SGM90810
12-Bit, 8-Channel, Digital System Monitor with Temperature Sensor, Internal/External Reference, and I^2C Interface

GENERAL DESCRIPTION

The SGM90810 is an 8-channel system monitor especially designed for monitoring complicated system status. The power supply voltage range is from 3V to 5.5V. By configuring the internal registers, the signal input mode can be single-ended or pseudo-differential. The SGM90810 is equipped with a temperature sensor inside, built-in digital comparators and an interrupt output pin, which provides flexibility to monitor each channel and generate alarm signals when the input exceeds the thresholds. The SGM90810 also integrates an internal reference, which makes this device a complete single chip solution for system monitor.

The SGM90810 system monitor has a true 12-bit sigma-delta ADC internally with I^2C interfaces. The interface supports the Standard Mode (100kbps) and the Fast Mode (400kbps). The analog filters on the I^2C bus provide excellent noise resistance performance. The SDA and SCL of I^2C have a timeout reset function to prevent I^2C bus locking. The SGM90810 provides a flexible sequencer for controlling channel conversions. The data conversion results of each channel is stored in independent registers. And each channel can be independently shut down to save power.

The SGM90810 is available in a Green TSSOP-16 package. It operates over the operating temperature range of -40℃ to +125℃.
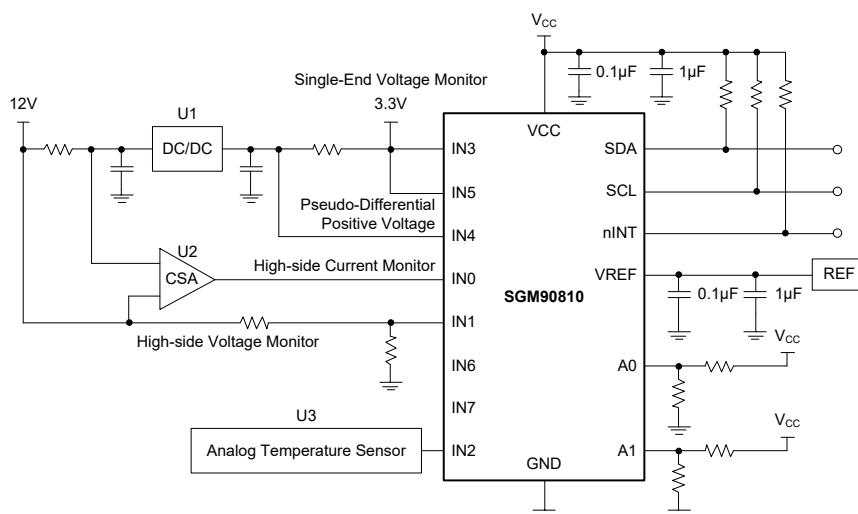
FEATURES

- True 12-Bit Sigma-Delta ADC Core
- Power Supply Range: 3V to 5.5V
- Total Unadjusted Error: ±0.16%
- ±1 LSB INL and ±1 LSB DNL
- Operating Current: 0.25mA
- Deep Shutdown Current: 15µA
- Temperature Resolution: 0.5℃/LSB
- Temperature Accuracy:
  - -40℃ to +125℃: ±2℃ (MAX)
- Configurable Single-Ended and/or Pseudo-Diff. Inputs
- Selectable Internal 2.56V V_{REF} or External V_{REF}
- Digital Comparators for Each Channel
- Interrupt Pin nINT for Generating Alarm Signal
- I^2C Serial Bus Interface Compatibility with 9 Selectable Addresses
- Time-Out Reset Feature for I^2C interface
- Separate Channel Shutdown and Whole Chip Deep Shutdown Mode to Minimize Power Consumption
- Available in a Green TSSOP-16 Package

APPLICATIONS

Telecommunications
Server Systems
Industrial and Medical Systems
Instrumentation and Test Equipment
Voltage and Current Monitoring

## TYPICAL APPLICATION

Figure 1. Typical Application Circuit

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM90810	TSSOP-16	-40℃ to +125℃	SGM90810XTS16G/TR	SGM17J XTS16 XXXXX	Tape and Reel, 4000

MARKING INFORMATION

NOTE: XXXXX = Date Code, Trace Code and Vendor Code.

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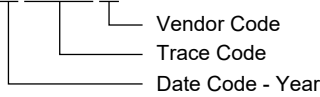
Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

ABSOLUTE MAXIMUM RATINGS

Supply Voltage, V_{CC}..6V
Voltage on SCL, SDA, A0, A1, nINT.................... -0.3V to 6V
Voltage on IN0 to IN7, V_{REF} ....-0.3V to V_{CC} + 0.3V
Input Current at Any Pin................................±5mA
Package Input Current...............................±30mA
Package Thermal Resistance
  TSSOP-16, θ_{JA}.................................... 99.3℃/W
  TSSOP-16, θ_{JB}.................................... 69.1℃/W
  TSSOP-16, θ_{JC}.................................... 38.7℃/W
Junction Temperature.................................+150℃
Storage Temperature Range ....-65℃ to +150℃
Lead Temperature (Soldering, 10s)...........................+260℃
ESD Susceptibility [1] [2]
HBM..±6000V
CDM ....±2000V

NOTES:

1. For human body model (HBM), all pins comply with ANSI/ESDA/JEDEC JS-001 specifications.

2. For charged device model (CDM), all pins comply with ANSI/ESDA/JEDEC JS-002 specifications.

RECOMMENDED OPERATING CONDITIONS

Supply Voltage, V_{CC}..3V to 5.5V
Voltage on SCL, SDA, A0, A1, nINT.............. -0.05V to 5.5V
Voltage on IN0 to IN7, V_{REF} ....-0.05V to V_{CC} + 0.05V
Operating Ambient Temperature Range......-40℃ to +125℃
Operating Junction Temperature Range......-40℃ to +125℃

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.
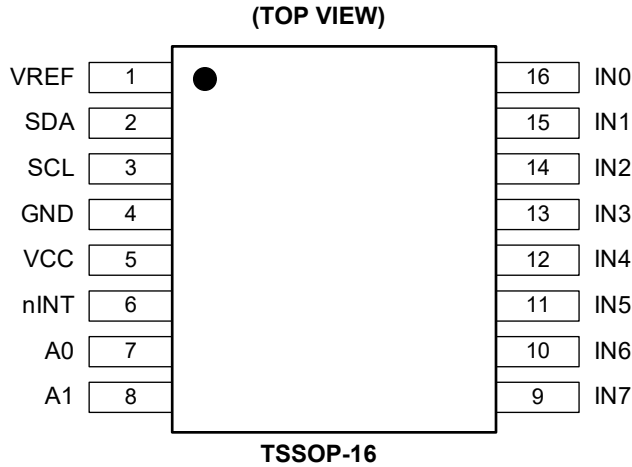
DISCLAIMER

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

PIN CONFIGURATION

(TOP VIEW)

```
        VREF ┌─ 1    ●        16 ─┐ IN0
         SDA ┌─ 2             15 ─┐ IN1
         SCL ┌─ 3             14 ─┐ IN2
         GND ┌─ 4             13 ─┐ IN3
         VCC ┌─ 5             12 ─┐ IN4
        nINT ┌─ 6             11 ─┐ IN5
          A0 ┌─ 7             10 ─┐ IN6
          A1 ┌─ 8              9 ─┐ IN7
```

TSSOP-16

PIN DESCRIPTION

PIN	NAME	TYPE	FUNCTION
1	VREF	AI	External Reference Input. The external reference voltage ranges from 1.25V to V_{CC}. Bypass this pin with a ceramic 1µF parallel with 0.1µF capacitor is strongly recommended. Leave it disconnected if using internal 2.56V reference. Note that the SGM90810 enables internal reference by default.
2	SDA	DI/DO	Serial Bus Data Line, Open-Drain Input/Output.
3	SCL	DI	Serial Bus Clock Line, Open-Drain Input.
4	GND	G	Ground.
5	VCC	P	Power Supply Pin. Bypass this pin with a ceramic 1µF parallel with 0.1µF capacitor is strongly recommended.
6	nINT	DO	Active-Low Open-Drain Interrupt Alarm Pin. A pull-up resistor is needed to make it work properly.
7	A0	Tri-Level Inputs	I²C Bus Device Address Select Pins. Support 9 addresses.
8	A1		
9	IN7	AI	Eight input pins which can be configured to different input modes. The input mode can be configured as single ended mode or pseudo-differential mode through registers.
10	IN6		
11	IN5		
12	IN4		
13	IN3		
14	IN2		
15	IN1		
16	IN0		

NOTE: AI: Analog Input, DI: Digital Input, DO: Digital Output, G: Ground, P: Power.

PACKAGE OUTLINE DIMENSIONS

TSSOP-16

RECOMMENDED LAND PATTERN (Unit: mm)
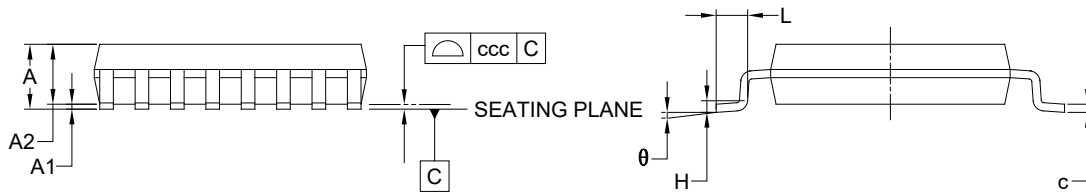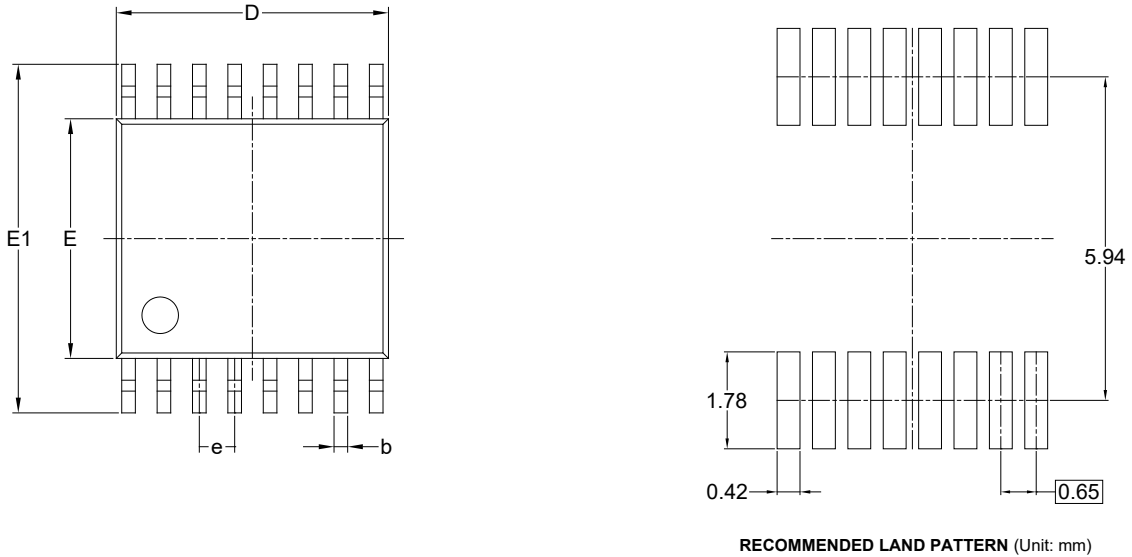
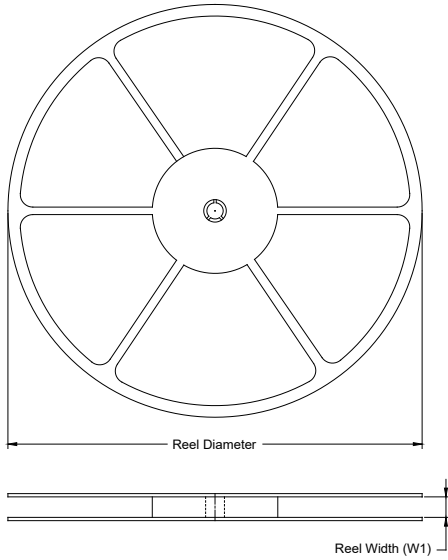| Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	-	-	1.200
A1	0.050	-	0.150
A2	0.800	-	1.050
b	0.190	-	0.300
c	0.090	-	0.200
D	4.860	-	5.100
E	4.300	-	4.500
E1	6.200	-	6.600
e	0.650 BSC		
L	0.450	-	0.750
H	0.250 TYP		
θ	0°	-	8°
ccc	0.100		

NOTES:
1. This drawing is subject to change without notice.
2. The dimensions do not include mold flashes, protrusions or gate burrs.
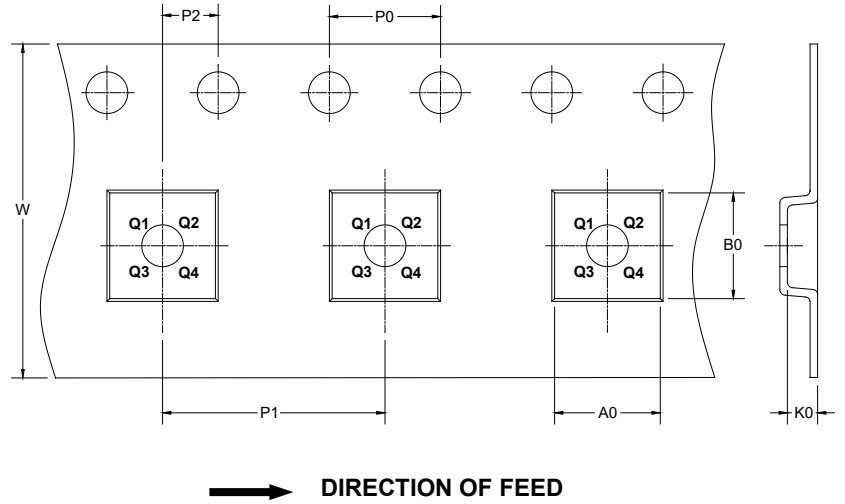3. Reference JEDEC MO-153.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

TAPE DIMENSIONS

DIRECTION OF FEED

NOTE: The picture is only for reference. Please make the object as the standard.
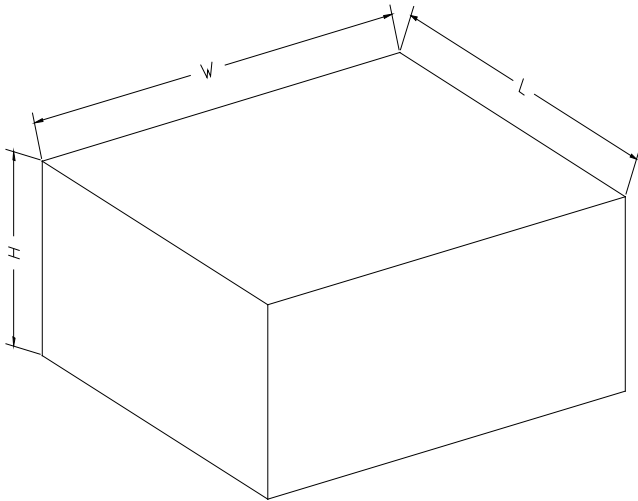
KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
TSSOP-16	13"	12.4	6.80	5.40	1.50	4.0	8.0	2.0	12.0	Q1

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	
13″	386	280	370	5	DD0002