



# Reference Design Eval Kit MCDP2900-RD2

## RD2-2900 DP1.4 to HDMI2.0a Protocol Converter

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## 1. Purpose and Scope

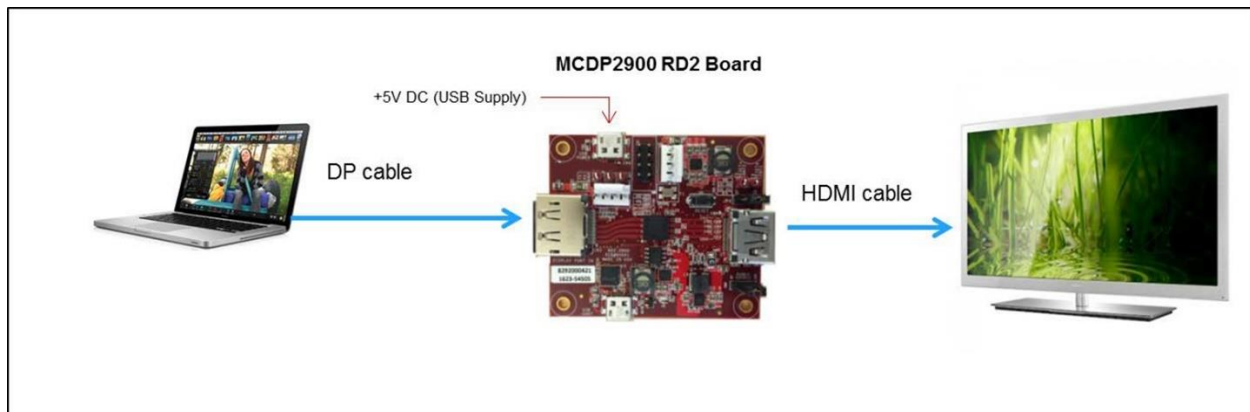
This user guide provides set up instructions and the description of the RD2-2900 reference board targeted for DisplayPort™ to HDMI2.0b converter applications.

## 2. Description

The MCDP2900 is Kinetic's latest generation DisplayPort converter series product that features a DisplayPort1.4 compatible receiver and an HDMI 2.0b compliant transmitter.

The RD2-2900 board is intended for product evaluation and testing. The board contains the MCDP2900 A4 silicon with a standard DisplayPort connector that feeds the AV input, a standard HDMI connector for AV output, and a micro USB connector for powering. The board also includes a 27 MHz crystal that feeds the reference clock to MCDP2900, an SPI flash for storing the firmware, a reset switch and power regulators (3 V and 1.2 V). There are two optional connectors, UART and an I2C slave interface port. The UART connector is operational only with MCDP2900 FX part (applicable for development purpose) for firmware download and debug purpose. UART port is not accessible in production silicon for security reasons. The I2C port can be used for configuring MCDP2900 from external host controller.

A typical system level configuration (Figure 1) can be used to evaluate RD2-2900 board.



**Figure 1. Basic System Configuration**

For a detailed product functional description, please refer to the MCDP2900 datasheet.

## 2.1. Set Up Instructions

The above picture shows the typical setup of the MCDP2900 used in a dongle application. A notebook or tablet with a DisplayPort output or DisplayPort Alt mode over USB-C output is used as the source. The output of the RD2-2900 board is driving a 4k2k 60Hz monitor or TV.

1. Select Power source (default is set to external 5V via onboard microUSB).
2. Select the chip RESET source (default is set to onboard circuit).
3. Connect the DP output from the notebook to the DP input of the RD2-2900 board using a standard DP cable.
4. Connect the HDMI output of the RD2-2900 board to the HDMI input of the TV or the LCD monitor.
5. Power up the RD board by plugging in the micro USB cable (supplied with board) from an external USB source (for example: one of the USB ports from the notebook).
6. The LED should be ON to confirm that the board is properly powered.
7. Use an HDMI TV or monitor that has audio output for testing the audio conversion through the RD2-2900 board as well.
8. Once the connection is established and the board is powered, an image appears on the screen within 2-3 seconds.

## 2.2. Diagnosis

If the image does not come up, follow the steps below for diagnosis.

1. Check the power source and RESET jumpers, LED, etc.
2. Press the RESET button to make sure the RD2-2900 board is properly reset.
3. Unplug the DP and HDMI cables and plug again (change cables if it is bad one).
4. Click on the Windows Display settings to check if the connected display is shown. If not change the multiple display option selection (preferred selection "Extend these displays").
5. If there is still no image, then contact a Kinetic FAE for support.

## 2.3. In-System Programming (ISP)

The RD2-2900 board uses SPI Flash to store the firmware. Please contact an FAE or AE from Kinetic for the firmware upgrade tool and instructions.

### 3. RD2-2900 Board Description

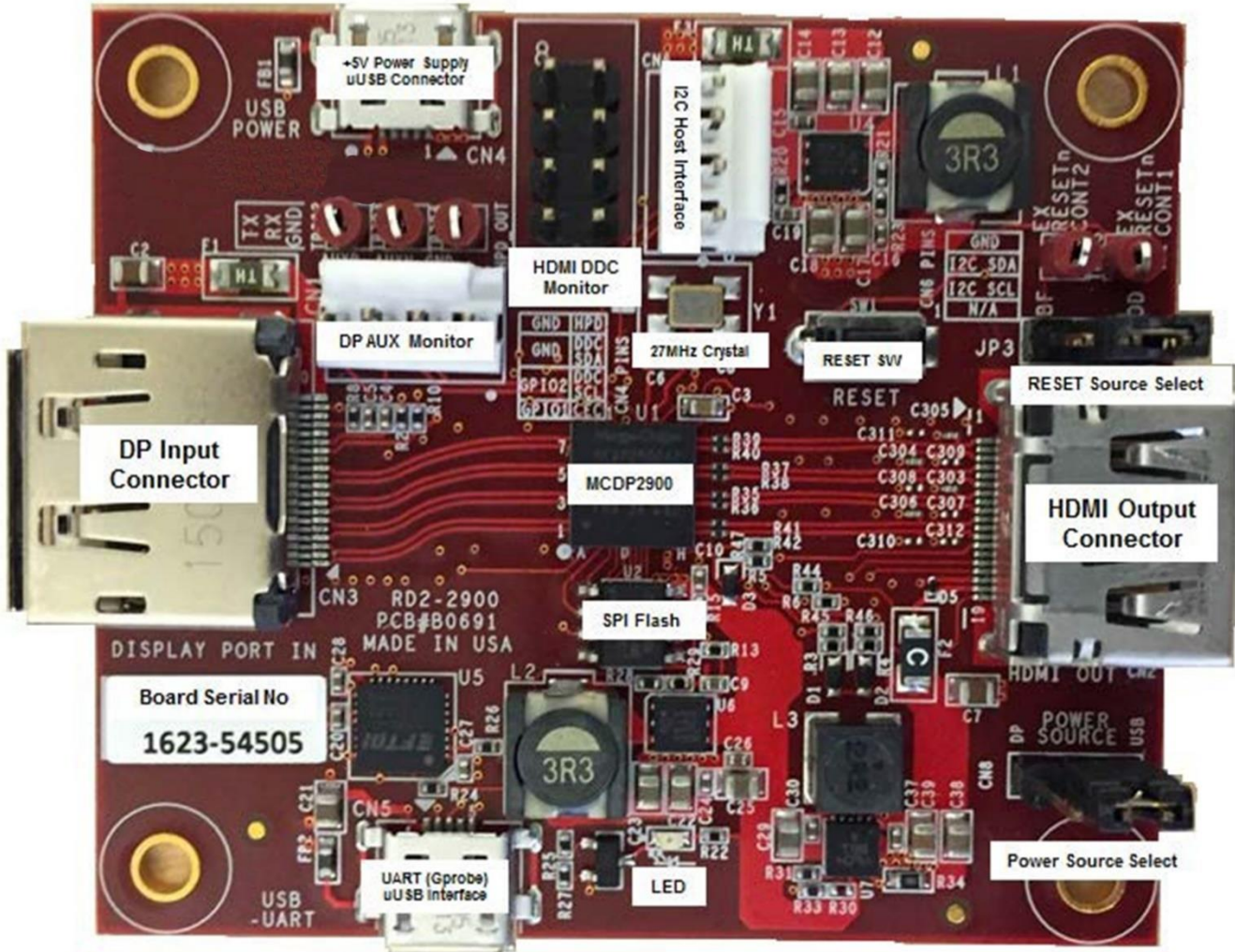


Figure 2. RD2-2900 Board Picture

### 3.1. Brief Description

**Table 3.1-1. Connectors, Jumpers and IC Summary**

Label	Description	Ref des
+5 V Power Supply (uUSB ) Connector	Input 5 V, down conversion to 3.3 V, and 1.2 V. This board uses two step-down switch regulators to generate 3.3 V and 1.2 V. Note the analog and digital supplies (3.3 A and 3.3 D or 1.2 A and 1.2 D) are isolated using ferrite beads.	CN4
Power source (3.3V) selection	3.3V input power selectable via jumper: “USB”: from onboard 5V-3.3V step-down switch regulator (default) “DP”: from external DP source (via DP connector using DP_PWR enabled captive cable) * Renamed to JP4 in the next board revision	*CN8 Or JP4
RESET source selection	label “OD” for Open-Drain (onboard Reset -Default) label “BF” for Buffered (external Reset source, e.g. host CPU)	JP3
DP Input	DP input connector	CN3
HDMI Output	HDMI output connector	CN2
MCDP2900	Kinetic DP1.4 to HDMI2.0a converter IC for Protocol Converter / Dongle application. See product datasheet for more details	U1
SPI Flash	The board includes an SPI Flash of 8 MB to hold the firmware. The SPI Flash can be programmed (ISP) through UART interface.	U2
UART (GProbe)	The board includes a UART-USB chip (U5) that allows GProbe communication (through this USB port) to MCDP2900 UART port for communication with external PC sources for debug.	CN5
Host Interface (I2C)	Host Interface (I2C): This is a provision to access the MCDP2900 device from an external host controller through the Host Interface (I2C port) connection.	CN9
Reset	The reset button, when pressed, triggers a system reset through the internal reset circuitry. The reset button is used for system reset and debugs purposes	SW1
LED	Single LED for indicating the power on status.	D8
Crystal	A crystal of 27 MHz	Y1
DP AUX/HPD Monitor	For connecting to Kinetic AUX monitor board. Also, it can be used to monitor these signals.	CN1
HDMI DDC Monitor	Can be used to monitor HDMI DDC, HPD and CEC, and GPIO activity.	CN6

### 3.2. Connectors and Jumpers Details

The RD2-2900 board has the following connectors. The locations of these connectors are shown in the board picture above.

**CN4** – +5 V DC 2.5A Power Input uUSB connector

**CN5** – UART/GProbe for debug

**CN6** – HDMI DDC/HPD/CEC/GPIO monitor (2x4 pin header)

<b>Pin 1</b>	CEC
<b>Pin 2</b>	GPIO1_33
<b>Pin 3</b>	HDMITX_DDC_SCL
<b>Pin 4</b>	GPIO2_33
<b>Pin 5</b>	HDMITX_DDC_SDA
<b>Pin 6</b>	GND
<b>Pin 7</b>	HPD
<b>Pin 8</b>	GND

**CN3** – DisplayPort receiver pin out details are shown below.

<b>Pin 1</b>	ML_L3N
<b>Pin 2</b>	GND
<b>Pin 3</b>	ML_L3P
<b>Pin 4</b>	ML_L2N
<b>Pin 5</b>	GND
<b>Pin 6</b>	ML_L2P
<b>Pin 7</b>	ML_L1N
<b>Pin 8</b>	GND
<b>Pin 9</b>	ML_L1P
<b>Pin 10</b>	ML_L0N
<b>Pin 11</b>	GND
<b>Pin 12</b>	ML_L0P
<b>Pin 13</b>	GND
<b>Pin 14</b>	GND
<b>Pin 15</b>	AUX_P
<b>Pin 16</b>	GND
<b>Pin 17</b>	AUX_N
<b>Pin 18</b>	HPD_OUT
<b>Pin 19</b>	GND
<b>Pin 20</b>	+3V3_AVDD



**CN2** – HDMI transmitter (refer to the schematics for complete pin out details).

<b>Pin 1</b>	Data Lane 2+
<b>Pin 2</b>	GND
<b>Pin 3</b>	Data Lane 2-
<b>Pin 4</b>	Data Lane 1+
<b>Pin 5</b>	GND
<b>Pin 6</b>	Data Lane 1-
<b>Pin 7</b>	Data Lane 0+
<b>Pin 8</b>	GND
<b>Pin 9</b>	Data Lane 0-
<b>Pin 10</b>	Clock Lane +
<b>Pin 11</b>	GND
<b>Pin 12</b>	Clock Lane -
<b>Pin 13</b>	CEC
<b>Pin 14</b>	NC
<b>Pin 15</b>	DDC_SCL
<b>Pin 16</b>	DDC_SDA
<b>Pin 17</b>	GND
<b>Pin 18</b>	+5V
<b>Pin 19</b>	HPD

**CN1** – DP AUX and HPD interface for debug and AUX traffic monitoring (1x4 pin header).

<b>Pin 1</b>	HPD_OUT
<b>Pin 2</b>	GND
<b>Pin 3</b>	AUXN
<b>Pin 4</b>	AUXP

**CN9** – Host Interface (I2C) - optional

<b>Pin 1</b>	No Connect
<b>Pin 2</b>	I2C_SCL
<b>Pin 3</b>	I2C_SDA
<b>Pin 4</b>	GND

**JP3** – MCDP2900 RESET Source: 1-2 OD (Open Drain) - default  
3-2 BF (Buffered, from external source e.g. host CPU)

**CN8\*** – Power Source (3.3v): Pins 1+2 = DP 3.3V (via DP connector using DP\_PWR enabled captive cable), Pins 3+2 = USB 5V to 3.3V (via onboard switch regulator) - Default

\* Note: Renamed to JP4 in the next board revision