



Features

- ☑ Eight wavelength option
- ☑ Designed for ATM/SONET/SDH OC-3 and OC-12 (156 Mb/s & 622 Mb/s)
- ☑ Eye Safe (Class I Laser Safety)
- ☑ Excellent EMI & ESD protection (optional extra EMI shield also available)
- ☑ Multi-sourced 1x9 package style
- ☑ Duplex SC or ST or FC connector
- ☑ Single +5 V supply & PECL interface
- ☑ Conductive Plastic or Metal packages
- ☑ Wave Solder Process Compatible

Description

The DTR-xxx-SM-CWDM fiber optic transceivers offer a simple and convenient way to interface PCBs to single mode fiber optic cables in Coarse Wavelength Division Multiplexing (CWDM) OC-3 and OC-12 applications. There are eight center wavelengths available 1470 nm, 1490nm, 1510 nm, 1530 nm, 1550 nm, 1570 nm, 1590 nm, and 1610 nm. For OC-3 application two performance options are offered, "LO" and "HP". In option "LO", a DFB laser and a high sensitivity receiver are used to increase the distance to 90 km (assuming worst case fiber loss of 0.3 dB/km), and in option "HP", a high power DFB laser and an ultra high sensitivity receiver are used to increase the distance to 100 km or better. For OC-12 application, the "HP" power level is standard using DFB laser to obtain the distance of at least 80 km.

All modules satisfy Class I Laser Safety requirements in accordance with the US FDA/CDRH and international

IEC-825 standards.

The transmit and receive functions are contained in a single one-row, 9-pin (1x9) package with a Duplex SC or ST or FC connector interface. The transmitter incorporates a highly reliable DFB InGaAsP Laser and a driver circuit which converts Positive Emitter Coupled Logic (PECL) data to light. The receiver incorporates an efficient InGaAs/InP PIN photodiode converting the light signal into an electrical current which is amplified and regenerated into PECL-compatible data. The transimpedance amplifier IC has internal AGC for wide dynamic range. A Signal Detect status output flag is also provided.

The transceiver operates from a single +5V power supply over an operating temperature range of 0°C to +70°C. The transceiver package is made of either *conductive* plastic (Duplex-SC version) with blue color or metal (FC and ST version) for excellent EMI shielding.

Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
Storage Temperature	T_{st}	- 40	+ 85	°C
Operating Case Temperature	T_{op}	0	+ 70	°C
Supply Voltage	V_{CC}	- 0.5	+ 6.0	V
Input Voltage	V_{in}	- 0.5	V_{CC}	V
Output Current	I_o	-	50	mA
Lead Soldering Temperature & Time	-	-	260°C, 10 sec	

OC-3/STM-1 Single Mode Transceiver: DTR-156-SM-CWDM

Transmitter Performance Characteristics (over Operating Case Temperature, $V_{CC} = 4.75$ to $5.25V$)

Parameter		Symbol	Minimum	Typical	Maximum	Units
Data Rate		B	50	156	300	Mb/s
Average Optical Output Power (coupled into single mode fiber), 50% duty cycle	HP	P_o	- 3.0	- 1.0	+2.0	dBm
	L0		- 5.0	- 3.0	0	
Extinction Ratio		P_{hi}/P_{lo}	10	-	-	dB
Center Wavelength	1470	λ_c	1464	1470	1477.5	nm
	1490		1484	1490	1497.5	
	1510		1504	1510	1517.5	
	1530		1524	1530	1537.5	
	1550		1544	1550	1557.5	
	1570		1564	1570	1577.5	
	1590		1584	1590	1597.5	
	1610		1604	1610	1617.5	
Spectral Width (-20 dB)		$\Delta\lambda_{20}$	-	-	1	nm
Side Mode Suppression Ratio		$SMSR$	30	-	-	dB
Optical Rise and Fall Time (10% to 90%)		t_r, t_f	-	1	2	ns
Optical Output Eye	compliant with Telcordia GR-253-CORE and ITU-T Recommendation G.957					

Receiver Performance Characteristics (over Operating Case Temperature, $V_{CC} = 4.75$ to $5.25V$)

Parameter		Symbol	Minimum	Typical	Maximum	Units
Data Rate		B	50	156	266	Mb/s
Receiver Sensitivity (10^{-10} BER) ¹		P_{min}	- 34.0	- 37.0	-	dBm
Maximum Input Optical Power (10^{-10} BER) ¹		P_{max}	- 7.0	0	-	dBm
Signal Detect Thresholds	Increasing Light Input	P_{sd+}	-	-	- 34.0	dBm
	Decreasing Light Input	P_{sd-}	- 45.0	-	-	
Signal Detect Hysteresis		-	1.0	-	-	dB
Signal Detect Timing Delay	Increasing Light Input	t_{sd+}	-	-	100	μs
	Decreasing Light Input	t_{sd-}	-	-	100	
Wavelength of Operation		λ	1100	-	1620	nm
¹ measured with $2^{23}-1$ PRBS. The Receiver Sensitivity is specified at 156 Mb/s with a minimum eye opening of 1.3 ns.						

Ordering Information

DTR - 156 - SM - XX - Ln - Czzz

Receptacle

Blank: SC Receptacle
ST : ST Receptacle
FC : FC Receptacle

Light Output Option

HP: -1 dBm (typ.)
L0: -3 dBm (typ.)

Center Wavelength Option

C470 = 1470 nm C550 = 1550 nm
C490 = 1490 nm C570 = 1570 nm
C510 = 1510 nm C590 = 1590 nm
C530 = 1530 nm C610 = 1610 nm

OC-12/STM-4 Single Mode Transceiver: DTR-622-SM-CWDM

Transmitter Performance Characteristics (over Operating Case Temperature, $V_{CC} = 4.75$ to $5.25V$)

Parameter		Symbol	Minimum	Typical	Maximum	Units
Data Rate		B	50	622	700	Mb/s
Average Optical Output Power (coupled into single mode fiber), 50% duty cycle	HP	P_o	- 3.0	- 1.0	+2.0	dBm
Extinction Ratio		P_{hi}/P_{lo}	10	-	-	dB
Center Wavelength ¹	1470	λ_c	1464	1470	1477.5	nm
	1490		1484	1490	1497.5	
	1510		1504	1510	1517.5	
	1530		1524	1530	1537.5	
	1550		1544	1550	1557.5	
	1570		1564	1570	1577.5	
	1590		1584	1590	1597.5	
	1610		1604	1610	1617.5	
Spectral Width (-20 dB)		$\Delta\lambda_{20}$	-	-	1.0	nm
Side Mode Suppression Ratio		$SMSR$	30	-	-	dB
Optical Rise and Fall Time (10% to 90%)		t_r, t_f	-	0.5	1.0	ns
Optical Output Eye		compliant with Telcordia GR-253-CORE and ITU-T Recommendation G.957				

Receiver Performance Characteristics (over Operating Case Temperature, $V_{CC} = 4.75$ to $5.25V$)

Parameter		Symbol	Minimum	Typical	Maximum	Units
Data Rate		B	50	622	700	Mb/s
Receiver Sensitivity (10^{-10} BER) ¹		P_{min}	- 29.0	- 31.0	-	dBm
Maximum Input Optical Power (10^{-10} BER) ¹		P_{max}	- 7.0	0	-	dBm
Signal Detect Thresholds	Increasing Light Input	P_{sd+}	-	-	- 29.0	dBm
	Decreasing Light Input	P_{sd-}	- 45.0	-	-	
Signal Detect Hysteresis		-	0.5	1.5	-	dB
Signal Detect Timing Delay	Increasing Light Input	t_{sd+}	-	-	100	μs
	Decreasing Light Input	t_{sd-}	-	-	100	
Wavelength of Operation		λ	1100	-	1620	nm

¹ Measured at 622 Mb/s with $2^{23}-1$ PRBS.

Ordering Information

DTR - 622 - SM - XX - HP - Czzz

Receptacle

Blank: SC Receptacle
ST : ST Receptacle
FC : FC Receptacle

Center Wavelength Option

C470 = 1470 nm C550 = 1550 nm
C490 = 1490 nm C570 = 1570 nm
C510 = 1510 nm C590 = 1590 nm
C530 = 1530 nm C610 = 1610 nm

DTR-xxx-SM-CWDM

Transmitter Electrical Interface (over Operating Case Temperature Range)

Parameter	Symbol	Minimum	Typical	Maximum	Units
Input HIGH Voltage	V_{IH}	$V_{CC} - 1.165$	-	$V_{CC} - 0.700$	V
Input LOW Voltage	V_{IL}	$V_{CC} - 1.890$	-	$V_{CC} - 1.475$	V
Data Input Current - HIGH	I_H	-	-	350	μA
Data Input Current - LOW	I_L	-	-	250	μA

Receiver Electrical Interface (over Operating Case Temperature Range)

Parameter	Symbol	Minimum	Typical	Maximum	Units
Output HIGH Voltage	V_{OH}	$V_{CC} - 1.080$	-	$V_{CC} - 0.700$	V
Output LOW Voltage	V_{OL}	$V_{CC} - 1.950$	-	$V_{CC} - 1.595$	V
Output Current	I_O	-	-	25	mA

Electrical Power Supply Characteristics (over Operating Case Temperature Range)

Parameter	Symbol	Minimum	Typical	Maximum	Units
Supply Voltage	V_{CC}	4.75	5.0	5.25	V
Supply Current	TX	-	90	120	mA
	RX	-	110	150	

Application Notes

Transmitter: When the DATA+ input is at logic HIGH and DATA- input is at logic LOW, the LD is ON; and vice versa. In single-ended applications, the unused input pin should be biased to $V_{CC} - 1.29$ V.

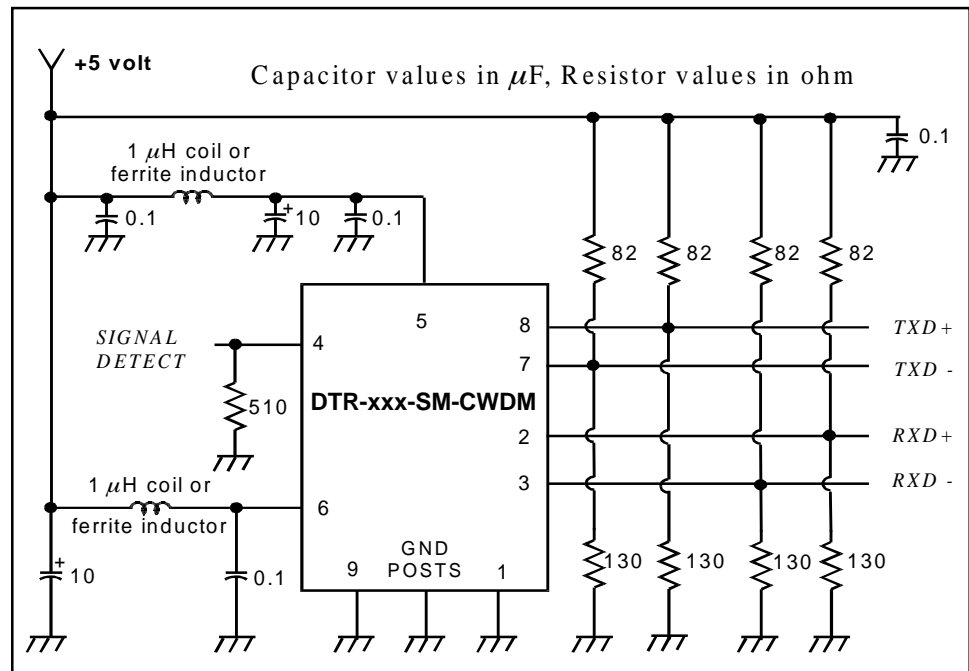
The transmitter incorporates an Average Power Control (APC) loop to stabilize the transmitter average optical output power against temperature variation. The APC loop always acts to keep the transmitter average optical output power at a constant value. Therefore, when the input data is all continuous “zeroes” or all continuous “ones”, the transmitter optical output power is a constant level equal to the nominal average optical output power (not at the “OFF” level or at the “ON” level).

Receiver: Both differential DATA+ and DATA- outputs are PECL levels requiring termination (50 ohms to $V_{CC} - 2$ volts or 510 ohms to GND is recommended). For optimum performance, both outputs should be terminated in the same manner, even if only one is used.

The Signal Detect circuit monitors the level of the incoming optical signal and generates a logic LOW signal when insufficient optical power is received. The SIGNAL

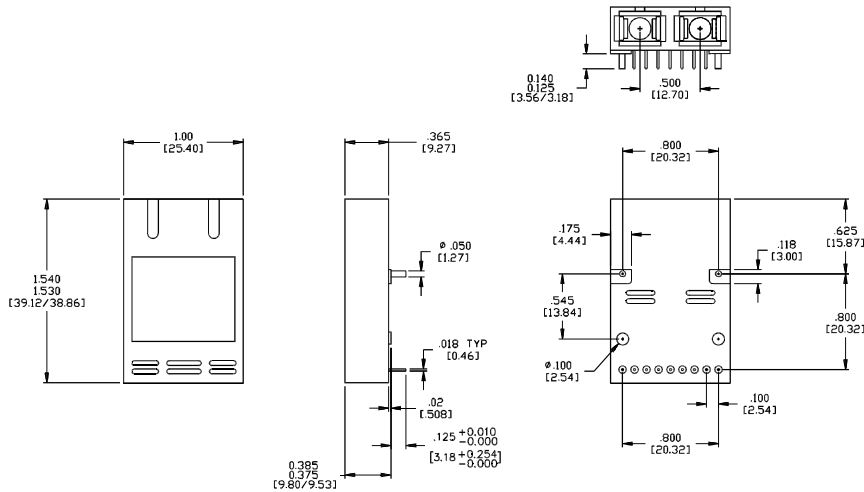
DETECT output is PECL level requiring termination (510 ohms to GND is recommended).

Interface circuit: The power supply line should be well-filtered. All 0.1 μF power supply bypass capacitors should be as close to the DTR transceiver module as possible. The two front GND posts should be connected to Circuit Ground or Chassis Ground. The termination resistors for the Transmitter should be close to the DTR transceiver module. The termination resistors for the Receiver should be close to the PHY or SERDES device (which receives the DATA outputs from the Receiver).



DTR-xxx-SM-CWDM

Duplex SC Receptacle Package



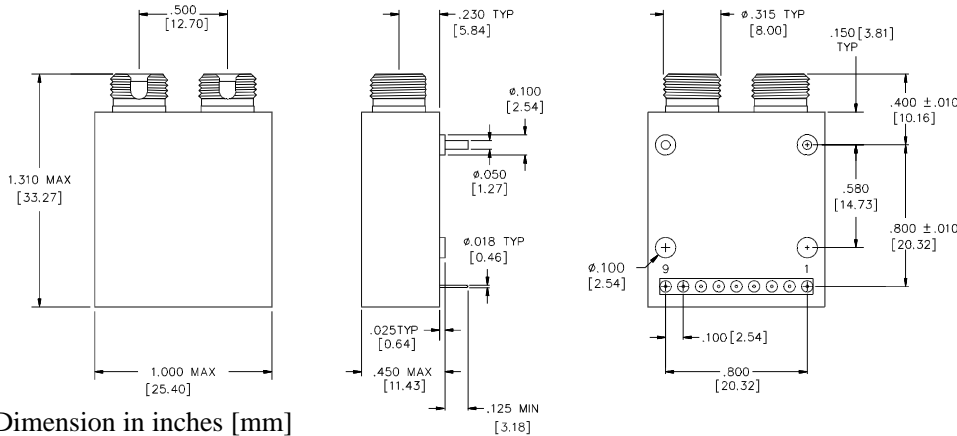
Note: For option on EMI shield, please refer to the datasheet for 1x9 package EMI shield.

Dimension in inches [mm]

Pin Assignments

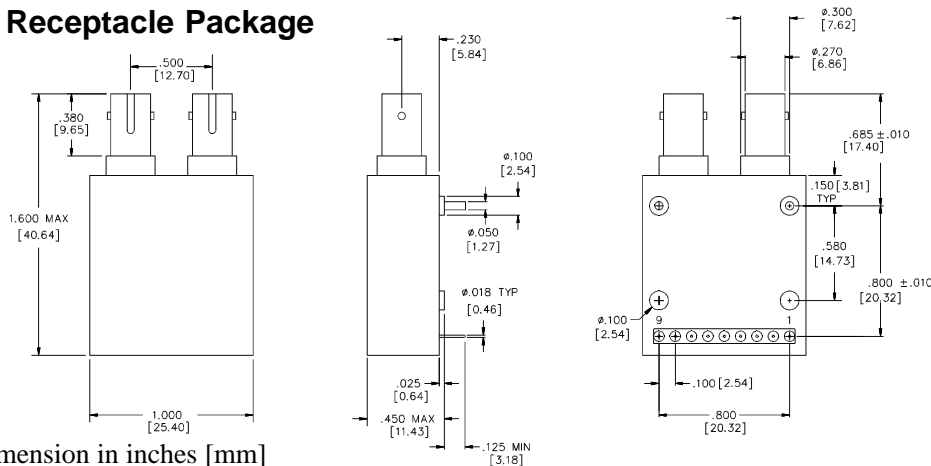
PIN	FUNCTION
1	RX GND
2	RD+ (RX DATA OUT +)
3	RD- (RX DATA OUT -)
4	SD (RX SIGNAL DETECT)
5	V _{CC} RX
6	V _{CC} TX
7	TD- (TX DATA IN -)
8	TD+ (TX DATA IN +)
9	TX GND

FC Receptacle Package



Dimension in inches [mm]

ST Receptacle Package



Dimension in inches [mm]

Laser Safety: All transmitters are Class I Laser products per FDA/CDRH and IEC-825 standards. They must be operated under specified operating conditions.

Optical Communication Products, Inc.
DATE OF MANUFACTURE:

MANUFACTURED IN THE USA
This product complies with
21 CFR 1040.10 and 1040.11
Meets Class I Laser Safety Requirements

Optical Communication Products, Inc.

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