SGM8271/SGM8272/SGM8274
High Voltage Rail-to-Rail
Output Operational Amplifiers

GENERAL DESCRIPTION

The SGM8271 (single), SGM8272 (dual) and SGM8274 (quad) are high voltage operational amplifiers that are designed to offer a wide input common mode voltage range and output voltage swing. These devices can operate from ±2.25V to ±18V dual power supplies or from 4.5V to 36V single supply.

The devices feature high slew rate, low input bias and offset current, low offset voltage and low offset-voltage temperature coefficient.

The SGM8271/2/4 are specified over the extended -40℃ to +125℃ temperature range. The SGM8271 single is available in Green SOT-23-5, MSOP-8 and SOIC-8 packages. The SGM8272 dual is available in Green SOIC-8 and MSOP-8 packages. The SGM8274 quad is available in Green SOIC-14 and TSSOP-14 packages.

FEATURES

- **Low Power Consumption: 150µA/Amplifier**
- **Wide Input Common Mode Voltage Range**
- **Low Input Bias and Offset Currents**
- **Output Short-Circuit Protection**
- **Rail-to-Rail Output**
- **High Input Impedance**
- **Low Offset Voltage: 3mV (MAX)**
- **High Slew Rate: 7V/µs**
- **Small Packaging:**
  SGM8271 Available in Green SOT-23-5, MSOP-8 and SOIC-8
  SGM8272 Available in Green MSOP-8 and SOIC-8
  SGM8274 Available in Green TSSOP-14 and SOIC-14

APPLICATIONS

High Impedance Sensor
Photodiode Amplifier
Precision Instrumentation
Phase-Locked Loop Filter
High End, Professional Audio
DAC Output Amplifier
ATE
Medical

PACKAGE/ORDERING INFORMATION

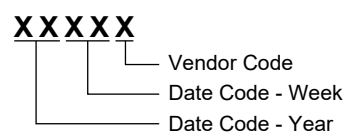| MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM8271	SOT-23-5	-40℃ to +85℃	SGM8271AYN5G/TR	SBDXX	Tape and Reel, 3000
	SOT-23-5	-40℃ to +85℃	SGM8271BYN5G/TR	SG5XX	Tape and Reel, 3000
	MSOP-8	-40℃ to +85℃	SGM8271YMS8G/TR	SGM8271 YMS8 XXXXX	Tape and Reel, 3000
	SOIC-8	-40℃ to +85℃	SGM8271YS8G/TR	SGM 8271YS8 XXXXX	Tape and Reel, 2500
	SOIC-8	-40℃ to +125℃	SGM8271XS8G/TR	SGM 8271XS8 XXXXX	Tape and Reel, 2500
SGM8272	MSOP-8	-40℃ to +85℃	SGM8272YMS8G/TR	SGM8272 YMS8 XXXXX	Tape and Reel, 3000
	SOIC-8	-40℃ to +85℃	SGM8272YS8G/TR	SGM 8272YS8 XXXXX	Tape and Reel, 2500
	SOIC-8	-40℃ to +125℃	SGM8272XS8G/TR	SGM 8272XS8 XXXXX	Tape and Reel, 2500
SGM8274	SOIC-14	-40℃ to +85℃	SGM8274YS14G/TR	SGM8274YS14 XXXXX	Tape and Reel, 2500
	SOIC-14	-40℃ to +125℃	SGM8274XS14G/TR	SGM8274XS14 XXXXX	Tape and Reel, 2500
	TSSOP-14	-40℃ to +85℃	SGM8274YTS14G/TR	SGM8274 YTS14 XXXXX	Tape and Reel, 3000

MARKING INFORMATION

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

SOT-23-5

YYY X X
         └── Date Code - Month
      └───── Date Code - Year
└────────── Serial Number
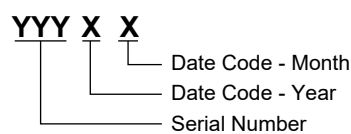
SOIC-8/MSOP-8/SOIC-14/TSSOP-14

X X X X X
          └── Vendor Code
       └───── 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

Supply Voltage, $+V_S$ to $-V_S$ 40V

Input Common Mode Voltage Range
.... ($-V_S$) - 0.1V to ($+V_S$) - 1.5V

Input/Output Voltage Range .... ($-V_S$) - 0.3V to ($+V_S$) + 0.3V

Differential Input Voltage.. 1.5V

Junction Temperature.. +150℃

Storage Temperature Range .... -65℃ to +150℃

Lead Temperature (Soldering, 10s) .... +260℃

ESD Susceptibility

HBM.. 4000V

MM (SGM8271/2) 150V

MM (SGM8274) 300V

RECOMMENDED OPERATING CONDITIONS

Operating Temperature Range .... -40℃ to +125℃

NOTE:

1. Proper power supply sequencing is recommended for the CMOS device. Always sequence V_S on first, followed by the inputs and outputs.

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.
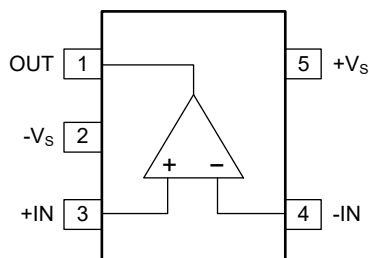
ESD SENSITIVITY CAUTION

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.
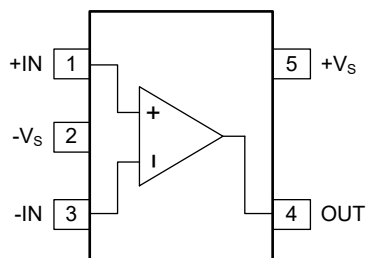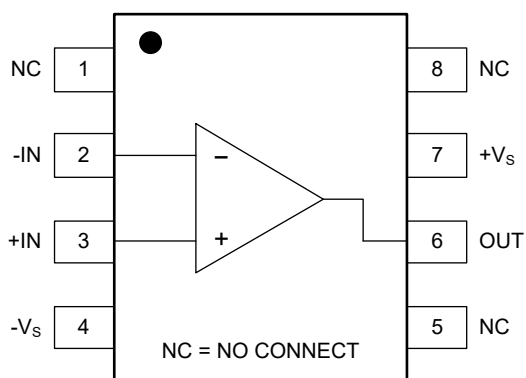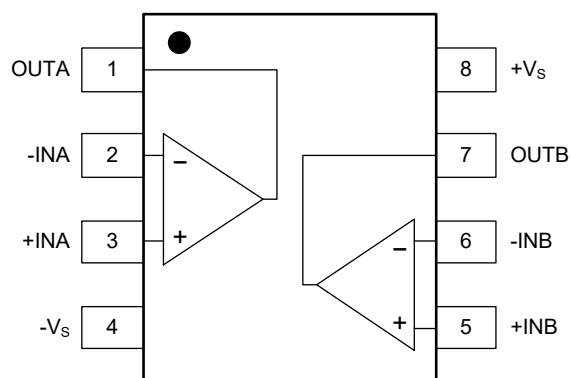
PIN CONFIGURATIONS

SGM8271AYN5G (TOP VIEW)

OUT	1	5	+V_S
-V_S	2		
+IN	3	4	-IN

SOT-23-5

SGM8271BYN5G (TOP VIEW)

+IN	1	5	+V_S
-V_S	2		
-IN	3	4	OUT

SOT-23-5

SGM8271 (TOP VIEW)

NC	1	8	NC
-IN	2	7	+V_S
+IN	3	6	OUT
-V_S	4	5	NC

NC = NO CONNECT

SOIC-8/MSOP-8

SGM8272 (TOP VIEW)

OUTA	1	8	+V_S
-INA	2	7	OUTB
+INA	3	6	-INB
-V_S	4	5	+INB

SOIC-8/MSOP-8

SGM8274 (TOP VIEW)

OUTA	1	14	OUTD
-INA	2	13	-IND
+INA	3	12	+IND
+V_S	4	11	-V_S
+INB	5	10	+INC
-INB	6	9	-INC
OUTB	7	8	OUTC
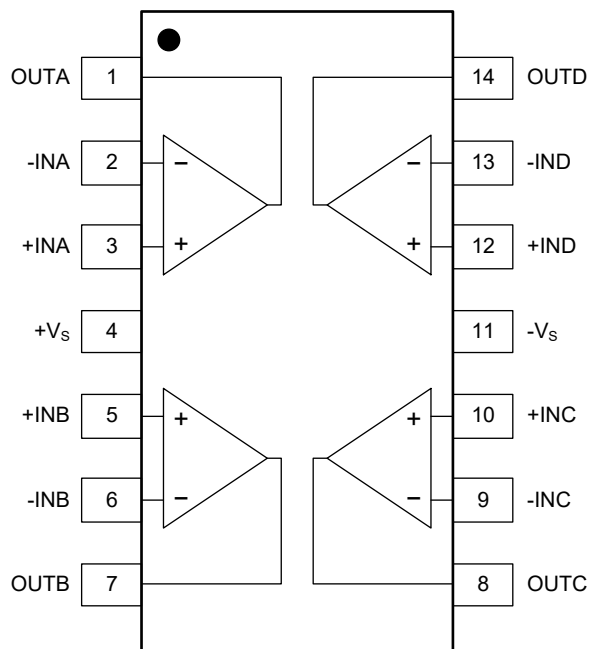
SOIC-14/TSSOP-14

ELECTRICAL CHARACTERISTICS

(V_S = 5V, R_L = 2kΩ connected to 2.5V, unless otherwise noted.)

PARAMETER		CONDITIONS	SGM8271/2/4					
			TYP	MIN/MAX OVER TEMPERATURE				
			+25℃	+25℃	-40℃ to +85℃	-40℃ to +125℃	UNITS	MIN/ MAX
Input Offset Voltage (V_{OS})		V_{CM} = 2.5V	0.6	3.0	3.8	3.9	mV	MAX
Input Offset Voltage Drift ($\Delta V_{OS}/\Delta T$)			3				µV/℃	TYP
Input Bias Current (I_B)			20				pA	TYP
Input Offset Current (I_{OS})			20				pA	TYP
Open-Loop Voltage Gain (A_{OL})		V_{OUT} = 0.5V to 4.5V, R_L = 5kΩ	86	75	72	70	dB	MIN
Output Voltage Swing from Rail	V_{OH}	R_L = 10kΩ	16	39	43	46	mV	MAX
	V_{OL}	R_L = 10kΩ	14	30	34	38	mV	MAX
Output Short-Circuit Current (I_{SC})	Sink	R_L = 10Ω	46.2	34.1	21.5	11.0	mA	MIN
	Source	R_L = 10Ω	44.4	30.5	20.7	12.3		
Input Common Mode Voltage Range (V_{CM})			-0.1 to 3.5				V	TYP
Common Mode Rejection Ratio (CMRR)		V_{CM} = -0.1V to 3.5V	84	67	62	60	dB	MIN
Power Supply Rejection Ratio (PSRR)		V_S = 4.5V to 36V	103	82	80	78	dB	MIN
Quiescent Current/Amplifier		I_{OUT} = 0A	144	275	309	329	µA	MAX
Gain-Bandwidth Product (GBP)		C_L = 100pF, V_{CM} = 2.5V	1.4				MHz	TYP
Gain Margin		C_L = 100pF, V_{CM} = 2.5V	-10				dB	TYP
Phase Margin		C_L = 100pF, V_{CM} = 2.5V	50				°	TYP
Channel-to-Channel Crosstalk		f = 1MHz	-80				dB	TYP
Slew Rate (SR)	Up	V_{OUT} = 2V_{P-P} step, C_L = 100pF, A_V = 1	5				V/µs	TYP
	Down	V_{OUT} = 2V_{P-P} step, C_L = 100pF, A_V = 1	5				V/µs	TYP
Overload Recovery Time (ORT)	Up	V_{IN} × G = V_S	2.0				µs	TYP
	Down	V_{IN} × G = V_S	4.0					
Settling Time (t_S)		C_L = 100pF, A_V = 1, 200mV output step	2				µs	TYP
Input Voltage Noise Density (e_n)		f = 20kHz, V_{CM} = 2.5V	30				nV/$\sqrt{Hz}$	TYP
		f = 1kHz, V_{CM} = 2.5V	45					
Total Harmonic Distortion + Noise (THD+N)		V_{OUT} = 2V_{P-P}, f = 1kHz, A_V = 1, R_L = 600Ω	0.018				%	TYP
		V_{OUT} = 2V_{P-P}, f = 1kHz, A_V = 1, R_L = 2kΩ	0.009					

ELECTRICAL CHARACTERISTICS (continued)

($V_S = \pm 5V$, $R_L = 2k\Omega$ connected to 0V, unless otherwise noted.)

PARAMETER		CONDITIONS	SGM8271/2/4					
			TYP	MIN/MAX OVER TEMPERATURE				
			+25℃	+25℃	-40℃ to +85℃	-40℃ to +125℃	UNITS	MIN/ MAX
Input Offset Voltage (V_{OS})		$V_{CM} = 0V$	0.6	3.0	3.8	3.9	mV	MAX
Input Offset Voltage Drift ($\Delta V_{OS}/\Delta T$)			3				µV/℃	TYP
Input Bias Current (I_B)			20				pA	TYP
Input Offset Current (I_{OS})			20				pA	TYP
Open-Loop Voltage Gain (A_{OL})		$V_{OUT} = -4.5V$ to 4.5V, $R_L = 5k\Omega$	93	81	78	76	dB	MIN
Output Voltage Swing from Rail	V_{OH}	$R_L = 10k\Omega$	28	67	73	79	mV	MAX
	V_{OL}	$R_L = 10k\Omega$	23	39	47	62	mV	MAX
Output Current (I_{OUT})			60				mA	TYP
Input Common Mode Voltage Range (V_{CM})			-5.1 to 3.5				V	TYP
Common Mode Rejection Ratio (CMRR)		$V_{CM} = -5.1V$ to 3.5V	92	75	68	66	dB	MIN
Quiescent Current/Amplifier		$I_{OUT} = 0A$	145	276	311	332	µA	MAX
Gain-Bandwidth Product (GBP)		$C_L = 100pF$, $V_{CM} = 0V$	1.4				MHz	TYP
Gain Margin		$C_L = 100pF$, $V_{CM} = 0V$	-10				dB	TYP
Phase Margin		$C_L = 100pF$, $V_{CM} = 0V$	50				°	TYP
Channel-to-Channel Crosstalk		f = 1MHz	-80				dB	TYP
Slew Rate (SR)	Up	$V_{OUT} = 2V_{P-P}$ step, $C_L = 100pF$, $A_V = 1$	6				V/µs	TYP
	Down	$V_{OUT} = 2V_{P-P}$ step, $C_L = 100pF$, $A_V = 1$	4				V/µs	TYP
Overload Recovery Time (ORT)	Up	$V_{IN} \times G = V_S$	1.5				µs	TYP
	Down	$V_{IN} \times G = V_S$	2.5					
Settling Time (t_S)		$C_L = 100pF$, $A_V = 1$, 200mV output step	2				µs	TYP
Input Voltage Noise Density (e_n)		f = 20kHz, $V_{CM} = 0V$	30				nV/$\sqrt{Hz}$	TYP
		f = 1kHz, $V_{CM} = 0V$	45					
Total Harmonic Distortion + Noise (THD+N)		$V_{OUT} = 2V_{P-P}$, f = 1kHz, $A_V = 1$, $R_L = 600\Omega$	0.018				%	TYP
		$V_{OUT} = 2V_{P-P}$, f = 1kHz, $A_V = 1$, $R_L = 2k\Omega$	0.009					

ELECTRICAL CHARACTERISTICS (continued)

($V_S = \pm15V$, $R_L = 2k\Omega$ connected to 0V, unless otherwise noted.)

PARAMETER		CONDITIONS	TYP	MIN/MAX OVER TEMPERATURE			UNITS	MIN/ MAX
			+25℃	+25℃	-40℃ to +85℃	-40℃ to +125℃		
Input Offset Voltage (V_{OS})		$V_{CM} = 0V$	0.6	3.0	3.8	3.9	mV	MAX
Input Offset Voltage Drift ($\Delta V_{OS}/\Delta T$)			3				μV/℃	TYP
Input Bias Current (I_B)			20				pA	TYP
Input Offset Current (I_{OS})			20				pA	TYP
Open-Loop Voltage Gain (A_{OL})		V_{OUT} = -14.5V to 14.5V, $R_L = 5k\Omega$	100	85	82	80	dB	MIN
Output Voltage Swing from Rail	V_{OH}	$R_L = 10k\Omega$	67	174	193	210	mV	MAX
	V_{OL}	$R_L = 10k\Omega$	63	102	124	148	mV	MAX
Output Current (I_{OUT})			60				mA	TYP
Input Common Mode Voltage Range (V_{CM})			-15.1 to 13.5				V	TYP
Common Mode Rejection Ratio (CMRR)		V_{CM} = -15.1V to 13.5V	95	79	71	66	dB	MIN
Quiescent Current/Amplifier		$I_{OUT} = 0A$	150	286	320	337	μA	MAX
Gain-Bandwidth Product (GBP)		$C_L = 100pF$, $V_{CM} = 0V$	1.4				MHz	TYP
Gain Margin		$C_L = 100pF$, $V_{CM} = 0V$	-10				dB	TYP
Phase Margin		$C_L = 100pF$, $V_{CM} = 0V$	50				°	TYP
Channel-to-Channel Crosstalk		f = 1MHz	-80				dB	TYP
Slew Rate (SR)	Up	V_{OUT} = 2V_{P-P} step, $C_L = 100pF$, $A_V = 1$	7				V/μs	TYP
	Down	V_{OUT} = 2V_{P-P} step, $C_L = 100pF$, $A_V = 1$	4				V/μs	TYP
Overload Recovery Time (ORT)	Up	$V_{IN} \times G = V_S$	0.5				μs	TYP
	Down	$V_{IN} \times G = V_S$	1.0					
Settling Time (t_S)		$C_L = 100pF$, $A_V = 1$, 200mV output step	2				μs	TYP
Input Voltage Noise Density (e_n)		f = 20kHz, $V_{CM} = 0V$	29				nV/$\sqrt{Hz}$	TYP
		f = 1kHz, $V_{CM} = 0V$	43					
Total Harmonic Distortion + Noise (THD+N)		V_{OUT} = 2V_{P-P}, f = 1kHz, $A_V = 1$, $R_L = 600\Omega$	0.018				%	TYP
		V_{OUT} = 2V_{P-P}, f = 1kHz, $A_V = 1$, $R_L = 2k\Omega$	0.009					

ELECTRICAL CHARACTERISTICS (continued)

(V_S = ±18V, R_L = 2kΩ connected to 0V, unless otherwise noted.)

PARAMETER		CONDITIONS	TYP	MIN/MAX OVER TEMPERATURE				
			+25℃	+25℃	-40℃ to +85℃	-40℃ to +125℃	UNITS	MIN/ MAX
Input Offset Voltage (V_{OS})		V_{CM} = 0V	0.6	3.0	3.8	3.9	mV	MAX
Input Offset Voltage Drift ($\Delta V_{OS}/\Delta T$)			3				µV/℃	TYP
Input Bias Current (I_B)			20				pA	TYP
Input Offset Current (I_{OS})			20				pA	TYP
Open-Loop Voltage Gain (A_{OL})		V_{OUT} = -17.5V to 17.5V, R_L = 5kΩ	101	87	84	82	dB	MIN
Output Voltage Swing from Rail	V_{OH}	R_L = 10kΩ	81	208	231	251	mV	MAX
	V_{OL}	R_L = 10kΩ	73	119	146	172	mV	MAX
Output Current (I_{OUT})			60				mA	TYP
Input Common Mode Voltage Range (V_{CM})			-18.1 to 16.5				V	TYP
Common Mode Rejection Ratio (CMRR)		V_{CM} = -18.1V to 16.5V	91	78	72	69	dB	MIN
Quiescent Current/Amplifier		I_{OUT} = 0A	157	299	332	352	µA	MAX
Gain-Bandwidth Product (GBP)		C_L = 100pF, V_{CM} = 0V	1.4				MHz	TYP
Gain Margin		C_L = 100pF, V_{CM} = 0V	-10				dB	TYP
Phase Margin		C_L = 100pF, V_{CM} = 0V	50				°	TYP
Channel-to-Channel Crosstalk		f = 1MHz	-80				dB	TYP
Slew Rate (SR)	Up	V_{OUT} = 2V$_{P-P}$ step, C_L = 100pF, A_V = 1	7				V/µs	TYP
	Down	V_{OUT} = 2V$_{P-P}$ step, C_L = 100pF, A_V = 1	4				V/µs	TYP
Overload Recovery Time (ORT)	Up	V_{IN} × G = V_S	0.5				µs	TYP
	Down	V_{IN} × G = V_S	1.0					
Settling Time (t_S)		C_L = 100pF, A_V = 1, 200mV output step	2				µs	TYP
Input Voltage Noise Density (e_n)		f = 20kHz, V_{CM} = 0V	29				nV/$\sqrt{Hz}$	TYP
		f = 1kHz, V_{CM} = 0V	43					
Total Harmonic Distortion + Noise (THD+N)		V_{OUT} = 2V$_{P-P}$, f = 1kHz, A_V = 1, R_L = 600Ω	0.018				%	TYP
		V_{OUT} = 2V$_{P-P}$, f = 1kHz, A_V = 1, R_L = 2kΩ	0.009					

TYPICAL APPLICATION CIRCUITS
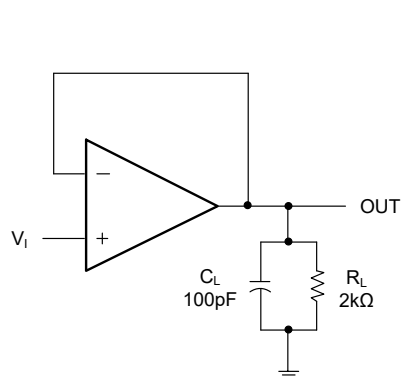
Figure 1
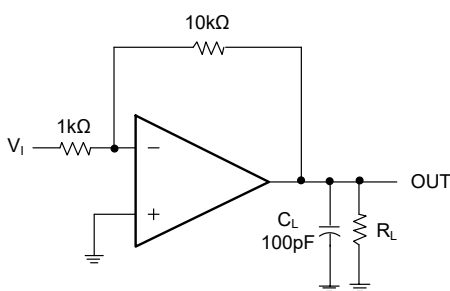
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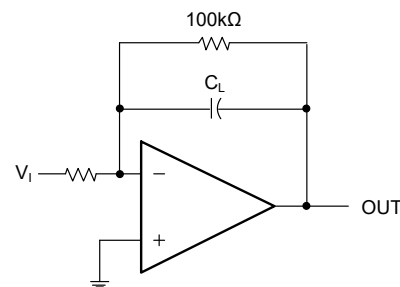
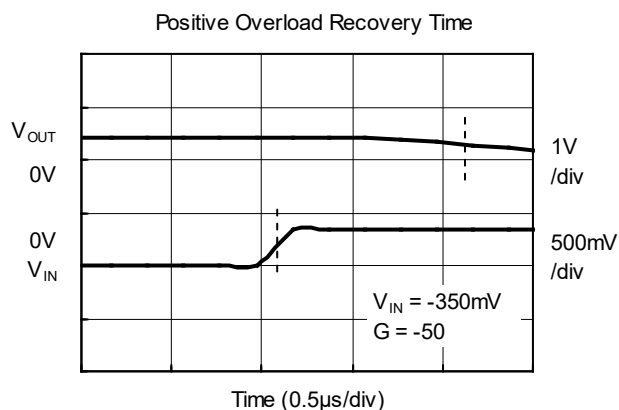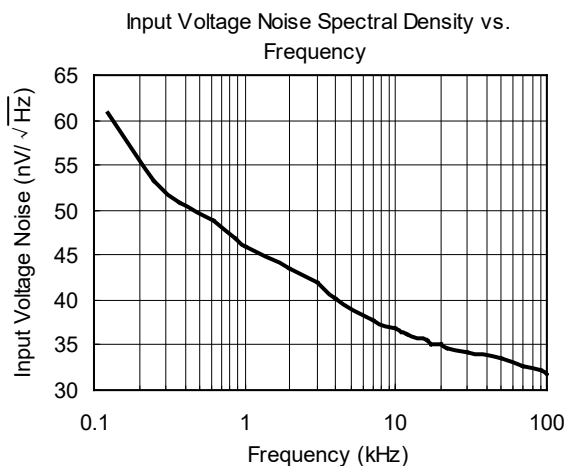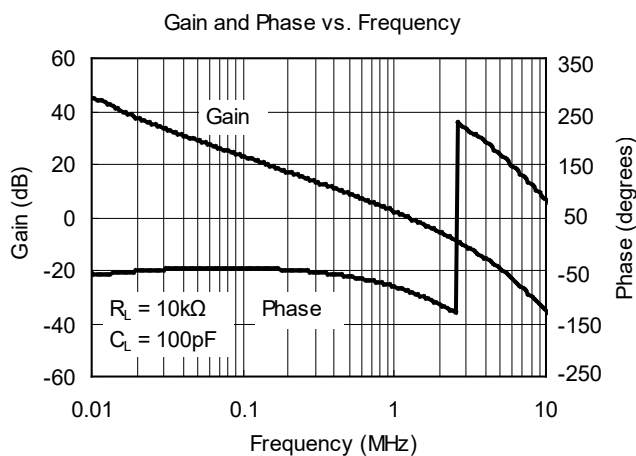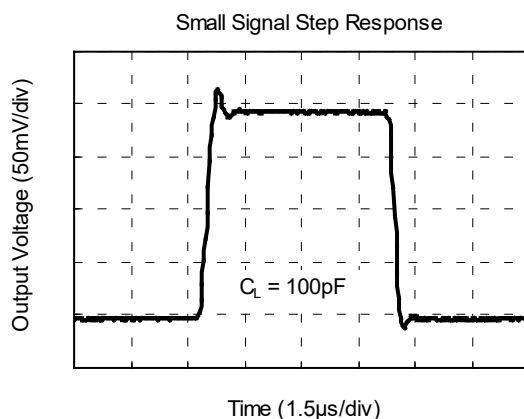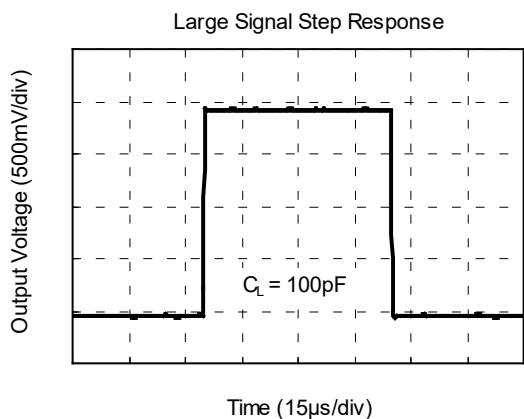Figure 3

TYPICAL PERFORMANCE CHARACTERISTICS

At V_S = ±15V, R_L = 2kΩ connected to 0V, unless otherwise noted.

Large Signal Step Response

Output Voltage (500mV/div)

C_L = 100pF

Time (15μs/div)

Small Signal Step Response

Output Voltage (50mV/div)

C_L = 100pF

Time (1.5μs/div)

Gain and Phase vs. Frequency

Gain

R_L = 10kΩ
C_L = 100pF

Phase

Input Voltage Noise Spectral Density vs. Frequency

Negative Overload Recovery Time

V_{IN}

0V

V_{IN} = 350mV
G = -50

0V

V_{OUT}

500mV /div

1V /div

Time (0.5μs/div)

Positive Overload Recovery Time

V_{OUT}

0V

0V
V_{IN}

V_{IN} = -350mV
G = -50

1V /div

500mV /div

Time (0.5μs/div)

REVISION HISTORY

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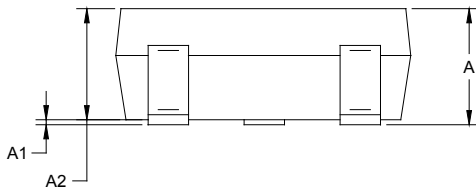
PACKAGE OUTLINE DIMENSIONS

SOT-23-5

RECOMMENDED LAND PATTERN (Unit: mm)
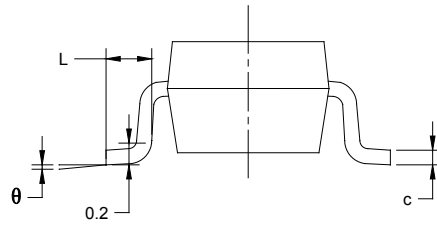
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	**MAX**	**MIN**	**MAX**
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 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

SOIC-8

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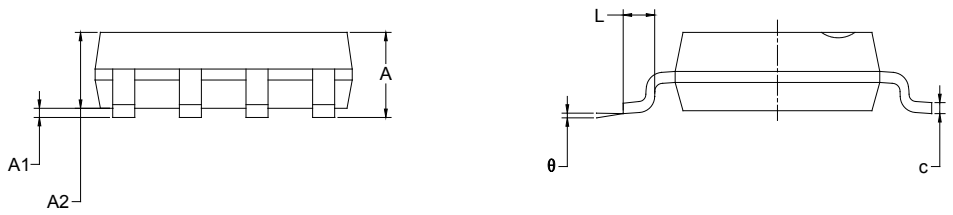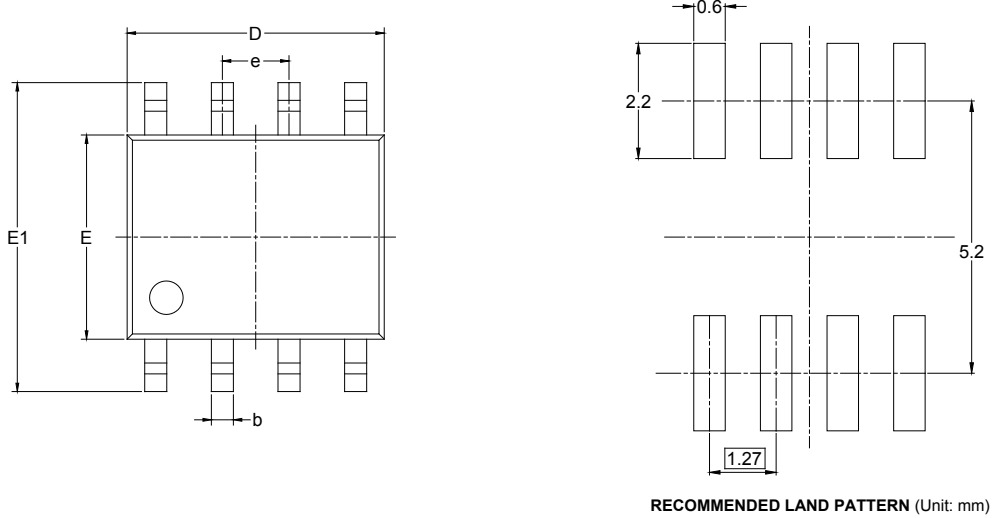
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.27 BSC		0.050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

PACKAGE OUTLINE DIMENSIONS

MSOP-8
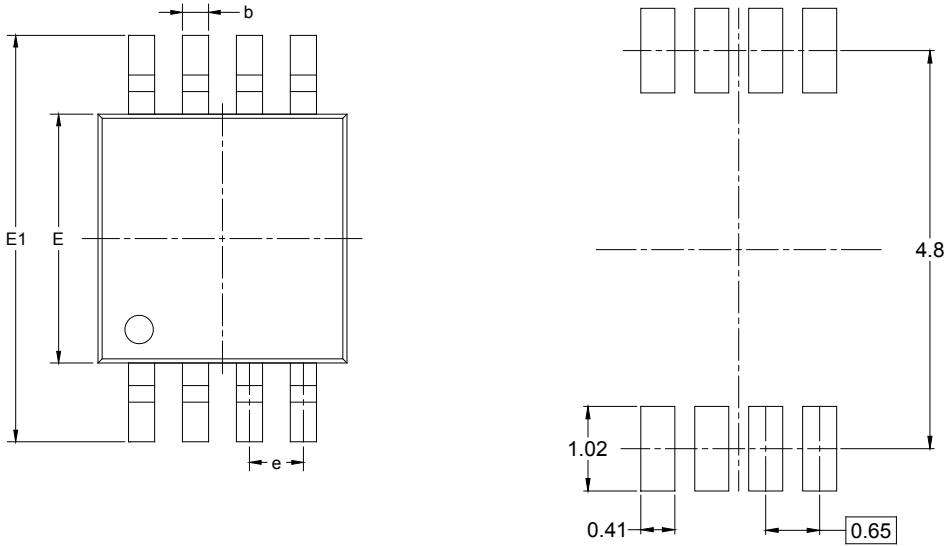
RECOMMENDED LAND PATTERN (Unit: mm)
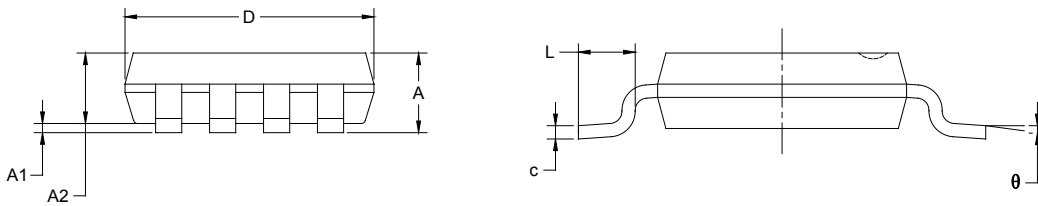
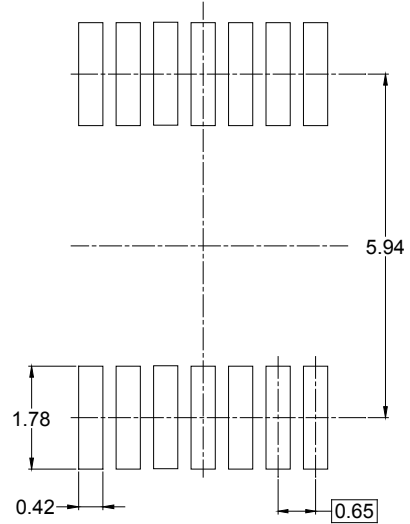| Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.250	0.380	0.010	0.015
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
e	0.650 BSC		0.026 BSC	
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°

PACKAGE OUTLINE DIMENSIONS

SOIC-14
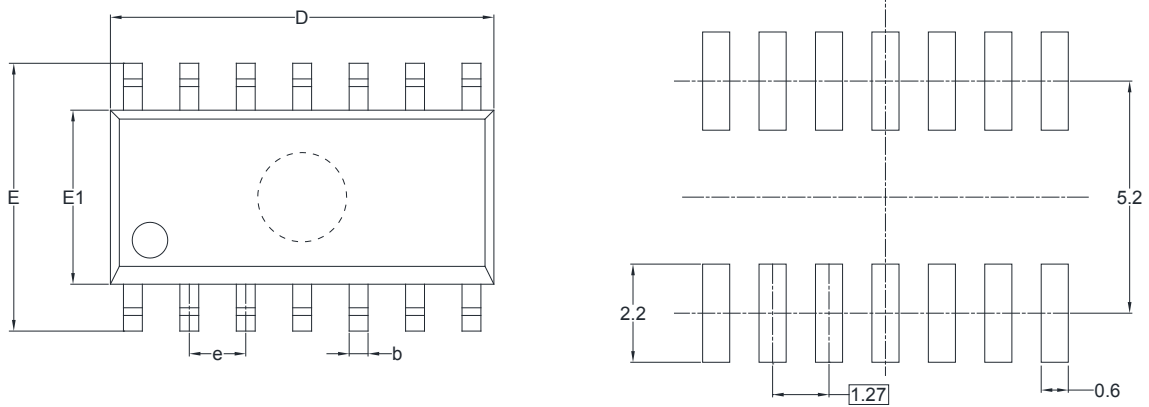
RECOMMENDED LAND PATTERN (Unit: mm)
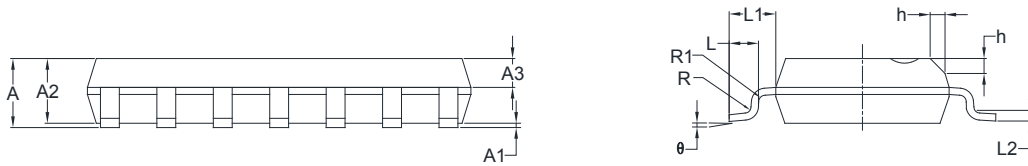
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	**MAX**	**MIN**	**MAX**
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
A2	1.25	1.65	0.049	0.065
A3	0.55	0.75	0.022	0.030
b	0.36	0.49	0.014	0.019
D	8.53	8.73	0.336	0.344
E	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
L	0.45	0.80	0.018	0.032
L1	1.04 REF		0.040 REF	
L2	0.25 BSC		0.01 BSC	
R	0.07		0.003	
R1	0.07		0.003	
h	0.30	0.50	0.012	0.020
θ	0°	8°	0°	8°

PACKAGE OUTLINE DIMENSIONS

TSSOP-14
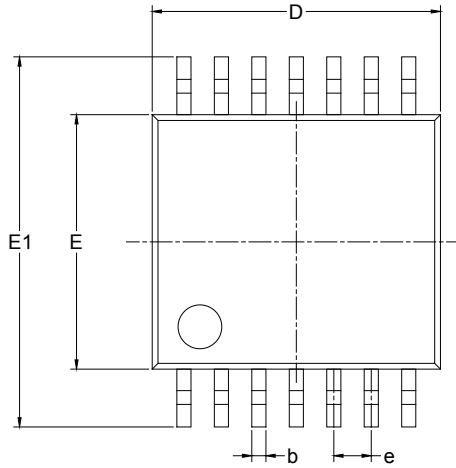
RECOMMENDED LAND PATTERN (Unit: mm)
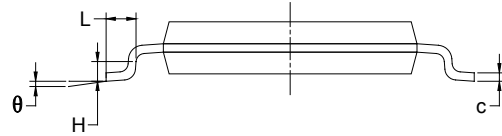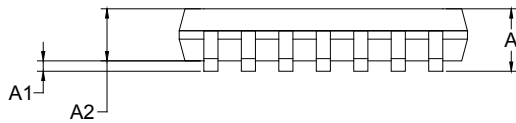
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A		1.200		0.047
A1	0.050	0.150	0.002	0.006
A2	0.800	1.050	0.031	0.041
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	4.860	5.100	0.191	0.201
E	4.300	4.500	0.169	0.177
E1	6.250	6.550	0.246	0.258
e	0.650 BSC		0.026 BSC	
L	0.500	0.700	0.02	0.028
H	0.25 TYP		0.01 TYP	
θ	1°	7°	1°	7°

TAPE AND REEL INFORMATION

REEL DIMENSIONS

TAPE DIMENSIONS
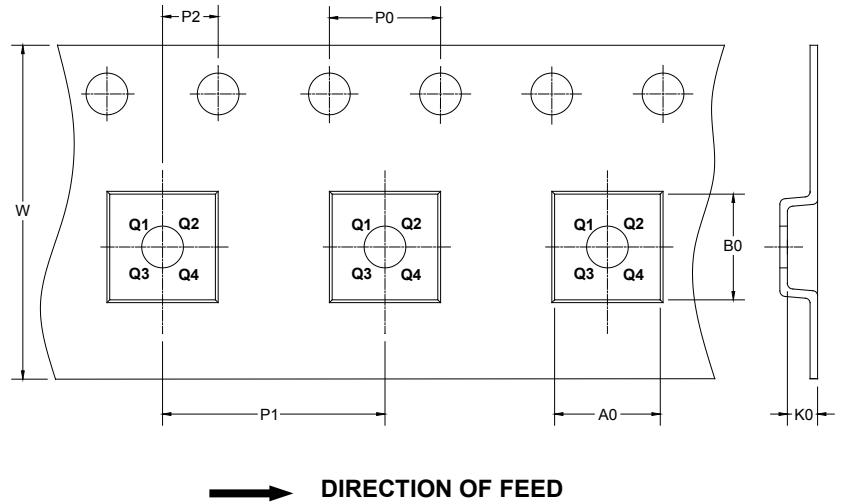
Reel Diameter

Reel Width (W1)

P2   P0

W

Q1 | Q2
Q3 | Q4

Q1 | Q2
Q3 | Q4

Q1 | Q2
Q3 | Q4

B0

P1   A0   K0

DIRECTION OF FEED

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-23-5	7″	9.5	3.20	3.20	1.40	4.0	4.0	2.0	8.0	Q3
SOIC-8	13″	12.4	6.40	5.40	2.10	4.0	8.0	2.0	12.0	Q1
MSOP-8	13″	12.4	5.20	3.30	1.50	4.0	8.0	2.0	12.0	Q1
SOIC-14	13″	16.4	6.60	9.30	2.10	4.0	8.0	2.0	16.0	Q1
TSSOP-14	13″	12.4	6.95	5.60	1.20	4.0	8.0	2.0	12.0	Q1

DD0001

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