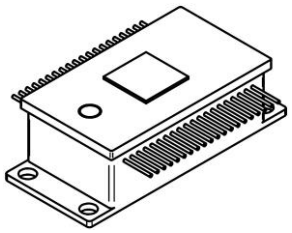
32EM-5 SERIES

PRELIMINARY DATASHEET

HgCdTe 32-channel thermoelectrically cooled infrared detection modules with an integrated first stage transimpedance amplifier



FEATURES

- Spectral range: 2.0 to 5.6 µm (typ.)
- Frequency bandwidth: DC to 400 kHz (typ.)
- Low crosstalk
- Compact, small size
- Convenient cryogenic-free operation
- External heatsink is necessary (recommended thermal resistance of ~2 K/W)
- External TEC controller is necessary

APPLICATIONS

- Contactless temperature measurements: railway transport, industrial and laboratory processes monitoring
- Flame and explosion detection
- Threat warning systems
- Heat-seeking, thermal signature detection
- Gas detection, monitoring and analysis: CH_4, C_2H_2, CH_2O, HCl, NH_3, SO_2, C_2H_6, CO, CO_2, NO_x
- Breath analysis: C_2H_6, CH_2O, NH_3, NO, OCS
- Gas leak detection
- Combustion process control
- Non-destructive material testing: optical sorting systems

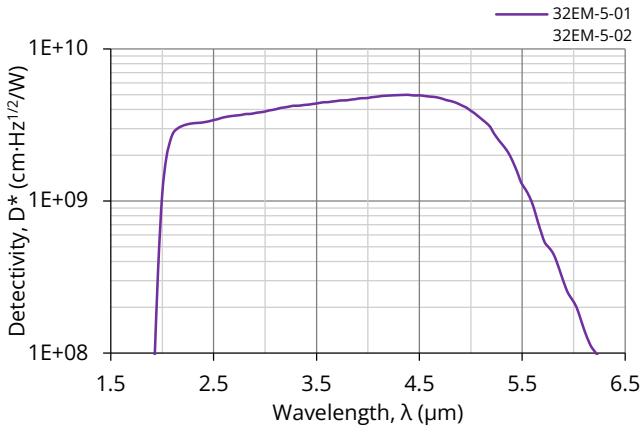
DETECTION MODULE CONFIGURATION

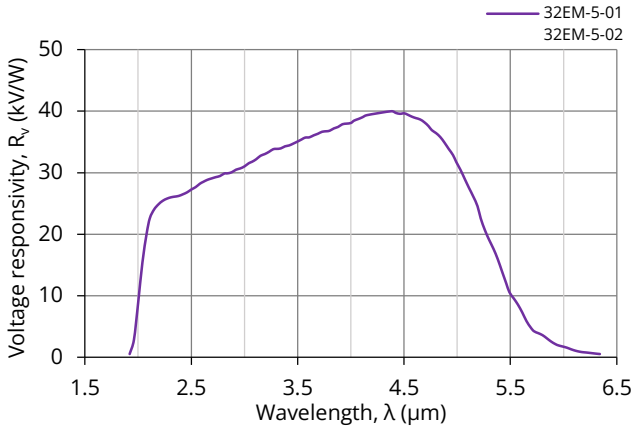
Detection module symbol	Cooling	Temperature sensor	Active area of single element, A, mm×mm	Number of elements	Active element pitch, mm	Optical immersion	Package	Acceptance angle Φ, deg.	Window
32EM-5-01	3TE (T_{chip}≅230K)	thermistor	0.125×1.000	32 (one row)	0.15	no	butterfly (40-pin)	≥40 deg.	pAl_2O_3AR (planar sapphire, anti-reflection coating)
32EM-5-02			0.1×0.1						

SPECIFICATION (T_{amb} = 293 K, T_{chip} = 230 K, R_{load} = 1 MΩ)

Parameter	Test conditions, remarks	Value			Unit
		Min.	Typ.	Max.	
Active element temperature, T_{chip}		-	~230	-	K
Cut-on wavelength, $\lambda_{cut\text{-}on}$ (10%)	At 10% of the peak responsivity	-	2.0	-	µm
Peak wavelength, λ_{peak}		-	4.2	-	µm
Specific wavelength, λ_{spec}		-	5.0	-	µm
Cut-off wavelength, $\lambda_{cut\text{-}off}$ (10%)	At 10% of the peak responsivity	-	5.6	-	µm
Detectivity, D*	At $\lambda = \lambda_{peak}$, f = 10 kHz	-	5.0×10^9	-	cm·Hz$^{1/2}$/W
	At $\lambda = \lambda_{spec}$, f = 10 kHz	-	3.9×10^9	-	
Output noise voltage density, v_n	At f = 10 kHz	-	250	-	nV/Hz$^{1/2}$
Voltage responsivity, R_v	At $\lambda = \lambda_{peak}$	-	4.0×10^4	-	V/W
	At $\lambda = \lambda_{spec}$	-	3.1×10^4	-	
Low cut-off frequency, f_{lo}	DC coupling	-	0	-	Hz
High cut-off frequency, f_{hi}		-	400	-	kHz
Output impedance, R_{out}		-	50	-	Ω
Output voltage swing, V_{out}	Negative output	-	-1	-	V
Output voltage offset, V_{off}		-	-	-200	mV_{DC}
Power supply voltage (positive), $+V_{sup}$		-	+5	-	V
Power supply voltage (negative), $-V_{sup}$		-	-5	-	V
Power supply current consumption (positive), $+I_{sup}$		-	+100	-	mA
Power supply current consumption (negative), $-I_{sup}$		-	-100	-	mA

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





MECHANICAL LAYOUT, ACTIVE ELEMENTS ARRANGEMENTS AND PINOUT

- 32EM-5-01 IR detection module technical drawing
- 32EM-5-02 IR detection module technical drawing

ABSOLUTE MAXIMUM RATINGS

Parameter	Test conditions, remarks	Value	Unit
Ambient operating temperature, T_{amb}	Operation at T_{amb} > 30°C may increase the active element temperature and reduce the performance of the detection module below specified parameters	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	100	W/cm^2
	Single pulses <1 μs duration	1	MW/cm^2
Maximum TEC voltage, $V_{TEC\ max}$	3TE	3.7	V
Maximum TEC current, $I_{TEC\ max}$	3TE	0.7	A
Maximum power supply voltage positive, $+V_{sup\ max}$		+5.5	V
Maximum power supply voltage negative, $-V_{sup\ max}$		-5.5	V

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.