ELECTRO-OPTIC DEVICES, INC.

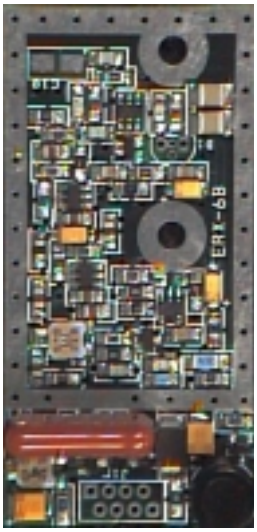
ERX-6 Series

Single-Board APD/PIN Photodiode Optical Receiver

(preliminary)

FEATURES:

- Si-APD (Avalanche PhotoDiode) version “-6B”
- Si-PIN (PIN PhotoDiode) version “-6C”
- On-board APD bias supply (-6B version only)
- On-board bias control circuit for CFAR applications
- Analog output (standard), Digital output (PIN optional)
- Wideband -3dB bandwidth = 20 MHz. (standard)
- Directly compatible with ERC-4A Ranging Controller
- Single 5Vdc power supply
- Current consumption 20-30mA (typical).
- Compact circuit board 1.125 x 2.250 Inches.



DESCRIPPTION:

The ERX-6 is a single board APD/PIN photodiode optical receiver. Advanced optional features, such as support for both Si-APD Avalanche PhotoDiode or Si-PIN PhotoDiode photo detectors in the “-6B” or “-6C” versions respectively, on-board APD bias supply, and digital output for Si-PIN in the “O” version, provides application design flexibility. On-board bias control circuit for Continuous False Alarm Rate (CFAR) applications helps maintain optimum bias of an APD under varying conditions. Wideband -3dB bandwidth = 20 MHz. (standard). Typical current consumption of 30mA for APD and 20mA for PIN board option.

Requires only a single 5Vdc power supply. Compact circuit board layout with dimension of 1.125 x 2.250 inches. Directly compatible with ERC-4A Ranging Controller and part of the ERC-4KIT: Complete Asynchronous Time-of-Flight Laser Ranging Kit.

Interface Connection:

J1: Receiver Interface
(square pad denotes pin #1, pin numbers increase in staggered fashion with pin #8 at end)

Pin	Signal	Description
1	**N.C.**	No Connect
2	**ASO**	Analog Signal output, all models
3	**GND**	Analog signal ground return
4	**SHDN**	APD Bias shutdown when logic HI
5	**DCO**	Digital Comparator Output for "O" version
6	**Vcc2**	Power supply to bias supply (APD only)
7	**Vcc1**	Power supply to amplifier section
8	**GND**	Power supply ground return

Receiver Application:

The ERX-6 is a wideband optical receiver. As such, it is susceptible to internal and external interference if the receiver is not shielded properly. To facilitate this, a narrow ground-plane perimeter is available on the component side of the circuit board. A thin copper, brass or tin shield should be soldered to this perimeter.

The Photodiode detector is located at an extremely noise/interference sensitive node. A metallic shield should be used to surround the detector – often to which the receiver is attached via the two mounting holes. This metallic shield is typically a metal component (plate) machined to provide not only the shield properties but to facilitate optical alignment in the application's optical system. The receiver mount holes are oversized for #2 screws to facilitate XY position adjustment of the circuit relative to the optical centerline.

CAUTION: beware of the flush mount perimeter (see illustration). No contact should be made to bottom side of PCB outside this perimeter. Inside the perimeter, the PCB should be in full contact with a metal shield/mount.

Sensitivity Adjustment:

The ERX-6B models implement a proprietary Constant False Alarm Rate (CFAR) technology to maintain optimum bias of the APD under varying conditions of temperature and background illumination. Additionally, the ERX-6B gain can be adjusted using VR1 (see illustration).

OPERATING SPECIFICATIONS:

PARAMETER	MIN.	TYP.	MAX.	UNIT
Supply Voltage	4.9	5.0	5.2	Vdc
Supply Current[1] (APD Configuration)	20	30	40	mA
Supply Current (PIN Configuration)		20		mA
APD Bias Voltage (over full temperature range)	50		160	Vdc
PIN Bias Voltage (over full temperature range)		2.8		Vdc
V_{OPP}, Analog Output Voltage Swing			700	mV (p-p)
A_T, Transimpedance Gain (APD Configuration)		1000		K Ohms
A_T, Transimpedance Gain (PIN Configuration)		1000		K Ohms
f_{BW}, Receiver Bandwidth[2]		20		MHz
C_D, Detector Depletion Capacitance[3]			4	pF
I_N, Input-referred noise current spectral density[4]		2		pA/√Hz

NOTES:
1. Supply current changes with bias voltage/current demand.
2. Standard upper cut-off frequency 20 MHz, lower cut-on frequency ~20 kHz. Other bandwidth configurations are available.
3. On-board frequency compensation limit. Modifications are available.
4. Without detector.

Model Ordering Codes:

Model Number	Model Description
ERX-6B	Optical Receiver, APD Configuration, APD detector not included
ERX-6BD	Optical Receiver, APD Config., 0.5 mm APD detector incl. (standard)
ERX-6BD-0.2	Optical Receiver, APD Config., 0.2 mm APD detector incl. (special order)
ERX-6BD-1.0	Optical Receiver, APD Config., 1.0 mm APD detector incl. (special order)
ERX-6C	Optical Receiver, PIN Configuration, PIN detector not included
ERX-6CD	Optical Receiver, PIN Configuration, 1.0 mm PIN-Visible detector
ERX-6CDF	Optical Receiver, PIN Configuration, 1.0 mm PIN-NIR detector (standard)
ERX-6CO	Optical Receiver, PIN Config, PIN detector not included, Digital output
ERX-6CDO	Optical Receiver, PIN Config., 1.0 mm PIN-Visible detector, Digital output
ERX-6CDFO	Optical Receiver, PIN Config., 1.0 mm PIN-NIR detector, Digital output

Ordering Code Suffix

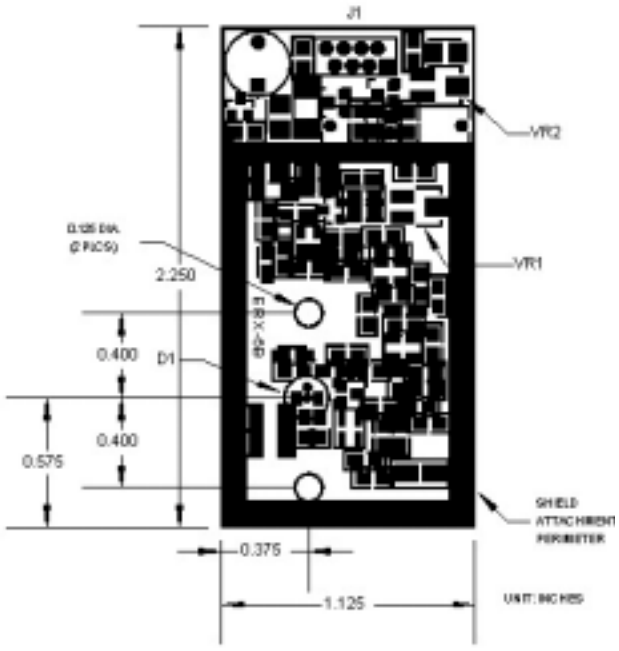
8 position 1mm pitch FFC Connector available on all models by adding suffix: -C

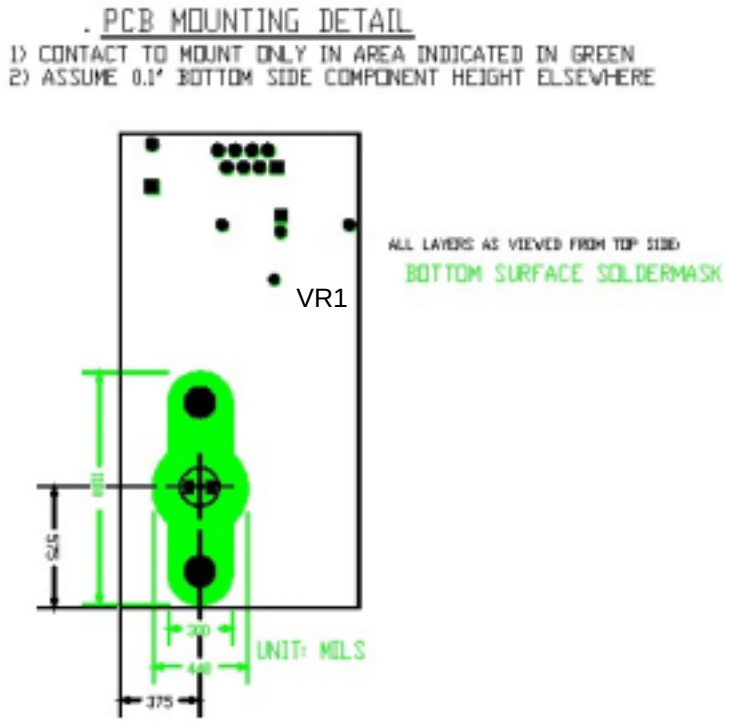
example: **ERX-6BD-C** = ERX-6BD APD Rx w/ 0.5mm APD + FFC connector

DETECTORS:

The following chart indicates the available versions of the ERX-6 receiver and the corresponding detector implemented.

Receiver Model Number	Detector Model
ERX-6BD	APD, Hamamatsu S2382
ERX-6BD-0.2	APD, Hamamatsu S2381
ERX-6BD-1.0	APD, Hamamatsu S2383
ERX-6CD	PIN, OSRAM SFH203P
ERX-6CDF	PIN, OSRAM SFH203PFA





(specifications are subject to change)