TIGER ELECTRONIC CO.,LTD

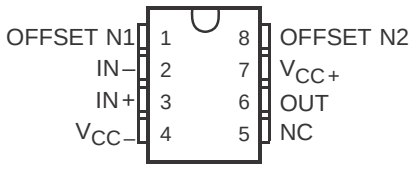
RoHS COMPLIANT

OP07 CP / DP , CDR / DDR

PRECISION OPERATIONAL AMPLIFIERS

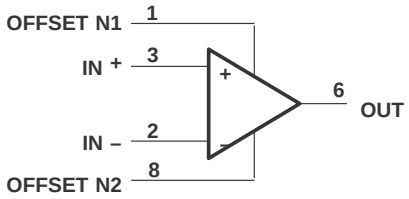
- **Low Noise**
- **No External Components Required**
- **Replaces Chopper Amplifiers at a Lower Cost**
- **Single-Chip Monolithic Fabrication**
- **Wide Input Voltage Range**
  0 to ±14 V Typ
- **Wide Supply Voltage Range**
  ±3 V to ±18 V

D OR P PACKAGE
(TOP VIEW)



NC – No internal connection

symbol



description

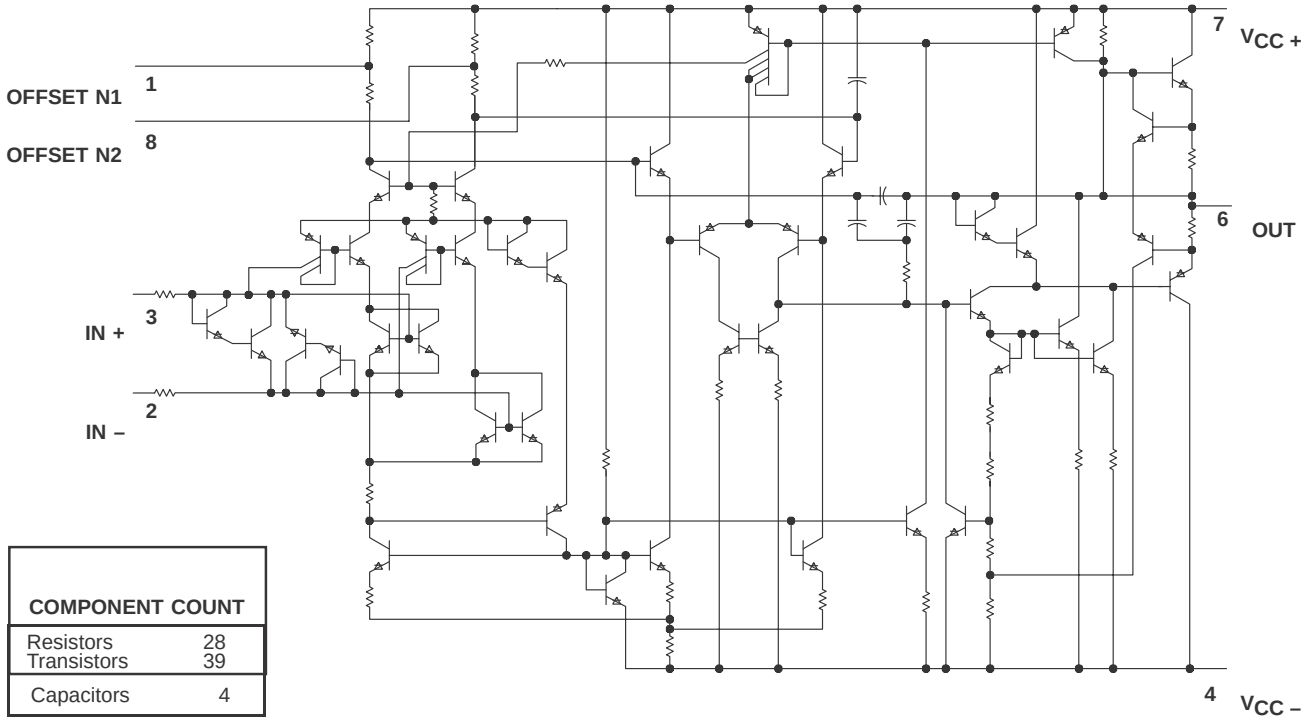
These devices represent a breakthrough in operational amplifier performance. Low offset and long-term stability are achieved by means of a low-noise, chopperless, bipolar-input-transistor amplifier circuit. For most applications, external components are not required for offset nulling and frequency compensation. The true differential input, with a wide input voltage range and outstanding common-mode rejection, provides maximum flexibility and performance in high-noise environments and in noninverting applications. Low bias currents and extremely high input impedances are maintained over the entire temperature range. The OP07 is unsurpassed for low-noise, high-accuracy amplification of very low-level signals.

These devices are characterized for operation from 0°C to 70°C.

AVAILABLE OPTIONS

T_A	V_{IO}max AT 25°C	PACKAGED DEVICES		
		SMALL OUTLINE (D)	PLASTIC DIP (P)	
0°C to 70°C	150 V	OP07CD OP07DD	OP07CP OP07DP	

schematic



COMPONENT COUNT	
Resistors	28
Transistors	39
Capacitors	4

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

Supply voltage, V_{CC+} (see Note 1) . . . . . 22 V
Supply voltage, V_{CC-} . . . . . –22 V
Differential input voltage (see Note 2) . . . . . ±30 V
Input voltage, V_I (either input, see Note 3) . . . . . ±22 V
Duration of output short circuit (see Note 4) . . . . . unlimited
Continuous total dissipation at (or below) 25°C free-air temperature (see Note 5) . . . . . 500 mW
Operating free-air temperature range, T_A . . . . . 0°C to 70°C
Storage temperature range . . . . . –65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds . . . . . 260°C

NOTES: 1. All voltage values, unless otherwise noted, are with respect to the midpoint between V_{CC+} and V_{CC-}.
2. Differential voltages are at IN+ with respect to IN–.
3. The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15 V, whichever is less.
4. The output may be shorted to ground or either power supply.
5. For operation above 64°C free-air temperature, derate the D package to 464 mW at 70°C at the rate of 5.8 mW/°C.

recommended operating conditions

		MIN	MAX	UNIT
Supply voltage, $V_{CC\pm}$		±3	±18	V
Common-mode input voltage, V_{IC}	$V_{CC\pm}$ = ±15 V	–13	13	V
Operating free-air temperature, T_A		0	70	°C

electrical characteristics at specified free-air temperature, $V_{CC}\pm$ = ±15 V (unless otherwise noted)

PARAME		TEST CONDITIONS†		T_A	OP07C			OP07D			UNIT
					MIN	TYP	MAX	MIN	TYP	MAX	
V_{IO}	Input offset voltage	V_O = 0,	R_S = 50	25°C		60	150		60	150	V
				0°C to 70°C		85	250		85	250	
VIO	Temperature coefficient of input offset	V_O = 0,	R_S = 50	0°C to 70°C		0.5	1.8		0.7	2.5	V/°C
	Long-term drift of input offset voltage	See Note 6				0.4			0.5		V/mo
	Offset adjustment range	R_S = 20 k ,	See Figure 1	25°C		±4			±4		mV
I_{IO}	Input offset current			25°C		0.8	6		0.8	6	nA
				0°C to 70°C		1.6	8		1.6	8	
IIO	Temperature coefficient of input offset current			0°C to 70°C		12	50		12	50	pA/°C
I_{IB}	Input bias current			25°C		±1.8	±7		±2	±12	nA
				0°C to 70°C		±2.2	±9		±3	±14	
IIB	Temperature coefficient of input bias current			0°C to 70°C		18	50		18	50	pA/°C
V_{ICR}	Common-mode input voltge range			25°C	±13	±14		±13	±14		V
				0°C to 70°C	±13	±13.5		±13	±13.5		
V_{OM}	Peak output voltage	R_L ε 10 k		25°C	±12	±13		±12	±13		V
		R_L ε 2 k			±11.5	±12.8		±11.5	±12.8		
		R_L ε 1 k				±12			±12		
		R_L ε 2 k		0°C to 70°C	±11	±12.6		±11	±12.6		
A_{VD}	Large-signal differential voltage amplification	$V_{CC}\pm$ = ±3 V, R_L ε 500 k	V_O = ±0.5 V,	25°C	100	400			400		V/mV
		V_O = ±10 V,	R_L = 2 k	25°C	120	400		120	400		
				0°C to 70°C	100	400		100	400		
B_1	Unity-gain bandwidth			25°C	0.4	0.6		0.4	0.6		MHz
r_i	Input resistance			25°C	8	33		7	31		M
CMRR	Common-mode rejection ratio	V_{IC} = ±13 V,	R_S = 50	25°C	100	120		94	110		dB
				0°C to 70°C	97	120		94	106		
k_{SVS}	Supply voltage sensitivity (V_{IO}/ V_{CC})	$V_{CC}\pm$ = ±3 V to ±18 V, R_S = 50		25°C		7	32		7	32	V/V
				0°C to 70°C		10	51		10	51	
P_D	Power dissipation	V_O = 0,	No load	25°C		80	150		80	150	mW
		$V_{CC}\pm$ = ±3 V, No load	V_O = 0,			4	8		4	8	

operating characteristics, $V_{CC\pm}$ = ±15 V, T_A = 25°C

PARAMETER		TEST CONDITIONS†	OP07C			OP07D			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
V_n	Equivalent input noise voltage	f = 10 Hz		10.5			10.5		nV/√Hz
		f = 100 Hz		10.2			10.3		
		f = 1 kHz		9.8			9.8		
$V_{N(PP)}$	Peak-to-peak equivalent input noise voltage	f = 0.1 Hz to 10 Hz		0.38			0.38		V
I_n	Equivalent input noise current	f = 10 Hz		0.35			0.35		pA/√Hz
		f = 100 Hz		0.15			0.15		
		f = 1 kHz		0.13			0.13		
$I_{N(PP)}$	Peak-to-peak equivalent input noise current	f = 0.1 Hz to 10 Hz		15			15		pA
SR	Slew rate	R_L ε 2 k		0.3			0.3		V/ s

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

electrical characteristics, $V_{CC\pm}$ = ±15 V, T_A = 25°C (unless otherwise noted)

PARAMETER		TEST CONDITIONS†	OP07Y			UNIT
			MIN	TYP	MAX	
V_{IO}	Input offset voltage	R_S = 50		60	150	V
	Long-term drift of input offset voltage	See Note 6		0.5		V/mo
	Offset adjustment range	R_S = 20 k , See Figure 1		±4		mV
I_{IO}	Input offset current			0.8	6	nA
I_{IB}	Input bias current			±2	±12	nA
V_{ICR}	Common-mode input voltage range		±13	±14		V
V_{OM}	Peak output voltage	R_L δ 10 k	±12	±13		V
		R_L δ 2 k	±11.5	±12.8		
		R_L δ 1 k		±12		
A_{VD}	Large-signal differential voltage amplification	$V_{CC\pm}$ = ±3 V, V_O = ±0.5 V, R_L δ 500 k		400		
		V_O = ±10 V, R_L = 2 k	120	400		
B_1	Unity-gain bandwidth		0.4	0.6		MHz
r_i	Input resistance		7	31		M
CMRR	Common-mode input resistance	V_{IC} = ±13 V, R_S = 50	94	110		dB
k_{SVS}	Supply-voltage rejection ratio (V_{CC}/ V_{IO})	$V_{CC\pm}$ = ±3 V to ±18 V, R_S = 50		7	32	V/V
P_D	Power dissipation	V_O = 0, No load		80	150	M
		$V_{CC\pm}$ = ±3 V, V_O = 0, No load		4	8	

operating characteristics, $V_{CC\pm}$ = ±15 V, T_A = 25°C

PARAMETER		TEST CONDITIONS†	OP07Y			UNIT
			MIN	TYP	MAX	
V_n	Equivalent input noise voltage	f = 10 Hz		10.5		nV/√Hz
		f = 1 kHz		10.3		
		f = 0.1 Hz to 10 Hz		9.8		
$V_{N(PP)}$	Peak-to-peak equivalent input noise voltage	f = 0.1 Hz to 10 Hz		0.38		V
I_n	Equivalent input noise current	f = 10 Hz		0.35		pA/√Hz
		f = 100 Hz		0.15		
		f = 1 kHz		0.13		
$I_{N(PP)}$	Peak-to-peak equivalent input noise current	f = 0.1 Hz to 10 Hz		15		pA
SR	Slew rate	R_L = 2 k		0.3		V/ s

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

APPLICATION INFORMATION

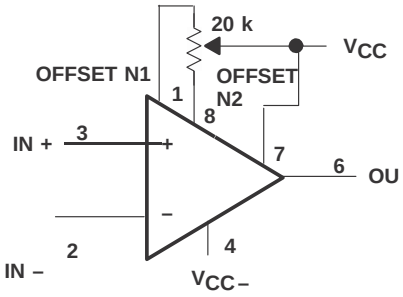


Figure 1. Input Offset Voltage Null Circuit