

GENERAL DESCRIPTION

The SGM6602 is a boost converter integrated with both the PWM switch and the isolation switch. This device accepts an input voltage range of 1.8V to 5.5V. And the output voltage can reach a maximum of 20V. The output of this device has the 9V or 12V default output voltage when the FB pin is connected to VIN pin. This device has a switching current limit of 900mA (TYP). It is highly efficient with peak efficiency of 85% at 3.6V input and 12V output when in operation. In shutdown mode, the input and output are truly disconnected.

This device is targeted at the applications with high voltage and small solution size requirements. The 1.1MHz switching frequency allows this device to use small external components. The packages of this device also allow it to have a tiny solution size. The protection features involve the output short-circuit protection, output over-voltage protection and thermal shutdown.

The SGM6602 is available in Green WLCSP-0.8×1.2-6B and TDFN-2×2-6L packages. It operates over an ambient temperature range of -40°C to +85°C.

FEATURES

- 1.8V to 5.5V Input Voltage Range
- Up to 20V Output Voltage
- Up to 85% Efficiency
- 900mA (TYP) Switch Current
- Internal 5ms Soft-Start Time
- Less than 1μA Ultra-Low Shutdown Current
- Integrated Isolation Switch
- Power-Save Mode at Light Load
- Input and Output are Disconnected during Shutdown
- Output Short-Circuit and Over-Voltage Protection
- Thermal Shutdown
- -40°C to +85°C Operating Temperature Range
- Available in Green WLCSP-0.8×1.2-6B and TDFN-2×2-6L Packages

APPLICATIONS

PMOLED and Sensor Power Supplies
Wearable Devices
Portable Medical Equipment

TYPICAL APPLICATION

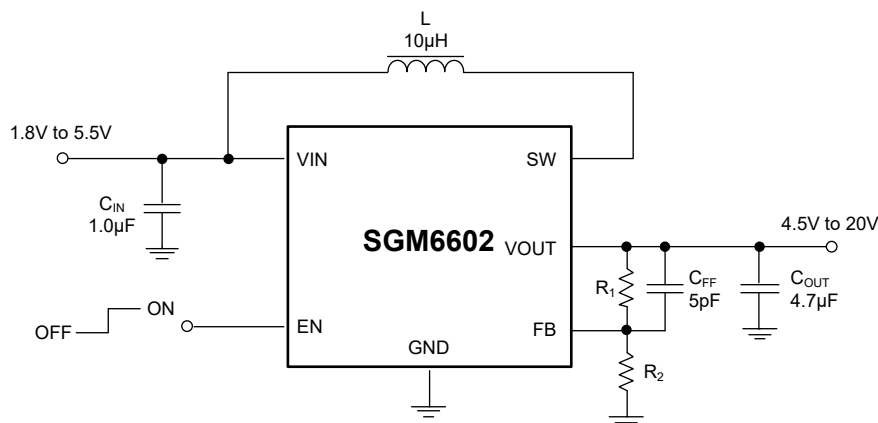


Figure 1. Typical Application Circuit

PACKAGE/ORDERING INFORMATION

MODEL	V _{OUT} (V)	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM6602-9	9	WLCSP-0.8×1.2-6B	-40°C to +85°C	SGM6602-9YG/TR	WDXX	Tape and Reel, 3000
	9	TDFN-2×2-6L	-40°C to +85°C	SGM6602-9YTDI6G/TR	M32 XXXX	Tape and Reel, 3000
SGM6602-12	12	WLCSP-0.8×1.2-6B	-40°C to +85°C	SGM6602-12YG/TR	SBXX	Tape and Reel, 3000
	12	TDFN-2×2-6L	-40°C to +85°C	SGM6602-12YTDI6G/TR	GT6 XXXX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XX = Date Code, XXXX = Date Code.

YY XX

— Date code - Month ("A" = Jan. "B" = Feb. ... "L" = Dec.)

— Date code - Year ("A" = 2010, "B" = 2011 ...)

— Chip I.D.

For example: SBHA (2017, January)

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

Voltage Range at Terminals

VIN, EN, FB -0.3V to 6V

SW, VOUT -0.3V to 22V

Junction Temperature +150°C

Storage Temperature Range -65°C to +150°C

Lead Temperature (Soldering, 10s) +260°C

ESD Susceptibility

HBM 5000V

MM 300V

CDM 1000V

RECOMMENDED OPERATING CONDITIONS

Inductance, Effective Value, L 10μH (TYP)

Input Capacitance, Effective Value, C_{IN} 1μF (MIN)

Output Capacitance, Effective Value, C_{OUT} 4.7μF to 10μF

Input Voltage Range 1.8V to 5.5V

Output Voltage Range 4.5V to 20V

Operating Ambient Temperature Range -40°C to +85°C

Operating Junction Temperature Range -40°C to +125°C

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.

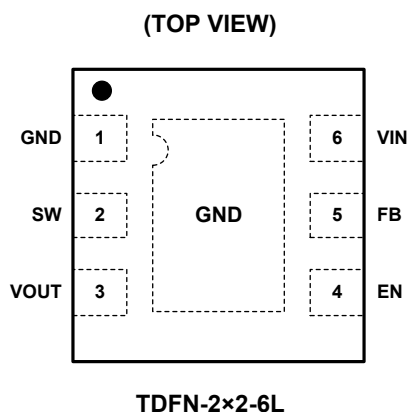
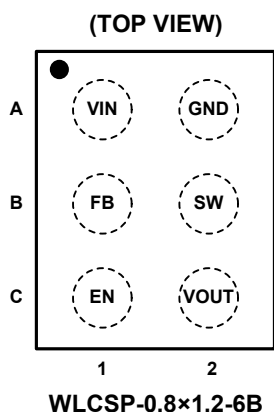
ESD SENSITIVITY CAUTION

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



PIN DESCRIPTION

PIN		NAME	FUNCTION
WLCSP-0.8×1.2-6B	TDFN-2×2-6L		
A1	6	VIN	Power Supply Input.
A2	1	GND	Ground.
B1	5	FB	Voltage Feedback. The FB pin is connected to the center tap of a resistor divider to program the output voltage.
B2	2	SW	Switch Pin. Connect it to the drain of the internal power MOSFET.
C1	4	EN	Enable Logic Input. Logic high makes the device enabled and logic low makes it disabled. The device enters into shutdown mode.
C2	3	VOUT	Output.
–	Exposed Pad	GND	Be connected to GND.

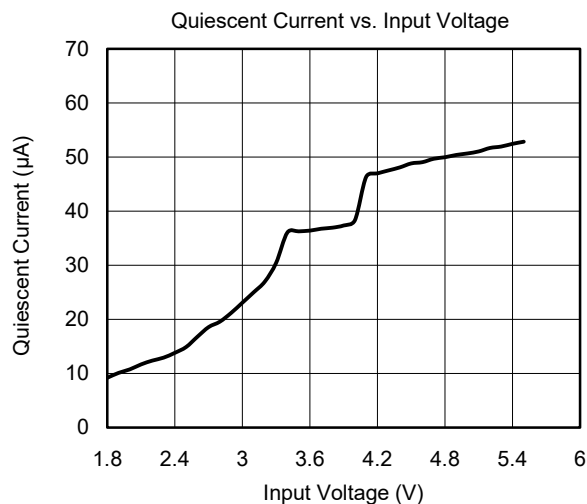
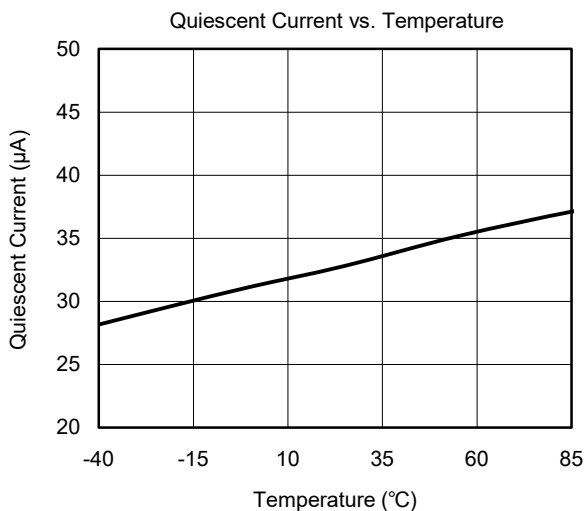
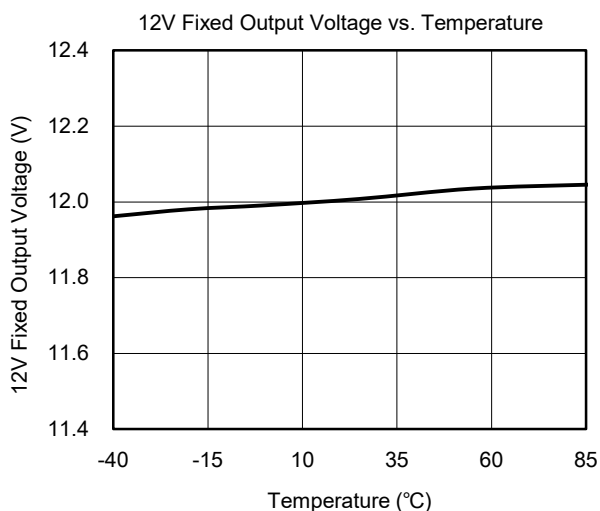
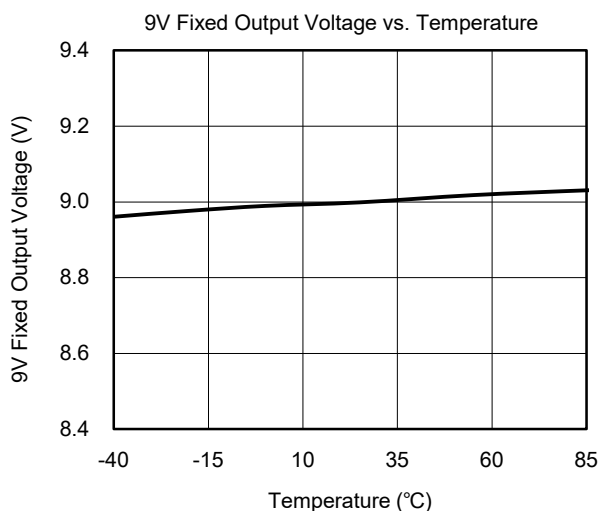
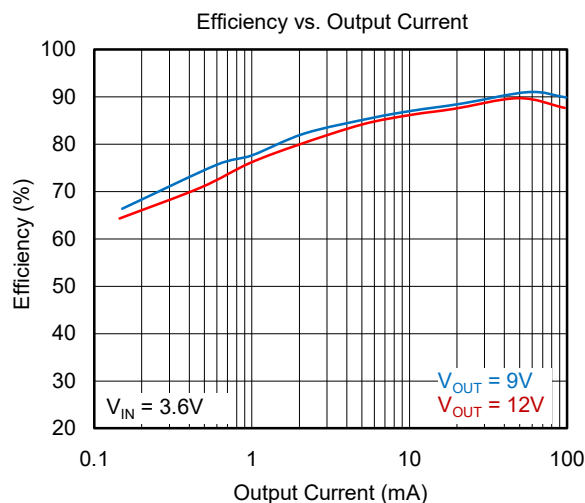
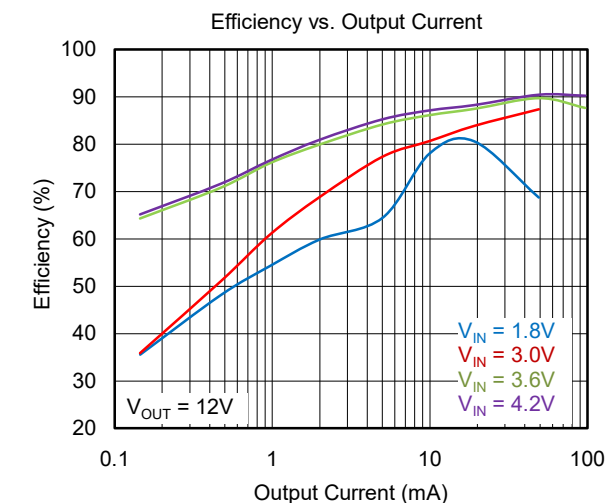
ELECTRICAL CHARACTERISTICS

($V_{IN} = 3.6V$, $V_{OUT} = 12V$, $C_{IN} = 1.0\mu F$, $C_{OUT} = 4.7\mu F$, $L = 10\mu H$, Full = $-40^{\circ}C$ to $+85^{\circ}C$, typical values are at $T_A = +25^{\circ}C$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
POWER SUPPLY							
Under-Voltage Lockout Threshold	V_{IN_UVLO}	V_{IN} rising	$+25^{\circ}C$		1.52	1.8	V
VIN UVLO Hysteresis	V_{IN_HYS}		$+25^{\circ}C$		150		mV
Quiescent Current into VIN Pin	I_{Q_VIN}	IC enabled, no load, no switching	Full		41	60	μA
Shutdown Current into VIN Pin	I_{SD}	IC disabled	$+25^{\circ}C$			1	μA
OUTPUT							
12V Output Voltage Accuracy	V_{OUT_12V}	FB pin connected to VIN pin	$+25^{\circ}C$	11.64	12.00	12.36	V
9V Output Voltage Accuracy	V_{OUT_9V}			8.73	9.00	9.27	
Feedback Voltage	V_{FB}	PWM mode	$+25^{\circ}C$	0.771	0.795	0.818	V
Output Over-Voltage Protection Threshold	V_{OVP}		$+25^{\circ}C$	20.2	21.5	22.2	V
Over-Voltage Protection Hysteresis	V_{OVP_HYS}		$+25^{\circ}C$		1.4		V
Leakage Current into FB Pin	I_{FB_LKG}		Full			200	nA
Leakage Current into SW Pin	I_{SW_LKG}	IC disabled	Full			500	nA
POWER SWITCH							
Isolation MOSFET On-Resistance	$R_{DS(ON)}$	WLCSP-0.8×1.2-6B	$+25^{\circ}C$		975		m Ω
Low-side MOSFET On-Resistance			$+25^{\circ}C$		515		
Isolation MOSFET On-Resistance	$R_{DS(ON)}$	TDFN-2×2-6L	$+25^{\circ}C$		955		m Ω
Low-side MOSFET On-Resistance			$+25^{\circ}C$		485		
Switching Frequency	f_{SW}	$V_{IN} = 3.6V$, $V_{OUT} = 12V$, PWM mode	$+25^{\circ}C$	0.8	1.1	1.4	MHz
Peak Switch Current Limit	I_{LIM_SW}	$V_{IN} = 3.6V$, $V_{OUT} = 12V$	$+25^{\circ}C$	650	900	1100	mA
Soft Startup Time	$t_{START-UP}$	V_{OUT} from V_{IN} to 12V, $C_{OUT_EFFECTIVE} = 4.7\mu F$, $I_{OUT} = 0A$	$+25^{\circ}C$		5		ms
LOGIC INTERFACE							
EN Logic High Threshold	V_{EN_H}		Full	1.2			V
EN Logic Low Threshold	V_{EN_L}		Full			0.3	V
PROTECTION							
Thermal Shutdown Threshold	T_{SD}	T_A rising			160		$^{\circ}C$
Thermal Shutdown Hysteresis	T_{SD_HYS}	T_A falling below T_{SD}			20		$^{\circ}C$

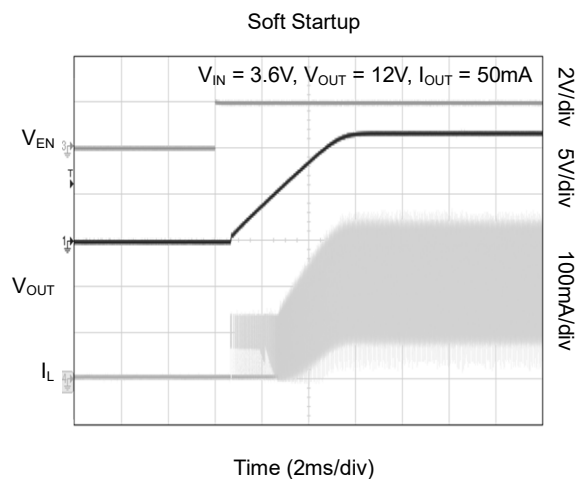
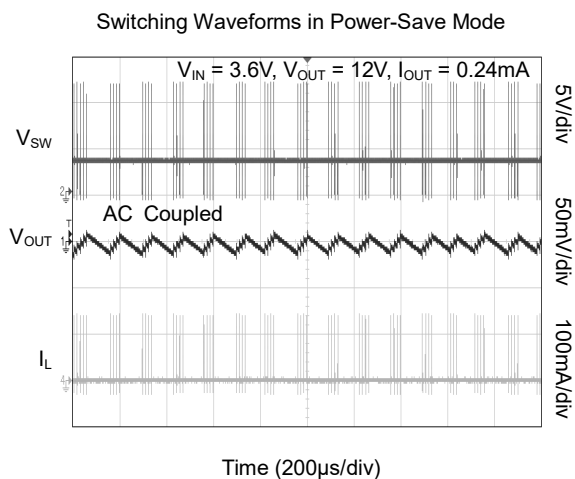
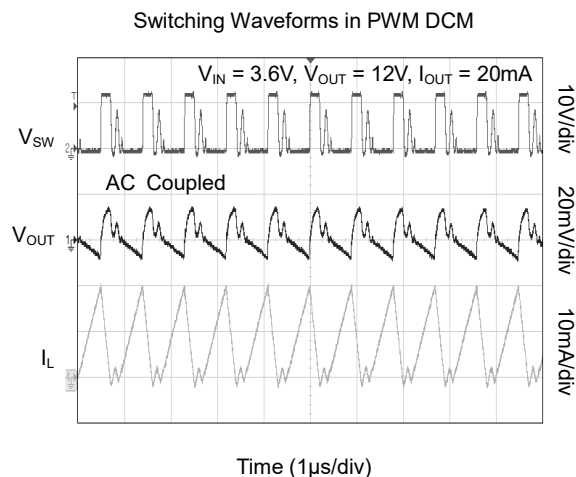
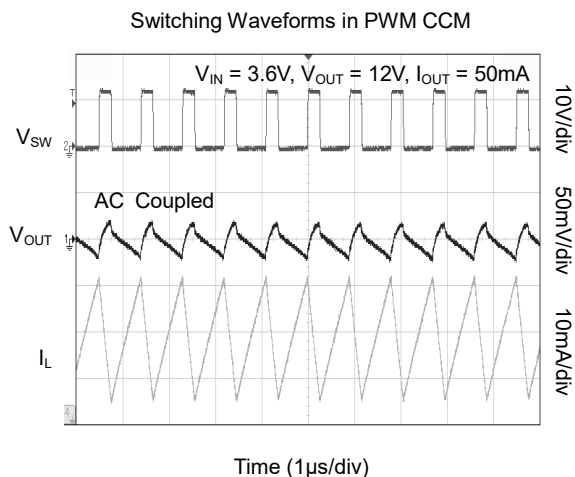
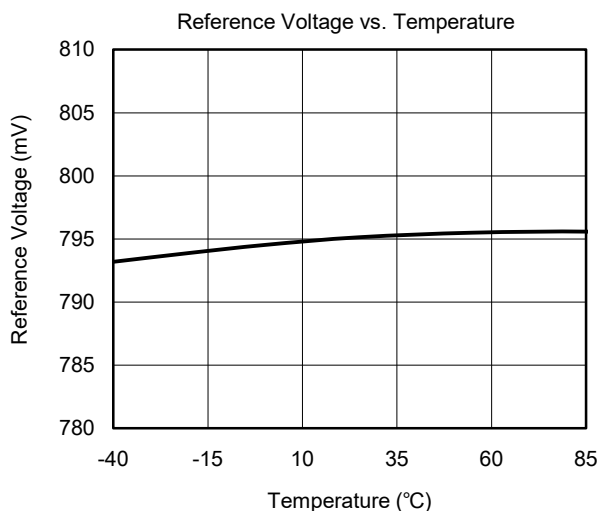
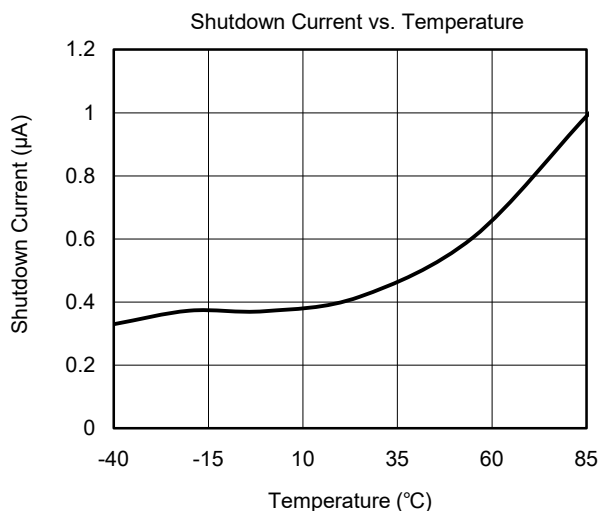
TYPICAL PERFORMANCE CHARACTERISTICS

At $T_A = +25^\circ\text{C}$, $V_{IN} = 3.6\text{V}$, $V_{OUT} = 12\text{V}$, unless otherwise noted.



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

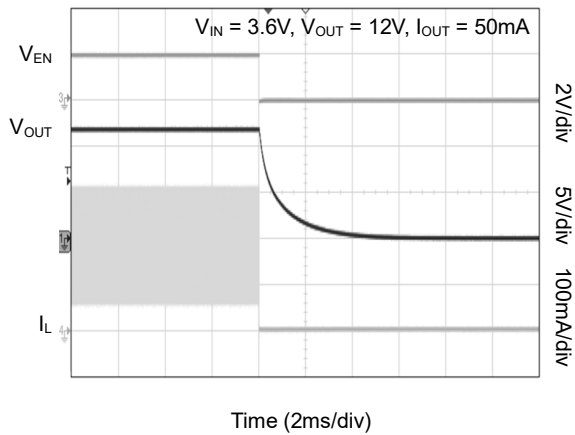
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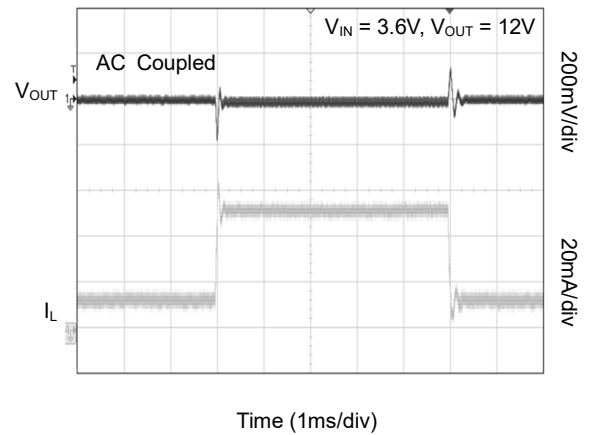
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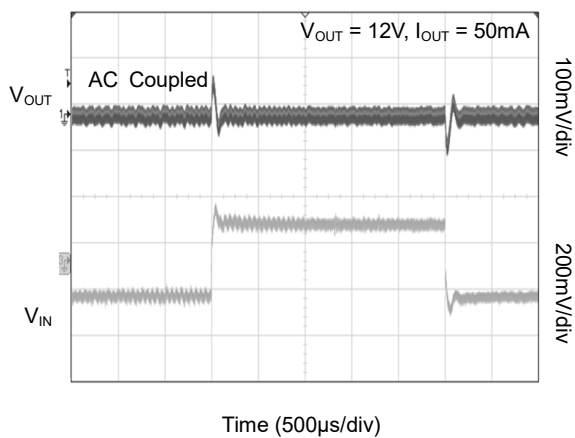
Shutdown Waveforms



10mA to 50mA Load Transient Response



Input Voltage from 3.6V to 3.9V Line Transient Response



PCB Layout

The ground plane of the bottom layer is connected to the ground pin of the top layer through vias.

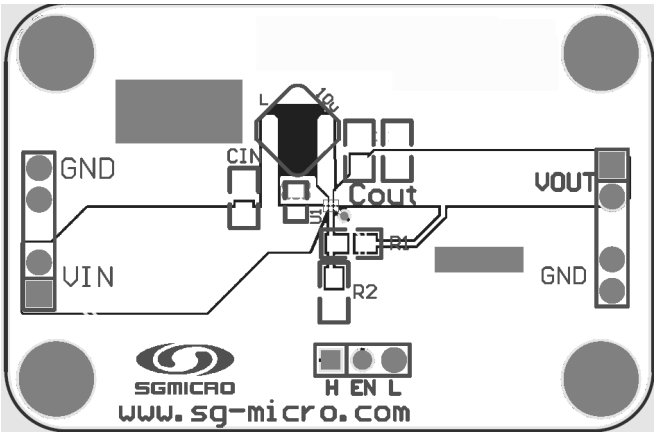


Figure 2. WLCSP-0.8x1.2-6B PCB

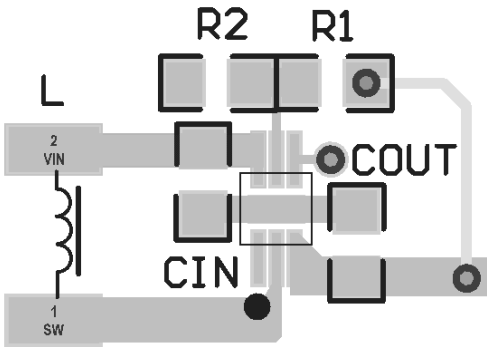


Figure 3. TDFN-2x2-6L PCB

REVISION HISTORY

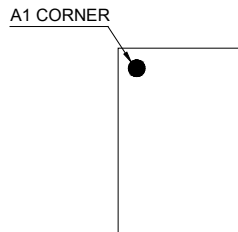
NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Original (DECEMBER 2017) to REV.A

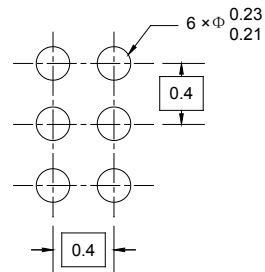
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PACKAGE OUTLINE DIMENSIONS

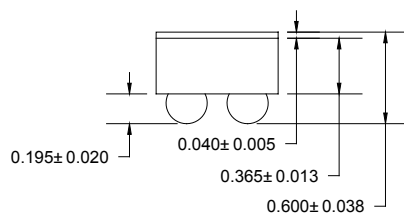
WLCSP-0.8×1.2-6B



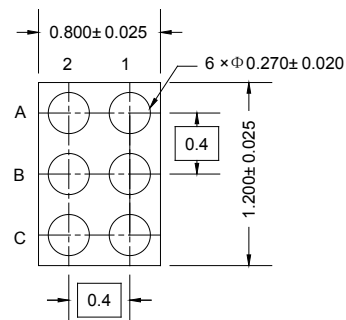
TOP VIEW



RECOMMENDED LAND PATTERN



SIDE VIEW

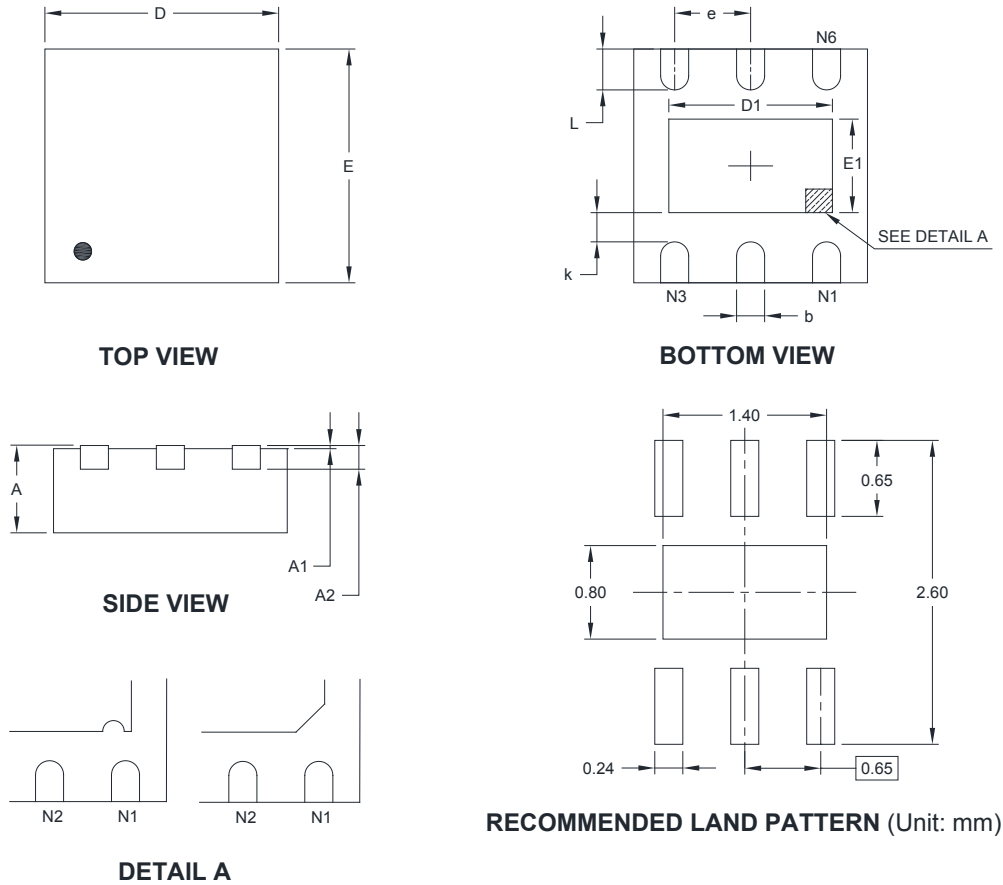


BOTTOM VIEW

NOTE: All linear dimensions are in millimeters.

PACKAGE OUTLINE DIMENSIONS

TDFN-2x2-6L



Pin #1 ID and Tie Bar Mark Options

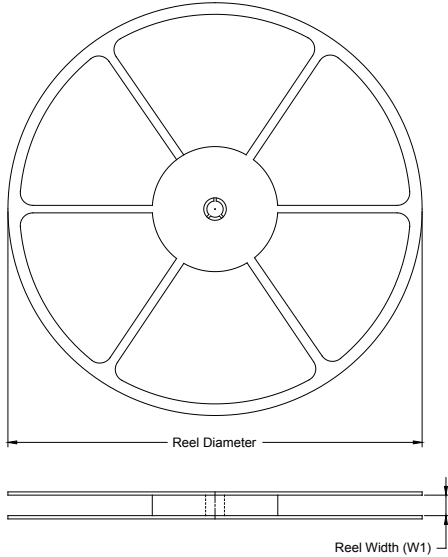
NOTE: The configuration of the Pin #1 identifier is optional, but must be located within the zone indicated.

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	1.900	2.100	0.075	0.083
D1	1.100	1.450	0.043	0.057
E	1.900	2.100	0.075	0.083
E1	0.600	0.850	0.024	0.034
k	0.200 MIN		0.008 MIN	
b	0.180	0.300	0.007	0.012
e	0.650 TYP		0.026 TYP	
L	0.250	0.450	0.010	0.018

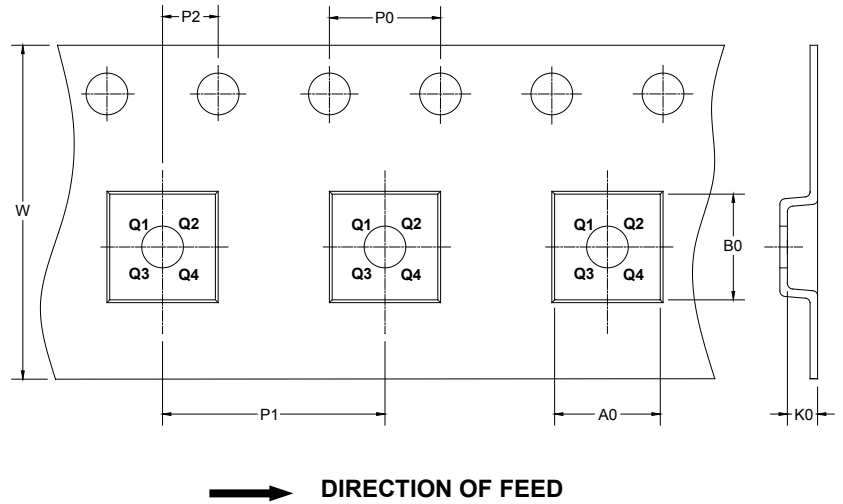
PACKAGE INFORMATION

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



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

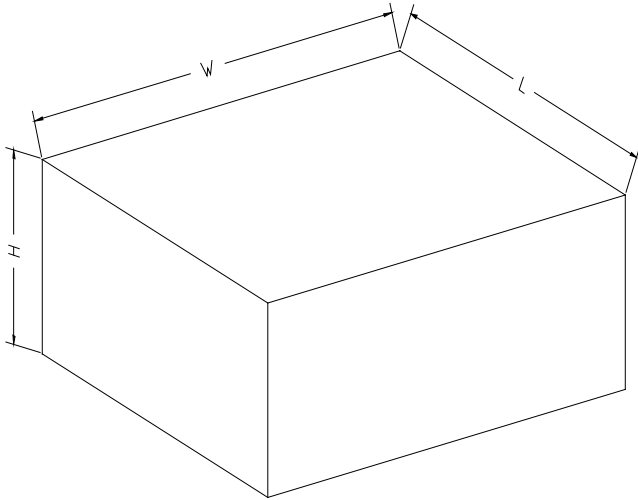
KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
WLCSP-0.8×1.2-6B	7"	9.2	0.91	1.31	0.71	4.0	4.0	2.0	8.0	Q1
TDFN-2×2-6L	7"	9.5	2.30	2.30	1.10	4.0	4.0	2.0	8.0	Q1

DD0001

PACKAGE INFORMATION

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