



050-364

PRODUCT BRIEF

100 MBPS – 5 GBPS

PRINTED CIRCUIT BOARD (PCB) MOUNT QUAD RECEIVER

(4) 850NM VCSEL COMPATIBLE RECEIVERS

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

REV	DESCRIPTION	DATE	APPROVED
2	Preliminary	08/18/2015	SZ
3	Update radiation test data	10/29/2015	RL
4	Add ECCN and export legend	07/31/2016	RL
5	Update Outline Drawing. Change height of transceiver	08/31/2016	GC/NH
6	Change PRBS Specification to 2 ⁷ -1	10/12/2016	SZ/GC
7	General Update	11/18/2016	SZ/GC
8	Edit Bag and Tag Labeling	12/13/2016	RAS/GC
9	Add Material/Finish Table	02/06/2017	RAS/GC

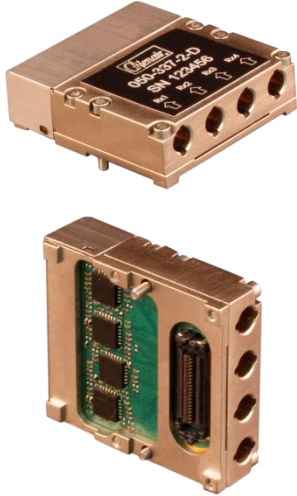
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PCB Mount Quad Fiber Optic Receiver
5 Mbps – 4.25 Gbps, MMF, 3.3V



Quad Fiber Optic Receiver for Harsh and Radiation Exposed Environments



Glenair 050-364, is a ruggedized harsh environment PCB mount Quad-receiver designed for use in harsh environments that include high levels of gamma and neutron radiation. The module is comprised of four receiver sections that reside on a common package platform and interface with a host board through a high speed electrical connector. The receivers utilize 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 control 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 quad-receiver interfaces with the host PCB through a high speed surface-mount electrical connector.

Each receiver section includes the Receiver Optical Subassembly (ROSA) and amplification/quantization circuitry. The ROSA, containing a PIN photodiode and transimpedance preamplifier, is located at the optical interface and mates with an ARINC 801 optical connector. The ROSA is mated to 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 input and outputs that make for simple integration on customer host PCB
- ARINC 801 Optical contacts
- Easy assembly - Module is securely mounted with screws from the top 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: 1.1" x 1" x 0.39"
- -40°C to +85°C Operating Case Temperature
- Glenair fiber jumpers connect from device to any Glenair Mil/Aero Fiber Optic Connector Style
- Evaluation fixtures available
- Radiation exposure test without errors:
 - Gamma: >165 Krad
 - Neutron: 250 x 10¹⁰ /cm²

APPLICATIONS

- Harsh Environment such as: Airborne, Tactical, Railway, Industrial, Oil and Gas and Shipboard applications
- Radiation exposed environments such as Nuclear Power Plants, Medical equipment, particle accelerators, spacecraft, satellites and other payloads
- Ethernet, Fibrechannel (1FC,2FC,4FC), SFPDP

HOW TO ORDER

Table 1 Part Number Options

Part Number	Description
050-364-1	5Mbps-2.5Gbps
050-364-2	2.5Gbps-4.25Gbps

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Ratings and Specifications

TABLE 2 ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Typ	Max	Units	Notes
Storage Temperature	T _s	-55		+100	°C	
Supply Voltage	V _{cc}	-0.4		3.8	V	V _{cc} 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	I _{cc}		360	400	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
050-364-1						
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
050-364-2						
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	R _{out}		100		Ohms	AC coupled internally
Differential Output Voltage Swing	V _{out_d}	600		1200	mV	CML, 100 ohm
LOS Assert Level	LOS		-24	-22	dBm	@ 1.25Gbps
LOS Hysteresis	LOS _{HYS}	1.5	2.3		dB	@ 1.25Gbps

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	

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Ratings and Specifications (continued)

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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LABELING:

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

ANTISTATIC BAG LABEL:

Glenair

Cage Code: 06324

PN: 050-364-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 as follows:

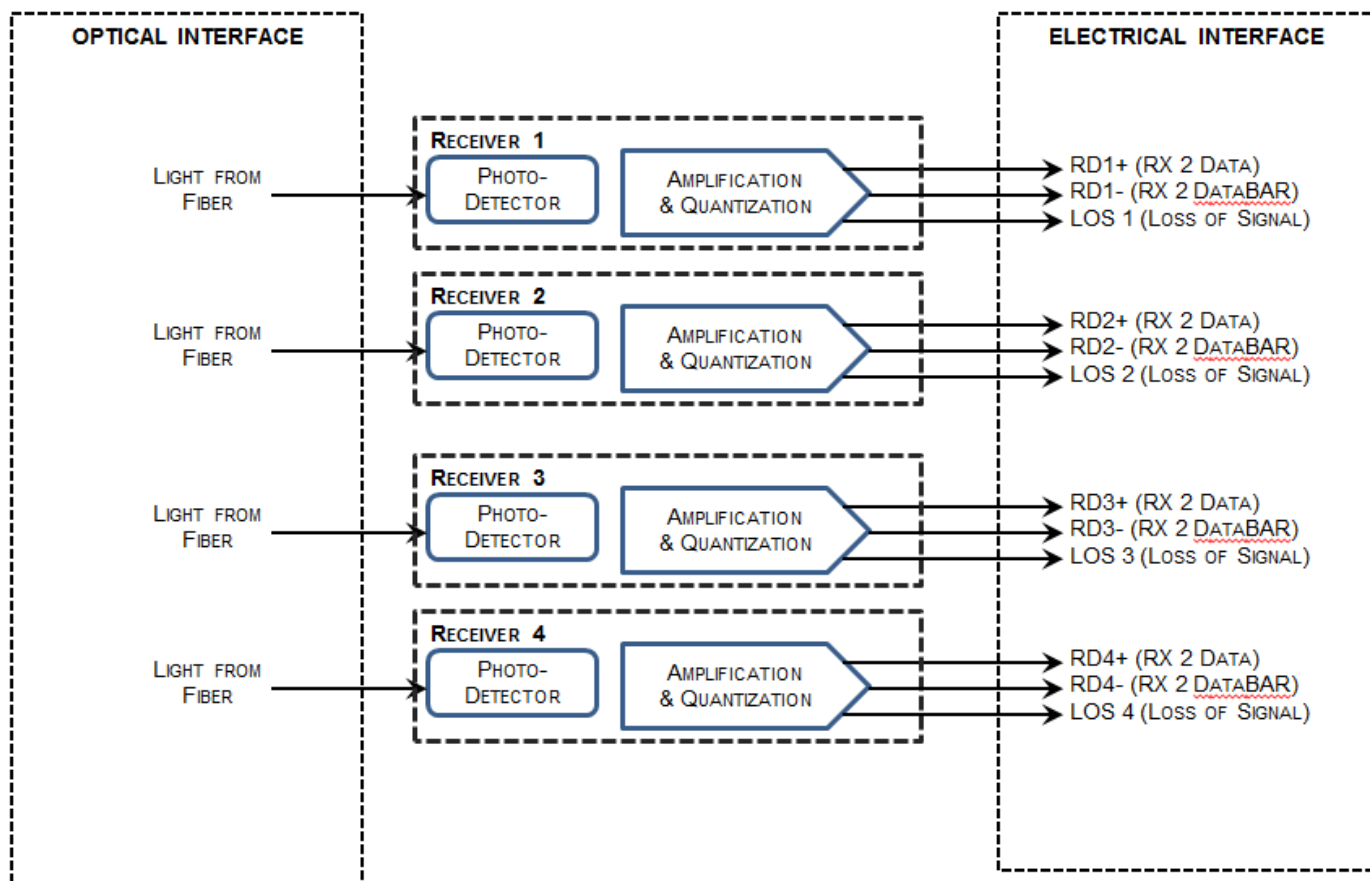
- Marking:
 - Glenair
 - Part Number
 - Serial Number (6 digits)

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FUNCTIONAL DESCRIPTION

FIGURE 2 –BLOCK DIAGRAM- QUAD RECEIVER



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 receiver, etc.).

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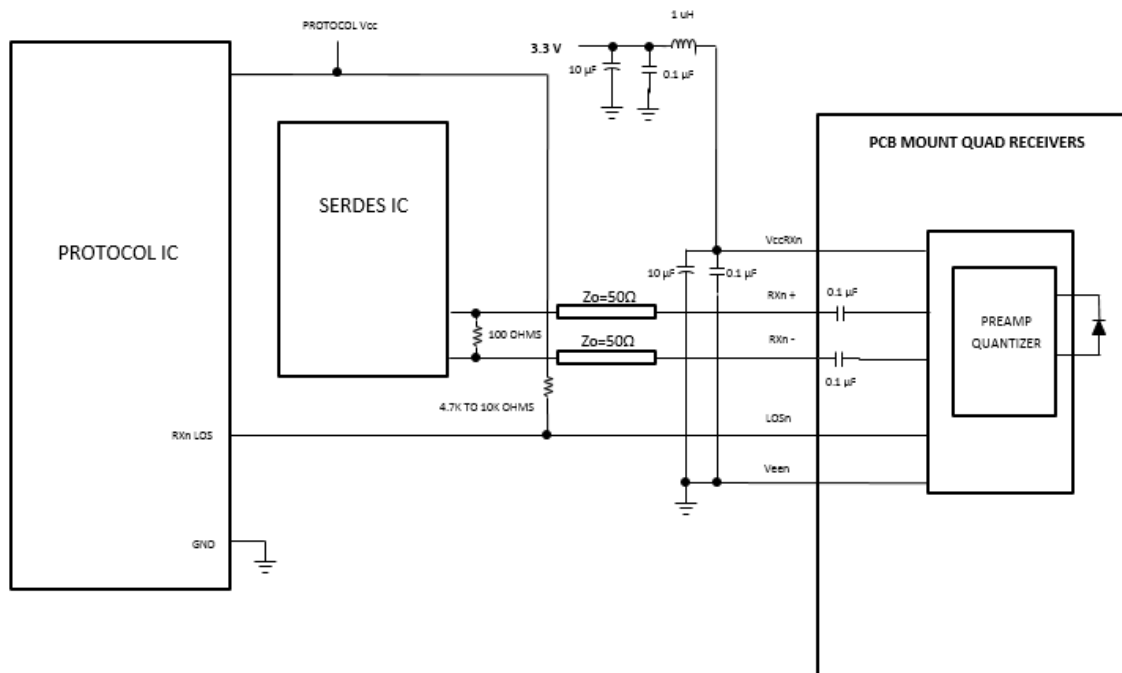
FUNCTIONAL I/O

The PCB mount device 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 PCB mount device to the supporting Physical Layer integrated circuits.

FIGURE 3 – RECOMMENDED HOST BOARD SCHEMATIC

SINGLE RECEIVER SHOWN (4X RECEIVERS PER MODULE)



RECOMMENDED PCB MOUNT QUAD RECEIVER HOST BOARD SCHEMATIC

The PCB mount receiver interfaces with the host circuit board through twenty I/O pins identified by function in Table 7. The receive interfaces require SFP MSA compliant signal lines on the host board. The Rx LOS lines 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, RX1_LOS, RX2_LOS, RX3_LOS and RX4_LOS do not need to be connected.

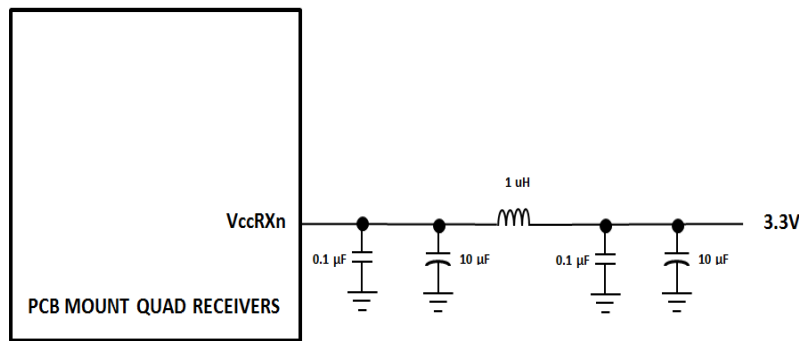
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Required Host Board Components

A power supply noise rejection filter as describe in SFP MSA is required on the host PCB to meet data sheet performance. This is the same 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 5. Also, the host PCB for the PCB mount receiver requires 4.7 K to 10 K Ω pull-up resistors for LOS lines.

FIGURE 5 RECOMMENDED HOST BOARD POWER SUPPLY FILTERING CIRCUIT FOR EACH RECEIVER



Fiber Compatibility

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

Electrostatic Discharge (ESD)

The receiver is compatible with ESD levels found in typical manufacturing and operating environments as described JDEC/EIAJESD22-A114-A, Class 1 (<2000Volts) HBM. Glenair recommends that devices are handled with ESD precautions to limit exposure to below 250V HBM.

There are two design cases in which immunity to ESD damage is important. The first case is during handling of the device prior to insertion to the host board. To protect the OE device, 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 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 device may be subject to system-level ESD requirements.