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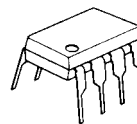
HIGH SPEED OPERATIONAL AMPLIFIER WITH SWITCH

■ GENERAL DESCRIPTION

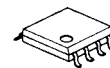
The NJM2121 is a dual operational amplifier of 2-INPUT and 1-OUTPUT with analog switch. The NJM2121 can be used as analog switch under the condition of $G_V=0\text{dB}$, as Switch + Amp in order that each gain (A or B) can be adjusted independently. Each amplifier of the NJM2121 has the same electrical characteristics as the NJM4560.

The NJM2121 is suitable for Audio, Video, Electrical musical instrument...etc.

■ PACKAGE OUTLINE



NJM2121D

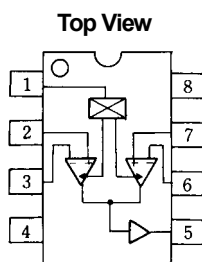


NJM2121M

■ FEATURES

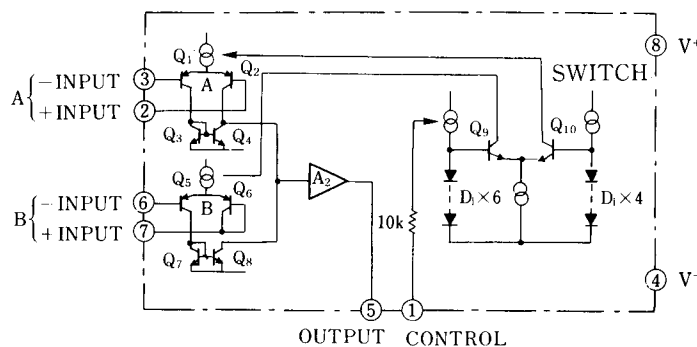
- Analog Switch Function
- Operating Voltage $(\pm 3\text{V} \sim \pm 18\text{V})$
- Slew Rate $(4\text{V}/\mu\text{s typ.})$
- Wide Unity Gain Bandwidth (14MHz typ.)
- Package Outline DIP8, DMP8
- Bipolar Technology

■ 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



NJM2121

■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+/V^-	± 18 (36)	V
Differential Input Voltage	V_{ID}	± 30	V
Input Voltage	V_{IC}	± 15	V
Output Current	I_O	± 50	mA
Power Dissipation	P_D	(DIP8) 500 (DMP8) 300	mW
Operating Temperature Range	T_{opr}	-20~+75	°C
Storage Temperature Range	T_{stg}	-40~+125	°C

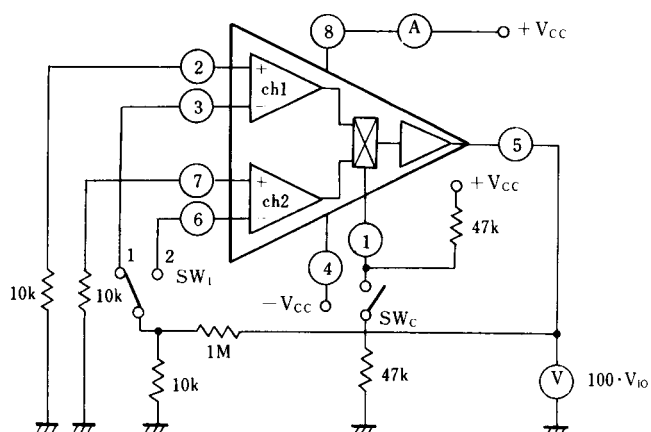
■ ELECTRICAL CHARACTERISTICS

($V^+/V^- = \pm 15V$, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Current	I_{CC}	V_{IN} SW ON SW OFF	- -	2.3 2.1	6.0 6.0	mA
Input Offset Voltage	V_{IO}	$R_S = 10k\Omega$	-	0.8	6.0	mV
Input Bias Current	I_B		-	0.2	1.0	μA
Large Signal Voltage Gain	A_V	$R_L = 2k\Omega$	-	110	-	dB
Maximum Output Voltage Swing	V_{OM}	$R_L \geq 10k\Omega$	± 12	± 14	-	V
Total Harmonic Distortion	THD	$f = 1kHz, V_O = 5V_{rms}, G_V = 20dB$	-	0.002	-	%
Supply Voltage Rejection Ratio	SVR		-	20	150	$\mu V/V$
Channel Separation	CS	$f = 1kHz$	-	82	-	dB
Unity Gain Bandwidth	f_T	$G_V = 0dB$	-	14	-	MHz
Slew Rate	SR	$G_V = 0dB, R_L = 2k\Omega / 100pF$	-	4	-	V/ μs
Equivalent Input Noise Voltage	V_{NI}	$R_S = 1k\Omega, BW = 10Hz \sim 30kHz, Flat$	-	2.0	-	μV_{rms}

■ TEST CIRCUIT

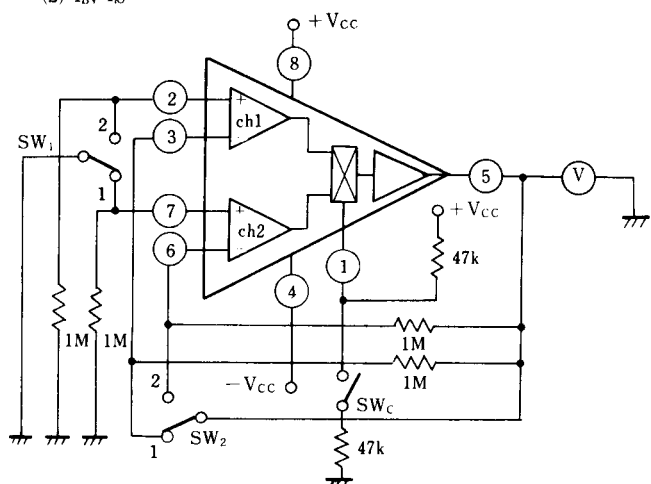
(1) I_{CC} , V_{IO} , SVR



	SW _C	SW _I	Select ch
I_{CC1} , V_{IO1} , SVR ₁	OFF	1	ch 1
I_{CC2} , V_{IO2} , SVR ₂	ON	2	ch 2

Unit Resistance : Ω
Capacity : F

(2) I_B , I_{IO}



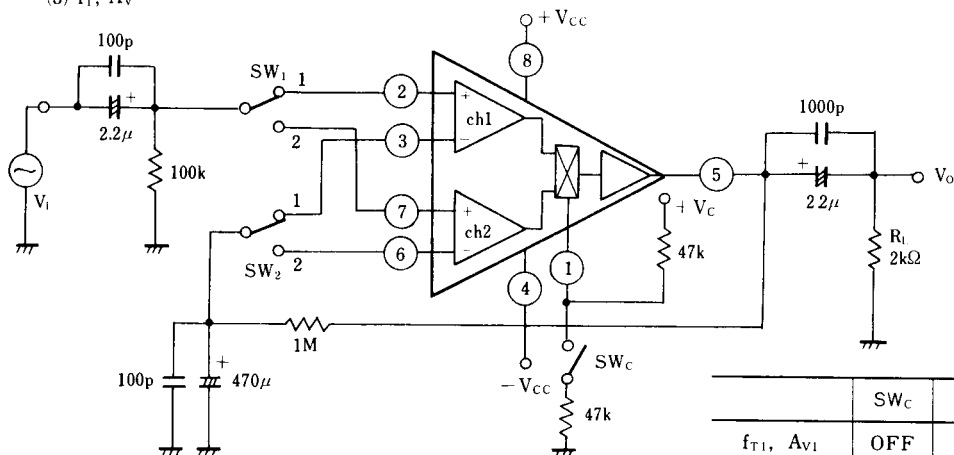
$$I_{B^+} = V_{O^+} / 1M\Omega$$

$$I_{B^-} = V_{O^-} / 1M\Omega$$

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

	SW _C	SW _I	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

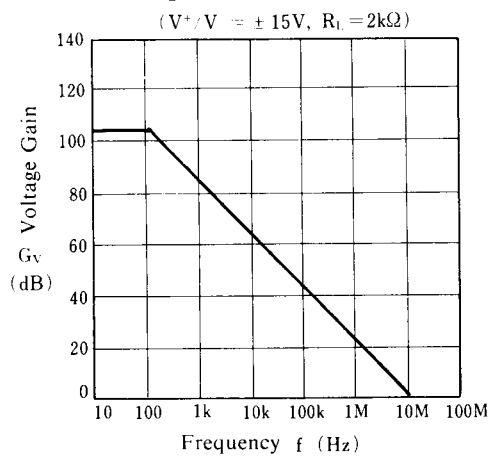
(3) f_T , A_v



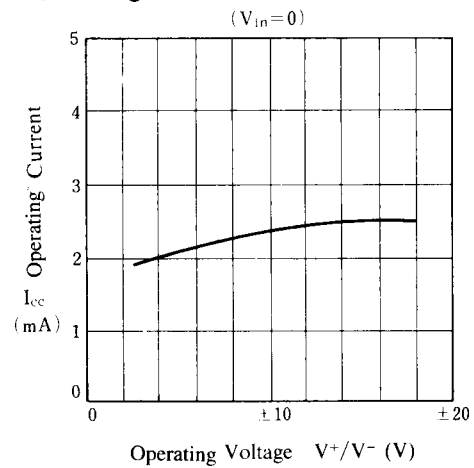
	SW _C	SW _I	SW ₂	Select ch
f_{T1} , A_{v1}	OFF	1	1	ch 1
f_{T2} , A_{v2}	ON	2	2	ch 2

■ TYPICAL CHARACTERISTICS

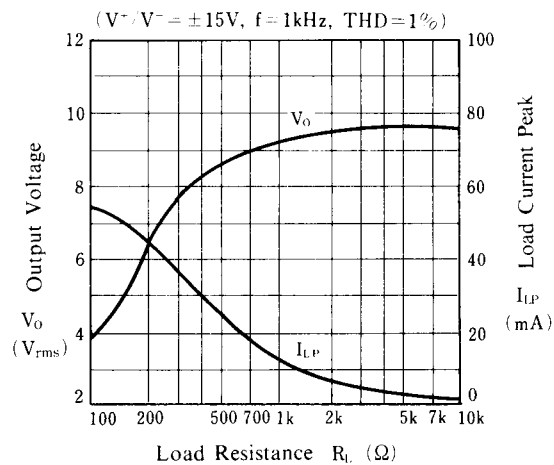
Voltage Gain vs. Frequency



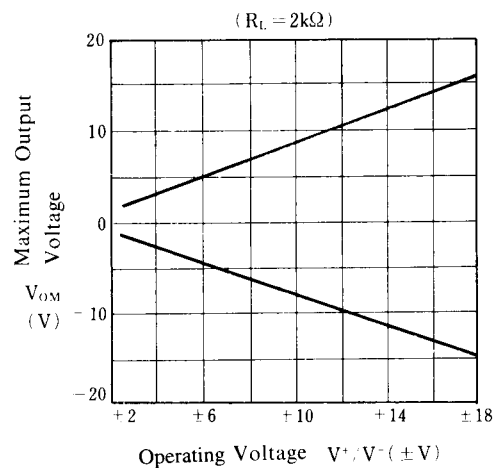
Operating Current vs. Operating Voltage



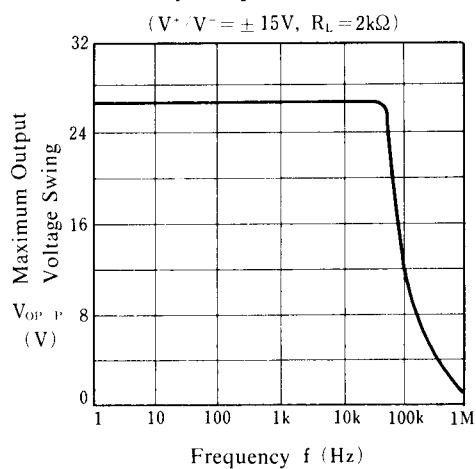
Output Voltage, Load Current Peak vs. Load Resistance



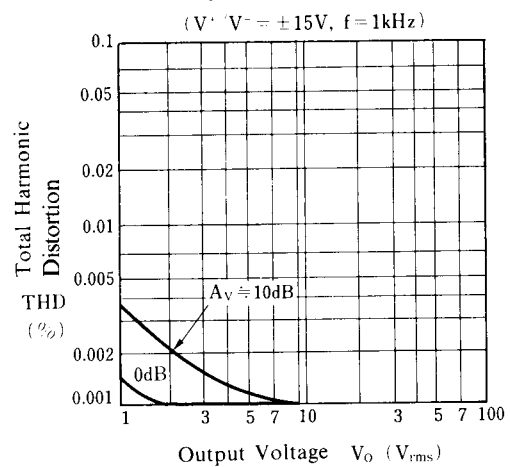
Maximum Output Voltage vs. Operating Voltage



Maximum Output Voltage Swing vs. Frequency

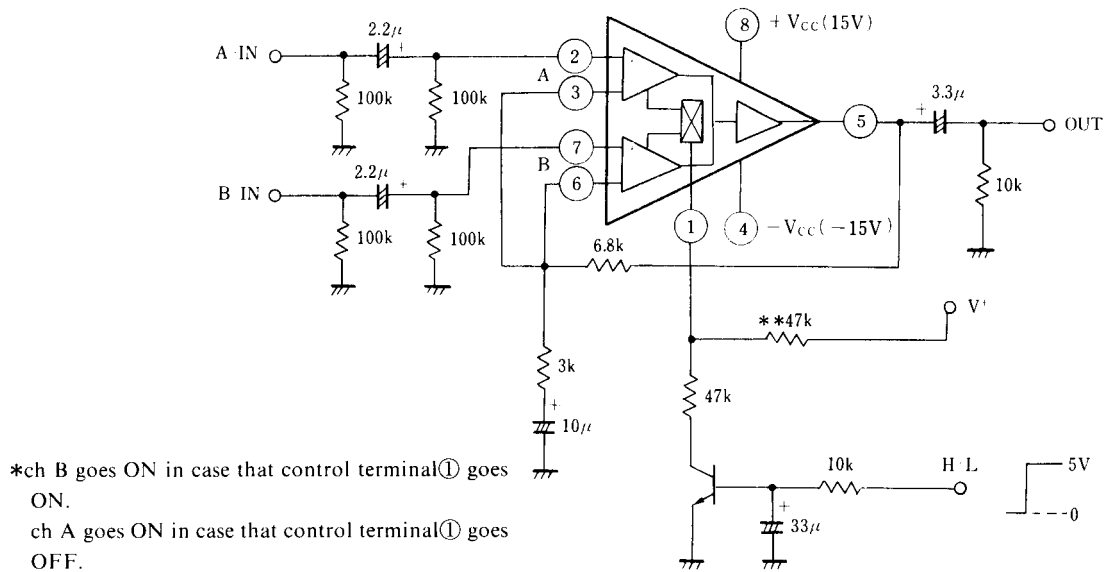


Total Harmonic Distortion vs. Output Voltage

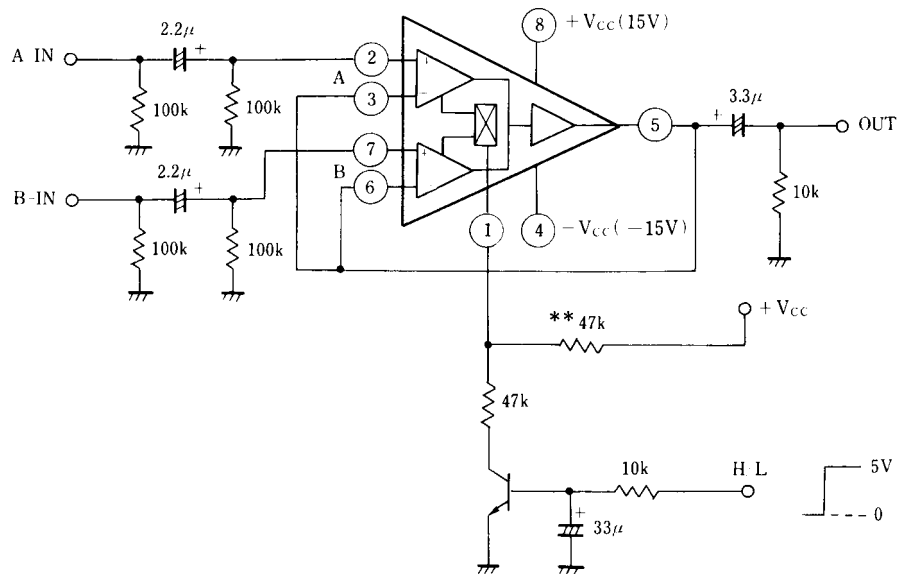


APPLICATION CIRCUIT

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

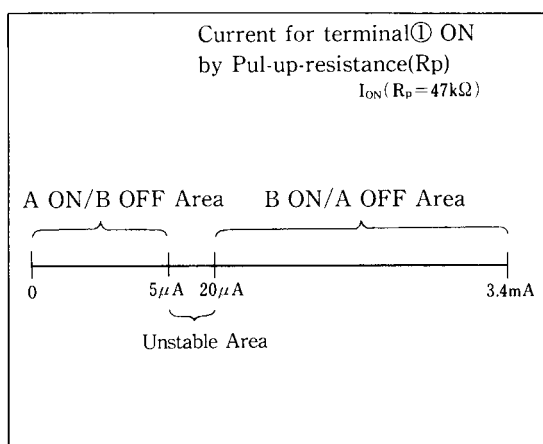
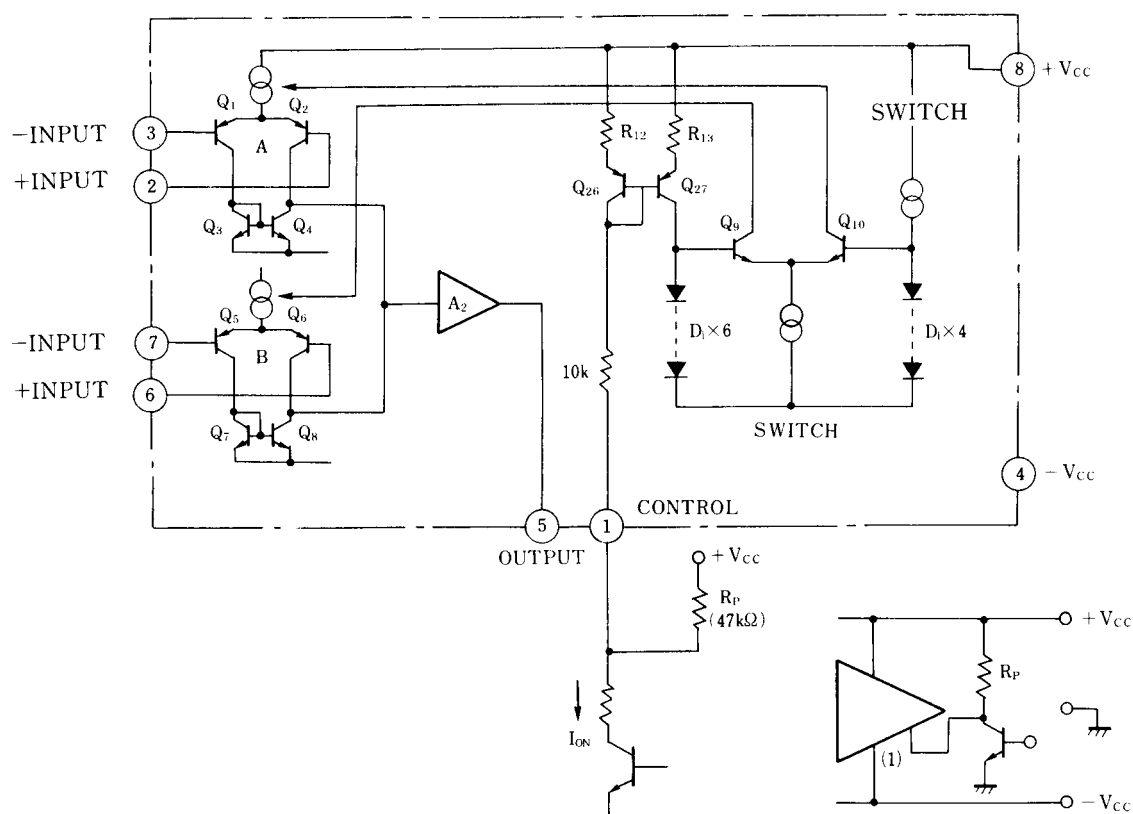


(2) Analog Switch Circuit ($G_V=0\text{dB}$ Voltage Follower Amp)



*Resistance(**) is Pull-up resistance for prevent from switching terminal① going ON by leakage of external circuit(TR...etc).

■ SWITCHING MECHANISM



Switching Mechanism of NJM2121 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, NJM2121 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 NJM2121 under the condition of lowering sensitivity for current ON/OFF by external Pull-up-resistance (R_p)

[CAUTION]

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