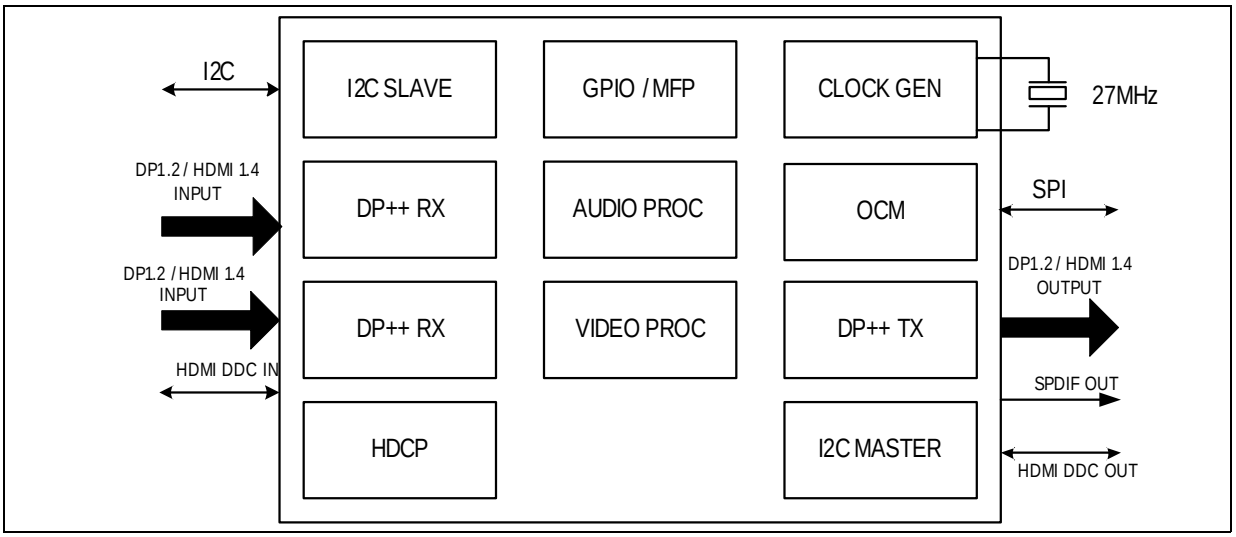
Features

- DisplayPort® dual mode receivers
  - Two receiver ports
  - DP 1.2a compliant
  - Link rate HBR2/HBR/RBR
  - SST or MST (up to eight streams)
  - 1, 2, or 4 lanes
  - AUX CH 1 Mbps
  - HPD out
  - HDMI/DVI operation (320 MHz)
  - Functions as eDP and MyDP receiver
- DisplayPort dual mode transmitter
  - DP 1.2a compliant
  - Link rate HBR2/HBR/RBR
  - SST or MST (up to eight streams)
  - 1, 2, or 4 lanes
  - AUX CH 1 Mbps
  - HPD in
  - HDMI/DVI operation (320 MHz) with external level translator
  - Functions as eDP transmitter
- SPDIF audio output
  - Two SPDIF port pins
  - 192 kHz/24 bits
  - Compressed/LPCM
- Conversion from DP SST to TMDS format and vice versa
- HDCP repeater with embedded keys
- AUX to I2C bridge for EDID/MCCS pass through
  - Maps on DDC ports
- Device configuration options
  - SPI Flash
  - I2C host interface
- Deep color support
  - RGB/YCC (4:4:4) – 16-bit color
  - YCC (4:2:2) – 16-bit color
- Spread spectrum on DisplayPort interface for EMI reduction
- Bandwidth
  - Video resolution up to 4K2K @ 60 Hz
  - Audio 7.1 Ch up to 192 kHz sample rate
- Low power operation
  - Standby 30 mW
- Package
  - 172 LFBGA (12 x 12 mm)
- Power supply voltages
  - 3.3 V I/O; 1.2 V core

Applications

- Audio-video router, multiplexer for universal docking stations and 4K2K cameras/recorders



1. Description

The STDP4328 is a high-speed DisplayPort dual mode concentrator IC that facilitates routing of multiple HDMI or DP audio-video streams on a single DP connector. This device is targeted for audio-video routing and multiplexer applications in digital signage, universal docking stations and high-end 4K2K cameras, recorders, etc. Enterprise universal docking station designs can make use of STDP4328 to route video from multiple sources such as notebooks, Smartphones, and tablets to share the desktop monitor space. High-end consumer products such as 4K2K cameras, recorders and players can make use of STDP4328 to transport a 4K2K 60 Hz uncompressed video and audio stream, which otherwise requires up to four HDMI connectors and cables. STDP4328 consists of two dual mode input ports and one dual mode output port, configurable as DisplayPort or HDMI/DVI. This device has VESA DP Standard Ver. 1.2a compliant receivers and transmitters supporting advanced features such as MST, HBR2, 3D formats, and GTC assist. Designs based on STDP4328 have the flexibility to offer either DP or HDMI/DVI connectors on its end product to interface with commercial and consumer video sources and displays. In addition, STDP4328 based products with a DisplayPort output connector are DP++ compliant which work with any HDMI or single link DVI displays through passive dongles (level translators).

The STDP4328 uses MegaChips' latest generation DisplayPort dual mode receiver and transmitter technology that supports both DisplayPort and TMDS signal format. In DisplayPort configuration, the device receives either SST or MST streams through the two input ports and combines them as one MST stream at the output port: in MST mode, it supports up to 8 AV streams. For example, it can receive two 2K x 2K 60 Hz streams on each of the input ports and send as one 4K2K 60 Hz SST or MST output to drive a 4K2K display. The DisplayPort receiver and transmitter supports HBR2 speed, a data rate of 5.4 Gbps per lane with a total bandwidth of 21.6 Gbps link rate. In HDMI mode, this device supports a link rate up to 3.2 Gbps that corresponds to a pixel rate of 320 MHz, adequate for supporting video resolution up to FHD 120 Hz including 3D formats. Two independent HDMI inputs can be converted into one DP MST output. The device is also capable of delivering deep color video up to 16-bits per color. It allows audio transport from the source to the desired audio rendering devices over the video output port or through the SPDIF port.

The STDP4328 supports RGB and YCC colorimetric formats with color depth of 16, 12, 10, and 8 bits. The device features the HDCP 1.3 content protection scheme with embedded keys for secure transmission of premium digital audio-video content. It also operates as an HDCP repeater for downstream sink.

The DDC ports allow the upstream source to access EDID and exchange MCCS commands with a downstream sink when the physical ports are either HDMI or DVI type. If both the upstream source and downstream sink are DP type, I2C transactions take place over the AUX CH. If the upstream is DP type and the downstream is either HDMI or DVI type, the device bridges DP AUX CH with downstream DDC port for all I2C-based transactions. The device has an on-chip microcontroller with SPI, UART, and I2C interface. It uses an external SPI Flash ROM for storing device configuration firmware. It has an I2C slave port for external host communication. Other system interface signals include general purpose IO for source, sink communication, detection, monitoring, etc.

2. Application overview

Figure 1. STDP4328 in universal docking station application

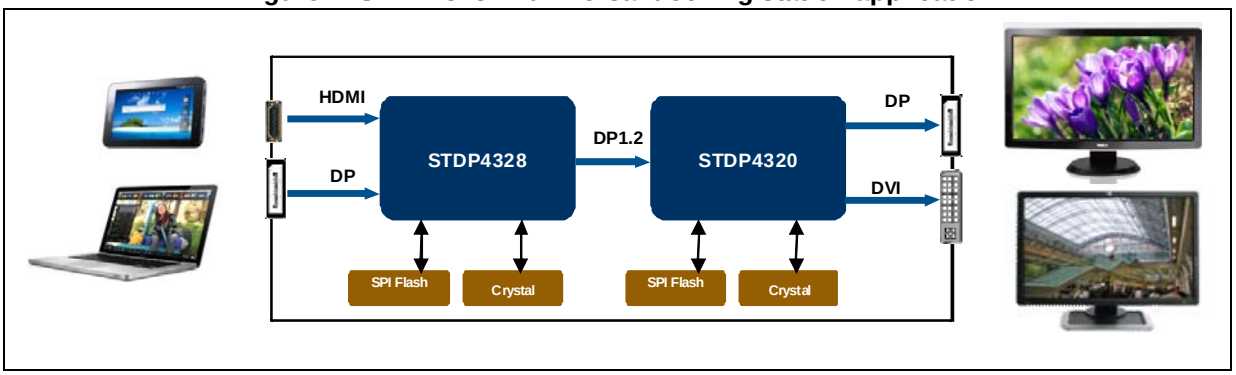


Figure 2. STDP4328 in digital signage application as DP/HDMI port expander

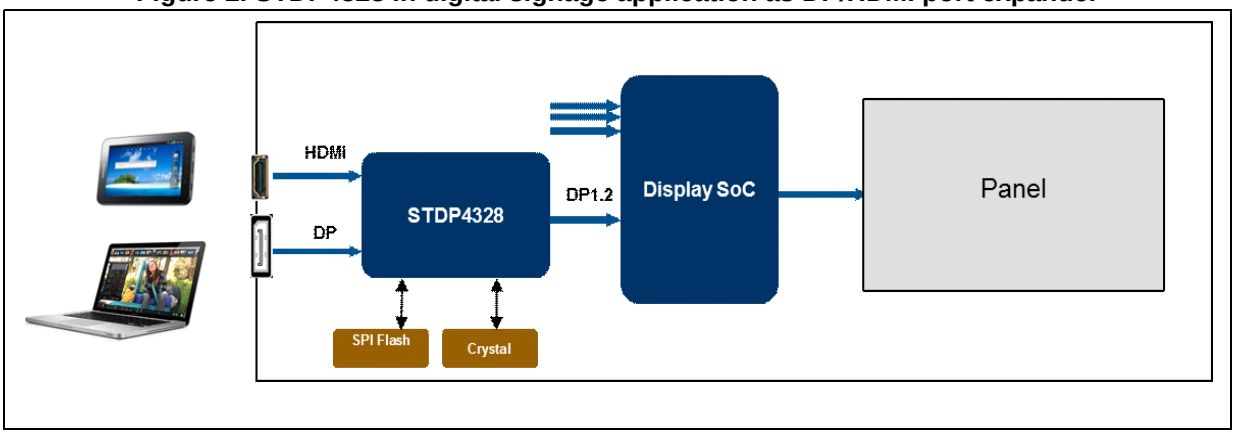
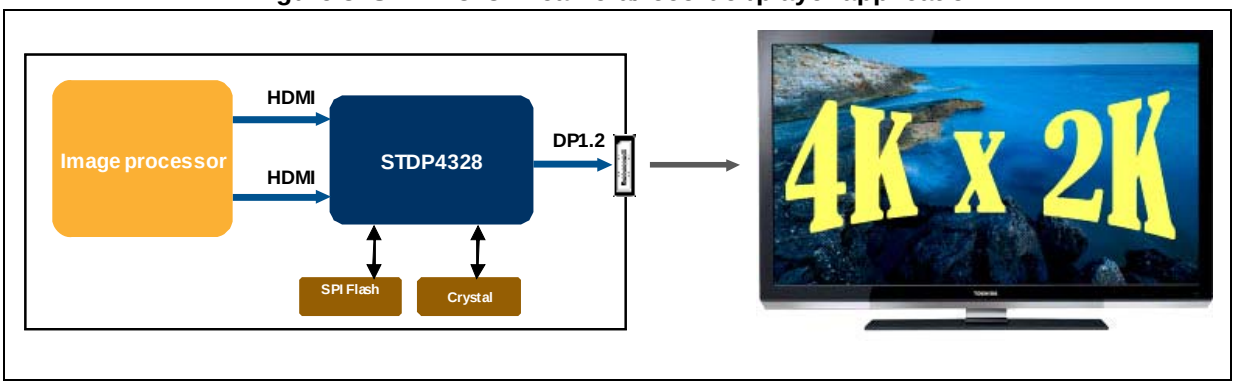


Figure 3. STDP4328 in camera/recorder/player application



3. Feature attributes

3.1 Input interface

- Dual DP++ interface featuring
  - DisplayPort Ver. 1.2a compliant receiver; supports eDP and MyDP
  - HDMI 1.4 compliant receiver
- Main link configuration
  - SST or MST (up to eight streams)
  - HBR2/HBR/RBR link rate
  - 1, 2, or 4 lanes
- AUX CH: 1 Mbps Manchester transaction format
- HPD: IRQ_HPD assertion
- Video: EDID 1.4 and CEA861 video timing and formats from 24 to 48 bits/pixel in RGB, YCC422, or YCC444 colorimetry
- Audio: DisplayPort 1.2a standard info frame packets and IEC60958/61937 type audio stream packets ranging from 16 to 24 bits/sample, 32 to 192 kHz sample rates
- HDMI link rate: 3.2 Gbps/data pair max

3.2 Output interface

- Single DP++ interfaces featuring
  - AC coupled DisplayPort Ver. 1.2a compliant transmitter: supports eDP
  - AC coupled HDMI 1.4 transmitter
- DP main link configuration
  - SST or MST (up to eight streams)
  - HBR2/HBR/RBR link rate
  - 1, 2, or 4 lanes
- AUX CH: Manchester transaction format
- HPD: IRQ_HPD assertion
- Video: EDID 1.4 and CEA861 video timing and formats from 24 to 48 bits/pixel in RGB, YCC422, or YCC444 colorimetry
- Audio: DisplayPort 1.2a standard info frame packets and IEC60958/61937 type audio stream packets ranging from 16 to 24 bits/sample, 32 to 192 kHz sample rates
- HDMI link rate: 3.2 Gbps/data pair max

3.3 Supported video timings

- 4K2K 60 Hz: 24 bits/pixel in DP 1.2a configuration
- 1920 x 1080 (FHD) 240 Hz, 24 bits/pixel
- All 3D formats defined in DP 1.2a and HDMI 1.4 standards
- All standard CEA861 timing formats

3.4 Supported audio timings

- All audio formats as specified in DP 1.2a and HDMI 1.4 standards
- SPDIF; 2-Ch LPCM, AC3, DTS, bit depth up to 24 bits, sample rate up to 192 kHz (applicable in DP SST/HDMI output use case)

3.5 Control channel interfaces

- AUX CH, DDC, I2C host interface, and UART (UART for test/debug purposes only)

3.6 HDCP 1.3 support

- Key sets for DP/HDMI RX and DP/HDMI TX integrated in one-time programmable ROM (OTP)
- Standalone HDCP repeater capability

3.7 Package

- 172 LFBGA (12 x 12 mm), 0.8 ball pitch

3.8 Power supply voltages

- 3.3 V I/O; 1.2 V core

3.9 ESD

- 2 KV HBM, 450 V CDM

4. Ordering information

Table 1. Order codes

Part number	Description
STDP4328-BA	172 LFBGA (12 x 12 mm)

5. Revision history

Table 2. Document revision history

Date	Revision	Changes
02-Oct-2012	1	Preliminary release.
08-May-2013	2	Cover page: Low power operation standby changed to 30 mW Added eDP references throughout. Deleted CEC feature throughout including in block diagrams. Added Figure 2. STDP4328 in digital signage application as DP/HDMI port expander. Ordering information section: Updated silicon revision in the table.
27-Jun-2013	3	Cover page: Deep color support YCC bullet updated. Section 3.9 ESD updated.
27-May-2014	4	Updated to comply with MegaChips documentation style/formatting.
20-Jun-2014	5	References to STDP4320 corrected.
15-Sep-2014	6	Updated footers and added copyright information to last page.

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