

NJM2120

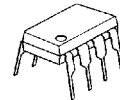
The NJM2120 is a dual operational amplifier of 2-INPUT and 1-OUTPUT with analog switch. The NJM2120 can be used as analog switch under the condition of $G_v=0$ dB, as Switch+Amp in order that each gain (A or B) can be adjusted independently. Each amplifier of the NJM2120 has the same electrical characteristics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

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

Absolute Maximum Ratings ($T_a=25^\circ\text{C}$)

Supply Voltage	V^+/V^-	$\pm 18\text{V}$
Differential Input Voltage	V_{ID}	$\pm 30\text{V}$
Input Voltage (note)	V_{IC}	$\pm 15\text{V}$
Output Current	I_O	$\pm 50\text{mA}$
Power Dissipation	P_D (D-type)	500mW
	(M-type)	300mW
	(L-type)	800mW
Operating Temperature Range	T_{opr}	$-20\sim+75^\circ\text{C}$
Storage Temperature Range	T_{stg}	$-40\sim+125^\circ\text{C}$

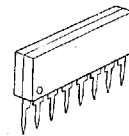
Package Outline



NJM2120D

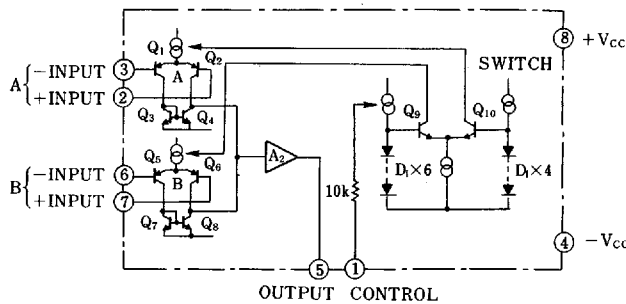


NJM2120M

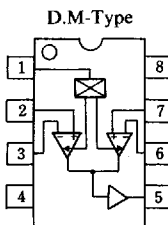


NJM2120L

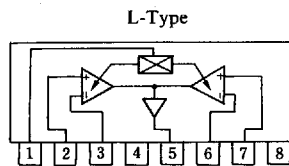
Equivalent Circuit



Connection Diagram



D.M-Type



L-Type

PIN FUNCTION

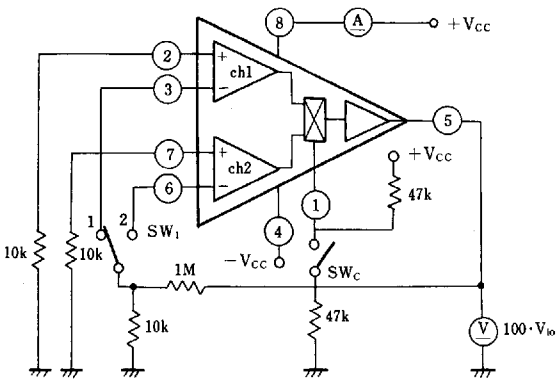
1. SW. CONTROL
2. A +INPUT
3. A -INPUT
4. V^-
5. OUTPUT
6. B -INPUT
7. B +INPUT
8. V^+

Electrical Characteristics ($V^+/V^- = \pm 15\text{V}$, $T_a = 25^\circ\text{C}$)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Supply Current	I_{CC}	V_{in} SW ON SW OFF	—	2.3 2.1	6.0 6.0	mA
Input Offset Voltage	V_{IO}	$R_S = 10\text{k}\Omega$	—	0.8	6.0	mV
Input Bias Current	I_B		—	80	500	nA
Open Voltage Gain	A_v	$R_L = 2\text{k}\Omega$	—	100	—	dB
Maximum Output Voltage	V_{OM}	$R_L = 10\text{k}\Omega$	± 12	± 14	—	V
Total Harmonic Distortion	THD	$f = 1\text{kHz}$, $V_o = 5\text{V}_{rms}$, $G_v = 20\text{dB}$	—	0.002	—	%
Supply Voltage Rejection Ratio	SVR		—	20	150	$\mu\text{V/V}$
Channel Separation	C·S	$f = 1\text{kHz}$	—	82	—	dB
Unity Gain Bandwidth	f_T	$G_v = 0\text{dB}$	—	7	—	MHz
Slew Rate	SR	$G_v = 0\text{dB}$, $R_L = 2\text{k}\Omega/100\text{pF}$	—	2.2	—	$\text{V}/\mu\text{s}$
Equivalent Input Noise Voltage	V_{NI}	$R_S = 1\text{k}\Omega$, $\text{BW} = 10\text{Hz} \sim 30\text{kHz}$, Flat	—	2.0	—	μV_{rms}

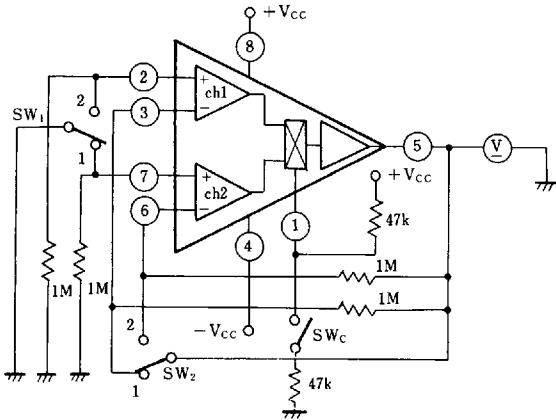
■ Test Circuit

(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_{IO}

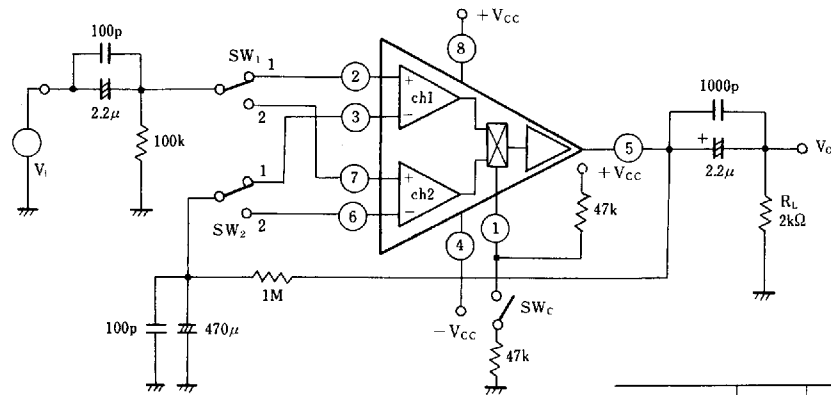


Unit Resistance: Ω
Capacity : F

$$I_b^+ = V_{O1}/1M\Omega$$
$$I_b^- = V_{O2}/1M\Omega$$
$$I_{IO} = |I_b^+ - I_b^-|$$

	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

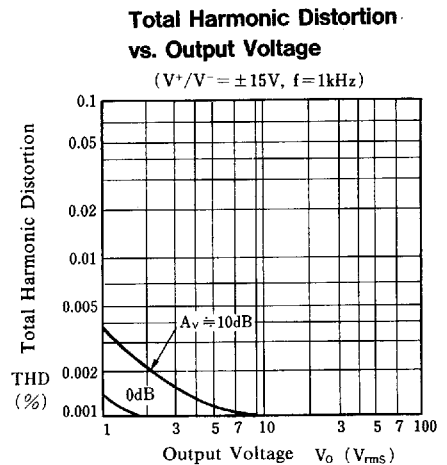
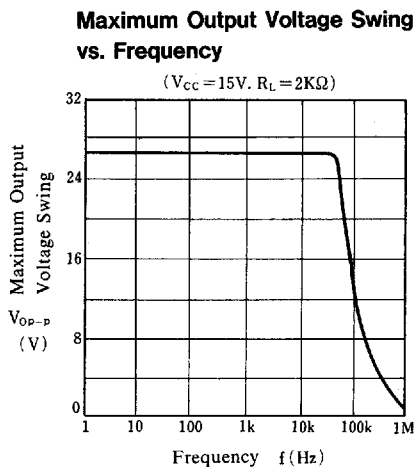
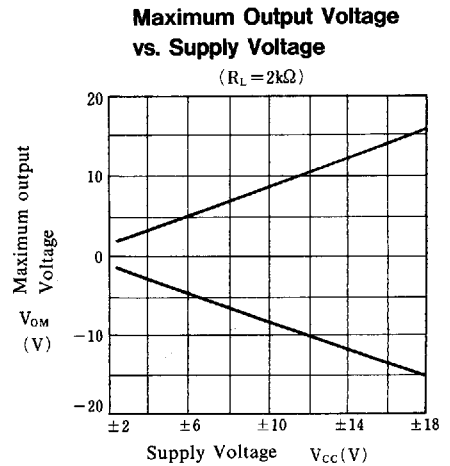
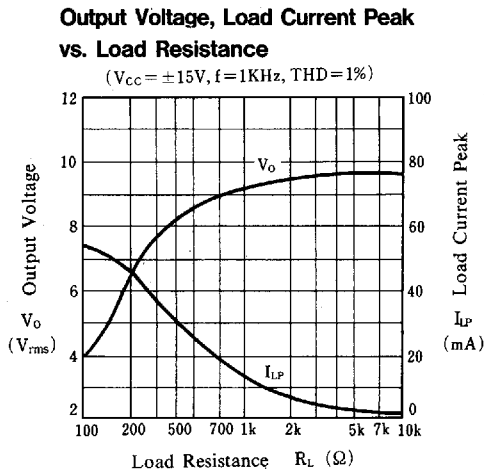
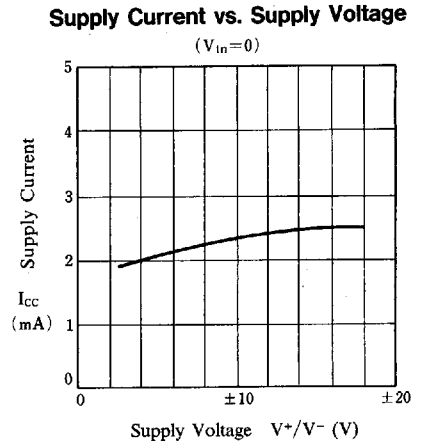
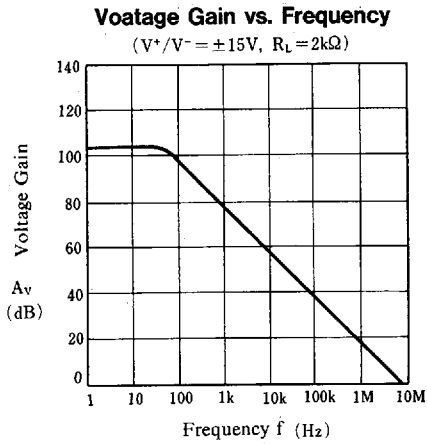
(3) f_t , A_v



Unit Resistance: Ω
Capacity : F

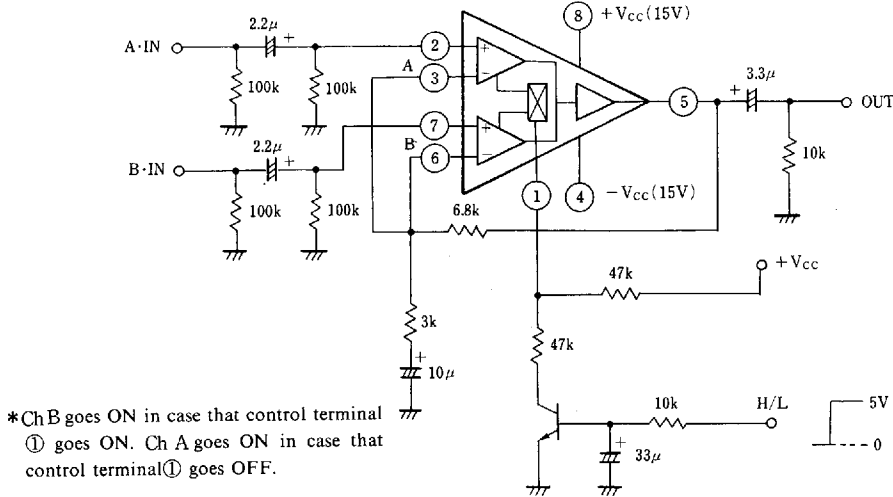
	SW _c	SW ₁	SW ₂	Selection
f_{t1} , A_{v1}	OFF	1	1	ch 1
f_{t2} , A_{v2}	ON	2	2	ch 2

■ Typical Characteristics



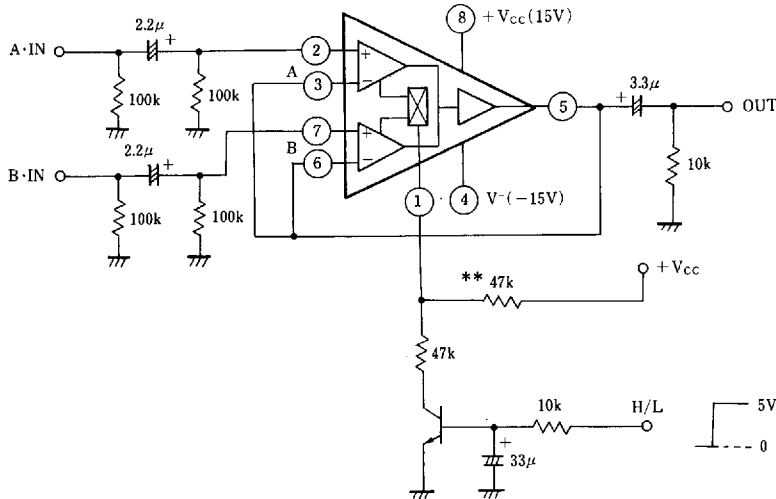
■ Application Circuit

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

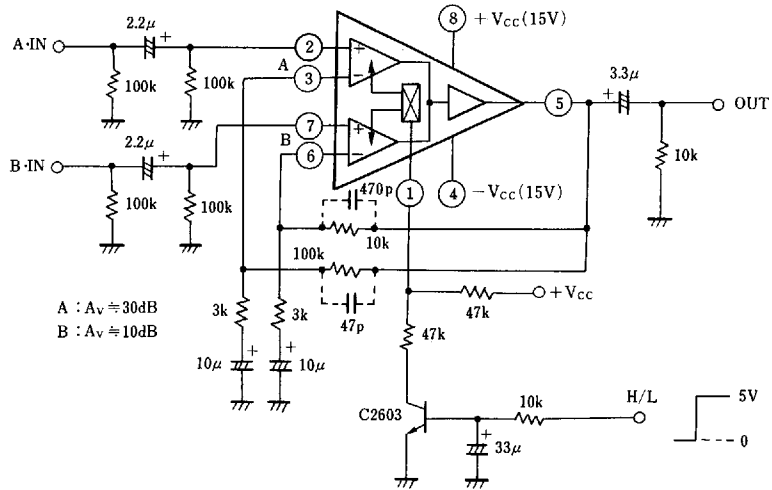


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(2) Analog Switch Circuit ($G_V=0\text{dB}$ Voltage Follower Amp)



■ Typical Application Circuit

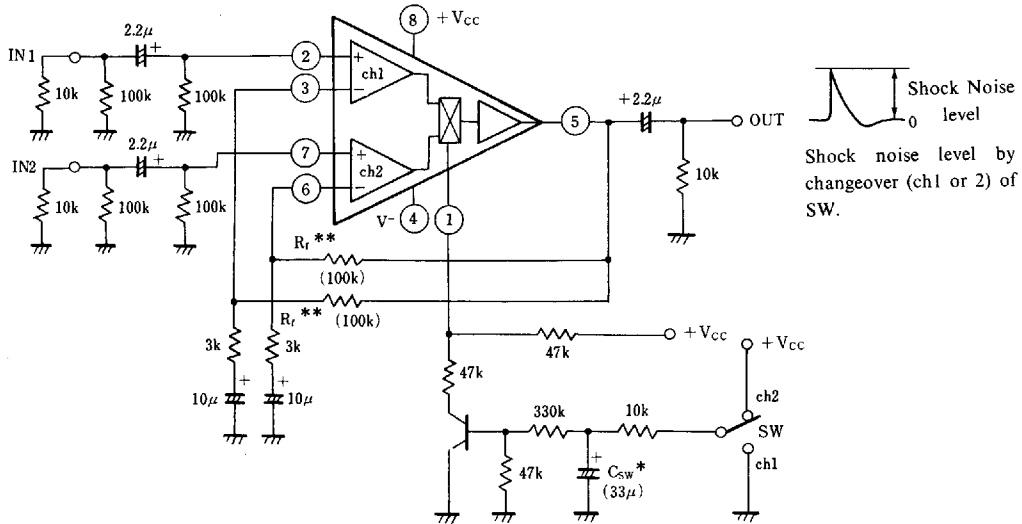


* ChB goes ON in case that control terminal
① goes ON. Ch A goes ON in case that
control terminal① goes OFF.

Unit Resistance: Ω
 Capacity : F

Shock Noise Test

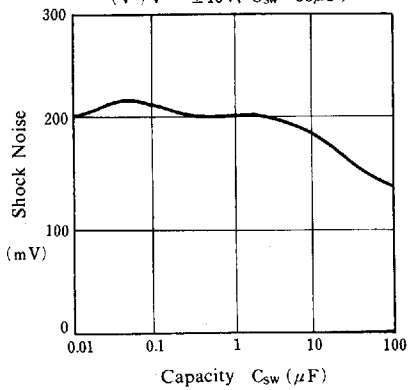
Test Circuit



4

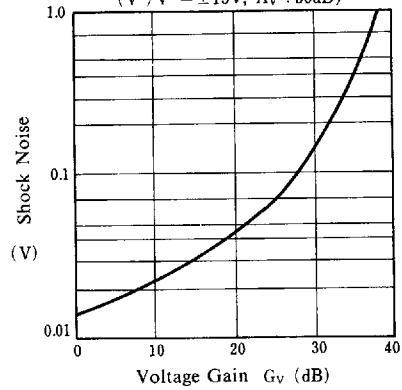
Shock Noise vs. Capacity C_{sw}

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

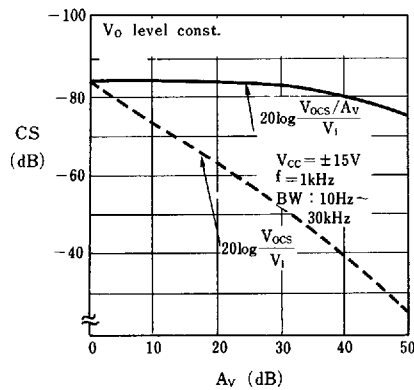


Shock Noise vs. Voltage Gain

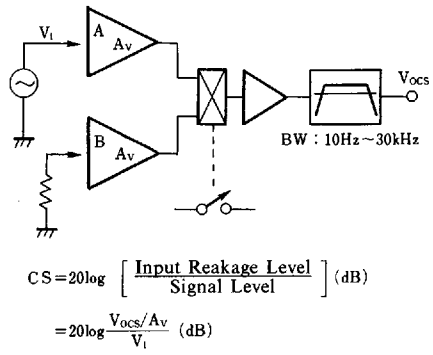
($V^+/V^- = \pm 15V$, $A_v \approx 30dB$)



■ Channel Separation



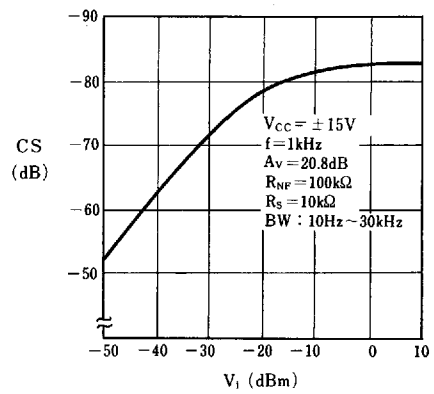
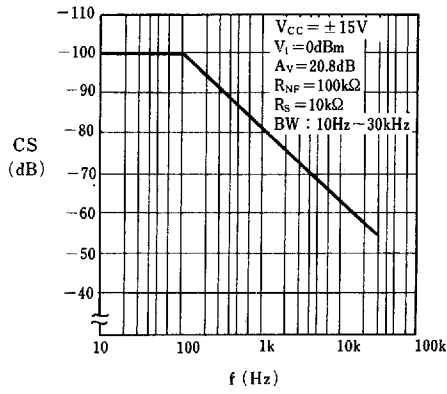
[In case of A:OFF/B:ON]



C·S is defined on ratio of reakege signal which occur on input side and input signal.

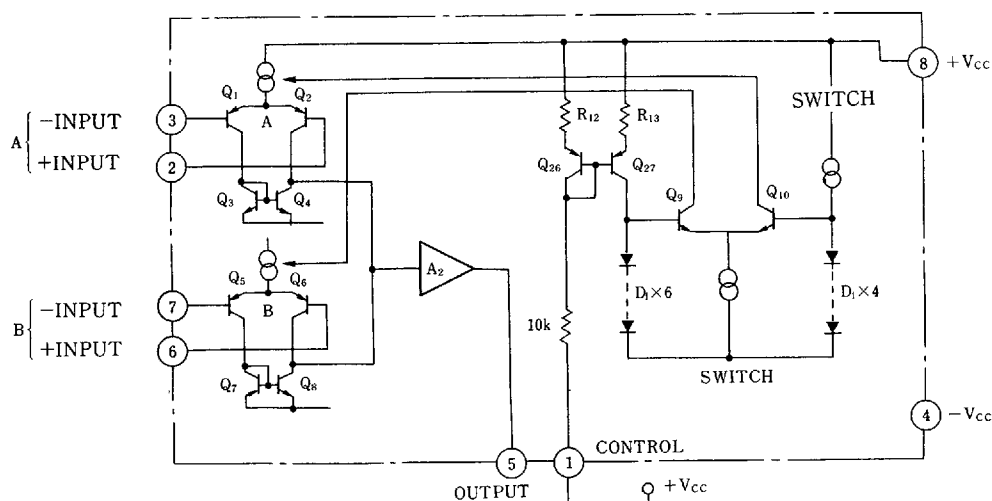
$$(20\log \frac{V_{ocs}}{V_i} / \frac{A_v}{V_i})$$

But, C·S seem to be inferior apparently in case that Gain(Av) is left out of consideration.



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Switching Mechanism



Switching mechanism of NJM2120 is as follows.

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.

But this switch goes ON by very little current because of signal communicate system which depend on ON of V_F .

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

