050-361

PRODUCT BRIEF

100 MBPS-5 GBPS

PRINTED CIRCUIT BOARD (PCB) MOUNT DUAL PIN TIA RECEIVER

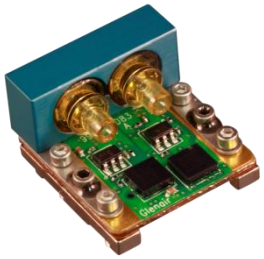
SMALL & COMPACT WITH RUGGED CONSTRUCTION FOR HARSH ENVIRONMENTS INCLUDING RADIATION EXPOSURE

REV	DESCRIPTION	DATE	APPROVED
1	Preliminary	07/13/2015	SZ
2	Updated radiation exposure data	10/01/2015	RL
3	Change PRBS Specification to 2^7-1	10/12/2016	SZ/GC
4	Edit Bag and Tag Labeling	12/13/2016	RAS/GC
5	Add Material/Finish Table and new Evalboard picture	03/10/2017	RAS/GC

15U2-3277

050-361 PRODUCT BRIEF
Radiation Tolerant PCB Mount Dual Receiver
100 Mbps – 5 Gbps, MMF, 3.3V

Radiation-Tolerant Fiber Optic Dual-Receiver, 100M-5Gbps, MMF, 3.3V



Glenair 050-361, is a ruggedized harsh environment PCB mount Dual-Receiver designed for use in harsh environments that include high levels of gamma and neutron radiation. The receivers utilize a GaAs PIN photo-detector, a transimpedance amplifier, and a limiting amplifier that have been tested and found to be tolerant of gamma and neutron radiation exposure to high levels. The electrical circuitry does not employ a microprocessor. The mechanical design is suited to the harsh temperature and vibration environments found in the Aerospace, Military and Nuclear Industrial applications. The dual-receiver interfaces with the host PCB through a high speed surface-mount electrical connector.

The receiver includes two (2) Receiver Optical Subassemblies (ROSA) and amplification/quantization circuitry. The ROSAs, containing a PIN photodiode and trans-impedance preamplifier, are located at the optical interface and mate with the GC optical connector. Each ROSA is followed by a limiting amplifier IC that provides post-amplification and quantization. Also included is a Loss Of Signal (LOS) detection circuit.

KEY FEATURES/BENEFITS

- SFP Compatible Electrical I/O signal levels
- PIN PD to support high sensitivity up to 5 Gbps
- Industry standard CML inputs that make for simple integration on customer host PCB
- Glenair Rugged GC Optical connector for high shock and vibration applications.
- Dual-Receiver 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
- Captive screws to simplify manufacturing logistics and assembly
- Compact: 0.8” x 0.9” x 0.5”
- -40°C to +85°C Operating Temperature Range
- Glenair fiber jumpers connect from PCB Mount Module to any Glenair Mil/Aero Fiber Optic Connector Style
- Evaluation fixtures available
- Radiation exposure test without errors:
  - Gamma: >165 Krad
  - Neutron: 250 x 10^{10} /cm^2

APPLICATIONS

- Harsh Environment such as: Synchrotron Particle Detectors, Airborne, Tactical, Nuclear Generation, Medical or Processing Facilities and Equipment, Spacecraft, and Shipboard applications
  - Ethernet, Fibrechannel, 1x, 2x, 4x, SFPDP

HOW TO ORDER

Table 1 Part Number Options

Part Number	Description
050-361-1	100Mbps-2.5Gbps
050-361-2	2.5Gbps-5Gbps

Ratings and Specifications

TABLE 2 ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Typ	Max	Units	Notes
Storage Temperature	Ts	-55		+100	°C	
Supply Voltage	V_{cc}	-0.4		3.8	V	VccR may not differ by more than 0.5V

TABLE 3 OPERATING CONDITIONS

Parameter	Symbol	Min	Typ	Max	Units	Notes
Operating Temperature, Case	T_{op}	-40		+85	°C	
Supply Voltage	V_{cc}	3.135	3.3	3.465	V	
Supply Current	Icc		180	200	mA	Typical @ +85°C
Power Supply Noise (Peak-Peak)	V_{cc_ripple}			100	mV	

TABLE 4 ELECTRO-OPTICAL CHARACTERISTICS – RECEIVER

Parameter	Symbol	Min	Typ	Max	Units	Notes
050-361-1						
Sensitivity, BER 10^{-12}, PRBS 2^7-1, Er 10 dB	P_{IN}		-22.5	-19	dBm	PIN PD @ 1.25 Gbps
Sensitivity, BER 10^{-12}, PRBS 2^7-1, Er 10 dB	P_{IN}		-22.5		dBm	PIN PD @ 2.5 Gbps
050-361-2						
Sensitivity, BER 10^{-12}, PRBS 2^7-1, Er 10 dB	P_{IN}		-18.5	-14	dBm	PIN PD @ 3.2 Gbps
Sensitivity, BER 10^{-12}, PRBS 2^7-1, Er 10 dB	P_{IN}		-18	-14	dBm	PIN PD @ 4.25 Gbps
Sensitivity, BER 10^{-12}, PRBS 2^7-1, Er 10 dB	P_{IN}		-17.5	-16	dBm	PIN PD @ 5 Gbps
Overload, BER 10^{-12}, PRBS 2^7-1	P_{IN}	-1			dBm	@1.25Gbps or @ 5 Gbps
Optical Wavelength	λ_{IN}	830		860	nm	
Receiver Differential Output Impedance	Zout		100		Ohms	AC coupled internally
Differential Output Voltage Swing	Vout_d	600		1200	mV	CML, 100 ohm
LOS Assert Level	LOS		-24	-22	dBm	@ 1.25Gbps
LOS Hysteresis	LOS_{HYS}	1.25	2.3		dB	@ 1.25Gbps

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		1000V 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)

FIGURE 1 - OUTLINE DRAWING CONTINUED (MARKING)

LABELING:

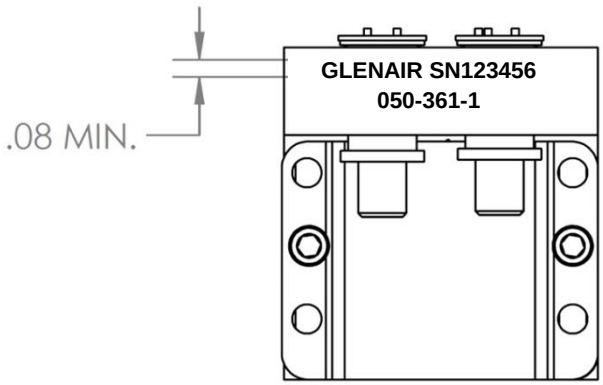
Each unit will be shipped in an antistatic bag. The label on the antistatic bag shall be at a minimum Arial size 10 black font and contain at a minimum the following information:

ANTISTATIC BAG LABEL:
Glenair
Cage Code: 06324
PN: 050-361-X
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.

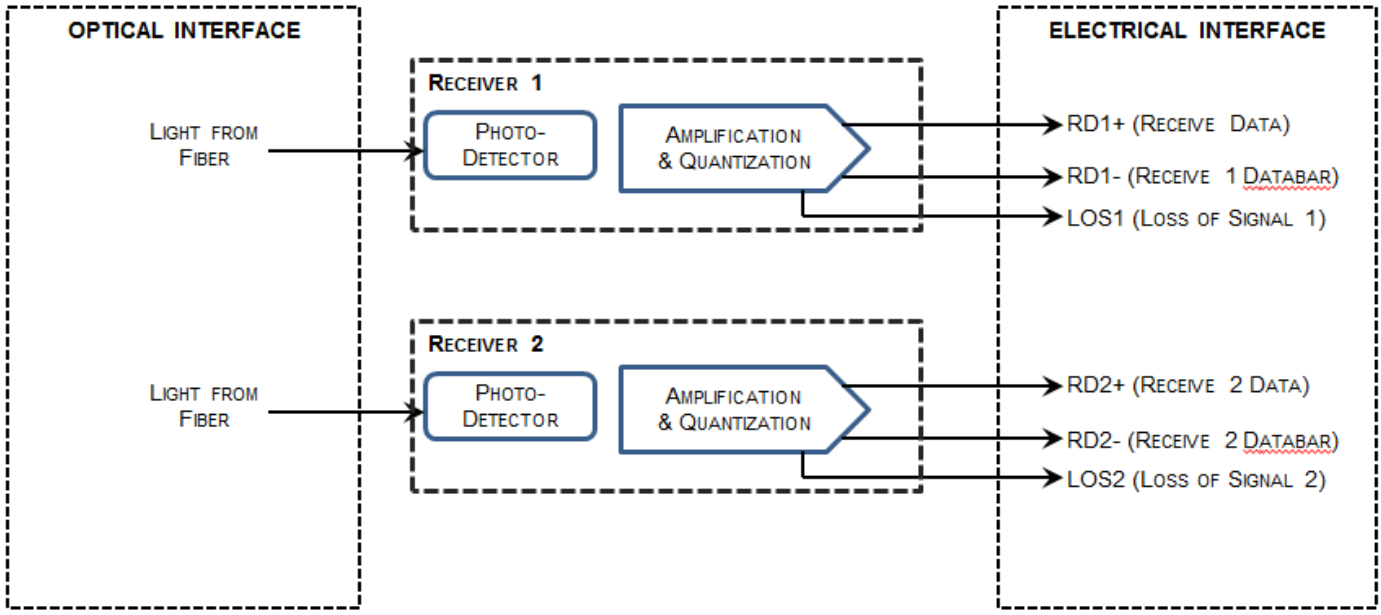
- Marking font to be Arial, greater than .08 inches in height.
- Marking:
  - FIRST LINE OF TEXT
    - Glenair
    - Serial Number (6 digits)
  - SECOND LINE OF TEXT:
    - Part number

Example



FUNCTIONAL DESCRIPTION

Figure 2 PCB mount Dual-Receiver Block Diagram



RECEIVER SECTION

Receiver Loss of Signal (LOS)

The Loss Of Signal (LOS) output indicates an unusable optical input power level. The post-amplification IC includes transition detection circuitry which monitors the ac level of incoming optical signals and provides a TTL/CMOS compatible status signal to the host. A low LOS logic level indicates the presence of an optical input while a high LOS logic level indicates an unusable optical input. The LOS thresholds are factory-set so that a high output indicates a definite optical fault has occurred (e.g. failed transmitter, broken or disconnected fiber connection to the PCB Mount Module, etc.).

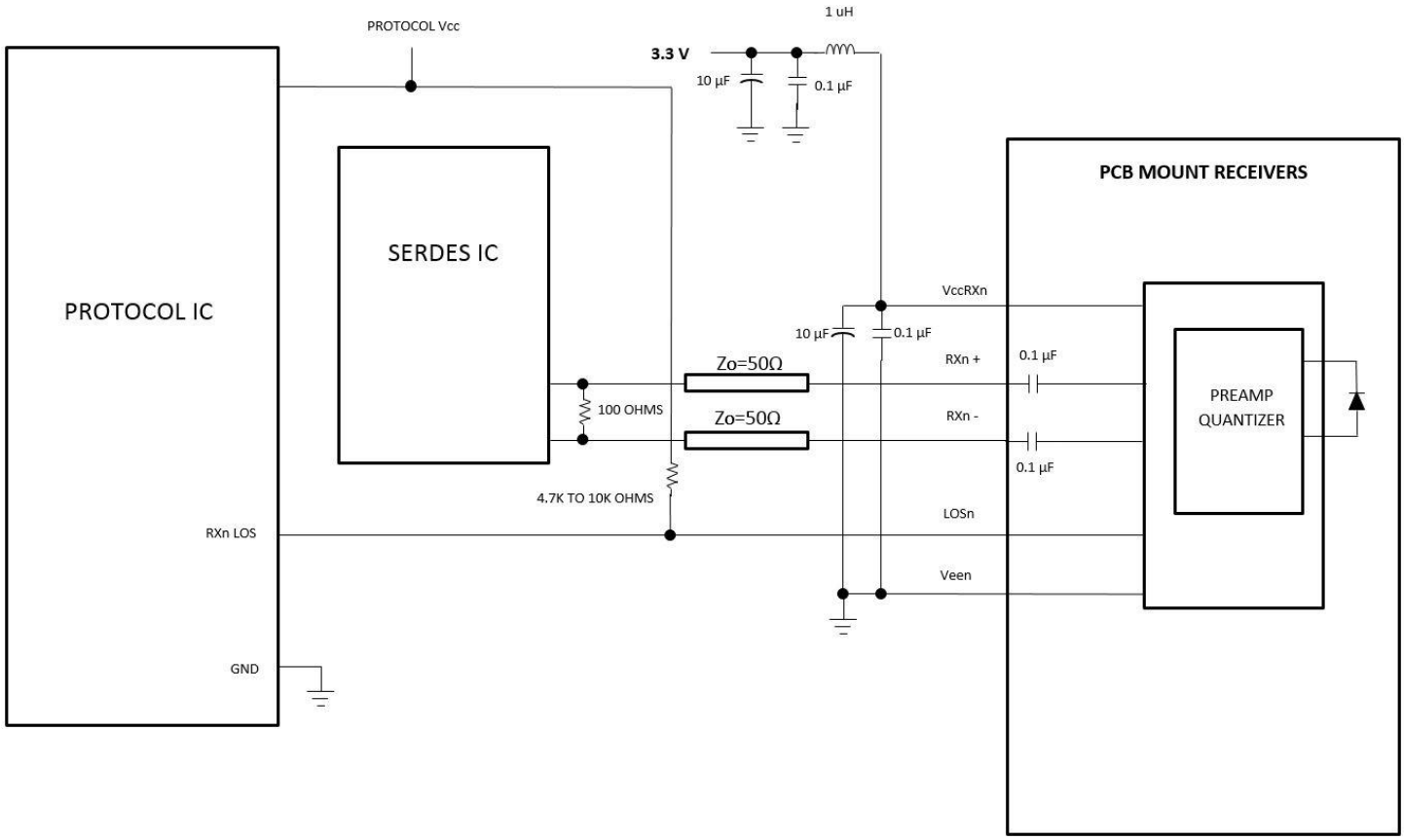
FUNCTIONAL I/O

The PCB mount Dual-Receiver accepts industry standard differential signals such as LVPECL and CML within the scope of the SFP MSA. The module is AC-coupled and internally terminated.

Figure 3 illustrates a recommended interface circuit to link the PCB mount Dual-Receiver to the supporting Physical Layer integrated circuits.

FIGURE 3 RECOMMENDED PCB MOUNT DUAL-RECEIVER HOST BOARD SCHEMATIC

SINGLE RECEIVER SHOWN (2X RECEIVERS PER MODULE)

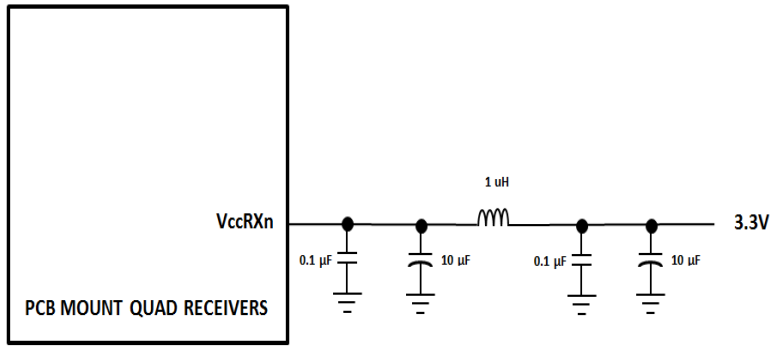


The PCB mount Dual-Receiver interfaces with the host circuit board through twenty I/O pins identified by function in Table 7. The Dual-Receiver high speed receive interface requires SFP MSA compliant signal lines on the host board.

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 is filter incorporates an inductor which should be rated to 400 mADC and 1 Ω series resistance or better. It should not be replaced with a ferrite. The required filter is illustrated in Figure 5. Also, the host PCB for the PCB mount Dual-Receiver requires 4.7 K to 10 KΩ pull-up resistors for LOS lines.

FIGURE 5 RECOMMENDED HOST BOARD POWER SUPPLY FILTERING CIRCUIT



Fiber Compatibility

The Dual-Receiver 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-Receiver is compatible with ESD levels found in typical manufacturing and operating environments as described JEDEC EIA JESD22-A114, Class 1C (<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-Receiver prior to insertion to the host board. To protect the Dual-Receiver, 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 PCB mount Dual-Receiver 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-Receiver may be subject to system-level ESD requirements.

Application Support

To assist in the Dual-Receiver design and evaluation process, Glenair offers the following aids:

- Evaluation board & Product Manual, part number 050-330, which facilitates in the testing of the PCB mount Dual-Receiver.
- 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 PCB mount Dual-Receiver 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.

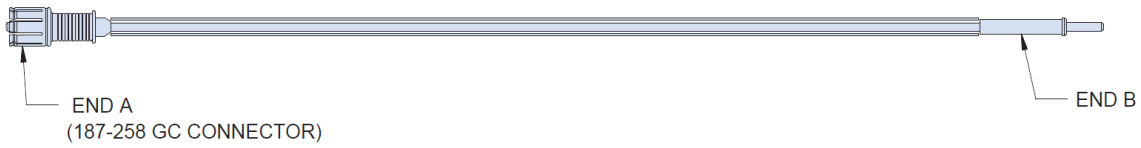
ACCESSORIES

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

KEY FEATURES:

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

FIGURE 6
Fiber Optic Jumper Cable Assembly (see separate Glenair sales drawing FA02454 for details)



PCB Threaded Inserts, PN 059-0007

KEY FEATURES

- Simplifies installation of PCB mount PCB Mount Modules eliminating the need for washers and nuts
- Soldered to PCB to eliminate need for handling nuts during assembly
- Existing Options to support PCB thickness from 0.03” to 0.92”
- Can support thicker PCB if required

EVALUATION Boards, PN 050-330 Include

- MANUAL with test block diagram, schematic and Evaluation board PCBA
- Multiple types of PCB mount modules supported by this evaluation board
- 2 fiber optic cables (P/N: FA02318, 1m, 50 µm/125 µm, GC connector to LC connector)