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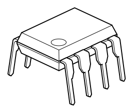
LOW OFFSET VOLTAGE,LOW DRIFT OPERATIONAL AMPLIFIER

■ GENERAL DESCRIPTION

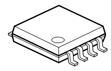
The NJM OP-07 is ultra-low input offset voltage and bias current, low drift and high gain operational amplifier with internal frequency compensation.

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

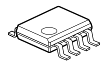
■ PACKAGE OUTLINE



NJMOP-07D



NJMOP-07M

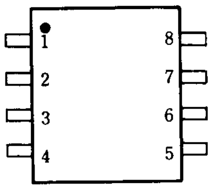


NJMOP-07E

■ FEATURES

- Low V_{IO} (60µV typ.)
- Low I_B (1.8nA typ.)
- Low Drift (unnull 0.5µV/˚C typ.)
  (null 0.4µV/˚C typ.)
  (0.4µV/M_o typ.)
- Wide Operating Voltage (±3V~±22V)
- Package Outline DIP8,DMP8,SOP8 JEDEC 150mil
- Bipolar Technology

■ PIN CONFIGURATION

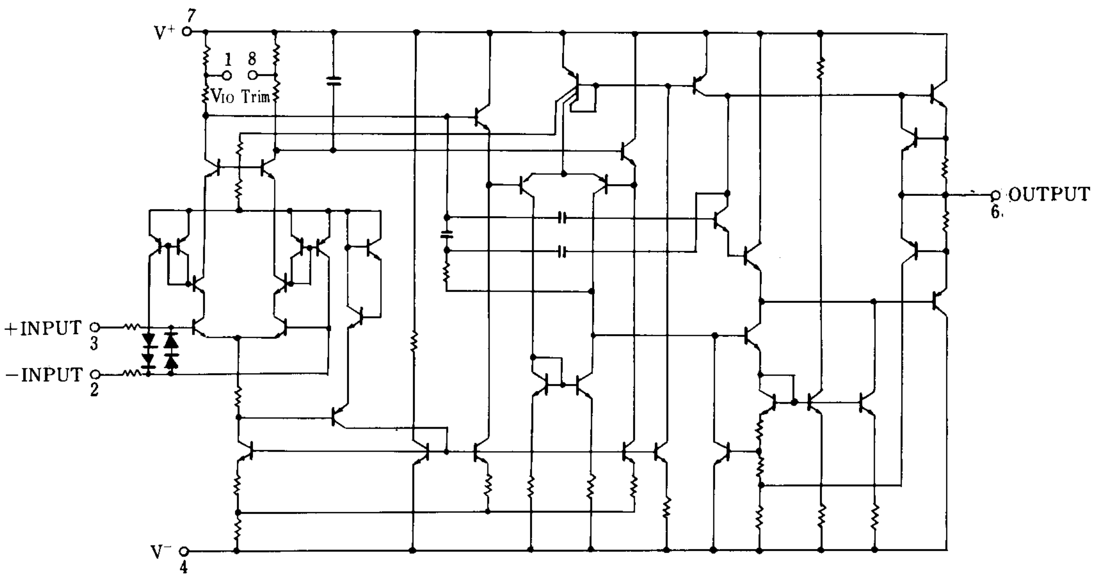


NJMOP-07D
NJMOP-07M
NJMOP-07E

PIN FUNCTION

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

■ EQUIVALENT CIRCUIT



■ ABSOLUTE MAXIMUM RATINGS

(Ta=25˚C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+/V^-	± 22	V
Input Voltage	V_1	± 22 (note1)	V
Differential Input Voltage	V_{ID}	± 30	V
Power Dissipation	P_D	(DIP8) 500(note2) (DMP8) 300(note2) / 430(note3) (SOP8) 300 (note2) / 640(note3)	mW
Storage Temperature Range	T_{stg}	-40~+125	˚C
Operating Temperature Range	T_{opr}	-40~+85	˚C
Output Current		continuous	

(note1) For supply voltage less than ±22V. the absolute maximum input voltage is equal to the supply voltage.
(note2) Device itself.
(note3) Mounted on the EIA/JEDEC standard board (76.2×114.3×1.6mm, two layer, FR-4).

■ 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		(note4,5)	-	0.4	2	$\mu V/M_O$
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	$V_{CM}=\pm13V$	100	120	-	dB
Supply Voltage Rejection Ratio	SVR	$V^+/V^-=\pm3V\sim\pm18V$	90	104	-	dB
Large Signal Voltage Gain 1	AV_1	$R_L\geq2k\Omega, V_O=\pm10V$	101.5	112.0	-	dB
Large Signal Voltage Gain 2	AV_2	$R_L=500\Omega, V_O=\pm0.5V, V^+/V^-=\pm3V$	100.0	112.0	-	dB
Maximum Output Voltage 1	V_{OM1}	$R_L\geq10k\Omega$	±12	±13	-	V
Maximum Output Voltage 2	V_{OM2}	$R_L>2k\Omega$	±11.5	±12.8	-	V
Maximum Output Voltage 3	V_{OM3}	$R_L>1k\Omega$	-	±12	-	V
Slew Rate	SR	$R_L\geq2k\Omega$	-	0.17	-	V/μS
Unity Gain Bandwidth	f_T	$A_{VCL}=1$	-	0.5	-	MHz
Operating Current 1	I_{CC1}	$V^+/V^-=\pm15V$	-	2.7	5.0	mA
Operating Current 2	I_{CC2}	$V^+/V^-=\pm3V$	-	0.67	1.3	mA
Offset Adjustment Range		$R_P=20k\Omega$	-	± 4	-	mV
Equivalent Input Noise Voltage	V_{NI}	$0.1H_Z\sim10Hz$ (note5)	-	0.38	0.65	μV_{P-P}
Equivalent Input Noise Voltage 1	e_{n1}	$f_O=10Hz$ (note5)	-	10.5	20	nV/√Hz
Equivalent Input Noise Voltage 2	e_{n2}	$f_O=100Hz$ (note5)	-	10.2	13.5	nV/√Hz
Equivalent Input Noise Voltage 3	e_{n3}	$f_O=1kHz$ (note5)	-	9.8	11.5	nV/√Hz
Equivalent Input Noise Current	I_{NI}	0.1Hz~10Hz (note5)	-	15	35	pA_{P-P}
Equivalent Input Noise Current 1	i_{n1}	$f_O=10Hz$ (note5)	-	0.35	0.9	pA/√Hz
Equivalent Input Noise Current 2	i_{n2}	$f_O=100Hz$ (note5)	-	0.15	0.27	pA/√Hz
Equivalent Input Noise Current 3	i_{n3}	$f_O=1kHz$ (note5)	-	0.13	0.18	pA/√Hz

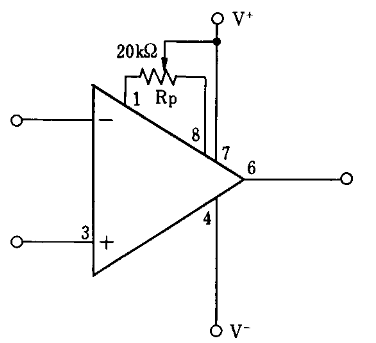
■ ELECTRICAL CHARACTERISTICS

(0°C≤Ta≤70°C,V^+/V^-=±15V)

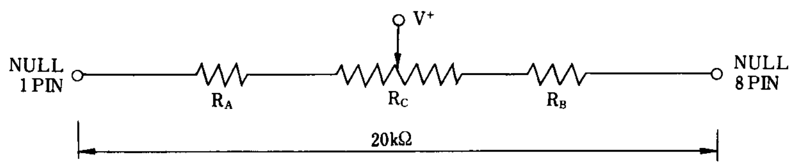
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V_{IO}		-	85	250	µV
Average V_{IO} Drift (unnull)		(note5)	-	0.5	1.8	µV/°C
Average V_{IO} Drift (null)		R_P=20kΩ,(note5)	-	0.4	1.6	µV/°C
Input Offset Current	I_{IO}		-	1.6	8	nA
Average I_{IIO} Drift		(note5)	-	12	50	pA/°C
Input Bias Current	I_{IB}		-	± 2.2	± 9	nA
Average I_{IB} Drift		(note5)	-	18	50	pA/°C
Input Common Mode Voltage Range	V_{ICM}		± 13	± 13.5	-	V
Common Mode Rejection Ratio	CMR	V_{CM}=±13V	97	120	-	dB
Supply Voltage Rejection Ratio	SVR	V^+/V^-=±3V~±18V	86	120	-	dB
Voltage Gain	A_V	R_L≥2kΩ,V_O=±10V	100	400	-	V/mV
Maximum Output Voltage	V_{OM}	R_L≥2kΩ	± 11	± 12.6	-	V

(note 4) 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 5) 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)

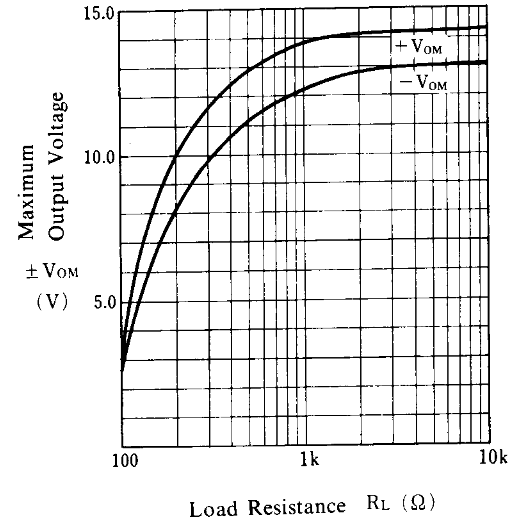


* R_A,R_B Fixed 7.5kΩ,R_C adjustable 5.0kΩ
* R_A,R_B,R_C are metalfilm resisters, R_C is more than 10 times winding.

■ TYPICAL CHARACTERISTICS

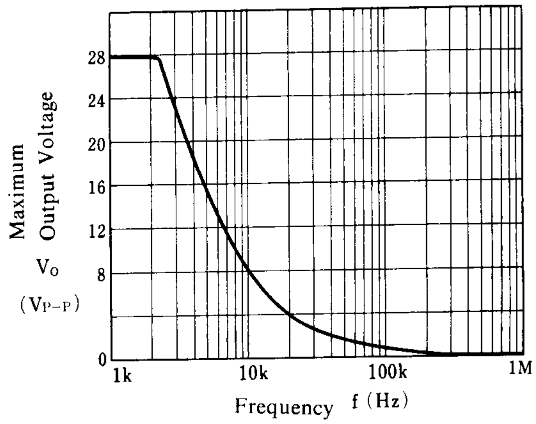
Maximum Output Voltage vs. Load Resistance

($V^+/V^- = \pm15V$, $V_{in} = \pm10mV$, $Ta=25°C$)



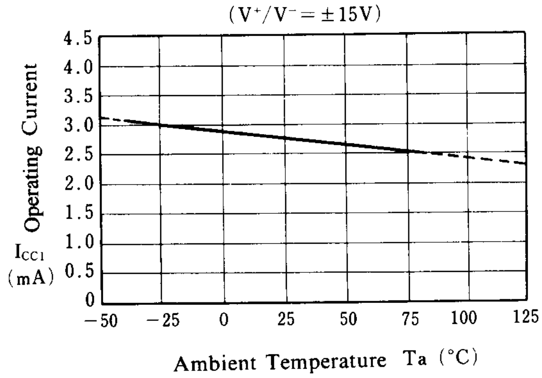
Maximum Output Voltage Swing vs. Frequency

($V^+/V^- = \pm15V$, $Ta=25°C$)



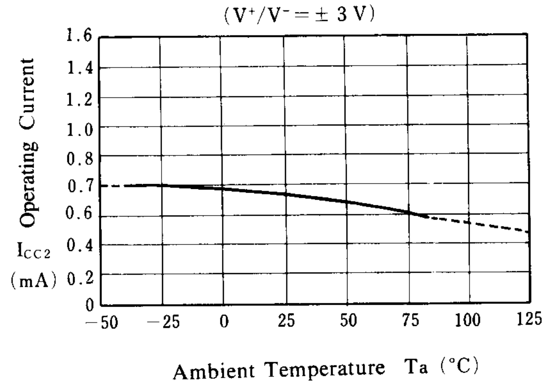
Operating Current vs. Temperature

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



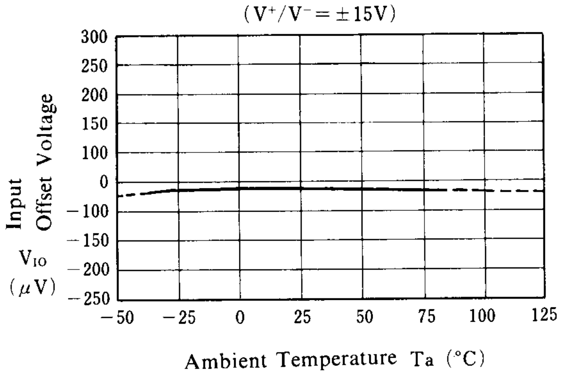
Operating current vs. Temperature

($V^+/V^- = \pm3V$)



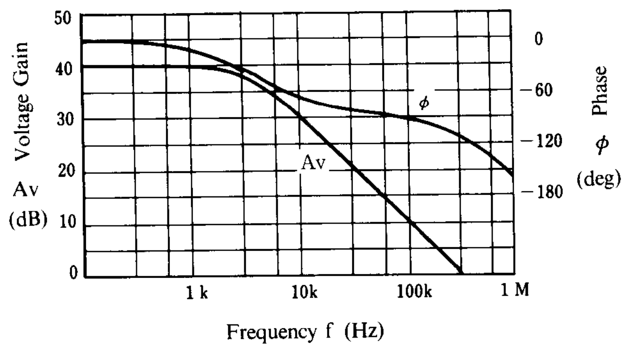
Input Offset Voltage vs. Temperature

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

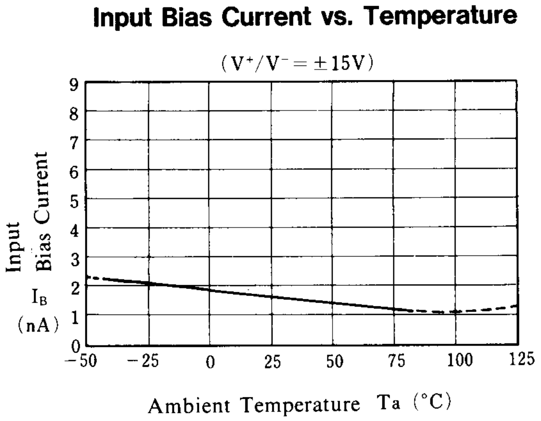


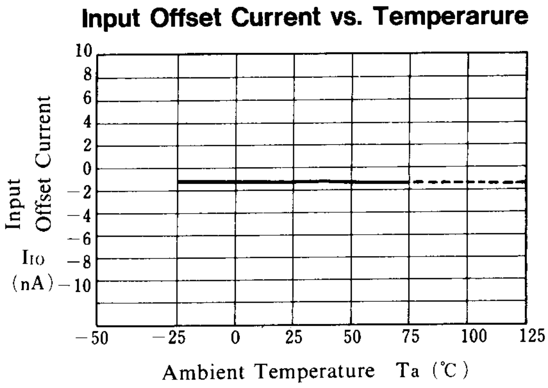
Voltage Gain, Phase vs. Frequency

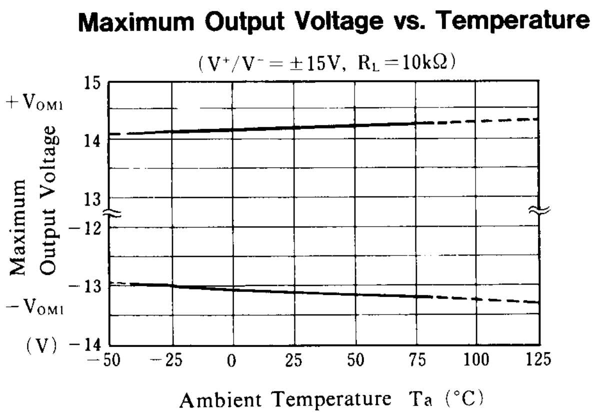
($V^+/V^-=\pm15V$, $R_L=2k\Omega$, 40dB Amp. $Ta=25°C$)

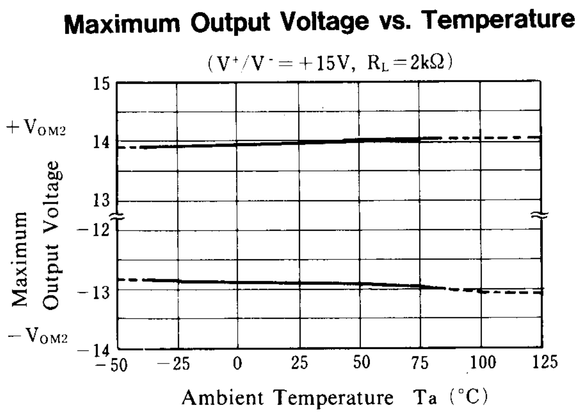


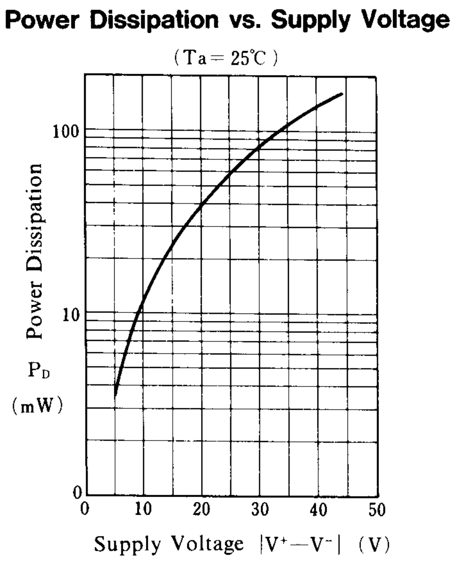
■ TYPICAL CHARACTERISTICS











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