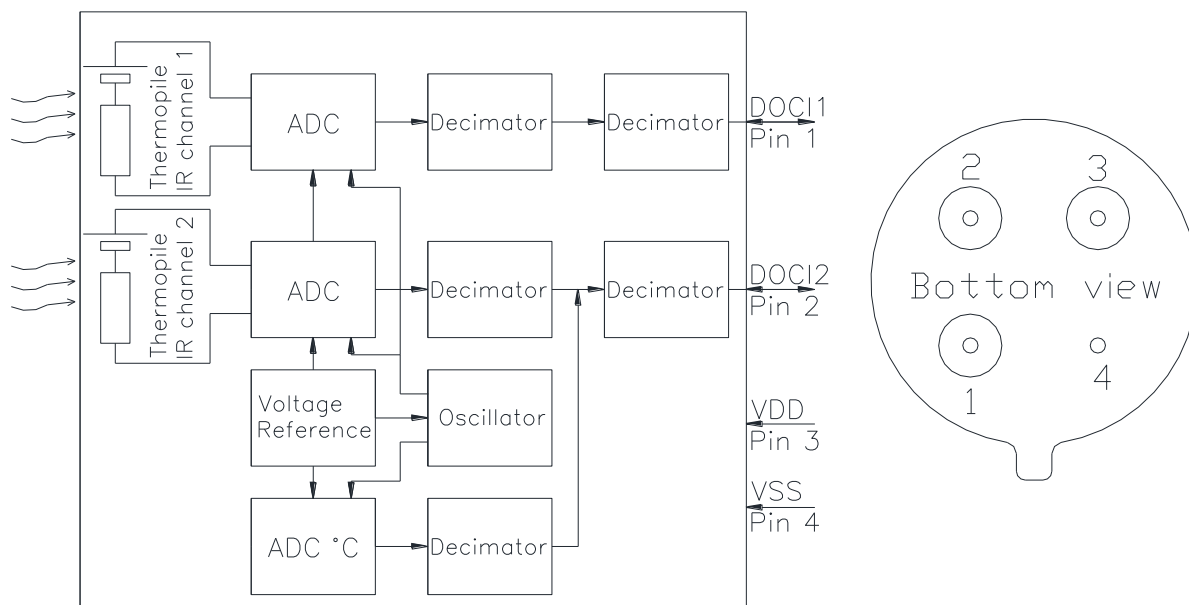


Features and Benefits

- two-channel NDIR gas detection with thermopile sensor and integrated ASIC for signal processing
- 17 bit digital thermopile value and on chip temperature reference on digital output DOCI
- Operating range 2.4V to 3.6V , -20°C to 70°C
- Low current consumption below 30µA

Functional Description



The output signal from the ADC is converted to a 17 bit value by down sampling to $F_{clk}/32$. The on chip temperature is measured by converting the temperature dependent voltage of the reference to a digital value with a resolution of 0.01K.

Data is transferred to the serial interface whenever new data is available and the DOCI output is not active (being read) or at "H" level. If the micro controller reads the register faster than the update rate of the filter, the data read is "0". The start of a read cycle is indicated by the sensor by pulling DOCI high.

The microcontroller generates a low to high transition on the DOCI line, before it samples the data bit. The first bit read is the MSB. This process is repeated until all 31 bits have been read. After the last bit is read, the microcontroller must force low level and subsequently release DOCI. When a new ADC value is generated, the sensor will pull the DOCI line high and a new data byte can be read.

If reading is interrupted for more than 1 system clock with the DOCI interface at low level, the output data latch is updated with new values. Reading can be interrupted, while the DOCI interface is forced high. The output latch is not updated in this condition.

As there is a new filter value available every 32 system clock cycles, the device accepts shorter readout cycles (TREP). To make use of this feature, the microcontroller must force an "H" level on the DOCI line for at least 2 clock cycles (t_S). Thereafter, it can read out the data bits as usual.

The DOCI line must be at "L" level for at least 2 system clock cycles to ensure, that the interface is loaded with new data.

A synchronized or uniform reading is recommended to achieve optimum signal to noise ratio.

Absolute Maximum Ratings

Parameter	Min to Max Value	Unit	Condition
Supply voltage	-0.3 tp +3.6	V	
Current into any pin	-100 to 100	mA	One pin at a time
Storage temperature	-45 to +125	°C	

Operating Conditions / Electrical Characteristics (Ta=25°C, unless otherwise stated)

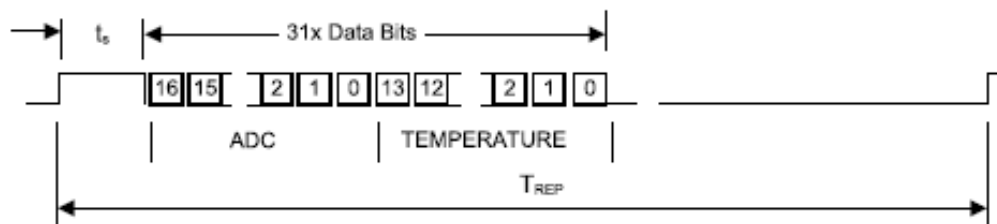
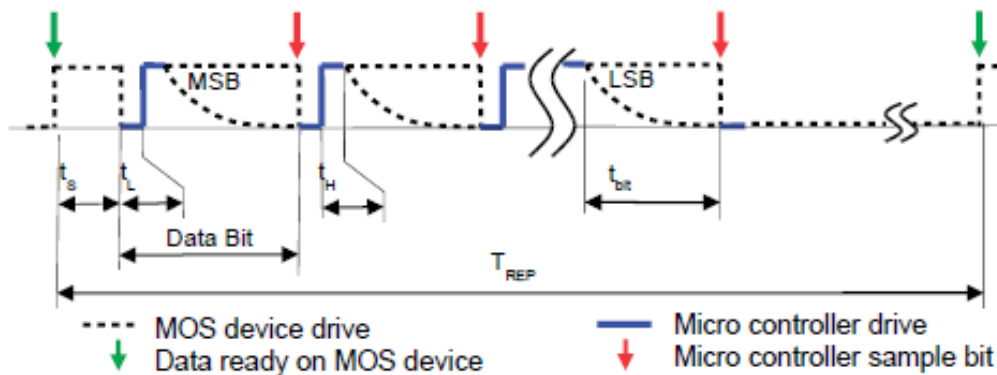
Parameter	Typical Value	Unit	Condition
Absorbing area	1.2 x 1.2	mm ²	TP chip
Sensitivity IR channel 1 (DOCI1)	57	counts/K	at ToBB=500°C, Ta=25°C, Filter F3.91-90 + Sapphire
Sensitivity IR channel 2 (DOCI2)	90	counts/K	at ToBB=500°C, Ta=25°C Filter F4.26-180 + Sapphire
Output noise	2	counts	RMS ; 8Hz ; Ta=25°C
ADC offset	64500	counts	IR channel at To=Ta
Time constant	8	Ms	TP chip
Operating voltage V _{DD}	2.4 .. 3.6	V	+Vs
Supply voltage V _{SS}	0	V	-Vs , Ground
Supply current	16 .. 30	µA	At V _{DD} =3V
ADC resolution	17	bit	Thermopile
ADC resolution	14	bit	Temperature reference
ADC sensitivity	0.7 .. 0.9	µV/count	
Sensitivity temp. reference	90	counts/K	Linear
Linearity temp. reference	+/-5	%	
Count at Ta=25°C	8400	counts	typical at Ta=25°C
Low pass cut off frequency	8	Hz	LPF 2nd order
Data refreshing	15	ms	typical
Internal clock frequency	35	kHz	typical
Input low voltage	0.2 VDD	V	
Input high voltage	0.8 VDD	V	
Pull down current	200	µA	
Pull up current	130	µA	
Operating temperature	-20 .. 70	°C	Storage -40..100°C

The electrical parameters may vary from specified values accordance with their temperature dependence.

Digital 1-wire Interface DOCI

VDD+3.3V, T_{OP}=+25°C

Parameter	Symb	Min	Typ	Max	Unit	Condition
Input low voltage	V _{IL}			20	%V _{DD}	
Input high voltage	V _{IH}	80			%V _{DD}	
Pull down current			200		µA	IN/OUT to V _{DD}
Pull up current			130		µA	IN/OUT to V _{DD}
Input capacitance			5		pF	
Data setup time	t _S	2			1/F _{CLK}	
Data clock low time	t _L	200			ns	
Data clock high time	t _H	200			ns	
Data bit settling time	t _{bit}	1			µs	C _{LOAD} =10pF
Serial interface update time	T _{UP}		915		µs	
Serial interface interrupt time	T _{REP}		15		ms	
DOCI low time to avoid update	t _L +t _{bit}			1/F _{CLK}		
Internal clock frequency	F _{CLK}		35		kHz	
Temperature dependency F _{CLK}		-1000		1000	ppm/K	-20°C to +80°C



Filter Selection

Standard Filter		
<i>Filter Type</i>	<i>Application</i>	<i>Specification</i>
F4.26-180	CO2 gas detection	NBP CWL 4.26µm HPB 180nm
F4.30-110	CO2 gas detection	NBP CWL 4.30µm HPB 110nm
F4.43-60	CO2 gas detection	NBP CWL 4.43µm HPB 60nm
F4.64-180	CO gas detection	NBP CWL 4.64µm HPB 180nm
F3.30-160	HC gas detection	NBP CWL 3.30µm HPB 160nm
F3.37-190	HC gas detection	NBP CWL 3.375µm HPB 190nm
F3.91-90	gas reference	NBP CWL 3.91µm HPB 90nm
F5.30-180	NOx gas detection	NBP CWL 5.30µm HPB 180nm

Please contact Heimann customer service for special filter requirements.

Ordering Information

HID E226 F3.91-90 F4.26-180

Filter IR channel 1: F3.91-90

Filter IR channel 2: F4.26-180

Handling Instructions

ESD and SEL Avoidance

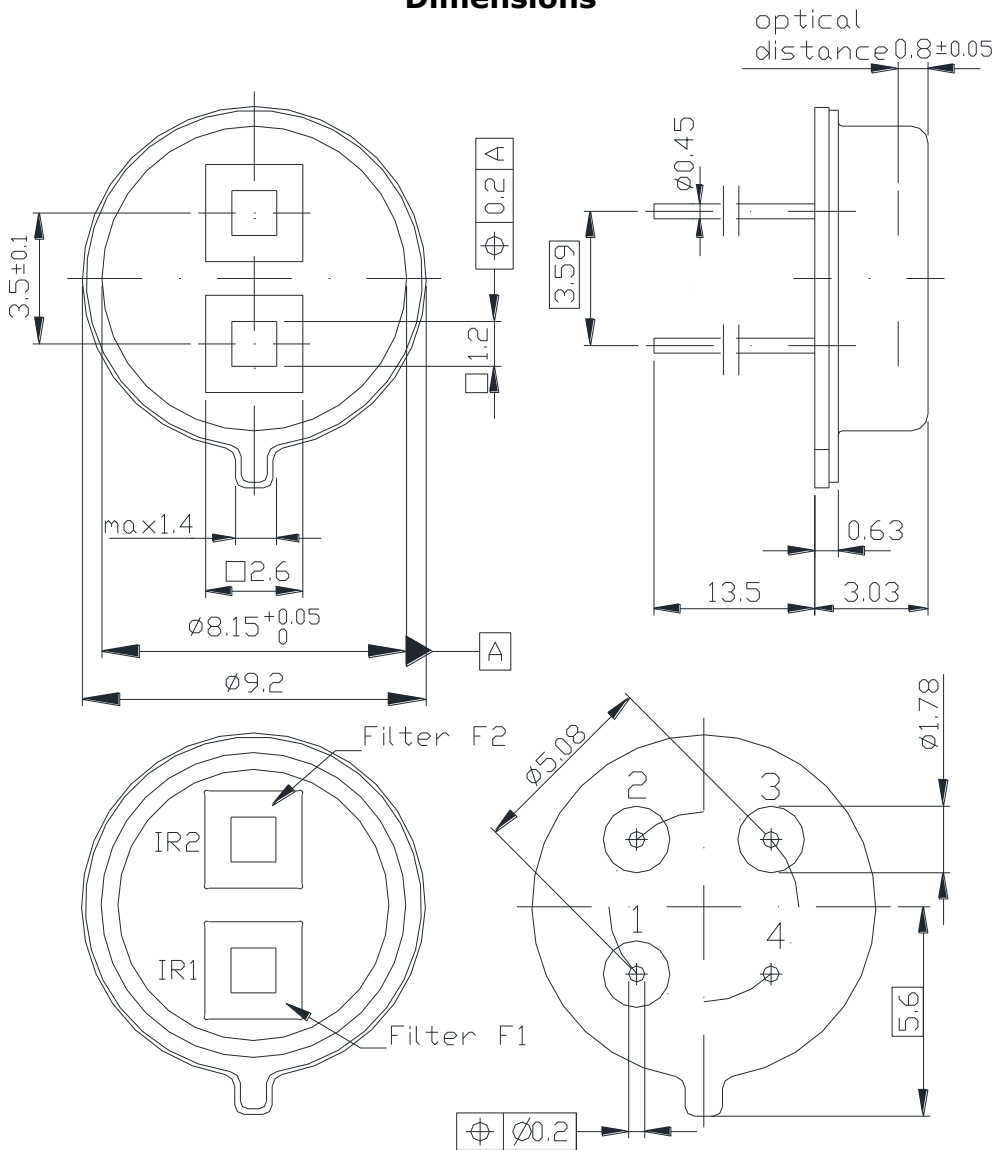
Integrated sensors can be damaged by electrostatic discharges and single event latch-up. Please take appropriate precautions for the handling to avoid such events. To prevent thermal damages by latch-up condition, no voltage greater than 0.3V beyond supply voltage should be applied to any pin. Supply voltages must be established before or at least at same time before any other connections are applied. Stresses above the absolute maximum ratings may cause damages to the device.

Cleaning and Soldering Advise

Do not expose the sensors to aggressive detergents. Windows may be cleaned with alcohol and cotton swab.

Wave soldering may be applied by a maximum temperature of 280°C for a dwell time less than 10s. Avoid solder exposure to the top and the window of the detector. For hand soldering the maximum applicable temperature is 350°C for a dwell time less than 3s. The minimum distance between the housing body and the liquid solder should be for 280°C at least 0.6mm and for 350°C at least 1.5mm.

Dimensions



Pin Assignment

Pin No	Symbol	Description
1	DOCI1	Data Out Clock In (IR1 + Tref)
2	DOCI2	Data Out Clock In (IR2 + Tref)
3	VDD	Positive supply voltage
4	VSS	Negative supply voltage / Ground (0V)

