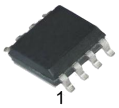
# HG741 Operational Amplifier

## General Description

The HG741 series are general purpose operational amplifies which feature improved performance over industry standards like the HG709.They are e direct, plug-in replacements for the 709C, LM201, MC1439 and 748 in most applications. The amplifiers offer many features which make their applica tion nearly foolproof: overload protection on the input and output, no latch-up when the common mode range is ex ceeded, as well as freedom from oscillations.

DIP-8



SOP-8

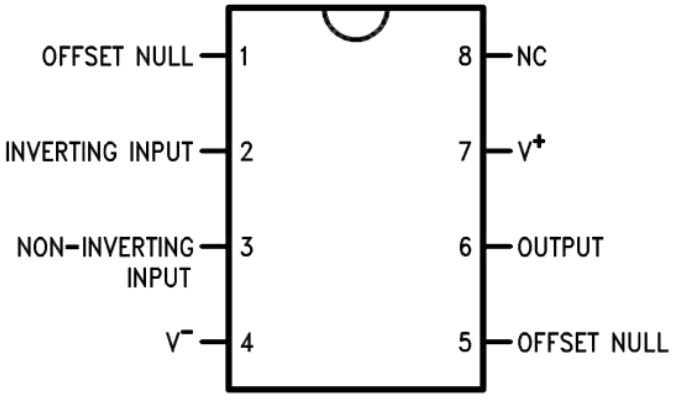

MSOP-8

## Ordering Information

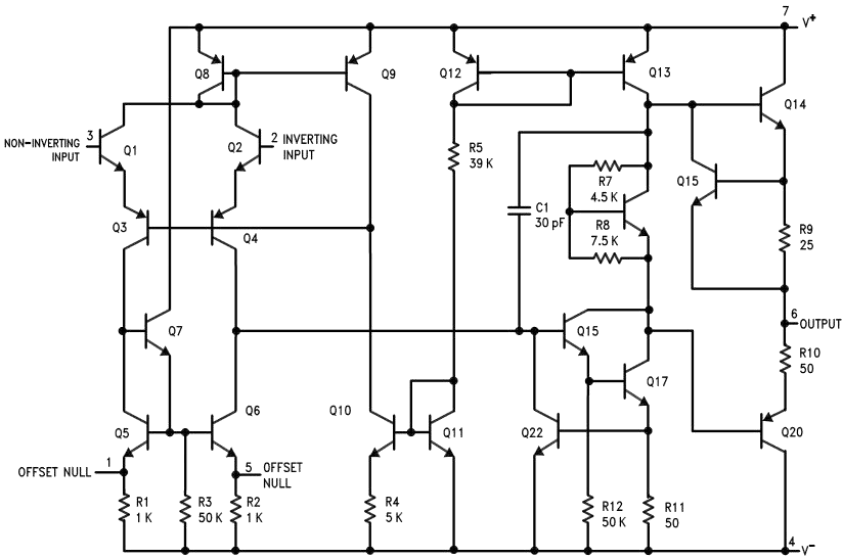
| DEVICE | Package Type | MARKING | Packing | Packing Qty |
|---|---|---|---|---|
| HG741N | DIP-8 | HG741,741 | TUBE | 2000pcs/Box |
| HG741AN | DIP-8 | HG741A,741A | TUBE | 2000pcs/Box |
| HG741CM/TR | SOP-8 | HG741C,741C | REEL | 2500pcs/Reel |
| HG741ACM/TR | SOP-8 | HG741AC,741AC | REEL | 2500pcs/Reel |
| HG741CMM/TR | MSOP-8 | HG741C,741C | REEL | 3000pcs/Reel |
| HG741ACMM/TR | MSOP-8 | HG741AC,741AC | REEL | 3000pcs/Reel |

## Connection Diagram

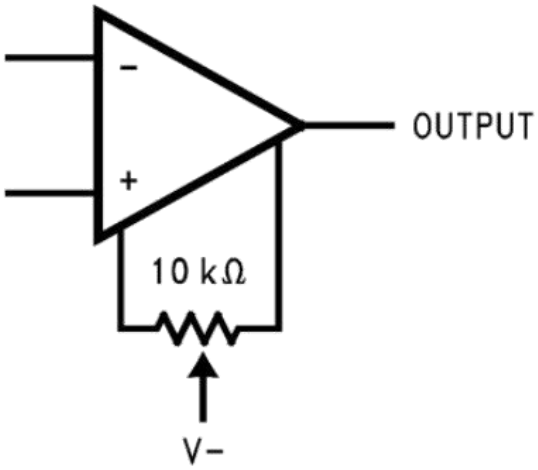
DIP-8/SOP-8/MSOP-8



## Schematic Diagram




## Offset Nulling Circuit



## Absolute Maximum Ratings

| CONDITION | LIMITS |
|---|---|
| Supply Voltage | ±22V |
| Power Dissipation(Note2） | 500mW |
| Differential Input Voltage | ±30V |
| Input Voltage(Note3) | ±15V |
| Output Sort Circuit Duration | Continuous |
| Operating Temperature Range | 0˚C to +70˚C |
| Junction Temperature | 150˚C |
| Soldering Information(10 seconds) | 260˚C |
| Storage Temperature Range | -65˚C to +150˚C |
| ESD Tolerance(Note7) | 400V |

Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but specific performance is not ensured.

## Electrical Characteristics

| Parameter | Conditions | HG741A | | | HG741 | | | Units |
|---|---|---|---|---|---|---|---|---|
| | | Min | Typ | Max | Min | Typ | Max | |
| Input Offset Voltage | $T_A$=25°C | | | | | | | |
| | $R_S$≤10KΩ | | | | | 1.0 | 5.0 | mW |
| | $R_S$≤50Ω | | 0.8 | 3.0 | | | | mW |
| | $T_{AMIN}$≤TA≤$T_{AMAX}$ | | | | | | | |
| | $R_S$≤50Ω | | | 4.0 | | | | mW |
| | $R_S$≤10KΩ | | | | | | 6.0 | mW |
| Average Input Offset Voltage Drift | | | | 15 | | | | μv/°C |
| Input Offset Voltage Adjustment Range | $T_A$=25°C,$V_S$=±20V | ±10 | | | | ±15 | | mW |
| Input Offset Current | $T_A$=25°C | | 3.0 | 30 | | 20 | 200 | nA |
| | $T_{AMIN}$≤TA≤$T_{AMAX}$ | | | 70 | | 85 | 500 | nA |
| Average Input Offset Current Drift | | | | 0.5 | | | | nA/°C |
| Input Bias Current | $T_A$=25°C | | 30 | 80 | | 80 | 500 | nA |
| | $T_{AMIN}$≤TA≤$T_{AMAX}$ | | | 0.210 | | | 1.5 | μA |
| Input Resistance | $T_A$=25°C,$V_S$=±18V | 1.0 | 6.0 | | 0.3 | 2.0 | | MΩ |
| | $T_{AMIN}$≤TA≤$T_{AMAX}$, Vs=±18V | 0.5 | | | | | | MΩ |
| Input Voltage Range | $T_A$=25°C | | | | ±12 | ±13 | | V |
| | $T_{AMIN}$≤TA≤$T_{AMAX}$ | | | | | | | V |
| Large Signal Voltage Gain | $T_A$=25°C,$R_L$≥2KΩ | | | | | | | |
| | $V_S$=±18V,$V_O$=±15V | 50 | | | | | | V/mW |
| | $V_S$=±15V,$V_O$=±10V | | | | 20 | 200 | | V/mW |
| | $T_{AMIN}$≤TA≤$T_{AMAX}$ | | | | | | | |
| | $R_L$≥2KΩ | | | | | | | |
| | $V_S$=±18V,$V_O$=±15V | 32 | | | | | | V/mW |
| | $V_S$=±15V,$V_O$=±10V | | | | 15 | | | V/mW |
| | $V_S$=±5V,$V_O$=±2V | 10 | | | | | | V/mW |
| Output Voltage Swing | $V_S$=±18V | | | | | | | |
| | $R_L$≥10KΩ | ±16 | | | | | | V |
| | $R_L$≥2KΩ | ±15 | | | | | | V |
| | $V_S$=±15V | | | | | | | |
| | $R_L$≥10KΩ | | | | ±12 | ±14 | | V |
| | $R_L$≥2KΩ | | | | ±10 | ±13 | | V |
| Output Short Circuit Current | $T_A$=25°C | 10 | 25 | 35 | | 25 | | mA |
| | $T_{AMIN}$≤TA≤$T_{AMAX}$ | 10 | | 40 | | | | mA |
| Common-Mode Rejection Ratio | $T_{AMIN}$≤TA≤$T_{AMAX}$ | | | 0.5 | | | | |
| | $R_S$≤10KΩ,$V_{CM}$=±12V | | | | 70 | 90 | | dB |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | $R_S$≤50Ω,$V_{CM}$=±12V | 80 | 95 | | | | | dB |
| Supply Voltage Rejection Ratio | $T_{AMIN}$≤TA≤$T_{AMAX}$<br>Vs=±18VtoVS=±5V<br>$R_S$≤50Ω<br>$R_S$≤10KΩ | 86 | 96 | | 77 | 96 | | dB<br>dB |
| Transient Response Rise Time Overshoot | $T_A$=25°C,Unity Gain | | 0.25<br>6.0 | 0.8<br>20 | | 0.3<br>5 | | μs |
| Bandwidth(Note5) | $T_A$=25°C | 0.437 | 1.5 | | | | | MHz |
| Slew Rate | $T_A$=25°C,Unity Gain | 0.3 | 0.7 | | | 0.5 | | V/μs |
| Supply Current | $T_A$=25°C | | | | | 1.7 | 2.8 | mA |
| Power Consumption | $T_A$=25°C<br>$V_S$=±18V<br>$V_S$=±15V | | 80 | 150 | | 50 | 85 | mw<br>mw |

**Note1**:“Absolute Maximum Ratings”indicate limits beyond which damage to the device may occur.Operating Ratings indicate conditions for which the device is functional,but do not guarantee specific performance limits.

**Note 2**: For operation at elevated temperatures, these devices must be derated based on thermal resistance, and $T_j$ max. (listed under “Absolute Maximum Ratings”). $T_j = T_A + (\theta_{jA} P_D)$.

| Thermal Resistance | DIP(B) | SOP-8(M) |
|---|---|---|
| $\theta_{jA}$(Junction to Ambient) | 100°C/W | 195°C/W |
| $\theta_{jC}$(Junction to Case) | N/A | N/A |

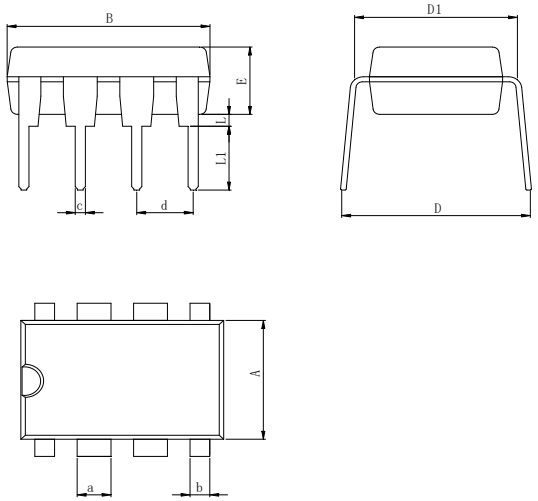
**Note 3**: For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.

**Note 4:** Calculated value from: BW (MHz) = 0.35/Rise Time(μs).

**Note 5:** Human body model, 1.5 kΩ in series with 100 pF.

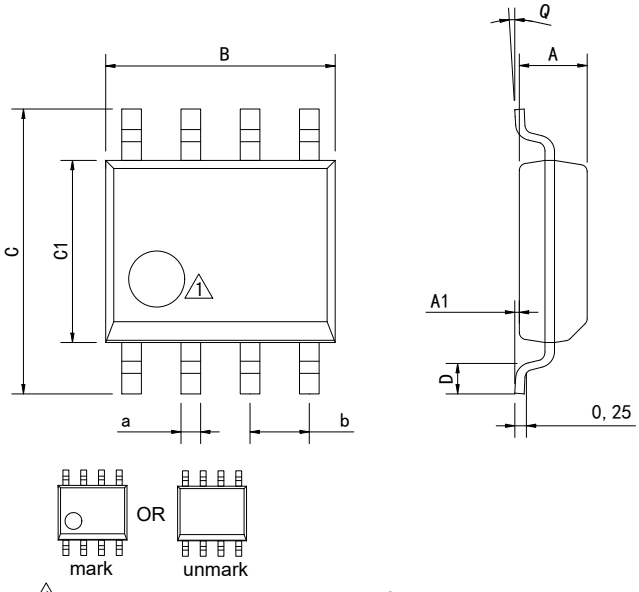
## Physical Dimensions

DIP-8




| Dimensions In Millimeters(DIP-8) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Symbol:** | A | B | D | D1 | E | L | L1 | a | b | c | d |
| **Min:** | 6.10 | 9.00 | 8.10 | 7.42 | 3.10 | 0.50 | 3.00 | 1.50 | 0.85 | 0.40 | 2.54 BSC |
| **Max:** | 6.68 | 9.50 | 10.9 | 7.82 | 3.55 | 0.70 | 3.60 | 1.55 | 0.90 | 0.50 | |

SOP-8

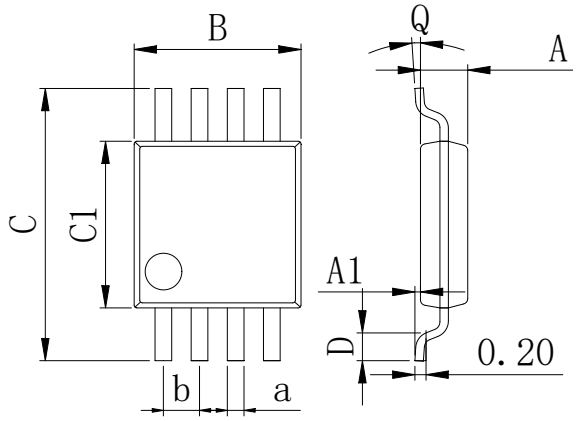



1 Package top mark may be in lower left corner or unmark

| Dimensions In Millimeters(SOP-8) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Symbol:** | A | A1 | B | C | C1 | D | Q | a | b |
| **Min:** | 1.35 | 0.05 | 4.90 | 5.80 | 3.80 | 0.40 | 0° | 0.35 | 1.27 BSC |
| **Max:** | 1.55 | 0.20 | 5.10 | 6.20 | 4.00 | 0.80 | 8° | 0.45 | |

## Physical Dimensions

MSOP-8




| Dimensions In Millimeters(MSOP-8) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Symbol:** | A | A1 | B | C | C1 | D | Q | a | b |
| **Min:** | 0.80 | 0.05 | 2.90 | 4.75 | 2.90 | 0.35 | 0° | 0.25 | 0.65 BSC |
| **Max:** | 0.90 | 0.20 | 3.10 | 5.05 | 3.10 | 0.75 | 8° | 0.35 | |

## Revision History

| REVISION NUMBER | DATE | DESCRIPTION | PAGE |
|---|---|---|---|
| V1.0 | 2011-5 | New | 1-9 |
| V1.1 | 2018-9 | Update encapsulation type | 1 |
| V1.2 | 2022-4 | Update Lead Temperature | 3 |
| V1.3 | 2024-12 | Add a model marking name | 1 |
| V1.4 | 2025-11 | Update important statements、Update SOP-8 Dimension drawing | 6、9 |

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