



SGM3110

Micro-Power Regulated Charge Pump

GENERAL DESCRIPTION

The SGM3110 is a Micro-Power switched capacitor voltage converter that delivers a regulated output. No external inductor is required for operation.

The SGM3110 can deliver up to 100mA 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 SGM3110 uses a pulse skipping technique to provide a regulated output from a varying input supply. The SGM3110 contains a thermal management circuit to protect the device under continuous output short-circuit conditions.

The SGM3110 is available in Green SOT-23-6 package and is rated over the -40°C to $+85^{\circ}\text{C}$ temperature range.

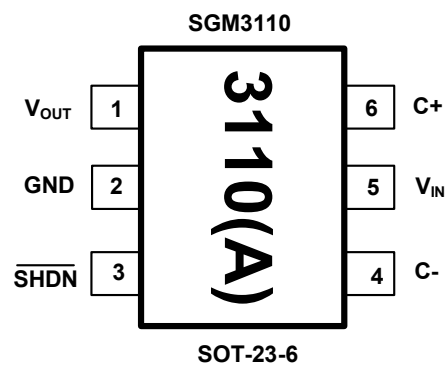
APPLICATIONS

- Cellular Phones
- Digital Cameras
- Handheld Electronics
- LED/Display Backlight Driver
- LEDs for Camera Flash
- Portable Communication Devices
- MP3 Players
- GPS Receivers
- PDA's

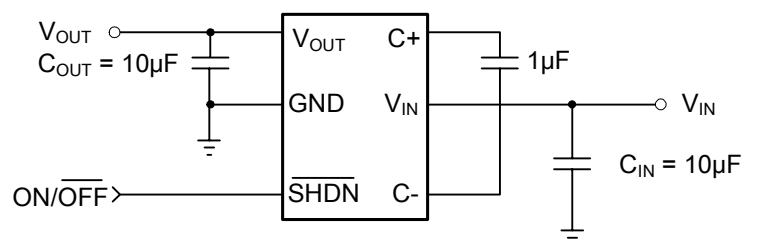
FEATURES

- Step-Up Voltage Converter
- Input Voltage Range:
 - SGM3110-5.0: 2.7V to 5.0V
 - SGM3110-4.5: 2.7V to 4.5V
- Micro-Power Consumption: 60 μA
- Fixed 5V, 4.5V \pm 4% Output
- Peak Current 250mA for 100ms
- High Frequency 750kHz Operation
- Logic-Controlled Shutdown
- Short-Circuit/Over-Temperature Protection
- Available in Green SOT-23-6 Package

PIN CONFIGURATION (TOP VIEW)



TYPICAL APPLICATION



PACKAGE/ORDERING INFORMATION

ORDER NUMBER	PACKAGE DESCRIPTION	PACKAGE OPTION	MARKING INFORMATION
SGM3110-5.0YN6/TR	SOT-23-6	Tape and Reel, 3000	3110
SGM3110-4.5YN6/TR	SOT-23-6	Tape and Reel, 3000	3110A

ABSOLUTE MAXIMUM RATINGS

V_{IN} to GND	-0.3V to 6V	Package Thermal Resistance	
V_{OUT} to GND	-0.3V to 6V	SOT-23-6, θ_{JA}	250°C/W
SHDN to GND.....	-0.3V to 6V	Lead Temperature Range (Soldering 10 sec)	
Storage Temperature Range.....	-65°C to +150°C	260°C
Junction Temperature.....	160°C	ESD Susceptibility	
Operating Temperature Range	-40°C to +85°C	HBM.....	2000V
Power Dissipation, P_D @ $T_A = 25^\circ\text{C}$		MM.....	400V
SOT-23-6	0.34W		

NOTE:

Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

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.

SGMICRO reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time. Please contact SGMICRO sales office to get the last datasheet.

PIN DESCRIPTION

NAME	FUNCTION
V_{OUT}	Regulated output pin.
GND	Ground
$\overline{\text{SHDN}}$	Shutdown input. Logic low signal disables the converter.
C-	Flying capacitor negative terminal.
V_{IN}	Input supply pin.
C+	Flying capacitor positive terminal.

ELECTRICAL CHARACTERISTICS

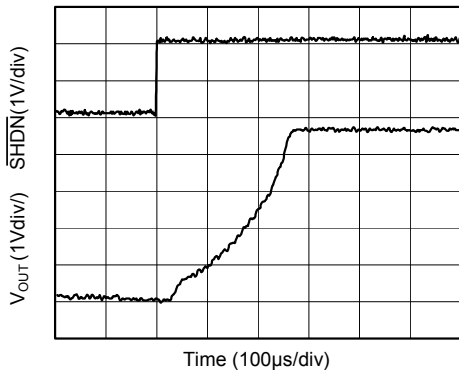
(T_A = -40°C to +85°C, unless otherwise noted. Typical values are at T_A = 25°C, C_{FLY} = 1μF, C_{IN} = 10μF, C_{OUT} = 10μF).

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
SGM3110-5.0						
Input Voltage Range	V _{IN}	V _{OUT} = 5.0V	2.7		V _{OUT}	V
Output Voltage	V _{OUT}	2.7V < V _{IN} < 5V, I _{OUT} ≤ 50mA	4.8	5.0	5.2	V
		3.0V < V _{IN} < 5V, I _{OUT} ≤ 100mA	4.8	5.0	5.2	
Quiescent Power Supply Current	I _Q	2.7V < V _{IN} < 5V, I _{OUT} = 0mA, $\overline{\text{SHDN}} = V_{\text{IN}}$		60	68	μA
Shutdown Supply Current	I _{SHDN}	2.7V < V _{IN} < 3.6V, I _{OUT} = 0mA, V _{SHDN} = 0		0.2	1	μA
		3.6V < V _{IN} < 5V, I _{OUT} = 0mA, V _{SHDN} = 0			1	
Ripple Voltage	V _{RIPPLE}	V _{IN} = 2.7V, I _{OUT} = 50mA		15		mV _{P-P}
		V _{IN} = 3V, I _{OUT} = 100mA		88		
Efficiency	η	V _{IN} = 2.7V, I _{OUT} = 50mA		91		%
Frequency	f _{OSC}	Oscillator Free Running		750		kHz
$\overline{\text{SHDN}}$ Input Threshold High	V _{IH}		1.4			V
$\overline{\text{SHDN}}$ Input Threshold Low	V _{IL}				0.4	
$\overline{\text{SHDN}}$ Input High Current	I _{IH}	$\overline{\text{SHDN}} = V_{\text{IN}}$	-1		+1	μA
$\overline{\text{SHDN}}$ Input Low Current	I _{IL}	$\overline{\text{SHDN}} = \text{GND}$	-1		+1	μA
Turn-On Time	T _{ON}	V _{IN} = 3V, I _{OUT} = 0mA		0.3		ms
SGM3110-4.5						
Input Voltage Range	V _{IN}	V _{OUT} = 4.5V	2.7		V _{OUT}	V
Output Voltage	V _{OUT}	2.7V < V _{IN} < 4.5V, I _{OUT} ≤ 50mA	4.32	4.5	4.68	V
		3.0V < V _{IN} < 4.5V, I _{OUT} ≤ 100mA	4.32	4.5	4.68	
Quiescent Power Supply Current	I _Q	2.7V < V _{IN} < 4.5V, I _{OUT} = 0mA, $\overline{\text{SHDN}} = V_{\text{IN}}$		60	68	μA
Shutdown Supply Current	I _{SHDN}	2.7V < V _{IN} < 3.6V, I _{OUT} = 0mA, V _{SHDN} = 0		0.2	1	μA
		3.6V < V _{IN} < 4.5V, I _{OUT} = 0mA, V _{SHDN} = 0			1	
Ripple Voltage	V _{RIPPLE}	V _{IN} = 2.7V, I _{OUT} = 50mA		15		mV _{P-P}
		V _{IN} = 3V, I _{OUT} = 100mA		88		
Efficiency	η	V _{IN} = 2.7V, I _{OUT} = 50mA		83		%
Frequency	f _{OSC}	Oscillator Free Running		750		kHz
$\overline{\text{SHDN}}$ Input Threshold High	V _{IH}		1.4			V
$\overline{\text{SHDN}}$ Input Threshold Low	V _{IL}				0.4	
$\overline{\text{SHDN}}$ Input High Current	I _{IH}	$\overline{\text{SHDN}} = V_{\text{IN}}$	-1		+1	μA
$\overline{\text{SHDN}}$ Input Low Current	I _{IL}	$\overline{\text{SHDN}} = \text{GND}$	-1		+1	μA
Turn-On Time	T _{ON}	V _{IN} = 3V, I _{OUT} = 0mA		0.3		ms

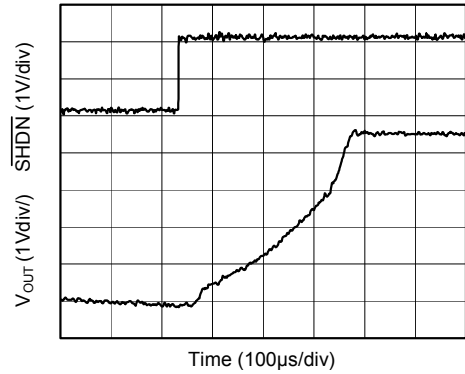
TYPICAL PERFORMANCE CHARACTERISTICS

At $V_S = +5.0V$, $T_A = +25^\circ C$, $V_{IN} = 3V$, $C_{IN} = C_{OUT} = 10\mu F$, $C_{FLY} = 1\mu F$, unless otherwise noted.

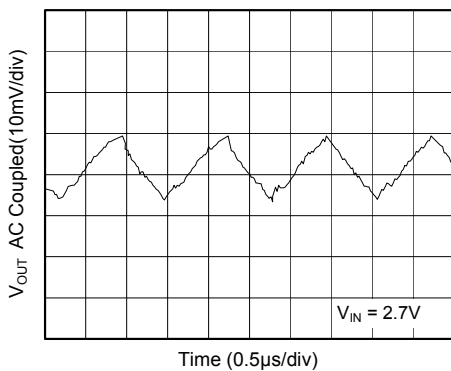
Startup Time with 50mA Load



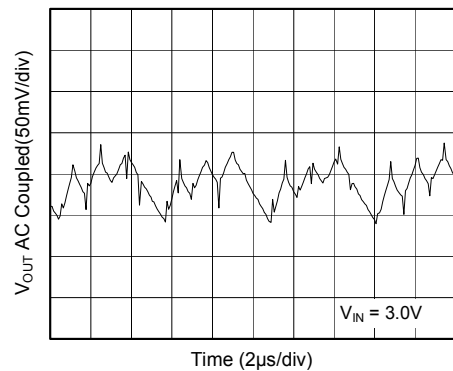
Startup Time with 100mA Load



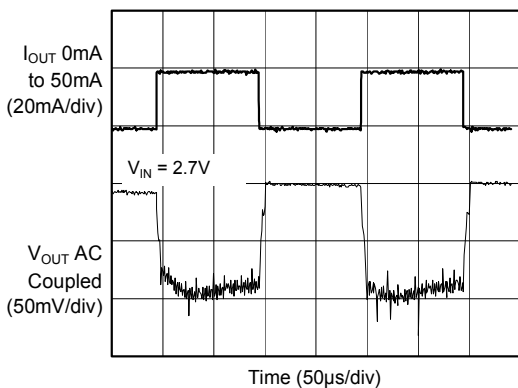
Output Ripple with $I_{OUT} = 50mA$



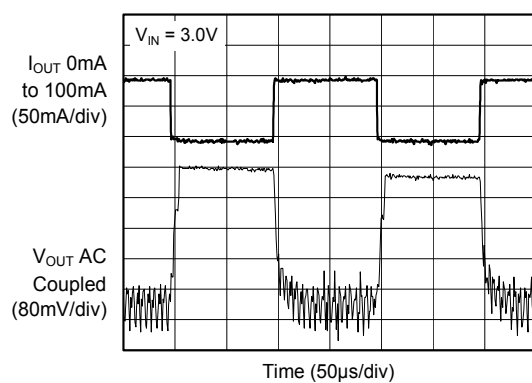
Output Ripple with $I_{OUT} = 100mA$



Load Transient Response for 50mA

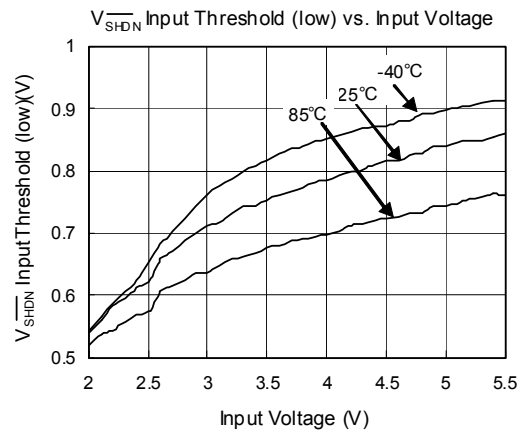
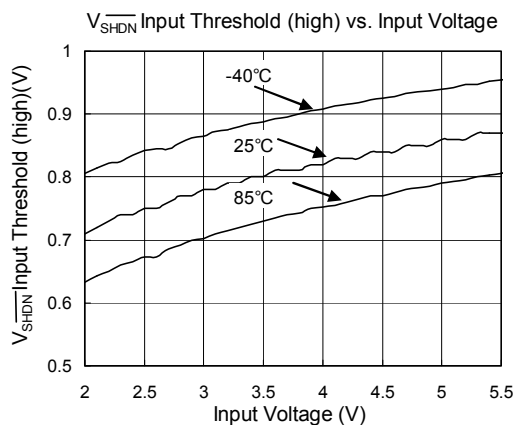
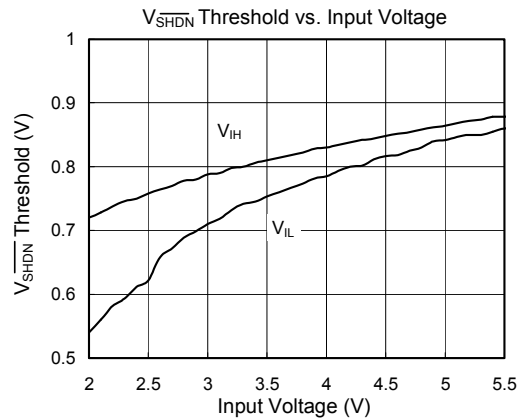
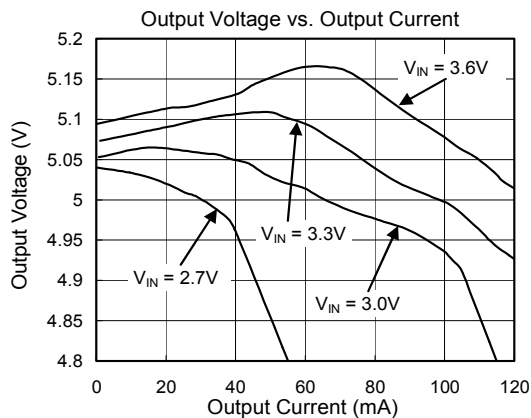
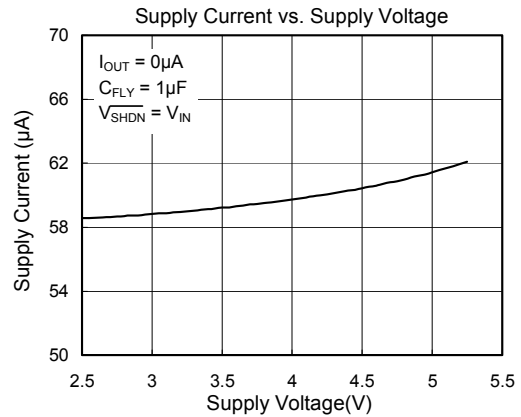
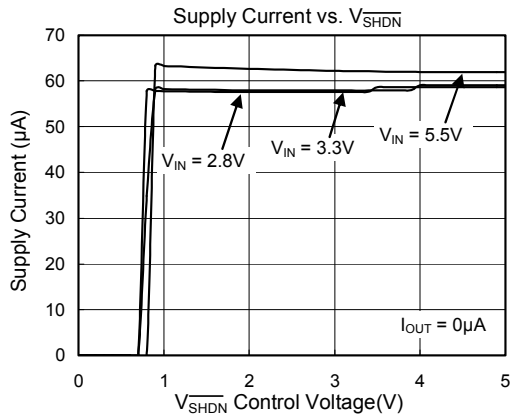


Load Transient Response for 100mA



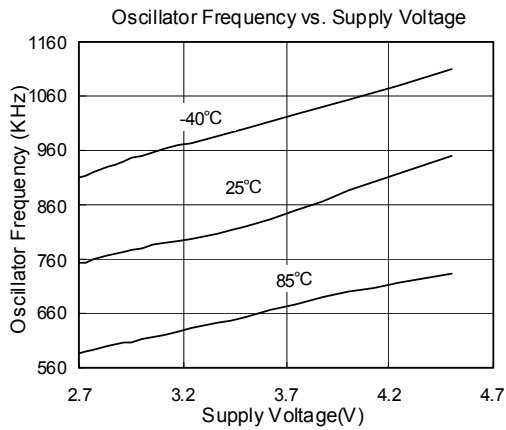
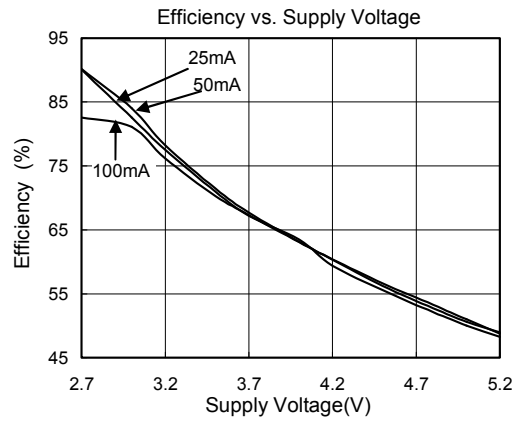
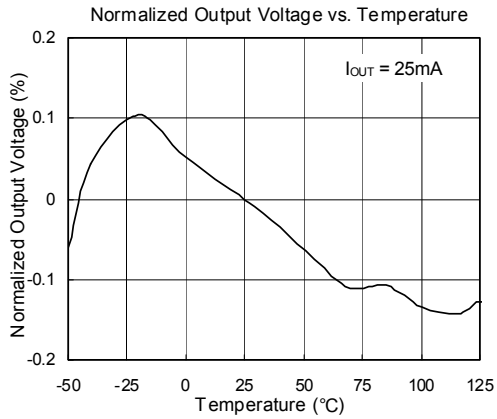
TYPICAL PERFORMANCE CHARACTERISTICS

At $V_S = +5.0V$, $T_A = +25^\circ C$, $V_{IN} = 3V$, $C_{IN} = C_{OUT} = 10\mu F$, $C_{FLY} = 1\mu F$, unless otherwise noted.



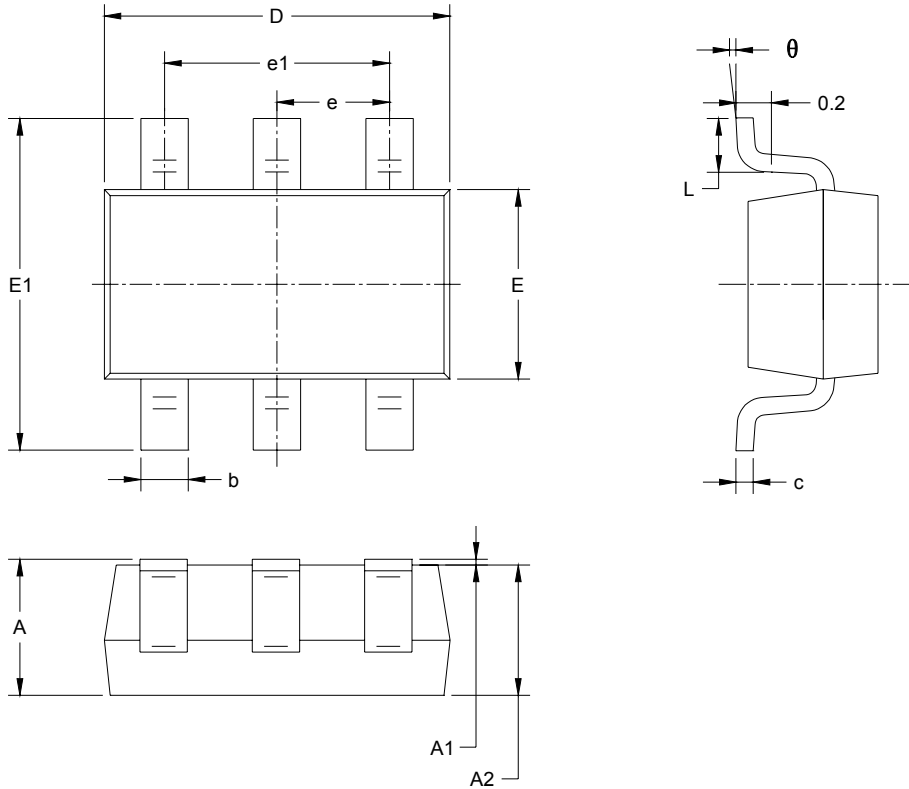
TYPICAL PERFORMANCE CHARACTERISTICS

At $V_S = +5.0V$, $T_A = +25^\circ C$, $V_{IN} = 3V$, $C_{IN} = C_{OUT} = 10\mu F$, $C_{FLY} = 1\mu F$, unless otherwise noted.



PACKAGE OUTLINE DIMENSIONS

SOT-23-6



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037 BSC	
e1	1.900 BSC		0.075 BSC	
L	0.300	0.600	0.012	0.024
theta	0°	8°	0°	8°