

# Si Avalanche Photodiode Preamplifier Module with Thermoelectric Cooler

CMC Electronics' 264-339820 series uses a Silicon APD with a built-in preamplifier and a thermo-electric cooler (TEC), enabling optimum signal to noise performance.

The APD is coupled to a GaAs FET input trans-impedance amplifier in a 12-lead TO-8 package. The amplifier has an overload input protection circuit which sustains high optical power exposure. An integral TEC allows temperature control of the APD, supporting APD module gain and temperature stabilization. The internal temperature can be monitored via an embedded thermistor close to the APD. The module is designed for a 100-ohm output load connection (AC or DC coupled, as required by design).

Customizations such as bandwidth selection, NEP screening, responsivity optimization and packaging are available, to fit your system design needs.



## Features

- 500  $\mu\text{m}$  Silicon APD
- 60-100 MHz Preamplifier Module
- Spectral Response: 550-1100 nm (typical use: YAG wavelength)
- Low Noise Equivalent Power (NEP)
- Overload Input Protection circuit
- High efficiency TEC
- High Quantum Efficiency
- Hermetically-Sealed TO-8 Package



## Applications

- Laser Range Finding
- LIDAR
- Instrumentation
- Laser Profiling
- Industrial
- Photometry

**Table 1. Electro-Optical Characteristics**

Unless otherwise specified:  $T_A = 25^\circ\text{C}$ ,  $V_{\text{POS}} = 5.0\text{ V}$ ,  $V_{\text{NEG}} = -5.0\text{ V}$ ,  $R_L = 100\ \Omega\ \text{AC}$ ,  $\lambda = 1064\ \text{nm} \pm 10\ \text{nm}$ , Cooler OFF (Externally AC-coupled through 4.7  $\mu\text{F}$ )

Parameter	Min.	Typ.	Max.	Units
Active area		500		$\mu\text{m}$
Operating Voltage (Note 1)	150	225	300	V
Temperature coefficient of $V_{\text{OP}}$		0.6	1.5	$\text{V}/^\circ\text{C}$
ADP dark current		7	50	nA
Responsivity	1000			$\text{kV}/\text{W}$
Noise equivalent power (Note 2)				
1064 nm [ $T_{\text{case}}=25^\circ\text{C}$ ]		100	120	$\text{fW}/\sqrt{\text{Hz}}$
1064 nm [ $T_{\text{case}}=85^\circ\text{C}$ ]	75	220	575	$\text{fW}/\sqrt{\text{Hz}}$
1064 nm, Cooler ON [ $T_{\text{case}}=85^\circ\text{C}$ ]	50	125	195	$\text{fW}/\sqrt{\text{Hz}}$
Output impedance		10		$\Omega$
Bandwidth	60	80		MHz
Rise time (10-90%)		6		ns
Fall time (90-10%)		6		ns
Linear output voltage swing (Pulse)	1.5	2.5	4.0	V
Output offset voltage	-0.75	-0.45	0	V
Thermal sensor (NTC thermistor)				
Impedance	8.5	9.4	11	$\text{k}\Omega$
Accuracy		$\pm 5$		%
Overload recovery for optical power input signal of 1 mW, 20 ns pulse width:				
$V_{\text{out}} \rightarrow 200\ \text{ns}$ after pulse start			3000	mV
$V_{\text{out}} \rightarrow 1\ \mu\text{s}$ after pulse start			20	mV
Hybrid Supply current				
$V_{\text{POS}}$ (pin 10)	25	30	40	mA
$V_{\text{NEG}}$ (pin 11)	-20	-15	-10	mA

- Notes:**
- Each APD receivers will have its individual  $V_{\text{OP}}$  (provided on its production tests report).
  - NEP values for  $+85^\circ\text{C}$  are by design and are for reference only. No test values provided on individual test reports. Integration of the noise calculation is based on minimum bandwidth.

**Table 2. Absolute-Maximum Ratings, Limiting Values**

Parameter	Min.	Max.	Units
APD breakdown, Maximum voltage [ $\text{HV\_POSITIVE}$ (pin7) ] (Note 1)		450	V
Recommended overcurrent limit		100	$\mu\text{A}$
Input Voltage Positive Supply [ $V_{\text{POS}}$ (+5V) (pin10) ]	+4.8	+6.0	V
Input Voltage Negative Supply [ $V_{\text{NEG}}$ (-5V) (pin11) ]	-4.8	-6.0	V
Maximum Optical Power, $M = 100$		300	$\mu\text{W}$
Maximum Optical Power, $M = 1$		30	mW
TEC Current (between TEC+ (pin3) and TEC- (pin2))	-1.75	1.75	A
Operating Temperature	-40	85	$^\circ\text{C}$
Storage Temperature	-55	125	$^\circ\text{C}$

- Note:** 1. Absolute maximum over the product Temperature Operating Range ( $-40^\circ\text{C}$  to  $+85^\circ\text{C}$ ).

Figure 1. CMC 264-339820 Series block diagram

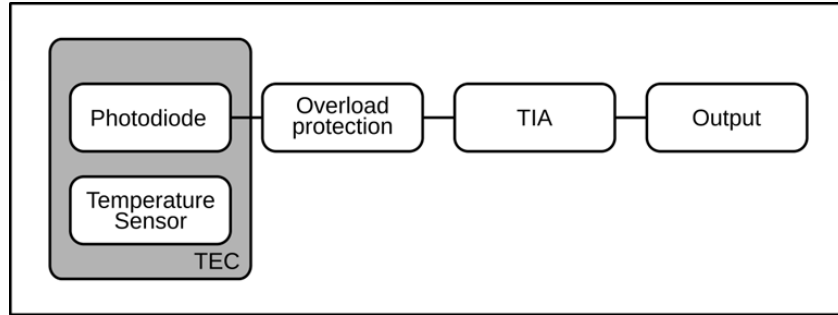
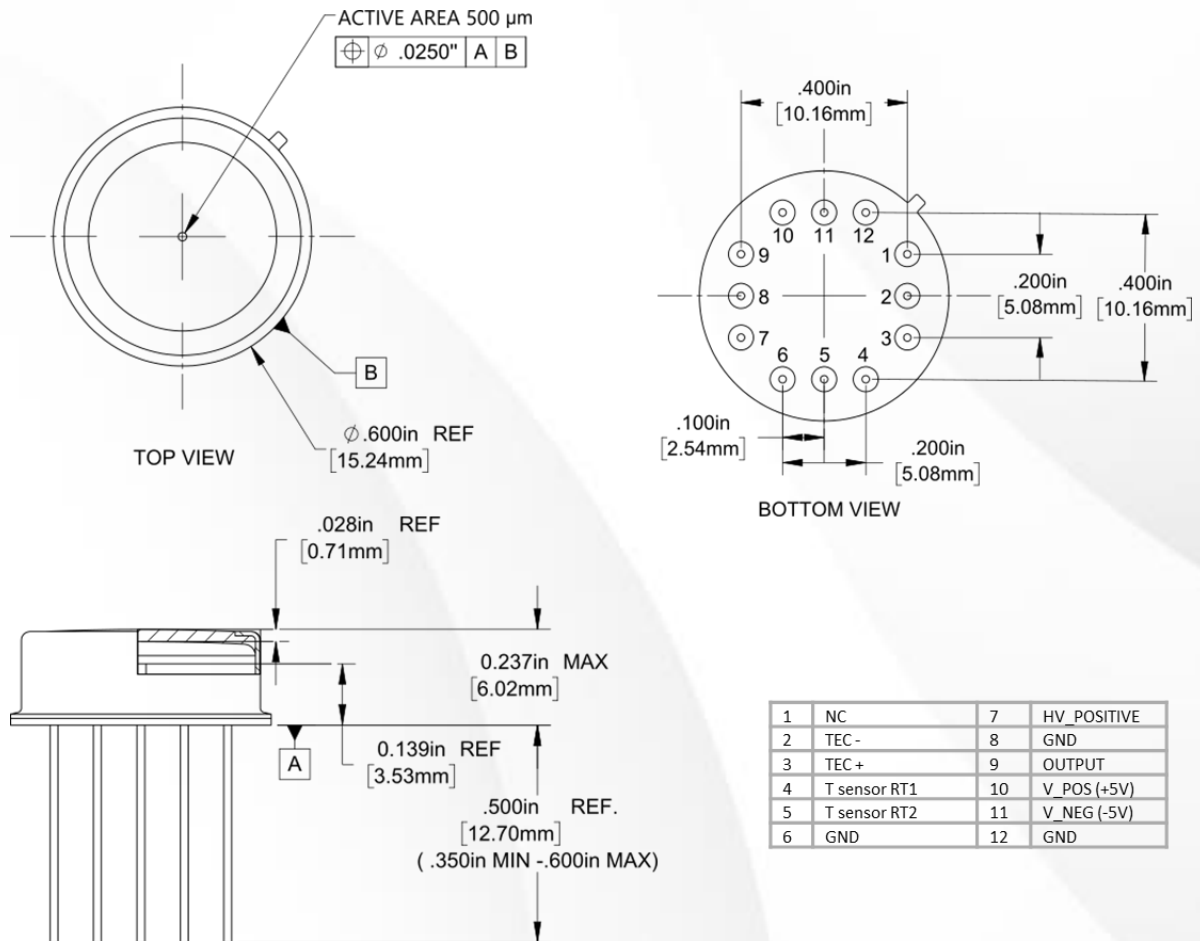


Figure 2. Package Dimension and Pinout

Unless otherwise specified, dimensions are in inches (mm) and are for reference only.



## VAR Options

-001	Silicon APD 500 μm, 60-100 MHz TIA, TEC
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For more information, visit [www.cmcelectronics.ca](http://www.cmcelectronics.ca) or email us at [opto@cmcelectronics.ca](mailto:opto@cmcelectronics.ca)

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