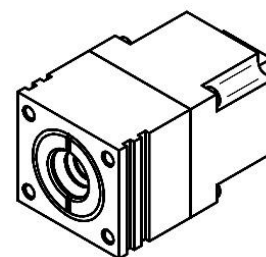


# SM-I-12

## DATASHEET

### Small-size IR detection module based on HgCdTe thermoelectrically cooled optically immersed photoconductive detector



#### FEATURES

- Spectral range: over 14.0  $\mu\text{m}$
- Frequency bandwidth: 10 Hz to 1 MHz
- Adjustable gain
- Small size
- Compatible with optical accessories
- External TEC controller required
- External heatsink required
- Quantity discounted price
- Fast delivery
- No minimum order quantity required

#### APPLICATIONS

- FTIR spectroscopy
- Gas detection, monitoring and analysis:  $\text{C}_2\text{H}_6$ ,  $\text{NH}_3$
- Laser measurements: power monitoring and control, beam profiling and positioning, calibration

#### INCLUDED ACCESSORIES

- 1 pc of MMCX-SMA cable
- 1 pc of AMP2x4-DB9 or AMP2x4-DUBOX2x5 cable

#### DEDICATED ACCESSORIES

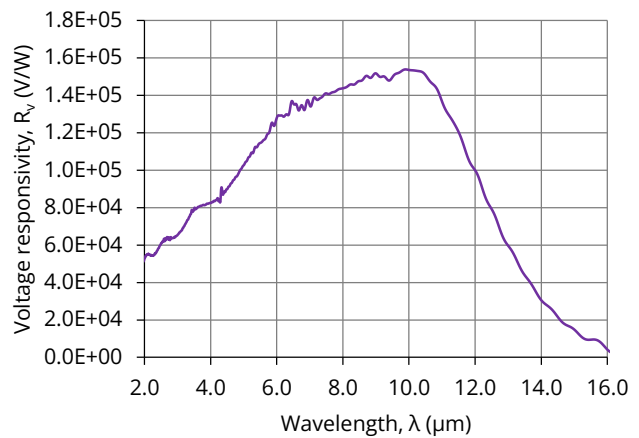
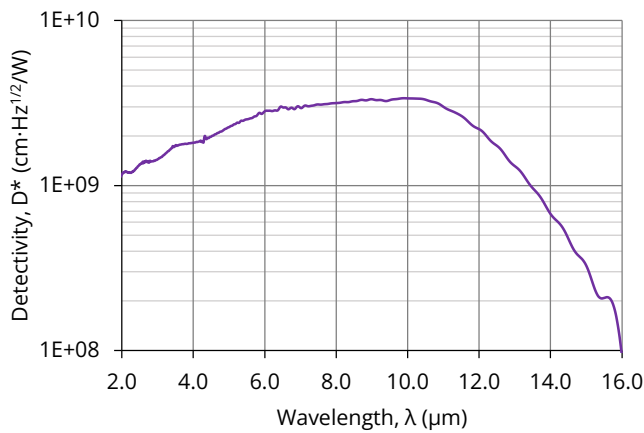
- [PTCC-01 TEC controller series](#)
- [Smart Manager software](#): freeware
- [MHS-2 heatsink](#)

#### DETECTION MODULE CONFIGURATION

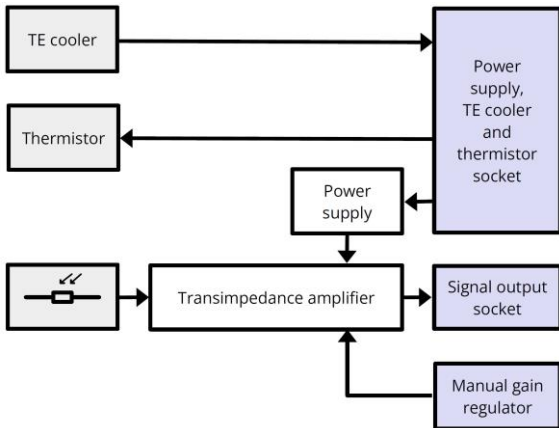
Detection module symbol	SM-I-12
Detector symbol	PCI-3TE-12-1x1-TO8-wZnSeAR-36
Detector type	photoconductive
Active element material	epitaxial HgCdTe heterostructure
Optical area, $A_o$	1 mm $\times$ 1 mm
<a href="#">Optical immersion</a>	hyperhemisphere
Cooling	3TE ( $T_{\text{chip}} \cong 210\text{K}$ )
<a href="#">Temperature sensor</a>	thermistor
Acceptance angle, $\Phi$	$\sim 36$ deg.
<a href="#">Window</a>	wZnSeAR (3 deg. wedged zinc selenide, anti-reflection coating)
Amplifier symbol	SIP-TO8
Amplifier type	small-size, transimpedance
Signal output socket	MMCX
Power supply, TE cooler and thermistor socket	AMPMODU 280389-2 (male)

**SPECIFICATION** ( $T_{amb} = 293\text{ K}$ ,  $T_{chip} = 210\text{ K}$ ,  $R_{load} = 1\text{ M}\Omega$ , unless otherwise noted)

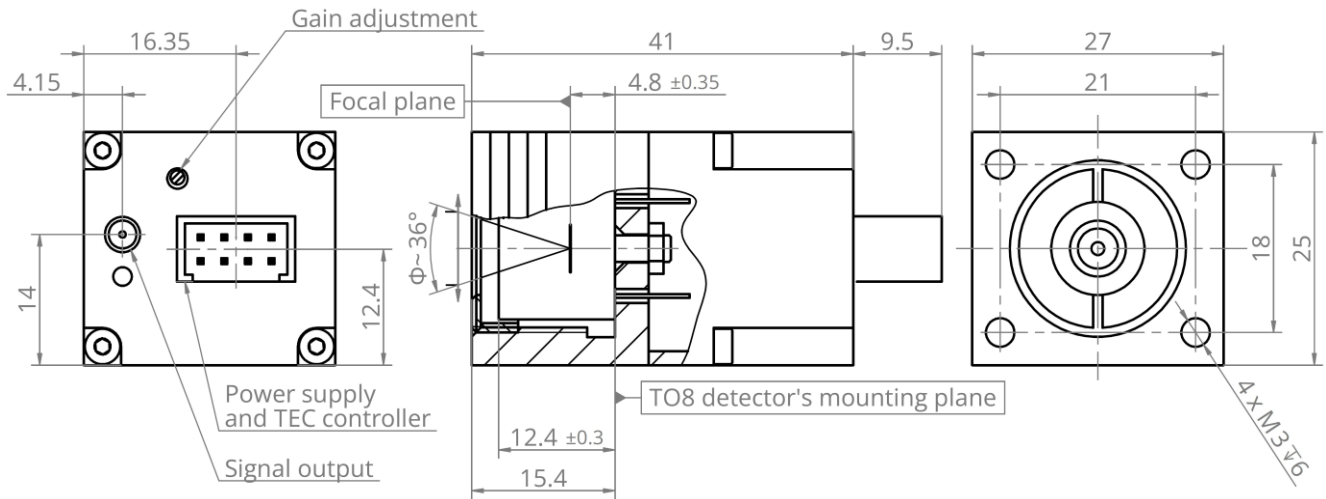
Parameter	Test conditions, remarks	Value			Unit
		Min.	Typ.	Max.	
Active element temperature, $T_{chip}$		-	210	-	K
Peak wavelength, $\lambda_{peak}$		-	10.0±0.5	-	$\mu\text{m}$
Specific wavelength, $\lambda_{spec}$		-	12.0	-	$\mu\text{m}$
Cut-off wavelength, $\lambda_{cut-off}$ (10%)	At 10% of peak responsivity	-	14.0	-	$\mu\text{m}$
Detectivity, $D^*$	At $\lambda = \lambda_{peak}$ , $f = 100\text{ kHz}$	-	$3.4 \times 10^9$	-	$\text{cm}\cdot\text{Hz}^{1/2}/\text{W}$
	At $\lambda = \lambda_{spec}$ , $f = 100\text{ kHz}$	$1.2 \times 10^9$	$2.2 \times 10^9$	-	
Output noise voltage density, $v_n$	At $f = 100\text{ kHz}$	-	-	8	$\mu\text{V}/\text{Hz}^{1/2}$
Voltage responsivity, $R_v$	At $\lambda = \lambda_{peak}$ , $K_i = 100\text{ kV/A}$	-	$1.5 \times 10^5$	-	V/W
	At $\lambda = \lambda_{spec}$ , $K_i = 100\text{ kV/A}$	$5.0 \times 10^4$	$1.0 \times 10^5$	-	
	At $\lambda = \lambda_{peak}$ , $K_i = 55\text{ kV/A}$	-	$8.3 \times 10^4$	-	
	At $\lambda = \lambda_{spec}$ , $K_i = 55\text{ kV/A}$	$2.75 \times 10^4$	$5.5 \times 10^4$	-	
Low cut-off frequency, $f_{lo}$	AC coupling	-	10	-	Hz
High cut-off frequency, $f_{hi}$		1	-	-	MHz
Output impedance, $R_{out}$		-	50	-	$\Omega$
Output voltage swing, $V_{out}$		-	-	±10	V
Output voltage offset, $V_{off}$		-	-	±20	mV
Power supply voltage (positive), $+V_{sup}$		-	+15	-	V
Power supply voltage (negative), $-V_{sup}$		-	-15	-	V
Power supply current consumption (positive), $+I_{sup}$		-	-	+50	mA
Power supply current consumption (negative), $-I_{sup}$		-	-	-50	mA
TEC voltage, $V_{TEC}$		-	-	3.6	V
TEC current, $I_{TEC}$		-	-	0.45	A
Weight		-	52	-	g

**SPECTRAL RESPONSE** (Typ.,  $T_{amb} = 293\text{ K}$ ,  $T_{chip} = 210\text{ K}$ ,  $K_i = 100\text{ kV/A}$ )


### SCHEMATIC DIAGRAM

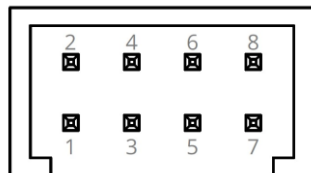


### MECHANICAL LAYOUT AND PINOUT (Unit: mm)



### POWER SUPPLY, TEC AND THERMISTOR SOCKET

AMPMODU 280389-2 (male)



Pin No.	Symbol	Function
1	-Vsup	Power supply input (-)
2	TH2	Thermistor output (2)
3	DATA	DATA pin
4	TEC-	TEC supply input (-)
5	GND	Ground
6	TH1	Thermistor output (1)
7	+Vsup	Power supply input (+)
8	TEC+	TEC supply input (+)

### ABSOLUTE MAXIMUM RATINGS

Parameter	Test conditions, remarks	Value	Unit
Ambient operating temperature, $T_{amb}$		10 to 30	°C
Storage temperature, $T_{stg}$		-20 to 50	°C
Humidity	No dew condensation	10 to 90	%
Maximum incident optical power density	Continuous wave (CW) or single pulses >1 $\mu$ s duration	2.5	W/cm <sup>2</sup>
	Single pulses <1 $\mu$ s duration	10	kW/cm <sup>2</sup>

Stresses beyond those listed under absolute maximum ratings may cause permanent damage to the device. Constant or repeated exposure to absolute maximum rating conditions may affect the quality and reliability of the device.