

InGaAs APD with Thermoelectric Cooler



CMC Electronics' 264-339839 series is an InGaAs APD with low k-factor of 0.2 and high responsivity, in a TO-hermetic package with a high-efficiency thermoelectric cooler (TEC).

The 264-339839 InGaAs APDs has a high Quantum Efficiency (QE) over the wavelength range of 1000 to 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. Optional fiber receptacle option to ease coupling are also available.

Features

- Active area from 80 – 350 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 Fiber Optic Sensing (DFOS)
- Distributed Temperature Sensing (DTS)
- Distributed Acoustic Systems (DAS)
- Structural Health Monitoring (SHM)

Table 1. Electro-Optical Common CharacteristicsConditions: $T_A = 25^\circ\text{C}$, $M = 10$ unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Units
Breakdown Voltage (Note 1)	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 2)	M	10	65	100	
Thermal sensor (NTC Thermistor) (Note 3)	R	9	10	11	k Ω

- Notes:**
- Each APD receiver will have its individual V_{OP} (provided on its production tests report).
 - Integration of the noise calculation is based on f_{-3dB} bandwidth.
 - Alternate thermal sensors (thermistance or diode) are available upon request.

Table 2. Electro-Optical Specific CharacteristicsConditions: $T_{case} = 25^\circ\text{C}$, $\lambda = 1550 \text{ nm} \pm 10 \text{ nm}$, TE Cooler OFF and $M = 10$ unless otherwise specified

Parameter	Symbol	350 μm		200 μm DIA		80 μm DIA		Units
		Typ.	Max.	Typ.	Max.	Typ.	Max.	
Dark current	I_d	30	150	10	50	2	10	nA
Capacitance	C_d	3.4	4.2	1.7	2.2	0.55	0.6	pF
Spectral Noise Current	i_n	0.7		0.36		0.18		$\text{pA}/\sqrt{\text{Hz}}$
Bandwidth	f_{-3dB}	0.6		1.0		2.0		GHz

Table 3. Absolute-Maximum Ratings, Limiting Values

Parameter	Symbol	Min.	Max.	Units
Forward Current	I_F		10	mA
Reverse Current	I_R		1	mA
Total Power Dissipation	P_{TOT}		20	mW
TEC Current	I_{TEC}	-0.9	0.9	A
Operating Temperature	T_{op}	-40	85	$^\circ\text{C}$
Storage Temperature	T_{sto}	-55	125	$^\circ\text{C}$
Soldering Temperature (5 seconds, leads only)	T_{solder}		250	$^\circ\text{C}$

Figure 1. Typical Quantum Efficiency

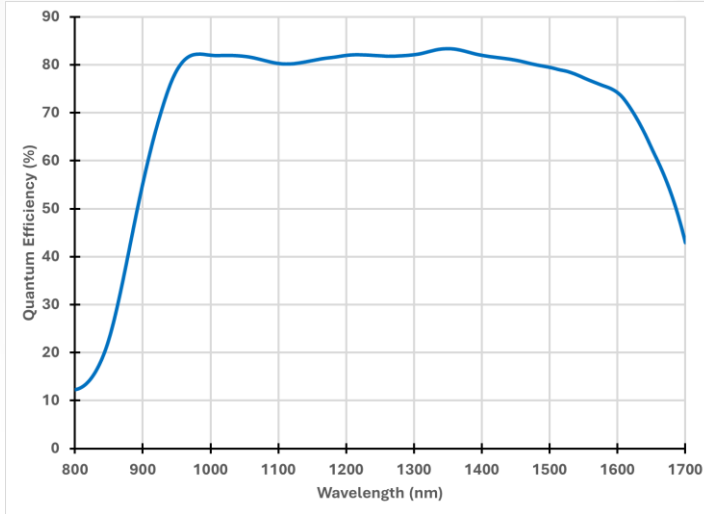


Figure 2. Typical Normalized Responsivity (M=1)

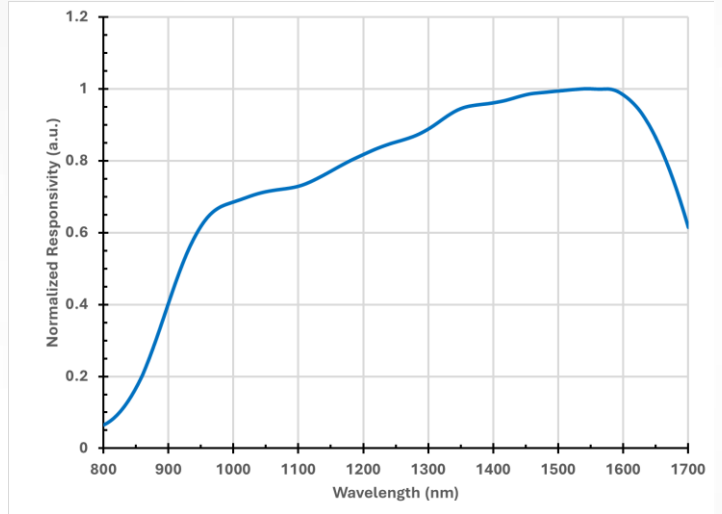


Figure 3. Typical APD Gain

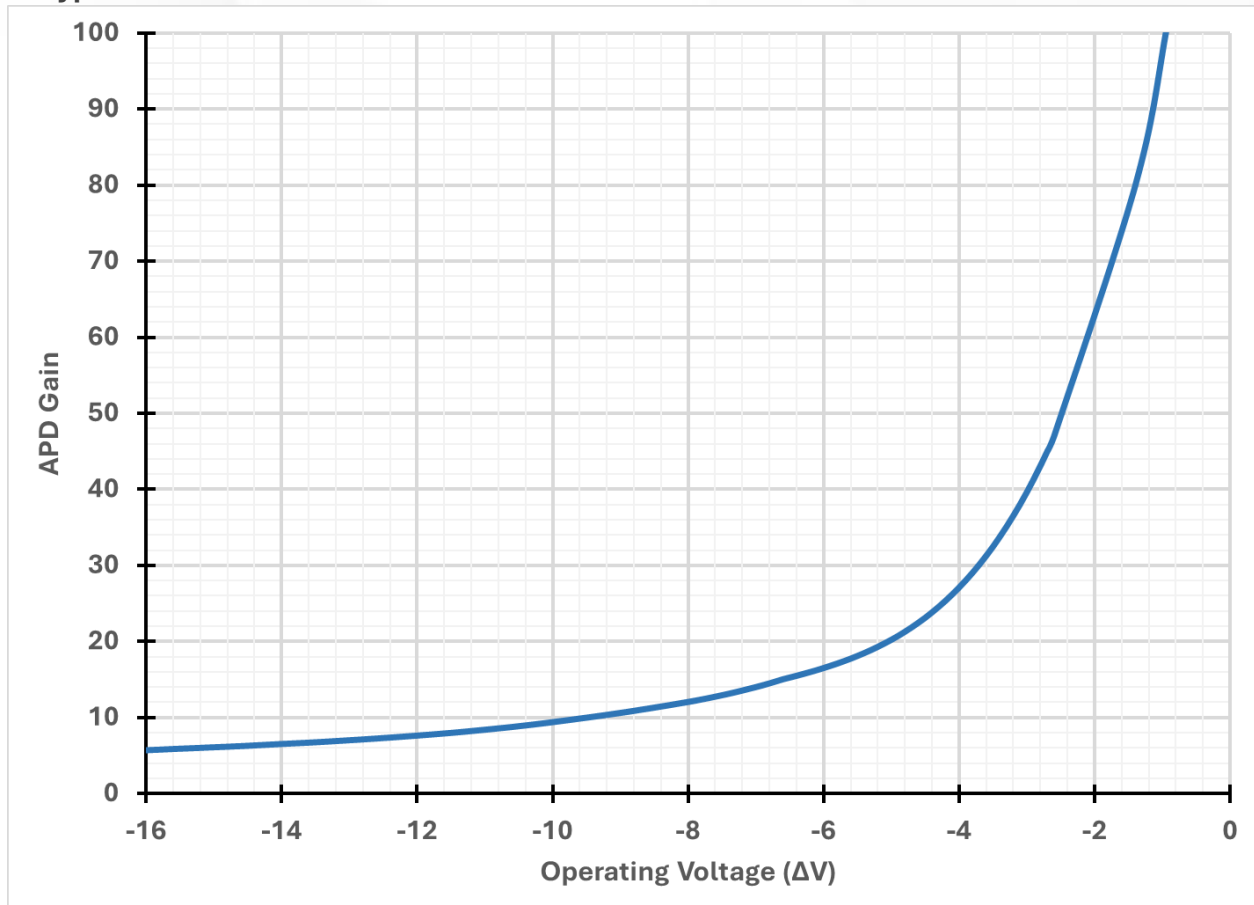
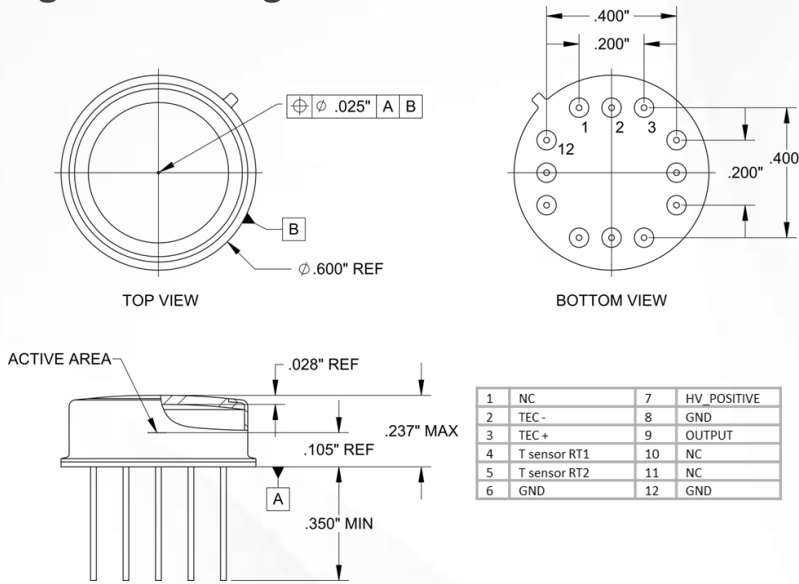


Figure 4. Package Dimension and Pinout



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

Figure 5. FC connector (617-339839)

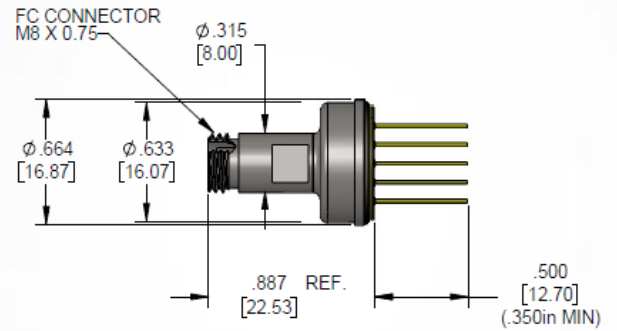


Table 4. Ordering Guide

VAR	Typical Bandwidth	Active Diameter	Comments
264-339839-001	0.6 GHz	350 μm	
617-339839-001			with FC connector
264-339839-002	1.0 GHz	200 μm	
617-339839-002			with FC connector
264-339839-003	2.0 GHz	80 μm	
617-339839-003			



For more information, visit www.cmcelectronics.ca/optoelectronics or email us at opto@cmcelectronics.ca

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264-339839-VAR | Datasheet REV 04.2026