



SGM66055A

2.2MHz, Fixed Output Synchronous Tiny Boost Converter with a 3A Switch

GENERAL DESCRIPTION

The SGM66055A is an internally compensated, 2.2MHz switching frequency, current mode, synchronous boost switching regulator. Even below the minimum system battery voltage, the device maintains the output voltage regulation for a minimum output load current of 0.7A. This device turns into power-save mode to maintain high efficiency by lowering switching frequency. With its anti-ringing circuitry damping the charge in parasitic capacitor, it reduces EMI interference significantly.

In addition, the SGM66055A device can also support the pass-through mode by pulling EN to low. In this mode, the output voltage follows the input voltage with a voltage drop by the resistance of the inductor and high-side MOSFET.

The SGM66055A-5.0 and SGM66055A-5.4 are preset for outputting 5.0V and 5.4V.

The device is available in a Green WLCSP-1.21×1.21-9B package and operates over an ambient temperature range of -40°C to +85°C.

FEATURES

- **Operating Input Voltage Range: 2.5V to 4.5V**
- **Fixed Output Voltages: 5.0V and 5.4V**
- **Output Voltage Clamping: 5.7V**
- **93% Efficient Synchronous Boost Converter**
- **Device Quiescent Current: 23μA (TYP)**
- **Improved Light Load Efficiency with Power-Save Mode (PSM)**
- **Pass-through Mode by Pulling EN Low**
- **Low Reverse Leakage Current when $V_{OUT} > V_{IN}$**
- **Over-Temperature Protection**
- **Available in a Green WLCSP-1.21×1.21-9B Package**
- **-40°C to +85°C Operating Temperature Range**

APPLICATIONS

Class-D Audio Amplifier
Smart Phones and Tablets
Portable and Wearable Devices
USB OTG Supply

PACKAGE/ORDERING INFORMATION

MODEL	V _{OUT} (V)	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM66055A	5.0	WLCSP-1.21×1.21-9B	-40°C to +85°C	SGM66055A-5.0YG/TR	GP2 XXXX	Tape and Reel, 3000
	5.4	WLCSP-1.21×1.21-9B	-40°C to +85°C	SGM66055A-5.4YG/TR	GP3 XXXX	Tape and Reel, 3000

MARKING INFORMATION

NOTE: XXXX = Date Code.

YYY — Serial Number

XXXX

Date Code - Week

Date Code - Year

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 on VIN Pin	-0.3V to 5.5V
Voltage on VOUT Pin	6V
SW Node (DC).....	-0.3V to 6V
SW Node (Transient: 10ns, 3MHz).....	-1V to 8V
Voltage on Other Pins.....	-0.3V to 6V ⁽¹⁾
Package Thermal Resistance	
WLCSP-1.21×1.21-9B, θ_{JA}	90°C/W
Junction Temperature	+150°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (Soldering, 10s)	+260°C
ESD Susceptibility	
HBM.....	4000V
MM.....	400V
CDM	1000V

NOTE: 1. Lesser of 6V or V_{IN} + 0.3V.

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.

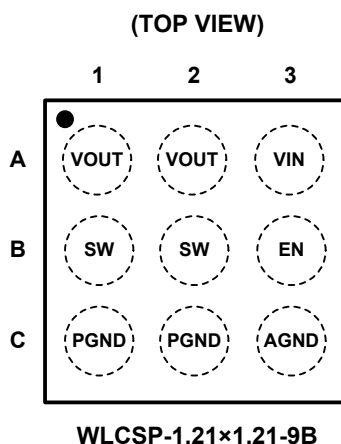
ESD SENSITIVITY CAUTION

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



PIN DESCRIPTION

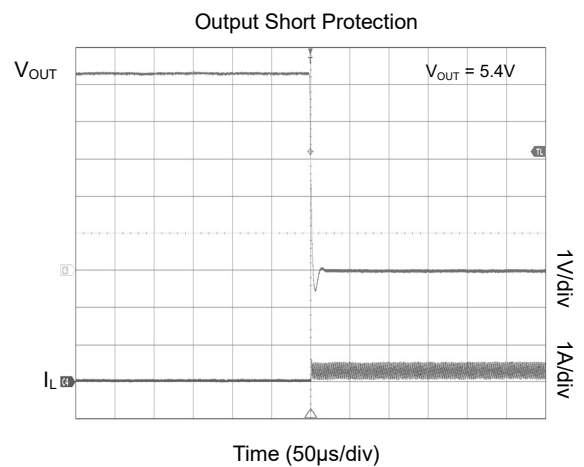
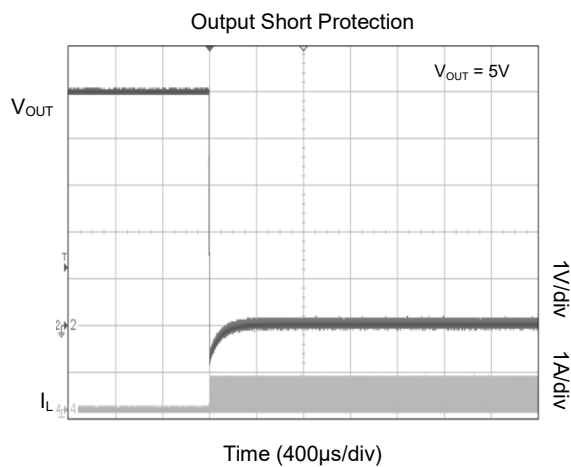
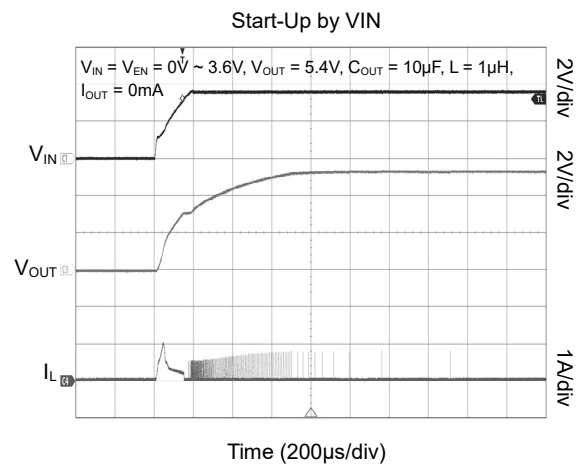
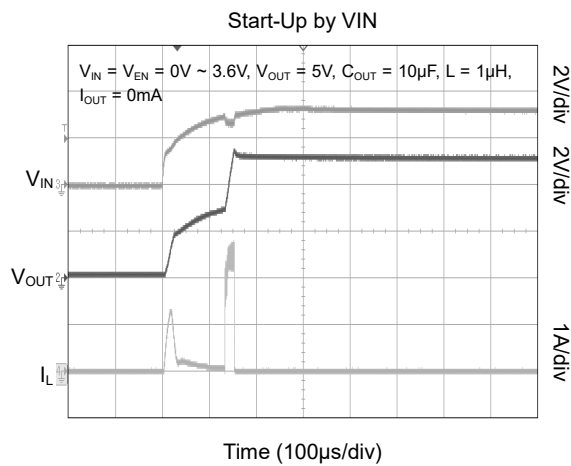
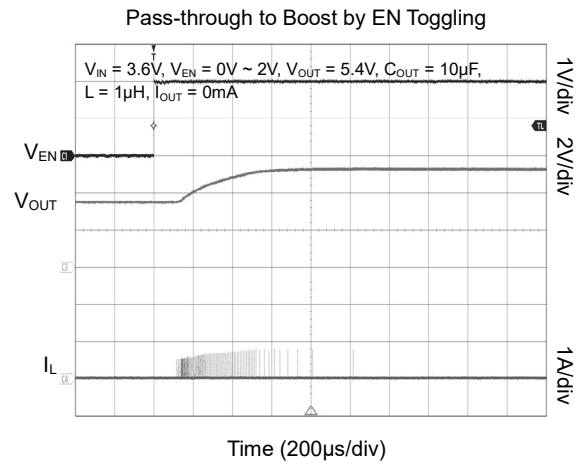
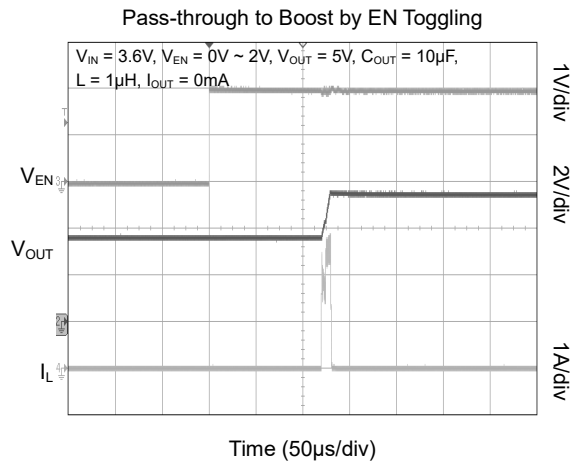
PIN	NAME	FUNCTION
A1, A2	VOUT	Output Voltage. Directly connect to C_{OUT} .
A3	VIN	Input Voltage. Connect to Li-Ion battery and the bias supply.
B1, B2	SW	Switching Node. SW connects to an inductor.
B3	EN	EN = HIGH, the device works in the boost mode; EN = LOW, the device is in pass-through mode. In pass-through operation, current limit function is not enabled.
C1, C2	PGND	Power Ground. C_{OUT} capacitor should be connected to the pins as close as possible.
C3	AGND	Analog Ground. All voltage levels are referenced to this pin and it connects to PGND at a single point.

ELECTRICAL CHARACTERISTICS(V_{IN} = 3.6V, Full = -40°C to +85°C, typical values are at T_A = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
DC/DC STAGE							
Input Voltage Range	V _{IN}		+25°C	2.5		4.5	V
Switching Frequency	f		Full	1.80	2.20	2.55	MHz
Switch Current Limit	I _L	SGM66055A-5.0	+25°C	2.2	3.0	3.5	A
		SGM66055A-5.4	+25°C	0.9	1.3	1.7	
Boost Switch On-Resistance		V _{OUT} = 5.0V	+25°C		50	65	mΩ
Rectifying Switch On-Resistance		V _{OUT} = 5.0V	+25°C		60	80	mΩ
Output Voltage		SGM66055A-5.0	Full	4.89	5.00	5.15	V
		SGM66055A-5.4	Full	5.25	5.40	5.48	
Line Regulation		V _{IN} = 2.5V to V _{OUT} - 0.5V	+25°C		0.1		%
Load Regulation			+25°C		0.2		%
Quiescent Current	I _Q	V _{EN} = V _{IN} = 3.6V, not switching	+25°C		23	33	μA
Shutdown Current		V _{EN} = 0V, V _{IN} = 3.6V	+25°C			2.5	μA
CONTROL STAGE							
EN Input Low Voltage	V _{IL}		Full			0.4	V
EN Input High Voltage	V _{IH}		Full	1.3			V
EN Input Current		Clamped on GND or VIN	Full	-1		1	μA
Over-Temperature Protection					150		°C
Over-Temperature Hysteresis					20		°C

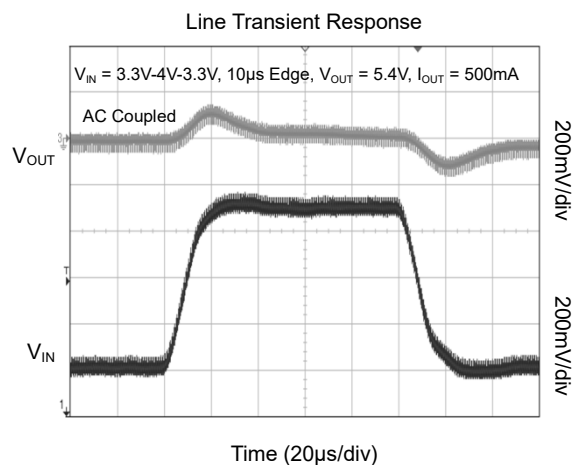
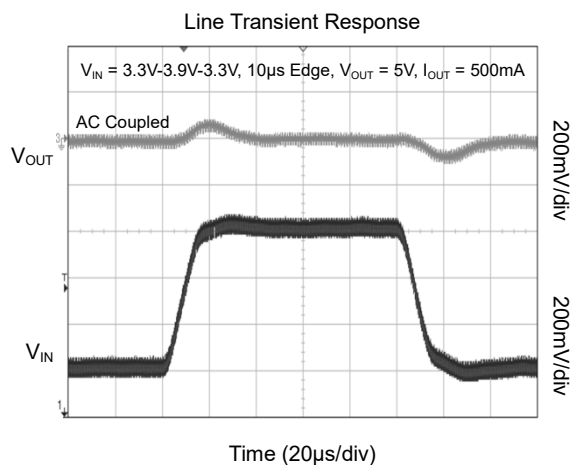
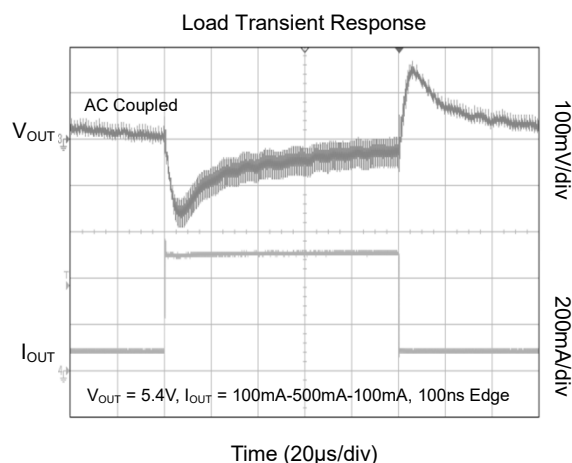
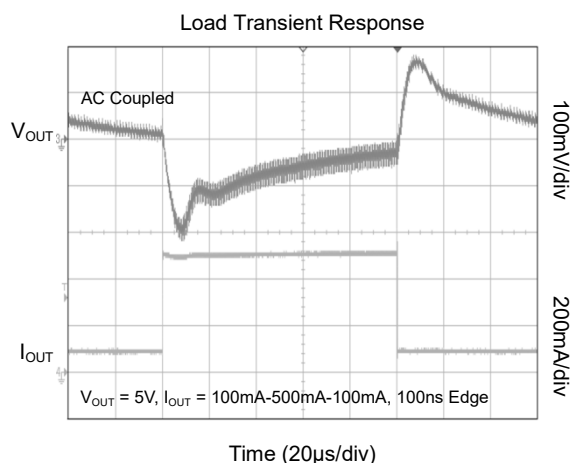
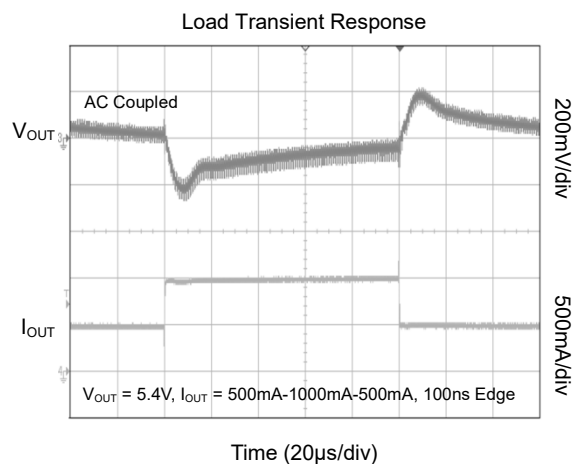
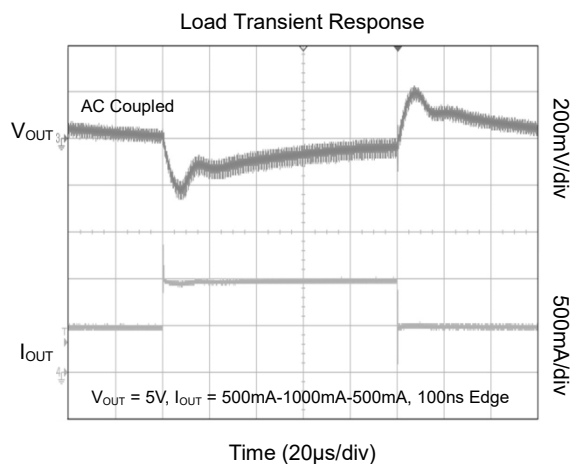
TYPICAL PERFORMANCE CHARACTERISTICS

$T_A = +25^\circ\text{C}$, $V_{IN} = 3.6\text{V}$, $C_{IN} = 4.7\mu\text{F}$, $C_{OUT} = 20\mu\text{F}$, unless otherwise noted.



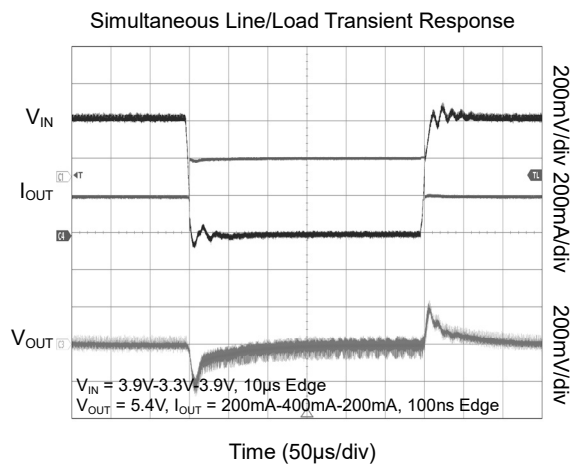
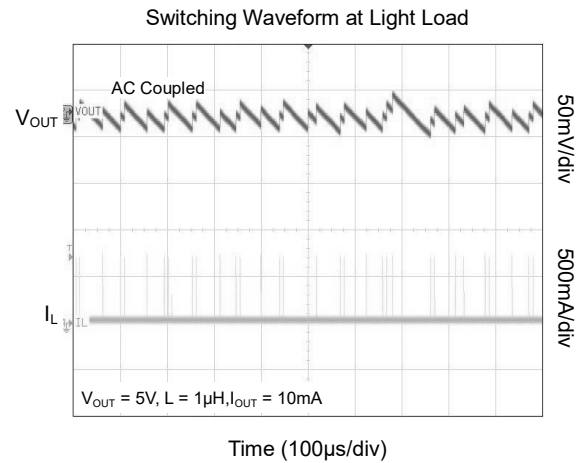
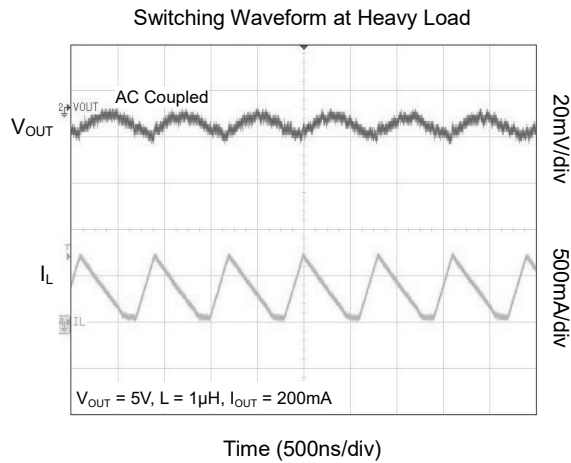
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

$T_A = +25^\circ\text{C}$, $V_{IN} = 3.6\text{V}$, $C_{IN} = 4.7\mu\text{F}$, $C_{OUT} = 20\mu\text{F}$, unless otherwise noted.



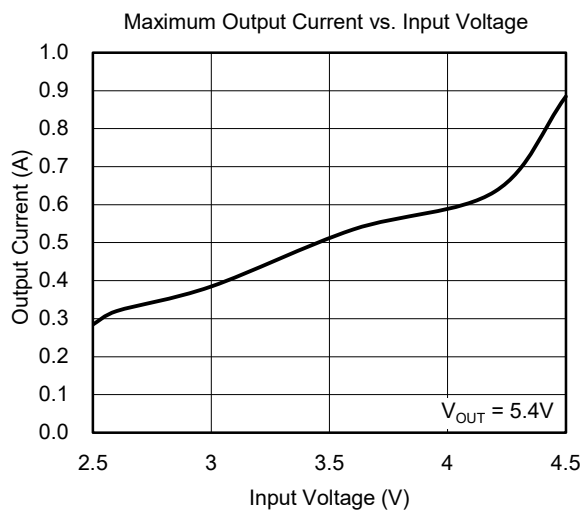
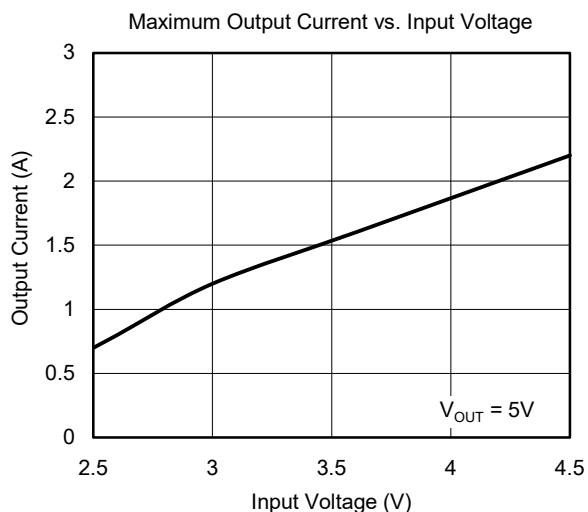
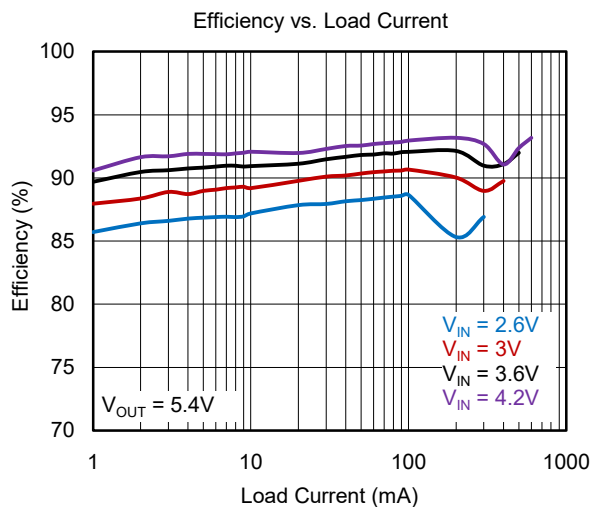
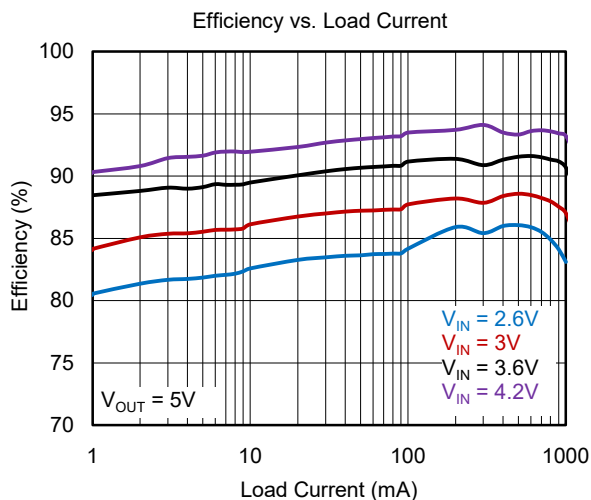
TYPICAL PERFORMANCE CHARACTERISTICS (continued)

$T_A = +25^\circ\text{C}$, $V_{IN} = 3.6\text{V}$, $C_{IN} = 4.7\mu\text{F}$, $C_{OUT} = 20\mu\text{F}$, unless otherwise noted.



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

$T_A = +25^\circ\text{C}$, $V_{IN} = 3.6\text{V}$, $C_{IN} = 4.7\mu\text{F}$, $C_{OUT} = 20\mu\text{F}$, unless otherwise noted.



SGM66055A

2.2MHz, Fixed Output Synchronous Tiny Boost Converter with a 3A Switch

FUNCTIONAL BLOCK DIAGRAM

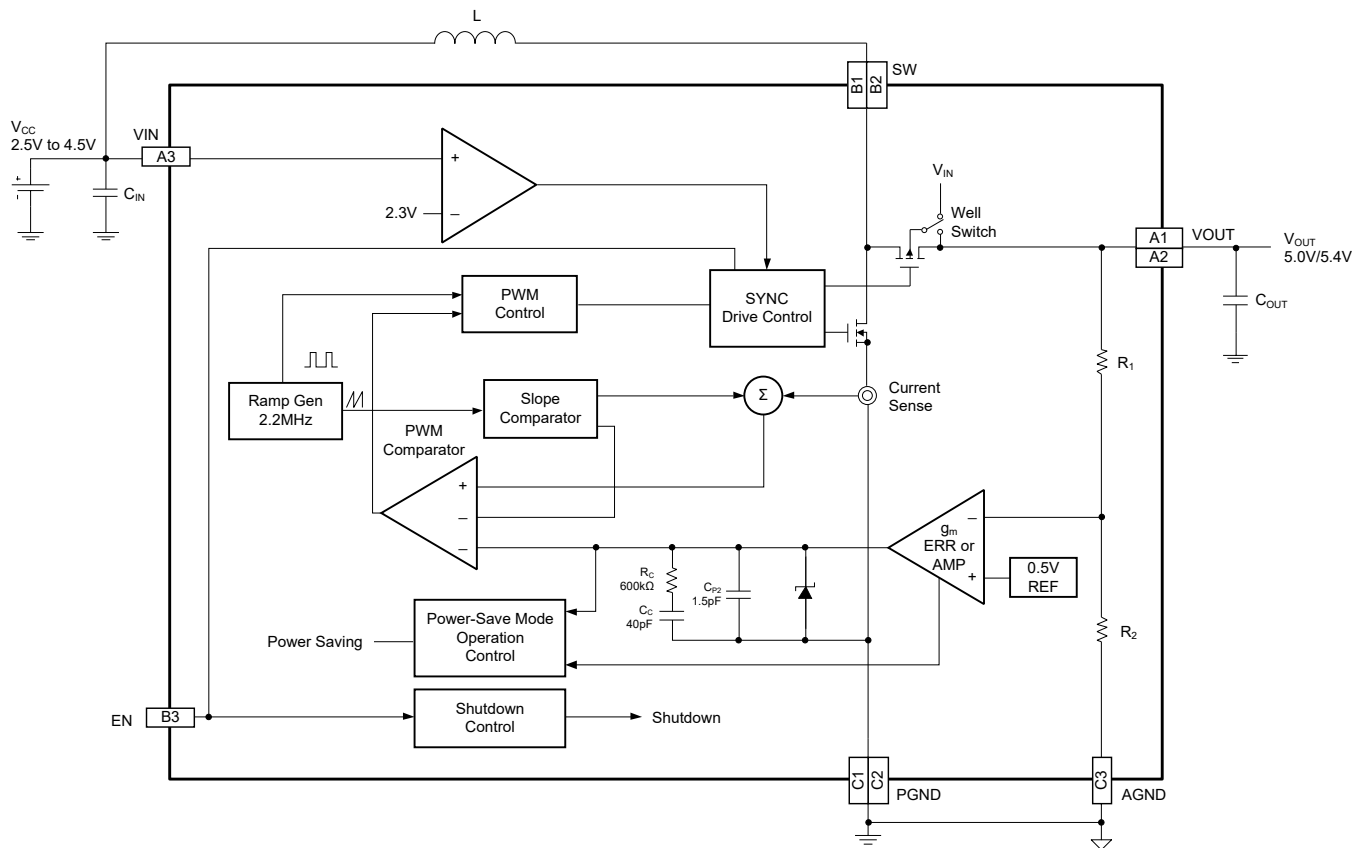


Figure 1. Block Diagram

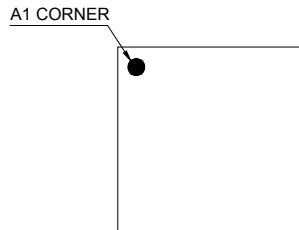
REVISION HISTORY

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

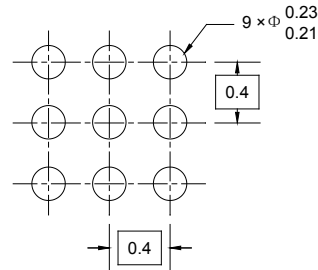
MAY 2019 – REV.A.1 to REV.A.2		Page
Updated SGM66055A-5.4	4, 5, 7, 8	
FEBRUARY 2019 – REV.A to REV.A.1		Page
Updated Features	1	
Changes from Original (AUGUST 2018) to REV.A		Page
Changed from product preview to production data	All	

PACKAGE OUTLINE DIMENSIONS

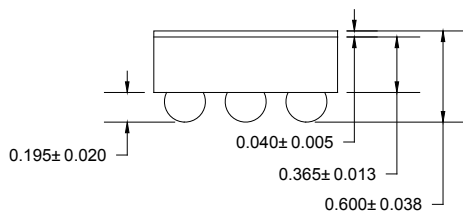
WLCSP-1.21×1.21-9B



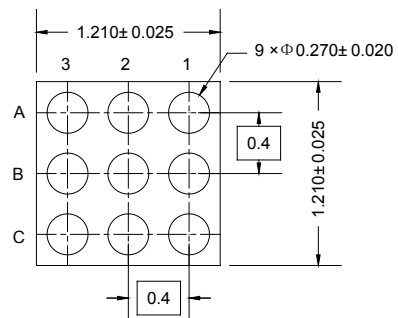
TOP VIEW



RECOMMENDED LAND PATTERN



SIDE VIEW



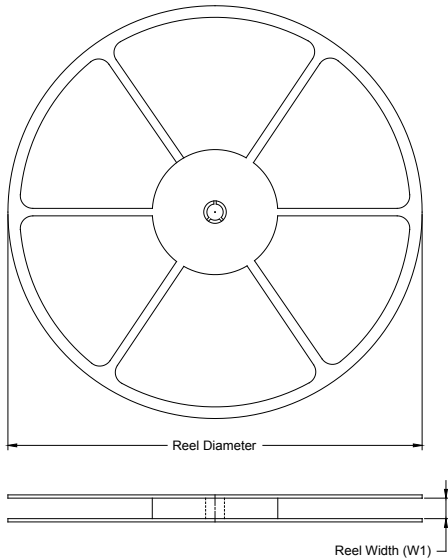
BOTTOM VIEW

NOTE: All linear dimensions are in millimeters.

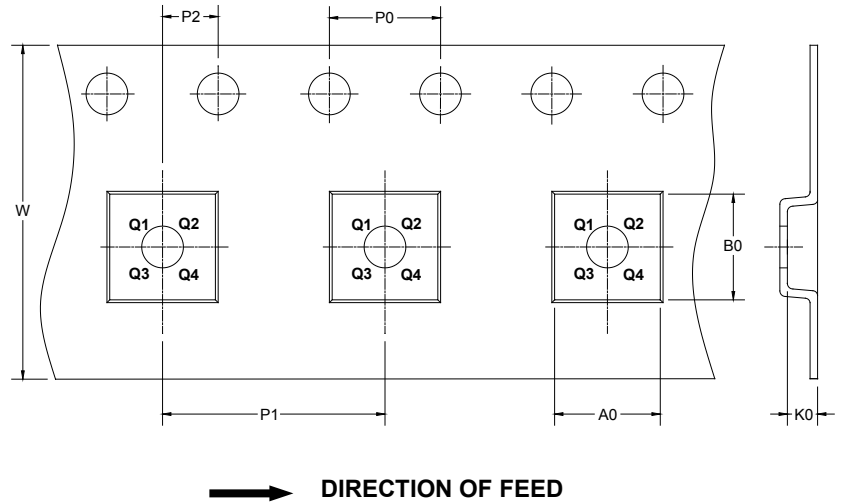
PACKAGE INFORMATION

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-1.21×1.21-9B	7"	9.2	1.33	1.33	0.74	4.0	4.0	2.0	8.0	Q1

DD00001

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