RD1-4320

DisplayPort 1.2a Splitter

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Contents

List of Tables

List of Figures

1. Purpose and Scope

This document provides a description and set up instructions for the STDP4320 reference board [RD1-4320 (400-657)] targeted for DisplayPort™ Splitter applications.

2. Description

The STDP4320 is a high-speed DisplayPort dual mode splitter IC targeted for audio-video de-multiplexing and routing in applications such as notebooks, docking stations, video hub, 4K2K TVs, daisy-chainable monitors, digital signage and others.

The board consists of one dual mode input port and two dual mode output ports.

This board implements test points, jumpers, and potentiometers that are not required for the end customer applications, these are intended for convenience of functional test and validation purpose only. This board includes an SPI flash for storing firmware, an UART connector for debugging and In-System Programming purposes (firmware download), two S/PDIF outputs, four I2C master interfaces and one I2C slave interface.

3. Set Up Instructions

The picture below [Figure 1] is a connection diagram showing the RD1-4320 board used for connecting a PC to two monitors. This board uses the standard DisplayPort connector recommended in the DP 1.2a specification to connect the DisplayPort input to the PC and standard DisplayPort connectors to DisplayPort TV/monitors.
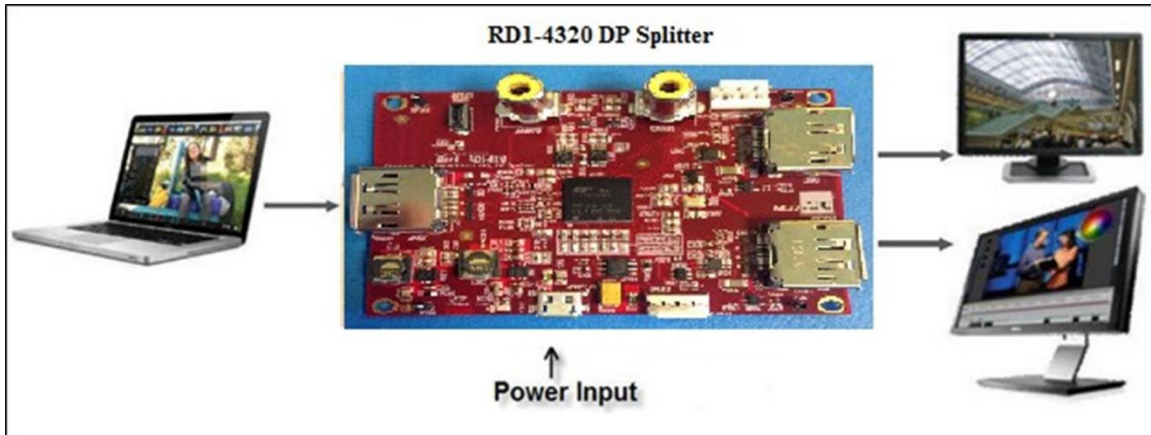
Figure 1. Connection Diagram: Video Hub Application

1. Connect the DisplayPort output from a PC/NB source to the DP input connector on RD1-4320 board using a DP cable and connect the two DisplayPort outputs to two DisplayPort 1.1a or 1.2a monitors using DP cables.
2. Connect a Micro-USB port on the board to PC or USB power adapter for powering the board.
3. Optional: An active speaker can be connected to the S/PDIF connector on the board for audio output if needed.
4. Once the connection is established, power ON the PC, monitor, and RD1-4320 (DP Splitter) board. An image should pop up on the screen within 2-3 seconds. Configure the displays either in clone mode or extended mode through the Display settings on PC/NB.

4. Diagnosis

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

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

1. Install the Kinetic GProbe diagnostic tool on a computer and set the baud rate to 115,200.
2. Connect Kinetic GProbe board (not supplied) to the serial port (or USB port if using USB version) of the computer.
3. Connect the other end of the GProbe board to connector (CN501) on the RD1-4320 board using 4-wire cable (part of the GProbe board).

Note: CHECK POLARITY while connecting the cable; Pin 1 is marked on the board. The 4-wire cable connection from CN501 to GProbe board is 1 to 1.

4. Hit the Reset button on the board (RESET SW501). You will see the firmware version and date of firmware in the GProbe window. This indicates the STDP4320 IC is functional. If the message does not appear, reprogram the Flash using the ISP method described in the GProbe user guide.

5. Using an oscilloscope, check the video input and output from the STDP4320.

Note: Refer to the STDP4320 datasheet for more pin out descriptions.

4.1. In-System Programming

The STDP4320 RD board uses SPI Flash to store the firmware. For a new firmware upgrade, the following method is recommended.

ISP through UART connector: Allows programming of the SPI Flash through the UART (RS232) connector. The GProbe board (RS232 converter circuit) and GProbe software tool are required. Please contact Kinetic for latest software and binary file.
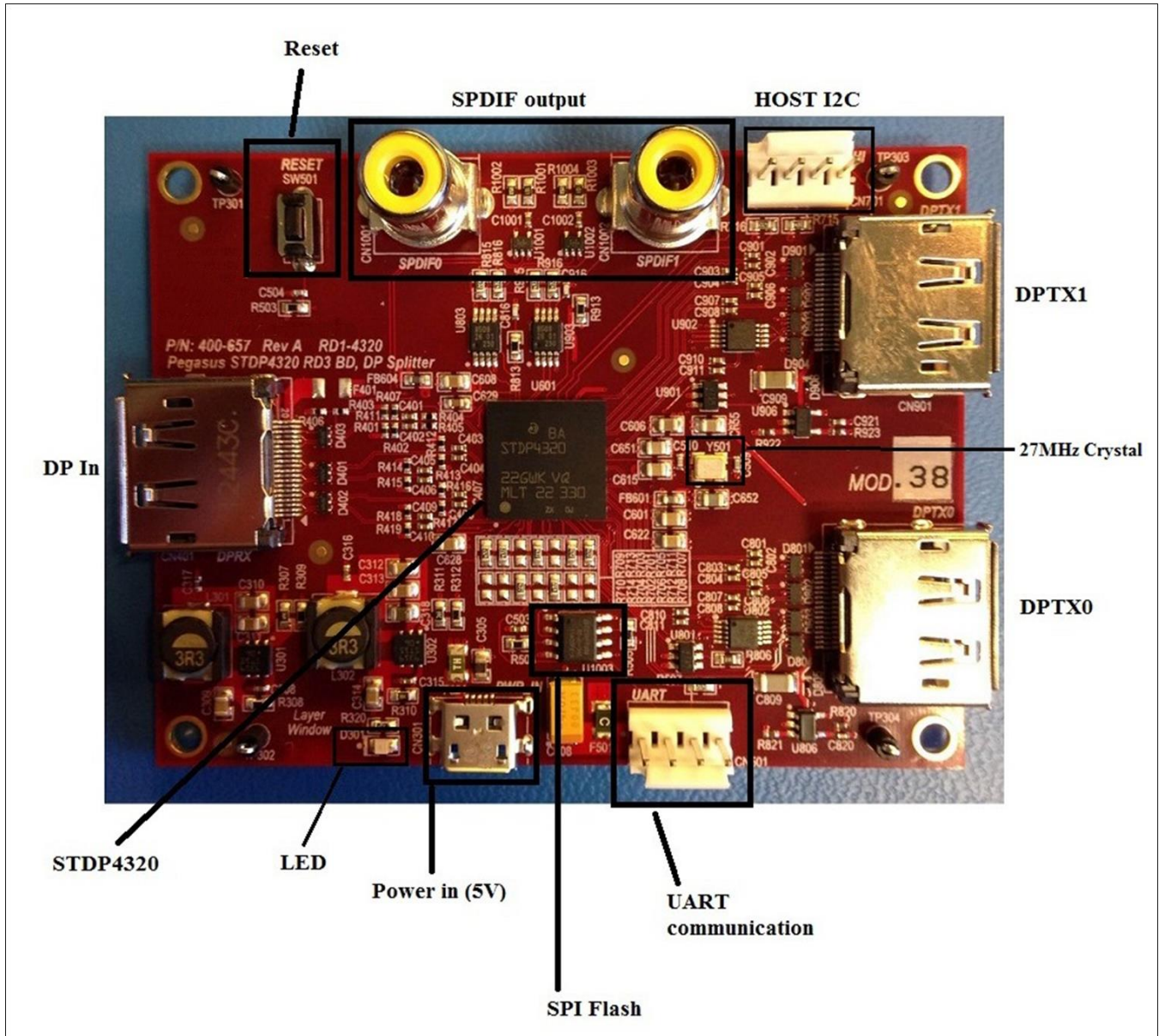
5. Board Description

Figure 2. RD1-4320 Board Picture

5.1. 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 5.1-1. Principal Components and Functions

Label	Description	RefDes
Power Input (+5 V)	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.	CN301
STDP4320	STDP4320 is a VESA DP Standard Ver. 1.2a compliant device that supports advanced features such as MST, HBR2 and 3D formats	U601
DP Input	DisplayPort input connector	CN401
DP Outputs	DPTX output connectors	CN901 CN801
Flash	The board includes an SPI Flash of 2 MB to hold the firmware. The SPI Flash can be programmed (ISP) through UART interface	U1003
Analog S/PDIF Outputs	Standard S/PDIF output connectors.	CN1001 CN1002
Host I2C Interface	Host Interface (I2C): This board includes a provision to access the STDP4320 device from an external host controller through the Host Interface (I2C port) connection.	CN701
GProbe	GProbe Interface (+5 V logic): the board includes a GProbe connector that connects to the STDP4320 UART port for communication with external PC sources for debug and FW upgrade purposes.	CN501
Reset	Reset Button, when pressed, triggers a system master reset through the internal reset circuitry.	SW501
LED	One LED for indicating +5 V input power-on status	D301
Crystal	An external crystal of 27 MHz	Y501

5.2. Connector Descriptions

The RD1-4320 has the following connectors. The locations of these connectors are shown in the board picture in Figure 2.

CN301 – +5 V Micro-USB female connector for supplying power to the board.

CN501 – GProbe Interface which connects to the UART port of the STDP4320. Use the Kinetic GProbe board and interface cable for connecting the board to an external PC that has GProbe software running.

Pin 1	+5V
Pin 2	GPROBE_TX
Pin 3	GPROBE_RX
Pin 4	GND

CN401 – DisplayPort input connector. 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	CONFIG1
Pin 14	CONFIG2
Pin 15	AUX_P
Pin 16	GND
Pin 17	AUX_N
Pin 18	HPD_OUT
Pin 19	GND
Pin 20	+3V3_AVDD

CN901, CN801 – Standard DP output connectors. Pin out details are shown below.

Pin 1	ML_Lane 0(p)
Pin 2	GND
Pin 3	ML_Lane 0 (n)
Pin 4	ML_Lane 1 (p)
Pin 5	GND
Pin 6	ML_Lane 1 (n)
Pin 7	ML_Lane 2 (p)
Pin 8	GND
Pin 9	ML_Lane 2 (n)
Pin 10	ML_Lane 3 (p)
Pin 11	GND
Pin 12	ML_Lane 3 (n)
Pin 13	CONFIG1
Pin 14	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	+3.3V

CN1001, CN1002 – S/PDIF Output connectors. The pin out description is shown below.

Pin 1	GND
Pin 2	I2S_0
Pin 3	GND

CN701 – I2C Host Interface

Pin 1	I2C_SCL
Pin 2	I2C SDA
Pin 3	IRQ_OUT
Pin 4	GND