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TPMCP6021T-E/OT

10MHz, Low Power, CMOS,
Rail-to-Rail Operational Amplifier

www.sot23.com.tw

General Description

The TPMCP6021 is wideband, low-noise, low-distortio n dual operational amplifier, that offer rail-torail 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 currentnoise density (0.5fA/Hz).These features make the devices an ideal choicef or 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 witha gain-bandwid of 10MHz.The TPMCP6021 is available in SOT23-5 packages. The extended temperature range of -40℃ to +125℃ over all supply voltages offers additional design flexibility.

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℃ ~ +125℃
- Available in SOT23-5 Package

Applications

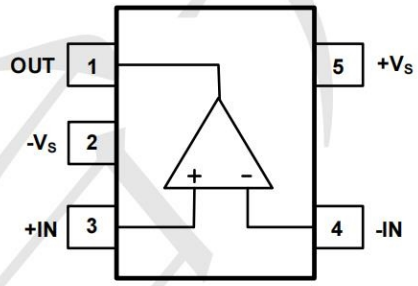
- Portable Equipment
- Mobile Communications
- Smoke Detector
- Sensor Interface
- Medical Instrumentation

Ordering Information

Part Number	Package	QTY Per Reel	Reel Size
TPMCP6021T-E/OT	SOT23-5	3000	12″

Pin Assignments

LMV721M5X-P



Marking: ECTP

Electrical Characteristics

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

Electrical Characteristics

(VDD = +5V, Vss = 0V, V_{CM} = 0V, V_{OUT} = V_{DD}/2, R_L=100K tied to V_{DD}/2, SHDNB = V_{DD}, TA = -40℃ to +125℃, unless otherwise noted. Typical values are at TA =+25℃.) (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℃	-	-	±5	mV
		T_A = -40℃ to +85℃	-	-	-	
		T_A = -40℃ to +125℃	-	-	±1.5	
Input Offset Voltage Tempco	$\Delta V_{OS}/\Delta T$		-	±0.3	±6	μV/℃
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℃	-0.2	-	V_{DD}+0.2	V
		CMRR test T_A = -40°C to +125°C	0	-	V_{DD}0	
Common-Mode Rejection Ratio	CMRR	Vss-0.2V≤V_{CM}≤V_{DD}+0.2V T_A = +25℃	-	75	-	dB
		Vss≤V_{CM}≤5V T_A = +25℃	65	80	-	
		Vss-0.2V≤V_{CM}≤V_{DD}+0.2V T_A = -40℃ to +125℃	-	65	-	
Power-Supply Rejection Ratio	PSRR	V_{DD} = +2.2V to +5.5V	75	90	-	dB
Open-Loop Voltage Gain	A_V	R_L=100kΩ to V_{DD}/2, 100mV≤V_O≤V_{DD} -125mV	90	100	-	dB
		R_L=1kΩ to V_{DD}/2, 200mV≤V_O≤V_{DD} -250mV	75	85	-	
		R_L=500Ω to V_{DD}/2, 350mV≤V_O≤V_{DD} -500mV	55	65	-	
Output Voltage Swing	V_{OUT}	|V_{IN+}-V_{IN-}| ≥ 10mV V_{DD}-V_{OH}	-	10	35	mV
		R_L = 10kΩ to V_{DD}/2 V_{OL}-V_{SS}	-	10	30	
		|V_{IN+}-V_{IN-}| ≥ 10mV V_{DD}-V_{OH}	-	80	200	
		R_L = 1kΩ to V_{DD}/2 V_{OL}-V_{SS}	-	50	150	
		|V_{IN+}-V_{IN-}| ≥ 10mV V_{DD}-V_{OH}		100	350	

		R_L = 500Ω 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		Av = +1V/V	-	0.4	-	MHz
Phase Margin	ϕ_m	Av = +1V/V	-	55	-	deg
Gain Margin	G_m	Av = +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. Av = +1V/V	-	200	-	pF
Peak-to-Peak Input Noise Voltage (Note 5)	e_n(p-p)	f = 0.1Hz to 10Hz	-	5	-	μVp-p
Input Voltage Noise Density	e_n	f = 10Hz f = 1kHz f = 30kHz	- - -	60 30 15	- - -	nV/√Hz
Input Current Noise Density	i_n	f = 1kHz				fA/√Hz
Total Harmonic Distortion plus Noise	THD+N	V_{OUT} = 2Vp-p, Av = +1V/V, f = 1kHz RL = 10kΩ to GND f = 20kHz V_{OUT} = 2Vp-p, Av = +1V/V, f = 1kHz RL = 1kΩ to GND f = 20kHz	- - - -	0.0001 0.002 0.0002 0.004	- - - -	%

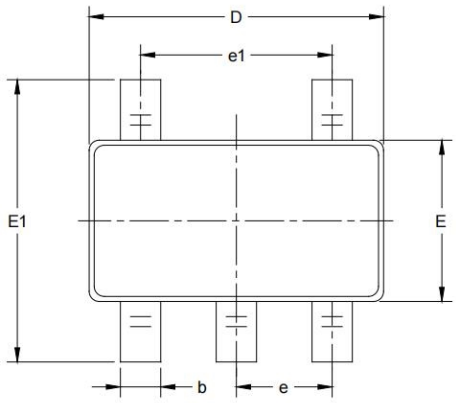
Note 1: All devices are 100% production tested at TA = +25℃ ; all specifications over the automotive temperature range is guaranteed by design, not production tested.

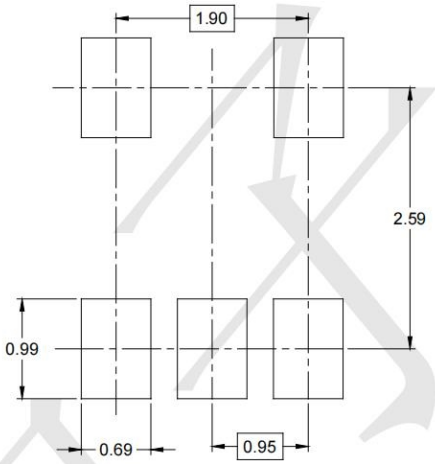
Note 2: Parameter is guaranteed by design.

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

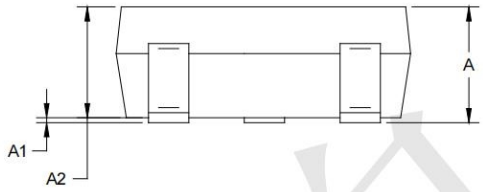
Package Information

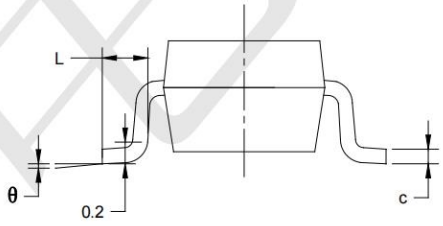
SOT-23-5





RECOMMENDED LAND PATTERN (Unit: mm)





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°