

钍地半导体
Tudi Semiconductor

Product Specification

TUDI-AD8613/AD8617/AD8619

Low Cost Micropower, Low Noise CMOS Rail-to Rail, Input/Output Operational Amplifiers

网址 www.sztdbdt.com

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semiconductor device manufacturer

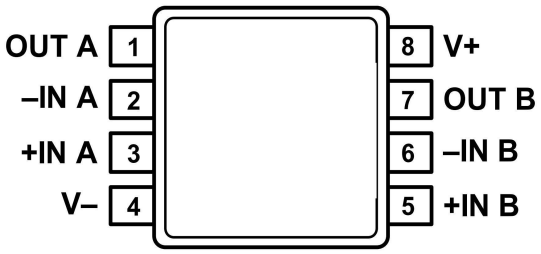
- Design
- research and development
- production
- and sales

FEATURES

- Offset voltage: 2.2 mV maximum
- Low input bias current: 1 pA maximum
- Single-supply operation: 1.8 V to 5.5 V
- Low noise: 22 nV/√Hz
- Micropower: 50 μA/amplifier maximum over temperature
- No phase reversal
- Unity gain stable
- Qualified for automotive applications



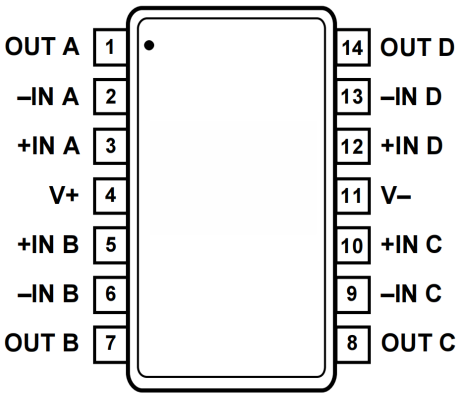
AD8613 SOT23-5



AD8614 SOP8/MSOP8

APPLICATIONS

- Battery-powered instrumentation
- Multipole filters
- Current shunt sense
- Sensors
- ADC predrivers
- DAC drivers/level shifters
- Low power ASIC input or output amplifiers



AD8619 SOP14/TSSOP14

DESCRIPTION

The AD8613/AD8617/AD8619 are single, dual, and quad micro power, rail-to-rail input and output amplifiers that feature low supply current, as well as low input voltage and current noise. The parts are fully specified to operate from 1.8 V to 5 V single supply, or ±0.9 V and ±2.5 V dual supply. The combination of low noise, very low input bias currents, and low power consumption make the AD8613/AD8617/AD8619 especially useful in portable and loop-powered instrumentation.

The ability to swing rail-to-rail at both the input and output enables designers to buffer CMOS ADCs, DACs, ASICs, and other wide output swing devices in low power, single-supply systems. The AD8613 is available in a 5-lead SC70 package and a 5-lead TSOT-23 package. The AD8617 is available in 8-lead MSOP and 8-lead SOIC packages. The AD8619 is available in 14-lead TSSOP and 14-lead SOIC packages.

ABSOLUTE MAXIMUM RATINGS

Table 1.

TA= 25°C, unless otherwise noted.

Parameter	Rating
Supply Voltage	6V
Input Voltage	Vss-0.3Vto VDD+0.3V
Input Current	±10 mA
Differential Input Voltage	± 6V
Output Short-Circuit Duration to GND	Indefinite
Storage Temperature Range	-65 to +150
Operating Temperature Range	-40 to+125
Junction Temperature Range	-65 to +150
Lead Temperature(Soldering,60 sec)	300
ESD AD8613	
HBM	±4000V
FICDM	±1000V
ESD AD8617	
HBM	±3000V
FICDM	±1000V
MM	± 100V
ESD AD8619	
HBM	±4000V
FICDM	±1250V
MM	+200V

Stresses at or above those listed under Absolute Maximum Ratings may cause permanent damage to the product. This is a stress rating only; functional operation of the product at these or any other conditions above those indicated in the operational section of this specification is not implied. Operation beyond the maximum operating conditions for extended periods may affect product reliability

SPECIFICATIONS

Table 2.

Electrical characteristics at V_{SY}= 5 V, V_{CM}= V_{SY}/2, T_A= 25°C, unless otherwise noted.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage	Vos	-0.3V<V_{CM}<+5.3V		0.4	2.2	mV
		-40℃<T_A<+125℃, -0.3V<V_{CM}<+5.2V			2.2	mV
Offset Voltage Drift AD8613	△Vos/△T	-40℃<T_A<+125℃		1	4.5	μV/ ℃
				2.5	7.0	μV/ ℃
Input Bias Current	I_B			0.2	1	pA
		-40℃<T_A<+85℃			110	pA
		-40℃<T_A<+125℃			780	pA
Input Offset Current	Ios			0.1	0.5	pA
		-40℃<T_A<+85℃			50	pA
		-40℃<T_A<+125℃			250	pA
Input Voltage Range	IVR		0		5	V
Common-Mode Rejection Ratio	CMRR	0V<V_{CM}<5V		95		dB
		-40℃<T_A<+125℃	68			dB
Large Signal Voltage Gain	Avo	R_L=10 kΩ,0.5V<Vo<4.5V	235	500		V/mV
Input Capacitance	C_{DIFF}			1.9		pF
	C_{CM}			2.5		pF
OUTPUT CHARACTERISTICS						
Output Voltage High	V_{OH}	I_L=1mA	4.95	4.98		V
		-40℃ to+125℃	4.9			V
		I_L= 10 mA		4.7		V
		-40℃ to+125℃	4.50			V
Output Voltage Low	V_{OL}	I_L=1mA		20	30	mV
		-40℃ to+125℃			50	mV
		I_L= 10 mA		190	275	mV
		-40℃ to +125℃			335	mV
Short-Circuit Current	Isc			± 80		mA
Closed-Loop Output Impedance	Z_{OUT}	f=10kHz,Av=1		15		Ω

Table 2.(Continued)

Electrical characteristics at V_{SY}= 5 V, V_{CM}= V_{SY}/2, T_A= 25°C, unless otherwise noted.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	1.8V<V_{SY}<5V	67	94		dB
		-40℃<TA<+125℃	64			dB
Supply Current/Amplifier	I_{SY}	Vo=V_{SY}/2		38		μA
		-40℃<T_A<+125℃			50	μA
DYNAMIC PERFORMANCE						
Slew Rate	SR	R_L=10 kΩ		0.1		V/μs
Settling Time to 0.1%	ts	G=±1,V_{IN}=2V step, C_L=20 pF,R_L=1kΩ		23		μs
Gain Bandwidth Product	GBP	R_L=100 kΩ		400		kHz
		R_L=10 kΩ		350		kHz
Phase Margin	ØM	R_L=10 kΩ,R_L=100 kΩ,C_L=20 pF		70		Degrees
NOISE PERFORMANCE						
Peak-to-Peak Noise	e_n p-p	0.1 Hz to 10 Hz		2.3	3.5	μV
Voltage Noise Density	e_n	f=1 kHz		25		nV/√Hz
		f=10 kHz		22		nV/√Hz
Current Noise Density	i_n	f=1kHz		0.05		pA/√ Hz

Table 3.

Electrical characteristics at V_{SY}= 1.8 V, V_{CM}= V_{SY}/2, T_A= 25°C, unless otherwise noted.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage	Vos	-0.3V<V_{CM}<+1.9V		0.4	2.2	mV
		-0.3V<V_{CM}<+1.8V; -40℃<T_A<+125℃			2.2	mV
Offset Voltage DriftAD8613	△Vos/ΔT	-40℃<T_A<+125℃		1	8.5	μV/ ℃
				3.7	9.0	μV ℃
Input Bias Current	I_B			0.2	1	pA
		-40℃<T_A<+85℃			110	pA
		-40℃<T_A<+125℃			780	pA
Input Offset Current	Ios			0.1	0.5	pA
		-40℃<T_A<+85℃			50	pA
		-40℃<T_A<+125℃			250	pA
Input Voltage Range	IVR		0		1.8	V
Common-Mode Rejection Ratio	CMRR	0V<V_{CM}<1.8V	58	86		dB
		-40℃<T_A<+125℃	55			dB
Large Signal Voltage Gain	Avo	R_L=10kΩ,0.5V<Vo<1.3V	85	1000		V/mV
Input Capacitance	C_{DIFF}			2.1		pF
	C_{CM}			3.8		pF
OUTPUT CHARACTERISTICS						
Output Voltage High	V_{OH}	I_L=1mA	1.65	1.73		V
		-40℃ to +125℃	1.6			V
Output Voltage Low	V_{OL}	I_L=1mA		44	60	mV
		-40℃ to+125℃			80	mV
Short-Circuit Current	Isc			±7		mA
Closed-Loop Output Impedance	Z_{OUT}	f=10 kHz,Av=1		15		Ω
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	1.8V<Vs<5V	67	94		dB
Supply Current/Amplifier	I_{SY}	Vo=V_{SY}/2		38		μA
		-40℃<TA<+125℃			50	μA

Table 3. (Continued)

Electrical characteristics at V_{SY}= 1.8 V, V_{CM}= V_{SY}/2, T_A= 25°C, unless otherwise noted.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
DYNAMIC PERFORMANCE						
Slew Rate	SR	R_L=10 kΩ		0.1		V/μs
Settling Time to 0.1%	ts	G=±1,VIN=1V step,CL=20 pF, R_L=1kΩ		6.5		μs
Gain Bandwidth Product	GBP	R_L=100 kΩ2		400		kHz
		R_L=10 kΩ		350		kHz
Phase Margin	ØM	R_L=10 kΩ,R_L=100 kΩ,C_L=20 pF		70		Degrees
NOISE PERFORMANCE						
Peak-to-Peak Noise	e_n p-p	0.1 Hz to 10Hz		2.3	3.5	μV
Voltage Noise Density	e_n	f=1 kHz		25		nV/ √Hz
		f=10kHz		22		nV/ √Hz
Current Noise Density	i_n	f=1kHz		0.05		pA/ √Hz

THERMAL RESISTANCE

Table 4. Thermal Characteristics

θ_{JA} is specified for the worst-case conditions, that is, a device soldered in a circuit board for surface-mount packages.

Package Type	θ_{JA}	θ_{JC}	Unit
5-Lead TSOT-23(UJ-5)	207	61	℃/W
8-Lead MSOP(RM-8)	210	45	℃/W
8-Lead SOIC_N(R-8)	158	43	℃/W
14-Lead SOIC_N(R-14)	120	36	℃/W
14-Lead TSSOP(RU-14)	180	35	℃/W

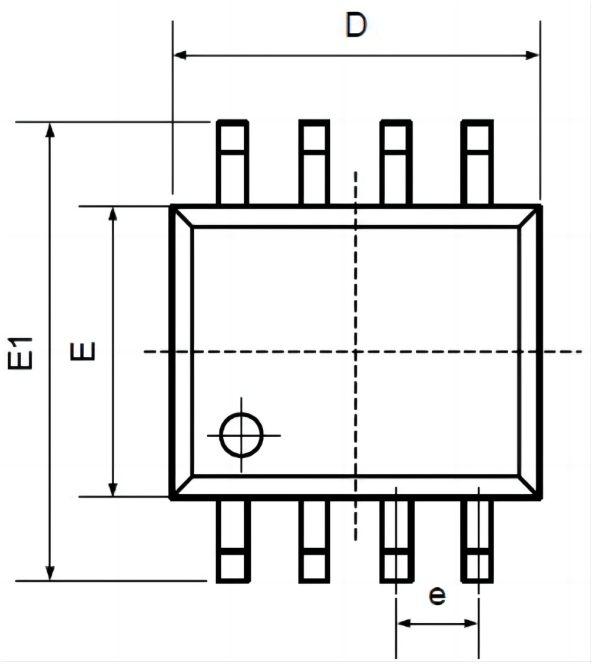
Order information

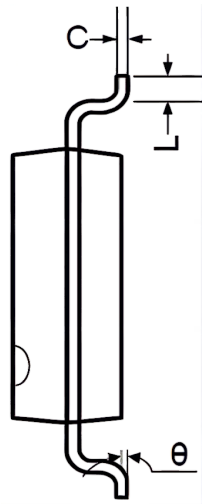
Order Number	Package	Package Quantity	Marking On The park	Temperature
AD8613AUJZ-REEL-TUDI	SOT23-5	Tape,Reel,3000	A0Y	−40°C to +125°C
AD8617ARMZ-REEL-TUDI	MSOP8	Tape,Reel,4000	A0T	
AD8617ARZ-REEL-TUDI	SOP8	Tape,Reel,4000	AD8617A	
AD8619ARUZ-REEL-TUDI	TSSOP14	Tape,Reel,4000	AD8619A	
AD8619ARZ-REEL-TUDI	SOP14	Tape,Reel,4000	AD8619A	

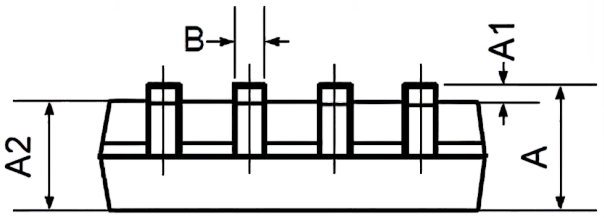
Revision history

	Date	Revision	Page
V1.0	2023/7	New	1-14

Package SOP8

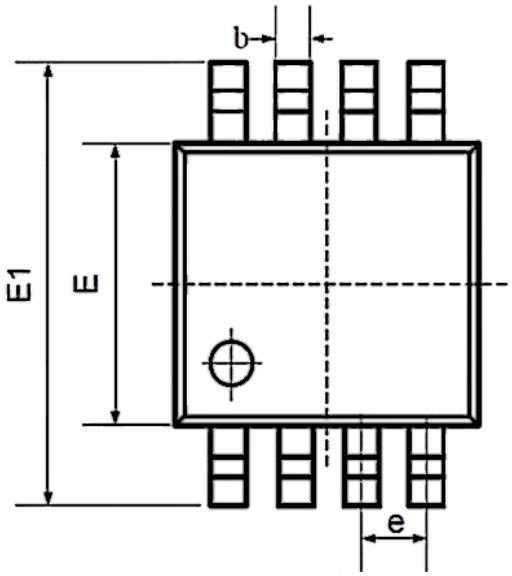


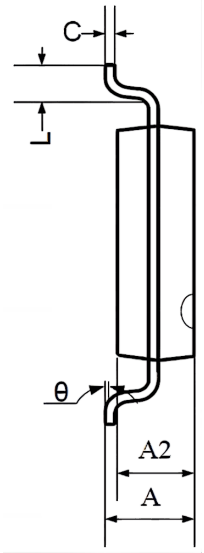


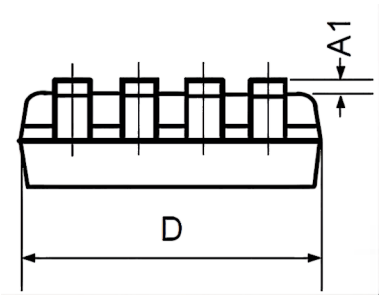


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
B	0.330	0.510	0.013	0.020
C	0.190	0.250	0.007	0.010
D	4.780	5.000	0.188	0.197
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	0.228	0.248
e	1.270TYP		0.050TYP	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

Package MSOP8

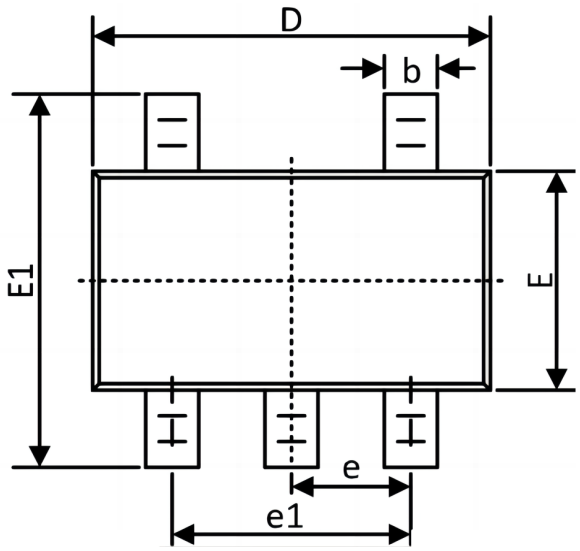


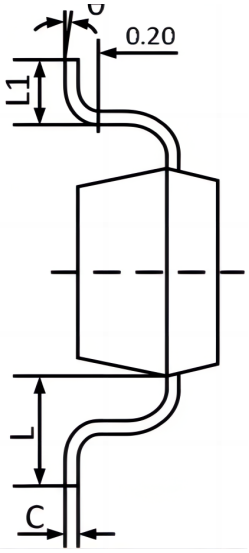


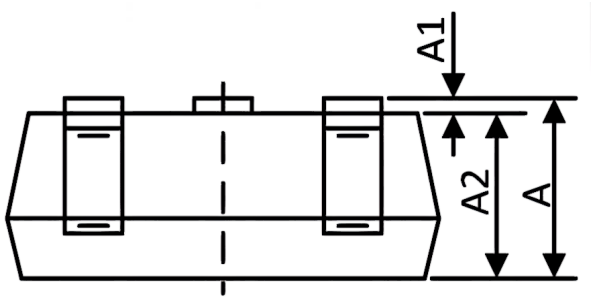


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.800	1.200	0.031	0.047
A1	0.000	0.200	0.000	0.008
A2	0.760	0.970	0.030	0.038
b	0.30 TYP		0.012 TYP	
C	0.15 TYP		0.006 TYP	
D	2.900	3.100	0.114	0.122
e	0.65 TYP		0.026 TYP	
E	2.900	3.100	0.114	0.122
E1	4.700	5.100	0.185	0.201
L	0.410	0.650	0.016	0.026
θ	0°	6°	0°	6°

Package SOT23-5

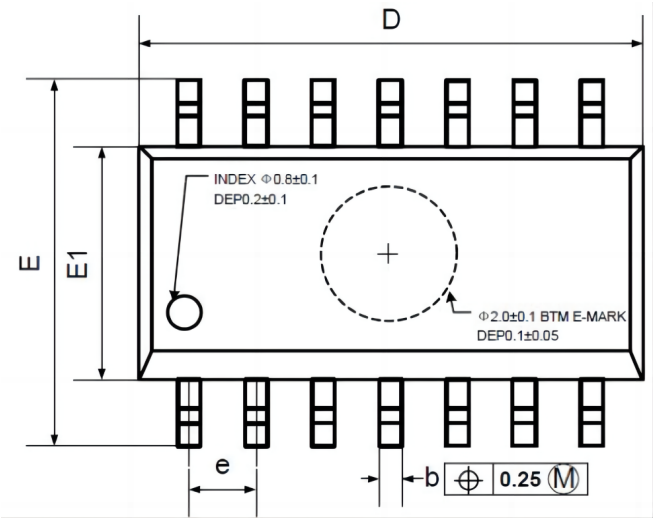


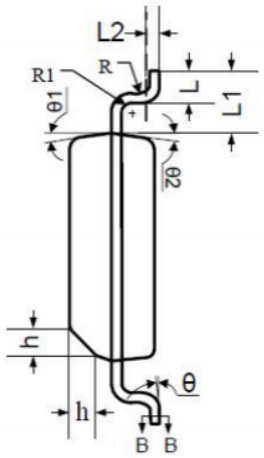


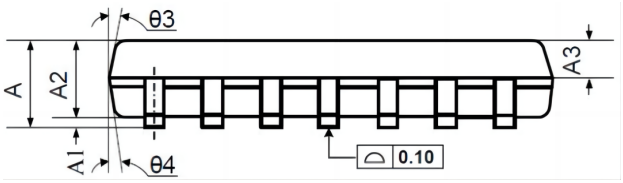


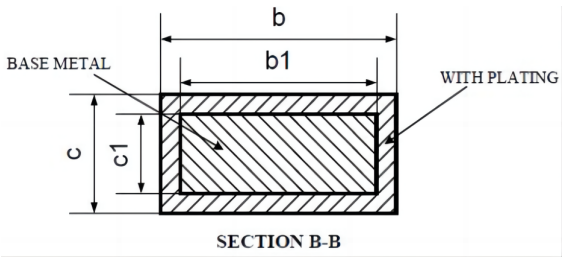
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.400	0.012	0.016
C	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.700REF		0.028REF	
L1	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

Package SOP14



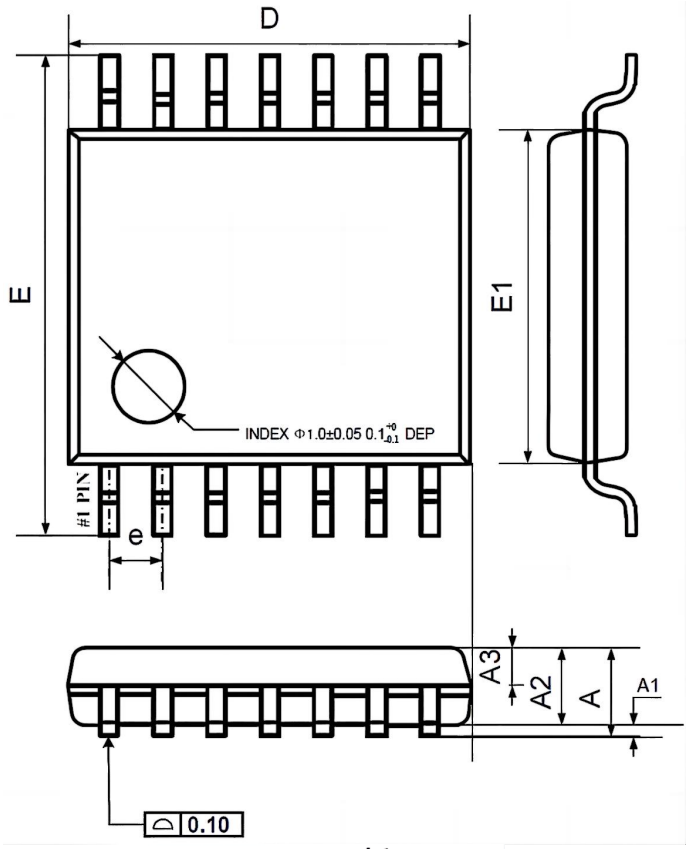


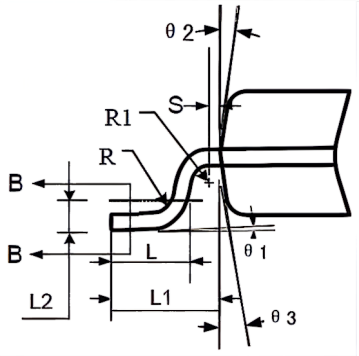


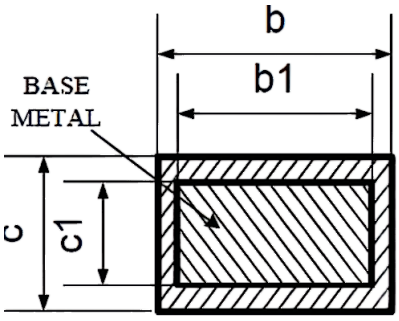


Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	1.35	1.60	1.75
A1	0.10	0.15	0.25
A2	1.25	1.45	1.65
A3	0.55	0.65	0.75
b	0.36		0.49
b1	0.35	0.40	0.45
C	0.16		0.25
c1	0.15	0.20	0.25
D	8.53	8.63	8.73
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27 BSC		
L	0.45	0.60	0.80
L1	1.04 REF		
L2	0.25 BSC		
R	0.07		
R1	0.07		
h	0.30	0.40	0.50
θ	0°		8°
θ1	6°	8°	10°
θ2	6°	8°	10°
θ3	5°	7°	9°
θ4	5°	7°	9°

Package TSSOP14







Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	—	—	1.20
A1	0.05	—	0.15
A2	0.90	1.00	1.05
A3	0.34	0.44	0.54
b	0.20	—	0.28
b1	0.20	0.22	0.24
C	0.10	—	0.19
c1	0.10	0.13	0.15
D	4.86	4.96	5.06
E	6.20	6.40	6.60
E1	4.30	4.40	4.50
e	0.65 BSC		
L	0.45	0.60	0.75
L1	1.00 REF		
L2	0.25 BSC		
R	0.09	—	—
R1	0.09	—	—
S	0.20	—	—
θ1	0°	—	8°
θ2	10°	12°	14°
θ3	10°	12°	14°

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