Ordering number: EN 3191A

Monolithic Linear IC

No.3191A

SANYO

LA6358N,6358NS

High-Performance Dual Operational Amplifiers

Overview

The LA6358N 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 30.0V (single power supply)
  ±1.5 to ±15.0V (dual power supply)
- Input voltage swingable down to nearly ground level and output voltage range V_{OUT} of 0 to $V_{CC}-1.5V$
- Low current dissipation : $I_{CC}=0.5mA$ typ/$V_{CC}=+5V, R_L=\infty$

Maximum Ratings at Ta = 25°C

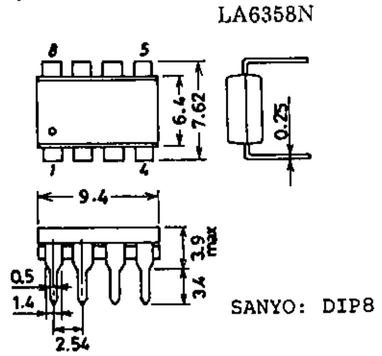
				unit
Maximum Supply Voltage	V_{CC}		32	V
Differential Input Voltage	V_{ID}		32	V
Maximum Input Voltage	V_{IN} max		−0.3 to +32	V
Allowable Power Dissipation	Pd max	Ta≦25°C	570	mW
Operating Temperature	Topr		−30 to +85	°C
Storage Temperature	Tstg		−55 to +125	°C

Operating Characteristics at Ta = 25°C, V_{CC} = +5V

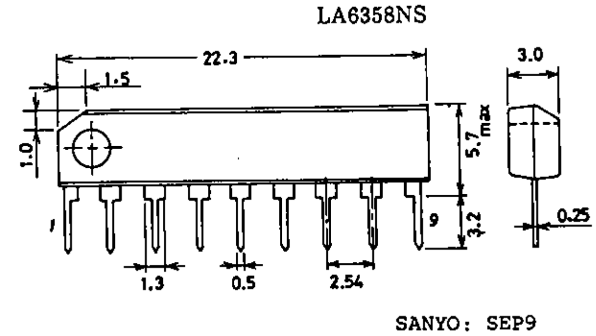
			Test Circuit	min	typ	max	unit
Input Offset Voltage	V_{IO}		1		±2	±7	mV
Input Offset Current	I_{IO}	$I_{IN(+)}/I_{IN(-)}$	2		±5	±50	nA
Input Bias Current	I_B	$I_{IN(+)}/I_{IN(-)}$	3		45	250	nA
Common-Mode Input Voltage Range	V_{ICM}		4	0		$V_{CC}-1.5$	V

Continued on next page.

Package Dimensions 3001B-D8IC
(unit : mm)



Package Dimensions 3017B-S9IC
(unit : mm)



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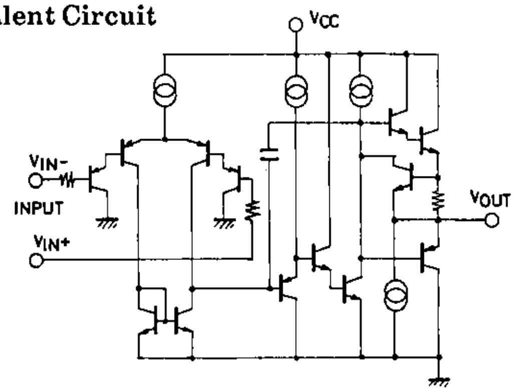
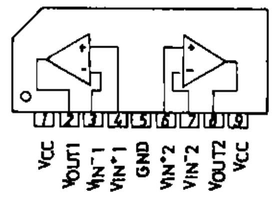
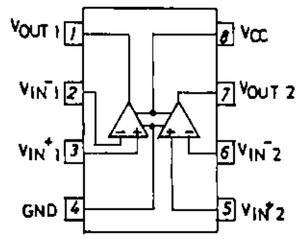
			Test Circuit	min	typ	max	unit
Common-Mode Rejection Ratio	CMR		4	65	80		dB
Large Signal Voltage Gain	VG	$V_{CC}=15V, R_L \geqq 2k\Omega$	5	25	100		V/mV
Output Voltage Range	V_{OUT}			0		$V_{CC}-1.5$	V
Power Supply Rejection Ratio	SVR		6	65	100		dB
Channel Separation		f=1k to 20kHz	7		120		dB
Current Dissipation	I_{CC}		8		0.5	1.2	mA
Output Current (Source)	$I_{O\,source}$	$V_{IN+}=1V, V_{IN-}=0V$	9	20	40		mA
Output Current (Sink)	$I_{O\,sink}$	$V_{IN+}=0V, V_{IN-}=1V$	10	10	20		mA

Equivalent Circuit





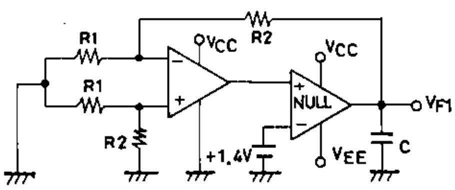
LA6358NS



LA6358N

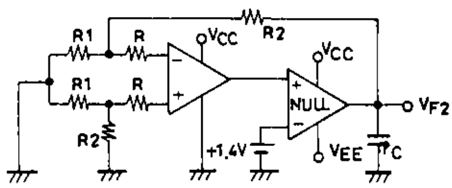
Test Circuits

1. Input Offset Voltage V_{IO}



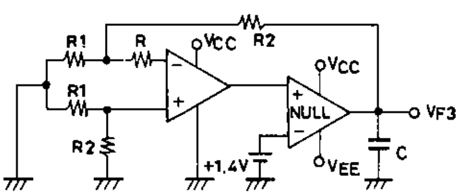
$$V_{IO}=\frac{V_{F1}}{1+R2/R1}$$

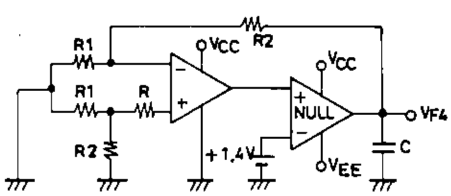
2. Input Offset Current I_{IO}



$$I_{IO}=\frac{V_{F2}-V_{F1}}{R\,(1+R2/R1)}$$

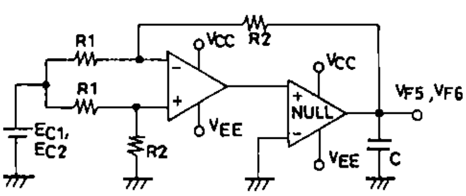
3. Input Bias Current I_B





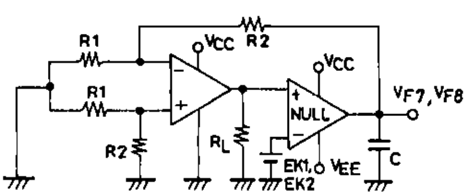
$$I_B=\frac{V_{F4}-V_{F3}}{2R\,(1+R2/R1)}$$

4. Common-mode Rejection Ratio CMR
Common-mode Input Voltage Range V_{ICM}



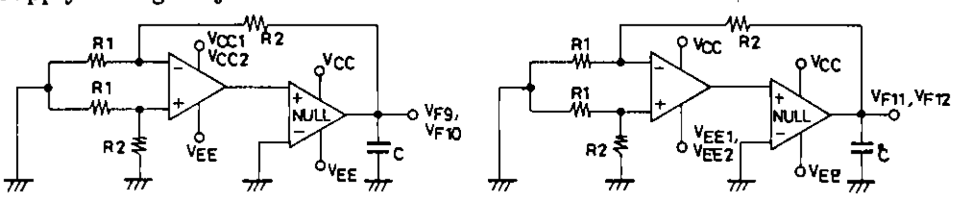
$$CMR=20\log\left|\frac{(E_{C1}-E_{C2})(1+R2/R1)}{V_{F5}-V_{F6}}\right|$$

5. Voltage Gain VG



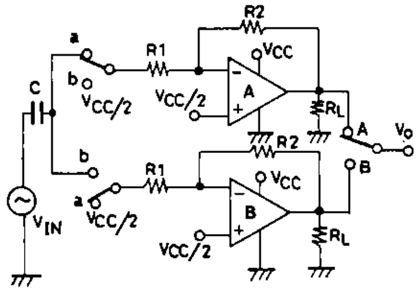
$$VG=\frac{(E_{K1}-E_{K2})(1+R2/R1)}{V_{F8}-V_{F7}}$$

6. Supply Voltage Rejection SVR



$$SVR(+)=20\log\left|\frac{(1+R2/R1)(V_{CC1}-V_{CC2})}{V_{F9}-V_{F10}}\right| \qquad SVR(-)=20\log\left|\frac{(1+R2/R1)(V_{EE1}-V_{EE2})}{V_{F11}-V_{F12}}\right|$$

7. Channel Separation CS



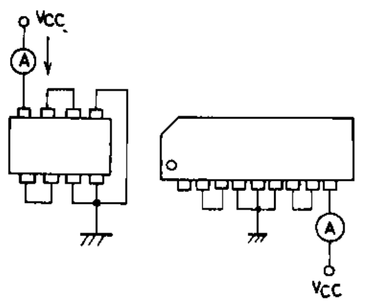
SW : a

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

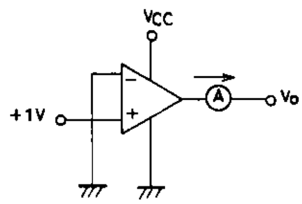
SW : b

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

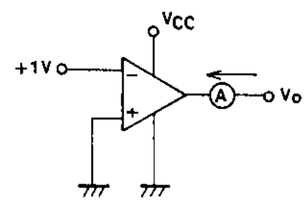
8. Current Dissipation I_{CC}



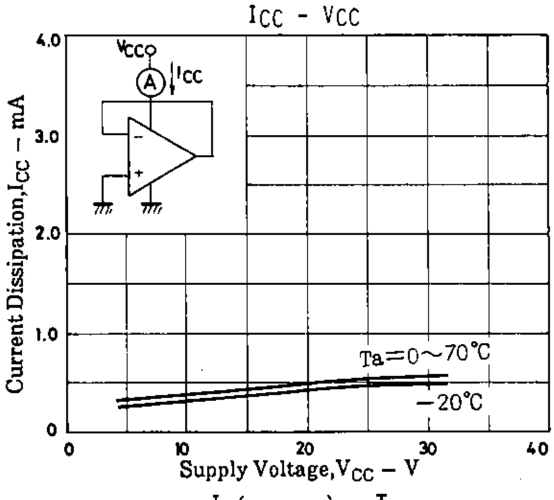
9. Output Current $I_{O\,source}$



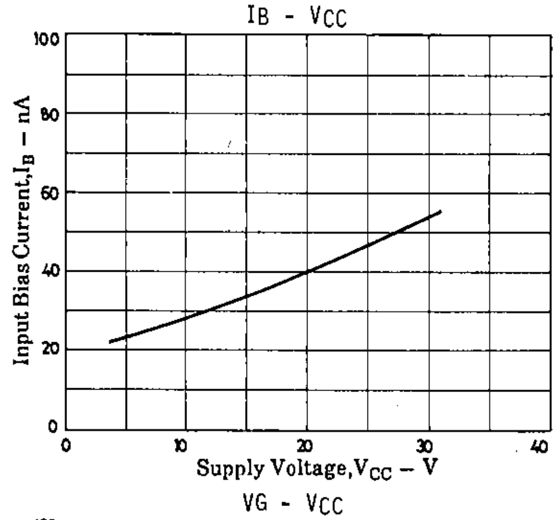
10. Output Current $I_{O\,sink}$



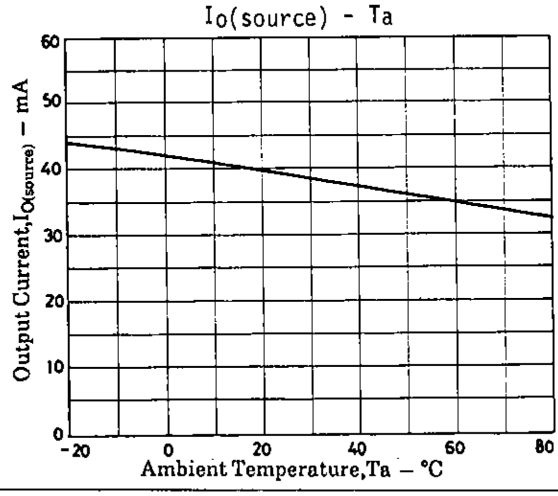
ICC - VCC



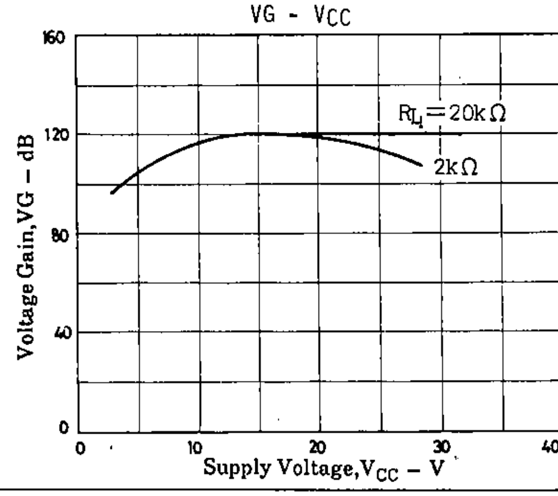
IB - VCC

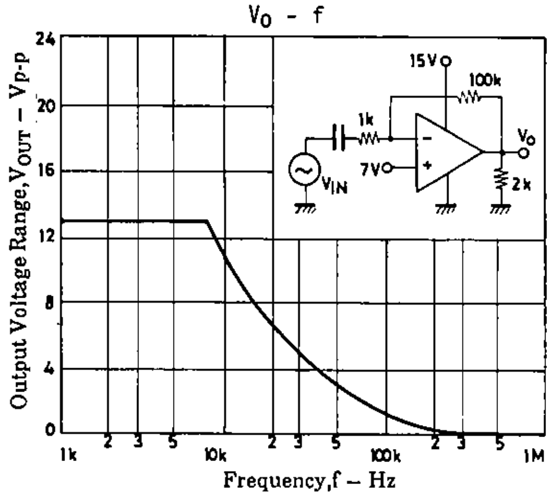


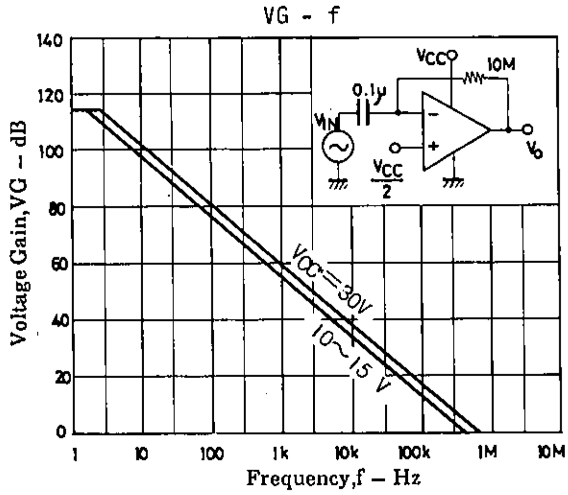
Io(source) - Ta

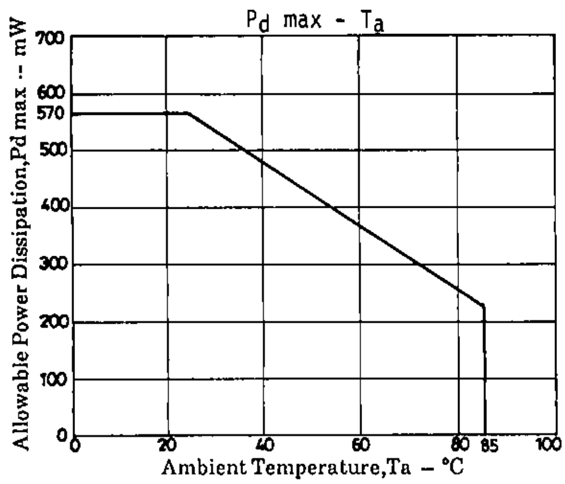


VG - VCC



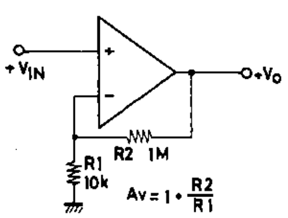




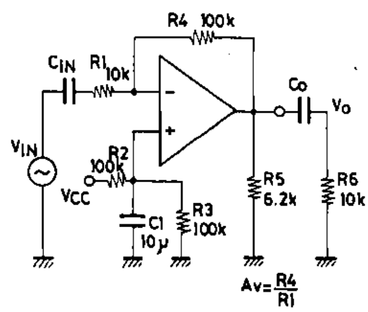


Sample Application Circuits

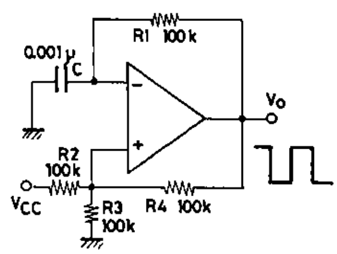
Noninverting DC amplifier



Inverting AC amplifier



Rectangular wave oscillator



Unit (resistance:Ω capacitance:F)

Ordering number: EN 3192

Monolithic Linear IC

No.3192

SANYO

LA6358NM

High-Performance Dual Operational Amplifier

Overview

The LA6358NM 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.

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Features

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

Maximum Ratings at Ta = 25°C

			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	Pd max	300	mW
Operating Temperature	Topr	−30 to +85	°C
Storage Temperature	Tstg	−55 to +125	°C

Operating Characteristics at Ta = 25°C, $V_{CC}=+5V$

			Test Circuit	min	typ	max	unit
Input Offset Voltage	V_{IO}		1		$\pm$2	$\pm$7	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		45	250	nA
Common-mode Input Voltage Range	V_{ICM}		4	0		$V_{CC}-1.5$	V

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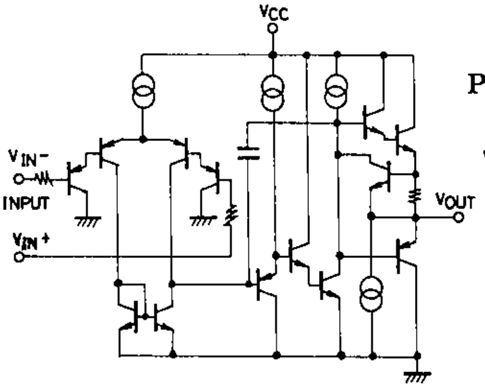
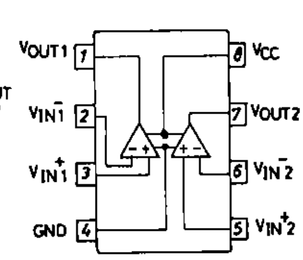
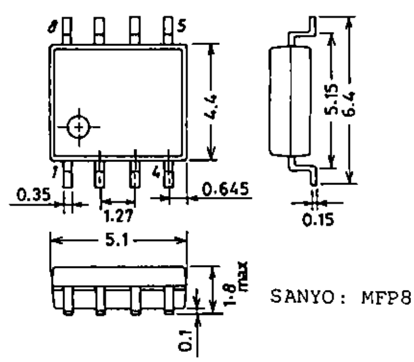
Equivalent Circuit (1 unit)



Pin Assignment



Package Dimensions 3032B-M8IC
(unit : mm)

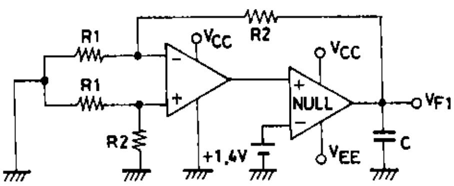


Continued from preceding page.

			Test Circuit	min	typ	max	unit
Common-mode Rejection Ratio	CMR		4	65	80		dB
Large Signal Voltage Gain	VG	$V_{CC}=15V, R_L \geqq 2k\Omega$	5	25	100		V/mV
Output Voltage Range	V_{OUT}			0	$V_{CC}-1.5$		V
Power Supply Rejection Ratio	SVR		6	65	100		dB
Channel Separation		f=1k to 20kHz	7		120		dB
Current Dissipation	I_{CC}		8		0.5	1.2	mA
Output Current (Source)	$I_{O\,source}$	$V_{IN+}=1V, V_{IN-}=0V$	9	20	40		mA
Output Current (Sink)	$I_{O\,sink}$	$V_{IN+}=0V, V_{IN-}=1V$	10	10	20		mA

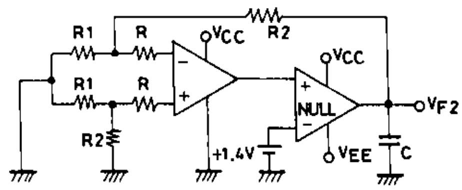
Test Circuits

1. Input Offset Voltage V_{IO}



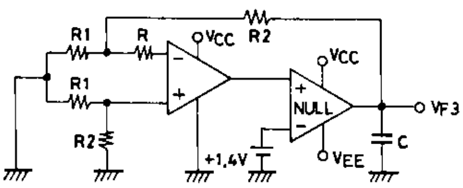
$$V_{IO} = \frac{V_{F1}}{1+R2/R1}$$

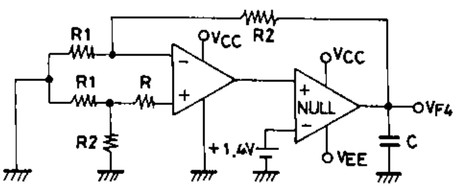
2. Input Offset Current I_{IO}



$$I_{IO} = \frac{V_{F2}-V_{F1}}{R(1+R2/R1)}$$

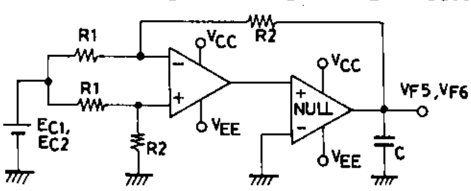
3. Input Bias Current I_B





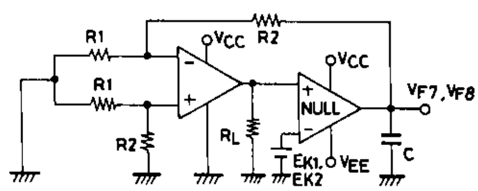
$$I_B = \frac{V_{F4}-V_{F3}}{2R(1+R2/R1)}$$

4. Common-mode Rejection Ratio CMR
   Common-mode Input Voltage Range V_{ICM}



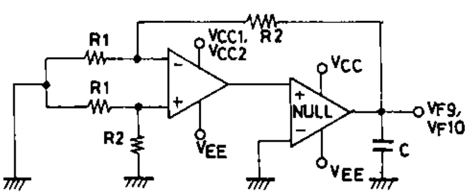
$$CMR = 20\log\left|\frac{(E_{C1}-E_{C2})(1+R2/R1)}{V_{F5}-V_{F6}}\right|$$

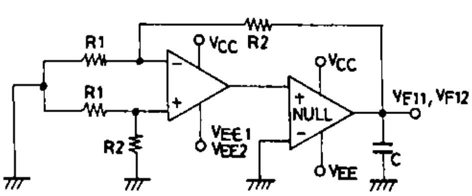
5. Voltage Gain VG



$$VG = \frac{(E_{K1}-E_{K2})(1+R2/R1)}{V_{F8}-V_{F7}}$$

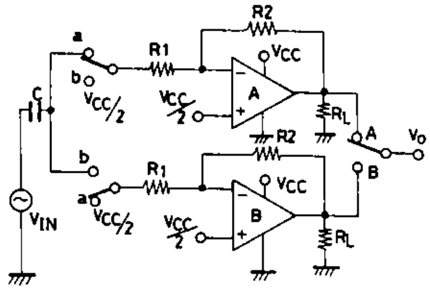
6. Supply Voltage Rejection SVR





$$SVR(+) = 20\log\left|\frac{(1+R2/R1)(V_{CC1}-V_{CC2})}{V_{F9}-V_{F10}}\right| \qquad SVR(-) = 20\log\left|\frac{(1+R2/R1)(V_{EE1}-V_{EE2})}{V_{F11}-V_{F12}}\right|$$

7. Channel Separation CS



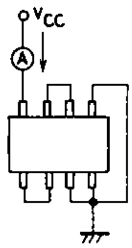
SW : a

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

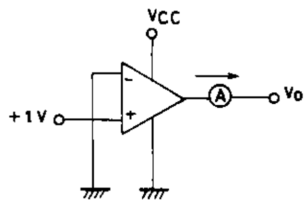
SW : b

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

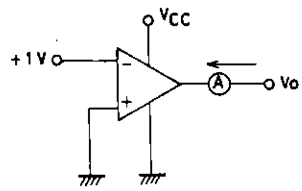
8. Current Dissipation I_{CC}

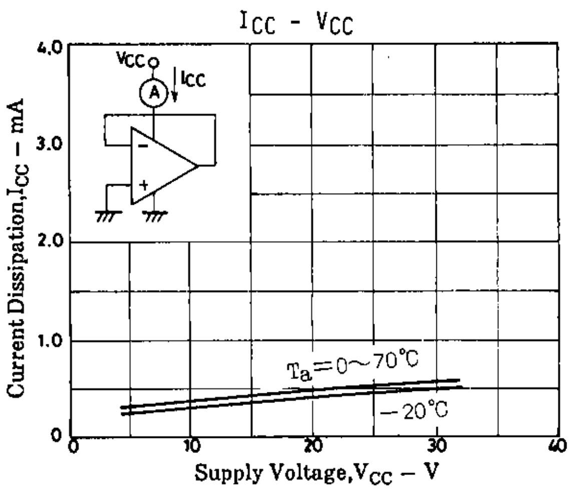


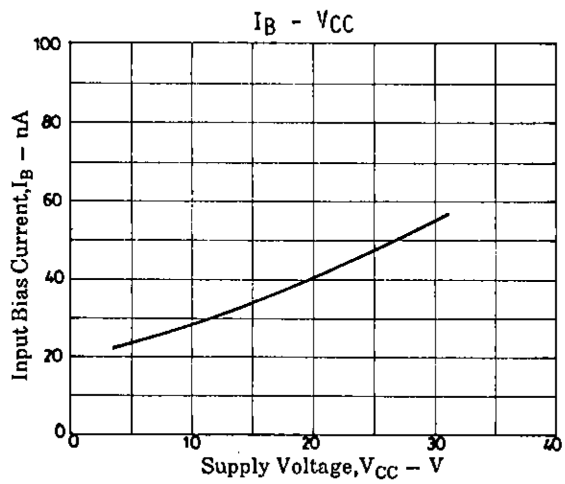
9. Output Current $I_{O\,source}$

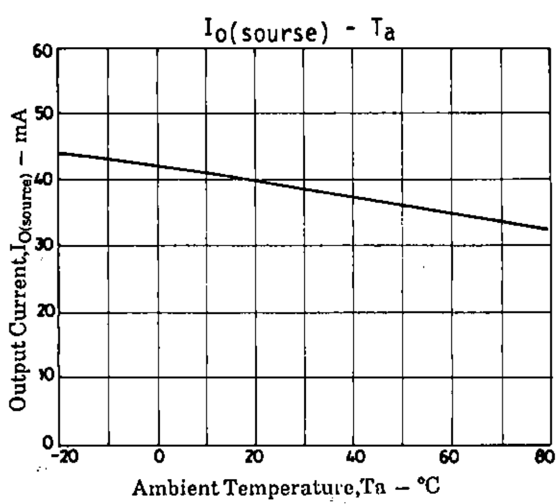


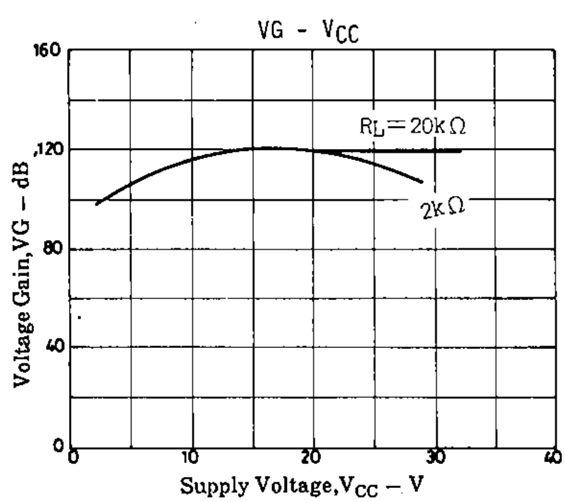
10. Output Current $I_{O\,sink}$

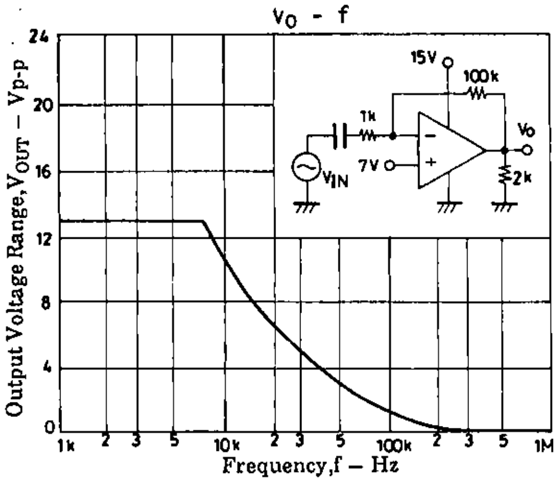


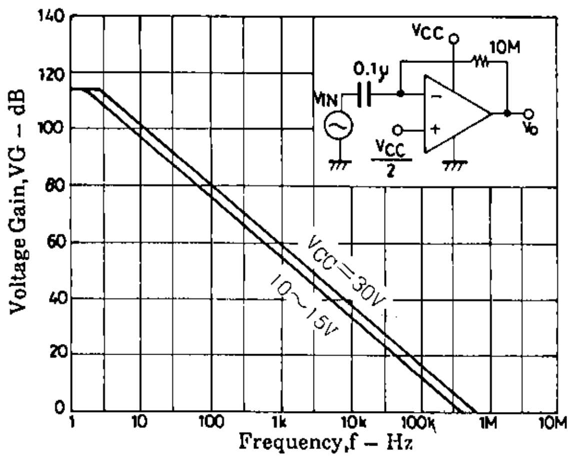


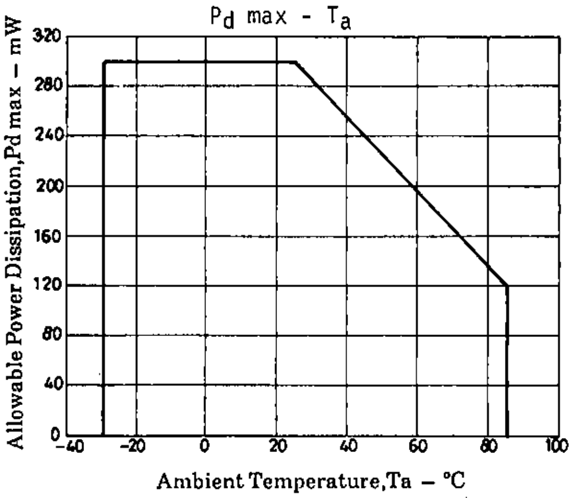




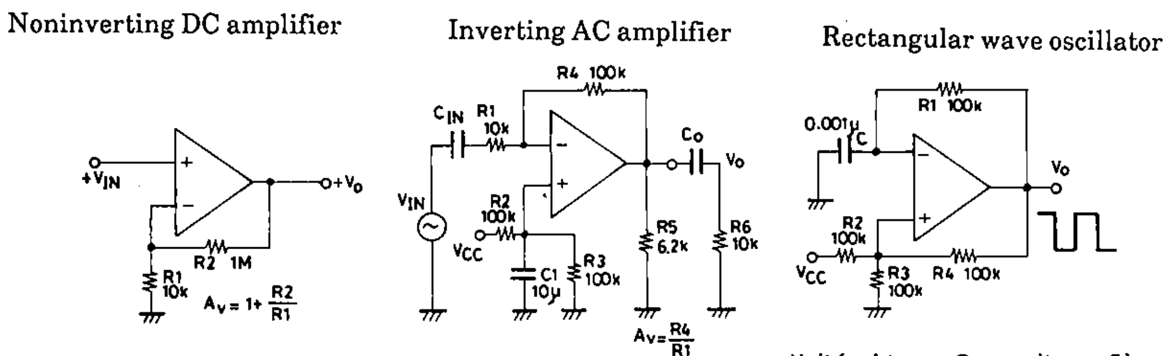








Sample Application Circuits



Unit (resistance: Ω, capacitance: F)

Ordering number: EN 3191A

Monolithic Linear IC

No.3191A

LA6358N,6358NS

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- Eliminates need for phase compensation
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  ±1.5 to ±15.0V (dual power supply)
- Input voltage swingable down to nearly ground level and output voltage range V_{OUT} of 0 to $V_{CC}-1.5V$
- Low current dissipation : $I_{CC}=0.5mA$ typ/$V_{CC}=+5V, R_L=\infty$

Maximum Ratings at Ta=25°C

				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	Pd max	Ta≦25°C	570	mW
Operating Temperature	Topr		−30 to +85	°C
Storage Temperature	Tstg		−55 to +125	°C

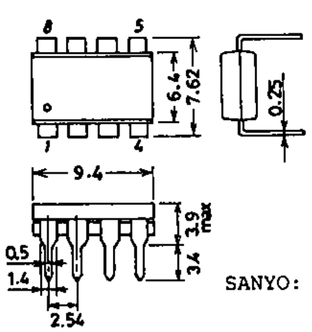
Operating Characteristics at Ta=25°C, $V_{CC}=+5V$

			Test Circuit	min	typ	max	unit
Input Offset Voltage	V_{IO}		1		±2	±7	mV
Input Offset Current	I_{IO}	$I_{IN(+)}/I_{IN(-)}$	2		±5	±50	nA
Input Bias Current	I_B	$I_{IN(+)}/I_{IN(-)}$	3		45	250	nA
Common-Mode Input Voltage Range	V_{ICM}		4	0		$V_{CC}-1.5$	V

Continued on next page.

Package Dimensions 3001B-D8IC
(unit : mm)

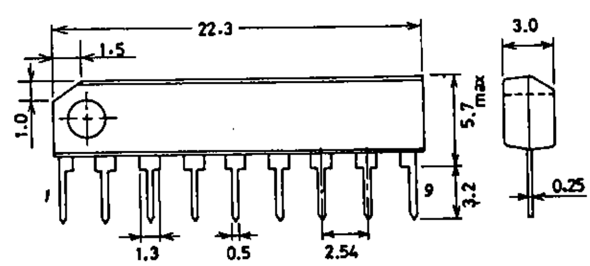
LA6358N



SANYO: DIP8

Package Dimensions 3017B-S9IC
(unit : mm)

LA6358NS

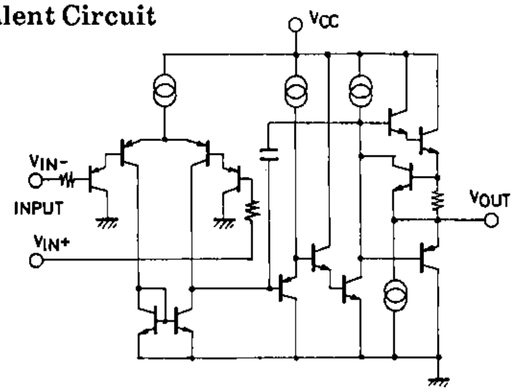


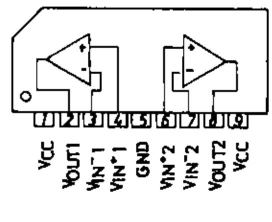
SANYO: SEP9

Continued from preceding page.

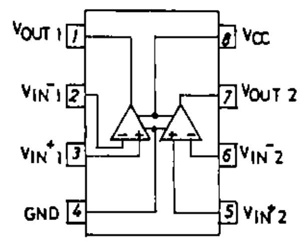
			Test Circuit	min	typ	max	unit
Common-Mode Rejection Ratio	CMR		4	65	80		dB
Large Signal Voltage Gain	VG	$V_{CC}=15V, R_L \geqq 2k\Omega$	5	25	100		V/mV
Output Voltage Range	V_{OUT}			0	$V_{CC}-1.5$		V
Power Supply Rejection Ratio	SVR		6	65	100		dB
Channel Separation		f=1k to 20kHz	7		120		dB
Current Dissipation	I_{CC}		8		0.5	1.2	mA
Output Current (Source)	$I_{O\,source}$	$V_{IN+}=1V, V_{IN-}=0V$	9	20	40		mA
Output Current (Sink)	$I_{O\,sink}$	$V_{IN+}=0V, V_{IN-}=1V$	10	10	20		mA

Equivalent Circuit





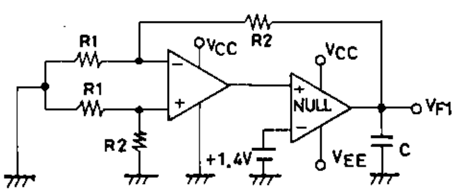
LA6358NS



LA6358N

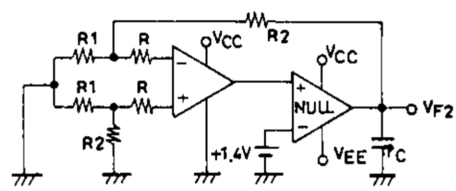
Test Circuits

1. Input Offset Voltage V_{IO}



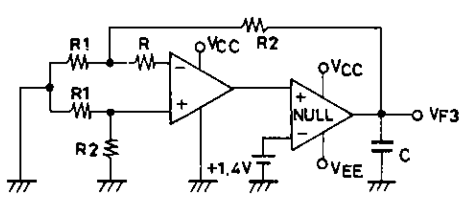
$$V_{IO} = \frac{V_{F1}}{1+R2/R1}$$

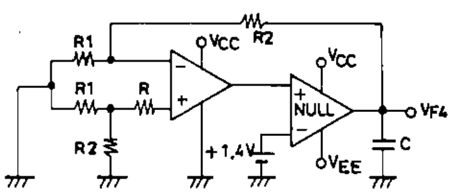
2. Input Offset Current I_{IO}



$$I_{IO} = \frac{V_{F2}-V_{F1}}{R(1+R2/R1)}$$

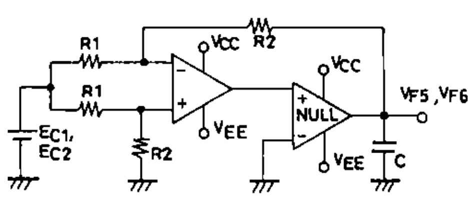
3. Input Bias Current I_B





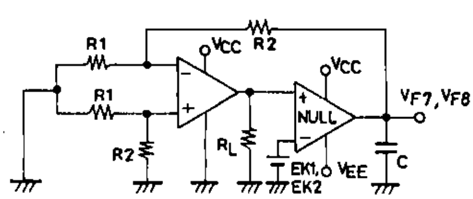
$$I_B = \frac{V_{F4}-V_{F3}}{2R(1+R2/R1)}$$

4. Common-mode Rejection Ratio CMR
Common-mode Input Voltage Range V_{ICM}



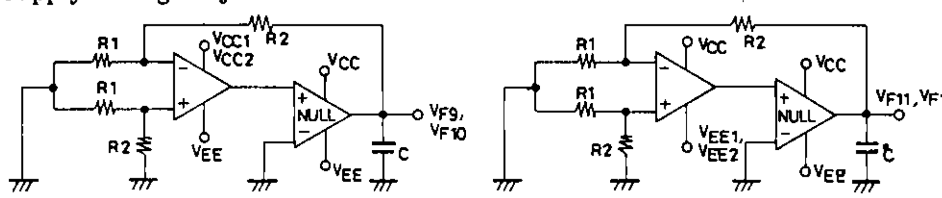
$$CMR = 20\log\left|\frac{(E_{C1}-E_{C2})(1+R2/R1)}{V_{F5}-V_{F6}}\right|$$

5. Voltage Gain VG



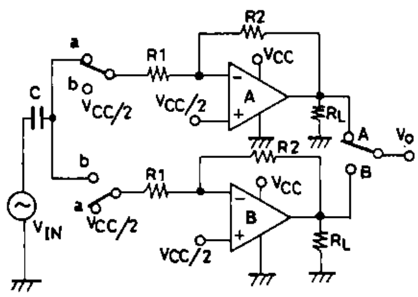
$$VG = \frac{(E_{K1}-E_{K2})(1+R2/R1)}{V_{F8}-V_{F7}}$$

6. Supply Voltage Rejection SVR



$$SVR(+)=20\log\left|\frac{(1+R2/R1)(V_{CC1}-V_{CC2})}{V_{F9}-V_{F10}}\right| \qquad SVR(-)=20\log\left|\frac{(1+R2/R1)(V_{EE1}-V_{EE2})}{V_{F11}-V_{F12}}\right|$$

7. Channel Separation CS



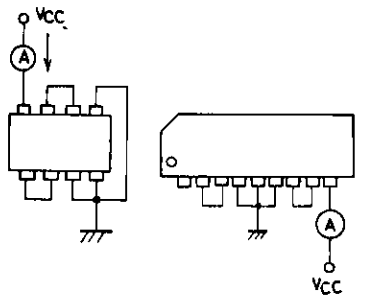
SW : a

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

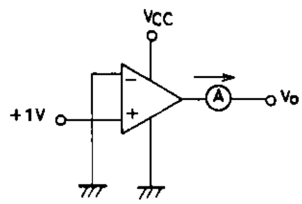
SW : b

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

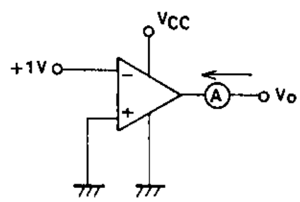
8. Current Dissipation I_{CC}



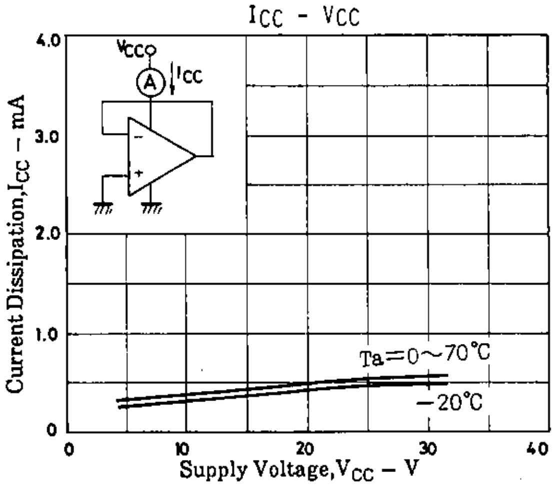
9. Output Current $I_{O\,source}$



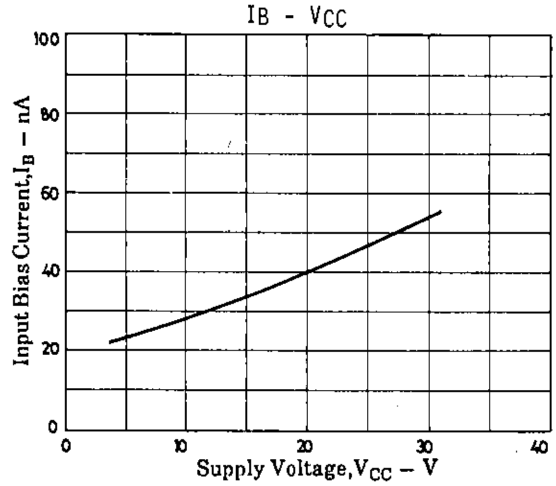
10. Output Current $I_{O\,sink}$



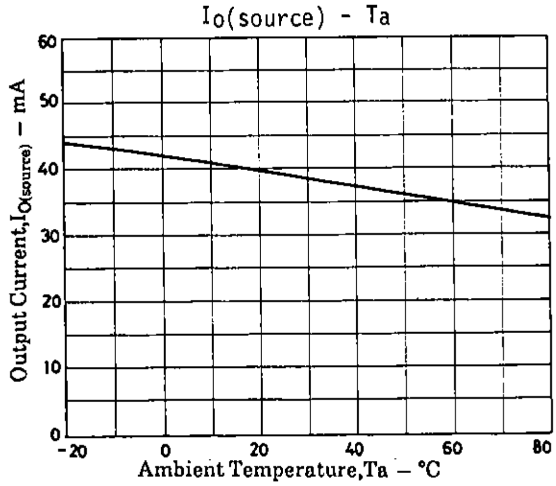
I_{CC} - V_{CC}



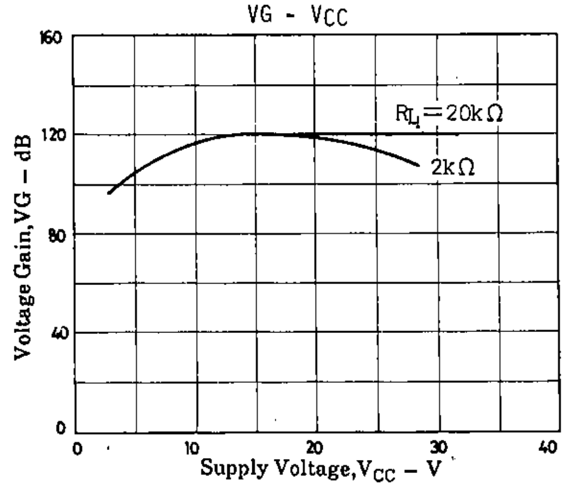
I_B - V_{CC}

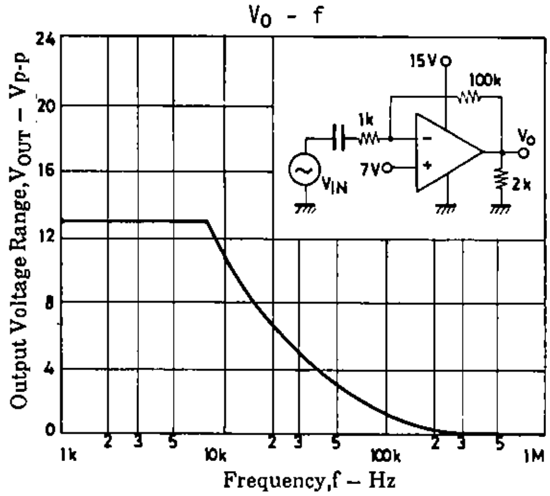


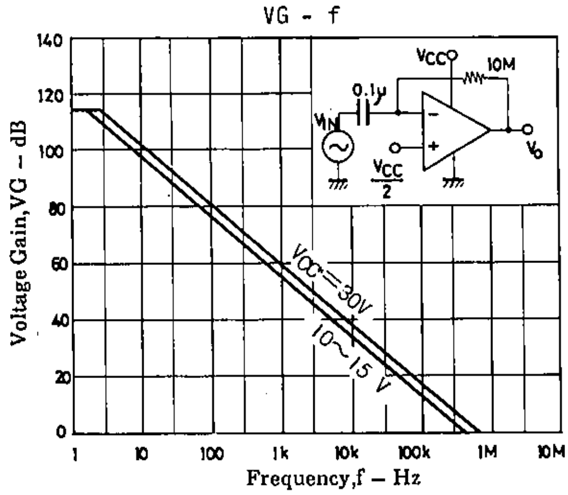
I_O(source) - Ta

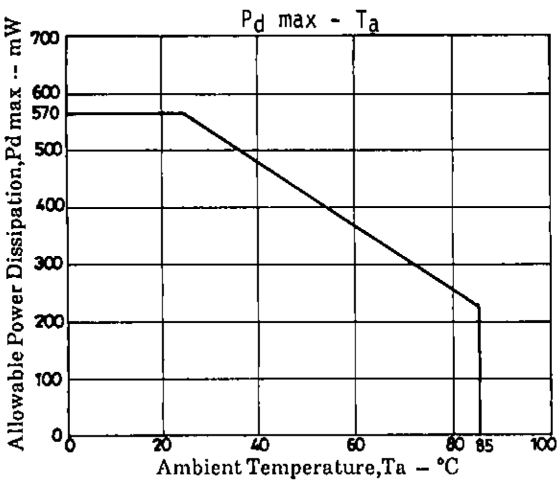


VG - V_{CC}



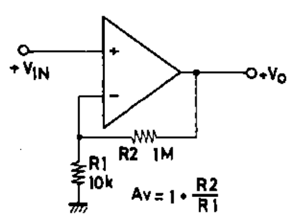




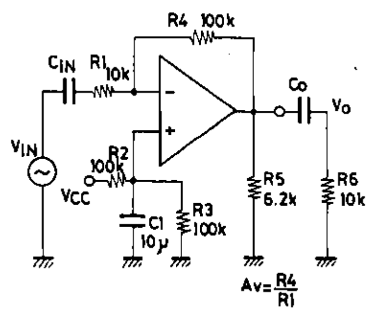


Sample Application Circuits

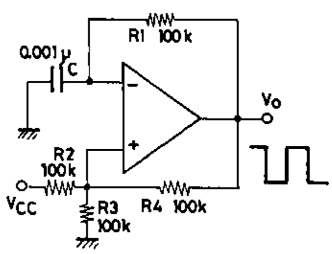
Noninverting DC amplifier



Inverting AC amplifier



Rectangular wave oscillator



Unit (resistance:Ω capacitance:F)