

GENERAL DESCRIPTION

The SGM431x is a precision programmable shunt voltage reference that can be used in many applications. It is a three-terminal adjustable-output device that can keep stable under all capacitive loads. It requires two external capacitors in application to set the output voltage is to any value between V_{REF} and 36V. All versions have a maximum operating current of 100mA.

The SGM431x features low dynamic impedance, low noise, and low temperature coefficient to ensure a stable output voltage over a wide range of operating temperatures and currents. The high performances make it very suitable for multiple applications, such as precision audio components and flyback switching power supplies.

The SGM431 is available in Green SOIC-8, SOT-23, SOT-89-3, SOT-23-5 and SC70-6 packages. The SGM431B is available in Green SOIC-8, SOT-23, SOT-89-3 and SOT-23-5 packages.

FEATURES

- **Adjustable Output Voltage:** V_{REF} to 36V
- **Sink-Current Capability:** 1mA to 100mA
- **Reference Voltage Tolerance at +25°C:**
 - ◆ SGM431: 1% (Standard Grade)
 - ◆ SGM431B: 0.5% (B Grade)
- **Output Impedance:** 0.1Ω (TYP)
- **Temperature Drift:** 5mV (TYP)
- **High Stability under Capacitive Load**
- **Low Output Noise**
- **-40°C to +125°C Operating Temperature Range**
- **SGM431 is available in Green SOIC-8, SOT-23, SOT-89-3, SOT-23-5 and SC70-6 Packages**
- **SGM431B is available in Green SOIC-8, SOT-23, SOT-89-3 and SOT-23-5 Packages**

APPLICATIONS

- Portable, Battery-Powered Equipment
- Voltage Monitoring
- Flyback Switching Power Supplies
- Instrumentation
- Product Testing
- Precision Audio Components

TYPICAL APPLICATION

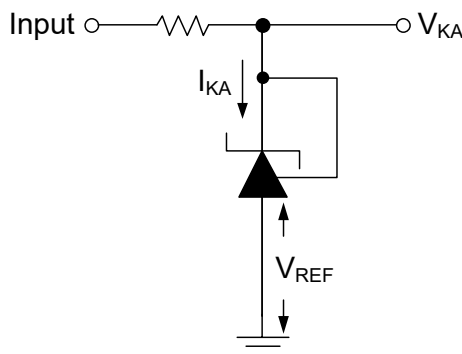


Figure 1. Typical Application Circuit

PACKAGE/ORDERING INFORMATION

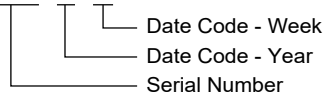
MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM431	SOIC-8	-40°C to +125°C	SGM431XS8G/TR	SGM 431XS8 XXXXX	Tape and Reel, 4000
	SOT-23	-40°C to +125°C	SGM431XN3LG/TR	MPCXX	Tape and Reel, 3000
	SOT-23-5	-40°C to +125°C	SGM431XN5G/TR	MPBXX	Tape and Reel, 3000
	SOT-89-3	-40°C to +125°C	SGM431XK3G/TR	SGM431X XXXXX	Tape and Reel, 1000
	SC70-6	-40°C to +125°C	SGM431XC6G/TR	CJEXX	Tape and Reel, 3000
SGM431B	SOIC-8	-40°C to +125°C	SGM431BXS8G/TR	SGM 431BXS8 XXXXX	Tape and Reel, 4000
	SOT-23	-40°C to +125°C	SGM431BXN3LG/TR	CY6XX	Tape and Reel, 3000
	SOT-23-5	-40°C to +125°C	SGM431BXN5G/TR	CY7XX	Tape and Reel, 3000
	SOT-89-3	-40°C to +125°C	SGM431BXK3G/TR	SGM431BX XXXXX	Tape and Reel, 1000

MARKING INFORMATION

NOTE: XX = Date Code, XXXXX = Date Code, Trace Code and Vendor Code.

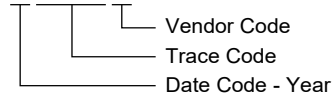
SOT-23/SOT-23-5/SC70-6

YYY X X



SOIC-8/SOT-89-3

XXXXX



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

Cathode Voltage ⁽¹⁾ , V _{KA}	40V
Package Thermal Resistance	
SOIC-8, θ_{JA}	126°C/W
SOT-23, θ_{JA}	245°C/W
SOT-23-5, θ_{JA}	210°C/W
SOT-89-3, θ_{JA}	71°C/W
SC70-6, θ_{JA}	210°C/W
Junction Temperature	+150°C
Storage Temperature Range.....	-65°C to +150°C
Lead Temperature (Soldering, 10s)	+260°C
ESD Susceptibility	
HBM.....	4000V
CDM	1000V

RECOMMENDED OPERATING CONDITIONS

Cathode Voltage, V _{KA}	V _{REF} to 36V
Cathode Current, I _{KA}	1mA to 100mA
Operating Junction Temperature Range	-40°C to +125°C

NOTE:

1. All voltage values are with respect to ANODE, unless otherwise noted.

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.

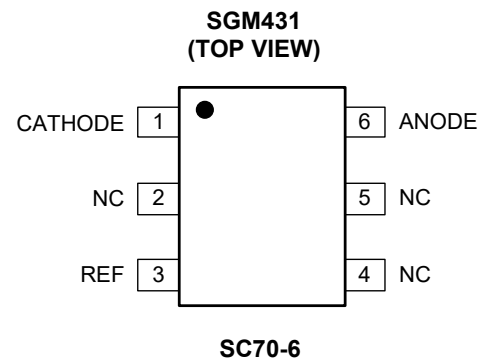
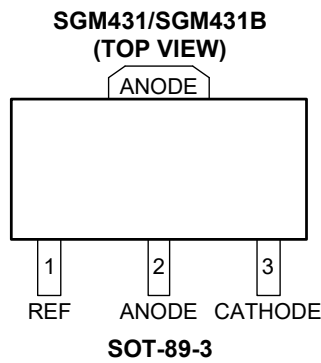
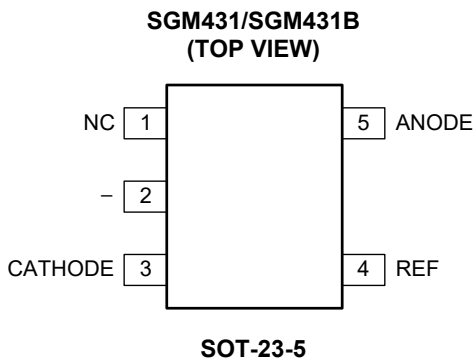
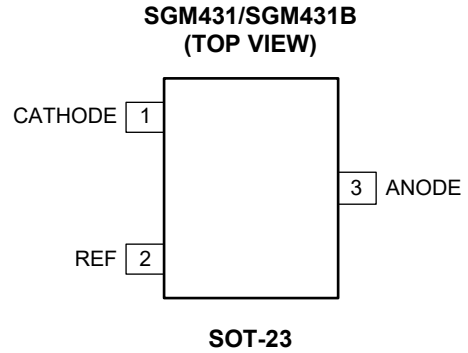
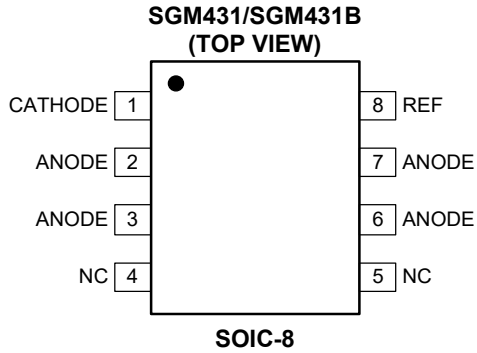
ESD SENSITIVITY CAUTION

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	TYPE	DESCRIPTION
SOIC-8	SOT-23	SOT-23-5	SOT-89-3	SC70-6			
1	1	3	3	1	CATHODE	I/O	Cathode Pin. Shunt Current/Voltage Input.
2, 3, 6, 7	3	5	2	6	ANODE	O	Anode Pin. Connect to ground normally.
4, 5	-	1	-	2, 4, 5	NC	-	Not Connected.
8	2	4	1	3	REF	I	REF Input Pin. Threshold Relative to Common Anode.
-	-	2	-	-	-	-	Pin 2. Attach pin 2 to the substrate, and it must be connected to the Anode pin or left open.

NOTES: I: input, O: output, I/O: input or output.

ELECTRICAL CHARACTERISTICS

(Over recommended operating conditions, T_J = +25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
SGM431						
Reference Voltage	V _{REF}	V _{KA} = V _{REF} , I _{KA} = 10mA	2.475	2.500	2.525	V
Deviation of Reference Input Voltage over Full Temperature Range ⁽¹⁾	V _{I(DEV)}	V _{KA} = V _{REF} , I _{KA} = 10mA		5	25	mV
Ratio of Change in Reference Voltage to the Change in Cathode Voltage	ΔV _{REF} /ΔV _{KA}	I _{KA} = 10mA	ΔV _{KA} = 10V - V _{REF}	-0.5	-1.0	mV/V
			ΔV _{KA} = 36V - 10V	0.1	0.5	
Reference Input Current	I _{REF}	I _{KA} = 10mA, R ₁ = 10kΩ, R ₂ = ∞		1	2	μA
Deviation of Reference Input Current over Full Temperature Range ⁽¹⁾	I _{I(DEV)}	I _{KA} = 10mA, R ₁ = 10kΩ, R ₂ = ∞		0.4	0.8	μA
Minimum Cathode Current for Regulation	I _{MIN}	V _{KA} = V _{REF}		0.4	0.7	mA
Off-State Cathode Current	I _{OFF}	V _{KA} = 36V, V _{REF} = 0		0.1	1	μA
Dynamic Impedance ⁽²⁾	Z _{KA}	V _{KA} = V _{REF} , f ≤ 1kHz, I _{KA} = 1mA to 100mA		0.1	0.5	Ω
SGM431B						
Reference Voltage	V _{REF}	V _{KA} = V _{REF} , I _{KA} = 10mA	2.488	2.500	2.512	V
Deviation of Reference Input Voltage over Full Temperature Range ⁽¹⁾	V _{I(DEV)}	V _{KA} = V _{REF} , I _{KA} = 10mA		5	25	mV
Ratio of Change in Reference Voltage to the Change in Cathode Voltage	ΔV _{REF} /ΔV _{KA}	I _{KA} = 10mA	ΔV _{KA} = 10V - V _{REF}	-0.5	-1.0	mV/V
			ΔV _{KA} = 36V - 10V	0.1	0.5	
Reference Input Current	I _{REF}	I _{KA} = 10mA, R ₁ = 10kΩ, R ₂ = ∞		1	2	μA
Deviation of Reference Input Current over Full Temperature Range ⁽¹⁾	I _{I(DEV)}	I _{KA} = 10mA, R ₁ = 10kΩ, R ₂ = ∞		0.4	0.8	μA
Minimum Cathode Current for Regulation	I _{MIN}	V _{KA} = V _{REF}		0.4	0.7	mA
Off-State Cathode Current	I _{OFF}	V _{KA} = 36V, V _{REF} = 0		0.1	1	μA
Dynamic Impedance ⁽²⁾	Z _{KA}	V _{KA} = V _{REF} , f ≤ 1kHz, I _{KA} = 1mA to 100mA		0.1	0.5	Ω

NOTES:

1. V_{I(DEV)} and I_{I(DEV)} refer to the difference between the maximum value minus the minimum value obtained within the rated temperature range. α_{VREF} is defined as:

$$|\alpha_{VREF}| \left(\frac{\text{ppm}}{^{\circ}\text{C}} \right) = \left| \frac{\left(\frac{V_{I(DEV)}}{V_{REF \text{ at } 25^{\circ}\text{C}}} \right) \times 10^6}{\Delta T_J} \right|$$

where,

ΔT_J is the rated operating junction temperature range of the device.

α_{VREF} is the average full-range temperature coefficient of the reference input voltage.

2. |Z_{KA}| = ΔV_{KA} / ΔI_{KA}, when the device is operating with two external resistors, the total dynamic impedance of the circuit is equal to:

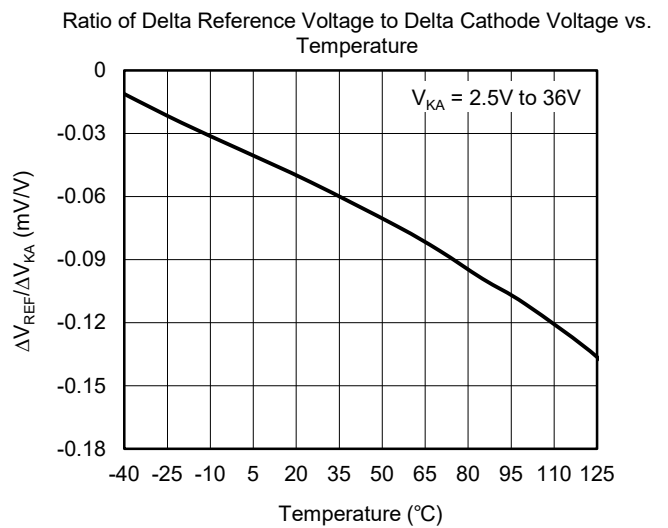
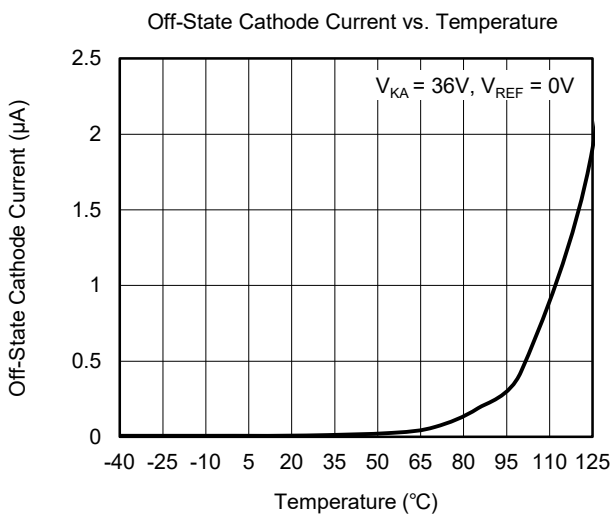
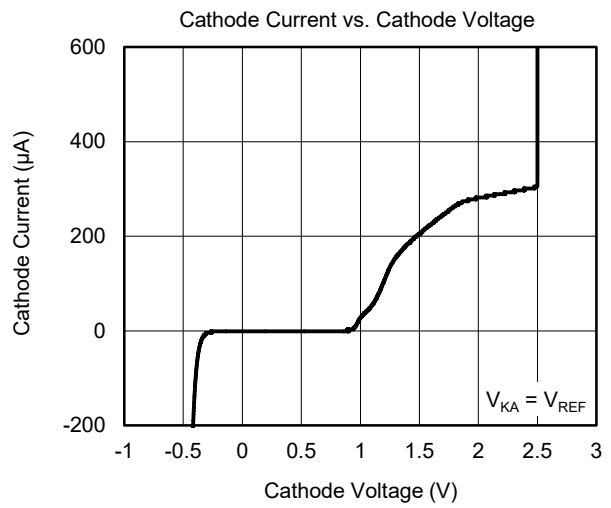
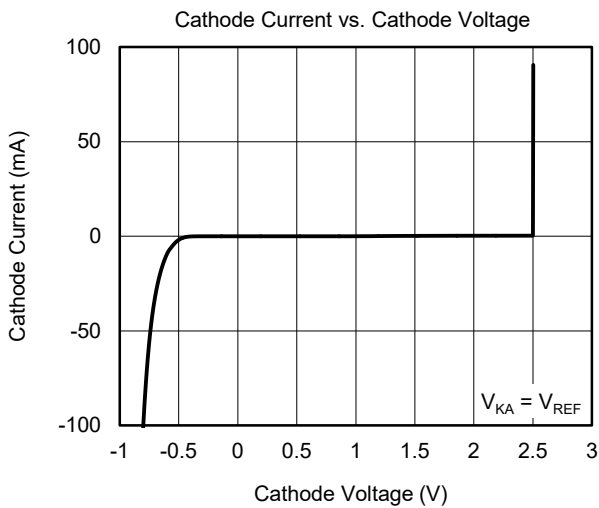
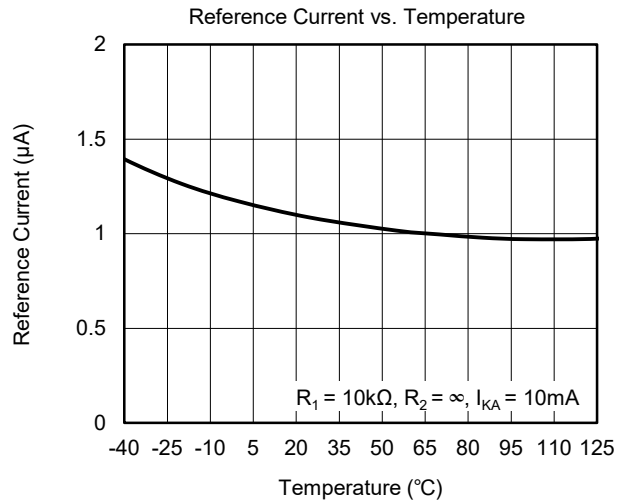
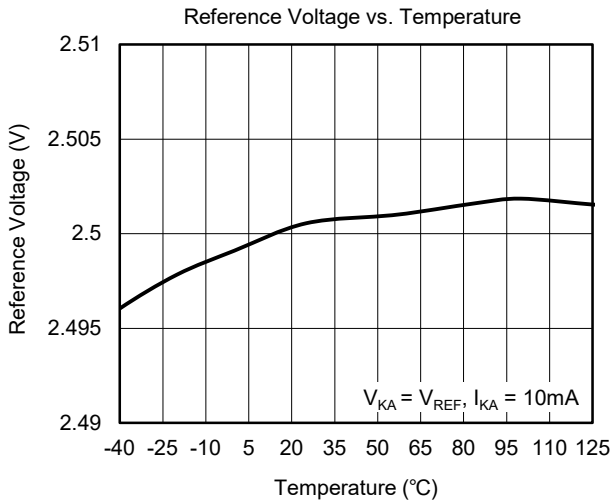
$$|Z'| = \frac{\Delta V}{\Delta I}$$

which is approximately equal to

$$|Z_{KA}| \left(1 + \frac{R_1}{R_2} \right)$$

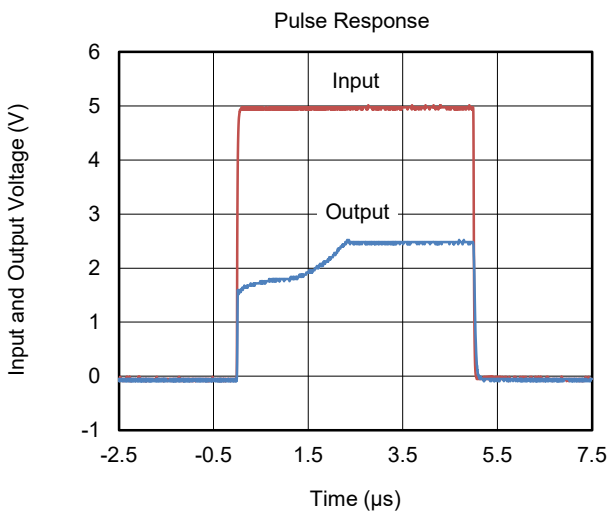
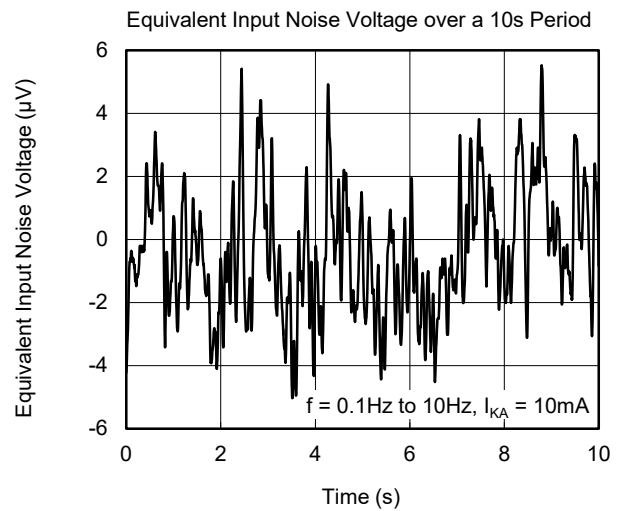
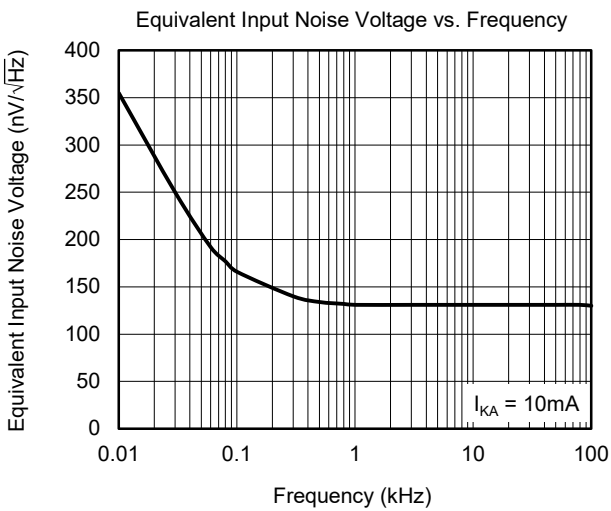
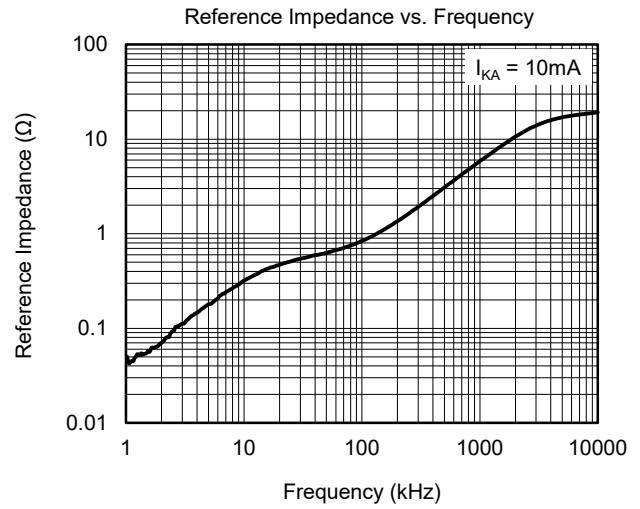
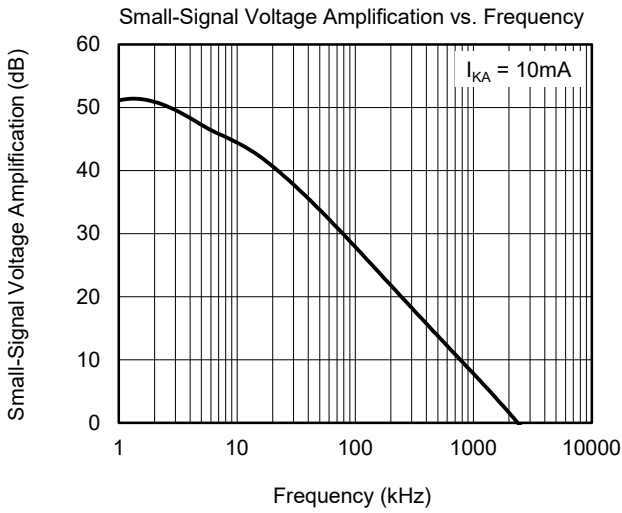
TYPICAL PERFORMANCE CHARACTERISTICS

T_J = +25°C, unless otherwise noted.



TYPICAL PERFORMANCE CHARACTERISTICS (continued)

T_J = +25°C, unless otherwise noted.



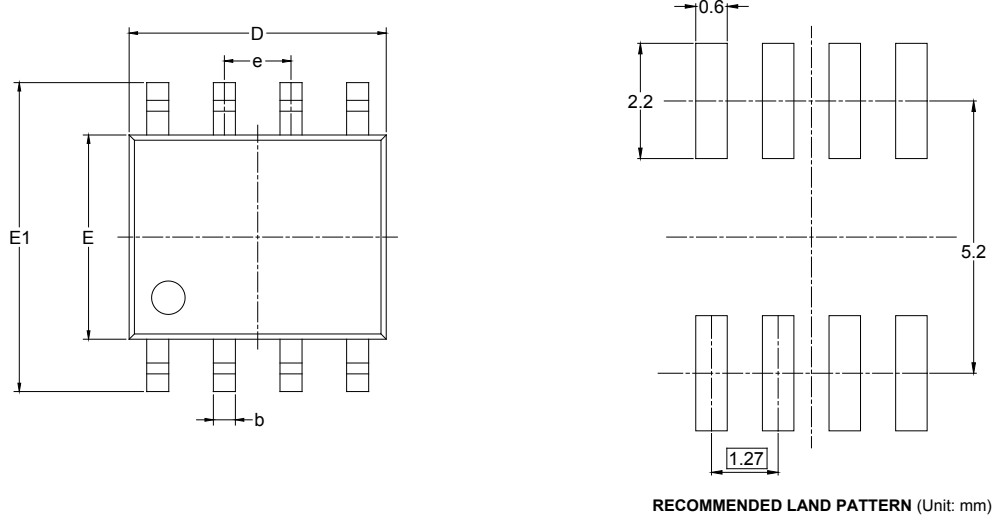
REVISION HISTORY

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

SEPTEMBER 2020 – REV.A.2 to REV.A.3	Page
Updated Application Information section.....	11
AUGUST 2020 – REV.A.1 to REV.A.2	Page
Added Figure 6. Test Circuits for Stability Boundary Conditions.....	9
Updated Application Information section.....	12
JUNE 2020 – REV.A to REV.A.1	Page
Updated Electrical Characteristics section.....	5
Changes from Original (MAY 2020) to REV.A	Page
Changed from product preview to production data.....	All

PACKAGE OUTLINE DIMENSIONS

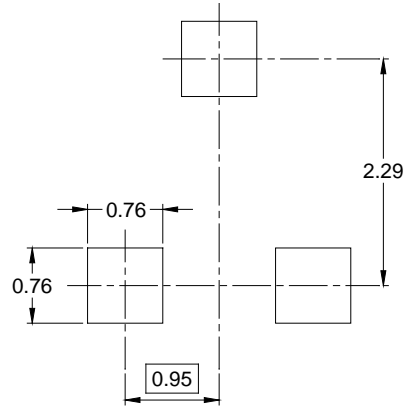
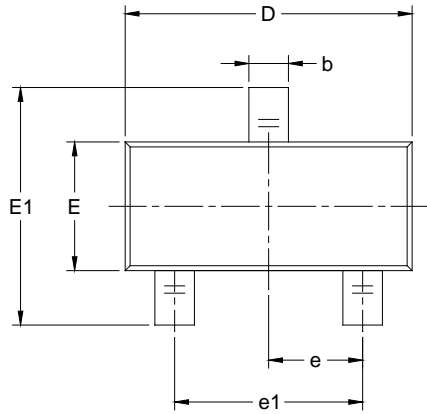
SOIC-8



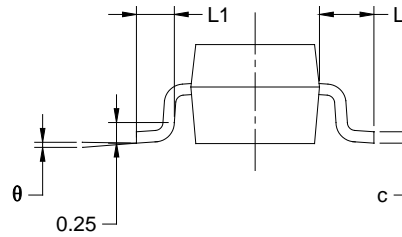
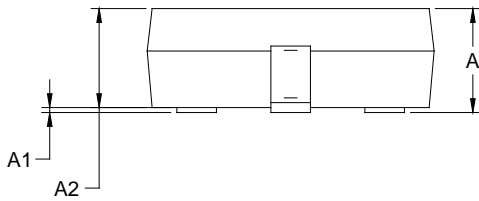
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.27 BSC		0.050 BSC	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

PACKAGE OUTLINE DIMENSIONS

SOT-23



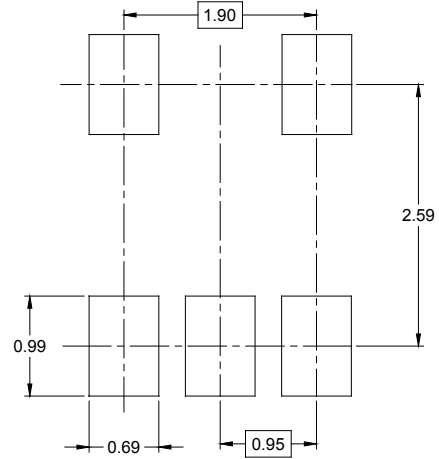
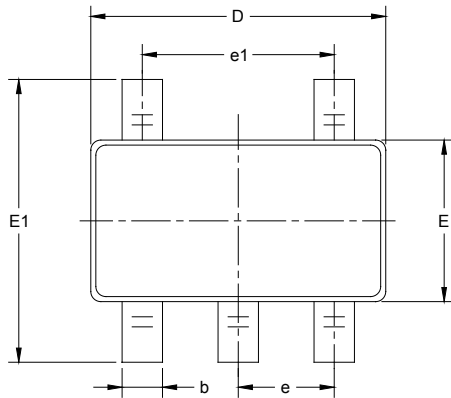
RECOMMENDED LAND PATTERN (Unit: mm)



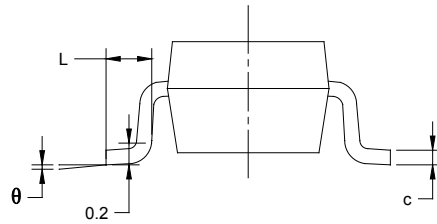
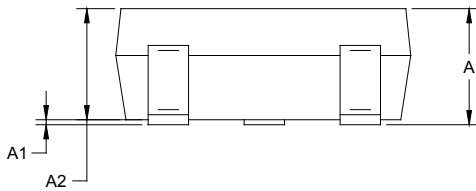
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.89	1.12	0.035	0.044
A1	0.01	0.10	0.000	0.004
A2	0.88	1.02	0.035	0.040
b	0.30	0.50	0.012	0.020
c	0.08	0.20	0.003	0.008
D	2.80	3.04	0.110	0.120
E	1.20	1.40	0.047	0.055
E1	2.10	2.64	0.083	0.104
e	0.95 BSC		0.037 BSC	
e1	1.90 BSC		0.075 BSC	
L	0.54 REF		0.021 REF	
L1	0.40	0.60	0.016	0.024
θ	0°	8°	0°	8°

PACKAGE OUTLINE DIMENSIONS

SOT-23-5



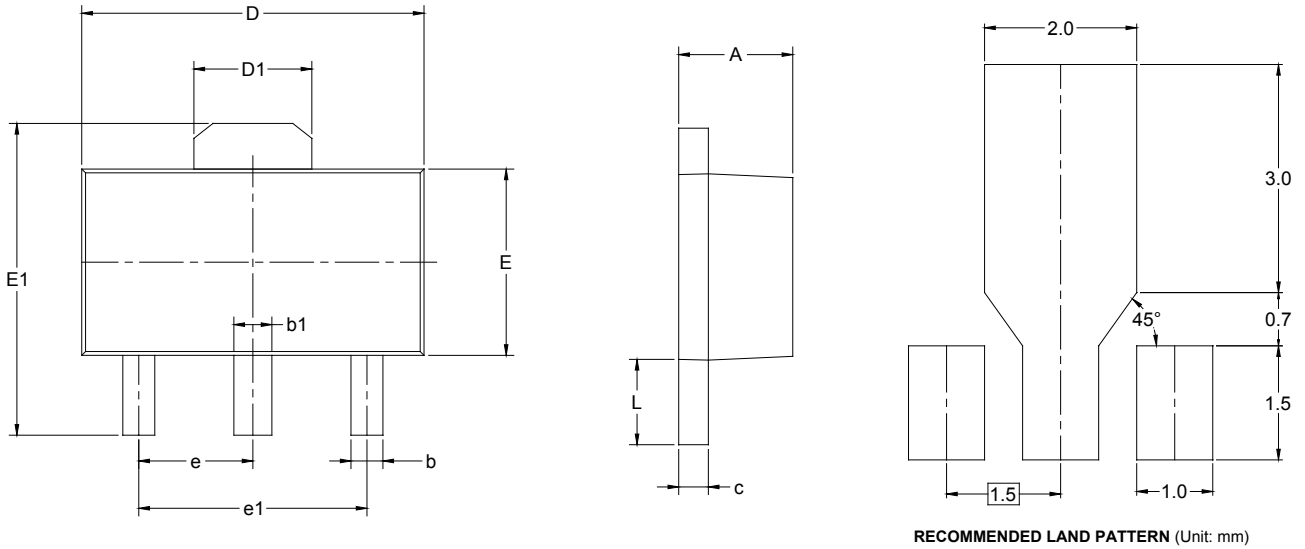
RECOMMENDED LAND PATTERN (Unit: mm)



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
θ	0°	8°	0°	8°

PACKAGE OUTLINE DIMENSIONS

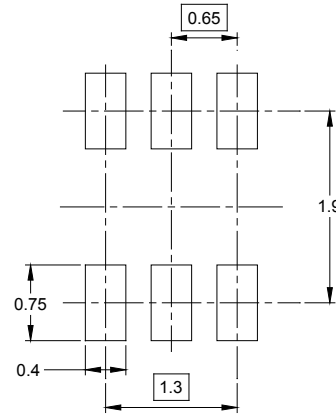
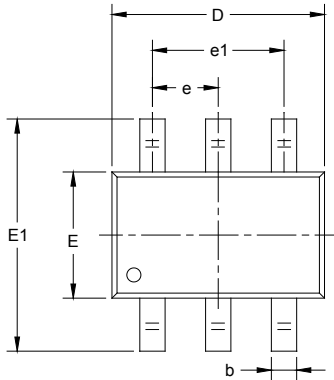
SOT-89-3



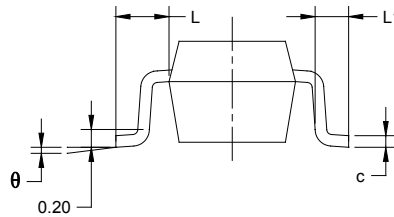
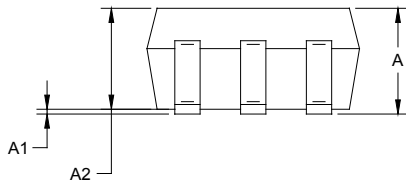
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF		0.061 REF	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP		0.060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

PACKAGE OUTLINE DIMENSIONS

SC70-6



RECOMMENDED LAND PATTERN (Unit: mm)

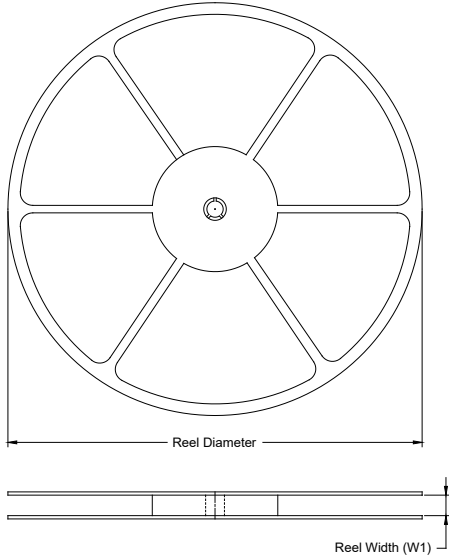


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.65 TYP		0.026 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°

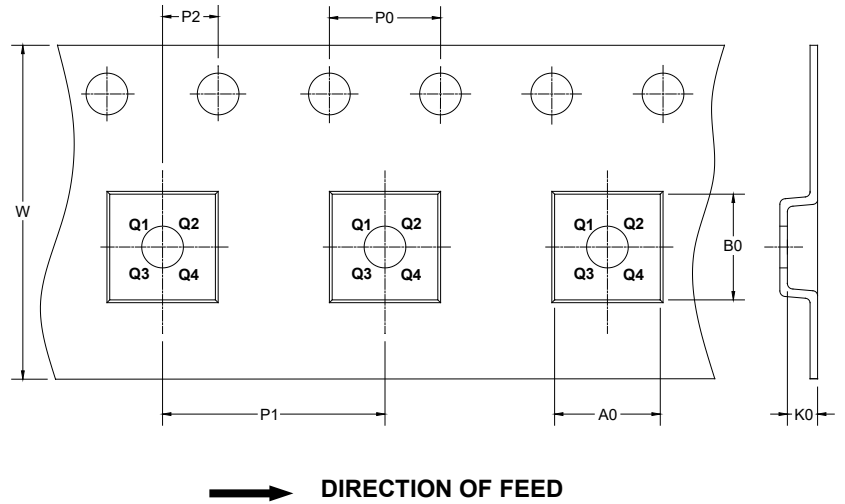
PACKAGE INFORMATION

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
SOIC-8	13"	12.4	6.40	5.40	2.10	4.0	8.0	2.0	12.0	Q1
SOT-23	7"	9.5	3.15	2.77	1.22	4.0	4.0	2.0	8.0	Q3
SOT-23-5	7"	9.5	3.20	3.20	1.40	4.0	4.0	2.0	8.0	Q3
SOT-89-3	7"	13.2	4.85	4.45	1.85	4.0	8.0	2.0	12.0	Q3
SC70-6	7"	9.5	2.40	2.50	1.20	4.0	4.0	2.0	8.0	Q3

D20001

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
13"	386	280	370	5

DD0002

单击下面可查看定价，库存，交付和生命周期等信息

[>>SGMICRO\(圣邦微电子\)](#)