



# TJM4558

## WIDE BANDWIDTH DUAL BIPOLAR OPERATIONAL AMPLIFIERS

- INTERNALLY COMPENSATED
- SHORT-CIRCUIT PROTECTION
- GAIN AND PHASE MATCH BETWEEN AMPLIFIER
- LOW POWER CONSUMPTION
- PIN TO PIN COMPATIBLE WITH MC1458/LM358
- GAIN BANDWIDTH PRODUCT (at 100kHz) 5.5MHz

### DESCRIPTION

The TJM4558 is a high performance monolithic dual operational amplifier.

The circuit combines all the outstanding features of the MC1458 and, in addition possesses three times the unity gain bandwidth of the industry standard.

### ORDER CODE

| Part Number | Temperature Range | Package |   |   |
|-------------|-------------------|---------|---|---|
|             |                   | N       | D | P |
| TJM4558C    | 0°C, +70°C        | •       | • | • |
| TJM4558I    | -40°C, +105°C     | •       | • | • |

**Example :** TJM4558CN

**N** = Dual in Line Package (DIP)

**D** = Small Outline Package (SO) - also available in Tape & Reel (DT)

**P** = Thin Shrink Small Outline Package (TSSOP) - only available in Tape & Reel (PT)



**N**  
**DIP8**  
(Plastic Package)

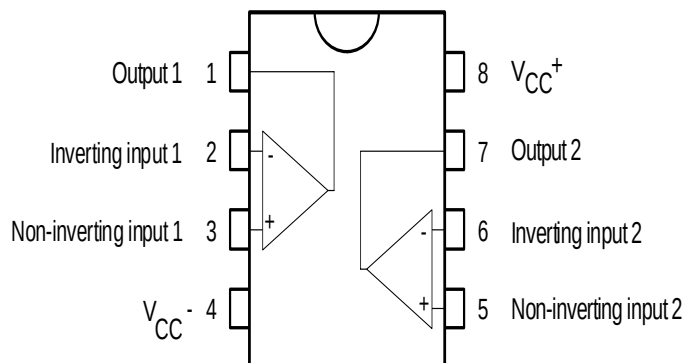


**D**  
**SO8**  
(Plastic Micropackage)

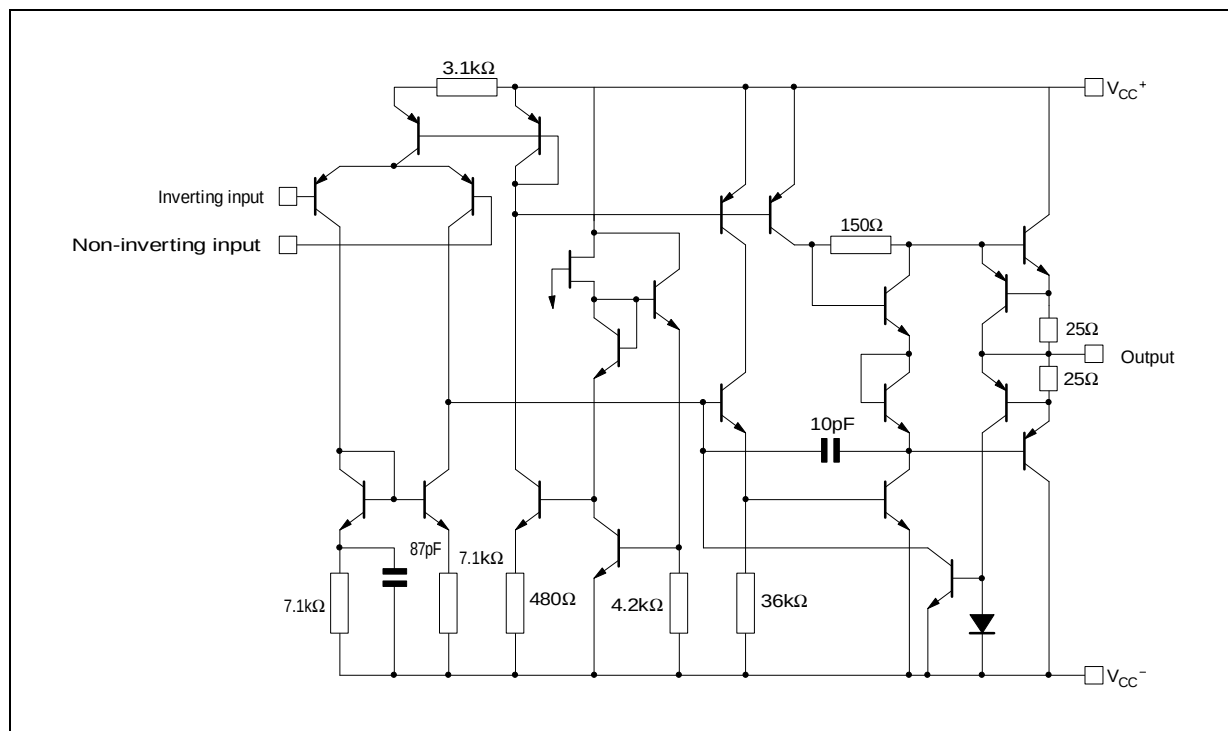


**P**  
**TSSOP8**  
(Thin Shrink Small Outline Package)

### PIN CONNECTIONS (top view)



## SCHEMATIC DIAGRAM (1/2 TJM4558)



## ABSOLUTE MAXIMUM RATINGS

| Symbol     | Parameter                            | TJM4558I    | TJM4558C | Unit               |
|------------|--------------------------------------|-------------|----------|--------------------|
| $V_{CC}$   | Supply Voltage                       | $\pm 22$    |          | V                  |
| $V_i$      | Input Voltage                        | $\pm 15$    |          | V                  |
| $V_{id}$   | Differential Input Voltage           | $\pm 30$    |          | V                  |
| $P_{tot}$  | Power Dissipation                    | 680         |          | mW                 |
|            | Output Short Circuit Duration        | Infinite    |          |                    |
| $T_{oper}$ | Operating Free-Air Temperature Range | -40 to +105 | 0 to +70 | $^{\circ}\text{C}$ |
| $T_{stg}$  | Storage Temperature                  | -65 to +150 |          | $^{\circ}\text{C}$ |

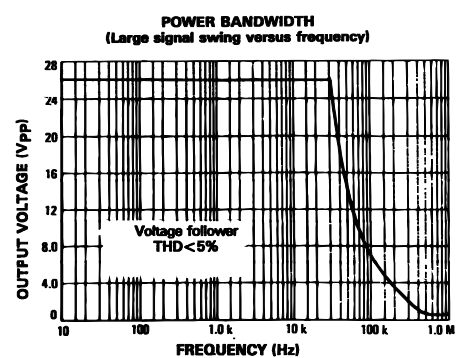
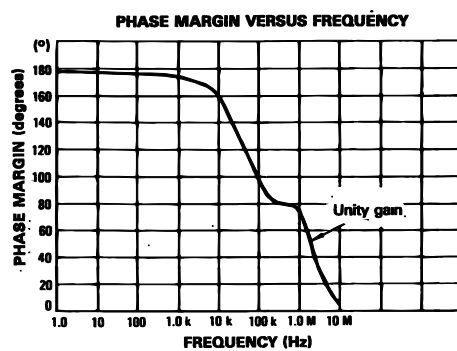
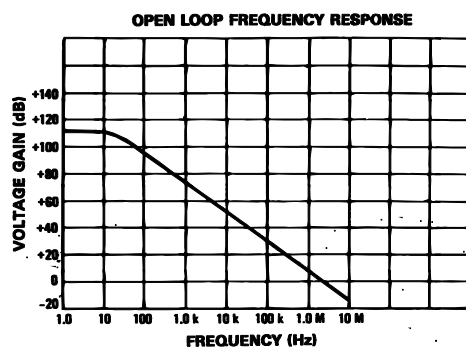
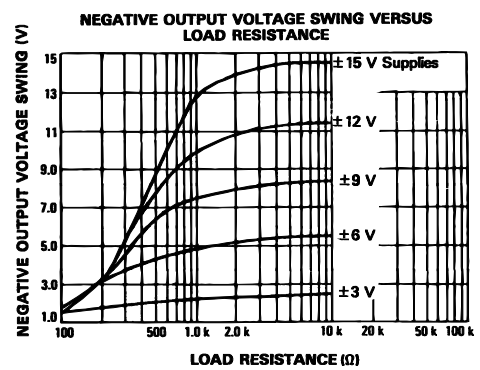
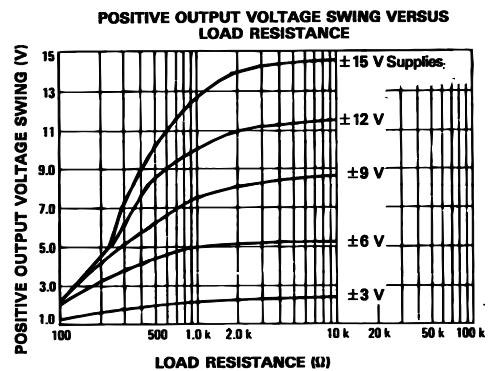
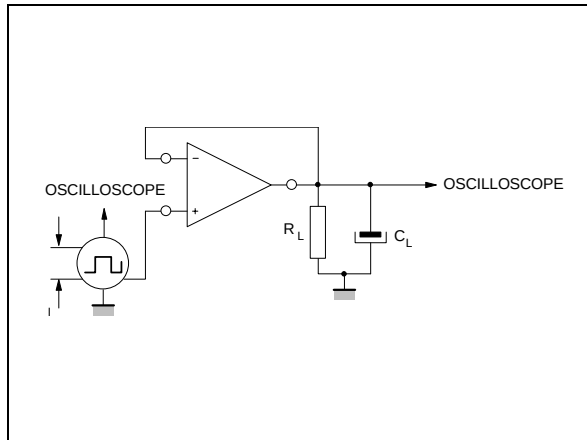
## ELECTRICAL CHARACTERISTICS

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

| Symbol   | Parameter                                                                                                                                                | Min.     | Typ.      | Max.   | Unit |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----------|--------|------|
| $V_{io}$ | Input Offset Voltage ( $R_s \leq 10\text{k}\Omega$ )<br>$T_{amb} = +25^{\circ}\text{C}$<br>$T_{min} \leq T_{amb} \leq T_{max}$                           |          | 1         | 5<br>6 | mV   |
| $I_{io}$ | Input Offset Current<br>$T_{amb} = +25^{\circ}\text{C}$<br>$T_{min} \leq T_{amb} \leq T_{max}$                                                           |          | 20<br>40  | 100    | nA   |
| $I_{ib}$ | Input Bias Current<br>$T_{amb} = +25^{\circ}\text{C}$<br>$T_{min} \leq T_{amb} \leq T_{max}$                                                             |          | 50<br>100 | 400    | nA   |
| $A_{vd}$ | Large Signal Voltage Gain ( $R_L = 2\text{k}\Omega$ , $V_o = \pm 10\text{V}$ )<br>$T_{amb} = +25^{\circ}\text{C}$<br>$T_{min} \leq T_{amb} \leq T_{max}$ | 50<br>25 | 200       |        | V/mV |

| Symbol          | Parameter                                                                                                                                                                | Min.                                         | Typ.                 | Max. | Unit                   |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|----------------------|------|------------------------|
| SVR             | Supply Voltage Rejection Ratio ( $R_S \leq 10k\Omega$ )<br>$T_{amb} = +25^\circ C$<br>$T_{min} \leq T_{amb} \leq T_{max}$                                                |                                              | 90<br>77             |      | dB                     |
| $I_{CC}$        | Supply Current, all amplifiers, no load<br>$T_{amb} = +25^\circ C$<br>$T_{min} \leq T_{amb} \leq T_{max}$                                                                |                                              | 2.3<br>4             | 4.5  | mA                     |
| $V_{icm}$       | Input Common Mode Voltage Range<br>$T_{amb} = +25^\circ C$<br>$T_{min} \leq T_{amb} \leq T_{max}$                                                                        | $\pm 12$<br>$\pm 12$                         |                      |      | V                      |
| CMR             | Common-mode Rejection Ratio ( $R_S \leq 10k\Omega$ )<br>$T_{amb} = +25^\circ C$<br>$T_{min} \leq T_{amb} \leq T_{max}$                                                   |                                              | 90<br>70             |      | dB                     |
| $I_{OS}$        | Output Short Circuit Current                                                                                                                                             | 10                                           | 20                   |      | mA                     |
| $V_O$           | Output Voltage Swing<br>$T_{amb} = +25^\circ C$<br>$T_{min} \leq T_{amb} \leq T_{max}$<br>$R_L = 10k\Omega$<br>$R_L = 2k\Omega$<br>$R_L = 10k\Omega$<br>$R_L = 2k\Omega$ | $\pm 12$<br>$\pm 10$<br>$\pm 12$<br>$\pm 10$ | $\pm 14$<br>$\pm 13$ |      | V                      |
| SR              | Slew Rate<br>( $V_i = \pm 10$ , $R_L = 2k\Omega$ , $C_L = 100pF$ , $T_{amb} = 25^\circ C$ , unity gain)                                                                  |                                              | 2.2                  |      | V/ $\mu s$             |
| $t_r$           | Rise Time<br>( $V_i = \pm 20mV$ , $R_L = 2k\Omega$ , $C_L = 100pF$ , $T_{amb} = 25^\circ C$ , unity gain)                                                                |                                              | 0.3                  |      | $\mu s$                |
| $K_{OV}$        | Overshoot<br>( $V_i = \pm 20mV$ , $R_L = 2k\Omega$ , $C_L = 100pF$ , $T_{amb} = 25^\circ C$ , unity gain)                                                                |                                              | 15                   |      | %                      |
| $R_i$           | Input Resistance                                                                                                                                                         | 0.3                                          | 2                    |      | $M\Omega$              |
| $C_i$           | Input Capacitance                                                                                                                                                        |                                              | 1.4                  |      | pF                     |
| $R_O$           | Output Resistance                                                                                                                                                        |                                              | 75                   |      | $\Omega$               |
| B               | Unity Gain Bandwidth                                                                                                                                                     |                                              | 2.8                  |      | MHz                    |
| GBP             | Gain Bandwidth Product<br>( $V_i = 10mV$ , $R_L = 2k\Omega$ , $C_L = 100pF$ , $f = 100kHz$ , $T_{amb} = 25^\circ C$ )                                                    |                                              | 5.5                  |      | MHz                    |
| THD             | Total Harmonic Distortion<br>( $f = 1kHz$ , $A_v = 20dB$ , $R_L = 2k\Omega$ , $V_O = 2V_{pp}$ , $C_L = 100pF$ , $T_{amb} = 25^\circ C$ )                                 |                                              | 0.008                |      | %                      |
| $e_n$           | Equivalent Input Noise Voltage ( $R_S = 100\Omega$ , $f = 1kHz$ )                                                                                                        |                                              | 12                   |      | $\frac{nV}{\sqrt{Hz}}$ |
| $V_{O1}/V_{O2}$ | Channel Separation                                                                                                                                                       |                                              | 120                  |      | dB                     |

## TRANSIENT RESPONSE TEST CIRCUIT



PACKAGE MECHANICAL DATA

| Plastic DIP-8 MECHANICAL DATA |      |      |      |       |       |       |
|-------------------------------|------|------|------|-------|-------|-------|
| DIM.                          | mm.  |      |      | inch  |       |       |
|                               | MIN. | TYP  | MAX. | MIN.  | TYP.  | MAX.  |
| A                             |      | 3.3  |      |       | 0.130 |       |
| a1                            | 0.7  |      |      | 0.028 |       |       |
| B                             | 1.39 |      | 1.65 | 0.055 |       | 0.065 |
| B1                            | 0.91 |      | 1.04 | 0.036 |       | 0.041 |
| b                             |      | 0.5  |      |       | 0.020 |       |
| b1                            | 0.38 |      | 0.5  | 0.015 |       | 0.020 |
| D                             |      |      | 9.8  |       |       | 0.386 |
| E                             |      | 8.8  |      |       | 0.346 |       |
| e                             |      | 2.54 |      |       | 0.100 |       |
| e3                            |      | 7.62 |      |       | 0.300 |       |
| e4                            |      | 7.62 |      |       | 0.300 |       |
| F                             |      |      | 7.1  |       |       | 0.280 |
| I                             |      |      | 4.8  |       |       | 0.189 |
| L                             |      | 3.3  |      |       | 0.130 |       |
| Z                             | 0.44 |      | 1.6  | 0.017 |       | 0.063 |

P001F

## PACKAGE MECHANICAL DATA

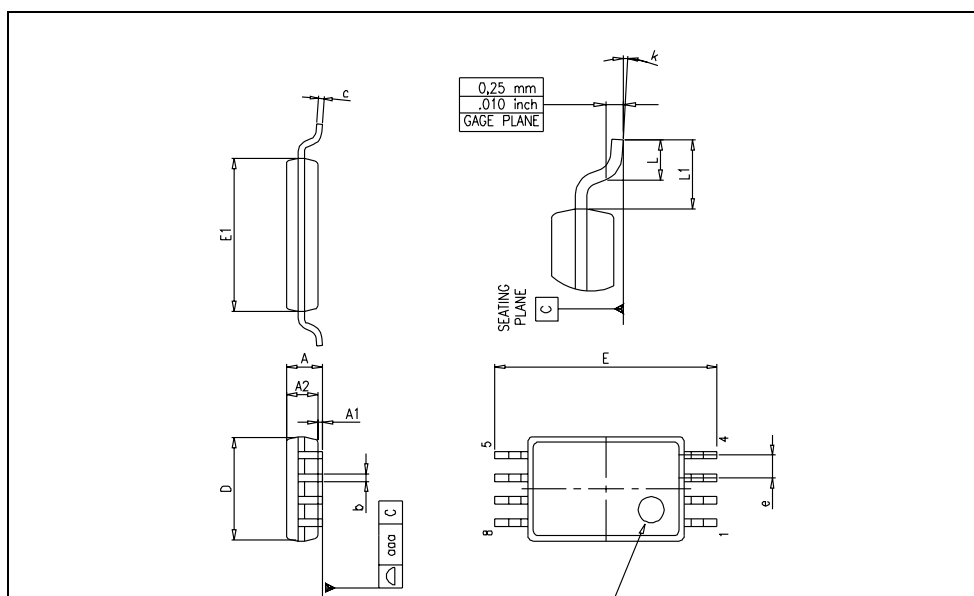
| SO-8 MECHANICAL DATA |           |      |      |       |       |       |
|----------------------|-----------|------|------|-------|-------|-------|
| DIM.                 | mm.       |      |      | inch  |       |       |
|                      | MIN.      | TYP. | MAX. | MIN.  | TYP.  | MAX.  |
| A                    | 1.35      |      | 1.75 | 0.053 |       | 0.069 |
| A1                   | 0.10      |      | 0.25 | 0.04  |       | 0.010 |
| A2                   | 1.10      |      | 1.65 | 0.043 |       | 0.065 |
| B                    | 0.33      |      | 0.51 | 0.013 |       | 0.020 |
| C                    | 0.19      |      | 0.25 | 0.007 |       | 0.010 |
| D                    | 4.80      |      | 5.00 | 0.189 |       | 0.197 |
| E                    | 3.80      |      | 4.00 | 0.150 |       | 0.157 |
| e                    |           | 1.27 |      |       | 0.050 |       |
| H                    | 5.80      |      | 6.20 | 0.228 |       | 0.244 |
| h                    | 0.25      |      | 0.50 | 0.010 |       | 0.020 |
| L                    | 0.40      |      | 1.27 | 0.016 |       | 0.050 |
| k                    | 8° (max.) |      |      |       |       |       |
| ddd                  |           |      | 0.1  |       |       | 0.04  |

0016023/C

## PACKAGE MECHANICAL DATA

| TSSOP8 MECHANICAL DATA |      |      |      |       |        |       |
|------------------------|------|------|------|-------|--------|-------|
| DIM.                   | mm.  |      |      | inch  |        |       |
|                        | MIN. | TYP. | MAX. | MIN.  | TYP.   | MAX.  |
| A                      |      |      | 1.2  |       |        | 0.047 |
| A1                     | 0.05 |      | 0.15 | 0.002 |        | 0.006 |
| A2                     | 0.80 | 1.00 | 1.05 | 0.031 | 0.039  | 0.041 |
| b                      | 0.19 |      | 0.30 | 0.007 |        | 0.012 |
| c                      | 0.09 |      | 0.20 | 0.004 |        | 0.008 |
| D                      | 2.90 | 3.00 | 3.10 | 0.114 | 0.118  | 0.122 |
| E                      | 6.20 | 6.40 | 6.60 | 0.244 | 0.252  | 0.260 |
| E1                     | 4.30 | 4.40 | 4.50 | 0.169 | 0.173  | 0.177 |
| e                      |      | 0.65 |      |       | 0.0256 |       |
| K                      | 0°   |      | 8°   | 0°    |        | 8°    |
| L                      | 0.45 | 0.60 | 0.75 | 0.018 | 0.024  | 0.030 |
| L1                     |      | 1    |      |       | 0.039  |       |



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