

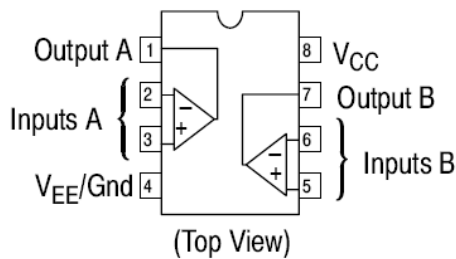
■ Description

The LM358 consist 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. 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. Application areas include transducer amplifiers, DC gain blocks and all the conventional op amp circuits.

■ Features

- Wide range of supply voltages
- Low supply current drain independent of supply voltage
- Low input biasing current
- Low input offset voltage and offset current
- Input common-mode voltage range includes ground
- Differential input voltage range equal to the power supply voltage
- DC voltage gain 100V/mV Typ.
- Internally frequency compensation

■ Pin Description



SOP-8 & DIP-8

■ Applications

- Battery Charger
- Cordless Telephone
- Switching Power Supply

■ Ordering Information

Part Number	Operating Temperature Range	Package	Packing
LM358KI	-40°C ~ +125°C	SOP-8	Tape & Reel
LM358JI	-40°C ~ +125°C	DIP-8	Tube

■ Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{CC}	Power Supply Voltages	Single Supply	32
V_{CC}, V_{EE}		Split Supplies	± 16
V_{IDR}	Input Differential Voltage Range (Split Power Supplies)	± 32	V
V_{ICR}	Input Common Mode Voltage Range	-0.3~32	
T_J	Junction Temperature	150	
T_{STG}	Storage Temperature ($T_A=+25^{\circ}C$)	;-60~+150	
T_L	Lead Temperature, 1mm from Case for 10 Senconds	260	

■ Thermal Characteristics

Symbol	Parameter	Package	Typical Value	Unit
θ_{JA}	Thermal Resistance From Junction to Ambient in Free Air. (Measured with the component mounted on a high effective thermal conductivity test board in free air.)	SOP-8	160	°C/W
		DIP-8	125	

■ Electrical Characteristics ($T_A=25^\circ\text{C}$, $V_{CC}=5.0\text{V}$, $V_{EE}=\text{Gnd}$, unless otherwise noted)

Symbol	Parameter	Test Condition	Typ.	Max.	Unit	
V_{IO}	Input Offset Voltage	$V_{CC}=5\text{V to Max.}$ $V_{IC}=V_{ICR \text{ min}}$ $V_O=1.4\text{V}$	25°C	3.0	7.0	mV
			Full Range	--	9.0	
$\Delta V_{IO}/\Delta T$	Average Temperature Coefficient Of Input Offset Voltage		Full Range	7.0	--	$\mu\text{V}/^\circ\text{C}$
I_{IO}	Input Offset Current	$V_O=1.4\text{V}$	25°C	2	50	nA
			Full Range	--	150	
$\Delta I_{IO}/\Delta T$	Average Temperature Coefficient of Input Offset Current		Full Range	10	--	$\text{pA}/^\circ\text{C}$
I_{IB}	Input Bias Current	$V_O=1.4\text{V}$	25°C	-20	-250	nA
			Full Range	--	-500	
V_{ICR}	Common-mode Input Voltage Range	$V_{CC}=5\text{V to Max}$	25°C	--	$V_{CC}-1.5$	nA
			Full Range	--	$V_{CC}-2.0$	
V_{OH}	High-level Output Voltage	$V_{CC}=\text{Max}$, $R_L=2\text{K}\Omega$ $V_{CC}=\text{Max}$, $R_L\geq 10\text{K}\Omega$	Full Range	26	--	V
				27	--	
V_{OL}	Low-level Output Voltage	$R_L\geq 10\text{K}\Omega$	Full Range	5	20	mV
A_{VD}	Large-signal Differential Voltage Amplification	$V_{CC}=15\text{V}$, $R_L\geq 2\text{K}\Omega$ $V_O=1\text{V to } 11\text{V}$	25°C	25	100	mV/V
			Full Range	15	--	
CMRR	Common-mode Rejection Ratio	$V_{CC}=5\text{V to Max.}$	25°C	65	80	dB
$\Delta V_{CC}/\Delta V_{IO}$	KSVR Supply Voltage Rejection Ratio	$V_{CC}=5\text{V to Max.}$	25°C	65	100	
V_{O1}/V_{O2}	Crosstalk Attenuation	$f=1\text{KHz to } 20\text{KHz}$	25°C	--	120	
I_O	Output Current	$V_{CC}=15\text{V}$, $V_{ID}=1\text{V}$ $V_O=0\text{V}$	25°C	-30	-50	mA
			Full Range	-20	--	
		$V_{CC}=15\text{V}$, $V_{ID}=1\text{V}$ $V_O=15\text{V}$	25°C	15	35	
			Full Range	7	--	
I_{OS}	Short-circuit Output Current	$V_{ID}=-1\text{V}$, $V_O=15\text{V}$	25°C	50	70	mA
			Full Range	0.7	1.2	
I_{CC}	Supply Current (Two Amplifiers)	$V_O=2.5\text{V}$, No Load	Full Range	0.7	1.2	mA
		$V_{CC}=\text{Max.}$, $V_O=0.5V_{CC}$, No Load		1	2	

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

■ Typical Characteristics

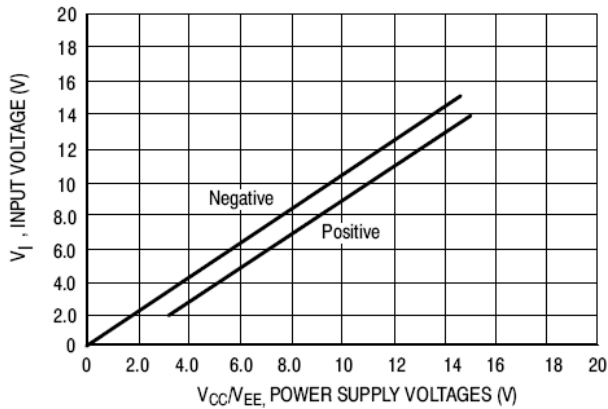


Figure 1. Input Voltage Range

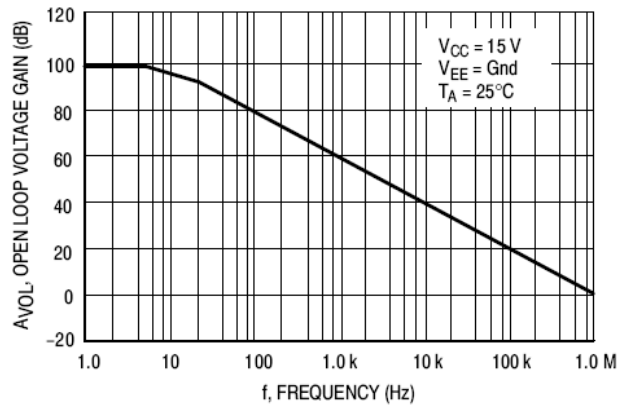


Figure 2. Large-Signal Open Loop Voltage Gain

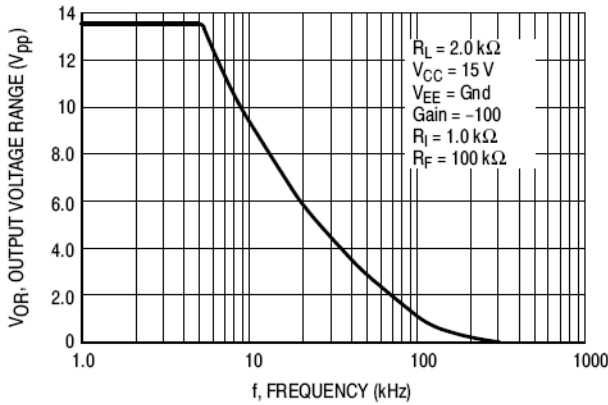


Figure 3. Large-Signal Frequency Response

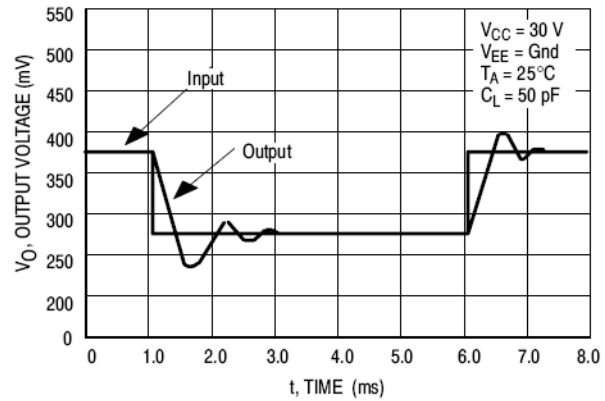


Figure 4. Small Signal Voltage Follower Pulse Response (Noninverting)

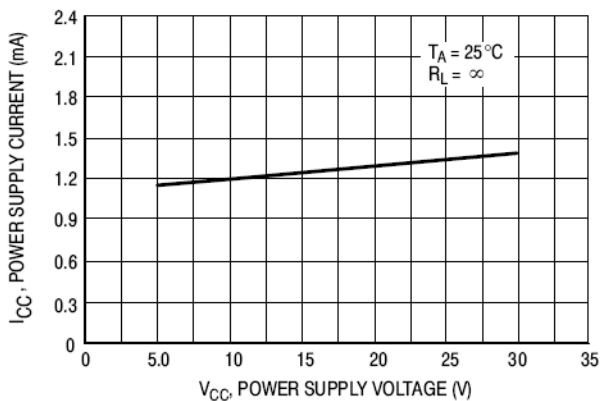


Figure 5. Power Supply Current versus Power Supply Voltage

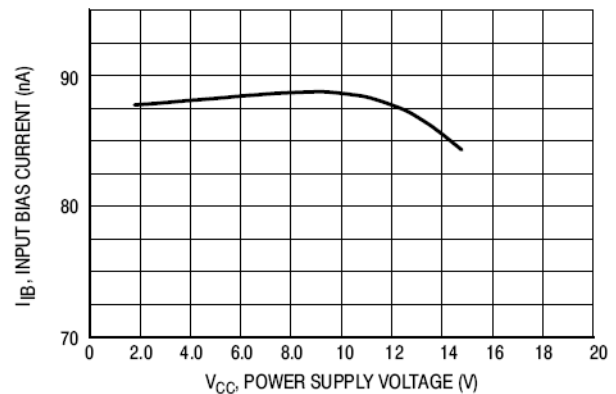
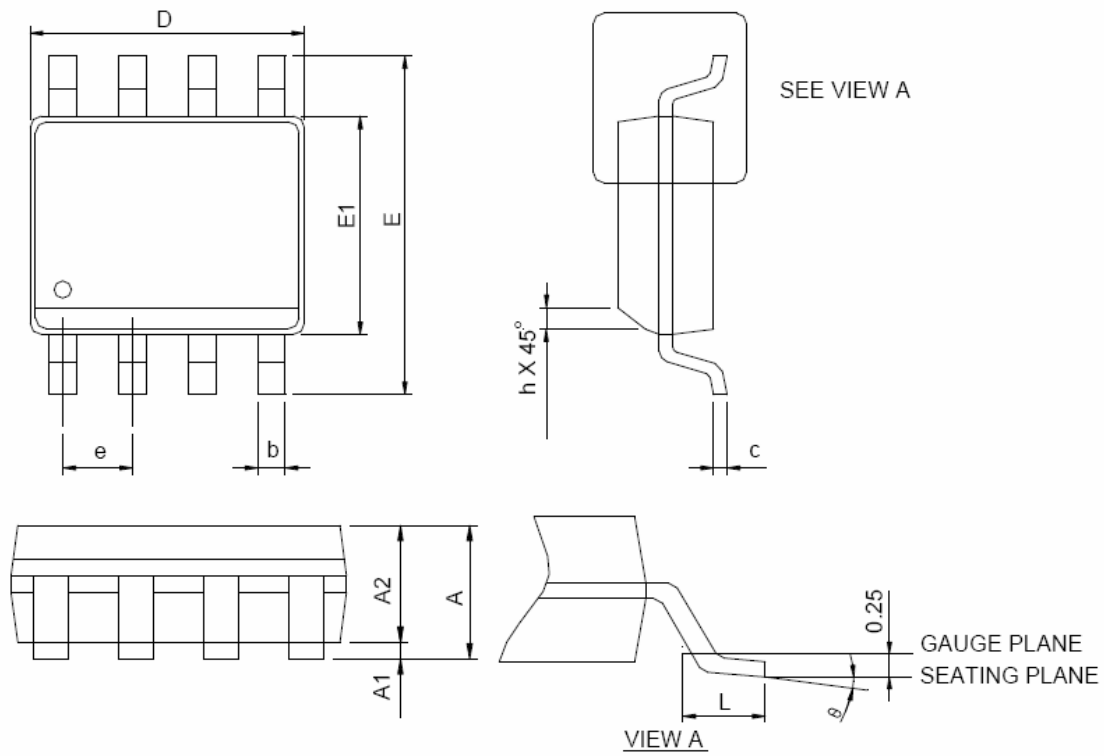
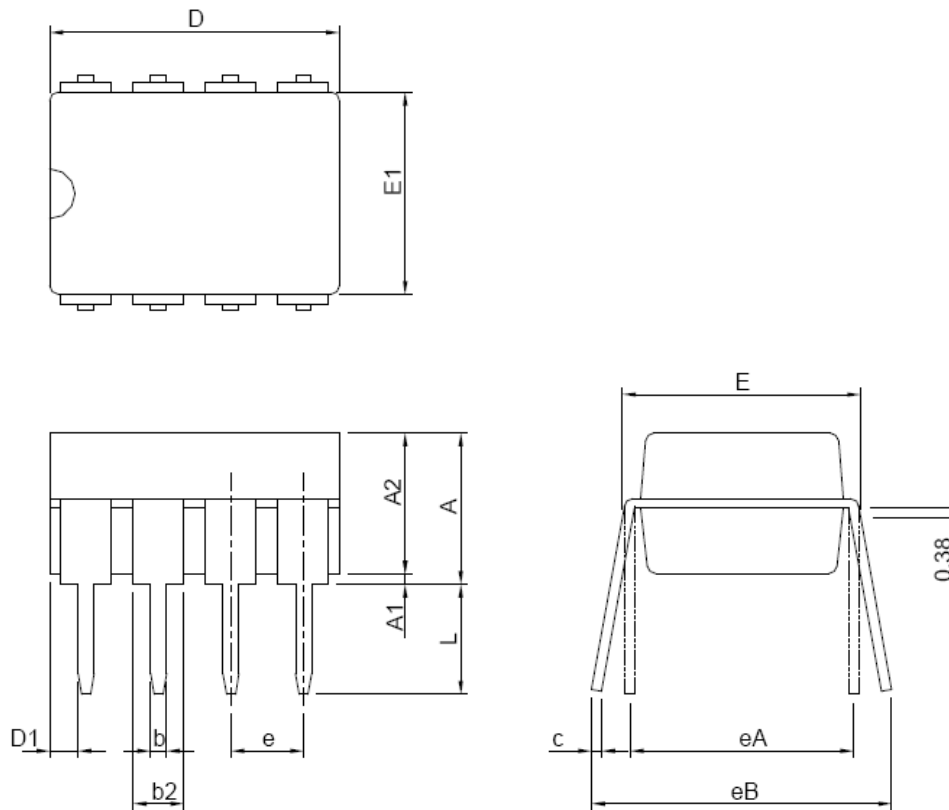


Figure 6. Input Bias Current versus Supply Voltage

■ SOP-8 Package Information


SYMBOL	SOP-8			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A		1.75		0.069
A1	0.10	0.25	0.004	0.010
A2	1.25		0.049	
b	0.31	0.51	0.012	0.020
c	0.17	0.25	0.007	0.010
D	4.80	5.00	0.189	0.197
E	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
h	0.25	0.50	0.010	0.020
L	0.40	1.27	0.016	0.050
θ	0°	8°	0°	8°

■ DIP-8 Package Information


Symbol	DIP-8			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A		5.33		0.210
A1	0.38		0.015	
A2	2.92	4.95	0.115	0.195
b	0.36	0.56	0.014	0.022
b2	1.14	1.78	0.045	0.070
c	0.20	0.35	0.008	0.014
D	9.01	10.16	0.355	0.400
D1	0.13		0.005	
E	7.62	8.26	0.300	0.325
E1	6.10	7.11	0.240	0.280
e	2.54 BSC		0.100 BSC	
eA	7.62 BSC		0.300 BSC	
eB		10.92		0.430
L	2.92	3.81	0.115	0.150

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