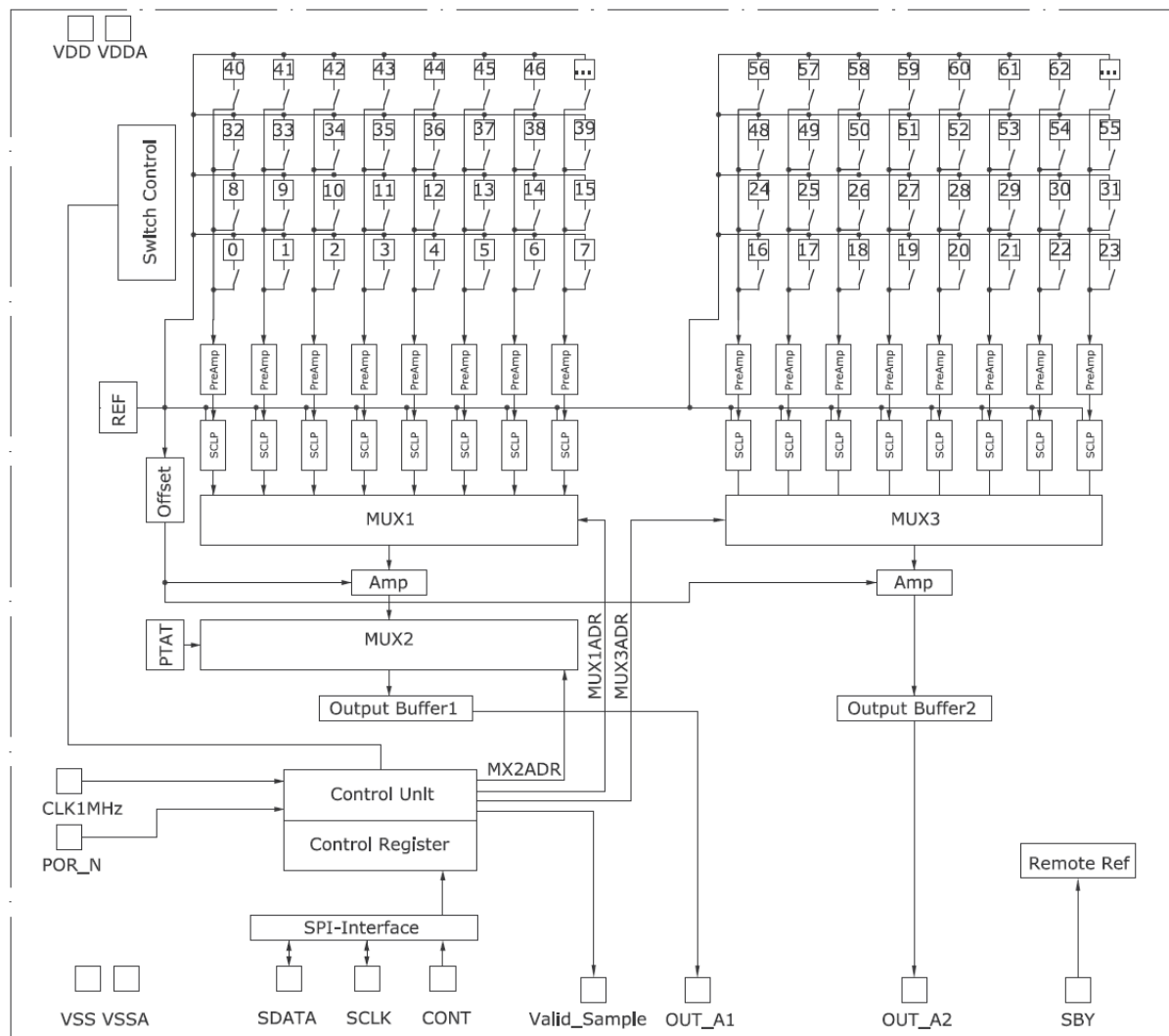
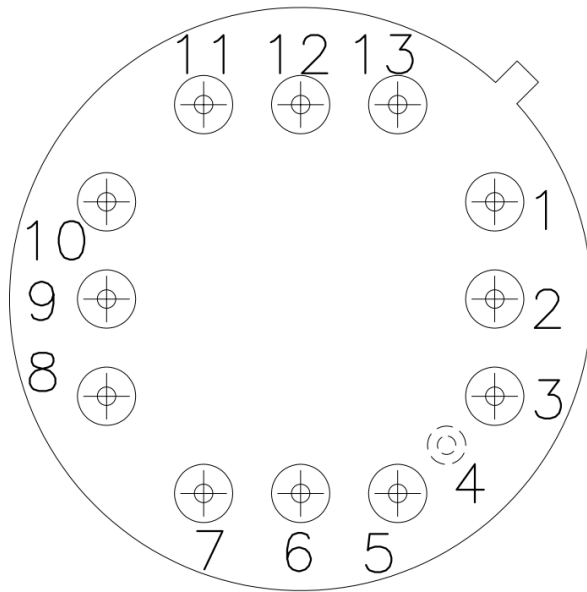


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Principal Schematic for HTPA32x31:



Pin Assignment in TO8 – Bottom View:

Connect all reference voltages via 100 nF capacitors to VSS.

Pin Assignment 32x31			
Pin	Name	Description	Type
1	MCLK	master clock	Digital Input
2	SCLK_IO	clock input/output for SPI	Digital Input/Output **
3	SBY	Standby	Digital Input***
4	VSS	negative power supply voltage	Power
5	VSAM	valid sample	Digital Output
6	DATA_IO	data input/output for SPI	Digital Input/Output **
7	OUT_A2	Analog Output	Analog Output
8	VCM_C	common mode voltage	Reference Voltage*
9	VREF_1225V	1.225V reference voltage	Reference Voltage*
10	OUT_A1	Analog Output	Analog Output
11	VSS	negative power supply voltage	Power
12	VDD	positive power supply voltage	Power
13	CONT	Control Pin for SPI	Digital Input

*) Connect via 100 nF to VSS

**) The HTPA32x31 has no ADC, but the valid sample cycle number is delivered.

***) Connect to VSS or NC for internal reference voltages. Connect to VDD if VREF_1225V and VCM_C are applied from external. See “Application Note HTPA” for details.

Internal Register Map:

Num	Name	Function	Default	Notes
0	R	Reset	0	In case of 1, the mux pixel counter is reset. ASIC stays in reset.
1		spare	1	-not used- write '1' to this location
2		spare	0	-not used- write '0' to this location
3	MA0	Multiplexer address 0	0	-not used- write '0' to this location
4	MA1	Multiplexer address 1	0	-not used- write '0' to this location
5	MA2	Multiplexer address 2	0	-not used- write '0' to this location
6	MA3	Multiplexer address 3	0	-not used- write '0' to this location
7	MA4	Multiplexer address 4	0	-not used- write '0' to this location
8	MA5	Multiplexer address 5	0	-not used- write '0' to this location
9	MA6	Multiplexer address 6	0	-not used- write '0' to this location
10	AIM	Automatic increment mode	1	1 : auto increment mode 0: manual mode (not used)
11	AMPL	Amplification high bit	0	0: low amplification 1: high amplification
12		spare	0	-not used- write '0' to this location
13		spare	0	-not used- write '0' to this location
14		spare	0	-not used- write '0' to this location
15	BDUR	Break Duration	0	0: 64clks of MCLK 1: 32clks of MCLK

HTPA32x31L7.5/1.0HiS / HTPA32x31L7.5/1.0S

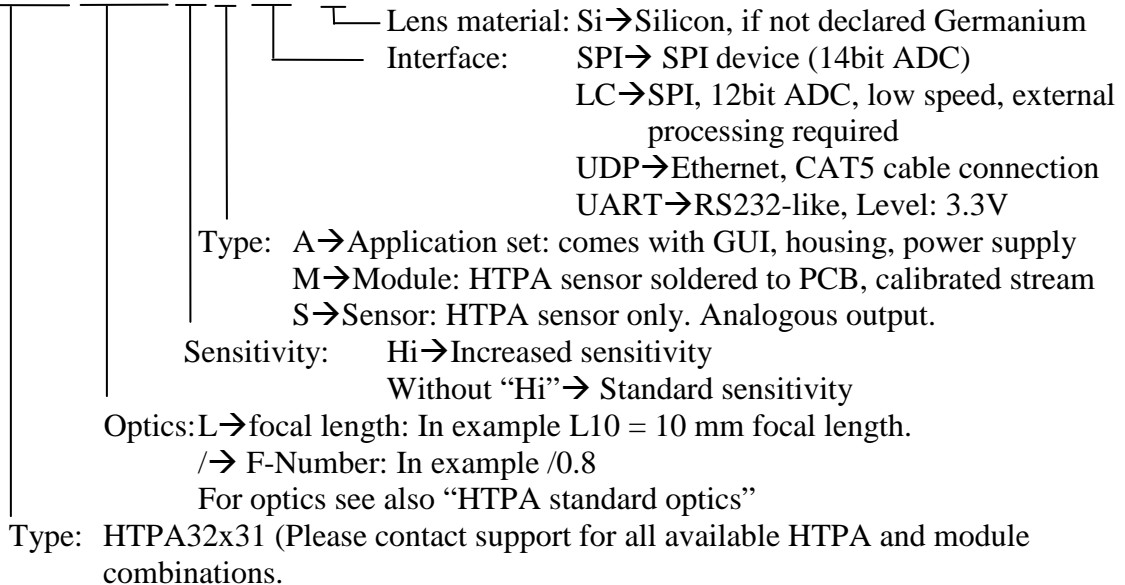
Thermopile Array With Lens Optics

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Order Code Example

HTPA32x31L10/1.0HiM(SPI)[Si]



HTPA32x31L7.5/1.0HiS / HTPA32x31L7.5/1.0S

Thermopile Array With Lens Optics

Rev.1: 2013.04.05 Forg/Schnorr



Characteristics:

Common Specifications:

Technology	n-poly/p-poly Si
Element Resistance	approx. 80 kOhms
Sensitivity	approx. 100 V/W without optics and filter
Thermal pixel time constant	<4 ms
MUX preamplifier noise	approx. 30 nV/ $\sqrt{\text{Hz}}$
Pixel + amplifier noise	approx. 50 nV/ $\sqrt{\text{Hz}}$
Digital Interface	SPI
Analog Output	Yes
2 point selectable Gains	880x / 2640 x

Pitch	220 μm
Absorber size	150 μm
Max. Framerate	25 Hz
(without Averaging)	
16 internal Amps + MUX	
992 sensitive elements	

Optical characteristics:

Focal length:	7.5 mm ("L" equals the focal length of the lens)
F-Number:	1.0
Field of view:	50x49 deg
Lens coating:	AR-Coating; average reflectance per surface < 3% for $8 \mu\text{m} < \lambda < 11.5 \mu\text{m}$ Environment acc. for MIL-C-48497

Electric Specifications:

Absolute Maximum Ratings:

Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit
Supply Voltage	V _{DD}		-0.5		6	V
Voltage at All inputs and outputs	V _{IO}		-0.5		V _{DD} +0.5	V
Storage Temperature	T _{STG}		-30		125	Deg. C

Operating Conditions:

Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit
Supply Voltage	V _{DD}		4.5		5.5	V
Operation Temperature	T _A		0		85	Deg. C
ESD-Protection		Human body model	1.5			kV
		100pF + 1k50hm				

Electrical Characteristics

Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit
-----------	--------	-----------	------	------	------	------

Digital Input

Frequency of MCLK	MCLK		100k	1M	TBD	Hz
Input voltage high	V _{IH}		V _{DD} -1.2			V
Input voltage low	V _{IL}				1.2	V

PTAT

Temperature range			0		85	Deg. C
PTAT gradient			37.4	39.1	40.5	K/V

Signal Processing

First amplifier stage gain	G0		TBD	880	TBD	V/V
Second amplifier stage gain	G1	AMPL=0	TBD	1	TBD	V/V
Second amplifier stage gain	G1	AMPL=1	TBD	3	TBD	V/V
Analog path 1 Output ripple	V _{PPSENS}	AMPL=0 MCLK=1MHz	16	18	22	mV
Analog path 2 Output ripple	V _{PPSENS}	AMPL=0 MCLK=1MHz	64	69	74	mV
Temp. coefficient Thermopile path output voltage	TCO _{OUTA}		-0.07	0.02	0.10	mV/K

Electrical Characteristics (continued)

Parameter	Symbol	Condition	MIN.	TYP.	MAX.	Unit
VoltageReference						
VREF_1225	V _{REF}	V _{dd} =5V, T _{amb} =25°C SBY=1	1.31	1.32	1.34	V
Temp. coeff. of V _{REF}	TC _{REF}		41	128	217	ppm/K

Analog Output

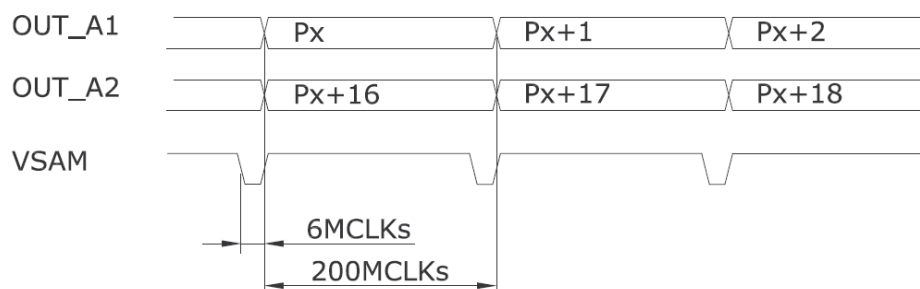
Output voltage swing	V _{OUTA}	load 10kOhm	0.5		V _{DD} -0.8	V
Power supply rejection ratio	P _{SRR}	AMPL=0, VDD<5V MCLK=1MHz	-14.5	-13.8	-13.3	dB
Output current limit	I _{OUTA}	OUT_A	0.15			mA

General Parameters

Overall current consumption	I _{DD}	MCLK=1MHz 25° C	7.1	7.4	8.2	mA
Start up time	T _{POR}	Power On to first VSAM transition		1610		cycles

Timings HTPA32x31:

Sample Timing HTPA32x31



For the HTPA32x31 every analogous voltage is stable in the whole time domain.

HTPA32x31L7.5/1.0HiS / HTPA32x31L7.5/1.0S

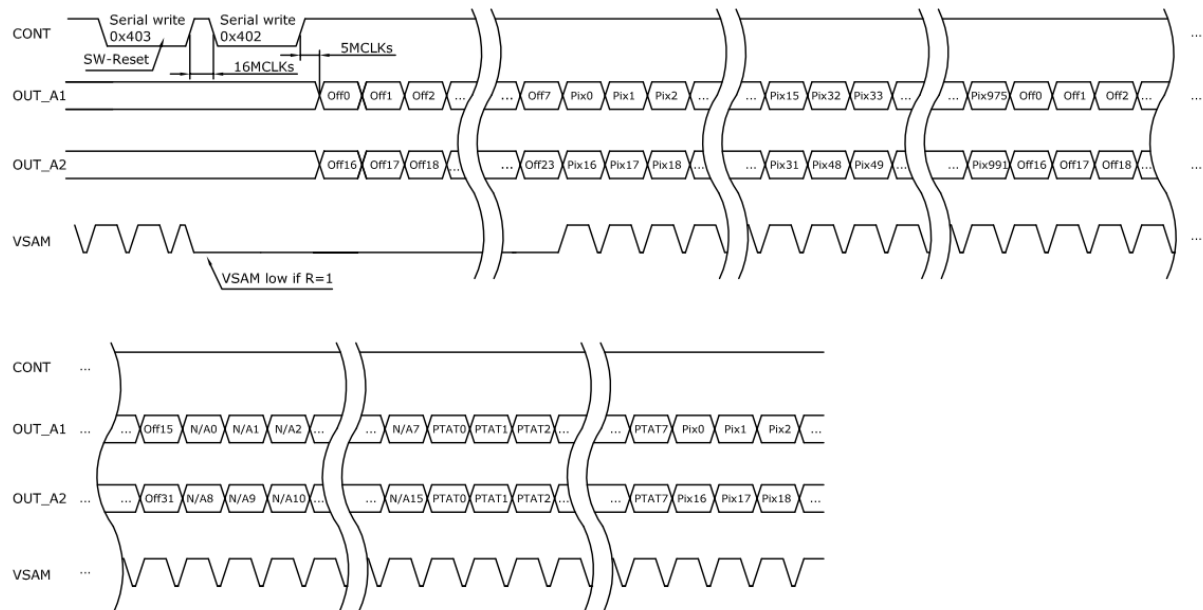
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Rev.1: 2013.04.05 Forg/Schnorr



Serial Transmission:

HTPA32x31 Serial Transmission of analogue data



Off0...Off16	Electric offset of amplifier 0 to amplifier 16
Pix0...Pix991	Amplified pixel voltage of Pixel0 to Pixel991
PTAT0...PTAT7	PTAT-Signal

The numeration of the pixels is in all cases line by line.

SPI Communication:

Data sampled at rising edge of SCLK, MSB first.

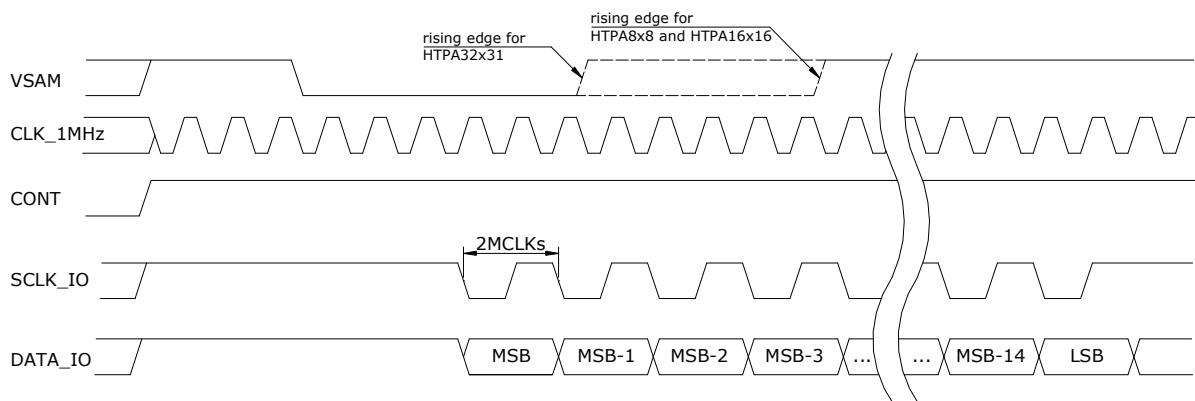
In case of ASIC as master device the frequency of the SCLK_IO is equal to the frequency of MCLK/2.

The valid sample cycle numbers are expensed in the least 10 bits. The value runs from 0 to 527.

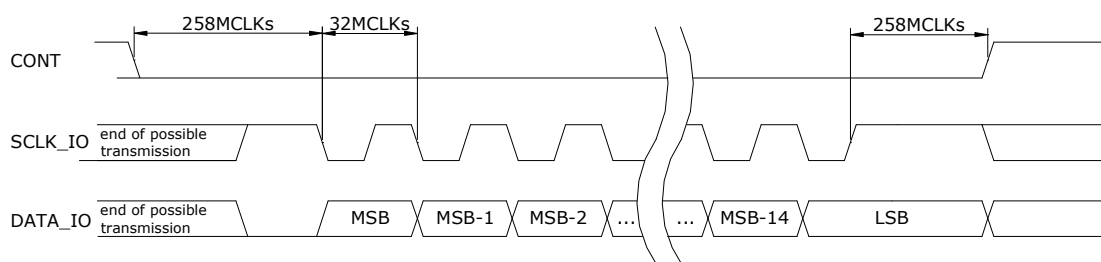
The output drivers for SCLK_IO and DATA_IO are enabled by CONT.

If CONT is low the data can be written serially from external controller through DATA_IO. In that case the external controller has to wait a minimum delay time, until SCLK_IO and DATA_IO output drivers are disabled. After programming, the positive slope of CONT stores the contents, when the number of SCLK-pulses is equal 16. While the output driver of the ASIC is disabled a weak pull up ensures that the SCLK_IO pin is at high level. To execute a reset command, the μ C has to write a logical "1" to the R-Bit in to configuration and afterwards a "0" into the R-bit, which requires two write cycles in this special case.

Serial Read from ASIC



Serial Write to ASIC



HTPA32x31L7.5/1.0HiS / HTPA32x31L7.5/1.0S

Thermopile Array With Lens Optics

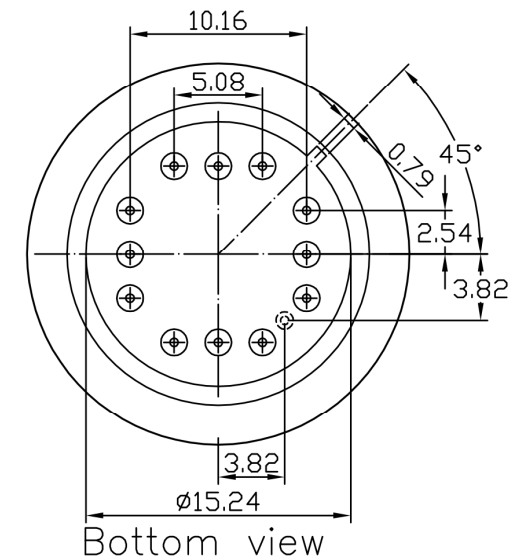
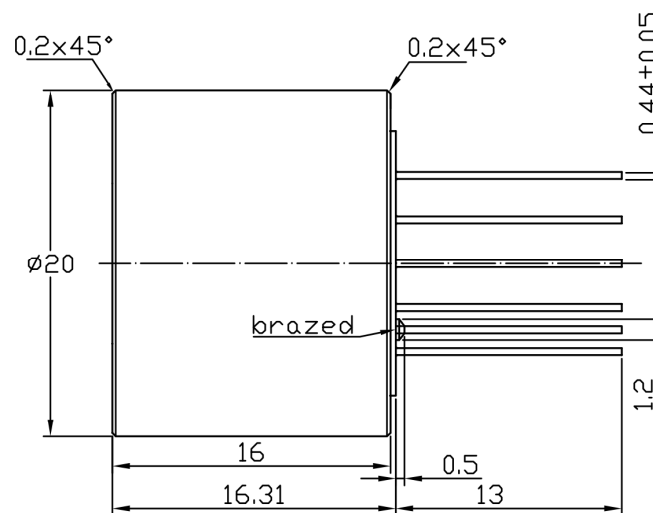
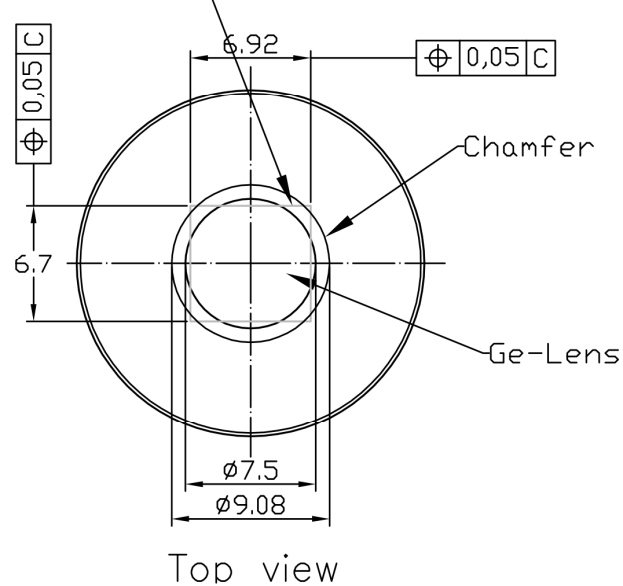
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Outer Dimensions:

HTPA32x31L7.5 (dual Germanium Spherical/Spherical lens combination, focal length 7.5mm):

Absorbing Area



HEIMANN Sensor GmbH Contact / Customer Support
Maria-Reiche-Str. 1 Phone 49 (0) 6123 60 50 30
D-01109 Dresden / Germany Fax 49 (0) 6123 60 50 39

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