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ClearEdge™ Technology

LT8711UXC

4-Lane Type-C/DP to HDMI2.0 Converter

Datasheet

1. Features

● USB Type-C

- Compliant with VESA DisplayPort alt mode on USB Type-C standard 2.0
- Compliant with USB power delivery specification 3.0
- Compliant with USB Type-C cable and connector specification 1.3
- Built-in CC controllers for normal communication
- Support UFP data role
- Support sink power role

● DP1.4 Receiver

- Compliant with DisplayPort specification 1.4 for 1.62Gbps, 2.7Gbps, 5.4Gbps, 8.1Gbps
- Compliant Embedded DisplayPort specification version 1.4b
- Support DisplayPort 1/2/4 lanes
- Support SSC
- Support HDCP 1.3/2.3
- Support HDCP repeater
- Support 8K@30Hz YCbCr 420 only
- Support HBE
- Support HDR10 and Dolby Vision
- Support ASSR for eDP
- Support adaptive EQ

● HDMI2.0 Transmitter

- Compliant with HDMI2.0b, HDMI1.4 and DVI1.0
- Data rate up to 6Gbps
- Support HDCP 1.4/2.3
- Support HDCP repeater
- Support 8K@30Hz YCbCr 420 only
- Support HDR10 and Dolby Vision
- Support CEC
- Programmable transmitter swing and pre-emphasis

● Miscellaneous

- CSC: RGB <=> YUV444 <=> YUV422<=> YUV420

- Integrated 100K/400KHz I2C slave
- External oscillator 27MHz, +/-50ppm
- Integrated microprocessor
- Embedded SPI flash for firmware and HDCP keys
- Firmware update through I2C/BB interface
- Power supply: 3.3V for I/O and 1.2V for core

2. General Description

The LT8711UXC is a high performance Type-C/DP1.4 to HDMI2.0 converter, designed to connect a USB Type-C source or a DP1.4 source to an HDMI2.0 sink. The LT8711UXC integrates a DP1.4 compliant receiver, and an HDMI2.0 compliant transmitter. Also, a CC controller is embedded for CC communication to implement DP Alt Mode. The DP interface comprises 4 main lanes, AUX channel, and HPD signal. The receiver supports maximum 8.1Gbps data rate per lane. The DP receiver incorporates HDCP 1.3/2.3 content protection scheme with embedded key for secure transmission of digital audio-video content.

The HDMI interface includes 4 TMDS clock/data pairs, DDC, and HPD signal. The HDMI transmitter is capable of supporting up to 6Gbps data rate, quite adequate for handling video resolutions up to UHD 4k 60Hz format. The HDMI transmitter incorporates HDCP engines which support both HDCP1.4/2.3. With the inclusion of HDCP, the LT8711UXC allows secure transmission of protected content. Embedded key is available that provides the highest level of HDCP key security.

The device is capable of automatic operation which is enabled by an integrated microprocessor that uses an embedded SPI flash for firmware storage. System control is also available through the use of a dedicated configuration I2C slave interface.

3. Applications

- Docking station
- Dongle

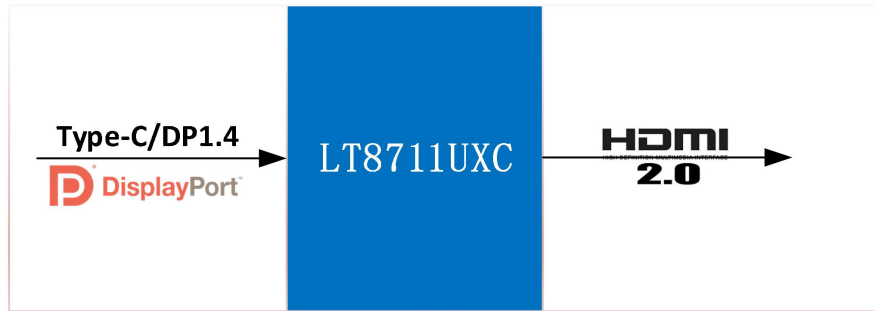
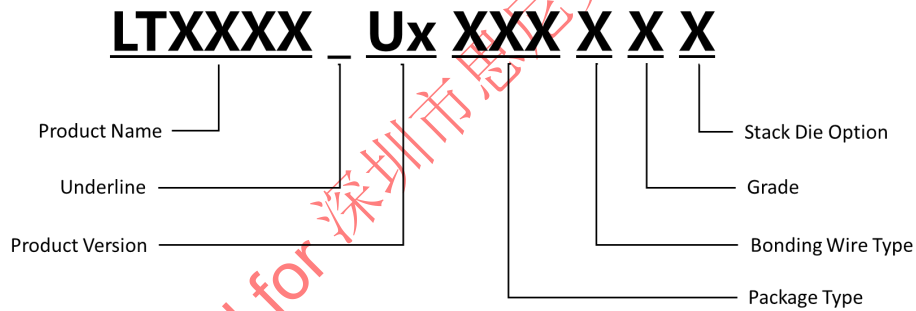


Figure 3.1 Application Diagram

4. Ordering Information

Table 4.1 Ordering Information

Product Name	Part Number	Product Status	Package	Bonding Wire	Grade	Operating Temperature Range	Stack Die Option	Packing Method	MPQ
LT8711UXC	LT8711UXC_U3Q10CEM	Preview	QFN48 (6*6)Saw	Cu	E	-40°C to +85°C	M	Tray	4900pcs



Note: No spaces in the P/N name.

Figure 4.1 Part Number Naming Rules

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5. Revision History

Version	Owner	Content	Date
R0.1	XY J	Initial U3 Release	04/18/2025

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6. Pinning Information

6.1 Pin Configuration

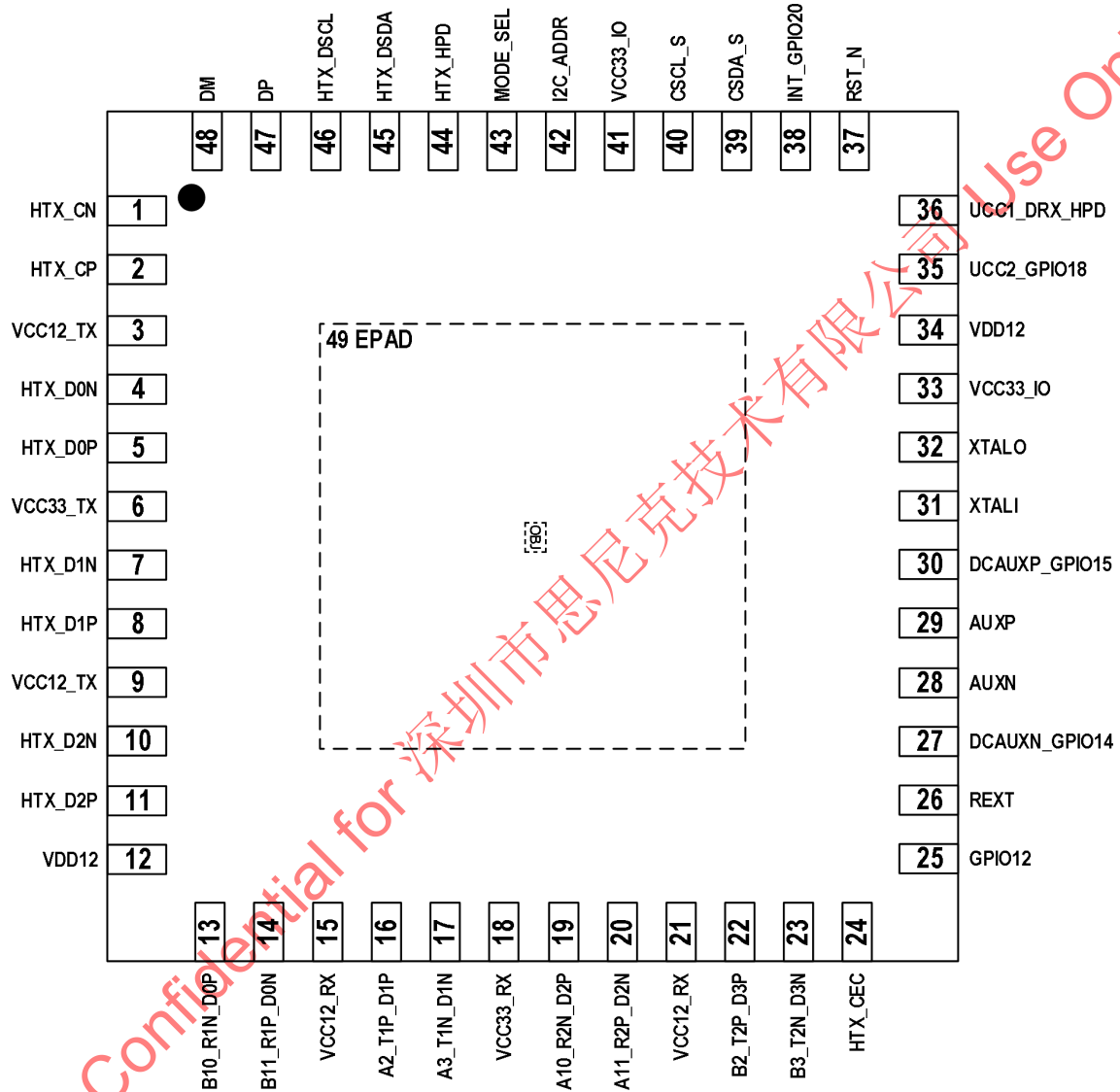


Figure 6.1.1 LT8711UXC QFN48 (6mmx6mm) Pin Assignment (Top View)

6.2 Pin Description

Table 6.2.1 Pin Description

Pin#	Pin Name	I/O Type	I/O Dir	Description
1	HTX_CN	Analog	O	HDMI TX clock channel differential pair negative polarity.
2	HTX_CP	Analog	O	HDMI TX clock channel differential pair positive polarity.
3	VCC12_TX	PG	N/A	HDMI TX 1.2V power supply.
4	HTX_D0N	Analog	O	HDMI TX data0 channel differential pair negative polarity.
5	HTX_D0P	Analog	O	HDMI TX data0 channel differential pair positive polarity.
6	VCC33_TX	PG	N/A	HDMI TX 3.3V power supply.
7	HTX_D1N	Analog	O	HDMI TX data1 channel differential pair negative polarity.
8	HTX_D1P	Analog	O	HDMI TX data1 channel differential pair positive polarity.
9	VCC12_TX	PG	N/A	HDMI TX 1.2V power supply.
10	HTX_D2N	Analog	O	HDMI TX data2 channel differential pair negative polarity.
11	HTX_D2P	Analog	O	HDMI TX data2 channel differential pair positive polarity.
12	VDD12	PG	N/A	1.2V core power supply.
13	B10_R1N_D0P	Analog	I	Type-C High Speed differential pair negative polarity. Positive polarity for DP RX.
14	B11_R1P_D0N	Analog	I	Type-C High Speed differential pair positive polarity. Negative polarity for DP RX.
15	VCC12_RX	PG	N/A	Type-C/DP RX 1.2V power supply.
16	A2_T1P_D1P	Analog	I	Type-C High Speed differential pair positive polarity. Positive polarity for DP RX.
17	A3_T1N_D1N	Analog	I	Type-C High Speed differential pair negative polarity. Negative polarity for DP RX.
18	VCC33_RX	PG	N/A	Type-C/DP RX 3.3V power supply.
19	A10_R2N_D2P	Analog	I	Type-C High Speed differential pair negative polarity. Positive polarity for DP RX.
20	A11_R2P_D2N	Analog	I	Type-C High Speed differential pair positive polarity. Negative polarity for DP RX.
21	VCC12_RX	PG	N/A	Type-C/DP RX 1.2V power supply.
22	B2_T2P_D3P	Analog	I	Type-C High Speed differential pair positive polarity. Positive polarity for DP RX.
23	B3_T2N_D3N	Analog	I	Type-C High Speed differential pair negative polarity. Negative polarity for DP RX.
24	HTX_CEC	OD	I/O	HDMI CEC IO. 3.3V tolerance.
25	GPIO12	LVTTL	I/O	General Purpose I/O. 3.3V tolerance.
26	REXT	Analog	O	Bandgap external resistor for current reference. Connect 12k (1%) resistor to ground.
27	DCAUXN_GPIO14	Analog, LVTTL	I/O	DP AUX DC detect negative polarity (DC-coupled). It also can be configured as General Purpose I/O. 3.3V tolerance.
28	AUXN	Analog	I/O	DP AUX differential pair negative polarity (AC-coupled).
29	AUXP	Analog	I/O	DP AUX differential pair positive polarity (AC-coupled).
30	DCAUXP_GPIO15	Analog, LVTTL	I/O	DP AUX DC detect positive polarity (DC-coupled). It also can be configured as General Purpose I/O. 3.3V tolerance.
31	XTALI	Analog	I	Crystal oscillator input interface.
32	XTALO	Analog	O	Crystal oscillator output interface.
33	VCC33_IO	PG	N/A	3.3V IO power supply.
34	VDD12	PG	N/A	Digital core 1.2V power supply.
35	UCC2_GPIO18	Analog,	I/O	CC2 pin for upstream USB Type-C port. It also can be

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Pin#	Pin Name	I/O Type	I/O Dir	Description
		LVTTL		configured as General Purpose I/O. 5V tolerance.
36	UCC1_DRX_HPD	Analog, LVTTL	I/O	CC1 pin for upstream USB Type-C port. It also can be configured as HPD of DP RX. 5V tolerance.
37	RST_N	LVTTL	I	Hardware reset pin, active low. Connect a resistor pullup to 3.3V power and a cap connected to ground to this pin.
38	INT_GPIO20	LVTTL	I/O	Interrupt I/O. It also can be configured as General Purpose I/O. 3.3V tolerance.
39	CSDA_S	OD,LVTTL	I/O	Configuration slave I2C interface. 5V tolerance.
40	CSCL_S	OD,LVTTL	I	Configuration slave I2C interface. 5V tolerance.
41	VCC33_IO	PG	N/A	3.3V IO power supply.
42	I2C_ADDR	Analog, LVTTL	I/O	I2C address select pin. It also can be configured as General Purpose I/O. 3.3V tolerance.
43	MODE_SEL	Analog, LVTTL	I/O	Chip mode select pin. It also can be configured as General Purpose I/O. 3.3V tolerance.
44	HTX_HPD	LVTTL	I	HPD input of HDMI TX. 5V tolerance.
45	HTX_DSDA	OD,LVTTL	I/O	DDC interface of HDMI TX. 5V tolerance.
46	HTX_DSCL	OD,LVTTL	I/O	DDC interface of HDMI TX. 5V tolerance.
47	DP	Analog	I/O	BB PHY interface.
48	DM	Analog	I/O	BB PHY interface.
49	EPAD	PG	N/A	Exposed pad which should be connected to ground.

7. Function Description

7.1 Function Block Diagram

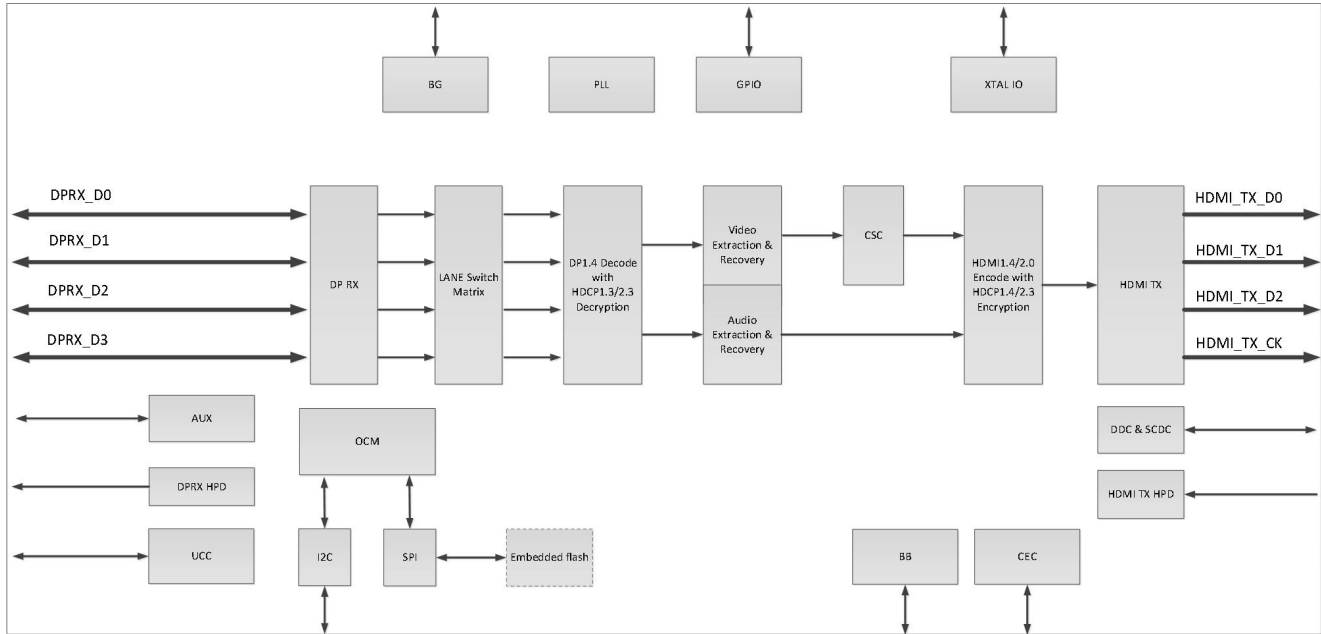


Figure 7.1.1 Function Block Diagram

8. Specification

8.1 Absolute Maximum Conditions

Table 8.1.1 Absolute Maximum Conditions

Symbol	Description	Min	Typ	Max	Unit
VCC33_TX, VCC33_RX, VCC33_IO	3.3V Power Supply Voltage	-0.3		4.0	V
VCC12_TX, VCC12_RX, VDD12	1.2V Power Supply Voltage	-0.3		1.5	V
V_I / V_O	CMOS Terminal Input/Output Voltage Range	-0.3		VCC33_IO + 0.3	V
$V_{I(5V)} / V_{O(5V)}$	5V Tolerant Input/Output Voltage Range	-0.3		6	V
T_S	Storage Temperature	-40		150	°C
T_J	Junction Temperature			125	°C
ESD	HBM		TBD		V
	CDM		TBD		V

Note: Permanent device damage may occur if absolute maximum conditions are exceeded.

8.2 Normal Operating Conditions

Table 8.2.1 Normal Operating Conditions

Symbol	Description	Min	Typ	Max	Unit
VCC33_TX, VCC33_RX, VCC33_IO	3.3V Power Supply Voltage	2.97	3.3	3.63	V
VCC12_TX, VCC12_RX, VDD12	1.2V Power Supply Voltage	1.14	1.2	1.32	V
T_A	Operating Free-air Temperature	-40		85	°C
θ_{JC}	Junction to Case Thermal Resistance		14.27		°C/W

8.3 DC Characteristics

Table 8.3.1 DC Characteristics

DP Main Link Receiver					
Parameter	Condition	Min	Typ	Max	Unit
Unit Interval	HBR3		123		ps
Unit Interval	HBR2		185		ps
Unit Interval	HBR		370		ps
Unit Interval	RBR		617		ps
SSC Down-spreading		0		0.5	%
SSC Modulation Frequency		30		33	kHz
Differential Eye Voltage	at input pins	100		1320	mVp-p

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DP AUX Channel					
Parameter	Condition	Min	Typ	Max	Unit
Unit Interval		0.4	0.5	0.6	us
Differential Voltage	Transmitting	390		1380	mVp-p
Differential Voltage	Receiving	320		1360	mVp-p
AC-Coupling Capacitor		75		200	nF
HDMI Transmitter					
Parameter	Condition	Min	Typ	Max	Unit
Single-ended High Level Output Voltage	HDMI1.4	VCC33_TX-200		VCC33_TX+10	mV
	HDMI2.0 data channel	VCC33_TX-400		VCC33_TX+10	mV
	HDMI2.0 clock channel	VCC33_TX-400		VCC33_TX+10	mV
Single-ended Low Level Output Voltage	HDMI1.4	VCC33_TX-700		VCC33_TX-400	mV
	HDMI2.0 data channel	VCC33_TX-1000		VCC33_TX-400	mV
	HDMI2.0 clock channel	VCC33_TX-1000		VCC33_TX-200	mV
Single-ended Output Swing Voltage	HDMI1.4	400		600	mV
	HDMI2.0 data channel	400		600	mV
	HDMI2.0 clock channel	200		600	mV

Table 8.3.2 I2C ADDR select

I2C_ADDR input voltage (Vin)	I2C address (8bit)
Vin<800mV	0X52
800mV<Vin<2000mV	0X5E
2000mV<Vin<2800mV	0X76
Vin>2800mV	0X7E

8.4 AC Characteristics

Table 8.4.1 AC Characteristics

DP Main Link Receiver					
Parameter	Condition	Min	Typ	Max	Unit
Lane intra-pair skew tolerance	For HBR3			50	ps
	For HBR2			50	ps
	For HBR			60	ps
	For RBR			260	ps
Jitter closed-loop tracking bandwidth	For HBR3	15			MHz
	For HBR2	10			MHz

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	For HBR	10			MHz
	For RBR	5.4			MHz
TMD5 TX AC Specifications					
Parameter	Condition	Min	Typ	Max	Unit
Rise/Fall Time (20%-80%)	HDMI1.4	75			ps
	HDMI2.0 data channel	42.5			ps
	HDMI2.0 clock channel	75			ps
Intra-pair Skew				0.15	T _{bit}
Inter-pair Skew				0.2	T _{character}
Clock Duty Cycle		40%		60%	
TMD5 Clock Jitter	HDMI1.4			0.25	T _{bit}
	HDMI2.0			0.3	T _{bit}
Maximum Differential Voltage	HDMI2.0			780	mV
Minimum Differential Voltage	HDMI2.0	-780			mV

8.5 Power Consumption

Table 8.5.1 Power Consumption

Condition		Supply Current (3.3V)	Supply Current (1.2V)	Unit
8K@30Hz	4Lane@8.1G			mA
4K@60Hz	2Lane@8.1G			mA
	4Lane@5.4G			mA
4K@30Hz	2Lane@5.4G			mA
	4Lane@2.7G			mA
1080P@60Hz	1Lane@5.4G			mA
	2Lane@2.7G			mA
	4Lane@1.62G			mA

8.6 Power-up Sequence

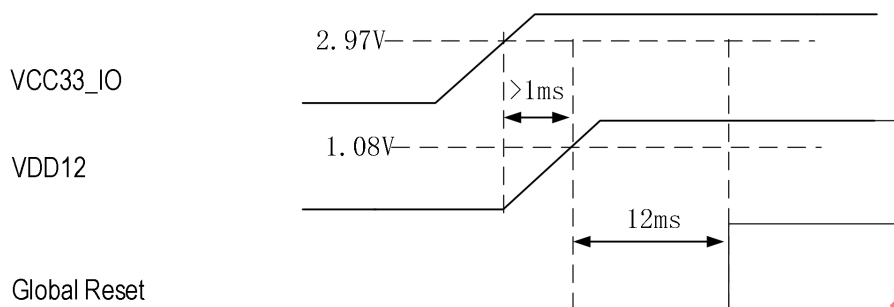


Figure 8.6.1 Power-up Sequence

9.2 Packing Dimensions

TBD

Figure 9.2.1 Packing Dimensions (HT)

Note: Pin1 points to the position of the missing corner in the tray.

9.3 Recommended Layout Footprint

TBD

Figure 9.3.1 Recommended Layout Footprint (Top View)

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10. Temperature Profile of Soldering

TBD

Figure 10.1 Temperature Profile of Soldering

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