GSV2201

DisplayPort 1.4 to HDMI 2.0 Converter with Embedded MCU

March, 2022

Preliminary Product Specification

1. General Description

1.1 General Information

Gscoolink GSV2201 is a high-performance, low-power, USB Type-C Alternate Mode DisplayPort 1.4 to HDMI 2.0 converter. By integrating enhanced microcontroller, GSV2201 has created a cost-effective solution that provides time-to-market advantages. The DisplayPort Receiver supports up to 32.4Gbps (HBR3, 4-lane) and HDMI Transmitter supports up to 18Gbps (TMDS, 6G3Lane). Integrated Power Delivery 3.0 controller handles Type-C CC interface for USB power management and DisplayPort mode entry. The superior architecture of GSV2201 provides economical smaller footprint solutions using QFN64, targeting applications of Type-C Docking, Type-C dongle and DP to HDMI cable.

GSV2201 supports all DisplayPort SDP packets pass-through to HDMI output. HDCP 1.4 and HDCP 2.2/2.3 are implemented in GSV2201 for both DisplayPort Rx and HDMI Tx. Color Space Conversion is supported at HDMI Tx in TMDS mode. Flexible implementations of Audio Insertion, Audio Extraction and SPDIF to I2S conversion are supported in GSV2201.

An internal Video Generator can be used to generate any uncompressed video timing defined in HDMI 2.0, such as 4K@60Hz, 4K@30Hz, 480i@60Hz.
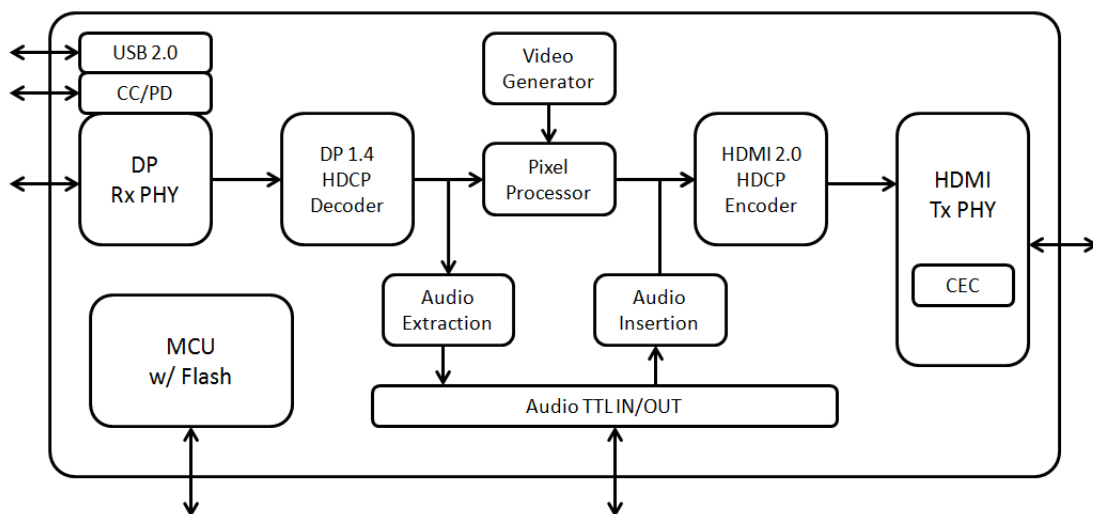

Figure 1. Top Diagram

The supported audio formats are listed in Table 1

Table 1. Supported Audio Format

Packet ID	Packet Type	Sampling Frequency (KHz)		
		32/44.1/48/88.2/ 96/176.4/192	256/352.8/384/ 512/705.6/768	64/128
0x02	Audio Sample Packet (LPCM and Compressed Audio)	Y		Y
0x07	One Bit Audio Sample Packet	Y		
0x08	DST Audio Packet	Y		
0x09	High Bit-rate Audio Stream Packet	Y	Y	

1.2 Features

1.2.1 DisplayPort Receiver

- Compliant with VESA DisplayPort 1.4a

- Compliant with HDCP 2.2/2.3 and HDCP 1.4

- Support HBR3, HBR2, HBR and RBR (8.1/5.4/2.7/1.62 Gbps)

- Flexible 1/2/4 lane Main-Link configuration

- Programmable Adaptive Equalization

- Support Full-Link Training and No-Link Training

- Support High Dynamic Range (HDR) and Dynamic/Static Metadata

- Support Audio Extraction

- Support Horizontal Blanking Expansion up to 4K@60Hz format

- Support Forward Error Correction (FEC)

- Embedded arbitrary EDID and MCCS

- Support Spread Spectrum Clock (SSC)

1.2.2 HDMI Transmitter

- Compliant with HDMI 2.0b, HDMI 1.4b

- Compliant with HDCP 2.2/2.3 and HDCP 1.4

- Data rate up to 18Gbps (TMDS 6Gbps/3 Lane)

- Programmable Voltage Swing, Slew-Rate and Pre-emphasis

- Support AC-coupling on TMDS

- Support Color Space Converter

- Support HDR (HDR10/HDR10+/Dolby Vision/HLG)

- Hardware CEC Engine for Low Level protocol decoding
- 5V tolerance on DDC/HPD/CEC pins

1.2.3 USB Type-C Interface

- USB Power Delivery 3.0 Compliant controller
- 3 Configuration Channels (CC) with on-chip Rp/Rd resistors
- Dual Role Power Port (DRP)
- Fast Role Swap
- USB 2.0 billboard enumeration

1.2.4 Audio Input/Output

- I2S and SPDIF Audio Extraction from DisplayPort Rx
- I2S/SPDIF Audio Insertion to HDMI Tx
- SPDIF/I2S/HBR/DSD/TDM Format Supported for Audio Extraction and Insertion
- SPDIF to I2S Conversion using single TTL bus in Bi-direction

1.2.5 System Features

- Embedded internal MCU
- External pins of Flash QSPI interface
- External 25MHz Crystal required
- Available Pins for UART/Timer/GPIO
- Temperature Sensor Monitoring Circuit

1.3 Chip Application Modes

1.3.1 DP to HDMI Conversion

Based on the DisplayPort input and output requirement, GSV2201 can dynamically switch between HDMI 1.4 and HDMI 2.0 mode for the best compatibility in 4K/2K timings. Audio extraction can be applicable if required.
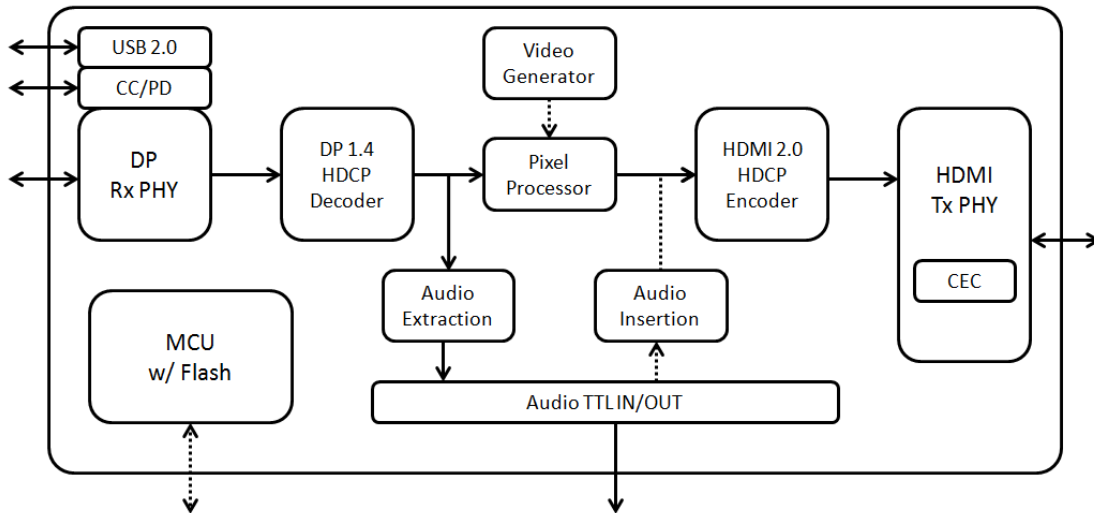
Figure 2. DisplayPort to HDMI TMDS mode Conversion

1.3.2 Audio Insertion for HDMI Tx

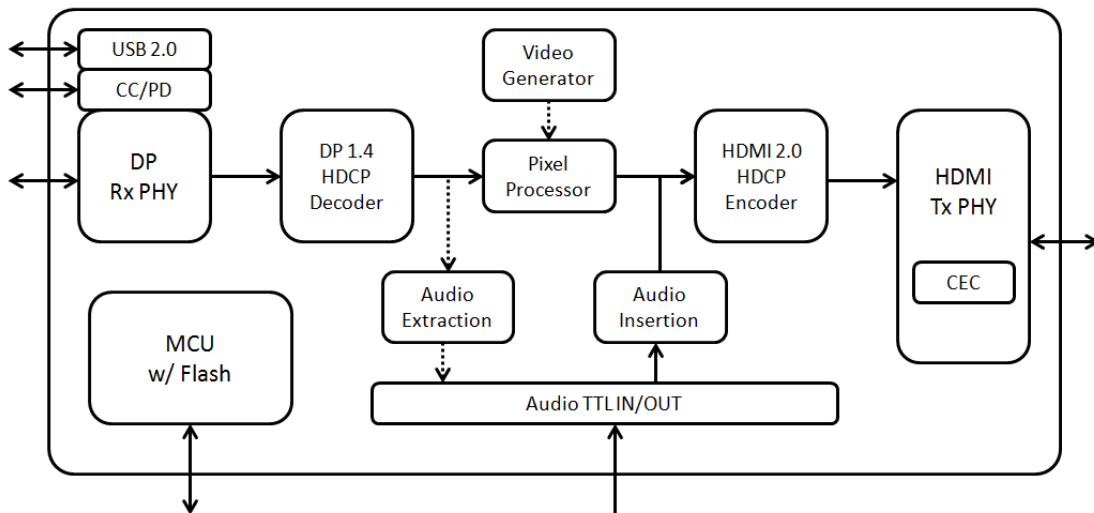I2S/SPDIF audio stream and DisplayPort Rx video can be inserted into HDMI Tx.

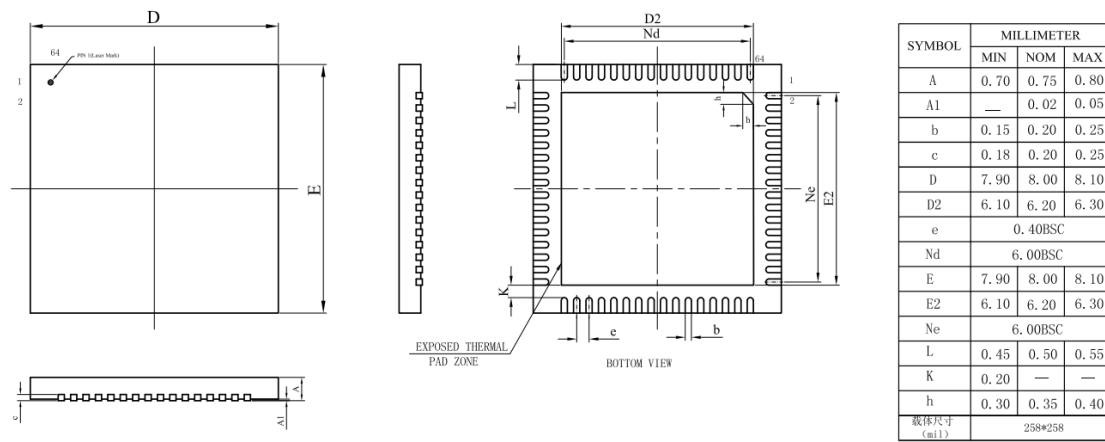Figure 3. Audio Insertion Application

4. Package Information

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	—	0.02	0.05
b	0.15	0.20	0.25
c	0.18	0.20	0.25
D	7.90	8.00	8.10
D2	6.10	6.20	6.30
e	0.40BSC		
Nd	6.00BSC		
E	7.90	8.00	8.10
E2	6.10	6.20	6.30
Ne	6.00BSC		
L	0.45	0.50	0.55
K	0.20	—	—
h	0.30	0.35	0.40
载体尺寸（mil）	258*258		

Figure 8. Package Dimensions (QFN64)

5. Ordering Guide

Table 10. Ordering Information

Part Number.	Temperature Range	Package Description	Packing Type
GSV2201	−20°C to +85°C	QFN64	Tray