

To our customers,

Old Company Name in Catalogs and Other Documents

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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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ADJUSTABLE PRECISION SHUNT REGULATORS

DESCRIPTION

The μPC1943, 1944 are adjustable high precision shunt regulators. The output voltage can be set to any value between reference voltage (1.26 V) and 24 V by two external resistors.

These ICs can apply to error amplifier of switching regulators.

FEATURES

- Low voltage operation. $V_{REF} \leq V_{OUT} \leq 24\text{ V}$
- High accuracy. $V_{REF} = 1.26\text{ V} \pm 2.4\%$
- Adjustable output voltage by two external resistors.
- Pin compatible with μPC1093. (μPC1944)

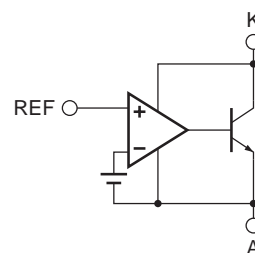
<R> ORDERING INFORMATION

Part Number	Marking	Marking
μPC1943T	POWER MINI MOLD (SOT-89) (SC-62)	9B
μPC1943T-AZ ^{Note1}	POWER MINI MOLD (SOT-89) (SC-62)	9B
μPC1944T	POWER MINI MOLD (SOT-89) (SC-62)	9C
μPC1944T-AZ ^{Note1}	POWER MINI MOLD (SOT-89) (SC-62)	9C
μPC1944J	3PIN PLASTIC SIP (TO-92)	1944
μPC1944J-A ^{Note2}	3PIN PLASTIC SIP (TO-92)	1944
μPC1944GR	8PIN PLASTIC SOP (5.72 mm (225))	1944
μPC1944GR-A ^{Note2}	8PIN PLASTIC SOP (5.72 mm (225))	1944

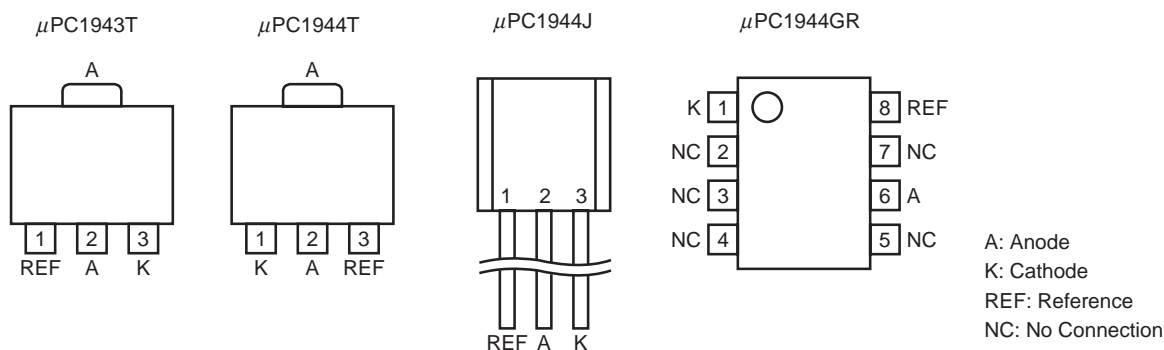
Notes 1. Pb-free (This product does not contain Pb in the external electrode.)

2. Pb-free (This product does not contain Pb in the external electrode and other parts.)

BLOCK DIAGRAM



<R> PIN CONFIGURATIONS (Marking Side)



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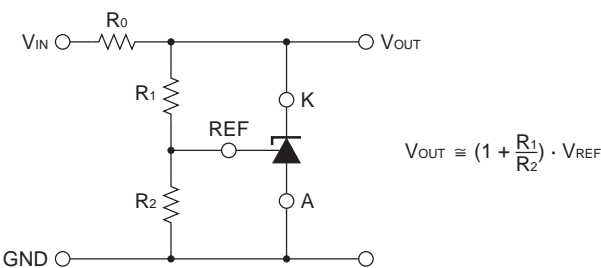
ABSOLUTE MAXIMUM RATINGS (TA = 25°C, unless otherwise specified.)

Parameter		Symbol	Ratings	Unit
Cathode Voltage		VKA	25	V
Cathode Current		Ik	50	mA
Cathode to Anode Reverse Current		− Ik	−30	mA
Reference Voltage		VREF	7	V
Reference Input Current		IREF	50	μA
Reference to Anode Reverse Current		− IREF	−10	mA
Total Power Dissipation	μPC1943T	PT	320/1600 ^{Note}	mW
	μPC1944T		320/1600 ^{Note}	mW
	μPC1944J		560	mW
	μPC1944GR		385	mW
Operating Ambient Temperature		TA	−30 to +85	°C
Operating Junction Temperature		TJ	−30 to +125	°C
Storage Temperature		Tstg	−65 to +125	°C

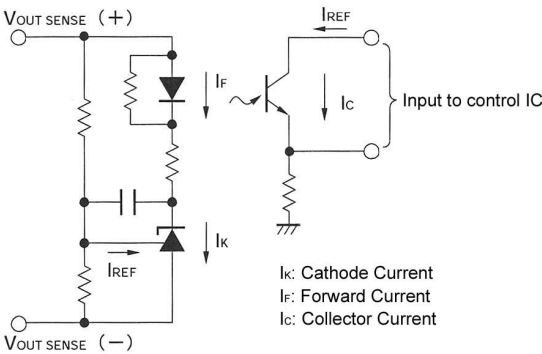
Note with 16 cm² × 0.7 mm ceramic substrate.

Caution Product quality may suffer if the absolute maximum rating is exceeded even momentarily for any parameter. That is the absolute maximum ratings are rated values at which the product is on the verge of suffering physical damage, and therefore the product must be used under conditions that ensure that the absolute maximum ratings are not exceeded.

TYPICAL CONNECTION



<R> APPLICATION CIRCUIT



RECOMMENDED OPERATING CONDITIONS

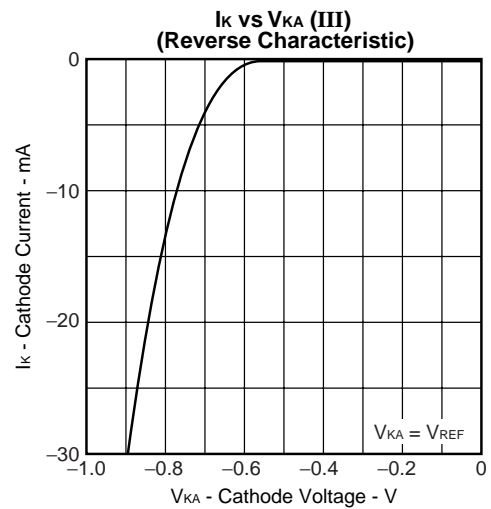
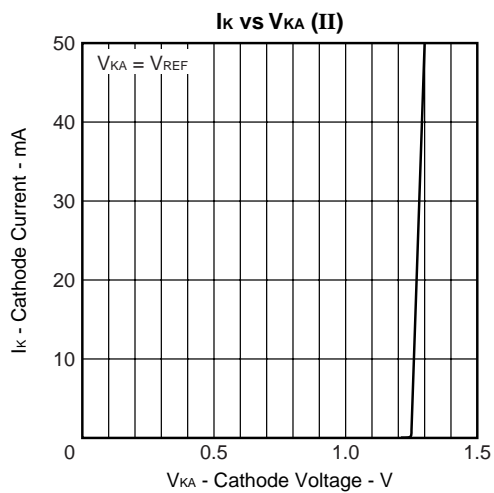
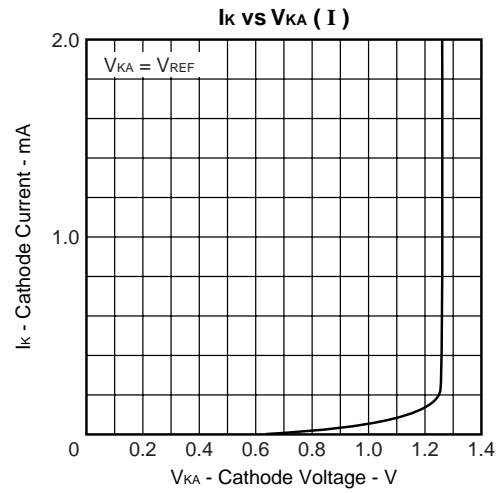
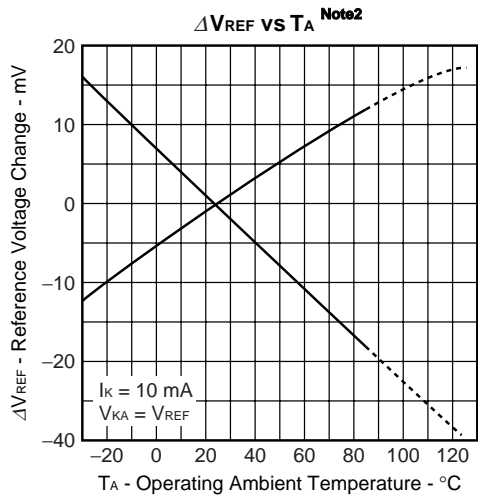
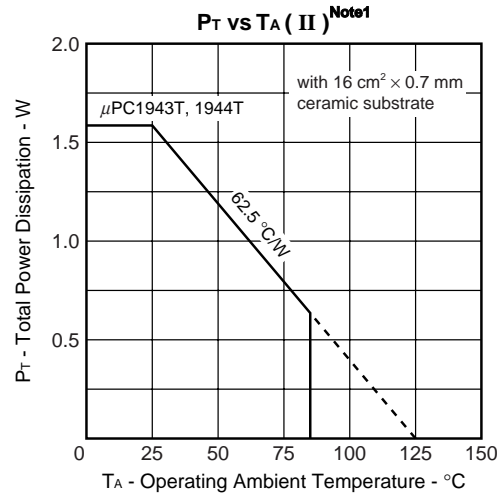
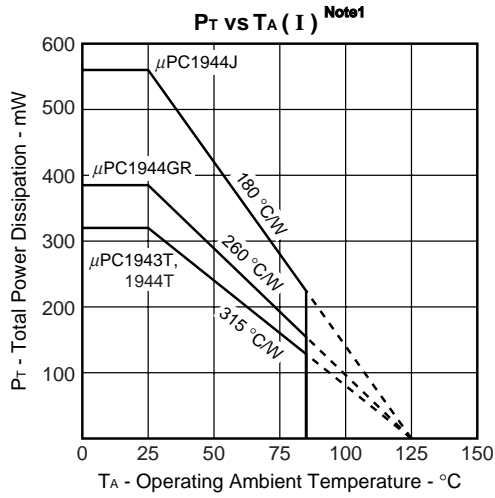
Parameter		Symbol	MIN.	TYP.	MAX.	Unit
Cathode Voltage		V_{KA}	V_{REF}		24	V
Cathode Current		I_K	1	10	30	mA
Total Power Dissipation	μ PC1943T	P_T			45/240 ^{Note}	mW
	μ PC1944T				45/240 ^{Note}	mW
	μ PC1944J				83	mW
	μ PC1944GR				57	mW
Operating Ambient Temperature		T_A	-30		+85	°C
Operating Junction Temperature		T_J	-30		+100	°C

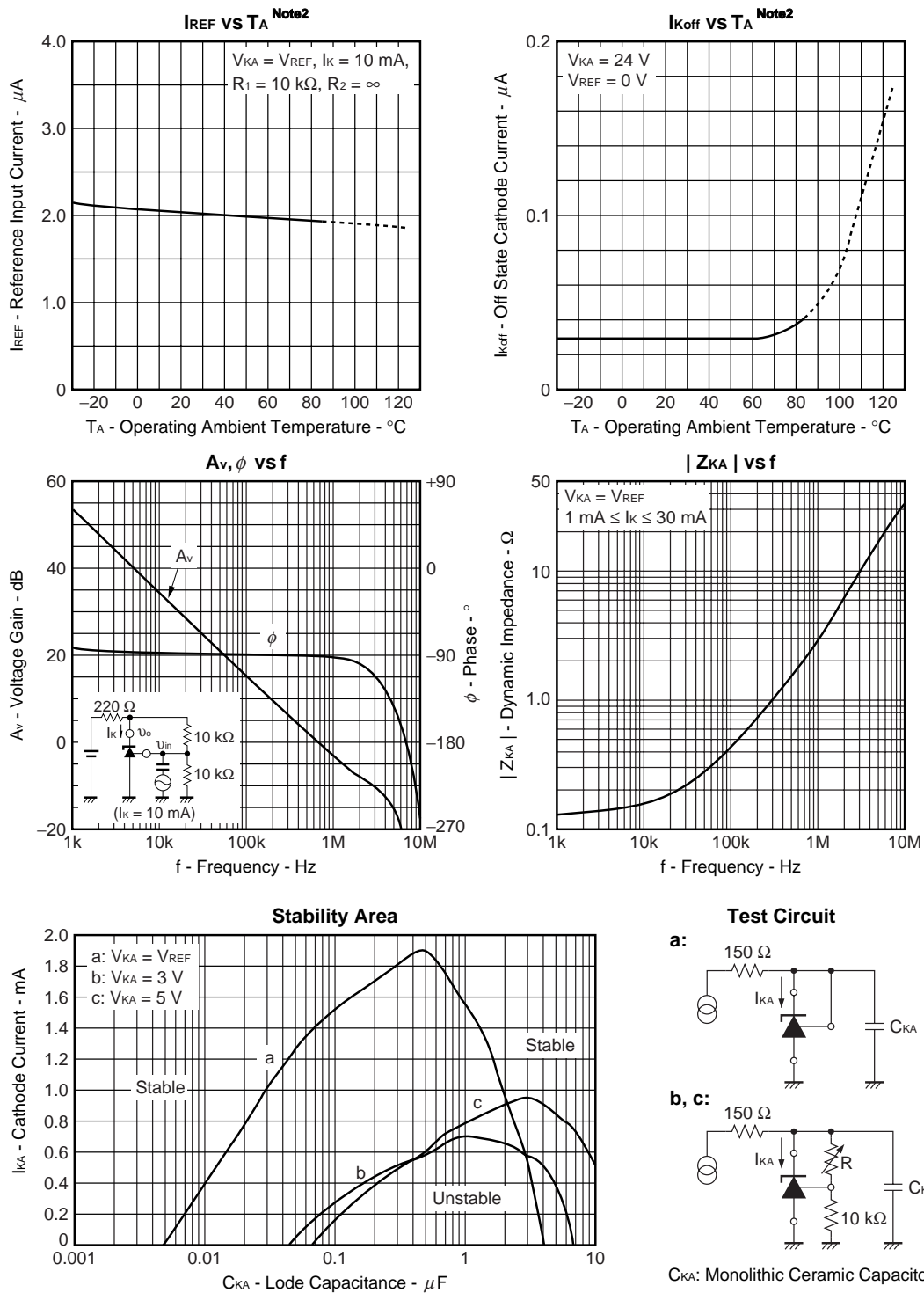
Note with 16 cm² × 0.7 mm ceramic substrate.

ELECTRICAL CHARACTERISTICS ($I_K = 10$ mA, $T_A = 25^\circ\text{C}$, unless otherwise specified.)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Reference Voltage	V_{REF}	$V_{KA} = V_{REF}$	1.23	1.26	1.29	V
Reference Voltage Change Over Temperature	ΔV_{REF}	$V_{KA} = V_{REF}$, $0^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$		±5	±30	mV
Reference Voltage Change Over Cathode Voltage	$\Delta V_{REF}/\Delta V_{KA}$	$ V_{REF} \leq V_{KA} \leq 5$ V			2.7	mV/V
		5 V $\leq V_{KA} \leq 24$ V			2.0	mV/V
Reference Input Current	I_{REF}	$V_{KA} = V_{REF}$, $R_1 = 10$ k Ω , $R_2 = \infty$		2.0	4.0	μ A
Reference Input Current Change Over Temperature	ΔI_{REF}	$V_{KA} = V_{REF}$, $0^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$, $R_1 = 10$ k Ω , $R_2 = \infty$		0.3	1.2	μ A
Minimum Cathode Current	I_{Kmin}	$V_{KA} = V_{REF}$, $\Delta V_{REF} = 2\%$		0.16	1.0	mA
Off-state Cathode Current	I_{Koff}	$V_{KA} = 24$ V, $V_{REF} = 0$ V		0.01	1.0	μ A
Dynamic Impedance	$ Z_{KA} $	$V_{KA} = V_{REF}$, $f \leq 1$ kHz, 1 mA $\leq I_K \leq 30$ mA		0.12	0.5	Ω

TYPICAL CHARACTERISTIC ($T_A = 25^\circ\text{C}$, unless otherwise specified. Nominal)





<R>

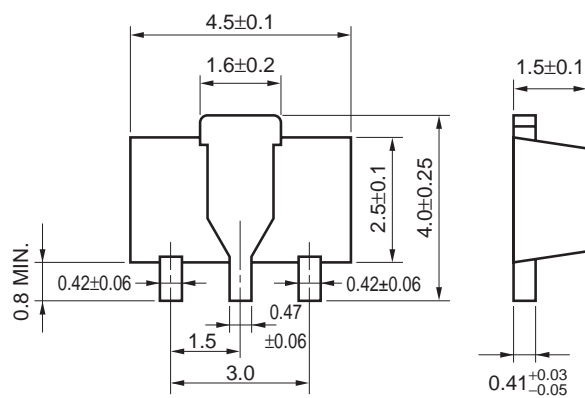
- Notes 1.** This graph shows the absolute maximum rating, while the other graphs show standard characteristics. Be sure to use the devices within the ranges delimited by the solid lines shown for each device.
- 2.** In this temperature characteristics graph, the ratings for the operating ambient temperatures are indicated by a solid line, and the ratings for the operating junction temperatures are indicated by a dashed line.

Caution of Stability Area

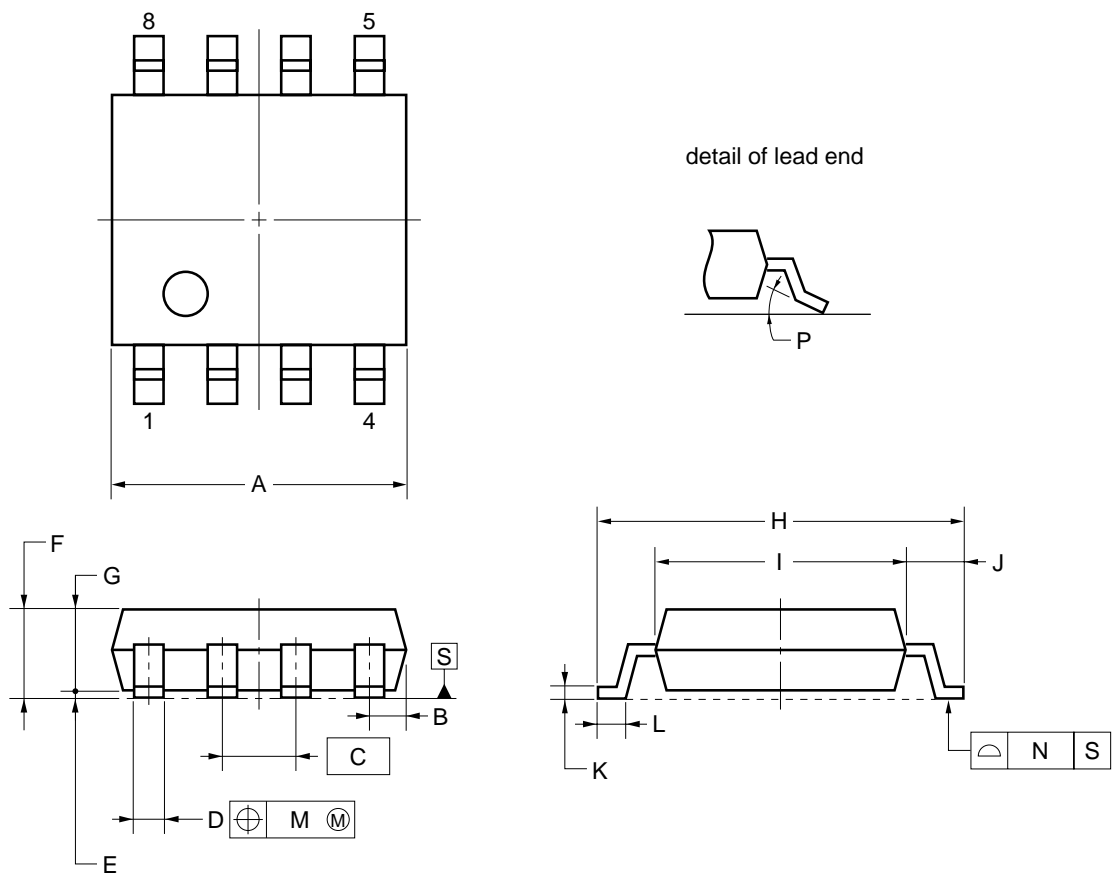
If the Aluminum electrolytic capacitor is used, it should be kept $C_{KA} \geq 6.8 \mu\text{F}$. Please note Temperature characteristic and Electrical characteristic by capacitor type etc.

PACKAGE DRAWINGS (Unit : mm)

POWER MINI MOLD (SOT-89) (SC-62)



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

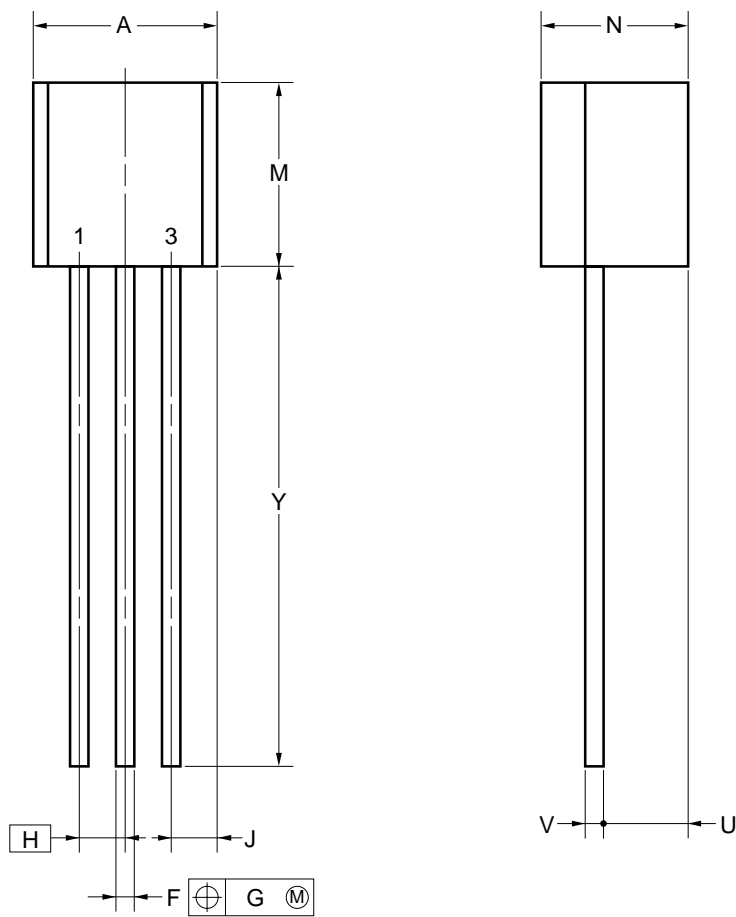


NOTE
Each lead centerline is located within 0.12 mm of its true position (T.P.) at maximum material condition.

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±0.1
F	1.59±0.21
G	1.49
H	6.5±0.3
I	4.4±0.15
J	1.1±0.2
K	0.17 ^{+0.08} _{-0.07}
L	0.6±0.2
M	0.12
N	0.10
P	3° ^{+7°} _{-3°}

S8GM-50-225B-6

3-PIN PLASTIC SIP (TO-92)



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

ITEM	MILLIMETERS
A	5.0±0.2
F	0.50 ^{+0.30} _{-0.10}
G	0.12
H	1.27
J	1.33 MAX.
M	5.0±0.5
N	4.0±0.2
U	2.8 MAX.
V	0.50±0.10
Y	15.0±0.7

P3J-127B-3

<R> RECOMMENDED SOLDERING CONDITIONS

The μPC1943, 1944 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>)

<R> Type of Surface Mount Device

μPC1943T, 1944T : POWER MINI MOLD (SOT-89) (SC-62)

Process	Conditions	Symbol
Infrared ray reflow	Peak temperature: 235°C or below (Package surface temperature), Reflow time: 30 seconds or less (at 210°C or higher), Maximum number of reflow processes: 3 times.	IR35-00-3
VPS	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: 2 times.	VP15-00-2
Partial Heating Method	Pin temperature: 350°C or below, Heat time: 3 seconds or less (per each side of the device).	P350

μPC1943T-AZ, 1944T-AZ : POWER MINI MOLD (SOT-89) (SC-62)

Process	Conditions	Symbol
Infrared ray reflow	Peak temperature: 260°C or below (Package surface temperature), Reflow time: 60 seconds or less (at 220°C or higher), Maximum number of reflow processes: 3 times.	IR60-00-3
Partial Heating Method	Pin temperature: 350°C or below, Heat time: 3 seconds or less (per each side of the device).	P350

Caution Apply only one kind of soldering condition to a device, or the device will be damaged by heat stress.

μ PC1944GR : 8PIN PLASTIC SOP (5.72 mm (225))

Process	Conditions	Symbol
Infrared ray reflow	Peak temperature: 235°C or below (Package surface temperature), Reflow time: 30 seconds or less (at 210°C or higher), Maximum number of reflow processes: 3 time.	IR35-00-3
VPS	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.	WS60-00-1
Partial Heating Method	Pin temperature: 350°C or below, Heat time: 3 seconds or less (per each side of the device).	P350

 μ PC1944GR-A : 8PIN PLASTIC SOP (5.72 mm (225))

Process	Conditions	Symbol
Infrared ray reflow	Peak temperature: 260°C or below (Package surface temperature), Reflow time: 60 seconds or less (at 220°C or higher), Maximum number of reflow processes: 3 time.	IR60-00-3
Wave soldering	Solder temperature: 260°C or below, Flow time: 10 seconds or less, Maximum number of flow processes: 1 time.	WS60-00-1
Partial Heating Method	Pin temperature: 350°C or below, Heat time: 3 seconds or less (per each side of the device).	P350

Caution Apply only one kind of soldering condition to a device, or the device will be damaged by heat stress.

<R> **Type of Through-hole Device** μ PC1944J, 1944J-A : 3PIN PLASTIC SIP (TO-92)

Process	Conditions	Symbol
Wave soldering (only to leads)	Solder temperature: 260°C or below, Flow time: 10 seconds or less. Maximum number of flow processes: 1 time,	WS60-00-1
Partial Heating Method	Pin temperature: 350°C or below, Heat time: 3 seconds or less (per each pin).	P350

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.

<R> **REFERENCE DOCUMENTS**

Review of Quality and Reliability Handbook Information
Semiconductor Device Mount Manual

C12769E
<http://www.necel.com/pkg/en/mount/index.html>

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