

General Description

These family are single and dual channel voltage comparator with very low input offset voltage. They are designed to operate from a single power supply over a wide range of voltage up to 36V and operate from split power supply. They operate with low I_q in dependent of the magnitude of the power supply voltage. The comparator family are designed to directly interface with TTL and CMOS. When operating from both plus and minus power supply, these comparators could directly interface with MOS logic where their low power drain is a distinct advantage over standard comparator, the dual channel voltage comparator.

Features and Benefits

- Wide Supply: 3.0V to 36V
- Faster Response Time: 0.6us (typical)
- Low Offset Voltage: $\pm 2\text{mV}$ (typical)
- Low Input Bias Current: -33nA (typical)
- Large Voltage Gain: 110 dB (typical)
- Open Collector Output
- Input Common-Mode Voltage Range Includes Ground
- Differential Input Voltage Range Equal To Power Supply
- Extended Temperature Range: $-40^\circ\text{C} \sim +125^\circ\text{C}$

Applications

- Industrial Application
- Solar Inverter
- White Goods
- Battery Management
- System Medical Equipment

Pin Configuration (Top View)

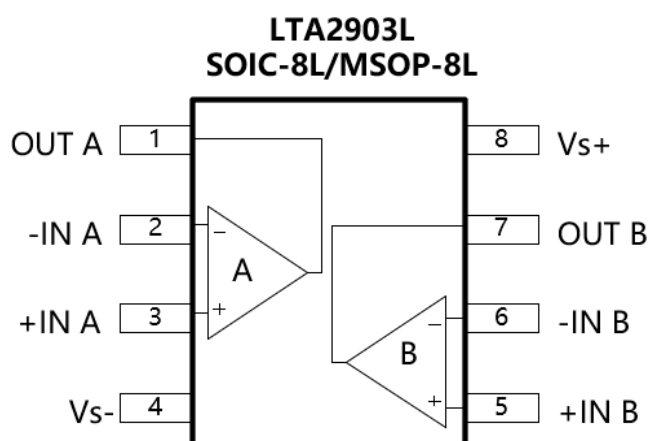
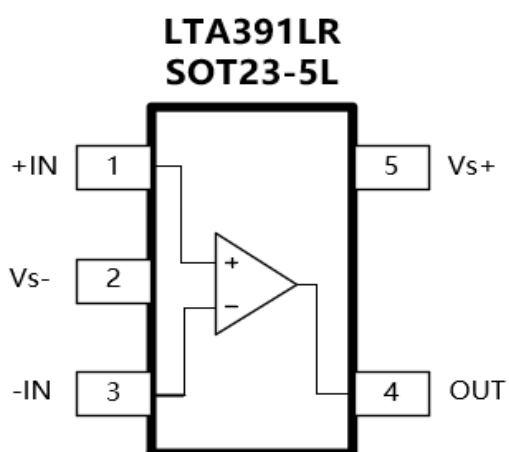
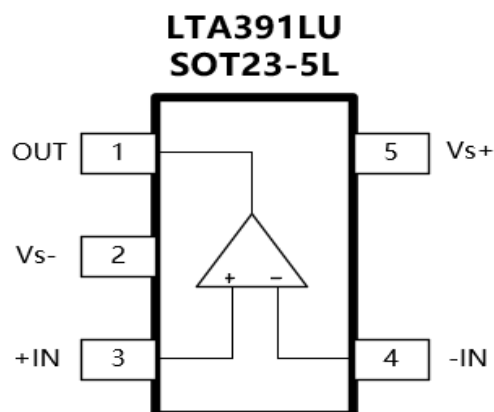
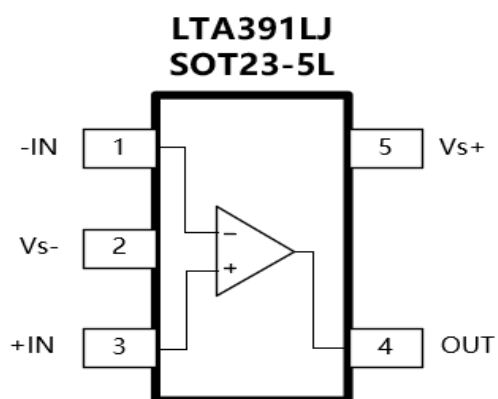


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Pin Configuration

PIN Name	LTA391LJ	LTA391LU	LTA391LR	Description
-IN	1	4	3	Inverting input
+IN	3	3	1	Noninverting input
OUT	4	1	4	Output
Vs+	5	5	5	Positive (highest) power supply
Vs-	2	2	2	Negative (low) supply or ground (for single-supply operation)

PIN Name	LTA2903L	Description
-IN A	2	Inverting input, channel A
+IN A	3	Noninverting input, channel A
-IN B	6	Inverting input, channel B
+IN B	5	Noninverting input, channel B
OUT A	1	Output, channel A
OUT B	7	Output, channel B
Vs+	8	Positive (highest) power supply
Vs-	4	Negative (low) supply or ground (for single-supply operation)

Ordering Information

Type Number	Package Name	Package Quantity	Eco Class	Mark Code
LTA2903LXS8/R8	SOIC-8L	Tape and Reel, 4 000	Green (RoHS & no Sb/Br)	X2903
LTA2903LXV8/R6	MSOP-8L	Tape and Reel, 3 000	Green (RoHS & no Sb/Br)	X2903
LTA391LJXT5/R6	SOT23-5L	Tape and Reel, 3 000	Green (RoHS & no Sb/Br)	J91
LTA391LUXT5/R6	SOT23-5L	Tape and Reel, 3 000	Green (RoHS & no Sb/Br)	U91
LTA391LRXT5/R6	SOT23-5L	Tape and Reel, 3 000	Green (RoHS & no Sb/Br)	R91

Limiting Value

In accordance with the Absolute Maximum Rating System (IEC60134).

Parameter	Absolute Maximum Rating
Supply Voltage, V_{S+} to V_{S-}	36 V
Signal Input Terminals: Voltage	$V_{S-} - 0.3V$ to V_{S+}
Output Short-Circuit	Continuous
Storage Temperature Range, T_{stg}	-65 °C to +150 °C
Junction Temperature, T_j	150 °C
Lead Temperature Range (Soldering 10 sec)	260 °C

ESD Ratings

Parameter	Level	Unit
Human body model (HBM), per ANSI/ESDA/JEDEC JS-001	800	V
Charged device model (CDM), per ANSI/ESDA/JEDEC JS-002	2000	V

Thermal Information

Thermal Metric	Package	Level	Unit
θ_{JA} Package Thermal Resistance	SOIC-8L	160	°C/W
	MSOP-8L	180	
	SOT23-5L	190	

Electrical Characteristics

$V_S = +5.0\text{ V}$, $T_A = 25^\circ\text{C}$, unless otherwise noted.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
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DC PERFORMANCE

Input Offset Voltage	V_{OS}	$V_{IC} = V_{CM}\text{ Min}$, $V_{OUT} = 1.4\text{V}$, $V_S = 5\text{V to Max}$, $R_S = 0\ \Omega$		± 2	± 7	mV
		$V_{IC} = V_{CM}\text{ Min}$, $V_{OUT} = 1.4\text{V}$, $V_S = 5\text{V to Max}$, $R_S = 0\ \Omega$, $T_A = -40^\circ\text{C to } +125^\circ\text{C}$			± 10	
Input Bias Current	I_B	$V_{CM} = 0$		-33	-200	nA
		$V_{CM} = 0$, $T_A = -40^\circ\text{C to } 125^\circ\text{C}$			-500	
Input Offset Current	I_{OS}	$V_{CM} = 0$		2	50	nA
		$V_{CM} = 0$, $T_A = -40^\circ\text{C to } 125^\circ\text{C}$			150	
Open-loop voltage gain	A_{VOL}	$V_S = 15\text{V}$, $V_{OUT} = 1.0\text{V to } 11\text{V}$ $R_L \geq 2\text{k}\Omega$	90	110		dB
		$V_S = 15\text{V}$, $V_{OUT} = 1.0\text{V to } 11\text{V}$ $R_L \geq 2\text{k}\Omega$, $T_A = -40^\circ\text{C to } +125^\circ\text{C}$	90			

INPUT CHARACTERISTICS

Input Common Mode Voltage Range	V_{CM}	$V_S = 30\text{V}$, $T_A = -40^\circ\text{C to } +125^\circ\text{C}$ (Note 1)	V_{S-}		$V_{S+} - 2$	V
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OUTPUT CHARACTERISTICS

Low Output Voltage Swing	V_{OL}	$V_{ID} = -1\text{V}$, $I_{OL} = 4\text{mA}$		200	300	mV
Output Current	I_{source}	$V_{ID} = 1\text{V}$, $V_{OH} = 5\text{V}$		0.001		mA
	I_{sink}	$V_{ID} = -1\text{V}$, $V_{OL} = 1.5\text{V}$	6	16		

POWER SUPPLY

Operating Supply Voltage	V_S	$T_A = -40\text{ to } +125^\circ\text{C}$	3		36	V
Quiescent Current (Per amplifier)	I_Q	$V_S = 5.0\text{ V}$, $V_{OUT} = 0.5V_{CC}$, No Load		280	330	μA
		$V_S = 36\text{ V}$, $V_{OUT} = 0.5V_{CC}$, No Load		310	400	
Propagation delay time	$T_{(pd)}$	R_L connected to 5 V through 5.1 k Ω		0.6		μs
		$V_{IN} = \text{TTL Logic Swing}$, $V_{REF} = 1.4\text{V}$		100		ns

Note 1: The input common-mode voltage of either input signal voltage should not be allowed to go negative by more than 0.3V (@ $+25^\circ\text{C}$). The upper end of the common-mode voltage range is $V_{CC} - 1.5\text{V}$ (@ $+25^\circ\text{C}$), but either or both inputs can go to $+36\text{V}$ without damage, independent of the magnitude of V_{CC} .

Typical Characteristics

$V_S = 5.0\text{ V to }36\text{ V}$, $T_A = +25^\circ\text{C}$, $V_{CM} = V_{OUT} = V_S/2$, and $R_L = 10\text{ k}\Omega$ connected to $V_S/2$, unless otherwise noted.

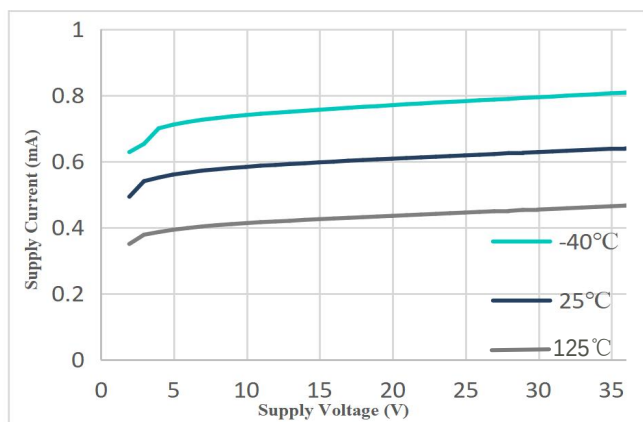


Figure 1. Supply Current vs Supply Voltage

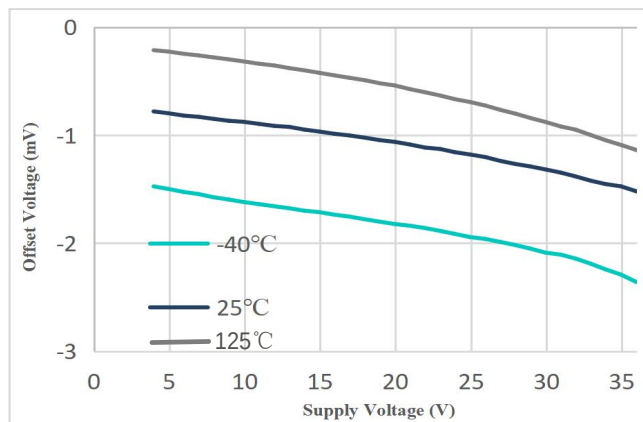


Figure 2. Offset voltage vs Supply Voltage

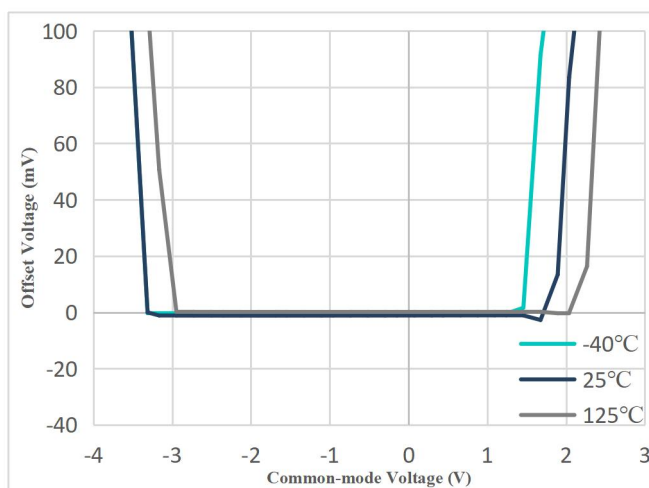
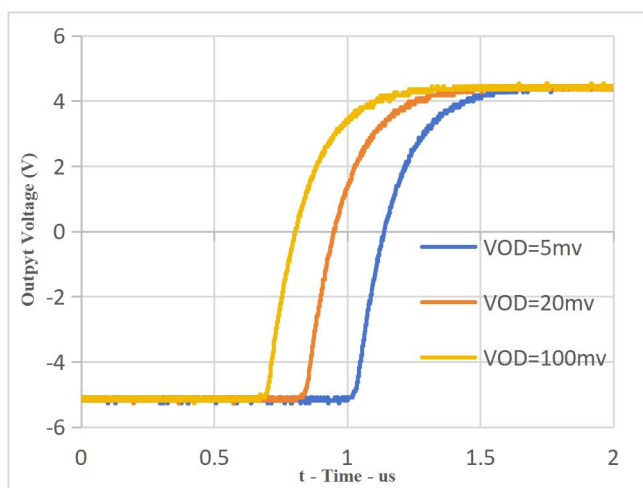
Figure 3. Offset voltage vs Common-mode Voltage ($V_S=5\text{V}$)

Figure 4. Propagation Delay Falling Edge

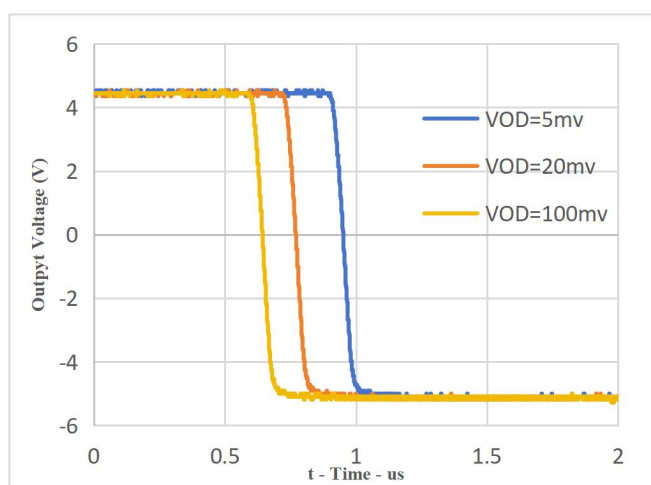
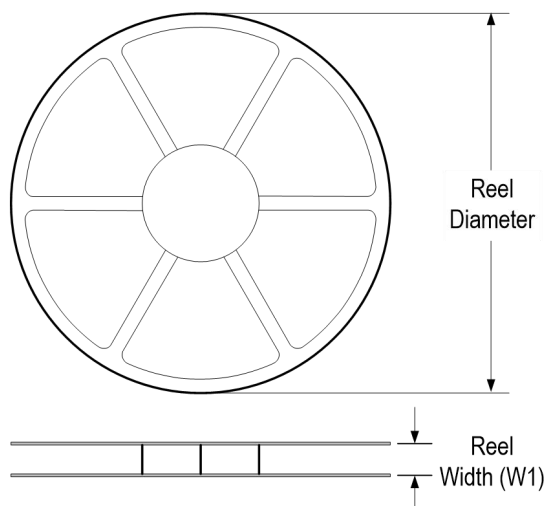


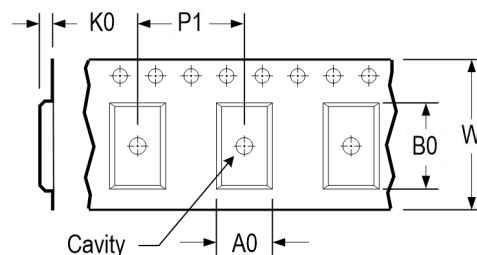
Figure 5. Propagation Delay Rising Edge

Tape and Reel Information

REEL DIMENSIONS

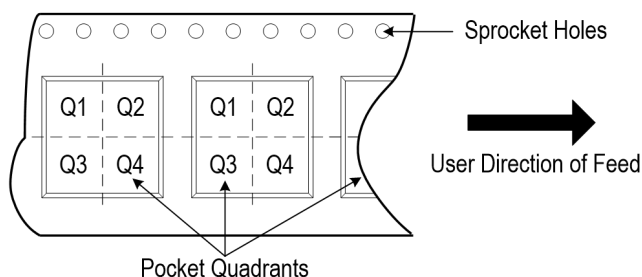


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE

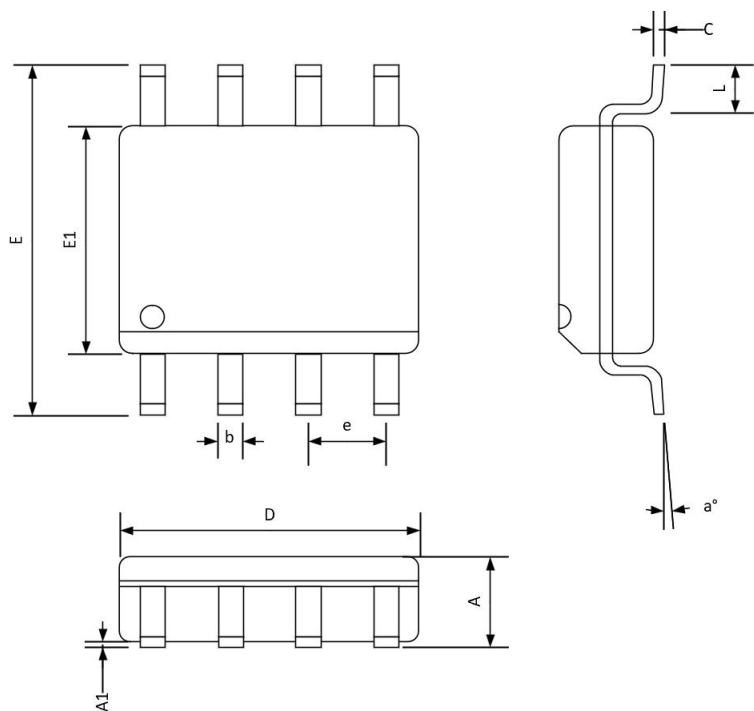


* All dimensions are nominal

Device	Package Type	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin 1 Quadrant
LTA2903LXS8/R8	SOIC	8	4 000	330	12.5	6.6	5.3	2.0	8.0	12.0	Q1
LTA2903LXV8/R6	MSOP	8	3 000	330	12.5	5.0	3.5	2.0	8.0	12.0	Q1
LTA391LJXT5/R6	SOT23	5	3 000	178	9.5	3.3	3.2	1.5	4.0	8.0	Q3
LTA391LUXT5/R6	SOT23	5	3 000	178	9.5	3.3	3.2	1.5	4.0	8.0	Q3
LTA391LRXT5/R6	SOT23	5	3 000	178	9.5	3.3	3.2	1.5	4.0	8.0	Q3

Package Outlines

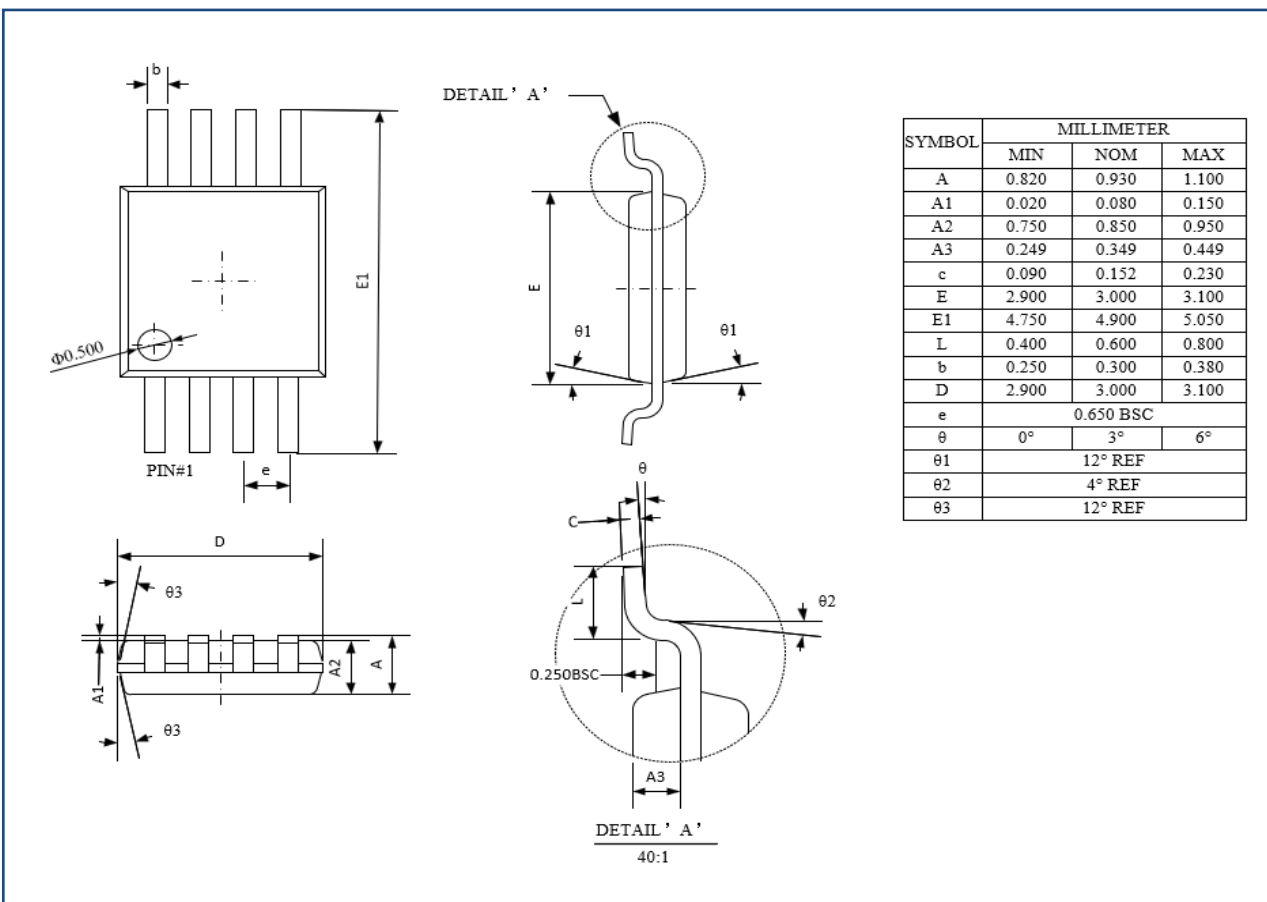
DIMENSIONS, SOIC-8L



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	--	--	1.75
A1	0.10	--	0.23
b	0.35	--	0.48
c	0.19	--	0.25
D	4.70	4.90	5.00
E	5.80	6.00	6.20
E1	3.70	3.90	4.10
e	1.27BSC		
L	0.50	--	0.80
a°	0°	--	8°

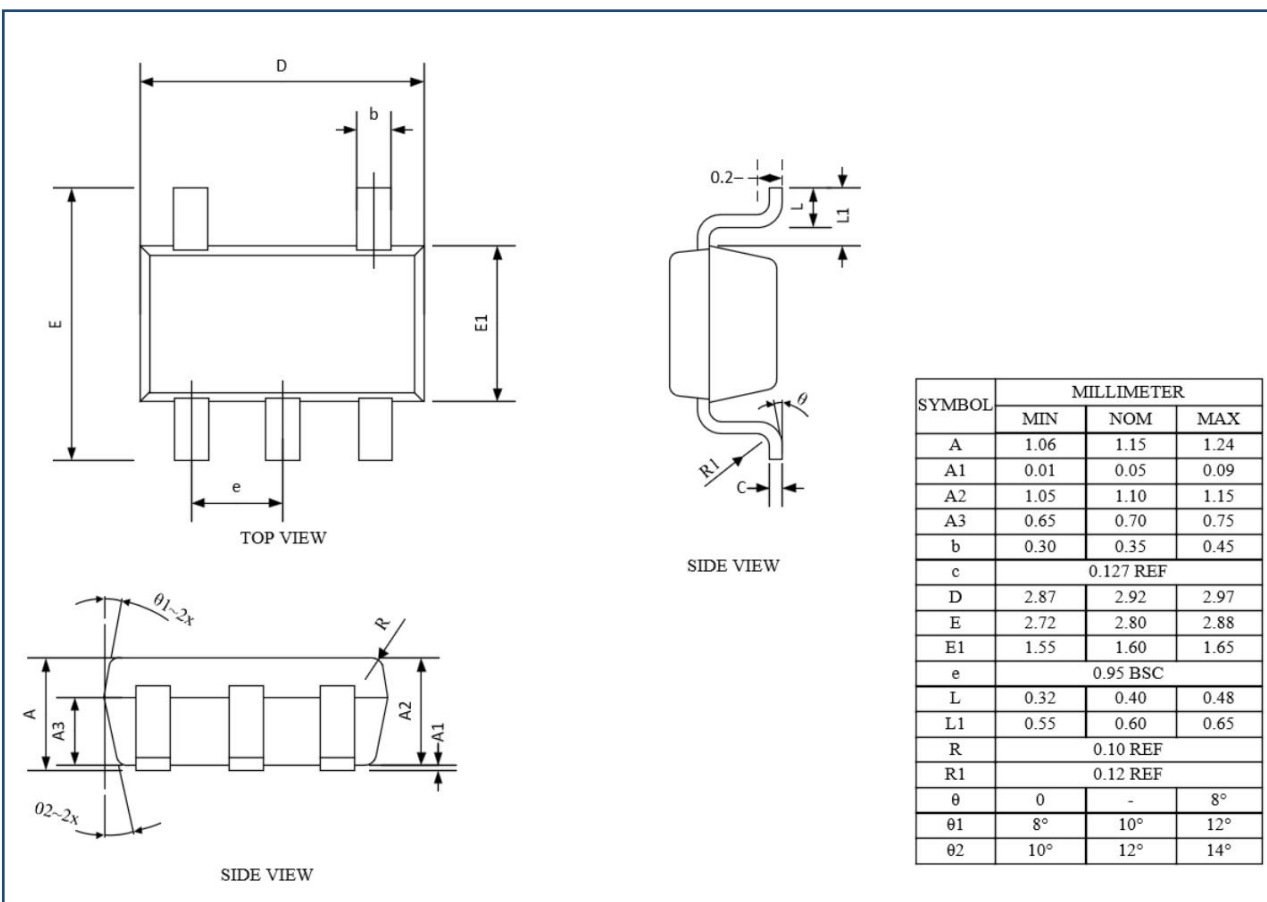
Package Outlines (cont.)

DIMENSIONS, MSOP-8L



Package Outlines (cont.)

DIMENSIONS, SOT23-5L



Important Notice

Linearin is a global fabless semiconductor company specializing in advanced high-performance high-quality analog/mixed-signal IC products and sensor solutions. The company is devoted to the innovation of high performance, analog-intensive sensor front-end products and modular sensor solutions, applied in multi-market of medical & wearable devices, smart home, sensing of IoT, intelligent industrial & smart factory (industry 4.0), and automotives. Linearin's product families include widely-used standard catalog products, solution-based application specific standard products (ASSPs) and sensor modules that help customers achieve faster time-to-market products. Go to <http://www.linearin.com> for a complete list of Linearin product families.

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