

HTPA160x120dR1 Module(PoE)

Datasheet for Thermopile Array Module

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Changelog

2025-07-24	Initial Release
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1 Cleaning and Handling of Sensors with Optical Elements

Cleaning of Filter with Isopropyl Alcohol or Acetone

This is the method most universally used for cleaning optical elements with or without coatings. Filters or lenses mounted in our sensors may be cleaned rubbing the surfaces lightly with a clean, soft, all-cotton cloth or cotton swab during immersion in solvent or simply moistened with the solvent. The parts are then immediately wiped dry with another clean, soft, all-cotton cloth or cotton swab.

Cleaning with Detergent and Water

A very mild, non-abrasive detergent (one which does not contain additives) and water may also be used for cleaning optical elements. In general, a detergent and water mixture is an excellent method for removing fingerprints and other smudges. The liquid detergent is first mixed with deionized water (proportions recommended by the manufacturer should be followed). The element is then washed, rinsed, and immediately wiped dry. Use a clean, soft cloth when cleaning and drying. If the part is allowed to dry in air, a permanent stain may result.

Please note:

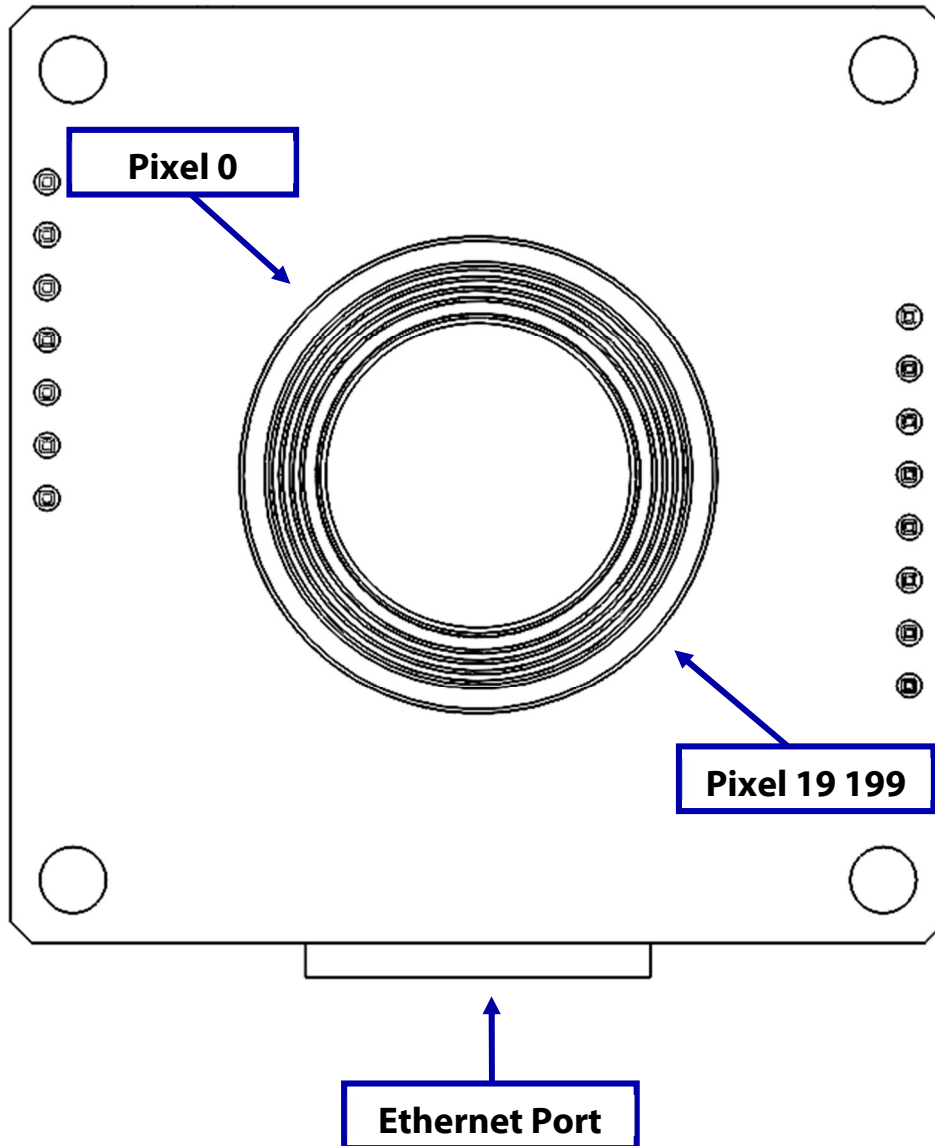
- Do not use isopropyl alcohol or acetone or detergent if the elements will be mounted in an assembly with a finish which may be soluble by these solvents.
- Please avoid glass isolation being moistened by solvent.
- If the part is allowed to dry in air, a permanent stain may result.

Handling Advice

Sensors with optical elements deserve special consideration in their handling and care. Ordinarily, filters or lenses are cleaned and inspected prior to shipment. If proper care is exercised during handling cleaning should not be necessary prior to use.

- Wear gloves when handling a sensor or optical element. Lightweight nylon or cotton gloves which are relatively lint-free are recommended.
- Avoid touching the surface of filters and lenses.
- Protect devices from static discharge and static fields.
- Thermopile sensors are electrostatic sensitive devices. Sensors should be handled over an electrostatic protected work area.
- Precautions should be taken to avoid reverse polarity of power supply for sensors with integrated signal processing. Reversed polarity of power supply results in a destroyed unit.
- Sensors should rest preferably in a partitioned container where the mounted filters or lenses will be not coming into contact with other material.
- During storage optical surfaces should be covered to avoid contamination from the surrounding environment.
- A covered container can eliminate damage during transportation and storage.
- Sensors or optical elements should be stored in a restricted access area to eliminate handling.
- Do not expose the sensors to aggressive detergents such as freon, trichlorethylen, etc.
- Avoid rotating the sensors when they are soldered into a PCB or something similar.
- Shortening of the pins is not suggested. This may cause cracks in the glass of the pins and result in a leakage.
- If this is necessary, a tool for this is recommended. Please contact Heimann Sensor for further information.

2 Optical Orientation



3 Characteristics

3.1 Common Specifications

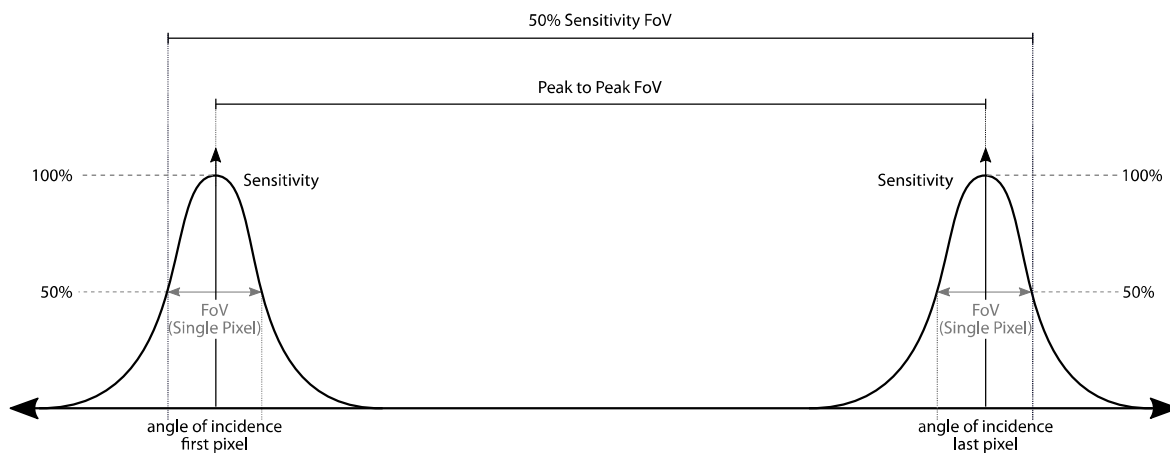
Technology:	n-poly/p-poly Si
Thermal pixel time constant:	TBD
Digital Interface:	SPI
Flash size:	2048 kByte

Pitch:	45 μm
Absorber size:	40 μm
Framerate (full frame):	16 Hz
Framerate (12 th part of array):	168 Hz

19020 sensitive elements

3.2 Optical Characteristics

Focal length:	3.95 mm	10 mm
F-Number:	0.8	0.72
Field of View (50 %):	123 x 84 deg.	38 x 30 deg.
Lens Coating:	AR-Coating	LWP-Coating 7.7



Lens coating:	AR-Coating; average reflectance per surface Cut On (Tr. 5 %): 5.0 $\mu\text{m} \pm 0.3 \mu\text{m}$
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Accuracy:	$\pm 3 \%$ or $\pm 3 \text{ K}$ (whatever is larger) in the working ambient temperature range of 5 °C to 50 °C and object temperatures $\leq 300 \text{ °C}$ within the radiometric radius.
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The radiometric radius is specified for pixels listed below with a "1". All pixels outside this area can have a higher tolerance and less accuracy.

This depends on the optics used. The L10/0.72 does not have a radiometric radius. The one for the L3.95 is shown in Figure 1.

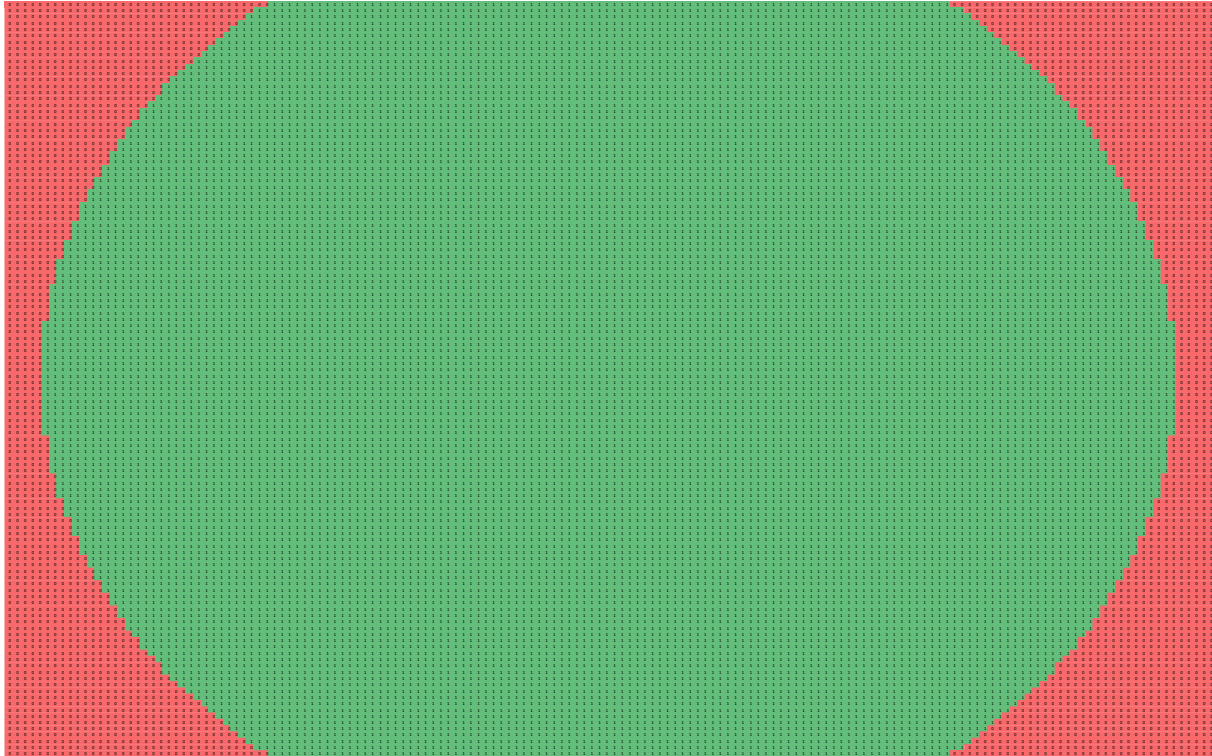


Figure 1: Radiometric Radius of the L3.95

4 Serial Order of Data in Stream

HTPA160x120d Temperature Mode		HTPA160x120d Voltage Mode	
Dataset	Value	Dataset	Value
0	tempature of Pixel0 in K*10	0	absolute Voltage of Pixel0 in digits
1	tempature of Pixel1 in K*10	1	absolute Voltage of Pixel1 in digits
2	tempature of Pixel2 in K*10	2	absolute Voltage of Pixel2 in digits
3	tempature of Pixel3 in K*10	3	absolute Voltage of Pixel3 in digits
...
19199	tempature of Pixel19199 in K*10	19199	absolute Voltage of Pixel19199 in digits
19200	el. Offset 0	19200	el. Offset 0
19201	el. Offset 1	19201	el. Offset 1
...
20799	el. Offset 1599	20799	el. Offset 1599
20800	VDD	20800	VDD
20801	TAmb	20801	TAmb
20802	PTAT0	20802	PTAT0
20803	PTAT1	20803	PTAT1
20804	PTAT2	20804	PTAT2
...
20825	PTAT23	20825	PTAT23
20826	ATC1	20826	ATC1
20827	ATC2	20827	ATC2

Each dataset consists of a 16 bit value, first the low-Byte is send, then the high-Byte.

5 Packets (UDP)

Packet Details for HTPA160x120d

Packet No.	Packet size	Packet contains
1	1401	Packet index 1 (8bit), data of Pixel0-Pixel699
2	1401	Packet index 2 (8bit), data of Pixel700-Pixel1399
3	1401	Packet index 3 (8bit), data of Pixel1400-Pixel2099
4	1401	Packet index 4 (8bit), data of Pixel2100-Pixel2799
5	1401	Packet index 5 (8bit), data of Pixel2800-Pixel3499
6	1401	Packet index 6 (8bit), data of Pixel3500-Pixel4199
7	1401	Packet index 7 (8bit), data of Pixel4200-Pixel4899
8	1401	Packet index 8 (8bit), data of Pixel4900-Pixel5599
9	1401	Packet index 9 (8bit), data of Pixel5600-Pixel6299
10	1401	Packet index 10 (8bit), data of Pixel6300-Pixel6999
11	1401	Packet index 11 (8bit), data of Pixel7000-Pixel7699
12	1401	Packet index 12 (8bit), data of Pixel7700-Pixel8399
13	1401	Packet index 13 (8bit), data of Pixel8400-Pixel9099
14	1401	Packet index 14 (8bit), data of Pixel9100-Pixel9799
15	1401	Packet index 15 (8bit), data of Pixel9800-Pixel10499
16	1401	Packet index 16 (8bit), data of Pixel10500-Pixel11199
17	1401	Packet index 17 (8bit), data of Pixel11200-Pixel11899
18	1401	Packet index 18 (8bit), data of Pixel11900-Pixel12599
19	1401	Packet index 19 (8bit), data of Pixel12600-Pixel13299
20	1401	Packet index 20 (8bit), data of Pixel13300-Pixel13999
21	1401	Packet index 21 (8bit), data of Pixel14000-Pixel14699
22	1401	Packet index 22 (8bit), data of Pixel14700-Pixel15399
23	1401	Packet index 23 (8bit), data of Pixel15400-Pixel16099
24	1401	Packet index 24 (8bit), data of Pixel16100-Pixel16799
25	1401	Packet index 25 (8bit), data of Pixel16800-Pixel17499
26	1401	Packet index 26 (8bit), data of Pixel17500-Pixel18199
27	1401	Packet index 27 (8bit), data of Pixel18200-Pixel18899
28	1401	Packet index 28 (8bit), data of Pixel18900-el.Offset400
29	1401	Packet index 29 (8bit), data of el.Offset401-el.Offset1100
30	1057	Packet index 30 (8bit), data of el.Offset1101-to end of frame

6 Specifications

Table 1: General Conditions

Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit
Supply Voltage Power over Ethernet	V _{DD}		44	48	57	V
Operation Temperature	T _A		-20		85	Deg. C
Storage Temperature	T _{St}		-40		85	Deg. C

Table 2: Network Specification

Parameter	Value
Network Protocol	UDP
Port	30444
Networking Standard	IEEE 802.3af
Link Speed	10/100 Mbps

7 Command Description

7.1 htpadvice

Purpose

The ?htpadvice query requests network, firmware and HTPAd device information from the module and it returns its current configuration including MAC address, IP address, port, array type and firmware version. This is particularly useful for system diagnostics or network integration.

Set Command

N/A

Request Command

?htpadvice\r

Response Format

!htpadvice <mac>,<ip>,<subnet>,<port>,<arraytype>,<FW>\r

Parameter Explanation

<i>Parameter</i>	<i>Description</i>	<i>Example</i>
<i><mac></i>	Device MAC address	e.g. 00:97:ff:c0:ff:ee
<i><ip></i>	IP address	e.g. 192.168.240.002
<i><subnet></i>	Subnet mask	e.g. 255.255.255.000
<i><port></i>	UDP port (5 digits)	e.g. 30444
<i><arraytype></i>	HTPAd array type (2-digit number)	e.g. 18
<i><FW></i>	Firmware version (4 digits)	e.g. 0001
<i>\r</i>	Carriage return	moves the cursor to the beginning of the line

Example

Request:

?htpadvice\r

Response:

!htpadvice 00:97:ff:c0:ff:ee,192.168.240.002,255.255.255.000,30444,18,0001

7.2 bind

Purpose

The :bind command binds the HTPA device to the IP address, that sends this command. From that moment, the device will only accept commands from this IP.

Set Command

```
:bind <KeepAliveTime>\r
```

Request Command

```
N/A
```

Response Format

```
!bind <KeepAliveTime>\r
```

Parameter Explanation

<i>Parameter</i>	<i>Description</i>	<i>Example</i>
<i><KeepAliveTime></i>	Binding time in seconds (3-digit number)	120
<i>0</i>	Device remains in binding mode indefinitely until it receives a :release command	000
<i>\r</i>	Carriage return	moves the cursor to the beginning of the line

Example

Configure:

```
:bind 120\r
```

Response:

```
!bind 120\r
```

7.3 heartbeatreset

Purpose

The :heartbeatreset resets the remaining binding time to the KeepAliveTime set with the :bind command.

Set Command

```
:heartbeatreset\r
```

Request Command

```
N/A
```

Response Format

```
!heartbeatrese\r
```

Parameter Explanation

<i>Parameter</i>	<i>Description</i>	<i>Example</i>
lr	Carriage return	moves the cursor to the beginning of the line

Example

Configure:

```
:heartbeatreset\r
```

Response:

```
!heartbeatreset\r
```

7.4 htpaboot

Purpose

The :htpaboot is used to activate the bootloader mode, in which the software, including the lookup table for the sensor type, is flashed.

Set Command

:htpaboot\r

Request Command

N/A

Response Format

!htpaboot\r

Parameter Explanation

<i>Parameter</i>	<i>Description</i>	<i>Example</i>
lr	Carriage return	moves the cursor to the beginning of the line

Example

Configure:

:htpaboot\r

Response:

!htpaboot\r

7.5 release

Purpose

The `:release` command terminates the connection previously established via `:bind`.

Set Command

`:release\r`

Request Command

N/A

Response Format

`!release\r`

Parameter Explanation

<i>Parameter</i>	<i>Description</i>	<i>Example</i>
<code>lr</code>	Carriage return	moves the cursor to the beginning of the line

Example

Configure:

`:release\r`

Response:

`!release\r`

7.6 dhcp

Purpose

DHCP Mode enables or disables the DHCP functionality of the module, allowing it to obtain an IP address from a DHCP server when enabled.

Set Command

```
:dhcp <dhcpstate>\r
```

Request Command

```
?dhcp\r
```

Response Format

```
!dhcp<dhcpstate>\r
```

Parameter Explanation

<i>Parameter</i>	<i>Description</i>	<i>Example</i>
<i><dhcpstate></i>	enables (1) or disables (0) the DHCP function (1 digit number)	1
<i>\r</i>	Carriage return	moves the cursor to the beginning of the line

Example

Configure:

```
:dhcp 1\r
```

Request:

```
?dhcp\r
```

Response:

```
!dhcp 1\r
```

7.7 netip

Purpose

The **:netip** command sets a static IP address and subnets mask for the modul. It does **not** affect the current network settings, if the device is operating in **DHCP mode**.

Set Command

```
:netip <ip>,<subnet>\r
```

Request Command

```
?netip\r
```

Response Format

```
!netip<ip>,<subnet>\r
```

Parameter Explanation

<i>Parameter</i>	<i>Description</i>	<i>Example</i>
<i><ip></i>	IP address (xxx.xxx.xxx.xxx)	192.168.001.010
<i><subnet></i>	Subnet mask (xxx.xxx.xxx.xxx)	255.255.255.000
<i>\r</i>	Carriage return	moves the cursor to the beginning of the line

Example

Configure:

```
:netip 192.168.123.010,255.255.255.000\r
```

Request:

```
?netip\r
```

Response:

```
!netip 192.168.123.010,255.255.255.000\r
```

7.8 stream

Purpose

The **:stream** command starts or stops the data stream, selects the transmitted data type (temperature or voltage) and sets a frame skipping rate, where every n-th frame is ignored.

Set Command

```
:stream <what>,<skip>\r
```

Request Command

N/A

Response Format

```
!stream<what>,<skip>\r
```

Parameter Explanation

Parameter	Description	Example
<i><what></i>	0 = no stream / stop streaming 1 = temperature stream 2 = voltage stream (1 digit number)	1
<i><skip></i>	Skipping rate (2 digit number)	00
<i>\r</i>	Carriage return	moves the cursor to the beginning of the line

Example

Configure:

```
:stream 1,10\r
```

Response:

```
!stream 1,10\r
```

7.9 radradius

Purpose

The **:radradius** command sets the radiometric radius, defined as a circular area from the center of the array . A radius of 100 is equal to 10 pixels measured from that center.

Set Command

```
:radradius<radius>\r
```

Request Command

```
?radradius
```

Response Format

```
!radradius<radius>\r
```

Parameter Explanation

<i>Parameter</i>	<i>Description</i>	<i>Example</i>
<i><radius></i>	Radius [10 ² pixel] (4 digit number)	0100
<i>\r</i>	Carriage return	moves the cursor to the beginning of the line

Example

Configure:

```
:radradius 0123\r
```

Request:

```
?radradius 0123\r
```

Response:

```
!radradius 0123\r
```

7.10 *tamb*

Purpose

The *?tamb* query returns the ambient temperature in dK provided by the PTAT (Proportional to Absolut Temperature).

Set Command

N/A

Request Command

?tamb\r

Response Format

!tamb <tamb>\r

Parameter Explanation

<i>Parameter</i>	<i>Description</i>	<i>Example</i>
<i><tamb></i>	Ambient temperature in dK (4 digit number)	2732
<i>\r</i>	Carriage return	moves the cursor to the beginning of the line

Example

Request:

?tamb\r

Response:

!tamb 2972\r

7.11 reset

Purpose

The :reset command triggers a complete device restart.

Set Command

`:reset\r`

Request Command

`N/A`

Response Format

`!reset\r`

Parameter Explanation

<i>Parameter</i>	<i>Description</i>	<i>Example</i>
lr	Carriage return	moves the cursor to the beginning of the line

Example

Configure:

`:reset\r`

Response:

`!reset\r`

7.12 info

Purpose

The ?info query will return general information about the HTPA.

Set Command

N/A

Request Command

?info\r

Response Format

!info<arraytype>,<modtype>,<ADC>,<fclk>,<id>,<emission>,<tn>,<biastop>,<clk>,<mbit>,<biasbot>,<go>,<gg>,<bw>,<calib>\r

Parameter Explanation

Parameter	Description	Example
<arraytype>	HTPA array type number (2 digit number)	18
<modtype>	Modul type (2 digit number)	05
<ADC>	ADC resolution (2 digit number)	16 (Bit)
<fclk>	HTPA clock frequency	1234.5 (kHz)
<id>	Sensor ID(10 digit number)	0000001234
<emission>	Emission (3 digit number)	097 (%)
<tn>	Table number (5 digit number)	00172
<biastop>	BIAS trim register setting for the top half of ADC (2 digit hex number)	6a
<clk>	Clock trim register setting (2 digit hex number)	1a
<mbit>	MBIT trim register (2 digit hex number)	0c
<biasbot>	BIAS trim register setting of the bottom half of ADC (2 digit hex number)	66
<go>	Global Offset (3 digit sign number)	-001
<gg>	Global Gain (5 digit number)	10000
<bw>	Bandwidth	123.45
<calib>	Calibration state (2 digit hex number)	3F
\r	Carriage return	moves the cursor to the beginning of the line

Example

Request:

?info\r

Response:

*!info18,05,16,2563.5,000000760,098,00172,6a,1a,0c,66,
-002,10053,155.92,3F\r*

7.13 emission

Purpose

The `:emission` command sets the emissivity value used by the device to calculate the object's temperature. This value is stored in the internal NVM (Non-volatile memory) of the HTPA. Default is 100.

Set Command

```
:emission<emission>\r
```

Request Command

```
?emission\r
```

Response Format

```
!emission<emission>\r
```

Parameter Explanation

<i>Parameter</i>	<i>Description</i>	<i>Example</i>
<i><emission></i>	Emissivity value in percent (3 digit number)	098
<i>\r</i>	Carriage return	moves the cursor to the beginning of the line

Example

Configure:

```
:emission 098\r
```

Request:

```
?emission\r
```

Response:

```
!emission 098\r
```

7.14 state

Purpose

The ?state query sets NVM register content.

Set Command

N/A

Request Command

?state\r

Response Format

!state <minstate>,<maxstate>,<mintemp>,<minpix>,<maxtemp>,<maxpix>,<tamb>\r

Parameter Explanation

<i>Parameter</i>	<i>Description</i>	<i>Example</i>
<i><minstate></i>	0 = no warning/alarm 1 = min pixel temperature between warning and alarm threshold 2 = min pixel temperature lower than alarm threshold (1 digit number)	0
<i><maxstate></i>	0 = no warning/alarm 1 = max pixel temperature between warning and alarm threshold 2 = max pixel temperature lower than alarm threshold (1 digit number)	0
<i><mintemp></i>	min pixel temperature in dK (4 digit number)	2882
<i><minpix></i>	min pixel number range: 0 - 255 (5 digit number)	5
<i><maxtemp></i>	max pixel temperature in dK (4 digit number)	3532
<i><maxpix></i>	max pixel number range: 0 - 255(5 digit number)	10
<i><tamb></i>	ambient temperature in dK(4 digit number)	2952
<i>\r</i>	Carriage return	moves the cursor to the beginning of the line

Example

Configure:

N/A

Request:

?state\r

Response:

\r

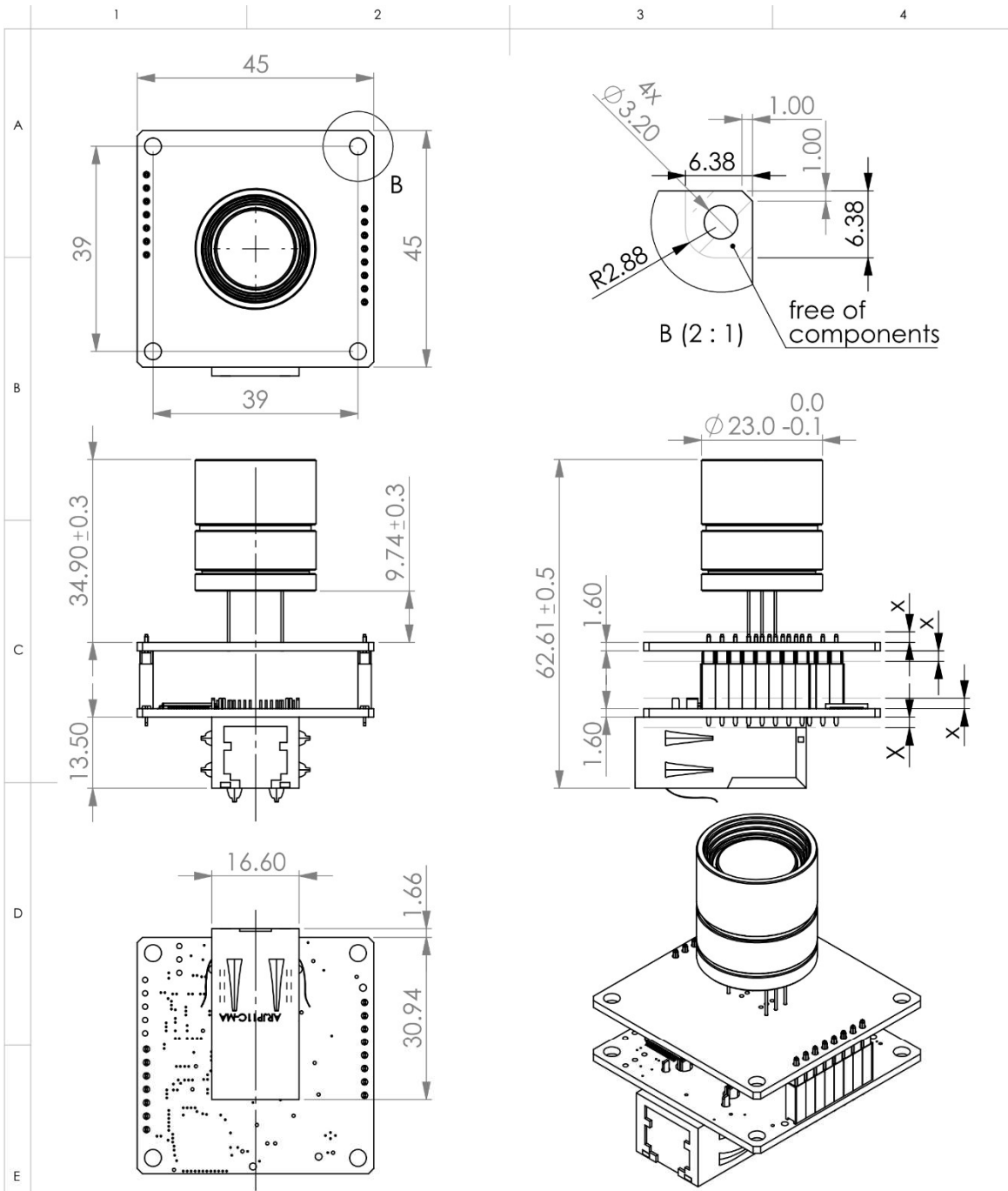
8 Order Code Chart

HTPA160x120d	R1	L10/0.72	UHi	M	(PoE)
HTPA160x120d	R1	L3.95/0.8	UHi	M	(PoE)

Bold: Selectable options

Regular: Fixed/Not selectable

9 Outer Dimension



x = 5mm (max. height for non shown components)

				Valid variation for untoleranced dimensions DIN ISO 7168 (fine) Inner edges DIN ISO 13715 +0.2 Outer edges DIN ISO 13715 -0.2			
				Datum	Name		
				Bearb.	22.05.2025	D.Pauer	
				Gepr.	03.06.2025	M.Lupp	
				Norm			
						HTPA160x120dR1L10/0.72F7.7UHIM(PoE)	
						HSZ-25044	
Zust.	Änderung	Datum	Name	Urspr.:	Ersatz für:	Ersatz durch:	