LTC8811, LTC8812, LTC8814

600nA, RRIO Op-amps for Cost-Optimized Systems

General Description

The LTC881x family of single-, dual-, and quad- channel amplifiers features a maximized ratio of gain bandwidth (GBW) to supply current and is ideal for battery-powered applications such as portable instrumentations, portable medical equipments, wearable fitness devices, and wireless remote sensors. Featuring rail-to-rail input and output swings, 15-kHz bandwidth of combined with ultra-low supply current (typical 600 nA at 5.0 V per amplifier) and low noise (6.3 μV_{P-P} at 0.1 to 10 Hz) , the LTC881x family is an excellent choice for precision, cost-optimized, “Always ON” sensing applications.

The robust design of the LTC881x amplifiers provides ease-of-use to the circuit designer: integrated RF/EMI rejection filter, no phase reversal in overdrive conditions, and high electro-static discharge (ESD) protection (5-kV HBM). The LTC881x amplifiers are optimized for operation at voltages as low as +1.7 V (±0.85 V) and up to +5.5 V (±2.75 V) over the extended temperature range of −40 °C to +85 °C.

The LTC8811/3 (single) is available in both SOT23-5L and SC70-5L packages. The LTC8812 (dual) is offered in DFN-8L, SOIC-8L and MSOP-8L packages. The quad-channel LTC8814 is offered in QFN-16L, SOIC-14L and TSSOP-14L packages.

Features and Benefits

- Ultra-Low Power Preserves Battery Life
  - 600 nA Supply Current (Typically at 5 V) Per Amplifier
- Single 1.7 V to 5.5 V Supply Voltage Range
  - Can be Powered From the Same 1.8V/2.5V/3.3V/5V System Rails
- 15 kHz GBW
- Precision Specifications for Buffer/Filter/Gain Stages
  - Low Input Offset Voltage: 0.6 mV
  - Low Noise: 6.3 μV_{P-P} at 0.1 to 10 Hz
  - 1 pA Input Bias Current
  - Rail-to-Rail Input and Output
- Extended Temperature Range: −40°C to +85°C

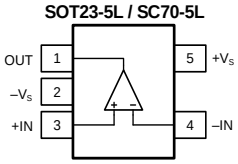
Preliminary

Applications

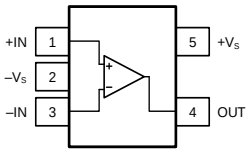
- Battery-Powered Instruments:
  - Consumer, Industrial, Medical, Notebooks
- Wearable Fitness Devices
- Sensor Signal Conditioning:
  - Sensor Interfaces, Loop-Powered, Active Filters
- Wireless Sensors:
  - Home Security, Remote Sensing, Wireless Metering

Pin Configurations (Top View)

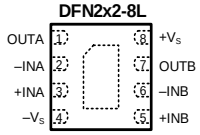
LTC8811
SOT23-5L / SC70-5L



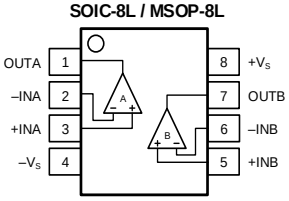
LTC8813
SOT23-5L / SC70-5L



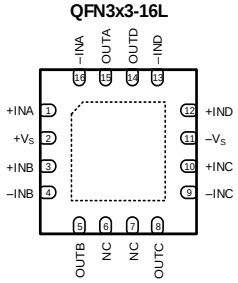
LTC8812
DFN2x2-8L



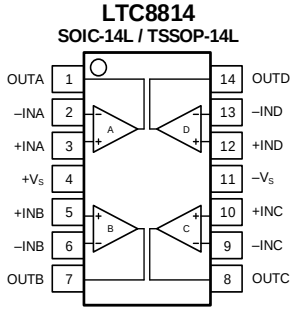
SOIC-8L / MSOP-8L



LTC8814
QFN3x3-16L



LTC8814
SOIC-14L / TSSOP-14L



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Pin Description

Symbol	Description
–IN	Inverting input of the amplifier.
+IN	Non-inverting input of the amplifier.
$+V_S$	Positive (highest) power supply.
$-V_S$	Negative (lowest) power supply.
OUT	Amplifier output.

Ordering Information

Type Number	Package Name	Package Quantity	Marking Code
LTC8811YT5/R6	SOT23-5L	Tape and Reel, 3 000	AN1
LTC8811YC5/R6	SC70-5L	Tape and Reel, 3 000	AN1
LTC8812YF8/R6	DFN2x2-8L	Tape and Reel, 3 000	AN2
LTC8812YS8/R8	SOIC-8L	Tape and Reel, 4 000	AN2 Y
LTC8812YV8/R6	MSOP-8L	Tape and Reel, 3 000	AN2Y
LTC8813YT5/R6	SOT23-5L	Tape and Reel, 3 000	AN3
LTC8813YC5/R6	SC70-5L	Tape and Reel, 3 000	AN3
LTC8814YS14/R5	SOIC-14L	Tape and Reel, 2 500	AN4 Y
LTC8814XF16/R6	QFN3x3-16L	Tape and Reel, 3 000	AN4 Y
LTC8814YT14/R6	TSSOP-14L	Tape and Reel, 3 000	AN4 Y

Preliminary

Limiting Value

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

Parameter	Absolute Maximum Rating
Supply Voltage, V_{S+} to V_{S-}	10.0 V
Signal Input Terminals: Voltage, Current	V_{S-} – 0.5 V to V_{S+} + 0.5 V, ±10 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)	±5 000	V
	Charged device model (CDM), per ESDA/JEDEC JS-002-2014 (2)	±2 000	
	Machine model (MM), per JESD22-A115C	±250	

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

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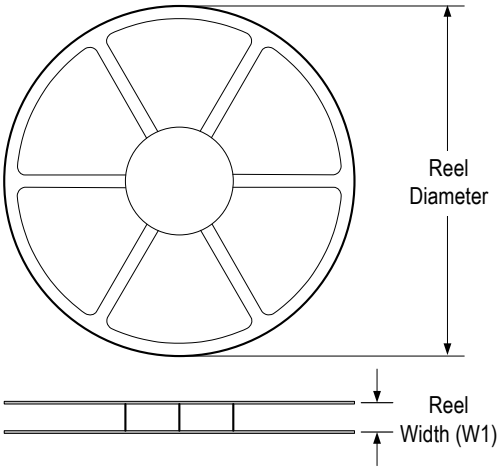
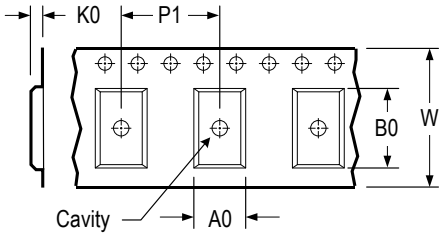
Tape and Reel Information

REEL DIMENSIONS

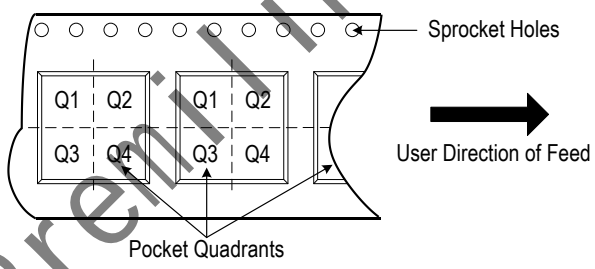


TAPE DIMENSIONS



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



Preliminary

* 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
LTC8811XT5/R6	SOT23	5	3 000	178	9.0	3.3	3.2	1.5	4.0	8.0	Q3

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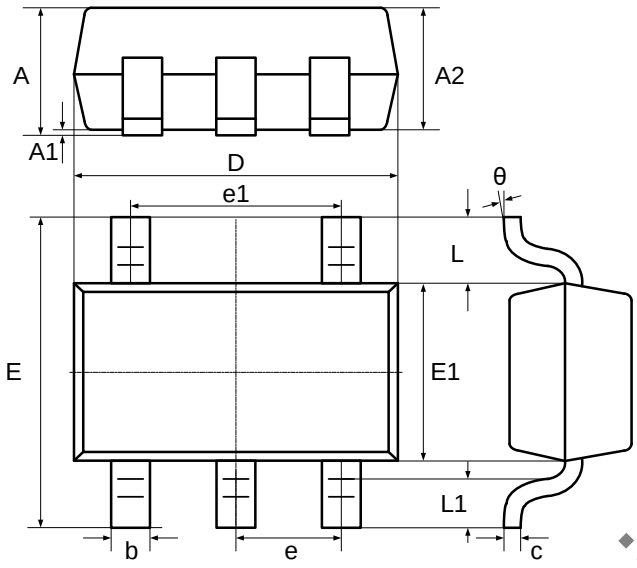
Package Outlines

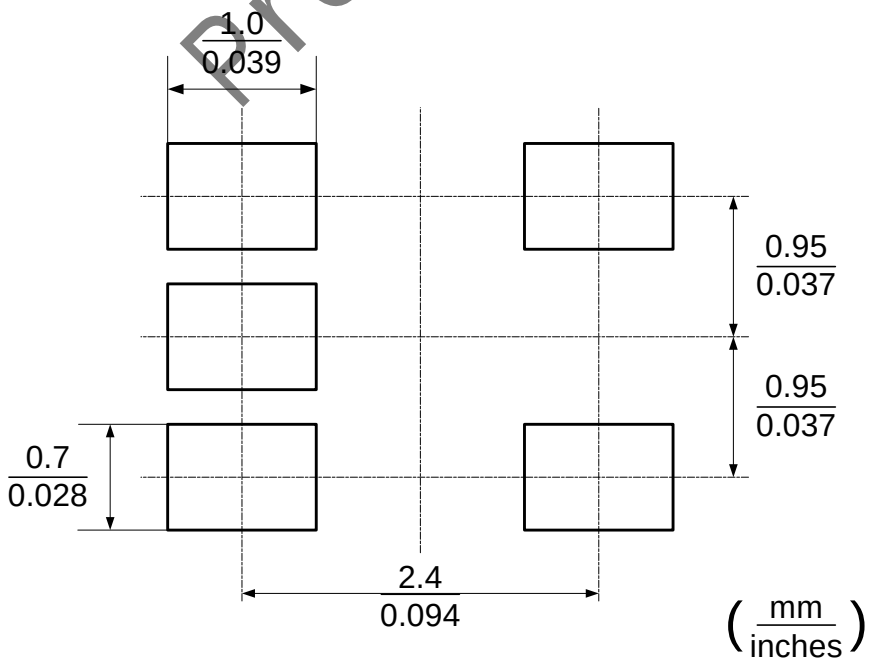
DIMENSIONS, SOT23-5L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	-	1.25	-	0.049
A1	0.04	0.10	0.002	0.004
A2	1.00	1.20	0.039	0.047
b	0.33	0.41	0.013	0.016
c	0.15	0.19	0.006	0.007
D	2.820	3.02	0.111	0.119
E1	1.50	1.70	0.059	0.067
E	2.60	3.00	0.102	0.118
e	0.95 BSC		0.037 BSC	
e1	1.90 BSC		0.075 BSC	
L	0.60 REF		0.024 REF	
L1	0.30	0.60	0.012	0.024
θ	0°	8°	0°	8°

Preliminary

RECOMMENDED SOLDERING FOOTPRINT, SOT23-5L



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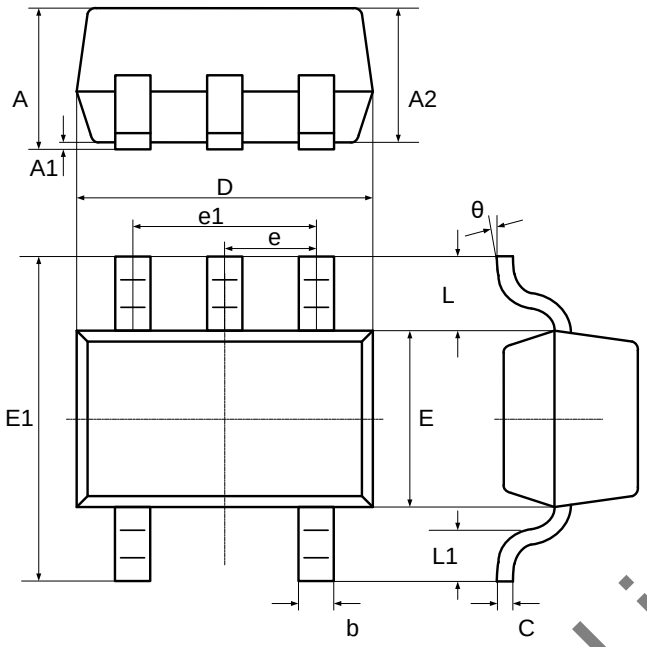
Package Outlines (continued)

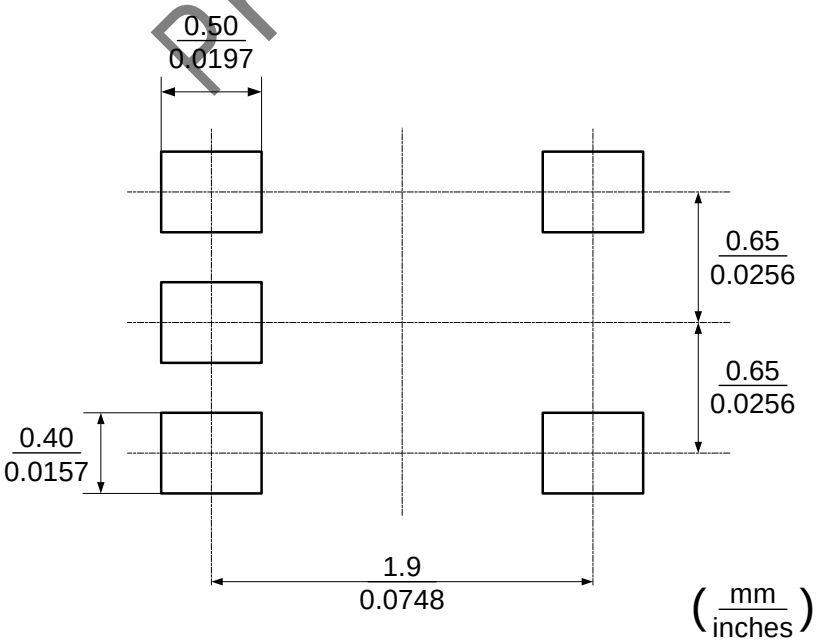
DIMENSIONS, SC70-5L (SOT353)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.90	1.10	0.035	0.043
A1	0.00	0.10	0.000	0.004
A2	0.90	1.00	0.035	0.039
b	0.15	0.35	0.006	0.014
C	0.08	0.15	0.003	0.006
D	2.00	2.20	0.079	0.087
E	1.15	1.35	0.045	0.053
E1	2.15	2.45	0.085	0.096
e	0.65 typ.		0.026 typ.	
e1	1.20	1.40	0.047	0.055
L	0.525 ref.		0.021 ref.	
L1	0.26	0.46	0.010	0.018
θ	0°	8°	0°	8°

Preliminary

RECOMMENDED SOLDERING FOOTPRINT, SC70-5L (SOT353)



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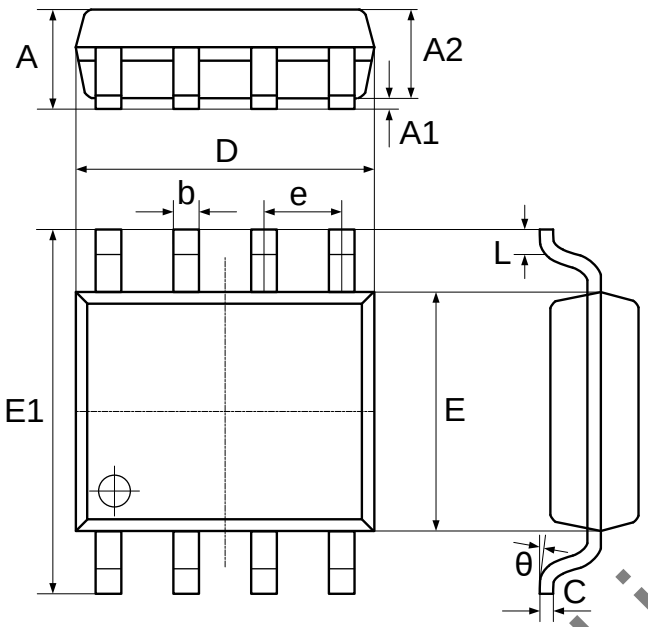
Package Outlines (continued)

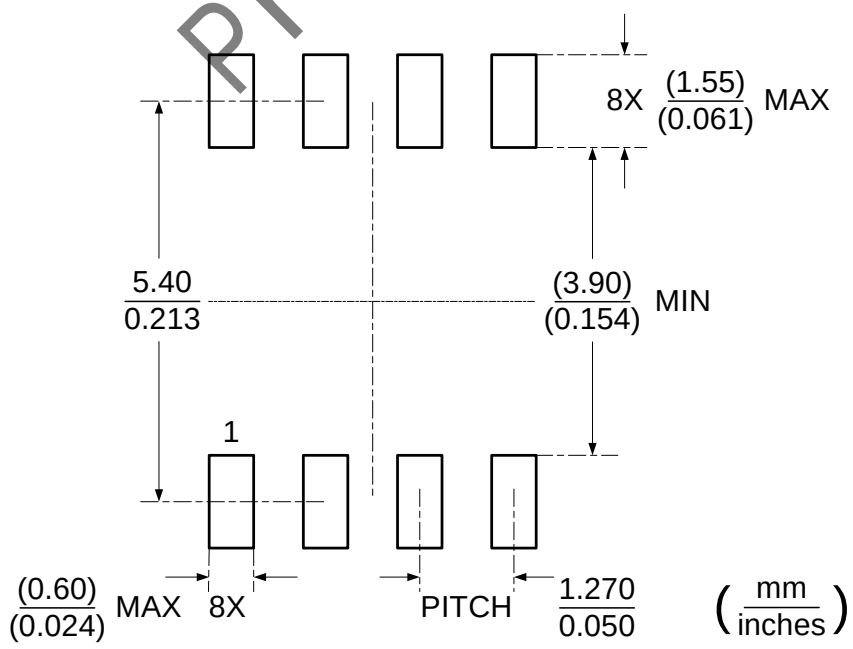
DIMENSIONS, SOIC-8L



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°

Preliminary

RECOMMENDED SOLDERING FOOTPRINT, SOIC-8L



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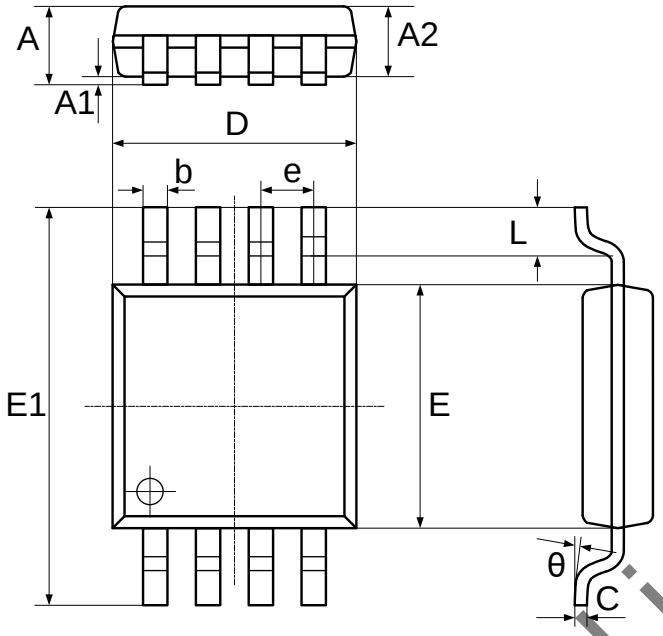
Package Outlines (continued)

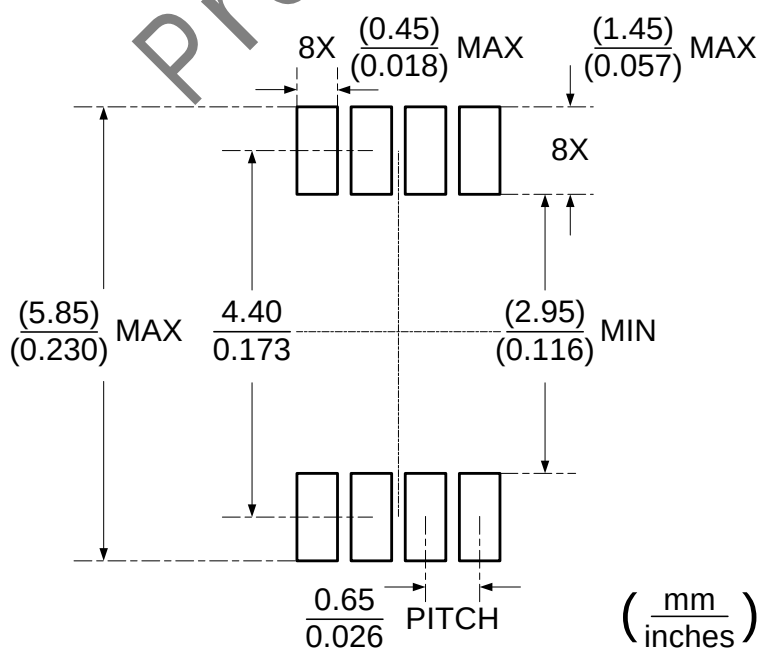
DIMENSIONS, MSOP-8L



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°

Preliminary

RECOMMENDED SOLDERING FOOTPRINT, MSOP-8L



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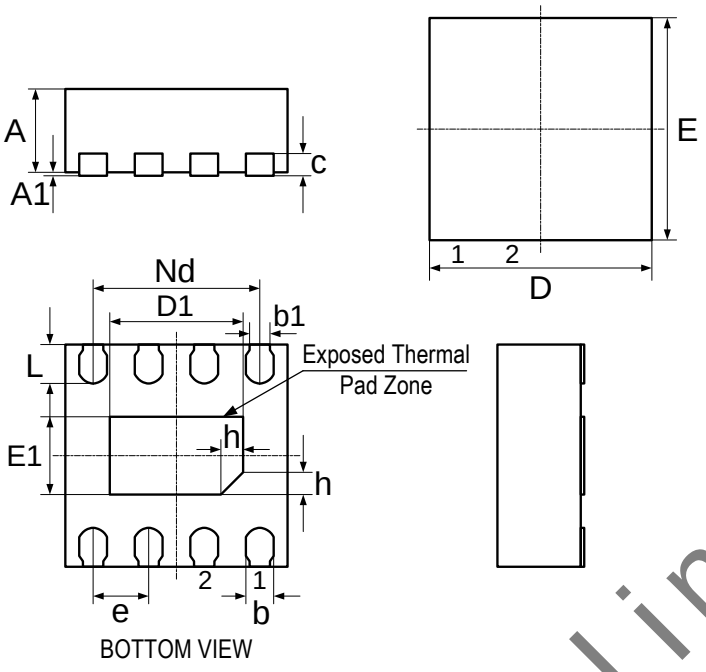
Package Outlines (continued)

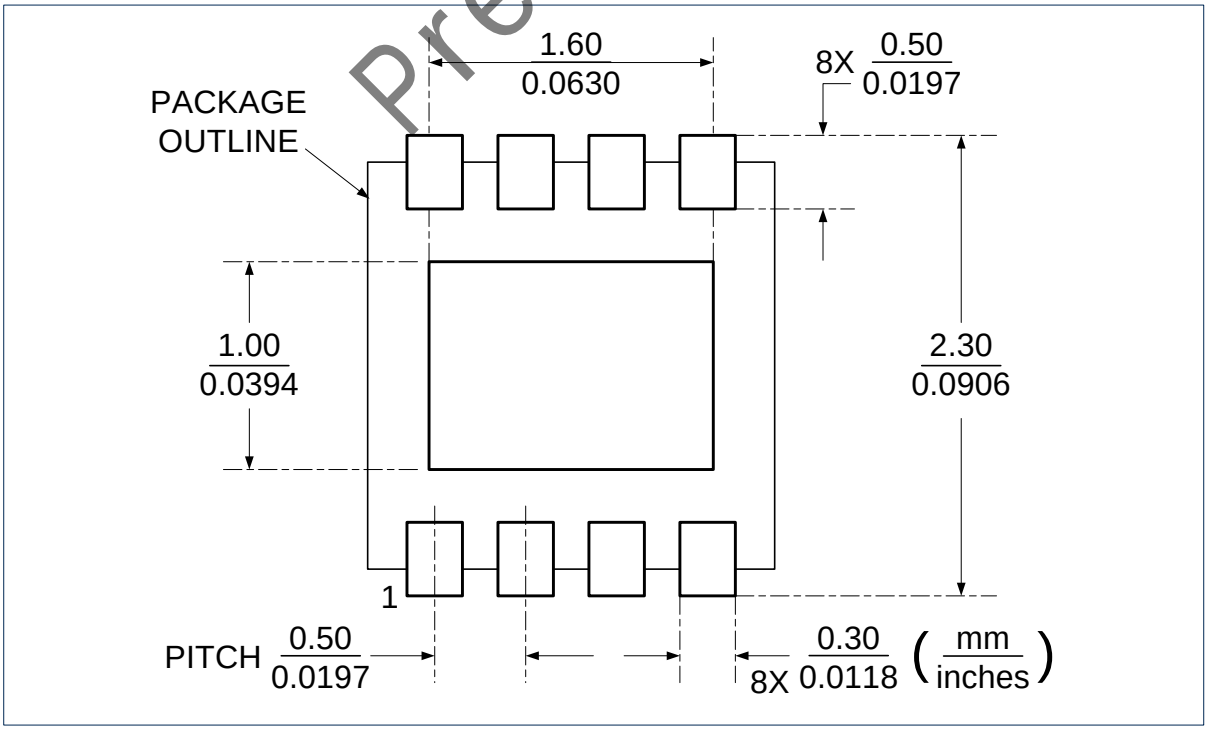
DIMENSIONS, DFN2x2-8L



Symbol	Millimeters		
	Min.	Nom.	Max.
A	0.70	0.75	0.80
A1	-	0.02	0.05
b	0.20	0.25	0.30
b1		0.18 REF	
c	0.18	0.20	0.25
D	1.90	2.00	2.10
D1	1.10	1.20	1.30
Nd		1.50BSC	
E	1.90	2.00	2.10
E1	0.60	0.70	0.80
e		0.50BSC	
L	0.30	0.35	0.40
h	0.15	0.20	0.25

Preliminary

RECOMMENDED SOLDERING FOOTPRINT, DFN2x2-8L



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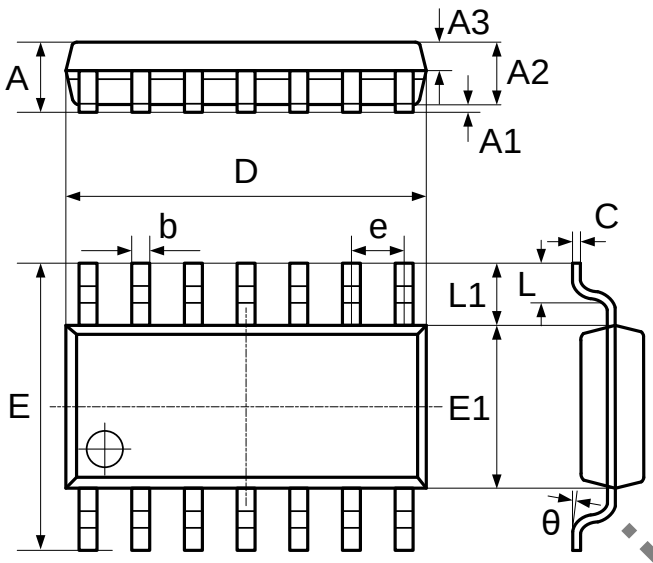
Package Outlines (continued)

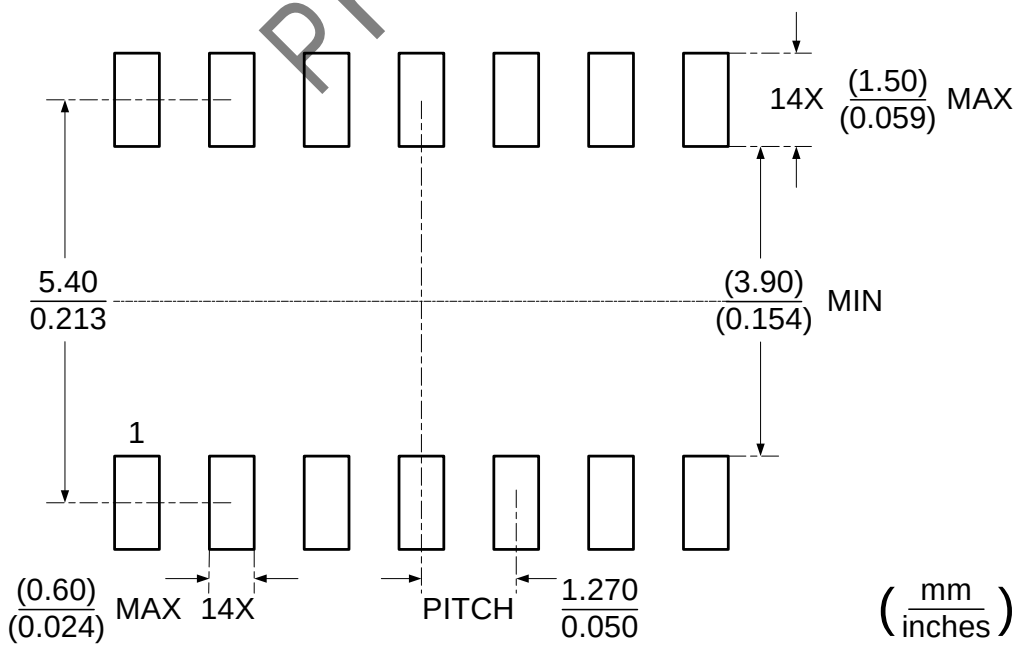
DIMENSIONS, SOIC-14L



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°

Preliminary

RECOMMENDED SOLDERING FOOTPRINT, SO-14



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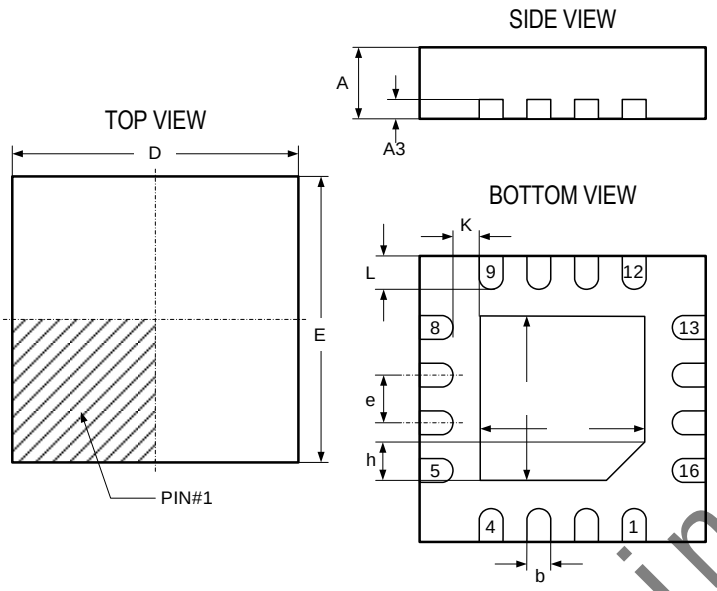
Package Outlines (continued)

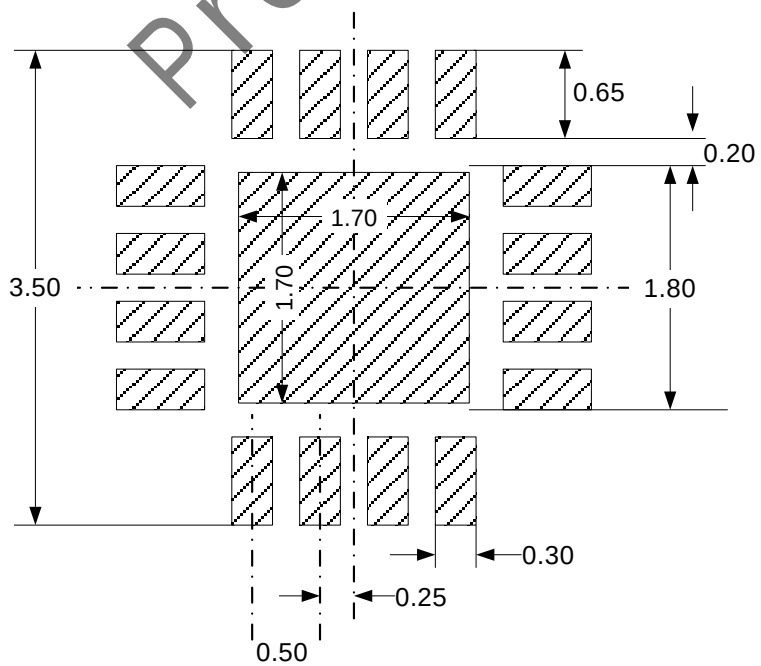
DIMENSIONS, QFN3x3-16L



Symbol	Millimeters		
	Min.	Nom.	Max.
A	0.70	0.75	0.80
A3		0.210 REF.	
b	0.20	0.25	0.30
D	2.90	3.00	3.10
D1	1.60	1.65	1.70
E	2.90	3.00	3.10
E1	1.60	1.65	1.70
e		0.50 BSC.	
h	0.20	0.25	0.30
K	0.225	0.275	0.325
L	0.35	0.40	0.45

Preliminary

RECOMMENDED SOLDERING FOOTPRINT, QFN3x3-16L



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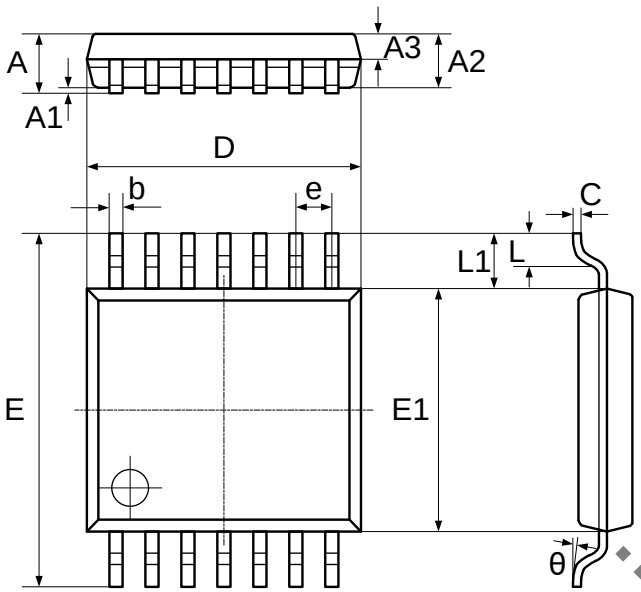
Package Outlines (continued)

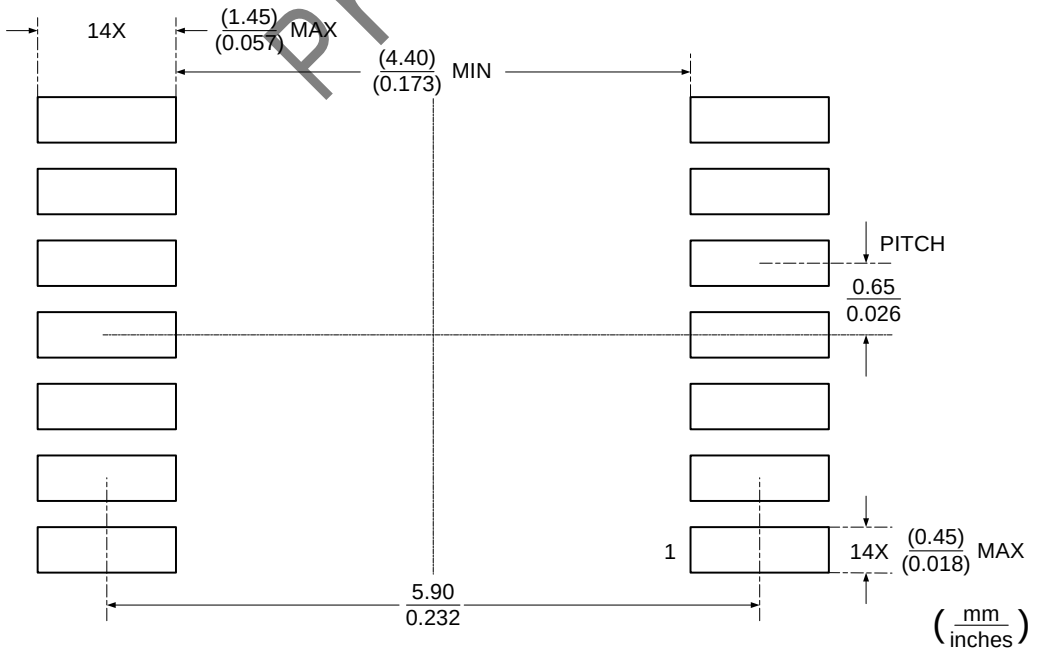
DIMENSIONS, TSSOP-14L



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°

Preliminary

RECOMMENDED SOLDERING FOOTPRINT, TSSOP-14L



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

Premiliary

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