OCP

DTR-xxx-SM2-LC/LS-CWDM

3.3 Volt 2x10 LC connector OC-3 & OC-12 Single Mode Transceivers

Features

☑ *Eight wavelengths (8) option*

☑ *Designed for ATM/SONET/SDH OC-3 (156 Mb/s) & OC-12 (622 Mb/s)*

☑ *Eye Safe (Class I Laser Safety)*

☑ *Multi-sourced 20-pin (2x10) SFF (Small Form Factor) package style*

☑ *Duplex LC optical connector interface*

☑ *Excellent EMI & ESD protection*

☑ *Single +3.3 V supply & LV-PECL DATA interface*

☑ *Option for LV-TTL or LV-PECL SIGNAL DETECT output*

Description

The DTR-xxx-SM2-LC/LS-CWDM fiber optic transceivers offer a simple, convenient way to interface PCBs to single mode fiber optic cables in Coarse Wavelength Division Multiplexing (CWDM) applications. There are eight center wavelengths available 1470 nm, 1490 nm, 1510 nm, 1530 nm, 1550 nm, 1570 nm, 1590 nm, 1610 nm. For OC-3 applications two performance options are available, "L0" and "HP". In option "L0", 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 lase is used to improve link budget and increase the distance to 100 km or better. For OC-12 applications, the "HP" power level is used with the DFB laser to obtain 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 narrow width two-row, 20-pin (2x10) package with a Duplex LC connector interface. The receptacle fits into an RJ-45 form factor outline. The 20-pin configuration is in conformance to a Small Form Factor (SFF) multisource transceiver agreement.

The transmitter incorporates a highly reliable InGaAsP Laser and a driver circuit which converts LV-PECL data to light. A LV-TTL Transmitter Disable control input is also provided. The receiver features a transimpedance amplifier IC with internal AGC for high sensitivity and wide dynamic range. The Signal Detect status output can be either LV-TTL or LV-PECL.

The transceiver operates from a single +3.3V power supply over an operating temperature range of 0°C to +70°C. The package is made of metal for excellent EMI shielding

Absolute Maximum Ratings

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

Optical Communication Products, Inc.

OC-3/STM-1 LC Single Mode CWDM Transceiver

Transmitter Performance Characteristics (over Operating Case Temperature, V_{CC} = 3.13 to 3.47V)
All parameters guaranteed only at typical data rate

Parameter		Symbol	Minimum	Typical	Maximum	Units
Operating Data Rate[1]		B	-	156	-	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 (-20dB)		$\Delta\lambda_{20}$	-	-	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					

[1]Data rate ranges from 50Mb/s to 300Mb/s. However, some degradation may be incurred in overall performace.

Receiver Performance Characteristics (over Operating Case Temperature, V_{CC} = 3.13 to 3.47V)
All parameters guaranteed only at typical data rate

Parameter		Symbol	Minimum	Typical	Maximum	Units
Operating Data Rate[1]		B	-	156	-	Mb/s
Receiver Sensitivity (10^{-10} BER)[2]		P_{min}	- 34.0	- 36.0	-	dBm
Maximum Input Optical Power (10^{-10} BER)[2]		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		-	0.5	-	-	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]Data rate ranges from 50Mb/s to 266Mb/s. However, some degradation may be incurred in overall performance.
[2]Measured at 156Mb/s with 2^{23}-1 PRBS.

Laser Safety: All transceivers 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

OC-12/STM-4 LC Single Mode CWDM Transceiver

Transmitter Performance Characteristics (over Operating Case Temperature, V_{CC} = 3.13 to 3.47V)
All parameters guaranteed only at typical data rate

Parameter		Symbol	Minimum	Typical	Maximum	Units
Operating Data Rate[1]		B	-	622	-	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 [2]	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 (-20dB)		$\Delta\lambda_{20}$	-	-	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					

[1]Data rate ranges from 50Mb/s to 700Mb/s. However, some degradation may be incurred in overall performance.

Receiver Performance Characteristics (over Operating Case Temperature, V_{CC} = 3.13 to 3.47V)
All parameters guaranteed only at typical data rate

Parameter		Symbol	Minimum	Typical	Maximum	Units
Operating Data Rate[1]		B	-	622	-	Mb/s
Receiver Sensitivity (10^{-10} BER)[2]		P_{min}	- 29.0	- 31.0	-	dBm
Maximum Input Optical Power (10^{-10} BER)[2]		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 622Mb/s with 2^{23}-1 PRBS.
[2]Data rate ranges from 50Mb/s to 700Mb/s. However, some degradation may be incurred in overall performance.

DTR-*xxx*-SM2-LC-CWDM & DTR-*xxx*-SM2-LS-CWDM

Transmitter Electrical Interface (over Operating Case Temperature, V_{CC} = 3.13 to 3.47V)

Parameter	Symbol	Minimum	Typical	Maximum	Units
Input HIGH Voltage	V_{IH}	V_{CC} - 1.165	-	V_{CC} - 0.880	V
Input LOW Voltage	V_{IL}	V_{CC} - 1.810	-	V_{CC} - 1.475	V
Data Input Current - HIGH	I_H	-	-	150	μA
Data Input Current - LOW	I_L	0.5	-	-	μA
Transmitter Disable Voltage	V_{DIS}	2.0	-	V_{CC}	V
Transmitter Enable Voltage	V_{EN}	0	-	0.8	V
Differential Bias Monitor Voltage (T_a = 25°C)	V_{BM+} - V_{BM-}	0.02	-	0.12	V
Differential Back Facet Monitor Voltage	V_{FM+} - V_{FM-}	-	100	-	mV

Receiver Electrical Interface (over Operating Case Temperature, V_{CC} = 3.13 to 3.47V)

Parameter	Symbol	Minimum	Typical	Maximum	Units
Output HIGH Voltage (LV-PECL) [1]	V_{OH}	V_{CC} - 1.10	-	V_{CC} - 0.70	V
Output LOW Voltage (LV-PECL) [1]	V_{OL}	V_{CC} - 1.95	-	V_{CC} - 1.50	V
Output HIGH Voltage (LV-TTL)	V_{OH}	2.4	-	V_{CC}	
Output LOW Voltage (LV-TTL)	V_{OL}	0	-	0.8	
Output Current	I_O	-	-	25	mA

[1] With 50 ohm terminated to V_{CC} - 2 volts.

Electrical Power Supply Characteristics (over Operating Case Temperature, V_{CC} = 3.13 to 3.47V)

Parameter		Symbol	Minimum	Typical	Maximum	Units
Supply Voltage		V_{CC}	3.13	3.3	3.47	V
Supply Current [1]	TX	$I_{CC,TX}$	-	80	120	mA
	RX	$I_{CC,RX}$	-	75	100	mA

[1] Supply current does not include termination resistor current.

Application Notes

Transmitter: When the DATA+ input is at logic HIGH and DATA- input is at logic LOW, the Laser Diode is ON; and vice versa. The transmitter is normally enabled (i.e. when the TX DISABLE control input is not connected). When the TX DISABLE control input voltage is higher than V_{CC} - 1.3 V, the laser is turned off independent of the input data.

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 LV-PECL levels requiring proper termination (see recommended interface circuit). 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 photocurrent is produced. If the SIGNAL DETECT output is LV-TTL level, no termination is required.

If the SIGNAL DETECT output is LV-PECL level, a termination resistor of 160 ohms to *GND* is required.

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 (mounting studs) should be grounded to Circuit Ground or Chassis Ground. The Transmitter has internal 50 ohm termination (see interface circuit below).

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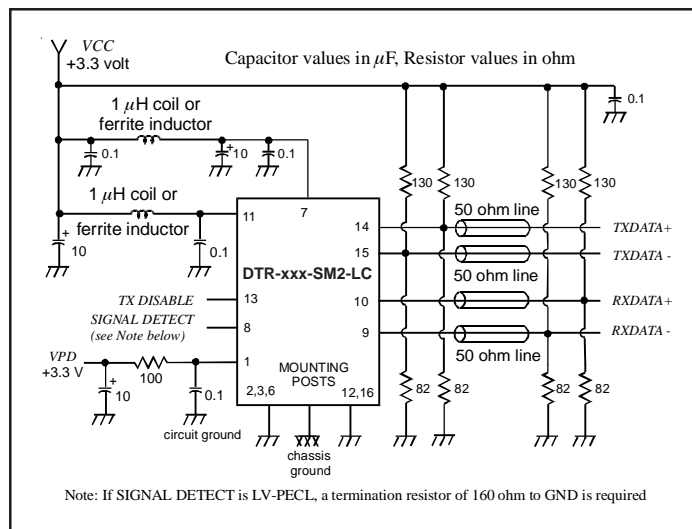
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Pin Assignments

PIN	FUNCTION	PIN	FUNCTION
1	VPD	11	V_{CC}TX
2	RX GND	12	TX GND
3	RX GND	13	TX DISABLE
4	N/C	14	TD+ (TX DATA IN +)
5	N/C	15	TD- (TX DATA IN -)
6	RX GND	16	TX GND
7	V_{CC}RX	17	BM - (BIAS MONITOR -)
8	SD (RX SIGNAL DETECT)	18	BM + (BIAS MONITOR +)
9	RD- (RX DATA OUT-)	19	FM - (FACET MONITOR -)
10	RD+ (RX DATA OUT+)	20	FM + (FACET MONITOR +)

Package without EMI shield (LC)
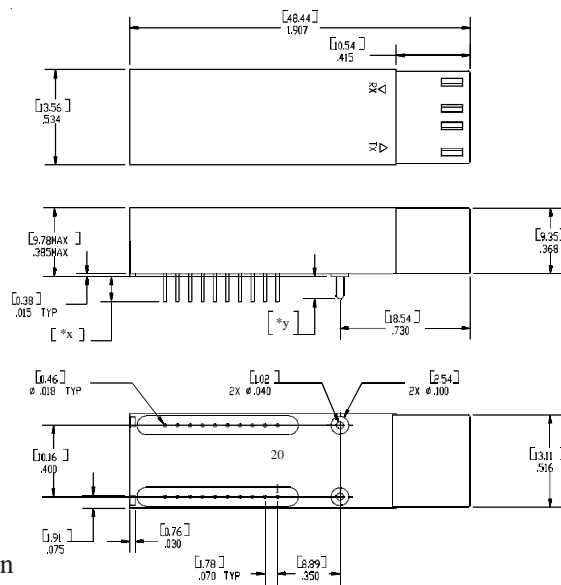
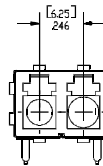*x, *y: see Pin length option table in ordering information
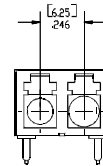
Dimension in inches [mm]

Package with EMI Shield (LS)
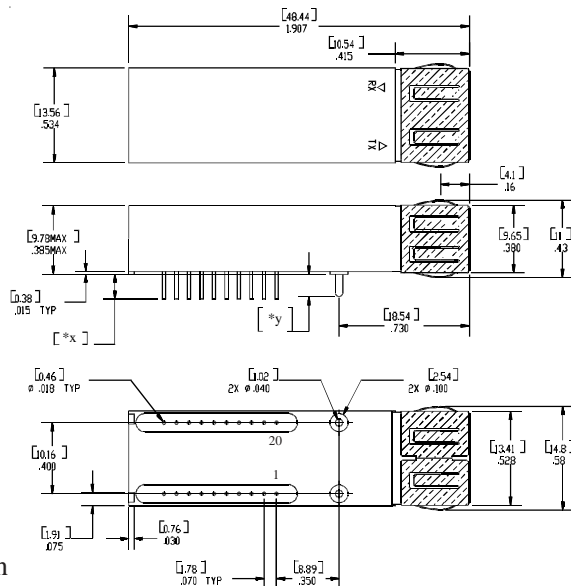
*x, *y: see Pin length option table in ordering information

Dimension in inches [mm]

DTR-*xxx*-SM2-LC-CWDM & DTR-*xxx*-SM2-LS-CWDM

Ordering Information

DTR - 156 - SM2 - *WW* - Xn - *Czzz* - M*p*E

Package Option
LC: no EMI shield
LS: with EMI shield

Light Output Power
HP: -1 dBm typical
L0 : -3 dBm typical

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

see Pin Length option table

Signal Detect Option
"Blank": LVTTL
E : LVPECL

Pin Length option table

Options (P)	Pin Length (x)		Post Length (y)	
	Inches	Millimeters	Inches	Millimeters
M	0.140 ± 0.010	3.56 ± 0.250	0.125 + 0.010 - 0.005	3.17 + 0.250 - 0.125
M5	0.155 ± 0.010	3.94 ± 0.250	0.155 + 0.010 - 0.005	3.94 + 0.250 - 0.125
M8	0.180 ± 0.010	4.57 ± 0.250	0.180 ± 0.010	4.57 ± 0.250

Ordering Information

DTR - 622 - SM2 - *WW* - HP - *Czzz* - M*p*E

Package Option
LC: no EMI shield
LS: with EMI shield

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

see Pin Length option table

Signal Detect Option
"Blank": LVTTL
E : LVPECL

Pin Length option table

Options (P)	Pin Length (x)		Post Length (y)	
	Inches	Millimeters	Inches	Millimeters
M	0.140 ± 0.010	3.56 ± 0.250	0.125 + 0.010 - 0.005	3.17 + 0.250 - 0.125
M5	0.155 ± 0.010	3.94 ± 0.250	0.155 + 0.010 - 0.005	3.94 + 0.250 - 0.125
M8	0.180 ± 0.010	4.57 ± 0.250	0.180 ± 0.010	4.57 ± 0.250

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