SGM2036S
300mA, Low Power and Low Dropout RF Linear Regulator

GENERAL DESCRIPTION

The SGM2036S is a low noise, low voltage and low dropout voltage linear regulator. It is capable of supplying 300mA output current with typical dropout voltage of only 154mV. The operating input voltage range is from 1.6V to 5.5V. The output voltage range is from 0.8V to 5.0V in fixed output version. For adjustable output version, the output voltage can be adjusted from 0.8V to 5.0V by using external resistors.

Other features include logic-controlled shutdown mode, short-circuit current limit and thermal shutdown protection. The SGM2036S has automatic discharge function to quickly discharge V_{OUT} in the disabled status.

The SGM2036S is available in Green XTDFN-1×1-4L, SOT-23-5 and SC70-5 packages. It operates over an operating temperature range of -40℃ to +125℃.

FEATURES

- **Operating Input Voltage Range: 1.6V to 5.5V**
- **Fixed Output Voltages: 0.8V, 0.9V, 1.0V, 1.05V, 1.1V, 1.2V, 1.3V, 1.35V, 1.5V, 1.8V, 1.85V, 2.1V, 2.2V, 2.3V, 2.5V, 2.6V, 2.7V, 2.8V, 2.85V, 2.9V, 3.0V, 3.1V, 3.3V, 3.6V, 4.2V, 4.4V and 5.0V**
- **Adjustable Output from 0.8V to 5.0V**
- **300mA Guaranteed Output Current**
- **Low Dropout Voltage: 154mV (TYP) at 300mA**
- **Low Noise: 40μV_{RMS} (TYP)**
- **Low Supply Current: 25μA (TYP)**
- **Shutdown Supply Current: 0.04μA (TYP)**
- **Short Start-Up Time**
- **Short Auto-Discharge Function**
- **Thermal Shutdown Protection**
- **Short-Circuit Current Limit**
- **Fast Load and Line Transient Responses**
- **-40℃ to +125℃ Operating Temperature Range**
- **Available in Green XTDFN-1×1-4L, SOT-23-5 and SC70-5 Packages**

APPLICATIONS

Modems
Cellular Telephones
PCMCIA Cards
Palmtop Computers
Portable Electronics

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM2036S-0.8	SOT-23-5	-40℃ to +125℃	SGM2036S-0.8XN5G/TR	G6ZXX	Tape and Reel, 3000
SGM2036S-0.9	SOT-23-5	-40℃ to +125℃	SGM2036S-0.9XN5G/TR	G78XX	Tape and Reel, 3000
SGM2036S-1.0	SOT-23-5	-40℃ to +125℃	SGM2036S-1.0XN5G/TR	G7GXX	Tape and Reel, 3000
SGM2036S-1.05	SOT-23-5	-40℃ to +125℃	SGM2036S-1.05XN5G/TR	G7HXX	Tape and Reel, 3000
SGM2036S-1.1	SOT-23-5	-40℃ to +125℃	SGM2036S-1.1XN5G/TR	G7IXX	Tape and Reel, 3000
SGM2036S-1.2	SOT-23-5	-40℃ to +125℃	SGM2036S-1.2XN5G/TR	G7JXX	Tape and Reel, 3000
SGM2036S-1.3	SOT-23-5	-40℃ to +125℃	SGM2036S-1.3XN5G/TR	G7KXX	Tape and Reel, 3000
SGM2036S-1.5	SOT-23-5	-40℃ to +125℃	SGM2036S-1.5XN5G/TR	G7LXX	Tape and Reel, 3000
SGM2036S-1.8	SOT-23-5	-40℃ to +125℃	SGM2036S-1.8XN5G/TR	G7MXX	Tape and Reel, 3000
SGM2036S-1.85	SOT-23-5	-40℃ to +125℃	SGM2036S-1.85XN5G/TR	G7NXX	Tape and Reel, 3000
SGM2036S-2.1	SOT-23-5	-40℃ to +125℃	SGM2036S-2.1XN5G/TR	G7PXX	Tape and Reel, 3000
SGM2036S-2.2	SOT-23-5	-40℃ to +125℃	SGM2036S-2.2XN5G/TR	G7QXX	Tape and Reel, 3000
SGM2036S-2.3	SOT-23-5	-40℃ to +125℃	SGM2036S-2.3XN5G/TR	G7RXX	Tape and Reel, 3000
SGM2036S-2.5	SOT-23-5	-40℃ to +125℃	SGM2036S-2.5XN5G/TR	G7SXX	Tape and Reel, 3000
SGM2036S-2.6	SOT-23-5	-40℃ to +125℃	SGM2036S-2.6XN5G/TR	G7TXX	Tape and Reel, 3000
SGM2036S-2.7	SOT-23-5	-40℃ to +125℃	SGM2036S-2.7XN5G/TR	G7UXX	Tape and Reel, 3000
SGM2036S-2.8	SOT-23-5	-40℃ to +125℃	SGM2036S-2.8XN5G/TR	G7VXX	Tape and Reel, 3000
SGM2036S-2.85	SOT-23-5	-40℃ to +125℃	SGM2036S-2.85XN5G/TR	G7WXX	Tape and Reel, 3000
SGM2036S-2.9	SOT-23-5	-40℃ to +125℃	SGM2036S-2.9XN5G/TR	G7XXX	Tape and Reel, 3000
SGM2036S-3.0	SOT-23-5	-40℃ to +125℃	SGM2036S-3.0XN5G/TR	G7YXX	Tape and Reel, 3000
SGM2036S-3.1	SOT-23-5	-40℃ to +125℃	SGM2036S-3.1XN5G/TR	G7ZXX	Tape and Reel, 3000
SGM2036S-3.3	SOT-23-5	-40℃ to +125℃	SGM2036S-3.3XN5G/TR	G8EXX	Tape and Reel, 3000
SGM2036S-3.6	SOT-23-5	-40℃ to +125℃	SGM2036S-3.6XN5G/TR	G8GXX	Tape and Reel, 3000
SGM2036S-4.2	SOT-23-5	-40℃ to +125℃	SGM2036S-4.2XN5G/TR	G8HXX	Tape and Reel, 3000
SGM2036S-4.4	SOT-23-5	-40℃ to +125℃	SGM2036S-4.4XN5G/TR	G8IXX	Tape and Reel, 3000
SGM2036S-5.0	SOT-23-5	-40℃ to +125℃	SGM2036S-5.0XN5G/TR	G8JXX	Tape and Reel, 3000
SGM2036S-ADJ	SOT-23-5	-40℃ to +125℃	SGM2036S-ADJXN5G/TR	G5QXX	Tape and Reel, 3000

PACKAGE/ORDERING INFORMATION (continued)

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM2036S-0.8	SC70-5	-40℃ to +125℃	SGM2036S-0.8XC5G/TR	G8KXX	Tape and Reel, 3000
SGM2036S-0.9	SC70-5	-40℃ to +125℃	SGM2036S-0.9XC5G/TR	G8LXX	Tape and Reel, 3000
SGM2036S-1.0	SC70-5	-40℃ to +125℃	SGM2036S-1.0XC5G/TR	G8MXX	Tape and Reel, 3000
SGM2036S-1.05	SC70-5	-40℃ to +125℃	SGM2036S-1.05XC5G/TR	G8NXX	Tape and Reel, 3000
SGM2036S-1.1	SC70-5	-40℃ to +125℃	SGM2036S-1.1XC5G/TR	G8PXX	Tape and Reel, 3000
SGM2036S-1.2	SC70-5	-40℃ to +125℃	SGM2036S-1.2XC5G/TR	G8QXX	Tape and Reel, 3000
SGM2036S-1.3	SC70-5	-40℃ to +125℃	SGM2036S-1.3XC5G/TR	G8RXX	Tape and Reel, 3000
SGM2036S-1.5	SC70-5	-40℃ to +125℃	SGM2036S-1.5XC5G/TR	G8SXX	Tape and Reel, 3000
SGM2036S-1.8	SC70-5	-40℃ to +125℃	SGM2036S-1.8XC5G/TR	G8TXX	Tape and Reel, 3000
SGM2036S-1.85	SC70-5	-40℃ to +125℃	SGM2036S-1.85XC5G/TR	G8UXX	Tape and Reel, 3000
SGM2036S-2.1	SC70-5	-40℃ to +125℃	SGM2036S-2.1XC5G/TR	G8VXX	Tape and Reel, 3000
SGM2036S-2.2	SC70-5	-40℃ to +125℃	SGM2036S-2.2XC5G/TR	G8WXX	Tape and Reel, 3000
SGM2036S-2.3	SC70-5	-40℃ to +125℃	SGM2036S-2.3XC5G/TR	G8XXX	Tape and Reel, 3000
SGM2036S-2.5	SC70-5	-40℃ to +125℃	SGM2036S-2.5XC5G/TR	G8YXX	Tape and Reel, 3000
SGM2036S-2.6	SC70-5	-40℃ to +125℃	SGM2036S-2.6XC5G/TR	G8ZXX	Tape and Reel, 3000
SGM2036S-2.7	SC70-5	-40℃ to +125℃	SGM2036S-2.7XC5G/TR	G9GXX	Tape and Reel, 3000
SGM2036S-2.8	SC70-5	-40℃ to +125℃	SGM2036S-2.8XC5G/TR	G9HXX	Tape and Reel, 3000
SGM2036S-2.85	SC70-5	-40℃ to +125℃	SGM2036S-2.85XC5G/TR	G9IXX	Tape and Reel, 3000
SGM2036S-2.9	SC70-5	-40℃ to +125℃	SGM2036S-2.9XC5G/TR	G9JXX	Tape and Reel, 3000
SGM2036S-3.0	SC70-5	-40℃ to +125℃	SGM2036S-3.0XC5G/TR	G9KXX	Tape and Reel, 3000
SGM2036S-3.1	SC70-5	-40℃ to +125℃	SGM2036S-3.1XC5G/TR	G9LXX	Tape and Reel, 3000
SGM2036S-3.3	SC70-5	-40℃ to +125℃	SGM2036S-3.3XC5G/TR	G9MXX	Tape and Reel, 3000
SGM2036S-3.6	SC70-5	-40℃ to +125℃	SGM2036S-3.6XC5G/TR	G9NXX	Tape and Reel, 3000
SGM2036S-4.2	SC70-5	-40℃ to +125℃	SGM2036S-4.2XC5G/TR	G9PXX	Tape and Reel, 3000
SGM2036S-4.4	SC70-5	-40℃ to +125℃	SGM2036S-4.4XC5G/TR	G9QXX	Tape and Reel, 3000
SGM2036S-5.0	SC70-5	-40℃ to +125℃	SGM2036S-5.0XC5G/TR	G9RXX	Tape and Reel, 3000
SGM2036S-ADJ	SC70-5	-40℃ to +125℃	SGM2036S-ADJXC5G/TR	G5PXX	Tape and Reel, 3000

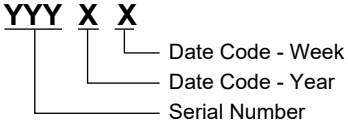
PACKAGE/ORDERING INFORMATION (continued)

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM2036S-0.8	XTDFN-1×1-4L	-40℃ to +125℃	SGM2036S-0.8XXDH4G/TR	1Y	Tape and Reel,10000
SGM2036S-0.9	XTDFN-1×1-4L	-40℃ to +125℃	SGM2036S-0.9XXDH4G/TR	3K	Tape and Reel,10000
SGM2036S-1.0	XTDFN-1×1-4L	-40℃ to +125℃	SGM2036S-1.0XXDH4G/TR	3L	Tape and Reel,10000
SGM2036S-1.05	XTDFN-1×1-4L	-40℃ to +125℃	SGM2036S-1.05XXDH4G/TR	3M	Tape and Reel,10000
SGM2036S-1.1	XTDFN-1×1-4L	-40℃ to +125℃	SGM2036S-1.1XXDH4G/TR	3N	Tape and Reel,10000
SGM2036S-1.2	XTDFN-1×1-4L	-40℃ to +125℃	SGM2036S-1.2XXDH4G/TR	3P	Tape and Reel,10000
SGM2036S-1.3	XTDFN-1×1-4L	-40℃ to +125℃	SGM2036S-1.3XXDH4G/TR	3Q	Tape and Reel,10000
SGM2036S-1.35	XTDFN-1×1-4L	-40℃ to +125℃	SGM2036S-1.35XXDH4G/TR	3R	Tape and Reel,10000
SGM2036S-1.5	XTDFN-1×1-4L	-40℃ to +125℃	SGM2036S-1.5XXDH4G/TR	3S	Tape and Reel,10000
SGM2036S-1.8	XTDFN-1×1-4L	-40℃ to +125℃	SGM2036S-1.8XXDH4G/TR	3T	Tape and Reel,10000
SGM2036S-1.85	XTDFN-1×1-4L	-40℃ to +125℃	SGM2036S-1.85XXDH4G/TR	3U	Tape and Reel,10000
SGM2036S-2.1	XTDFN-1×1-4L	-40℃ to +125℃	SGM2036S-2.1XXDH4G/TR	3V	Tape and Reel,10000
SGM2036S-2.2	XTDFN-1×1-4L	-40℃ to +125℃	SGM2036S-2.2XXDH4G/TR	3W	Tape and Reel,10000
SGM2036S-2.3	XTDFN-1×1-4L	-40℃ to +125℃	SGM2036S-2.3XXDH4G/TR	3X	Tape and Reel,10000
SGM2036S-2.5	XTDFN-1×1-4L	-40℃ to +125℃	SGM2036S-2.5XXDH4G/TR	3Y	Tape and Reel,10000
SGM2036S-2.6	XTDFN-1×1-4L	-40℃ to +125℃	SGM2036S-2.6XXDH4G/TR	3Z	Tape and Reel,10000
SGM2036S-2.7	XTDFN-1×1-4L	-40℃ to +125℃	SGM2036S-2.7XXDH4G/TR	4C	Tape and Reel,10000
SGM2036S-2.8	XTDFN-1×1-4L	-40℃ to +125℃	SGM2036S-2.8XXDH4G/TR	4D	Tape and Reel,10000
SGM2036S-2.85	XTDFN-1×1-4L	-40℃ to +125℃	SGM2036S-2.85XXDH4G/TR	4G	Tape and Reel,10000
SGM2036S-2.9	XTDFN-1×1-4L	-40℃ to +125℃	SGM2036S-2.9XXDH4G/TR	4H	Tape and Reel,10000
SGM2036S-3.0	XTDFN-1×1-4L	-40℃ to +125℃	SGM2036S-3.0XXDH4G/TR	4I	Tape and Reel,10000
SGM2036S-3.3	XTDFN-1×1-4L	-40℃ to +125℃	SGM2036S-3.3XXDH4G/TR	4J	Tape and Reel,10000

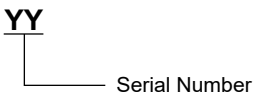
MARKING INFORMATION

NOTE: XX = Date Code.

SOT-23-5/SC70-5



XTDFN-1×1-4L



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, EN to GND ..... -0.3V to 6V
OUT, BP/FB to GND ..... -0.3V to (V_{IN} + 0.3V)
Power Dissipation, P_D @ T_A = +25℃
XTDFN-1×1-4L 530mW
SOT-23-5 ..... 350mW
SC70-5 ..... 410mW
Package Thermal Resistance
XTDFN-1×1-4L, θ_{JA} ..... 232℃/W
SOT-23-5, θ_{JA} ..... 352℃/W
SC70-5, θ_{JA} ..... 300℃/W
Junction Temperature ..... +150℃
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ..... +260℃

RECOMMENDED OPERATING CONDITIONS

Input Supply Voltage Range ..... 1.6V to 5.5V
Input Effective Capacitance, C_{IN} ..... 0.5μF (MIN)
Output Effective Capacitance, C_{OUT} ..... 0.5μF to 10μF
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

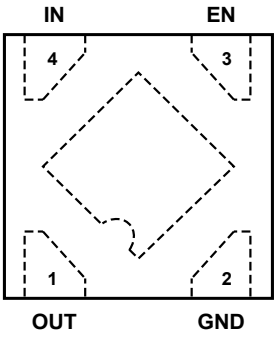
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance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

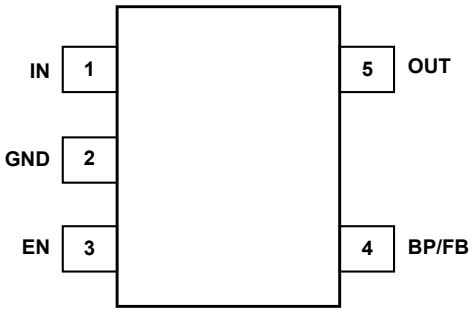
PIN CONFIGURATIONS

(TOP VIEW)



XTDFN-1×1-4L

(TOP VIEW)



SOT-23-5/SC70-5

PIN DESCRIPTION

PIN		NAME	FUNCTION
XTDFN-1×1-4L	SOT-23-5/ SC70-5		
1	5	OUT	Regulator Output Pin. It is recommended to use a ceramic capacitor with effective capacitance in the range of 0.5μF to 10μF to get good power supply decoupling. This ceramic capacitor should be placed as close as possible to OUT pin.
2	2	GND	Ground.
3	3	EN	Enable Pin. Drive EN high to turn on the regulator. Drive EN low to turn off the regulator. This pin must be pulled high by an external resistor connected to IN pin if EN pin is not used.
4	1	IN	Input Voltage Supply Pin. It is recommended to use a 1μF or larger ceramic capacitor from IN pin to ground. This ceramic capacitor should be placed as close as possible to IN pin.
–	4	BP	Reference-Noise Bypass Pin (fixed voltage version only). Bypass with an external capacitor C_{BP} can reduce output noise to very low level. The capacitor is recommended to be placed very close to the pin for high PSRR.
		FB	Feedback Voltage Input Pin (adjustable voltage version only). Connect this pin to the external resistor divider to adjust the output voltage. Place the resistors as close as possible to this pin.
Exposed Pad	–	–	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.

ELECTRICAL CHARACTERISTICS

(V_{IN} = ($V_{OUT(NOM)}$ + 0.5V) or 2.5V (whichever is greater), T_J = -40℃ to +125℃, typical values are at T_J = +25℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Input Voltage Range	V_{IN}			1.6		5.5	V
Output Voltage Accuracy		I_{OUT} = 0.1mA		TBD		TBD	%
Feedback Voltage	V_{FB}	I_{OUT} = 0.1mA, SGM2036S-ADJ			0.8		V
Maximum Output Current				300			mA
Output Current Limit	I_{LIMIT}	V_{IN} = 5.5V			700		mA
Supply Pin Current	I_Q	No load, V_{EN} = V_{IN}			25		μA
Dropout Voltage (1)	V_{DROP}	I_{OUT} = 300mA	V_{OUT} = 0.8V		860		mV
			V_{OUT} = 5.0V		154		
Line Regulation	ΔV_{LNR}	V_{IN} = ($V_{OUT(NOM)}$ + 0.3V) to 5.5V, I_{OUT} = 0.1mA			1		mV
Load Regulation	ΔV_{LDR}	I_{OUT} = 0.1mA to 300mA			23		mV
		I_{OUT} = 0.1mA to 300mA, SGM2036S-ADJ			0.52		
Short-Circuit Current	I_{SHORT}	V_{OUT} = 0V, V_{IN} = 5.5V			380		mA
Power Supply Rejection Ratio	PSRR	C_{BP} = 0nF, I_{OUT} = 30mA, C_{OUT} = 1μF, V_{IN} = V_{OUT} + 1V, ΔV_{RIPPLE} = 0.2V_{P-P}	f = 100Hz		83		dB
			f = 1kHz		65		
			f = 10kHz		50		
			f = 100kHz		40		
Output Voltage Noise	e_n	I_{OUT} = 30mA, C_{BP} = 0nF, f = 10Hz to 100kHz, C_{OUT} = 1μF, V_{OUT} = 0.8V			40		μV_{RMS}
EN Input Threshold	V_{IH}	V_{IN} = 1.6V to 5.5V		1.5			V
	V_{IL}					0.4	
EN Input Bias Current	I_{BH}	V_{EN} = 5.5V			0.7		μA
	I_{BL}	V_{EN} = 0V			0.01		
Shutdown Supply Current	I_{SHDN}	V_{EN} = 0V			0.04		μA
Start-Up Time	t_{STR}	C_{OUT} = 1μF, I_{OUT} = 1mA, $V_{OUT(NOM)}$ = 1.8V from assertion of V_{EN} to V_{OUT} = 90% × $V_{OUT\ (NOM)}$			70		μs
Output Discharge Resistance	R_{DIS}	V_{IN} = 4.0V, V_{EN} = 0V			73		Ω
Thermal Shutdown Temperature	T_{SHDN}				160		℃
Thermal Shutdown Hysteresis	ΔT_{SHDN}				20		℃

NOTE:

1. The dropout voltage is defined as the difference between V_{IN} and V_{OUT} when V_{OUT} falls to $V_{OUT(NOM)}$ - 100mV.

FUNCTIONAL BLOCK DIAGRAMS

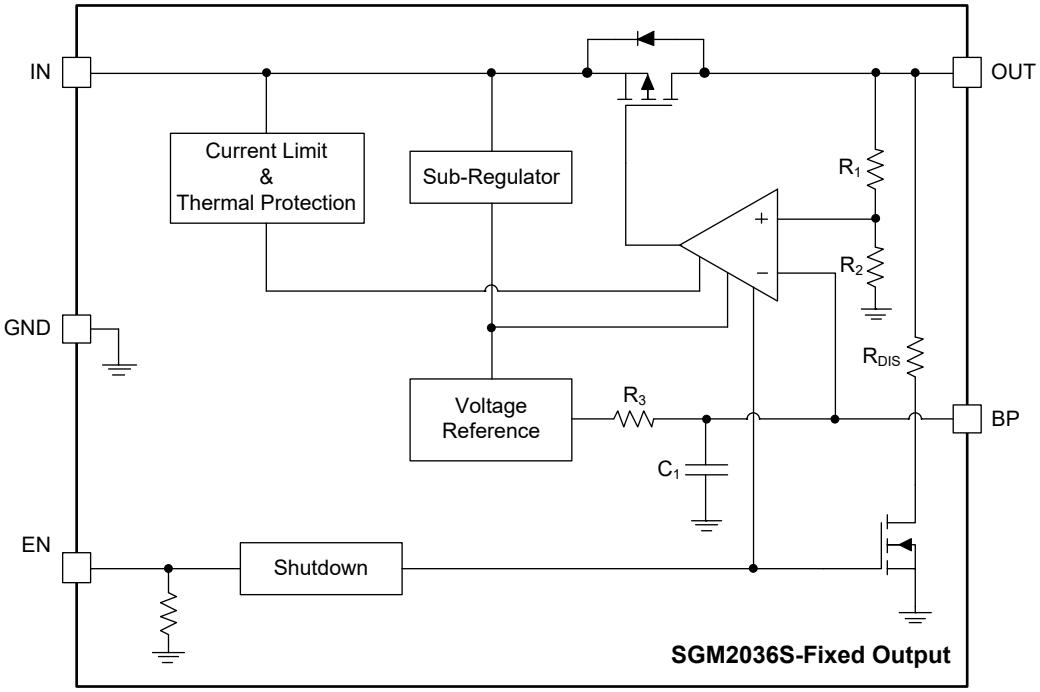


Figure 1. Fixed Output Regulator Block Diagram

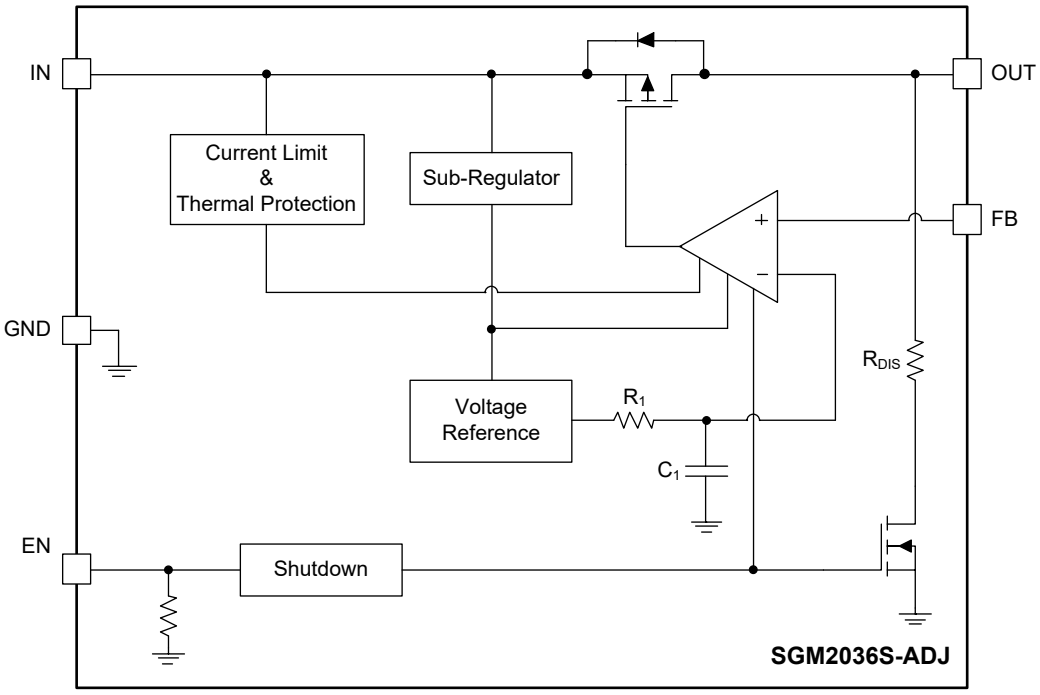


Figure 2. Adjustable Output Regulator Block Diagram

TYPICAL APPLICATION CIRCUITS

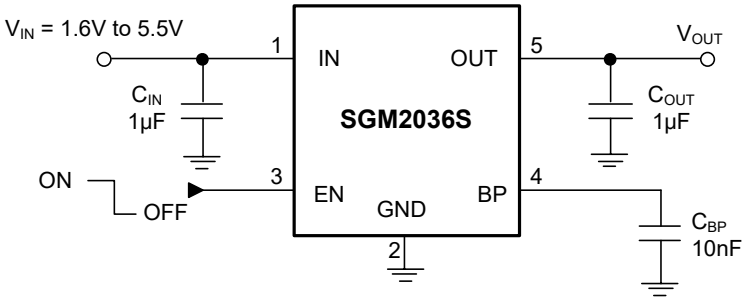


Figure 3. Fixed Output Version (SOT-23-5/SC70-5)

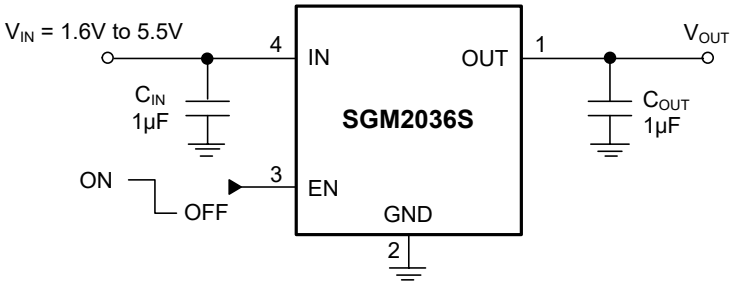
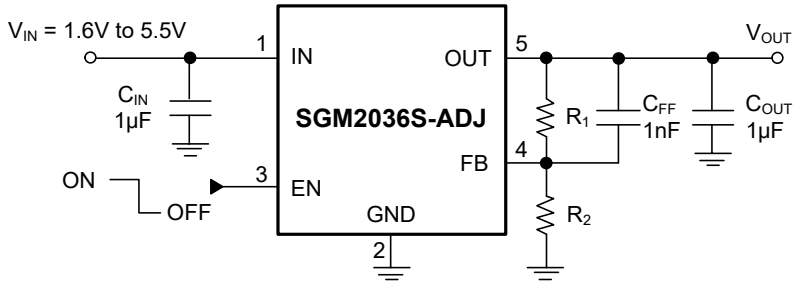


Figure 4. Fixed Output Version (XTDFN-1×1-4L)



$$R_1 = R_2 \times \left(\frac{V_{OUT}}{0.8V} - 1 \right)$$

Figure 5. Adjustable Output Version (SOT-23-5/SC70-5)

APPLICATION INFORMATION

The SGM2036S is a low input voltage, ultra-low noise and low dropout LDO and provides 300mA output current. These features make the device a reliable solution to solve many challenging problems in the generation of clean and accurate power supply. The high performance also makes the SGM2036S useful in a variety of applications. The SGM2036S provides the protection function for output overload, output short -circuit condition and overheating.

The SGM2036S provides an EN pin as an external chip enable control to enable/disable the device. When the regulator is in shutdown state, the shutdown current consumes as low as 0.04μA (TYP).

Input Capacitor Selection (C_{IN})

The input decoupling capacitor is necessary to be connected as close as possible to the IN pin for ensuring the device stability. 1μF or greater X7R or X5R ceramic capacitor is selected to get good dynamic performance.

When V_{IN} is required to provide large current instantaneously, a large effective input capacitor is required. Multiple input capacitors can limit the input tracking inductance. Adding more input capacitors is available to restrict the ringing and to keep it below the device absolute maximum ratings.

Output Capacitor Selection (C_{OUT})

The output decoupling capacitor should be located as close as possible to the OUT pin. 1μF or greater X7R or X5R ceramic capacitor is selected to get good dynamic performance. The minimum effective capacitance of C_{OUT} that SGM2036S can remain stable is 0.5μF. For ceramic capacitor, temperature, DC bias and package size will change the effective capacitance, so enough margin of C_{OUT} must be considered in design. Larger capacitance and lower ESR C_{OUT} will help improve the load transient response and increase the high frequency PSRR.

Enable Control

The SGM2036S uses the EN pin to enable/disable its device and to deactivate/activate the output automatic discharge function.

When the EN pin voltage is lower than 0.4V, the device is in shutdown state, there is no current flowing from IN to OUT pins. In this state, the automatic discharge transistor is active to discharge the output voltage through a 73Ω (TYP) resistor.

When the EN pin voltage is higher than 1.5V, the device is in active state, the input voltage is regulated to the output voltage and the automatic discharge transistor is turned off.

The EN pin is pulled down by internal 0.7μA (TYP) current source when the EN pin is floated. This current source will ensure the SGM2036S in shutdown state and reduce the power dissipation in system.

Adjustable Regulator

The output voltage of the SGM2036S can be adjusted from 0.8V to 5.0V. The ADJ pin will be connected with two external resistors as shown in Figure 6, the output voltage is determined by the following equation:

$$V_{OUT} = V_{FB} \times \left(1 + \frac{R_1}{R_2}\right) \quad (1)$$

where:

V_{OUT} is output voltage and V_{FB} is the internal voltage reference, V_{FB} = 0.8V.

One parallel capacitor (C_{FF}) with R_1 can be used to improve the feedback loop stability and PSRR, increase the transient response and reduce the output noise. Use R_2 = 160kΩ to maintain a 5μA minimum load.

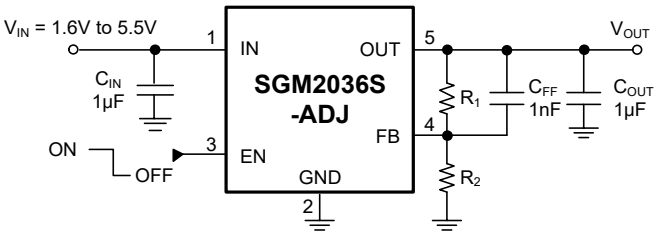


Figure 6. Adjustable Output Voltage Application

APPLICATION INFORMATION (continued)

Output Current Limit and Short-Circuit Protection

When overload events happen, the output current is internally limited to 700mA (TYP). When the OUT pin is shorted to ground, the short-circuit protection will limit the output current to 380mA (TYP).

Thermal Shutdown

The SGM2036S can detect the temperature of die. When the die temperature exceeds the threshold value of thermal shutdown, the SGM2036S will be in shutdown state and it will remain in this state until the die temperature decreases to +140℃.

Power Dissipation (P_D)

Thermal protection limits power dissipation in the SGM2036S. When power dissipation on pass element (P_D = (V_{IN} - V_{OUT}) × I_{OUT}) is too much that raise the operation junction temperature exceeds +160℃, the OTP circuit starts the thermal shutdown function and turns the pass element off.

Therefore, thermal analysis for the chosen application is important to guarantee reliable performance over all conditions. To guarantee reliable operation, the junction temperature of the SGM2036S must not exceed 125℃.

In order to calculate the maximum power that the device can dissipate, the following formula is used:

$$P_{D(MAX)} = (125℃ - T_A) / \theta_{JA} \quad (2)$$

where T_A is the ambient temperature, and θ_{JA} is the junction-to-ambient thermal resistance.

Negatively Biased Output

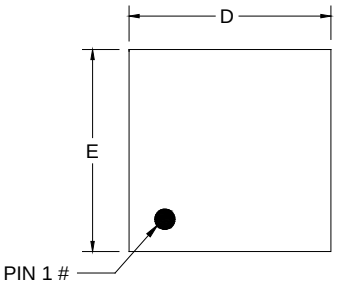
When the output is negative voltage, the chip may not start up due to parasitic effects. Ensure that the output is greater than -0.3V under all conditions. If excessive negatively biased output is expected in the application, a Schottky diode can be added between the OUT pin and GND pin.

Reverse Current

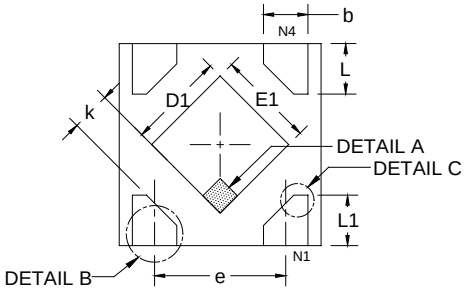
The pass transistor has an inherent body diode which will be forward biased in the case when V_{OUT} > (V_{IN} + 0.3V). If extended reverse voltage operation is anticipated, external limiting might be appropriate.

PACKAGE OUTLINE DIMENSIONS

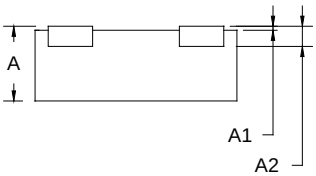
XTDFN-1×1-4L



TOP VIEW



BOTTOM VIEW

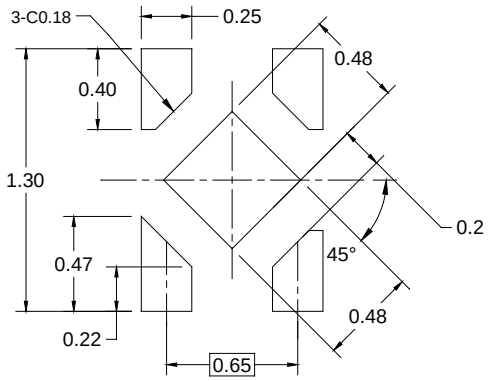


SIDE VIEW

DETAIL A
ALTERNATE PIN 1 CONSTRUCTION

DETAIL B
ALTERNATE TERMINAL CONSTRUCTION

DETAIL C
ALTERNATE TERMINAL CONSTRUCTION



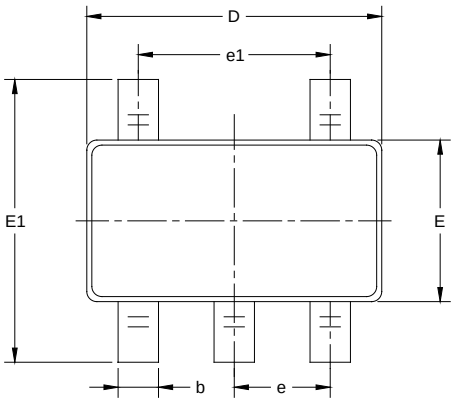
RECOMMENDED LAND PATTERN (Unit: mm)

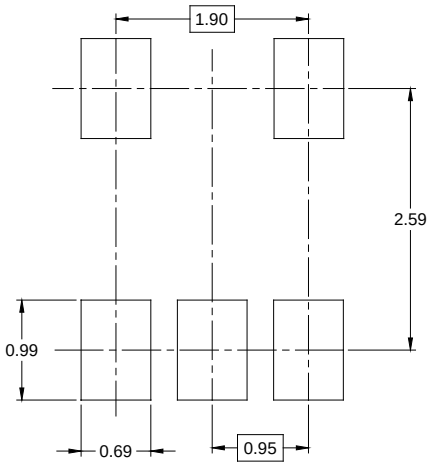
Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	0.340	0.370	0.400
A1	0.000	0.020	0.050
A2	0.100 REF		
b	0.170	-	0.300
D	0.950	1.000	1.050
E	0.950	1.000	1.050
D1	0.430	0.480	0.530
E1	0.430	0.480	0.530
L	0.200	0.250	0.300
L1	0.200	-	0.370
e	0.650 BSC		
k	0.150	-	-

NOTE: This drawing is subject to change without notice.

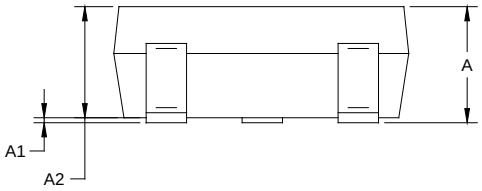
PACKAGE OUTLINE DIMENSIONS

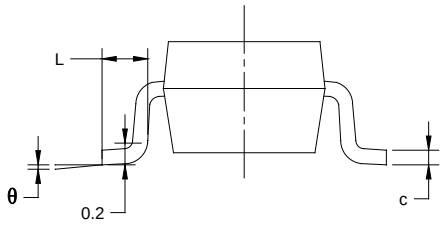
SOT-23-5





RECOMMENDED LAND PATTERN (Unit: mm)



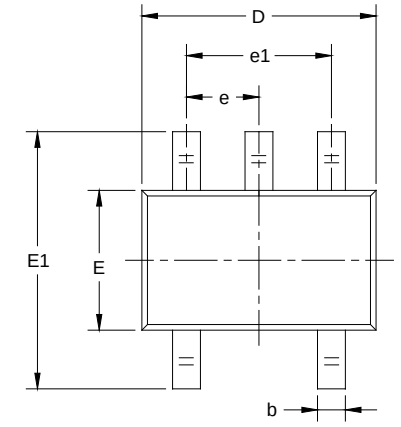


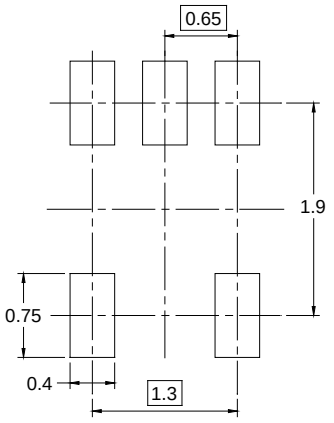
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037 BSC	
e1	1.900 BSC		0.075 BSC	
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

NOTES:
1. Body dimensions do not include mode flash or protrusion.
2. This drawing is subject to change without notice.

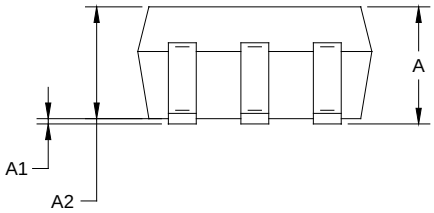
PACKAGE OUTLINE DIMENSIONS

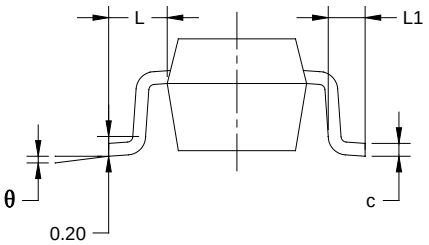
SC70-5





RECOMMENDED LAND PATTERN (Unit: mm)



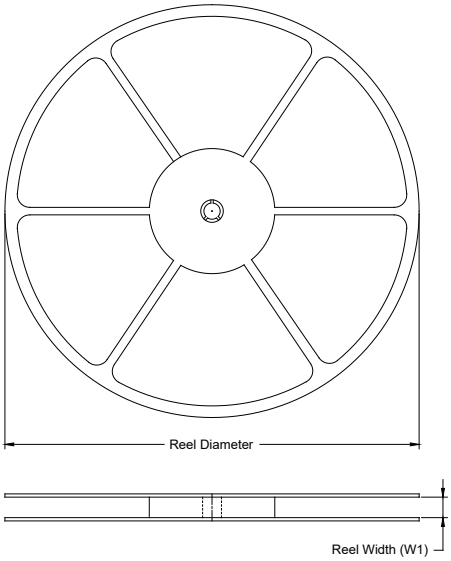


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.65 TYP		0.026 TYP	
e1	1.300 BSC		0.051 BSC	
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

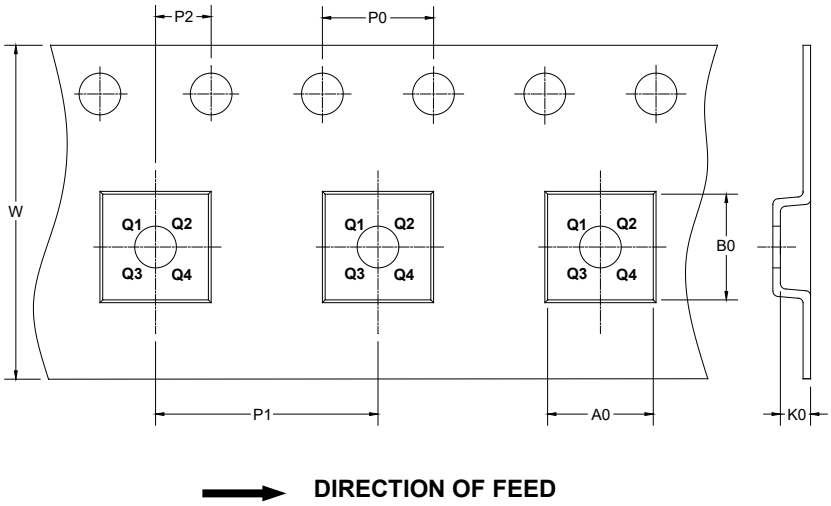
NOTES:
1. Body dimensions do not include mode flash or protrusion.
2. This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



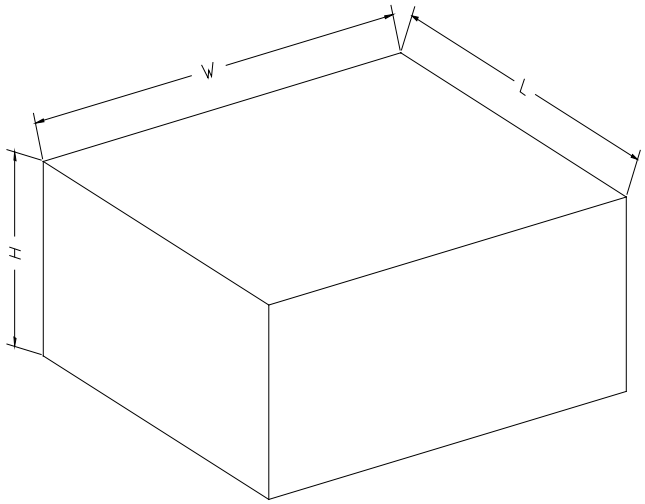
NOTE: The picture is only for reference. Please make the object as the standard.

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
XTDFN-1×1-4L	7″	9.5	1.16	1.16	0.50	4.0	2.0	2.0	8.0	Q1
SOT-23-5	7″	9.5	3.20	3.20	1.40	4.0	4.0	2.0	8.0	Q3
SC70-5	7″	9.5	2.25	2.55	1.20	4.0	4.0	2.0	8.0	Q3

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