

# optical

**2014 - High Performance Portfolio**

## **Optical & IC Selector Guide**

- TIAs
- ROSAs
- Single-Lane CDRs
- Dual-Lane CDRs
- Quad-Lane CDRs
- Multi-Lane Signal Conditioners
- Laser & Modulator Drivers
- Limiting Amplifiers
- Mux/DMux ICs
- Transceiver ICs
- Optical & Copper Reference Design Kits

**High-Speed Communications** Products

  
**SEMTECH**

## contents

Overview	1
Semtech Solutions	3
Emerging Technology	4
Optical Applications	5
Copper Applications	6
<hr/>	
TIAs	7
ROSAs	9
Super High Gain ROSAs	10
40Gbps - 100Gbps SerDes	11
Single-Lane CDRs	12
Optical Module CDRs	13
Backplane & Linecard Signal Conditioners	14
Laser Drivers and Limiting Amplifiers	15
Transceiver IC's (LD & LA)	16
Optical Module Reference Design Kits	17
CDR-based Copper Cable Assembly Reference Design Kits	18
Portfolio Summary	19

# High Performance Optical and Copper Products

Shipping more than 150 million Optical ICs, Semtech is an active contributor to networking standards development. This combination of real-world experience and industry leadership enables us to deliver the most complex solutions to our customers' designs.

Semtech designs the industry's most innovative optical, analog and mixed signal semiconductor solutions to serve the rising global demand for high-speed data transmission products—robust solutions that improve performance and reliability, simplify design, lower system costs and speed time-to-market.

Semtech offers one of the industry's most comprehensive portfolios of optical transceiver IC products ranging from 100Mb/s-100Gbps supporting such key industry standards such as Fibre Channel, InfiniBand®, Ethernet, PON, SONET and PCI Express®. Semtech is also investing in leading edge technologies to enable communication systems at 400Gbps and beyond.

For optical component suppliers, this highly differentiated set of products provides a unique roadmap that improves performance and reliability, simplifies design, lowers costs and speeds time-to-market.

For systems designers and manufacturers working on the next generation of high-speed networks, Semtech's multi-lane and multi-rate 10Gbps-100Gbps backplane solutions provide cost-effective, low power, high performance products to enable next-generation networks.



## Enabling High Performance, High-Speed:

- Class leading IC solutions for 100G applications in CFP, CFP2/4 and QSFP modules
- Receive Optical Sub-Assembly (ROSA) based on Semtech's Rchip technology
- Full portfolio of integrated solutions to address all SFP+ and XFP modules
- Dual lane CDRs (Tx/Rx) with integrated DML or EML driver
- Low power, reference-free CDRs
- Limiting amplifiers (LA) that provide wideband, low noise post-amplification
- Transimpedance amplifiers (TIAs) that exceed the IEEE 10GbE Stressed Receiver Sensitivity (SRS) specifications
- High performance, low power laser drivers
- Full portfolio of integrated solutions for all PON applications including complete reference designs
- Industry's first single-chip 10G PON transceivers for symmetric and asymmetric applications
- Industry's first quad 10 Gbps CDR, enabling long reach Infiniband® QDR, 40 GbE and 100 GbE applications
- Protocol-independent repeaters/redrivers
- SFP+ reference design kits for optical module and copper cable assemblies to decrease design time
- Industry's most complete portfolio of MUX and DMUX devices for lineside and client side applications

## Building the Future Together

As networking requirements continue to evolve, so will we, working with customers to provide solutions for tomorrow's networking challenges. One thing that won't change, however, is Semtech's commitment to being a reliable partner and providing innovative approaches that deliver unrivaled performance for the most sophisticated applications.

# Technology Leadership for the Future of Optical Communications

## TECHNOLOGIES

### CDRs

Market leader in CDRs

Reference-Free operation

Integrated solutions to address power requirements of emerging SFP+ SONET market

### ROSAs

Best-in-class sensitivity, based on our patented Rchip technology

### TIAs

Proven reliability, with over 100 million sold

### LASER DRIVERS & LIMITING AMPS

Industry-leading integrated solutions.

## MARKETS

### 100G ETHERNET

Class leading CDRs, TIAs, drivers and gearbox chips

Solutions for CFP, CFP2/4 and QSFP

### 40G/100G DWDM

Complete chipset for 40G DPSK, DQPSK and ODB

Industry leading 100G DP-QPSK MUX devices

### 16G FIBRE CHANNEL

Industry's first complete integrated IC solution for 16G Fibre Channel

### 10G

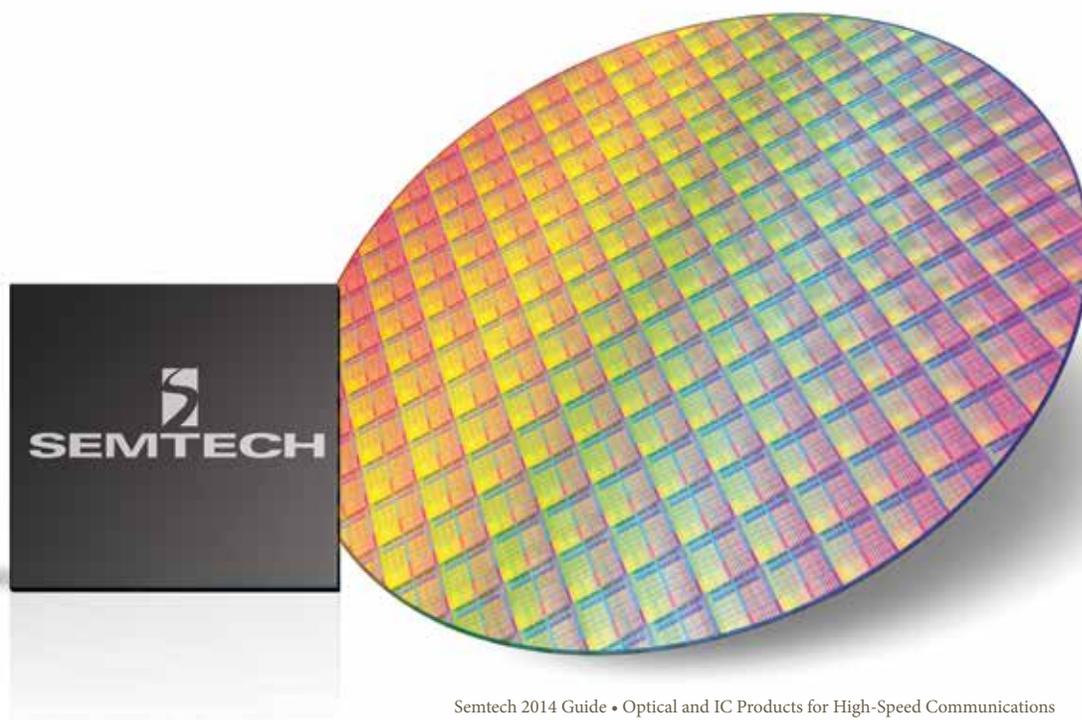
Complete portfolio of module IC and backplane solutions

Solutions for XFP, SFP+, QSFP+

### PON/FTTH

Industry's first fully integrated 10G PON solutions

Highly integrated chipset solutions for EPON & GPON ONU/OLT





# Emerging Technology 100G and 400G Physical Layer Solutions

---

## **GN3484 FULLY HERMETIC 4 X 28GBPS LR4 ROSA.**

- Low Power Dissipation
- Sensitivity per lane : -14dBm
- Optical Return Loss : 26dB

## **GN1185 HIGH PERFORMANCE 4 X 28GBPS DML LASER DRIVER**

## **GN1085 LOW POWER 4 X 28GBPS TIA**

- 4 x 28Gbps Linear TIAs for advanced modulation schemes
- Compatible with emerging physical layer standards

## **PON/FTTH SOLUTIONS**

- GN7050 10G EPON Burst Mode TIA

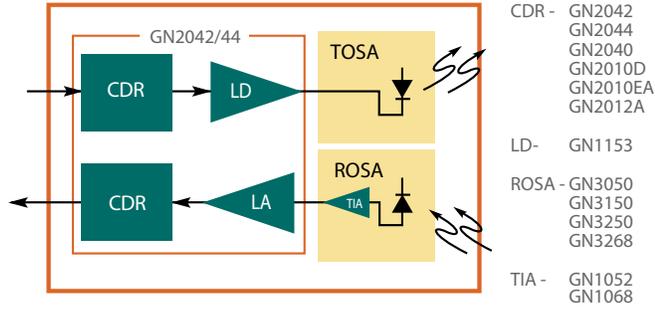
## **GN2104 & GN2106**

- High performance reference-free quad CDRs for next-generation networks
- Industry-leading power dissipation

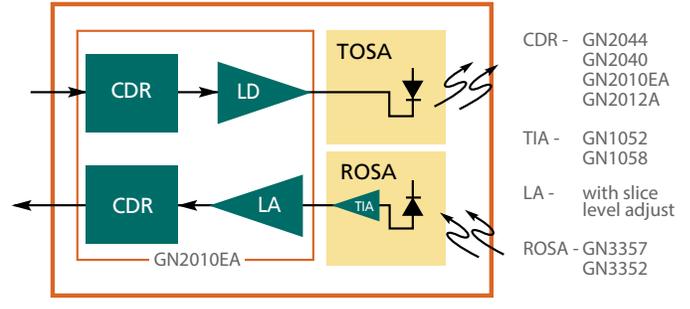
# Optical Applications

Semtech products offer a comprehensive selection of optical transceiver ICs and components for all 10GbE and OC-192 module form factors, as well as copper solutions for high-speed serial line card and backplane communications.

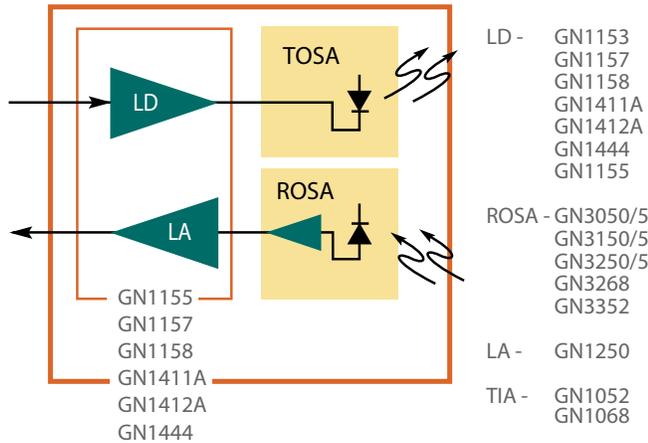
**10G XFP Retimed SFP+ Module for  $\leq 40\text{Km}$  Applications**



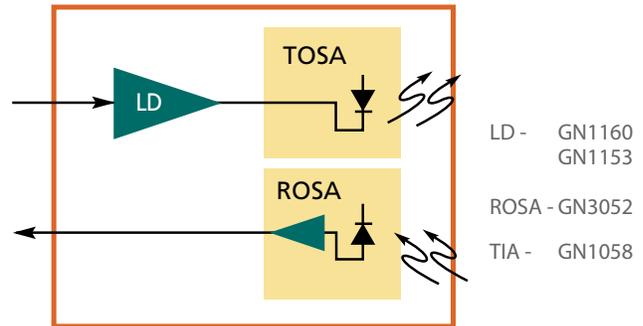
**10G XFP Module for  $\leq 80\text{Km}$  Applications**



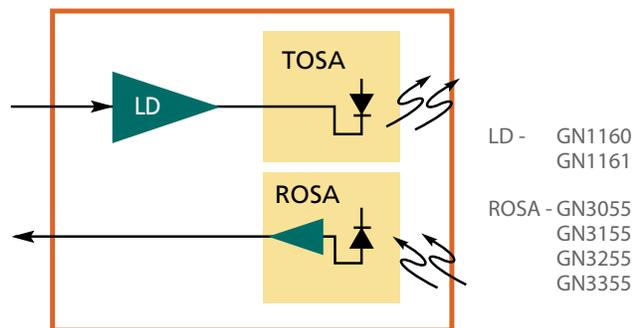
**6/8/10G SFP+ Module Applications**



**10G SFP+ LRM Module Applications**



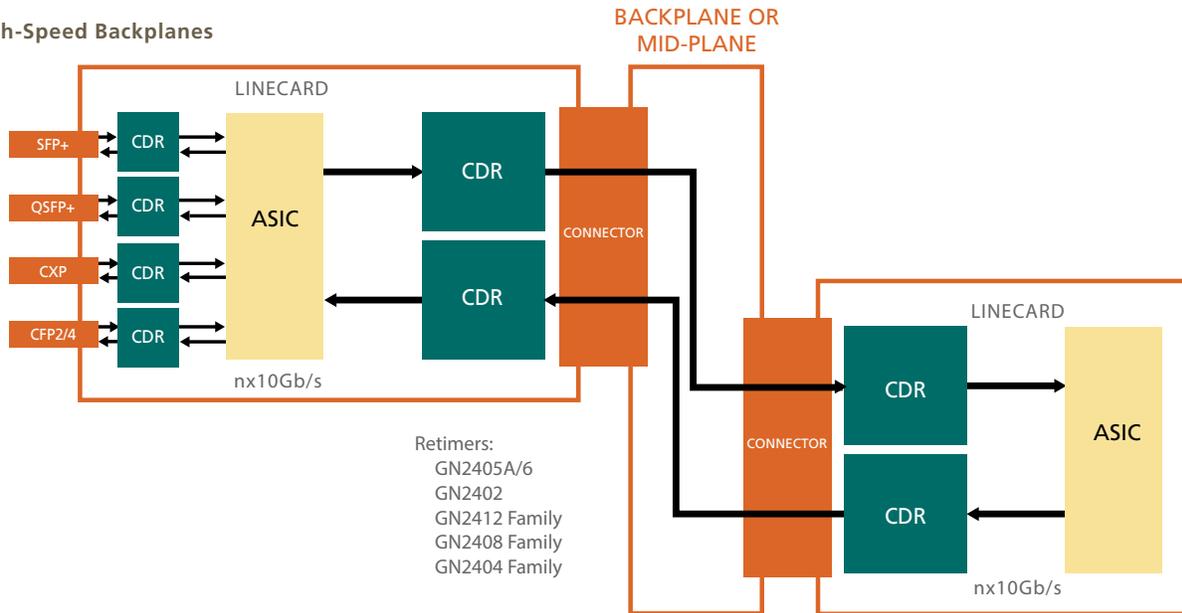
**Lowest power, LA Free SFP+ Architecture**



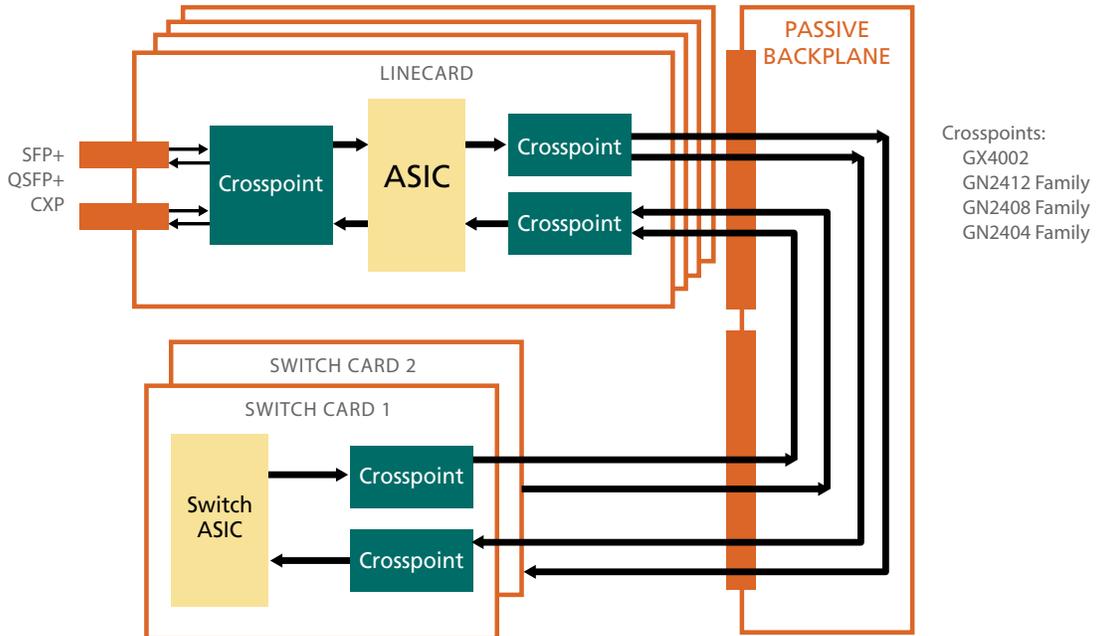
# Copper Applications

Semtech products offer a comprehensive selection of optical transceiver ICs and components for all 10GbE and OC-192 module form factors, as well as copper solutions for high-speed serial line card and backplane communications.

## High-Speed Backplanes



## Retimed Crosspoints



# TIA's

Wideband, low noise transimpedance amplifiers (TIAs) for your optical communication applications.

Semtech offers a portfolio of fully integrated Silicon Germanium (SiGe) BiCMOS and pure CMOS transimpedance amplifiers providing wideband, low noise pre-amplification of a current signal from a PIN photodiode or APD. Semtech's TIAs offer best-in-class performance in limiting, linear or automatic gain control versions for use in high performance optical receivers operating from 155 Mb/s to 28Gbps.

## FEATURES

- Wideband, low noise TIAs
- Limiting, linear and AGC versions
- Fully integrated on-chip de-coupling for low cost and best performance

## APPLICATIONS

- ITU/IEEE-based transmission systems
- 10G and 100G Ethernet
- SONET/SDH based transmission systems, test equipment and optical modules from OC-3 to OC-192
- 8G and 16G Fibre Channel
- Serial data systems up to 28Gbps
- PON/FTTH systems – BPON, EPON, GPON, 10GEPON and XG-PON
- 6G and 10G CPRI modules for wireless back haul
- 100Gbps Client side modules

## NT20R67

Low cost 3.3V to 5.0V CMOS PIN TIA with automatic gain control and more than 43dB dynamic range for Optical Fiber applications up to 200Mb/s.

## NT23L50

622Mb/s high sensitivity TIA for FTTH and Telecom Fiber transceiver applications.

## NT24L50

1.25Gbps high sensitivity TIA with automatic gain control for FTTH and datacom fiber transceiver applications.

## NT24L55

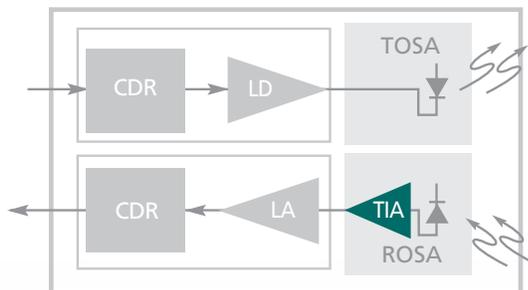
Super high sensitivity, high performance CMOS 1.25 Gbps TIA with 35dB of dynamic operating range designed for FTTH applications such as GePON transceivers and long haul telecom/datacom applications.

## NT25L51

2.5 Gbps CMOS TIA for FTTH and Telecom Fiber transceiver applications with automatic gain control enabling over 27 dB of dynamic operating range.

## NT25L59

2.5 Gbps high sensitivity CMOS TIA for GPON with automatic gain control enabling over 30 dB of dynamic operating range.



**GN1056**

Linear TIA for high performance APD applications such as ultra-long haul telecom and submarine applications.

**GN1058**

High gain TIA optimized for applications requiring AGC, such as 10GBASE-LRM and DWDM receivers for low OSNR environments.

**GN7068**

Limiting TIA designed for APD applications such as ROSAs for 10G PON OLT's and 10GBASE-ZR transceivers modules.

**GN1068**

Multi-rate limiting TIA providing high gain and wideband performance for use in Ethernet and emerging 16G Fibre Channel applications.

**GN7050, GN7051, GN7052, GN7053**

Limiting TIA's designed specifically for 1G EPON, 1G GPON, 2.5G XG-PON and 10G EPON OLT applications.

**GN1083**

4x28Gbps limiting TIA optimized for 100GBASE-LR4 applications.

TIAs							
Part Number	Overview	Data Rate (Gbps)	Gain	BW (GHz)	Supply (V)	Noise	Applications
NT20R67	155 Mb/s AGC TIA	0.155	63k $\Omega$	0.165	3.3/5.0	11 nA	OC-3, Fast Ethernet
NT20O67	155 Mb/s AGC TIA	0.155	23k $\Omega$	0.165	3.3/5.0	11 nA	OC-3, Fast Ethernet
NT23L50	622 Mb/s AGC TIA	0.622	50k $\Omega$	0.32	3.3	60 nA	OC-12, BPON
NT24L50	1.25 Gbps AGC TIA	1.25	25k $\Omega$	0.75	3.3	92 nA	GbE, EPON
NT24L55	1.25 Gbps High Sensitivity AGC TIA	1.25	46k $\Omega$	0.75	3.3	74 nA	EPON
NT25L51	2.5 Gbps AGC TIA	2.5	8k $\Omega$	1.7	3.3	230 nA	OC-48, GPON (APD)
GN25L52	2.5 Gbps AGC TIA	2.5	6.5k $\Omega$	1.85	3.3	455 nA	OC-48, GPON (APD)
NT25L59	2.5 Gbps High Sensitivity AGC TIA	2.5	29k $\Omega$	1.5	3.3	108 nA	GPON (PD)
GN1056	10G Linear	to 11.3	500/1k $\Omega$	12	+3.3	1 $\mu$ A	OC-192
GN1058	10G Linear AGC	to 11.3	4k $\Omega$	12	+3.3	1 $\mu$ A	10GBASE-LRM & DWDM
GN7068	10G Limiting	to 11.3	3k $\Omega$	12	+3.3	1 $\mu$ A	APD ROSAs for 10G PON ONU & 10GBASE-ZR
GN1068	14G Limiting	to 14.3	6.75k $\Omega$	12	+3.3	1.2 $\mu$ A	10GBASES-SR/LR/ER & 16G FC
GN7050	1.25G Burst mode Limiting	1.25	12k $\Omega$	*	*	*	1G EPON OLT
GN7051	2.5G Burst mode Limiting	2.5	1.5k $\Omega$	*	*	*	2.5G XG-PON OLT
GN7052	Tri-rate PON TIA	1.25/2.5/10.3	2k $\Omega$	*	*	*	1.25G EPON/ 2.5G XG-PON / 10G EPON OLT
GN7053	1G GPON Burst mode Limiting	1.25	1.25k $\Omega$	*	*	*	1G GPON OLT
GN1083	Quad 25G Limiting	100	6.3k $\Omega$	*	*	*	100GBASE-LR4

\* Please contact your sales representative for a detailed datasheet.

# ROSAs

Best-in-class receive optical sub-assemblies (ROSAs) based on patented Rchip technology.

Semtech's complete line of PIN and APD ROSA products spans 850 nanometer (nm) to 1550nm including limiting, linear and automatic gain control (AGC) functionality. Our PIN ROSAs operate at  $+3.3V \pm 10\%$  and from  $-40^{\circ}C$  to  $+85^{\circ}C$ , with highly accurate RSSI functionality and industry best dynamic range. The ROSA products feature patented Rchip packaged in a fully compliant SC or LC type optical subassembly and are available with optional flex circuits.

Super High Gain Rchip ROSAs deliver  $35k\Omega$  of gain that eliminates the cost and power of the limiting amplifier for SFP+ applications.

## FEATURES:

- Best-in-class stressed receiver sensitivity
- High gain to ensure exceptional crosstalk performance within the module
- Patented Rchip technology to ensure maximum module manufacturing yield
- Super High Gain deliver most integrated, lowest power SFP+ solution

## APPLICATIONS:

- 10GBASE-LR
- 10GBASE-ER
- 10GBASE-LRM
- OC-192 SR-1
- OC-192 IR-2
- 10G EPON
- 80 km
- DWDM
- 8GFC & 10GFC
- 100GBASE-LR4



GN3352-PT  
ROSA

GN3250  
ROSA

## GN3150

850nm limiting ROSA is ideal for 10GBASE-SR and 8G Fibre Channel applications.

## GN3050

10 km limiting ROSA provides excellent performance achieving  $-21dBm$  unstressed sensitivity. Ideal for 10GBASELR and SR-1.

## GN3250

10/40 km XMD compatible limiting ROSA provides excellent  $-21dBm$  unstressed sensitivity and high ORL for 10GBASE-ER and IR-2 applications.

## GN3052

AGC ROSA for 10 GbE LRM and linear applications. Interoperability with all leading EDC solutions for LRM.

## GN3068

11.3Gbps low power PIN limiting ROSA for 10km applications. Features unique crosstalk-reducing architecture.

## GN3257

11.3Gbps linear PIN ROSA with AGC for DWDM applications. Gives excellent performance in low-OSNR environments.

## GN3357

11.3Gbps APD ROSA with AGC TIA is ideal for both 80km limiting and DWDM applications requiring excellent OSNR performance.

## GN3268

10/40 km XMD compatible low power (94 mW) limiting ROSA

## GN3352

11.3Gbps APD linear ROSA with AGC for 80km applications.

## GN3483

4x28G ROSA for 100GbE LR4 applications. Incorporating Semtech's patented Rchip technology in a single small package for CFP2, CFP4 and QSFP.



GN3483  
ROSA

# Semtech's Super High Gain ROSAs

Best-in-class receive optical sub-assemblies (ROSAs) based on patented Rchip technology.

Super High Gain ROSAs deliver 300mV module output swing allowing for new SFP+ architecture. 125mW total power dissipation achieving approximately 100mW power savings over traditional architecture.

## GN3155

Super High Gain 850nm limiting ROSA is ideal for 10GBASE-SR and 8G Fibre Channel applications.

## GN3055

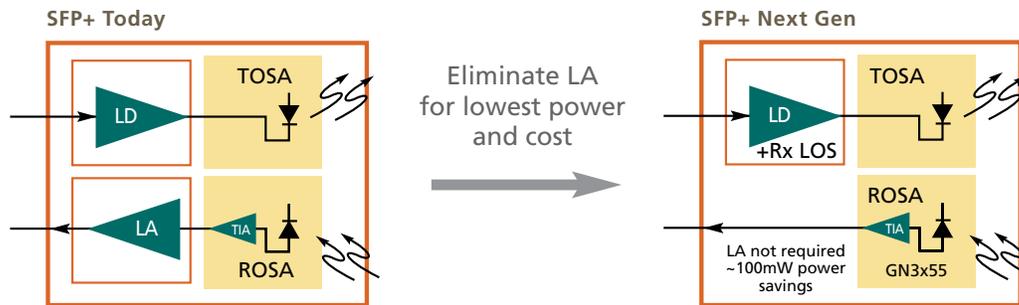
Super High Gain 10 km limiting ROSA provides excellent performance achieving -21dBm unstressed sensitivity. Ideal for 10GBASELR and SR-1.

## GN3255

Super High Gain 10/40 km XMD compatible limiting ROSA provides excellent -21dBm unstressed sensitivity and high ORL for 10GBASE-ER and IR-2 applications.

## GN3355

High Gain APD limiting ROSA optimized for TDM application provides best in class sensitivity and crosstalk.



ROSAs & SUPER HIGH GAIN ROSAs								
Part Number	Overview	Data Rate (Gbps)	Gain	Supply	RSSI	Unstressed Sensitivity	Stressed Sensitivity	ORL
GN3150	SR Rchip Limiting	to 11.3	10kΩ	+3.3V ± 10%	Yes	-15dBm OMA	-13.5dBm OMA (BASE-SR)	-14dB
GN3050	10km Rchip Limiting	to 11.3	10kΩ	+3.3V ± 10%	Yes	-21dBm	-16.8dBm OMA (BASE-L)	-14dB
GN3250	40km Rchip Limiting	to 11.3	10kΩ	+3.3V ± 10%	Yes	-21dBm	-16.0dBm OMA (BASE-E)	-27dB
GN3052	LRM Rchip AGC	to 11.3	9kΩ	+3.3V ± 10%	Yes	-17dBm OMA	-12dBm OMA (LRM Symmetric, 6" FR4)	-14dB
GN3257	PIN with AGC	to 11.3	8.5kΩ	+3.3V ± 10%	Yes	-19dBm	-	-27dB
GN3352	APD with AGC	to 11.3	4kΩ	+3.3V ± 10%	VAPD	-27dBm	-	-27dB
GN3357	APD with AGC	to 11.3	8.5kΩ	+3.3V ± 10%	VAPD	-27dBm	-	-27dB
GN3055	10km Super High Gain Rchip	to 11.3	35kΩ	+3.3V ± 10%	-	-21dBm	Eliminate LA in SFP+	-14dB
GN3155	SR Super High Gain Rchip	to 11.3	35kΩ	+3.3V ± 10%	Yes	-15dBm OMA	Eliminate LA in SFP+	-14dB
GN3255	40km Super High Gain Rchip	to 11.3	35kΩ	+3.3V ± 10%	Yes	-21dBm	Eliminate LA in SFP+	-27dB
GN3355	High Gain APD Rchip	to 11.3	13kΩ	+3.3V ± 10%	Yes	-27dBm	Eliminate LA in SFP+	-27dB
GN3068	10km Low Power Limiting	to 11.3	7kΩ	+3.3V ± 10%	Yes	-21dBm	94 mW power dissipation	-14dB
GN3268	40km Low Power Limiting	to 11.3	7kΩ	+3.3V ± 10%	Yes	-21dBm	94mW power dissipation	-27dB
GN3483	100GBASE-LR4	to 100	6.3kΩ	+3.3V ± 10%	Yes	-14dBm	*	-26dB

# 40Gbps - 100Gbps SerDes

Semtech ultra low jitter performance Telecom & Datacom SerDes devices allow manufacturers to develop low cost, low power, and high performance optical transport equipment that can handle more bandwidth in a smaller space, enabling global carriers to meet exponentially growing video, voice and data traffic demands.

## 100G MUX/DEMUX

Semtech provides 100 Gbps multiplexers and demultiplexers for high-speed telecom and datacom applications.

### APPLICATIONS:

- 100G Long-Haul DWDM Transport Modules
- 100G LineCards
- 100GE / OTU4 transmission system
- CFP optical module/CFP2 optical module with gearbox
- Optical test equipment
- Terabit routers

## 40G MUX/DEMUX

Industry leading 40Gbps Mux/Demux ICs covers applications from VSR to coherent long haul.

### APPLICATIONS:

- 40G DWDM Transport Modules
- 40G LineCards
- OC768/OTU3 Modules and Transponders
- MSPP, ADM and Cross-connects
- IP Routers and Switches

100G MUX/DMUX			
Part Number	Overview	Data Rate (Gbps)	Applications
SMI10027	10:4 MUX with Differential Precoder	25.75 to 28.3	100GbE and OTU4 CFP modules CFP2 modules with Gearbox
SMI10037	4:10 DMUX with ODB Decoder	25.75 to 28.3	
SMI10022	10:4/20:4 MUX with Single/Dual DQPSK Precoder	27.9 to 32.1	100G Long haul DWDM Transport Module 100G Linecards

40G MUX/DMUX			
Part Number	Overview	Data Rate (Gbps)	Applications
SM14027	16:1 MUX with Differential Precoder	39.8 to 44.6	OC768/OTU3VSR Modules and Transponders
SM14037	1:16 DMUX with Differential Decoder	39.8 to 44.6	OC768/OTU3VSR Modules and Transponders
SM14029	16:2 MUX with DQPSK Precoder	39.8 to 44.6	OC768/OTU3VSR Modules and DWDM Transponders
SM14039	2:16 DMUX with DQPSK Decoder	39.8 to 44.6	OC768/OTU3VSR Modules and DWDM Transponders

# Single-Lane CDRs

Semtech's clock and data recovery (CDR) products offer the highest performance in the key areas of power consumption, receiver sensitivity, output jitter and jitter tolerance.

## LOW POWER

Delivering low power single lane 10Gbps CDR products enables small form factor module designs.

## PIN COMPATIBILITY

With pin compatible solutions for 10GbE, SONET OC-192 and 8G, 10G and 16G Fibre Channel, overall design effort is reduced.

## REFERENCE FREE

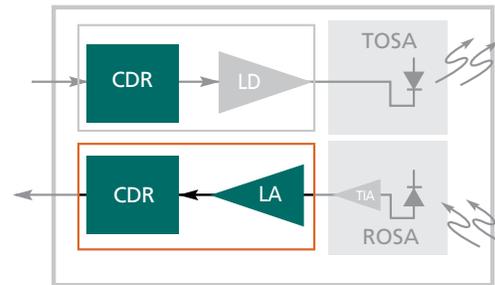
Reference-free CDRs ease the requirements at both the module and system level.

## LEADING JITTER PERFORMANCE

With industry leading input jitter tolerance and output jitter, Semtech's CDRs help create an extremely robust design.

## XFP AND SFP+ COMPATIBLE

Semtech's CDRs are fully XFP compliant. The low power, reference-free architecture also enables the use of CDRs in SFP+ modules.



SINGLE-LANE CDRS									
Part Number	Data Rate (Gbps)	Input Stage	Laser Driver	Slice Level Adjust	Loopback Support	Pin Compatibility	Supply (V)	Pkg	Applications
GN2003S	9.95 - 11.3	Limiting Amplifier	-	-	Yes	GN1113 GN2023	3.3	24 QFN	OC-192, 10GbE, 10GFC
GN2004S	9.95 - 11.3	Equalizer	-	-	Yes	GN2024	3.3	24 QFN	OC-192, 10GbE, 10GFC
GN2013A	9.95 - 11.3	Limiting Amplifier	-	Yes	Yes	-	3.3	24 QFN	OC-192, 10GbE, 10GFC
GN2014A	9.95 - 11.3	Equalizer	-	-	Yes	GN1114	3.3	24 QFN	10GbE, 10GFC
GN2023	9.95 - 11.3	Limiting Amplifier	-	-	Yes	GN1113 GN2003S	3.3	24 QFN	10GbE, 10GFC
GN2024	9.95 - 11.3	Equalizer	-	-	Yes	GN2004S	3.3	24 QFN	10GbE, 10GFC

# Optical Module CDRs

Semtech's dual-lane signal conditioners, with integrated VCSEL, DML or EML driver, offer the lowest power, smallest footprint solution for XFP and retimed SFP+ modules.

## ENABLING SFP+ SONET

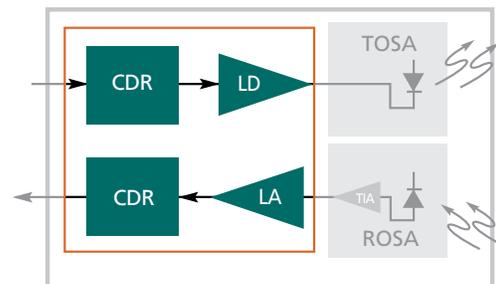
The GN2042 and GN2044 enable a SONET compliant module in an SFP+ form factor. The integration of the laser driver enables the lowest power solution for SFP+. The high level of integration also delivers a small footprint solution to fit within the form factor. The reference clock free architecture simplifies the overall module design and saves cost.

## LOW COST, SMALL FOOTPRINT SOLUTION

By integrating the limiting amplifier, laser driver and receive and transmit CDR, the GN2042, GN2044 and GN2017A provide an optimal path for lower cost designs. The integrated APC loop and small number of external components also save cost. The high level of integration in a small, 5mmx5mm 32-QFN package enables use in very high density designs.

## FEATURE SET FOR DWDM APPLICATIONS

The GN2040 family has a rich feature set to enable optimal performance in DWDM applications. The features include slice level adjust, programmable peaking on the receive path input and sampling clock phase adjust.



OPTICAL MODULE CDRs							
Part Number	Data Rate (Gbps)	Lanes	Laser Driver	Slice Level Adjust	Pin Compatibility	Pkg	Applications
GN2042	9.95 - 11.3	2 (1 Rx + 1 Tx)	DML	Yes	GN2044	32 QFN	XFP and SFP+ 10GbE and OC-192
GN2044	9.95 - 11.3	2 (1 Rx + 1 Tx)	EML	Yes	GN1444, GN2042	32 QFN	XFP and SFP+ 10GbE, OC-192 and DWDM
GN2040	9.95 - 11.3	2 (1 Rx + 1 Tx)	DML	Yes	GN204x	32 QFN	XFP and SFP+ 10GbE, OC-192 and DWDM
GN2010D	8.5 9.95 - 11.7	2 (1 Rx + 1 Tx)	DML	Yes	GN2010EA	32 QFN	XFP and SFP+ 10GbE, OC-192 and 8GFC
GN2010EA	8.5 9.95 - 11.7	2 (1 Rx + 1 Tx)	EML	Yes	GN2010D	32 QFN	XFP and SFP+ 10GbE, OC-192, 8GFC and DWDM
GN2012A	8.5 9.95 - 11.7	2 (1 Rx + 1 Tx)	-	Yes	-	32 QFN	XFP and SFP+ 10GbE, OC-192, 8GFC and DWDM
GN2017A	9.95 - 11.7 14.025	2 (1 Rx + 1 Tx)	VCSEL	No	GN2010X	32 QFN	16G FC, 10G FCoE
GN2425	25 - 28	2 (2 Tx)	-	Yes	-	32 QFN	100Gbps Ethernet / OTN, Infiniband EDR
GN2426	25 - 28	2 (2 Rx)	-	Yes	-	32 QFN	100Gbps Ethernet / OTN, Infiniband EDR

# Backplane & Linecard Signal Conditioners

Semtech's multi-channel signal conditioners enhance the reach and robustness of high-speed serial links by compensating for transmission losses and re-setting the crosstalk and jitter budgets.

## HIGH LEVEL OF INTEGRATION AND SMALL FOOTPRINT

Semtech's backplane & linecard signal conditioners are ideal for small form factor modules or dense backplane /linecard applications.

## FULL PORTFOLIO

Semtech products offer solutions for Ethernet, Infiniband®, Fibre Channel® and PCI Express®. Solutions are available with and without CDR functionality.

## DRIVE LONG BACKPLANES OR CABLES

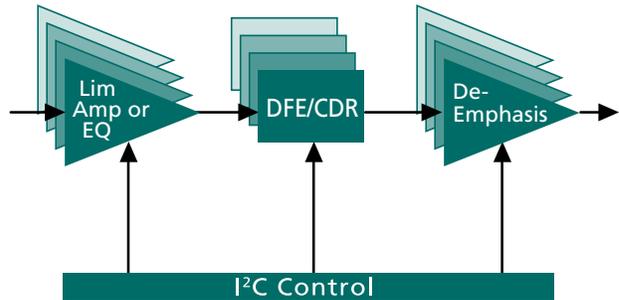
A combination of Equalizer, DFE and CDR technology allows for an optimal solution to drive long, dense backplanes or cables at high speeds.

## LOW POWER

Semtech's 5 Gbps and higher CDR products require the lowest power in the industry, a key factor as densities increase.

## RESET THE JITTER AND CROSSTALK BUDGETS

Using CDRs will reset the jitter budget, substantially increasing the robustness of the system and allowing for design flexibility. Using CDRs in multi-channel systems will also reset the crosstalk budget, an increasing concern at higher data rates.



MULTI-LANE SIGNAL CONDITIONERS										
Part Number	Data Rate (Gbps)	Lanes	CDR	Ref Clock	Input Stage	De-emphasis	Pin Compatibility	Supply (V)	Pkg	Applications
GN2412 Family	1.25 - 12.8	12	Yes	Required	Adaptive Equalizer +5-tap DFE	Yes	-	0.9 1.8	144 BGA	> nx10G Backplanes, 10G/40G/100G Linecards, 10G-KR, 40G-KR4, 40G-CR4, Crosspoint Switching, CPRI
GN2408 Family	1.25 - 12.8	8	Yes	Required	Adaptive Equalizer +5-tap DFE	Yes	GN2412	0.9 1.8	144 BGA	>nx10G Backplanes, 10G/40G Linecards, 10G-KR, Crosspoint Switching, CPRI
GN2404 Family	1.25 - 12.8	4	Yes	Required	Adaptive Equalizer +5-tap DFE	Yes	GN2412	0.9 1.8	144 BGA	>nx10G Backplanes, 10G/40G Linecards, 10G-KR, 40G-KR4, 40G-CR4, Crosspoint Switching, CPRI
GN2402	10.3125	4	Yes	Not Required	Equalizer	Yes	-	3.3	44 QFN	nx10G Backplanes, 10G/40G Linecards, 10G/40G Active cables
GX4002	9.95 - 11.3, 14.025	2	Yes	Not Required	Equalizer	Yes	-	3.3	32 QFN	nx10G Backplanes, 10G/40G Linecards, Infiniband FDR, 16G Fibre Channel, Crosspoint Switching
GN2405A/5S	9.95 - 11.3	4	Yes	Not Required	Equalizer	Yes	GN2406	3.3	48 QFN	nx10G Backplanes 10G/40G Linecards 10G/40G Active cables
GN2406/6S	9.95 - 10.95	4	Yes	Not Required	Limiting Amp	Yes	GN2405A	3.3	48 QFN	10G/40G Linecards
GN1407	1 - 8	4	-	N/A	Equalizer (Programmable)	-	GN1406	1.2 1.8	56 QFN	PCIe Gen 1/2/3, SNAP-12, POP-4/LX-4/CX-4/KX-4, XAUI/RXAUI and Rapid I/O
GN1406	2.5 3.125 5.0, 6.25	4	Yes	Required	Equalizer (Programmable)	Yes	GN1407	1.2 1.8	56 QFN	PCIe Gen 1/2, SNAP-12, POP-4/LX-4/CX-4/KX-4, XAUI/RXAUI and Rapid I/O

# Laser Drivers and Limiting Amplifiers

High performance laser drivers and limiting amplifiers for optical communication.

## APPLICATIONS:

- 10G EPON, XG-PON1 and XG-PON2
- 8G Fibre Channel
- 9.95 Gbps OC-192 and 10.70 Gbps OC-192 with FEC
- 10.3 Gbps Ethernet
- 10.52 Gbps Fibre Channel
- 11.1 Gbps Ethernet over SONET
- 11.3 Gbps Fibre Channel with Forward Error Correction
- 40G QSFP+ modules

## LASER DRIVERS:

### NT20042

Low cost 3.3V / 5.0 V 300 Mb/s LED driver for SONET, ESCON and Fast Ethernet applications over optical fiber.

### NT22L33

3.3 V/ 5.0 V CMOS laser driver for data rates of 125 Mb/s to 1.25 Gbps.

### GN1153C

Low power DFB/FP laser driver is designed specifically to address the 1W power requirements of SFP+, while still satisfying the requirements for XENPAK, X2, and XFP.

### GN1160 & GN1161

Very low power laser drivers for DFB/VCSEL applications. RSSI feature for compatibility with our high gain ROSA's, enabling SFP+ modules without limiting amplifiers.

## LIMITING AMPLIFIERS:

### NT20045

Low cost 3.0 V to 5.5 V, 200 Mb/s limiting amplifier for SONET, SDH, ESCON and Fast Ethernet applications over optical fiber.

### NT24L71

1.25 Gbps CMOS 3.0 V to 5.5 V limiting amplifier with CML data outputs and signal status output in QSOP 16.

### NT24L73

1.25 Gbps CMOS limiting amplifier with CML data outputs and signal status in an MSOP package.

### GN1250L

A limiting amplifier that provides wideband, low noise postamplification, aimed primarily at OC-192 and SDH STM-64 systems.

LASER DRIVERS						
Part Number	Overview	Data Rate (Gbps)	Max Mod / Bias Current	Supply	Pkg.	Applications
NT20042	300 Mb/s LED Driver	0.3	100mA	3.3/5.0V	QSOP 16	OC-3, Fast Ethernet
NT22L33	1.25 Gbps FP/DFB Laser Driver	1.25	70mA / 80mA	3.3/5.0V	4mm QFN24	OC-3, OC-12, GbE
GN1153C	DFB/FP Laser Driver	to 11.3	80mA / 120mA	3.3V (opt. 5V output stage)	24 QFN	10GbE, OC-192
GN1160	DFB driver	to 11.3	90mA/ 120mA	3.3V (Opt. 2.8V)	28 QFN	10GE SFP+ 10GBASE-LR
GN1161	VCSEL driver	to 11.3	20mA/ 15mA	3.3V (Opt. 2.8V)	28 QFN	10GE SFP+ 10GBASE-SR

LIMITING AMPLIFIERS							
Part Number	Overview	Data Rate (Gbps)	Gain	BW	Supply	Noise Figure	Applications
NT20045	200 Mb/s Limiting Amp	0.2	60dB	0.125	3.3/5.0V	80uV	OC-3, Fast Ethernet
NT24L71	1.25 Gbps Limiting Amp	1.25	46dB	0.938	3.3V	300uV	OC-3, OC-12, GbE
NT24L73	1.25 Gbps Limiting Amp	1.25	46dB	0.938	3.3V	300uV	OC-3, OC-12, GbE
GN1250L	10/14G Limiting Amp	to 14.5	33.7dB	14.7GHz	+3.3V	13dB	10GbE, OC-192, 8G and 16GFC

# Transceiver IC's (LD & LA)

High performance laser drivers and limiting amplifiers for optical communication.

## NT25L91

2.5 Gbps CMOS burst mode laser driver and limiting post amplifier with digital set-up, control, on-chip NVM and APD DAC output.

## NT28L90

Combined 10 Gbps limiting post amplifier and 2.5 Gbps burst mode laser driver for cost critical 10GEPON and XG-PON asymmetric applications. The NT28L90 features Tx & Rx sleep control, TX\_SD output and Tx Power burst monitoring.

## GN7354 & GN7355

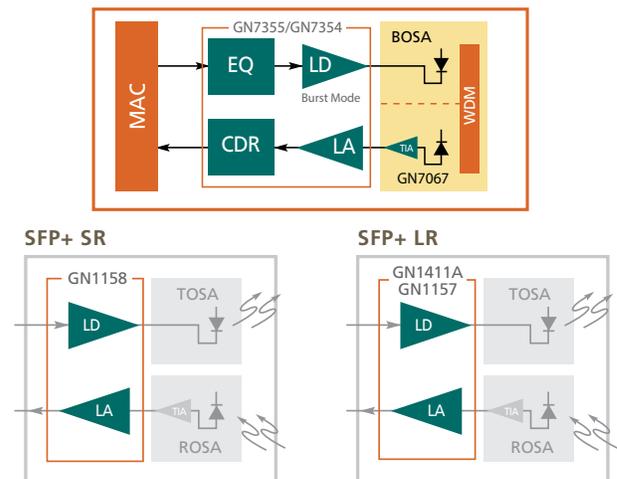
10G EPON transceiver for next generation PON systems. The GN7355 combines a 10G burst mode laser driver with a receive CDR and is targeted at 10G EPON symmetric applications. The GN7354 is a pin-for-pin compatible, de-rated version of the GN7355 intended to address the 1.25Gbps and 2.5Gbps transmit data rate, and cost pressures of the 10Gbps asymmetric EPON and XG-PON applications.

## GN1411A/12A

The GN1411A/GN1412A are highly-integrated, low-power, small footprint transceivers that are ideal for SFP+ LR/ER optical modules.

## GN1157/58

Semtech's latest, lowest power transceiver IC's for SFP+ LR/SR applications with integrated APC and advanced eye shaping features.



TRANSCEIVER IC (LD&LA)						
Part Number	Overview	Data Rate (Gbps)	Max Mod / Bias Current	Supply	Pkg.	Applications
NT25L90/91	2.5 Gbps Burst Mode LDD & LA	2.5	90mA / 100mA	3.3V	28 QFN	EPON, GPON, BOSA-on-Board
NT28L90	2.5Gbps Burst Mode DFB + 10Gbps Receive LA	Rx 10.3 Tx 2.5	90mA / 100mA	3.3V	28 QFN	10GEPON, XG-PON1 (Asymmetric)
GN7354	Burst Mode DFB + Receive LA & CDR	Rx: 10.3 Tx: to 2.5	90mA / 90mA	3.3V (3.3 V or 5V output stage)	32 QFN	10GEPON, XG-PON (Asymmetric)
GN7355	Burst Mode DFB + Receive LA & CDR	10.3	90mA / 90mA	3.3V +5 V output stage (optional 3.3 V)	32 QFN	10GEPON, XG-PON (Symmetric)
GN1411A	DFB/FB Laser Driver + Receive LA	to 11.3G	80mA / 120mA	3.3V	32 QFN	10GbE, OC-192
GN1412A	EML Laser Driver + Receive LA	to 11.3G	2.5Vpp / 120mA	3.3V	32 QFN	10GbE, OC-192
GN1157	DML Laser Driver + Receive LA	to 11.3G	90mA / 120mA	3.3V (Optional 2.8V)	28 QFN	10GbE LR SFP+
GN1158	VCSEL Laser Driver + Receive LA	to 11.3G	20mA / 15mA	3.3V (Optional 2.8V)	28 QFN	10GbE SR SFP+
GN25L95	Burst Mode DFB + Receive LA	to 2.5G	90mA / 100mA	3.3V	28 QFN	EPON, GPON, BOSA-on-Board

# Optical Module Reference Design Kit

Improve the performance and time to market of your SFP+ design with Semtech Optical Module Reference Design Kits.

## FAST TIME TO MARKET

Semtech's reference design kits include schematics, layout files and a design guide as well as attentive support from experienced applications engineers. This reduces both design costs and decreases time to market. This is further realized in the FTTx market where it is possible to re-use the 10G symmetric SFP+ design to address the 10G asymmetric market.

### GN1157 RDK (RDK-SFP+-Optical02)



### GN1160/GN3055 RDK (RDK-SFP+-Optical04)



## BROAD RANGE OF REFERENCE DESIGNS AVAILABLE

Reference design kits are offered to cover a wide variety of SFP+ applications, including symmetrical and asymmetrical PON, and 10GbE SR and LR applications.

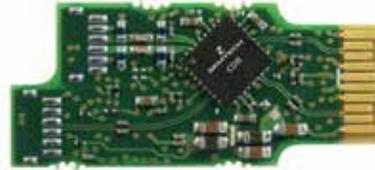
For ethernet SFP+, designs are available for both the traditional architecture (including a limiting amplifier in the receive chain), as well as a new LA-free architecture enabled by Semtech's High Gain ROSA portfolio.

### GN7354/7355 RDK RDK-SFP+-PON-S00 RDK-SFP+-PON-A00



Rx CDR+ Tx Burst Mode  
DML driver  
GN7355 - Symmetric PON  
GN7354 - Asymmetric PON

### RDK-SFP++LR



## OPTICAL REFERENCE DESIGN KITS

Part Number	Parts Demonstrated	Data Rate (Gbps)	Connector Type	Wavelength (nm)	Applications
RDK-SFP++LR	GN3068/GN3268, GN2010D/GN2042	9.95 - 11.3	SFP+	1310	10GbE LR, OC-192
RDK-SFP++ER	GN3268, GN2010EA /GN2044	9.95 - 11.3	SFP+	1550	10Gb ER, OC-192
RDK-SFP+-PON-S00	GN7355	10.3	SFP+	1577/ 1270	10G EPON
RDK-SFP+-PON-A00	GN7354	10/1.25 10/2.5	SFP+	1577/1310 1577/ 1270	10G EPON Asym. XG-PON1
RDK-SFP+-Optical02	GN1157	1 - 11.3	SFP+	1310	10GbE LR
RDK-SFP+-Optical03	GN1158	1 - 11.3	SFP+	850	10GbE SR
RDK-SFP+-Optical04	GN1160 & GN3055	1 - 11.3	SFP+	1310	10GbE LR
RDK-SFP+-Optical05	GN1161 & GN3155	1 - 11.3	SFP+	850	10GbE SR

*design files and results available upon request.*

# CDR-based Copper Cable Assembly Reference Design Kits

SFP+ copper cable assembly reference design kits (RDK) based on Semtech's industry leading 8 Gbps and 10 Gbps CDR technology.

## FAST TIME TO MARKET

Semtech's reference design kits include schematics, layout files and a design guide as well as attentive support from experienced applications engineers. This reduces both design costs and time, to get to market quickly.

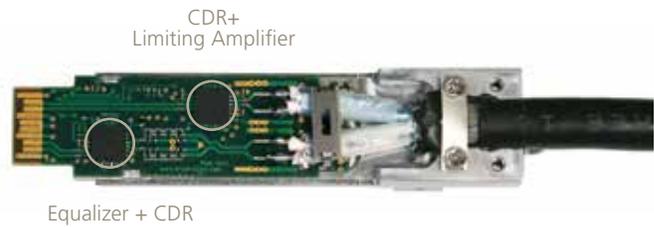
## MULTIPLE EVALUATION OPTIONS

The RDKs are available in two forms, with or without attached cable. The version with attached cable can be immediately plugged into a system or test set up for quick evaluation. The version without attached cable comes as a set of two populated PCBs with housing, wherein any manufacturer's cable can be soldered onto the PCBs for a custom evaluation.

## CDR ADVANTAGE

There are multiple advantages to a CDR-based copper cable assembly. By resetting the jitter budget in the connector, the cable's performance will be independent of the system it is plugged into. It allows for longer trace lengths and reduces overall crosstalk in the system.

### Copper Cable Assembly RDK



COPPER REFERENCE DESIGN KITS						
Part Number	Data Rate (Gbps)	Connector Type	Length (m)	Cable Gauge (AWG)	Full Action/ Half Action	Applications
RDK-QSFP-Copper00	40	QSFP	13	26	Full	10GbE, 40GbE, Infiniband® QDR
RDK-QSFP-Copper05	40	QSFP	13	26	Half	10GbE, 40GbE, Infiniband® QDR

*\*A version of the Reference Design Kit is available that contains two populated PCBs without housing, but no cable. It can be used to solder cable to the boards, if a cable type other than the one provided with the reference design kit is desired.*

# Portfolio Summary

TIAs							
Part Number	Overview	Data Rate (Gbps)	Gain	BW (GHz)	Supply (V)	Noise	Applications
NT20R67	155 Mb/s AGC TIA	0.155	63kΩ	0.165	3.3/5.0	11 nA	OC-3, Fast Ethernet
NT20067	155 Mb/s AGC TIA	0.155	234kΩ	0.165	3.3/5.0	11 nA	OC-3, Fast Ethernet
NT23L50	622 Mb/s AGC TIA	0.622	50kΩ	0.32	3.3	60 nA	OC-12, BPON
NT24L50	1.25 Gbps AGC TIA	1.25	25kΩ	0.75	3.3	92 nA	GbE, EPON
NT24L55	1.25 Gbps High Sensitivity AGC TIA	1.25	46kΩ	0.75	3.3	74 nA	EPON
NT25L51	2.5 Gbps AGC TIA	2.5	8kΩ	1.7	3.3	230 nA	OC-48, GPON (APD)
GN25L52	2.5 Gbps AGC TIA	2.5	6.5kΩ	1.85	3.3	455 nA	OC-48, GPON (APD)
NT25L59	2.5 Gbps High Sensitivity AGC TIA	2.5	29kΩ	1.5	3.3	108 nA	GPON (PD)
GN1056	10G Linear	to 11.3	500/1kΩ	12	+3.3	1μA	OC-192
GN1058	10G Linear AGC	to 11.3	4kΩ	12	+3.3	1μA	10GBASE-LRM & DWDM
GN7068	10G Limiting	to 11.3	3kΩ	12	+3.3	1μA	APD ROSAs for 10G PON ONU & 10GBASE-ZR
GN1068	14G Limiting	to 14.3	6.75kΩ	12	+3.3	1.2μA	10GBASES-SR/LR/ER & 16G FC
GN7050	1.25G Burst mode Limiting	1.25	12kΩ	*	*	*	1G EPON OLT
GN7051	2.5G Burst mode Limiting	2.5	1.5kΩ	*	*	*	2.5G XG-PON OLT
GN7052	Tri-rate PON TIA	1.25/2.5 /10.3	2kΩ	*	*	*	1.25G EPON/2.5G XG-PON/10G EPON OLT
GN7053	1G GPON Burst mode Limiting	1.25	1.25kΩ	*	*	*	1G GPON OLT
GN1083	Quad 25G Limiting	100	6.3kΩ	*	+3.3	*	100GBASE-LR4

\* Please contact your sales representative for a detailed datasheet.

ROSAs & SUPER HIGH GAIN ROSAs								
Part Number	Overview	Data Rate (Gbps)	Gain	Supply	RSSI	Unstressed Sensitivity	Stressed Sensitivity	ORL
GN3150	SR Rchip Limiting	to 11.3	10kΩ	+3.3V ± 10%	Yes	-15dBm OMA	-13.5dBm OMA (BASE-SR)	-14dB
GN3050	10km Rchip Limiting	to 11.3	10kΩ	+3.3V ± 10%	Yes	-21dBm	-16.8dBm OMA (BASE-L)	-14dB
GN3250	40km Rchip Limiting	to 11.3	10kΩ	+3.3V ± 10%	Yes	-21dBm	-16.0dBm OMA (BASE-E)	-27dB
GN3052	LRM Rchip AGC	to 11.3	9kΩ	+3.3V ± 10%	Yes	-17dBm OMA	-12dBm OMA (LRM Symmetric, 6° FR4)	-14dB
GN3257	PIN with AGC	to 11.3	8.5kΩ	+3.3V ± 10%	Yes	-19dBm	-	-27dB
GN3352	APD with AGC	to 11.3	4kΩ	+3.3V ± 10%	VAPD	-27dBm	-	-27dB
GN3357	APD with AGC	to 11.3	8.5kΩ	+3.3V ± 10%	VAPD	-27dBm	-	-27dB
GN3055	10km Super High Gain Rchip	to 11.3	35kΩ	+3.3V ± 10%	-	-21dBm	Eliminate LA in SFP+	-14dB
GN3155	SR Super High Gain Rchip	to 11.3	35kΩ	+3.3V ± 10%	Yes	-15dBm OMA	Eliminate LA in SFP+	-14dB
GN3255	40km Super High Gain Rchip	to 11.3	35kΩ	+3.3V ± 10%	Yes	-21dBm	Eliminate LA in SFP+	-27dB
GN3355	High Gain APD Rchip	to 11.3	13kΩ	+3.3V ± 10%	Yes	-27dBm	Eliminate LA in SFP+	-27dB
GN3068	10km Low Power Limiting	to 11.3	7kΩ	+3.3V ± 10%	Yes	-21dBm	94 mW power dissipation	-14dB
GN3268	40km Low Power Limiting	to 11.3	7kΩ	+3.3V ± 10%	Yes	-21dBm	94mW power dissipation	-27dB
GN3483	100GBASE-LR4	to 100	6.3kΩ	+3.3V ± 10%	Yes	-14dBm	*	-26dB

## SINGLE-LANE CDRS

Part Number	Data Rate (Gbps)	Input Stage	Laser Driver	Slice Level Adjust	Loopback Support	Pin Compatibility	Supply (V)	Pkg	Applications
GN2003S	9.95 - 11.3	Limiting Amplifier	-	-	Yes	GN1113 GN2023	3.3	24 QFN	OC-192, 10GbE, 10GFC
GN2004S	9.95 - 11.3	Equalizer	-	-	Yes	GN2024	3.3	24 QFN	OC-192, 10GbE, 10GFC
GN2013A	9.95 - 11.3	Limiting Amplifier	-	Yes	Yes	-	3.3	24 QFN	OC-192, 10GbE, 10GFC
GN2014A	9.95 - 11.3	Equalizer	-	-	Yes	GN1114	3.3	24 QFN	10GbE, 10GFC
GN2023	9.95 - 11.3	Limiting Amplifier	-	-	Yes	GN1113 GN2003S	3.3	24 QFN	10GbE, 10GFC
GN2024	9.95 - 11.3	Equalizer	-	-	Yes	GN2004S	3.3	24 QFN	10GbE, 10GFC

## OPTICAL MODULE CDRs

Part Number	Data Rate (Gbps)	Lanes	Laser Driver	Slice Level Adjust	Pin Compatibility	Pkg	Applications
GN2042	9.95 - 11.3	$\frac{2}{(1 \text{ Rx} + 1 \text{ Tx})}$	DML	Yes	GN2044	32 QFN	XFP and SFP+ 10GbE and OC-192
GN2044	9.95 - 11.3	$\frac{2}{(1 \text{ Rx} + 1 \text{ Tx})}$	EML	Yes	GN1444, GN2042	32 QFN	XFP and SFP+ 10GbE, OC-192 and DWDM
GN2040	9.95 - 11.3	$\frac{2}{(1 \text{ Rx} + 1 \text{ Tx})}$	-	Yes	GN204x	32 QFN	XFP and SFP+ 10GbE, OC-192 and DWDM
GN2010D	8.5 9.95 - 11.7	$\frac{2}{(1 \text{ Rx} + 1 \text{ Tx})}$	DML	Yes	GN2010EA	32 QFN	XFP and SFP+ 10GbE, OC-192 and 8GFC
GN2010EA	8.5 9.95 - 11.7	$\frac{2}{(1 \text{ Rx} + 1 \text{ Tx})}$	EML	Yes	GN2010D	32 QFN	XFP and SFP+ 10GbE, OC-192, 8GFC and DWDM
GN2012A	8.5 9.95 - 11.7	$\frac{2}{(1 \text{ Rx} + 1 \text{ Tx})}$	-	Yes	-	32 QFN	XFP and SFP+ 10GbE, OC-192, 8GFC and DWDM
GN2017A	9.95 - 11.7 14.025	$\frac{2}{(1 \text{ Rx} + 1 \text{ Tx})}$	VCSEL	No	GN2010X	32 QFN	16G FC, 10G FCoE
GN2425	25 - 28	2 (2 Tx)	-	Yes	-	32 QFN	100Gbps Ethernet / OTN, Infiniband EDR
GN2426	25 - 28	2 (2 Rx)	-	Yes	-	32 QFN	100Gbps Ethernet / OTN, Infiniband EDR

## MULTI-LANE SIGNAL CONDITIONERS

Part Number	Data Rate (Gbps)	Lanes	CDR	Ref Clock	Input Stage	De-emphasis	Pin Compatibility	Supply (V)	Pkg	Applications
GN2412 Family	1.25 - 12.8	12	Yes	Required	Adaptive Equalizer +5-tap DFE	Yes	-	0.9 1.8	144 BGA	> nx10G Backplanes, 10G/40G/100G Linecards, 10G-KR, 40G-KR4, 40G-CR4, Crosspoint Switching, CPRI
GN2408 Family	1.25 - 12.8	8	Yes	Required	Adaptive Equalizer +5-tap DFE	Yes	GN2412	0.9 1.8	144 BGA	>nx10G Backplanes, 10G/40G Linecards, 10G-KR, Crosspoint Switching, CPRI
GN2404 Family	1.25 - 12.8	4	Yes	Required	Adaptive Equalizer +5-tap DFE	Yes	GN2412	0.9 1.8	144 BGA	>nx10G Backplanes, 10G/40G Linecards, 10G-KR, 40G-KR4, 40G-CR4, Crosspoint Switching, CPRI
GN2402	10.3125	4	Yes	Not Required	Equalizer	Yes	-	3.3	44 QFN	nx10G Backplanes, 10G/40G Linecards, 10G/40G Active cables
GX4002	9.95 - 11.3, 14.025	2	Yes	Not Required	Equalizer	Yes	-	3.3	32 QFN	nx10G Backplanes, 10G/40G Linecards, Infiniband FDR, 16G Fibre Channel, Crosspoint Switching
GN2405A/5S	9.95 - 11.3	4	Yes	Not Required	Equalizer	Yes	GN2406	3.3	48 QFN	nx10G Backplanes 10G/40G Linecards 10G/40G Active cables
GN2406/6S	9.95 - 10.95	4	Yes	Not Required	Limiting Amp	Yes	GN2405A	3.3	48 QFN	10G/40G Linecards
GN1407	1 - 8	4	-	N/A	Equalizer (Programmable)	-	GN1406	1.2 1.8	56 QFN	PCIe Gen 1/2/3, SNAP-12, POP-4/LX-4/CX-4/KX-4, XAUI/RXAUI and Rapid I/O
GN1406	2.5, 3.125 5.0, 6.25	4	Yes	Required	Equalizer (Programmable)	Yes	GN1407	1.2 1.8	56 QFN	PCIe Gen 1/2, SNAP-12, POP-4/LX-4/CX-4/KX-4, XAUI/RXAUI and Rapid I/O

## 100G MUX/DMUX

Part Number	Overview	Data Rate (Gbps)	Applications
SMI10027	10:4 MUX with Differential Precoder	25.75 to 28.3	100GbE and OTU4 CFP modules CFP2 modules with Gearbox
SMI10037	4:10 DMUX with ODB Decoder	25.75 to 28.3	
SMI10022	10:4/20:4 MUX with Single/Dual DQPSK Precoder	27.9 to 32.1	100G Long haul DWDM Transport Module 100G Linecards

## 40G MUX/DMUX

Part Number	Overview	Data Rate (Gbps)	Applications
SM14027	16:1 MUX with Differential Precoder	39.8 to 44.6	OC768/OTU3VSR Modules and Transponders
SM14037	1:16 DMUX with Differential Decoder	39.8 to 44.6	OC768/OTU3VSR Modules and Transponders
SM14029	16:2 MUX with DQPSK Precoder	39.8 to 44.6	OC768/OTU3VSR Modules and DWDM Transponders
SM14039	2:16 DMUX with DQPSK Decoder	39.8 to 44.6	OC768/OTU3VSR Modules and DWDM Transponders

## LASER DRIVERS

Part Number	Overview	Data Rate (Gbps)	Max Mod / Bias Current	Supply	Pkg.	Applications
NT20042	300 Mb/s LED Driver	0.3	100mA	3.3/5.0V	QSOP 16	OC-3, Fast Ethernet
NT22L33	1.25 Gbps FP/DFB Laser Driver	1.25	70mA / 80mA	3.3/5.0V	4mm QFN24	OC-3, OC-12, GbE
GN1153C	DFB/FP Laser Driver	to 11.3	80mA / 120mA	3.3V (opt. 5V output stage)	24 QFN	10GbE, OC-192
GN1160	DFB driver	to 11.3	90mA/ 120mA	3.3V (Opt. 2.8V)	28 QFN	10GE SFP+ 10GBASE-LR
GN1161	VCSEL driver	to 11.3	20mA/ 15mA	3.3V (Opt. 2.8V)	28 QFN	10GE SFP+ 10GBASE-SR

## LIMITING AMPLIFIERS

Part Number	Overview	Data Rate (Gbps)	Gain	BW	Supply	Noise Figure	Applications
NT20045	200 Mb/s Limiting Amp	0.2	60dB	0.125	3.3/5.0V	80uV	OC-3, Fast Ethernet
NT24L71	1.25 Gbps Limiting Amp	1.25	46dB	0.938	3.3V	300uV	OC-3, OC-12, GbE
NT24L73	1.25 Gbps Limiting Amp	1.25	46dB	0.938	3.3V	300uV	OC-3, OC-12, GbE
GN1250L	10/14G Limiting Amp	to 14.5	33.7dB	14.7GHz	+3.3V	13dB	10GbE, OC-192, 8G and 16GFC

## TRANSCEIVER IC (LD&LA)

Part Number	Overview	Data Rate (Gbps)	Max Mod / Bias Current	Supply	Pkg.	Applications
NT25L90/91	2.5 Gbps Burst Mode LDD & LA	2.5	90mA / 100mA	3.3V	28 QFN	EPON, GPON, BOSA-on-Board
NT28L90	2.5Gbps Burst Mode DFB + 10Gbps Receive LA	Rx 10.3 Tx 2.5	90mA / 100mA	3.3V	28 QFN	10GEAPON, XG-PON1 (Asymmetric)
GN7354	Burst Mode DFB + Receive LA & CDR	Rx: 10.3 Tx: to 2.5	90mA / 90mA	3.3V (3.3 V or 5V output stage)	32 QFN	10GEAPON, XG-PON (Asymmetric)
GN7355	Burst Mode DFB + Receive LA & CDR	10.3	90mA / 90mA	3.3V +5 V output stage (opt. 3.3 V)	32 QFN	10GEAPON, XG-PON (Symmetric)
GN1411A	DFB/FB Laser Driver + Receive LA	to 11.3G	80mA / 120mA	3.3V	32 QFN	10GbE, OC-192
GN1412A	EML Laser Driver + Receive LA	to 11.3G	2.5Vpp / 120mA	3.3V	32 QFN	10GbE, OC-192
GN1157	DML Laser Driver + Receive LA	to 11.3G	90mA / 120mA	3.3V (opt. 2.8V)	28 QFN	10GbE LR SFP+
GN1158	VCSEL Laser Driver + Receive LA	to 11.3G	20mA / 15mA	3.3V (opt. 2.8V)	28 QFN	10GbE SR SFP+
GN25L95	Burst Mode DFB + Receive LA	to 2.5G	90mA / 100mA	3.3V	28 QFN	EPON, GPON, BOSA-on-Board

## OPTICAL REFERENCE DESIGN KITS

Part Number	Parts Demonstrated	Data Rate (Gbps)	Connector Type	Wavelength (nm)	Applications
RDK-SFP++LR	GN3068/GN3268, GN2010D/GN2042	9.95 - 11.3	SFP+	1310	10GbE LR, OC-192
RDK-SFP++ER	GN3268, GN2010EA /GN2044 and	9.95 - 11.3	SFP+	1550	10Gb ER, OC-192
RDK-SFP+-PON-S00	GN7355	10.3	SFP+	1577/ 1270	10G EPON
RDK-SFP+-PON-A00	GN7354	10/1.25 10/2.5	SFP+	1577/1310 1577/ 1270	10G EPON Asym. XG-PON1
RDK-SFP+-Optical02	GN1157	1-11.3	SFP+	1310	10GbE LR
RDK-SFP+-Optical03	GN1158	1-11.3	SFP+	850	10GbE SR
RDK-SFP+-Optical04	GN1160 & GN3055	1-11.3	SFP+	1310	10GbE LR
RDK-SFP+-Optical05	GN1161 & GN3155	1-11.3	SFP+	850	10GbE SR

design files and results available upon request.

## COPPER REFERENCE DESIGN KITS

Part Number	Data Rate (Gbps)	Connector Type	Length (m)	Cable Gauge (AWG)	Full Action/ Half Action	Applications
RDK-QSFP-Copper00	40	QSFP	13	26	Full	10GbE, 40GbE, Infiniband® QDR
RDK-QSFP-Copper05	40	QSFP	13	26	Half	10GbE, 40GbE, Infiniband® QDR

\*A version of the Reference Design Kit is available that contains two populated PCBs without housing, but no cable. It can be used to solder cable to the boards, if a cable type other than the one provided with the reference design kit is desired.

## ABOUT SEMTECH

*Semtech Corporation is a leading supplier of analog and mixed-signal semiconductor platforms for high-end consumer, computing, communications and industrial applications.*

Our vision is to be the global leader in analog and mixed-signal platforms enabling architectural and performance differentiation. Semtech, publicly traded since 1967, is listed on the NASDAQ Global Select Market under the symbol SMTC and has more than 31 sales and application support offices in 18 countries as well as representatives and distribution support locations in more than 30 countries.

Our proprietary platforms, differentiated by innovation, size, efficiency, performance and reach, are used in some of the most innovative systems and products in the market today. Semtech products can be found in a wide range of fast-growing market segments, including Smart Phones, LED TVs, Tablets, Wireless LAN Modems, Automated Meter Reading, Ultra-Low-Power Medical, Satellite Communication, Cellular Infrastructure, Optical Transport, Datacenters and state-of-the-art Broadcast Video industries.

More than 5,000 customers worldwide rely on our diverse product portfolio and world class technology roadmap to provide them with solutions for 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.

## CUSTOMER CONTACT & SALES OFFICE LISTING

### CORPORATE HEADQUARTERS

Camarillo, California  
805 498 2111

### NORTH AMERICA

Burlington, Ontario  
905 632 2996

### EUROPE

Wil, Switzerland  
+ 41 71 313 4828

Bristol, England  
+44 1454 462200

Courtaboeuf, France  
+ 33 169 28 22 00

Hallbergmoos, Germany  
+ 49 811 998 728 10

### ASIA

Seoul, Korea  
+ 82 2 527 4377

Tokyo, Japan  
+ 81 3 5719 7560

Osaka, Japan  
+ 81 6 6347 6570

Beijing, China  
+ 86 10 6410 6855

Shanghai, China  
+ 86 21 6391 0830

Shenzhen, China  
Design Center &  
Applications  
+ 86 755 8282 8515

Taipei, Taiwan  
+ 886 2 2748 3380

For a detailed list of sales representatives for your area please visit



[www.semtech.com/contact](http://www.semtech.com/contact)



[www.semtech.com](http://www.semtech.com)



### Semtech Corporation Headquarters

200 Flynn Road, Camarillo, California 93012

phone: (805) 498-2111 • fax: (805) 498-3804 • email: [corporate@gennum.com](mailto:corporate@gennum.com) • [www.semtech.com](http://www.semtech.com)