THERMOMETRICS
A COMMITMENT TO EXCELLENCE

Amphenol
Advanced Sensors

Thermopile IR (Infrared) Sensors

Thermopile IR (Infrared) Sensors are used for non-contact or surface temperature measuring.

Thermometrics Thermopile Infrared (IR) Sensors consist of thermo-elements, a flat infrared filter and a thermistor for temperature compensation, all in a hermetically-sealed package.

Part#	Status	Lead length	Response Time	Output	Package	Operating Temp	RvT @ 25°C (kΩ)	Accuracy	Field of View (Typ)
ZTP-101T	Active	3.0mm	22ms	Analogue	TO-39 (TO-5)	-20°C to 100°C	30.00		50°
ZTP-115	Active	3.0mm	25ms	Analogue	TO-5	-20°C to 100°C	10.00		55°
ZTP-115L	Active	13.2mm	25ms	Analogue	TO-5	-20°C to 100°C	10.00		55°
ZTP-115L1	Active	6.7mm	25ms	Analogue	TO-5	-20°C to 100°C	10.00		55°
ZTP-115M	Active	N/A	0.3 to 0.6 seconds	Analogue	PCBA Module	-20°C to 100°C	10.00		
ZTP-135	Active	3.0mm	25ms	Analogue	TO-46	-20°C to 100°C	10.00		56°
ZTP-135BS	Active	13.5mm	25ms	Analogue	TO-46	-20°C to 100°C	100.00		85°
ZTP-135H	Active	13.2mm	25ms	Analogue	TO-46	-20°C to 100°C	100.00		86°
ZTP-135L	Active	25.4mm	25ms	Analogue	TO-46	-20°C to 100°C	100.00		86°
ZTP-135SR	Active	13.5mm	25ms	Analogue	TO-46	-20°C to 100°C	100.00		85°
ZTP-148SR	Active	13.5mm	32ms	Analogue	TO-46	-20°C to 100°C	100.00		85°
ZTP-315	Active	25.4mm	25ms	Analogue	TO-46	-20°C to 100°C	30.00		75°
ZTPD-2210				Digital I2C	TO-39	-20°C to 85°C	100.00	± 1.0°C @ 40°C	85°
Development Kit					PCBA				

New Product Coming Soon

Features

- Non-contact measurement
- Wider surface area measurement
- Small-size sensor package
- High sensitivity
- Included ambient temperature (thermistor) sensor for compensation
- Fast response time
- Low cost

Applications

Medical

- Patient Monitoring
- Ear & Tympanic Thermometers
- Forehead Thermometers

Industrial

- HVAC
- Occupancy Detection
- Appliances

Electrification

- Charging Cables & Stands
- High Voltage Converters & Transformers
- Battery Storage

See the full range here:

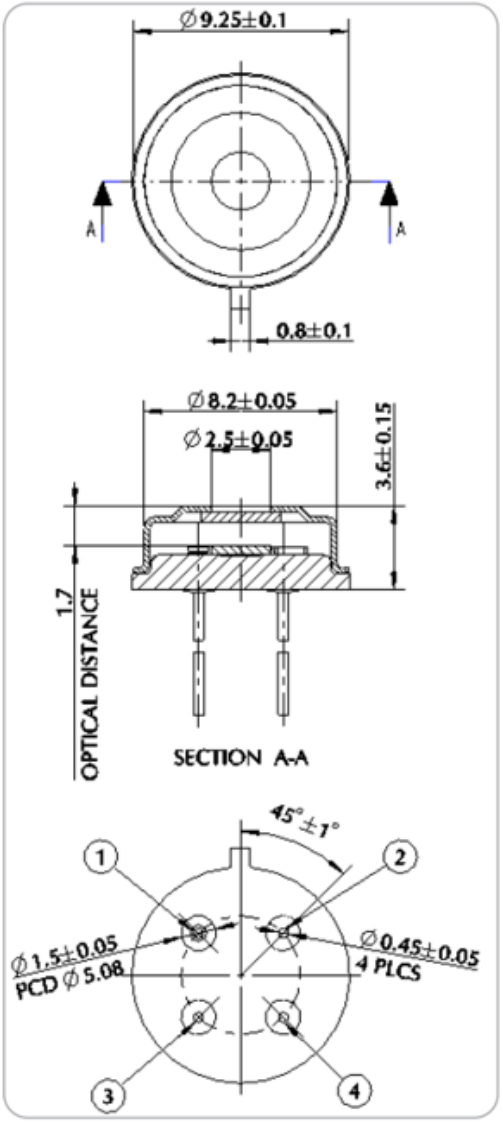
https://www.amphenol-sensors.com/en/thermometrics/infrared-sensors

ZTP-101T

Specifications

Thermopile Chip

Parameter	Min	Limits Typ	Max	Units	Condition
Chip Size		3.0 X 3.0		mm^2	
Diaphragm Size		1.5 x 1.5		mm^2	
Active Area		0.51 x 0.51		mm^2	
Internal Resistance	140	200	260	kΩ	25°C
Resistance T.C			0.10	%/°C	
Responsivity	77	110	143	V/W	500K, 1 Hz
Responsivity T.C		-0.11		%/°C	
Noise Voltage		62		nV rms	R.M.S., 25°C
NEP		0.60		$nW/Hz^{1/2}$	500K, 1 Hz
Detectivity		9.00 E07		$cmHz^{1/2}/W$	500K, 1 Hz
Time Constant		22		ms	



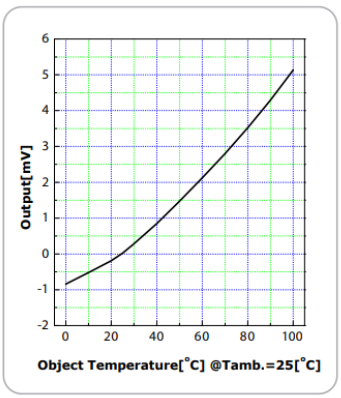
Unit: mm

Pin arrangement:
1. GND Thermistor
2 . Thermopile
3. GND Thermopile
4 . Thermistor

Thermistor for Temperature Compensation

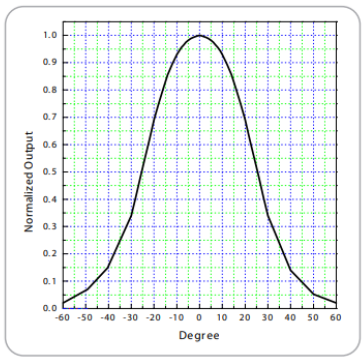
Parameter	Limits Min	Typ	Max	Units	Condition
Resistance	29.1	30	30.9	kΩ	Tol. :3%, @25°C
Beta - Value	3773	3811	3849	K	Tol. :1%, Defined at 0°C/50°C

Sensitivity

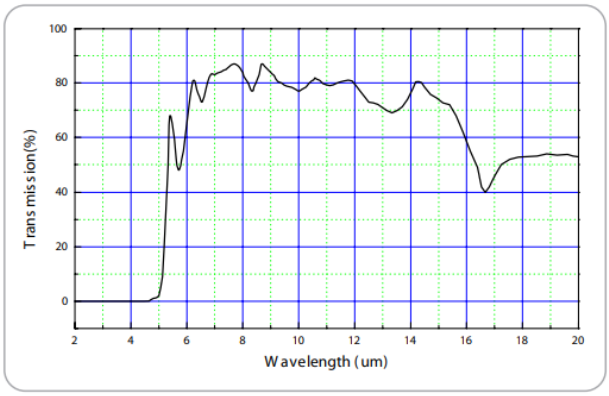


Field of View

Parameter	Limits Min	Typ	Max	Units	Condition
Field of View	45	50	55	Degree	50% of Maximum Output



Transmission Data of Filter

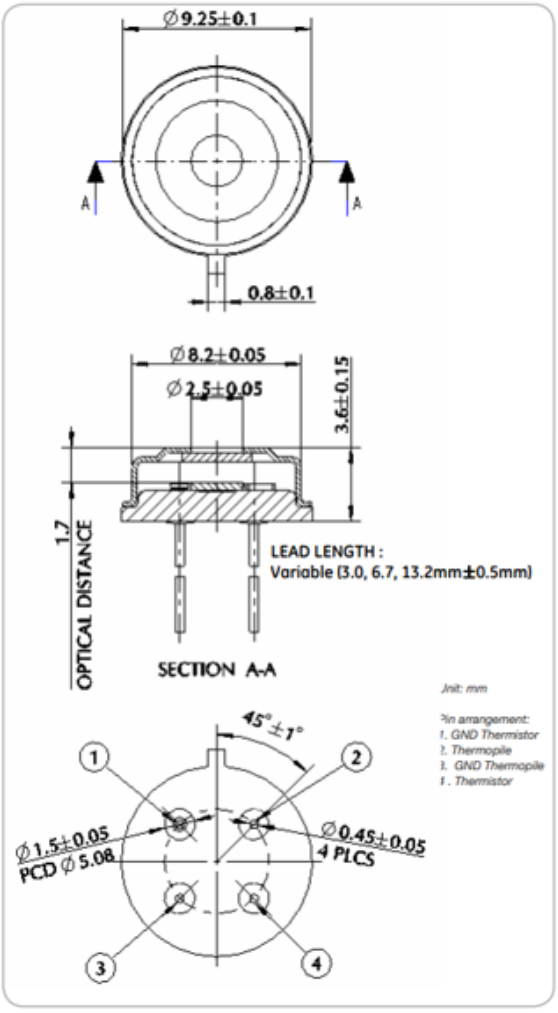


ZTP-115 (L & L1)

Specifications

Thermopile Chip

Parameter	Limits			Units	Condition
	Min	Typ	Max		
Chip Size		1.8 x 1.8		mm^2	
Diaphragm Size		1.0 x 1.0		mm^2	
Active Area		0.5 x 0.5		mm^2	
Internal Resistance	35	50	65	kΩ	25°C
Resistance T.C			0.15	%/°C	
Responsivity	42	60	78	V/W	500K, 1 Hz
Responsivity T.C		-0.10		%/°C	
Noise Voltage		30		nV rms	R.M.S., 25°C
NEP		0.50		$nW/Hz^{1/2}$	500K, 1 Hz
Detectivity		1.00 E08		$cmHz^{1/2}/W$	500K, 1 Hz
Time Constant		20		ms	



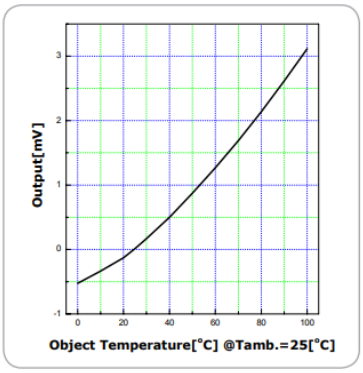
Thermistor for Temperature Compensation

Parameter	Limits			Units	Condition
	Min	Typ	Max		
Resistance	9.7	10	10.3	kΩ	Tol. :3%, @25°C
Beta - Value	3930	3970	4010	K	Tol. :1%, Defined at 25°C/85°C

Ordering Information

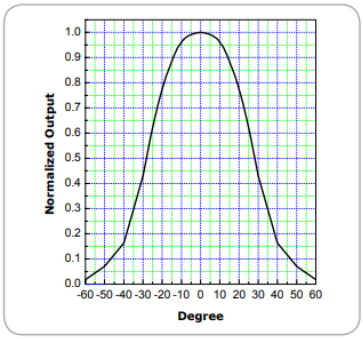
Lead Length (mm)	Part No.
3.0	ZTP-115
6.7	ZTP-115L1
13.2	ZTP-115L

Sensitivity

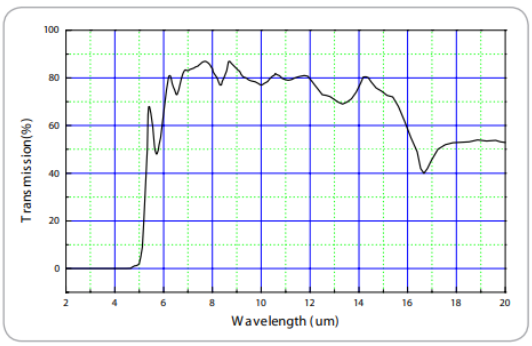


Field of View

Parameter	Limits			Units	Condition
	Min	Typ	Max		
Field of View	50	55	60	Degree	50% of Maximum Output



Filter Transmission Data



ZTP-115M

Thermometrics ZTP-115M is a single Thermopile Infrared (IR) Sensor Module used for non-contact surface temperature measurement. It consists of a thermopile, IR sensor, signal conditioning and voltage output.

Specifications

Supply Voltage
Single Supply (+5V)

Supply Current
Typical 2.7 mA

Response Time
0.3 ~ 0.6 second

Range of Measuring Temperature
-40°C ~ 145°C

Operating Temperature
-20°C ~ 100°C

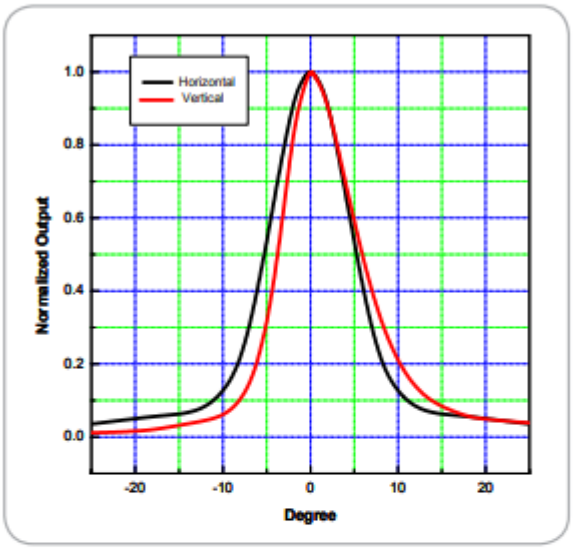
Storage Temperature
-20°C ~ 120°C

Thermopile Sensor
ZTP-115

Field of View

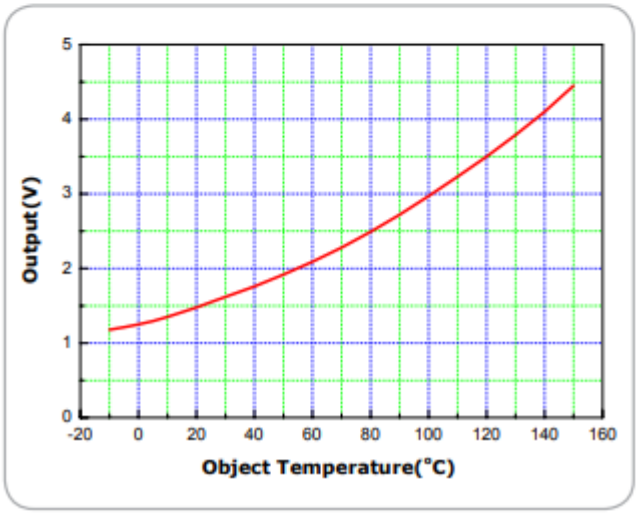
- Horizontal Normalized Output (above 50%) : ±5.5°
- Vertical Normalized Output (above 50%) : +6° / -3.5°

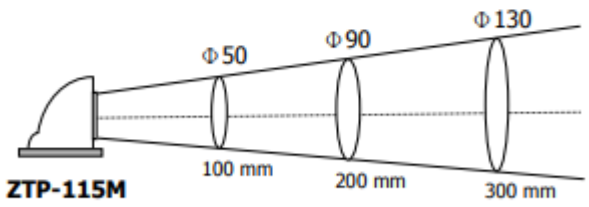
*Condition : Distance of IR Point Source to Reflector : 170 mm



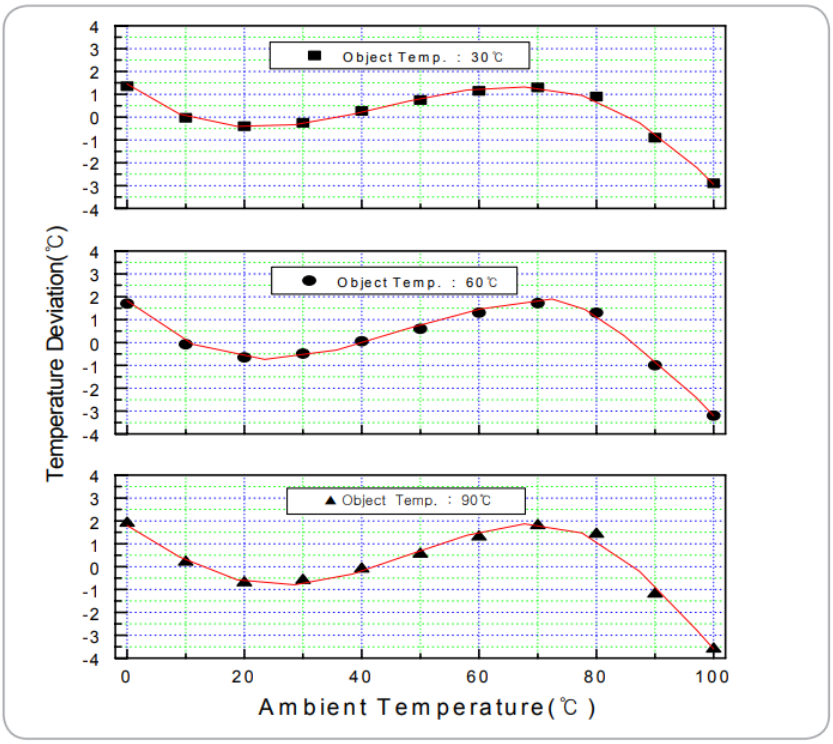
- Spot Size of Normalized Output (above 10%)

Sensitivity

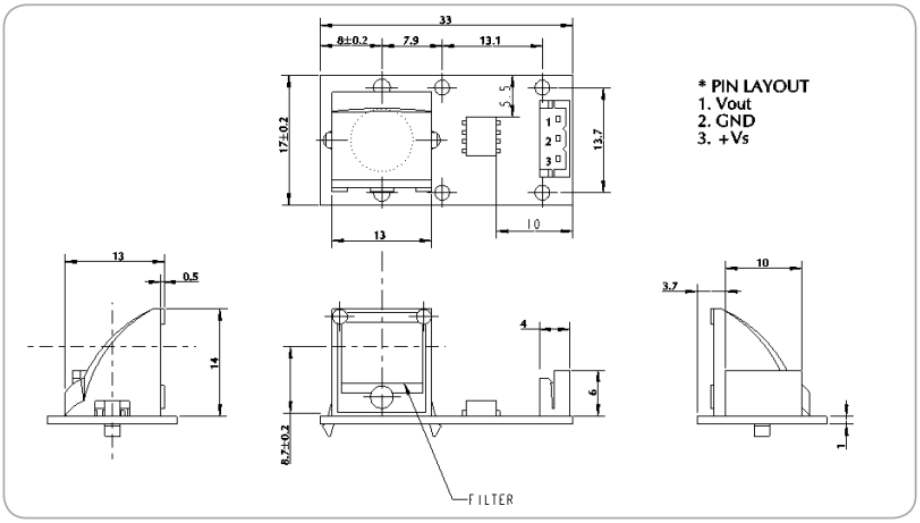




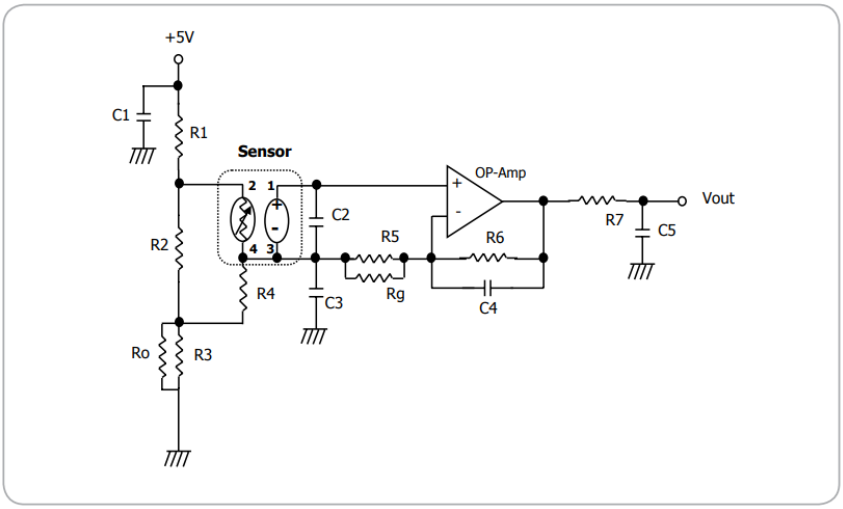
Temperature Accuracy (Typical)



Outline of Sensor Packaging and Pin Arrangement



Module Circuit



ZTP-135

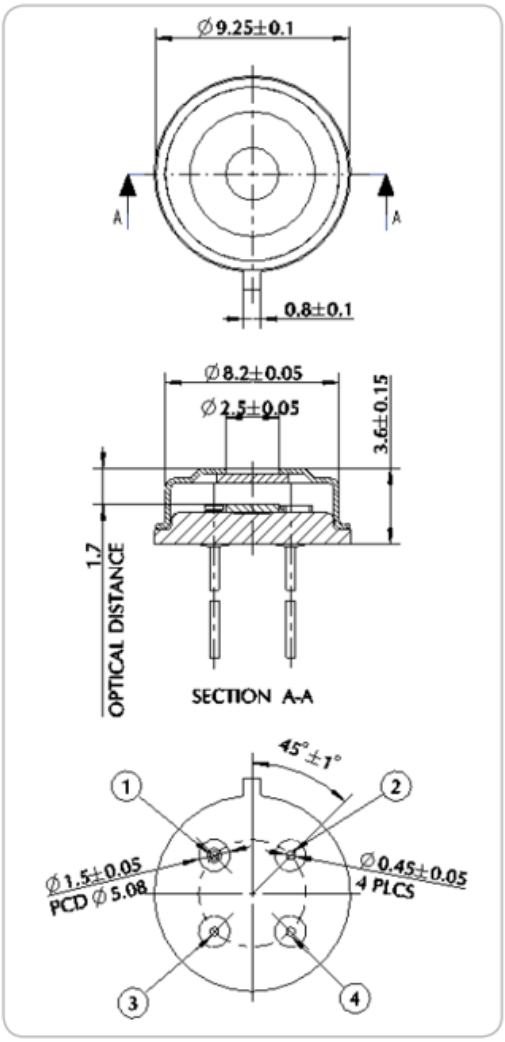
Specifications

Thermopile Chip

Parameter	Limits			Units	Condition
	Min	Typ	Max		
Chip Size		1.8 x 1.8		mm^2	
Diaphragm Size		1.4 x 1.4		mm^2	
Active Area		0.7 x 0.7		mm^2	
Internal Resistance	42	60	78	kΩ	25°C
Resistance T.C			0.12	%/°C	
Responsivity	42	60	78	V/W	500K, 1 Hz
Responsivity T.C		-0.10		%/°C	
Noise Voltage		32		nV rms	R.M.S., 25°C
NEP		0.53		$nW/Hz^{1/2}$	500K, 1 Hz
Detectivity		1.30 E08		$cmHz^{1/2}/W$	500K, 1 Hz
Time Constant		25		ms	

Thermistor for Temperature Compensation

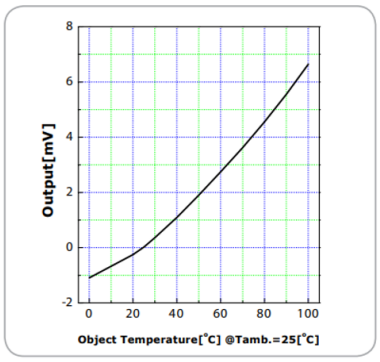
Parameter	Limits			Units	Condition
	Min	Typ	Max		
Resistance	9.7	10	10.3	kΩ	Tol. :3%, @25°C
Beta - Value	3930	3970	4001	K	Tol. :1%, Defined at 25°C/85°C



Unit: mm

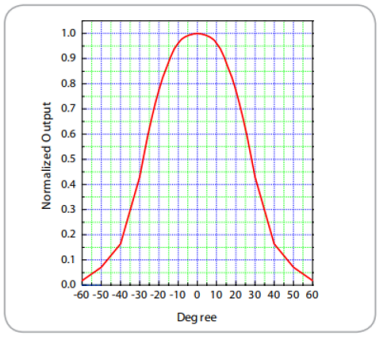
Pin arrangement:
1. GND Thermistor
2. Thermopile
3. GND Thermopile
4. Thermistor

Sensitivity

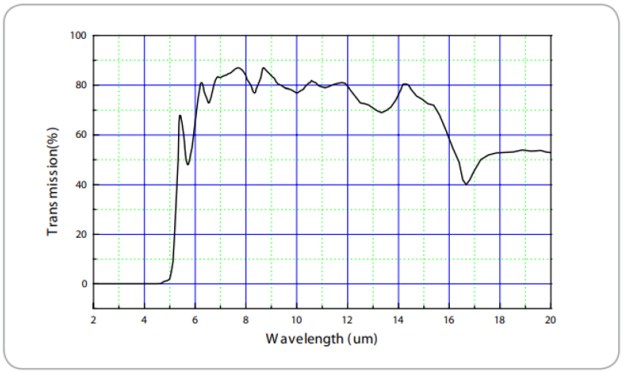


Field of View

Parameter	Limits			Units	Condition
	Min	Typ	Max		
Field of View	51	56	61	Degree	50% of Maximum Output



Filter Transmission Data



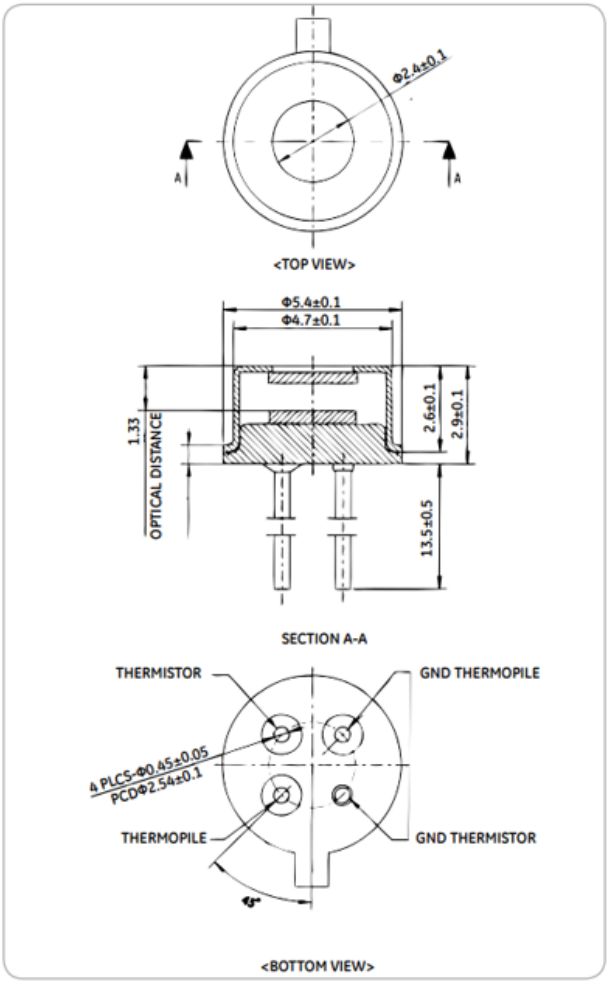
ZTP-135BS

ZTP-135BS has a blackbody layer. This blackbody layer can increase thermopile sensitivity and reduce R-TC (Responsivity of Temperature Coefficient) value.

Specifications

Thermopile Chip

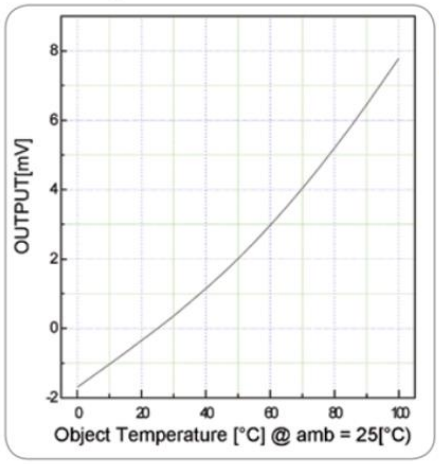
Parameter	Limits			Units	Condition
	Min	Typ	Max		
Chip Size		1.8 x 1.8		mm^2	
Diaphragm Size		1.4 x 1.4		mm^2	
Active Area		0.7 x 0.7		mm^2	
Internal Resistance	42	60	78	kΩ	25 °C
Resistance T.C.			0.12	%/ °C	
Responsivity	38	54	70	V/W	500K, 1Hz
Responsivity T.C.		-0.03		%/ °C	
Noise Voltage		32		nV rms	R.M.S., 25 °C
NEP		0.59		$nW/Hz^{1/2}$	500K, 1Hz
Detectivity		1.18 E08		$cmHz^{1/2}/W$	500K, 1Hz
Time Constant		25		ms	



Thermistor

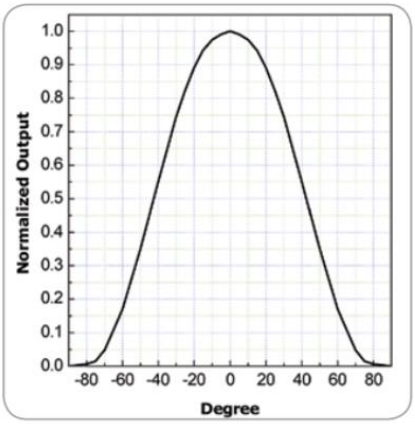
Parameter	Limits			Units	Condition
	Min	Typ	Max		
Resistance	97	100	103	kΩ	Tol.:3%, @25 °C
Beta - Value	3901	3940	3979	K	Tol.:1%, Defined at @25 °C/50 °C

Sensitivity

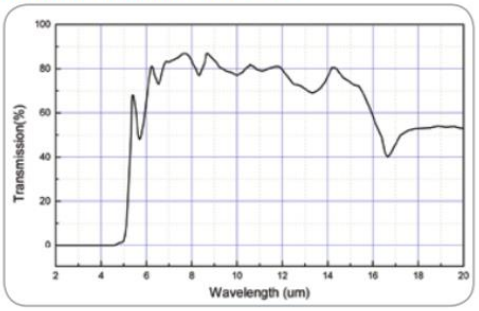


Field of View

Parameter	Limits			Units	Condition
	Min	Typ	Max		
Field of View	80	85	90	Degree	50% of Maximum Output



Filter Transmission Data



ZTP-135H

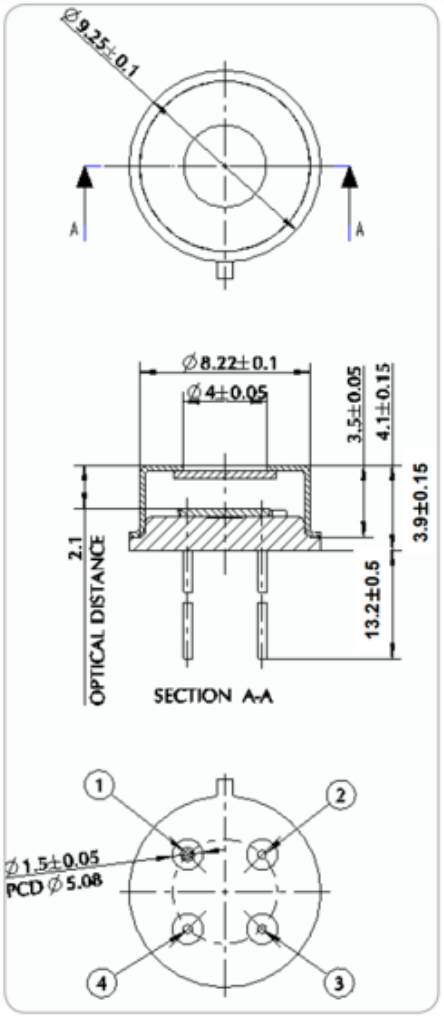
Specifications

Thermopile Chip

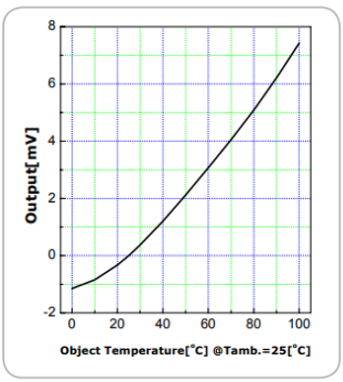
Parameter	Limits			Units	Condition
	Min	Typ	Max		
Chip Size		1.8 x 1.8		mm^2	
Diaphragm Size		1.4 x 1.4		mm^2	
Active Area		0.7 x 0.7		mm^2	
Internal Resistance	42	60	78	kΩ	25°C
Resistance T.C			0.12	%/°C	
Responsivity	42	58	78	V/W	500K, 1 Hz
Responsivity T.C		-0.10		%/°C	
Noise Voltage		32		nV rms	R.M.S., 25°C
NEP		0.55		$nW/Hz^{1/2}$	500K, 1 Hz
Detectivity		1.27 E08		$cmHz^{1/2}/W$	500K, 1 Hz
Time Constant		25		ms	

Thermistor for Temperature Compensation

Parameter	Limits			Units	Condition
	Min	Typ	Max		
Resistance	97	100	103	kΩ	Tol. :3%, @25°C
Beta - Value	3920	3960	4000	K	Tol. :1%, Defined at 25°C/50°C

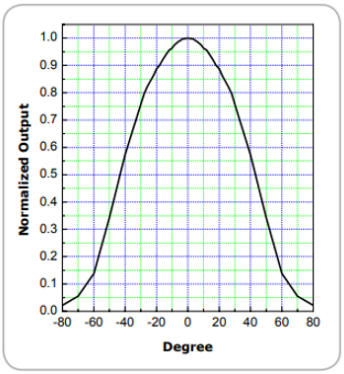


Sensitivity

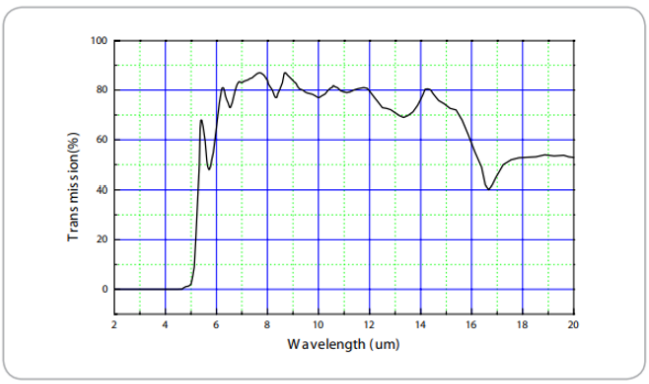


Field of View

Parameter	Limits			Units	Condition
	Min	Typ	Max		
Field of View	81	86	91	Degree	50% of Maximum Output



Filter Transmission Data

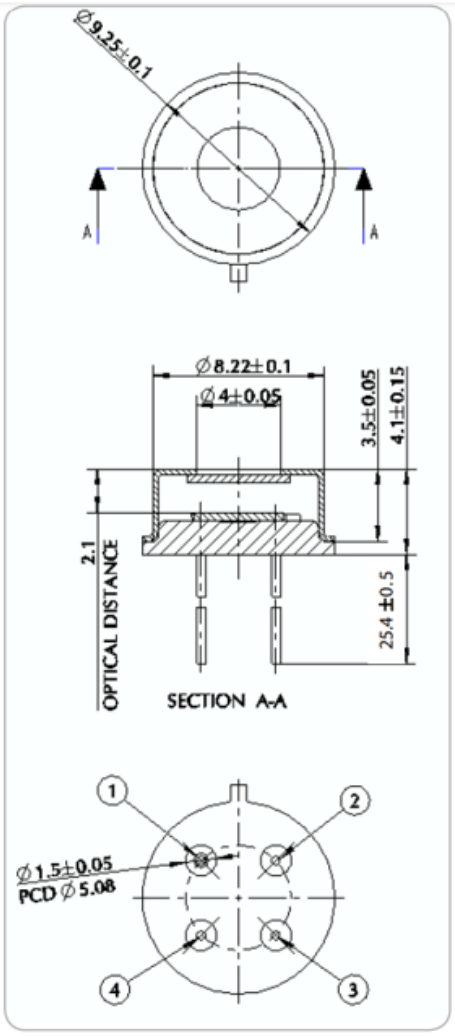


ZTP-135L

Specifications

Thermopile Chip

Parameter	Limits			Units	Condition
	Min	Typ	Max		
Chip Size		1.8 x 1.8		mm^2	
Diaphragm Size		1.4 x 1.4		mm^2	
Active Area		0.7 x 0.7		mm^2	
Internal Resistance	42	60	78	kΩ	25°C
Resistance T.C			0.12	%/°C	
Responsivity	42	58	78	V/W	500K, 1 Hz
Responsivity T.C		-0.10		%/°C	
Noise Voltage		32		nV rms	R.M.S., 25°C
NEP		0.55		$nW/Hz^{1/2}$	500K, 1 Hz
Detectivity		1.27 E08		$cmHz^{1/2}/W$	500K, 1 Hz
Time Constant		25		ms	



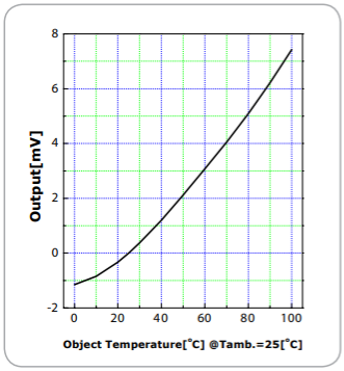
Unit: mm

Pin arrangement:
1. GND Thermistor
2. Thermopile
3. Thermistor
4 . GND Thermopile

Thermistor for Temperature Compensation

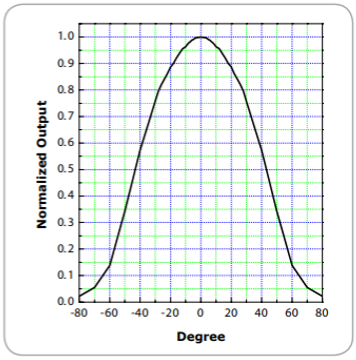
Parameter	Limits			Units	Condition
	Min	Typ	Max		
Resistance	97	100	103	kΩ	Tol. :3%, @25°C
Beta - Value	3920	3960	4000	K	Tol. :1%, Defined at 25°C/50°C

Sensitivity

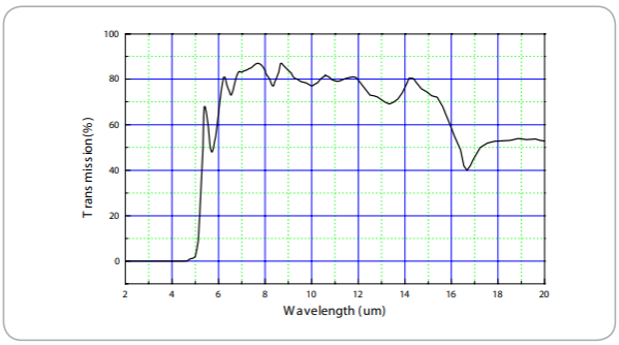


Field of View

Parameter	Limits			Units	Condition
	Min	Typ	Max		
Field of View	81	86	91	Degree	50% of Maximum Output



Filter Transmission Data



ZTP-135SR

See ZTP-135BS for version with blackbody layer.

Specifications

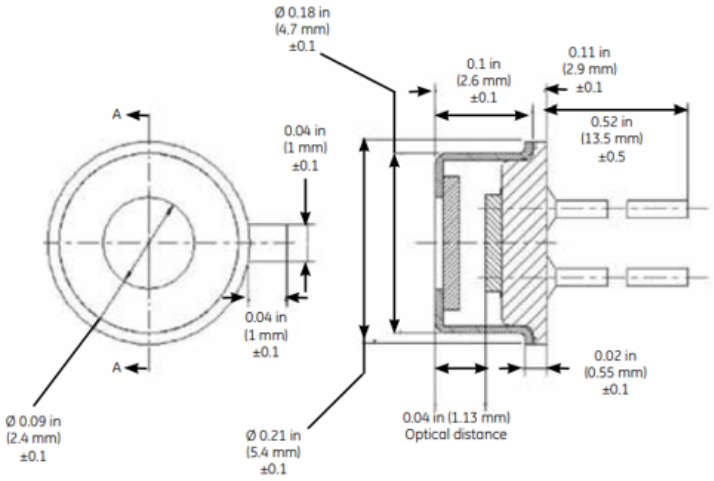
Thermopile Chip

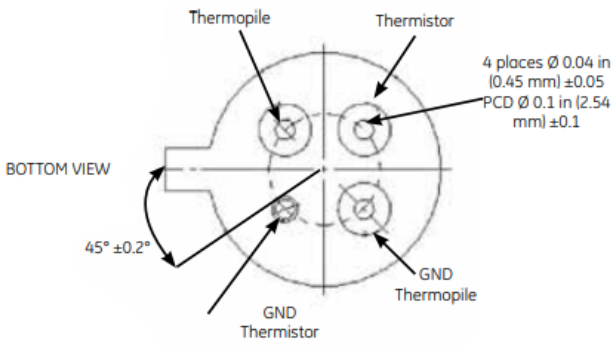
Parameter	Limits			Units	Condition
	Min	Typ	Max		
Chip Size		1.8 x 1.8		mm^2	
Diaphragm Size		1.4 x 1.4		mm^2	
Active Area		0.7 x 0.7		mm^2	
Internal Resistance	42	60	81	kΩ	25 °C
Resistance T.C.			0.12	%/ °C	
Responsivity	43	62	81	V/W	500K, 1Hz
Responsivity T.C.		-0.10		%/ °C	
Noise Voltage		32		nV rms	R.M.S., 25 °C
NEP		0.51		$nW/Hz^{1/2}$	500K, 1Hz
Detectivity		1.35 E08		$cmHz^{1/2}/W$	500K, 1Hz
Time Constant		25		ms	

Thermistor

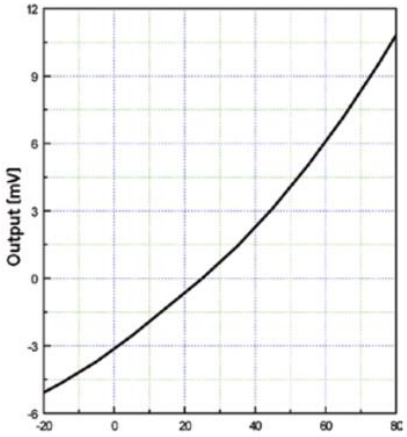
Parameter	Limits			Units	Condition
	Min	Typ	Max		
Resistance	97	100	103	kΩ	Tol.:3%, @25 °C
Beta - Value	3920	3960	4000	K	Tol.:1%, Defined at @25 °C/50 °C

Outline of Sensor Package and Pin Arrangement



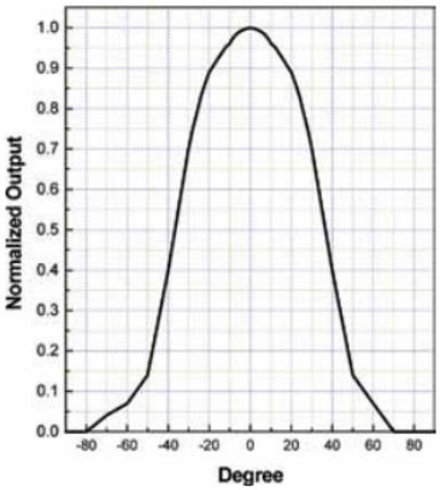


Sensitivity

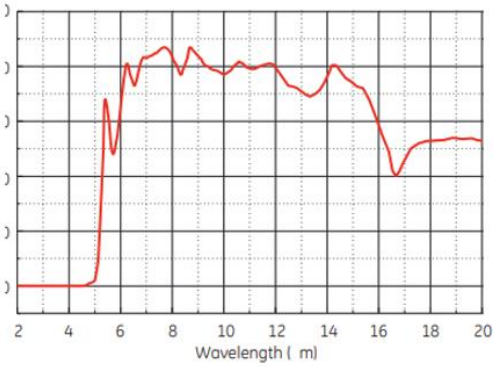


Field of View

Parameter	Limits			Units	Condition
	Min	Typ	Max		
Field of View	80	85	90	Degree	50% of Maximum Output



Filter Transmission Data



ZTP-148SR

Specifications

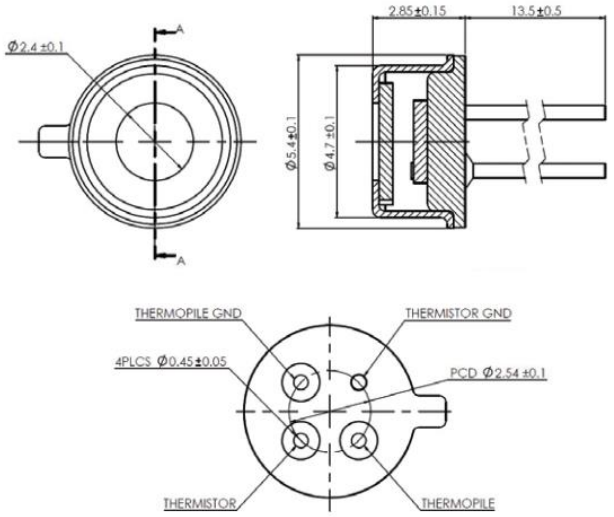
Thermopile Chip

Parameter	Limits			Unit	Condition
	Min	Typ	Max		
Chip Size		1.8 X 1.8		mm^2	
Active Area		0.7x0.7		mm^2	Absorber area
Internal Resistance	60	85	111	kΩ	@25°C
Resistance T.C.			0.12	%/°C	
Responsivity	43	61	79	V/W	500K, 1Hz,
Responsivity T.C.		-0.07		%/°C	
Noise Voltage		37		nV rms	R.M.S, 25°C
NEP		0.61		$nW/Hz^{1/2}$	
Detectivity		1.14		$cmHz^{1/2}/W$	
Time Constant		32		ms	

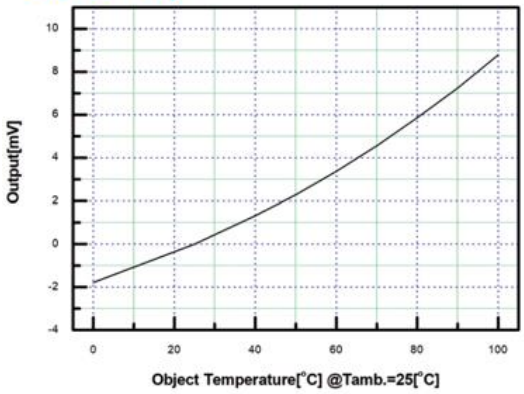
Thermistor

Parameter	Limits			Unit	Condition
	Min	Typ	Max		
Resistance	97	100	103	kΩ	Tol.:3%, @ 25°C
Beta – Value	3920	3960	4000	K	Tol.:1%, Defined at 25°C/50°C

Outline of Sensor Package and Pin Arrangement

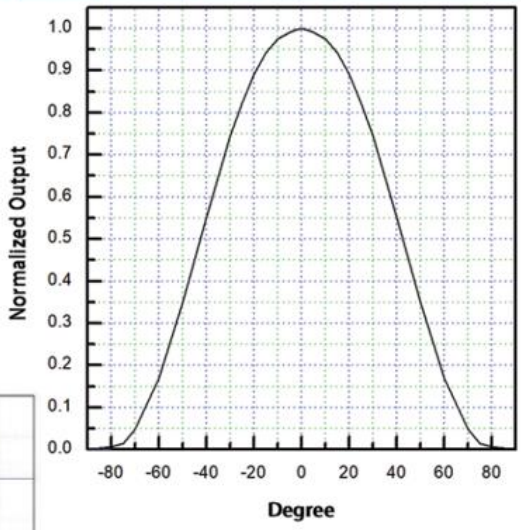


Sensitivity

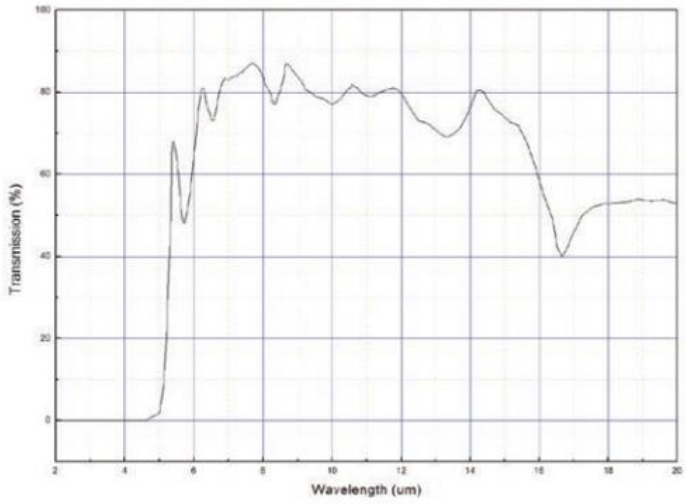


Field of View

Parameter	Limits			Units	Condition
	Min	Typ	Max		
Field of View	80	85	90	Degree	50% of Maximum Output



Filter Transmission Data

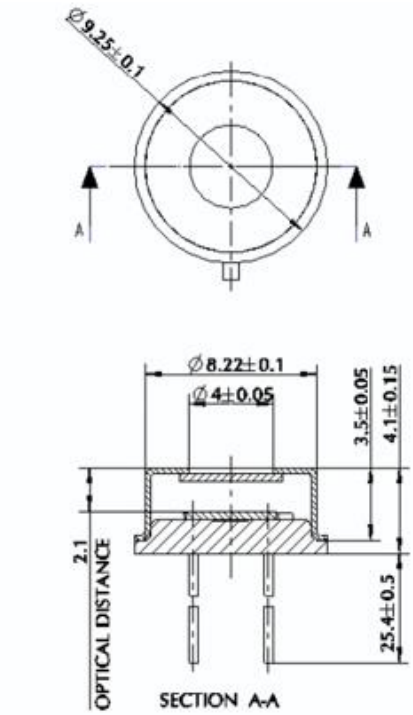


ZTP-315

Specifications

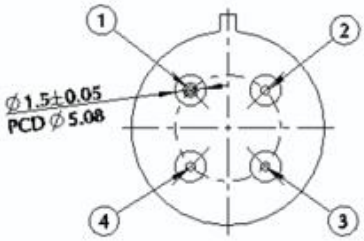
Thermopile Chip

Parameter	Limits			Units	Condition
	Min	Typ	Max		
Chip Size		3.6 x 3.6		mm^2	
Diaphragm Size		2.6 x 2.6		mm^2	
Active Area		1.3 x 1.3		mm^2	
Internal Resistance	35	50	65	kΩ	25 °C
Resistance T.C.			0.12	%/ °C	
Responsivity	22	32	42	V/W	500K, 1Hz
Responsivity T.C.		-0.11		%/ °C	
Noise Voltage		30		nV rms	R.M.S., 25 °C
NEP		0.94		$nW/Hz^{1/2}$	500K, 1 Hz
Detectivity		1.38 E08		$cmHz^{1/2}/W$	500K, 1 Hz
Time Constant		25		ms	



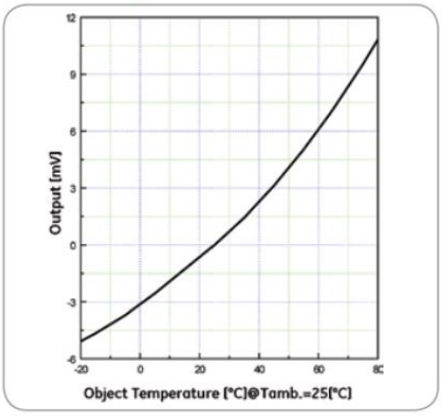
Thermistor

Parameter	Limits			Units	Condition
	Min	Typ	Max		
Resistance	29.7	30	30.3	kΩ	Tol.:1%, @25 °C
Beta - Value	3773	3811	3849	K	Tol.:1%, Defined at @25 °C/50 °C



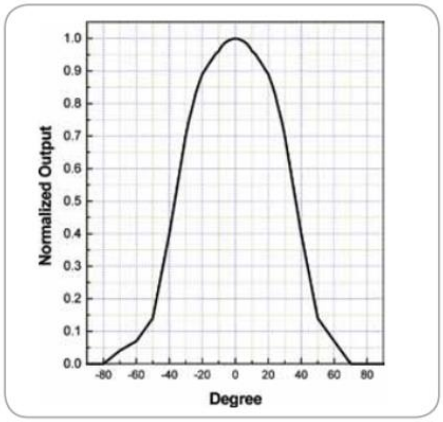
Pin Arrangement
1. *GND Thermistor*
2. *Thermopile*
3. *Thermistor*
4. *GND Thermopile*

Sensitivity

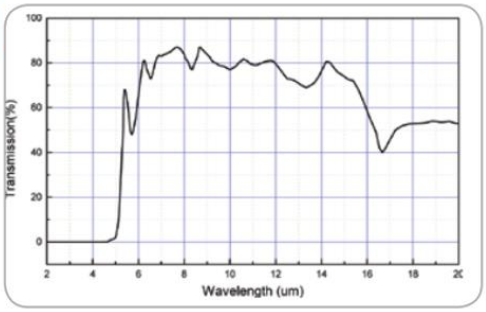


Field of View

Parameter	Limits			Units	Condition
	Min	Typ	Max		
Field of View	70	75	80	Degree	50% of Maximum Output



Filter Transmission Data



ZTPD-2210

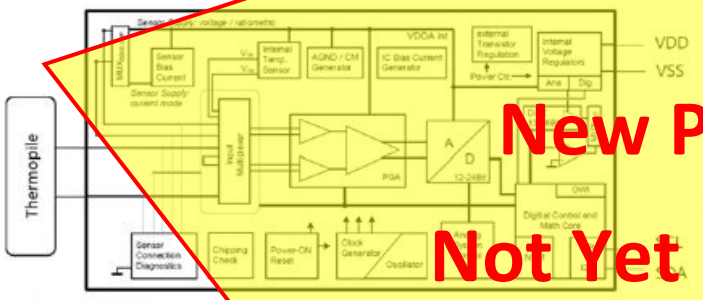
ZTPD-2210 is an Infrared Thermopile detector with digital I2C calibrated output for non-contact temperature detection. This sensor measurement detection range as standard is -20°C to 100°C and sleep mode for energy savings.

New Product

Not Yet Released

Preliminary Data

Sensor Block Diagram



Electrical Characteristic

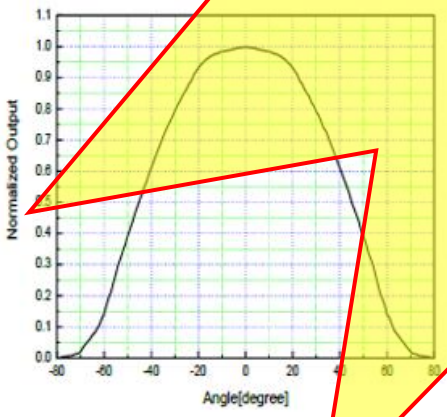
Parameter		LIMITS MIN	TYP	MAX	UNIT	CONDITION
Supply Voltage		2.7		5.5	V	
	Active		1.0		mA	@25℃
	Sleep		0.02	0.25	uA	
Object Temp. Range (1)		-20		100	℃	
Operating Temp. Range(1)		-20		85	℃	
Storage Temp. Range		-40		100	℃	
Accuracy			1.0		℃	@25℃
Resolution				24	bit	
ADC Clock Frequency		0.9		1.1	MHz	Internal ADC clock
Start-up Time				1	ms	VDD ramp up to interface communication
Sleep Time				2.5	ms	VDD ramp up to analog operation
I²C Clock Frequency				3.4	MHz	

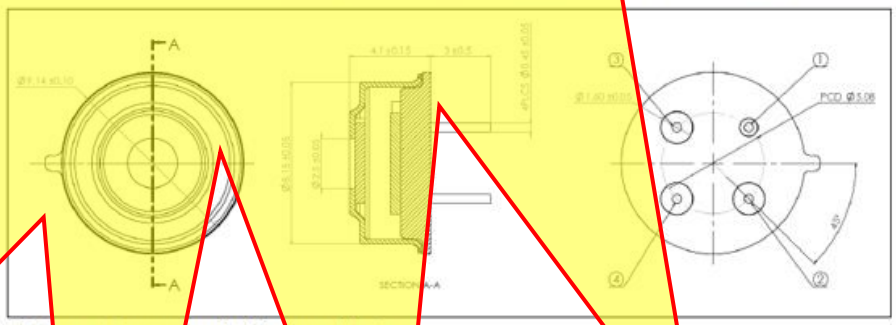
* Notes

(1) : Object and operating temperature in excess of min/max value, sensor output will provide fixed min/max temperature value

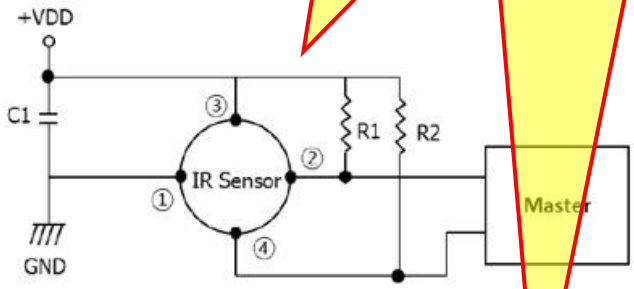
Optics characteristic

Parameter	LIMITS Min	Typ	Max	Units	Condition
Field of View		90		Degree	50% of Energy Content





* Notes : Sensor lead(pin) plated by Au.



Remark

- R1, R2(Full up resistor) : 2.2 ~ 10Kohm
- C1(Decoupling capacitor) : 100nF