

Pigtailed High-Gain Low-Noise InGaAs APD



CMC Electronics' 276-339767-VAR is a pigtailed InGaAs APD Series available in 30 μm (single mode fiber, SMF) and 80 μm (multimode fiber, MMF) active area variants, both with very high operating gain above $M = 100$, very low k-factor (k), and Excess Noise Figure (F).

Based on an industry-proven design, the 276-339767 Series InGaAs APDs have a high Quantum Efficiency (QE) over the wavelength range of 950 to 1600 nm.

A high dynamic range is maintained even at high operating temperatures, reducing the need for cooling.

Customizations such as optical return loss tuning or responsivity screening are available upon request.

Features

- Active area from 30 – 80 μm
- 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
- Typical coupling efficiency: $> 90 \%$
- Low Optical Return Loss (ORL)
- FC/APC and SC/FC connectors available

Applications

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

Table 1. Electro-Optical Characteristics

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

MULTIMODE FIBER 80 μm 276-369767-002

Parameter	Symbol	Min	Typical	Max	Units
Breakdown Voltage	V_{BR}	45	60	80	V
Operating point from Breakdown Voltage ($V_{BR} - V_{OP}$)	ΔV	7	8	9	V
Temperature Coefficient of V_{OP}	$\Delta V/\Delta T$		0.06		V/ $^\circ\text{C}$
Dark current	I_d		2	10	nA
Quantum Efficiency (1064-1550 nm)	QE	75	83		%
Responsivity at 1550 nm	R	8.5	9.0		A/W
Capacitance	C_d		0.35	0.4	pF
Spectral Noise Current	i_n		0.18		$\text{pA}/\sqrt{\text{Hz}}$
Excess Noise Factor	F		3.2		
Bandwidth	$f_{-3\text{dB}}$		5.8		GHz
Recommended Operating Gain (Note 1)	M	10	65	100	
Operating Temperature	T_A	-45		+85	$^\circ\text{C}$
Storage Temperature	T_{stg}	-45		+85	$^\circ\text{C}$
Optical Return Loss	ORL		-25		dB

SINGLE MODE FIBER 30 μm 276-369767-004

Parameter	Symbol	Min	Typical	Max	Units
Breakdown Voltage	V_{BR}	45	60	80	V
Operating point from Breakdown Voltage ($V_{BR} - V_{OP}$)	ΔV	7	8	9	V
Temperature Coefficient of V_{OP}	$\Delta V/\Delta T$		0.06		V/ $^\circ\text{C}$
Dark current	I_d		0.25	0.5	nA
Quantum Efficiency (1064-1550 nm)	QE	75	83		%
Responsivity at 1550 nm	R	8.5	9.0		A/W
Capacitance	C_d			0.25	pF
Spectral Noise Current	i_n		0.045		$\text{pA}/\sqrt{\text{Hz}}$
Excess Noise Factor	F		3.2		
Bandwidth	$f_{-3\text{dB}}$		6.5		GHz
Recommended Operating Gain (Note 1)	M	10	65	100	
Operating Temperature	T_A	-45		+85	$^\circ\text{C}$
Storage Temperature	T_{stg}	-45		+85	$^\circ\text{C}$
Optical Return Loss	ORL		-35		dB

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

Table 2. 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

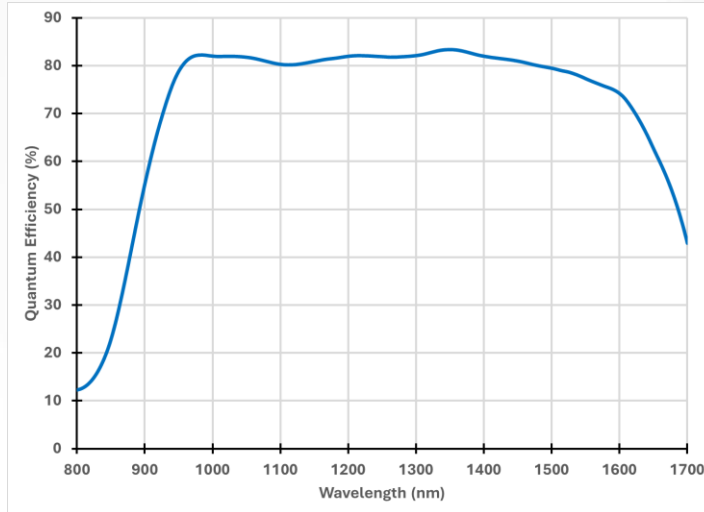


Figure 2. Typical Normalized Responsivity (M=1)

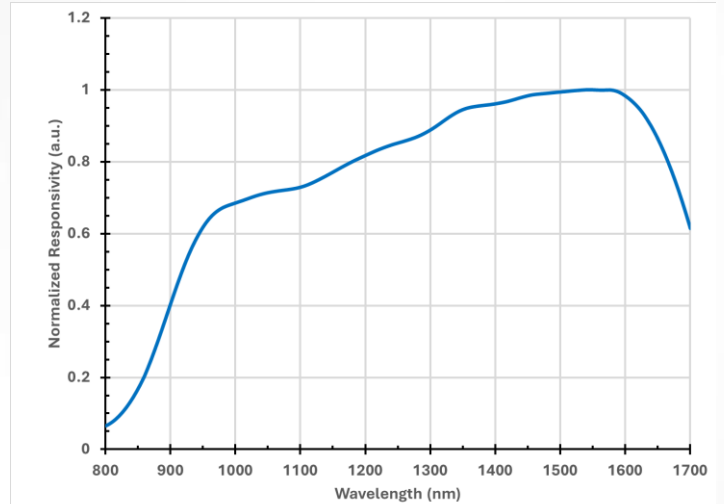


Figure 3. Typical APD Gain

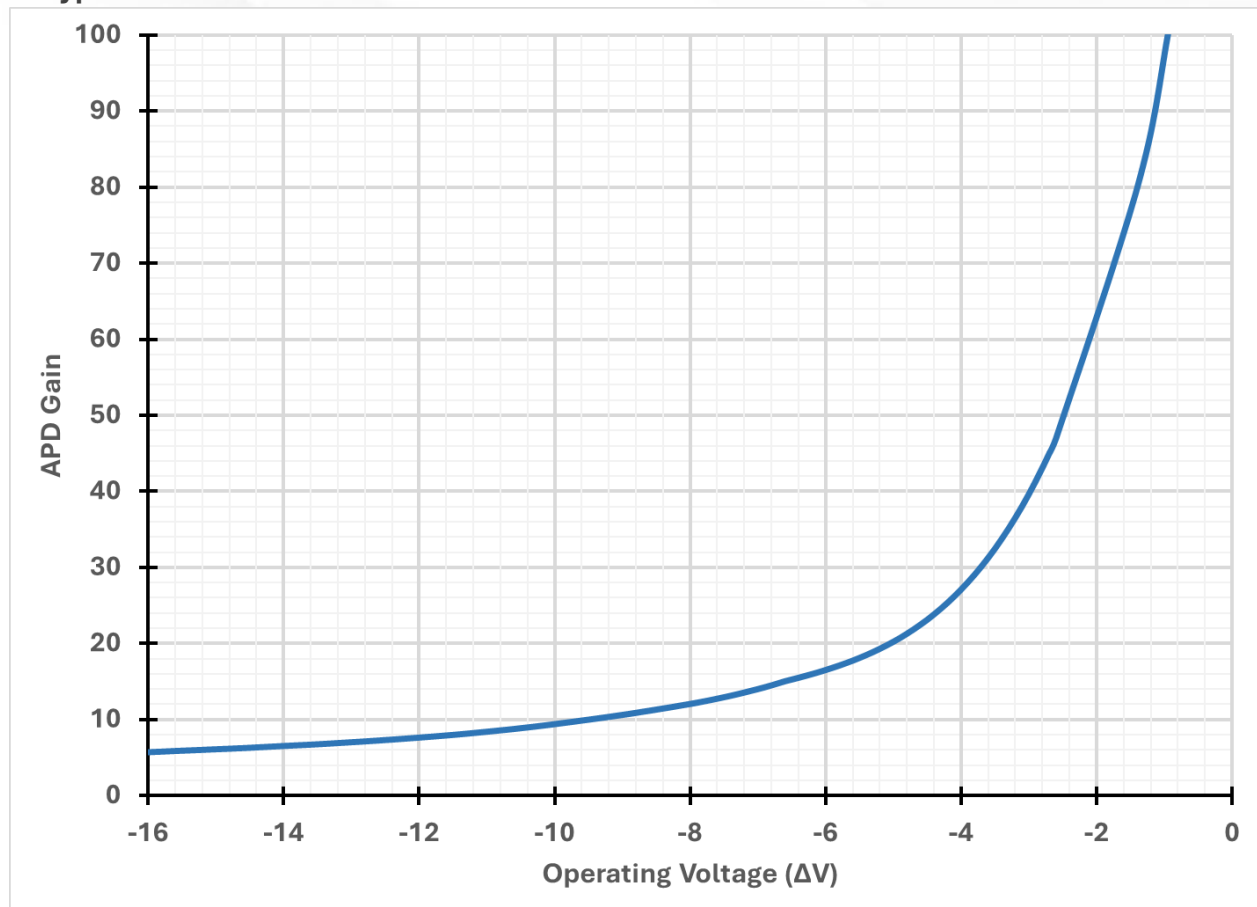
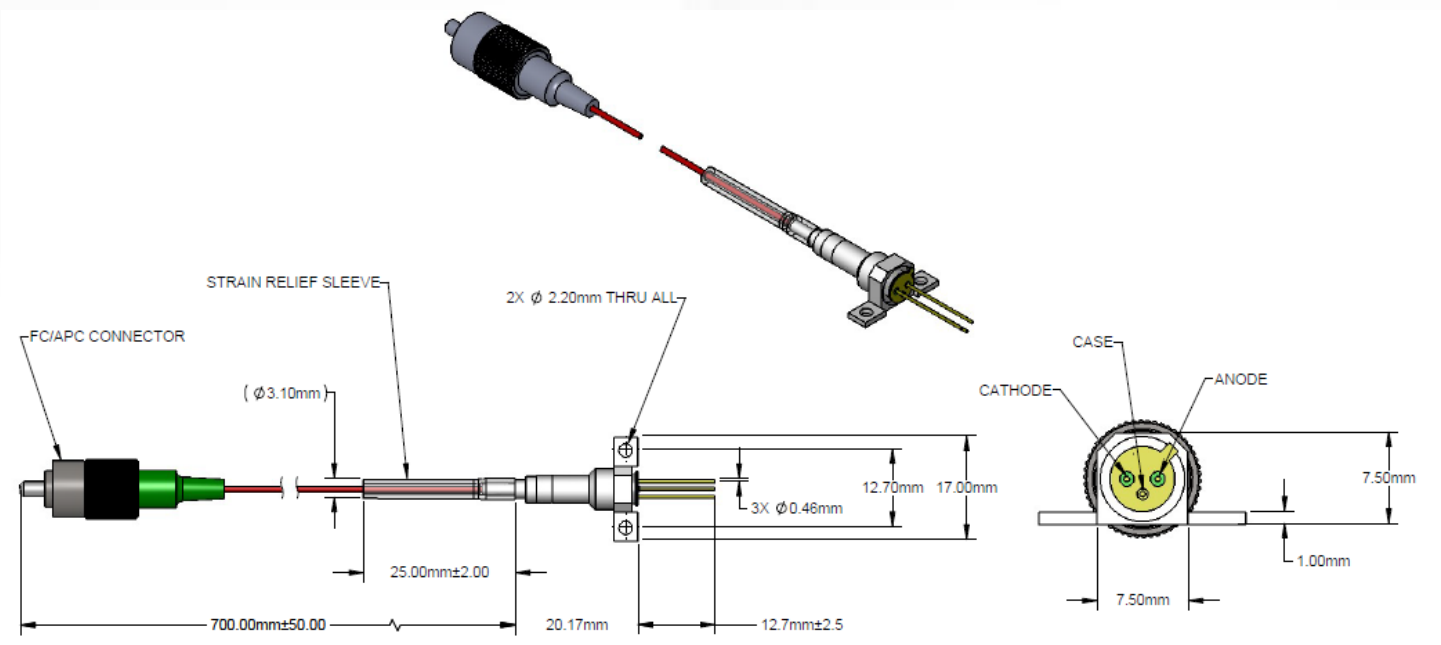


Figure 4. 276-339767 Package Dimension and Pinout

Unless otherwise specified, dimensions are in mm and are for reference only. Standard fiber length = 700 mm. Connector options available



VAR Options

VAR	APD Diameter	276-339767-VAR
-002	80 μm	Fiber Pigtail 62.5 μm MMF
-004	30 μm	Fiber Pigtail 9 μm SMF



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

For information purposes only. To accommodate product improvements, specifications are subject to change without notice.

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