

Low-Noise InGaAs APD



CMC Electronics' 264-339767-VAR series is an InGaAs APD with very high operating gain above $M = 100$, very low k-factor (k), and Excess Noise Figure (F), in a TO-hermetic package.

Based on an industry-proven design and optimized for fast overload recovery, the 264-339767 InGaAs APDs have a high Quantum Efficiency (QE) over the wavelength range of 950 - 1600 nm.

With low leakage current, high dynamic range is maintained even at high operating temperatures, reducing the need for cooling.

Customizations such as detector size, noise, pass band filter or responsivity screening are available upon request.

Features

- Active area from 20 – 3500 μm
- High gain above 100
- Low k-factor InGaAs APD
- Low Excess Noise Factor (F)
- Low Noise Equivalent Power (NEP)
- High dynamic range
 - $\Delta V \approx 8 \text{ V}$ ($M = 10$)
 - $\Delta V \approx 4 \text{ V}$ ($M = 45$)
 - $\Delta V \approx 1 \text{ V}$ ($M = 100$)
- Wide Operating Temp Range

Applications

- Optical Time-Domain Reflectometry (OTDR)
- LiDAR and Laser Range Finding (LRF)
- Distributed Temperature Sensing (DTS)
- Distributed Acoustic Systems (DAS)
- Structural Health Monitoring (SHM)

Table 1. Electro-Optical Common Characteristics

Conditions: $T_A = 25^\circ\text{C}$, $M = 10$ unless otherwise specified

Parameter	Symbol	Min	Typ	Max	Units
Breakdown Voltage	V_{BR}	45		80	V
Operating point from Breakdown Voltage ($V_{BR} - V_{OP}$)	ΔV	7	8		V
Temperature Coefficient of V_{OP}	$\Delta V/\Delta T$		0.06		V/ $^\circ\text{C}$
Quantum Efficiency (1064-1550 nm)	QE	75	83		%
Responsivity at 1550 nm	R	8.5	9.4		A/W
Excess Noise Factor	F		3.2		
Recommended Operating Gain (Note 1)	M	10	65	100	
Operating Temperature	T_A	-45		+85	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55		+125	$^\circ\text{C}$

Note: 1. Noise increases with gain and depends on bulk and surface currents.

Table 2. Electro-Optical Specific Characteristics

Conditions: $T_A = 25^\circ\text{C}$, $M = 10$ unless otherwise specified

Parameter	Symbol	Typ	Max	Typ	Max	Typ	Max	Typ	Max	Typ	Max	Typ	Max	Units
APD Active Area (VAR)		350 (006)		200 (001)		80 (002)		50 (003)		30 (004)		20 (005)		μm
Dark current	I_d	30	150	10	50	2	10	1	5	0.25	0.5	0.3	1.5	nA
Capacitance	C_d	3.2	4.0	1.5	2.0	0.35	0.4	0.25	0.3		0.25		0.25	pF
Spectral Noise Current	i_n	0.7		0.36		0.18		0.14		0.045		0.13		$\text{pA}/\sqrt{\text{Hz}}$
Bandwidth	f_{-3dB}	1		2.5		5.8		6.5		6.5		6.5		GHz

Table 3. Absolute-Maximum Ratings, Limiting Values

Parameter	Symbol	Max.	Units
Forward Current	I_F	10	mA
Reverse Current	I_R	1	mA
Total Power Dissipation	P_{TOT}	20	mW
Soldering Temperature (5 seconds, leads only)		260	$^\circ\text{C}$

Figure 1. Typical Quantum Efficiency

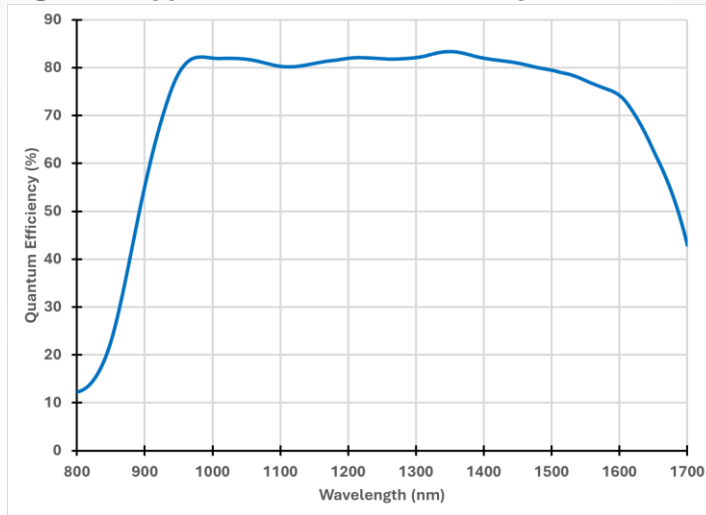


Figure 2. Typical Normalized Responsivity (M=1)

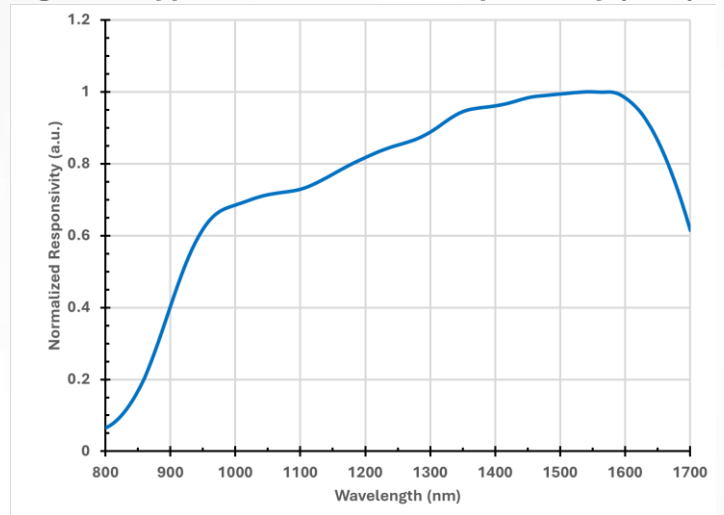


Figure 3. Typical APD Gain

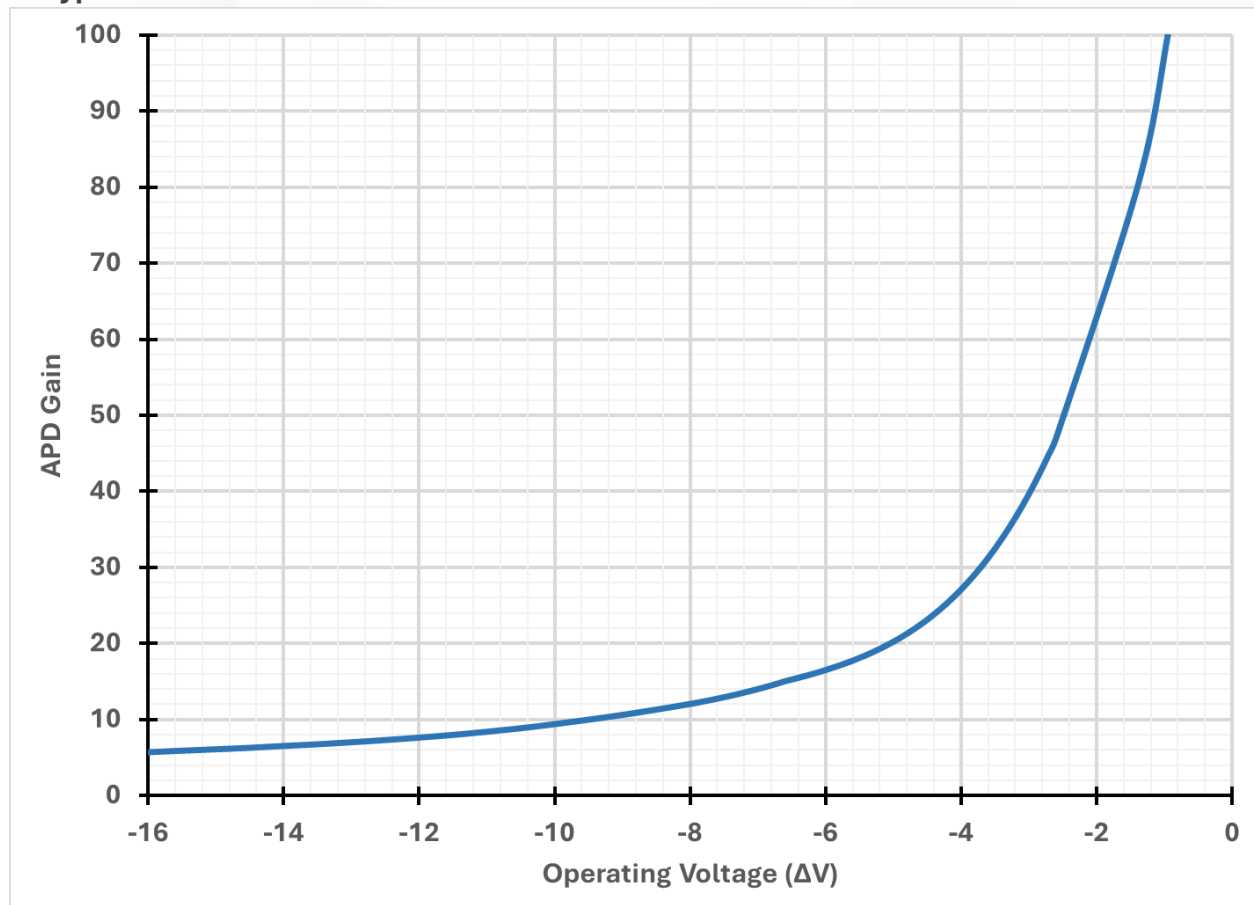
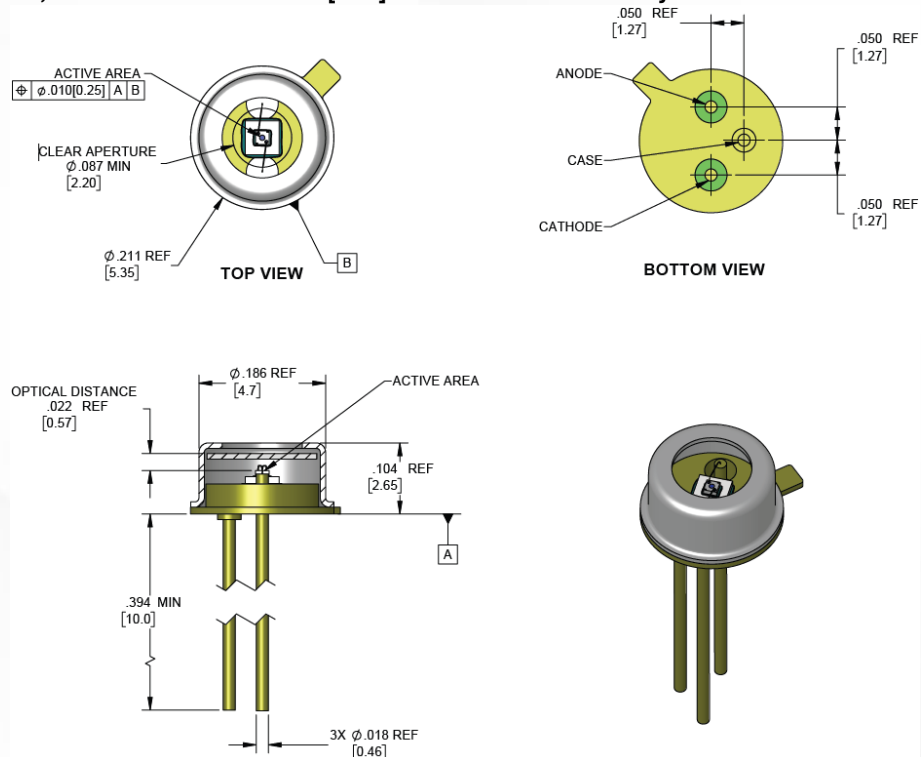


Figure 4. 264-339767 Package Dimension and Pinout

Unless otherwise specified, dimensions are in inches [mm] and are for reference only.



VAR Options

VAR	264-339767-VAR
-006	350 μm
-001	200 μm
-002	80 μm
-003	50 μm
-004	30 μm
-005	20 μm



For more information, visit www.cmcelectronics.ca/optoelectronics
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