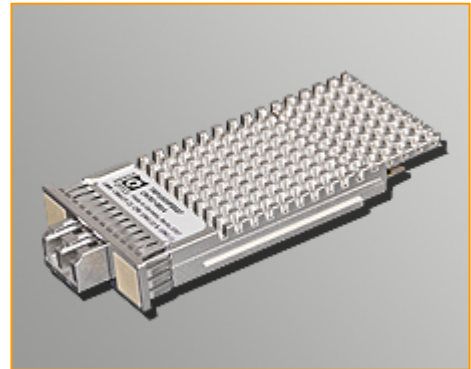


## 10Gbit/s XPAK 850 nm Transponder (TRP10GVP2x27)

### Features

- Compatible with XPAK MSA Rev. 2.3
- Compliant to IEEE 802.3ae 10GBASE-SR at 10.3125 Gbit/s (TRP10GVP2027)
- Conforms with 10 Gigabit Fibre Channel 1200-M5-SN-I, 1200-M5E-SN-I, 1200-M6-SN-I at 10.51875 Gbit/s (TRP10GVP2127)
- Transmission distance up to 82 m (50  $\mu$ m MMF) or 300m (special MMF)
- Low Power Consumption 1.8 W (typ.)
- Temperature Range 0°C - 70°C
- Laser Class 1M compliant
- Vertical Cavity Surface Emitting Laser at 850 nm (VCSEL)
- LC duplex connector
- Hot pluggable 70-pin connector with XAUI electrical interface
- Management and control via MDIO 2-wire interface
- Compliant with the EU RoHS 6 Environmental Requirements



<i>Standard</i>	<i>Description</i>	<i>Nominal Baud Rate</i>	<i>Unit</i>
IEEE 802.3ae	10 GBASE-SR	10.3125	GBd
10GFC Rev. 4.0	1200-Mx-SN-I	10.5128	GBd

### General Description and Applications

The TRP10GVP2x27 is a highly integrated, serial optical transponder module for high-speed, 10Gbit/s data transmission applications. The module is fully compliant to IEEE 802.3ae standard for Ethernet and the 10GFC Rev. 4 Fiber Channel standard, making it ideally suited for 10 GbE datacom and storage area network (SAN / NAS). Designed for short range distances the transponder module comprises a transmitter with a vertical cavity surface emitting laser (VCSEL), a receiver with a PIN photodiode and a XAUI-



Attachment Interface, an integrated Coder / Decoder and multiplexer / demultiplexer (SERDES: Serializer / Deserializer). The transponder operates within a wide temperature range of 0°C to +70°C and offers optimum heat dissipation and excellent electromagnetic shielding which enables high port densities for 10 GbE systems. A 70 pin electrical connector assures a X2 and XENPAK MSA compliant connectivity.

## Electrical Characteristics

### Absolute Maximum Ratings

Rating	Conditions/Remark	Symbol	Min	Max	Units
Storage Ambient Temperature	non condensing	$\vartheta_{stg}$	-40	+85	°C
Powered Case Temperature	non condensing	$\vartheta_c$	-10	+80	°C
Adaptable Power Supply (APS)	Voltage @ Pin APS Sense	$V_{APSsense}$	0	1.5	V
Supply Voltage 3.3V Rail		$V_{CC3}$	0	4.0	V
Supply Voltage 5V Rail		$V_{CC5}$	0	6.0	V
Input Voltage Low Speed Signals	RESET, TxOn/Off, PRTADR4..0	$V_I$	-0.5	3.6	V
Clamp Currents Low Speed Signals	RESET, TxOn/Off, PRTADR4..0 V<0V	$I_{IK}$	-50		mA
LASI Voltage		$V_Q$	-0.5	3.6	V
LASI Sink Current	Continuous Sink Current	$I_{QL}$		20	mA
XAUI Input Level		$V_{IXAUI}$	-0.4	2.3	V
Differential XAUI Input Amplitude		$ V_{IDXAUI} $		1000	mV
Optical Receiver Input Power	Average Receiver Input Power	$P_{Rx}$		0	dBm
Static Discharge Voltage	MIL STD 883 Method 3015.1			1000	V

Any stress beyond the maximum ratings can result in permanent damage. The device specifications are guaranteed only under the recommended operating conditions.

### Recommended Operating Conditions

Parameter	Conditions / Remark	Symbol	Min	Typ	Max	Units
Operating Case Temperature		$\vartheta_{Case}$	0		+70	°C
Power Supply Voltage @ 3.3V		$V_{CC3}$	3.14	3.3	3.47	V
Power Supply Voltage @ 5.0V		$V_{CC5}$	4.75	5.00	5.25	V
Power Supply Voltage APS		$V_{APS}$	1.164	1.2	1.236	V

### Characteristics

Parameter	Conditions	Symbol	Min	Typ	Max	Units
5V Supply Current		$I_{VCC5}$	8	50	29	mA
3.3V Supply Current		$I_{VCC3}$	160	400	280	mA
APS Supply Current		$I_{VCCAPS}$	740	800	1070	mA
Total Power Consumption		$P_{tot}$	1.4	1.8	2.4	W



### XAUI Output (AC-Coupled)

<i>Parameter</i>	<i>Conditions</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Units</i>
Nominal XAUI Baud Rate				3.125		GBd
Nominal XAUI Baud Rate Tolerance			-100		+100	ppm
Output Differential Skew		$t_{skew, out}$			15	ps
Output Differential Impedance		$Z_{XAUI, out}$	80	100	120	$\Omega$
Differential Transition Time	20% - 80%		40		100	ps
Total Output Jitter	no pre-equalization	$T_{JXAUI}$			0.35	UI
Total Deterministic Output Jitter	no pre-equalization	$DJ_{XAUI}$			0.17	UI
Differential Output Return Loss	312.5 to 625 MHz	S22	10			dB

### XAUI Input (AC-Coupled)

<i>Parameter</i>	<i>Conditions</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Units</i>
Nominal XAUI Baud Rate	10 GBASE-SR 1200-Mx-SN-I			3.125 3.1875		GBd
Nominal XAUI Baud Rate Tolerance			-100		+100	ppm
Differential Return Loss	100 MHz – 2.5 GHz	SDD11	10			dB
Input differential skew	at crossing point	$T_{jRDS}$			75	ps <sub>P-P</sub>
Differential Input Impedance		$R_{IND}$	80	100	120	$\Omega$

## Optical Characteristics

### General Parameters

Parameter	Conditions	Min Modal Bandwidth (MHz*km)	Symbol	Min	Typ	Max	Units
Operating Range	62.5 µm MMF	160	I <sub>OP</sub>	2		26	m
	50 µm MMF	400		2		66	
	62.5 µm MMF	200		0.5		33	
	50 µm MMF	500		0.5		82	
	50 µm MMF	2000		0.5		300	
Nominal Signalling Speed	10 GBASE-SR 1200-Mx-SN-I		f <sub>OPT</sub>		10.3125 10.5187		GBd

### Optical Transmitter

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Nominal Wavelength		λ <sub>TRP</sub>	840	850	860	nm
Spectral Width		Δλ		0.4	0.45	nm
Launch Power	in OMA	P <sub>opt,OMA</sub>	-2.0			dBm
Average Launch Power		P <sub>opt,avg</sub>	-3	-2	-1	dBm
Extinction Ratio		ER	5	6.5		dB
Relative Intensity Noise		RIN			-128	dB/Hz

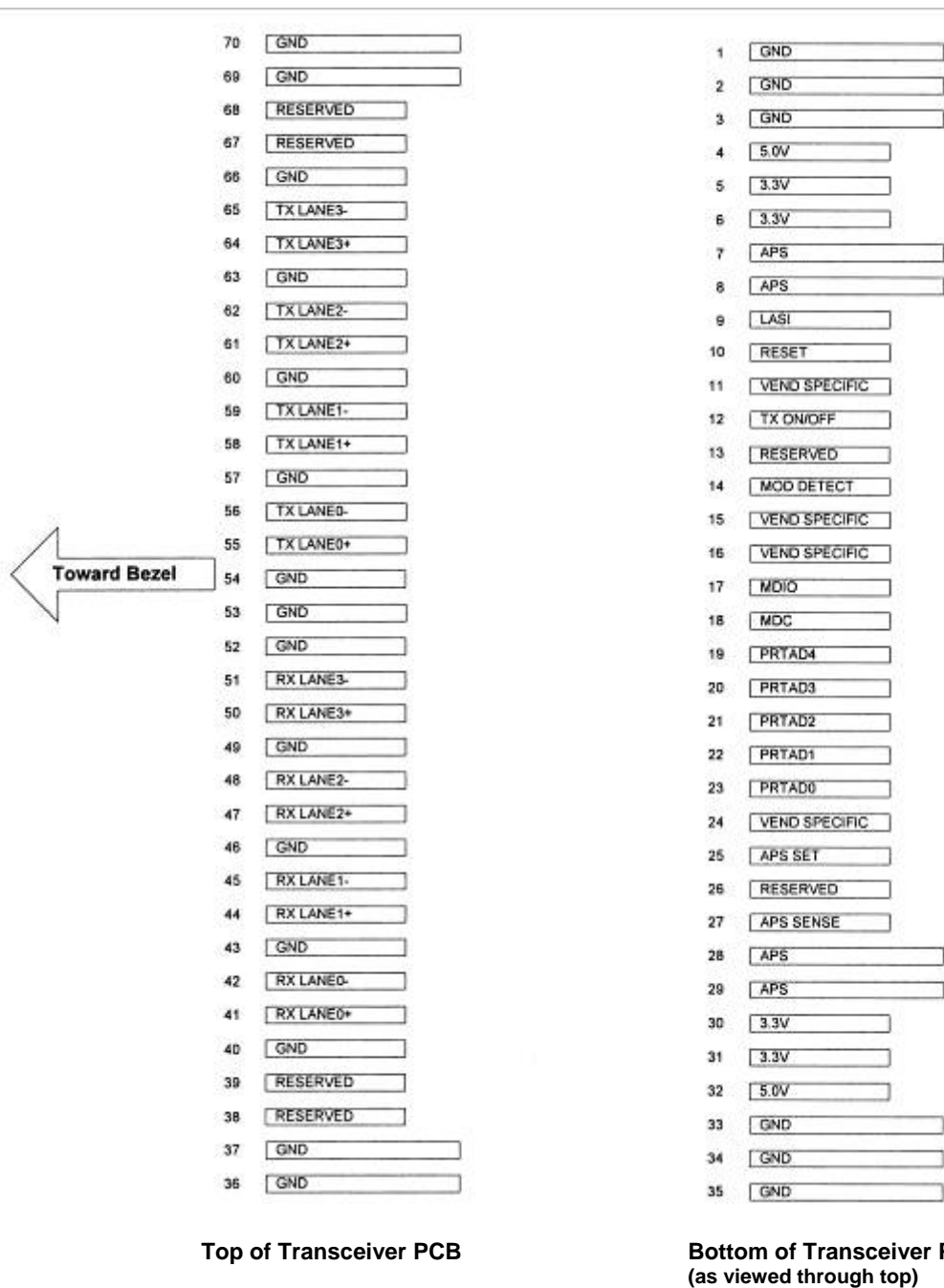
### Optical Receiver

Parameter	Conditions	Symbol	Min	Typ	Max	Units
Center Wavelength		λ <sub>C</sub>	840	850	860	nm
Receiver Sensitivity	in OMA, BER 10 <sup>-12</sup> @ 2 <sup>31</sup> -1 <sup>1)</sup>	P <sub>IN</sub>			-11.1	dBm
Stressed Receiver Sensitivity	in OMA	P <sub>IN</sub>			-7.5	dBm
Saturation Input Power		P <sub>SAT</sub>			-1	dBm

<sup>1)</sup> with ideal transmitter

Note: The specified characteristics are met within the recommended range of operating conditions and under the default settings of output power and modulation amplitude. A change in setting of the optical output power will affect especially the dynamic behavior of the output signal. Unless otherwise noted typical data is quoted at nominal voltages and +25°C ambient temperature.

## Edge-Board-Connector-Pinning and Layout



## Electrical Pin Definition

Symbol	Logic	I/O	PIN	Name / Description	Note
3.3V	+3.3 V DC	I	5, 6, 30, 31	Power Supply of Optical Receiver and Transmitter and Control Circuits	2
5.0V	+5.0 V DC	I	4, 32	Power Supply of Optical Receiver Frontend	2
APS	+1.2 V	I	7, 8, 28, 29	Adaptive Power Supply, Supply of PHY XS and PCS Layer Devices	2
APS SENSE	+1.2 V	O	27	APS Sense Output for APS Control Circuit	
APS SET	GND	I	25	Feedback Input for APS, Input of APS Setting Resistor	
GND	0 V DC	I	1, 2, 3, 33, 34, 35, 36, 37, 40, 43, 46, 49, 52, 53, 54, 57, 60, 63, 66, 69, 70	Common Electrical Ground	1
LASI	1.2V CMOS Open Drain	O	9	Link Alarm Status Indicator, low active, Open Drain Output, Supposed to operate with 10K $\Omega$ - 22K $\Omega$ pull upon host. Logic High: Normal Operation Logic Low: Link Alarm is indicated	
MDC	1.2 V CMOS	I	18	Management Clock Input	3
MDIO	Open Drain	I/O	17	Management Data I/O. Requires external 10-22 k $\Omega$ pull-up to 1.2 V on host.	3
MOD DETECT		O	14	1k $\Omega$ to Ground for APS Circuit Environment	
PRTADO	1.2V CMOS	I	23	Port Address Setting 0	
PRTAD1	1.2V CMOS	I	22	Port Address Setting 1	
PRTAD2	1.2V CMOS	I	21	Port Address Setting 2	
PRTAD3	1.2V CMOS	I	20	Port Address Setting 3	
PRTAD4	1.2V CMOS	I	19	Port Address Setting 4	
RESERVED			13, 38, 39, 67, 68	Reserved for future use, pins w/o function, leave unconnected	
RESERVED			26	Reserved for Avalanche Photodiode use, not in use	5
RESET	1.2V CMOS Open Drain	I	10	Low active Reset Input, 10K $\Omega$ pull-up on Transceiver Logic high = Normal Operation, Logic Low = Reset asserted	
RX LANE0+	AC-coupled, internally based differential XAUI	O	41	Module XAUI Output Lane 0+	4
RX LANE0-		O	42	Module XAUI Output Lane 0-	4
RX LANE1+		O	44	Module XAUI Output Lane 1+	4
RX LANE1-		O	45	Module XAUI Output Lane 1-	4
RX LANE2+		O	47	Module XAUI Output Lane 2+	4
RX LANE2-		O	48	Module XAUI Output Lane 2-	4
RX LANE3+		O	50	Module XAUI Output Lane 3+	4
RX LANE3-		O	51	Module XAUI Output Lane 3-	4
TX LANE0+		I	55	Module XAUI Input Lane 0+	4
TX LANE0-		I	56	Module XAUI Input Lane 0-	4
TX LANE1 +		I	58	Module XAUI Input Lane 1+	4
TX LANE1-		I	59	Module XAUI Input Lane 1-	4
TX LANE2+		I	61	Module XAUI Input Lane 2+	4

<b>Symbol</b>	<b>Logic</b>	<b>I/O</b>	<b>PIN</b>	<b>Name / Description</b>	<b>Note</b>
TX LANE2-	AC-coupled, internally based differential XAU	I	62	Module XAU Input Lane 2-	4
TX LANE3+		I	64	Module XAU Input Lane 3+	4
TX LANE3-		I	65	Module XAU Input Lane 3-	4
TX ON/OFF	1.2V CMOS Open Drain	I	12	High active Transmitter Enable Input 10K $\Omega$ pull-up on Transceiver Logic high = Transmitter active (normal Operation) And Register Bit 1.9.0 set to low as well Logic Low = shut down of Transmitter	
VEND SPECIFIC			11, 15, 16, 24	Vendor Specific Pin. Leave unconnected.	5

- 1) Ground connections are common for TX and RX.
- 2) All connector contacts are rated at 0.5A nominal.
- 3) MDIO and MDC timing must comply with IEEE 802.3ae clause 45.3.
- 4) XAU output characteristics comply with IEEE 802.3ae clause 47.
- 5) Transceivers will be MSA compliant when no signals are present on the vendor specific pins

## Electro Static Discharge (ESD)

The maximum electrostatic charge based on a human body model and the conditions as outlined below is:

<i>Parameter</i>	<i>Conditions</i>	<i>Symbol</i>	<i>Min</i>	<i>Typ</i>	<i>Max</i>	<i>Units</i>
Static Discharge Voltage	MIL STD 883 Method 3015.1				1000	V

## Thermal Management

The transponder is designed to operate within a temperature range between 0°C to +70°C at an altitude of < 3km. The built in heat-sink provides optimized thermal performance. The user needs to guarantee per the system design not to exceed this temperature range. It has to be considered that in case of usage of multiple modules on a single hostboard that there is a temperature rise among the modules hosted side by side. Airflow direction and air speed needs to be chosen accordingly.

## Eye Safety

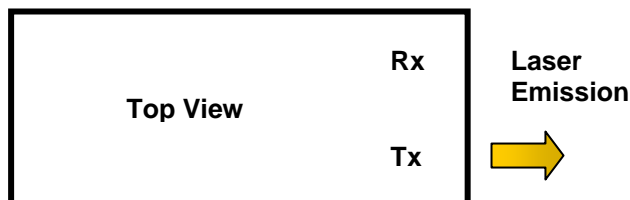
This laser based multimode transceiver is a Class 1 product. It complies with IEC 60825-1 Ed.2: 2007 and FDA performance standards for laser products (21 CFR 1040.10 and 1040.11) except for deviations pursuant to Laser Notice 50, dated June 24, 2007.

### CLASS 1 LASER PRODUCT DO NOT VIEW DIRECTLY WITH OPTICAL INSTRUMENTS

Caution: use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation.

*Note: All adjustments have been made at the factory prior to shipment of the devices. No maintenance or alteration to the device is required. Tampering with or modifying the performance of the device will result in voided product warranty. Failure to adhere to the above restrictions could result in a modification that is considered an act of "manufacturing", and will require, under law, recertification of the modified product with the U.S. Food and Drug Administration (ref. 21 CFR 1040.10 (i)).*

### Laser Emission Data



Wavelength	850 nm
Accessible Emission Limit (as defined by IEC: 7 mm aperture at 100 mm distance)	771 $\mu$ W/ -1.13dBm
Beam divergence (full angle)	20° / 0.18rad

### Required Labeling

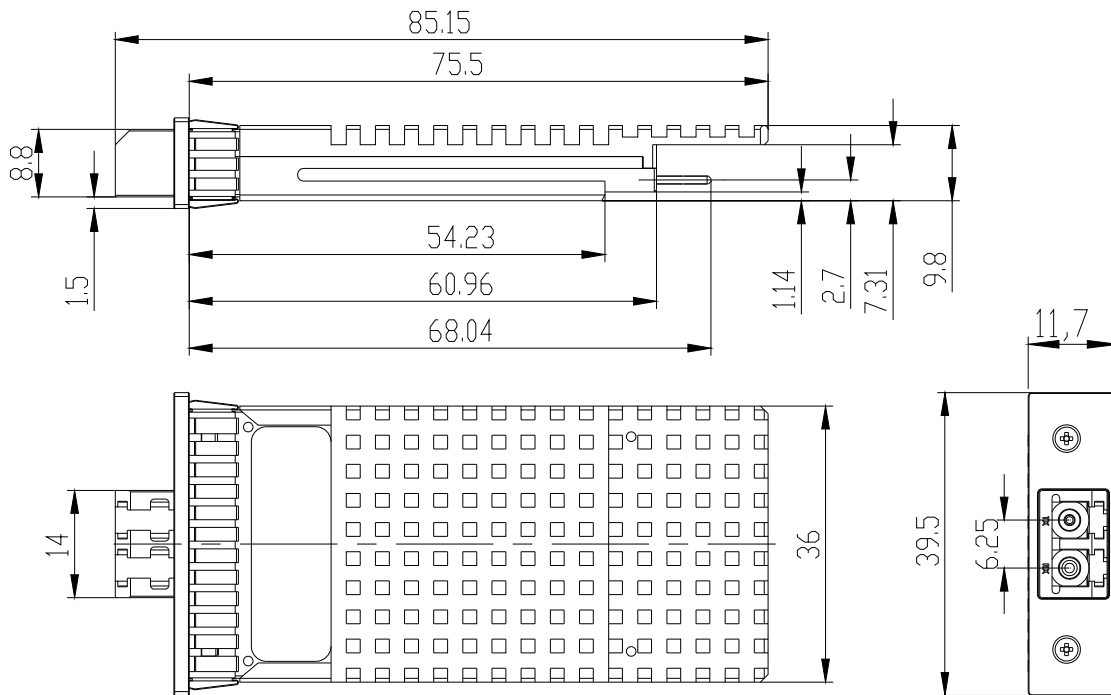
#### FDA

Compliant to 21 CFR  
1040.10 and 1040.11

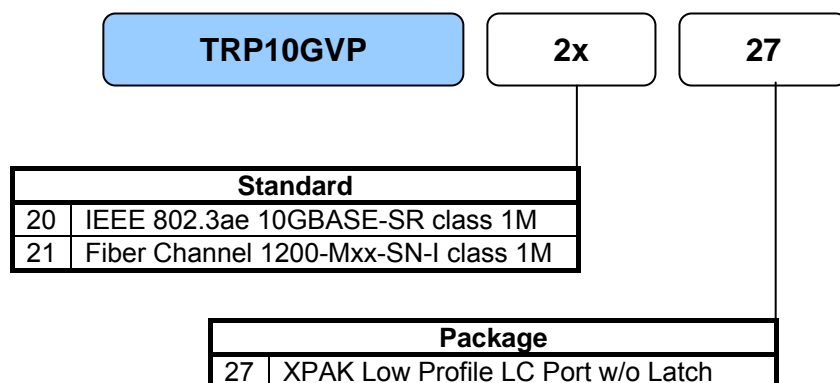
#### IEC

Class 1M Laser Product

## Mechanical Drawing



## Ordering Information



For further information please contact us at:

**Web:** [www.mergeoptics.com](http://www.mergeoptics.com)

**Email:** [info@mergeoptics.com](mailto:info@mergeoptics.com)

[marketing@mergeoptics.com](mailto:marketing@mergeoptics.com)

[sales@mergeoptics.com](mailto:sales@mergeoptics.com)

[technical\\_support@mergeoptics.com](mailto:technical_support@mergeoptics.com)