

## RD3-2650

### DP1.2 to HDMI1.4 converter

### Reference board user guide

Rev. B



### MegaChips' Proprietary and Confidential

This information shall not be shared or distributed outside the company and will be exchanged based on the signed proprietary information exchange agreement. MegaChips reserves the right to make any change herein at any time without prior notice. MegaChips does not assume any responsibility or liability arising out of application or use of any product or service described herein except as explicitly agreed upon.

## Contents

1. Purpose and scope .....	4
2. Description.....	5
2.1. Board picture.....	5
2.2. Set up instructions.....	5
2.3. Diagnosis .....	6
2.3.1. In-System Programming (ISP).....	7
3. RD3-2650 board description .....	7
3.1. Principal components and functions .....	7
3.2. Connector descriptions .....	8
4. Revision history .....	11

## List of tables

Table 1.	Principal components and functions.....	8
Table 2.	Document revision history .....	11

## List of figures

Figure 1.	Board picture.....	5
Figure 2.	Connection set up.....	6
Figure 3.	Connection diagram.....	7

## 1. Purpose and scope

This user guide provides set up instructions and the description of the STDP2650 reference board targeted for DP to HDMI conversion applications.

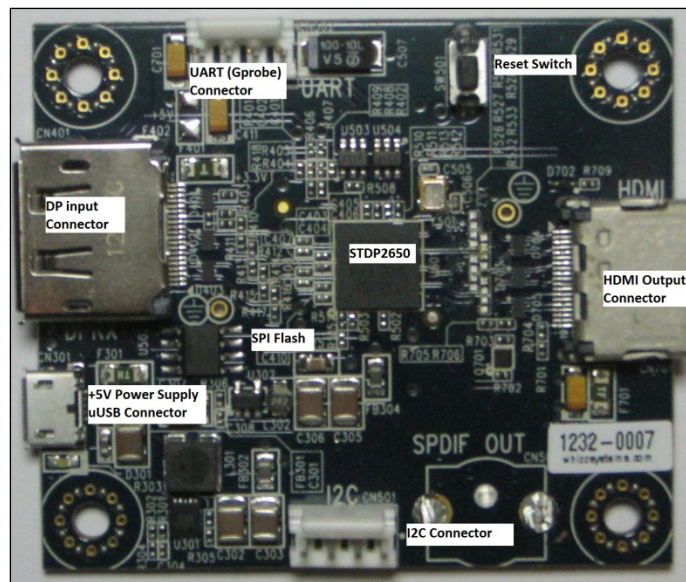
## 2. Description

The STDP2650 is MegaChips' latest generation DisplayPort converter series product that features a DisplayPort1.2 compliant receiver and an HDMI1.4 compliant transmitter, capable of handling high resolution video up to 4K2K 30Hz / FHD120Hz and audio up to 7.1CH.

The STDP2650 RD3 board is intended for the 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**



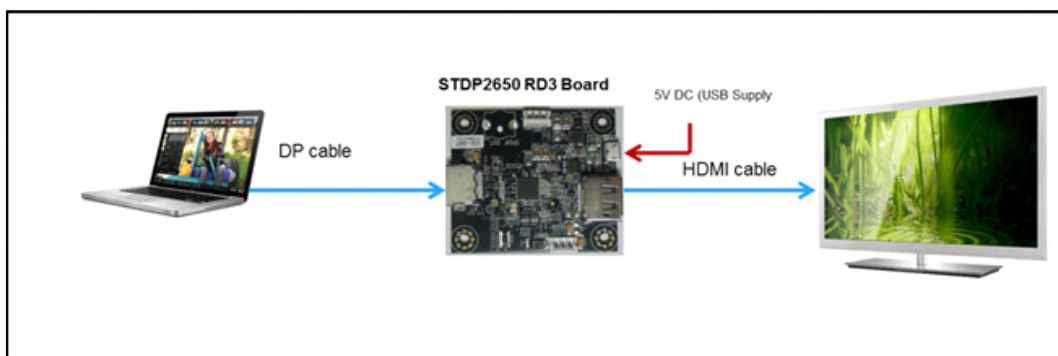
### 2.2. Set up instructions

The picture below is a typical connection diagram showing a notebook with DisplayPort output driving a TV/monitor using an STDP2650 RD board.

1. Connect the DP output from the notebook to the DP input of the STDP2650 RD board using a standard DP cable.

2. Connect the HDMI output of the STDP2650 RD board to the HDMI input of the TV or the LCD monitor.
3. Power up the RD board by plugging in the micro USB cable (supplied with board) from an external USB source (ex: one of the USB ports from the notebook).
4. Use an HDMI TV or monitor that has audio output for testing the audio conversion through the STDP2650 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 2. Connection set up**



## 2.3. 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.*

1. Install the GProbe diagnostic tool on a Windows OS based PC/NB and set the baud rate to 115,200.
2. Connect the GProbe board to the serial port (or USB port if using the USB version of the GProbe board) of the computer.
3. Connect the other end of the GProbe board to the UART connector (CN502) on the STDP2650 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 the GProbe board is 1 to 1.*

4. Hit the reset button on the board (RESET SW501). 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.

- Using an oscilloscope, check the video input and output from the STDP2650 RD board.

*Note: Refer to the STDP2650 datasheet for pin-out descriptions.*

### 2.3.1. In-System Programming (ISP)

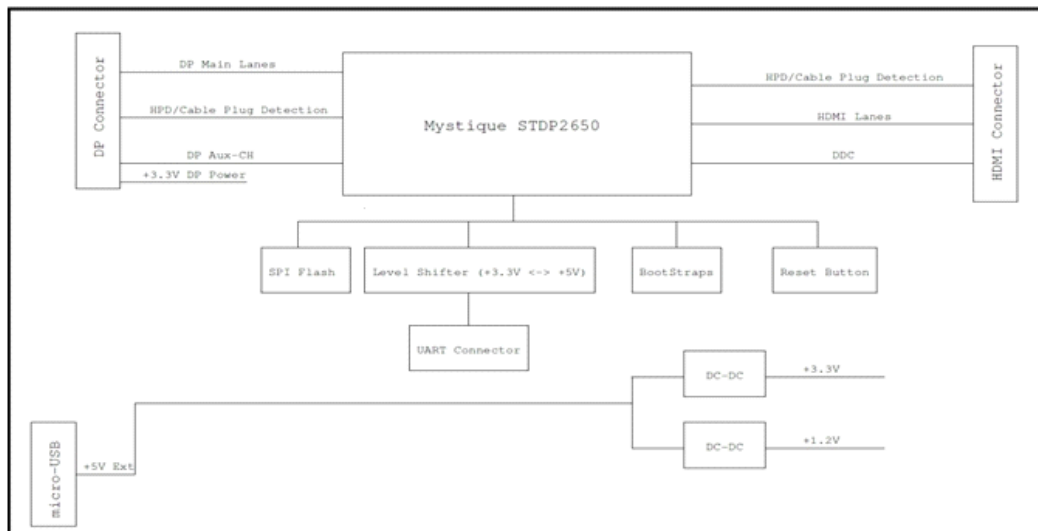
The STDP2650 RD board uses SPI Flash to store the firmware. For new firmware upgrade, following method is recommended.

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

## 3. RD3-2650 board description

### 3.1. Connection diagram

**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 components and functions**

Label	Description	Ref des
Power Input (+5 V, uUSB)	Input 5 V, 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 (3.3 A and 3.3 D or 1.2 A and 1.2 D) are isolated using ferrite beads.	CN301
STDP2650	MegaChips DP1.2 to HDMI1.4 converter IC	U601
DP Input	DP input connector	CN401
HDMI Output	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	CN503 Not Populated
Host Interface (I2C)	Host Interface (I2C): This is a provision to access the STDP2650 device from an external host controller through the Host Interface (I2C port) connection.	CN501
UART (GProbe)	GProbe Interface (+3.3 V logic): GProbe connector that connects to the STDP2650 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	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	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.	

### 3.3. Connector descriptions

The STDP2650 RD board has the following connectors. The locations of these connectors are shown in the above board picture.

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

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

<b>Pin 1</b>	NC
<b>Pin 2</b>	I2C_SCL
<b>Pin 3</b>	I2C_SDA
<b>Pin 4</b>	GND



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

<b>Pin 1</b>	+5V
<b>Pin 2</b>	UART_TX
<b>Pin 3</b>	UART_RX
<b>Pin 4</b>	GND

**CN401** – 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

**U701** – 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

## 4. Revision history

**Table 2. Document revision history**

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

## Notice

Semiconductor products may possibly experience breakdown or malfunction. Adequate care should be taken with respect to the safety design of equipment in order to prevent the occurrence of human injury, fire or social loss in the event of breakdown or malfunction of semiconductor products

The overview of operations and illustration of applications described in this document indicate the conceptual method of use of the semiconductor product and do not guarantee operability in equipment in which the product is actually used.

The names of companies and trademarks stated in this document are registered trademarks of the relevant companies.

MegaChips Co. provides no guarantees nor grants any implementation rights with respect to industrial property rights, intellectual property rights and other such rights belonging to third parties or/and MegaChips Co. in the use of products and of technical information including information on the overview of operations and the circuit diagrams that are described in this document.

The product described in this document may possibly be considered goods or technology regulated by the Foreign Currency and Foreign Trade Control Law. In the event such law applies, export license will be required under said law when exporting the product. This regulation shall be valid in Japan domestic.

In the event the intention is to use the product described in this document in applications that require an extremely high standard of reliability such as nuclear systems, aerospace equipment or medical equipment for life support, please contact the sales department of MegaChips Co. in advance.

All information contained in this document is subject to change without notice.

Copyright © 2014 MegaChips Corporation All rights reserved

## Contact

### MegaChips Corporation

#### Head Quarters

1-1-1 Miyahara, Yodogawa-ku Osaka 532-0003, Japan  
TEL: +81-6-6399-2884

### MegaChips Corporation

#### Tokyo Office

17-6 Ichiban-cho, Chiyoda-ku, Tokyo 102-0082, Japan  
TEL: +81-3-3512-5080

### MegaChips Corporation

#### Makuhari Office

1-3 Nakase Mihama-ku Chiba 261-8501, Japan  
TEL: +81-43-296-7414

### MegaChips Corporation

#### San Jose Office

2033 Gateway Place, Suite 400, San Jose, CA 95110 U.S.A.  
TEL: +1-408-570-0555

### MegaChips Corporation

#### India Branch

17th Floor, Concorde Block UB City,  
Vittal Mallya Road, Bangalore 560-001, India  
TEL: +91-80-4041-3999

### MegaChips Corporation

#### Taiwan Branch

RM. B 2F, Worldwide House, No.129,  
Min Sheng E. Rd., Sec. 3, Taipei 105, Taiwan  
TEL: +886-2-2547-1297

### MegaChips Corporation

#### Tainan Office

RM. 2, 8F, No.24, Da Qiao 2 Rd., Yong Kang Dist.,  
Tainan 710, Taiwan  
TEL: +886-6-302-2898

### MegaChips Corporation

#### Zhunan Office

No.118, Chung-Hua Rd., Chu-Nan, Miao-Li 350, Taiwan  
TEL: +886-37-666-156

### MegaChips Corporation

#### Shenzhen Office

Room 6307, Office Tower, Shun Hing Square, 5002  
Shen Nan Dong Road, Luohu District,  
Shenzhen 518000, P. R. China  
TEL: +86-755-3664-6990