

# LT8712X --- Product Brief

## Type-C/DP1.2 to HDMI2.0 and VGA Converter with Audio

### Features

- **USB Type-C**
  - Compliant with VESA DisplayPort Alt Mode on USB Type-C standard V1.0
  - Compliant with USB Power Delivery specification R2.0, V1.0
  - Compliant with USB Type-C Cable and Connector specification R1.2
  - Compliant with HDMI 1.4b Alt Mode on USB Type-C specification V1.0
  - Compliant with DP Alt Mode 1.0, PD 2.0, Type-C 1.2, HDMI1.4b Alt Mode 1.0
  - Built-in dual CC controllers for charger and normal communication
  - 3 data roles supported: DFP, UFP and DRP
  - 2 power roles supported: source and sink
- **DP1.2 Receiver**
  - Compliant with VESA DP1.2 and Embedded DisplayPort (eDP) v1.4
  - No HDCP decryption
  - 1/2/4 configurable data lanes
  - 1.62/2.7/5.4Gbps per data lane
  - Support SSC
  - 1Mbps AUX channel
  - Receiver PHY is HDMI signal compatible
  - Adaptive or programmable receiver equalization
  - Support lane swap(arbitrarily) and polarity inversion(independent)
  - Support 4k@60Hz
  - Support eDP Authentication: Alternative Scramble Seed Reset and Alternative Framing
  - Fast and full Link Training for Embedded DisplayPort system
- **HDMI2.0 Transmitter**
  - Compliant with HDMI2.0, HDMI1.4 and DV11.0
  - Data rate up to 6Gbps
  - Support 4k@60Hz
  - Support TMDS scrambling for EMI/RFI reduction
  - Support SCDC
  - Support channel swap(arbitrarily) and polarity inversion(independent)
  - Programmable transmitter swing and pre-emphasis
  - Downstream receiver sensing
  - 5V tolerance DDC/HPD I/Os
- **Triple-Channel Video DAC**
  - Compliant with VESA VSIS1.2
  - 200MSPS throughput and WUXGA timing support
  - Amplitude calibration
  - R/B swappable
  - Load sensing
  - 5V tolerance DDC I/Os
- **Digital Audio Input/Output**
  - One I2S interface supporting 2-channel audio, with sample rates of 32~192 kHz and sample sizes of 16~24 bits
  - SPDIF interface supporting PCM, Dolby Digital, DTS digital audio at up to 192kHz frame rate
  - IEC60958 or IEC61937 compatible
- **Miscellaneous**
  - DP receiver to HDMI transmitter bypass to support HDMI Alt Mode
  - Support Swift Charge
  - USB billboard module and USB2.0 switch integrated
  - Internal or external oscillator
  - Integrated microprocessor

- Embedded SPI flash for firmware
- GPIOs for VBUS/VCONN/AUX and other system controls
- Integrated 100/400kHz I2C slave
- Firmware update through SPI, I2C, AUX or USB interface
- Low power consumption
- Power supply: 3.3V for I/O and 1.2V for core
- Embedded 5V to 3.3V LDO
- ESD 4kV HBM
- Temperature range: -40°C ~ +85°C
- Package : 9mmx9mm QFN76

## Description

The LT8712X is a high performance Type-C/DP1.2 to HDMI2.0 and VGA converter, designed to connect a USB Type-C source or a DP1.2 source to an HDMI2.0 and a VGA sink .

The LT8712X integrates a DP1.2 compliant receiver, an HDMI2.0 compliant transmitter and a high-speed triple-channel video DAC. Also, two CC controllers are included for CC communication to implement DP Alt Mode and power delivery function, one for upstream Type-C port and another for downstream port.

Two digital audio output interfaces are available, I2S and SPDIF. The I2S interface supports 2-ch LPCM and the SPDIF interface supports 2-ch LPCM or 8-ch compressed

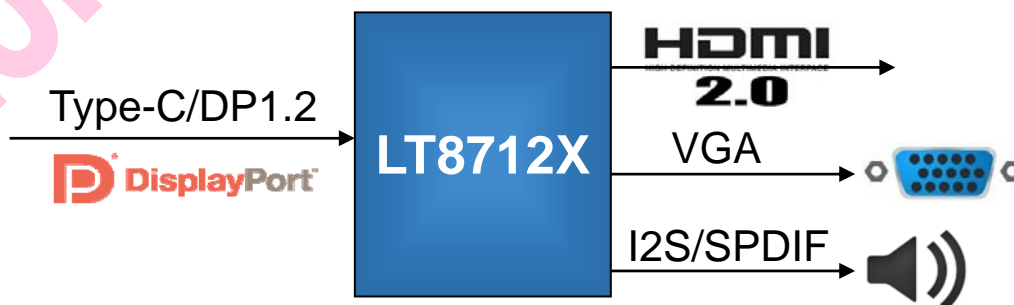
audio, both at maximum 192kHz sample rate.

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

LT8712X also support EDID buffer, DP/eDP input detection and determine to enter into power saving mode automatically. When the receiver of LT8712X locks the input signal, the MCU can read the recovered timing parameters by the MSA registers to match the ASSR. The DPCD registers are accessible via system I2C when debugging the full link training. Once the fast link training used, system time will save at least 400ms.

## Applications

- Docking Station
- Dongle



**Figure 1. Application Diagram**

## Ordering Information

Part Number	Operating Temperature Range	Package	Packing Method
LT8712X	-40°C to+85°C	QFN76 (9*9)	Tray

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