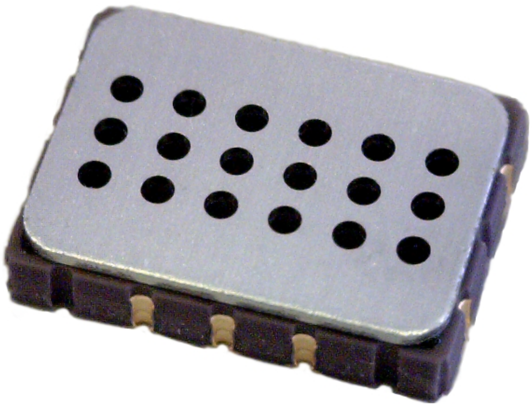
MiCS-5914
NH3 Sensor

This datasheet describes the use of the MiCS-5914. The package and the mode of operation illustrated in this document target the detection of ammonia (NH_3).



FEATURES

- Low heater current
- Wide detection range
- Wide temperature range
- High sensitivity
- Miniature dimensions
- High resistance to shocks and vibrations

OPERATING MODE

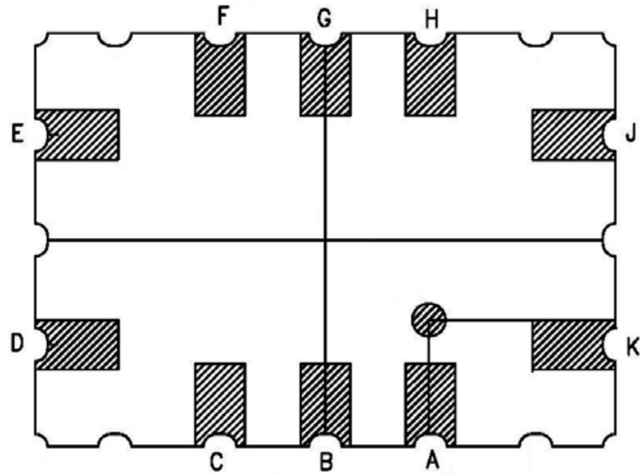
The recommended mode of operation is constant power. The nominal power is P_H = 66 mW. The resulting temperature of the sensing layer is about 320 °C, in air at approximately 20 °C.

Detection of the pollution gases is achieved by measuring the sensing resistance of the sensor. The resistance decreases in the presence of NH3.

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 internal connections are shown below.



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

Rs: sensor resistance
Rh: heater resistance

Figure 1: MiCS-5914 configuration (bottom view)

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POWER CIRCUIT EXAMPLE

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

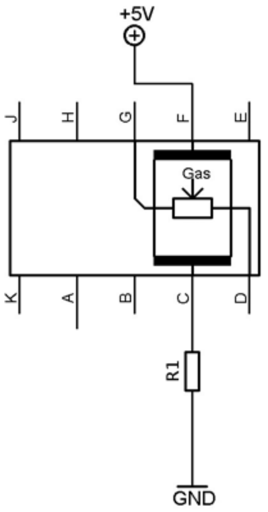


Figure 2: MiCS-5914 with recommended supply circuit (top view)

R1 is typically a E96 resistor at 93.1 Ω. This resistor is necessary to obtain the right temperature on the heater while using a single 5 V power supply. The resulting voltages is typically VH = 2.2 V.

SENSOR CHARACTERISTICS

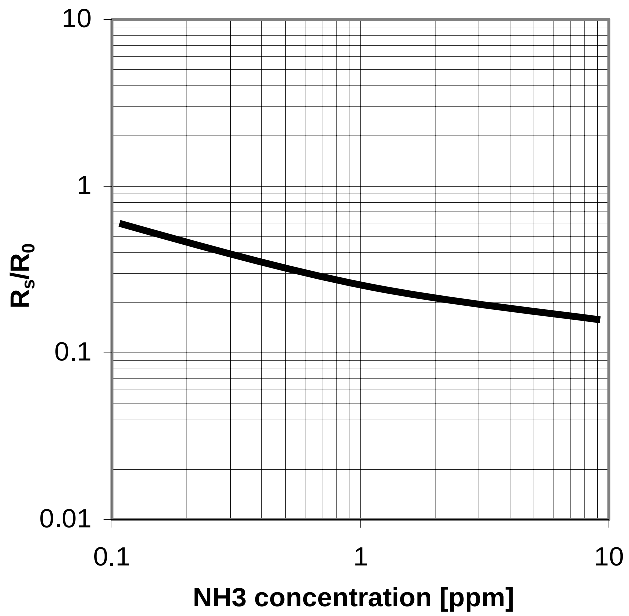


Figure 4: R_s/R_0 as a function of NH3 concentration at 40% RH and 25 °C, measured on an engineering test bench

MEASUREMENT CIRCUIT EXAMPLE

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

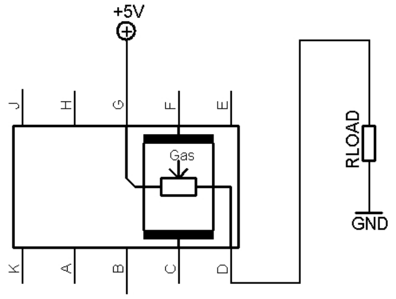


Figure 3: MiCS-5914 with measurement circuit (top view)

The voltage measured on the load resistor is directly linked to the resistance of the sensor. RLOAD must be 820 Ω at the lowest in order not to damage the sensitive layer.

ELECTRICAL CHARACTERISTICS

Rating	Symbol	Value/Range	Unit
Maximum heater power dissipation	P_H	88	mW
Maximum sensitive layer power dissipation	P_S	8	mW
Voltage supply	V_{supply}	4.9 / 5.1	V
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	66	60	73	mW
Heating voltage	V_H	2.2	-	-	V
Heating current	I_H	30	-	-	mA
Heating resistance at nominal power	R_H	72	64	80	Ω

SENSITIVITY CHARACTERISTICS

Characteristic	Symbol	Typ	Min	Max	Unit
NH3 detection range	FS		0.1	100	ppm
Sensing resistance in air (see note 1)	R_0	-	10	1500	kΩ
Sensitivity NH3 1 ppm (see note 2)	S_1	-	1.5	15	-

Notes:

1. Sensing resistance in air R_0 is measured under controlled ambient conditions, i.e. synthetic air at 23 ± 5 °C and 50 ± 10%. Sampling test.

2. Sensitivity NH3 1 ppm is defined as R_S in air (R_0) divided by R_S at 1 ppm NH3. Test conditions are 23 ± 5 °C and 50 ± 10% RH. Indicative values only, sampling test.

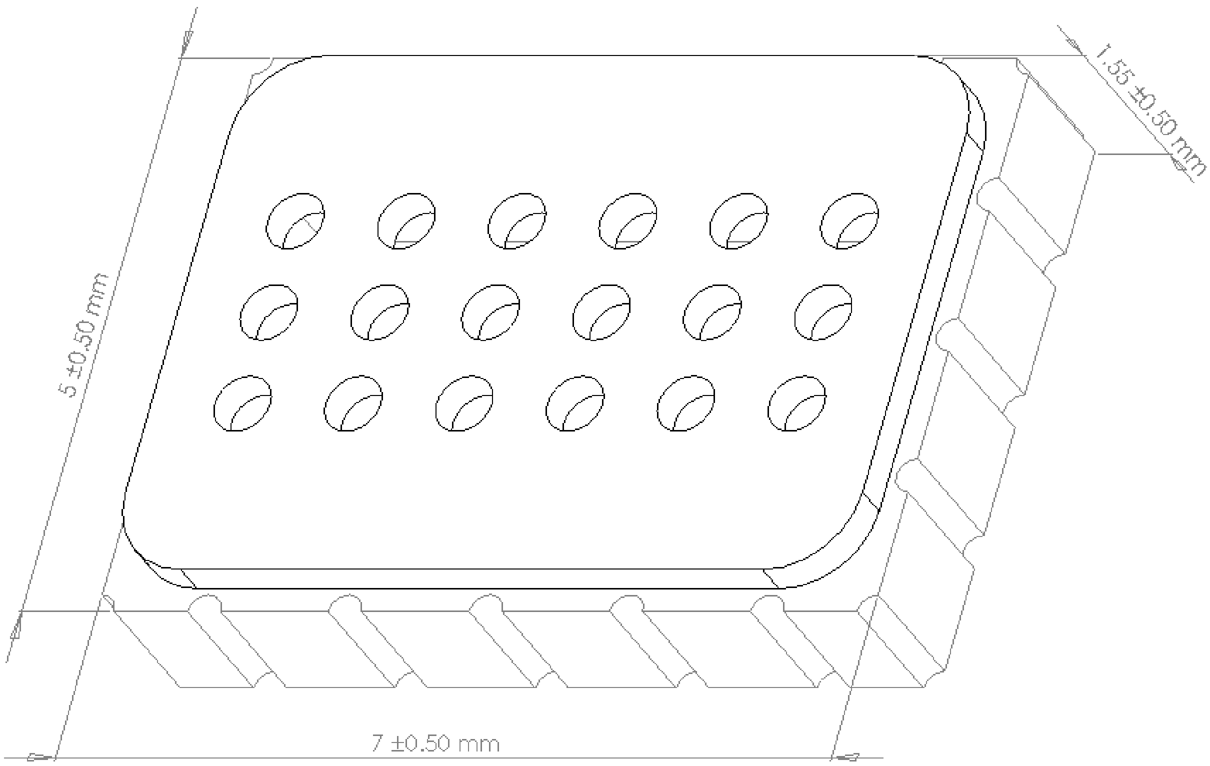
IMPORTANT PRECAUTIONS

Read the following instructions carefully before using the MiCS-5914 described in this document to avoid erroneous readings and to prevent the device from permanent damage.

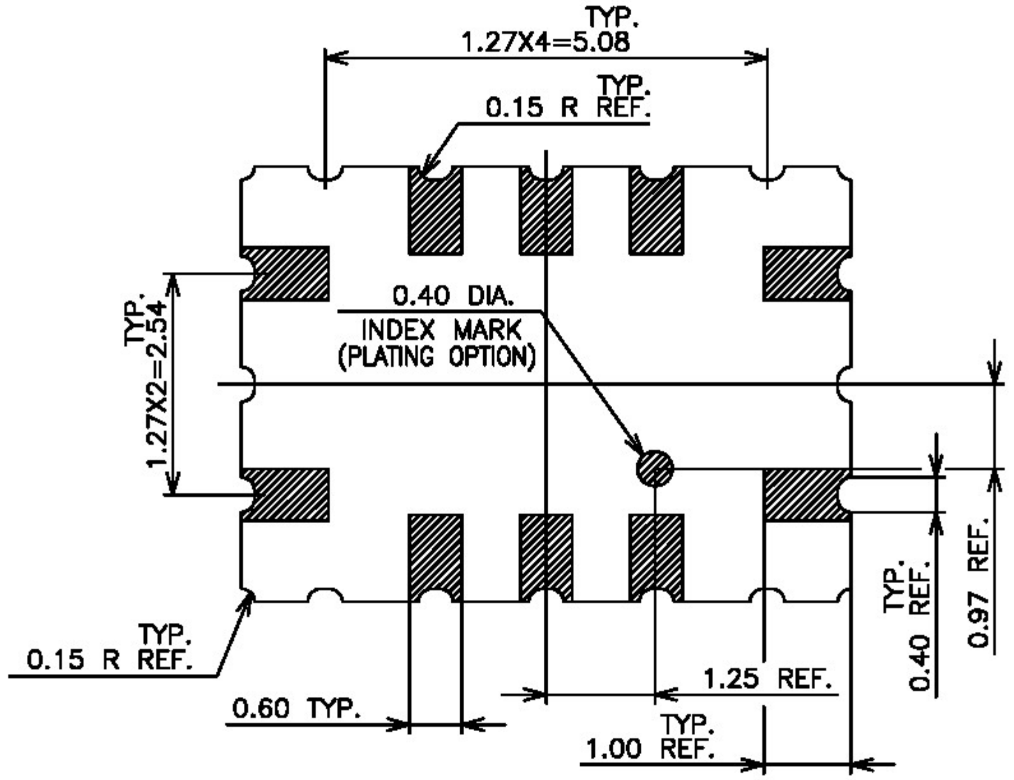
- The sensor must be reflow soldered in a neutral atmosphere, without soldering flux vapours.
- The sensor must not be exposed to high concentrations of organic solvents, silicone vapour or cigarette-smoke in order to avoid poisoning the sensitive layer.
- Heater voltages above the specified maximum 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.
- e2v strongly recommends using ESD protection equipment to handle the sensor.
- For any additional questions, contact e2v.

PACKAGE OUTLINE DIMENSIONS

The package is compatible with SMD assembly process.

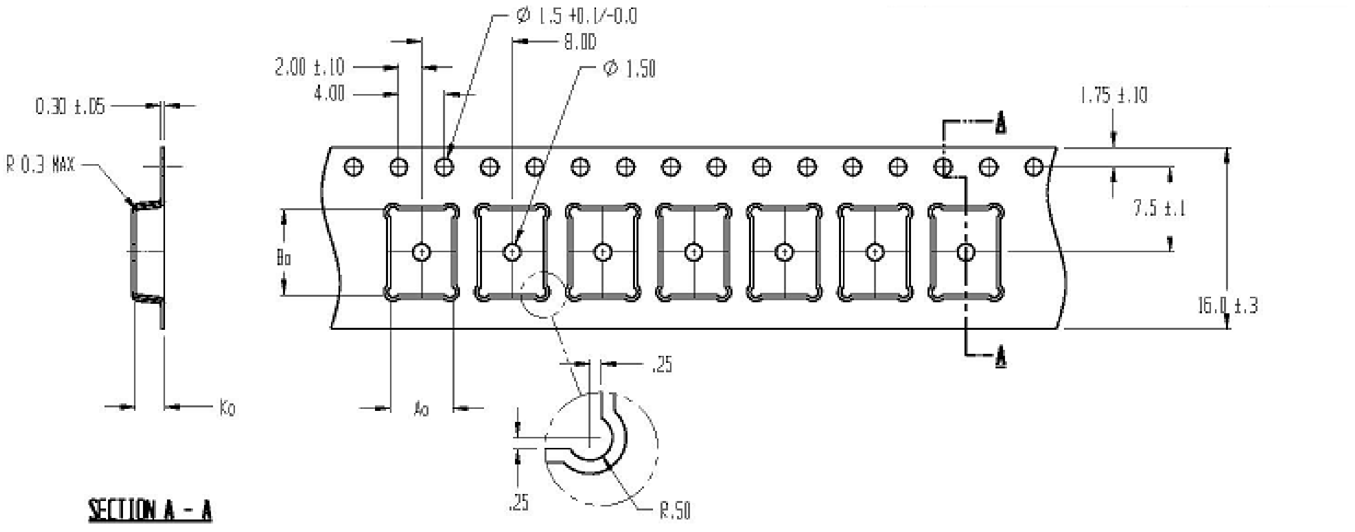


SOLDERING PADS GEOMETRY

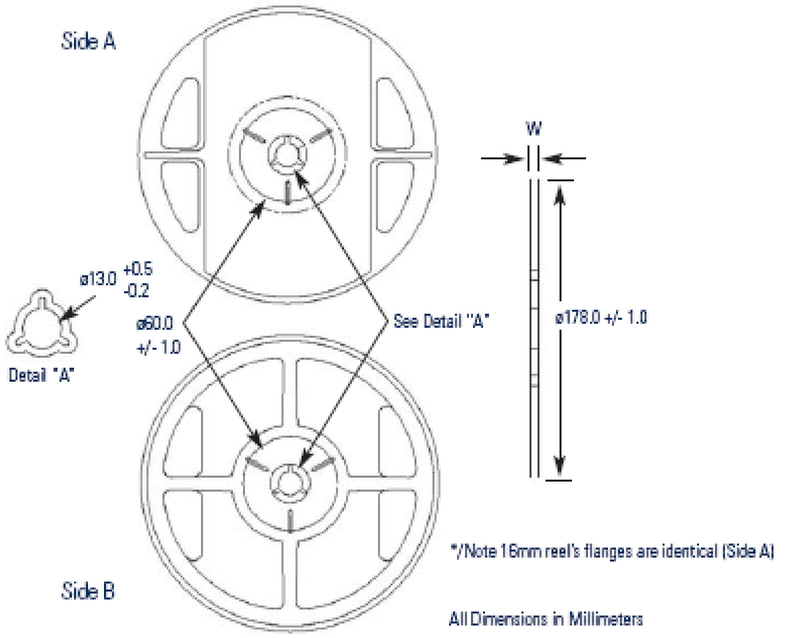


PACKAGING TAPE AND REEL FOR EXPEDITION

The sensors are placed in a carrier tape. The dimensions of the cavity are 5.5 x 7.5 x 2.55 mm (the tolerance is +/- 0.2 mm).



The outside diameter of the reel is either 178 +/- 1 mm (for a maximum of 700 sensors) or 330 +0.25 / -4 mm (for a maximum of 2000 sensors).



e2v semiconductor gas sensors are well suited for leak detection and applications requiring limited accuracy. Their use for absolute gas concentration detection is more complicated because they typically require temperature compensation, calibration, and sometimes as well, humidity compensation. Their base resistance in clean air and their sensitivity can vary overtime depending on the environment they are in. This effect must be taken into account for any application development (1108-1.0).