

LT7912 --- Product Brief

Type-C/DP1.4a/HDMI2.1 to Type-C/DP1.4a/HDMI2.1 and Quad-port MIPI/LVDS with Audio

1. Features

● Type-C

- Compliant with VESA DisplayPort Alt Mode on USB Type-C Standard 1.0b
- DP Alt Mode support pin assignment C and E
- Compliant with USB power delivery specification 3.0
- Compliant with USB Type-C cable and connector specification 1.3
- Built-in dual CC logic and PD controller for charger and normal communication
- Data roles supported: UFP and DFP
- Power roles supported: source, sink and DRP
- Support USB Billboard

● DP1.4a/eDP1.5 Receiver

- Compliant with DisplayPort specification 1.4a for 1.62Gbps, 2.7Gbps, 5.4Gbps and 8.1Gbps
- Compliant with Embedded DisplayPort specification version 1.5
- Support SSC
- Support DisplayPort 1/2/4 lanes
- Support FEC
- Support ASSR for eDP
- Support HDCP 1.3/2.3
- Support HDCP repeater
- Support SST/MST mode
- Support RGB 6/8/10/12 bpc, YCbCr4:4:4/YCbCr4:2:2/YCbCr4:2:0 8/10/12 bpc
- Support up to 8K@30Hz RGB 6bpc, YCbCr4:2:2 10 bpc or YCbCr4:2:0 12 bpc
- Support up to 4K@144Hz RGB 6bpc, YCbCr4:2:2 10 bpc or YCbCr4:2:0 12 bpc
- Support up to 8K@60Hz DSC pass-through
- Support HDR10
- Support Adaptive-Sync

- Support Horizontal Blanking Expansion

● HDMI2.1 Receiver

- Compliant with HDMI2.1, HDMI2.0b, HDMI1.4 and DVI1.0
- Data rate up to 10Gbps
- Support HDCP 1.4/2.3
- Support HDCP repeater
- Support RGB 8/10/12 bpc, YCbCr4:4:4/ YCbCr4:2:2/ YCbCr4:2:0 8/10/12 bpc
- Support up to 8K@30Hz RGB/YCbCr4:4:4/ YCbCr4:2:2 10bpc or YCbCr4:2:0 12 bpc
- Support up to 4K@144Hz RGB/YCbCr4:4:4/ YCbCr4:2:2 8bpc or YCbCr4:2:0 12 bpc
- Support up to 8K@60Hz DSC pass-through
- Support HDR10
- Support FEC
- Support CEC
- Support VRR
- Integrated EDID shadow (max 512-byte)
- Support ARC
- Support eARC

● DP1.4a/eDP1.5 Transmitter

- Compliant with DisplayPort specification 1.4a for 1.62Gbps, 2.7Gbps, 5.4Gbps, 8.1Gbps
- Compliant Embedded DisplayPort specification version 1.5
- Support DisplayPort 1/2/4 lanes
- Support HDCP 1.3/2.3
- Support HDCP repeater
- Support RGB 6/8/10/12 bpc, YCbCr4:4:4/YCbCr4:2:2/ YCbCr4:2:0 8/10/12 bpc
- Support up to 8K@30Hz RGB 6bpc, YCbCr4:2:2 10 bpc or YCbCr4:2:0 12 bpc
- Support up to 4K@144Hz RGB 6bpc, YCbCr4:2:2 10 bpc or YCbCr4:2:0 12 bpc

- Support up to 8K@60Hz DSC pass-through
 - Support HDR10
 - Support Adaptive-Sync
 - Support ASSR for eDP
 - Support Horizontal Blanking Expansion
 - Support SSC
- **HDMI2.1 Transmitter**
- Compliant with HDMI2.1, HDMI2.0b, HDMI1.4 and DV11.0
 - Data rate up to 10Gbps
 - Support HDCP 1.4/2.3
 - Support HDCP repeater
 - Support RGB 8/10/12 bpc, YCbCr4:4:4/ YCbCr4:2:2/ YCbCr4:2:0 /8/10/12 bpc
 - Support up to 8K@30Hz RGB/YCbCr4:4:4/ YCbCr4:2:2 8bpc or YCbCr4:2:0 12 bpc
 - Support up to 4K@120Hz RGB/YCbCr4:4:4/ YCbCr4:2:2 8bpc or YCbCr4:2:0 12 bpc
 - Support up to 8K@60Hz DSC pass-through
 - Support HDR10
 - Support FEC
 - Support VRR
 - Support CEC
 - Support ARC
- **Four-Port MIPI® DSI/CSI Transmitter**
- Compliant with D-PHY1.2 & DSI 1.3 & CSI-2 1.3 ; 1 clock lane, and 1/2/3/4 configurable data lanes, and 8 configurable data lanes only for CSI; 2.5Gbps per data lane
 - Compliant with C-PHY1.0 & DSI-2 1.0 & CSI-2 2.0; 1/2/3 configurable data lanes; 5.7Gbps per data lane
 - Support 1/2/4 configurable ports and only 1 port for CSI D-PHY 8lanes mode
 - Support up to 8K@30Hz YUV422 8bit for CSI D-PHY 8lanes mode
 - Support up to 8K@30Hz RGB 10bit
 - Support up to 4K@144Hz RGB 8bit
 - Support up to 8K@60Hz DSC pass-through
 - Support overlap mode
 - DSI Support 16/20/24-bit YCbCr4:2:2, 16/18/24/30-bit RGB
- CSI Support RGB888/666/565, YUV422 8/10bit, YUV420 8bit(legacy)
 - Support side by side 3D
- **Four-Port LVDS Transmitter**
- Compatible with VESA and JEIDA standard
 - Support 1/2/4 configurable ports
 - 1 Clock lane and 3/4/5 configurable data lanes
 - Data rate up to 1.2Gbps per data lane
 - Support up to 8K@30Hz YCbCr422 8bit
 - Support up to 4K@120Hz YCbCr422 8bit
 - Support up to 4K@60Hz RGB 10bit
 - Support side by side 3D
 - Programmable transmitter swing
 - Support SSC
- **Digital Audio Input and Output**
- I2S interface supports up to 8-channel audio, with sample rates of 32~192 KHz and sample sizes of 16~24 bits
 - TDM interface supports up to 8-channel audio, with sample rates of 32~192 KHz and sample sizes of 16~24 bits
 - SPDIF interface supports LPCM, Dolby Digital, DTS digital audio up to 192KHz frame rate
 - Compliant with IEC60958 or IEC61937
- **DSC Decoder**
- Compliant with DSC 1.2a
 - Support up to hactive 7680
 - Support up to pixel clock 1.44GHz
 - Support 1/2/4 slices
 - Support color space RGB, YCbCr4:4:4, YCbCr4:2:2, and YCbCr4:2:0
 - Support color depth 8bit and 10bit
 - Support bpp precision 1/16 bit
 - Support dynamic refresh rate
- **DSC Encoder**
- Compliant with DSC 1.2a
 - Support up to hactive 7680
 - Support up to pixel clock 1.44GHz
 - Support 1/2/4/8 slices
 - Support color space RGB, YCbCr4:4:4, YCbCr4:2:2, and YCbCr4:2:0
 - Support color depth 8bit and 10bit

- Support bpp precision 1/16 bit
- Support dynamic refresh rate
- **Miscellaneous**
 - CSC: RGB <-> YCbCr4:4:4 <-> YCbCr4:2:2<-> YCbCr4:2:0
 - Integrated 100/400KHz I2C slave
 - Integrated microprocessor
 - External oscillator 25MHz, +/-50ppm
 - Embedded SPI flash for firmware and HDCP keys
 - Firmware update through SPI or I2C or USB interface
 - Power supply: 3.3V and 1.1V

2. General Description

LT7912 is a high performance Type-C/DP1.4a or HDMI2.1 to MIPI or LVDS chip for VR/Display application. HDCP RX as the upstream of HDCP repeater, can cooperate with HDCP TX of other chips to realize the repeater function.

For Type-C/DP1.4a input, LT7912 can be configured as 1/2/4 lanes. Adaptive equalization makes it suitable for long cable application and the maximum bandwidth up to 32.4Gbps.

For HDMI2.1 input, LT7912 can be configured as 3/4 lanes. Adaptive equalization makes it suitable for long cable application and the maximum bandwidth up to 40Gbps.

For MIPI output, LT7912 features configurable single-port

or dual-port or quad-port MIPI@DSI/CSI with 1 high-speed clock lane and 1~4 high-speed data lanes operating at maximum 2.5Gbps/lane with D-PHY, which can support a total bandwidth of up to 40Gbps for four port. LT7912 also support 5.7Gbps/lane with C-PHY, which can support a total bandwidth of up to 68.4Gbps for four port.

For LVDS output, LT7912 can be configured as single, dual or quad-port LVDS with 1 high-speed clock lane, and 3~5 high-speed data lanes, operating at maximum 1.2Gbps per lane, which can support a total bandwidth of up to 24Gbps. LT7912 supports flexible video data mapping path for 2D and 3D applications.

Two digital audio interfaces are available I2S and SPDIF.

The I2S interface supports 8-ch LPCM and the SPDIF interface supports 2-ch LPCM or compressed audio, both at maximum 192 KHz sample rate.

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 configuration I2C slave interface.

3. Applications

- Mobile system
- Display
- VR
- Video conferencing

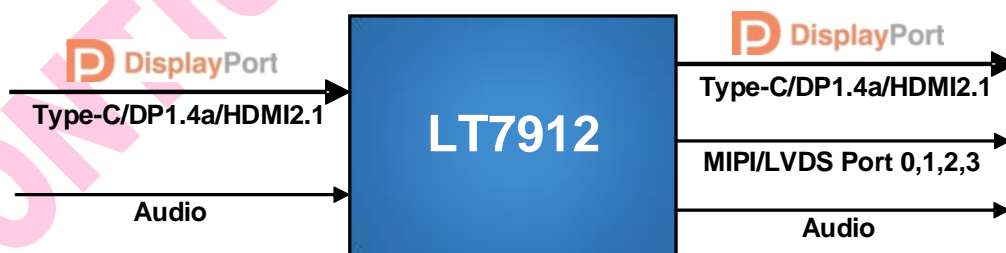


Figure 3.1 Application Diagram

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
LT7912	LT7912_U3B03AED	Preview	BGA288(12*12)	Au	E	TBD	D	Tray	1890pcs

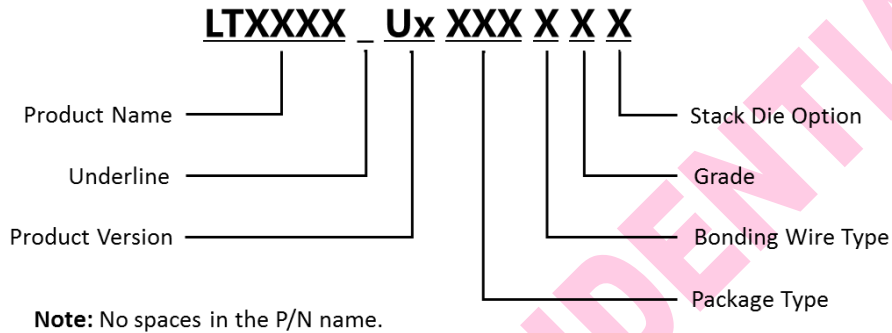


Figure 4.1 Part Number Naming Rules

Copyright © 2024-2025 Lontium Semiconductor Corporation, All rights reserved.

Lontium Semiconductor Proprietary & Confidential

This document and the information it contains belong to Lontium Semiconductor. Any review, use, dissemination, distribution or copying of this document or its information outside the scope of a signed agreement with Lontium is strictly prohibited.

LONTIUM DISCLAIMS ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THOSE OF NONINFRINGEMENT, MERCHANTABILITY, TITLE AND FITNESS FOR A PARTICULAR PURPOSE. CUSTOMERS EXPRESSLY ASSUME THEIR OWN RISK IN RELYING ON THIS DOCUMENT.

LONTIUM PRODUCTS ARE NOT DESIGNED OR INTENDED FOR USE IN LIFE SUPPORT APPLIANCES, DEVICES OR SYSTEMS WHERE A MALFUNCTION OF A LONTIUM DEVICE COULD RESULT IN A PERSONAL INJURY OR LOSS OF LIFE.

Lontium assumes no responsibility for any errors in this document, and makes no commitment to update the information contained herein. Lontium reserves the right to change or discontinue this document and the products it describes at any time, without notice. Other than as set forth in a separate, signed, written agreement, Lontium grants the user of this document no right, title or interest in the document, the information it contains or the intellectual property it embodies.

Trademarks

Lontium™ 龙迅™ and ClearEdge™ is a registered trademark of Lontium Semiconductor. All other brand names, product names, trademarks, and registered trademarks contained herein are the property of their respective owners.

Visit our corporate web page at: www.lontiumsemi.com

Technical support: support@lontium.com

Sales: sales@lontium.com