



SGM2069Q

Automotive 1.5A, High PSRR, Low Dropout Linear Regulator with Programmable Soft-Start and Bias Rail

GENERAL DESCRIPTION

The SGM2069Q is a high PSRR and low dropout linear regulator with programmable soft-start. It is capable of supplying 1.5A output current with typical V_{IN} dropout voltage of only 110mV. The operating input voltage range is from 1.1V to 5.5V and bias supply voltage range is from 2.7V to 5.5V. The output voltage range is from 0.8V to 3.6V.

Other features include an open-drain power-good (PG) output, under-voltage lockout, logic-controlled shutdown mode, short-circuit current limit and thermal shutdown protection. The SGM2069Q has automatic discharge function to quickly discharge V_{OUT} in the disabled status.

This device is AEC-Q100 qualified (Automotive Electronics Council (AEC) standard Q100 Grade 1) and it is suitable for automotive applications.

The SGM2069Q is available in a Green TDFN-3×3-10BL package. It operates over an operating temperature range of -40°C to $+125^{\circ}\text{C}$.

APPLICATIONS

Automotive Applications

Power for Processors

Power Modules

TYPICAL APPLICATION

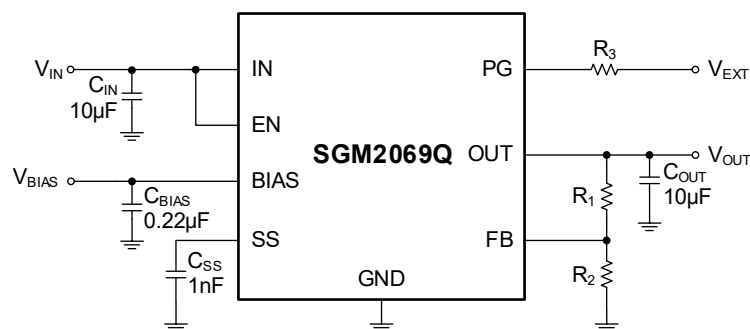


Figure 1. Typical Application Circuit

FEATURES

- AEC-Q100 Qualified for Automotive Applications
Device Temperature Grade 1
 $T_A = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$
- Input Supply Voltage Range: 1.1V to 5.5V
- Bias Supply Voltage Range: 2.7V to 5.5V
- Adjustable Output from 0.8V to 3.6V
- Output Voltage Accuracy: $\pm 1\%$ at $+25^{\circ}\text{C}$
- 1.5A Output Current
- Quiescent Current: 0.9mA (TYP)
- V_{IN} Dropout Voltage: 110mV (TYP) at 1.5A
- V_{BIAS} Dropout Voltage: 1200mV (TYP) at 1.5A
- Low Noise: $29\mu\text{V}_{\text{RMS}}$
- Shutdown Ground Current: 0.1 μA (TYP)
- Current Limiting and Thermal Protection
- Programmable Soft-Start Output
- UVLO with Hysteresis
- Support Power-Good Indicator Function
- With Output Automatic Discharge
- Stable with Small Case Size Ceramic Capacitors
- Available in a Green TDFN-3×3-10BL Package

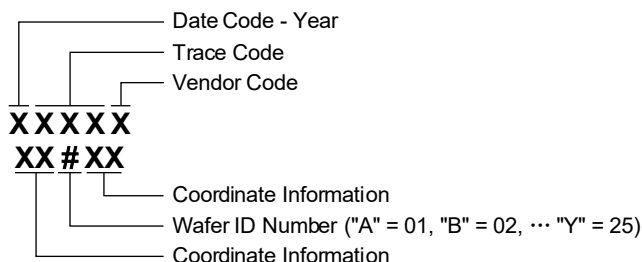
Automotive 1.5A, High PSRR, Low Dropout Linear SGM2069Q Regulator with Programmable Soft-Start and Bias Rail

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM2069Q	TDFN-3×3-10BL	-40°C to +125°C (T _A)	SGM2069QTHS10G/TR	2LM XXXXX XX#XX	Tape and Reel, 4000

MARKING INFORMATION

NOTE: XXXXX = Date Code, Trace Code and Vendor Code. XX#XX = Coordinate Information and Wafer ID Number.



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

IN, BIAS, PG, EN to GND	-0.3V to 6V
OUT to GND	-0.3V to (V _{IN} + 0.3V)
SS, FB to GND	-0.3V to 6V
PG Sink Current, I _{PG}	0mA to 1.5mA
Package Thermal Resistance	
TDFN-3×3-10BL, θ _{JA}	45.3°C/W
TDFN-3×3-10BL, θ _{JB}	18.9°C/W
TDFN-3×3-10BL, θ _{JC} (TOP)	43.5°C/W
TDFN-3×3-10BL, θ _{JC} (BOT)	8.1°C/W
Junction Temperature	+150°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (Soldering, 10s)	+260°C
ESD Susceptibility ^{(1) (2)}	
HBM	±8000V
CDM	±1000V

NOTES:

1. For human body model (HBM), all pins comply with AEC-Q100-002 specification.
2. For charged device model (CDM), all pins comply with AEC-Q100-011 specification.

RECOMMENDED OPERATING CONDITIONS

Input Supply Voltage Range	1.1V to 5.5V
BIAS Supply Voltage Range	2.7V to 5.5V
Enable Input Voltage Range	0V to 5.5V
Input Effective Capacitance, C _{IN}	1μF (MIN)

BIAS Effective Capacitance, C _{BIAS}	0.1μF (MIN)
Output Effective Capacitance, C _{OUT}	1μF to 1000μF
Operating Ambient Temperature Range	-40°C to +125°C
Operating Junction Temperature Range	-40°C to +150°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

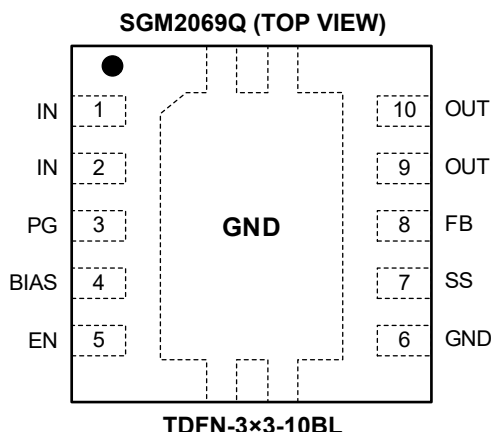
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance 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.

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PIN CONFIGURATION



PIN DESCRIPTION

PIN	NAME	FUNCTION
1, 2	IN	Input Supply Voltage Pin. It is recommended to use a 2.2μF or larger ceramic capacitor from IN pin to ground to get good power supply decoupling. This ceramic capacitor should be placed as close as possible to IN pin.
3	PG	Open-Drain Power-Good Output Pin. An open-drain output and active high when the output voltage reaches the target voltage.
4	BIAS	Bias Voltage Supply Pin for Internal Control Circuits. It is recommended to use a 0.22μF or larger ceramic capacitor from BIAS pin to ground and this ceramic capacitor should be placed as close as possible to BIAS pin.
5	EN	Enable Pin. Drive EN high to turn on the regulator. Drive EN low to turn off the regulator.
6	GND	Ground.
7	SS	Soft-Start Pin. The soft-start time is determined by an external capacitor connected to this pin.
8	FB	Feedback Pin. Connect this pin to the midpoint of an external resistor divider to adjust the output voltage. Place the resistors as close as possible to this pin.
9, 10	OUT	Regulator Output Pin. It is recommended to use a ceramic capacitor with effective capacitance in the range of 1μF to 1000μF to ensure stability. This ceramic capacitor should be placed as close as possible to OUT pin.
Exposed Pad	GND	Exposed Pad. Connect it to GND internally. Connect it to a large ground plane to maximize thermal performance. This pad is not an electrical connection point.

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FUNCTIONAL BLOCK DIAGRAM

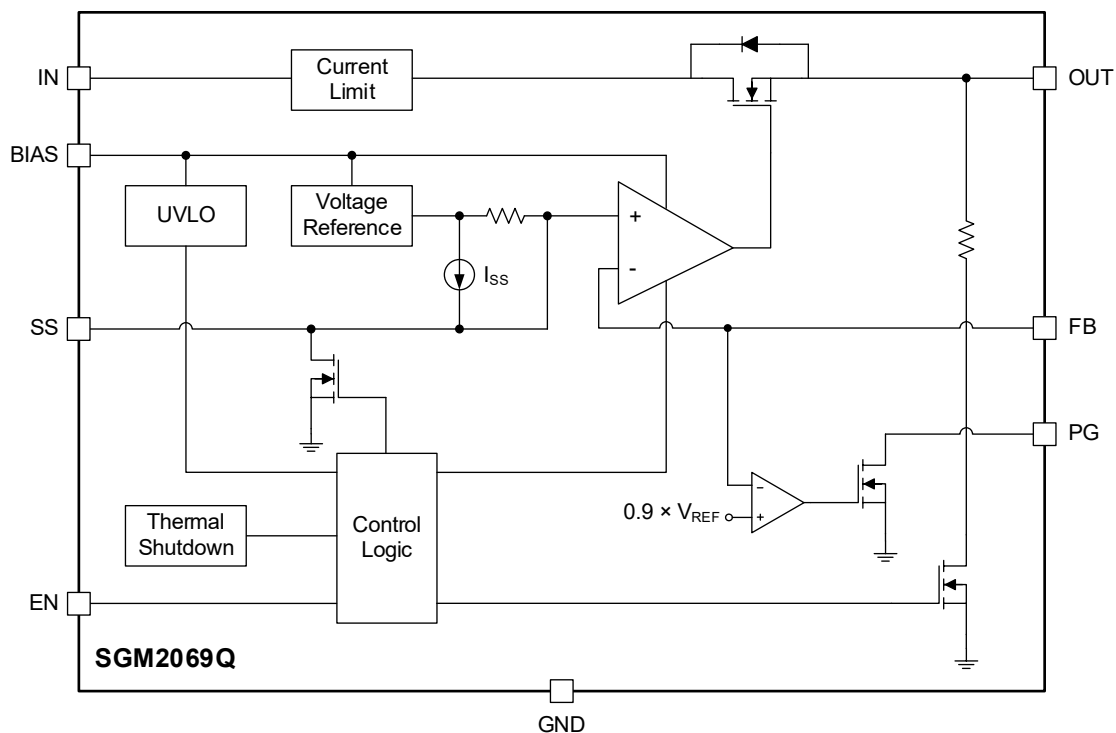
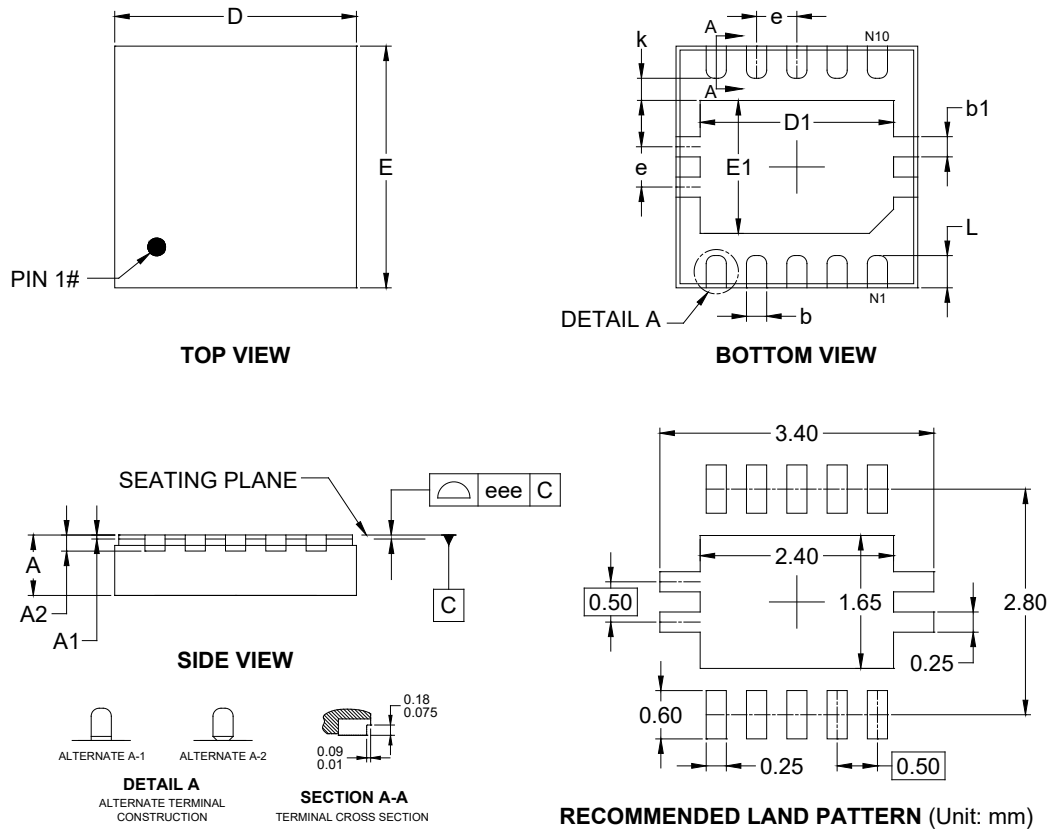


Figure 2. Block Diagram

PACKAGE OUTLINE DIMENSIONS

TDFN-3×3-10BL



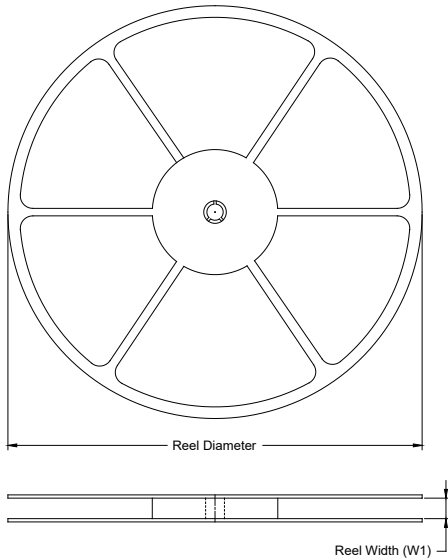
Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	0.700	-	0.800
A1	0.000	-	0.050
A2	0.203 REF		
b	0.200	-	0.300
b1	0.250 REF		
D	2.900	-	3.100
D1	2.300	-	2.500
E	2.900	-	3.100
E1	1.550	-	1.750
e	0.500 BSC		
k	0.275 REF		
L	0.300	-	0.500
eee	0.080		

NOTE: This drawing is subject to change without notice.

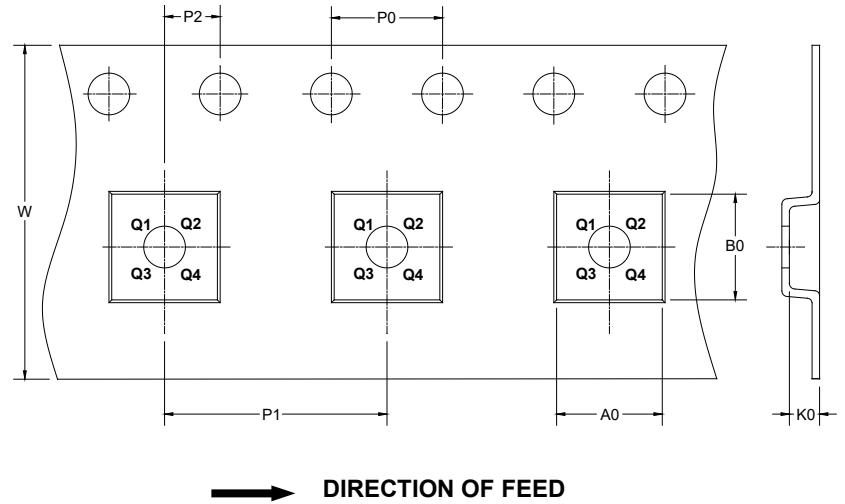
PACKAGE INFORMATION

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



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

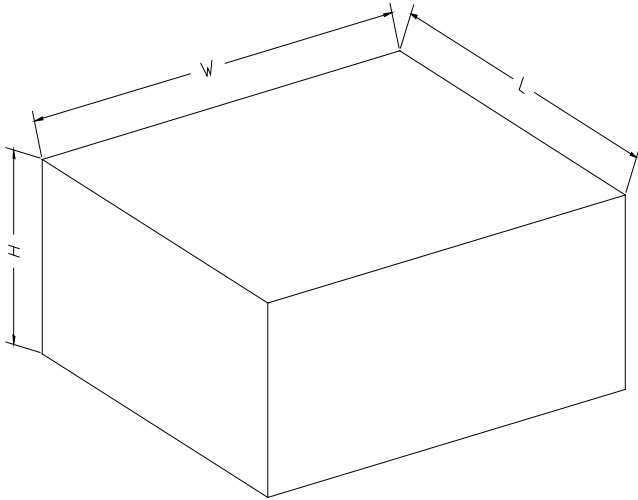
KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
TDFN-3×3-10BL	13"	12.4	3.35	3.35	1.13	4.0	8.0	2.0	12.0	Q2

DD00001

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
13"	386	280	370	5

DD0002