



General Description

These devices offer low offset and long-term stability 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.

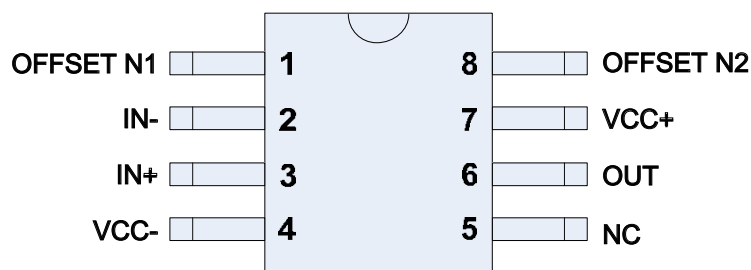
Features

- Low Noise
- No External Components Required
- Replace Chopper Amplifiers at a Lower Cost
- Wide Input-Voltage Range: 0 to ± 14 V (Typ)
- Wide Supply-Voltage Range: ± 3 V to ± 18 V

Ordering Information

| Product Model | Package Type | Packing | Packing Qty |
|---------------|--------------|---------|--------------|
| OP07CDR | SOP-8 | Tape | 4000Pcs/Reel |

Pin Configurations



Function Block

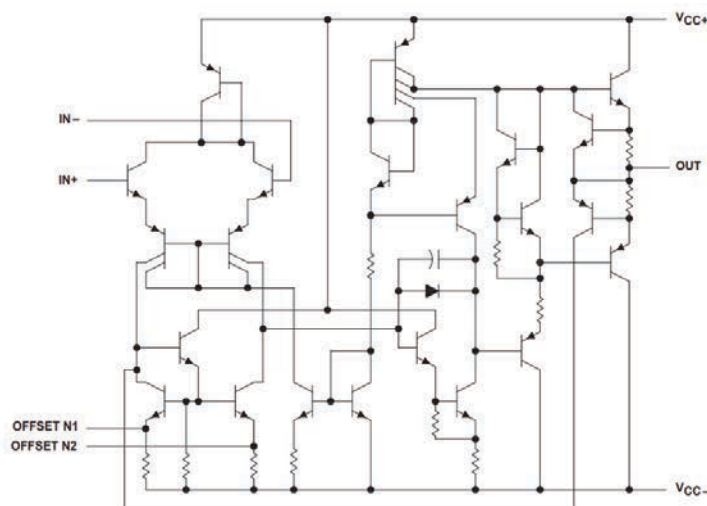


Figure 1 Function Block Diagram of OP07CDR



Absolute Maximum Ratings

| Symbol | Parameter | Value | Unit |
|-------------------|---|-------------|------|
| VCC | Supply voltage | ±22 | V |
| V _{id} | Differential input voltage | ±30 | |
| V _i | Input voltage | ±22 | |
| | Output short-circuit duration | Infinite | |
| R _{thja} | Thermal resistance junction to ambient | 125 | °C/W |
| R _{thjc} | Thermal resistance junction to case | 40 | |
| ESD | HBM: human body model ⁽¹⁾ DIP package SO package | 500 400 | V |
| | MM: machine model ⁽²⁾ | 100 | |
| | CDM: charged device model ⁽³⁾ | 1.5 | kV |
| Tstg | Storage temperature range | -65 to +150 | °C |

1. Human body model: a 100 pF capacitor is charged to the specified voltage, then discharged through a 1.5kΩ resistor between two pins of the device. This is done for all couples of connected pin combinations while the other pins are floating.

2. Machine model: a 200 pF capacitor is charged to the specified voltage, then discharged directly between two pins of the device with no external series resistor (internal resistor <5Ω). This is done for all couples of connected pin combinations while the other pins are floating.

3. Charged device model: all pins and the package are charged together to the specified voltage and then discharged directly to the ground through only one pin. This is done for all pins.

Operating Conditions

| Symbol | Parameter | Value | Unit |
|-------------------|--------------------------------------|-------------|------|
| VCC | Supply voltage | 6 to 36 | V |
| V _{icm} | Common mode input voltage range | ±13 | |
| T _{oper} | Operating free air temperature range | -40 to +125 | °C |



Electrical Characteristics

TA = 25°C, unless otherwise noted, VCC = ±15 V, Tamb = 25 °C

| Symbol | Parameter | | Min. | Typ. | Max. | Unit |
|-------------------|---|--|----------------------|----------|------------|------|
| V _{io} | Input offset voltage ((R _S ≤ 10 kΩ) T _{amb} = +25 °C T _{min} ≤ T _{amb} ≤ T _{max} | | | 260 | 300 350 | μV |
| I _{io} | Input offset current Tamb = +25 °C T _{min} ≤ T _{amb} ≤ T _{max} | | | 2 | 6 8 | nA |
| I _{ib} | Input bias current Tamb = +25 °C T _{min} ≤ T _{amb} ≤ T _{max} | | | | ±12 ±14 | |
| A _{vd} | Large signal voltage gain (Vo = ±10 V, R _L = 2 kΩ) T _{am} = +25 °C T _{min} ≤ T _{amb} ≤ T _{max} | | 120 100 | 400 | | V/mV |
| SVR | Supply voltage rejection ratio ((R _S ≤ 10 kΩ) T _{amb} = +25 °C T _{min} ≤ T _{amb} ≤ T _{max} | | 77 77 | 90 | | dB |
| I _{cc} | Supply current, no load Tamb = +25 °C T _{min} ≤ T _{amb} ≤ T _{max} | | | 1.7 | 2.8 3.3 | mA |
| V _{icm} | Input common mode voltage range T _{amb} = +25 °C T _{min} ≤ T _{amb} ≤ T _{max} | | ±13 ±13 | | | V |
| CMR | Common mode rejection ratio (R _S ≤ 10 kΩ) T _{amb} = +25 °C T _{min} ≤ T _{amb} ≤ T _{max} | | 70 70 | 90 | | dB |
| I _{os} | Output short circuit current | | 10 | 25 | 40 | mA |
| ±V _{opp} | Output voltage swing Tamb = +25 °C Tmin ≤ Tamb ≤ Tmax | R _L = 10 kΩ R _L = 2 kΩ R _L = 10 kΩ R _L = 2 kΩ | 12 10 12 10 | 14 13 | | V |
| SR | Slew rate V _i = ±10 V, R _L = 2 kΩ, C _L = 100 pF, unity gai | | 0.25 | 0.5 | | V/μs |
| t _r | Rise time V _i = ±20 mV, R _L = 2 kΩ, C _L = 100 pF, unity gain | | | 0.3 | | μs |
| K _{ov} | Overshoot V _i = 20 mV, R _L = 2 kΩ, C _L = 100 pF, unity gain | | | 5 | | % |
| R _i | Input resistance | | 7 | 31 | | MΩ |

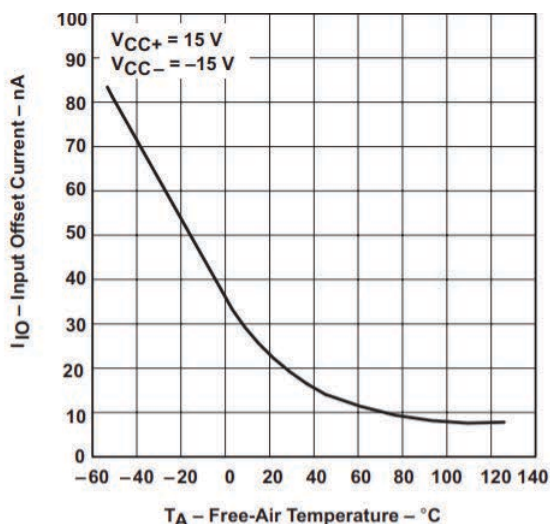


Electrical Characteristics

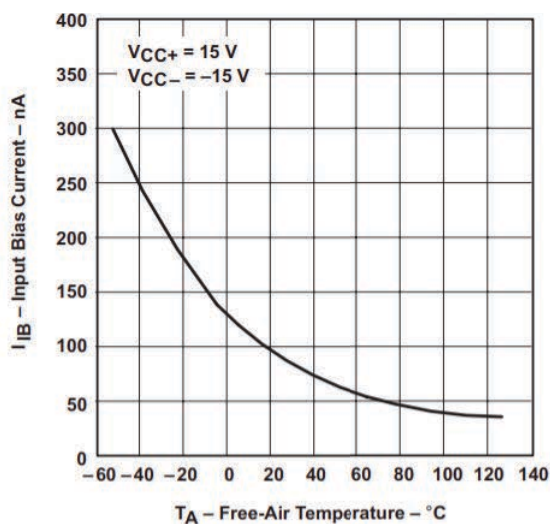
$T_A = 25^\circ\text{C}$, unless otherwise noted, $V_{CC} = \pm 15\text{ V}$, $T_{\text{amb}} = 25^\circ\text{C}$

| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|----------|---|------|------|------|-------------------------------|
| GBP | Gain bandwidth product $V_i = 10\text{ mV}$, $R_L = 2\text{ k}\Omega$, $C_L = 100\text{ pF}$, $f = 100\text{ kHz}$ | 0.4 | 0.6 | | MHz |
| THD | Total harmonic distortion $f = 1\text{ kHz}$, $A_V = 20\text{ dB}$, $R_L = 2\text{ k}\Omega$, $V_O = 2\text{ V}_{pp}$, $C_L = 100\text{ pF}$, $T_{\text{amb}} = +25^\circ\text{C}$ | | 0.06 | | % |
| e_n | Equivalent input noise voltage $f = 1\text{ kHz}$, $R_S = 100\ \Omega$ | | 23 | | $\frac{nV}{\sqrt{\text{Hz}}}$ |
| ϕ_m | Phase margin | | 50 | | Degree |

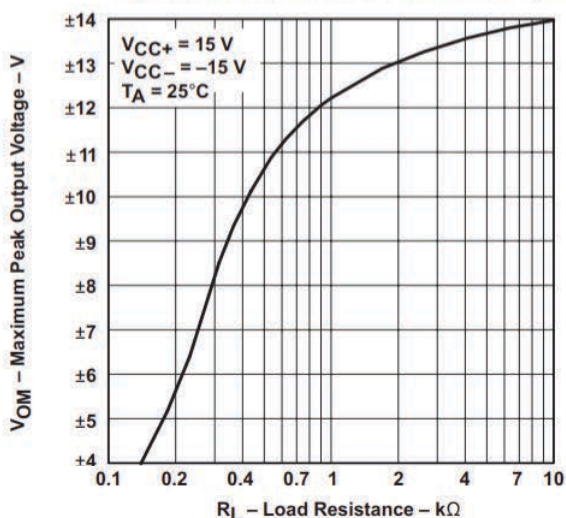
Typical Characteristics



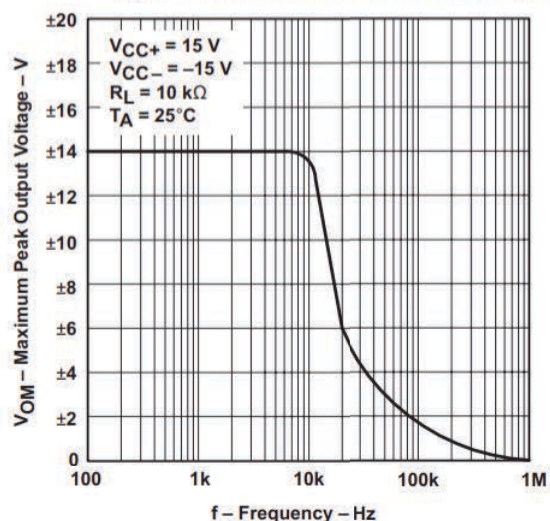
Input Offset Current vs Free-Air Temperature



Input Bias Current vs Free-Air Temperature



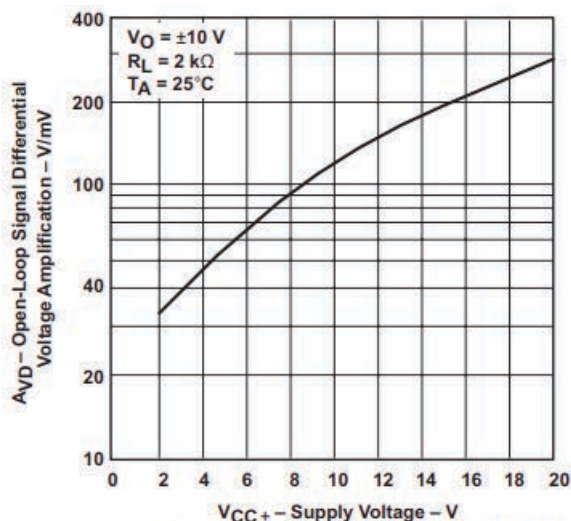
Maximum Output Voltage vs Load Resistance



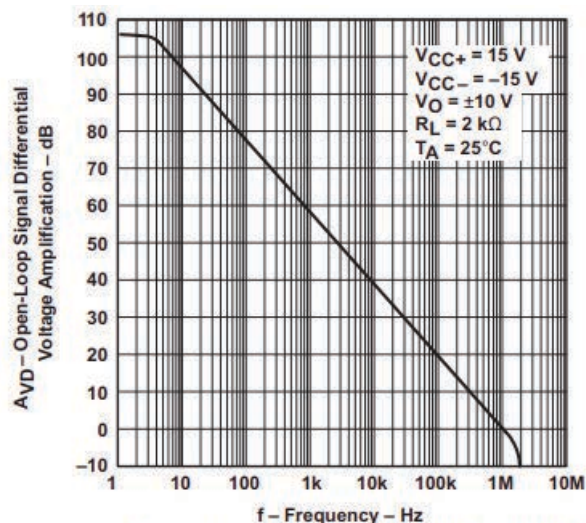
Maximum Peak Output Voltage vs Frequency



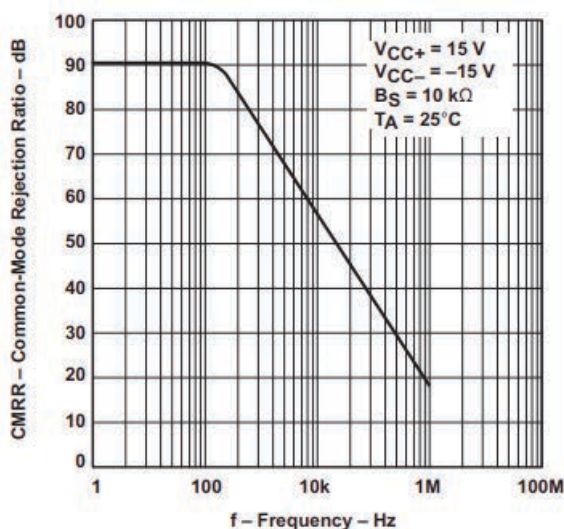
Typical Characteristics



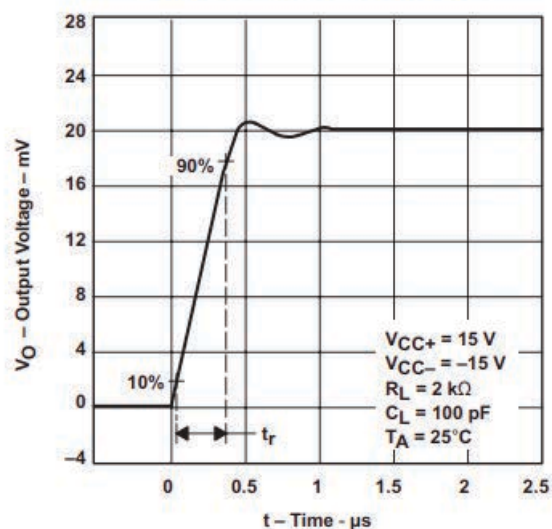
Open-Loop Signal Differential Voltage Amplification vs Supply Voltage



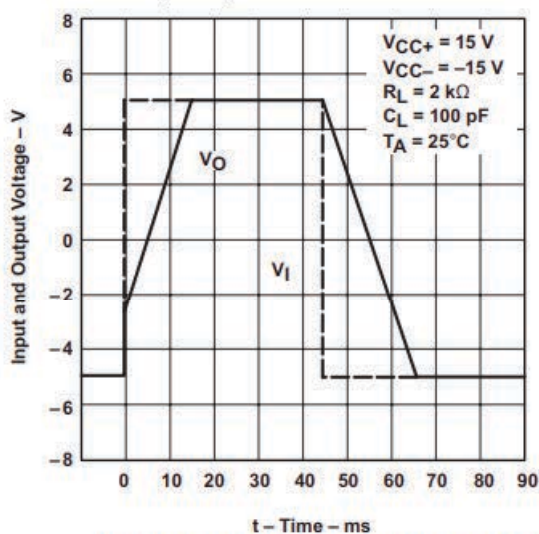
Open-Loop Large-Signal Differential Voltage Amplification vs Frequency



Common-Mode Rejection Ratio vs Frequency



Output Voltage vs Elapsed Time

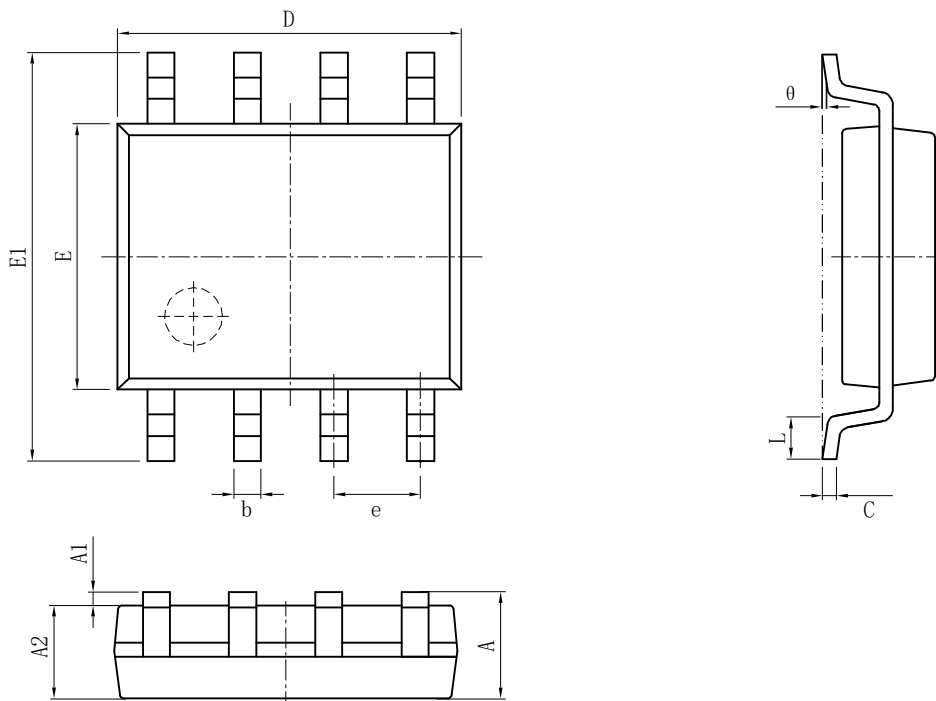


Voltage-Follower Large-Signal Pulse Response



Package Information

SOP-8(SOIC-8)



| Size Symbol | Dimensions In Millimeters | | Size Symbol | Dimensions In Inches | |
|----------------|---------------------------|---------|----------------|----------------------|---------|
| | Min(mm) | Max(mm) | | Min(in) | Max(in) |
| A | 1.350 | 1.750 | A | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | A1 | 0.004 | 0.010 |
| A2 | 1.350 | 1.550 | A2 | 0.053 | 0.061 |
| b | 0.330 | 0.510 | b | 0.013 | 0.020 |
| c | 0.170 | 0.250 | c | 0.006 | 0.010 |
| D | 4.700 | 5.100 | D | 0.185 | 0.200 |
| E | 3.800 | 4.000 | E | 0.150 | 0.157 |
| E1 | 5.800 | 6.200 | E1 | 0.228 | 0.224 |
| e | 1.270(BSC) | | e | 0.050(BSC) | |
| L | 0.400 | 1.270 | L | 0.016 | 0.050 |
| θ | 0° | 8° | θ | 0° | 8° |



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