

Optical & IC Products

Featuring High Performance Portfolio



- FiberEdge® TIAs, Laser and Modulator Drivers
- PON-X® TIAs, Laser and Modulator Drivers
- Single-Lane ClearEdge® CDRs
- Dual-Lane ClearEdge CDRs
- Quad-Lane Tri-Edge™ CDRs
- Multi-Lane Signal Conditioners
- ROSAs
- Limiting Amplifiers
- Transceiver ICs
- Optical Reference Design Kits



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High-Performance

Optical & Copper IC Products

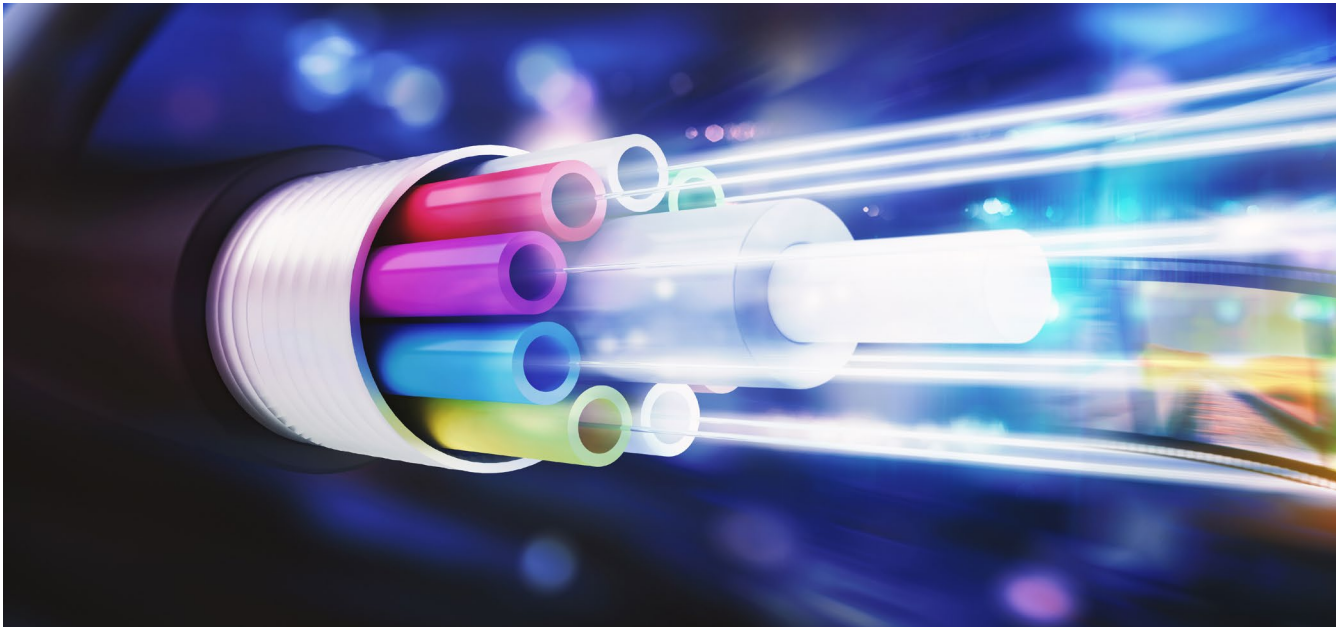
Semtech designs the industry's most innovative optical, analog and mixed-signal semiconductor solutions to serve the rising global demand for high-speed data transmission products.

Semtech is an active contributor to networking standards development and has shipped over 2 billion optical ICs. This combination of real-world experience and industry leadership enables us to deliver best-in-class solutions for our customers' designs.

Semtech offers one of the industry's most comprehensive portfolios of optical transceiver IC products ranging from 100Mbps to over 100Gbps, supporting key industry standards such as Fibre Channel, InfiniBand®, Ethernet, CPRI, PON, OTN, SONET, and PCI Express®. Semtech is also investing in leading-edge technologies to enable communication systems at 800Gbps and beyond.

For our optical component and module customers, this highly differentiated set of products provides a unique roadmap that improves performance and reliability, while simplifying design, lowering costs and speeding time-to-market.

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



Semtech Solutions

Enabling High Performance, High-Speed

- Class leading IC solutions for 10G to 800G applications, including SFP28, QSFP28, CFPx, FRx, DRx, SRx, and AOCs
- Full portfolio of integrated solutions for all PON applications and complete reference designs
- Semtech's ClearEdge® and Tri-Edge™ CDR with low power, reference-free technology
- FiberEdge® Transimpedance Amplifiers (TIAs) that exceed the IEEE Stressed Receiver Sensitivity (SRS) specifications
- FiberEdge Laser Drivers featuring high bandwidth, low noise and THD
- Receive Optical Sub-Assembly (ROSA) based on Semtech's Rchip technology
- Industry's first single-chip 10G PON OLT transceivers for XGSPON and 10GEPON applications
- Industry's first quad CDRs enabling long reach Infiniband® QDR, 40GbE and 100GbE applications
- Full portfolio of integrated solutions to address all SFP+ and XFP modules
- Dual-lane CDRs (Tx/Rx) with integrated DML or EML driver
- Protocol-independent repeaters/redrivers
- Limiting Amplifiers (LA) that provide wideband, low noise post-amplification
- SFP+ reference design kits for optical modules to decrease design time

Building the Future Together

As networking requirements continue to evolve, so will Semtech, by 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 supplier and providing innovative approaches that deliver unrivaled performance for the most sophisticated applications.

Technology Leadership for the Future of Optical Communications

TECHNOLOGIES

PAM4

- Chipsets for both 28 and 56Gbaud applications
- Industry leading linear performance
- Data center and wireless markets served

Tri-Edge™ & ClearEdge® CDRs

- Market leader in CDRs
- Reference-free operation
- Integrated solutions enable best performance, lowest power and ultra-low latency

TIAs

Industry leading performance and proven reliability

Laser Drivers & Limiting Amplifiers

High performance and discrete integrated solutions for single- and multi-channel applications

ROSAs

Best-in-class sensitivity, based on Semtech's patented Rchip technology

MARKETS

Data Center

- 56 and 28Gbaud PAM4 for SRx modules and AOCs
- n x 25Gbps NRZ solutions

5G Wireless

Market leading 10Gbps and 25Gbps solutions for SFP28 modules

PON/FTTH

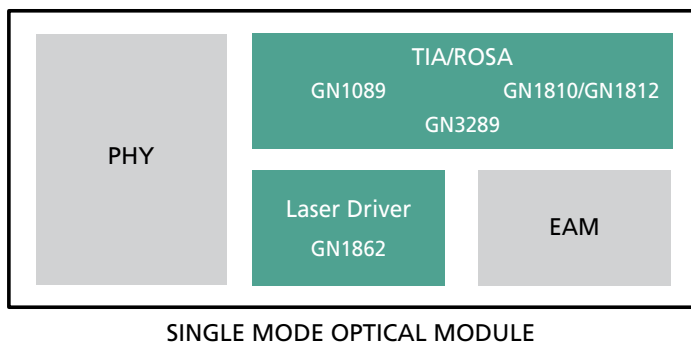
- PON-X® portfolio driving the future of PON
- Industry's first fully integrated 10G PON OLT solutions
- Highly integrated chipset solutions for 10G PON ONU



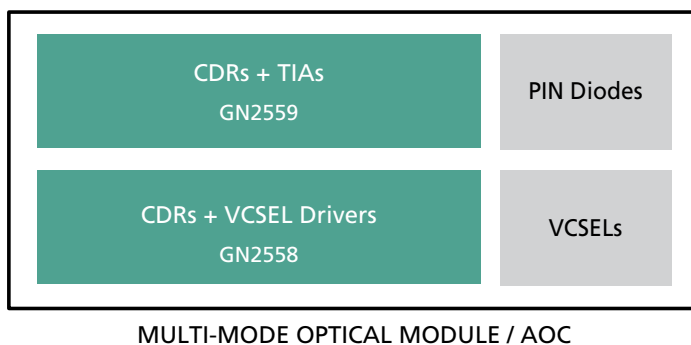
PAM4 Connected Data Center

Over the past several years, PAM4 has emerged as the leading technology for implementation of a new generation of data center and wireless optical links.

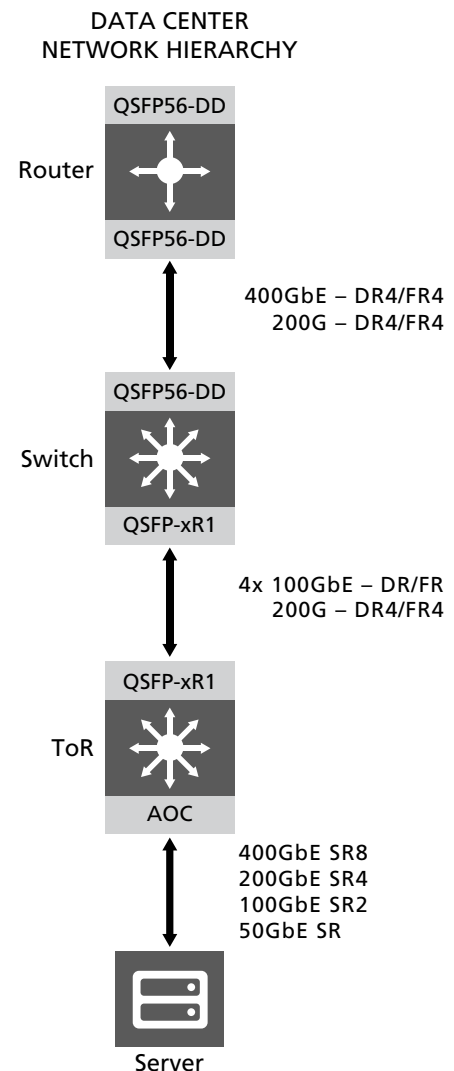
Standards such as IEEE 802.3bs and 802.3cd provide a common understanding of link requirements enabling interoperability that will drive the PAM4 communications market to scale, thereby reducing costs. Concurrently, applications such as machine learning and 4K video apply continuous pressure on service providers to supply more and more bandwidth. Semtech is uniquely positioned to meet the challenges of this market by providing its customers a wide range of solutions specifically tailored to individual application needs.



Comprised of Semtech's market-leading, linear, Physical Media Dependent (PMD) FiberEdge® products and advanced physical layer devices, our chipsets for single mode applications set the standard for data center applications. Semtech delivers 100Gbps, single lambda solutions that exceed stringent IEEE, OIF and MSA standards with world class electronics specifically designed and orchestrated for optimal performance.



Leveraging its dominant 25Gbps ClearEdge® CDR and PMD technologies, Semtech's highly integrated, 56Gbps PAM4 devices provide an optimal mix of low power, high performance and cost effectiveness required to meet the demands of the multi-mode market. Whether utilized in Active Optical Cables (AOCs) or in standard optical transceivers, Semtech's easy to design in multi-mode PAM4 solutions are the ideal electronics solution for multi-mode optical links.



New Products

GN2146: Low-Power Bidirectional 24-28Gbps ClearEdge® CDR + EML/MZM Driver

- Fully integrated EML/MZM driver and industry-leading ClearEdge CDR
- Enables <1.5W SFP28 DWDM or tuneable modules up to 80km
- Fully monolithic integrated EML/MZM driver and ClearEdge CDR with integrated Bias T components to allow easier layout
- Industry's smallest die size of 5mm x 4mm FC-LFBGA package (including passives) and ultra-low power 550mW at 2VppSE (4VppD) swing

GN2152B: Low-Power Bidirectional 24-28Gbps ClearEdge CDR + DML Driver

- Fully integrated DML driver and industry-leading ClearEdge CDR
- Enables <1W SFP28 300m/10km modules
- Proprietary DML compensation technology maximizes performance with multiple DML laser vendors including low bandwidth lasers

GN2154: Low-Power Bidirectional 24-28Gbps ClearEdge CDR + Single-Ended EML Driver

- Fully integrated EML driver and industry-leading ClearEdge CDR
- Enables <1.5W SFP28 LAN-WDM and DWDM modules up to 80km
- Small package (3.2mm x 2mm) and industry's lowest power of 550mW typical at 1.85VppSE driver swing
- Proprietary EML compensation technology maximizes performance with multiple EML laser vendors including low bandwidth lasers

GN1196/GN28L55A: 10Gbps LR Chipset with Digital Diagnostic

- MCU Free operation
- Full suite of flexible Digital Diagnostics modes
- Advanced eye-shaping features
- Industrial best 10Gbps sensitivity CMOS TIA with the lowest power consumption

GN7155B/7055B: PON-X® XGPON OLT Chipset

- 10G EML/CDR with 2.5G burst mode limiting amplifier
- GN7055B: High sensitivity 10G/2.5G burst mode TIA

GN28L97B: XGPON ONU Combo IC

- 10G Rx, 2.5G dual loop Tx with programmable eye-shaping
- Highly integrated, low BOM cost and compact size

GN2558: Tri-Edge™ PAM4 4x56G CDR + VCSEL Driver

- Low power consumption
- Low latency analog CDR
- Four independent transmit channels
- 200GBASE-SR4 Optical transceiver modules
- 200G & 400G QSFP-DD Optical transceiver modules
- 200G & 400G OSFP Optical transceiver modules
- 200G-AUI-4 and 400G-AUI-8 chip to module and CEI 56G VSR re-timed interfaces

GN2559: Tri-Edge PAM4 4x56G CDR + TIA

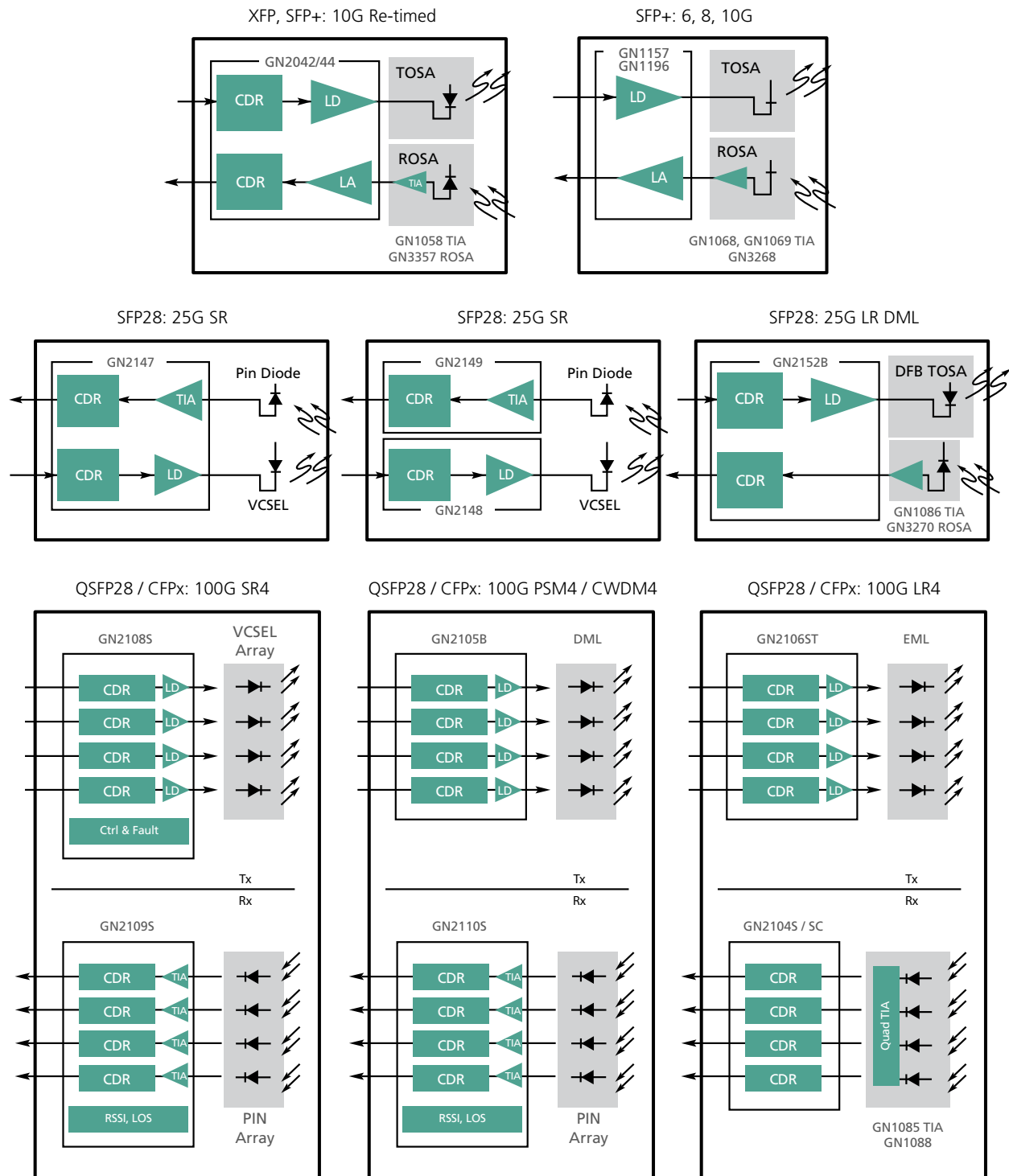
- Low power consumption
- Low latency analog CDR
- Four independent receive channels
- 200G & 400G QSFP-DD Optical transceiver modules
- 200G & 400G OSFP Optical transceiver modules
- 200G-AUI-4 and 400G-AUI-8 chip to module and CEI 56G VSR re-timed interfaces

GN1812: Quad Channel 56GBd PAM4 Linear TIA

- Low power—188mW typical
- Low IRN—1.9μA typical (30GHz BW)
- High bandwidth—35GHz typical
- MGC and AGC Modes with programmable gain/output swing

Optical Applications

Semtech offers a comprehensive selection of optical transceiver ICs and components for all 1-10GbE, CPRI, OC-192, and 100G module form factors.



Tri-Edge™ CDRs

Semtech's Tri-Edge technology offers the only analog CDR solution for optical modules capable of meeting the low power, low cost requirements needed for data center PAM4 optical interconnects. Tri-Edge also offers significant latency improvements over DSP which are key to HPC and AI data centers demanding the lowest latency. The products are fully compliant to the Open Eye MSA and address a full range of needs for a data center, from 500m to 10km, SR, TOR and Tier 1, in a range of laser and module types.

GN2538

- The GN2538 Tri-Edge CDR is a dual PAM4 CDR re-timer with integrated VCSEL array driver designed for 53.125Gbps signal conditioning within next-gen pluggable optical modules and Active Optical Cables (AOC).
- This PAM4 CDR includes proprietary VCSEL compensation to enable a wide range of VCSEL options with fully adaptive input equalization and fast startup to streamline system bring up.

GN2539

- The GN2539 Tri-Edge CDR is a dual PAM4 CDR with an integrated transimpedance amplifier (TIA) array.
- This PAM4 CDR includes configurable output equalization enabling robust electrical interfaces compliant to OIF VSR and IEEE XLAUI specifications.
- The GN2539 linear TIA and CDR provides superior receiver performance with fast adaptation and startup.

GN2558

- The GN2558 Tri-Edge CDR is a quad PAM4 CDR re-timer with integrated VCSEL array driver designed for 53.125Gbps signal conditioning within next-gen pluggable optical modules and AOC.
- This PAM4 CDR includes proprietary VCSEL compensation to enable a wide range of VCSEL options with fully adaptive input equalization and fast startup to streamline system bring up.

GN2559

- The GN2559 Tri-Edge CDR is a quad PAM4 CDR with an integrated array.
- This PAM4 CDR includes configurable output equalization enabling robust electrical interfaces compliant to OIF VSR and IEEE XLAUI specifications.
- The GN2559 linear TIA and CDR provides superior receiver performance with fast adaptation and startup.



Watch Now

ClearEdge® CDRs

Semtech's multi-lane signal conditioners, based on our reference-free ClearEdge CDR platform with integrated drivers and TIAs, offer the lowest power, smallest footprint solutions for XFP, re-timed SFP+, 25G and 100G modules, in addition to AOCs.

Enabling Next-Generation 100G Markets

Semtech's 100G ClearEdge CDR portfolio integrates our proven Quad 24G-28G CDRs with VCSEL, DML or EML drivers for transmit with TIAs for receive, targeting both short reach and long reach modules. Our proven integration and the industry's lowest power and superior performance simplifies 100G designs and lowers cost.

Enabling SFP28 AND 25Gbps AOCs

The GN2147 dual CDR with integrated VCSEL driver and TIA enables high-performance and low cost SFP28 SR modules and AOCs. The single chip design and advanced transmit

compensation provides for low cost solutions using a single lens design as well as low bandwidth VCSELs for exceptional BOM savings.

Feature Set for DWDM and Tunable Application

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

| ClearEdge CDRs | | | | | | | | |
|------------------------------|---------------------|------------------|--------------|-----|--------------------|-------------------|---------|---|
| Part Number | Data Rate (Gbps) | Lanes | Laser Driver | TIA | Slice Level Adjust | Pin Compatibility | Package | Applications |
| GN2017A* | 9.95–11.7 14.025 | 2 (1Rx + 1Tx) | VCSEL | – | No | GN2010X | QFN-32 | 16G FC, 10G FCoE |
| GN2040* | 9.95–11.3 | 2 (1Rx + 1Tx) | DML | – | Yes | GN204x | QFN-32 | XFP and SFP+, 10GbE, OC-192 and DWDM |
| GN2042* | 9.95–11.3 | 2 (1Rx + 1Tx) | DML | – | Yes | GN2044 | QFN-32 | XFP and SFP+, 10GbE and OC-192 Enables 1W Re-timed SFP+10km |
| GN2044* | 9.95–11.3 | 2 (1Rx + 1Tx) | EML | – | Yes | GN1444, GN2042 | QFN-32 | XFP and SFP+ 10GbE, OC-192 and DWDM Enables 1.5W Re-timed SFP+ 40/80km |
| GN2044S* | 9.95–11.3 | 2 (1Rx + 1Tx) | EML | – | Yes | GN1444S | QFN-32 | Tunable SFP+, OC-192 and DWDM Enables 1.5W Re-timed TSFP+ |
| GN2104S/SC* | 24–28 | 4 | – | – | Yes | – | FC-CSP | 100Gbps Ethernet, Infiniband EDR |
| GN2105B* | 24–28 | 4 | DML | – | Yes | – | FC-BGA | 100Gbps Ethernet, PSM4, CWDM4, CLR4 |
| GN2106ST* | 24–28 | 4 | EML | – | Yes | – | BGA | 100Gbps Ethernet/OTN, Infiniband EDR |
| GN2108S* | 24–28 | 4 | VCSEL | – | Yes | – | Die | 100Gbps Ethernet SR4 |
| GN2109S/10S* | 24–28 | 4 | – | Yes | Yes | GN2109S | Die | 100Gbps Ethernet/OTN PSM4, CWDM4, CLR4 |
| GN2147* | 24–28.1 | 2 (Rx + Tx) | VCSEL | Yes | – | – | Die | 25Gbps AOC |
| GN2148* | 24–28.1 | 1 Tx | VCSEL | – | – | – | Die | SFP28 SR |
| GN2149* | 24–28.1 | 1 Rx | – | Yes | – | – | Die | SFP28 SR |
| GN2152* | 24–28 | 2 (Rx + Tx) | DML | – | – | CSP | CSP | SFP28 LR |
| GN2152B* | 24–28.1 | 2 (Rx + Tx) | EML/MZM | – | Yes | – | – | SFP28 LR, BiDi, CWDM |
| GN2154* | 24–28.1 | 2 (Rx + Tx) | SE-EML | – | Yes | – | – | SFP28 DWDM and LAN-WDM up to 80km |

* Please contact your sales representative for more details.

Transceiver ICs (LD & LA)

High performance laser drivers and limiting amplifiers for optical communications.

GN28L95

Combined 10Gbps limiting post amplifier and 2.5Gbps burst mode laser driver for cost critical 10GEAPON and XG-PON asymmetric applications. GN28L95 features robust automatic ER control and integrated APD controller.

GN28L96

10G PON combo for next-generation systems. The GN28L96 integrates a 10G burst mode laser driver with dual loop ER control and a 10G limiting amplifier. GN28L96 targets low cost for BoB ONU and module applications.

GN1158/GB1196

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

GN28L97B

GN28L97B is an integrated 2.5G burst mode laser driver and 10G limiting post amplifier targeting low cost BoB XGPON ONU applications.

GN7153B

GN7153B is an integrated 10G EML laser driver and dual rate 10G/2.5G burst mode limiting amplifier with built-in AC-coupling discharge circuit.

GN1444/44S

The GN1444 and GN44S are highly integrated, low power, small footprint transceivers that are ideal for SFP+ ER optical modules.

GN7154

GN7154 is an integrated 10G EML driver and dual rate 10G/1G burst mode limiting amplifier for 10GEAPON OLT applications.

GN7155B

GN7155B is an integrated 10G EML laser driver and 2.5G burst mode limiting amplifier for XGPON OLT applications

| Transceiver IC (LD and LA) | | | | | | |
|----------------------------|--|------------------|---------------------------|--------------------|---------|------------------------------------|
| Part Number | Overview | Data Rate (Gbps) | Max Mod/Bias Current (mA) | Supply (V) | Package | Applications |
| GN1444S* | EML Laser Driver + Receive LA | to 11.3 | 2.5Vpp /120mA | 1.8 and 3.3 | QFN-32 | 10GbE, OC-192 |
| GN1157 | DML Laser Driver + Receive LA | to 11.3 | 90/120 | 3.3 (Optional 2.8) | QFN-28 | 10GbE LR SFP+, CPRI |
| GN1157B* | DML Laser Driver + Receive LA | to 12.5 | 90/120 | 2.4 and 3.3 | QFN-28 | 10GbE LR SFP+, CPRI |
| GN1158 | VCSEL Laser Driver + Receive LA | to 11.3 | 20/15 | 3.3 (Optional 2.8) | QFN-28 | 10GbE SR SFP+ |
| GN1159* | 1.0 to 12.5Gbps LR Transceiver Chip with Digital Diagnostics | to 12.5 | 90/120 | 2.4 and 3.3 | QFN-32 | 10GbE LR SFP+, CPRI |
| GN1196* | 1.0 to 12.5Gbps LR Transceiver Chip with Digital Diagnostics | to 12.5 | 100/120 | 2.4 and 3.3 | QFN-32 | 10GbE LR SFP+, CPRI |
| GN25L95 | Burst Mode DFB + Receive LA | to 2.5 | 90/100 | 3.3 | QFN-28 | EPON, GPON, BOSA-on-Board |
| GN25L95C | SFP Burst Mode DFB + Receive LA | 3.1G to 125M | 90/100 | 3.3 | QFN-28 | Single and multi-rate SFP |
| GN25L96 | Programmable Burst Mode DFB + Receive LA | to 2.5 | 90/100 | 3.3 | QFN-28 | EPON, GPON, BOSA-on-Board, SFP |
| GN25L98 | Burst Mode DFB + Receive LA + APD Controller | to 2.5 | 90/100 | 3.3 | QFN-28 | EPON, GPON, BOSA-on-Board |
| GN28L95 | 2.5Gbps Burst Mode DFB + 10Gbps Receive LA | Rx 10.3, Tx 2.5G | 100/85 | 3.3 | QFN-32 | 10GbE EPON, XGS-PON (Asymmetric) |
| GN28L96 | 10Gbps Burst Mode DFB + 10Gbps Receive LA | 10.3 | 100/85 | 3.3 | QFN-32 | 10GbE EPON, XG-PON (Symmetric) |
| GN28L97B | 10Gb/s Limiting Post Amplifier & 2.5Gbps Burst Mode Laser Driver | 10.3 | 100/120 | 3.3 | QFN-32 | 10Gbps Asymmetric PON Applications |
| GN7153B | 10G EML Driver CDR/Burst-mode LAM Combo | to 10.3 | 100/140 | 1.8 and 3.3 | QFN-32 | 10GbE XG-PON, XGSPON |
| GN7154 | 10GEAPON OLT Combo | to 10.3 | 100/140 | 1.8 and 3.3 | QFN-32 | 10G EPON XFP and SFP+ OLT modules |
| GN7155B | 10G EML Driver CDR/2.5G Burst-mode LAM Combo | to 10.3 | 100/140 | 1.8 and 3.3 | QFN-32 | OLT modules for XGPON |

TIA

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

Semtech offers a portfolio of fully integrated BiCMOS and pure CMOS transimpedance amplifiers providing wideband, low noise pre-amplification of a current signal from a PIN photodiode or APD.

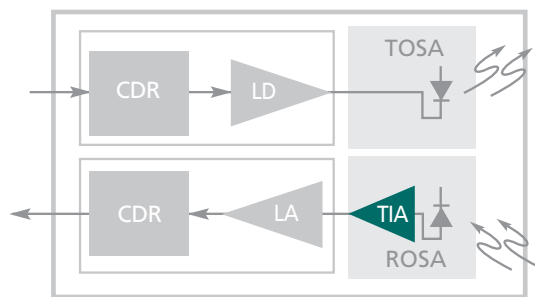
Semtech's TIAs offer best-in-class performance in limiting, linear or automatic gain control versions for use in high performance optical receivers operating from 155Mbps to 100Gbps.

Features

- Wideband, low noise
- 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 – EPON, GPON, 10GEPON, XGPON, and XGSPON
- 6G and 1–12G CPRI modules for wireless front haul
- 100Gbps client side modules



GN1081, GN1084, GN1085, GN1088

1 x 28Gbps and 4 x 28Gbps limiting TIA optimized for 100GBASE-LR4 applications

GN1089, GN1810, GN1812

1 x 56GBd and 4 x 56GBd PAM4 linear TIAs

GN7069

10Gbps limiting TIA designed for APD applications such as 5GHz Wi-Fi immune 10G PON ONU's

GN7055, GN7056

Limiting TIA designed specifically for XGSPON and 10G EPON OLT applications

GN1090

- Quad 14.5Gbps array receiver for parallel and multi-channel datacom and telecom modules.
- Advanced receiver design for excellent optical performance and very low power consumption (240mW total for 4 channels).
- Use with GN1190 Quad VCSEL driver

GN28L55A

Industrial lowest sensitivity and power 10Gbps CMOS TIA for telecom and data center

GN25L54

2.5Gbps Super TIA for GPON ONU with low cost build

NT24L55

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

NT24L50

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

NT23L50

622Mbps high sensitivity TIA for FTTH and telecom fiber transceiver applications

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 200Mbps

TIA

| TIA | | | | | | | |
|-------------------------|-----------------------------------|------------------|--------------------|----------------|------------|--------------|---|
| Part Number | Overview | Data Rate (Gbps) | Gain (k Ω) | BW (GHz) | Supply (V) | Noise | Applications |
| GN1068 | 14G Limiting | to 14.3 | 6.75 | 12 | 3.3 | 1.2 μ A | CPRI, 10GBASE-SR/LR/ER and 16G FC |
| GN1069 | 12.5G Limiting | to 12.5 | 9 | 11.5 | 3.3 | 0.86 μ A | - |
| GN1086* | 28G Limiting | 25-28 | 6 | 23 | 3.3 | 1.25 μ A | 25Gbps and 100Gbps Ethernet/ OTN, Infiniband EDR |
| GN1084* | 25G Limiting | 25 | 6 | 22 | 3.3 | 2.3 μ A | 25Gbps and 100Gbps Ethernet |
| GN1088* | Quad 28G Limiting | 28 | 5 | 23 | 3.3 | - | - |
| GN1090 | Quad 10G Limiting | to 14.3 | * | * | 3.3 | 0.9 μ A | 40Gbps Ethernet, Infiniband, QSFP+ |
| GN25L53 | 3.1Gbps AGC TIA | 3.1 | 5.5 | 1.9 | 3.3 | 335nA | CPRI, GPON, OC-48 (APD) |
| GN25L54 | 2.5Gbps High Sensitivity AGC TIA | 2.5 | 42 | 1.4 | 3.3 | 80nA | GPON (PD) |
| GN7055 | Multi-rate PON Burst Mode TIA | 10.3/ 2.5/ 1.25 | 3.6/ 4.6/ 11.5 | 8.7/ 2.2/ 1.14 | 3.3 | * | 10G XGS-PON/10G EPON/ 2.5G XG-PON/1.25 EPON |
| GN7069 | 10G Limiting | to 11.3 | 8 | 10 | 3.3 | 0.9 μ A | APD ROSAs for 10G PON ONU |
| GN7053* | 1G GPON Burst Mode Limiting | 1.25 | 1.25 | 1.5 | 3.3 | * | 1G GPON OLT |
| GN7056B | Multi-rate PON Burst Mode TIA | 10.3/ 1.25 | 3.5/12.2 | 8.9/1.7 | 3.3v | * | 10GbE EPON OLT |
| NT20R67 | 155Mbps AGC TIA | 0.155 | 63 | 0.165 | 3.3/5.0 | 11nA | OC-3, Fast Ethernet |
| NT20067 | 155Mbps AGC TIA | 0.155 | 23 | 0.165 | 3.3/5.0 | 11nA | OC-3, Fast Ethernet |
| NT24L50 | 1.25Gbps AGC TIA | 1.25 | 25 | 0.75 | 3.3 | 92nA | GbE, EPON |
| NT24L55 | 1.25Gbps High Sensitivity AGC TIA | 1.25 | 46 | 0.75 | 3.3 | 74nA | EPON |
| NT25L51 | 2.5Gbps AGC TIA | 2.5 | 8 | 1.7 | 3.3 | 230nA | OC-48, GPON (APD) |
| GN1089 | Single Channel PAM4 Linear | 100 | 5 | 34 | 3.3 | 2.4 μ A | 56GBd Ethernet PAM4 modules (100GBASE and 400GBASE) |
| GN1810 | Quad PAM4 Linear | 100 | 5 | 34 | 3.3 | 2.4 μ A | 56GBd Ethernet PAM4 modules (400GBASE) |
| GN1812 | Quad PAM4 Linear | 100 | 5.5 | 35 | 3.3 | 1.9 μ A | 56GBd Ethernet PAM4 modules (400GBASE) |

* Please contact your sales representative for more details.

Laser Drivers & Limiting Amplifiers

High performance laser drivers and limiting amplifiers for optical communications.

Applications

- 100Gbps Ethernet
- 6Gbps and 10Gbps CPRI Modules for Wireless Front Haul
- 40G QSFP+ Modules
- 8G Fibre Channel
- 9.95Gbps OC-192 and 10.70Gbps OC-192 with FEC
- 10.3Gbps Ethernet
- 10.52Gbps Fibre Channel
- 11.1Gbps Ethernet over SONET/SDH
- 11.3Gbps Fibre Channel with Forward Error Correction

Limiting Amplifiers

NT24L73

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

| Limiting Amplifiers | | | | | | | |
|-------------------------|-----------------------|------------------|-----------|-------|------------|-------------------|---------------------|
| Part Number | Overview | Data Rate (Gbps) | Gain (dB) | BW | Supply (V) | Noise Figure (uV) | Applications |
| NT20045 | 200Mbps Limiting Amp | 0.2 | 60 | 0.125 | 3.3/5.0 | 80 | OC-3, Fast Ethernet |
| NT24L73 | 1.25Gbps Limiting Amp | 1.25 | 46 | 0.938 | 3.3 | 300 | OC-3, OC-12, GbE |

Laser Drivers

GN1185

High-performance quad 25–28Gbps DML driver for active TOSAs targeting 100G applications

NT20042

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

NT22L33

3.3V/5.0V CMOS laser driver for data rates of 125Mbps to 1.25Gbps

GN1190

- Quad VCSEL driver for parallel and multi-channel datacom and telecom modules
- Low power consumption, 210mW typical for 4 channels
- Use with GN1090 quad TIA

GN7151

GN7151 is a 10G EML driver integrating ClearEdge® reference free CDR to deliver best-in class eye quality and enabling lower power modules for 10G PON OLT applications

| Laser Drivers | | | | | | |
|-------------------------|------------------------------|------------------|---------------------------|------------|--------------|------------------------------------|
| Part Number | Overview | Data Rate (Gbps) | Max Mod/Bias Current (mA) | Supply (V) | Package | Applications |
| GN1185* | Quad DFB driver | 25-28 | 55m/70 | 2.3/3.3 | Bare Die | 100GbE Ethernet active TOSA |
| GN1190 | Quad VCSEL Driver | to 14.3 | 12/12 | 3.3 | Bare Die | 40Gbps Ethernet, Infiniband, QSFP+ |
| NT20042 | 300Mbps LED Driver | 0.3 | 100 | 3.3/5.0 | QSOP-16 | OC-3, Fast Ethernet |
| NT22L33 | 1.25Gbps FP/DFB Laser Driver | 1.25 | 70/80 | 3.3/5.0 | QFN-24 (4mm) | OC-3, OC-12, GbE |

* Please contact your sales representative for more details.

ROSAs

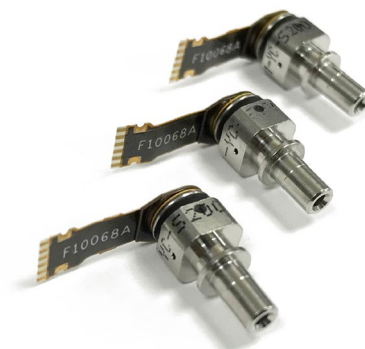
Best-in-class receive optical sub-assemblies (ROSAs) based on patented Rchip technology

Features

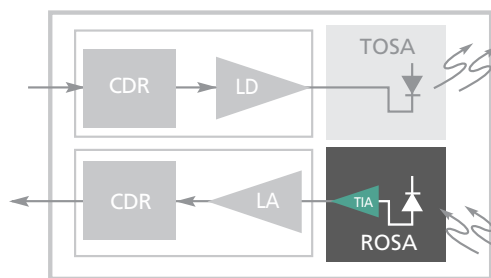
- Best-in-class stressed receiver sensitivity
- High gain to ensure exceptional crosstalk performance within the module
- Patented Rchip technology to ensure maximum module manufacturing yield
- Super high gain delivers most integrated, lowest power SFP+ solution

Applications

- 10GBASE-LR
- 10GBASE-ER
- 10GBASE-LRM
- OC-192 SR-1
- OC-192 IR-2
- 10G EPON
- Low OSNR DWDM
- 8GFC and 10GFC
- 25G Ethernet
- 28GBd and 56GBd PAM4



GN3289



| ROSAs and Super High Gain ROSAs | | | | | | | | |
|---------------------------------|------------------------|------------------|-----------|-------------|------|------------------------|--|-------|
| Part Number | Overview | Data Rate (Gbps) | Gain (kΩ) | Supply | RSSI | Unstressed Sensitivity | Comments | ORL |
| GN3257* | PIN with AGC | to 11.3 | 8.5 | +3.3V ±10% | Yes | -19dBm | – | -27dB |
| GN3357* | High Gain APD with AGC | to 11.3 | 8.5 | +3.3V ±10% | VAPD | -27dBm | – | -27dB |
| GN3358* | High Gain APD Rchip | to 11.3 | 13 | +3.3V ± 10% | VAPD | -27dBm | Ideal for non-retimed SFP+ | -27dB |
| GN3270* | 25G Limiting PIN ROSA | 28 | 6 | +3.3V ±10% | Yes | -14dBm | SFP28 LR applications | -27dB |
| GN3289* | 56GBd Linear AGC ROSA | to 100 | 5 | +3.3V ±10% | Yes | -7.7dBm OMA | 100Gbps Ethernet operation using PAM4 modulation | -27dB |
| GN3361* | High Gain APD with AGC | to 11.3 | 8.5 | +3.3V ±10% | VAPD | -26.5dBm | – | -27dB |
| GN3362* | Limiting APD ROSA | to 11.3 | 8 | +3.3V ±10% | VAPD | -27.5dBm | – | -27dB |

* Please contact your sales representative for more details.

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 resetting crosstalk and jitter budgets.

High Level of Integration and Small Footprint

Semtech's backplane and 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

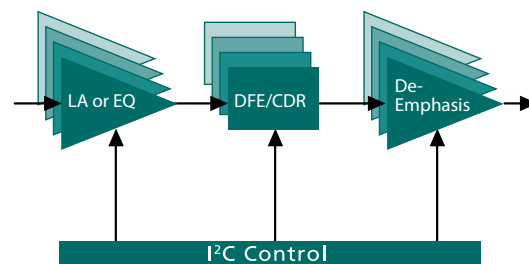
A combination of Equalizer, DFE and ClearEdge® CDR technology allows for an optimal solution to drive long, dense backplanes or cables at high speeds.

Low Power

Semtech's ClearEdge CDR products require the lowest power in the industry, a key factor as densities increase.

Reset the Jitter and Crosstalk Budgets

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



Multi-Lane Signal Conditioners

| Part Number | Data Rate (Gbps) | Lanes | CDR | Ref Clock | Input Stage | De-emphasis | Supply (V) | Package | Applications |
|-----------------------------|-----------------------|-------|-----|-----------|------------------------|-------------|------------|---------|--|
| GN1406 | 2.5, 3.125, 5.0, 6.25 | 4 | Yes | Req. | Equalizer | Yes | 1.2 1.8 | QFN-56 | PCIe Gen 1/2, SNAP-12, POP-4/LX-4/CX-4/KX-4, XAUI/RXAUI and Rapid I/O |
| GN1407 | 1–8 | 4 | No | Not Req. | Equalizer | No | 1.2 1.8 | QFN-56 | PCIe Gen 1/2/3, SNAP-12, POP-4/LX-4/CX-4/KX-4, XAUI/RXAUI and Rapid I/O |
| GN2402* | 10.3125 | 4 | Yes | Not Req. | Equalizer | Yes | 3.3 | QFN-44 | nx10G Backplanes, 10G/40G Linecards, 10G/40G Active Cables |
| GN2404* | 1.25–12.8 | 4 | Yes | Req. | Adaptive Equalizer DFE | Yes | 0.9 1.8 | BGA-144 | >nx10G Backplanes, 10G/40G Linecards, 10G-KR, 40G-KR4, 40G-CR4, Crosspoint Switching, CPRI |
| GN2405A/5S* | 9.95–11.3 | 4 | Yes | Not Req. | Equalizer | Yes | 3.3 | QFN-48 | nx10G Backplanes 10G/40G Linecards 10G/40G Active Cables |
| GN2406/6S* | 9.95–10.95 | 4 | Yes | Not Req. | Limiting Amp | Yes | 3.3 | QFN-48 | 10G/40G Linecards |
| GN2408* | 1.25–12.8 | 8 | Yes | Req. | Adaptive Equalizer DFE | Yes | 0.9 1.8 | BGA-144 | >nx10G Backplanes, 10G/40G Linecards, 10G-KR, Crosspoint Switching, CPRI |
| GN2412* | 1.25–12.8 | 12 | Yes | Req. | Adaptive Equalizer DFE | Yes | 0.9 1.8 | BGA-144 | >nx10G Backplanes, 10G/40G/100G Linecards, 10G-KR, 40G-KR4, 40G-CR4, Crosspoint Switching, CPRI |
| GN2504* | 25.6–28.1 | 4 | Yes | Not Req. | Adaptive Equalizer | Yes | 1.8 | QFN-54 | 25G/50G/100G Linecards, nx28G Backplanes, 25G/50G/100G Active Copper Cables |
| GT1706* | 1.25–14.5 | 6 | Yes | Req. | Adaptive Equalizer | Yes | 0.9 1.8 | BGA-144 | HD/3G/4K/8K Video Broadcast testing Fibre Channel/Infiniband/Ethernet Link Testing BERT Developments |
| GX4002 | 9.9–11.3, 14.025 | 2 | Yes | Not Req. | Equalizer | Yes | 3.3 | QFN-32 | nx10G Backplanes, 10G/40G Linecards, Infiniband FDR, 16G Fibre Channel, Crosspoint Switching |

* Please contact your sales representative for more details.

Optical Module Reference Design Kits

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 offer training through schematics, layout files and a design guide, as well as prompt support from our experienced applications engineers, reducing both design costs and time-to-market. This type of system is currently executed in the FTTx market, as the ability to reuse the 10G symmetric SFP+ design to address the 10G asymmetric market is incorporated.

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 LA in the receive chain), as well as a new LA-free architecture enabled by Semtech's High Gain ROSA portfolio.

*Reference design kits are available upon request. Please contact your semtech sales representative or through the link below.



For a detailed list of sales representatives
in your area please visit **[semtech.com/sales](https://www.semtech.com/sales)**



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