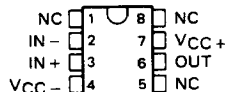


- Internally Frequency Compensated
- Improved Version of LM108
- Direct Replacement for PMI OP-12A, OP-12B, OP-12C, OP-12E, OP-12F, and OP-12G.

OP-12A, OP-12B, OP-12C . . . JG PACKAGE
OP-12E, OP-12F, OP-12G . . . D, JG, OR P PACKAGE
(TOP VIEW)



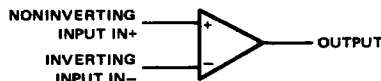
NC—No internal connection

description

The OP-12 devices are precision low-input-current internally compensated operational amplifiers. The devices are improved versions of the LM108 series. The OP-12 amplifiers exhibit low input bias current and input offset voltage and current to improve the accuracy of high-impedance circuits using these devices. The devices feature short-circuit protection and internal frequency compensation.

The OP-12A, OP-12B, and OP-12C are characterized for operation over the full military temperature range of -55°C to 125°C . The OP-12E, OP-12F, and OP-12G are characterized for operation from 0°C to 70°C .

symbol



DEVICE FEATURES

PARAMETER	OP-12A OP-12E	OP-12B OP-12F	OP-12C OP-12G
Input offset voltage (Max)	150 μV	300 μV	1000 μV
Temperature coefficient of input offset voltage (Max)	2.5 $\mu\text{V}/^{\circ}\text{C}$	3.5 $\mu\text{V}/^{\circ}\text{C}$	10 $\mu\text{V}/^{\circ}\text{C}$
Input offset current (Max)	200 pA	200 pA	500 pA
Input bias current (Max)	2 nA	2 nA	5 nA
Common-mode input voltage range	$\pm 13\text{ V}$	$\pm 13\text{ V}$	$\pm 13\text{ V}$
Power dissipation (Max)	6 mW	6 mW	8 mW

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Operational Amplifiers

TYPES OP-12A, OP-12B, OP-12C, OP-12E, OP-12F, OP-12G **PRECISION LOW-INPUT-CURRENT OPERATIONAL AMPLIFIERS**

absolute maximum ratings over free-air temperature range (unless otherwise noted)

	OP-12A, OP-12B OP-12C	OP-12E, OP-12F OP-12G	UNIT
Supply voltage, V_{CC+} (see Note 1)	20	18	V
Supply voltage, V_{CC-} (see Note 1)	-20	-18	V
Input voltage (either input, see Note 2)	± 15	± 15	V
Differential input current (see Note 3)	± 10	± 10	mA
Duration of output short circuit (see Note 4)	unlimited	unlimited	
Continuous total dissipation at (or below) 25°C free-air temperature (see Note 5)	500	500	mW
Operating free-air temperature range	-55 to 125	0 to 70	°C
Storage temperature range	-65 to 150	-65 to 150	°C
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds JG package	300	300	°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds D or P package		260	°C

- NOTES: 1. All voltage values, except otherwise noted, are with respect to the midpoint between V_{CC+} and V_{CC-} .
2. The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15 volts, whichever is less.
3. The inputs are shunted with back-to-back diodes for input overvoltage protection. Therefore, excessive current will flow if a differential voltage in excess of 1 volt is applied between the inputs unless some limiting resistance is provided.
4. The output may be shorted to ground or to either supply. Temperature and/or supply voltages must be limited to ensure that the dissipation rating is not exceeded.
5. For operation above 25°C free-air temperature, refer to Dissipation Derating Curves, Section 2. In the JG packages, OP-12A, OP-12B, and OP-12C chips are alloy-mounted; OP-12E, OP-12F, and OP-12G chips are glass-mounted.

TYPES OP-12A, OP-12B, OP-12C **PRECISION LOW-INPUT-CURRENT OPERATIONAL AMPLIFIERS**

electrical characteristics at specified free-air temperature, $V_{CC} \pm = \pm 20$ V for OP-12A and OP-12B, ± 15 V for OP-12C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	OP-12A			OP-12B			OP-12C			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_{IO}	Input offset voltage										mV
α_{VIO}	Average temperature coefficient of input offset voltage										$\mu V/^{\circ}C$
I_{IO}	Input offset current										nA
α_{IIO}	Average temperature coefficient of input offset current										pA/^{\circ}C
I_B	Input bias current										nA
V_{ICR}	Common-mode input voltage range										V
V_{OM}	Maximum peak output voltage swing										V
A_{VD}	Large-signal differential voltage amplification										V/mV
B_1	Unity-gain bandwidth										MHz
r_i	Input resistance										M Ω
r_o	Output resistance										Ω
CMRR	Common-mode rejection ratio										dB
k_{SVR}	Supply voltage rejection ratio ($\Delta V_{CC} \pm / V_{IO}$)										dB
P_D	Power dissipation										mW
I_{CC}	Supply current										mA

† All characteristics are specified under open-loop conditions with zero common-mode input voltage, unless otherwise noted.

Operational Amplifiers

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TYPES OP-12A, OP-12B, OP-12C
PRECISION LOW-INPUT-CURRENT OPERATIONAL AMPLIFIERS

operating characteristics at 25°C free-air temperature, $V_{CC\pm} = \pm 20\text{ V}$ for OP-12A and OP-12B, $\pm 15\text{ V}$ for OP-12C (unless otherwise noted)

PARAMETER		TEST CONDITIONS†	OP-12A			OP-12B			OP-12C			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
SR	Slew rate at unity gain	$R_L \geq 2\text{ k}\Omega$	0.12			0.12			0.12			$V/\mu\text{s}$
V_n	Equivalent input noise voltage	$f = 10\text{ Hz}$	22			22			22			$\text{nV}\sqrt{\text{Hz}}$
		$f = 100\text{ Hz}$	21			21			21			
		$f = 1000\text{ Hz}$	20			20			20			
I_n	Equivalent input noise current	$f = 10\text{ Hz}$	0.15			0.15			0.15			$\text{pA}\sqrt{\text{Hz}}$
		$f = 100\text{ Hz}$	0.14			0.14			0.14			
		$f = 1000\text{ Hz}$	0.13			0.13			0.13			
V_{NPP}	Peak-to-peak input noise voltage	$f = 0.1\text{ Hz to }10\text{ Hz}$	0.9			0.9			0.9			μV
I_{NPP}	Peak-to-peak input noise current	$f = 0.1\text{ Hz to }10\text{ Hz}$	3			3			3			pA

† All characteristics are specified under open-loop conditions with zero common-mode input voltage, unless otherwise noted.

TYPES OP-12E, OP-12F, OP-12G PRECISION LOW-INPUT-CURRENT OPERATIONAL AMPLIFIERS

electrical characteristics at specified free-air temperature, $V_{CC} \pm = \pm 20$ V for OP-12E and OP-12F, ± 15 V for OP-12G (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	OP-12E			OP-12F			OP-12G			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_{IO} Input offset voltage	$V_O = 0, R_S = 50 \Omega$ 25°C 0°C to 70°C	0.07	0.15		0.18	0.3		0.25	1		mV
α_{VIO} coefficient of input offset voltage	$V_O = 0$ 0°C to 70°C	0.1	0.26		0.23	0.45		0.32	1.4		$\mu V/^\circ C$
I_{IO} Input offset current	$V_O = 0$ 25°C 0°C to 70°C	0.05	0.2		0.05	0.2		0.08	0.5		nA
α_{IIO} coefficient of input offset current	$V_O = 0$ 0°C to 70°C	0.08	0.3		0.11	0.6		0.12	0.7		pA/°C
I_{IB} Input bias current	$V_O = 0$ 25°C 0°C to 70°C	0.8	2		0.8	2		1	5		nA
V_{ICR} Common-mode input voltage range	$V_{CC} = \pm 15$ V 25°C 0°C to 70°C	± 13	± 14		± 13	± 14		± 13	± 14		V
V_{OM} Maximum peak output voltage swing	$V_{CC} \pm = \pm 15$ V, $R_L \geq 10$ k Ω 25°C 0°C to 70°C	± 13	± 14		± 13	± 14		± 13	± 14		V
A_{VD} Large-signal differential voltage amplification	$V_O = \pm 10$ V, $R_L \geq 10$ k Ω 25°C 0°C to 70°C	80	300		80	300		40	250		V/mV
B_{OM} Maximum-output swing bandwidth	$A_{VD} \approx 1$ 25°C	26	70		26	70		10	50		MHz
f_i Input resistance	No load 25°C	200			200			200			M Ω
f_o Output resistance	No load 25°C	104	120		102	120		84	116		Ω
CMRR Common-mode rejection ratio	$V_{IC} = \pm 13$ V, $R_S = 50 \Omega$, $V_O = 0$ 25°C 0°C to 70°C	100	116		100	116		80	112		dB
k_{SVR} Supply voltage rejection ratio ($\Delta V_{CC} \pm / V_{IO}$)	$V_{CC} = \pm 5$ V to ± 15 V, $V_O = 0, R_S = 50 \Omega$ 25°C 0°C to 70°C	104	120		102	120		84	116		dB
P_D Power dissipation	No load 25°C	9	18		9	18		15	24		mW
I_{CC} Supply current	No load 25°C	0.3	0.6		0.3	0.6		0.4	0.8		mA

† All characteristics are specified under open-loop conditions with zero common-mode input voltage, unless otherwise noted.

Operational Amplifiers

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TYPES OP-12E, OP-12F, OP-12G
PRECISION LOW-INPUT-CURRENT OPERATIONAL AMPLIFIERS

operating characteristics at 25 °C free-air temperature, $V_{CC\pm} = \pm 20\text{ V}$ for OP-12E and OP-12F, $\pm 15\text{ V}$ for OP-12G (unless otherwise noted)

PARAMETER		TEST CONDITIONS†	OP-12E			OP-12F			OP-12G			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
SR	Slew rate at unity gain	$R_L \geq 2\text{ k}\Omega$	0.12			0.12			0.12			$V/\mu\text{s}$
V_n	Equivalent input noise voltage	$f = 10\text{ Hz}$	22			22			22			$\text{nV}/\sqrt{\text{Hz}}$
		$f = 100\text{ Hz}$	21			21			21			
		$f = 1000\text{ Hz}$	20			20			20			
I_n	Equivalent input noise current	$f = 10\text{ Hz}$	0.15			0.15			0.15			$\text{pA}/\sqrt{\text{Hz}}$
		$f = 100\text{ Hz}$	0.14			0.14			0.14			
		$f = 1000\text{ Hz}$	0.13			0.13			0.13			
V_{NPP}	Peak-to-peak input noise voltage	$f = 0.1\text{ Hz to }10\text{ Hz}$	0.9			0.9			0.9			μV
I_{NPP}	Peak-to-peak input noise current	$f = 0.1\text{ Hz to }10\text{ Hz}$	3			3			3			pA

† All characteristics are specified under open-loop conditions with zero common-mode input voltage, unless otherwise noted.

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Operational Amplifiers