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RD3-2850

DP1.2 to HDMI2.0a converter

[PCON]

Reference board user guide

Rev. A

MegaChips

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1. Purpose and scope

This user guide provides set up instructions and the description of the RD3-2850 reference board targeted for DP1.2 to HDMI2.0a conversion for PCON/Dongle application.

2. Description

The MCDP2850 is MegaChips' latest generation DisplayPort converter series product that features a DisplayPort1.2 compliant receiver and an HDMI 2.0 compliant transmitter.

The RD3-2850 board is intended for product evaluation and testing. The board contains a standard DP input connector, a standard HDMI output connector, and a micro USB connector for powering. It also includes an SPI flash for storing the firmware, a UART connector for debugging and in-system programming purpose (firmware download), and an I2C slave interface to configure the device from an external host controller (optional).
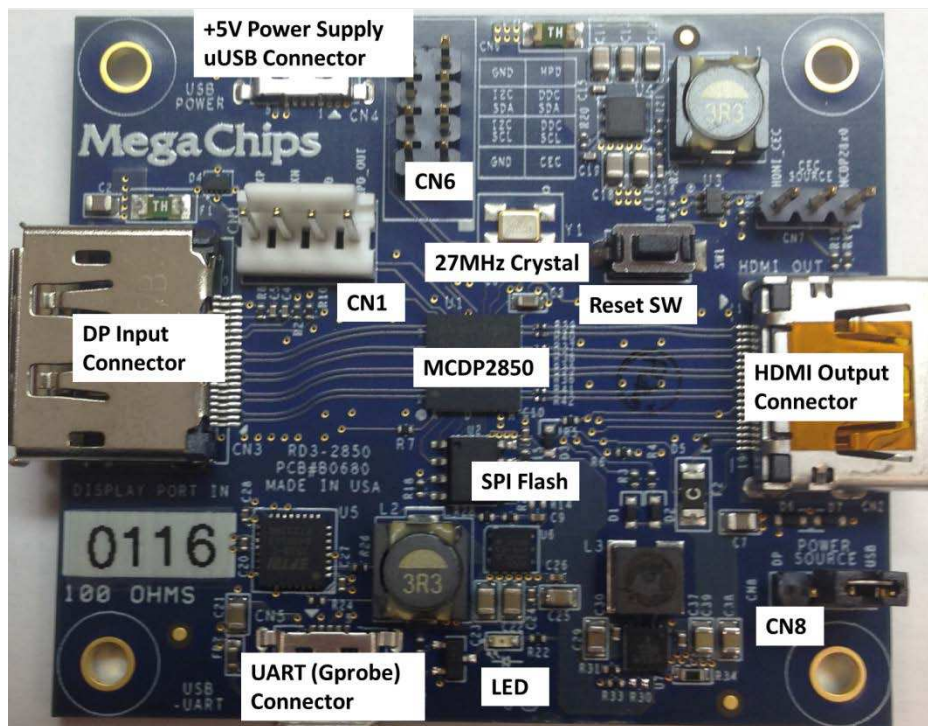
2.1. Board picture

Figure 1. Board picture

2.2. Set up instructions

The picture below is a diagram of a typical connection. It shows a notebook with DisplayPort output driving a TV/monitor using RD3-2850 board.

1. Select the power source (direct 5V via USB or 3.3V via DP source) - refer to CN8
2. Connect the DP output from the notebook to the DP input of the RD3-2850 board using a standard DP cable (or DP_PWR enabled captive cable for DP source power).
3. Connect the HDMI output of the RD3-2850 board to the HDMI input of the TV or the LCD monitor.
4. For direct 5V power option, connect the micro USB cable (supplied with board) from an external USB source (ex: one of the USB ports from the notebook).
5. Use an HDMI TV or monitor that has audio output for testing the audio conversion through the RD3-2850 board as well.
6. Once the connection is established and the board is powered, an image appears within 2-3 seconds.
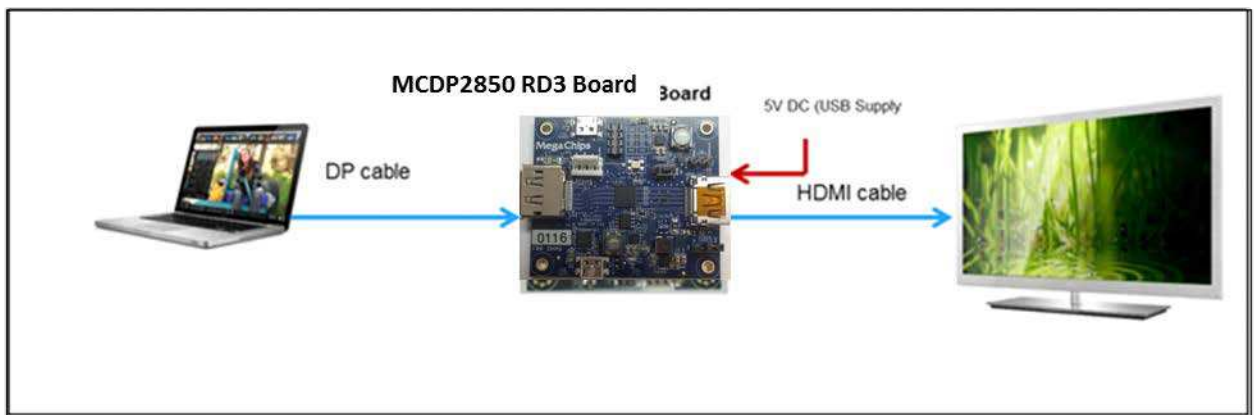

Figure 2. Connection set up

2.3. Diagnosis

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

- Install the GProbe diagnostic tool on a Windows OS based PC/NB. Please contact MegaChips FAE to obtain the GProbe software tool.

- Connect the UART uUSB input (CN5) of the RD3-2850 to an available USB port of a PC/Laptop
- Hit the reset button on the board (RESET SW1). You will see the firmware version and the date of the firmware in the GProbe window. This indicates that the DP Receiver IC is functional. If the message does not appear, reprogram the SPI Flash using the ISP method described in the GProbe user guide

2.3.1. In-System Programming (ISP)

The RD3-2850 board uses SPI Flash to store the firmware. Please contact MegaChips FAE for the latest firmware, upgrade tool and instructions.

3. RD3-2850 board description

3.1. Connection diagram

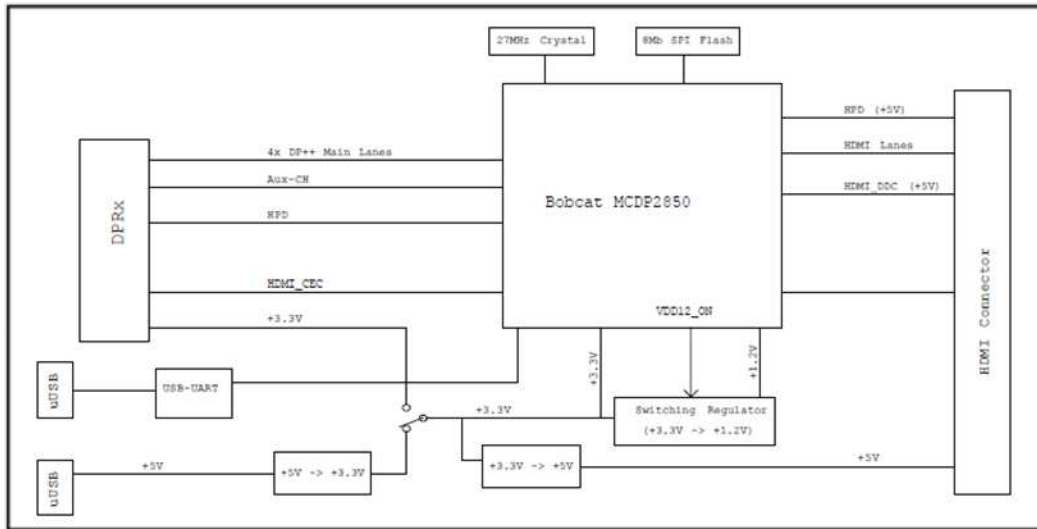For details, refer to the latest RD3-2850 board schematics.

Figure 3. Connection diagram

3.2. Principal components and functions

Below is a summary of all necessary connectors, switches, and other components. Please refer to the latest board schematics for further details.

Table 1.   Principal connections and functions

Label	Description	Ref
USB Power	+5 V Power Supply (uUSB) Connector 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 input power selectable via jumper: "USB" from onboard 5V-3.3V step-down switch regulator "DP" from external DP source (via DP connector using DP_PWR enabled captive cable)	CN8
DP Input	DP input connector	CN3
HDMI Output	HDMI output connector	CN2
DP AUX and HPD	For connecting to MegaChips AUX monitor board. Also, it can be used to monitor these signals.	CN1
Host Interface (I2C) and DDC/CEC monitor	This is a provision to access the MCDP2850 device from an external host controller through the Host Interface (I2C port) connection. Other pins on this connector can be used for DDC and CEC monitoring/debug	CN6
MCDP2850	MegaChips DP1.2a to HDMI2.0a converter IC for PCON / dongle applications	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 or over AUX using MegaChips DPISP tool	U2
UART (GProbe)	The board includes a UART-USB chip (U5) that allows GProbe communication (through this USB port) to MCDP2850 UART port for communication with external PC sources for debug.	CN5
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
ESD Diodes	ESD protection diodes for HDMI (+5V line) and DisplayPort signal (CONFIG1 and HPD line). The board implements low cost ESD diodes.	

3.3. Connector descriptions

The RD3-2850 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.

CN8 – Power source selection via jumper: DP = DP source (via DP cable), USB = USB source (local board power)

CN3 – DisplayPort receiver pin out details are shown below.

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

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

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

CN1 – DP AUX and HPD interface (1x4 pin header).

Pin 1	HPD_OUT
Pin 2	GND
Pin 3	AUXN
Pin 4	AUXP

CN6 – I2C Host interface (2x4 pin header).

Pin 1	CEC
Pin 2	GND
Pin 3	HDMI_DDC_ SCL
Pin 4	I2C_SCL
Pin 5	HDMI_DDC_ SDA
Pin 6	I2C_SDA
Pin 7	HPD
Pin 8	GND

4. Revision history

Table 2.   Document revision history

Date	Revision	Changes
19-April-2016	A	Initial version.