TECH PUBLIC
台舟电子

TPV8041S5

700nA, Single Rail-to-Rail I/O Operational Amplifier

www.sot23.com.tw

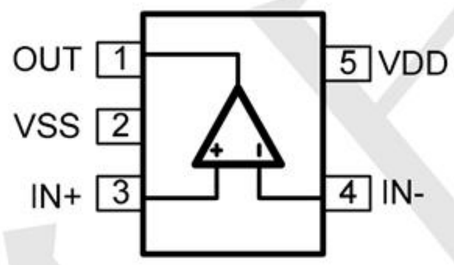
Features

- Quiescent Current: 700nA per Amplifier (Typ.)
- Low Offset Voltage: 3mV (Max.)
- Low Offset Drift: 2.5μV/°C, max
- Gain-Bandwidth: 14.5kHz (Typ.)
- Single-Supply
- Supply Voltage:1.4V to 5.5V
- Rail-to-Rail Input / Output
- Low Input Bias Current: 1pA (Typ.)
- Operating Temperature: -40°C ~ +125°C
- Embedded RF Anti-EMI Filter
- Available in SOT-25 and SC70-5 packages

Applications

- Battery-Powered Instruments
- Portable Devices
- Medical Instruments
- Test Equipment
- Low-Power Sensor Signal Conditioning
- ASIC Input or Output Amplifier
- Sensor Interface
- Smoke Detectors
- Audio Output
- Piezoelectric Transducer Amplifier

Pin Assignments



SOT23-5

Electrical Characteristics

Power Supply Voltage (V_{DD} to V_{SS})	-0.5V ~ +7.5V
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	+160°C
Storage Temperature Range	-55°C ~ 150°C
Lead Temperature (soldering, 10sec)	+260°C
Package Thermal Resistance (T_A=+25℃)	
θ_{JA}, SOT-25	190°C/W
θ_{JA}, SC70-5	333°C/W
ESD Susceptibility	
HBM	6kV
MM	300V

Electrical Characteristics

At V_S = +5V, R_L = 1MΩ connected to $V_S/2$, and V_{OUT} = $V_S/2$, unless otherwise noted.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
Input Offset Voltage	V_{OS}	V_{CM} = $V_S/2$		0.4	3	mV
Input Bias Current	I_B		-	1	-	pA
Input Offset Current	I_{OS}		-	1	-	pA
Common-Mode Voltage Range	V_{CM}	V_S = 5.5V	-	-0.1 to +5.6	-	V
Common-Mode Rejection Ratio	CMRR	V_S = 5V, V_{CM} = -0.1V to 2.5V	66	78	-	dB
		V_S = 5V, V_{CM} = -0.1V to 5.1V	67	84	-	
Open-Loop Voltage Gain	A_{OL}	V_S=1.4V, R_L = 50kΩ, V_O = V_S-0.1V	75	86	-	dB
		V_S=5V, R_L = 50kΩ, V_O = Vs-0.1V	84	93	-	
Input Offset Voltage Drift	$\Delta V_{OS}/\Delta_T$		-	2.5	-	μV/°C
OUTPUT CHARACTERISTICS						
Output Voltage Swing from Rail	V_{OH}	V_S=1.4V, R_L = 50kΩ	1.390	1.395	-	V
	V_{OL}		-	4.5	10	mV
	V_{OH}	V_S=5V, R_L = 50kΩ	4.990	4.997	-	V
	V_{OL}		-	3.5	10	mV
Output Current	I_{SOURCE}	R_L = 10Ω to $V_S/2$	-	20	-	mA
	I_{SINK}		-	20	-	
POWER SUPPLY						
Operating Voltage Range			-	1.4	-	V
			-	5.5	-	
Power Supply Rejection Ratio	PSRR	V_S = +1.4V to +5.5V, V_{CM} = +0.5V	77	80	-	dB
Quiescent Current / Amplifier	I_Q		-	700	-	nA
DYNAMIC PERFORMANCE (C_L = 100pF)						
Gain-Bandwidth Product	GBP		-	14.5	-	kHz
Slew Rate	SR		-	6	-	V/ms

		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	ts	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.

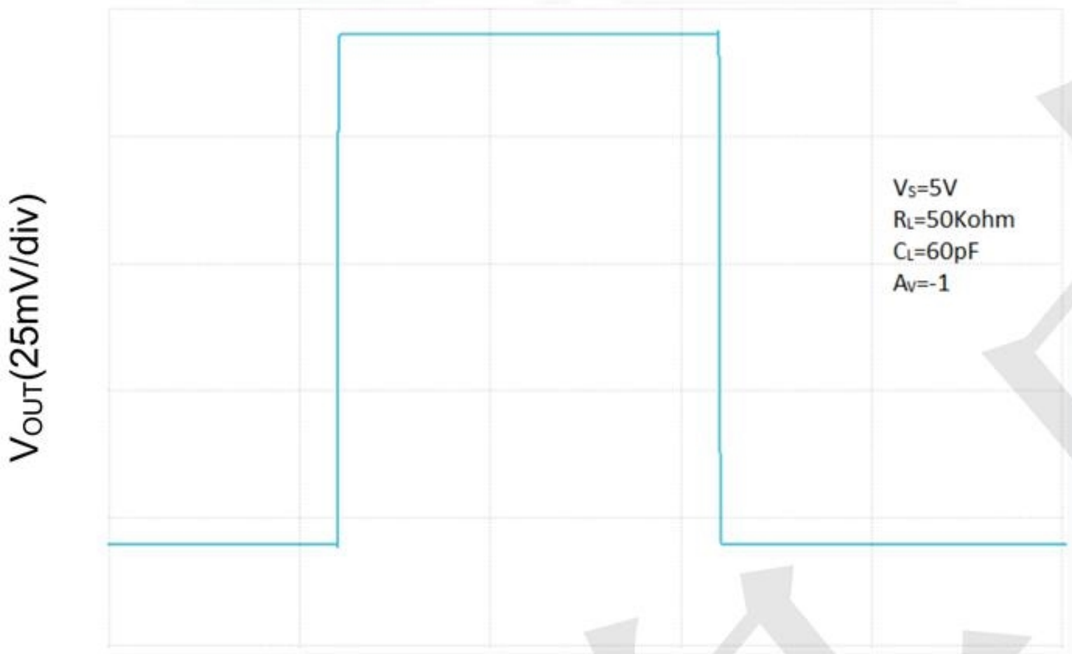
Note 2: Parameter is guaranteed by design.

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

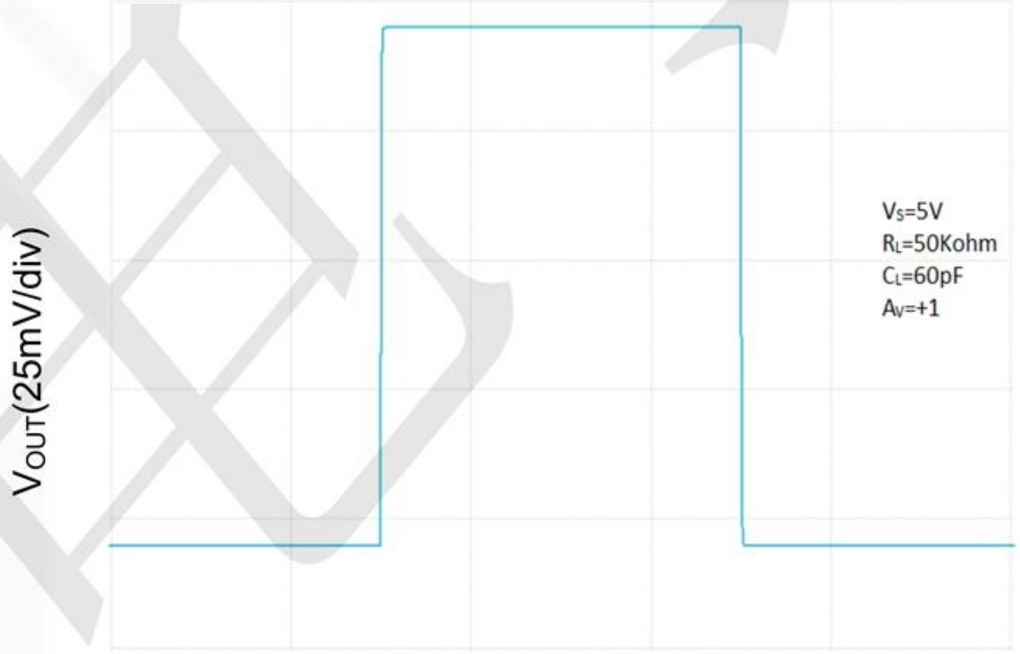
Typical Performance characteristics

At T_A=+25°C, V_S=+5V, and R_L=100KΩ connected to V_S/2, unless otherwise noted.

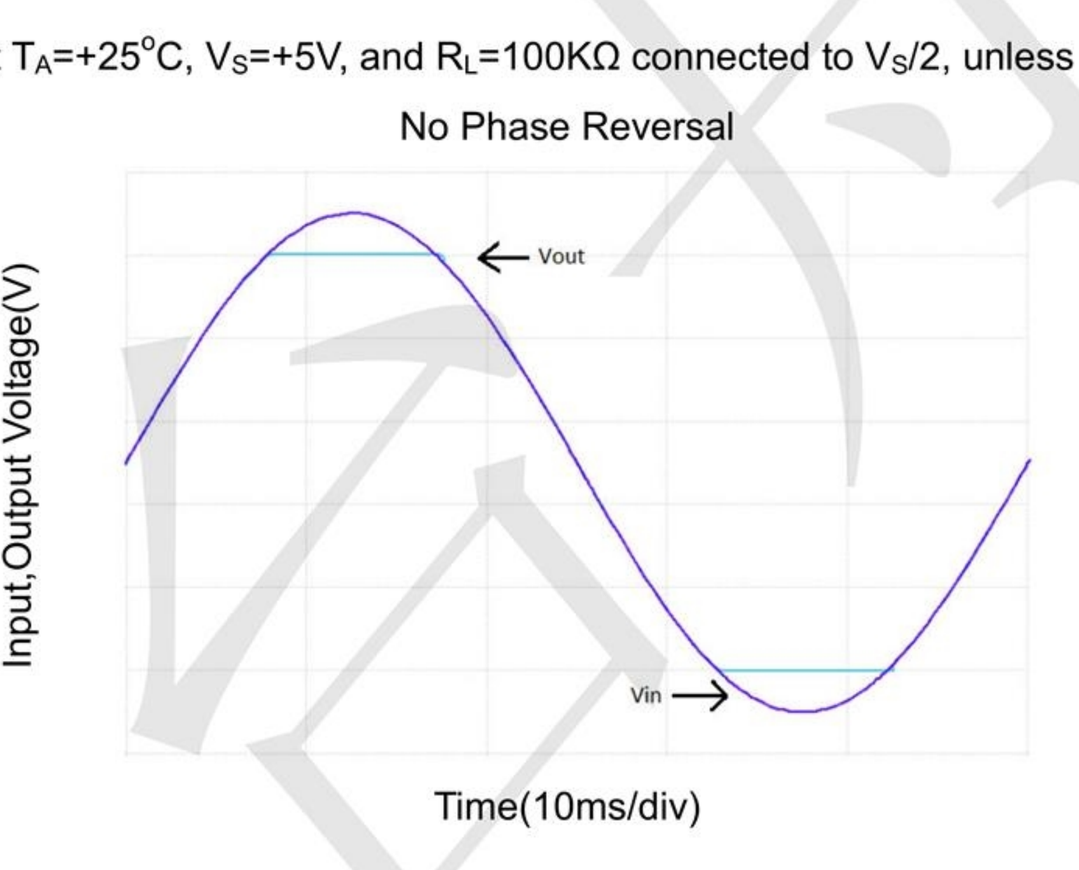
Large Signal Inverting Pulse Response



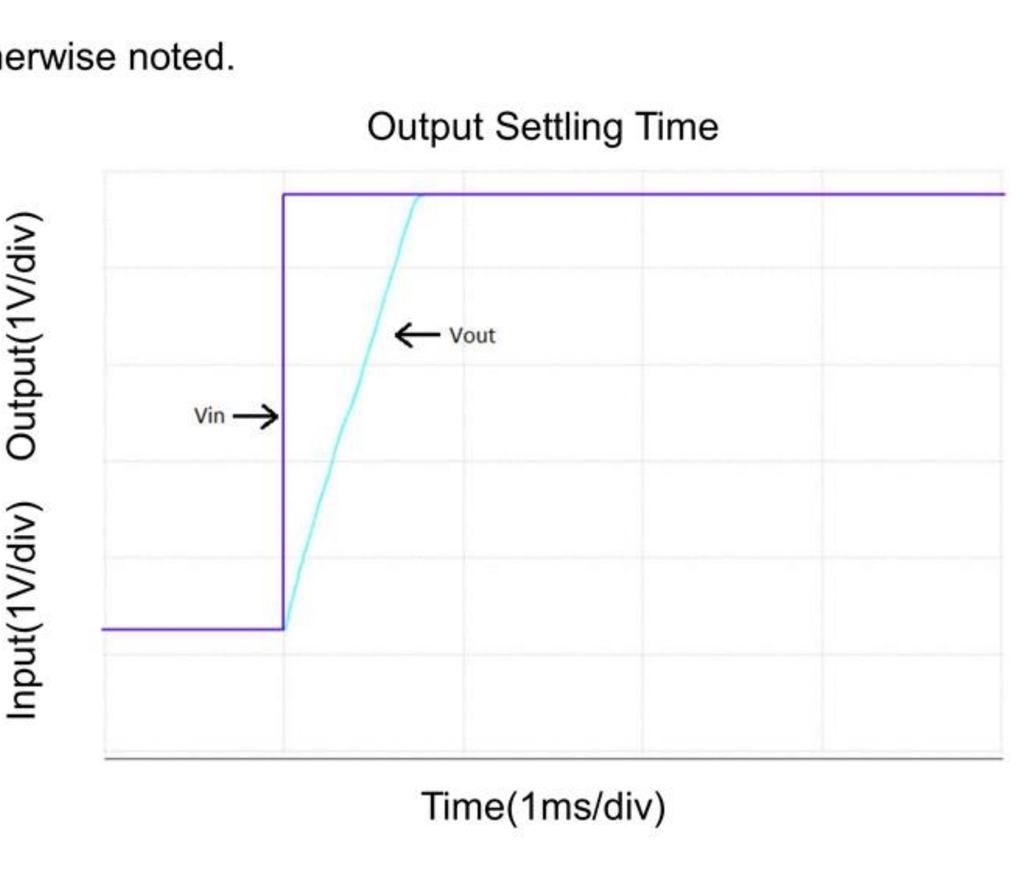
Large Signal Non-Inverting Pulse Response



Small Signal Inverting Pulse Response



Small Signal Non-Inverting Pulse Response



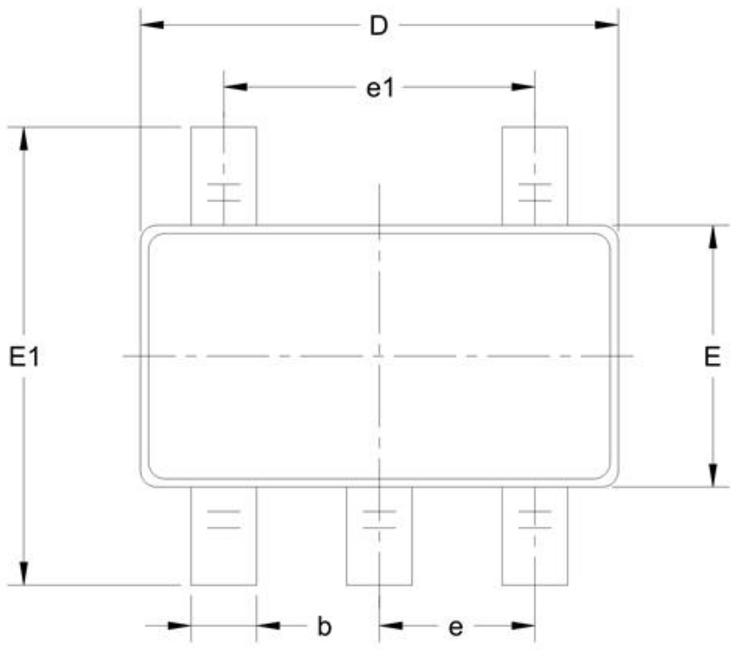
At T_A=+25°C, V_S=+5V, and R_L=100KΩ connected to V_S/2, unless otherwise noted.

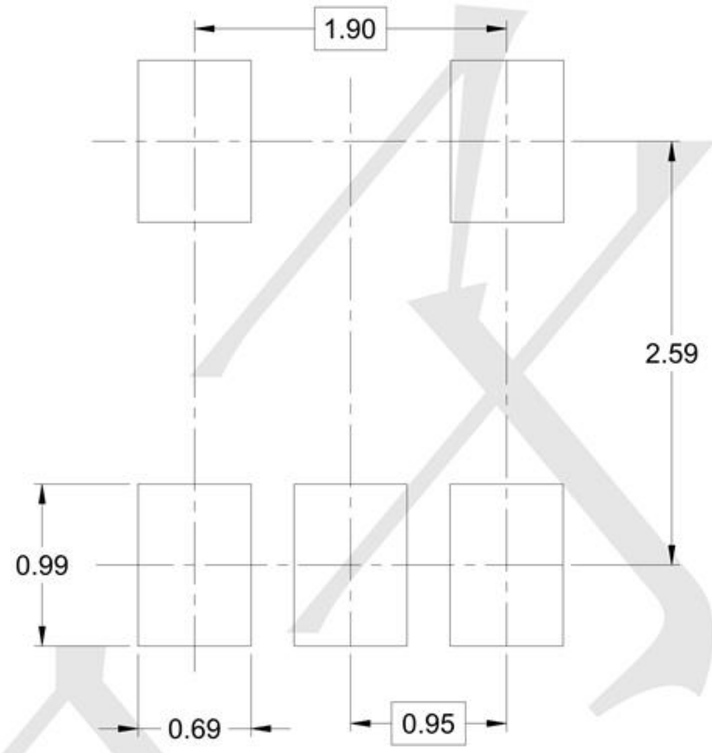
No Phase Reversal

Output Settling Time

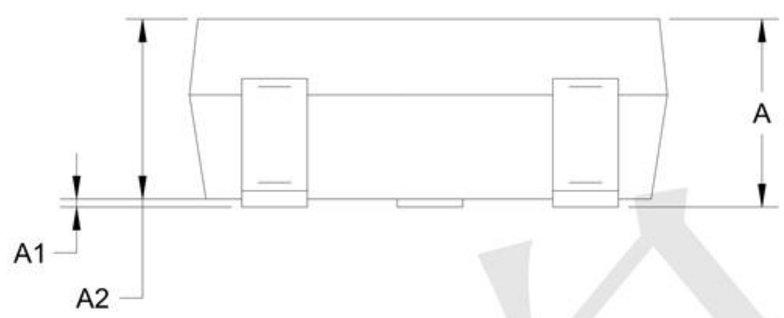
Package Information

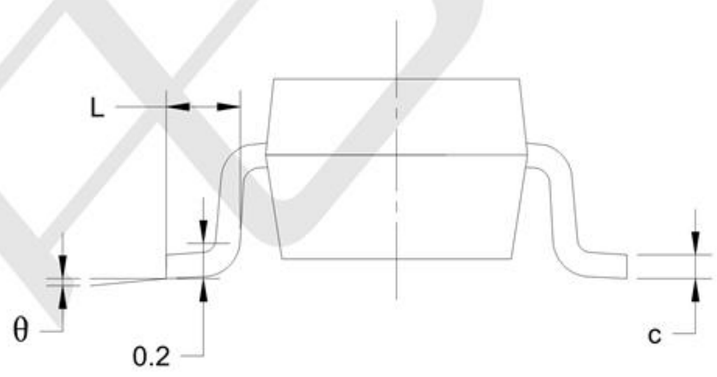
SOT-23-5





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°

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