

### 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

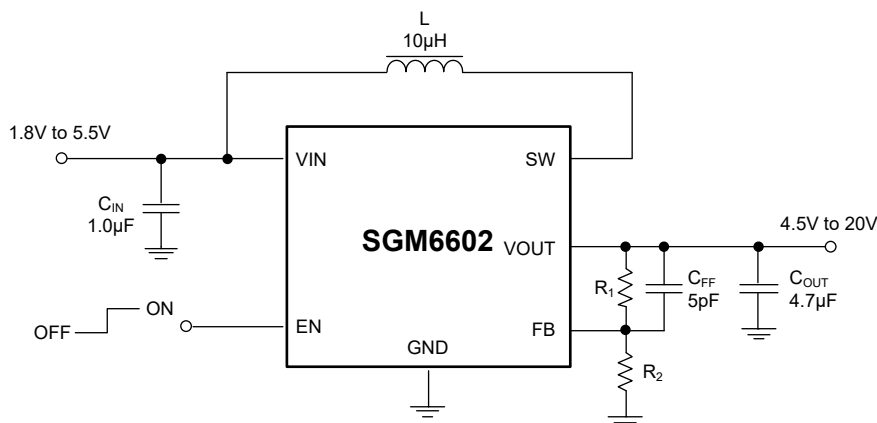


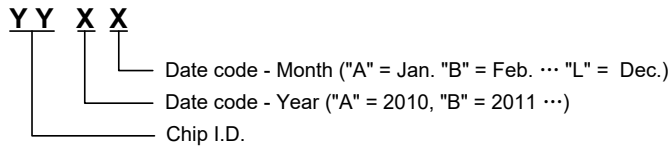
Figure 1. Typical Application Circuit

**PACKAGE/ORDERING INFORMATION**

MODEL	V <sub>OUT</sub> (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.



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 <sub>IN</sub> .....	1µF (MIN)
Output Capacitance, Effective Value, C <sub>OUT</sub> .....	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.

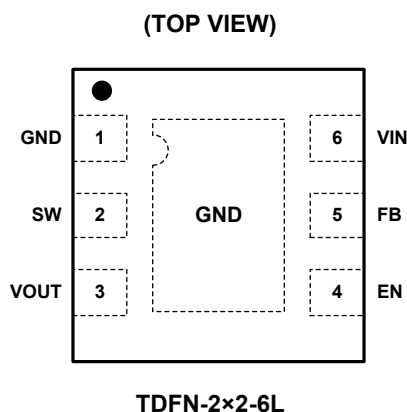
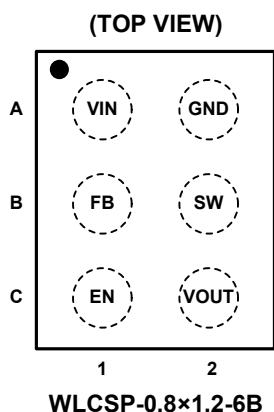
**ESD SENSITIVITY CAUTION**

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.

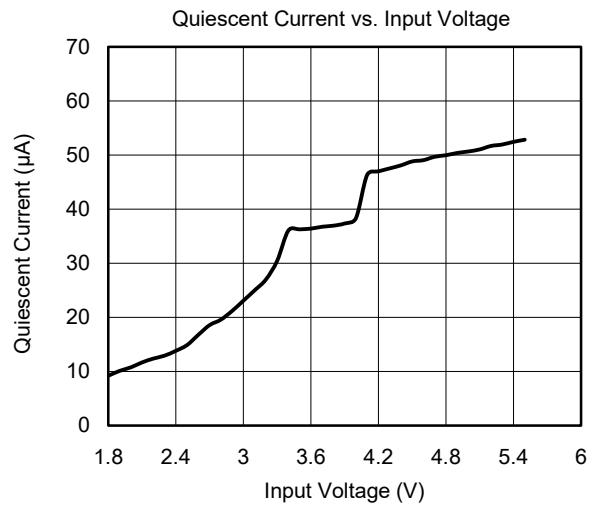
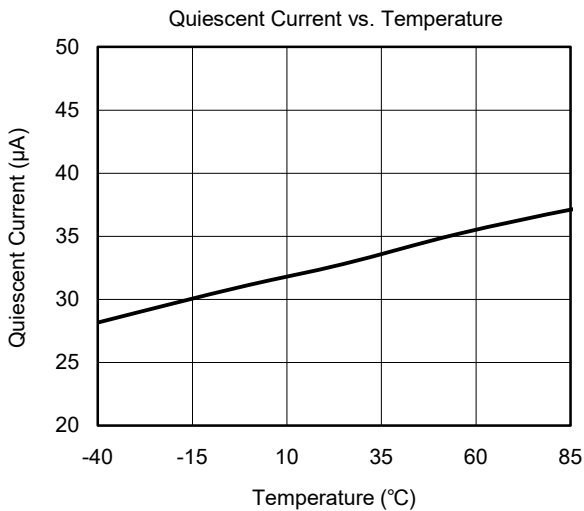
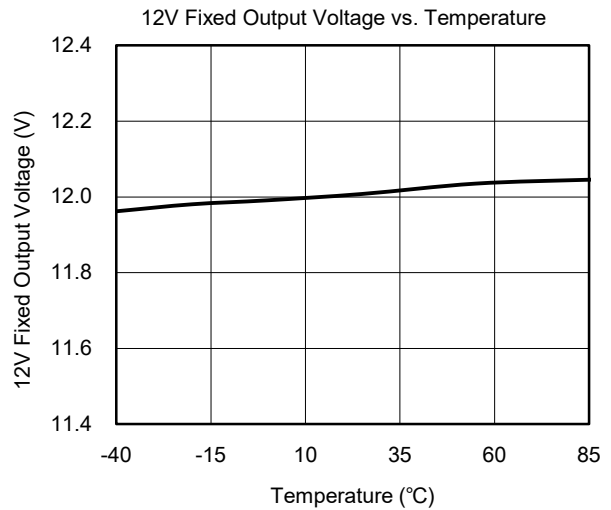
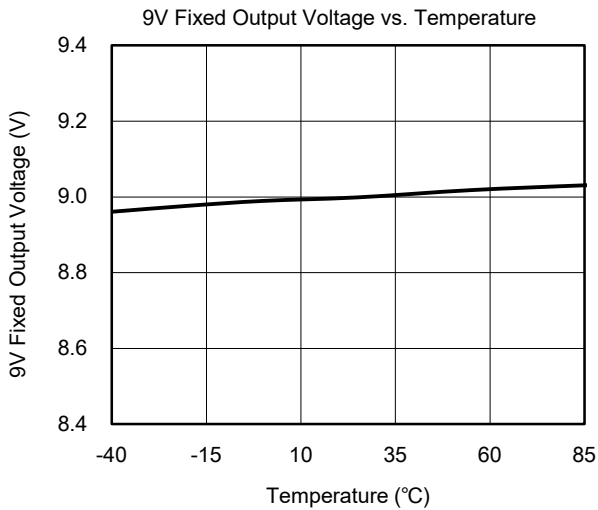
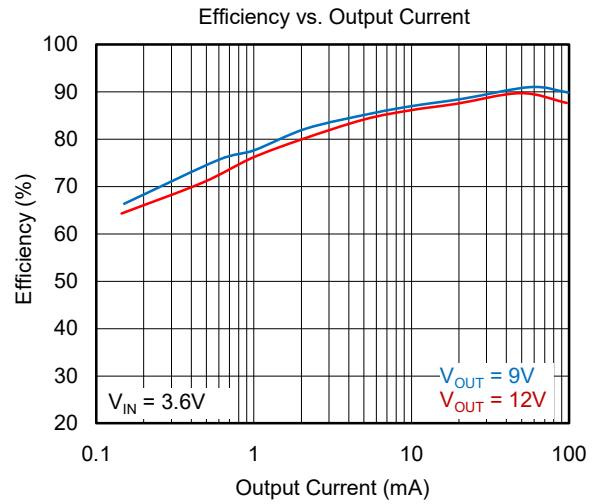
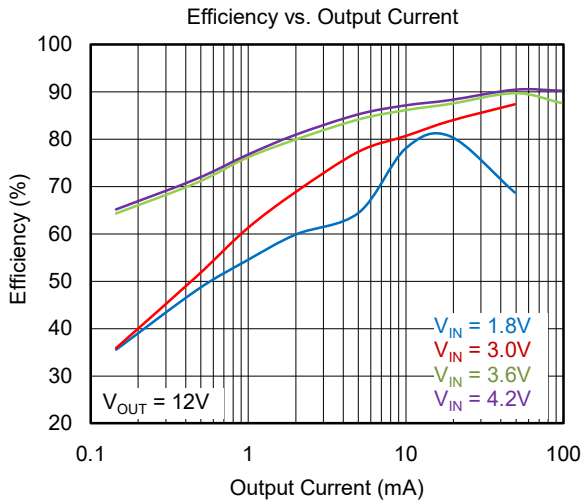
**ELECTRICAL CHARACTERISTICS**

( $V_{IN} = 3.6V$ ,  $V_{OUT} = 12V$ ,  $C_{IN} = 1.0\mu F$ ,  $C_{OUT} = 4.7\mu F$ ,  $L = 10\mu H$ , 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
<b>POWER SUPPLY</b>							
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	$\mu A$
Shutdown Current into VIN Pin	$I_{SD}$	IC disabled	$+25^{\circ}C$			1	$\mu A$
<b>OUTPUT</b>							
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
<b>POWER SWITCH</b>							
Isolation MOSFET On-Resistance	$R_{DS(ON)}$	WLCSP-0.8×1.2-6B	$+25^{\circ}C$		975		m $\Omega$
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 $\Omega$
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
<b>LOGIC INTERFACE</b>							
EN Logic High Threshold	$V_{EN\_H}$		Full	1.2			V
EN Logic Low Threshold	$V_{EN\_L}$		Full			0.3	V
<b>PROTECTION</b>							
Thermal Shutdown Threshold	$T_{SD}$	$T_A$ rising			160		$^{\circ}C$
Thermal Shutdown Hysteresis	$T_{SD\_HYS}$	$T_A$ falling below $T_{SD}$			20		$^{\circ}C$

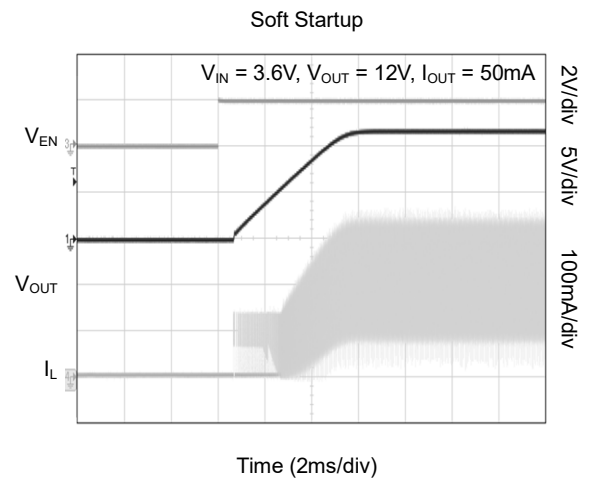
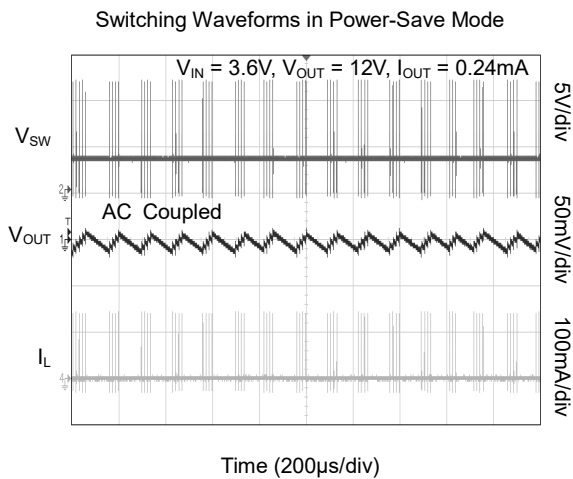
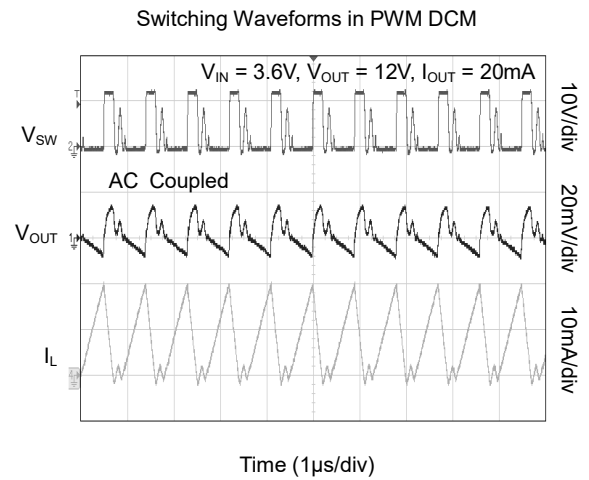
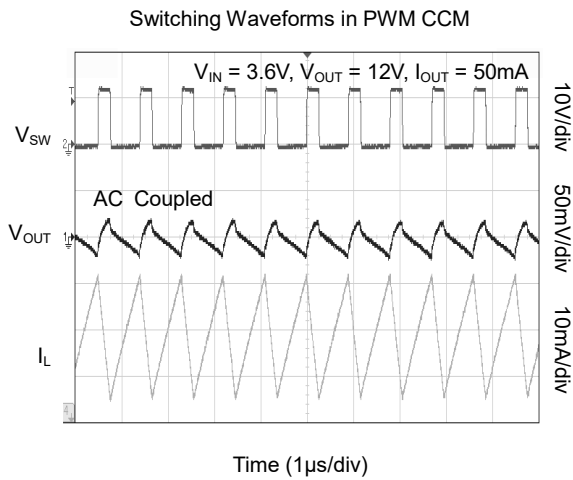
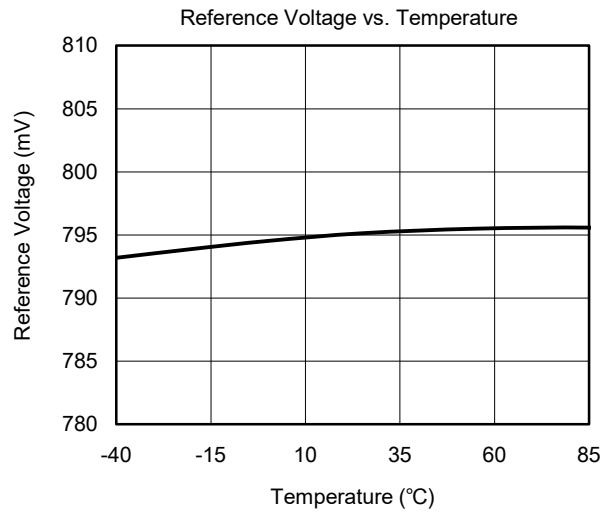
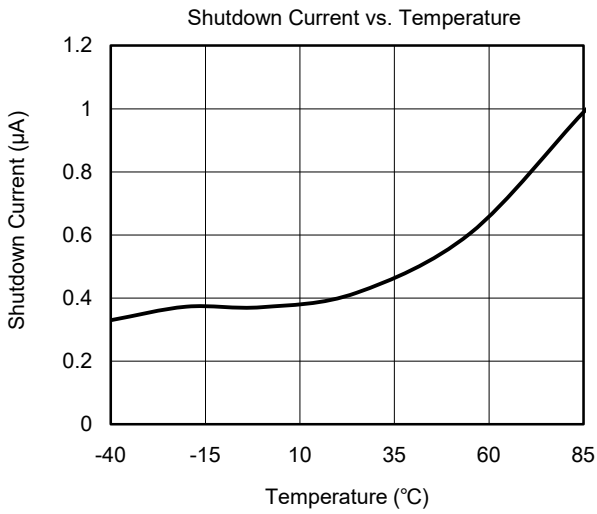
TYPICAL PERFORMANCE CHARACTERISTICS

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



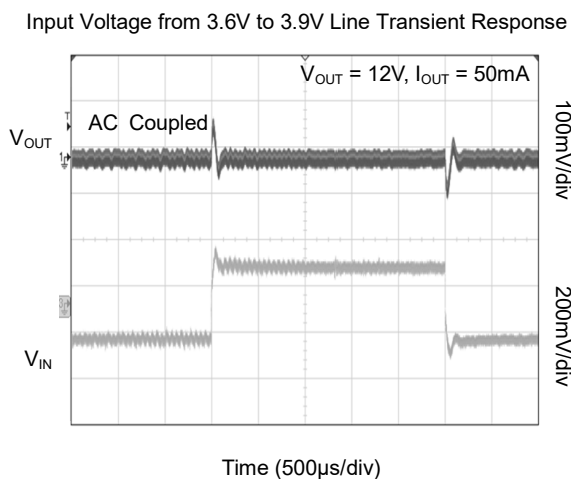
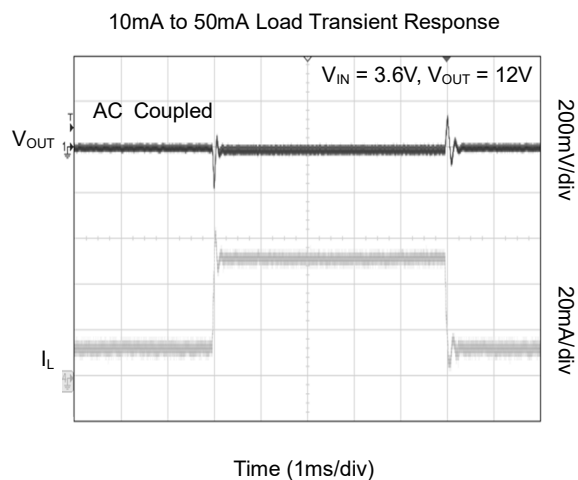
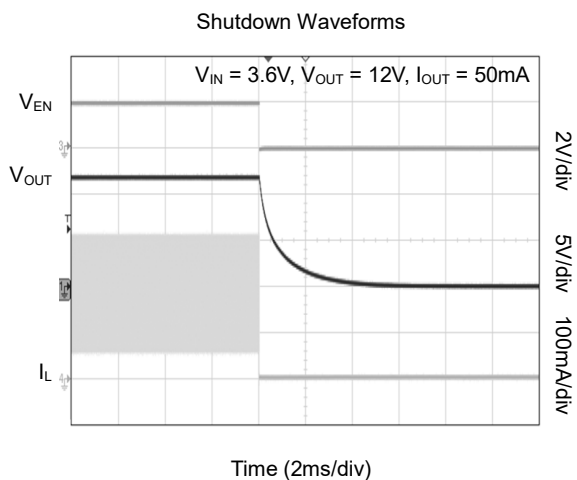
**TYPICAL PERFORMANCE CHARACTERISTICS (continued)**

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)**

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



**PCB Layout**

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

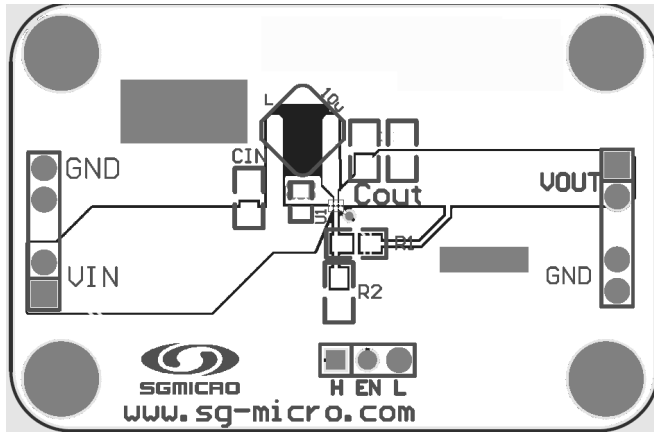


Figure 2. WLCSP-0.8x1.2-6B PCB

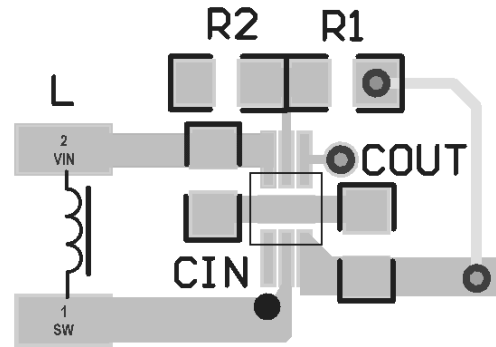


Figure 3. TDFN-2x2-6L PCB

**REVISION HISTORY**

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

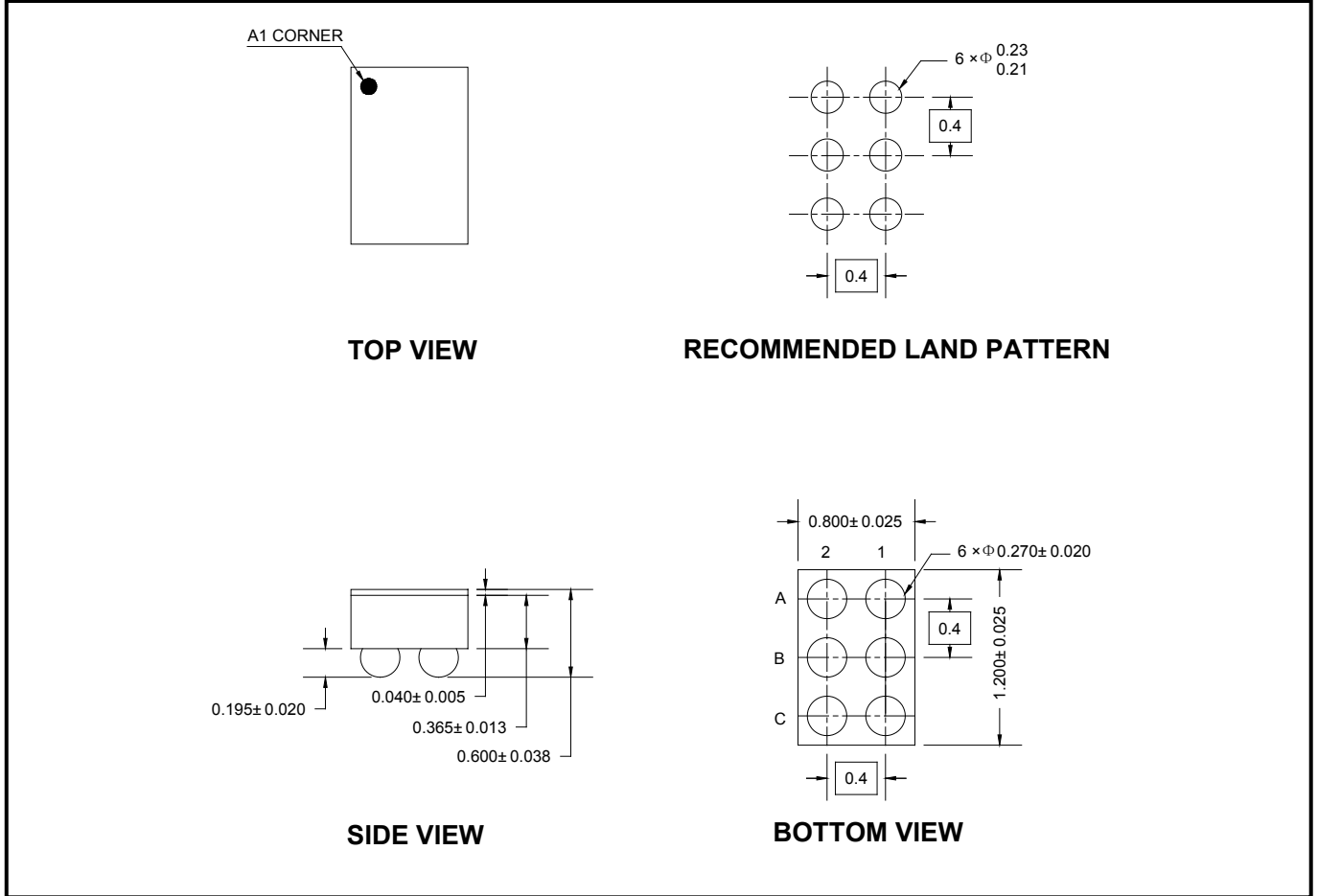
**Changes from Original (DECEMBER 2017) to REV.A**

Changed from product preview to production data.....	All
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PACKAGE OUTLINE DIMENSIONS

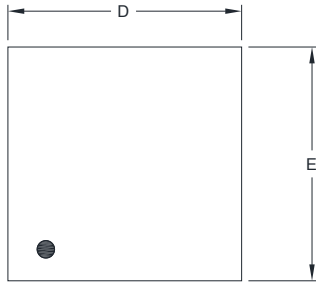
WLCSP-0.8×1.2-6B



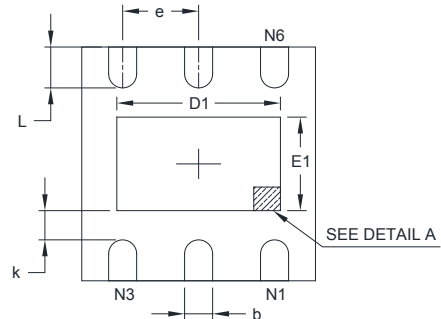
NOTE: All linear dimensions are in millimeters.

PACKAGE OUTLINE DIMENSIONS

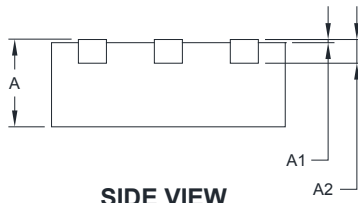
TDFN-2x2-6L



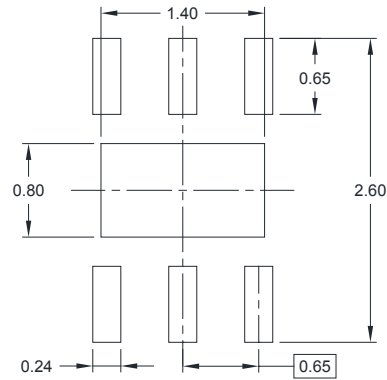
TOP VIEW



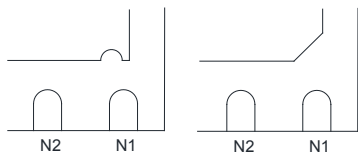
BOTTOM VIEW



SIDE VIEW



RECOMMENDED LAND PATTERN (Unit: mm)



DETAIL A

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

## 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