



SANYO Semiconductors

## DATA SHEET

# LA6358NMM — Monolithic Linear IC

## High-Performance Dual Operational Amplifier

### Overview

The LA6358NMM is a high-performance dual operational amplifier that can operate from a single voltage power supply. It features a built-in phase correction circuit. It can also operate from a dual power supply with both positive and negative levels and features low power consumption. The LA6358NMM can be used in a wide range of industrial applications as a transducer amplifier for all types of transducers, as a DC amplifier circuit, and for other purposes as well.

### Functions

- High-performance dual operational amplifier

### Specifications

**Maximum Ratings** at  $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC}$ max		32	V
Differential input voltage	$V_{ID}$		32	V
Maximum input voltage	$V_{IN}$ max		-0.3 to +32	V
Allowable power dissipation	$P_d$ max	$T_a \leq 25^\circ\text{C}$	300	mW
Operating temperature	$T_{opr}$		-30 to +85	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-55 to +125	$^\circ\text{C}$

**Recommended Operating Conditions** at  $T_a = -30$  to  $+85^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Supply voltage	$V_{CC}$		3		24	V

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**SANYO Semiconductor Co., Ltd.**

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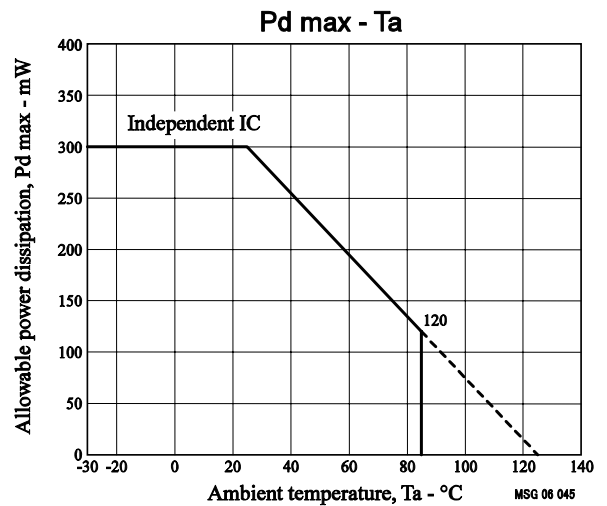
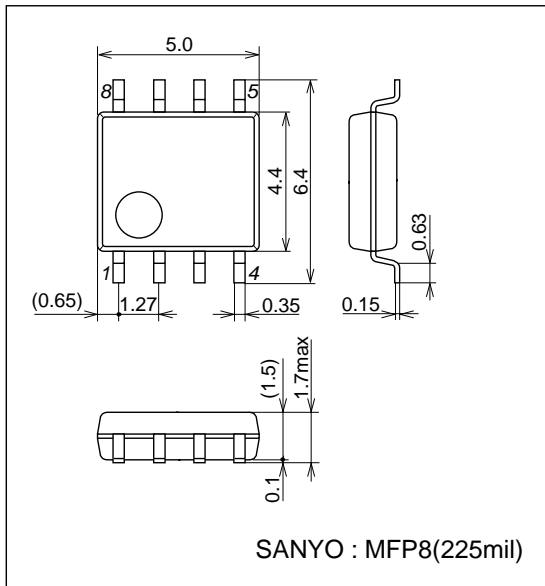
# LA6358NMM

Electrical Characteristics at  $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 5\text{V}$

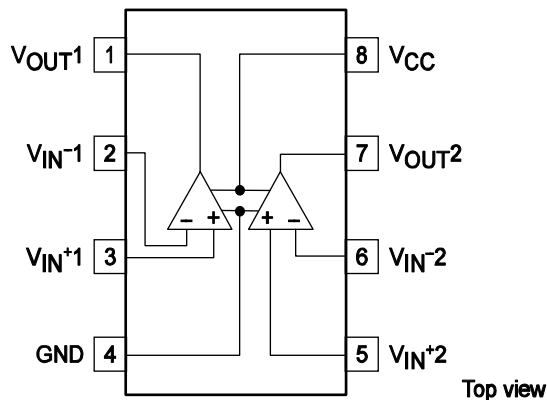
Parameter	Symbol	Conditions	Test circuit	Ratings			Unit
				min	typ	max	
Input offset voltage	$V_{IO}$		1		$\pm 1$	$\pm 3$	mV
Input offset current	$I_{IO}$	$I_{IN(+)} / I_{IN(-)}$	2		$\pm 5$	$\pm 50$	nA
Input bias current	$I_B$	$I_{IN(+)} / I_{IN(-)}$	3,4		45	250	nA
Common-mode input voltage range	VICM		5	0		$V_{CC} - 1.5$	V
Common-mode rejection ratio	CMR	$V_{CC} = 30\text{V}$	5	65	80		dB
Large-amplitude voltage gain	VG	$V_{CC} = 15\text{V}$ , $R_L \geq 2\text{k}\Omega$	6	25	100		V/mV
Output voltage range	$V_{OUT}$			0		$V_{CC} - 1.5$	V
Supply voltage rejection ratio	SVR		11	65	100		dB
Channel separation	CS	$f = 1\text{ k to } 20\text{ kHz}$	7		120		dB
Current drain	$I_{CC}$		8		0.5	1.2	mA
Output current (source)	$I_{O \text{ source}}$	$V_{IN+} = 1\text{V}$ , $V_{IN-} = 0\text{V}$	9	20	40		mA
Output current (sink)	$I_{O \text{ sink}}$	$V_{IN+} = 0\text{V}$ , $V_{IN-} = 1\text{V}$	10	10	20		mA

## Package Dimensions

unit : mm  
3032D

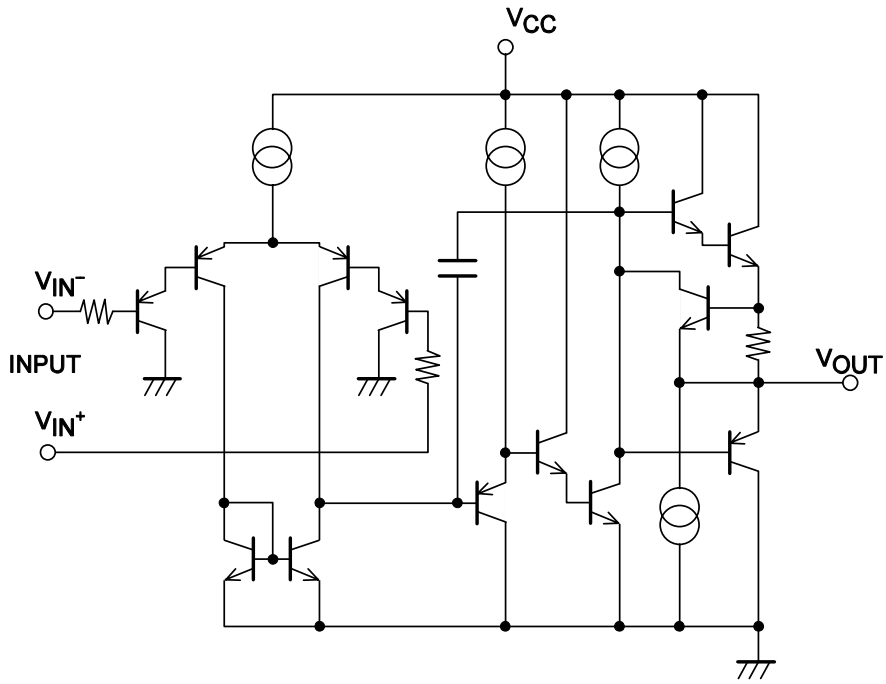


## Pin Assignment



ILA01067

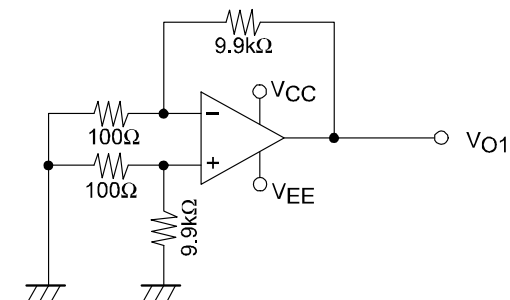
Equivalent Circuit



ILA01065

Test Circuits

1. Input offset voltage  $V_{IO}$

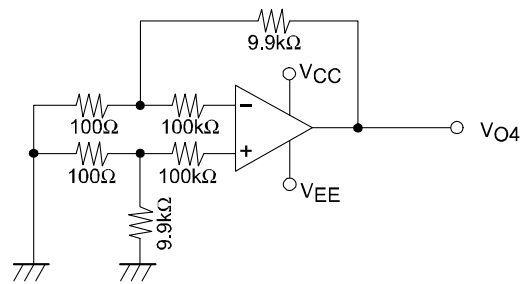


$$V_{CC} / V_{EE} = \pm 15V$$

$$V_{IO} = V_{O1} / 100$$

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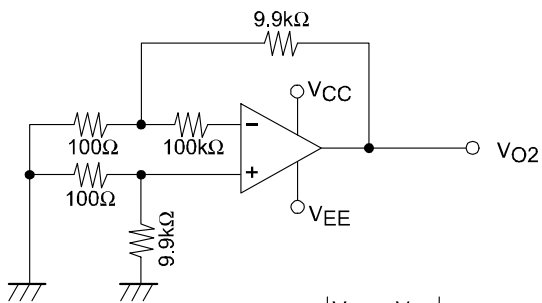
2. Input offset current  $I_{IO}$



$$I_{IO} = \frac{|V_{O4} - V_{O1}|}{100K\Omega \times 100}$$

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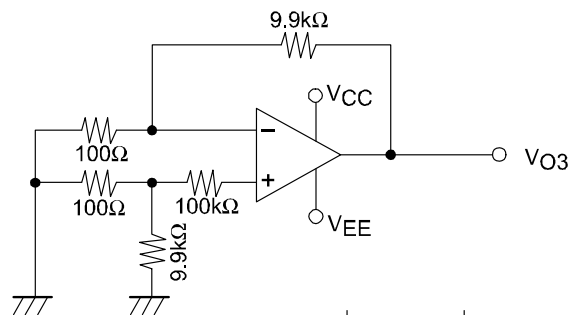
3. Input bias current  $I_B (-)$



$$I_{B(-)} = \frac{|V_{O2} - V_{O1}|}{100K\Omega \times 100}$$

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4. Input bias current  $I_B (+)$

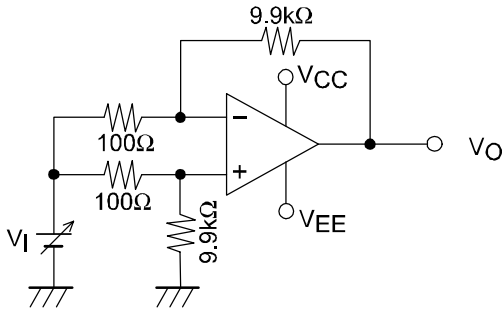


$$I_{B(+)} = \frac{|V_{O3} - V_{O1}|}{100K\Omega \times 100}$$

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# LA6358NMM

5. Common-mode rejection ratio CMR  
Common-mode input voltage range VICN

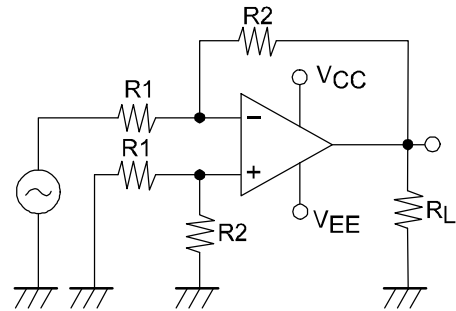


CMR  $V_I = \pm 7.5V$

$$CMR = 20 \log \frac{15 \times 100}{|\Delta V_O|}$$

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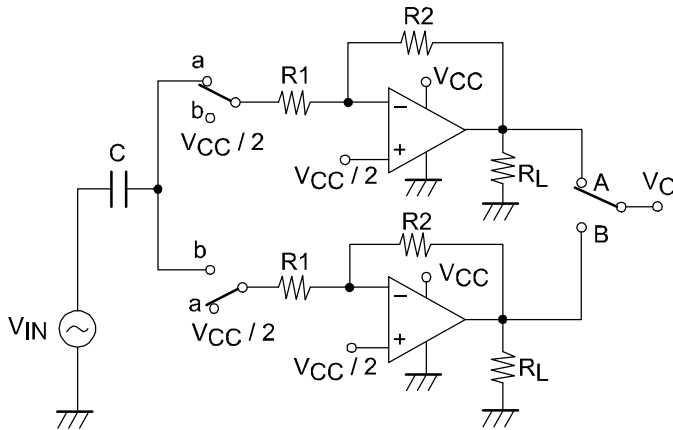
6. Voltage gain VG



$$VG = \frac{R_2}{R_1}$$

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7. Channel separation CH sep



When the switch is in the "a" position

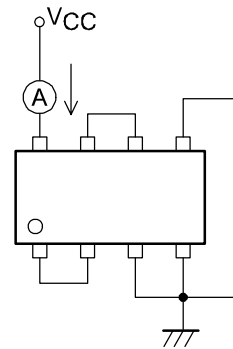
$$CS(A \rightarrow B) = 20 \log \frac{R_2 V_{OA}}{R_1 V_{OB}}$$

When the switch is in the "b" position

$$CS(B \rightarrow A) = 20 \log \frac{R_2 V_{OB}}{R_1 V_{OA}}$$

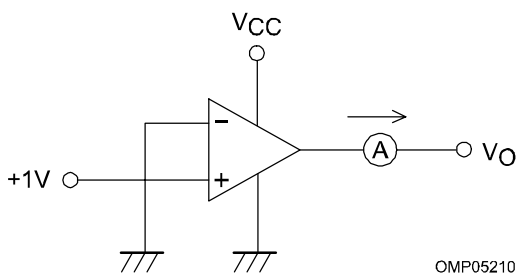
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8. Current drain I<sub>CC</sub>



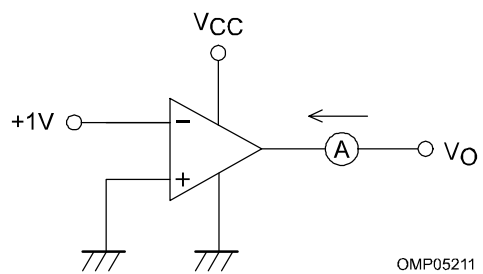
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9. Output current I<sub>O</sub> source



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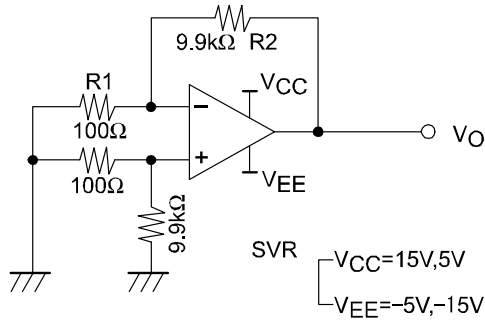
10. Output current I<sub>O</sub> sink



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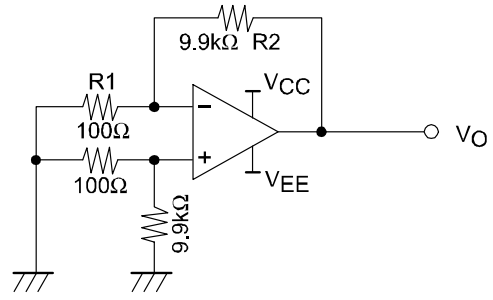
# LA6358NMM

## 11. Supply voltage rejection ratio SVR (+)



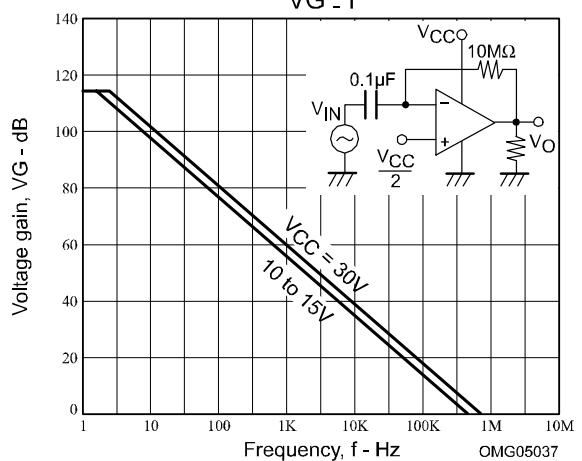
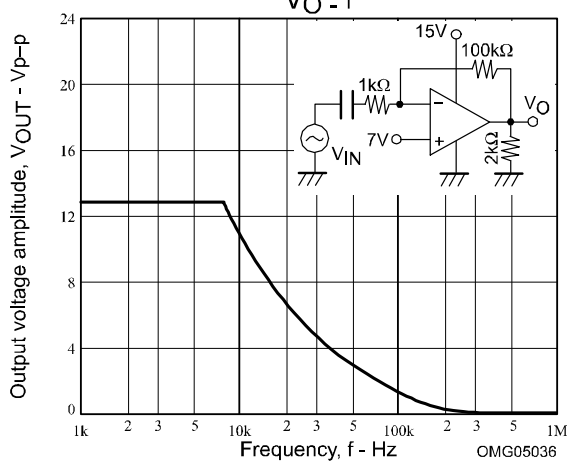
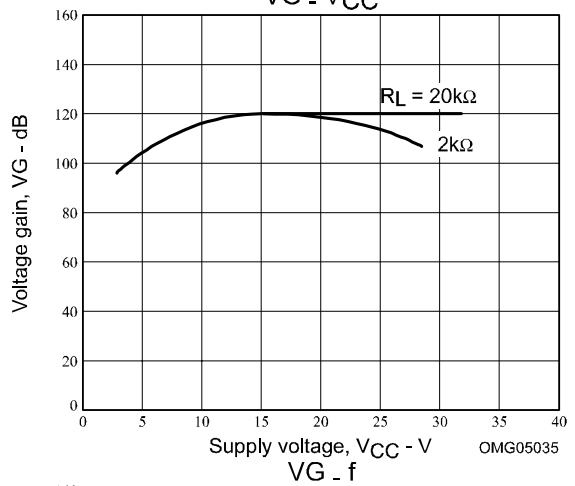
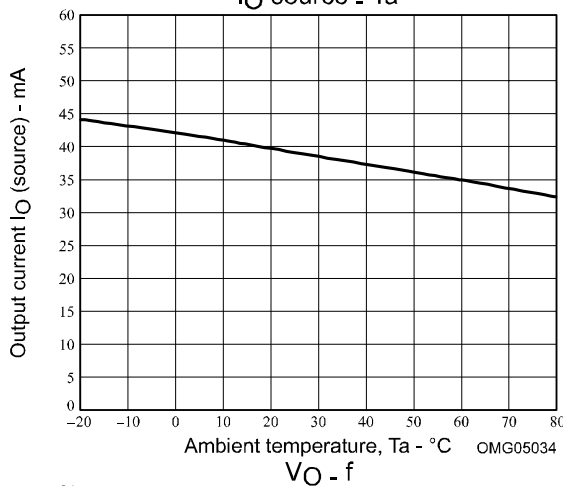
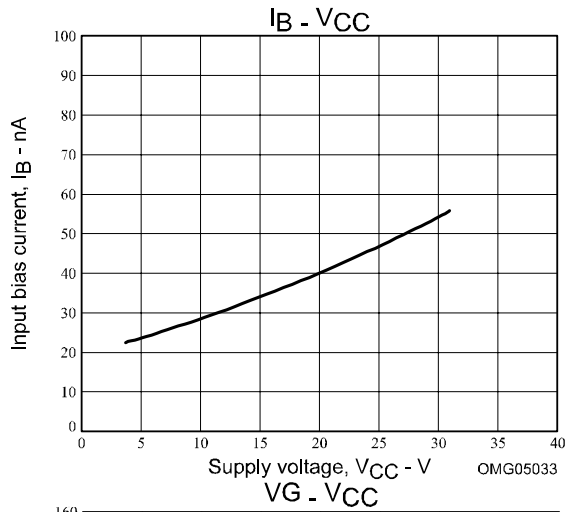
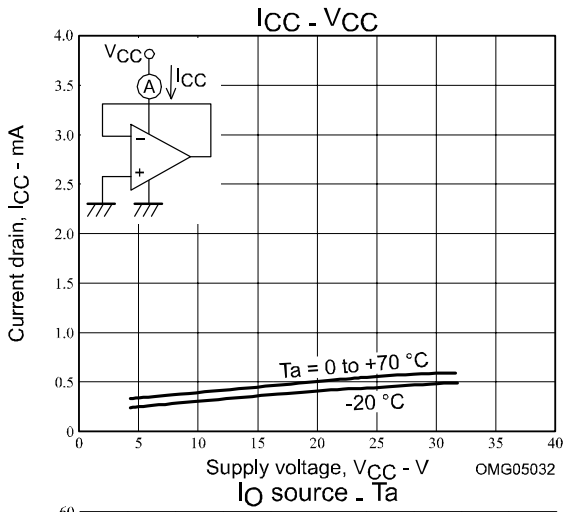
$$SVR(+)=20\log \left| \frac{\Delta V_{CC} \times 100}{\Delta V_O} \right|$$

## 12. Supply voltage rejection ratio SVR (-)



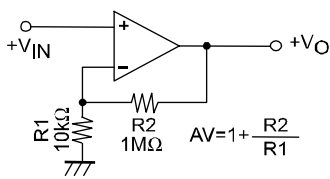
$$SVR(-)=20\log \left| \frac{\Delta V_{EE} \times 100}{\Delta V_O} \right|$$

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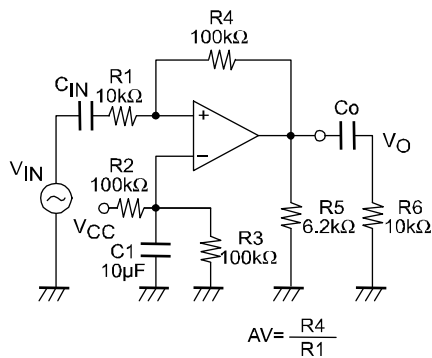


Application Circuit Examples

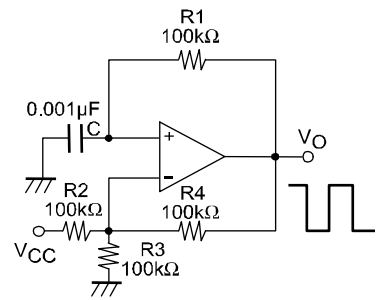
Noninverting DC amplifier



Inverting AC amplifier



Square wave generator



OMB05077

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