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TP8541ARTZ

1MHz,Low Power,1.8V,CMOS, Rail to Rail Operational Amplifier

www.sot23.com.tw

General Description

The TP8541ARTZ is a single supply, low power CMOS operational amplifier; these amplifiers offer bandwidth of 1MHz, rail-to-rail inputs and outputs, and single-supply operation from 1.8V to 5.5V. Typical low quiescent supply current of 55μA in one operational amplifier within one chip and very low input bias current of 10pA make the devices an ideal choice for low offset, low power consumption and high impedance applications such as smoke detectors, photodiode amplifiers, and other sensors.

The TP8541ARTZ is available in SOT23-5L packages.

The extended temperature range of -40 ℃ to +125 ℃ over all supply voltages offers additional design flexibility.

Features

- Single-Supply Operation from +1.8V ~ +5.5V
- Rail-to-Rail Input / Output
- Gain-Bandwidth Product: 1MHz (Typ.)
- Low Input Bias Current: 10pA (Typ.)
- Low Offset Voltage: 5mV (Max.)
- Quiescent Current: 55μA per Amplifier (Typ.)
- Operating Temperature: -40℃ ~ +125℃
- Available in SOT23-5L Packages

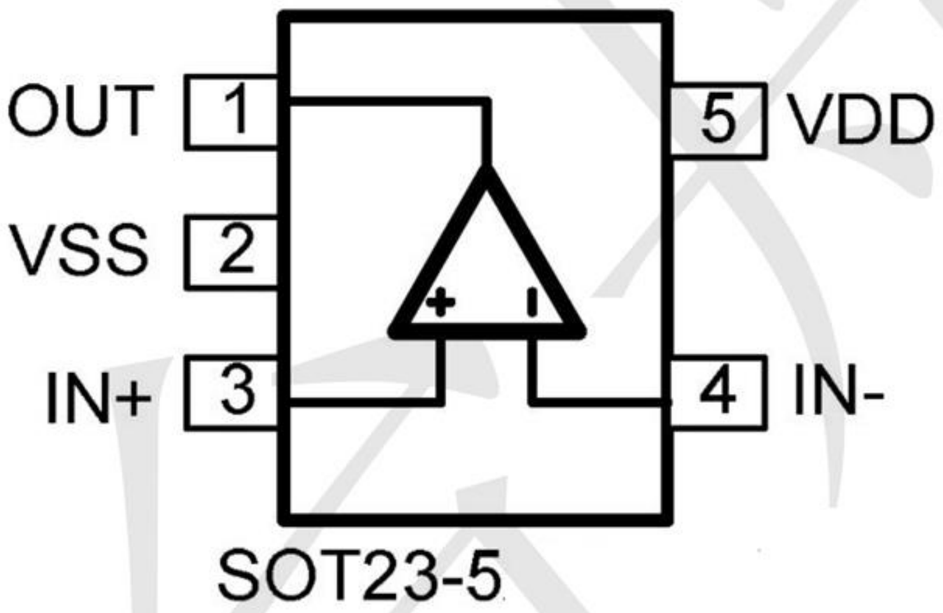
Applications

- Portable Equipment
- Mobile Communications
- Smoke Detector
- Medical Instrumentation
- Battery-Powered Instruments
- Sensor Interface
- Handheld Test Equipment

Ordering Information

Part Number	Package	QTY Per Reel	Reel Size
TP8541ARTZ	SOT23-5	3000	7″

Pin Assignments



SOT23-5

Marking:

Or

Absolute Maximum Ratings

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℃)		
SOT23-5L, θ_{JA}	190℃	
SOP-8L, θ_{JA}	130℃	

Note: Stress greater than those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions outside those indicated in the operational sections of this specification are not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

Electrical Characteristics

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Supply-Voltage Range	V_{DD}	Guaranteed by the PSRR test	1.8	-	5.5	V
Quiescent Supply Current (per Amplifier)	I_Q	V_{DD} = 5V	-	55	80	μA
Input Offset Voltage	V_{OS}		-	0.5	±5	mV
Input Offset Voltage Tempco	$\Delta V_{OS}/\Delta T$		-	2	-	μV/℃
Input Bias Current	I_B	(Note 2)	-	10	-	pA
Input Offset Current	I_{OS}	(Note 2)	-	10	-	pA
Input Common-Mode Voltage Range	V_{CM}		-0.1	-	V_{DD}+0.1	V
Common-Mode Rejection Ratio	CMRR	V_{DD}=5.5 Vss-0.1V≦V_{CM}≦V_{DD}+0.1V	60	75	-	dB
		Vss≦V_{CM}≦5V	65	80	-	dB
Power-Supply Rejection Ratio	PSRR	V_{DD} = +1.8V to +5.5V	75	90	-	dB
Open-Loop Voltage Gain	A_V	V_{DD}=5V, R_L=100kΩ , 0.05V≦V_O≦4.95V	90	100	-	dB
		V_{DD}=5V, R_L=5kΩ , 0.05V≦V_O≦4.95V	65	75	-	dB
Output Voltage Swing	V_{OUT}	|V_{IN+}-V_{IN-}|≧10mV V_{DD}-V_{OH}	-	6	-	mV
		R_L = 100kΩ to V_{DD}/2 V_{OL}-Vss	-	6	-	mV
		|V_{IN+}-V_{IN-}|≧10mV V_{DD}-V_{OH}	-	60	-	mV
		R_L = 5kΩ to V_{DD}/2 V_{OL}-Vss	-	60	-	mV
Output Short-Circuit Current	I_{SC}	Sinking or Sourcing	-	±20	-	mA
Gain Bandwidth Product	GBW	A_V = +1V/V	-	1	-	MHz
Slew Rate	SR	A_V = +1V/V	-	0.6	-	V/μs
Settling Time	ts	To 0.1%, V_{OUT} = 2V step A_V = +1V/V	-	5	-	μs
Over Load Recovery Time		V_{INX} Gain=V_S	-	2	-	μs
Input Voltage Noise Density	e_n	f = 1kHz	-	50	-	nV/√Hz
		f = 10kHz	-	20	-	nV/√Hz

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

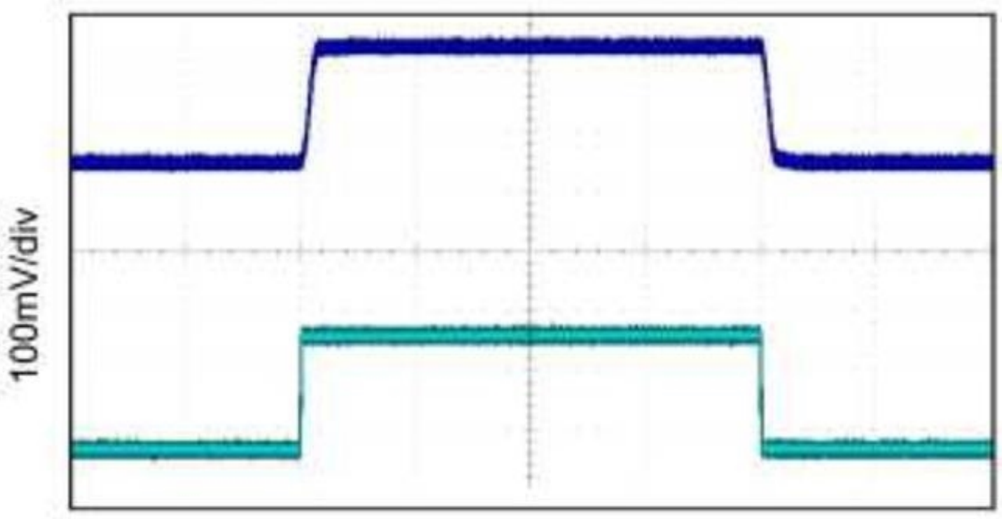
Note 2: Parameter is guaranteed by design.

Typical characteristics

At T_A=+25℃, R_L=100 kΩ connected to V_S/2 and V_{OUT}= V_S/2, unless otherwise noted.

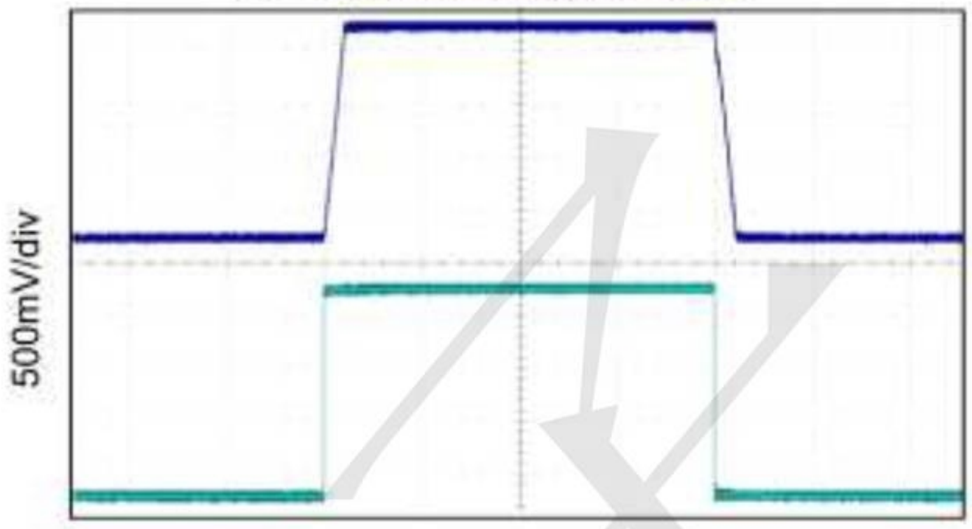
Small Signal Step Response

G=+1V/V,R_L=100kΩ,C_L=100pF



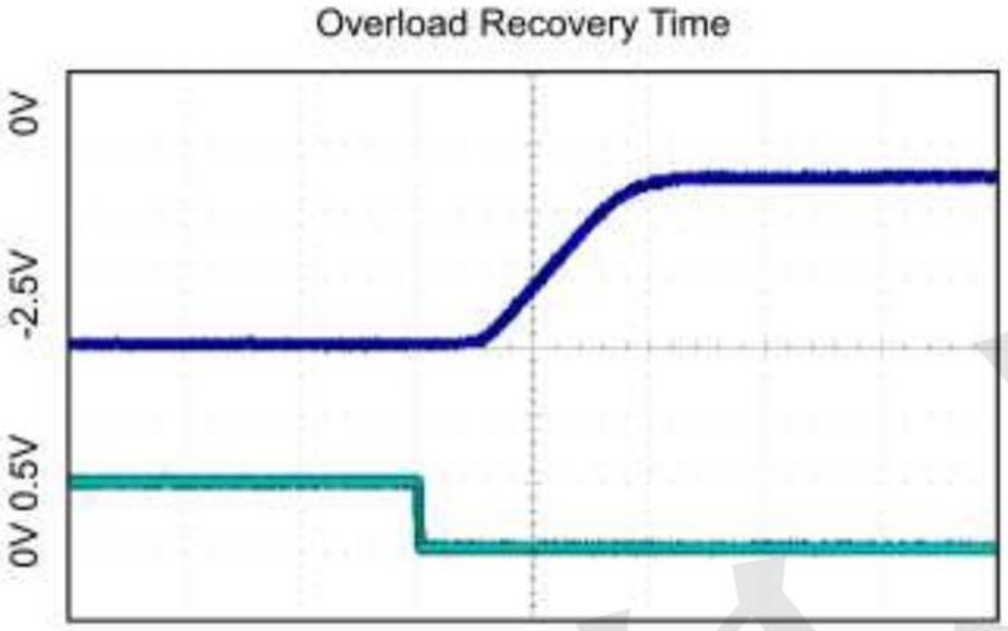
Large Signal Step Response

G=+1V/V,R_L=100kΩ,C_L=100pF



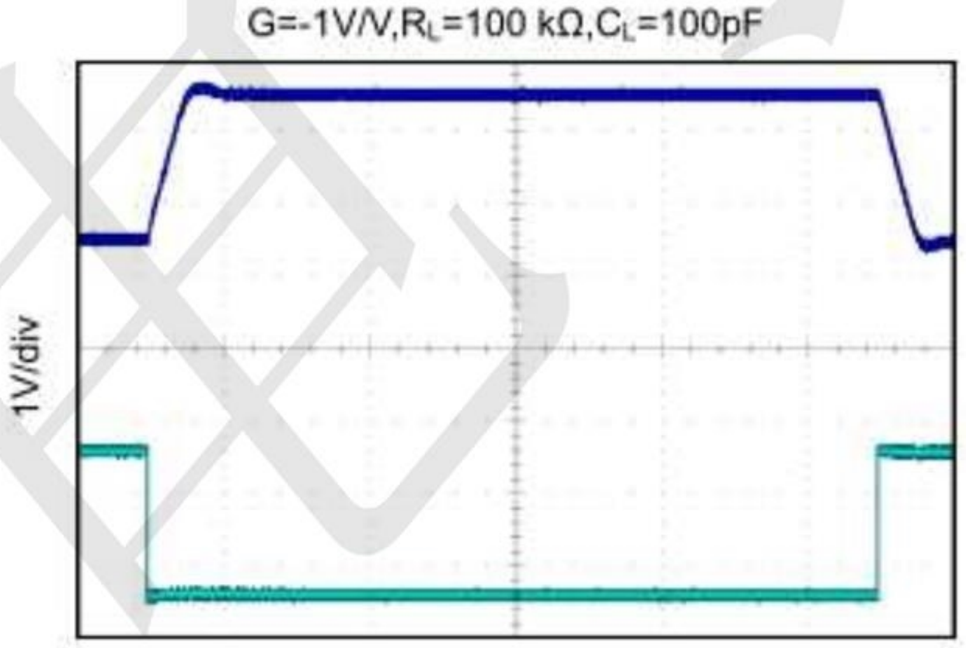
Overload Recovery Time

G=-1V/V,R_L=100 kΩ,C_L=100pF



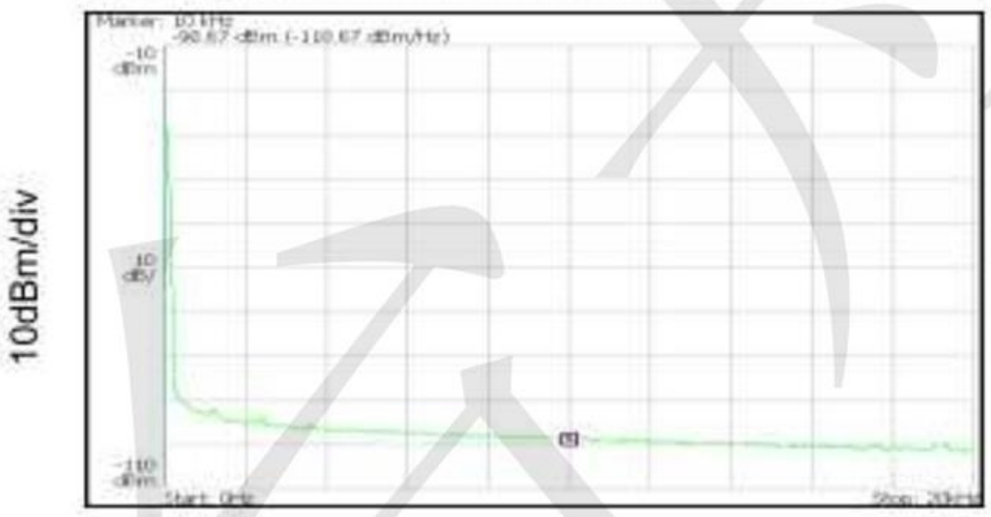
Large Signal Step Response

G=-1V/V,R_L=100 kΩ,C_L=100pF



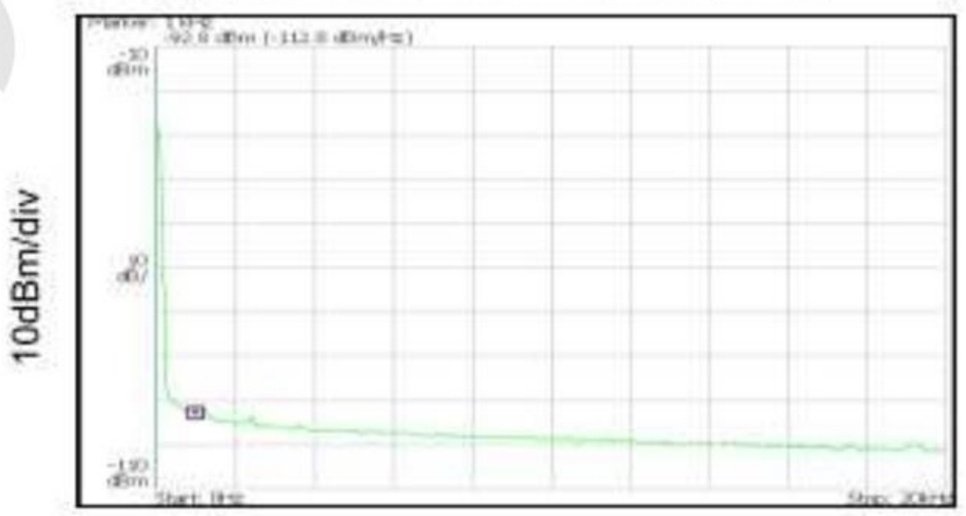
Input Voltage noise Spectral Density VS. Frequency

Noise Gain=+10,V_n=26(nV/√HZ)@10kHz



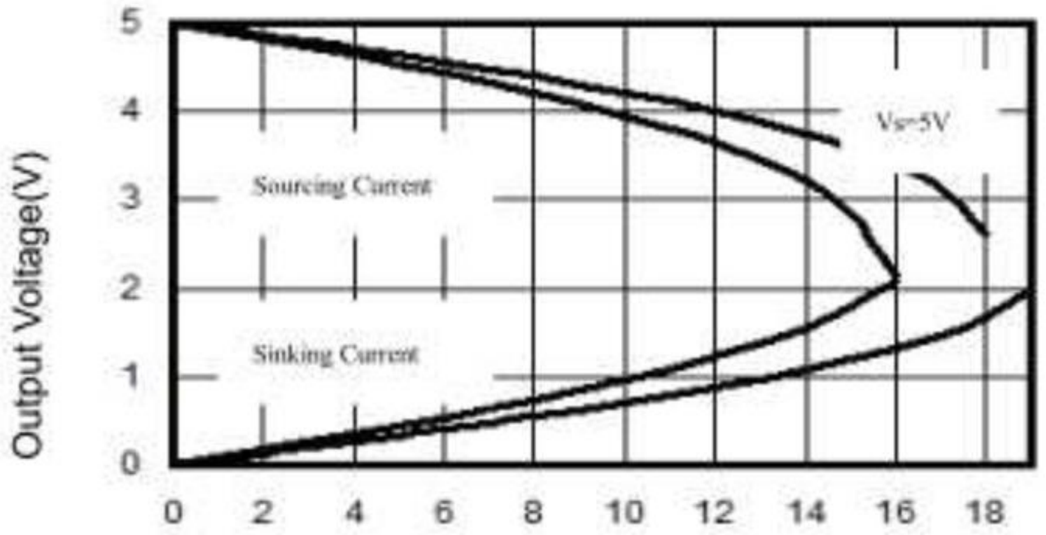
Input Voltage noise Spectral Density VS. Frequency

Noise Gain=+10,V_n=51(nV/√HZ)@1kHz

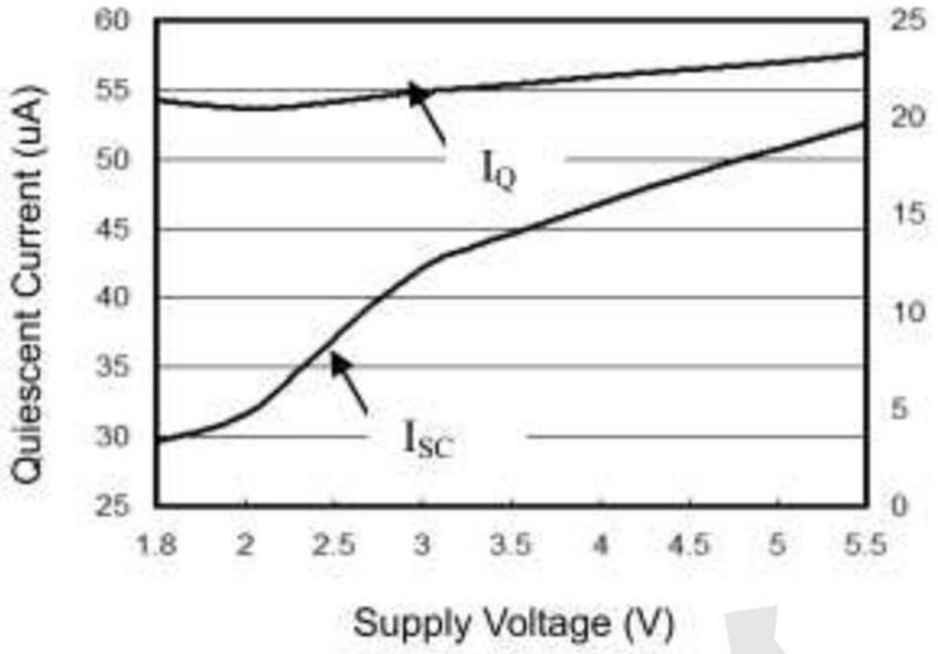


At T_A=+25℃, R_L=100 kΩ connected to V_S/2 and V_{OUT}= V_S/2, unless otherwise noted.

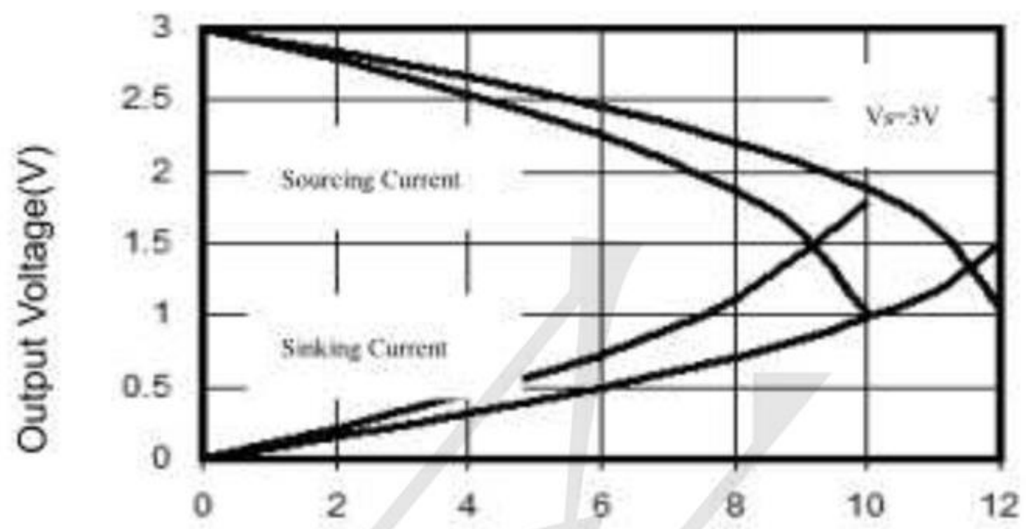
Output Voltage Swing vs. Output Current



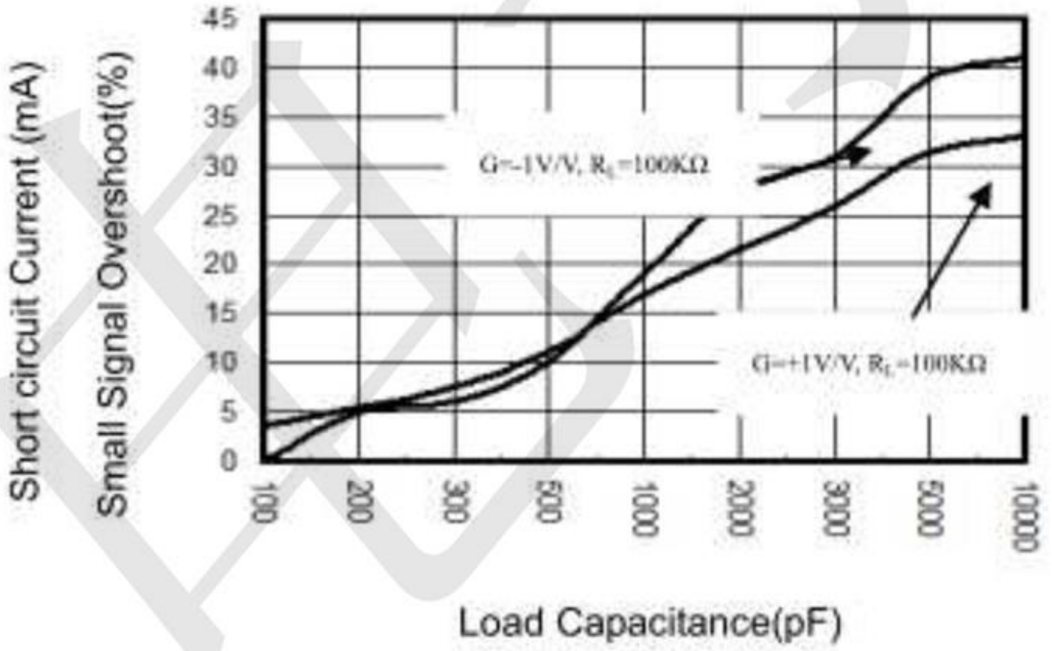
Quiescent and Short-Circuit Current Vs. Supply Voltage



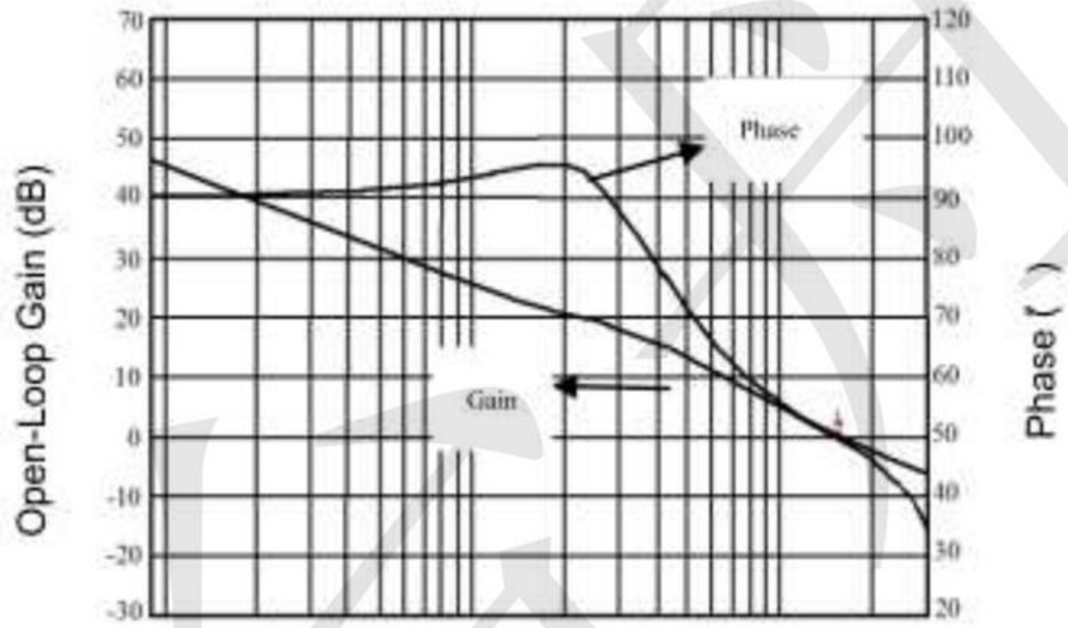
Output Voltage Swing vs. Output Current



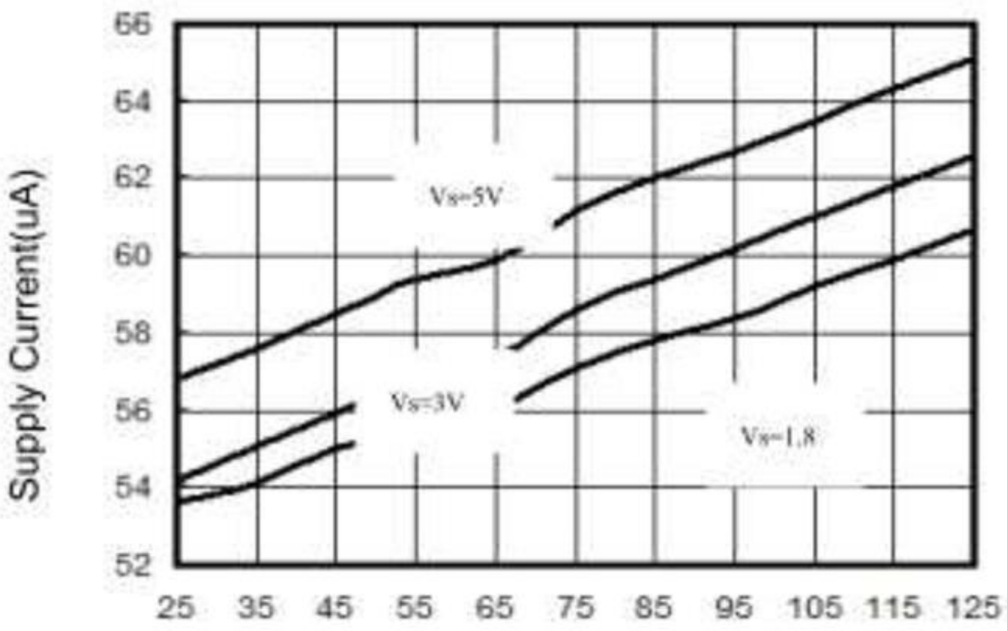
Small Signal Overshoot vs. Load Capacitance



Open-Loop Gain And Phase VS. Frequency

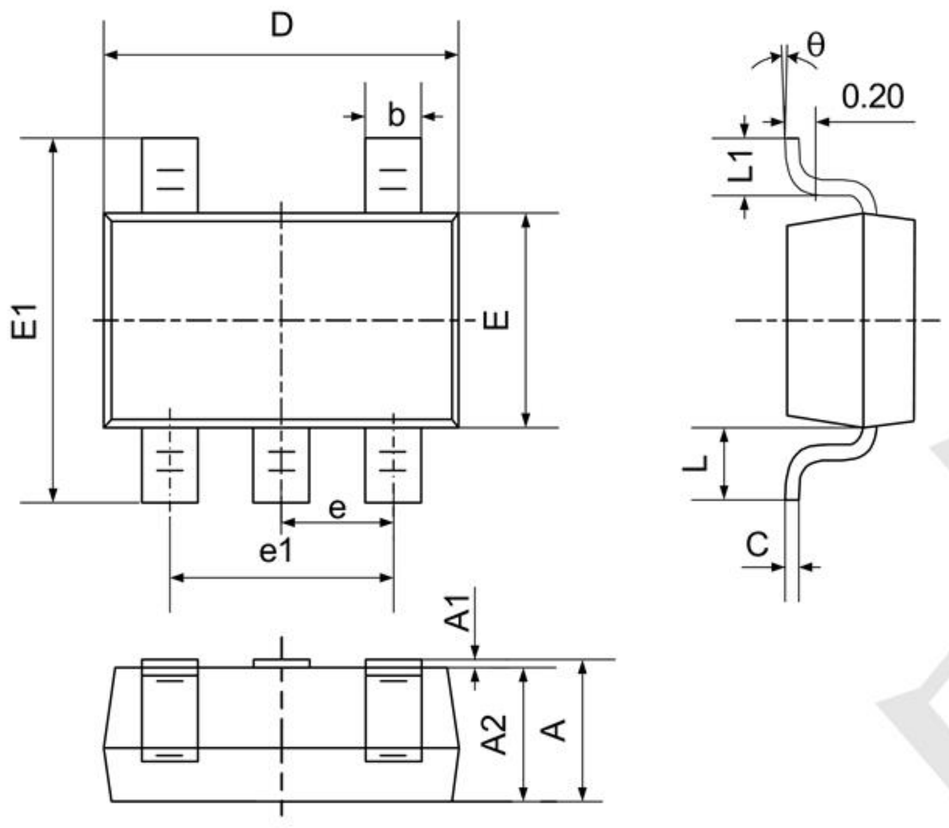


Supply Current vs. Temmperature



Package Information

SOT23-5



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	0.400	0.012	0.016
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	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.700REF		0.028REF	
L1	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

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