

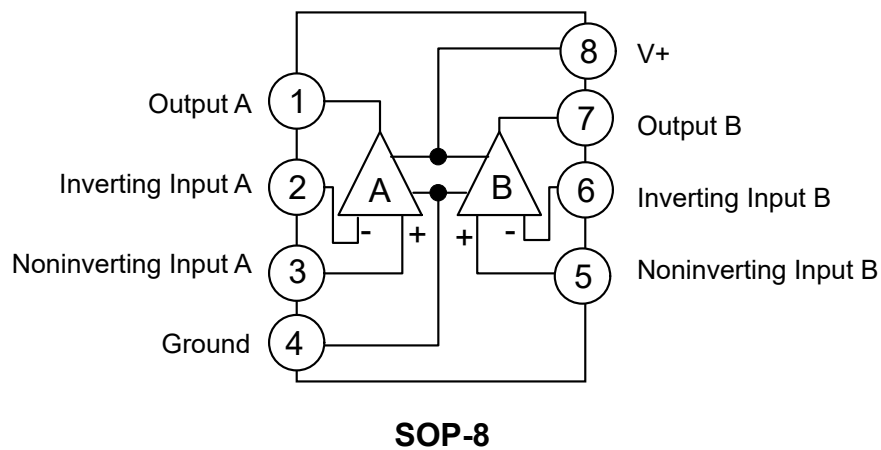
1. Description

The LM358 consists of two independent high-gain operational amplifiers. It can operate from either a single or dual power supply, and the current consumption is independent of the supply voltage. Applications include frequency converters, DC gain blocks, and all conventional operational amplifier circuits. Available in DIP8, SOP8, TSSOP-8 packages.

2. Features

- Single or Dual Supply Operation
- Two Internally Compensated Operational Amplifiers in One Package
- Matched Logic Circuits
- Low Power Consumption
- Wide Frequency Range

3. Pinning Information





4. Absolute Maximum Ratings ($T_A=25^{\circ}\text{C}$, unless otherwise specified)

Parameter		Value	Units
Supply Voltage		36 or ± 18	V
Differential Input Voltage		± 36	V
Input Voltage		-0.3 to 36	V
Power Dissipation (Note 1)	DIP package	550	mW
	SOP package	530	mW
Output Short-Circuit Current to Ground (1 Amplifier) (Note 2) ($V + 15\text{V}$, $T_A=25^{\circ}\text{C}$)		Continuous	
Input Current ($V_{IN} < -0.3\text{V}$) (Note 3)		50	mA
Operating Temperature		0 to 70	$^{\circ}\text{C}$
Storage Temperature		-65 to 150	$^{\circ}\text{C}$



5. Electrical Characteristics

LM358 (for $V_S = (V_+) - (V_-) = 5.0V$, $T_A = 25^\circ C$, unless otherwise specified)

Parameter		Conditions		Min	Typ	Max	Units	
Input offset voltage		T _A =25°C			2	5	mV	
Input bias current		T _A =25°C, I _{IN(+)} or I _{IN(-)} , V _{CM} =0V			45	150	nA	
Input Offset Current		T _A =25°C, I _{IN(+)} - I _{IN(-)} , V _{CM} =0V			3	30	nA	
Input common mode voltage range		T _A =25°C, V ⁺ =30V		0		V ⁺ -1.5	V	
Power supply current		R _L =∞	V ⁺ =30V		1	2	mA	
			V ⁺ =5V		0.5	1.2	mA	
Large Signal Voltage Gain		V ⁺ =15V, T _A =25°C, R _L ≥2kΩ (for V _O =1~11V)		50	100		V/mV	
CMRR		DC, T _A =25°C, V _{CM} =0~V ⁺ -1.5V		70	85		dB	
PSRR		DC, T _A =25°C, V ⁺ =5~30V		65	100		dB	
Coupling system between amplifiers number		T _A =25°C, f=1~20kHz (all inputs)			-120		dB	
Output source current		V _{IN(+)} =1V, V _{IN(-)} =0V, V ⁺ =15V V _O =2V, T _A =25°C		20	40		mA	
Output suction current		V _{IN(-)} =1V, V _{IN(+)} =0V, V ⁺ =15V V _O =2V, T _A =25°C		10	20		mA	
		V _{IN(-)} =1V, V _{IN(+)} =0V, V ⁺ =15V V _O =200mV, T _A =25°C		12	50		μA	
Short circuit current to ground		V ⁺ =15V, T _A =25°C			40	60	mA	
Output voltage swing		V _{OH}	V ⁺ =30V	R _L =2kΩ	26		V	
				R _L =10kΩ	27	28	V	
		V _{OL}	V ⁺ =5V, R _L =10kΩ			5	20	mV
The static current of each amplifier		I _Q	V _O =2.5V, I _O =0A	T _A =0~70°C		350	600	μA
			V _S =30V, V _O =15V, I _O =0A			500	1000	μA

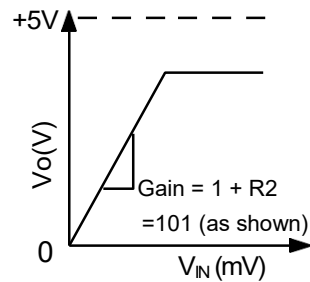
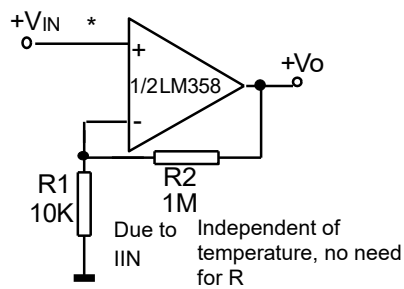


Parameter		Conditions	Min	Typ	Max	Units
Slew rate	SR	$V_{CC}^{+}=15V$, $V_i=0.5$ to $3V$, $R_L=2\text{ k}\Omega$ $C_L=100\text{pF}$, unity gain	0.3	0.6		$V/\mu s$
Gain bandwidth product	GBP	$V_{CC}^{+}=30V$, $f=100\text{kHz}$, $V_{in}=10\text{mV}$ $R_L=2\text{k}\Omega$, $C_L=100\text{pF}$	0.7	1.1		MHz
Total harmonic distortion	THD	$f=1\text{kHz}$, $A_v=20\text{dB}$, $R_L=2\text{k}\Omega$, $V_o=2V_{pp}$ $C_L=100\text{pF}$, $V_o=2V_{pp}$		0.02		%
Equivalent input noise voltage	e_n	$f=1\text{kHz}$, $R_s=100\Omega$, $V_{CC}^{+}=30V$		55		$nV/\sqrt{\text{Hz}}$



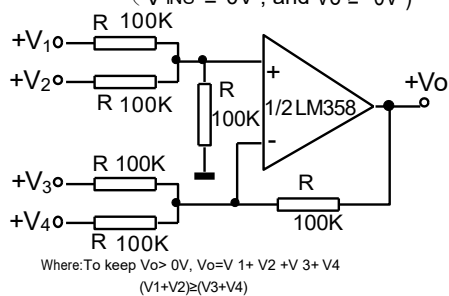
6. Typical Application

Non-Inverting DC gain (0 V in = 0 V out)

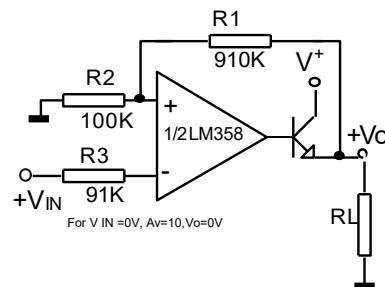


DC Summing Amplifier

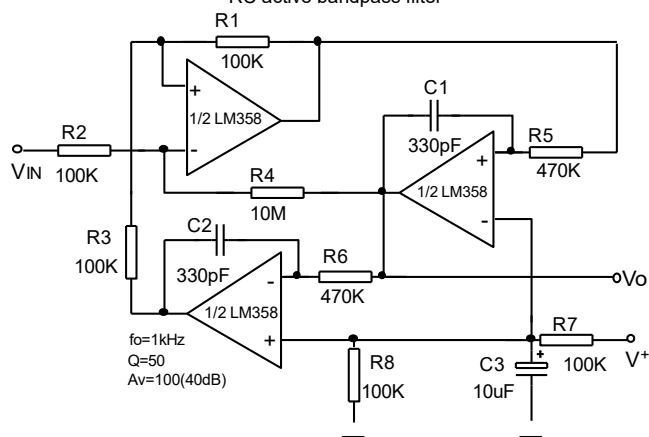
($V_{INs} \geq 0V$, and $V_O \geq 0V$)



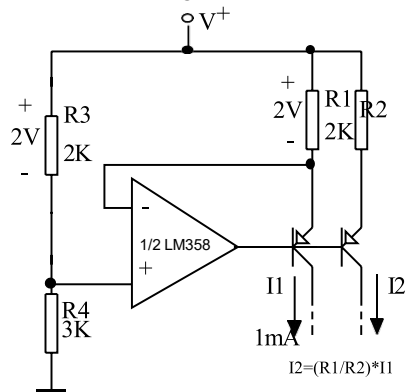
Power Amplifier



RC active bandpass filter



Fixed Current Source





7. Typical Characteristics

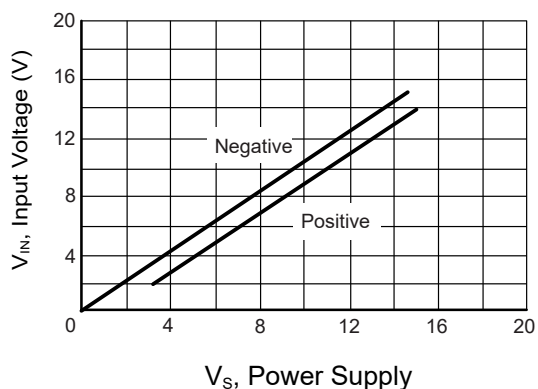


Figure 1: Input Voltage Range

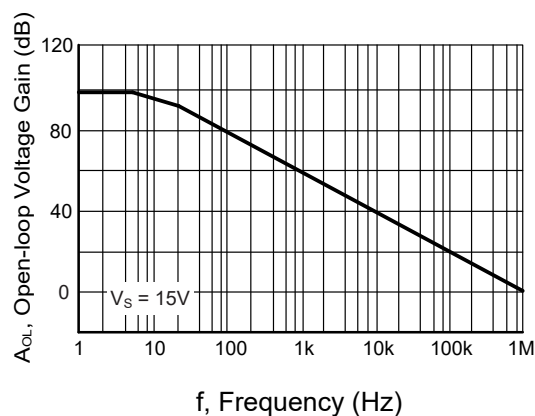


Figure 2: Large-Signal Open Loop Voltage Gain

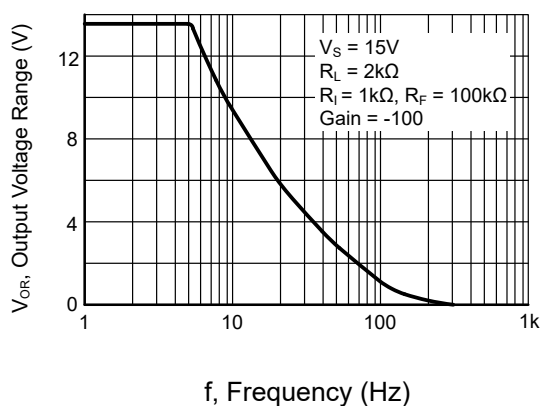


Figure 3: Large-Signal Frequency Response

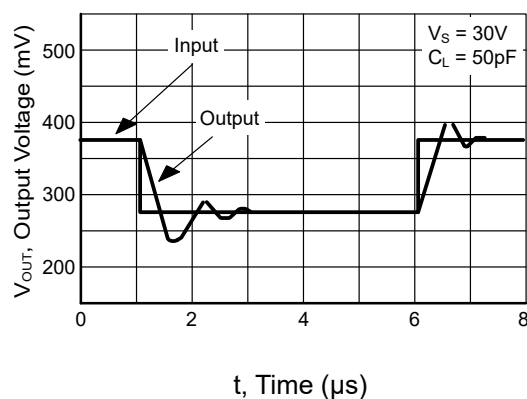


Figure 4: Small Signal Voltage Follower Pulse Response (Noninverting)

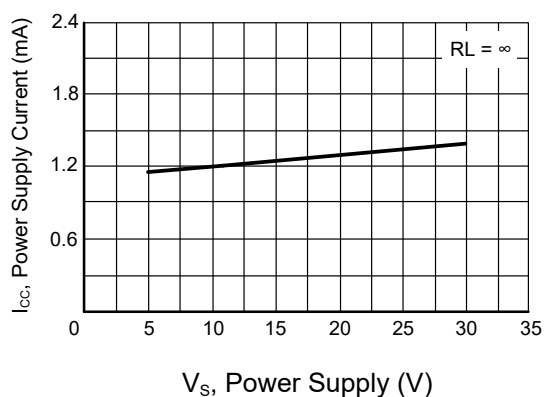


Figure 5: Power Supply Current

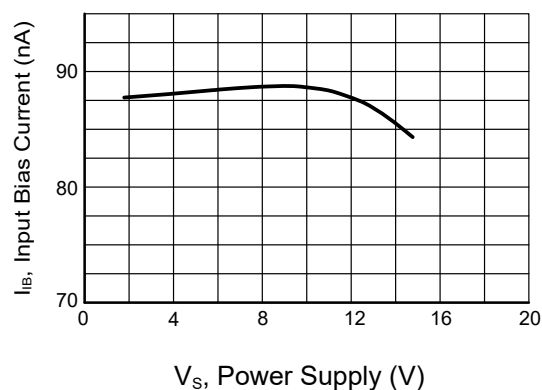
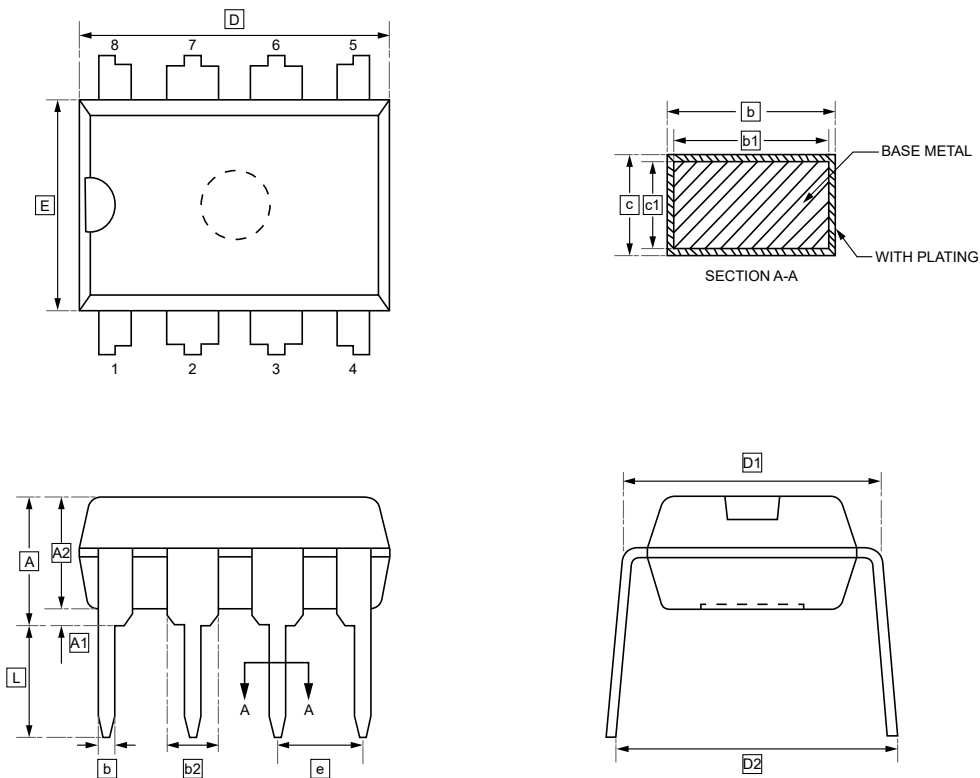


Figure 6: Input Bias Current



8.1 DIP-8 Package Outline Dimensions



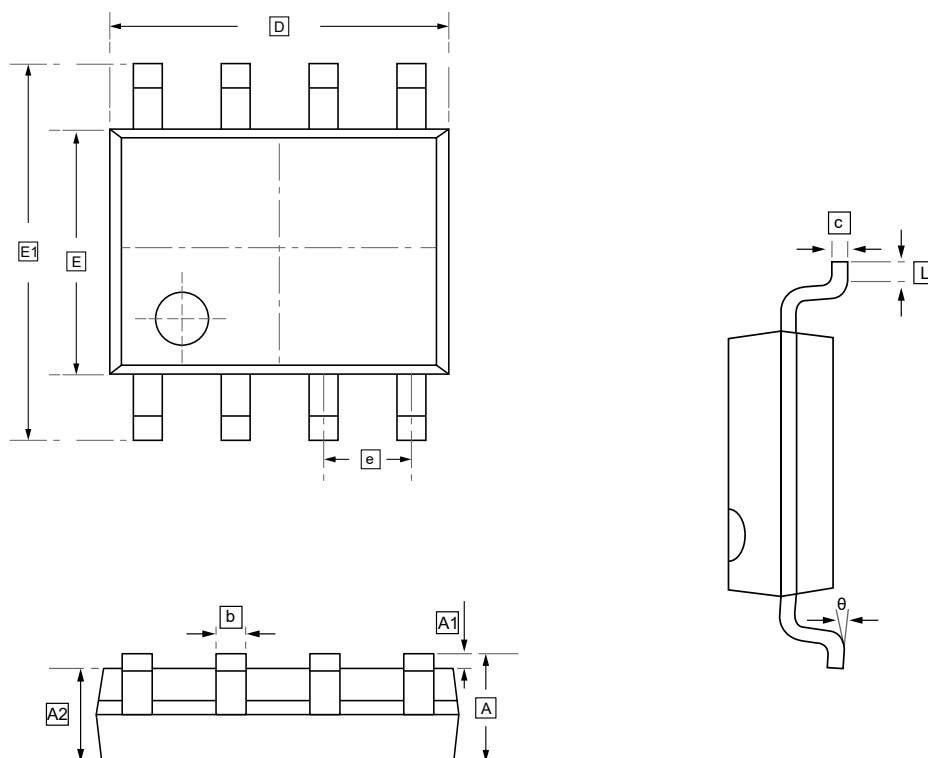
DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	b	b1	b2	c	c1	D	D1	D2	E
Min	3.60	0.45	3.20	0.42	0.41	1.52	0.24	0.23	9.15	7.62	7.62	6.10
Max	4.20	-	3.40	0.54	0.51	REF	0.30	0.28	9.40	REF	9.30	6.45

Symbol	e	L
Min	2.54	3.00
Max	BSC	3.40



8.2 SOP-8 Package Outline Dimensions

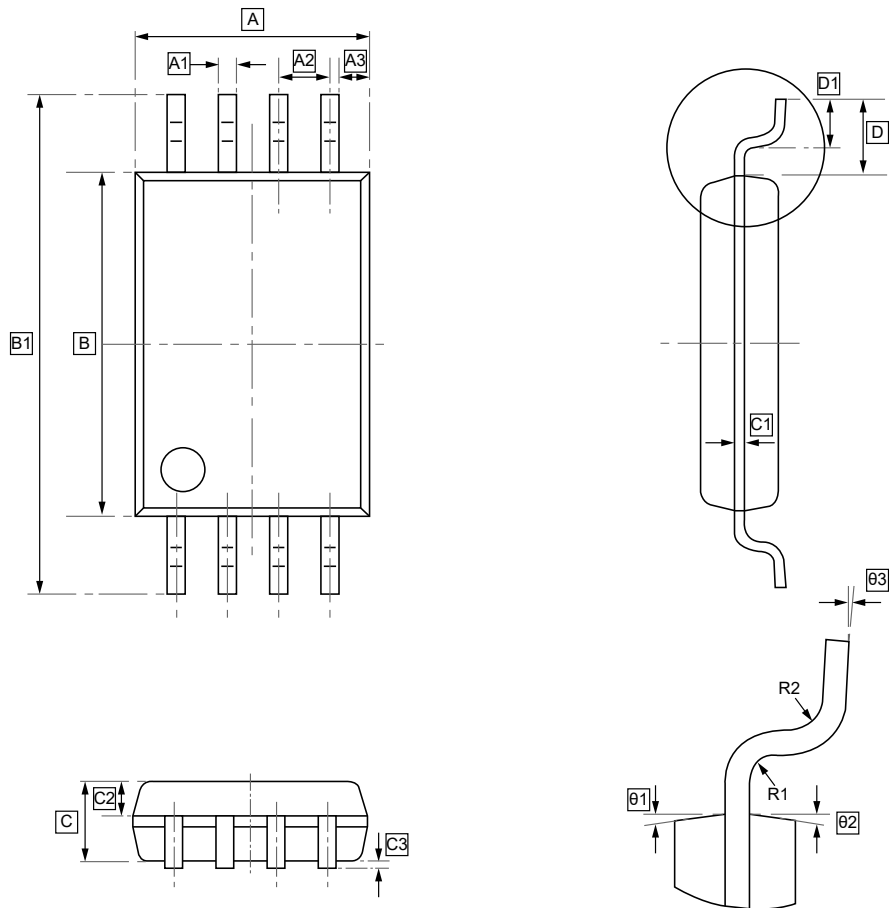


DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	b	c	D	E	E1	e	L	θ
Min	1.350	0.000	1.350	0.330	0.170	4.700	3.800	5.800	1.270	0.400	0°
Max	1.750	0.100	1.550	0.510	0.250	5.100	4.000	6.200	BSC	1.270	8°



8.3 TSSOP-8 Package Outline Dimensions



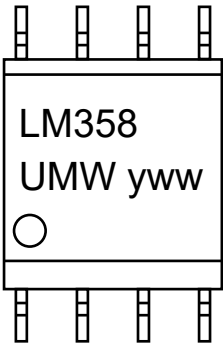
DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	B	B1	C	C1	C2	C3	D	D1
Min	2.90	0.20	0.65	0.36	4.30	6.30	0.95	0.127	0.39	0.05	1.00	0.50
Max	3.10	0.30	TYP	0.46	4.50	6.50	1.05	TYP	0.49	0.15	REF	0.70

Symbol	R1	R2	θ1	θ2	θ3
Min	0.15	0.15	12°	12°	0°
Max	TYP	TYP	TYP4	TYP4	7°



9.Ordering Information



yww: Batch Code

Order Code	Marking	Package	Base QTY	Delivery Mode
UMW LM358ADR	LM358A	SOP-8	2500	Tape and reel
UMW LM358P	LM358	DIP-8	5000	Tape and reel
UMW LM358PWR	LM358	TSSOP-8	4000	Tape and reel



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