



Fast Response
Small Size



Datasheet HEIMANN Sensor Integrated Module HTIA

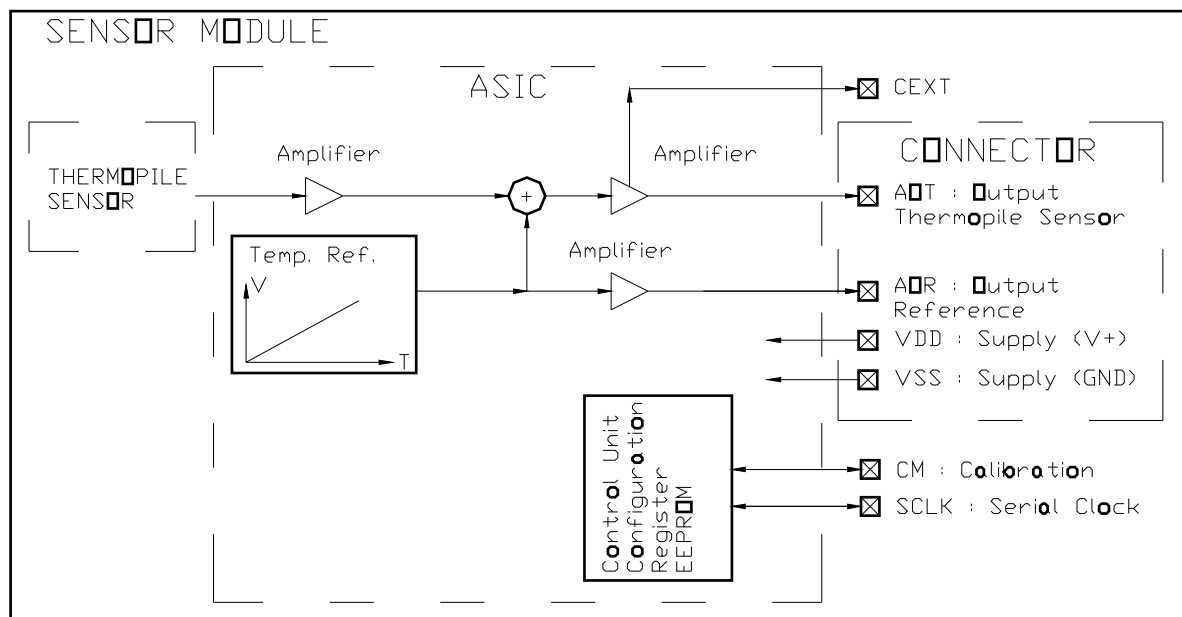
The HEIMANN Sensor thermopile module is designed for the non-contact temperature measurement of surfaces based on infrared radiation. A self-designed application specific integrated circuit is used for the sensor signal processing. The module can be supplied with or without internal compensation of the sensor-typical, physical-based ambient temperature drift.

The HEIMANN Sensor thermopile module HTIA-type-To can be supplied for different object temperature ranges characterized by the detectable object temperature „To“. The “type” in the nomenclature describes the sizes, optics and filter characteristics of the different versions.

Features

- **Thermopile sensor with integrated ASIC for signal processing**
- **2 analog outputs for thermopile and reference signal**
- **Simple linear reference function for external compensation**
- **Small size by COB technology**
- **Fast response time of 6 msec available**
- **Various optics and filter available**

Schematic





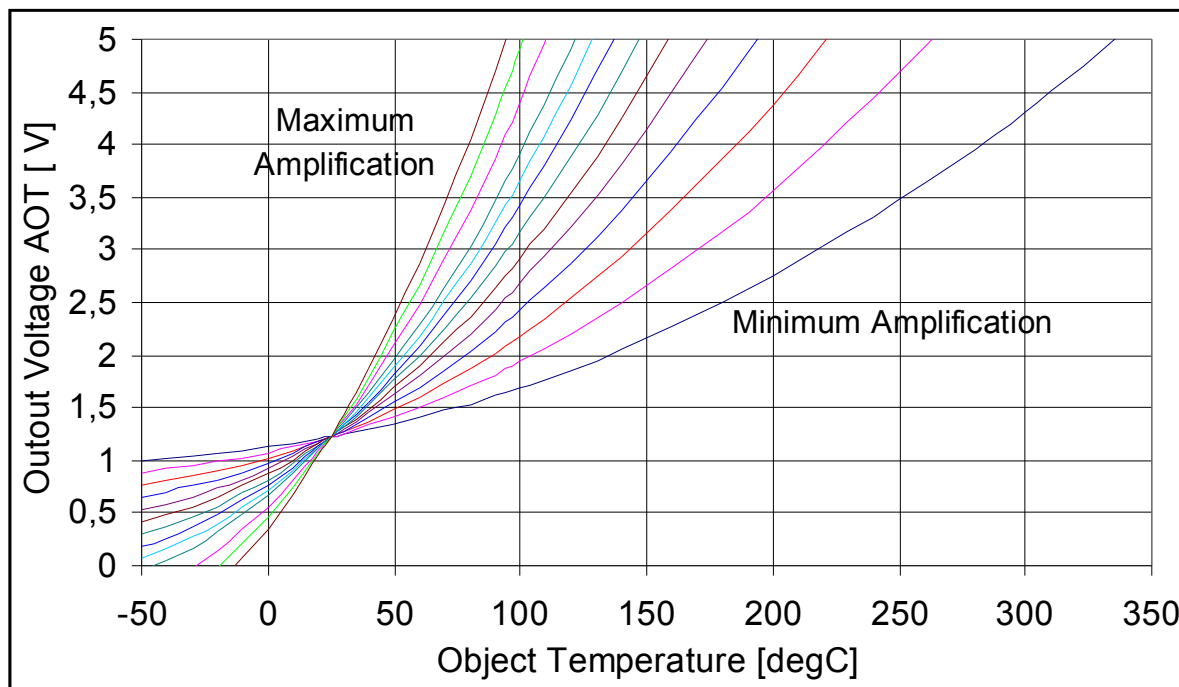
Fast Response
Small Size

Datasheet HEIMANN Sensor Integrated Module HTIA

Operating Conditions and Characteristics

Parameter	min/typ/max value	unit	condition
supply voltage	4.5 .. 5 .. 5.5	V	VDD
supply current	0.8 .. 1 .. 1.6	mA	without load
output voltage range	0.3 .. VDD-0.3	V	
output resistance	< 10	Ohm	$f < 100\text{Hz}$
output load	> 20	kOhm	for optimal operation
thermopile amplification	500 .. 5000		
object temperature range	-30...+500	°C	dep. on meas.conditions
gradient temp. reference	8 .. 15 .. 17	mV/°C	linear function w/ 1.225V at 25°C
response time	6 .. 15 .. 100	ms	$t/T=63\%$; by ext. capacitance
operating temperature	-40 to 125	°C	

Signal Characteristics Sensor Output AOT



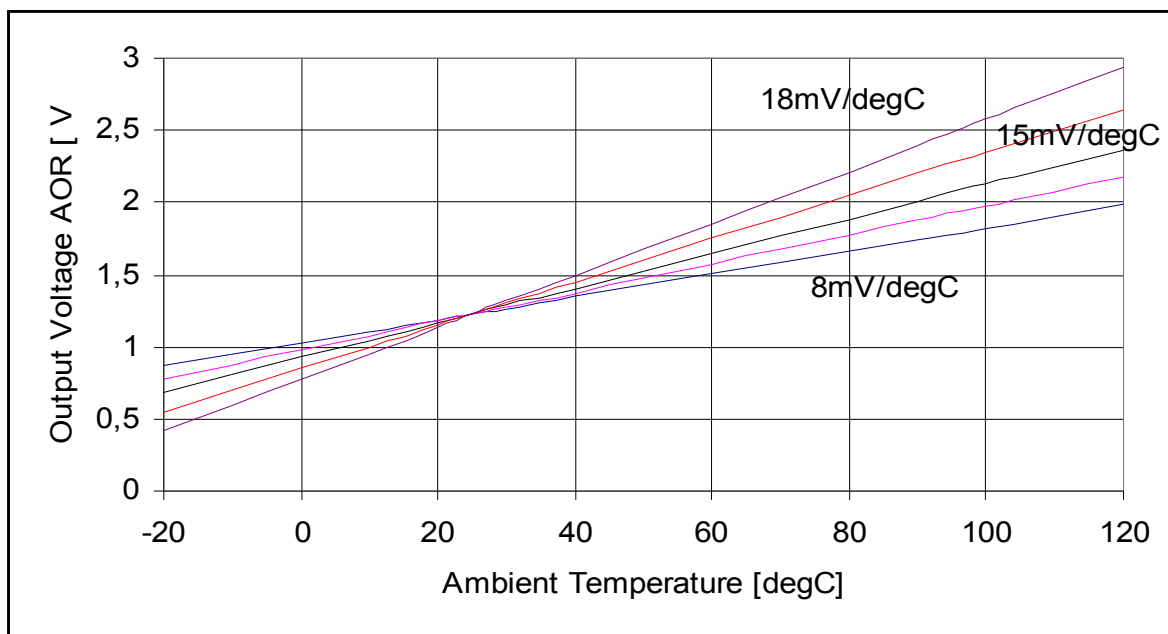


Fast Response
Small Size

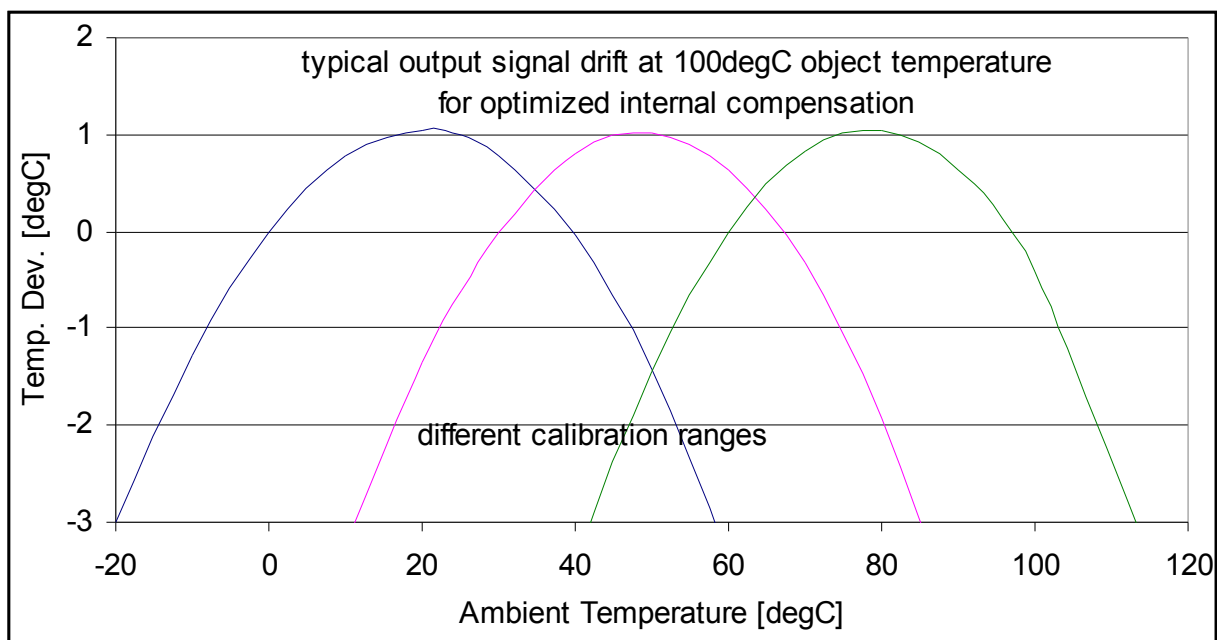


Datasheet HEIMANN Sensor Integrated Module HTIA

Signal Characteristics Reference Output AOT



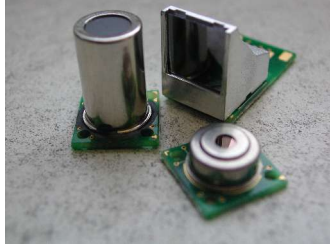
Temperature Accuracy with Internal Compensation



HEIMANN Sensor GmbH
Grenzstr. 22
D-01109 Dresden

Contact / Customer Support
Phone 49 (0) 6123 60 50 30
Fax 49 (0) 6123 60 50 39

Internet
www.heimanssensor.com
mail: info@heimanssensor.com



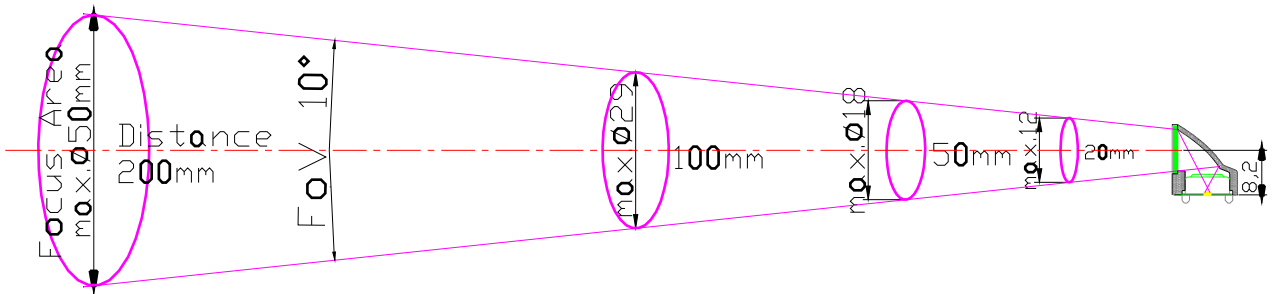
Fast Response
Small Size



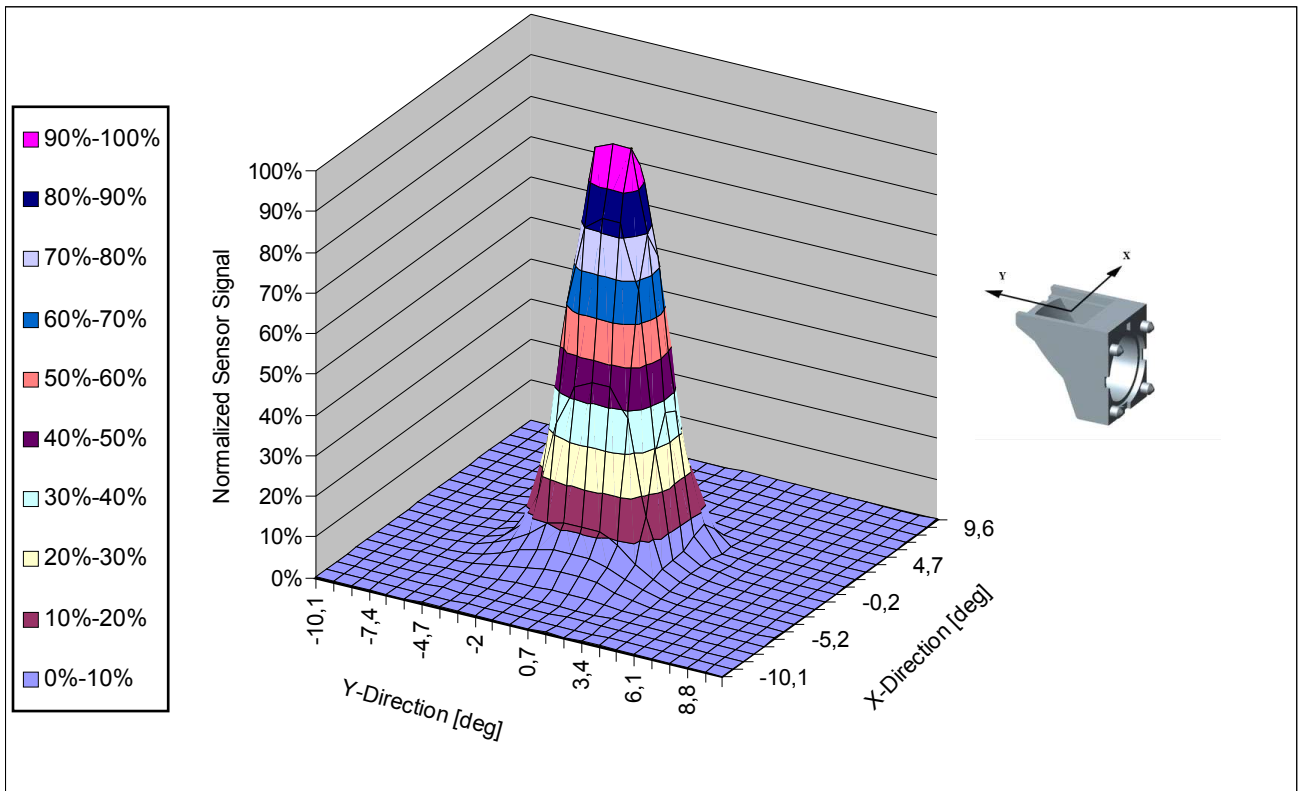
HEIMANN Sensor Integrated Module HTIA-B with Parabolic Mirror Optics – Field Of View 4 :

1

Field of View and Focus Area at 5% Signal Cut On



Measured Field of View

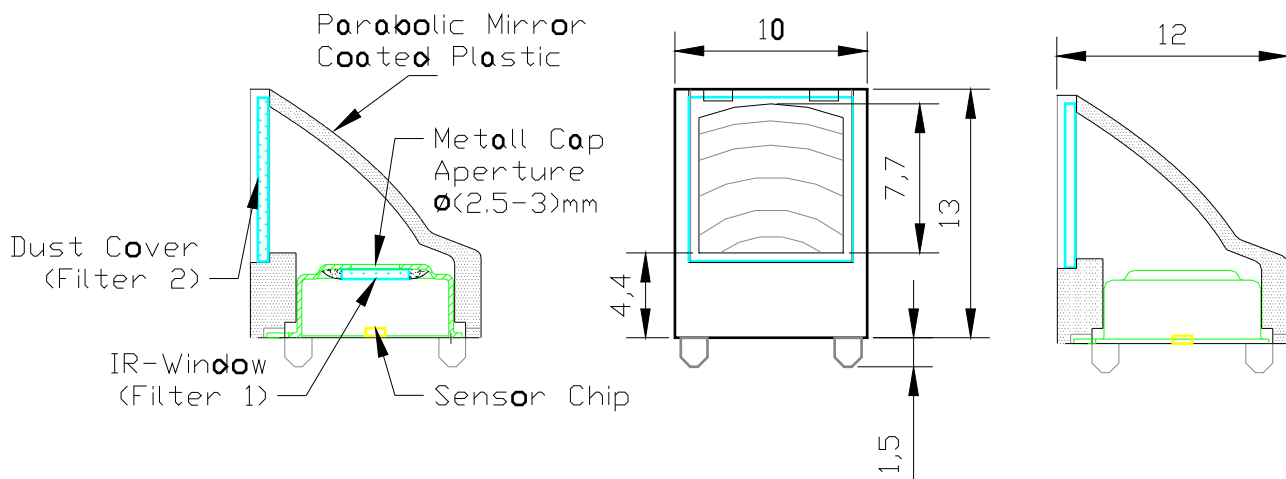




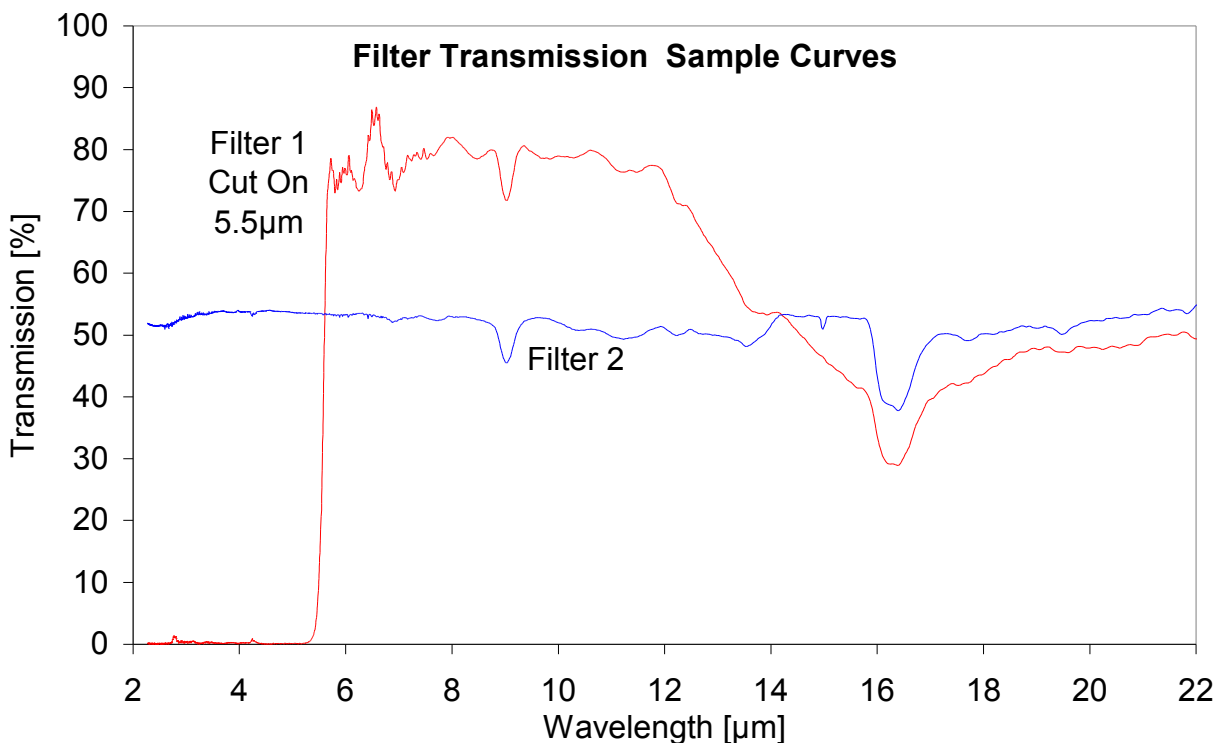
Fast Response
Small Size

HEIMANN Sensor Integrated Module HTIA-B with Parabolic Mirror

Parabolic Mirror Dimensions and Construction



Filter Characteristics



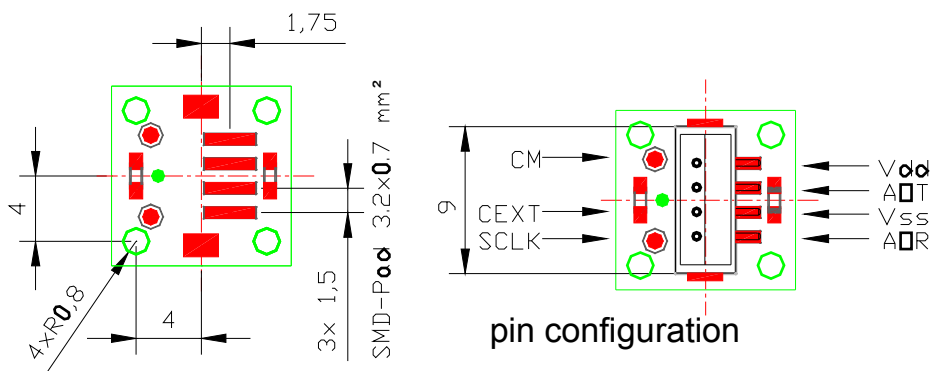


Fast Response
Small Size

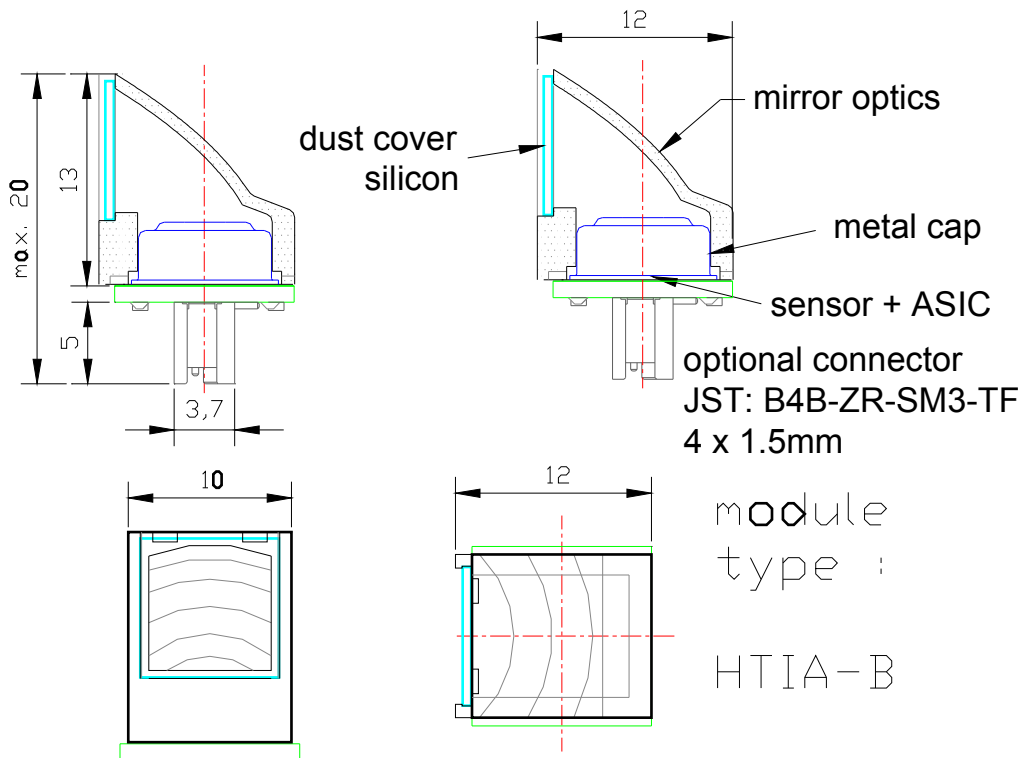


HEIMANN Sensor Integrated Module HTIA-B with Parabolic Mirror and PCB 11x11mm²

Dimensions, Options



PCB-size : 11(+0.4) x11(+0.4) mm²
PCB-thickness max.1.3mm (substrate 1mm)



HEIMANN Sensor GmbH
Grenzstr. 22
D-01109 Dresden

Contact / Customer Support
Phone 49 (0) 6123 60 50 30
Fax 49 (0) 6123 60 50 39

Internet
www.heimannsensor.com
mail: info@heimannsensor.com

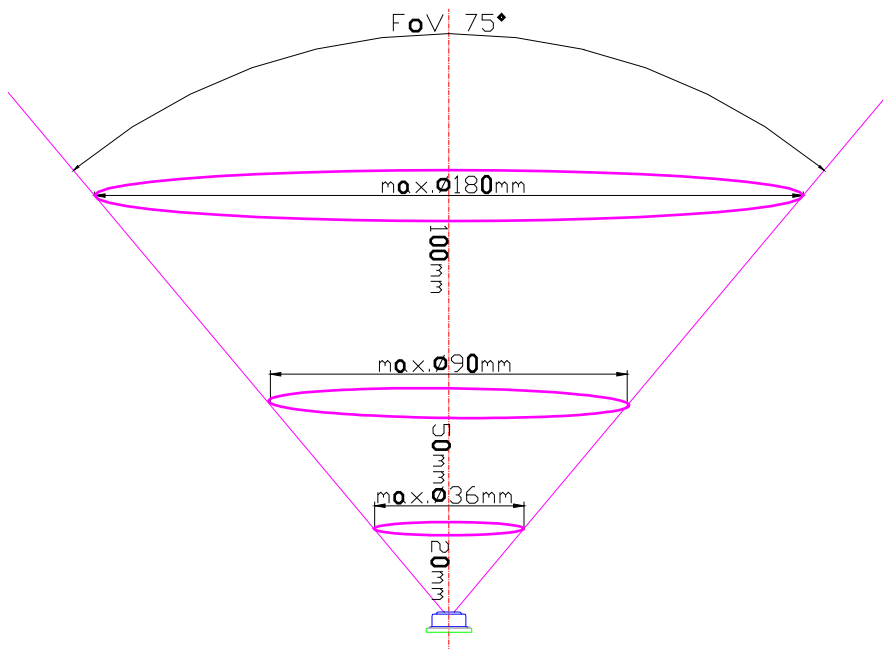


Fast Response
Small Size

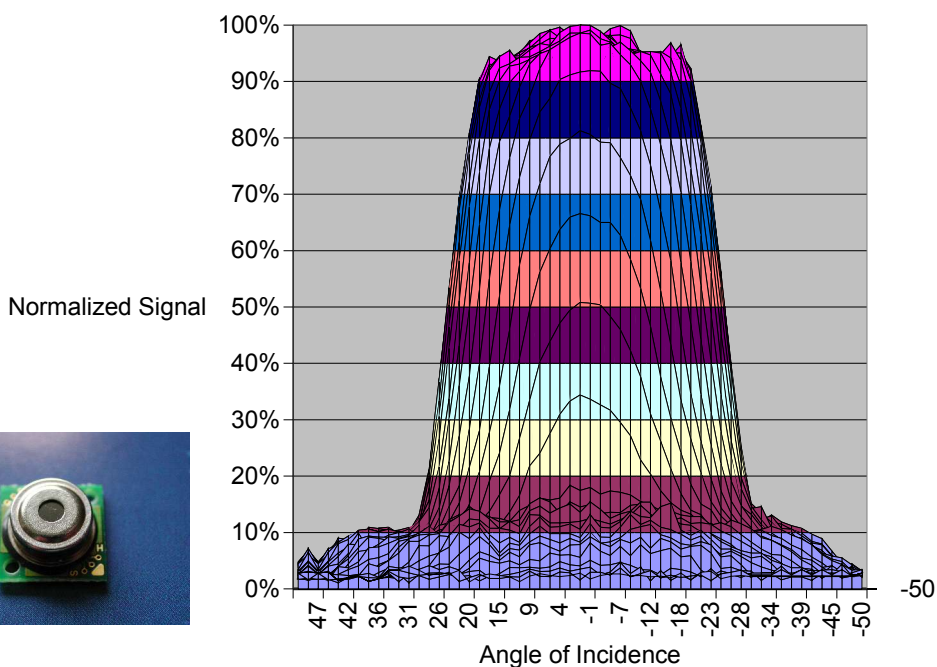


HEIMANN Sensor Integrated Module HTIA-C with Cap Aperture – Field of View 1 : 2

Field of View and Focus Area at 10% Signal Cut On



Measured Field of View



HEIMANN Sensor GmbH
Grenzstr. 22
D-01109 Dresden

Contact / Customer Support
Phone 49 (0) 6123 60 50 30
Fax 49 (0) 6123 60 50 39

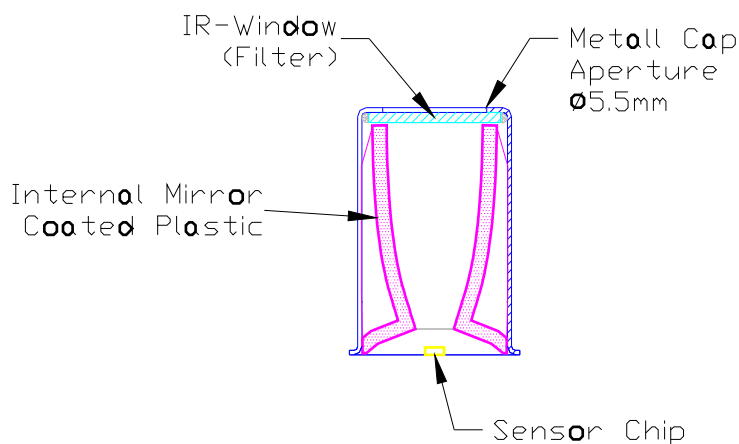
Internet
www.heimannsensor.com
mail: info@heimannsensor.com



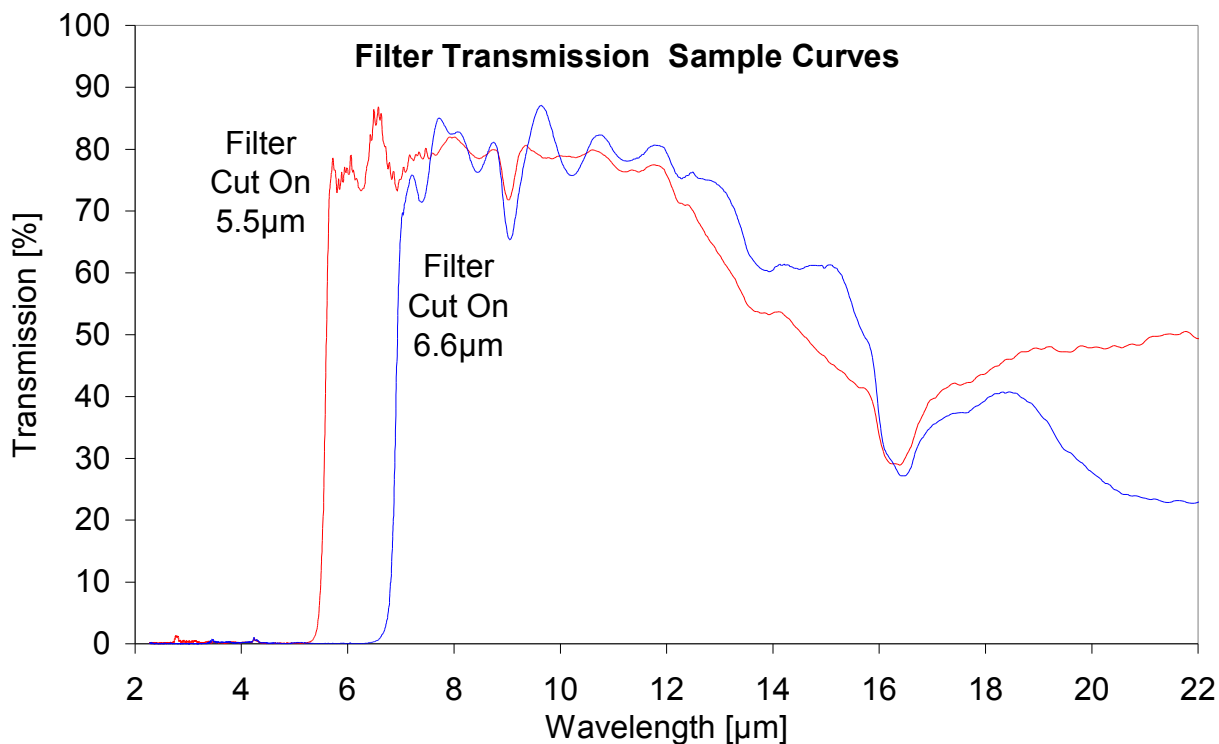
Fast Response
Small Size

HEIMANN Sensor Integrated Module HTIA-D with Internal Mirror Optics

Internal Mirror Dimensions and Construction



Filter Characteristics



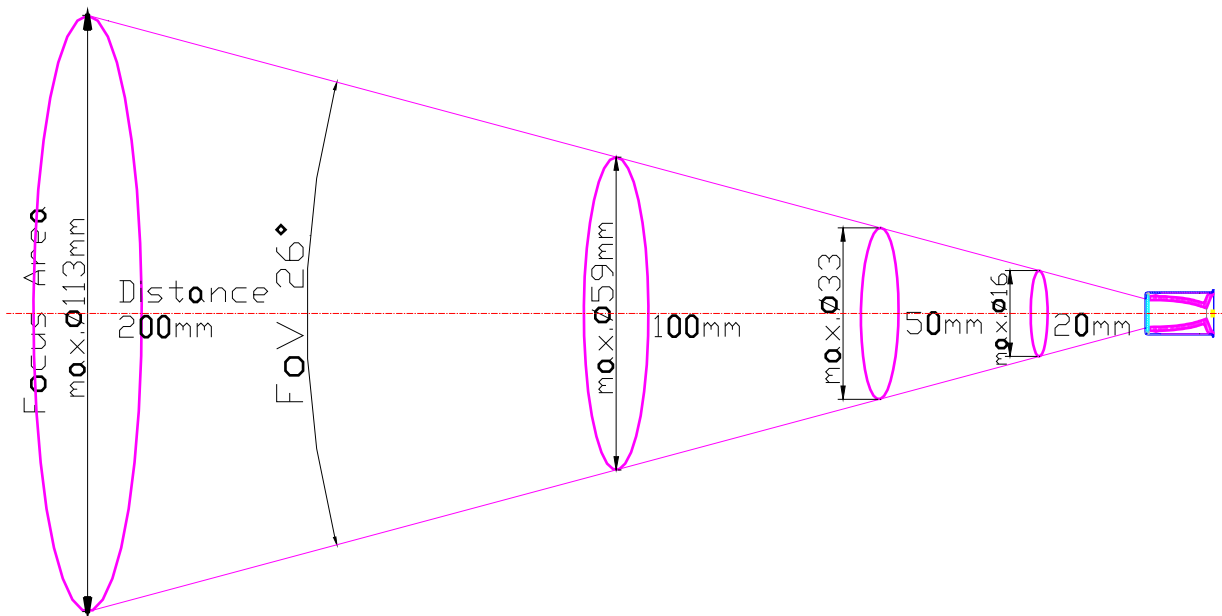


Fast Response
Small Size

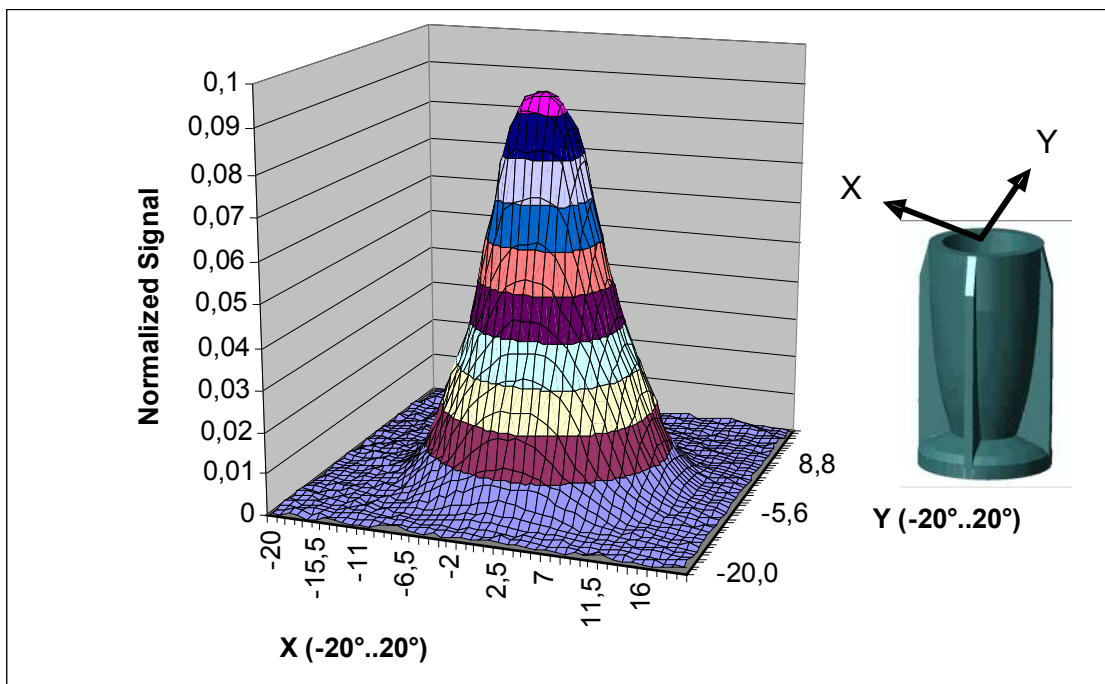


HEIMANN Sensor Integrated Module HTIA-D with Internal Mirror Optics – Field Of View 2 : 1

Field of View and Focus Area at 5% Signal Cut On



Measured Field of View



HEIMANN Sensor GmbH
Grenzstr. 22
D-01109 Dresden

Contact / Customer Support
Phone 49 (0) 6123 60 50 30
Fax 49 (0) 6123 60 50 39

Internet
www.heimanssensor.com
mail: info@heimanssensor.com

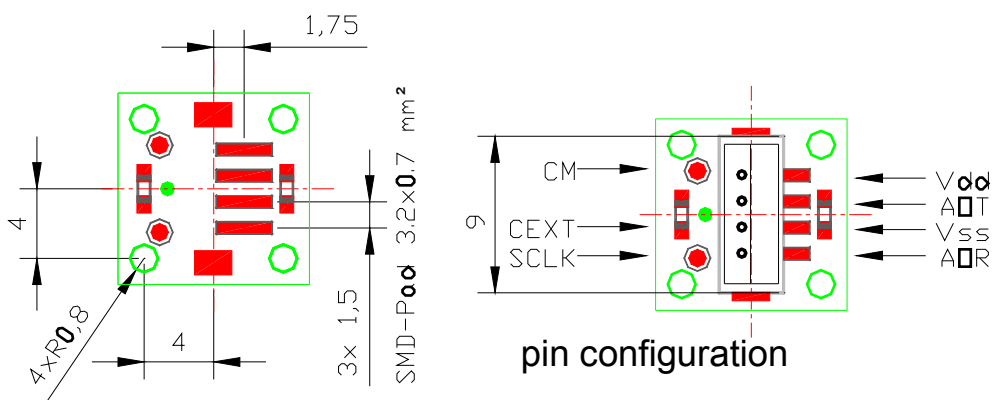


Fast Response
Small Size

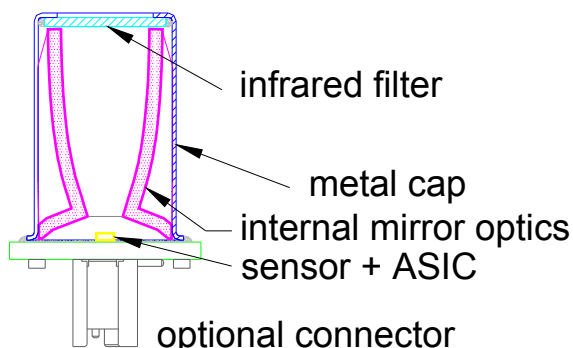
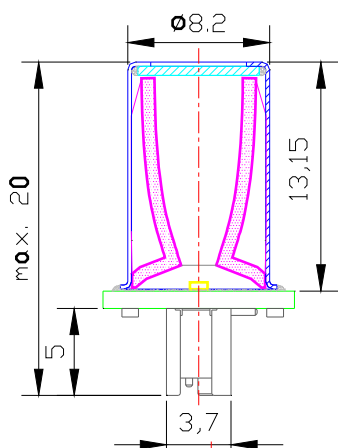


HEIMANN Sensor Integrated Module HTIA-D with Internal Mirror Optics and PCB 11x11mm²

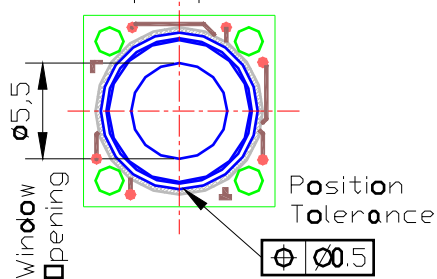
Dimensions, Options



PCB-size : 11(+0.4) x11(+0.4) mm²
PCB-thickness max.1.3mm (substrate 1mm)



optional connector
JST: B4B-ZR-SM3-TF
4 x 1.5mm



module
type :

HTIA-D

HEIMANN Sensor GmbH
Grenzstr. 22
D-01109 Dresden

Contact / Customer Support
Phone 49 (0) 6123 60 50 30
Fax 49 (0) 6123 60 50 39

Internet
www.heimannsensor.com
mail: info@heimannsensor.com

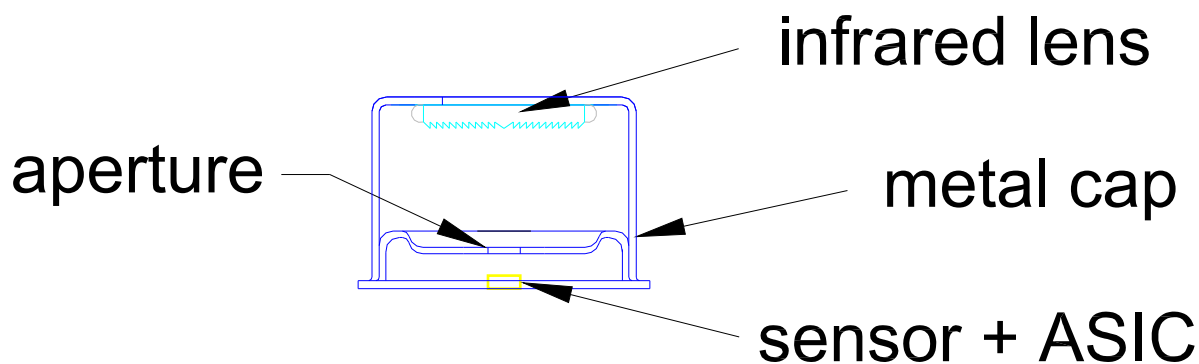


Fast Response
Small Size

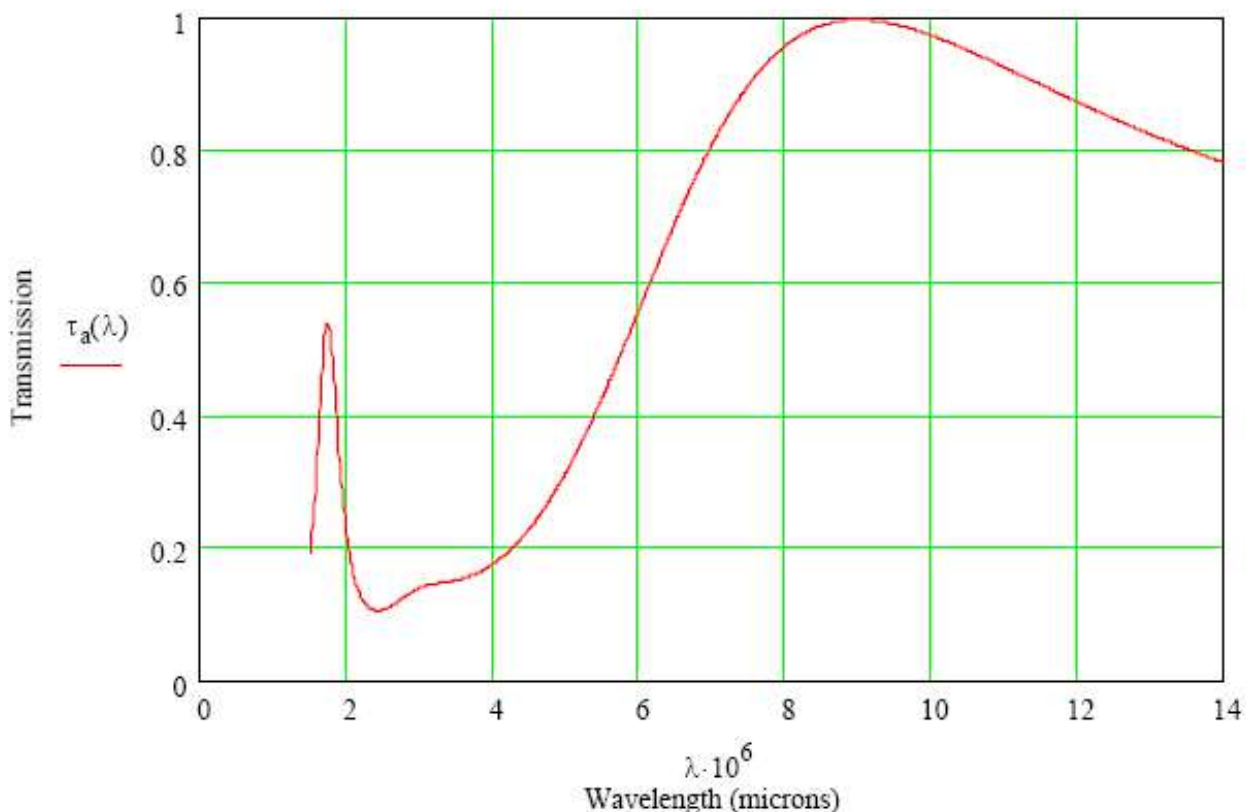


HEIMANN Sensor Integrated Module HTIA-E with Lens Optics

Lens Optics Dimensions and Construction



Filter Characteristics



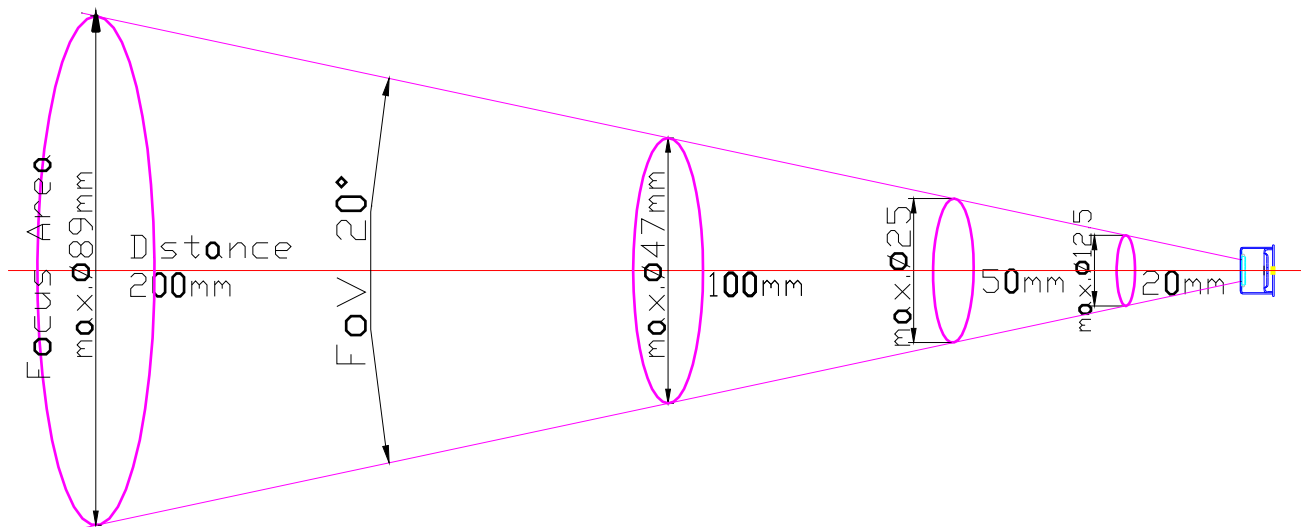


Fast Response
Small Size

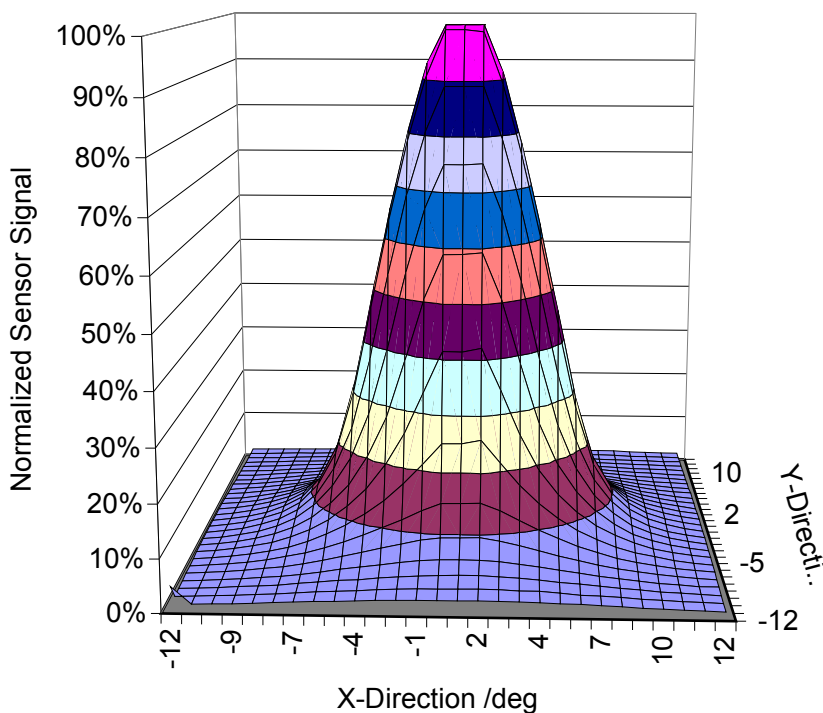


HEIMANN Sensor Integrated Module HTIA-E with Lens Optics – Field Of View 2 : 1

Field of View and Focus Area at 5% Signal Cut On



Measured Field of View



HEIMANN Sensor GmbH
Grenzstr. 22
D-01109 Dresden

Contact / Customer Support
Phone 49 (0) 6123 60 50 30
Fax 49 (0) 6123 60 50 39

Internet
www.heimannsensor.com
mail: info@heimannsensor.com

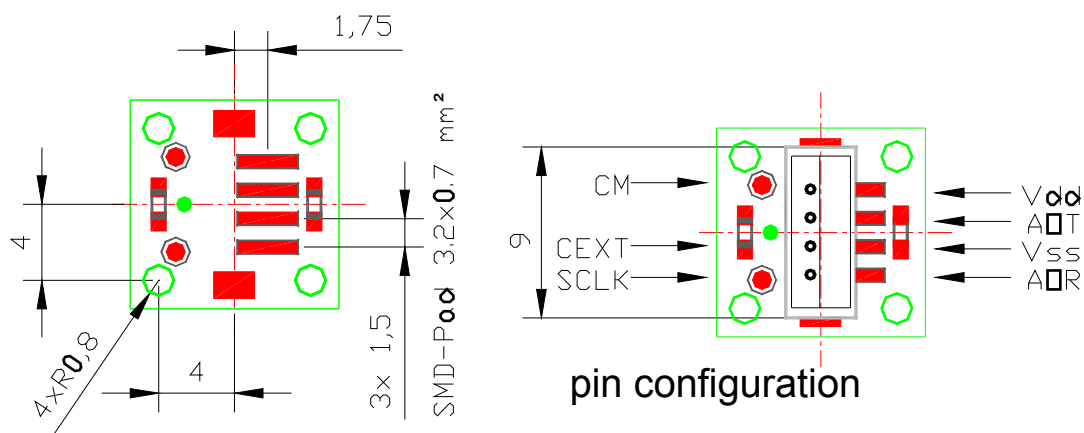


Fast Response
Small Size



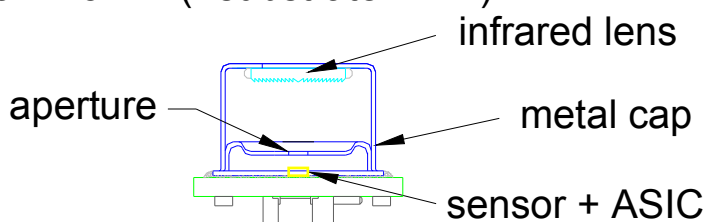
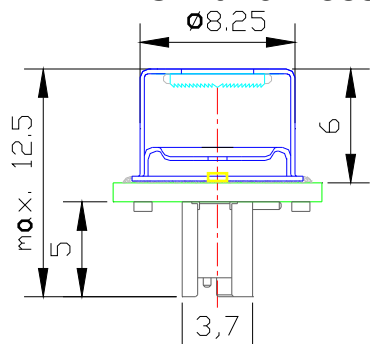
HEIMANN Sensor Integrated Module HTIA-E with Lens Optics and PCB 11x11mm²

Dimensions, Options

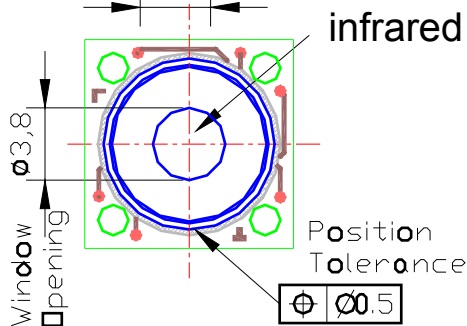


PCB-size : 11(+0.4) x11(+0.4) mm²

PCB-thickness max.1.3mm (substrate 1mm)



optional connector
JST: B4B-ZR-SM3-TF
4 x 1.5mm



module
type :
HTIA-E

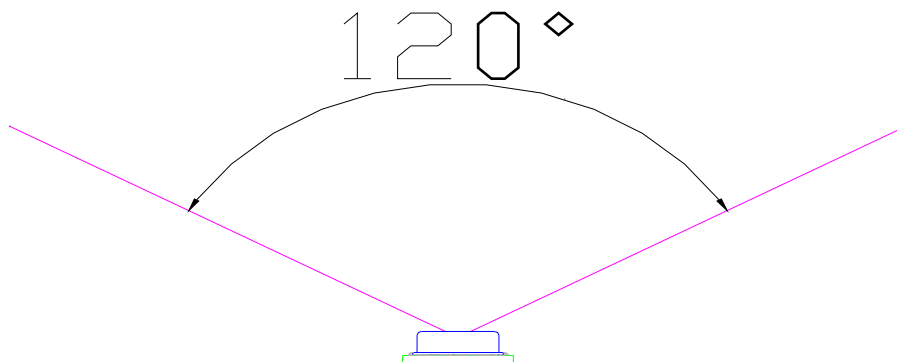


Fast Response
Small Size

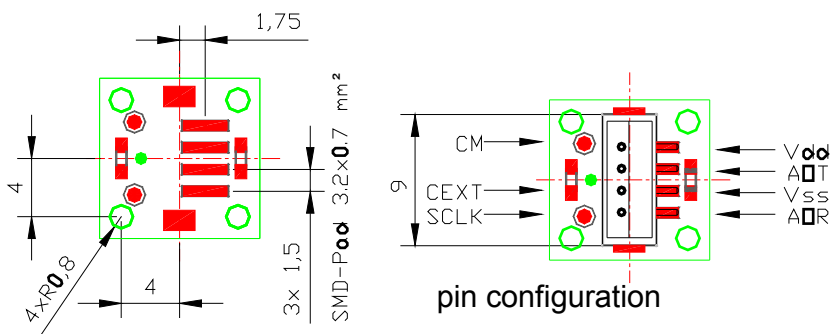


HEIMANN Sensor Integrated Module HTIA-F with Cap Aperture – Field Of View 1 : 4

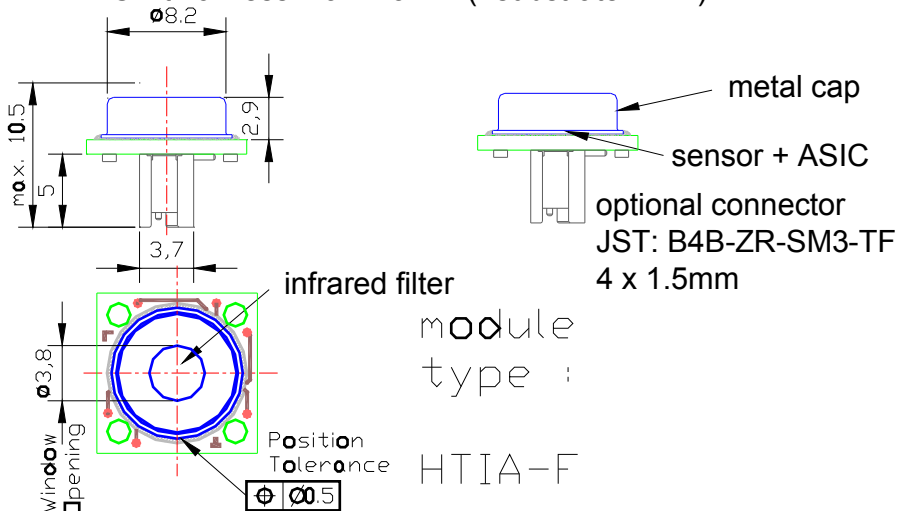
Field of View at 10% Signal Cut On



Dimensions, Options



PCB-size : 11(+0.4) x11(+0.4) mm²
PCB-thickness max.1.3mm (substrate 1mm)



module
type :
HTIA-F

HEIMANN Sensor GmbH
Grenzstr. 22
D-01109 Dresden

Contact / Customer Support
Phone 49 (0) 6123 60 50 30
Fax 49 (0) 6123 60 50 39

Internet
www.heimannsensor.com
mail: info@heimannsensor.com



Fast Response
Small Size



HEIMANN Sensor Integrated Module HTIA

Application Hints

The HEIMANN Sensor integrated module HTIA consists of a fast response thermopile sensor and an ASIC as specific integrated circuit for the signal processing and on chip calibration.

The thermopile sensor converts the temperature radiation of an object surface to an electrical signal (voltage) by thermocouples (Seebeck effect). The sensor output voltage is related to the object temperature and emissivity (radiation) as well as to the sensor chip temperature (housing temperature) and surrounding temperature (radiation) by the following equation :

$$V_S = K * \epsilon * (T_O^n - T_S^n)_{T_A=T_S}$$

V_S -> sensor output voltage

K -> constant apparatus factor

ϵ -> object emissivity

T_O -> object temperature

T_A -> ambient (surrounding) temperature

T_S -> sensor (housing) temperature

n -> exponent to describe the temperature dependency of the signal voltage

The equation is simplified by the hypothesis of equal ambient and sensor temperatures. The exponent „n“ has the theoretical value of „4“ based on physical laws. But in the application practice it is an empirical determined, multi-polynomial regression function.

The knowledge of the housing temperature is necessary to get the right object temperature from the sensor voltage. The integrated sensor module HTIA is designed to detect the housing temperature and to convert the temperature to a voltage. By the multi-functionality of the integrated sensor module HTIA it is possible to use that voltage for an on chip ambient temperature compensation which makes the output voltage of the sensor module widely independent from ambient temperature variations within a range of 40°C. For higher accuracy requirements the multi-functional sensor module can output the amplified and calibrated sensor voltage separated from the linear on-chip temperature reference voltage. With it the ambient temperature compensation can be simple done by an external microcontroller using a polynomial regression equation.

By the large number of physical affects influencing the non-contact temperature measurement, it is difficult to have the best initial adjustment for the different applications. In detail the measuring is influenced by the object emissivity and its variation, optical ratios (field of view, object size, measuring distances), the ambient and object temperature ranges, the adjustment of the ambient temperature compensation, unstable (dynamic) ambient temperature conditions.

For all applications an optimized solution can be found and fixed for a serial production. Don't hesitate to contact HEIMANN Sensor for support to use our long-time experience in infrared sensors and sensor modules.

HEIMANN Sensor GmbH
Grenzstr. 22
D-01109 Dresden

Contact / Customer Support
Phone 49 (0) 6123 60 50 30
Fax 49 (0) 6123 60 50 39

Internet
www.heimannsensor.com
mail: info@heimannsensor.com



Fast Response
Small Size

HEIMANN
Sensor
HEIMANN SENSOR GMBH

HEIMANN Sensor Integrated Module HTIA

Ordering Information

The sensor modules can be ordered by the following nomenclature :

HTIA-"type"+"U" or "C"-To , e.g. HTIA-DU-100

HTIA -> HEIMANN Sensor thermopile module with integrated circuit and analog outputs
type -> letter describing the size and optics according to the datasheet
"U" or "C" -> stands for uncompensated or compensated output voltage AOT
To -> maximum object temperature describing the amplification adjustment
The long wavelength pass filter with 5.5µm cut on is used as standard filter type.

Please give following information :

- object and ambient temperature ranges
- object (surface) emissivity
- required temperature accuracy and resolution
- required optics (field of view or object size and measuring distance)
- special environmental conditions
- requested speed of response (typical sensor time constant : 7msec ; low pass filtering by an external capacitance is normally used to reduce the noise level by increasing of the time constant to typical 10..15msec ; for a higher noise suppression the external capacitance can be increased combined with a higher time constant)

Don't hesitate to contact us , if the sensor modules show problems in your special application.

Liability Information

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.

Customers are requested to consult with Heimann Sensor representatives before the use of Heimann Sensor products in special applications where failure or abnormal operation may directly affect human lives or cause physical injury or property damage. The company or their representatives will not be responsible for damage arising from such use without prior approval.

HEIMANN Sensor GmbH
Grenzstr. 22
D-01109 Dresden

Contact / Customer Support
Phone 49 (0) 6123 60 50 30
Fax 49 (0) 6123 60 50 39

Internet
www.heimannsensor.com
mail: info@heimannsensor.com