

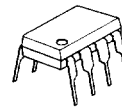
ULTRA-LOW OFFSET VOLTAGE, LOW DRIFT OPERATIONAL AMPLIFIER

■ GENERAL DESCRIPTION

The NJM OP-07 is ultra-low input offset voltage and bias current, low drift and high gain operational amplifier with internal frequency compensation.

The NJM OP-07 is suitable for a high accurate instrumental amplifier.

■ PACKAGE OUTLINE



NJMOP-07D

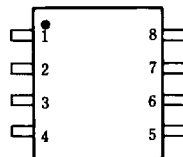


NJMOP-07M

■ FEATURES

- Ultra-Low V_{IO} $60 \mu V$
- Ultra-Low I_B $1.8 nA$
- Ultra-Low Drift
 - unnull $0.5 \mu V/^\circ C$
 - null $0.4 \mu V/^\circ C$
- Ultra-Stable $0.4 \mu V/M_o$
- Wide Operating Voltage $\pm 3V \sim \pm 22V$
- Package Outline DIP8, DMP8
- Bipolar Technology

■ PIN CONFIGURATION



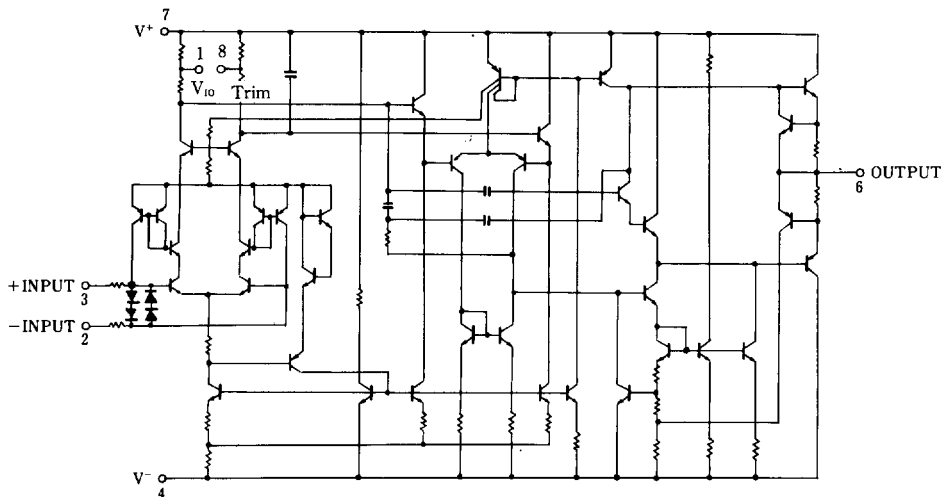
NJMOP-07D
NJMOP-07M

PIN FUNCTION

1. V_{IO} Trim
2. -INPUT
3. +INPUT
4. V^-
5. NC
6. OUTPUT
7. V^+
8. V_{IO} Trim

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■ EQUIVALENT CIRCUIT





■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V ⁺ /V ⁻	±22	V
Input Voltage	V _I	±22(note 1)	V
Differential Input Voltage	V _{ID}	±30	V
Power Dissipation	P _D	(DIP8) 500 (DMP8) 300	mW
Storage Temperature Range	T _{stg}	-40~+125	°C
Operating Temperature Range	T _{opr}	-20~+75	°C
Output Current		continuous	

(note) For supply voltage less than ±22V, the absolute maximum input voltage is equal to the supply voltage.

■ ELECTRICAL CHARACTERISTICS

(Ta=+25°C, V⁺/V⁻=±15V)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V _{IO}		—	60	150	μV
Long Term Stability		(note 1,2)	—	0.4	2	μV/Mo
Input Offset Current	I _{IO}		—	0.8	6	nA
Input Bias Current	I _B		—	±1.8	±7	nA
Open Loop Output Resistance	R _O	V _O =0, I _O =0	—	60	—	Ω
Input Resistance	R _{ID}	(Differential Mode)	8	33	—	MΩ
Input Resistance	R _{IC}	(Common Mode)	—	120	—	GΩ
Input Common Mode Voltage Range	V _{ICM}		±13	±14	—	V
Common Mode Rejection Ratio	CMR	V _{CM} =±13V	100	120	—	dB
Supply Voltage Rejection Ratio	SVR	V ⁺ /V ⁻ =±3V~±18V	90	104	—	dB
Large Signal Voltage Gain	AV ₁	R _L ≥2kΩ, V _O =±10V	101.5	112.0	—	dB
Large Signal Voltage Gain	AV ₂	R _L =500Ω, V _O =±0.5V, V ⁺ =±3V	100.0	112.0	—	dB
Maximum Output Voltage	V _{OM1}	R _L ≥10kΩ	±12	±13	—	V
Maximum Output Voltage	V _{OM2}	R _L ≥2kΩ	±11.5	±12.8	—	V
Maximum Output Voltage	V _{OM3}	R _L ≥1kΩ	—	±12	—	V
Slew Rate	SR	R _L ≥2kΩ	—	0.17	—	V/μS
Closed Loop Bandwidth	f _T	A _{VCL} =1	—	0.5	—	MHz
Operating Current	I _{CC1}	V ⁺ /V ⁻ =±15V	—	2.7	5.0	mA
Operating Current	I _{CC2}	V ⁺ /V ⁻ =±3V	—	0.67	1.3	mA
Offset Adjustment Range		R _P =20kΩ	—	±4	—	mV
Equivalent Input Noise Voltage	V _{NI}	0.1Hz~10Hz (note 2)	—	0.38	0.65	μV _{p-p}
Equivalent Input Noise Voltage	e _n	f _O =10Hz (note 2)	—	10.5	20	nV/√Hz
Equivalent Input Noise Voltage	e _n	f _O =100Hz (note 2)	—	10.2	13.5	nV/√Hz
Equivalent Input Noise Voltage	e _n	f _O =1kHz (note 2)	—	9.8	11.5	nV/√Hz
Equivalent Input Noise Current	I _{NI}	0.1Hz~10Hz (note 2)	—	15	35	pA _{p-p}
Equivalent Input Noise Current	i _n	f _O =10Hz (note 2)	—	0.35	0.9	pA/√Hz
Equivalent Input Noise Current	i _n	f _O =100Hz (note 2)	—	0.15	0.27	pA/√Hz
Equivalent Input Noise Current	i _n	f _O =1kHz (note 2)	—	0.13	0.18	pA/√Hz

ELECTRICAL CHARACTERISTICS

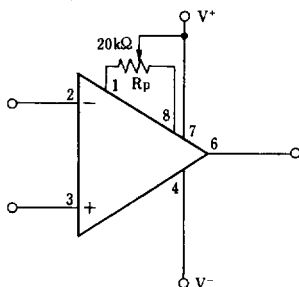
($0^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$, $V^+/V^- = \pm 15\text{V}$)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V_{IO}		—	85	250	μV
Average V_{IO} Drift (unnull)			—	0.5	1.8	$\mu\text{V}/^{\circ}\text{C}$
Average V_{IO} Drift (null)			—	0.4	1.6	$\mu\text{V}/^{\circ}\text{C}$
Input Offset Current	I_{IO}	$R_P = 20\text{k}\Omega$	—	1.6	8	nA
Average I_{IO} Drift			—	12	50	$\text{pA}/^{\circ}\text{C}$
Input Bias Current	I_{IB}		—	± 2.2	± 9	nA
Average I_{IB} Drift			—	18	50	$\text{pA}/^{\circ}\text{C}$
Input Common Mode Voltage Range	V_{ICM}		± 13	± 13.5	—	V
Common Mode Rejection Ratio	CMR	$V_{CM} = \pm 13\text{V}$	97	120	—	dB
Supply Voltage Rejection Ratio	SVR	$V^+/V^- = \pm 3\text{V} \sim \pm 8\text{V}$	86	120	—	dB
Voltage Gain	A_V	$R_L \geq 2\text{k}\Omega$, $V_O = \pm 10\text{V}$	100	400	—	V/mV
Maximum Output Voltage	V_{OM}	$R_L \geq 2\text{k}\Omega$	± 11	± 12.6	—	V

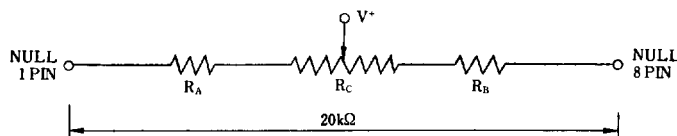
(note 1) Long Term Stability refers to the average trend line of V_{IO} vs. time over extended periods after the first 30 days of operation.

(note 2) According to the evaluation by NJRC, more than 90% of all these products can be guaranteed.

OFFSET ADJUSTMENT METHOD



For making low sensitivity of change in the input offset voltage against resistance regulation of potentiometer
(Easy case of offset adjustment)



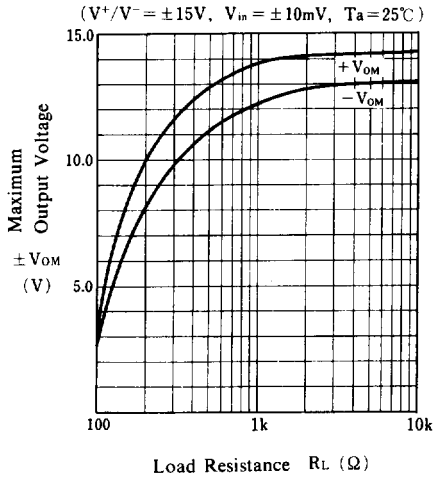
※ R_A , R_B Fixed $7.5\text{k}\Omega$, R_C adjustable $5.0\text{k}\Omega$

※ R_A , R_B , R_C are metalfilm resistors, R_C is more than 10 times winding.

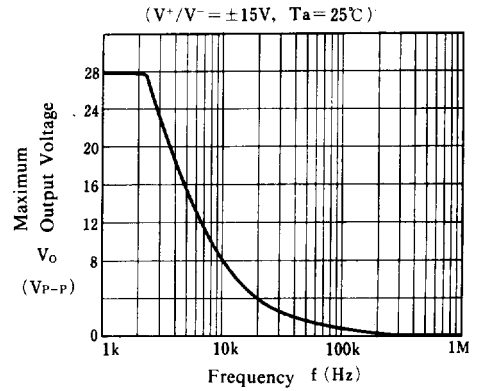


TYPICAL CHARACTERISTICS

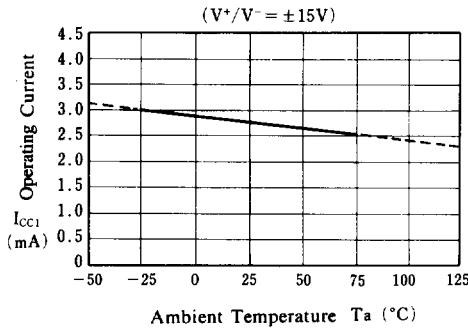
Maximum Output Voltage vs. Load Resistance



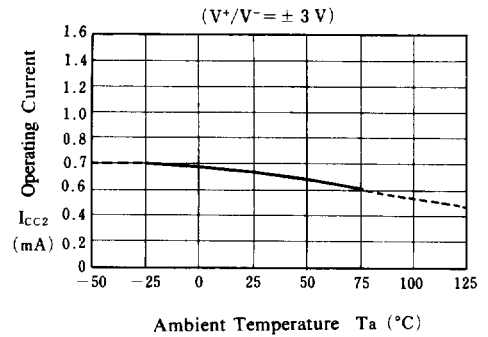
Maximum Output Voltage Swing vs. Frequency



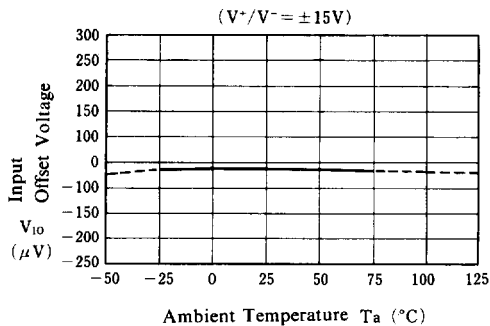
Operating Current vs. Temperature



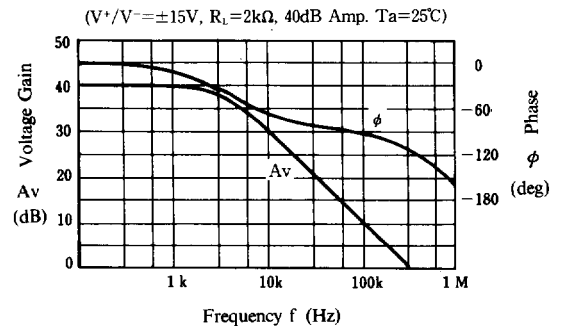
Operating current vs. Temperature



Input Offset Voltage vs. Temperature



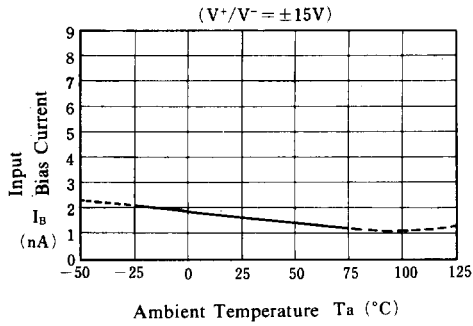
Voltage Gain, Phase vs. Frequency



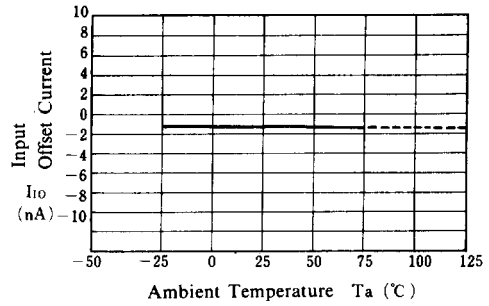


■ TYPICAL CHARACTERISTICS

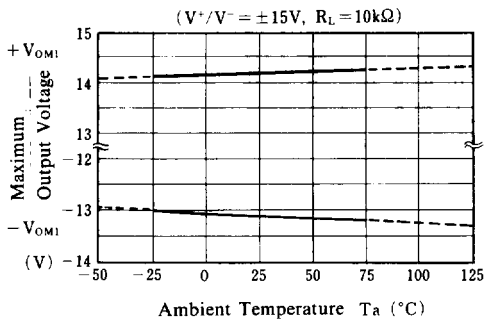
Input Bias Current vs. Temperature



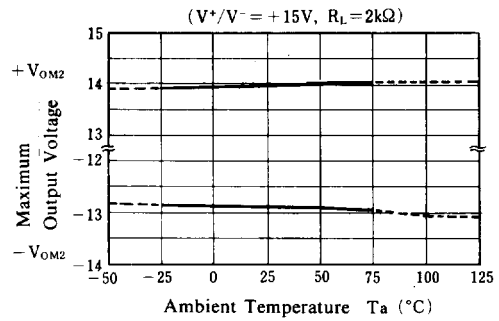
Input Offset Current vs. Temperature



Maximum Output Voltage vs. Temperature



Maximum Output Voltage vs. Temperature



Power Dissipation vs. Supply Voltage

