

High Speed InGaAs Photodiodes

Front Illuminated on Ceramic Submounts

Features

- Photosensitive diameters of 75 or 300 μm
- High responsivity at 1300 and 1550 nm
- Low capacitance, low dark current
- Planar, passivated diode

Applications

- Fiber optic modules to 3 GHz
 - Laser diode back facet monitor (CER-F Version)
 - Hybrid pin-FETs (CER-H Version)

Description

The EPITAXX series of high speed, front-illuminated detectors on ceramic submounts are made up of Indium Gallium Arsenide PIN photodiodes packaged on alumina substrates. These InGaAs photodiodes, which have a planar structure, feature high responsivity between 850 and 1700 nm, low dark current, and low capacitance.

Two standard sizes of photodiodes are available in the front illuminated, submount series. The ETX 75 has a photosensitive diameter of 75 μm ; this size maximizes bandwidth and sensitivity. The larger active area of the 300 μm diameter ETX 300 offers the user simpler coupling of incident light.



The ceramic submounts on which the photodiodes are packaged permit use of the devices in high speed optical communication modules. Two standard submounts are available. The CER-F version is a flat ceramic metallized on its backside. A photodiode, typically the ETX 300, mounted on this package can be used for monitoring the back facet of a 1300 or 1550 nm laser diode. The second version is the CER-H, designed for use in hybrid circuits. A common application is a fiber optic pin-FET receiver, which would likely employ the ETX 75 photodiode.

EPITAXX will also mount other diameter photodiodes on these ceramics. In addition, customers can specify ceramic submounts of their own design. Please consult with an EPITAXX sales engineer to review specific requirements.

Specifications

Optical / Electrical Characteristics

($V_R = 5\text{ V}$, $T_A = 25^\circ\text{C}$ – unless otherwise noted.)

InGaAs PIN Photodiode

| Model | ETX 75CER-F/H | | | ETX 300CER-F/H | | | |
|------------------------|---------------|------|------|----------------|------|------|---------------|
| Parameter | Min. | Typ. | Max. | Min. | Typ. | Max. | Units |
| Active Diameter | | 75 | | | 300 | | μm |
| Responsivity @ 1300 nm | 0.8 | 0.9 | | 0.8 | 0.9 | | A/W |
| Dark Current | | 0.15 | 0.60 | | 1.0 | 5.0 | nA |
| Total Capacitance | | 0.50 | 0.75 | | 5.0 | 8.0 | pF |
| Bandwidth ¹ | | 2.5 | | | 0.4 | | GHz |
| Rise Time ² | | 0.15 | | | 1.0 | | ns |

Notes:

¹ -3 dB point into a 50Ω load

² $R_{\text{LOAD}} = 50\Omega$.

Maximum Ratings

InGaAs PIN Photodiode - All Models

| Parameter | Rating | Units |
|------------------------------|------------|------------------|
| Reverse Voltage | 25 | V |
| Reverse Current ^A | 10 | mA |
| Forward Current ^B | 10 | mA |
| Power Dissipation | 100 | mW |
| Operating Temperature | -40 / +125 | $^\circ\text{C}$ |
| Storage Temperature | -40 / +125 | $^\circ\text{C}$ |

Notes:

^A Under reverse bias, current at which device may be damaged.

^B Under forward bias, current at which device may be damaged.

Figure 1

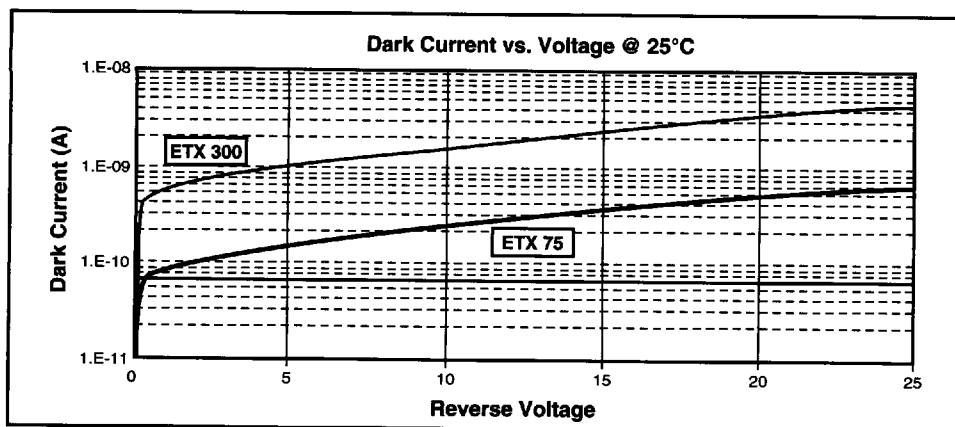


Figure 2

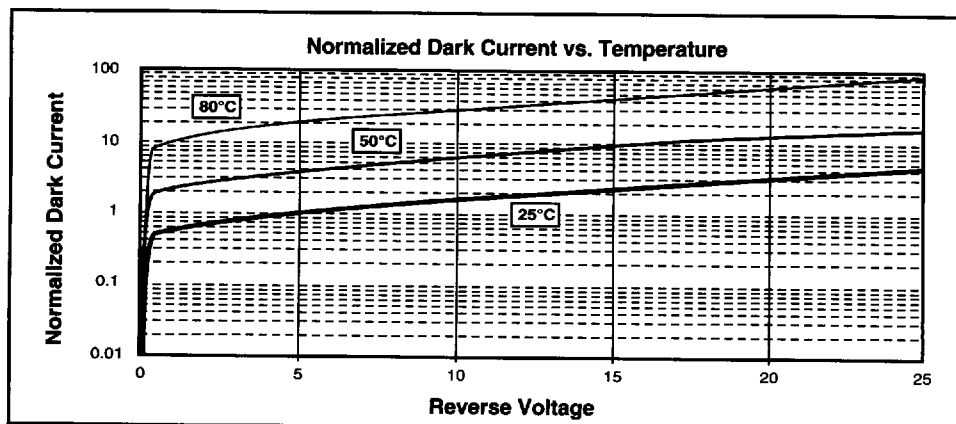


Figure 3

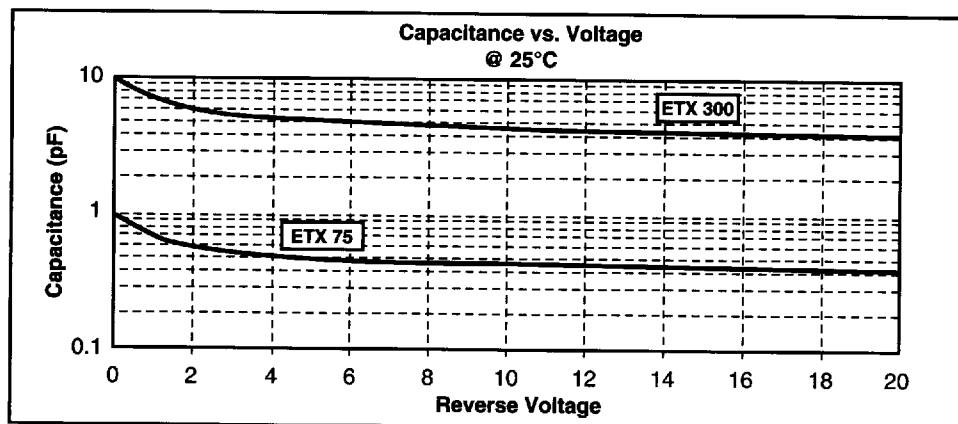
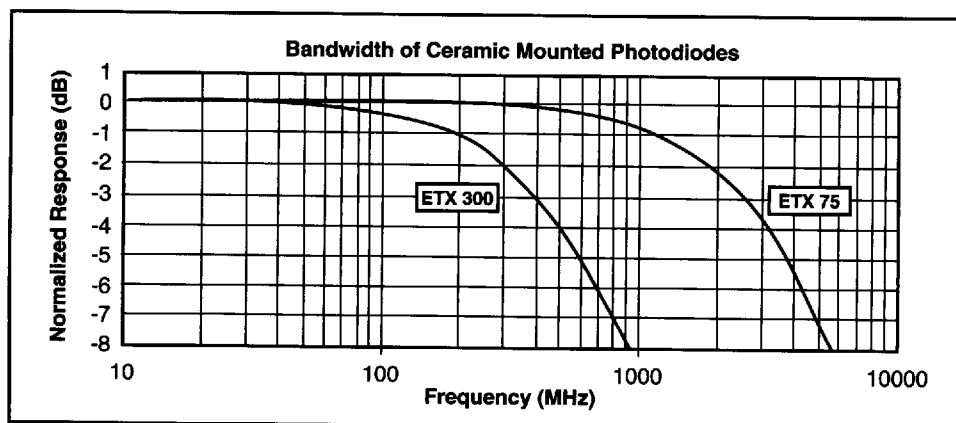


Figure 4



Ordering Information

To order, please specify active diameter and version of ceramic submount.

Designation Description

| | |
|--------------|--|
| ETX 75CER-F | 75 μm diameter InGaAs diode on flat ceramic submount |
| ETX 75CER-H | 75 μm diameter InGaAs diode on hybrid ceramic submount |
| ETX 300CER-F | 300 μm diameter InGaAs diode on flat ceramic submount |
| ETX 300CER-H | 300 μm diameter InGaAs diode on hybrid ceramic submount |

On request, EPITAXX will supply these photodiodes on custom submounts for OEM or research applications.

EPITAXX also manufactures a line of higher speed InGaAs PIN photodiodes on low capacitance, ceramic submounts. These detectors have active diameters of 25 and 60 μm and are back illuminated. The submount on which the diodes are packaged contains an alignment groove for positioning an optical fiber to the detector. Please call EPITAXX for more information.

Quality and Reliability

EPITAXX maintains a strict quality control program throughout the design and manufacture of photodetectors. To ensure reliability, EPITAXX passivates photodiodes dielectrically with Silicon Nitride. Devices are attached to the submount with a high temperature eutectic.

EPITAXX qualifies all photodiodes by lot and pre-tests them through a baking procedure at 200°C. Expected photodiode lifetime is greater than 10^{10} hours at 70°C. Failure rate of the devices is below 1 FIT.

Precautions for Use

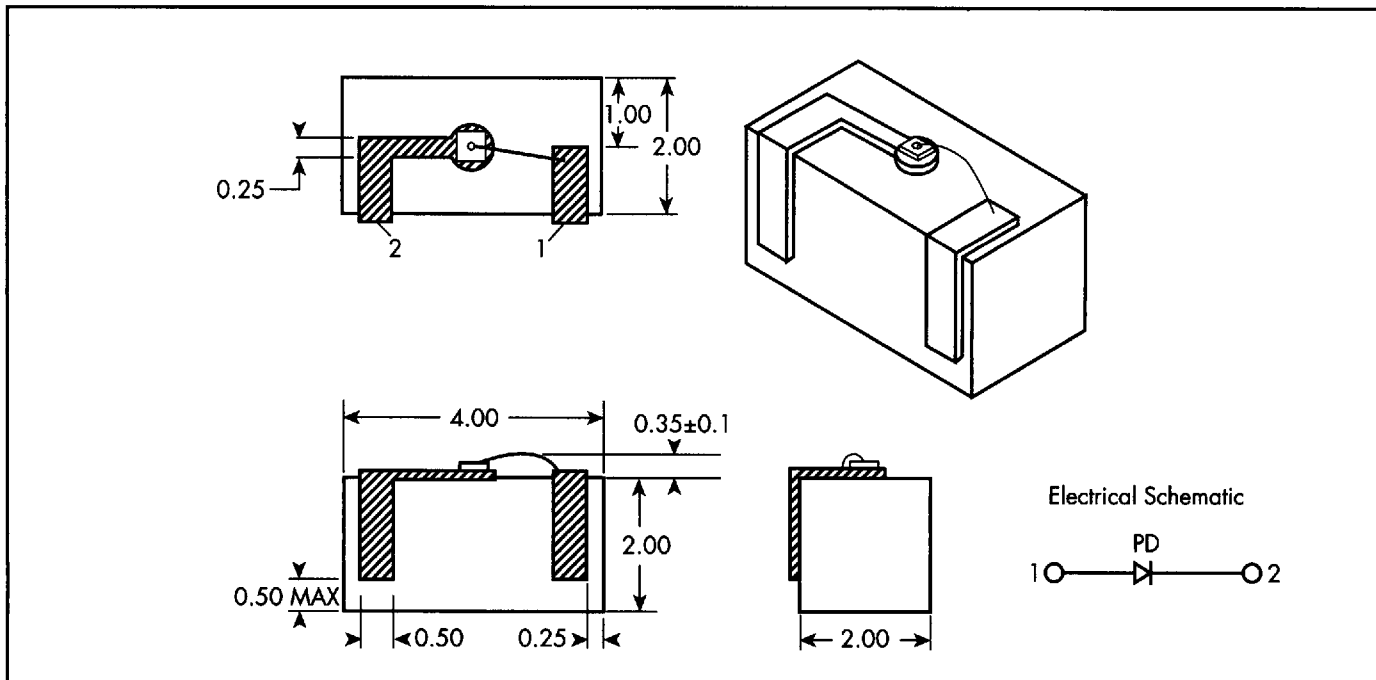
▪ ESD PROTECTION IS IMPERATIVE.

Use of grounding straps, anti-static mats, and other standard ESD protective equipment is recommended when handling or testing InGaAs photodiodes.

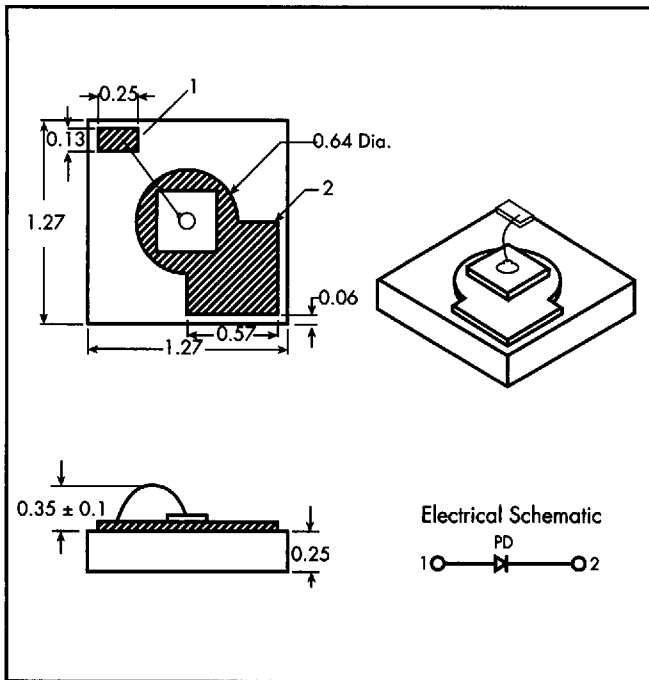
Protect InGaAs photodiodes from static electricity. Always store photodiodes in a dry, particle free box or in N_2 at room temperature.

Mechanical Dimensions - All Dimensions in mm

ETX 75CER-H, ETX 300CER-H



ETX 75CER-F



ETX 300CER-F

