LTA4580, LTA4584
Low Noise Audio Operational Amplifiers

General Description

The LTA4580 device is a dual operational amplifier that has been designed optimally for audio applications, such as improving tone control.

The LTA4580 device offers low noise, high gain bandwidth, low harmonic distortion, and high output current, all of which make the device ideally suited for audio electronics, such as preamplifiers, active filters, and professional audio mixers. When high output current is required, this device can be used as a headphone amplifier.

The LTA4580 device is improved to rail-to-rail output swing and an input common mode range that includes the $-V_S$ rail. Due to its wide operating supply voltage, this device can also be used in low-voltage applications.

The LTA4584 device is an additional supply of quad audio operational amplifier that features same performance. This device offers in 14-pin industry-standard configuration for obtaining the space and cost savings.

Features and Benefits

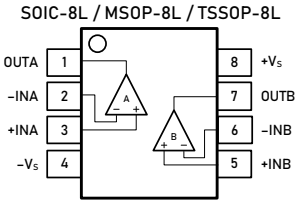
- Wide Supply: ±2 V to ±18 V, 4 V to 36 V
- Wide Bandwidth: 19 MHz GBW
- High Slew Rate: 17 V/µs
- Low Noise Voltage: 0.8 μV_{RMS}
- Total Harmonic Distortion: 0.0005%
- Low Offset Voltage: ±3 mV Maximum
- Input Common Mode Range: $-V_S$ to $+V_S - 2$ V
- Rail-to-Rail Output Swing
- Drop-In Replacement for NJM4580, NE5532, RC4580, NJM4560/2/5, and LM833
- Additional Quad in 14-Pin Industry-Standard: LTA4584

Applications

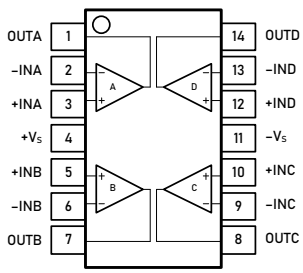
- Audio Preamplifiers
- Active Filters
- Pro Audio Mixers
- Headphone Amplifiers
- Netbooks
- Multichannel Video Transcoders
- Industrial Measurement Equipment

Pin Configuration (Top View)

LTA4580
SOIC-8L / MSOP-8L / TSSOP-8L



LTA4584
SOIC-14L / TSSOP-14L



Pin Description

Symbol	Description
–IN	Inverting input of the amplifier. The voltage range is from V_{S-} to V_{S+} – 2V.
+IN	Non-inverting input of the amplifier. This pin has the same voltage range as –IN.
$+V_S$	Positive power supply. The voltage is from 4V to 48V. Split supplies are possible as long as the voltage between V_{S+} and V_{S-} is from 4V to 48V.
$-V_S$	Negative power supply. It is normally tied to ground. It can also be tied to a voltage other than ground as long as the voltage between V_{S+} and V_{S-} is from 4V to 48V.
OUT	Amplifier output.

Ordering Information (1)

Type Number	Package Name	Package Quantity	Eco Class (2)	Marking Code (3)
LTA4580XS8/R8	SOIC-8L	Tape and Reel, 4 000	Green (RoHS & no Sb/Br)	HV-92
LTA4580XV8/R6	MSOP-8L	Tape and Reel, 3 000	Green (RoHS & no Sb/Br)	HV92
LTA4580XT8/R6	TSSOP-8L	Tape and Reel, 3 000	Green (RoHS & no Sb/Br)	HV92
LTA4584XS14/R5	SOIC-14L	Tape and Reel, 2 500	Green (RoHS & no Sb/Br)	HV-94
LTA4584XT14/R6	TSSOP-14L	Tape and Reel, 3 000	Green (RoHS & no Sb/Br)	HV-94

(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, a varied marking character of "x" , or additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

Limiting Value – In accordance with the Absolute Maximum Rating System (IEC 60134).

Parameter	Absolute Maximum Rating
Supply Voltage, V_{S+} to V_{S-}	40 V
Signal Input Terminals: Voltage, Current	V_{S-} to V_{S+}, ±10 mA
Output Current	±50 mA
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 Rating

Parameter	Item	Value	Unit
Electrostatic Discharge Voltage	Human body model (HBM), per MIL-STD-883J / Method 3015.9 (1)	±1 000	V
	Charged device model (CDM), per ESDA/JEDEC JS-002-2014 (2)	±1 000	
	Machine model (MM), per JESD22-A115C	±400	

(1) 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.

(2) 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.

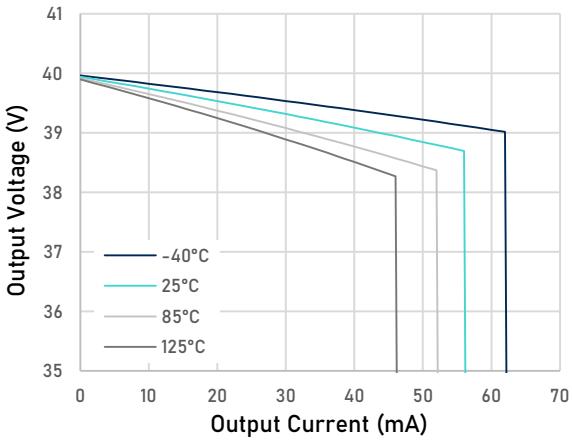
Electrical Characteristics

V_S = ±15 V, T_A = +25 °C, V_{CM} = V_S/2, V_O = V_S/2, and R_L = 10 kΩ connected to V_S/2, unless otherwise noted.
Boldface limits apply over the specified temperature range, T_A = −40 °C to +125 °C.

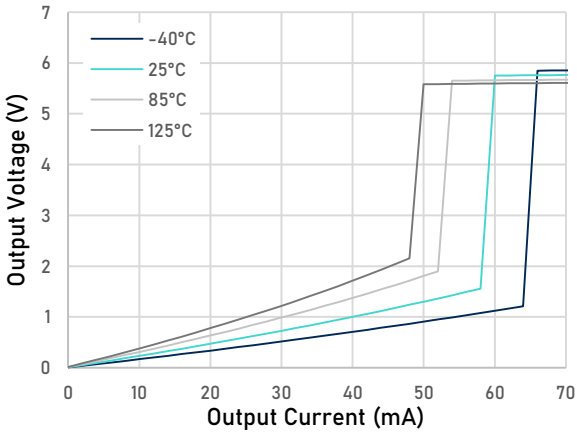
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
DC CHARACTERISTICS						
V_{OS}	Input offset voltage			±0.5	±3	mV
V_{OS} TC	Offset voltage drift	T_A = −40 to +125 °C		±2		µV/°C
PSRR	Power supply rejection ratio		80	110		dB
I_B	Input bias current			0.1		nA
		T_A = +85 °C		0.5		
		T_A = +125 °C		2		
I_{OS}	Input offset current			0.1		nA
V_{CM}	Common-mode voltage range		$-V_S$		$+V_S-2$	V
CMRR	Common-mode rejection ratio		86	110		dB
		T_A = −40 to +125 °C	80			
V_{OH}	High output voltage swing	R_L ≥ 2 kΩ		+14.7		V
V_{OL}	Low output voltage swing	R_L ≥ 2 kΩ		−14.7		V
A_{VOL}	Open-loop voltage gain	R_L ≥ 2 kΩ, V_O = ±10 V	96	110		dB
		T_A = −40 to +125 °C	90			
V_S	Operating supply voltage		±2		±18	V
I_Q	Quiescent current (per amplifier)			7.3		mA
AC CHARACTERISTICS						
GBW	Gain bandwidth product			19		MHz
SR	Slew rate	G = +1, 10 V step, R_L ≥ 2 kΩ		17		V/µs
THD+N	Total harmonic distortion + noise	G = +10, f = 1 kHz, V_O = 5 V, R_L = 2 kΩ		0.0005		%
V_n	Input voltage noise	RIAA, R_S ≤ 2.2 kΩ, 30 kHz LPF		0.8		$µV_{RMS}$
THERMAL CHARACTERISTICS						
T_A	Operating temperature range		−40		+125	°C
$θ_{JA}$	Package Thermal Resistance	SOIC-8L		125		°C/W
		MSOP-8L		201		
		TSSOP-8L		160		
		SOIC-14L		115		
		TSSOP-14L		112		

Typical Performance Characteristics

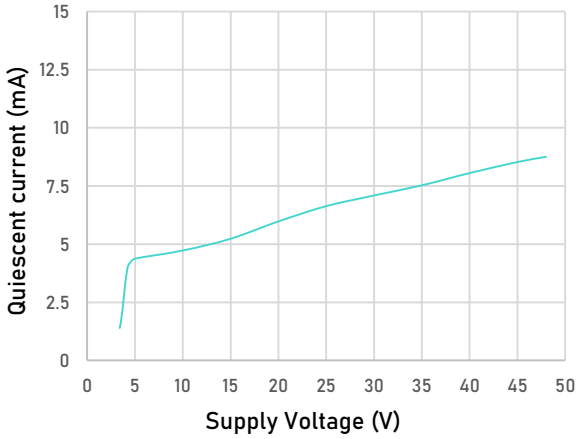
At T_A = +25 °C, V_{CM} = V_S /2, and R_L = 10 kΩ connected to V_S /2, unless otherwise noted.



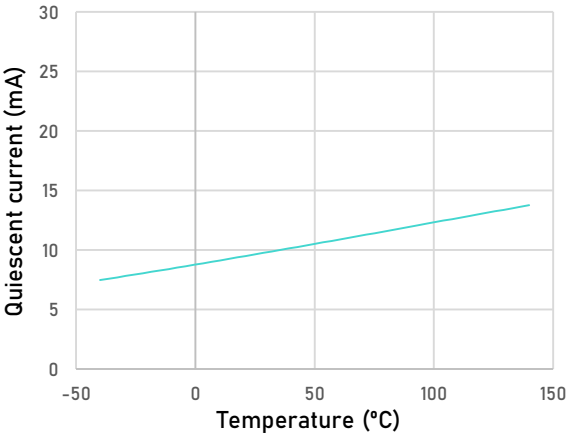
Output Voltage Swing as a function of Output Current (Sourcing)



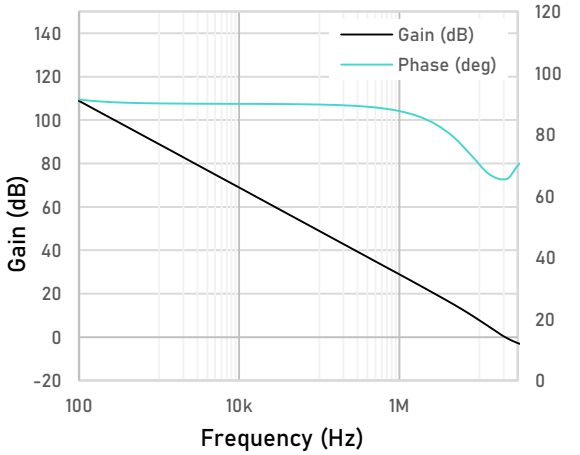
Output Voltage Swing as a function of Output Current (Sinking)



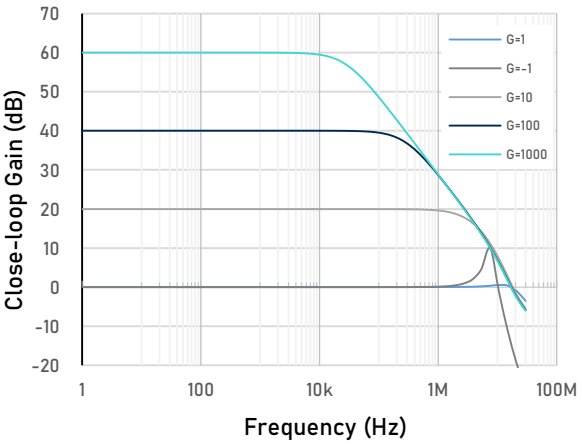
Quiescent Current as a function of Supply Voltage



Quiescent Current as a function of Temperature



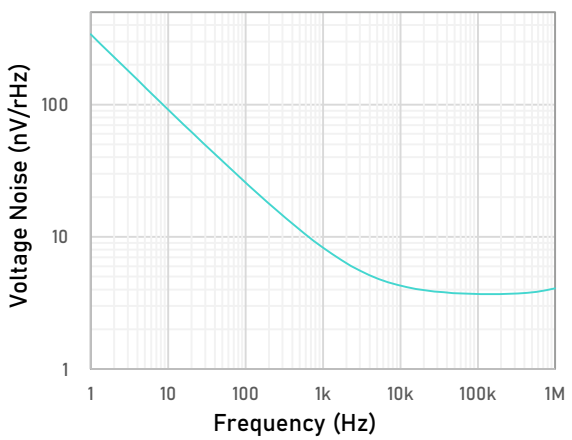
Open-loop Gain and Phase as a function of Frequency



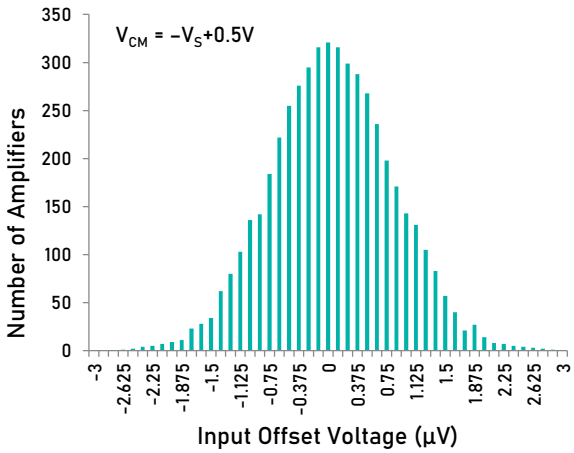
Close-loop Gain as a function of Frequency

Typical Performance Characteristics

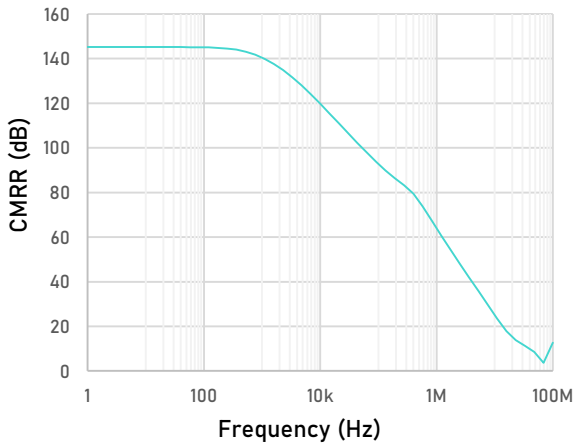
At T_A = +25 °C, V_{CM} = V_S /2, and R_L = 10 kΩ connected to V_S /2, unless otherwise noted.



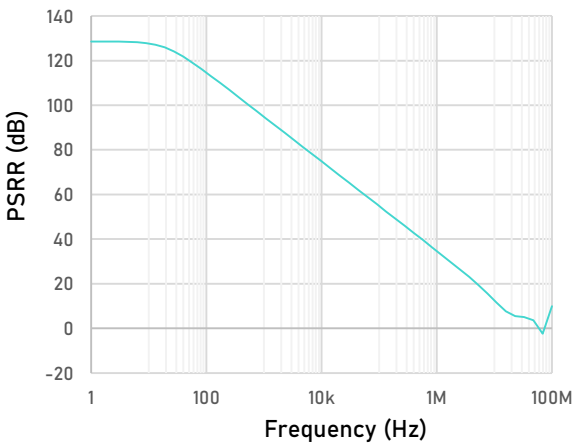
Input Voltage Noise Spectral Density as a function of Frequency



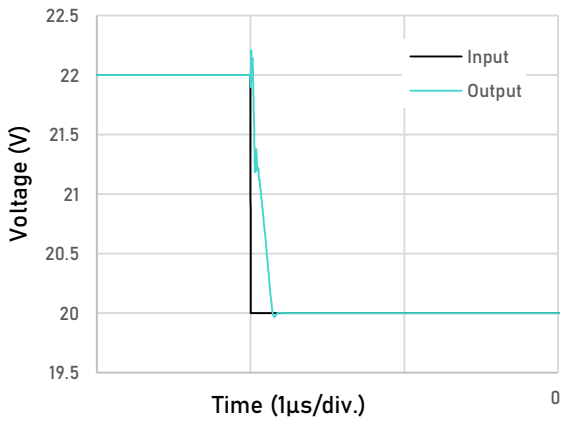
Offset Voltage Production Distribution



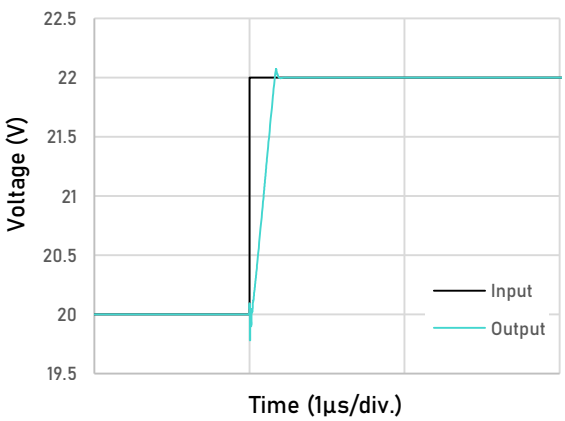
CMRR as a function of Frequency



PSRR as a function of Frequency



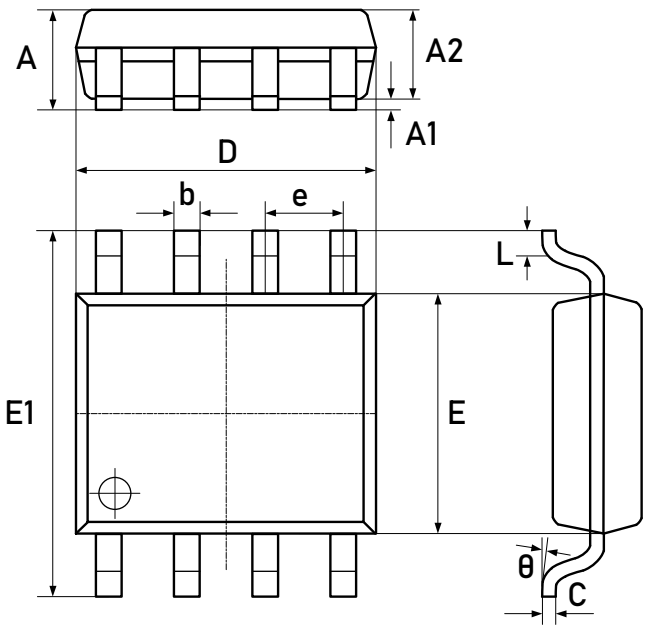
Large-Signal Step Response(Failing)



Large-Signal Step Response(Rising)

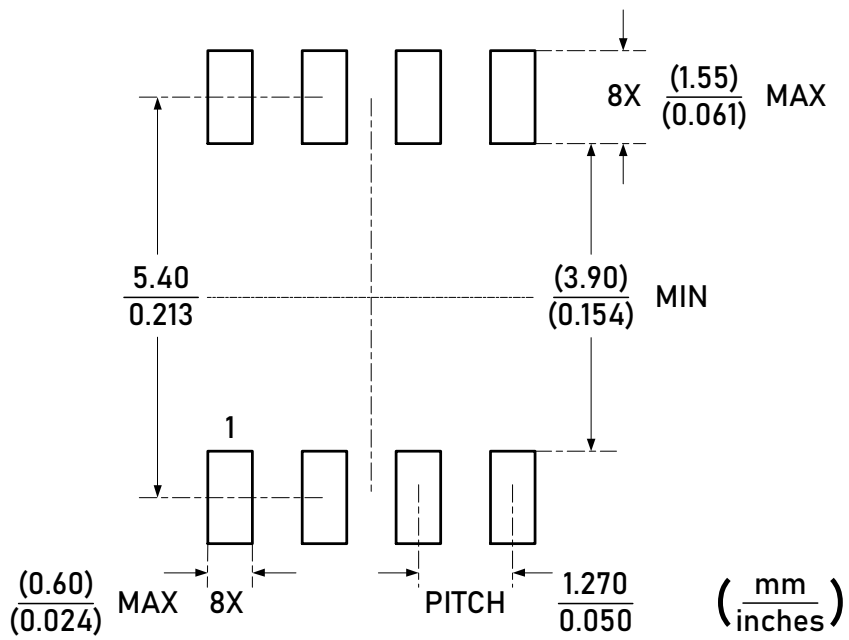
Package Outlines (continued)

DIMENSIONS, SOIC-8L



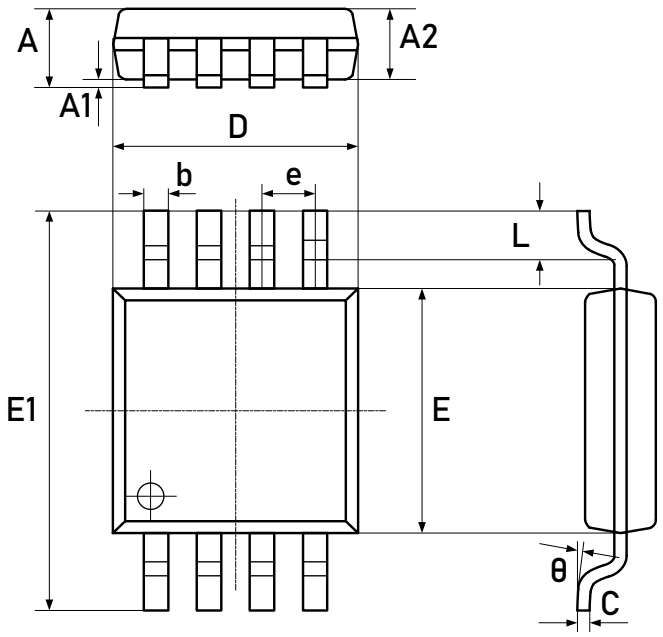
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.370	1.670	0.054	0.066
A1	0.070	0.170	0.003	0.007
A2	1.300	1.500	0.051	0.059
b	0.306	0.506	0.012	0.020
C	0.203 TYP.		0.008 TYP.	
D	4.700	5.100	0.185	0.201
E	3.820	4.020	0.150	0.158
E1	5.800	6.200	0.228	0.244
e	1.270 TYP.		0.050 TYP.	
L	0.450	0.750	0.018	0.030
θ	0°	8°	0°	8°

RECOMMENDED SOLDERING FOOTPRINT, SOIC-8L



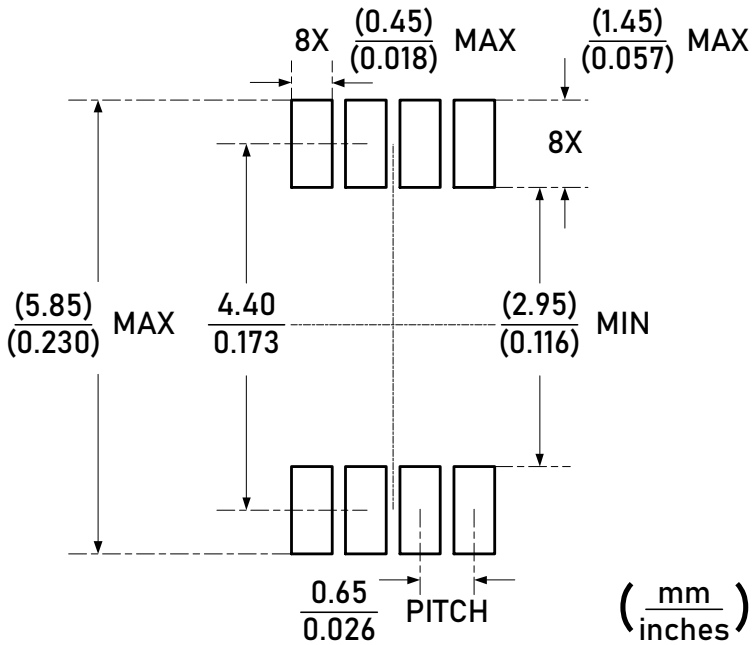
Package Outlines (continued)

DIMENSIONS, MSOP-8L



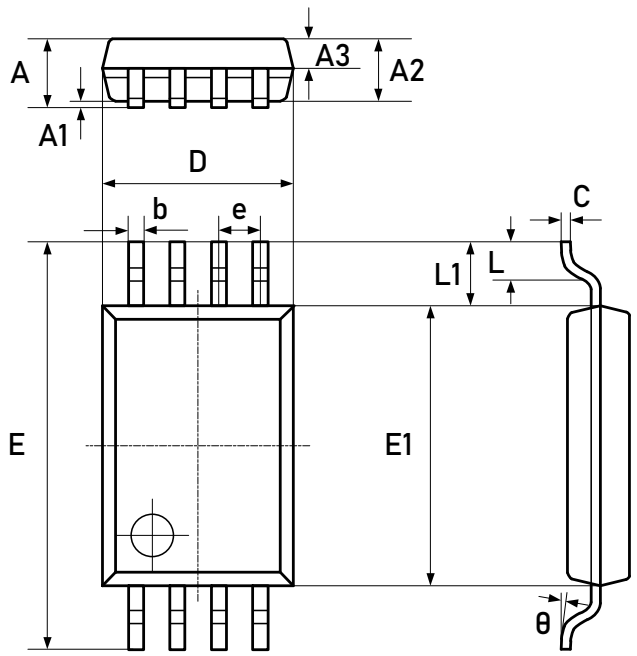
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.800	1.100	0.031	0.043
A1	0.050	0.150	0.002	0.006
A2	0.750	0.950	0.030	0.037
b	0.290	0.380	0.011	0.015
C	0.150	0.200	0.006	0.008
D	2.900	3.100	0.114	0.122
E	2.900	3.100	0.114	0.122
E1	4.700	5.100	0.185	0.201
e	0.650 TYP.		0.026 TYP.	
L	0.400	0.700	0.016	0.028
θ	0°	8°	0°	8°

RECOMMENDED SOLDERING FOOTPRINT, MSOP-8L



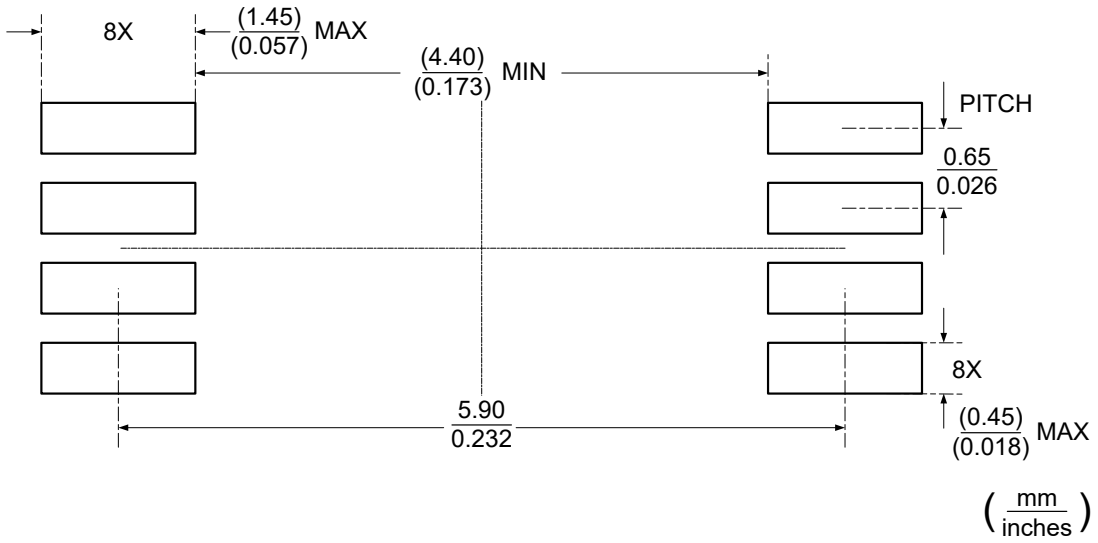
Package Outlines (continued)

DIMENSIONS, DFN3x3-8L



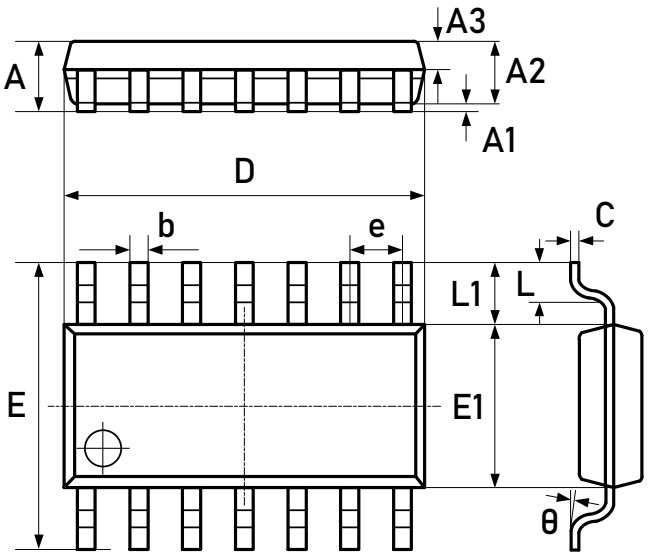
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	-	1.200	-	0.047
A1	0.020	0.150	0.001	0.006
A2	0.900	1.050	0.035	0.041
A3	0.390	0.490	0.015	0.019
b	0.200	0.290	0.008	0.011
C	0.130	0.180	0.005	0.007
D	2.900	3.100	0.114	0.122
E	6.200	6.600	0.244	0.260
E1	4.300	4.500	0.169	0.177
e	0.650 typ.		0.026 typ.	
L1	1.000 ref.		0.039 ref.	
L	0.450	0.750	0.018	0.030
θ	0°	8°	0°	8°

RECOMMENDED SOLDERING FOOTPRINT, MSOP-8L



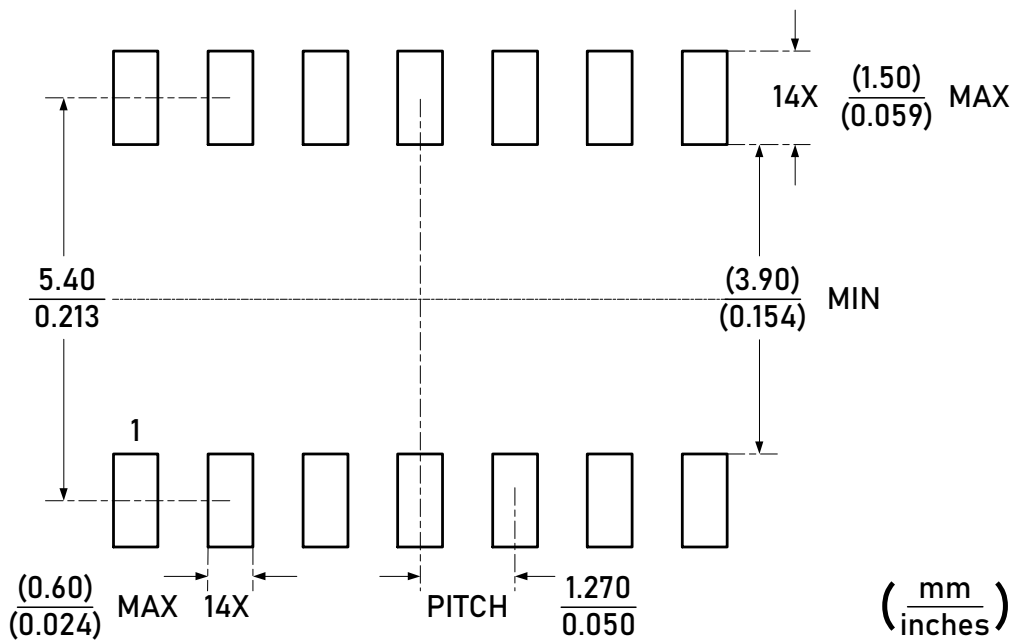
Package Outlines (continued)

DIMENSIONS, SOIC-14L



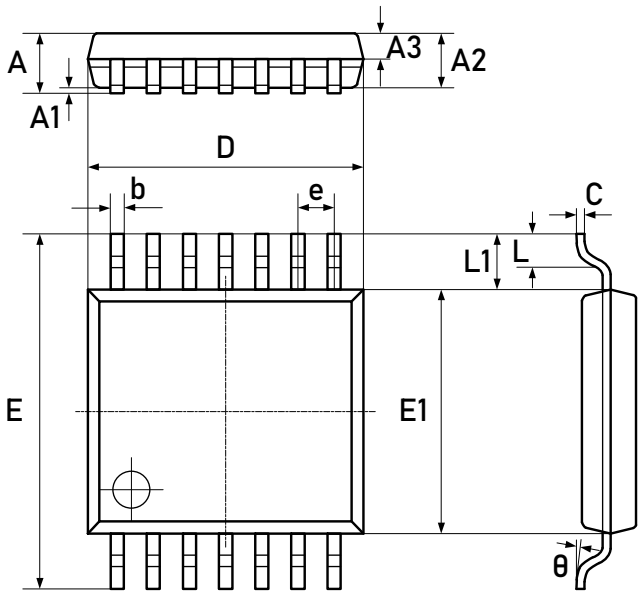
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.450	1.850	0.057	0.073
A1	0.100	0.300	0.004	0.012
A2	1.350	1.550	0.053	0.061
A3	0.550	0.750	0.022	0.030
b	0.406 TYP.		0.016 TYP.	
C	0.203 TYP.		0.008 TYP.	
D	8.630	8.830	0.340	0.348
E	5.840	6.240	0.230	0.246
E1	3.850	4.050	0.152	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



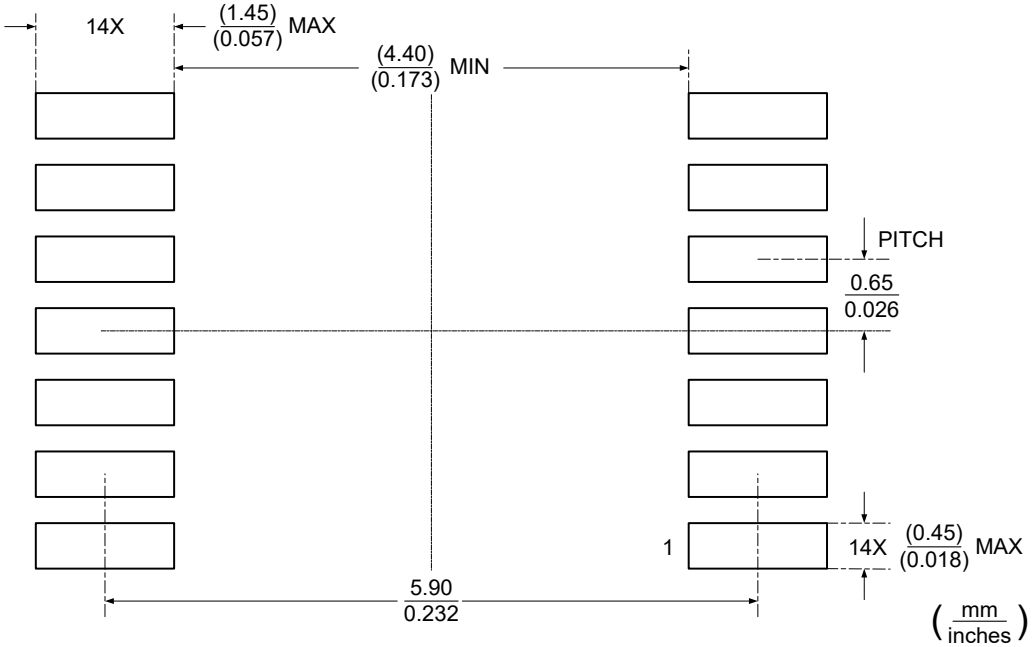
Package Outlines (continued)

DIMENSIONS, TSSOP-14L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	-	1.200	-	0.047
A1	0.050	0.150	0.002	0.006
A2	0.900	1.050	0.035	0.041
A3	0.390	0.490	0.015	0.019
b	0.200	0.290	0.008	0.011
C	0.130	0.180	0.005	0.007
D	4.860	5.060	0.191	0.199
E	6.200	6.600	0.244	0.260
E1	4.300	4.500	0.169	0.177
e	0.650 TYP.		0.026 TYP.	
L1	1.000 REF.		0.039 REF.	
L	0.450	0.750	0.018	0.030
θ	0°	8°	0°	8°

RECOMMENDED SOLDERING FOOTPRINT, SOIC-14L



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 (industrie 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.

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