

# Dense Wavelength Division Multiplexing (DWDM) Transponder with Multi-Rate XFP Interfaces

## WRT-840DT100B



### Key Features

- DWDM reach extension for power and dispersion limited 10 Gb/s
- 3R (reshape, regenerate, retime) operation
- TL1 and SNMP management, remote hardware management through embedded management channel
- High transmit power (+1.8 dBm typical)
- Extended dispersion tolerance to 88 km (1600 ps/nm) at OC-192
- XFP Client-side optics

### Applications

- SONET reach extension
- Storage area networks and Gigabit Ethernet reach extension
- Wavelength services and metro optical access overlay
- Reach extension of dispersion-limited links

### Compliance

- Telcordia NEBS Level 3
- GR-253-CORE, Issue 3, sections 4.1 (Physical Layer Classifications), 5.6.1 (Jitter for Regenerators), and 7 (Other Generic Criteria)
- UL 60950-1 First Edition, CAN/CSA C22.2 No. 60950 01 First Edition, EN 60950-1:2001, IEC 60950-1:2001
- EN55022:1998/A1:2000/A2:2003, EN 300 386 V1.3.1
- FCC Class A
- FDA Class 1 Laser Device

The JDSU WRT-840 is a multi-rate, bi-directional transponder that converts short-reach 10 Gb/s optical signals to long-reach, single-mode DWDM optical interfaces. The module is used with WaveReady™ 3000 series shelves to enable DWDM multiplexing applications such as fiber relief, wavelength services and metro optical DWDM access overlay on existing optical infrastructure. Supporting dense wavelength multiplexing schemes, the WRT-840 can expand the useable bandwidth of a single optical fiber to over 300 Gb/s.

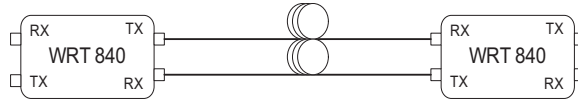
The WRT-840 provides a standard line interface for multiple protocols through replaceable XFP client-side optics. The data rates and typical protocols transported include SONET/SDH (OC-192 SR1), Gigabit Ethernet (10GBASE-S and 10GBASE-L), 10G Fibre Channel (10GFC) and SONET G.709 FEC (10.709 Gb/s). The module supports 3R operation (reshape, retime, regenerate) at supported rates.

The WRT-840 also has advanced demarcation capability for carrier services. Capabilities include loopback testing, power monitoring, and other features. These functions facilitate fault location and correction and simplify operations required by service management and service-level agreements.

Locally and remotely, the WRT-840 can be managed over the in-band management channel through a WaveReady communications module and 3000 series shelf. Both TL1 and SNMP management are supported.

## 2

### Point-to-Point Single Channel Link

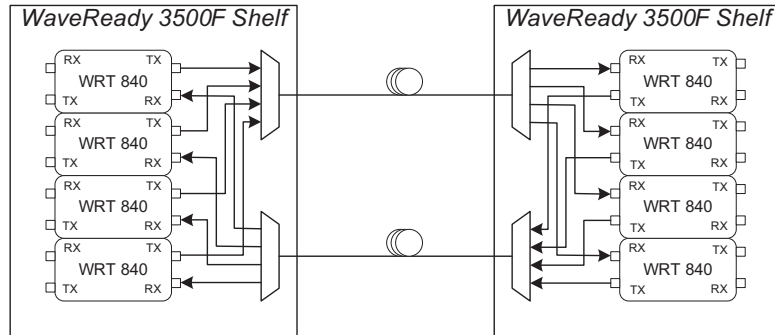


### Typical Link Budget

Data Rate	Minimum Rx Power	Total Power Budget <sup>1</sup>	Maximum Distance <sup>2</sup>
OC-192 (9.953 Gb/s)	-24 dBm	23.8 dB	88 km
10 GigE (10.31 Gb/s)	-23 dBm	22.8 dB	88 km

1. With embedded operations channel present, add 1 dB additional power penalty
2. Based on 1600 ps/nm dispersion limit

### Point-to-Point Four Channel DWDM Link



### Typical Link Budget

Data Rate	Minimum Rx Power <sup>1</sup>	Total Power Budget <sup>2,3</sup>	Maximum Distance
OC-192 (9.953 Gb/s)	-24 dBm	20.8 dB	83.2 km
10 GigE (10.31 Gb/s)	-23 dBm	19.8 dB	79.2 km

1. With embedded operations channel present, add 1 dB additional power penalty
2. MUX and DEMUX are MDX-04M(D)X2001A
3. Fiber type = NDSF 0.25 dB/km at 1550 nm and dispersion of 18 ps/nm.km

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#### Optical Specifications<sup>1</sup>

Parameter	Minimum	Typical	Maximum
<b>Transport and Customer Interface Side</b>			
Input and output data rates	OC-192/STM-64 (9.95 Gb/s), 10 GBASE-SW/LW (9.95 Gb/s), 10 GBASE-SR/LR (10.3125 Gb/s), 10 GFC (10.51875 Gb/s), 10 G OC-192 FEC (10.709 Gb/s)		
<b>Transport Side</b>			
Input and output wavelength			
Input wavelength, port D	1530 nm	-	1565 nm
Output wavelength, DWDM frequencies, port C	C-band ITU-T 100 GHz spaced channels		
Input sensitivity at 9.95 Gb/s, BER=10 <sup>-12</sup>	-24 dBm <sup>2</sup>	-	-
Input sensitivity at 10.709 Gb/s, BER=10 <sup>-12</sup>	-23 dBm	-	-
Input overload power at BER 10 <sup>-12</sup>	-6 dBm	-	-
Wavelength/temperature accuracy	-	-	±100 pm
Maximum dispersion at 1550 nm 2 dB path penalty	-	-	1600 ps/nm
Dispersion penalty (80 km at 9.953 Gb/s and BER 10 <sup>-12</sup> )	-	-	2.0 dB
Dispersion penalty (80 km at 10.709 Gb/s and BER 10 <sup>-12</sup> )	-	-	2.8 dB
OSNR at OC-192, BER 10 <sup>-12</sup>	20 dB	-	-
Spectral width at -20 dB (full width)	-	-	0.3 nm
Eye mask Per GR-253-CORE			
Output power level	0 dBm	1.8 dBm	4 dBm
Jitter (generation, tolerance, transfer)	Telcordia GR-253, ITU-T G.958, ANSI X3.230-1994 and IEEE 802.3		
<b>Customer Interface Side</b>			
Input and output wavelength	See 'Supported Client-Side XFPs' on page 4		
Input sensitivity at BER 10 <sup>-12</sup>	See XFP part numbers referenced in 'Supported Client-Side XFPs'		
Output power level	See XFP part numbers referenced in 'Supported Client-Side XFPs'		
Input fiber types	Single-mode fiber (SMF) or multi-mode fiber (MMF)		

1. All specifications are guaranteed over the life, operating temperatures, wavelength range, and input voltage specified
2. Receiver sensitivity without in-band management channel. 1 dB power penalty applies to link budget when in-band management channel activated

#### Electrical Specifications

Parameter	Minimum	Typical	Maximum
DC supply voltage	-	-48 V	-
Power dissipation	-	18.5 W	24 W
Loss of signal threshold activation	-	-	10 ms
Alarm relay signals	Dry contact major and minor alarms. Relay open under normal operation. Relay closed when power is off.		

## 4

### Physical Specifications

#### Parameter

#### Specification

Size (H x W x L)	6.8 x 1.0 x 8.8 inches (17.27 x 2.54 x 22.35 cm)
Weight (approximate)	1.4 lbs. (0.635 kg)

### Environmental Specifications

#### Parameter

#### Minimum

#### Typical

#### Maximum

Normal operating temperature	0 °C	-	40 °C
Extended operating temperature	-5 °C	-	55 °C
Storage temperature	-40 °C	-	85 °C
Relative humidity (non-condensing)	5%	-	90%

### Interface Specifications

#### Parameter

#### Specification

Optical	LC/PC XFP, SMF, or MMF on output port A and input port B (per XFP specification) LC/PC SMF on output port C and input port D
Craft	Requires WaveReady 3100 or 3500F series shelf and a WaveReady COM200 communications module. Craft access through RS-232/DB9 connector on front panel of COM200 module
TL1/SNMP	Requires WaveReady 3100 or 3500F series shelf and a WaveReady COM200 communications module. TL1/SNMP interfaces via 10Base-T Ethernet/RJ45 connector on front panel of COM200.
Front panel	Six LEDs: CARD (power), MAJ/CRIT (major/critical alarm), MIN (minor alarm), PORT A/B (port status at the client side), PORT C/D (port status at the network side), MGT (management channel)

### Supported Client-Side XFPs

#### Protocol

#### Bit-Rate

#### Wavelength

#### Launch Power

#### Reach

#### Receiver Sensitivity

#### Maximum Input Power

#### WRT-XFPsMR3 : 1310 nm Single-Mode Client XFP

OC-192/STM-64	9.953 Gb/s	1310 nm	-6 dBm	12 km	-11 dBm	0 dBm
10 Gb/s Ethernet LAN PHY	10.312 Gb/s	1310 nm	-6 dBm	12 km	-11 dBm	0 dBm
10 Gb/s Fibre Channel	10.52 Gb/s	1310 nm	-6 dBm	12 km	-11 dBm	0 dBm
OC-192 with G.709 FEC	10.709 Gb/s	1310 nm	-6 dBm	12 km	-11 dBm	0 dBm

#### WRT-XFPsMR8 : 850 nm Multi-Mode Client XFP

10 Gb/s Ethernet WAN PHY	9.953 Gb/s	850 nm	-1 to -7.3 dBm	0.5 to 300 m	-7.5 dBm	-
10 Gb/s Ethernet LAN PHY	10.312 Gb/s	850 nm	-1 to -7.3 dBm	0.5 to 300 m	-7.5 dBm	-
10 Gb/s Fibre Channel	10.52 Gb/s	850 nm	-1 to -7.3 dBm	0.5 to 300 m	-7.5 dBm	-

1. Values quoted are for worst-case extinction ratio and BER of  $1 \times 10^{-12}$  and PRBS pattern of  $2^{31} - 1$  unless otherwise noted

## 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: WRT-840DT100B-023

## Associated Parts

# WRT-840DT100B-0

Code	Wavelength/Frequency
60	1529.55 nm/196.0 THz
59	1530.33 nm/195.9 THz
58	1531.12 nm/195.8 THz
57	1531.90 nm/195.7 THz
55	1533.47 nm/195.5 THz
54	1534.25 nm/195.4 THz
53	1535.04 nm/195.3 THz
52	1535.82 nm/195.2 THz
50	1537.40 nm/195.0 THz
49	1538.19 nm/194.9 THz
48	1538.98 nm/194.8 THz
47	1539.77 nm/194.7 THz
45	1541.35 nm/194.5 THz
44	1542.14 nm/194.4 THz
43	1542.94 nm/194.3 THz
42	1543.73 nm/194.2 THz
38	1546.92 nm/193.8 THz
37	1547.72 nm/193.7 THz
36	1548.51 nm/193.6 THz
35	1549.32 nm/193.5 THz
33	1550.92 nm/193.3 THz
32	1551.72 nm/193.2 THz
31	1552.52 nm/193.1 THz
30	1553.33 nm/193.0 THz
28	1554.94 nm/192.8 THz
27	1555.75 nm/192.7 THz
26	1556.55 nm/192.6 THz
25	1557.36 nm/192.5 THz
23	1558.98 nm/192.3 THz
22	1559.79 nm/192.2 THz
21	1560.61 nm/192.1 THz
20	1561.42 nm/192.0 THz

Product Code	Description
DMS-3500FSE02	WR3500F shelf
COM-200ET002Y	COM200 communication module
WRT-XFP5MR3	Multi-rate XFP, 1310 nm SR
WRT-XFPMMR8	Multi-rate XFP, 850 nm VSR

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