

Extended InGaAs Photodiodes IG22-Series

Description

The IG22-series is a panchromatic PIN photodiode with a nominal wavelength cut-off at 2.2 μm . This series has been designed for demanding spectroscopic and radiometric applications. It offers excellent shunt resistance in combination with superior responsivity over a wide range.

Features

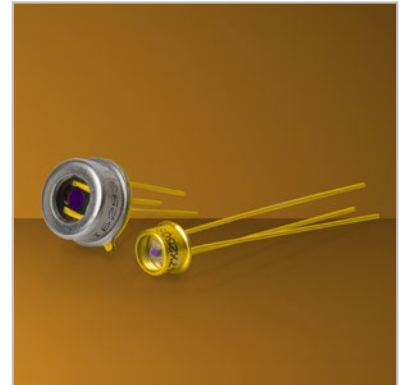
- 50% cut-off wavelength: $\geq 2.15 \mu\text{m}$
- Typical peak responsivity: 1.40 A/W
- Excellent temperature stability
- Reduced edge effect

Applications

- Spectrophotometer
- Diode laser monitoring
- Non-contact temperature measurement
- Flame control
- Moisture monitoring

Versions

- Uncooled
TO-can, chip only, digital module
- Cooled
TE1, TE2, TE3



Optical Characteristics, Specifications @ 25°C ^c

| Part Number | Diameter [μm] | 50% Cut off Wavelength ^a [μm] | Peak Wave- length ^a [μm] | Peak Responsivity ^{a,b} [A/W] | | Responsivity @ 520 nm ^{a,b,d} [A/W] | | Responsivity @ 1300 nm ^{a,b} [A/W] | | Responsivity @ 1500 nm ^{a,b} [A/W] | |
|--------------|------------------|--|---|--|------|--|------|---|------|---|------|
| | | | | Min. | Typ. | Min. | Typ. | Min. | Typ. | Min. | Typ. |
| IG22X250S4i | 250 | ≥ 2.15 | 1.95 ± 0.1 | 1.15 | 1.40 | TBD | 0.1 | 0.74 | 0.92 | 0.87 | 1.09 |
| IG22X500S4i | 500 | | | | | | | | | | |
| IG22X1000S4i | 1000 | | | | | | | | | | |
| IG22X1300S4i | 1300 | | | | | | | | | | |
| IG22X2000G1i | 2000 | | | | | | | | | | |
| IG22X3000G1i | 3000 | | | | | | | | | | |

^a Parameter tested on batch level at T = 25°C^b Responsivity measured at 0 V Bias.^c Data are prior to window integration.^d Preliminary data.

Electro-Optical Characteristics, Specifications @ 25°C

| Part Number | Diameter [μm] | Shunt Impedance @ V _r = 10 mV ^b [kOhm] | | Dark Current @ V _r = 0.25 V ^b [μA] | | Peak D* ^a f = 1 kHz [cm Hz ^{1/2} /W] | | Peak NEP ^a f = 1 kHz [W/Hz ^{1/2}] | |
|--------------|------------------|--|------|--|------|--|----------|--|----------|
| | | Min. | Typ. | Typ. | Max. | Min. | Typ. | Max. | Typ. |
| IG22X250S4i | 250 | 500 | 1000 | 0.05 | 0.5 | 3.1 E+11 | 4.5 E+11 | 1.6 E-13 | 1.1 E-13 |
| IG22X500S4i | 500 | 200 | 600 | 0.1 | 1 | 2.8 E+11 | 4.9 E+11 | 2.5 E-13 | 1.4 E-13 |
| IG22X1000S4i | 1000 | 60 | 300 | 0.2 | 2.5 | 2.2 E+11 | 4.9 E+11 | 4.6 E-13 | 2.0 E-13 |
| IG22X1300S4i | 1300 | 25 | 150 | 0.5 | 5 | 1.6 E+11 | 4.0 E+11 | 7.1 E-13 | 2.9 E-13 |
| IG22X2000G1i | 2000 | 12 | 40 | 1 | 10 | 1.3 E+11 | 2.5 E+11 | 1.0 E-12 | 5.6 E-13 |
| IG22X3000G1i | 3000 | 4 | 12 | 5 | 50 | 9.8 E+10 | 1.7 E+11 | 1.8 E-12 | 1.0 E-12 |

^a Parameter tested on batch level^b Parameter 100% tested

Electrical Characteristics, Specifications @ 25°C

| Part Number | Diameter [μm] | Capacitance @ $V_r = 0 \text{ V}^a$ | | Forward Voltage [V] | |
|--------------|-------------------------------|-------------------------------------|--|------------------------|--|
| | | Typ. | | Typ. | |
| IG22X250S4i | 250 | 40 | | 0.56 | |
| IG22X500S4i | 500 | 160 | | | |
| IG22X1000S4i | 1000 | 650 | | | |
| IG22X1300S4i | 1300 | 1100 | | | |
| IG22X2000G1i | 2000 | 1750 | | | |
| IG22X3000G1i | 3000 | 5200 | | | |

^a Parameter tested on batch level^b Parameter 100% tested

Thermoelectrically Cooled InGaAs Detectors

| Part Number | Diameter [μm] | Operating Temperature [°C] | Shunt Impedance @ $V_r = 10 \text{ mV}^b$ [kOhm] | | Peak D^*^a [$\text{cm Hz}^{1/2}/\text{W}$] | Peak NEP ^a [$\text{W}/\text{Hz}^{1/2}$] | Capacitance @ $V_r = 0 \text{ V}^a$ [pF] |
|-------------|-------------------------------|----------------------------------|--|-------|---|---|--|
| | | | Min. | Typ. | Typ. | Typ. | Typ. |
| IG22X250T7 | 250 | -20 | 11000 | 23500 | 1.2E+12 | 1.8E-14 | 40 |
| IG22X1000T7 | 1000 | | 600 | 1200 | 1.0E+12 | 8.1E-14 | 650 |
| IG22X2000T7 | 2000 | | 120 | 240 | 9.8E+11 | 1.8E-13 | 1750 |
| IG22X3000T7 | 3000 | | 62 | 190 | 1.3E+12 | 2.0E-13 | 5200 |
| IG22X250T9 | 250 | -40 | 48000 | 90000 | 2.7E+12 | 8.3E-15 | 40 |
| IG22X1000T9 | 1000 | | 1600 | 3200 | 2.0E+12 | 4.4E-14 | 650 |
| IG22X2000T9 | 2000 | | 400 | 800 | 2.0E+12 | 8.8E-14 | 1750 |
| IG22X3000T9 | 3000 | | 260 | 610 | 2.6E+12 | 1.0E-13 | 5200 |

Absolute Maximum Ratings

| | Min. | Max. |
|---|------|------|
| Storage Temperature [°C] | -55 | +125 |
| Operating Temperature [°C] | -40 | +85 |
| Reverse Bias, cw [V] | | 1 |
| Forward Current, cw [mA] | | 1 |
| Soldering temperature, 5 sec. [°C] | | 260 |
| ESD Damage Threshold, Human Body Model Class 0* [V] | 0 | <250 |
| TE Cooler allowable voltage [V] | | 3.7 |
| TE Cooler allowable current [A] | | 1.1 |

*ANSI/ ESD STM5. 1-2007

Fig. 1: Spectral Response

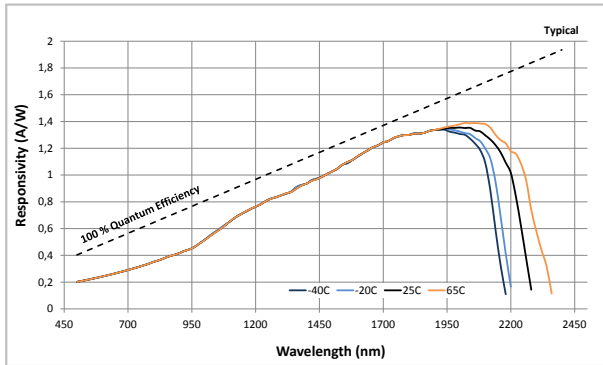


Fig. 2: Dark Current vs. Reverse Voltage

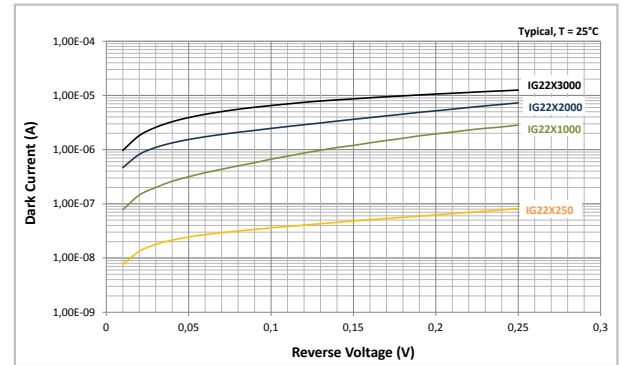


Fig. 3: Shunt Resistance vs. Temperature

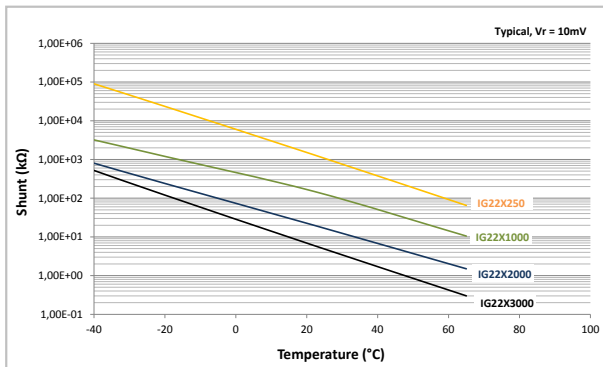


Fig. 4: Detectivity vs. Shunt x Area

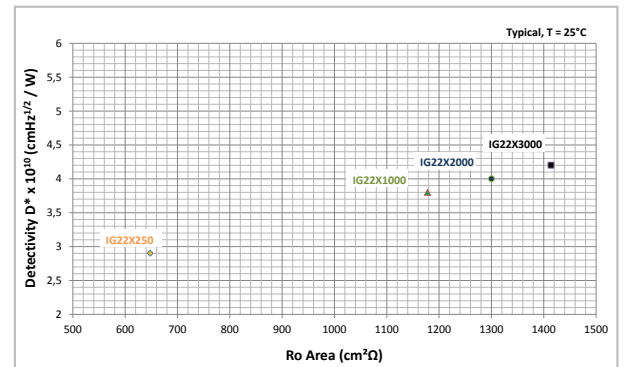


Fig. 5: Capacitance vs. Reverse Voltage

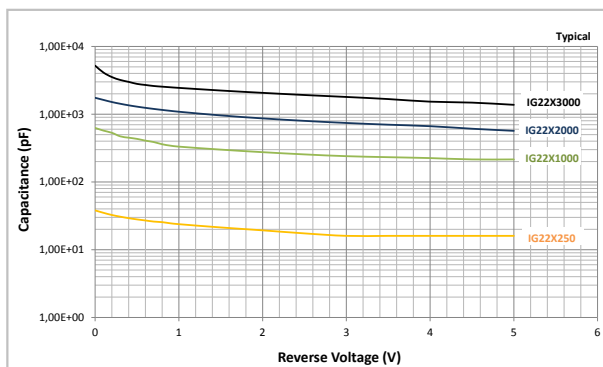


Fig. 6: Responsivity Temperature Coefficient

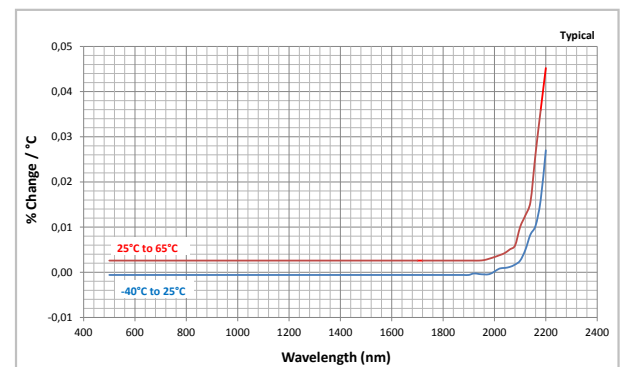


Fig. 7: Sample Pulse Response

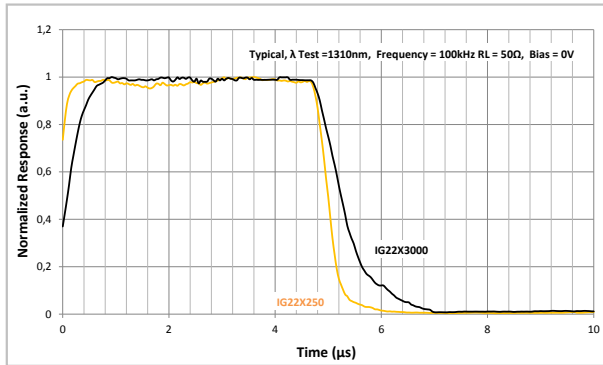
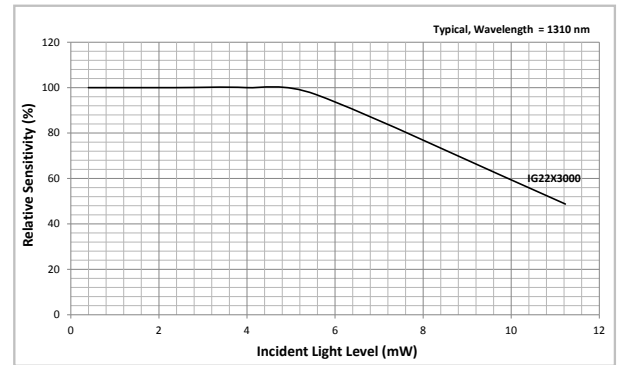


Fig. 8: Linearity



Nomenclature

| | | | | | | | | | | | | | |
|-----------|--------------------------------|----------|----------|----------|----------|---------------|----------|----------|----------|------------------------------|----------|----------|--|
| C- | I | G | 2 | 2 | X | | 2 | 5 | 0 | S | 4 | i | |
| Chip only | Type | | | | | Diameter | | | | Package Style | | | |
| | Extended InGaAs PIN Photodiode | | | | | 250 = 250 µm | | | | S4i - TO-46, isolated | | | |
| | | | | | | 500 = 500 µm | | | | S4ix - TO-46, no window | | | |
| | | | | | | 1000 = 1 mm | | | | G1i - TO-39, isolated | | | |
| | | | | | | 1300 = 1.3 mm | | | | G1ix - TO-39, no window | | | |
| | | | | | | 2000 = 2 mm | | | | T7 - TO-37, single stage TEC | | | |
| | | | | | | 3000 = 3 mm | | | | T9 - TO-66, dual stage TEC | | | |
| | | | | | | | | | | M2 - 2 pad PCB SMD | | | |
| | | | | | | | | | | L5 - TO-46 lens cap | | | |

Standard window: Borosilicate glass

Package drawings, TEC and thermistor curves can be found on a separate datasheet.

Product Changes

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