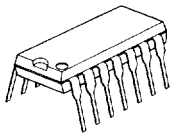
QUAD OPERATIONAL AMPLIFIER

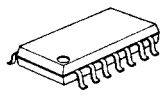
■ GENERAL DESCRIPTION

The NJM2060 integrated circuit is a high-gain, wide-bandwidth, quad operational amplifier capable of driving 20V peak-to-peak into 400Ω loads. The NJM2060 combines many of the features of the NJM2058 as well as providing the capability of wider bandwidth, and higher slew rate make the NJM2060 ideal for active filters, data and telecommunications, and many instrumentation applications. The availability of the NJM2060 in the surface mounted micro-package allows the NJM2060 to be used in critical applications requiring very high packing densities. Each amplifier of the NJM2060 has the same electrical characteristic of the NJM4560.

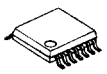
■ PACKAGE OUTLINE



NJM2060D



NJM2060M

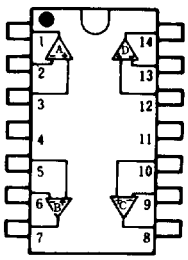


NJM2060V

■ FEATURES

- Operating Voltage (±4V～±18V)
- Low Noise Voltage (RIAA 1.2 μVrms typ.)
- Slew Rate (4V/μs typ.)
- Unity Gain Bandwidth (10MHz typ.)
- High Output Current (25mA)
- Package Outline DIP14, DMP14, SSOP14
- Bipolar Technology

■ PIN CONFIGURATION

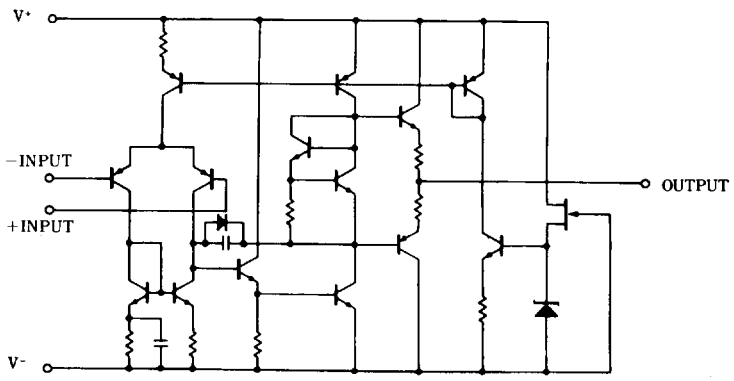


NJM2060D
NJM2060M
NJM2060V

PIN FUNCITON

1.	A OUTPUT	8.	C OUTPUT
2.	A−INPUT	9.	C−INPUT
3.	A+INPUT	10.	C+INPUT
4.	V+	11.	V−
5.	B+INPUT	12.	D+INPUT
6.	B−INPUT	13.	D−INPUT
7.	B OUTPUT	14.	D OUTPUT

■ EQUIVALENT CIRCUIT (1/4 Shown)



■ ABSOLUTE MAXIMUM RATINGS

(Ta=25℃)

PARAMETER	SYMBOL	RATINGS		UNIT
Supply Voltage	V^+/V^-	±18		V
Differential Input Voltage	V_{ID}	±30		V
Input Voltage	V_I	±15	(note 1)	V
Power Dissipation	P_D	(DIP14) 700		mW
		(DIM14) 700	(note 2)	mW
		(SSOP14) 300		mW
Operating Temperature Range	T_{opr}	−20～+75		℃
Storage Temperature Range	T_{stg}	−40～+125		℃

(note 1) For supply voltage less than ±15V. the absolute maximum input voltage is equal to the supply voltage.
(note 2) At on PC board

■ ELECTRICAL CHARACTERISTICS

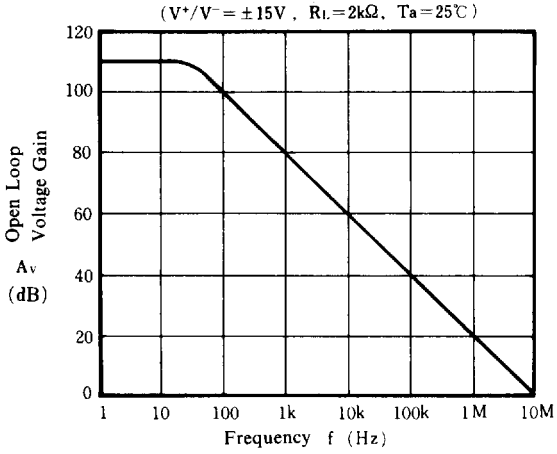
(Ta =25℃, V^+=15V, V^-=−15V)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V_{IO}	R_S≦10kΩ	—	0.5	6	mV
Input Offset Current	I_{IO}		—	5	200	nA
Input Bias Current	I_B		—	40	500	nA
Input Resistance	R_{IN}		100	500	—	kΩ
Large Signal Voltage Gain	A_V	R_L≧2kΩ, V_O=±10V	86	100	—	dB
Maximum Output Voltage Swing 1	V_{OM1}	R_L≧ 2kΩ	±12	±14	—	V
Maximum Output Voltage Swing 2	V_{OM2}	I_O=25mA	±10	±11.5	—	V
Input Common Mode Voltage Range	V_{ICM}		±12	±14	—	V
Common Mode Rejection Ratio	CMR	R_S≦10kΩ	70	90	—	dB
Supply Voltage Rejection Ratio	SVR	R_S≦10kΩ	76	90	—	dB
Operating Current	I_{CC}		—	9	14	mA
Slew Rate	SR		—	4	—	V/μs
Gain Bandwidth Product	GB		—	10	—	MHz
Equivalent Input Noise Voltage	V_{NI}	RIAA R_S =2.2kΩ, 30kHz L.P.F.	—	1.2	—	μVrms

■ TYPICAL CHARACTERISTICS

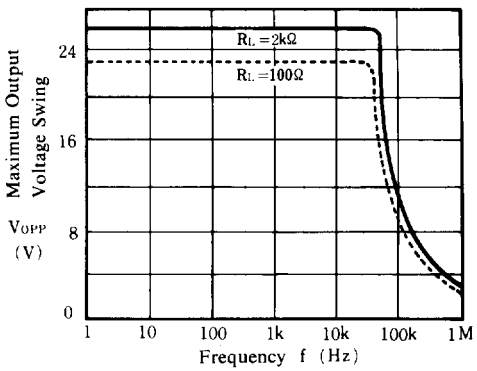
Open Loop Voltage Gain vs. Frequency

($V^+/V^-=\pm15V$, $R_L=2k\Omega$, $Ta=25℃$)



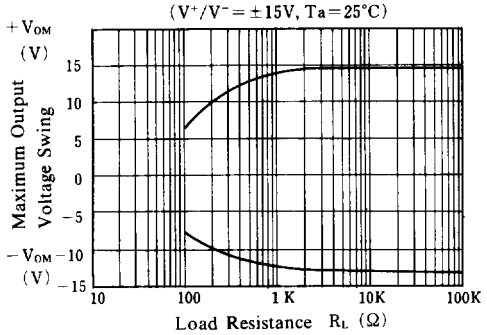
Maximum Output Voltage Swing vs. Frequency

($V^+/V^-=\pm15V$, $Ta=25℃$)



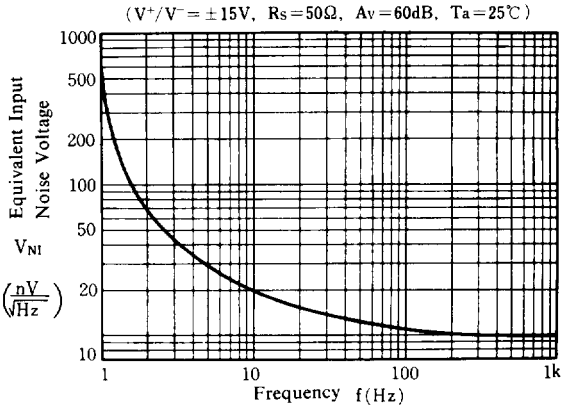
Maximum Output Voltage Swing vs. Lood Resistance

($V^+/V^-=\pm15V$, $Ta=25°C$)



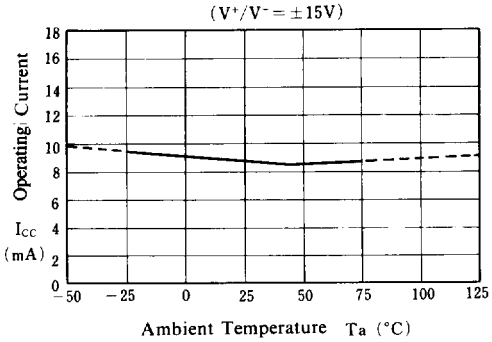
Equivalent Input Noise Voltage vs. Frequency

($V^+/V^-=\pm15V$, $Rs=50\Omega$, $Av=60dB$, $Ta=25℃$)



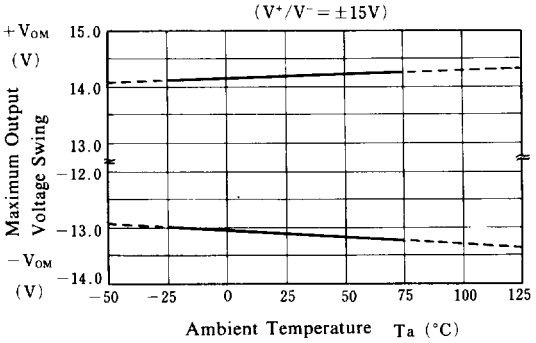
Operating Current vs. Temperature

($V^+/V^-=\pm15V$)



Maximum Output Voltage Swing vs. Temperature

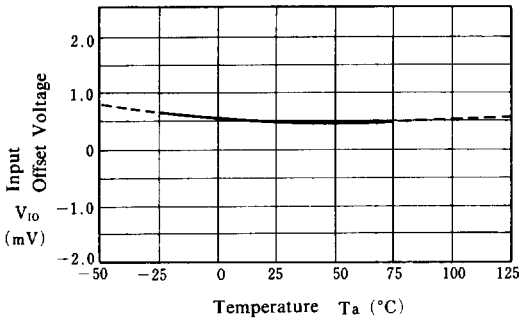
($V^+/V^-=\pm15V$)



■ TYPICAL CHARACTERISTICS

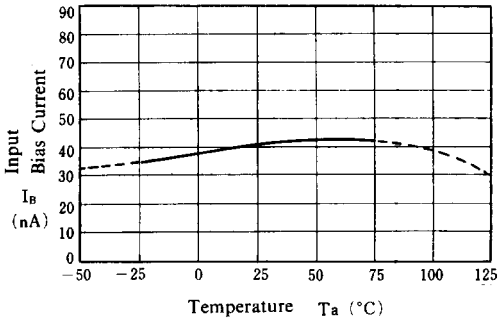
Input Offset Voltage vs. Temperature

($V^+/V^-=\pm15V$)



Input Bias Current vs. Temperature

($V^+/V^-=\pm15V$)



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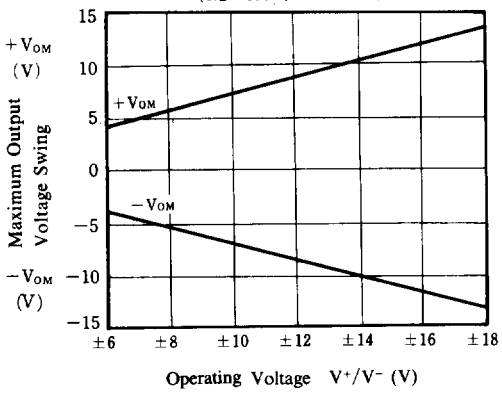
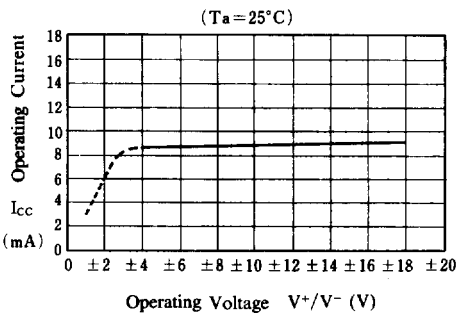
Maximum Output Voltage Swing vs. Operating Voltage

($R_L=400\Omega$, $Ta=25°C$)



Operating Current vs. Operating Voltage

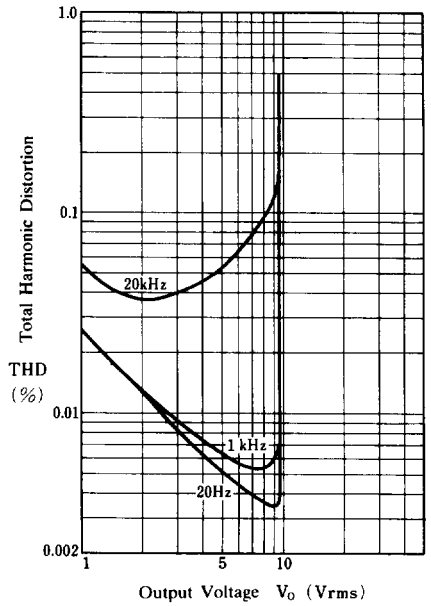
($Ta=25°C$)



■ TYPICAL CHARACTERISTICS

Total Harmonic Distortion

($V^+/V^-=\pm15V$, Gain=40dB, $R_L=10k\Omega$, Ta=25°C)



Total Harmonic Distortion

($V^+/V^-=\pm15V$, Gain=40dB, $R_L=2k\Omega$, Ta=25°C)