

Dual Operational Amplifiers

FEATURES

- Wide Range of Supply Voltages
- Low Supply Current Drain Independent of the Supply Voltage
- Low Input Biasing Current
- Low Input Offset Voltage and Offset Current
- Input Common-Mode Voltage Range Including the Ground
- Differential Input Voltage Range Equal to the Power Supply Voltage
- DC Voltage Gain 100V/mV (Typ.)
- Internal Frequency Compensation

APPLICATIONS

- Battery Charger
- Cordless Telephone
- Switching Power Supply

ORDERING INFORMATION

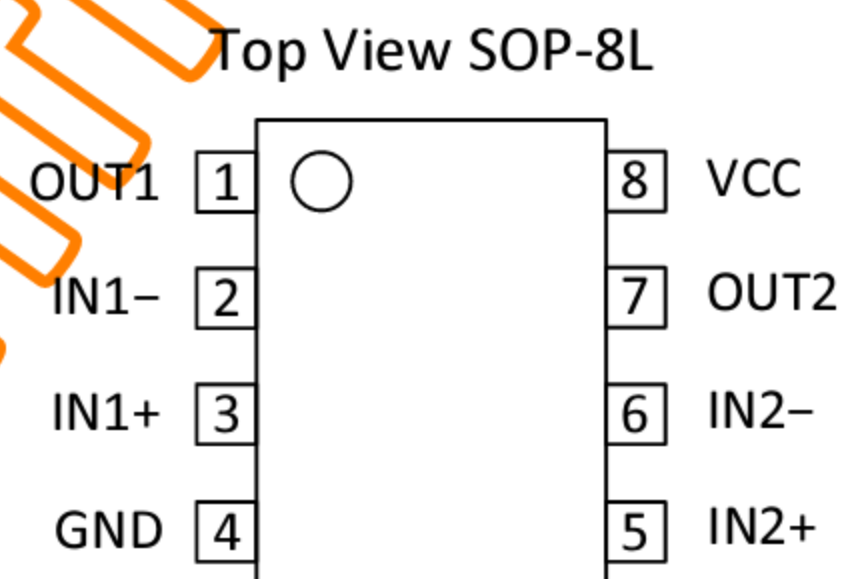
PART	PACKAGE	RoHS	Ship, Quantity
ZTA358S	SOP-8L	Yes	Tape and Reel

DESCRIPTION

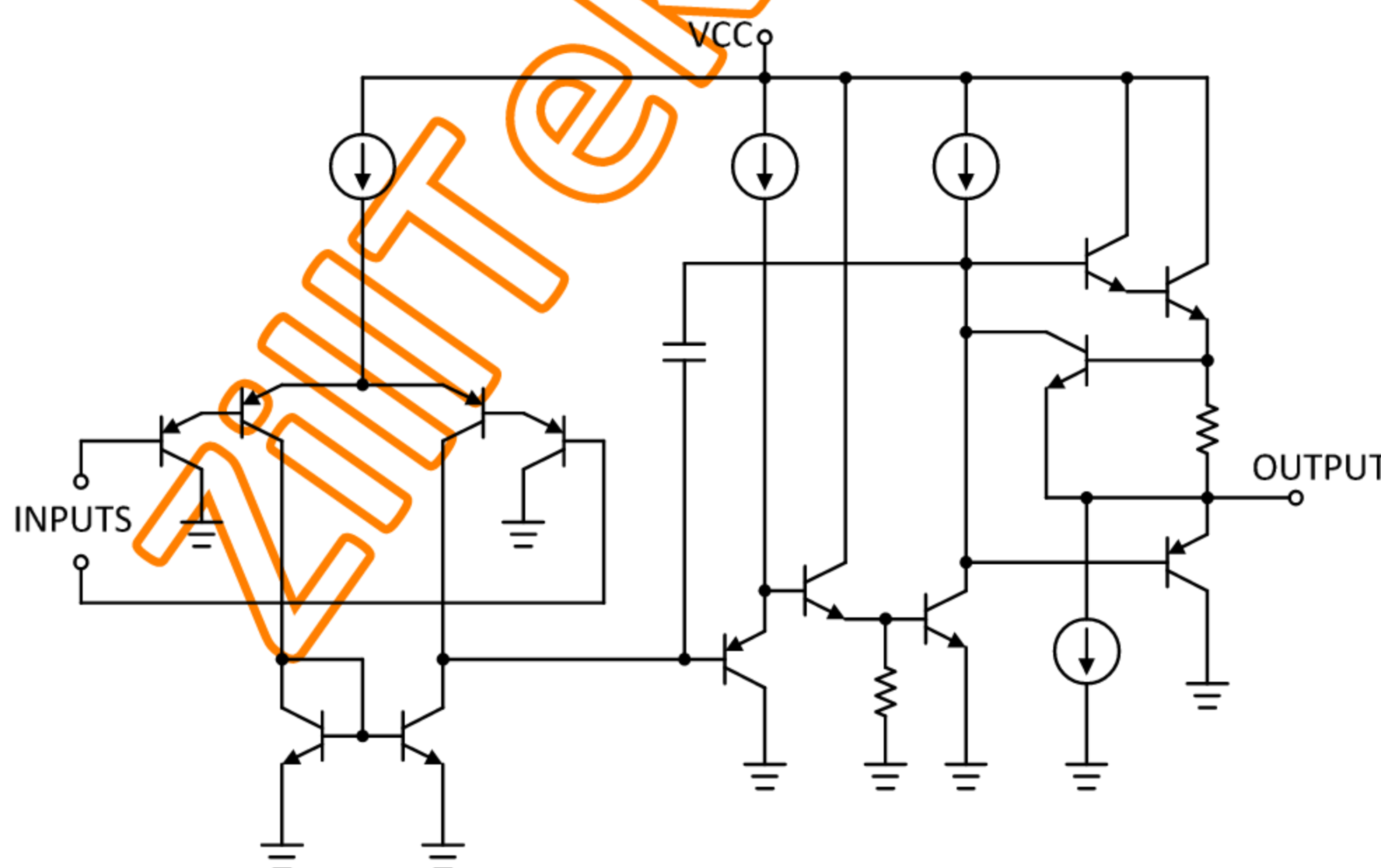
The ZTA358 consists of two independent, high-gain, (internally) frequency-compensated operational amplifiers, which were designed specifically to operate from a single power supply over a wide range of voltages. The device operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

Its application areas include transducer amplifiers, dc gain blocks and all the conventional operational amplifier circuits.

Pins Configuration

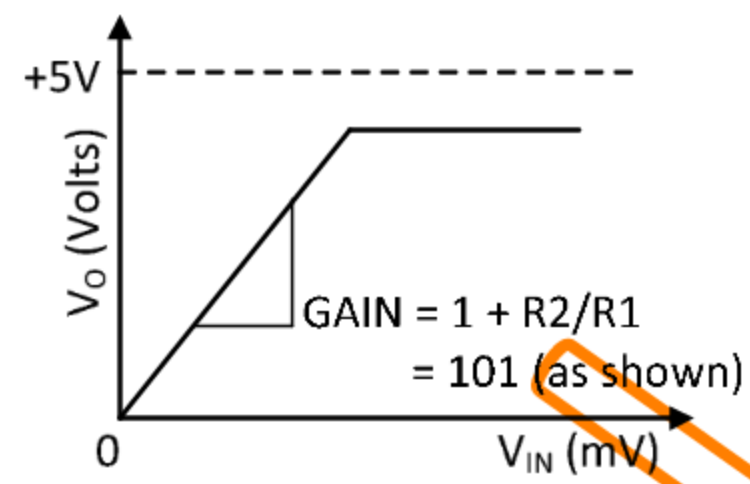
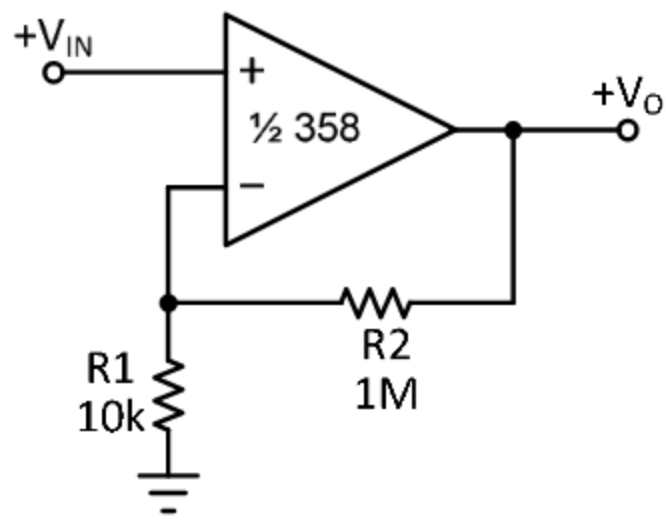


Block Diagram



Typical Single-Supply Applications ($V^+ = 5.0 V_{DC}$)

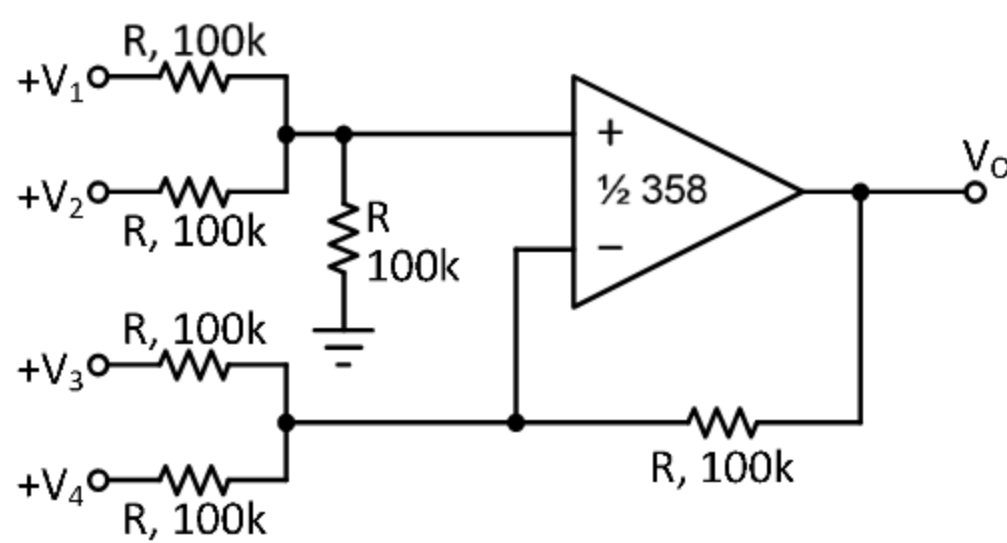
Non-Inverting DC Gain (0V Output)



Note: R is not needed from +V_{IN} to 1/2 ZTA358 due to temperature independent I_{IN}.

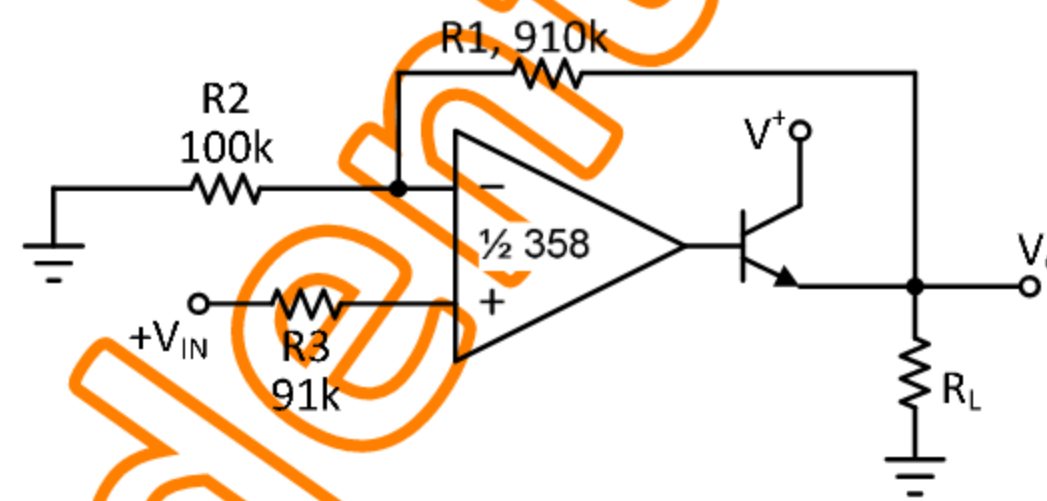
DC Summing Amplifier

(V_{IN}'S ≥ 0 V_{DC} and V_O ≥ 0 V_{DC})



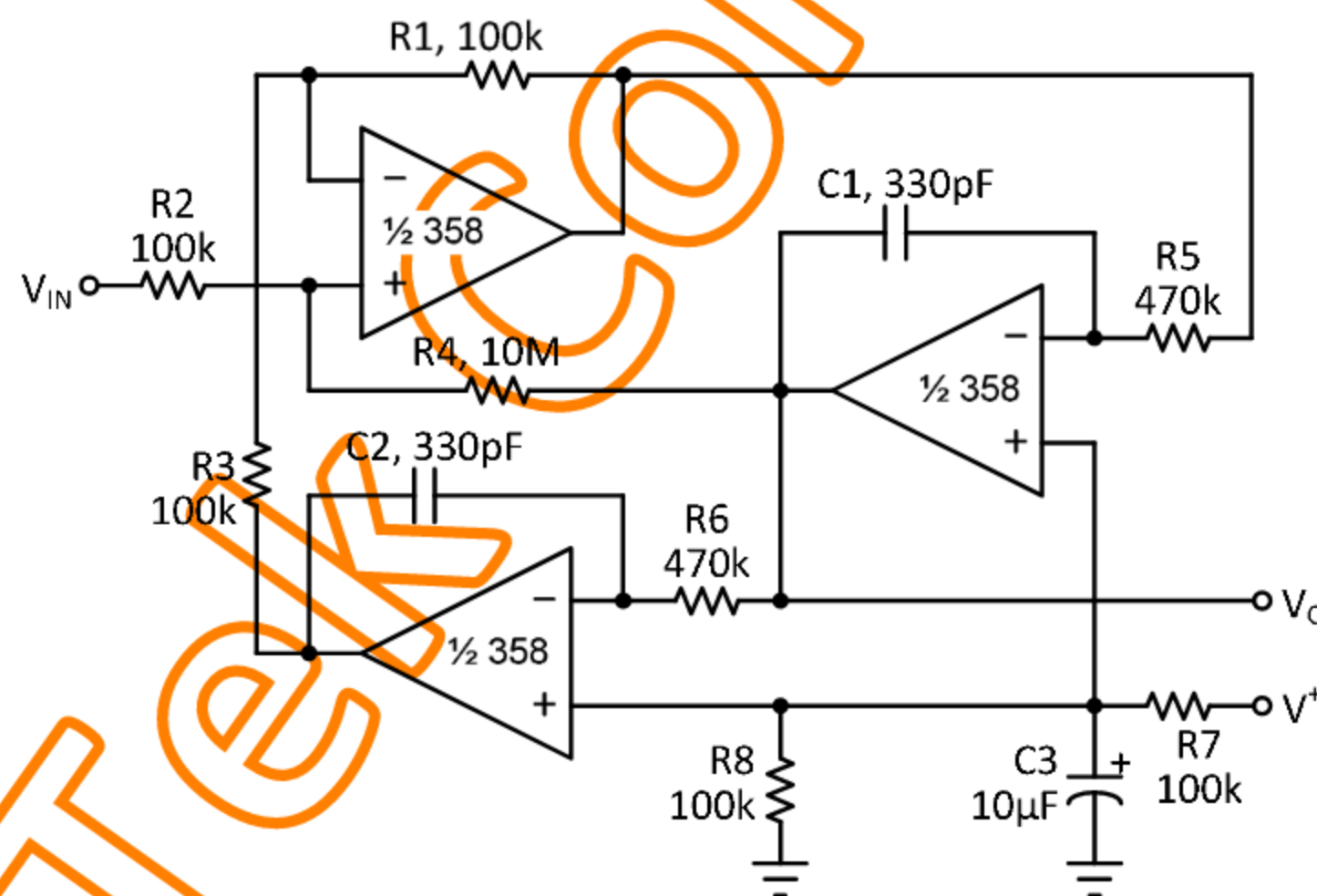
Where: $V_O = V_1 + V_2 - V_3 - V_4$
($V_1 + V_2$) ≥ ($V_3 + V_4$) to keep $V_O > 0 V_{DC}$

Power Amplifier



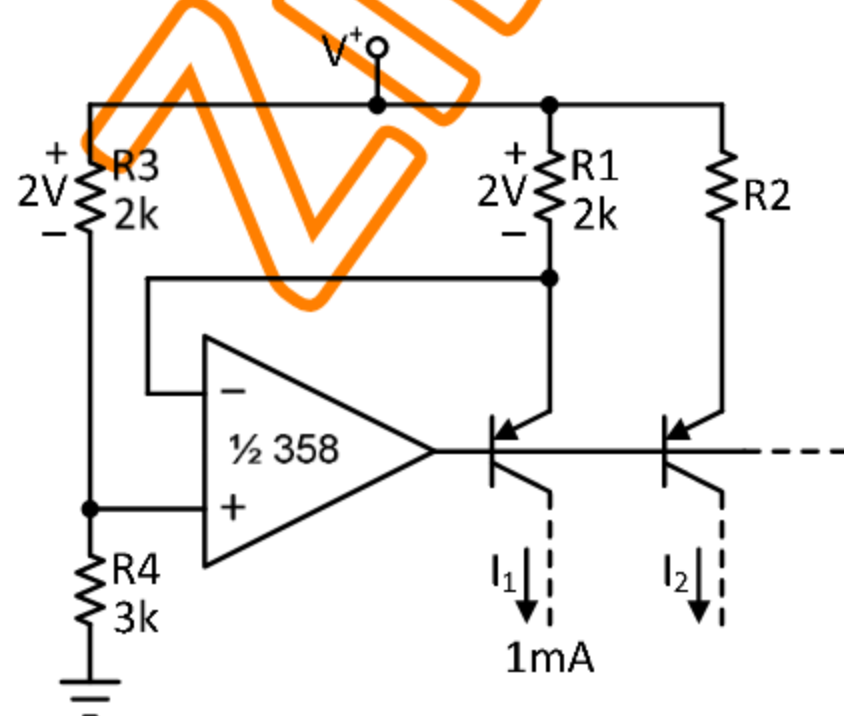
$V_O = 0 V_{DC}$ for $V_{IN} = 0 V_{DC}$
 $A_V = 10$

“BI-QUAD” RC Active Band-Pass Filter



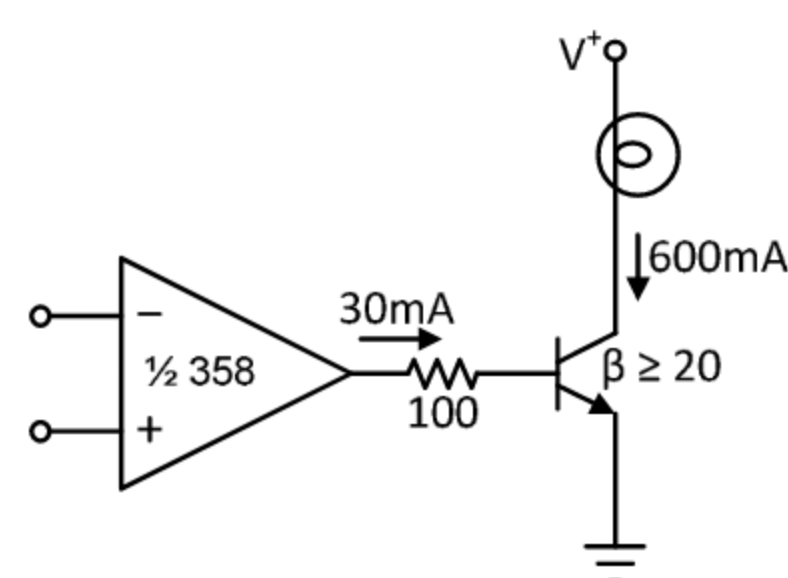
$f_o = 1\text{kHz}$, $Q = 50$, $A_V = 100$ (40dB)

Fixed Current Sources



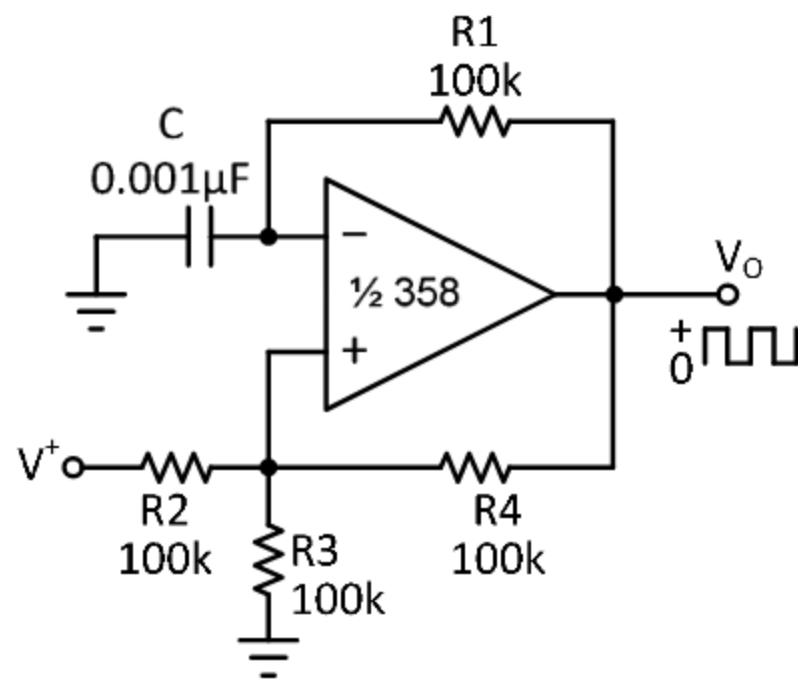
$I_2 = (R1/R2) \times I_1$

Lamp Driver

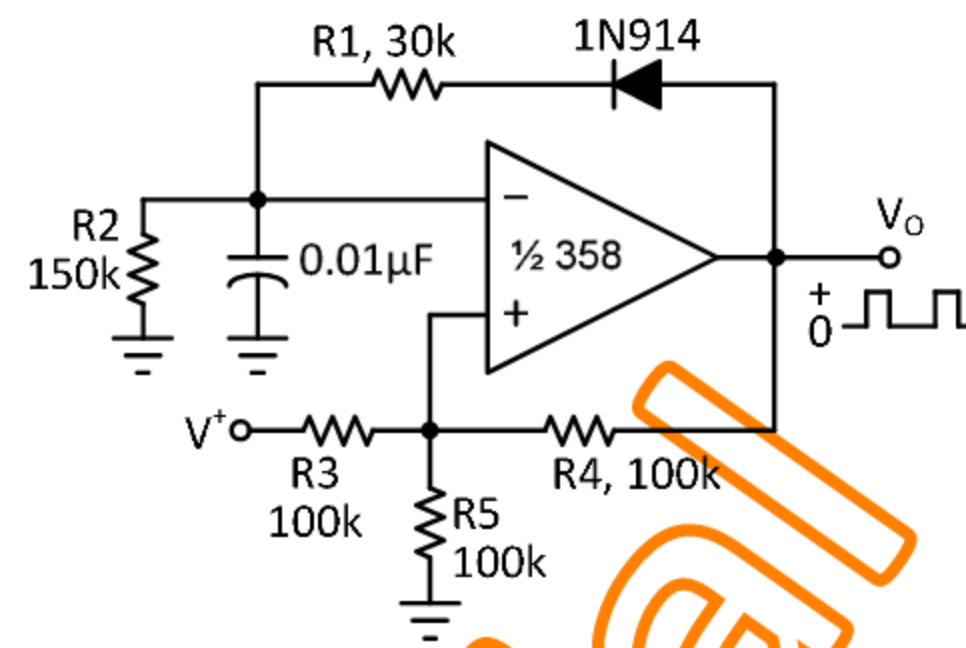


Typical Single-Supply Applications (Continued...)

Square Wave Oscillator



Pulse Generator



Absolute Maximum Ratings

Supply Voltage V_{CC}	+45V
Input Voltage V_{IN}	-0.3V to +45V
Input Current I_{IN} (at $V_{IN} = -0.3V$)	50mA
Operating Temperature Range	-40°C to +125°C
ESD	700V

CAUTION: Stresses above those listed in “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Pins Description

Pin	Description
1	OUT1 (AMPL #1)
2	IN1- (AMPL #1)
3	IN1+ (AMPL #1)
4	GND
5	IN2+ (AMPL #2)
6	IN2- (AMPL #2)
7	OUT2 (AMPL #2)
8	VCC

Electro-Static Discharge Sensitivity



This integrated circuit can be damaged by ESD. It is recommended that all integrated circuits be handled with proper precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure.

Electrical Specifications

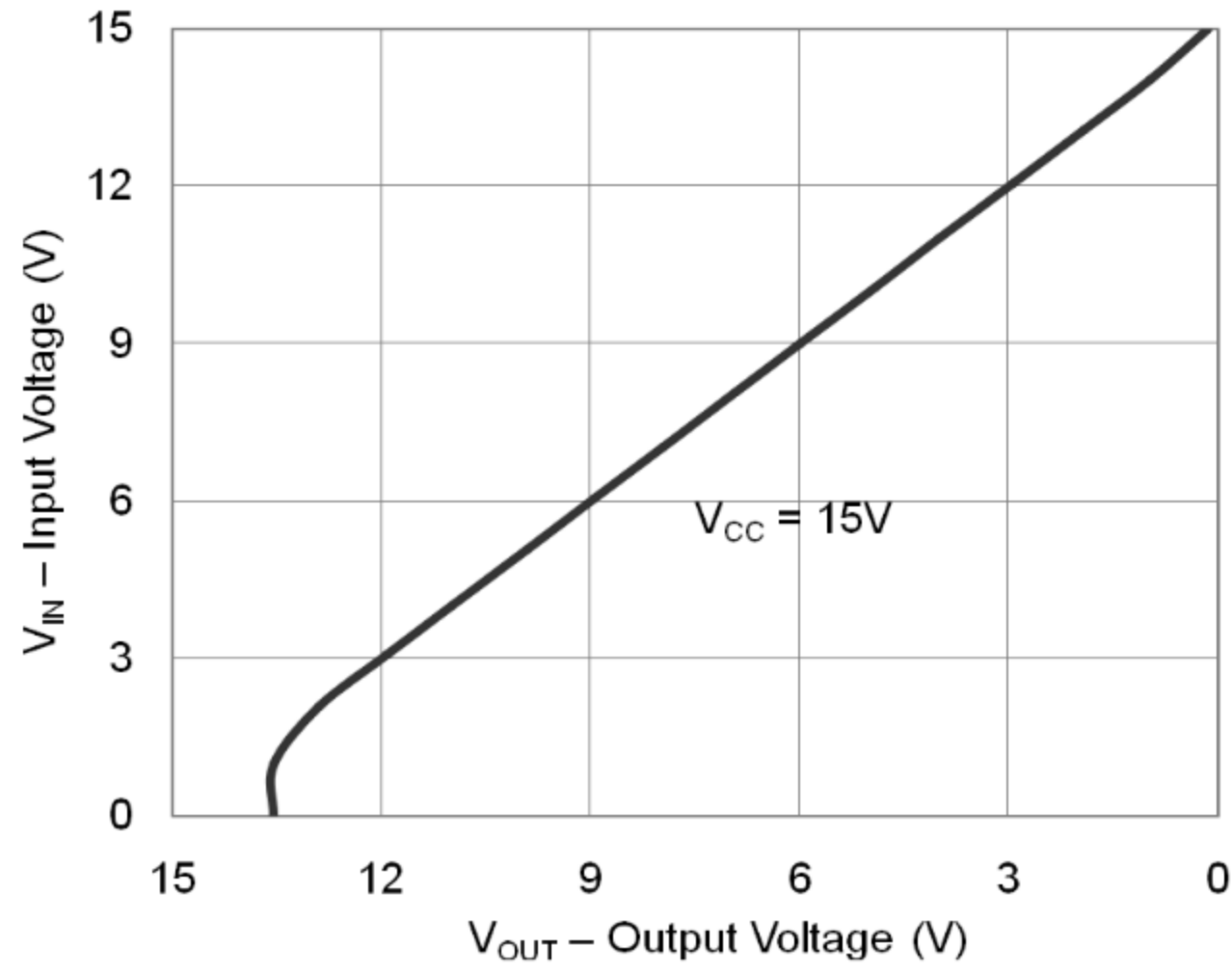
(At specified free-air temperature, $V_{CC} = +5V$, unless otherwise specified.)

PARAMETER	Symbol	TEST CONDITIONS (Note)	MIN	TYP	MAX	UNIT
Input Offset Voltage	V_{IO}	$V_{CC} = +5V$ to max, $V_{IC} = V_{ICR(min)}$, $V_O = +1.4V$	25°C	3	7	mV
			Full range		9	
Average Temperature Coefficient of Input Offset Voltage	αV_{IO}		Full range	7		$\mu V/^\circ C$
Input Offset Current	I_{IO}	$V_O = +1.4V$	25°C	2	50	nA
			Full range		150	
Average Temperature Coefficient of Input Offset Current	αI_{IO}		Full range	10		$pA/^\circ C$
Input Bias Current	I_{IB}	$V_O = +1.4V$	25°C	-20	-250	nA
			Full range		-500	
Common-Mode Input Voltage Range	V_{ICR}	$V_{CC} = +5V$ to max	25°C	0 to $V_{CC}-1.5$		V
			Full range	0 to $V_{CC}-2$		
High-Level Output Voltage	V_{OH}	$V_{CC} = \text{max}$, $R_L = 2k\Omega$	Full range	26		V
		$V_{CC} = \text{max}$, $R_L \geq 10k\Omega$	Full range	27	28	
Low-Level Output Voltage	V_{OL}	$R_L \geq 10k\Omega$	Full range	5	20	mV
Large-Signal Differential Voltage Amplification	A_{VD}	$V_{CC} = +15V$, $R_L \geq 2k\Omega$ $V_{OUT} = +1V$ to $+11V$	25°C	25	100	V/mV
			Full range	15		
Common-Mode Rejection Ratio	CMRR	$V_{CC} = +5V$ to max, $V_{IC} = V_{ICR(min)}$	25°C	65	80	dB
Supply Voltage Rejection Ratio ($\Delta V_{CC}/\Delta V_{IO}$)	k_{SVR}	$V_{CC} = +5V$ to max	25°C	65	100	dB
Crosstalk Attenuation	V_{O1}/V_{O2}	$f = 1kHz$ to $20kHz$	25°C		120	dB
Output Current	I_{OUT}	$V_{CC} = +15V$, $V_{ID} = +1V$, $V_O = 0V$	25°C	-30	-50	mA
			Full range	-20		
		$V_{CC} = +15V$, $V_{ID} = -1V$, $V_O = +15V$	25°C	15	35	mA
			Full range	7		
		$V_{CC} = +15V$, $V_{ID} = -1V$, $V_O = +2V$	25°C	15	28	mA
$V_{ID} = -1V$, $V_O = +200mV$	25°C	12	50	μA		
Short-Circuit Output Current	I_{OS}	$V_{ID} = -1V$, $V_O = +15V$	25°C	50	70	mA
Supply Current (Two Amplifiers)	I_{CC}	$V_{CC} = +2.5V$, No load	Full range	0.7	1.2	mA
		$V_{CC} = \text{max}$, $V_O = 0.5V_{CC}$, No load	Full range	1	2	mA
Slew Rate		$V_{CC} = +15V$, $R_L = 2k\Omega$, $V_{IN} = +0.5V$ to $+3V$, $C_L = 100pF$, Unity gain	25°C	0.35		$V/\mu s$
Gain Bandwidth		$V_{CC} = +30V$, $f = 100kHz$, $V_{IN} = +10mV$, $R_L = 2k\Omega$, $C_L = 100pF$	25°C	700		kHz
Total Harmonic Distortion		$f = 1kHz$, $A_V = 20dB$, $R_L = 2k\Omega$, $V_O = 2V_{pp}$, $C_L = 100pF$	25°C	0.04		%

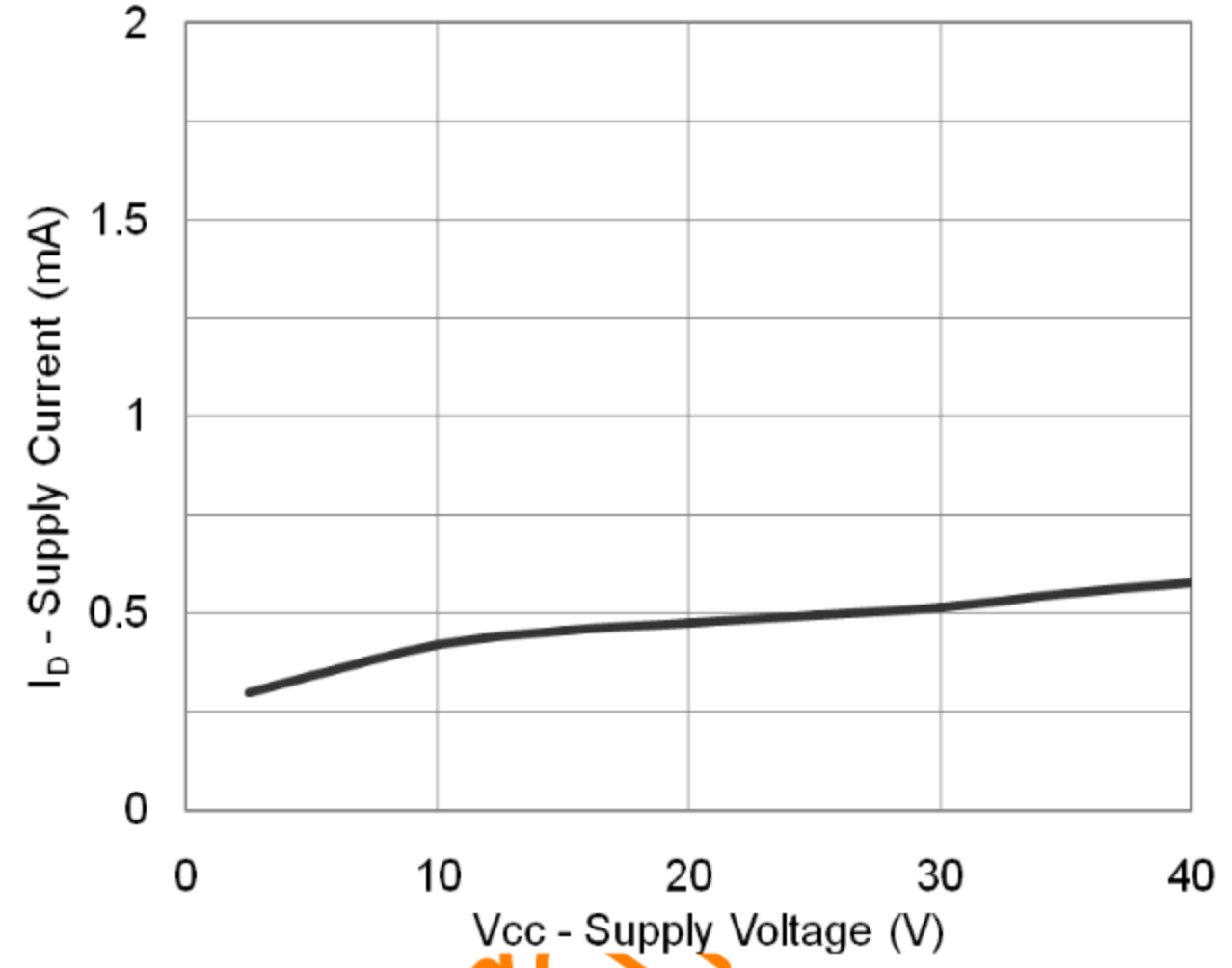
Note: All characteristics are measured under the open-loop conditions with zero common-mode input voltage, unless otherwise specified. Max V_{CC} for testing purposes is $+36V$, $V_{CCabsmax} = +45V$. Full range is $-40^\circ C$ to $+125^\circ C$.

Typical Characteristics

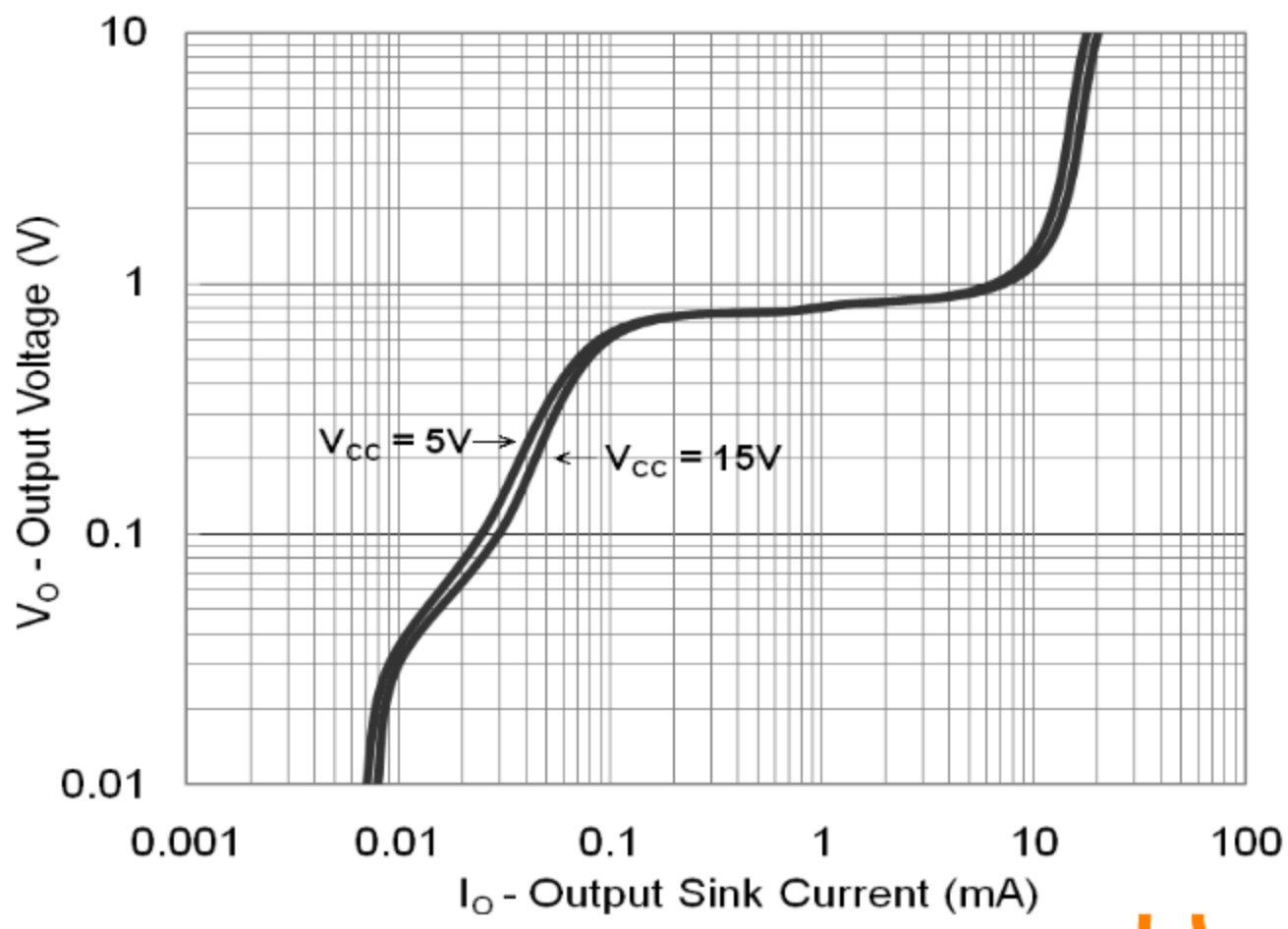
Inverting Op Amp With Vcc Bias



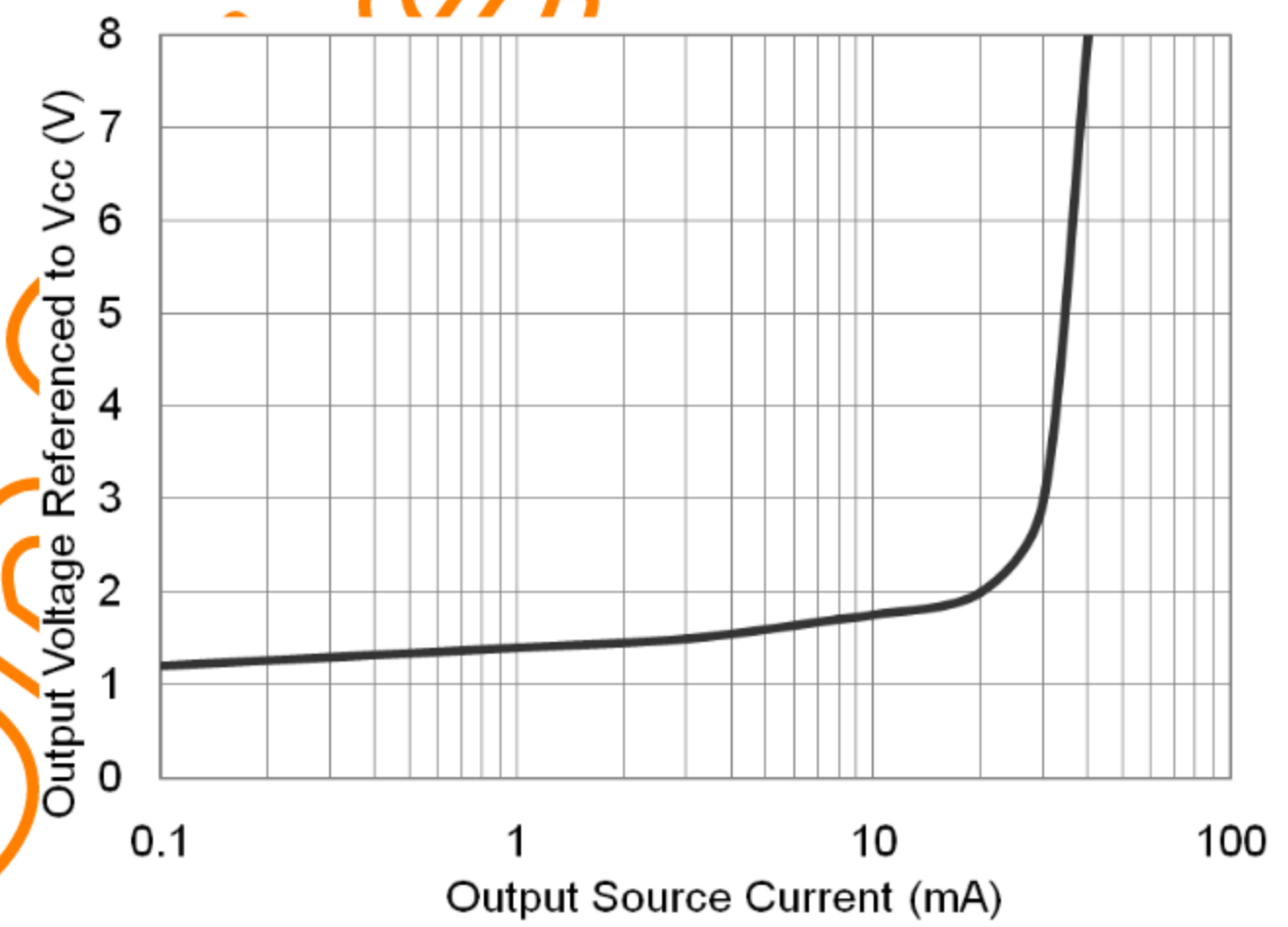
Supply Current



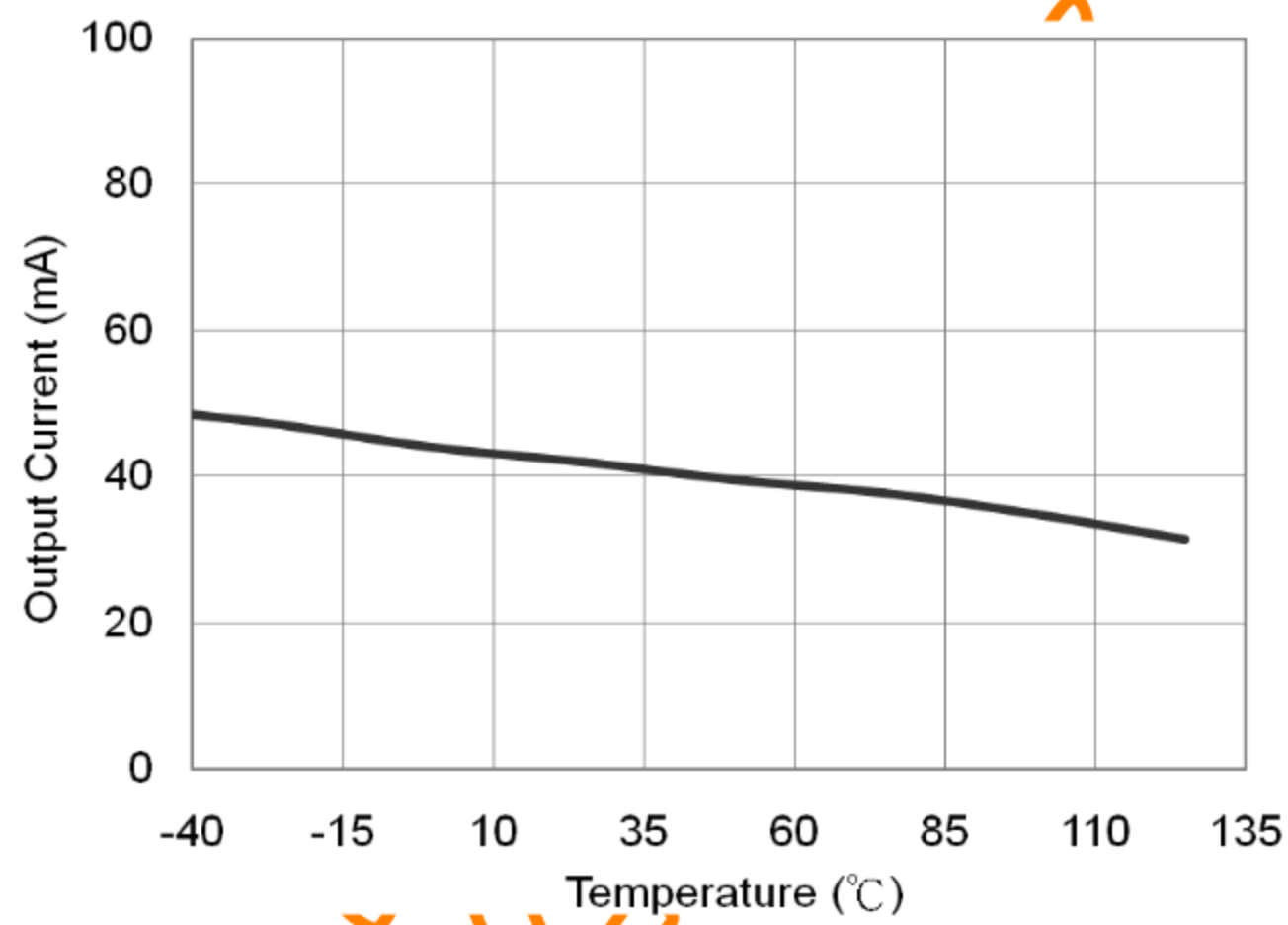
Output Characteristics Current Sinking



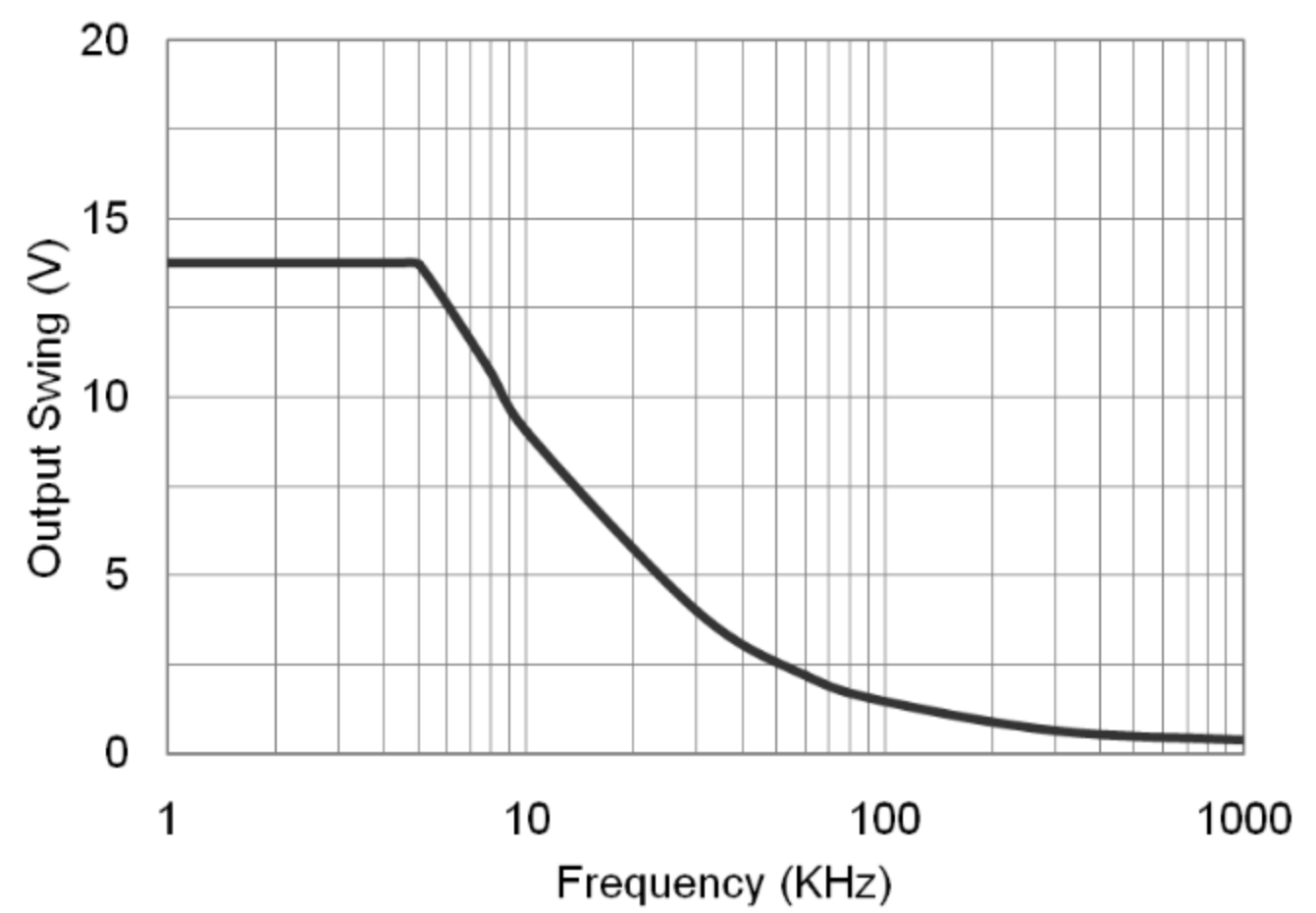
Output Characteristics: Current Sourcing



Current Limiting

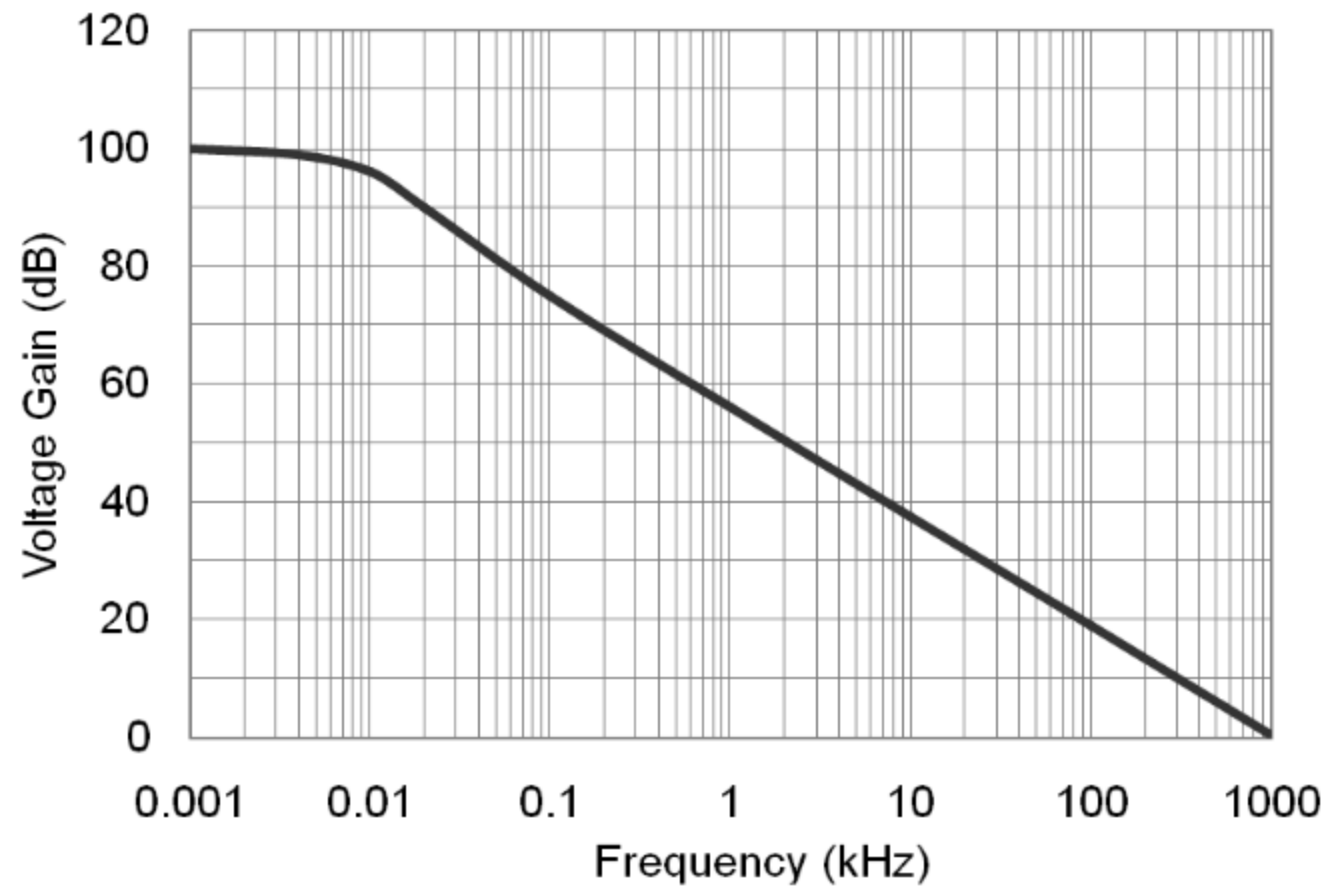


Large Signal Frequency Response

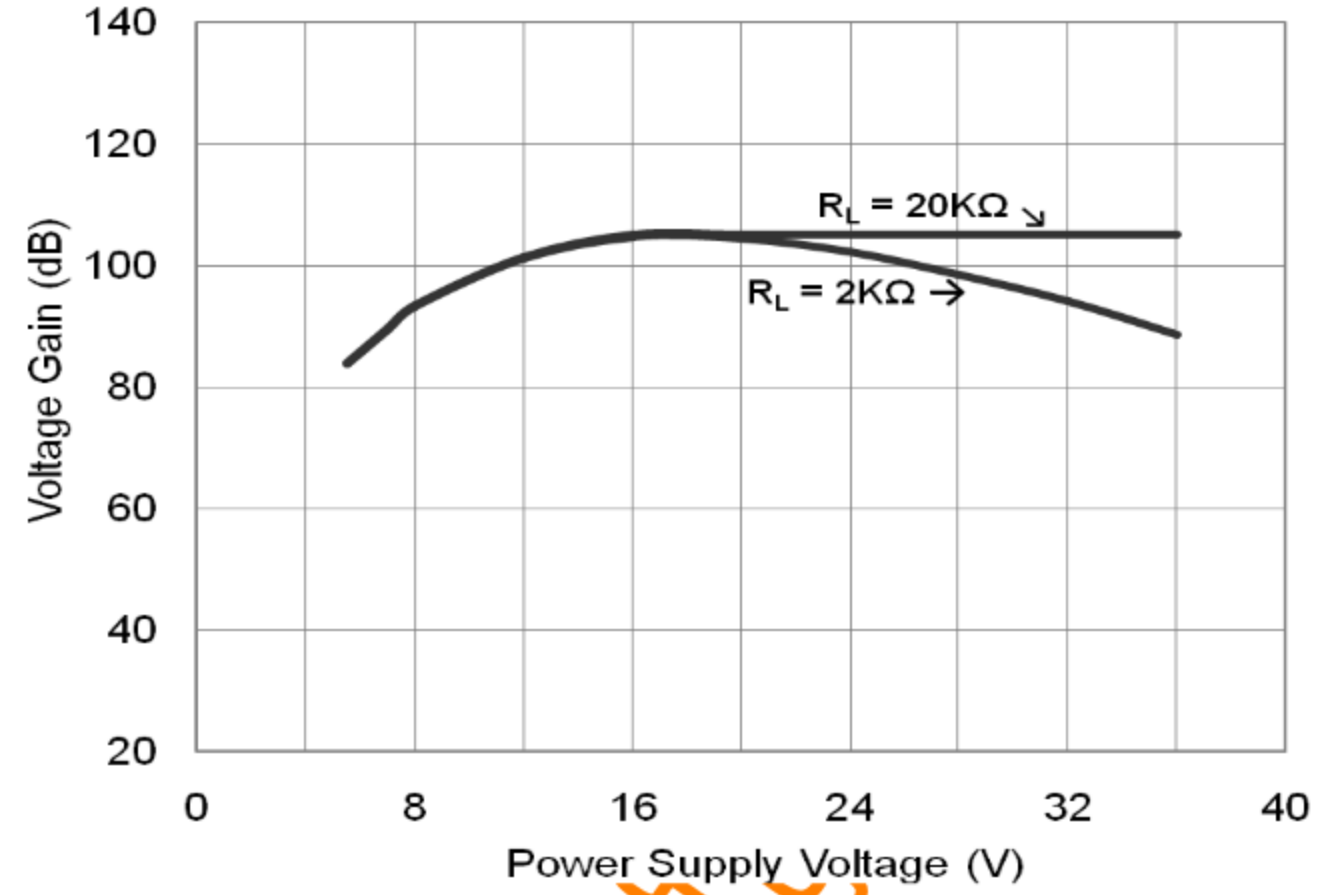


Typical Characteristics (Continued...)

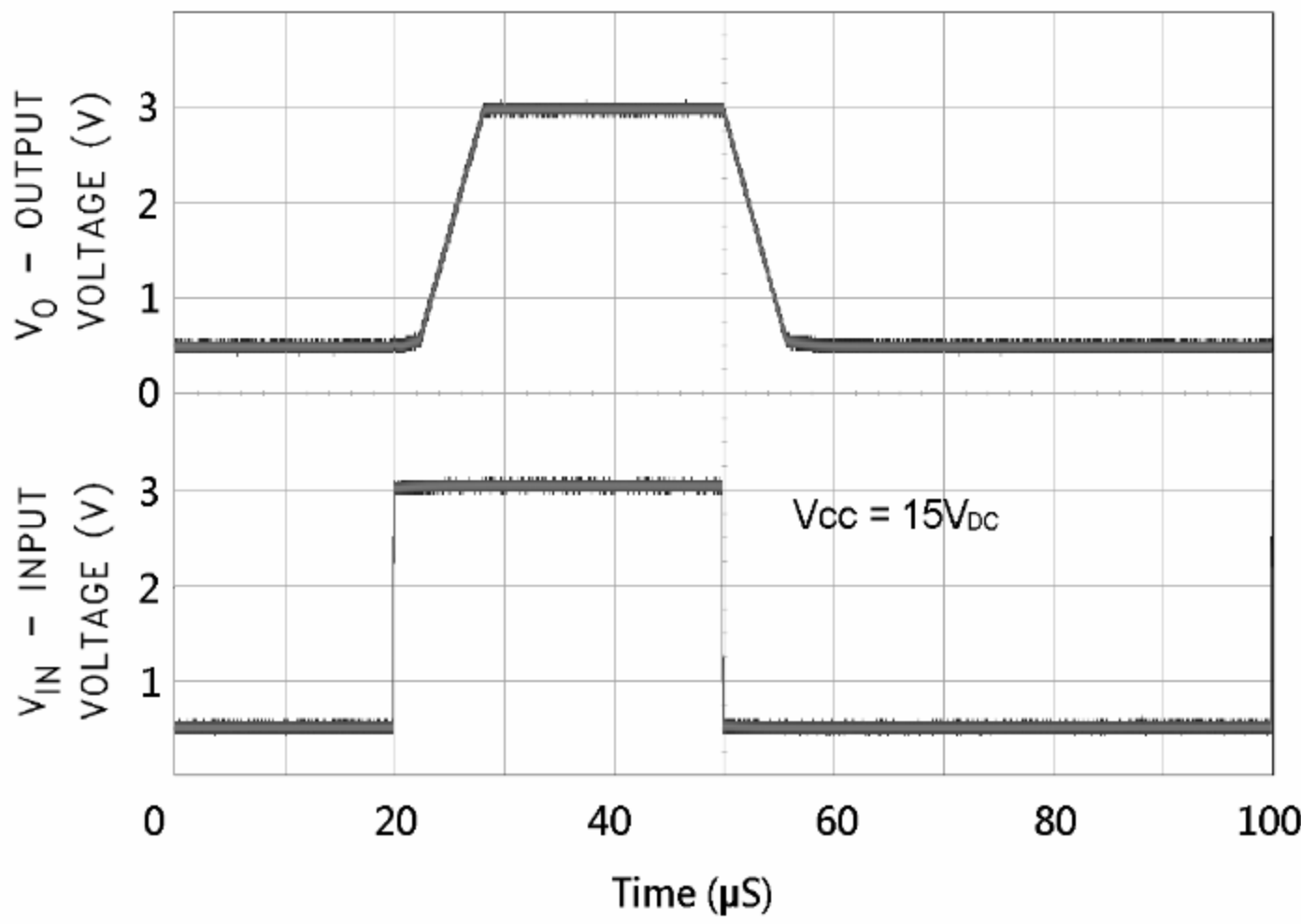
Open Loop Frequency Response



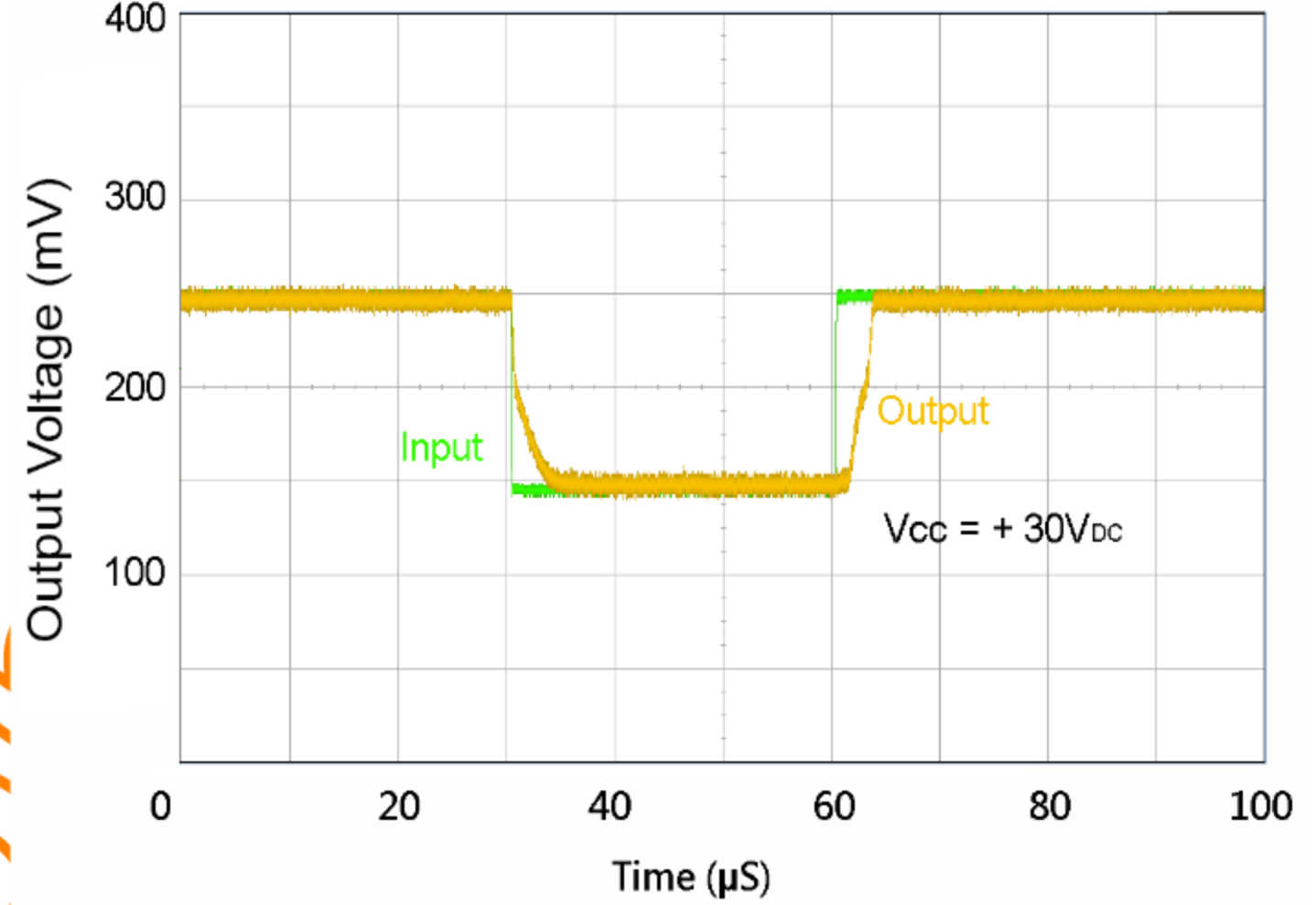
Voltage Gain



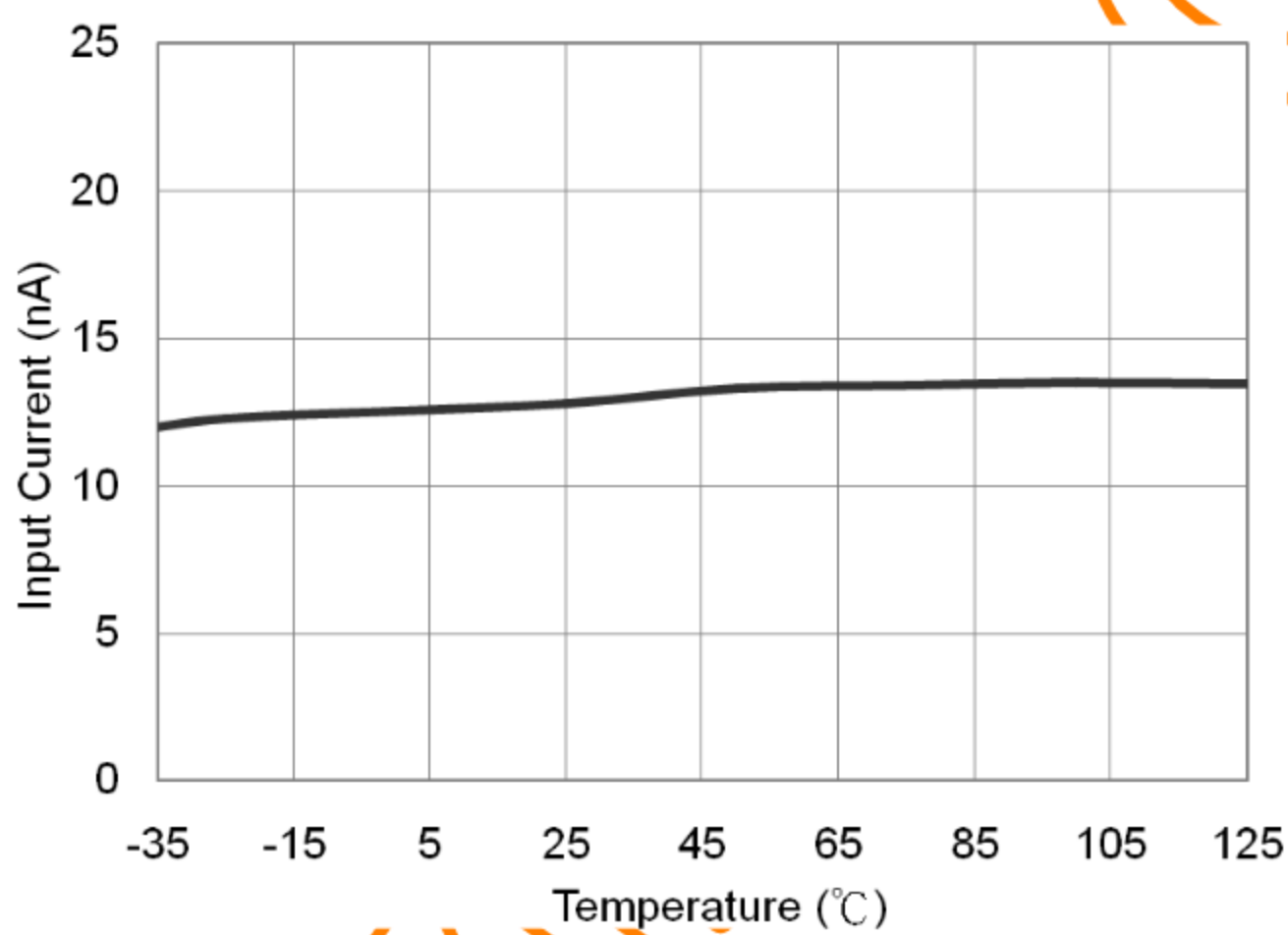
Voltage Follower Pulse Response



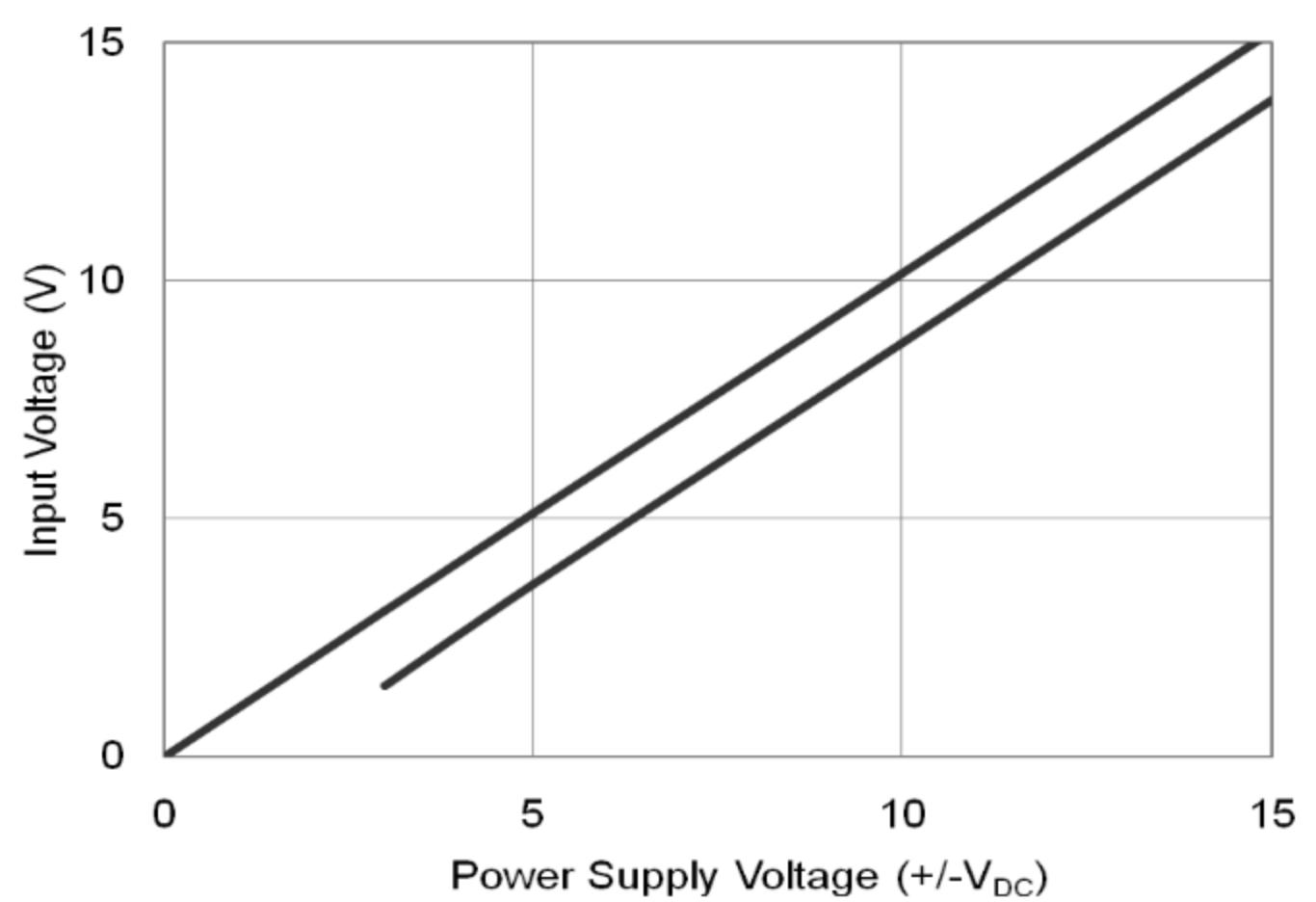
Voltage Follower Pulse Response (Small Signal)



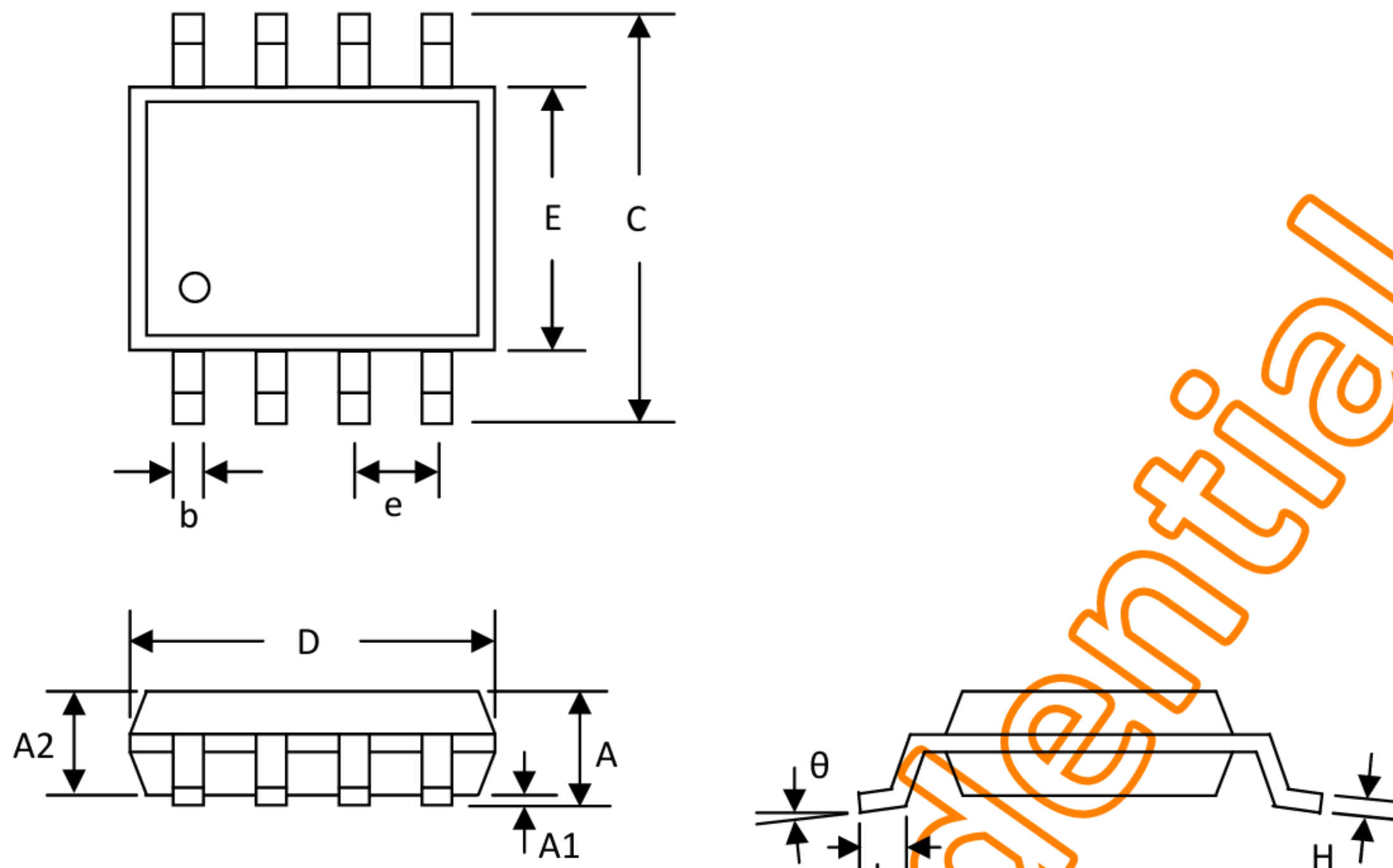
Input Current



Input Voltage Range



PACKAGE DIMENSIONS SOP-8L



SYMBOLS	DIMENSION (MM)		DIMENSION (INCH)	
	MIN	MAX	MIN	MAX
A	1.300	1.752	0.051	0.069
A1	0.000	0.150	0.000	0.006
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
C	5.790	6.200	0.228	0.244
D	4.700	5.110	0.185	0.201
E	3.800	4.000	0.150	0.157
e	1.27 BSC		0.05 BSC	
H	0.170	0.254	0.007	0.010
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°