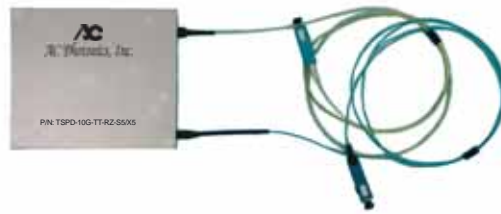




## TSPD-10G-TT-RZ-S5 (50GHz Standard C-Band)

## TSPD-10G-TT-RZ-X5 (50GHz Extended C-Band)



### Features

- RZ MZ LiNbO3 Modulator
- Up to +5dBm Output Power
- Integrated 10 Gbps Tunable Transmitter and Receiver with 16 channels 6xMbps Mux and Demux
- Full C-band Coverage with Extended Band Option
- 50 GHz ITU Grid Wavelength Spacing
- High Sensitivity APD Receiver
- Multi Data Rate Support from 9.95Gbps up to 12.5Gbps
- Comply with 300PIN Multi Source Agreement (MSA)
- Comply with I2C 300PIN MSA Interface Rev 4.2
- Comply with OIF SFI-4
- Comply with Telcordia Qualification
- Fits MSA Size 4.5"x3.5"x0.53"

### Applications

- Ultra Long Haul
- DWDM Systems
- Metro Rings and Point to Point Networks
- Ultra Long Reach
- Non Dispersion Compensated Networks
- Sparring and Inventory
- One Time Wavelength Provisioning
- SONET/SDH and 10 Gbps Ethernet with or without FEC

## Overview

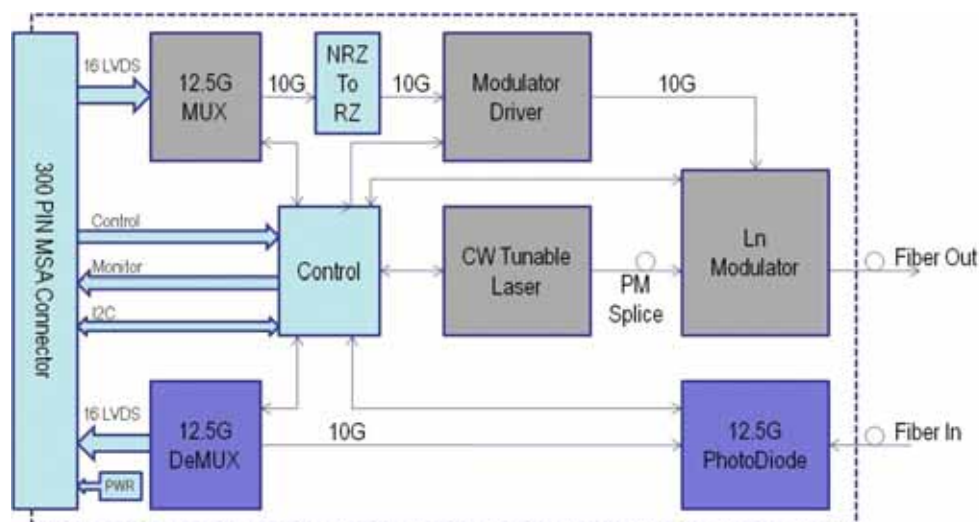


Figure 1: Transponder Block Diagram

The TSPD-10G-TT-RZ-S5/X5 is an Ultra long reach widely tunable transponder designed for DWDM applications. The transponder contains both a 10 Gbps widely tunable transmitter and a wide band receiver. The TSPD-10G-TT-RZ-S5/X5 interface is compatible with the 300-pin MSA and I<sup>2</sup>C interface. The TSPD-10G-TT-RZ-S5/X5 uses a widely tunable laser to tune and cover the entire C-Band.

The TSPD-10G-TT-RZ-S5/X5 uses a zero chirp Mach Zehnder Lithium Niobate modulator to enable operation across the entire C band and over long distances.

Integrated SERDES are used to convert parallel electrical signals into serial signals and serial signals into parallel electrical signals respectively. The electrical interface of both transmit and receive is based on 16 differential LVDS data lines and 6x Mbps clock. The module complies with OIF SFI-4 standard.

A sensitive APD receiver converts optical to electrical signal and feeds the clock and data recovery (CDR) circuit.

50GHz ITU grid wavelength spacing is available as well as multi bit rate including 9.95 to 12.5 Gbps. Tuning the transponder's laser is made possible through standard I<sup>2</sup>C commands.

The TSPD-10G-TT-RZ-S5/X5 allows the user to adjust the decision threshold of the receiver circuitry. The decision threshold can be set using I<sup>2</sup>C commands in the range of 10% to 90%.

## Part number description:

Part Number	Description
TSPD-10G-TT-RZ-S5 (50GHz standard C-Band)	10G widely tunable transponder, RZ modulation, C-Band, APD receiver, +5dBm output power, LC/APC connectors, 50GHz ITU Grid.
TSPD-10G-TT-RZ-X5 (50GHz Extended C-Band)	10G widely tunable transponder, RZ modulation, Extended C-Band, APD receiver, +5dBm output power, LC/APC connectors, 50GHz ITU Grid.



## Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Units
Operating Case Temperature	T <sub>c</sub>	-5	70	°C
Storage Case Temperature	T <sub>s</sub>	-40	85	°C
-5.2V Supply Voltage	V <sub>EE</sub>	-6	0.5	V
3.3V Supply Voltage	V <sub>DD</sub>	-0.5	4	V
5.0V Supply Voltage	V <sub>CC</sub>	-0.5	5.5	V
1.8V Supply Voltage	V <sub>DD2</sub>	-0.5	2.5	V
Voltage on LVDS pin		0	V <sub>cc</sub>	V
Static Discharge Voltage	ESD		500	V
Relative Humidity	RH		85	%
Receiver Maximum Input Power	P <sub>in</sub>		0	dBm

## Operating Conditions

Parameter	Symbol	Min	Typ	Max	Units
Operating Temperature	T <sub>case</sub>	-5		70	°C
Power Consumption	P <sub>max</sub>			13*	W
-5.2V Supply Voltage	V <sub>ee</sub>	-4.94	-5.2	-5.45	V
VEE Current	I <sub>ee</sub>			1.8*	A
3.3V Supply Voltage	V <sub>dd</sub>	3.13	3.3	3.47	V
VDD Current	I <sub>dd</sub>			2.2*	A
5.0V Supply Voltage	V <sub>cc</sub>	4.75	5.0	5.25	V
VCC Current	I <sub>cc</sub>			0.8*	A
1.8V Supply Voltage	V <sub>dd2</sub>	1.71	1.8	1.89	V
VDD2 Current	I <sub>dd2</sub>			1.2*	A

\* End of life values





## Optical Parameters

	Parameter	Symbol	Min	Typ	Max	Units	
<b>Tx</b>	Output Power	Po	+4	+4.5	+5	dBm	
	Modulator Extinction Ratio (Filtered)	ER	13	14		dB	
	Shutter – output power during tuning	SHER		-45	-40	dBm	
	Optical Signal to Noise Ratio	OSNR	50			dB@0.1nm	
	Side Mode Suppression Ratio	SMSR	40	50		dB@0.1nm	
	Tuning Range	C Band	$\lambda$	1528.77		1565.49	nm
			Freq	196.10		191.50	THz
		Extended C-Band	$\lambda$	1526.05		1567.13	nm
			Freq	196.45		191.30	THz
		Wavelength Switching Time	$t_s$		10	15	s
		Wavelength Accuracy*	$\Delta f_t$	-2.5		+2.5	GHz
	Power Variation Between Channels	$\Delta P_t$	-0.5		+0.5	dBm	
	Preset Chirp						
		Zero	$\alpha$	-0.1	0	+0.1	
	Jitter Generation	Compliant with GR-253 issue 3					
<b>Rx</b>	Sensitivity**						
		9.95 to 10.5Gbps	Si		-24		dBm
		10.7 to 11.3Gbps	Si		-23		dBm
		Max Receiver Overload***	PinMax	-8			dBm
		Rx Spectral Range	$\lambda_{in}$	1526		1567	nm
		Optical Return Loss	RL	27			dB
	Jitter Transfer & Tolerance	Compliant with GR-253 issue 3					

All parameters are at 10.7Gbps data rate unless otherwise mentioned

\* After 30 seconds

\*\* @ BER < 10<sup>-12</sup>, ER=13dB, PRBS=2<sup>31</sup>-1, RZ, OSNR>35dB

\*\*\* @ BER < 10<sup>-12</sup>, ER=13dB, PRBS=2<sup>31</sup>-1, RZ, OSNR>35dB

