SGM2036-0.75
300mA, Low Power, Low Dropout, RF Linear Regulator

GENERAL DESCRIPTION

The SGM2036-0.75 low-power, low-dropout, CMOS linear voltage regulator operates from a 1.6V to 5.5V input voltage and deliver up to 300mA output current. It is the perfect choice for low voltage, low power applications. A low ground current makes this part attractive for battery operated power systems. The SGM2036-0.75 also offers low dropout voltage to prolong battery life in portable electronics. Systems requiring a quiet voltage source, such as RF applications, will benefit from the low output noise and high PSRR.

Other features include a 10nA logic-controlled shutdown mode, short current limit and thermal shutdown protection.

The SGM2036-0.75 has auto-discharge function to quickly discharge V_{OUT} in the disable status.

The SGM2036-0.75 is available in Green SOT-23-5 and UTDFN-1×1-4L packages. It operates over an operating temperature range of -40℃ to +85℃.

FEATURES

- **Low Dropout Voltage**
- **Thermal Overload Protection**
- **Built-In Fold Back Protection Circuit**
- **20μA Low Supply Current**
- **10nA Logic-Controlled Shutdown**
- **1.6V to 5.5V Input Voltage Range**
- **0.75V Fixed Output Voltage**
- **Short Auto-Discharge Function**
- **300mA Output Current**
- **High Output Voltage Accuracy**
- **Short Start-Up Time**
- **-40℃ to +85℃ Operating Temperature Range**
- **Available in Green SOT-23-5 and UTDFN-1×1-4L Packages**

APPLICATIONS

Cellular Telephones
Cordless Telephones
PCMCIA Cards
Modems
MP3 Players
Hand-Held Instruments
Palmtop Computers
Electronic Planners
Portable/Battery-Powered Equipment

TYPICAL APPLICATION

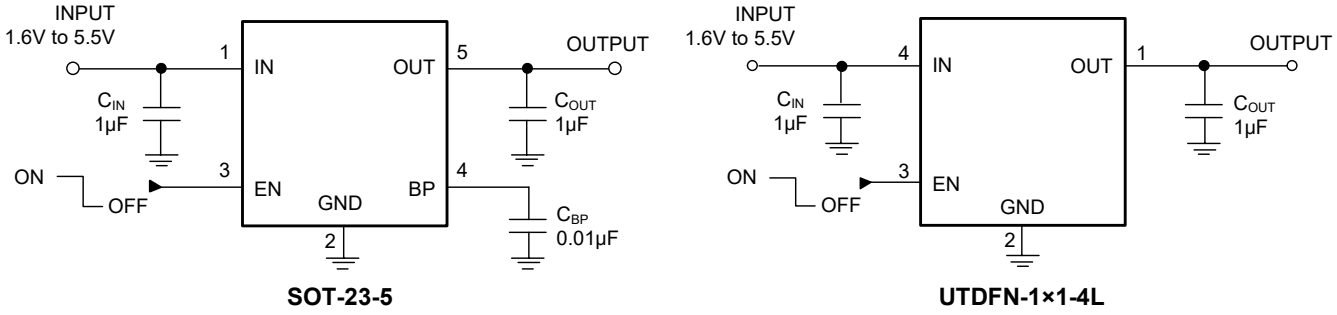


Figure 1. Typical Application Circuits

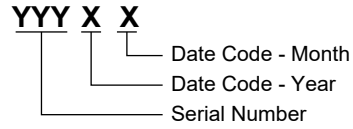
PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM2036-0.75	SOT-23-5	-40℃ to +85℃	SGM2036-0.75YN5G/TR	MCEXX	Tape and Reel, 3000
SGM2036-0.75	UTDFN-1×1-4L	-40℃ to +85℃	SGM2036-0.75YUDH4G/TR	G9	Tape and Reel, 10000

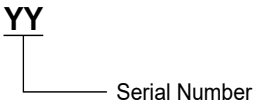
MARKING INFORMATION

NOTE: XX = Date Code.

SOT-23-5



UTDFN-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 to GND ..... -0.3V to 6V
Output Short-Circuit Duration..... Infinite
EN to GND..... -0.3V to 6V
OUT, BP to GND..... -0.3V to (V_{IN} + 0.3V)
Power Dissipation, P_D @ T_A = +25℃
SOT-23-5..... 390mW
UTDFN-1×1-4L..... 400mW
Package Thermal Resistance
SOT-23-5, θ_{JA}..... 285℃/W
UTDFN-1×1-4L, θ_{JA}..... 280℃/W
Junction Temperature..... +150℃
Storage Temperature Range..... -65℃ to +150℃
Lead Temperature (Soldering, 10s)..... +260℃
ESD Susceptibility
HBM..... 4000V
MM..... 400V
CDM..... 1000V

RECOMMENDED OPERATING CONDITIONS

Operating Voltage Range..... 1.6V to 5.5V
Operating Junction Temperature Range..... -40℃ to +85℃

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

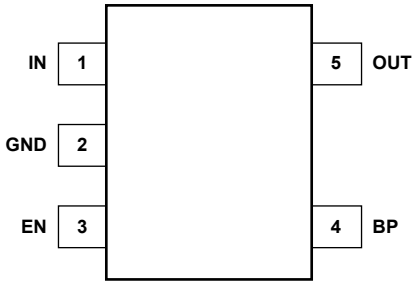
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance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

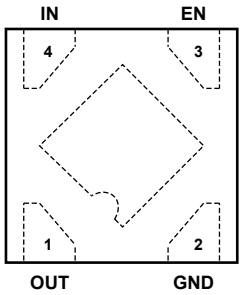
PIN CONFIGURATIONS

(TOP VIEW)



SOT-23-5

(TOP VIEW)



UTDFN-1×1-4L

PIN DESCRIPTION

PIN		NAME	FUNCTION
SOT-23-5	UTDFN-1×1-4L		
1	4	IN	Regulator Input. Supply voltage can range from 1.6V to 5.5V. Bypass with a 1μF capacitor to GND.
2	2	GND	Ground.
3	3	EN	Enable Pin. This pin has an internal pull-down resistor. A logic low reduces the supply current to less than 1μA. Connect to IN pin for normal operation.
4	–	BP	Reference-Noise Bypass Pin. Bypass with a low-leakage 0.01μF ceramic capacitor for reduced noise at the output. The capacitor is recommended to be placed very close to the pin for high PSRR.
5	1	OUT	Regulator Output.
–	Exposed Pad	–	Exposed Pad. The exposed pad should be connected to a large ground plane to maximize thermal performance.

ELECTRICAL CHARACTERISTICS

(V_{IN} = 2.5V, Full = -40℃ to +85℃, unless otherwise noted.)

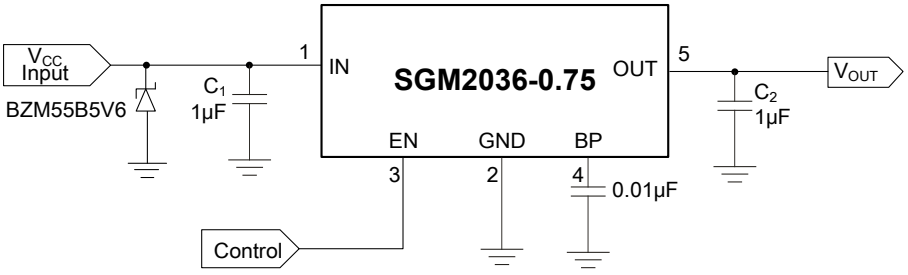
PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN	TYP	MAX	UNITS
Input Voltage	V_{IN}			+25℃	1.6		5.5	V
Output Voltage Accuracy		I_{OUT} = 0.1mA		+25℃	-2.5		+2.5	%
Maximum Output Current (1)				+25℃	300			mA
Current Limit	I_{LIM}			+25℃	360	560		mA
Supply Pin Current	I_Q	No load, V_{EN} = V_{IN}		+25℃		20	26	μA
Dropout Voltage (2)	V_{DROP}	I_{OUT} = 300mA		+25℃		950	1300	mV
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	V_{IN} = 1.6V to 5.5V, I_{OUT} = 1mA		+25℃		0.01	0.1	%/V
Load Regulation	ΔV_{OUT}	I_{OUT} = 0.1mA to 300mA		+25℃		12	40	mV
Short Current Limit	I_{SHORT}	V_{OUT} = 0V		+25℃		200		mA
Power Supply Rejection Ratio	PSRR	C_{BP} = 0μF, I_{OUT} = 30mA, C_{OUT} = 1μF, V_{IN} = 1.75V, ΔV_{RIPPLE} = 0.2V_{P-P}	f = 217Hz	+25℃		74		dB
			f = 1kHz	+25℃		61		
		C_{BP} = 0.01μF, I_{OUT} = 30mA, C_{OUT} = 1μF, V_{IN} = 1.75V, ΔV_{RIPPLE} = 0.2V_{P-P}	f = 217Hz	+25℃		82		
			f = 1kHz	+25℃		70		
Output Voltage Noise	e_n	C_{BP} = 0μF, C_{OUT} = 1μF, f = 10Hz to 100kHz	I_{OUT} = 0mA	+25℃		40		μV_{RMS}
			I_{OUT} = 30mA	+25℃		76		
		C_{BP} = 0.01μF, C_{OUT} = 1μF, f = 10Hz to 100kHz	I_{OUT} = 0mA	+25℃		12		
			I_{OUT} = 30mA	+25℃		40		
Shutdown								
EN Input Threshold	V_{IH}	V_{IN} = 1.6V to 5.5V		Full	1.5			V
	V_{IL}			Full			0.4	
EN Input Bias Current	I_{BH}	V_{EN} = 5.5V		Full		0.8	2	μA
	I_{BL}	V_{EN} = 0V		Full		0.01	1	
Shutdown Supply Current	I_{SHDN}	V_{EN} = 0V		Full		0.01	1	μA
Start-Up Time (3)	t_{STR}	C_{OUT} = 1μF, no load		+25℃		30		μs
R_{ON} of Discharge MOSFET		V_{IN} = 4.0V, V_{EN} = 0V		+25℃		50		Ω
Thermal Protection								
Thermal Shutdown Temperature	T_{SHDN}					140		℃
Thermal Shutdown Hysteresis	ΔT_{SHDN}					15		℃

NOTES:

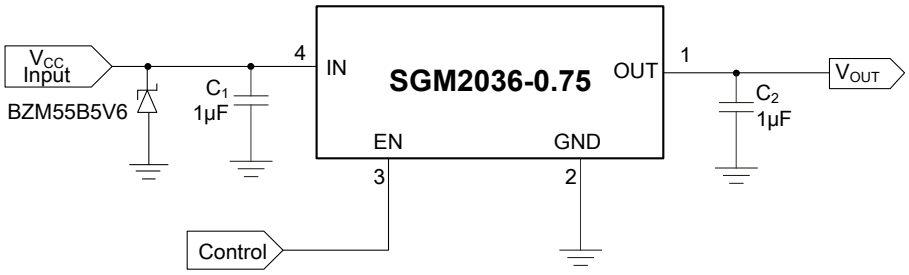
1. Maximum output current is affected by the PCB layout, size of metal trace, the thermal conduction path between metal layers, ambient temperature and the other environment factors of system. Attention should be paid to the dropout voltage when V_{IN} < V_{OUT} + V_{DROP}.
2. The dropout voltage is defined as V_{IN} - V_{OUT}, when V_{OUT} is 60mV below the value of V_{OUT} for V_{IN} = 2.5V.
3. Time needed for V_{OUT} to reach 90% of final value.

APPLICATION NOTE

When LDO is used in handheld products, attention must be paid to voltage spikes which could damage SGM2036-0.75. In such applications, voltage spikes will be generated at charger interface and V_{BUS} pin of USB interface when charger adapters and USB equipments are hot-plugged. Besides this, handheld products will be tested on the production line without battery. Test engineer will apply power from the connector pin which connects with positive pole of the battery. When external power supply is turned on suddenly, the voltage spikes will be generated at the battery connector. The voltage spikes will be very high, and it always exceeds the absolute maximum input voltage (6.0V) of LDO. In order to get robust design, design engineer needs to clear up this voltage spike. Zener diode is a cheap and effective solution to eliminate such voltage spike. For example, BZM55B5V6 is a 5.6V small package Zener diode which can be used to remove voltage spikes in cell phone designs. The schematic is shown below.



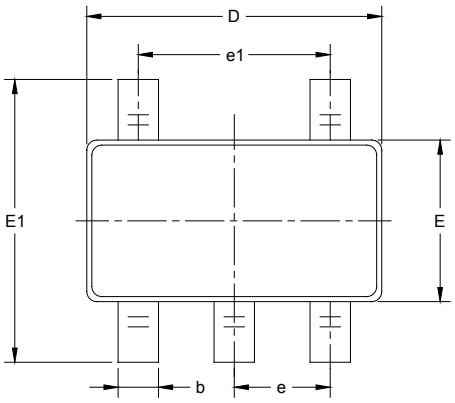
SOT-23-5

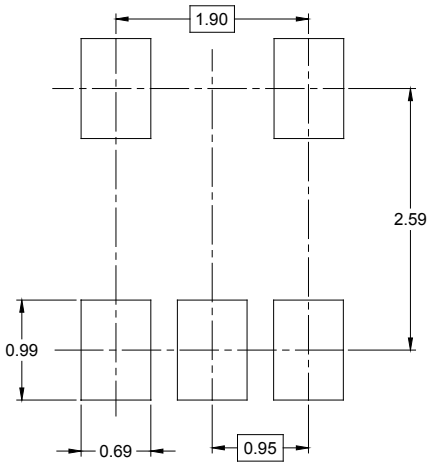


UTDFN-1×1-4L

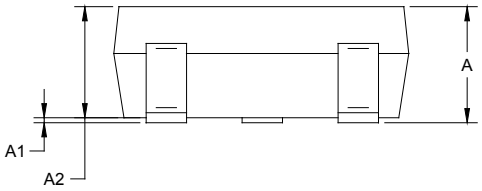
PACKAGE OUTLINE DIMENSIONS

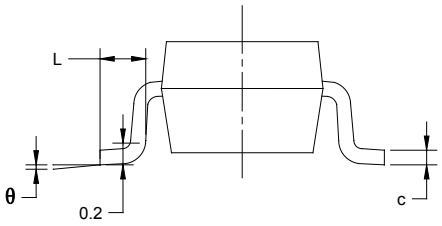
SOT-23-5





RECOMMENDED LAND PATTERN (Unit: mm)

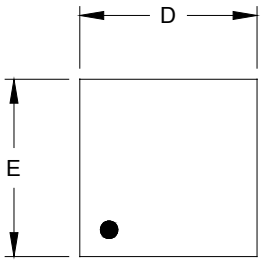




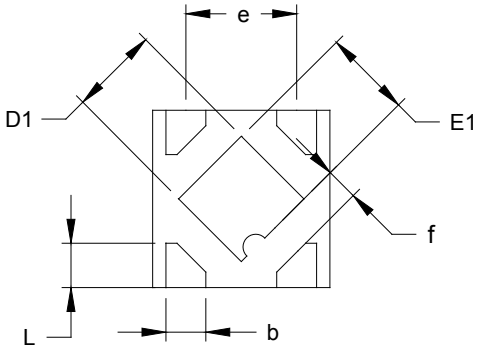
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037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

PACKAGE OUTLINE DIMENSIONS

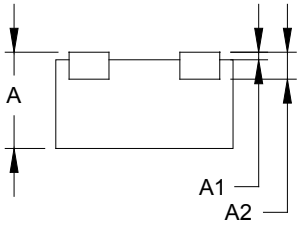
UTDFN-1×1-4L



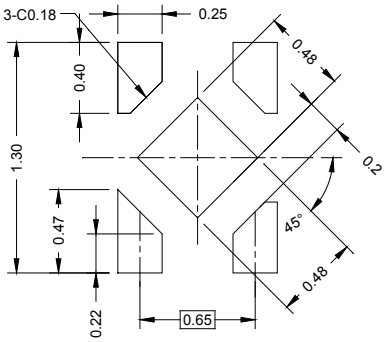
TOP VIEW



BOTTOM VIEW



SIDE VIEW

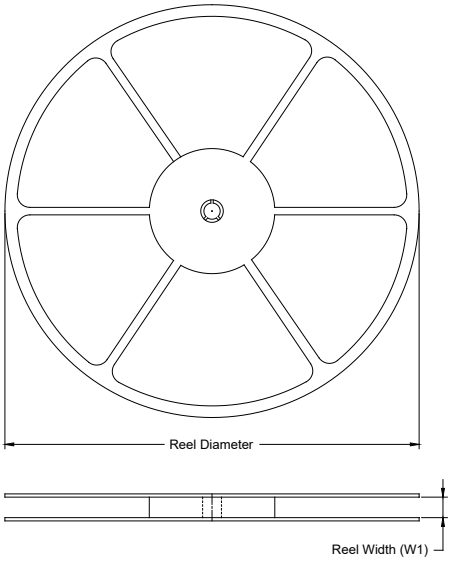


RECOMMENDED LAND PATTERN (Unit: mm)

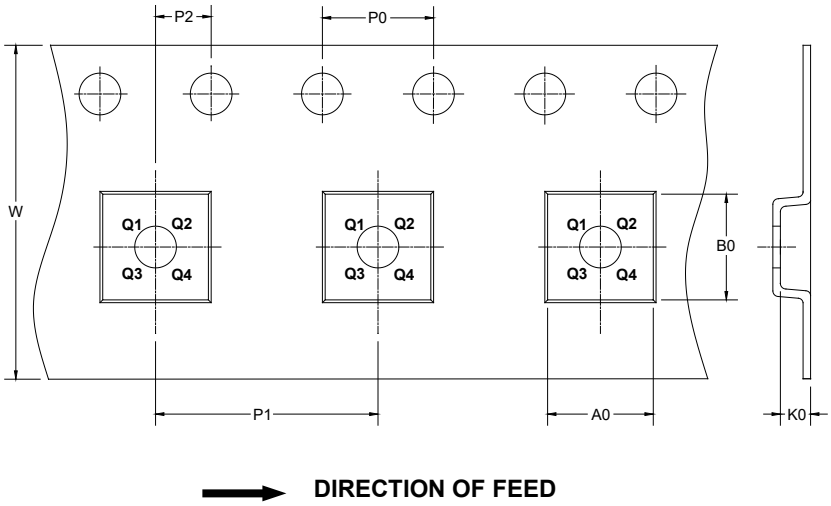
Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	0.500	0.550	0.600
A1	0.000		0.050
A2	0.152 REF		
D	0.950	1.000	1.050
D1	0.450	0.500	0.550
E	0.950	1.000	1.050
E1	0.450	0.500	0.550
b	0.175	0.225	0.275
e	0.625 BSC		
f	0.195 REF		
L	0.200	0.250	0.300

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



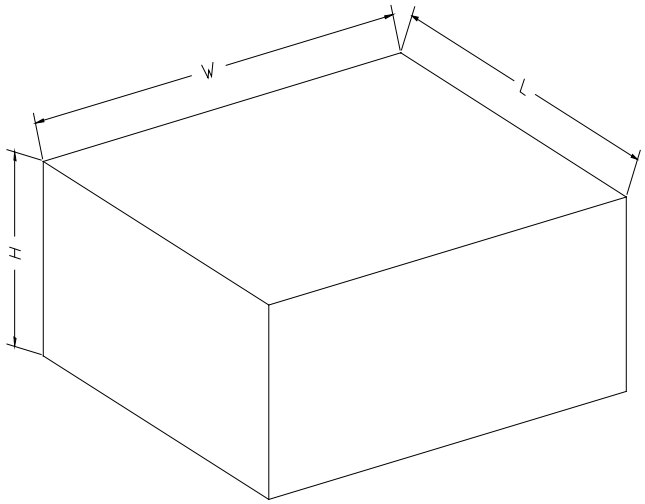
NOTE: The picture is only for reference. Please make the object as the standard.

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-23-5	7″	9.5	3.20	3.20	1.40	4.0	4.0	2.0	8.0	Q3
UTDFN-1×1-4L	7″	9.0	1.18	1.18	0.68	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