



# SGM8199N

## Voltage Output, High-side or Low-side Measurement, Bi-Directional Current Shunt Monitor

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### GENERAL DESCRIPTION

The SGM8199N is a current shunt monitor that operates from 2.7V to 26V single supply, consuming only 85 $\mu$ A quiescent current. The device features a wide common mode voltage range from -0.1V to 26V. It can detect voltage drops across shunt resistors without being affected by the supply voltage.

The SGM8199N provides a fixed gain of 100V/V. The device offers a low offset, which allows 10mV full-scale maximum drops across the shunt when sensing current.

The SGM8199N is available in a Green SC70-6 package. It is specified over the extended -40 $^{\circ}$ C to +125 $^{\circ}$ C temperature range.

### FEATURES

- **Wide Input Common Mode Voltage: -0.1V to 26V**
- **Low Quiescent Current: 85 $\mu$ A (TYP)**
- **Low Input Offset Voltage: 350 $\mu$ V ( $V_{CM} = 12V$ , MAX)  
(Enable 10mV Full-Scale Shunt Drops)**
- **Gain: 100V/V**
- **Gain Error:  $\pm 0.4\%$  (MAX)**
- **-40 $^{\circ}$ C to +125 $^{\circ}$ C Operating Temperature Range**
- **Available in a Green SC70-6 Package**

### APPLICATIONS

Portable Equipment  
Computers  
Battery Chargers  
Energy Managements  
Telecom Equipment

# Voltage Output, High-side or Low-side Measurement, Bi-Directional Current Shunt Monitor

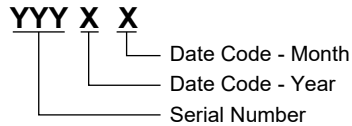
## SGM8199N

### PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM8199N	SC70-6	-40°C to +125°C	SGM8199NXC6G/TR	CEAXX	Tape and Reel, 3000

### 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.....	28V
V <sub>IN</sub> Differential.....	±28V
Input Common Mode Voltage Range.....	GND - 0.3V to 28V
Input Current into All Pins .....	5mA
Junction Temperature .....	+150°C
Storage Temperature Range.....	-65°C to +150°C
Lead Temperature (Soldering, 10s) .....	+260°C
ESD Susceptibility	
HBM.....	3000V
CDM .....	2000V

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.

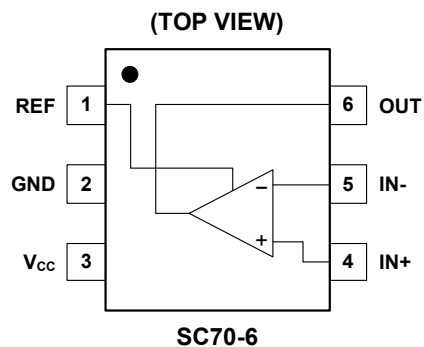
### DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

### RECOMMENDED OPERATING CONDITIONS

Operating Temperature Range .....	-40°C to +125°C
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### PIN CONFIGURATION



### 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.

# Voltage Output, High-side or Low-side Measurement, Bi-Directional Current Shunt Monitor

## SGM8199N

### ELECTRICAL CHARACTERISTICS

(At  $T_A = +25^\circ\text{C}$ , Full =  $-40^\circ\text{C}$  to  $+125^\circ\text{C}$ ,  $V_{CC} = 2.7\text{V}$  to  $26\text{V}$ ,  $V_{IN+} = 12\text{V}$ ,  $V_{SENSE} = V_{IN+} - V_{IN-}$ , and  $V_{REF} = V_{CC}/2$ , unless otherwise noted.)

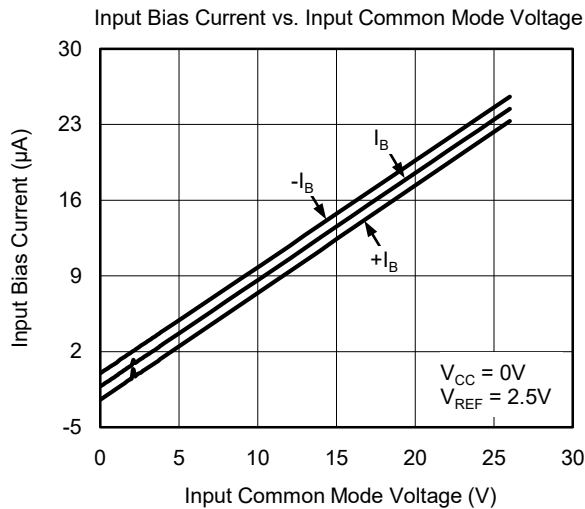
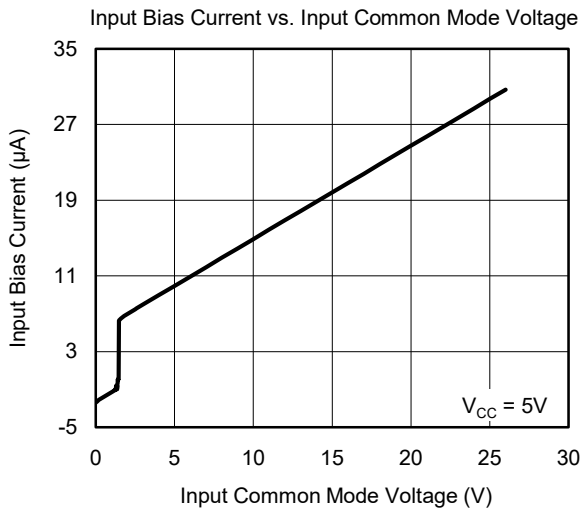
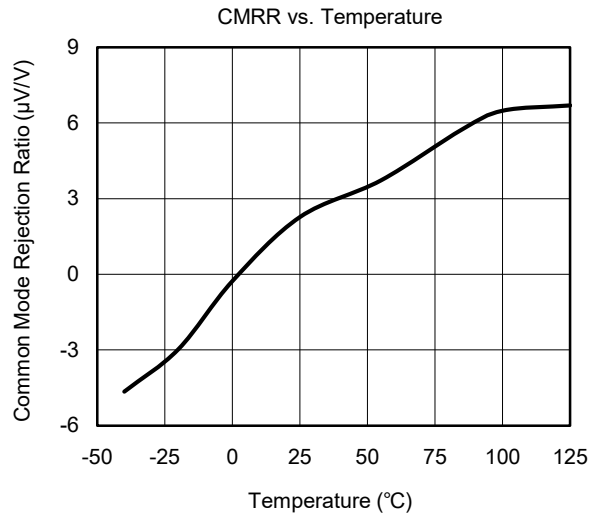
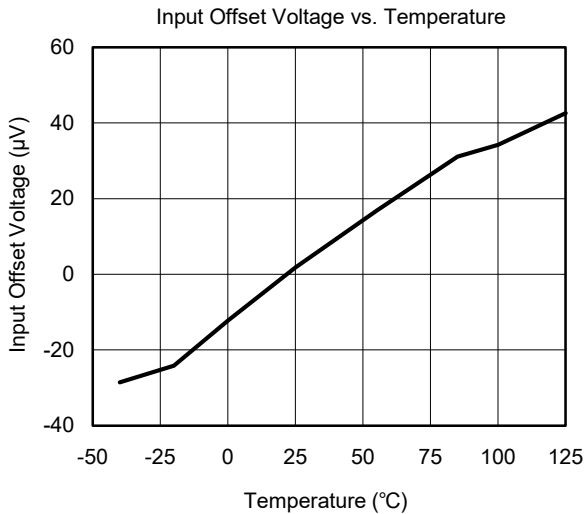
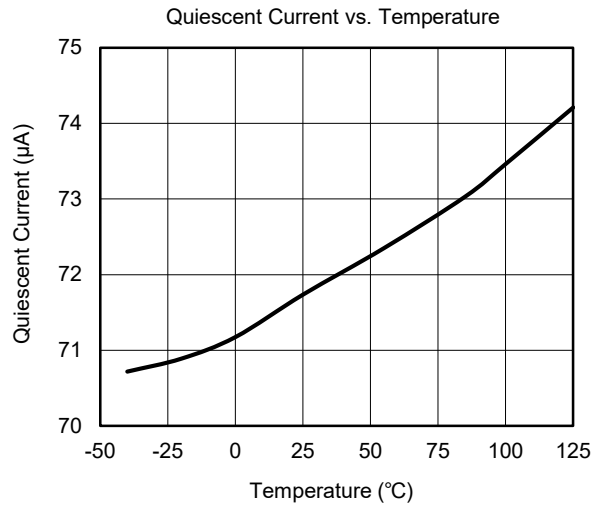
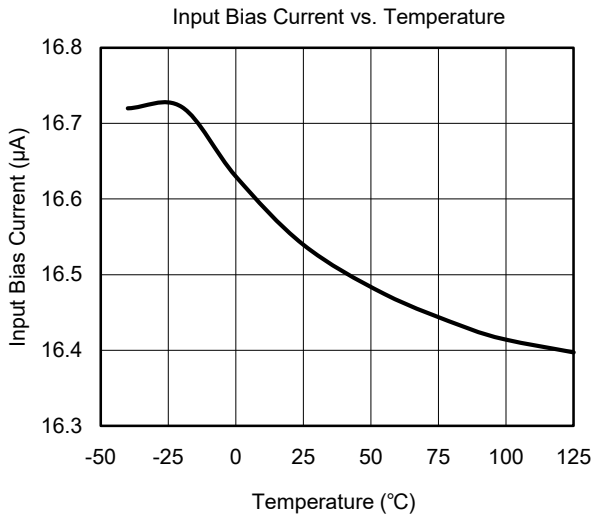
PARAMETER	CONDITIONS	TEMP	MIN	TYP	MAX	UNITS
<b>Input Characteristics</b>						
Input Offset Voltage, RTI <sup>(1)</sup> ( $V_{OS}$ )	$V_{CM} = -0.1\text{V}$ to $2\text{V}$ , $V_{SENSE} = 0\text{mV}$	+25°C		100	450	μV
	$V_{CM} = 2\text{V}$ to $26\text{V}$ , $V_{SENSE} = 0\text{mV}$			100	350	
Input Offset Voltage Drift ( $\Delta V_{OS}/\Delta T$ )		Full		1.5		μV/°C
Input Bias Current ( $I_b$ )	$V_{SENSE} = 0\text{mV}$	+25°C		16		μA
Input Offset Current ( $I_{OS}$ )	$V_{SENSE} = 0\text{mV}$	+25°C		100		nA
Input Common Mode Voltage Range ( $V_{CM}$ )		Full	-0.1		26	V
Common Mode Rejection Ratio (CMRR)	$V_{CM} = -0.1\text{V}$ to $26\text{V}$ , $V_{SENSE} = 0\text{mV}$	Full	89	108		dB
	$V_{CM} = 2\text{V}$ to $26\text{V}$ , $V_{SENSE} = 0\text{mV}$		90	106		
<b>Output Characteristics</b>						
Gain (G)		+25°C		100		V/V
Gain Error	$V_{SENSE} = -5\text{mV}$ to $5\text{mV}$	Full		0.05	0.4	%
Gain Temperature Coefficient		Full		15		ppm/°C
Nonlinearity Error	$V_{SENSE} = -5\text{mV}$ to $5\text{mV}$	+25°C		0.01		%
Maximum Capacitive Load	No sustained oscillation	+25°C		1		nF
Output Voltage Swing from Rail	$V_{OH}$ $V_{OL}$ $V_{CC} = 26\text{V}$ , $R_L = 10\text{k}\Omega$ to $V_{CC}/2$	+25°C		140	300	mV
				90	200	
<b>Frequency Response</b>						
-3dB Bandwidth	$V_{CC} = 5\text{V}$ , $R_L = 10\text{k}\Omega$ , $C_L = 10\text{pF}$	+25°C		20		kHz
Slew Rate (SR)	$f = 1\text{kHz}$ , $R_L = 10\text{k}\Omega$ , $V_{OUT} = 1V_{P-P}$	+25°C		0.04		V/μs
	$f = 1\text{kHz}$ , $R_L = 10\text{k}\Omega$ , $V_{OUT} = 2V_{P-P}$			0.09		
<b>Noise, RTI</b>						
Voltage Noise Density ( $e_n$ )	$f = 1\text{kHz}$	+25°C		50		nV/√Hz
<b>Power Supply</b>						
Operating Voltage Range ( $V_{CC}$ )		Full	2.7		26	V
Quiescent Current ( $I_Q$ )	$V_{CC} = 26\text{V}$ , $V_{SENSE} = 0\text{mV}$	+25°C		85	120	μA
		Full			130	
Power Supply Rejection Ratio (PSRR)	$V_{CC} = 2.7\text{V}$ to $26\text{V}$ , $V_{SENSE} = 0\text{mV}$	+25°C		110		dB

NOTE: 1. RTI = Referred-to-input.

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## TYPICAL PERFORMANCE CHARACTERISTICS

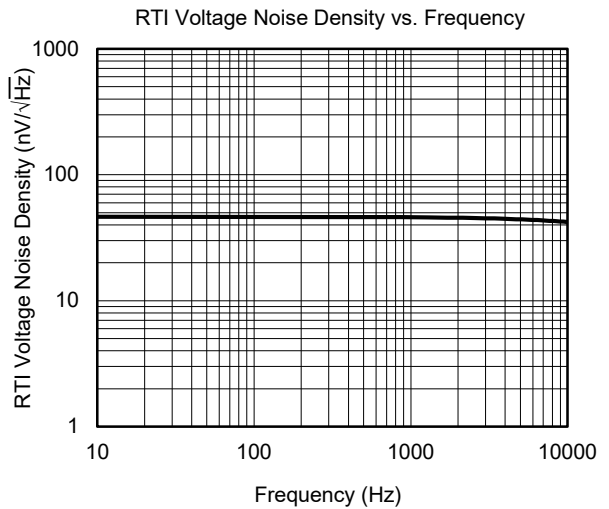
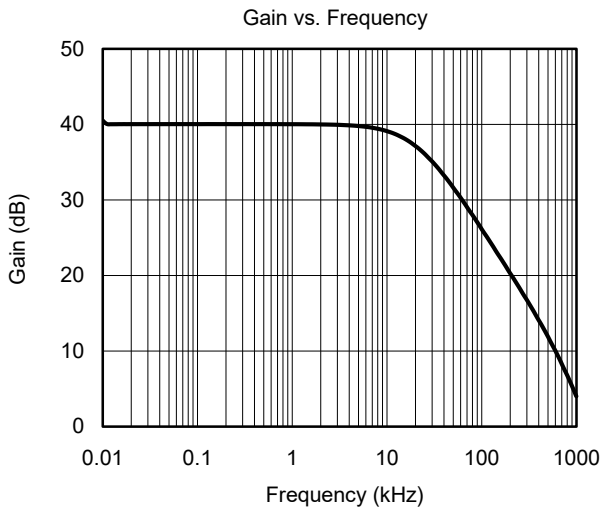
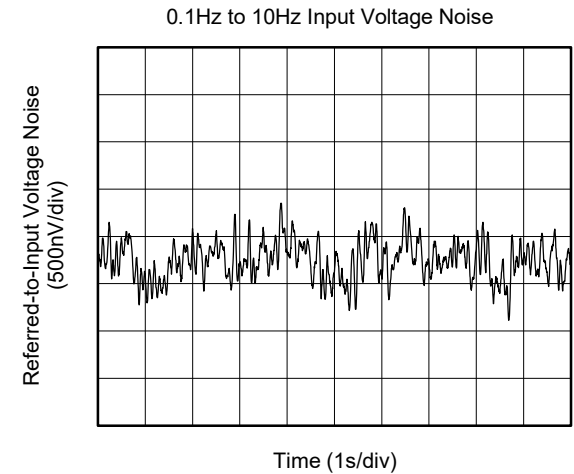
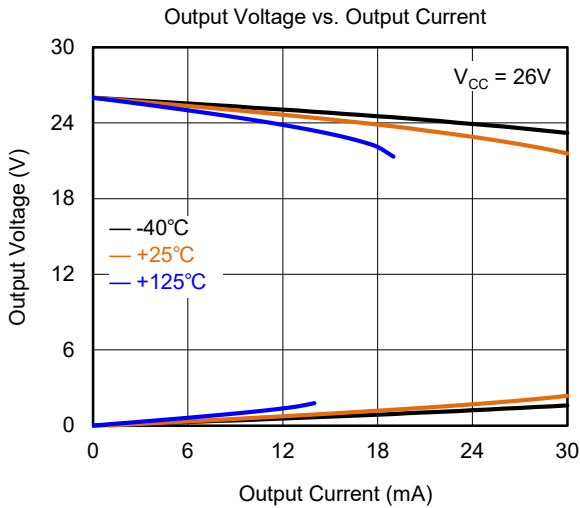
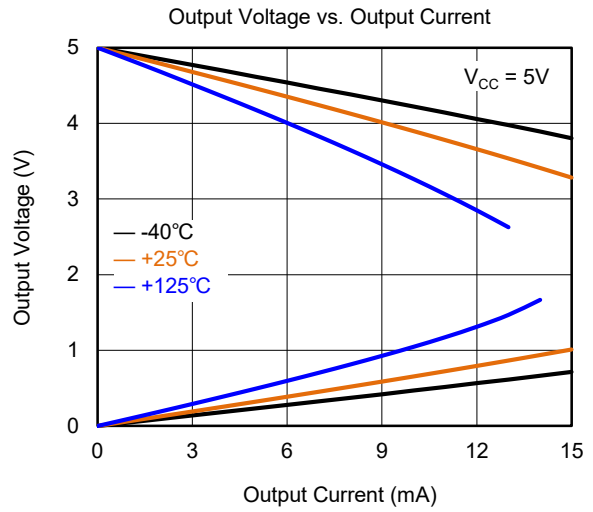
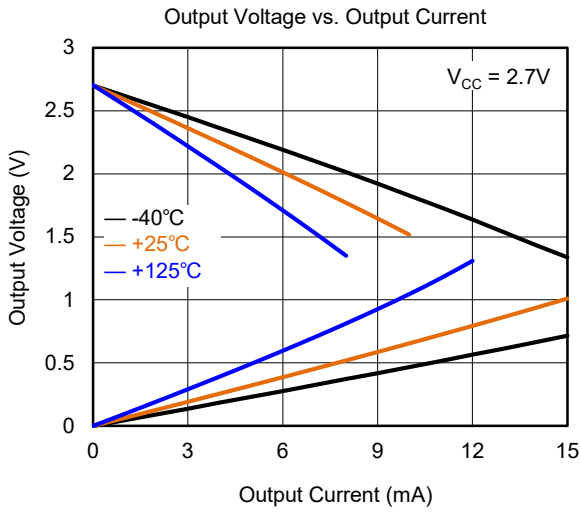
At  $T_A = +25^\circ\text{C}$ ,  $V_{CC} = 5\text{V}$ ,  $\text{GND} = 0\text{V}$ ,  $V_{IN+} = 12\text{V}$ ,  $V_{SENSE} = V_{IN+} - V_{IN-}$  and  $V_{REF} = V_{CC}/2$ , unless otherwise noted.



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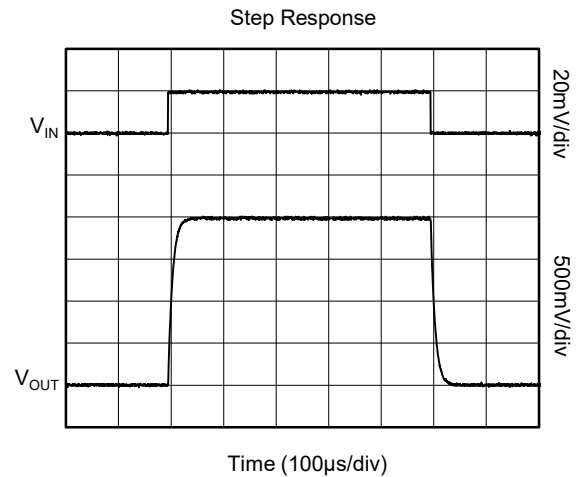
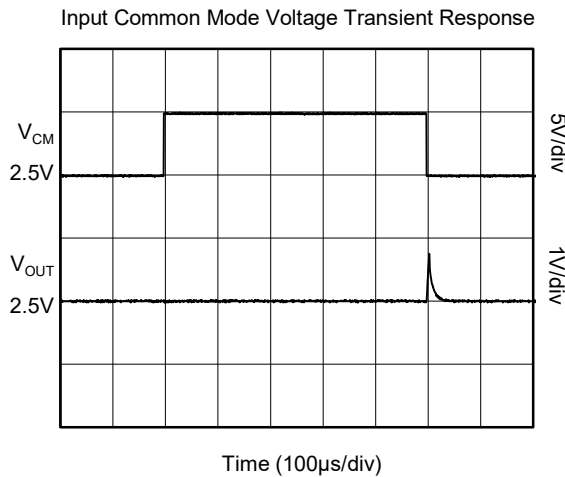
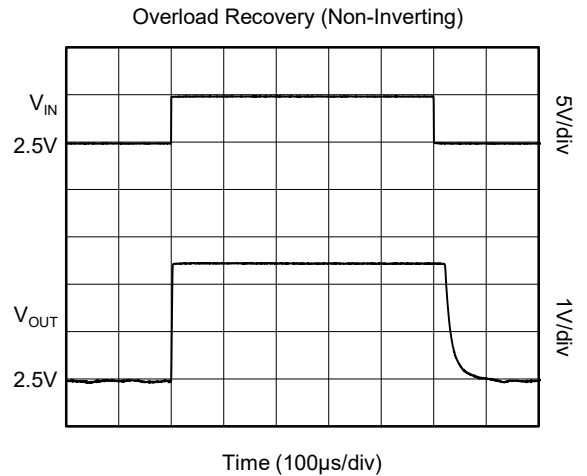
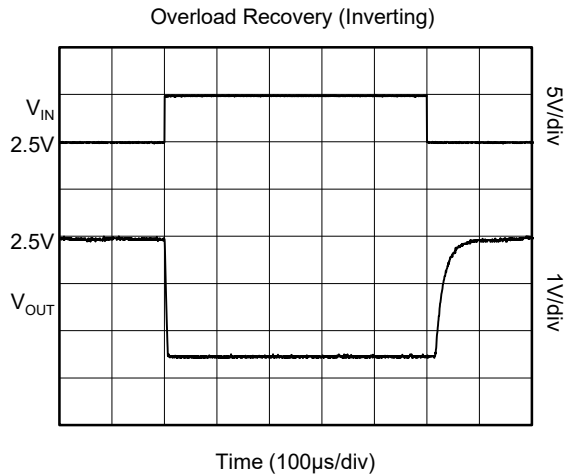
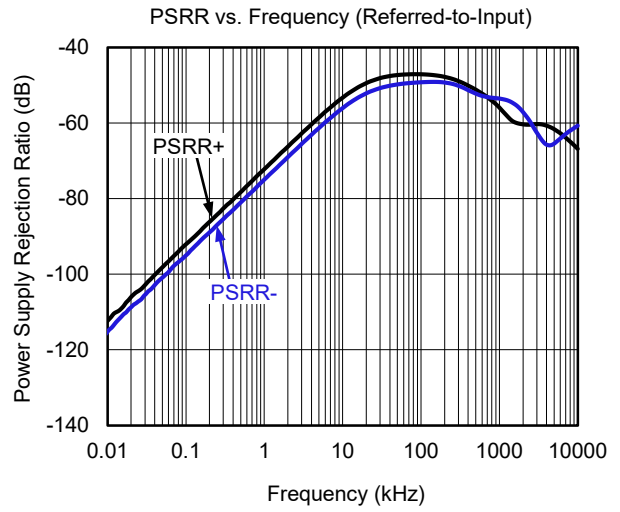
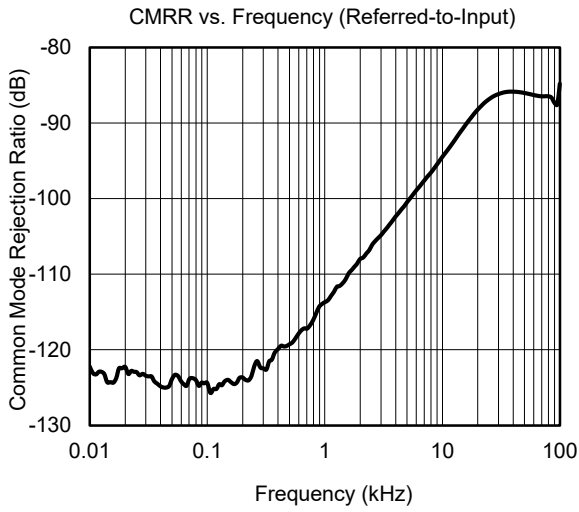
## TYPICAL PERFORMANCE CHARACTERISTICS (continued)

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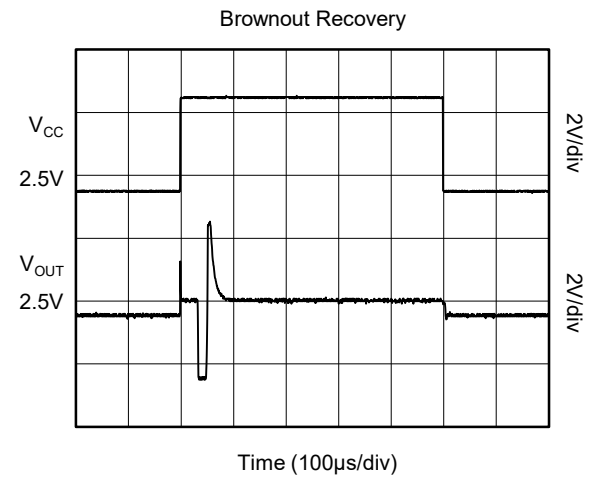
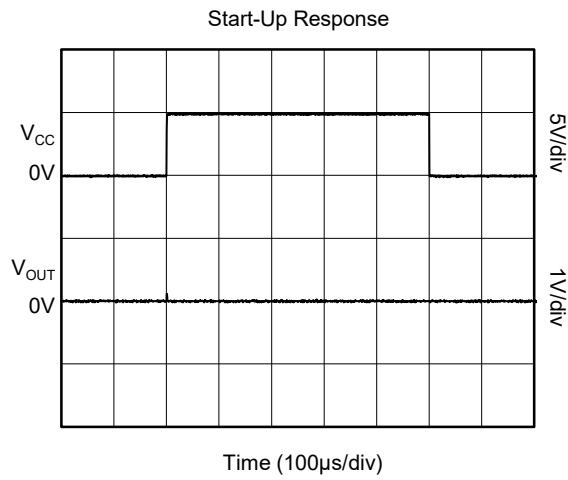
**TYPICAL PERFORMANCE CHARACTERISTICS (continued)**

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**TYPICAL PERFORMANCE CHARACTERISTICS (continued)**

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## REVISION HISTORY

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

OCTOBER 2020 – REV.A to REV.A.1	Page
Updated Typical Performance Characteristics section .....	6, 7

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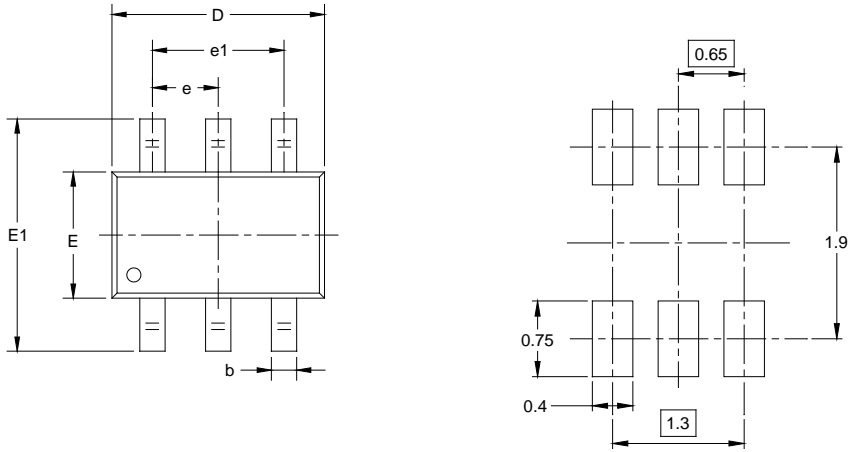
Changes from Original (AUGUST 2019) to REV.A	Page
Changed from product preview to production data.....	All

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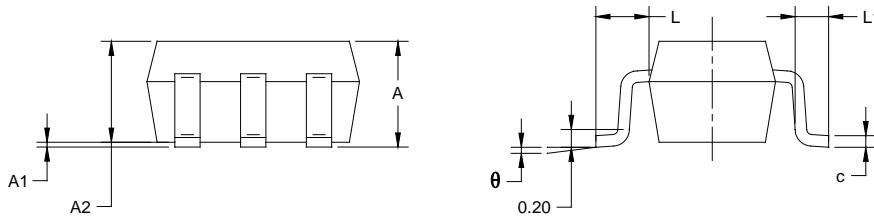


PACKAGE OUTLINE DIMENSIONS

SC70-6



RECOMMENDED LAND PATTERN (Unit: mm)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.800	1.100	0.031	0.043
A1	0.000	0.100	0.000	0.004
A2	0.800	1.000	0.031	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.220	0.003	0.009
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.65 TYP		0.026 TYP	
e1	1.300 BSC		0.051 BSC	
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

# 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
SC70-6	7"	9.5	2.40	2.50	1.20	4.0	4.0	2.0	8.0	Q3

000001

# 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