RD4-2600

HDMI1.4 to dual-mode TX (DP++) converter

Reference board user guide

Rev. B

MegaChips

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1. Purpose and scope

This user guide provides set up instructions and the description of the STDP2600 reference board RD4-2600 (P/N 400-627) targeted for HDMI to DP++ (DisplayPort TX or HDMI/DVI output) conversion applications.

2. Description

The STDP2600 is MegaChips' latest generation of HDMI converter series product that features an HDMI1.4 compliant receiver and DisplayPort dual mode transmitter technology that supports both DisplayPort and TMDS signal formats. The HDMI receiver supports a link rate up to 3.0GHz, 3D video formats and 16-bit deep color. The DisplayPort transmitter supports HBR2 speed, a data rate of 5.4 Gbps per lane with a total bandwidth of 21.6 Gbps link rate. In addition, the DisplayPort transmitter is capable of supporting HDMI or single link DVI output through a passive level translator (dongle). When configured as HDMI output, this device supports link rate up to 2.97 Gbps that corresponds to a pixel rate of 297 MHz, adequate for supporting video resolution up to FHD 120 Hz with all 3D formats.

The STDP2600 RD4 board is intended for the product evaluation and testing. The board contains a standard HDMI input connector, a standard DP++ 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).

3. Set up instructions

The picture below is a typical connection diagram showing a Notebook with HDMI output driving a TV/monitor using STDP2600 RD board.

1. Connect HDMI output from the notebook to HDMI input of STDP2600 RD board using standard HDMI cable.
2. Connect the DP output of STDP2600 RD board to either DP input of LCD monitor or HDMI input of the TV/LCD monitor through a passive dongle.
3. Power up the RD board by plugging in the microUSB cable (supplied with board) from an external USB source (Ex: one of the USB ports from the Notebook).
4. Use a DP monitor/ HDMI TV that has audio output for testing the audio conversion through the STDP2600 RD board as well.
5. Once the connection is established and the board is powered, an image should appear on the screen within 2-3 seconds.

Figure 1.   Connection set up
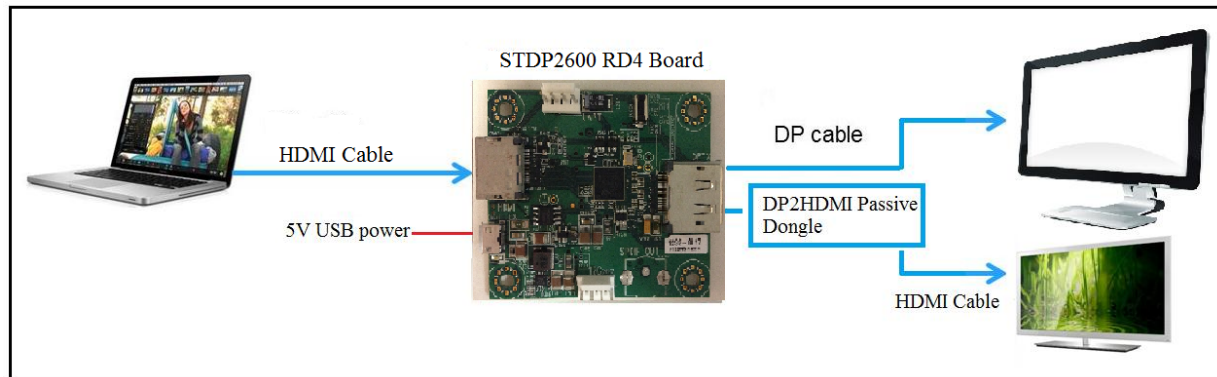
4. Diagnosis

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

Note: The diagnosis requires MegaChips GProbe software and hardware tool. Contact MegaChips for the GProbe software and board.

6.   Install the MegaChips GProbe diagnostic tool on a Windows OS based PC/NB and set the baud rate to 115,200.

7.   Connect GProbe board to the serial port (or USB port if using USB version of Gprobe board) of the computer.

8.   Connect the other end of the GProbe board to UART connector (CN502) on the STDP2600 RD board using 4-wire cable (part of the GProbe board). Note: CHECK the POLARITY while connecting the cable; Pin 1 is marked on the board. The 4-wire cable connection from CN502 to GProbe board is 1 to 1.

9.   Hit the Reset button on the board (RESET SW501). You will see Firmware version and date of firmware in the GProbe window. This indicates 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.

10.   Using an oscilloscope, check the video input and output from the STDP2600 RD board.

Note: Refer to the STDP2600 datasheet for pin-out descriptions.

4.1. In-System Programming (ISP)

The STDP2600 RD board uses SPI Flash to store the firmware. For new firmware upgrade, following method is recommended.

ISP through UART connector: Allows programming of the SPI Flash through UART (CN502) connector. This requires GProbe board and GProbe software tool from MegaChips. Also contact MegaChips for the latest binary file.
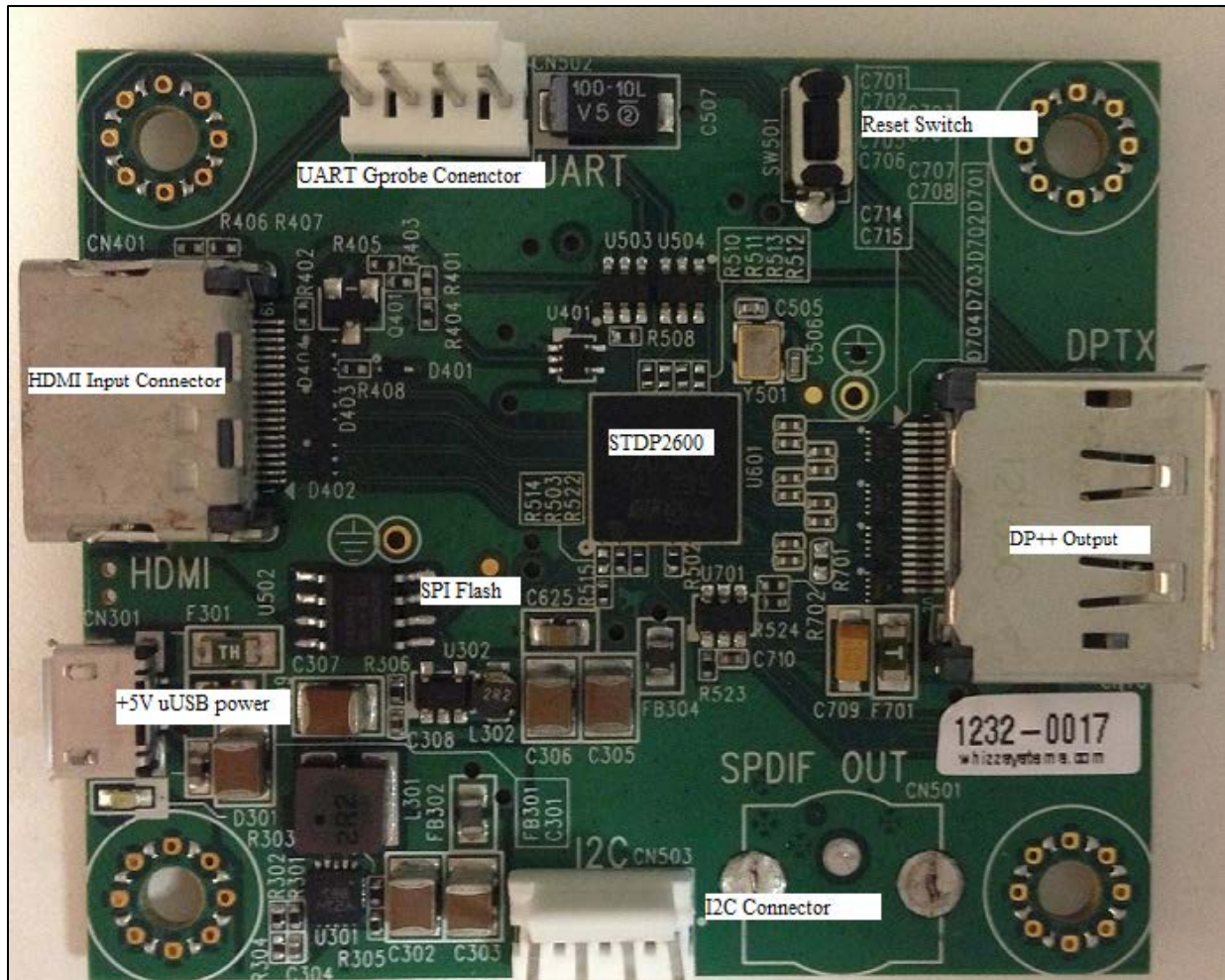
5. Board description

5.1. Connection diagram

Figure 2.   Connection diagram
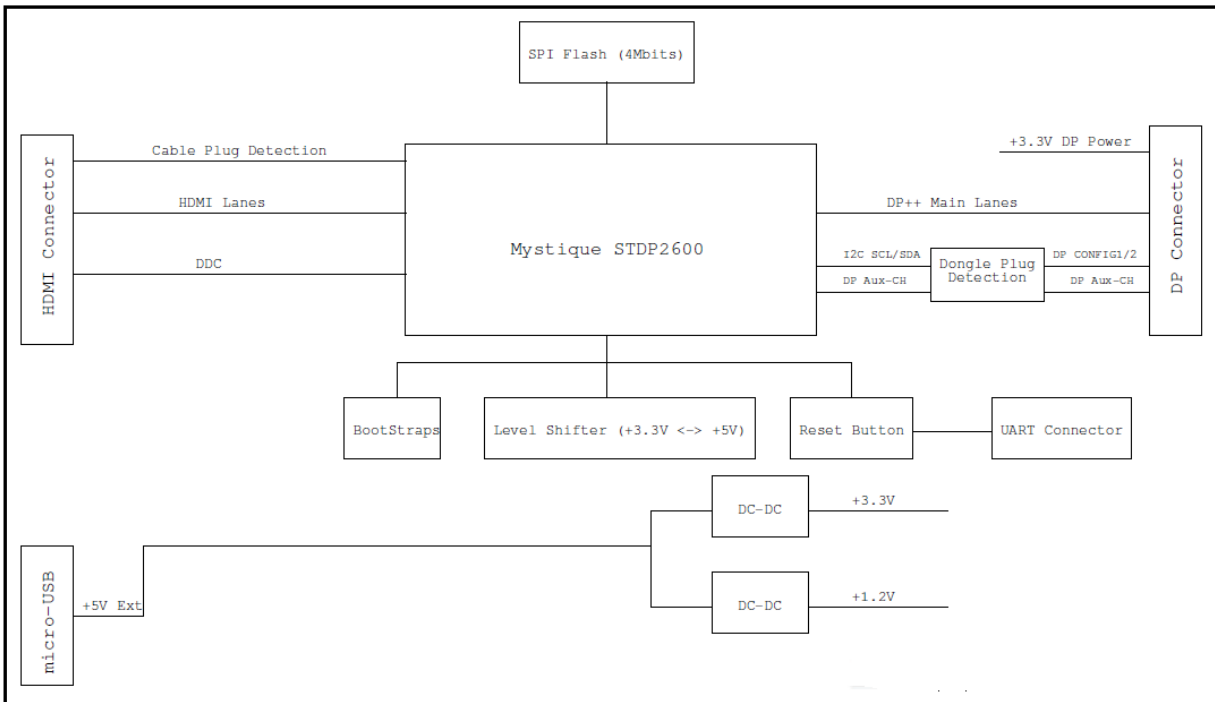
5.2. Board picture

Figure 3.   Board picture

5.3. 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 components and functions**

Label	Description	Ref des
Power Input (+5 V, uUSB)	Input 5V, down conversion to 3.3 V, and 1.2 V. This board uses an LDO [**low-dropout**] for 3.3 V and 1.2 V. Note the analog and digital supplies (3.3A and 3.3D or 1.2A and 1.2D) are isolated using ferrite beads.	CN301
STDP2600	MegaChips HDMI1.4 to DP++ (Dual Mode TX)	U601
HDMI Input	HDMI input connector	CN401
Dual Mode TX	DP++ output connector	CN701
SPI Flash	The board includes an SPI Flash of 4 MB to hold the firmware. The SPI Flash can be programmed (ISP) through UART interface.	U502
S/PDIF Output Not populated	Single wire S/PDIF output signal. Can route the encoded audio through SPDIF audio port	CN501 Not Populated
Host Interface (I2C)	Host Interface (I2C): This is a provision to access the STDP2600 device from an external host controller through the Host Interface (I2C port) connection.	CN503
UART (GProbe)	GProbe Interface (+3.3 V logic): GProbe connector that connects to the STDP2600 UART port for communication with external PC sources for debug purposes. The MegaChips GProbe tool (software) and PC interface board together create a debug environment for device debug and firmware update. The GProbe interface is also used for ISP purposes.	CN502
Reset	Reset Button, when pressed, triggers a system reset through the internal reset circuitry. The reset button is used for system reset and debugs purposes	SW501
LED	Single LED for indicating the power on status.	D301
Crystal	A crystal of 27 MHz.	Y501
ESD Diodes	ESD protection diodes for HDMI and DisplayPort signal (main lanes, AUX and HPD line). The board implements low cost ESD diodes.	

5.4. Connector descriptions

The STDP2600 RD board has the following connectors. The locations of these connectors are shown in the above board picture.

CN301 – +5V DC 2.5A Power Input uUSB connector

CN501 – I2C Host interface (4x1 pin keyed header)

Pin 1	NC
Pin 2	I2C_SCL
Pin 3	I2C_SDA
Pin 4	GND

CN502 – UART (GProbe) Interface (4x1 pin keyed header)

Pin 1	+5V
Pin 2	UART_TX
Pin 3	UART_RX
Pin 4	GND

CN401 – HDMI Receiver pin out details are shown below.

Pin 1	HDMI_RX2+
Pin 2	GND
Pin 3	HDMI_RX2-
Pin 4	HDMI_RX1+
Pin 5	GND
Pin 6	HDMI_RX1-
Pin 7	HDMI_RX0+
Pin 8	GND
Pin 9	HDMI_RX0-
Pin 10	HDMI_RXC+
Pin 11	GND
Pin 12	HDMI_RXC
Pin 13	HDMI_CEC
Pin 14	Reserved
Pin 15	DDC_SDL
Pin 16	DDC_SDA
Pin 17	GND
Pin 18	HDMI_+5V
Pin 19	HDMI_HPD

U701 – DPTX (DP++) (refer to the schematics or data sheet for complete pin out details)

Pin 1	DPTX_L0+
Pin 2	GND
Pin 3	DPTX_L0-
Pin 4	DPTX_L1+
Pin 5	GND
Pin 6	DPTX_L1-
Pin 7	DPTX_L2+
Pin 8	GND
Pin 9	DPTX_L2-
Pin 10	DPTX_L3+
Pin 11	GND
Pin 12	DPTX_L3-
Pin 13	DPTX_CONFIG1
Pin 14	DPTX_CONFIG2
Pin 15	AUX_CH (p)
Pin 16	GND
Pin 17	AUX_CH (n)
Pin 18	Hot Plug Detect
Pin 19	Return (GND)
Pin 20	DP_PWR

6. Revision history

Table 2. Document revision history

Date	Revision	Changes
06-Nov-2012	A	Initial version.
09-Jun-2014	B	Updated to comply with MegaChips documentation style/formatting.

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