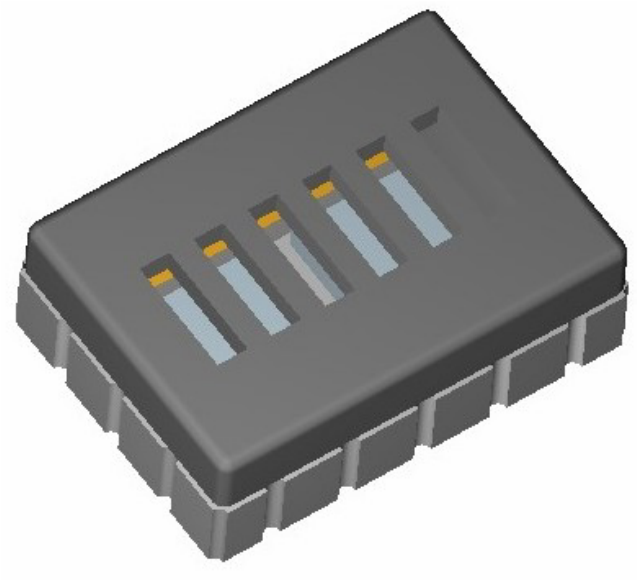
MiCS-2714
NO_2 Sensor

This datasheet describes the use of the MiCS-2714. The package and the mode of operation illustrated in this document target the detection of nitrogen dioxide (NO_2).



FEATURES

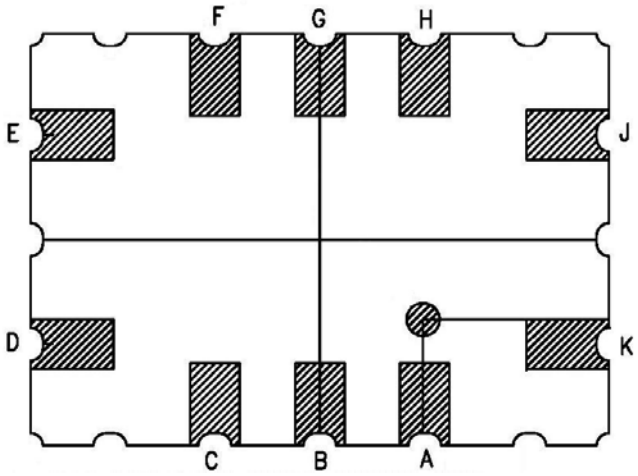
- Low heater current
- Wide detection range
- Wide temperature range
- High sensitivity
- Short pre-heating time
- ESD protection diodes
- SMD package with miniature dimensions
- High resistance to shocks and vibrations
- Compliant with automotive test requirements

SENSOR CONFIGURATION

The silicon gas sensor structure consists of an accurately micro machined diaphragm with an embedded heating resistor and the sensing layer on top.

The MiCS-2714 includes one sensor chip with independent heater and sensitive layer.

The internal connections are shown below.



Pin	Connection
A	Rh1
B	Rs1
C	
D	
E	
F	
G	
H	Rh2
J	Rs2
K	NC

Rs: sensor resistance
Rh: heater resistance

Figure 1: MiCS-2714 configuration (bottom view)

OPERATING MODE

The recommended mode of operation is a constant power on each sensor. The nominal power for the sensor is P_H = 43 mW. The resulting temperature of the sensing layer is about 220 °C, in air at approximately 20 °C.

Detection of the pollution gases is achieved by measuring the sensing resistance of the sensor. The sensor resistance increases in the presence of NO_2.

POWER CIRCUIT EXAMPLE

As shown below, one external load resistor can be used to power the heater with a single 5 V power supply.

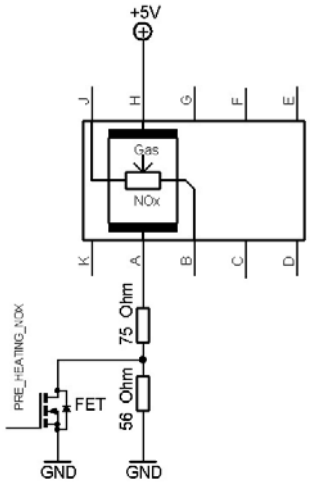


Figure 2: MiCS-2714 with recommended supply circuit (top view)

R is 131 Ω. This resistor is necessary to obtain the right temperature on the heater while using a single 5 V power supply. The resulting voltage is typically V_H = 1.7 V.

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MEASUREMENT CIRCUIT EXAMPLE

As shown below, the sensitive resistance shall be read by using a load resistor.

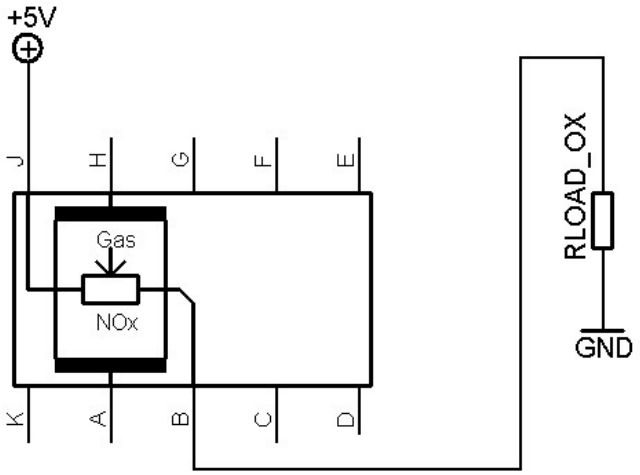


Figure 3: MiCS-2714 with measurement circuit (top view)

The voltage measured on the load resistor is directly linked to the resistance of the sensor.

IMPORTANT PRECAUTIONS

Read the following instructions carefully before using the MiCS-2714 described in this document to avoid erroneous readings and to prevent the device from permanent damage.

- The sensor must be reflow soldered in a neutral atmosphere, without soldering flux vapours.
- The sensor must not be exposed to high concentrations of organic solvents, ammonia, silicone vapour or cigarette-smoke in order to avoid poisoning the sensitive layer.
- Heater voltages above the specified maximum rating will destroy the sensor due to overheating.
- This sensor is to be placed in a filtered package that protects it against water and dust projections.
- For any additional questions, contact e2v.

OX SENSOR CHARACTERISTICS

The typical sensor response to NO_2 in air is represented in Figure 4. The sensor resistance R_S is normalised to the resistance under air (R_0).

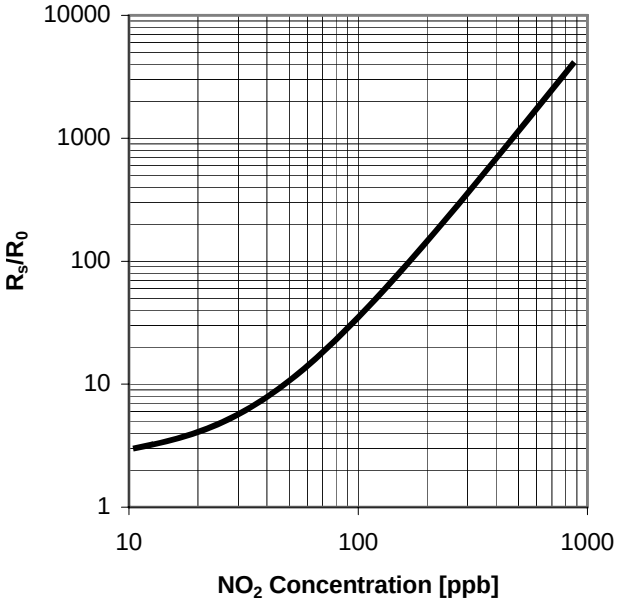


Figure 4: R_S/R_0 as a function of NO_2 concentration at 40% RH and 25 °C, measured on an engineering test bench

ELECTRICAL CHARACTERISTICS

Rating	Symbol	Value/Range		Unit
Maximum heater power dissipation	P_H	50		mW
Relative humidity range	R_H	5	95	%RH
Ambient operating temperature	T_{amb}	-30	85	°C
Storage temperature range	T_{sto}	-40	120	°C
Storage humidity range	RH_{sto}	5	95	%RH

OPERATING CONDITIONS

Parameter	Symbol	Typ	Min	Max	Unit
Heating power	P_H	83	30	50	mW
Heating voltage	V_H	1.7	-	-	V
Heating current	I_H	26	-	-	mA
Heating resistance at nominal power	R_H	66	59	73	Ω

SENSITIVITY CHARACTERISTICS

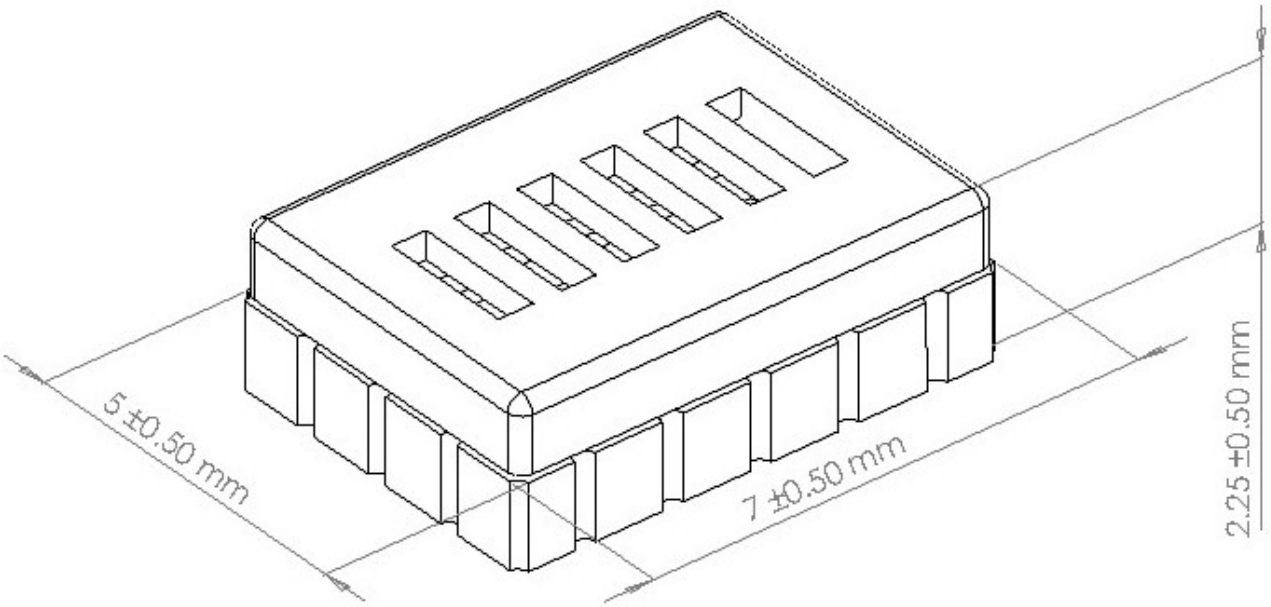
Characteristic	Symbol	Typ	Min	Max	Unit
NO_2 detection range	FS		0.05	5	ppm
Sensing resistance in air (see note 1)	R_0	-	0.8	8	kΩ
Sensitivity factor (see note 2)	S_R	55	6	100	-

Notes:

1. Sensing resistance in air R_0 is measured under controlled ambient conditions, i.e. synthetic air at 23 ± 5 °C and ≤5% RH. Indicative values only.
2. Sensitivity factor S_R is defined as R_S at 0.25 ppm of NO_2, divided by R_S in air. Test conditions are 23 ± 5°C and ≤5 ± 5% RH. Indicative values only.

PACKAGE OUTLINE DIMENSIONS

The package is compatible with SMD assembly process.



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