



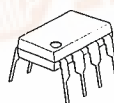
SWITCHING OPERATIONAL AMPLIFIER

■ GENERAL DESCRIPTION

The NJM 2120 is a dual operational amplifier of 2-INPUT and 1-OUTPUT with analog switch. The NJM2120 can be used as analog switch under the condition of $G_v=0$ dB, as Switch+Amp in order that each gain (A or B) can be adjusted independently. Each amplifier of the NJM2120 has the same electrical characteristics as the NJM4558.

The NJM2120 is suitable for Audio, Video, Electrical musical instrument...etc.

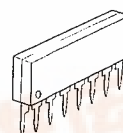
■ PACKAGE OUTLINE



NJM2120D



NJM2120M

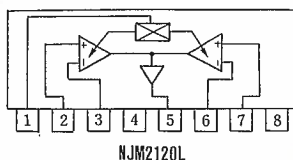
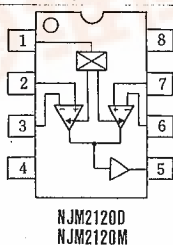


NJM2120L

■ FEATURES

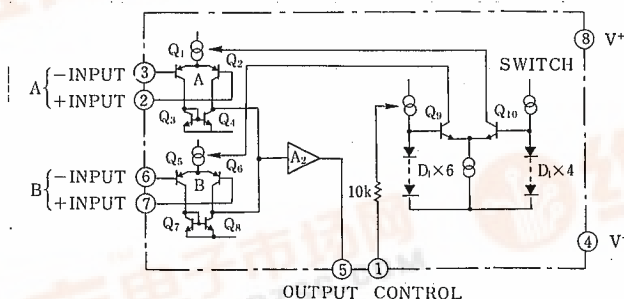
- Analog Switch Function
- Operating Voltage $(\pm 2.5V \sim \pm 18V)$
- Slew Rate $(2.2V/\mu s \text{ typ.})$
- Wide Unity Gain Bandwidth $(7MHz \text{ typ.})$
- Package Outline DIP8, DMP8, SIP8
- Bipolar Technology

■ PIN CONFIGURATION



- PIN FUNCTION
1. SW. CONTROL
 2. A +INPUT
 3. A -INPUT
 4. V^-
 5. OUTPUT
 6. B -INPUT
 7. B +INPUT
 8. V^+

■ EQUIVALENT CIRCUIT



■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|-----------------------------|--------------------------------|------------|------|
| Supply Voltage | V ⁺ /V ⁻ | ±18 | V |
| Differential Input Voltage | V _{ID} | ±30 | V |
| Input Voltage | V _{IC} | ±15 (note) | V |
| Output Current | I _O | ±50 | mA |
| Power Dissipation | P _D | (DIP8) 500 | mW |
| | | (DMP8) 300 | mW |
| | | (SIP8) 800 | mW |
| Operating Temperature Range | T _{opr} | -40 ~ +85 | °C |
| Storage Temperature Range | T _{stg} | -40 ~ +125 | °C |

■ ELECTRICAL CHARACTERISTICS

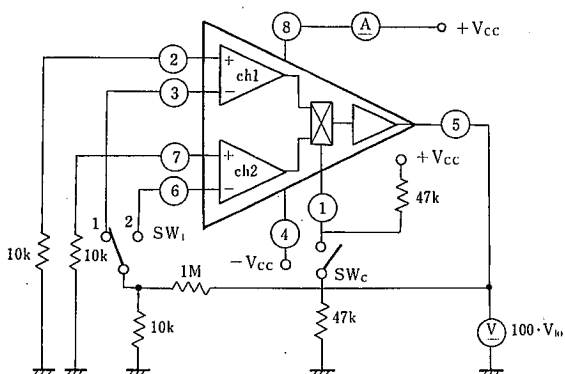
(V⁺/V⁻ = ±15V, Ta=25°C)

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|--------------------------------|-----------------|---|------|-------|------|-------|
| Operating Current | I _{CC} | V _{IN} SW ON | — | 2.3 | 6.0 | mA |
| | | SW OFF | — | 2.1 | 6.0 | mA |
| Input Offset Voltage | V _{IO} | R _S = 10kΩ | — | 0.8 | 6.0 | mV |
| Input Bias Current | I _B | | — | 80 | 500 | nA |
| Large Signal Voltage Gain | A _V | R _L = 2kΩ | — | 100 | — | dB |
| Maximum Output Voltage Swing | V _{OM} | R _L = 10kΩ | ±12 | ±14 | — | V |
| Total Harmonic Distortion | THD | f=1kHz, V _O =5Vrms, G _V =20dB | — | 0.002 | — | % |
| Supply Voltage Rejection Ratio | SVR | | — | 20 | 150 | μV/V |
| Channel Separation | CS | f=1kHz | — | 82 | — | dB |
| Unity Gain Bandwidth | f _T | G _V =0dB | — | 7 | — | MHz |
| Slew Rate | SR | G _V =0dB, R _L =2kΩ/100pF | — | 2.2 | — | V/μs |
| Equivalent Input Noise Voltage | V _{NI} | R _S =1kΩ, BW=10Hz~30kHz, Flat | — | 2.0 | — | μVrms |

NJM2120

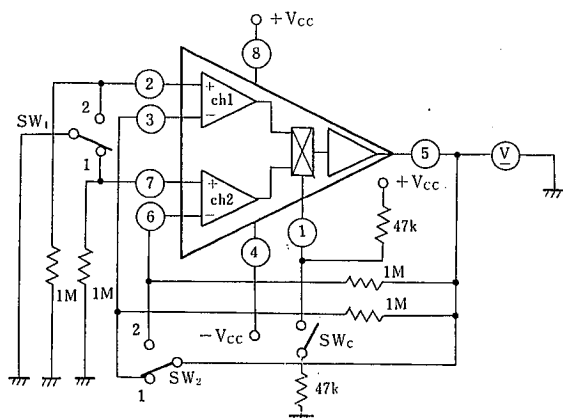
TEST CIRCUIT

(1) I_{CC} , V_{IO} , SVR



| | SW _c | SW ₁ | Select ch |
|--|-----------------|-----------------|-----------|
| I_{CC1} , V_{IO1} , SVR ₁ | OFF | 1 | ch 1 |
| I_{CC2} , V_{IO2} , SVR ₂ | ON | 2 | ch 2 |

(2) I_b , I_o



Unit Resistance: Ω
Capacity : F

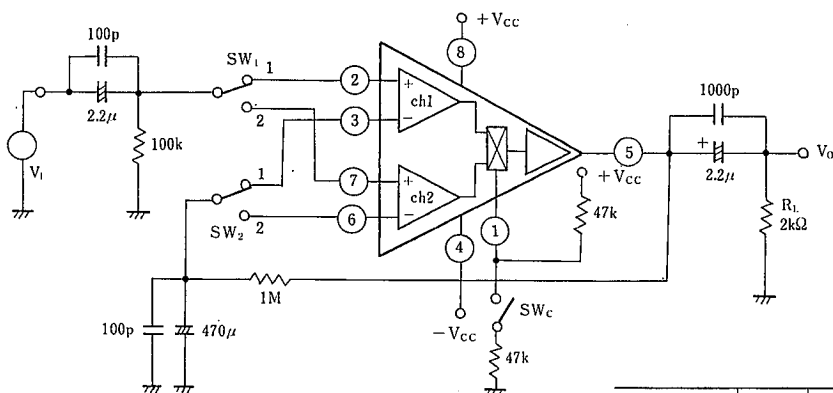
$$I_b^+ = V_o^+ / 1M\Omega$$

$$I_b^- = V_o^- / 1M\Omega$$

$$I_{IO} = |I_b^+ - I_b^-|$$

| | SW _c | SW ₁ | SW ₂ | Select ch |
|----------|-----------------|-----------------|-----------------|-----------|
| V_{O1} | OFF | 1 | 1 | ch 1 |
| V_{O1} | OFF | 2 | 2 | ch 1 |
| V_{O2} | ON | 2 | 2 | ch 2 |
| V_{O2} | ON | 1 | 1 | ch 2 |

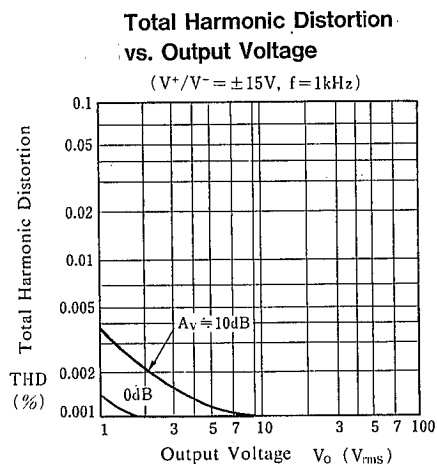
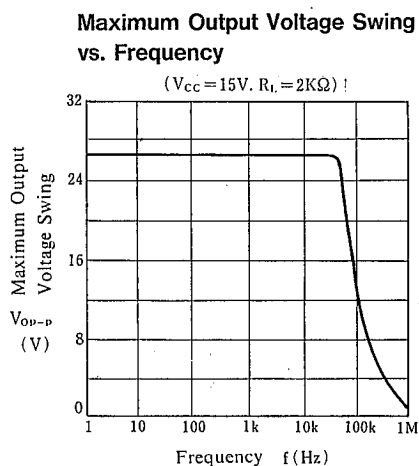
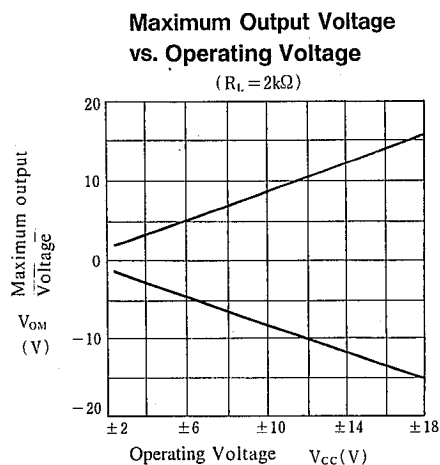
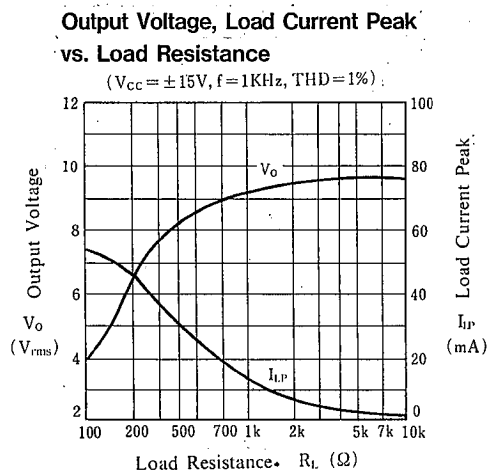
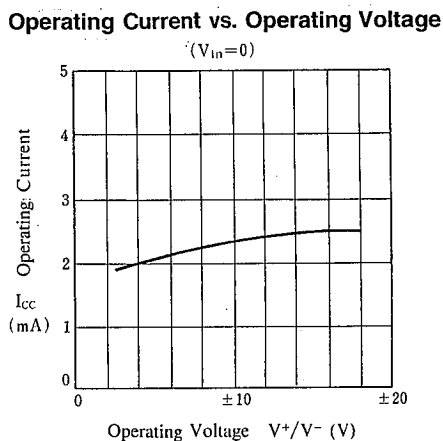
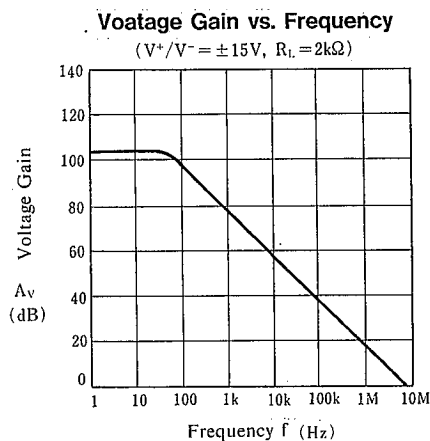
(3) f_t , A_v



Unit Resistance: Ω
Capacity : F

| | SW _c | SW ₁ | SW ₂ | Selection |
|---------------------|-----------------|-----------------|-----------------|-----------|
| f_{t1} , A_{v1} | OFF | 1 | 1 | ch 1 |
| f_{t2} , A_{v2} | ON | 2 | 2 | ch 2 |

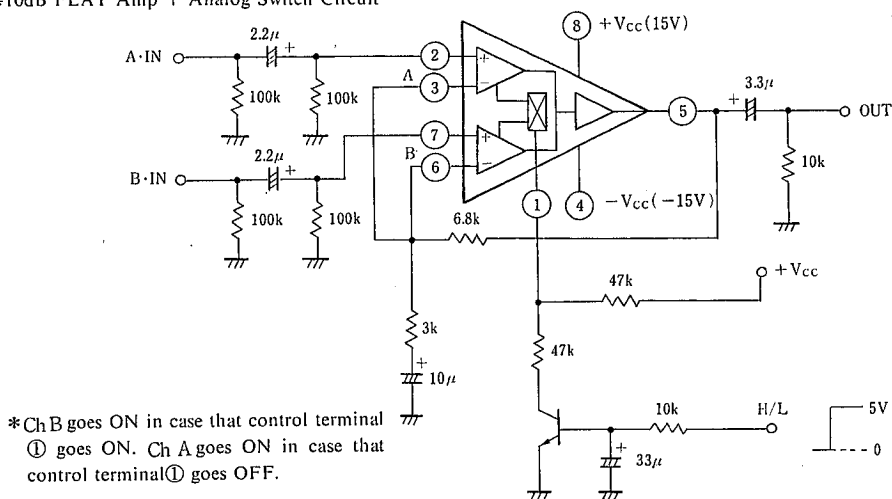
TYPICAL CHARACTERISTICS



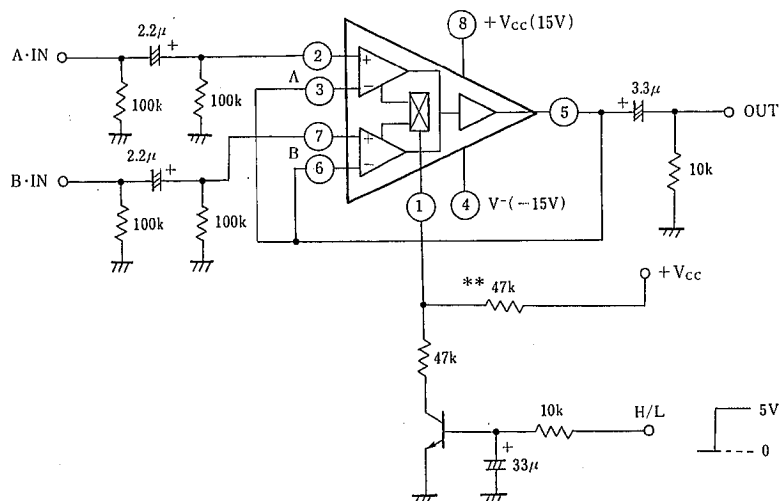
NJM2120

APPLICATION CIRCUIT

(1) $G_V \approx 10\text{dB}$ FLAT Amp + Analog Switch Circuit

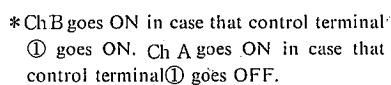


(2) Analog Switch Circuit ($G_V=0\text{dB}$ Voltage Follower Amp)



*: *Resistanc(**) is Pull-up-resistance for prevent from switching terminal ① going ON by leakage of external circuit (TR...etc).

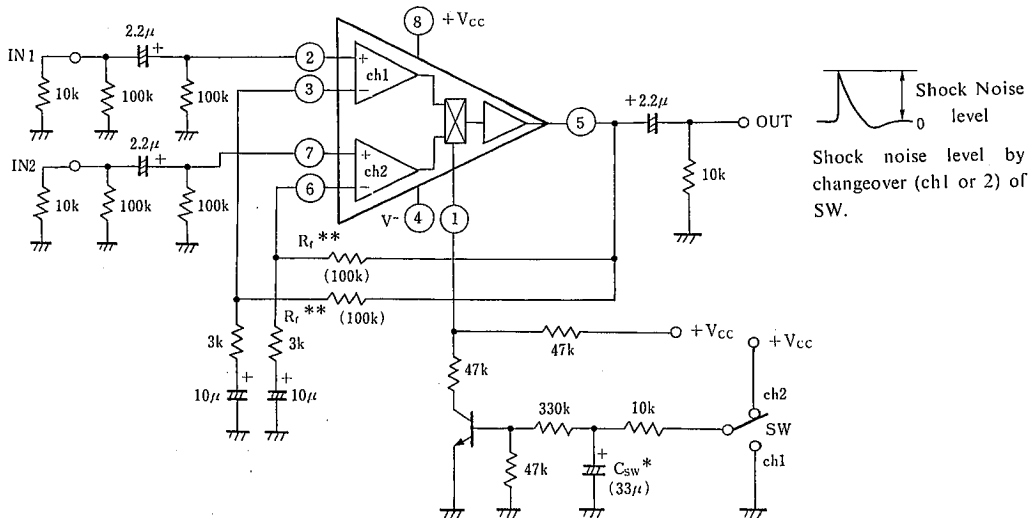
■ TYPICAL APPLICATION CIRCUIT



Unit Resistance: Ω
Capacity : F

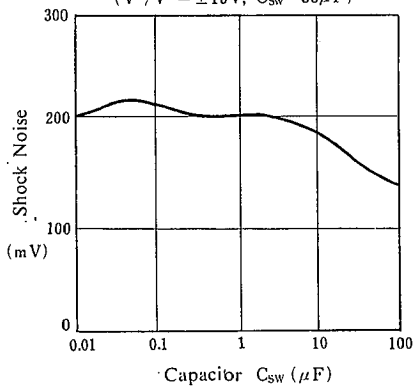
SHOCK NOISE TEST

Test Circuit



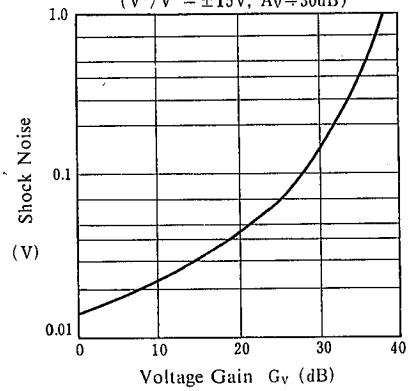
Shock Noise vs. Capacitor C_{sw}

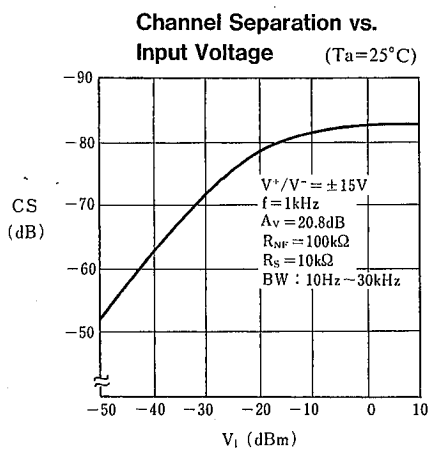
($V^+/V^- = \pm 15V$, $C_{sw} = 33\mu F$)



Shock Noise vs. Voltage Gain

($V^+/V^- = \pm 15V$, $A_v \approx 30dB$)



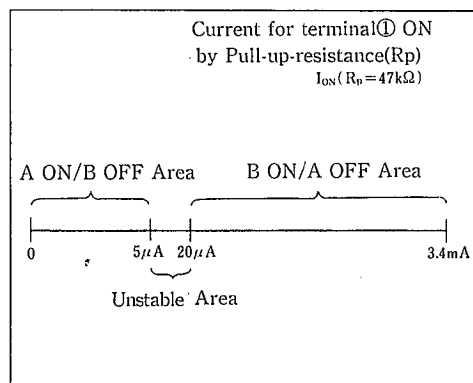
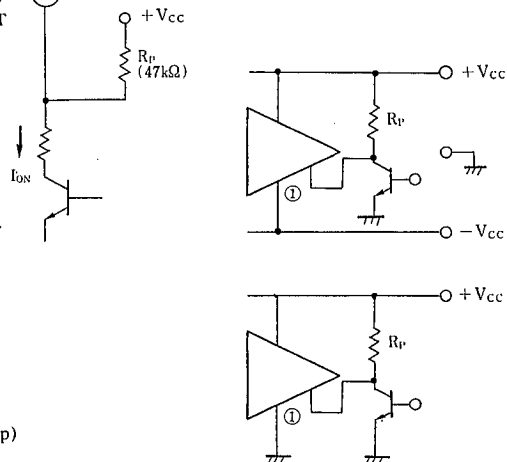


(continued)



Switch signal is communicated in case that V_F of Q26 goes ON; on current mirror which is composed with Q26 and Q27. Q10 goes ON by 4 diodes of Q10 in case that terminal ① goes OFF and Amp(ch A) goes active. Q9 goes ON by 6 diodes of Q9 in case that terminal ① goes ON and Amp(ch B) goes active. So, NJM2120 have merit that drive system is controlled freely. Because drive system is not related to supply voltage system (Single supply type/Two supply type) in order that switch change by current ON/OFF.

So, please use NJM2120 under the condition of lowering sensitivity for current ON/OFF by external Pull-up-resistance(Rp)



NJM2120

MEMO

[CAUTION]
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