

Features

- Supply Voltage: 3.0V to 36V
- Offset Voltage: ± 100μV Maximum
- Differential Input Voltage Range to Supply Rail, can

Work as Comparator

- Input Rail to -VS , Rail to Rail Output
- Bandwidth: 3.5MHz
- Slew Rate: 13V/μs
- Excellent EMI Suppress Performance: 45dB at 1GHz

- Quiescent Current: 0.72mA per Amplifier (Typ)
- -40°C to 125°C Operation Temperature Range
- Small Package:

GS2231 Available in SOT23-5 Package

GS2232 Available in SOP-8 and MSOP-8 Packages

GS2234 Available in SOP-14 and TSSOP-14 Packages

General Description

The GS223X series amplifiers are newest high supply voltage amplifiers with low offset, low power and stable high frequency response. Good AC performance with 3.5MHz bandwidth, 13V/μs slew rate and low distortion while drawing only 0.72mA of quiescent current per amplifier. The input common-mode voltage range extends to -VS , and the outputs swing rail-to-rail. The GS223X family can be used as plug-in replacements for many commercially available op-amps to reduce power and improve input/output range and performance. The GS2231 single is available in SOT23-5 package. The GS2232 Dual is available in Green SOP-8 and MSOP-8 packages. The GS2234 Quad is available in Green SOP-14 and TSSOP-14 packages.

Applications

- Instrumentation
- Active Filters, ASIC Input or Output Amplifier
- Sensor Interface
- Motor Control
- Industrial Control

Pin Configuration

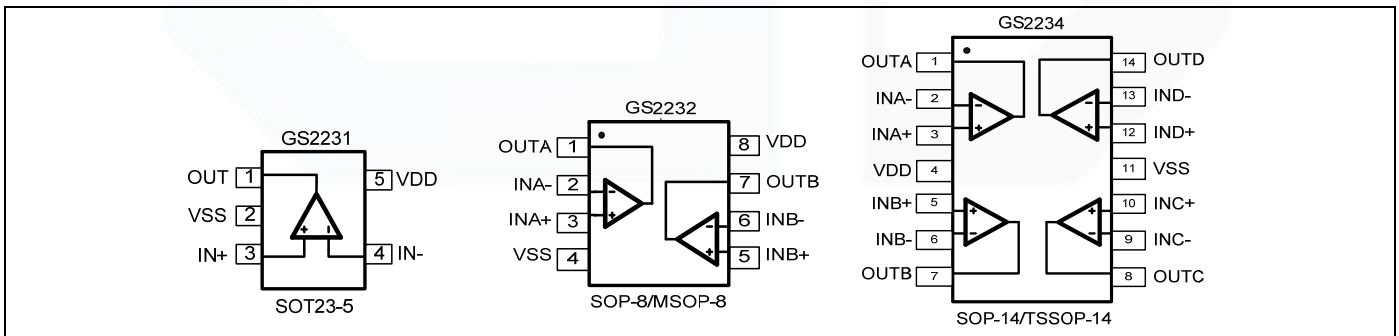


Figure 1. Pin Assignment Diagram

Absolute Maximum Ratings

Condition	Min	Max
Power Supply Voltage (V_{DD} to V_{SS})	-0.5V	+40V
Analog Input Voltage ($IN+$ or $IN-$)	$V_{SS}-0.5V$	$V_{DD}+0.5V$
PDB Input Voltage	$V_{SS}-0.5V$	+40V
Operating Temperature Range	-40°C	+125°C
Junction Temperature	+160°C	
Storage Temperature Range	-55°C	+150°C
Lead Temperature (soldering, 10sec)	+260°C	
Package Thermal Resistance ($T_A=+25^\circ\text{C}$)		
SOP-8, θ_{JA}	125°C/W	
MSOP-8, θ_{JA}	216°C/W	
SOT23-5, θ_{JA}	190°C/W	
SOP-14, θ_{JA}	120°C/W	
TSSOP-14, θ_{JA}	180°C/W	
ESD Susceptibility		
HBM	2KV	
MM	300V	
CDM	2KV	

Note: Stress greater than those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions outside those indicated in the operational sections of this specification are not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Package/Ordering Information

MODEL	CHANNEL	ORDER NUMBER	PACKAGE DESCRIPTION	PACKAGE OPTION	MARKING INFORMATION
GS2231	Single	GS2231-TR	SOT23-5	Tape and Reel,3000	2231
GS2232	Dual	GS2232-SR	SOP-8	Tape and Reel,4000	GS2232
		GS2232-MR	MSOP-8	Tape and Reel,3000	GS2232
GS2234	Quad	GS2234-TR	TSSOP-14	Tape and Reel,3000	GS2234
		GS2234-SR	SOP-14	Tape and Reel,2500	GS2234

Electrical Characteristics

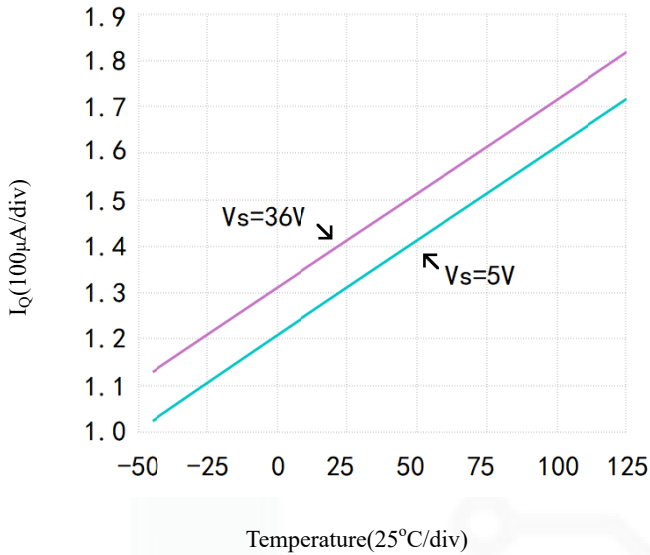
(All test condition is $V_S = 30V$, $T_A = 25^\circ C$, $R_L = \infty$, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	GS2231/2232/2234			
			TYP	MIN	MAX	UNITS
INPUT CHARACTERISTICS						
Input Offset Voltage	V_{OS}	$V_{CM} = V_S/2$	20	-100	100	μV
Input Bias Current	I_B		100			pA
Input Offset Current	I_{OS}		25			pA
Common-Mode Voltage Range	V_{CM}	$V_S = 30V$	0 to $(V_S - 1.5V)$			V
Common-Mode Rejection Ratio	CMRR	$V_S = 30V, V_{CM} = 0V$ to 28.5V	120	100		dB
Open-Loop Voltage Gain	A_{OL}	$V_S = 30V, R_L = 10k\Omega, V_{CM} = 0V$ to 28.5V	130	100		dB
Input Offset Voltage Drift	$\Delta V_{OS}/\Delta T$		2.0			$\mu V/^\circ C$
OUTPUT CHARACTERISTICS						
Output Voltage Swing from Rail	V_{OH}	$V_S = 30V, R_L = 10k\Omega$	29.85	29.65		V
	V_{OL}		100		300	mV
	V_{OH}	$V_S = 30V, R_L = 2k\Omega$	29.25	28.0		V
	V_{OL}		500		1500	mV
Output Current	I_{SOURCE}	$V_S = 30V$	33			mA
	I_{SINK}		35			
POWER SUPPLY						
Operating Voltage Range			3.0			V
			36			V
Power Supply Rejection Ratio	PSRR	$V_S = +3.3V$ to +30V, $V_{CM} = +0.5V$	120	100		dB
Quiescent Current / Amplifier	I_Q		0.72			mA
DYNAMIC PERFORMANCE						
Gain-Bandwidth Product	GBP		3.5			MHz
Slew Rate	SR	$G = +1, 5V$ Output Step	13			$V/\mu s$
NOISE PERFORMANCE						
Input Voltage Noise	e_{nP-P}	$f = 0.1Hz$ to 10Hz	3.0			μV_{RMS}
Input Voltage Noise	e_n	$f = 1kHz$	39			nV/\sqrt{Hz}
		$f = 10kHz$	19			

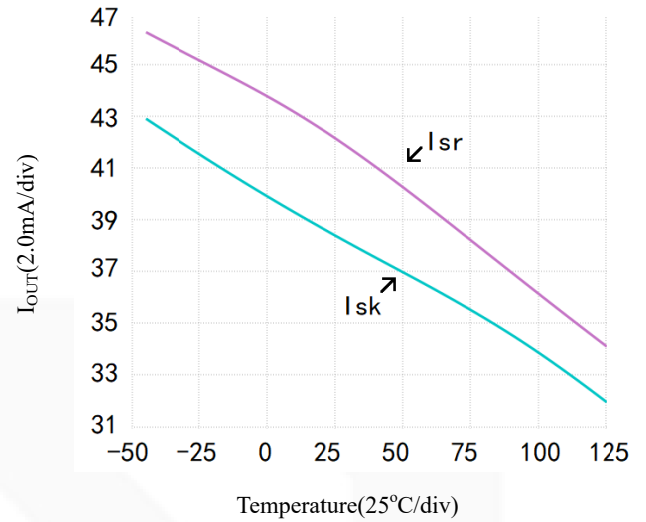
Typical Performance Characteristics

$T_A=+25^{\circ}\text{C}$, $V_S=+30\text{V}$, and $R_L= \infty$ connected to $V_S/2$, unless otherwise specified.

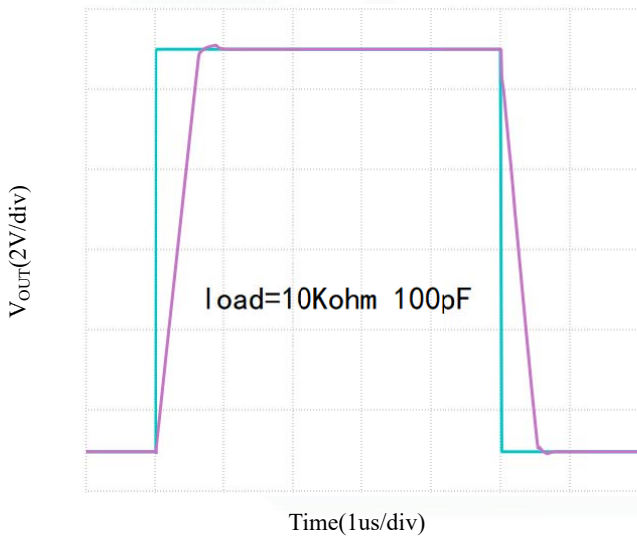
Supply Current(GS2232) vs. Temperature



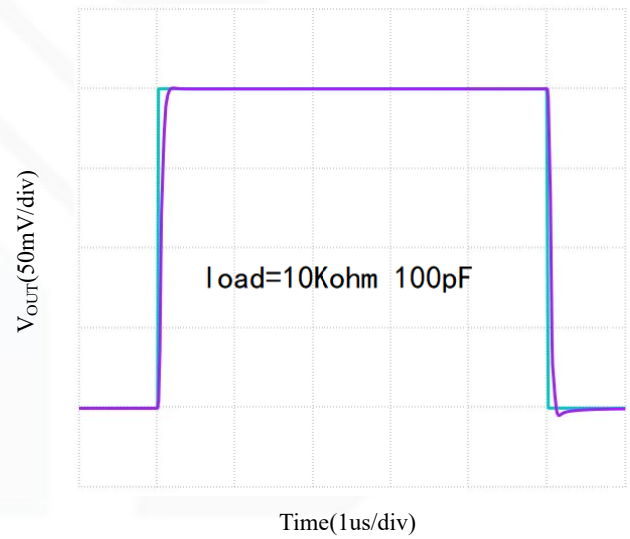
Output Short-Circuit Current vs. Temperature

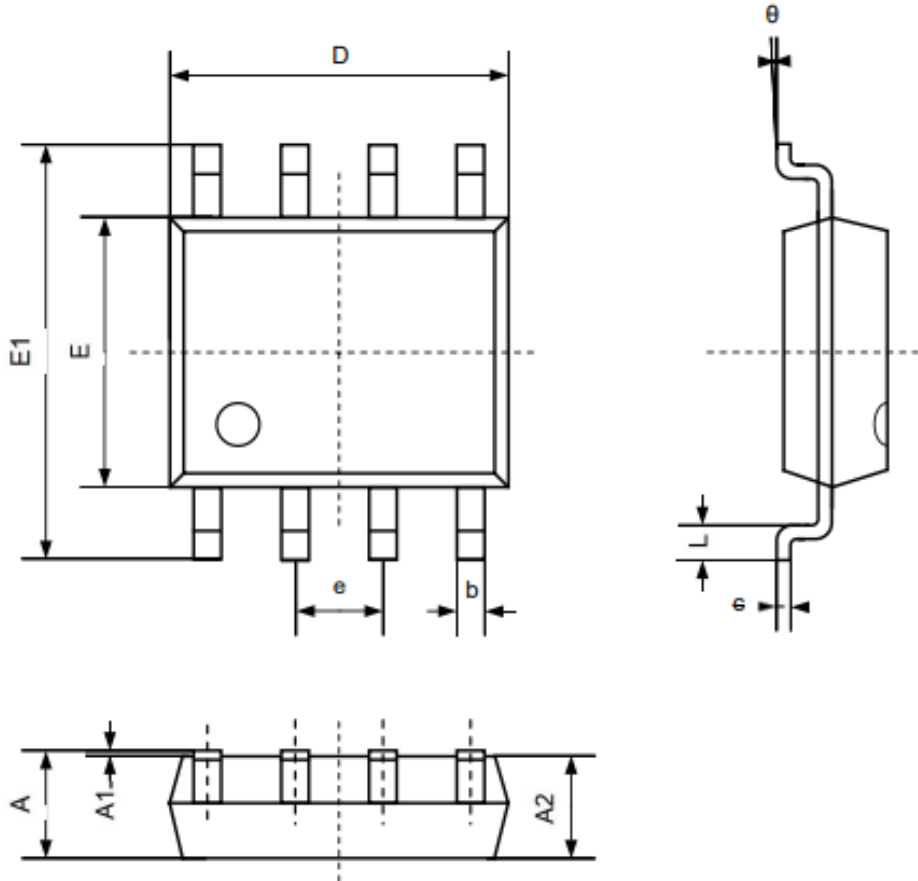


Large Signal Pulse Response

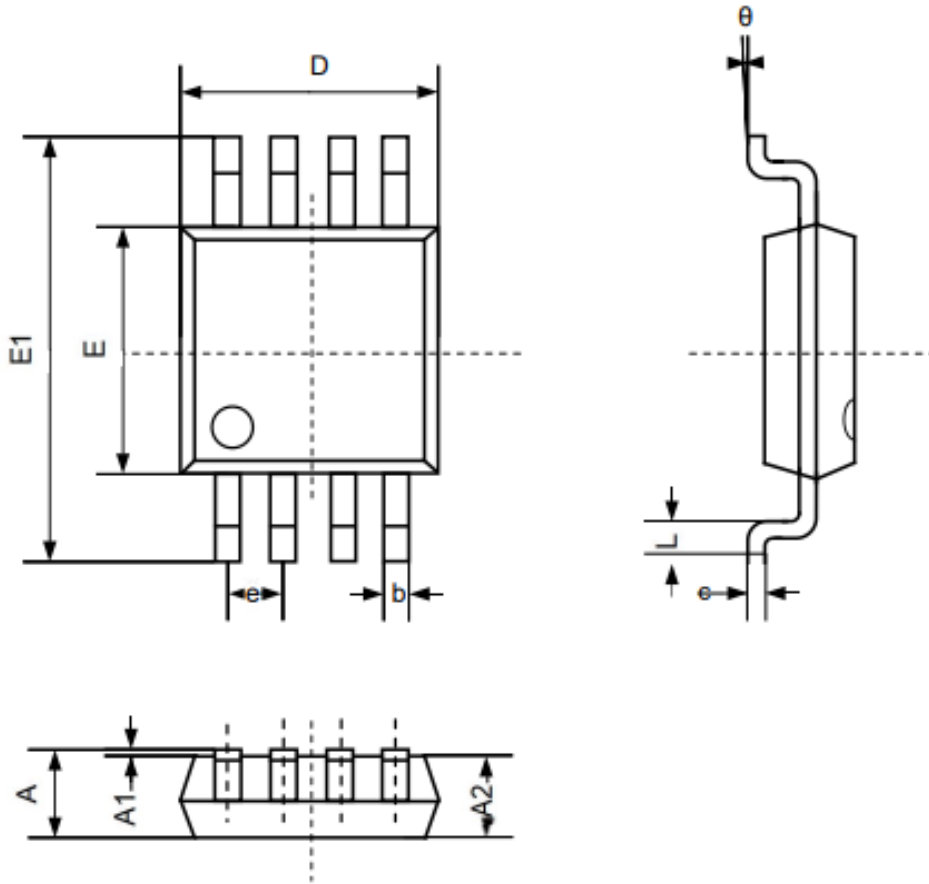


Small Signal Pulse Response

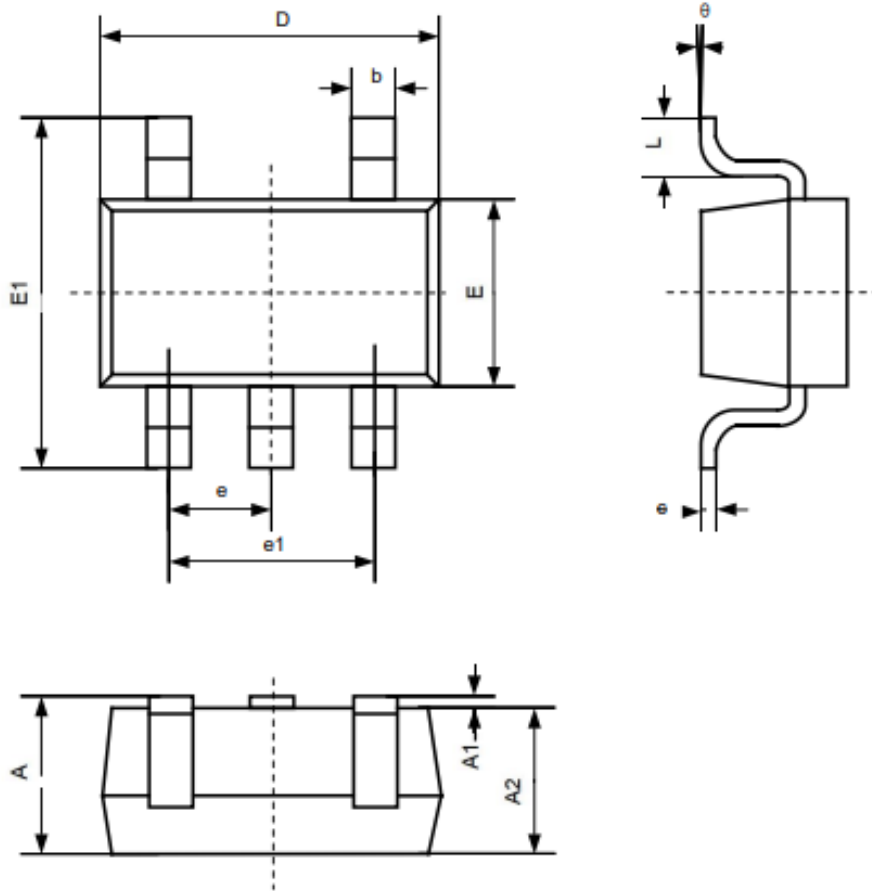


Package Information
SOP-8


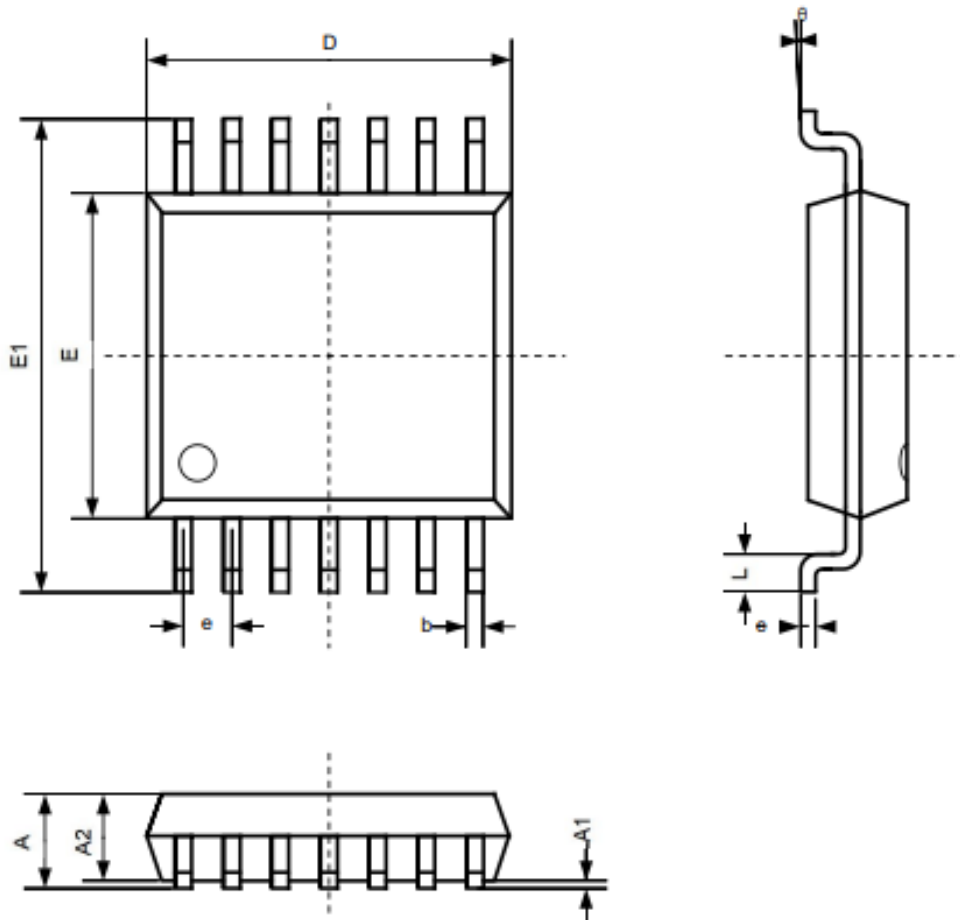
Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 BSC		0.050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

MSOP-8


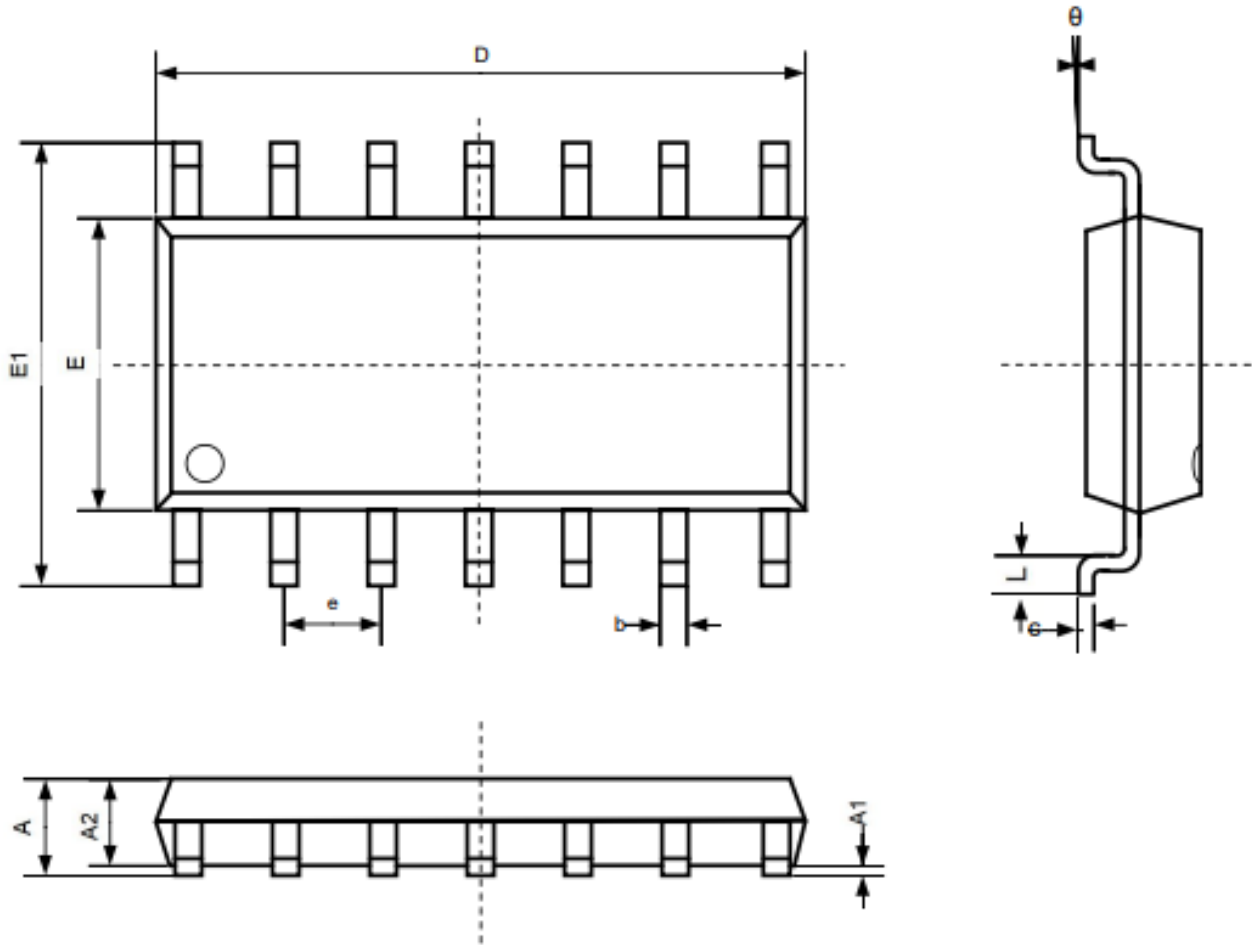
Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.250	0.380	0.010	0.015
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
e	0.650 BSC		0.026 BSC	
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°

SOT23-5


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°

TSSOP-14


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	1.000	0.031	0.039
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	4.900	5.100	0.193	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	0.020	0.028
θ	1°	7°	1°	7°

SOP-14


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	1.250	1.650	0.049	0.065
b	0.360	0.490	0.014	0.019
c	0.130	0.250	0.005	0.010
D	8.530	8.730	0.336	0.344
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 BSC		0.050 BSC	
L	0.450	0.800	0.018	0.032
θ	0°	8°	0°	8°