

6427525 N E C ELECTRONICS INC

05E 22283 D

BIPOLAR ANALOG INTEGRATED CIRCUITS

μ PC844

T-79-10

**SINGLE SUPPLY VOLTAGE, HIGH SPEED,
WIDE BAND, QUAD OPERATIONAL AMPLIFIERS**

DESCRIPTION

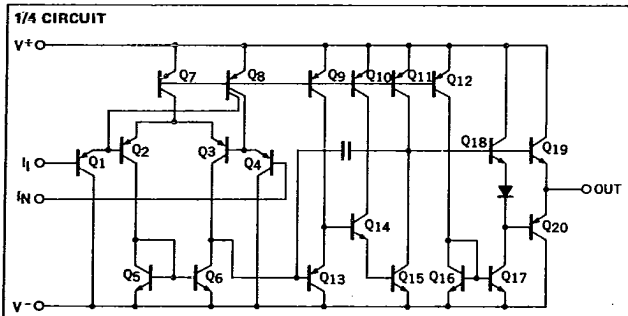
The μ PC844 is quad high speed, wide band operational amplifier designed for single supply operation from +3 V to +36 V with low supply current drain. By using high speed PNP transistors for input and output circuits, the excellent AC performance is achieved without degrading capacitive load drive capability.

With no crossover distortion and wide output voltage range characteristics, the μ PC844 is optimum choice for single supply AC amplifier, and active filters.

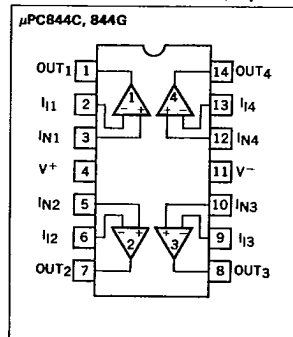
FEATURES

- High Slew Rate: 7 V/ μ s ($V^+ = +5$ V)
- Wide Gain Band Width Product: 3.5 MHz ($V^+ = +5$ V)
- Wide Supply Voltage: +3 V to +36 V
- Large Output Voltage Swing: 0 V to $V^+ - 1.3$ V
- Input Common Mode Voltage Range Include Ground.
- Internal Frequency Compensation.

EQUIVALENT CIRCUIT



CONNECTION DIAGRAM (Top View)



ORDERING INFORMATION

Part Number	Package
μ PC844C	14 PIN PLASTIC DIP (300 mil)
μ PC844G2	14 PIN PLASTIC SOP (225 mil)

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ABSOLUTE MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

PARAMETER	μ PC844	UNIT
Voltage between V^+ and V^-	36	V
Differential Input Voltage	36	V
Input Voltage	-0.3 to 36	V
Power Dissipation	C Package (Note 1)	570 mW
	G Package (Note 2)	550 mW
Output Short Circuit Duration	Indefinite	s
Operating Temperature Range	-40 to +85	$^\circ\text{C}$
Storage Temperature Range	-55 to +125	$^\circ\text{C}$

Note 1: Thermal derating factor is $-7.6 \text{ mW}/^\circ\text{C}$ when ambient temperature is higher than 50°C .
Note 2: Thermal derating factor is $-5.5 \text{ mW}/^\circ\text{C}$ when ambient temperature is higher than 25°C .

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage (Single)	V^\pm	+3		+32	V
Capacitive Load ($A_o = +1, R_f = 0$)	C_L			1000	pF
Output Current	I_o			± 10	mA

ELECTRICAL CHARACTERISTICS ($T_a = 25 \pm 3^\circ\text{C}, RH \leq 70\%, V^\pm = \pm 15 \text{ V}$)

CHARACTERISTIC	MIN.	TYP.	MAX.	UNIT	CONDITIONS
Input Offset Voltage		1.0	6.0	mV	
Input Offset Current		6	75	nA	
Input Bias Current		140	500	nA	
Large Signal Voltage Gain	25	300		V/mV	$R_L \geq 2 \text{ k}\Omega, V_O = \pm 10 \text{ V}$
Supply Current		7.5	11	mA	All Amplifiers
Common Mode Rejection Ratio	70	86		dB	
Supply Voltage Rejection Ratio	70	93		dB	
Output Voltage Swing	± 13.7	± 14		V	$R_L \geq 10 \text{ k}\Omega$
Output Voltage Swing	± 13.5			V	$R_L \geq 2 \text{ k}\Omega$
Common Mode Input Voltage Range	V^-		$V^+ - 1.8$	V	
Slew Rate (Rise)		8.5		V/ μ s	$A_o = 1, R_L \geq 2 \text{ k}\Omega$
Gain Band Width Product		3.5		MHz	$f_o = 100 \text{ kHz}$
Channel Separation		120		dB	$f = 20 \text{ Hz to } 20 \text{ kHz}$

ELECTRICAL CHARACTERISTICS ($T_a = 25 \pm 3^\circ\text{C}, RH \leq 70\%, V^+ = 5 \text{ V}, V^- = \text{GND}$)

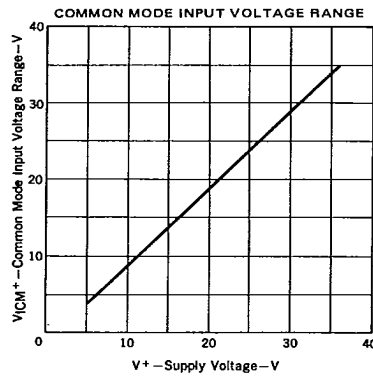
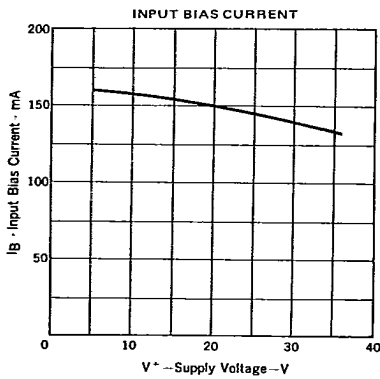
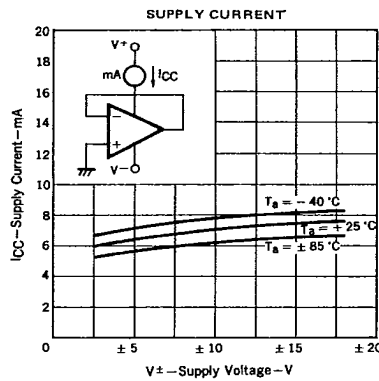
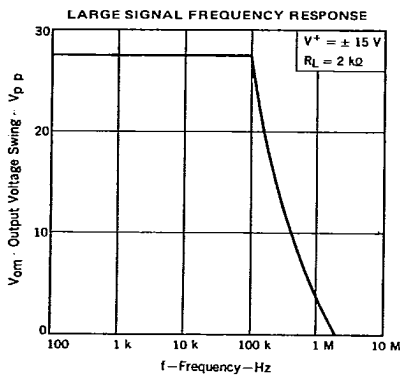
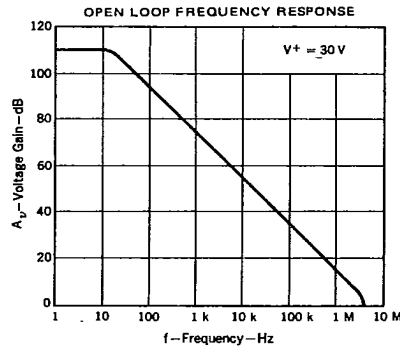
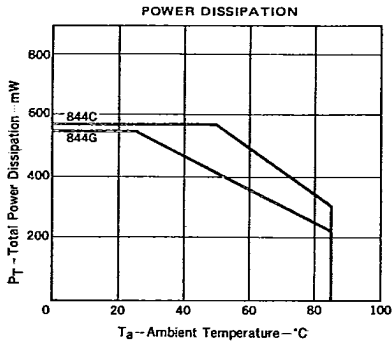
CHARACTERISTIC	MIN.	TYP.	MAX.	UNIT	CONDITIONS
Input Offset Voltage		1.0	5	mV	
Input Offset Current		6	75	nA	
Input Bias Current		160	500	nA	
Large Signal Voltage Gain	25	300		V/mV	$R_L \geq 2 \text{ k}\Omega$
Supply Current		6.0	9.0	mA	All Amplifiers
Common Mode Rejection Ratio	70	80		dB	
Supply Voltage Rejection Ratio	70	95		dB	
Output Voltage (V_{OH})	3.7	4.0		V	$R_L \geq 2 \text{ k}\Omega$
Output Voltage (V_{OL})	0	0		V	$R_L \geq 2 \text{ k}\Omega$
Common Mode Input Voltage Range	0		$V^+ - 1.8$	V	
Slew Rate (Rise)		7		V/ μ s	
Output Current (Source)	10	30		mA	$V_{IN}^+ = +1 \text{ V}, V_{IN}^- = 0 \text{ V}$
Output Current (Sink)	10	30		mA	$V_{IN}^+ = 0 \text{ V}, V_{IN}^- = +1 \text{ V}$

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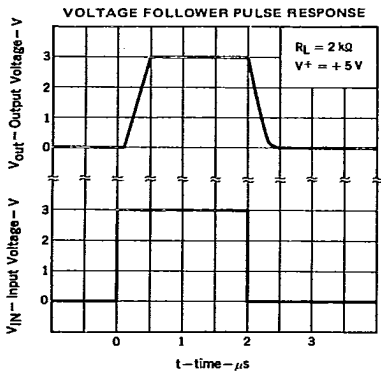
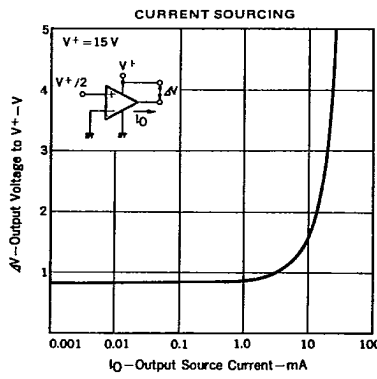
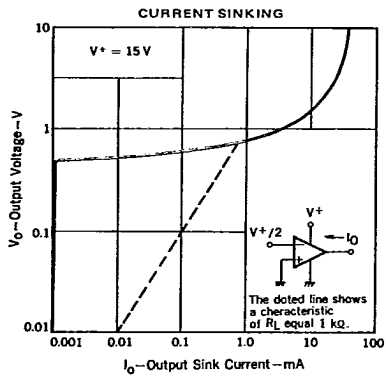
TYPICAL PERFORMANCE CHARACTERISTICS ($T_a = 25^\circ\text{C}$)



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APPLICATION INFORMATION

The μ PC844 uses PNP transistor (Q₂₀) for output sink stage. Therefore, when the output is below 0.7 V under single supply operation, Tr. Q₂₀ becomes "OFF" and the load resistance dominates output saturation characteristics (See Fig. 1). If large load capacitance connected to R_L, the output shows RC discharge characteristics below V_{OL} = 0.7 V when output falls (See Fig. 2).

If this RC delay is critical, following action is necessary to obtain shorter time constant.

- ① make R_L smaller
- ② connect negative supply to R_L (See Fig. 3)

Fig. 1 Output Saturation Characteristics.

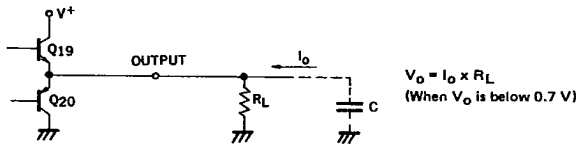


Fig. 2 Pulse Response Under Large Capacitive Condition.

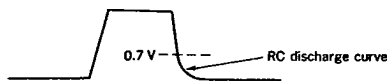
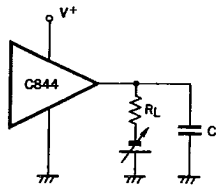


Fig. 3 Application Circuits to Prevent RC Delay.



Note: The μ PC844G2 has larger chip size than other op amps. Therefore we recommend hot plate belt conveyor type reflow soldering for mounting.

Wave soldering or infrared rays type reflow soldering methods are not recommendable because of their hard heat shock.

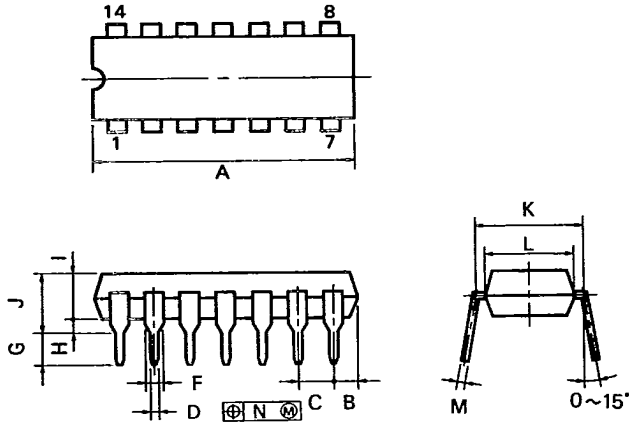
μ PC844

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14PIN PLASTIC DIP (300 mil)



P14C-100-300B2

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	20.32 MAX.	0.800 MAX.
B	2.54 MAX.	0.100 MAX.
C	2.54 (T.P.)	0.100 (T.P.)
D	0.50 ± 0.10	0.020 ± 0.004
F	1.1 MIN.	0.043 MIN.
G	3.5 ± 0.3	0.138 ± 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	6.5	0.256
M	0.25 ± 0.08	0.010 ± 0.003
N	0.25	0.01

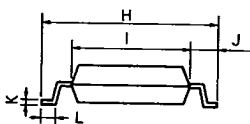
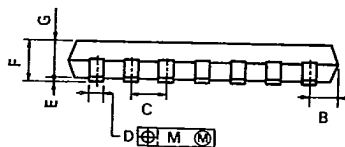
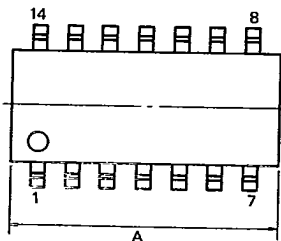
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14PIN PLASTIC SOP (225 mil)



S14GM-50-225B, C

NOTE

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

ITEM	MILLIMETERS	INCHES
A	10.46 MAX.	0.412 MAX.
B	1.42 MAX.	0.056 MAX.
C	1.27 (T.P.)	0.050 (T.P.)
D	0.40 ^{+0.08}	0.016 ^{+0.003}
E	0.1 ^{+0.1}	0.004 ^{+0.004}
F	1.8 MAX.	0.071 MAX.
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 ^{+0.08}	0.006 ^{+0.003}
L	0.6 ^{+0.2}	0.024 ^{+0.008}
M	0.12	0.005