

## 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.

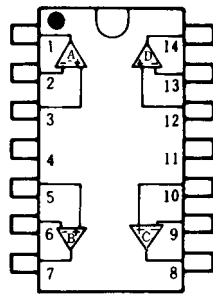
The NJM2059 has wider unity gain bandwidth and larger slew rate compared to the NJM2058.

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

### ■ FEATURES

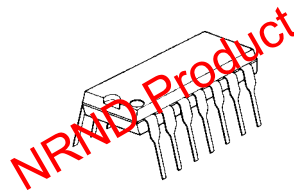
- Operating Voltage (  $\pm 4V \sim \pm 18V$  )
- Slew Rate (  $2V/\mu s$  typ. )
- Unity Gain Bandwidth (  $6MHz$  typ. )
- Package Outline DIP14,DMP14,SSOP14
- Bipolar Technology

### ■ PIN CONFIGURATION

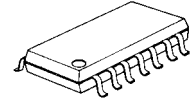


NJM2059D  
NJM2059M  
NJM2059V

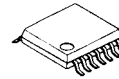
### ■ PACKAGE OUTLINE



NJM2059D



NJM2059M

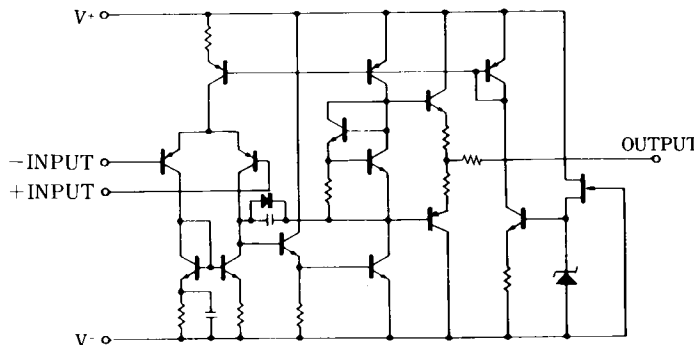


NJM2059V

### PIN FUNCTION

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

### ■ EQUIVALENT CIRCUIT ( 1/4 Shown )



## ■ 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 ( note1 )	V
Power Dissipation	$P_D$	( DIP14 ) 700 ( DMP14 ) 700 ( note2 ) ( SSOP14 ) 300	mW
Operating Temperature Range	$T_{opr}$	-40~+85	°C
Storage Temperature Range	$T_{stg}$	-40~+125	°C

( note1 ) For supply voltage less than ±15V, the absolute maximum input voltage is equal to the supply voltage.

( note2 ) At on PC board

## ■ ELECTRICAL CHARACTERISTICS

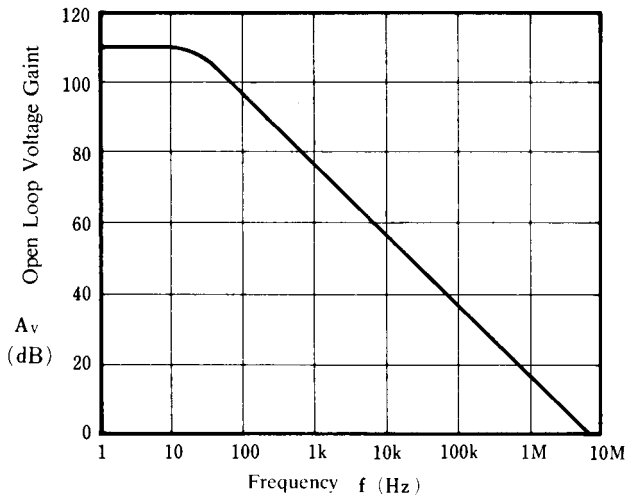
( Ta=25°C,  $V^+ / V^- = \pm 15V$  )

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	$V_{IO}$	$R_S \leq 10k\Omega$	-	0.5	6	mV
Input Offset Current	$I_{IO}$		-	5	200	nA
Input Bias Current	$I_B$		-	20	500	nA
Input Resistance	$R_{IN}$		0.3	1	-	MΩ
Large Signal Voltage Gain	$A_V$	$R_L \geq 2k\Omega, V_O = \pm 10V$	86	100	-	dB
Maximum Output Voltage Swing 1	$V_{OM1}$	$R_L \geq 10k\Omega$	± 12	± 14	-	V
Maximum Output Voltage Swing 2	$V_{OM2}$	$R_L \geq 2k\Omega$	± 10	± 13	-	V
Input Common Mode Voltage Range	$V_{ICM}$		± 12	± 14	-	V
Common Mode Rejection Ratio	CMR	$R_S \leq 10k\Omega$	70	90	-	dB
Supply Voltage Rejection Ratio	SVR	$R_S \leq 10k\Omega$	76.5	90	-	dB
Operating Current	$I_{CC}$		-	7	11.3	mA
Slew Rate	SR		-	2	-	V/μs
Equivalent Input Noise Voltage	$V_{NI}$	RIAA, $R_S = 2.2k\Omega, 30kHz$ LPF	-	1.4	-	μVrms

■ TYPICAL CHARACTERISTICS

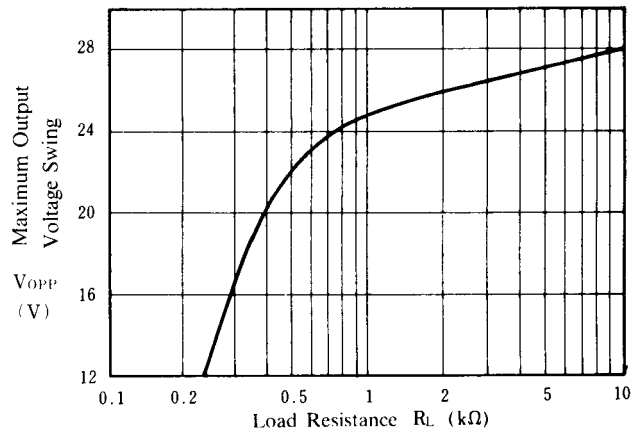
Open Loop Voltage Gain vs. Frequency

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



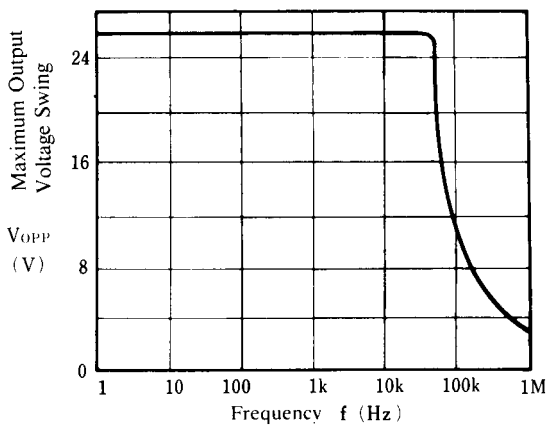
Maximum Output Voltage Swing vs. Load Resistance

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



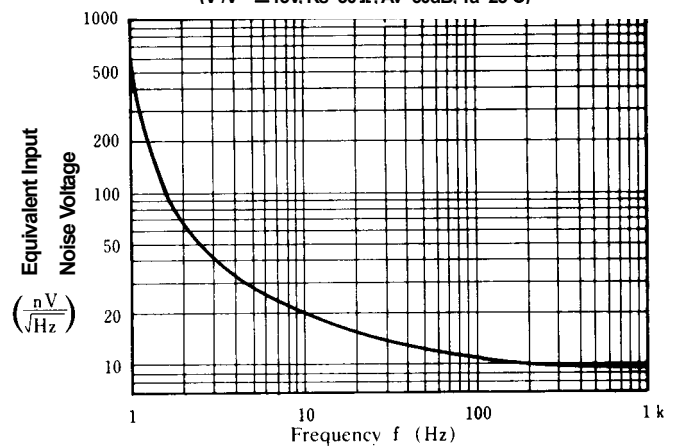
Maximum Output Voltage Swing vs. Frequency

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



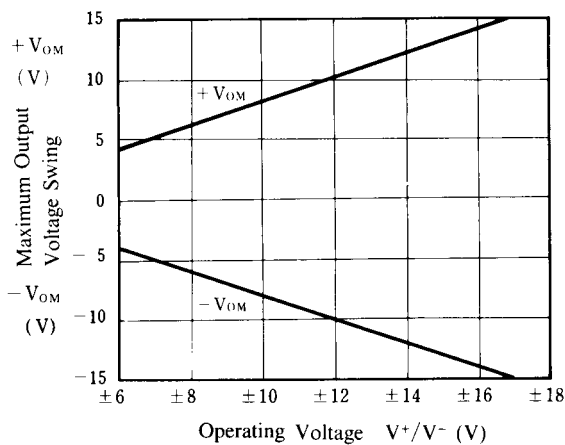
Equivalent Input Noise Voltage vs. Frequency

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



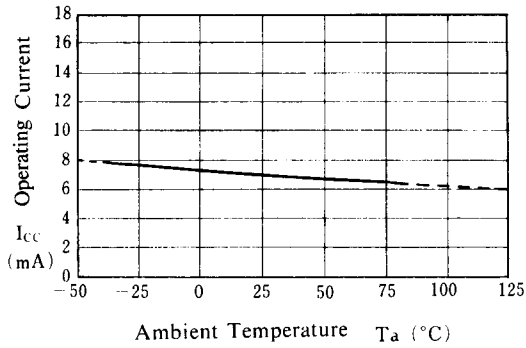
Maximum Output Voltage Swing vs. Operating Voltage

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

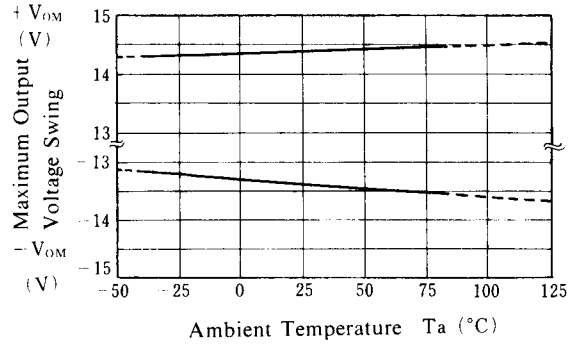


■ TYPICAL CHARACTERISTICS

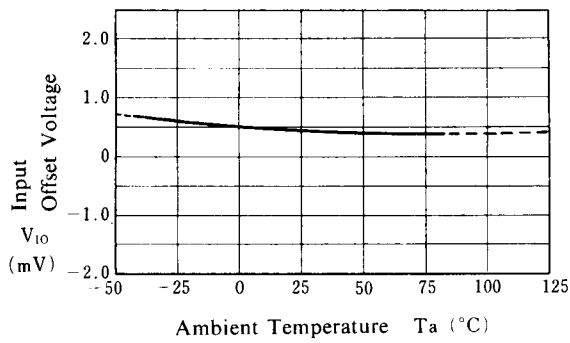
**Operating Current vs. Temperature**  
( $V^+V^- = \pm 15V$ )



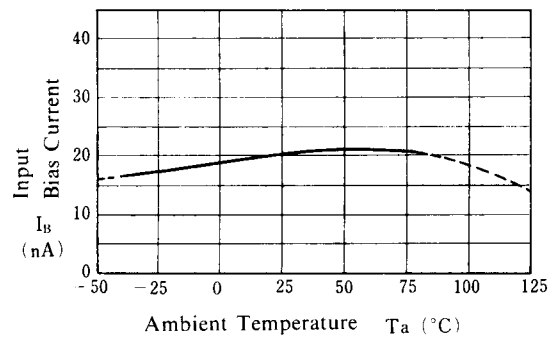
**Maximum Output Voltage Swing vs. Temperature**  
( $V^+V^- = \pm 15V, R_L = 10k\Omega$ )



**Input Offset voltage vs. Temperature**  
( $V^+V^- = \pm 15V$ )



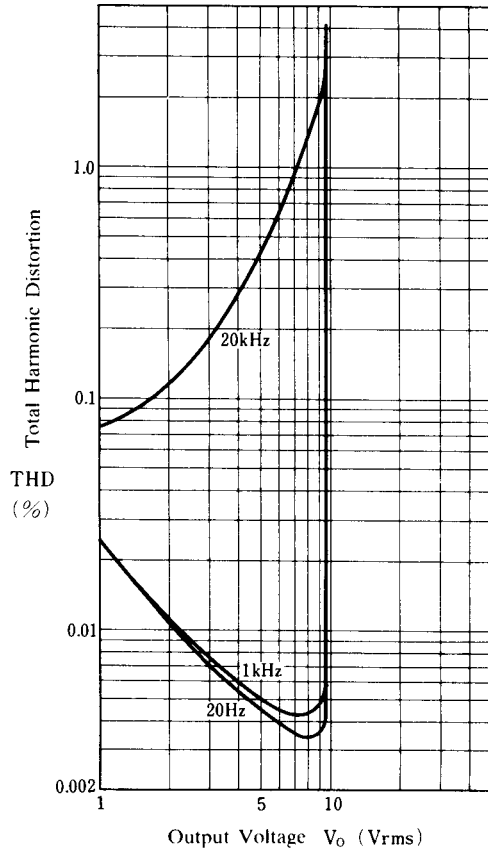
**Input Bias Current vs. Temperature**  
( $V^+V^- = \pm 15V$ )



■ TYPICAL CHARACTERISTICS

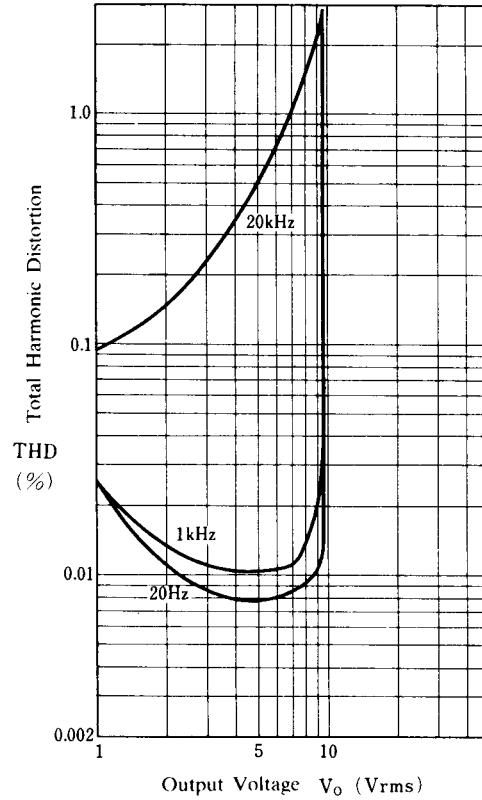
**Total Harmonic Distortion**

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



**Total Harmonic Distortion**

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



[CAUTION]

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