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 (NO₂).

**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.

**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 NO₂.

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

\[ R = 131 \, \Omega \]

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.
MEASUREMENT CIRCUIT EXAMPLE

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

![Measurement Circuit Diagram](image)

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 NO₂ in air is represented in Figure 4. The sensor resistance Rₜ is normalised to the resistance under air (R₀).

![Graph](image)

Figure 4: Rₜ/R₀ as a function of NO₂ concentration at 40% RH and 25 °C, measured on an engineering test bench

ELECTRICAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Rating</th>
<th>Symbol</th>
<th>Value/Range</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum heater power dissipation</td>
<td>Pₜ</td>
<td>50</td>
<td>mW</td>
</tr>
<tr>
<td>Relative humidity range</td>
<td>Rₚ</td>
<td>5 95</td>
<td>%RH</td>
</tr>
<tr>
<td>Ambient operating temperature</td>
<td>Tₚ</td>
<td>-30 85</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>Tₛ</td>
<td>-40 120</td>
<td>°C</td>
</tr>
<tr>
<td>Storage humidity range</td>
<td>RHₛ</td>
<td>5 95</td>
<td>%RH</td>
</tr>
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</table>

OPERATING CONDITIONS

<table>
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<th>Parameter</th>
<th>Symbol</th>
<th>Typ</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
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<tbody>
<tr>
<td>Heating power</td>
<td>Pₜ</td>
<td>83</td>
<td>30</td>
<td>50</td>
<td>mW</td>
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<tr>
<td>Heating voltage</td>
<td>Vₚ</td>
<td>1.7</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>Heating current</td>
<td>Iₚ</td>
<td>26</td>
<td>-</td>
<td>-</td>
<td>mA</td>
</tr>
<tr>
<td>Heating resistance at nominal power</td>
<td>Rₚ</td>
<td>66</td>
<td>59</td>
<td>73</td>
<td>Ω</td>
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SENSITIVITY CHARACTERISTICS

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Symbol</th>
<th>Typ</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
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</thead>
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<td>NO₂ detection range</td>
<td>FS</td>
<td>0.05</td>
<td>5</td>
<td>ppm</td>
<td></td>
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<tr>
<td>Sensing resistance in air</td>
<td>Rₚ</td>
<td>-</td>
<td>0.8</td>
<td>8</td>
<td>kΩ</td>
</tr>
<tr>
<td>Sensitivity factor (see note 2)</td>
<td>SR</td>
<td>55</td>
<td>6</td>
<td>100</td>
<td>-</td>
</tr>
</tbody>
</table>

Notes:

1. Sensing resistance in air Rₚ is measured under controlled ambient conditions, i.e. synthetic air at 23 ± 5 °C and ≤5% RH. Indicative values only.
2. Sensitivity factor SR is defined as Rₜ at 0.25 ppm of NO₂, divided by Rₚ 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.

SOLDERING PADS GEOMETRY