UM2048
User manual

DSI to HDMI adapter board for STM32 Development Tools

Introduction

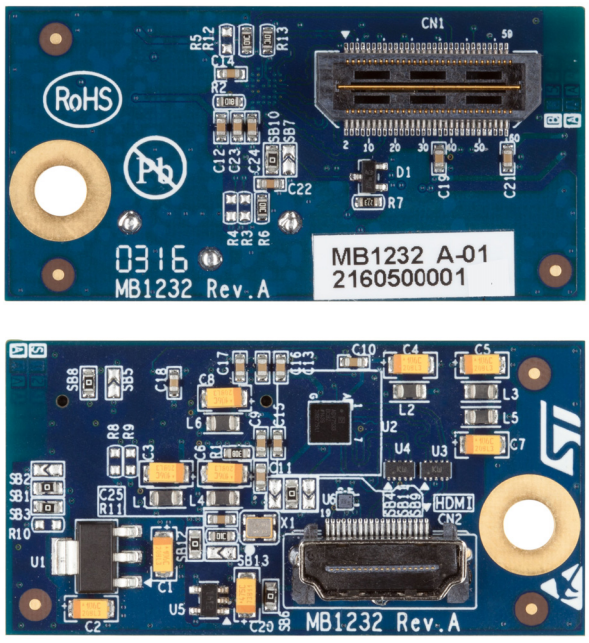
The DSI to HDMI adapter board (order code B-LCDAD-HDMI1) provides DSI input port and HDMI output port. It can be used on STM32 evaluation boards or discovery boards, to demonstrate video solutions based on STM32 MCUs.

Thanks to the bridge chip ADV7533, the DSI to HDMI adapter board can support 2-, 3- or 4-lanes DSI video input data, S/PDIF, 2-channels I^2S audio input data and HDMI v1.3 output port.

The B-LCDAD-HDMI1 adapter board has the following features:

- Up to four lanes of MIPI/DSI data, each running up to 800 Mbps (video mode only: Non-Burst mode with synchronization pulse)
- 2-channels I^2S transmit stereo up to 192 kHz sampling rate
- S/PDIF carries stereo LPCM audio or compressed audio
- HDMI output connector:
  - Support of video resolutions with pixel clocks up to 80 MHz
  - Support of CEC signals, 5 V-tolerant I^2C and HPD I/Os
  - Common-mode filters with ESD protection

Figure 1. DSI to HDMI adapter board



Back side

Front side

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1 Hardware Layout and configuration

DSI to HDMI adapter board is designed around the ADV7533. *Figure 2* illustrates the connections on DSI to HDMI adapter board and *Figure 3* will help to locate these features on the actual evaluation board.

Figure 2. Hardware Block Diagram

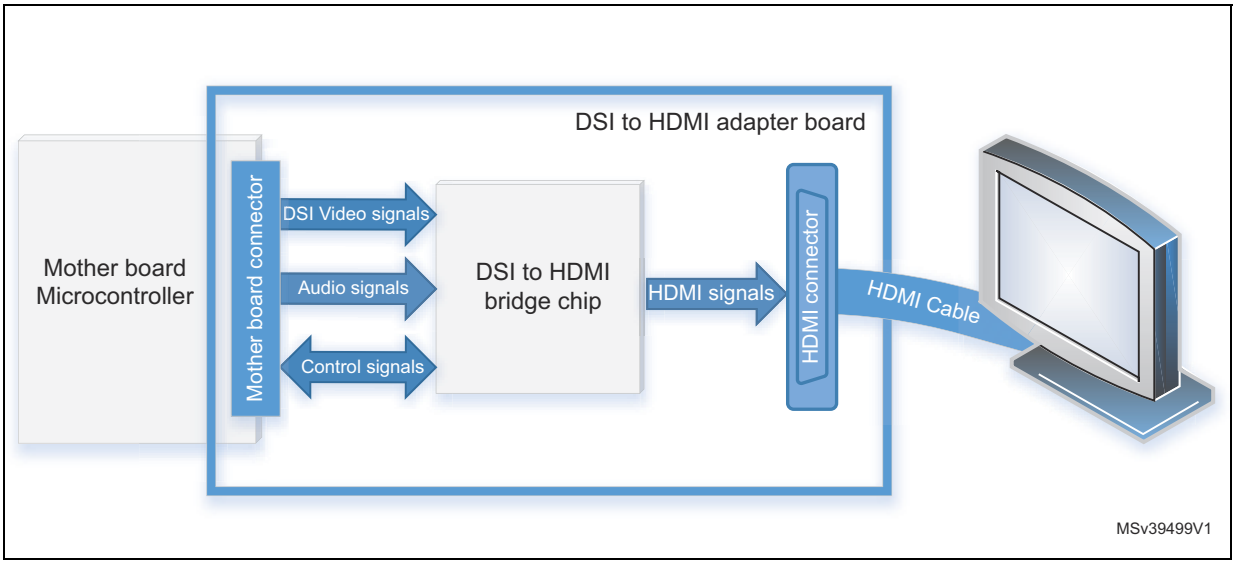
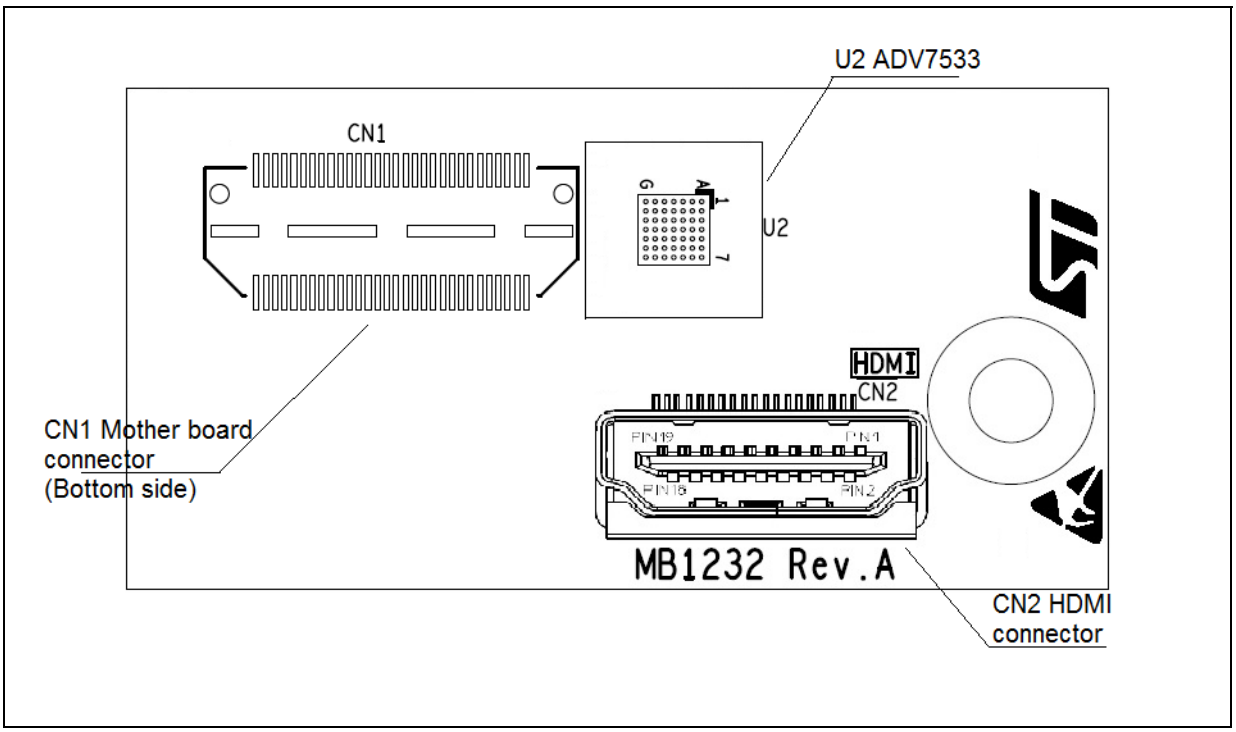


Figure 3. DSI to HDMI adapter board layout



2 Video and audio input connector

A male high speed connector CN1 on bottom side is used to implement DSI to HDMI adapter board on mother board. The 4-lane DSI video signals, audio (I^2S or S/PDIF) signals, CEC signals and control signals (I^2C bus, reset and interrupt signals) are on this connector.

Table 1 shows the pinout of CN1.

Table 1. Video and audio input connector CN1

Pin number	Description	Interface	Pin number	Description	Interface
1	GND	-	2	-	-
3	DSI_CK_P	DSI	4	INT	Interrupt output
5	DSI_CK_N	DSI	6	GND	-
7	GND	-	8	DSI_D2_P	DSI
9	DSI_D0_P	DSI	10	DSI_D2_N	DSI
11	DSI_D0_N	DSI	12	GND	-
13	GND	-	14	DSI_D3_P	DSI
15	DSI_D1_P	DSI	16	DSI_D3_N	DSI
17	DSI_D1_N	DSI	18	-	-
19	GND	-	20	-	-
21	+5 V	-	22	-	-
23	+5 V	-	24	-	-
25	-	-	26	-	-
27	-	-	28	-	-
29	-	-	30	-	-
31	-	-	32	-	-
33	-	-	34	-	-
35	SCLK/MCLK	Audio	36	3.3 V	
37	LRCLK	Audio	38	-	-
39	I2S/SPDIF	Audio	40	I2C_SDA	I2C
41	-	-	42	-	-
43	-	-	44	I2C_SCL	I2C
45	CEC_CLK	CEC	46	-	-
47	CEC	CEC	48	-	-
49	-	-	50	-	-
51	-	-	52	-	-
53	-	-	54	-	-
55	-	-	56	-	-
57	RESET	Reset input	58	-	-
59	-	-	60	1.8V	-

2.1 Video input (MIPI DSI) signals

4-lane MIPI DSI signals are connected on DSI to HDMI adapter board as video input interface. This board supports 2-, 3- or 4-lane DSI video input data and each running up to 800 Mbps.

DSI interface is compatible with DPHY V.0.90 and DSI V.1.02 and Supports inputs of 16-bit RGB 4:4:4, 24-bit RGB 4:4:4 and 30-bit RGB 4:4:4.

2.2 Audio input (S/PDIF & I^2S) signals

S/PDIF or I^2S audio input interface is implemented on CN1. DSI to HDMI adapter board supports standard S/PDIF for stereo LPCM or compressed audio up to 192 kHz, or 2-channel uncompressed LPCM I^2S audio up to 192 kHz.

2.3 Control signals

I^2C bus on CN1 serves as the serial port data I/O slave for register access. The default address is 0x7A.

Reset signal from mother board is connected to Power Down (PD) pin on ADV7533. It is internal pulled up by ADV7533.

Interrupt output signal is for mother board and it is pull up on DSI to HDMI adapter board.

3 HDMI output connector

A standard HDMI output connector CN2 is implemented on DSI to HDMI adapter board. The output supports all video and graphics resolutions from 480i to 1080p at 30 Hz. Thanks to common-mode filter with ESD protection parts, HDMI output connector is complies with IEC 61000-4-2 level 4 standard.

On CN2, I^2C master for EDID reading and HDCP operations reports HDMI events through interrupts and registers. Hot Plug Detect Signal (HPD) Indicates to the interface whether the receiver is connected.

Table 2 shows the pinout of CN2.

Table 2. HDMI output connector CN2

Pin number	Description	Pin number	Description
1	TMDS D2+	11	GND
2	GND	12	TMDS Clock-
3	TMDS D2-	13	CEC
4	TMDS D1+	14	NC
5	GND	15	DDC_I2C_SCL
6	TMDS D1-	16	DDC_I2C_SDA
7	TMDS D0+	17	GND
8	GND	18	HDMI_5V_Source from power switch U5
9	TMDS D0-	19	HPD
10	TMDS Clock+	-	-

4 CEC

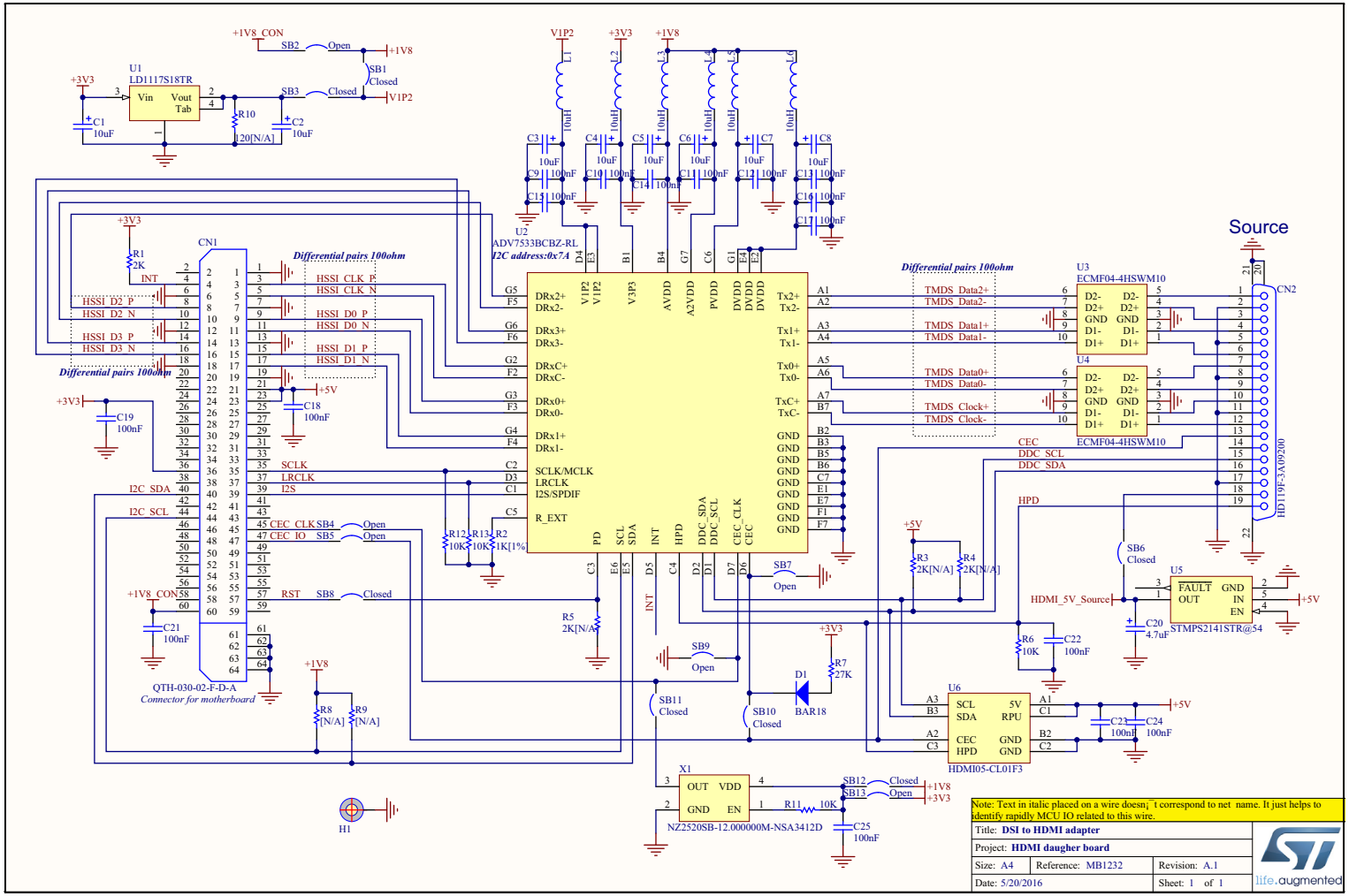
There are two sources of CEC signal on HDMI output connector on DSI to HDMI adapter board. One source (Default setting) is from ADV7533 and its clock is from X1 on the board. The other source is from CN1 and mother board. Some PCB reworks should be done when using the second source shown in *Table 3.*

Table 3. CEC source connection

CEC source	Mount	Remove
ADV7533 (Default)	SB10	SB5
CN1 (Mother board)	SB5	SB10

5 Schematic

Figure 4. Board schematic



6 Revision history

Table 4. Document revision history

Date	Revision	Changes
09-Jun-2016	1	Initial release.