Si APD Preamplifier Module with TEC

CMC Electronics' 264-339820 series use 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 transimpedance amplifier (TIA) in a 12-lead TO-8 package with an integrated thermoelectric cooler (TEC) allowing temperature control of the APD and easing stabilization of gain and optimized sensitivity.

The internal temperature can be monitored via an embedded thermal sensor close to the APD. The module is designed with either a 10 Ω output impedance which can be AC- or DC-coupled.

The amplifier has an overload input protection circuit that sustains high optical power exposure with a very fast recovery time.

Customizations such as bandwidth tuning, NEP screening, responsivity optimization and different temperature sensors are available upon request.

Features

- 500 µm Silicon APD
- 60 – 100 MHz Preamplifier Module
- Spectral Response: 550 – 1100 nm
- Low Noise Equivalent Power (NEP)
- Overload Input Protection circuit
- High efficiency TEC
- 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°C, V_POS = 5.0 V, V_NEG = -5.0 V, R_L = 100 Ω, λ = 1064 nm +/- 10 nm, Cooler OFF (Externally AC-coupled through 4.7 µF)

Parameter	Min.	Typ.	Max.	Units
Active area		500		µm
Operating Voltage (Note 1)	150	225	300	V
Temperature coefficient of V_{OP}		0.6	1.5	V/˚C
ADP dark current		7	50	nA
Responsivity	1000			kV/W
Noise equivalent power (Note 2)				
1064 nm [T_{case}=25°C]		100	120	fW/√Hz
1064 nm [T_{case}=85°C]	75	220	575	fW/√Hz
Output impedance		10		Ω
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) (Note 3)				
Impedance	8.5	9.4	11	kΩ
Accuracy		±5		%
Overload recovery for optical power input signal of 1 mW, 20 ns pulse width:				
V_{out} → 200 ns after pulse start			3000	mV
V_{out} → 1 µs after pulse start			20	mV
Hybrid Supply current V_POS (pin 10)	25	30	40	mA
V_NEG (pin 11)	-20	-15	-10	mA

Notes:
1. Each APD receivers will have its individual V_{OP} (provided on its production tests report).
2. NEP values for +85°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.
3. To compute the temperature, T, in Celsius, based on the thermistor resistance, R, the Steinhart-Hart equation can be used with the factors $A = 1.125160\ x\ 10^{-3}$, $B = 2.347211\ x\ 10^{-4}$ and $C = 8.587705\ x\ 10^{-8}$.

$$T = \frac{1}{A + B\ln(R) + C(\ln R)^3} - 273.15$$

Table 2. Absolute-Maximum Ratings, Limiting Values

Parameter	Min.	Max.	Units
APD breakdown, Maximum voltage [HV_POSITIVE (pin7)] (Note 1)		450	V
Recommended overcurrent limit		100	µA
Input Voltage Positive Supply [V_POS (+5V) (pin10)]	+4.8	+6.0	V
Input Voltage Negative Supply [V_NEG (-5V) (pin11)]	-4.8	-6.0	V
Maximum Optical Power, M = 100		300	µW
Maximum Optical Power, M = 1		30	mW
TEC Current (between TEC+ (pin3) and TEC- (pin2))	-1.75	1.75	A
Operating Temperature	-40	85	°C
Storage Temperature	-55	125	°C

Note: 1. Absolute maximum over the product Temperature Operating Range (-40°C to +85°C).

Figure 1. CMC 264-339820 Series block diagram

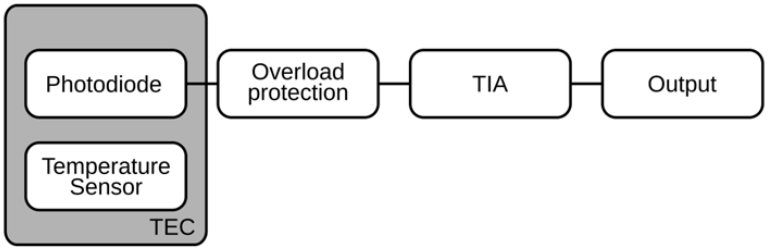
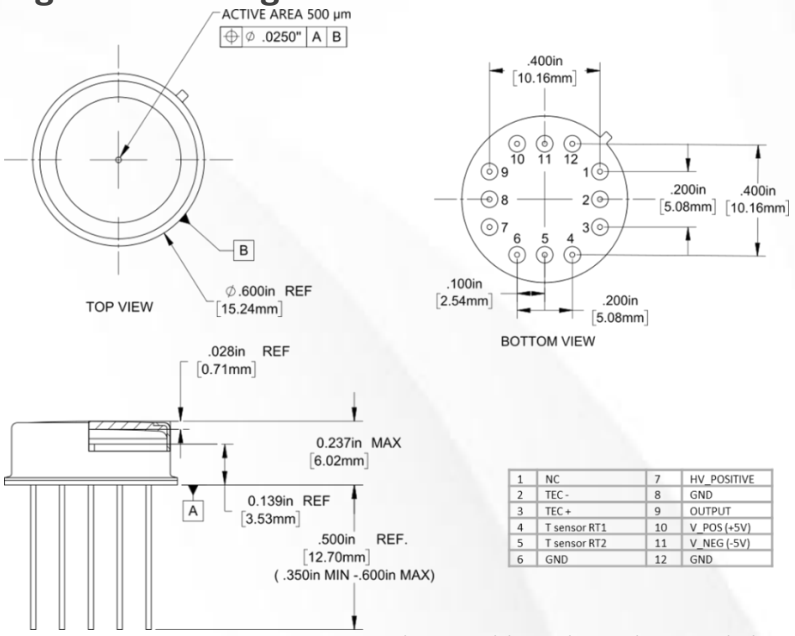
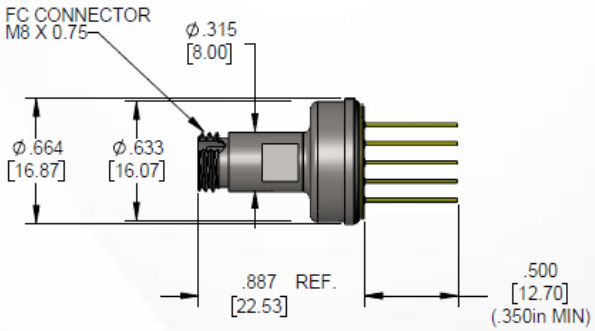


Figure 2. Package Dimension and Pinout



1	NC	7	HV_POSITIVE
2	TEC -	8	GND
3	TEC +	9	OUTPUT
4	T sensor RT1	10	V_POS (+5V)
5	T sensor RT2	11	V_NEG (-5V)
6	GND	12	GND

Figure 3. FC connector (617-339820)



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

VAR Options

VAR	264-339820-VAR
-001	Silicon APD 500 µm, 60-100 MHz TIA, TEC

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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