

Features

- Power supply range:
 - Single supply: 3.0 to 32V
 - Dual supplies: ± 1.5 to ± 16 V
- Two independent operational amplifiers built-in:
 - Equivalent to one-half of an LM324
 - Quiescent current of 500 μ A / channel
- Input offset voltage of 5mV max. at 25°C
- Low bias current of 45nA typ. at 25°C
- Unity-gain bandwidth of 1.0MHz typical
- Internally frequency compensated for unity gain
- Common-mode input voltage range includes ground

Application

- Computer and motherboard
- Household electric appliances
- Inverter circuit
- Motor control
- Multi-functional printer
- Power supply and portable charger
- Uninterruptible power supply (UPS)

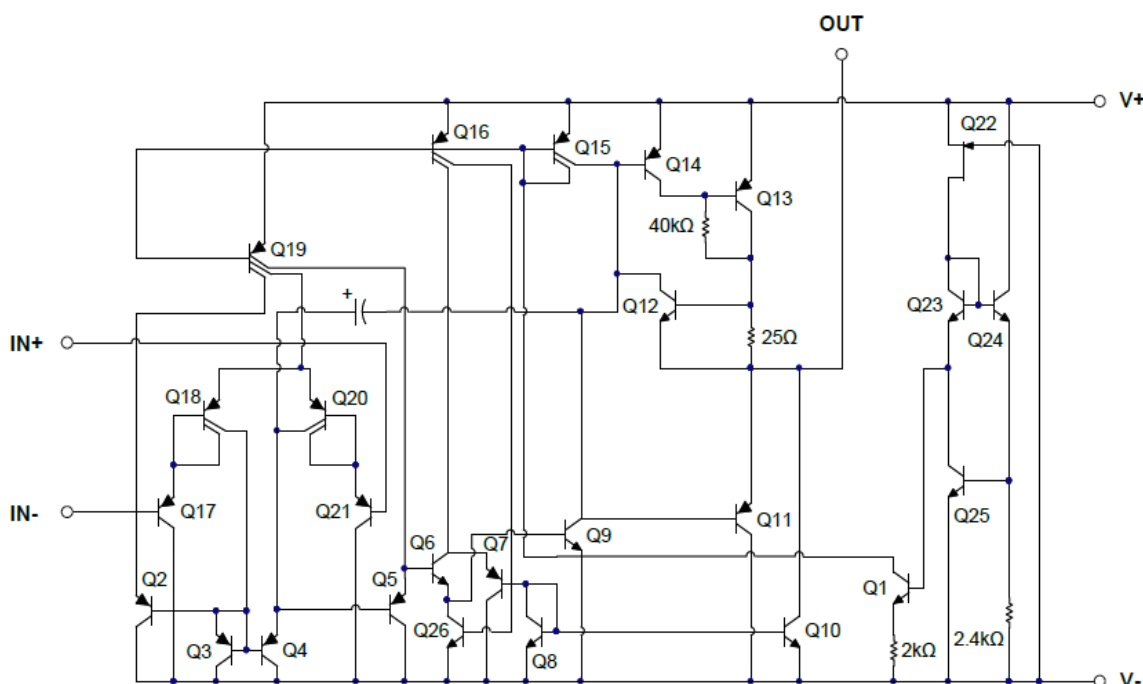
Description

LM358 is an industry-standard operational amplifier. It consists of two independent operational amplifiers, each with high gain and low power consumption characteristics. LM358 is equivalent to half of LM324. The LM358 can operate at power voltages as low as 3.0 V or as high as 32 V, and supports the use of single or dual power sources for power supply. Therefore, LM358 is widely used in various application circuits, such as audio amplifiers, DC gain components, and conventional operational amplifier circuits.

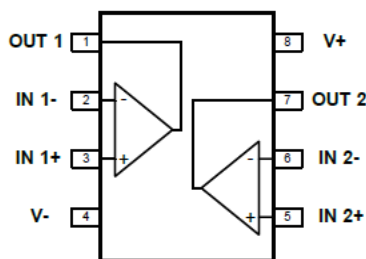


Halogen-Free

Representative Schematic Diagram



Pin Configuration and Functions



SOP-8 Top View

Pin		I/O	Pin Description
Name	No.		
OUT 1	1	O	Output of the operational amplifier 1.
IN 1-	2	I	Negative input of the operational amplifier 1.
IN 1+	3	I	Positive input of the operational amplifier 1.
V -	4	-	Negative (lowest) supply or ground for single supply.
IN 2+	5	I	Positive input of the operational amplifier 2.
IN 2-	6	I	Negative input of the operational amplifier 2.
OUT 2	7	O	Output of the operational amplifier 2.
V+	8	-	Positive (highest) supply

Ordering Information

Type	Package	Marking	Minimum Package(pcs)	Inner Box Quantity(pcs)	Outer Carton Quantity(pcs)	Delivery Mode
LM358	SOP-8	LM358	3,000	6,000	42,000	13"reel

Absolute Maximum Ratings

Parameter		Symbol	Value	Unit
Maximum power supply	Single supply	V_S	40	V
	Dual supplies		± 20	V
Maximum differential input range		$V_{I(DIFF)}$	± 40	V
Maximum input range (either input)		V_{IN}	-0.3~40	V
Duration of output short circuit (one amplifier) to ground (or below) at $T_A = 25^\circ\text{C}$, $V_S \leq 15\text{V}$		t_{SC}	Continuous	
Maximum input pin current ($V_{IN} < -0.3\text{V}$)		I_{IN}	50	mA
Soldering temperature & time		T_{solder}	260, 10s	$^\circ\text{C}$
Junction Temperature		T_J	150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-65~150	$^\circ\text{C}$

Notes:

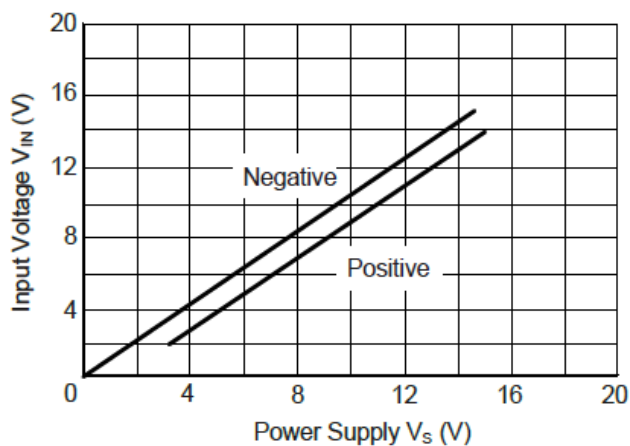
(1) Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions. Exposure to absolute-maximum rated conditions for extended periods may affect device reliability.

(2) Differential voltages are at $IN+$, with respect to $IN-$.

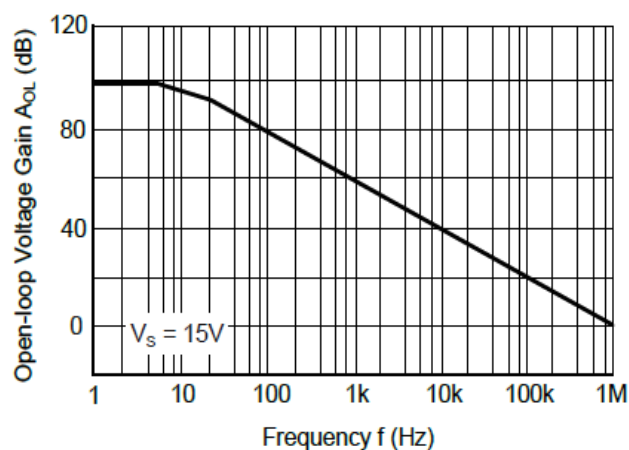
Electrical Characteristics

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V _{OS}	Input offset voltage	V _S = 5.0V, V _{CM} = 0V, V _{OUT} = 1.4V		-	±5	-	mV
PSRR	Input offset voltage vs power supply (ΔV _{IO} / ΔV _S)	V _S = 5.0 to 36V		-	100	-	dB
V _{CM}	Common-mode voltage range	V _S = 5.0 to 36V		V-	-	V ⁺ - 1.5	V
CMRR	Common-mode rejection ratio	V _S = 5.0 to 36V; V _{CM} = 0V		65	80	-	dB
I _Q	Quiescent current per amplifier	R _L = ∞	V _S = 5.0V	-	0.5	-	mA
			V _S = 36V	-	0.8	-	mA
I _{IB}	Input bias current	V _{CM} = 0V, V _{OUT} = 1.4V		-	±50	±250	nA
I _{OS}	Input offset current	V _{CM} = 0V, V _{OUT} = 1.4V		-	±10	±50	nA
GBW	Gain bandwidth product	-		-	1.2	-	MHz
SR	Slew rate	G = +1		-	1.4	-	V/μs
V _{OUT}	Voltage output swing from rail	V _S = 30V, R _L = 2kΩ	Positive rail	-	-	-	V
		V _S = 30V, R _L ≥ 10kΩ		-	2	-	V
		V _S = 5.0V, R _L = 10kΩ	Negative rail	-	5	-	mV
I _{OUT}	Output current	V _{OUT} = 0V, V _S =15V, V _{ID} = 1V	Source	-	30	-	mA
		V _{OUT} =2V, V _S =15V, V _{ID} = -1V	Sink	-	15	-	mA
		V _{OUT} =0.2V, V _S =15V, V _{ID} = -2V		-	50	-	μA
I _{SC}	Short-circuit current	V _S = 15V		-	40	-	mA
A _{OL}	Open-loop voltage gain	V _S = 15V, V _{OUT} = 1.0 to 11V, R _L ≥ 2kΩ		-	100	-	mV/V

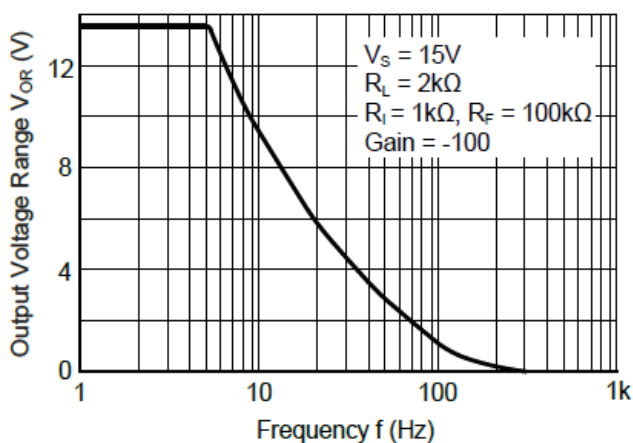
Typical Characteristics



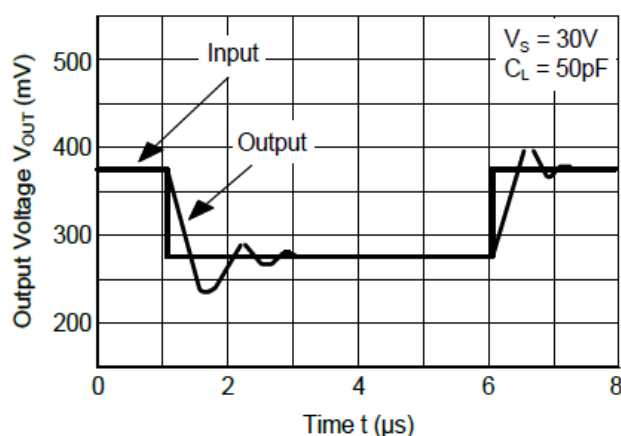
Input Voltage Range



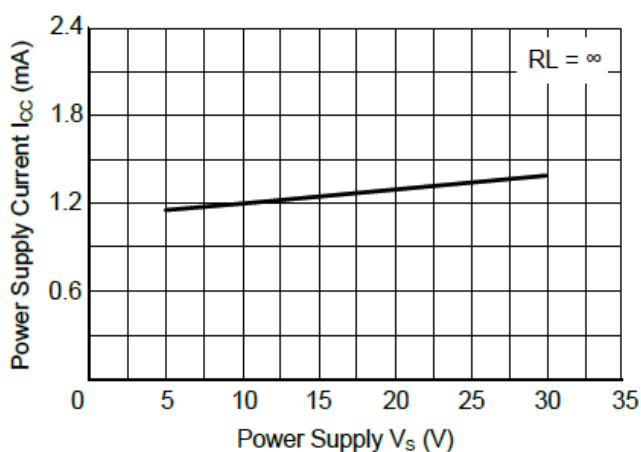
Large-Signal Open Loop Voltage Gain



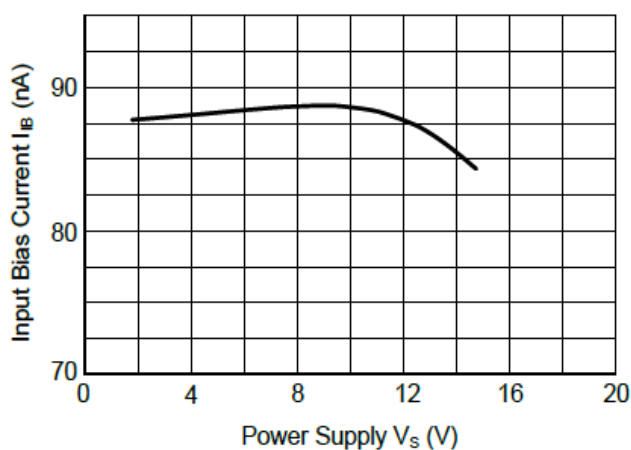
Large-Signal Frequency Response



Small Signal Voltage Follower Pulse Response (Noninverting)

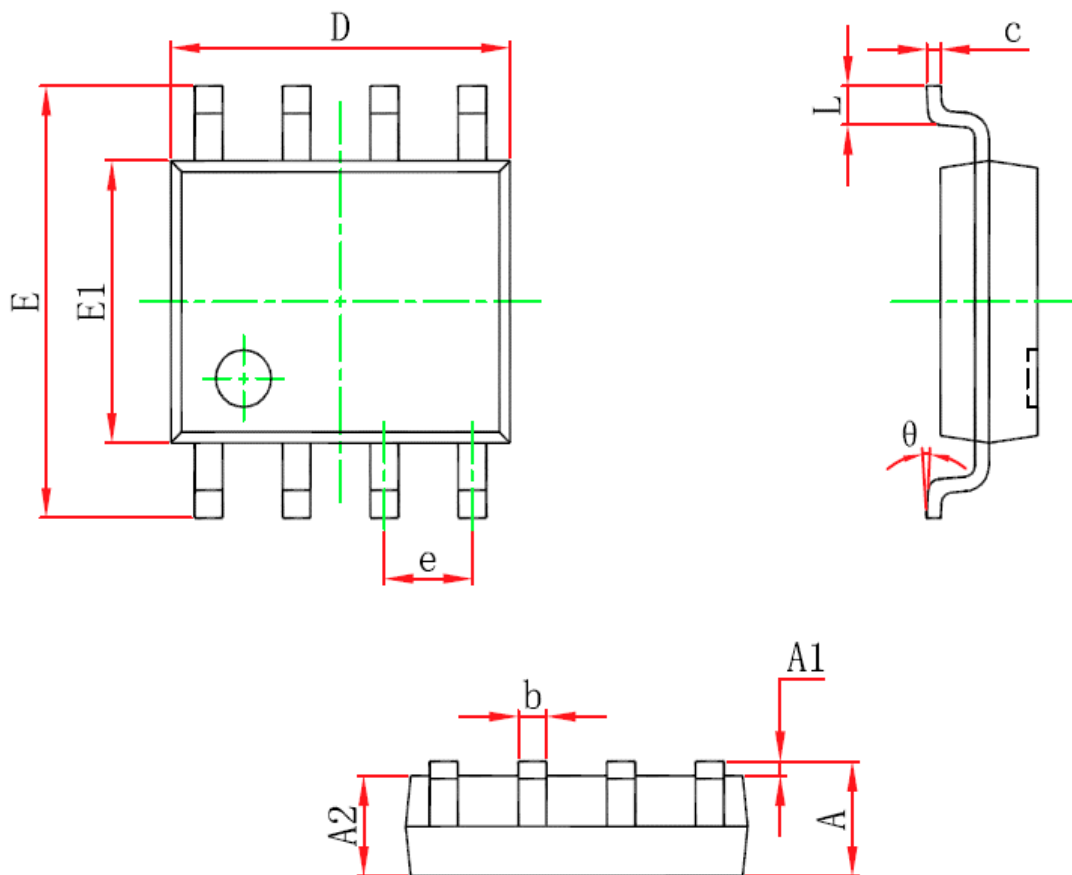


Power Supply Current



Input Bias Current

SOP-8 Package information



Symbol	Dimensions in Millimeters(mm)		Dimensions in Inches	
	Min	Max	Min	Max
A	1.450	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.700	5.100	0.185	0.201
e	1.270(BSC)		0.050(BSC)	
E	5.800	6.200	0.028	0.035
E1	3.800	4.000	0.057	0.069
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°