Keysight E7515A UXM Wireless Test Set

Assess Design Readiness with Greater Confidence



User's and Programmer's Guide



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Manual Part Number

E7515-90012

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Keysight Technologies, Inc.

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CAUTION

A CAUTION notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

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A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

Electrical Rating

Input Voltage Range: 100/120/220/240 V_{AC}

Input Frequency Range: 50/60Hz, nominal

Input Power Rating: 1100 Watts Max

Mains supply voltage fluctuates up to +/- 10% of the nominal voltage.

WARNING	This is a Safety Class 1 Product (provided with a protective earth ground incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor inside or outside of the product is likely to make the product dangerous. Intentional interruption is prohibited.
WARNING	No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock do not remove covers.
WARNING	This instrument is heavy. Two people are required to lift this instrument.
WARNING	Please consult ergonomic guidelines regarding placement of the external keyboard when using it with the instrument. Using the keyboard in an uncomfortable or awkward environment could result in personal injury.

CAUTION	 Before switching on this instrument, make sure: the rating for the service breaker is correct. the supply voltage is in the specified range.
CAUTION	This instrument has auto-ranging line voltage input. Be sure the supply voltage is within the specified range and voltage fluctuations do not exceed 10 percent of the nominal supply voltage.
CAUTION	The Mains wiring and connectors shall be compatible with the connector used in the premise electrical system. Failure, to ensure adequate earth grounding by not using the correct components may cause product damage, and serious injury.
CAUTION	This product is designed for use in Installation Category II and Pollution Degree 2 environment.

NOTE	Use the Keysight supplied power cord or one with the same or better electrical rating.
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Electrical Safety Compliance

SAFETY

Complies with European Low Voltage Directive 20006/95/EC

- IEC/EN 61010-1, 3rd Edition
- Canada: CAN/CSA C22.2 No. 61010-1-12
- USA: UL std no. 61010-1, 3rd Edition

Acoustic statement (European Machinery Directive 2002/42/EC, 1.7.4.2u)Acoustic noise emissionGeraeuschemissionLpA <70 dB</td>LpA <70 dB</td>Operator positionAm ArbeitsplatzNormal operation modeNormaler BetriebPer ISO 7779Nach DIN 45635 t.19

EMI and EMC Compliance

EMC

Complies with European EMC Directive 2004/108EC

- IEC/EN 61326-1
- CISPR Pub 11 Group 1, class A
- AX/NZS CISPR 11
- ICES/NMB-001 This ISM device complies with Canadian ICES-001 Cet appareil ISM est conforme a la norme NMB-001 du Canada.
- South Korean Class A EMC declaration: This equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home.

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Is your product software up-to-date?

Keysight will periodically release software updates to fix known defects and incorporate product enhancements. To search for software updates for your product, go to the Keysight Software Manager website at:

www.keysight.com/find/softwaremanager

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1 Introduction

Welcome to the User's and Programmer's Guide for the Keysight E7515A UXM Wireless Test Set (UXM). The purpose of this guide is to provide you with the information that is needed to use the Application Switch Tool, to remotely control the components of the UXM, and to specify the RF cable compensation loss located on the UXM Control Panel. The following topics are covered in this manual:

- Application Switch Tool
- Programming the UXM
- Specifying RF Cable Compensation

Refer to the following documentation for more detailed information describing the TA/LA software, the X-Series Measurement applications, the UXM Control Panel, and the UXM Platform software application.

Document Title	Location	Description	
E7530A/E7630A LTE/LTE-A Application Help	Embedded in the TA/LA software: Right-click on any setting displayed on front-panel and select Help . (Complete SCPI list is displayed by selecting Programming the TA/LA , List of SCPI Commands.)	TA/LA software application setting descriptions and SCPI commands	
	www.keysight.com/find/UXM-Manuals		
T9080B/T9082A LTE/LTE-A FDD/TDD X-Series Measurement Application Help	Embedded in the X-Series software: Select the Help menu key from the Virtual Front-panel. (Complete SCPI list is displayed by selecting Programming the Analyzer, List of SCPI Commands.) www.keysight.com/find/UXM-Manuals	X-Series software application setting descriptions and SCPI commands	
E7515A UXM Getting Started	Included in UXM shipment	Information on the Platform and	
Guide	On Keysight.com, click here.	Control Panel components.	

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Overview

The UXM is the most highly-integrated signaling test set created for functional and RF design validation in the 4G era and beyond. It provides the capabilities you need to test the newest designs, delivering LTE-Advanced category 7 now and handling more complex requirements later.



Figure 1-1: Keysight E7515A UXM Wireless Test Set

Capabilities of the UXM

- Stable, bidirectional data throughput at 300 Mbps downlink (DL) / 100 Mbps uplink (UL)
- Category 4/6/7 support with two independent 100 MHz RF transceivers enabling multiple cells, DL/UL carrier aggregation, up to 4x2 DL MIMO, and integrated fading
- Receiver test capabilities including flexible channel definitions and closed-loop testing
- Trusted X-Series measurement applications for transmitter testing
- Wide range of network emulator capabilities including complex handover scenarios (such as CSFB and SRVCC), VoLTE support (including SPS and multi-DRB) and sleep modes for battery drain test
- Frequency Division Duplex (FDD) and Time Division Duplex (TDD) options

2 Application Switch Tool

The UXM has many components of software that combine to bring you the most highlyintegrated signaling test set available for functional and RF design validation in the 4G era and beyond. The Application Switch Tool enables you to access each of these components easily with just a simple touch.



Figure 2-1: Application Switch Tool

This tool is available whenever you launch the E7530A/E7630A LTE/LTE-A Application software. Since the TA/LA also launches the X-Series Measurement application, this tool enables you to easily access and switch between them, as well as the Control Panel and Desktop with just a simple touch.

The Application Switch Tool hides to enable you to view/access the currently viewed software application more easily.



Just pull this icon down in order to view the complete set of switchable options.



Touch this icon to hide it again.

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3 Programming the UXM

There are three software application components available for remote control. HiSLIP, Socket, or Telnet protocols are available for this purpose. The following Device/Port IDs are already set in your UXM and it is recommended that you do not change them.

You must use lower case text for hislip values, as shown in the table entries IMPORTANT below.

Component	HiSLIP Device ID	TCP (Socket) Port	Telnet Port
E7530A/E7630A LTE/LTE-A TA/LA Application	hislip2	5125	5124
X-Series Measurement Application	hislip1	5075	5074
Platform Application	hislip0	5025	5024

Figure 4-1: Device/Port IDs for each Component

NOTE	It is recommended that you use the Keysight Connection Expert software to control the UXM components, which is available as a free download at this location: www.keysight.com/find/iosuite.
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Using HiSLIP to send SCPI Commands

There are a few steps involved in creating the connection that enables you to send SCPI commands to each of the three UXM software components.

- 1. Obtain the IP address of the UXM.
- 2. Viewing the HiSLIP and Ports for each software component
- 3. Adding software components to the Keysight Connection Expert



The E7515A is not auto-discoverable. You need to add it manually to your software environment. For example if using *Keysight Connection Expert* follow the procedure described on page 13 of this document.

Obtain the IP address of the UXM

You can easily access the IP address of the UXM by performing the following steps:

- 1. Use the App Switcher to view the UXM Control Panel.
- 2. Select the Configuration icon on the Control Panel.
- 3. The following window is displayed, providing you with the LAN Configuration details.

🔘 Automatic		
Pv4 LAN Config	uration	
Rear GbE4 F	ront	
🚺 Use DHCP		
IP Address:	10.112.36.150	
Subnet Mask:	255.255.252.0	
Gateway:	10.112.36.1	
DNS Server:	141.121.48.100	
Revert		Apply

Viewing the HiSLIP and Ports for each software component

(This is for reference only. It is recommended that you do not change these device/port IDs.)

E7530A/E7630A LTE/LTE-A TA/LA Application

Navigate to the **Systems** lower tab, **App Info** upper tab and view the HiSLIP/Port IDs as shown:

1	RF Config App Info	Impairments	Error Log	RVI Log		
	Application Information					
	App Number:	E7630A			Telnet Port:	5124
	App Name:	LTE/LTE-Advanced	Lab Applicatio	on	Socket Port:	5125
	App Version:	1.2.1.0			HiSLIP Device:	hislip2
	Host ID:	PCSERNO,SS4779	98662			
	Serial Number:	TH54090112				



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X-Series Measurement Application

Use the App Switcher to open the X-Series application. The HiSLIP, Port, and Socket IDs can be viewed at the following location: **System**, **I/O Config**, **SCPI LAN**.



Figure 4-3: X-Series HiSLIP, Socket, and Telnet Device/Port IDs

Platform Application

This application is always set at HiSLIPO, Socket port: 5025, and Telnet port: 5024. They are not available to view.

NOTE	RF compensation is set via this port. Refer to Specifying RF Cable Compensation .
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Adding software components to the Keysight Connection Expert

For this example, only the HiSLIP connection is presented. Adding each component using their port IDs is handled similarly.

- 1. Open the Keysight Connection Expert.
- 2. Add the TA/LA component using the IP Address and HiSLIP2 Device ID.

-L- Add LAN Instruments	— X—
Discover or locate LAN instruments. Select any number of them to add to the configuration.	
Auto Find Discover local instruments	
- Enter Instrument Address	Connect to an instrument
Use Hostname	by using an address or
or	know. This has the
Examples: IPv4: 192.168.0.100 IPv6: fe80::218:e77f	advantage of being able to connect devices that are
Optional Connection Information	not auto discovered.
HiSLIP Device name: hislip2	
Socket Port number: 5025	
Test Connection I The instrument is present	
Instrument identification O Web information (recommended) O *IDN query	
None Keysight Technologies, E7515A LTE Identify Instrument Application, TH54090112, 1.2.1.0	Instrument Web Page Add to configuration
ОК	Cancel Help

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3. Verify the device has been added:



- 4. Similarly add the X-Series and the Platform applications.
- 5. Verify they are added.



At this point you can now use your existing programming environment to send SCPI commands to these software components.

4 Specifying RF Cable Compensation

You can specify compensation using the front-panel or via the remote command interface described in Chapter 3.

Using the Front-panel

The RF cable compensation has two parts:

 Cable Loss Correction: This setting enables/disables use of the Compensation Table (described below) within the E7530A/E7630A applications. Remote command: SYSTem:CORRECTION[:STATE] < ON | 1 | OFF | 0 >

👛 Keysight E7630A LTE/LTE-A Lab A	oplication					
Cell1 FDD Per: -85.00 d DL Freq: 1842.50 j	8m/15kHz UL 1747.50 MHz Hz Freq: 1		Cell2 FDD Phr: -85.00 DL 740.00	dBm/15kHz UL 710.00 MHz	OFF	Main Activate Cell
RF Config App Info Ir	npairments Error Log R	Ji Log	Cable Lana Compating			Connect►
RF Output 1 (A):	TXRX1		RF Output 2 (A):	TXRX2	•	<u>.</u>
Expected Input Power:	Auto	•	Manual Input Power:	0.0	dBm	
Timing Configuration Reference Cell:			Timing Offset:		μs	Handover
		and Foundation				Function Test
Output Antenna 1		iner Emulator		RF Output 1		
Output Antenna 2	•					Tx Measurements
Output Antenna 3	•			RF Output 2	-	Rx Measurements
Output Antenna 4		Bypass				Utility►
Cell Power Control PH	Y Scheduling MAC/RLC		System UE Info BLER/Tp	ut CSI Tx Meas		
					Local	

Figure 5-1: Cable Loss Correction setting

2. **Compensation:** The icon located on the UXM Control Panel enables you to specify RF cable loss/gain at specific frequencies.



Figure 5-2: Compensation

Compensation Set 1												Rese	t Al
Port Selection												8	
	Transceiver A						Transceiver B						
		TXRX1	TXRX2	TX2			C	x1)		TXI (202	TX2	
Tran	sceiver A	TXRX1	10.1	nem									
	Freq	(MHz)	Gain (dB)	k Tabl	es A	1							
						0	-						_
						.1-							
							0	1	2	3	4	5	6
				-		Add					ſ	Res	et
											ļ	-	

To do this, select the **Compensation** icon to open the table shown below.

Figure 5-3: Compensation Table

To specify gain or loss, perform the following steps:

- 1. Select the Transceiver A/B port for which you wish to specify compensation.
- 2. Enter the Frequency value (MHz) and Gain (dB) in the two boxes to the left of **Add:** Freq (left box) Gain (right box).^a
- 3. Select Add.^{b,c}
- 4. The box above now displays the values you entered and the graph on the right plots the value.^d

Notes:

- a. Gain values are positive and loss values are negative. You do not need to enter plus sign (+) for gain, but you do need to enter negative sign (-) for loss.
- b. If the values are invalid, they are highlighted with a red border around the boxes.
- c. If the table contains only one entry then that loss compensation value is applied to all frequency points.
- d. The X-axis represents GHz and is dependent upon the frequency range option of your UXM (option: 504 or 506). The Y-axis depends upon the range of values entered.

An example table is shown below.



Figure 5-4: Example of Populated Compensation Table

Using Remote Command Interface to Specify Compensation

Use one of the connection protocols (HiSLIPO, Socket port 5025, or Telnet port: 5024) to connect to the Platform software application as described in the section entitled, *Programming the UXM*, above.

The following remote commands are available for this purpose:

```
:SYSTem:CORRection:CSET:RESet
:SYSTem:CORRection:CSET[:TRXA]:TX1|TX:DATA[:GAIN]
:SYSTem:CORRection:CSET[:TRXA]:TX1|TX:POINts?
:SYSTem:CORRection:CSET[:TRXA]:TX1|TX:RESet
:SYSTem:CORRection:CSET[:TRXA]:TX2:DATA[:GAIN]
:SYSTem:CORRection:CSET[:TRXA]:TX2:POINts?
:SYSTem:CORRection:CSET[:TRXA]:TX2:RESet
:SYSTem:CORRection:CSET[:TRXA]:TXRX1|TXRX[:ULDL]:DATA[:GAIN]
:SYSTem:CORRection:CSET[:TRXA]:TXRX1|TXRX[:ULDL]:POINts?
:SYSTem:CORRection:CSET[:TRXA]:TXRX1|TXRX[:ULDL]:RESet
:SYSTem:CORRection:CSET[:TRXA]:TXRX2[:ULDL]:DATA[:GAIN]
:SYSTem:CORRection:CSET[:TRXA]:TXRX2[:ULDL]:POINts?
:SYSTem:CORRection:CSET[:TRXA]:TXRX2[:ULDL]:RESet
:SYSTem:CORRection:CSET:TRXB:TX1 |TX:DATA[:GAIN]
:SYSTem:CORRection:CSET:TRXB:TX1 |TX:POINts?
:SYSTem:CORRection:CSET:TRXB:TX1 | TX:RESet
```

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:SYSTem:CORRection:CSET:TRXB:TX2:DATA[:GAIN]

:SYSTem:CORRection:CSET:TRXB:TX2:POINts?

:SYSTem:CORRection:CSET:TRXB:TX2:RESet

:SYSTem:CORRection:CSET:TRXB:TXRX1|TXRX[:ULDL]:DATA[:GAIN]

:SYSTem:CORRection:CSET:TRXB:TXRX1 | TXRX[:ULDL]:POINts?

:SYSTem:CORRection:CSET:TRXB:TXRX1 | TXRX[:ULDL]:RESet

:SYSTem:CORRection:CSET:TRXB:TXRX2[:ULDL]:DATA[:GAIN]

:SYSTem:CORRection:CSET:TRXB:TXRX2[:ULDL]:POINts?

:SYSTem:CORRection:CSET:TRXB:TXRX2[:ULDL]:RESet

5 Returning Your Test Set for Service

Calling Keysight Technologies

Keysight Technologies has offices around the world to provide you with complete support for your wireless test set. To obtain servicing information or to order replacement parts, contact the nearest Keysight Technologies office listed below. In any correspondence or telephone conversations, refer to your test set by its product number, full serial number, and software revision.



To access your product information, select this icon E7515A Info in the E7515A Control Panel view after switching to the E7515A Control Panel via the Application Switch tool or after performing both or only the second action described below:

- 1. If you are inside the TA/LA software application, press the windows icon key on your USB connected keyboard to enable you to view your windows task bar.
- 2. Once you have access to the windows task bar, double-click the E7515A Control Panel icon:

to maximize the E7515A Control Panel view.

Locations for Keysight Technologies

Online assistance: http://www.keysight.com/find/assist

If you do not have access to the Internet, one of these centers can direct you to your nearest representative:

Should the Declaration of Conformity be required, please contact a Keysight Sales Representative, or the closest Keysight Sales Office. Alternately, contact Keysight at: www.keysight.com.

Service and Support

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Brazil 55 11 3351 7010 United States (800) 829 4444

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