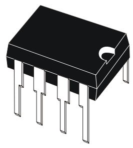
# Very low offset single bipolar operational amplifier

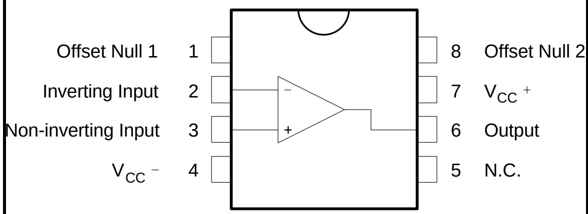
## Features

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



**N**
**DIP8**
(Plastic package)

**Pin connections**
(top view)




## Description

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

Offering also low input current (1.8nA) and high gain (400V/mV), the OP07C is particularly suitable for instrumentation applications.

# 1 Schematic diagram

**Figure 1. Schematic diagram**

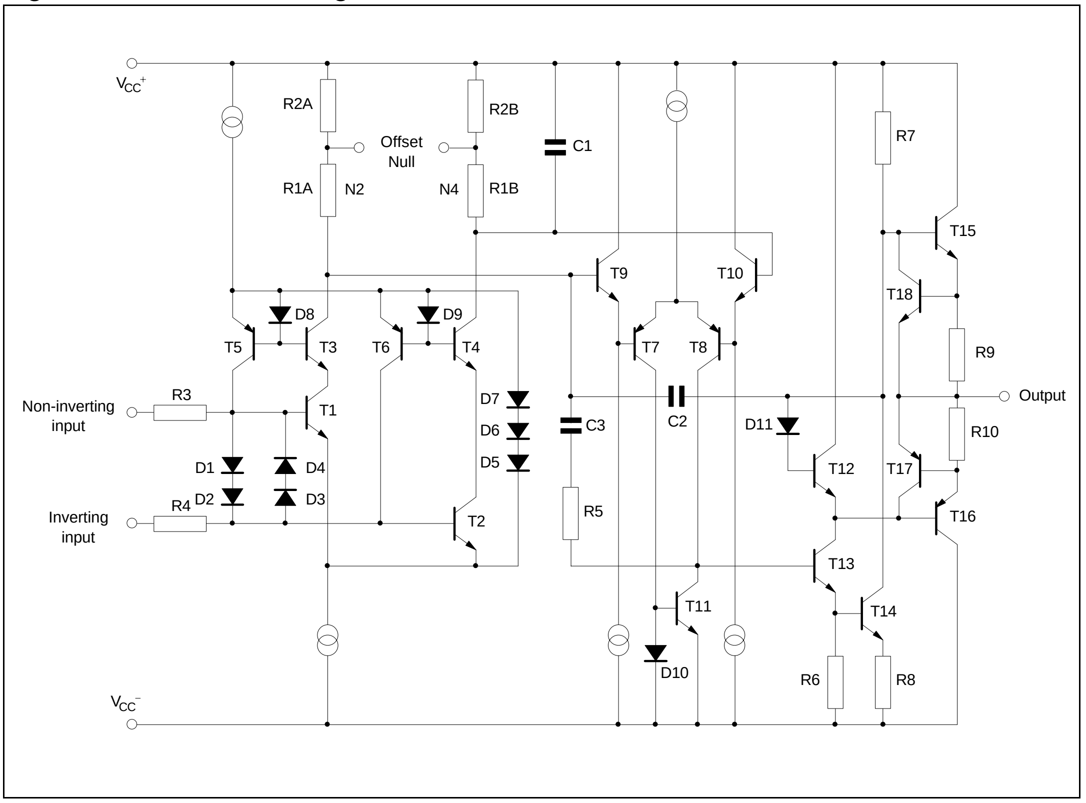
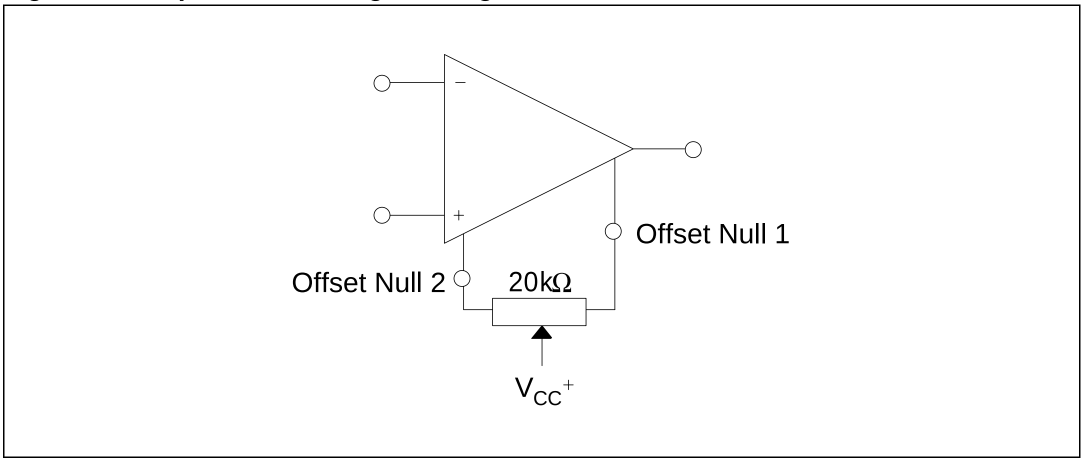



**Figure 2. Input offset voltage nulling circuit**



# 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 105 | °C |
| $T_{stg}$ | Storage temperature | -65 to 150 | °C |
| $R_{thja}$ | Thermal resistance junction to ambient(1) (2)<br>DIP8 | 85 | °C/W |
| $R_{thjc}$ | Thermal resistance junction to case(1) (2)<br>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 1.5kΩ 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 < 5Ω). 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 V, $V_{CC}^{-}$ = Ground, $T_{amb}$ = 25° C (unless otherwise specified)**

| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| $V_{io}$ | Input offset voltage<br>0°C ≤ $T_{amb}$ ≤ +105°C | | 60 | 150<br>250 | µV |
| | Long term input offset - voltage stability [(1)] | | 0.4 | 2 | µV/Mo |
| $DV_{io}$ | Input offset voltage drift | | 0.5 | 1.8 | µV/°C |
| $I_{io}$ | Input offset current ($V_{ic}$ = 0V)<br>0°C ≤ $T_{amb}$ ≤ +105°C | | 0.8 | 6<br>7 | nA |
| $DI_{io}$ | Input offset current drift | | 15 | 50 | pA/°C |
| $DI_{ib}$ | Input bias current drift | | 15 | 50 | pA/°C |
| $R_o$ | Open loop output resistance | | 60 | | Ω |
| $R_{id}$ | Differential input resistance | | 33 | | MW |
| $R_{ic}$ | Common mode input resistance | | 120 | | GW |
| $V_{icm}$ | Input common mode voltage range<br>0°C ≤ $T_{amb}$ ≤ +105°C | ±13<br>±13 | ±13.5 | | V |
| CMR | Common-mode rejection ratio ($V_{ic}$ = $V_{icm\ -min}$)<br>0°C ≤ $T_{amb}$ ≤ +105°C | 100<br>97 | 120 | | dB |
| SVR | Supply voltage rejection ratio ($V_{CC}$ = ±3 to ±18V)<br>0°C ≤ $T_{amb}$ ≤ +105°C | 90<br>86 | 104 | | dB |
| $A_{vd}$ | Large signal voltage gain<br>$V_{CC}$ = ±15, $R_L$ = 2kΩ, $V_o$ = ±10V<br>0°C ≤ $T_{amb}$ ≤ +105°C<br>$V_{CC}$ = ±3, $R_L$ = 500Ω, $V_o$ = ±0.5V | <br>120<br>100<br>100 | <br>400<br><br>400 | | V/mV |
| $V_{opp}$ | Output voltage swing<br>$R_L$ = 10kΩ<br>$R_L$ = 2kΩ<br>$R_L$ = 1kΩ<br>0°C ≤ $T_{amb}$ ≤ +105°C $R_L$ = 2kΩ | <br>±12<br>±11.5<br><br>±11 | <br>±13<br>±12.8<br>±12 | | V |
| SR | Slew rate ( $R_L$ = 2kΩ, $C_L$ = 100pF) | | 0.17 | | V/µs |
| GBP | Gain bandwidth product ($R_L$ = 2kΩ, $C_L$ = 100pF, f = 100kHz) | | 0.5 | | MHz |
| $I_{CC}$ | Supply current - no load<br>0°C ≤ $T_{amb}$ ≤ +105°C<br>$V_{CC}$ = ±3V | | 2.7<br><br>0.67 | 5<br>6<br>1.3 | mA |
| $e_n$ | Equivalent input noise voltage<br>f = 10Hz<br>f = 100Hz<br>f = 1kHz | | <br>11<br>10.5<br>10 | <br>20<br>13.5<br>11.5 | $\frac{nV}{\sqrt{Hz}}$ |
| $i_n$ | Equivalent input noise current<br>f = 10Hz<br>f = 100Hz<br>f = 1kHz | | <br>0.3<br>0.2<br>0.1 | <br>0.9<br>0.3<br>0.2 | $\frac{pA}{\sqrt{Hz}}$ |

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