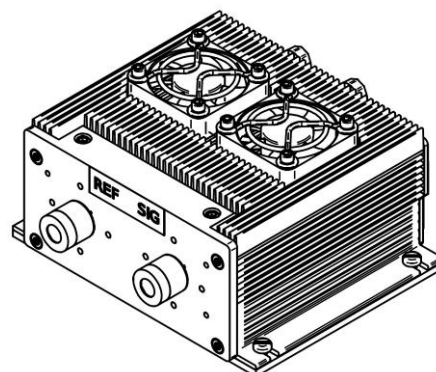


NIPM-I-8

PRELIMINARY DATASHEET

Balanced/autobalanced IR detection module based on two HgCdTe thermoelectrically cooled optically immersed photovoltaic detectors



FEATURES

- Spectral range: 3.0 to 10.0 μm
- Frequency bandwidth: DC to 2.0 MHz (typ.)
- Back-side illuminated
- Unique immersion lens technology applied
- Two channels with similar spectral and frequency characteristics
- Manual switch between balance and autobalance modes
- Integrated two TEC controllers and two fans
- Low-noise performance and high detectivity
- Single power supply
- M6 mounting hole
- Compatible with optical accessories

APPLICATIONS

- Gas detection, monitoring and analysis: CH_4 , H_2S , NO_2 , SO_x
- Excess noise suppression of Quantum Cascade Laser (QCL) in gas analysis

INCLUDED ACCESSORIES

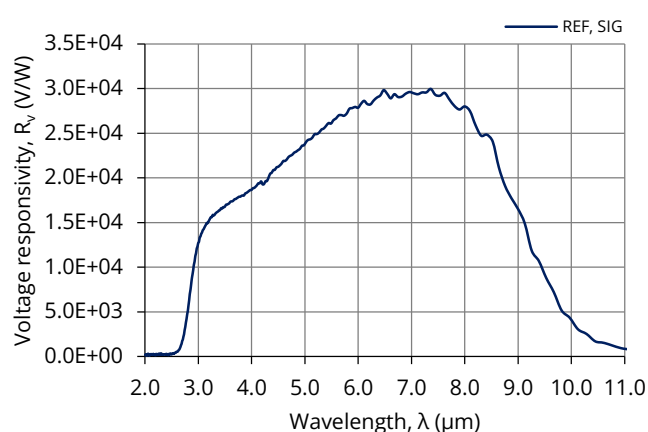
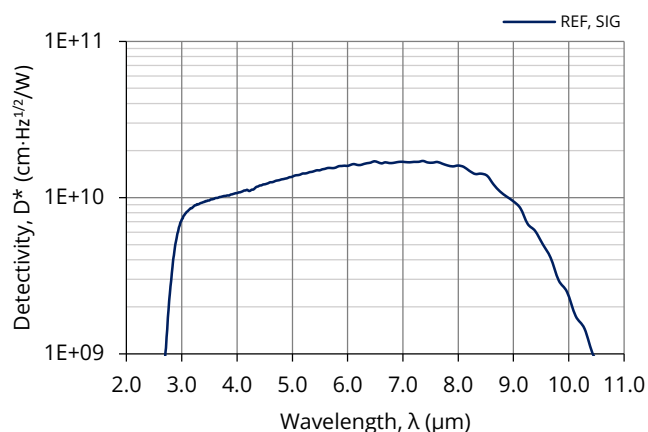
- 3 pcs of SMA-BNC cable
- 1 pc of AC adaptor

DETECTION MODULE CONFIGURATION

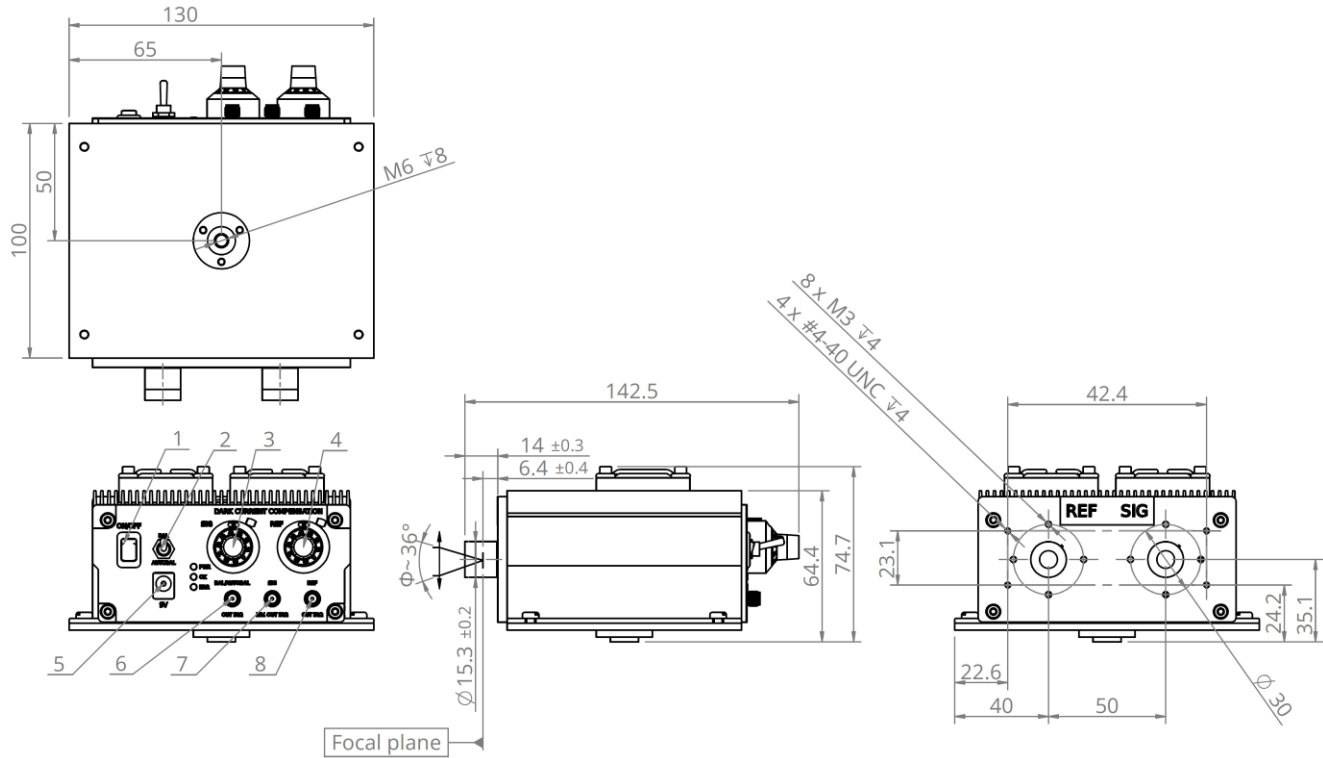
Detection module symbol	NIPM-I-8
Number of detectors	2 pcs
Detectors symbol	PVI-4TE-8-1x1-TO8-wZnSeAR-36
Detectors type	photovoltaic
Active element material	epitaxial HgCdTe heterostructure
Optical area, A_o	1 mm $\times$ 1 mm
Optical immersion	yes
Cooling	4TE ($T_{\text{chip}} \cong 210\text{K}$)
Acceptance angle, Φ	~ 36 deg.
Window	wZnSeAR (3 deg. zinc selenide, anti-reflection coating)
Amplifier type	two-channel, balanced/autobalanced, transimpedance
Reference output socket (REF)	SMA
Signal output socket (SIG)	SMA
Balance/autobalance socket (BAL/AUTOBAL)	SMA
Power supply socket	DC 2.1/5.5

SPECIFICATION ($T_{\text{amb}} = 293 \text{ K}$, $T_{\text{chip}} = 210 \text{ K}$, $R_{\text{load}} = 50 \Omega$)

Parameter	Test conditions, remarks	Value			Unit
		Min.	Typ.	Max.	
Active element temperature, T_{chip}		-	~210	-	K
Cut-on wavelength, $\lambda_{\text{cut-on}} (10\%)$	At 10% of peak responsivity	-	3.0	-	μm
Peak wavelength, λ_{peak}		-	6.5 ± 1.0	-	μm
Specific wavelength, λ_{spec}		-	8.0	-	μm
Cut-off wavelength, $\lambda_{\text{cut-off}} (10\%)$	At 10% of peak responsivity	-	10.0	-	μm
Detectivity, D^*	REF, at $\lambda = \lambda_{\text{spec}}$, $f = 100 \text{ kHz}$	5.0×10^9	1.6×10^{10}	-	$\text{cm} \cdot \text{Hz}^{1/2} / \text{W}$
	SIG, at $\lambda = \lambda_{\text{spec}}$, $f = 100 \text{ kHz}$	5.0×10^9	1.6×10^{10}	-	
Output noise voltage density, v_n	REF, at $f = 100 \text{ kHz}$	-	-	400	$\text{nV}/\text{Hz}^{1/2}$
	SIG, at $f = 100 \text{ kHz}$	-	-	400	
Voltage responsivity, R_v	REF, at $\lambda = \lambda_{\text{spec}}$	1.5×10^4	2.8×10^4	-	V/W
	SIG, at $\lambda = \lambda_{\text{spec}}$	1.5×10^4	2.8×10^4	-	
Low cut-off frequency, f_{lo}	DC coupling	-	0	-	Hz
High cut-off frequency, f_{hi}		1.8	2.0	-	MHz
Output impedance, R_{out}	REF, SIG, BAL/AUTOBAL	-	50	-	Ω
Output voltage swing, V_{out}		-	± 0.4	-	V
Output voltage offset, V_{off}		-	± 30	-	mV_{DC}
Common mode rejection ratio, CMRR (balance).	REF, at $f = 100 \text{ kHz}$	-	-	-30	dB
Common mode rejection ratio, CMRR (auto-balance)	REF, at $f = 100 \text{ kHz}$	-	-	-22	dB
Power supply voltage, V_{sup}		-	+9	-	V_{DC}
Power supply current consumption, I_{sup}		-	1.5	-	A

SPECTRAL RESPONSE (Typ., $T_{\text{amb}} = 293 \text{ K}$, $T_{\text{chip}} = 210 \text{ K}$, REF and SIG)


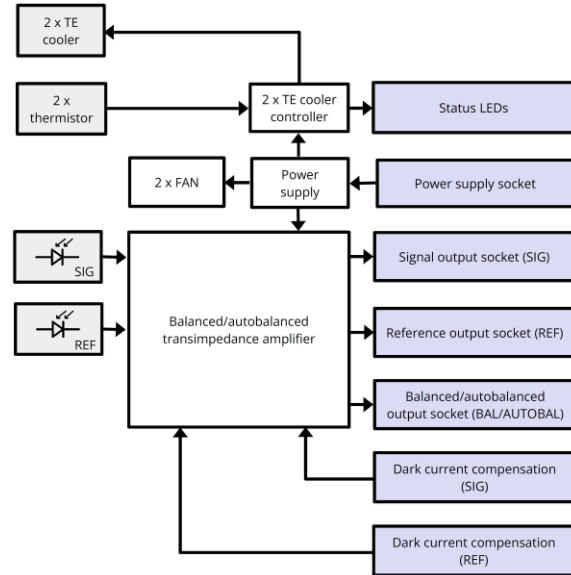
MECHANICAL LAYOUT (Unit: mm)



MARKING DESCRIPTION

1. Power switch
2. Balance/autobalance switch
3. Dark current compensation – signal
4. Dark current compensation – reference
5. Power supply
6. Balance/autobalance output
7. Signal output
8. Reference output

SCHEMATIC DIAGRAM



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 μ s duration	2.5	W/cm ²
	Single pulses <1 μ s duration	10	kW/cm ²

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.