

ADJUSTABLE PRECISION SHUNT REGULATORS

DESCRIPTION

μ PC1944 are adjustable precision shunt regulators with guaranteed thermal stability. 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 power supplies.

FEATURES

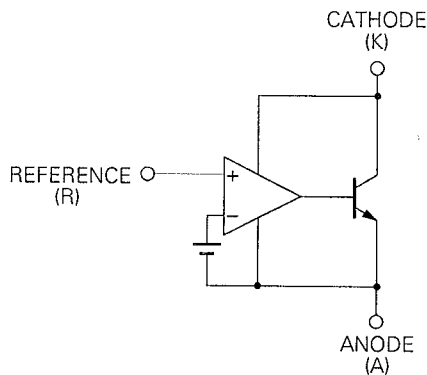
- Low voltage operation and High accuracy. $V_{REF} = 1.26\text{ V} \pm 2.4\%$
- Adjustable output voltage by two external resistors. $V_{REF} \leq V_O \leq 24\text{ V}$
- Pin compatible to μ PC1093.

ORDERING INFORMATION

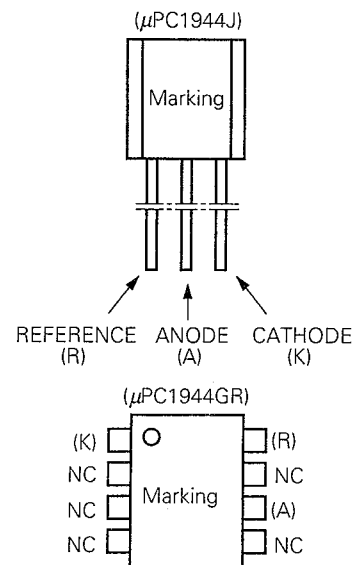
Part Number	Package	Quality Grade
μ PC1944GR	8 Pin SOP (225 mil)	Standard
μ PC1944J	3 Pin SIP	

Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

BLOCK DIAGRAM



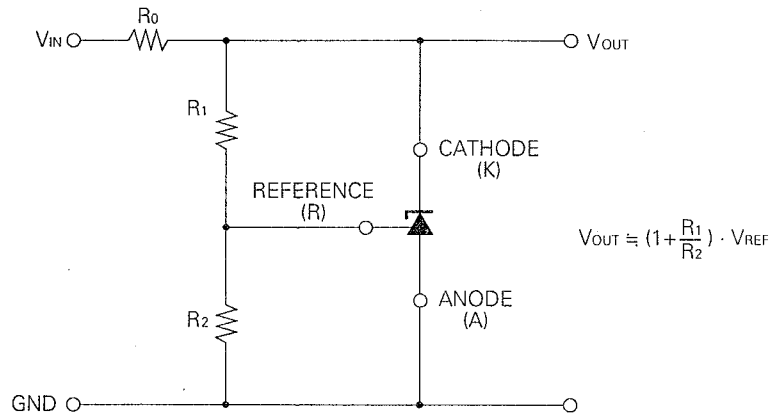
CONNECTION DIAGRAM



ABSOLUTE MAXIMUM RATINGS (T_a = 25 °C)

PARAMETER		SYMBOL	RATING	UNIT
Cathode Voltage		V _{KA}	25	V
Cathode Current		I _k	50	mA
Cathode to Anode Reverse Current		-I _k	-30	mA
Reference Voltage		V _{REF}	7.0	V
Reference Input Current		I _{REF}	50	μA
Total Power Dissipation	μPC1944J	P _T	560	mW
	μPC1944GR		385	
Operating Temperature Range		T _{opt}	-30 to +85	°C
Operating Junction Temperature Range		T _{opt (j)}	-30 to +125	°C
Storage Temperature Range		T _{stg}	-65 to +125	°C

TEST AND APPLICATION CIRCUIT



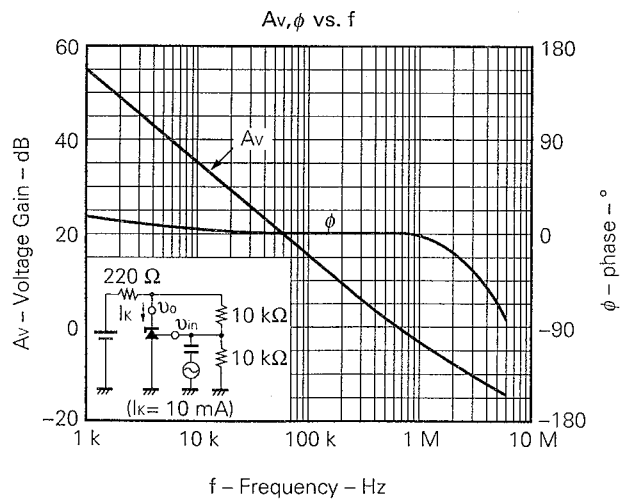
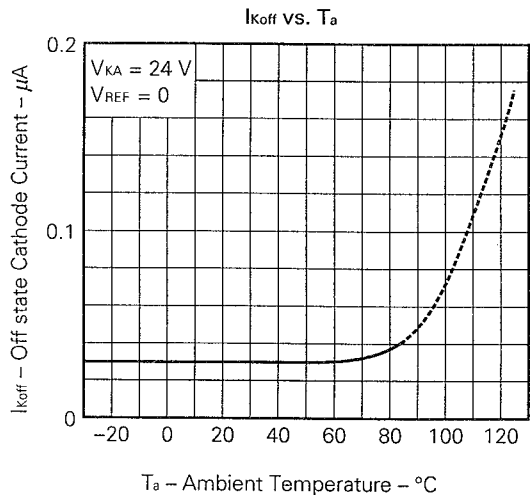
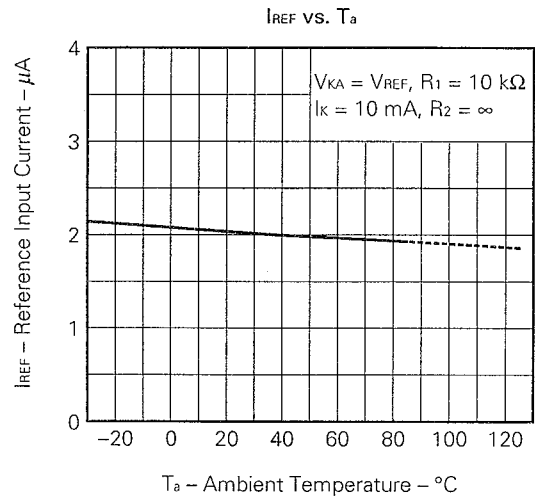
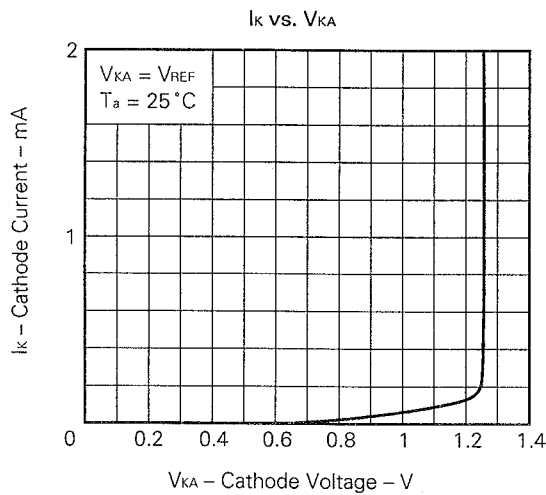
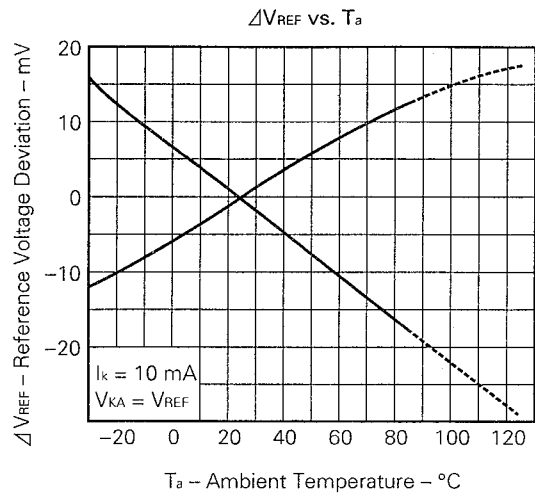
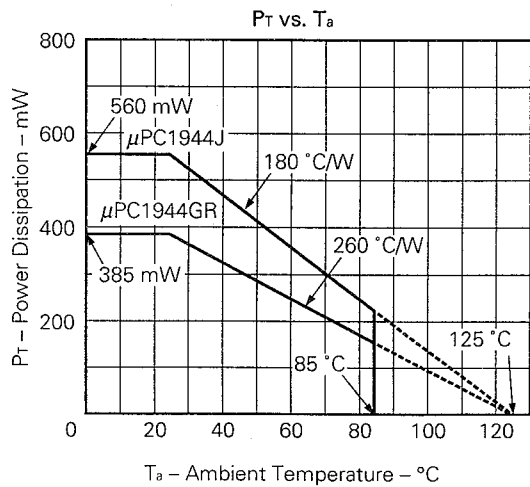
RECOMMENDED OPERATING CONDITIONS

PARAMETER		SYMBOL	MIN.	TYP.	MAX.	UNIT
Cathode Voltage		V _{KA}	V _{REF}		24	V
Cathode Current		I _k	1.0	10	30	mA
Power Dissipation	μPC1944J	P _T			83	mW
	μPC1944GR				57	
Operating Temperature		T _{opt}	-30		+85	°C
Operating Junction Temperature Range		T _{opt (j)}	-30		+100	°C

ELECTRICAL CHARACTERISTICS ($T_a = 25\text{ }^\circ\text{C}$, $I_k = 10\text{ mA}$)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Reference Voltage	V_{REF}	1.23	1.26	1.29	V	$V_{KA} = V_{REF}$
Reference Voltage Deviation Over Temperature	ΔV_{REF}		5	± 30	mV	$0\text{ }^\circ\text{C} \leq T_a \leq 70\text{ }^\circ\text{C}$, $V_{KA} = V_{REF}$
Reference Voltage Deviation Over Cathode Voltage	$\Delta V_{REF}/\Delta V_{KA}$			2.7	mV/V	$ V_{REF} \leq V_{KA} \leq 5\text{ V}$
				2.0		$5\text{ V} \leq V_{KA} \leq 24\text{ V}$
Reference Input Current	I_{REF}		1.9	4.0	μA	$V_{KA} = V_{REF}$, $R_1 = 10\text{ k}\Omega$, $R_2 = \infty$
Reference Input Current Deviation Over Temperature	ΔI_{REF}		0.3	1.2	μA	$0\text{ }^\circ\text{C} \leq T_a \leq 70\text{ }^\circ\text{C}$, $V_{KA} = V_{REF}$, $R_1 = 10\text{ k}\Omega$, $R_2 = \infty$
Minimum Cathode Current	I_{kmin}		0.15	1.0	mA	$V_{KA} = V_{REF}$, $\Delta V_{REF} = 2\%$
Off-state Cathode Current	I_{koff}			1.0	μA	$V_{KA} = 24\text{ V}$, $V_{REF} = 0\text{ V}$
Dynamic Impedance	$ Z_{KA} $		0.1	0.5	Ω	$V_{KA} = V_{REF}$, $f \leq 1\text{ kHz}$, $1\text{ mA} \leq I_k \leq 30\text{ mA}$

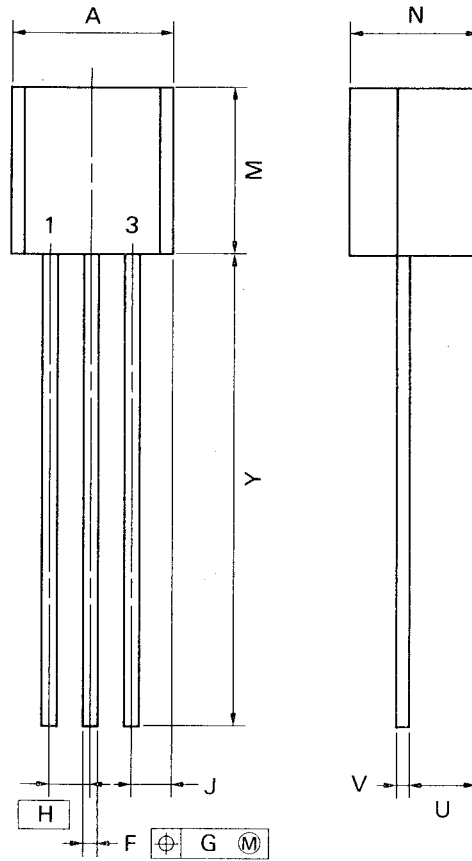
TYPICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)



PACKAGE DIMENSIONS (in millimeters)

μPC1944J

3 PIN PLASTIC SIP (TO-92)



P3J-127B

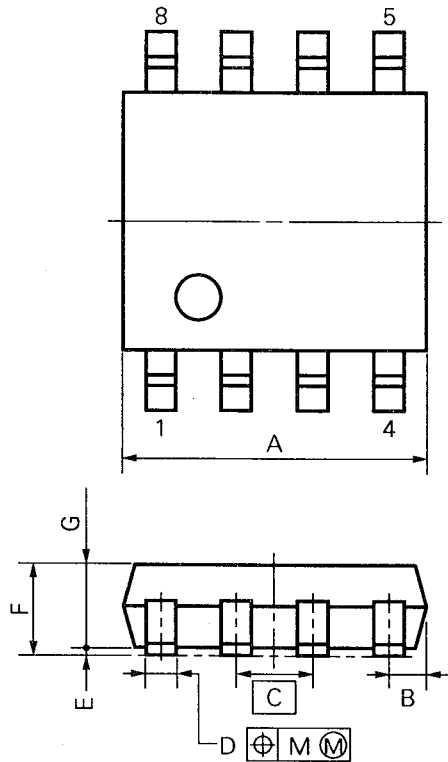
NOTE

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

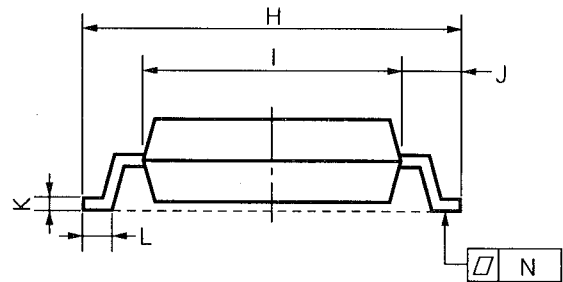
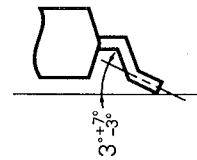
ITEM	MILLIMETERS	INCHES
A	5.2 MAX.	0.205 MAX.
F	0.5 ^{+0.1}	0.02 ^{+0.004}
G	0.12	0.005
H	1.27	0.05
J	1.33 MAX.	0.053 MAX.
M	5.5 MAX.	0.217 MAX.
N	4.2 MAX.	0.166 MAX.
U	2.8 MAX.	0.111 MAX.
V	0.5 ^{±0.1}	0.02 ^{+0.004}
Y	15.0 ^{±0.7}	0.591 ^{+0.028}

μPC1944GR

8 PIN PLASTIC SOP (225 mil)



detail of lead end



S8GM-50-225B-3

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.	0.071MAX.
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

Note : If the capacitance is connected between Cathode to Anode terminal, it should be following value to avoid oscillation.

$$C_{KA} \leq 470 \text{ pF or } C_{KA} \geq 2.2 \text{ } \mu\text{F}$$

RECOMMENDED SOLDERING CONDITIONS

The following conditions (see table below) must be met when soldering this product.

Please consult with our sales offices in case other soldering process is used, or in case soldering is done under different conditions.

TYPES OF SURFACE MOUNT DEVICE

For more details, refer to our document "Semiconductor Device Mounting Manual" (IEI-1207).

μPC1944G

Soldering process	Soldering conditions	Symbol
Infrared ray reflow	Peak package's surface temperature : 235 °C or below, Reflow time : 30 seconds or below (210 °C or higher), Number of reflow process : 1, Exposure limit*: None	IR35-00-1
Wave soldering	Solder temperature : 260 °C or below, Flow time : 10 seconds or below, Number of flow process : 1, Exposure limit*: None	WS60-00-1

* : Exposure limit before soldering after dry-pack package is opened.
Storage conditions : 25 °C and relative humidity at 65 % or less.

Note : Do not apply more than a single process at once, except for "Partial heating method".

TYPES OF THROUGH HOLE MOUNT DEVICE

μPC1944J

Soldering process	Soldering conditions	Symbol
Wave soldering	Solder temperature : 260 °C or below, Flow time : 10 seconds or below	

REFERENCE

Document name	Document No.
Quality control of NEC semiconductor devices	TEM-1202
Quality control guide of semiconductor devices	MEI-1202
Assembly manual of semiconductor devices	IEI-1207
NEC semiconductor device reliability/quality control system	IEI-1212

[MEMO]

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Application examples recommended by NEC Corporation.

Standard: Computer, Office equipment, Communication equipment, Test and Measurement equipment, Machine tools, Industrial robots, Audio and Visual equipment, Other consumer products, etc.

Special: Automotive and Transportation equipment, Traffic control systems, Antidisaster systems, Anticrime systems, etc.