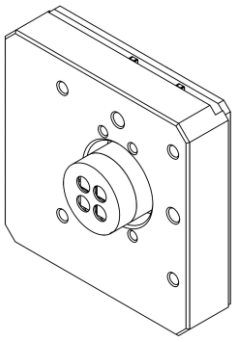
4EF-I-5

PRELIMINARY DATASHEET

Four-band IR detection module based on four-element InAsSb thermoelectrically cooled optically immersed photovoltaic detector



FEATURES

- Integrated TEC controller
- Low crosstalk
- Compatible with optical accessories
- Possibility of selecting various configurations of bandpass filters

APPLICATIONS

- Gas detection, monitoring and analysis: CH_4, C_2H_6, CO_2,CO
- Flame and explosion detection
- Combustion process control
- Emission control (exhaust fumes, greenhouse gases)

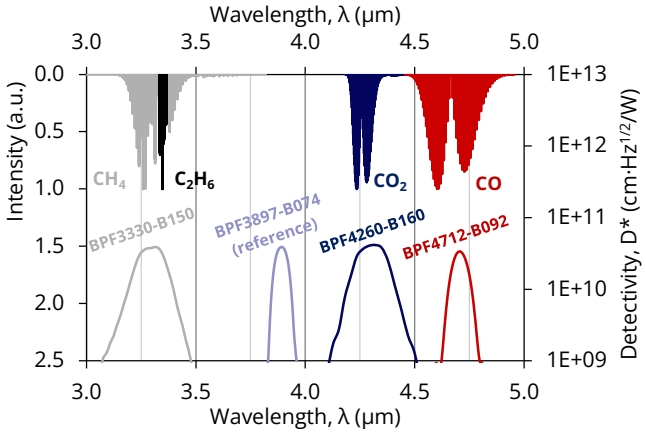
DETECTION MODULE CONFIGURATION

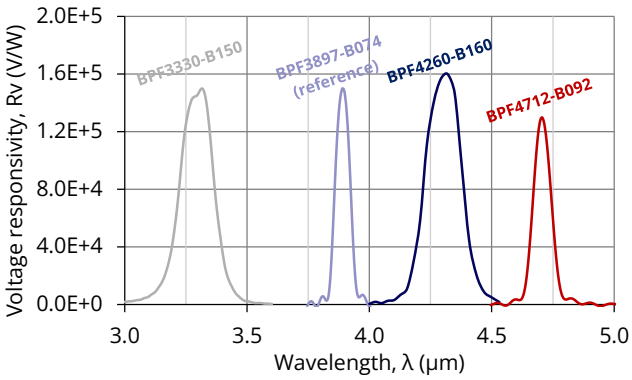
Detection module symbol	4EF-I-5
Detector type	photovoltaic
Active element material	epitaxial InAsSb heterostructure
Optical area of single element, A_O	1 mm × 1 mm
Number of elements	4 (2 rows, 2 columns)
Active element pitch, mm	4.5
Optical immersion	hyperhemisphere
Cooling	3TE (T_{chip} ≅ 230 K)
Acceptance angle, Φ	~29 deg.
Window	four planar, with band-pass filters Filter 1: λ_{cwl}=3330nm, bandwidth=150nm Filter 2: λ_{cwl}=4260nm, bandwidth=160nm Filter 3: λ_{cwl}=3897nm, bandwidth=74nm Filter 4: λ_{cwl}=4712nm, bandwidth=92nm
Amplifier type	four-channel, transimpedance
Signal output and power supply socket	WR-MM (female) SMT 690367281676 (mating plug: WR-MM (male) IDC 690157001672)

SPECIFICATION (Typ., T_{amb} = 293 K, T_{chip} = 230 K, R_{load} = 1 MΩ, unless otherwise noted)

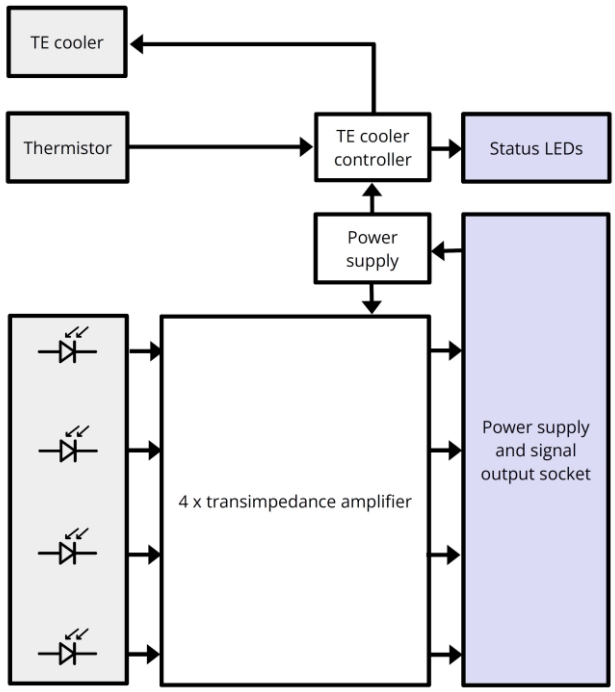
Parameter	Test conditions, remarks	Value				Unit
		Channel 1	Channel 2	Channel 3	Channel 4	
Active element temperature, T_{chip}		230				K
Filter centre wavelength, λ_{cwl}		3330±30	4260±30	3897±40	4712±40	nm
Filter bandwidth		150	160	74	92	nm
Detectivity, D*	At λ = λ_{cwl}, f = 10 kHz	3.88×10^{10}		4.14×10^{10}	3.37×10^{10}	cm·$Hz^{1/2}$/W
Voltage responsivity, R_v	At λ = λ_{cwl}	1.5×10^{5}		1.6×10^{5}	1.3×10^{5}	V/W
Output noise voltage density, v_n	At f = 10 kHz	390				nV/$Hz^{1/2}$
Low cut-off frequency, f_{lo}	DC coupling	0				Hz
High cut-off frequency, f_{hi}		100				kHz
Output impedance, R_{out}		50				Ω
Output voltage swing, V_{out}		max. ±1				V
Output voltage offset, V_{off}		max. ±20				mV
Power supply voltage (positive), $+V_{sup}$, $+V_{TECC}$		+5				V
Power supply voltage (negative), $-V_{sup}$		-5				V
Power supply current consumption (positive), $+I_{sup}$		max. +1.2				A
Power supply current consumption (negative), $-I_{sup}$		max. -200				A

SPECTRAL RESPONSE (Typ., T_{amb} = 293 K, T_{chip} = 230 K)

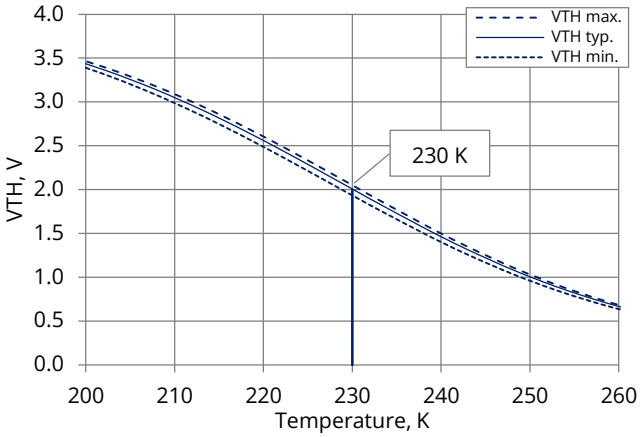




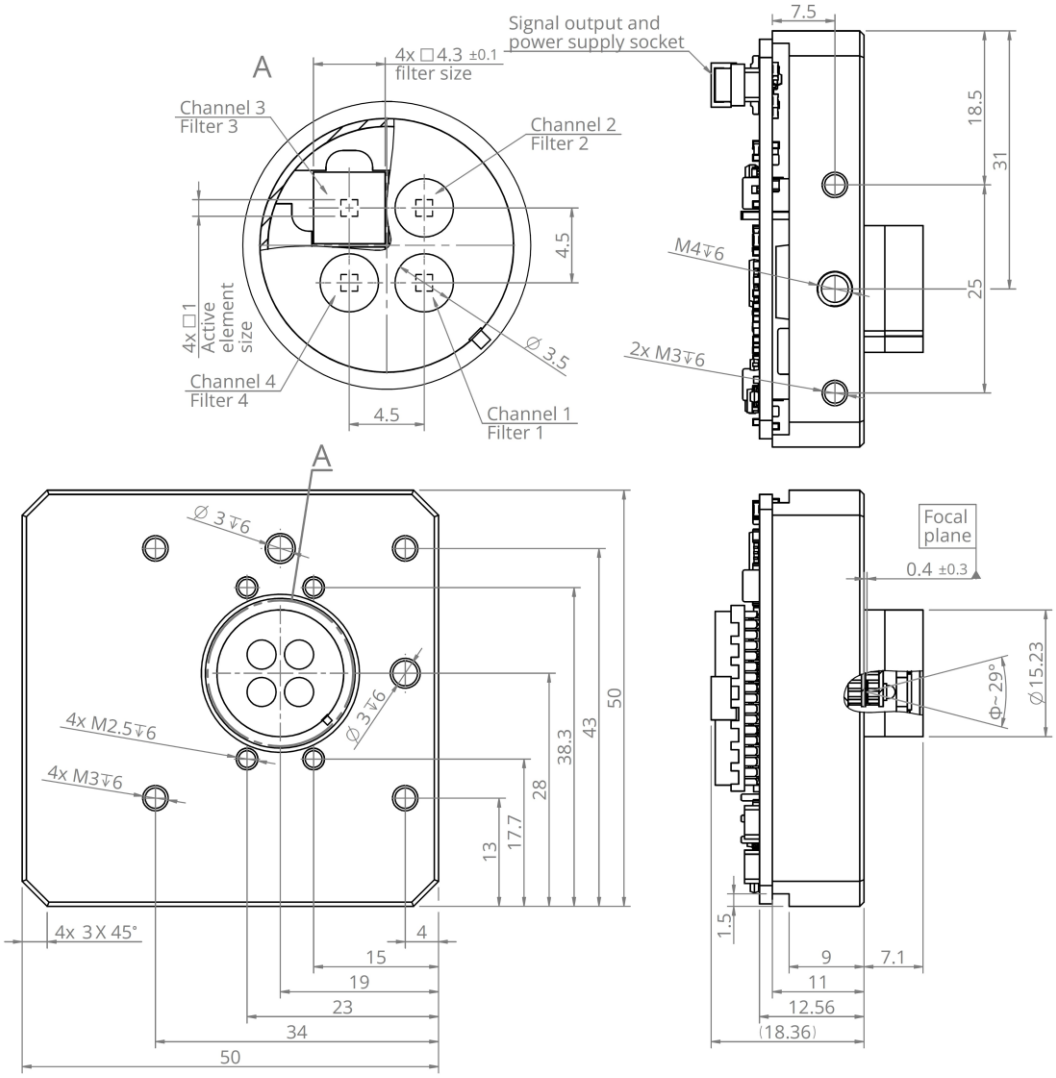
SCHEMATIC DIAGRAM



DETECTOR TEMPERATURE MONTOR CHARACTERISTICS

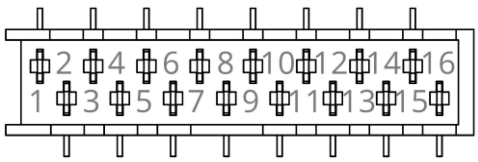


MECHANICAL LAYOUT (Unit: mm)



POWER SUPPLY AND SIGNAL OUTPUT SOCKET

WR-MM (female) SMT 690367281676



Pin No.	Symbol	Function
1	GND	Ground
2	CH1	Channel 1 output
3	GND	Ground
4	CH2	Channel 2 output
5	GND	Ground
6	CH3	Channel 3 output
7	GND	Ground
8	CH4	Channel 4 output
9	GND	Ground
10	VTH	Active element temperature monitor
11	GND	Ground
12	+Vsup	Power supply input (+)
13	GND	Ground
14	-Vsup	Power supply input (-)
15	TGND	TECC power ground
16	+VTECC	TECC power 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 µs duration	2.5	W/cm^2
	Single pulses <1 µs 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.