

Fiber Pigtailed InGaAs ADP Preamplifier Module



CMC Electronics' 276-339832 series use an InGaAs APD with a low k-factor of 0.2, with a built-in preamplifier enabling optimum signal-to-noise performance.

The APD preamplifier receiver is housed in a robust 16-pin surface mount butterfly package with a 50 μm multimode (MM) graded-index core fiber.

The internal temperature can be monitored via an embedded thermal sensor. The module is designed with a 10 Ω output impedance and can be AC- or DC-coupled.

Customizations such as fiber diameter and type, bandwidth selection, NEP screening, different temperature sensors and further responsivity optimization are available upon request.

Features

- 120 MHz Preamplifier Module
- Spectral Response: 1050 – 1600nm
- Low k-factor InGaAs APD
- Low Noise Equivalent Power (NEP)
- 50 μm Multimode fiber pigtail
- High dynamic range
- Hermetically Sealed 16-pin package
- ITAR-Free
- ROHS compliant
- Optional:
 - Fast Overload Recovery Circuitry

Applications

- Range Finding
- LiDAR
- Instrumentation
- Distributed Temperature Sensing (DTS)
- Distributed Acoustic Sensing (DAS)
- Structural Health Monitoring (SHM)
- Free-Space Communications (FSO)

Table 1. Electro-Optical Characteristics

Unless otherwise specified: $T_A = 25^\circ\text{C}$, $V_+ = 5.0\text{ V}$, $V_- = -5.0\text{ V}$, $V_{HV} = 40\text{ V}$ to V_{BR} , $V_{OO_ADJ} = -5\text{ V}$, $R_L = 100\ \Omega$, $\lambda = 1570\text{ nm} \pm 20\text{ nm}$

Parameter	Min.	Typ.	Max.	Units
Operating Voltage, V_{OP} (Note 1)	40	54	85	V
Temperature coefficient of V_{OP}		0.07		V/ $^\circ\text{C}$
Responsivity		2.0		MV/W
Noise equivalent power				
1570 nm [$T_{case}=25^\circ\text{C}$]		40		fW/ $\sqrt{\text{Hz}}$
1570 nm [$T_{case}=85^\circ\text{C}$] (-001)		85		fW/ $\sqrt{\text{Hz}}$
1570 nm [$T_{case}=85^\circ\text{C}$] (-002)		110		fW/ $\sqrt{\text{Hz}}$
Output impedance		10		Ω
Bandwidth	100	120		MHz
Rise time (10-90 %)		3		ns
Fall time (90-10 %)		3		ns
Linear output voltage swing (Pulse)	1.5	2.5	4.0	V
Output offset voltage	-0.75	-0.45	0	V
Thermal sensor (1N914 diode) (Note 2)				
I_f of 5 mA at 25°C		645		mV
Sensor sensitivity		-1.9		mV/ $^\circ\text{C}$
Overload recovery for optical power input signal:				
1 mW, 20 ns pulse width:				
$V_{out} \rightarrow 200\text{ ns}$ after pulse start			250	mV
$V_{out} \rightarrow 1\ \mu\text{s}$ after pulse start			40	mV
5 W, 20 ns pulse width (Note 3) (-001)		525		ns
5 W, 20 ns pulse width (Note 3) (-002)		325		ns
Hybrid Supply current				
V_POS (pin 10)	25		35	mA
V_NEG (pin 11)	-20		-10	mA

- Notes:** 1. Each APD receiver will have its individual V_{OP} (provided on its production tests report).
2. Alternate thermal sensors (IC sensors or thermistance) are available upon request.
3. Not tested on all units

Table 2. Absolute-Maximum Ratings, Limiting Values

Parameter	Min.	Max.	Units
APD breakdown, Maximum voltage [HV_POS (pin 4)] (Note 1)		105	V
Recommended overcurrent limit		100	μA
Photodiode Total Current (All temp.)		1	mA
Input Voltage Positive Supply [V_POS (+5V) (pin 7)]		6	V
Input Voltage Negative Supply [V_NEG (-5V) (pin 5)]		6	V
Maximum Optical Power, CW		10	μW
Peak value, 20 ns pulses < 100 Hz		100	kW/cm ²
Temperature sensor fixed input current between			
Sensor V_{in} $\rightarrow$ TSensor ANODE (pin 8)	1	10	mA
Sensor output $\rightarrow$ TSensor CATHODE (pin 9)			
Operating Temperature	-40	85	$^\circ\text{C}$
Storage Temperature	-55	125	$^\circ\text{C}$
Soldering Temperature (5 s, leads only)		250	$^\circ\text{C}$

Figure 1. Typical Normalized Responsivity (M=1)

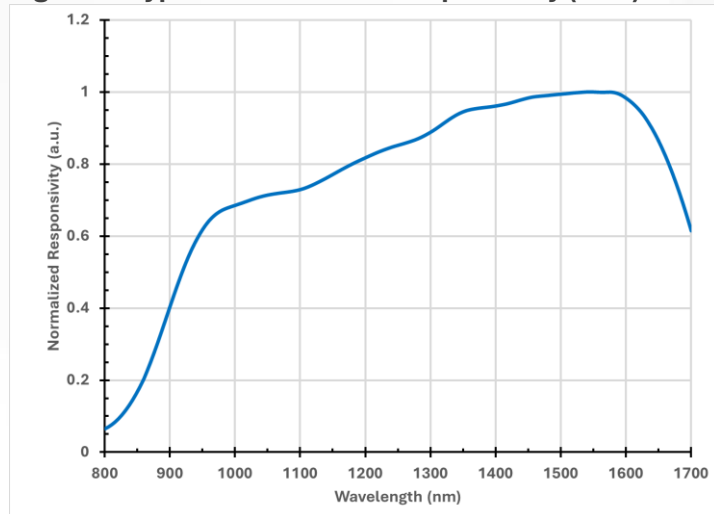


Figure 2. Typical Normalized Frequency Response

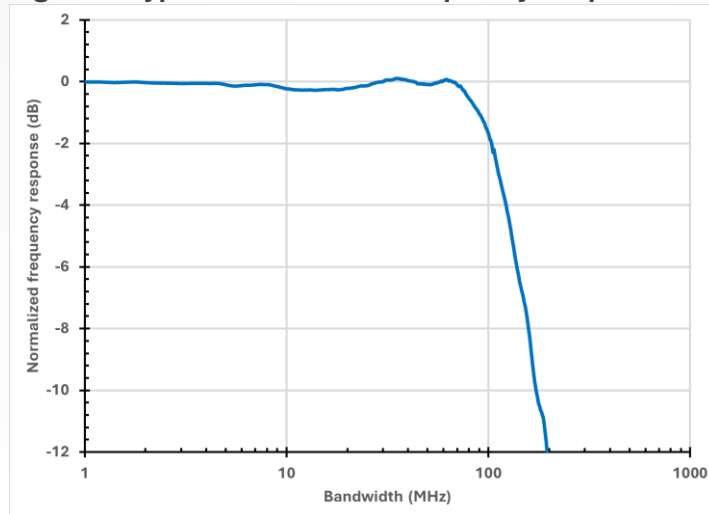


Figure 3. Typical Responsivity (-001)

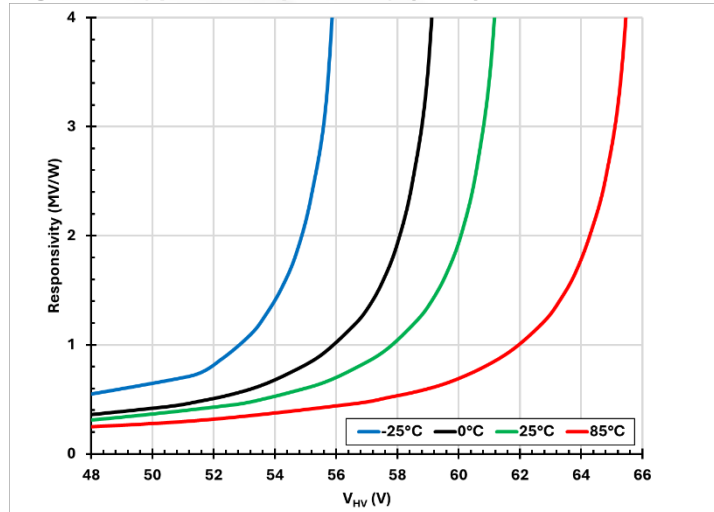


Figure 4. Typical NEP (-001)

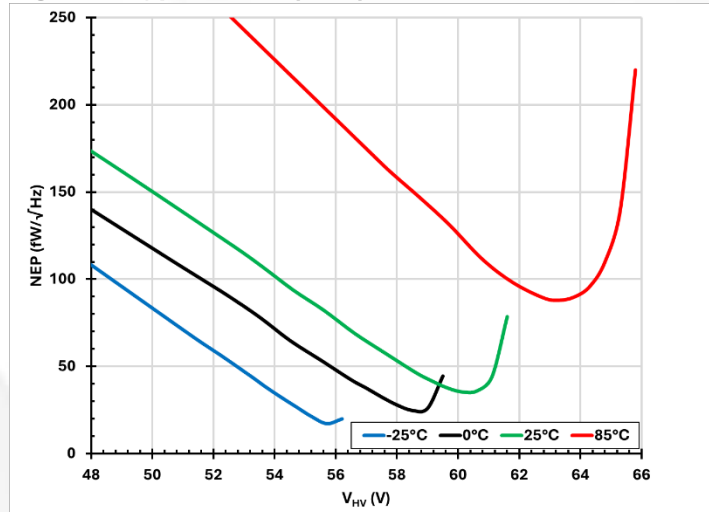


Figure 5. Typical Responsivity (-002)

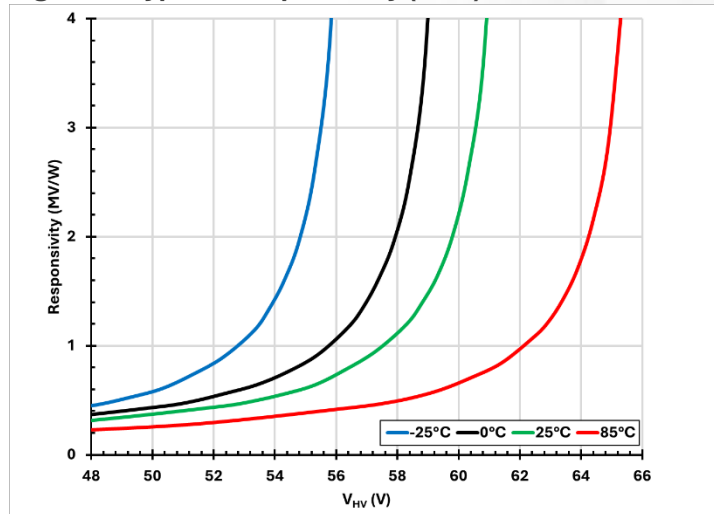


Figure 6. Typical NEP (-002)

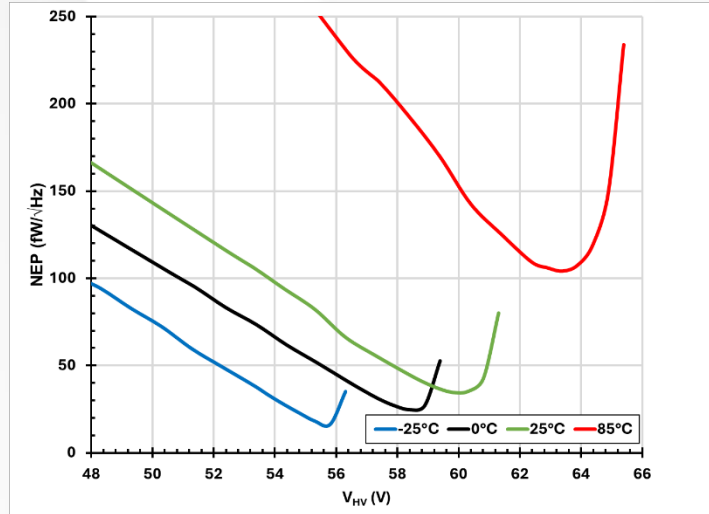


Figure 7. CMC 276-339832 Series block diagram

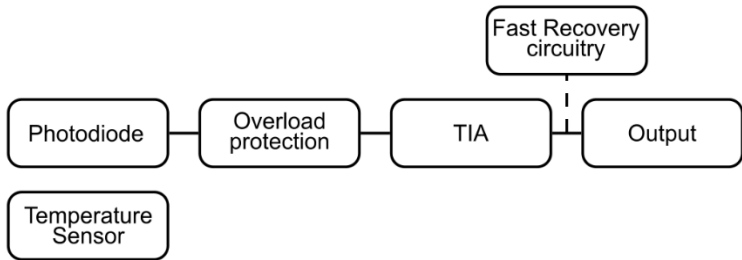
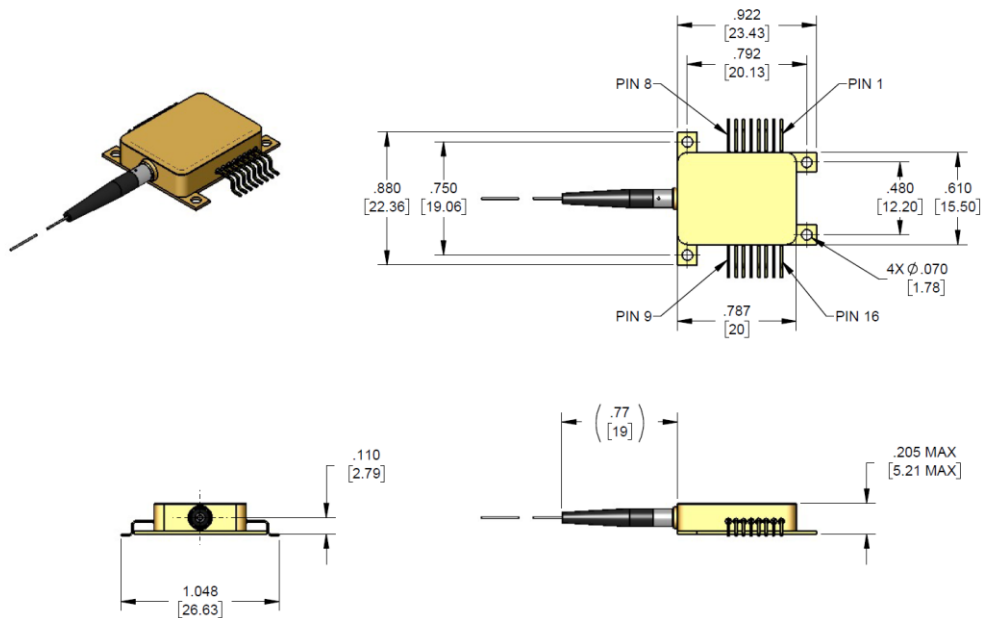


Figure 8. Package Dimension and Pinout

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



1	GND
2	TSensor ANODE
3	TSensor CATHODE
4	NC
5	V_NEG (-5V)
6	GND
7	V_POS (+5V)
8	GND
9	HV_POSITIVE
10	GND
11	GND
12	GND
13	OUTPUT
14	GND
15	VOO_ADJ
16	GND

VAR Options

VAR	276-339832-VAR
-001	Standard recovery
-002	Fast recovery from high power pulses



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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276-339832-VAR | Datasheet REV 02.2026