Features

- Wide Supply Voltage Range
- Single Supply: 2.0V to 36V
- Dual Supplies: ±1.0V to ±18V
- Low Supply Current Drain: GS2903:0.6mA GS2901:0.9mA
- Low Input Bias Current: 25nA (Typ)
- Low Input Offset Current: 5.0nA (Typ)
- Low Input Offset Voltage: ±1.0mV (Typ)
- Input Common Mode Voltage Range Includes Ground
- Differential Input Voltage Range Equals to the Power Supply Voltage
- Low Output Saturation Voltage:GS2903 200mV at 4mA ,GS2901:100 mV at 4mA
- Open Collector Output
- Output Voltage Compatible with TTL, MOS and CMOS
- Small Package:

GS2903 Available in SOP-8 and MSOP-8 Packages

GS2901 Available in SOP-14 and TSSOP-14 Packages

General Description

The GS2901/2903 series comparators consist of four and two independent precision voltage comparators with very low input offset voltage specification. They are designed to operate from a single power supply over a wide range of voltages; however operation from split power supplies is also possible. They offer low power supply current independent of the magnitude of the power supply voltage.

The GS2901/2903 series comparators are designed to directly interface with TTL and CMOS. When operating from both plus and minus power supplies, the GS2901/2903 series comparators will directly interface with MOS logic where their low power drain is a distinct advantage over standard comparators.

The dual devices are available in SO-8 and MSOP-8, and the quad devices available in SOP-14 and TSSOP-14 with industry standard pinouts. Both use green mold compound as standard.

Applications

- Battery Charger
- Cordless Telephone
- Switching Power Supply
- DC-DC Module
- PC Motherboard
- Communication Equipment

Pin Configuration

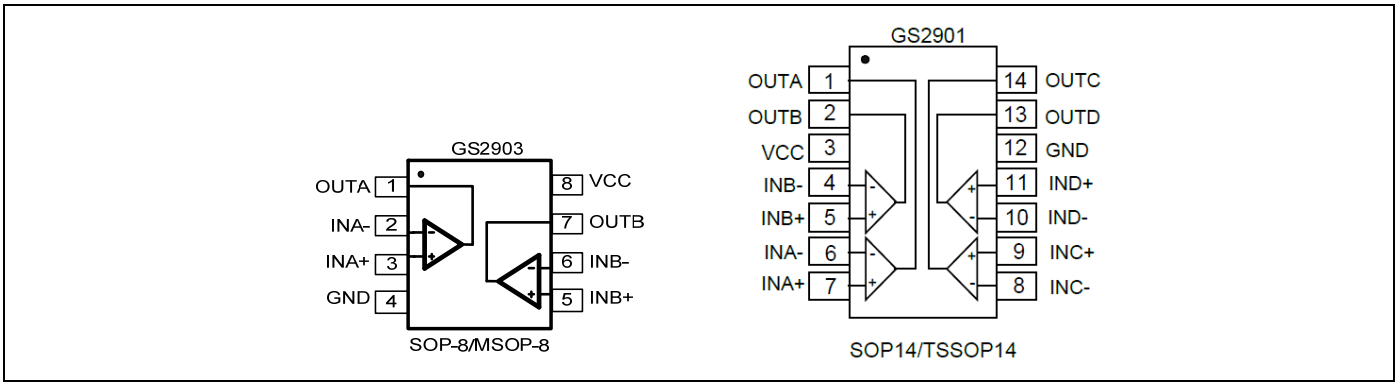


Figure 1. Pin Assignment Diagram

Functional Block Diagram

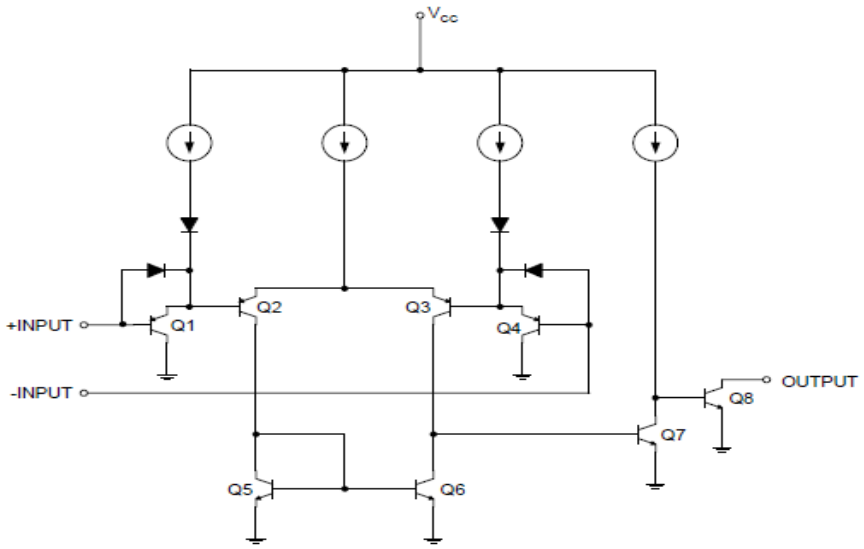


Figure 2. Functional Block Diagram of GS2901/2903 (Each comparator)

Absolute Maximum Ratings

Condition	Symbol	Max
Power Supply Voltage	Vcc	±18V or 36V
Differential input voltage	$V_{I(DIFF)}$	36V
Input Voltage	V_I	-0.3V~36V
Operating Temperature Range	T_A	-40 to +125°C
Lead Temperature (Soldering, 10 seconds)	T_{LEAD}	260°C
Operating Junction Temperature	T_J	150°C
Storage Temperature Range	Tstg	-65°C ~+150°C

Note 1: Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Max-imum Ratings" for extended periods may affect device reliability.

Note 2: This input current will only exist when the voltage at any of the input leads is driven negative. It is due to the collector-base junction of the input PNP transistors becoming forward biased and thereby acting as input diode clamps. In addition to this diode action, there is also lateral NPN parasitic transistor action on the IC chip. This transistor action can cause the output voltages of the comparators to go to the V+ voltage level (or to ground for a large overdrive) for the time duration that an input is driven negative. This is not destructive and normal output states will re-establish when the input voltage, which was negative, again returns to a value greater than -0.3 VDC at 25°C).

Package/Ordering Information

MODEL	CHANNEL	ORDER NUMBER	PACKAGE DESCRIPTION	PACKAGE OPTION	MARKING INFORMATION
GS2903	Dual	GS2903-SR	SOP-8	Tape and Reel,4000	GS2903
		GS2903-MR	MSOP-8	Tape and Reel,3000	GS2903
GS2901	Quad	GS2901-TR	TSSOP-14	Tape and Reel,3000	GS2901
		GS2901-SR	SOP-14	Tape and Reel,2500	GS2901

Electrical Characteristics

(At V_S = 5.0V, GND=0V, T_A=25°C, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	T_A	Min	Typ	Max	Unit
Input Offset Voltage	V_{OS}	VCM = VS Min Vo=1.4V Vs=5V to 30V	T_A=25℃	-	1	2	mV
			Full Range	-	-	4	
Input Bias Current	I_B		T_A=25℃	-	25	250	nA
			Full Range	-	-	500	
Input Offset Current	I_{OS}		T_A=25℃	-	5	50	nA
			Full Range	-	-	200	
Common-Mode Voltage Range	V_{CM}	V_S = 30V(Note3)	T_A=25℃	0 to V_{CC}-1.5	-	-	V
			Full Range	0 to V_{CC}-2	-	-	
Quiescent Current (GS2903)	I_Q	V_S = 30V, RL=∞	T_A=25℃	-	0.7	1.7	mA
			Full Range	-	-	3	
		V_S = 5V, RL=∞	T_A=25℃		0.6	1	mA
			Full Range		-	2	
Quiescent Current (GS2901)	I_Q	V_S = 30V, RL=∞	T_A=25℃	-	1.2	2.5	mA
			Full Range	-	-	3.5	
		V_S = 5V, RL=∞	T_A=25℃		0.9	2	mA
			Full Range		-	3	
Open-Loop Voltage Gain	A_V	Vs =15V, VR_L = 15kΩ, V_O = 1V to 11V	T_A=25℃	50	200	-	V/mV
Large Signal Response Time	-	V_{IN}=TTL Logic Swing, V_{REF}=1.4V, V_{RL}=5V, R_L=5.1kΩ	T_A=25℃	-	300	-	ns
Response Time	-	V_{RL}=5V, R_L=5.1kΩ	T_A=25℃	-	1.3	-	us
Output Sink Current	I_O(SINK)	V_{IN-}=1V, V_{IN+}=0, V_O≤1.5V	T_A=25℃	6	16	-	mA
Saturation Voltage	VSAT	V_{IN-}=1V, V_{IN+}=0, I_{SINK}≤4mA	T_A=25℃	-	200	400	mV
			Full Range	-	-	700	
Output Sink Current	I_O(LEAK)	V_{IN-}=0V,V_{IN+}=1,V_O=5V	T_A=25℃	-	0.1	-	nA
		V_{IN-}=0V,V_{IN+}=1,V_O=30V	Full Range	-	-	1	uA
Differential Input Voltage	V_{ID}	All V_{IN}≥0V	T_A=25℃	-	-	36	V
Operating Voltage Range						3	V
						36	V

Note 3: The input common-mode voltage of either input signal voltage should not be allowed to go negatively by more than 0.3V (at 25°C). The upper end of the common-mode voltage range is VCC-1.5V (at 25°C), but either or both inputs can go to +36V without damages, independent of the magnitude of the VCC.

Typical Performance characteristics

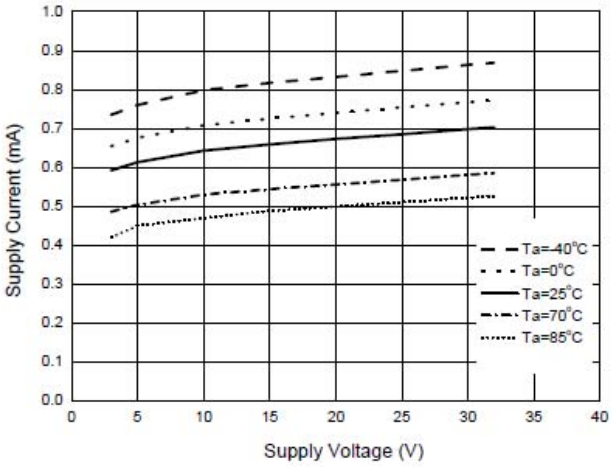


Figure 3. Supply Voltage vs. Supply Current

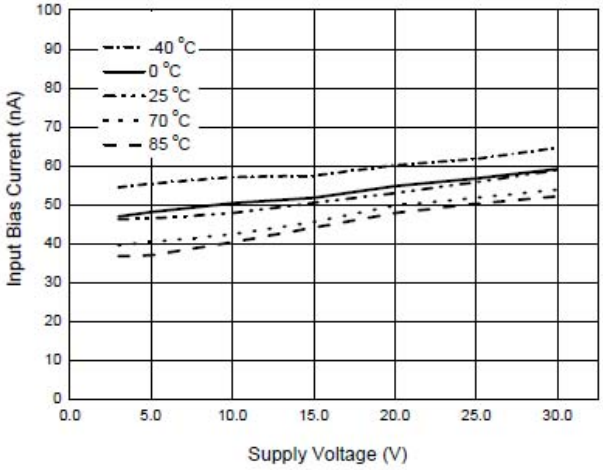


Figure 4. Supply Voltage vs. Input Bias Current

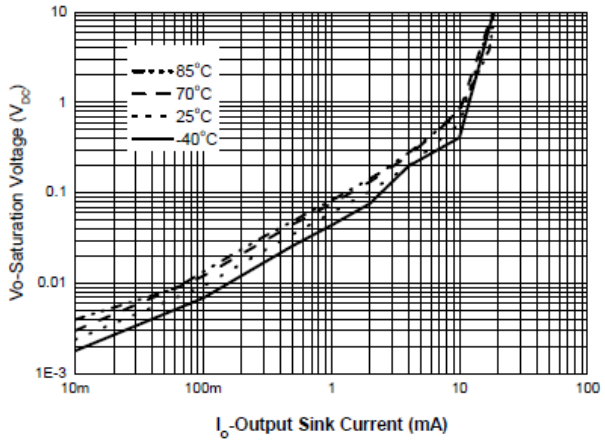


Figure 5. Output Sink Current vs. Saturation Voltage

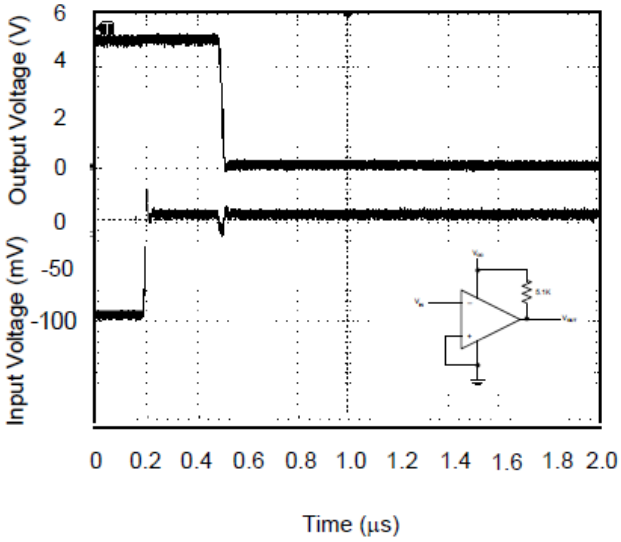


Figure 6. Response Time for 5mV Input Overdrive - Negative Transition

Typical Performance characteristics

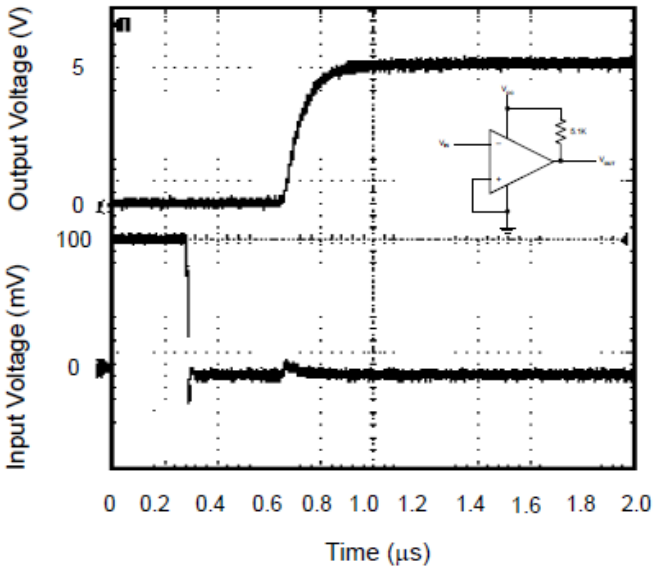
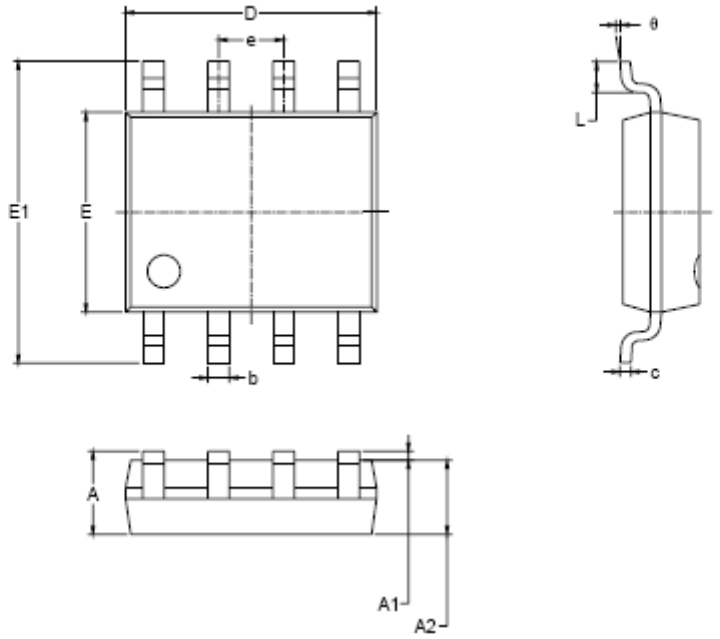


Figure 7. Response Time for 5mV Input Overdrive - Positive Transition

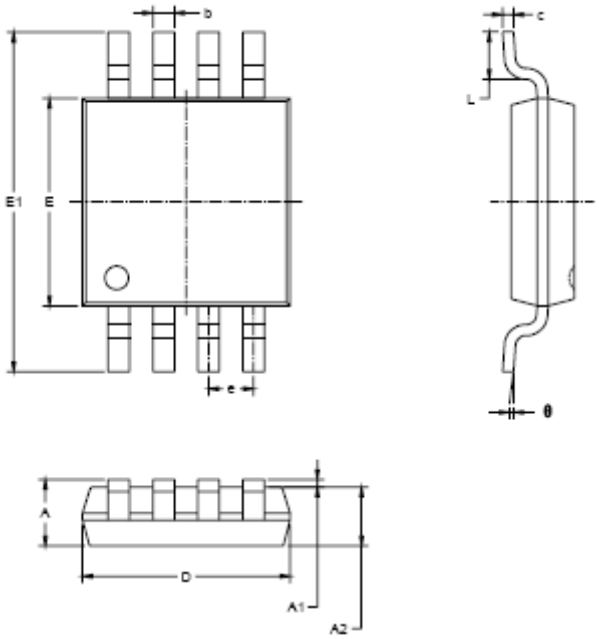
Package Information

SOP-8



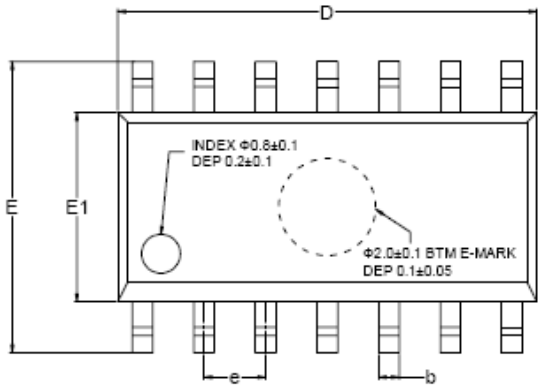
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.27 BSC		0.050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

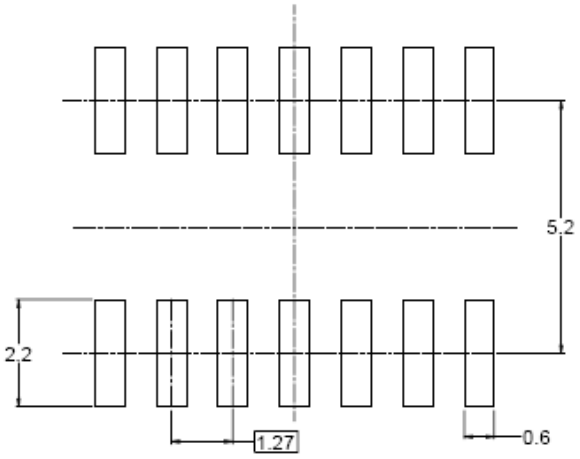
MSOP-8



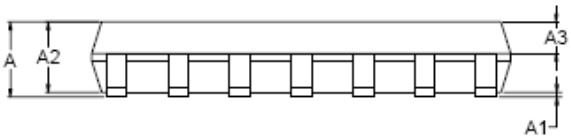
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.250	0.380	0.010	0.015
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
e	0.650 BSC		0.026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

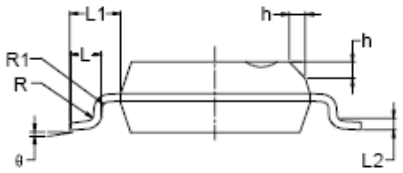
SOP-14





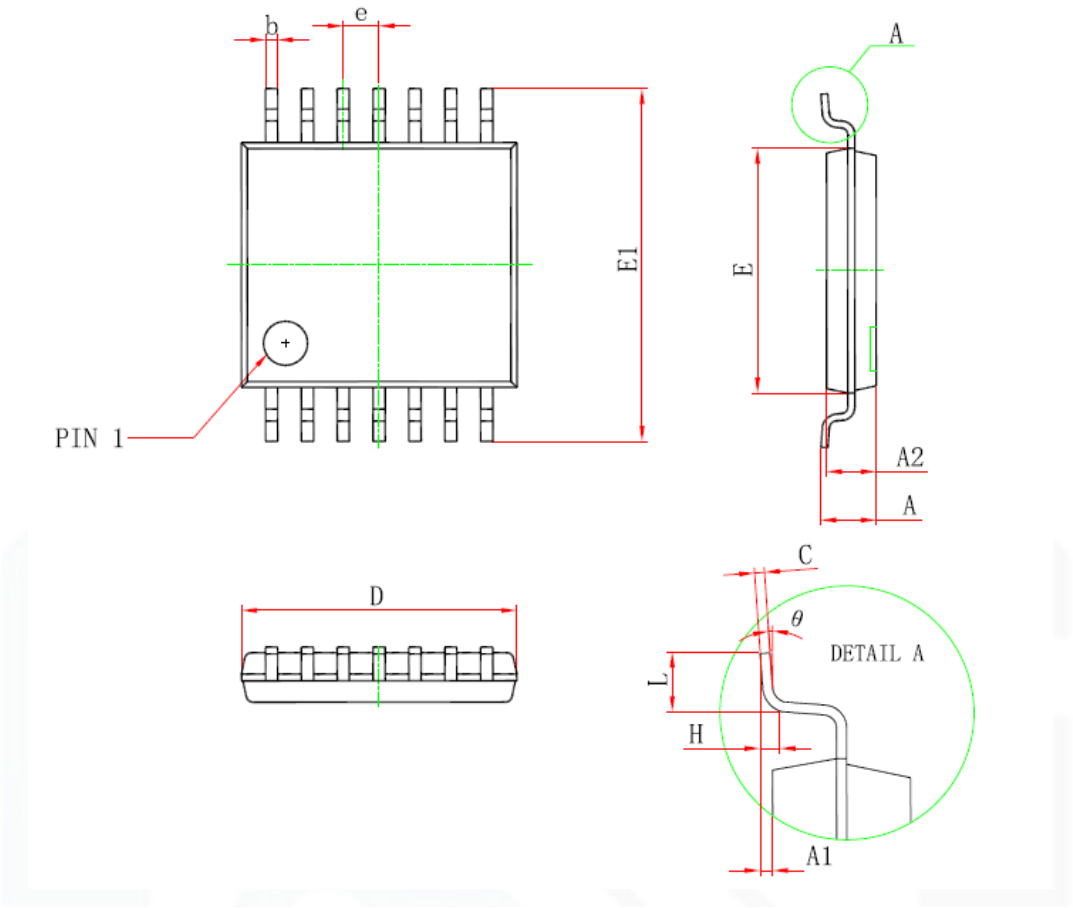
RECOMMENDED LAND PATTERN (Unit: mm)





Symbol	Dimensions In Millimeters			Dimensions In Inches		
	MIN	MOD	MAX	MIN	MOD	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°

TSSOP-14



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	**Max**	**Min**	**Max**
D	4.900	5.100	0.193	0.201
E	4.300	4.500	0.169	0.177
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
E1	6.250	6.550	0.246	0.258
A		1.200		0.047
A2	0.800	1.000	0.031	0.039
A1	0.050	0.150	0.002	0.006
e	0.65 (BSC)		0.026(BSC)	
L	0.500	0.700	0.020	0.028
H	0.25(TYP)		0.01(TYP)	
θ	1°	7°	1°	7°

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