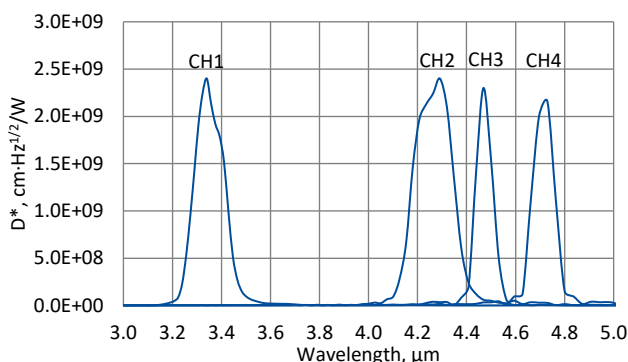


## 4EF-5 – ENGINEERING SAMPLE

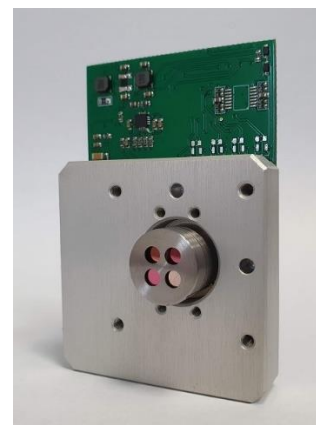
### Four band mid-IR detection module

**4EF-5** is a multiband, four-channel infrared detection module. Thermoelectrically cooled photovoltaic multiple junction four-element 2x2 array detector, based on InAsSb heterostructure, is integrated with four-channel transimpedance preamplifier and thermoelectric cooler controller. This module uses four band-pass filters with centre wavelengths: 3.34  $\mu\text{m}$  (CH1), 4.26  $\mu\text{m}$  (CH2), 4.47  $\mu\text{m}$  (CH3) and 4.71  $\mu\text{m}$  (CH4). 4EF-5 is suitable for the detection of common gases.

#### Spectral response ( $T_a = 20^\circ\text{C}$ )



Exemplary spectral detectivity, the spectral response of delivered devices may differ.



#### Features

- Integrated TEC controller
- Easy assembly
- Compatible with optical accessories
- Other filters available upon request

#### Applications

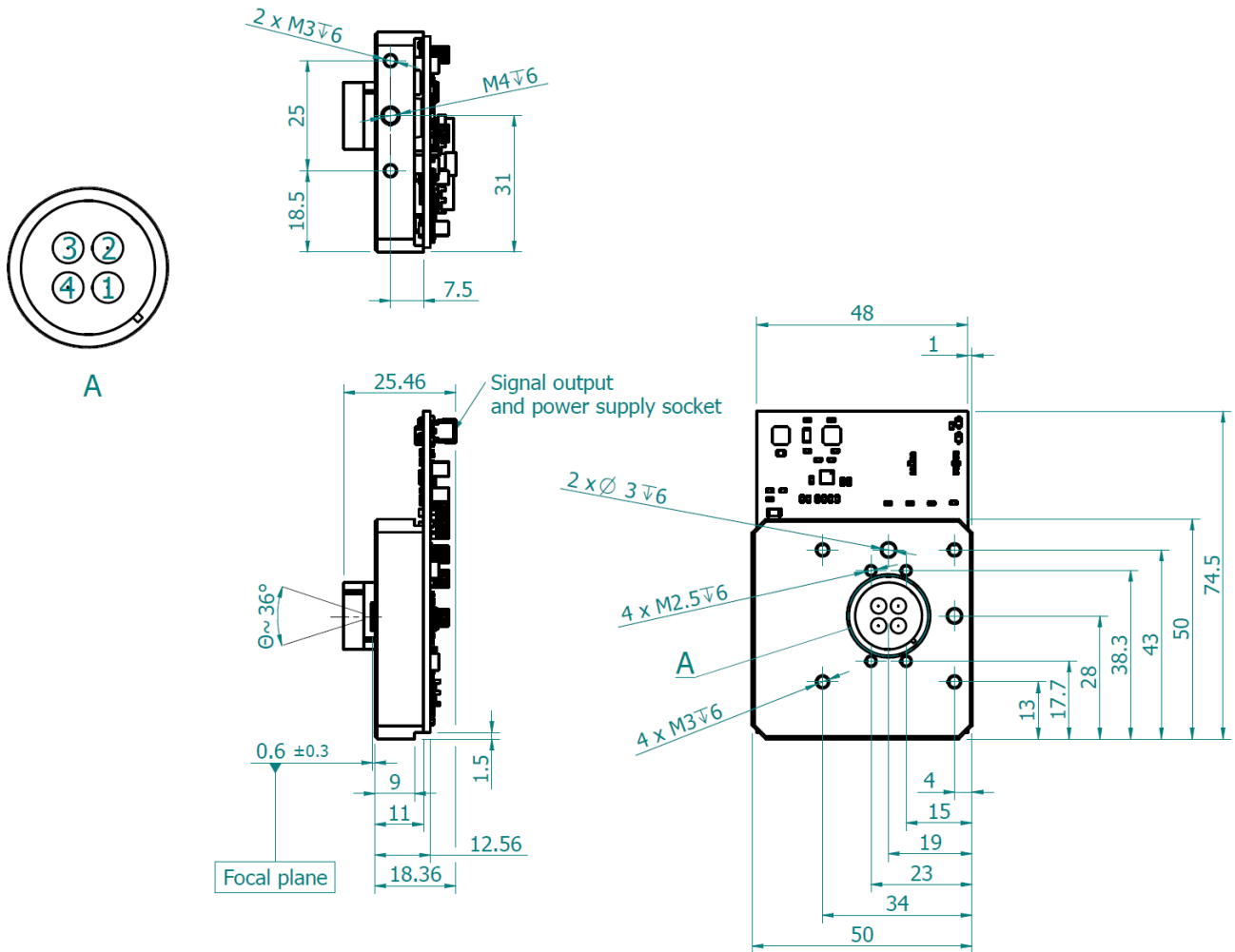
- Detection of gases:
  - CH<sub>4</sub> (methane)
  - C<sub>2</sub>H<sub>6</sub> (ethane)
  - CO<sub>2</sub> (carbon dioxide)
  - N<sub>2</sub>O (nitrous oxide)
  - CO (carbon monoxide)
- Flame and fire detection
- Combustion process control
- Explosives detection
- Exhaust fumes analysis

#### Specification ( $T_a = 20^\circ\text{C}$ )

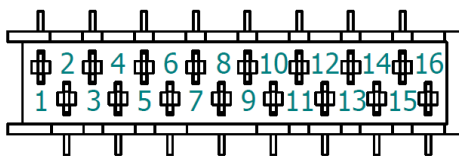
Parameter	Typical value			
	Channel 1	Channel 2	Channel 3	Channel 4
<b>Optical characteristics</b>				
Centre wavelength $\lambda_{\text{CWL}}$ , $\mu\text{m}$	3.34	4.26	4.47	4.71
Filter bandwidth, nm	130 $\pm$ 20	180 $\pm$ 20	80 $\pm$ 20	100 $\pm$ 20
Detectivity $D^*$ ( $\lambda_{\text{CWL}}$ ), $\text{cm}\cdot\text{Hz}^{1/2}/\text{W}$	$\geq 2.4 \times 10^9$	$\geq 2.4 \times 10^9$	$\geq 2.3 \times 10^9$	$\geq 2.0 \times 10^9$
Output noise density $v_n$ (10 kHz), $\text{nV}/\text{Hz}^{1/2}$	$\leq 700$	$\leq 700$	$\leq 700$	$\leq 700$
<b>Electrical parameters</b>				
Voltage responsivity $R_v$ ( $\lambda_{\text{CWL}}$ , $R_L = 1 \text{ M}\Omega^{\text{*)}$ ), $\text{V}/\text{W}$	$\geq 1.4 \times 10^4$	$\geq 1.4 \times 10^4$	$\geq 1.4 \times 10^4$	$\geq 1.1 \times 10^4$
Low cut-off frequency $f_{\text{lo}}$ , Hz	DC	DC	DC	DC
High cut-off frequency $f_{\text{hi}}$ , kHz	100	100	100	100
Output impedance $R_{\text{out}}$ , $\Omega$	50	50	50	50
Output voltage swing $V_{\text{out}}$ ( $R_L = 1 \text{ M}\Omega^{\text{*)}$ ), V	1	1	1	1
Output voltage offset $V_{\text{off}}$ , mV	max $\pm$ 20	max $\pm$ 20	max $\pm$ 20	max $\pm$ 20
Detection module power supply voltage $V_{\text{sup}}$ , $V_{\text{DC}}$			$\pm 5.0$	
TEC controller power supply voltage, V			+5.0	
Power consumption, W			5	
<b>Other information</b>				
Active elements material	epitaxial InAsSb heterostructure			
Active areas A, mm $\times$ mm	4 $\times$ (1 $\times$ 1)			
Active element pitch, mm	4.5			
Acceptance angle of single element $\Phi$	$\sim 36^\circ$	$\sim 36^\circ$	$\sim 36^\circ$	$\sim 36^\circ$
Ambient operating temperature $T_a$ , $^\circ\text{C}$	10 to 30			
TEC controller	on board			
Input-output socket	WR-MM (female) SMT 690367281676			

<sup>\*)</sup>  $R_L$  – load resistance

### Mechanical layout, mm



### Signal output and power supply socket WR-MM (female) SMT 690367281676



Function	Symbol	Pin number
Ground	GND	1, 3, 5, 7, 9, 11, 13
Channel 1 output	CH1	2
Channel 2 output	CH2	4
Channel 3 output	CH3	6
Channel 4 output	CH4	8
Not connected	NC	10
Power supply input (+)	+V <sub>sup</sub>	12
Power supply input (-)	-V <sub>sup</sub>	14
TEC ground	TEC GND	15
TEC supply input (+)	TEC+	16

### Included accessories

- 2x8 WR-MM ribbon cable