

## QUAD OPERATIONAL AMPLIFIER

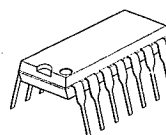
## ■ GENERAL DESCRIPTION

The NJM2059 integrated circuit is a quad high-gain operational amplifier internally compensated and constructed on a single silicon chip using an advanced epitaxial process.

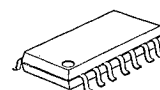
The NJM2059 has wider unity gain bandwidth and larger slew rate compared to the NJM2058.

Each amplifier of the NJM2059 has the same electrical characteristics of the NJM4559.

## ■ PACKAGE OUTLINE



NJM2059D



NJM2059M

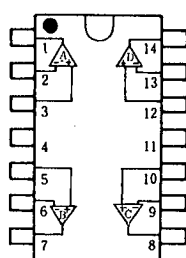


NJM2059V

## ■ FEATURES

- Operating Voltage ( $\pm 4V \sim \pm 18V$ )
- Slew Rate ( $2V/\mu s$  typ.)
- Unity Gain Bandwidth (6MHz typ.)
- Package Outline DIP14, DMP14, (SSOP14)
- Bipolar Technology

## ■ PIN CONFIGURATION

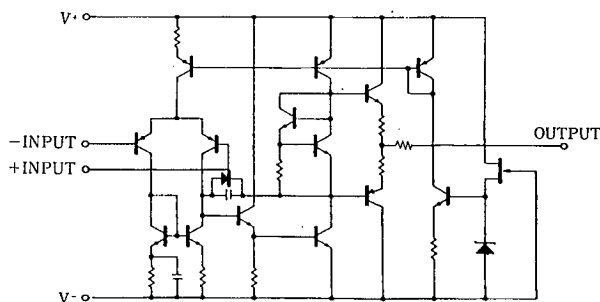


NJM2059D  
NJM2059M  
NJM2059L

## PIN FUNCTION

- |             |              |
|-------------|--------------|
| 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°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sup>+</sup> /V <sup>-</sup>	±18	V
Differential Input Voltage	V <sub>ID</sub>	±30	V
Input Voltage	V <sub>IC</sub>	±15 (note 1)	V
Power Dissipation	P <sub>D</sub>	(DIP14) 700	mW
		(DIM14) 700 (note 2)	mW
		(SSOP14) 300	mW
Operating Temperature Range	T <sub>opr</sub>	-40 ~ +85	°C
Storage Temperature Range	T <sub>stg</sub>	-40 ~ +125	°C

(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°C, V<sup>+</sup>/V<sup>-</sup>=±15V)

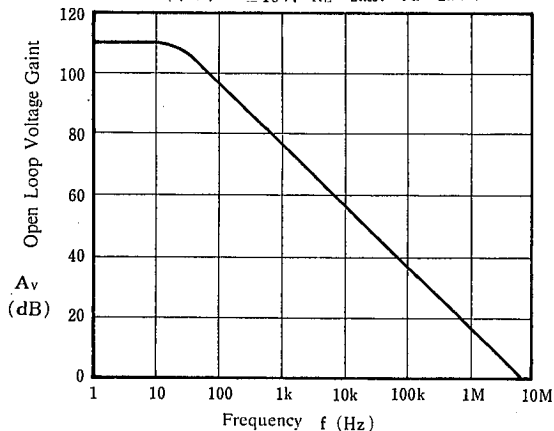
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V <sub>IO</sub>	R <sub>S</sub> ≤ 10kΩ	—	0.5	6	mV
Input Offset Current	I <sub>IO</sub>		—	5	200	nA
Input Bias Current	I <sub>B</sub>		—	20	500	nA
Input Resistance	R <sub>IN</sub>		0.3	1	—	MΩ
Large Signal Voltage Gain	A <sub>V</sub>	R <sub>L</sub> ≥ 2kΩ, V <sub>O</sub> = ±10V	86	100	—	dB
Maximum Output Voltage Swing 1	V <sub>OM1</sub>	R <sub>L</sub> ≥ 10kΩ	±12	±14	—	V
Maximum Output Voltage Swing 2	V <sub>OM2</sub>	R <sub>L</sub> ≥ 2kΩ	±10	±13	—	V
Input Common Mode Voltage Range	V <sub>ICM</sub>		±12	±14	—	V
Common Mode Rejection Ratio	CMR	R <sub>S</sub> ≤ 10kΩ	70	90	—	dB
Supply Voltage Rejection Ratio	SVR	R <sub>S</sub> ≤ 10kΩ	76.5	90	—	dB
Operating Current	I <sub>CC</sub>		—	7	11.3	mA
Slew Rate	SR		—	2	—	V/μs
Equivalent Input Noise Voltage	V <sub>N1</sub>	RIAA, R <sub>S</sub> = 2.2kΩ, 30kHz LPF	—	1.4	—	μVrms

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## TYPICAL CHARACTERISTICS

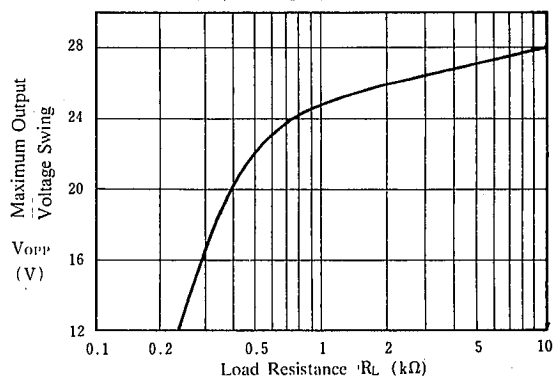
Open Loop Voltage Gain  
vs. Frequency

( $V^+/V^- = \pm 15V$ ,  $R_L = 2k\Omega$ ,  $T_a = 25^\circ C$ )



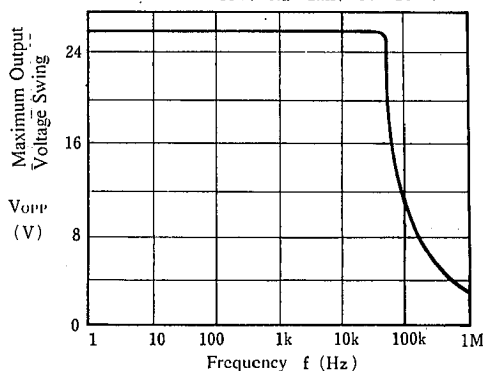
Maximum Output Voltage Swing  
vs. Load Resistance

( $V^+/V^- = \pm 15V$ ,  $T_a = 25^\circ C$ )



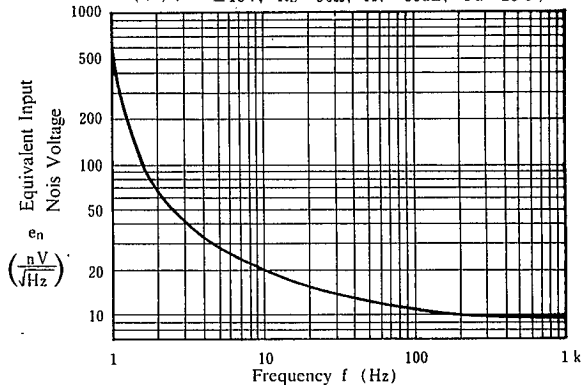
Maximum Output Voltage Swing  
vs. Frequency

( $V^+/V^- = \pm 15V$ ,  $R_L = 2k\Omega$ ,  $T_a = 25^\circ C$ )



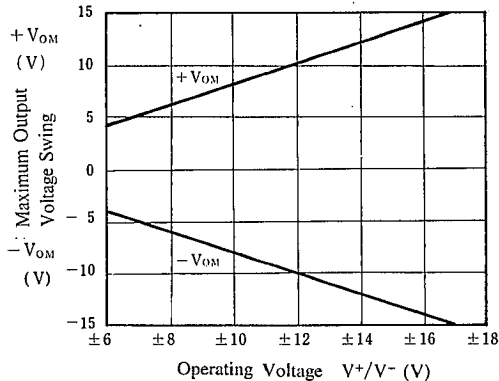
Equivalent Input Noise Voltage  
vs. Frequency

( $V^+/V^- = \pm 15V$ ,  $R_s = 50\Omega$ ,  $A_v = 60dB$ ,  $T_a = 25^\circ C$ )



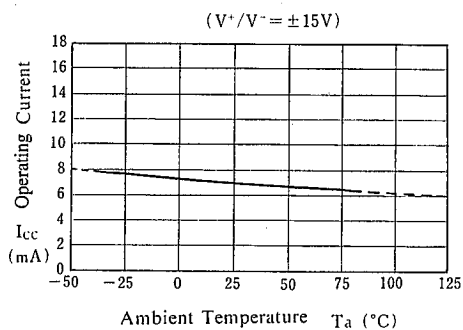
Maximum Output Voltage Swing  
vs. Operating Voltage

( $R_L = 2k\Omega$ ,  $T_a = 25^\circ C$ )

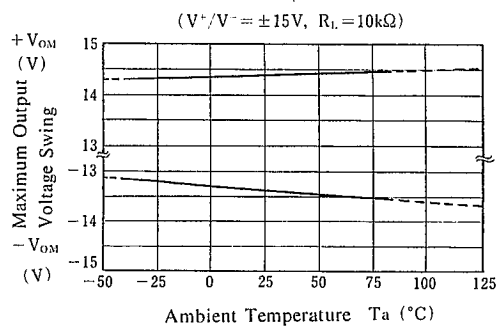


■ TYPICAL CHARACTERISTICS

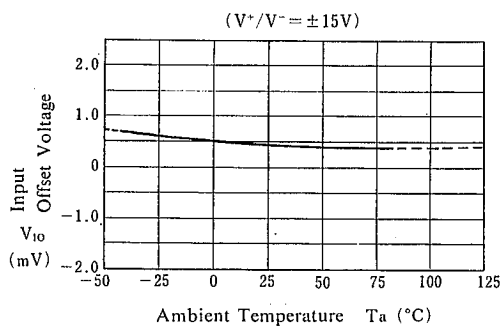
Operating Current vs. Temperature



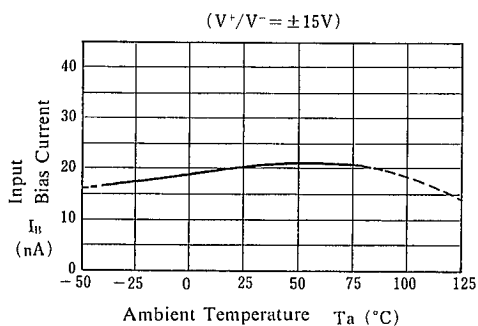
Maximum Output Voltage Swing vs. Temperature



Input Offset voltage vs. Temperature



Input Bias Current vs. Temperature

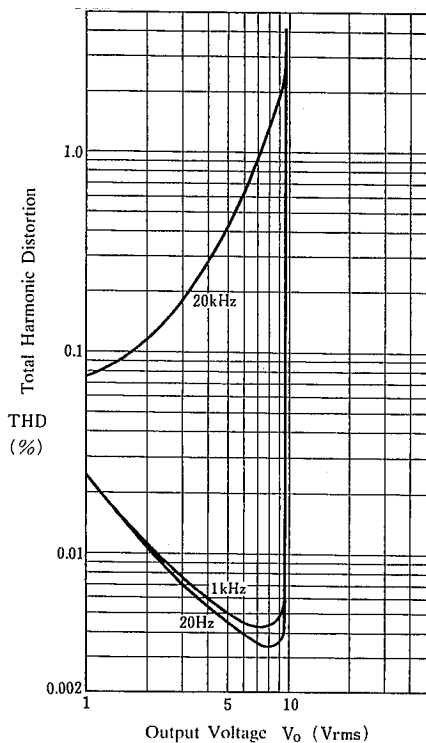


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## ■ TYPICAL CHARACTERISTICS

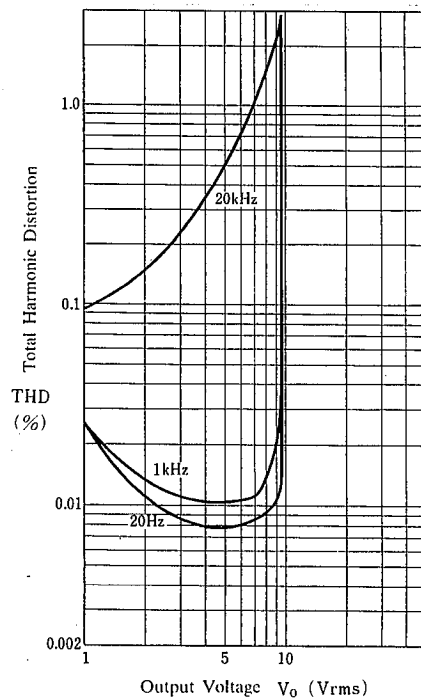
### Total Harmonic Distortion

( $V^+/V^- = \pm 15V$ , Gain = 40dB,  $R_L = 10k\Omega$ ,  
 $T_a = 25^\circ C$ )



### Total Harmonic Distortion

( $V^+/V^- = \pm 15V$ , Gain = 40dB,  $R_L = 2k\Omega$ ,  
 $T_a = 25^\circ C$ )



## MEMO

**[CAUTION]**

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