SGM3200
Charge Pump Boost DC/DC Integrated Load Switch

GENERAL DESCRIPTION

The SGM3200 is a switched capacitor voltage converter that delivers a regulated output. No external inductor is required for operation. SGM3200 also integrates one 500mA load switch.

The SGM3200 can deliver up to 500mA to the voltage regulated output. It features very low quiescent current and high efficiency over a large portion of its load range, making this device ideal for battery-powered applications. Furthermore, the combination of few external components and small package size keeps the total converter board area to a minimum in space-restricted applications.

The SGM3200 uses charge pump technique to provide a regulated output from a varying input supply. The SGM3200 contains a thermal management circuit to protect the device under high temperature conditions.

The SGM3200 is available in a Green TDFN-3×3-8L package and is rated over the -40℃ to +85℃ temperature range.

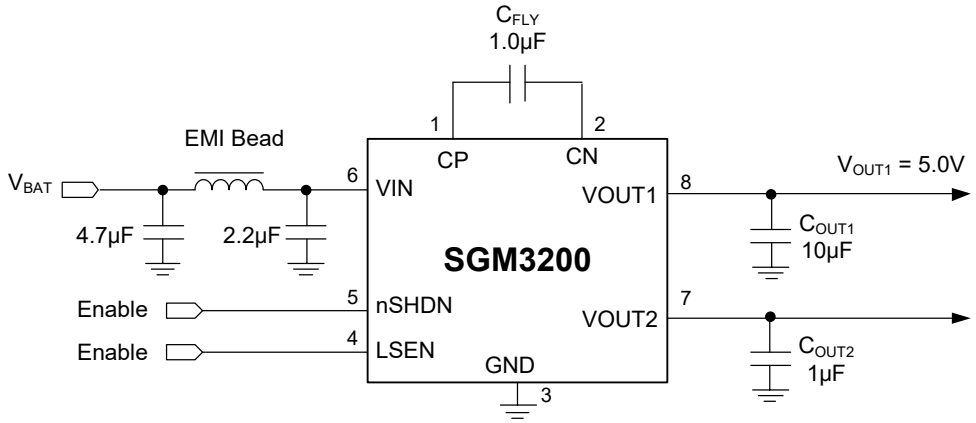
FEATURES

- **Step-Up Voltage Converter**
- **Input Voltage Range: 2.7V to 5.0V**
- **Micro-Power Consumption: 70μA**
- **Fixed 5.0V ± 3% Output Voltage**
- **VOUT1 Provides Continuous 5.0V/500mA Output**
- **VOUT2 Provides 500mA Current Limit Load Switch Output**
- **High Frequency 1.7MHz Operation**
- **1.8V Logic-Controlled Shutdown of Charge Pump**
- **1.8V Logic-Controlled LSEN Pin to Control Load switch**
- **Short-Circuit and Over-Temperature Protections**
- **Over-Current Protection**
- **Available in a Green TDFN-3×3-8L Package**

APPLICATIONS

Cellular Phones
Digital Cameras
LED/Display Backlight Driver
LEDs for Camera Flash

TYPICAL APPLICATION

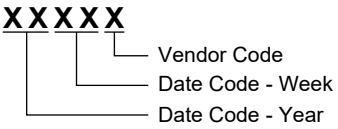


PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM3200	TDFN-3×3-8L	-40℃ to +85℃	SGM3200YTDB8G/TR	SGM MADB XXXXX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XXXXX = Date Code and Vendor Code.



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

V_{IN} to GND ..... -0.3V to 6V
V_{OUT1} to GND ..... -0.3V to 6V
V_{OUT2} to GND .....-0.3V to V_{OUT1} + 0.3V
CP to GND..... -0.3V to 6V
CN to GND.....0.3V to V_{IN} + 0.3V
nSHDN, LSEN to GND ..... -0.3V to 6V
Operating Temperature Range .....-40℃ to +85℃
Junction Temperature.....+150℃
Storage Temperature Range .....-65℃ to +150℃
Lead Temperature (Soldering, 10s).....+260℃
ESD Susceptibility
HBM.....2000V
MM.....200V

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

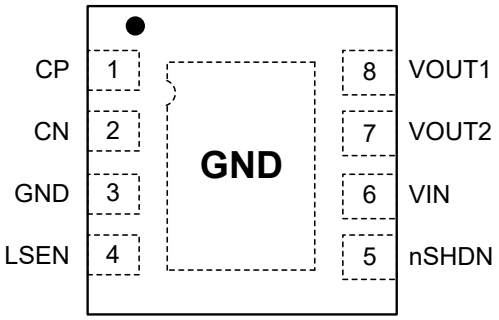
This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance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

SGM3200 (TOP VIEW)



TDFN-3×3-8L

PIN DESCRIPTION

PIN	NAME	FUNCTION
1	CP	Positive Input Pin for the External Flying Capacitor C_{FLY}.
2	CN	Negative Input Pin for the External Flying Capacitor C_{FLY}.
3	GND	Ground.
4	LSEN	Load Switch Enable Pin. Logic “High” to turn on the load switch, VOUT2 is connected with VOUT1. Logic “Low” to turn off Load switch, VOUT2 is disconnected with VOUT1.
5	nSHDN	Shutdown Input Pin. Logic low disables the chip. Logic high enables the chip.
6	VIN	Chip Input Supply Pin.
7	VOUT2	Load Switch Output Pin. Controlled by the LSEN pin. Provide 500mA current limit.
8	VOUT1	A Regulated Output Pin. Provide continuous 5.0V/500mA output.
Exposed Pad	GND	Exposed pad should be soldered to PCB board and connected to GND.

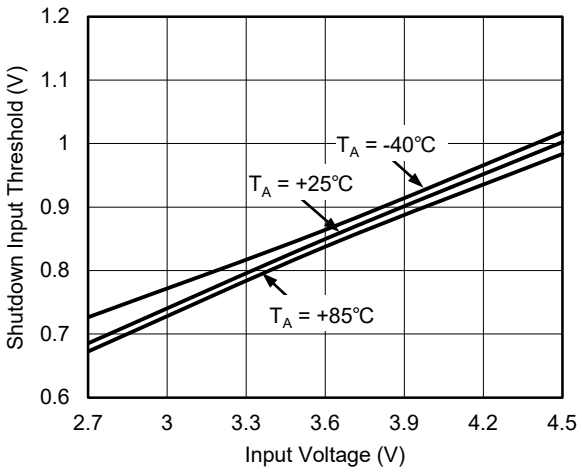
ELECTRICAL CHARACTERISTICS

(T_A = 25℃, C_{FLY} = 1μF, C_{IN} = 10μF, C_{OUT1} = 10μF, C_{OUT2} = 1μF, unless otherwise noted.)

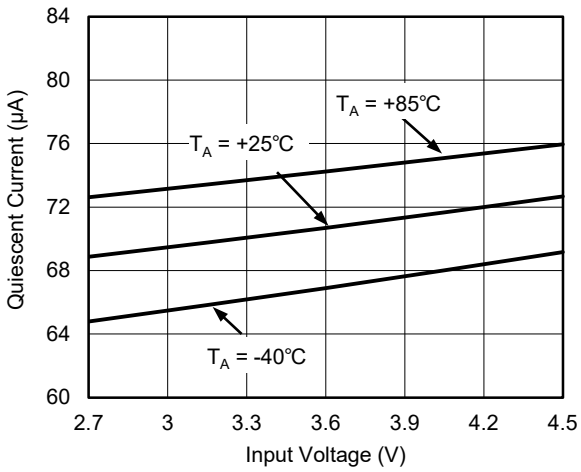
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage Range	V_{IN}	V_{OUT1} = 5.0V	2.7		V_{OUT1}	V
Output Voltage	V_{OUT1}	V_{IN} = 3.6V, I_{OUT1} = I_{OUT2} = 0mA	4.85	5	5.15	V
Quiescent Power Supply Current	I_Q	2.7V < V_{IN} < 5V, LSEN = GND		70	100	μA
Shutdown Supply Current	I_{SHDN}	2.7V < V_{IN} < 5V, nSHDN = GND		0.1	2	μA
Ripple Voltage	V_{RIPPLE}	V_{IN} = 3.3V, I_{OUT1} = 300mA		40		mV_{P-P}
Efficiency	η	V_{IN} = 3.3V, I_{OUT1} = 300mA		75		%
Frequency	f_{OSC}	Oscillator Free Running		1.7		MHz
Turn-On Time	t_{ON}	V_{IN} = 3V, I_{OUT} = 0mA		0.2		ms
nSHDN, LSEN						
Logic Input Threshold High	V_{IH}		1.6			V
Logic Input Threshold Low	V_{IL}				0.5	
Logic Input Leakage Current	$I_{leakage}$	Clamped on V_{IN} or GND			1	μA

TYPICAL PERFORMANCE CHARACTERISTICS

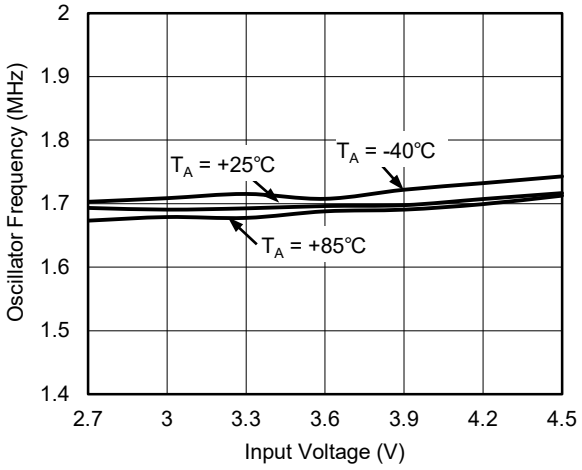
Shutdown Input Threshold vs. Input Voltage



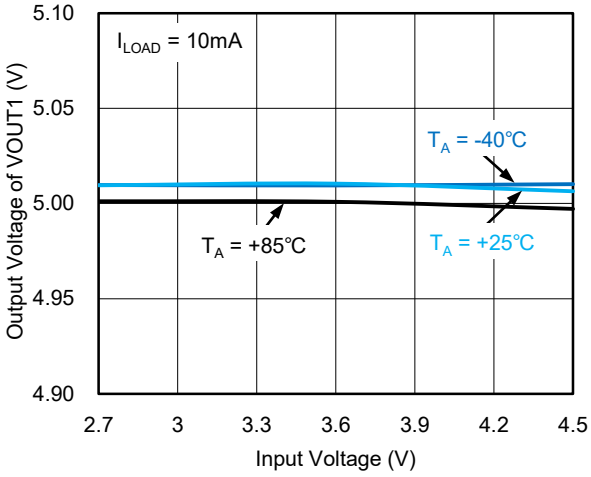
Quiescent Current vs. Input Voltage



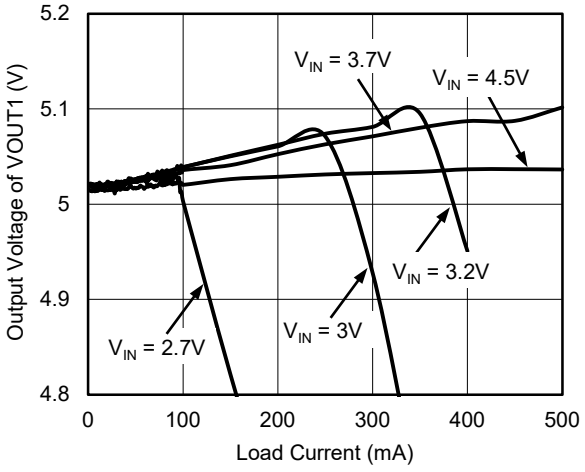
Oscillator Frequency vs. Input Voltage



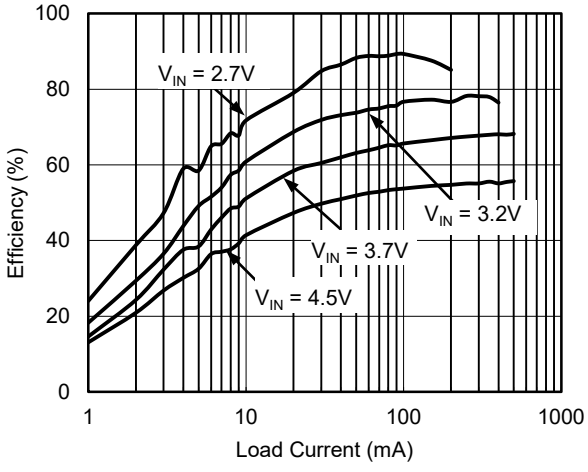
Output Voltage of VOUT1 vs. Input Voltage



Output Voltage of VOUT1 vs. Load Current

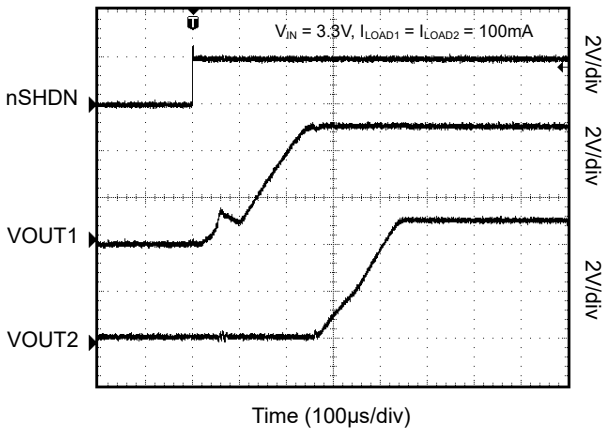


Efficiency vs. Load Current

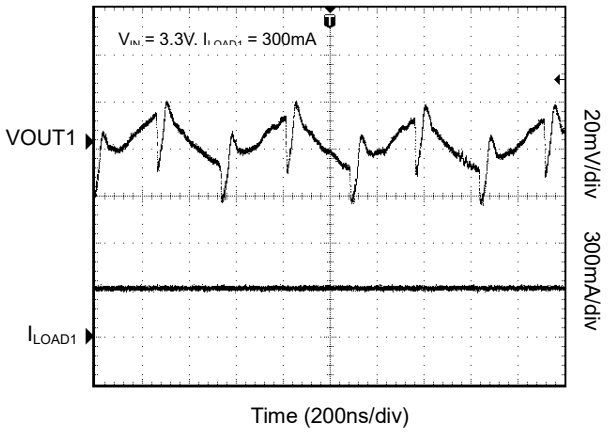


TYPICAL PERFORMANCE CHARACTERISTICS (continued)

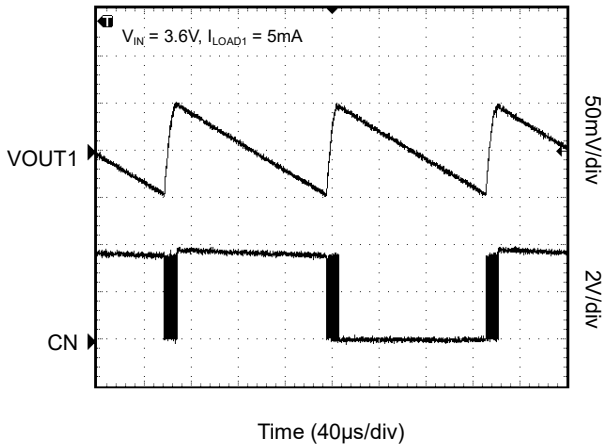
VOUT Soft-Start Ramp



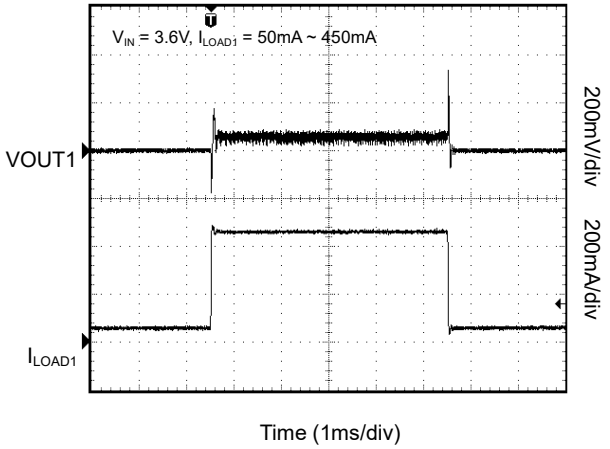
Output Ripple



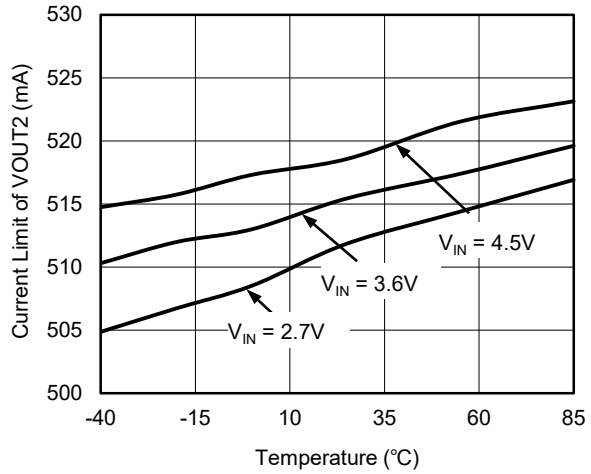
Skip Mode



Load Transient Response



Current Limit of VOUT2 vs. Temperature



FUNCTIONAL BLOCK DIAGRAM

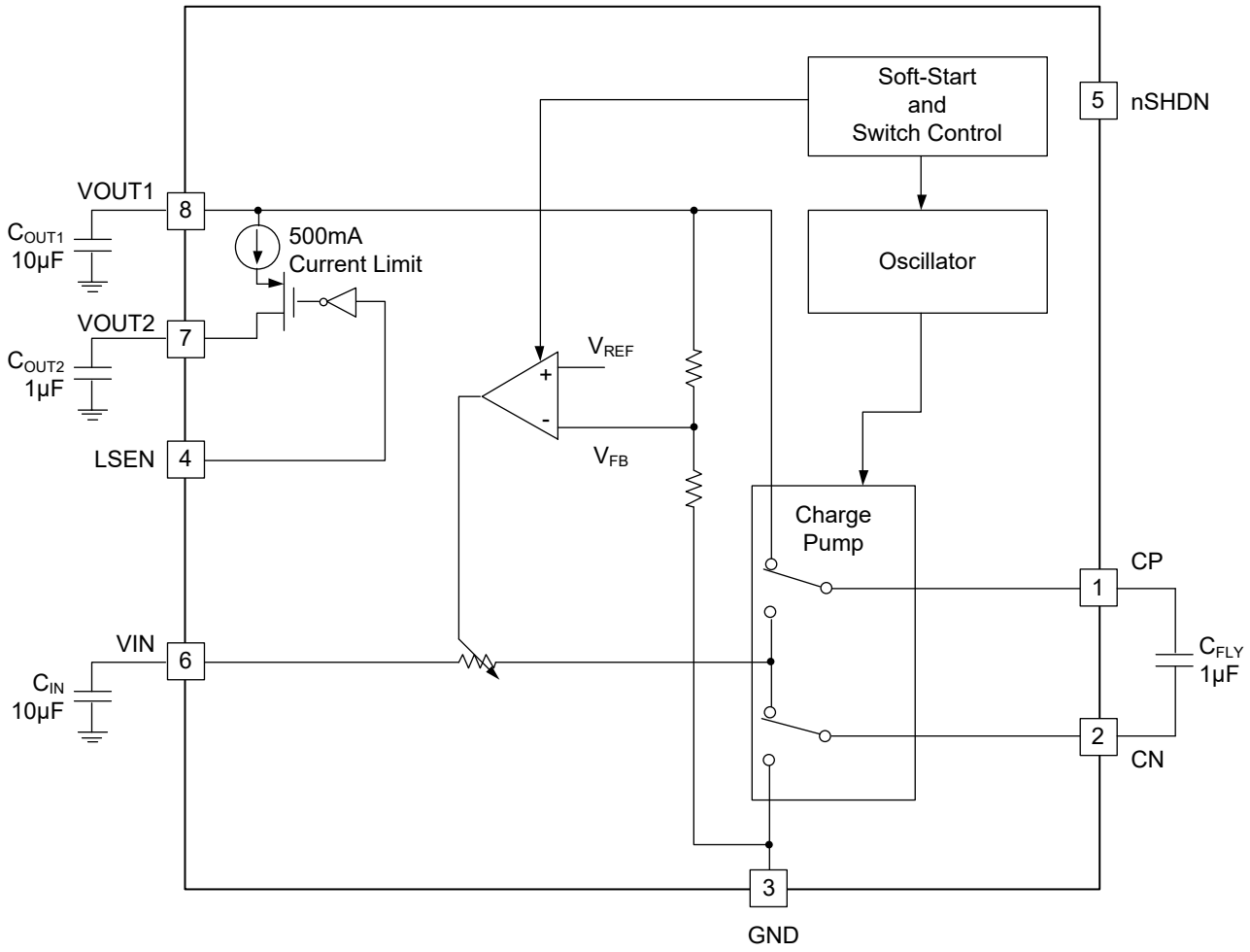


Figure 1. Block Diagram

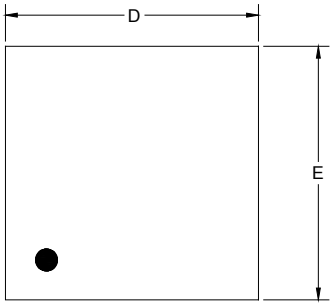
REVISION HISTORY

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

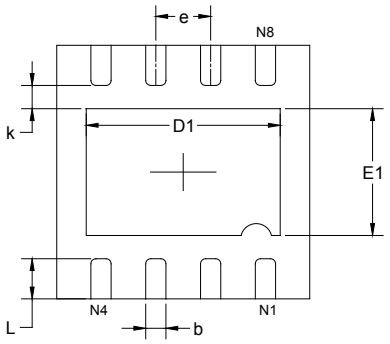
Changes from Original (DECEMBER 2013) to REV.A	Page
Changed from product preview to production data	All

PACKAGE OUTLINE DIMENSIONS

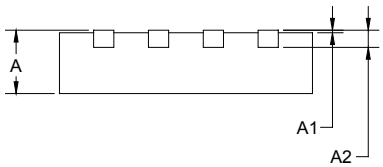
TDFN-3×3-8L



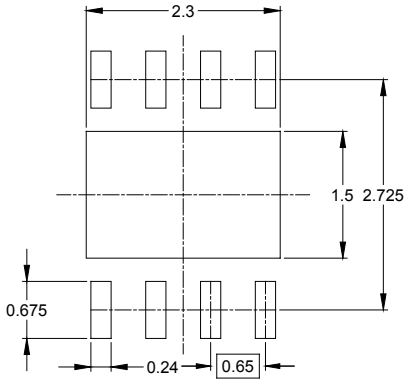
TOP VIEW



BOTTOM VIEW



SIDE VIEW

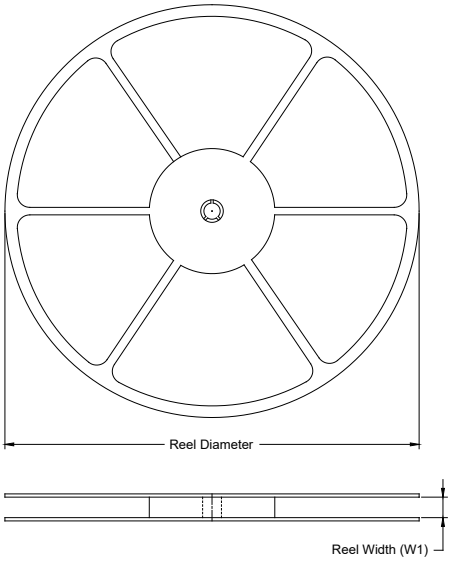


RECOMMENDED LAND PATTERN (Unit: mm)

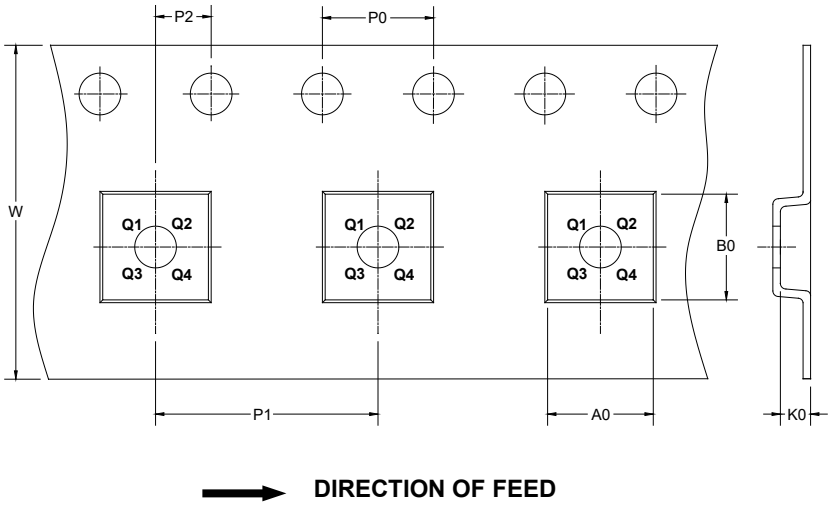
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.203 REF		0.008 REF	
D	2.900	3.100	0.114	0.122
D1	2.200	2.400	0.087	0.094
E	2.900	3.100	0.114	0.122
E1	1.400	1.600	0.055	0.063
k	0.200 MIN		0.008 MIN	
b	0.180	0.300	0.007	0.012
e	0.650 TYP		0.026 TYP	
L	0.375	0.575	0.015	0.023

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



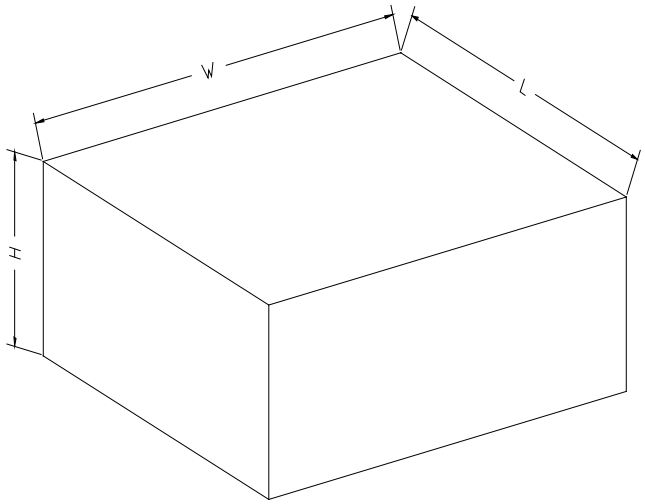
NOTE: The picture is only for reference. Please make the object as the standard.

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-3×3-8L	13″	12.4	3.35	3.35	1.13	4.0	8.0	2.0	12.0	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
13″	386	280	370	5

DD0002