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 a Green UTDFN-1.2×1.6-4L package. It operates over an ambient temperature range of -40℃ to +85℃.

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℃ to +85℃ Operating Temperature Range**
- **Available in a 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

TYPICAL APPLICATION

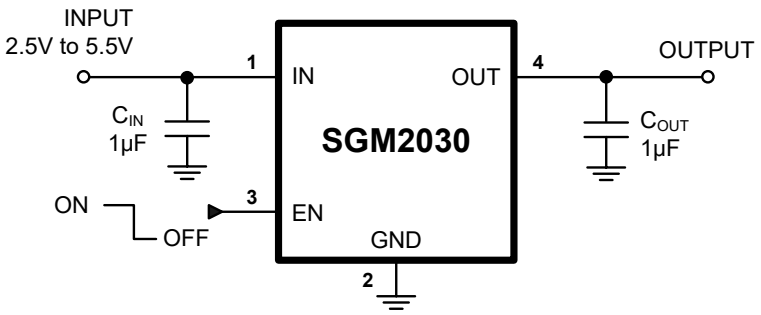


Figure 1. Typical Application Circuit

PACKAGE/ORDERING INFORMATION

MODEL	V_{OUT} (V)	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM2030-1.2	1.2V	UTDFN-1.2×1.6-4L	-40℃ to +85℃	SGM2030-1.2YUDG4G/TR	63X	Tape and Reel, 5000
SGM2030-1.5	1.5V	UTDFN-1.2×1.6-4L	-40℃ to +85℃	SGM2030-1.5YUDG4G/TR	9DX	Tape and Reel, 5000
SGM2030-1.8	1.8V	UTDFN-1.2×1.6-4L	-40℃ to +85℃	SGM2030-1.8YUDG4G/TR	4EX	Tape and Reel, 5000
SGM2030-2.5	2.5V	UTDFN-1.2×1.6-4L	-40℃ to +85℃	SGM2030-2.5YUDG4G/TR	9EX	Tape and Reel, 5000
SGM2030-2.6	2.6V	UTDFN-1.2×1.6-4L	-40℃ to +85℃	SGM2030-2.6YUDG4G/TR	68X	Tape and Reel, 5000
SGM2030-2.8	2.8V	UTDFN-1.2×1.6-4L	-40℃ to +85℃	SGM2030-2.8YUDG4G/TR	4FX	Tape and Reel, 5000
SGM2030-2.85	2.85V	UTDFN-1.2×1.6-4L	-40℃ to +85℃	SGM2030-2.85YUDG4G/TR	BAX	Tape and Reel, 5000
SGM2030-3.0	3.0V	UTDFN-1.2×1.6-4L	-40℃ to +85℃	SGM2030-3.0YUDG4G/TR	50X	Tape and Reel, 5000
SGM2030-3.3	3.3V	UTDFN-1.2×1.6-4L	-40℃ to +85℃	SGM2030-3.3YUDG4G/TR	56X	Tape and Reel, 5000

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.

ORDER NUMBER

SGM2030 - X X X G / TR

Tape and Reel

Green Product

Package Type

UDG4 UTDFN-1.2×1.6-4L

Operating Temperature Range

Y -40℃ to +85℃

Output Voltages

1.2 1.2V
1.5 1.5V
1.8 1.8V
. .
. .
. .
3.0 3.0V
3.3 3.3V

MARKING INFORMATION

NOTE: X = Date Code.

YY X

Date Code - Year

Serial Number

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)
Package Thermal Resistance
UTDFN-1.2×1.6-4L, θ_{JA} ..... 148℃/W
Junction Temperature..... +150℃
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s)..... +260℃
ESD Susceptibility
HBM..... 4000V
MM..... 400V

RECOMMENDED OPERATING CONDITIONS

Operating 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

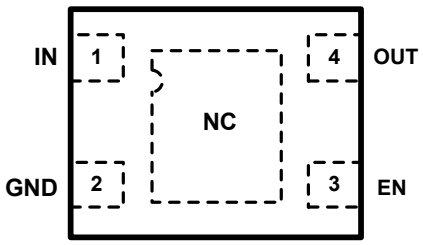
This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance 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.

DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

PIN CONFIGURATION

(TOP VIEW)



UTDFN-1.2×1.6-4L

PIN DESCRIPTION

PIN	NAME	FUNCTION
1	IN	Regulator Input. Supply voltage can range from 2.5V to 5.5V. Bypass with a 1μF 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℃ to +85℃, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		TEMP	MIN	TYP	MAX	UNITS
Input Voltage	V_{IN}			+25℃	2.5		5.5	V
Output Voltage Accuracy [1]		I_{OUT} = 0.1mA		+25℃	-3		+3	%
Maximum Output Current [1]				+25℃	300			mA
Current Limit [1]	I_{LIM}			+25℃	310			mA
Ground Pin Current	I_Q	No load, EN = 2V		+25℃		95	200	μA
Dropout Voltage [2]		I_{OUT} = 1mA		+25℃		0.9		mV
		I_{OUT} = 300mA				270	400	
Line Regulation [1]	ΔV_{LNR}	V_{IN} = 2.5V or (V_{OUT} + 0.5V) to 5.5V, I_{OUT} = 1mA		+25℃		0.02	0.05	%/V
Load Regulation	ΔV_{LDR}	I_{OUT} = 0.1mA to 300mA, C_{OUT} = 1μF, V_{OUT} > 2V		+25℃		0.002	0.005	%/mA
		I_{OUT} = 0.1mA to 300mA, C_{OUT} = 1μF, V_{OUT} ≤ 2V				0.004	0.008	
Output Voltage Noise	e_n	f = 10Hz to 100kHz, C_{OUT} = 10μF		+25℃		140		μV_{RMS}
Power Supply Rejection Ratio	PSRR	I_{OUT} = 50mA, C_{OUT} = 1μF, V_{IN} = V_{OUT} + 1V	f = 217Hz	+25℃		72		dB
			f = 1kHz	+25℃		71		dB
Shutdown [3]								
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℃		0.01	1	μA
				Full		0.01		
Shutdown Supply Current	$I_{Q(SHDN)}$	EN = 0.4V		+25℃		0.01	1	μA
				Full		0.01		
Shutdown Exit Delay [4]		C_{OUT} = 1μF, No Load		+25℃		10		μs
Thermal Protection								
Thermal Shutdown Temperature	T_{SHDN}					150		℃
Thermal Shutdown Hysteresis	ΔT_{SHDN}					15		℃

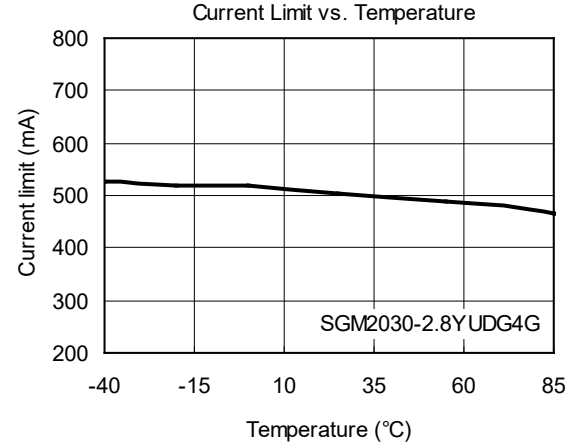
NOTES:

1. V_{IN} = $V_{OUT\ (NOMINAL)}$ + 0.5V or 2.5V, whichever is greater.
2. 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.)
3. V_{EN} = -0.3V to V_{IN}
4. Time needed for V_{OUT} to reach 90% of final value.

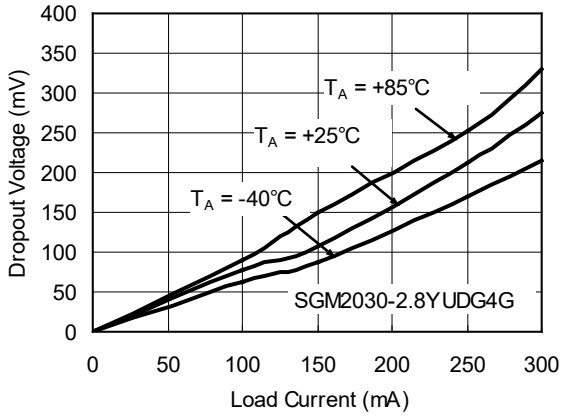
TYPICAL PERFORMANCE CHARACTERISTICS

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

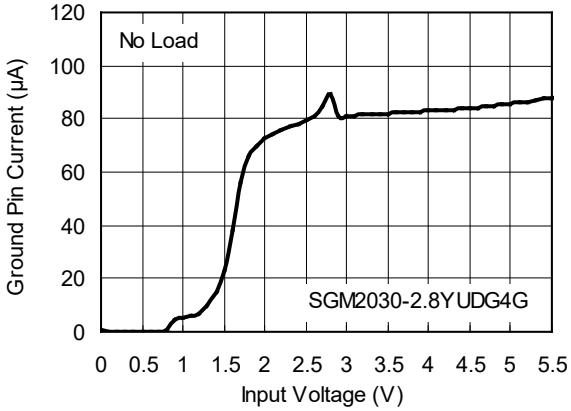
Current Limit vs. Temperature



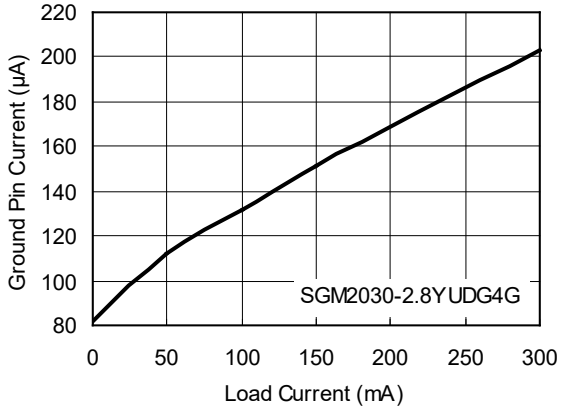
Dropout Voltage vs. Load Current



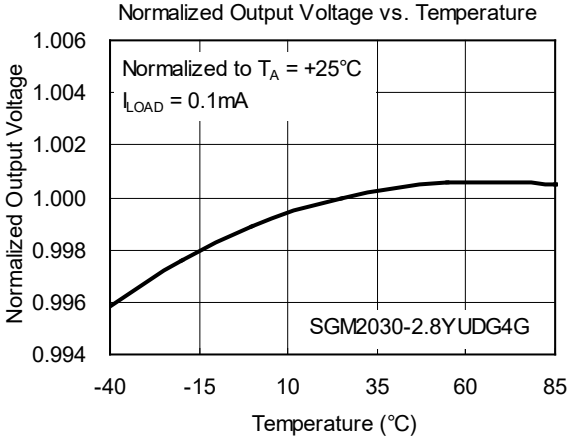
Ground Pin Current vs.Input Voltage



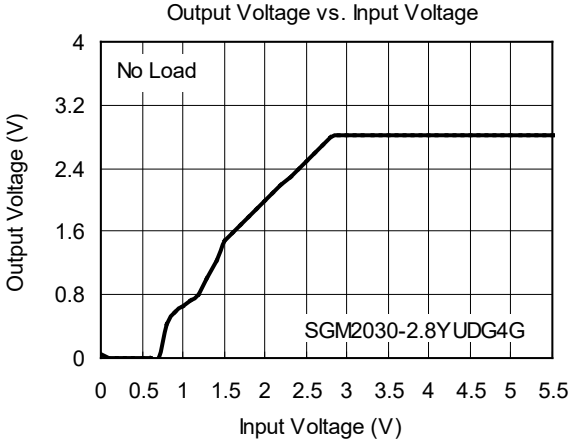
Ground Pin Current vs. Load Current



Normalized Output Voltage vs. Temperature



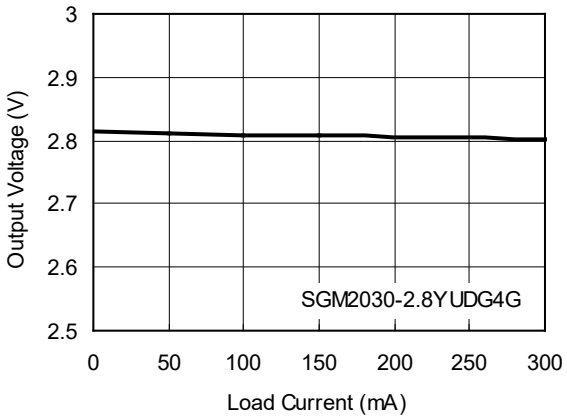
Output Voltage vs. Input Voltage



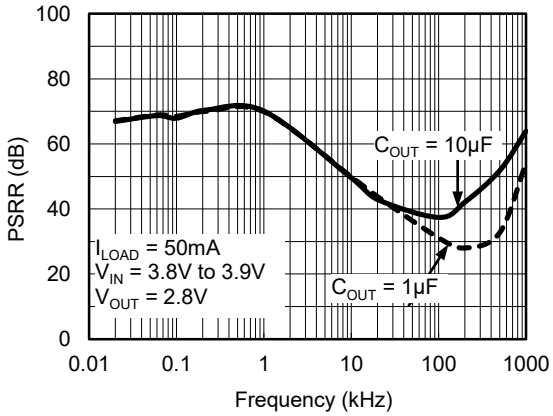
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

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

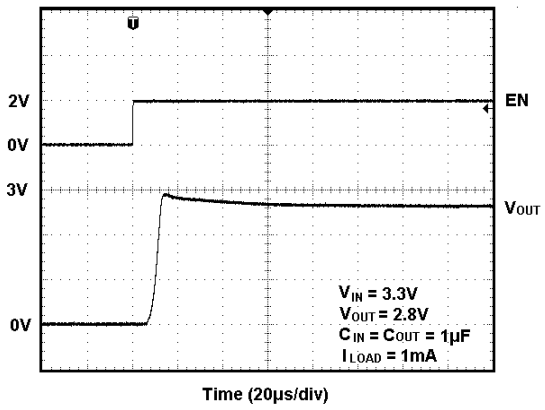
Output Voltage vs. Load Current



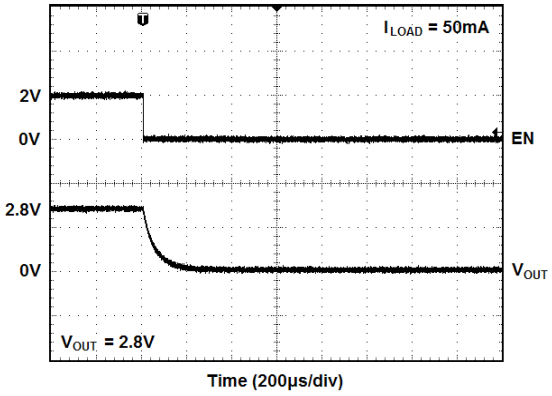
Power Supply Rejection Ratio vs. Frequency



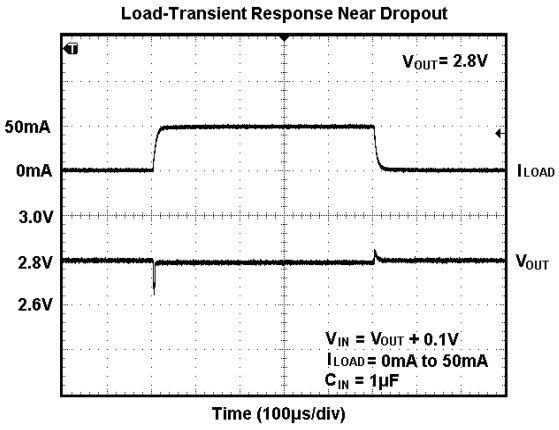
Start Up



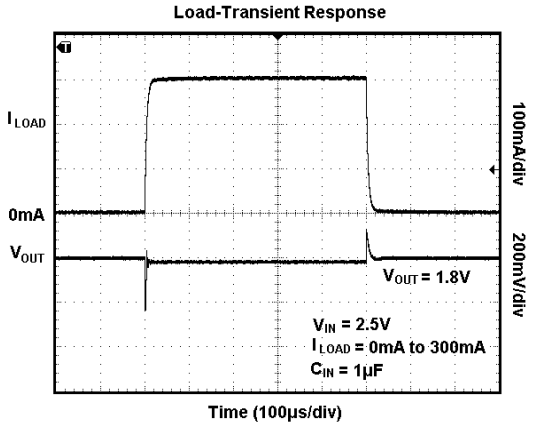
Entering Shutdown



Load-Transient Response Near Dropout



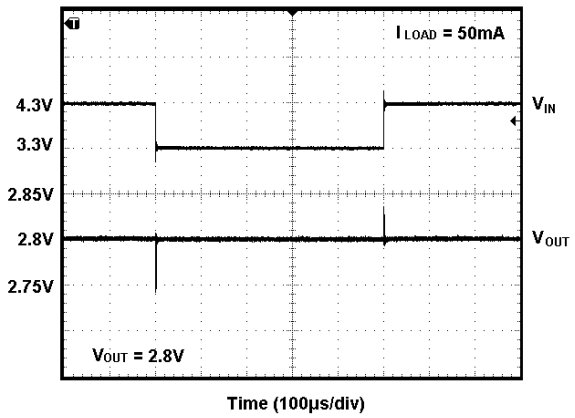
Load-Transient Response



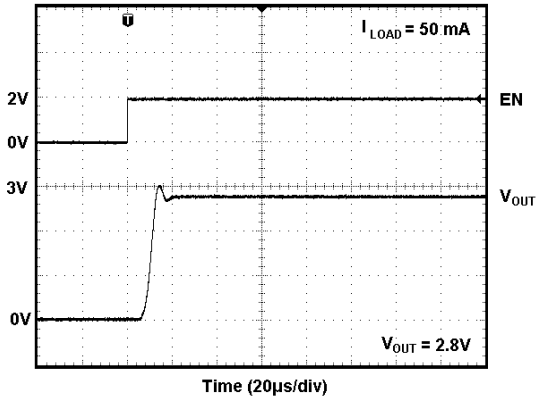
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

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

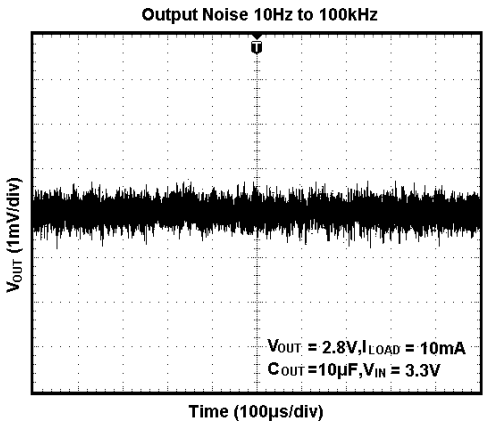
Line-Transient Response



Shutdown Exit Delay

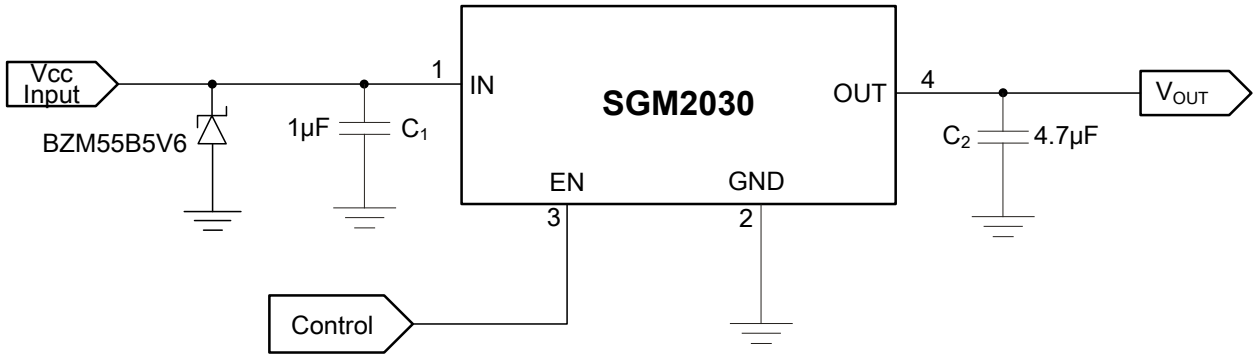


Output Noise 10Hz to 100kHz



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.



REVISION HISTORY

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

MAY 2016 – REV.A.4 to REV.B **Page**

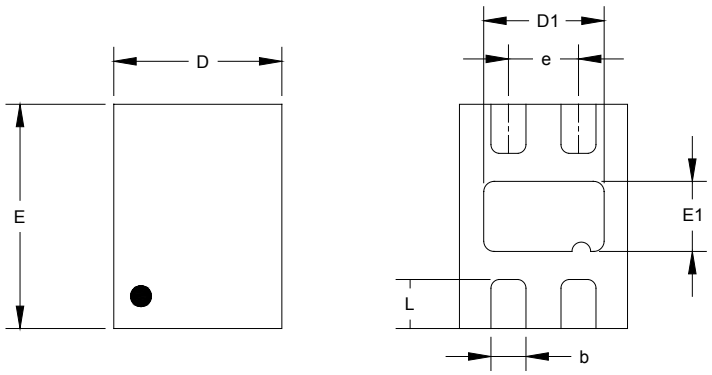
Changed Normalized Output Voltage vs. Temperature 6

AUGUST 2014 – REV.A.3 to REV.A.4 **Page**

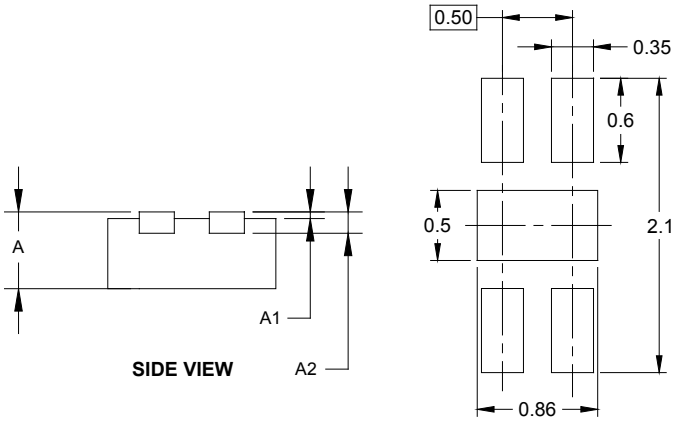
Changed TYPICAL PERFORMANCE CHARACTERISTICS section 7

PACKAGE OUTLINE DIMENSIONS

UTDFN-1.2×1.6-4L



TOP VIEW **BOTTOM VIEW**



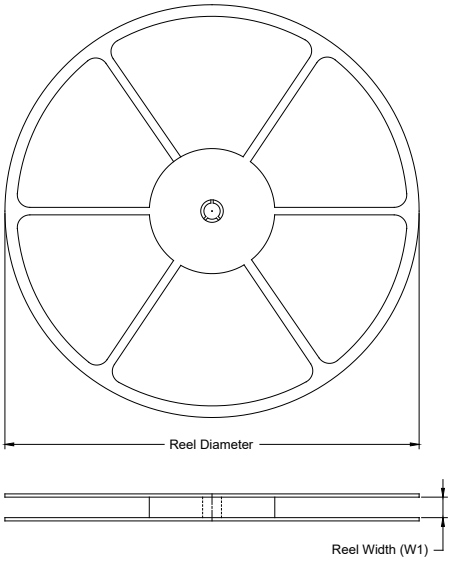
SIDE VIEW

RECOMMENDED LAND PATTERN (Unit: mm)

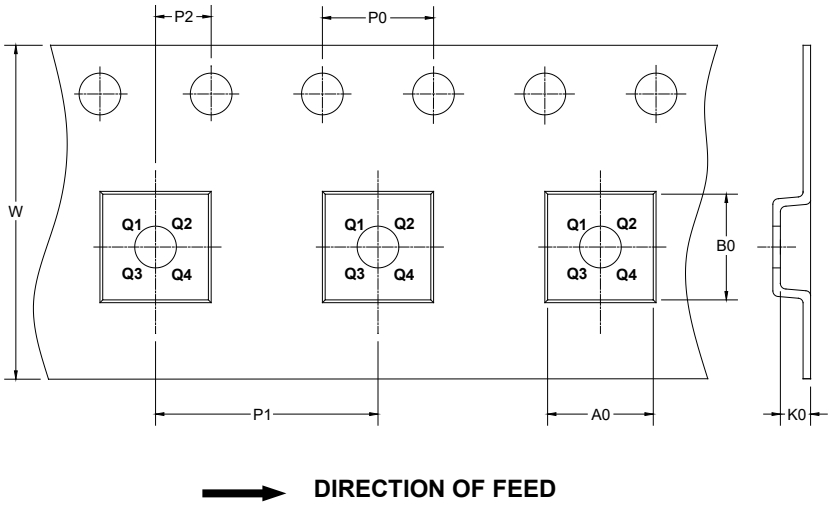
Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	0.500	0.550	0.600
A1	0.000		0.050
A2	0.152 REF		
D	1.150	1.200	1.250
D1	0.810	0.860	0.910
E	1.550	1.600	1.650
E1	0.450	0.500	0.550
b	0.200	0.250	0.300
e	0.500 BSC		
L	0.300	0.350	0.400

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



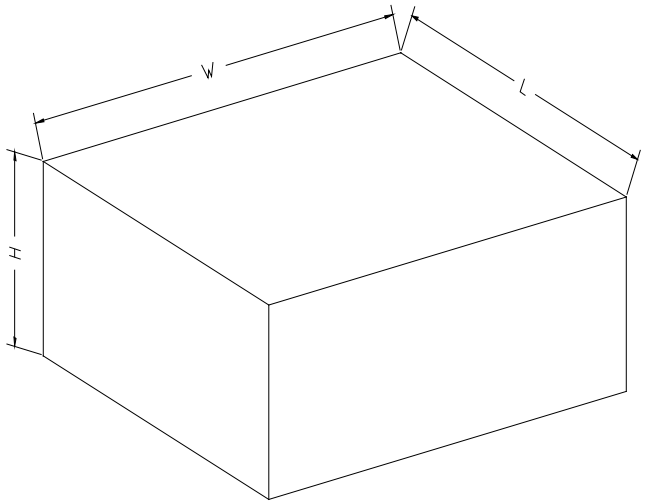
NOTE: The picture is only for reference. Please make the object as the standard.

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-1.2×1.6-4L	7″	9.0	1.50	1.70	0.60	4.0	4.0	2.0	8.0	Q2

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