

General Description

The TPMCP6021 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 TPMCP6021 are unity gain stable with a gain-bandwidth of 10MHz. The TPMCP6021 is available in SOT23-5 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
TPMCP6021T-E/OT	SOT23-5	3000	12"

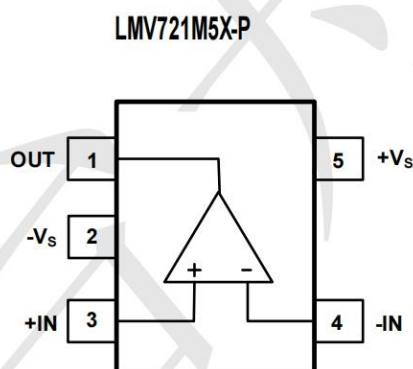
Features

- 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 Package

Applications

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

Pin Assignments



Marking: ECTP

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 ($T_A=+25^\circ\text{C}$)		
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 $V_{DD}/2$, $100mV \leq V_{OS} \leq V_{DD} - 125mV$	90	100	-	dB
		$R_L = 1k\Omega$ to $V_{DD}/2$, $200mV \leq V_{OS} \leq V_{DD} - 250mV$	75	85	-	
		$R_L = 500\Omega$ to $V_{DD}/2$, $350mV \leq V_{OS} \leq V_{DD} - 500mV$	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	-	

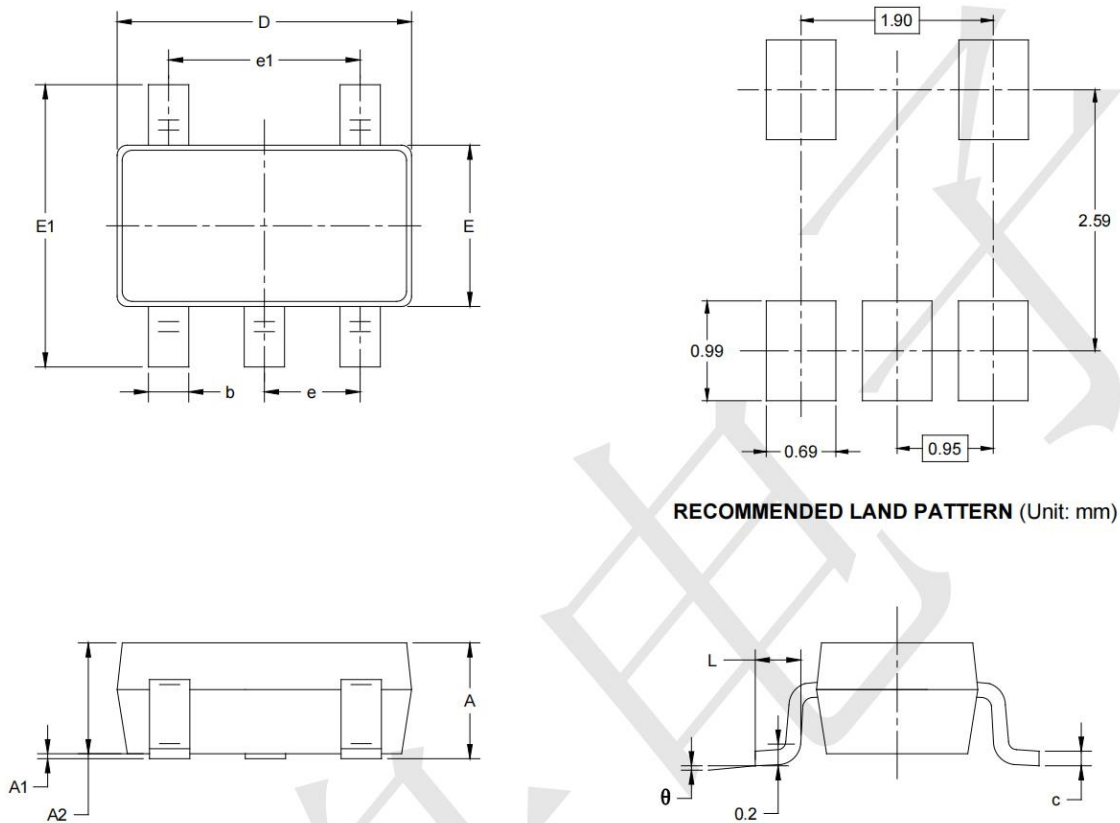
Note 1: All devices are 100% production tested at $T_A = +25^\circ C$; all specifications over the automotive temperature range is guaranteed by design, not production tested.

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

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°

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