Optical & IC Products

SEMTECH®

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

semtech.com/**optical**

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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.
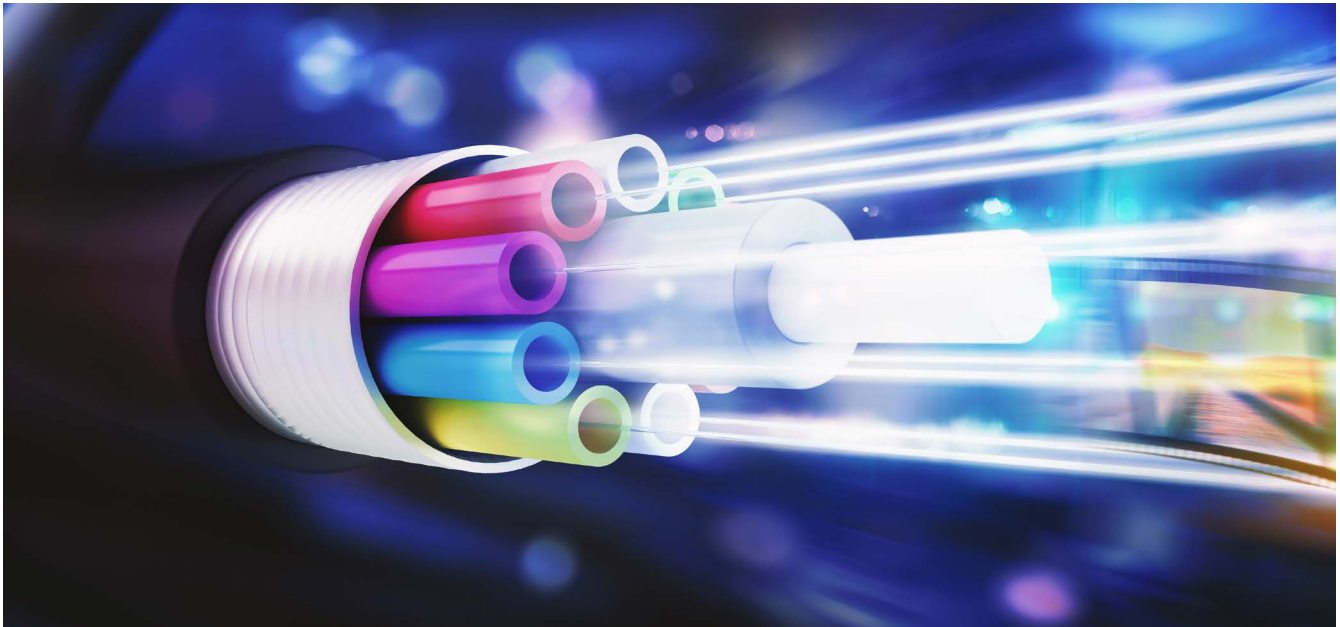
Semtech Solutions

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® Transimpedence 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 25G Burst Mode TIA for HS-PON and 25GS-PON OLT 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	Markets

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

CopperEdge™

112G PAM4 Quad Linear Equalizers

Data Center

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

5G Wireless

Market leading 10Gbps, 25Gbps, NRZ, 25Gbps NRZ and 50Gbps PAM4 solutions for SFP28 modules

PON/FTTH

- PON-X® portfolio driving the future of PON
- Industry's first 25G Burst Mode TIA for HS-PON and 25GS-PON OLT
- 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.

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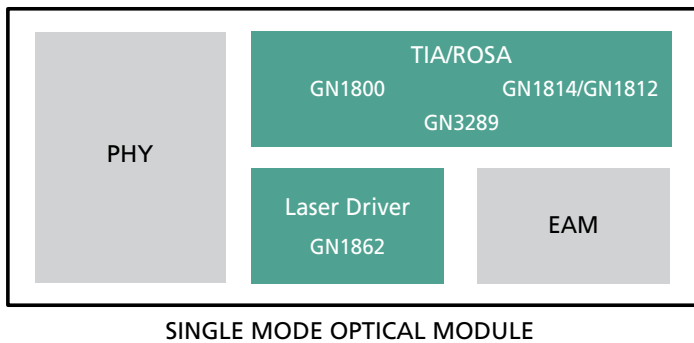
Comprised of Semtech's market-leading, linear, Physical Media Dependent (PMD) FiberEdge® products and advanced physical layer devices, our chipsets for single mode applications set the standard for data center applications. Semtech delivers 100Gbps, single lambda solutions that exceed stringent IEEE,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

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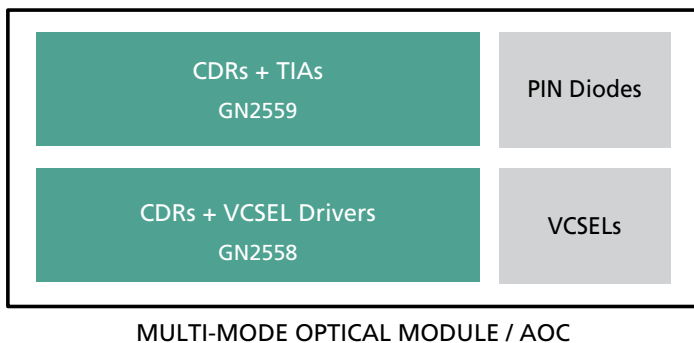
Leveraging its dominant 25Gbps ClearEdge® CDR and PMD technologies, Semtech's highly integrated, 56Gbps PAM4 devices provide an optimal mix of low power, high performance and cost effectiveness required to meet the demands of the multi-mode market. Whether utilized in Active Optical Cables (AOCs) or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

DATA CENTER NETWORK HIERARCHY
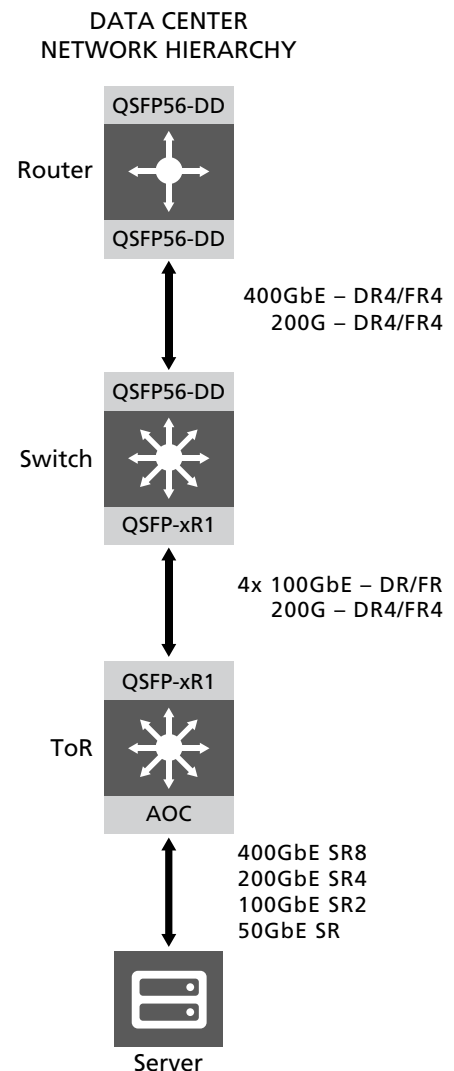
New Products

GN7060: PON-X® 25G Burst Mode TIA

- Supports 25Gbps/12.5Gbps/10Gbps data rates

GN28L45: PON-X 10G Burst Mode TIA

- Low noise, high sensitivity TIA

GN25L99E: GPON FTTR OLT Combo IC

- Highly integrated solution for Main FTTR Units (MFU)
- 1.25G Burst Mode Rx and 2.5G Tx with proprietary dual loop control

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

- Lower power consumption, low latency analog CDR and four independent transmit channels
- 200GBASE-SR4 optical transceiver modules
- 200G & 400G QSFP-DD & OSFP Optical transceiver modules

GN1800: Single Channel 56GBd PAM4 Linear TIA

- Supports 56GBd PAM4 operation
- Low IRN—1.9µA typical (30GHz BW)
- High bandwidth: 35GHz typical
- 6.25kΩ differential transimpedance gain
- Overload 2.5mApp, 2.7mADC

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

GN1814: Quad Channel 56GBd PAM4 Linear TIA, 500um pitch

- Supports 56GBd PAM4 operation per lane
- Low IRN
- 500µm I/O pitch
- High bandwidth
- MGC and AGC modes with programmable gain/output swing

GN1816: Quad Channel 56GBd PAM4 Linear TIA, 250um pitch

- Low power and IRN
- High bandwidth
- 250um I/O pitch

GN1817: Quad Channel 56GBd PAM4 Linear TIA

- Low power and IRN
- High bandwidth
- Features compensation for extended input inductance, leading to superior overload performance
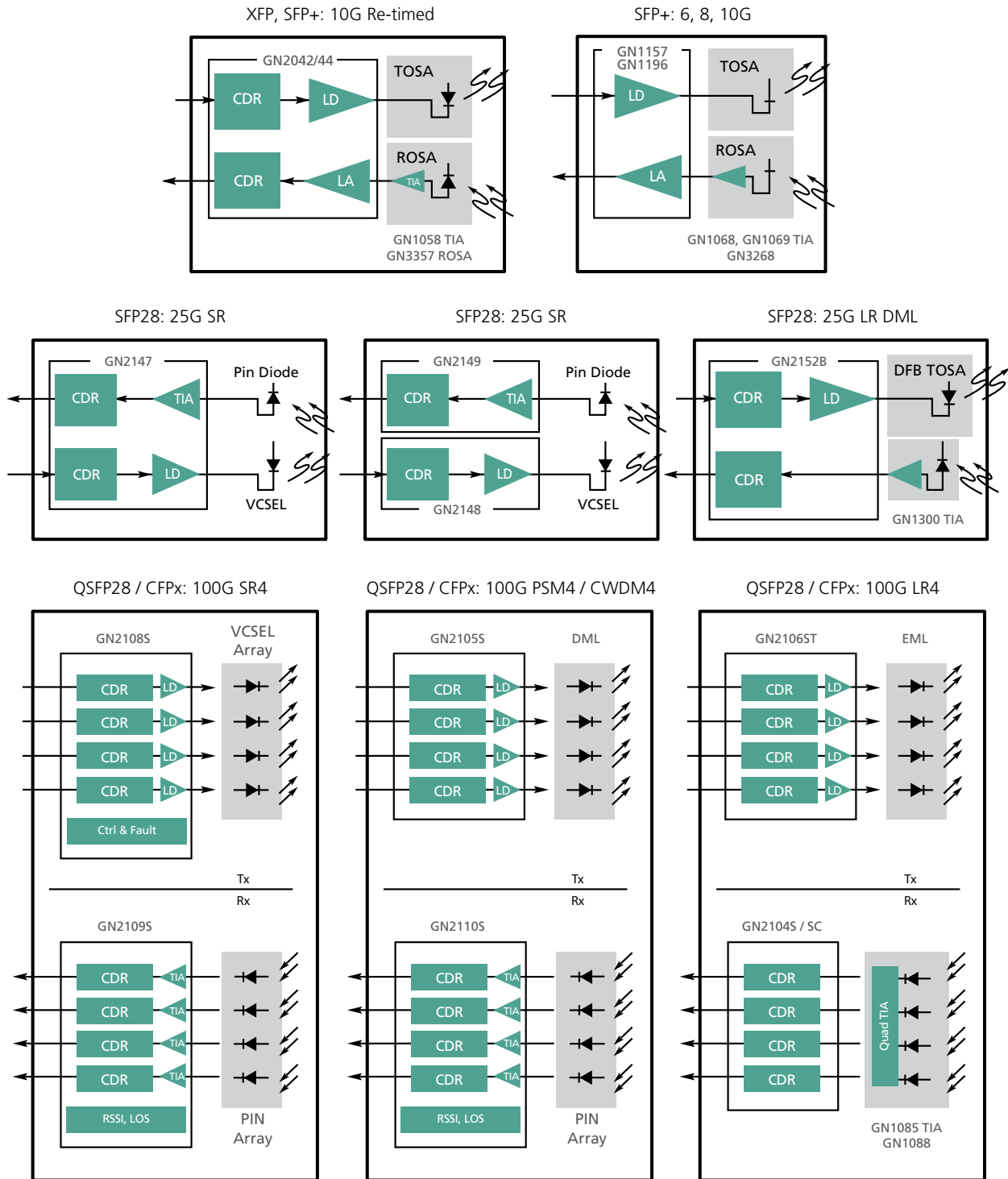
GN1848: Quad Channel 56GBd PAM4 Linear VCSEL Driver

- Low power and IRN
- High bandwidth
- Superior driver linearity
- Widely programmable VCSEL bias and modulation currents

GN8112: CopperEdge™ 112G PAM4 Quad Linear Equalizers

- Low power consumption
- Operates from a single 3.3V power supply with an integrated POR
- Low latency
- Linear PAM4 programmable equalizer optimized for 56GBaud copper link with up to 15dB equalization
- Enables a transparent ACC solution meeting all IEEE 400GBASE-CR4 Auto-Negotiation and Link Training requirements
- 4x100G or 8x100G Active Copper Cable and 4x100G onboard equalizer

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.

XFP, SFP+: 10G Re-timed

GN2042/44

CDR — LD — TOSA

CDR — LA — ROSA

TIA

GN1058 TIA
GN3357 ROSA

SFP+: 6, 8, 10G

GN1157
GN1196

LD — TOSA

LA — ROSA

GN1068, GN1069 TIA
GN3268

SFP28: 25G SR

GN2147

CDR — TIA — Pin Diode

CDR — LD — VCSEL

SFP28: 25G SR

GN2149

CDR — TIA — Pin Diode

CDR — LD — VCSEL

GN2148

SFP28: 25G LR DML

GN2152B

CDR — LD — DFB TOSA

CDR

GN1300 TIA

QSFP28 / CFPx: 100G SR4

GN2108S

VCSEL Array

CDR — LD
CDR — LD
CDR — LD
CDR — LD

Ctrl & Fault

Tx
Rx

GN2109S

CDR — TIA
CDR — TIA
CDR — TIA
CDR — TIA

RSSI, LOS

PIN Array

QSFP28 / CFPx: 100G PSM4 / CWDM4

GN2105S

DML

CDR — LD
CDR — LD
CDR — LD
CDR — LD

Tx
Rx

GN2110S

CDR — TIA
CDR — TIA
CDR — TIA
CDR — TIA

RSSI, LOS

PIN Array

QSFP28 / CFPx: 100G LR4

GN2106ST

EML

CDR — LD
CDR — LD
CDR — LD
CDR — LD

Tx
Rx

GN2104S / SC

CDR
CDR
CDR
CDR

Quad TIA

GN1085 TIA
GN1088

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.

GN2255

- The GN2255 Tri-Edge CDR is a bi-directional PAM4 CDR with an integrated DML Driver.

- The GN2255 offers an ultra-low power solution in the smallest package size for emerging 5G Advanced wireless front-haul and mid-haul optical transceiver modules.

GN2256

- The GN2256 Tri-Edge CDR is a bi-directional PAM4 CDR with an integrated differential EML Driver.

- The GN2256 offers an ultra-low power solution in the smallest package size for emerging 5G Advanced wireless front-haul and mid-haul optical transceiver modules.

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.

GN2555

- The Tri-Edge GN2555 CDR is a quad PAM4 CDR with integrated DML laser drivers designed for 53.125Gbps signal conditioning within next generation pluggable optical modules.

- This PAM4 CDR includes proprietary DML laser compensation to enable a wide range of low-cost DML laser options with fully adaptive input equalization and fast startup to streamline system bring up.

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.

GN2559S

- The Tri-Edge GN2559S CDR is a quad PAM4 CDR with integrated transimpedance amplifiers (TIAs) designed for 53.125Gbps signal conditioning within next generation pluggable single mode and multimode optical modules and active optical cables (AOC).

- When combined with the GN2558/GN2555/GN2556, this Tri-Edge CDR chipset offers low power, low latency analog signal processing solution to meet the needs of artificial intelligence (AI), high-performance computing (HPC) and Cloud data center networks.

Tri-Edge™
Ultra-low Latency
Signal Integrity Solutions
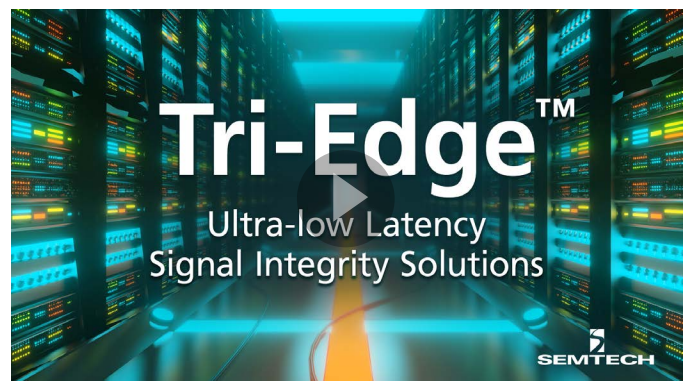
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ClearEdge® CDRs

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 DWDMEnables 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
GN2105S*	24–28	4	DML	–	Yes	–	WL-CSP	100Gbps Ethernet, PAM4, CWDM4, LR4
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
GN2146*	24-28.1	2 (Rx + Tx)	EML/MZM	–	Yes	–	–	Fixed DWDM and Tunable DWDM up to 40km
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
GN2152B*	24-28.1	2 (Rx + Tx)	DML	–	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.

GN25L99E

1.25Gbps burst mode limiting post amplifier and 2.5Gbps laser driver for cost critical GPON FTTR (Fiber-To-The-Room) main unit applications. GN25L99E features automatic ER and APC control.

GN1196/GN1158

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

GN28L97B

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

GN28L98

Integrates a 10G burst mode laser driver with dual loop ER control and advanced eye-shaping with a 10G limiting post amplifier. GN28L98 targets low cost BoB XGSPON ONU applications.

GN7153B

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

Highly integrated, low power, small footprint transceivers that are ideal for SFP+ ER optical modules.

GN7154

An integrated 10G EML driver and dual rate 10G/1G burst mode limiting amplifier for 10GEPON OLT applications.

GN7155B

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 LRTransceiver 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
GN25L95C	SFP Burst Mode DFB + Receive LA	3.1G to 125M	85/90	3.3	QFN-28	Single and multi-rate SFP
GN25L95(D)	Burst Mode DFB + Receive LA	to 2.5	85/90	3.3	QFN-28	EPON, GPON, BOSA-on-Board
GN25L96	Programmable Burst Mode DFB + Receive LA	to 2.5	85/90	3.3	QFN-28	EPON, GPON, BOSA-on-Board, SFP
GN25L98	Burst Mode DFB + Receive LA + APD Controller	to 2.5	85/90	3.3	QFN-28	EPON, GPON, BOSA-on-Board
GN25L99E	2.5G DFB + 1.25G Burst Mode Receive LA	to 2.5	98/90	3.3	QFN-28	GPON FTTR OLT BOSA-on-Board, SFP
GN28L95	2.5Gbps Burst Mode DFB + 10Gbps Receive LA	Rx 10.3, Tx 2.5G	85/90	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	85/90	3.3	QFN-32	10Gbps Asymmetric PON Applications
GN28L98	10Gbps Burst Mode DFB + 10Gbps Receive LA	10.3	10.3	3.3	QFN-32	10GbE EPON, XG-PON (Symmetric)
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	10GEPON 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

TIAs

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, XGSPON, HS-PON and 25GS-PON
- 6G and 1–12G CPRI modules for wireless front haul
- 100Gbps client side modules
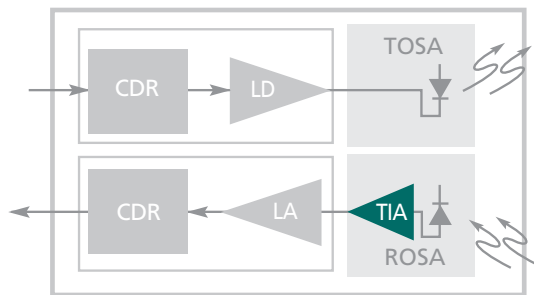
GN1081, GN1084, GN1085, GN1088
1 x 28Gbps and 4 x 28Gbps limiting TIA optimized for 100GBASE-LR4 applications

GN1700
1x 25GBd PAM4 linear TIA

GN1089, GN1810, GN1812
1 x 56GBd and 4 x 56GBd PAM4 linear TIAs, 750um pitch

GN1814
4 x 56GBd PAM4 linear TIA, 500um pitch

GN1816
4 x 56GBd PAM4 linear TIA, 250um pitch

GN1817
4 x 56GBd PAM4 linear TIA, 750um pitch with compensation for extended input inductance

GN7060
25Gbps limiting TIA designed for HS-PON and 25GS-PON OLT applications

GN7055, GN7056, GN28L45
Limiting TIA designed specifically for XGSPON and 10G EPON OLT applications

GN7069
10Gbps limiting TIA designed for APD applications such as 5GHz Wi-Fi immune 10G PON ONU's

GN1090
Quad VCSEL driver for parallel and multi-channel datacom and telecom modules with low power consumption, 210mW typical for 4 channels. Can be used together with GN1090 quad TIA.

GN28L54A
10Gbps limiting TIA designed for APD applications such as 10G PON ONUs

GN28L55A
Industrial lowest sensitivity and power 10Gbps CMOS TIA for telecom and data center

TIAs

Part Number	Overview	Data Rate (Gbps)	Gain (kΩ)	BW (GHz)	Supply (V)	Noise	Applications
GN28L54A	10G Limiting	to 10.3	7	6	3.3	*	-
GN28L45	Multi-rate Burst Mode TIA	12.44/2.5	7	6/1.8	3.3	*	-
GN7060	25G PON Burst Mode TIA	to 25	8	6/7.8	3.3	*	-
GN1068	14G Limiting	to 14.3	6.75	12	3.3	1.2µA	CPRI, 10GBASE-SR/LR/ER and 16G FC
GN1069	12.5G Limiting	to 12.5	9	11.5	3.3	0.86µA	-
GN1086*	28G Limiting	25-28	6	23	3.3	1.25uA	25Gbps and 100Gbps Ethernet/ OTN, Infiniband EDR
GN1088*	Quad 28G Limiting	28	5	23	3.3	-	-
GN1090	Quad 10G Limiting	to 14.3	*	*	3.3	0.9µA	40Gbps Ethernet, Infiniband, QSFP+
GN25L53	3.1Gbps AGC TIA	3.1	5.5	1.9	3.3	335nA	CPRI, GPON, OC-48 (APD)
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	0.9µA	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	2.4µA	56GBd Ethernet PAM4 modules (100GBASE and 400GBASE)
GN1800	Single PAM4 Linear	100	5.5	35	3.3	1.9µA	56GBd Ethernet PAM4 modules (100GBASE)
GN1700	Single PAM4 Linear	100	5.5	35	3.3	1.9µA	25GBd Wireless PAM4 modules
GN1810	Quad PAM4 Linear	100	5	34	3.3	2.4µA	56GBd Ethernet PAM4 modules (400GBASE)
GN1812	Quad PAM4 Linear	100	5.5	35	3.3	1.9µA	56GBd Ethernet PAM4 modules (400GBASE)
GN1814	Quad PAM4 Linear, 500µm pitch	100	5.5	35	3.3	1.9µA	56GBd Ethernet PAM4 modules (400GBASE, 2x400GBASE and 800GBASE)
GN1817	Quad PAM4 Linear	100	5.5	35	3.3	1.9µA	56GBd Ethernet PAM4 modules (400GBASE)
GN1816	Quad PAM4 Linear, 500µm pitch	100	5.5	35	3.3	1.9µA	56GBd Ethernet PAM4 modules (400GBASE, 2x400GBASE and 800GBASE)

* 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

GN1848
Quad channel 56GBd PAM4 linear VCSEL driver with low power, low IRN, high bandwidth and superior driver linearity. Can be used together with GN1816 quad TIA.

GN1190
Quad VCSEL driver for parallel and multi-channel datacom and telecom modules with low power consumption, 210mW typical for 4 channels. Can be used together 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
GN1848	Quad Channel 56GBd PAM4 Linear VCSEL Driver	100	10/12	3.3/5.0	Bare Die	56GBd Ethernet PAM4 modules (400GBASE, 2x400GBASE, 800GBASE)
GN1862	Single Channel 56GBd PAM4 Linear EML Driver Die	100	N/A (voltage driven)	3.3/-4	Bare Die	56 GBd Ethernet PAM4 modules (100GBASE and 400GBASE)

* 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

GN3289

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
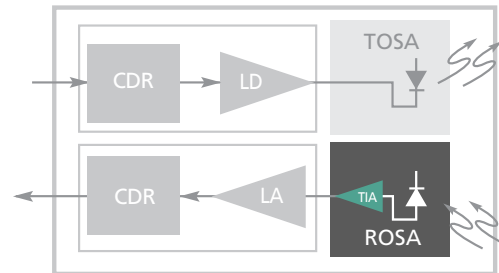
ROSAs and Super High Gain ROSAs								
Part Number	Overview	Data Rate (Gbps)	Gain (kΩ)	Supply	RSSI	Unstressed Sensitivity	Comments	ORL
GN3257*	PIN with AGC	to 11.3	8.5	+3.3V ±10%	Yes	-19dBm	–	-27dB
GN3357*	High Gain APD with AGC	to 11.3	8.5	+3.3V ±10%	VAPD	-27dBm	–	-27dB
GN3358*	High Gain APD Rchip	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.
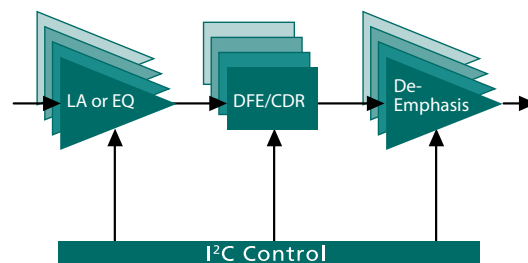
Multi-Lane Signal Conditioners									
Part Number	Data Rate (Gbps)	Lanes	CDR	Ref Clock	Input Stage	De-emphasis	Supply (V)	Package	Applications
GN2402*	10.3125	4	Yes	Not Req.	Equalizer	Yes	3.3	QFN-44	nx10G Backplanes,10G/40G Linecards, 10G/40G Active Cables
GN2404*	1.25–12.8	4	Yes	Req.	Adaptive Equalizer 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 Backplanes10G/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**