DS34RT5110-EVKH
HDMI Extender Demo Kit for HDMI Cables

User's Guide

Literature Number: SNLU033A
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DS34RT5110-EVKH HDMI Extender Demo Kit for HDMI Cables

The DS34RT5110-EVKH HDMI Cable Extender Demo Kit provides a complete HDMI system extension solution using Texas Instruments DS34RT5110 - a DVI, HDMI retimer with input equalization and output de-emphasis.

Topic **Page**

1 Description

- Two HDMI female connectors are used as the input and the output connections for a HDMI system.
- The DDC signals are connected through an I2C buffer.
- The hot plug, 5V power and 5V ground are directly connected between the HDMI connectors, making this demo kit HDCP compliant.
- A 3.3V VCC 1-pin header (J22) and a GND 1-pin header (J23) are used for the power supply.
- Alternately, an AC/DC power adapter (>800 mA) can be used for the evaluation kit to provide 5V DC voltage for easy portability. A 1.8 mm DC power jack is used to connect the AC/DC power adapter. Texas Instruments LP3965, a 3.3V, 1500 mA, fast, ultra low dropout linear regulator, converts the 5V power supply voltage to a 3.3V power supply voltage that powers the DS34RT5110.

2 Features

- Compatible with DTV Resolutions 480i, 480p, 720i, 720p, 1080i, and 1080p with 8-bit, 12-bit and 16-bit Deep Color Depths
- Compatible with Computer Resolutions of VGA, SVGA, XGA, SXGA, and UXGA
- Supports TMDS HDMI Single Link
- Adjustable Rotary Switches for Easy Custom EQ Boost Level Setting and De-Emphasis Setting to Reach Maximum Length of TMDS Interface with Twisted Pair , HDMI, or DVI Cables
- Single 3.3V Supply
- Ultra Portable with AC/DC Power Adapter (not included in this kit)
- 8 kV ESD Rating
- 0 to 70°C Temperature Range

3 Applications

- Repeater Applications:
  - Digital Routers
  - HDMI / DVI Extender Hubs
- Source Applications:
  - Video Cards
  - Blu-Ray DVD Players
  - Game Consoles
- Sink Applications:
  - High Definition Displays
  - Projectors

4 Typical Configuration

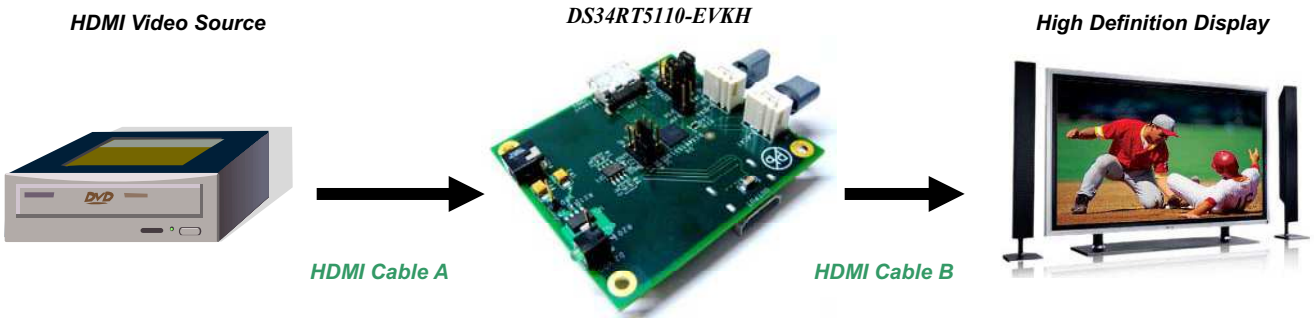

Figure 1. DS34RT5110-EVKH

The DS34RT5110 demo kit extends TMDS with the 28 AWG STP DVI cable as follows:

	Resolution	Pixel Bandwidth (MPixel/s) 60 Hz LCD with 20% Blanking	Per Channel Bandwidth (Gb/s) 60 Hz LCD with 20% Blanking	HDMI Cable A (28 AWG)	HDMI Cable B (28 AWG)
HDTV (1080i)	1920 x1080	75	0.75	>70m	>20m
HDTV (1080p) 8-bit Color Depth	1920 x1080	150	1.5	>35m	>10m
HDTV (1080p) 12-bit Color Depth	1920 x1080	225	2.25	>25m	>7.5m
HDTV (1080p) 16-bit Color Depth	1920 x1080	300	3	>20m	>5m

5 Quick Start Guide

1. Connect 3.3V DC power to J22 and ground to J23 from the power supply.
   Or, plug the AC/DC power adapter to the DC power jack
   (AC/DC power adapter requirement: Output DC 4V~6V, Output current >800 mA)
2. Attach two HDMI cables to the HDMI input and output connectors
3. Turn on the DVD/Computer and the Monitor/HDTV

6 Adjustments and Controls

Table 1. Adjustments and Controls

Component	Name	Function
D2	PWR	LED turns on when 5V DC is applied
D3	SD / LOCK	GREEN LED turns on when the incoming signal is detected by DS34RT5110 ORANGE LED turns on when the PLL of the DS34RT5110 is locked
J24	5 V DC	Optional DC power jack for 1.5 mm adaptor plug
J22	3.3 V	3.3V VCC power supply
J23	GND	GND
JP19, JP21	VOD_CRL	Connect JP19 - sets external resistor = 24 kΩ for VO = 1000 mVpp Connect JP21 - sets external resistor = 12 kΩ for VO = 2000 mVpp
JP24, JP25, JP26	LOCK /EN /SD	Connect JP24 and JP26 to enable D3 Connect JP25 to disable the device outputs Or, use as SD-EN, LOCK-EN auto control (see datasheet)
JP48	BYPASS	Connect JP48 to VDD to bypass reclock function
JP52	MODE	Connect JP52 to VDD to bypass the clock PLL function
U6	Rotary Switch (EQ)	Turn the switch to control the EQ boost setting. “0” on the switch refers to the boost setting of “0x00”, “7” on the switch refers to the boost setting of “0x07”. (See datasheet for detailed boost setting information.)
U11	Rotary Switch (DE)	Turn the switch to control the DE setting. “0” = 0 dB, “1” = -3 dB, “2” = -6 dB, “3” = -9 dB, “4”, “5”, “6”, “7” = N/A

7 Schematic

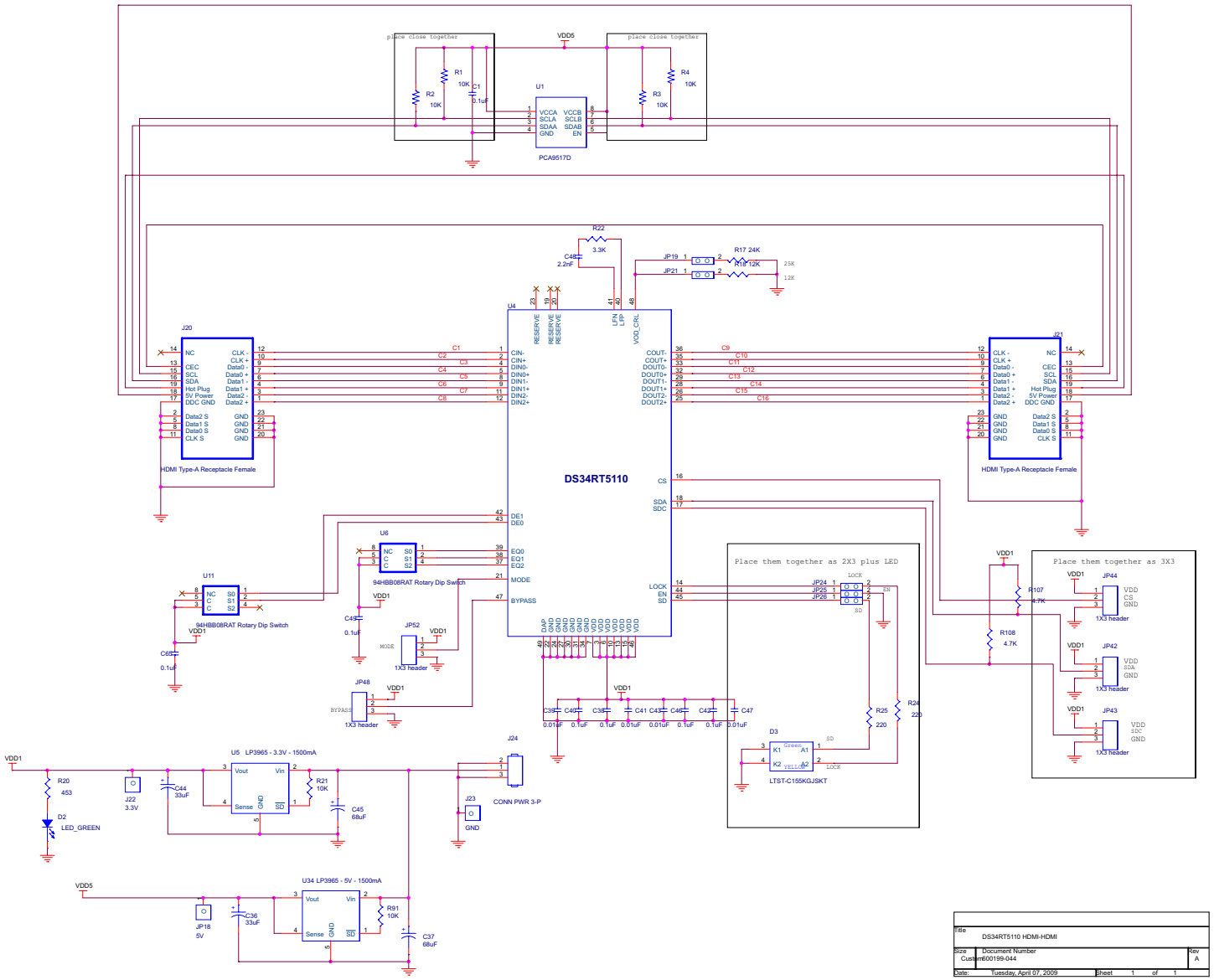

Figure 2. Schematic

8 Layout Considerations

- Keep the clock and data transmission lines as short as possible with controlled 50Ω single-ended impedance. Or, use differentially coupled traces with 100Ω impedance.
- Avoid using vias on the clock and data transmission lines on the input side of the DS34RT5110.
- Place power supply decoupling capacitors close to the VCC pins.

9 Layout

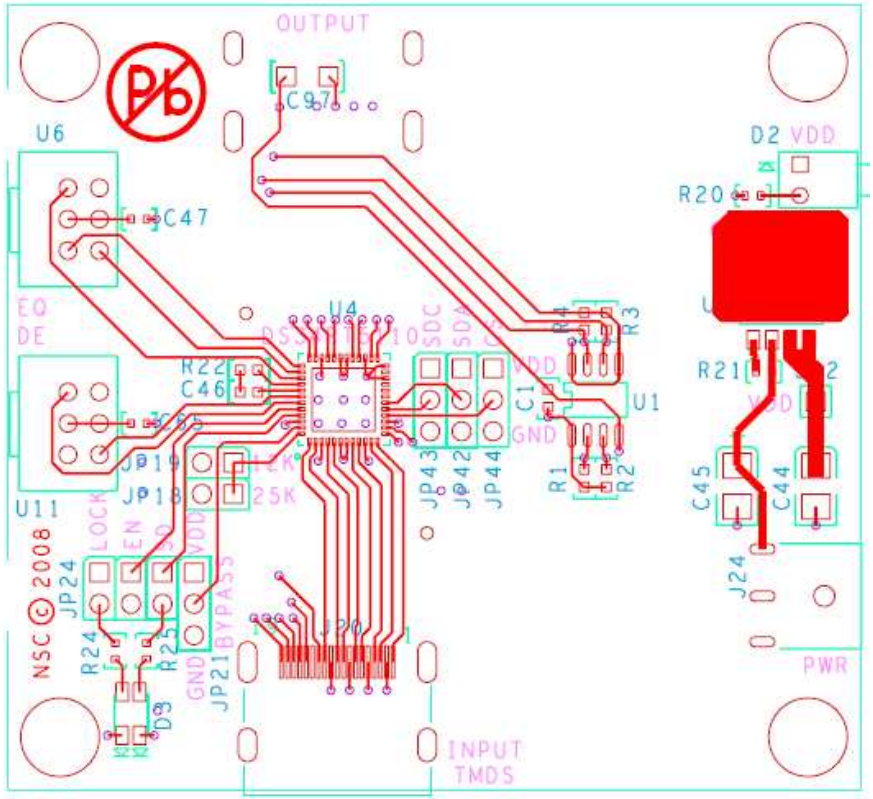

Figure 3. Top Layer

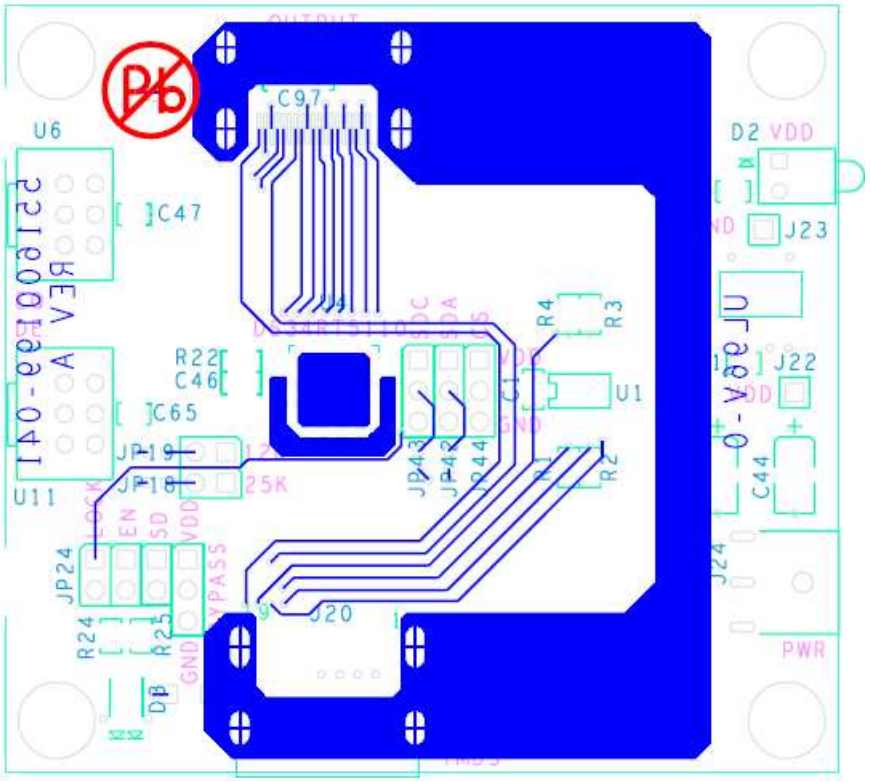

Figure 4. Bottom Layer

10 Bill of Materials

Table 2. DS34RT5110-EVKH Bill of Materials

Qty	Reference	Description
7	C1, C38, C40, C42, C46, C49, C65	0.1 uF ±10% 16V 0402
2	C36, C44	33 uF ±10% 16V 3528
2	C37, C45	68 uF ±10% 16V 3528
4	C39, C41, C43, C47	0.01 uF ±10% 16V 0402
1	C48	2.2 nF ±10% 16V 0402
1	D2	LEDSSF-LXH103LGD
1	D3	LTST-C155KGJSKT
1	JP18	HDR1x1
5	JP19, JP21, JP24, JP25, JP26	HDR1x2
2	JP48, JP52	HDR1x3
2	J20, J21	HDMI Female 500254-1927
1	J22	HDR1x1
1	J23	HDR1x1
1	J24	PJ-014D
6	R1, R2, R3, R4, R21, R91	10 kΩ ±1% 1/10W 0402
1	R17	24 kΩ ±1% 1/10W 0402
1	R18	12 kΩ ±1% 1/10W 0402
1	R20	453Ω ±1% 1/10W 0402
1	R22	3.3 kΩ ±1% 1/10W 0402
2	R24, R25	220Ω ±1% 1/10W 0402
1	U1	PCA9517D
1	U4	DS34RT5110 QFN48
1	U5	LP3965 - 3.3 V - 1500 mA SOT223-5
2	U6, U11	94HBB08RAT Rotary Dip Switch
1	U34	LP3965 - 5 V - 1500 mA SOT223-5

Changes from Original (January, 2012) to A Revision	Page
• Added "(not included in this kit)"	3

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

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      This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

      Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

3.2 *Canada*

3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210*

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Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

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2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265