

钍地半导体
Tudi Semiconductor

Product Specification

TUDI-AD8615/AD8616/AD8618

Precision, 20 MHz, CMOS, Rail-to-Rail Input/ Output Operational Amplifiers

网址 www.sztdbdt.com

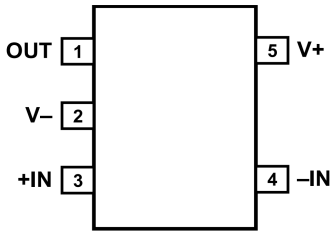
用芯智造·卓越品质

semiconductor device manufacturer

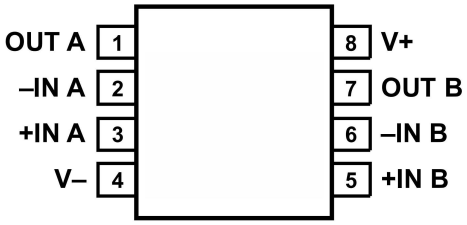
- Design
- research and development
- production
- and sales

FEATURES

- Low offset voltage: 65 μVmaximum
- Single-supply operation: 2.7 V to 5.0 V
- Low noise: 8 nV/√Hz
- Wide bandwidth: >20 MHz
- Slew rate: 12 V/μs
- High output current: 150 mA
- No phase reversal
- Low input bias current: 1 pA
- Low supply current: 2 mA
- Unity-gain stable



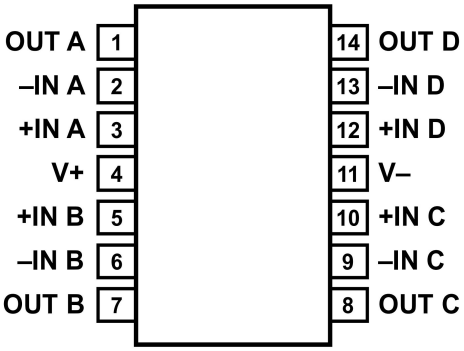
AD8615 SOT23-5



AD8616 SOP8/MSOP8

APPLICATIONS

- Barcode scanners
- Battery-powered instrumentation
- Multipole filters
- Sensors
- ASIC input or output amplifiers
- Audio
- Photodiode amplification



AD8618 SOP14/TSSOP14

DESCRIPTION

The AD8615/AD8616/AD8618 are single/dual/quad, rail-to-rail, input and output, single-supply amplifiers featuring very low offset voltage, wide signal bandwidth, and low input voltage and current noise. The parts use a patented trimming technique that achieves superior precision without laser trimming. The AD8615/AD8616/AD8618 are fully specified to operate from 2.7 V to 5 V single supplies.

The combination of >20 MHz bandwidth, low offset, low noise, and low input bias current makes these amplifiers useful in a wide variety of applications. Filters, integrators, photodiode amplifiers, and high impedance sensors all benefit from the combination of performance features. AC applications benefit from the wide bandwidth and low distortion.

Applications for the parts include portable and low powered instrumentation, audio amplification for portable devices, portable phone headsets, bar code scanners, and multipole filters. 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 single-supply systems.

The AD8615/AD8616/AD8618 are specified over the extended industrial temperature range (-40°C to +125°C). The AD8615 is available in 5-lead TSOT-23 package. The AD8616 is available in 8-lead MSOP and narrow SOIC surface-mount packages; the MSOP version is available in tape and reel only. The AD8618 is available in 14-lead SOIC and TSSOP packages.

ABSOLUTE MAXIMUM RATINGS

Table 1.

Parameter	Rating
Supply Voltage	6V
Input Voltage	GND to V_S
Differential Input Voltage	±6V
Output Short-Circuit Duration to GND	Indefinite
Storage Temperature Range	-65℃to +150℃
Operating Temperature Range	-40℃ to +125℃
Lead Temperature(Soldering,60 sec)	300℃
Junction Temperature	150℃

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

THERMAL RESISTANCE

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

Table 2.

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

SPECIFICATIONS

Table 3.

V_S = 5 V, V_{CM} = V_S/2, T_A = 25°C, unless otherwise noted.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage,AD8616/ AD8618	Vos	Vs=3.5V at V_{CM}=0.5V and 3.0V		23	60	μV
Offset Voltage,AD8615				23	100	μV
		V_{CM}=0V to 5V		80	500	μV
		-40°C<T_A<+125°C			800	μV
Offset Voltage Drift,AD8616/ AD8618	△Vos/ △T	-40°C<T_A<+125°C		1.5	7	μV °C
Offset Voltage Drift,AD8615				3	10	μV °C
Input Bias Current	I_B			0.2	1	pA
		-40°C<T_A<+85°C			50	pA
		-40°C<T_A<+125°C			550	pA
Input Offset Current	Ios			0.1	0.5	pA
		-40°C<T_A<+85°C			50	pA
		-40°C<T_A<+125°C			250	pA
Input Voltage Range			0		5	V
Common-Mode Rejection Ratio	CMRR	V_{CM}=0V to 4.5V	80	100		dB
Large Signal Voltage Gain	Avo	R_L=2kΩ,Vo=0.5V to 5V	105	1500		V/mV
Input Capacitance	C_{DIFF}			2.5		pF
	C_{CM}			6.7		pF
OUTPUT CHARACTERISTICS						
Output Voltage High	V_{OH}	I_L=1mA	4.98	4.99		V
		I_L=10mA	4.88	4.92		V
		-40°C<T_A<+125°C	4.7			V
Output Voltage Low	V_{OL}	I_L=1mA		7.5	15	mV
		I_L=10 mA		70	100	mV
		-40°C<T_A<+125°C			200	mV
Output Current	I_{OUT}			±150		mA
Closed-Loop Output Impedance	Z_{OUT}	f=1 MHz,Av=1		3		Ω

Table 3. (Continued)

V_S = 5 V, V_{CM} = V_S/2, T_A = 25°C, unless otherwise noted.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
POWER SUPPLY						
Power Supply Rejection RatioSupply Current per Amplifier	PSRR	Vs=2.7V to 5.5V	70	90		dB
	I_{SY}	Vo=0V		1.7	2	mA
		-40℃<T_A<+125℃			2.5	mA
DYNAMIC PERFORMANCE						
Slew Rate	SR	R_L=2kΩ		12		V/μs
Settling Time	ts	To 0.01%		<0.5		μs
Gain Bandwidth Product	GBP			24		MHz
Phase Margin	Øm			63		Degrees
NOISE PERFORMANCE						
Peak-to-Peak Noise	e_n p-p	0.1 Hz to 10Hz		2.4		μV
Voltage Noise Density	e_n	f=1kHz		10		nV/√Hz
		f=10 kHz		7		nV/√Hz
Current Noise Density	i_n	f=1kHz		0.05		pA/√H z
Channel Separation	Cs	f=10 kHz		-115		dB
		f=100 kHz		-110		dB

Table 4.

VS = 2.7 V, VCM = VS/2, TA = 25°C,unless otherwise noted.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Offset Voltage,AD8616/AD8618	Vos	Vs=3.5V at V_{CM}=0.5V and 3.0V		23	65	μV
Offset Voltage,AD8615				23	100	μV
		V_{CM}=0V to 2.7V		80	500	μV
		-40°C<T_A<+125°C			800	μV
Offset Voltage Drift,AD8616/ AD8618	△Vos/ △T	-40°C<T_A<+125°C		1.5	7	μV/°C
Offset Voltage Drift,AD8615				3	10	μV/°C
Input Bias Current	I_B			0.2	1	pA
		-40°C<T_A<+85°C			50	pA
		-40°C<T_A<+125°C			550	pA
Input Offset Current	Ios			0.1	0.5	pA
		-40°C<T_A<+85°C			50	pA
		-40°C<T_A<+125°C			250	pA
Input Voltage Range			0		2.7	V
Common-Mode Rejection Ratio	CMRR	V_{CM}=0V to 2.7V	80	100		dB
Large Signal Voltage Gain	Avo	RL=2kΩ,Vo=0.5V to 2.2V	55	150		V/mV
Input Capacitance	C_{DIFF}			2.5		pF
	C_{CM}			7.8		pF
OUTPUT CHARACTERISTICS						
Output Voltage High	V_{OH}	I_L=1mA	2.65	2.68		V
		-40°C<TA<+125°C	2.6			V
Output Voltage Low	V_{OL}	I_L=1mA		11	25	mV
		-40°C<T_A<+125°C			30	mV
Output Current	I_{OUT}			±50		mA
Closed-Loop Output Impedance	Z_{OUT}	f=1 MHz,Av=1		3		Ω
POWER SUPPLY						
Power Supply Rejection Ratio	PSRR	Vs=2.7V to 5.5V	70	90		dB
Supply Current per Amplifier	I_{SY}	Vo=0V		1.7	2	mA
		-40°C<T_A<+125°C			2.5	mA

Table 4. (Continued)

VS = 2.7 V, VCM = VS/2, TA = 25°C,unless otherwise noted.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
DYNAMIC PERFORMANCE						
Slew Rate	SR	R_L=2kΩ		12		V/μs
Settling Time	ts	To 0.01%		<0.3		μs
Gain Bandwidth Product	GBP			23		MHz
Phase Margin	$Ø_M$			42		Degrees
NOISE PERFORMANCE						
Peak-to-Peak Noise	e_n p-p	0.1 Hz to 10 Hz		2.1		μV
Voltage Noise Density	e_n	f=1kHz		10		nV/√Hz
		f=10 kHz		7		nV/√Hz
Current Noise Density	i_n	f=1kHz		0.05		pA/√Hz
Channel Separation	Cs	f=10kHz		-115		dB
		f=100 kHz		-110		dB

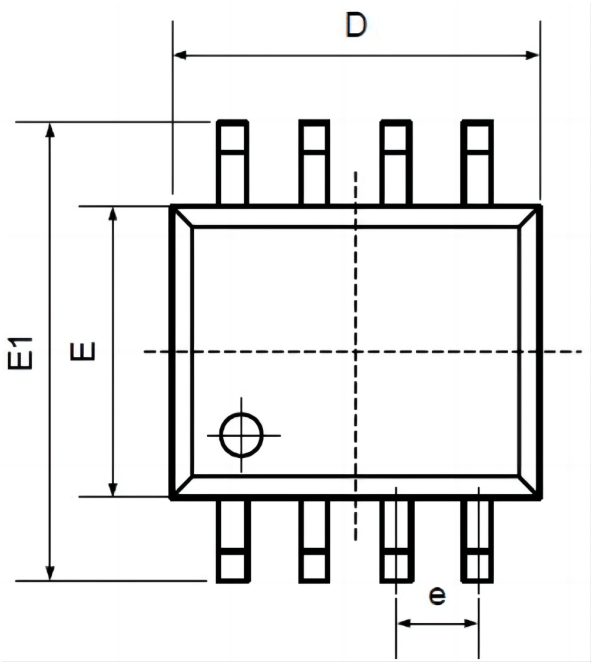
Order information

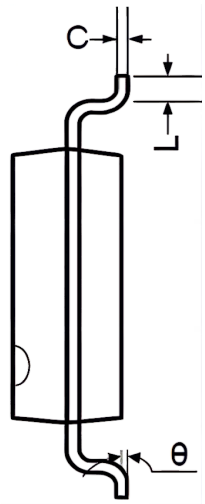
Order Number	Package	Package Quantity	Marking On The park	Temperature
AD8615AUJZ-REEL-TUDI	SOT23-5	Tape,Reel,3000	BKA	−40°C to +125°C
AD8618ARZ-REEL-TUDI	SOP8	Tape,Reel,4000	AD8618A	
AD8616ARMZ-REEL-TUDI	MSOP8	Tape,Reel,4000	A0K	
AD8618ARZ-REEL-TUDI	SOP14	Tape,Reel,4000	AD8618A	
AD8618ARUZ-REEL-TUDI	TSSOP14	Tape,Reel,4000	AD8618A	

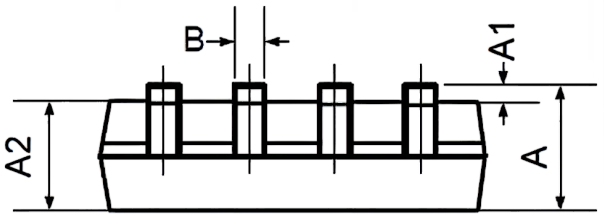
Revision history

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

Package SOP8

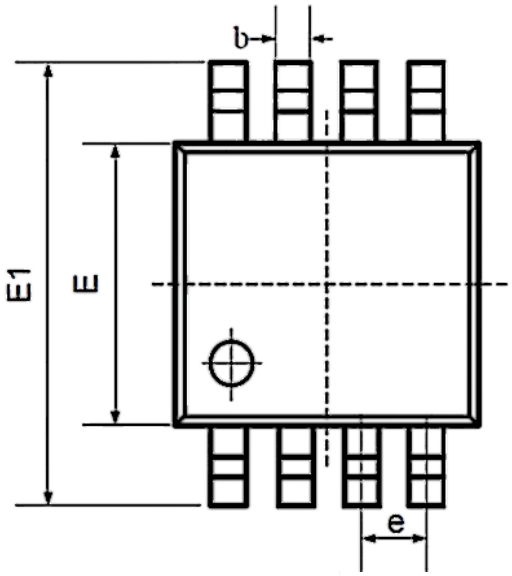


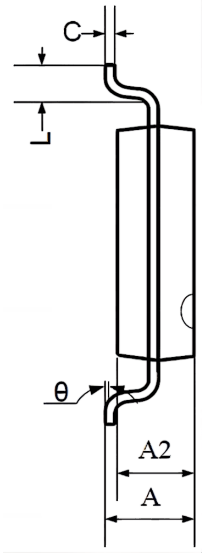


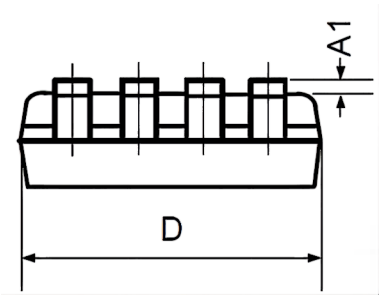


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
B	0.330	0.510	0.013	0.020
C	0.190	0.250	0.007	0.010
D	4.780	5.000	0.188	0.197
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	0.228	0.248
e	1.270TYP		0.050TYP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

Package MSOP8

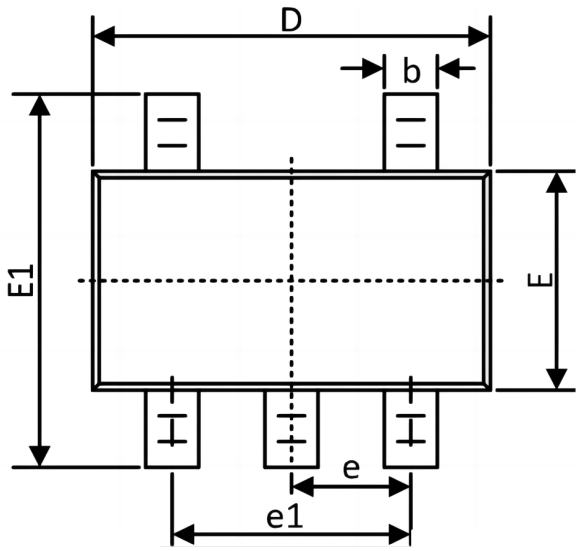


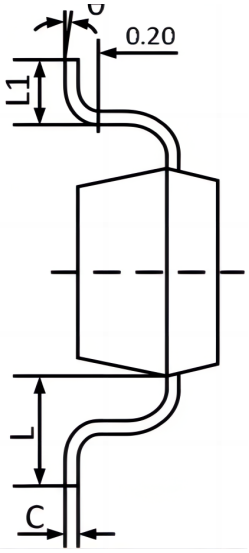


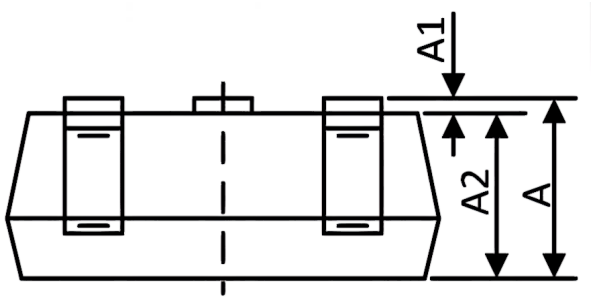


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.800	1.200	0.031	0.047
A1	0.000	0.200	0.000	0.008
A2	0.760	0.970	0.030	0.038
b	0.30 TYP		0.012 TYP	
C	0.15 TYP		0.006 TYP	
D	2.900	3.100	0.114	0.122
e	0.65 TYP		0.026 TYP	
E	2.900	3.100	0.114	0.122
E1	4.700	5.100	0.185	0.201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

Package SOT23-5

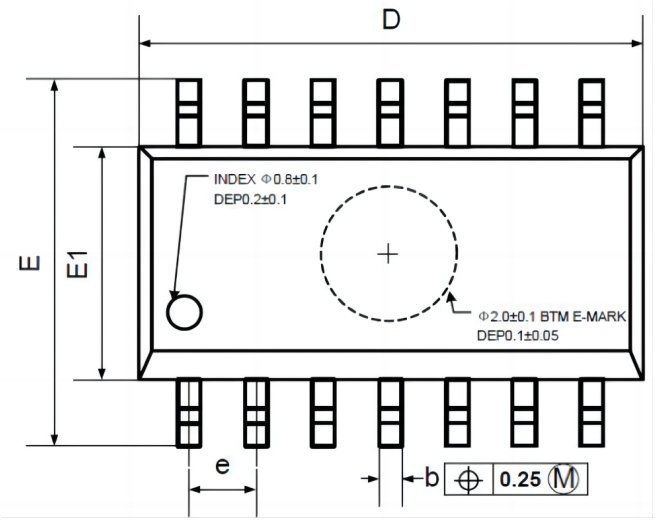


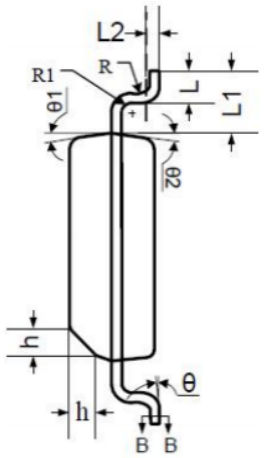


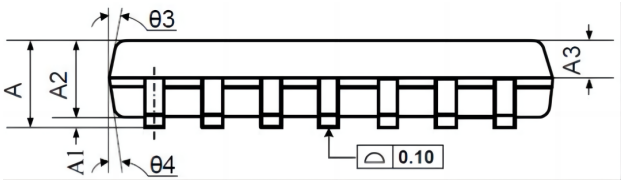


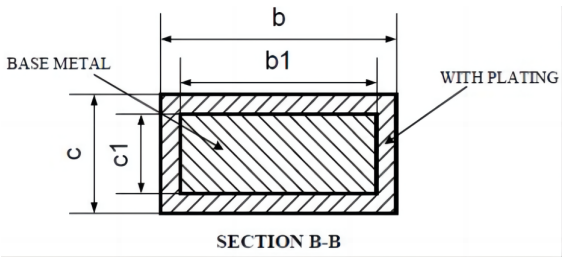
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.400	0.012	0.016
C	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950TYP		0.037TYP	
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



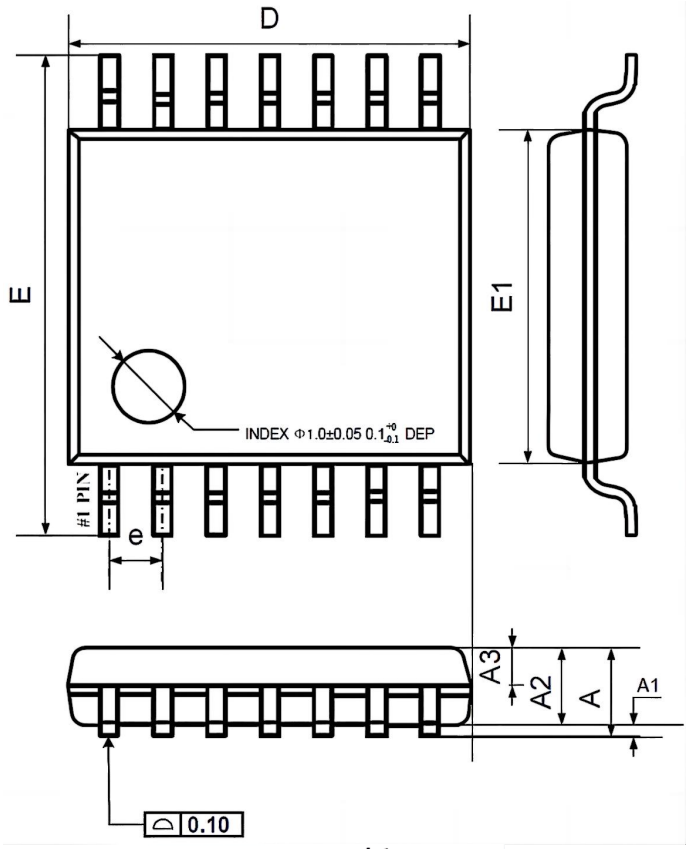


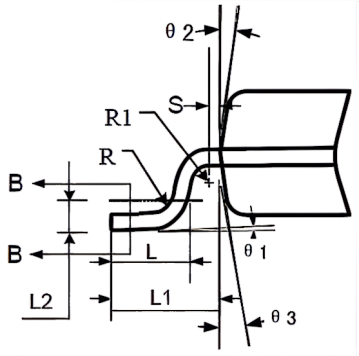


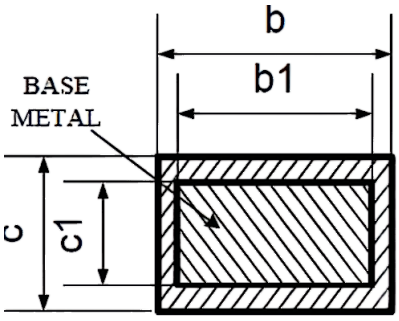


Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	1.35	1.60	1.75
A1	0.10	0.15	0.25
A2	1.25	1.45	1.65
A3	0.55	0.65	0.75
b	0.36		0.49
b1	0.35	0.40	0.45
C	0.16		0.25
c1	0.15	0.20	0.25
D	8.53	8.63	8.73
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27 BSC		
L	0.45	0.60	0.80
L1	1.04 REF		
L2	0.25 BSC		
R	0.07		
R1	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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