PQ05SZ5/51/5T/5U Series PQ05SZ1/11/1T/1U Series

Low Power-Loss Voltage Regulators With Reverse Voltage Protection Function

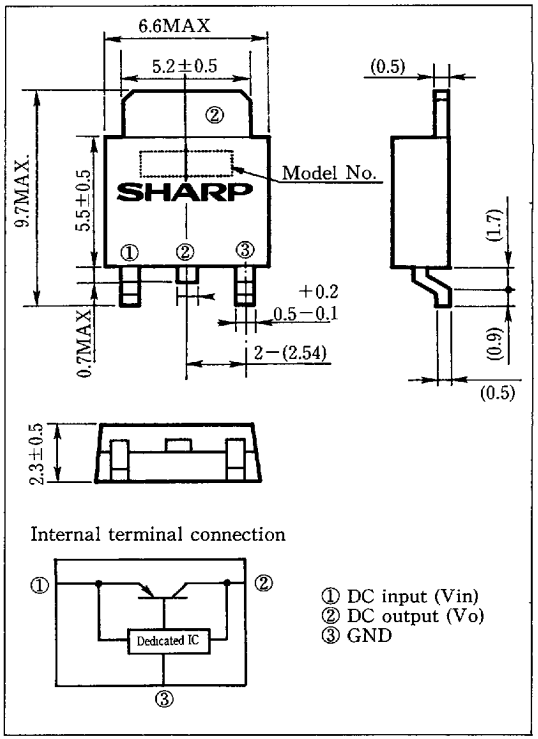
■ General Description

The Sharp's PQ05SZ5/PQ05SZ1 series surface mount type low power-loss voltage regulators provide 1A output and employ a miniature, high-efficiency heat radiation package. They are multi-function regulators with a overcurrent protection function and a function to prevent reverse voltage between input and output, which are best suited to small equipment and portable equipment.

■ Features

(1) Low power-loss (voltage difference between input and output : MAX. 0.5V)
(2) Surface mount type package (Equivalent to SC-63)
(3) With a function to prevent reverse voltage between input and output
The diode to prevent reverse voltage between input and output is not necessary. (When $V_{o-I} \leqq 13V$)
(4) 0.5A output (PQ05SZ5 series), 1A output (PQ05SZ1 series)
Standard precision output (±5%) mode and high-precision output model (±2.5%) are also available.
(5) Tape-packaged type (PQ05SZ1T/ PQ05SZ1U / PQ05SZ5T / PQ05SZ5U) is also available.

■ Outline Dimensions (Unit : mm)



■ Model Line-ups

		5V output	9V output	12V output
0.5A output	Output voltage precision: ±5%	PQ05SZ5	PQ09SZ5	PQ12SZ5
	Output voltage precision: ±2.5%	PQ05SZ51	PQ09SZ51	PQ12SZ51
1A output	Output voltage precision. ±5%	PQ05SZ1	PQ09SZ1	PQ12SZ1
	Output voltage precision ±2.5%	PQ05SZ11	PQ09SZ11	PQ12SZ11

■ Absolute Maximum Ratings

(Ta=25°C, xx=05, 09, 12)

Parameter	Symbol	Conditions	Rating		Unit
			PQxxSZ5/51	PQxxSZ1/11	
Input voltage	V_{in}	*1	24		V
Input-output reverse voltage	V_{o-I}	*2	13		V
Output current	I_o		0.5	1.0	A
Power dissipation	Pd	*3	8		W
Junction temperature	Tj	*4	150		°C
Operating temperature	T_{opr}		−20 to + 80		°C
Storage temperature	T_{stg}		−40 to +150		°C
Soldering temperature	T_{sol}	For 10s	260		°C

*1 All are open except GND and applicable terminals.
*2 V_o terminal applicable voltage from external : V_o (characteristics value) to 24V.
*3 With infinite heat sink
*4 Over heat protection operates at Tj>125°C

■ Electrical Characteristics

(Tj=25°C, xx=05, 09, 12)

Parameter		Symbol	Conditions		MIN.	TYP.	MAX.	Unit
Output voltage	PQ05SZ1/5	Vo	Vin=7V	*5	4.75	5.0	5.25	V
	PQ09SZ1/5		Vin=11V		8.55	9.0	9.45	
	PQ12SZ1/5		Vin=14V		11.4	12.0	12.6	
	PQ05SZ11/51		Vin=7V		4.88	5.0	5.12	
	PQ09SZ11/51		Vin=11V		8.78	9.0	9.22	
	PQ12SZ11/51		Vin=14V		11.7	12.0	12.3	
Load regulation		$R_{eg}L$	*6		—	0.2	2.0	%
Line regulation		$R_{eg}I$	Io=5mA, *7		—	0.1	2.5	%
Temperature coefficient of output voltage		T_cV_o	Io=5mA, Tj=0 to 125°C, *8		—	±0.01	—	%/°C
Ripple rejection		RR	Refer to Fig. 2		45	60	—	dB
Dropout Voltage	PQxxSZ1/11	V_{I-o}	*9	Io=0.5A	—	0.2	0.5	V
	PQxxSZ5/51			Io=0.3A				
Quiescent current		I_q	Io=0A, *7		—	4.0	10.0	mA

*5 PQxxSZ1/11 Series : Io=0.5A
PQxxSZ5/51 Series : Io=0.3A

*6 PQ05SZ1/11 : Vin=7V, Io=5mA to 1.0A
PQ09SZ1/11 : Vin=11V, Io=5mA to 1.0A
PQ12SZ1/11 : Vin=14V, Io=5mA to 1.0A
PQ05SZ5/51 : Vin=7V, Io=5mA to 0.5A
PQ09SZ5/51 : Vin=11V, Io=5mA to 0.5A
PQ12SZ5/51 : Vin=14V, Io=5mA to 0.5A

*7 PQ05SZ1/11/5/51 : Vin=6 to 16V
PQ09SZ1/11/5/51 : Vin=10 to 20V
PQ12SZ1/11/5/51 : Vin=13 to 23V

*8 PQ05SZ1/11/5/51 : Vin=7V
PQ09SZ1/11/5/51 : Vin=11V
PQ12SZ1/11/5/51 : Vin=14V

*9 Input voltage shall be the value when output voltage is 95% in conparison with the initial value.

Fig. 1 Test Circuit

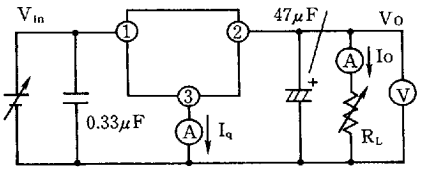
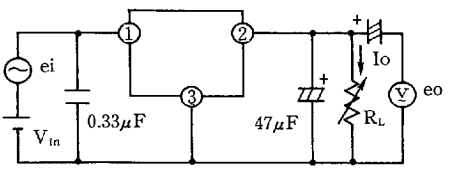


Fig. 2 Test Circuit of Ripple Rejection



f=120Hz(sine wave)
ei=0.5Vrms
Vin=7V(PQ05SZ1/11/5/51)
Vin=11V(PQ09SZ1/11/5/51)
Vin=14V(PQ12SZ1/11/5/51)
Io=0.3A
RR=20 log(ei/eo)

Fig. 3 Overcurrent Protection Characteristics (Typical value)

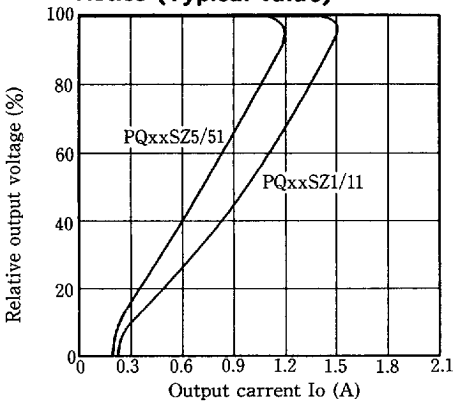
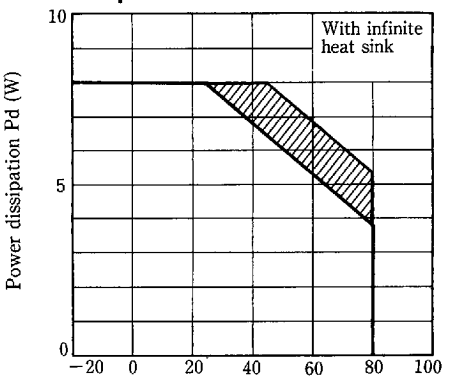


Fig. 4 Power Dissipation vs. Ambient Temperature



Note) Oblique line portion : operating area of overheat protection

Fig. 5 Output Voltage Deviation vs. Junction Temperature
(PQ05SZ1/PQ05SZ11/PQ05SZ5/PQ05SZ51)

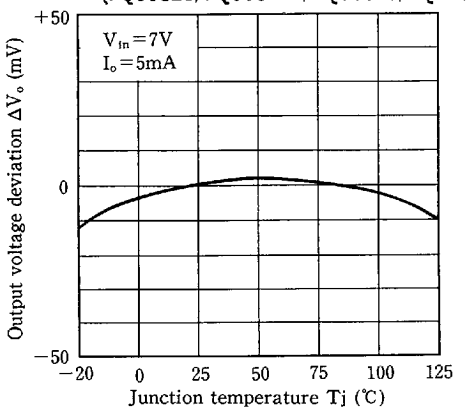


Fig. 6 Output Voltage Deviation vs. Junction Temperature
(PQ09SZ1/PQ09SZ11/PQ09SZ5/PQ09SZ51)

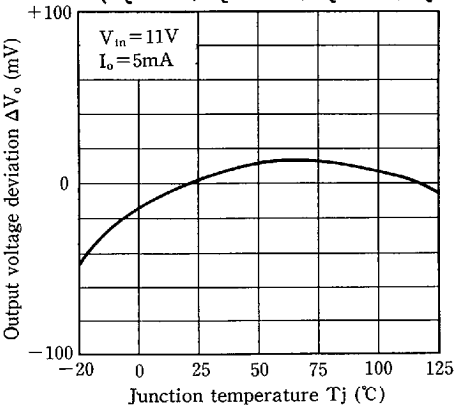


Fig. 7 Output Voltage Deviation vs. Junction Temperature
(PQ12SZ1/PQ12SZ11/PQ12SZ5/PQ12SZ51)

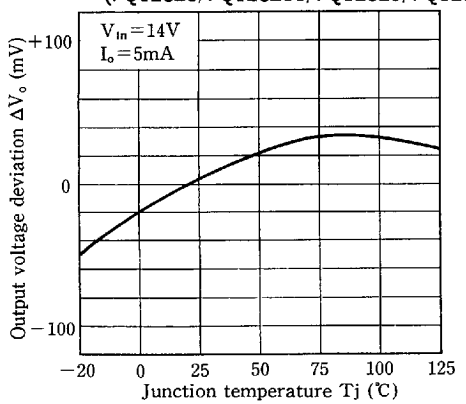


Fig. 8 Output Voltage vs. Input Voltage
(PQ05SZ1/PQ05SZ11)

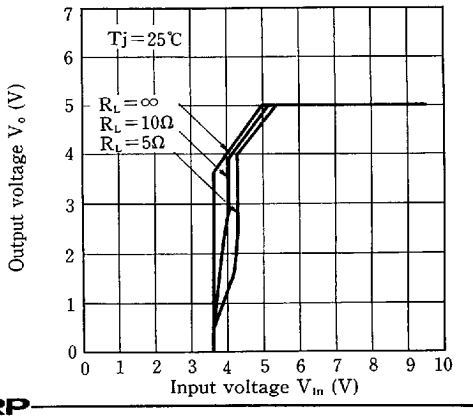


Fig. 9 Output Voltage vs. Input Voltage (PQ05SZ5/PQ05SZ51)

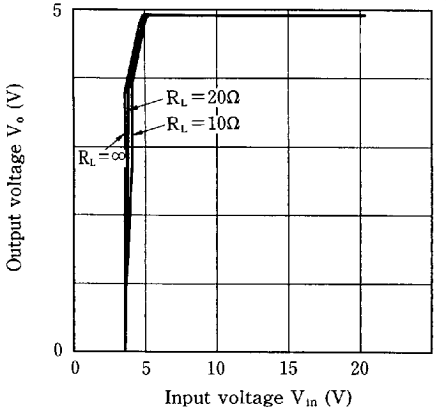


Fig. 10 Output Voltage vs. Input Voltage (PQ09SZ1/PQ09SZ11)

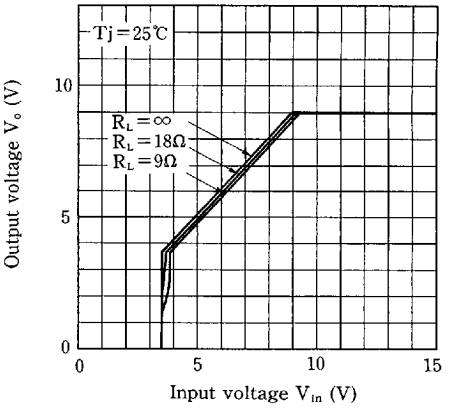


Fig. 11 Output Voltage vs. Input Voltage (PQ09SZ5/PQ09SZ51)

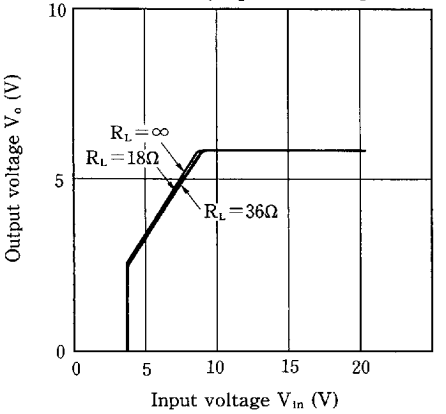


Fig. 12 Output Voltage vs. Input Voltage (PQ12SZ1/PQ12SZ11)

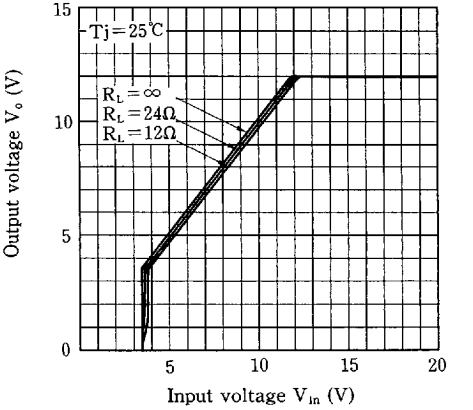


Fig. 13 Output Voltage vs. Input Voltage (PQ12SZ5/PQ12SZ51)

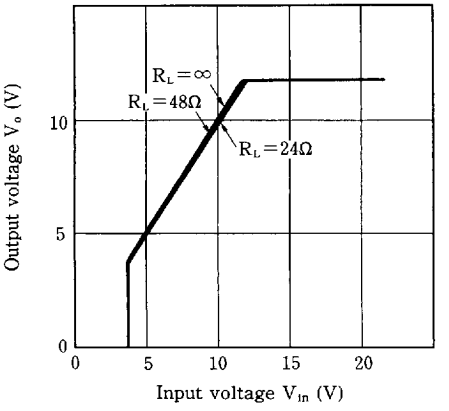


Fig. 14-a Dropout Voltage vs. Juntion Temperature (PQ05SZ5/51 Series)

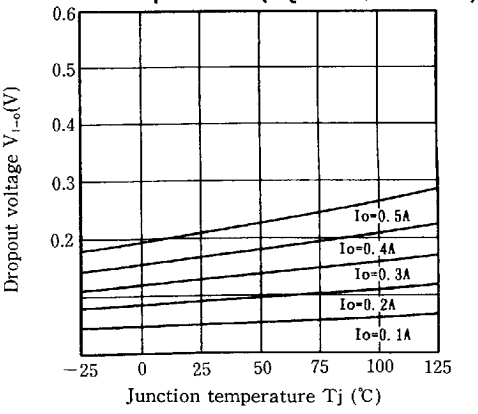


Fig. 14-b Dropout Voltage vs. Juntion Temperature (PQ05SZ1/11 Series)

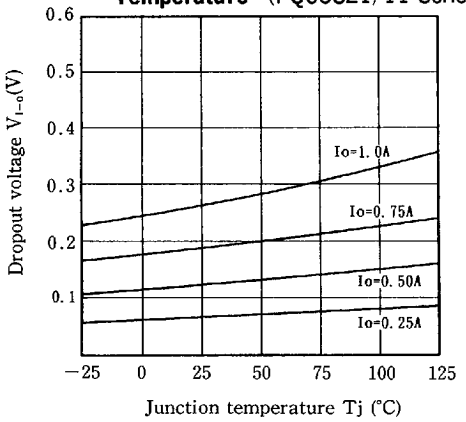


Fig. 15 Circuit Operating Current vs. Input Voltage (PQ05SZ1/PQ05SZ11)

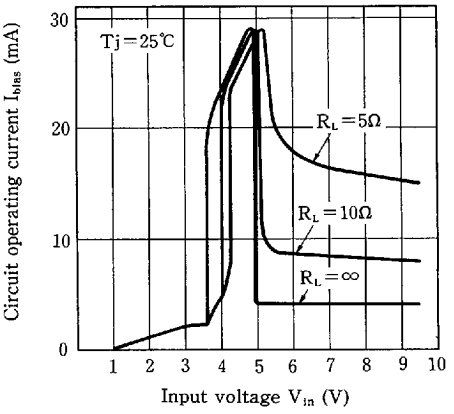


Fig. 16 Circuit Operating Current vs. Input Voltage (PQ05SZ5/PQ05SZ51)

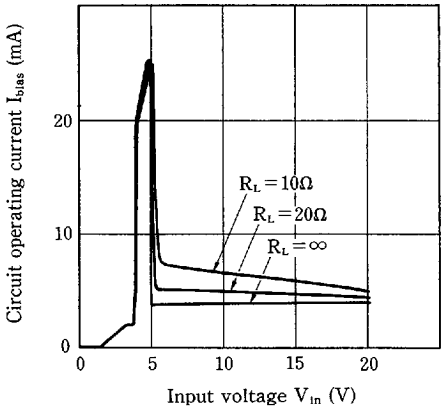


Fig. 17 Circuit Operating Current vs. Input Voltage (PQ09SZ1/PQ09SZ11)

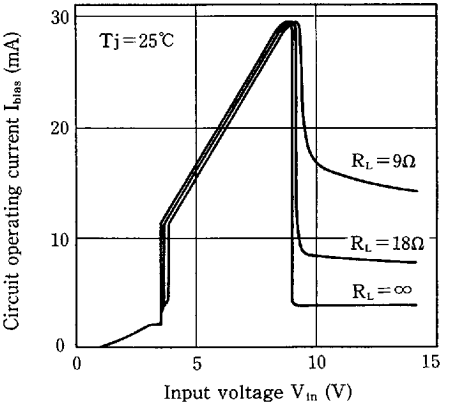


Fig. 18 Circuit Operating Current vs. Input Voltage (PQ09SZ5/PQ09SZ51)

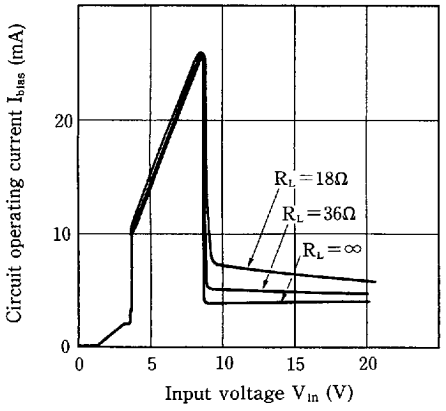


Fig. 19 Circuit Operating Current vs. Input Voltagd (PQ12SZ1/PQ12SZ11)

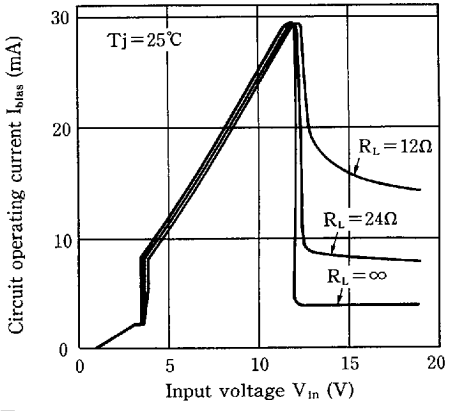


Fig. 20 Circuit Operating Current vs. Input Voltage (PQ12SZ5/PQ12SZ51)

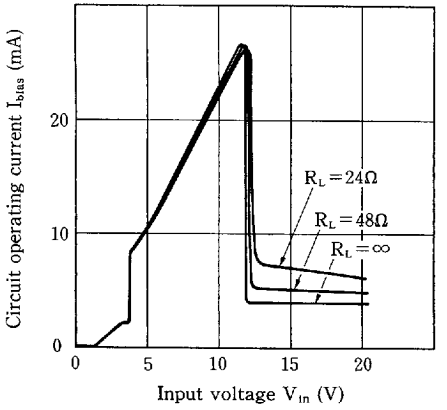


Fig. 21 Quiescent Current vs. Junction Temperature
(PQ05SZ1/PQ05SZ11/PQ09SZ1/PQ09SZ11/PQ12SZ1/PQ12SZ11)

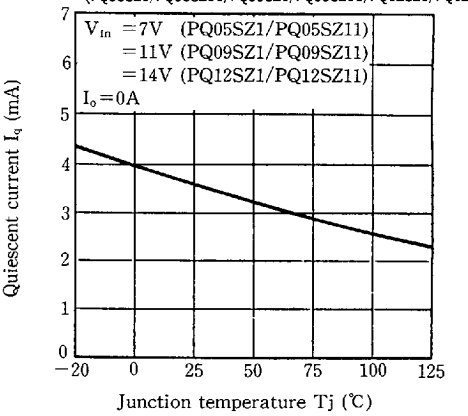


Fig. 22 Ripple Rejection vs. Input Ripple Frequency
(PQ05SZ1/PQ05SZ11/PQ09SZ1/PQ09SZ11/PQ12SZ1/PQ12SZ11)

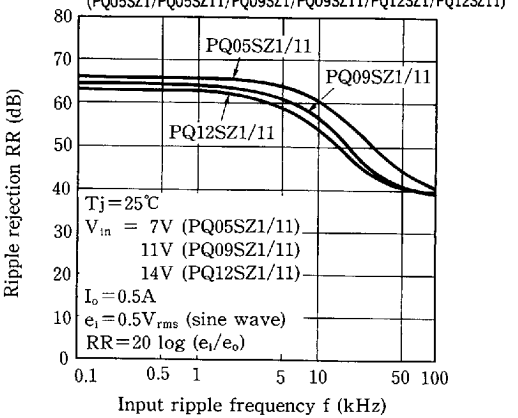


Fig. 23 Ripple Rejection vs. Input Ripple Frequency
(PQ05SZ5/PQ05SZ51/PQ09SZ5/PQ09SZ51/PQ12SZ5/PQ12SZ51)

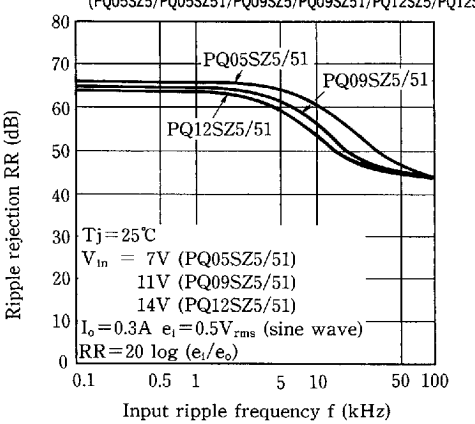


Fig. 24 Ripple Rejection vs. Output Current (PQ05SZ1/11 PQ09SZ1/11 PQ12SZ1/11)

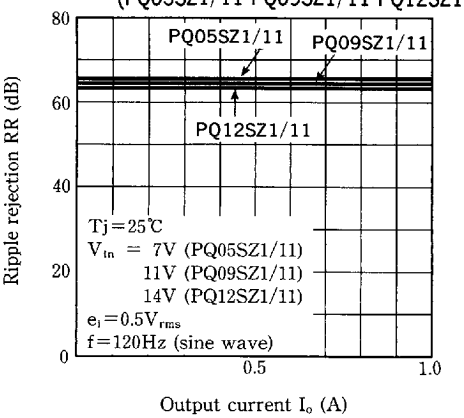


Fig. 25 Ripple Rejection vs. Output Current (PQ05SZ5/51 PQ09SZ5/51 PQ12SZ5/51)

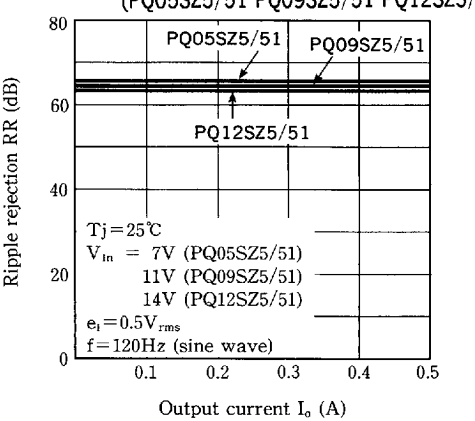


Fig. 26 Input-Output Reverse Current vs. Input-Output Reverse Voltage

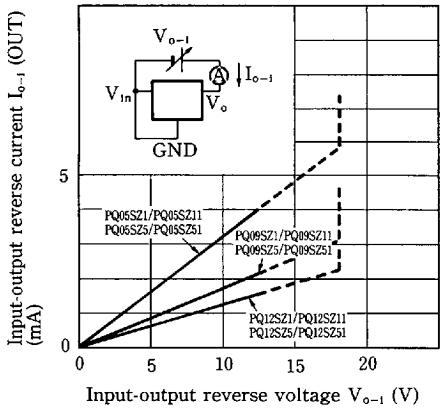
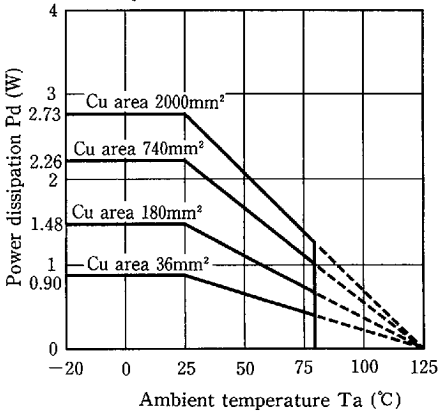
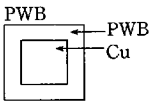


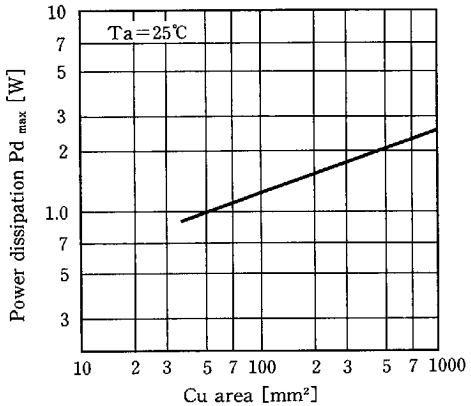
Fig. 27 Power Dissipation vs. Ambient Temperature

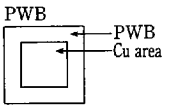




Material . Glass-cloth epoxy resin
Size . 50×50×1.6mm
Cu thickness. 35μm

Fig. 28 Power Dissipation vs. Cu Area





Material . Glass cloth epoxy resin
Size . 50×50×1.6mm³
Cu thickness: 35μm

■ Taping Specifications

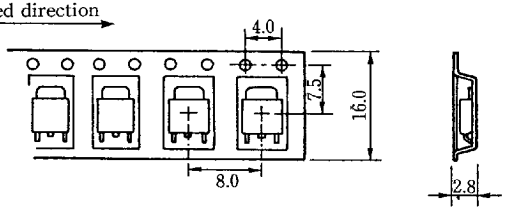
Model Line-ups

	Sleeve-packaged products		Tape-packaged products	
	Standard type	High-precision output type	Standard type	High precision output type
1A output	PQ05SZ1 Series	PQ05SZ11 Series	PQ05SZ1T Series	PQ05SZ1U Series
0.5A output	PQ05SZ5 Series	PQ05SZ51 Series	PQ05SZ5T Series	PQ05SZ5U Series

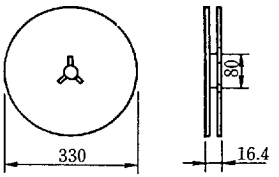
Note) The value of absolute maximum ratings and electrical characteristics is same as ones of sleeve-packaged products. (PQ05SZ1/11/5/51 Series)

Package form : 3,000pcs./reel (ϕ330 reel)

Tape feed direction →



(Unit; mm)



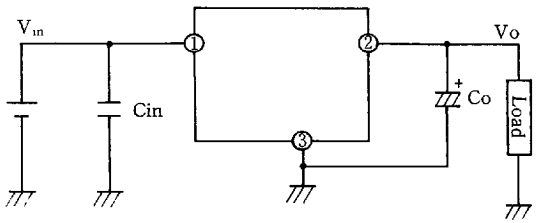
• Material for tape: polystyrene

Equivalent to EIAJ standard (RC-1009B)
EIAJ RC-1009B-TE1608L

Equivalent to EIAJ standard (RC-1009B)
EIAJ RC-1009B-R33

※ As for detailed specification, refer to each specification sheet.

■ Precautions for Use



(1) The connecting wiring of Co and Cin to terminals and connecting wiring to fin must be as short as possible. Especially, it is recommended to use the tantalum capacitor as Co if it is used at low temperature.

(2) If voltage is applied when the mounting is improper, such as deviation of element pin, the characteristics deterioration and damage may occur. Never allow improper mounting.

Note:
Specifications may be changed partially without notice for its improvement.
Cares when handling:
Follow the requirements stated in the specification and data book.