



DATA SHEET

ULTRA-LOW POWER INFRARED GAS SENSOR MIPEX-05-B-RX-3.3

Ex version



Features

- ☑ Ultra-low power consumption. Average current consumption at constant measurement of concentration is less than 60 μ A.
- ☑ Smart sensor with embedded microcontroller returns linearized, temperature-compensated output data.
- ☑ LED based dual wavelength technology.
- ☑ Response time (T90) without dust filter 15 sec for methane, ethane and 25 sec for propane.
- ☑ Measurement range:
 - up to 100% vol. for methane (CH_4)
 - up to 20% vol. for propane (C_3H_8)
- ☑ Provides intrinsically safe explosion protection level "ia".
- ☑ Industry standard size ($\varnothing 20.1 \times 16.6$ 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.

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ULTRA-LOW POWER
INFRARED GAS SENSOR MIPEX-05-B-RX-3.3

Available part numbers

Part number	Calibration gas	Measurement range, % vol.	Temperature range, °C	RX-code
MIPEX-05-1-10-3.3	CH ₄	0...5	-10...+40	10
MIPEX-05-1-20-3.3		0...100		20
MIPEX-05-1-11-3.3		0...5	-40...+60	11
MIPEX-05-1-21-3.3		0...100		21
MIPEX-05-1-12-3.3		0...5	-20...+50	12
MIPEX-05-1-22-3.3		0...100		22
MIPEX-05-2-71-3.3	C ₃ H ₈	0...2.5	-40...+60	71
MIPEX-05-2-81-3.3		0...20		81
MIPEX-05-2-72-3.3		0...2.5	-20...+50	72
MIPEX-05-2-82-3.3		0...20		82
MIPEX-05-4-10-3.3	CH ₄ *	0...5	-10...+40	10
MIPEX-05-4-20-3.3		0...100		20
MIPEX-05-4-11-3.3		0...5	-40...+60	11
MIPEX-05-4-21-3.3		0...100		21
MIPEX-05-4-12-3.3		0...5	-20...+50	12
MIPEX-05-4-22-3.3		0...100		22

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

Technical specification

General specification		
Gas sampling method:		Diffusion
Operating principle:		Non-Dispersive Infra-Red (NDIR)
Target gas		CH ₄
		C ₃ H ₈
Operating, storage and transportation conditions:	Relative humidity, %	up to 98
	Atmospheric pressure, kPa	80...120
	Temperature*, °C	-60...+60
Warm-up time, sec		≤ 120
Lifetime, years		>10
Level IP		without filter 20
		with dust filter 54
Housing material		Polycarbonate Lexan™
Overall dimensions, mm		ø20.1×16.6 (w/o pins)
Max weight, g		7.5

Measurement specification	
Measurement range, % Vol **	0...2.5 (C ₃ H ₈)
	0...5 (CH ₄)
	0...20 (C ₃ H ₈)
	0...100 (CH ₄)
Accuracy (+20...+25 °C)***	± 0.1% vol. or ± 5% of readings (whichever is greater) for CH ₄
	± 0.05% vol. or ± 5% of readings (whichever is greater) for C ₃ H ₈
Response time (T90), sec	without dust filter 15 - CH ₄ , 25 - C ₃ H ₈
	with dust filter attached 25 - CH ₄ , 30 - C ₃ H ₈

Electrical specification	
Operating supply voltage, VDC	+2.7...+5.0
Maximum supply voltage, VDC	+5.4
Communication interface	UART
Average current, µA	60****
Peak current, mA	4 max

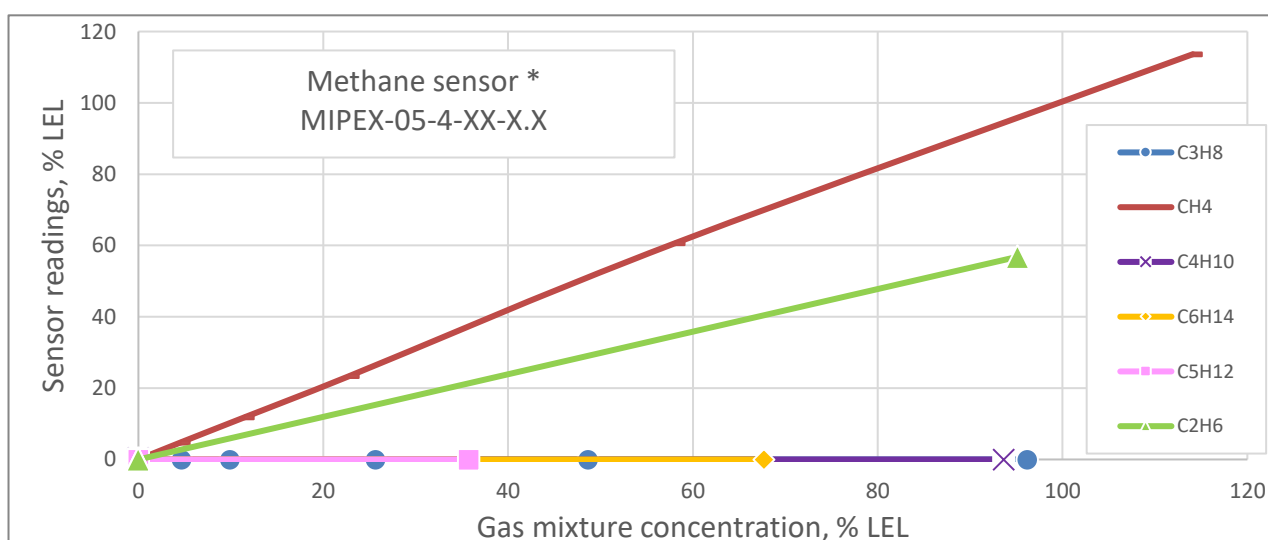
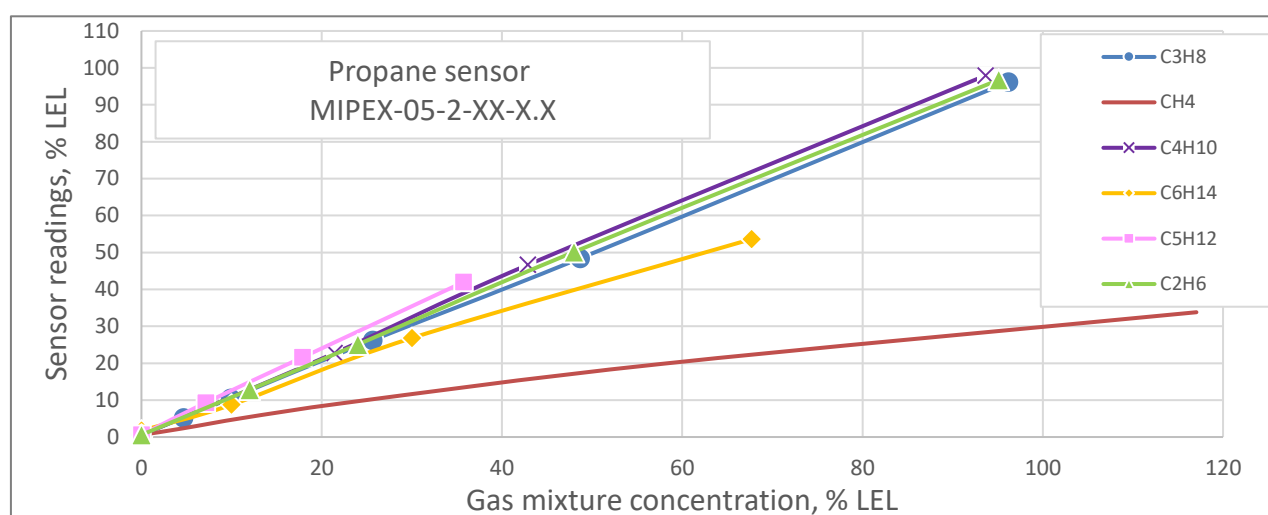
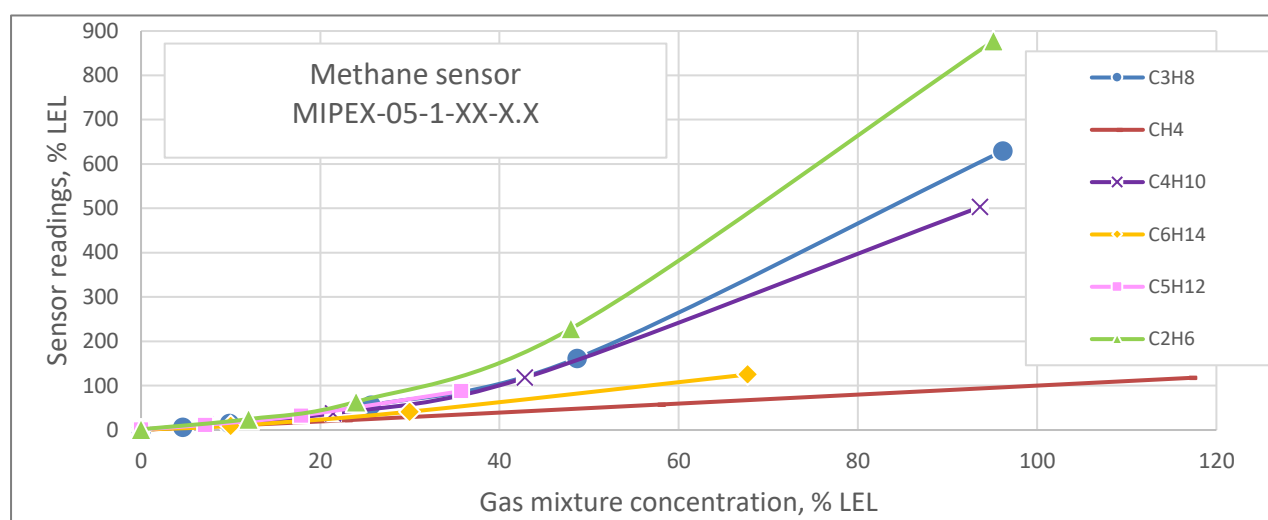
* Term operating temperature refers to ambient temperature at which sensor operates and its intrinsic safety is ensured, but sensor accuracy is provided only in specified temperature range determined by RX-code (see Ordering info).

** 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 60 µA, when sending the command <@> no more than 1.32 ± 0.04 seconds.

Typical sensor cross-sensitivity to hydrocarbons and accuracy



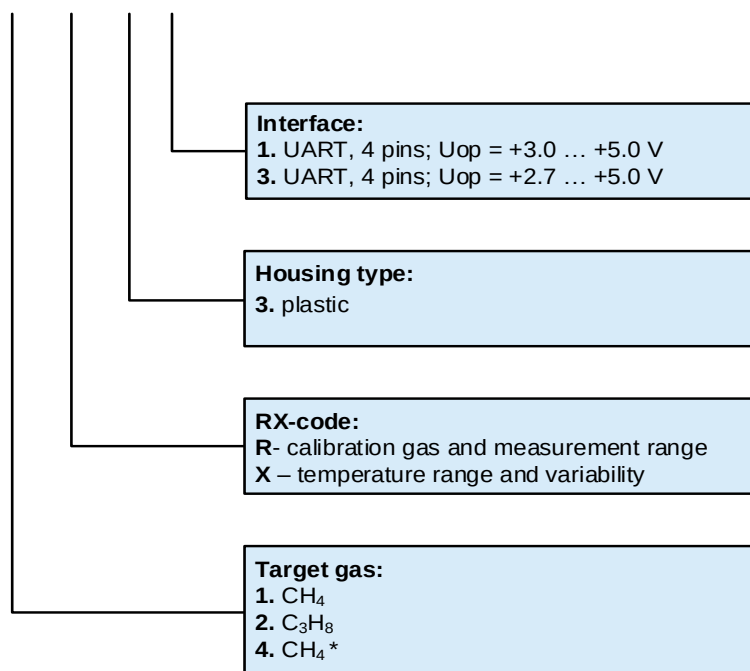
Readings variability

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)
	± 0.15% vol. or ± 10% of readings (whichever is greater) within the range of -10...+20 °C and +25...+40 °C;		
	± 0.3% vol. or ± 20% of readings (whichever is greater) within the range of -40...-10 °C and +40...+60 °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)
	± 0.075% vol. or ± 10% of readings (whichever is greater) within the range of -10...+20 °C and +25...+40 °C;		
	± 0.15% vol. or ± 20% of readings (whichever is greater) within the range of -40...-10 °C and +40...+60 °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.

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

Intrinsic safety

Sensor is designed in accordance with standards:

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

- Explosion protection level – “ia”;
- Hazardous area class (Electrical equipment group) – “I” and “IIC”;
- Intrinsic safety parameters: $P_i = 0.25 \text{ W}$, $U_i = 5.4 \text{ V}$, $I_i = 450 \text{ mA}$, $C_i = 60.1 \text{ }\mu\text{F}$, $L_i = 0 \text{ mH}$.

UL913, UL 60079-0, UL 60079-11, CSA C22.2 No. 60079-0, CSA C22.2 No. 60079-11:

- Class I, Division 1, Group A, B, C, D.
- Intrinsic safety parameters: $P_{\max} = 0.25 \text{ W}$, $U_{\max} = 5.4 \text{ V}$, $I_{\max} = 450 \text{ mA}$, $C_i = 60.1 \text{ }\mu\text{F}$, $L_i = 0 \text{ mH}$.

IEC/EN 60079-28:

- MIPEX-05's optical radiation power is less than 7 mW.

Certificates / Declarations of conformity

Scheduled to be received:

- IEC / EN IEC 60079-0
- IEC / EN 60079-11
- IEC / EN 60079-28
- UL 913
- UL 60079-0
- UL 60079-11
- UL 60079-28
- CSA C22.2 No. 60079-0
- CSA C22.2 No. 60079-11
- 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 – 4 N.

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.

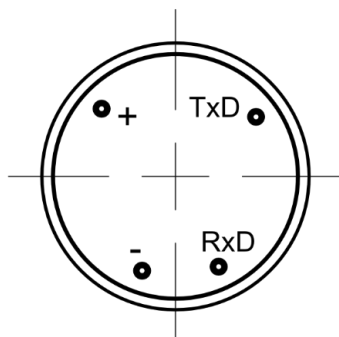
Diffusion holes of sensor should be protected against ingress of dust and sprayed materials.

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

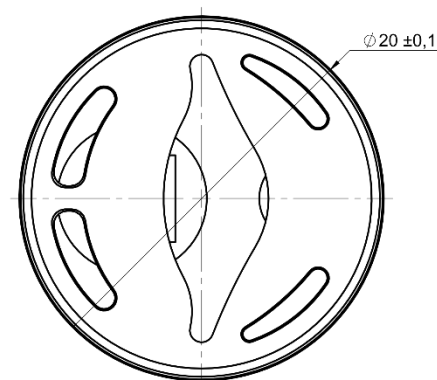
- $V_{dd} = +2.7 \dots 5.0$ VDC;
- High logic level for transmitting line TxD and receiving line RxD corresponds to V_{dd} .

Outline

All dimensions are in millimeters.

Technical drawing of the front view of a rectangular plate. The overall height is 16.6". The distance from the bottom edge to the center of the pin array is 4.6". The pin array consists of 4 pins, with a center-to-center distance of 1.02" between adjacent pins. The pins are arranged in two rows of two. The drawing includes a vertical centerline and a horizontal centerline.

Technical drawing of a circular part. The drawing shows a cross-section of a circular component with a central hole. The outer diameter is dimensioned as $\varnothing 20,1 \pm 0,1$. The inner hole has a diameter of $\varnothing 10,0 \pm 0,1$. The part has a central vertical slot and a horizontal slot. The drawing includes a center line and a dimension line with arrows pointing to the outer and inner diameters.



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