

To our customers,

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## Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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

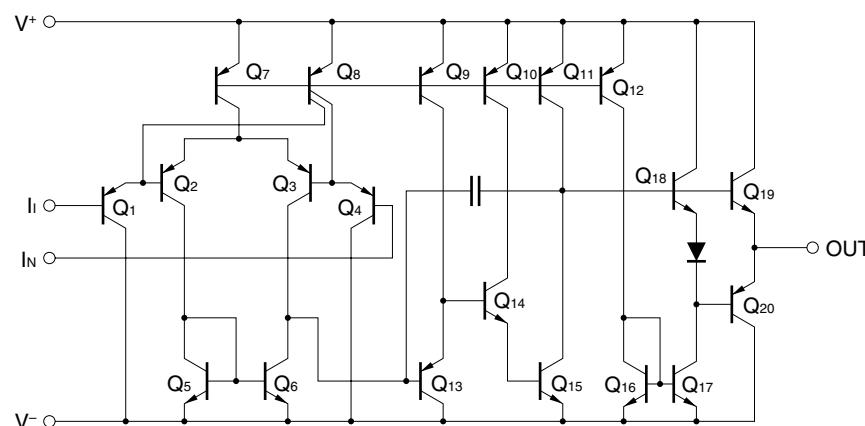
The  $\mu$ PC4742 is dual high speed, wide band operational amplifier designed for single supply operation from +3 V to +32 V with low supply current drain. By using high speed PNP transistors for input and output circuits, the excellent AC performance is achieved without degrading capacitive load drive capability.

With no crossover distortion and wide output voltage range characteristics, the  $\mu$ PC4742 is optimum choice for single supply AC amplifier, and active filters.

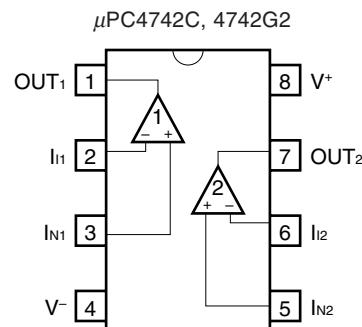
**FEATURES**

- High slew rate: 7 V/ $\mu$ s 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
$\mu$ PC4742C	8-pin plastic DIP (7.62 mm (300))
$\mu$ PC4742G2	8-pin plastic SOP (5.72 mm (225))

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

Parameter	Symbol	Ratings	Unit
Voltage between $V^+$ and $V^-$ <sup>Note 1</sup>	$V^+ - V^-$	-0.3 to +36	V
Differential Input Voltage	$V_{ID}$	$\pm 36$	V
Input Voltage <sup>Note 2</sup>	$V_I$	$V^- - 0.3$ to $V^+ + 36$	V
Output Voltage <sup>Note 3</sup>	$V_O$	$V^- - 0.3$ to $V^+ + 0.3$	V
Power Dissipation	C Package <sup>Note 4</sup>	350	mW
	G2 Package <sup>Note 5</sup>	440	mW
Output Short Circuit Duration <sup>Note 6</sup>		Indefinite	sec
Operating Ambient Temperature	$T_A$	-20 to +80	°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  $-5.0 \text{ mW/}^\circ\text{C}$  when operating ambient temperature is higher than  $55^\circ\text{C}$ .
5. Thermal derating factor is  $-4.4 \text{ mW/}^\circ\text{C}$  when operating ambient temperature is higher than  $25^\circ\text{C}$ .
6. Pay careful attention to the total power dissipation not to exceed the absolute maximum ratings, Note 4 and Note 5.

## RECOMMENDED OPERATING CONDITIONS

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

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

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input Offset Voltage	$V_{IO}$			$\pm 1.0$	$\pm 4.5$	mV
Input Offset Current	$I_{IO}$			$\pm 6$	$\pm 75$	nA
Input Bias Current <sup>Note 7</sup>	$I_B$			140	500	nA
Large Signal Voltage Gain	$A_V$	$R_L \geq 2\text{ k}\Omega$ , $V_O = \pm 10\text{ V}$	25000	300000		
Supply Current <sup>Note 8</sup>	$I_{CC}$	$I_O = 0\text{ A}$		4.3	5.5	mA
Common Mode Rejection Ratio	CMR		70	86		dB
Supply Voltage Rejection Ratio	SVR		70	93		dB
Output Voltage Swing	$V_{OM}$	$R_L \geq 10\text{ k}\Omega$	$\pm 13.7$	+14 -14.3		V
Output Voltage Swing	$V_{OM}$	$R_L \geq 2\text{ k}\Omega$	$\pm 13.5$			V
Common Mode Input Voltage Range	$V_{ICM}$		$V^-$		$V^+ - 1.8$	V
Slew Rate (Rise)	SR	$A_V = 1$ , $R_L \geq 2\text{ k}\Omega$		8.5		$\text{V}/\mu\text{s}$
Gain Band Width Product	GBW	$f_O = 100\text{ kHz}$		3.5		MHz
Channel Separation		$f = 20\text{ Hz}$ to $20\text{ kHz}$		120		dB

ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ ,  $V^+ = 5\text{ V}$ ,  $V^- = \text{GND}$ )

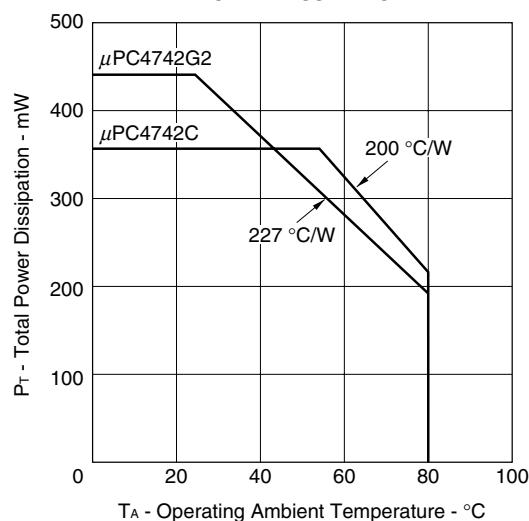
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input Offset Voltage	$V_{IO}$			$\pm 1.0$	$\pm 5$	mV
Input Offset Current	$I_{IO}$			$\pm 6$	$\pm 75$	nA
Input Bias Current <sup>Note 7</sup>	$I_B$			160	500	nA
Large Signal Voltage Gain	$A_V$	$R_L \geq 2\text{ k}\Omega$	25000	300000		
Supply Current <sup>Note 8</sup>	$I_{CC}$	$I_O = 0\text{ A}$		3.3	4.5	mA
Common Mode Rejection Ratio	CMR		70	80		dB
Supply Voltage Rejection Ratio	SVR		70	95		dB
Output Voltage Swing	$V_{OM}$	$R_L \geq 2\text{ k}\Omega$ (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	$V^+_{IN} = +1\text{ V}$ , $V^-_{IN} = 0\text{ V}$	10	30		mA
Output Current (SINK)	$I_O$ SINK	$V^+_{IN} = 0\text{ V}$ , $V^-_{IN} = +1\text{ V}$	10	30		mA
Slew Rate (Rise)	SR			7		$\text{V}/\mu\text{s}$

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

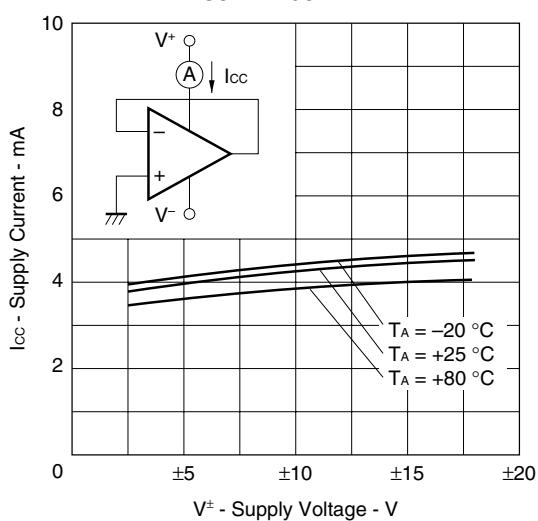
**8.** This current flows irrespective of the existence of use.

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

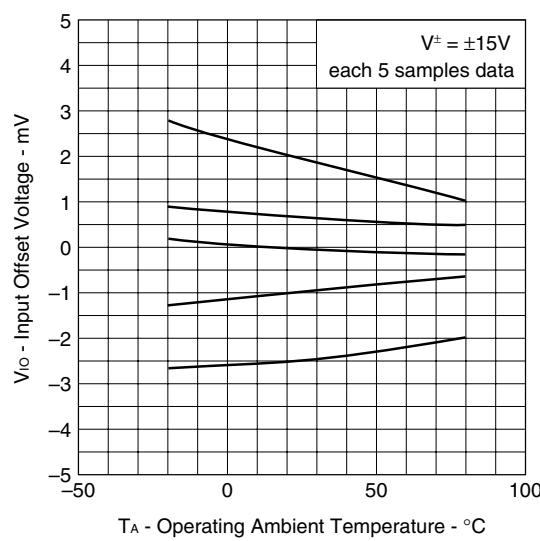
POWER DISSIPATION



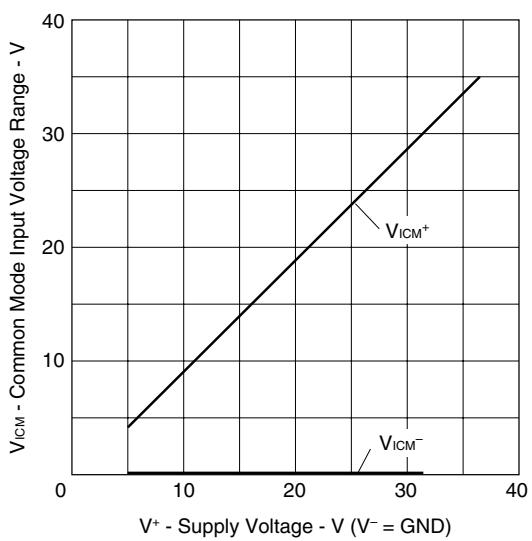
SUPPLY CURRENT



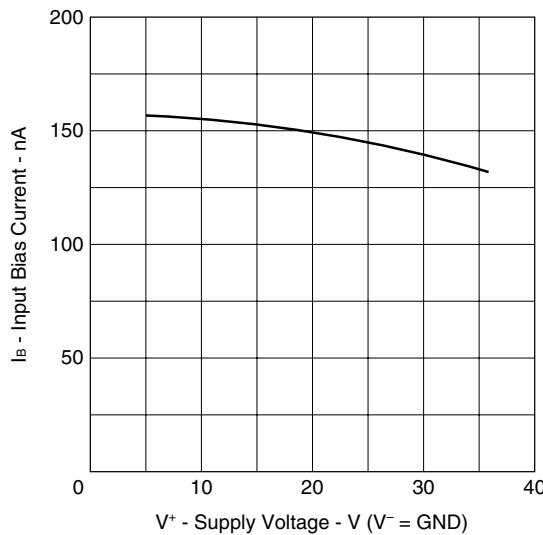
★ INPUT OFFSET VOLTAGE



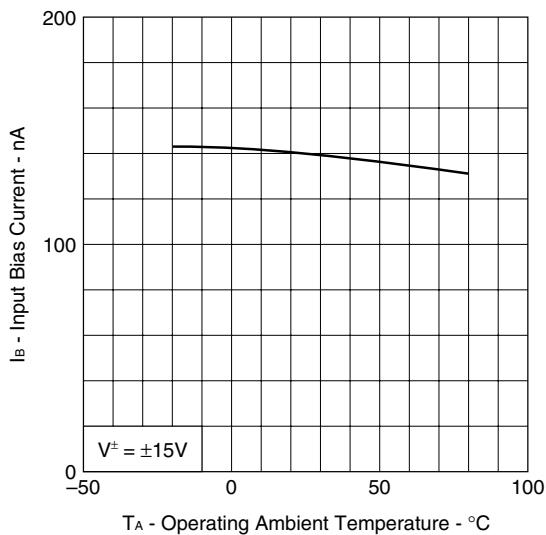
COMMON MODE INPUT VOLTAGE RANGE

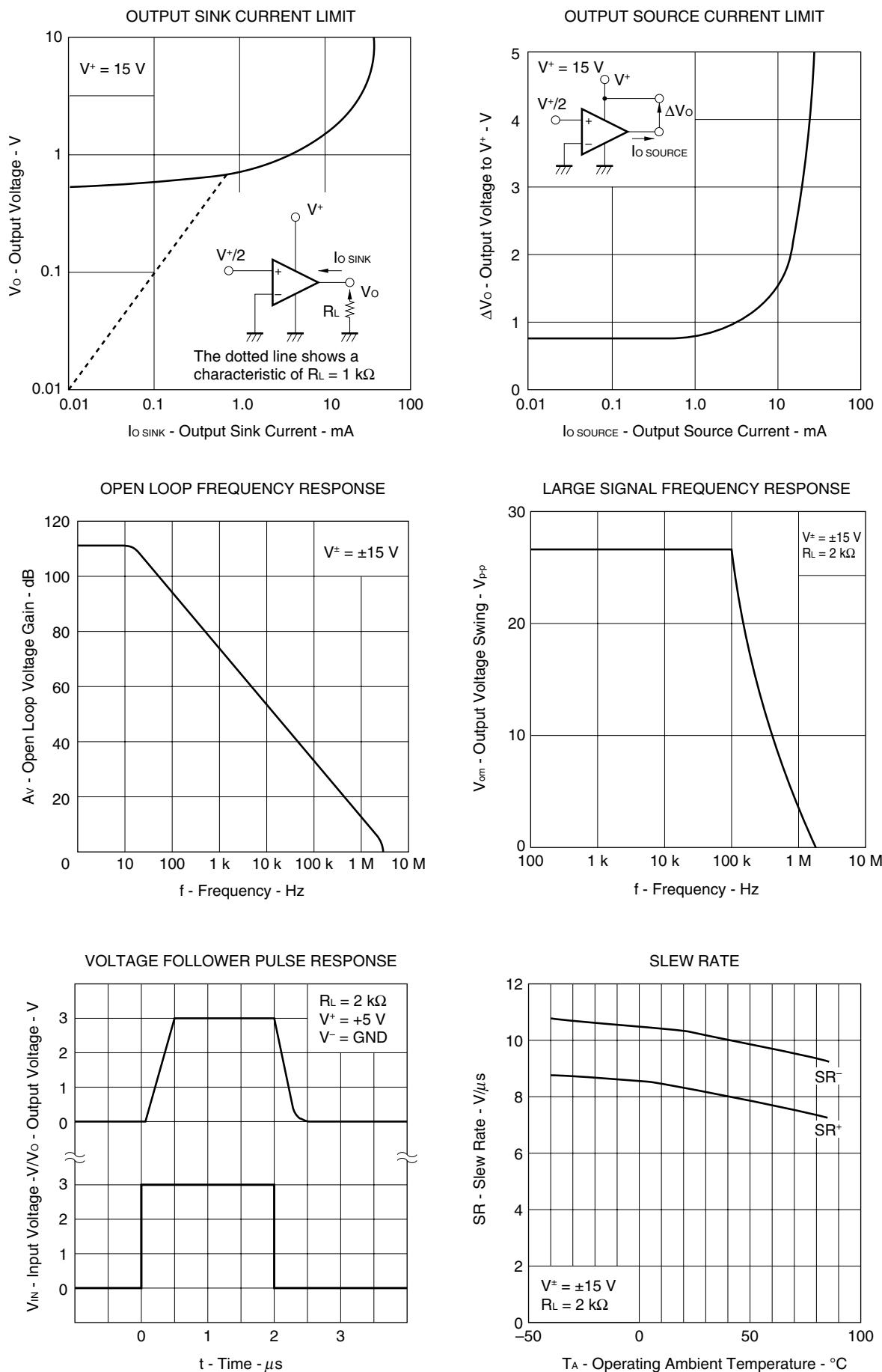


INPUT BIAS CURRENT



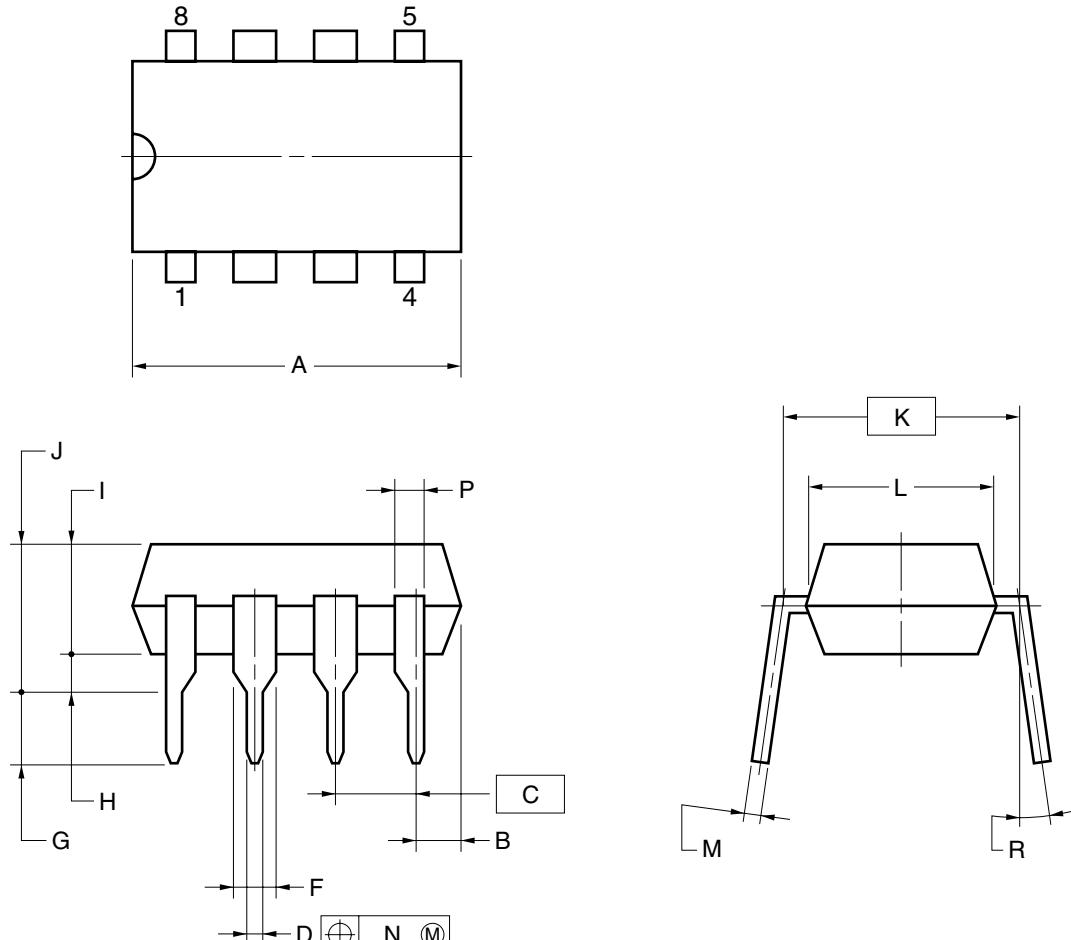
INPUT BIAS CURRENT





## ★ PACKAGE DRAWINGS (Unit: mm)

## 8-PIN PLASTIC DIP (7.62mm(300))



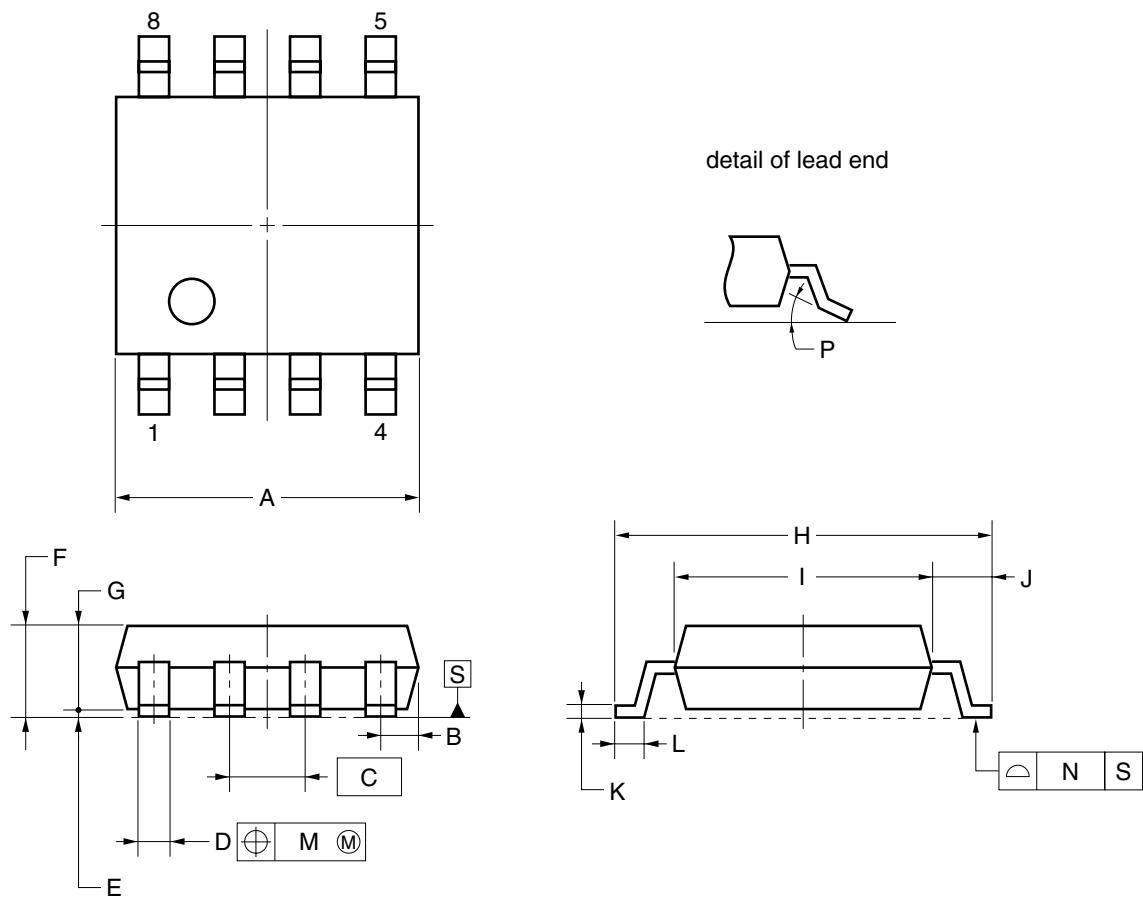
## NOTES

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

ITEM	MILLIMETERS
A	10.16 MAX.
B	1.27 MAX.
C	2.54 (T.P.)
D	$0.50 \pm 0.10$
F	1.4 MIN.
G	$3.2 \pm 0.3$
H	0.51 MIN.
I	4.31 MAX.
J	5.08 MAX.
K	7.62 (T.P.)
L	6.4
M	$0.25^{+0.10}_{-0.05}$
N	0.25
P	0.9 MIN.
R	$0 \text{--} 15^\circ$

P8C-100-300B,C-2

## 8-PIN PLASTIC SOP (5.72 mm (225))



## NOTE

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

ITEM	MILLIMETERS
A	5.2 $^{+0.17}_{-0.20}$
B	0.78 MAX.
C	1.27 (T.P.)
D	0.42 $^{+0.08}_{-0.07}$
E	0.1 $\pm 0.1$
F	1.59 $\pm 0.21$
G	1.49
H	6.5 $\pm 0.3$
I	4.4 $\pm 0.15$
J	1.1 $\pm 0.2$
K	0.17 $^{+0.08}_{-0.07}$
L	0.6 $\pm 0.2$
M	0.12
N	0.10
P	3° $^{+7°}_{-3°}$

S8GM-50-225B-6

## ★ RECOMMENDED SOLDERING CONDITIONS

The μPC4742 should be soldered and mounted under the following recommended conditions.

For soldering methods and conditions other than those recommended below, contact an NEC Electronics sales representative.

For technical information, see the following website.

**Semiconductor Device Mount Manual (<http://www.necel.com/pkg/en/mount/index.html>)**

### Type of Surface Mount Device

**μPC4742G2: 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

**μPC4742C: 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.

**REFERENCE DOCUMENTS**

★	QUALITY GRADES ON NEC SEMICONDUCTOR DEVICES	C11531E
	SEMICONDUCTOR DEVICE MOUNT MANUAL	<a href="http://www.necel.com/pkg/en/mount/index.html">http://www.necel.com/pkg/en/mount/index.html</a>
	NEC SEMICONDUCTOR DEVICE RELIABILITY/QUALITY CONTROL SYSTEM	IEI-1212
	(STANDARD LINEAR IC)	

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