SEMTECH GS12241 UHD SDI Solutions User Guide

Contents

SEMTECH

SEMTECH GS12241 UHD SDI Solutions

Product Information

UHD-SDI

FEATURING 2018 New UHD-SDI Solutions

Broadcast Video Selector Guide www.semtech.com

Specifications

- Comprehensive portfolio of industry-leading UHD-SDI products
- Supports UHD-SDI rates up to 12G
- Integrated retiming, low-power, long reach, and support for data rates up to 11.88Gbps
- Complies with SMPTE ST 2082-1, ST 2081-1, ST 424, ST292-1, and ST 259-C standards
- Low-power and small package size
- Advanced signal integrity diagnostics
- Integrated retiming/reclocking with low jitter
- Minimizes crosstalk interference in high channel-density applications

Product Usage Instructions

Equalizers

Semtech offers multi-rate adaptive cable equalizers that support rates up to 11.88Gbps (12G) while maintaining

industry-leading performance at lower rates such as 6G, 3G, HD, and SD. The GS12241 adaptive cable equalizer features integrated retiming to maximize performance. These equalizers comply with SMPTE ST 2082-1, ST 2081-1, ST 424, ST292-1, and ST 259-C standards.

Low-Power and Small Package Size

Semtech's GS12241 adaptive cable EQ with integrated retiming features a 6×4 QFN package. This compact package size facilitates high-density designs, accommodating a very dense connector pitch with its narrow 4mm package width. Additionally, Semtech offers low-power, multi-rate 3G adaptive cable equalizers, such as the GS3140, ideal for applications requiring both low-power and long cable reach.

Advanced Signal Integrity Diagnostics

The GS12241 equalizer features unique diagnostic capabilities, including pattern generation and error checking, as well as a high-resolution 3D eye monitor. These features ease board design and debugging, speeding up time to market.

Integrated Retiming/Reclocking, Lowest Jitter

The GS12241's integrated timer ensures low output jitter, even at extended cable lengths. This ensures high-quality signal transmission and reception.

Crosstalk Interference Robustness

The advanced design of the equalizers minimizes the effect of inter-channel crosstalk interference in high-channel-density applications. This leads to improved signal integrity and reduced signal degradation.

FAQ

- **Q:** What data rates does the UHD-SDI equalizer support?
- **A:** The UHD-SDI equalizer supports data rates up to 11.88Gbps (12G), as well as lower rates such as 6G, 3G, HD, and SD.
- **Q:** What standards do the equalizers comply with?
- **A:** The equalizers comply with SMPTE ST 2082-1, ST 2081-1, ST 424, ST292-1, and ST 259-C standards.
- **Q:** What is the package size of the GS12241 adaptive cable equalizer?
- **A:** The GS12241 adaptive cable equalizer features a compact 6×4 QFN package with a narrow 4mm package width, suitable for high-density designs.
- **Q:** Does the GS12241 equalizer have diagnostic capabilities?
- **A:** Yes, the GS12241 equalizer features unique diagnostic capabilities including pattern generation, error checking, and a high-resolution 3D eye monitor.

UHD-SDI Products

Semtech's broadcast video products extend its 20+ year leadership in SDI technology with a complete line of advanced UHD-SDI solutions. Semtech's multi-rate device lineup enables customer roadmaps, facilitating the creation of differentiated and advanced UHD-SDI products. We offer the world's most advanced solutions designed specifically for real-world broadcast challenges, including the latest innovations that help push the boundaries of performance, reach, power, and signal integrity while reducing time to market and design risks

Comprehensive portfolio of industry-leading UHD-SDI products

We offer the most comprehensive, end-to-end portfolio of UHD-SDI video solutions available, including our new family of long-reach, dual-input, multi-rate 12G retiming equalizers and cable drivers, low-power 3G equalizers, cable drivers and reclockers, integrated adaptive cable equalizers and cable drivers, and innovative UHD-SDI gearbox solutions.

UHD-SDI: The Next Generation Broadcast Television Production Interface

New UHD-SDI solutions are needed to enable next-generation broadcast television and D-Cinema applications. UHD-SDI is the only fully-standardized interface for next-generation broadcast television production for high definition television (HDTV), ultra-high definition television (UHDTV), high dynamic range (HDR), high frame rate (HFR), and wide color gamut (WCG) services

Dedicated to customer success

Our commitment to customer success is the driver for everything we do. That's why we are unique in providing:

- A comprehensive test for each component in production, assuring high yield on assembled boards.
- Complimentary design support, including review and feedback to shorten development cycles, reduce risks and optimize performance.
- Dedicated field applications engineering support throughout the product's life cycle.

Equalizers

Integrated retiming, low-power, long reach, and support for data rates up to 11.88Gbps

SUPPORT UHD-SDI RATES UP TO 12G

Semtech offers multi-rate adaptive cable equalizers that support rates up to 11.88Gbps (12G) while continuing to offer industry-leading performance at 6G, 3G, HD, and SD rates. Semtech's GS12241 adaptive cable equalizer features an integrated retimer to maximize performance. In addition to robust performance, Semtech adaptive cable equalizers comply with SMPTE ST 2082-1, ST 2081-1, ST 424, ST292-1, and ST 259-C standards

LOW-POWER AND SMALL PACKAGE SIZE

PCB board density continues to increase, placing additional requirements for both small package sizes and low power. Semtech's GS12241 adaptive cable EQ with integrated retiming features a 6×4 QFN package. This manufacturing friendly, asymmetric package facilitates high density designs by accommodating a very dense connector pitch with its narrow 4mm package width. In addition, Semtech features a range of adaptive cable equalizers for applications requiring low-power. The GS3140 low-power, multi-rate 3G adaptive cable equalizer is ideal for applications requiring both low-power and long cable reach

ADVANCED SIGNAL INTEGRITY DIAGNOSTICS

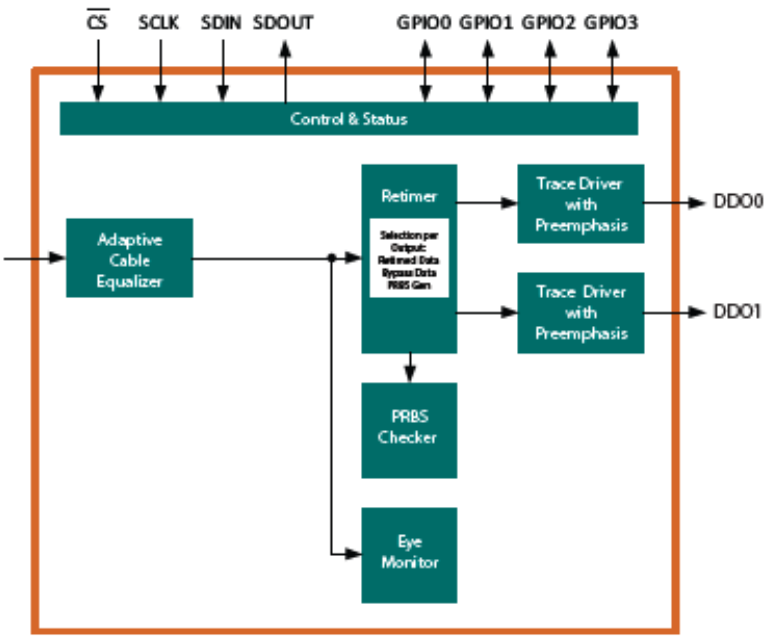
The GS12241 features unique diagnostic capabilities, including pattern generation and error checking, and a high-resolution 3D eye monitor to ease board design and debugging while speeding time to market.

INTEGRATED RETIMING/RECLOCKING, LOWEST JITTER

The GS12241's integrated timer ensures low output jitter, even at extended cable lengths.

CROSSTALK INTERFERENCE ROBUSTNESS

The advanced design minimizes the effect of inter-channel crosstalk interference in high-channel-density applications



	EQUALIZERS													
	Part Number	Data Rate (Mbps)	Input 0/6dB gain	Output Coupling (V)	No. of Inputs	No. of Outputs	Cable Length (m)					Temp Range (ºC)	Power (mW)	Package (mm)
							12G	6G	3G	HD	SD			
GS12241		1–11880	YES*	1.2–2.5	1	2	80	100	190	260	450	-40 to +85	385***	QFN-40 (6×4)
GS12142**		1–11880	YES*	1.2–2.5	2	2	80	100	190	260	450	-40 to +85	385***	QFN-40 (6×4)
GS12141		1–11880	YES*	1.2–2.5	1	2	70	90	190	260	450	-40 to +85	320***	QFN-40 (6×4)
	GS3241	1–2970	YES*	1.2–2.5	1	2	–	–	190	260	450	-40 to +85	405***	QFN-40 (6×4)
GS3140		1–2970	YES*	1.0–2.5	1	1	–	–	200	280	500	-40 to +85	83	QFN-16-COL (4×4)
	GS6042	125–5940	YES	1.2–3.3	1	1	–	80	210	300	550	-40 to +85	180	QFN-16 (4×4)
GS3440		125–2970	YES	1.2–3.3	1	1	–	–	210	300	550	-40 to +85	180	QFN-16 (4×4)
	GS3441	125–2970	YES	1.2–3.3	1	2	–	–	210	300	550	-40 to +85	212	QFN-24 (4×4)

- Features adjustable upstream launch swing compensation.
- GS12142 specifications are preliminary and subject to change.
- Power specifications include power consumed by integrated timer

Cable Drivers

Integrated retiming for the lowest output jitter, sophisticated easy-to-use eye shaping for SMPTE compliance, and data rates up to 11.88Gbps

MULTI-RATE

Semtech's UHD-SDI cable drivers are SMPTE compliant and feature multi-rate operation; our high-performance GS12281 12G UHD-SDI cable driver is the industry's best-performing driver. Semtech offers a driver for every UHDTV-1, UHDTV-2, 3G, HD, and SD application.

INTEGRATED RETIMING/RECLOCKING

The GS12281's integrated timer enables the best jitter performance at all rates up to 11.88Gbps

ADVANCED SIGNAL INTEGRITY DIAGNOSTICS

The GS12281 features unique diagnostic capabilities, including pattern generation and error checking, and a high-resolution 3D eye monitor to ease board design and debugging while speeding time to market.

INPUT TRACE EQUALIZATION

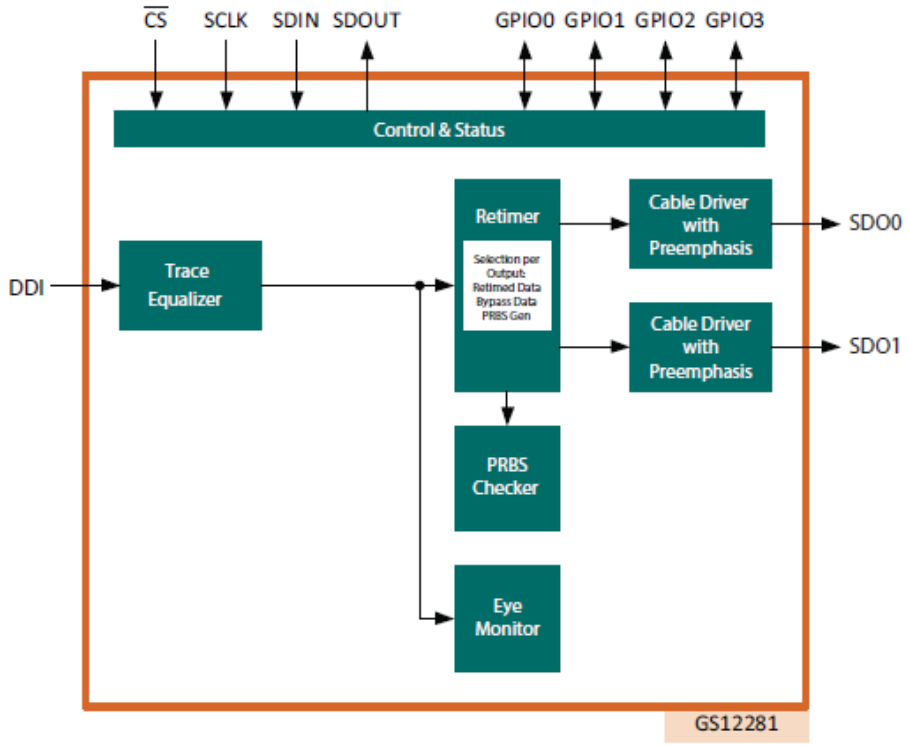
The GS12281 features input trace equalization to compensate for long input trace lengths. Input trace equalization is critical for optimizing performance in 12G UHD-SDI designs

BEST OUTPUT RETURN LOSS

Output return loss performance that surpasses SMPTE specifications at all rates. This increased margin simplifies board optimization to speed up production.

OUTPUT EYE SHAPING

The GS12281 features an output signal presence detector which provides status on the validity of the output. The GS12281 also offers high maximum output swing and sophisticated, yet easy-to-use, pre-emphasis to compensate for losses that occur after the cable driver output



CABLE DRIVERS											
Part Number	Data Rate (Mbps)	Power (mW)	Power Supply (V)	No. of Inputs	No. of Outputs	Input Trace EQ	Max Output Swing (mV)	ORL (dB)	Circuit Compatible with	Temp Range (ºC)	Package (mm)

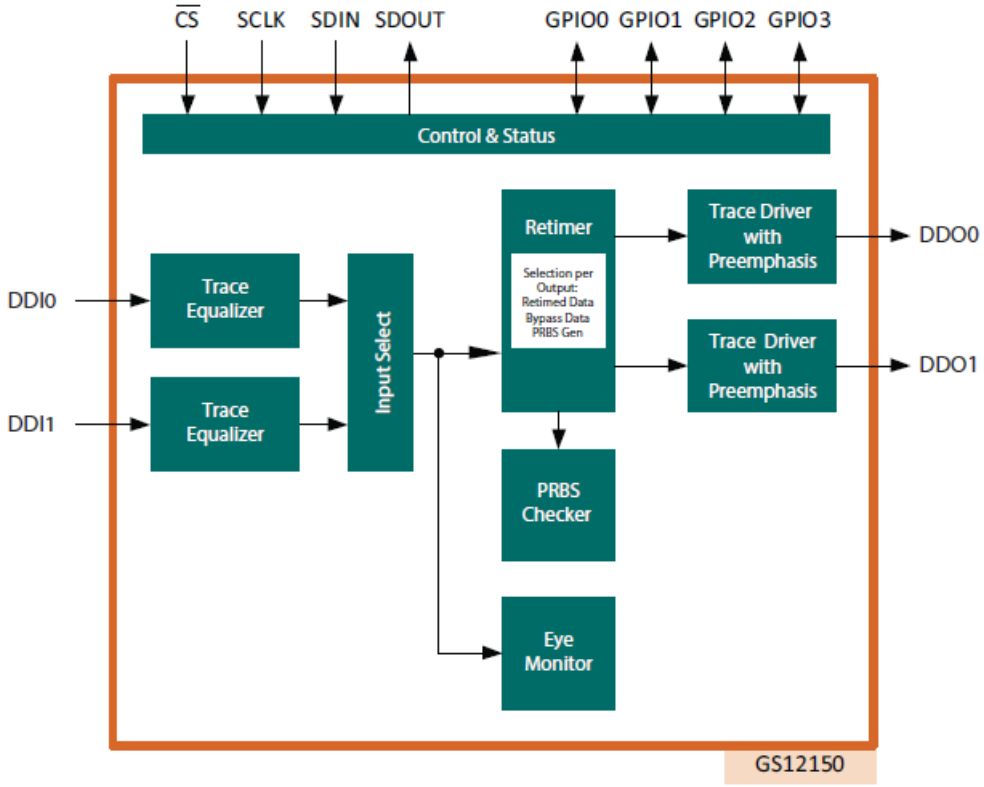
GS12281	1–11880	360**	1.8, 2.5	1	2	YES	1000	12G:-10 6G:-10 3G:-15 HD:-19	GS12181 GS12081 GS3281 GS12090 GS3590	-40 to +85	QFN-40 (6×4)
GS12182*	1–11880	360**	1.8, 2.5	2	2	YES	1000	12G:-10 6G:-10 3G:-15 HD:-19	GS12281 GS12081 GS12181 GS3281	-40 to +85	QFN-40 (6×4)
GS12181	1–11880	310**	1.8, 2.5	1	2	YES	1000	12G:-10 6G:-10 3G:-15 HD:-19	GS12281 GS3281 GS12081 GS3590 GS12090	-40 to +85	QFN-40 (6×4)
GS12081	1 -11880	170	1.8, 2.5	1	2	YES	1000	12G:-10 6G:-10 3G:-15 HD:-19	GS12281 GS3590 GS12181 GS3281 GS12090	-40 to +85	QFN-40 (6×4)
GS3281	1–2970	375**	1.8, 2.5	1	2	YES	1000	3G:-15 HD:-19	GS12281 GS12090 GS12181 GS3590 GS12081	-40 to +85	QFN-40 (6×4)
GS6080	143–5940	135	2.5 or 3.3	1	2	YES	1800	6G:-10 3G:-15 HD:-19	GS2988	-40 to +85	QFN-16 (4×4)
GS6081	143–5940	205	2.5 or 3.3	1	4	YES	1800	6G:-10 3G:-15 HD:-19	GS2989	-40 to +85	QFN-16 (4×4)

- GS12182 specifications are preliminary and subject to change.

- Power specifications include power consumed by integrated timer

Reclockers

Industry’s best-performing reclockers Reclocking is an important function required to maintain overall system robustness. As UHD-SDI infrastructure continues to grow in size and as greater amounts of processing are being integrated into broadcast products, overall system jitter can potentially increase. As a result, controlling the overall system jitter is critical to reliable operation. Processing devices such as FPGAs can have poor input jitter tolerance (IJT) and frequently require external reclocking to maintain the overall system margin. The rapid growth in UHD-SDI infrastructure and the associated higher rates make reclocking mandatory in most applications. Semtech offers a complete family of UHD-SDI reclockers for all data rates. The GS12150 reclocker supports rates up to 11.88Gbps with low power consumption and is ideal for UHD-SDI applications



ADVANCED SIGNAL INTEGRITY FEATURES

The GS12150 includes programmable trace equalization to compensate for high-frequency losses associated with board-level interconnects. It operates without an external frequency reference. Programmable output swing and preemphasis provide flexibility for managing signal integrity of the output signals. The GS12150 features unique diagnostic capabilities, including pattern generation and error checking, and a high-resolution 3D eye monitor to ease board design and debugging while speeding time to market.

SMALL SIZE

The GS12150 features a compact 6×4 40-pin QFN package. Ideal for high-channel density designs or other applications where the layout is constrained by available PCB real estate.

LOW-POWER

The GS12150’s low-power consumption is ideal for designs with high channel density or in applications where low power consumption is a critical design requirement

RECLOCKERS												
	Part Number	Data Rate (Mbps)	Power Supply (V)	Integrated Eye Monitor	Output Jitter (UI)	Input Trace EQ	Output Pre-/ De-emphasis	Input MUX	No. of Inputs	No. of Outputs	Temp Range (°C)	Power (mW)	Package (mm)
NEW	GS12150*	11880 5940 2970 1485 270	1.8	YES	12G:0.08 6G:0.05 3G:0.04 HD:0.03 SD:0.03	YES	YES	2:1	2	2	-40 to +85	385	QFN-40 (6x4)
	GS6151	5940 2970 1485 270	1.8	YES	6G:0.13 3G:0.09 HD:0.06 SD:0.03	YES	YES	2:1	2	2	-40 to +85	130	QFN-32 (4x4)
	GS6152	5940 2970 1485 270	1.8	YES	6G:0.13 3G:0.09 HD:0.06 SD:0.03	YES	YES	4:1	4	2	-40 to +85	130	QFN-48 (6x6)

Configurable SDI Input/Output – Equalizer/Cable Driver

High-performance configurable devices for multi-rate applications up to 12Gbps

DESIGN FLEXIBILITY

The GS12090 is a low-power, configurable 12G multi-rate retiming cable equalizer and cable driver. The GS12090 is suitable for systems with limited connector space and enables individual connectors to function either as an input or an output. In addition, the GS12090 is ideal for multifunction designs requiring connectors to be reconfigurable based on a given customer's needs. Applications suitable for the GS12090 include next-generation 3G, 6G, and 12G UHD-SDI infrastructures designed in support of UHDTV1, UHDTV2, 4K D-Cinema, and 3D HFR and HDR production image formats.

ADVANCED SIGNAL INTEGRITY FEATURES

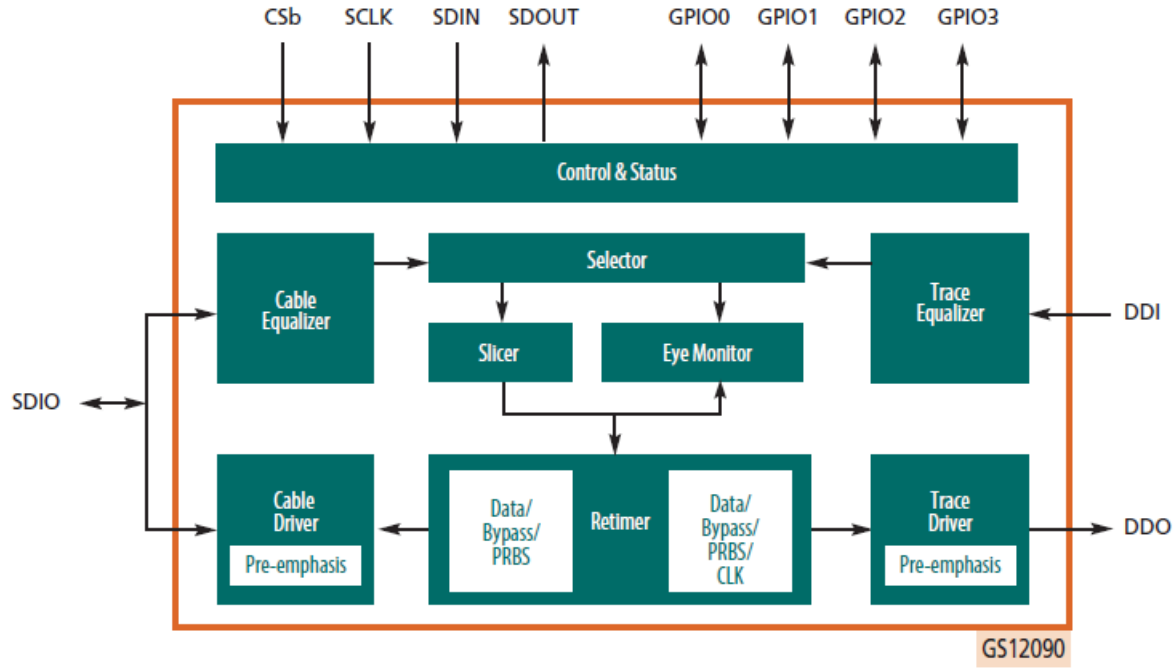
The GS12090 features integrated retiming, minimizing output jitter even at extended cable lengths. To compensate for PCB trace losses and to simplify PCB layout optimization the GS12090 features output pre-emphasis. In addition, to facilitate optimal PCB layout, the GS12090 requires no external return loss components or return loss networks

ADVANCED SIGNAL INTEGRITY DIAGNOSTICS

The GS12281 features unique diagnostic capabilities, including pattern generation and error checking, and a high-resolution 3D eye monitor to ease board design and debugging, and speed production time.

SMALL PACKAGE SIZE

The GS12090 features a compact 6×4, QFN package and low power consumption



CONFIGURABLE SDI INPUT/OUTPUT – EQUALIZER/CABLE DRIVER									
Part Number	Data Rate (Mbps)	Power (mW)	No. of Outputs	Cable Reach (m)	Integrated Retiming	Circuit Compatible with	DVB-ASI and MADI	Temp Range (ºC)	Package (mm)
GS12090	1–11880	EQ: 430 * CD: 375*	EQ: 1 CD: 1	12G:60 6G:65 3G:160 HD:240 SD:300	YES	GS3590 GS12181 GS12281 GS12081 GS3281	YES	-40 to +85	QFN-40 (6×4)
GS3590	1–2970	EQ: 430 * CD: 375*	EQ: 1 CD: 1	3G:160 HD:240 SD:300	YES	GS12090 GS12181 GS12281 GS12081 GS3281	YES	-40 to +85	QFN-40 (6×4)
GS3490	125–2970	EQ: 202 CD: 215	EQ: 1 CD: 1	3G:140 HD:260 SD:500	NO	–	YES	-40 to +85	QFN-32 (5×5)

- Power specifications include power consumed by integrated timer

UHD-SDI Gearbox

Single-chip UHDTV SDI link rate conversion The GS12070 is a four-input and four-output device that supports conversions between multi-link, dual-link and single-link UHD-SDI interfaces. A bypass mode is also available

where the inputs can be routed directly to the outputs. The device supports 12Gbps, 6Gbps, 3Gbps, and 1.5Gbps data rates in the conversion modes and additionally supports 270Mbps in bypass mode. The GS12070 features 100ohm differential serial interfaces, allowing connection to Semtech equalizers, cable drivers as well as optical modules

SINGLE-CHIP CONVERSION

The GS12070 can be conveniently configured for both multiplex and de-multiplex modes via mode-select pins.

GEARBOX MODES		
12Gbps	←→	Quad 3Gbps
12Gbps	←→	Dual 6Gbps*
6Gbps	←→	Dual 3Gbps*
6Gbps	←→	Quad 1.5Gbps
3Gbps	←→	Dual 1.5Gbps*

- Two conversions can be performed simultaneously.

ROBUST RECEIVE SOLUTION

The GS12070 eases the system challenge of receiving multi-link SDI signals by automatically compensating for input channel skew. In modes that convert from 12Gbps ←→ to 6Gbps combinations, the GS12070 automatically compensates for up to 300ns of serial input channel skew. In all other conversion modes, up to 800ns of input channel skew is available. Also featured is automatic link ordering, which reduces the cost and time spent troubleshooting cabling issues during the installation of UHD-SDI infrastructures

FLEXIBLE DISTRIBUTION MODES

In configuration modes where there are unused outputs available, the GS12070 can be programmed to duplicate existing outputs. In addition, inputs can be assigned to unused outputs for monitoring purposes. The GS12070 also features an integrated 4×4 crosspoint which enables any input to be routed to any output. This is ideal for routing and distribution applications.

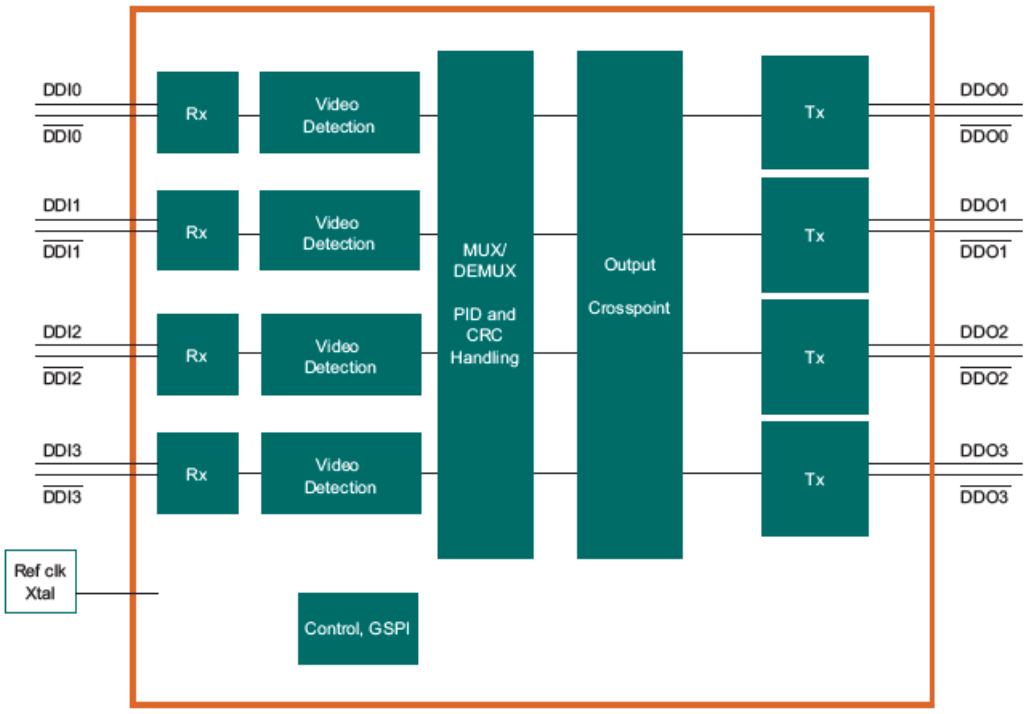
APPLICATIONS

- Multiplex/Demultiplex for 3G router applications
- UHD-SDI distribution amplifier
- 4:1 ←→ 1:4 selector
- UHD-SDI crosspoint applications
- 12G UHD-SDI interfacing
- SDI link concatenation

UHD-SDI GEARBOX							
Part Number	SDI Rates	Error and Format Detection	SMPTE 352M Handling	Input SKEW Adjustment	Per Lane Output Delay Adjustment	Temp Range (ºC)	Package
GS12070	HD, 3G, 6G, 12G (270M bypass)	YES	YES	YES	YES	-40 to +85	BGA 196

UHD-SDI Gearbox

Single-chip UHDTV SDI rate conversion.



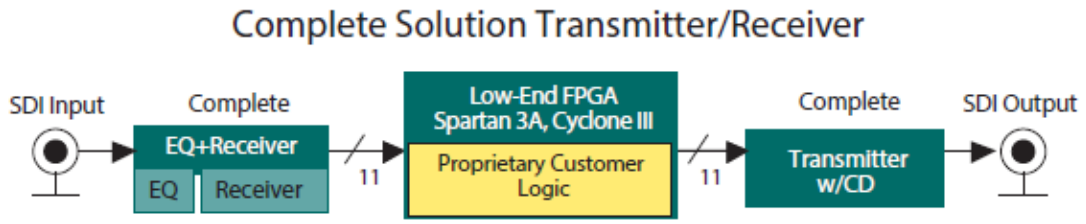
SDI Transmitters and Receivers

Choose the right SDI transmitter and SDI receiver for your system.

Designers have the choice of selecting components from different vendors, but when it comes to designs with SDI transmitters and SDI receivers, they must first choose an architecture. In implementing a design with a SDI transmitter and/or SDI receiver, there are three architectural choices: Semtech's complete SDI transmitter/ SDI receiver solution architecture, an integrated transceiver FPGA architecture, and an FPGA-helper architecture. Let's explore these three options with an assessment of the following key parameters: jitter, power consumption, integration (component/features), time-to-market, system size, and cost.

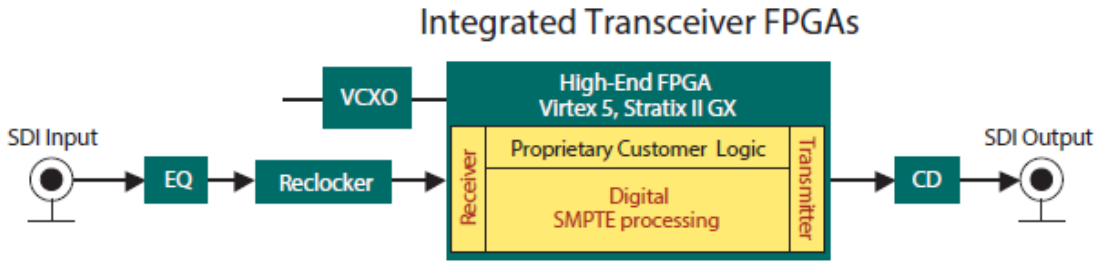
SEMTECH'S COMPLETE SOLUTION ARCHITECTURE

Leveraging our expertise in signal integrity and our deep understanding of broadcast video technologies, Semtech's SDI transmitter and SDI receiver offering encapsulates all the analog components (SerDes, VCO, CD, EQ, and Reclocker) and digital SMPTE video and audio processing required to transmit and receive SDI video. Integrating all of these components into one package reduces the PCB footprint required to implement SDI transmit/receive, and the solution benefits from Semtech's superior jitter performance. This optimized, cost-effective and power-efficient ASIC implementation allows customers to focus on their unique value-added processing for quicker time-to-market. Only Semtech offers a solution that scores high for each evaluation parameter.



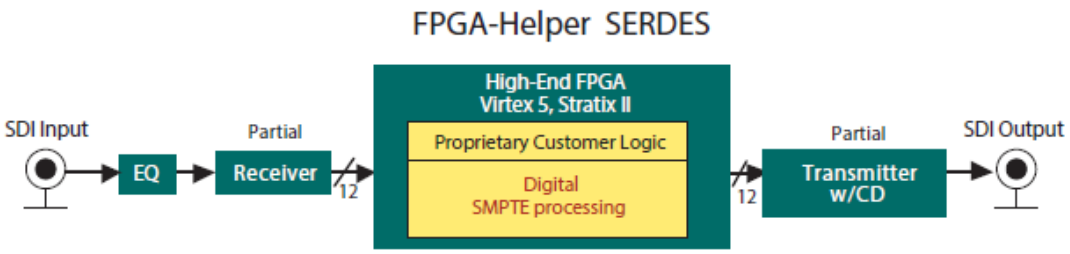
INTEGRATED-TRANSCEIVER FPGA ARCHITECTURE

Integrated-transceiver FPGAs typically offer the worst specifications in terms of jitter. Maximum output jitter and input jitter tolerance (IJT) are typically at the limit of the SMPTE standards and, in some cases, actually in violation of industry norms. That is why extra components, namely VCXOs and reclockers, are required to get the system jitter performance to an acceptable level. This comes at a penalty of higher power consumption, system footprint size, and cost. Because of all the fine-tuning required to get this architecture to work and because of the licensing/development required for the digital SMPTE video processing, this architecture unnecessarily prolongs time-to-market. Finally, while FPGAs integrate transceivers, they do not integrate routing components like cable drivers and equalizers



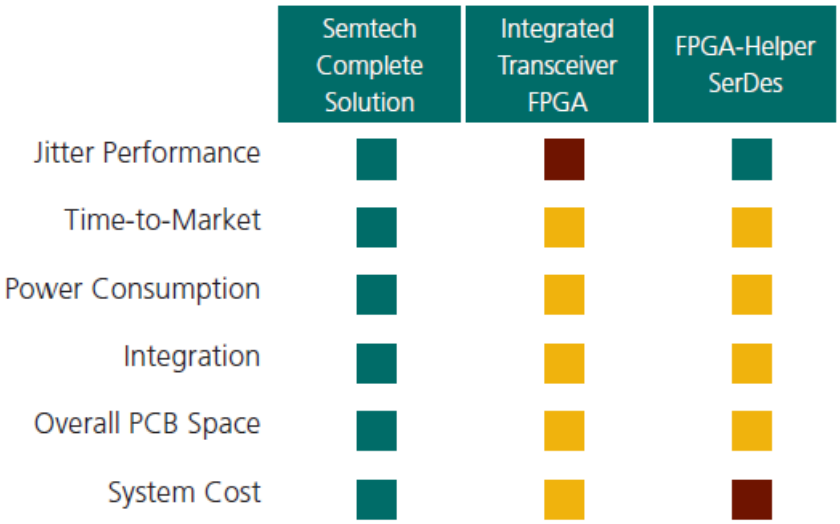
FPGA-HELPER ARCHITECTURE

The FPGA-helper architecture, as depicted below, involves the use of a component that includes the physical media attachment part of a SMPTE SDI receiver/SDI transmitter with the digital SMPTE processing implemented in the FPGA. The result is an architecture that is taxing in terms of power consumption, and those FPGA-helper parts are lacking even basic SMPTE digital processing. In many cases, product-specific FPGA IP already requires high utilization factors in small, low-cost FPGAs, and the added requirement of digital SMPTE video processing in the FPGA may drive adoption of a larger FPGA. This results in further penalties in power consumption, size, and system cost. While this architecture fares well in system jitter performance in certain cases, the added engineering effort in developing (or licensing) and stitching that video processing logic to product-specific code ensures a slower time-to-market. Finally, while some FPGA-helper parts integrate a cable driver, the offering lacks an integrated equalizer



HOW THE SEMTECH SOLUTION STACKS UP

Compare the ratings of each of the three architectures for key parameters in an implementation of 1Rx and 1Tx channel



SDI Transmitters

High-performance, integrated, low-power solution for SDI transmit links

3Gbps SDI

Semtech's GS2972 and GS2962 are fully compatible with SMPTE ST 424 and ST 425 as well as new ST 2081-1 and ST 2082-1 UHD-SDI standards. In addition, Semtech SDI transmitters feature integrated SMPTE video processing including scrambling, TRS detection, insertion, and ancillary data insertion. Semtech's GS2972 SDI transmitter includes an integrated audio embedder and supports AES, I2S, and serial audio formats. The fully integrated functionality of Semtech's SDI transmitters provides the lowest power and smallest footprint solution for a complete SDI transmit link.

COMPLETE VIDEO PROCESSING

Semtech SDI transmitters have the most complete video processing features available. These include but are not limited to, scrambling, TRS detection or insertion, and ancillary data insertion.

GREAT FOR DVB-ASI

All Semtech SDI transmitters are DVB-ASI capable.

AUDIO EMBEDDING

Semtech’s SDI transmitters include an integrated audio embedder supporting AES, I2S and serial audio formats

EXCELLENT JITTER PERFORMANCE

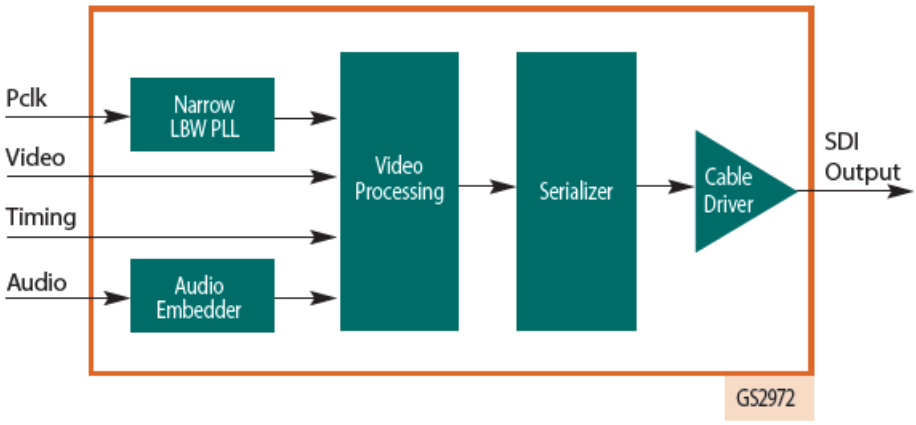
Due to the integrated PLL with narrow loop bandwidth, the SDI transmitters can reject up to 300ps of jitter on the parallel clock, outputting very low jitter, SMPTE-compliant SDI signals.

POWER AND AREA EFFICIENT

The high level of integration in Semtech’s SDI transmitters provides the lowest power and smallest means of implementing a SDI link.

APPLICATIONS

Cameras, camera control units, multi viewers, routers, production switchers, master control switchers, VTRs, video servers, encoders/decoders, up/down/cross converters, audio embedders, format detectors, test, and measurement equipment.



SDI TRANSMITTERS												
Part Number	Data Rate (Mbps)	Video Processing	DVB / ASI	Ancillary Data Insert	Audio Embed	Cable Driver	Output Jitter (ps)	Parallel Bus Width	CEA 861 Timing	Temp Range (ºC)	Power (mW)	Package
GS2972	270 1485 2970	YES	YES	YES	YES	YES	3G:40 HD:50 SD:200	10 or 20	YES	-40 to +85	400	BGA 100
GS2962	270 1485 2970	YES	YES	YES	NO	YES	3G:40 HD:50 SD:200	10 or 20	YES	-40 to +85	350	BGA 100
GS1672	270 1485	YES	YES	YES	YES	YES	HD:50 SD:200	10 or 20	YES	-40 to +85	350	BGA 100
GS1662	270 1485	YES	YES	YES	NO	YES	HD:50 SD:200	10 or 20	YES	-40 to +85	330	BGA 100

SDI Receivers

High-performance, integrated, low-power solution for SDI receive links.

3Gbps SDI

The GS3470 and GS3471 are Semtech's latest generation high-performance, single-chip SDI receiver solutions, featuring integrated cable equalization, video and audio processing, and dual SDI inputs. All Semtech's SDI receivers are fully compatible with SMPTE ST 424 and ST 425 as well as new ST 2081-1 and ST 2082-1 UHD-SDI standards. The GS3470 and GS3471 feature two selectable serial video inputs which make them ideal for video monitoring applications. Both parts are optimized for low-power designs, providing up to 45% power reduction over previous-generation SDI receivers.

INTEGRATED EQUALIZER

The GS3471 fully integrates a high-performance long-reach adaptive cable equalizer, providing up to 200m reach at 3Gbps. The integration of the cable equalizer reduces the overall PCB component footprint and power.

COMPLETE VIDEO PROCESSING

Semtech's SDI receivers offer integrated SMPTE video processing including descrambling, word alignment,

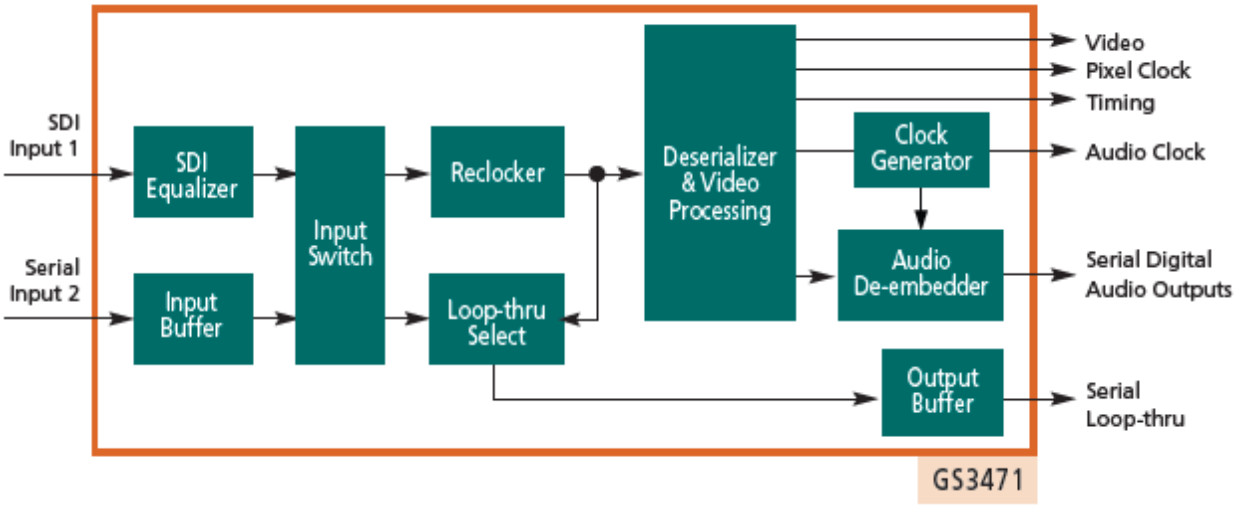
comprehensive error detection and correction, and ancillary data extraction. Additionally, all Semtech SDI receivers fully support DVB-ASI inputs.

AUDIO DE-EMBEDDING

The GS3470 and GS3471 include an integrated SMPTE-compliant audio de-embedder, supporting AES, I2S and serial digital audio output formats. Both parts feature a high performance audio clock generator, further reducing overall system costs.

APPLICATIONS

Monitors, camera control units, multi-viewers, routers, production switchers, master control switchers, video recorders and servers, compression encoders and decoders, video format converters, audio de-embedders, test, and measurement equipment



SDI RECEIVERS								
Part Number	Data Rate (Mbps)	Integrated Equalizer	Number of SDI Inputs	Audio De-embed	Audio Clock Generator	I/O Supply Voltage (V)	Power (mW)	Package (mm)
GS3471	270, 1485, 2970	Yes	2	Yes	Yes	1.8 or 2.5	300	BGA 100 (9×9)
GS3470	270, 1485, 2970	No	2	Yes	Yes	1.8 or 2.5	220	BGA 100 (9×9)
GS2971A	270, 1485, 2970	Yes	1	Yes	Yes	1.8 or 3.3	525	BGA 100 (11×11)
GS2961A	270, 1485, 2970	Yes	1	No	No	1.8 or 3.3	500	BGA 100 (11×11)
GS2970A	270, 1485, 2970	No	1	Yes	Yes	1.8 or 3.3	350	BGA 100 (11×11)
GS2960A	270, 1485, 2970	No	1	No	No	1.8 or 3.3	320	BGA 100 (11×11)
GS1661A	270, 1485	Yes	1	No	No	1.8 or 3.3	460	BGA 100 (11×11)
GS1660A	270, 1485	No	1	No	No	1.8 or 3.3	250	BGA 100 (11×11)

SDI Crosspoints

Semtech crosspoint switches provide an unmatched combination of size, features, and performance

MULTIPLE STROBES

Eight update-enabled strobe pins allow our crosspoint to be partitioned into independently updatable blocks. This is useful in multi-format environments when the switches need to occur at different points in time. Each update strobe can be assigned on a per-output basis, enabling maximum flexibility.

DATA RATE MARGIN

Supporting data rates up to 3.5Gbps means that there is a significant margin for video systems operating up to 2.97Gbps. This margin also means the product can be used in Xaui™, DisplayPort™ and HDMI switching applications

FULLY INDEPENDENT INPUT AND OUTPUT CHANNELS

All our crosspoints provide independent input trace equalization and output de-emphasis which can compensate for over 50 inches of PCB trace loss. This provides higher signal integrity and lower jitter in designs utilizing long traces or passive splitting. In addition, with output swing configurable as low as 200mV, system power can be significantly reduced

ON-CHIP PATTERN GENERATORS EYE PATTERN DIAGNOSTICS

Independent pattern generators and checkers can be used for testing signal paths on either the input or output side of the system. The pattern checker can be configured to check for bit errors using one of three PRBS patterns or any arbitrary pattern, important for evaluating system performance with video pathological signals. All crosspoint devices can check for bit errors at arbitrary phase offsets from the received data and the jitter margin can be determined by measurement of the horizontal eye-opening

TEMPERATURE SENSORS

Four on-chip temperature sensors monitor the junction temperature of the chip. This enables automated control of fan speed and power-down sequences to meet environmental demands for energy conservation

LOW-POWER

When compared to competitive solutions, Semtech crosspoints provide industry-leading per-channel power consumption with less than 1W consumed in stand-by mode. System power can be reduced further by taking advantage of the crosspoint’s high input sensitivity while using Semtech equalizers configured for minimum output swing levels.

FLEXIBLE FOOTPRINT

All Semtech crosspoints are pin compatible, sharing the same control interface and register set. This allows a single platform design to be easily scaled to the necessary switch size with no re-work required in either hardware or software

INPUT SENSITIVITY

To address losses typical in many router architectures, the Semtech crosspoint family provides for high input sensitivity, resulting in additional system margin. In addition, high input sensitivity facilitates better system optimization, including reduced swing on upstream drivers, providing substantial power savings

APPLICATIONS

Routers, multi-viewers, production switchers, master control switchers, and broadcast modular equipment

CROSSPOINT SWITCHES										
Part Number	Data Rate (Gbps)	Inputs	Input Sensitivity (mV)	Input Trace EQ	Outputs	Output De-emphasis	DC Coupling	Temp Range (ºC)	Power (W)	Package (mm)
GX3290	3.5	290	80	YES	290	YES	1.2V, 1.8V, 2.5V	0 to +85	34	BGA 2377 (50×50)
GX3190	3.5	146	80	YES	290	YES	1.2V, 1.8V, 2.5V	0 to +85	25	BGA 2377 (50×50)
GX3246	3.5	290	80	YES	146	YES	1.2V, 1.8V, 2.5V	0 to +85	18	BGA 2377 (50×50)
GX3202	3.5	202	80	YES	202	YES	1.2V, 1.8V, 2.5V	0 to +85	24	BGA 2377 (50×50)
GX3146	3.5	146	80	YES	146	YES	1.2V, 1.8V, 2.5V	0 to +85	18	BGA 2377 (50×50)

Timing (GEN-Clocks)

A complete timing solution for broadcast video

GENLOCK CAPABILITY

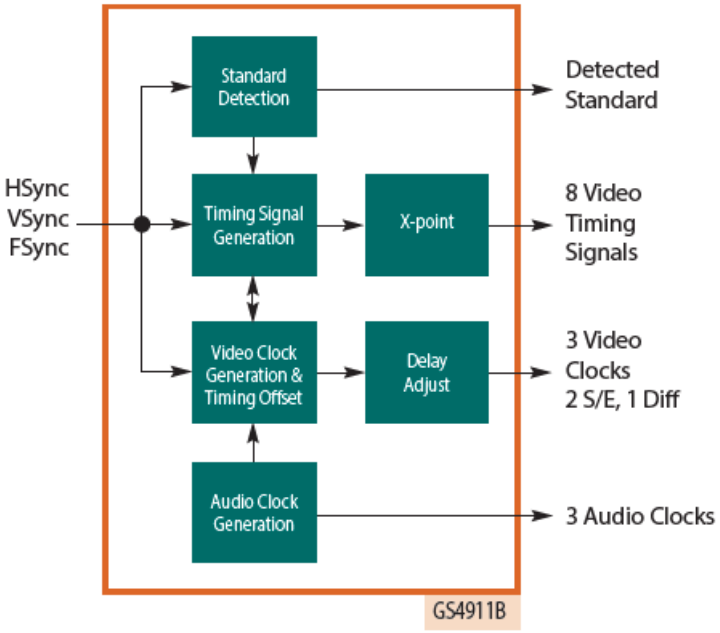
GS4900B/GS4901B/GS4910B/GS4911B clock generators can be genlocked to reference with a variable offset. On loss of reference, the video clocks will flywheel to maintain their frequency

GENERATES MULTIPLE CLOCKS

Three video clocks (two single-ended and one differential), three single-ended audio clocks, and eight single-ended configurable timing signals can be generated. Video clocks up to 165MHz can be produced in order to support up to 3Gbps SDI and UXGA. In addition, the GS4911B features crosslocking capability where HD timing can be generated from an SD reference, increasing design flexibility

INPUT STANDARD DETECTION

By supplying the clock generator with HSync, VSync and FSync, the chip will determine if it matches one of 36 video or 16 graphics standards and will report the detected standard



REDUCES JITTER TO MEET SMPTE SPECS

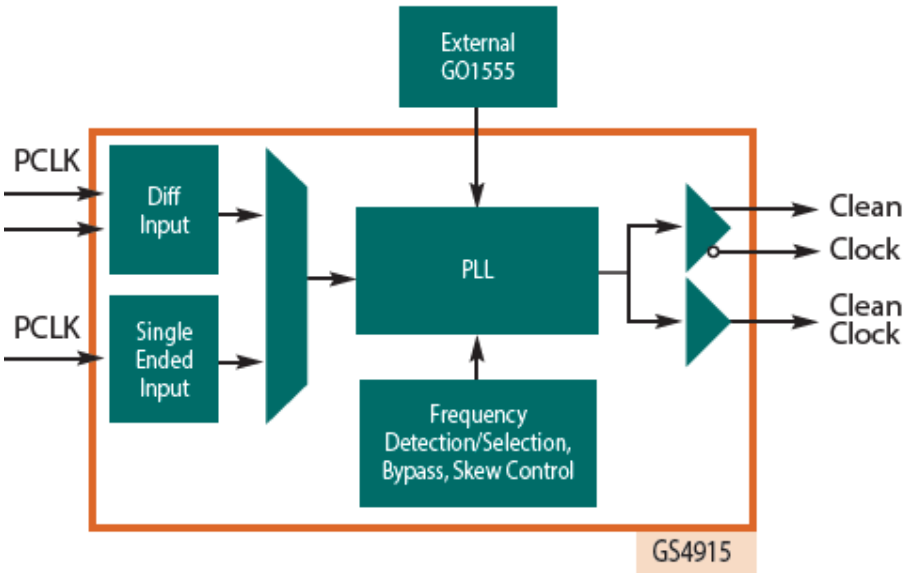
The GS4915 ClockCleaner™ will reduce jitter on video clocks of 27, 74.25, 74.25/1.001, 148.5, and 148.5/1.001MHz. Output jitter will typically be 20ps, which will guarantee 3Gbps SDI compliance when used with a SDI transmitter.

FLEXIBLE I/O FREQUENCIES AND LEVELS

SD (27MHz) and HD (74.25, 74.25/1.001, 148.5, and 148.5/ 1.001MHz) frequencies can be input and output from the GS4915. The chip also has single-ended and differential inputs and outputs to facilitate interfacing with a variety of chips.

FREQUENCY DOUBLER TO MEET 3Gbps SDI REQUIREMENTS

If the input clock frequency is 74.25 or 74.25/1.001MHz, the GS4915 can double the output, providing a low jitter 148.5 or 148.5/1.001MHz output clock which can be used for HD-SDI and 3Gbps SDI applications



CLOCK GENERATORS									
Part Number	Input Video Standard	Output Video Standard	Max Output Video Clock (MHz)	Power Supply (V)	Genlock	Audio Clocks	User Programmable	Power (mW)	Package (mm)
GS4900B	3G/HD/SD/ Graphics	SD	54	3.3, 1.8	YES	NO	NO	215	QFN-64 (9×9)
GS4901B	3G/HD/SD/ Graphics	SD	54	3.3, 1.8	YES	YES	NO	265	QFN-64 (9×9)
GS4910B	3G/HD/ SD Graphics	3G/HD/SD/ Graphics	165	3.3, 1.8	YES	NO	YES	250	QFN-64 (9×9)
GS4911B	3G/HD/SD/ Graphics	3G/HD/SD/ Graphics	165	3.3, 1.8	YES	YES	YES	300	QFN-64 (9×9)

We offer value and quality that can be trusted

Semtech pledges to provide always improving value to customers with innovative and technically superior products and services that exceed expectations. Our qualification systems strive to guarantee the quality and reliability of our products, processes and suppliers to ensure they meet specifications. With increasing environmental concerns, Semtech supports the voluntary reduction and subsequent elimination of lead in electronics products, including component lead finishes

Find out more: www.semtech.com/quality

SEMTECH CORPORATION

Semtech Corporation is a leading supplier of high-performance analog, mixed-signal semiconductors, and advanced algorithms for high-end consumer, enterprise computing, communications, and industrial equipment.

Semtech, publicly traded since 1967, is listed on the Global Select Market under the symbol SMTC and has more than 32 sales and application support offices in 14 countries as well as representatives and distribution support locations in more than 30 countries. Semtech is dedicated to providing proprietary platforms, differentiated by innovation, size, efficiency, performance, and reach. Our solutions are used in some of the most innovative systems and products in the fastest-growing markets today

These markets include smartphones, LCD TVs, notebooks, tablets, smart grid, automotive, automatic meter reading, medical, wireless infrastructure, PON, Internet of Things, optical transport, and data centers. More than 5,000 customers worldwide rely on our diverse product portfolio and world-class technology roadmap for solutions in low-power wireless communications, optical data transport, video broadcasting, power management, circuit protection, touch sensing, and more, making Semtech one of the most balanced semiconductor companies in the industry.

CONTACT

CUSTOMER CONTACT & KEY SALES OFFICES

CORPORATE

- HEADQUARTERS
- Camarillo, California
- 805-498-2111

NORTH AMERICA

- San Jose, California
- 408-324-3300
- San Diego, California
- 858-614-6700
- Plano, Texas
- 972-231-1606
- Burlington, Ontario
- 289-856-9200
- Saint-Laurent, Quebec
- 514-908-9768

EUROPE

- Rapperswil, Switzerland
- + 41-71-313-4828
- Bristol, England
- + 44-1454-462200
- Courtaboeuf, France
- + 33-169-282200

- Hallbergmoos, Germany
- + 49-811-998-728-0

ASIA

- Seoul, Korea
- + 82-2-527-4377
- Tokyo, Japan
- + 81-3-5719-7560
- Osaka, Japan
- + 81-6-6133-4510
- Beijing, China
- +86-10-6410-6855
- Shanghai, China
- + 86-21-6391-0830
- Shenzhen, China
- + 86-755-8282-8515

Taipei, Taiwan

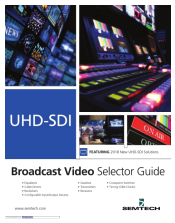
- + 886-2-2748-3380
- Manila, Philippines
- + 63-2-772-1834
- Ipoh, Malaysia
- + 60-5-501-4800
- Penang, Malaysia
- + 60-4-683-8200
- Bhubaneswar, India
- + 91-674-398-1400

For a detailed list of sales representatives for your area please visit **www.semtech.com/contact**

200 Flynn Road, Camarillo, California 93012

- phone: (805) 498-2111
- fax: (805) 498-3804

Documents / Resources

	SEMTECH GS12241 UHD SDI Solutions [pdf] User Guide GS12241 UHD SDI Solutions, GS12241, UHD SDI Solutions, SDI Solutions, Solutions

References

- Semtech Semiconductor, IoT Systems and Cloud Connectivity | Semtech
- Office Locations | Semtech Corporation | Semtech
- Quality Assurance | Committed to Quality and Reliability | Semtech
- User Manual