DDR/LPDDR Custom Configuration Creator Tool

User's Guide

KEYSIGHT
TECHNOLOGIES

Notices

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Software Release

06.00.0000

Edition

August 2014

Available in electronic format only

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Warranty

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Safety Notices

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.

WARNING

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.

Safety Summary

The following general safety precautions must be observed during all phases of operation of this instrument. Failure to comply with these precautions or with specific warnings or operating instructions in the product manuals violates safety standards of design, manufacture, and intended use of the instrument. Keysight Technologies assumes no liability for the customer's failure to comply with these requirements. Product manuals are provided with your instrument on CD-ROM and/or in printed form. Printed manuals are an option for many products. Manuals may also be available on the Web. Go to www.keysight.com and type in your product number in the Search field at the top of the page.

General	Do not use this product in any manner not specified by the manufacturer. The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.
Before Applying Power	Verify that all safety precautions are taken. Make all connections to the unit before applying power. Note the instrument's external markings described in "Safety Symbols".
Ground the Instrument	If your product is provided with a grounding type power plug, the instrument chassis and cover must be connected to an electrical ground to minimize shock hazard. The ground pin must be firmly connected to an electrical ground (safety ground) terminal at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.
Fuses	See the user's guide or operator's manual for information about line-fuse replacement. Some instruments contain an internal fuse, which is not user accessible.
Do Not Operate in an Explosive Atmosphere	Do not operate the instrument in the presence of flammable gases or fumes.
Do Not Remove the Instrument Cover	Only qualified, service-trained personnel who are aware of the hazards involved should remove instrument covers. Always disconnect the power cable and any external circuits before removing the instrument cover.
Cleaning	Clean the outside of the instrument with a soft, lint-free, slightly dampened cloth. Do not use detergent or chemical solvents.
Do Not Modify the Instrument	Do not install substitute parts or perform any unauthorized modification to the product. Return the product to an Keysight Sales and Service Office for service and repair to ensure that safety features are maintained.
In Case of Damage	Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.

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Safety Symbols

Table 1   Safety Symbol

Symbol	Description
	Direct current
	Alternating current
	Both direct and alternating current
	Three phase alternating current
	Three phase alternating current
	Earth ground terminal
	Protective earth ground terminal
	Frame or chassis ground terminal
	Terminal is at earth potential
	Equipotentiality
N	Neutral conductor on permanently installed equipment
L	Line conductor on permanently installed equipment
	On (mains supply)
	Off (mains supply)
	Standby (mains supply). The instrument is not completely disconnected from the mains supply when the power switch is in the standby position
	In position of a bi-stable push switch

Symbol	Description
	Out position of a bi-stable push switch
	Equipment protected throughout by DOUBLE INSULATION or REINFORCED INSULATION
	Caution, refer to accompanying documentation
	Caution, risk of electric shock
	Do not apply around or remove from HAZARDOUS LIVE conductors
	Application around and removal from HAZARDOUS LIVE conductors is permitted
	Caution, hot surface
	Ionizing radiation
CAT I	IEC Measurement Category I
CAT II	Measurement Category II
CAT III	Measurement Category III
CAT IV	Measurement Category IV

Compliance and Environmental Information

Table 2   **Compliance and Environmental Information**

Safety Symbol	Description
	CSA is the Canadian certification mark to demonstrate compliance with the Safety requirements.
N10149	The C-tick mark is a registered trademark of the Spectrum Management Agency of Australia. This signifies compliance with the Australia EMC Framework regulations under the terms of the Radio Communication Act of 1992.
CE	CE compliance marking to the EU Safety and EMC Directives. ISM GRP-1A classification according to the international EMC standard. ICES/NMB-001 compliance marking to the Canadian EMC standard.

Contents

1
Introduction

Overview

The **DDR/LPDDR Custom Configuration Creator** tool allows you to define the footprints layout as per your custom probing solution used in the DDR/LPDDR setup and then create an XML configuration file based on this footprint information. The generated XML configuration file contains all the information for your custom probing needed by Keysight B4621 DDR Decoder, B4623 LPDDR Decoder, and B4622 DDR Protocol Compliance and Analysis toolset.

Once created, you input this XML configuration file in the Keysight DDR Setup Assistant wizard to define the DDR/LPDDR acquisition setup for logic analyzer. By using such a custom configuration file, you can ensure that the logic analyzer setup is correctly and completely set for a custom probing scenario.

Supported Bus Types

This tool can generate configuration files for the following DDR/LPDDR bus types.

- DDR3
- DDR4 (< 2.5 GHz and > 2.5 GHz)
- LPDDR2
- LPDDR3

Other Related Help Links

You may find useful information related to using DDR Setup Assistant, DDR/LPDDR Decoders, and capturing and analyzing data in the following online help integrated with the Logic and Protocol Analyzer GUI.

- DDR Setup Assistant online help
- Logic and Protocol Analyzer online help
- B4621 DDR Bus Decoder online help
- B4623 LPDDR Bus Decoder online help

When to Use This Tool

The usage of this tool depends on the probing solution you are using with your DDR/LPDDR target.

For Keysight probing solutions

If you are using an Keysight probing solution, then you can directly use one of the Keysight-provided standard XML configuration files suitable for that probe. These configuration files are installed at the following location when you install the B4621 DDR Decoder, B4623 LPDDR Decoder, or B4622 DDR Protocol Compliance and Analysis toolset.

C:\Users\Public\Documents\Keysight Technologies\Logic Analyzer\Default Configs\ Keysight
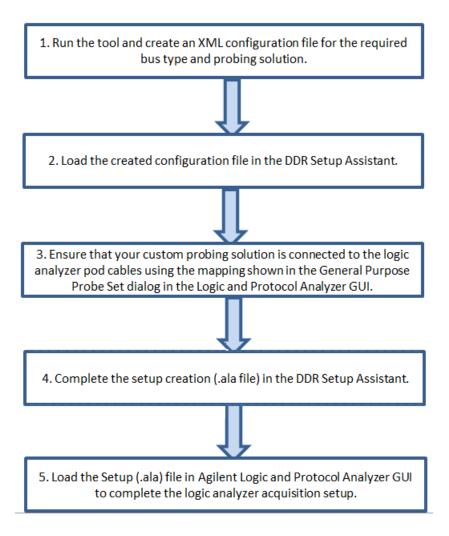
For a custom probing solution

If you are using a custom probing solution, you have the following two options to create XML configuration files as per your custom probing.

- *Create a custom configuration file manually or modify an Keysight-provided standard configuration file for your custom footprint pinout* - This method can be complex, time-consuming, error-prone, and may lack inclusion of all the required information in the created configuration file.

- *Create a custom configuration file using the DDR/LPDDR Custom Configuration Creator tool* - This method simplifies the procedure of customized configuration file creation. It also ensures that all the layout information needed by Keysight tools such as DDR Setup Assistant, DDR Decoder, or LPDDR Decoder is included in the configuration file.

Flow of Steps

The following figure depicts the flow of steps for using this tool to create a logic analyzer acquisition setup for a custom probing solution.

These steps are described in detail in the chapter "Setting up Logic Analyzer for Custom Probing" on page 15.

2
Installing and Starting the Tool

To install the tool

The DDR/LPDDR Custom Configuration Creator tool is a part of the *Keysight DDR Setup Assistant and Eyefinder* software package. Therefore, the tool is available when you install this package.
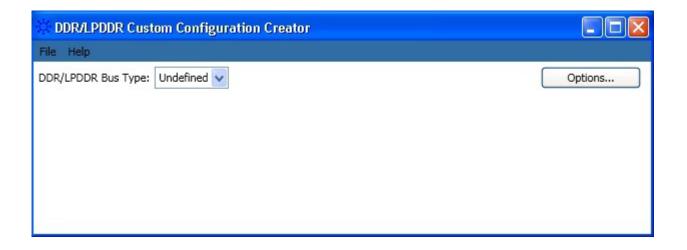
NOTE	You must install the Keysight Logic and Protocol Analyzer software version 5.80 or higher before installing the Keysight DDR Setup Assistant and Eyefinder package. You can install both these software from the Keysight web site at: www.keysight.com/find/la-sw-download.

To start the tool

1   From the system's taskbar, select **All Programs** > **Keysight Logic Analyzer** > **Utilities** > **DDR Custom Configuration Creator**.

   Alternatively, double-click the DDR/LPDDR Custom Configuration Creator icon on your desktop.

The DDR/LPDDR Custom Configuration Creator tool is displayed.

2   **Installing and Starting the Tool**

3

Setting up Logic Analyzer for Custom Probing

This chapter describes the tasks that you need to perform to complete the logic analyzer DDR/LPDDR acquisition setup in situations when a custom probing solution is used.

Creating a Custom XML Configuration File

Defining Footprints

To create a custom configuration file, you need to define footprint layout(s) matching the custom footprint(s) you have designed in your schematics. In a footprint layout, you reflect your custom footprint pinout by defining a signals to pins/logic analyzer channels mapping.
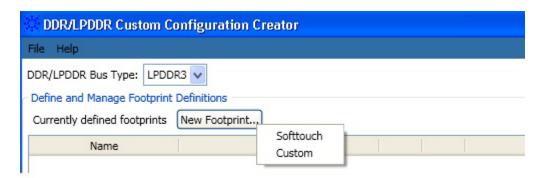
You route signal bits to logic analyzer bits using this mapping.

To define a footprint

1   Launch the DDR/LPDDR Custom Configuration Creator tool.

2   From the **DDR/LPDDR Bus Type** listbox, select the bus type for which you want to define a footprint layout.

On selecting the bus type, appropriate fields are displayed in the tool to define a footprint.

3   Click the **New Footprint** button.

4   The types of footprint layouts that you can create are displayed as menu options. Select a type that suits your probing setup.
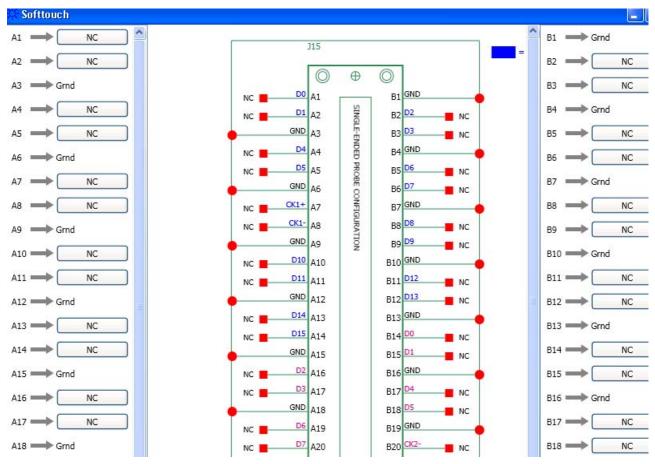

5   The **New Footprint Name** dialog box is displayed. Specify a name for the new footprint and click **OK**. The name usually should be the name given to the footprint in the schematics.

From this point onwards, the steps are slightly different based on the type of footprint you want to create. The steps outlined below are segregated based on whether you want to create a **Softtouch** or a **Custom** type of footprint layout.
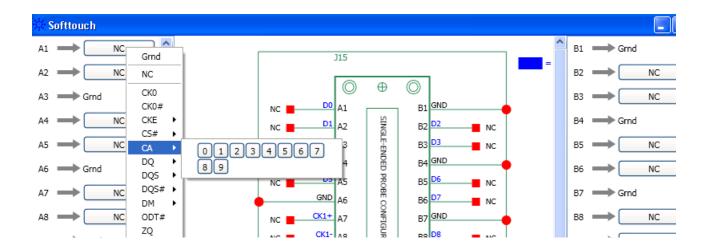
For a Softtouch footprint layout

The tool then displays a diagrammatic representation of the pins in the probe connector. The logic analyzer channel associated to each of these pins is also displayed in this diagrammatic representation. On the left and right sides of this representation, two columns are provided to allow you to map signal bits to these pins.

6   To map a signal bit to a pin, click the signal box displayed in front of that pin in one of the two columns on left or right of the diagrammatic representation.

A list of signals based on the selected DDR/LPDDR bus type is displayed.

7   Select a signal to which the pin is mapped in your footprint. Then select the bit.
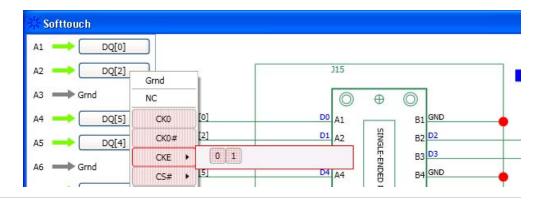
NOTE   A signal displayed with a red shading in this list indicates that you have already mapped this signal to a pin. However, it is possible to map an already mapped signal to another pin thereby creating its mapping to multiple pins.
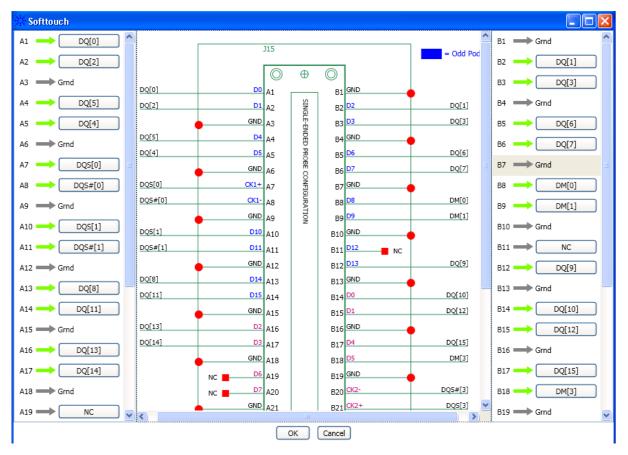
An example of such a situation is a clock enable bit (CKE) mapped to two different pins to use it as a clock qualifier as well as to scan it with eyescan as a logic analyzer bit.

Warnings are displayed in the created configuration file for such multiple mappings.
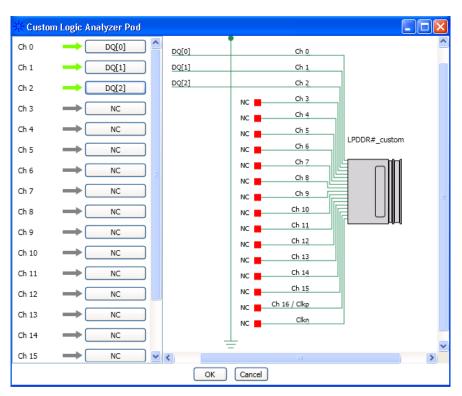

8 Repeat steps 6 and 7 to map all other pins to signals.

As you proceed with mapping pins to signals, the schematic drawing in the middle of the screen is updated accordingly to reflect these mappings.
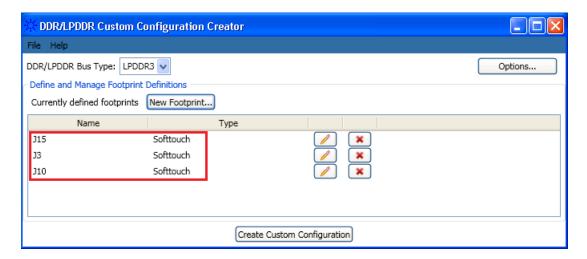
For a Custom footprint layout

If you are creating a **Custom** type of footprint layout, the tool displays a diagrammatic representation of the logic analyzer pod with all the logic analyzer channels that you can map to signals. On the left side of this representation, a column is provided to allow you to map signals to these channels. To map a signal to a channel, click the signal box in front of that channel displayed in the column on the left.

9   Once the footprint layout is complete, click **OK**.

10 Repeat the entire procedure to create more footprint layouts matching your schematics.

Interpreting the Mappings

- For the pins for which you have defined the mapping, a green arrow is displayed between these pins and their mapped signals.

- For the pins that are not mapped to any signals, NC (Not Connected) is displayed.

- If you have mapped a signal to multiple pins (by mistake or intentionally), a yellow arrow is displayed between such mappings so that you can distinguish such mappings from other mappings and take corrective actions, if needed.

Once created, you can edit or delete a footprint layout by clicking the [icon] or [icon] buttons respectively. These buttons are displayed with each footprint.
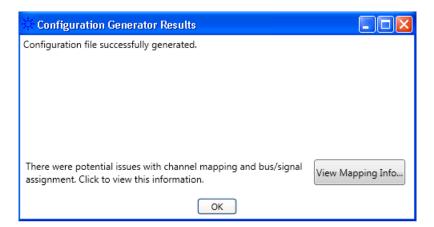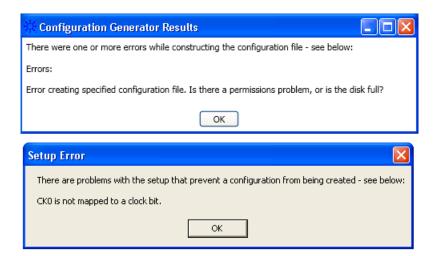
Creating a Configuration File

Once you defined footprint layouts in the tool, you can create a custom configuration file. The generated file will store information related to all these footprint layouts.

1 Click the **Create Custom Configuration** button displayed in the tool.

2 In the **Save As** dialog box, specify a file name for the configuration file and click **Save**.

If the configuration file is created successfully, then the following screen is displayed.

If the tool could not create the configuration file, then a screen similar to one of the following screens is displayed.

NOTE   The tool is not able to create a configuration file in situations such as:

- Incorrect mapping of the clock bit. If the clock bit is not mapped at all, or not mapped correctly to a logic analyzer clock bit, then the configuration file is not generated.

- Permission problems or a full disk while saving the configuration file at the user-specified location.
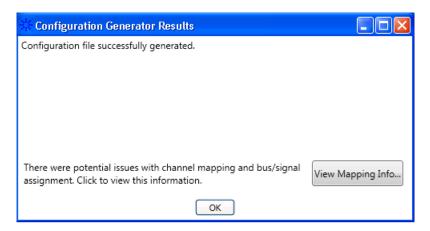
Viewing Mapping Warnings or Errors

There are situations when a custom configuration file is created successfully but has some mapping related warnings or errors such as:

- A signal mapped to multiple pins.

- A signal bit from the middle of a group of bits not mapped - For instance, if all DQ bits 0 – 31 are mapped except bit 20, then this is reported as an error.

- A missing signal.

- Upper bits of a label not mapped intentionally (reported as warnings).

To view these warnings and errors

1   Click the **View Mapping Info** button from the **Configuration Generator Results** dialog box. This dialog box is displayed as a result of the completion of the configuration file creation.

The **Bit Mapping and Label Creation Information** dialog box is displayed. In this dialog box, various warnings and errors are grouped in categories.

2   Expand a category to view the warnings/errors encountered.

3   Resolve any errors and (if needed) any warnings and regenerate the configuration file.

Saving a Configuration Setup

You can save the configuration settings and footprint layouts that you defined in a setup file for future use. The tool saves this setup file with a .ccc extension.

<table>
<tr><td>**NOTE**</td><td>The configuration setup CCC file is different from the configuration XML file that you create using this tool. The configuration setup file has only the information related to the setup that you created in this tool. This setup file cannot be loaded in the DDR Setup Assistant.</td></tr>
</table>

1   Click **File** > **Save Setup** in the tool.

2   Navigate to the location where you want to save the configuration setup file, specify a name for the file, and click **Save**.

Loading a Saved Configuration Setup File

1   Click **File** > **Load Setup** in the tool.

2   Navigate to the location where you saved the configuration setup CCC file, select the file, and click **Open**.

Loading a Custom Configuration File in DDR Setup Assistant

The custom configuration file that you created using the DDR/LPDDR Custom Configuration Creator tool needs to be loaded in the DDR Setup Assistant

The DDR Setup Assistant is a wizard-like application that provides a series of steps to set up your logic analyzer properly for DDR data capture and analysis. One of its steps (Step 3) requires you to load an appropriate configuration file (standard or custom) matching your probing setup. The wizard uses this configuration file to gather information about your probing and accordingly generate a Logic analyzer setup file based on this information.

NOTE	You can also directly load the custom configuration file in the Logic and Protocol Analyzer GUI to define the logic analyzer acquisition setup. However, it is recommended to use the DDR Setup Assistant that ensures a step by step inclusion of all the required information in the acquisition setup.

To load a custom configuration file in DDR Setup Assistant

1   Double-click the DDR Setup Assistant icon on your desktop to start the DDR Setup Assistant.

2   Complete the first two steps.

3   In the third step, select the **Load a custom configuration file** radio button.

4   Click the **Load Configuration File** button.

5   Browse to the location where you saved your custom XML configuration file and click **Open**.

6   Proceed with the rest of steps in the DDR Setup Assistant wizard.

NOTE	For detailed information on how to install and use the DDR Setup Assistant wizard, refer to its online help at *<Install location of Logic and Protocol Analyzer software>\ help*. The online help is available only when you install this wizard application.

Completing the DDR Setup Assistant Steps

All the steps in the DDR Setup Assistant are important and need to be completed to generate a setup file. (Refer to the topic *Using the DDR Setup Assistant* in its online help to know about each step.)

Out of these steps, this topic highlights the hardware setup step in context of a custom probing scenario. For such a scenario, it is important that you make correct logic analyzer pods to footprint connections before proceeding to the next step.

To make these connections, you can use the **General Purpose Probe Set** dialog box in the Logic and Protocol Analyzer GUI. This dialog box displays the mapping between the probe's pins/pads and logic analyzer pod cables as per the currently used configuration. You can use these mappings to ensure correct connections between probes and logic analyzer pods.

Refer to the topic **Step - Do Hardware Setup** in the DDR Setup Assistant online help to get detailed information on this step.

Loading the Acquisition Setup File in Logic and Protocol Analyzer GUI

Once you have completed all the steps in the DDR Setup Assistant wizard, a setup file is generated that you can load in the Logic and Protocol Analyzer GUI to complete your logic analyzer acquisition setup for custom probing.

3   Setting up Logic Analyzer for Custom Probing

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