

### Features

- Single-Supply Operation from +2.2V ~ +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: 40µA (Typ.)
- Operating Temperature: -40°C ~ +125°C
- Available in SOT23-5 and SOP8 Packages

### Applications

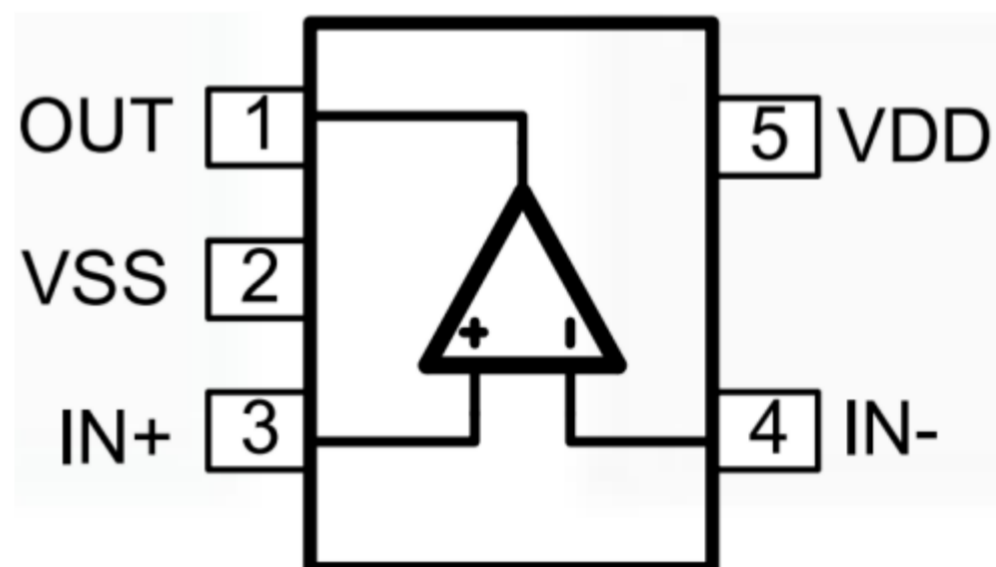
- Portable Equipment
- Mobile Communications
- Smoke Detector
- Sensor Interface
- Medical Instrumentation
- Battery-Powered Instruments
- Handheld Test Equipment

### General Description

TPLMV321RILT are rail-to-rail CMOS operational amplifiers with ultra low offset. Features include wide input common-mode voltage range and broad output voltage swing with operating supply voltage from 2.2V to 5.5V. Products are fully specified over the extended -40 to +125°C temperature range.

TPLMV321R provide 1MHz bandwidth consuming Ultra low current of 40uA per channel . Very low input bias currents of 10pA enable them ideal for integrators, photodiode amplifiers, and piezoelectric sensors

### Pin Assignments



## Absolute Maximum Ratings

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 ( $T_A=+25^\circ C$ )		
SOT23-5, $\theta_{JA}$	190°C	
SOP-8, $\theta_{JA}$	130°C	

**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 (T<sub>A</sub>=25°C unless otherwise noted)

(V<sub>DD</sub> = +5V, V<sub>SS</sub> = 0V, V<sub>CM</sub> = 0V, V<sub>OUT</sub> = V<sub>DD</sub>/2, R<sub>L</sub>=100K tied to V<sub>DD</sub>/2, SHDNB = V<sub>DD</sub>, T<sub>A</sub> = -40°C to +125°C, unless otherwise noted. Typical values are at T<sub>A</sub> =+25°C.) (Notes 1)

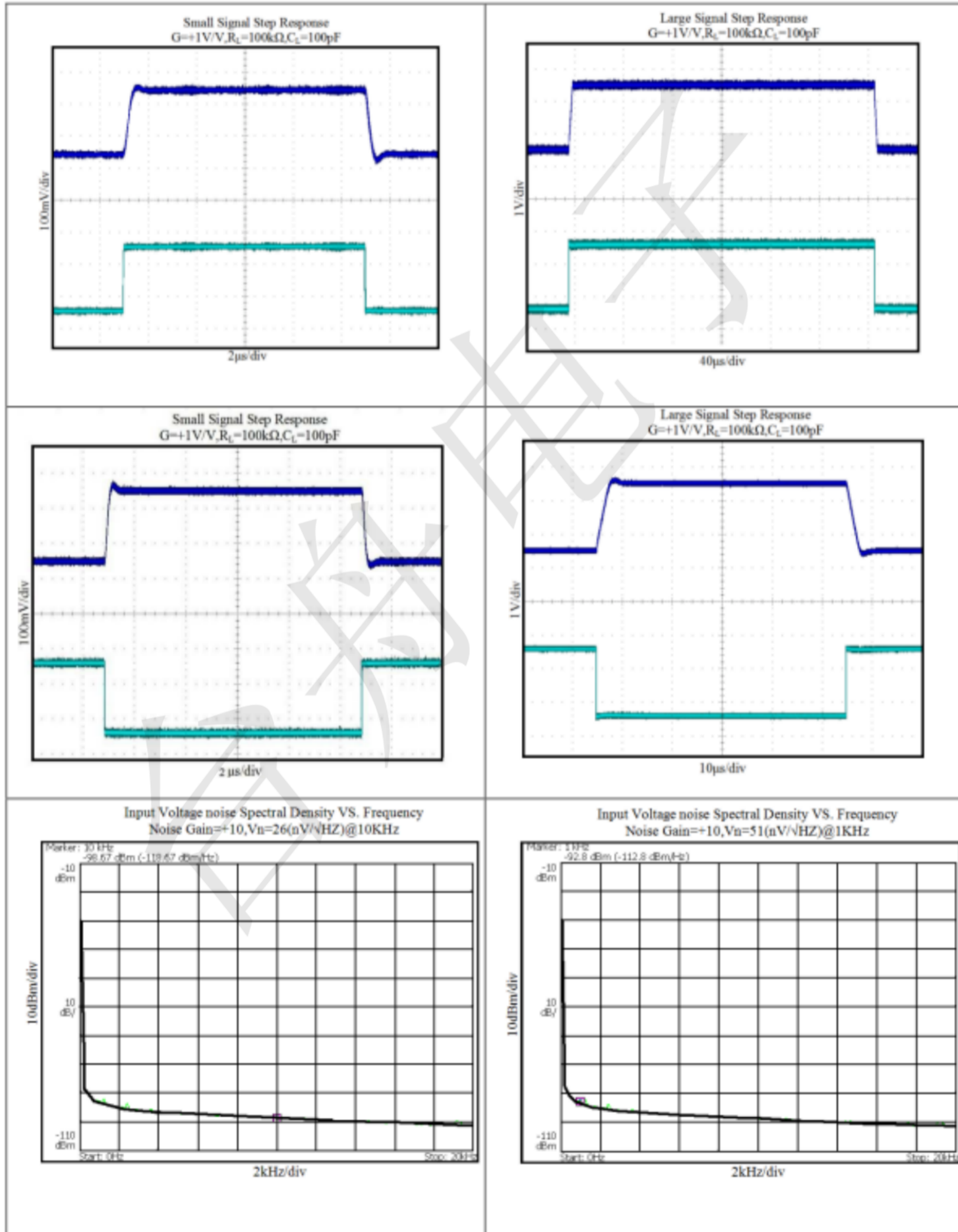
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Supply-Voltage Range	V <sub>DD</sub>	Guaranteed by the PSRR test	2.2	-	5.5	V
Quiescent Supply Current (per Amplifier)	I <sub>Q</sub>	V <sub>DD</sub> = 5V	30	40	60	μA
Input Offset Voltage	V <sub>OS</sub>		-	0.5	±5	mV
Input Offset Voltage Tempco	ΔV <sub>OS</sub> /ΔT		-	2	-	μV/°C
Input Bias Current	I <sub>B</sub>	(Note 2)	-	10	-	pA
Input Offset Current	I <sub>OS</sub>	(Note 2)	-	10	-	pA
Input Common-Mode Voltage Range	V <sub>CM</sub>		-0.1	-	V <sub>DD</sub> +0.1	V
Common-Mode Rejection Ratio	CMRR	V <sub>DD</sub> =5.5 V <sub>SS</sub> -0.1V≤V <sub>CM</sub> ≤V <sub>DD</sub> +0.1V	55	65	-	dB
		V <sub>SS</sub> ≤V <sub>CM</sub> ≤5V	60	80	-	dB
Power-Supply Rejection Ratio	PSRR	V <sub>DD</sub> = +2.5V to +5.5V	75	94	-	dB
Open-Loop Voltage Gain	A <sub>V</sub>	V <sub>DD</sub> =5V, R <sub>L</sub> =100kΩ, 0.05V≤V <sub>O</sub> ≤4.95V	100	110	-	dB
		V <sub>DD</sub> =5V, R <sub>L</sub> =5kΩ, 0.05V≤V <sub>O</sub> ≤4.95V	70	80	-	dB
Output Voltage Swing	V <sub>OUT</sub>	V <sub>IN+</sub> -V <sub>IN-</sub>   ≥ 10mV V <sub>DD</sub> -V <sub>OH</sub>	-	6	-	mV
		R <sub>L</sub> = 100kΩ to V <sub>DD</sub> /2 V <sub>OL</sub> -V <sub>SS</sub>	-	6	-	mV
		V <sub>IN+</sub> -V <sub>IN-</sub>   ≥ 10mV V <sub>DD</sub> -V <sub>OH</sub>	-	60	-	mV
		R <sub>L</sub> = 5kΩ to V <sub>DD</sub> /2 V <sub>OL</sub> -V <sub>SS</sub>	-	60	-	mV
Output Short-Circuit Current	I <sub>SC</sub>	Sinking or Sourcing	-	±20	-	mA
Gain Bandwidth Product	GBW	A <sub>V</sub> = +1V/V	-	1	-	MHz
Slew Rate	SR	A <sub>V</sub> = +1V/V	-	0.6	-	V/μs
Settling Time	t <sub>s</sub>	To 0.1%, V <sub>OUT</sub> = 2V step A <sub>V</sub> = +1V/V	-	5	-	μs
Over Load Recovery Time		V <sub>IN</sub> × Gain=V <sub>s</sub>	-	2	-	μs
Input Voltage Noise Density	e <sub>n</sub>	f = 10kHz	-	20	-	nV/√Hz

**Note 1:** All devices are 100% production tested at T<sub>A</sub> = +25°C; all specifications over the automotive temperature range is guaranteed by design, not production tested.

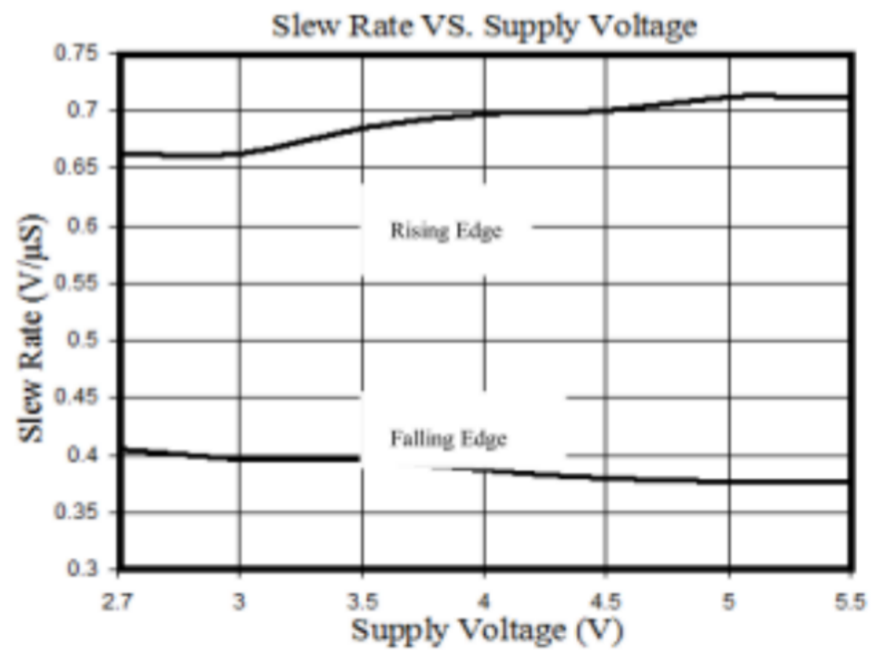
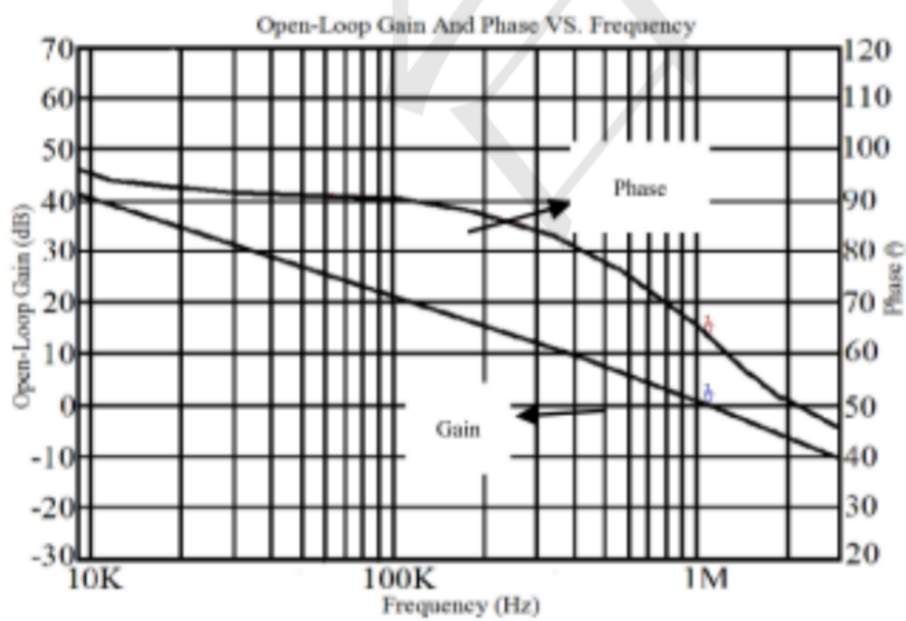
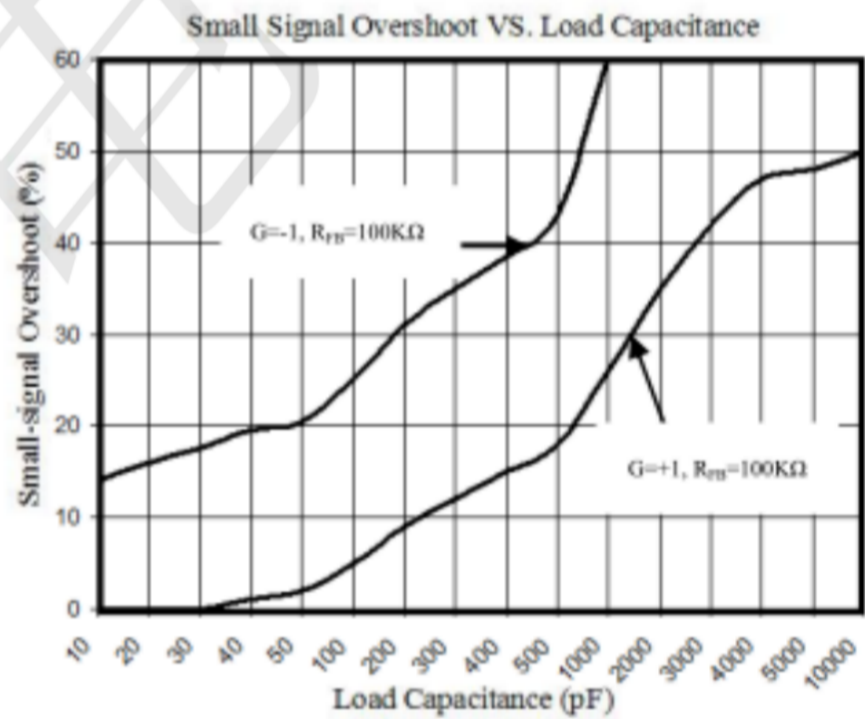
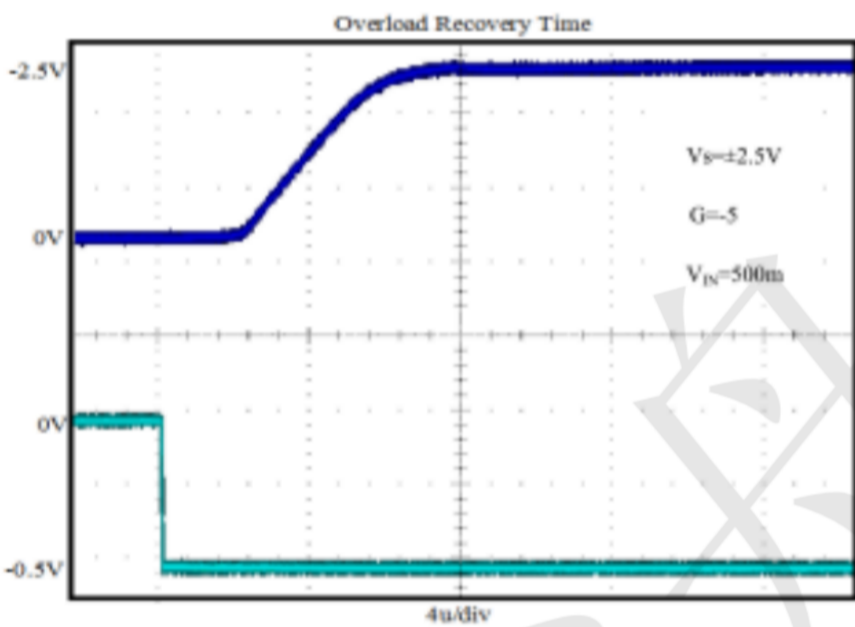
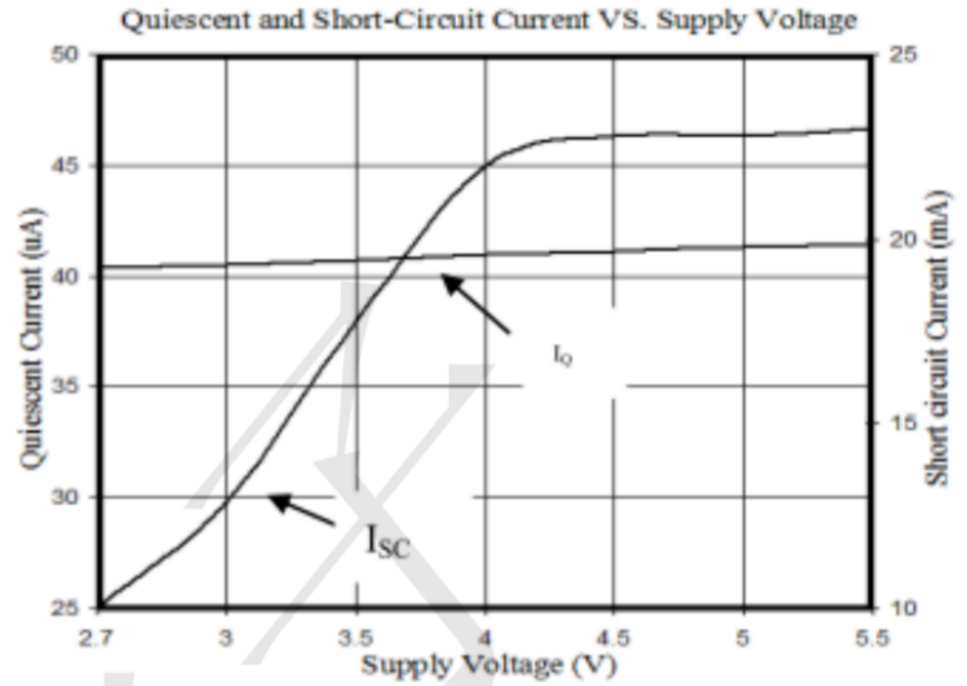
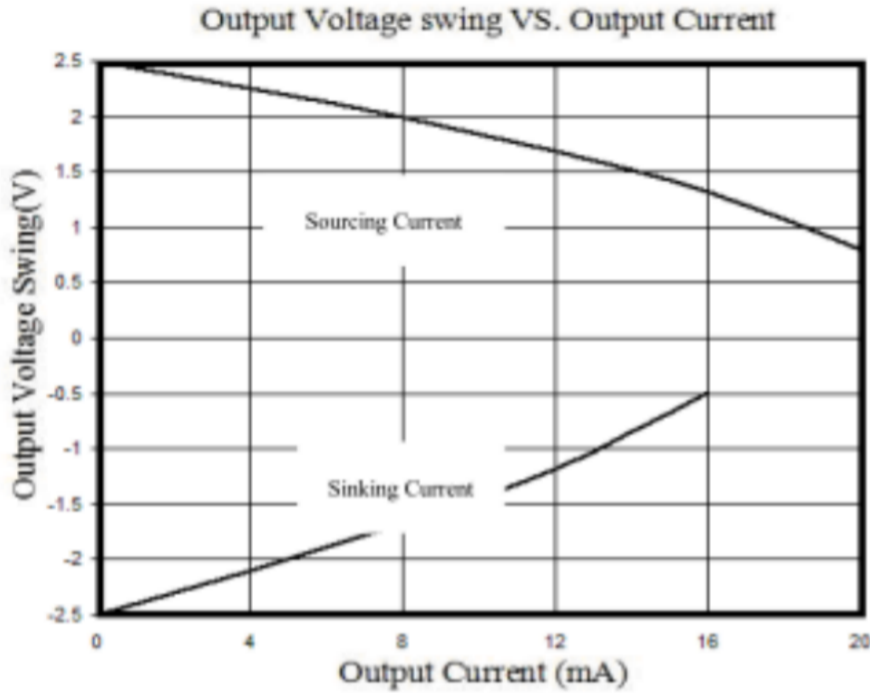
**Note 2:** Parameter is guaranteed by design.

**TYPICAL PERFORMANCE CHARACTERISTICS**

At  $T_A=+25^\circ\text{C}$ ,  $R_L=100\text{ k}\Omega$  connected to  $V_S/2$  and  $V_{OUT}=V_S/2$ , unless otherwise noted.

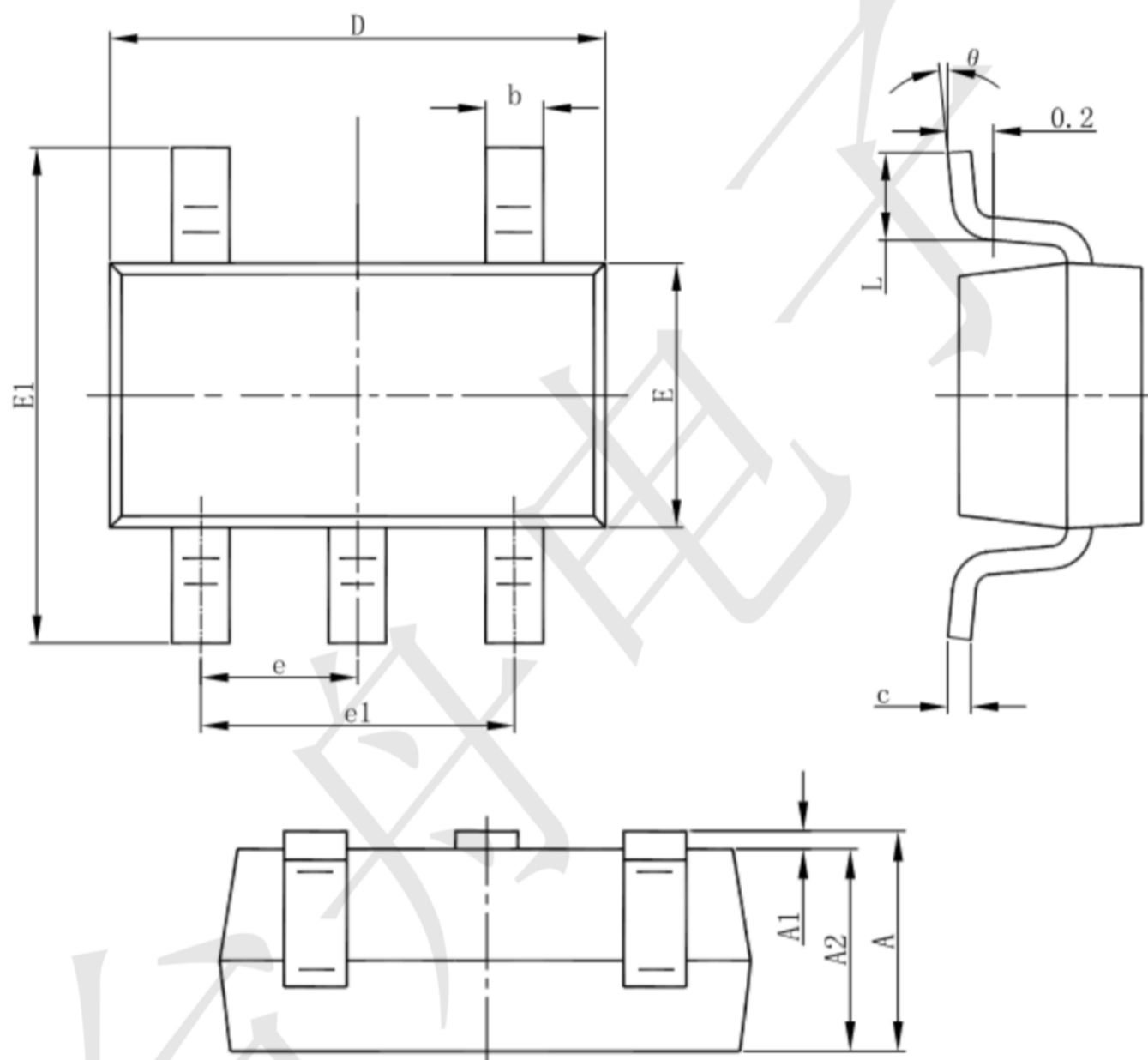


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**Package Information**

**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	0.500	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	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
theta	0°	8°	0°	8°