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, passband filter or responsivity screening are available upon request.

Features

- Active area from 20 – 350 µm
- High gain above 100
- Low k-factor InGaAs APD
- Low Excess Noise Factor (F)
- Low Noise Equivalent Power (NEP)
- High dynamic range
  - ΔV ≈ 8 V (M = 10)
  - ΔV ≈ 4 V (M = 45)
  - ΔV ≈ 1 V (M = 100)
- Wide Operating Temp Range

Applications

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

Table 1. Electro-Optical Common Characteristics

Conditions: $T_{case} = 25°C$, 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}	ΔV/ΔT		0.06		V/°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	°C
Storage Temperature	T_{stg}	-55		+125	°C

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

Table 2. Electro-Optical Specific Characteristics

Conditions: $T_{case} = 25°C$, M = 10 unless otherwise specified

		350 µm		200 µm		80 µm		50 µm		30 µm		20 µm		
Parameter	**Symbol**	**Typ.**	**Max.**	**Typ.**	**Max.**	**Typ.**	**Max.**	**Typ.**	**Max.**	**Typ.**	**Max.**	**Typ.**	**Max.**	**Units**
Dark current	I_d	30	150	10	50	2	10	1	5	0.25	0.5	0.3	1.5	nA
Capacitance	C_d	3.4	4.2	1.7	2.2	0.55	0.6	0.45	0.5		0.45		0.45	pF
Spectral Noise Current	i_n	0.7		0.36		0.18		0.14		0.045		0.13		pA/√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)	T_{solder}	260	°C

Figure 1. Typical Quantum Efficiency

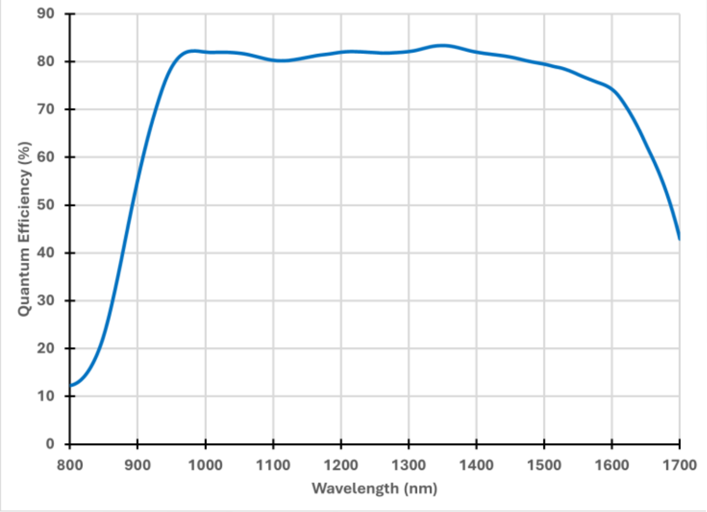

Figure 2. Typical Normalized Responsivity (M=1)

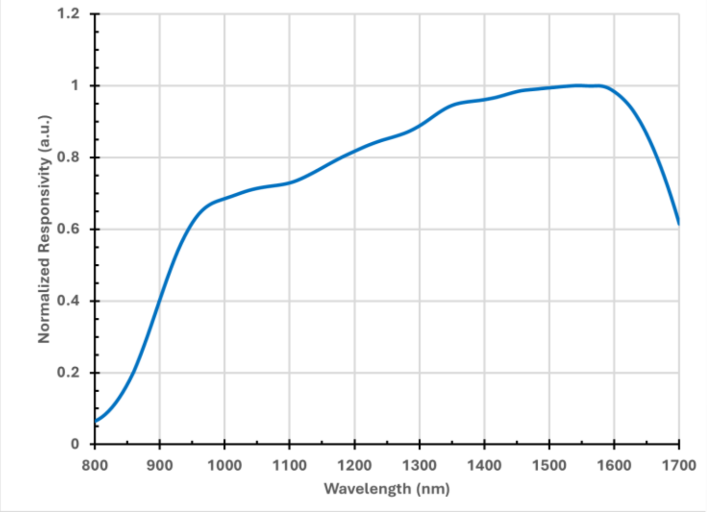

Figure 3. Typical APD Gain

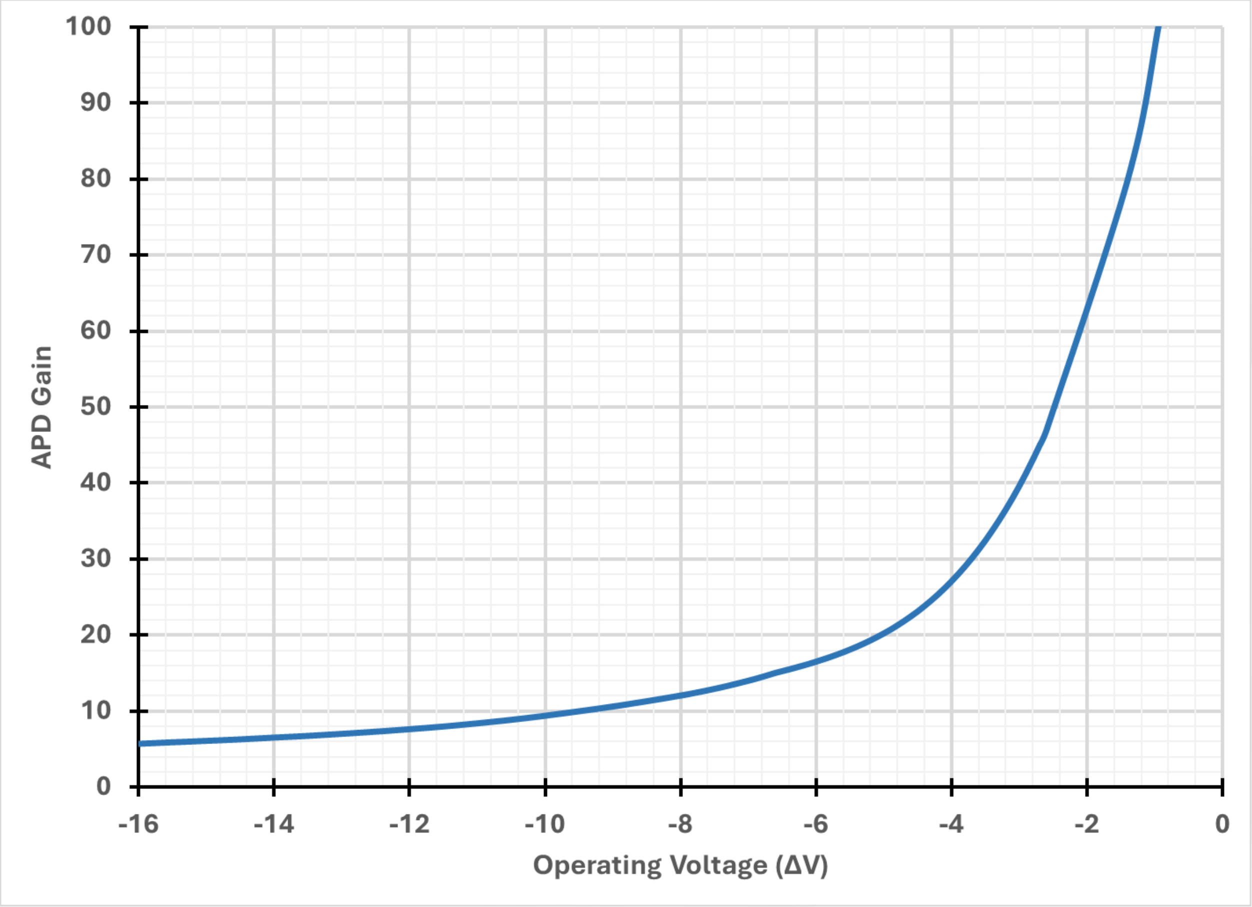

Figure 4. 264-339767 Package Dimension and Pinout

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

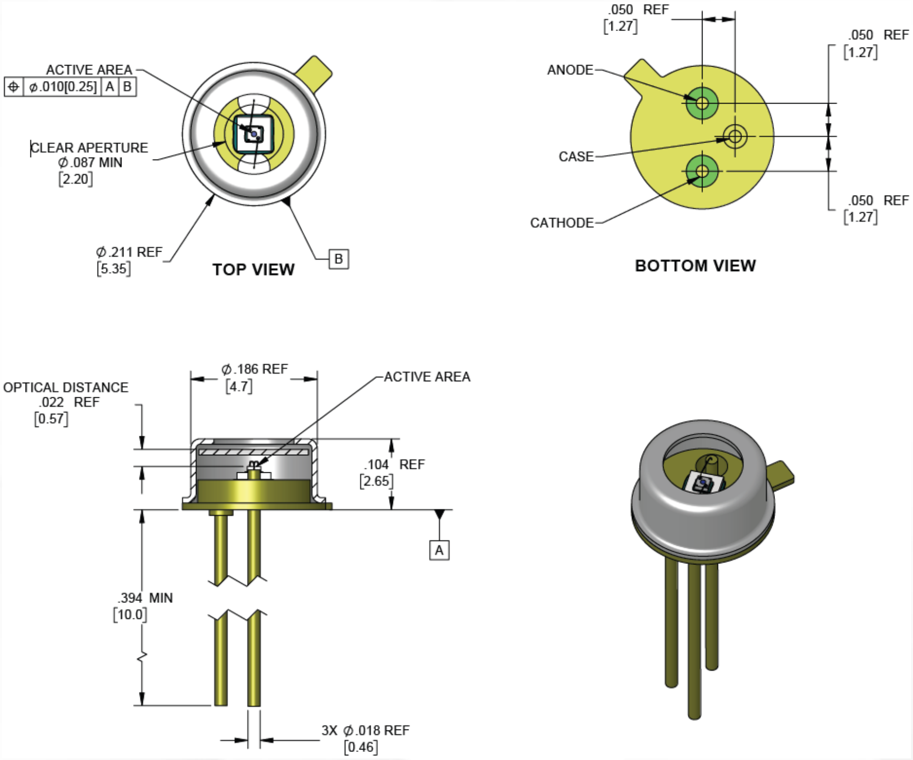

Table 4. Ordering Guide

VAR	Typical Bandwidth	Active Diameter	Comments
264-339767-001	2.5 GHz	200 µm	
264-339767-002	5.8 GHz	80 µm	Pigtailed multimode fiber available
264-339767-003	6.5 GHz	50 µm	
264-339767-004	6.5 GHz	30 µm	Pigtailed single mode fiber available
264-339767-005	6.5 GHz	20 µm	
264-339767-006	1 GHz	350 µm	

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