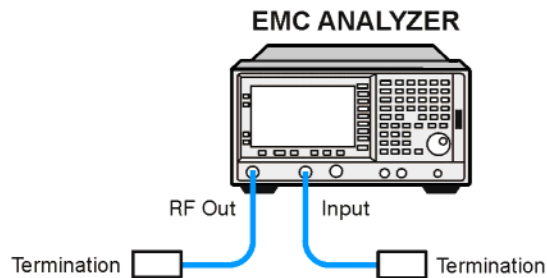
| Item   | Critical Specifications (for this test) | Recommended Agilent Model |
|--|---|---------------------------|
| <b>Adapters</b>  |   |                           |
| Termination, 50 $\Omega$<br>Type-N (m)                       |   | 908A                      |
| <b>Additional Equipment for 75 <math>\Omega</math> Input</b> |   |                           |
| Termination, 75 $\Omega$<br>Type-N (m)                       |   | 909E                      |
| Adapter, Type-N (f), to<br>BNC (m), 75 $\Omega$              |   | 1250-1534                 |

Figure 4-1 Equipment Setup



w1719a

Figure 4-2 Equipment Setup



pb932a

### Procedure (10 MHz to 500 MHz) E4401B and E4411B E7401A

1. Connect the equipment as shown in [Figure 4-1](#) [Figure 4-2](#).
2. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer. Wait for the preset routine to finish. Set the analyzer by pressing the following keys:

**FREQUENCY, Start Freq, 10, MHz**  
**Stop Freq, 500, MHz**  
**AMPLITUDE, More, Y Axis Units, dBm**  
**AMPLITUDE, -70, dBm (50  $\Omega$  Input only)**  
**AMPLITUDE, More, Y Axis Units, dBmV (75  $\Omega$  Input only)**  
**AMPLITUDE, Ref Level, -21.24, dBmV (75  $\Omega$  Input only)**  
**BW/Avg, Res BW, 1, MHz**  
**Video BW, 10, kHz**

3. Press the following keys on the analyzer:

**Single**  
**BW/Avg, Average (On), 3, Enter**  
**Single**

Wait until **AVG 3** is displayed to the left of the graticule (the analyzer will take 3 sweeps, then stop).

4. Press **Peak Search**. Record the marker frequency next to your analyzer model in the Measured Frequency column as entry (a) or (b) in [Table 4-1 on page 156](#) for 10 MHz to 500 MHz.
5. Press the following keys on the analyzer:
  - Sweep, Sweep** (Cont)
  - BW/Avg, Average** (Off)
  - BW/Avg, Res BW** (Auto)
  - Video BW** (Auto)
  - SPAN, 50, kHz**
  - FREQUENCY**
6. Press **Center Freq**, and set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (a) or (b) of [Table 4-1 on page 156](#) for 10 MHz to 500 MHz.
7. Press the following keys on the analyzer:
  - BW/Avg, Res BW, 1, kHz**
  - Video BW, 30, Hz**
  - Single**Wait for the sweep to finish.
8. Press the following keys on the analyzer:
  - Display, Display Line** (On)Adjust the display so that it is centered on the average trace noise, ignoring any residual responses.
9. Record the display line amplitude setting as TR Entry 1 (TR Entry 19 or 20 for a 75  $\Omega$  Input) in [Table 4-1 on page 156](#). The Average Noise Level should be less than the Maximum for the appropriate input impedance.

### **Procedure (501 MHz to 1.0 GHz) E4401B and E4411B E7401A**

1. Press the following keys on the analyzer:
  - Sweep, Sweep** (Cont)
  - FREQUENCY, Start Freq, 501, MHz**
  - Stop Freq, 1.0, GHz**
  - BW/Avg, Res BW, 1, MHz**
  - Video BW, 10, kHz**
2. Press the following keys on the analyzer:
  - Single**
  - BW/Avg, Average** (On), 3, **Enter**
  - Single**Wait until **AVG 3** is displayed to the left of the graticule (the analyzer will take 3 sweeps, then stop).
3. Press **Peak Search**, and record the marker frequency next to your analyzer model in the Measured Frequency column as entry (c) (b) in [Table 4-1 on page 156](#) for 501 MHz to 1.0 GHz.

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4. Press the following keys on the analyzer:

**Sweep, Sweep** (Cont)  
**BW/Avg, Average** (Off)  
**BW/Avg, Res BW** (Auto)  
Video **BW** (Auto)  
**SPAN, 50, kHz**  
**FREQUENCY**

5. Press **Center Freq**. Set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (c) (b) in [Table 4-1 on page 156](#) for 501 MHz to 1.0 GHz.

6. Press the following keys on the analyzer:

**BW/Avg, Res BW, 1, kHz**  
**Video BW, 30, Hz**  
**Single**

Wait for the sweep to finish.

7. Press the following keys on the analyzer:

**Display, Display Line** (On)

Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.

8. Record the display line amplitude setting as TR Entry 2 (TR Entry 21 for a 75  $\Omega$  Input) in [Table 4-1 on page 156](#). The Average Noise Level should be less than the Maximum for the appropriate input impedance.

### Procedure (1.01 GHz to 1.5 GHz) *E4401B and E4411B E7401A*

1. Press the following keys on the analyzer:

**Sweep, Sweep** (Cont)  
**FREQUENCY, Start Freq, 1.0 GHz**  
**Stop Freq, 1.5 GHz**  
**BW/Avg, Res BW, 1, MHz**  
**Video BW, 10, kHz**

2. Press the following keys on the analyzer:

**Single**  
**BW/Avg, Average** (On), 3, **Enter**  
**Single**

Wait until **AVG 3** is displayed to the left of the graticule (the analyzer will take 3 sweeps, then stop).

3. Press **Peak Search**, and record the marker frequency next to your analyzer model in the Measured Frequency column as entry (d) or (e) (c) in [Table 4-1 on page 156](#) for 1.01 GHz to 1.5 GHz.



4. Press the following keys on the analyzer:

**Sweep, Sweep** (Cont)  
**BW/Avg, Average** (Off)  
**BW/Avg, Res BW** (Auto)  
Video **BW** (Auto)  
**SPAN, 50, kHz**  
**FREQUENCY**

5. Press **Center Freq.** Set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (d) or (e) (c) in [Table 4-1 on page 156](#) for 1.01 GHz to 1.5 GHz.

6. Press the following keys on the analyzer:

**BW/Avg, Res BW, 1, kHz**  
**Video BW, 30, Hz**  
**Single**

Wait for the sweep to finish.

7. Press the following keys on the analyzer:

**Display, Display Line** (On)

Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.

8. Record the display line amplitude setting as TR Entry 3 (TR Entry 22 or 23 for a 75  $\Omega$  Input) in [Table 4-1 on page 156](#). The average noise level should be less than the Maximum for the appropriate input impedance.

### **Procedure (10 MHz to 1 GHz) *E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B E7402A, E7403A, E7404A, and E7405A***

1. Press **System, Power On/Preset, Preset Type** (Factory), **Preset** on the analyzer. Wait for the preset routine to finish. Set the analyzer by pressing the following keys:

**FREQUENCY, Start Freq, 10, MHz**  
**Stop Freq, 1.0, GHz**  
**AMPLITUDE, More, Y Axis Units, dBm**  
**AMPLITUDE, -70, dBm**  
**Attenuation (Man), 0, dB**  
**BW/Avg, Res BW, 1, MHz**  
**Video BW, 10, kHz**

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2. Press the following keys on the analyzer:

**Single**  
**BW/Avg, Average** (On), 3, **Enter**  
**Single**

Wait until **AVG 3** is displayed to the left of the graticule (the analyzer will take three sweeps, then stop).

3. Press **Peak Search**. Record the marker frequency next to your analyzer model in the Measured Frequency column as entry (f) or (g) (d) or (e) in [Table 4-1 on page 156](#) for 10 MHz to 1.0 GHz.

4. Press the following keys on the analyzer:

**Sweep, Sweep** (Cont)  
**BW/Avg, Average** (Off)  
**BW/Avg, Res BW** (Auto)  
**Video BW** (Auto)  
**SPAN, 50, kHz**  
**FREQUENCY**

5. Press **Center Freq**. Set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (f) or (g) (d) or (e) in [Table 4-1 on page 156](#) for 10 MHz to 1.0 GHz.

6. Press the following keys on the analyzer:

**BW/Avg, Res BW, 1, kHz**  
**Video BW, 30, Hz**  
**Single**

Wait for the sweep to finish.

7. Press the following keys on the analyzer:

**Display, Display Line** (On)

Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.

8. If the analyzer is an E4402B or E4403B E7402A, record the display line amplitude setting as TR Entry 4 in [Table 4-1 on page 156](#). Otherwise, record the display line amplitude setting as TR Entry 5 in [Table 4-1 on page 156](#). The average noise level should be less than the Maximum.

**Procedure (1.01 GHz to 2 GHz) E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B E7402A, E7403A, E7404A, and E7405A**

1. Press **System, Power On/Preset, Preset Type** (Factory), **Preset** on the analyzer. Wait for the preset routine to finish. Set the analyzer by pressing the following keys:

**FREQUENCY, Start Freq, 1.01, GHz**  
**Stop Freq, 2, GHz**  
**AMPLITUDE, More, Y Axis Units, dBm**  
**AMPLITUDE, -70, dBm**  
**Attenuation (Man), 0, dB**  
**BW/Avg, Res BW, 1, MHz**  
**Video BW, 10, kHz**

2. Press the following keys on the analyzer:

**Single**  
**BW/Avg, Average (On), 3, Enter**  
**Single**

Wait until **AVG 3** is displayed to the left of the graticule (the analyzer will take 3 sweeps and then stop).

3. Press **Peak Search**. Record the marker frequency next to your analyzer model in the Measured Frequency column as entry (h), (i) or (j) (f) or (g) in [Table 4-1 on page 156](#) for 1.01 GHz to 2 GHz.

4. Press the following keys on the analyzer:

**Sweep, Sweep (Cont)**  
**BW/Avg, Average (Off)**  
**BW/Avg, Res BW (Auto)**  
**Video BW (Auto)**  
**SPAN, 50, kHz**  
**FREQUENCY**

5. Press **Center Freq**. Set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (h), (i) or (j) (f) or (g) in [Table 4-1 on page 156](#) for 1.01 GHz to 2 GHz.

6. Press the following keys on the analyzer:

**BW/Avg, Res BW, 1, kHz**  
**Video BW, 30, Hz**  
**Single**

Wait for the sweep to finish.

7. Press the following keys on the analyzer:

**Display, Display Line (On)**

Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.

8. If the analyzer is an E4402B or E4403B E7402A, record the display line amplitude setting as TR

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Entry 6 in [Table 4-1 on page 156](#). Otherwise, record the display line amplitude setting as TR Entry 7 or 8 in [Table 4-1 on page 156](#). The average noise level should be less than the Maximum.

**Procedure (2.01 GHz to 3.0 GHz) E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B E7402A, E7403A, E7404A, and E7405A**

1. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer. Wait for the preset routine to finish. Set the analyzer by pressing the following keys:

**FREQUENCY, Start Freq, 2.01, GHz**  
**Stop Freq, 3.0, GHz**  
**AMPLITUDE, More, Y Axis Units, dBm**  
**AMPLITUDE, -70, dBm**  
**Attenuation (Man), 0, dB**  
**BW/Avg, Res BW, 1, MHz**  
**Video BW, 10, kHz**

2. Press the following keys on the analyzer:

**Single**  
**BW/Avg, Average (On), 3, Enter**  
**Single**

Wait until **AVG 3** is displayed to the left of the graticule (the analyzer will take 3 sweeps and then stop).

3. Press **Peak Search**. Record the marker frequency next to your analyzer model in the Measured Frequency column as entry (k) or (l) (h) or (i) in [Table 4-1 on page 156](#) for 2.01 GHz to 3.0 GHz.
4. Press the following keys on the analyzer:  
**Sweep, Sweep (Cont)**  
**BW/Avg, Average (Off)**  
**BW/Avg, Res BW (Auto)**  
**Video BW (Auto)**  
**SPAN, 50, kHz**  
**FREQUENCY**
5. Press **Center Freq**. Set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (k) or (l) (h) or (i) in [Table 4-1 on page 156](#) for 2.01 GHz to 3.0 GHz.
6. Press the following keys on the analyzer:

**BW/Avg, Res BW, 1, kHz**  
**Video BW, 30, Hz**  
**Single**

Wait for the sweep to finish.

7. Press the following keys on the analyzer:

**Display, Display Line (On)**

Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.

8. If the analyzer is an E4402B or E4403B E7402A, record the display line amplitude setting as TR Entry 9 8 in [Table 4-1 on page 156](#) Otherwise, record the display line amplitude setting as TR Entry 10 9 in [Table 4-1 on page 156](#) The Average Noise Level should be less than the maximum.

### **Procedure (3.01 GHz to 6.0 GHz) E4404B, E4405B, E4407B, and E4408B E7403A, E7404A, and E7405A**

1. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer. Wait for the preset routine to finish. Set the analyzer by pressing the following keys:

**FREQUENCY, Start Freq, 3.01, GHz**  
**Stop Freq, 6.0, GHz**  
**AMPLITUDE, More, Y Axis Units, dBm**  
**AMPLITUDE, -70, dBm**  
**Attenuation (Man), 0, dB**  
**BW/Avg, Res BW, 1, MHz**  
**Video BW, 10, kHz**

2. Press the following keys on the analyzer:

**Single**  
**BW/Avg, Average (On), 3, Enter**  
**Single**

Wait until **AVG 3** is displayed to the left of the graticule (the analyzer will take 3 sweeps and then stop).

3. Press **Peak Search**. Record the marker frequency next to your analyzer model in the Measured Frequency column as entry (m) (j) in [Table 4-1 on page 156](#) for 3.01 GHz to 6.0 GHz.

4. Press the following keys on the analyzer:

**Sweep, Sweep (Cont)**  
**BW/Avg, Average (Off)**  
**BW/Avg, Res BW (Auto)**  
**Video BW (Auto)**  
**SPAN, 50, kHz**  
**FREQUENCY**

5. Press **Center Freq**. Set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (m) (j) in [Table 4-1 on page 156](#) for 3.01 GHz to 6.0 GHz.

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6. Press the following keys on the analyzer:

**BW/Avg, Res BW, 1, kHz**  
**Video BW, 30, Hz**  
**Single**

Wait for the sweep to finish.

7. Press the following keys on the analyzer:

**Display, Display Line (On)**

Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.

8. Record the display line amplitude setting as TR Entry 11 10 in [Table 4-1 on page 156](#). The Average Noise Level should be less than the Maximum.

### Procedure (6.01 GHz to 6.7 GHz) *E4404B E7403A*

1. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer. Wait for the preset routine to finish. Set the analyzer by pressing the following keys:

**FREQUENCY, Start Freq, 6.01, GHz**  
**Stop Freq, 6.7, GHz**  
**AMPLITUDE, More, Y Axis Units, dBm**  
**AMPLITUDE, -70, dBm**  
**Attenuation (Man), 0, dB**  
**BW/Avg, Res BW, 1, MHz**  
**Video BW, 10, kHz**

2. Press the following keys on the analyzer:

**Single**  
**BW/Avg, Average (On), 3, Enter**  
**Single**

Wait until **AVG 3** is displayed to the left of the graticule (the analyzer will take 3 sweeps and then stop).

3. Press **Peak Search**. Record the marker frequency next to your analyzer model in the Measured Frequency column as entry (n) (k) in [Table 4-1 on page 156](#) for 6.01 GHz to 6.7 GHz.
4. Press the following keys on the analyzer:

**Sweep, Sweep (Cont)**  
**BW/Avg, Average (Off)**  
**BW/Avg, Res BW (Auto)**  
**Video BW (Auto)**  
**SPAN, 50, kHz**  
**FREQUENCY**

5. Press **Center Freq.** Set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (n) (k) in [Table 4-1 on page 156](#) for 6.01 GHz to 6.7 GHz.
6. Press the following keys on the analyzer:

**BW/Avg, Res BW, 1, kHz**  
**Video BW, 30, Hz**  
**Single**

Wait for the sweep to finish.

7. Press the following keys on the analyzer:

**Display, Display Line (On)**

Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.

8. Record the display line amplitude setting as TR Entry 12 11 in [Table 4-1 on page 156](#). The Average Noise Level should be less than the Maximum.

### **Procedure (6.01 GHz to 12.0 GHz) E4405B, E4407B, and E4408B E7404A and E7405A**

1. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer. Wait for the preset routine to finish. Set the analyzer by pressing the following keys:

**FREQUENCY, Start Freq, 6.01, GHz**  
**Stop Freq, 12.0, GHz**  
**AMPLITUDE, More, Y Axis Units, dBm**  
**AMPLITUDE, -70, dBm**  
**Attenuation (Man), 0, dB**  
**BW/Avg, Res BW, 1, MHz**  
**Video BW, 10, kHz**

2. Press the following keys on the analyzer:

**Single**  
**BW/Avg, Average (On), 3, Enter**  
**Single**

Wait until **AVG 3** is displayed to the left of the graticule (the analyzer will take 3 sweeps and then stop).

3. Press **Peak Search**. Record the marker frequency next to your analyzer model in the Measured Frequency column as entry (o) or (p) (l) in [Table 4-1 on page 156](#) for 6.01 GHz to 12.0 GHz.

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4. Press the following keys on the analyzer:

**Sweep, Sweep** (Cont)  
**BW/Avg, Average** (Off)  
**BW/Avg, Res BW** (Auto)  
**Video BW** (Auto)  
**SPAN, 50, kHz**  
**FREQUENCY**

5. Press **Center Freq**. Set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (o) or (p) (l) in [Table 4-1 on page 156](#) for 6.01 GHz to 12.0 GHz.
6. Press the following keys on the analyzer:

**BW/Avg, Res BW, 1, kHz**  
**Video BW, 30, Hz**  
**Single**

Wait for the sweep to finish.

7. Press the following keys on the analyzer:

**Display, Display Line** (On)

Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.

8. Record the display line amplitude setting as TR Entry 13 or 14 12 in [Table 4-1 on page 156](#). The average noise level should be less than the Maximum.

### Procedure (12.01 GHz to 13.2 GHz) *E4405B E7404A*

1. Press **Preset System, Power On/Preset, Preset Type** (Factory), **Preset**, on the analyzer. Wait for the preset routine to finish. Set the analyzer by pressing the following keys:

**FREQUENCY, Start Freq, 12.01, GHz**  
**Stop Freq, 13.2, GHz**  
**AMPLITUDE, More, Y Axis Units, dBm**  
**AMPLITUDE, -70, dBm**  
**Attenuation (Man), 0, dB**  
**BW/Avg, Res BW, 1, MHz**  
**Video BW, 10, kHz**

2. Press the following keys on the analyzer:

**Single**  
**BW/Avg, Average** (On), 3, **Enter**  
**Single**

Wait until **AVG 3** is displayed to the left of the graticule (the analyzer will take 3 sweeps and then stop).



3. Press **Peak Search**. Record the marker frequency next to your analyzer model in the Measured Frequency column as entry (q) (m) in [Table 4-1 on page 156](#) for 12.01 GHz to 13.2 GHz.
4. Press the following keys on the analyzer:
  - Sweep, Sweep** (Cont)
  - BW/Avg, Average** (Off)
  - BW/Avg, Res BW** (Auto)
  - Video BW** (Auto)
  - SPAN, 50, kHz**
  - FREQUENCY**
5. Press **Center Freq**. Set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (q) (m) in [Table 4-1 on page 156](#) for 12.01 GHz to 13.2 GHz.
6. Press the following keys on the analyzer:
  - BW/Avg, Res BW, 1, kHz**
  - Video BW, 30, Hz**
  - Single**Wait for the sweep to finish.
7. Press the following keys on the analyzer:
  - Display, Display Line** (On)Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.
8. Record the display line amplitude setting as TR Entry 15 13 in [Table 4-1 on page 156](#). The Average Noise Level should be less than the Maximum.

### **Procedure (12.01 GHz to 22 GHz) E4407B and E4408B E7405A**

1. Press **System, Power On/Preset, Preset Type** (Factory), **Preset** on the analyzer. Wait for the preset routine to finish. Set the analyzer by pressing the following keys:
  - FREQUENCY, Start Freq, 12.01, GHz**
  - Stop Freq, 22, GHz**
  - AMPLITUDE, More, Y Axis Units, dBm**
  - AMPLITUDE, -70, dBm**
  - Attenuation** (Man), 0, dB
  - BW/Avg, Res BW, 1, MHz**
  - Video BW, 10, kHz**

ESA Functional Tests  
Displayed Average Noise Level

2. Press the following keys on the analyzer:

**Single**  
**BW/Avg, Average (On), 3, Enter**  
**Single**

Wait until **AVG 3** is displayed to the left of the graticule (the analyzer will take 3 sweeps and then stop).

3. Press **Peak Search**. Record the marker frequency next to your analyzer model in the Measured Frequency column as entry (r) (n) in [Table 4-1 on page 156](#) for 12.01 GHz to 22 GHz.
4. Press the following keys on the analyzer:

**Sweep, Sweep (Cont)**  
**BW/Avg, Average (Off)**  
**BW/Avg, Res BW (Auto)**  
**Video BW (Auto)**  
**SPAN, 50, kHz**  
**FREQUENCY**

5. Press **Center Freq**. Set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (r) (n) in [Table 4-1 on page 156](#) for 12.01 GHz to 22 GHz.
6. Press the following keys on the analyzer:

**BW/Avg, Res BW, 1, kHz**  
**Video BW, 30, Hz**  
**Single**

Wait for the sweep to finish.

7. Press the following keys on the analyzer:

**Display, Display Line (On)**

Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.

8. Record the display line amplitude setting as TR Entry 16 14 in [Table 4-1 on page 156](#). The Average Noise Level should be less than the Maximum.

### Procedure (22.01 GHz to 26.5 GHz) *E4407B and E4408B E7405A*

1. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer. Wait for the preset routine to finish. Set the analyzer by pressing the following keys:

**FREQUENCY, Start Freq, 22.01, GHz**  
**Stop Freq, 26.5, GHz**  
**AMPLITUDE, More, Y Axis Units, dBm**  
**AMPLITUDE, -70, dBm**  
**Attenuation (Man), 0, dB**  
**BW/Avg, Res BW, 1, MHz**  
**Video BW, 10, kHz**

2. Press the following keys on the analyzer:

**Single**  
**BW/Avg, Average** (On), 3, **Enter**  
**Single**

Wait until AVG 3 is displayed to the left of the graticule (the analyzer will take 3 sweeps and then stop).

3. Press **Peak Search**. Record the marker frequency next to your analyzer model in the Measured Frequency column as entry (s) or (t) (o) in [Table 4-1 on page 156](#) for 22.01 GHz to 26.5 GHz.

4. Press the following keys on the analyzer:

**Sweep, Sweep** (Cont)  
**BW/Avg, Average** (Off)  
**BW/Avg, Res BW** (Auto)  
**Video BW** (Auto)  
**SPAN, 50, kHz**  
**FREQUENCY**

5. Press **Center Freq**. Set the center frequency of the analyzer to the frequency recorded in the Measured Frequency column as entry (s) or (t) (o) in [Table 4-1 on page 156](#) for 22.01 GHz to 26.5 GHz.

6. Press the following keys on the analyzer:

**BW/Avg, Res BW, 1, kHz**  
**Video BW, 30, Hz**  
**Single**

Wait for the sweep to finish.

7. Press the following keys on the analyzer:

**Display, Display Line** (On)

Adjust the display line so that it is centered on the average trace noise, ignoring any residual responses.

8. Record the display line amplitude setting as TR Entry 17 or 18 15 in [Table 4-1 on page 156](#). The Average Noise Level should be less than the Maximum.

ESA Functional Tests  
Displayed Average Noise Level

**Table 4-1 Display Average Noise Level Worksheet**

| Model Number                   | Frequency Range     | Measured Frequency | Average Noise Level (TR Entry) | Maximum           |                   |
|--------------------------------|---------------------|--------------------|--------------------------------|-------------------|-------------------|
|                                |                     |                    |                                | 50 $\Omega$ Input | 75 $\Omega$ Input |
| E4401B                         | 10 MHz to 500 MHz   | (a) _____          | (1) or (19) _____              | - 119 dBm         | - 66 dBmV         |
| E7401A                         | 10 MHz to 500 MHz   | (a) _____          | (1) _____                      | - 119 dBm         | N/A               |
| E4411B                         | 10 MHz to 500 MHz   | (b) _____          | (1) or (20) _____              | - 119 dBm         | - 65 dBmV         |
| E4401B, E4411B                 | 501 MHz to 1.0 GHz  | (c) _____          | (2) or (21) _____              | - 117 dBm         | - 60 dBmV         |
| E7401A                         | 501 MHz to 1.0 GHz  | (b) _____          | (2) _____                      | - 117 dBm         | N/A               |
| E4401B                         | 1.01 GHz to 1.5 GHz | (d) _____          | (3) or (22) _____              | - 114 dBm         | - 56 dBmV         |
| E7401A                         | 1.01 GHz to 1.5 GHz | (c) _____          | (3) _____                      | - 114 dBm         | N/A               |
| E4411B                         | 1.01 GHz to 1.5 GHz | (e) _____          | (3) or (23) _____              | - 113 dBm         | - 53 dBmV         |
| E4402B, E4403B                 | 10 MHz to 1.0 GHz   | (f) _____          | (4) _____                      | - 117 dBm         | N/A               |
| E7402A                         | 10 MHz to 1.0 GHz   | (d) _____          | (4) _____                      | - 117 dBm         | N/A               |
| E4404B, E4405B, E4407B, E4408B | 10 MHz to 1.0 GHz   | (g) _____          | (5) _____                      | - 116 dBm         | N/A               |
| E7403A, E7404A, E7405A         | 10 MHz to 1.0 GHz   | (e) _____          | (5) _____                      | - 116 dBm         | N/A               |
| E4402B, E4403B                 | 1.01 GHz to 2.0 GHz | (h) _____          | (6) _____                      | - 116 dBm         | N/A               |
| E7402A                         | 1.01 GHz to 2.0 GHz | (f) _____          | (6) _____                      | - 116 dBm         | N/A               |
| E4404B, E4405B, E4407B         | 1.01 GHz to 2.0 GHz | (i) _____          | (7) _____                      | - 116 dBm         | N/A               |
| E7403A, E7404A, E7405A         | 1.01 GHz to 2.0 GHz | (g) _____          | (7) _____                      | - 116 dBm         | N/A               |
| E4408B                         | 1.01 GHz to 2.0 GHz | (j) _____          | (8) _____                      | - 115 dBm         | N/A               |
| E4402B, E4403B                 | 2.01 GHz to 3.0 GHz | (k) _____          | (9) _____                      | - 114 dBm         | N/A               |
| E7402A                         | 2.01 GHz to 3.0 GHz | (h) _____          | (8) _____                      | - 114 dBm         | N/A               |
| E4404B, E4405B, E4407B, E4408B | 2.01 GHz to 3.0 GHz | (l) _____          | (10) _____                     | - 112 dBm         | N/A               |
| E7403A, E7404A, E7405A         | 2.01 GHz to 3.0 GHz | (i) _____          | (9) _____                      | - 112 dBm         | N/A               |
| E4404B, E4405B, E4407B, E4408B | 3.01 GHz to 6.0 GHz | (m) _____          | (11) _____                     | - 112 dBm         | N/A               |

**Table 4-1 Display Average Noise Level Worksheet (Continued)**

| Model Number           | Frequency Range       | Measured Frequency | Average Noise Level (TR Entry) | Maximum           |                   |
|------------------------|-----------------------|--------------------|--------------------------------|-------------------|-------------------|
|                        |                       |                    |                                | 50 $\Omega$ Input | 75 $\Omega$ Input |
| E7403A, E7404A, E7405A | 3.01 GHz to 6.0 GHz   | (j) _____          | (10) _____                     | - 112 dBm         | N/A               |
| E4404B                 | 6.01 GHz to 6.7 GHz   | (n) _____          | (12) _____                     | - 111 dBm         | N/A               |
| E7403A                 | 6.01 GHz to 6.7 GHz   | (k) _____          | (11) _____                     | - 111 dBm         | N/A               |
| E4405B, E4407B         | 6.01 GHz to 12.0 GHz  | (o) _____          | (13) _____                     | - 111 dBm         | N/A               |
| E7404A, E7405A         | 6.01 GHz to 12.0 GHz  | (l) _____          | (12) _____                     | - 111 dBm         | N/A               |
| E4408B                 | 6.01 GHz to 12.0 GHz  | (p) _____          | (14) _____                     | - 110 dBm         | N/A               |
| E4405B                 | 12.01 GHz to 13.2 GHz | (q) _____          | (15) _____                     | - 107 dBm         | N/A               |
| E7405A                 | 12.01 GHz to 13.2 GHz | (m) _____          | (13) _____                     | - 107 dBm         | N/A               |
| E4407B, E4408B         | 12.01 GHz to 22 GHz   | (r) _____          | (16) _____                     | - 107 dBm         | N/A               |
| E7405A                 | 12.01 GHz to 22 GHz   | (n) _____          | (14) _____                     | - 107 dBm         | N/A               |
| E4407B                 | 22.01 GHz to 26.5 GHz | (s) _____          | (17) _____                     | - 106 dBm         | N/A               |
| E4408B                 | 22.01 GHz to 26.5 GHz | (t) _____          | (18) _____                     | - 101 dBm         | N/A               |
| E7405A                 | 22.01 GHz to 26.5 GHz | (o) _____          | (15) _____                     | - 101 dBm         | N/A               |

## EMI Detector Test

### Test Limits

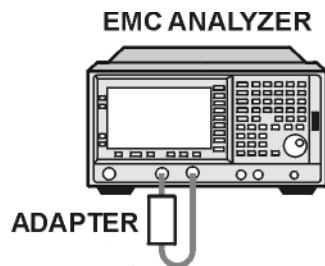
| Test Description        | Test Limits)                        |
|-------------------------|-------------------------------------|
| EMI Detector Procedures | Peak, Quasi-Peak, or Average Values |
| 200 Hz Procedure        | +/- 2 dB                            |
| 9 kHz Procedure         |                                     |
| 120 kHz Procedure       |                                     |

### Test Description

The internal 50 MHz signal is applied to the input of the analyzer. For each of the CISPR filters (200 Hz, 9 kHz, and 120 kHz) a peak, quasi-peak, and average measurement is made on the 50 MHz CW signal.

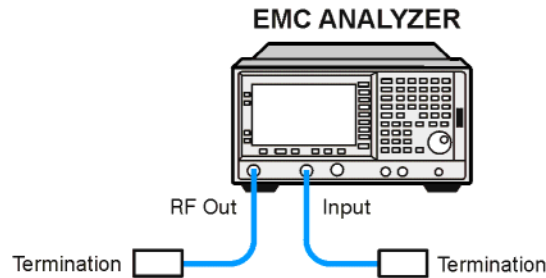
| Item                         | Critical Specifications (for this test) | Recommended Agilent Model |
|------------------------------|---|---------------------------|
| <b>Adapters</b>              |   |                           |
| Type-N (m) to BNC (f)        |   | 1250-0780                 |
| <b>Cables</b>                |   |                           |
| BNC (m) to BNC (m), 9 inches |   | HP 10502A                 |

Figure 4-3. Equipment Setup



W1719es

Figure 4-4 Equipment Setup



pb932a

## 200 Hz Procedure

1. Connect the equipment as shown in Figure 4-3. on page 158.

---

**NOTE** For the E7401A, it is not necessary to connect the AMPTD REF OUT to the analyzer's 50 $\Omega$  input. It switches internally.

---

2. Press **Preset** on the analyzer and wait for the preset routine to finish. Set the analyzer up by pressing the following keys:

**Input/Output, Amptd Ref Out (f=50 MHz) (On)**  
**FREQUENCY, Center Freq, 50, MHz**  
**Span, 2, kHz**  
**AMPLITUDE, Attenuation, 5, dB, More, Y Axis Units, dBm**  
**BW/Avg, Res BW, 200 Hz, Video BW, 300, Hz**  
**AMPLITUDE, 25, —dBm (E7401A only)**  
**AMPLITUDE, 20, —dBm (E7402A, E7403A, E7404A, and E7405A only)**  
**Peak Search**  
**MEASURE, Meas at Marker**

3. Wait for the Measure at Marker routine to finish and then record the peak, quasi-peak, and average values measured by the analyzer. When the measurement is complete, a box will appear in the upper left hand corner of the screen with the most recent measurement information. Record these on your worksheet (in Table 4-2 on page 161) in 200 Hz Procedure.

## 9 kHz Procedure

1. Connect the equipment as shown in Figure 4-3. on page 158.

---

**NOTE** For the HP E7401A, it is not necessary to connect the AMPTD REF OUT to the analyzer's 50 $\Omega$  input. It switches internally.

---

2. Press **Preset** on the analyzer and wait for the preset routine to finish. Set the analyzer up by pressing the following keys:

**Input/Output, Amptd Ref Out (f=50 MHz) (On)**  
**FREQUENCY, Center Freq, 50, MHz**  
**Span, 500, kHz**  
**AMPLITUDE, Attenuation, 5, dB, More, Y Axis Units, dBm**  
**BW/Avg, Res BW, 9 kHz, Video BW, 10, Hz**  
**AMPLITUDE, 25, —dBm (E7401A only)**  
**AMPLITUDE, 20, —dBm (E7402A, E7403A, E7404A, and E7405A only)**  
**Peak Search**  
**MEASURE, Meas at Marker**

3. Wait for the Measure at Marker routine to finish and then record the peak, quasi-peak, and average values measured by the analyzer. When the measurement is complete, a box will appear in the upper left hand corner of the screen with the most recent measurement information. Record these in your worksheet (in [Table 4-2 on page 161](#)) in 9 kHz Procedure.

## 120 kHz Procedure

1. Connect the equipment as shown in Figure 4-3. on page 158.

---

**NOTE** For the HP E7401A, it is not necessary to connect the AMPTD REF OUT to the analyzer's 50Ω input. It switches internally.

---

2. Press **Preset** on the analyzer and wait for the preset routine to finish. Set the analyzer up by pressing the following keys:

**Input/Output, Amptd Ref Out (f=50 MHz) (On)**  
**FREQUENCY, Center Freq, 50, MHz**  
**Span, 2, MHz**  
**AMPLITUDE, Attenuation, 5, dB, More, Y Axis Units, dBm**  
**BW/Avg, Res BW, 120 kHz, Video BW, 300, Hz**  
**AMPLITUDE, 25, —dBm (E7401A only)**  
**AMPLITUDE, 20, —dBm (E7402A, E7403A, E7404A, and E7405A only)**  
**Peak Search**  
**MEASURE, Meas at Marker**

3. Wait for the Measure at Marker routine to finish and then record the peak, quasi-peak, and average values measured by the analyzer. When the measurement is complete, a box will appear in the upper left hand corner of the screen with the most recent measurement information. Record these in your worksheet (in [Table 4-2 on page 161](#)) in 120 kHz Procedure.



**Table 4-2 EMI Detector Worksheet**

| Test Description        | Detector |            |         |
|-------------------------|----------|------------|---------|
| EMI Detector Procedures | Peak     | Quasi-peak | Average |
| 200 Hz Procedure        |          |            |         |
| 9 kHz Procedure         |          |            |         |
| 120 kHz Procedure       |          |            |         |

## Frequency Readout Accuracy

### Test Limits

| Span  | Minimum)        | Maximum         |
|---|-----------------|-----------------|
| 10 MHz  | 1.48988 GHz     | 1.49012 GHz     |
| 100 kHz   | 1.4899988 GHz   | 1.4900012 GHz   |
| Marker Count Accuracy with Counter Resolution at 1 Hz | 1.489999999 GHz | 1.490000001 GHz |

### Test Description

The frequency readout accuracy of the analyzer is tested with an input signal of known frequency. Frequency reference error is eliminated by using the same frequency standard for the analyzer and the signal source.

| Item   | Critical Specifications (for this test)       | Recommended Agilent Model        |
|--|---|----------------------------------|
| <b>Signal Sources</b>                        |   |                                  |
| Synthesized Sweeper or Signal Generator      | 10 MHz to 1.5 GHz<br>External Reference Input | 8340A/B, 836XX Series, or E8257D |
| <b>Adapters</b>                              |   |                                  |
| Type-N (f), to APC 3.5(f)                    |   | 1250-1745                        |
| <b>Cables</b>                                |   |                                  |
| Type-N, 152-cm (60-in)                       |   | 11500D                           |
| BNC, 122-cm (48-in)                          |   | 10503A                           |
| <b>Additional Equipment for 75-Ohm Input</b> |   |                                  |
| Pad, minimum loss                            |   | 11852B                           |
| Type-N (f), to BNC (m), 75 $\Omega$          |   | 1250-1534                        |

Figure 4-5. Equipment Setup

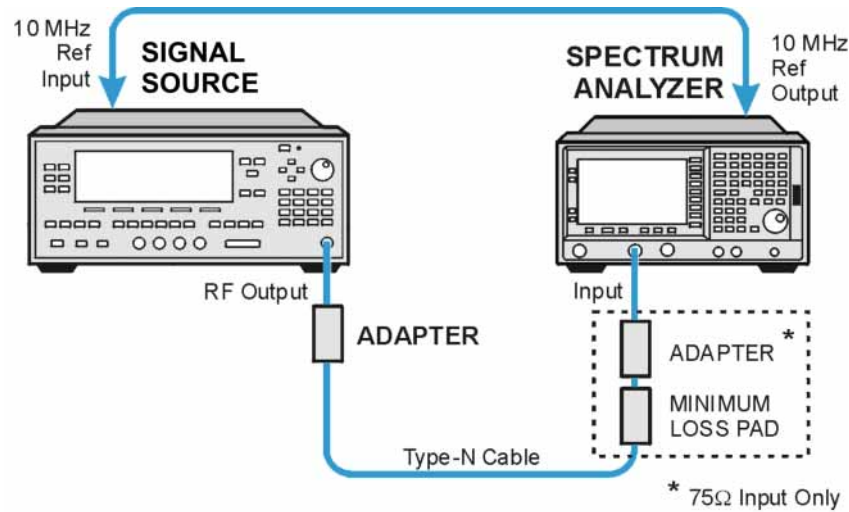
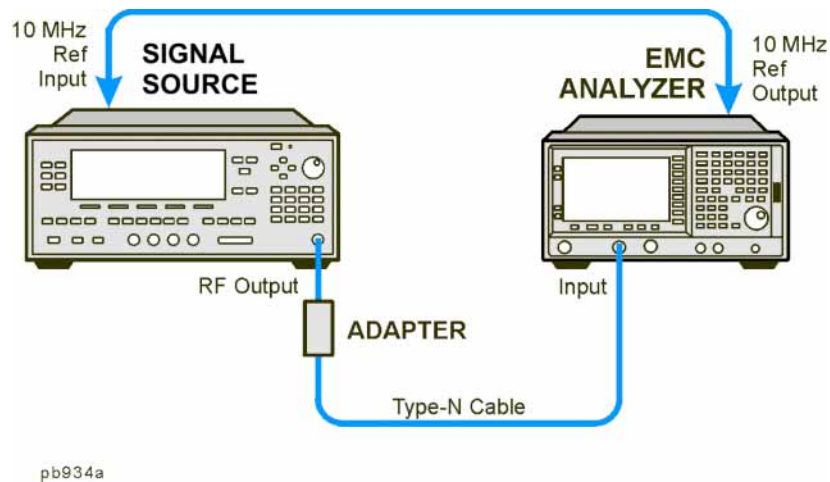


Figure 4-6 Equipment Setup



## Procedure

1. Connect the equipment as shown in [Figure 4-5](#). or [Figure 4-6](#). Remember to connect the 10 MHz REF OUT of the analyzer to the 10 MHz REF IN of the signal source.

---

**IMPORTANT** If an E8257D is being used as a signal source an “Error-512, Reference Unlocked” message may appear. This message informs the user that the reference has changed from internal to external reference and is normal behavior. This error has been logged to the error queue. Clear this error by pressing **Utility, Error Info, Clear Error Queue (s)**. Now continue with Step 2.

---

ESA Functional Tests  
Frequency Readout Accuracy

2. Perform the following steps to set up the equipment:
  - a. Press **INSTRUMENT PRESET** on the signal source, then set the controls as follows:

**CW, 1.490, GHz**  
**POWER LEVEL, 10, – dBm**
  - b. Press **System, Power On/Preset, Preset Type** (Factory), **Preset** on the analyzer, then wait for the preset routine to finish. Set the analyzer by pressing the following keys:

**Frequency, Center Freq, 1.490, GHz**  
**SPAN, 10, MHz**  
**BW/Avg, Res BW, 100, kHz**  
**Video BW, 30, kHz**

---

**CAUTION** Use only 75  $\Omega$  cables, connectors, or adapters on analyzers with 75  $\Omega$  inputs, or damage to connectors will occur.

---

3. Press **Peak Search** on the analyzer to measure the frequency readout accuracy. Record this in the Marker Frequency Readout column in [Table 4-3 on page 165](#).
4. Press **Span, 100, kHz, BW/Avg, Res BW, 1, kHz, Video BW, 1, kHz**.
5. Press **Peak Search** on the analyzer to measure the frequency readout accuracy. Record this in the Marker Frequency Readout column in [Table 4-3 on page 165](#).

---

**NOTE** The Frequency Readout Accuracy is now complete. Continue with the Marker Count Accuracy functional check.

---

## Marker Count Accuracy

### Procedure

1. Press **System, Power On/Presets, Preset Type (Factory), Preset** on the analyzer, then wait for the preset routine to finish. Set the analyzer to measure the marker count accuracy by pressing the following keys:

**Frequency, Center Freq, 1.490, GHz**

**SPAN, 10, MHz**

**BW/Avg, Res BW, 100, kHz**

**Freq Count, Resolution, 1, Hz**

2. Press **Peak Search**, then wait for a count to be taken (it may take several seconds).
3. Record the **Cnt:r1** frequency as the Marker Frequency Readout in [Table 4-3](#).

**Table 4-3 Frequency Readout and Marker Count Accuracy Worksheet**

| Span   | Minimum         | Marker Frequency Readout | Maximum         |
|--|-----------------|--------------------------|-----------------|
| 10 MHz   | 1.48988 GHz     |                          | 1.49012 GHz     |
| 100 kHz  | 1.4899988 GHz   |                          | 1.4900012 GHz   |
| Marker Count Accuracy w/Counter Resolution at 1 Hz | 1.489999999 GHz |                          | 1.490000001 GHz |

## Frequency Response (Flatness)

### Test Limits

| ESA EMC Model             | Frequency            | Minimum (dB) | Maximum (dB) |
|---------------------------|----------------------|--------------|--------------|
| E4411B & E4401B<br>E7401A | 9 kHz to 1.5 GHz     | -1.5         | 1.5          |
| E4402B & E4403B<br>E7402A | 9 kHz to 3 GHz       | -1.5         | 1.5          |
| E4404B<br>E7403A          | 9 kHz to 3 GHz       | -1.5         | 1.5          |
|                           | 3.01 GHz to 6.7 GHz  | -3.0         | 3.0          |
| E4405B<br>E7404A          | 9 kHz to 3 GHz       | -1.5         | 1.5          |
|                           | 3.01 GHz to 6.7 GHz  | -3.0         | 3.0          |
|                           | 6.71 GHz to 13.2 GHz | -3.5         | 3.5          |
| E4407B & E4408B<br>E7405A | 9 kHz to 3 GHz       | -1.5         | 1.5          |
|                           | 3.01 GHz to 6.7 GHz  | -3.0         | 3.0          |
|                           | 6.71 GHz to 13.2 GHz | -3.5         | 3.5          |
|                           | 13.21 GHz to 25 GHz  | -4.0         | 4.0          |
|                           | 25 GHz to 26.5 GHz   | -4.5         | 4.5          |

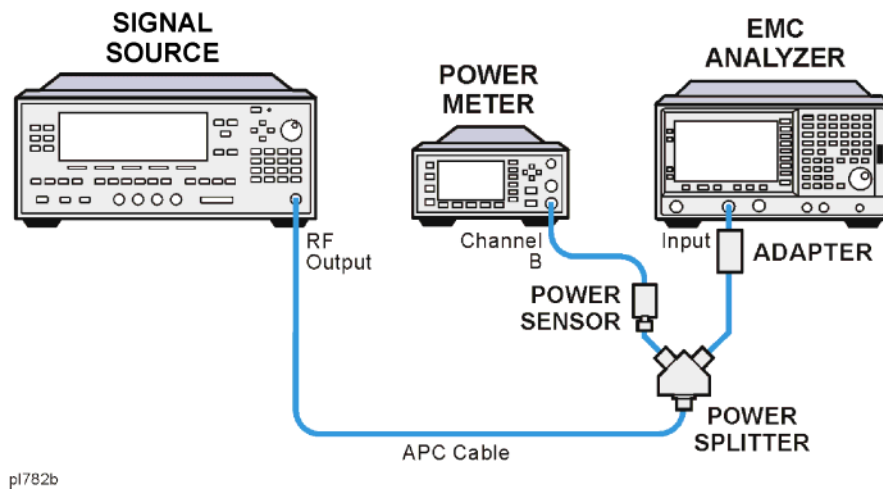
### Test Description

The output of the signal source is fed through a power splitter to a power sensor and the analyzer as shown in [Figure 4-7](#), or [Figure 4-8](#). The signal source's power level is adjusted at 50 MHz to place the displayed signal at the analyzer center horizontal graticule line. Measurements are made at various points depending on the model being tested. The signal source amplitude is measured with a power meter to eliminate errors due to source flatness. The power meter is zeroed and calibrated before starting the measurement.

| Item                                    | Critical Specifications (for this test) | Recommended Agilent Model        |
|---|---|----------------------------------|
| <b>Signal Sources</b>                   |   |                                  |
| Synthesized Sweeper or Signal Generator |   | 8340A/B, 836xx Series, or E8257D |
| <b>Adapters</b>                         |   |                                  |

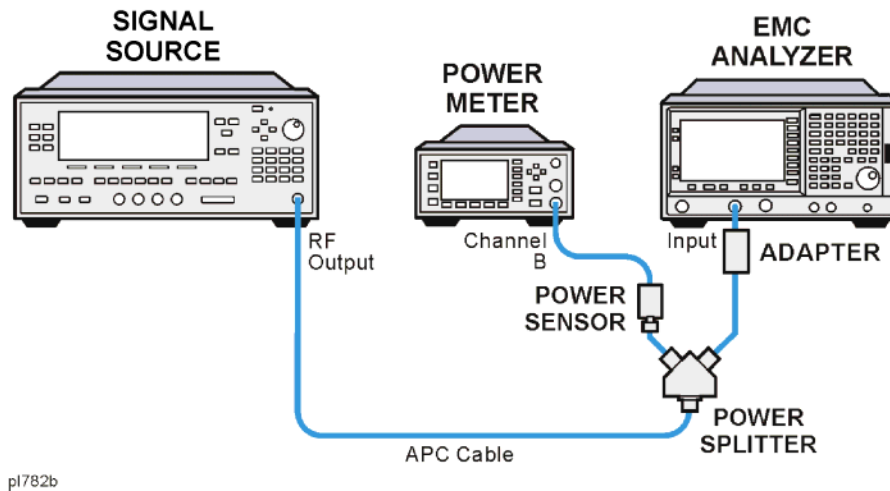
| Item   | Critical Specifications<br>(for this test) | Recommended<br>Agilent Model |
|--|--|------------------------------|
| Type-N (f) to BNC (f)                        |  | 1250-1474                    |
| APC 3.5 (f) to APC 3.5 (f)                   |  | 5061-5311                    |
| BNC (f) to SMA (m)                           |  | 1250-1237                    |
| Type-N (m), to APC 3.5(m)                    |  | 1250-1743                    |
| <b>Cables</b>                                |  |                              |
| (2) APC 3.5mm (36 in)                        | E4407B and E4408B only<br>E7405A only      | 8120-4921 or 11500E          |
| BNC (m) both ends, (48 in)                   |  | 10503A                       |
| <b>Additional Equipment for 75-Ohm Input</b> |  |                              |
| Pad, minimum loss                            |  | 11852B                       |
| Type-N (f), to BNC (m)                       |  | 1250-1534                    |
| <b>Miscellaneous</b>                         |  |                              |
| Power Meter                                  |  | EPM-441A (E4418A)            |
| Power Sensor, 75 $\Omega$                    |  | 8483A                        |
| Power Sensor, 50 $\Omega$                    |  | 8485A                        |
| Power Splitter                               |  | 11667B                       |

**Figure 4-7. Equipment Setup**



pl782b

Figure 4-8. Equipment Setup



## Procedure

1. Zero and calibrate the power meter and power sensor as described in the power meter operation manual.
2. Connect the equipment as shown in [Figure 4-7.](#) or [Figure 4-8.](#)

---

**CAUTION** Use only 75  $\Omega$  cables, connectors, or adapters on analyzers with 75  $\Omega$  connectors, or damage to the connectors will occur.

---

3. Set the signal source controls as follows:

**FREQUENCY, Center Freq, 50, MHz**

**POWER LEVEL, -8, dBm**

4. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer and wait for the preset routine to finish. Set the analyzer by pressing the following keys.

**FREQUENCY, 50, MHz**

**CF Step, 50, MHz**

**SPAN, 20, kHz**

**AMPLITUDE, More, Y Axis Units, dBm**

**AMPLITUDE, -10, dBm**

**AMPLITUDE, Attenuation, 10, dB**

**Scale/Div, 2, dB**

**BW/Avg, Res BW, 10, kHz**

**Video BW, 3, kHz**

**Peak Search**

**FREQUENCY, Signal Track (On)**

5. Adjust the signal source power level for a marker amplitude reading of -14 dBm  $\pm$  0.10 dB.



---

**NOTE** The power level of the signal source remains unchanged for the duration of the test. For each new test frequency, the power sensor cal factor should be entered to minimize measurement errors.

---

6. Refer to [Table 4-4 on page 170](#) Enter the marker readout amplitude for 50 MHz as displayed on the analyzer in the Analyzer Amplitude column.
7. Enter the power meter reading in the Power Meter Amplitude column.
8. Compute the flatness error at 50 MHz using the following equation and record the results in the Flatness Error column:

$$\text{Flatness Error} = \text{Analyzer Amplitude} - \text{Power Meter Amplitude}$$

9. Perform the following steps for each center frequency setting listed in [Table 4-4 on page 170](#).
  - a. Tune the source to the next frequency listed in the Center Frequency column.
  - b. Enter the power sensor cal factor for the new test frequency.
  - c. Tune the analyzer center frequency by pressing the  $\hat{\uparrow}$  key or press **FREQUENCY**, **Center Freq**, “n”, and **MHz** (where “n” is the next test frequency in [Table 4-4 on page 170](#)).
  - d. Press **Peak Search**.
  - e. Enter the power meter reading in the Power Meter Amplitude column.
  - f. Enter the analyzer reading in the Analyzer Amplitude column.
  - g. Compute the flatness error using the following equation and record the results in the Flatness Error column:

$$\text{Flatness Error} = \text{Analyzer Amplitude} - \text{Power Meter Amplitude}$$

The flatness error should be less than the specified amount.

ESA Functional Tests  
**Frequency Response (Flatness)**

**Table 4-4    Frequency Response Worksheet**

| Model                              | Center Freq | Analyzer Amplitude | Power Meter Amplitude | Flatness Error | Flatness Error Test Limits (dB) |
|------------------------------------|-------------|--------------------|-----------------------|----------------|---------------------------------|
| All Models                         | 50 MHz      |                    |                       |                | ± 1.5                           |
|                                    | 100 MHz     |                    |                       |                | ± 1.5                           |
|                                    | 750 MHz     |                    |                       |                | ± 1.5                           |
|                                    | 1250 MHz    |                    |                       |                | ± 1.5                           |
|                                    | 1500 MHz    |                    |                       |                | ± 1.5                           |
| E4402B – E4408B<br>E7402A – E7405A | 2000 MHz    |                    |                       |                | ± 1.5                           |
|                                    | 2500 MHz    |                    |                       |                | ± 1.5                           |
|                                    | 2999 MHz    |                    |                       |                | ± 1.5                           |
| E4402B – E4408B<br>E7402A – E7405A | 4250 MHz    |                    |                       |                | ± 3.0                           |
|                                    | 5750 MHz    |                    |                       |                | ± 3.0                           |
|                                    | 6699 MHz    |                    |                       |                | ± 3.0                           |
| E4402B – E4408B<br>E7402A – E7405A | 8000 MHz    |                    |                       |                | ± 3.5                           |
|                                    | 9000 MHz    |                    |                       |                | ± 3.5                           |
|                                    | 10000 MHz   |                    |                       |                | ± 3.5                           |
|                                    | 11000 MHz   |                    |                       |                | ± 3.5                           |
|                                    | 13199 MHz   |                    |                       |                | ± 3.5                           |
| E4407B & E4408B<br>E7405A          | 14000 MHz   |                    |                       |                | ± 4.0                           |
|                                    | 19000 MHz   |                    |                       |                | ± 4.0                           |
|                                    | 24000 MHz   |                    |                       |                | ± 4.0                           |
|                                    | 26500 MHz   |                    |                       |                | ± 4.5                           |

## Reference Level Accuracy

### Test Limits

| Reference Level |        | Minimum (dB) | Maximum (dB) |
|-----------------|--------|--------------|--------------|
| dBm             | dBmV   |              |              |
| -30             | 21.76  | Reference    | Reference    |
| -20             | 31.76  | -1.40        | 1.40         |
| -10             | 41.76  | -1.40        | 1.40         |
| -40             | 11.76  | -1.40        | 1.40         |
| -50             | 1.76   | -1.40        | 1.40         |
| -60             | -8.24  | -1.40        | 1.40         |
| -70             | -18.24 | -2.0         | 2.0          |

### Test Description

A 50 MHz CW signal is applied to the Input of the analyzer. The amplitude of the signal source and the analyzer's reference level are decreased in 10 dB steps. The analyzer marker functions are used to measure the amplitude difference between steps. Reference Level Accuracy is tested in both Log and Linear Scale Modes. Most of the error is contributed from the output attenuator inaccuracy in the signal source and not the analyzer.

| Item   | Critical Specifications (for this test)  | Recommended Agilent Model        |
|--|--|----------------------------------|
| <b>Signal Sources</b>                        |  |                                  |
| Synthesized Sweeper or Signal Generator      | Output Level Accuracy<br>0 to -15 dBm: $\pm 1.0$ dB<br>-16 dBm to -63 dBm: $\pm 1.4$ dB<br>$\leq -64$ dBm: $\geq 2.0$ dB | 8340A/B, 836XX Series, or E8257D |
| <b>Adapters</b>                              |  |                                  |
| Type-N (m), to BNC (f)                       |  | 1250-1476                        |
| Type-N (m), to APC 3.5 (f)                   |  | 1250-1745                        |
| <b>Cables</b>                                |  |                                  |
| Type-N, 152-cm (60-in)                       |  | 11500D                           |
| BNC, 122-cm (48-in)                          |  | 10503A                           |
| <b>Additional Equipment for 75-Ohm Input</b> |  |                                  |
| Pad, minimum loss                            |  | 11852B                           |

ESA Functional Tests  
Reference Level Accuracy

| Item                   | Critical Specifications<br>(for this test) | Recommended<br>Agilent Model |
|------------------------|--|------------------------------|
| Type-N (f), to BNC (m) |  | 1250-1534                    |

Figure 4-9. Equipment Setup

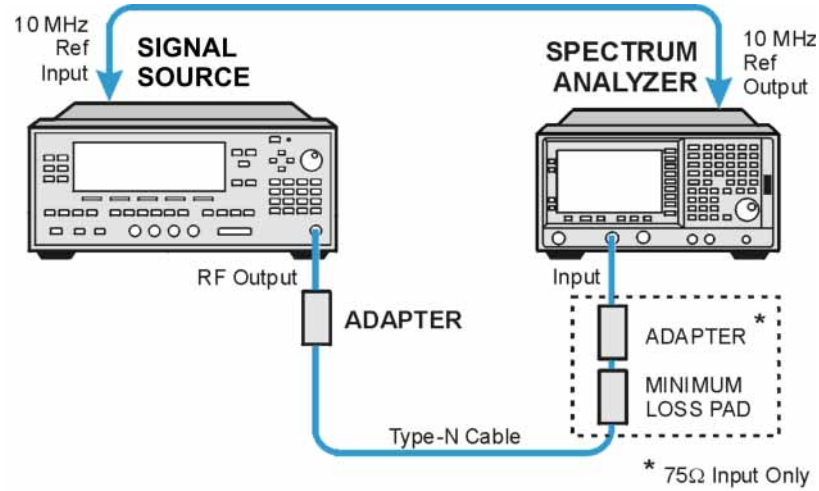
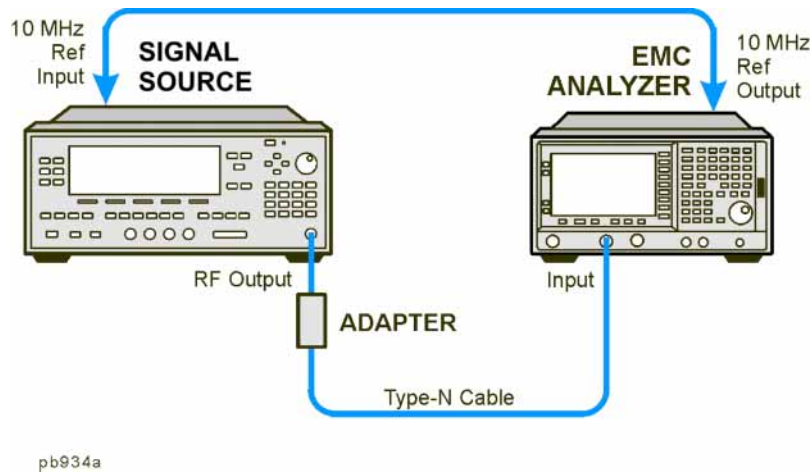


Figure 4-10 Equipment Setup



## Log Mode Procedure

1. Connect the equipment as shown in [Figure 4-9.](#) or [Figure 4-10.](#)

---

**IMPORTANT** If an E8257D is being used as a signal source an “Error-512, Reference Unlocked” message may appear. This message informs the user that the reference has changed from internal to external reference and is normal behavior. This error has been logged to the error queue. Clear this error by pressing **Utility, Error Info, Clear Error Queue (s)**. Now continue with Step 2.

---

2. Press **PRESET** on the signal source. Set the signal source controls as follows:

**CW, 50, MHz**  
**Power Level, -30, dBm**

3. Press **System, Power On/Presets, Preset Type (Factory), Preset** on the analyzer, then wait for the preset routine to finish. Press **System, Alignments, Auto Align, Off**. Set the analyzer by pressing the following keys:

**FREQUENCY, Center Freq, 50, MHz**  
**SPAN, 50, kHz**  
**AMPLITUDE, More, Y Axis Units, dBm**  
**AMPLITUDE, -30, dBm (50 Ω Input only)**  
**AMPLITUDE, More, Y Axis Units, dBmV (75 Ω Input only)**  
**AMPLITUDE, 21.76, dBmV (75 Ω Input only)**  
**Attenuation (Man), 5, dB**  
**BW/Avg, Res BW, 3, kHz**  
**Video BW, 30, Hz**

4. Press **Peak Search** on the analyzer. Adjust the amplitude on the signal source until the marker amplitude on the analyzer reads -30 dBm +/- 0.10 dB. Enter the signal source power level as the Signal Source Amplitude reference in [Table 4-5 on page 173](#).

---

**NOTE** Under these analyzer conditions, the sweep time is 1.7 seconds. Therefore, the marker amplitude updates are fairly slow when adjusting the signal source output power.

---

5. Now that the reference has been established in step 4, adjust the signal source power level and the analyzer reference level according to [Table 4-5 on page 173](#). (The signal source output power and the analyzer's reference level will be changed in 10 dB steps.)

6. On the analyzer, press **Single**, wait for a sweep to finish, and then press **Peak Search, Marker, Delta**.

7. For each new signal source power level and analyzer reference level change, press the following keys on the analyzer:

**Single**

**Peak Search**

Record the Analyzer Marker Amplitude reading in [Table 4-5](#).

**Table 4-5 Reference Level Accuracy Worksheet (Log Mode)**

| Analyzer Reference Level |       | Signal Source Amplitude (dBm) | Minimum (dB)  | Analyzer Marker Δ Amplitude (dB) | Maximum (dB)  |
|--------------------------|-------|-------------------------------|---------------|----------------------------------|---------------|
| dBm                      | dBmV  |                               |               |                                  |               |
| -30                      | 21.76 | Reference = _____             | 0 (Reference) | 0 (Reference)                    | 0 (Reference) |
| -20                      | 31.76 | Reference + (10 dB)           | 8.60          |                                  | 11.40         |
| -10                      | 41.76 | Reference + (20 dB)           | 18.60         |                                  | 21.40         |
| -40                      | 11.76 | Reference + (-10 dB)          | -11.40        |                                  | -8.60         |

**Table 4-5 Reference Level Accuracy Worksheet (Log Mode) (Continued)**

| Analyzer Reference Level |        | Signal Source Amplitude (dBm) | Minimum (dB) | Analyzer Marker $\Delta$ Amplitude (dB) | Maximum (dB) |
|--------------------------|--------|-------------------------------|--------------|---|--------------|
| dBm                      | dBmV   |                               |              |   |              |
| -50                      | 1.76   | Reference + (-20 dB)          | -21.40       |   | -18.60       |
| -60                      | -8.24  | Reference + (-30 dB)          | -31.40       |   | -28.60       |
| -70                      | -18.24 | Reference + (-40 dB)          | -42.0        |   | -38.0        |

### Linear Mode Procedure

1. Set the power level on the signal source to -30 dBm by pressing **Power Level, -30, dBm**.
2. Set the analyzer by pressing the following keys:

**Sweep, Sweep** (Cont)  
**AMPLITUDE, More, Y Axis Units, dBm** (50  $\Omega$  Input)  
**AMPLITUDE, -30, dBm** (50  $\Omega$  Input)  
**AMPLITUDE, More, Y Axis Units, dBmV** (75  $\Omega$  Input)  
**AMPLITUDE, +21.76, dBmV** (75  $\Omega$  Input)  
**Scale Type** (Lin)

3. Adjust the amplitude on the signal source until the marker amplitude on the analyzer reads -30 dBm +/- 0.10 dB. Enter the signal source power level as the Signal Source Amplitude reference in [Table 4-6 on page 175](#).

---

**NOTE** Under these analyzer conditions, the sweep time is 1.7 seconds. Therefore, the marker amplitude updates are fairly slow when adjusting the signal source output power.

---

4. Now that the reference has been established in step 4, adjust the signal source power level and the analyzer reference level according to [Table 4-6 on page 175](#) (The signal source output power and the analyzer's reference level will be changed in 10 dB steps.)
5. On the analyzer, press **Single**, wait for a sweep to finish, and then press **Peak Search, Marker, Delta**.
6. For each new signal source power level and analyzer reference level change, press the following keys on the analyzer:

**Single**  
**Peak Search**

Record the Analyzer Marker Amplitude reading in [Table 4-6](#)

**Table 4-6 Reference Level Accuracy Worksheet (Linear Mode)**

| Analyzer Reference Level |        | Signal Source Amplitude (dBm) | Minimum (dB)  | Analyzer Marker $\Delta$ Amplitude (dB) | Maximum (dB)  |
|--------------------------|--------|-------------------------------|---------------|---|---------------|
| dBm                      | dBmV   |                               |               |   |               |
| -30                      | 21.76  | Reference = _____             | 0 (Reference) | 0 (Reference)                           | 0 (Reference) |
| -20                      | 31.76  | Reference + (10 dB)           | 8.60          |   | 11.40         |
| -10                      | 41.76  | Reference + (20 dB)           | 18.60         |   | 21.40         |
| -40                      | 11.76  | Reference + (-10 dB)          | -11.40        |   | -8.60         |
| -50                      | 1.76   | Reference + (-20 dB)          | -21.40        |   | -18.60        |
| -60                      | - 8.24 | Reference + (-30 dB)          | -31.40        |   | -28.60        |
| -70                      | -18.24 | Reference + (-40 dB)          | -42.0         |   | -38.0         |

## Resolution Bandwidth Switching Uncertainty

### Test Limits

| Resolution Bandwidth | Minimum (dB) | Maximum (dB) |
|----------------------|--------------|--------------|
| 1 kHz                | 0 (Ref)      | 0 (Ref)      |
| 3 kHz                | -0.3 dB      | 0.3 dB       |
| 10 kHz               | -0.3 dB      | 0.3 dB       |
| 30 kHz               | -0.3 dB      | 0.3 dB       |
| 100 kHz              | -0.3 dB      | 0.3 dB       |
| 300 kHz              | -0.3 dB      | 0.3 dB       |
| 1 MHz                | -0.3 dB      | 0.3 dB       |
| 3 MHz                | -0.3 dB      | 0.3 dB       |
| 5 MHz                | -0.6 dB      | 0.6 dB       |

### Test Description

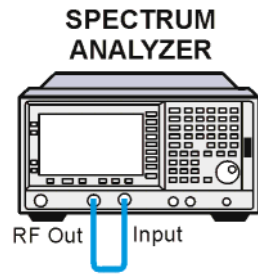
To measure the resolution-bandwidth switching uncertainty, an amplitude reference is taken with the resolution bandwidth set to 1 kHz. The resolution bandwidth is changed to settings between 5 MHz and 3 kHz and the amplitude variation is measured at each setting using the marker delta function and compared to the specification. The span is changed as necessary to maintain approximately the same aspect ratio.

No equipment required for analyzer models E4401B and E4411B or E7401A.

| Item           | Critical Specifications<br>(for this test) | Recommended<br>Agilent Model |
|----------------|--|------------------------------|
| <b>Cables</b>  |  |                              |
| BNC, 9 inch    |  | 10502A                       |
| <b>Adapter</b> |  |                              |
| Type N to BNC  |  | 1250-0780 or<br>1250-1476    |

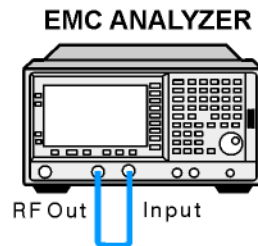


Figure 4-11 Equipment Setup



vi71b

Figure 4-12 Equipment Setup



pl783b

## Procedure

---

**NOTE** The 50 MHz reference output will automatically be switched internally on the E4401B and E4411B or E7401A and will not require any external connections. All other ESA or EMC analyzers require that the AMPTD REF OUT be connected to the INPUT to perform this test.

---

1. Press **System, Power On/Preset, Preset Type** (Factory), **Preset** on the analyzer. Wait for the preset routine to finish. Set the analyzer by pressing the following keys:

**Input/Output, Amptd Ref** (On) (E4401B and E4411B) (E7401A)

**Input/Output, Amptd Ref Out** (On) (E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B) (E7402A, E7403A, E7404A, and E7405A).

Connect a cable from the **AMPTD REF OUT** to the **INPUT 50  $\Omega$** , as shown in [Figure 4-11](#) (E4402B, E4403B, E4404B, E4405B, E4407B, and E4408B) [Figure 4-12](#) (E7402A, E7403A, E7404A, and E7405A).

**FREQUENCY, 50, MHz**

**SPAN, 50, kHz**

**AMPLITUDE, More, Y Axis Units, dBm** (75  $\Omega$  Input only)

**AMPLITUDE, -20, dBm**

**AMPLITUDE, Scale/Div, 1, dB**

**BW/Avg, Res BW, 1, kHz**

ESA Functional Tests  
**Resolution Bandwidth Switching Uncertainty**

**Video BW, 1, kHz**

2. Press **AMPLITUDE** and use the knob to adjust the reference level until the signal appears five divisions (mid-screen) below the reference level. Press the following keys on the analyzer:

**Peak Search**  
**Marker, Delta**  
**FREQUENCY, Signal Track (On)**

3. Set the analyzer Resolution Bandwidth and Span according to [Table 4-7 on page 178](#).
4. Press **Peak Search**, then record the  $\Delta$  Mkr 1 amplitude reading in [Table 4-7](#).
5. Repeat step 3 and 4 for each of the remaining resolution bandwidth and span settings listed in [Table 4-7](#). The  $\Delta$  Mkr 1 amplitude reading should be within the range indicated in the table “[Test Limits](#)” on page 176.

**Table 4-7 Resolution Bandwidth Switching Uncertainty Worksheet**

| <b>Resolution Bandwidth Setting</b> | <b>SPAN Setting</b> | <b><math>\Delta</math> Mkr 1 Amplitude Reading</b> |
|-------------------------------------|---------------------|--|
| 1 kHz                               | 50 kHz              | 0 (Ref)  |
| 3 kHz                               | 50 kHz              |  |
| 10 kHz                              | 50 kHz              |  |
| 30 kHz                              | 500 kHz             |  |
| 100 kHz                             | 500 kHz             |  |
| 300 kHz                             | 5 MHz               |  |
| 1 MHz                               | 10 MHz              |  |
| 3 MHz                               | 10 MHz              |  |

## Scale Fidelity

### Test Limits

| dB from Reference Level | Minimum (dB) | Maximum (dB) |
|-------------------------|--------------|--------------|
| -4                      | -1.0         | 1.0          |
| -16                     | -1.4         | 1.4          |
| -28                     | -1.4         | 1.4          |
| -40                     | -1.4         | 1.4          |
| -52                     | -1.4         | 1.4          |
| -64                     | -2.0         | 2.0          |

### Test Description

A 50 MHz CW signal is applied from a signal source to the input of the analyzer. The source is adjusted for a response at the reference level. The signal source amplitude is adjusted to achieve a nominal amplitude below the reference level. The analyzer's amplitude marker is compared to the actual source change to determine the scale fidelity error. Most of the error is the source's output attenuator inaccuracy from the signal source.

| Item   | Critical Specifications<br>(for this test)   | Recommended<br>Agilent Model        |
|--|--|-------------------------------------|
| <b>Signal Sources</b>                        |  |                                     |
| Synthesized Sweeper<br>or Signal Generator   | Output Level Accuracy<br>0 to -15 dBm: $\pm 1.0$ dB<br>-16 dBm to -63 dBm: $\pm 1.4$ dB<br>$\leq -64$ dBm: $\geq 2.0$ dB | 8340A/B, 836XX<br>Series, or E8257D |
| <b>Adapters</b>                              |  |                                     |
| Type-N (m), to BNC (f)                       |  | 1250-1476                           |
| Type-N (m), to<br>APC 3.5 (f)                |  | 1250-1475                           |
| <b>Cables</b>                                |  |                                     |
| Type-N, 152-cm (60-in)                       |  | 11500D                              |
| BNC, 122-cm (48-in)                          |  | 10503A                              |
| <b>Additional Equipment for 75-Ohm Input</b> |  |                                     |
| Pad, minimum loss                            |  | 11852B                              |
| Type-N (f), to BNC (m)                       |  | 1250-1534                           |

Figure 4-13. Equipment Setup

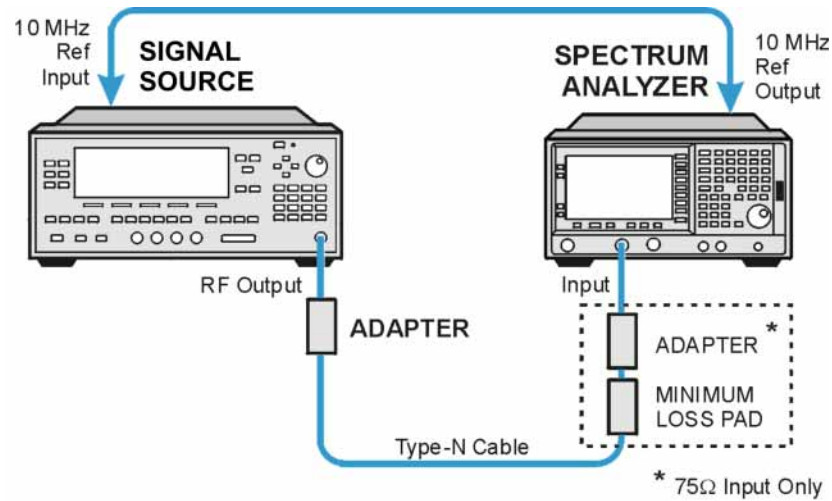
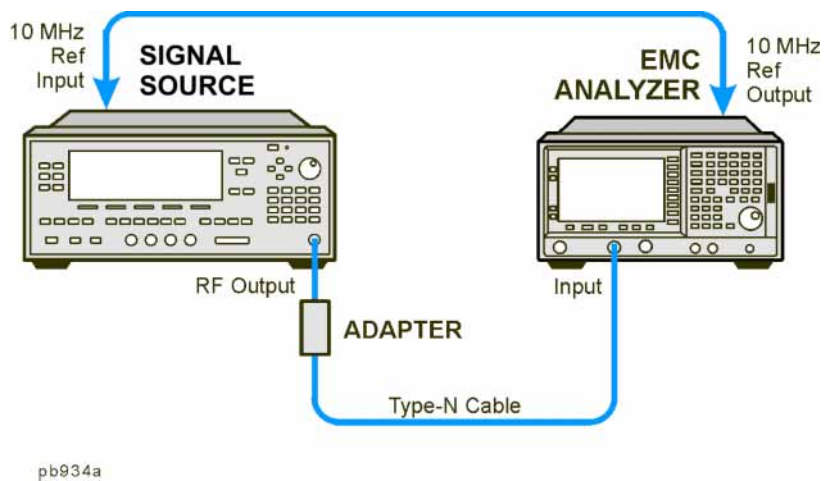


Figure 4-14 Equipment Setup



## Procedure

1. Connect the equipment as shown in [Figure 4-13](#). or [Figure 4-14](#).

---

**IMPORTANT** If an E8257D is being used as a signal source an “Error-512, Reference Unlocked” message may appear. This message informs the user that the reference has changed from internal to external reference and is normal behavior. This error has been logged to the error queue. Clear this error by pressing **Utility, Error Info, Clear Error Queue (s)**. Now continue with Step 2.

---

2. Preset the signal source. Set the signal source controls as follows:

**CW, 50, MHz**  
**Power Level, 0, dBm (50 Ω Input)**  
**Power Level, 4, dBm (75 Ω Input)**

---

**IMPORTANT** An “Error-512, Reference Unlocked” message may appear on the E8257D. This message informs the user that the reference has changed from internal to external reference and is normal behavior.

---

3. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer, then wait for the preset routine to finish. Press **System, Alignments, Auto Align, Off**. Set the analyzer by pressing the following keys:

**FREQUENCY, Center Freq, 50, MHz**  
**SPAN, 45, kHz**  
**AMPLITUDE, More, Y Axis Units, dBm**  
**AMPLITUDE, Attenuation, 10, dB**  
**BW/Avg, Res BW, 3, kHz**  
**Video BW, 1, kHz**  
**Peak Search**

4. Adjust the amplitude on the signal source until the marker amplitude on the analyzer reads 0 dBm +/- 0.10 dB. Record the signal source output level as the reference in [Table 4-8 on page 181](#).

---

**NOTE** *75 Ω Input only.* Adjust the signal source amplitude until the analyzer’s marker reads 48.8 dBmV +/- 0.10 dB.

---

5. On the analyzer, press the following keys:

**Single**  
**Peak Search**  
**Marker, Delta**

6. Record the marker delta reading in [Table 4-8](#). At each new signal source power level, press **Single, Peak Search**, and record the marker amplitude level.

**Table 4-8 Scale Fidelity Worksheet**

| Signal Source Level | Minimum (dB)  | Marker Level (dB) | Maximum (dB)  |
|---------------------|---------------|-------------------|---------------|
| Reference=_____     | 0 (Reference) |                   | 0 (Reference) |
| Reference -4 dB     | -5.0          |                   | -3.0          |
| Reference -16 dB    | -17.40        |                   | -15.60        |
| Reference -28 dB    | -29.40        |                   | -26.60        |
| Reference -40 dB    | -41.40        |                   | -38.60        |
| Reference -52 dB    | -53.40        |                   | -50.60        |
| Reference -64 dB    | -66.0         |                   | -62.0         |

## Second Harmonic Spurious Responses

### Test Limits

| Model Number     | Maximum |
|------------------|---------|
| E4401B<br>E7401A | -55 dBc |
| E4402B<br>E7402A | -55 dBc |
| E4403B           | -50 dBc |
| E4404B<br>E7403A | -55 dBc |
| E4405B<br>E7404A | -55 dBc |
| E4407B<br>E7405A | -55 dBc |
| E4408B           | -50 dBc |
| E4411B           | -55 dBc |

### Test Description

To test second harmonic distortion, a 50 MHz low pass filter is used to filter the signal source output, ensuring that harmonics read by the analyzer are internally generated and not coming from the source. The source power and input attenuation on the analyzer are adjusted so -20 dBm is the power level at the first mixer.

| Item                                       | Critical Specifications<br>(for this test) | Recommended<br>Agilent Model        |
|--|--|-------------------------------------|
| <b>Signal Sources</b>                      |  |                                     |
| Synthesized Sweeper<br>or Signal Generator |  | 8340A/B, 836XX<br>Series, or E8257D |
| <b>Miscellaneous</b>                       |  |                                     |
| 50 MHz Low pass filter                     | Rejection at 80 MHz: >60 dB                | 0955-0306                           |
| <b>Adapters</b>                            |  |                                     |
| (2) Type-N (m) to<br>BNC (f)               |  | 1250-1476                           |
| BNC (f) to BNC (f)                         |  | 1250-0080                           |

| Item                                       | Critical Specifications<br>(for this test) | Recommended<br>Agilent Model |
|--|--|------------------------------|
| Type-N (f), to APC 3.5(f)                  |  | 1250-1745                    |
| 3.5 mm (m) to 3.5 mm (m)                   |  | 5061-5311                    |
| SMA (f) to BNC (m)                         |  | 1250-2015                    |
| <b>Cables</b>                              |  |                              |
| (2) BNC, 122-cm (48-in)                    |  | 10503A                       |
| APC 3.5 mm                                 |  | HP 11500D                    |
| <b>Additional Equipment for 75 Ω Input</b> |  |                              |
| Pad, minimum loss                          |  | 11852B                       |
| Type-N (f), to BNC (m)                     |  | 1250-1534                    |

**Figure 4-15. Equipment Setup**

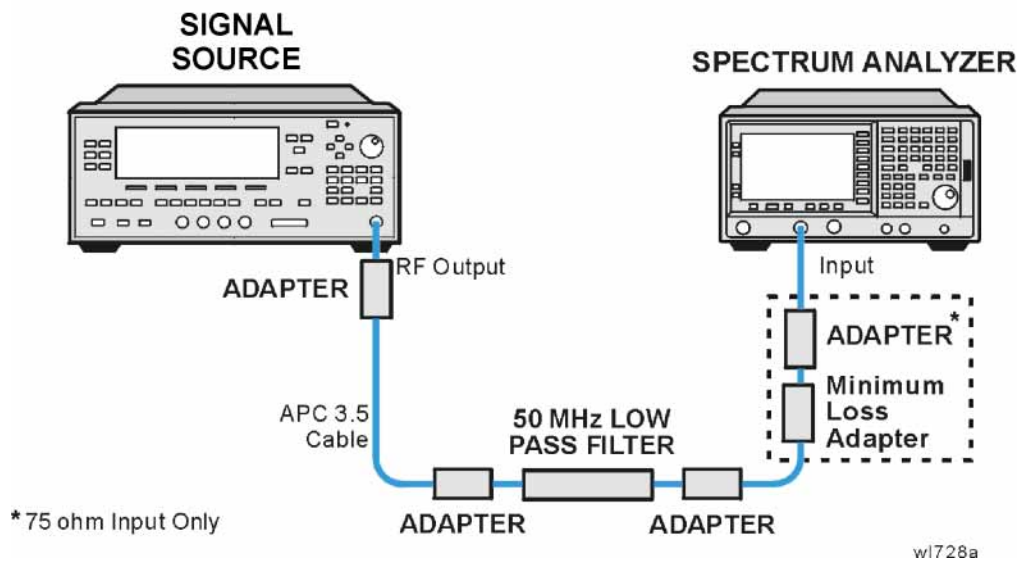
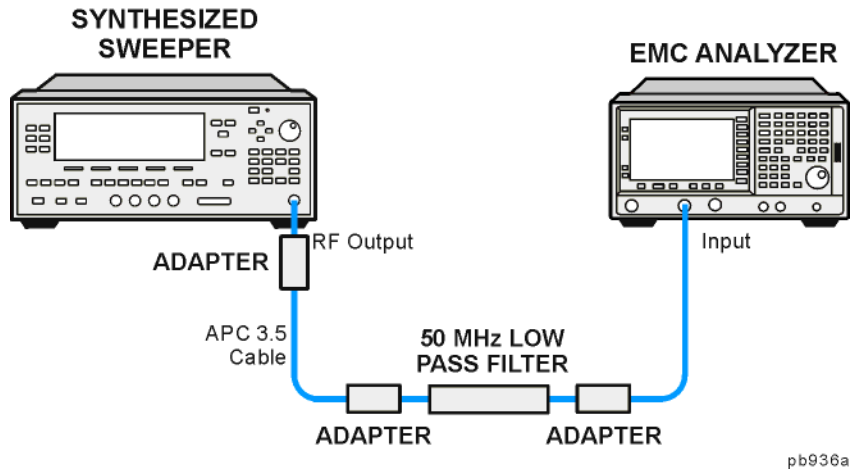


Figure 4-16 Equipment Setup



## Procedure

1. Connect the equipment as shown in [Figure 4-15](#). or [Figure 4-16](#).
2. Set the signal source controls as follows:

**Frequency, 40, MHz**  
**POWER LEVEL, -10, dBm** (50  $\Omega$  Input only)  
**POWER LEVEL, -4.3, dBm** (75  $\Omega$  Input only)

---

**NOTE** 75  $\Omega$  Input only. Connect the minimum loss adapter between the low pass filter and 75  $\Omega$  Input.

---

3. Press **System, Power On/Preset, Preset Type** (Factory), **Preset** on the analyzer. Wait for the preset routine to finish.  
Set the analyzer by pressing the following keys:

**AMPLITUDE, More, Y Axis Units, dBm**  
**FREQUENCY, Center Freq, 40, MHz**  
**SPAN, 1, MHz**  
**AMPLITUDE, -10, dBm** (50  $\Omega$  Input only)  
**AMPLITUDE, 44, dBmV** (75  $\Omega$  Input only)  
**Attenuation (Man), 10, dB**  
**BW/Avg, Res BW, 30, kHz**

4. Adjust the signal source power level to place the peak of the signal at the reference level.
5. Set the analyzer by pressing the following keys:

**SPAN, 50, kHz**  
**BW/Avg, Res BW, 1, kHz**  
**Video BW, 100, Hz**

6. Wait for two sweeps to finish, then press the following analyzer keys:



**Peak Search**

**Mkr** →

**Mkr** → **CF Step**

**Marker, Delta**

**FREQUENCY**

7. Press the  $\hat{=}$  key on the analyzer to step to the second harmonic (at 80 MHz). Press **Peak Search**. The marker delta amplitude reading should be less than the Maximum value listed in the Test Limits Table.

## Tracking Generator Level Flatness: Models E4401B and E4411B E7401A, Options 1DN and 1DQ

### Test Limits

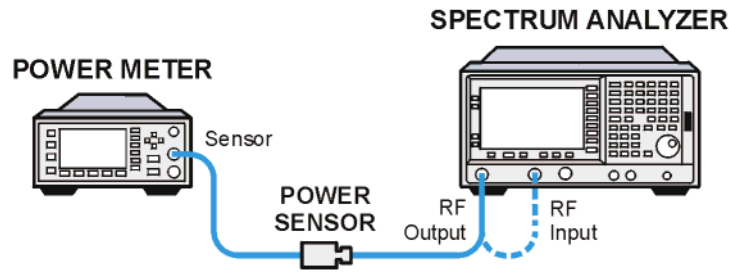
|                                     | Maximum | Maximum |
|-------------------------------------|---------|---------|
| Flatness $\leq$ 10 MHz, 50 $\Omega$ | -2.5 dB | 2.5 dB  |
| Flatness $>$ 10 MHz, 50 $\Omega$    | -2.0 dB | 2.0 dB  |
| Flatness $>$ 10 MHz, 75 $\Omega$    | -3.0 dB | 3.0 dB  |
| Flatness $>$ 10 MHz, 75 $\Omega$    | -2.5 dB | 2.5 dB  |

### Test Description

A calibrated power sensor is connected to the tracking generator output to measure the power level at 50 MHz. The power meter is set for REL mode so that future power level readings are in dB relative to the power level at 50 MHz. The tracking generator is then stepped to several frequencies throughout its range. The output power difference relative to the power level at 50 MHz is measured at each frequency and recorded. Analyzers with 75  $\Omega$  tracking generators are only tested from 1 MHz to 1500 MHz.

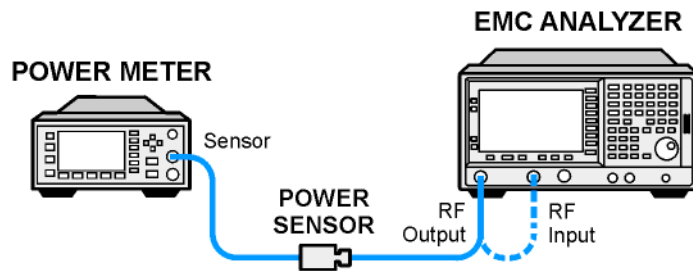
| Item   | Critical Specifications<br>(for this test) | Recommended<br>Agilent Model |
|--|--|------------------------------|
| <b>Meters</b>  |  |                              |
| Power Meter  |  | 438A or E4418A,<br>E4419A    |
| RF Power Sensor  | Frequency Range:<br>100 kHz to 1.5GHz      | 8482A                        |
| <b>Adapters</b>  |  |                              |
| Type-N (m to BNC (f)<br>(2)                                  |  | 1250-1476                    |
| <b>Cables</b>  |  |                              |
| BNC, 122-cm (48-in)<br>(2)                                   |  | 10503A                       |
| BNC, 23-cm (9-in)  |  | 10502A                       |
| <b>Additional Equipment for 75 <math>\Omega</math> Input</b> |  |                              |
| 75 $\Omega$ Power Sensor                                     | Frequency Range:<br>1 MHz to 1.5GHz        | 8483A                        |
| Type-N (f) to BNC (m),<br>75 $\Omega$ Adapter                |  | 1250-1534                    |

Figure 4-17 Equipment Setup



w712a

Figure 4-18 Equipment Setup



pb937a

## Procedure

1. Calibrate the tracking generator by pressing **System, Alignments, Align Now, TG**. Connect the RF Out to the Input when prompted.
2. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer, then wait for the preset routine to finish. Set the analyzer by pressing the following keys:

**FREQUENCY, Center Freq, 50, MHz**

**CF Step, 500, MHz**

**SPAN, Zero Span**

**AMPLITUDE, More, Y Axis Units, dBm**

**Source, Amplitude (On), 0, dBm (50  $\Omega$  RF Output only)**

**Source, Amplitude (On), 42.76, dBmV (75  $\Omega$  RF Output only)**

3. Zero and calibrate the power meter and RF power sensor. Make sure the power meter is reading out in dBm. Enter the power sensor 50 MHz cal factor into the power meter.

---

**NOTE**      *75  $\Omega$  RF Out only: Zero and calibrate the 75  $\Omega$  power sensor.*

---

4. Connect the power sensor to the RF Out on the analyzer as shown in [Figure 4-17](#) or [Figure 4-18](#).

ESA Functional Tests  
**Tracking Generator Level Flatness: Models E4401B and E4411B E7401A,  
Options 1DN and 1DQ**

**NOTE**      *75 Ω RF Out only:* Connect the 75 Ω power sensor through an adapter to the RF Out 75 Ω.

5. Press REL on the power meter. The power meter readout amplitudes are now relative to the power level at 50 MHz.
6. Set the analyzer center frequency to 100 kHz by pressing **FREQUENCY, Center Freq, 100, kHz**.

**NOTE**      *75 Ω RF Out only:* Set the analyzer center frequency to 1 MHz.

7. Enter the appropriate power sensor Cal Factor for the test frequency into the power meter as indicated on the label of the power sensor.
8. Record the power level displayed on the power meter as the Level Flatness in [Table 4-9](#).
9. Repeat steps 7 through 8 to measure the flatness at each center frequency setting listed in [Table 4-9](#). The ↑ may be used to tune to center frequencies above 500 MHz.

**NOTE**      *75 Ω RF Out only:* Repeat steps 5 through 7 to measure the flatness at the frequencies above 1 MHz listed in [Table 4-9](#).

**Table 4-9      Tracking Generator Level Flatness Worksheet**

| Center Frequency              | Level Flatness (dB) |
|-------------------------------|---------------------|
| 100 kHz or 1 MHz <sup>a</sup> |                     |
| 5 MHz                         |                     |
| 40 MHz                        |                     |
| 50 MHz                        | 0 (Ref)             |
| 80 MHz                        |                     |
| 500 MHz                       |                     |
| 1000 MHz                      |                     |
| 1500 MHz                      |                     |

a. This frequency is 100 kHz for analyzers with 50 Ω tracking generators, and 1 MHz for analyzers with 75 Ω tracking generators.

## Tracking Generator Level Flatness: E4402B, E4403B, E4404B, E4405B, E4407B and E4408B E7402A, E7403A, E7404A, and E7405A, Option 1DN

### Test Limits

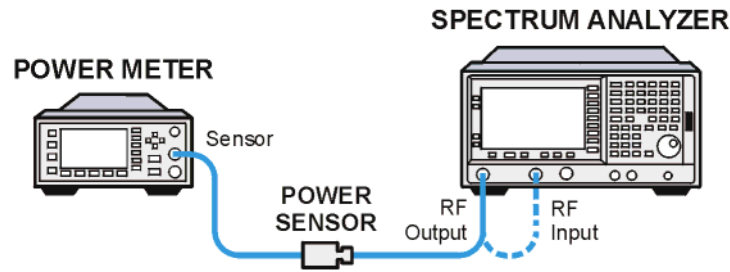
|                        | Maximum  | Maximum  |
|------------------------|----------|----------|
| Flatness $\leq$ 10 MHz | -3.5 dBm | +3.5 dBm |
| Flatness $>$ 10 MHz    | -2.5 dBm | -2.5 dBm |

### Test Description

A calibrated power sensor is connected to the tracking generator output to measure the power level at 50 MHz. The power meter is set for REL mode so that future power level readings are in dB relative to the power level at 50 MHz. The tracking generator is then stepped to several frequencies throughout its range. The output power difference relative to the power level at 50 MHz is measured at each frequency and recorded.

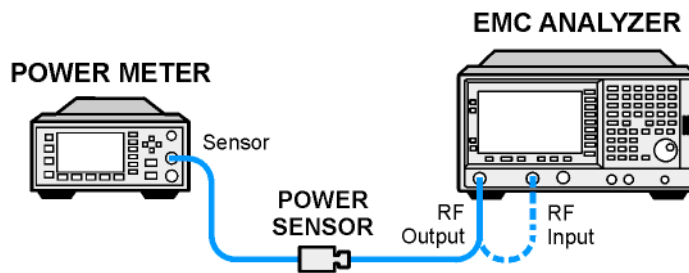
| Item                             | Critical Specifications<br>(for this test) | Recommended<br>Agilent Model |
|----------------------------------|--|------------------------------|
| <b>Meters</b>                    |  |                              |
| Power Meter                      |  | 438A or E4418A,<br>E4419A    |
| RF Power Sensor                  | Frequency Range: 100 kHz to 3.0 GHz        | 8482A                        |
| <b>Adapters</b>                  |  |                              |
| Type-N (f) to BNC (m),<br>75-Ohm |  | 1250-1534                    |
| Type-N (m to BNC (f)<br>(2)      |  | 1250-1476                    |
| <b>Cables</b>                    |  |                              |
| (2) BNC, 122-cm<br>(48-in)       |  | 10503A                       |
| BNC, 23-cm (9-in)                |  | 10502A                       |

Figure 4-19 Equipment Setup



wf712a

Figure 4-20 Equipment Setup



pb937a

## Procedure

1. Calibrate the tracking generator by pressing **System, Alignments, Align Now, TG**. Connect the RF OUT to the RF INPUT when prompted.
2. Press **System, Power On/Preset, Preset Type (Factory), Preset** on the analyzer, then wait for the preset routine to finish. Set the analyzer by pressing the following keys:

**FREQUENCY, Center Freq, 50, MHz**  
**CF Step, 100, MHz**  
**SPAN, Zero Span**  
**AMPLITUDE, More, Y Axis Units, dBm**  
**Source, Amplitude (On), -20, dBm**  
**System, Alignments, Auto Align, Off**

3. Zero and calibrate the power meter and power sensor. Make sure the power meter is reading out in dBm. Enter the power sensor 50 MHz cal factor into the power meter.
4. Connect the power sensor to the RF Out on the analyzer as shown in [Figure 4-19](#) or [Figure 4-20](#).
5. Press REL on the power meter. The power meter readout amplitudes are now relative to the power level at 50 MHz.

**Tracking Generator Level Flatness: E4402B, E4403B, E4404B, E4405B, E4407B and E4408B E7402A, E7403A, E7404A, and E7405A, Option 1DN**

6. Set the analyzer center frequency to 100 kHz by pressing **FREQUENCY, Center Freq, 100, kHz**.
7. Enter the appropriate power sensor Cal Factor for the test frequency into the power meter as indicated on the label of the power sensor. This must be done at each test frequency.
8. Record the power level displayed on the power meter as the Level Flatness in [Table 4-10 on page 191](#).
9. Repeat steps 5 through 7 to measure the flatness at each center frequency setting listed in [Table 4-10](#). The  $\uparrow$  may be used to tune to center frequencies above 500 MHz.
10. Press **System, Alignments, Auto Align, On**.

**Table 4-10 Tracking Generator Level Flatness Worksheet**

| Center Frequency | Level Flatness (dB) |
|------------------|---------------------|
| 100 kHz          |                     |
| 5 MHz            |                     |
| 40 MHz           |                     |
| 50 MHz           | 0 (Ref)             |
| 80 MHz           |                     |
| 500 MHz          |                     |
| 1000 MHz         |                     |
| 1500 MHz         |                     |
| 2000 MHz         |                     |
| 2300 MHz         |                     |
| 2500 MHz         |                     |
| 2700 MHz         |                     |
| 3.0 GHz          |                     |

ESA Functional Tests

**Tracking Generator Level Flatness: E4402B, E4403B, E4404B, E4405B,  
E4407B and E4408B E7402A, E7403A, E7404A, and E7405A, Option 1DN**



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