LASER COMPONENTS®

# Extended InGaAs Photodiodes IG22-Series

## Description

The IG22-series is a panchromatic PIN photodiode with a nominal cut-off wavelength 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 spectal range.

## Features

- 50% cut-off wavelength: > 2.15 µm
- 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
- Cooled:
  TE1, TE2

07/23 / V09 / MB-IF / lc-ingaas/ig22-extended-ingaas



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# Extended InGaAs Photodiodes
# IG22-Series

## Optical Characteristics, Specifications @ 25 °C [c]

| Part Number | Diameter [µm] | 50% Cut off Wavelength [a] [µm] | Peak Wavelength [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] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Typ. | Min. | Typ. | Min. | Typ. | Min. | Typ. | Min. | Typ. |
| IG22X080S4i | 80 | ≥ 2.15 | 1.95 ± 0.1 | 1.15 | 1.40 | TBD | 0.1 | 0.74 | 0.92 | 0.87 | 1.09 |
| IG22X250S4i | 250 | | | | | | | | | | |
| 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 ½/W] | | Peak NEP [a] f = 1 kHz [W/Hz ½] | |
|---|---|---|---|---|---|---|---|---|---|
| | | Min. | Typ. | Typ. | Max. | Min. | Typ. | Max. | Typ. |
| IG22X080S4i | 80 | 1500 | 3000 | 0.01 | 0.05 | 9.0 E+10 | - | 2.2 E-13 | - |
| 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



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## Electrical Characteristics, Specifications @ 25 °C

| Part Number | Diameter [µm] | Capacitance @ $V_R$= 0 V[a] [pF] | Forward Voltage [V] |
|---|---|---|---|
| | | Typ. | Typ. |
| IG22X080S4i | 80 | 10 | |
| IG22X250S4i | 250 | 40 | |
| IG22X500S4i | 500 | 160 | |
| IG22X1000S4i | 1000 | 650 | 0.56 |
| 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 mV[b] [kOhm] | | Peak D* [a] [cm Hz½/W] | Peak NEP[a] [W/Hz½] | Capacitance @ $V_R$= 0 V[a] [pF] |
|---|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Typ. | Typ. | Typ. |
| IG22X250T7 | 250 | -10 | 2500 | 5000 | 1.0E+12 | 5.0E-14 | 40 |
| IG22X1000T7 | 1000 | | 300 | 1500 | 1.1E+12 | 9.1E-14 | 650 |
| IG22X2000T7 | 2000 | | 60 | 200 | 5.7E+11 | 2.5E-13 | 1750 |
| IG22X3000T7 | 3000 | | 20 | 60 | 3.8E+11 | 4.6E-13 | 5200 |
| IG22X250T9 | 250 | -20 | 5000 | 10000 | 1.4E+12 | 3.5E-14 | 40 |
| IG22X1000T9 | 1000 | | 600 | 3000 | 1.5E+12 | 6.5E-14 | 650 |
| IG22X2000T9 | 2000 | | 120 | 400 | 8.0E+11 | 1.8E-13 | 1750 |
| IG22X3000T9 | 3000 | | - | - | - | - | 5200 |



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## Absolute Maximum Ratings

| | | Min. | Max. |
|---|---|---|---|
| Storage temperature [°C] | | -55 | +125 |
| Operating temperature [°C] | | -40 | +85 |
| Reverse bias, cw [V] | | | 0.25 |
| 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] | T7<br>T9 | -<br>- | 0.8<br>3.7 |
| TE cooler allowable current [A] | T7<br>T9 | -<br>- | 1.9<br>1.2 |

*ANSI/ ESD STM5. 1-2007
Valid with sufficient heat sinking only.

## ESD sensitive device.

High electrostatic discharge can damage or degrade the device.
Use proper EDS handling precautions.



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Fig. 1: Spectral Response

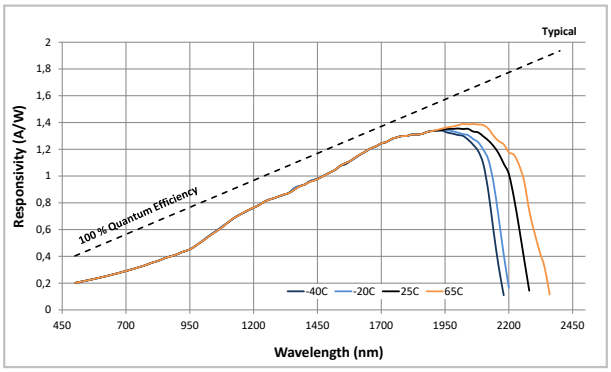


Fig. 2: Dark Current vs. Reverse Voltage

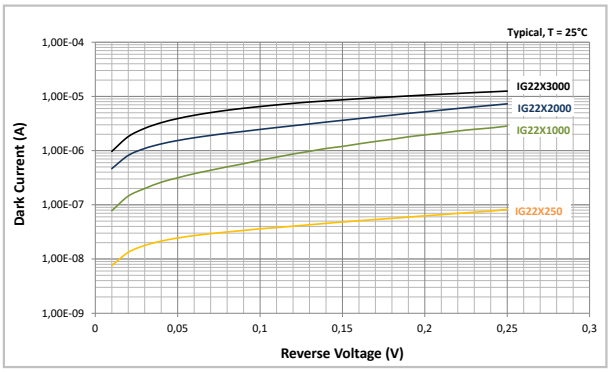


Fig. 3: Shunt Resistance vs. Temperature

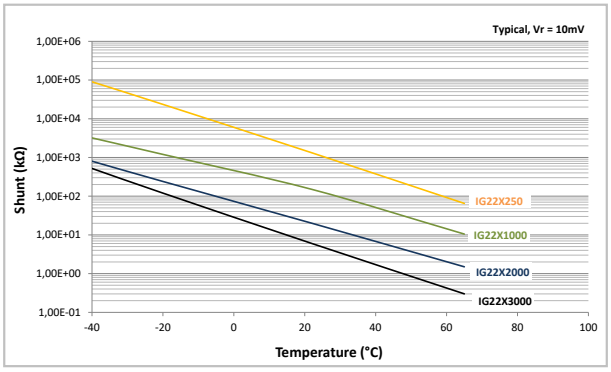


Fig. 4: Shunt Resistance vs. Detectivity

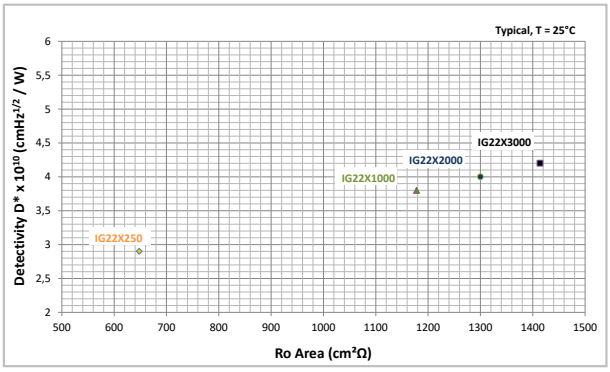


Fig. 5: Capacitance vs. Reverse Voltage

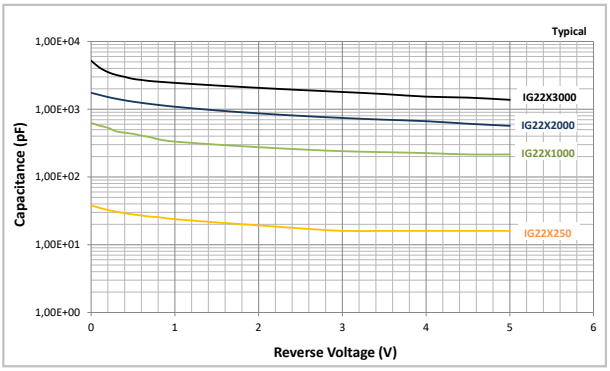


Fig. 6: Responsivity Temperature Coefficient

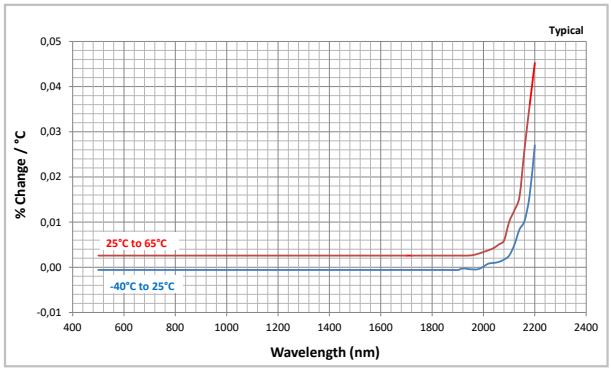




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Fig. 7: Sample Pulse Response

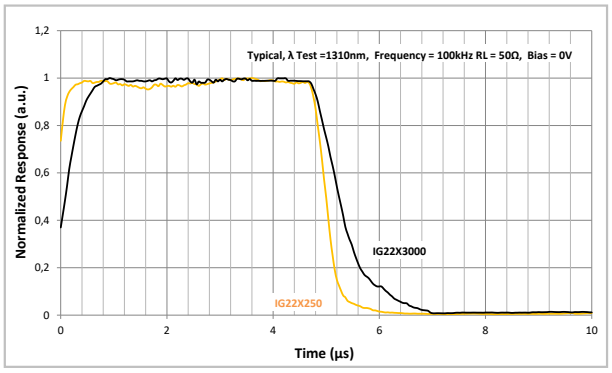
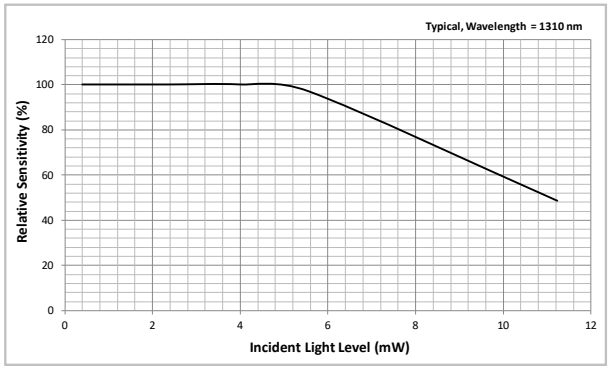



Fig. 8: Linearity



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## Nomenclature

| C- | I | G | 2 | 2 | X | | 2 | 5 | 0 | S | 4 | i | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| Chip only |
|---|

| Type |
|---|
| Extended InGaAs PIN Photodiode |

| Diameter | | |
|---|---|---|
| 080 | = | 80 µm |
| 250 | = | 250 µm |
| 500 | = | 500 µm |
| 1000 | = | 1 mm |
| 1300 | = | 1.3 mm |
| 2000 | = | 2 mm |
| 3000 | = | 3 mm |

| Package Style | | |
|---|---|---|
| S4i | - | TO-46, isolated |
| S4ix | - | TO-46, no window |
| G1i | - | TO-39, isolated |
| G1ix | - | TO-39, no window |
| T7 | - | TO-37, single stage TEC |
| T9 | - | TO-66, dual stage TEC |
| 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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