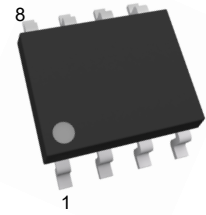


### Description

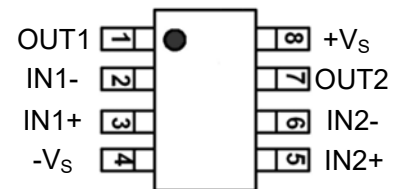
LMV358 (dual channel) is a rail-to-rail input, output voltage feedback, low power consumption operational amplifier. It has wide input common mode voltage and output swing. The minimum working voltage can be up to 2.1V, and the maximum working voltage is recommended to be 5.5V. Used as power amplifier in all kinds of pocket or portable stereo radio recorders.

LMV358 has the following characteristics: Can provide 1MHz gain bandwidth product. It has an extremely low input bias current (about 10pA level) and can be used for integration, photo diode amplifiers and piezoelectric sensors. The Rail to Rail input and output buffers are also used for specific IC designs in single power systems. Applications of this series of amplifiers include safety monitoring, portable devices, batteries and power supplies, supply control, signal processing and interfaces in low power sensor systems.

SOP-8



### Pin Assignment



### Features

- Low power dissipation
- Rail to rail input and output, typical 0.8mv Vos
- Stable unit gain
- Gain bandwidth product 1.1MHz
- Low input bias current: 10pA Level, <1nA
- Low Power consumption
- 2.1V ~ 5.5V working voltage
- Low operating current: 45uA each channel

### Pin Function

Pin No.	Symbol	Function	Pin No.	Symbol	Function
1	OUT1	The output of the first operational amplifier	5	IN2+	The non-inverting input of the second operational amplifier
2	IN1-	The inverting input of the first operational amplifier	6	IN2-	The inverting input of the second operational amplifier
3	IN1+	The non-inverting input of the first operational amplifier	7	OUT2	The output of the second operational amplifier
4	-Vs	Negative power input	8	+Vs	Positive power input



# LMV358

## Low-Power rail-to-rail Operational Amplifier

### Absolute Maximum Ratings (at $T_A = 25^\circ\text{C}$ ) <sup>Note1</sup>

Parameter	Symbol	Value	Unit
Supply Voltage(+V <sub>S</sub> →-V <sub>S</sub> )	V <sub>CC</sub>	7.5	V
Common-mode Input Voltage	V <sub>ICR</sub>	-V <sub>S</sub> -0.5~+V <sub>S</sub> +0.5	V
Junction Temperature	T <sub>J</sub>	150	°C
Operating Temperature Range	T <sub>OPR</sub>	-40~85	°C
Storage Temperature Range	T <sub>STG</sub>	-50~150	°C
Lead Temperature (Soldering, 10 sec)	T <sub>L</sub>	260	°C

Note1: Exceeding the above limits may damage to the chip. The reliability of the device will also be affected if the device works under the limit conditions. Electrostatic discharge can also cause damage to chips, so it is suggested to take some preventive measures for integrated circuits. Failure to follow proper handling and installation can also cause damage. Precision LMV358 and other devices are more vulnerable to damage than ordinary devices in the case of tiny electrostatic, and small parameter changes may make the whole circuit performance substandard.

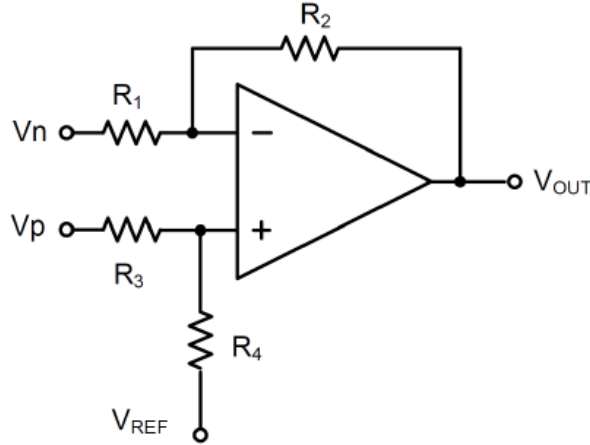

**Electrical Characteristics**
 $R_L=100K\Omega$  Connected to  $V_S/2$  and  $V_{OUT}=V_S/2$ ,  $T_A=25^\circ C$ , unless otherwise noted

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Input offset voltage	$V_{OS}$		--	$\pm 0.8$	$\pm 5$	mV
Input offset current	$I_{OS}$		--	10	--	pA
Low input bias current	$I_B$		--	10	--	pA
Common-mode input voltage rang	$V_{CM}$	$V_S=5.5V$	--	-0.1-5.6	--	V
Input offset voltage drift	$\Delta V_{OS}/\Delta T$		--	2.7	--	$\mu V/^\circ C$
Open-loop gain	$A_{OL}$	$V_O=0.1V\sim 4.9V$ , $R_L=5k\Omega$	70	80	--	dB
		$V_O=0.035V\sim 4.96V$ , $R_L=100k\Omega$	80	84	--	dB
Common mode rejection	CMRR	$V_S=5.5, V_{CM}=0.1\sim 4V$	62	70	--	dB
		$V_S=5.5, V_{CM}=0.1\sim 5.6V$	56	68	--	dB
Power supply rejection	PSRR	$V_S=2.5V\sim 5.5V, V_{CM}=(-V_S)+0.5V$	60	80	--	dB
Working voltage range	$V_W$		2.1	--	5.5	V
Quiescent current	$I_Q$	$I_{OUT}=0$	--	45	75	$\mu A$
Gain bandwidth product	GBP	$C_L=100pF$	--	1.1	--	MHz
Slew rate	SR	$G=1$ , 2V Output Step	--	0.5	--	V/ $\mu s$
Equivalent input noise Voltage	$e_n$	$f=1KHz$	--	27	--	$nV/\sqrt{Hz}$
		$f=10KHz$	--	20	--	
Output current	$I_{OUT}$		18	30	--	mA
Output voltage swing	$V_{OH}$	$R_L=100K\Omega$	--	0.008	--	V
	$V_{OL}$	$R_L=10K\Omega$	--	0.08	--	V

### Typical Application Circuit

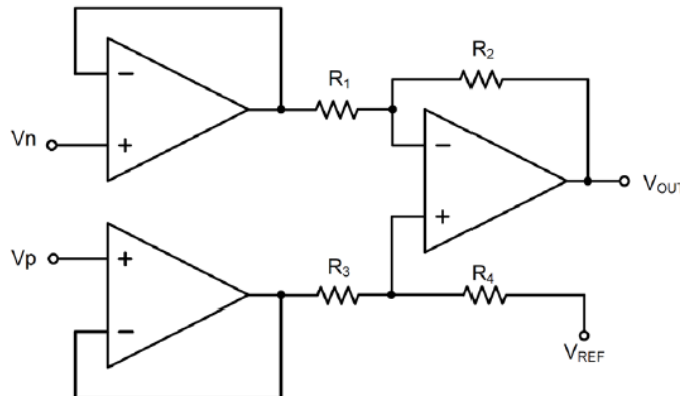
#### 1. differential amplifier

As shown in the figure, if the resistance is equal, ( $R_4 / R_3 = R_2 / R_1$ ), then the output  $V_{OUT} = (V_p - V_n) \times R_2 / R_1 + V_{REF}$



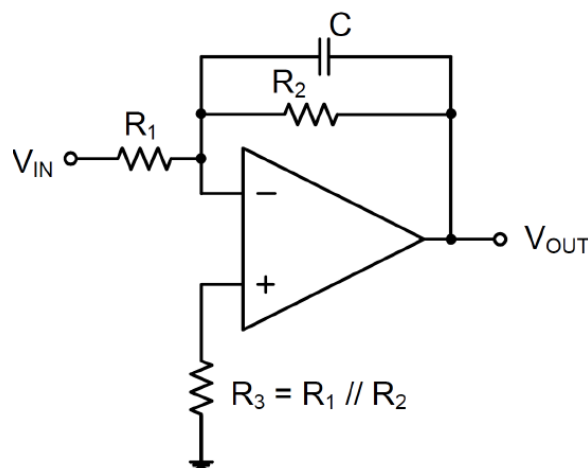
#### 2. instrumentation amplifier

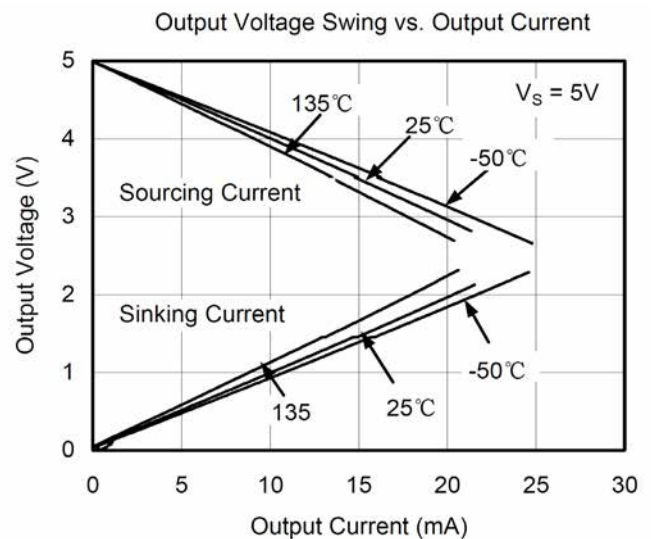
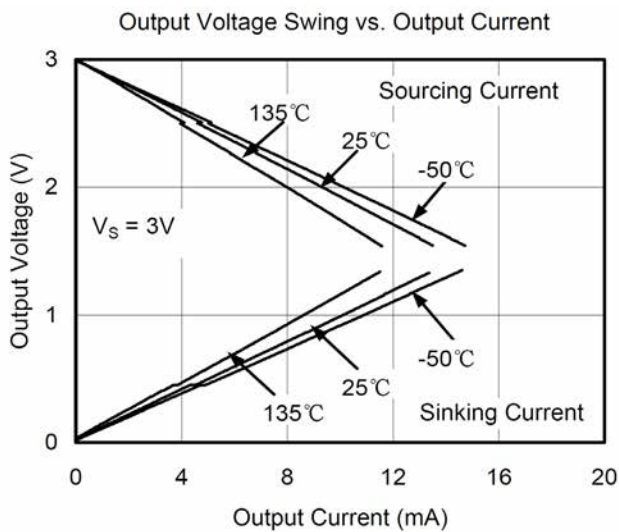
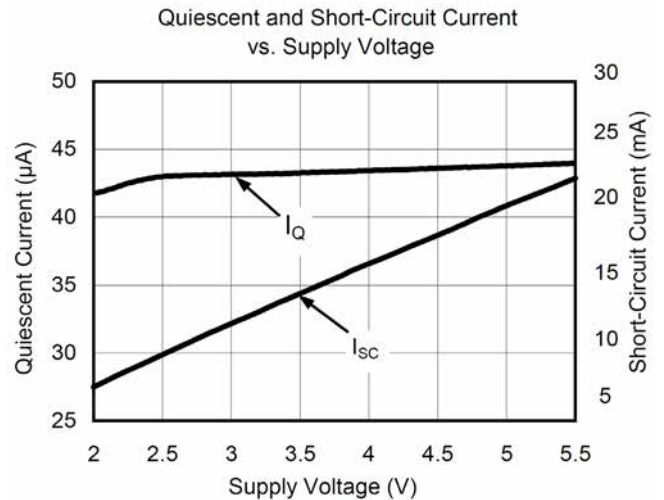
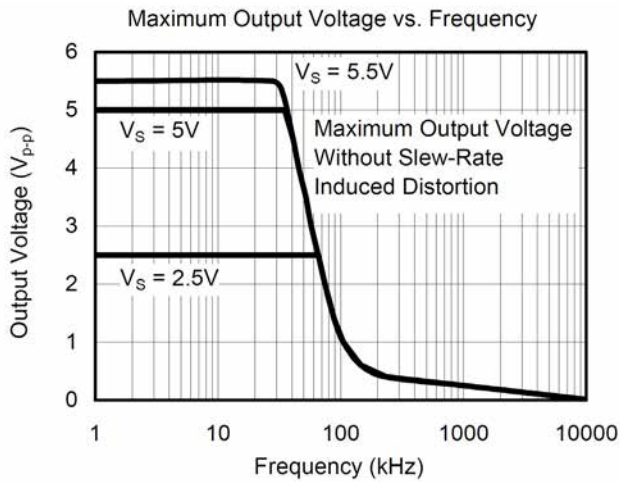
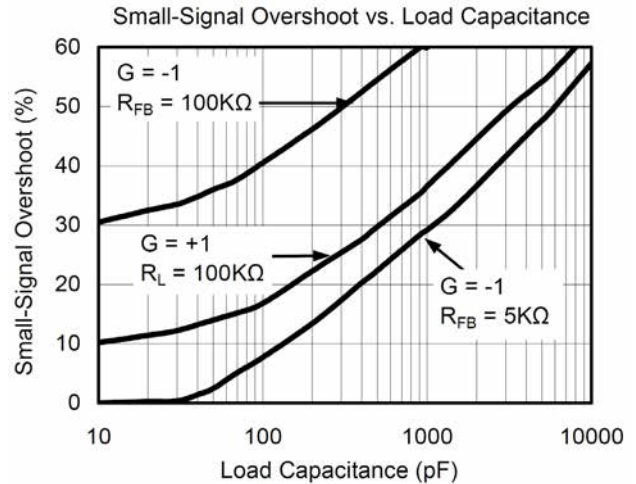
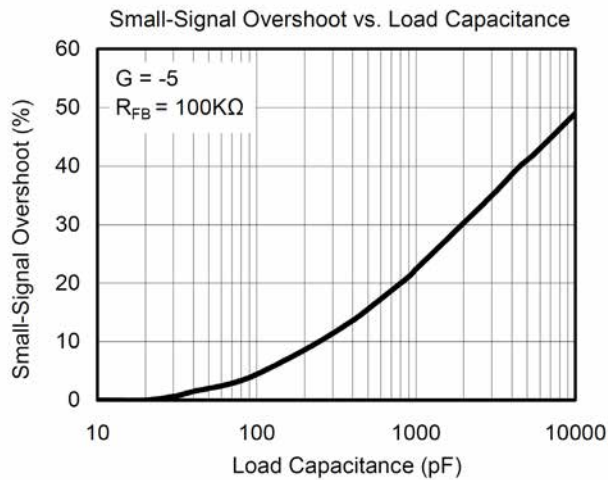
The circuit in the figure above performs the same function, but the input is high impedance.

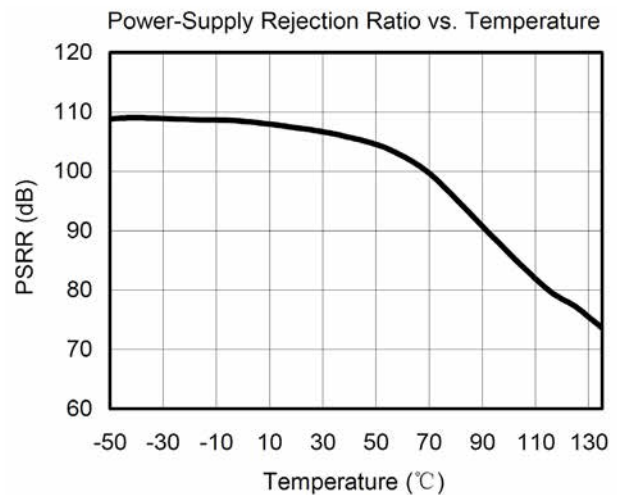
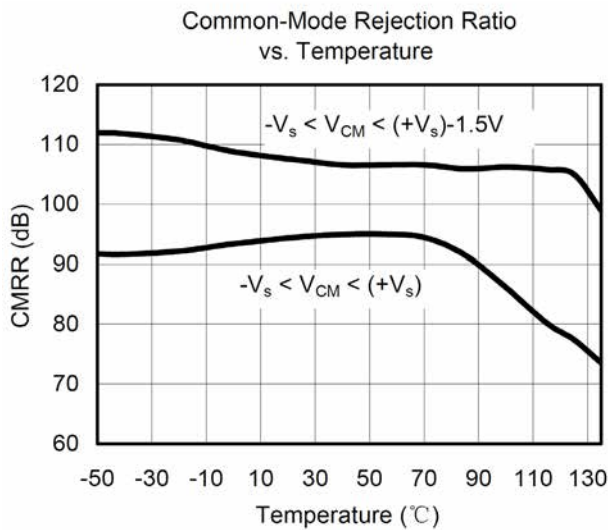
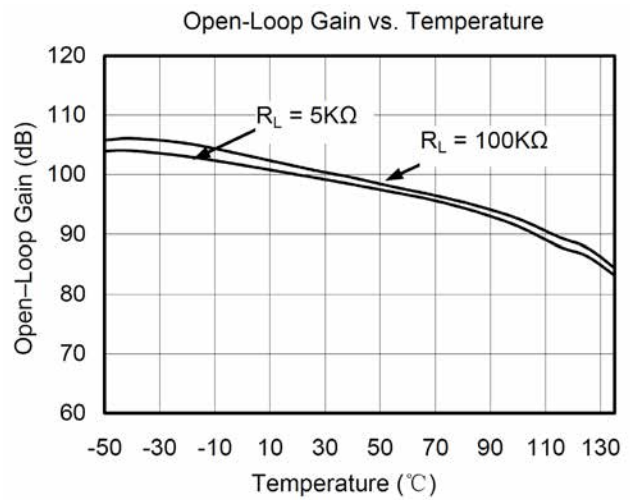
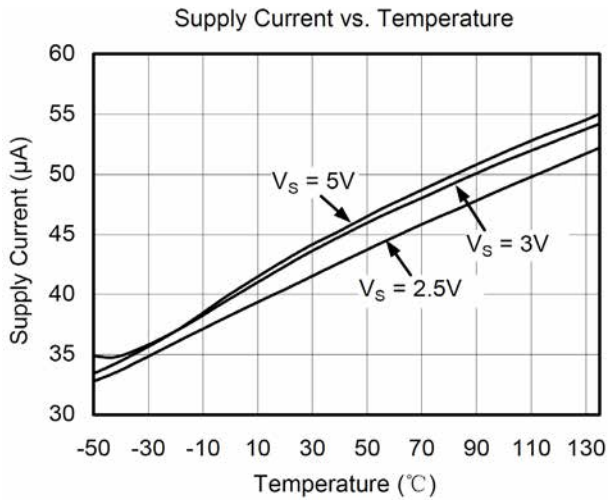


#### 3. Low pass active filtering

The low-pass filter circuit shown here has a  $(-R_2 / R_1)$  DC gain and  $-3\text{db}$  at a frequency of  $1/2 \pi R_2 C$  corner. Make sure the filter is within the amplifier's bandwidth. Large feedback resistors are easily accompanied by parasitic capacitance at high speed, resulting in adverse effects such as oscillation. Keep the resistance value as low as possible and consider the appropriate output load.



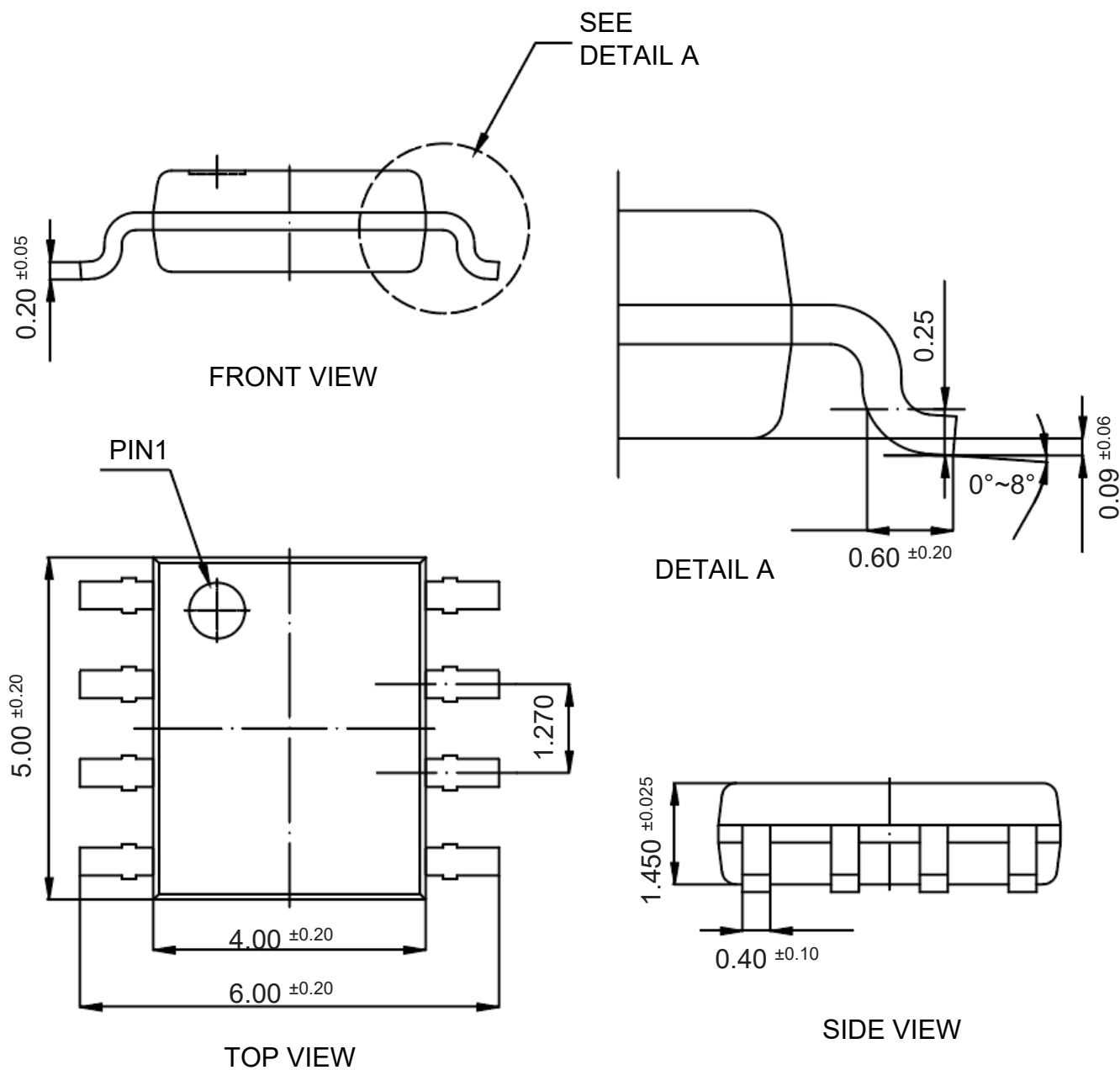
**Typical characteristic curve**




**Package Outline**

SOP-8

Dimensions in mm


**Ordering Information**

Device	Package	Shipping
LMV358	SOP-8	4,000PCS/Reel&13inches