



DATA SHEET
ULTRA-LOW POWER
INFRARED GAS SENSOR
MIPEX-05-B-RX-3.1
Ex version



Features

- ☑ Ultra-low power consumption. Average current consumption at constant measurement of concentration is less than 50 μ A.
- ☑ Smart sensor with embedded microcontroller returns linearized, temperature-compensated output data.
- ☑ LED based dual wavelength technology.
- ☑ Response time (T90) without dust filter 10 sec for methane, propane, ethane.
- ☑ Measurement range:
 - up to 100% vol. for methane (CH_4)
 - up to 2.5% vol. for propane (C_3H_8)
- ☑ Provides intrinsically safe explosion protection level "ia".
- ☑ Industry standard size ($\varnothing 20.3 \times 16.6$ mm).

Description

MIPEX-05 is intended for automatic continuous measurement of the concentration of hydrocarbons in atmosphere of hazardous areas.

Sensor operating principle is based on NDIR technology, i.e. on selective absorption of infrared radiation by gas molecules.

Differential dual wavelength method allows eliminating of water vapor, optical elements contamination and other non-selective hindrances influence.

Communication interface – UART.

Application

MIPEX-05 sensor is intended for using in a hazardous areas. Sensor is used as a OEM component for portable and fixed gas detectors for industrial safety.

Available part numbers

Part number	Sensor type	Calibration gas	Measurement range, % vol.	Temperature range, °C	RX-code
MIPEX-05-1-10-3.1	Black	CH ₄	0...5	-10...+40	10
MIPEX-05-1-20-3.1			0...100		20
MIPEX-05-1-11-3.1			0...5	-40...+60	11
MIPEX-05-1-21-3.1			0...100		21
MIPEX-05-1-12-3.1			0...5	-20...+50	12
MIPEX-05-1-22-3.1			0...100		22
MIPEX-05-1-13-3.1			0...5	-55...+60	13
MIPEX-05-1-23-3.1			0...100		23
MIPEX-05-2-71-3.1	White	C ₃ H ₈		-40...+60	71
MIPEX-05-2-72-3.1			0...2.5	-20...+50	72
MIPEX-05-2-73-3.1				-55...+60	73
MIPEX-05-4-10-3.1	Grey*	CH ₄	0...5	-10...+40	10
MIPEX-05-4-20-3.1			0...100		20
MIPEX-05-4-11-3.1			0...5	-40...+60	11
MIPEX-05-4-21-3.1			0...100		21
MIPEX-05-4-12-3.1			0...5	-20...+50	12
MIPEX-05-4-22-3.1			0...100		22
MIPEX-05-4-13-3.1			0...5	-55...+60	13
MIPEX-05-4-23-3.1			0...100		23

* The atmosphere of objects of group I in accordance with IEC 60079-29-1 section 5.4.24.2.

Technical specification

General specification		Measurement specification		
Gas sampling method:	Diffusion	Measurement range, % Vol **	0...2.5 (C ₃ H ₈)	
Operating principle:	Non-Dispersive Infra-Red (NDIR)		0...5 (CH ₄)	
Sensor type	Black		0...100 (CH ₄)	
	White	Accuracy (+20...+25 °C)***	± 0.1% vol. or ± 5% of readings (whichever is greater) for CH ₄	
	Grey		± 0.05% vol. or ± 5% of readings (whichever is greater) for C ₃ H ₈	
Operating, storage and transportation conditions:	Relative humidity, %	up to 98	Response time (T90), sec	
	Atmospheric pressure, kPa	80...120		without dust filter 10
	Temperature*, °C	-55...+70		with dust filter attached 20
Warm-up time, sec	≤ 120			
MTBF, years	≥ 5			
Level IP	without filter 20	Electrical specification		
	with dust filter 54			
Housing material	Polycarbonate Lexan™	Operating supply voltage, VDC	+2.2...+5.0	
Overall dimensions, mm	∅20.3×16.6 (w/o pins)	Maximum supply voltage, VDC	+5.5	
Max weight, g	7.5	Communication interface	UART	
		Average current, µA	50****	
		Peak current, mA	4 max	

* Term operating temperature refers to ambient temperature at which sensor operates and its intrinsic safety is ensured, but sensor accuracy is provided only in specified temperature range determined by RX-code (see Ordering info).

** Variability in whole operating measurement range for any sensor modification is presented below.

*** Variability in whole operating temperature range for any sensor modification is presented below.

**** Average current consumption at constant measurement of concentration is less than 50 µA, when sending the command <@> of user manual (ESAT.100500.00 UM) no more than 1.32 ± 0.04 seconds.

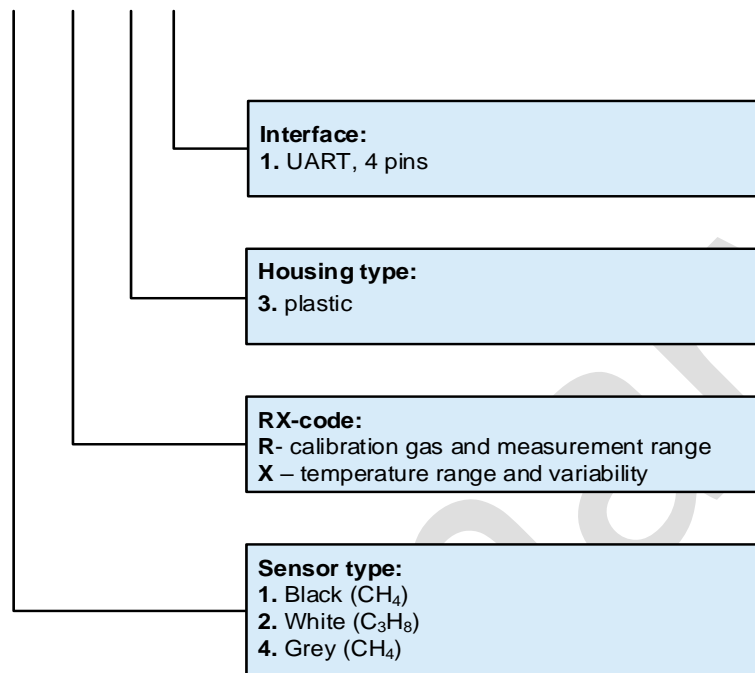
Readings variability

Calibration gas	Readings variability within a temperature range	Additional variability due to pressure	Additional variability due to humidity
CH ₄	± 0.1% vol. or ± 5% of readings (whichever is greater) within the range of +20...+25 °C;	± 0.2% vol. or ± 30% of readings (whichever is greater) at 100 kPa (test: 80 kPa, 100 kPa, 120 kPa)	± 0.2% vol. or ± 15% of readings (whichever is greater) at 40 °C (test: 20% RH, 50% RH, 90% RH)
	± 0.2% vol. or ± 10% of readings (whichever is greater) within the range of -10...+20 °C and +25...+40 °C;		
	± 0.4% vol. or ± 20% of readings (whichever is greater) within the range of -40...-10 °C and +40...+60 °C.		
	± 0.6% vol. or ± 30% of readings (whichever is greater) within the range of -55...-40 °C		
C ₃ H ₈	± 0.05% vol. or ± 5% of readings (whichever is greater) within the range of +20...+25 °C;	± 0.1% vol. or ± 30% of readings (whichever is greater) at 100 kPa (test: 80 kPa, 100 kPa, 120 kPa)	± 0.1% vol. or ± 15% of readings (whichever is greater) at 40 °C (test: 20% RH, 50% RH, 90% RH)
	± 0.1% vol. or ± 10% of readings (whichever is greater) within the range of -10...+20 °C and +25...+40 °C;		
	± 0.2% vol. or ± 20% of readings (whichever is greater) within the range of -40...-10°C and +40...+60 °C.		
	± 0.3% vol. or ± 30% of readings (whichever is greater) within the range of -55...-40°C		

Ordering info

Part number structure:

MIPEX-05-B-RX-D.E



Term “sensor type” refers to emitter and photodiode spectral range which is adjusted for best detection of a certain gas, while term “calibration gas” refers to gas mixture used for sensor calibration.

Intrinsic safety

Sensor is designed in accordance with standards:

IEC/EN 60079-0 and IEC/EN 60079-11:

- Explosion protection level – “ia”;
- Hazardous area class (Electrical equipment group) – “I” and “IIC”;
- Intrinsic safety parameters: $P_i = 0.25 \text{ W}$, $U_i = 5.5 \text{ V}$, $I_i = 450 \text{ mA}$, $C_i = 38.8 \mu\text{F}$, $L_i = 0 \text{ mH}$.

UL913, CAN/CSA-C22.2 No. 60079-11:2014:

- Class I, Division 1, Group A, B, C, D.
- Intrinsic safety parameters: $P_{\max} = 0.25 \text{ W}$, $U_{\max} = 5.5 \text{ V}$, $I_{\max} = 450 \text{ mA}$, $C_i = 38.8 \mu\text{F}$, $L_i = 0 \text{ mH}$.

IEC/EN 60079-28:

- MIPEX-05's optical radiation power is less than 15 mW.

Certificates / Declarations of conformity

- IECEx Quality Assessment Report – IEC 80079-34:2018;
- ATEX Quality Assurance Notification – 2014/34/EU;
- RoHS 2 Compliant – Directive 2011/65/EU;
- RoHS 3 Compliant – EU Directive 2015/863.

Handling precautions

Maximum allowable pressure on the central part of sensor reflecting cover and on side surface sensor – 20 kPa, on sensor upper edge – 2 MPa.

Sensor is not intended to measure carbon dioxide contained in fluids.

Keep sensor out of contact with aggressive substances e.g. acidic environments, which can react with metals, as well as solvents, which may affect polymeric materials.

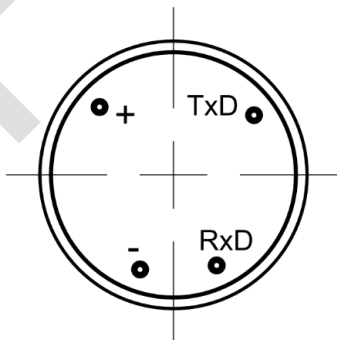
Diffusion holes of sensor should be protected against ingress of dust and sprayed materials.

Covering diffusion holes of sensor increases its response time.

Sensor must be mounted using sockets only, as soldering the pins may damage sensor.

There is no risk of pollution and negative impact on human health. Sensor does not contain any harmful substances that may be released during its normal operation.

Sensor pinout (bottom side)

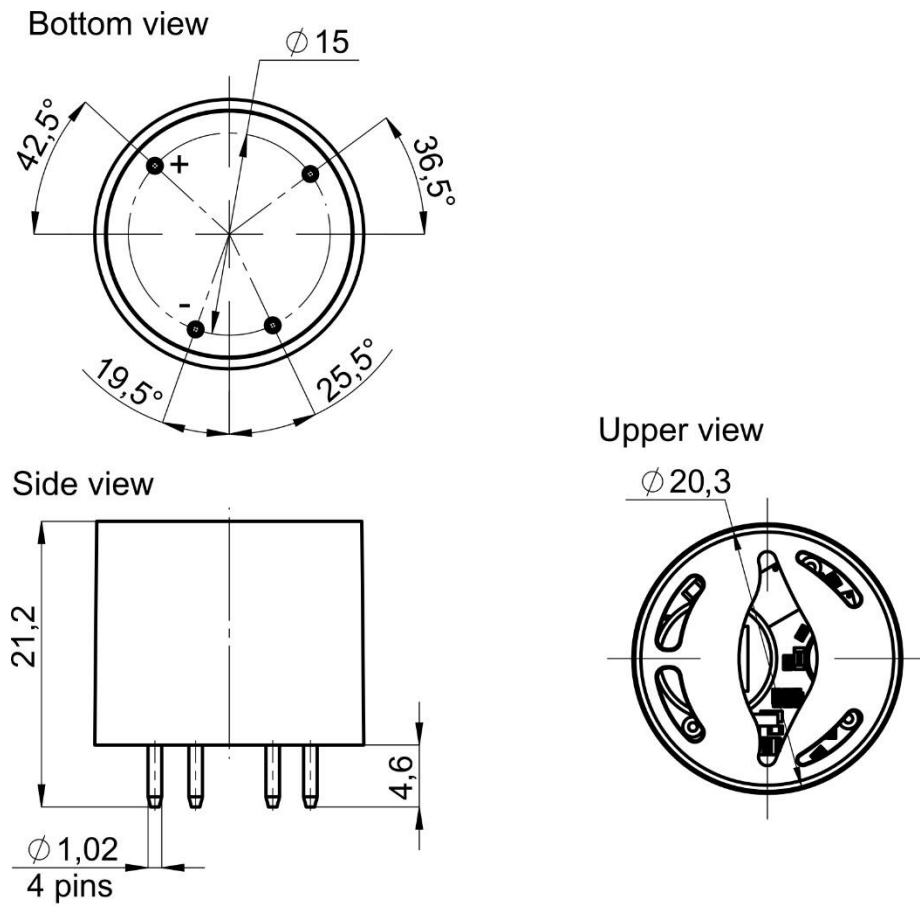


Pin	Purpose
TxD	UART, TxD output
RxD	UART, RxD input
+	V_{dd}
-	GND

- $V_{dd} = +2.2 \dots 5.0 \text{ VDC}$;
- High logic level for transmitting line TxD and receiving line RxD corresponds to V_{dd} .

Outline

All dimensions are in millimeters.



Contacts

MIPEX TECHNOLOGY

SIA MIPEX

2B, Valkas iela, Daugavpils, Latvia, 5417

Tel/fax: [+371 26179021](tel:+37126179021)

web: www.mipex-tech.com

e-mail: info@mipex-tech.com

support: support@mipex-tech.com