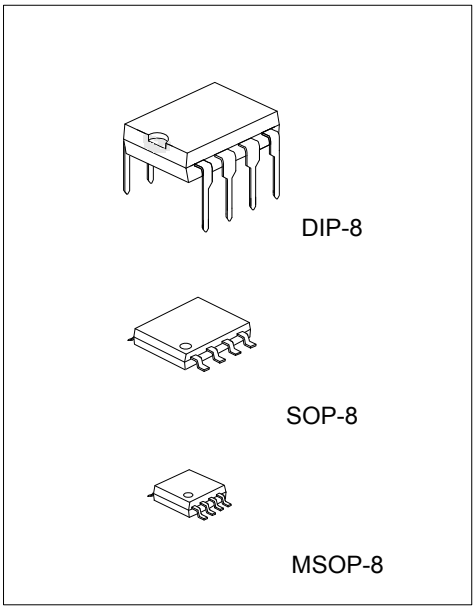
# MC4560

**LINEAR INTEGRATED CIRCUIT**

# DUAL OPERATIONAL AMPLIFIER




## ■ DESCRIPTION

The UTC **MC4560** is a dual operational amplifier suitable for driving 20V peak-to-peak into 400Ω loads. It offer many features which provide the capability of wider bandwidth, and higher slew rate to make it ideal for active filters, data and telecommunications, and many instrumentation applications.

## ■ FEATURES

*Operating Voltage (±4V~±18V)
*Wide Gain Bandwidth Product. (10MHz typ.)
*Slew Rate (4V / μs typ.)
*Bipolar Technology

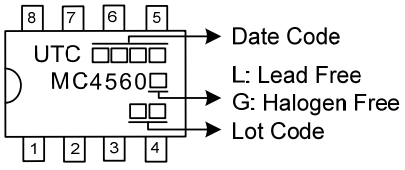
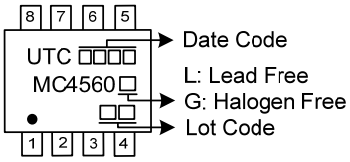
## ■ ORDERING INFORMATION

| Ordering Number | | Package | Packing |
|---|---|---|---|
| Lead Free | Halogen Free | | |
| MC4560L-D08-T | MC4560G-D08-T | DIP-8 | Tube |
| MC4560L-S08-R | MC4560G-S08-R | SOP-8 | Tape Reel |
| MC4560L-SM1-R | MC4560G-SM1-R | MSOP-8 | Tape Reel |

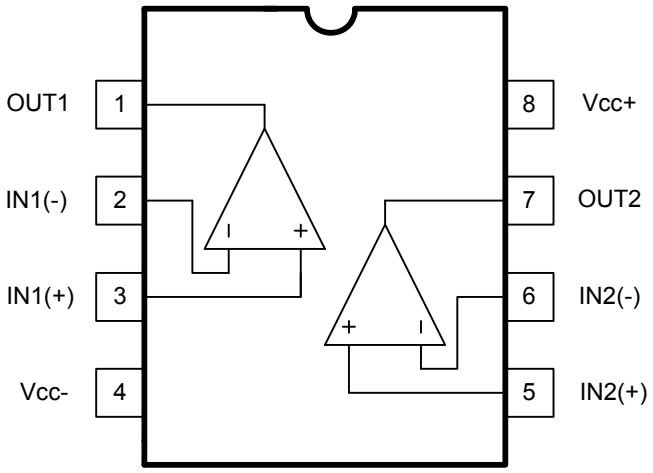
MC4560G-D08-T
(1)Packing Type
(2)Package Type
(3)Green Package

(1) T: Tube, R: Tape Reel
(2) D08: DIP-8, S08: SOP-8, SM1: MSOP-8
(3) G: Halogen Free and Lead Free, L: Lead Free

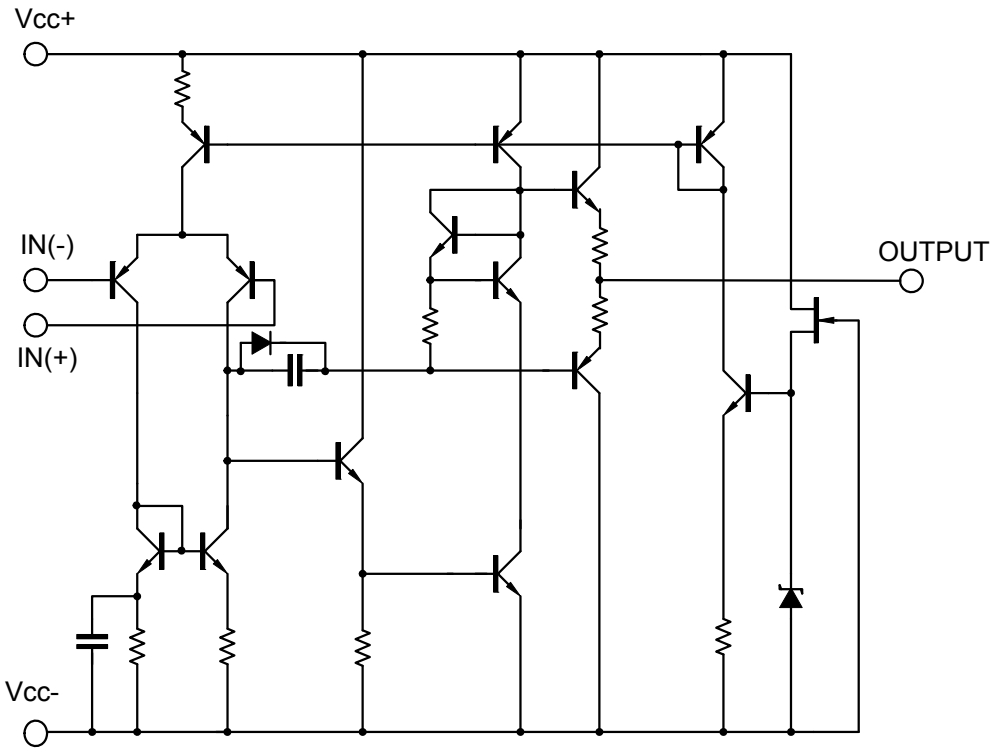
## ■ MARKING

| DIP-8 | SOP-8 / MSOP-8 |
|---|---|
|  |  |

## ■ PIN CONFIGURATION




## ■ BLOCK DIAGRAM



## ■ ABSOLUTE MAXIMUM RATINGS ($T_A$=25°C, unless otherwise specified)

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Supply Voltage | | V+/V- | ±18 | V |
| Differential Input Voltage | | $V_{I(DIFF)}$ | ±30 | V |
| Input Voltage | | $V_{IN}$ | ±15(Note1) | V |
| Power Dissipation | DIP-8 | $P_D$ | 500 | mW |
| | SOP-8 | | 300 | mW |
| | MSOP-8 | | 250 | mW |
| Operating Temperature Range | | $T_{OPR}$ | -20 ~ +75 | °C |
| Storage Temperature Range | | $T_{STG}$ | -40 ~ +125 | °C |

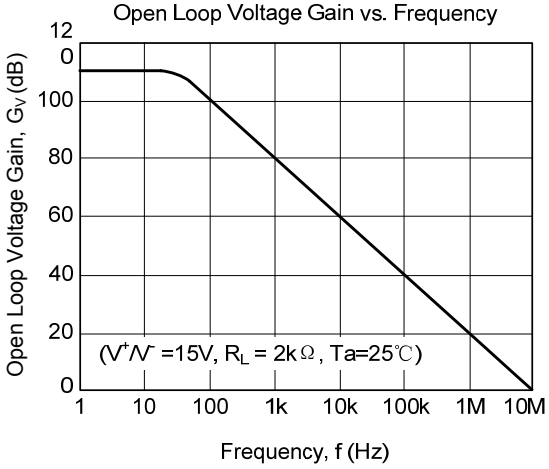
Note: 1. The absolute maximum input voltage is equal to the supply voltage in case supply voltage less than ±15V.
2. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

## ■ ELECTRICAL CHARACTERISTICS ($T_A$=25°C, $V^+/V^-$ =±15V, unless otherwise specified)

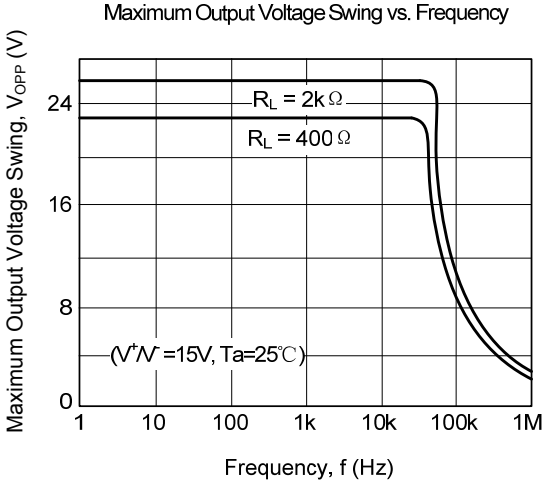
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Input offset voltage | $V_{I(OFF)}$ | Rs≤10kΩ | | 0.5 | 6 | mV |
| Input offset current | $I_{I(OFF)}$ | | | 5 | 200 | nA |
| Input bias current | $I_{i(BIAS)}$ | | | 40 | 500 | nA |
| Input Resistance | $R_{IN}$ | | 0.3 | 5 | | MΩ |
| Large Signal Voltage Gain | Gv | $R_L$≥2kΩ, $V_{OUT}$=±10V | 86 | 100 | | dB |
| Maximum Output Voltage 1 | $V_{OM1}$ | $R_L$≥2kΩ | ±12 | ±14 | | V |
| Maximum Output Voltage 2 | $V_{OM2}$ | $I_{OUT}$=25mA | ±10 | ±11.5 | | V |
| Input Common Mode Voltage Range | $V_{ICM}$ | | ±12 | ±14 | | V |
| Common Mode Rejection Ratio | CMR | Rs≤10kΩ | 70 | 90 | | dB |
| Supply Voltage Rejection Ratio | SVR | Rs≤10kΩ | 76.5 | 90 | | dB |
| Operating Current | $I_{CC}$ | | | 4.3 | 5.7 | mA |
| Slew Rate | SR | | | 4 | | V/μs |
| Gain Bandwidth Product | GBP | | | 10 | | MHz |
| Equivalent Input Noise Voltage | eN | RIAA, $R_S$=2kΩ, 30kHz LPF | | 1.2 | | μVrms |

## ■ TYPICAL CHARACTERISTICS

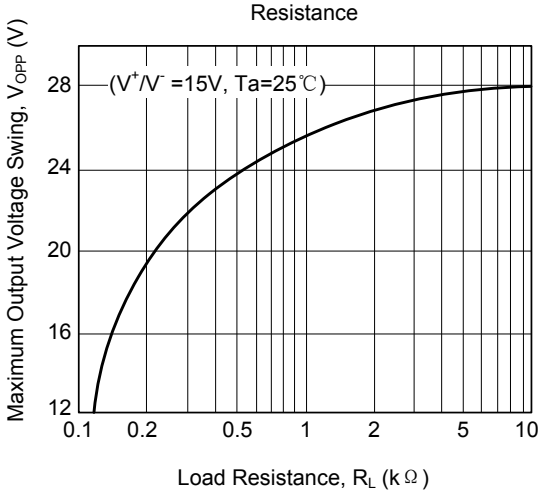
Open Loop Voltage Gain vs. Frequency



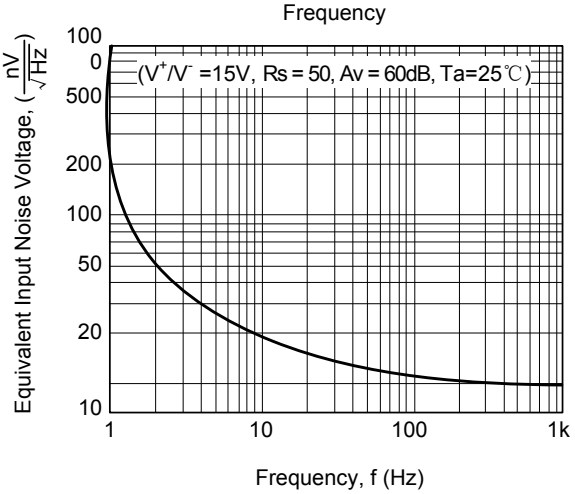

Maximum Output Voltage Swing vs. Frequency



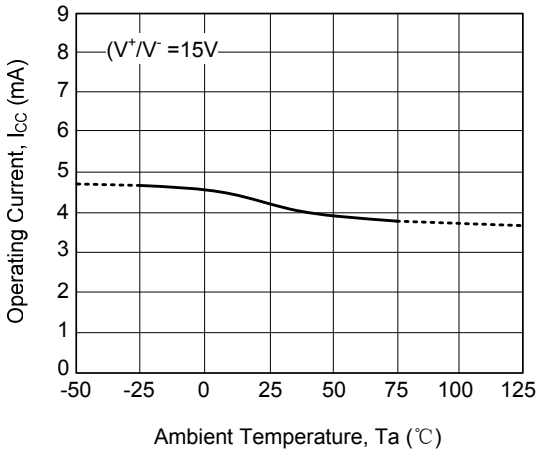

Maximum Output Voltage Swing vs. Load Resistance



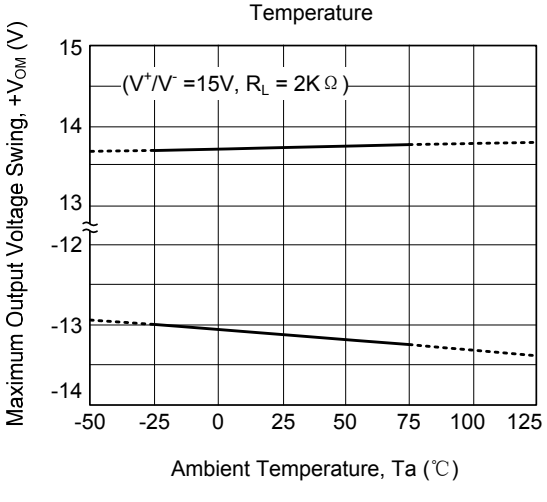

Equivalent Input Noise Voltage vs. Frequency




Operating Current vs. Temperature

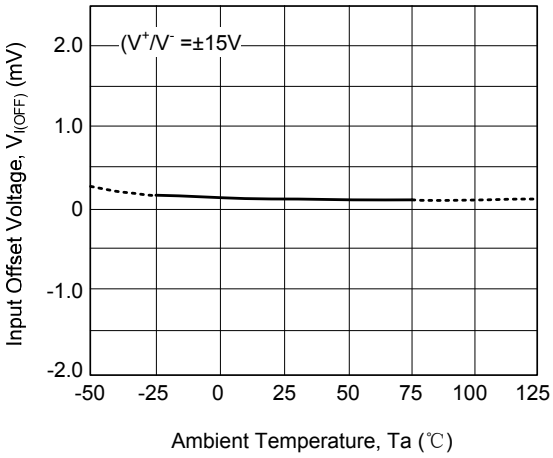



Maximum Output Voltage Swing vs. Temperature

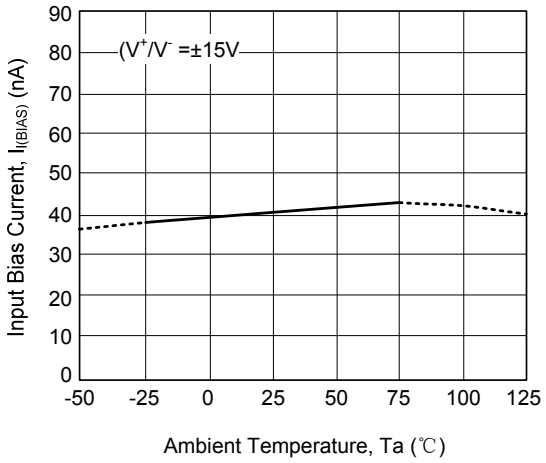


## ■ TYPICAL CHARACTERISTICS (Cont.)

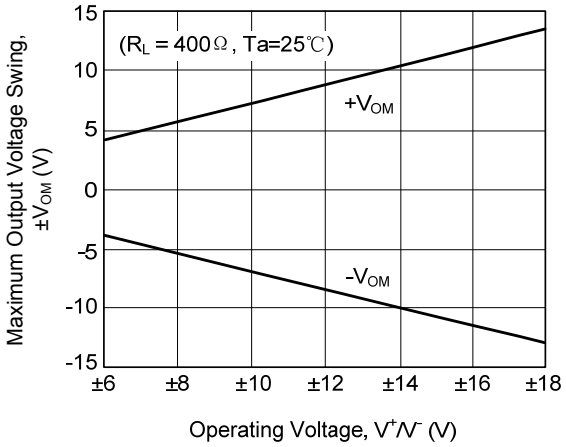
Input Offset Voltage vs. Temperature




Input Bias Current vs. Temperature




Maximum Output Voltage Swing vs. Supply Voltage




Operating Current vs. Operating Voltage