Datasheet Thermopile Module
Type HID L1x FL5.5 (LS) Tx (PWM)

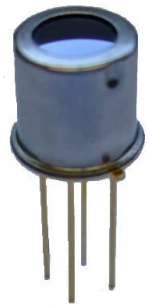
Features and Benefits

- Non-contact surface temperature detection with digital temperature output
- Thermopile Sensor and ASIC in TO-5 housing with 4 leads
- Lens optics with 8:1 D:S ratio
- Digital temperature or sensor voltage output (SMBus compatible or PWM)
- Temperature resolution < 0.1°C at T200 and SMBus compatible operation
- High accuracy over wide sensor temperature and object temperature ranges
- 3V and 5V versions available
- Complies with ROHS regulations

Ordering Information

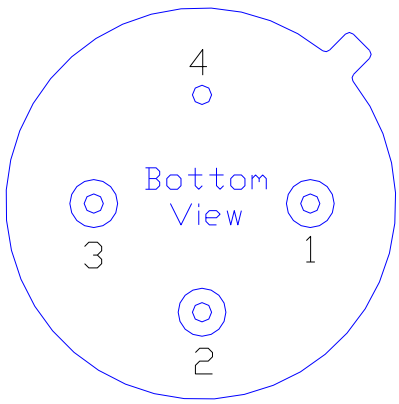
HID -> Heimann thermopile sensor and ASIC
in a TO39 housing
L1x -> „L" lens cap TO39 ; „1" sensor chip TP1
-> x: ASIC supply voltage x=„4" : 5V or x=„5" : 3V
FL5.5 -> Infrared lens with 5.5mm focal length
(LS) -> optional: „LS" with lens shade, standard without
Tx -> Object temperature range e.g. T200 for max. 200°C,
max. object temperature on digital output 382°C
(PWM) -> optional: „PWM" output - SDA/PWM-pin adusted to pulse width modulation

e.g. HID L14 FL5.5 T200 -> 5V supply voltage , max. gain for highest resolution to detect an object temperature of max. 200°C (shown on picture)



Pin Configuration

Pin	*Symbol*	*Description*
1	SCL	Digital input , serial clock in SMBus compatible mode
2	SDA/ PWM	Digital I/O , data input /output in SMBus compatible mode (open drain), pulse width modulated temperature(s) in PWM mode
3	VDD	Positive supply voltage
4	VSS	Negative supply voltage / Ground (0V) (connected to housing)



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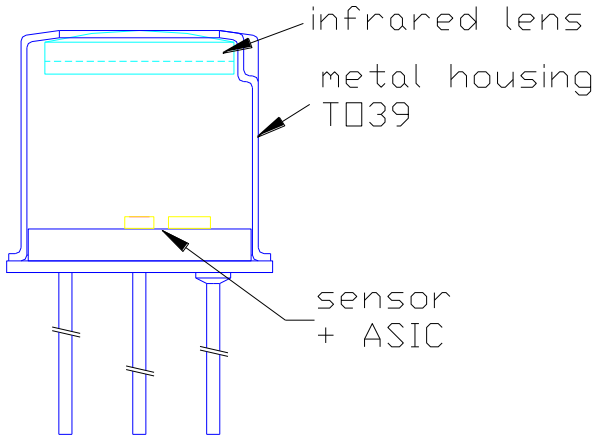
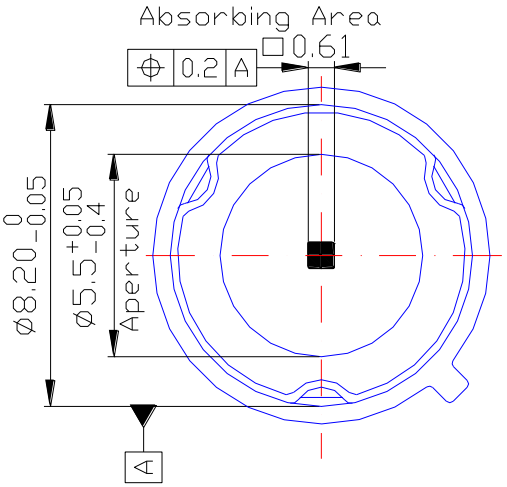
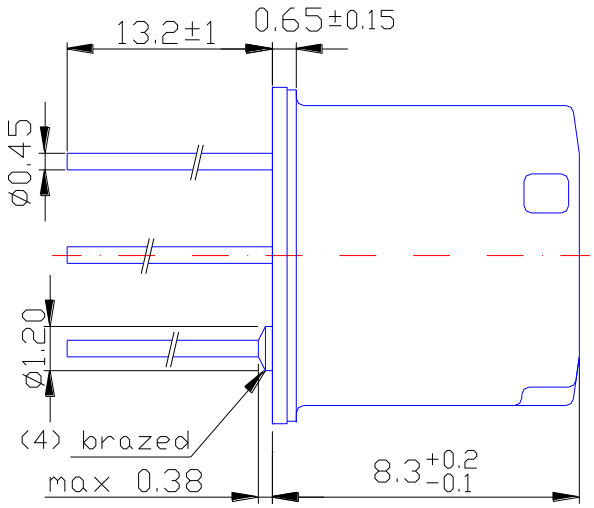
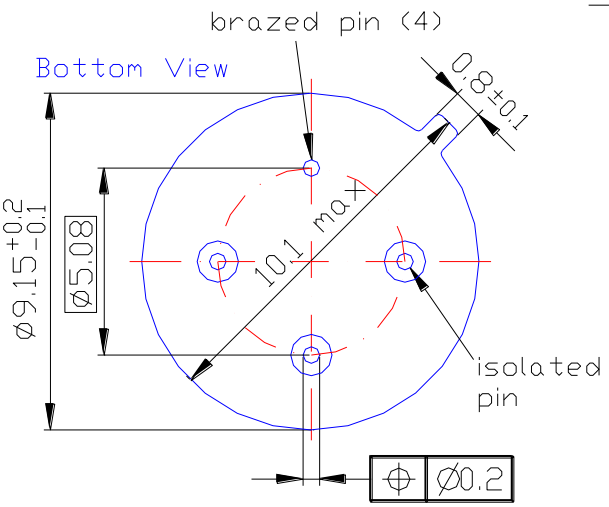
Dimensional Drawings HID L1x FL5.5 Tyyy (PWM)









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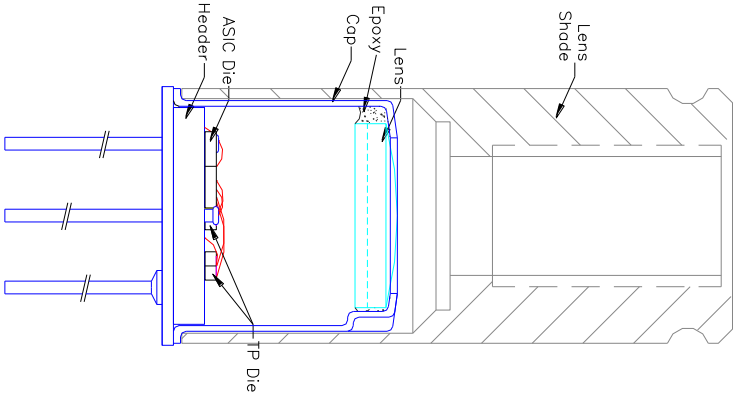
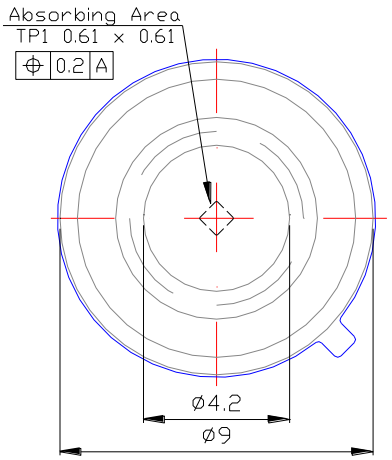
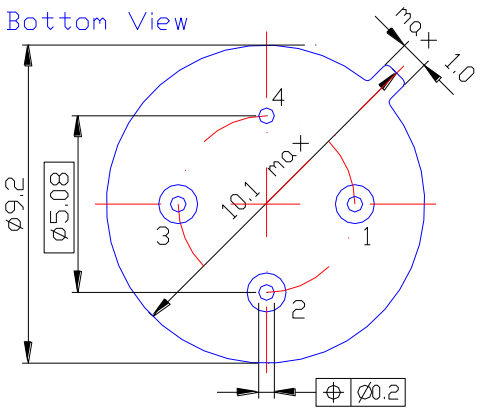
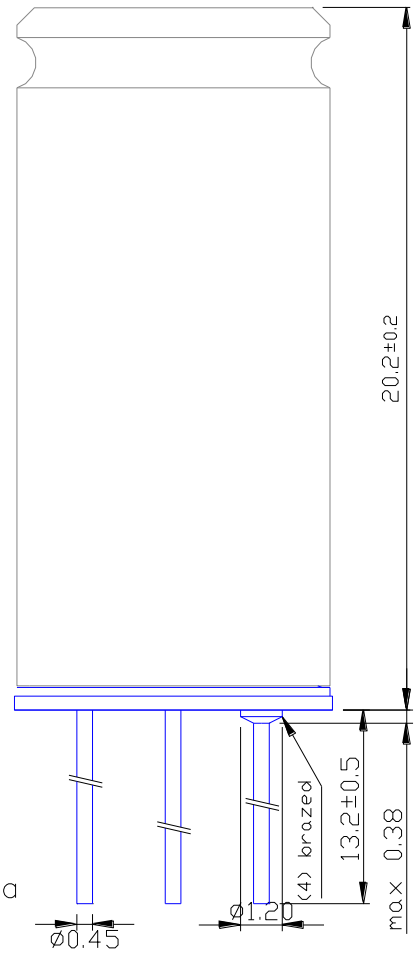
Dimensional Drawings HID with Lens Shade









Pin Assignment

(1) SCL : Serial Clock

(2) PWM/SDA : PWM or Serial Data

(3) VDD : Supply (V+)

(4) VSS : Supply (GND)

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Maximum Ratings

Parameter	*Max. value*	*Unit*	*Condition*
Supply voltage 1 VDD	7	V	Type 5V
Supply voltage 2 VDD	5	V	Type 3V
Reverse voltage	0.4	V	Ground
ESD sensitivity	2	kV	Human body
Storage temperature	-40.. 125	°C	

Operating Conditions

Parameter	*Typical Value*	*Unit*	*Condition*
Supply voltage 1 VDD	5	V	Preset option "x -> 4"
Supply voltage 2 VDD	3	V	Preset option "x -> 5"
Supply voltage VSS	0	V	Ground
Supply current	1	mA	Without load
Start up time after POR	0.15	sec	
Sensor absorbing area	0.61 x 0.61	mm²	Type TP1
Object temperature range	-40 .. max.+380	°C	maximum "T380", typical "T300", maximum gain "T200"
Ambient temperature range	-40 .. +125	°C	
Response time	5	ms	Sensor chip
Refresh rate	100	ms	Temperature signal
IR transmission	52	%	Wavelength range 5.5µm to 13.5µm
Operating temperature	-40.. 125	°C	
Slave address	5Ah	hex	Factory default
Interface SM-Bus (default)	2-wire SMBus compatible, factory default without interface indication, output configured as open drain NMOS by default		
Interface PWM (type .. PWM)	1-wire PWM output on SDA/PWM, 10 bit resolution default settings: push-pull, single PWM, output of object temperature sensor 1, coefficients for voltage to temp. calculation Tomin: -40°C & Tomax: defined by Tyyy		

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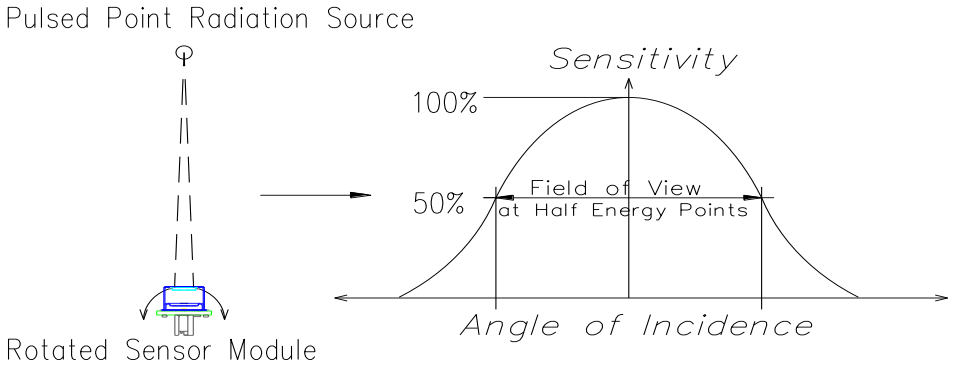
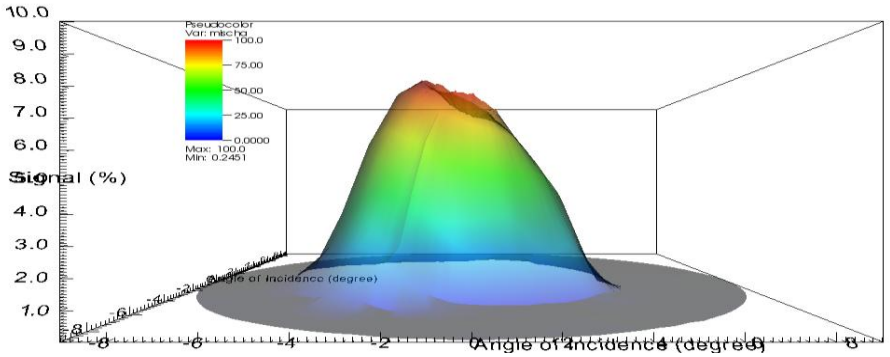
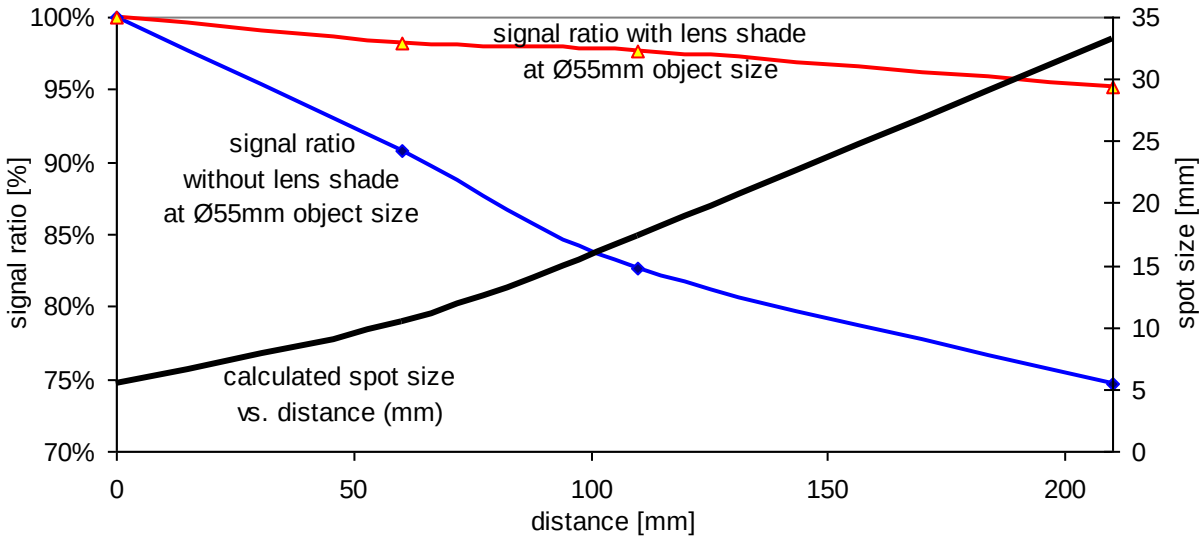
Field of View, Spot Size and Attenuation of Stray Light





parameter	*limits*			*unit*	*conditions*
	Min	*Typ*	*Max*		
Optical axis	-3.5	0	+3.5	degree	Sensor view direction
Field of View		6	11	degree	50% energy points
D:S Ratio		8:1			Distance to spot size



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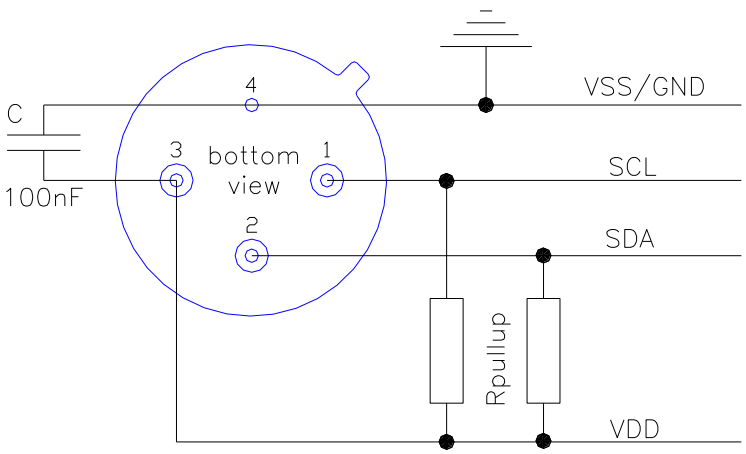
Applications Circuitry SM-Bus Operation

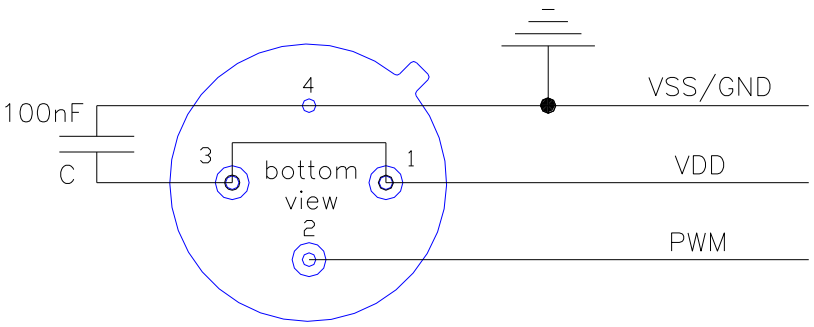


Pull-up resistor recommendation:

low power applications 20kOhm (SM-Bus DC specification Ipullup 100µA .. 350µA)

high power applications 1.5kOhm (SM-Bus DC specification Ipullup min. 4mA)

Applications Circuitry PWM Operation



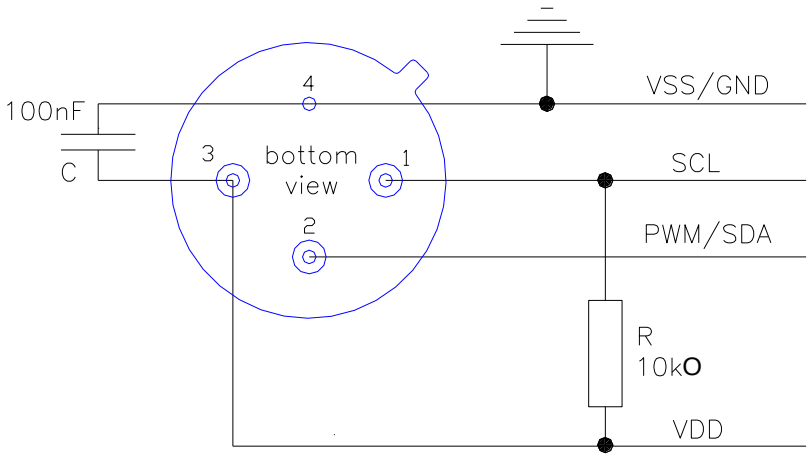
PWM mode is free running after power on.

Pin 3 (SCL) must be forced high for PWM mode

PWM output is configured as push pull

Default PWM output of object temperature 1

Applications Circuitry PWM Operation with SM-Bus Option



PWM mode is free running after power on.

SM-Bus operation available by added pull-up resistor

PWM output is configured as push pull

Default PWM output of object temperature 1

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Temperature Performance

Object Temperature [°C]	Sensor (Ambient) Temperature [°C]				Temperature Accuracy [°C]
	-40 .. 0	0 .. 50	50 .. 100	100 .. 125	
-30 .. 0	±3°C	±2°C	±3°C	±4°C	
0 .. 60	±2°C	±1°C	±1.5°C	±2.5°C	
60 .. 120	±3°C	±2°C	±2°C	±3°C	
120 .. 180	±4°C	±2°C	±2.5°C	±3.5°C	
180 .. 240	±5°C	±3°C	±3°C	±4°C	
240 .. 300	±5°C	±4°C	±4°C	±5°C	

Notes to the temperature performance:

- The specified temperature performance presents preliminary findings based on sample investigations using special test equipment.
- The temperature accuracies are achievable by following conditions
  - thermal equilibrium of the sensor
  - no temperature differences in the sensor package
  - the object fills the sensor field of view completely
  - homogenously distributed temperature on the object surface
  - high and uniform emissivity of the object surface in the interesting infrared range

Liability

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Changes or modifications at the product which haven't influence to the performance and/or quality of the device haven't to be announced to the customers in advance.
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