

SMB-95-11
SPECIFICATIONS

MODEL	SMB-95-11
PARTS NAME	LOW POWER METHANE SENSOR
SPECIFICATION	S-2111-01
ISSUE DATE	8. Nov. 2021
CUSTOMER	General customer via Shanghai DAYI

Document No.	Date	Name
Created	2 nd , Nov., 2021	T. Maeda
Approved	8 th , Nov., 2021	S. Matsumoto
N of copy	Number	Date
Customer	copy	
Distributor	copy	
FIS	copy	

Sign,

Customer; _____

Distributor; Dayi (Shanghai) Industry Co., Ltd



FIS; Nissha FIS, Inc.

S. Matsumoto
2021. Nov. 16

SPECIFICATIONS**Nissha FIS**

Parts Name Low Power Methane Sensor

Specification No.

Model SMB-95-11

S-2111-01

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Attachment;

Package specifications, Product drawing

History of revisions

Ref. No.	Date	Notes	Designed
Issue	2 nd , Nov., 2021	Created	T. Maeda

SPECIFICATIONS

Nissha FIS

Parts Name Low Power Methane Sensor
 Model SMB-95-11

Specification No.
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2. Application

This specification is applied to the SMB-95-11 which is designed for low power methane alarming devices applications.

<Futures>

SMB-95-11 is a mcMEMS® semiconductor gas sensor using the micro coiling technology.

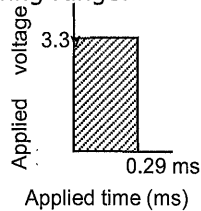
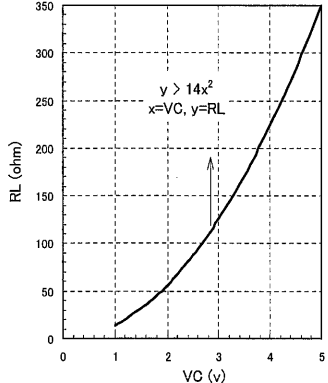
This sensor has excellent features to detect methane for battery operated gas detector, portable gas monitor, IoT/WiFi devices and others.

- Small power consumption (below 1mW)
- Heater can be pulse driven.
- Sensor housing without heat dissipation
- Long life

3. Parts Name/Number

Name: Low Power Methane Sensor
 Model: SMB-95-11
 Customer's parts number:

4. Absolute Maximum Ratings

Parameter	Symbol	Maximum Rating	Remark
Heater Power Consumption	P_H	Maximum heater power consumption is 130mW (0.8v). (pin1-3)	In the case of Dynamic Driving(pulse) operation, the voltage and duration of pulse must be inside of the following range. 
Circuit Voltage	V_C	Maximum 5.5v DC	
Load Resistance	R_L	The R_L value must be chosen in the range defined by the following formula. $x=V_C, y=R_L$ $y > 14x^2$ Example: $V_C=5v; R_L > 350 \text{ ohm}$ $V_C=3v; R_L > 126 \text{ ohm}$	
Operating Temperature	Top	-10 ~ 50°C	Condensation must be avoided.
Storage Temperature	Tst	-20 ~ 60°C	Condensation must be avoided.
Note		Avoid any contamination by organic solvents (e.g. isopropyl alcohol) and silicon compound.	

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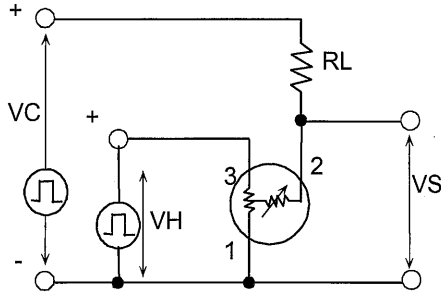
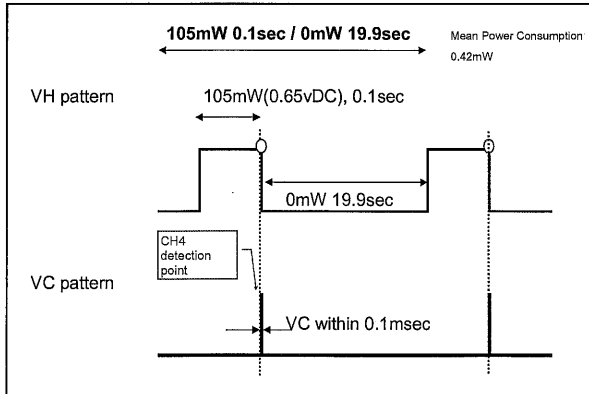
Parts Name Low Power Methane Sensor

Specification No.

Model SMB-95-11

S-2111-01

5. Standard circuit and operating conditions

Parameters	Conditions	Remarks
Test temperature and humidity	20°C±2°C, 65%±5%	
Test gases	Clean air Pure methane gas (purity: 99% or higher)	
Operating Circuit	 <p>The waveform of the service power source for the heater.</p> <p>By the effective value, VH(on) = 105mW ± 4%, 0.1sec. ± 0.03sec. or = 0.65vDC ± 4%, 0.1sec. ± 0.03sec. VH(off) = 0mW or 0vDC, 19.9sec</p> <p>VC = 3.3v (min.2v max.3.4v), pulse within 0.1msec. width</p> <p>Recommend RL = 0.51 kohm</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;">  </div>	<p>Response speed of voltage change from VH(on) to VH(off) should be within 5msec.(90% stable points) Response speed of voltage change from VH(off) to VH(on) should be within 5msec.(90% stable points)</p> <p>Both DC and pulse drive for VH operations are usable.</p> <p>Can operate VH(off) from 9.9sec to 179.9sec</p>
Detection timing of CH4 Alarm	The detection timing of CH4 alarm is end of VH(on). VH(on) 0.1seconds +/- 0.01 seconds	
Pre-heating time	More than three days	At 20°C±10°C, 65%±15% in clean environment

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6. Characteristics of methane

NO	Parameters	Conditions	Specifications	Remarks
1	Resistance in CH4 5000ppm	R_s (CH4 5000)	0.2 – 2.0 kohm	
2	Concentration Slope 5000 - 10000ppm	$R(\text{CH}_4 10000) / R(\text{CH}_4 5000)$	0.3 - 0.8	
3	Sensitivity of CH4	$R(\text{air})/R(\text{CH}_4 5000)$	more than 3.0	
4	Ethanol selectivity	$\frac{R_s (\text{ET } 1000)}{R (\text{CH}_4 5000)}$	more than 2.0	
5	Heater current	IVH= 0.65v DC 30 seconds after supplying VH	150 mA \pm 10 mA	
6	Heater resistance	RH with VH OFF	1.8 ohm \pm 0.2 ohm	in 25°C
7	Low temperature dependency	$\frac{R (\text{CH}_4 5000 \text{ at } -10^\circ\text{C})}{R (\text{CH}_4 5000 \text{ at } 20^\circ\text{C}, 65\%)}$	1.3 \pm 0.3	1 hour retention
8	High temperature dependency	$\frac{R (\text{CH}_4 5000 \text{ at } 50^\circ\text{C}, 60\%)}{R (\text{CH}_4 5000 \text{ at } 20^\circ\text{C}, 65\%)}$	0.75 \pm 0.10	1 hour retention

Note: The above characteristics are specified using the Standard Circuit and operating conditions shown in section5 Standard circuit and operating conditions.
The unit of the gas concentration is ppm.

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Model SMB-95-11

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7. Reference technical data

< Example of formula for pulse-driving the heater with DC 3.3 v >

SMB-95-xx Pulse condition
Low power gas sensor

	Conditions
VP= (v)	3.3
Period= (msec)	5.0

VH (V)	WH (W)	IH (A)	RH (ohm)	Temp	Ton (msec)	Peak IH (A)
0.10	0.009	0.063	1.878	41.5	0.0082	1.7569
0.15	0.015	0.077	2.057	73.5	0.0146	1.6042
0.20	0.022	0.090	2.266	105.5	0.0233	1.4565
0.25	0.030	0.100	2.489	137.5	0.0343	1.3261
0.30	0.038	0.109	2.717	169.5	0.0477	1.2144
0.35	0.047	0.117	2.946	201.6	0.0635	1.1201
0.40	0.056	0.124	3.174	233.6	0.0816	1.0396
0.45	0.065	0.131	3.401	265.6	0.1021	0.9703
0.50	0.075	0.136	3.623	297.6	0.1249	0.9109
0.55	0.085	0.142	3.841	329.6	0.1499	0.8591
0.60	0.095	0.146	4.053	361.7	0.1770	0.8142
0.65	0.105	0.151	4.257	393.7	0.2060	0.7751
0.70	0.116	0.154	4.452	425.7	0.2367	0.7412
0.75	0.126	0.158	4.638	457.7	0.2691	0.7116
0.80	0.133	0.166	4.814	489.7	0.2938	0.6855

0.65v is standard VH, 0.80v is an absolute Maximum Rating of VH.
For details please contact Nissha FIS, Inc..

8. Mechanical characteristics

NO	Parameters	Conditions	Specifications
1	Connection strength of filter housing	Between the external filter housing and base	More than 9.8N (1kgf)
2	Vibration	Acceleration; 12.7m/s ² (1.3G) Frequency range; 5 ~ 500Hz Method of changing the sweep; Logarithmic Sweep time; 40min. Direction of vibration; 3 directions (X,Y,Z) Duration; 66hr of each direction	Should satisfy the specifications shown in 6 Characteristics of methane.
3	Drop and impact	From the height 1m, freedom drop Floor material; Concrete Test number of times; three	Should satisfy the specifications shown in 6 Characteristics of methane.
4	Soldering specifications	Standard; JIS C 60068-2-20 (2010) 4.3.3 Soldering iron; Trowel point B Soldering times; 2~3seconds	The wet ability is good.

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Parts Name Low Power Methane Sensor Model SMB-95-11	Specification No. S-2111-01
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9. Marking

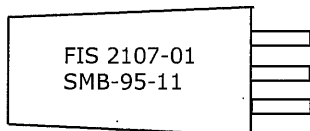
F I S Y Y M M - I I ← Company name, - , Sensor lot number
S M B - 9 5 - 1 1 ← Parts number

YY: Production year; the bottom column of a.d.

MM: Production month; 01~12

II: Trace number; 01~99

<Example>



10. Related drawing sheets

1. Package specifications
2. Product drawing

11. Handling of this specification

This specification shall be exchanged between customer and Nissha FIS, Inc..

Other contents than specified in this specification shall be decided through mutual consultation between both parties.

All or a part of this specification shall not be disclosed to any third parties without advance consent of the other party.

12. Other information

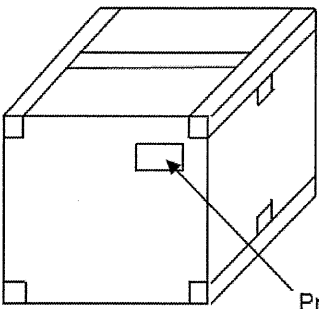
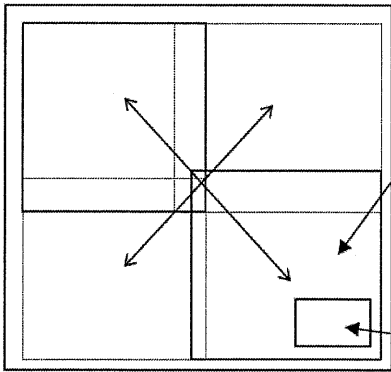
Handling Notes

- Gas sensitivity measurement should be made under clean air without noise gases.
- When soldering the sensor, keep the recommended soldering conditions. Avoid reflow soldering and soldering bath.
- If sensor housing is damaged, don't use the sensor.
- Don't blow organic solvents, paints, chemical agents, oils, or high concentration gases onto the sensor.
- The sensor can be poisoned by silicon, so use circuit components that don't contain silicon. Also, when using an adhesive for fixing parts, use a material that doesn't contain silicon.
- When conducting a detailed gas sensitivity test, energize for at least 24 hours before performing the gas sensitivity test.
- Don't install in the following places.
 - i. Places where it will be exposed to rain or water droplets
 - ii. Installation location outside the operating temperature and humidity range
 - iii. Places where condensation forms and oily smoke is generated
 - iv. Places with strong vibration / impact
 - v. Places where strong inductive noise, electric field, and magnetic field are generated
 - vi. Places exposed to direct sunlight
 - vii. Places with corrosive gas

Packing Specifications

Issue date: 2nd, November 2021

NisshaFIS Inc.

		Approval		Drawing													
		S. Matsumoto		T.Maeda													
Customer		Chinese customer via Shanghai DAYI		Quantity													
Products Name		SMB-95-11		5000 pcs.													
		Weight		8.2 kg													
		Storage Temp.		-20 deg ~ 60 deg													
Packaging Materials		1. Carton box (330 X 360 X 280mm) 2. Gas/humidity barrier plastic bag (210 X 210mm) 3. Products label		4. Packaging tape 5. Cushion sheet													
Packaging procedure		<p>* At the place that the temperature and humidity atmosphere is controlled, put 100 pcs. in a gas/humidity barrier plastic bag and seal it up and put the product slip. It is packed plural plastic bags to one carton box.</p> <p>* The number of the sensor in a gas/humidity barrier bag is 100 pcs. (1 layer, 100 pcs x 50 layers) and put the cushion sheet on every layers.</p> <p>* Put the product slip witch written down on the contents of the package on the upper right of the surface.</p> <p>Put the cushion sheet in the space of each step and top and bottom of the box.</p> <p style="text-align: center;">Sample of the layout for a layer</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Products label</p> </div> <div style="text-align: center;">  <p>Gas/Humidity barrier bag</p> <p>Products label</p> </div> </div>															
Packing unit.		Products label (e.g.)		Note													
<p>The number of the units in the carton box have to be 5000 pcs.</p> <p>In case of that it doesn't arrive at the packing unit, an optional carton box can be used.</p>		<p style="text-align: center;">Nissha FIS, Inc.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Part No.</td> <td>SMB-95-11</td> </tr> <tr> <td>Class</td> <td></td> </tr> <tr> <td>Quantity</td> <td>100 pcs.</td> </tr> <tr> <td>Date</td> <td>2-Sep-2021</td> </tr> <tr> <td>Remarks</td> <td>RoHS compliant</td> </tr> <tr> <td colspan="2" style="text-align: center;">MADE IN JAPAN</td> </tr> </table>		Part No.	SMB-95-11	Class		Quantity	100 pcs.	Date	2-Sep-2021	Remarks	RoHS compliant	MADE IN JAPAN			
Part No.	SMB-95-11																
Class																	
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Date	2-Sep-2021																
Remarks	RoHS compliant																
MADE IN JAPAN																	
Modification	Date	Modification contents		Name													

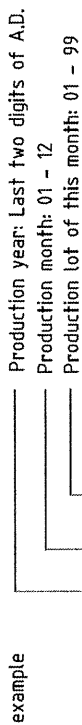
Operation conditions: Based on the specification document

Weight: Approx. 1.2g

RoHS: compliant product

Appearance: No significant dirt, deformation, pin bending or breakage

Identification markings:

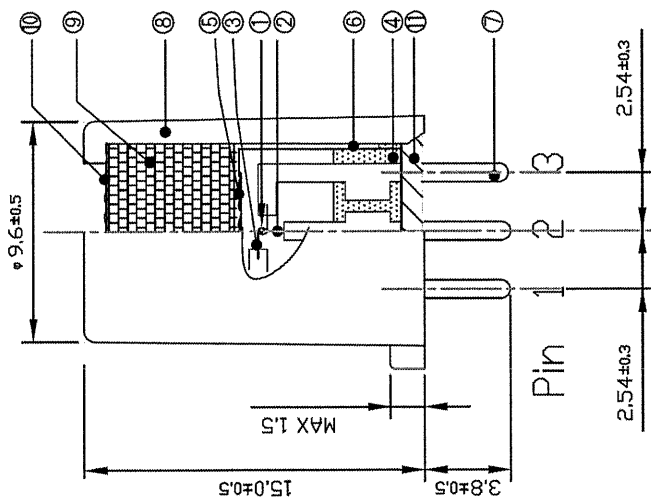
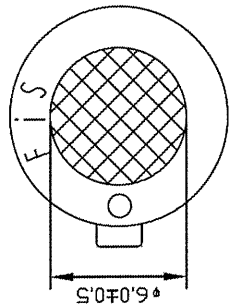


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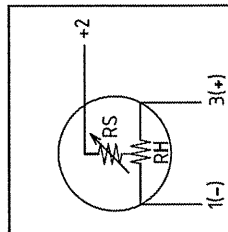
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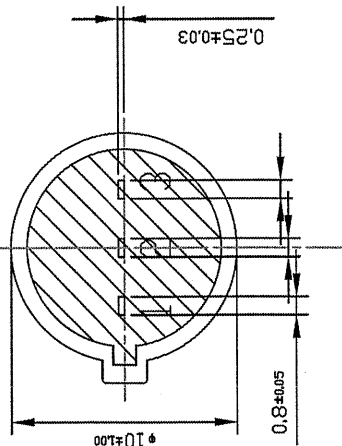
Sensor part number



EQUIVALENT CIRCUIT



RS : Sensor resistance
RH : Heater resistance



Storage: Avoid any contamination of filter by organic solvents (e.g. isopropyl alcohol) and silicon compounds.
Don't store in high humidity environment or in a place where solvent is present.
Sensors should be stored in a sealed bag for avoiding possible effect from gas/humidity.

Special mention: The sensor should seal the bottom of the housing for airtightness.

No.	Part name	Material	Specification
①	Sensing element	Metal oxide semiconductor	
②	Lead wire	Pt	φ 15μm
③	Heater coil	Pt	φ 15μm
④	Sensor base	PBT, GF30%, Gray	UL94 V-0(0.66m)
⑤	Mesh of sensor cover	SUS316 1/2H, Ni plating	100 mesh, 2 sheets
⑥	Sensor cover	Brass, Ni plating	
⑦	Electrode pin	SUS304 1/2H, Ni plating	
⑧	Filter housing	NYLON6	UL94 V-2
⑨	Filter	Active charcoal	
⑩	Mesh of filter housing	SUS316 1/2H, Ni plating	100 mesh
⑪	Sealant	Urethane	UL94 V-0

Part's Name

SMB-95-11

Scale

UNIT

Free

mm

Drawn / Date

Checked / Date

Revision Record

LTR

FIS Inc