

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.

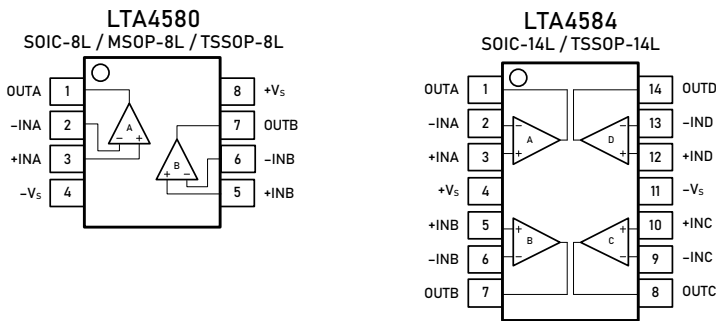
Features and Benefits

- Wide Supply:  $\pm 2\text{ V}$  to  $\pm 18\text{ V}$ ,  $4\text{ V}$  to  $36\text{ V}$
- Wide Bandwidth:  $19\text{ MHz GBW}$
- High Slew Rate:  $17\text{ V}/\mu\text{s}$
- Low Noise Voltage:  $0.8\text{ }\mu\text{V}_{\text{RMS}}$
- Total Harmonic Distortion:  $0.0005\%$
- Low Offset Voltage:  $\pm 3\text{ mV}$  Maximum
- Input Common Mode Range:  $-V_S$  to  $+V_S - 2\text{ V}$
- 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)



## 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 <sub>S</sub>	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 <sub>S</sub>	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 <sup>(1)</sup>

Type Number	Package Name	Package Quantity	Eco Class <sup>(2)</sup>	Marking Code <sup>(3)</sup>
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/R8	TSSOP-8L	Tape and Reel, 4 000	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 $V_{S+}$ , $\pm 10$ mA
Output Current	$\pm 50$ 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 <sup>(1)</sup>	$\pm 1\,000$	V
	Charged device model (CDM), per ESDA/JEDEC JS-002-2014 <sup>(2)</sup>	$\pm 1\,000$	
	Machine model (MM), per JESD22-A115C	$\pm 400$	

(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.

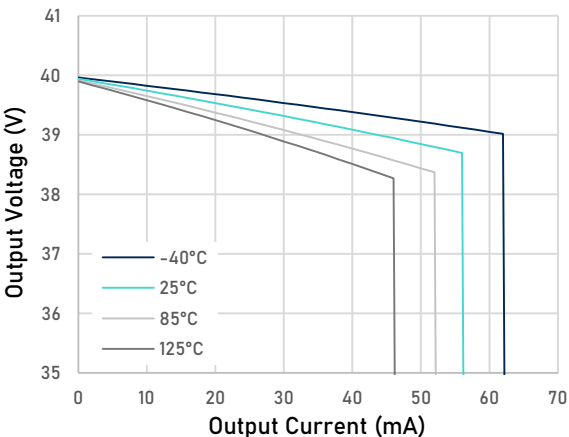
## Electrical Characteristics

$V_S = \pm 15\text{ V}$ ,  $T_A = +25\text{ }^\circ\text{C}$ ,  $V_{CM} = V_S/2$ ,  $V_O = V_S/2$ , and  $R_L = 10\text{ k}\Omega$  connected to  $V_S/2$ , unless otherwise noted. Boldface limits apply over the specified temperature range,  $T_A = -40\text{ }^\circ\text{C}$  to  $+125\text{ }^\circ\text{C}$ .

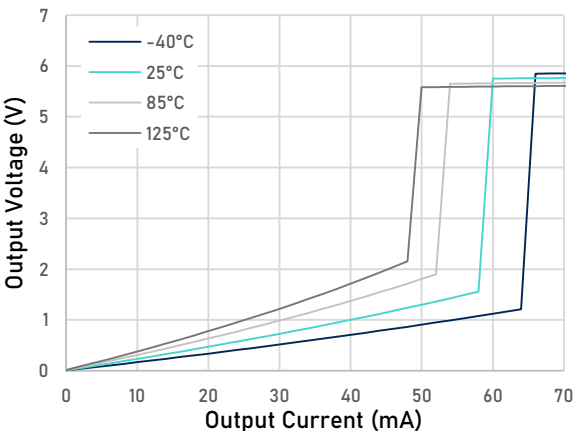
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
<b>DC CHARACTERISTICS</b>						
$V_{OS}$	Input offset voltage			$\pm 0.5$	$\pm 3$	mV
$V_{OS\ TC}$	Offset voltage drift	$T_A = -40\text{ to }+125\text{ }^\circ\text{C}$		$\pm 2$		$\mu\text{V}/^\circ\text{C}$
PSRR	Power supply rejection ratio		80	110		dB
$I_B$	Input bias current			0.1		nA
		$T_A = +85\text{ }^\circ\text{C}$		0.5		
		$T_A = +125\text{ }^\circ\text{C}$		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
		$T_A = -40\text{ to }+125\text{ }^\circ\text{C}$	80			
$V_{OH}$	High output voltage swing	$R_L \geq 2\text{ k}\Omega$		$+14.7$		V
$V_{OL}$	Low output voltage swing	$R_L \geq 2\text{ k}\Omega$		$-14.7$		V
$A_{VOL}$	Open-loop voltage gain	$R_L \geq 2\text{ k}\Omega$ , $V_O = \pm 10\text{ V}$	96	110		dB
		$T_A = -40\text{ to }+125\text{ }^\circ\text{C}$	90			
$V_S$	Operating supply voltage		$\pm 2$		$\pm 18$	V
$I_q$	Quiescent current (per amplifier)			7.3		mA
<b>AC CHARACTERISTICS</b>						
GBW	Gain bandwidth product			19		MHz
SR	Slew rate	$G = +1$ , 10 V step, $R_L \geq 2\text{ k}\Omega$		17		V/ $\mu\text{s}$
THD+N	Total harmonic distortion + noise	$G = +10$ , $f = 1\text{ kHz}$ , $V_O = 5\text{ V}$ , $R_L = 2\text{ k}\Omega$		0.0005		%
$V_n$	Input voltage noise	RIAA, $R_S \leq 2.2\text{ k}\Omega$ , 30 kHz LPF		0.8		$\mu\text{V}_{RMS}$
<b>THERMAL CHARACTERISTICS</b>						
$T_A$	Operating temperature range		$-40$		$+125$	$^\circ\text{C}$
$\theta_{JA}$	Package Thermal Resistance	SOIC-8L		125		$^\circ\text{C}/\text{W}$
		MSOP-8L		201		
		TSSOP-8L		160		
		SOIC-14L		115		
		TSSOP-14L		112		

Typical Performance Characteristics

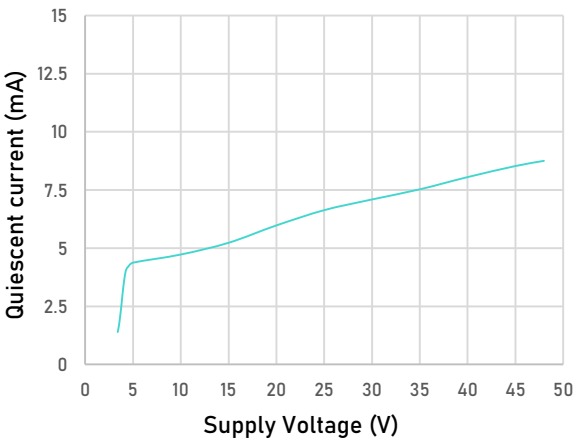
At  $T_A = +25\text{ }^{\circ}\text{C}$ ,  $V_{CM} = V_S/2$ , and  $R_L = 10\text{ k}\Omega$  connected to  $V_S/2$ , unless otherwise noted.



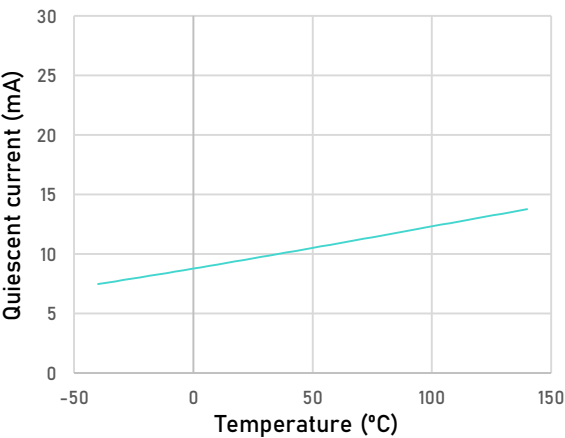
Output Voltage Swing as a function of Output Current (Sourcing)



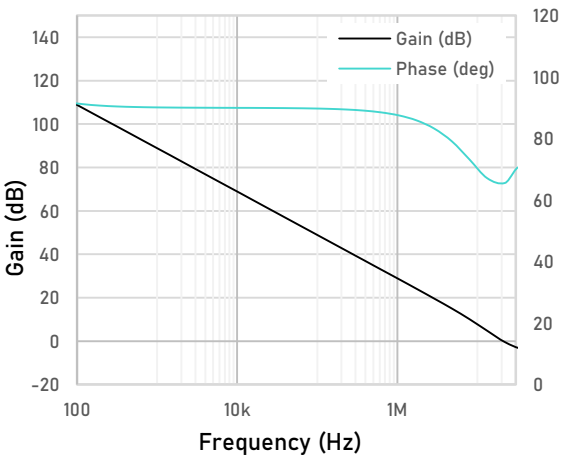
Output Voltage Swing as a function of Output Current (Sinking)



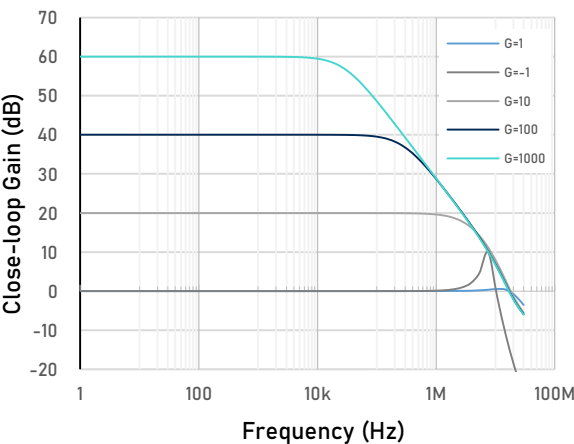
Quiescent Current as a function of Supply Voltage



Quiescent Current as a function of Temperature



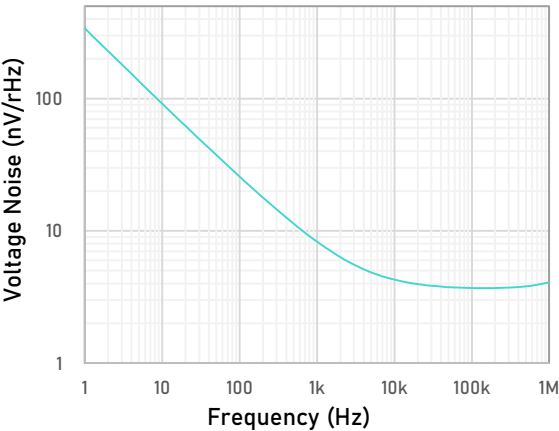
Open-loop Gain and Phase as a function of Frequency



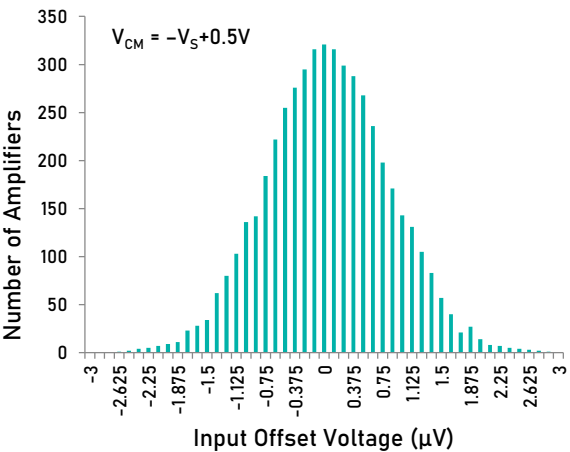
Close-loop Gain as a function of Frequency

Typical Performance Characteristics

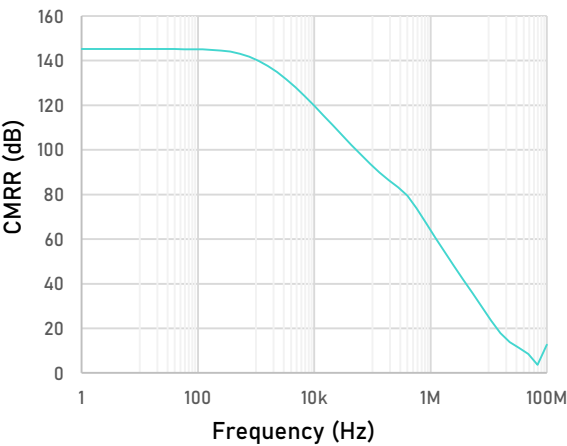
At  $T_A = +25\text{ }^{\circ}\text{C}$ ,  $V_{CM} = V_S/2$ , and  $R_L = 10\text{ k}\Omega$  connected to  $V_S/2$ , unless otherwise noted.



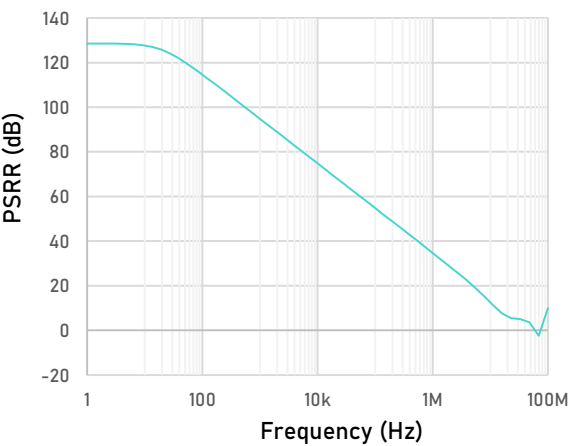
Input Voltage Noise Spectral Density as a function of Frequency



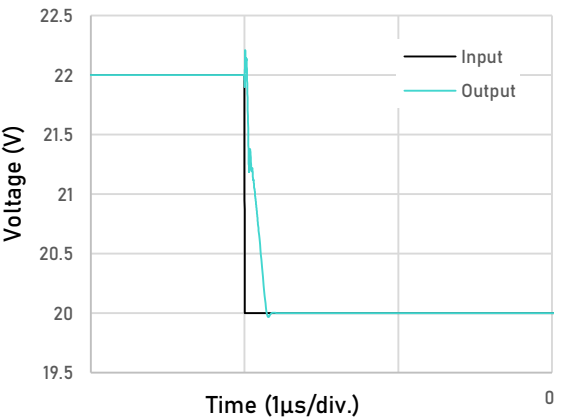
Offset Voltage Production Distribution



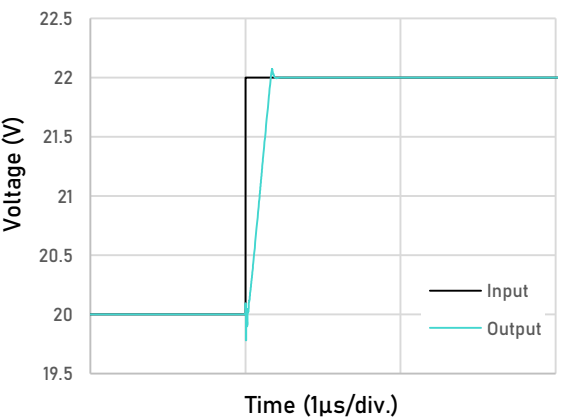
CMRR as a function of Frequency



PSRR as a function of Frequency



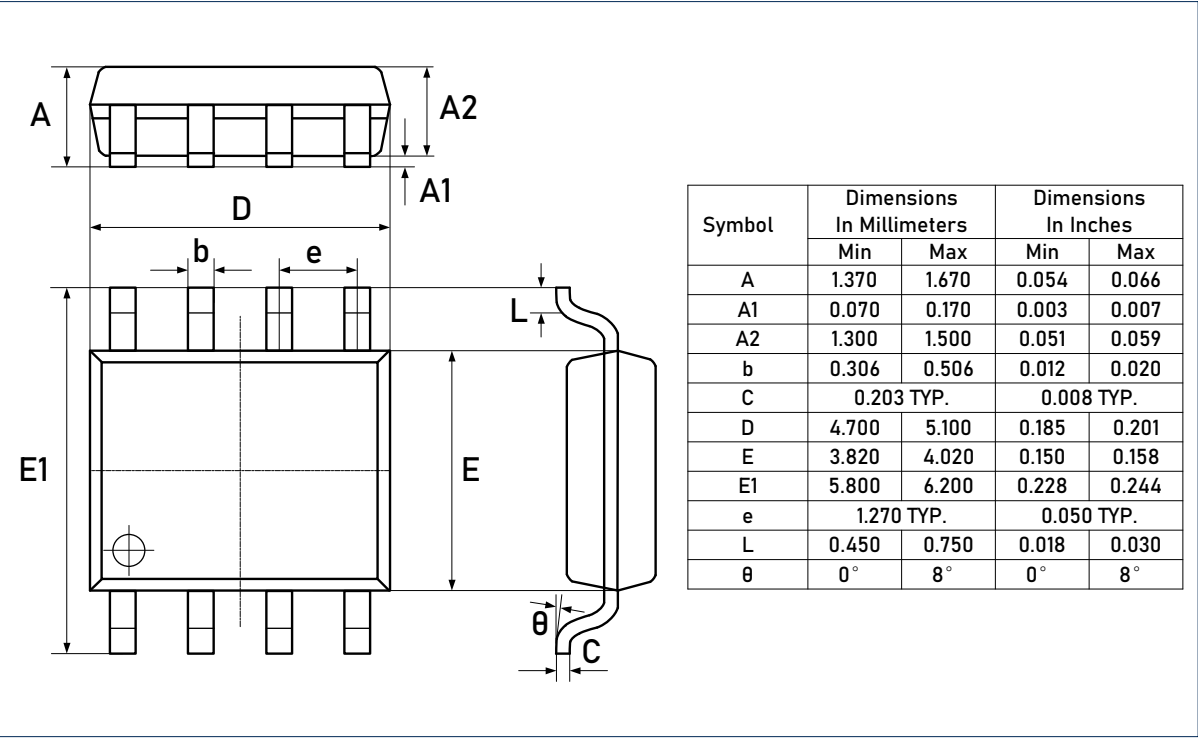
Large-Signal Step Response(Falling)



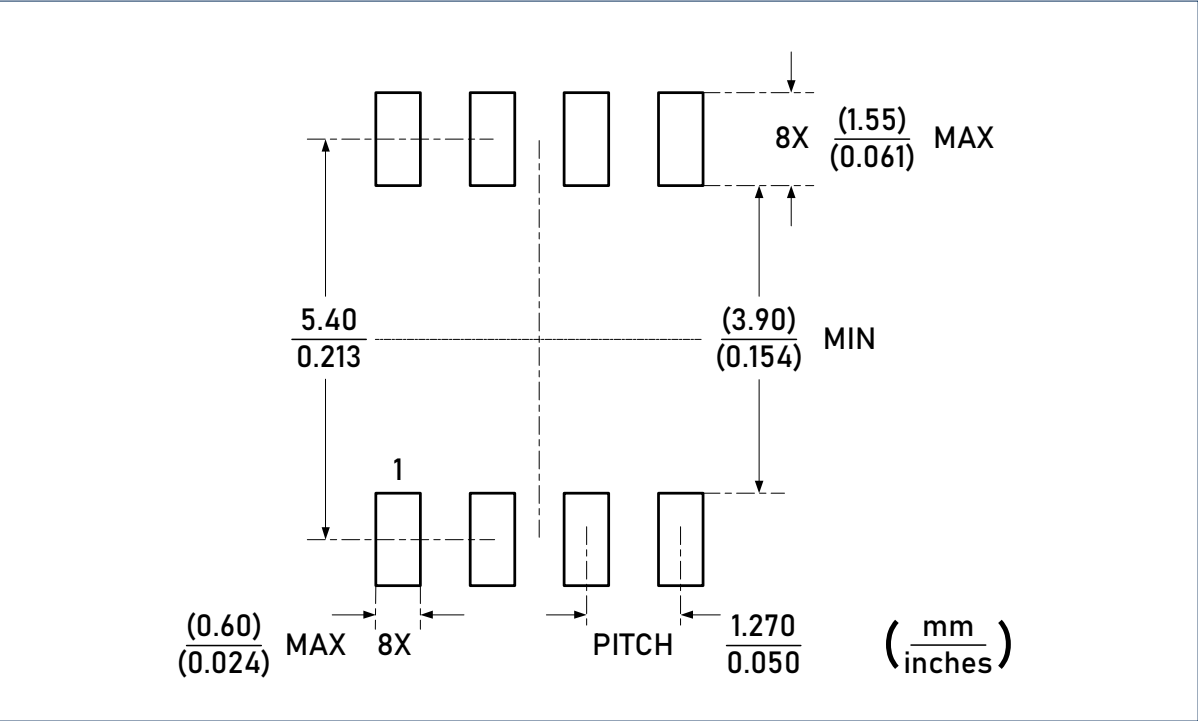
Large-Signal Step Response(Rising)

Package Outlines (continued)

DIMENSIONS, SOIC-8L



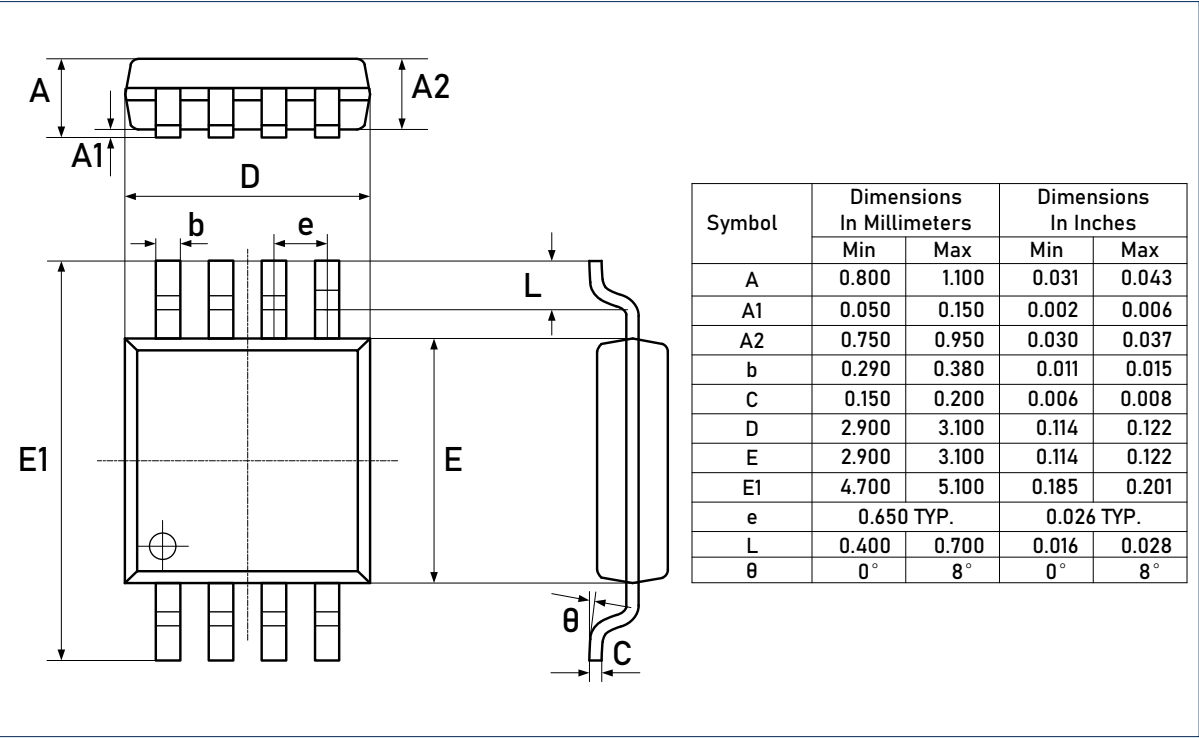
RECOMMENDED SOLDERING FOOTPRINT, SOIC-8L



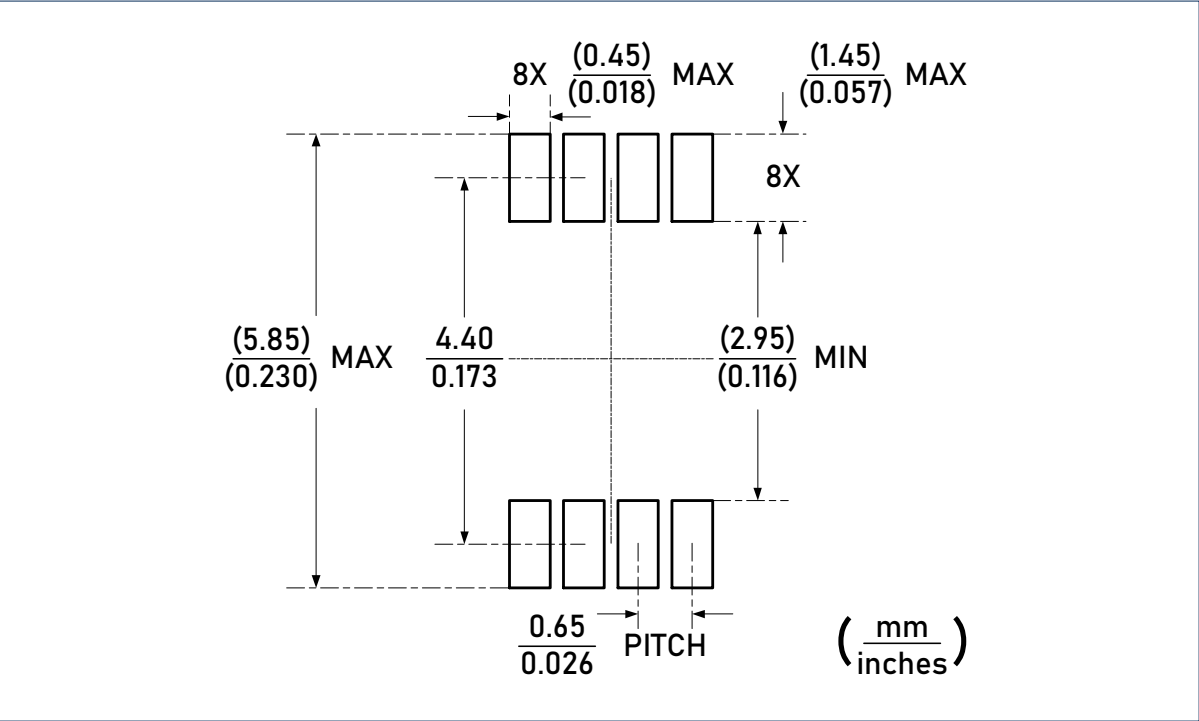
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Package Outlines (continued)

DIMENSIONS, MSOP-8L



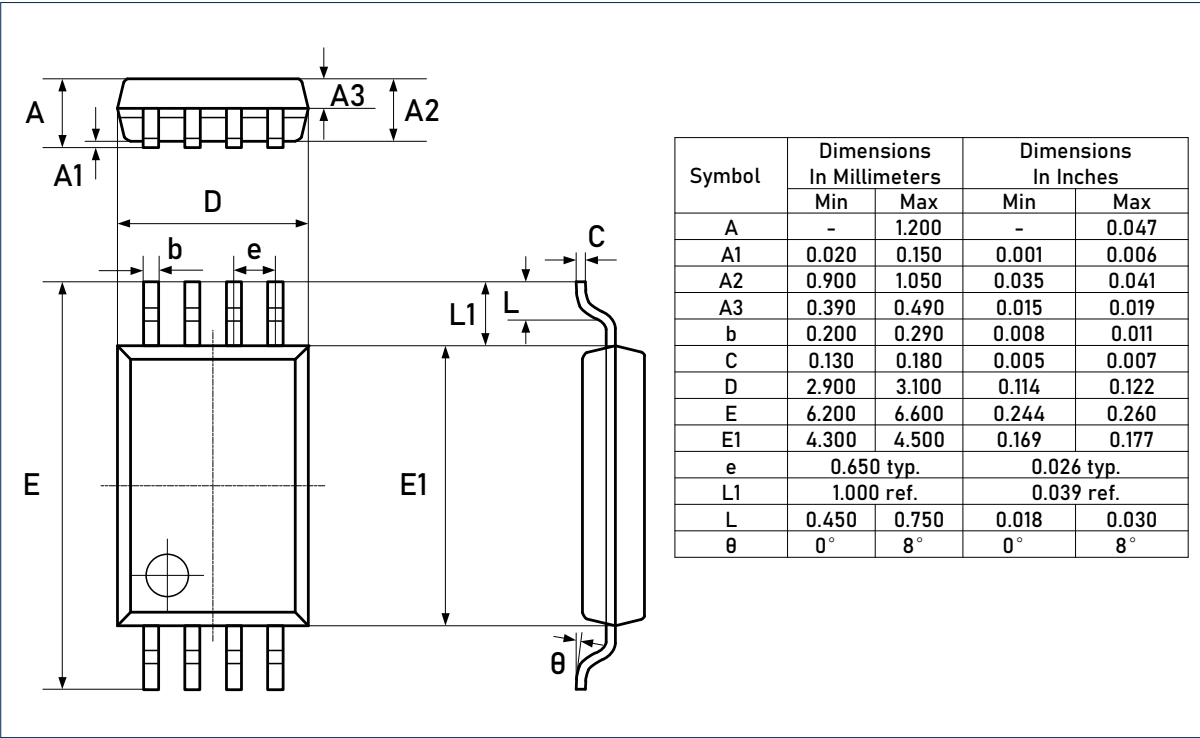
RECOMMENDED SOLDERING FOOTPRINT, MSOP-8L



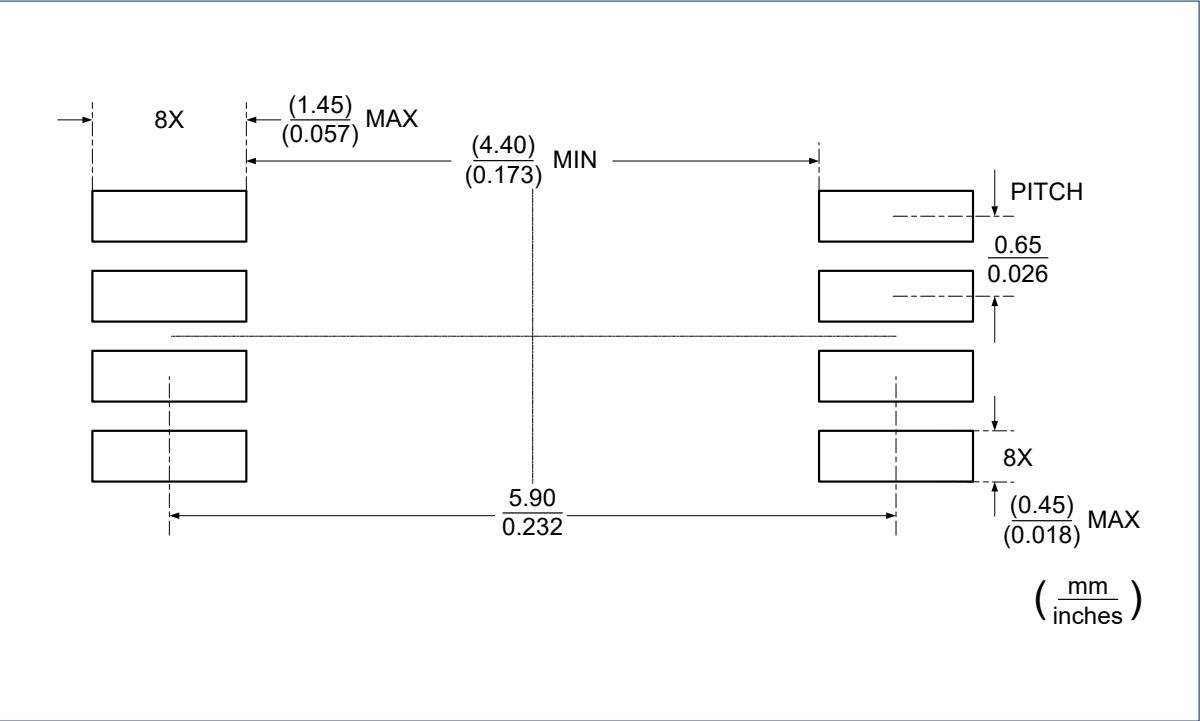
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Package Outlines (continued)

DIMENSIONS, TSSOP-8



RECOMMENDED SOLDERING FOOTPRINT, MSOP-8L

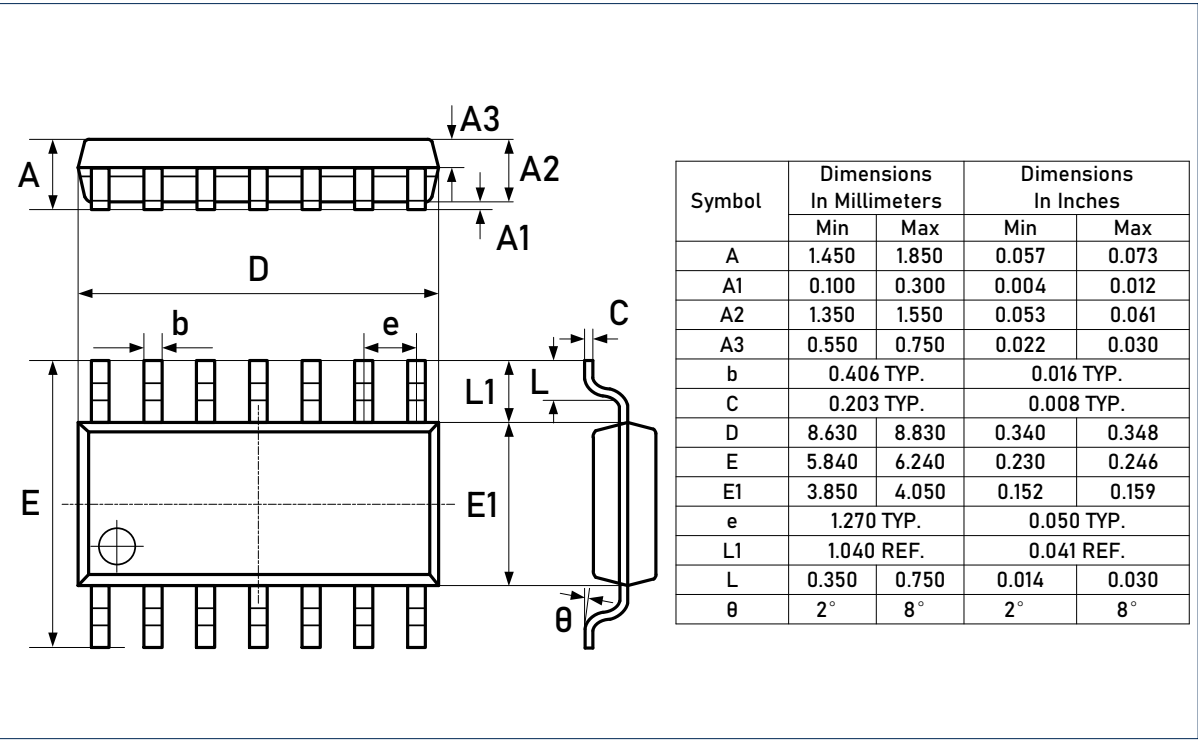


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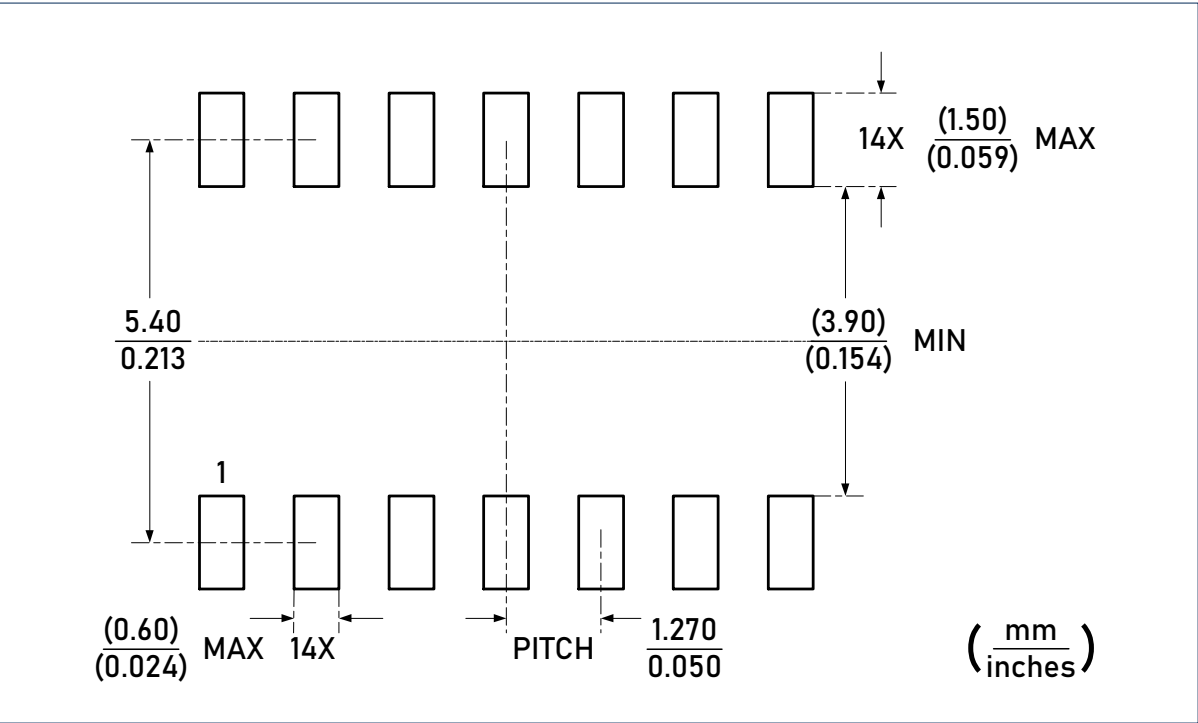


Package Outlines (continued)

DIMENSIONS, SOIC-14L



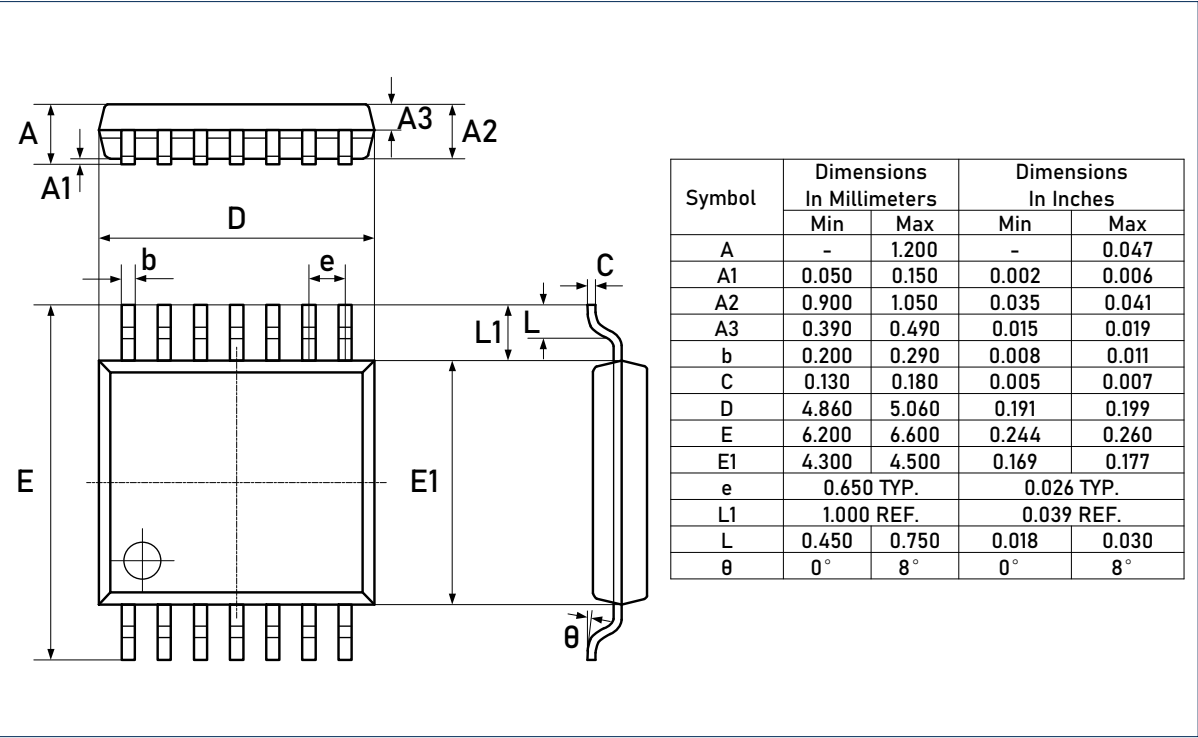
RECOMMENDED SOLDERING FOOTPRINT, SOIC-14L



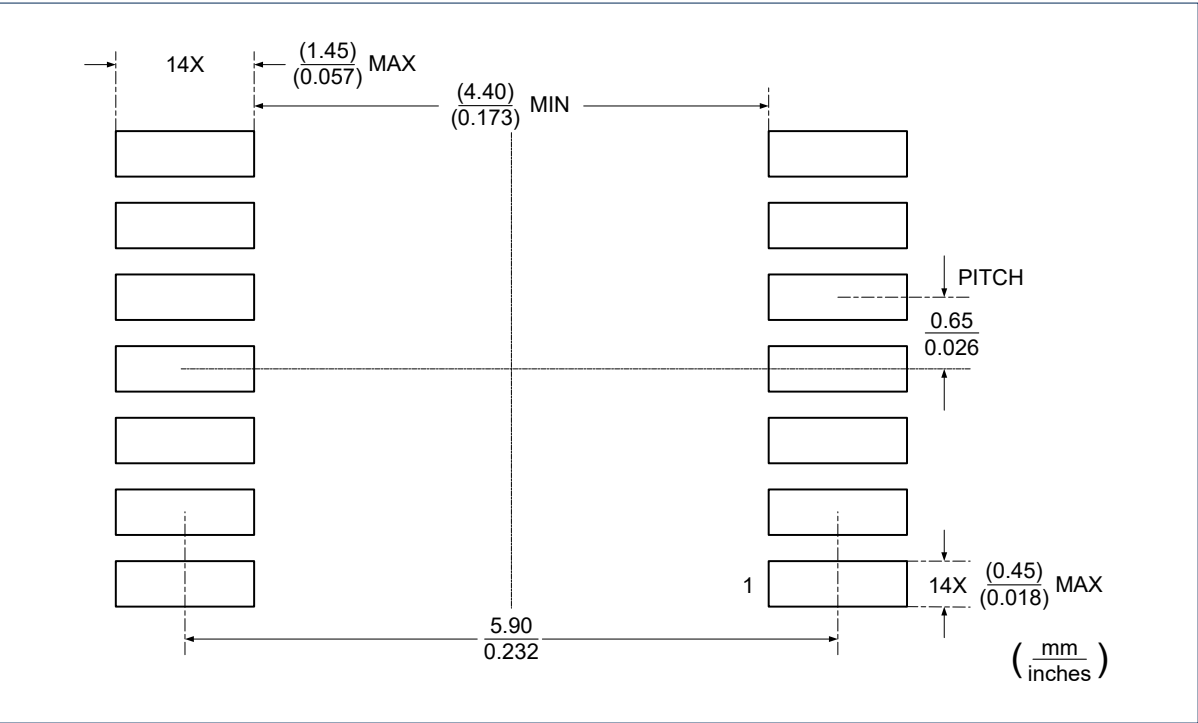
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Package Outlines (continued)

DIMENSIONS, TSSOP-14L



RECOMMENDED SOLDERING FOOTPRINT, SOIC-14L



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