



GSV6705

4 In to 1 Out HDMI 2.1 Repeater with
Embedded MCU

April, 2022

Preliminary Product Specification

1. General Description

1.1 General Information

Gschoolink GSV6705 is a high-performance, low-power 4 In to 1 Out HDMI 2.1 repeater. By integrating enhanced microcontroller based on RISC-V, GSV6705 has created a cost-effective solution that provides time-to-market advantages. HDMI Receiver and HDMI Transmitter support up to 48Gbps (FRL, 12G/4Lane). The superior architecture of GSV6705 provides economical smaller footprint solutions using QFN124, targeting applications of Consumer Switch and KVM.

HDCP 1.4 and HDCP 2.2/2.3 are implemented in GSV6705 for its all HDMI ports in HDMI 2.0 and FRL mode. Color Space Conversion is supported at HDMI Tx in HDMI 2.0 mode. Flexible implementations of Audio Insertion, Audio Extraction and SPDIF to I2S conversion features are supported in GSV6705. Embedded CEC and eARC Rx engine enable downstream ARC/eARC to I2S and SPDIF audio extraction features.

An internal Video Generator can be used to generate any uncompressed video timing defined in HDMI 2.1, such as 8K@60Hz, 8K@30Hz, 4K@120Hz, 480i@60Hz.

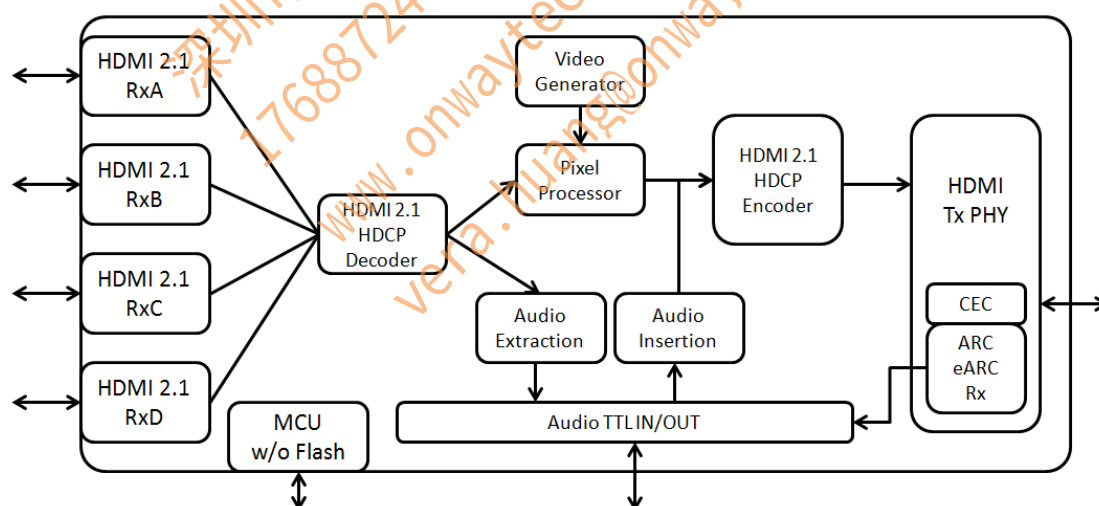


Figure 1. Top Diagram

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 HDMI Receiver

- Compliant with HDMI 2.1, 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 48Gbps (FRL 12Gbps/4 Lane)
- Programmable Adaptive Equalization
- Support High Dynamic Range (HDR) and Dynamic/Static Metadata
- Support Variable Refresh Rate (VRR), FreeSync, G-Sync
- Support ALLM
- Support Forward Error Correction (FEC)
- Support DSC pass-through for compressed input timing
- 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

1.2.2 HDMI Transmitter

- Compliant with HDMI 2.1a, HDMI 2.0b, HDMI 1.4b
- Compliant with HDCP 2.2/2.3 and HDCP 1.4
- Data rate up to 48Gbps (FRL 12Gbps/4 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
- Support DSC encoded stream pass-through from HDMI input
- Hardware CEC Engine for Low Level protocol decoding
- 5V tolerance on DDC/HPD/CEC pins
- 3D format support of frame packing, side-by-side, top-and-bottom
- Support eARC Rx to I2S/SPDIF audio extraction in HDMI 2.1a

1.2.3 Audio Input/Output

- I2S and SPDIF Audio Extraction from HDMI Rx
- I2S and SPDIF Audio Extraction from downstream ARC /eARC
- 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 Bi-directional TTL bus

1.2.4 System Features

- Optional External MCU (via I2C)/ Internal MCU mode
- Embedded MCU and External Flash
- External pins of Flash QSPI interface
- 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 HDMI switch with audio extraction

RxA/RxB/RxC/RxD are configured as HDMI Rx Inputs. This mode is applicable for monitor application.

Within bandwidth limitation, GSV6705 can keep input stream consistent and intact, while dynamically switch output between FRL and HDMI 2.0 mode for the best compatibility. For example, when FRL12G/4Lane 4K@60Hz timing is input, GSV6705 can convert to HDMI 2.0 or FRL 6G/3Lane, FRL 6G/4Lane, FRL 8G/4Lane, FRL 10G/4Lane, FRL 12G/4Lane as output. During HDMI output mode switch, HDMI input stream will not be disturbed.

GSV6705 can also support fixed output FRL rate, regardless of HDMI input mode. For example, when HDMI 2.0 4K@30Hz is input, GSV6705 can convert it to FRL 10G/4Lane output. And when FRL 8G/4Lane 4K@120Hz is input, GSV6705 can still maintain FRL 10G/4Lane output with timing conversion.

Meanwhile, Audio extraction can be applicable if required.

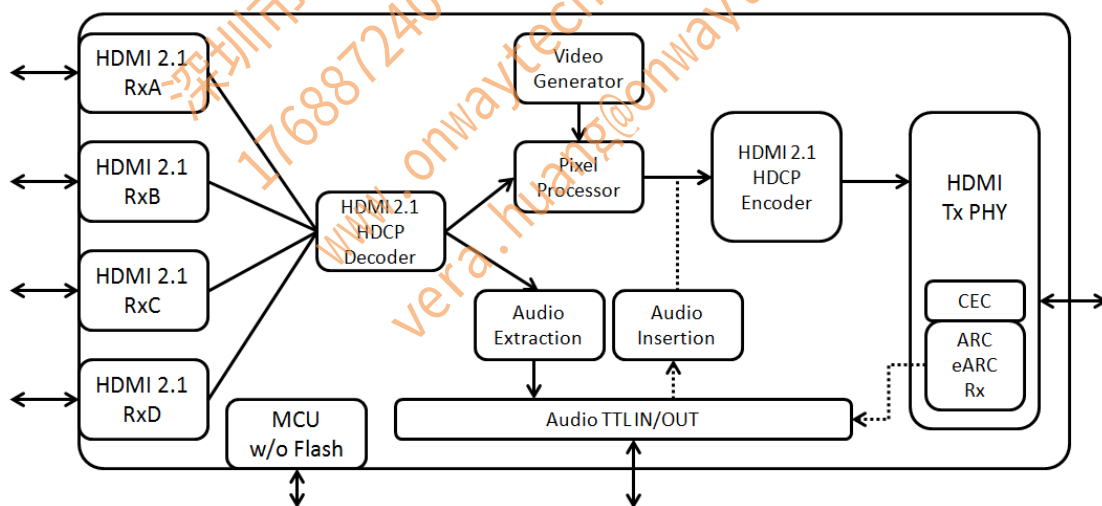


Figure 2. Input Switch Between Different Inputs

1.3.2 HDMI switch with audio insertion

I2S/SPDIF audio stream can be inserted into HDMI Tx if required.

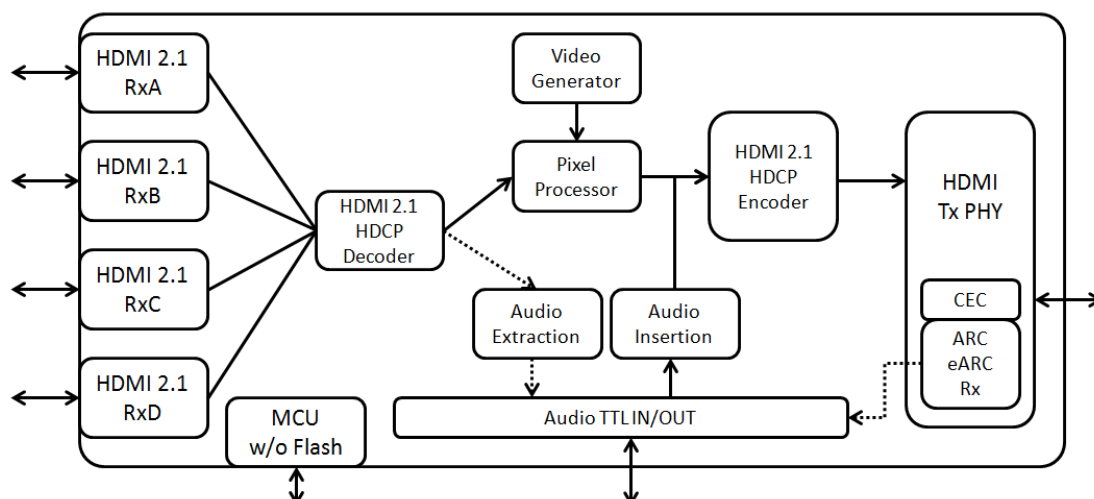


Figure 3. Audio Insertion Application

1.3.3 Audio Return to Audio Extraction

With embedded CEC engine, GSV6705 HDMI Tx can support ARC return channel defined in HDMI 1.4b specification. GSV6705 can convert SPDIF in ARC return stream to both SPDIF and I2S TTL output on Audio Bus.

With embedded eARC Rx engine, GSV6705 HDMI Tx can support eARC return channel defined in HDMI 2.1a specification. GSV6705 can convert SPDIF in eARC return stream to both SPDIF and I2S TTL output on Audio Bus.

HDMI Tx differential pairs can output FRL/HDMI 2.0 to downstream while ARC/eARC feature is enabled.

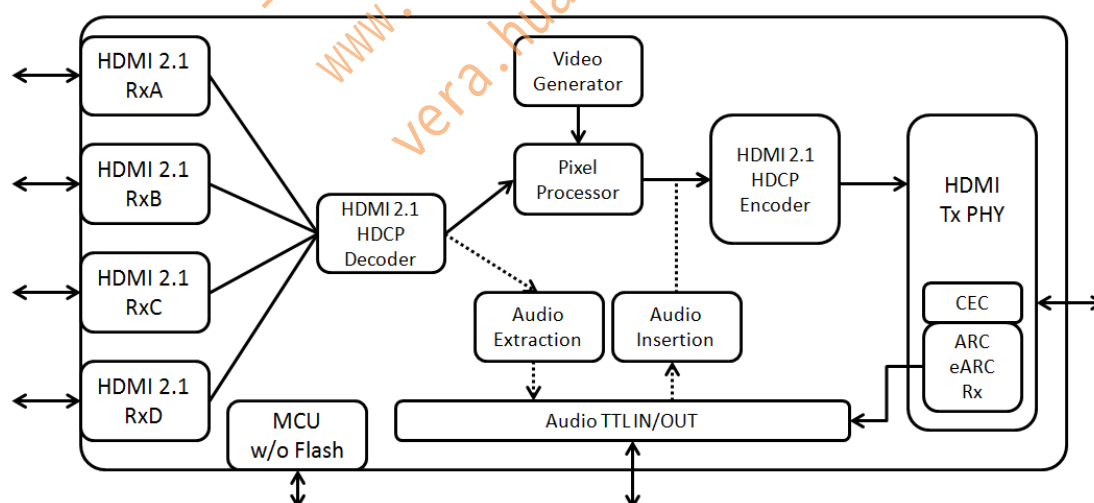


Figure 4. Audio Return Application

2. Pin Description

2.1 QFN124 Pin Diagram

QFN124 Pin definition is defined as below.

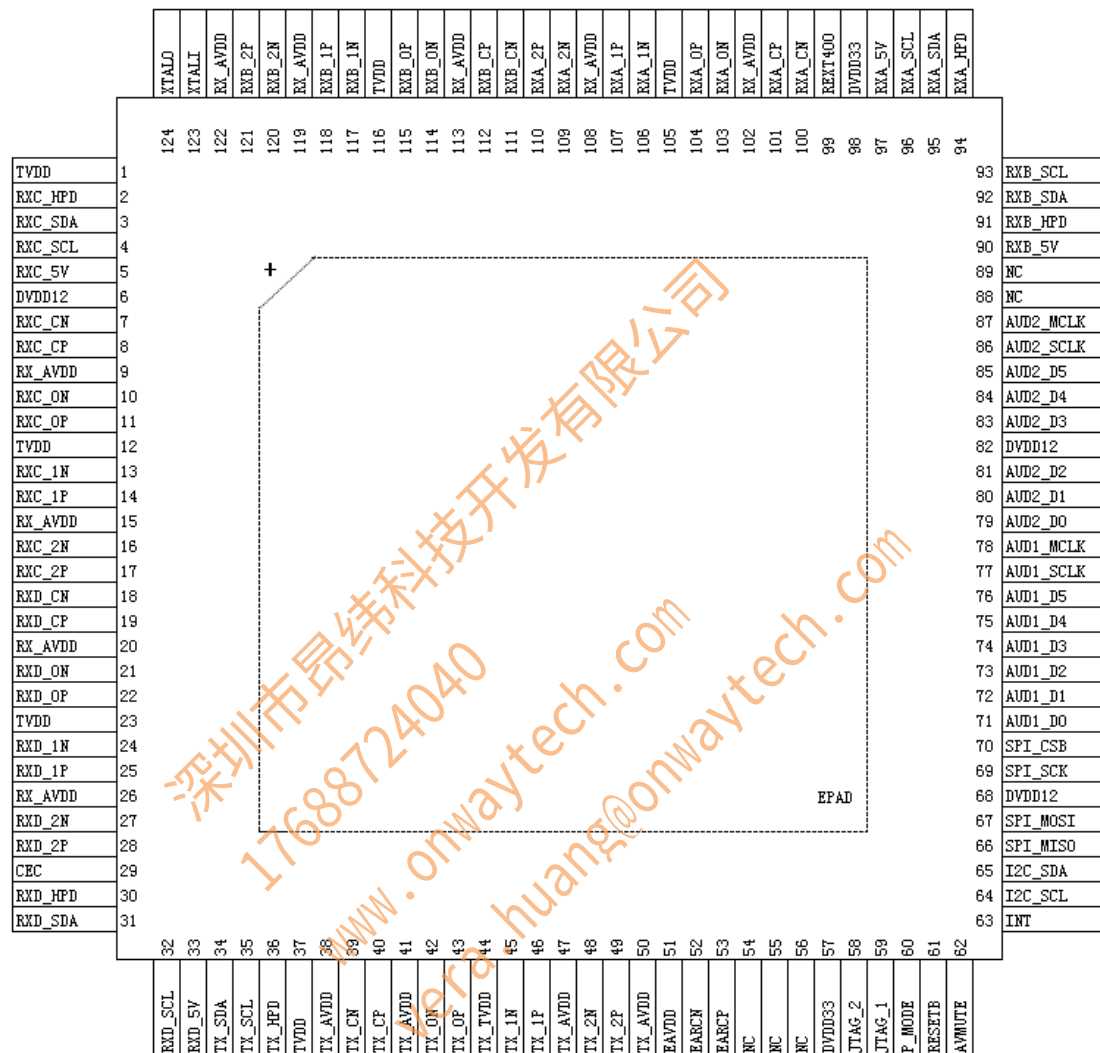


Figure 5. GSV6705 QFN124 Pin Diagram

2.2 QFN124 Pin Description

Table 8. QFN124 Pin Description

Pin Name	Direction	Pin No.	Description
HDMI Rx/A Pins			
RXA_5V	I	97	RXA 5V Detection PAD
RXA_HPD	I/O	94	RXA HPD PAD
RXA_SDA	I/O	95	RXA DDC SDA PAD

4. Package Information

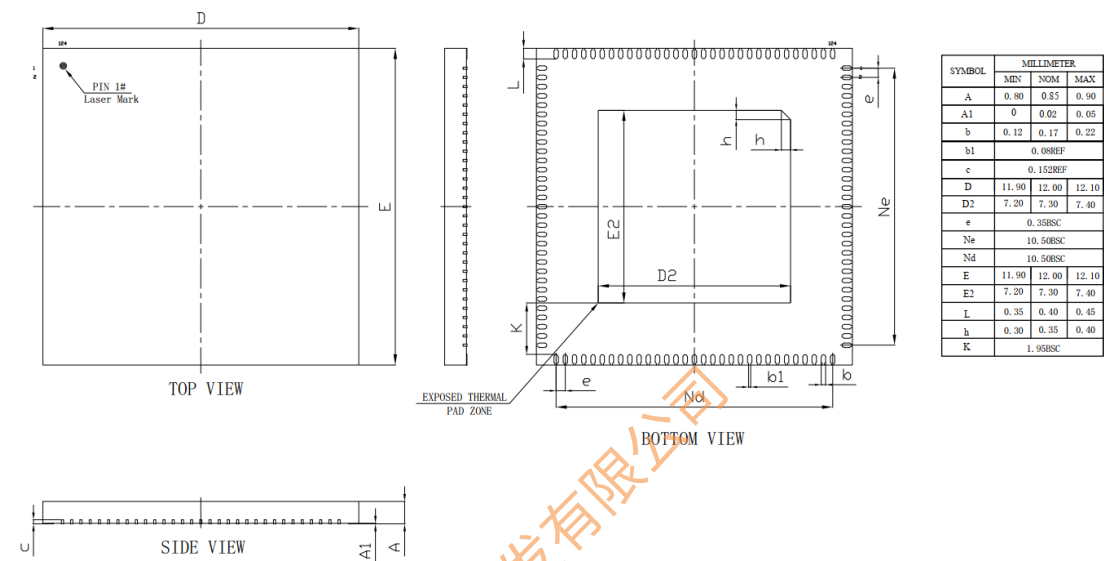


Figure 12. Package Dimensions (QFN124)

5. Ordering Guide

Table 12. Ordering Information

Part Number.	Temperature Range	Package Description	Packing Type
GSV6705	–20°C to +85°C	124QFN	Tray

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