

General Description

The TP3721/2 is wideband, low-noise, low-distortion dual operational amplifier, that offer rail-to-rail inputs / outputs and single supply operation down to 2.2V. They draw 1.6mA of quiescent supply current while featuring ultra-low distortion (0.0002% THD+N), as well as low input voltage-noise density (15nV/Hz) and low input current noise density (0.5fA/Hz). These features make the devices an ideal choice for applications that require low distortion and/or low noise. These amplifiers have inputs and outputs which swing rail-to-rail and their input common mode voltage range includes ground. The maximum input offset of these amplifiers is less than 5mV.

The TP3721/2 are unity gain stable with a gain-bandwidth of 10MHz. The TP3721/2 is available in SOT23-5 and SOP-8 packages. The extended temperature range of -40°C to +125°C over all supply voltages offers additional design flexibility.

Ordering Information

Part Number	Package	QTY Per Reel	Reel Size
TP3721S5	SOT23-5	3000	12"
TP3722S8	SOP-8L	4000	12"
TP3722M8	MSOP-8L	3000	12"

Pin Assignments

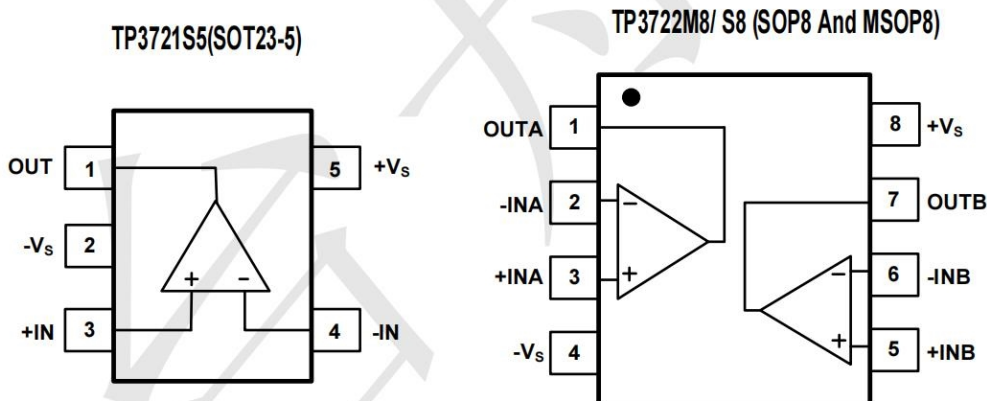


Figure 1. Pin Assignment Diagram (SOT23-5/SOP-8L and MSOP-8L Package)

Features

- Single-Supply Operation from +2.2V ~ +5.5V
- Rail-to-Rail Input / Output
- Gain-Bandwidth Product: 10MHz (Typ.)
- Low Input Bias Current: 10pA (Typ.)
- Low Offset Voltage: 5mV (Max.)
- Quiescent Current: 800µA per Amplifier (Typ.)
- Operating Temperature: -40°C ~ +125°C
- Available in SOT23-5 and MSOP-8 SOP8 Packages

Applications

- Portable Equipment
- Mobile Communications
- Smoke Detector
- Sensor Interface
- Medical Instrumentation

Ordering Information

TP3722S8

Package Type
S8 : SOP8
M8:MSOP8L
S5:SOT23-5
TP= TECH PUBLIC

Electrical Characteristics

Condition	Min	Max
Power Supply Voltage (V_{DD} to V_{SS})	-0.5V	+7V
Analog Input Voltage ($IN+$ or $IN-$)	$V_{SS}-0.5V$	$V_{DD}+0.5V$
PDB Input Voltage	$V_{SS}-0.5V$	+7V
Operating Temperature Range	-40°C	+125°C
Junction Temperature	+150°C	
Storage Temperature Range	-65°C	+150°C
Lead Temperature (soldering, 10sec)	+300°C	
Package Thermal Resistance ($T_A=+25^\circ C$)		
SOP8, θ_{JA}	130°C	
MSOP8, θ_{JA}	210°C	

Electrical Characteristics

($V_{DD} = +5V$, $V_{SS} = 0V$, $V_{CM} = 0V$, $V_{OUT} = V_{DD}/2$, $R_L = 100K$ tied to $V_{DD}/2$, $SHDNB = V_{DD}$, $T_A = -40^\circ C$ to $+125^\circ C$, unless otherwise noted. Typical values are at $T_A = +25^\circ C$.) (Notes 1)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Supply-Voltage Range	V_{DD}	Guaranteed by the PSRR test	2.2	-	5.5	V
Quiescent Supply Current (per Amplifier)	I_{DD}	$V_{DD} = 3V$	-	0.8	-	mA
		$V_{DD} = 5V$	-	0.8	1.2	
Input Offset Voltage	V_{OS}	$T_A = +25^\circ C$	-	-	± 5	mV
		$T_A = -40^\circ C$ to $+85^\circ C$	-	-	-	
		$T_A = -40^\circ C$ to $+125^\circ C$	-	-	± 1.5	
Input Offset Voltage Tempco	$\Delta V_{OS}/\Delta T$		-	± 0.3	± 6	$\mu V/^\circ C$
Input Bias Current	I_B	(Note 3)	-	± 1	± 100	pA
Input Offset Current	I_{OS}	(Note 3)	-	± 1	± 100	pA
Input Common-Mode Voltage Range	V_{CM}	Guaranteed by the $T_A = 25^\circ C$	-0.2	-	$V_{DD} + 0.2$	V
		CMRR test $T_A = -40^\circ C$ to $+125^\circ C$	0	-	$V_{DD} 0$	
Common-Mode Rejection Ratio	CMRR	$V_{SS} - 0.2V \leq V_{CM} \leq V_{DD} + 0.2V$ $T_A = +25^\circ C$	-	75	-	dB
		$V_{SS} \leq V_{CM} \leq 5V$ $T_A = +25^\circ C$	65	80	-	
		$V_{SS} - 0.2V \leq V_{CM} \leq V_{DD} + 0.2V$ $T_A = -40^\circ C$ to $+125^\circ C$	-	65	-	
Power-Supply Rejection Ratio	PSRR	$V_{DD} = +2.2V$ to $+5.5V$	75	90	-	dB
Open-Loop Voltage Gain	A_V	$R_L = 100k\Omega$ to $V_{DD}/2$, $100mV \leq V_{O} \leq V_{DD} - 125mV$	90	100	-	dB
		$R_L = 1k\Omega$ to $V_{DD}/2$, $200mV \leq V_{O} \leq V_{DD} - 250mV$	75	85	-	
		$R_L = 500\Omega$ to $V_{DD}/2$, $350mV \leq V_{O} \leq V_{DD} - 500mV$	55	65	-	
Output Voltage Swing	V_{OUT}	$ V_{IN+} - V_{IN-} \geq 10mV$ $V_{DD} - V_{OH}$	-	10	35	mV
		$R_L = 10k\Omega$ to $V_{DD}/2$ $V_{OL} - V_{SS}$	-	10	30	
		$ V_{IN+} - V_{IN-} \geq 10mV$ $V_{DD} - V_{OH}$	-	80	200	
		$R_L = 1k\Omega$ to $V_{DD}/2$ $V_{OL} - V_{SS}$	-	50	150	
		$ V_{IN+} - V_{IN-} \geq 10mV$ $V_{DD} - V_{OH}$	-	100	350	

		$R_L = 500\Omega$ to $V_{DD}/2$ $V_{OL}-V_{SS}$		80	260	
Output Short-Circuit Current	I_{SC}	Sinking or Sourcing	-	± 50	-	mA
PDB Logic Low	V_{IL}		-	-	0.8	V
PDB Logic High	V_{IH}		2	-	-	V
Turn-On Time	T_{ON}		-	2.2	-	μs
Turn-Off Time	T_{OFF}		-	0.8	-	μs
Output Leakage Current	I_{LEAK}	Shutdown Mode (PDB = V_{SS}), $V_{OUT} = V_{SS}$ to V_{DD}	-	± 0.001	± 1.0	μA
Input Capacitance	C_{IN}			10		pF
Gain Bandwidth Product	GBW	$A_V = +1V/V$	-	10	-	MHz
Slew Rate	SR	$A_V = +1V/V$	-	4.5	-	V/ μs
Full Power Bandwidth		$A_V = +1V/V$	-	0.4	-	MHz
Phase Margin	ϕ_m	$A_V = +1V/V$	-	55	-	deg
Gain Margin	G_m	$A_V = +1V/V$	-	12	-	dB
Settling Time	t_s	To 0.01%, $V_{OUT} = 2V$ step $A_V = +1V/V$	-	1	-	μs
Capacitive-Load Stability	C_{LOAD}	No sustained oscillations. $A_V = +1V/V$	-	200	-	pF
Peak-to-Peak Input Noise Voltage (Note 5)	$e_n(p-p)$	$f = 0.1Hz$ to 10Hz	-	5	-	$\mu Vp-p$
Input Voltage Noise Density	e_n	$f = 10Hz$	-	60	-	nV/ \sqrt{Hz}
		$f = 1kHz$	-	30	-	
		$f = 30kHz$	-	15	-	
Input Current Noise Density	i_n	$f = 1kHz$				fA/ \sqrt{Hz}
Total Harmonic Distortion plus Noise	THD+N	$V_{OUT} = 2Vp-p$, $A_V = +1V/V$, $f = 1kHz$	-	0.0001	-	%
		$R_L = 10k\Omega$ to GND $f = 20kHz$	-	0.002	-	
		$V_{OUT} = 2Vp-p$, $A_V = +1V/V$, $f = 1kHz$	-	0.0002	-	
		$R_L = 1k\Omega$ to GND $f = 20kHz$	-	0.004	-	

Note 1: All devices are 100% production tested at $T_A = +25^\circ C$; all specifications over the automotive temperature range is guaranteed by design, not production tested.

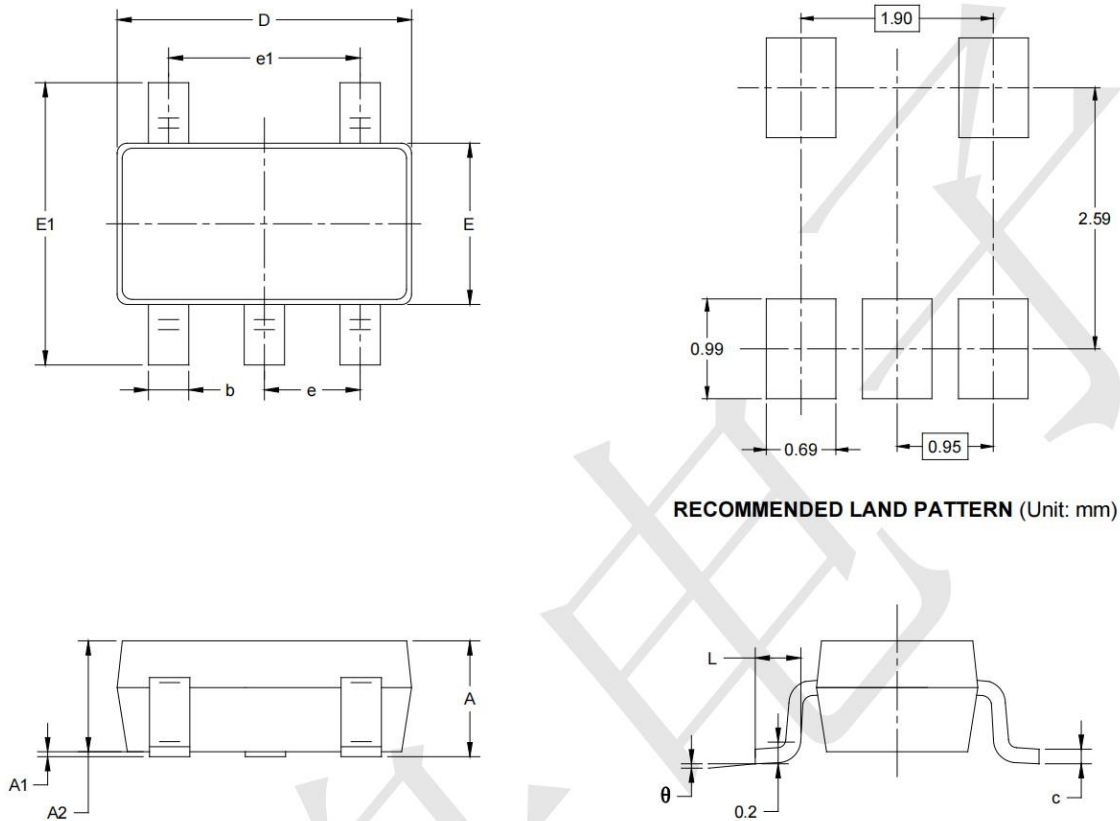
Note 2: Parameter is guaranteed by design.

Note 3: Peak-to-peak input noise voltage is defined as six times RMS value of input noise voltage.

Package Information

www.sot23.com.tw

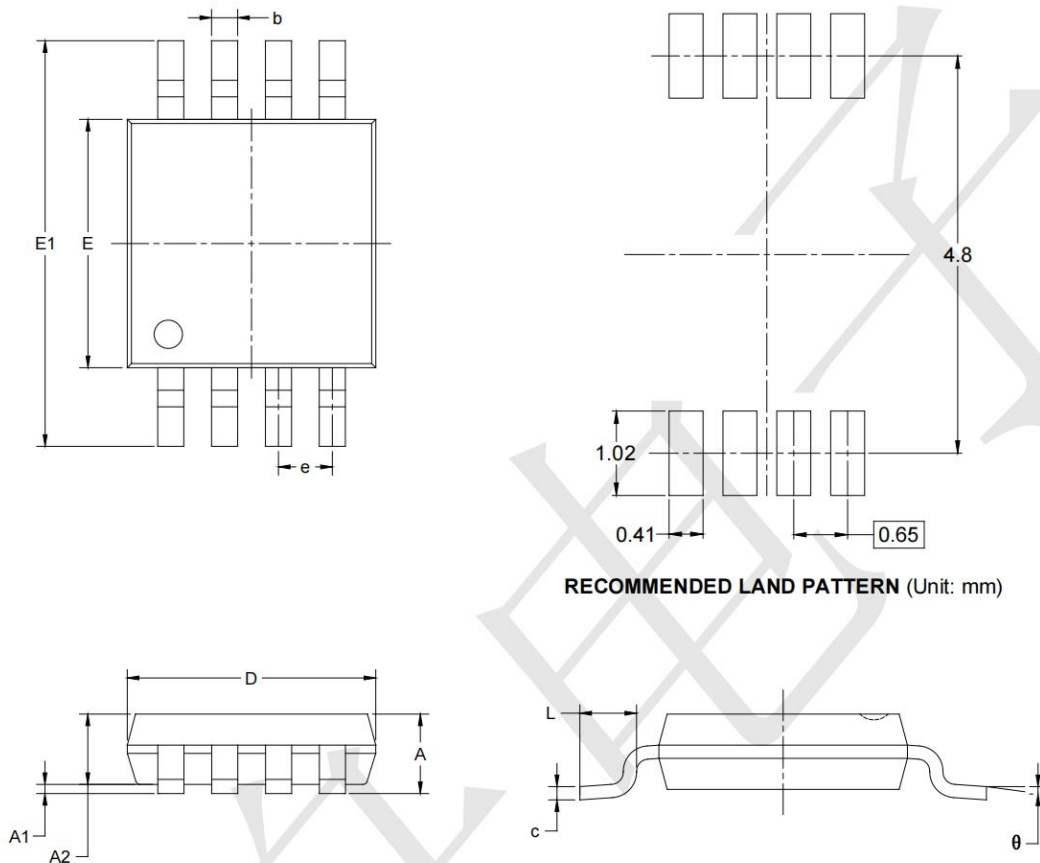
SOT-23-5



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037 BSC	
e1	1.900 BSC		0.075 BSC	
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

Package Information

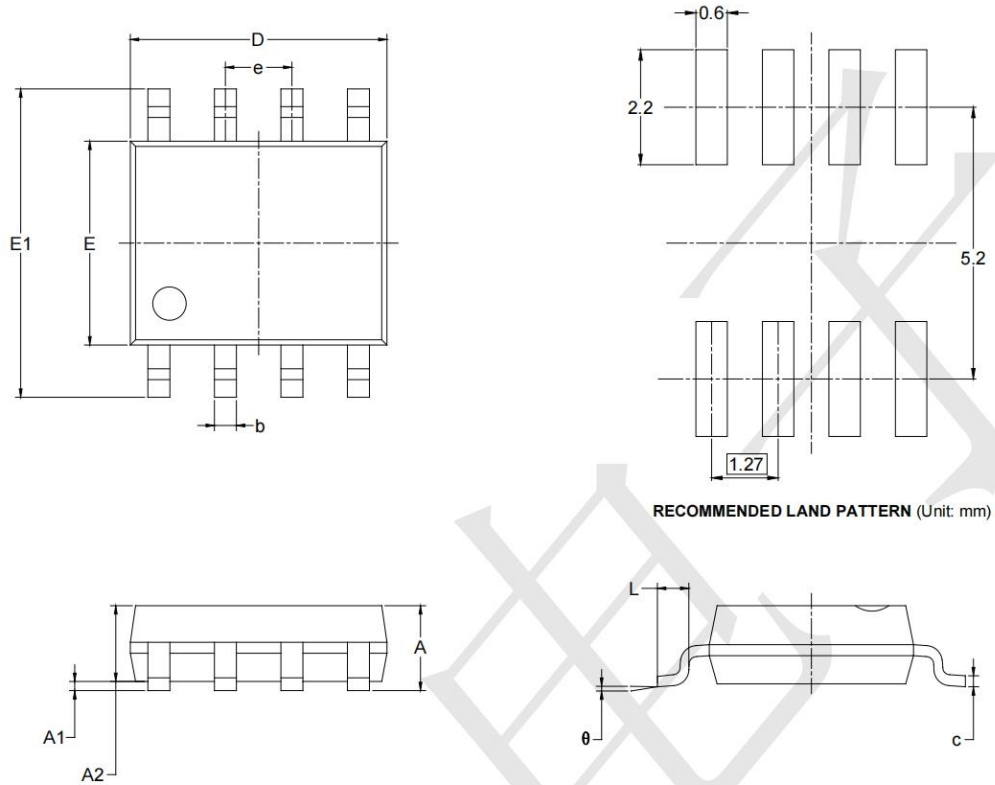
MSOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.250	0.380	0.010	0.015
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
e	0.650 BSC		0.026 BSC	
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°

Package Information

SOIC-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.27 BSC		0.050 BSC	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°