

Very low offset single bipolar operational amplifier

Features

- Extremely low offset: 150 μ V/ max.
- Low input bias current: 1.8nA
- LOW V_{i0} drift: 0.5 μ V/ $^{\circ}$ C
- Ultra stable with time: 2 μ V/month max.
- Wide supply voltage range: \pm 3V to \pm 22V
- Temperature range: 0 $^{\circ}$ C to -105 $^{\circ}$ C

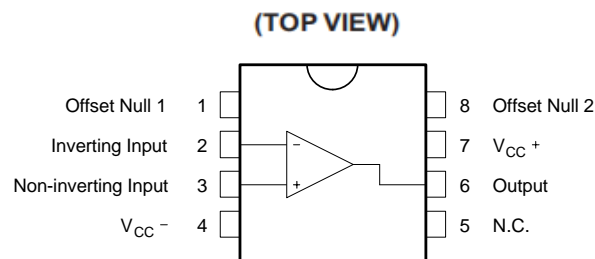
Description

The OP07 is a very high precision op-amp with an offset voltage maximum of 150 μ V.

Offering also low input current (1.8nA) and high gain (400V/mV), the OP07 is particularly suitable for instrumentation applications.

ORDERING INFORMATION

DEVICE	Package Type	MARKING	Packing	Packing Qty
OP07CN	DIP8	OP07C	TUBE	2000/box
OP07DN	DIP8	OP07D	TUBE	2000/box
OP07CM/TR	SOP8	OP07C	REEL	2500/reel
OP07DM/TR	SOP8	OP07D	REEL	2500/reel



1 Schematic diagram

Figure 1. Schematic diagram

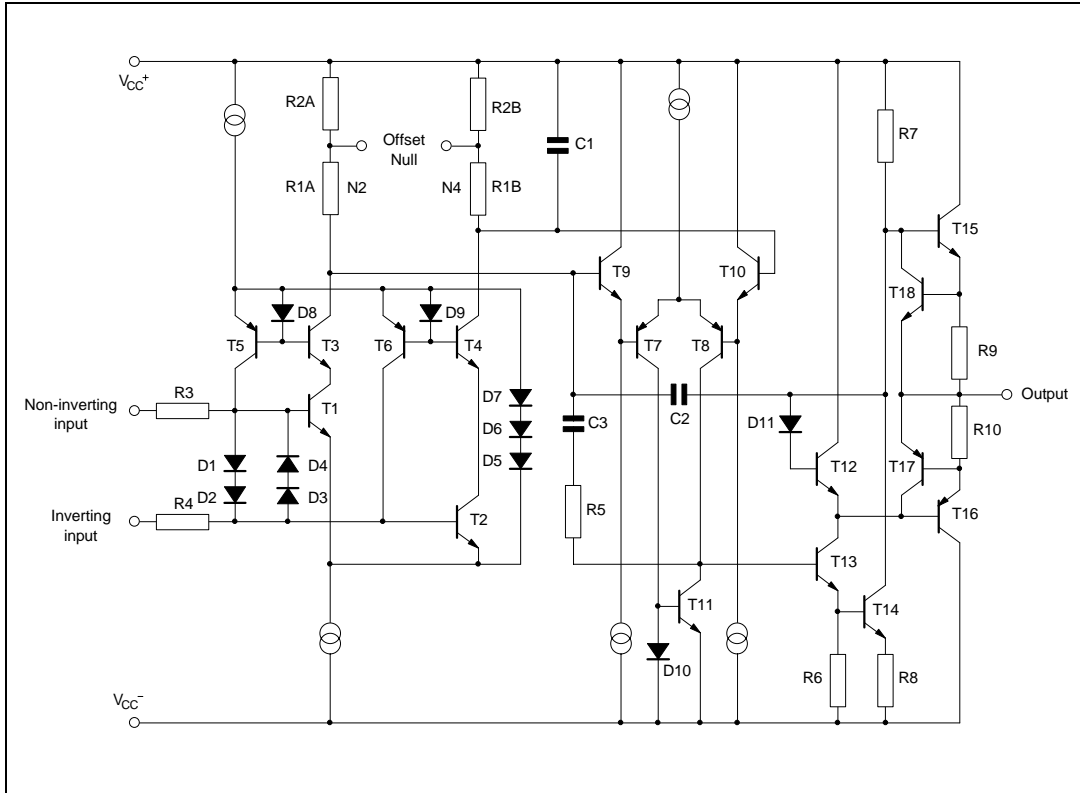
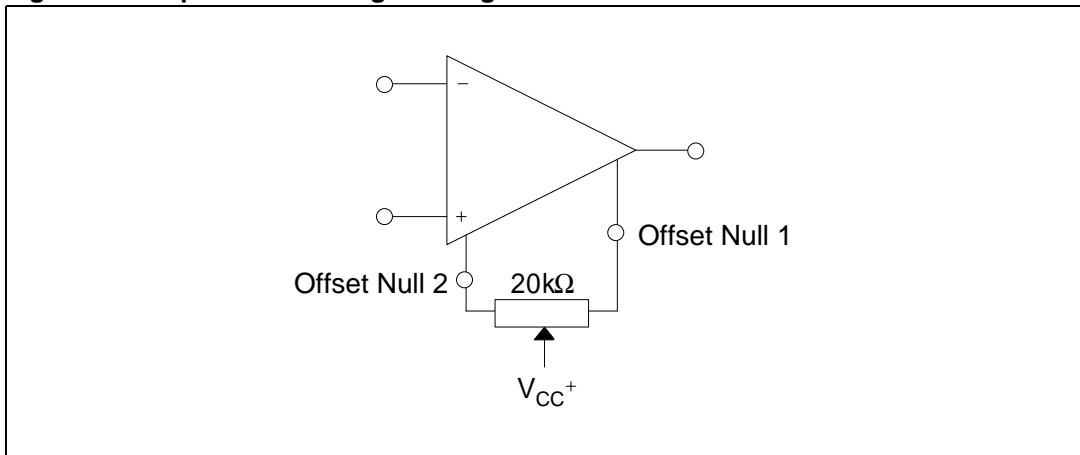


Figure 2. Input offset voltage nulling circuit



2 Absolute maximum ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CC}	Supply voltage	± 22	V
V_{id}	Differential input voltage	± 30	V
V_i	Input voltage	± 22	V
T_{oper}	Operating temperature	-40 to 85	°C
T_{stg}	Storage temperature	-65 to 150	°C
R_{thja}	Thermal resistance junction to ambient ^{(1) (2)} DIP8	85	°C/W
R_{thjc}	Thermal resistance junction to case ^{(1) (2)} DIP8	41	°C/W
ESD	HBM: human body model ⁽³⁾	1.5	kV
	MM: machine model ⁽⁴⁾	200	V
	CDM: charged device model ⁽⁵⁾	1.5	kV

1. Short-circuits can cause excessive heating and destructive dissipation.
2. R_{th} are typical values.
3. Human body model: 100pF discharged through a 1.5k Ω resistor between two pins of the device, done for all couples of pin combinations with other pins floating.
4. Machine model: a 200pF cap is charged to the specified voltage, then discharged directly between two pins of the device with no external series resistor (internal resistor < 5 Ω). Done for all couples of pin combinations with other pins floating.
5. Charged device model: all pins plus package are charged together to the specified voltage and then discharged directly to the ground.

3 Electrical characteristics

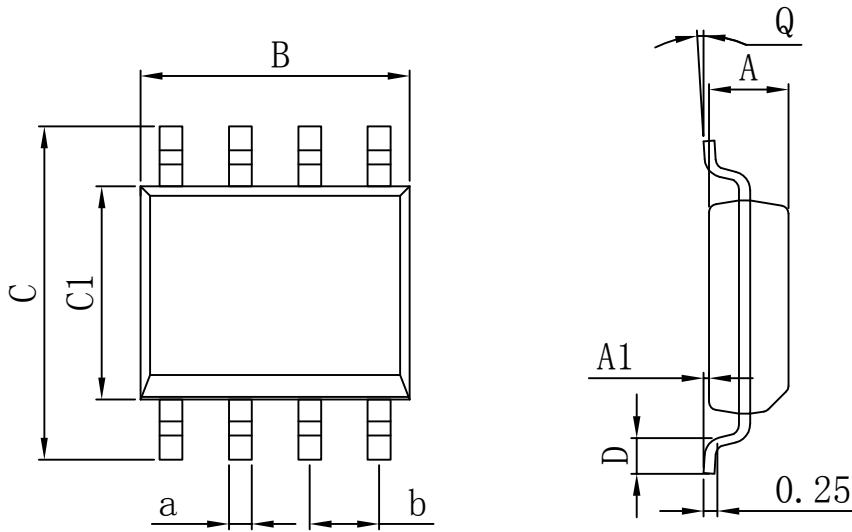
Table 2. $V_{CC^+} = 15\text{ V}$, $V_{CC^-} = \text{Ground}$, $T_{amb} = 25^\circ\text{ C}$ (unless otherwise specified)

Symbol	Parameter	OP07C			OP07D			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
V_{io}	Input offset voltage $0^\circ\text{C} \leq T_{amb} \leq +105^\circ\text{C}$		60 85				150 250	μV
	Long term input offset - voltage stability ⁽¹⁾		0.4					$\mu\text{V}/\text{Mo}$
DV_{io}	Input offset voltage drift		0.5				2.5	$\mu\text{V}/^\circ\text{C}$
I_{io}	Input offset current ($V_{ic} = 0\text{V}$) $0^\circ\text{C} \leq T_{amb} \leq +105^\circ\text{C}$		0.8	6 7		0.8	6 7	nA
	DI_{io}	Input offset current drift		15	50		15	50
DI_{ib}	Input bias current drift		15	50		15	50	$\text{pA}/^\circ\text{C}$
R_o	Open loop output resistance		60			60		Ω
R_{id}	Differential input resistance		33			33		MW
R_{ic}	Common mode input resistance		120			120		GW
V_{icm}	Input common mode voltage range $0^\circ\text{C} \leq T_{amb} \leq +105^\circ\text{C}$	± 13 ± 13	± 13.5		± 13 ± 13	± 13.5		V
	CMR	Common-mode rejection ratio ($V_{ic} = V_{icm} - \text{min}$) $0^\circ\text{C} \leq T_{amb} \leq +105^\circ\text{C}$	100 97	120		94 94	110 106	
SVR	Supply voltage rejection ratio ($V_{CC} = \pm 3$ to $\pm 18\text{V}$) $0^\circ\text{C} \leq T_{amb} \leq +105^\circ\text{C}$	90 86	104		90 86	104		dB
	A_{vd}	Large signal voltage gain $V_{CC} = \pm 15$, $R_L = 2\text{k}\Omega$, $V_O = \pm 10\text{V}$ $0^\circ\text{C} \leq T_{amb} \leq +105^\circ\text{C}$	120 100	400		120 100	400	
$V_{CC} = \pm 3$, $R_L = 500\Omega$, $V_O = \pm 0.5\text{V}$		100	400		100	400		
V_{opp}		Output voltage swing $R_L = 10\text{k}\Omega$	± 12	± 13		± 12	± 13	
	$R_L = 2\text{k}\Omega$	± 11.5	± 12.8		± 11.5	± 12.8		
	$R_L = 1\text{k}\Omega$		± 12			± 12		
	$0^\circ\text{C} \leq T_{amb} \leq +105^\circ\text{C}$, $R_L = 2\text{k}\Omega$	± 11			± 11			
SR	Slew rate ($R = 2\text{k}\Omega$, $C_L = 100\text{pF}$)		0.17			0.17		V/us
GBP	Gain bandwidth product ($R_L = 2\text{k}\Omega$, $C_L = 100\text{pF}$, $f = 100\text{kHz}$)		0.5			0.5		MHz
I_{CC}	Supply current - no load $0^\circ\text{C} \leq T_{amb} \leq +105^\circ\text{C}$		2.7	5 6		2.7	5 6	mA
	$V_{CC} = \pm 3\text{V}$		0.67	1.3		0.67	1.3	
e_n	Equivalent input noise voltage $f = 10\text{Hz}$		11	20		11	20	$\frac{\text{nV}}{\sqrt{\text{Hz}}}$
	$f = 100\text{Hz}$		10.5	13.5		10.5	13.5	
	$f = 1\text{kHz}$		10	11.5		10	11.5	
i_n	Equivalent input noise current $f = 10\text{Hz}$		0.3	0.9		0.3	0.9	$\frac{\text{pA}}{\sqrt{\text{Hz}}}$
	$f = 100\text{Hz}$		0.2	0.3		0.2	0.3	
	$f = 1\text{kHz}$		0.1	0.2		0.1	0.2	

1. Long term input offset voltage stability refers to the average trend line of V_{io} vs time over extended periods after the first 30 days of operation.

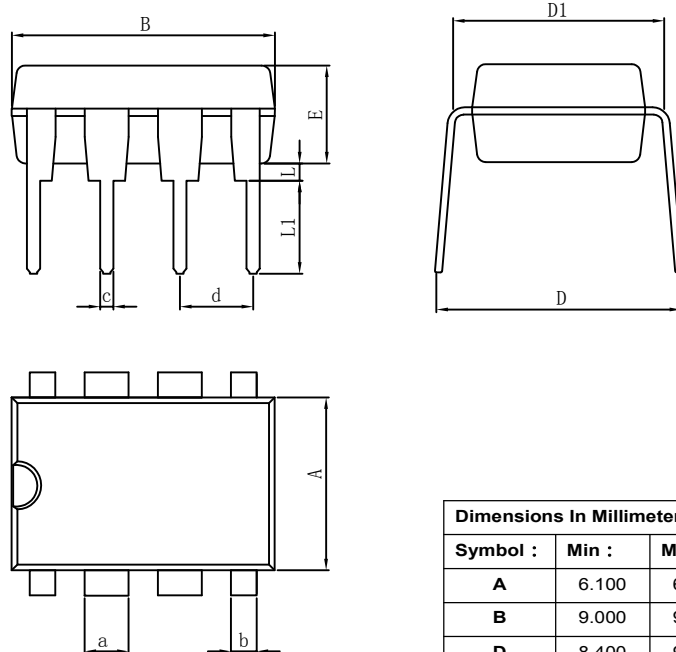
PACKAGE

SOP8



Dimensions In Millimeters					
Symbol :	Min :	Max :	Symbol :	Min :	Max :
A	1.225	1.570	D	0.400	0.950
A1	0.100	0.250	Q	0°	8°
B	4.800	5.100	a	0.420 TYP	
C	5.800	6.250	b	1.270 TYP	
C1	3.800	4.000			

DIP8



Dimensions In Millimeters					
Symbol :	Min :	Max :	Symbol :	Min :	Max :
A	6.100	6.680	L1	3.000	3.600
B	9.000	9.500	a	1.524 TYP	
D	8.400	9.000	b	0.889 TYP	
D1	7.420	7.820	c	0.457 TYP	
E	3.100	3.550	d	2.540 TYP	
L	0.500	0.700			

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