FIGARO

PRODUCT INFORMATION

NGM2611-C13 - pre-calibrated module for Methane

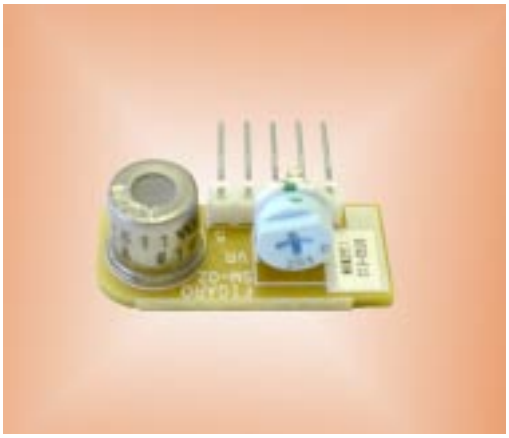
Features:

* Factory calibrated
* Temperature compensation circuit
* Low power consumption sensor TGS2611
* Compact size
* Meets RoHS regulations

Applications:

* Residential natural gas alarm

The NGM2611 is a pre-calibrated module for natural gas alarms which is precisely calibrated in Figaro's humidity and temperature controlled facility.



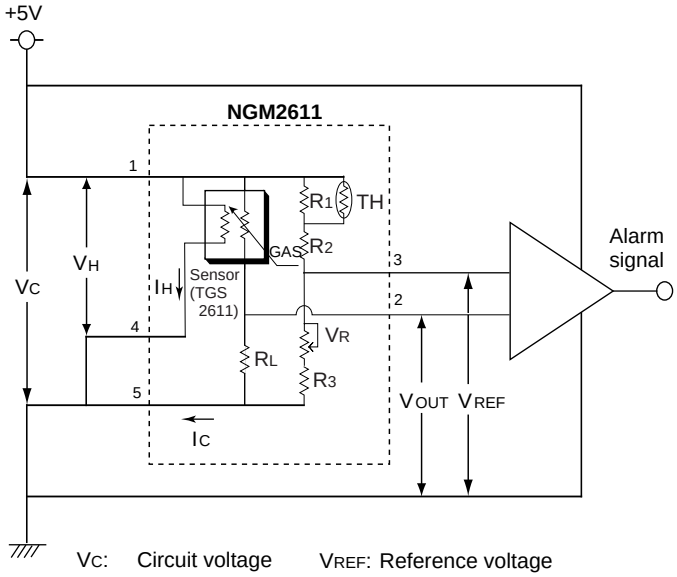
The most important process in manufacturing reliable resdential gas alarms is adjusting the alarm point. Calibration is a complicated and time consuming process which also requires a substantial investment in calibration equipment. By eliminating the costly calibration process, this module enables users to easily and simply manufacture residential natural gas alarms. Figaro has taken the complexity out of designing a gas detector circuit by providing users with a temperature compensation circuit which combines a built-in thermistor and individually adjusted load resistor together with Figaro's low power methane gas sensor.

A connector allows easy replacement of the module for the purpose of periodic sensor renewal. This input/output connector enables easy installation of the module into the gas detectors' mother board. This same mother board can be used for both methane and LPG gas detectors by simply changing the module.

This module is designed to meet the performance requirements of EN50194, and UL1484.

Please refer to *"Technical Information for TGS2611"* for sensor sensitivity characteristics. Refer to *"Application Notes for TGS2611"* for further information regarding circuit design.

Circuit Diagram



VC: Circuit voltage
VH: Heater voltage
VOUT: Output voltage
VREF: Reference voltage
IC: Circuit current
IH: Heater current

Basic Pin Connection

A regulated voltage of 5V DC should be applied to Pin #1. A voltage comparator should be connected to Pins #2 and 3. A circuit for detecting breakage of the heater may be connected to Pin #4 (in which case, Pins #4 and 5 should be connected separately to the GND).

When the gas sensor module is exposed to a concentration of target gas which exceeds the desired alarming point, the value of Vout will reach or exceed the value of VREF, causing the module to reach the alarm condition.

NOTE: As described in Sec. 2-6 of *"Technical Information for TGS2611"*, when energizing the sensor after an unpowered period, the sensor's resistance (Rs) drops sharply for the first few seconds after energizing, regardless of the presence of gases, before recovering to a stable level. This 'initial action' may cause activation of an alarm during the first few moments of energizing since VRL would exceed Vref. To prevent unnecessary alarms during sensor warmup, a circuit modification such as that shown in Sec. 1-7 of *"Application Notes for TGS2611"* should be used.

Parts List:

Symbol	Part	Spec.	Maker	Model #	Qty
R_1	Carbon resistor	22kΩ 1/8W	Panasonic	ERJ8GEYJ223A	1
R_2	Carbon resistor	6.8kΩ 1/8W	Panasonic	ERJ8GEYJ682A	1
R_3	Carbon resistor	6.8kΩ 1/8W	Panasonic	ERJ8GEYJ682A	1
R_L	Carbon resistor	Var. 1/8W	Panasonic	ERJ8GEYJxxxA	1
V	Potentiometer	20kΩ 1/3W	HDK	NVG6	1
	(alternate)	20kΩ 1/3W	Koa	KVSF689A	1
TH	Thermistor	10kΩ at 25˚C B const.=3400±3%	Mitsubishi Materials	SC20-3I103KT	1
	(alternate 1)	10kΩ at 25˚C B const.=3370±1%	Mitsubishi Materials	TH11-3H103FT	
	(alternate 2)	10kΩ at 25˚C B const.=3414±1%	Semitec	103K1608T-1P	
	(alternate 3)	10kΩ at 25˚C B const.=3380±1%	Murata	NCP18XH103J03RB	
Sensor	Gas Sensor	-	Figaro	TGS2611-C00	1
CN	Connector	-	Nichiatsu	MB5P-90S	1

Specifications:

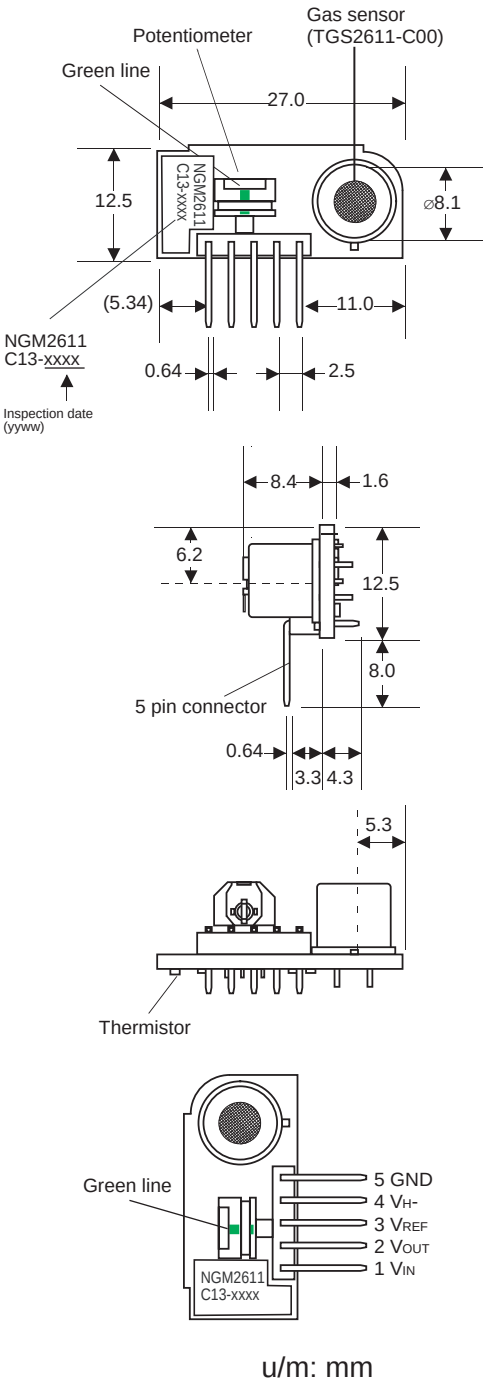
Module number			NGM 2611-C13
Standard test conditions	Test gas conditions		5000±100ppm methane in air at 20±2˚C, 65±5%RH
	Circuit conditions		V_H = 5.0±0.05V DC V_C = 5.0±0.05V DC
	Preheating period prior to test		2 days
Electrical characteristics under standard test conditions	Reference voltage	$V_{REF(STD)}$	$V_{out(STD)}$ ±0.5V DC
	Output voltage	$V_{out(STD)}$	2.5±0.5V DC

Electrical Characteristics:

Recommended operating conditions	Heater voltage	V_H	5.0±0.2V DC
	Circuit voltage	V_C	5.0±0.2V DC
	Minimum impedance between Pin#2 and GND		2.5MΩ
	Minimum impedance between Pin#3 and GND		
	Operating conditions		0~40˚C, 30~95%RH
	Temperature differential between inside and outside detector casing		≤10˚C max. (see NOTE)
Electrical characteristics under operating conditions	Heater current *(current between Pins #1 and 4)*	I_H	56±5mA
	Circuit current *(current between Pins #1 and 5)*	I_C	10mA (max.)
	Reference voltage	V_{REF}	1.0~4.0V DC
	Output voltage	V_{out}	0.05~(Vc-0.05)V DC

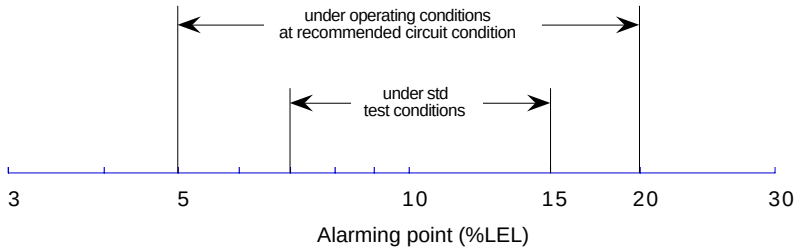
NOTE: Due to heat generated by circuit components, if the internal temperature of the detector exceeds the environmental temperture outside the detector casing by 10˚C or more, the calibrated alarm concentration would drift due to drifting of Vref. If users are unable to design detectors so as to keep this temperature differential below 10˚C, please consult with Figaro.

Structure and Dimensions:



IMPORTANT NOTE: *The original setting of the potentiometer should be checked prior to usage of the module to verify that it is in the calibrated position. NGM2611 has a green line on the potentiometer which should be in alignment.*

Expected performance:



Expected performance of methanegas detectors
using NGM2611 and 10% LEL alarming point

NOTE: When using NGM2611, typical alarm tolerances for 10%LEL of methane gas such as those shown in the figure above can be expected. However, in actual usage, alarm thresholds may vary since the threshold is also affected by such factors as the tolerances of test conditions and heat generation inside the gas detection enclosure. As a result, Figaro neither expressly nor impliedly warrants the performance shown in this figure. If a large difference between the expected and actual performance of detectors is noticed, please consult with Figaro.

Absolute Maximum Ratings:

Absolute maximum ratings (see NOTE)	Circuit voltage	Vc	-0.3~+5.5V DC
	Heater voltage	V_H	-0.3~+5.5V DC *(max. of 2 minutes at 5.5V)*
	Operating temperature		-15~+55˚C *(max. 95%RH)*
	Storage temperature		-20~+60˚C *(avoid condensation)*
	Soldering temperature		260˚C *(max. in 10 sec.)*

NOTE: Detectors should be designed according to "Recommended Operating Conditions" as shown above. However, detector circuits should also be designed not to exceed "Absolute Maximum Ratings" under any circumstances. To exceed these ratings may cause damage or deterioration of the sensor.

For applications involving usage of NGM2611 for applications other than residential natural gas alarms, please consult with Figaro.

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