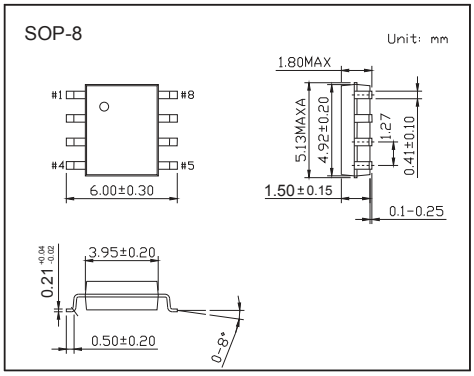
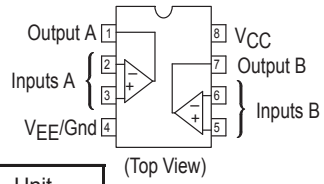
Single Supply Dual Operational Amplifiers

LM358 (KM358)





■ Features

- Short Circuit Protected Outputs
- True Differential Input Stage
- Single Supply Operation: 3.0 V to 32 V
- Low Input Bias Currents
- Internally Compensated
- Common Mode Range Extends to Negative Supply
- Single and Split Supply Operation

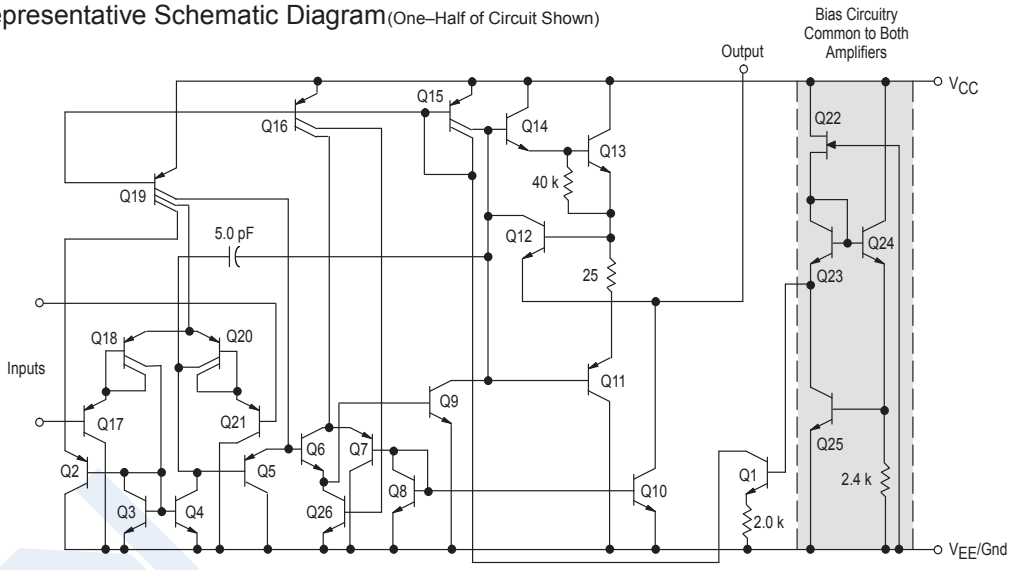
■ Absolute Maximum Ratings Ta = 25℃

Parameter	Symbol	Rating	Unit
Power Supply Voltages Single Supply Split Supplies	 V_{CC} V_{CC}, V_{EE}	 32 ±16	Vdc
Input Differential Voltage Range *1	V_{IDR}	±32	Vdc
Input Common Mode Voltage Range *2	V_{ICR}	-0.3 to 32	Vdc
Output Short Circuit Duration	t_{SC}	Continuous	
Junction Temperature	T_J	150	℃
Thermal Resistance, Junction-to-Air	$R_{\theta JA}$	238	℃/W
Storage Temperature Range	T_{stg}	-55 to +125	℃
Operating Ambient Temperature Range	T_A	0 to +70	℃

*1 Split Power Supplies.

*2 For supply voltages less than 32 V the absolute maximum input voltage is equal to the supply voltage.

■ Representative Schematic Diagram (One–Half of Circuit Shown)



LM358 (KM358)

■ Electrical Characteristics Ta = 25℃ (V_{CC} = 5.0 V, V_{EE} = Gnd, T_A = 25℃, unless otherwise noted.)

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Input Offset Voltage	V_{IO}	V_{CC} = 5.0 V to 30 V, V_{IC} = 0 V to V_{CC} -1.7V $V_O \simeq$ 1.4 V, R_S = 0Ω T_A = 25℃		2.0	7.0	mV
		T_A = T_{high} *5			9.0	
		T_A = T_{low} *5			9.0	
Average Temperature Coefficient of Input Offset Voltage	$\triangle V_{IO}/\triangle T$	T_A = T_{high} to T_{low} *5		7.0		μV/℃
Input Offset Current	I_{IO}	T_A = T_{high} to T_{low} *5		5.0	50	nA
					150	
Input Bias Current	I_{IB}	T_A = T_{high} to T_{low} *5		-45	-250	
				-50	-500	
Average Temperature Coefficient of Input Offset Current	$\triangle V_{IO}/\triangle T$	T_A = T_{high} to T_{low}*5		10		pA/℃
Input Common Mode Voltage Range *6	V_{ICR}	V_{CC} = 30 V	0		28.3	V
		V_{CC} = 30 V, T_A = T_{high} to T_{low}	0		28	
Differential Input Voltage Range	V_{IDR}				V_{CC}	V
Large Signal Open Loop Voltage Gain	A_{VOL}	R_L = 2.0 kΩ V_{CC} = 15 V, For Large V_O Swing,	25	100		V/mV
		TA = T_{high} to T_{low}	15			
Channel Separation	C_S	1.0 kHz ≤ f ≤ 20 kHz, Input Referenced		-120		dB
Common Mode Rejection	C_{MR}	R_S ≤ 10 KΩ	65	70		dB
Power Supply Rejection	P_{SR}		65	100		dB
Output Voltage-High Limit	V_{OH}	T_A = T_{high} to T_{low} *5				V
		V_{CC} = 5.0 V, R_L = 2.0KΩ T_A = 25℃	3.3	3.5		
		V_{CC} = 30 V, R_L = 2.0 KΩ	26			
		V_{CC} = 30 V, R_L = 10 KΩ	27	28		
Output Voltage-Low Limit	V_{OL}	V_{CC} = 5.0 V, R_L = 10 KΩ T_A = Thigh to Tlow *5		5	20	mV
Output Source Current	I_{O+}	V_{ID} = +1.0 V, V_{CC} = 15 V	20	40		mA
Output Sink Current	I_{O-}	V_{ID} = -1.0 V, V_{CC} = 15 V	10	20		mA
		V_{ID} = -1.0 V, V_O = 200 mV	12	50		μA
Output Short Circuit to Ground *7	I_{SC}			40	60	mA
Power Supply Current (Total Device)	I_{CC}	T_A = T_{high} to T_{low} *5				mA
		V_{CC} = 30 V, V_O = 0 V, R_L = ∞		1.5	3.0	
		V_{CC} = 5 V, V_O = 0 V, R_L = ∞		0.7	1.2	

*5 Tlow = 0℃, Thigh = +70℃

*6 The input common mode voltage or either input signal voltage should not be allowed to go negative by more than 0.3 V.
The upper end of the common mode voltage range is V_{CC} -1.7 V.

*7 Short circuits from the output to VCC can cause excessive heating and eventual destruction.
Destructive dissipation can result from simultaneous shorts on all amplifiers.

■ Marking

Marking	LM358

LM358 (KM358)

■ Typical Characteristics

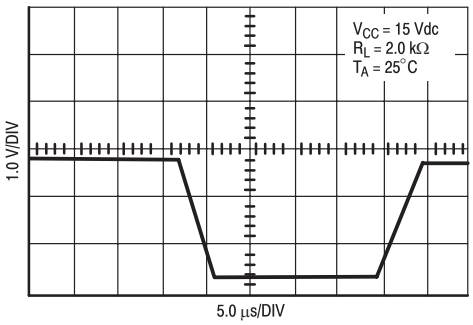


Figure 1. Large Signal Voltage Follower Response

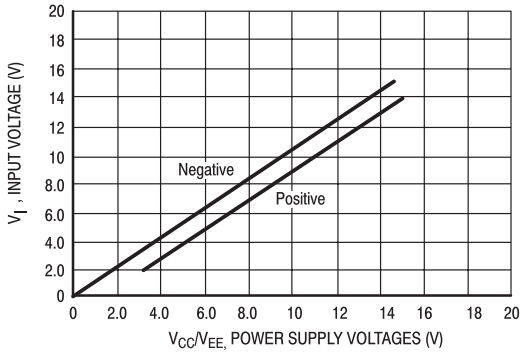


Figure 2. Input Voltage Range

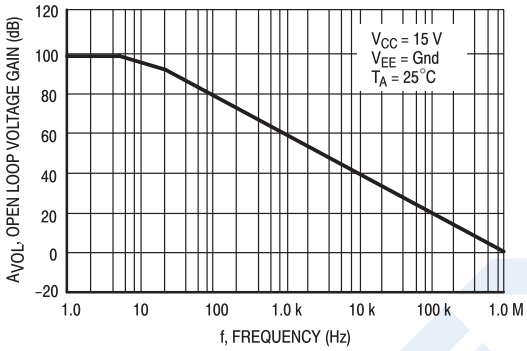


Figure 3. Large–Signal Open Loop Voltage Gain

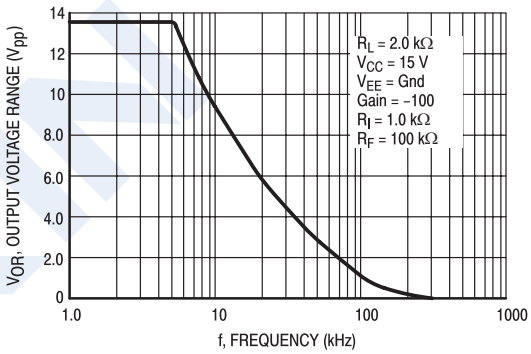


Figure 4. Large–Signal Frequency Response

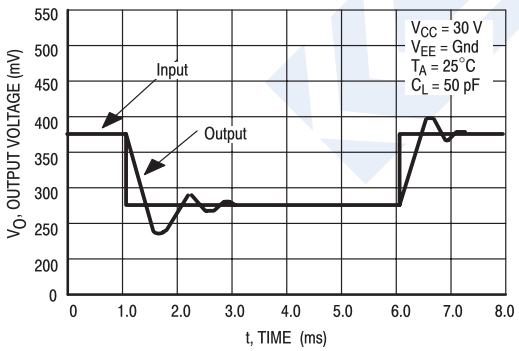


Figure 5. Small Signal Voltage Follower Pulse Response (Noninverting)

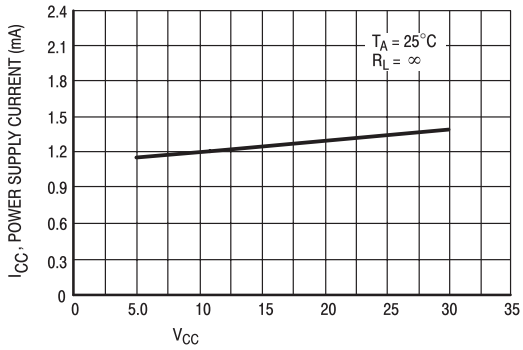


Figure 6. Power Supply Current versus Power Supply Voltage

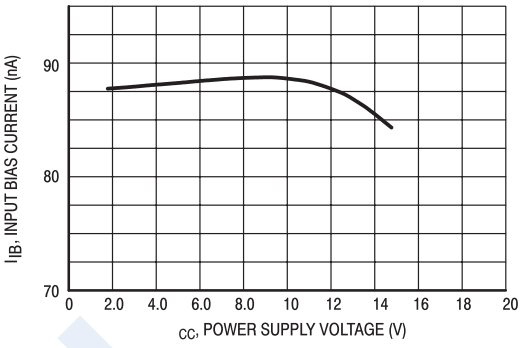


Figure 7. Input Bias Current versus Supply Voltage