

## Key Features

- Fully standards compliant SDI interface bridging to and from HDMI 2.0
  - Support for 4K video formats up to 60Hz at 10-bit 4:2:2 sampling
- Converts between Single-Link and Multi-Link SDI interfaces from HD-SDI to 12Gb/s UHD-SDI
- Three modes of operation:
  - SDI to HDMI Bridge Mode
  - HDMI to SDI Bridge Mode
  - SDI to SDI Gearbox Mode
- Supports up to 16 channels of digital audio de-embedding and embedding at 48kHz or 96kHz
  - Simultaneous de-embedding and embedding in all modes of operation
- Dedicated AES/EBU or I<sup>2</sup>S serial digital audio inputs and outputs
- Extraction and insertion of HDMI InfoFrames
- Extraction and insertion of SDI ancillary data packets
- Extraction and insertion of Time Code (TC) data packets
- SDI Gearbox Mode also supports all functions and features of the GS12070 UHD-SDI Gearbox
- Automatic and manual handling of SMPTE ST 352 packets
- Automatic skew compensation for multi-link SDI inputs
- Automatic input link order handling for multi-link SDI inputs
- Four 100Ω differential inputs with input trace equalization up to 12dB
- Four 100Ω differential outputs with individually selectable output swing adjust
- Single 27MHz reference clock/crystal input
- Gennum Serial Peripheral Interface (GSPI) serial control and monitoring interface
- Typical power <2W
- 12mm x 12mm 196-ball BGA (0.8mm pitch)
- Pb-free, Halogen-free, RoHS / WEEE compliant

## Description

The GS12170 is a fully featured SDI/HDMI bridge chip (including backwards compatibility with the GS12070 UHD-SDI Gearbox) for SDI link conversion applications. The GS12170 can be configured to operate in one of three modes: SDI to HDMI Bridge Mode, HDMI to SDI Bridge Mode, or SDI Gearbox Mode.

The device fully supports SDI interface standards from HD-SDI (ST 292) to UHD-SDI at 12Gb/s (ST 2082-1), including all Multi-Link SDI standards at these rates. When configured for HDMI bridging, the GS12170 fully supports the HDMI 2.0 standard up to 4Kp60 4:2:2 format.

The GS12170 is the ideal solution for chip-to-chip connectivity using TMDS signalling for UHDTV products requiring a 12Gb/s UHD-SDI interface. For example, add a 12Gb/s UHD-SDI input interface to a UHDTV monitor simply by adding the GS12170 in SDI to HDMI Mode, with TMDS connection directly into off-the-shelf image processing ASICs.

For applications requiring multi-channel audio, the GS12170 includes a full 16-channel audio de-embedding and embedding feature. Up to 16 channels of digital audio at 48kHz sampling, or up to 8 channels at 96kHz sampling, can be extracted from the input video, and output on dedicated balls in AES/EBU or I<sup>2</sup>S serial digital formats. Existing audio is also simultaneously re-embedded in the selected output interface format. Users may also choose to insert up to 8 channels of new audio using dedicated audio input balls.

In HDMI to SDI Mode, the GS12170 can extract all HDMI InfoFrames, including HDR meta data. Video payload information is automatically converted to SMPTE ST 352 packets. Similarly, in SDI to HDMI Mode, SDI SMPTE ST 352 packets are extracted and converted to equivalent InfoFrames. All InfoFrame and ancillary data packets can be read via the GSPI host interface. Users can also choose to insert new SDI ancillary data packets via the GSPI.

In SDI Gearbox Mode, the device will automatically reorder the output serial stream according to the received ST 352 packets, and may also duplicate outputs to unused serial output ports, or route any input channel to an unused output.

The device will also automatically compensate for up to 400ns of skew between Multi-Link SDI inputs. This aids in any lane-to-lane variance introduced by cable mismatch or upstream routing and distribution equipment.

For optimal SDI performance, the GS12170 is designed to interface directly with Semtech's UHD-SDI equalizers and cable drivers. For HDMI connectivity, the TMDS inputs and outputs are designed for direct chip-to-chip connectivity. The device can be connected to physical HDMI connectors using an HDMI re-driver device.

The GS12170 is packaged in a space-saving 12mm by 12mm 196-ball BGA package, and offers low power operation of less than 2W typically, when used in 12Gb/s UHD-SDI to HDMI or HDMI to 12Gb/s UHD-SDI applications.

This makes the device ideal for adding UHD-SDI interfaces to existing HDMI 2.0 based UHDTV products, and for low-cost SDI/HDMI converters and extenders.

## Applications

- UHDTV monitors & displays
- UHDTV cameras & camcorders
- SDI/HDMI converters
- HDMI extenders
- SDI I/O adapters
- SDI/HDMI switchers & routers

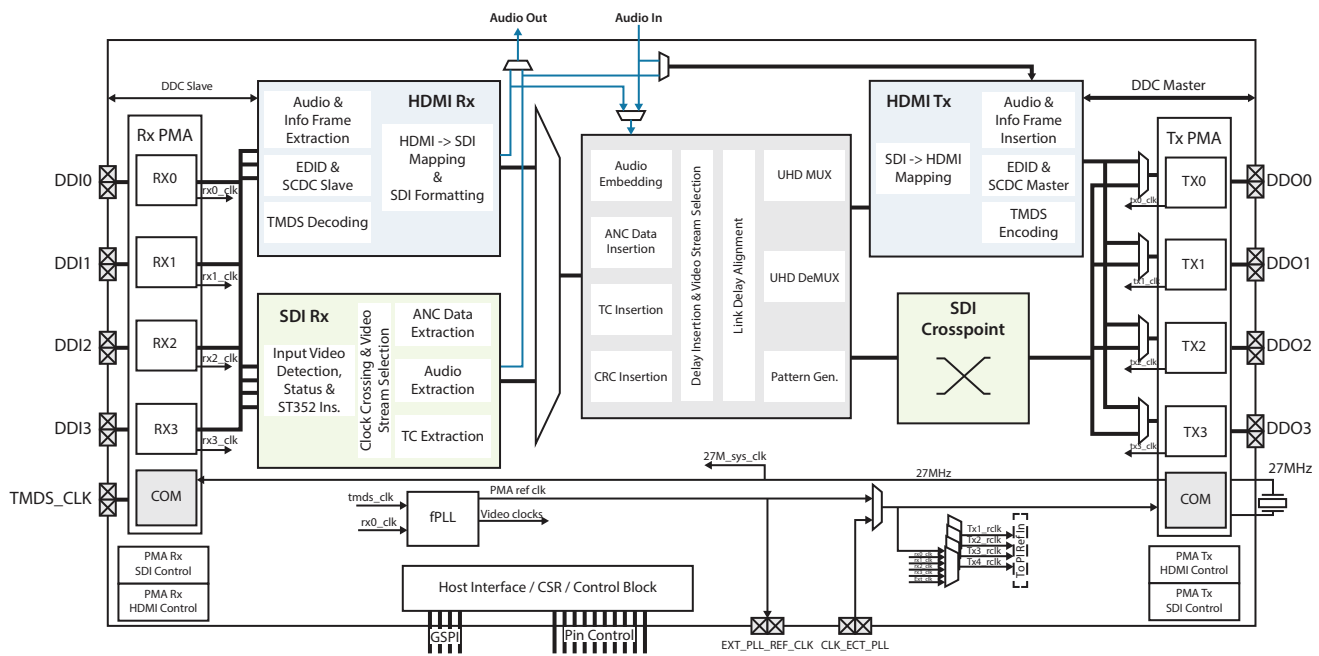
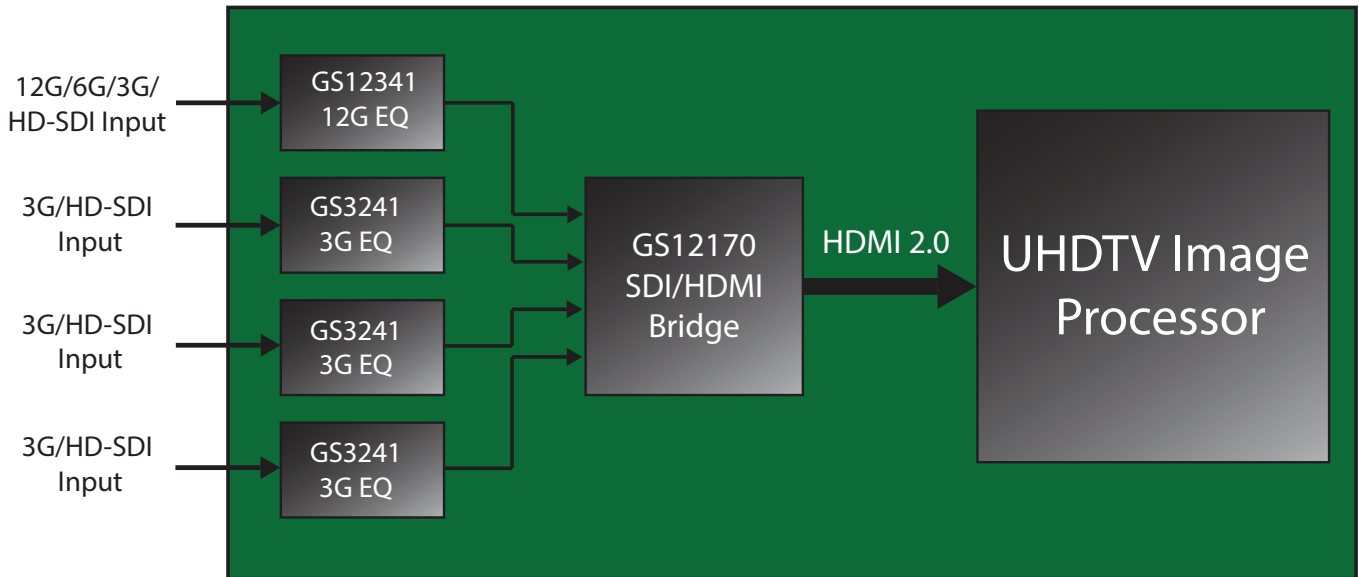
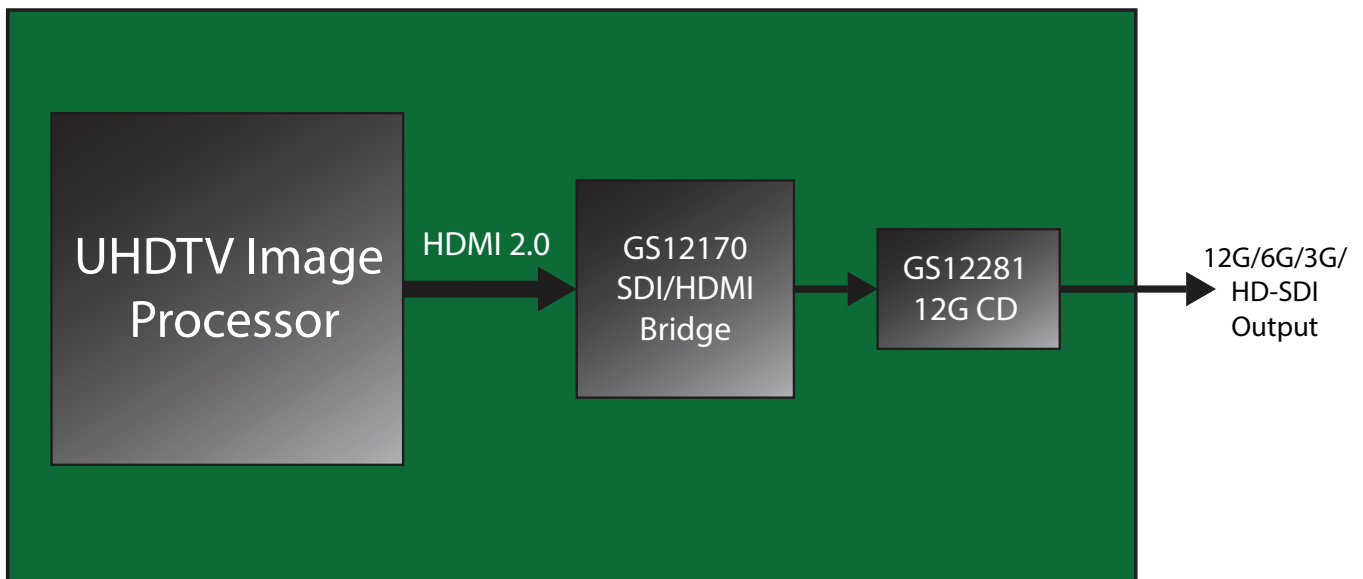


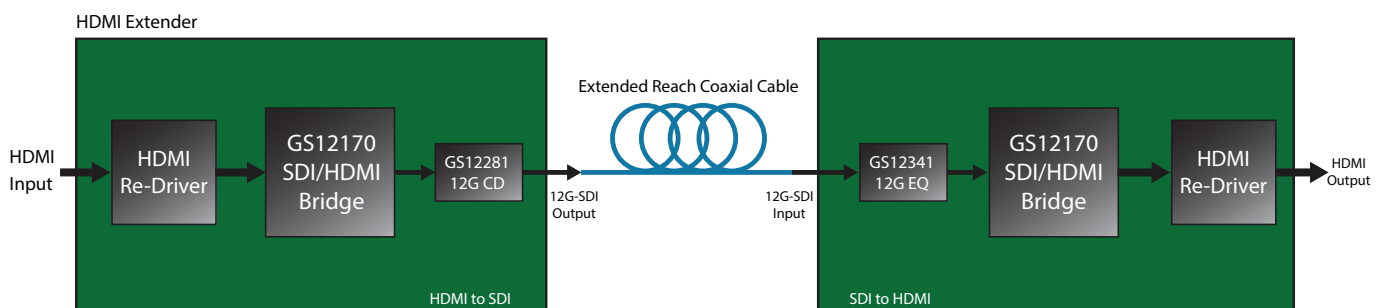
Figure A: Functional Block Diagram



**Figure B: GS12170 UHDTV Monitor Application**



**Figure C: GS12170 UHDTV Camcorder Application**



**Figure D: GS12170 UHDTV HDMI Extender Application**



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