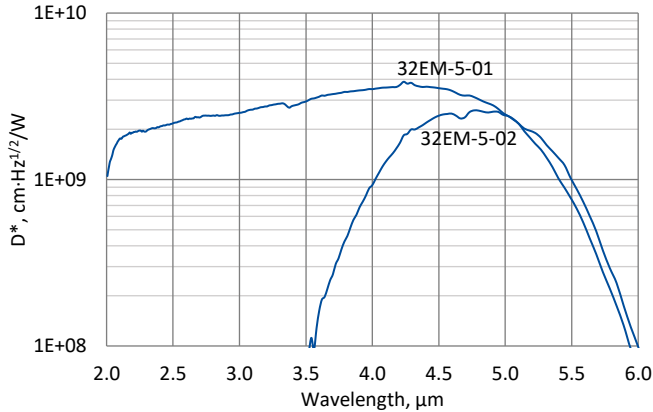


32EM-5-01, 32EM-5-02 – ENGINEERING SAMPLES

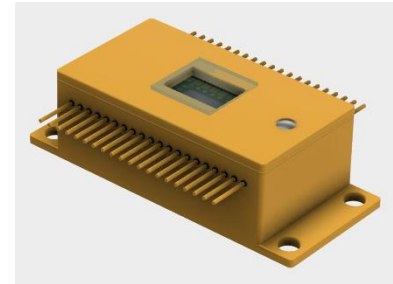
MWIR 32-channel IR detection modules series with HgCdTe photovoltaic detector

32EM-5 is a series of 32-channel detection modules. Thermoelectrically cooled MWIR 32-element HgCdTe photovoltaic detector is integrated with DC-coupled 32-channel transimpedance preamplifier.

Spectral response ($T_a = 20^\circ\text{C}$, $V_b = 0\text{ mV}$)



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



Specification ($T_a = 20^\circ\text{C}$, $V_b = 0\text{ mV}$)

Parameter	Detection module type	
	32EM-5-01	32EM-5-02
Optical characteristics		
Cut-on wavelength $\lambda_{\text{cut-on}}$ (10%), μm	≤ 2.0	3.7 ± 0.2
Peak wavelength λ_{peak} , μm	4.25 ± 0.2	4.75 ± 0.2
Optimal wavelength λ_{opt} , μm	5.0	5.0
Cut-off wavelength $\lambda_{\text{cut-off}}$ (10%), μm	5.6 ± 0.2	5.8 ± 0.2
Detectivity $D^*(\lambda_{\text{peak}})$, $\text{cm}\cdot\text{Hz}^{1/2}/\text{W}$	$\geq 3.5 \times 10^9$	$\geq 2.4 \times 10^9$
Detectivity $D^*(\lambda_{\text{opt}})$, $\text{cm}\cdot\text{Hz}^{1/2}/\text{W}$	$\geq 2.2 \times 10^9$	$\geq 2.2 \times 10^9$
Electrical parameters		
Voltage responsivity $R_v(\lambda_{\text{peak}}, R_{\text{Load}} = 1\text{ M}\Omega)$, V/W	$\geq 3.5 \times 10^4$	$\geq 5.0 \times 10^4$
Voltage responsivity $R_v(\lambda_{\text{opt}}, R_{\text{Load}} = 1\text{ M}\Omega)$, V/W	$\geq 2.2 \times 10^4$	$\geq 4.6 \times 10^4$
Low cut-off frequency f_{lo} , Hz	DC	DC
High cut-off frequency f_{hi} , kHz	≥ 400	≥ 650
Output impedance R_{out} , Ω	50	50
Output voltage swing $V_{\text{out}} (R_{\text{Load}} = 1\text{ M}\Omega)$, V	-1 (negative output)	-1 (negative output)
Output voltage offset V_{off} , mV_{DC}	max -200	max -200
Power supply voltage V_{sup} , V_{DC}	+5	+5
Other information		
Active elements material	epitaxial HgCdTe heterostructure	
Number of elements	1×32 linear array	
Active area of single element A, $\text{mm}\times\text{mm}$	0.125×1	0.1×0.1
Distance between active elements, μm	25	50
Window	$\text{pAl}_2\text{O}_3\text{AR}$	
Acceptance angle Φ	$\sim 70^\circ$	
Ambient operating temperature T_a , $^\circ\text{C}$	10 to 30	

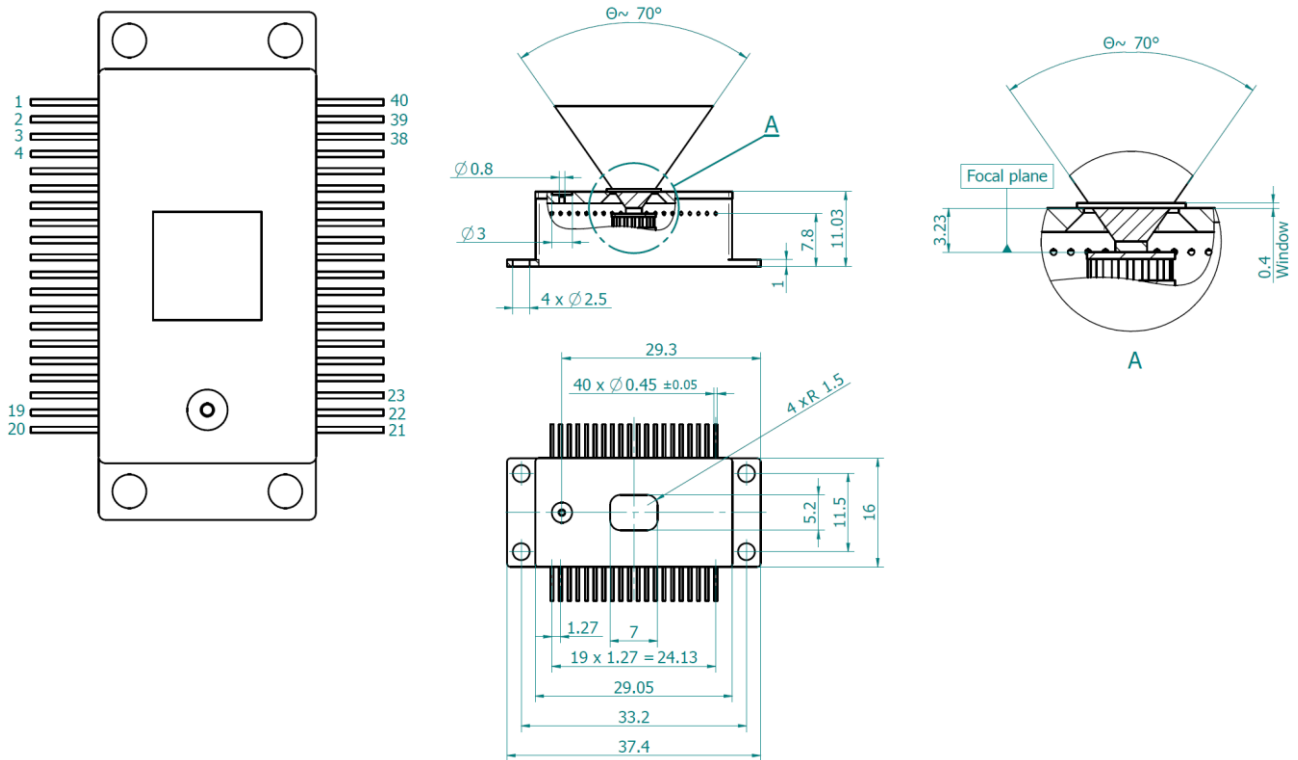
Features

- High sensitivity
- High-speed response
- 32 channels
- Low crosstalk
- Compact small size
- Convenient cryogenic-free operation
- External heatsink is necessary (recommended thermal resistance: $\sim 2\text{ K/W}$)
- External TEC controller is necessary

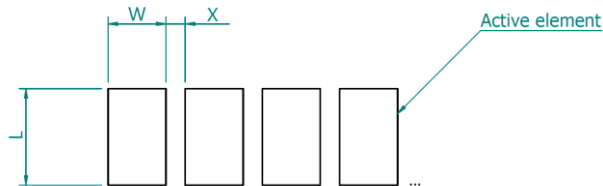
Applications

- Spectroscopy (gas detection, breath analysis)
- Slow and fast contactless temperature measurement (railway transport, industrial and laboratory processes monitoring)
- Optical sorting systems
- Laser beam profiling and positioning
- Flame and explosion detection
- Defense and security
- Combustion process control

Mechanical layout, mm



Details of active elements area

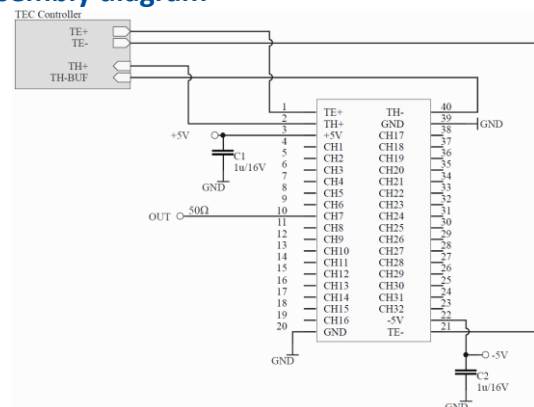


Detection module symbol	W, mm	L, mm	X, μm
32EM-5-01	0.125	1	25
32EM-5-02	0.1	0.1	50

Pinout

Function	Symbol	Pin number
TEC supply input (+)	TEC+	1
Thermistor output (1)	TH1	2
Power supply input (+)	+V _{sup}	3
Channel 1 – 16	CH1 – CH16	4 – 19
Ground	GND	20
TEC ground	TEC GND	21
Power supply input (-)	-V _{sup}	22
Channel 32 – 17	CH32 – CH17	23 – 38
Ground	GND	39
Thermistor output (2)	TH2	40

Assembly diagram



Thermoelectric cooler parameters

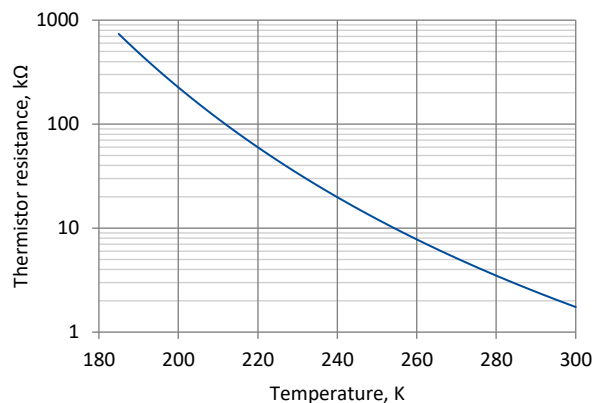
Parameter	Value
Active element temperature T _{det}	~230 K
Maximum TEC voltage V _{max}	3.7 V
Maximum TEC current I _{max}	0.8 A
Maximum heat pumping capacity Q _{max}	0.6 W

Temperature sensor

32EM-5 series modules are equipped with the built-in thermistor to provide precise control and measurements of detector active elements temperature.

The maximal power dissipated by the thermistor should not exceed 0.2 mW, therefore its bias must be carefully chosen. To provide accurate temperature measurement, this power should not exceed 0.03 mW.

Thermistor characteristics



Resistance vs. temperature of the thermistor

T, K	T, °C	R, kΩ
185	-88	736.85
186	-87	676.94
187	-86	622.47
188	-85	572.89
189	-84	527.72
190	-83	486.53
191	-82	448.95
192	-81	414.61
193	-80	383.21
194	-79	354.48
195	-78	328.17
196	-77	304.04
197	-76	281.91
198	-75	261.59
199	-74	242.92
200	-73	225.75
201	-72	209.94
202	-71	195.38
203	-70	181.96
204	-69	169.58
205	-68	158.15
206	-67	147.59
207	-66	137.83
208	-65	128.80
209	-64	120.44
210	-63	112.69
211	-62	105.51
212	-61	98.85
213	-60	92.66

T, K	T, °C	R, kΩ
214	-59	86.92
215	-58	81.57
216	-57	76.61
217	-56	71.98
218	-55	67.68
219	-54	63.66
220	-53	59.92
221	-52	56.43
222	-51	53.17
223	-50	50.13
224	-49	47.29
225	-48	44.63
226	-47	42.14
227	-46	39.81
228	-45	37.63
229	-44	35.58
230	-43	33.66
231	-42	31.86
232	-41	30.18
233	-40	28.59
234	-39	27.10
235	-38	25.70
236	-37	24.38
237	-36	23.14
238	-35	21.98
239	-34	20.88
240	-33	19.84
241	-32	18.87
242	-31	17.94

T, K	T, °C	R, kΩ
243	-30	17.08
244	-29	16.26
245	-28	15.48
246	-27	14.75
247	-26	14.06
248	-25	13.40
249	-24	12.79
250	-23	12.20
251	-22	11.65
252	-21	11.12
253	-20	10.62
254	-19	10.15
255	-18	9.70
256	-17	9.28
257	-16	8.88
258	-15	8.50
259	-14	8.13
260	-13	7.79
261	-12	7.46
262	-11	7.15
263	-10	6.85
264	-9	6.57
265	-8	6.30
266	-7	6.05
267	-6	5.80
268	-5	5.57
269	-4	5.35
270	-3	5.14
271	-2	4.94

T, K	T, °C	R, kΩ
272	-1	4.75
273	0	4.56
274	1	4.39
275	2	4.22
276	3	4.06
277	4	3.91
278	5	3.77
279	6	3.63
280	7	3.49
281	8	3.37
282	9	3.24
283	10	3.13
284	11	3.02
285	12	2.91
286	13	2.81
287	14	2.71
288	15	2.62
289	16	2.53
290	17	2.44
291	18	2.36
292	19	2.28
293	20	2.20
294	21	2.13
295	22	2.06
296	23	1.99
297	24	1.92
298	25	1.86
299	26	1.80
300	27	1.74