

< Specifications (Precautions and Prohibitions) >

● **Safety Precautions**

- 1) The products are designed and produced for application in ordinary electronic equipment (AV equipment, OA equipment, telecommunication equipment, home appliances, amusement equipment, etc.). If the products are to be used in devices requiring extremely high reliability (medical equipment, transport equipment, aircraft/spacecraft, nuclear power controllers, fuel controllers, car equipment including car accessories, safety devices, etc.) and whose malfunction or operational error may endanger human life and sufficient fail-safe measures, please consult with the Company's sales staff in advance. If product malfunctions may result in serious damage, including that to human life, sufficient fail-safe measures must be taken, including the following:
 - [a] Installation of protection circuits or other protective devices to improve system safety.
 - [b] Installation of redundant circuits in the case of single-circuit failure.
- 2) The products are designed for use in a standard environment and not in any special environments. Application of the products in a special environment can deteriorate product performance. Accordingly, verification and confirmation of product performance, prior to use, is recommended if used under the following conditions:
 - [a] Use in various types of liquid, including water, oils, chemicals, and organic solvents.
 - [b] Use outdoors where the products are exposed to direct sunlight, or in dusty places.
 - [c] Use in places where the products are exposed to sea winds or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂.
 - [d] Use in places where the products are exposed to static electricity or electromagnetic waves.
 - [e] Use in proximity to heat-producing components, plastic cords, or other flammable items.
 - [f] Use involving sealing or coating the products with resin or other coating materials.
 - [g] Use involving unclean solder or use of water or water-soluble cleaning agents for cleaning after soldering.
 - [h] Use of the products in places subject to dew condensation.
- 3) The products are not radiation resistant.
- 4) The Company is not responsible for any problems resulting from use of the products under conditions not recommended herein.
- 5) The Company should be notified of any product safety issues. Moreover, product safety issues should be periodically monitored by the customer.
- 6) The positioning of the peripheral components must consider the safety regulations, any applicable laws, the effectiveness of the module by electrical and heat influences, the electrical characteristics, and the reliability must be checked.

● **Precautions Regarding Application Examples and External Circuits**

- 1) If change is made to the constant of an external circuit, allow a sufficient margin due to variations of the characteristics of the products and external components, including transient characteristics, as well as static characteristics.
- 2) The application examples, their constants, and other types of information contained herein are applicable only when the products are used in accordance with standard methods. Therefore, if mass production is intended, sufficient consideration to external conditions must be made.

DESIGN	CHECK	APPROVAL	DATE: 18/JAN/2008	SPECIFICATION No. :AC-DC Converter(Lead Free)
<i>K. Kitagawa</i>	<i>H. Hayashi</i>	<i>K. Watanabe</i>	REV.D	ROHM CO., LTD.

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● Precautions Regarding Foreign Exchange and Foreign Trade Control Law

- 1) The Company has not determined whether or not the products are considered "a controlled product or technology" as specified in the Foreign Exchange and Foreign Trade Control Law. Accordingly, if exportation of the products, either separately or integrated in another company's products, is intended, or giving the products to persons who are not residents is planned, additional steps are required, based upon the appropriate regulations.

● Prohibitions Regarding Industrial Property

- 1) These Specifications contain information related to the Company's industrial property. Any use of them other than pertaining to the usage of appropriate products is not permitted. Duplication of these Specifications and its disclosure to a third party without the Company's permission is prohibited.
- 2) Information and data on products, including application examples, contained in these specifications are simply for reference; the Company does not guarantee any industrial property rights, intellectual property rights, or any other rights of a third party regarding this information or data. Accordingly, the Company does not bear any responsibility for:
- [a] infringement of the intellectual property rights of a third party.
 - [b] any problems incurred by the use of the products listed herein.
- 3) The Company prohibits the purchaser of its products to exercise or use the intellectual property rights, industrial property rights, or any other rights that either belong to or are controlled by the Company, other than the right to use, sell, or dispose of the products.

● Precautions on Use of Products

- 1) Verification and confirmation of performance characteristics of products, after on-board mounting, is advised.
- 2) Exceeding loaded current (over the absolute current) may influence on the function, reliability. Please make sure to use below the absolute electric power.
- 3) When a highly active halogenous (chlorine, bromine, etc.) flux is used, the remainder of flux may negatively affect product performance and reliability.
- 4) Please firmly solder lead pins by flow soldering basically. (260°C within 10sec) In case of hand soldering. Please set soldering iron temperature below 380°C within 3 sec.
- 5) The output power supply should be reduced according to the increase of the ambient temperature. (Refer to the derating curve)
- 6) Fuse should be used to avoid the emergent smoke or fire.
- 7) This product is not insulated on the primary sides, and there is a danger of electrical shock if it is touched. (But, an insulation type isn't contained)
- 8) Strong shock should not be influenced.
- 9) For external parts, please use those mentioned in this specification or those equivalent parts. Efficient evaluation is necessary in case any other parts are used. Parts for different applications may not satisfy the Spec or even result in failure cause.
- 10) Please be careful about the chattering at the start up of the power supply.
- 11) Make sure not to exceed the absolute max value when the overstress voltage and current is loaded to the module input and output terminal due to counter electromotive force during on and off in case of a motor and relay are loaded.

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- 12) About the Dew
Weakened insulation between terminals due to dew would cause the abnormal operation and destruction. Please be careful especially the area between the external coil pins or input terminals.
- 13) Operation temperature
In case it is used in the closed up place, please measure temperature and confirm if it is within the derating curve
- 14) Please set the static electricity during mounting and storing.
- 15) Please do not add the loaded voltage exceeding output voltage on the output terminal to avoid destruction
- 16) Please avoid to load the reverse voltage at the power supply start up since the output voltage would not start up when the reverse voltage is loaded on the output terminal.
- 17) Please fix this part in case of big vibration.
- 18) Layout of external parts may significantly change the characteristics or cause abnormal oscillation. Efficient evaluation of electrical characteristics is necessary in mounting.
- 19) Output load may cause large ripple current in the input smoothing electrolytic capacitor. Note the allowable ripple current of the capacitor to be used.
- 20) As the output smoothing electrolytic capacitor, one with especially low impedance is recommended for suppressing output ripple voltage. Select a capacitor suited for the use.
- 21) Because this module is composed of the precise electrical components, the use beyond the specification will lead to the loss of product reliability, and also to destruct it self.

● **Precautions Regarding Product Storage**

- 1) Product performance and soldered connections may deteriorate if the products are stored in the following places:
 - [a] Where the products are exposed to sea winds or corrosive gases, including Cl_2 , H_2S , NH_3 , SO_2 , and NO_2 .
 - [b] Where the temperature or humidity exceeds those recommended by the Company.
Recommendation storage temperature : 5 to 40 °C
Recommendation storage humidity : 40 to 60 %RH
 - [c] Storage in the place where unusual static electricity occurs.
 - [d] Storage in a place where any heat and mechanical shocks could be applied.
- 2) The guaranteed period of solder connections and product performance is within one year from shipment by the Company, provided that the above-mentioned storage conditions have been satisfied.
After the long period of product storage, please be sure to check the deterioration of soldering due to the module lead terminal oxidization and the electrical characteristics.

● **Other Matters**

- 1) Please sign these Specifications and return one copy to the Company.
If a copy is not returned within three months after the issued date specified on the front page of these Specifications, the Company will consider the Specifications accepted.
- 2) If any matter related to these Specifications needs to be clarified, discussions shall be held promptly between the two parties concerned to determine the issue.

As this specification is for a provisional target, the contents and the specifications are subject to change without notice.

1. **STRUCTURE** Single Inline package with coating.
2. **DESCRIPTION** POWER MODULE
3. **TYPE** BP5843A
4. **APPLICATION** LED DRIVER
5. **FUNCTION** Insulation type LED DRIVER
 The BP5843 is an output constant-current controlled and isolated LED DRIVER incorporating a primary switching circuit and a secondary control circuit. Combination of input/output smoothing capacitors and a constant-current setting resistance allows the 113-170VDC (equivalent to 80-120VAC) input to drive a maximum current of 350mA, 1-3 LEDs of 1W power.

6. ABSOLUTE MAXIMUM RATINGS

These are the values which must not be exceeded at any time under any application or any test conditions. Please make design keeping enough margins accordingly.

(Ta=25°C)

No	Parameter	Symbol	Limits	Units	Remarks
1	Input voltage	Vi	170	V	DC
2	Output voltage	Vo	12	Vpk	
3	Withstand voltage	BV	1.8	kV	1sec (between primary and secondary) While pin 1 and 3 are shorted and pins 9-11 are shorted, a voltage is applied between them.
4	Maximum surface temperature	Tcmax	105	°C	Ambient temperature + the module self-heating \leq Tcmax
5	Operating temperature range	Topr	-20~80	°C	Refer to the derating curve
6	Storage temperature range	Tstg	-25~85	°C	

DESIGN <i>H. Fukui</i>	CHECK	APPROVAL	DATE : 28/MAR/2008	SPECIFICATION No. : BP5843A-B-001-E (Lead Free)
			REV.B	ROHM CO., LTD.

7. ELECTRICAL CHARACTERISTICS

<Definition of the items>

Output current	This is an output voltage range allowed at a constant-current output. This value must not be exceeded for a moment.
Output ripple voltage	Measured peak-to-peak (spike noise not included).
Conversion efficiency	It computes by $\eta = \frac{V_o \times I_o}{V_{in} \times I_{in}} \times 100$ [%]

(Ta=25°C)

NO	Parameter	Symbol	Spec			Units	measurement circuit	Measurement condition
			Min.	Typ.	Max.			
1	Input voltage range	V _i	113	141	170	V	figure 1	
2	Output current	I _o	332	350	369	mA	figure 1	V _i =141V, R _L =0.82Ω(1%)
3	Output voltage range	V _o	2.5	-	12	V	figure 1	V _i =141V, I _o =350mA
4	Output ripple voltage	V _p	-	-	0.5	Vp-p	figure 1	V _i =141V, I _o =350mA
5	Conversion efficiency	η	80	85	-	%	figure 1	V _i =141V, V _o =12V, I _o =350mA

Note 1) Maximum output current varies depending on ambient temperature. Refer to the derating curve.
 Note 2) Spike noise is not included in output ripple voltage.

8. MEASUREMENT CIRCUIT DIAGRAM

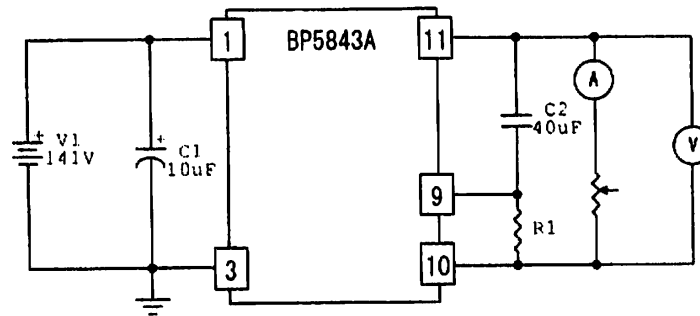
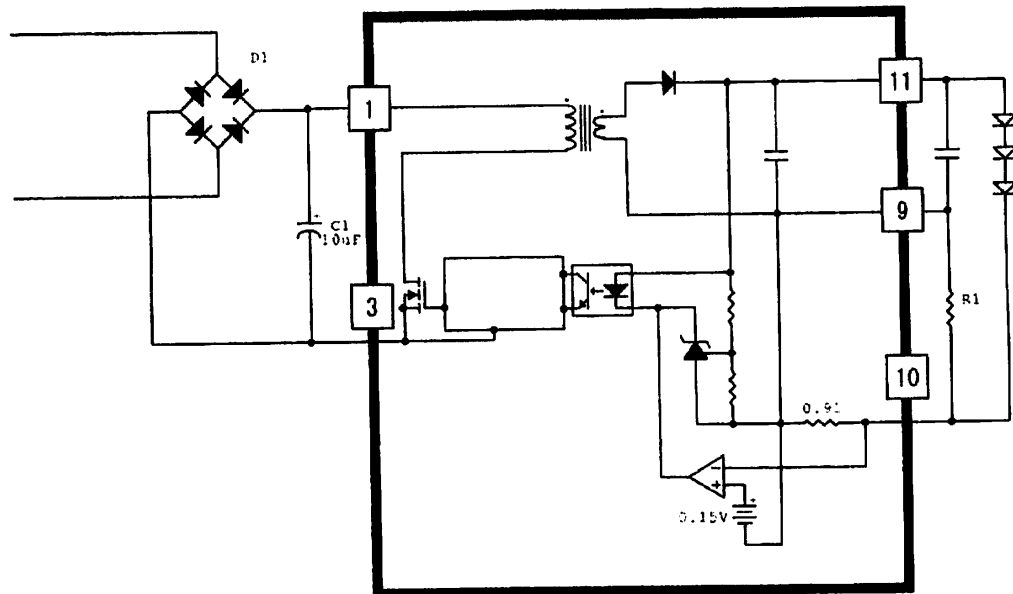


Figure 1 Measurement circuit diagram

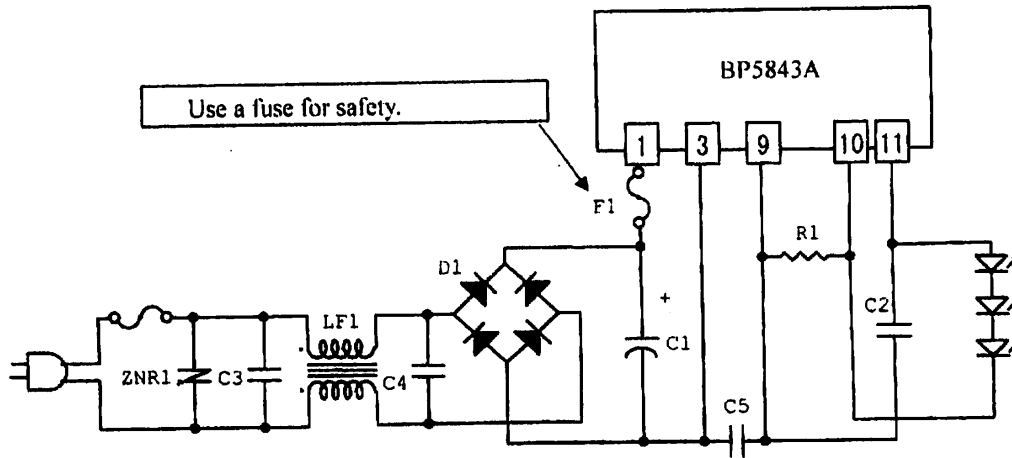
< Used parts >

Symbol	Application	Characteristics	Recommended parts
C1	Input capacitor	10µF / 250V General Purpose	Manufactured by RUBYCON 250YXA 10M
C2	Output capacitor	40µF / 25V Ceramic Capacitor	Manufactured by MURATA GRM31CB31E106K×4 in parallel
R1	Output current setting resistor	0.82 Ω ±1% 1/4W (I _o =350mA)	Manufactured by ROHM MCR10EZHFLR820

9. BLOCK DIAGRAM



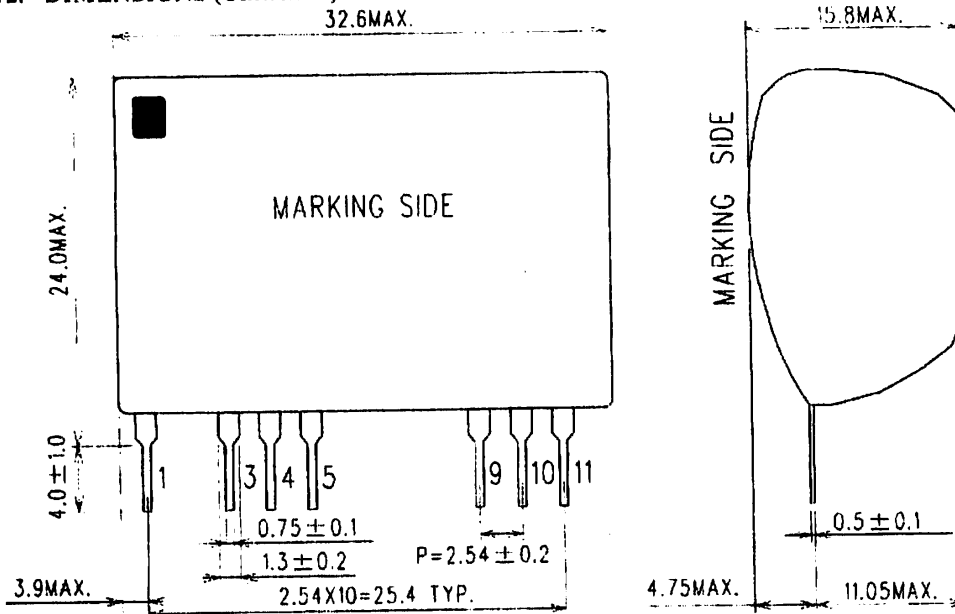
10. APPLICATION CIRCUIT EXAMPLE



<Used parts>

Symbol	Application	Characteristics	Recommended parts
C1	Input capacitor	10 μ F / 250V General purpose	Manufactured by RUBYCON 250YXA10M
C2	Output capacitor	40 μ F / 25V Ceramic capacitor	Manufactured by MURATA GRM31CB31E106K \times 4 in parallel
R1	Output current setting resistor	0.82 Ω \pm 1% 1/4W ($I_o=350$ mA)	Manufactured by ROHM MCR10EZHFLR910
C3,C4	Noise reduction capacitor	It should be installed when required. above 250V 0.1~0.22 μ F	Manufactured by MATUSHITA ECQE1A104KF
C5	Noise reduction capacitor	2200pF (Products with basic isolation certification)	Manufactured by TDK CS11-2GA222MYNS
D1	DIODEBRIDGE	800V/1A	Manufactured by SHINDENGEN DIUBA80
F1	FUSE	Use a fuse for safety.	
LF1	LINE FILTER	10mH	
ZNR1	VARISTOR	Use a varistor. Be sure to use it to protect this product from thunder surge and the static electricity.	

12. DIMENSIONS (Units:mm)



Marking contents

■	Pin No.1 mark
ROHM	Trademark
BP5843A	Type name
0805S	Production lot number
	Manufactured in the 05th week of 2008
S	: ROHM ELECTRICS DALIAN CO.,LTD.(CHINA)
No mark	: ROHM AMAGI CO.,LTD(JAPAN)

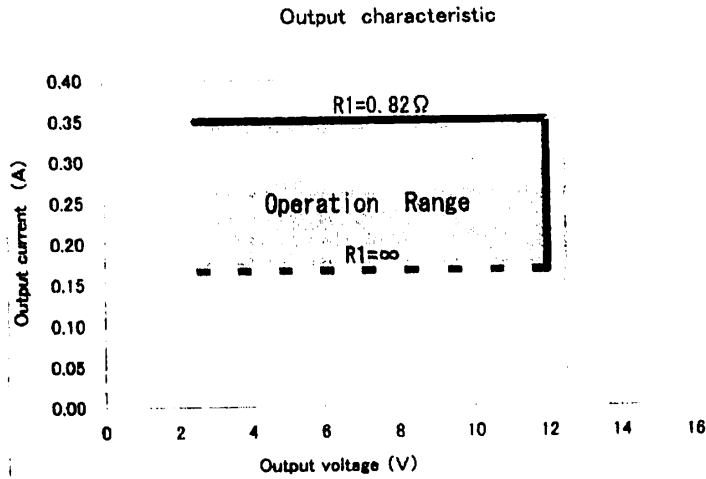
PIN No.

PIN No.	Terminal name
1	Input terminal (+)
2	Skip
3	Input terminal (-)
4,5	N.C.
6~8	Skip
9	Output capacitor connection terminal (-)
10	LED connection terminal (cathode)
11	LED connection terminal (anode)

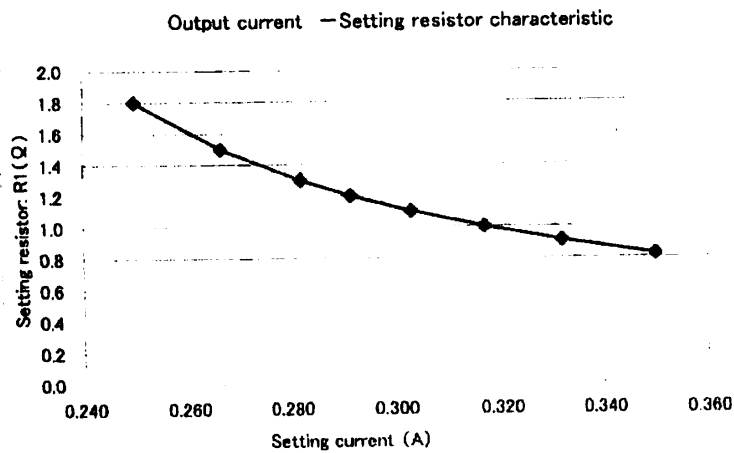
An appearance regulation is the standard specification of Rohm.
Coating pin hole electrical characteristics

11. OUTPUT CHARACTERISTIC EXAMPLE

Output current - Voltage characteristic



Setting resistor R1 - Output current

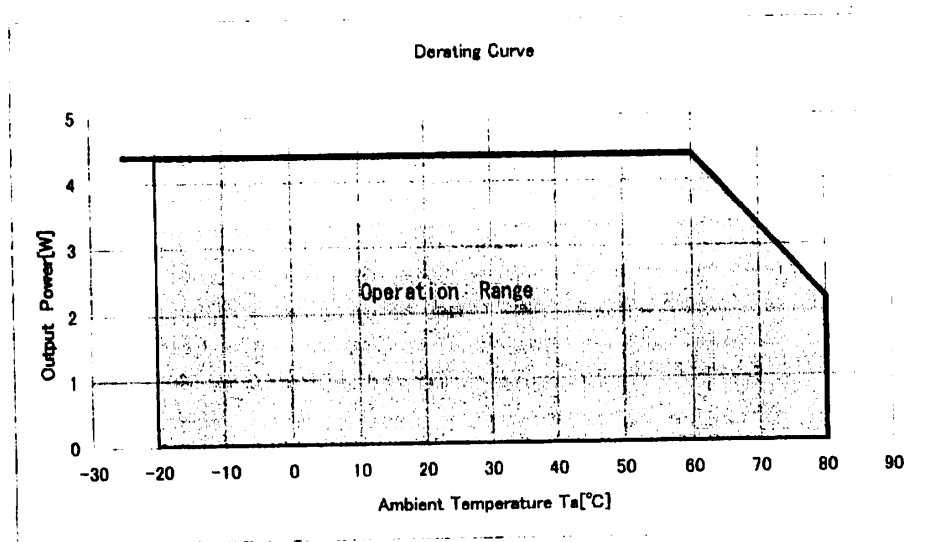


Setting resistor how to calculate R1
 $R1 = 0.13741 / (0.91 \times I_o - 0.151)$
 I_o : Output current

Note) A maximum output current is set to 350mA. Operations beyond this limit are prohibited.

13. DERATING CURVE

- A maximum output current is set to 350mA. Operations beyond this limit are prohibited.
- Output Power=Output voltage × Output current



14. OPERATING PRECAUTIONS

- 14-1. The output current should be reduced as the ambient temperature increases. (Refer to the derating curve)
- 14-2. Please take a careful attention that lead pin of the IC, and other external components around the IC are properly soldered. In case soldering is incomplete, it would cause the failure or destruction of the IC due to the improper voltage output.
- 14-3. Please put an I/O smoothing capacitor near this module. The output ripple voltage may increase.
- 14-4. When an LED is connected after power-on, an inrush current passes through the LED.

15. MANUFACTURING SITES

ROHM AMAGI CO.,LTD (FUKUOKA,JAPAN)
ROHM ELECTRICS DALIAN CO.,LTD. (CHINA)

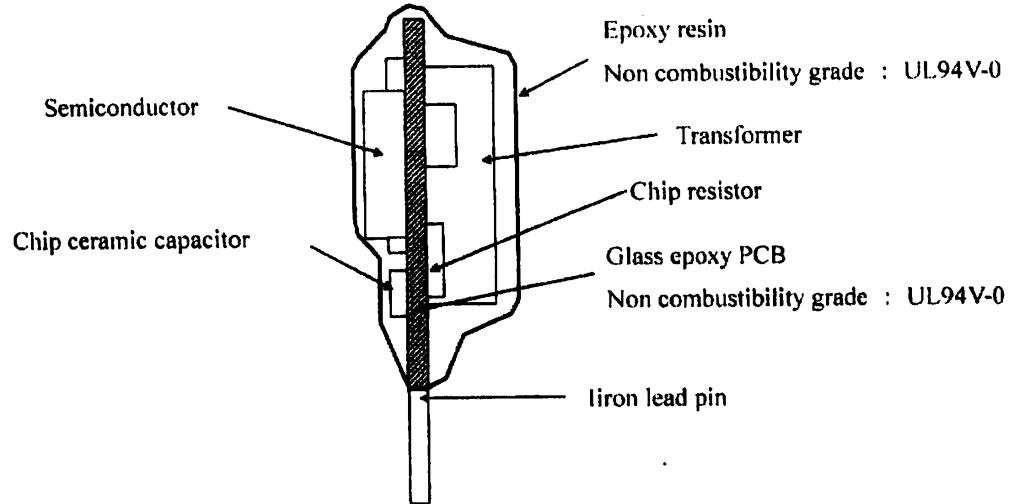
16. OTHERS

The Company is not responsible for any problems resulting from use of the products under conditions not recommended herein. Reproduction of this document in whole or in part without the permission of ROHM is prohibited. This product is designed to be used for general electronics devices and offer a standard level of quality. If you intend to use this product for applications requiring higher quality and reliability, such as automotive electric equipment, medical devices, aircrafts, controllers involving human lives and various safety devices, please contact our sales staff.

17. PACKAGE SPEC

20 pieces of modules shall in principle be packaged into a packaging material-package tray, and package trays shall be piled up in 2 stages to make 40 pcs in total, then the whole shall be packed with a cover pack. The number of piled stages is subject to change without prior notice according to shipment quantity.

18. STRUCTURE



• Recommended soldering condition

Flow soldering	260°C	within	10 sec
Manual soldering	380°C	within	3 sec

• Recommended land dimensions

Hole diameter	0.9mm
Land diameter	2.0mm