

## Description

The GM358 consists of two high gain, internally frequency compensated operational amplifiers which are designed to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also available. The GM358 features low power drain, a common mode input voltage range extending to GND/VEE. The GM358 is equivalent to one-half of the GM324.

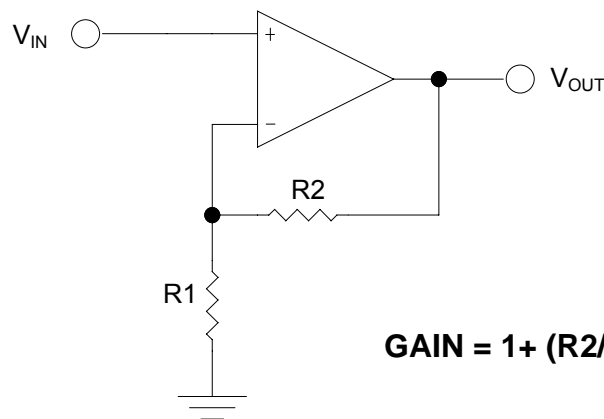
Application areas include transducer amplifiers, DC gain blocks and all the conventional op-amp circuits which now can be more easily implemented in single power supply systems. For example, the GM358 can be directly operated from the standard +5V power supply voltage which is used in digital systems and will easily provide the required interface electronics without requiring the additional  $\pm 15V$  power supplies.

The GM358 is available in SOP-8 and DIP-8 packages.

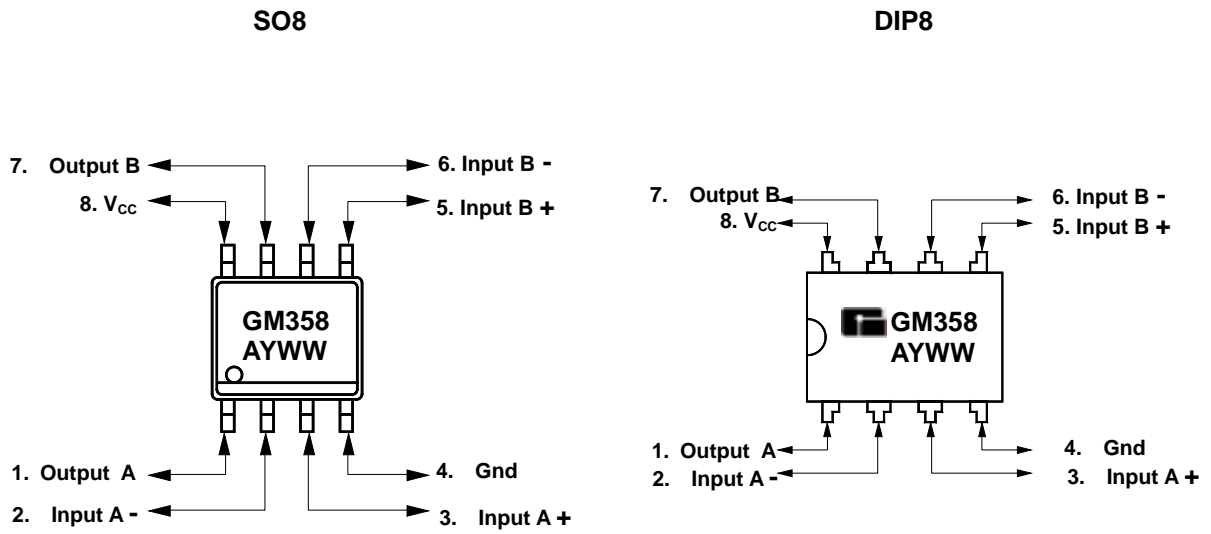
## Features

- ◆ True Differential Input Stage
- ◆ Internally Frequency Compensated for Unity Gain
- ◆ Single Supply Operation: 3V to 40V
- ◆ Wide Bandwidth (unity Gain, temperature compensated): 1 MHz
- ◆ Short Circuit Protected Outputs
- ◆ Low Input Bias Current
- ◆ Common Mode Range Extends to Negative Supply
- ◆ Single and Split Supply Operation

## Typical Application Circuits



## Marking Information and Pin Configurations (Top View)



A: Assembly / Test site code  
Y: Year  
WW: Week

## Ordering Information

Ordering Number	Package	Shipping
GM358D8T	DIP-8	60 Units / Tube
GM358S8T	SOP-8	100 Units / Tube
GM358S8R	SOP-8	2,500 Units / Tape & Reel

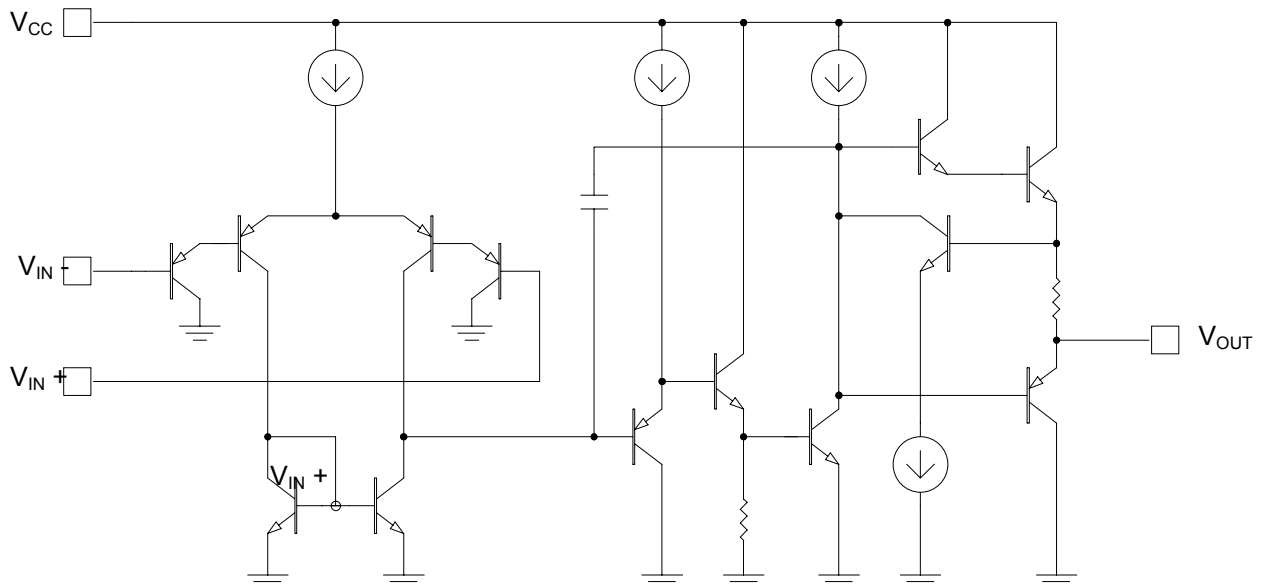
## Absolute Maximum Ratings

PARAMETER	Symbol	RATINGS	UNITS
Supply Voltage	$V_{CC}$	40	V
	$V_{CC}, V_{EE}$	$\pm 20$	
Input Differential Voltage Range (Note 1)	$V_{IDR}$	$\pm 32$	V
Input Common Mode Voltage Range (Note 2)	$V_{ICR}$	$=0.3$ to 32	V
Output Short Circuit Duration	$t_{SC}$	Continuous	-
Junction Temperature	$T_J$	150	
Operating Ambient Temperature Range	$T_A$	- 40 to 125-	
Storage Temperature		- 65 to 150	
Lead Temperature (soldering 10 sec.)		260	
ESD Tolerance – Human Body Mode		2,000	V

Note 1: Split Power Supplies

Note 2: For Supply less 40V, the absolute maximum input range is equal to the supply voltage

## Block Diagram

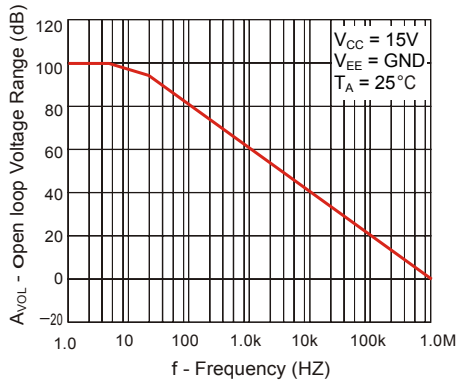


### Electrical Characteristics ( $V_{CC} = 5V$ , at specified free-air temperature, unless otherwise specified)

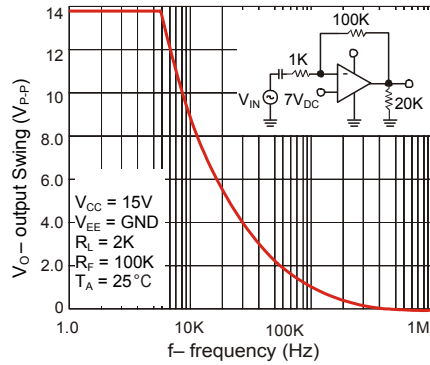
Parameter	Symbol	Condition	Min	Typ	Max	Unit	
Input offset Voltage	$V_{IO}$	$V_{CC} = 5V$ to Max $V_{IC} = V_{ICR}$ min $V_O = 1.4V$	$T_A = 25$		3	7	mV
			Full Range			9	
Average Temperature Coefficient of Input offset Voltage	$\alpha V_{IO}$		Full Range		7		$\mu V/^{\circ}C$
Input Offset Current	$I_{IO}$		$T_A = 25$		2	50	nA
			Full Range			150	
Average Temperature Coefficient of Input offset Current	$\alpha I_{IO}$		Full Range		10		$pA/^{\circ}C$
Input Bias Current	$I_{IB}$	$V_O = 1.4V$	$T_A = 25$		-20	-250	nA
			Full Range			-500	
Common-Mode Input Voltage Range	$V_{ICR}$	$V_{CC} = 5V$ to Max	$T_A = 25$	0 to $V_{CC}-1.5V$			V
			Full Range	0 to $V_{CC}-2.0V$			
High-Level output Voltage	$V_{OH}$	$R_L = 2K$	$T_A = 25$	$V_{CC}-1.5V$	-	-	V
		$V_{CC} = MAX, R_L = 2K$	Full Range	26			
		$V_{CC} = MAX, R_L = 10K$	Full Range	27	28		
High-Level output Voltage	$V_{OL}$	$R_L = 10K$	Full Range		5	20	mV
Large-Signal Differential Voltage Amplification	$A_{VD}$	$V_{CC} = 15V,$ $V_O = 1V$ to $11V$ $R_L \geq 2K$	$T_A = 25$	25	100		V/mV
			Full Range	15			
Common Mode Rejection Ratio	CMRR	$V_{CC} = 5V$ to Max $V_{IC} = V_{ICR}$ min	$T_A = 25$	65	80		dB
Supply Voltage Rejection Ratio	$K_{SVR}$	$V_{CC} = 5V$ to Max	$T_A = 25$	65	100		dB
Crosstalk Attenuation	$V_{O1}/V_{O2}$	$f = 1KHz$ to $20KHz$	$T_A = 25$		120		dB
Output Current	$I_O$	$V_{CC} = 15V, V_{ID} = 1V,$ $V_O = 0V$	$T_A = 25$	-20	-30		mA
			Full Range	-10			
		$V_{CC} = 15V, V_{ID} = -1V,$ $V_O = 15V$	$T_A = 25$	10	20		mA
			Full Range	5			
		$V_{ID} = -1V, V_O = 200mV$	Full Range	12	30		$\mu A$
Short-Circuit output Current	$I_{OS}$	$V_{CC}$ at $5V, Gnd$ at $-5V,$ $V_O = 0V$	$T_A = 25$		$\pm 40$	$\pm 60$	mA
Supply Current (four amplifiers)	$I_{CC}$	$V_O = 2.5V, No$ Load	Full Range		1.5	2.4	mA
		$V_{CC} = Max,$ $V_O = 0.5V_{CC}, No$ Load	Full Range		1.1	3	

\* All characteristics are measured under open loop conditions with zero common-mode input voltage unless otherwise specified. "MAX"  $V_{CC}$  for testing purposes is 30V. Full range is  $0^{\circ}C$  to  $70^{\circ}C$ .

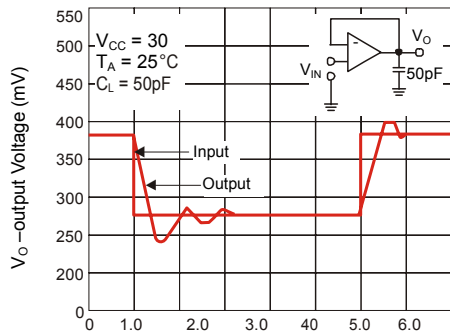
### Typical Performance Characteristics



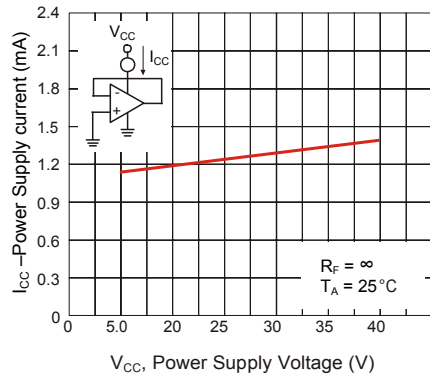
**Figure 1. Large-Signal Open Loop Voltage Gain**



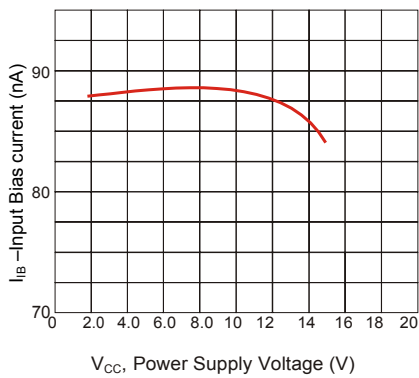
**Figure 2. Large - Signal Frequency Response**



**Figure 3. Small Signal Voltage Follower Pulse Response (Noninverting)**



**Figure 4. Power Supply Current versus Power Supply Voltage**



**Figure 5. Input Bias Current versus Supply Voltage**

## Application Information

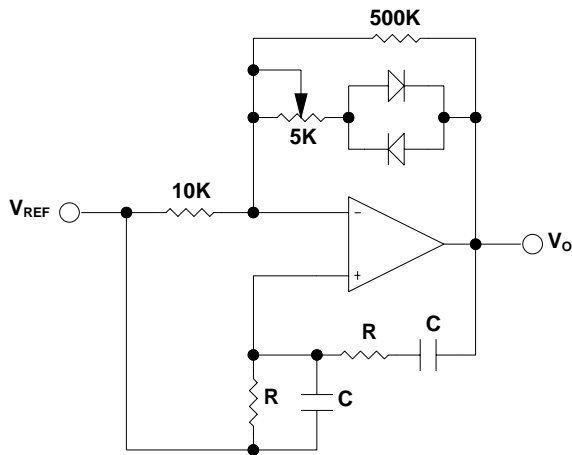


Fig.1 Wien Bridge Oscillator

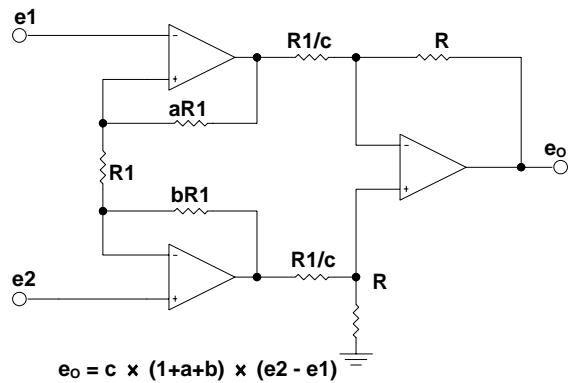


Fig. 2 High Impedance Differential Amplifier

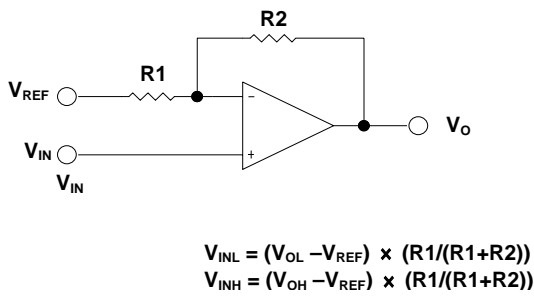


Fig. 3 Comparator with Hysteresis

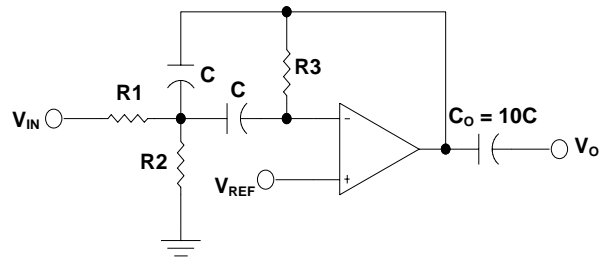


Fig. 4 Multiple Feedback Bandpass Filter

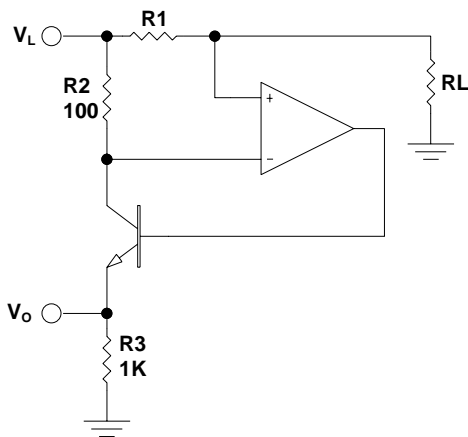


Fig. 5 Current Monitor

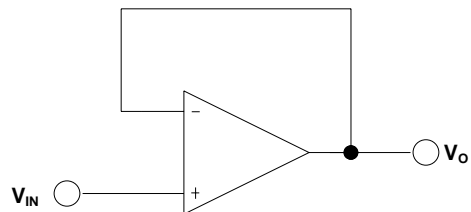
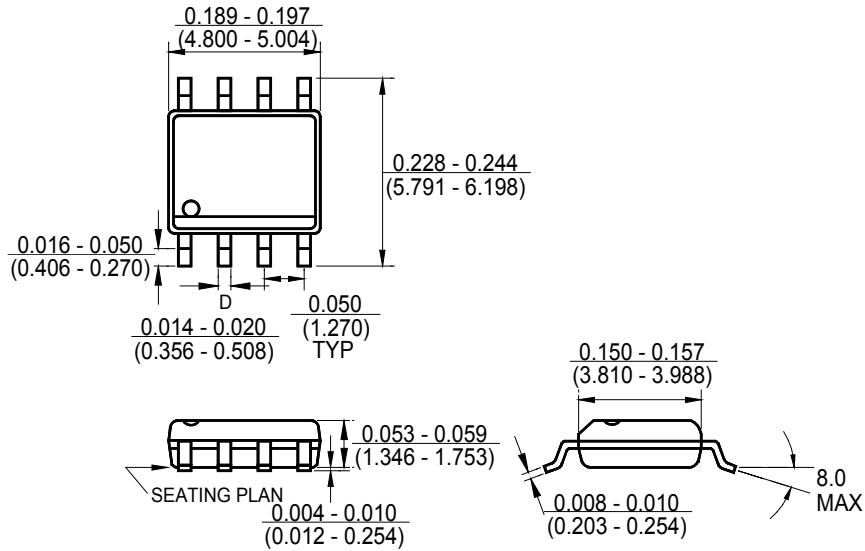
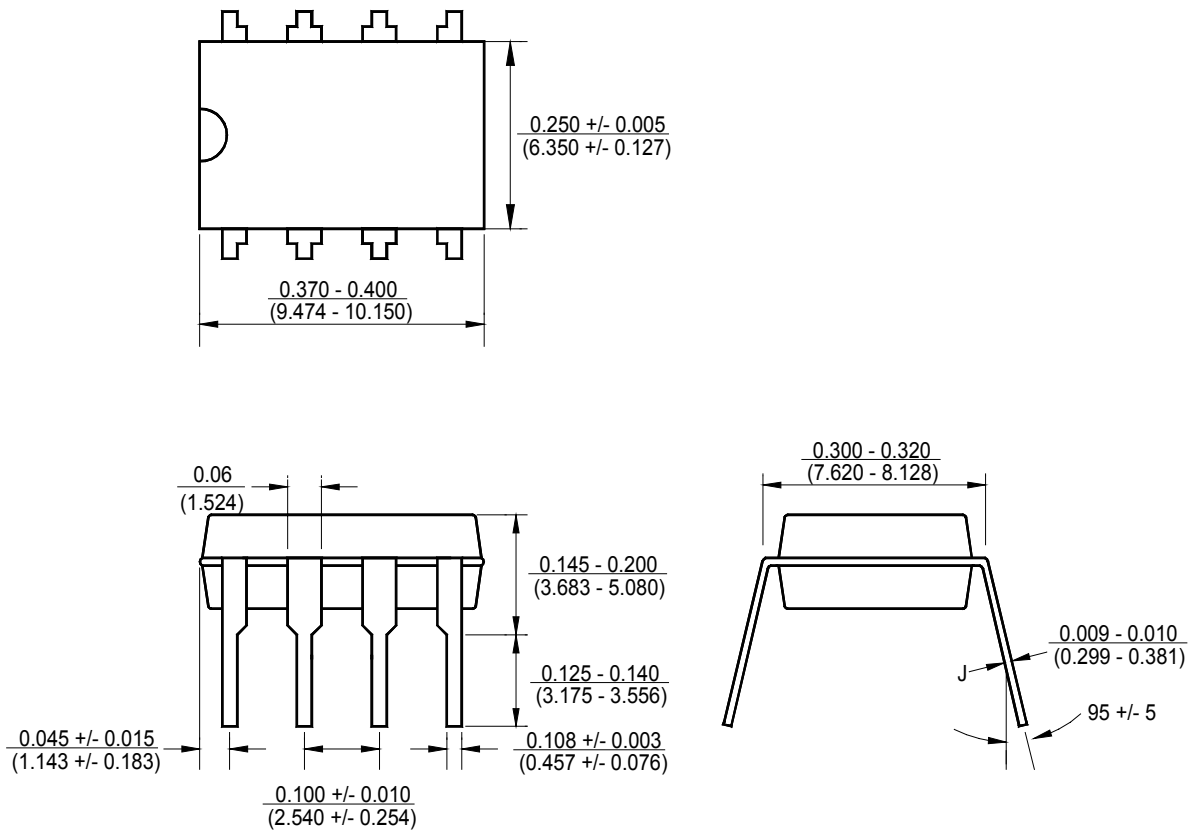


Fig. 6 Voltage Follower

## Package Outline Dimensions – SO 8



## Package Outline Dimensions – DIP 8



## Ordering Number

**GM   358   S8   R**

APM Gamma  
Micro

Circuit Type

Package  
Type

S8: SO 8  
D8: DIP 8

Shipping Type

R: Taping & Reel  
T: Tube