

HIGH PERFORMANCE DUAL DECOMPENSATED
OPERATIONAL AMPLIFIER

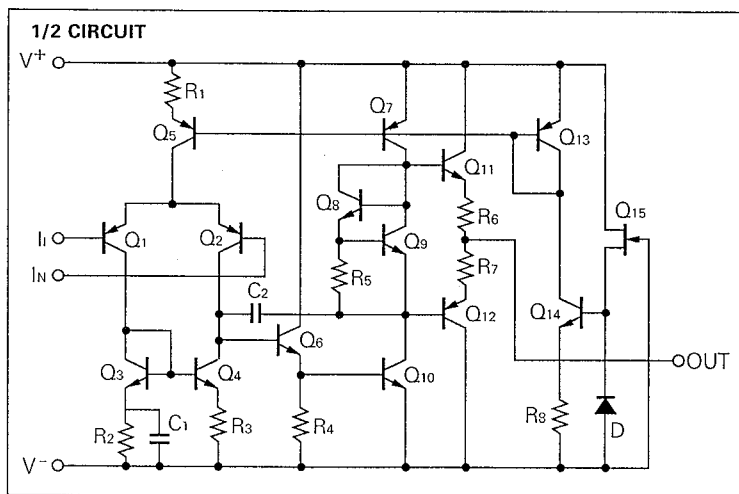
DESCRIPTION

The μ PC4556 is a dual operational amplifier which features further advanced A.C. performance than that of the μ PC4558. Decompensation characteristic guarantees 20MHz gain-bandwidth product higher than 20 dB. Also featured are low input noise and high output drive capability making this device the optimum choice for audio application.

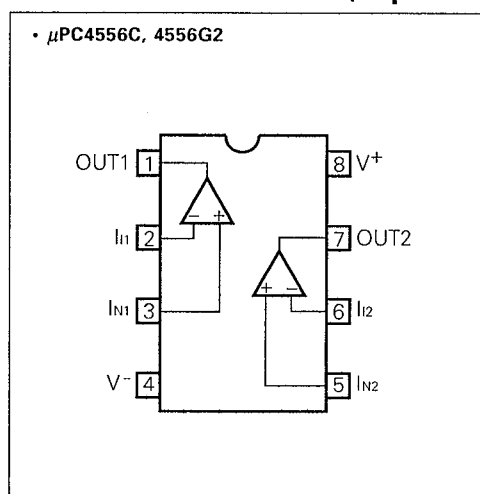
FEATURES

- Gain bandwidth products: 20 MHz ($A_v \geq 20$ dB)
- High slew rate: 5 V/ μ s
- Low input noise voltage 6 μ Vp-p
- Internal frequency compensation ($A_v \geq 20$ dB)

EQUIVALENT CIRCUIT



CONNECTION DIAGRAM (Top View)



ORDERING INFORMATION

| PART NUMBER | PACKAGE | QUALITY GRADE |
|----------------|-----------------------------|---------------|
| μ PC4556C | 8 PIN PLASTIC DIP (300 mil) | Standard |
| μ PC4556G2 | 8 PIN PLASTIC SOP (225 mil) | Standard |

Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

ABSOLUTE MAXIMUM RATINGS (T_a=25 °C)

| PARAMETER | | SYMBOL | μPC4556 | UNIT |
|--|---------------------|---------------------------------|--|------|
| Voltage between V ⁺ and V ⁻ (Note 1) | | V ⁺ - V ⁻ | -0.3 to +36 | V |
| Differential Input Voltage | | V _{IO} | ±30 | V |
| Input Voltage (Note 2) | | V _I | V ⁻ -0.3 to V ⁺ +0.3 | V |
| Output Voltage (Note 3) | | V _O | V ⁻ -0.3 to V ⁺ +0.3 | V |
| Power Dissipation | C Package (Note 4) | P _T | 700 | mW |
| | G2 Package (Note 5) | | 440 | mW |
| Output Short Circuit Duration (Note 6) | | | Indefinite | sec |
| Operating Temperature Range | | T _{opt} | -20 to +80 | °C |
| Storage Temperature Range | | T _{stg} | -55 to +125 | °C |

- Note 1.** Reverse connection of supply voltage can cause destruction.
- Note 2.** The input voltage should be allowed to input without damage or destruction. Even during the transition period of supply voltage, power on/off etc., this specification should be kept. The normal operation will establish when the both inputs are within the Common Mode Input Voltage Range of electrical characteristics.
- Note 3.** This specification is the voltage which should be allowed to supply to the output terminal from external without damage or destruction. Even during the transition period of supply voltage, power on/off etc., this specification should be kept. The output voltage of normal operation will be the Output Voltage Swing of electrical characteristics.
- Note 4.** Thermal derating factor is -7.0 mV/°C when ambient temperature is higher than 25 °C.
- Note 5.** Thermal derating factor is -4.4 mV/°C when ambient temperature is higher than 25 °C.
- Note 6.** Pay careful attention to the total power dissipation not to exceed the absolute maximum ratings, Note 4 and Note 5.

RECOMMENDED OPERATING CONDITIONS

| CHARACTERISTIC | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|----------------|----------------|------|------|------|------|
| Supply Voltage | V [±] | ±4 | | ±16 | V |

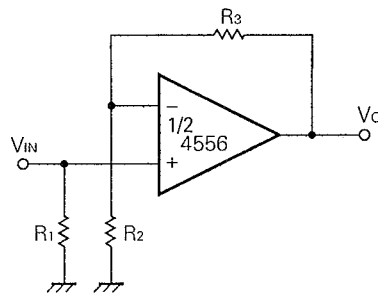
ELECTRICAL CHARACTERISTICS (T_a = 25 °C, V[±] = ±15 V)

| CHARACTERISTIC | SYMBOL | MIN. | TYP. | MAX. | UNIT | TEST CONDITIONS |
|---------------------------------|------------------|--------|---------|------|-------|---|
| Input Offset Voltage | V _{IO} | | ±0.5 | ±6.0 | mV | R _L ≤ 10 kΩ |
| Input Offset Current (Note 7) | I _{IO} | | ±5 | ±200 | nA | |
| Input Bias Current (Note 7) | I _B | | 180 | 500 | nA | |
| Large Signal Voltage Gain | A _v | 20,000 | 100,000 | | | R _L ≥ 2 kΩ, V _O = ±10 V |
| Power Consumption | P _d | | 90 | 170 | mW | I _O = 0 A, Both Amplifiers |
| Common Mode Rejection Ratio | CMR | 70 | 90 | | dB | R _S ≤ 10 kΩ |
| Supply Voltage Rejection Ratio | SVR | | 30 | 150 | μV/V | R _S ≤ 10 kΩ |
| Output Voltage Swing | V _{OM} | ±12 | ±14 | | V | R _L ≥ 2 kΩ |
| Output Voltage Swing | V _{OM} | ±10 | ±11.5 | | V | I _O = ±25 mA |
| Common Mode Input Voltage Range | V _{ICM} | ±12 | ±14 | | V | |
| Slew Rate | SR | | 5 | | V/s | A _v ≥ 10 (20 dB) |
| Input Equivalent Noise Voltage | V _n | | 6 | | μVp-p | R _S = 1 kΩ, f = 1 Hz to 1 kHz |
| Channel Separation | | | 105 | | dB | f = 1 kHz |

Note 7. Input bias currents flow out from IC. Because each currents are base current of PNP-transistor on input stage.

TYPICAL APPLICATION CIRCUIT

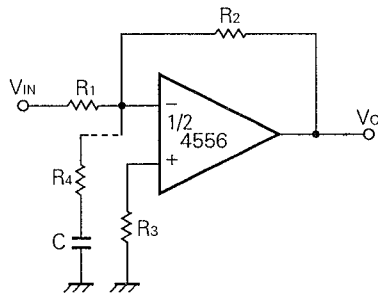
Noninverting Amplifier



$$R_3 \geq 9 \cdot R_2$$

$$R_1 = R_2$$

Inverting Amplifier



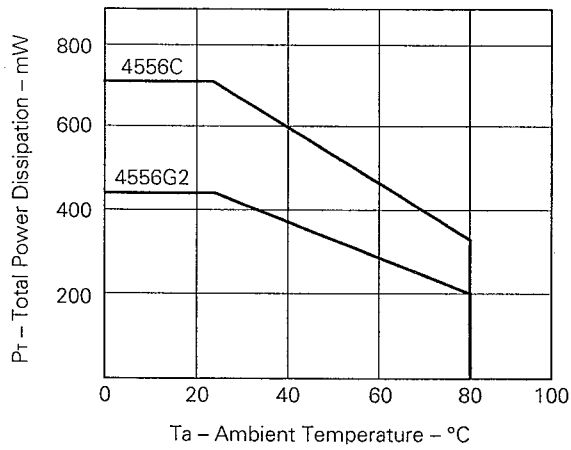
R_4, C are necessary
when $R_2 < 10 \cdot R_1$

$$R_4 \leq \frac{1}{9} R_2$$

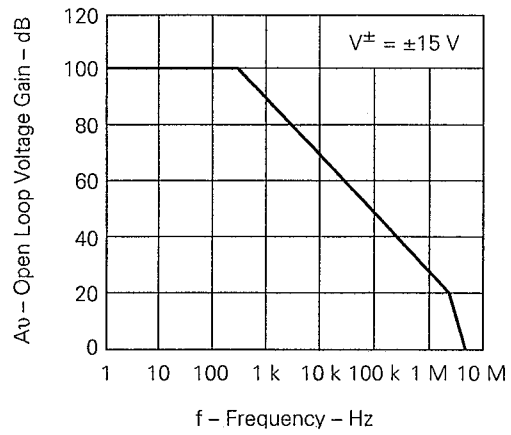
$$C \geq \frac{R_2/R_4}{2 \cdot \pi \cdot R_4 \cdot 5 \text{ MHz}}$$

TYPICAL PERFORMANCE CHARACTERISTICS ($T_a=25^\circ\text{C}$, TYP.)

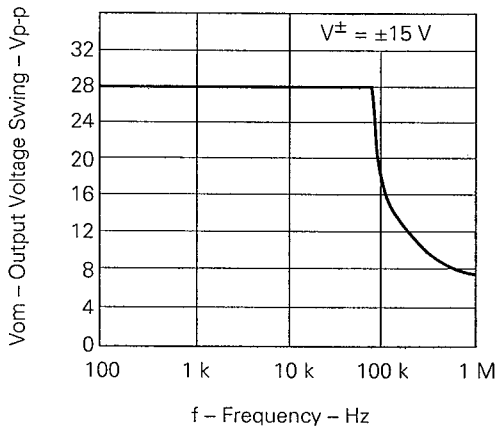
POWER DISSIPATION



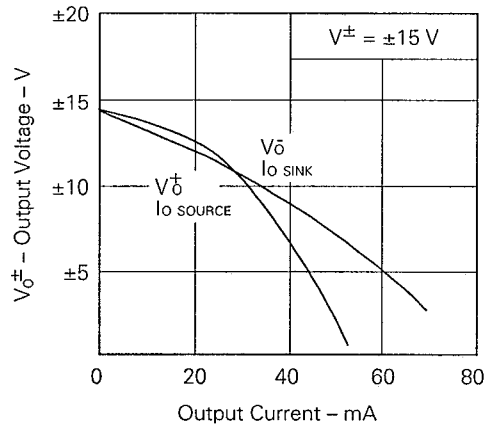
OPEN LOOP FREQUENCY RESPONSE



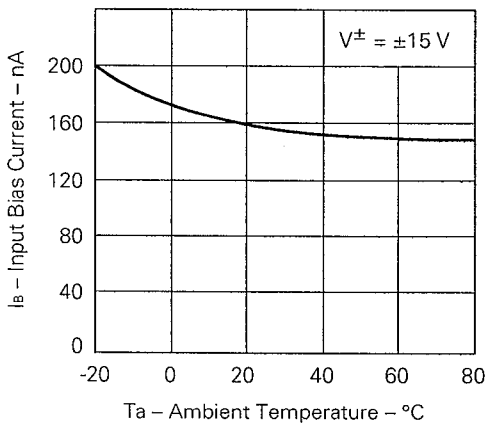
LARGE SIGNAL FREQUENCY RESPONSE



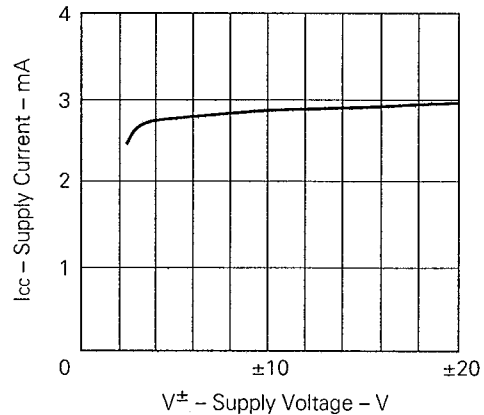
OUTPUT CURRENT LIMIT



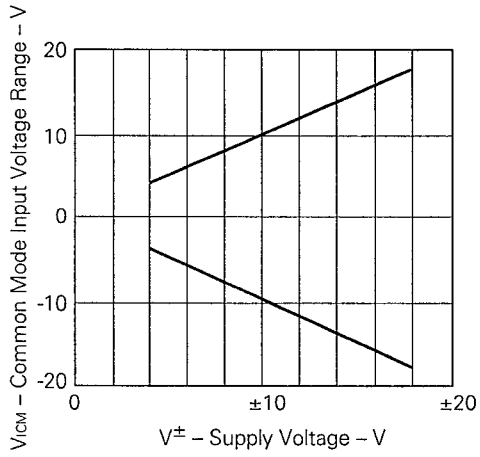
INPUT BIAS CURRENT



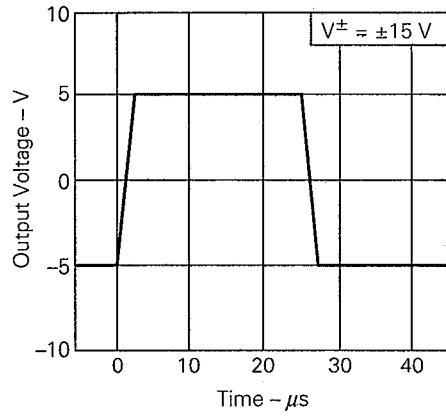
SUPPLY CURRENT



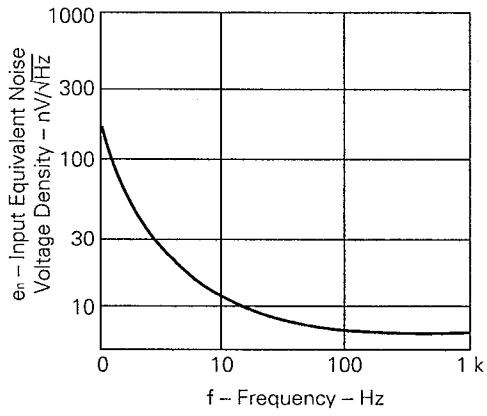
COMMON MODE INPUT VOLTAGE RANGE



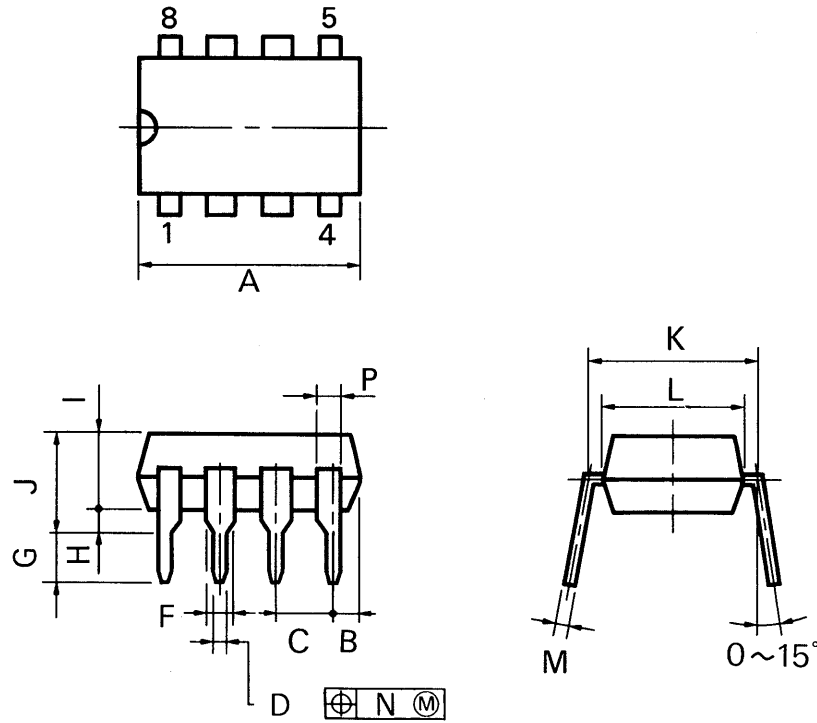
VOLTAGE FOLLOWER PULSE RESPONSE



INPUT EQUIVALENT NOISE VOLTAGE DENSITY



8PIN PLASTIC DIP (300 mil)



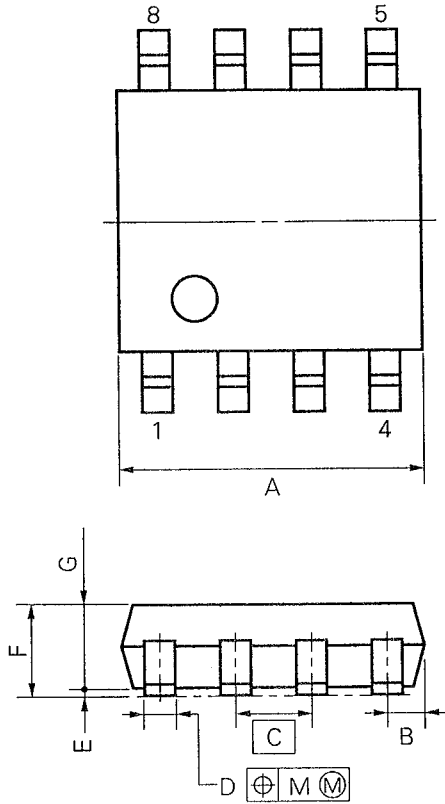
P8C-100-300B,C

NOTES

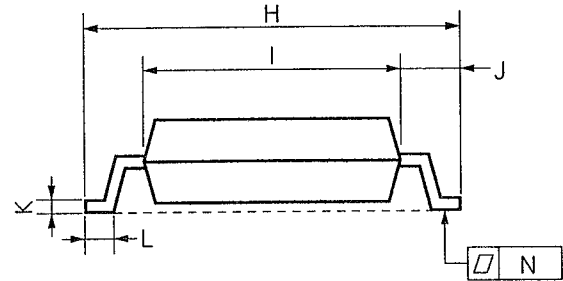
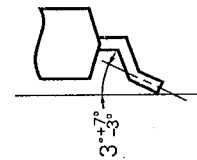
- 1) Each lead centerline is located within 0.25 mm (0.01 inch) of its true position (T.P.) at maximum material condition.
- 2) Item "K" to center of leads when formed parallel.

| ITEM | MILLIMETERS | INCHES |
|------|--|---|
| A | 10.16 MAX. | 0.400 MAX. |
| B | 1.27 MAX. | 0.050 MAX. |
| C | 2.54 (T.P.) | 0.100 (T.P.) |
| D | 0.50 ^{±0.10} | 0.020 ^{+0.004} _{-0.005} |
| F | 1.4 MIN. | 0.055 MIN. |
| G | 3.2 ^{±0.3} | 0.126 ^{±0.012} |
| H | 0.51 MIN. | 0.020 MIN. |
| I | 4.31 MAX. | 0.170 MAX. |
| J | 5.08 MAX. | 0.200 MAX. |
| K | 7.62 (T.P.) | 0.300 (T.P.) |
| L | 6.4 | 0.252 |
| M | 0.25 ^{+0.10} _{-0.05} | 0.010 ^{+0.004} _{-0.003} |
| N | 0.25 | 0.01 |
| P | 0.9 MIN. | 0.035 MIN. |

8PIN PLASTIC SOP (225 mil)



detail of lead end



NOTE

Each lead centerline is located within 0.12 mm (0.005 inch) of its true position (T.P.) at maximum material condition.

S8GM-50-225B-2

| ITEM | MILLIMETERS | INCHES |
|------|--|---|
| A | 5.37 MAX. | 0.212 MAX. |
| B | 0.78 MAX. | 0.031 MAX. |
| C | 1.27 (T.P.) | 0.050 (T.P.) |
| D | 0.40 ^{+0.10} _{-0.05} | 0.016 ^{+0.004} _{-0.003} |
| E | 0.1±0.1 | 0.004±0.004 |
| F | 1.8 MAX. | 0.071MAX. |
| G | 1.49 | 0.059 |
| H | 6.5±0.3 | 0.256±0.012 |
| I | 4.4 | 0.173 |
| J | 1.1 | 0.043 |
| K | 0.15 ^{+0.10} _{-0.05} | 0.006 ^{+0.004} _{-0.002} |
| L | 0.6±0.2 | 0.024 ^{+0.008} _{-0.009} |
| M | 0.12 | 0.005 |
| N | 0.15 | 0.006 |

RECOMMENDED SOLDERING CONDITIONS

The following conditions (see table below) must be met when soldering this product.

Please consult with our sales offices in case other soldering process is used, or in case soldering is done under different conditions.

TYPES OF SURFACE MOUNT DEVICE

For more details, refer to our document "SEMICONDUCTOR DEVICE MOUNTING TECHNOLOGY MANUAL" (IEI-1207).

[μPC4556G2]

| Soldering method | Soldering conditions | Recommended condition symbol |
|------------------------|--|------------------------------|
| Infrared ray reflow | Peak package's surface temperature : 230 °C or below, Reflow time : 30 seconds or below (210 °C or higher), Number of reflow process : 1, Exposure limit* : None | IR30-00-1 |
| VPS | Peak package's surface temperature : 215 °C or below, Reflow time : 40 seconds or below (200 °C or higher), Number of reflow process : 1, Exposure limit* : None | VP15-00-1 |
| Wave soldering | Solder temperature: 260 °C or below, Flow time: 10 seconds or below, Number of flow process: 1, Exposure limit*: None | WS15-00-1 |
| Partial heating method | Terminal temperature : 300 °C or below, Flow time : 10 seconds or below, Exposure limit* : None | ○ |

* Exposure limit before soldering after dry-pack package is opened.
Storage conditions: 25 °C and relative humidity at 65 % or less.

Note Do not apply more than a single process at once, except for "Partial heating method".

TYPES OF THROUGH HOLE DEVICE

[μPC4556C]

| Soldering method | Soldering conditions | Recommended condition symbol |
|------------------|--|------------------------------|
| Wave soldering | Solder temperature: 260 °C or below, Flow time: 10 seconds or below | ○ |

[MEMO]

[MEMO]

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Application examples recommended by NEC Corporation

Standard: Computer, Office equipment, Communication equipment, Test and Measurement equipment, Machine tools, Industrial robots, Audio and Visual equipment, Other consumer products, etc.

Special: Automotive and Transportation equipment, Traffic control systems, Antidisaster systems, Anticrime systems, etc.