

HEIMANN
Sensor
HEIMANN SENSOR GMBH

The diagram illustrates the internal architecture of the AD7124 ADC. It features a multi-channel input array with 32 channels (0-31) connected to PreAmps and SCLPs. A Switch Control block manages the input selection. The output of the SCLPs goes to MUX1, which then feeds into an Amp block. The Amp output goes to MUX2, which is controlled by PTAT. The MUX2 output goes to the ADC block, which is also controlled by the Control Unit. The ADC output goes to the Output Buffer, which is controlled by the Control Unit. The Control Unit is also controlled by the SPI-Interface. The SPI-Interface is connected to SDATA, SCLK, and CONT pins. The Control Unit is also connected to CLK1MHz and POR_N pins. The Control Unit outputs Valid_Sample and MUX2ADR signals. The Output Buffer outputs OutA. The diagram also shows VDD, VDDA, VSS, and VSSA power pins.

Dataset HTPA8x8L5.5/1.0 R0 27.11.2014

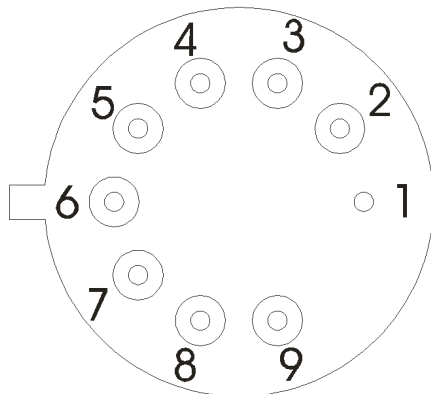
HTPA32x31	L10 / 0.8	F8-14	Hi	M	(SPI)	[Si]
-----------	-----------	-------	----	---	-------	------

HTPA32x31	L10 / 0.8	F8-14	Hi	M	(SPI)	[Si]	
							Type: HTPA32x31 Please contact support for all available HTPA and module combinations.
							Output: d Not declared HTPA sensor with digital output HTPA sensor with analogous output
							Optics: L / Focal length: In example L10 = 10.0 mm focal length F-Number: In example /0.8 For optics see also "HTPA standard optics"
							Filter: F Not declared Filter characteristics. In example F8-14 (μm, Bandpass) Broad band ARC
							Sensitivity: Hi Not declared Increased sensitivity Standard sensitivity
							Version: A C M S Application set: comes with GUI, housing, power supply. Always UDP Interface. Calibrated sensor (only digital). Carries calibration constants on internal EEPROM Module: HTPA sensor soldered to PCB, calibrated stream HTPA sensor only. Raw voltage output, not calibrated
							Interface: SPI LC UDP PoE SPI device; Three variants: HTPA82x62: 16bit ADC all other analogous HTPAs: 14bit ADC Digital HTPA: 12bit ADC SPI,Only Analogous HTPA, 12bit ADC low speed, external processing required Ethernet, CAT5 cable connection Power over Ethernet, CAT5 connection, UDP protocol
							Lens Material: Si Not declared Silicon Germanium

Datasheet HTPA8x8L5.5/1.0 R0 27.11.2014

Thermopile Array With Lens Optics
 Type HTPA 8x8 L5.5/1.0 Hi S
 Type HTPA 8x8 L5.5/1.0 S

Pin Assignment in TO39 – Bottom View:



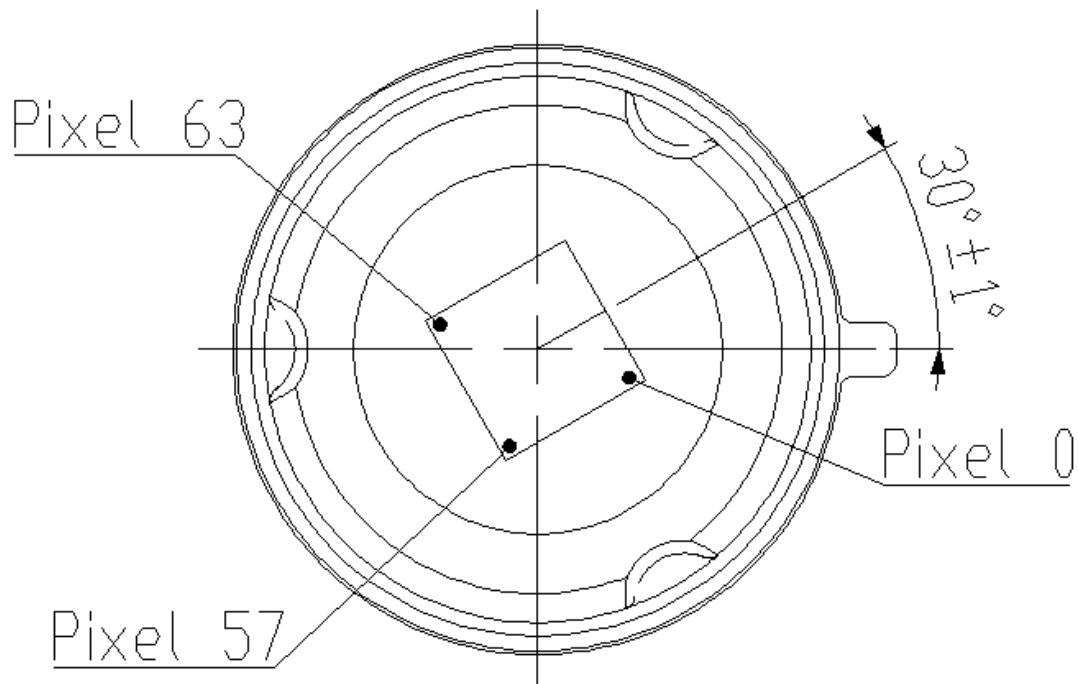
Connect all reference voltages via 100 nF capacitors to VSS.

Pin Assignment 8x8			
Pin	Name	Description	Type
1	VSS	Negative power supply voltage	Power
2	VDD	Positive power supply voltage	Power
3	OUT_A	Analog Output	Analog Output
4	VCM_C	Common mode voltage	Reference Voltage*
5	DATA_IO	Data input/output for SPI	Digital Input/Output
6	CONT	Control Pin for SPI	Digital Input
7	SCLK_IO	Clock input/output for SPI	Digital Input/Output
8	VSAM	Valid sample	Digital Output
9	CLK_1MHZ	Master clock	Digital Input

*) Connect via 100 nF to VSS

Thermopile Array With Lens Optics
Type HTPA 8x8 L5.5/1.0 Hi S
Type HTPA 8x8 L5.5/1.0 S

Optical Orientation of Pixels:



Internal Register Map 8x8:

Num	Name	Function	Notes
0	R	Reset	1: Mux-Pixel-Counter on reset
'(2:1)	OPCTL(1:0)	Selection of operating point Reference choice at SCLP	00: VrefN 01: CM 10: VrefP
'(9:3)	MA(6:0)	Adress for static pixel selection	
10	AIM	Adress Increment Mode	0: adress = MA 1: auto adress inrement
11	AMP	Amplification	1: high amplification
14	SDL	SCLK Divider Low	different clock dividers for operating SCLK SCLK = MCLK / 2, 4, 8
15	SDH	SCLK Divider High	

Characteristics:

Common Specifications:

- Number of Thermocouples 80
- Technology n-poly/p-poly Si
- Element Resistance approx. 80 kOhms
- Sensitivity approx. 75 V/W without optics and filter
- Thermal Pixeltime 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 2640x / 7920 x
- Pitch 300 μm
- Absorber size 220 μm
- Max. Framerate 100 Hz
(without Averaging)
- 4 internal Amps + MUX
- 64 sensitive elements

Optical characteristics:

- Focal length: 5.5 mm ("L" equals the focal length of the lens)
- F-Number: 1.0
- Field of view: 24.6°
- 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 _{CC} +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
Operating Frequency	f _{OP}	CLK_1MHz	100k	1M	TBD	Hz

PTAT

Temperature range			0		85	Deg. C
PTAT value@ -20°C				TBD		V
PTAT value@100°C				TBD		V

Signal Processing

First amplifier stage gain	G0		TBD	880	TBD	V/V
Second amplifier stage gain	G1	AMPL=0	TBD	3	TBD	V/V
Second amplifier stage gain	G1	AMPL=1	TBD	9	TBD	V/V
Analog path Output ripple	V _{PPSENS}	CLK_1MHz	65	91	120	mV
Temp. coefficient Thermopile path output voltage	TCO _{OUTA}		TBD	-	TBD	mV/K

VoltageReference

VREF_1225	V _{REF}	V _{CC} =5V, T _{amb} =25°C	1.2	1.225	1.25	V
Temp. coeff. of V _{REF}	TC _{REF}		35	100	156	ppm/K

Electrical Characteristics (continued)

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

Analog Output

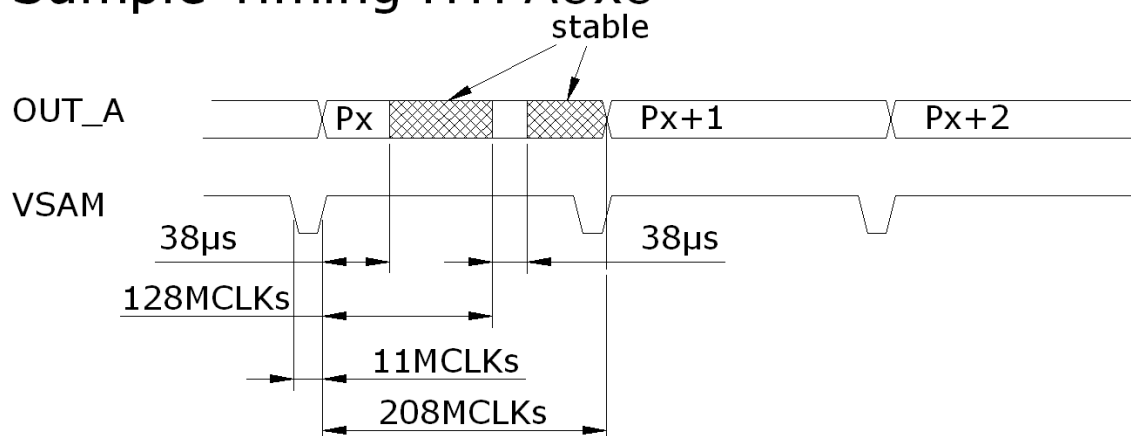
Output voltage swing	V_{OUTA}	load 10kOhm	0.5		$V_{CC}-0.8$	V
Power supply rejection ratio	P_{SRR}	AMPL=0 VDD<5V	-16			dB
Output current limit	I_{OUTA}	OUT_A	0.15			mA

General Parameters

Overall current consumption	I_{DD}	CLK_1MHz=1MHz 25° C	4.5	4.8	5.3	mA
Start up time	T_{POR}	Power On to first VSAM transition			805	cycles

Timings HTPA8x8:

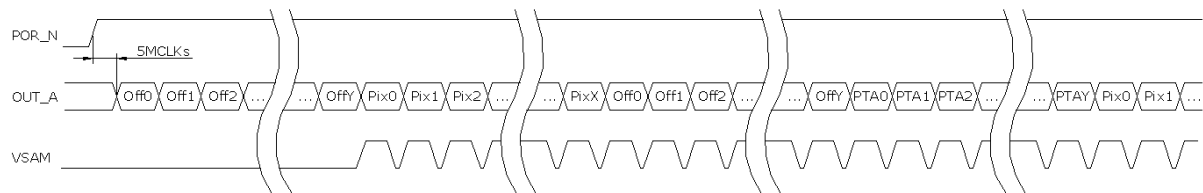
Sample Timing HTPA8x8



For the HTPA 8x8 every analogous voltage has 2 stable domains, as shown above.

Serial Transmission:

HTPA8x8 Serial Transmission of analogue data



Off0...OffY	Electric offset of amplifier 0 to amplifier Y
Pix0...PixX	Amplified pixel voltage of Pixel0 to PixelX
PTA0...PTAY	PTAT-Signal

Constants for array types:

Type 8x8:

Y=3

X=63

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.

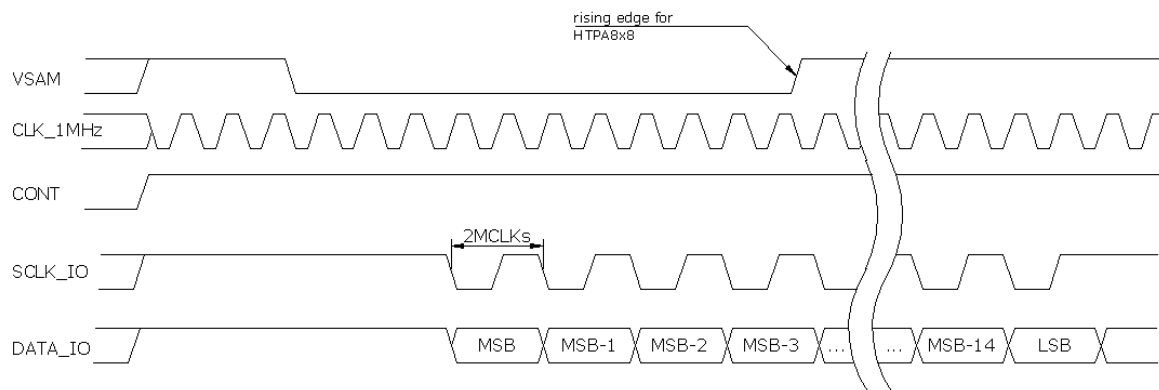
HTPA8x8:

The four MSB's signify the row address of the current pixel, the other bits describe the ADC-result. The ADC result has a large offset and therefore is not accurate. However, it might be used for movement detection or other applications, which not require absolute temperature measurements.

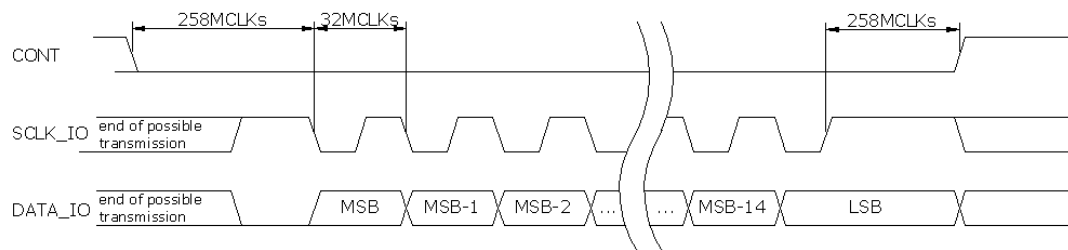
The output drivers for SCLK_IO and DATA_IO are enabled by CONT.

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

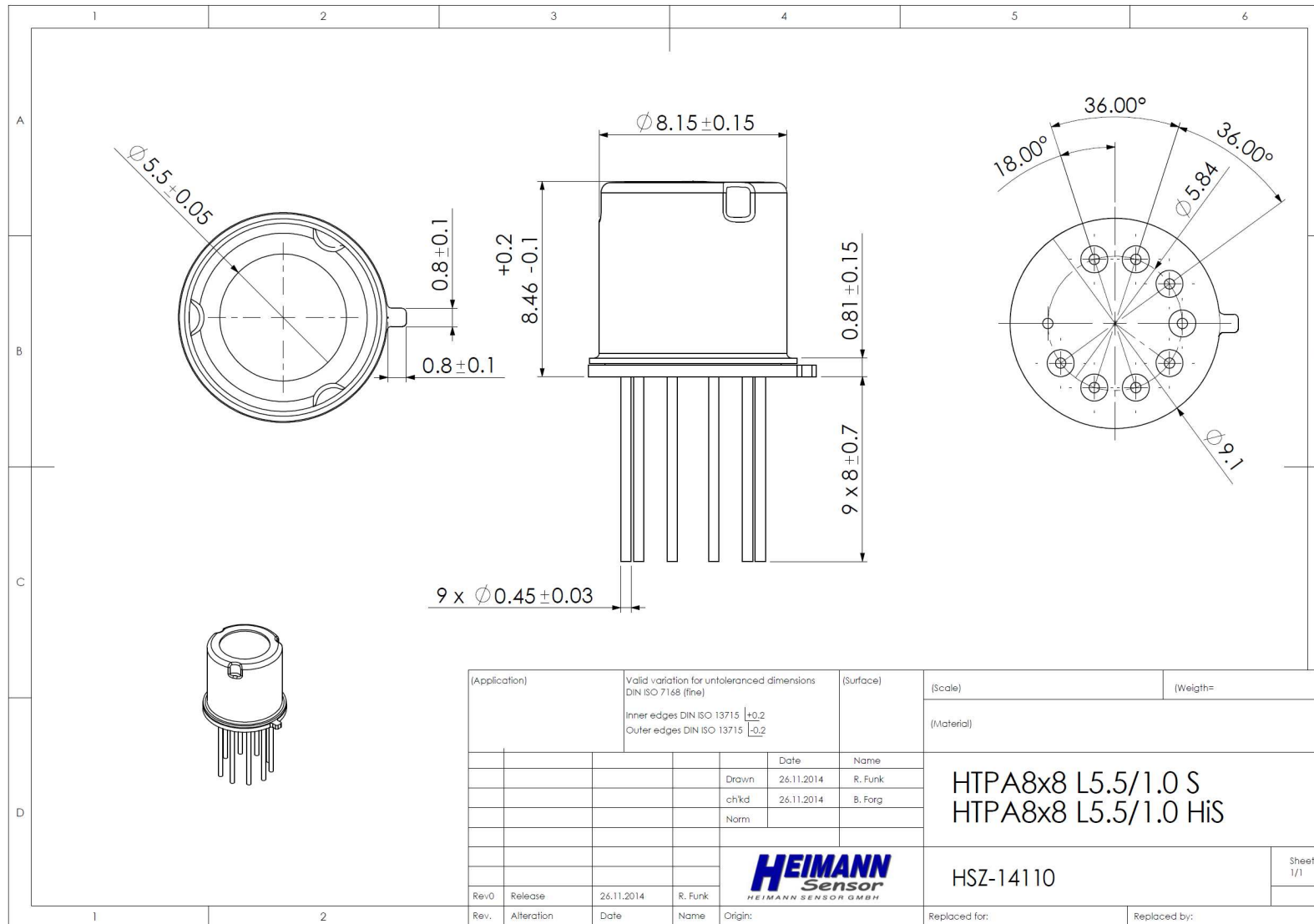


Serial Write to ASIC



Thermopile Array With Lens Optics
 Type HTPA 8x8 L5.5/1.0 Hi S
 Type HTPA 8x8 L5.5/1.0 S

Dimensions:



HEIMANN Sensor GmbH
 Maria-Reiche-Str. 1
 D-01109 Dresden / Germany

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