

Optical Engines

opnext 

WE *light* IT UP

Opnext Lights It Up

Opnext (NASDAQ: OPXT) is paving the way to a future of exciting photonic and integrated circuit developments and groundbreaking applications. Our industry heritage, future-focused thinking and deep commitment to research and development help us anticipate and meet the needs of a diverse range of markets, from telecomm and datacomm to medical, and information and industry applications, to defense and security.

Established in 2000, Opnext was created from the resources of the Fiber Optic Components Business Unit at Hitachi. We have continued to build on three decades of advanced Hitachi technology, establishing our own broad portfolio of solutions.

Technology

Opnext technologies represent the leading edge of product development in the marketplace today. Our optical engines are the core of an extensive portfolio of solutions for use throughout the network including lasers, transceivers, transponders and subsystems. Our solutions are backed by a strong and dedicated R&D program and the confidence that comes with proven experience and application success.

Research and Development

Opnext technology leads the industry and is well regarded in our many markets because we anticipate and meet our customers' needs for best-quality components and innovative applications at economical prices. We continue to expand our existing product line with our in-house advanced development team and the full support of Hitachi's R&D efforts, including the Central Research Laboratory (CRL), Mechanical Engineering Research Laboratory (MERL), and Production Engineering Research Laboratory (PERL).

Service

The high capacity networks of today and tomorrow call for significant cost and power reduction with increased performance and reliability. Opnext combines our laser technology with

the optical packaging platforms needed to meet industry MSA standards, and add comprehensive engineering resources, for solutions that exceed expectations.

Our dedication and talent has earned us a reputation for excellence in all we do. Opnext engineers work hand-in-hand with customers, tailoring our solutions to every applications' specifications. Our focus on service extends from the first meeting through to final delivery — we are truly committed.

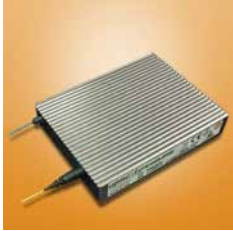
The dedication of Opnext professionals has helped us earn several accolades including being selected as "Cisco Technology Supplier of the Year," as the Top Optical Component Supplier by Ovum-RHK, Huawei's "Year 2008 Technical Support Award" and being selected for multiple annual Supplier Performance Awards by CIENA. Lightwave Magazine, the only publication serving the fiber optic communication industry worldwide, named Opnext one of its Top Five component suppliers for two consecutive years.

Opnext was established with a commitment to quality. Today, and into the future, you'll find evidence of that commitment in our relationships with our customers, communities and peers and in every solution we deliver.

Let Opnext bring new light to your applications. Visit www.opnext.com or contact us by calling 510-580-8828.

Featured Products

40G DPSK & DQPSK



Opnext offers 40Gb/s DWDM modules based upon the 40G 300-pin MSA for long haul and regional networking applications. Opnext provides enhanced control functionality for improved performance.

CFP for 40GbE and 100GbE



Opnext is a founder of this newest MSA for 100G & 40G optical transmission modules. The CFP MSA modules offer pluggability and the highest speed industry standard interfaces available to date.

DWDM XFP



Next generation networks are being designed for density, throughput and low power dissipation. Opnext DWDM XFP modules support OC192/10GbE/OTU2 data rates in a pluggable form factor.

1550nm XFP/SFP+ with Wide Temp. Range



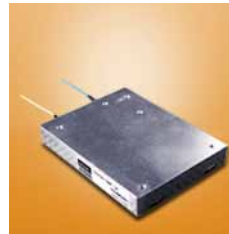
Next generation networks require low power consumption and wider operating temperature ranges. Opnext EA-DFB technology provides these features for 10Gb/s ≥ 40 km reaches with 100% backwards compatibility to deployed 10Gb/s ≥ 40 km interfaces.

1310nm SFP+ both 8GFC & 10GbE



Long wavelength SFP+ modules use Opnext's world class laser technology and cover IEEE 802.3ae, aq.

300-pin Tunable Products



Opnext continues to offer a cost optimized 10G tunable 300-pin product family. Opnext has over 5 years of experience shipping full band tunable 10G optical modules.

X2/XENPAK Family



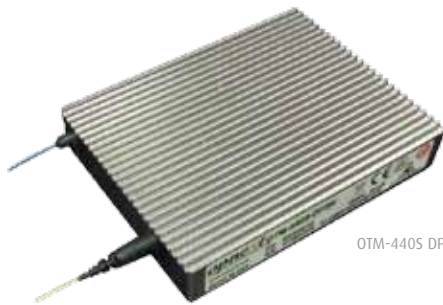
As a world leader in 10G optical modules, Opnext offers a full product lineup of X2 and XENPAK modules for all 10GbE interfaces.

40G, 300-pin Form Factor

Package	Data Rate	Function	Part Number	Reach	Availability
300-pin	40 Gb/s	16 ch MUX/DEMUX with Jitter Filter	TRV7B12xN 1.55 μ m ILM / PIN-PD	< 2 km VSR2000-3R2 (ITU-T G.693)	Available
			OTM-400 1.55 μ m ILM / PIN-PD	< 2 km VSR2000-3R2 (ITU-T G.693)	Available
			OTM-440 1.55 μ m Tunable LD+MZ / DLI-BPD	DWDM, 50 GHz DPSK Modulation	Available
			TRV7BC0xN 1.55 μ m Tunable LD+MZ / DLI-BPD	DWDM, 50 GHz DQPSK Modulation	Available



TRV7B12GN small form factor transceiver



OTM-440S DPSK transceiver

Features

- Laser Class 1
- VSR2000-3R2: 2 km Reach
- Transmission length: 1500 km (DWDM DPSK)
- DWDM 50GHZ DPSK and DQPSK Modulation
- Operation Case Temperature: 0 to 70°C
- Low Power Consumption
- OIF SFI-5 Electrical Interface
- MSA I2C Edition 4 Management Interface
- 300-pin MSA Package

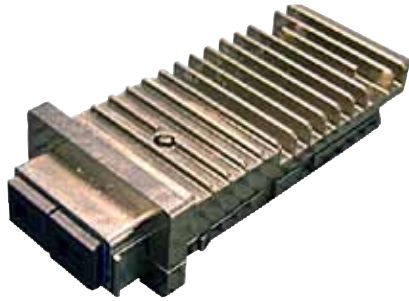
Applications

- OC-768, STM-256 and OTU3 short reach / DWDM
- MAN and WAN applications
- Long Haul and Regional Networks
- Router to Router Client
- Router to Transport Client
- Router IP over DWDM Line Side
- Transport DWDM Line Side

Part Number	Data Rate (Gb/s)	Wavelength (nm)	Operating Temp. (°C)	Output Power (dBm)	Extinction Ratio (dB)	Received Power (dBm)	Electrical I/F	Power Supply (v)	Power Consumption Typical (W)	Reach	Dimensions	Remarks
TRV7B12xN	40 43	1,550	0 to 70	0 to +3	>8.2	-6 to +3	CML (SFI-5)	+5, +1.8 +3.3 -5.2	12	<2 km VSR2000-3R2 (ITU-T G693)	89 x 114 x 13.7 mm 3.5 x 4.5 x 0.54" (flat top)	I2C, Jitter Filter
OTM-440	43 44.6	1,550	0 to 70	>3	N/A	6 - 10	CML (SFI-5)	+5, +3.3 -5.2	21	DWDM with full C-Band Tunable, 50 GHz, DPSK Modulation	123 x 152.4 x 17.48 mm 4.8 x 6 x 0.688" (flat top)	I2C, Jitter Filter
OTM-440S	43 44.6	1,550	0 to 70	>3	N/A	6 - 10	CML (SFI-5)	+5, +3.3 -5.2	15	DWDM with full C-Band Tunable, 50 GHz, DPSK Modulation	89 x 114 x 18 mm 3.5 x 4.5 x 0.71"	I2C, Jitter Filter
TRV7BC0xN	43 44.6	1,550	0 to 70	-7 to -1 3 to 8	N/A	3 to 8	CML (SFI-5)	+5, +1.8 +3.3 -5.2	27	DWDM with full C-Band Tunable, 50 GHz, DQPSK Modulation	123 x 177 x 18 mm 5 x 7 x 0.71" (flat top)	I2C, Jitter Filter

X2 Form Factor

Package	Data Rate	Interface	Part Number	Reach	Availability
X2	10 Gb/s	XAUI	TRTC010EN Electrical	≤20 m CX4 10GbE	Available
			TRT5002EN 1.3 μm uncooled DM/PIN-PD	≤220 m ^{*1} , LRM, 10GbE	Available
			TRT5041EN 4 x 1.3 μm uncooled DFB/PIN-PD	≤300 m ^{*1} , LX4, 10GbE	Available
			TRT200xEN 0.85 μm uncooled VCSEL/PIN-PD	≤300 m ^{*2} , SR, 10GbE	Available
			TRT502xEN 1.3 μm uncooled DFB/PIN-PD	≤10 km, LR, 10GbE	Available
			TRT7051EN 1.55 μm cooled EA-DFB/PIN-PD	≤40 km, ER, 10GbE	Available
			TRT7063EN 1.55 μm cooled EA-DFB/APD	≤80 km, ZR, 10GbE	Available
			TRT7063ENabc 1.55 μm cooled EA-DFB/APD	≤80 km, DWDM, 10GbE	Available



Features

- Laser Class 1
- MSA compliant
- VCSEL, DFB or EA-DFB transmitter
- PIN-PD or APD with CDR
- IEEE 802.3ae, aq compliant electrical interface
- Alarms, controls and performance monitoring functions

Applications

- Metropolitan area network
- Building vertical riser
- Inter and Intra Campus
- Data Centers

Part Number	Data Rate (Gb/s)	Wavelength (nm)	Operating Temperature (°C)	Output Power (dBm)	Extinction Ratio (dB)	Received Power (dBm)	Electrical I/F	Power Supply (v)	Power Consumption (W)	Reach	Dimensions
TRTC010EN	10.3	-	-5 to 70	-	-	-	XAUI	+5 +3.3, APS	<3.0	≤20 m CX4 10GbE	91 x36 x 13.46 mm 3.58 x 1.42 x 0.53"
TRT5002EN	10.3	1,310	0 to 70	>-4.5 ^{*3}	>3.5	-6.5 ^{*4}	XAUI	+5 +3.3, APS	<4.0	≤220 m ^{*1} , LRM, 10GbE	91 x36 x 13.46 mm 3.58 x 1.42 x 0.53"
TRT5041EN	10.3	1,275 1,300 1,325 1,349	0 to 70	>-6.75 ^{*3}	>3.5	-14.25 ^{*4}	XAUI	+5 +3.3, APS	<4.0	≤300 m ^{*1} LX4 10GbE	91 x36 x 13.46 mm 3.58 x 1.42 x 0.53"
TRT200xEN	10.3	850	0 to 70	≥-4.3 ^{*3}	≥3	≥-7.5 ^{*4}	XAUI	+3.3 APS	≤4.0	≤300 m ^{*2} SR 10GbE	91 x36 x 13.46 mm 3.58 x 1.42 x 0.53"
TRT502xEN	10.3	1,310	0 to 70	≥-5.2 ^{*3}	≥3.5	≥-10.3 ^{*4}	XAUI	+3.3 APS	≤4.0	≤10 km LR 10GbE	91 x36 x 13.46 mm 3.58 x 1.42 x 0.53"
TRT7051EN	10.3	1,550	0 to 70	>-1.7 ^{*3}	>3	-11.3 ^{*4}	XAUI	+5 +3.3 APS	<4.0	≤40 km ER 10GbE	91 x36 x 13.46 mm 3.58 x 1.42 x 0.53"
TRT7063EN	10.3	1,550	0 to 70	≥0	≥8.2	≥-24	XAUI	+5 +3.3, APS	≤4.0	≤80 km ZR 10GbE	91 x36 x 13.46 mm 3.58 x 1.42 x 0.53"
TRT7063ENabc	10.3	1,530 to 1,560	0 to 70	≥-1	≥8.2	≥24	XAUI	+5 +3.3, APS	≤4.0	≤80 km DWDM 10GbE	91 x36 x 13.46 mm 3.58 x 1.42 x 0.53"

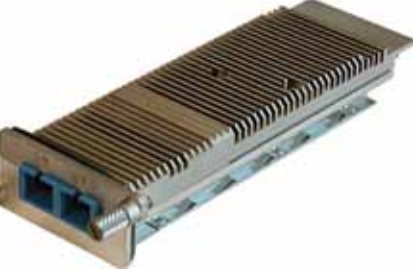
^{*1} This solution applies to FDDI grade 62.5 μm multimode fiber with a worst case modal bandwidth-distance product of 500 MHz-km

^{*2} This solution applies to high bandwidth 50 μm multimode fiber with a minimum modal bandwidth of 2,000 MHz-km

^{*3} This value is in Optical Modulation Amplitude (OMA)

^{*4} Stressed sensitivity value is in Optical Modulation Amplitude (OMA)

XENPAK Form Factor

Package	Data Rate	Interface	Part Number	Reach	Availability
XENPAK	10 Gb/s	XAUI	TREC010EN Electrical	≤20 m CX4 10 GbE	Available
			TRE5002EN 1.3 μm uncooled DM/PIN-PD	≤220 m ^{*1} , LRM, 10GbE	Available
			TRE5041EN 4 x 1.3 μm uncooled DFB/PIN-PD	≤300 m ^{*1} , LX4, 10 GbE	Available
			TRE200xEN 0.85 μm uncooled VCSEL/PIN-PD	≤300 m ^{*2} , SR, 10 GbE	Available
			TRE502xEN 1.3 μm uncooled DFB/PIN-PD	≤10 km, LR, 10 GbE	Available
			TRE7052EN 1.55 μm cooled EA-DFB/PIN-PD	≤40 km, ER, 10 GbE	Available

Features

- Laser Class 1
- MSA compliant
- VCSEL, DFB or EA-DFB transmitter
- PIN-PD or APD with CDR
- IEEE 802.3ae,aq compliant electrical interface
- Alarms, controls and performance monitoring functions

Applications

- 10 Gb/s Ethernet
- OADM
- Metropolitan area network
- Building vertical riser
- Inter and Intra Campus
- Data Centers

Part Number	Data Rate (Gb/s)	Wavelength (nm)	Operating Temperature (°C)	Output Power (dBm)	Extinction Ratio (dB)	Received Power (dBm)	Electrical I/F	Power Supply (v)	Power Consumption (W)	Reach	Dimensions
TREC010EN	10.3	-	-5 to 70	-	-	-	XAUI	+5 +3.3 APS	<3.0	≤20 m CX4 10GbE	121 x36 x 17.4 mm 4.76 x 1.42 x 0.68"
TRE5002EN	10.3	1,310	0 to 70	>-4.5 ^{*3}	>3.5	-6.5 ^{*4}	XAUI	+5 +3.3 APS	<4.0	≤220m ^{*1} , LRM, 10GbE	121 x36 x 17.4 mm 4.76 x 1.42 x 0.68"3
TRE5041EN	10.3	1,275 1,300 1,325 1,349	0 to 70	>-6.75 ^{*3}	>3.5	-14.25 ^{*4}	XAUI	+5 +3.3 APS	<6.0	≤300 m ^{*1} LX4 10 GbE	121 x36 x 17.4 mm 4.76 x 1.42 x 0.68"
TRE200xEN	10.3	850	0 to 70	≥-4.3 ^{*3}	≥3	≥-7.5 ^{*4}	XAUI	+3.3 APS	≤4.0	≤300 m ^{*2} SR 10 GbE	121 x36 x 17.4 mm 4.76 x 1.42 x 0.68"
TRE502xEN	10.3	1,310	0 to 70	≥-5.2 ^{*3}	≥3.5	≥-10.3 ^{*4}	XAUI	+3.3 APS	≤4.0	≤10 km LR 10 GbE	121 x36 x 17.4 mm 4.76 x 1.42 x 0.68"
TRE7052EN	10.3	1,550	0 to 70	>-1.7 ^{*3}	>3	-11.3 ^{*4}	XAUI	+5 +3.3 APS	<9.0	≤40 km ER 10 GbE	121 x36 x 17.4 mm 4.76 x 1.42 x 0.68"

^{*1} This solution applies to FDDI grade 62.5 μm multimode fiber with a worst case modal bandwidth-distance product of 500 MHz·km

^{*2} This solution applies to high bandwidth 50 μm multimode fiber with a minimum modal bandwidth of 2,000 MHz·km

^{*3} This value is in Optical Modulation Amplitude (OMA)

^{*4} Stressed Sensitivity value is in Optical Modulation Amplitude (OMA)

XFP Form Factor



Package	Data Rate / Application	Part Number	Reach	Availability
XFP	10 Gb/s	TRF2001xN-GA000 0.85 μm uncooled VCSEL/PIN-PD	≤300 m*1 10GBASE-S (10GbE) 1200-MX-SN-I (10GFC)	Available
		TRF5015Fx-GA000 1.3 μm uncooled DFB/PIN-PD	≤2 km / 7 km I64.1/SR-1 ≤10 km 10GBASE-L (10GbE) 1200-SM-LL-L (10GFC)	Available
		TRF5023EN-GA000 TRF5025Ex-GA000 1.3 μm uncooled DFB/PIN-PD	≤10 km 10GBASE-L (10GbE) 1200-SM-LL-L (10GFC)	Available
		TRF7052xx-GA000 TRF7053Fx-GA000 1.55 μm ILM/PIN-PD	≤40 km S64.2b/IR-2 10GBASE-E (10GbE)	Available*6
		TRF7052Fxabc 1.55 μm ILM/PIN-PD	≤40 km DWDM	Available
		TRF7061xN-LF001 1.55 μm ILM/APD	≤80 km G959.1/P1L1-2D2	Available
		TRF7061FNabc 1.55 μm ILM/APD	≤80 km DWDM	Available
		TRF7080FNabc 1.55 μm full C-band Tunable LD-MZ / APD	≤80 km DWDM	Under Development

Features

- Laser Class 1
- XFP MSA compliant
- 1310nm DFB-LD or 1550nm ILM TOSA
- 1550nm C-band tunable TOSA
- PIN-PD or APD ROSA
- 10G Serial Electrical I/F (XFI)
- I2C Management Interface

Applications

- OC-192 and STM-64 add/drop multiplexers
- Storage Area Network
- High-speed data Communications
- IP router ATM core switch
- Metropolitan transmission

Part Number	Data Rate (Gb/s)	Wavelength (nm)	Operating Temperature (°C)	Output Power (dBm)	Extinction Ratio (dB)	Received Power (dBm)	Electrical I/F	Power Supply (v)	Power Consumption (W)	Reach	Dimensions
TRF2001EN-GA000 TRF2001FN-GA000 (*5)	10.3, 10.5 11.1 11.3	850	0 to 70	>-4.3*2	>3	-7.5*3	XFI	+3.3	<1.5	≤300 m*1 10GBASE-S(10GbE) 1200-MX-SN-I (10GFC)	18.35 x 78.0 x 8.5 mm3
TRF5015FN-GA000 TRF5015FE-GA000	10, 10.3 10.5, 10.7 11.1, 11.3	1,310	-5 to 75 (FN) -5 to 85 (FE)	-6 to -1	>6	-11 or -10.3*3 to 0.5	XFI	+3.3	<1.7 (FN) <2.0 (FE)	≤2 km / 7 km I64.1/SR-1 ≤10 km 10GBASE-L(10 GbE) 1200-SM-LL-L(10 GFC)	18.35 x 78.0 x 8.5 mm3
TRF5025EN-GA000 TRF5025EE-GA000	10, 10.3, 10.5, 11.1, 11.3	1,310	-5 to 75 (EN) -5 to 85 (EE)	-5.2*2 to 0.5	>3.5	-10.3*3 to 0.5	XFI	+3.3	<1.7 (EN) <2.0 (EE)	≤10 km 10GBASE-L(10GbE) 1200-SM-LL-L(10GFC)	18.35 x 78.0 x 8.5 mm3
TRF7052xN-GA000 TRF7052xE-GA000 TRF7053Fx-GA000 (*4) (*6)	10, 10.3 10.7, 11.1 11.3	1,550	-5 to 75 (xN) -5 to 85 (xE)	-1 to +2	>8.2	-14 or -11.3*3 to -1	XFI	+3.3 +5	<3.5 (TRF7052) <2.5 (TRF7053)	≤40 km S64.2b/IR-2 10GBASE-E(10GbE)	18.35 x 78.0 x 8.5 mm3
TRF7061xN-LF001(*4)	10, 10.3 10.7, 11.1	1,550	-5 to 70	0 to +4	>9.0	-24 to -7	XFI	+3.3 +5	<3.5	≤80 km G959.1/P1L1-2D2	18.35 x 78.0 x 8.5 mm3
TRF7052Fxabc	10, 10.3 10.7, 11.1	1,529 to 1,561	-5 to 70	-1 to +2	>8.2	-14 to -1	XFI	+3.3 +5	<3.5	≤40 km DWDM	18.35 x 78.0 x 8.5 mm3
TRF7061FNabc	10, 10.3 10.7, 11.1	1,529 to 1,561	-5 to 70	-1 to +3	>9.0	-24 to -7	XFI	+3.3 +5	<3.5	≤80 km DWDM	18.35 x 78.0 x 8.5 mm3
TRF7080Nabc	10, 10.3, 10.5, 10.7, 11.1, 11.3	1529 to 1564	-5 to 70	-1 to +3	>9.0	-24 to -7	XFI	+3.3, +5, +1.8 (TBD)	<3.5	≤80 km DWDM	18.35 x 78.0 x 8.5 mm3

*1: This solution applies to high bandwidth 50μm multimode fiber with a minimum modal bandwidth of 2,000 MHz km
*2: OMA: Optical Modulation Amplitude

*3: Stressed receiver sensitivity in OMA
*4: x: B: Does not support 10.7 Gb/s, F: Supports 10.7 Gb/s

*5: E: Does not support 11.1 Gb/s and 11.3 Gb/s, F: Supports 11.1 Gb/s and 11.3 Gb/s
*6: TRF7053 is Sampling

SFP+ Form Factor

Package	Data Rate	Interface	Part Number	Reach	Availability
SFP+	8 Gb/s	SFI	TRS2200SM 850nm VCSEL PIN-PD	≤150 m ^{*1} SW	Available
		SFI	TRS5220SM 1310nm DFB PIN-PD	≤10 km LW	Available
SFP+	10 Gb/s	SFI	TRS20A0Ex 850nm VCSEL PIN-PD	≤100 m ^{*2} 10GbE USR*	Available
		SFI	TRS2001Ex 850nm VCSEL PIN-PD	≤300 m ^{*2} 10GBASE-SR	Available
		SFI	TRS5001EN 1310nm DFB PIN-PD	≤220 m ^{*3} 10GBASE-LRM	Available
		SFI	TRS502xEN 1310nm DFB PIN-PD	≤10 km 10GBASE-LR	Available
		SFI	TRS705xEN 1550nm uncooled EA-DFB/PIN-PD	≤40 km 10GBASE-ER	Available



Features

- Laser Class 1
- SFP+ MSA compliant
- 10G Serial Framer I/F (SFI)
- I2C Management Interface
- <1W, (1.5W/ER) Power consumption

Applications

- Rack to rack
- Data Centers
- Premise
- Metro
- Switches and Routers

Part Number	Data Rate (Gb/s)	Wavelength (nm)	Operating Temperature (°C)	Output Power (dBm)	Extinction Ratio (dB)	Received Power (dBm)	Electrical I/F	Power Supply (v)	Power Consumption (W)	Reach	Dimensions
TRS2200SM	8.5	850	-5 to 85	>-5.2 ^{*4}	-	>-8.2 ^{*5}	SFI	+3.3	1.0	≤50 m ^{*1} SW	56.5 x 13.9 x 11.85 mm 2.22 x 0.55 x 0.47"
TRS5220SM	8.5	1310	-5 to 85	> -5.4 ^{*4}	3.5	-13.8 ^{*6}	SFI	+3.3	1.0	≤10 km	56.5 x 13.9 x 11.85 mm 2.22 x 0.55 x 0.47"
TRS20A0Ex	10.3	850	0 to 70 -5 to 85	>-5.0 ^{*4}	>3	>-7.5 ^{*5}	SFI	+3.3	1.0	≤100 m ^{*2} 10GbE USR	56.5 x 13.9 x 11.85 mm 2.22 x 0.55 x 0.47"
TRS2001Ex	10.3	850	0 to 70 -5 to 85	≥-4.3 ^{*4}	≥3	≥-7.5 ^{*5}	SFI	+3.3	≤1.0	≤300 m ^{*2} 10GBASE-SR	56.5 x 13.9 x 11.85 mm 2.22 x 0.55 x 0.47"
TRS5001EN	10.3	1,310	0 to 70	>-4.5 ^{*4}	>3.5	>-6.5 ^{*5}	SFI	+3.3	1.0	≤220 m ^{*3} 10GBASE-LRM	56.5 x 13.9 x 11.85 mm 2.22 x 0.55 x 0.47"
TRS502xEN	10.3	1,310	0 to 70 -5 to 85	≥-5.2 ^{*4}	≥3.5	≥-10.3 ^{*5}	SFI	+3.3	≤1.0	≤10 km 10GBASE-LR	56.5 x 13.9 x 11.85 mm 2.22 x 0.55 x 0.47"
TRS705xEN	10.3	1,550	0 to 70	≥-1.7 ^{*4}	≥3	≥-11.3 ^{*5}	SFI	+3.3	≤1.5	≤40 km 10GBASE-ER	56.5 x 13.9 x 11.85 mm 2.22 x 0.55 x 0.47"

* 10GbE USR is not an IEEE standard.

*1: This distance applies to OM2 multimode fiber

*2: This solution applies to high bandwidth 50µm multimode fiber with a minimum modal bandwidth of 2000MHz · km

*3: This solution applies to FDD1 grade 62.5µm multimode fiber with a worst case modal bandwidth-distance product of 500MHz · km

*4: This value is in Optical Modulation Amplitude (OMA)

*5: Stressed sensitivity value is in OMA

*6: Unstressed Sensitivity value is in OMA

10G, 300-pin Form Factor

Package / Data Rate	Function	Size	Part Number	Reach	Availability
300-pin 10 Gb/s	16 ch MUX/DEMUX	55.9 x 76.2 x 13.5 mm 2.2 x 3.0 x 0.53"	TRV5019BS/ZS 1.3 μm uncooled DFB/PIN-PD	< 2 km / 7 km 164.1 / SR-1 (GR-253)	Available
			TRV5029BS*/ZS* 1.3 μm uncooled DFB/PIN-PD	<12 km SR-1(GR-1377)	Available
			TRV5029EN* 1.3 μm uncooled DFB/PIN-PD	10 km 10GBASE-LR (10GbE)	Available
			TRV5029EZ* 1.3 μm uncooled DFB/PIN-PD	< 2 km / 7 km, 10 km 164.1 / SR-1 (GR-253) 10GBASE-LR (10GbE)	Available
			TRV5039BS* 1.3 μm uncooled DFB/PIN-PD	< 20 km S64.1 / IR-1	Available
			TRV5018BS 1.3 μm uncooled DFB/PIN-PD	< 2 km / 7 km, 10 km 164.1 / SR-1 (GR-253) 10GBASE-LR (10GbE)	Available
			TRV5028BS 1.3 μm uncooled DFB/PIN-PD	<12 km SR-1 (GR-1377)	Available
			TRV5038BS 1.3 μm uncooled DFB/PIN-PD	<20 km S64.1 / IR-1	Available

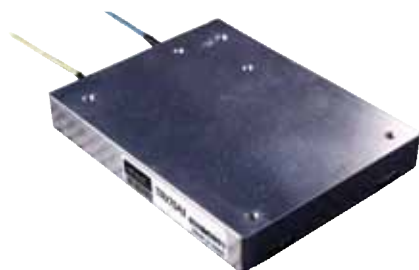


Features

- Laser Class 1
- SONET and ITU SDH compatible at OC-192 and STM-64 rates
- MSA compliant
- Short-reach and DWDM applications
- Available with C-band and L-band (TRV708x / TRV709x type)
- Increased dispersion tolerance (TRV70A1/A2 type)
- DFB, ILM or MZ + CW-LD transmitter
- PIN-PD or APD receiver with CDR
- Electrical interface with 16ch 622/644 Mbit/s MUX/DEMUX
- 622/644 Mbit/s LVDS data interface
- OIF, SFI4 compliant electrical interface
- Compact package with 300-pin (10x30 pin) electrical connector
- Alarms, controls and performance monitoring functions

Applications

- OC-192 and STM-64 long-reach terrestrial DWDM transmission
- Metropolitan area network
- IP router and ATM core switch
- OADM
- High-speed data communications
- FEC (10.7 Gb/s, G.709)
- 10 Gb/s Ethernet



88.9 x 114.3 x 13.5 mm 3.5 x 4.5 x 0.53"	TRV7089xN/7080BN 1.55 μm C/L-band CW-LD+MZ/APD	DWDM, 100 GHz 1600 ps/nm	Available
	TRV70A1xN*/70A2xN 1.55 μm full C/L-band Tunable LD+MZ/APD+VOA	DWDM, 50 GHz +/- 3000 ps/nm	Available
	TRV708N* 1.55 μm full C-band Tunable LD+MZ/APD	DWDM, 50 GHz 1600 ps/nm	Available
	TRV709N* 1.55 μm full C-BAND Tunable LD+MZ/APD	DWDM, 50 GHz +/- 800 ps/nm	Available

*: Built in Jitter Filter

**Built in VOA (Variable Optical Attenuator)

*1: OMA: Optical Modulation Amplitude

*2: Stressed receiver sensitivity in OMA

*3: +3.3V Single voltage supply is available with power consumption of 4.8W typ

10G, 300-pin Portfolio Cont.

Short-Reach

Part Number	Data Rate (Gb/s)	Wavelength (nm)	Operating Temp. (°C)	Output Power (dBm)	Extinction Ratio (dB)	Received Power (dBm)	Electrical I/F	Power Supply (v)	Power Consumption (W)	Reach	Dimensions	Remarks
TRV5019BS/ZS ^{*4}	10 10.7	1,310	-5 to 70	-6 to -1	>6	-11 to -1	LVDS	+3.3, +1.8 ^{*3}	4.3	<2 km / 7 km 164.1/SR-1 (GR-253)	55.9 x 76.2 x 13.5 mm 2.2 x 3.0 x 0.53"	I2C, Jitter Filter
TRV5029BS/ZS ^{*4}	10 10.7	1,310	-5 to 70	-4 to 0	>6	-12 to 0	LVDS	+3.3, +1.8 ^{*3}	4.3	<12 km SR-1 (GR-1377)	55.9 x 76.2 x 13.5 mm 2.2 x 3.0 x 0.53"	I2C, Jitter Filter
TRV5029EN	10.3	1,310	-5 to 70	-5.2 ^{*1} to 0.5	>3.5	-10.3 ^{*2} to 0.5	LVDS	+3.3, +1.8 ^{*3}	4.3	10 km 10GBASE-LR (10GbE)	55.9 x 76.2 x 13.5 mm 2.2 x 3.0 x 0.53"	I2C, Jitter Filter
TRV5029EZ	10 10.3	1,310	-5 to 70	-5.2 ^{*1} to -1	>6	-10.3 ^{*2} to 0.5	LVDS	+3.3, +1.8 ^{*3}	4.3	<2 km / 7 km, 10 km 164.1/SR-1 (GR253) 10GBASE-LR (10GbE)	55.9 x 76.2 x 13.5 mm 2.2 x 3.0 x 0.53"	I2C, Jitter Filter
TRV5039BS	10	1,310	-5 to 70	1 to 5	>6	-12 to 0	LVDS	+3.3, +1.8 ^{*3}	4.3	<20 km S64.1 / IR-1	55.9 x 76.2 x 13.5 mm 2.2 x 3.0 x 0.53"	I2C, Jitter Filter
TRV5018BS	10 10.3 10.7	1,310	-5 to 70	-5.2 ^{*1} to -1	>6	-10.3 ^{*2} to 0.5	LVDS	+3.3, +1.8 ^{*3}	4.3	10 km 10GBASE-LR (10GbE)	55.9 x 76.2 x 13.5 mm 2.2 x 3.0 x 0.53"	I2C
TRV5028BS	10 10.3 10.7	1,310	-5 to 70	-4 to 0	>6	-10.3 ^{*2} to 0.5	LVDS	+3.3, +1.8 ^{*3}	4.3	<12 km SR-1 (GR-1377) 10GBASE-LR(10GbE)	55.9 x 76.2 x 13.5 mm 2.2 x 3.0 x 0.53"	I2C
TRV5038BS	10 10.3 10.7	1,310	-5 to 70	1 to 5	>6	-12 to 0	LVDS	+3.3, +1.8 ^{*3}	4.3	<20 km S64.1 / IR-1	55.9 x 76.2 x 13.5 mm 2.2 x 3.0 x 0.53"	I2C

*1: OMA: Optical Modulation Amplitude

*2: Stressed receiver sensitivity in OMA

*3: +3.3V Single voltage supply is available with power consumption of 4.8W typ

*4: BS: Single rate 10 Gb/s, ZS: Dual rate

Long Reach and DWDM

Part Number	Data Rate (Gb/s)	Wavelength (nm)	Operating Temperature (°C)	Output Power (dBm)	Extinction Ratio (dB)	Received Power (dBm)	Electrical I/F	Power Supply (v)	Power Consumption (W)	Reach	Dimensions
TRV7089xN TRV7080BN	10 to 11.3	1,530 to 1,565	0 to 70	+3 to +6	>10	-24 to -7	LVDS	+3.3, -5.2	typ. 6.0	1600 ps/nm DWDM, 100GHz	88.9 x 114.3 x 13.5 mm 3.5 x 4.5 x 0.53
TRV70A1xN ^{*1,2} TRV70A2xN	10 to 11.3	1,528.8 to 1,563.9	0 to 70	+4 to +7	> 7	-22 to +5 ^{*1}	LVDS	+3.3, -5.2 +5.0	typ. 11.0	DWDM with full C/L-band tunable 50 GHz, +/- 3000 ps/nm @ BER=1E-3	88.9 x 114.3 x 13.5 mm 3.5 x 4.5 x 0.53"
TRV708N ^{*2}	10 to 11.3	1,528.8 to 1,563.9	0 to 70	+4 to +7	>10	-24 to -7	LVDS	+3.3, -5.2 +5.0	typ. 8.0	DWDM with full C-band tunable 50 GHz, 1600 ps/nm	88.9 x 114.3 x 13.5 mm 3.5 x 4.5 x 0.53"
TRV709N ^{*2}	10 to 11.3	1,528.8 to 1,563.9	0 to 70	+4 to +7	>12	-24 to -7	LVDS	+3.3, -5.2 +5.0	typ. 8.0	DWDM with full C-band tunable 50 GHz, ±800 ps/nm	88.9 x 114.3 x 13.5 mm 3.5 x 4.5 x 0.53"

*1: Built in VOA (Variable Optical Attenuator)

*2: Available with PIN PD as an option

SFP Form Factor



Features

- Laser Class 1
- Compliant with Small Form Factor Pluggable MSA Specification
- Compact size (13.3 x 49.8 x 9.8 mm / 0.52 x 1.95 x 0.39")
- Compliant with Industry Standard RFT Electrical Connector and Cage
- Available with either button release or bail release latching mechanism
- High-Performance and Cost-Effective
- Single +3.3V Power Supply and TTL Logic Interface
- Low Power Consumption
- Metal Package for Superior EMI Performance
- EEPROM with Serial ID Functionality
- Enhanced Monitoring Functionality
- Digital Diagnostics per SFF-8472 available
- Standard and Wide Operating Temperature Ranges

Applications

- SONET / SDH from 155 Mbit/s to 2.7 Gb/s (OC-48, OC-12, OC-3, and STM-16, STM-4, STM-1)
- Gigabit Ethernet (GbE-SX, GbE-LX, and GbE-ZX)
- Fibre Channel (1.062/2.125/4.25 Gb/s FC)
- Transmission distances from 150 m to 100 km
- Metropolitan and access systems
- IP routers and ATM core switches
- DWDM for Metro Area Networks

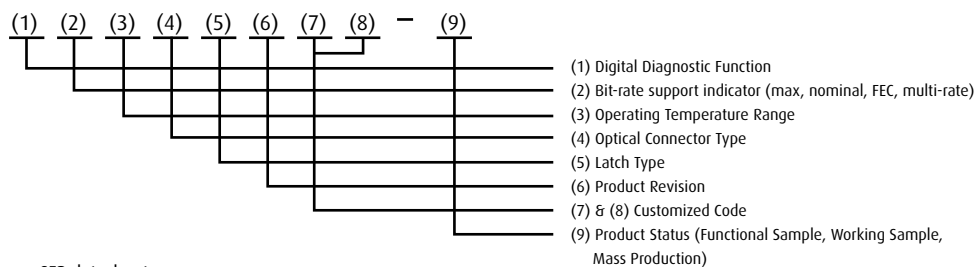
x = 5: Without digital diagnostic function
x = 6: With digital diagnostic function

Package	Data Rate / Application	Part Number	Reach	Availability
SFP	DWDM ≤ 2.7 Gb/s	TRF79A6 C-Band ITU Grid DFB APD	DWDM, 100 GHz 2400 ps/nm	Available
		TRF79B6 C-Band ITU Grid DFB APD	DWDM, 100 GHz 4000 ps/nm	Available
	OC-48 / STM-16	TRF591x 1310nm FP PIN-PD	<2 km SR / L-16	Available
		TRF592x 1310nm DFB PIN-PD	<15 km IR-1 / S-16.1	Available
		TRF595x 1310nm DFB APD	<40 km LR-1 / L-16.1	Available
	OC-12 / STM-4	TRF796x 1550nm DFB APD	<80 km LR-2 / L-16.2	Available
		TRF552x 1310nm FP PIN-PD	<15 km IR-1 / S-4.1	Available
		TRF555x 1310nm DFB PIN-PD	<40 km LR-1 / L-4.1	Available
OC-3 / STM-1	TRF756x 1550nm DFB PIN-PD	<80 km LR-2 / L-4.2	Available	
	TRF758x 1550nm DFB PIN-PD	<100 km LR-2/L-4.2 Extended	Available	
	TRF542x 1310nm FP PIN-PD	<15 km IR-1 / S-1.1	Available	
	TRF545x 1310nm FP PIN-PD	<40 km LR-1 / L-1.1	Available	
	TRF746x 1550nm DFB PIN-PD	<80 km LR-2 / L-1.2	Available	
GbE		TRF748x 1550nm DFB PIN-PD	<100 km LR-2/L-4.2 Extended	Available
		TRF271x 850nm VCSEL PIN-PD	<550 m SX	Available
		TRF573x 1310nm FP PIN-PD	<10 km LX	Available
		TRF776x 1550nm DFB PIN-PD	<80 km ZX	Available

SFP Form Factor Cont.

Part Number	Data Rate (Gb/s)	Wavelength (nm)	Maximum Operating Temperature (°C)	Output Power (dBm)	Reach	Extinction Ratio (dB)	Received Power (dBm)
TRF79A6	DWDM ≤2.7 Gb/s	1,530 to 1,562	-5 to 70	0 to +4	DWDM, 100 GHz 2400 ps/nm	>8.2	-28 to -8
TRF79B6		1,530 to 1,562	-5 to 70	0 to +4	DWDM, 100 GHz 4000 ps/nm	>8.2	-28 to -8
TRF591x	OC-48 / STM-16	1,310	-40 to 85	-10 to -3	≤ 2 km SR / L-16	>8.2	-18 to -3
TRF592x		1,310	-40 to 85	-5 to 0	≤ 15 km IR-1 / S-16.1	>8.2	-18 to 0
TRF595x		1,310	-40 to 85	-2 to +3	≤ 40 km LR-1 / L-16.1	>8.2	-27 to -9
TRF796x		1,550	-40 to 85	-2 to +3	≤ 80 km LR-2 / L-16.2	>8.2	-28 to -9
TRF552x	OC-12 / STM-4	1,310	-40 to 85	-15 to -8	≤ 15 km IR-1 / S-4.1	>8.2	-28 to -8
TRF555x		1,310	-40 to 85	-5 to 0	≤ 40 km LR-1 / L-4.1	>10	-28 to -8
TRF756x		1,550	-40 to 85	-5 to 0	≤ 80 km LR-2 / L-4.2	>10	-28 to -8
TRF758x		1,550	-40 to 85	-3 to +2	≤ 100 km LR-2 / L-4.2 Extended	>10	-30 to -8
TRF542x	OC-3 / STM-1	1,310	-40 to 85	-15 to -8	≤ 15 km IR-1 / S-1.1	>8.2	-28 to -8
TRF545x		1,310	-40 to 85	-5 to 0	≤ 40 km LR-1 / L-1.1	>10	-34 to -10
TRF746x		1,550	-40 to 85	-5 to 0	≤ 80 km LR-2 / L-1.2	>10	-34 to -10
TRF748x		1,550	-40 to 85	-3 to +2	≤ 100 km LR-2 / L-4.2 Extended	>10	-34 to -10
TRF271x	GbE	770 to 860	-20 to 85	-9.5 to -3	≤ 550 m SX	>9	-17 to 0
TRF573x		1,270 to 1,355	-40 to 85	-9.5 to -3	≤ 10 km LX	>9	-19 to -3
TRF776x		1,550	-40 to 85	0 to +5	≤ 80 km ZX	>9	-24 to 0

Product Nomenclature



For details of product nomenclature, please see SFP datasheet.

TOSA/ROSA Form Factor



Function	Data Rate	Package	Part Number	Reach	Availability
Laser Diode Modules	10 Gb/s	XMD-TOSA	LD5038 1.3µm DFB	≤10 km	Available
			LD7064 1.5µm EA-DFB	≤80 km	Sampling
	40 Gb/s	XMD SIZE TOSA	LD7060 1.5µm EA-DFB Uncooled	≤40 km	Available
		XLMD-TOSA	LE7B61 1.5µm EA-DFB	≤2 km	Available
Photo Diode Modules	10 Gb/s	XMD-ROSA	PD7055 APD-TIA (LIM)	-26 dBm	Available
			PD7057 APD-TIA (AGC)	-25 dBm	Available
	40 Gb/s	XLMD-ROSA	PS7B01 PIN-TIA	-9 dBm	Sampling

Features

Laser Diode Modules (TOSA: Transmitter Optical Sub Assembly)

- XMD / XLMD MSA compliant
- 1310 nm uncooled Direct Modulated DFB laser: LD5038
- 1550 nm cooled EA-DFB Laser: LD7064, Uncooled EA-DFB laser: LD7060*
- 1550 nm 40 Gb/s cooled EA-DFB laser and EA driver: LE7B61

Photo Diode Modules (ROSA: Receiver Optical Sub Assembly)

- XMD/XLMD MSA compliant
- High GB APD and TIA with AGC (PD7057), TIA with LIM (PD7055)
- High Gain and high sensitivity
- 40 Gb/s PIN-PD and TIA: PS7B01

Applications

- Small Form Transponders and Transceivers

Part Number	Data Rate (Gb/s)	Wavelength (nm)	Operating Temperature (°C)	Modulated Output Power (dBm)	Extinction Ratio (dB)	Dispersion (ps/nm)	Penalty (dB)	Reach	Dimensions	Remarks
LD5038	10	1,290 to 1,330	-5 to 90	-3 typ	>5	-	-	≤10km	Φ5.6,L=15 mm	DM-DFB XMD-MSA (Without Thermistor)
LD7064	10	1,530 to 1,565	-5 to 80	1 typ	≥9	800	≤2	≤40km	Φ5.6,L=18 mm	EA-DFB XMD-MSA
LD7060	10	1,530 to 1,565	-5 to 75	0 typ	≥6	800	≤3	≤40km	Φ5.6,L=15 mm	Uncooled EA-DFB *XMD-MSA Size
LE7B61	40	1,530 to 1,585	-5 to 80	1.5 typ	>8.2	40	≤1 ≤2	<2km	18 x 22 x 7.5 mm	EA-DFB Driver Integrated XLMD-MSA

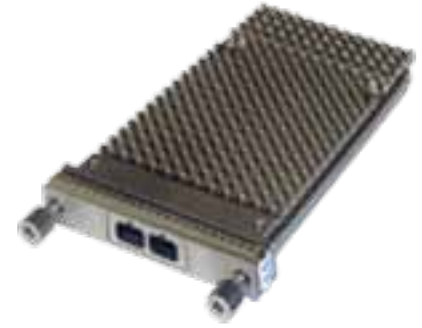
Part Number	Data Rate (Gb/s)	Wavelength (nm)	Operating Temperature (°C)	Received Power (dBm)	Power Supply (v) Typical	Dimensions	Remarks
PD7055	10	1,310 / 1,550	-5 to 85	-26 to -7	3.3 / 30	Φ5.35,L=14 mm	APD-TIA (ILM) XMD-MSA
PD7057	10	1,310 / 1,550	-5 to 85	-25 to -7	3.3 / 30	Φ5.35,L=14 mm	APD-TIA (AGC) XMD-MSA
PS7B01	40	1,310 / 1,550	-5 to 80	-9 to 4	3.3 / 5	15 x 22 x 8.7 mm	PIN-TIA XLMD-MSA

*XMD-MSA has not specified uncooled EA-DFB TOSA

CFP Modules & 100G Line Side Module



Flat top (100G)



Integrated heat-sink (40G)

Package	Data Rate	Interface	Part Number	Reach	Availability
CFP	40 Gb/s	XLAUI	TRC5B20xN 1.3µm DFB CWDM	≤10 km	Sampling
	100 Gb/s	CAUI	TRC5E20ENF-xF000 (100GbE) TRC5E20FNF-xF000 (OTU4 rate)	≤10 km	Sampling

The CFP Multi-Source Agreement (MSA) defines a hot-pluggable optical transceiver form factor to enable 40Gb/s and 100Gb/s applications, including next-generation High Speed Ethernet (40GbE and 100GbE). Pluggable CFP transceivers will support the ultra-high bandwidth requirements of data communications and telecommunication networks that form the backbone of the internet. For additional information on the CFP form factor, please visit <http://www.cfp-msa.org>

Part Number	Data Rate (Gb/s)	Wavelength (nm)	Operating Temp. (°C)	Output Power (dBm)	Extinction Ratio (dB)	Received Power (dBm)	Electrical I/F	Power Supply (v)	Power Consumption (W)	Reach	Chromatic Dispersion Tolerance (ps/nm)	Polarization Mode Tolerance (ps)	Dimensions
TRC5B20xN	39.8, 41.25, 43.0, 44.6 Gb/s	1271/1291 1311/1331	0 to 70	-1 to 3	3.5	-14 to 3	XLAUI	3.3	8	10km			145 x 77 x 13.6 mm
TRC5E20ENF-xF000 TRC5E20FNF-xF000	100Gb/s	1294.53 to 1296.59; 1299.02 to 1301.09; 1303.54 to 1305.63; 1308.09 to 1310.19	0 to 70	-1.3 to 4.5 (*1) (ENF) -0.6 to 4.5 (*2) (FNF)	4	-8.6 (*1) (ENF) -8.4 (*2) (FNF)	CAUI	3.3	24	10km	9.366	NA	145 x 77 x 13.6 mm

*1: This value is per lane in OMA

*2: This value is per lane in ave

100G Line Side Module

Package	Data Rate	Interface	Part Number	Reach	Availability
100G DWDM	100 Gb/s	OTL4.10	OTM-100	≤1500 km	Under Development

For additional information on the 100G line side module, please contact your Opnext sales representative.

SFP / SFP+ for Wireless Backhaul (CPRI / OBSAI)

Package	Data Rate	Interface	Part Number	Reach	Availability
SFP	0.6-3.1Gb/s	SFI	TRF5916AVLB40W 850nm VCSEL PIN-PD	2km	Available
			TRF5926AVLB30W 1310nm DFB PIN-PD	10 / 15km	Available
			TRF5956AVLB30W 850nm VCSEL PIN-PD	40km	Available
			TRF7966AVLB30W 1310nm DFB PIN-PD	80km	Available
SFP+	2.5 - 6.1 Gb/s	SFI	TRS2200WV-1001 850nm VCSEL PIN-PD	≤300 m	Available
			TRS5200WV-1001 850nm VCSEL PIN-PD	2km	Available
			TRS5220WV-1001 1310nm DFB PIN-PD	10/15km	Available



Features & Applications

- Full product line supporting various reaches (up to 80km) for all CPRI / OBSAI data rates
- Industrial temperature range for outdoor applications

Part Number	Data Rate (Gb/s)	Wavelength (nm)	Operating Temperature (°C)	Output Power (dBm)	Extinction Ratio (dB)	Received Power (dBm)	Electrical I/F	Power Supply (v)	Power Consumption (W)	Reach	Dimensions
TRF5916AVLB40W	≤3.1	1310	-40 to 85	-10 to -3	>8.2	-18 to -3		+3.3	≤1	≤2km	13.3 x 49.8 x 9.8mm
TRF5926AVLB30W	≤3.1	1310	-40 to 85	-5 to 0	>8.2	-18 to 0		+3.3	≤1	≤15km	13.3 x 49.8 x 9.8mm
TRF5956AVLB30W	≤3.1	1310	-40 to 85	-2 to +3	>8.2	-27 to -9		+3.3	≤1	≤40km	13.3 x 49.8 x 9.8mm
TRF7966AVLB30W	≤3.1	1550	-40 to 85	-2 to +3	>8.2	-28 to -9		+3.3	≤1	≤80km	13.3 x 49.8 x 9.8mm
TRS2200WV-1001	≤6.1	850	-40 to 85	≥-8.2	N/A	≤0	SFI	+3.3	≤1	≤300m	56.5 x 13.9 x 11.85 mm
TRS5200WV-1001	≤6.1	1310	-40 to 85	≥-8.4	≥3.5	≤0.5	SFI	+3.3	≤1	≤2km	56.5 x 13.9 x 11.85 mm
TRS5220WV-1001	≤6.1	1310	-40 to 85	≥-8.4	≥3.5	≤0.5	SFI	+3.3	≤1	≤15km	56.5 x 13.9 x 11.85 mm

* 10GbE USB is not an IEEE standard.

*1: This distance applies to OM2 multimode fiber

*2: This solution applies to high bandwidth 50µm multimode fiber with a minimum modal bandwidth of 2000MHz · km

*3: This solution applies to FDDI grade 62.5µm multimode fiber with a worst case modal bandwidth-distance product of 500MHz · km

*4: This value is in Optical Modulation Amplitude (OMA)

*5: Stressed sensitivity value is in OMAv

*6 Unstressed Sensitivity value is in OMA

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Optical Engines

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About this catalog

The Optical Engines Brochure is meant to showcase the Opnext line of modules, laser diodes and photodiodes. For more detailed information on our line of Optodevices or Subsystems, please visit the Opnext website at <http://www.opnext.com> or contact your nearest Opnext location or sales representative.

NOTE:

1. All specifications described herein are subject to change without prior notice.
2. To ensure safety and normal operation, be sure to read the instruction manual carefully before using the products.
3. Safety Considerations: Invisible laser radiation is emitted from the end of the fiber pigtail or optical connector of laser products and will be harmful to the human eye. Avoid looking directly into the beam during operation.