



# LA6358N, 6358NS, 6358NM, 6358NT

## High-Performance Dual Operational Amplifiers

### Overview

The LA6358 is an IC integrating two high-performance operational amplifiers in a single package.

This operational amplifier contains an internal phase compensator and is designed to operate from a single power supply over a wide range of voltages. As with conventional general-purpose operational amplifiers, operation from dual power supplies is also possible and power dissipation is very low. This IC can be used widely in commercial and industrial applications including various transducer amplifiers and DC amplifiers.

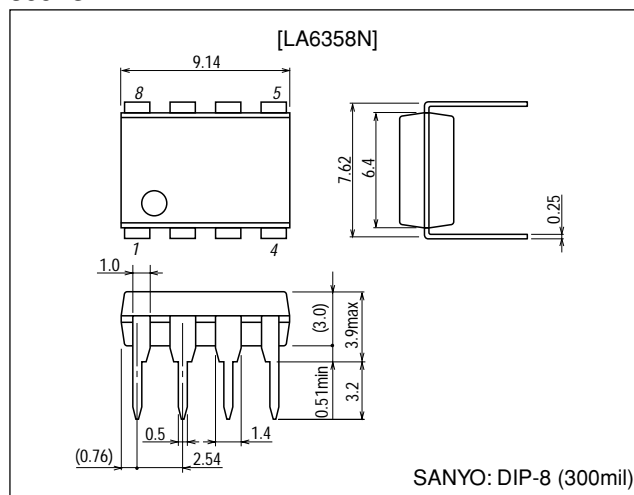
### Features

- Eliminates need for phase compensation
- Wide range of operating supply voltage:  
3.0 to 30.0 V (single power supply)  
 $\pm 1.5$  to  $\pm 15.0$  V (dual power supply)
- Input voltage swingable down to nearly ground level and output voltage range  $V_{OUT}$  of 0 to  $V_{CC} - 1.5$  V
- Low current dissipation:  
 $I_{CC} = 0.5$  mA typ/ $V_{CC} = +5$  V,  $R_L = \infty$
- Miniflat package permitting the LA6358NM-applied sets to be made small

### Package Dimensions

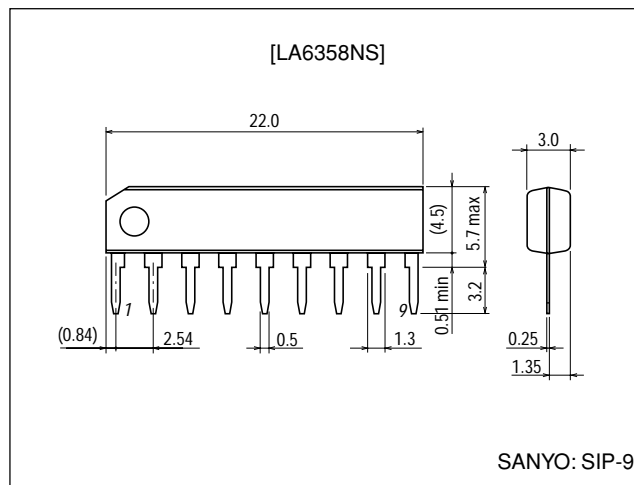
unit: mm

#### 3001C



unit: mm

#### 3017D



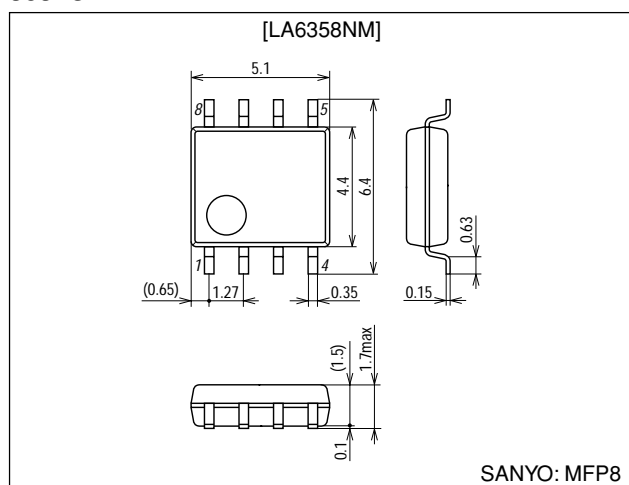
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## Package Dimensions

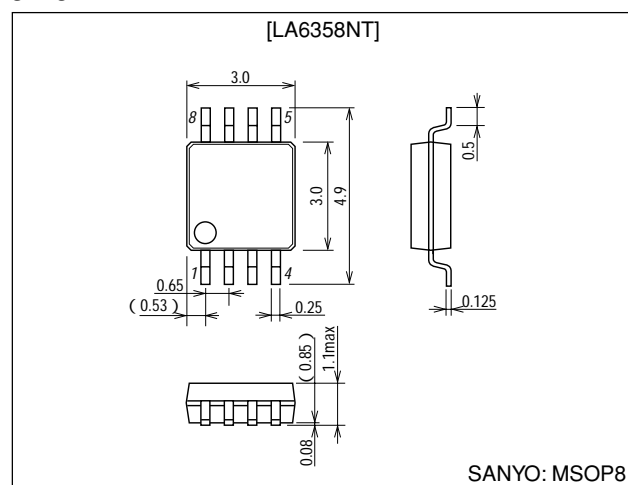
unit: mm

### 3032C



unit: mm

### 3245A



## Specifications

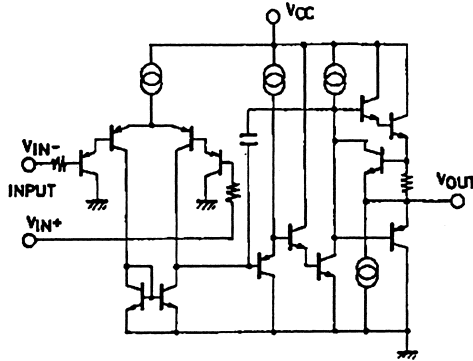
Maximum Ratings at  $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum Supply Voltage	$V_{CC}$		32	V
Differential Input Voltage	$V_{ID}$		32	V
Maximum Input Voltage	$V_{IN\ max}$		-0.3 to +32	V
Allowable Power Dissipation	$P_d\ max$	$T_a \leq 25^\circ\text{C}$ LA6358N, 6358NS	570	mW
		$T_a \leq 25^\circ\text{C}$ LA6358NM	300	mW
		$T_a \leq 25^\circ\text{C}$ LA6358NT	170	mW
Operating Temperature	$T_{opr}$		-30 to +85	$^\circ\text{C}$
Storage Temperature	$T_{stg}$		-55 to +125	$^\circ\text{C}$

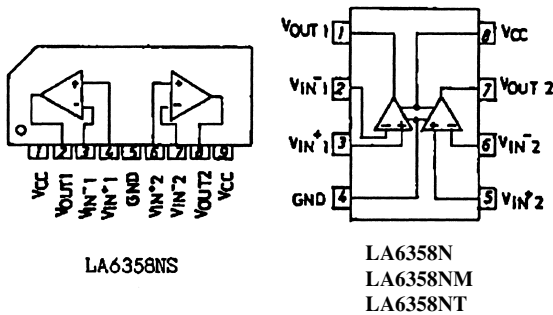
Operating Characteristics at  $T_a = 25^\circ\text{C}$ ,  $V_{CC} = +5\text{ V}$

Parameter	Symbol	Conditions	Test Circuit	Ratings			Unit
				min	typ	max	
Input Offset Voltage	$V_{IO}$		1		$\pm 2$	$\pm 7$	mV
Input Offset Current	$I_{IO}$	$I_{IN(+)} / I_{IN(-)}$	6		$\pm 5$	$\pm 50$	nA
Input Bias Current	$I_B$	$I_{IN(+)} / I_{IN(-)}$	4, 5		45	250	nA
Common-Mode Input Voltage Range	$V_{ICM}$		3	0		$V_{CC} - 1.5$	V
Common-Mode Rejection Ratio	CMRR		3	65	80		dB
Large Signal Voltage Gain	VG	$V_{CC} = 15\text{ V}$ , $R_L \geq 2\text{ k}\Omega$		25	100		V/mV
Output Voltage Range	$V_O$		2	0		$V_{CC} - 1.5$	V
Power Supply Rejection Ratio	SVRR		1	65	100		dB
Channel Separation	CS	$f = 1\text{ k}$ to $20\text{ kHz}$	9		120		dB
Current Dissipation	$I_{CC}$		7		0.5	1.2	mA
Output Current (Source)	$I_{O\ source}$	$V_{IN+} = 1\text{ V}$ , $V_{IN-} = 0\text{ V}$	10	20	40		mA
Output Current (Sink)	$I_{O\ sink}$	$V_{IN+} = 0\text{ V}$ , $V_{IN-} = 1\text{ V}$	11	10	20		mA

### Equivalent Circuit

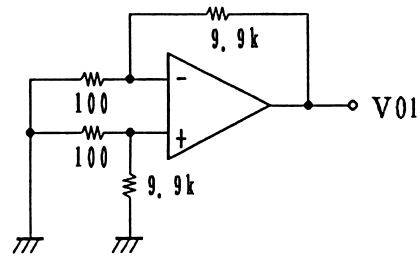


### Pin Assignment



### Test Circuits

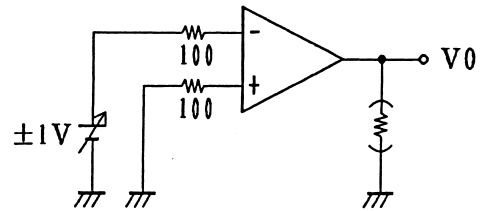
#### 1. VIO, SVRR



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

$$SVRR \left( \begin{matrix} V_{CC} = 15V, 5V \\ V_{EE} = -5V, -15V \end{matrix} \right)$$

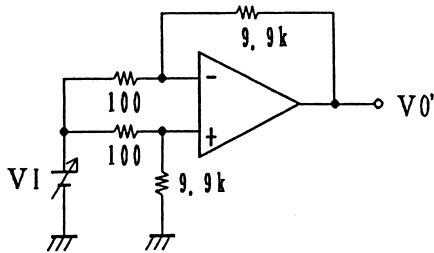
#### 2. VO



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

$$\frac{SVR(+)}{SVR(-)} = \left| \frac{\Delta V_{O1}}{100 \times 10V} \right|$$

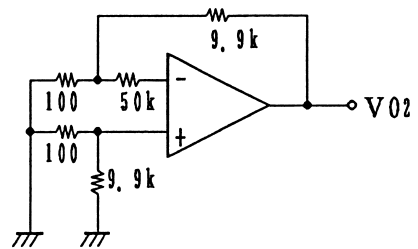
#### 3. CMRR, VICM



$$CMRR \quad V_I = \pm 7.5V$$

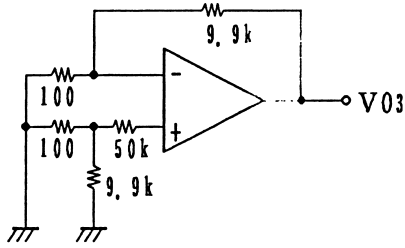
$$CMR = 20 \log \frac{15 \times 100}{|\Delta V_{O'}|}$$

#### 4. IB (+)



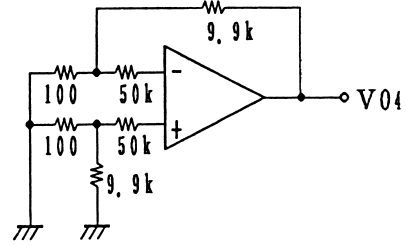
$$I_B(+)= \frac{|V_{O2}-V_{O1}|}{50k \times 100}$$

5. IB (-)



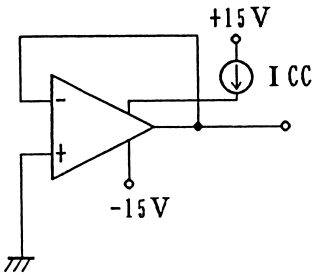
$$I_{B(-)} = \frac{|V_{03} - V_{01}|}{50k \times 100}$$

6. IIO

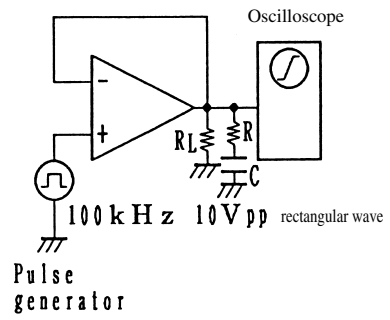


$$I_{IO} = \frac{|V_{04} - V_{01}|}{50k \times 100}$$

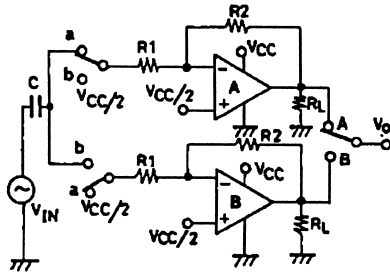
7. ICC



8. SR



9. Channel Separation CS



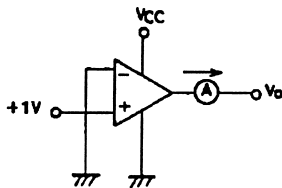
SW : a

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

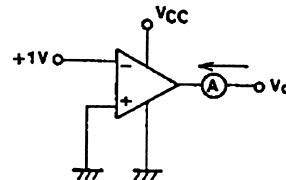
SW : b

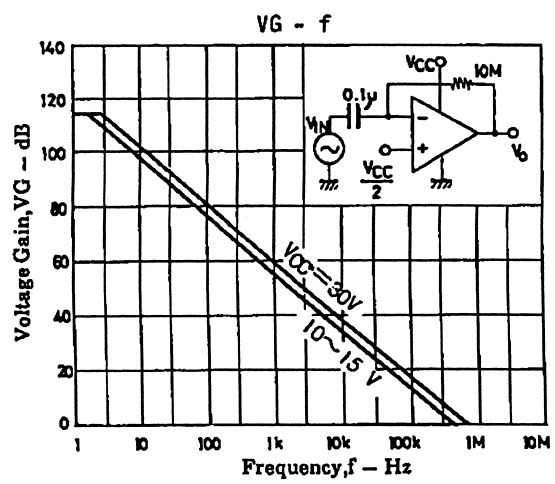
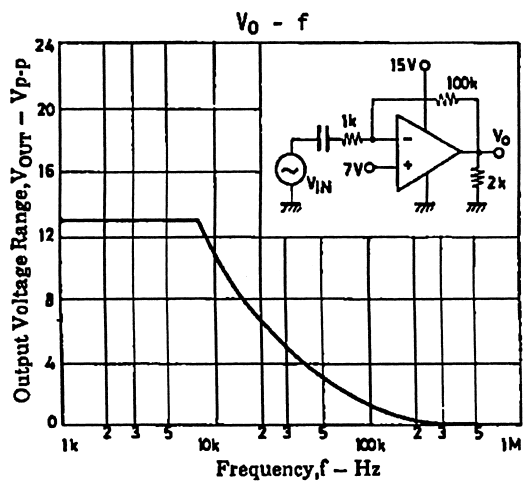
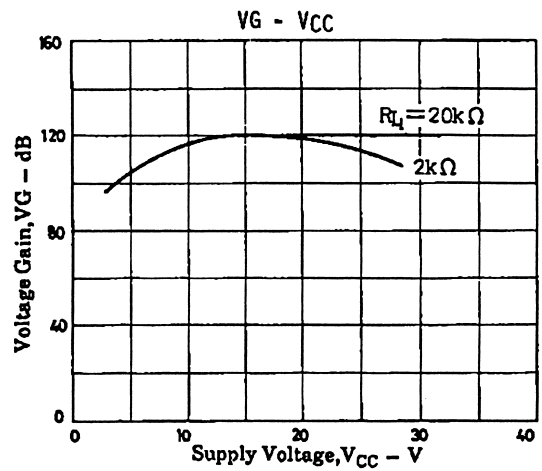
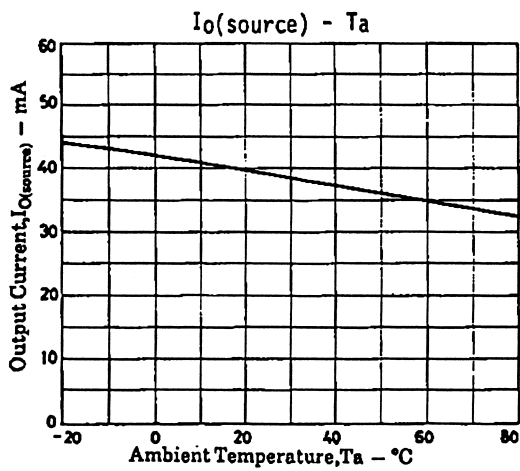
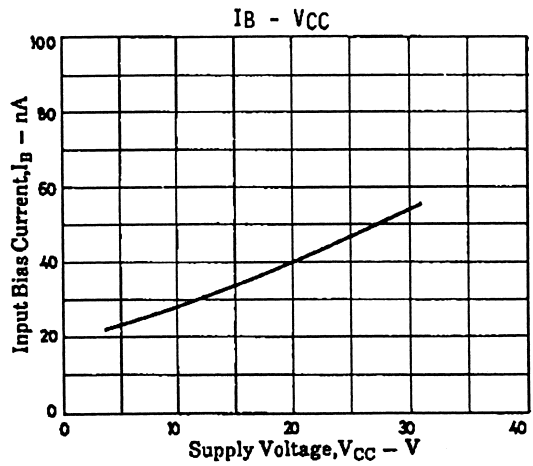
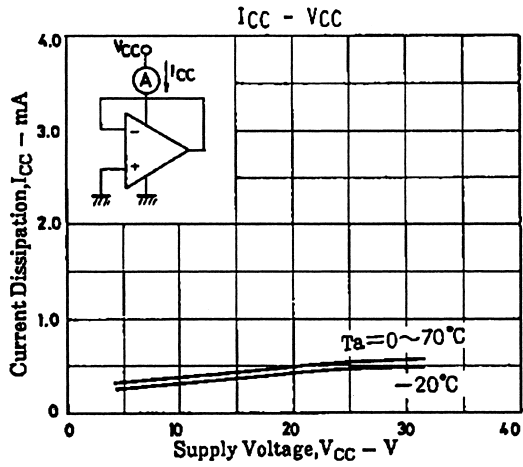
$$CS(B \rightarrow A) + 20 \log \frac{R_2 V_{OB}}{R_1 V_{OA}}$$

10. Output Current IO source



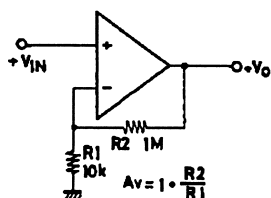
11. Output Current IO sink



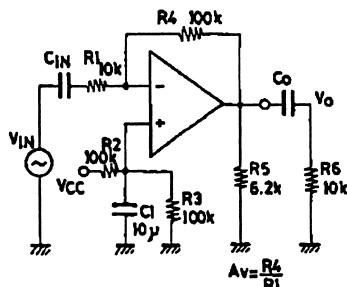


## Sample Application Circuits

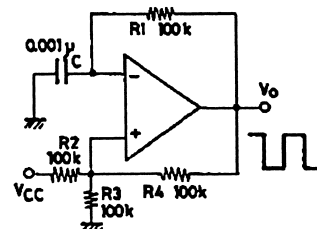
Noninverting DC amplifier



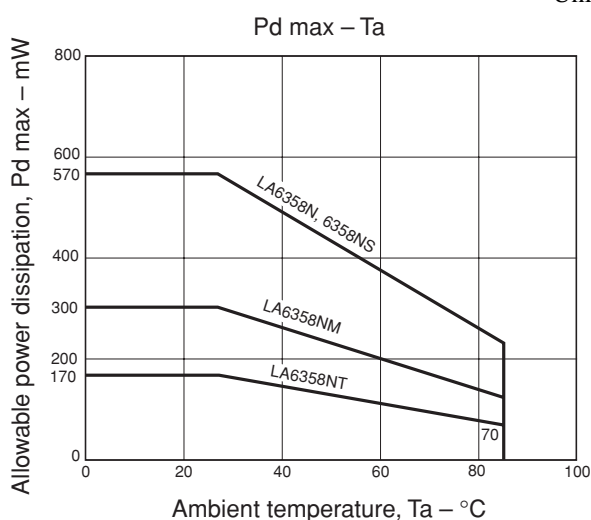
Inverting AC amplifier



Rectangular wave oscillator



Unit (resistance:  $\Omega$ , capacitance: F)



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