TAIWAN SEMICONDUCTOR

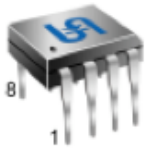
RoHS COMPLIANCE

# TS4558

## Dual General Purpose Operational Amplifier

**SOP-8**

**DIP-8**



**Pin Definition:**

| | |
|---|---|
| 1. Output A | 8. Vcc |
| 2. Input A (-) | 7. Output B |
| 3. Input A (+) | 6. Input B (-) |
| 4. Ground | 5. Input B (+) |

## General Description

The TS4558 is dual general purpose operational amplifier, and provide the high common-mode input voltage range and the absence of latch-up make these amplifiers ideal for voltage follower application.

The devices are short circuit protected and the internal frequency compensation ensures stability without external components. The TS4558 is offered in 8 pin SOP-8 and DIP-8 package.

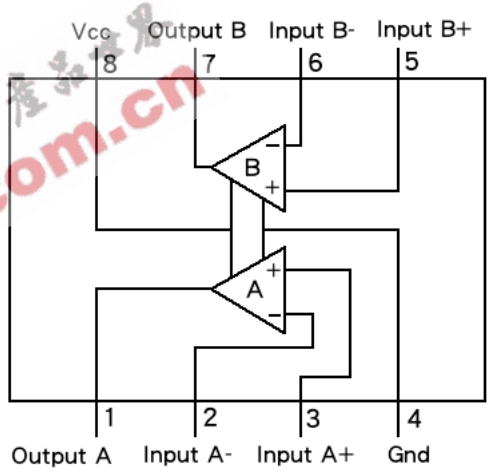
## Features

- Short circuit protection
- Wide common-mode and differential ranges
- No frequency compensation required
- Low power consumption
- No latch-up
- 3MHz unity gain bandwidth guaranteed
- Gain and phase match between amplifiers

## Applications

- DVD player
- Audio application

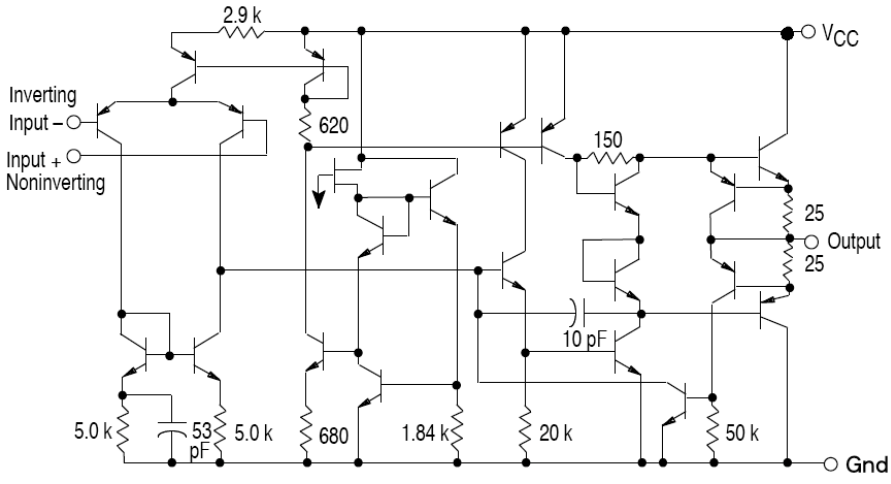
## Block Diagram




## Ordering Information

| Part No. | Package | Packing |
|---|---|---|
| TS4558CD C3 | DIP-8 | 50pcs / Tube |
| TS4558CS RL | SOP-8 | 2.5Kpcs / 13” Reel |

## Schematic (each amplifier)



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## Dual General Purpose Operational Amplifier

### Absolute Maximum Rating

| Parameter | | Symbol | Value | Unit |
|---|---|---|---|---|
| Supply Voltage | | Vcc + | 18 | V |
| Supply Voltage | | Vcc - | -18 | V |
| Differential Input Voltage | | VIDR | ±30 | V |
| Input Voltage | | Vin | 30 | V |
| Package Thermal Impedance | DIP-8 | θja | 97 | °C/W |
| | SOP-8 | | 85 | |
| Operating Junction Temperature Range | | TJ | 0 ~ +70 | °C |
| Storage Temperature Range | | TSTG | -65 ~ +150 | °C |
| Lead Temperature 1.6mm(1/16") from case for 10Sec. | | TLEAD | 260 | °C |

Note: Maximum ratings are those values beyond which damage to the device may occur, and functional operation should be restricted to the recommended operating condition.

### Recommended Operating Conditions

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Supply Voltage | Vcc + | 15 | V |
| Supply Voltage | Vcc - | -15 | V |

### Electrical Specifications ($V_{CC}$ = ±15V, Ta =25°C; unless otherwise noted)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Input Offset Current | Iio | | -- | 20 | ±200 | nA |
| Input Bias Current | Iib | | -- | 150 | 500 | nA |
| Input Resistance | Ri | | 0.3 | 5 | -- | MΩ |
| Unity Gain Bandwidth | B1 | | -- | 3 | -- | MHz |
| Large-Signal Voltage Gain | Av | RL ≥ 2kΩ, Vc = ±10V | 20 | 300 | -- | V/mV |
| Output Voltage Swing | Vom | RL ≥ 10kΩ | ±12 | ±14 | -- | V |
| | | RL ≥ 2kΩ | ±10 | ±14 | -- | |
| Input Common-Mode Voltage Range | Vicr | | ±12 | ±13 | -- | V |
| Common-Mode Rejection Ratio | CMRR | Rs ≤ 10kΩ | 70 | 90 | -- | dB |
| Supply Voltage Rejection Ratio | PSRR | Rs ≤ 10kΩ | -- | 30 | 150 | uV/V |
| Slew Rate | SR | RL = 2kΩ, Vin=10V, L=100pF | 0.8 | 1.6 | -- | V/uS |
| Supply Current | I+, I - | | -- | 2.5 | 5.6 | mA |
| Power Consumption | Pc | RL = ∞ | -- | 75 | 170 | mV |
| Input Noise Voltage | Vn | Rs = 1kΩ, f = 30Hz~30KHz | -- | -- | 3.5 | uVrms |
| Source Current | Isource | | -20 | -- | -- | mA |
| Sink Current | Isink | | 20 | -- | -- | mA |

Note : All characteristics are measured under open-loop conditions with zero common-mode input voltage, unless otherwise specified.

## Electrical Characteristics Curve

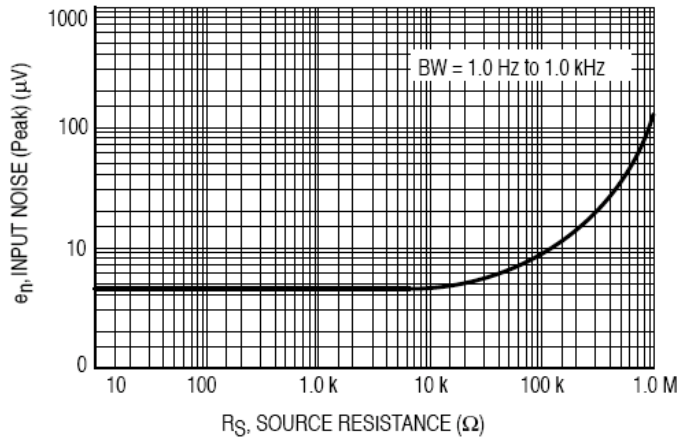



**Figure 1. Burst Noise vs. Source Resistance**

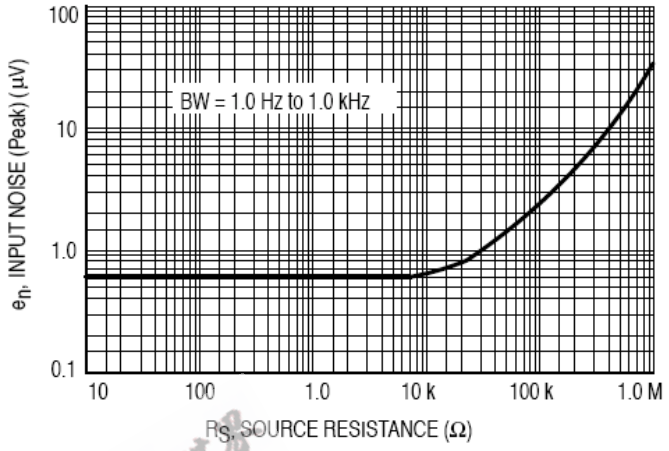



**Figure 2. RMS Noise vs. Source Resistance**

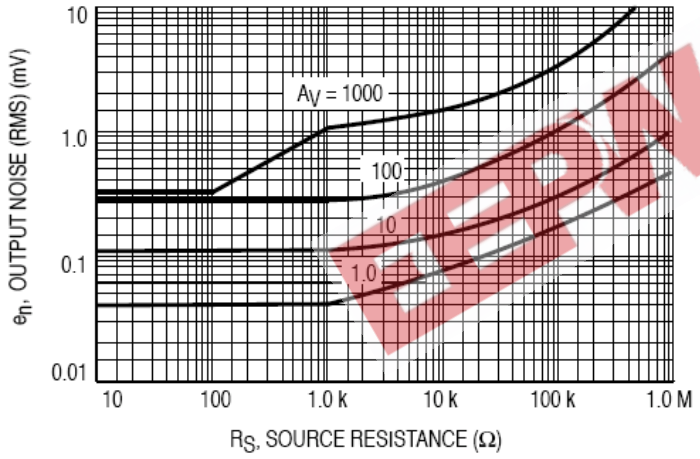



**Figure 3. Output Noise vs. Source Resistance**

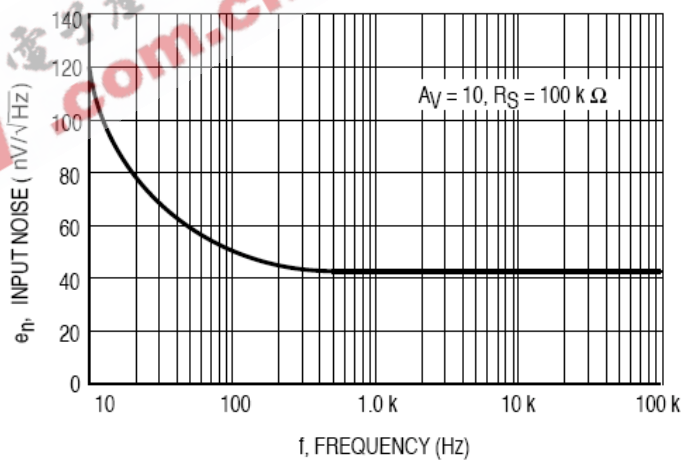
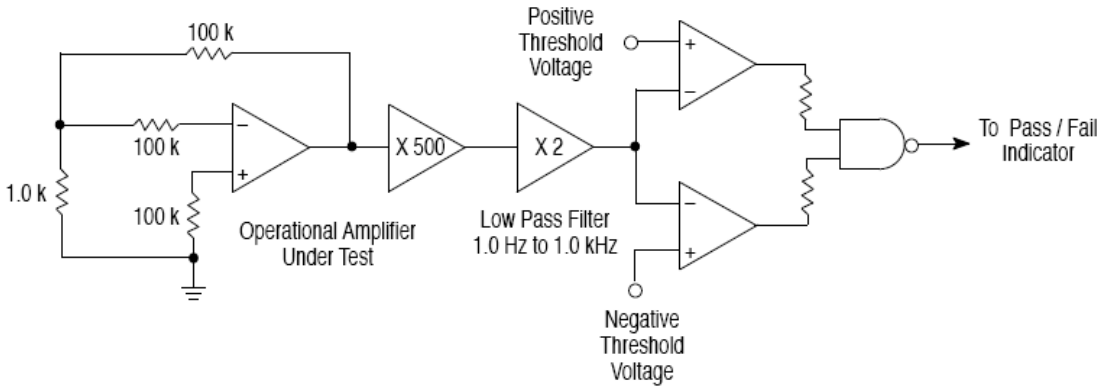



**Figure 4. Spectral Noise Density**




Unlike conventional peak reading or RMS meters, this system was especially designed to provide the quick response time essential to burst (popcorn) noise testing.

The test time employed is 10 sec and the 20 μV peak limit refers to the operational amplifier input thus eliminating errors in the closed loop gain factor of the operational amplifier.

**Figure 5. Burst Noise Test Citcuit**

## Electrical Characteristics Curve

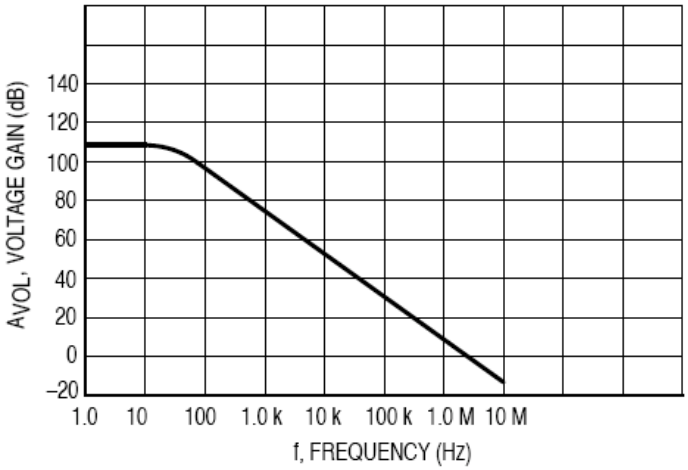



**Figure 6. Open Loop Frequency Response**

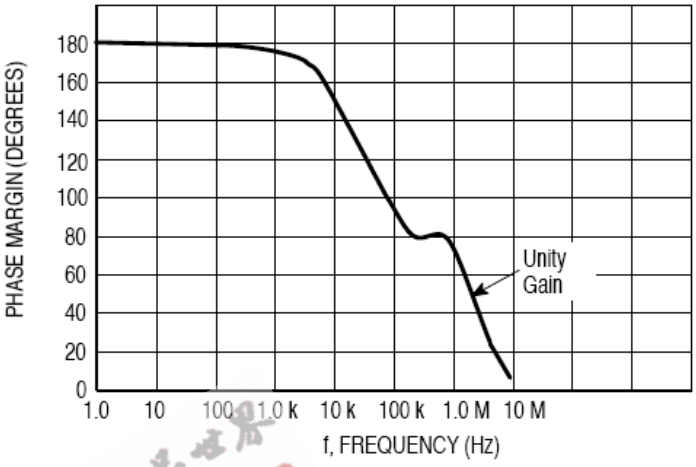



**Figure 7. Phase Margin vs. Frequency**

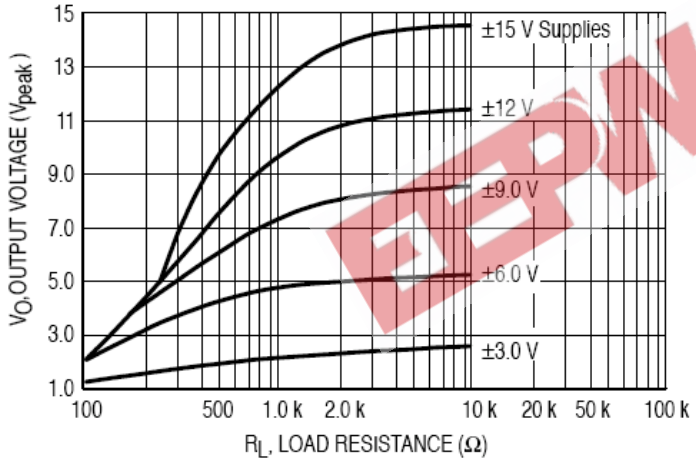



**Figure 8. Positive Vout Swing vs. Load Resistance**

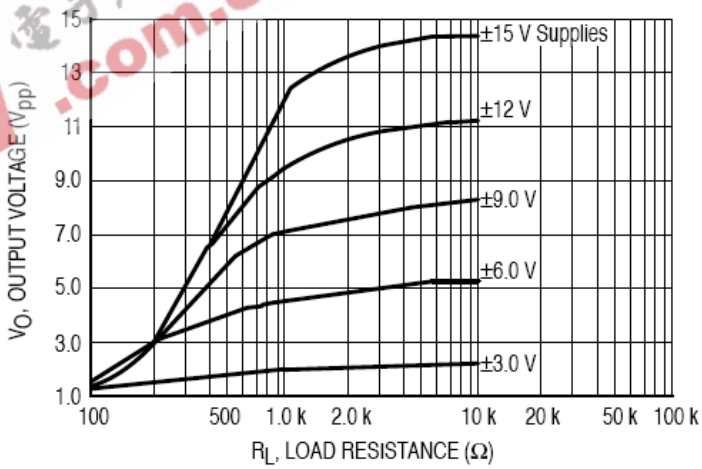



**Figure 9. Negative Vout Swing vs. Load Resistance**

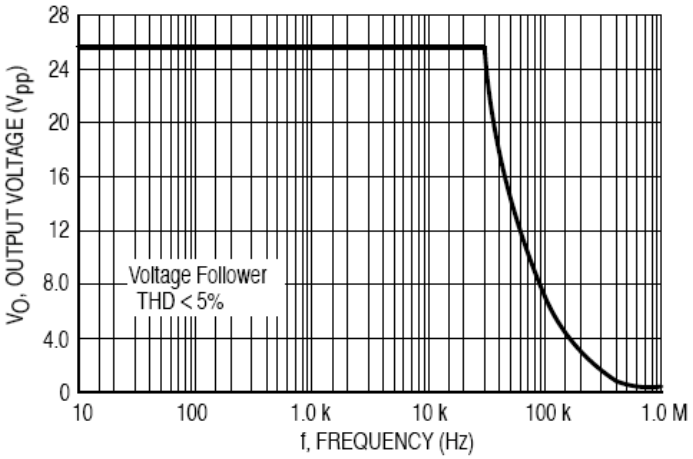



**Figure 10. Power Bandwidth (Large Signal Swing vs. Frequency)**

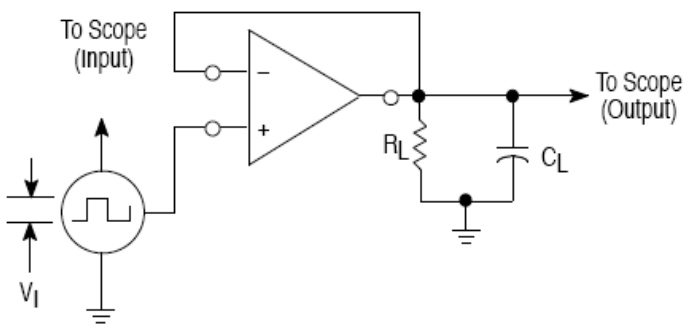



**Figure 11. Transient Response Test Circuit**

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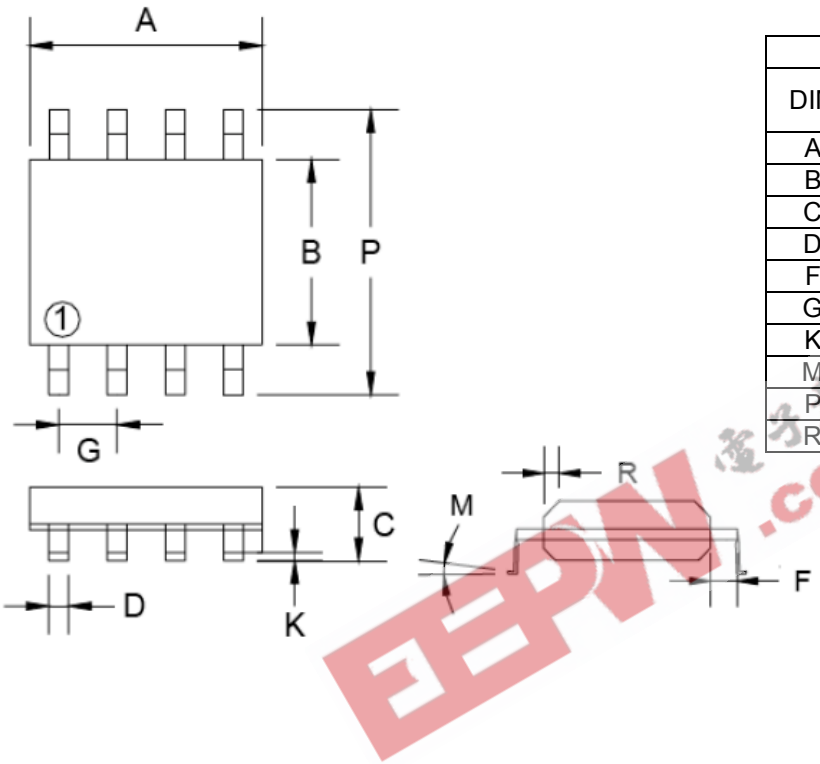
## SOP-8 Mechanical Drawing




| SOP-8 DIMENSION | | | | |
|---|---|---|---|---|
| DIM | MILLIMETERS | | INCHES | |
| | MIN | MAX | MIN | MAX. |
| A | 4.80 | 5.00 | 0.189 | 0.196 |
| B | 3.80 | 4.00 | 0.150 | 0.157 |
| C | 1.35 | 1.75 | 0.054 | 0.068 |
| D | 0.35 | 0.49 | 0.014 | 0.019 |
| F | 0.40 | 1.25 | 0.016 | 0.049 |
| G | 1.27BSC | | 0.05BSC | |
| K | 0.10 | 0.25 | 0.004 | 0.009 |
| M | 0° | 7° | 0° | 7° |
| P | 5.80 | 6.20 | 0.229 | 0.244 |
| R | 0.25 | 0.50 | 0.010 | 0.019 |

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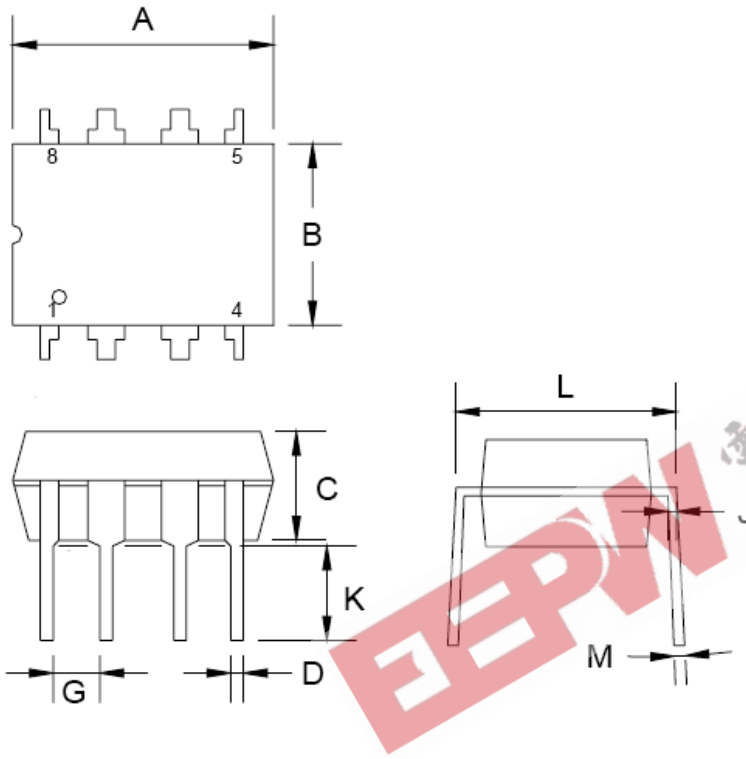
## DIP-8 Mechanical Drawing




| DIP-8 DIMENSION | | | | |
|---|---|---|---|---|
| DIM | MILLIMETERS | | INCHES | |
| | MIN | MAX | MIN | MAX |
| A | 9.07 | 9.32 | 0.357 | 0.367 |
| B | 6.22 | 6.48 | 0.245 | 0.255 |
| C | 3.18 | 4.45 | 0.125 | 0.135 |
| D | 0.35 | 0.55 | 0.019 | 0.020 |
| G | 2.54 (typ) | | 0.10 (typ) | |
| J | 0.29 | 0.31 | 0.011 | 0.012 |
| K | 3.25 | 3.35 | 0.128 | 0.132 |
| L | 7.75 | 8.00 | 0.305 | 0.315 |
| M | - | $10^{o}$ | - | $10^{o}$ |

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