

# Very low offset single bipolar operational amplifier

## Features

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

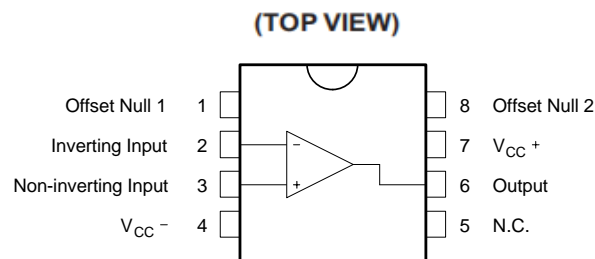
## Description

The OP07 is a very high precision op-amp with an offset voltage maximum of 150 $\mu$ 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

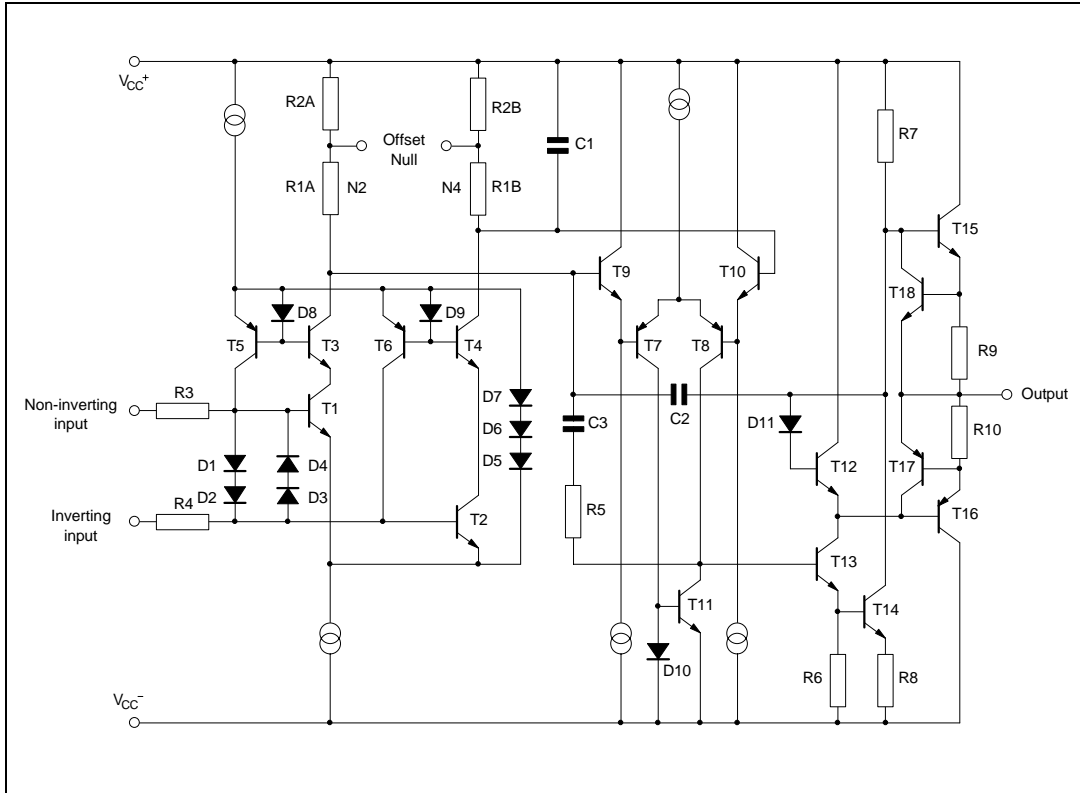
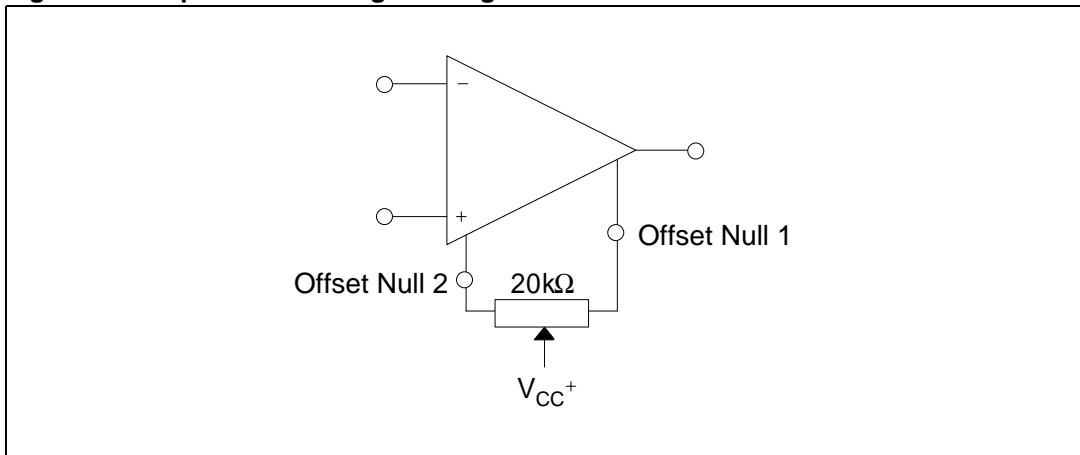


Figure 2. Input offset voltage nulling circuit



## 2 Absolute maximum ratings

**Table 1. Absolute maximum ratings**

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

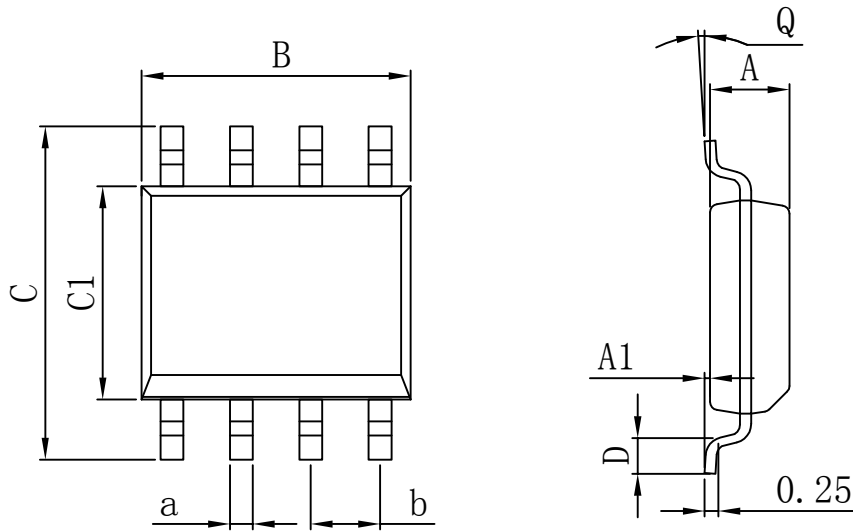
**Table 2.**  $V_{CC^+} = 15\text{ V}$ ,  $V_{CC^-} = \text{Ground}$ ,  $T_{amb} = 25^\circ\text{ C}$  (unless otherwise specified)

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	$\mu\text{V}$
	Long term input offset - voltage stability <sup>(1)</sup>		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		$\Omega$
$R_{id}$	Differential input resistance		33			33		MW
$R_{ic}$	Common mode input resistance		120			120		GW
$V_{icm}$	Input common mode voltage range $0^\circ\text{C} \leq T_{amb} \leq +105^\circ\text{C}$	$\pm 13$ $\pm 13$	$\pm 13.5$		$\pm 13$ $\pm 13$	$\pm 13.5$		V
	$\text{CMR}$	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	
$\text{SVR}$	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 $R_L = 10\text{k}\Omega$	$\pm 12$	$\pm 13$		$\pm 12$	$\pm 13$	
	$R_L = 2\text{k}\Omega$	$\pm 11.5$	$\pm 12.8$		$\pm 11.5$	$\pm 12.8$		
	$R_L = 1\text{k}\Omega$		$\pm 12$			$\pm 12$		
	$0^\circ\text{C} \leq T_{amb} \leq +105^\circ\text{C}$ , $R_L = 2\text{k}\Omega$	$\pm 11$			$\pm 11$			
$\text{SR}$	Slew rate ( $R = 2\text{k}\Omega$ , $C_L = 100\text{pF}$ )		0.17			0.17		V/us
$\text{GBP}$	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.

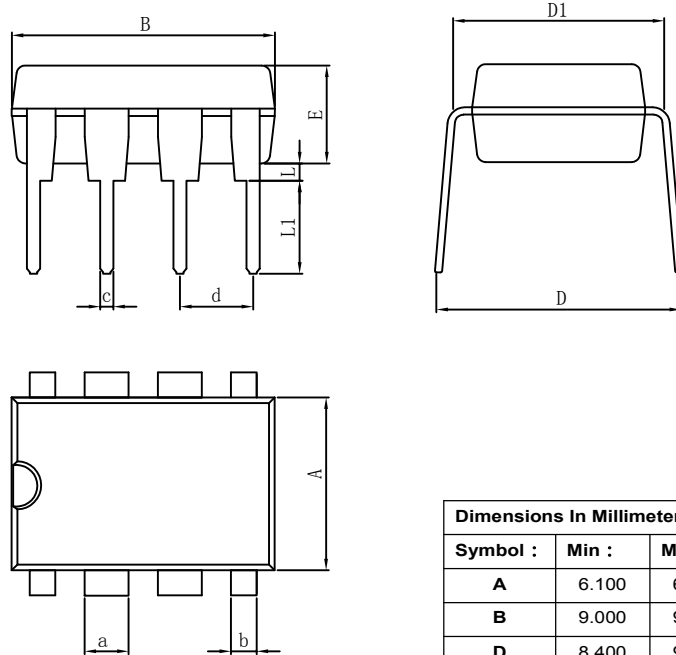
PACKAGE

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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