DATA SHEET

NEC

BIPOLAR ANALOG INTEGRATED CIRCUIT

µPC842

SINGLE SUPPLY VOLTAGE, HIGH SPEED, WIDE BAND, DUAL OPERATIONAL AMPLIFIERS

DESCRIPTION

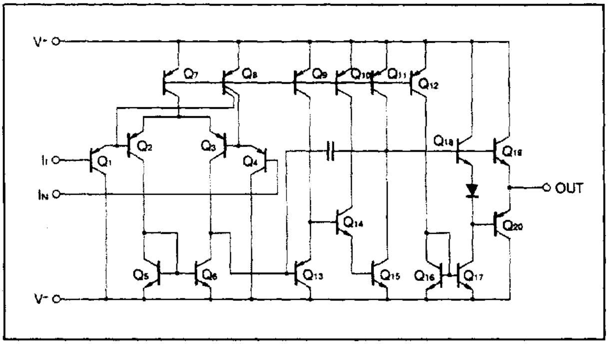
The µPC842 is dual high speed, wide band operational amplifier designed for single supply operation from +3 V to +32 V with low supply current drain. By using high speed PNP transistors for input and output circuits, the excellent AC performance is achieved without degrading capacitive load drive capability.

With no crossover distortion and wide output voltage range characteristics, the µPC842 is optimum choice for single supply AC amplifier, and active filters.

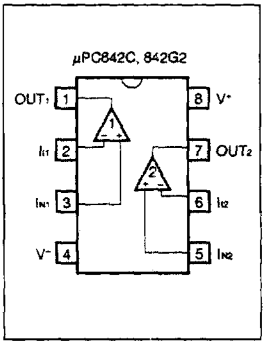
FEATURES

- High slew rate: 7 V/µs TYP. (V^+ = +5 V, V^- = GND)
- Wide gain band width product: 3.5 MHz TYP. (V^+ = +5 V, V^- = GND)
- Wide supply voltage range: +3 V to +32 V
- Wide output voltage swing
- Common mode input voltage range includes V^-
- Internal frequency compensation
- Output short circuit protection

EQUIVALENT CIRCUIT (1/2 Circuit)



PIN CONFIGURATION (Top View)



ORDERING INFORMATION

Part Number	Package
µPC842C	8-pin plastic DIP (300 mil)
µPC842G2	8-pin plastic SOP (225 mil)

The information in this document is subject to change without notice.

Document No. G10524EJ4V0DS00 (4th edition)
(Previous No. IC-1888)
Date Published February 1997 N
Printed in Japan

The mark ★ shows major revised points.

ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C)

Parameters		Symbol	Ratings	Unit
Voltage between V^+ and V^- **Note 1**		$V^+ - V^-$	–0.3 to +36	V
Differential Input Voltage		V_{ID}	±36	V
Input Voltage **Note 2**		V_I	V^-–0.3 to V^- +36	V
Output Voltage **Note 3**		V_O	V^-–0.3 to V^+ +0.3	V
Power Dissipation	C Package **Note 4**	P_T	350	mW
	G2 Package **Note 5**		440	mW
Output Short Circuit Duration **Note 6**			Indefinite	sec
Operating Ambient Temperature		T_A	–40 to +85	°C
Storage Temperature		T_{stg}	–55 to + 125	°C

Notes 1. Reverse connection of supply voltage can cause destruction.

2. The input voltage should be allowed to input without damage or destruction independent of the magnitude of V^+. Either input signal should not be allowed to go negative by more than 0.3 V. The normal operation will establish when the both inputs are within the Common Mode Input Voltage Range of electrical characteristics.

3. This specification is the voltage which should be allowed to supply to the output terminal from external without damage or destructive. 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.

4. Thermal derating factor is –5.0 mW/°C when operating ambient temperature is higher than 55 °C.

5. Thermal derating factor is –4.4 mW/°C when operating ambient temperature is higher than 25 °C.

6. Pay careful attention to the total power dissipation not to exceed the absolute maximum ratings, Note 4 and Note 5.

RECOMMENDED OPERATING CONDITIONS

Parameters	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage (Split)	$V^\pm$	±1.5		±16	V
Supply Voltage (V^- = GND)	V^+	+3		+32	V
Output Current	I_O			±10	mA
Capacitive Load ($A_V = +1$, $R_f = 0\ \Omega$)	C_L			1000	pF

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

Parameters	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input Offset Voltage	V_{IO}			±1.0	±4.5	mV
Input Offset Current	I_{IO}			±6	±75	nA
Input Bias Current **Note 7**	I_B			140	500	nA
Large Signal Voltage Gain	A_V	$R_L \geq 2$ kΩ, $V_O = \pm10$ V	25	300		V/mV
Supply Current	I_{CC}	I_O = 0 A, Both Amplifiers		4.3	5.5	mA
Common Mode Rejection Ratio	CMR		70	86		dB
Supply Voltage Rejection Ratio	SVR		70	93		dB
Output Voltage Swing	V_{om}	$R_L \geq 10$ kΩ	±13.7	+14 −14.3		V
Output Voltage Swing	V_{om}	$R_L \geq 2$ kΩ	±13.5			V
Common Mode Input Voltage Range	V_{ICM}		V^-		$V^+-1.8$	V
Slew Rate (Rise)	SR	$A_V = 1$, $R_L \geq 2$ kΩ		8.5		V/μs
Gain Band Width Product	GBW	f_O = 100 kHz		3.5		MHz
Channel Separation		f = 20 Hz to 20 kHz		120		dB

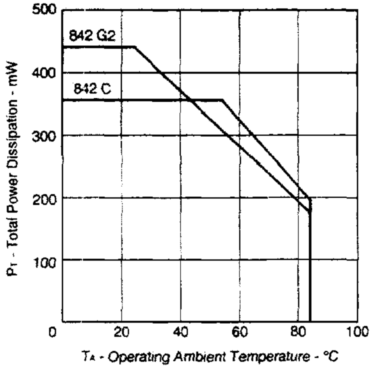
ELECTRICAL CHARACTERISTICS (T_A = 25 °C, V^+ = 5 V, V^- = GND)

Parameters	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input Offset Voltage	V_{IO}			±1.0	±5	mV
Input Offset Current	I_{IO}			±6	±75	nA
Input Bias Current **Note 7**	I_B			160	500	nA
Large Signal Voltage Gain	A_V	$R_L \geq 2$ kΩ	25	300		V/mV
Supply Current	I_{CC}	I_O = 0 A, All Amplifiers		3.3	4.5	mA
Common Mode Rejection Ratio	CMR		70	80		dB
Supply Voltage Rejection Ratio	SVR		70	95		dB
Output Voltage Swing	V_{om}	$R_L \geq 2$ kΩ (Connect to GND)	3.7 0	4.0 0		V
Common Mode Input Voltage Range	V_{ICM}		0		$V^+-1.8$	V
Output Current (SOURCE)	$I_{O\,SOURCE}$	$V^+_{IN} = +1$ V, $V^-_{IN} = 0$ V	10	30		mA
Output Current (SINK)	$I_{O\,SINK}$	$V^+_{IN} = 0$ V, $V^-_{IN} = +1$ V	10	30		mA
Slew Rate (Rise)	SR			7		V/μs

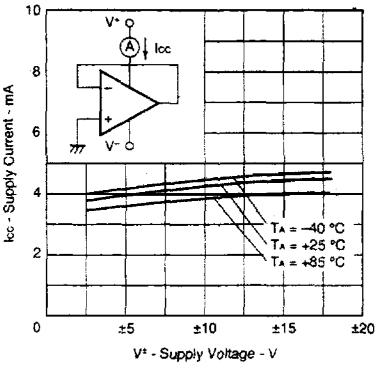
Notes 7. Input bias currents flow out from IC. Because each currents are base current of PNP-transistor on input stage.

TYPICAL CHARACTERISTICS (T_A = 25 °C, TYP.)

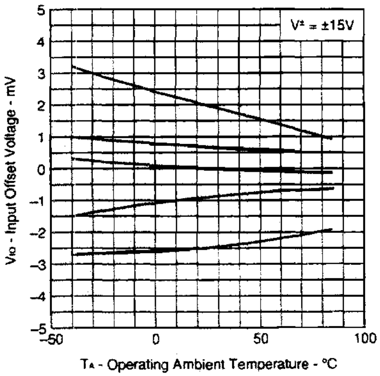
POWER DISSIPATION



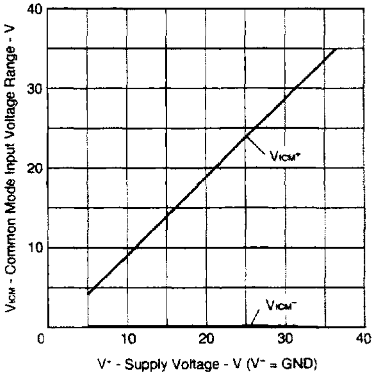
SUPPLY CURRENT



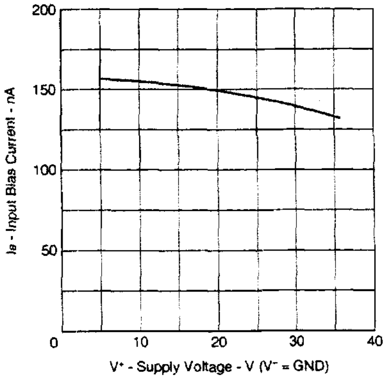
★ INPUT OFFSET VOLTAGE



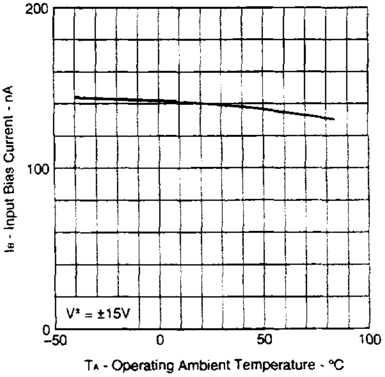
COMMON MODE INPUT VOLTAGE RANGE



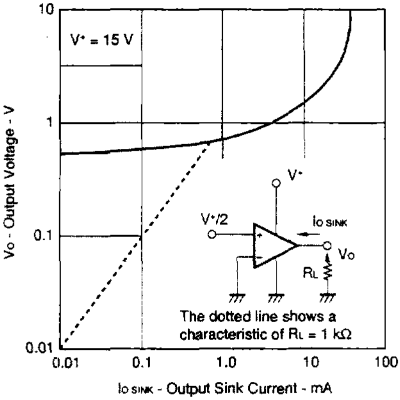
INPUT BIAS CURRENT



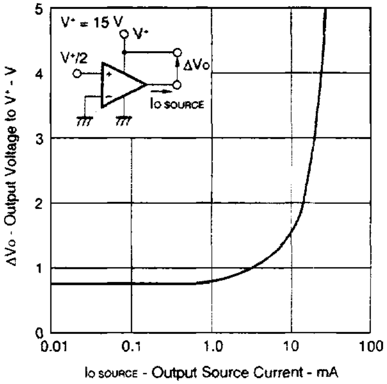
★ INPUT BIAS CURRENT



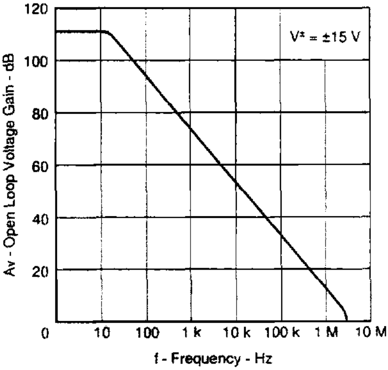
OUTPUT SINK CURRENT LIMIT



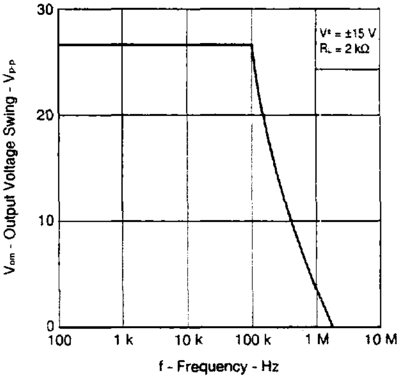
OUTPUT SOURCE CURRENT LIMIT



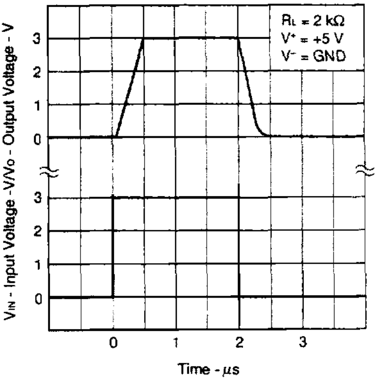
OPEN LOOP FREQUENCY RESPONSE



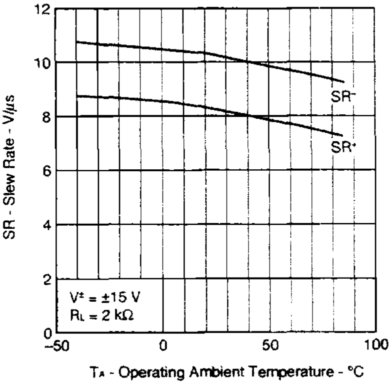
LARGE SIGNAL FREQUENCY RESPONSE



VOLTAGE FOLLOWER PULSE RESPONSE

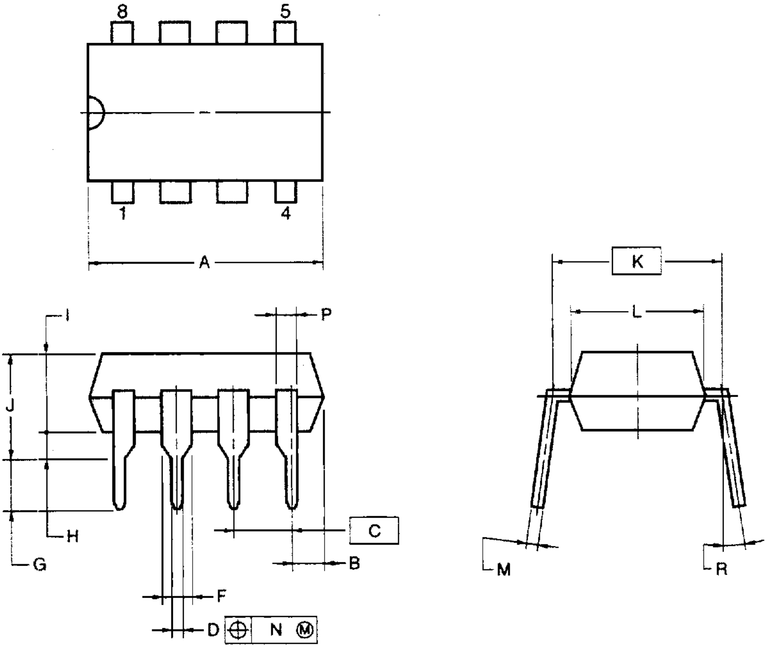


★ SLEW RATE



PACKAGE DRAWINGS

8PIN PLASTIC DIP (300 mil)



NOTES

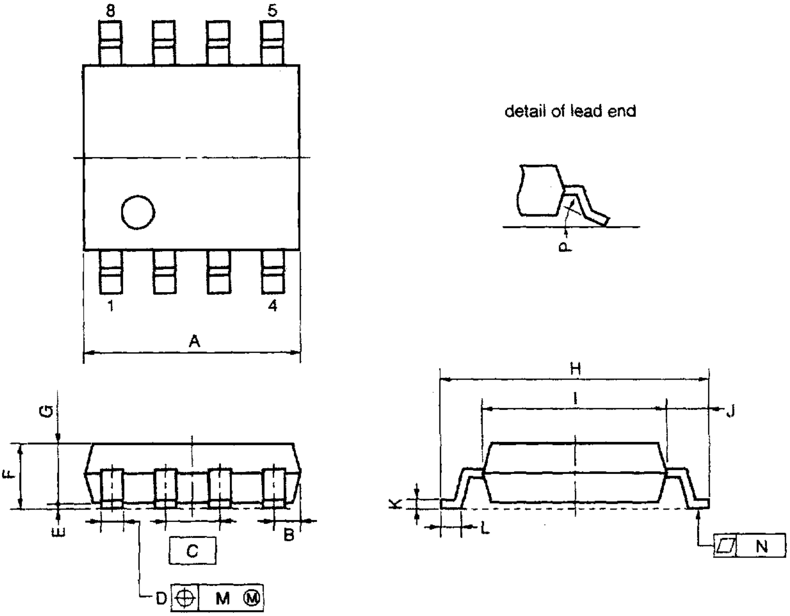
1) Each lead centerline is located within 0.25 mm (0.01 inch) of its true position (T.P.) at maximum material condition.

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.
R	0~15°	0~15°

P8C-100-300B,C-1

8 PIN PLASTIC SOP (225 mil)



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	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.	0.071 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	$0.15^{+0.10}_{-0.05}$	$0.006^{+0.004}_{-0.002}$
L	0.6±0.2	$0.024^{+0.008}_{-0.009}$
M	0.12	0.005
N	0.10	0.004
P	$3°^{+7°}_{-3°}$	$3°^{+7°}_{-3°}$

S8GM-50-225B-4

RECOMMENDED SOLDERING CONDITIONS

When soldering this product, it is highly recommended to observe the conditions as shown below. If other soldering processes are used, or if the soldering is performed under different conditions, please make sure to consult with our sales offices.

For more details, refer to our document **"Semiconductor Device Mounting Technology Manual"** **(C10535E).**

Type of Surface Mount Device

μPC842G2: 8-pin plastic SOP (225 mil)

Process	Conditions	Symbol
Infrared ray reflow	Peak temperature: 230 °C or below (Package surface temperature), Reflow time: 30 seconds or less (at 210 °C or higher), Maximum number of reflow processes: 1 time.	IR30-00-1
Vapor Phase Soldering	Peak temperature: 215 °C or below (Package surface temperature), Reflow time: 40 seconds or less (at 200 °C or higher), Maximum number of reflow processes: 1 time.	VP15-00-1
Wave Soldering	Solder temperature: 260 °C or below, Flow time: 10 seconds or less, Maximum number of flow processes: 1 time, Pre-heating temperature: 120 °C or below (Package surface temperature).	WS60-00-1
Partial heating method	Pin temperature: 300 °C or below, Heat time: 3 seconds or less (Per each side of the device).	–

Caution Apply only one kind of soldering condition to a device, except for "partial heating method", or the device will be damaged by heat stress.

Type of Through-hole Device

μPC842C: 8-pin plastic DIP (300 mil)

Process	Conditions
Wave soldering (only to leads)	Solder temperature: 260 °C or below, Flow time: 10 seconds or less.
Partial heating method	Pin temperature: 300 °C or below, Heat time: 3 seconds or less (per each lead).

Caution For through-hole device, the wave soldering process must be applied only to leads, and make sure that the package body does not get jet soldered.