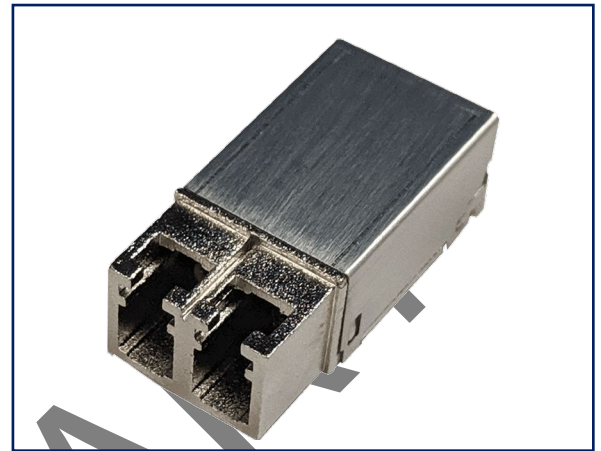


Features:

- Duplex transceiver module.
- Compliant operation at 10.3125Gbps.
- DWDM EML transmitter and wideband PIN receiver.
- Compliant to IEC-60825-1, Class 1 laser eye safe.
- Solder-down 1x12 electrical interface.
- +3.3V and +2.5V power supply.
- SFF-8472 compliant control and diagnostics monitor interface.
- -40°C to +85°C operating temperature range.
- -55°C to +105°C storage temperature range.
- Conformal coating options for harsh environment use.
- Option for RoHS 6(6) compliant and lead free per Directive 2002/95/EC.



The RJ-10G-DWDM is ideal for harsh environment connectivity because of its low cost, availability, and wide operating parameters.



COMMERCIAL AEROSPACE



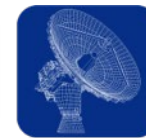
MILITARY AEROSPACE



MILITARY TACTICAL



SUBSEA NETWORKING



RADAR & SENSING



OIL & EXPLORATION

General Specifications

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Data Rate	DR	6.0	-	10.3125	Gbps	64b66 Encoding, Balanced NRZ data protocols
3.3V Supply Voltage	V _{CC3V3}	3.14	3.3	3.47	V	
2.5V Supply Voltage	V _{CC2V5}	2.375	2.5	2.625	V	
Output Power	P _{OUT}	-2	-	2	dBm	
RX Sensitivity	RX _{SENS}	-	-	-15	dBm	

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit	Notes
Maximum 3.3V Supply Voltage	V _{CC3V3}	-0.3	4	V	
Maximum 2.5V Supply Voltage	V _{CC2V5}	-0.5	3	V	
Storage Temperature	T _{sto}	-55	100	°C	
Case Operating Temperature	T _{OP}	-40	85	°C	
Relative Humidity	RH	0	95	%	Based on conformal coating, (1)
Hot Bar Soldering Temperature	-	-	260	°C	10 seconds, leads only, (2)
Hand Lead Soldering Temperature	-	-	260	°C	10 seconds, leads only, (2)
Conformal Coating	-	0.8	1.2	mil	(3)

Notes:

- 1) RJ transceivers may be water washed. The process must be followed by an 80°C bake for one hour to ensure the drying of any water inside the shell.
- 2) The components should not undergo reflow soldering under any circumstances.
- 3) See ruggedization notes on page 9.

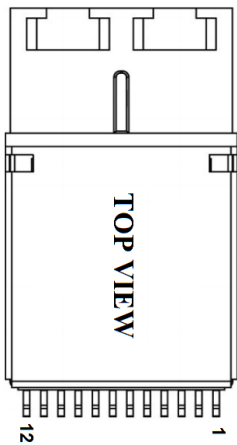


Electrical Specifications ($T_{OP} = -40$ to $85^{\circ}C$, $V_{CC3V3} = 3.14$ to 3.47 Volts, $V_{CC2V5} = 2.375$ to 2.625 Volts)

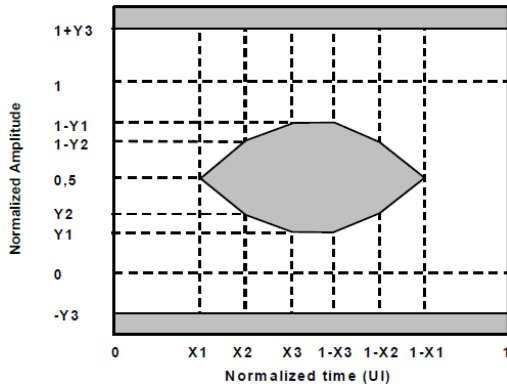
Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Total Module Power Dissipation	P_{DISS}	-	-	2	W	
3.3V Supply Current	I_{CC3V3}	-	-	500	mA	
2.5V Supply Current	I_{CC2V5}	-	-	350	mA	
Transmitter						
Input Differential Impedance	R_{in}	80	-	120	Ω	
TX Single-Ended Input Voltage Swing	$V_{D_{TX}}$	100	-	625	mV	
TX Disable Input Voltage	V_D	2	-	$V_{CC}+0.3$	V	
TX Enable Input Voltage	V_{EN}	-0.3	-	0.8	V	
Receiver						
Rx Single-Ended Output Voltage Swing	$V_{D_{RX}}$	150	-	500	mV	
Data Output Rise Time	t_r	-	-	45	ps	(1)
Data Output Fall Time	t_f	-	-	45	ps	(1)
Total Contributed Jitter	$RX_{\Delta TJ}$	-	-	0.42	UI	
Signal Detect Assert	SD_{NORM}	2.64	-	3.77	V	(2)
Signal Detect De-Assert	SD_{FAULT}	0.4	-	-	V	(2)
Signal Detect Assert Time	t_d	-	-	100	μs	
Signal Detect De-Assert Time	t_a	-	-	100	μs	
Serial Bus						
Data, Clock Input Low Voltage	V_{IL}	-0.3	-	$0.3 \cdot V_{CC}$	V	
Data, Clock Input High Voltage	V_{IH}	$0.7 \cdot V_{CC}$	-	$V_{CC}+0.3$	V	
Data, Clock Output Low Voltage	V_{OL}	-	-	0.4	V	
Data, Clock Output High Voltage	V_{OH}	$V_{CC}-0.4$	-	-	V	
Notes:						
1) 20% to 80%.						
2) SD is LVTTTL. Logic 1 indicates normal operation; logic 0 indicates no signal is detected.						

Pin Configuration

PIN #	Symbol	Description	Notes
1	TX-	Transmitter Data Input, Negative	CML
2	TX+	Transmitter Data Input, Positive	CML
3	GND	Ground	0V
4	VCC_2V5	2.5V Supply	2.5V
5	TX_DIS	Transmitter Disable	LVTTTL
6	SCL	I2C Clock	I2C
7	SDA	I2C Data	I2C
8	SD	Receiver Signal Detect	LVTTTL
9	VCC_3V3	3.3V Supply	3.3V
10	GND	Ground	0V
11	RX+	Receiver Data Output, Positive	CML
12	RX-	Receiver Data Output, Negative	CML
Notes:			
1) N/A.			

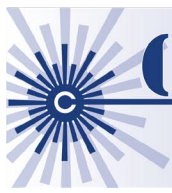


Optical Characteristics ($T_{OP} = -40$ to 85°C , $V_{CC3V3} = 3.14$ to 3.47 Volts, $V_{CC2V5} = 2.375$ to 2.625 Volts)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Transmitter						
Average Output Optical Power	P_{OUT}	-2	-	2	dBm	(1)(2)(3)
Optical Wavelength	λ	$\lambda-0.35$	λ	$\lambda+0.35$	nm	(4)
Spectral Width (RMS)	σ	-	-	0.2	nm	(1)(2)
Extinction ratio	ER	8.2	-	-	dB	(1)(2)
Transmitter and Dispersion Eye Closure	TDEC	-	-	2	dB	
TX Mask Compliance	-	$\{X1, X2, X3, Y1, Y2, Y3\} = \{0.25, 0.40, 0.45, 0.25, 0.28, 0.75\}$				
						
Receiver						
Receiver Sensitivity	$RX_{SENS10G}$	-	-	-15	dBm	(1)(2)
Receiver Saturation	RX_{SAT}	-1	-	-	dBm	
Return Loss	RL	12	-	-	dB	
Signal Detect Assert	SD_A	-	-	-16	dBm	
Signal Detect De-Assert	SD_D	-35	-	-	dBm	
Signal Detect Hysteresis	SD_H	0.5	-	5	dB	
Notes:						
1) Measured at the end of a 2–5m patch cord consisting of laser optimized 9/125 μm SM fiber. 2) Measured running 10.3125Gbps, PRBS $2^{31}-1$, BER $1\text{E}-12$. 3) Class 1 Laser Safety per FDA/CDRH and IEC-60825-1 regulations. 4) See wavelength ordering options on page 10.						

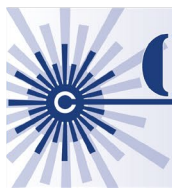
Address A0h Data Fields

A0h Address (dec)	# Bytes	Name	Description	Value (hex)
Base ID Fields				
00	1	Identifier	Type of transceiver	02
01	1	Ext. Identifier	Extended identifier of type of transceiver	04
02	1	Connector	Code for connector type	07
03	8	Transceiver	Code for electronic or optical compatibility	00
04				00
05				00
06				00
07				90
08				10
09				01
10				40
11	1	Encoding	Code for high speed serial encoding algorithm	06



12	1	BR, Nominal	Nominal signaling rate, units of 100 MBd	67
13	1	Rate Identifier	Type of rate select functionality	00
14	1	Length (SMF, km)	Link length supported for single mode fiber, units of km	50
15	1	Length (SMF)	Link length supported for single mode fiber, units of 100 m	FF
16	1	Length (50um)	Link length supported for 50 um OM2 fiber, units of 10 m	00
17	1	Length (62.5um)	Link length supported for 62.5 um OM1 fiber, units of 10 m	00
18	1	Length (OM4 or copper cable)	Link length supported for 50um OM4 fiber, units of 10m. Alternatively copper or direct attach cable, units of m	00
19	1	Length (OM3)	Link length supported for 50 um OM3 fiber, units of 10 m	00
20	16	Vendor Name	SFP vendor name (ASCII)	43
21				4F
22				54
23				53
24				57
25				4F
26				52
27				4B
28				53
29				20
30				20
31				20
32				20
33				20
34				20
35				20
36	1	Transceiver	Code for electronic or optical compatibility	00
37	3	Vendor OUI	SFP vendor IEEE company ID	00
38				00
39				00
40	16	Vendor PN	Part number provided by SFP vendor (ASCII)	52
41				4A
42				31
43				30
44				47
45				44
46				57
47				XX
48				XX
49				XX
50				XX
51				XX
52				XX
53				XX
54				XX
55				XX
56	4	Vendor rev	Revision level for part number provided by vendor (ASCII)	30
57				30
58				30
59				30





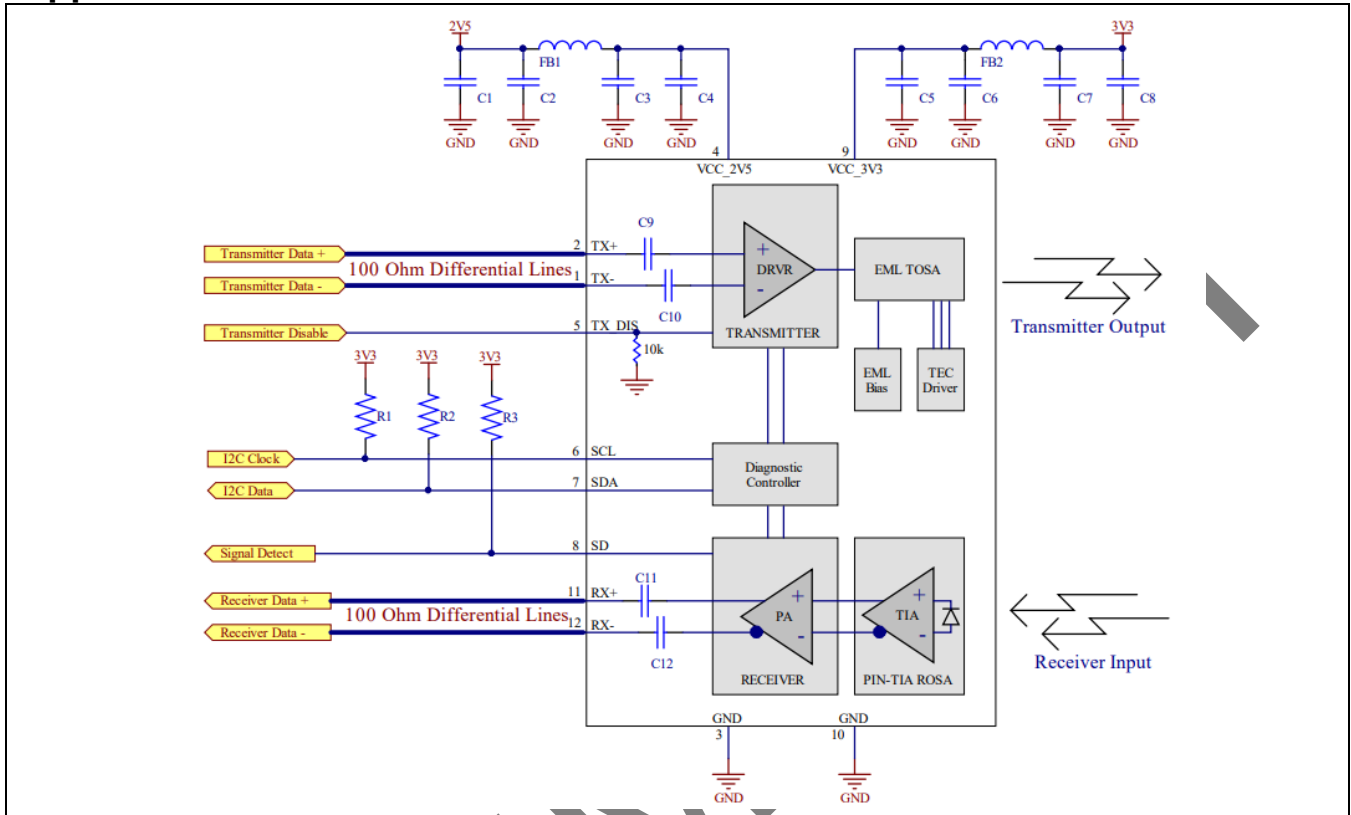
60	2	Wavelength	Laser wavelength	XX
61				XX
62	1	Unallocated		00
63	1	CC_BASE	Check code for Base ID Fields (addresses 0 to 62)	XX
Extended ID Fields				
64	2	Options	Indicates which optional transceiver signals are implemented	14
65				14
66	1	BR, max	Upper bit rate margin, units of %	00
67	1	BR, min	Lower bit rate margin, units of %	28
68	16	Vendor SN	Serial number provided by vendor (ASCII)	XX
69				XX
70				XX
71				XX
72				XX
73				XX
74				XX
75				XX
76				XX
77				XX
78				XX
79				XX
80				XX
81				XX
82				XX
83				XX
84	8	Date code	Vendor's manufacturing date code	XX
85				XX
86				XX
87				XX
88				XX
89				XX
90				20
91				20
92	1	Diagnostic Monitoring Type	Indicates which type of diagnostic monitoring is implemented (if any) in the transceiver	68
93	1	Enhanced Options	Indicates which optional enhanced features are implemented (if any) in the transceiver	F0
94	1	SFF-8472 Compliance	Indicates which revision of SFF-8472 the transceiver complies with	08
95	1	CC_EXT	Check code for the Extended ID Fields (addresses 64 to 94)	XX

PRELIMINARY





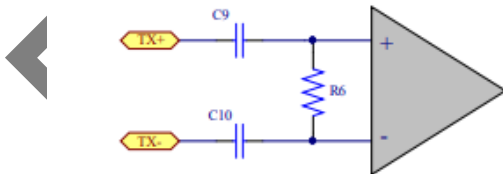
Application Schematics



Notes:

- 1) Recommend host routes separate filtering for RJ-module power planes as shown in the schematic above:
 - a. FB1/FB2 ferrite bead for power supply noise suppression; Murata BLM18KG601SN1, 0603, 600Ω @ 100MHz, 1300mA.
 - b. C1/C4/C5/C8 bulk capacitance; Murata GRM21BR61C106KE15L, 0805, 10μF, 16V.
- 2) R1/R2/R3 2-wire bus and SD pull-up resistors required on host for implementing digital diagnostics and SD; 4.7kΩ to 10kΩ.
- 3) Screw posts are not internally connected to signal ground. Recommend screw posts be connected to chassis ground if available, otherwise they should be tied to local signal ground.
- 4) For host with LVPECL electrical interface contact COTSWORKS' applications engineering.
- 5) 2V5 power plane powers data transmission transceiver IC.
- 6) 3V3 power plane powers digital diagnostics, digital controls, and analog performance functions.

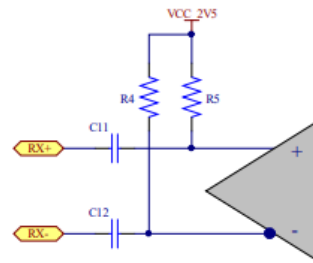
TRANSMITTER EQUIVALENT INPUT CIRCUIT



Notes:

- 1) C9/C10 0.1μF internal input data coupling capacitors.
- 2) R6 is an internal 100Ω input differential termination.
- 3) Transmitter electrical input is CML compatible.

RECEIVER EQUIVALENT OUTPUT CIRCUIT



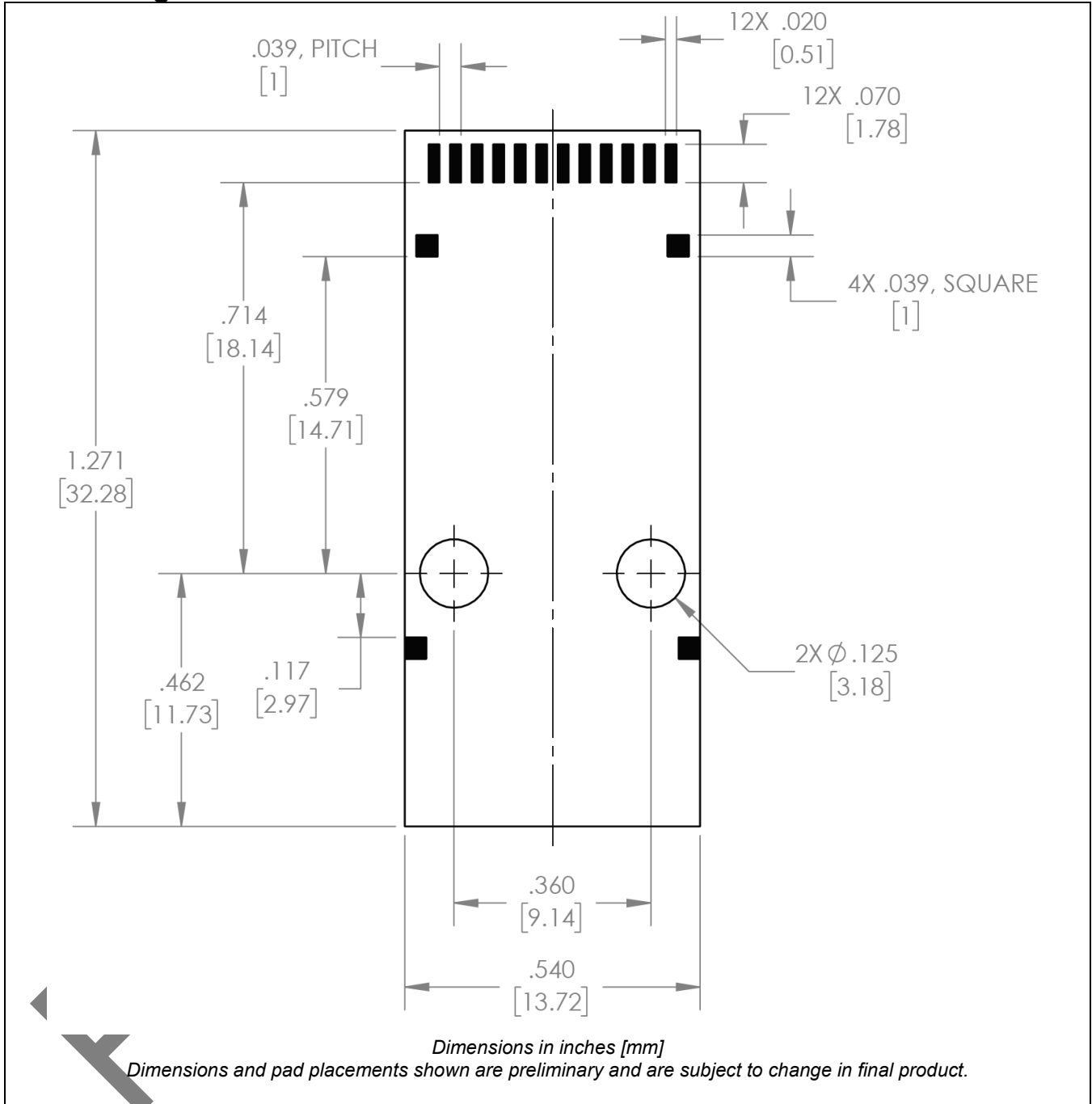
Notes:

- 1) C11/C12 are 0.1μF output data coupling capacitors.
- 2) R4/R5 are 45Ω pull-up resistors to V_{CC2V5}.
- 3) Receiver electrical output is CML compatible.



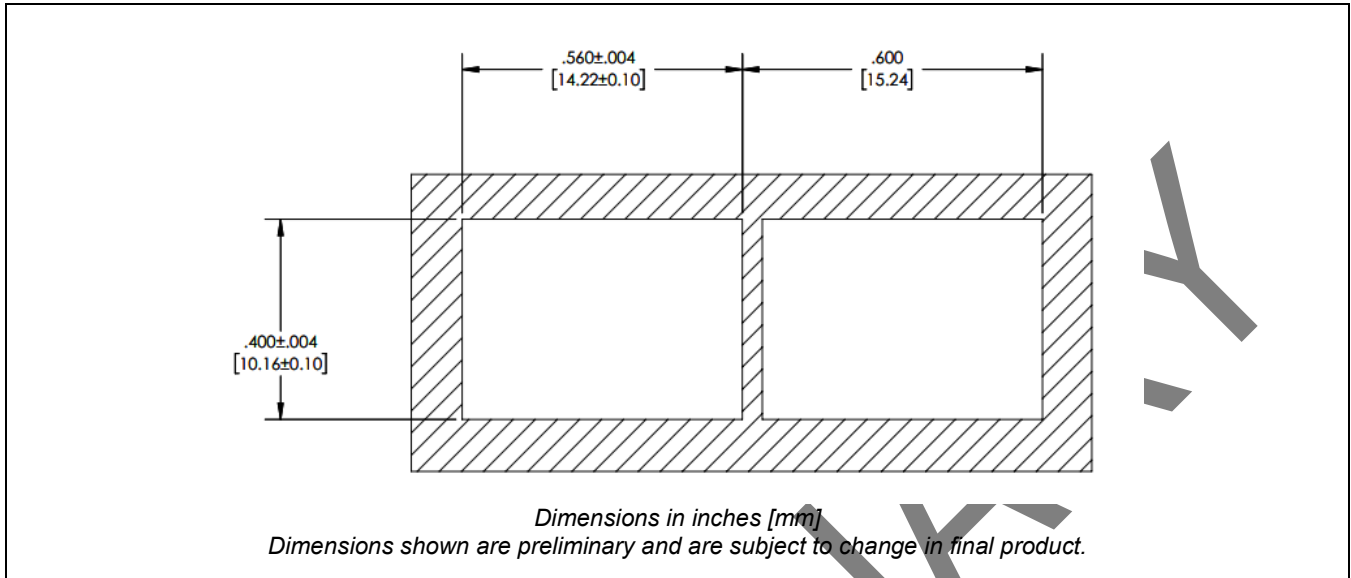


PCB Design Guidelines

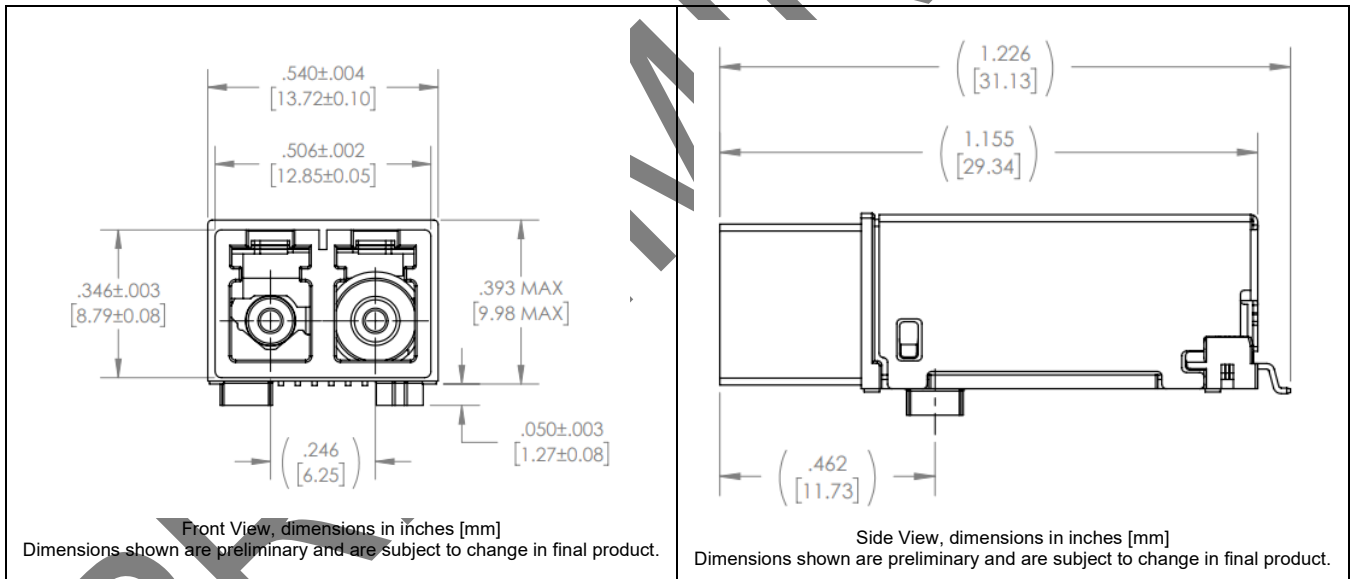




Panel Cutout

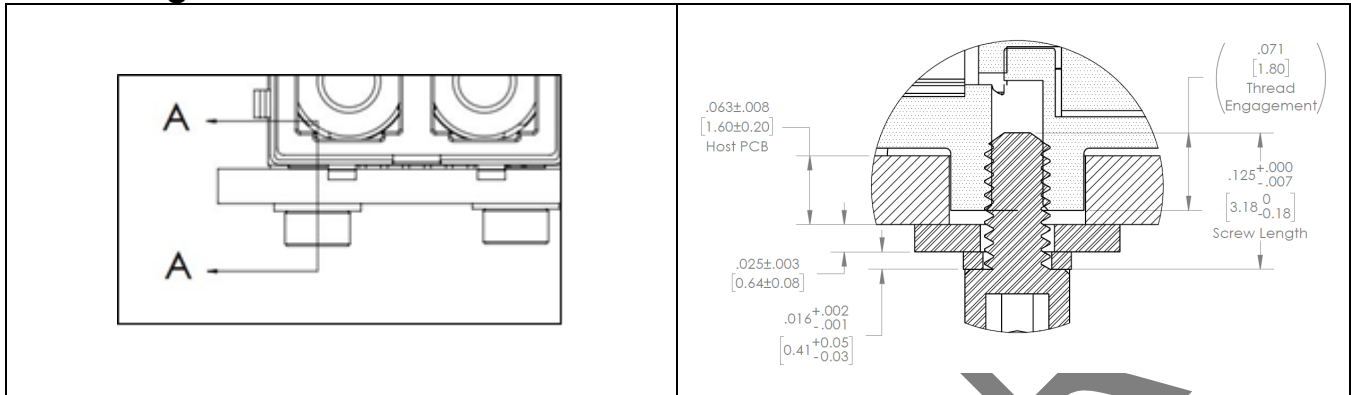


Standard Mechanical Dimensions





Mounting Hardware Guidelines



Notes:

- 1) An example illustrating a possible hardware combination to secure RJ-10G-DWDM to host PCB.
- 2) For further mounting hardware options and support contact COTSWORKS Application Engineering
- 3) When installing the RJ module
 - a. Install the washers and partially tighten the screws
 - b. Solder the leads
 - c. Tighten the screws to 12 in-oz

Ruggedization Notes

- Parylene Type C coating can be used for conformal coating with a 1.0 mil ± 0.2 mil thickness through a deposition process.
- Parylene Type C has a 5600 VPM rating, withstands high temperatures, and is extremely resistant to oil, dirt, and object impact.
- Contact COTSWORKS for all SDS and case composition information.

Reference Information

- 1) IEEE Standard 802.3-2018.
- 2) IEC Standard 60825-1:2014.
- 3) SFF-8472 r12.3.
- 4) ITU-T G.694.1.

Regulatory Compliance

- COTSWORKS transceivers are Class 1 Laser Products and comply with US FDA regulations.
- These products are designed to comply with the Class 1 Eye Safety requirements of EN (IEC) 60825 and the electrical safety requirements of EN (IEC) 60950.
- This part has an option for compliance with Directive 2011/65/EU covering restriction on certain hazardous substances (RoHS).
 - Contact COTSWORKS for a product compliance matrix.

Warnings:

Handling Precautions: This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended.

Laser Safety: Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation





Ordering Information

RJ-10G-DW	-XX	-XX	-X	-X	-X	-X	-X
	ITU Channel Wavelength	Connector Type	Ruggedized Coating	Operating Temp Range	EMI Shield	RoHS Level	Mounting
RJ Form Factor	39: 1546.12nm						
10Gbps MAX Data Rate	41: 1544.53nm						
Long Reach (SMF)	43: 1542.94nm	LC: Standard LC	N: Non-coated	A: -40° to 85°C	N: No Shield	5: Level 5	I: Imperial Screw
DWDM 100Ghz Spacing	45: 1541.35nm	LX: ARINC 801	R: Parylene		E: Shield	6: Level 6	U: Metric Screw
	47: 1539.77nm						
	49: 1538.19nm						

Example part number: RJ-10G-DW-45-LC-R-A-N-5-I

[Rugged Jack Surface Mount, 10.3125Gbps DWDM Long Reach Transceiver, Digital Diagnostics, ITU Channel 45 Transmitting Wavelength, Standard LC Receptacle, Parylene Conformal Coated, -40° to 85°C Operating Temperature Range, No EMI Shield, RoHS Level 5(6), Imperial Screw Thread]

Contact COTSWORKS for mechanical dimensional information, lead times, additional wavelengths, extended link budget requirements, and other configuration options.

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