PQ05SZ5/PQ05SZ1 Series

Low Power-Loss Voltage Regulators (Built-in Reverse Voltage Protection Function)

■ Features

- Low power-loss (Dropout voltage : MAX. 0.5V)
- Surface mount type package (Equivalent to SC-63)
- Built-in 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}=<13V)

■ Applications

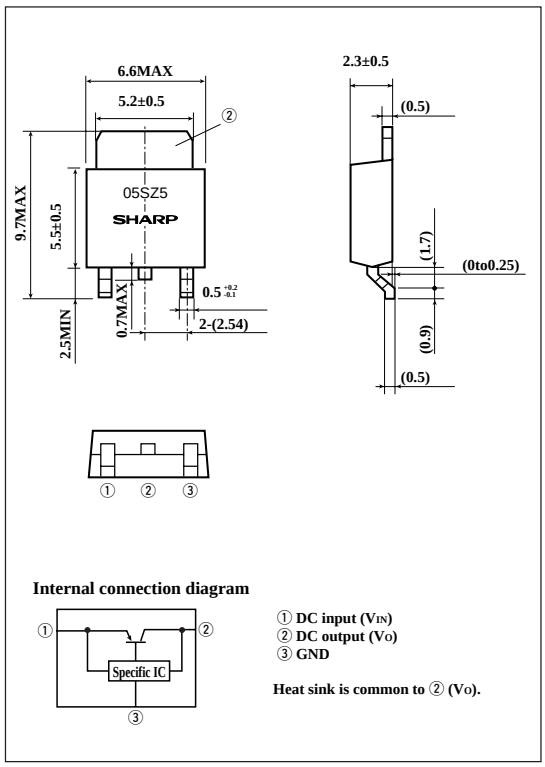
- Portable equipment
- Notebook PC

■ 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

■ Outline Dimensions

(Unit : mm)



■ Absolute Maximum Ratings

(T_a=25˚C, xx=05,09,12) (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}	V_{IN}=0V	13		V
Output current	I_O		0.5	1.0	A
Power dissipation	P_D	Refer to Fig. 4*2	8		W
Junction temperature	T_j	*	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 With imfinite heat sink.
* Over heat protection may operate at T_j>=125˚C

· Please refer to the chapter“ Handling Precautions ”.

■ Electrical Characteristics

(T_j=25˚C, xx=05,09,12)

Parameter		Symbol	Conditions		MIN.	TYP.	MAX.	Unit
Output voltage	PQ05SZ1/5	V_O	V_{IN}=7V	*3	4.75	5.0	5.25	V
	PQ09SZ1/5		V_{IN}=11V		8.55	9.0	9.45	
	PQ12SZ1/5		V_{IN}=14V		11.4	12.0	12.6	
	PQ05SZ11/51		V_{IN}=7V		4.88	5.0	5.12	
	PQ09SZ11/51		V_{IN}=11V		8.78	9.0	9.22	
	PQ12SZ11/51		V_{IN}=14V		11.7	12.0	12.3	
Load regulation		$R_{eg}L$	*4		-	0.2	2.0	%
Line regulation		$R_{eg}I$	I_O=5mA, *5		-	0.1	2.5	%
Temperature coefficient of output voltage		T_CV_O	I_O=5mA, T_j=0 to 125˚C, *6		-	±0.01	-	%/˚C
Ripple rejection		RR	Refer to Fig. 2		45	60	-	dB
Dropout voltage	PQxxSZ1/11	V_{i-O}	*7	I_O=0.5A	-	0.2	0.5	V
	PQxxSZ5/51			I_O=0.3A				
Quiescent current		I_q	I_O=0A, *6		-	4.0	10.0	mA

*3 PQxxSZ1/11 Series:**I_O=0.5A**
PQxxSZ5/51 Series:**I_O=0.3A**

*4 PQ05SZ1/11:**V_{IN}=7V, I_O=5mA to 1.0A** PQ05SZ5/51:**V_{IN}=7V, I_O=5mA to 0.5A**
PQ09SZ1/11:**V_{IN}=11V, I_O=5mA to 1.0A** PQ09SZ5/51:**V_{IN}=11V, I_O=5mA to 0.5A**
PQ12SZ1/11:**V_{IN}=14V, I_O=5mA to 1.0A** PQ12SZ5/51:**V_{IN}=14V, I_O=5mA to 0.5A**

*5 PQ05SZ1/11/5/51:**V_{IN}=6 to 16V**
PQ09SZ1/11/5/51:**V_{IN}=10 to 20V**
PQ12SZ1/11/5/51:**V_{IN}=13 to 23V**

*6 PQ05SZ1/11/5/51:**V_{IN}=7V**
PQ09SZ1/11/5/51:**V_{IN}=11V**
PQ12SZ1/11/5/51:**V_{IN}=14V**

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

Fig.1 Test Circuit

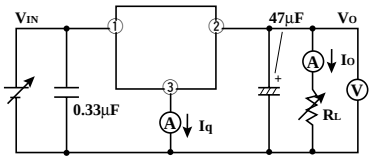
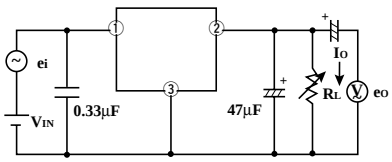


Fig.2 Test Circuit of Ripple Rejection



f=120Hz (sine wave)
ei=0.5Vrms
V_{IN}= 7V (PQ05SZ1/11/5/51)
V_{IN}=11V (PQ09SZ1/11/5/51)
V_{IN}=14V (PQ12SZ1/11/5/51)
I_O=0.3A
RR=20 log (ei/eo)

Fig.3 Overcurrent Protection Characteristics(Typical Value)

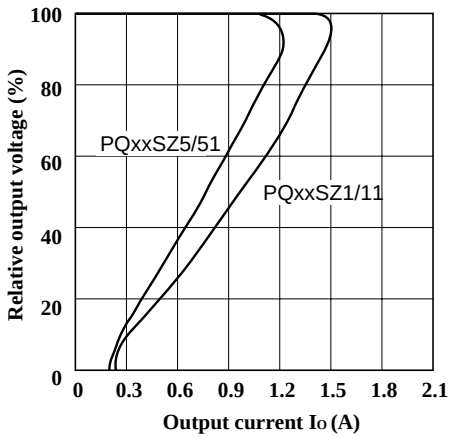
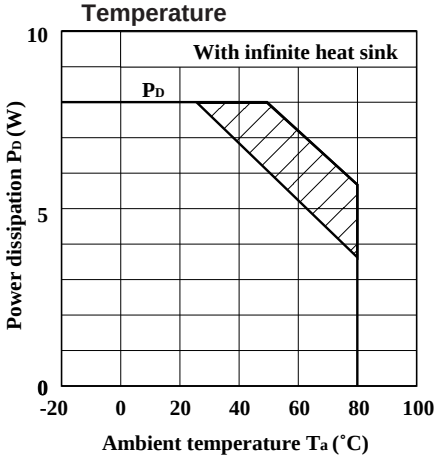


Fig.4 Power Dissipation vs. Ambient Temperature



Note) Oblique line portion:Overheat protection may operate in this area.

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

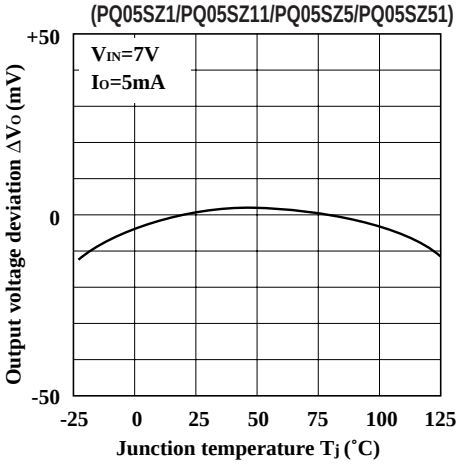


Fig.6 Output Voltage Deviation vs. Junction Temperature (PQ09SZ1/PQ09SZ11/PQ09SZ5/PQ09SZ51)

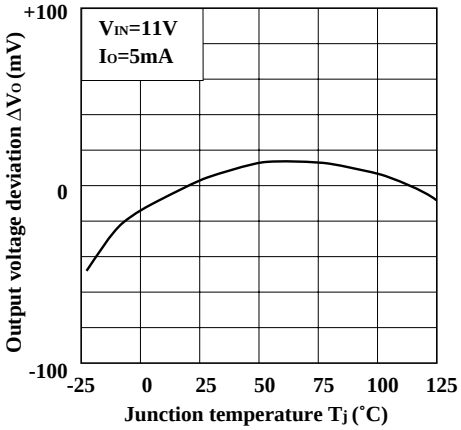


Fig.7 Output Voltage Deviation vs. Junction Temperature (PQ12SZ1/PQ12SZ11/PQ12SZ5/PQ12SZ51)

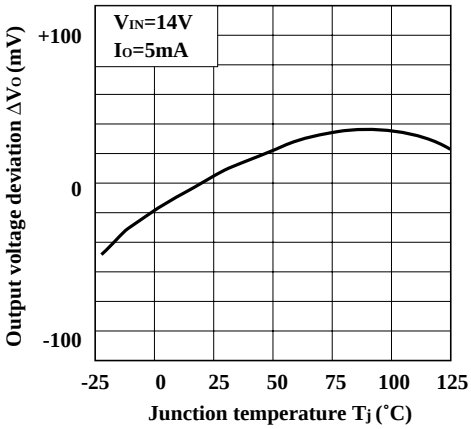


Fig.8 Output Voltage vs. Input Voltage (PQ05SZ1/PQ05SZ11)

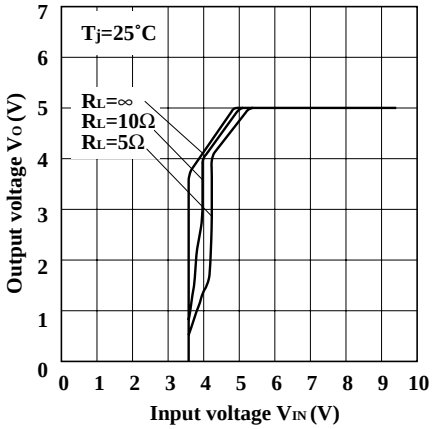


Fig.9 Output Voltage vs. Input Voltage (PQ05SZ5/PQ05SZ51)

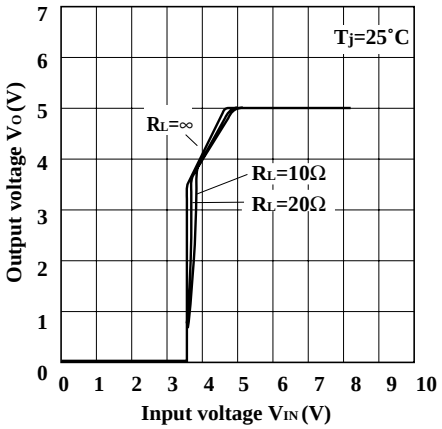


Fig.10 Output Voltage vs. Input Voltage (PQ09SZ1/PQ09SZ11)

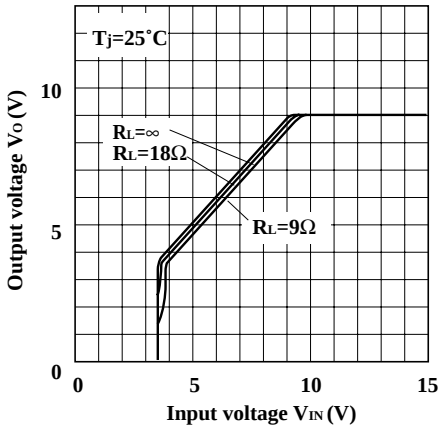


Fig.11 Output Voltage vs. Input Voltage (PQ09SZ5/PQ09SZ51)

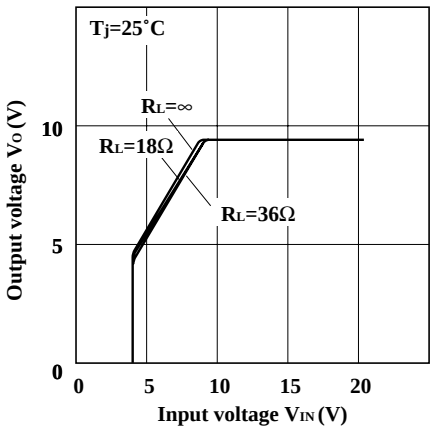


Fig.12 Output Voltage vs. Input Voltage (PQ12SZ1/PQ12SZ11)

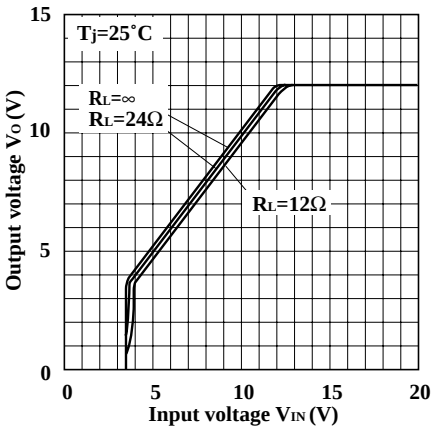


Fig.13 Output Voltage vs. Input Voltage (PQ12SZ5/PQ12SZ51)

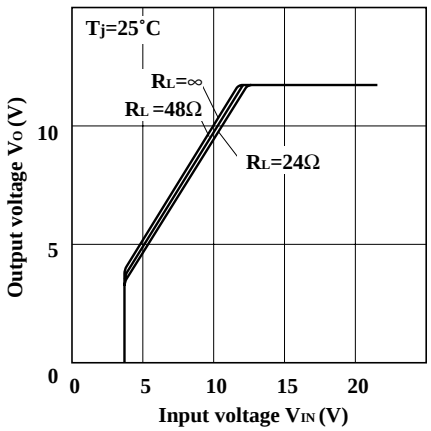


Fig.14-a Dropout Voltage vs. Junction Temperature (PQ05SZ5/51 Series)

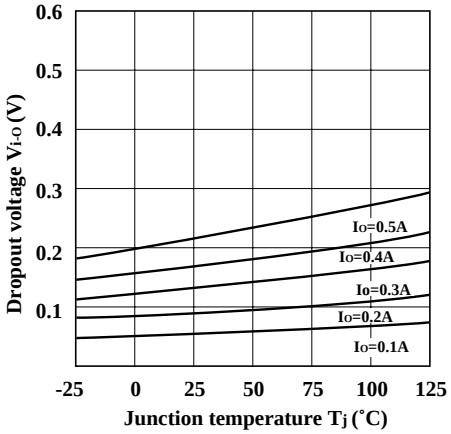


Fig.14-b Dropout Voltage vs. Junction Temperature (PQ05SZ1/11 Series)

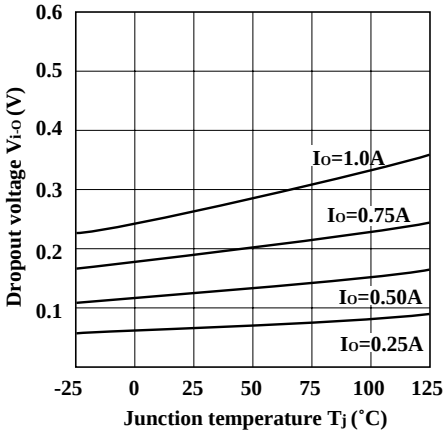


Fig.15 Circuit Operating Current vs. Input Voltage (PQ05SZ1/PQ05SZ11)

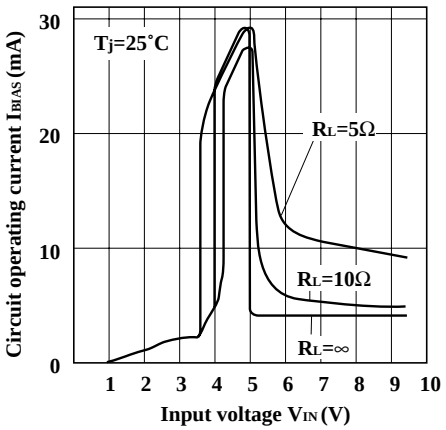


Fig.16 Circuit Operating Current vs. Input Voltage (PQ05SZ5/PQ05SZ51)

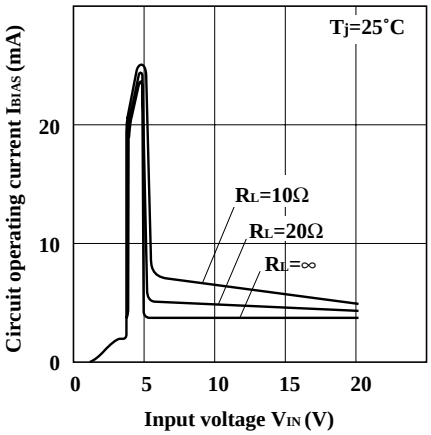


Fig.17 Circuit Operating Current vs. Input Voltage (PQ09SZ1/PQ09SZ11)

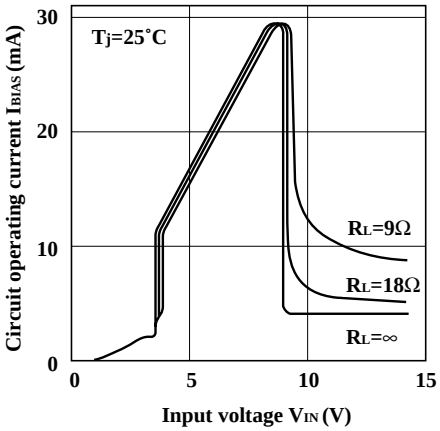


Fig.18 Circuit Operating Current vs. Input Voltage (PQ09SZ5/PQ09SZ51)

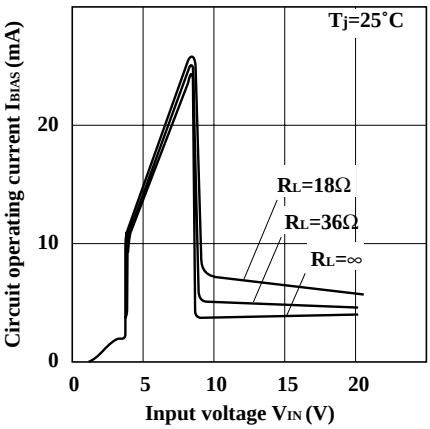


Fig.19 Circuit Operating Current vs. Input Voltage (PQ12SZ1/PQ12SZ11)

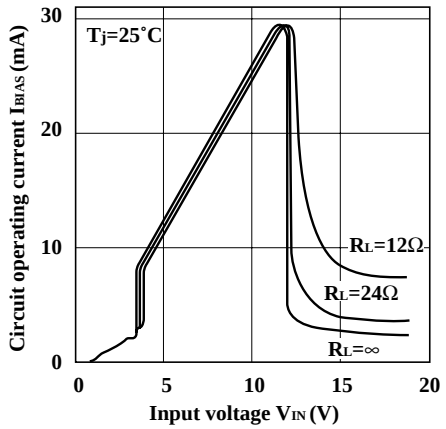


Fig.20 Circuit Operating Current vs. Input Voltage (PQ12SZ5/PQ12SZ51)

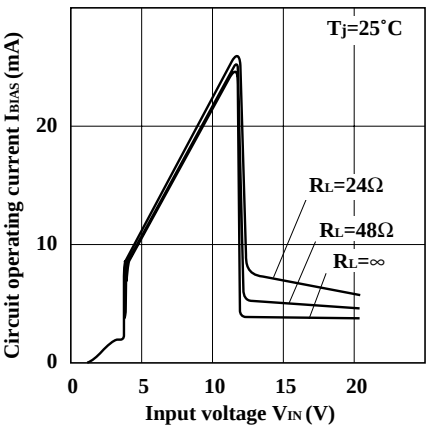


Fig.21 Quiescent Current vs. Junction Temperature
(PQ05SZ1/PQ05SZ11/PQ09SZ1/PQ09SZ11/PQ12SZ1/PQ12SZ11)

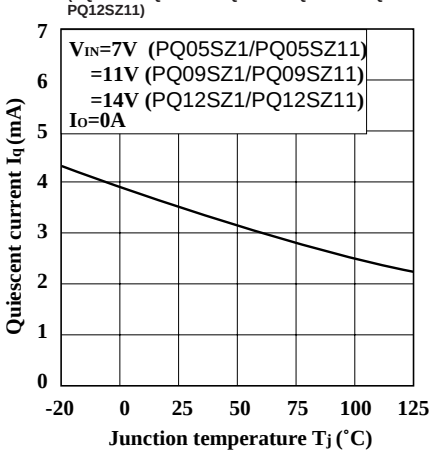


Fig.22 Ripple Rejection vs. Input Ripple Frequency
(PQ05SZ1/PQ05SZ11/PQ09SZ1/PQ09SZ11/PQ12SZ1/PQ12SZ11)

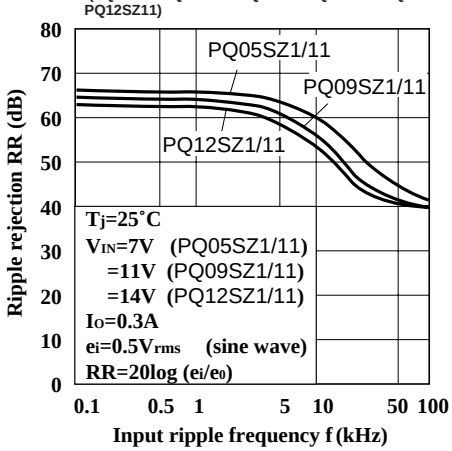


Fig.23 Ripple Rejection vs. Input Ripple Frequency
(PQ05SZ5/PQ05SZ51/PQ09SZ5/PQ09SZ51/PQ12SZ5/PQ12SZ51)

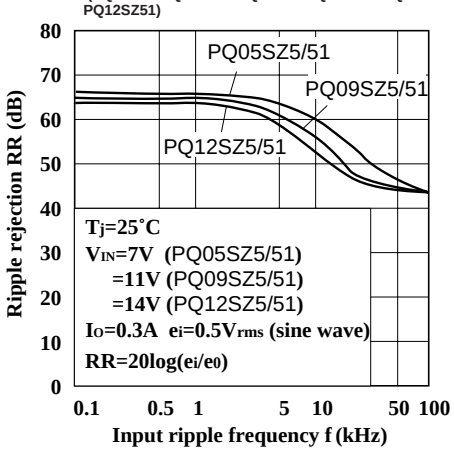


Fig.24 Ripple Rejection vs. Output Current (PQ05SZ1/11/ PQ09SZ1/11/ PQ12SZ1/11)

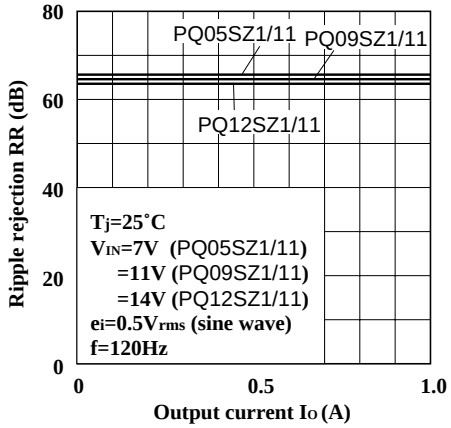


Fig.25 Ripple Rejection vs. Output Current (PQ05SZ5/51/ PQ09SZ5/51/ PQ12SZ5/51)

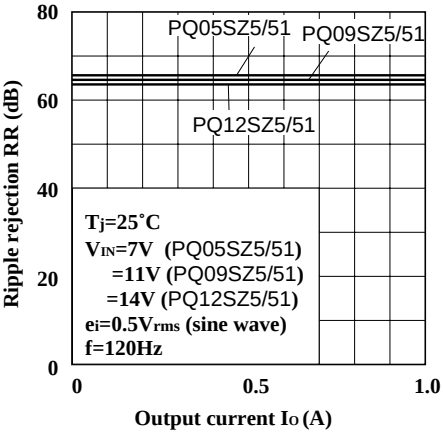


Fig.26 Input-Output Reverse Current vs. Input-Output Reverse Voltage

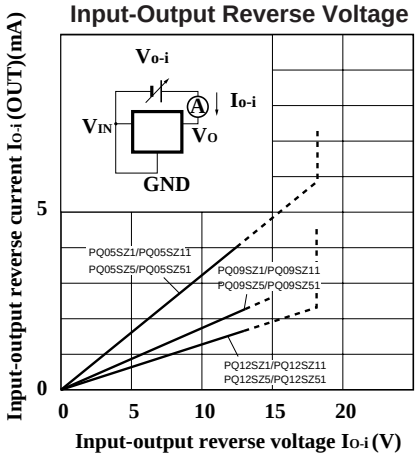


Fig.27 Power Dissipation vs. Ambient Temperature (Typical Value)

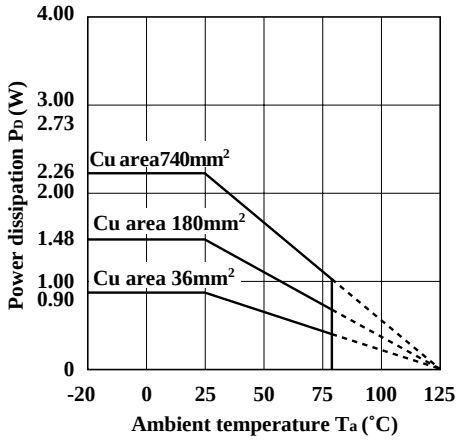
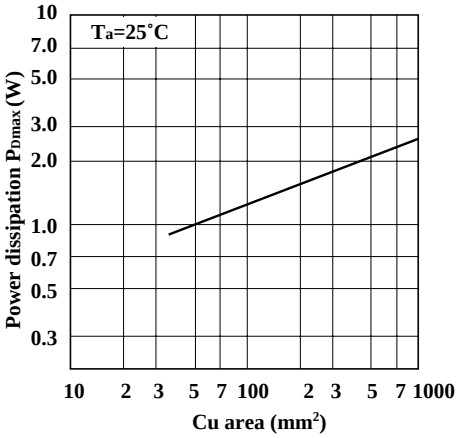
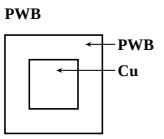


Fig.28 Power Dissipation vs. Cu Area





Material : Glass-cloth epoxy resin
Size : 50X50X1.6mm3
Cu thickness : 35μm

■ Model Line-ups for Tape-packaged Products

	Sleeve-packaged products		Tape-packaged products	
Output current	Standard type	High-precision output type	Standard type	High-precision output type
0.5A output	PQ05SZ5 Series	PQ05SZ51 Series	PQ05SZ5T Series	PQ05SZ5U Series
1.0A output	PQ05SZ1 Series	PQ05SZ11 Series	PQ05SZ1T Series	PQ05SZ1U Series