NEC

BIPOLAR ANALOG INTEGRATED CIRCUIT

μPC4556

HIGH PERFORMANCE DUAL DECOMPENSATED OPERATIONAL AMPLIFIER

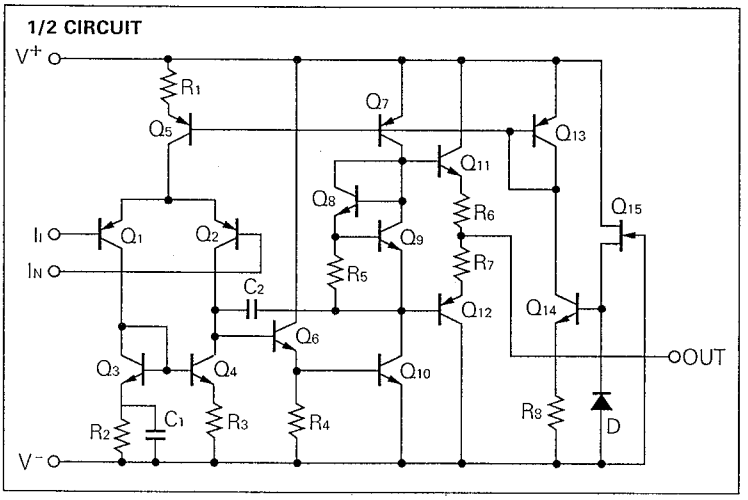
DESCRIPTION

The μPC4556 is a dual operational amplifier which features further advanced A.C. performance than that of the μPC4558. 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.

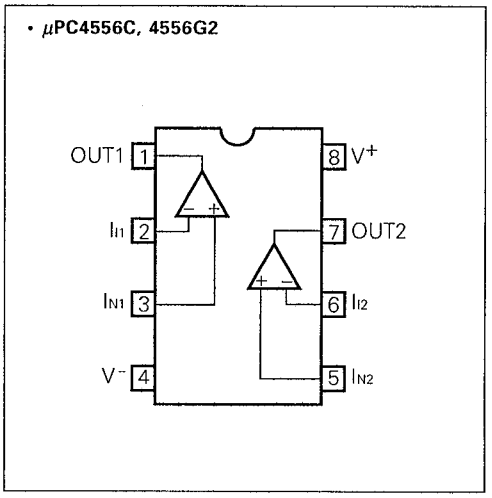
FEATURES

- Gain bandwidth products: 20 MHz (Aυ ≥ 20 dB)
- High slew rate: 5 V/μs
- Low input noise voltage 6 μVp-p
- Internal frequency compensation (Aυ ≥ 20 dB)

EQUIVALENT CIRCUIT



CONNECTION DIAGRAM (Top View)



ORDERING INFORMATION

PART NUMBER	PACKAGE	QUALITY GRADE
μPC4556C	8 PIN PLASTIC DIP (300 mil)	Standard
μPC4556G2	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.

Document No. IC-1285B
(O. D. No. IC-6065B)
Date Published March 1993 P
Printed in Japan

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_{ID}	±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	$V^{\pm}$	±4		±16	V

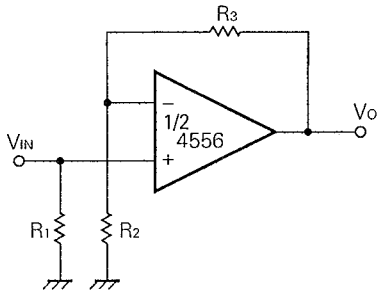
ELECTRICAL CHARACTERISTICS (T_a = 25 °C, $V^{\pm}$ = ±15 V)

CHARACTERISTIC		SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Input Offset Voltage		V_{IO}		±0.5	±6.0	mV	$R_S \leq 10$ 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			$R_L \geq 2$ 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	$R_S \leq 10$ kΩ
Supply Voltage Rejection Ratio		SVR		30	150	μV/V	$R_S \leq 10$ kΩ
Output Voltage Swing		V_{om}	±12	±14		V	$R_L \geq 2$ 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	$A_v \geq 10$ (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

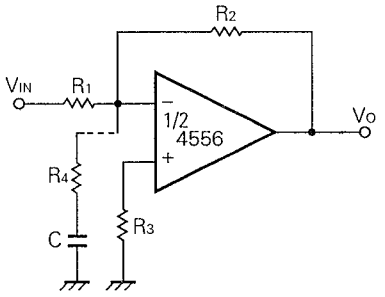
Noninverting Amplifier



$R_3 \geq 9 \cdot R_2$

$R_1 = R_2$

Inverting Amplifier



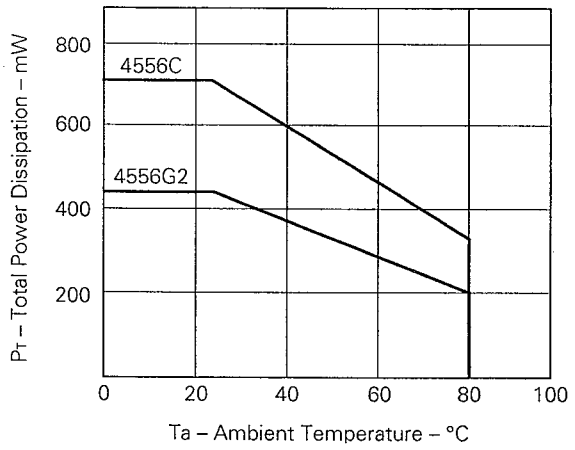
R_4, C are necessary when $R_2 < 10 \cdot R_1$

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

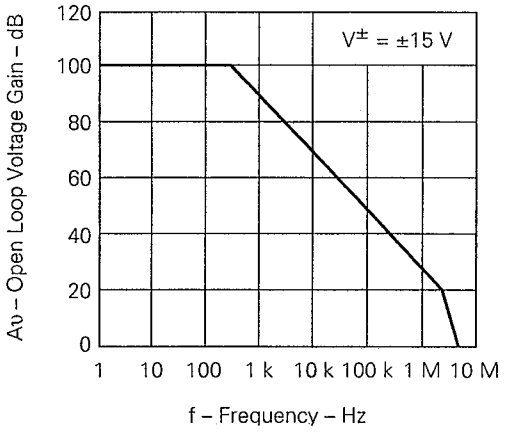
$$C \geq \frac{R_2/R_4}{2 \cdot \pi \cdot R_4 \cdot 5\ \text{MHz}}$$

TYPICAL PERFORMANCE CHARACTERISTICS (T_a=25 °C, TYP.)

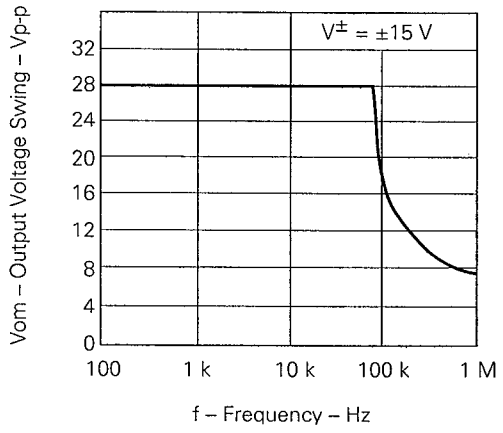
POWER DISSIPATION



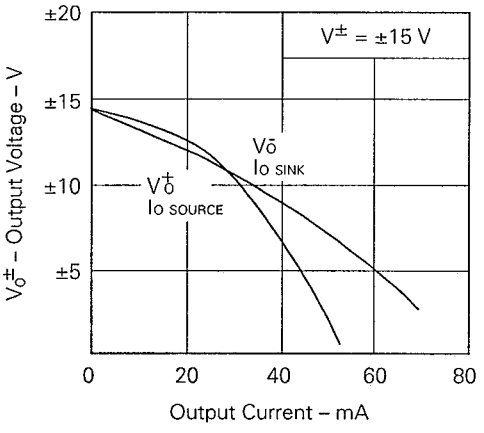
OPEN LOOP FREQUENCY RESPONSE



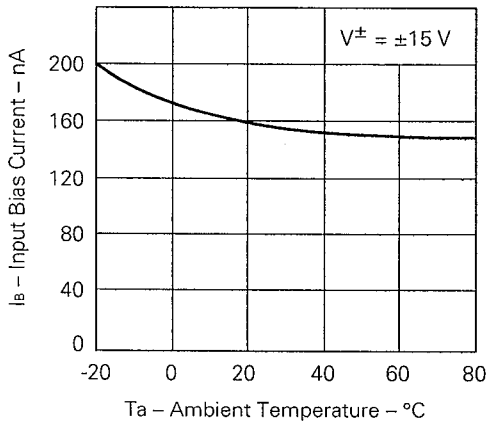
LARGE SIGNAL FREQUENCY RESPONSE



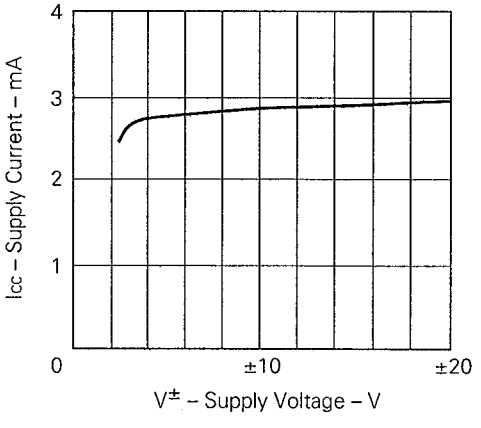
OUTPUT CURRENT LIMIT



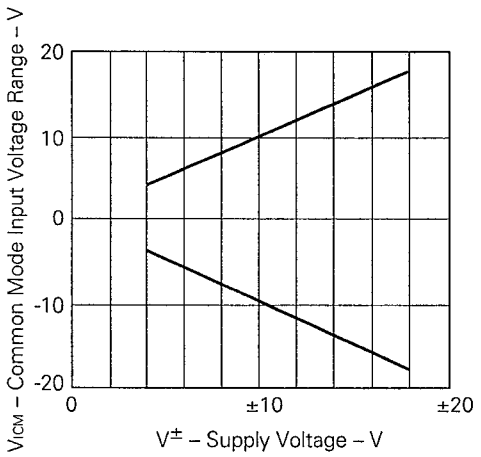
INPUT BIAS CURRENT



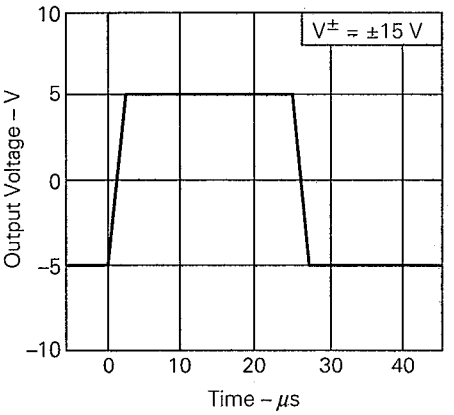
SUPPLY CURRENT



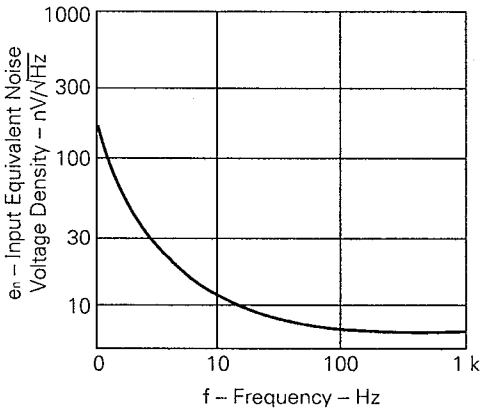
COMMON MODE INPUT VOLTAGE RANGE



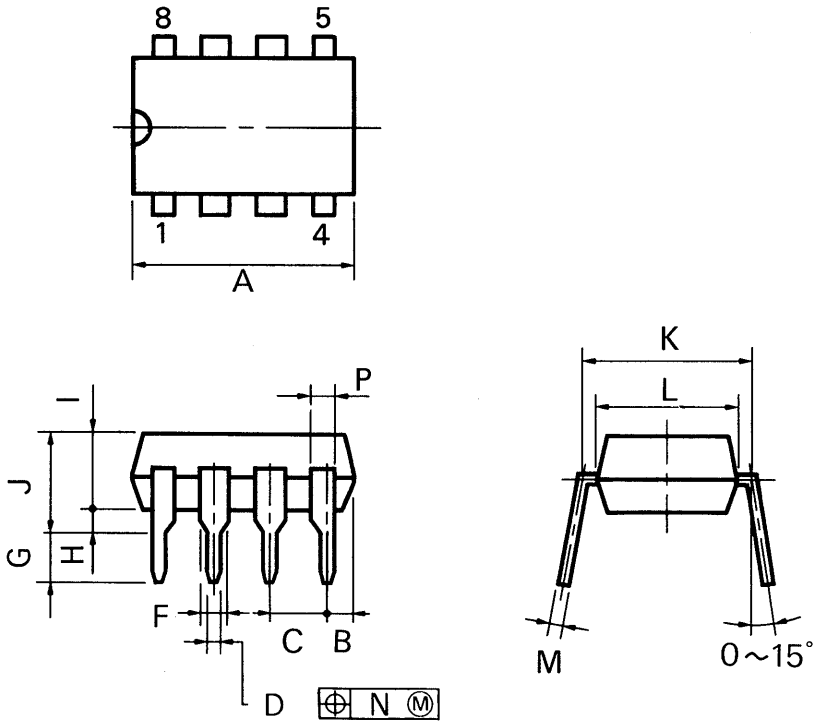
VOLTAGE FOLLOWER PULSE RESPONSE



INPUT EQUIVALENT NOISE VOLTAGE DENSITY



8PIN PLASTIC DIP (300 mil)



P8C-100-300B,C

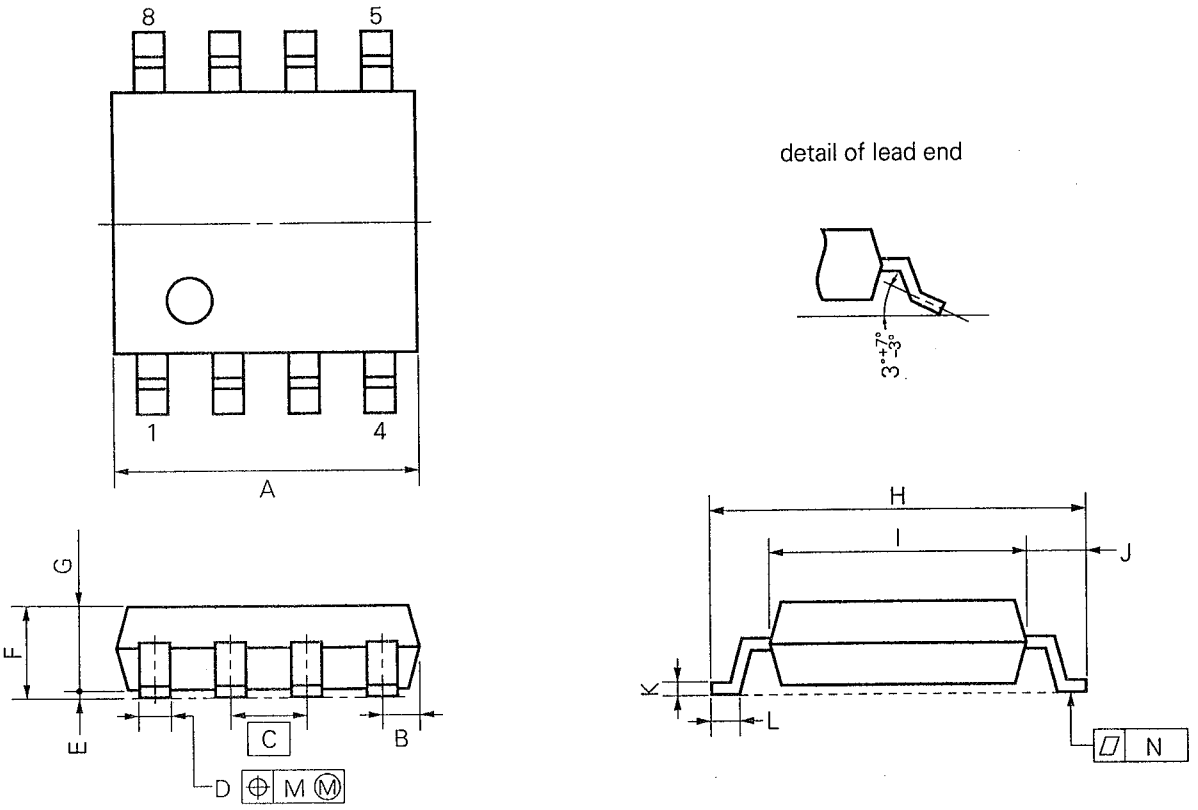
NOTES

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	$0.50^{\pm 0.10}$	$0.020^{+0.004}_{-0.005}$
F	1.4 MIN.	0.055 MIN.
G	$3.2^{\pm 0.3}$	$0.126^{\pm 0.012}$
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)



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

NOTE

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

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]

M4 92.6