050-376

PRODUCT BRIEF

PRINTED CIRCUIT BOARD (PCB) MOUNT
10GBPS CWDM DUAL-TRANSMITTER
SMALL & COMPACT WITH RUGGED CONSTRUCTION FOR HARSH ENVIRONMENTS

REV	DESCRIPTION	DATE	APPROVED
1	Preliminary	02/12/2016	SZ
2	Edit Bag and Tag Labeling. Remove reference to EEPROM protocol of the ATMEL AT240C01A	02/09/2017	RAS/GC
3	Add optional I2C addressing	03/01/2017	RAS/GC
4	Update 2D Outline Drawing (still waiting to updated); Update operating case temperatures for 1470 to 1610 wavelengths, Updated Transmitter output power	09/21/2018	SZ/GC

16U2-4803

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050-376 PRODUCT BRIEF
PCB Mount 10 Gbps CWDM Dual-Transmitter
SMF, 3.3V

PCB Mount Fiber Optic 10Gbps CWDM Dual-Transmitter, SMF, 3.3V

Glenair 050-376, is a ruggedized harsh environment PCB mount 10Gbps Dual-Transmitter with electrical and optical functionality equivalent to SFP devices but with mechanical design that is suited to the harsh temperature and vibration environments found in the Military, Aerospace, Railway, Oil and Gas, and Industrial applications. The PCB mount optical transceivers also support Digital Monitoring Interface (DMI) features in accordance with SFF 8472. The Dual-Transmitter interfaces with a host board through a high speed electrical connector.

The transmitters consists of a CWDM DFB Transmitter Optical Subassembly (TOSA) and laser driver. The TOSA is driven by a laser driver, which converts differential CML logic signals into an analog laser diode drive current. This laser driver circuit requires DC balanced input signals to operate properly (examples of balanced signals would include 4B/5B or 8B10B encoding)

KEY FEATURES/BENEFITS

- SFP Compatible Electrical I/O signal levels
- CWDM DFB lasers to support up to 10 Gbps
- Industry standard CML input and outputs that make for simple integration on customer host PCB
- Glenair Rugged GC Optical connector
- Transceiver is securely mounted with screws to PCB to ensure excellent shock and vibration performance
- High-Speed Electrical plug-in connector eliminates the need for soldering & enables ease of servicing
- Compact Size: Approx. 0.8” x 0.9” x 0.5”
- Glenair fiber jumpers connect from transceiver to any Glenair Mil/Aero Fiber Optic Connector Style
- Evaluation fixtures available
- Digital Diagnostic and Monitoring (DMI) based on SFF-8472

APPLICATIONS

- Harsh Environment such as: Airborne, Tactical, Railway, Industrial, Oil and Gas and Shipboard applications
  - Ethernet, Fibrechannel, 1x, 2x, 4x, 8x SFPDP

How To Order

Basic PN

050-376 **C2** - **27** **29** - **954A-200**

Blank = A2h, A4h

Other Options:
See Table 1A

Transmitter #2 Wavelength
See Central Wavelength Table

Transmitter #1 Wavelength
See Central Wavelength Table

Screw Length (Mod Code)
Blank = Standard
-954-xxxx = IAW Mod Code 954
-954A-xxxx = IAW Mod Code 954A

Central Wavelengths: Table
27 = 1271 nm
29 = 1291 nm
31 = 1311 nm
33 = 1331 nm
35 = 1351 nm
37 = 1371 nm
39 = 1391 nm
41 = 1411 nm
*Contact Glenair for other wavelengths

Example: ***050-376C2-2729***

PCB Mount CWDM Dual-Transmitter, SMF, 1271nm & 1291nm, Two Wire Address = C2h & C4h, Data Rate = 10 Gbps, Standard Temperature Range, Standard Screw Length

***Temperature and Screw Length Mod Codes will not be added onto Digital Memory ID (See Table 7)*

TABLE 1A TWO WIRE ADDRESS –IDENTIFIER OPTIONS

PN Identifier	Transceiver #1 Address	Transceiver #2 Address
Blank	A2h	A4h
A6	A6h	A8h
B2	B2h	B4h
B6	B6h	B8h
C2	C2h	C4h
C6	C6h	C8h
D2	D2h	D4h
D6	D6h	D8h
E2	E2h	E4h
E6	E6h	E8h

Contact Glenair if additional addresses required

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Ratings and Specifications

TABLE 2 OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Units	Notes
Operating Temperature, Case	T_{op}	-40		+85	°C	1270nm to 1450nm wavelengths
Operating Temperature, Case	T_{op}	-5		+75	°C	1470nm to 1610nm wavelengths
Supply Voltage	V_{cc}	3.135	3.3	3.465	V	
Supply Current	Icc		260	350	mA	Typical @ +85°C
Power Supply Noise (Peak-Peak)	$V_{cc\ ripple}$			5	mV	Per SFF-8431 Rev 4.1

TABLE 3 ELECTRO-OPTICAL CHARACTERISTICS – TRANSMITTER (1270NM TO 1450NM WAVELENGTHS)

Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical Output Power, Avg	P_{OUT}	+1		+5	dBm	1310nm DFB, 10.3125 Gbps
Optical Output Power – OFF CONDITION	$P_{OUT-OFF}$			-30	dBm	
Optical Return Loss Tolerance				12	dB	IEEE 802.3ae Clause 52 Compliant
Extinction Ratio	Er	3.5	5		dB	
Optical Central Wavelength						
27 designator	λ_{OUT}	1260	1270	1280	nm	
29 designator	λ_{OUT}	1280	1290	1300	nm	
31 designator	λ_{OUT}	1300	1310	1320	nm	
33 designator	λ_{OUT}	1320	1330	1340	nm	
Spectral Width, rms	$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Relative Intensity Noise	RIN			-128	dB/Hz	
Transmitter Differential Input Impedance	Z_{IN}		100		Ohms	AC coupled Internally
Differential Input Voltage	Vin_d	180		800	mV_{p-p}	CML, 100 ohm

TABLE 4 ELECTRO-OPTICAL CHARACTERISTICS – TRANSMITTER (1470NM TO 1610NM WAVELENGTHS)

Parameter	Symbol	Min	Typ	Max	Units	Notes
Optical Output Power, Avg	P_{OUT}	+1		+5	dBm	1310nm DFB, 10.3125 Gbps
Optical Output Power – OFF CONDITION	$P_{OUT-OFF}$			-30	dBm	
Optical Return Loss Tolerance				12	dB	IEEE 802.3ae Clause 52 Compliant
Extinction Ratio	Er	3.5	5		dB	
Optical Central Wavelength						
47 designator	λ_{OUT}	1460	1470	1480	nm	
49 designator	λ_{OUT}	1480	1490	1500	nm	
51 designator	λ_{OUT}	1500	1510	1520	nm	
53 designator	λ_{OUT}	1520	1530	1540	nm	
Spectral Width, rms	$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Relative Intensity Noise	RIN			-128	dB/Hz	
Transmitter Differential Input Impedance	Z_{IN}		100		Ohms	AC coupled Internally
Differential Input Voltage	Vin_d	180		800	mV_{p-p}	CML, 100 ohm

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Ratings and Specifications – (continued)

TABLE 5 COMPLIANCE SPECIFICATIONS

CHARACTERISTIC	Standard	Condition	Notes
Mechanical Shock	MIL-STD-810	Para. 516.6, proc. I, 650g	0.9 ms operating
Mechanical Vibration	MIL-STD-810	Para. 514.6, 40g rms	Random, operating
ESD	MIL-STD-883		500V HBM
Flame Resistance	MIL-STD-1344	Method 1012, Cond. B	30 seconds
Damp Heat	MIL-STD-1344	Method 1002.2, Cond. B	10 cycles , 24 hours
Eye Safety	CDRH and IEC-825	Class 1 Laser Product	

TABLE 6 MATERIAL/FINISH

Item	Material/Finish
PCB	FR4
PCB flex	FR4 & Polyimide
Railings	Aluminum 6061-T6 per ASTM-B221/B211M or Equivalent
Screws	CRES Type, 302, 303, 304, 305, or 316
Optical Ferrules & Sleeves	Zirconia, Ceramic
Solder type	RoHS compliant Sn95/Sb5 (232°C melting temp) & RoHS compliant Sn96.5/Ag3.0/Cu0.5 (217° melting)

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FIGURE 1 - OUTLINE DRAWING CONTINUED (MARKING)

LABELING:

Each unit will be shipped in an antistatic bag. The label on the antistatic bag shall be at a minimum Arial size 10 black font and contain at a minimum the following information:

ANTISTATIC BAG LABEL:
Glenair
Cage Code: 06324
PN: 050-376XX-XXXX
Rev: X
QTY: X
J/N: X
D/C:X
S/N*: XXXXXX
*If QTY is more than 1, there is no S/N

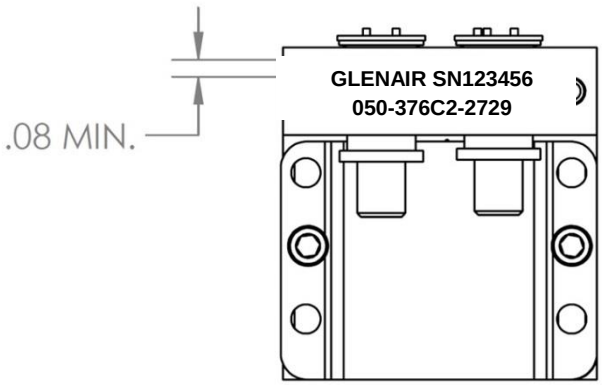
Each unit will be marked on the transceiver as follows. Either laser engraving or labeling may be used.

- Marking font to be Arial, greater than .08 inches in height.
- Marking:

  FIRST LINE OF TEXT
  - Glenair
  - Serial Number (6 digits)

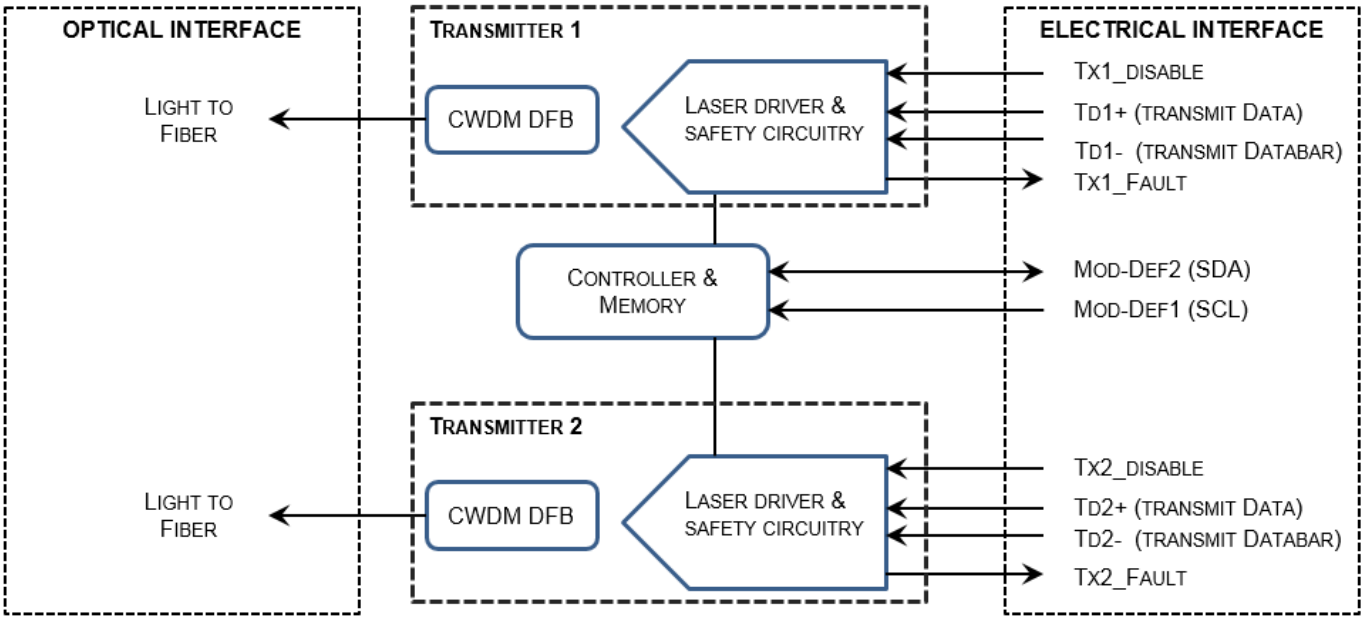
  SECOND LINE OF TEXT:
  - Part number

Example



FUNCTIONAL DESCRIPTION

Figure 2 PCB mount Dual-Transmitter Block Diagram



TRANSMITTER SECTION

Transmit Disable (TX1_Disable and TX2_Disable)

The transmitters accept a TTL and CMOS compatible transmit disable control signal input that shuts down the transmitter optical output. A high signal disables the transmitter while a low signal allows normal dual-transmitter operation. Also laser is disabled when TX Disable is open. In the event of a fault (e.g. eye safety circuit activated), cycling this control signal resets the module. Host systems should allow a 10ms interval between successive assertions of this control signal.

Transmit Fault (TX1_FAULT and TX2_FAULT)

A catastrophic laser fault will activate the transmitter signal, TX*_FAULT, and disable the laser. This signal is an open collector output (pull-up required on the host board). A low signal indicates normal laser operation and a high signal indicates a fault. The TX*_FAULT will be latched high when a laser fault occurs and is cleared by toggling the TX*_DISABLE input or cycling the power of the dual-transmitter. The transmitter fault condition can also be monitored via the optional 2-wire serial interface (address A2, byte 110, bit 2).

Eye Safety Circuit

The Transmitters provides Class 1 eye safety by design and is compliant with US FDA CDRH AEL Class 1 and EN(IEC) 60825-1,2, EN60950 Class 1. The eye safety circuit continuously monitors optical output power levels and will disable the transmitter and assert a TX_FAULT signal upon detecting an unsafe condition. Such unsafe conditions can be created by inputs from the host board (Vcc fluctuation, unbalanced code) or faults within the module.

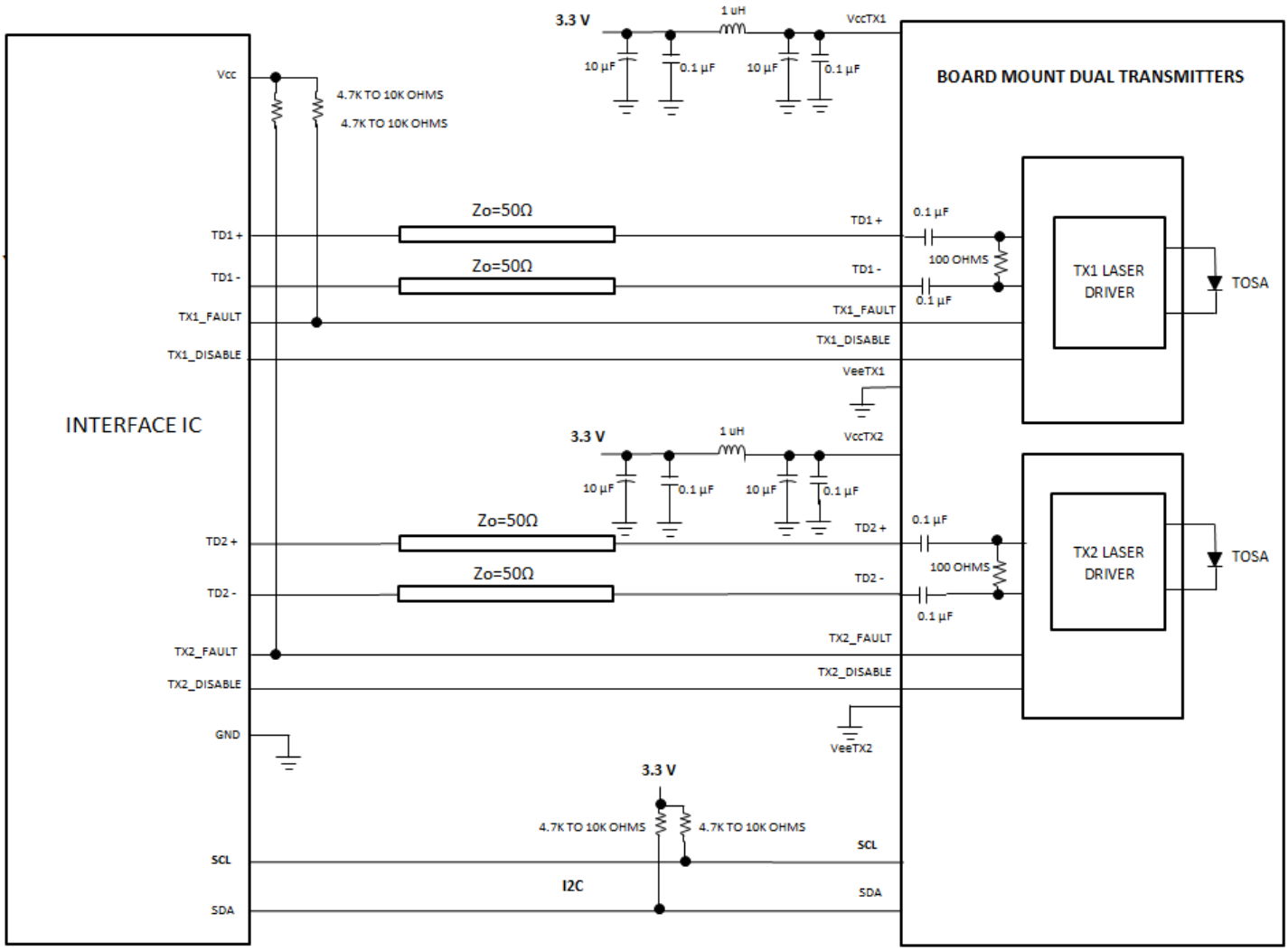
FUNCTIONAL I/O

The PC board mount dual-transmitter accepts industry standard differential signals such as LVPECL and CML within the scope of the SFP MSA. To simplify board requirements, transmitter bias resistors and ac coupling capacitors are incorporated, per SFF-8074i, and hence are not required on the host board. The module is AC-coupled and internally terminated.

Figure 3 illustrates a recommended interface circuit to link the PC board mount dual-transmitter to the supporting Physical Layer integrated circuits.

The PC board mount dual-transmitter interfaces with the host circuit board through twenty I/O pins identified by function in Table 7. The dual-transmitter high speed transmit and receive interfaces require SFP MSA compliant signal lines on the host board. The TX1_DISABLE, TX2_DISABLE, TX1_FAULT and TX2_FAULT require TTL lines on the host board (per SFF-8074i) if used. If an application chooses not to take advantage of the functionality of these pins TX1_Disable and TX2_Disable need to be tied to GND, TX1_Fault, TX2_Fault do not need to be connected.

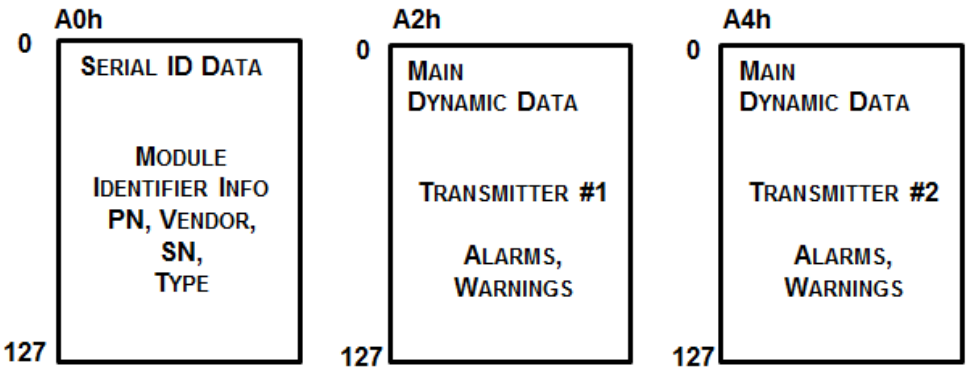
FIGURE 3 RECOMMENDED BOARD MOUNT DUAL-TRANSMITTER HOST BOARD SCHEMATIC



Digital Diagnostic Interface and Serial Identification (EEPROM)

The PCB mount Dual-Transmitter is derived from the SFF-8074i SFP specification and with SFF-8472, the SFP specification for Digital Diagnostic Monitoring Interface, but modified to account for Dual-Transmitter functionality. Both specifications can be found at http://www.sffcommittee.org.

FIGURE 4 – DIGITAL DIAGNOSTIC MEMORY MAP OVERVIEW



A0h (Standard Serial ID Data Address)
Other Dynamic Data Addresses available – see Part Number Development Options (Table 1 and Table 1A)

The PCB mount Dual-Transmitter features EEPROM for Serial ID, which contains the product data stored for retrieval by host equipment. This data is accessed via the 2-wire serial EEPROM protocol derived from with the industry standard SFP Multi-Source Agreement but modified to account for Dual-Transmitter functionality. The base EEPROM memory, bytes 0-255 at memory address A0h, is organized in compliance with SFF-8074i.

Predictive Failure Identification

The predictive failure feature allows a host to identify potential link problems before system performance is impacted. Prior identification of link problems enables a host to service an application via “fail over” to a redundant link or replace a suspect device, maintaining system uptime in the process. For applications where ultra-high system uptime is required, the PCB mount Transceiver provides a means to monitor two real-time laser metrics associated with observing laser degradation and predicting failure: average laser bias current (Tx_Bias) and average laser optical power (Tx_Power).

Compliance Prediction

Compliance prediction is the ability to determine if an optical transceiver is operating within its operating and environmental requirements. The PCB mount Transceiver provide real-time access to transceiver internal supply voltage and temperature, allowing a host to identify potential component compliance issues. Received optical power is also available to assess compliance of fiber cable plant and remote transmitter. When operating out of requirements, the link cannot guarantee error free transmission.

Fault Isolation

The fault isolation feature allows a host to quickly pinpoint the location of a link failure, minimizing downtime. For optical links, the ability to identify a fault at a local device, remote device or cable plant is crucial to speeding service of an installation. PCB mount Transceiver real-time monitors of Tx_Bias, Tx_Power, Vcc, Temperature and Rx_Power can be used to assess local transceiver current operating conditions. In addition, status flag Rx Loss of Signal (LOS) is mirrored in memory and available via the two-wire serial interface.

Component Monitoring

Component evaluation is another use of the real-time monitors of Tx_Bias, Tx_Power, Vcc, and Temperature. Potential uses are as debugging aids for system installation and design, and parametric evaluation for factory or field qualification. For example, temperature per module can be observed in high density applications to facilitate thermal evaluation of systems that incorporate this PCB mount component.

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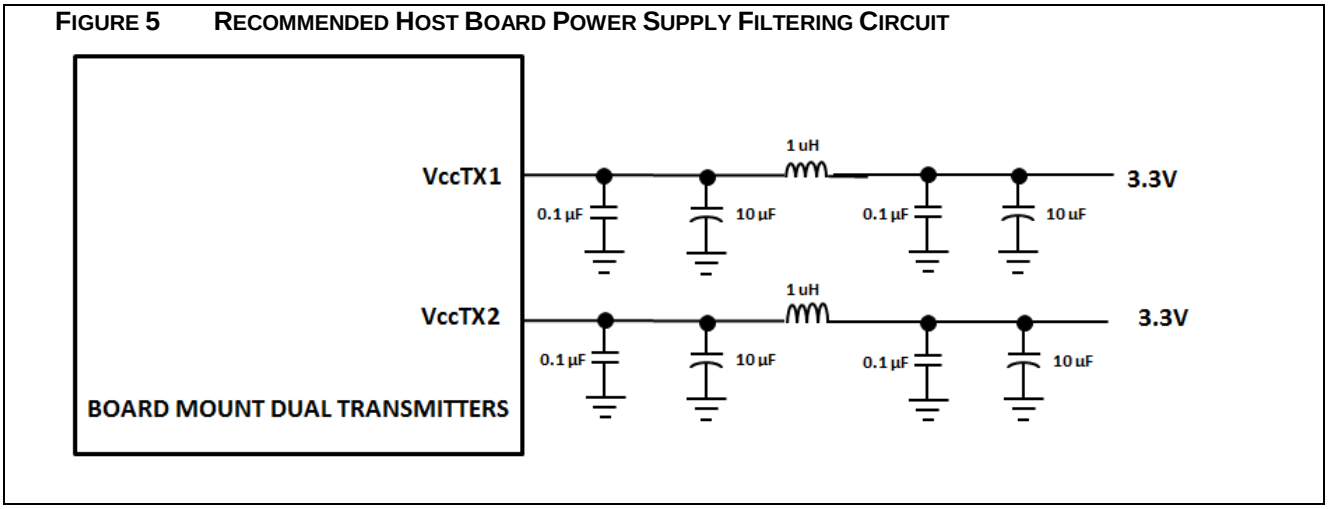
Required Host Board Components

A power supply noise rejection filter as describe in SFP MSA is required on the host PCB to meet data sheet performance. This filter incorporates an inductor which should be rated 400 mADC and 1 Ω series resistance or better. It should not be replaced with a ferrite. The required filter is illustrated in Figure 4. Also, the host PCB for the board mount dual-transmitter requires 4.7 K to 10 KΩ pull-up resistors for TX1_FAULT, TX2_FAULT, SCA and SDL lines.

FIGURE 5 RECOMMENDED HOST BOARD POWER SUPPLY FILTERING CIRCUIT



Fiber Compatibility

The dual-transmitter is capable of transmission at 2 to 550 meters with 50/125 µm fiber, and at 2 to 275 meters with 62.5 125 µm fiber, for 1.25 GBd Ethernet. It is capable of transmission up to 550m with 50/125 µm fiber and up to 300m with 62.5/125 µm fiber, for 1.0625 GBd Fiber Channel.

Electrostatic Discharge (ESD)

The Dual-transmitter is compatible with ESD levels found in typical manufacturing and operating environments as described JEDEC EIA JESD22-A114-A, Class 1 (<2000Volts) HBM. Glenair recommends that devices are handled with ESD precautions to limit exposure to below 500V HBM.

There are two design cases in which immunity to ESD damage is important. The first case is during handling of the dual-transmitter prior to insertion to the host board. To protect the dual-transmitter, it's important to use standard industry ESD handling precautions. These precautions include using grounded wrist straps, work benches, and floor mats in ESD controlled areas. The ESD sensitivity of the Glenair board mount dual-transmitter is compatible with typical industry production environments.

The second case to consider is static discharges to the exterior of the host equipment after installation, in which case the dual-transmitter may be subject to system-level ESD requirements.

Application Support

To assist in the dual-transmitter design and evaluation process, Glenair offers the following aids:

- Evaluation board & Product Manual, part number 050-330-MMF-EVALBOARD, which facilitates in the testing of the board mount dual-transmitter.
- 3D Step file to support modeling of mechanical fit and routing
- PADS schematic and PCB layout library files that can be exported into customer's PCB software design program
- Applications Aid Example of PCB layout including details of high speed transmission designs

Customer Manufacturing Processes

This module is mounted with screws and interfaces with a high-speed low cost surface mount electrical connector residing on the host PC board. The board mount dual-transmitter is not designed for aqueous wash, IR reflow, or wave soldering processes and should be mounted on the host board after host PC board has been through its assembly process.

TABLE 8 TWO-WIRE INTERFACE ID: DATA FIELDS – ADDRESS A0h

Byte Decimal	# Hex	Data Notes	Byte Decimal	# Hex	Data Notes
0	80	Glenair PCB mount Transceiver	**37**	00	Vendor OUI (NOT USED)
1	04	Serial ID Module Definition	**38**	00	Vendor OUI (NOT USED)
2	80	"GC" Fiber Optic Connector	**39**	00	Vendor OUI (NOT USED)
3	00		**40**	30	"0" Vendor Part Number ASCII character (Note 5)
4	00		**41**	35	"5" Vendor Part Number ASCII character (Note 5)
5	00		**42**	30	"0" Vendor Part Number ASCII character (Note 5)
6	00		**43**	2D	"-" Vendor Part Number ASCII character (Note 5)
7	00		**44**	33	"3" Vendor Part Number ASCII character (Note 5)
8	00		**45**	37	"7" Vendor Part Number ASCII character (Note 5)
9	00		**46**	36	"6" Vendor Part Number ASCII character (Note 5)
10	00		**47**	43	"C" Vendor Part Number ASCII character (Note 5)
11	06	Compatible with 64/66B encoded data	**48**	32	"2" Vendor Part Number ASCII character (Note 5)
12	67	BR, 10.3125 Gbps	**49**	2D	"-" Vendor Part Number ASCII character (Note 5)
13	00		**50**	32	"2" Vendor Part Number ASCII Character (Note 5)
14	00		**51**	37	"7" Vendor Part Number ASCII Character (Note 5)
15	64	9/125 µm Fiber, 10km @ 1.25Gbps	**52**	32	"2" Vendor Part Number ASCII Character (Note 5)
16	00		**53**	39	"9" Vendor Part Number ASCII Character (Note 5)
17	00		**54**	20	" " Vendor Part Number ASCII Character (Note 5)
18	00		**55**	20	" " Vendor Part Number ASCII Character (Note 5)
19	00		**56**	20	" " Vendor REV Level ASCII Character (Note 5)
20	47	"G" Vendor NAME ASCII Character	**57**	20	" " Vendor REV Level ASCII Character (Note 5)
21	4C	"L" Vendor NAME ASCII Character	**58**	20	" " Vendor REV Level ASCII Character (Note 5)
22	45	"E" Vendor NAME ASCII Character	**59**	20	" " Vendor REV Level ASCII Character (Note 5)
23	4E	"N" Vendor NAME ASCII Character	**60**	04	Hex Byte of Laser Wavelength (Note 6)
24	41	"A" Vendor NAME ASCII Character	**61**	F6	Hex Byte of Laser Wavelength (Note 6)
25	49	"I" Vendor NAME ASCII Character	**62**		RESERVED
26	52	"R" Vendor NAME ASCII Character	**63**		Check sum code for ID fields 0-62 (Note 7)
27	20	"" Vendor NAME ASCII Character	**64**	00	
28	20	"" Vendor NAME ASCII Character	**65**	1A	Hardware TX_Disable, TX_Fault, & LOS
29	20	"" Vendor NAME ASCII Character	**66**	00	
30	20	"" Vendor NAME ASCII Character	**67**	00	
31	20	"" Vendor NAME ASCII Character	**68-83**		Serial Number, ASCII (Note 8)
32	20	"" Vendor NAME ASCII Character	**84-91**		Date Code (Note 9)
33	20	"" Vendor NAME ASCII Character	**92**	68	Diagnostic Monitoring Type
34	20	"" Vendor NAME ASCII Character	**93**	B0	Enhanced Options
35	20	"" Vendor NAME ASCII Character	**94**	05	SFF-8472 rev 11.0
36	00		**95**		**Checksum for bytes 64-94 (Note 7)**
			96-255	00	

Notes:

1. RESERVED
2. RESERVED
3. RESERVED
4. RESERVED
5. Table 1, Part number options/extensions. Temperature and Screw Length Mod Codes will not be added onto Digital Memory ID.
6. Laser wavelength is represented in 16 unsigned bits. The hex representation of 1310 nm is 051E. The hex representation of 850nm is 0352.
7. Addresses 63 and 95 are checksums calculated per SFF-8472 and SFF-8074, and stored prior to product shipment.
8. Addresses 68-83 specify the module's ASCII serial number and will vary by unit.
9. Addresses 84-91 specify the module's ASCII date code and will vary according to manufactured date-code.

Table 9 Two-Wire interface ID: Data Fields – Address A2h (TX1), A4h (TX2) standard (or see Table 1A for other options)

Byte # Decimal	Data Notes	Byte # Decimal	Data Notes	Byte # Decimal	Data Notes
0	Temp H Alarm MSB (Note 1)	26	TX Pwr L Alarm MSB (Note 4)	104	Reserved
1	Temp H Alarm LSB (Note 1)	27	TX Pwr L Alarm LSB (Note 4)	105	Reserved
2	Temp L Alarm MSB (Note 1)	28	TX Pwr H Warning MSB (Note 4)	106	Reserved
3	Temp L Alarm LSB (Note 1)	29	TX Pwr H Warning LSB (Note 4)	107	Reserved
4	Temp H Warning MSB (Note 1)	30	TX Pwr L Warning MSB (Note 4)	108	Reserved
5	Temp H Warning LSB (Note 1)	31	TX Pwr L Warning LSB (Note 4)	109	Reserved
6	Temp L Warning MSB (Note 1)	32	Reserved	110	Status/Control
7	Temp L Warning LSB (Note 1)	33	Reserved	111	Reserved
8	Vcc H Alarm MSB (Note 2)	34	Reserved	112	Flag Bits
9	Vcc H Alarm LSB (Note 2)	35	Reserved	113	Flag Bits
10	Vcc L Alarm MSB (Note 2)	36	Reserved	114	Reserved
11	Vcc L Alarm LSB (Note 2)	37	Reserved	115	Reserved
12	Vcc H Warning MSB (Note 2)	38	Reserved	116	Flag Bits
13	Vcc H Warning LSB (Note 2)	39	Reserved	117	Flag Bits
14	Vcc L Warning MSB (Note 2)	40-45	Reserved	118	Reserved
15	Vcc L Warning LSB (Note 2)	56-94	External Cal Constants (Note 6)	119	Reserved
16	Tx Bias H Alarm MSB (Note 3)	95	Checksum for bytes 0-94	120-122	Reserved
17	Tx Bias H Alarm LSB (Note 3)	96	Temperature MSB (Note 1)	123	Reserved
18	Tx Bias L Alarm MSB (Note 3)	97	Temperature LSB (Note 1)	124	Reserved
19	Tx Bias L Alarm LSB (Note 3)	98	Vcc MSB (Note 2)	125	Reserved
20	Tx Bias H Warning MSB (Note 3)	99	Vcc LSB (Note 2)	126	Reserved
21	Tx Bias H Warning LSB (Note 3)	100	TX Bias MSB (Note 3)	127	Reserved (Note 8)
22	Tx Bias L Warning MSB (Note 3)	101	TX Bias LSB (Note 3)	128-247	Customer Writable (Note 9)
23	Tx Bias L Warning LSB (Note 3)	102	TX Power MSB (Note 4)	248-255	Vendor Specific
24	TX Pwr H Alarm MSB (Note 4)	103	TX Power LSB (Note 4)		
25	TX Pwr H Alarm LSB (Note 4)				

Notes:

1. Temperature (Temp) is decoded as a 16 bit signed twos compliment integer in increments of 1/256 °C.
2. Supply voltage (VCC) is decoded as a 16 bit unsigned integer in increments of 100 µV.
3. Laser bias current (Tx Bias) is decoded as a 16 bit unsigned integer in increments of 2 µA.
4. Transmitted average optical power (Tx Pwr) is decoded as a 16 bit unsigned integer in increments of 0.1 µW.
5. Reserved
6. Bytes 56-94 are not intended from use but have been set to default values per SFF-8472.
7. Bytes 95 is a checksum calculated (per SFF-8472) and stored prior to product shipment.
8. Byte 127 accepts a write but performs no action (reserved legacy byte).
9. Bytes 128-247 are write enabled (customer writable).

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TABLE 10 TRANSCEIVER DIGITAL DIAGNOSTIC MONITOR CHARACTERISTICS (WHEN APPLICABLE)

PARAMETER	SYMBOL	MIN.	UNITS	NOTES
Dual Transmitter Internal Temperature Accuracy	TINT	±3.0	°C	Temperature is measured internal to the Dual Transmitter and is valid from -40°C to +85 °C case temperature
Dual Transmitter internal Supply Voltage accuracy	VINT	±0.1	V	Supply voltage is measured internal to the Dual Transmitter and can, with less accuracy, be correlated to the voltage at the Vcc pin. Valid over 3.3V ±5%
Dual Transmitter Laser DC Bias Current Accuracy	IINT	±10	%	
Dual Transmitter Average Optical Output Power Accuracy	PT	±3.0	dB	Coupled into 50/125 mm MM fiber. Valid from -1dBm to -10dBm

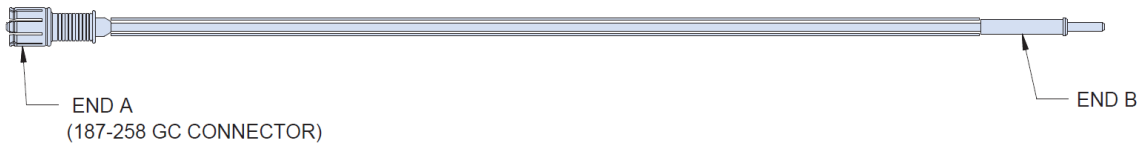
ACCESSORIES

Fiber Optic Jumper Cables to support connection to Mil/Aerospace Connectors

KEY FEATURES:

- Jumper cable between Glenair Transceiver (end A) and Mil/Aero Connector termini (End B)
- Offered with either Multimode and Single Mode fibers

FIGURE 5
Fiber Optic Jumper Cable Assembly (see separate Glenair sales drawing FA02454 for details)



PCB Mount Threaded Insert Fasteners, PN 059-0007

KEY FEATURES

- Simplifies installation of PCB mount device eliminating the need for washers and nuts
- Soldered to PCB to eliminate need for handling nuts during assembly

EVALUATION Boards, PN 050-330 Include

- MANUAL with test block diagram, schematic and Evaluation board PCBA
- 2 fiber optic cables (P/N: FA03216, 1m, 9 µm/125 µm, GC connector to LC connector)