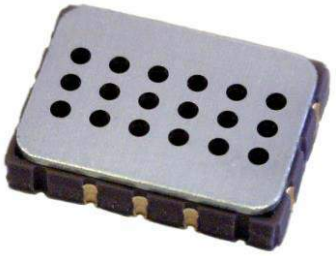
The MICS-Series is a compact MOS sensor.

MICS-Series has a proprietary MOS technology utilizing state of the art MES technolgy, combining a specialized nano-particle sensing layer with a patented poly-silicon heater. This unique design creates a highly sensitive and responsive semiconductor sensor,manufactured on an automotive production line for outstanding quality and performance. These sensors are easily capable to detect and measure combustible and polluition gasses in parts per billion (PPB) and are suitable for many environmental, automotive and industrial applications.



Name	Detectable Gases		Range
MiCS-2614	Ozon	O_3	10 ~ 1000 ppb
MiCS-2714	Nitrogen dioxide	NO_2	0.05 ~ 10 ppm
	Hydrogen	H_2	1 ~ 1000 ppm
MiCS-4514	Carbon monoxide	CO	1 ~ 1000 ppm
	Nitrogen dioxide	NO_2	0.05 ~ 10 ppm
	Ethanol	C_2H_5OH	10 ~ 500 ppm
	Hydrogen	H_2	1 ~ 1000 ppm
	Ammonia	NH_3	1 ~ 500 ppm
	Methane	CH_4	> 1000 ppm
MiCS-5524	Carbon monoxide	CO	1 ~ 1000 ppm
	Ethanol	C_2H_5OH	10 ~ 500 ppm
	Hydrogen	H_2	1 ~ 1000 ppm
	Ammonia	NH_3	1 ~ 500 ppm
	Methane	CH_4	>1000 ppm
MiCS-5914	Ammonia	NH_3	1 ~ 500 ppm
	Ethanol	C_2H_5OH	10 ~ 500 ppm
	Hydrogen	H_2	1 ~ 1000 ppm
	Propane	C_3H_8	> 1000 ppm
	Iso-butane	C_4H_{10}	> 1000 ppm
MiCS-VZ-86/87/89	Volatile Organic Compounds	VOCs	0~1000ppb
	Equivalent Carbon Dioxide	CO_2	400 ~ 2000 ppm
MiCS-EK1	Gas Sensors Evaluation Kit		
MiCS-QSB	Gas Sensors Quick Start Test Board		
MiCS-Socket	Gas Sensors Socket		

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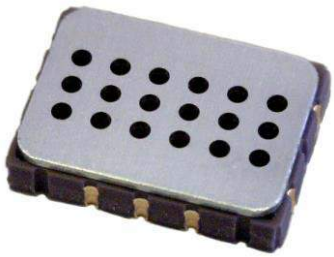
SGX SENSORTECH

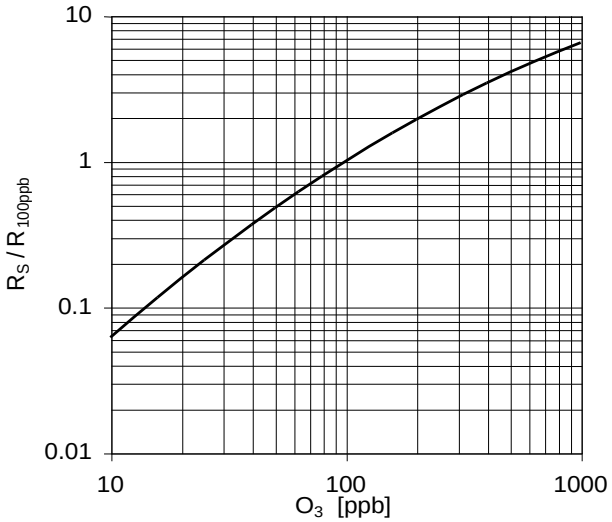
The MiCS-2614 is a compact MOS sensor.

The MiCS-2614 is a robust MEMS sensor for ozone detection; suitable also for gas leak detection and outdoor air quality monitoring.



Features

- Smallest footprint for compact designs (5 x 7 x 1.55 mm)
- Robust MEMS sensor for harsh environments
- High-volume manufacturing for low-cost applications
- Short lead-times



Continuous power ON, 25°C, 50% RH

Detectable gases

• Ozone	O_3	10 – 1000ppb

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SGX SENSORTECH

Performance sensor

Characteristic RED sensor	Symbol	Typ	Min	Max	Unit
Sensing resistance in air (see note 1)	R_0	11	3	60	kΩ
Typical O_3 detection range	FS		10	1000	ppb
Sensitivity factor (see note 2)	S_R	2	1.5	4	-

Notes:

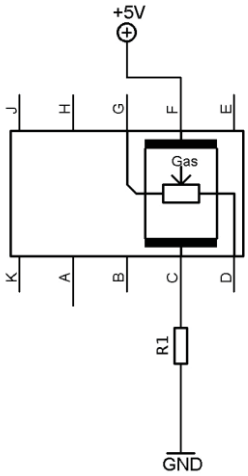
1. Sensing resistance in air R_0 is measured under controlled ambient conditions, i.e. synthetic air at 23 ±5°C and 50 ± 10% RH. Sampling test.

2. Sensitivity factor is defined as R_s at 100 ppb of O_3 divided by R_s at 50 ppb of O_3. Test conditions are 25 ± 2°C and 50 ± 5% RH. Indicative values only. Sampling test.

IMPORTANT PRECAUTIONS:
Read the following instructions carefully before using the MiCS-2614 described here to avoid erroneous readings and to prevent the device from permanent damage.

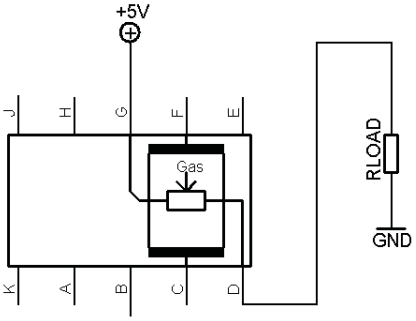
- The sensor must be reflow soldered in a neutral atmosphere, without soldering flux vapours.
- The sensor must not be exposed to high concentrations of organic solvents, silicone vapours or cigarette-smoke in order to avoid poisoning the sensitive layer.
- Heater voltage above the specified maximum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

SGX SENSORTECH



MiCS-2614 with recommended supply circuit (top view)

R1 is 82 **Ω**. This resistor is necessary to obtain the right temperature on the heater while using a single 5V power supply. The resulting voltage is typically VH = 2.35V.



MiCS-2614 with measurement circuit (top view)

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

Parameter	Symbol	Typ	Min	Max	Unit
Heating power	P_H	80	66	95	mW
Heating voltage	V_H	2.35	-	-	V
Heating current	I_H	34	-	-	mA
Heating resistance at nominal power	R_H	68	58	78	**Ω**

Rating	Symbol	Value / Range	Unit
Maximum heater power dissipation	P_H	95	mW
Maximum sensitive layer power dissipation	Ps	1	mW
Voltage supplyHeating current	Vsupply	4.9 – 5.1	V
Relative humidity range	RH	5 – 95	%RH
Ambient operating temperature	Tamb	-40 – 70	°C
Storage temperature range	Tsto	-40 – 50	°C
Storage humidity range	RHsto	5 - 95	%RH

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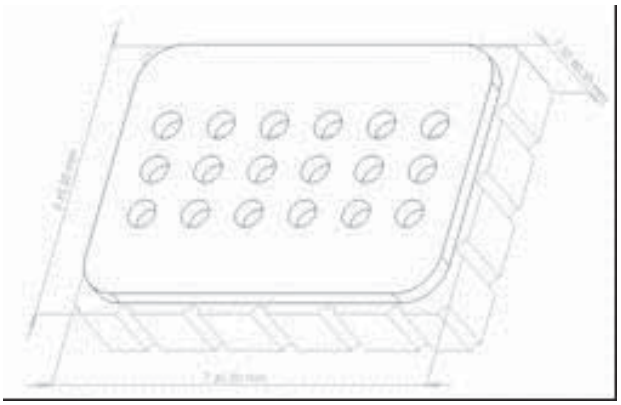
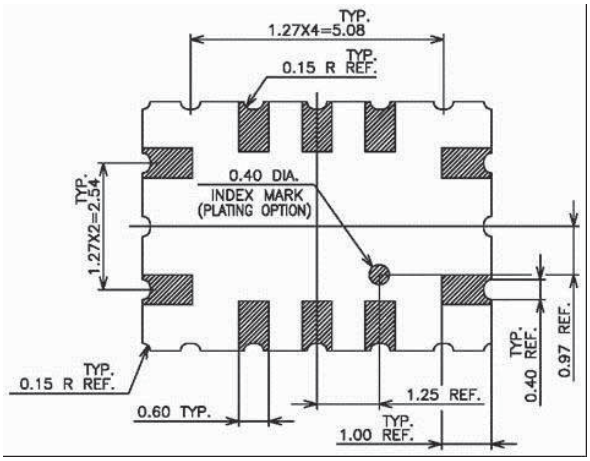
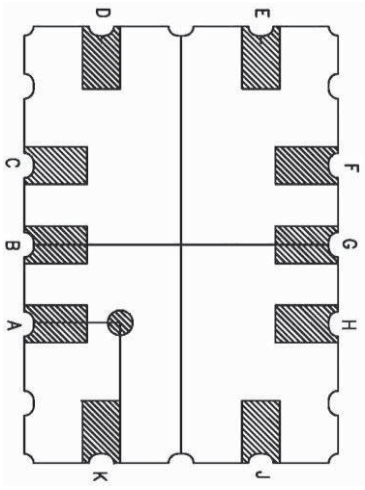




Package outline dimensions

The package is compatible with SMD assembly process.

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



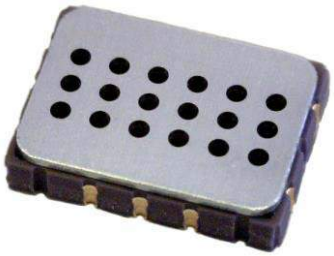
MiCS-2614 configuration (bottom view)

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 above.

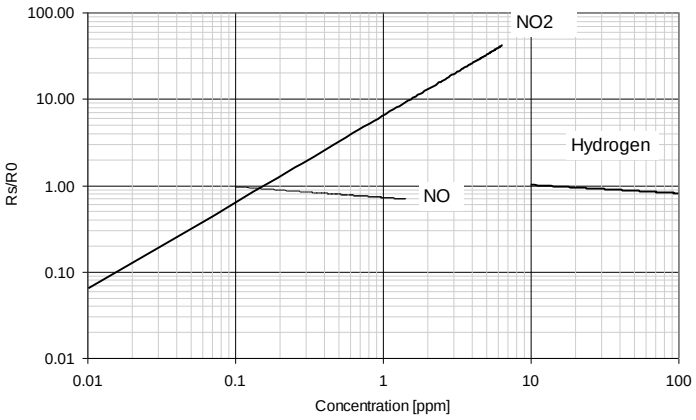
The MiCS-2714 is a compact MOS sensor.

The MiCS-2714 is a robust MEMS sensor for nitrogen dioxide and leakage detection.



Features

- Smallest footprint for compact designs (5 x 7 x 1.55 mm)
- Robust MEMS sensor for harsh environments
- High-volume manufacturing for low-cost applications
- Short lead-times



Continuous power ON, 25°C, 50% RH

Detectable gases

• Nitrogen dioxide	NO_2	0.05 – 10ppm
• Hydrogen	H_2	1 – 1000ppm

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SGX SENSORTECH

Performance sensor

Characteristic **OX** sensor	**Symbol**	**Typ**	**Min**	**Max**	**Unit**
Sensing resistance in air (see note 1)	R_0	-	0.8	20	kΩ
Typical NO_2 detection range	FS		0.05	10	ppm
Sensitivity factor (see note 2)	$S_{0.25}$	-	2	-	-

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% RH. Sampling test.

2. Sensitivity factor is defined as Rs at 0.25 ppm NO_2, divided by R_S in air. Test conditions are 23 ± 5°C and ≤5% RH. Indicative values only. Sampling test.

IMPORTANT PRECAUTIONS:

Read the following instructions carefully before using the MiCS-2714 described here 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 vapours or cigarette-smoke in order to avoid poisoning the sensitive layer.
- Heater voltage 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.
- SGX sensortech strongly recommends using ESD protection equipment to handle the sensor.

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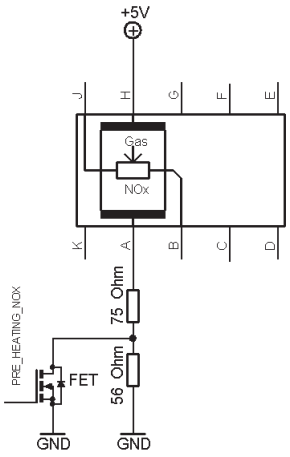
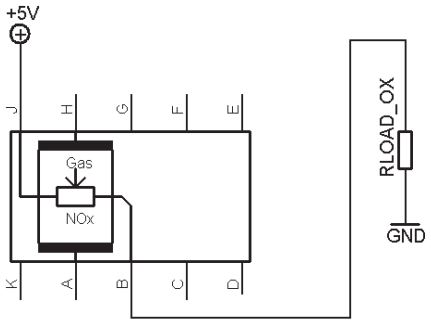


MiCS-2714 with recommended supply circuit (top view)

R is 131 ☒. 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 = 1.7 V.



MiCS-2714 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.

Parameter	**Symbol**	Typ	Min	Max	Unit
Heating power	P_H	43	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	☒

Rating	Symbol	Value / Range	Unit
Maximum heater power dissipation	P_H	50	mW
Maximum sensitive layer power dissipation	Ps	8	mW
Voltage supplyHeating current	Vsupply	4.9 – 5.1	V
Relative humidity range	RH	5 – 95	%RH
Ambient operating temperature	Tamb	-30 – 85	°C
Storage temperature range	Tsto	-40 – 120	°C
Storage humidity range	RHsto	5 - 95	%RH

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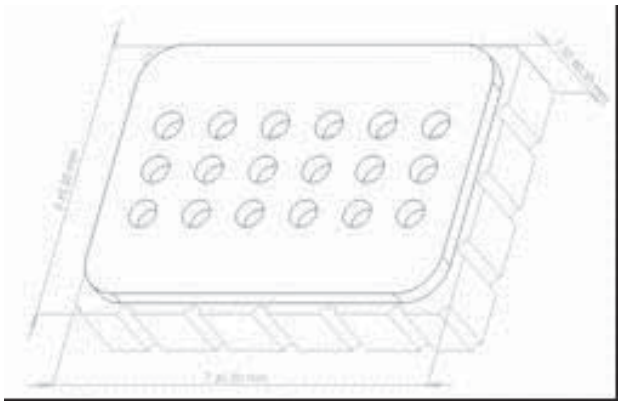
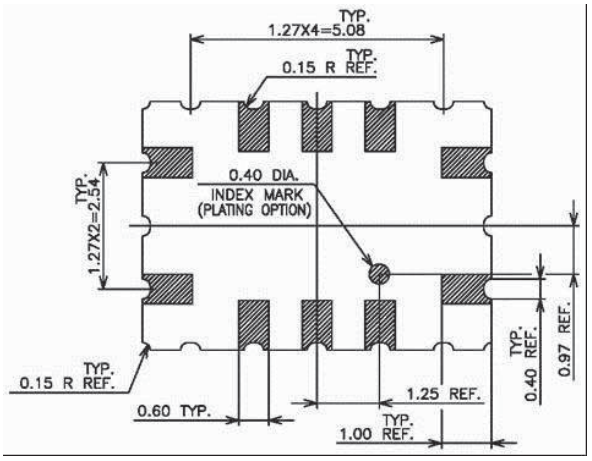
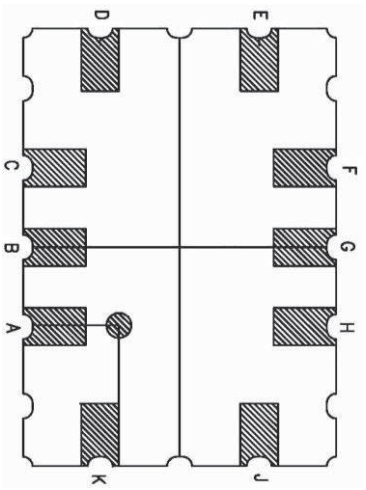




Package outline dimensions

The package is compatible with SMD assembly process.

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



MiCS-2714 configuration (bottom view)

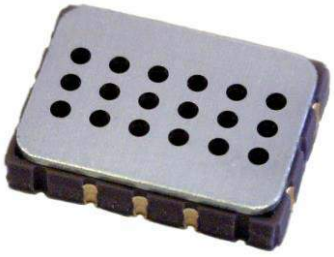
Sensor configuration

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 above.

SGX SENSORTECH

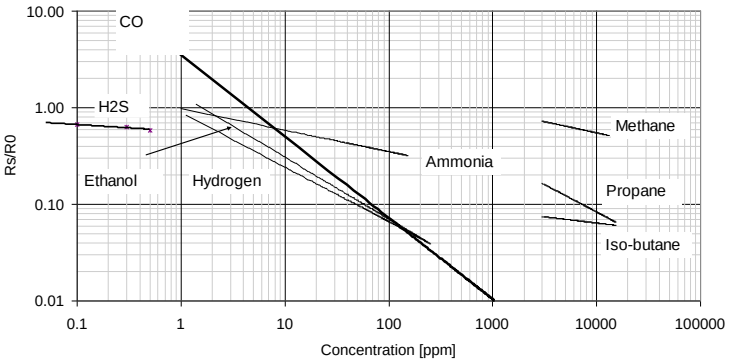
The MiCS-4514 is a compact MOS sensor with two fully independent sensing elements on one package.

The MiCS-4514 is a robust MEMS sensor for the detection of pollution from automobile exhausts.



Features

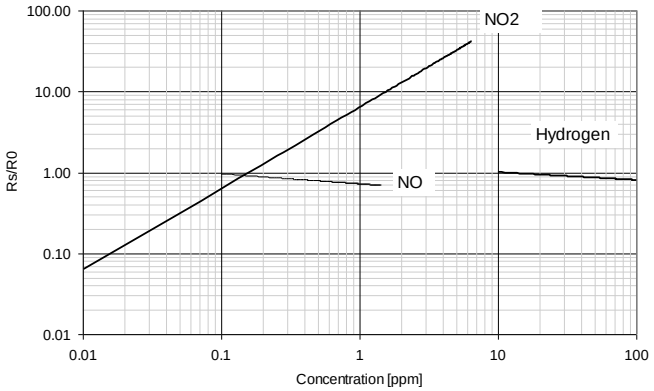
- Smallest footprint for compact designs (5 x 7 x 1.55 mm)
- Robust MEMS sensor for harsh environments
- High-volume manufacturing for low-cost applications
- Short lead-times



RED sensor, continuous power ON, 25°C, 50% RH

Detectable gases

• Carbon monoxide	CO	1 – 1000ppm
• Nitrogen dioxide	NO_2	0.05 – 10ppm
• Ethanol	C_2H_5OH	10 – 500ppm
• Hydrogen	H_2	1 – 1000ppm
• Ammonia	NH_3	1 – 500ppm
• Methane	CH_4	>1000ppm



OX sensor, continuous power ON, 25°C, 50% RH

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SGX SENSORTECH

Performance RED sensor

Characteristic RED sensor	Symbol	Typ	Min	Max	Unit
Sensing resistance in air (see note 1)	R_0	-	100	1500	kΩ
Typical CO detection range	FS		1	1000	ppm
Sensitivity factor (see note 2)	S_{60}	-	1.2	50	-

Performance OX sensor

Characteristic OX sensor	Symbol	Typ	Min	Max	Unit
Sensing resistance in air (see note 1)	R_0	-	0.8	20	kΩ
Typical NO_2 detection range	FS		0.05	10	ppm
Sensitivity factor (see note 3)	S_R	-	2	-	-

Notes:

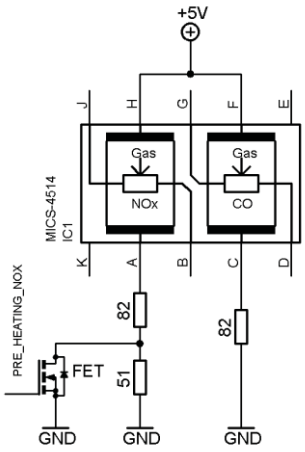
1. Sensing resistance in air R_0 is measured under controlled ambient conditions, i.e. synthetic air at 23 ±5°C and 50 ± 10% RH for RED sensor and synthetic air at 23 ±5°C and ≤ 5% RH for OX sensor. Sampling test.
2. Sensitivity factor is defined as Rs in air divided by Rs at 60 ppm CO. Test conditions are 23 ± 5°C and 50 ± 10% RH. Indicative values only. Sampling test.
3. Sensitivity factor is defined as Rs at 0.25 ppm NO_2, divided by Rs in air. Test conditions are 23 ± 5°C and ≤ 5% RH . Indicative values only. Sampling test.

IMPORTANT PRECAUTIONS:

Read the following instructions carefully before using the MiCS-4514 described here to avoid erroneous readings and to prevent the device from permanent damage.

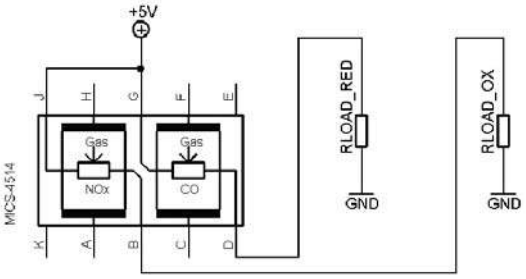
- The sensor must be reflow soldered in a neutral atmosphere, without soldering flux vapours.
- The sensor must not be exposed to high concentrations of organic solvents, silicone vapours or cigarette-smoke in order to avoid poisoning the sensitive layer.
- Heater voltage above the specified maximum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

SGX SENSORTECH



MiCS-4514 with recommended supply circuit (top view)

RDRED is a 82 Ω and RDOX is a 133 Ω. These resistors are necessary to obtain the right temperatures on the two independant heaters while using a single 5V power supply. The resulting voltages are typically VHRED = 2.4V and VHOX= 1.7V.



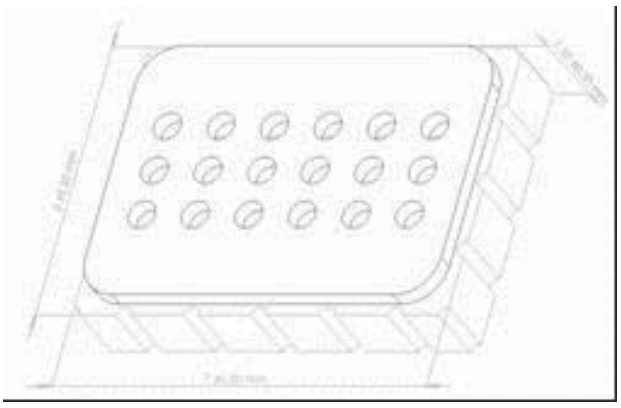
MiCS-4514 with measurement circuit (top view)

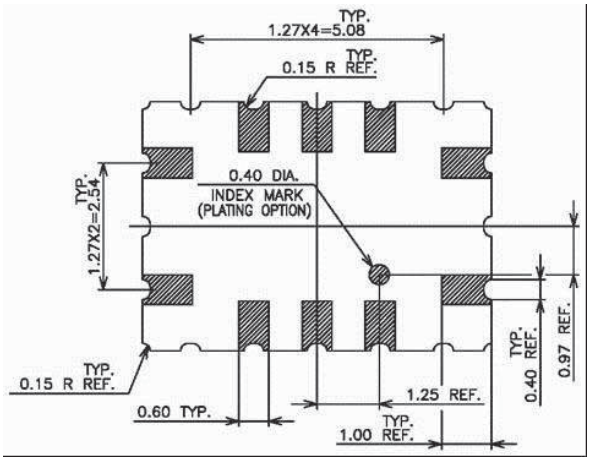
The two voltages measured on the load resistors are directly linked to the resistances of the RED and OX sensors respectively. RLOAD must be 820 Ω at the lowest in order not to damage the sensitive layer.

Parameter **RED sensor/OX sensor**	**Symbol**	**Typ**	**Min**	**Max**	**Unit**
Heating power	P_H	76/43	71/30	81/50	mW
Heating voltage	V_H	2.4/1.7	-	-	V
Heating current	I_H	32/26	-	-	mA
Heating resistance at nominal power	R_H	74/66	66/59	82/73	Ω

Rating	**Symbol**	**Value / Range**	**Unit**
Maximum heater power dissipation	P_H	88 (RED sensor)/50 (OX sensor)	mW
Maximum sensitive layer power dissipation	Ps	8	mW
Voltage supplyHeating current	Vsupply	4.9 – 5.1	V
Relative humidity range	RH	5 – 95	%RH
Ambient operating temperature	Tamb	-30 – 85	°C
Storage temperature range	Tsto	-40 – 120	°C
Storage humidity range	RHsto	5 - 95	%RH

SGX SENSORTECH

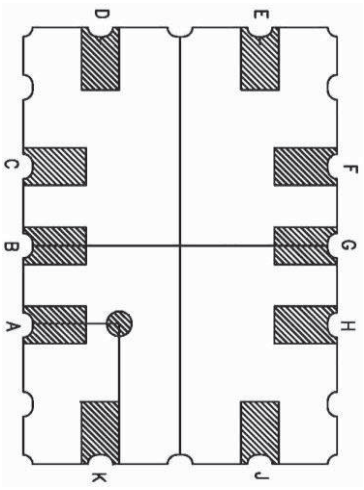




Package outline dimensions

The package is compatible with SMD assembly process.

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



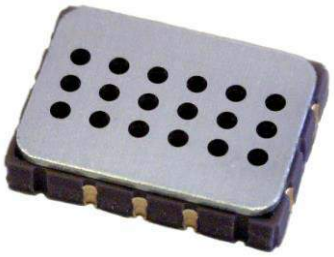
Sensor configuration

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-4514 includes two sensor chips with independent heaters and sensitive layers. One sensor chip detects oxidising gases (OX) and the other sensor detects reducing gases (RED). The internal connections are shown above.

SGX SENSORTECH

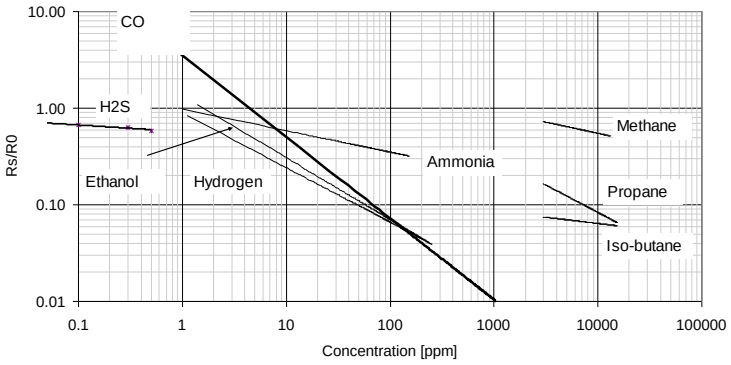
The MiCS-5524 is a compact MOS sensor.

The MiCS-5524 is a robust MEMS sensor for indoor carbon monoxide and natural gas leakage detection; suitable also for indoor air quality monitoring; breath checker and early fire detection.



Features

- Smallest footprint for compact designs (5 x 7 x 1.55 mm)
- Robust MEMS sensor for harsh environments
- High-volume manufacturing for low-cost applications
- Short lead-times



Continuous power ON, 25°C, 50% RH

Detectable gases

• Carbon monoxide	CO	1 – 1000ppm
• Ethanol	C_2H_6OH	10 – 500ppm
• Hydrogen	H_2	1 – 1000ppm
• Ammonia	NH_3	1 – 500ppm
• Methane	CH_4	>1000ppm

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SGX SENSORTECH

Performance sensor

Characteristic RED sensor	Symbol	Typ	Min	Max	Unit
Sensing resistance in air (see note 1)	R_0	-	100	1500	kΩ
Typical CO detection range	FS		1	1000	ppm
Sensitivity factor (see note 2)	S_{60}	-	1.2	50	-

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% RH. Sampling test.

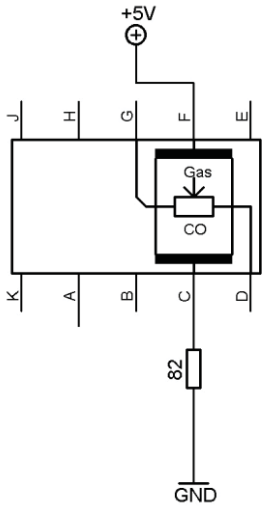
2. Sensitivity factor is defined as Rs in air divided by Rs at 60 ppm CO. Test conditions are 23 ± 5°C and 50 ± 10% RH. Indicative values only. Sampling test.

IMPORTANT PRECAUTIONS:

Read the following instructions carefully before using the MiCS-5524 described here to avoid erroneous readings and to prevent the device from permanent damage.

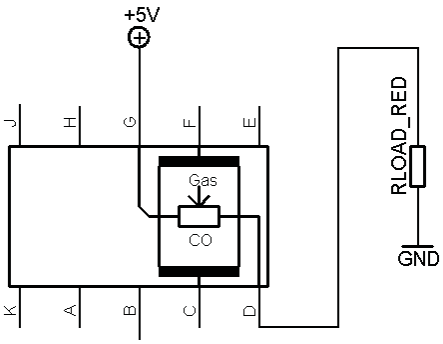
- The sensor must be reflow soldered in a neutral atmosphere, without soldering flux vapours.
- The sensor must not be exposed to high concentrations of organic solvents, silicone vapours or cigarette-smoke in order to avoid poisoning the sensitive layer.
- Heater voltage above the specified maximum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

SGX SENSORTECH



MiCS-5524 with recommended supply circuit (top view)

R is a 82 Ω . This resistor is necessary to obtain the right temperature on the heater while using a single 5V power supply. The resulting voltage is typically VH = 2.4V.



MiCS-5524 with measurement circuit (top view)

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

Parameter	Symbol	Typ	Min	Max	Unit
Heating power	P_H	76	71	81	mW
Heating voltage	V_H	2.4	-	-	V
Heating current	I_H	32	-	-	mA
Heating resistance at nominal power	R_H	74	66	82	Ω

Rating	Symbol	Value / Range	Unit
Maximum heater power dissipation	P_H	88	mW
Maximum sensitive layer power dissipation	Ps	8	mW
Voltage supplyHeating current	Vsupply	4.9 – 5.1	V
Relative humidity range	RH	5 – 95	%RH
Ambient operating temperature	Tamb	-30 – 85	°C
Storage temperature range	Tsto	-40 – 120	°C
Storage humidity range	RHsto	5 - 95	%RH

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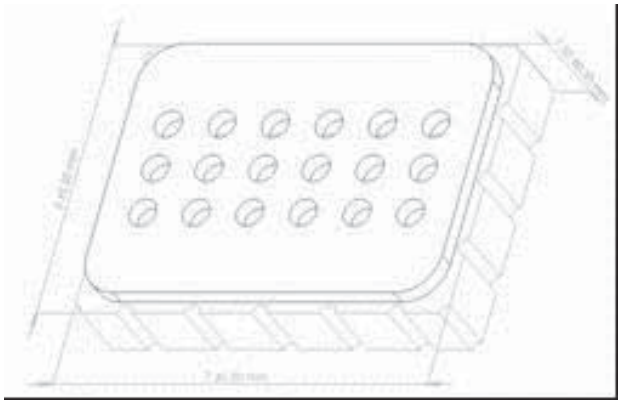
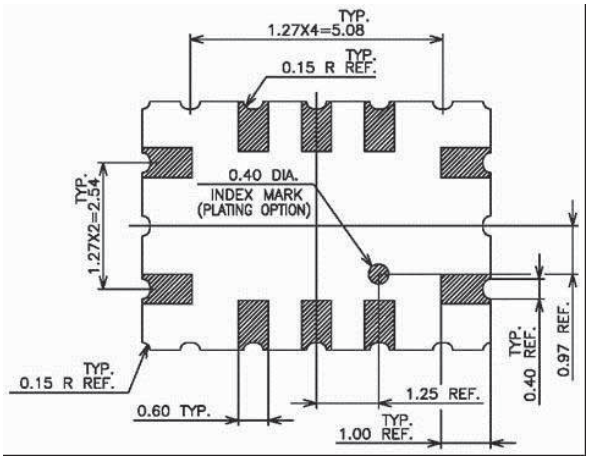
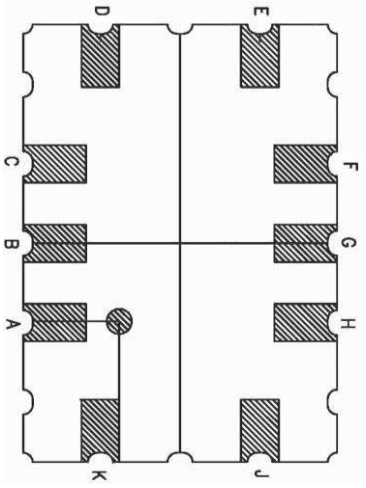




Package outline dimensions

The package is compatible with SMD assembly process.

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



MiCS-5524 configuration (bottom view)

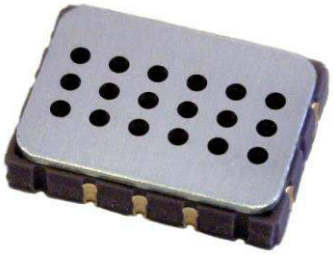
Sensor configuration

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 above.

SGX SENSORTECH

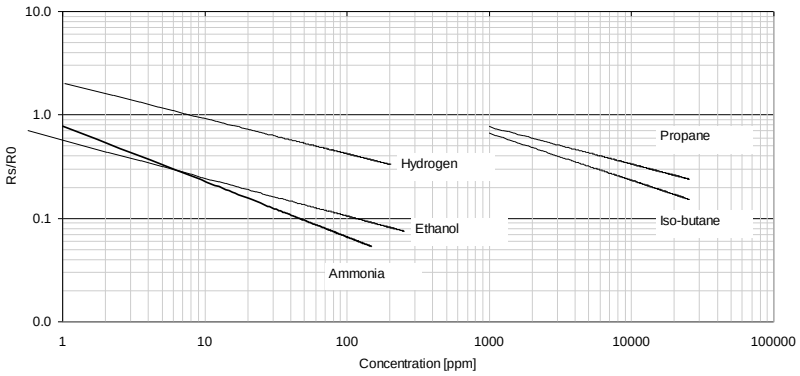
The MiCS-5914 is a compact MOS sensor.

The MiCS-5914 is a robust MEMS sensor for ammonia detection; suitable also for gas leak detection and indoor and outdoor air quality monitoring.



Features

- Smallest footprint for compact designs (5 x 7 x 1.55 mm)
- Robust MEMS sensor for harsh environments
- High-volume manufacturing for low-cost applications
- Short lead-times



Continuous power ON, 25°C, 50% RH

Detectable gases

• Ammonia	NH_3	1 – 500ppm
• Ethanol	C_2H_5OH	10 – 500ppm
• Hydrogen	H_2	1 – 1000ppm
• Propane	C_3H_8	>1000ppm
• Iso-butane	C_4H_{10}	>1000ppm

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SGX SENSORTECH

Performance sensor

Characteristic RED sensor	Symbol	Typ	Min	Max	Unit
Sensing resistance in air (see note 1)	R_0	-	10	1500	kΩ
Typical NH3 detection range	FS		1	300	ppm
Sensitivity factor (see note 2)	S_R	-	1.5	15	-

Notes:

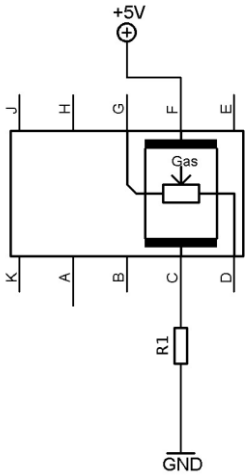
1. Sensing resistance in air R_0 is measured under controlled ambient conditions, i.e. synthetic air at 23 ±5°C and 50 ± 10% RH. Sampling test.

2. Sensitivity factor is defined as R_s in air divided by R_s at 1 ppm of NH_3. Test conditions are 23 ± 5°C and 50 ± 10% RH. Indicative values only. Sampling test.

IMPORTANT PRECAUTIONS:

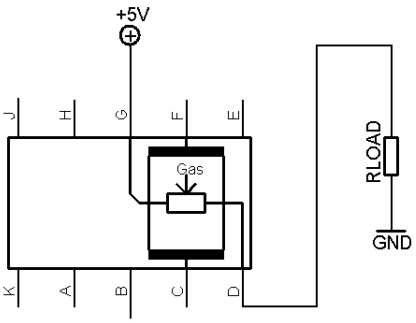
Read the following instructions carefully before using the MiCS-5914 described here to avoid erroneous readings and to prevent the device from permanent damage.

- 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 vapours or cigarette-smoke in order to avoid poisoning the sensitive layer.
- Heater voltage 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.
- SGX sensortech strongly recommends using ESD protection equipment to handle the sensor.



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 5V power supply. The resulting voltage is typically VH = 2.2V.



MiCS-5914 with measurement circuit (top view)

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

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

Rating	Symbol	Value / Range	Unit
Maximum heater power dissipation	P_H	88	mW
Maximum sensitive layer power dissipation	Ps	8	mW
Voltage supplyHeating current	Vsupply	4.9 – 5.1	V
Relative humidity range	RH	5 – 95	%RH
Ambient operating temperature	Tamb	-30 – 85	°C
Storage temperature range	Tsto	-40 – 120	°C
Storage humidity range	RHsto	5 - 95	%RH

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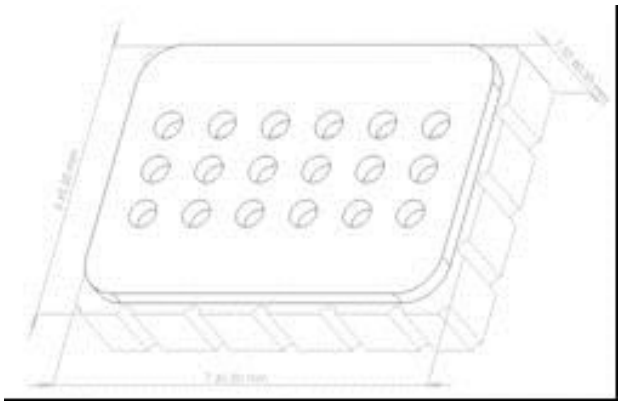
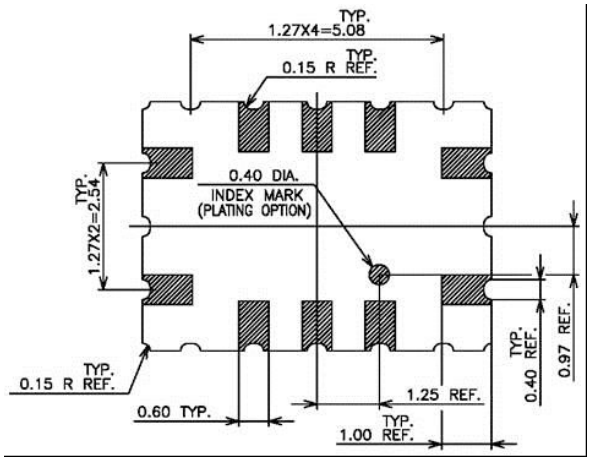
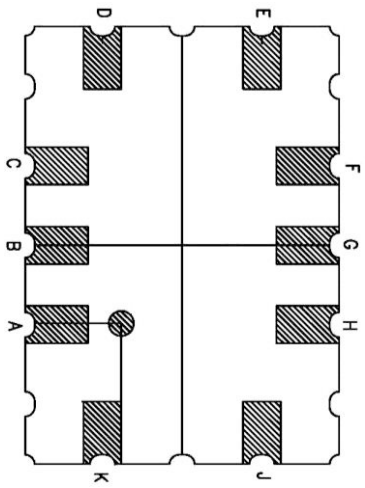




Package outline dimensions

The package is compatible with SMD assembly process.

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



MiCS-5914 configuration (bottom view)

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 above.

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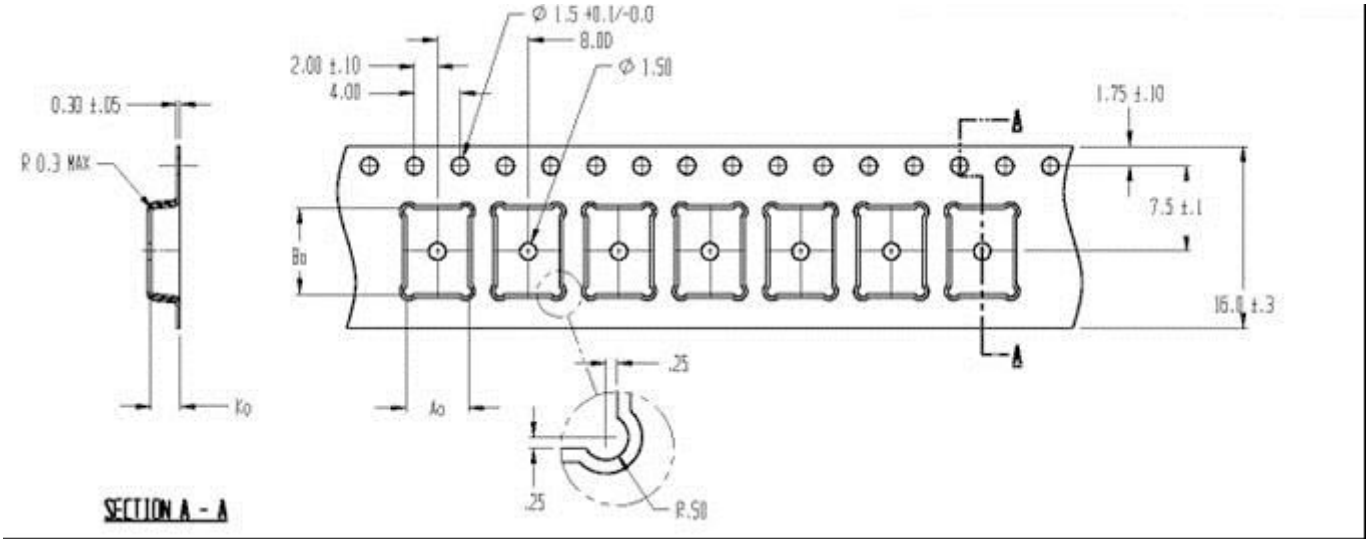
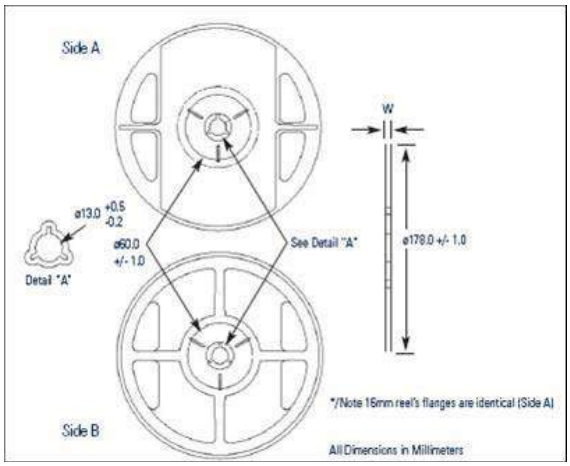


Packaging

The sensors are packaged in a tape and reel for expedition.
The sensors are placed in a carrier type. The dimensions of the cavity are 5.5 x 7.5 x 2.55 mm (the tolerance is +/- 0.2 mm).
The outside dimension of the reel is either 178 +- mm (for a maximum of 700 sensors) or 330 + 0.25 / -4 mm (for a maximum of 2000 sensors).



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SGX SENSORTECH

The MiCS-VZ-86/89 is an integrated sensor board for Indoor Air Quality monitoring.

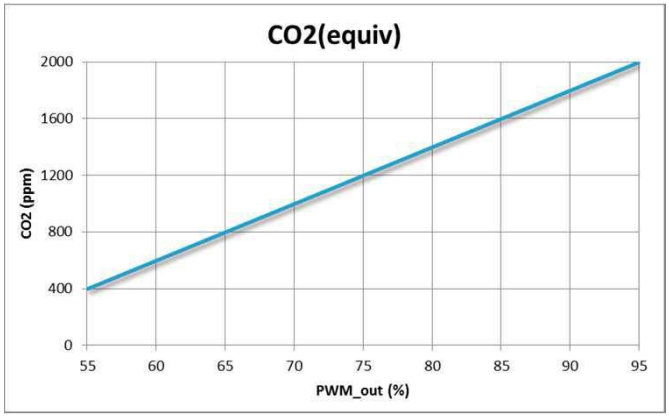
The MiCS-VZ-86/89 combines state-of-the-art MOS sensor technology with intelligent detection algorithms to monitor VOCs and CO2 equivalent variations in confined spaces, e.g. meeting rooms or vehicle cabins. The dual signal output can be used to control ventilation on-demand, saving energy and reducing cost-of-ownership.

Features

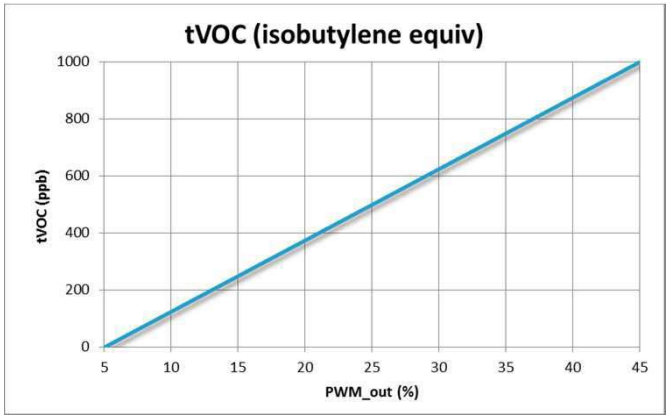
- Calibration-free
- Low power
- Wide VOCs detection range
- High sensitivity
- High resistance to shocks and vibrations

Detectable gases

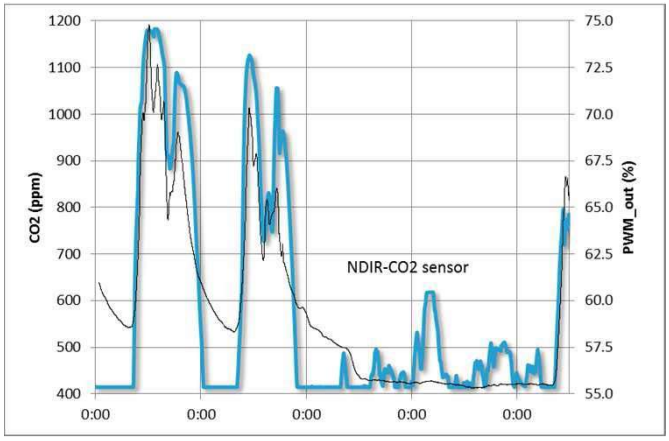
• Volatile Organic Compounds	VOCs
• equivalent Carbon Dioxide	CO_2(equiv)



Conversion from PWM output signal of MICS-VZ-86 to equivalent Carbon Dioxide concentration in ppm



Conversion from PWM output signal of MICS-VZ-86 to equivalent tVOC concentration in ppb



Comparison between MICS-VZ-86 output signal and NDIR CO2 sensor signal over a duration of 4 consecutive days (Thu – Sun)

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Performance

Detection Method	Semiconductor gas sensor, detecting a wide range of VOCs
Monitoring Range	400-2000 ppm equivalent CO2 0-1000 ppb isobutylene equivalent tVOCs
PWM Output (VZ-86)	Pin 1 : TTL output 30Hz, Range 5…95%, duty cycle 5V
I2C Output (VZ-89)	Pin 2 and 4 ; see VZ I2C SPEC rev A for details of operation
Response Time	Equivalent to conventional NDIR-CO2 sensors < 5 seconds for tVOC
Refresh Output Frequency	1 Hz

Operation

Supply Voltage	5V DC, regulated +/- 0.25V for F version 3.3V DC regulated +/- 0.25V for T version
Operating Power	150 mW
Warm-up Time	15 min
Operating Temperature	0°C to 50°C
Operating Humidity	0%RH to 95%RH (non condensing)
Storage Temperature	-40°C to 80°C
Storage Humidity	0%RH to 95%RH (non condensing)

IMPORTANT PRECAUTIONS

Read the following instructions carefully before using the indoor air quality sensor described in this document to avoid erroneous readings and to prevent the device from permanent damage.

•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.
•The sensor should be protected against water and dust projections.
•SGX strongly recommends using ESD protection equipment to handle the sensor.
•For any additional questions, contact SGX Sensortech

Power-on Self-Test

Parameter	Criteria	Failed Diagnostic Indicator
Sensor Resistance Range	Range Check	PWM < 5 % at Power ON
Sensor Operating Power	Range Check	PWM < 5 % at Power ON

MiCS-VZ-86 Output

After Power-on self-test (2 seconds) , the device is in “Functional Test Mode” for 60 seconds. During this period the device can be exposed to a test gas in order to check the reactivity and sensitivity of gas sensor (exposure to alcohol bottleneck is an example of check method).

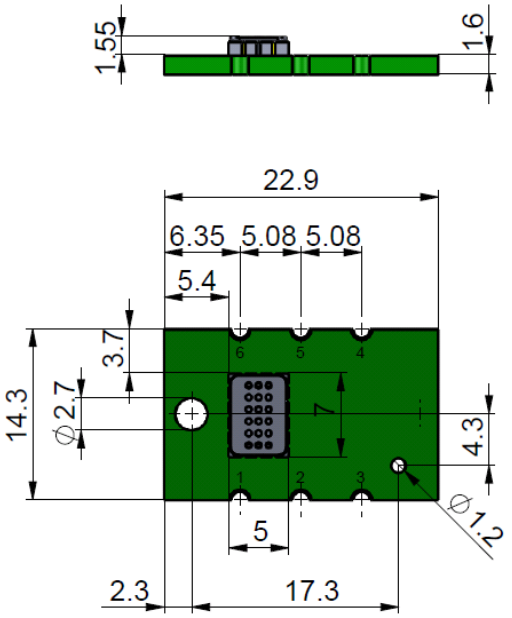
Out of this initial period, the device will have the PWM multiplexed output indicating CO2 equivalent Air Quality Level and tVOC equivalent referred to the isobutylene unit.

CO2 equ [ppm]	PWM Output [%]
400	55
1027	70.7
1654	86.4
2000	95

tVOC (isobutylene) [ppb]	PWM Output [%]
0	5
200	13
500	25
1000	45

Package outline dimensions

The MiCS-VZ-86/89 is available as PCB and can be mounted with a M2.5 screw in appliances.
Connections are made with soldering on card edge (cut via connector)



Pin Connection VZ-86

6:+5V/3.3V for T version	5: NC	4: NC
1: PWM OUT VZ-86	2: NC	3: GND

Pin Connection VZ-89

6:+ 5V/3.3V for T version	5: NC	4: SDA
1: NC	2: SCL	3: GND

Product nomenclature

MICS-VZ-86T	3.3V operation with PWM output
MICS-VZ-86F	5V operation with PWM output
MICS-VZ-89T	3.3V operation with I2C output
MICS-VZ-89F	5V operation with I2C output

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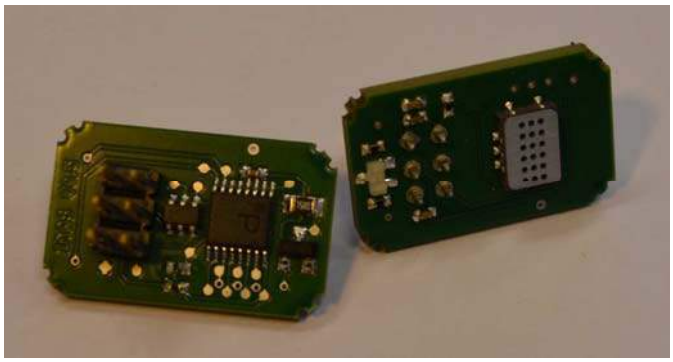
SGX SENSORTECH

The MiCS-VZ-87 is an integrated sensor board for Indoor Air Quality monitoring.



The MiCS-VZ-87 combines state-of-the-art MOS sensor technology with intelligent detection algorithms to monitor VOCs and CO2 equivalent variations in confined spaces, e.g. meeting rooms or vehicle cabins.
The signal output can be used to control ventilation on-demand, saving energy and reducing cost-of-ownership.

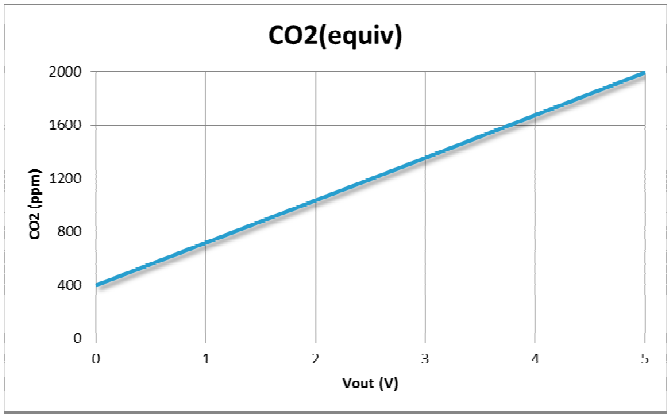
Features

- Calibration-free
- Low power
- Wide VOCs detection range
- High sensitivity
- High resistance to shocks and vibrations

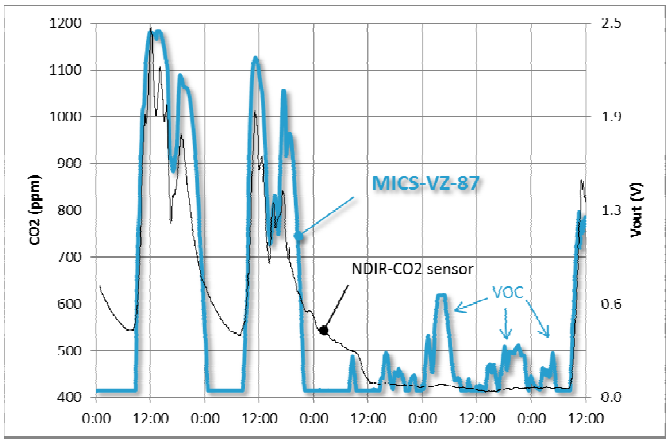
Detectable gases

- Volatile Organic Compounds — VOCs
- equivalent Carbon Dioxide — CO_2(equiv)

0V	→	400ppm	CO_2(equiv)
1V	→	720ppm	CO_2(equiv)
2V	→	1040ppm	CO_2(equiv)
3V	→	1360ppm	CO_2(equiv)
4V	→	1680ppm	CO_2(equiv)
5V	→	2000ppm	CO_2(equiv)



Conversion from analog output signal Vout of MICS-VZ-87 to equivalent Carbon Dioxide concentration in ppm



Comparison between MICS-VZ-87 output signal and NDIR CO2 sensor signal over a duration of 4 consecutive days (Thu – Sun)

For more information please contact:

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Performance

Detection Method	Semiconductor gas sensor, detecting a wide range of VOCs
Monitoring Range	400-2000 ppm equivalent CO2
Analog Output	Pin 2 – 3: 0…5V
Digital Output	Pin 5 – 6: I2C
PWM Output	Pin 2 – 4: TTL output 30Hz, Full Range 5…95%, duty cycle 5V
Response Time	Equivalent to conventional NDIR-CO2 sensors
Refresh Output Frequency	1 Hz

Operation

Supply Voltage	5V DC, regulated +/- 0.25V
Operating Power	250 mW
Warm-up Time	15 min
Operating Temperature	0°C to 50°C
Operating Humidity	0%RH to 95%RH (non condensing)
Storage Temperature	-40°C to 80°C
Storage Humidity	0%RH to 95%RH (non condensing)

IMPORTANT PRECAUTIONS

Read the following instructions carefully before using the indoor air quality sensor described in this document to avoid erroneous readings and to prevent the device from permanent damage.

•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.
•The sensor should be protected against water and dust projections.
•SGX strongly recommends using ESD protection equipment to handle the sensor.
•For any additional questions, contact SGX Sensortech

Power-on Self-Test

Parameter	Criteria	Failed Diagnostic Indicator
Sensor Resistance Range	Range Check	Continuous Red LED at Power ON
Sensor Operating Power	Range Check	Continuous Red LED at Power ON

LED Indicator

Operation Period	Operation Mode	Indicator
First minute after Power-on	Functional Test Mode	Blinking LED (0.5 Hz) Color according to pollution level (CO2 equ.)
Continuous mode after 60 sec.	Normal Operation	Green LED < 1027 ppm CO2 equ. 1027 ppm CO2 equ. < Yellow LED < 1654 ppm CO2 equ. 1654 ppm CO2 equ. < Red LED

MiCS-VZ-87 Outputs

After Power-on self-test (2 seconds) , the device is in “Functional Test Mode” for 60 seconds. This mode is made visible by LED indicator blinking. During this period the device can be exposed to a test gas in order to check the reactivity and sensitivity of gas sensor (exposure to alcohol bottleneck is an example of check method).

Out of this initial period, the device will have the three outputs (Analog, PWM and I2C) indicating CO2 equivalent Air Quality Level.

From Analog [V]: CO2 equ = (Analog_reading) * (2000-400)/(5) + 400

From PWM [%]: CO2 equ = (PWM_reading - 5) * (2000-400)/(95-5) + 400

From I2C [data byte vallue]: CO2 equ = (I2C_reading - 13) * (2000-400)/(242-13) + 400

CO2 equ [ppm]	Analog Output [V]	PWM Output [%]	LED Indicator
400	0	5	GREEN
1027	1.96	40.3	YELLOW (start)
1654	3.92	75.6	RED (start)
2000	5	95	RED

I2C Communication

I2C is a simple two-wire chip-to-chip digital communication protocol. The protocol is master oriented but allows bidirectional communication on just two communication lines.

Mode	Standard Mode, Slave
I2C Addressing method	7-bit addressing + R/W
MiCS-VZ-87 Slave address	0b1110000
Get Data Command	0b00000100
Data Retrieval	Read MiCS-VZ-87 data on two bytes: 1st byte (8-bit): CO2 equ value 2nd byte (8-bit): reserved (set at 0b00000000)
Clock Speed	Up to 100 kbit/s
Pull-up Resistor	Resistors between 2k and 10k work for most systems

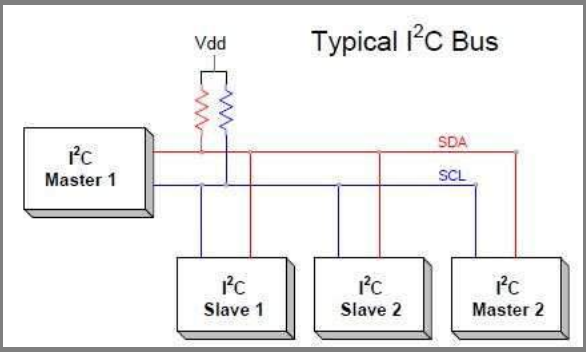
I2C Communication example:

MASTER to SLAVE
Address byte = 0b11100000 *(Write)*

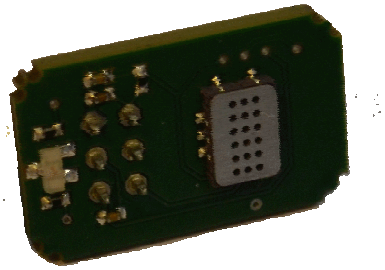
Command = 0b00000100
Data byte 1 = 0bxxxxxxxx *(not used)*
Data byte 2 = 0bxxxxxxxx *(not used)*
Address byte = 0b11100001 *(Read)*

SLAVE to MASTER
Address byte = 0b11100000
Command = 0b00000100
Data byte 1 = 0b00001101 (example of data)
Data byte 2 = 0b00000000 (constant)

Data byte 1 = 13 => 13/255 = 5%
5% correspond to 400 ppm CO2 equ (“Clean air”)

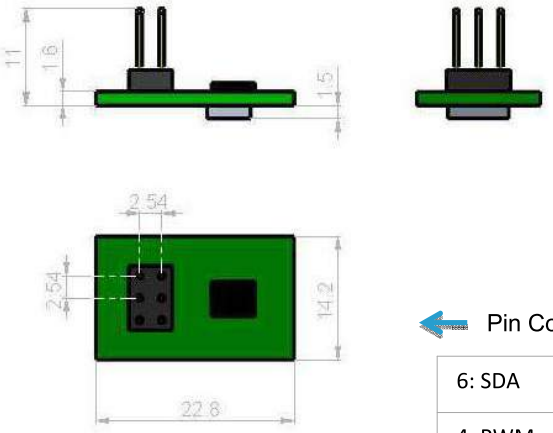


I2C bus allows communication between several masters and several slaves used in monitoring and control of peripherals like humidity and temperature sensors, actuators, etc…



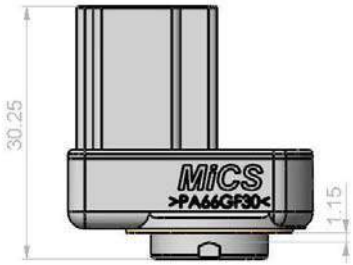
Package outline dimensions

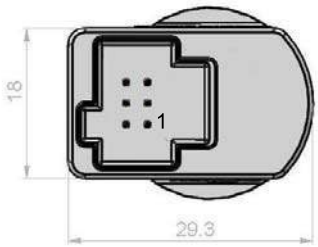
The MiCS-VZ-87 is available as PCB as well as in a packaged version for protection and simple mounting

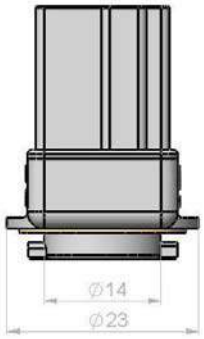


Pin Connection

6: SDA	5: SCL
4: PWM	3: 0...5V
2: GND	1: +5V







Teflon Membrane +
Bayonet Attachment

Electrical Connector
mates with Tyco Electronics
965413-1
1355881-1

For more information please conta

info.em@sgxsensortech.com

SGX Sensortech, Courtils 1
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Korea

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SGX MiCS-EK1 Gas sensor Evaluation Kit

Simply attach the universal power supply, connect to a PC USB port and plug in gas sensor.
The SGX data logging and control software allows the performance of different sensors to be assessed and make in easy to capture performance data.

Features

- For use with MiCS-Series Gas Sensors
- Automatic measuring of sensor resistance changes
- USB interface to a Personal Cumputer (PC)
- Free PC application software for easy control and data logging
- Settable heater drive levels
- Automatic load resistor switching
- Four configurable alarm outputs
- Two configurable analog outputs
- Four digital inputs
- Ambient temperature monitoring
- Provision for humidity sensor (customer fit)

Packing List

- Evaluation PCB
- Universal Mains Adapter
- USB lead
- CD Data Logging Software and User Manual
- MiCS-SMD-PCB (SMD Adapter PCBs x 5pcs)

For more information please contact :

info@sgxsensortech.com

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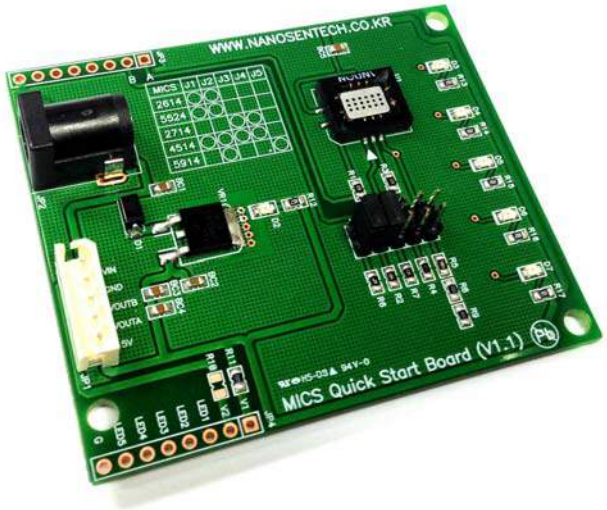
NST Nanosentech

Sensing the Future !!

MiCS-Quick Start Board



The MiCS-Quick Start Board allows a number of the MiCS Sensors to be quickly tested, with the required circuit on a PCB, through the use of jumpers.

Features

- For use with MiCS-2614, 2714, 4514, 5524, 5914
- Quick test
- Basic circuit supports
- Easy to up-garde or replacing sensors without de-soldering
- Eliminate soldering temperature damage
- Support SMD socket on the board
- DC 9V Power supply
- Operating Temeprature 0 ~ 50˚C
- Extension Port
- Jumper socket in order to use several sensors
- Size 70 x 59 x 23 mm

Packing List

- MiCS-Quick Start Board
- 4 Plastic_Legs with 4 Screws
- Not include Adapter
- Not include Sensors

For more information please contact :

info@nanosentech.co.kr

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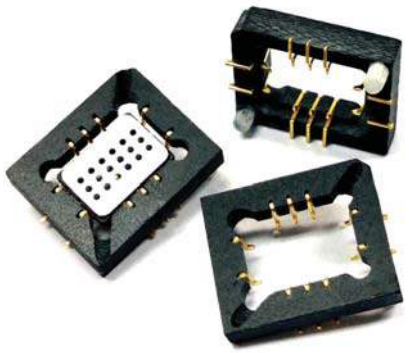
NST Nanosentech

Sensing the Future !!

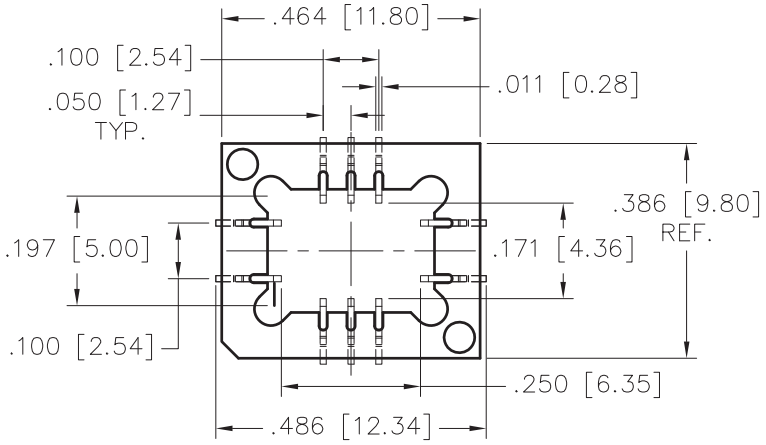
The MiCS-SOCKET provide high reliability.

The main advantage of using MiCS-SOCKET is
to eliminate soldering temperature damage,
production line ESD problems that can enter the sensors.
Easy to up-grade or replacing defective sensors without de-soldering.
MiCS-SOCKET provide high reliability and total lower costs.

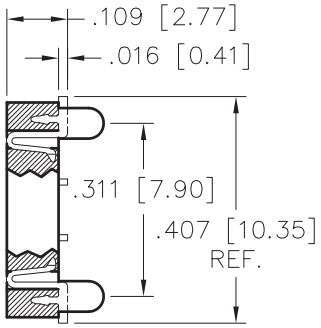


Electrical Data		Material Data	
Contact Resistance	30 mΩ	Insulator	FR-4, BLACK, UL94V-0
Current Rating	1.0 AMP	Contact	BERYLLIUM COPPER
Insulation Resistance	1000 mΩ	Plating	GOLD 10μ inch min
Dielectric Voltage	500 VAC		

Top view



Side view



Dimensions

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