To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

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

April 1st, 2010
Renesas Electronics Corporation

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

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RENESAS

BIPOLAR ANALOG INTEGRATED CIRCUIT

μPC4744

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

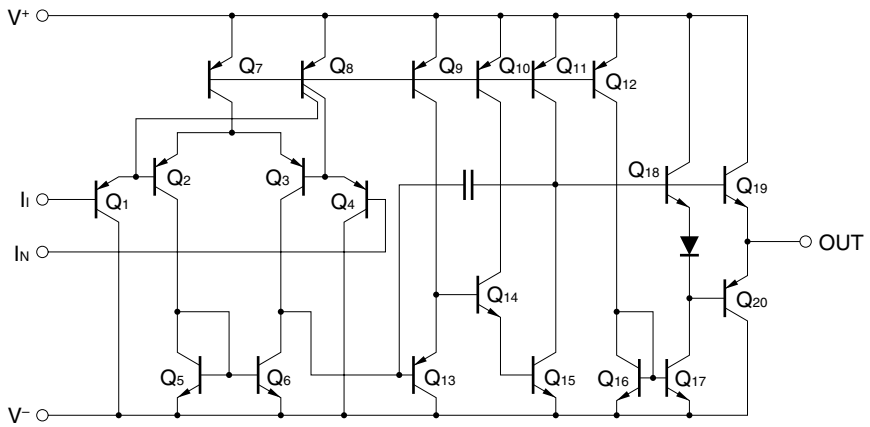
The μPC4744 is quad high speed, wide band operational amplifier designed for single supply operation from +3 V to +32 V with low supply current drain. By using high speed PNP transistors for input and output circuits, the excellent AC performance is achieved without degrading capacitive load drive capability.

With no crossover distortion and wide output voltage range characteristics, the μPC4744 is optimum choice for single supply AC amplifier, and active filters.

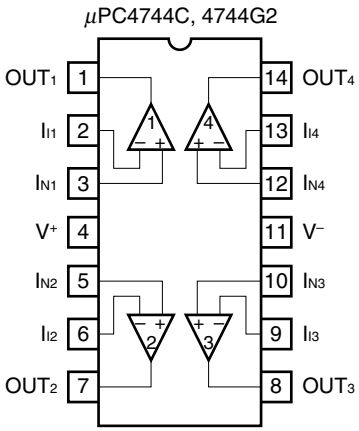
FEATURES

- High slew rate: 8.5 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 (1/4 Circuit)



PIN CONFIGURATION (Top View)



★ ORDERING INFORMATION

Part Number	Package
μPC4744C	14-pin plastic DIP (7.62 mm (300))
μPC4744G2	14-pin plastic SOP (5.72 mm (225))

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Document No. G13959EJ2V0DS00 (2nd edition)
Date Published March 2004 N CP(K)
Printed in Japan

The mark ★ shows major revised points.

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

Parameter		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	570	mW
	G2 Package Note 5		550	mW
Output Short Circuit Duration Note 6			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 –7.6 mW/°C when operating ambient temperature is higher than 50 °C.

5. Thermal derating factor is –5.5 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

Parameter	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 Ω)	C_L			1000	pF

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

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input Offset Voltage	V_{IO}			±1.0	±6.0	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 = ±10 V	25000	300000		
★ Supply Current[Note 8]	I_{CC}	I_O = 0 A		7.5	11	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)

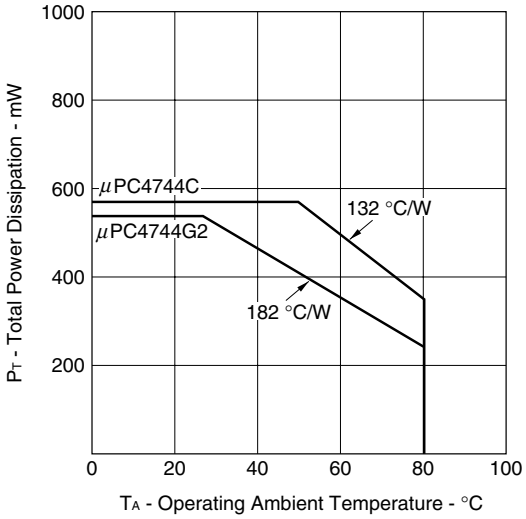
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input Offset Voltage	V_{IO}			±1.0	±5	mV
Input Offset Current	I_{IO}			±6	±75	nA
Input Bias Current[Note 7]	I_B			160	500	nA
Large Signal Voltage Gain	A_V	$R_L \geq 2$ kΩ	25000	300000		
★ Supply Current[Note 8]	I_{CC}	I_O = 0 A		6.0	9.0	mA
Common Mode Rejection 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	A_V = 1, $R_L \geq 2$ kΩ		8.5		V/μs

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

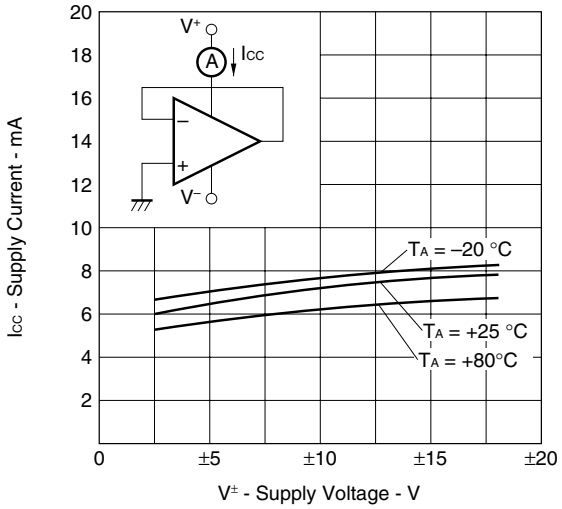
★ **8.** This current flows irrespective of the existence of use.

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

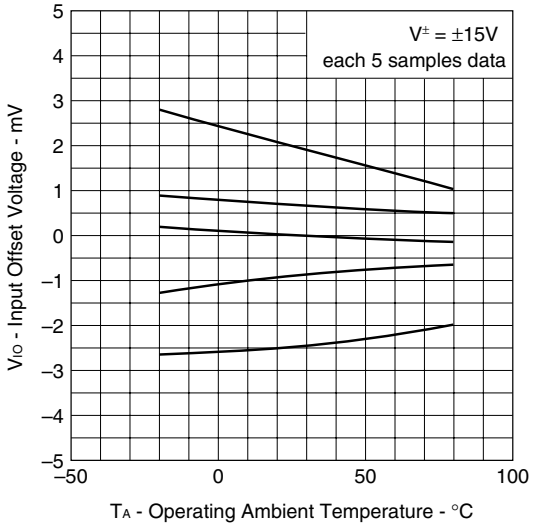
POWER DISSIPATION



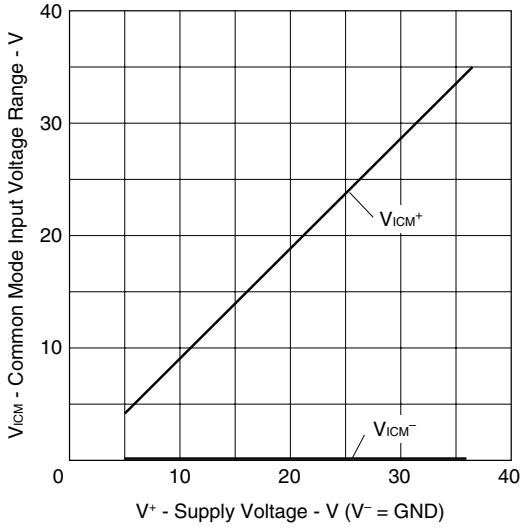
SUPPLY CURRENT



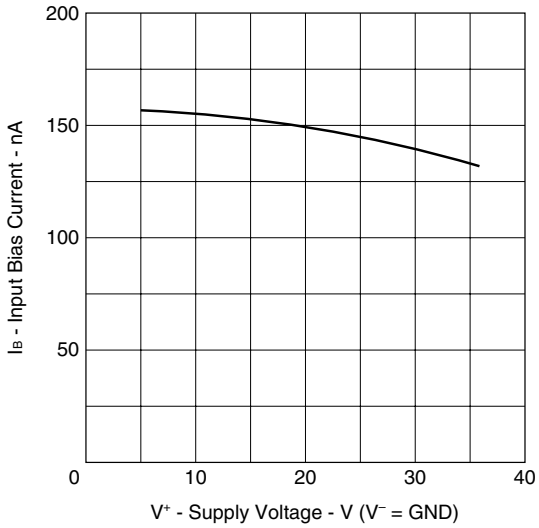
★ INPUT OFFSET VOLTAGE



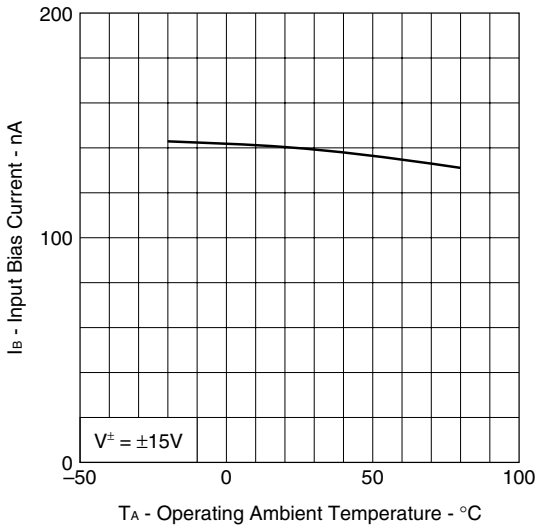
COMMON MODE INPUT VOLTAGE RANGE



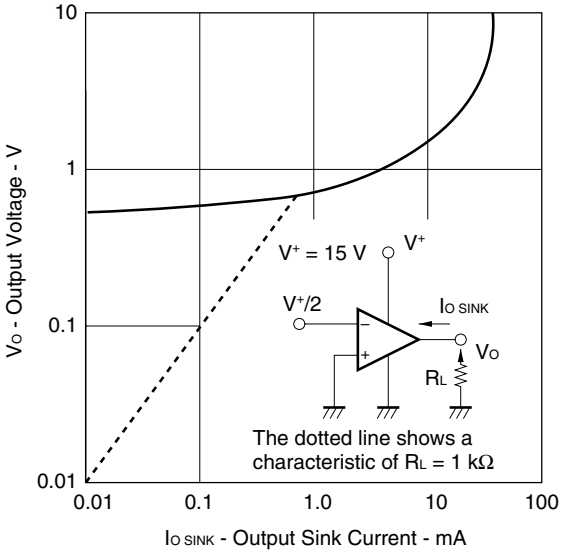
INPUT BIAS CURRENT



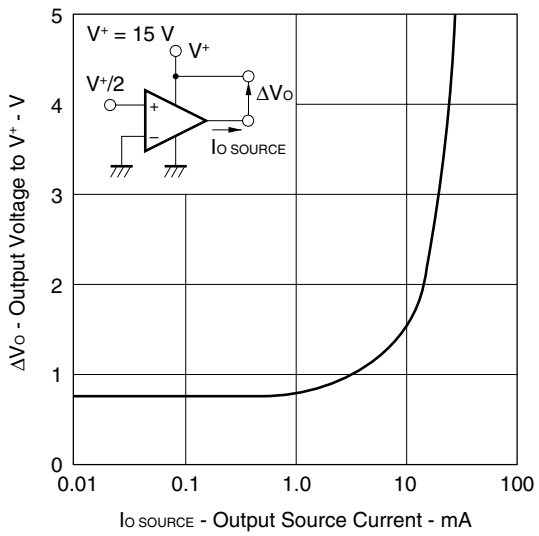
INPUT BIAS CURRENT



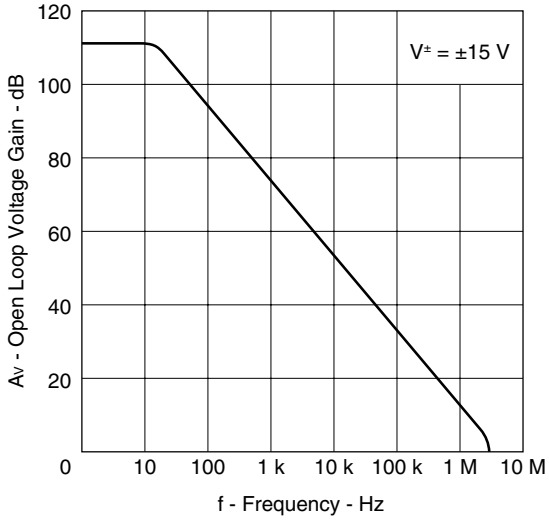
OUTPUT SINK CURRENT LIMIT



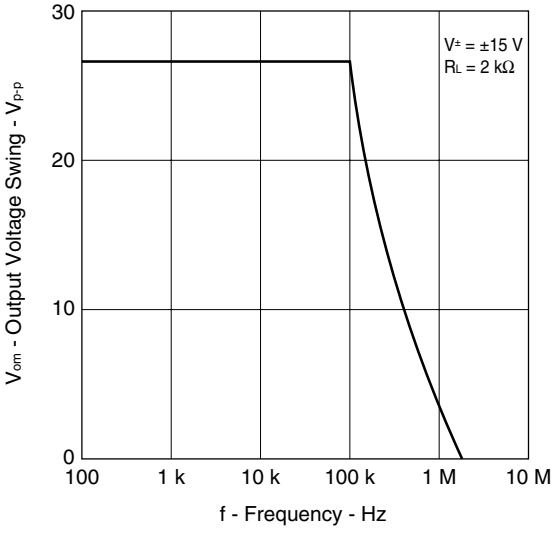
OUTPUT SOURCE CURRENT LIMIT



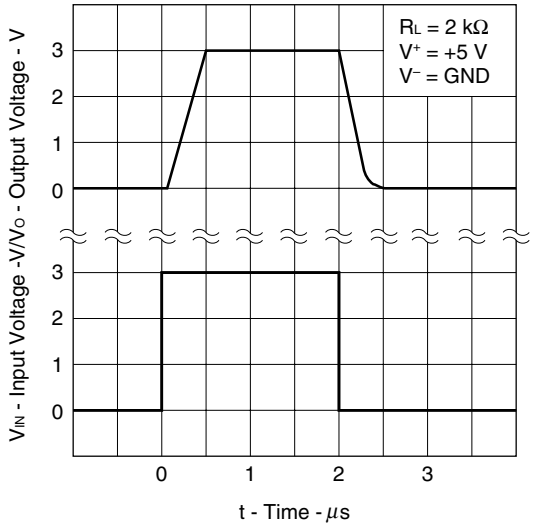
OPEN LOOP FREQUENCY RESPONSE



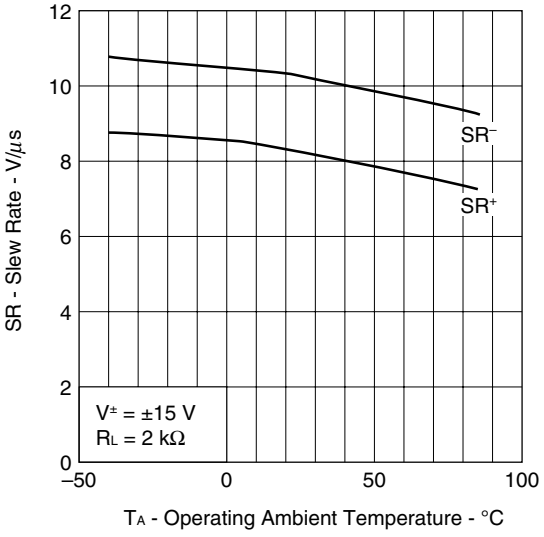
LARGE SIGNAL FREQUENCY RESPONSE



VOLTAGE FOLLOWER PULSE RESPONSE

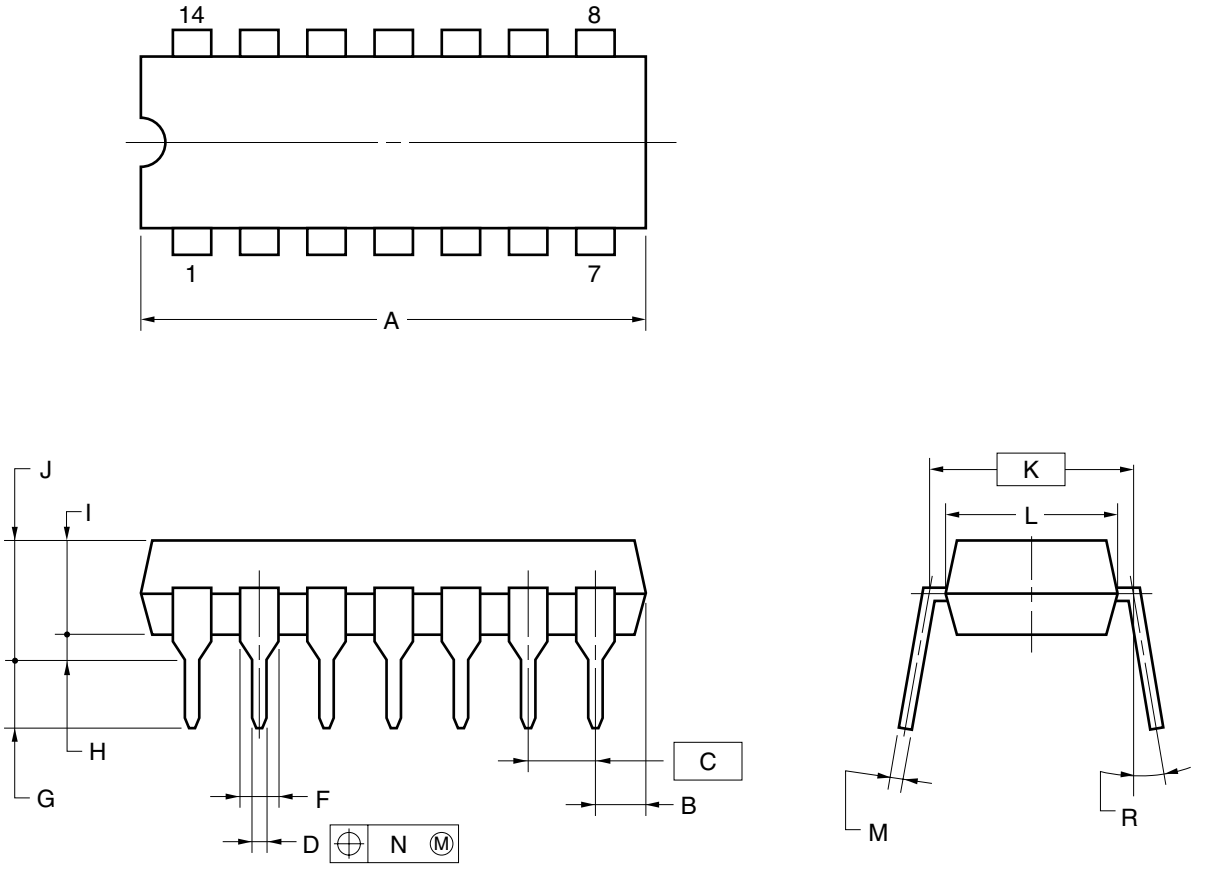


SLEW RATE



★ **PACKAGE DRAWINGS**

14-PIN PLASTIC DIP (7.62mm(300))



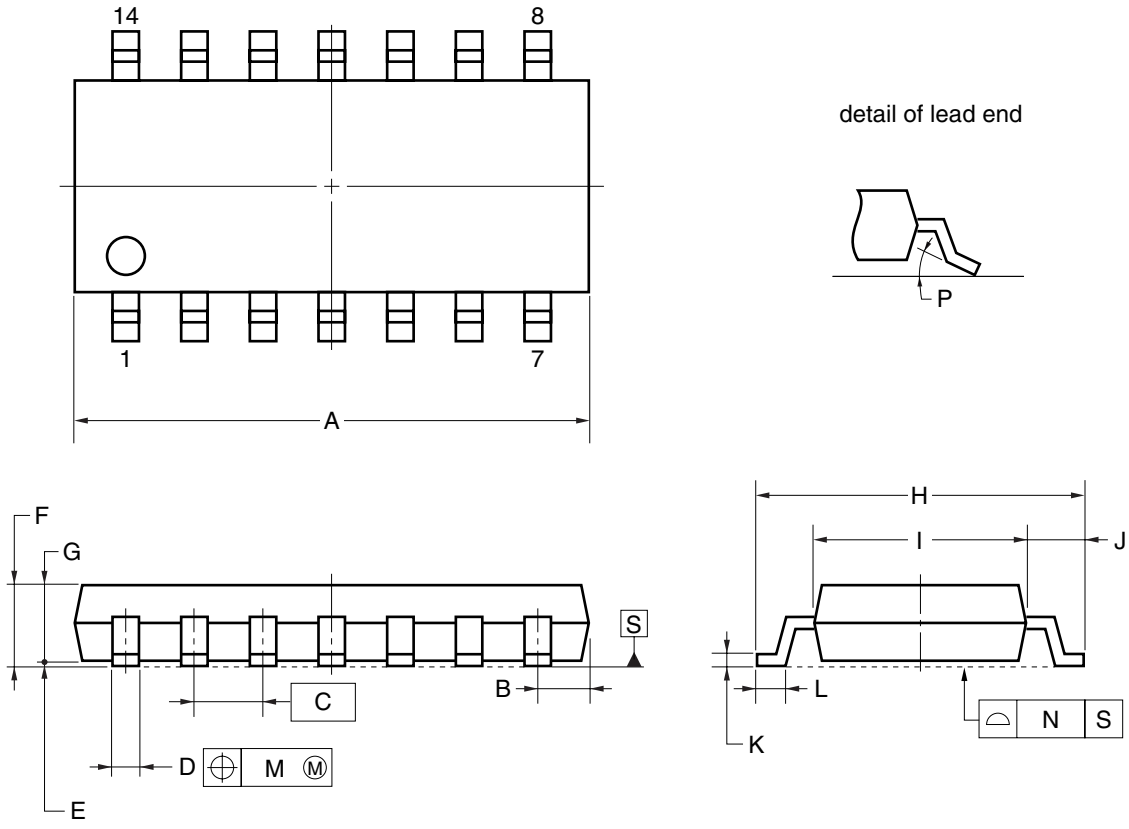
NOTES

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	20.32 MAX.
B	2.54 MAX.
C	2.54 (T.P.)
D	0.50±0.10
F	1.1 MIN.
G	3.5±0.3
H	0.51 MIN.
I	4.31 MAX.
J	5.08 MAX.
K	7.62 (T.P.)
L	6.5
M	$0.25^{+0.10}_{-0.05}$
N	0.25
R	0~15°

P14C-100-300B2-2

14-PIN PLASTIC SOP (5.72 mm (225))



NOTE

Each lead centerline is located within 0.1 mm of its true position (T.P.) at maximum material condition.

ITEM	MILLIMETERS
A	10.2±0.26
B	1.42 MAX.
C	1.27 (T.P.)
D	$0.42^{+0.08}_{-0.07}$
E	0.1±0.1
F	$1.59^{+0.21}_{-0.2}$
G	1.49
H	6.5±0.2
I	4.4±0.1
J	1.1±0.16
K	$0.17^{+0.08}_{-0.07}$
L	0.6±0.2
M	0.1
N	0.10
P	$3^{\circ}{}^{+7^{\circ}}_{-3^{\circ}}$

S14GM-50-225B, C-6

★ RECOMMENDED SOLDERING CONDITIONS

The μPC4744 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

μPC4744G2: 14-pin plastic SOP (5.72 mm (225))

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

μPC4744C: 14-pin plastic DIP (7.62 mm (300))

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	http://www.necel.com/pkg/en/mount/index.html
	NEC SEMICONDUCTOR DEVICE RELIABILITY/QUALITY CONTROL SYSTEM (STANDARD LINEAR IC)	IEI-1212

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