

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 °C to +125 °C 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°C ~ +125°C
- Available in SOT23-5L Packages

Applications

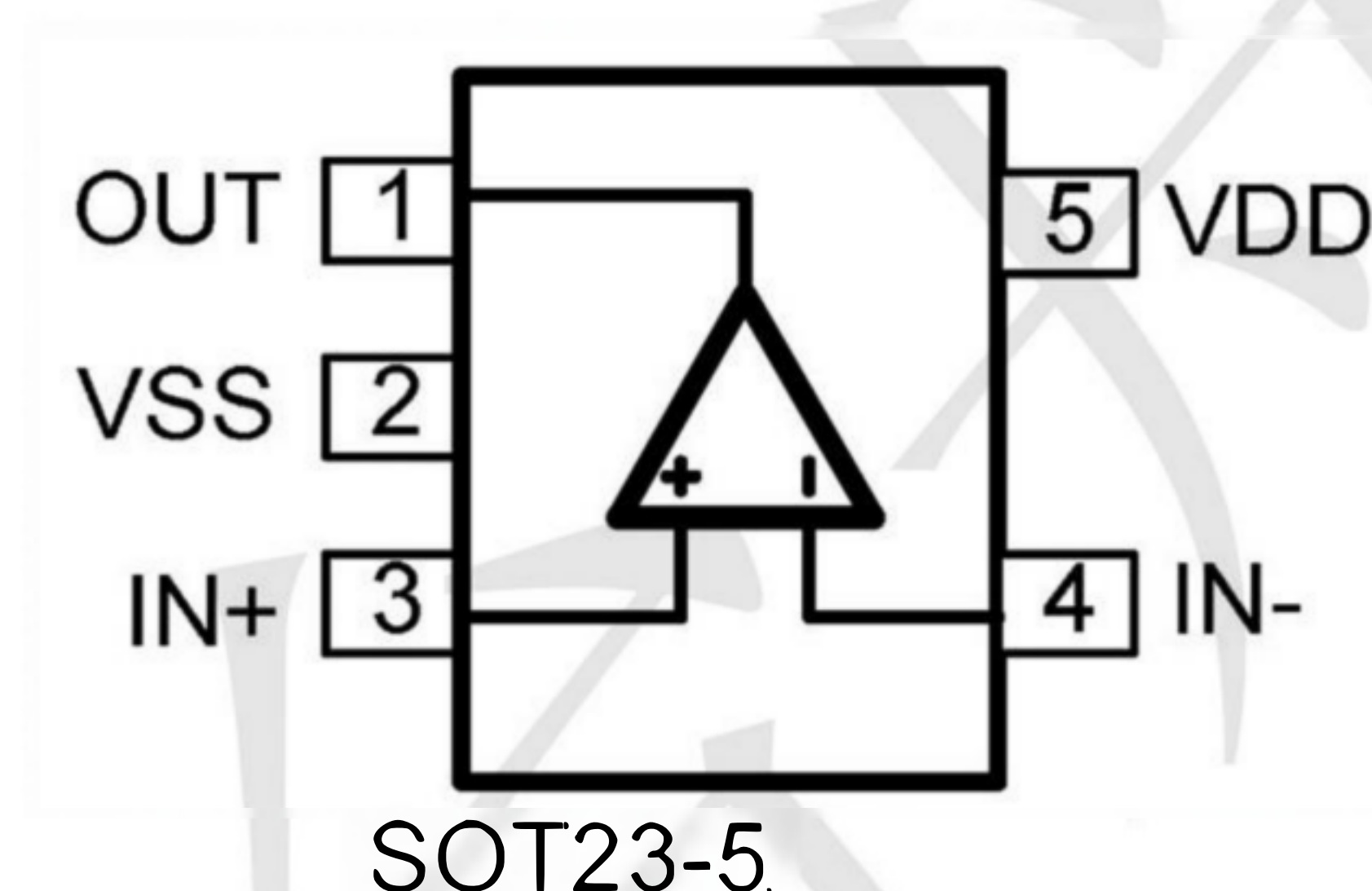
- Portable Equipment
- Mobile Communications
- Smoke Detector
- Medical Instrumentation
- Battery-Powered Instruments
- Sensor Interface
- Handheld Test Equipment

AD8541ARTZ-REEL7 pin to pin fully compatible

Ordering Information

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

Pin Assignments



Marking:



Or



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℃	+125℃
Junction Temperature		+150℃
Storage Temperature Range	-65℃	+150℃
Lead Temperature (soldering, 10sec)		+300℃
Package Thermal Resistance ($T_A=+25^{\circ}C$)		
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

($V_{DD} = +5V$, $V_{SS} = 0V$, $V_{CM} = 0V$, $V_{OUT} = V_{DD}/2$, $R_L = 100k\Omega$ 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	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	-	$\mu V/^\circ C$
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	$V_{DD}=5.5V, V_{SS}=0.1V \leq V_{CM} \leq V_{DD}+0.1V$	60	75	-	dB
		$V_{SS} \leq V_{CM} \leq 5V$	65	80	-	dB
Power-Supply Rejection Ratio	PSRR	$V_{DD} = +1.8V$ to $+5.5V$	75	90	-	dB
Open-Loop Voltage Gain	A_v	$V_{DD}=5V, R_L=100k\Omega$, $0.05V \leq V_o \leq 4.95V$	90	100	-	dB
		$V_{DD}=5V, R_L=5k\Omega$, $0.05V \leq V_o \leq 4.95V$	65	75	-	dB
Output Voltage Swing	V_{OUT}	$ V_{IN+}-V_{IN-} \geq 10mV$ $V_{DD}-V_{OH}$	-	6	-	mV
		$R_L = 100k\Omega$ to $V_{DD}/2$ $V_{OL}-V_{SS}$	-	6	-	mV
		$ V_{IN+}-V_{IN-} \geq 10mV$ $V_{DD}-V_{OH}$	-	60	-	mV
		$R_L = 5k\Omega$ to $V_{DD}/2$ $V_{OL}-V_{SS}$	-	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	t_s	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/ $\sqrt{Hz}$
		$f = 10kHz$	-	20	-	nV/ $\sqrt{Hz}$

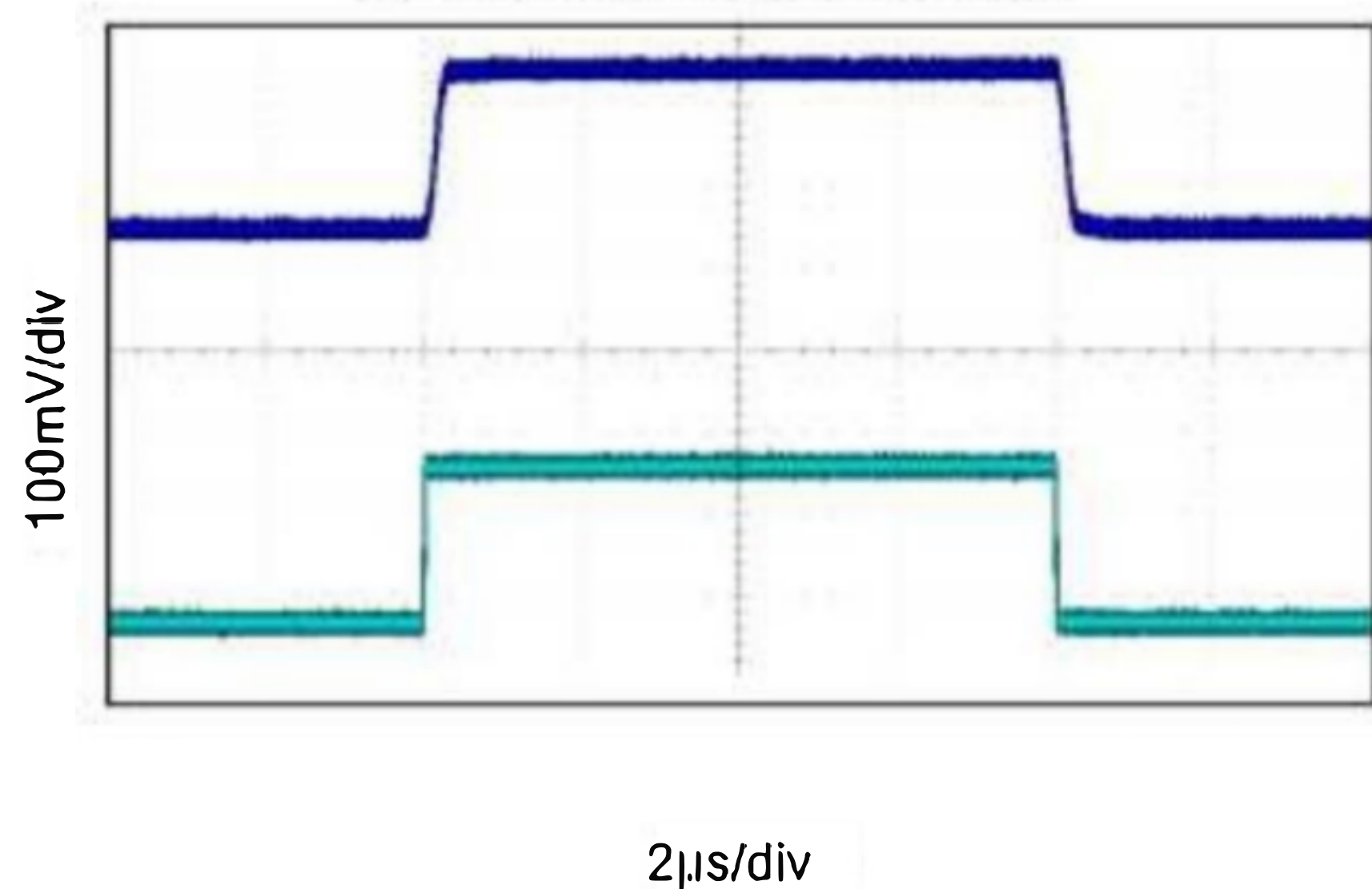
Note 1: All devices are 100% production tested at $T_A = +25^\circ C$; all specifications over the automotive temperature range is guaranteed by design, not production tested

Note 2: Parameter is guaranteed by design.

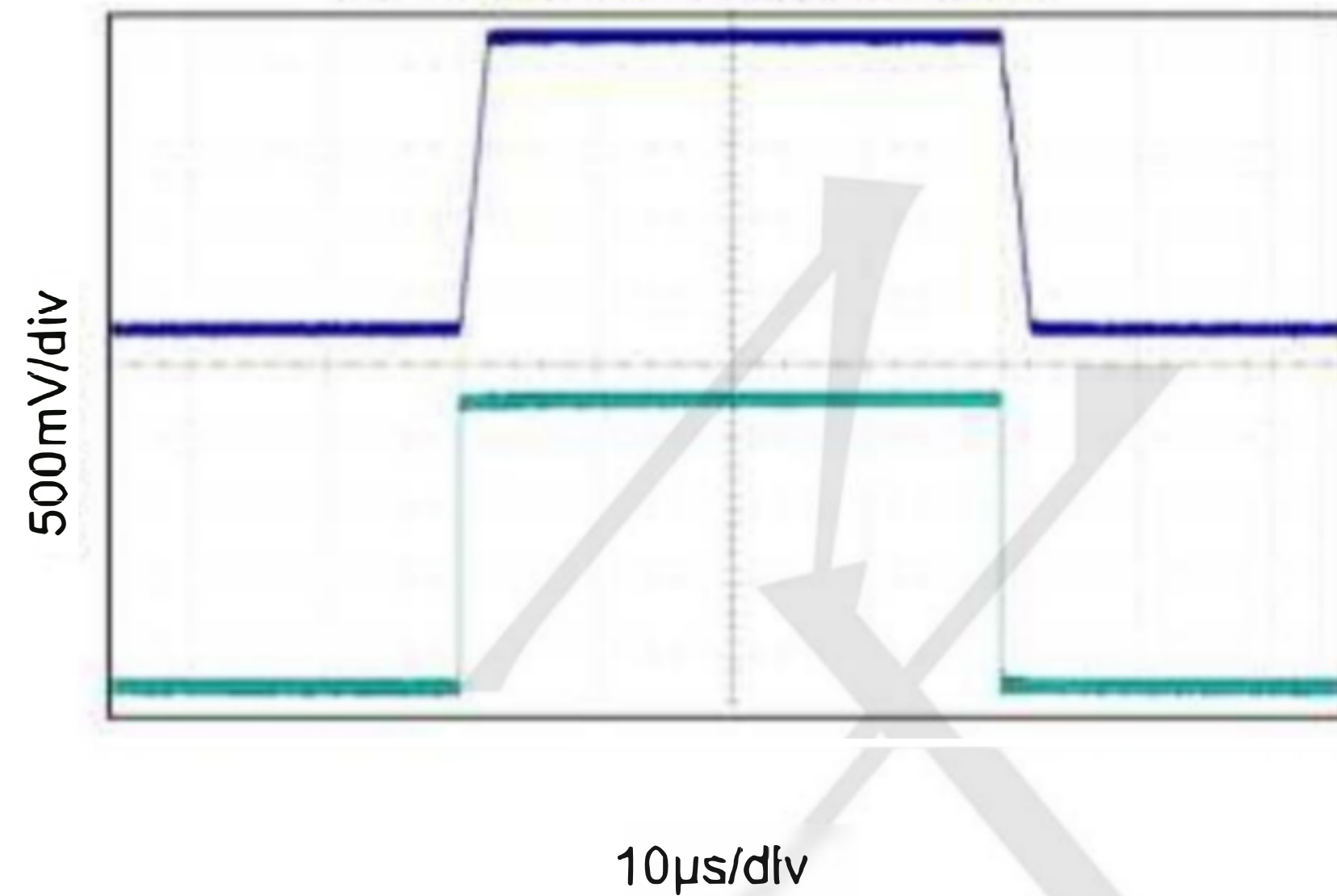
Typical characteristics

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.

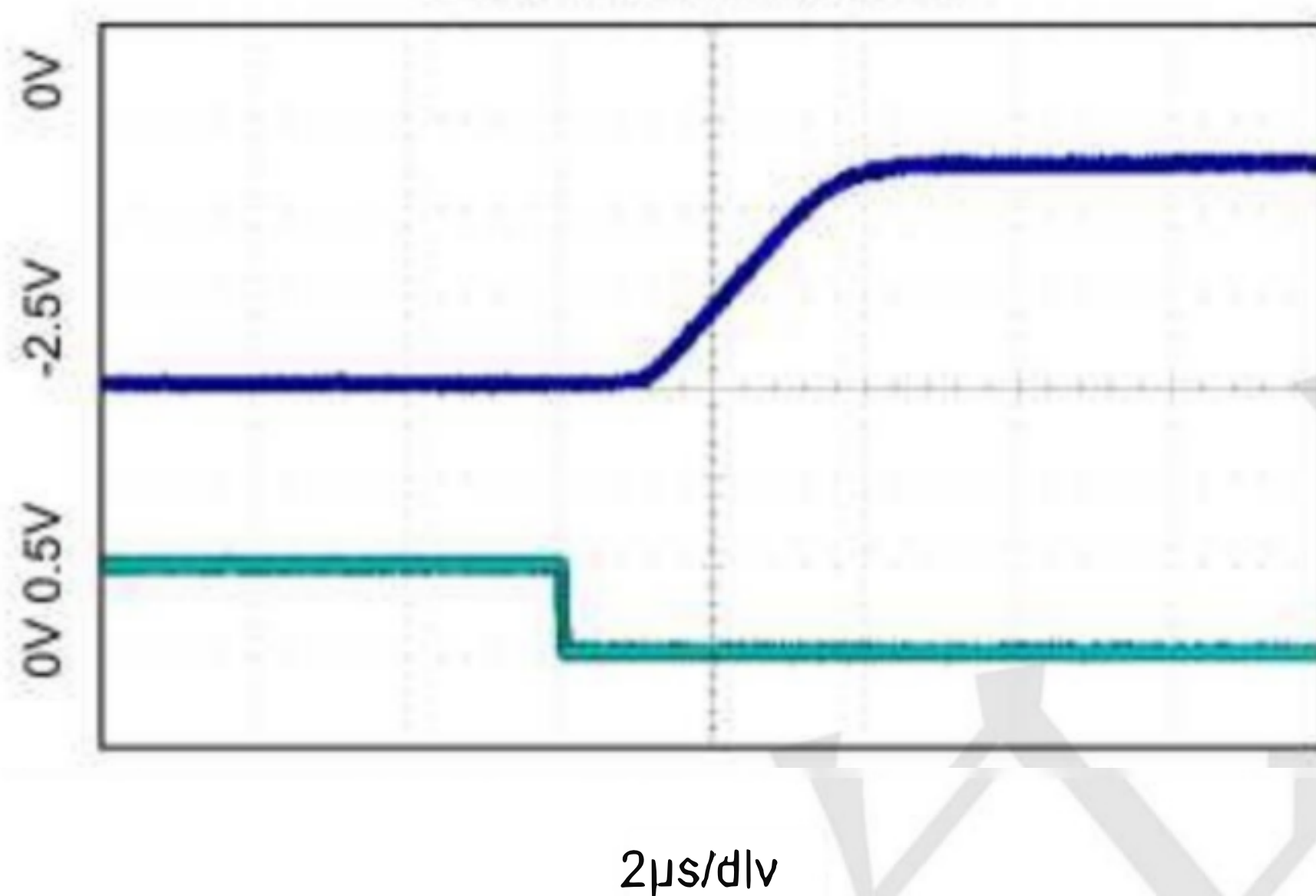
Small Signal Step Response
 $G = +1\text{V/V}$, $R_L = 100\text{ k}\Omega$, $C_L = 100\text{ pF}$



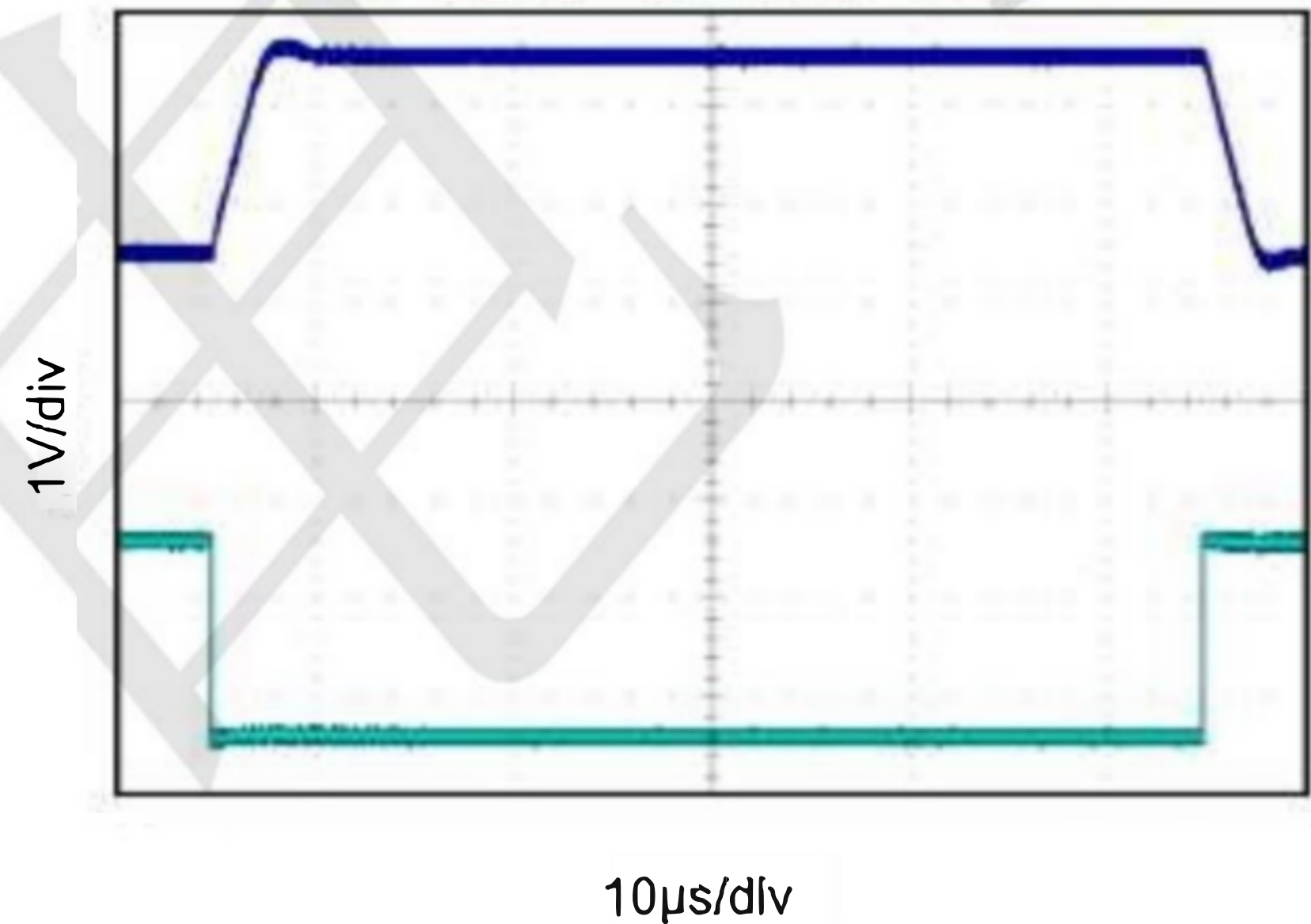
Large Signal Step Response
 $G = +1\text{V/V}$, $R_L = 100\text{ k}\Omega$, $C_L = 100\text{ pF}$



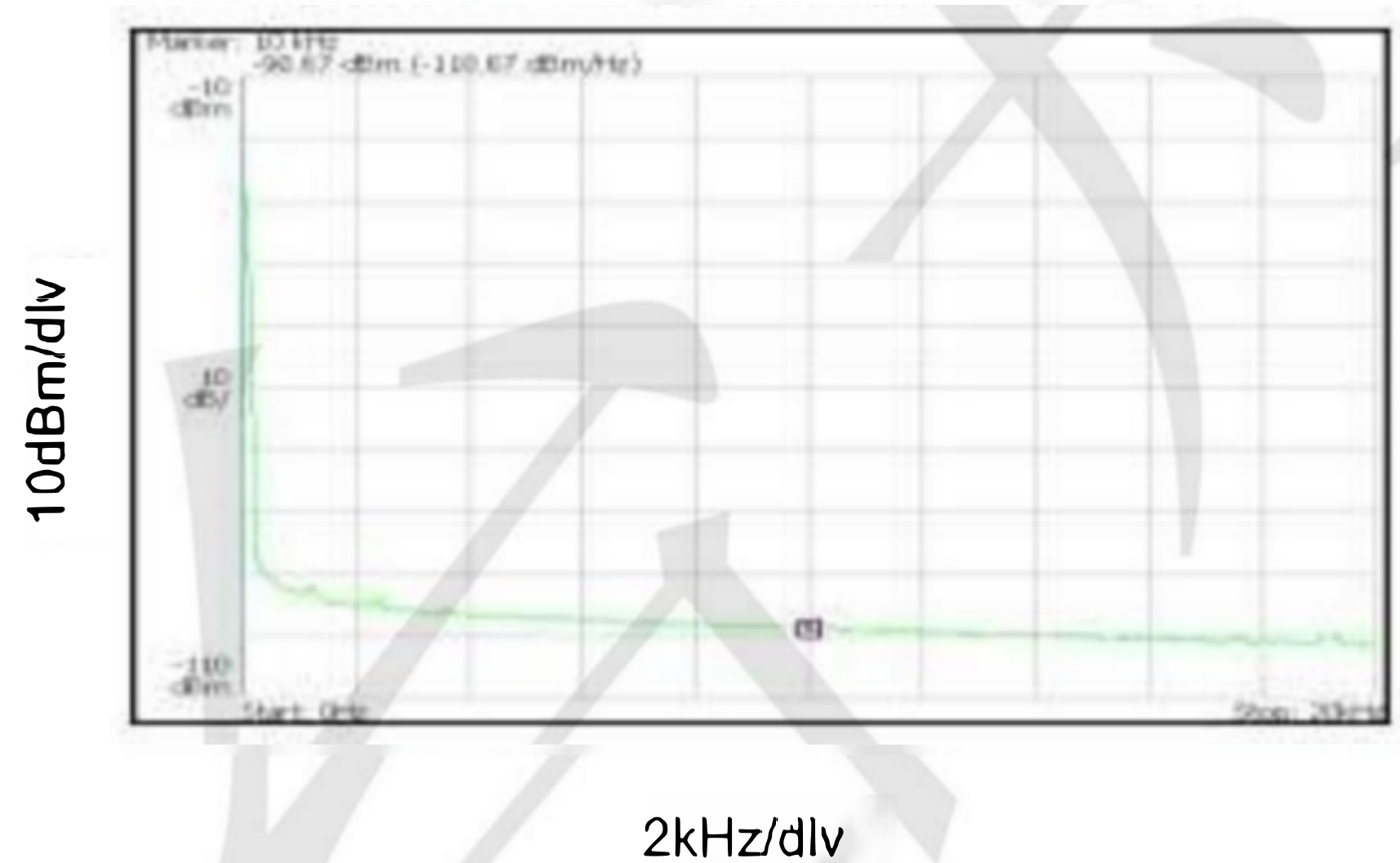
Overload Recovery Time



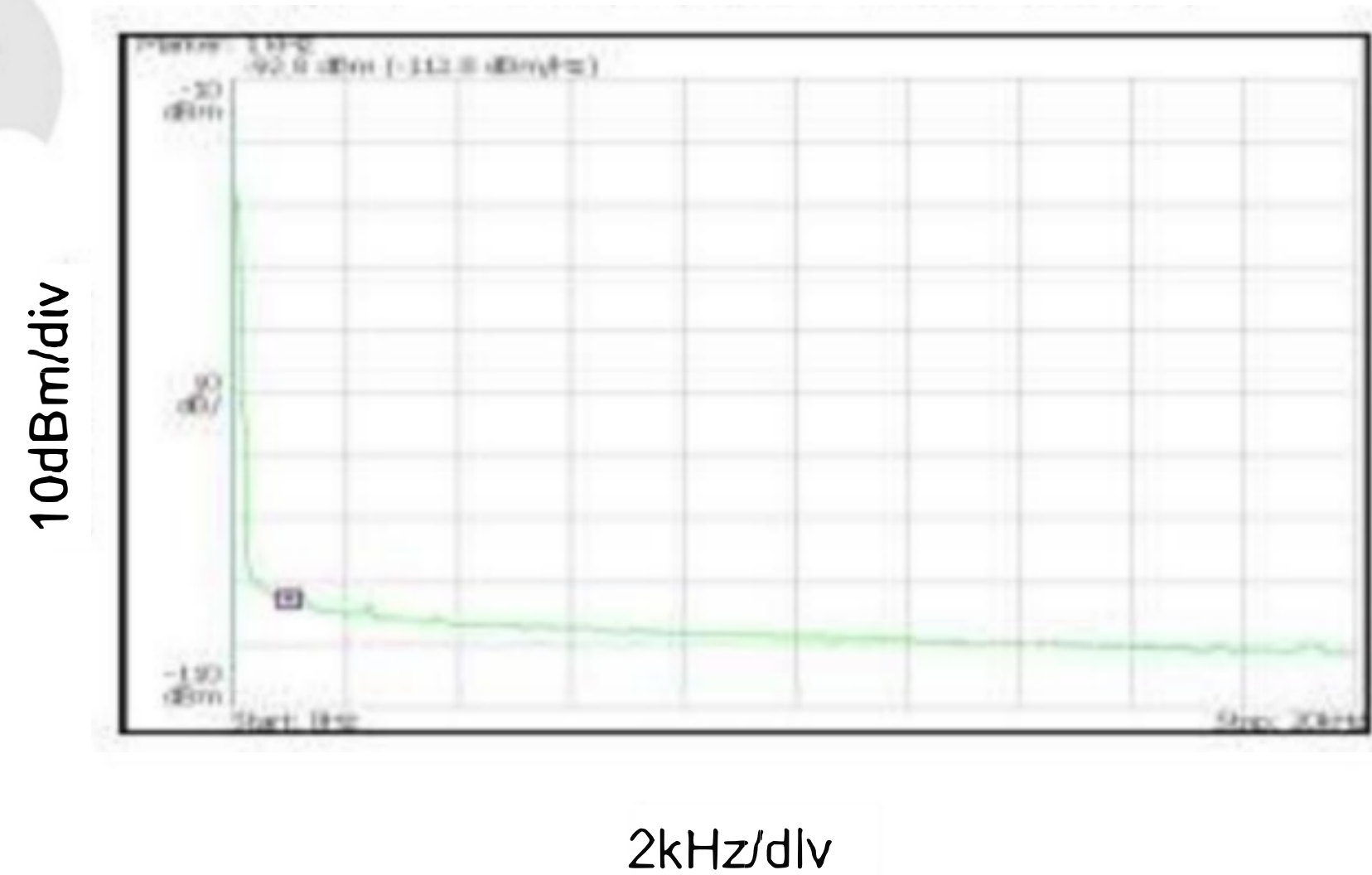
Large Signal Step Response
 $G = -1\text{V/V}$, $R_L = 100\text{ k}\Omega$, $C_L = 100\text{ pF}$



Input Voltage noise Spectral Density VS. Frequency
Noise Gain = +10, $V_n = 26\text{ (nV}/\sqrt{\text{Hz}}\text{)} @ 10\text{ kHz}$

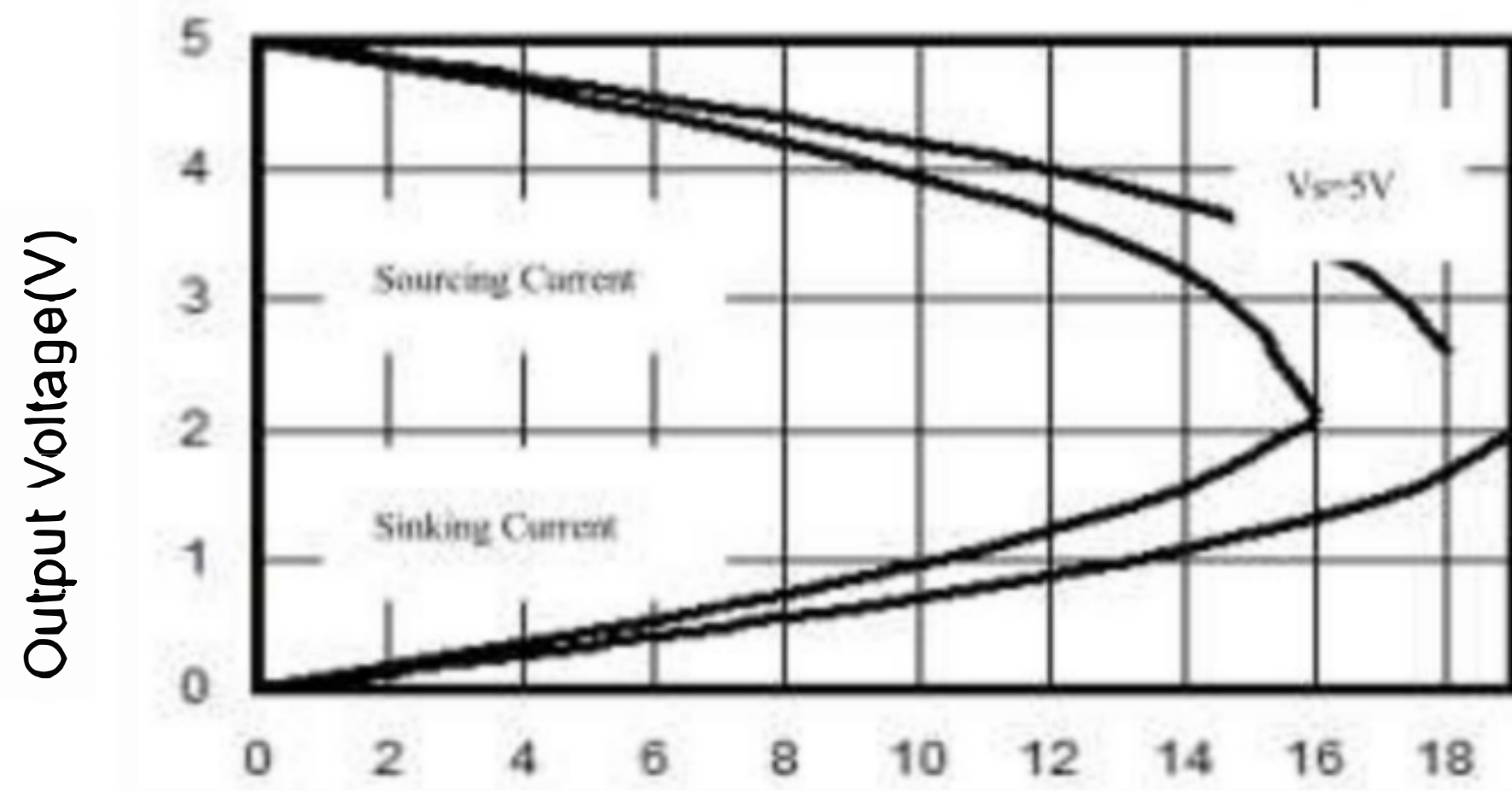


Input Voltage noise Spectral Density VS. Frequency
Noise Gain = +10, $V_n = 51\text{ (nV}/\sqrt{\text{Hz}}\text{)} @ 1\text{ kHz}$

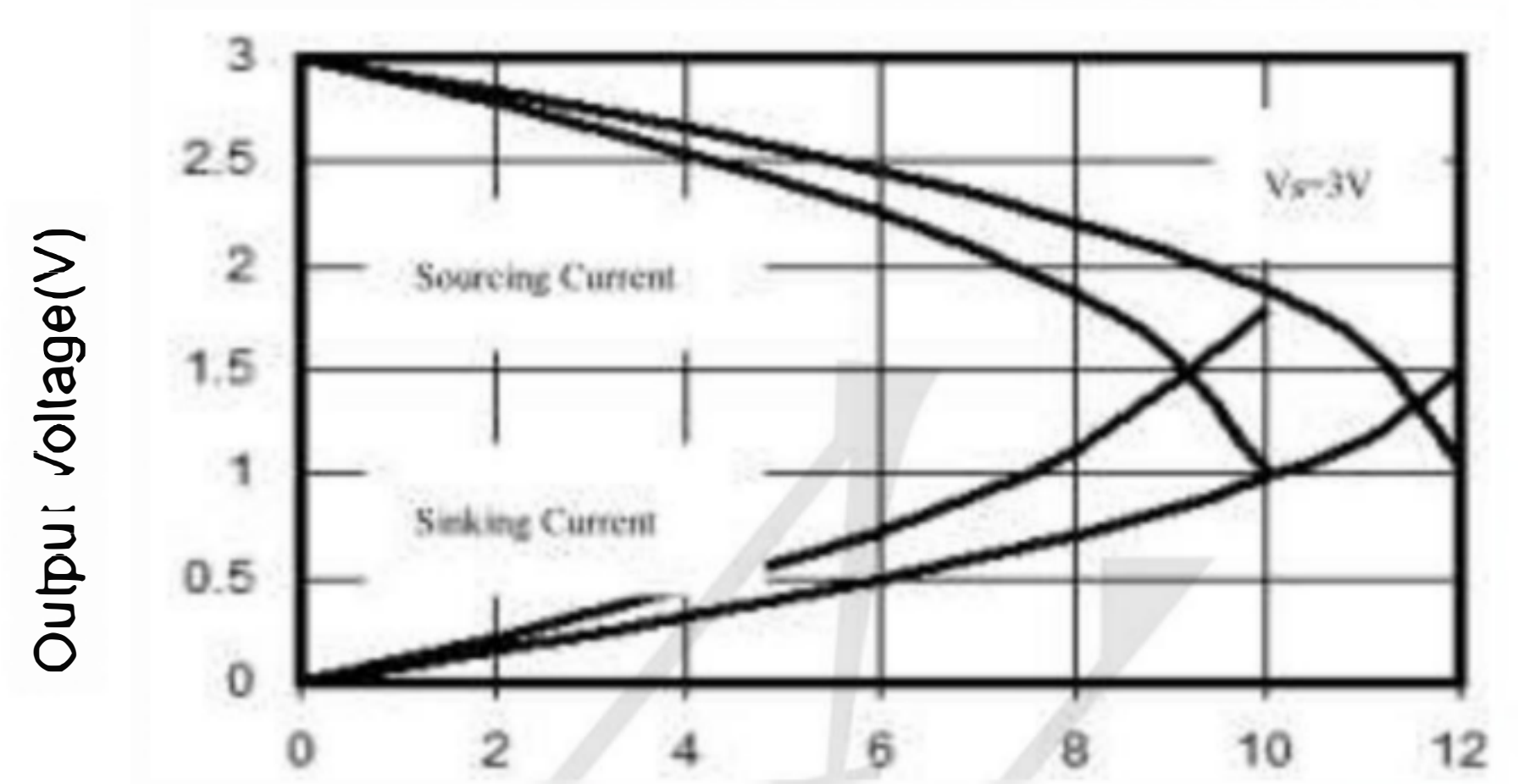


At $T_A=+25^{\circ}\text{C}$, $R_L=100\text{ k}\Omega$ connected to $V_S/2$ and $V_{OUT}=V_S/2$, unless otherwise noted.

Output Voltage Swing vs. Output Current



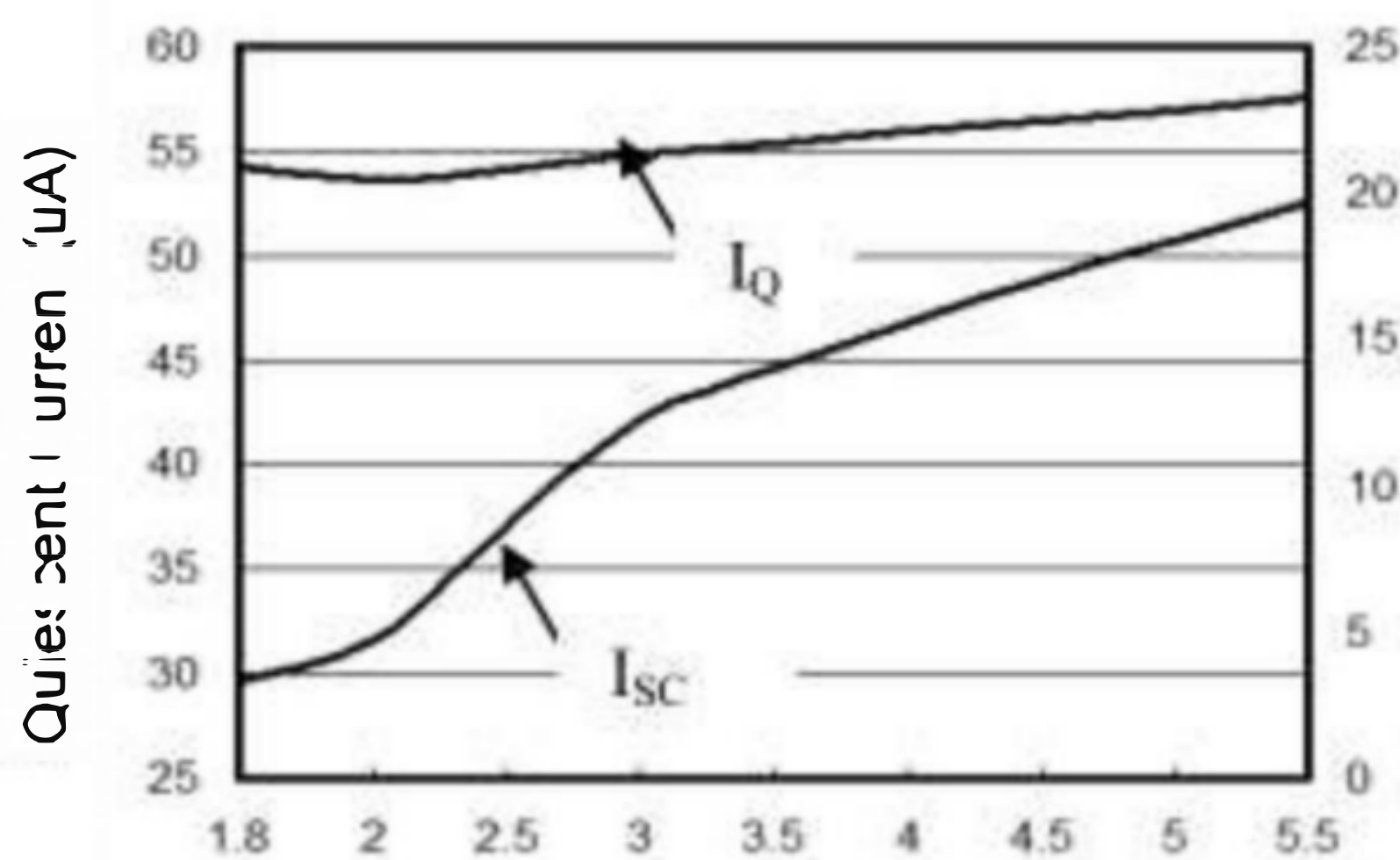
Output Voltage Swing vs. Output Current



Output Current (mA)

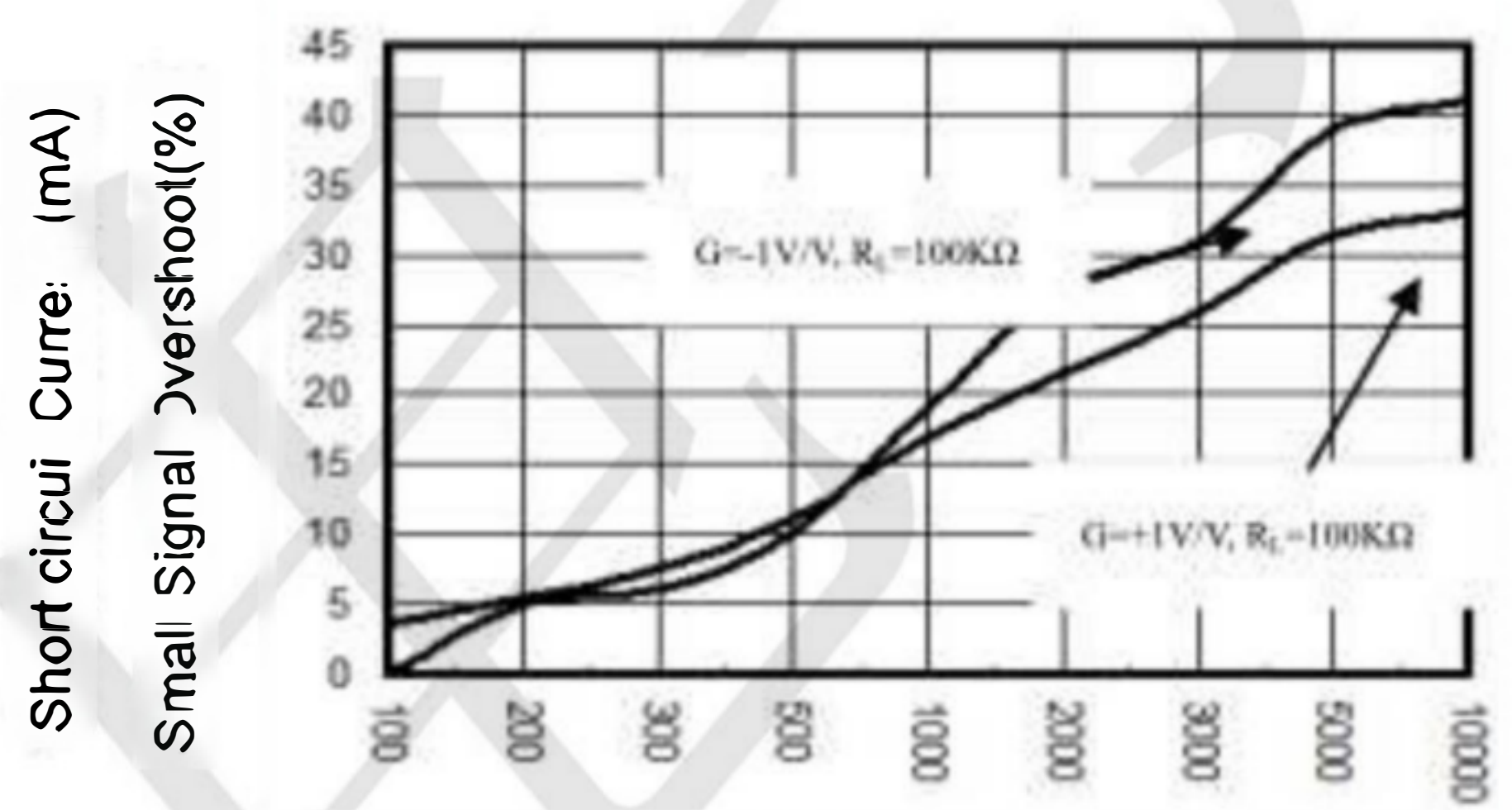
Output Current (mA)

Quiescent and Short-Circuit Current Vs. Supply Voltage



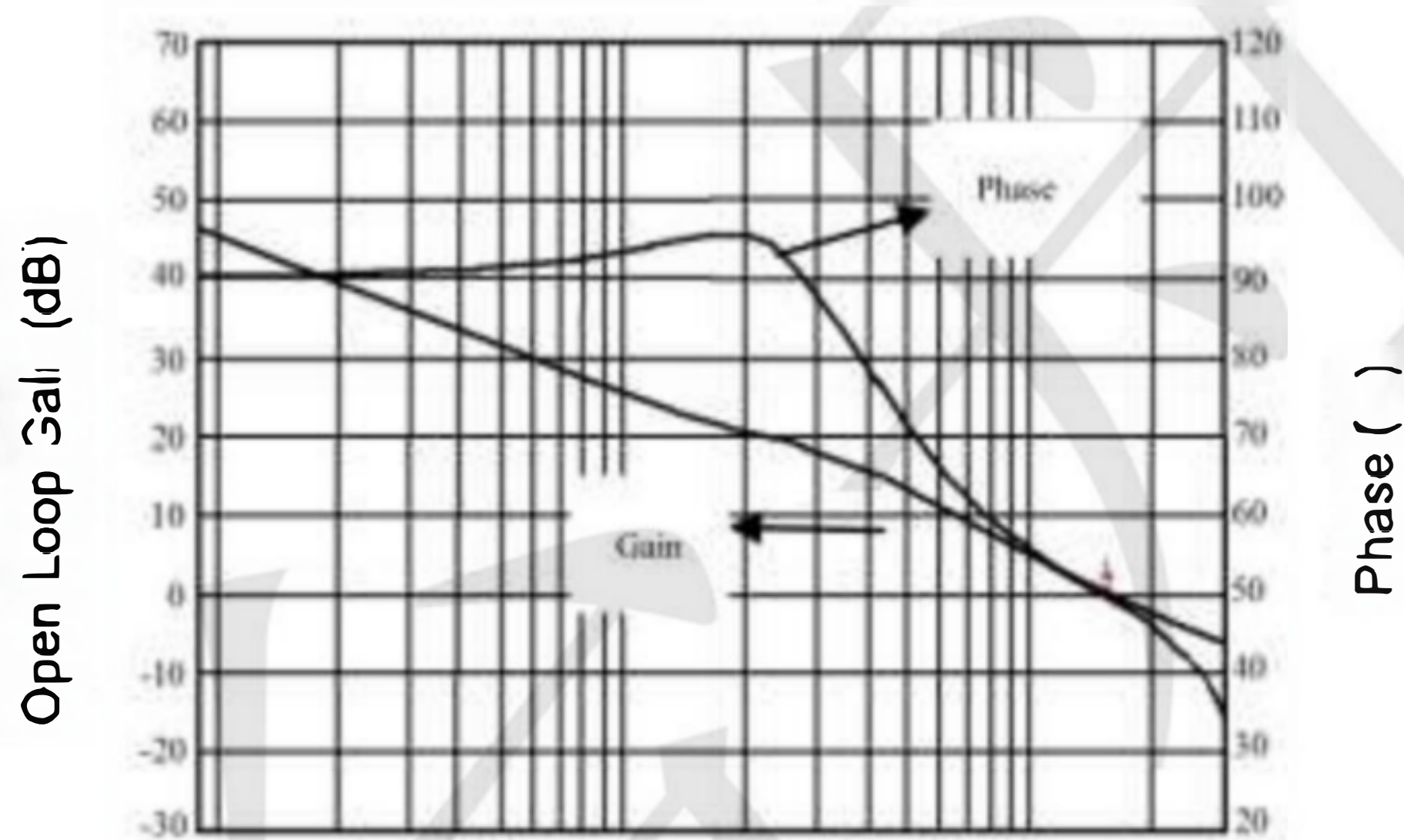
Supply Voltage (V)

Small Signal Overshoot vs. Load Capacitance



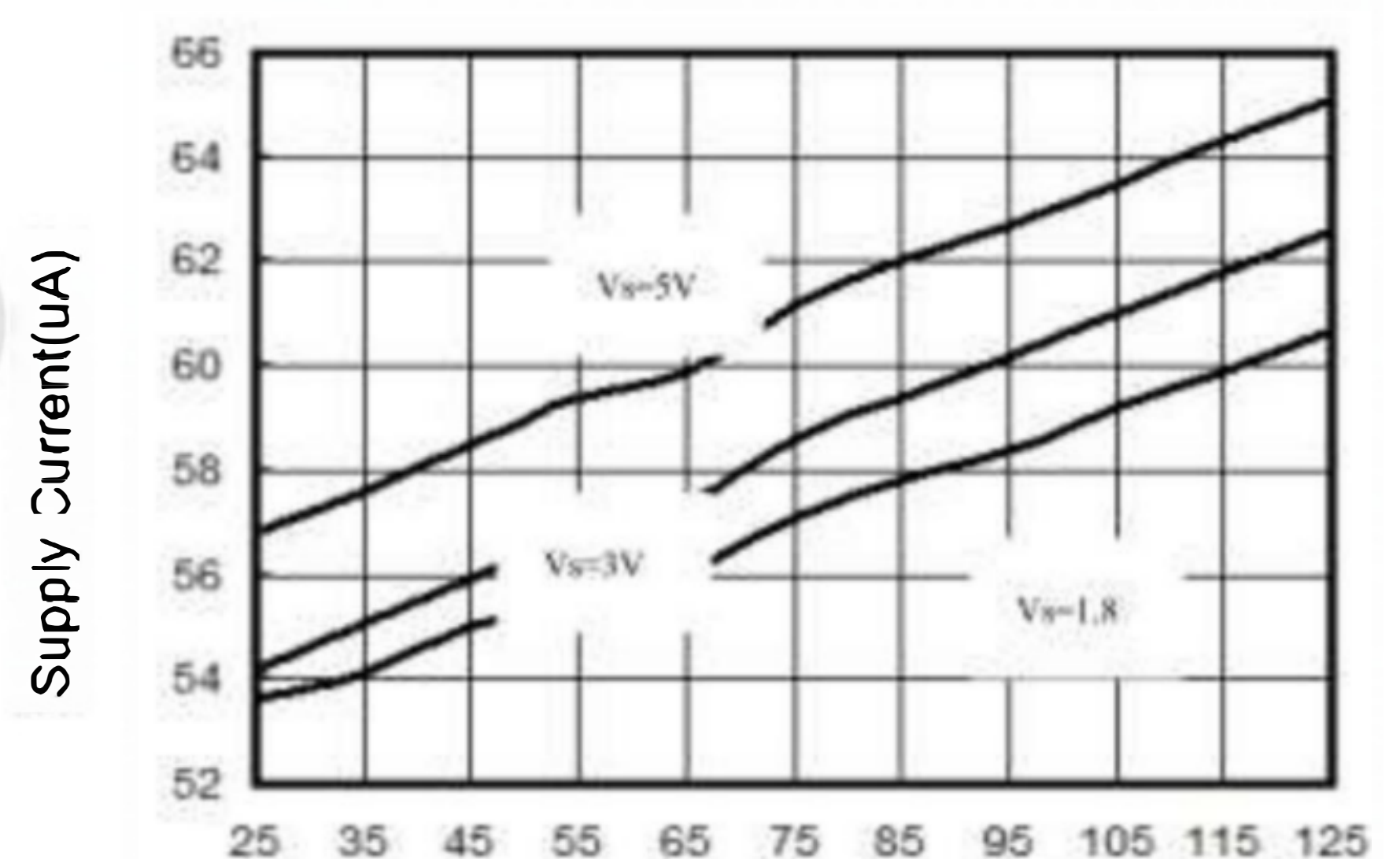
Load Capacitance (pF)

Open-Loop Gain And Phase VS. Frequency



Frequency (Hz)

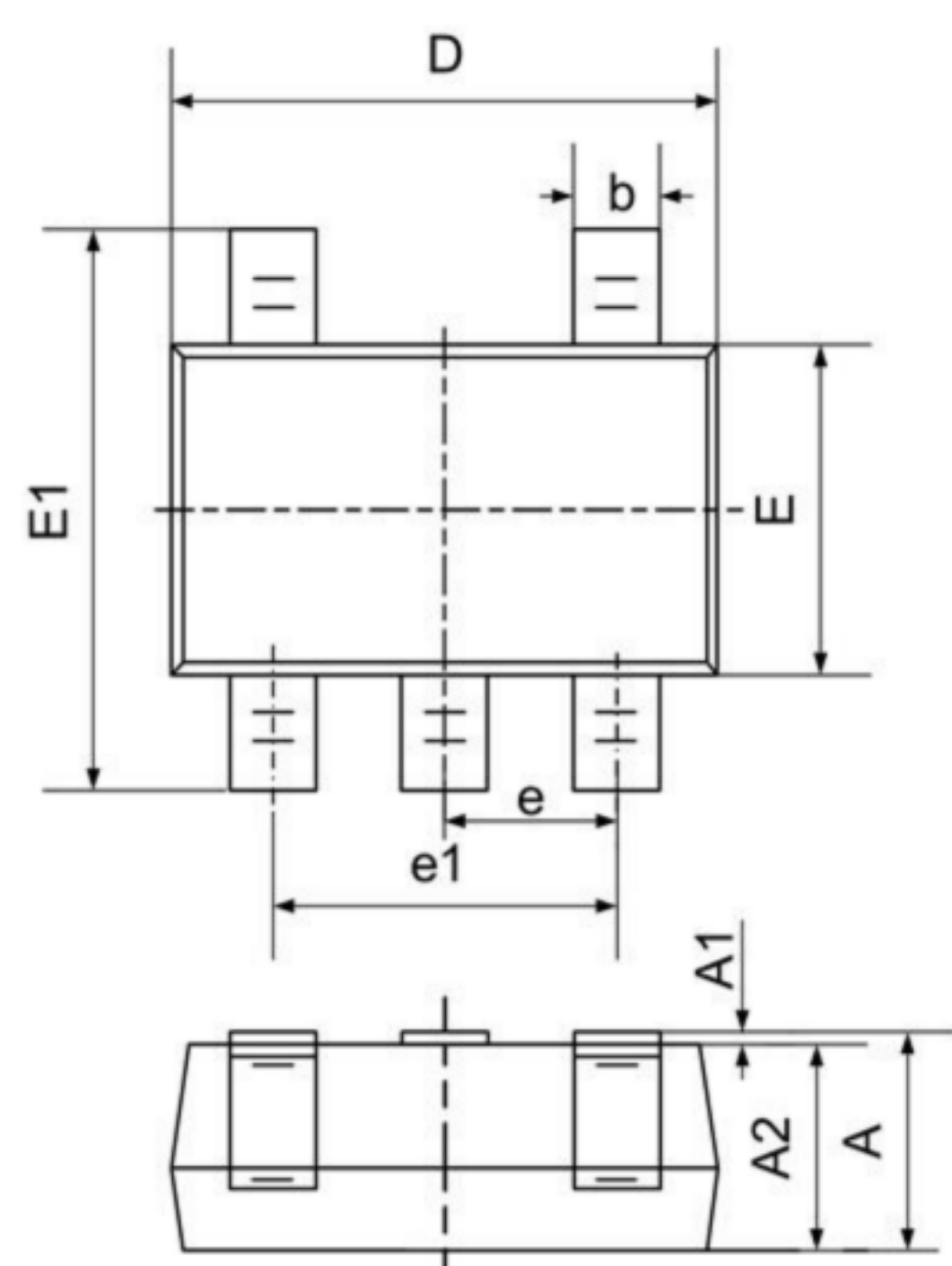
Supply Current vs. Temperature



Temperature (°C)

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°