



GSV6155E

Type-C/DisplayPort 1.4/eDP 1.4/HDMI 2.0
Repeater with Embedded MCU and PD
Controller

Oct, 2023

Preliminary Product Specification

1. General Description

1.1 General Information

Gschoolink GSV6155E is a high-performance, low-power Type-C/DisplayPort 1.4/eDP 1.4/HDMI 2.0 repeater. By integrating enhanced microcontroller, GSV6155E has created a cost-effective solution that provides time-to-market advantages. The DisplayPort Receiver and Transmitter support up to 32.4Gbps (HBR3, 4-lane). HDMI Receiver and Transmitter support up to 18Gbps (TMDS, 6G/3Lane). With embedded Channel Configuration (CC), Power Delivery (PD) controller and Billboard USB 2.0 controller, GSV6155E can support dual Type-C Alternate DisplayPort both as UFP and DFP in Type-C Alternate DisplayPort retimer application. Meanwhile, arbitrary input/output protocol conversions between HDMI/DisplayPort/eDP are also supported. The superior architecture of GSV6155E provides economical smaller footprint solutions using QFN76, targeting for low power embedded applications.

HDCP 1.4 and HDCP 2.2/2.3 are implemented in GSV6155E for its DisplayPort/HDMI port. Color Space Conversion, 420-444/422 Conversion, De-Interlacer and Downscaler are supported for flexible video processing. Audio Extraction of HDMI Rx and DisplayPort Rx is supported in GSV6155E for audio processing. With audio sample raw data detection feature, LPCM channel filled with consistent zero raw sample data will be automatically detected and muted.

Within 8KV HBM tolerance, GSV6155E's operation temperature range is -40 °C to 85 °C using automotive qualified process.

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

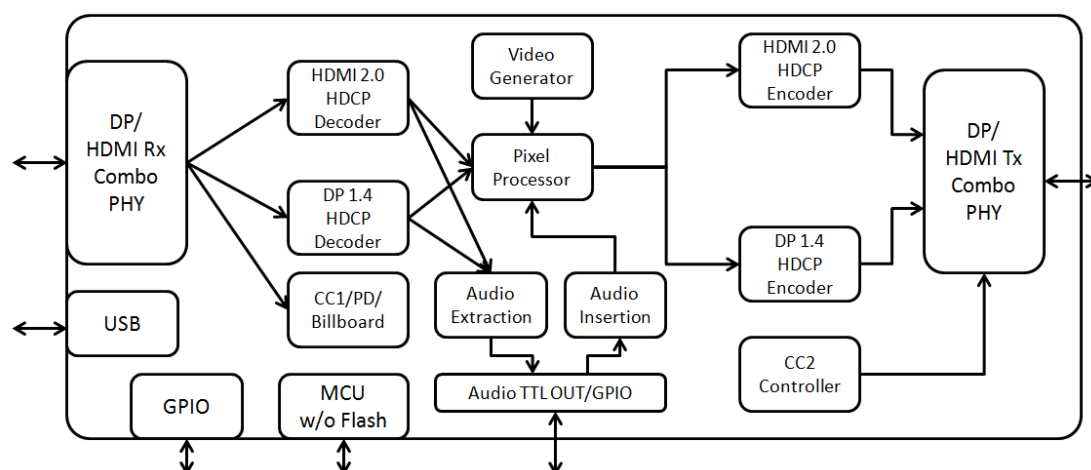


Figure 1. Top Diagram

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
- Compliant with both DisplayPort and USB Type-C Alternative Mode
- 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
- Embedded arbitrary EDID and MCCS

- Support Spread Spectrum Clock (SSC)
- 3D format support of frame sequential, stacked frame, side-by-side, top-to-bottom
- Support 2.16/2.43/3.24/4.32 Gbps in eDP
- Support ASSR in eDP

1.2.2 HDMI Receiver

- Compliant with HDMI 2.0b, HDMI 1.4b
- Compliant with HDCP 2.2/2.3 and HDCP 1.4 in repeater/receiver mode
- Data rate up to 18Gbps (TMDS 6Gbps/3 Lane)
- Programmable Adaptive Equalization
- Support High Dynamic Range (HDR) and Dynamic/Static Metadata
- Embedded arbitrary EDID (up to 512 bytes)
- 5V tolerance on DDC/HPD pins
- 3D format support of frame packing, side-by-side, top-and-bottom

1.2.3 DisplayPort Transmitter

- Compliant with VESA DisplayPort 1.4a
- Compliant with HDCP 2.2/2.3 and HDCP 1.4
- Compliant with both DisplayPort and USB Type-C Alternative Mode
- 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 High Dynamic Range (HDR) and Dynamic/Static Metadata
- Support Audio Insertion
- Support Horizontal Blanking Reduction up to 4K@60Hz format
- Support Spread Spectrum Clock (SSC)
- 3D format support of stacked frame, side-by-side, top-to-bottom
- Support 2.16/2.43/3.24/4.32 Gbps in eDP
- Support Backlight Control and MCCS over AUX
- Support ASSR in eDP

1.2.4 USB Type-C DisplayPort Alternative Mode Transceiver

- Compliant with USB Type-C 1.1/1.0 Specification
- Compliant with USB Power Delivery 3.0 Specification

- Programmable USB Type-C Channel Configuration function
- Support Billboard in USB 2.0

1.2.5 HDMI Transmitter Features

- 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 input/output
- Support Color Space Converter in TMDS mode
- Support HDR (HDR10/HDR10+/Dolby Vision/HLG)
- Support Variable Refresh Rate (VRR), FreeSync, G-Sync
- Support ALLM
- Hardware CEC Engine for Low Level protocol decoding
- 5V tolerance on DDC/HPD/CEC pins

1.2.6 Pixel Processor

- Color Space conversion
- YCbCr 444-420 timing conversion
- Downscaler with fixed horizontal and vertical 2 ratio for 4K to 2K conversion
- Deinterlacer for interlaced timing

1.2.7 Audio Output and Input

- I2S and SPDIF Audio Extraction from HDMI Rx/ DisplayPort Rx /Type-C Rx
- I2S and SPDIF Audio Insertion to HDMI Tx/ DisplayPort Tx /Type-C Tx
- SPDIF/I2S/HBR/DSD/TDM Format Supported for Audio Extraction

1.2.8 System Features

- Embedded MCU using External Flash
- External 25MHz Crystal required
- Available Pins for UART/Timer/GPIO control from embedded MCU
- Mailbox feature for external MCU access on chip function status
- Temperature Sensor Monitoring Circuit

1.3 Chip Application Modes

1.3.1 Type-C Alt-Mode In to Out Application

RxPort is configured as Type-C Alt-Mode (DisplayPort) Rx Input. Together with on-chip CC, USB 2.0 IP support, Type-C USB input can be configured to DisplayPort 1.4a input stream for processing. TxPort is configured as DisplayPort Tx Output. Together with another on-chip CC IP support, Type-C USB output can be configured for DisplayPort 1.4a output stream.

With internal Color Space Converter, De-Interlacer, DisplayPort input timing can be converted to Type-C Alt-DisplayPort compatible output timing. With Downscaler in Pixel Processor, output can be downscaled automatically when video stream bandwidth exceeds downstream capability.

Meanwhile, Audio extraction can be applicable if required.

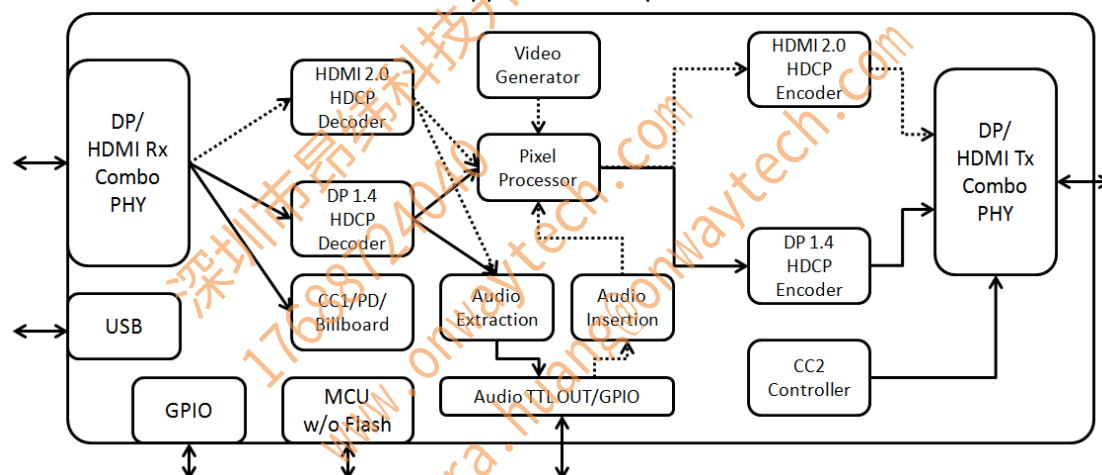


Figure 2. Type-C Alt-Mode In to Type-C Alt-Mode Out Application

1.3.2 HDMI In to Type-C Alt-Mode Out Application

RxPort is configured as HDMI 2.0 Input. TxPort can be configured as DisplayPort, eDP or HDMI Output. When DisplayPort output is used, the application can also be considered as HDMI to DisplayPort converter.

With internal Color Space Converter, De-Interlacer, HDMI 2.0 input timing can be converted to Type-C Alt-DisplayPort compatible output timing. With Downscaler in Pixel Processor, output can be downscaled automatically when video stream bandwidth

exceeds downstream capability.

Meanwhile, Audio extraction can be applicable if required.

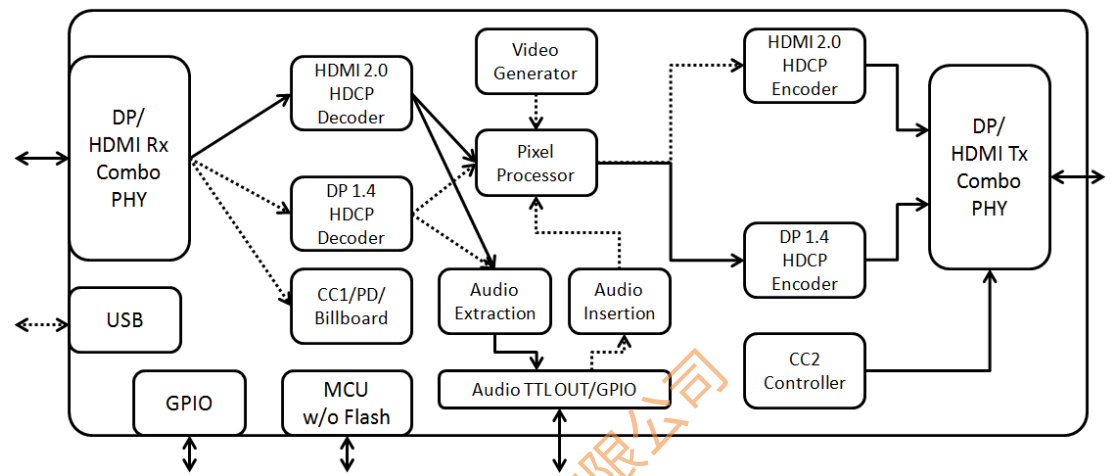


Figure 3. HDMI In to Type-C Alt-Mode Out Application

1.4 Audio Bus Output Configuration

When one group of audio bus is configured as output, I2S and SPDIF are output at the same time. General configuration of pin settings is shown below:

Table 2. I2S/SPDIF Audio Extraction

Pin Name	Alias	Direction	Description
AUD_D0	SDATA[0]	Output	I2S Data, default stereo channels
AUD_D1	SDATA[1]	Output	I2S Data, 3/4 channels
AUD_D2	SDATA[2]	Output	I2S Data, 5/6 channels
AUD_D3	SDATA[3]	Output	I2S Data, 7/8 channels
AUD_D4	SPDIF	Output	SPDIF channel
AUD_D5	LRCLK/WS	Output	Fs (0 = Left, 1 = Right)
AUD_SCLK	BCLK	Output	Fixed to 64Fs
AUD_MCLK	Sys Clock	Output	Selected from 128Fs/256Fs/384Fs/512Fs

For HBR application, SPDIF is also capable of sending out with 4 pins.

Table 3. HBR Audio Extraction in SPDIF

Pin Name	Alias	Direction	Description
----------	-------	-----------	-------------

2. Pin Description

2.1 Pin Diagram

QFN76 Pin definition is defined as below.

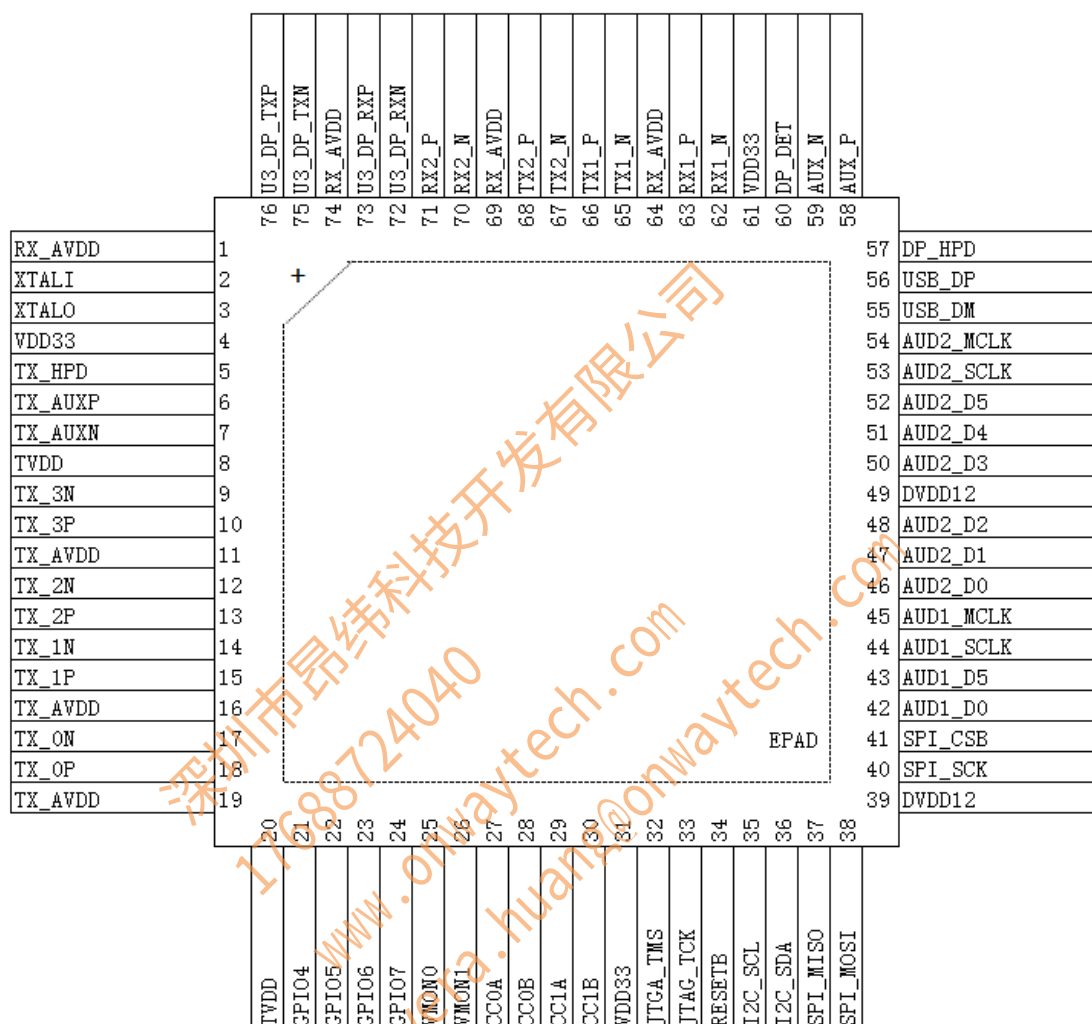


Figure 5. GSV6155E QFN76 Pin Diagram

2.2 QFN76 Pin Description

Table 5. QFN76 Pin Description

Pin Name	Direction	Pin No.	Description
Type-C UFP/DisplayPort RX Pins			
DP_DET	I	60	HDMI: RX 5V Detection PAD DP: RX DP Detection PAD
DP_HPD	O	57	HDMI: RX HPD PAD DP: RX HPD PAD

4. Package Information

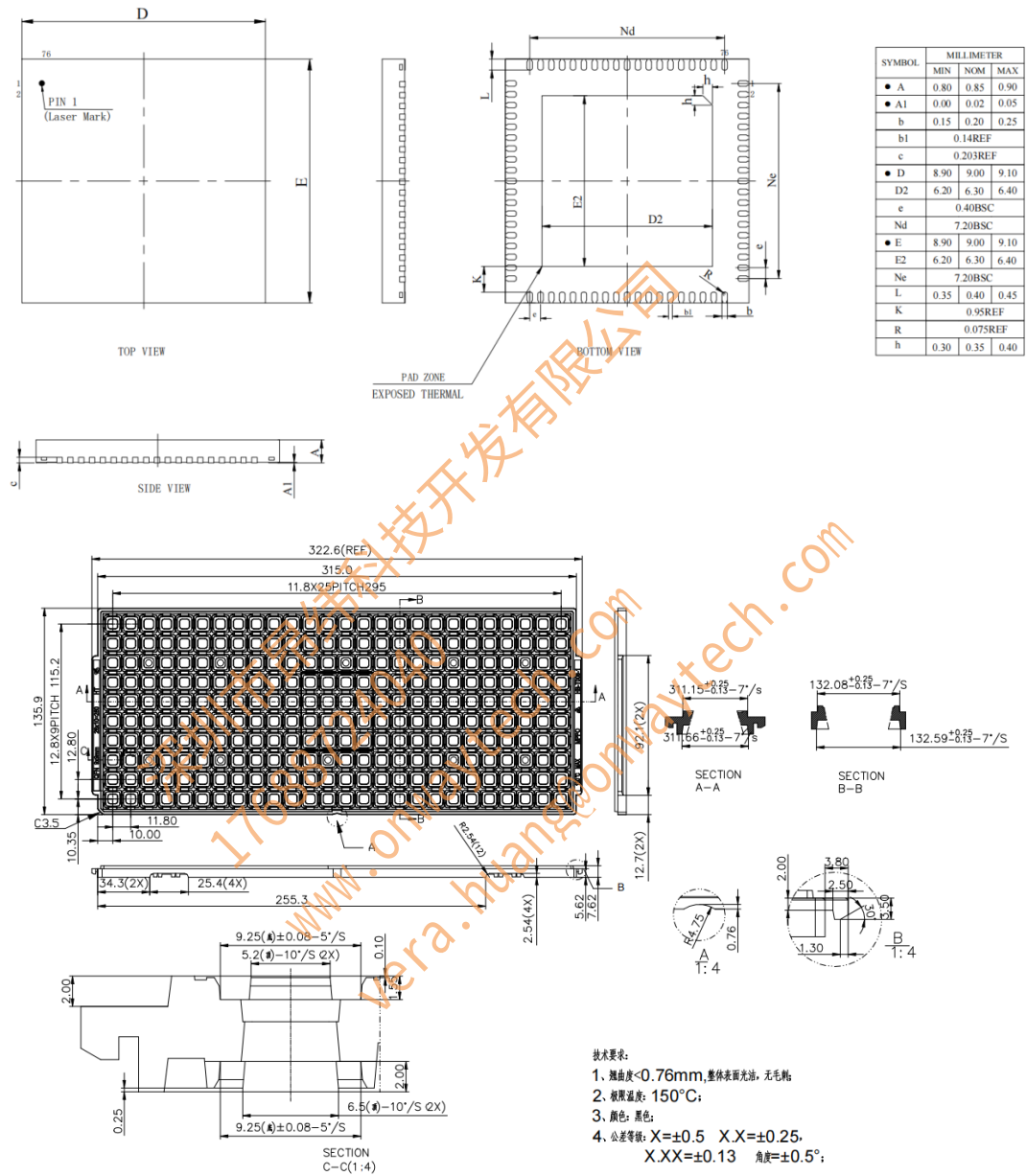


Figure 9. Package Dimensions (QFN76)

5. Ordering Guide

Table 13. Ordering Information

Part Number.	Temperature Range	Package Description	Packing Type
GSV6155E	−40°C to +85°C	QFN76	Tray

深圳市昂纬科技开发有限公司
17688724040
www.onwaytech.com
vera.huang@onwaytech.com