

### GENERAL DESCRIPTION

The SGM2205-12XK3G is a high voltage, low noise and low dropout voltage linear regulator. It is capable of supplying 800mA output current with typical dropout voltage of only 450mV. The operating input voltage range is from 3.6V to 36V.

Other features include short-circuit current limit and thermal shutdown protection.

The SGM2205-12XK3G is available in a Green SOT-89-3 package. It operates over an operating temperature range of -40°C to +125°C.

### FEATURES

- **Wide Operating Input Voltage Range: 3.6V to 36V**
- **Fixed Output Voltage: 12V**
- **Output Voltage Accuracy:  $\pm 1.5\%$  at +25°C**
- **Low Dropout Voltage: 450mV (TYP) at 800mA**
- **Current Limiting and Thermal Protection**
- **Excellent Load and Line Transient Responses**
- **No-Load Stability**
- **-40°C to +125°C Operating Temperature Range**
- **Available in a Green SOT-89-3 Package**

### APPLICATIONS

Cellular Telephones  
Palmtop Computers  
High-Efficiency Linear Power Supplies  
Portable Equipment

### TYPICAL APPLICATION

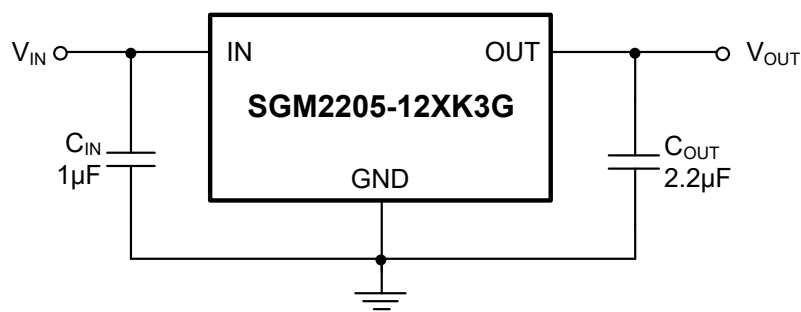


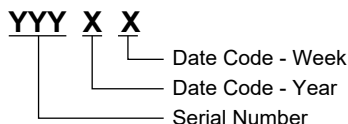
Figure 1. Typical Application Circuit

**PACKAGE/ORDERING INFORMATION**

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM2205-12XK3G	SOT-89-3	-40°C to +125°C	SGM2205-12XK3G/TR	GRBXX	Tape and Reel, 1000

**MARKING INFORMATION**

NOTE: XX = Date 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**

Supply Voltage Range, $V_{IN}$ .....	-40V to +40V
Power Dissipation, $P_D @ T_J = +25^\circ C$	
SOT-89-3 .....	1.66W
Package Thermal Resistance	
SOT-89-3, $\theta_{JA}$ .....	75°C/W
Junction Temperature .....	+150°C
Storage Temperature Range.....	-65°C to +150°C
Lead Temperature (Soldering, 10s) .....	+260°C
ESD Susceptibility	
HBM.....	6000V
CDM .....	1000V

**RECOMMENDED OPERATING CONDITIONS**

Supply Voltage Range, $V_{IN}$ .....	3.6V to 36V
Input Effective Capacitance, $C_{IN}$ .....	0.5µF (MIN)
Output Effective Capacitance, $C_{OUT}$ .....	1µF to 10µF
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.

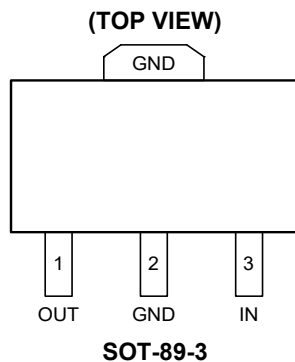
**ESD SENSITIVITY CAUTION**

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 CONFIGURATION**



**PIN DESCRIPTION**

PIN	NAME	FUNCTION
1	OUT	Regulator Output Pin. It is recommended to use an output capacitor with effective capacitance in the range of 1 $\mu$ F to 10 $\mu$ F to ensure stability.
2	GND	Ground.
3	IN	Input Supply Voltage Pin. It is recommended to use a 1 $\mu$ F or larger ceramic capacitor from IN pin to ground to get good power supply decoupling.

**ELECTRICAL CHARACTERISTICS**

( $V_{IN} = V_{OUT(NOM)} + 1V$ ,  $I_{OUT} = 100\mu A$  and  $C_{OUT} = 2.2\mu F$ ,  $T_J = -40^\circ C$  to  $+125^\circ C$ , typical values are at  $T_J = +25^\circ C$ , unless otherwise noted.)

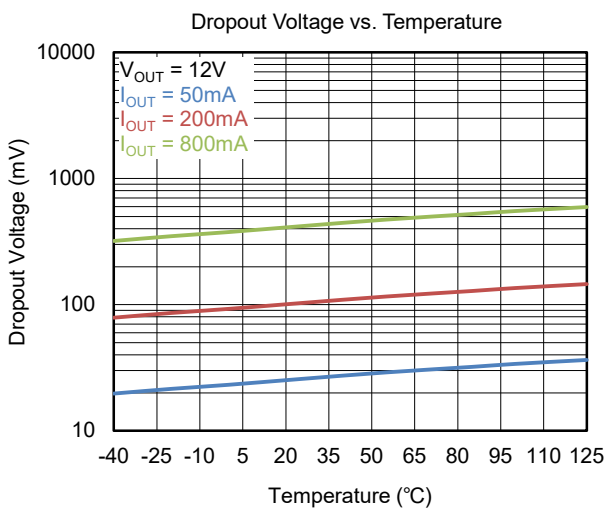
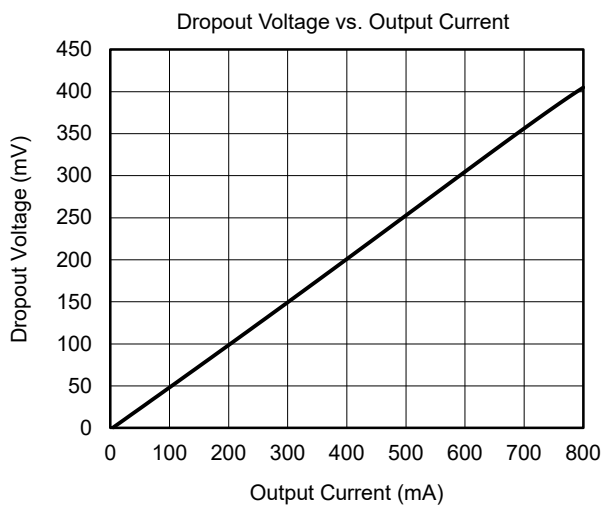
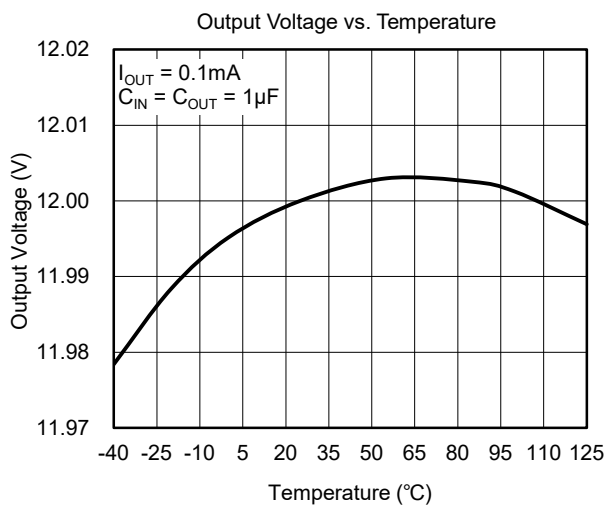
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage Range	$V_{IN}$	$T_J = +25^\circ C$	3.6		36	V
Output Voltage Accuracy	$V_{OUT}$	Variation from nominal $V_{OUT}$ , $T_J = +25^\circ C$	-1.5		1.5	%
		Variation from nominal $V_{OUT}$	-2		2	
Ground Pin Current	$I_Q$	No load, $T_J = +25^\circ C$		80	104	$\mu A$
		No load			112	
		$I_{OUT} = 100\mu A$ , $T_J = +25^\circ C$		80	104	
		$I_{OUT} = 100\mu A$			112	
		$I_{OUT} = 50mA$ , $T_J = +25^\circ C$		220	280	
		$I_{OUT} = 50mA$			290	
		$I_{OUT} = 800mA$ , $T_J = +25^\circ C$		1950	2250	
		$I_{OUT} = 800mA$			2350	
Current Limit	$I_{LIM}$	$V_{OUT} = 90\% \times V_{OUT(NOM)}$ , $T_J = +25^\circ C$	820	1100		mA
Short-Circuit Current	$I_{SHORT}$	$V_{OUT} = 0V$		230		mA
Dropout Voltage <sup>(1)</sup>	$V_{DROP}$	$I_{OUT} = 50mA$ , $T_J = +25^\circ C$		30	38	mV
		$I_{OUT} = 50mA$			55	
		$I_{OUT} = 200mA$ , $T_J = +25^\circ C$		115	150	
		$I_{OUT} = 200mA$			210	
		$I_{OUT} = 800mA$ , $T_J = +25^\circ C$		450	610	
		$I_{OUT} = 800mA$			850	
Line Regulation	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$V_{IN} = V_{OUT(NOM)} + 1V$ to 36V, $T_J = +25^\circ C$		0.0003	0.003	%V
		$V_{IN} = V_{OUT(NOM)} + 1V$ to 36V			0.005	
Load Regulation	$\frac{\Delta V_{OUT}}{V_{OUT}}$	$I_{OUT} = 100\mu A$ to 800mA, $T_J = +25^\circ C$		0.1	0.3	%
		$I_{OUT} = 100\mu A$ to 800mA			0.4	
Power Supply Rejection Ratio	PSRR	$f = 1kHz$ , $V_{OUT} = 12V$ , $I_{OUT} = 50mA$		62		dB
Output Voltage Noise	$e_n$	$V_{OUT} = 12V$ , $I_{OUT} = 50mA$ , $C_{OUT} = 2.2\mu F$		1900		nV/ $\sqrt{Hz}$
Output Voltage Temperature Coefficient	$\frac{\Delta V_{OUT}}{\Delta T_J \times V_{OUT}}$			40		ppm/ $^\circ C$

## NOTE:

1. The dropout voltage is defined as the difference between  $V_{IN}$  and  $V_{OUT}$  when  $V_{OUT}$  falls to  $95\% \times V_{OUT(NOM)}$ .

TYPICAL PERFORMANCE CHARACTERISTICS

T<sub>J</sub> = +25°C, C<sub>OUT</sub> = 2.2µF and I<sub>OUT</sub> = 100µA, unless otherwise noted.



FUNCTIONAL BLOCK DIAGRAM

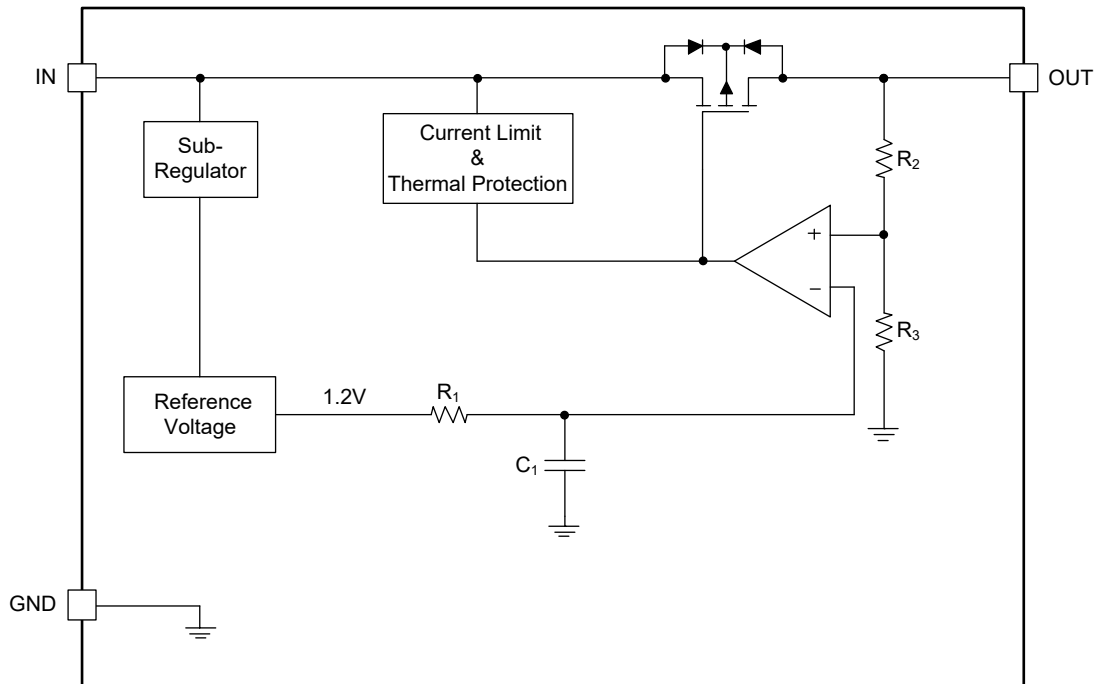


Figure 2. Block Diagram

## APPLICATION INFORMATION

The SGM2205-12XK3G is a high voltage, low noise and low dropout LDO and provides 800mA output current. These features make the device a reliable solution to solve many challenging problems in the generation of clean and accurate power supply. The high performance also makes the SGM2205-12XK3G useful in a variety of applications. The SGM2205-12XK3G provides protection functions for output overload, output short-circuit condition and overheating.

### Input Capacitor Selection ( $C_{IN}$ )

The input decoupling capacitor should be placed as close as possible to the IN pin for ensuring the device stability. 1 $\mu$ F or larger X7R or X5R ceramic capacitor is selected to get good dynamic performance.

When  $V_{IN}$  is required to provide large current instantaneously, a large effective input capacitor is required. Multiple input capacitors can limit the input tracking inductance. Adding more input capacitors is available to restrict the ringing and to keep it below the device absolute maximum ratings.

### Output Capacitor Selection ( $C_{OUT}$ )

The output decoupling capacitor should be placed as close as possible to the OUT pin. 2.2 $\mu$ F or larger X7R or X5R ceramic capacitor is selected to get good dynamic performance. The minimum effective capacitance of  $C_{OUT}$  that SGM2205-12XK3G can remain stable is 1 $\mu$ F. For ceramic capacitor, temperature, DC bias and package size will change the effective capacitance, so enough margin of  $C_{OUT}$  must be considered in design.

Additionally,  $C_{OUT}$  with larger capacitance and lower ESR will help increase the high frequency PSRR and improve the load transient response.

### Output Current Limit and Short-Circuit Protection

When overload events happen, the output current is internally limited to 1100mA (TYP). When the OUT pin is shorted to ground, the short-circuit protection will limit the output current to 230mA (TYP).

### No-Load Stability

The SGM2205-12XK3G can maintain stability without output load (except internal voltage divider).

### Input Power Supply

The input power supply range is from 3.6V to 36V.  $V_{IN}$  must be larger than ( $V_{OUT} + V_{DROP}$ ) in application. The input ceramic capacitor must be placed as close as possible to the IN pin, this  $C_{IN}$  can help improve the output noise performance of LDO.

### Layout Guidelines

To get good PSRR, low output noise and high transient response performance, the input and output bypass capacitors must be placed as close as possible to the IN pin and OUT pin separately.  $V_{IN}$  and  $V_{OUT}$  had better use separate ground planes and these ground planes are single point connected to the GND pin.

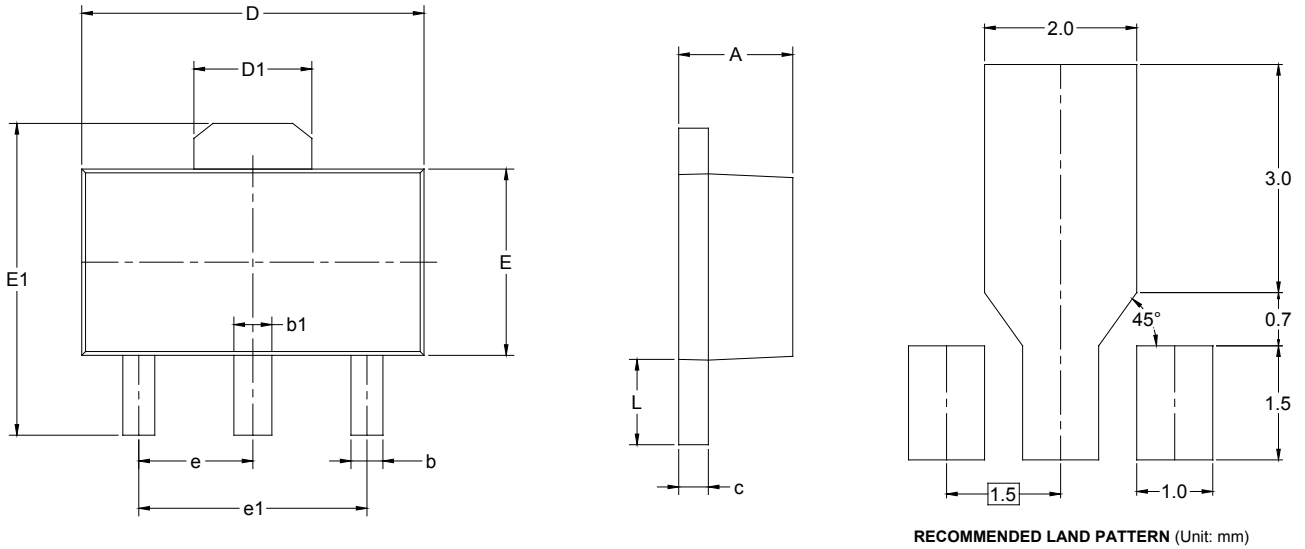
## REVISION HISTORY

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

Changes from Original (MARCH 2021) to REV.A	Page
Changed from product preview to production data.....	All

PACKAGE OUTLINE DIMENSIONS

SOT-89-3



RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF		0.061 REF	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP		0.060 TYP	
e1	3.000 TYP		0.118 TYP	
L	0.900	1.200	0.035	0.047



**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
SOT-89-3	7"	13.2	4.85	4.45	1.85	4.0	8.0	2.0	12.0	Q3

D00001

# 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