

# Path Protected, Client-Side SFP, Multi-Rate, Multi-Protocol, 3R DWDM Transponder

## WaveReady™ Transponder 760



### Key Features

- 1+1 protection for network optics, controlled by loss of signal (LOS) level, loss of lock, or user configurable power thresholds
- Client-side SFP modules support either single-mode fiber (SMF) or multimode fiber (MMF)
- Multiple protocols supported at discrete bit rates of 125 Mb/s to 3.125 Gb/s
- Automatic bit-rate detection and reporting
- Remote management via SNMP traps or TL1
- Network optics support 16 ITU wavelengths over distances up to 100 km without dispersion compensation or amplification
- Facility loopback on both network and client sides
- 3R functionality at all supported bit rates and protocols

### Applications

- Wavelength services
- Metro optical access overlay
- Protected storage area network (SAN) and GigE extension services

### Compliance

- FCC Part 15 (Class A); UL 60950 3rd Edition, December 2000; CAN/CSA-C22.2 No. 950-95; NEBS Level 3; GR-63-CORE; GR-1089-CORE; GR-78-CORE; CE; IEC 60950; ETS300-386; EN 55022 (Class B); 73/23/EEC

The WaveReady Transponder 760 (WRT-760) is a multi-rate, multi-protocol, auto-lock transponder module that translates optical signals between a variety of client-side interfaces into a long-reach, single-mode, dense wavelength division multiplexing (DWDM) interface. This module includes path protection, small form factor pluggable (SFP) modules on the client side, loopback, and 3R (reshape, retime and re-amplify/regenerate) functionality.

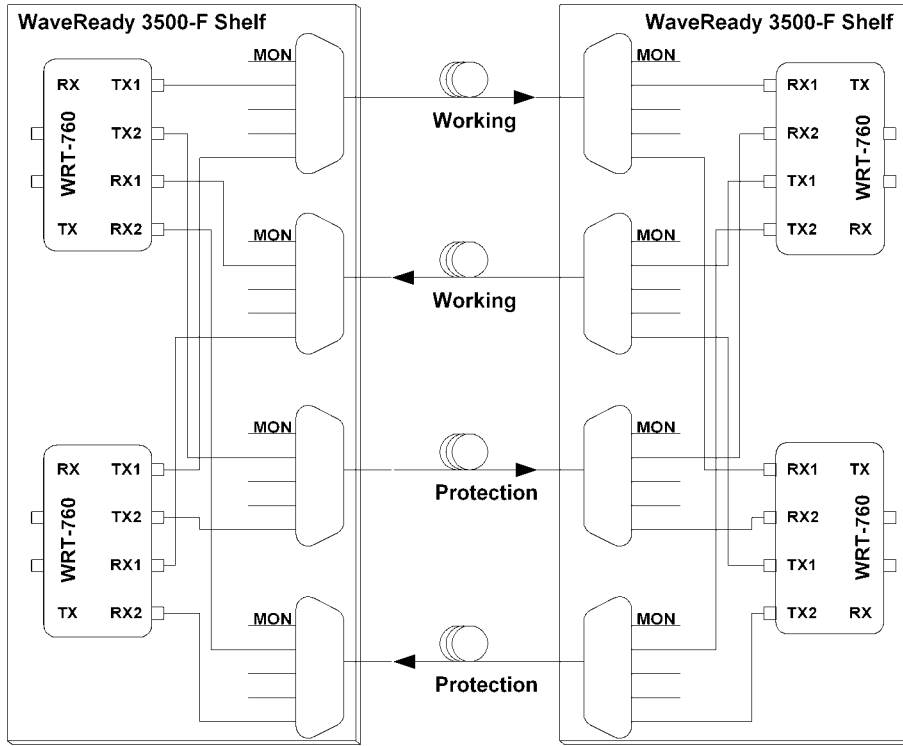
Built-in path protection eliminates the need for extra transponders and protection devices on protected links, a significant saving in capital expenditure.

SFP modules optimized for a wide range of protocols are available for single-mode and multimode fiber. Supported protocols include 100Base-FX Ethernet, Gigabit Ethernet (GigE), ESCON, Fibre channel, FICON, and OC-3 to OC-48. Supported data rates range from 125 Mb/s to 3.125 Gb/s. The WRT-760's bit-rate and protocol independence gives service providers the flexibility to meet the shifting service demands of customers without changing installed equipment.

Full 3R functionality allows multiple WRT-760 modules to be deployed in series for very long reach applications. Loopback facilitates fault isolation and troubleshooting.

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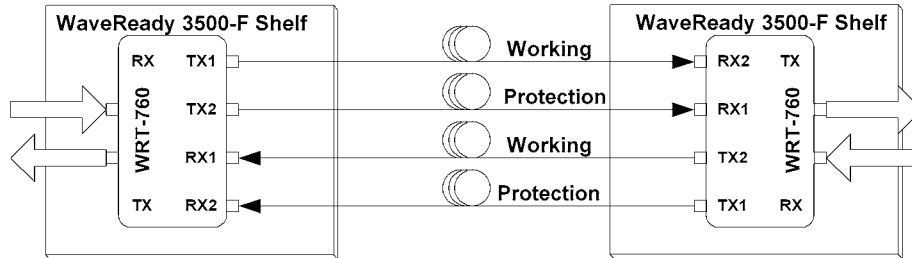
**Point-to-Point Four-Channel Protected DWDM Link**



**Typical Link Budget**

Parameter	Minimum Rx Power	Total Power Budget	Maximum Distance
OC-48	-28.5 dBm	24.4 dB	97 km
Gigabit Ethernet	-30 dBm	22.9 dB	91 km

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**Point-to-point Single Channel  
Protected DWDM Link**

**Typical Link Budget**

Parameter	Minimum Rx Power	Total Power Budget	Maximum Distance
OC-48	-28.5 dBm	30 dB	100 km (dispersion limited)
Gigabit Ethernet	-30 dBm	28.5 dB	114 km

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**Network Optical Specifications****Parameter****Specifications****Optical Path between Transmitter and Receiver Connectors**

Dispersion <sup>1</sup> at OC-48	Maximum	1800 ps/nm
Optical return loss of cable plant, including any connectors	Minimum	24 dB
Discrete reflectance between transmit and receive connectors	Maximum	27 dB
Maximum link budget at OC-48 including dispersion	Minimum	25.5 dB
	Typical	28.5 dB

**Transmitter**

Wavelength range		1530 to 1561 nm
Frequency range (32 frequencies, 100 GHz spacing)		192.1 to 195.9 THz
Central frequency deviation	Maximum	100 pm
Mean output power	Minimum	-1.0 dBm
	Maximum	2 dBm
Extinction ratio <sup>2</sup>	Minimum	8.2 dB
	Typical	10 dB

**Receiver**

Sensitivity at 100BaseF to GE, BER=1x10 <sup>-10</sup>	Minimum	-30 dBm
Sensitivity at OC-48, BER=1x10 <sup>-10</sup>	Minimum	-28.5 dBm
Overload	Minimum	-8 dBm
OSNR tolerance at BER=1x10 <sup>-12</sup>	Minimum	20 dB <sup>3</sup>
Optical path penalty on standard single-mode fiber	Maximum	2 dB <sup>4</sup>
Reflectance of receiver at receiver connector	Maximum	-27 dB
LOS activation threshold	Typical	-35 dBm
LOS deactivation threshold	Typical	-30 dBm

**Protection**

Switching time	Minimum	50 ms
Switch-back hold time (user configurable, default is 300 seconds)	Minimum	3 seconds
	Maximum	300 seconds

Note: All specifications are guaranteed over the life, operating temperatures, wavelength range, and input voltage range specified. This product should be deployed in accordance with each company's deployment directives.

1. Maximum dispersion for the defined path penalty of 2 dB
2. Back-to-back measurement, 8.2 dB extinction ratio and no other signal impairments
3. With receive power of -27 dBm with no other signal impairments at EOL over all temperatures
4. Dispersion penalty only

**Interface Specifications****Parameter****Specification**

Provisioning, operations,	Via the WaveReady Communication Module 200. Remote management: SNMP and TL1 command mode through administration, maintenance JDSU Node Manager software or TL1 through telnet or command-line application or SNMP. Communication with remote modules through an embedded supervisory channel.
Front panel LEDs	CARD (power), MAJ/CRIT (major or critical alarm), MIN (minor alarm), LOS B, LOS D (loss of lock) LOOPBK (loopback), MGT (management).
Front panel ports	Client side ports A and B single mode or multimode fiber (SMF or MMF), SFP1 SFP2, SFP3, SFP4 or SFP5. Network side ports: C and D, SMF.
Alarms	CARD (power), MAJ/CRIT (major or critical alarm), MIN (minor alarm), LOS B, LOS D (loss of lock). Alarm relay open under normal operation. Relay closed when power is off and alarm is active.

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**Other Specifications**

Parameter	Condition	Specifications	
<b>Electrical</b>			
Power consumption	Over temperature range EOL	Typical	16.5 W
		Maximum	20 W
Supply voltage <sup>1</sup>		Minimum	38 V
		Typical	48 V
		Maximum	60 V
<b>Environmental</b>			
Storage temperature			-40 to 85 °C
Ambient operating temperature	-5 to 55 °C short term, 96 hours continuous. No more than 15 days per year.		-5 to 55 °C
Humidity	Non-condensing		0 to 95%
<b>Mechanical</b>			
Connectorization			LC
Weight (approximate)			1.4 kg (3.1 pounds)
Dimensions (W x H x D)			25.4 x 223.5 x 175 mm (1.0 x 6.89 x 8.8 inches)
Mounting options			WaveReady 3500-F or fan-equipped WaveReady 3100 shelf in standard 19- or 24-inch rack

1. The DC power supply must be -48 V SELV output and certified by a nationally recognized test laboratory (NRTL)

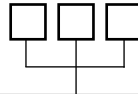
**Compatibility of Client SFPs**

Protocol	Bit Rate	SFP
<b>SMF Fiber</b>		
100Base-FX Ethernet	125 Mb/s	SFP1 and SFP2
OC-3 IR-1/STM-1 S-1.1	155.52 Mb/s	SFP1 and SFP2
ESCON	200 Mb/s	SFP1 and SFP2
D1 video	270 Mb/s	SFP1 and SFP2
OC-12/STM-4 S-4.1	622.08 Mb/s	SFP1 and SFP2
FICON LX single mode	1.0625 Gb/s	SFP1
Fibre channel 100-SMLL-L	1.0625 Gb/s	SFP1
Gigabit Ethernet 1000Base-LX	1.250 Gb/s	SFP1
Fibre channel 200-SMLL-I	2.125 Gb/s	SFP1
OC-48/STM-16 I-16	2.48832 Gb/s	SFP1
OC-48 FEC	2.7 Gb/s	SFP1
<b>MMF Fiber</b>		
100Base-FX Ethernet	125 Mb/s	SFP2
ESCON	200 Mb/s	SFP2 or SFP1 <sup>1</sup>
FICON LX	1.0625 Gb/s	SFP3 or SFP1 <sup>1</sup>
FICON SX	1.0625 Gb/s	SFP4
Fibre channel 100-M5-SN-I	1.0625 Gb/s	SFP4
Gigabit Ethernet 1000Base-SX	1.250 Gb/s	SFP4

1. Due to the dual media (single-mode and multimode) support of this transmitter, fulfillment of this protocol requires a single-mode fiber offset launch mode conditioning patch cord. The offset launch mode conditioning cable lowers the launch power by 0.5 dB and incurs a similar penalty on the sensitivity.

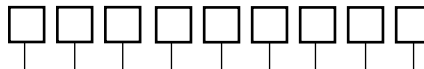
**Ordering Information**

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](mailto:customer.service@jdsu.com).

**Sample: WRT-760DT240B-053**
**WRT-760DT240B-**


Code	ITU Channel/Frequency <sup>1</sup>
035	193.5 THz/1549.32 nm
037	193.7 THz/1547.72 nm
044	194.4 THz/1542.14 nm
045	194.5 THz/1541.35 nm
046	194.6 THz/1540.56 nm
047	194.7 THz/1539.77 nm
048	194.8 THz/1538.98 nm
049	194.9 THz/1538.19 nm
052	195.2 THz/1535.82 nm
053	195.3 THz/1535.04 nm
054	195.4 THz/1534.25 nm
055	195.5 THz/1533.47 nm
056	195.6 THz/1532.68 nm
057	195.7 THz/1531.90 nm
058	195.8 THz/1531.12 nm
059	195.9 THz/1530.33 nm

1. Other channels are available upon request.

**SFP Sample: WRT-SFPS12SB1310**
**WRT-SFP**


Code	Model
S24SB1310	SFP1
S12SB1310	SFP2
M20SB0850	SFP3
S20SB1310	SFP4

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