



# SGM2030

## Low Power, Low Dropout, RF-Linear Regulators

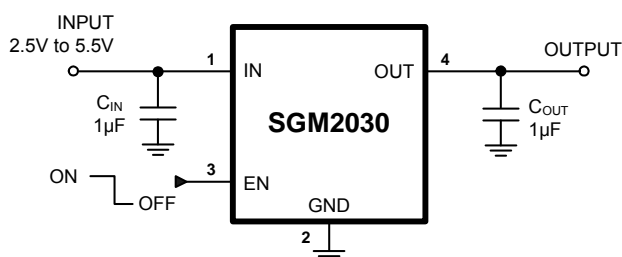
### GENERAL DESCRIPTION

The SGM2030 series low-power, low-dropout, CMOS linear voltage regulators operate from a 2.5V to 5.5V input voltage in an ultra small package. They are the perfect choice for low voltage, low power applications. A low ground current makes this part attractive for battery operated power systems. The SGM2030 series also offer ultra low dropout voltage to prolong battery life in portable electronics. Systems requiring a quiet voltage source, such as RF applications, will benefit from the SGM2030 series' low output noise and high PSRR.

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

The SGM2030 is available in Green UTDFN-1.2×1.6-4L package. It operates over an ambient temperature range of -40°C to +85°C.

### TYPICAL APPLICATION



### FEATURES

- Low Dropout Voltage
- Thermal-Overload Protection
- Output Current Limit
- High PSRR (71dB at 1kHz)
- 10nA Logic-Controlled Shutdown
- Available in Multiple Output Voltage Versions
- Fixed Outputs of 1.2V, 1.5V, 1.8V, 2.5V, 2.6V, 2.8V, 2.85V, 3.0V and 3.3V
- -40°C to +85°C Operating Temperature Range
- Available in Green UTDFN-1.2×1.6-4L Package

### APPLICATIONS

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

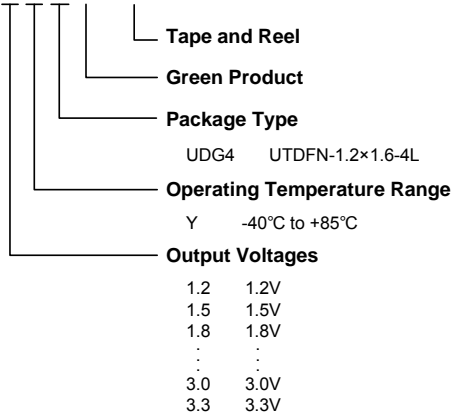
**PACKAGE/ORDERING INFORMATION**

| MODEL        | V <sub>OUT</sub> (V) | PIN-PACKAGE      | ORDERING NUMBER       | PACKAGE MARKING | PACKAGE OPTION      |
|--------------|----------------------|------------------|-----------------------|-----------------|---------------------|
| SGM2030-1.2  | 1.2V                 | UTDFN-1.2x1.6-4L | SGM2030-1.2YUDG4G/TR  | 63X             | Tape and Reel, 5000 |
| SGM2030-1.5  | 1.5V                 | UTDFN-1.2x1.6-4L | SGM2030-1.5YUDG4G/TR  | 9DX             | Tape and Reel, 5000 |
| SGM2030-1.8  | 1.8V                 | UTDFN-1.2x1.6-4L | SGM2030-1.8YUDG4G/TR  | 4EX             | Tape and Reel, 5000 |
| SGM2030-2.5  | 2.5V                 | UTDFN-1.2x1.6-4L | SGM2030-2.5YUDG4G/TR  | 9EX             | Tape and Reel, 5000 |
| SGM2030-2.6  | 2.6V                 | UTDFN-1.2x1.6-4L | SGM2030-2.6YUDG4G/TR  | 68X             | Tape and Reel, 5000 |
| SGM2030-2.8  | 2.8V                 | UTDFN-1.2x1.6-4L | SGM2030-2.8YUDG4G/TR  | 4FX             | Tape and Reel, 5000 |
| SGM2030-2.85 | 2.85V                | UTDFN-1.2x1.6-4L | SGM2030-2.85YUDG4G/TR | BAX             | Tape and Reel, 5000 |
| SGM2030-3.0  | 3.0V                 | UTDFN-1.2x1.6-4L | SGM2030-3.0YUDG4G/TR  | 50X             | Tape and Reel, 5000 |
| SGM2030-3.3  | 3.3V                 | UTDFN-1.2x1.6-4L | SGM2030-3.3YUDG4G/TR  | 56X             | Tape and Reel, 5000 |

NOTE: Order number is defined as the follow:

**ORDER NUMBER**

**SGM2030 - X X X G / TR**



**ABSOLUTE MAXIMUM RATINGS**

|  |                            |
|--|----------------------------|
| IN to GND.....                         | -0.3V to 6V                |
| Output Short-Circuit Duration .....    | Infinite                   |
| EN to GND.....                         | -0.3V to $V_{IN}$          |
| OUT to GND.....                        | -0.3V to $(V_{IN} + 0.3V)$ |
| Operating Temperature Range.....       | -40°C to +85°C             |
| Junction Temperature.....              | 150°C                      |
| Package Thermal Resistance             |                            |
| UTDFN-1.2×1.6-4L, $\theta_{JA}$ .....  | 148°C/W                    |
| Storage Temperature Range.....         | -65°C to +150°C            |
| Lead Temperature (soldering, 10s)..... | 260°C                      |
| ESD Susceptibility                     |                            |
| HBM.....                               | 4000V                      |
| MM.....                                | 400V                       |

**NOTE:**

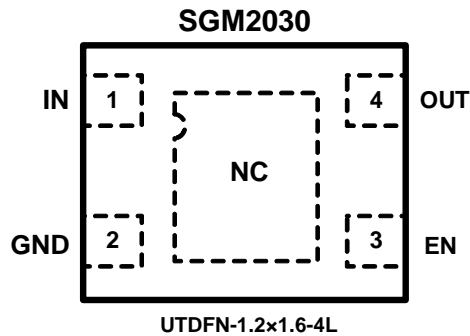
Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

**CAUTION**

This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. 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 very small parametric changes could cause the device not to meet its published specifications.

SGMICRO reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time. Please contact SGMICRO sales office to get the latest datasheet.

## PIN CONFIGURATION (TOP VIEW)



## PIN DESCRIPTION

| PIN         | NAME | FUNCTION   |
|-------------|------|--|
| 1           | IN   | Regulator Input. Supply voltage can range from 2.5V to 5.5V. Bypass with a 1 $\mu$ F capacitor to GND. |
| 2           | GND  | Ground.  |
| 3           | EN   | Shutdown Input. A logic low reduces the supply current to 10nA. Connect to IN for normal operation.    |
| 4           | OUT  | Regulator Output.  |
| Exposed Pad | NC   | No Connection.   |

**ELECTRICAL CHARACTERISTICS** $(V_{IN} = V_{OUT(NOMINAL)} + 0.5V^{(1)}$ , Full =  $-40^{\circ}C$  to  $+85^{\circ}C$ , unless otherwise noted.)

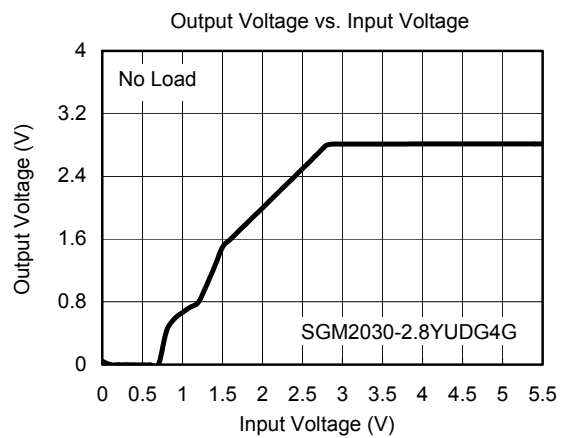
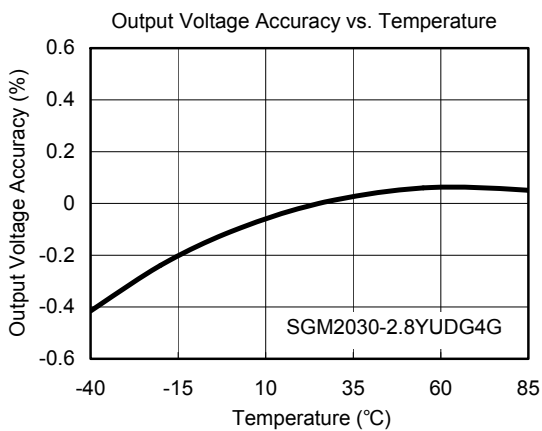
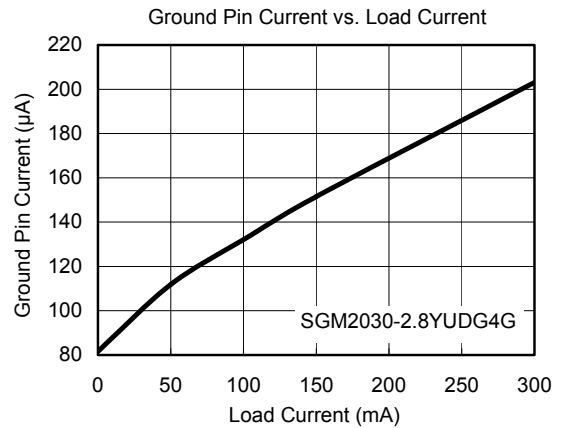
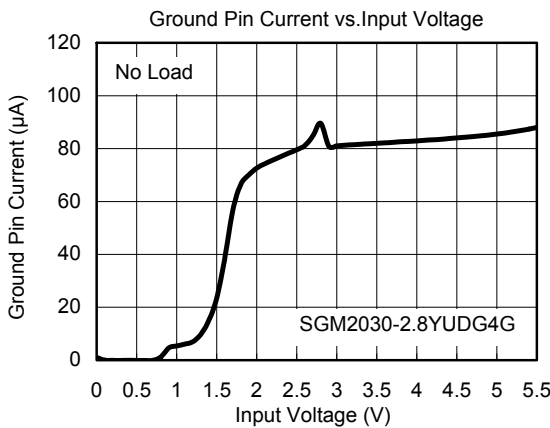
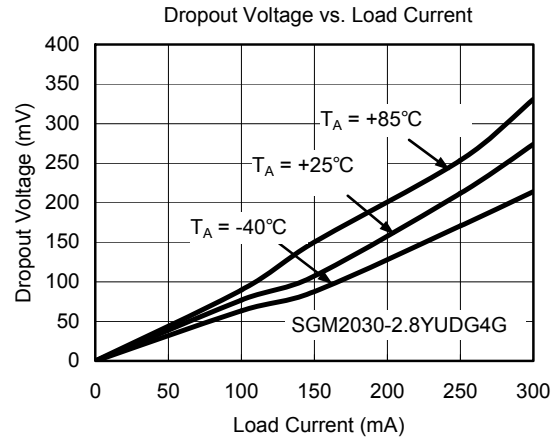
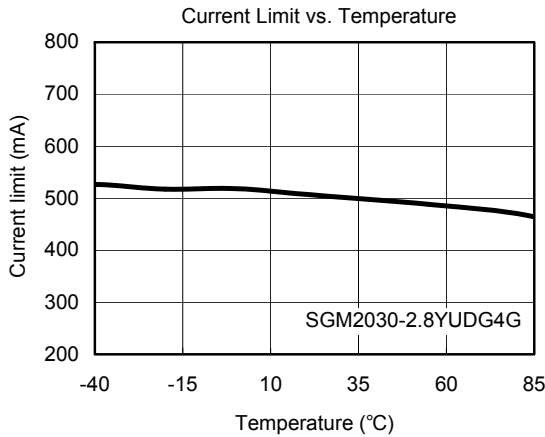
| PARAMETER                              | SYMBOL            | CONDITIONS   | TEMP           | MIN            | TYP   | MAX   | UNITS         |
|--|-------------------|--|----------------|----------------|-------|-------|---------------|
| Input Voltage                          | $V_{IN}$          |  | $+25^{\circ}C$ | 2.5            |       | 5.5   | V             |
| Output Voltage Accuracy <sup>(1)</sup> |                   | $I_{OUT} = 0.1mA$  | $+25^{\circ}C$ | -3             |       | +3    | %             |
| Maximum Output Current <sup>(1)</sup>  |                   |  | $+25^{\circ}C$ | 300            |       |       | mA            |
| Current Limit <sup>(1)</sup>           | $I_{LIM}$         |  | $+25^{\circ}C$ | 310            |       |       | mA            |
| Ground Pin Current                     | $I_Q$             | No load, $EN = 2V$   | $+25^{\circ}C$ |                | 95    | 200   | $\mu A$       |
| Dropout Voltage <sup>(2)</sup>         |                   | $I_{OUT} = 1mA$  | $+25^{\circ}C$ |                | 0.9   |       | mV            |
|  |                   | $I_{OUT} = 300mA$  |                |                | 270   | 400   |               |
| Line Regulation <sup>(1)</sup>         | $\Delta V_{LNR}$  | $V_{IN} = 2.5V$ or $(V_{OUT} + 0.5V)$ to $5.5V$ ,<br>$I_{OUT} = 1mA$     | $+25^{\circ}C$ |                | 0.02  | 0.05  | %/V           |
| Load Regulation                        | $\Delta V_{LDR}$  | $I_{OUT} = 0.1mA$ to $300mA$ , $C_{OUT} = 1\mu F$ ,<br>$V_{OUT} > 2V$    | $+25^{\circ}C$ |                | 0.002 | 0.005 | %/mA          |
|  |                   | $I_{OUT} = 0.1mA$ to $300mA$ , $C_{OUT} = 1\mu F$ ,<br>$V_{OUT} \leq 2V$ |                |                | 0.004 | 0.008 |               |
| Output Voltage Noise                   | $e_n$             | $f = 10Hz$ to $100kHz$ , $C_{OUT} = 10\mu F$                             | $+25^{\circ}C$ |                | 140   |       | $\mu V_{RMS}$ |
| Power Supply Rejection Ratio           | PSRR              | $I_{LOAD} = 50mA$ , $C_{OUT} = 1\mu F$ ,<br>$V_{IN} = V_{OUT} + 1V$      | $f = 217Hz$    | $+25^{\circ}C$ |       | 72    | dB            |
|  |                   |  | $f = 1kHz$     | $+25^{\circ}C$ |       | 71    | dB            |
| <b>SHUTDOWN <sup>(3)</sup></b>         |                   |  |                |                |       |       |               |
| EN Input Threshold                     | $V_{IH}$          | $V_{IN} = 2.5V$ to $5.5V$ , $V_{EN} = -0.3V$ to $V_{IN}$                 | Full           |                | 1.5   |       | V             |
|  | $V_{IL}$          |  | Full           |                |       | 0.3   |               |
| EN Input Bias Current                  | $I_{B(SHDN)}$     | $EN = 0V$ and $EN = 5.5V$  | $+25^{\circ}C$ |                | 0.01  | 1     | $\mu A$       |
|  |                   |  | Full           |                | 0.01  |       |               |
| Shutdown Supply Current                | $I_{Q(SHDN)}$     | $EN = 0.4V$  | $+25^{\circ}C$ |                | 0.01  | 1     | $\mu A$       |
|  |                   |  | Full           |                | 0.01  |       |               |
| Shutdown Exit Delay <sup>(4)</sup>     |                   | $C_{OUT} = 1\mu F$ , No Load   | $+25^{\circ}C$ |                | 10    |       | $\mu s$       |
| <b>THERMAL PROTECTION</b>              |                   |  |                |                |       |       |               |
| Thermal Shutdown Temperature           | $T_{SHDN}$        |  |                |                | 150   |       | $^{\circ}C$   |
| Thermal Shutdown Hysteresis            | $\Delta T_{SHDN}$ |  |                |                | 15    |       | $^{\circ}C$   |

## NOTES:

- $V_{IN} = V_{OUT(NOMINAL)} + 0.5V$  or  $2.5V$ , whichever is greater.
- The dropout voltage is defined as  $V_{IN} - V_{OUT}$ , when  $V_{OUT}$  is 100mV below the value of  $V_{OUT}$  for  $V_{IN} = V_{OUT} + 0.5V$ .  
(Only applicable for  $V_{OUT} = +2.5V$  to  $+5.0V$ .)
- $V_{EN} = -0.3V$  to  $V_{IN}$
- Time needed for  $V_{OUT}$  to reach 90% of final value.

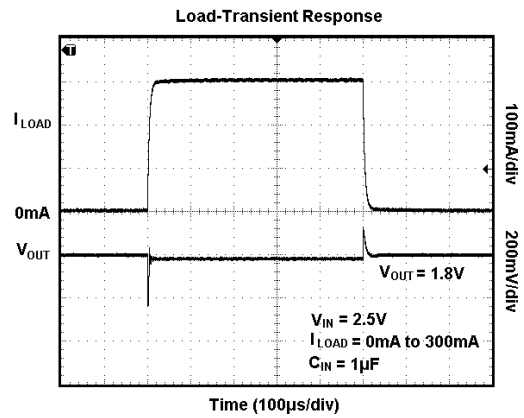
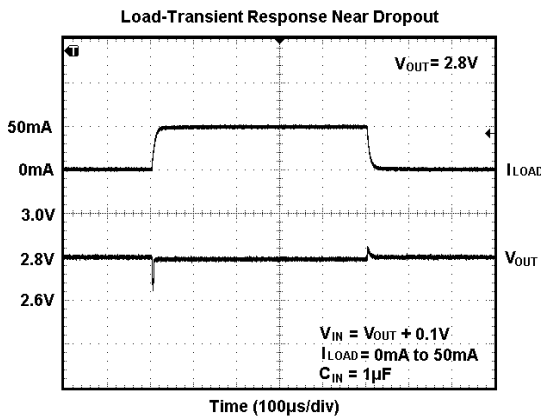
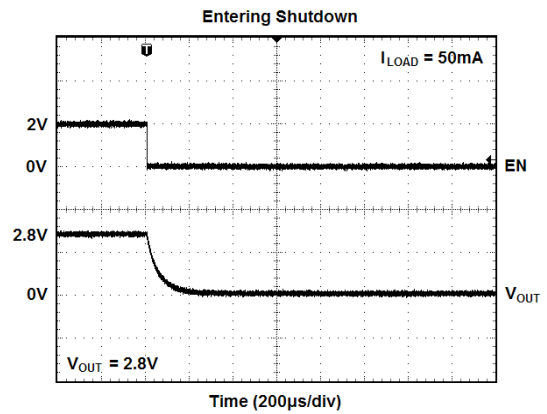
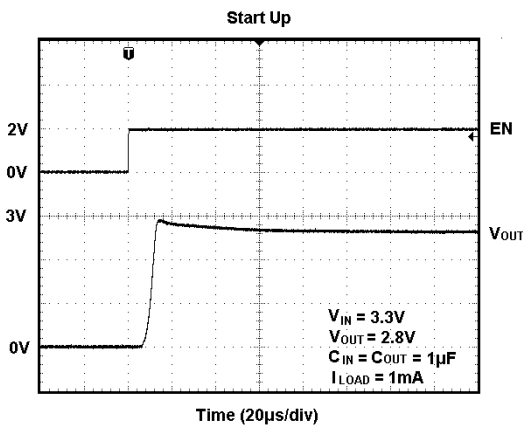
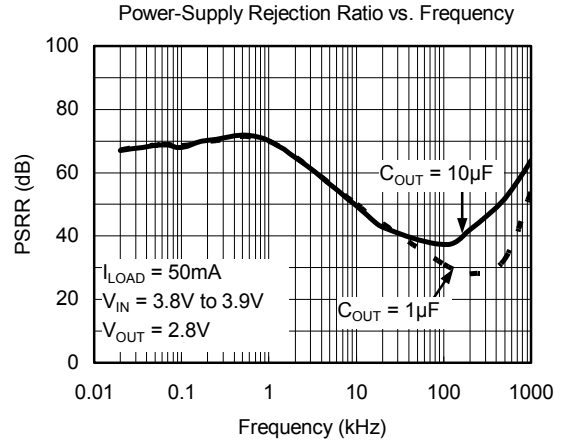
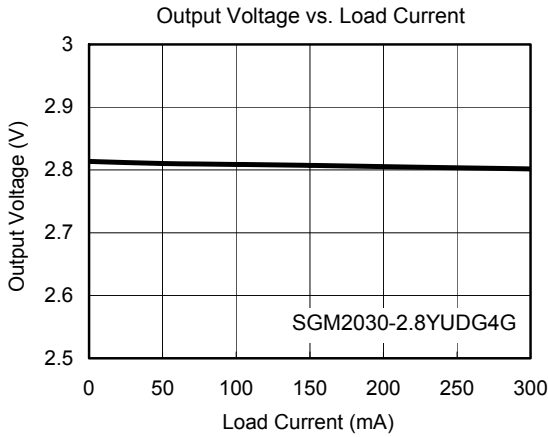
TYPICAL PERFORMANCE CHARACTERISTICS

$V_{IN} = V_{OUT (NOMINAL)} + 0.5V$  or  $2.5V$  (whichever is greater),  $C_{IN} = 1\mu F$ ,  $C_{OUT} = 1\mu F$ ,  $T_A = +25^\circ C$ , unless otherwise noted.



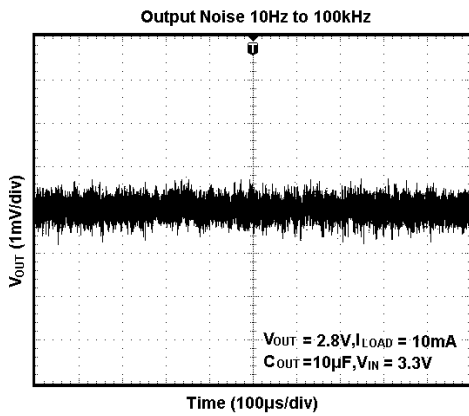
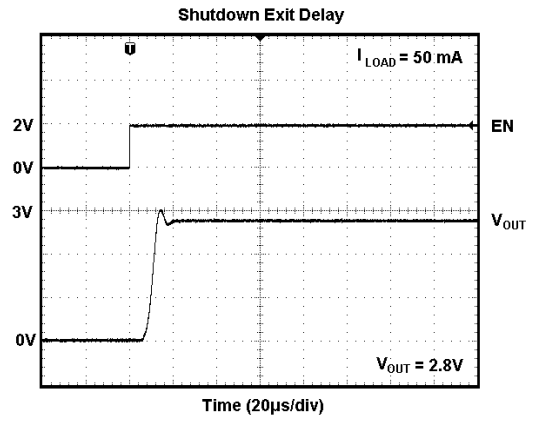
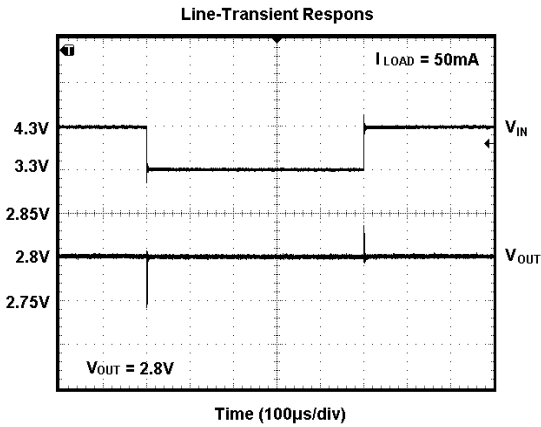
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**TYPICAL PERFORMANCE CHARACTERISTICS**

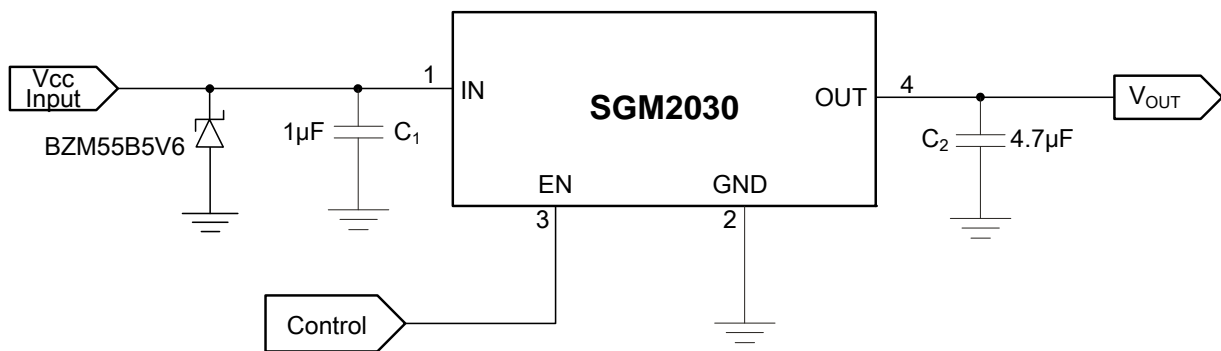
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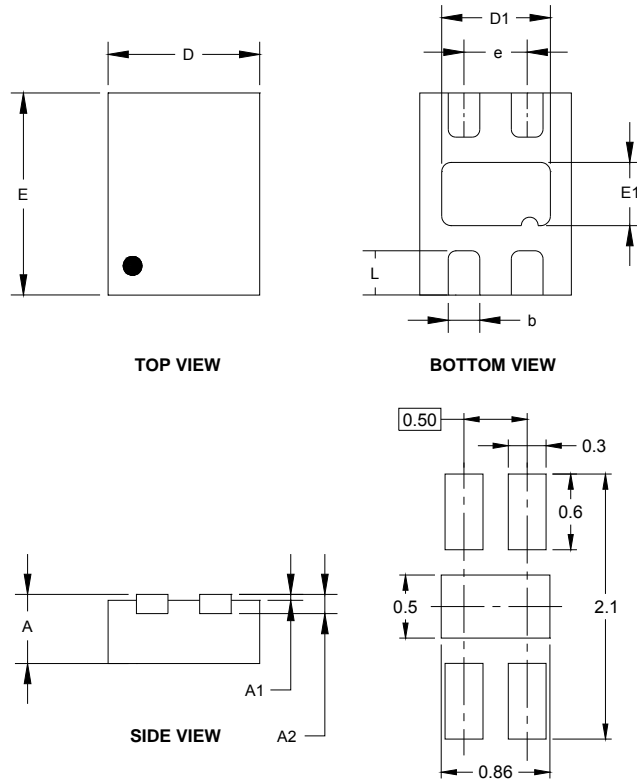
**APPLICATION NOTE**

When LDO is used in handheld products, attention must be paid to voltage spikes which could damage SGM2030. 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.



PACKAGE OUTLINE DIMENSIONS

UTDFN-1.2x1.6-4L

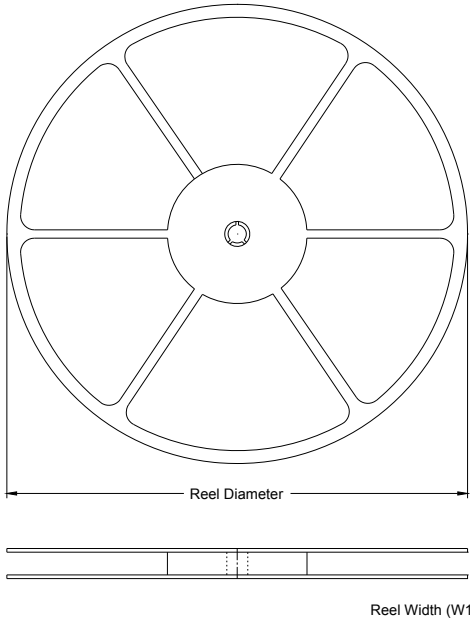


RECOMMENDED LAND PATTERN (Unit: mm)

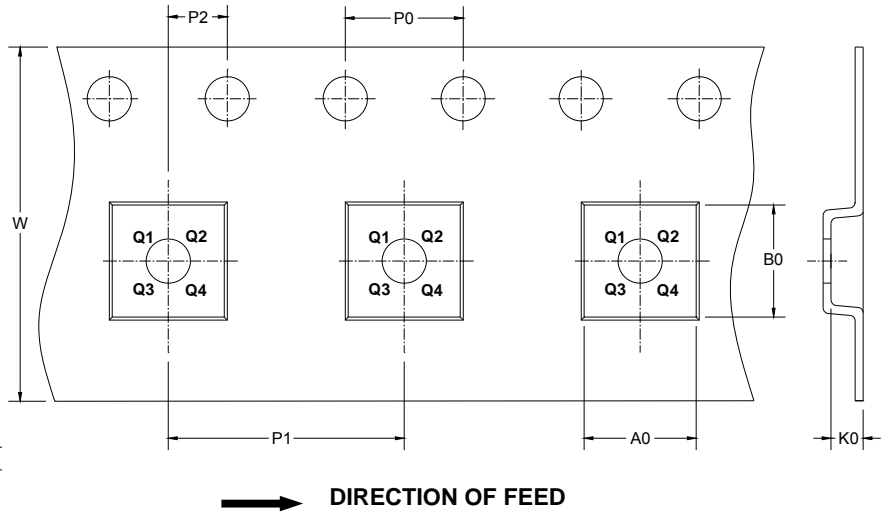
| Symbol | Dimensions<br>In Millimeters |       |       |
|--------|------------------------------|-------|-------|
|        | MIN                          | MOD   | MAX   |
| A      | 0.500                        | 0.550 | 0.600 |
| A1     | 0.000                        |       | 0.050 |
| A2     | 0.152 REF                    |       |       |
| D      | 1.150                        | 1.200 | 1.250 |
| D1     | 0.810                        | 0.860 | 0.910 |
| E      | 1.550                        | 1.600 | 1.650 |
| E1     | 0.450                        | 0.500 | 0.550 |
| b      | 0.200                        | 0.250 | 0.300 |
| e      | 0.500 BSC                    |       |       |
| L      | 0.300                        | 0.350 | 0.400 |

**TAPE AND REEL INFORMATION**

**REEL DIMENSIONS**



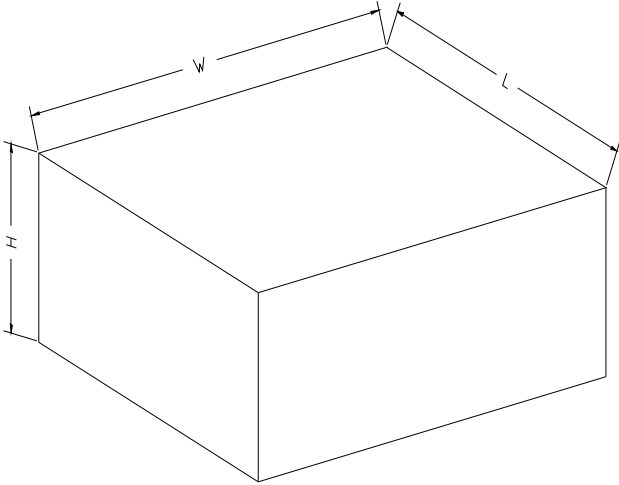
**TAPE DIMENSIONS**



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 |
|------------------|---------------|--------------------|---------|---------|---------|---------|---------|---------|--------|---------------|
| UTDFN-1.2x1.6-4L | 7"            | 9.0                | 1.5     | 1.7     | 0.6     | 4.0     | 4.0     | 2.0     | 8.0    | Q2            |

**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           |