

# 10 Gb/s TDM/DWDM 300 Pin SFF MSA SR2/IR2/LR2 Transponder PH1 Series



## Key Features

- Three configurations supporting SR2/IR2/LR2 applications
- Supports dense wavelength division multiplexing (DWDM) applications (without wavelocker)
- Microprocessor controls to support I2C
- Integrated 16:1/1:16 mux/demux
- Small form factor package (2.2" x 3.0" x 0.53") for high density applications
- Low power consumption: 4.8 W typical, 6.8 W maximum for TDM applications
- 70 °C maximum operating temperature
- High sensitivity PIN or APD receivers
- SONET, FEC, Ethernet and Multirate Capable Versions
- Forward, counter and line timing clocking modes

## Applications

- Telecommunications
- Metropolitan Area Networks
- Subscriber loop
- Intra-office SONET/SDH
- High bit-rate data communications

## Compliance

- Telcordia GR-253-Core

JDSU 10 Gb/s PH1 Series transponders are intended for 1550 nm system applications with reaches of up to 80 km. The series includes three different transponders for SR2 (25 km), IR2 (40 km), and LR2 (80 km) TDM or DWDM applications. Each transponder accepts 16 bits of parallel digital data and converts it to a 10 Gb/s NRZ modulated optical signal. It also accepts a 10 Gb/s NRZ modulated optical signal and converts it into 16 bit wide parallel digital data.

The PH1 series offers low DC power dissipation and is available in either a small form factor package (2.2 x 3 x 0.53 inches) or in a larger footprint (3.5 x 4.5 x 0.53 inches) package, depending on system thermal performance requirements. The transmit design uses an Electro-Absorptive Modulated Laser (EML) which, depending on the configuration, produces an average output power of between -4 dBm to 2 dBm (EOL). A PIN (-17 dBm typical sensitivity) or APD (-24 dBm typical sensitivity) receiver is available, based on system configurations.

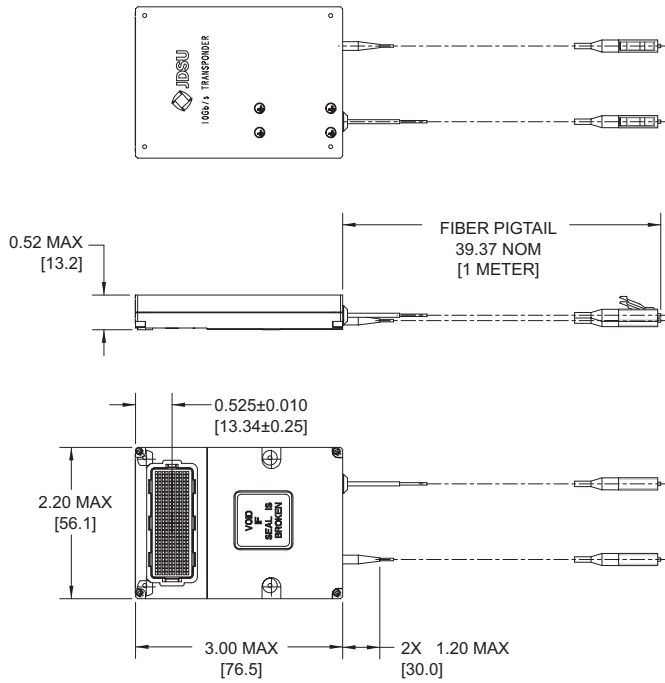
JDSU PH1 Series transponders are designed to support the following data rates: 9.953 Gb/s (SONET), 10.3125 Gb/s (Ethernet), 10.664 Gb/s (FEC Encoded), 10.709 Gb/s FEC, or 11.09 Gb/s EFEC. They meet all applicable SONET/SDH standards.

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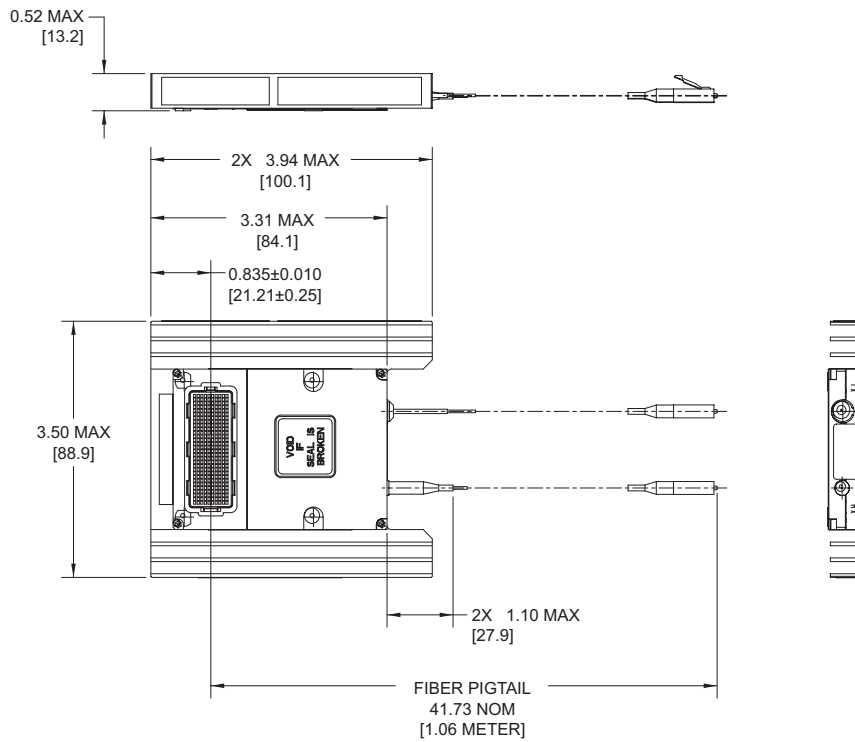
Dimensions Diagram

(Specifications in inches [mm] unless otherwise noted.)

Configuration A

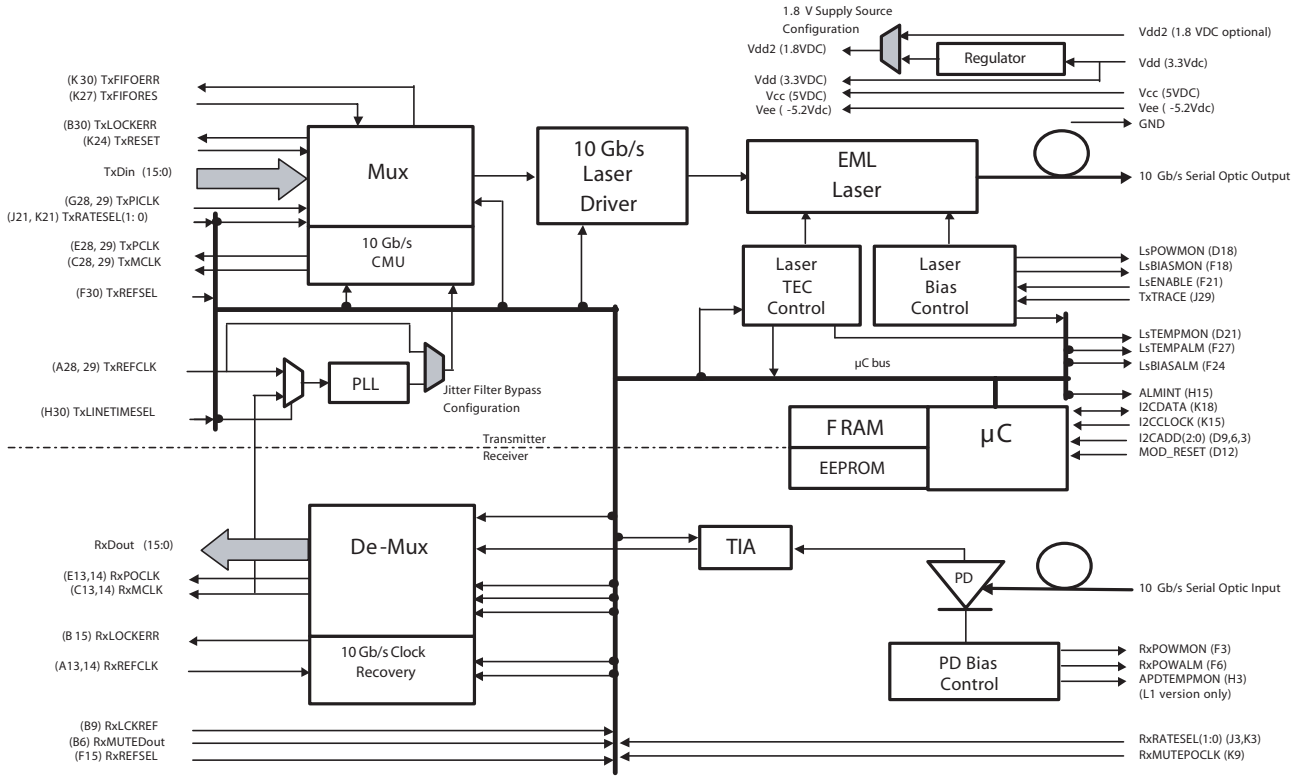


Configuration C



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Module Functional Block Diagram



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## PH1 (SR2) Specifications

Parameter	Minimum	Typical	Maximum
<b>Transmitter</b>			
Output power (EOL)	-4 dBm	-2.5 dBm	-1 dBm
Extinction ratio (EOL)	8.2 dB	-	-
Tx spectral range	1530 nm	-	1570 nm
Sidemode suppression ratio	30 dB	-	-
Spectral power density	-	-	0.1 mW/MHz
Jitter generation	-	GR-253 compliant	-
<b>Receiver</b>			
PIN input power {BER = 10 <sup>-12</sup> } (EOL)	-15.0 dBm	-16.0 dBm	-
Maximum overload: PIN receiver {BER = 10 <sup>-12</sup> } (EOL)	-1 dBm	-	-
Rx spectral range	1280 nm	-	1600 nm
Jitter tolerance and jitter transfer	-	GR-253 compliant	-
System optical return loss	-27 dB	-	-
<b>Optical Path</b>			
Optical path penalty at 1550 nm and with 1600 ps/nm dispersion	-	-	2 dB
<b>Electrical</b>			
Operating case temperature	-5 °C	-	70 °C
TDM power dissipation with jitter filter	-	5.0 W	7.0 W
TDM power dissipation without jitter filter	-	4.8 W	6.8 W

## PH1 (IR2) Specifications

Parameter	Minimum	Typical	Maximum
<b>Transmitter</b>			
Output power (EOL)	-1 dBm	0.5 dBm	2 dBm
Extinction ratio (EOL)	8.2 dB	-	-
Tx spectral range	1530 nm	-	1570 nm
Wavelength stability over operating temperature (BOL setup, 100 GHz option)	-25 pm	-	25 pm
Wavelength stability over operating temperature (EOL setup, 100 GHz option)	-100 pm	-	100 pm
Sidemode suppression ratio	30 dB	-	-
Spectral power density	-	-	0.1 mW/MHz
Jitter generation	-	GR-253 compliant	-
<b>Receiver</b>			
PIN input power {BER = 10 <sup>-12</sup> } (EOL)	-15.0 dBm	-16.0 dBm	-
Maximum overload: PIN receiver {BER = 10 <sup>-12</sup> } (EOL)	-1 dBm	-	-
Rx spectral range	1280 nm	-	1600 nm
Jitter tolerance and jitter transfer	-	GR-253 compliant	-
System optical return loss	-27 dB	-	-
<b>Optical Path</b>			
Optical path penalty at 1550 nm and with 1600 ps/nm dispersion	-	-	2 dB
<b>Electrical</b>			
Operating case temperature	-5 °C	-	70 °C
TDM power dissipation with jitter filter	-	5.0 W	7.0 W
TDM power dissipation without jitter filter	-	4.8 W	6.8 W
DWDM power dissipation with jitter filter	-	5.8 W	7.8 W
DWDM power dissipation without jitter filter	-	5.6 W	7.6 W

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**PH1 (LR2) Specifications**

Parameter	Minimum	Typical	Maximum
<b>Transmitter</b>			
Output power (EOL)			
LP and LA options	0 dBm	2 dBm	4 dBm
LH option	2 dBm	4 dBm	6 dBm
Extinction ratio (EOL)	9.5 dB	-	-
Tx spectral range	1530 nm	-	1570 nm
Wavelength stability over operating temperature (BOL setup, 100 GHz option)	-25 pm	-	25 pm
Wavelength stability over operating temperature (EOL setup, 100 GHz option)	-100 pm	-	100 pm
Sidemode suppression ratio	30 dB	-	-
Spectral power density	-	-	0.1 mW/MHz
Jitter generation		GR-253 compliant	
<b>Receiver</b>			
APD input power {BER = 10 <sup>-12</sup> } (EOL)	-24 dBm	-17 dBm	-
Maximum overload: APD receiver {BER = 10 <sup>-12</sup> } (EOL)	-5 dBm	-	-
Rx spectral range	1280 nm	-	1600 nm
Jitter tolerance and jitter transfer		GR-253 compliant	
System optical return loss	-27 dB	-	-
<b>Optical Path</b>			
Optical path penalty at 1550 nm and with 1600 ps/nm dispersion	-	-	2 dB
<b>Electrical</b>			
Operating case temperature	-5 °C	-	70 °C
TDM power dissipation with jitter filter	-	8.5 W	7.9 W
TDM power dissipation without jitter filter	-	8.7 W	7.7 W
DWDM power dissipation with jitter filter	-	6.7 W	8.7 W
DWDM power dissipation without jitter filter	-	6.5 W	8.5 W

**Ordering Information**

For more information on this or other products and their availability, please contact your local JDSU account manager or JDSU directly at 1-800-498-JDSU (5378) in North America and +800-5378-JDSU worldwide or via e-mail at customer.service@jdsu.com.

**Sample: PH1-S12LATD5N00**

Code	Rate	Code	Format/ITU Channel/Wavelength <sup>2</sup>	Code	Channel Width
N	OC-192 SONET without jitter filter	TD5	TDM 1550 nm	2	25 GHz <sup>1</sup>
S	OC-192 SONET with jitter filter	436	C-band DWDM channels,100 GHz spacing, 1563.86 nm/191.7 GHz	5	50 GHz <sup>1</sup>
F	10.66 Gb/s FEC with jitter filter <sup>1</sup>	432	C-band DWDM channels,100 GHz spacing, 1563.05 nm/191.8 GHz	1	100 GHz
7	10.709 Gb/s FEC with jitter filter <sup>1</sup>	428	C-band DWDM channels,100 GHz spacing, 1562.23 nm/191.9 GHz	N	Not used
G	10 GbE with jitter filter <sup>1</sup>	424	C-band DWDM channels,100 GHz spacing, 1561.42 nm/192.0 GHz	<b>Code Custom Options</b>	
M	Multi-rate (SONET, 10 GbE, 10.66, 10.709 with no jitter filter <sup>1</sup>	420	C-band DWDM channels,100 GHz spacing, 1560.61 nm/192.1 GHz	Please consult JDSU	
T	10.66 Gb/s FEC without jitter filter <sup>1</sup>	416	C-band DWDM channels,100 GHz spacing, 1559.79 nm/192.2 GHz	1. Future option.	
P	10.709 Gb/s FEC without jitter filter <sup>1</sup>	412	C-band DWDM channels,100 GHz spacing, 1558.98 nm/192.3 GHz	2. Please consult JDSU for other DWDM channel option.	
<b>Code Application</b>		408	C-band DWDM channels,100 GHz spacing, 1558.17 nm/192.4 GHz		
I2	IR-2 per GR-253-Core	404	C-band DWDM channels,100 GHz spacing, 1557.36 nm/192.5 GHz		
S2	SR-2 per GR-253-Core	400	C-band DWDM channels,100 GHz spacing, 1556.55 nm/192.6 GHz		
LA	LR ¾ 1550 APD Rx	396	C-band DWDM channels,100 GHz spacing, 1555.75 nm/192.7 GHz		
LP	LR with PIN Rx	392	C-band DWDM channels,100 GHz spacing, 1554.94 nm/192.8 GHz		
LH	LR ¾ APD Rx (High power)	388	C-band DWDM channels,100 GHz spacing, 1554.13 nm/192.9 GHz		
<b>Code Connector/Pigtail Length</b>		384	C-band DWDM channels,100 GHz spacing, 1553.33 nm/193.0 GHz		
F	FC/UPC/1 m pigtail length	380	C-band DWDM channels,100 GHz spacing, 1552.52 nm/193.1 GHz		
L	LC/SPC/1 m pigtail length	376	C-band DWDM channels,100 GHz spacing, 1551.72 nm/193.2 GHz		
S	SC/UPC/1 m pigtail length	372	C-band DWDM channels,100 GHz spacing, 1550.92 nm/193.3 GHz		
<b>Code Temperature Range, Package</b>		368	C-band DWDM channels,100 GHz spacing, 1550.12 nm/193.4 GHz		
A	-50 to 70 °C case, 2.2" x 3.0" x 0.53" flat top package with no heat sink	364	C-band DWDM channels,100 GHz spacing, 1549.32 nm/193.5 GHz		
C	-50 to 70 °C case, 3.5" x 4.0" x 0.53" package with flat top and integrated heat sink fins-down	360	C-band DWDM channels,100 GHz spacing, 1548.51 nm/193.6 GHz		
		356	C-band DWDM channels,100 GHz spacing, 1547.72 nm/193.7 GHz		
		352	C-band DWDM channels,100 GHz spacing, 1546.92 nm/193.8 GHz		
		348	C-band DWDM channels,100 GHz spacing, 1546.12 nm/193.9 GHz		
		344	C-band DWDM channels,100 GHz spacing, 1545.32 nm/194.0 GHz		
		340	C-band DWDM channels,100 GHz spacing, 1544.53 nm/194.1 GHz		
		336	C-band DWDM channels,100 GHz spacing, 1543.73 nm/194.2 GHz		
		332	C-band DWDM channels,100 GHz spacing, 1542.94 nm/194.3 GHz		
		328	C-band DWDM channels,100 GHz spacing, 1542.14 nm/194.4 GHz		
		324	C-band DWDM channels,100 GHz spacing, 1541.35 nm/194.5 GHz		
		320	C-band DWDM channels,100 GHz spacing, 1540.56 nm/194.6 GHz		
		316	C-band DWDM channels,100 GHz spacing, 1539.77 nm/194.7 GHz		
		312	C-band DWDM channels,100 GHz spacing, 1538.98 nm/194.8 GHz		
		308	C-band DWDM channels,100 GHz spacing, 1538.19 nm/194.9 GHz		
		304	C-band DWDM channels,100 GHz spacing, 1537.40 nm/195.0 GHz		
		300	C-band DWDM channels,100 GHz spacing, 1536.61 nm/195.1 GHz		
		296	C-band DWDM channels,100 GHz spacing, 1535.82 nm/195.2 GHz		
		292	C-band DWDM channels,100 GHz spacing, 1535.04 nm/195.3 GHz		
		288	C-band DWDM channels,100 GHz spacing, 1534.25 nm/195.4 GHz		
		284	C-band DWDM channels,100 GHz spacing, 1533.47 nm/195.5 GHz		
		280	C-band DWDM channels,100 GHz spacing, 1532.68 nm/195.6 GHz		
		276	C-band DWDM channels,100 GHz spacing, 1531.90 nm/195.7 GHz		
		272	C-band DWDM channels,100 GHz spacing, 1531.12 nm/195.8 GHz		
		268	C-band DWDM channels,100 GHz spacing, 1530.33 nm/195.9 GHz		
		264	C-band DWDM channels,100 GHz spacing, 1529.55 nm/196.0 GHz		
		260	C-band DWDM channels,100 GHz spacing, 1528.77 nm/196.1 GHz		
		256	C-band DWDM channels,100 GHz spacing, 1527.99 nm/196.2 GHz		

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