Broadcast Video

Fall 2009
Product Guide

gennum

Contents

Broadcast Video
Solutions

Explore the Most Complete Lineup of SDI Products Available from a Single Source

Gennum offers the most comprehensive, end-to-end portfolio of broadcast video solutions available. Our commitment to signal integrity and our knowledge of high-speed signal technologies are evident in everything we do. And, as a key contributor to SMPTE, we continue to pioneer transport solutions that push the envelope, allowing you to make the most of your innovative ideas.

Push the Boundaries of Performance, Reach and Signal Integrity

Gennum's award-winning portfolio of HD/3G components for the professional and broadcast video markets offers unmatched performance and signal integrity. In fact, Gennum solutions are so leading-edge that much of the industry's 3G test equipment utilizes them. Compare for yourself and you'll see why the industry leaders choose Gennum broadcast video solutions.
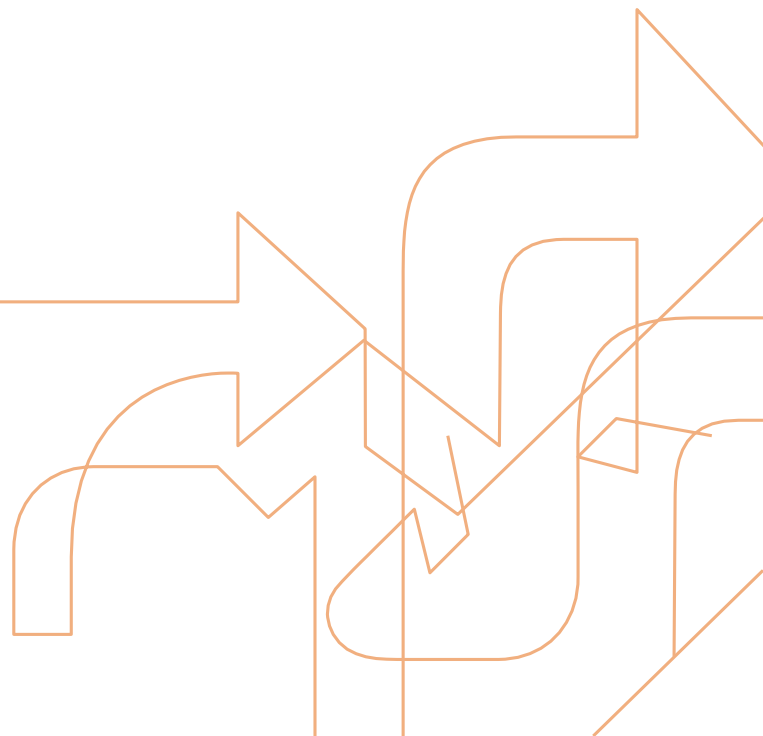
Get to Market Quickly

Gennum's portfolio of high-performance 3Gb/s-SDI solutions is designed to help you get to market quickly with feature-rich, differentiated products. We ease the migration path from current HD designs to future 3Gb/s products by offering a family of drop-in compatible solutions and we work closely with you to facilitate the design process. Our innovative SerDes family features integration of digital SMPTE processing, speeding your design time.

Control Costs without Sacrificing Performance

Especially in times like these, you look for solutions that can help you make the most of your investment. Gennum answers the call with the most cost-effective solutions available. Our highly integrated solutions cut design costs, power requirements and board space. We test each component in production, assuring high yield on assembled boards, which translates into fewer product recalls and less waste of costly WIP material for you.

Gennum: A Partner for Today…and Tomorrow

At Gennum, the broadcast video market is a prime focus, not a sideline. In fact, Gennum has been creating innovative solutions for the video transport market since the 1980s and led the way in drafting the 3G SDI standard.

Gennum continues to push the envelope of performance and pursue new opportunities to enhance customer solutions in the broadcast market. We recently introduced innovative new products for PCIe® as well as consumer and industrial connectivity while increasing our R&D investments and customer support network so you can focus on bringing your best solutions to market. Gennum's solid foundation, both financial and technical, means we're with you all the way.

Gennum's award-winning portfolio of professional and broadcast solutions includes:

- Equalizers

- Reclockers

- Cable drivers

- Transmitters & receivers (SerDes)

- Timing & clock cleaning solutions

- Optical modules

- PCI Express® solutions

- Consumer & industrial connectivity solutions

What's New

Second generation 3G SDI products offering industry-leading performance, new optical modules, solutions for PCI Express®, HDMI, and DisplayPort solidify Gennum's leadership position as the supplier of the most comprehensive Broadcast Video Solution portfolio.

Second Generation
3Gb/s-SDI Products
offer the industry's lowest power and highest performance

improved serial routinG and distribution solutions offer 55% power savinGs, improved performance and new features

- GS2914 3Gb/s DC restore is the industry's only 3Gb/s capable product

- GS2984 adaptive cable equalizer offers the industry's longest 3Gb/s cable lengths at the lowest jitter level (140m of Belden 1694A at 0.3UI), while reduced power, new input gain adjustment, and selectable output common mode level make this product even easier to use in complex systems

- GS2985 video reclocker has half of the output jitter of the previous generation and is 55% lower power with additional features such as input trace equalization, output de-emphasis, and serial control that address system issues present at 3Gb/s

- GS2986 and GS2965 video reclockers are 55% and 69% smaller than the GS2975A and GS2985

- GS2988 cable driver has reduced output jitter and power consumption, plus input trace equalization, output signal presence and a wider output launch swing, making it more versatile in all applications

- GS2989 cable driver has all of the features of the GS2988 and adds a second output, making it ideal for distribution applications

- All of the these new products are offered in the -40C to +85C industrial temperature range

the world's first video sfp with no patholoGical deGradation

- Massively improved link robustness due to extended link budget

- 5dB improvement in optical receiver sensitivity with 3Gb/s pathological data

- Highest performance 3G SDI optical PIN receiver module available today

the industry's first 3G sdi receiver with inteGrated cable equalization

- State-of-the-art cable equalization technology in the GS2971 and GS2961 achieves unprecedented cable lengths at 3G, HD and SD rates

- 3G data rates can now be run at HD cable lengths, alleviating potential need for 3G signal regeneration while upgrading existing HD installations with 3G equipment

- Integrated receiver packing an equalizer, VCO, reclocker and a deserializer offers substantial cost, power consumption and PCB footprint savings

enablinG the transport of sdi video over pci express

- GN4124 4-lane PCI Express-to-local bus bridge frees valuable FPGA resources and speeds time-to-market by integrating the link and transaction layers

- PCIe® re-driver and re-timing re-driver extend the reach of PCIe Gen1/Gen2 cabling

Equalizers

Industry's longest cable lengths, lowest jitter and data rates up to 3Gb/s

multi-rates

Gennum equalizers offer robust multi-standard operation from 143Mb/s to 2970Mb/s even under stressful video pathological signals and are fully SMPTE 424M, 292M, 344M and 259M compliant.

lonG cable lenGth - production tested

Industry's longest cable lengths: 140m at 3Gb/s, 230m at HD, and 400m at SD. All equalizers are production tested at applicable data rate and cable length.

lowest Jitter

Gennum continues to reduce jitter at all cable lengths and for all data rates. The GS2984 offers the industry's lowest guaranteed and production tested output jitter.

low power

Gennum offers the best performance at the lowest power consumption with an additional 10% power reduction from previous generations.

Power consumption stays at a low level across all operating conditions and cable lengths.

flexible footprint

Future proof your design by using Gennum's QFN footprint compatible parts for SD, HD, or 3Gb/s applications (GS9074A, GS1574A, GS2974A/B, and GS2984).

applications

Routers, distribution amplifiers, camera control units, multiviewers, production switchers, master control switchers, VTRs, video servers, encoders/decoders, up/down/cross converters, test and measurement equipment
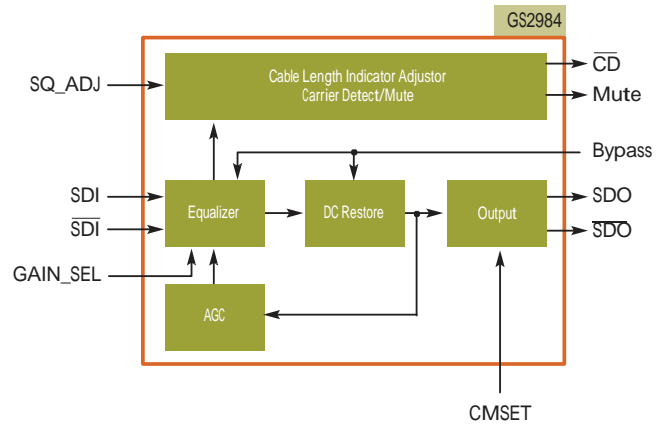
	Gs2984	Gs2964	Gs2974b	Gs2974a	Gs1574a	Gs1524a	Gs9074a
Data Rate (Mb/s)	143 - 2970	143 - 2970	143 - 2970	143 - 2970	143 - 1485	143 - 1485	143 - 360
Input 0/6dB Gain	YES	NO	NO	NO	NO	NO	NO
DC Coupling to 2.5V	YES	NO	NO	NO	NO	NO	NO
3G Typical Cable Length (m)	140 @ 0.3UI	100 @ 0.35UI	140 @ 0.4UI	120 @ 0.3UI	N/A	N/A	N/A
HD Typical Cable Length (m)	200 @ 0.2UI	140 @ 0.25UI	230 @ 0.3UI	200 @ 0.3UI	200 @ 0.3UI	200 @ 0.3UI	N/A
SD Typical Cable Length (m)	400	180	250	350	350	350	350
Footprint Compatible With	all 16 QFN EQs	all 16 QFN EQs	all 16 QFN EQs	all 16 QFN EQs	all 16 QFN EQs	GS9064A	all 16 QFN EQs
Temp Range (ºC)	-40 to +85	-40 to +85	0 to +70	0 to +70	0 to +70	0 to +70	0 to +70
Power (mW)	195	215	215	215	215	265	215
Size (mm)	4 x 4	4 x 4	4 x 4	4 x 4	4 x 4	6 x 10	4 x 4
Package	16 QFN	16 QFN	16 QFN	16 QFN	16 QFN	16 SOIC	16 QFN

Reclockers

Industry's lowest power and lowest jitter 3Gb/s solution

multi-rates
Gennum reclockers offer robust multi-standard operation from 143Mb/s to 2970Mb/s and are SMPTE 424M, 292M, 344M and 259M compliant.

lowest power
Gennum offers high-performance at the industry's lowest power consumption. The GS2985 has a 55% power reduction from previous generations.

best input Jitter tolerance
Gennum's unique reclocker architectures offer the industry's best input jitter tolerance and output jitter for worry free design flexibility.

low output Jitter
The GS2985 has output jitter that is 50% of the GS2975A.

improved features
The GS2985 adds input trace equalization and output signal de-emphasis, which give additional design flexibility to system designers. The serial interface allows for multiple communication methods.

size
The GS2985 maintains the same size as previous generations, the GS2986 maintains the same features as the GS2985 but is 55% smaller. The GS2965 is 69% smaller than the GS2985.

GS2985 Actual Size   GS2986 Actual Size   GS2965 Actual Size

applications
Routers, distribution amplifiers, camera control units, multiviewers, production switchers, master control switchers, VTRs, video servers, encoders/decoders, up/down/cross converters, test and measurement equipment
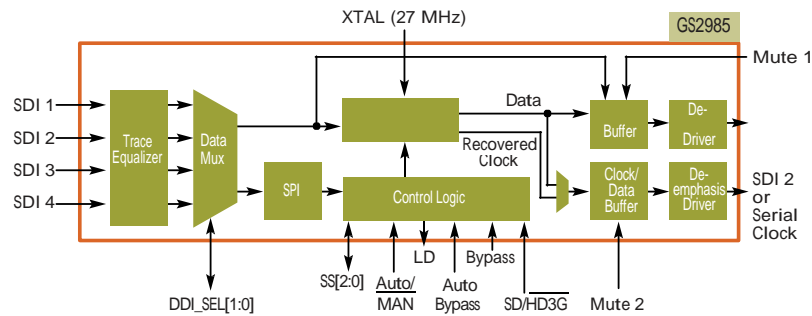
	Gs2965	Gs2985	Gs2986	Gs2975a	Gs1575b	Gs9076	Gs9075b
Data Rate (Mb/s)	270, 1485, 2970	270, 1485, 2970	270, 1485, 2970	270, 1485, 2970	143, 177, 270, 360, 540, 1485	270	143, 177, 270, 360, 540
Power Supply (V)	2.5 or 3.3	2.5 or 3.3	2.5 or 3.3	3.3	3.3	3.3	3.3
Input Trace Equalization	YES	YES	YES	NO	NO	NO	NO
Output De-Emphasis	YES	YES	YES	NO	NO	NO	NO
Serial Interface	YES	YES	YES	NO	NO	NO	NO
Input MUX	2 : 1	4 : 1	4 : 1	4 : 1	4 : 1	4 : 1	4 : 1
Dual Data Output	YES	YES	YES	YES	NO	YES	NO
Temp Range (ºC)	-40 to +85	-40 to +85	-40 to +85	0 to +70	0 to +70	0 to +70	0 to +70
Power (mW)	180	180	180	400	645	400	645
Size (mm)	5 x 5	9 x 9	6 x 6	9 x 9	9 x 9	9 x 9	9 x 9
Package	32 QFN	64 QFN	40 QFN	64 QFN	64 QFN	64 QFN	64 QFN

Lowest jitter, best ORL, and data rates up to 3Gb/s

multi-rates

Gennum cable drivers offer robust multi-standard operation from 143Mb/s to 2970Mb/s and are SMPTE 424M, 292M, 344M and 259M compliant.

low power

Gennum offers the best performance at the lowest power consumption with an additional 45% power reduction in standby mode.

low jitter

Ultra low additive jitter at SD, HD, and 3Gb/s data rates.

best orl

Better than -20dB output return loss (ORL) for HD applications and better than -12dB ORL for 3Gb/s applications.

input trace equalization

The GS2988 and GS2989 products have trace equalization to equalize long input trace lengths.

larGer output swinG

The GS2988 and 2989 offer higher maximum output swing to compensate for losses that occur after the cable driver output.

up to four outputs

The GS2989 offers four outputs for distribution applications.

output siGnal presence

The GS2988 and GS2989 offer an output signal presence detector which provides status on the validity of the output.

applications

Routers, distribution amplifiers, camera control units, multiviewers, production switchers, master control switchers, VTRs, video servers, encoders/decoders, up/down/cross converters, test and measurement equipment
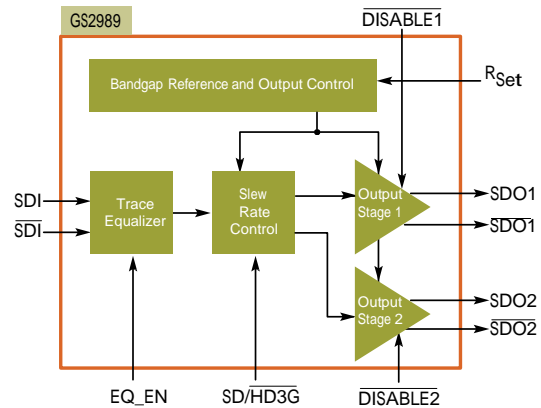
	Gs2988	Gs2989	Gs2978	Gs1578a	Gs1528b	Gs9077	Gs9068a
Data Rate (Mb/s)	143 - 2970	143 - 2970	143 - 2970	143 - 1485	143 - 1485	143 - 540	143 - 540
Power Supply (V)	2.5 or 3.3	2.5 or 3.3	3.3	3.3	3.3	3.3	3.3
Outputs	2	4	2	2	2	2	2
Input Trace Equalization	YES	YES	NO	NO	NO	NO	NO
Output Signal Presence	YES	YES	NO	NO	NO	NO	NO
Maximum Output Swing (mV)	1800	1800	1040	800	1040	1040	1040
ESD Protection (kV)	4	4	4	2	4	4	2
ORL (dB)	-20 (HD) -12 (3G)	-20 (HD) -12 (3G)	-20 (HD) -12 (3G)	-15	-20	-20	-15
Footprint Compatible With	GS2978		GS9077 GS1578A	GS9077 GS2978	GS9068A	GS1578A GS2978	GS1528B
Temp Range (ºC)	-40 to +85	-40 to +85	0 to +70	0 to +70	0 to +70	0 to +70	0 to +70
Power (mW)	125	220	168	168	168	168	168
Size (mm)	4 x 4	4 x 4	4 x 4	4 x 4	6.2 x 5	4 x 4	6.2 x 5
Package	16 QFN	16 QFN	16 QFN	16 QFN	8 SOIC	16 QFN	8 SOIC

Optical Driver Modules

Extend the reach of 3Gb/s-SDI over optical fiber

enGineered for diGital video

All Gennum video optical modules are designed to support video pathological patterns. Gennum's new optical receivers take video performance to the next level by eliminating the pathological penalty that plagues traditional optical receivers. The superior sensitivity and signal integrity offered by these receivers allows for the most robust optical SDI networks.
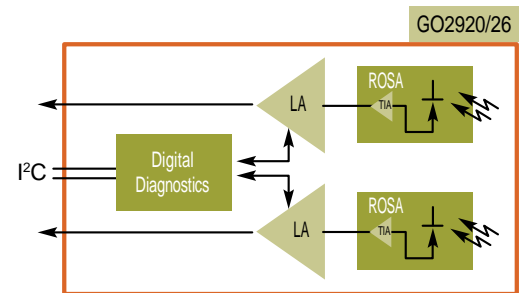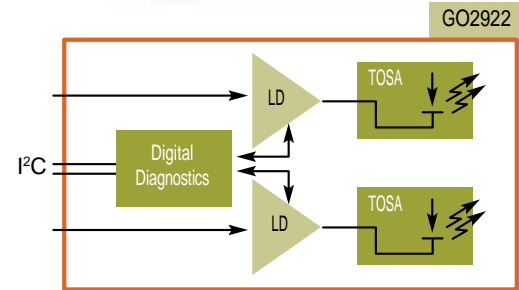
compact, pluGGable, flexible

Gennum's small form factor modules for digital video (Video SFP) are hot pluggable, easy to use, and offer the highest density optical solution for carrying digital video over optical fiber. The Video SFP pinout is designed so that one slot can be populated with a dual transmitter, dual receiver, single transmitter, single receiver, or a transceiver.

multirate and bacKwards compatible

Gennum's Video SFPs operate from 50Mb/s to 3Gb/s and seamlessly run at 3Gb/s-SDI, HD SDI and SD SDI rates without any user intervention required to change the data rate. They can also be used for other formats such as Ethernet and SONET.

monitorinG and control

All of Gennum's Video SFPs come equipped with an I^2C interface for monitoring and control of key parameters such as module temperature, optical power and bias current.

GO2922

GO2920/26

	Go2926	Go2916	Go2925	Go2921b	Go2920	Go2910	Go2922	Go2912
Description	3Gb/s-SDI Dual Channel PIN Receiver	3Gb/s-SDI Single Channel PIN Receiver	3Gb/s-SDI 1310nm FP/ PIN Transceiver	3Gb/s-SDI 1310nm FP/ PIN Transceiver	3Gb/s-SDI Dual Channel PIN Receiver	3Gb/s-SDI Single Channel PIN Receiver	3Gb/s-SDI Dual Channel 1310nm FP Transmitter	3Gb/s-SDI Single Channel 1310nm FP Transmitter
Number of Optical Inputs	2	1	1	1	2	1	–	–
Number of Optical Outputs	–	–	1	1	–	–	2	1
3Gb/s Pathological Receive Sensitivity (dBm)	-23	-23	-22	-18	-18	-18	–	–
Typical Ave. Optical Output Power (dBm)	–	–	-2	-2	–	–	-2	-2
Nominal Optical Wavelength (nm)	1260-1620	1260-1620	Tx 1310/Rx 1260-1620	Tx 1310/Rx 1260-1620	1260-1620	1260-1620	1310	1310
Data Rate (Mb/s)	50-3000	50-3000	50-3000	50-3000	50-3000	50-3000	50-3000	50-3000
Power (mW)	600	300	715	650	470	235	670	400
Temp Range (°C)	0 to +70	0 to +70	0 to +70	0 to +70	0 to +70	0 to +70	0 to +70	0 to +70
Supply Voltage	3.3V	3.3V	3.3V	3.3V	3.3V	3.3V	3.3V	3.3V
Max. Distance @ 3Gb/s-SDI (km)	–*	–*	10**	10**	–*	–*	10**	10**
Package	Video SFP	Video SFP	Video SFP	Video SFP	Video SFP	Video SFP	Video SFP	Video SFP

* Maximum link distance is dependent on transmitter type and data rate.
** When used with a SMPTE 297-2006 compatible receiver over single mode fiber. Maximum distance is 21km for HD-SDI, and 30km for SD-SDI.

Your complete timing solution for broadcast video

GS4900B/GS4901B/GS4910B/GS4911B CLOCK GENERATORS

GenlocK capability

Gennum 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

3 video clocks (2 single-ended and one differential), 3 audio clocks, and 8 configurable timing signal clocks can be generated. Video clocks up to 165MHz can be produced in order to support up to 3G SDI and UXGA.

input standard detection

By supplying the clock generator with HSync, VSync and Fsync, the chip will determine if it meets one of 36 video or 16 graphics standards and will report which standard.
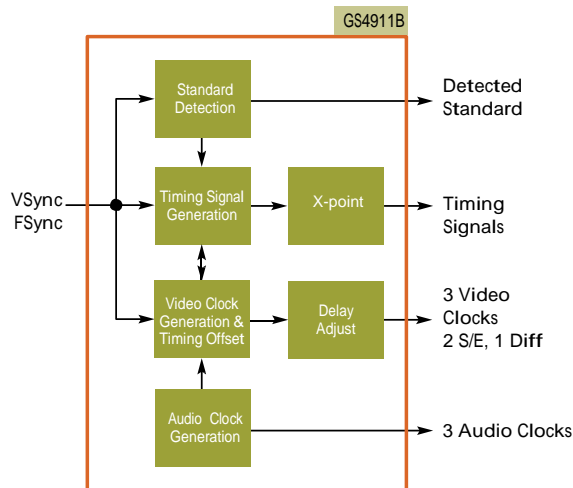
GS4915 ClockCleaner™

### reduces Jitter to meet smpte specs

The GS4915 will reduce jitter on input video clocks of 27, 74.25, 74.25/1.001, 148.5, and 148.5/1.001 MHz. Output jitter will typically be 20ps, which will guarantee 3Gb/s-SDI compliance when used with a serializer.

flexible i/o frequencies and levels

SD (27MHz), and HD (74.25, 74.25/1.001, 148.5, 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 3Gb/s-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 3Gb/s-SDI applications.
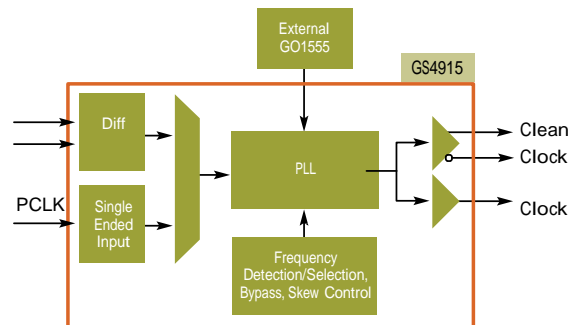
	Gs4900b	Gs4901b	Gs4910b	Gs4911b
Input Video Standard	3G/HD/SD/Graphics	3G/HD/SD/Graphics	3G/HD/SD/Graphics	3G/HD/SD/Graphics
Output Video Standard	SD	SD	3G/HD/SD/Graphics	3G/HD/SD/Graphics
Max Output Video Clock (MHz)	54	54	165	165
Power Supply (V)	3.3, 1.8	3.3, 1.8	3.3, 1.8	3.3, 1.8
Package	64 QFN	64 QFN	64 QFN	64 QFN
Size (mm)	9 x 9	9 x 9	9 x 9	9 x 9
Genlock	YES	YES	YES	YES
Audio Clocks	NO	YES	NO	YES
User Programmable	NO	NO	YES	YES
Power (mW)	215	265	250	300

transmitters

	Data Rate (Mb/s)	Video Processing	VCO	Audio Embed	Cable Driver	Parallel Bus Width	CEA 861 Timing	Standby	Temp Range (°C)	Power (mW)	Pkg
Gs2972	270, 1485, 2970	YES	YES	YES	YES	10 or 20	YES	YES	-20 to +85	400	BGA 100
Gs2962	270, 1485, 2970	YES	YES	NO	YES	10 or 20	YES	YES	-20 to +85	370	BGA 100
Gs1582	270, 1485	YES	GO1555	YES	YES	10 or 20	YES	YES	-20 to +85	490	BGA 100
Gs1572	270, 1485	YES	GO1555	NO	YES	10 or 20	YES	YES	-20 to +85	440	BGA 100
Gs9092a	270	YES	YES	NO	YES	10	NO	NO	0 to +70	200	QFN 56

receivers

	Data Rate (Mb/s)	Equalizer	Video Processing	Serial Loop Through	VCO	ANC Extraction	Audio De-embed	CEA 861 Timing	Temp Range (°C)	Power (mW)	Pkg
nEw Gs2971	270, 1485, 2970	YES	YES	YES	YES	YES	YES	YES	-20 to +85	545	BGA 100
nEw Gs2961	270, 1485, 2970	YES	YES	YES	YES	YES	NO	YES	-20 to +85	515	BGA 100
Gs2970	270, 1485, 2970	NO	YES	YES	YES	YES	YES	YES	-20 to +85	350	BGA 100
Gs2960	270, 1485, 2970	NO	YES	YES	YES	YES	NO	YES	-20 to +85	320	BGA 100
Gs1559	270, 1485	NO	YES	YES	GO1555	NO	NO	NO	0 to +70	500	BGA 100
Gs9091b	270	YES	YES	NO	YES	YES	NO	NO	0 to +70	350	BGA 100
Gs9090b	270	NO	YES	NO	YES	YES	NO	NO	0 to +70	145	QFN 56

optical modules

	Description	Optical Inputs	Optical Outputs	3Gb/s Receive (dBm)	Output Power (dBm)	Wavelength (nm)	Data Rate (Mb/s)	Power (mW)	Temp Range (°C)	Supply (V)	3Gb/s Distance (km)	Pkg
nEw G02926	Dual Rx	2	–	-23	–	1260-1620	50-3000	600	0 to +70	3.3	–	Video SFP
nEw G02916	Single Rx	1	–	-23	–	1260-1620	50-3000	300	0 to +70	3.3	–	Video SFP
nEw Go2925	Transceiver	1	1	-22	-2	Tx 1310 / Rx 1260-1620	50-3000	715	0 to +70	3.3	10	Video SFP
G02921b	Transceiver	1	1	-18	-2	Tx 1310 / Rx 1260-1620	50-3000	650	0 to +70	3.3	10	Video SFP
G02920	Dual Rx	2	–	-18	–	1260-1620	50-3000	470	0 to +70	3.3	–	Video SFP
G02910	Single Rx	1	–	-18	–	1260-1620	50-3000	235	0 to +70	3.3	–	Video SFP
G02922	Dual Tx	–	2	–	-2	1310	50-3000	670	0 to +70	3.3	10	Video SFP
G02912	Single Tx	–	1	–	-2	1310	50-3000	400	0 to +70	3.3	10	Video SFP

equalizers

	Data Rate (Mb/s)	Power (mW)	3G Cable Length (m)	HD Cable Length (m)	SD Cable Length (m)	Input 0/6dB gain	DC coupling to 2.5V	Temp Range (ºC)	Pkg
Gs2984 (nEw)	143 - 2970	195	140	200	400	YES	YES	-40 to +85	16 QFN
Gs2964 (nEw)	143 - 2970	215	100	140	180	NO	NO	-40 to +85	16 QFN
Gs2974b	143 - 2970	215	140	230	250	NO	NO	0 to +70	16 QFN
Gs2974a	143 - 2970	215	120	200	350	NO	NO	0 to +70	16 QFN
Gs1574a	143 - 1485	215	N/A	200	350	NO	NO	0 to +70	16 QFN
Gs1524a	143 - 1485	265	N/A	200	350	NO	NO	0 to +70	16 SOIC
Gs9074a	143 - 360	215	N/A	N/A	350	NO	NO	0 to +70	16 QFN

reclocKers

	Data Rate (Mb/s)	Power (mW)	Power Supply (V)	Input Trace EQ	Output De-emphasis	Input MUX	Temp Range (ºC)	Size (mm)	Pkg
Gs2965 (nEw)	270, 1485, 2970	180	2.5 or 3.3	YES	YES	2 : 1	-40 to +85	5x5	32 QFN
Gs2985 (nEw)	270, 1485, 2970	180	2.5 or 3.3	YES	YES	4 : 1	-40 to +85	9x9	64 QFN
Gs2986 (nEw)	270, 1485, 2970	180	2.5 or 3.3	YES	YES	4 : 1	-40 to +85	6x6	40 QFN
Gs2975a	270, 1485, 2970	400	3.3	NO	NO	4 : 1	0 to +70	9x9	64 QFN
Gs1575b	143, 177, 270, 360, 540, 1485	645	3.3	NO	NO	4 : 1	0 to +70	9x9	64 QFN
Gs9076	270	400	3.3	NO	NO	4 : 1	0 to +70	9x9	64 QFN
Gs9075b	143, 177, 270, 360, 540	645	3.3	NO	NO	4 : 1	0 to +70	9x9	64 QFN

cable drivers

	Data Rate (Mb/s)	Power (mW)	Power Supply (V)	Outputs	Input Trace EQ	Output Signal Presence	Max Output Swing (mV)	Temp Range (ºC)	Pkg
Gs2988 (nEw)	143 - 2970	125	2.5 or 3.3	2	YES	YES	1800	-40 to +85	16 QFN
Gs2989 (nEw)	143 - 2970	220	2.5 or 3.3	4	YES	YES	1800	-40 to +85	16 QFN
Gs2978	143 - 2970	168	3.3	2	NO	NO	1040	0 to +70	16 QFN
Gs1578a	143 - 1485	168	3.3	2	NO	NO	800	0 to +70	16 QFN
Gs1528b	143 - 1485	168	3.3	2	NO	NO	1040	0 to +70	8 SOIC
Gs9077	143 - 540	168	3.3	2	NO	NO	1040	0 to +70	16 QFN
Gs9068a	143 - 540	168	3.3	2	NO	NO	1040	0 to +70	8 SOIC

timinG (Gen-clocks)

|	Input Video Standard	Output Video Standard	Power (mW)	Power Supply (V)	Audio Clocks	Size (mm)	Pkg
Gs4911b	3G/HD/SD/Graphics	3G/HD/SD/Graphics	300	3.3, 1.8	YES	9x9	64 QFN
Gs4910b	3G/HD/SD/Graphics	3G/HD/SD/Graphics	250	3.3, 1.8	NO	9x9	64 QFN
Gs4901b	3G/HD/SD/Graphics	SD	265	3.3, 1.8	YES	9x9	64 QFN
Gs4900b	3G/HD/SD/Graphics	SD	215	3.3, 1.8	NO	9x9	64 QFN

Choosing the
Right SerDes
For Your System

As a designer, you have the choice of selecting components from different vendors. But when it comes to designs with serializers and deserializers, you first have to choose an architecture. In implementing a design with a serializer and/or deserializer, you have 3 architectural choices at your disposal: Gennum's complete transmitter/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.

Gennum's complete solution architecture

Leveraging its expertise in signal integrity and deep understanding of broadcast video technologies, Gennum's offering encapsulates all the analog components (SerDes, VCO, CD, EQ, Reclocker) as well as the digital SMPTE video and audio processing required to transmit and receive SDI video into one optimized, cost-effective and power efficient ASIC implementation that lets you focus on customer value-add processing for quicker time-to-market. All of this integration into one package reduces the system PCB footprint required to implement SDI transmit/receive, at no compromise to Gennum's superior jitter performance. Only Gennum offers a solution that scores high for each evaluation parameter.

Gennum: Complete Solution Transmitter/Receiver
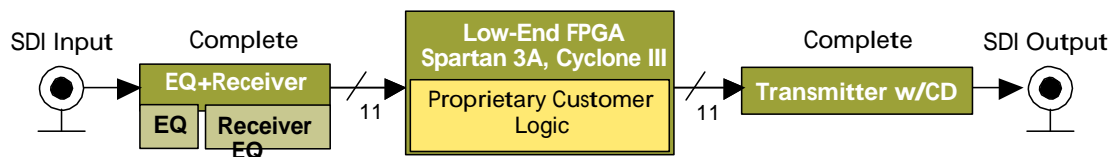
integrated-transceiver fpga architecture

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 a VCXO and reclockers, are required to get the system jitter performance to an acceptable level, but at the 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 IP 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.
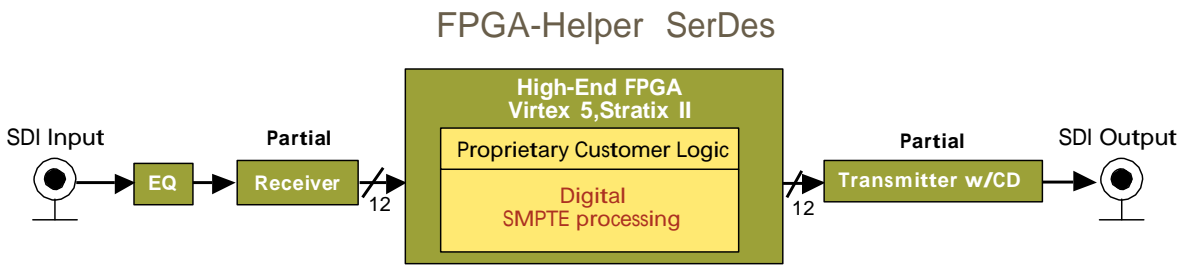
Integrated Transceiver FPGAs
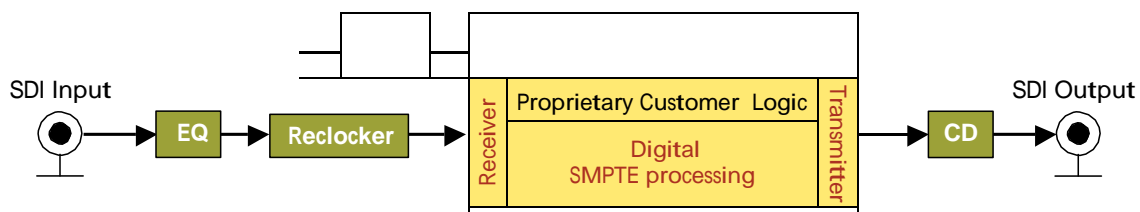
fpGa-helper architecture

The FPGA-helper architecture, as depicted below, involves the use of a component that includes the physical media attachment part of a SMPTE receiver/transmitter, with the digital SMPTE processing implemented in the FPGA. The result is an architecture that is taxing in terms of power consumption and that FPGA-helper parts are lacking, in terms of feature offering. In many cases, customer code 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, creating further penalties in power consumption, size and system cost. And 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 with the customer code means a slower time-to-market. Finally, while some FPGA-helper parts integrate a cable driver, the offering lacks an integrated equalizer.

FPGA-Helper SerDes

SDI Input — EQ — **Partial** Receiver — /12 — **High-End FPGA Virtex 5, Stratix II** (Proprietary Customer Logic / Digital SMPTE processing) — /12 — **Partial** Transmitter w/CD — SDI Output

how the Gennum solution stacKs up

Compare the ratings of each of the 3 architectures for key parameters in an implementation of 1 Rx and 1 Tx channel.

	Gennum complete solution	inteGrated-transceiver fpGa	fpGa-helper serdes
Jitter Performance	■	■	■
Time-to-Market	■	■	■
Power Consumption	■	■	■
Component/Feature Integration	■	■	■
Overall PCB Space	■	■	■
System Cost	■	■	■

Legend
■ Best in Category
■ Compromise Involved
■ worst in Category

The easiest, fastest, lowest power method of implementing an SDI or ASI link.

3Gb/s-sdi

Gennum's GS2972 and GS2962 are fully compliant with SMPTE 424M and 425M including support for both Level A and Level B. In addition, these chips are the only solutions providing conversion from Level A to Level B. The full set of included features makes these devices the ideal choice for 1080p 50/60 transmission.

complete video processinG

Gennum 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 Gennum transmitters are DVB/ASI capable. The GS9092A is ideally suited for this application due to its low power and small size.

audio embeddinG

Gennum's 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 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 Gennum's transmitters provides the lowest power and smallest means of implementing an SDI link.

applications

Cameras, camera control units, multiviewers, routers, production switchers, master control switchers, VTRs, video servers, encoders/decoders, up/down/cross converters, audio embedders, format detectors, test and measurement equipment
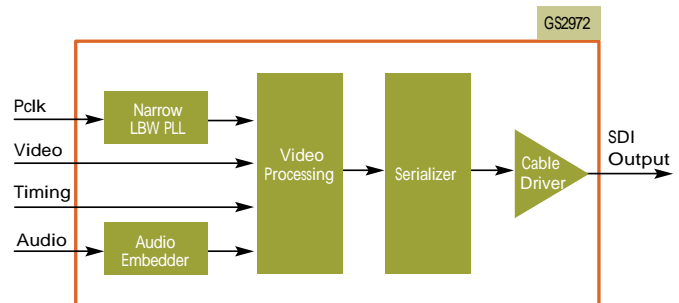
	Gs2972	Gs2962	Gs1582	Gs1572	Gs9092a
Data Rate (Mb/s)	270, 1485, 2970	270, 1485, 2970	270, 1485	270, 1485	270
Video Processing	YES	YES	YES	YES	YES
DVB/ASI	YES	YES	YES	YES	YES
VCO	YES	YES	GO1555	GO1555	YES
Ancillary Data Insertion	YES	YES	YES	YES	YES
Audio Embedder	YES	NO	YES	NO	NO
Cable Driver	YES	YES	YES	YES	YES
Parallel Bus Width	10 or 20	10 or 20	10 or 20	10 or 20	10
CEA 861 Timing	YES	YES	YES	YES	NO
Temp Range (ºC)	-20 - 85	-20 - 85	-20 - 85	-20 - 85	0 - 70
Power (mW)	400	370	490	440	200
Standby	YES	YES	YES	YES	NO
Package	BGA 100	BGA 100	BGA 100	BGA 100	QFN 56

Receivers

The easiest, fastest, lowest power method of implementing an SDI or ASI link.

3Gb/s-sdi

Gennum's new GS2971 and GS2961 receivers take integration to the next level by incorporating Gennum's latest equalization technology for a compact, comprehensive, single-chip receive solution that also includes a VCO, a reclocker, and digital SMPTE video and audio processing. Gennum's 3G receivers are fully compliant with SMPTE 424M and 425M including support for both Level A and Level B. In addition, Gennum receivers are the only solutions providing conversion from Level B to Level A. The full set of included features makes these devices the ideal choice for 1080p 50/60.

complete video processinG

Gennum receivers have the most complete video processing features available. These include, but are not limited to: descrambling, word alignment, comprehensive error detection and correction, and ancillary data extraction.

Great for dvb/asi

All Gennum recievers are DVB/ASI capable. The GS9090B is ideally suited for this application due to its low power and small size.

audio de-embeddinG

GS2971 includes an integrated audio de-embedder supporting AES, I²S, and serial audio formats. The chip also features an integrated audio clock generator.

unprecedented cable lenGths

The next generation leading edge cable equalizer technology integrated into the GS2971 means that cables can run for very long distances before connecting to the GS2971's BNC connector. The GS2971 can handle cable runs in excess of 150m at 3G data rates.

applications

Monitors, camera control units, multiviewers, routers, production switchers, master control switchers, VTRs, video servers, encoders/decoders, up/down/cross converters, audio de-embedders, format detectors, test and measurement equipment
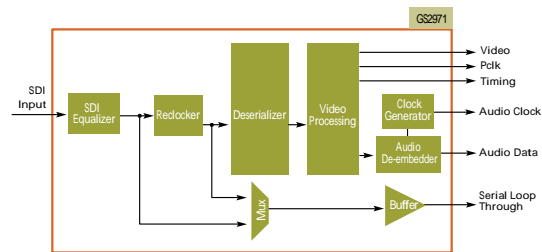
	Gs2971	Gs2961	Gs2970	Gs2960	Gs1559	Gs9091b	Gs9090b
Data Rate (Mb/s)	270, 1485, 2970	270, 1485, 2970	270, 1485, 2970	270, 1485, 2970	270, 1485	270	270
Equalizer	YES	YES	NO	NO	NO	YES	NO
Video Processing	YES	YES	YES	YES	YES	YES	YES
DVB/ASI	YES	YES	YES	YES	YES	YES	YES
Serial Loop Through	YES	YES	YES	YES	YES	NO	NO
VCO	YES	YES	YES	YES	GO1555	YES	YES
Ancillary Data Extraction	YES	YES	YES	YES	NO	YES	YES
Audio De-embedder	YES	NO	YES	NO	NO	NO	NO
Audio Clock Generator	YES	NO	YES	NO	NO	NO	NO
Parallel Bus Width	10 or 20	10 or 20	10 or 20	10 or 20	10 or 20	10	10
CEA 861 Timing	YES	YES	YES	YES	NO	NO	NO
Temp Range (ºC)	-20 to +85	-20 to +85	-20 to +85	-20 to +85	0 to +70	0 to +70	0 to +70
Power (mW)	545	515	350	320	500	350	145
Standby	YES	YES	YES	YES	NO	NO	NO
Package	BGA 100	BGA 100	BGA 100	BGA 100	BGA 100	BGA 100	QFN 56

The easiest way to transport SDI video over PCI Express

complete pci express solution

Gennum provides a complete solution for video capture/
playout over PCI Express including the GN4124
PCI Express-to-local bus bridge, SDI transmitters/receivers,
software, and firmware.

pci express bridGe

The heart of the Gennum PCI Express video solution is the
GN4124, a 4-lane PCI Express-to-local bus bridge. Unlike
legacy bridge solutions (PCIe to PCI bridges), the GN4124
takes full advantage of the performance features of PCIe.

The GN4124 is designed to work as a companion to FPGA
devices to provide a complete bridging solution. The GN4124
contains a PCI Express compliant PHY and the link and
transaction layers, and an applications interface.

Since the PCI Express transaction/link IP is hard-wired
into the GN4124, there is no need to license PCIe IP. Using
the GN4124 allows FPGA resources to be spent on what
differentiates the product.

live on power-up

The GN4124 devices are live on power-up so that a plug-and-
play BIOS can auto-detect them without an attached FPGA
having to be configured.

fpGa on-the-fly confiGuration loader

An FPGA configuration bitstream may be downloaded from
the host system over PCIe to the attached FPGA. This
eliminates the expense of a dedicated FPGA ROM and makes
on-the-fly reconfiguration and firmware upgrades simple.
Any application requiring dynamic reconfiguration can
benefit from the use of the GN4124 as a companion device.

*Gullwing RDK Board*

local bus interface

The local bus interface uses dual data rate to accomplish up
to 800MB/s of local bus peak throughput in each direction
(1600MB/s total peak throughput). The local bus facilitates
master mode and target mode read/write transactions.

firmware/software

The Gennum video capture solution includes FPGA firmware
and driver software is provided at no extra cost when used
with the GN4124.

reference desiGn Kit available

A complete RDK for video capture is available. The RDK
hardware for video capture consists of the Gullwing RDK
board and works in conjunction with select Gennum SDI
transmitter/receiver evaluation boards.
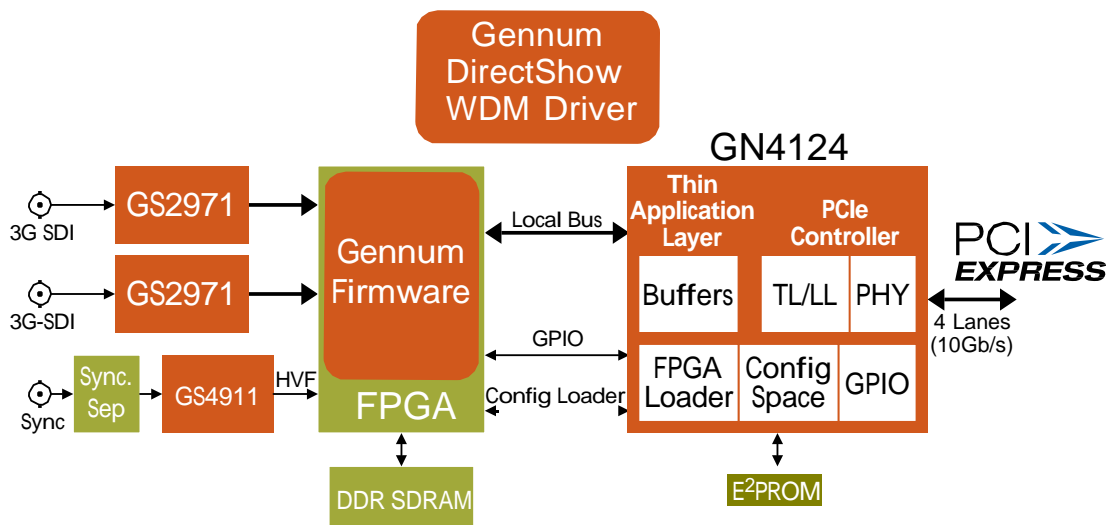
Gennum 3G SDI Capture block diagram

PCI Express® Video Streaming Solution

pci express cable extension solution

Gennum PCIe re-driver solutions provide new alternatives for system partitioning and extension. The GN1407 quad PCIe re-driver, and the GN1406 quad retiming re-driver, allow PCI Express to be extended across long cables to allow entire subsystems to be distributed throughout an equipment room and communicate via PCI Express.
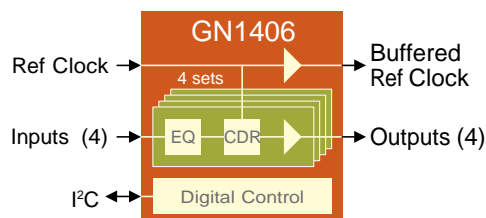
pcie re-driver and retiminG re-driver

GN1406 provide high-gain equalization (up to 24dB) for PCI Express for Gen1/Gen2 data rates to compensate for cable losses. Standard PCI Express cable may be used or lower cost alternatives such as CAT5/6. The GN1406 is unique in that it also provides retiming in order to achieve the longest cable lengths and address impairments such as crosstalk, source jitter, interpair skew, and reflections that cannot be compensated for by equalization alone. By resetting the jitter budget through retiming, the GN1406 provides the greatest robustness and lowest jitter solution available. Each of the 4 channels in the GN1406 includes independently adjustable equalization and de-emphasis.
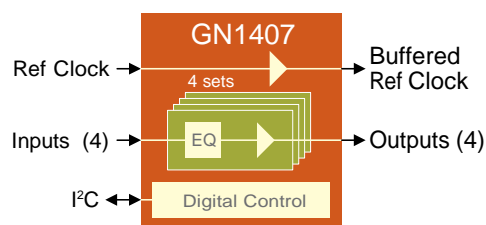
GN1407 is similar to GN1406 by configuration, except that it does not have the retiming and de-emphasis features. Each of the four channels includes independently adjustable equalization settings up to 24dB. This solution is ideal to recover signal attenuation loss due to input trace or cable lengths, sitting close to the receiver point.

A complete reference design kit, including schematics and board layout, is available from Gennum.

	Gn1406	Gn1407
Number of Channels	4	4
Data Rate Support (Gb/s)	Retimed: 2.5, 3.125, 5, 6.25 Equalizer Only: 1.25-8 Gb/s	1.25-8 Gb/s
Equalizer Gain	Programmable Up to 24dB	
Power Consumption (per channel)	Retimed: 100mW Equalizer Only: 70mW	70mW
Jitter Compensation	Transmitter & Channel Deterministic & Random Jitter	Channel Deterministic Jitter
PCI Express Compliance	Protocol Transparent, Electrical Idle Preservation, Supports Spread Spectrum Clocking and Receiver Detection by Switchable Input Termination, SIG Compliance Tested	
Device Control	Individual Channel Control and Monitoring, Control via Micro Using I2C or Initialize Using Small I2C EEPROM	
Output De-Emphasis	Programmable up to 20dB	–
Package	8x8 QFN (Footprint Compatible With GN1407)	8x8 QFN (Footprint Compatible With GN1406)

Longest reach connectivity for HDMI® and DisplayPort™

HDMI version 1.3 and DisplayPort version 1.1 offer new and exciting next generation features such as higher resolution video, Deep Color, and higher frame rates that can enable a whole new user experience. But to get the full spectrum of features and benefits, higher data rates are required. Gennum's ActiveConnect solutions offer the benefits of impeccable signal integrity at these data rates over long reaches, along with the ability to support full HDMI 1.3 and DisplayPort.

lonGest reach
Gennum's ActiveConnect technology can enable the longest reach HDMI and DisplayPort solutions, with extension up to 100m over copper cables.

next Generation performance
Future proof your design with ActiveConnect, the highest performance solution with twice the data rate of current HDMI 1.3 and DisplayPort 1.1 standards.

pluG and play
Gennum offers fully adaptive plug and play solutions that automatically adjust to various cable lengths.

turnKey reference desiGns available
Turnkey reference design kits (RDKs) are available for different copper media such as Coax, CATx and shielded twisted pair (STP) cables. RDKs consist of evaluation units, design collateral and design files to help enable time to market. Please see table below for details on Gennum's ActiveConnect RDKs.

activeconnect reference desiGn Kits

	hdmi over coax	hdmi over catx	displayport over stp
Chipset(s)	GV8500 Transmitter GV8501 Receiver	GV8500 Transmitter GV8501 Receiver	GV8502A Receiver
Cable Type	RGBHV or RGBS	Cat5e or Cat6	DisplayPort Cables
Data Rate (Gb/s)	10.2	6.8	21.6
Max Distance @ 5Gb/s (1080p60)	100m	60m	30m
Auto-Adaptive / Fixed gain	Auto	Auto	Fixed

Evaluation Boards & Reference Design Kits (EB/rdk)

product function	EB/RDK PART	DESCRIPTION
transmitters		
3G sdi transmitter	EBK-GS2972-00	GS2972 evaluation board; mates with the GS2960, GS2970 or GS2971 evaluation boards
3G sdi transmitter	EBK-GS2962-00	GS2962 evaluation board; mates with the GS2960, GS2970 or GS2971 evaluation boards
hd-sdi transmitter	EBK-GS1582-00	Rev B GS1582 evaluation board
hd-sdi transmitter	EBK-GS1572-00	Rev A GS1572 evaluation board
sd-sdi transmitter	EBK-GS9092A-00	GS9092A evaluation board
receivers		
3G sdi receiver	EBK-GS2971-00	GS2971 evaluation board that can mate with the GS2972 evaluation board, a Spartan-3A evaluation kit or a Cyclone III evaluation kit
3G sdi receiver	EBK-GS2970-00	GS2970 evaluation board; mates with the GS2962 or GS2972 evaluation boards
3G sdi receiver	EBK-GS2960-00	GS2960 evaluation board; mates with the GS2962 or GS2972 evaluation boards
sd-sdi receiver	EBK-GS9090B-00	GS9090B evaluation board
sd-sdi receiver	EBK-GS9091B-00	GS9091B evaluation board
transmitters & receivers		
3G sdi transceiver + vom	RDK-3GRXTXO-XLNX00	RDK with 2 SDI receivers, 2 SDI transmitters and 1 VOM input; mates with Spartan-3A evaluation kit; connectors for audio insertion and extraction
3G sdi transceiver + vom	RDK-3GRXTXO-ALTR00	RDK with 2 SDI receivers, 2 SDI transmitters and 1 VOM input; mates with Cyclone III evaluation kit; connectors for audio insertion and extraction
equalizers, reclocKers, cable drivers & dc restore		
3G sdi reclocker	EBK-GS2985-00	GS2985 system evaluation board (GS2984, GS2985 and GS2988)
3G sdi equalizer	EBK-GS2984-00	GS2984 evaluation board (GS2984 only)
3G sdi cable driver	EBK-GS2989-00	GS2989 four output evaluation board (GS2989 only)
3G sdi dc restore	EBK-GS2914-00	GS2914 evaluation board (GS2914 only)
3G sdi reclocker	EBK-GS2975A-00	GS2975A evaluation board - 2 SDI outputs (GS2974A, GS2975A and GS2978)
3G sdi reclocker	EBK-GS2975A-01	GS2975A evaluation board- 5 SDI outputs (GS2974A, GS2975A and GS2978x4)
timinG		
sdi timing	EBK-GS4911B-00	GS4911B evaluation board (GS4911B, GS4982)
optical modules		
3G sdi optical module	EBK-GO2900-00	Evaluation board compatible will all optical modules in GO29xx series
3G sdi optical module	EBK-GO2900-01	Optical system evaluation board which integrates GO29xx series optical modules with GS2975A, GS2974A and GS2978
pci express®		
Gen1/2 re-timing/re-driver	EBK-GN1406-00	GN1406 evaluation board
Gen 1/2/3 re-driver	EBK-GN1407-00	GN1407 evaluation board
Gen1 bridge	RDK-GN4124-PCIE0x	Video capture implementation using the GN4124
Gen1/2 re-timing/re-driver	RDK-GN1406-PCIE01	GN1406 RDK that includes: host interface board, expansion card, PCIe cable
Gen 1/2/3 re-driver	RDK-GN1407-PCIE01	GN1407 RDK that includes: host interface board, expansion card, PCIe cable
activeconnect™		
hdmi over 5-coax	RDK-5COAX-HDMI00	Transmit/Receive RDK for HDMI 1.3 up to 100m using the GV8500 and GV8501
hdmi over catx	RDK-CATX-HDMI00	Transmit/Receive RDK for HDMI 1.3 up to 60m using the GV8500 and GV8501
displayport over stp	RDK-GV8502-DP02	Receive-only RDK for DP 1.1 signals up to 30m using the GV8502

Gennum corporate headquarters
4281 Harvester Road
Burlington, Ontario L7L 5M4
Canada
Phone: (905) 632-2996
Fax: (905) 632-2055
Email: corporate@gennum.com
web: gennum.com

sales contacts

Germany
Hainbuchenstraße 2
80935 Munich
Germany
Phone: 011-49-89-35831696
Fax: 011-49-89-35804653

india
#208(A), nirmala Plaza
Airport Road, Forest Park Square
Bhubaneswar- 751009, Orissa
India
Phone: 011-91-674-653-4815
Fax: 011-91-674-259-5733

Japan KK
Shinjuku Green Tower, Building 27F
6-14-1, nishi Shinjuku,
Shinjuku-ku, Tokyo, 160-0023
Japan
Phone: 81-03-3349-5501
Fax: 81-03-3349-5505

Korea
8F, Jinnex Lakeview Building
65-2, Bangidong, Songpagu, Seoul
Korea 138-828
Phone: 82-2-414-2991
Fax: 82-2-414-2998

taiwan
6F-4, no.51, Sec.2, Keelung Road
Sinyi District, Taipei City 11502
Taiwan R.O.C.
Phone: (886) 2-8732-8879
Fax: (886) 2-8732-8870

united states
western region
691 South Milpitas Blvd.
Suite 200,
Milpitas, California, 95035
United States
Phone: (408) 934-1301
Fax: (408) 934-1029

united states
eastern region
4281 Harvester Road
Burlington, Ontario L7L 5M4
Canada
Phone: (905) 632-2996
Fax: (905) 632-2055