

Pyroelectric Infrared Detectors for Measurement Applications



Single-element and multi-channel detectors

- Detector elements made from Lithium Tantalate
- Highest detectivity (10^9 cm $\sqrt{\text{Hz/W}}$)
- Extremely low noise
- Low microphony
- Low temperature dependence
- Very good long-term stability
- Voltage or current mode
- Custom-designed IR filters
- Optional with absorber or silver black
- Optional with thermal compensation
- Up to 4 spectral channels per detector
- Individual element geometries
- Different package types
- Excellent price-performance payoff

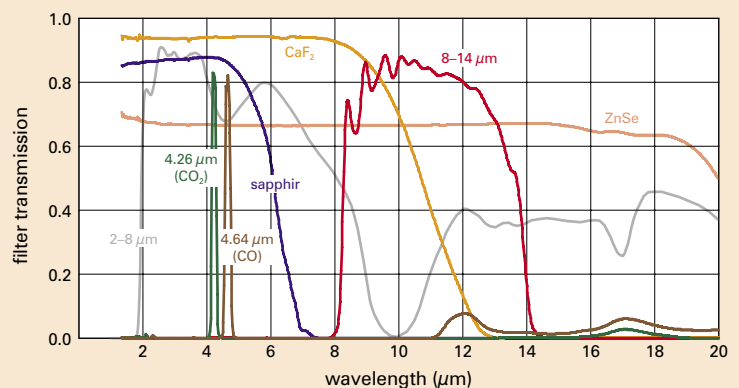
Applications

The pyroelectric single-element and multi-channel infrared detectors from DIAS Infrared GmbH are designed for use in gas analysis, spectroscopy, pyrometry and security engineering applications.

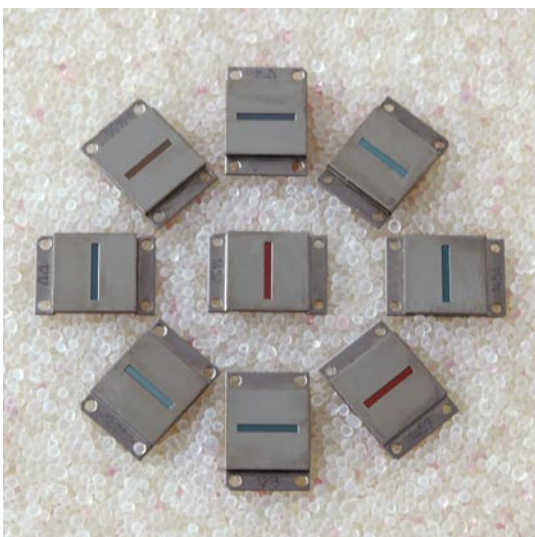
Very high values of specific detectivity D^* are achieved by using modern ion beam etching technology for extremely thin elements.

The great variety of infrared sensor constructions makes it possible to realize custom-made solutions for both small and large quantities with an excellent price-performance payoff.

IR filter



- Coated silicon or germanium as infrared window
- Broad band windows (>1.4 μm) or special filters
- Customised filters and integrated optics



Linear arrays with 128 or 256 elements

- 128 or 256 elements arranged in one line
- NEP (128 Hz) down to 1.1 nW
- Dynamic range > 75 dB
- Modulation frequency up to 512 Hz
- Integrated CMOS multiplexer
- High long-term stability
- Simple mode of operation
- Operation at ambient temperature
- Customised arrays with up to 256 elements with special sizes
- Modules with linear arrays

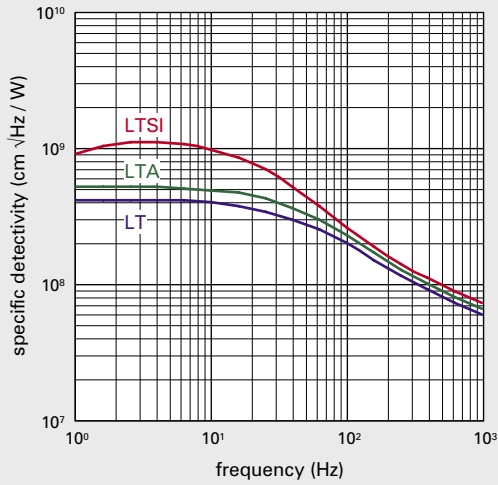
Single-Element and Multi-Channel Detectors

Types							
Type	Size of Element	Additional Absorber	Thermal Compensation	S_V (V/W) ^{1,2}	u_{Rn} (nV/ $\sqrt{\text{Hz}}$) ¹	D^* (cm $\sqrt{\text{Hz/W}}$) ^{1,2}	
Single-Element Detectors⁴							
LT – Standard Types							
LT Q2	2 mm × 2 mm			300	150	4 · 10 ⁸	
LT Q1.2	1.2 mm × 1.2 mm			800	370	2.5 · 10 ⁸	
LT Q1	1 mm × 1 mm			1100	500	2 · 10 ⁸	
LT Q0.5	0.5 mm × 0.5 mm			3200	1500	1 · 10 ⁸	
LT G2	2 mm × 2 mm			300	170	3.5 · 10 ⁸	
LT G2PC	2 mm × 2 mm		×	150	100	3 · 10 ⁸	
LT D2.5	∅ 2.5 mm			220	140	4 · 10 ⁸	
LT D2	∅ 2 mm			360	190	3.5 · 10 ⁸	
LT D1	∅ 1 mm			1200	700	2 · 10 ⁸	
LTI Q2 ³	2 mm × 2 mm			250	80	8 · 10 ⁸	
LTI Q1.2 ³	1.2 mm × 1.2 mm			700	120	6.5 · 10 ⁸	
LTI Q1 ³	1 mm × 1 mm			900	160	6 · 10 ⁸	
LTI Q0.5 ³	0.5 mm × 0.5 mm			3500	500	3 · 10 ⁸	
LTI D2 ³	∅ 2 mm			300	80	8 · 10 ⁸	
LTI D1 ³	∅ 1 mm			1200	200	5 · 10 ⁸	
LTI Q2I100 ^{3,5}	2 mm × 2 mm			300000	100000	8 · 10 ⁸	
LTA – Types with Increased Absorption							
LTA G2	2 mm × 2 mm	×		400	170	4.5 · 10 ⁸	
LTA G2PC	2 mm × 2 mm	×	×	200	100	3.7 · 10 ⁸	
LTAI G2 ³	2 mm × 2 mm	×		300	100	6 · 10 ⁸	
LTA G2I10 ⁵	2 mm × 2 mm	×		15000	20000	1.5 · 10 ⁸	
LTA G2I10PC ⁵	2 mm × 2 mm	×	×	14000	20000	1.4 · 10 ⁸	
LTA G2I100 ⁵	2 mm × 2 mm	×		70000	20000	2.5 · 10 ⁸	
LTA G2I100PC ⁵	2 mm × 2 mm	×	×	65000	20000	2.3 · 10 ⁸	
LTS – Types with Silver Black							
LTS Q2	2 mm × 2 mm	×		420	150	5 · 10 ⁸	
LTS Q1.2	1.2 mm × 1.2 mm	×		1200	370	3.5 · 10 ⁸	
LTS Q1	1 mm × 1 mm	×		1600	500	3 · 10 ⁸	
LTS D2.5	∅ 2.5 mm	×		340	140	6 · 10 ⁸	
LTS D2	∅ 2 mm	×		520	190	5 · 10 ⁸	
LTS D1	∅ 1 mm	×		1800	700	2.5 · 10 ⁸	
LTSI Q2 ³	2 mm × 2 mm	×		350	80	9 · 10 ⁸	
LTSI Q1.2 ³	1.2 mm × 1.2 mm	×		900	120	9 · 10 ⁸	
LTSI Q1 ³	1 mm × 1 mm	×		1300	150	8 · 10 ⁸	
LTSI D2 ³	∅ 2 mm	×		450	80	9 · 10 ⁸	
LTSI D1 ³	∅ 1 mm	×		1600	200	7.5 · 10 ⁸	
LTSI Q2I100 ⁵	2 mm × 2 mm	×		450000	100000	1 · 10 ⁹	
Multi-Channel Detectors							
2LTA G2	2 × 2 mm × 2 mm	×		300	170	3.4 · 10 ⁸	
2LTA G2PC	2 × 2 mm × 2 mm	×	×	150	100	3 · 10 ⁸	
3LTA G2	3 × 2 mm × 2 mm	×		300	170	3.4 · 10 ⁸	
3LTA G2PC	3 × 2 mm × 2 mm	×	×	150	100	3 · 10 ⁸	
4LTA G2	4 × 2 mm × 2 mm	×		300	170	3.4 · 10 ⁸	

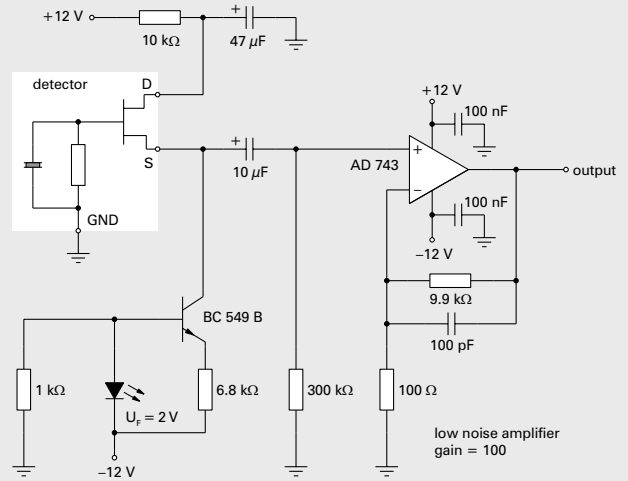
S_V responsivity, u_{Rn} noise voltage, D^* specific detectivity. ¹ frequency: 10 Hz, detector temperature: 25 °C ² blackbody source temperature: 500 K, filter transmission: 100 %
³ reduced noise by ion beam etched chips ⁴ other element sizes are available optionally ⁵ current mode type
 TO18, TO39 or TO8 housing, typical offset voltage: 0.4 V to 1.5 V, typical operating voltage: 2 V to 18 V, operating and storage temperature: -20 °C to 70 °C,
 operating and storage temperature LTS types: -20 °C to 60 °C

Single-Element and Multi-Channel Detectors

Specific Detectivity¹

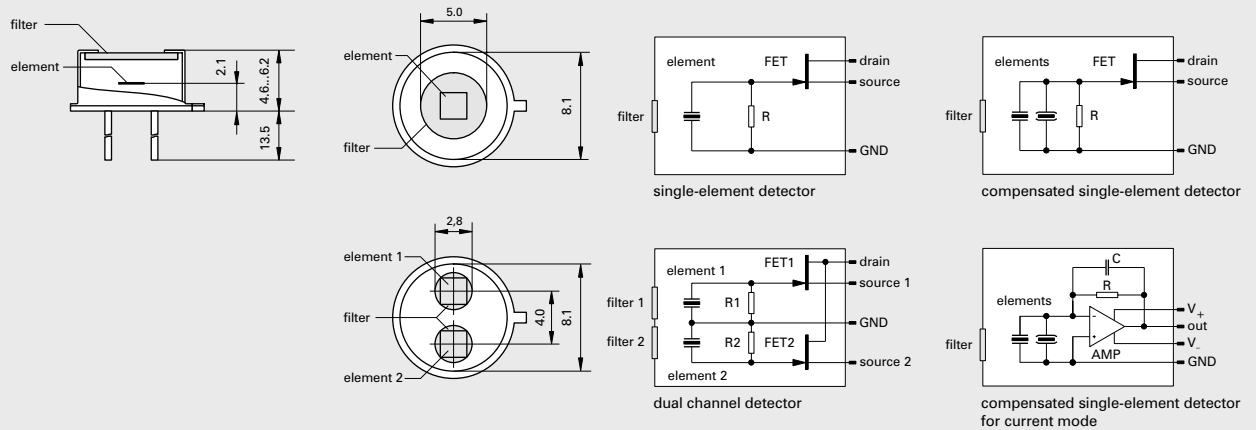


Detector in Voltage Mode with Amplifier

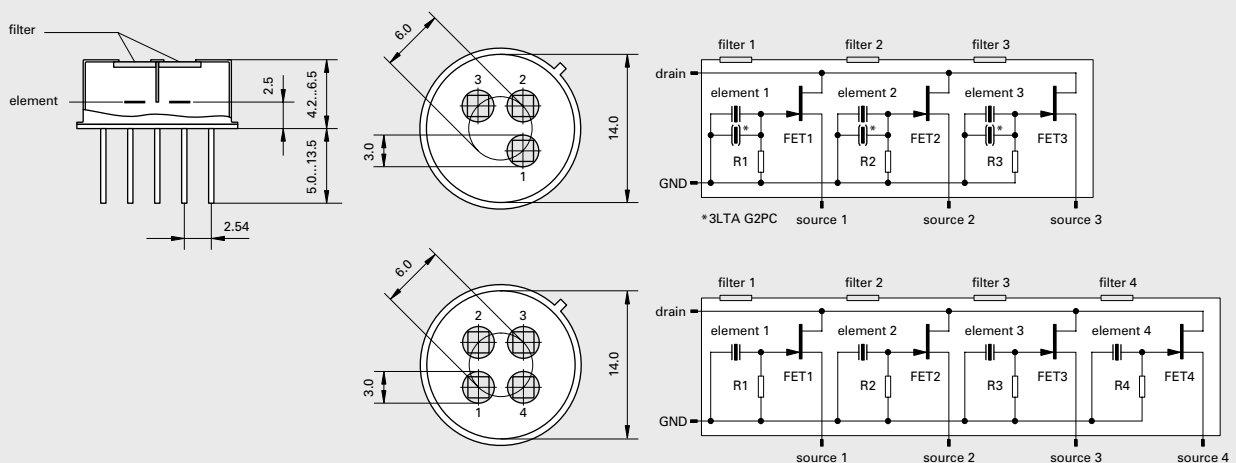


¹ detector temperature: 25 °C, blackbody source temperature: 500 K, filter transmission: 100 %, voltage mode

Single-Element and Dual Channel Detectors in TO39 Housing



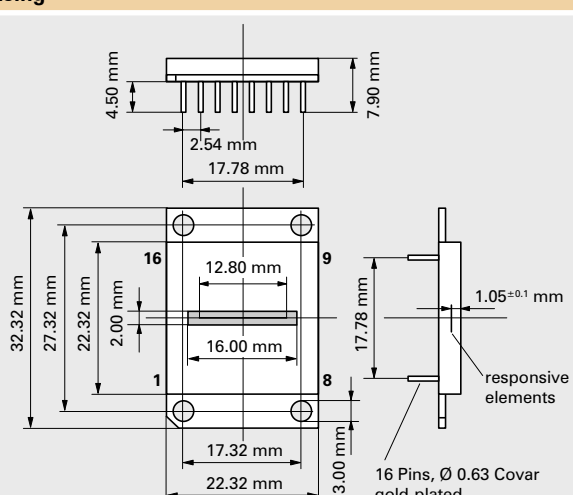
Three and Four Channel Detectors in TO8 Housing



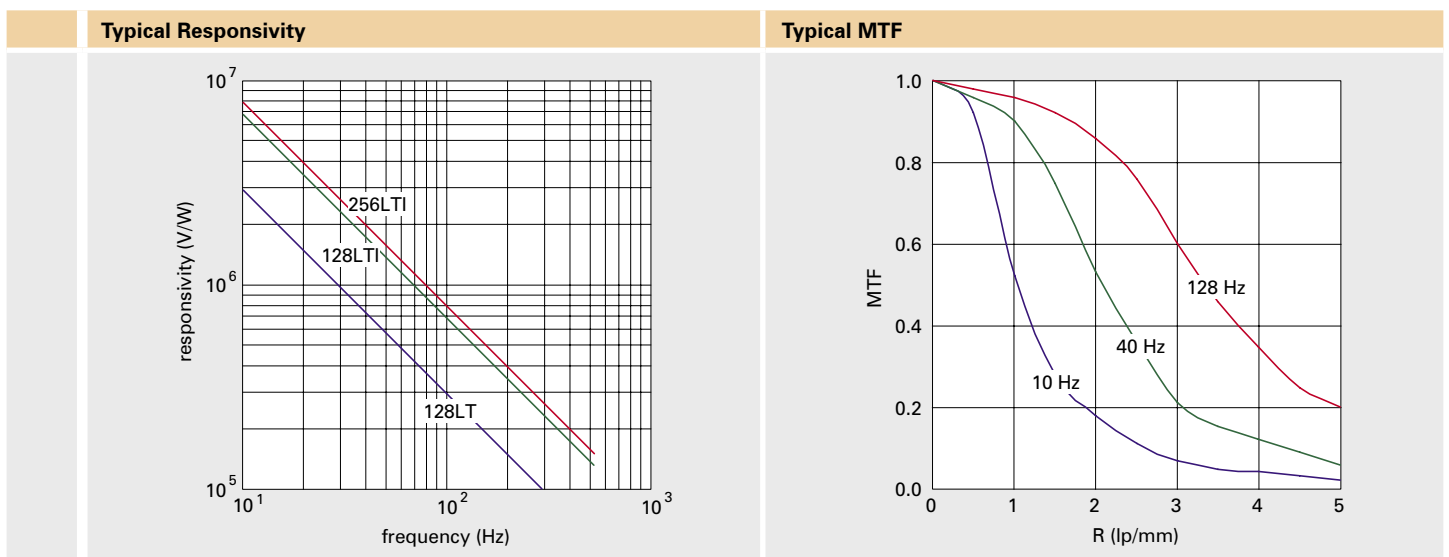
Pyroelectric Linear Arrays 128LTx and 256LTx

Types ¹										
Type	128LT	128LT1	128LT SP0.5	128LT1 SP0.5	128LT SP1.0	128LT1 SP1.0	256LT1	256LT1 SP0.5	256LT1 SP1.0	
Pixel number	128	128	128	128	128	128	256	256	256	
Pixel width in μm	90	90	90	90	90	90	42	42	42	
Pixel length in μm	100	100	500	500	1000	1000	100	500	1000	
Pitch in μm	100	100	100	100	100	100	50	50	50	
Responsivity S_v in V/W	230000	540000	230000	540000	230000	540000	620000	620000	620000	
Noise voltage U_N in mV	0.7	0.8	0.9	1.2	1.1	1.9	0.7	0.9	1.1	
NEP in nW	3.0	1.5	3.9	2.2	4.9	3.5	1.1	1.4	1.8	
MTF ($R = 3 \text{ lp/mm}$)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	
Uniformity ² of S_v in %	5	5	5	5	5	5	5	5	5	

¹ Typical values, rectangular chopping with 128 Hz, array temperature 25 °C, black body source temperature 400 °C, filter transmission 100 %. ² No defective elements.

Specification ¹		Housing
Parameter	Value	
Operating voltage VDD	5 V	
Operating voltage VD2	2.5 V	
Digital inputs, low voltage	< 0.3 VDD	
Digital inputs, high voltage	> 0.7 VDD	
Digital inputs, switching threshold	0.5 VDD	
Chopping frequency f_{ch}	10 Hz to 512 Hz	
Current consumption	8 mA	
Maximum irradiance	50 mW/mm ²	
Operating temperature	-15 °C to 70 °C	
Storage temperature	-20 °C to 80 °C	
Soldering temperature	300 °C	16 Pins, Ø 0.63 Cover gold-plated responsive elements 1.05 \pm 0.1 mm

¹ All voltages refer to ground (pin 10, 15).



Technical details are subject to change without notice. May 2008.