

GENERAL DESCRIPTION

The SGM836 family can monitor system voltages from 0.4V to 5V. When the detection voltage drops below a preset threshold (V_{IT}) or the manual reset (nMR) pin is driven low, the open-drain nRESET output is asserted. After the detection voltage and nMR voltage return above their respective thresholds, the nRESET output remains low within the user-adjustable delay time.

The SGM836 uses a precision reference to achieve 1% threshold accuracy. The fixed reset timeout period can be set to 20ms by leaving the C_T pin open and can be set to 300ms by connecting the C_T pin to V_{DD} through a resistor. The programmable reset timeout period can be set from 1.25ms to 10s through an external capacitor connected to the C_T pin. Low quiescent current makes the SGM836 very suitable for battery-powered applications.

The SGM836 is available in Green SOT-23-6 and TDFN-2x2-6AL packages.

FEATURES

- **Adjustable Reset Timeout Period: 1.25ms to 10s**
- **Low Quiescent Current: 0.6 μ A (TYP)**
- **High Threshold Accuracy: 1% (TYP)**
- **Factory-Set Detection Voltages: 0.9V to 5V**
- **Adjustable Detection Voltage Down to 0.4V**
- **Manual Reset (nMR) Input**
- **Open-Drain nRESET Output**
- **Available in Green SOT-23-6 and TDFN-2x2-6AL Packages**

APPLICATIONS

- Computers
- Portable Equipment
- Automotive Equipment
- Intelligent Instruments
- Microprocessor Systems
- Critical μ P Power Monitoring

TYPICAL APPLICATION

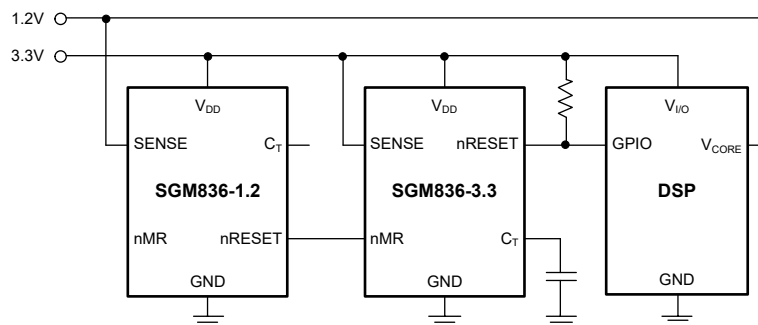


Figure 1. Typical Application Circuit

PACKAGE/ORDERING INFORMATION

MODEL	THRESHOLD VOLTAGE (V_{IT}) (V)	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM836-0.9	0.84	SOT-23-6	-40°C to +125°C	SGM836-0.9XN6G/TR	R6AXX	Tape and Reel, 3000
		TDFN-2×2-6AL	-40°C to +125°C	SGM836-0.9XTDI6G/TR	R18 XXXX	Tape and Reel, 3000
SGM836-1.2	1.12	SOT-23-6	-40°C to +125°C	SGM836-1.2XN6G/TR	R6BXX	Tape and Reel, 3000
		TDFN-2×2-6AL	-40°C to +125°C	SGM836-1.2XTDI6G/TR	R19 XXXX	Tape and Reel, 3000
SGM836-1.25	1.16	SOT-23-6	-40°C to +125°C	SGM836-1.25XN6G/TR	R6CXX	Tape and Reel, 3000
		TDFN-2×2-6AL	-40°C to +125°C	SGM836-1.25XTDI6G/TR	R1A XXXX	Tape and Reel, 3000
SGM836-1.5	1.40	SOT-23-6	-40°C to +125°C	SGM836-1.5XN6G/TR	R6EXX	Tape and Reel, 3000
		TDFN-2×2-6AL	-40°C to +125°C	SGM836-1.5XTDI6G/TR	R1B XXXX	Tape and Reel, 3000
SGM836-1.8	1.67	SOT-23-6	-40°C to +125°C	SGM836-1.8XN6G/TR	R71XX	Tape and Reel, 3000
		TDFN-2×2-6AL	-40°C to +125°C	SGM836-1.8XTDI6G/TR	R1C XXXX	Tape and Reel, 3000
SGM836-1.9	1.77	SOT-23-6	-40°C to +125°C	SGM836-1.9XN6G/TR	R73XX	Tape and Reel, 3000
		TDFN-2×2-6AL	-40°C to +125°C	SGM836-1.9XTDI6G/TR	R1D XXXX	Tape and Reel, 3000
SGM836-2.5	2.33	SOT-23-6	-40°C to +125°C	SGM836-2.5XN6G/TR	R76XX	Tape and Reel, 3000
		TDFN-2×2-6AL	-40°C to +125°C	SGM836-2.5XTDI6G/TR	R1E XXXX	Tape and Reel, 3000
SGM836-2.7	2.52	SOT-23-6	-40°C to +125°C	SGM836-2.7XN6G/TR	R78XX	Tape and Reel, 3000
		TDFN-2×2-6AL	-40°C to +125°C	SGM836-2.7XTDI6G/TR	R1F XXXX	Tape and Reel, 3000
SGM836-2.9	2.7	SOT-23-6	-40°C to +125°C	SGM836-2.9XN6G/TR	R7AXX	Tape and Reel, 3000
		TDFN-2×2-6AL	-40°C to +125°C	SGM836-2.9XTDI6G/TR	R20 XXXX	Tape and Reel, 3000
SGM836-3.0	2.79	SOT-23-6	-40°C to +125°C	SGM836-3.0XN6G/TR	R3DXX	Tape and Reel, 3000
		TDFN-2×2-6AL	-40°C to +125°C	SGM836-3.0XTDI6G/TR	R21 XXXX	Tape and Reel, 3000
SGM836-3.3	3.07	SOT-23-6	-40°C to +125°C	SGM836-3.3XN6G/TR	R7CXX	Tape and Reel, 3000
		TDFN-2×2-6AL	-40°C to +125°C	SGM836-3.3XTDI6G/TR	R22 XXXX	Tape and Reel, 3000
SGM836-3.7	3.45	SOT-23-6	-40°C to +125°C	SGM836-3.7XN6G/TR	R7EXX	Tape and Reel, 3000
		TDFN-2×2-6AL	-40°C to +125°C	SGM836-3.7XTDI6G/TR	R23 XXXX	Tape and Reel, 3000
SGM836-4.0	3.73	SOT-23-6	-40°C to +125°C	SGM836-4.0XN6G/TR	R80XX	Tape and Reel, 3000
		TDFN-2×2-6AL	-40°C to +125°C	SGM836-4.0XTDI6G/TR	R24 XXXX	Tape and Reel, 3000

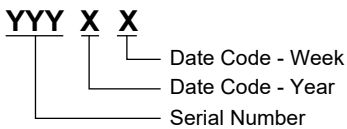
PACKAGE/ORDERING INFORMATION (continued)

MODEL	THRESHOLD VOLTAGE (V _{IT}) (V)	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM836-4.5	4.2	SOT-23-6	-40°C to +125°C	SGM836-4.5XN6G/TR	R82XX	Tape and Reel, 3000
		TDFN-2×2-6AL	-40°C to +125°C	SGM836-4.5XTDI6G/TR	R25 XXXX	Tape and Reel, 3000
SGM836-5.0	4.65	SOT-23-6	-40°C to +125°C	SGM836-5.0XN6G/TR	R84XX	Tape and Reel, 3000
		TDFN-2×2-6AL	-40°C to +125°C	SGM836-5.0XTDI6G/TR	R26 XXXX	Tape and Reel, 3000
SGM836-ADJ	0.405	SOT-23-6	-40°C to +125°C	SGM836-ADJXN6G/TR	R85XX	Tape and Reel, 3000
		TDFN-2×2-6AL	-40°C to +125°C	SGM836-ADJXTDI6G/TR	R27 XXXX	Tape and Reel, 3000

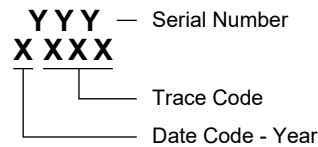
MARKING INFORMATION

NOTE: XX = Date Code. XXXX = Date Code and Trace Code.

SOT-23-6



TDFN-2×2-6AL



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

V _{DD} to GND	-0.3V to 7V
C _T to GND	-0.3V to V _{DD} + 0.3V
nRESET, nMR, SENSE to GND	-0.3V to 7V
nRESET Pin Current	±5mA
Package Thermal Resistance	
SOT-23-6, θ _{JA}	243°C/W
TDFN-2×2-6AL, θ _{JA}	124°C/W
Junction Temperature	+150°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (Soldering, 10s)	+260°C
ESD Susceptibility	
HBM	4000V
CDM	1000V

RECOMMENDED OPERATING CONDITIONS

Input Supply Voltage Range, V _{DD}	1.65V to 6.5V
SENSE Pin Voltage, V _{SENSE}	0V to 6.5V
C _T Pin Voltage, V _{CT}	V _{DD} (MAX)
nMR Pin Voltage, V _{nMR}	0V to 6.5V
nRESET Pin Voltage, V _{nRESET}	0V to 6.5V
nRESET Pin Current, I _{nRESET}	0.0003mA to 5mA
Operating Junction Temperature Range	-40°C to +125°C

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.

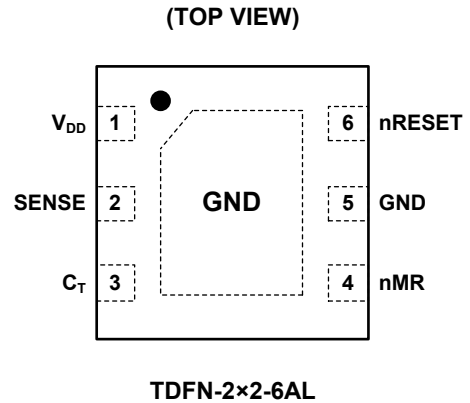
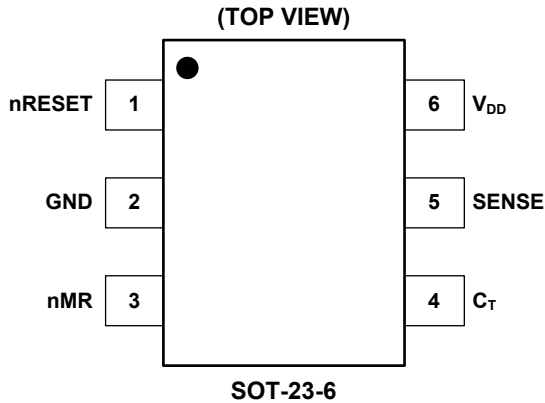
ESD SENSITIVITY CAUTION

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 CONFIGURATIONS



PIN DESCRIPTION

PIN		NAME	I/O	FUNCTION
SOT-23-6	TDFN-2x2-6AL			
1	6	nRESET	O	Active-Low Reset Output Pin. nRESET remains low if the SENSE input is below V_{IT} or nMR is logic low. It goes (or remains) low for the reset timeout period after the SENSE voltage exceeds V_{IT} and nMR pin is driven high. It is recommended to connect a 10kΩ to 1MΩ pull-up resistor to this pin which enables the reset voltages greater than V_{DD} .
2	5	GND	—	Ground.
3	4	nMR	I	Manual Reset Input Pin. Pulling this pin (nMR) low will assert nRESET. nMR is internally pulled up to V_{DD} by a 100kΩ resistor.
4	3	C_T	I	Reset Timeout Delay Programming Pin. The fixed delay time can be set by connecting a 40kΩ to 200kΩ resistor between C_T pin and V_{DD} or leaving it open. And the programmable delay time can be set by connecting a capacitor not less than 100pF to the ground.
5	2	SENSE	I	The Dedicated Voltage Monitor Pin. If the SENSE voltage falls below V_{IT} , the nRESET will be asserted.
6	1	V_{DD}	I	Supply Voltage.
—	Exposed Pad	GND	—	Exposed Pad. Connect it to the ground.

NOTE: I: input, O: output.

ELECTRICAL CHARACTERISTICS

(V_{DD} = 1.65V to 6.5V, R_{LRESET} = 100kΩ⁽¹⁾, T_J = -40°C to +125°C, typical values are at T_J = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Input Supply Range	V _{DD}		1.65		6.5	V
Supply Current (Current into V _{DD} Pin)	I _{DD}	V _{DD} = 3.3V, nRESET not asserted, nMR, nRESET, C _T open		0.6	1.5	μA
		V _{DD} = 6.5V, nRESET not asserted, nMR, nRESET, C _T open		0.9	2	
Low-Level Output Voltage	V _{OL}	1.3V ≤ V _{DD} < 1.8V, I _{OL} = 0.4mA			0.2	V
		1.8V ≤ V _{DD} ≤ 6.5V, I _{OL} = 1mA			0.3	
Power-Up Reset Voltage ⁽²⁾	V _{POR}	V _{OL} (MAX) = 0.2V, I _{nRESET} = 15μA			0.8	V
Negative-Going Input Threshold Accuracy	V _{IT}	All versions, T _J = +25°C	-1.0		1.0	%
		V _{IT} ≤ 3.3V	-1.5		1.5	
		3.3V < V _{IT} ≤ 5.0V	-1.8		1.8	
		V _{IT} ≤ 3.3V, T _J = -40°C to +85°C	-1.25		1.25	
		3.3V < V _{IT} ≤ 5.0V, T _J = -40°C to +85°C	-1.3		1.3	
Hysteresis On V _{IT}	V _{HYS}	All versions			3.5	%
nMR Internal Pull-Up Resistance	R _{nMR}		50	100		kΩ
Input Current at SENSE Pin	I _{SENSE}	SGM836-ADJ, V _{SENSE} = V _{IT}	-25		25	nA
		Fixed versions, V _{SENSE} = 6.5V		235		
nRESET Leakage Current	I _{OH}	V _{nRESET} = 6.5V, nRESET not asserted			1	μA
Input Capacitance, Any Pin	C _{IN}	C _T pin, V _{IN} = 0V to V _{DD}		5		pF
		Other pins, V _{IN} = 0V to 6.5V		5		
nMR Input	V _{IL}	Logic Low	0		0.3 × V _{DD}	V
	V _{IH}	Logic High	0.7 × V _{DD}		V _{DD}	
Input Pulse Width to nRESET	t _{SENSE}	V _{IH} = 1.05 × V _{IT} , V _{IL} = 0.95 × V _{IT}		25		μs
	t _{nMR}	V _{IH} = 0.7 × V _{DD} , V _{IL} = 0.3 × V _{DD}		100		ns
C _T Source Threshold Voltage	V _{TH-RAMP}			1.206		V
nRESET Delay Time	t _D	C _T = Open	12	20	28	ms
		C _T = V _{DD}	180	300	420	
		C _T = 100pF	0.8	1.3	1.8	
Propagation Delay	t _{MR}	nMR to nRESET		250		ns
High-to-Low Level nRESET Delay	t _{RP0}	SENSE to nRESET		100		μs

NOTE:

1. R_{LRESET} is the resistor connected to the nRESET pin.

TIMING DIAGRAM

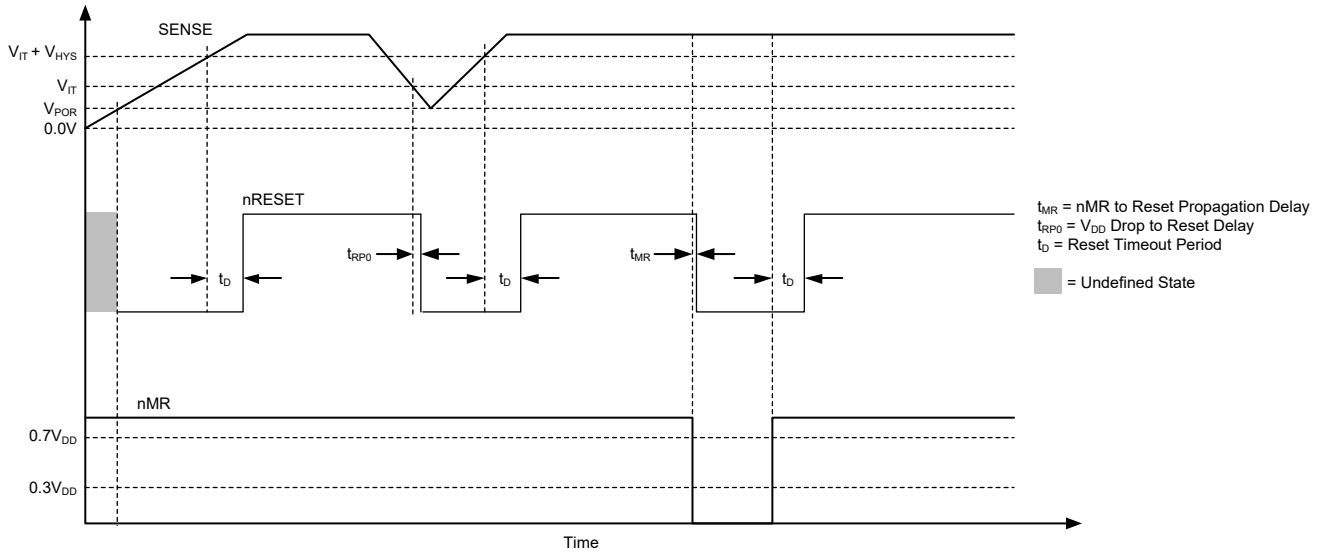
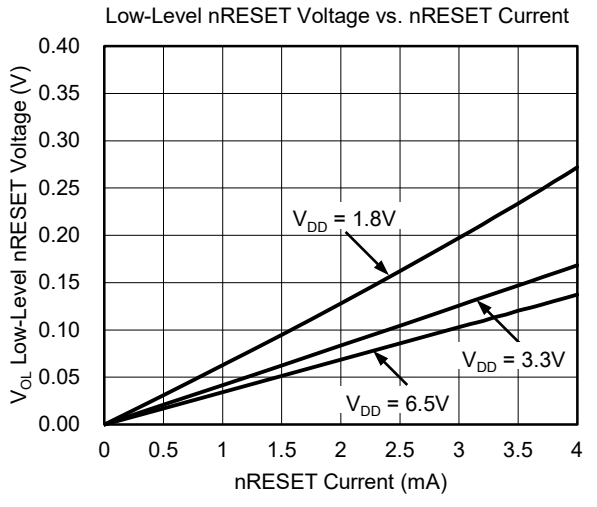
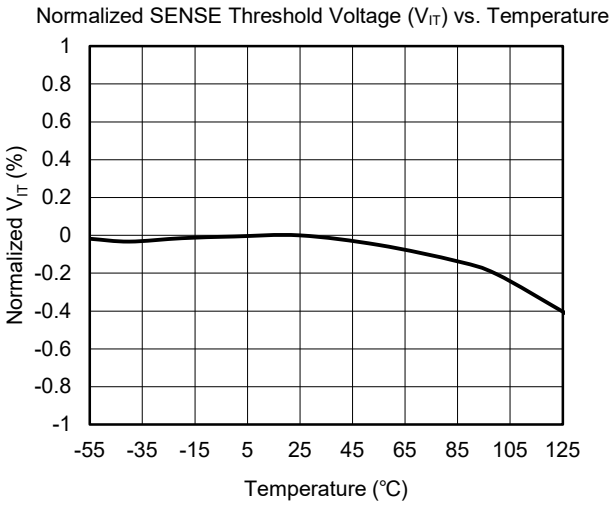
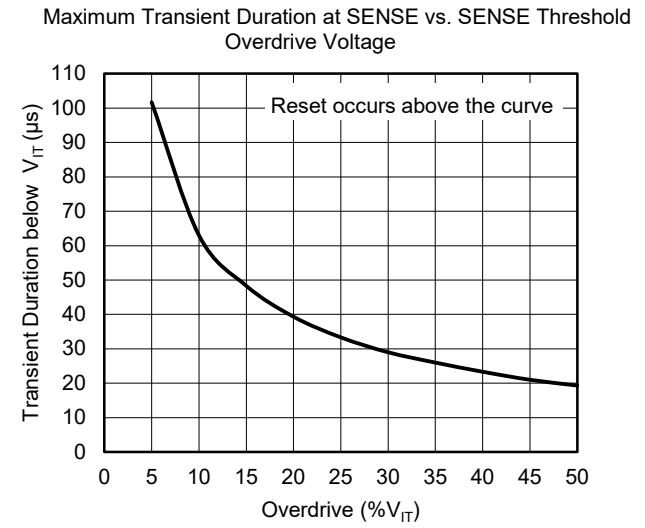
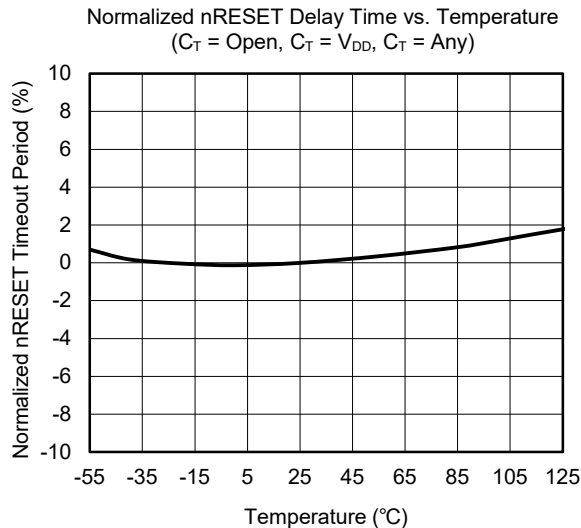
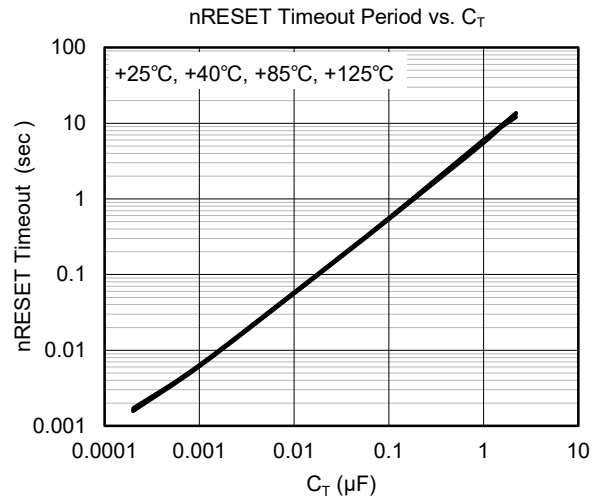
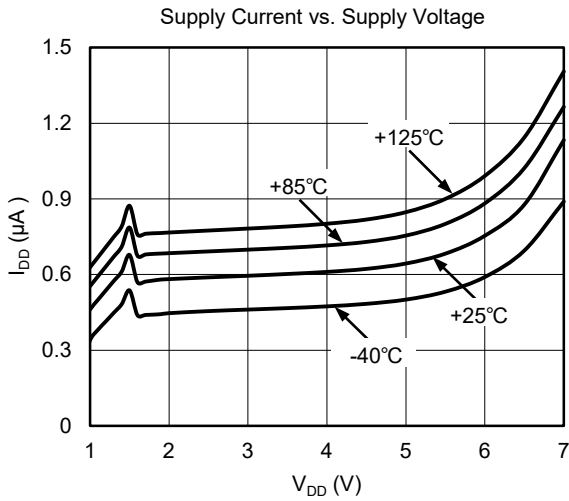


Figure 2. SGM836 Timing Diagram Showing nMR and SENSE Reset Timing

TYPICAL PERFORMANCE CHARACTERISTICS

$T_J = +25^\circ\text{C}$, $V_{DD} = 3.3\text{V}$ and $R_{L\text{RESET}} = 100\text{k}\Omega$, unless otherwise noted.



FUNCTIONAL BLOCK DIAGRAM

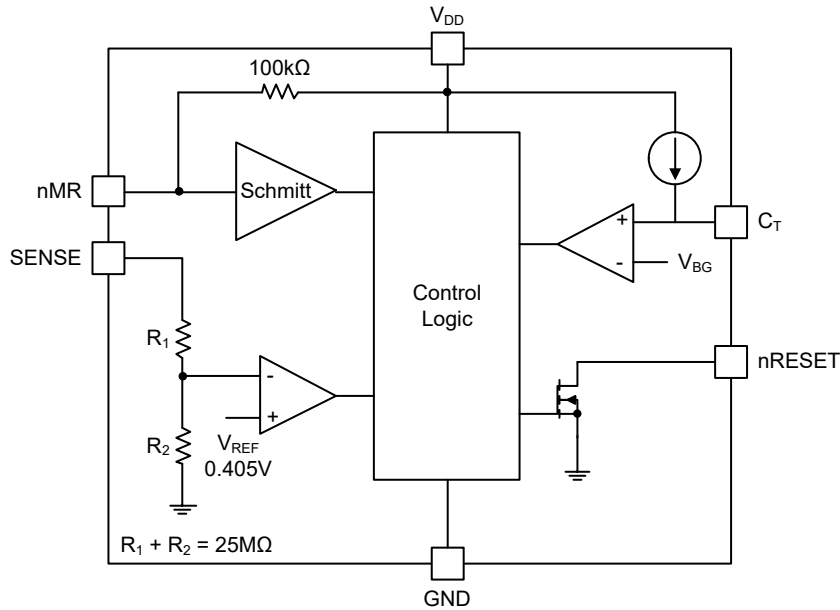


Figure 3. Fixed Voltage Version Block Diagram

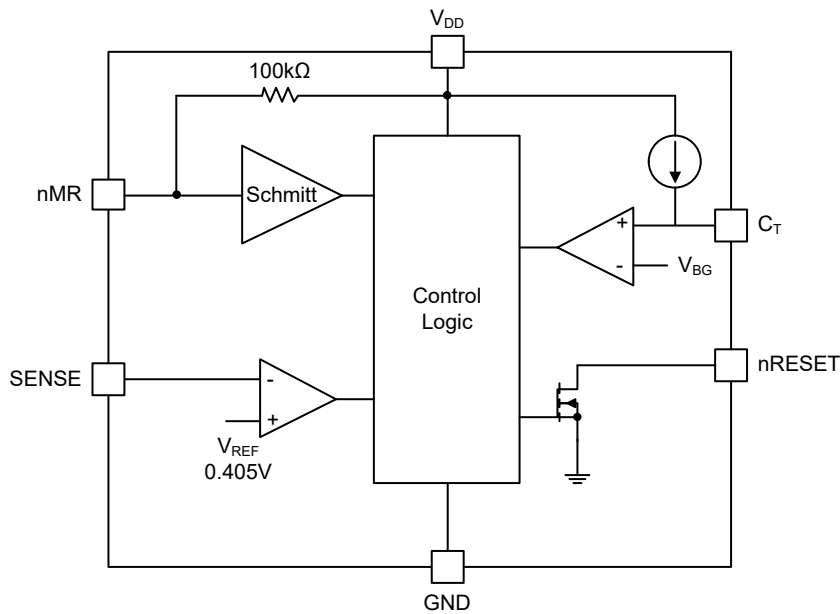


Figure 4. Adjustable Voltage Version Block Diagram

DETAILED DESCRIPTION

When the SENSE voltage falls below V_{IT} or the nMR pin is driven low, the open-drain nRESET output is asserted. After the SENSE and nMR voltages exceed their respective thresholds, the nRESET output remains low within the user-adjustable delay time.

Feature Description

The SGM836 device has a reset delay time adjustment function and a wide range of detection thresholds, so it can be widely used in various applications. The detection threshold voltages are factory-set from 0.9V to 5V, while the SGM836-ADJ detection threshold voltages can be adjusted to above 0.405V through an external resistance divider. The fixed reset timeout period can be set to 20ms by leaving the C_T pin open and 300ms by connecting the C_T pin to V_{DD} through a resistor. The programmable reset timeout period can be set from 1.25ms to 10s through an external capacitor connected to the C_T pin.

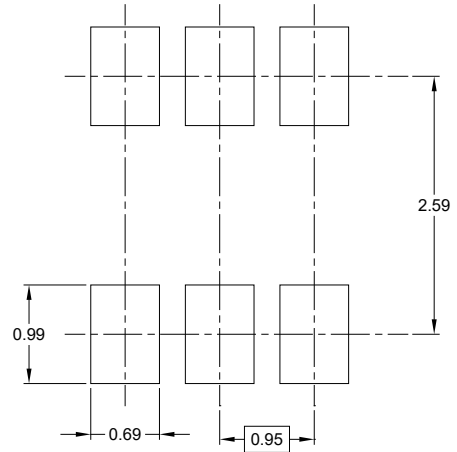
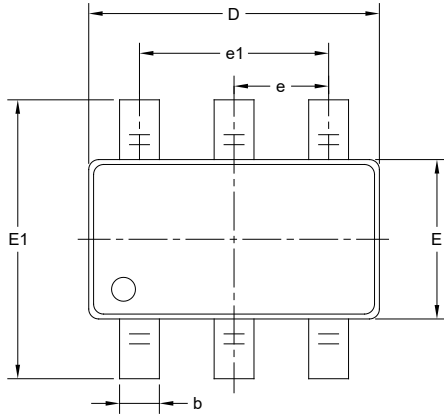
REVISION HISTORY

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

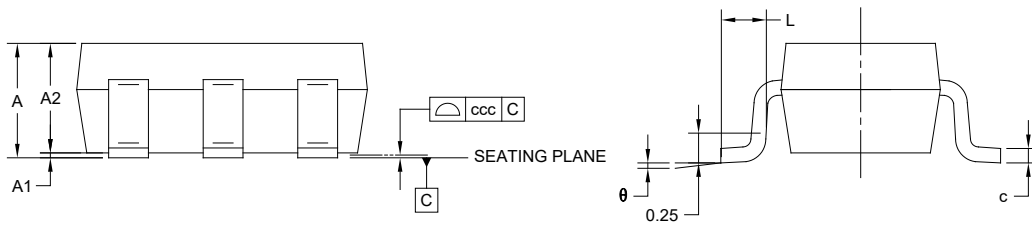
MAY 2022 – REV.A to REV.A.1	Page
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Updated Tape and Reel Information section.....	12
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Changes from Original (JANUARY 2021) to REV.A	Page
Changed from product preview to production data.....	All

PACKAGE OUTLINE DIMENSIONS

SOT-23-6



RECOMMENDED LAND PATTERN (Unit: mm)



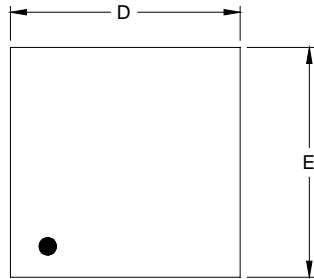
Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	-	-	1.450
A1	0.000	-	0.150
A2	0.900	-	1.300
b	0.300	-	0.500
c	0.080	-	0.220
D	2.750	-	3.050
E	1.450	-	1.750
E1	2.600	-	3.000
e	0.950 BSC		
e1	1.900 BSC		
L	0.300	-	0.600
θ	0°	-	8°
ccc	0.100		

NOTES:

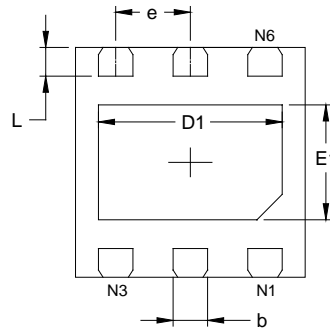
1. This drawing is subject to change without notice.
2. The dimensions do not include mold flashes, protrusions or gate burrs.
3. Reference JEDEC MO-178.

PACKAGE OUTLINE DIMENSIONS

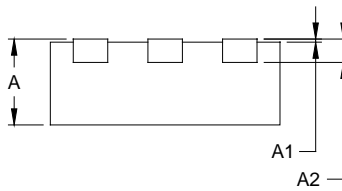
TDFN-2x2-6AL



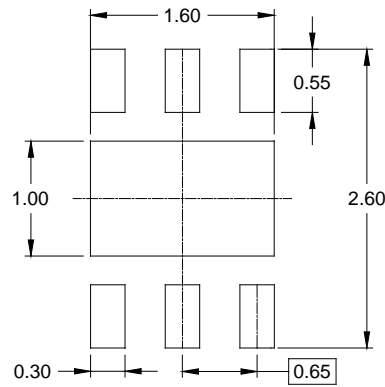
TOP VIEW



BOTTOM VIEW



SIDE VIEW



RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.203 REF		0.008 REF	
D	1.900	2.100	0.075	0.083
D1	1.500	1.700	0.059	0.067
E	1.900	2.100	0.075	0.083
E1	0.900	1.100	0.035	0.043
b	0.250	0.350	0.010	0.014
e	0.650 BSC		0.026 BSC	
L	0.174	0.326	0.007	0.013

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
SOT-23-6	7"	9.5	3.17	3.23	1.37	4.0	4.0	2.0	8.0	Q3
TDFN-2×2-6AL	7"	9.5	2.30	2.30	1.10	4.0	4.0	2.0	8.0	Q2

DD0001

PACKAGE INFORMATION

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