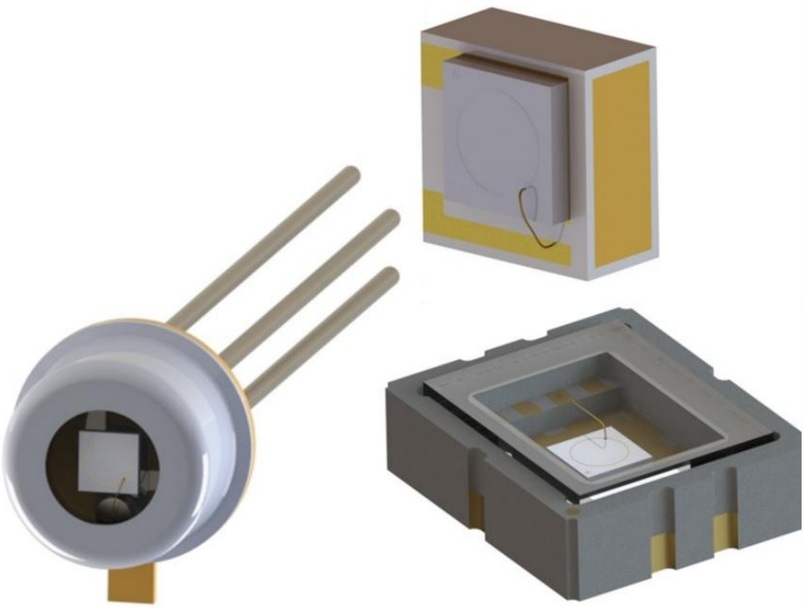
OPTOELECTRONICS

Extended InGaAs Photodiode

1.9µm to 2.6µm cutoff wavelength

0.3mm – 3mm dia. active areas



APPLICATIONS

- Gas sensing
- Hydrocarbon sensing
- Flame and spark detection
- FTIR
- Spectroscopy
- SWIR photodetection

AVAILABLE OPTIONS

- Chip active diameters from 0.3mm to 3mm
- High shunt resistance
- Multiple window and lens options
- Packages (TO-46, TO-18 or TO-5)
- Thermoelectric cooled options available

SPECIFICATIONS

Extended InGaAs Photodiode @ 1.9µm Cutoff

Part Number	N19S30-XX	N19S50-XX	N19S100-XX	N19S200-XX	N19S300-XX	Units
Optoelectronic Characteristics @ 23 ºC ± 2 ºC						
Active Diameter	0.3	0.5	1.0	2.0	3.0	**mm**
Peak Wavelength (typ)	1.7 ± 0.1	1.7 ± 0.1	1.7 ± 0.1	1.7 ± 0.1	1.7 ± 0.1	**µm**
Cutoff Wavelength (50%)	1.9 ± 0.1	1.9 ± 0.1	1.9 ± 0.1	1.9 ± 0.1	1.9 ± 0.1	**µm**
Responsivity @ λ_p (min/typ)	0.9/1.0	0.9/1.0	0.9/1.0	0.9/1.0	0.9/1.0	**A/W**
Shunt Resistance (min)	15	2	1	0.25	0.11	**MΩ**
Dark Current (max)	0.1 @ 1V	0.9 @ 1V	4.0 @ 1V	10.0 @ 1V	22.5 @ 1V	**µA**
Capacitance (typ) @ 0V	60	200	600	3000	6750	**pF**
Bandwidth w/ 50 Ω @ 0V	53	16	5.3	1.1	0.47	**MHz**
Rise time w/ 50 Ω 2 0V (typ)	6.6	22	66	33	742	**ns**
NEP @ λ_{PEAK} (typ)	3 x 10^{-14}	9 x 10^{-14}	12.8 x 10^{-14}	26 x 10^{-14}	38 x 10^{-14}	**$W/Hz^{1/2}$**
Linearity (± 0.2 dB @ 0V)	6	6	6	6	6	**dBm**
Standard Package	TO-46 window cap	TO-46 window cap	TO-46 window cap	TO-5 window cap	TO-5 window cap	
Maximum Ratings @ 23 °C ± 2 °C						
Storage Temperture	-40 to 125	-40 to 125	-40 to 125	-40 to 125	-40 to 125	**°C**
Operating Temperture	-40 to 85	-40 to 85	-40 to 85	-40 to 85	-40 to 85	**°C**
Reverse Voltage	3	2	2	2	1	**V**
Reverse Current	10	10	10	10	10	**mA**
Forward Current	10	10	10	10	10	**mA**
Power Dissipation	50	50	50	50	50	**mW**

Extended InGaAs Photodiode @ 2.05µm Cutoff

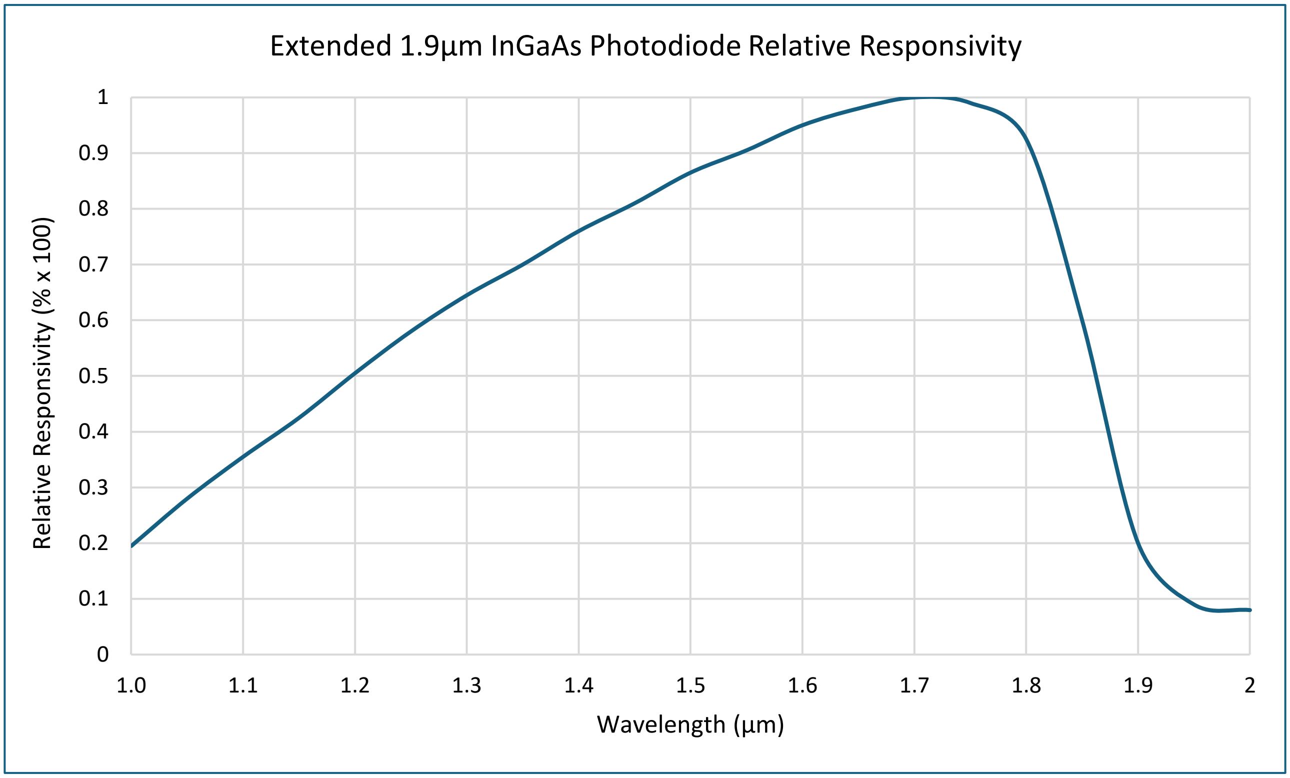
Part Number	N21S30-XX	N21S50-XX	N21S100-XX	N21S200-XX	N21S300-XX	Units
Optoelectronic Characteristics @ 23 ºC ± 2 ºC						
Active Diameter	0.3	0.5	1.0	2.0	3.0	**mm**
Peak Wavelength (typ)	1.8 ± 0.1	1.8 ± 0.1	1.8 ± 0.1	1.8 ± 0.1	1.8 ± 0.1	**µm**
Cutoff Wavelength (50%)	2.05 ± 0.1	2.05 ± 0.1	2.05 ± 0.1	2.05 ± 0.1	2.05 ± 0.1	**µm**
Responsivity @ λ_p (min/typ)	0.9/1.0	0.9/1.0	0.9/1.0	0.9/1.0	0.9/1.0	**A/W**
Shunt Resistance (min)	2	1	0.3	0.09	0.015	**MΩ**
Dark Current (max)	0.5 @ 1V	1.0 @ 1V	4.0 @ 1V	10.0 @ 1V	12.0 @ 1V	**µA**
Capacitance (typ) @ 0V	80	250	500	1600	4000	**pF**
Bandwidth w/ 50 Ω @ 0V	40	12.7	6.4	2	0.8	**MHz**
Rise time w/ 50 Ω 2 0V (typ)	9	27.5	55	175	440	**ns**
NEP @ λ_{PEAK} (typ)	5.7 x 10^{-14}	8.1 x 10^{-14}	23.4 x 10^{-14}	42.8 x 10^{-14}	90.7 x 10^{-14}	**W/Hz$^{1/2}$**
Linearity (± 0.2 dB @ 0V)	6	6	6	6	6	**dBm**
Standard Package	TO-46 window cap	TO-46 window cap	TO-46 window cap	TO-5 window cap	TO-5 window cap	
Maximum Ratings @ 23 °C ± 2 °C						
Storage Temperture	-40 to 125	-40 to 125	-40 to 125	-40 to 125	-40 to 125	**°C**
Operating Temperture	-40 to 85	-40 to 85	-40 to 85	-40 to 85	-40 to 85	**°C**
Reverse Voltage	2	2	2	2	1	**V**
Reverse Current	10	10	10	10	10	**mA**
Forward Current	10	10	10	10	10	**mA**
Power Dissipation	50	50	50	50	50	**mW**

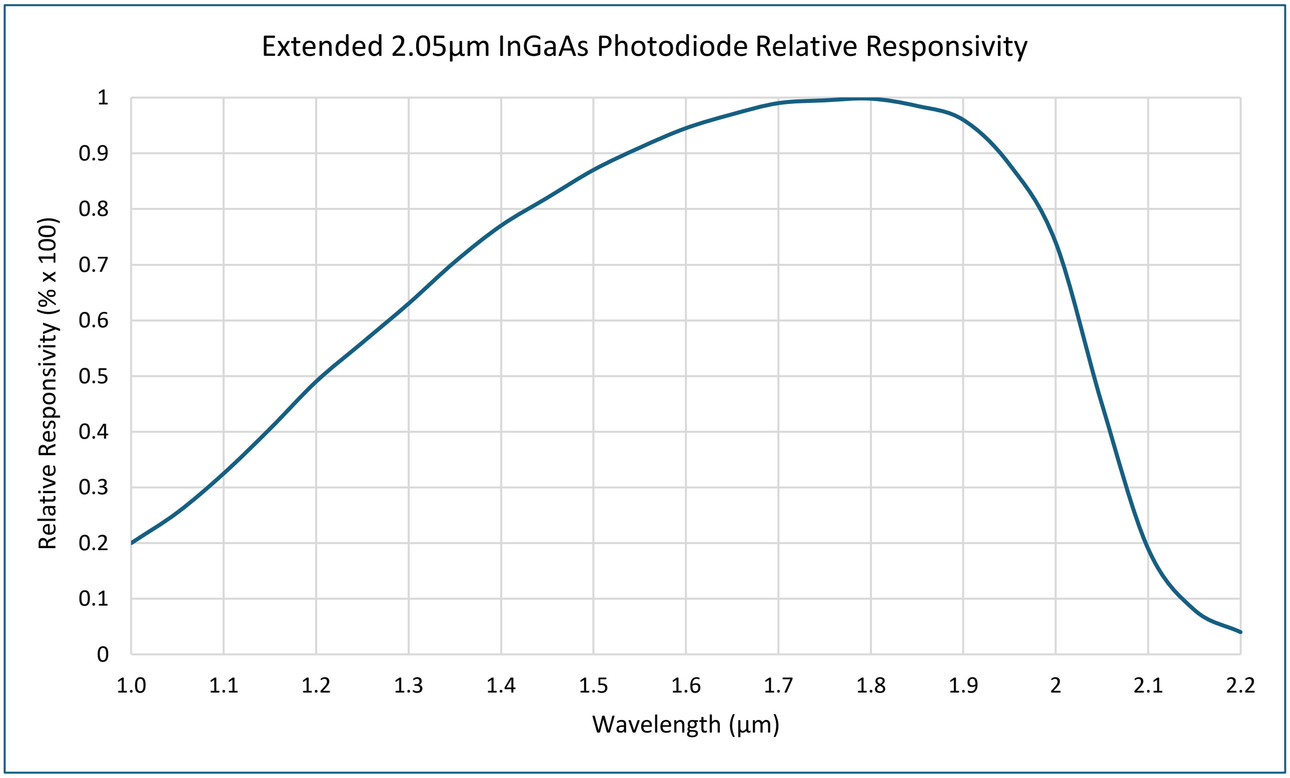
Extended InGaAs Photodiode @ 2.2µm Cutoff

Part Number	N22S30-XX	N22S50-XX	N22S100-XX	N22S200-XX	N22S300-XX	Units
Optoelectronic Characteristics @ 23 ºC ± 2 ºC						
Active Diameter	0.3	0.5	1.0	2.0	3.0	**mm**
Peak Wavelength (typ)	2.0 ± 0.1	2.0 ± 0.1	2.0 ± 0.1	2.0 ± 0.1	2.0 ± 0.1	**µm**
Cutoff Wavelength (50%)	2.2 ± 0.1	2.2 ± 0.1	2.2 ± 0.1	2.2 ± 0.1	2.2 ± 0.1	**µm**
Responsivity @ λ_p (min/typ)	0.9/1.0	0.9/1.0	0.9/1.0	0.9/1.0	0.9/1.0	**A/W**
Shunt Resistance (min)	0.5	0.18	0.04	0.006	0.002	**MΩ**
Dark Current (max)	1.0 @ 1V	5.0 @ 1V	10.0 @ 1V	40.0 @ 1V	100.0 @ 1V	**µA**
Capacitance (typ) @ 0V	90	275	1000	4000	8000	**pF**
Bandwidth w/ 50 Ω @ 0V	35	11.6	3.18	0.795	0.397	**MHz**
Rise time w/ 50 Ω 2 0V (typ)	10	30	110	440	881	**ns**
NEP @ λ_{PEAK} (typ)	14.3 x 10^{-14}	22.3 x 10^{-14}	46.8 x 10^{-14}	128 x 10^{-14}	287 x 10^{-14}	**W/Hz$^{1/2}$**
Linearity (± 0.2 dB @ 0V)	6	6	6	6	6	**dBm**
Standard Package	TO-46 window cap	TO-46 window cap	TO-46 window cap	TO-5 window cap	TO-5 window cap	
Maximum Ratings @ 23 °C ± 2 °C						
Storage Temperture	-40 to 125	-40 to 125	-40 to 125	-40 to 125	-40 to 125	**°C**
Operating Temperture	-40 to 85	-40 to 85	-40 to 85	-40 to 85	-40 to 85	**°C**
Reverse Voltage	2	2	1	1	1	**V**
Reverse Current	10	10	10	10	10	**mA**
Forward Current	10	10	10	10	10	**mA**
Power Dissipation	50	50	50	50	50	**mW**

Extended InGaAs Photodiode @ 2.6µm Cutoff

Part Number	N26S30-XX	N26S50-XX	N26S100-XX	N26S200-XX	N26S300-XX	Units
Optoelectronic Characteristics @ 23 ºC ± 2 ºC						
Active Diameter	0.3	0.5	1.0	2.0	3.0	**mm**
Peak Wavelength (typ)	2.2 ± 0.1	2.2 ± 0.1	2.2 ± 0.1	2.2 ± 0.1	2.2 ± 0.1	**µm**
Cutoff Wavelength (50%)	2.6 ± 0.1	2.6 ± 0.1	2.6 ± 0.1	2.6 ± 0.1	2.6 ± 0.1	**µm**
Responsivity @ λ_p (min/typ)	0.9/1.0	0.9/1.0	0.9/1.0	0.9/1.0	0.9/1.0	**A/W**
Shunt Resistance (min)	16	5	2	0.5	0.2	**kΩ**
Dark Current (max)	13 @ 1V	20 @ 1V	80 @ 1V	320 @ 1V	500 @ 1V	**µA**
Capacitance (typ) @ 0V	100	270	1000	4400	10000	**pF**
Bandwidth w/ 50 Ω @ 0V	32	16	3.2	0.8	0.35	**MHz**
Rise time w/ 50 Ω 2 0V (typ)	11	22	110	440	1000	**ns**
NEP @ λ_{PEAK} (typ)	81 x 10^{-14}	143 x 10^{-14}	203 x 10^{-14}	331 x 10^{-14}	574 x 10^{-14}	**W/Hz$^{1/2}$**
Linearity (± 0.2 dB @ 0V)	6	6	6	6	6	**dBm**
Standard Package	TO-46 window cap	TO-46 window cap	TO-46 window cap	TO-5 window cap	TO-5 window cap	
Maximum Ratings @ 23 °C ± 2 °C						
Storage Temperture	-40 to 125	-40 to 125	-40 to 125	-40 to 125	-40 to 125	**°C**
Operating Temperture	-40 to 85	-40 to 85	-40 to 85	-40 to 85	-40 to 85	**°C**
Reverse Voltage	2	0.5	0.5	0.5	0.5	**V**
Reverse Current	10	10	10	10	10	**mA**
Forward Current	10	10	10	10	10	**mA**
Power Dissipation	50	50	50	50	50	**mW**


Extended 1.9µm InGaAs Photodiode Relative Responsivity
Relative Responsivity (% x 100)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.0
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2
Wavelength (µm)

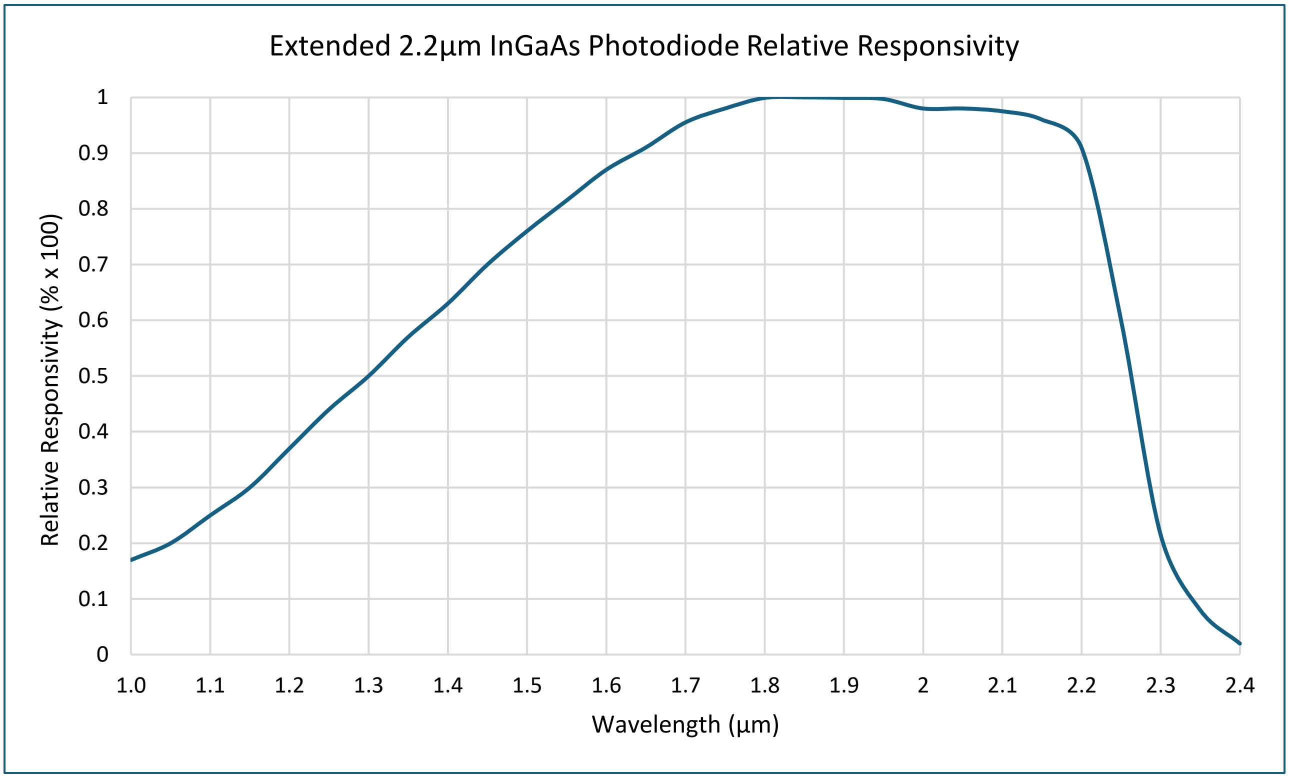

Extended 2.05µm InGaAs Photodiode Relative Responsivity
Relative Responsivity (% x 100)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.0
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2
2.1
2.2
Wavelength (µm)

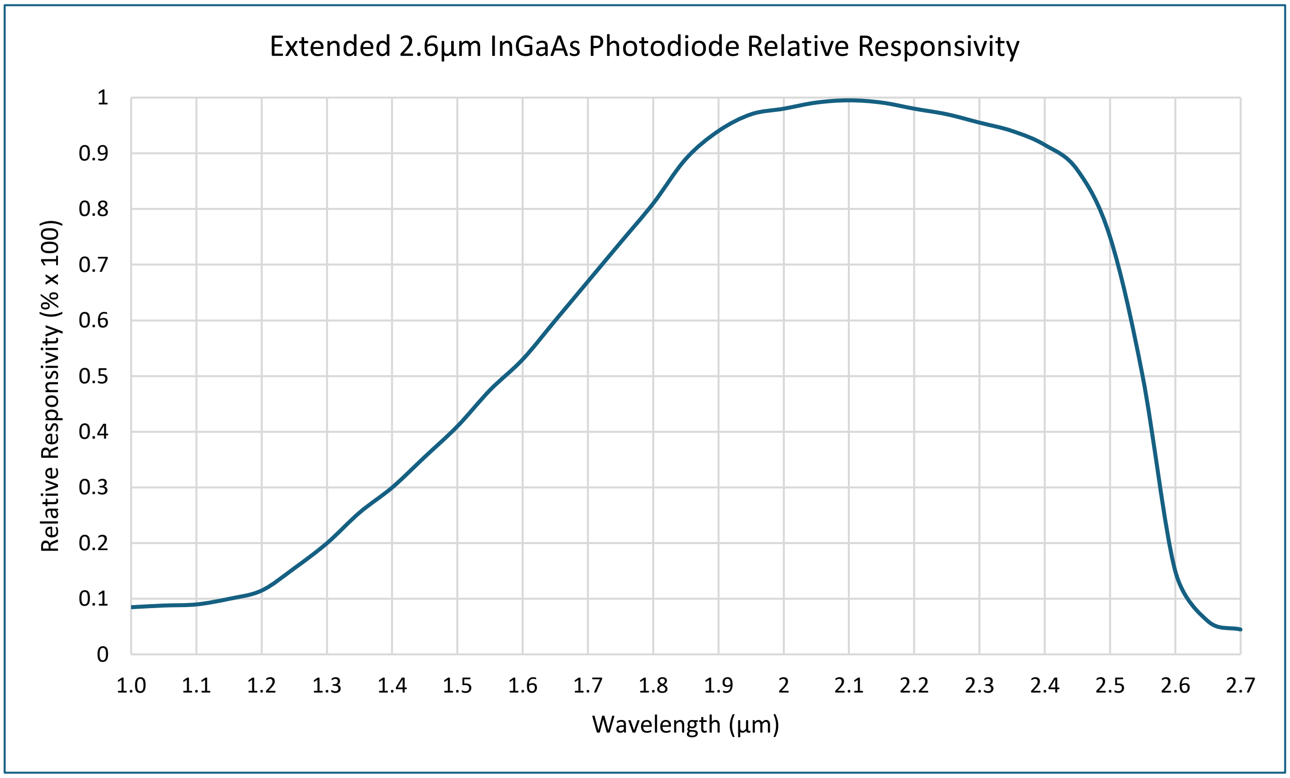
GPD OPTOELECTRONICS

Extended InGaAs Photodiode

1.9µm to 2.6µm cutoff wavelength

0.3mm – 3mm dia. active areas





PACKAGING CAPABILITIES

Packaging Configurations					
Diameter (mm)	TO Header			Ceramic Leadless Chip Carrier	
	TO-46	TO-18	TO-5	LCC-6	LCC-28
0.3	●	●			
0.5	●	●		●	
1	●	●	●	●	
2			●	●	
3			●		●

Window (Other Options Available)		
Material	Molded Clear Glass	Borosilicate Glass
Thickness (mm)	0.25	0.5

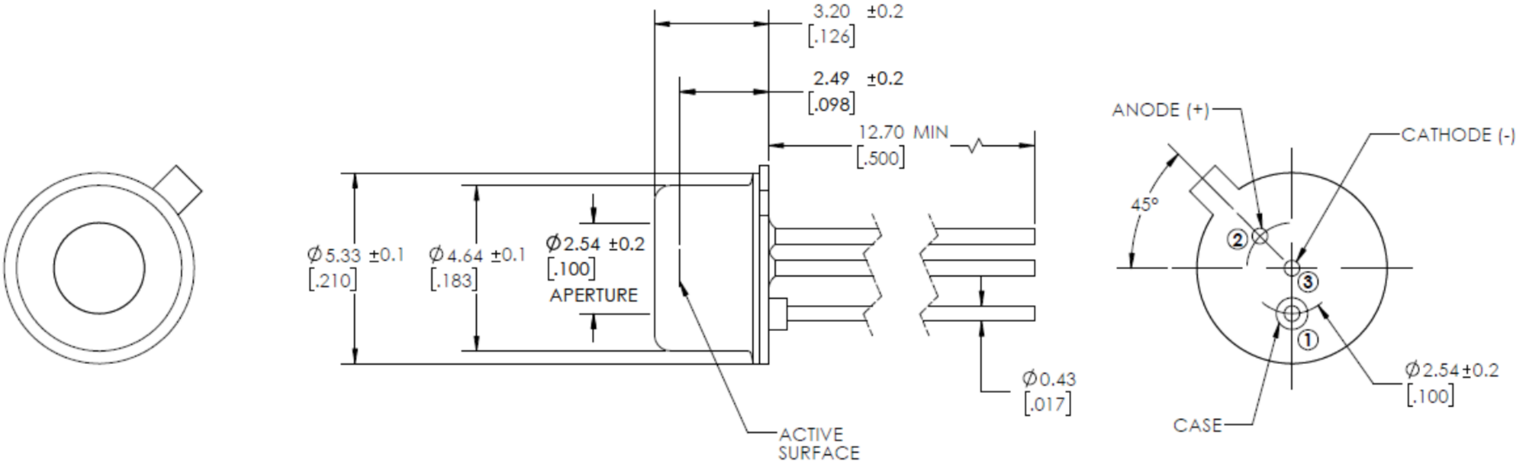
GPD QUALIFICATIONS

Our compliance, certificates, and capabilities

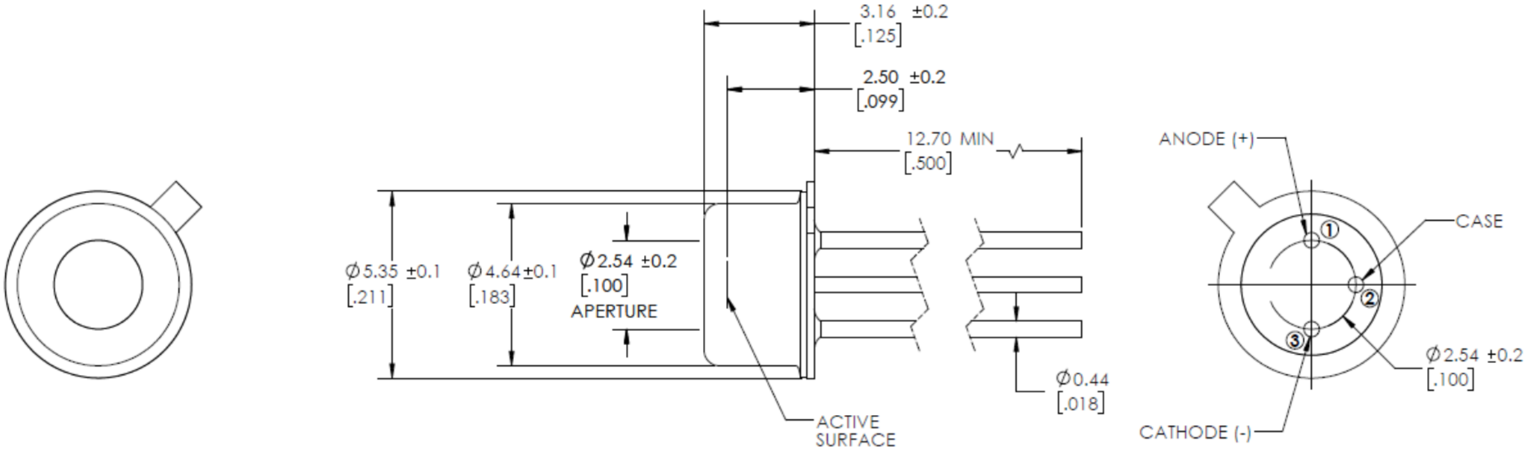
- ✓ **ISO 9001:2005**
- ✓ **Quality Assurance Provisions**
- ✓ **DDTC/ITAR registered**
- ✓ **MIL-STD-883**
- ✓ **MIL-STD-750**
- ✓ **Space-qualified designs**
- ✓ **High-reliable assembly and environmental/ radiation test**
- ✓ **Manufactured in Salem, NH**

Packaging Outline

TO-46



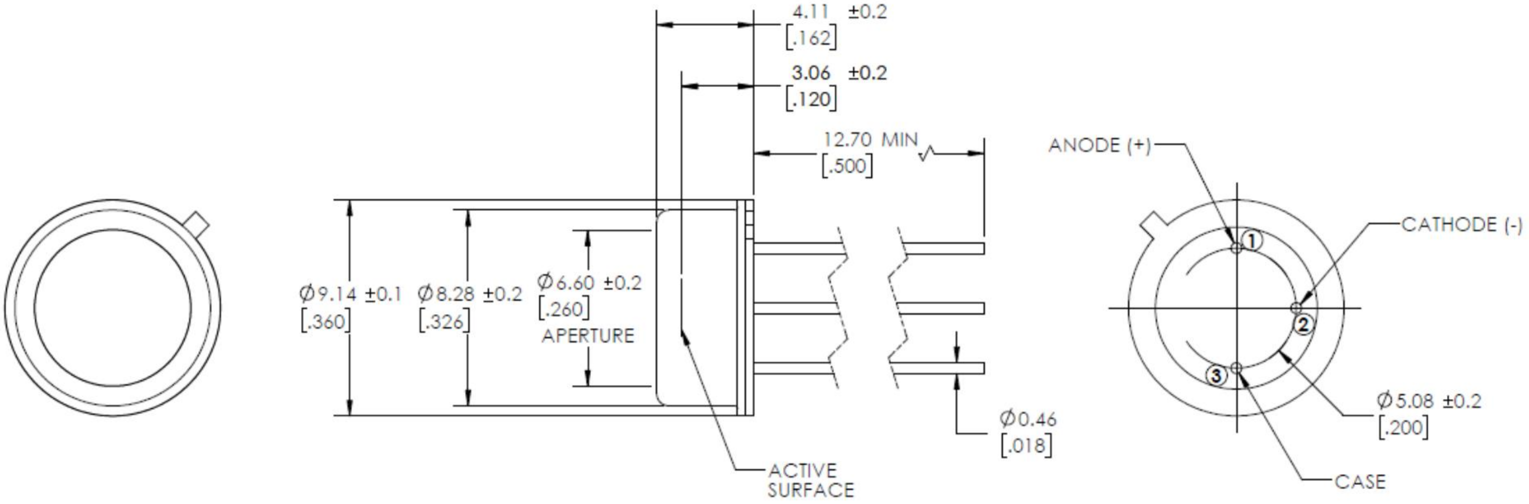
TO-18



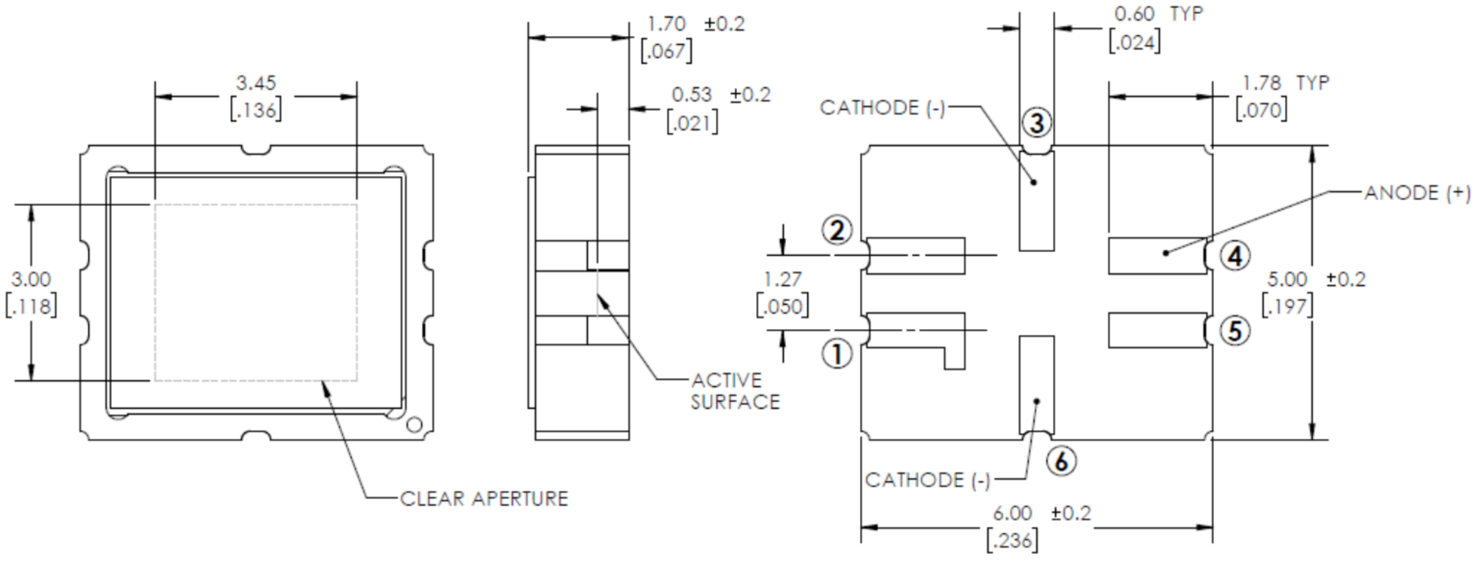
DIMENSIONS IN MM [INCH]

Packaging Outline

TO-5



LCC-6

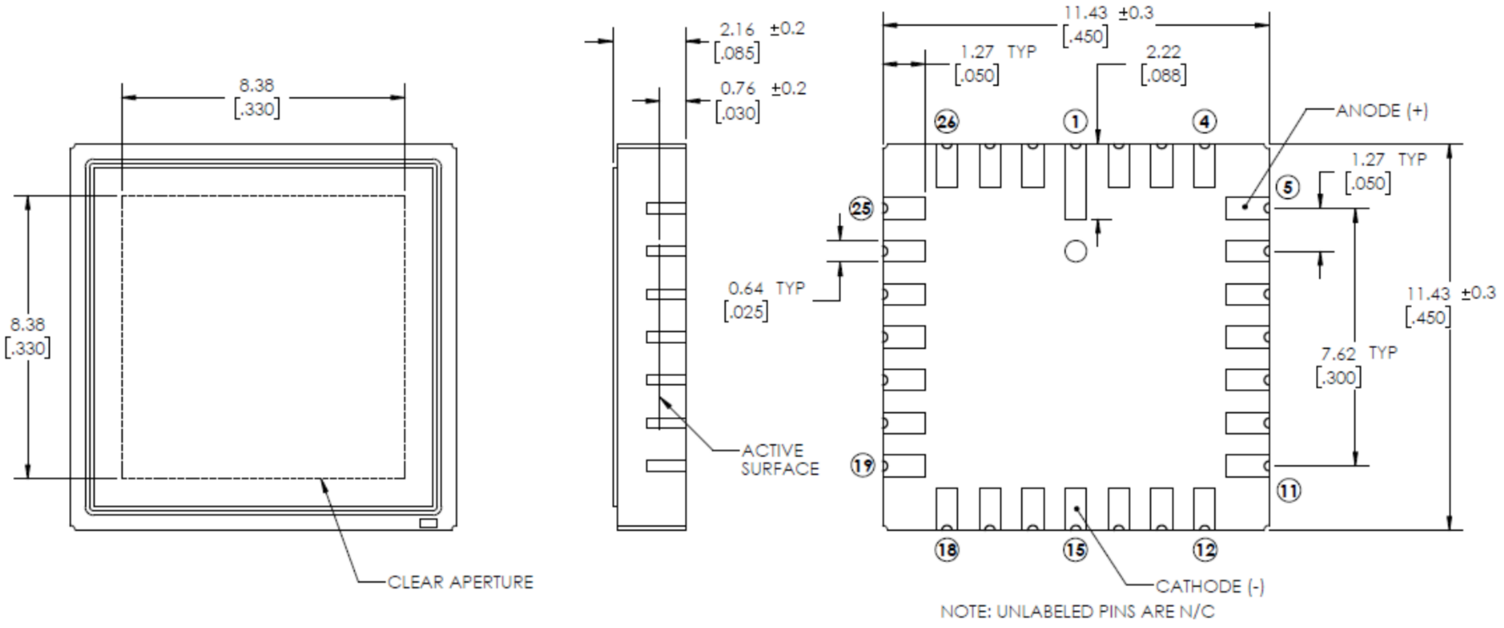


NOTE: UNLABELED PINS ARE N/C

DIMENSIONS IN MM [INCH]

Packaging Outline

LCC-28

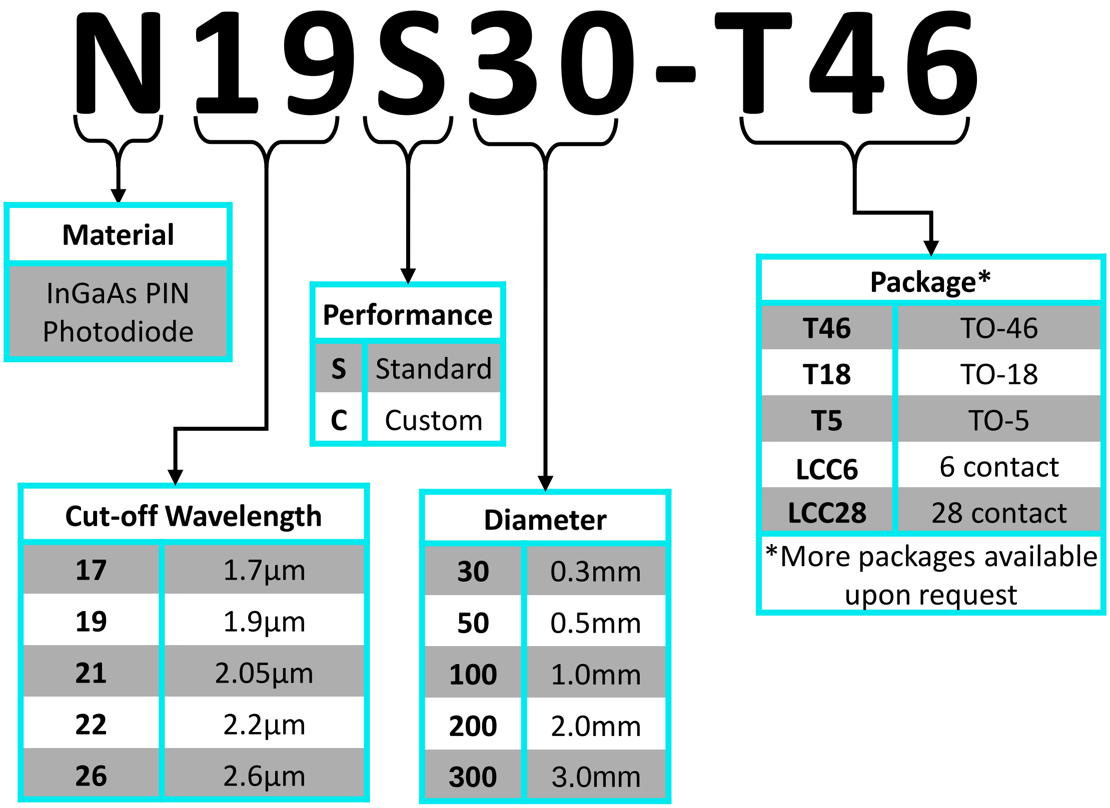


DIMENSIONS IN MM [INCH]

ORDERING INFORMATION

GPD is proud to offer multiple packaging solutions to best fit the needs of your application. Our Standard configurations are mentioned below, and custom packaging is also available.

Selection is based on the size of the photodiode and the package requirements of your application. Refer to packaging capabilities chart below for more information.



N19S30-T46

Material
InGaAs PIN Photodiode

Performance	
S	Standard
C	Custom

Cut-off Wavelength	
17	1.7µm
19	1.9µm
21	2.05µm
22	2.2µm
26	2.6µm

Diameter	
30	0.3mm
50	0.5mm
100	1.0mm
200	2.0mm
300	3.0mm

Package*	
T46	TO-46
T18	TO-18
T5	TO-5
LCC6	6 contact
LCC28	28 contact

*More packages available upon request

NOTE: GPD Optoelectronics may update product details without prior notice, and any use or application of our products is at your own discretion.

Handling and Processing Precautions

Electrostatic Discharge (ESD) Warning

Our detectors are highly susceptible to damage from electrostatic discharge (ESD). To prevent damage, use ESD protective measures, such as grounding straps, when unpacking and handling these devices.

To guarantee the optimal performance of a photodiode, it is crucial to adhere strictly to the device's electrical specifications. Photodiodes are highly sensitive to values that surpass their absolute maximum ratings. Exceeding these limits can lead to damage or total failure of the device. Users should employ handling techniques that avoid electrostatic discharges and other electrical surges during both the handling and operation of these devices.

Cleanroom Packaging and Handling

Our detectors are packaged in a clean state under cleanroom conditions, eliminating the need for cleaning before processing. In fact, cleaning is not recommended as it may introduce contaminants.

Processing Guidelines

To maintain the cleanliness of our detectors:

- Process under the cleanest conditions possible, including clean workplaces and room air.
- Wear suitable gloves or fingerstalls to prevent fingerprint contamination (mainly fats and organic acids).
- Ensure the soldering process is designed to prevent the need for post-soldering cleaning.

Cleaning Optical Windows (if necessary)

If exceptional circumstances require cleaning the optical windows:

- First, identify the type of contamination.
- For loose particles, gently blow them off with nitrogen gas or clean, dry air.
- For attached particles or other contaminating materials, clean with solvents such as isopropyl alcohol, or First Contact™ Polymer