SGM447
1.5V Dual-Gain Analog Temperature Sensor with Class-AB Output

GENERAL DESCRIPTION

The SGM447 is a high-accuracy analog output CMOS integrated-circuit temperature sensor with tiny WLCSP package. It can operate with a supply voltage of 1.5V in the lowest gain configuration while measuring the temperature of -55℃ to +150℃.

The SGM447 is capable of strong output source and sink current while driving heavy loads in that it has class-AB output. Therefore, it is available for sourcing the input of a sample-and-hold analog-to-digital converter requiring transient load. Without using external components such as resistors and buffers on the output, the SGM447 can deliver the output voltage inversely proportional to measured temperature from -55℃ to +150℃. Low supply current makes it suitable for application in general temperature sensors and battery-powered systems.

The gain of the temperature-to-voltage output transfer function is set by the gain selection input (GS) pin with two selectable slopes, (-5.4mV/℃ at GS = 0 or -8.1mV/℃ at GS = 1). If the GS pin is connect to logic high, the transfer function will achieve the maximum temperature sensitivity gain. The GS pin can be connected to VDD or GND without any components such as pull-up or pull-down resistors to minimize the board area. During operation or system diagnostics, if the input is driven by a logical signal, then the system will optimize the gain.

The SGM447 is available in a Green WLCSP-0.8×0.8-4B-A package. It is specified over a wide temperature range of -55℃ to +150℃.

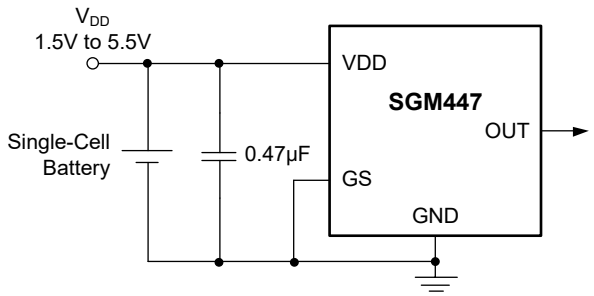
FEATURES

- **Power Supply Voltage: 1.5V to 5.5V**
- **Low Quiescent Current**
- **Temperature Accuracy:**
  - **-20℃ to +85℃: ±2.5℃ (MAX)**
  - **-55℃ to +150℃: ±3.5℃ (MAX)**
- **Two Selectable Gains**
- **300μA (MAX) Source Current**
- **Push-pull Output**
- **Output Short-Circuit Protection**
- **Operating Temperature Range: -55℃ to +150℃**
- **Available in a Green WLCSP-0.8×0.8-4B-A Package**

APPLICATIONS

Temperature Sensing and Compensation
Battery Management
Automotive Equipment

TYPICAL APPLICATION



Available Detected Temperature Range from -55℃ to +150℃ Powered by Battery.

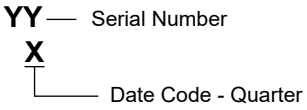
Figure 1. Typical Application Circuit

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM447	WLCSP-0.8×0.8-4B-A	-55℃ to +150℃	SGM447TG/TR	1X X	Tape and Reel, 5000

MARKING INFORMATION

NOTE: X = Date Code.



Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

ABSOLUTE MAXIMUM RATINGS

Supply Voltage ..... -0.3V to 6V
Voltage at Output Pin ..... -0.3V to (V_{DD} + 0.3V)
Output Current ..... ±7mA
Voltage at GS Input Pin ..... -0.3V to 6V
Input Current at Any Pin (1) 5mA
Package Thermal Resistance
WLCSP-0.8×0.8-4B-A, θ_{JA} ..... 122℃/W
Junction Temperature ..... +150℃
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ..... +260℃
ESD Susceptibility
HBM 4000V
CDM 1000V

RECOMMENDED OPERATING CONDITIONS

Supply Voltage Range, V_{DD} ..... 1.5V to 5.5V
Operating Ambient Temperature Range ..... -55℃ to +150℃
Supply Voltage Ramp Rate Range ..... 0.2V/ms to 20V/ms
Supply Voltage Ramp Rate Range(C_{OUT} = 1nF) .....
..... 0.2mV/μs to 5V/μs

NOTE:
1. When the input voltage (V_{IN}) at any pin exceeds power supplies (V_{IN} < GND or V_{IN} > V+), the current at that pin should be limited to 5mA.

OVERSTRESS CAUTION

Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

ESD SENSITIVITY CAUTION

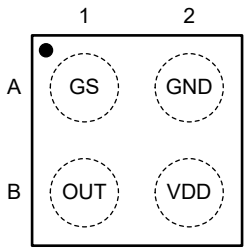
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because even small parametric changes could cause the device not to meet the published specifications.

DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

PIN CONFIGURATION

(TOP VIEW)



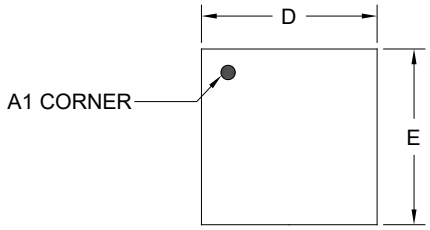
WLCSP-0.8×0.8-4B-A

PIN DESCRIPTION

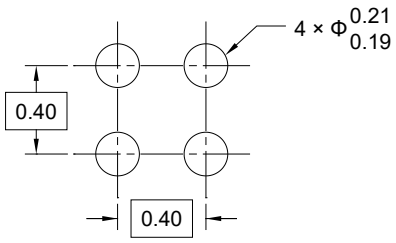
PIN	NAME	FUNCTION
A1	GS	Gain Selection Input Pin. It is used for selecting the slope of the analog output response, -5.4mV/℃ (GS = 0) or -8.1mV/℃ (GS = 1).
A2	GND	Ground Pin.
B1	OUT	Output Voltage Pin. The Output voltage is inversely proportional to measuring temperature.
B2	VDD	Positive Power Supply.

PACKAGE OUTLINE DIMENSIONS

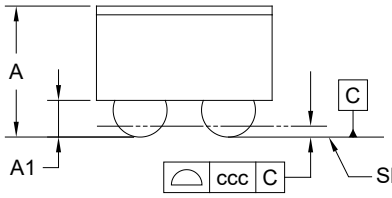
WLCSP-0.8×0.8-4B-A



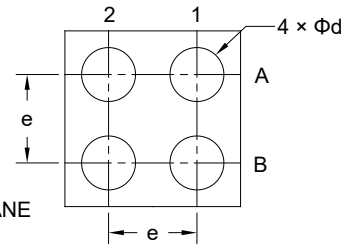
TOP VIEW



RECOMMENDED LAND PATTERN (Unit: mm)



SIDE VIEW



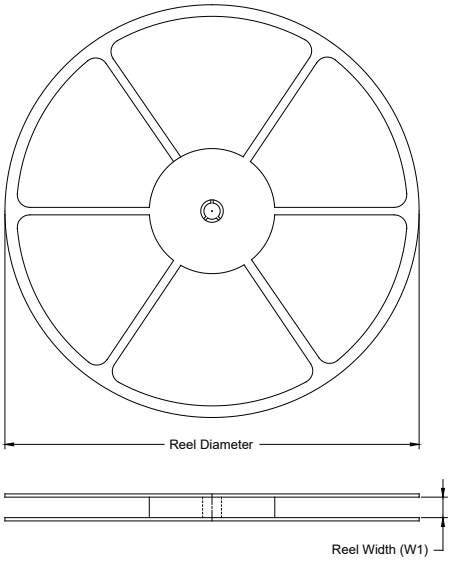
BOTTOM VIEW

Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	-	-	0.638
A1	0.148	-	0.188
D	0.775	-	0.835
E	0.775	-	0.835
d	0.217	-	0.277
e	0.400 BSC		
ccc	0.050		

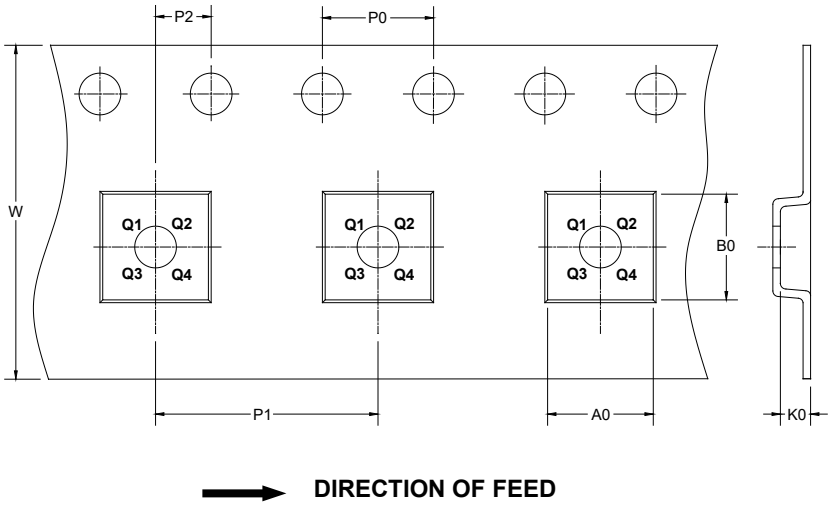
NOTE: This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



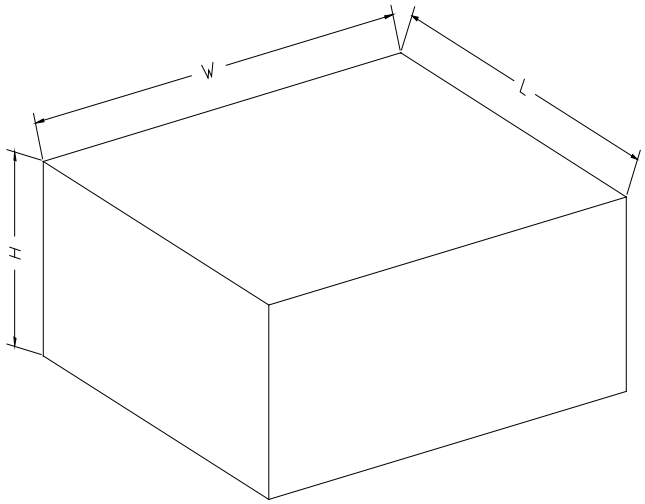
NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
WLCSP-0.8×0.8-4B-A	7″	9.5	0.89	0.89	0.70	4.0	2.0	2.0	8.0	Q1

DD0001

CARTON BOX DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
7″ (Option)	368	227	224	8
7″	442	410	224	18

DD0002