

Low offset voltage single channel operational amplifier circuit

Description

The OP07 chip is a low-noise, offset voltage trimmed, bipolar operational amplifier integrated circuit. Due to its very low input offset voltage (maximum offset voltage not exceeding $150\mu\text{V}$), the OP07 IC often does not require additional zero adjustment measures in many application scenarios.

Feature

- Ultra-low offset: maximum $150\mu\text{V}$
- Low input bias current: 1.8nA
- Low offset voltage drift: $0.5\mu\text{V}/^\circ\text{C}$
- Ultra-stable, over time: maximum $2\mu\text{V}/\text{month}$
- Wide high power supply voltage range: $\pm 3\text{V}$ to $\pm 22\text{V}$

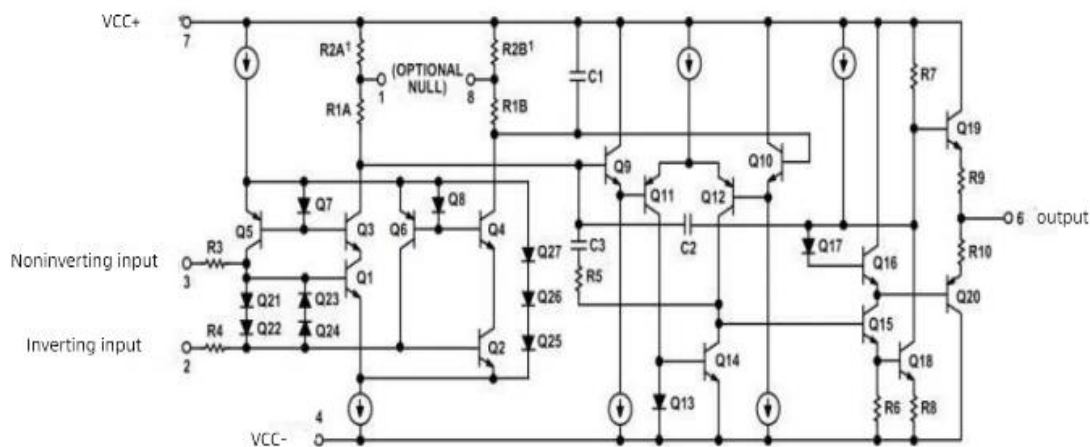


SOP-8 OP07

Application

- High-gain measuring equipment
- Amplifying weak signals from sensors
- Wireless base station control circuit □

Internal Usage Diagram



OP07 Internal Struction Diagram

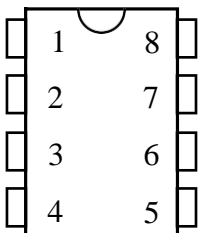
Pin Description

zeroing terminal 1

inverting input terminal

non-inverting input terminal

ground



zeroing terminal 2

electric source

Output

no-contact

OP07 Pin Diagram

| Number | Symbol | Parameter |
|--------|----------------------|----------------------------------|
| 1 | offsetnull 1 | zeroing terminal 1(bias balance) |
| 2 | Inverting input | inverting input terminal |
| 3 | non- inverting input | non-inverting input |
| 4 | V _{cc-} | ground |
| 5 | nc | no-contact |
| 6 | output | output |
| 7 | V _{cc+} | electric source |
| 8 | offsetnull 2 | zeroing terminal 2(bias balance) |

Maximum ratings (Unless otherwise specified, $T_{amb}=25^{\circ}\text{C}$)

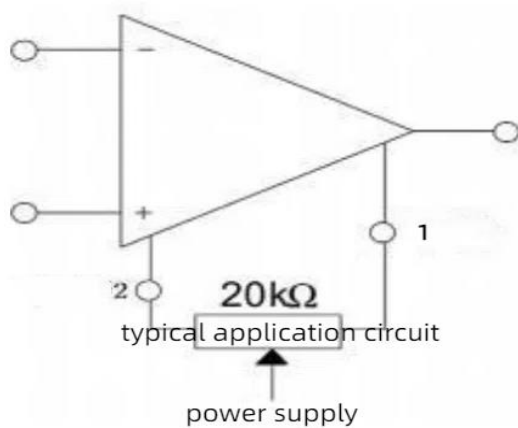
| Parameter | Symbol | Value | Unit |
|-------------------------------|-----------|------------|--------------------|
| supply voltage | V_{CC} | ± 22 | V |
| Differential input voltage | V_{IDR} | ± 30 | V |
| input voltage | V_i | ± 22 | V |
| Operating ambient temperature | T_{OPR} | -20 ~ +85 | $^{\circ}\text{C}$ |
| storage temperature | T_{STG} | -65 ~ +150 | $^{\circ}\text{C}$ |

Electrical characteristics(Unless otherwise specified, $V_{CC+}=15\text{V}$, $V_{CC-}=\text{ground}$, $T_{amb}=25^{\circ}\text{C}$)

| Parameter | Symbol | Text Condition | Min | Typ | Max | Unit |
|---|-----------|---|----------------------|------------|------------|--------------------------------|
| Input offset voltage | V_{io} | $0^{\circ}\text{C} \leq T_{amb} \leq +105^{\circ}\text{C}$ | | 60 | 150 250 | μV |
| Long-term stability of input bias voltage | | | | 0.4 | 2 | $\mu\text{V}/\text{Mo}$ |
| Input offset voltage drift | D_{Vio} | | | 0.5 | 1.8 | $\mu\text{V}/^{\circ}\text{C}$ |
| Input offset current | I_{io} | $0^{\circ}\text{C} \leq T_{amb} \leq +105^{\circ}\text{C}$ | | 0.8 | 6 7 | nA |
| Input offset current drift | D_{Iio} | | | 15 | 50 | $\text{pA}/^{\circ}\text{C}$ |
| Input bias current drift | D_{Iib} | | | 15 | 50 | $\text{pA}/^{\circ}\text{C}$ |
| Open-loop output impedance | R_o | | | 60 | | Ω |
| Differential input resistance | R_{id} | | | 33 | | $\text{M}\Omega$ |
| Common-mode input resistance | R_{ic} | | | 120 | | $\text{G}\Omega$ |
| Input common-mode voltage | V_{icm} | $0^{\circ}\text{C} \leq T_{amb} \leq +105^{\circ}\text{C}$ | ± 13 ± 13 | ± 13.5 | | V |
| Common-mode rejection ratio | C_{MR} | $0^{\circ}\text{C} \leq T_{amb} \leq +105^{\circ}\text{C}$ | 100 97 | 120 | | dB |
| Power supply rejection ratio | S_{VR} | $(V_{CC} = \pm 3\text{to } \pm 18\text{V})$ $0^{\circ}\text{C} \leq T_{amb} \leq +105^{\circ}\text{C}$ | 90 86 | 104 | | dB |
| Large signal voltage gain | A_{vd} | $V_{CC} = \pm 15, R_L = 2\text{K}\Omega,$ $V_O = \pm 10\text{V}$ | 120 | 400 | | V/mV |
| | | $0^{\circ}\text{C} \leq T_{amb} \leq +105^{\circ}\text{C}$ | 100 | | | |
| | | $V_{CC} = \pm 3\text{V}, R_L = 500\Omega, V_O =$ $\pm 0.5\text{V}$ | 100 | 400 | | |
| Output voltage swing | V_{OPP} | $R_L = 10\text{K}\Omega$ | ± 12 | ± 13 | | V |

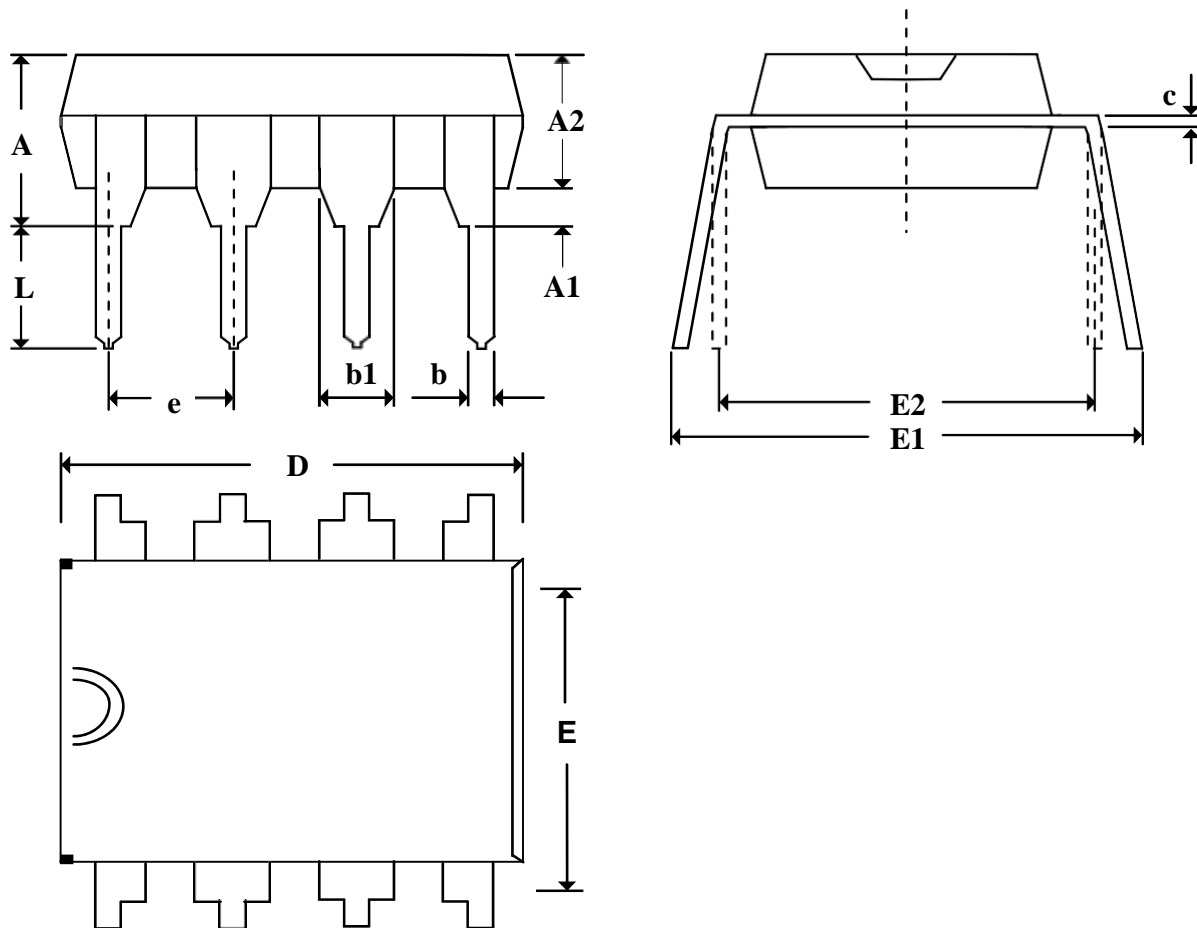
| | | | | | | |
|--------------------------------|----------|---|------------|------------|------|------------------------|
| | | $R_L = 2k\Omega$ | ± 11.5 | ± 12.8 | | |
| | | $R_L = 1k\Omega$ | | ± 12 | | |
| | | $0^\circ C \leq T_{amb} \leq +70^\circ C$ $R_L = 2k\Omega$ | ± 11 | | | |
| Conversion gain | S_R | $(R_L = 2k\Omega, C_L = 100PF)$ | | 0.17 | | $V/\mu S$ |
| Bandwidth gain | G_{BP} | $(R_L = 2k\Omega, C_L = 100PF,$ $f = 100KHz)$ | | 0.5 | | MHz |
| Power supply current | I_{cc} | no-load | | 2.7 | 5 | mA |
| | | $0^\circ C \leq T_{amb} \leq +105^\circ C$ | | | 6 | |
| | | $V_{CC} = \pm 3V$ | | 0.67 | 1.3 | |
| Equivalent input noise voltage | E_n | $f = 10Hz$ | | 11 | 20 | $\frac{nV}{\sqrt{Hz}}$ |
| | | $f = 100Hz$ | | 10.5 | 13.5 | |
| | | $f = 1KHz$ | | 10 | 11.5 | |
| Equivalent input noise current | I_n | $f = 10Hz$ | | 0.3 | 0.9 | $\frac{pA}{\sqrt{Hz}}$ |
| | | $f = 100Hz$ | | 0.2 | 0.3 | |
| | | $f = 1KHz$ | | 0.1 | 0.2 | |

Typical Application Circuit



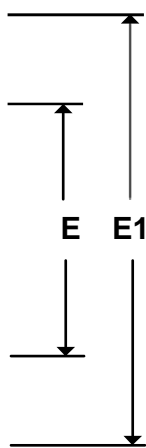
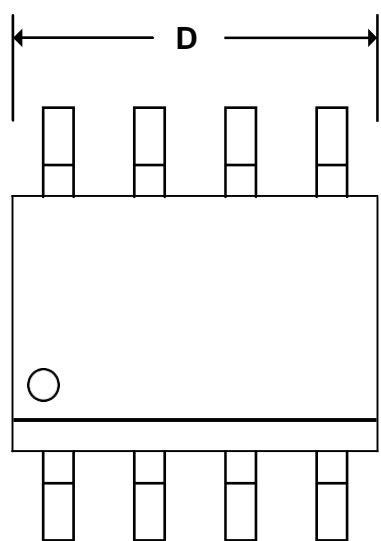
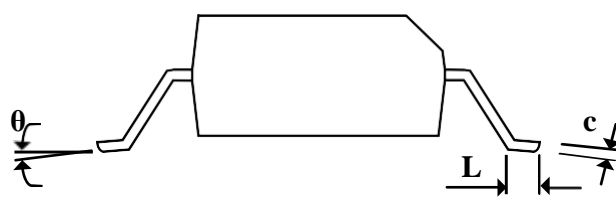
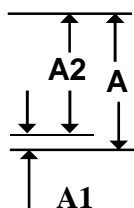
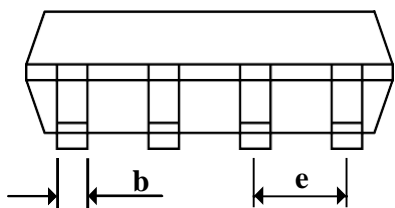
Package Outline Diagram

DIP-8



| Symbol | Size(mm) | | Symbol | Size(mm) | |
|--------|-------------|-------|--------|-------------|-------|
| | Min | Max | | Min | Max |
| a | 3.600 | 4.310 | e | 2.540 (bsc) | |
| a1 | 0.510 | | d | 9.000 | 9.450 |
| a2 | 3.000 | 3.600 | e | 6.150 | 6.600 |
| b | 0.330 | 0.530 | e1 | 7.870 | 9.610 |
| b1 | 1.520 (bsc) | | e2 | 7.320 | 7.920 |
| c | 0.204 | 0.360 | l | 3.000 | 3.600 |

SOP-8



| Symbol | Size(mm) | | Symbol | Size(mm) | |
|--------|-------------|-------|----------|----------|-------|
| | Min | Max | | Min | Max |
| a | 1.350 | 1.800 | d | 4.700 | 5.100 |
| a1 | 0.100 | 0.250 | e | 3.700 | 4.100 |
| a2 | 1.250 | 1.550 | e1 | 5.800 | 6.300 |
| b | 0.330 | 0.510 | l | 0.400 | 0.800 |
| c | 0.190 | 0.250 | θ | 0° | 8° |
| e | 1.270 (bsc) | | | | |