# M5260L, P, FP

## DUAL HIGH-SPEED LOW-NOISE OPERATIONAL AMPLIFIERS (DOUBLE POWER SUPPLY TYPE)

### DESCRIPTION

M5260 is a double-power-supply type semiconductor integrated circuit designed for operational amplifiers used in audio equipments (i.e. compact disk players), graphic devices (i.e. video disk players), office automation devices, or general electronic devices. This IC contains two circuits of operational amplifiers which provide the internally phase-compensated high gain, high speed, wide range, low noise characteristics.

This IC has the almost same characteristics as that of 4560 type operational amplifiers and can be used as general dual amplifiers in cnmmon electronic devices.

Since this IC can also be used by the single power source and can operate with low supply voltage, it is suitable for general amplifiers in portable equipments. Moreover, large load current can be applied so that it is suitable for headphone amplifiers as well.

### FEATURES

- High gain and low distortion ............ $G_{VD}$ = 110dB
  THD = 0.0015% (typ.)
- High slew rate, high $f_T$ ............. SR = 4.0V/μsec
  $f_T$ = 14MHz (typ.)
- Low noise ($R_S$ = 1kΩ) FLAT .... $V_{NI}$ = 1.8μVrms (typ.)
  RIAA .... $V_{NI}$ = 0.9μVrms (typ.)
- Operation with low source voltage .... $V_{CC} \geq 4V$ (±2V)
- High load current, High power dissipation. . $I_{LP}$ = ±50mA
  $P_d$ = 800mW (SIP)
  $P_d$ = 625mW (DIP)
  $P_d$ = 440mW (Mini-flat)

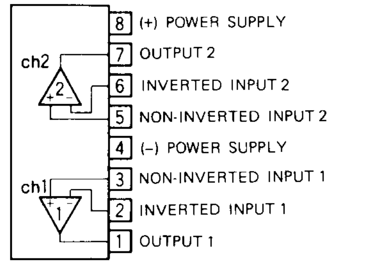
### APPLICATION

General amplifiers for compact disk units, VCRs, video disk players, or OA equipments and various operational circuits in general electrical devices, servo amplifiers, and active filters

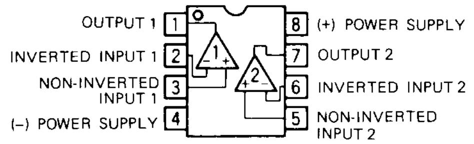
### RECOMMENDED OPERATING CONDITIONS

Supply voltage range ..................... ±2 ~ ±16V
Rated supply voltage ....................... ±15V

### PIN CONFIGURATION (TOP VIEW)

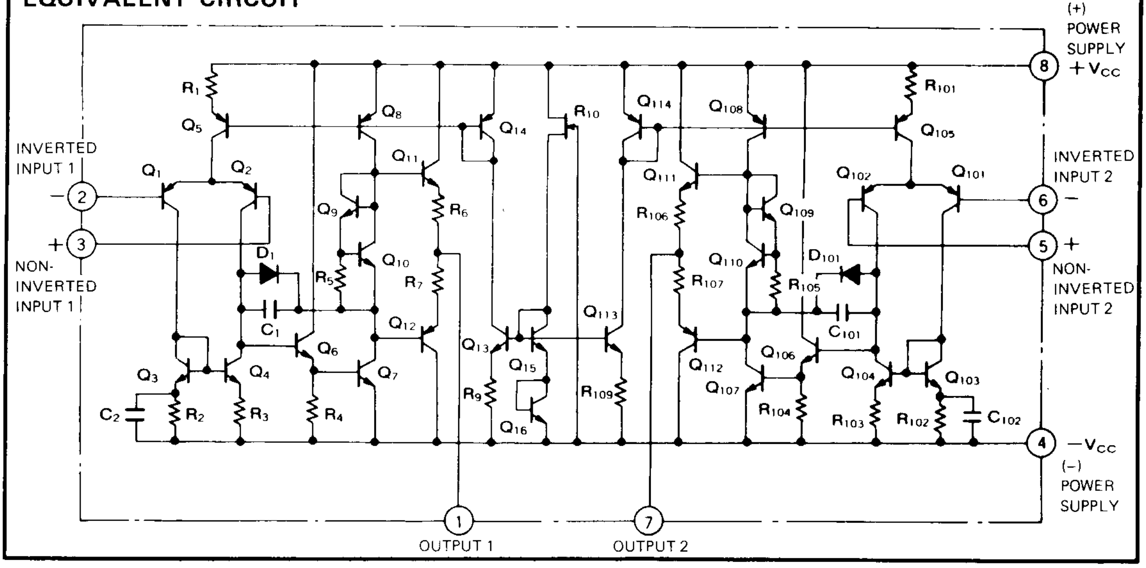



**Outline 8P5 (M5260L)**




**Outline 8P4 (M5260P)**
**8P2S (M5260FP)**

### EQUIVALENT CIRCUIT



**DUAL HIGH-SPEED LOW-NOISE OPERATIONAL AMPLIFIERS (DOUBLE POWER SUPPLY TYPE)**

## ABSOLUTE MAXIMUM RATINGS (Ta=25℃, otherwise noted)

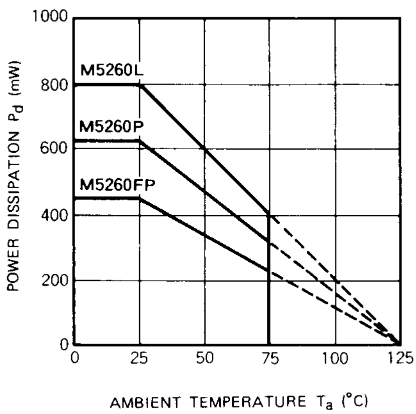
| Symbol | Parameter | Conditions | Ratings | Unit |
|---|---|---|---|---|
| $V_{CC}$ | Supply voltage | | ±18 | V |
| $I_{LP}$ | Load current | | ±50 | mA |
| $V_{id}$ | Differential input voltage | | ±30 | V |
| $V_{IC}$ | Common input voltage | | ±15 | V |
| Pd | Power dissipation | | 800(SIP)/625(DIP)/440(FP) | mW |
| $K_\theta$ | Thermal derating | Ta≧25℃ | 8(SIP)/6.25(DIP)/4.4(FP) | mW/℃ |
| Topr | Operating temperature | | −20～+75 | ℃ |
| Tstg | Storage temperature | | −55～+125 | ℃ |

## ELECTRICAL CHARACTERISTICS (Ta=25℃, $V_{CC}$=±15V)

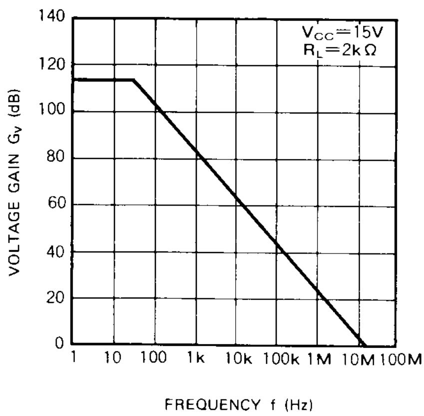
| Symbol | Parameter | Test conditions | Limits | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| $I_{CC}$ | Circuit current | $V_{in}$=0 | | 4.0 | 8.0 | mA |
| $V_{IO}$ | Input offset voltage | $R_S$≦10kΩ | | 0.5 | 6.0 | mV |
| $I_{IO}$ | Input offset current | | | 5 | 200 | nA |
| $I_{IB}$ | Input bias current | | | | 500 | nA |
| $R_{in}$ | Input resistance | | 0.3 | 5 | | MΩ |
| $G_{VO}$ | Open loop voltage gain | $R_L$≧2kΩ, $V_O$=±10V | 86 | 110 | | dB |
| $V_{OM}$ | Maximum output voltage | $R_L$≧10kΩ | ±12 | ±14 | | V |
| | | $R_L$≧2kΩ | ±10 | ±13 | | |
| $V_{CM}$ | Common input voltage range | | ±12 | ±14 | | V |
| CMRR | Common mode rejection ratio | $R_S$≦10kΩ | 70 | 90 | | dB |
| SVRR | Supply voltage rejection ratio | $R_S$≦10kΩ | | 30 | 150 | μV/V |
| Pd | Power dissipation | | | 90 | 180 | mW |
| SR | Slew rate | $G_V$=0dB, $R_L$=2kΩ | | 4.0 | | V/μs |
| $f_T$ | Gain band width product | | | 14 | | MHz |
| $V_{NI}$ | Input-referred noise voltage | $R_S$=1kΩ, BW : 10Hz～30kHz | | 1.8 | | μVrms |

## TYPICAL CHARACTERISTICS

### THERMAL DERATING (MAXIMUM RATING)

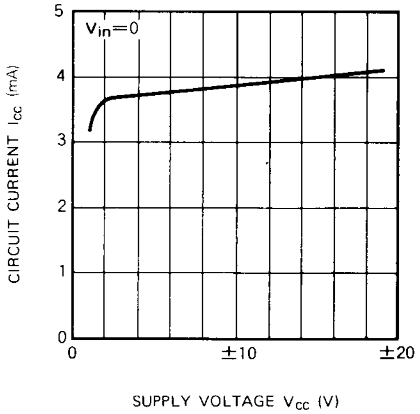



### VOLTAGE GAIN VS. FREQUENCY RESPONSE

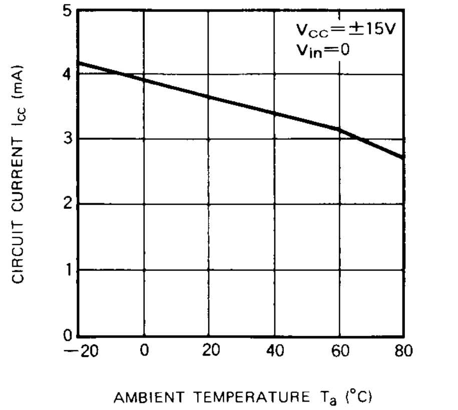


## DUAL HIGH-SPEED LOW-NOISE OPERATIONAL AMPLIFIERS (DOUBLE POWER SUPPLY TYPE)

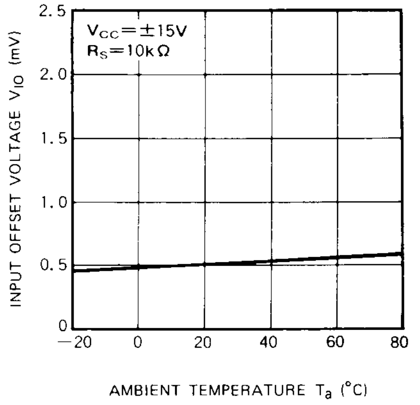
### CIRCUIT CURRENT VS. SUPPLY VOLTAGE



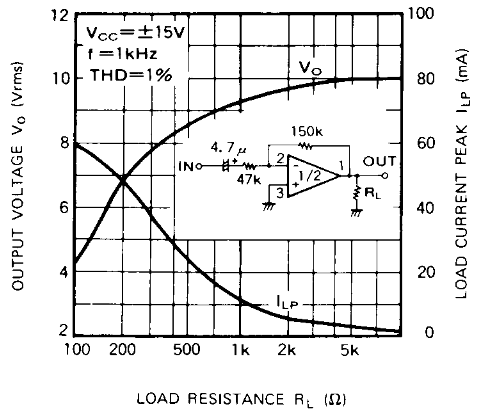

### CIRCUIT CURRENT VS. AMBIENT TEMPERATURE



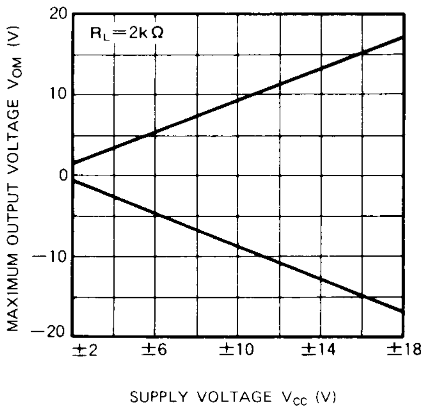

### INPUT OFFSET VOLTAGE VS. AMBIENT TEMPERATURE



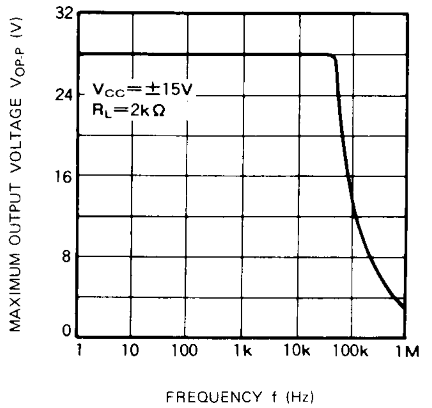

### OUTPUT VOLTAGE LOAD CURRENT PEAK VS. LOAD RESISTANCE



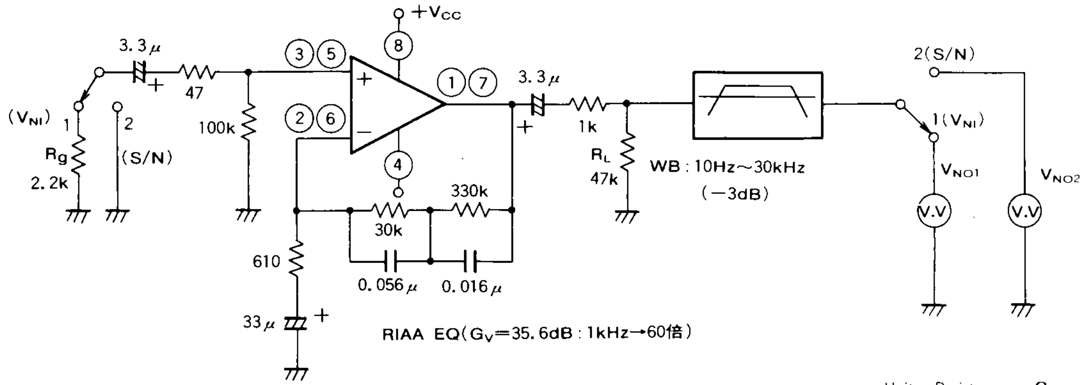

### MAXIMUM OUTPUT VOLTAGE VS. SUPPLY VOLTAGE




### MAXIMUM OUTPUT VOLTAGE VS. FREQUENCY RESPONSE



## $V_{NI}$, S/N

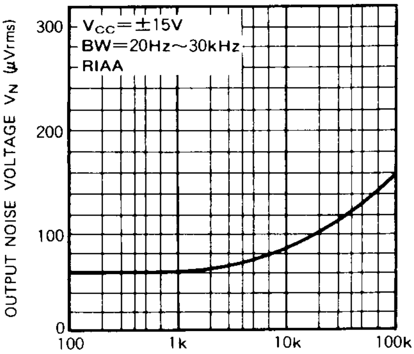



Unit Resistance: Ω
Capacitance: F

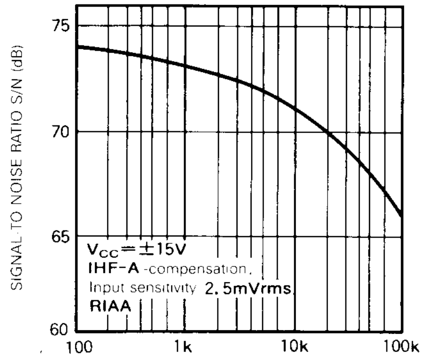
1. $V_{NI}=V_{NO1}/60$ [μVrms]
2. S/N=20 log(2.5mVrms $V_{NO2}$/60) [dB]

* A DC voltmeter to be used for the S/N measurement should be the IHF-A network filter (i.e. National noise meter VP-9690) built-in type.

**OUTPUT NOISE VOLTAGE VS. SIGNAL SOURCE RESISTANCE**



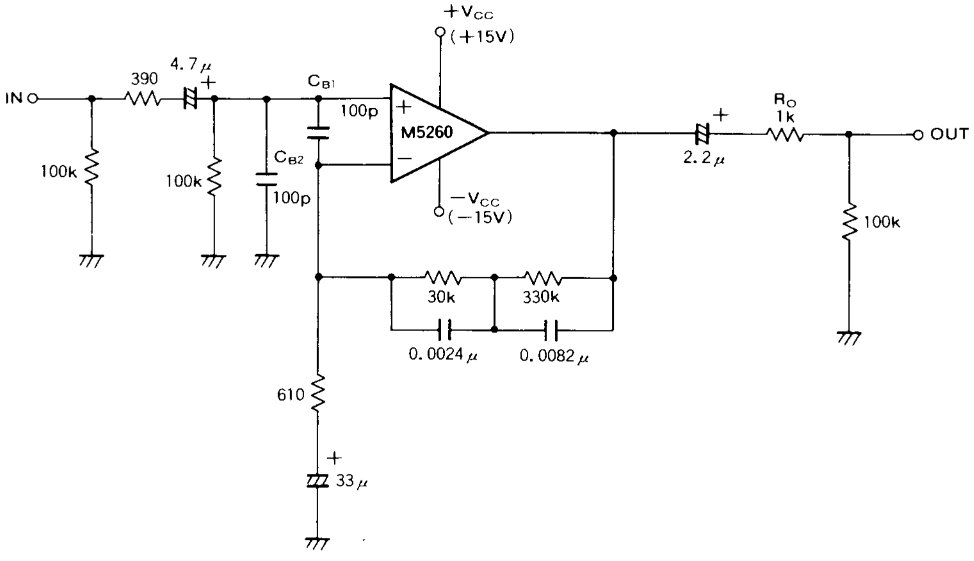

**SIGNAL VS. NOISE VOLTAGE RATIO VERSUS SIGNAL SOURCE RESISTANCE**



## About the RIAA (Record Industry Association of America)

In case that any sound is recorded on a record disk, long wave length (low tone) may exceeds the width of the ditch of the record so that the wave length becomes more longer, the amplitude should be more compressed. Also, since higher frequency elements will be picked up more as the noise by the record needle, the SN ratio will be increased in recording sound such that when the frequency becomes higher, the more emphasis is applied (preemphasis). Therefore, when you play a record you will need an equalizer circuit, which provides the opposite frequency characteristics to the recording characteristics, to obtain flat output.

## STERE EQUALIZER AMPLIFIER CIRCUIT

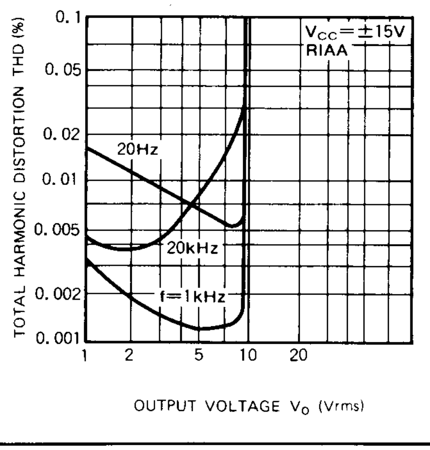



The circuit constant of $L_{ch}$ is the same as that of $R_{ch}$.
$C_{B1}$, $C_{B2}$: Capacitor for handling buzz. Use them if necessary.
$R_O$: Resistor used for controlling the current in case of abnormal current flow (i.e. short circuit at load end) or for preventing the parasitic oscillation for the capacitance load.

Typical characteristics ($V_{CC}$ = ±15V, RIAA)

- $G_V$ = 35.6dB (f = 1kHz)
- $V_{NI}$ = 1μVrms ($R_s$ = 1kΩ, BW = 20Hz to 30kHz)
- S/N = 74.0dB (IHF-A compensation, input short, input sensitivity 2.5mVrms)
- THD = 0.0015% (f = 1kHz, $V_O$ = 3Vrms)

**TOTAL HARMONIC DISTORTION VS. OUTPUT VOLTAGE**





MITSUBISHI ELECTRIC