LTA2902L
36V Industry-Standard Operational Amplifiers

General Description

The LTA2902L amplifier is the industry-standard operational amplifiers that is quad channel of high-voltage(36V) op-amps. This device provides outstanding value for cost-sensitive applications, with features including low offset, common-mode input range to ground. This standard op-amp could simplify circuit design with enhanced features, such as unity gain stability and lower quiescent current of 250μA per amplifier (typical). The quad of LTA2902L is offered in both SOIC-14 and TSSOP-14 packages.

Features and Benefits

- Wide Supply: ±1.5 V to ±18 V, 3.0 V to 36 V
- Extended Temperature Range: -40℃ ~ +125℃
- Offset Voltage: ±1 mV (typical)
- Offset Voltage Temperature Drift: 7μV/°C
- Input Common-Mode Voltage Range Includes Ground
- Large Voltage Gain: 120 dB (typical)
- Gain Bandwidth: 0.6MHz
- Slew Rate: 0.3 V/μs
- Quiescent Current: 142 μA/ch (typical)
- Large Output Voltage Swing: 0.8 V to Vcc - 2 V

Applications

- Merchant network and server power supply units
- Multi-functional printers
- Power supplies and mobile chargers
- Motor control: AC induction, BDC, BLDC and stepper Motor .,etc
- Indoor and outdoor air conditioners
- Washers, dryers, and refrigerators
- AC inverters, string inverters, central inverters
- Electronic point-of-sale systems

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Table of Content

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Ordering Information[1]

Part Number	Package Type	Package Size	Package Quantity	ECO Class[2]	Mark Code[3]
LTA2902LXS14/R5	SOIC-14L	8.73 mm * 3.95 mm	Tape and Reel, 2 500	Green (RoHS & no Sb/Br)	X2902
LTA2902LXT14/R6	TSSOP-14L	4.96 mm * 4.40 mm	Tape and Reel, 3 000	Green (RoHS & no Sb/Br)	X2902

(1) Please contact to your Linearin representative for the latest availability information and product content details.

(2) Eco Class - The planned eco-friendly classification: Pb-Free (RoHS) or Green (RoHS & Halogen Free).

(3) There may be multiple device markings, or additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

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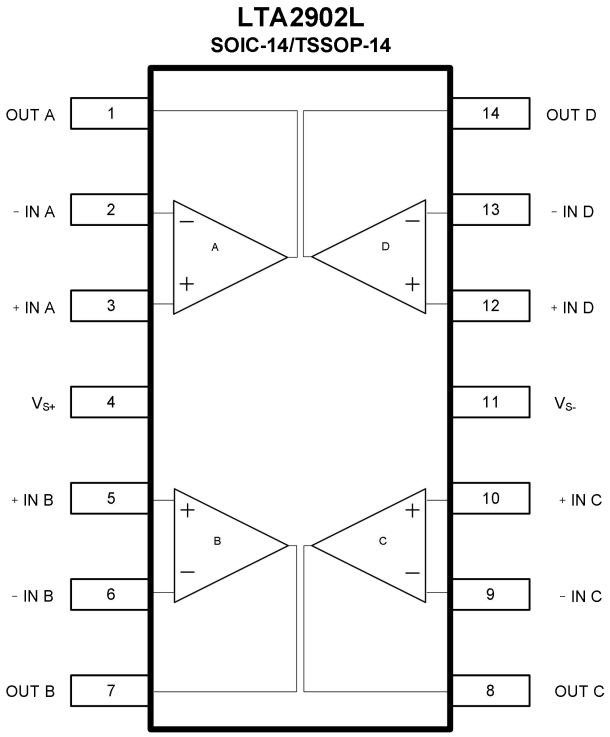
Pin Configuration (Top View)



PIN Name	LTA2902L	Description
-IN A	2	Inverting input, channel A
+IN A	3	Non-inverting input, channel A
OUT A	1	Output，channel A
V_{S-}	11	Negative power supply
-IN B	6	Inverting input, channel B
+IN B	5	Non-inverting input, channel B
OUT B	7	Output，channel B
V_{S+}	4	Positive power supply
-IN C	9	Inverting input, channel C
+IN C	10	Non-inverting input, channel C
OUT C	8	Output，channel C
-IN D	13	Inverting input, channel D
+IN D	12	Non-inverting input, channel D
OUT D	14	Output，channel D

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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-001-2023 (1)	500	V
Charged device model (CDM), per JESD22-C101	1000	V

JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process. Manufacturing with less than 500-V HBM is possible if necessary precautions are taken.

JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process. Manufacturing with less than 250-V CDM is possible if necessary precautions are taken.

Thermal Information

Thermal Metric		Package	Level	Unit
θ_{JA}	Package Thermal Resistance	SOIC-14L	115	℃/W
		TSSOP-14L	112	

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Electrical Characteristics

V_S = +5.0 V, T_A = 25℃, unless otherwise noted.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
DC PERFORMANCE						
Input Offset Voltage	V_{OS}	V_{IC} = V_{CM} Min, V_{OUT} = 1.4V, V_{cc} = 5V to Max, Rs = 0Ω		±1	±5	mV
		V_{IC} = V_{CM} Min, V_{OUT} = 1.4V, V_{cc} = 5V to Max, Rs = 0Ω, T_A = -40℃ to +125℃			±7	
Input Offset Voltage vs Temperature	dV_{os} / dT	Rs = 0Ω, T_A = -40℃ to 125℃		±7		μV/℃
Input Bias Current	I_B	V_{CM} = 0		-12	-35	nA
		V_{CM} = 0, T_A = -40℃ to 125℃		-20	-50	
Input Offset Current	I_{OS}	V_{CM} = 0		0.5	4	nA
		V_{CM} = 0, T_A = -40℃ to 125℃			50	
Open-loop voltage gain	A_{VOL}	V_S = 15V, V_{OUT} = 1.0V to 11V R_L ⩾ 2kΩ	100	120		dB
		V_S = 15V, V_{OUT} = 1.0V to 11V R_L ⩾ 2kΩ, T_A = −40℃ to +125℃	90	107		
NOISE and DISTORTION PERFORMANCE						
Input Voltage Noise Density	e_n	f = 1 kHz		15		nV/√Hz
INPUT CHARACTERISTICS						
Input Common Mode Voltage Range	V_{CM}	V_S = 30V, T_A = −40℃ to +125℃ (Note 1)	V_{S-}		V_{S+} - 2	V
Common Mode Rejection Rate	CMRR	DC, V_{CM} = 0V to V_{CC} - 1.5V	75	80		dB
DYNAMIC PERFORMANCE						
Gain-Bandwidth Product	GBP	R_L = 1MΩ, C_L = 20pF		0.6		MHz
Slew Rate	SR	R_L = 1MΩ, C_L = 30pF, V_i = ±10V		0.3		V/μs
OUTPUT CHARACTERISTICS						
High Output Voltage Swing	V_{OH}	V_S = 30 V, R_L = 2 kΩ, T_A = −40℃ to +125℃	26			V
		V_S = 30 V, R_L = 10 kΩ, T_A = −40℃ to +125℃	27	28		
Low Output Voltage Swing	V_{OL}	R_L = 10 kΩ, T_A = −40℃ to +125℃		0.8		V
Short-Circuit Current	I_{SC}	V_S = ±15 V, V_O = 0V		±30	±40	mA
POWER SUPPLY						
Operating Supply Voltage	V_S	T_A = -40 to +125 ℃	3		36	V
Power Supply Rejection Ratio	PSRR	V_S = 5.0 V to 30 V	80	91		dB
Quiescent Current (Per amplifier)	I_Q	V_S = 5.0 V, V_{OUT} = 0.5V_{CC}, No Load		142	280	μA
		V_S = 36 V, V_{OUT} = 0.5V_{CC}, No Load		196	400	

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°C). The upper end of the common-mode voltage range is V_{cc} -1.5V (@ +25°C), but either or both inputs can go to +36V without damage, independent of the magnitude of V_{cc}.

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Typical Characteristics

V_S = 5.0 V to 36V, T_A = +25 °C, V_{CM} = V_{OUT} = V_S /2, and R_L = 10 kΩ connected to V_S /2, unless otherwise noted.

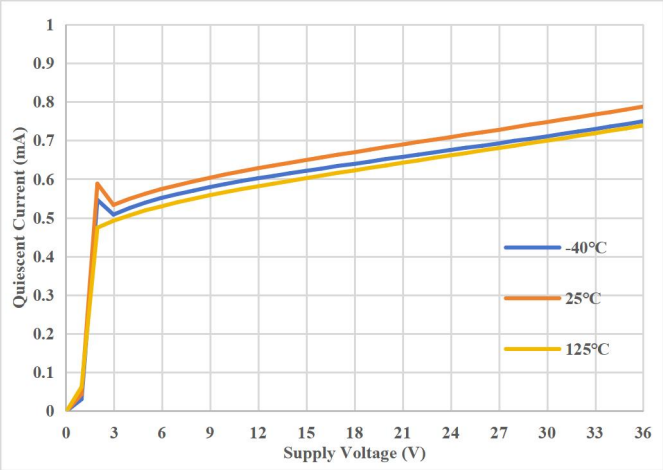

Figure 1. Quiescent Current vs Supply Voltage

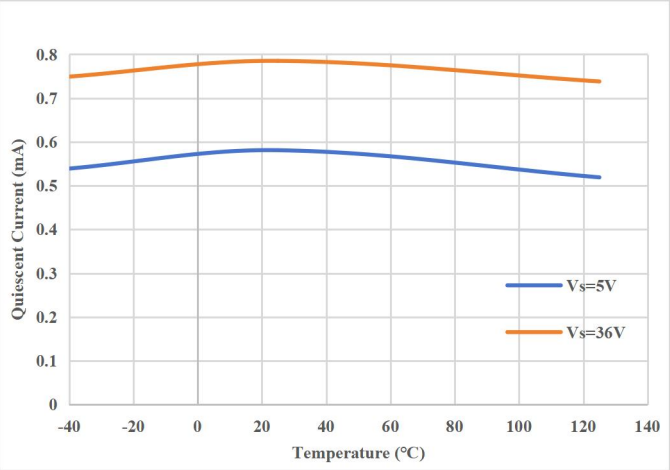

Figure 2. Quiescent Current vs Temperature

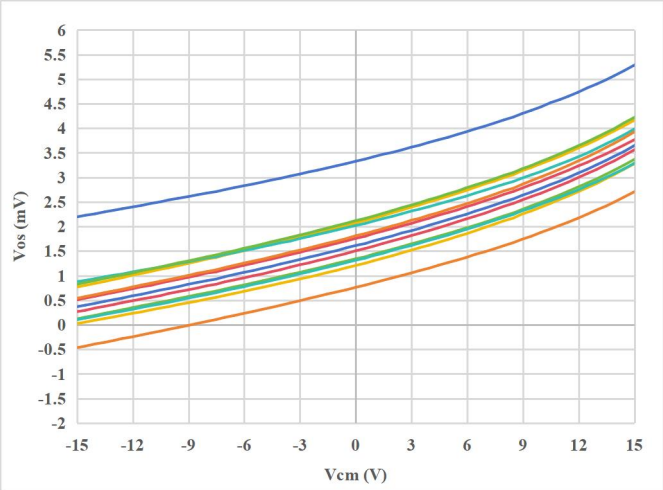

Figure 3. Offset voltage vs Common-mode Voltage

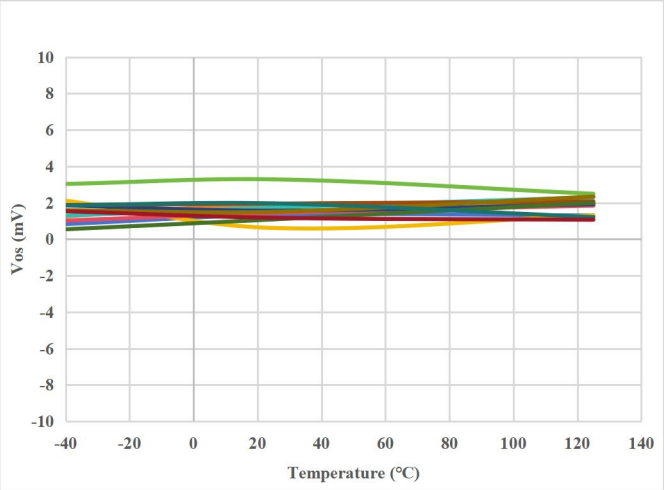

Figure 4. Offset voltage vs Temperature

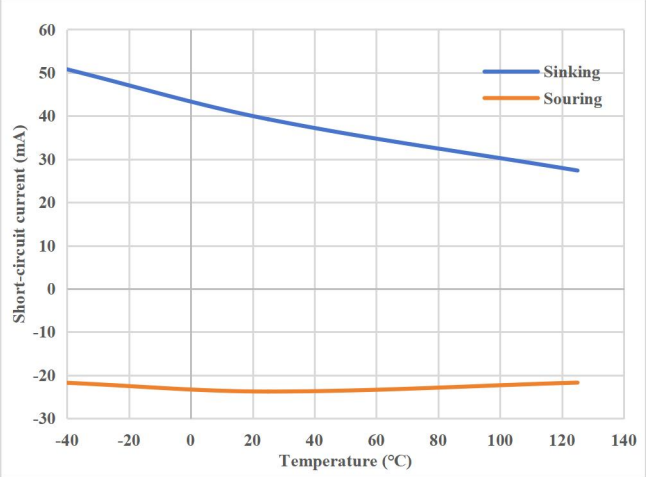

Figure 5. Short-circuit current vs Temperature Vs=30V

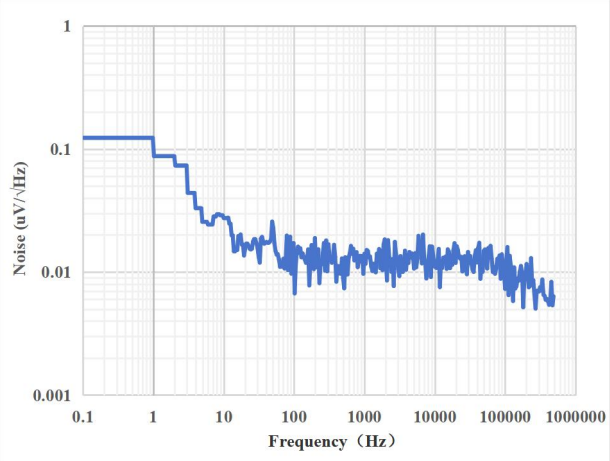

Figure 6. Input Voltage Noise Spectral Density vs Frequency

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Typical Characteristics

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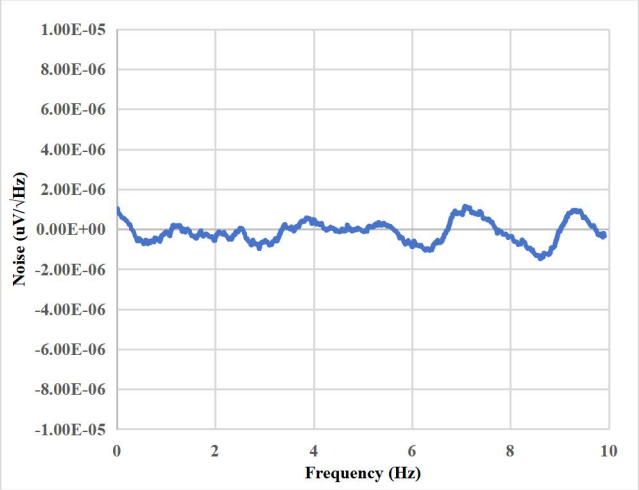

Figure 7. 0.1-10Hz Noise Spectral Density vs Frequency

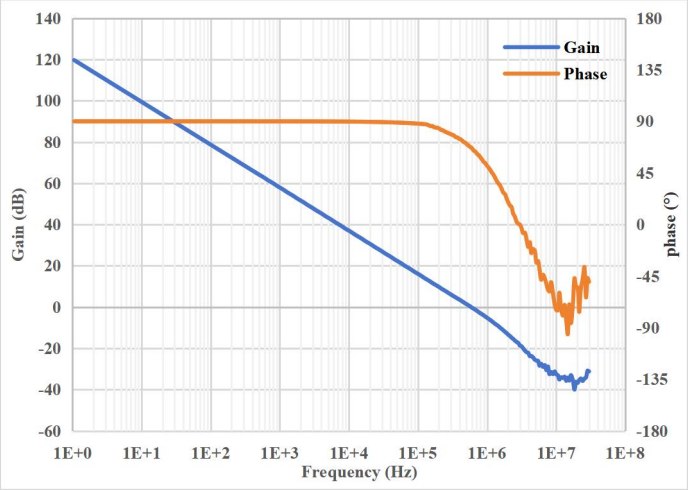

Figure 8.Open-Loop gain and phase vs Frequency

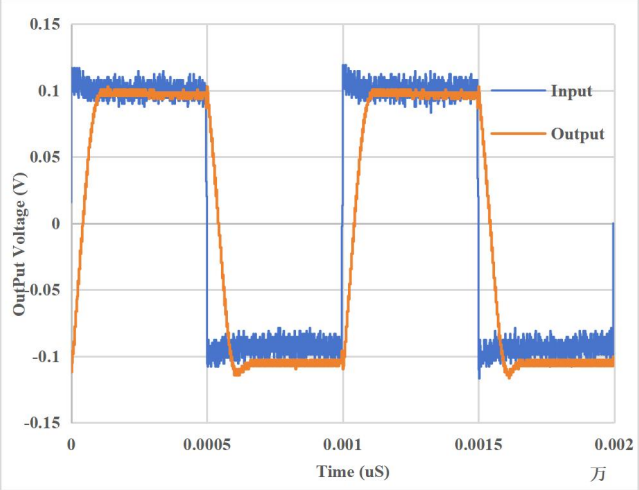

Figure 9. Small signal step response, G=1

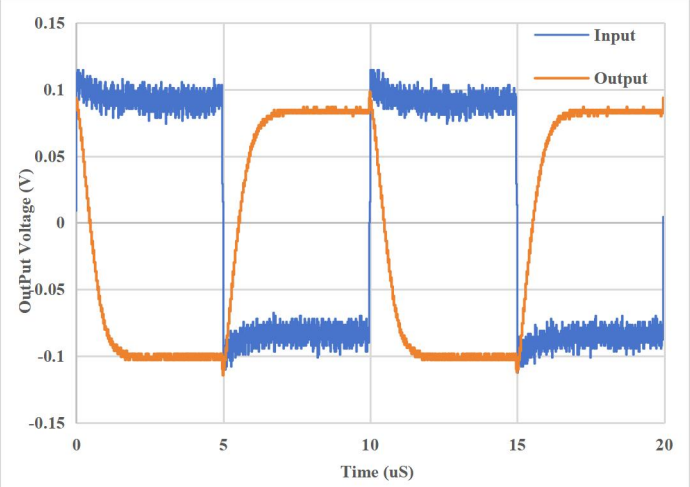

Figure 10. Small signal step response, G= -1

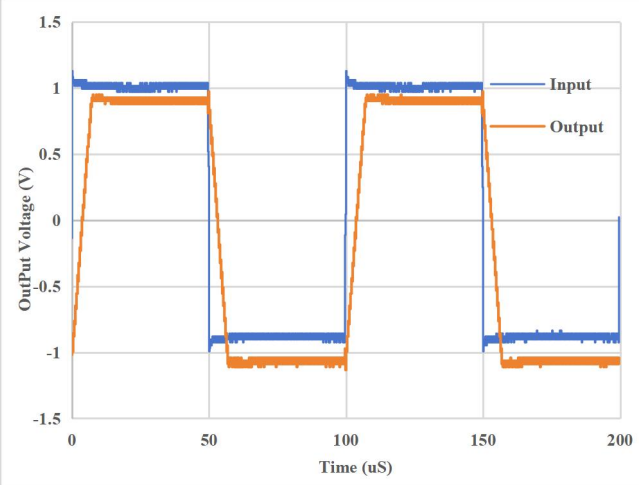

Figure 11. Large signal step response, G= 1

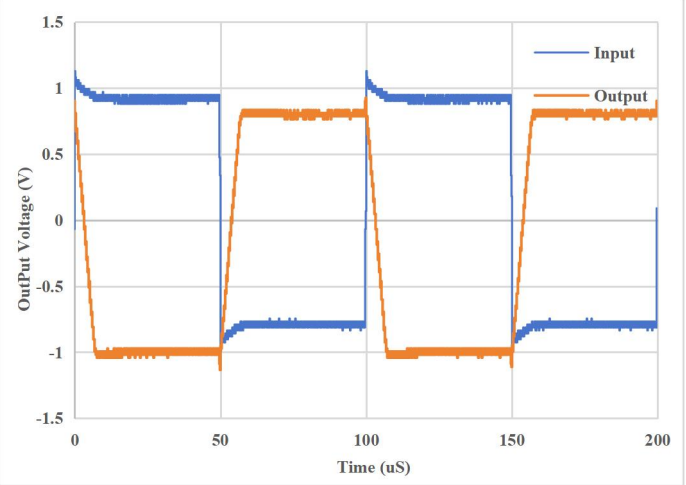

Figure 12. Large signal step response, G= -1

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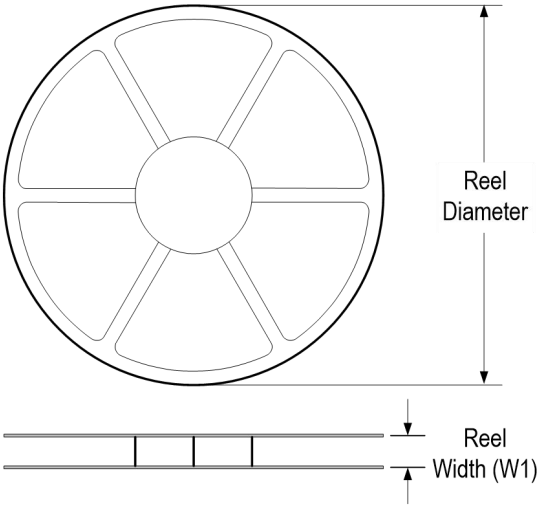
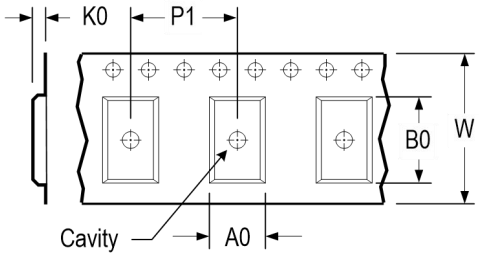
Tape and Reel Information

REEL DIMENSIONS

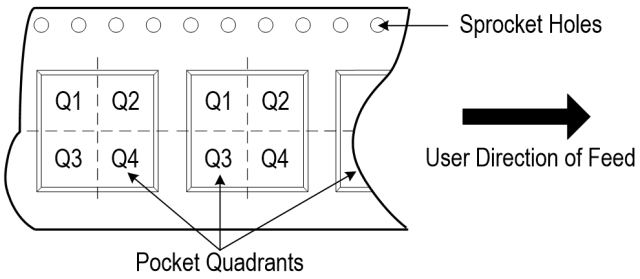


TAPE DIMENSIONS



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 ORIETATION 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
LTA2902LXS14/R5	SOIC	14	2 500	330	18	8.5	1.1	2.0	8.5	1.6	Q1
LTA2902LXT14/R6	TSSOP	14	3 000	330	18	8.5	1.1	2.0	8.5	1.6	Q1

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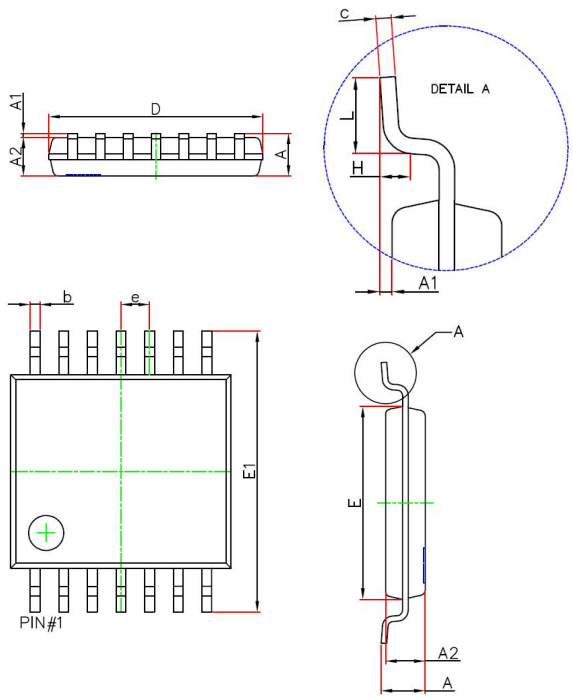
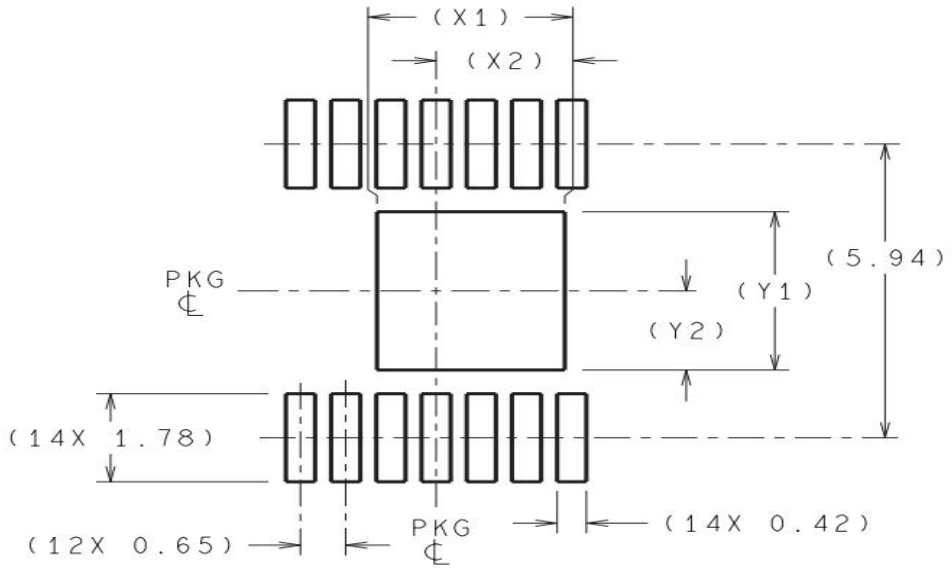
Package Outlines

DIMENSIONS, TSSOP-14L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
D	4.9	5.1	0.193	0.201
E	4.3	4.5	0.169	0.177
b	0.19	0.3	0.007	0.012
c	0.09	0.2	0.004	0.008
E1	6.25	6.55	0.246	0.258
A	—	1.2	—	0.047
A2	0.8	1	0.031	0.039
A1	0.05	0.15	0.002	0.006
e	0.65 (BSC)		0.026 (BSC)	
L	0.5	0.7	0.02	0.028
H	0.25(TYP)		0.01(TYP)	
θ	1°	7°	1°	7°

RECOMMENDED SOLDERING FOOTPRINT, TSSOP-14L



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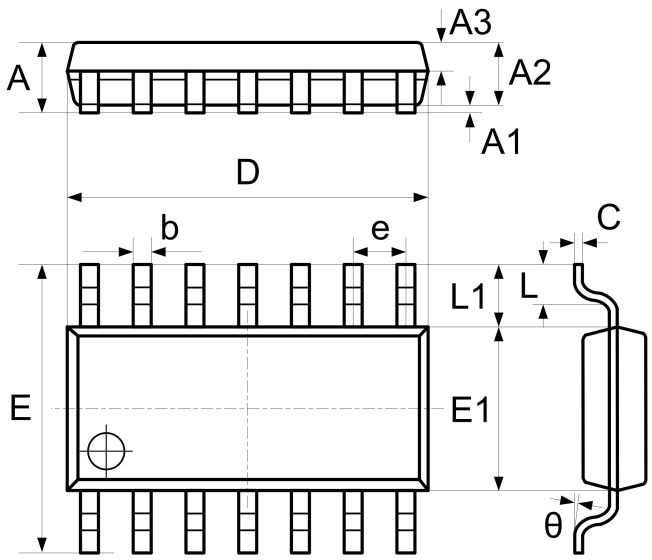
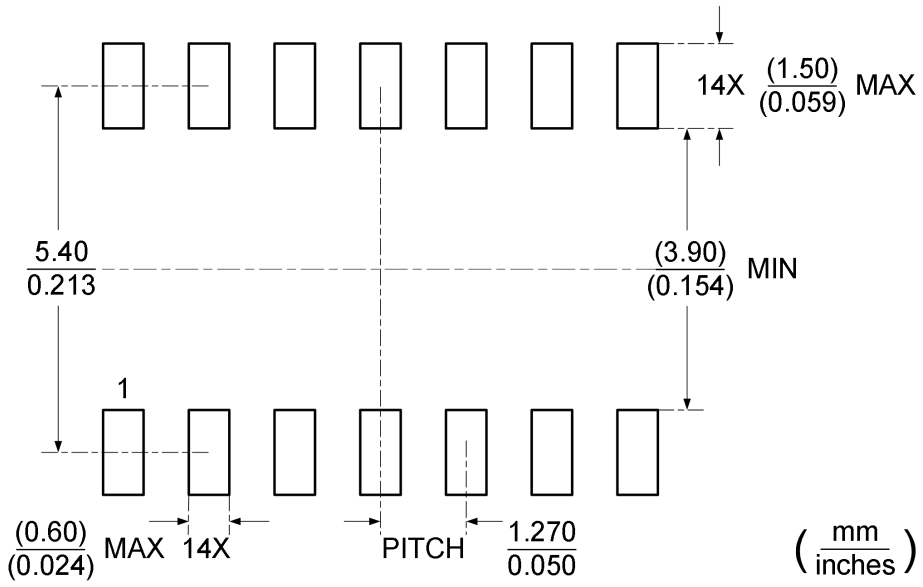
Package Outlines (cont.)

DIMENSIONS, SOIC-14L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.450	1.850	0.057	0.073
A1	0.100	0.300	0.004	0.012
A2	1.350	1.550	0.053	0.061
A3	0.550	0.750	0.022	0.030
b	0.406 TYP.		0.016 TYP.	
C	0.203 TYP.		0.008 TYP.	
D	8.630	8.830	0.340	0.348
E	5.840	6.240	0.230	0.246
E1	3.850	4.050	0.152	0.159
e	1.270 TYP.		0.050 TYP.	
L1	1.040 REF.		0.041 REF.	
L	0.350	0.750	0.014	0.030
θ	2°	8°	2°	8°

RECOMMENDED SOLDERING FOOTPRINT, SOIC-14L



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Important Notice

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For additional product information, or full datasheet, please contact with the Linearin's Sales Department or Representatives.

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