

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 $V_{O-I} \leq 13V$)

Applications

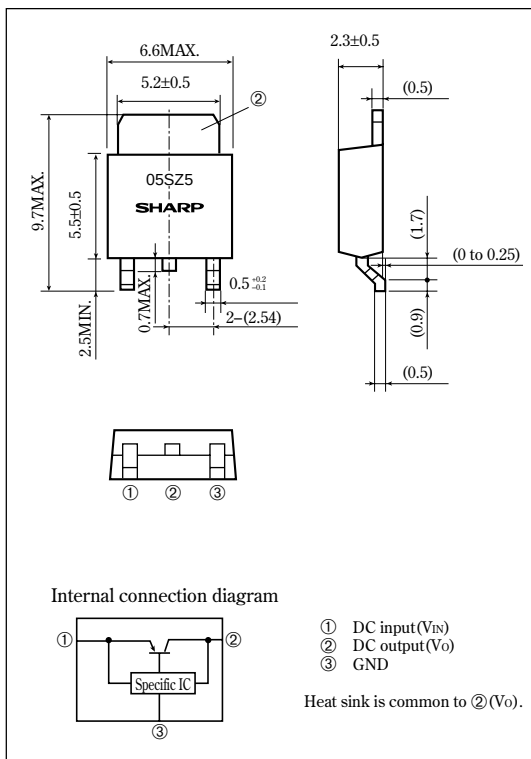
- Portable equipment
- Notebook PC

Model Line-ups

		5V output	9V output	12V output
1A output	0.5A output			
	Output voltage precision: $\pm 5\%$	PQ05SZ5	PQ09SZ5	PQ12SZ5
	Output voltage precision: $\pm 2.5\%$	PQ05SZ1	PQ09SZ1	PQ12SZ1
	Output voltage precision: $\pm 2.5\%$	PQ05SZ11	PQ09SZ11	PQ12SZ11

Outline Dimensions

(Unit : mm)



Absolute Maximum Ratings

($T_a = 25^\circ\text{C}$, 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}	$V_{IN} = 0V$	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		$^\circ\text{C}$
Operating temperature	T_{opr}		-20 to +80		$^\circ\text{C}$
Storage temperature	T_{stg}		-40 to +150		$^\circ\text{C}$
Soldering temperature	T_{sol}	For 10s	260		$^\circ\text{C}$

*1 All are open except GND and applicable terminals.

*2 With infinite heat sink.

* Over heat protection may operate at $T_j \geq 125^\circ\text{C}$

•Please refer to the chapter "Handling Precautions".

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Electrical Characteristics

(Tj=25°C, xx=05,09,12)

Parameter		Symbol	Conditions		MIN.	TYP.	MAX.	Unit
Output voltage	PQ05SZ1/5	Vo	VIN=7V	Ⓐ3	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		RegL	Ⓐ4		—	0.2	2.0	%
Line regulation		RegI	Io=5mA, Ⓐ5		—	0.1	2.5	%
Temperature coefficient of output voltage		TcVo	Io=5mA, Tj=0 to 125°C, Ⓐ6		—	±0.01	—	%/°C
Ripple rejection		RR	Refer to Fig. 2		45	60	—	dB
Dropout voltage	PQxxSZ1/11	Vi-o	Ⓐ7	Io=0.5A	—	0.2	0.5	V
	PQxxSZ5/51			Io=0.3A				
Quiescent current		Iq	Io=0A, Ⓐ6		—	4.0	10.0	mA

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

Ⓐ4 PQ05SZ1/11:VIN=7V, Io=5mA to 1.0A PQ05SZ5/51:VIN=7V, Io=5mA to 0.5A
PQ09SZ1/11:VIN=11V, Io=5mA to 1.0A PQ09SZ5/51:VIN=11V, Io=5mA to 0.5A
PQ12SZ1/11:VIN=14V, Io=5mA to 1.0A PQ12SZ5/51:VIN=14V, Io=5mA to 0.5A

Ⓐ5 PQ05SZ1/11/5/51:VIN=6 to 16V
PQ09SZ1/11/5/51:VIN=10 to 20V
PQ12SZ1/11/5/51:VIN=13 to 23V

Ⓐ6 PQ05SZ1/11/5/51:VIN=7V
PQ09SZ1/11/5/51:VIN=11V
PQ12SZ1/11/5/51:VIN=14V

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

Fig.1 Test Circuit

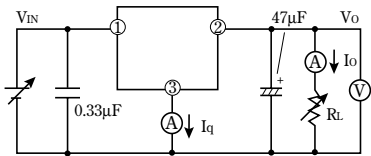
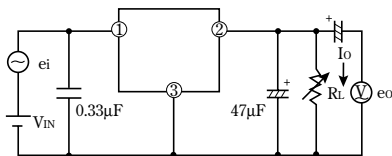


Fig.2 Test Circuit of Ripple Rejection



f=120Hz(sine wave)
ei(rms)=0.5V
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(rms)/eo(rms))

Fig.3 Overcurrent Protection Characteristics (Typical Value)

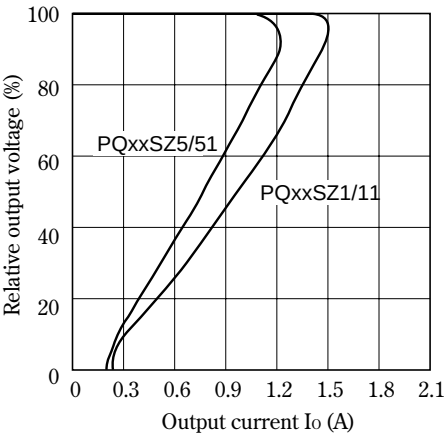
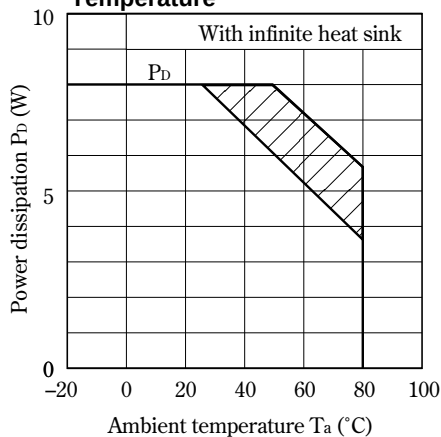


Fig.4 Power Dissipation vs. Ambient Temperature



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

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

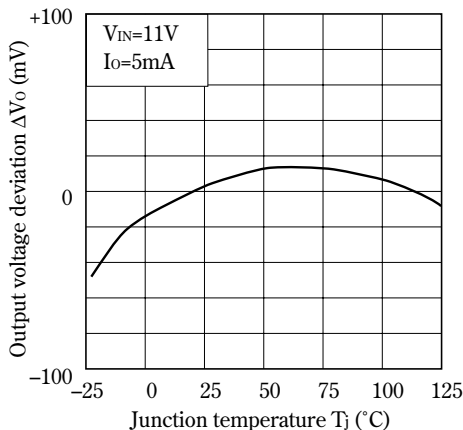


Fig.5 Output Voltage Deviation vs. Junction Temperature (PQ05SZ1/PQ05SZ11/PQ05SZ5/PQ05SZ51)

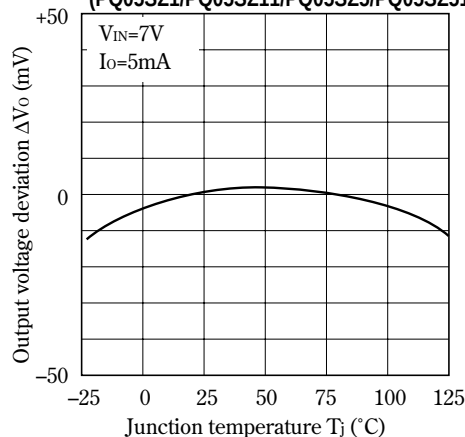


Fig.7 Output Voltage Deviation vs. Junction Temperature (PQ12SZ1/PQ12SZ11/PQ12SZ5/PQ12SZ51)

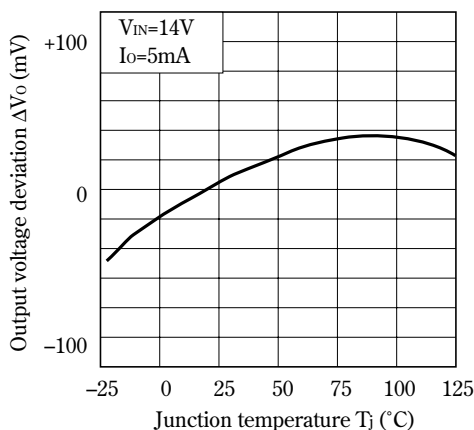


Fig.8 Output Voltage vs. Input Voltage (PQ05SZ1/PQ05SZ11)

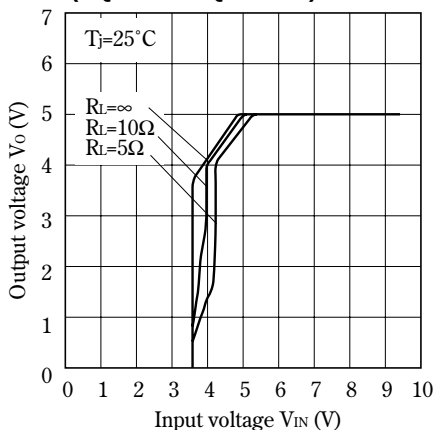


Fig.9 Output Voltage vs. Input Voltage (PQ05SZ5/PQ05SZ51)

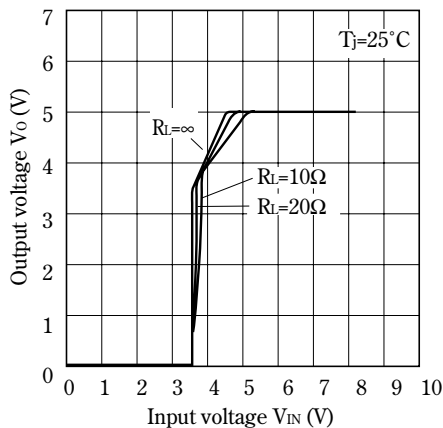


Fig.10 Output Voltage vs. Input Voltage (PQ09SZ1/PQ09SZ11)

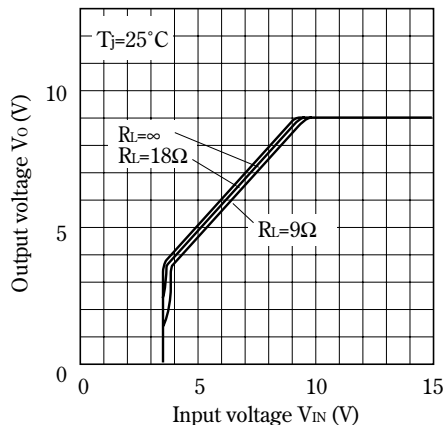


Fig.11 Output Voltage vs. Input Voltage (PQ09SZ5/PQ09SZ51)

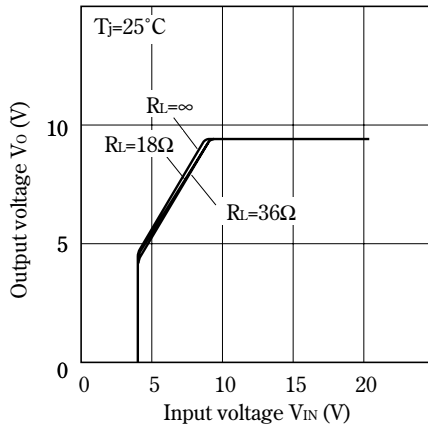


Fig.12 Output Voltage vs. Input Voltage (PQ12SZ1/PQ12SZ11)

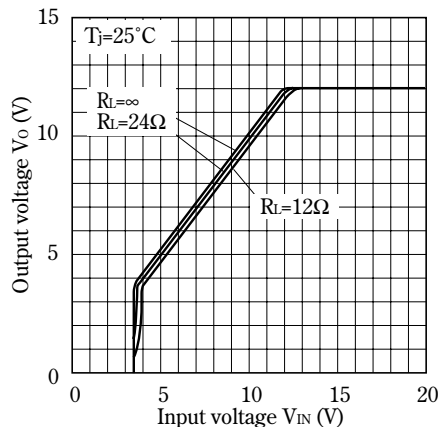


Fig.13 Output Voltage vs. Input Voltage (PQ12SZ5/PQ12SZ51)

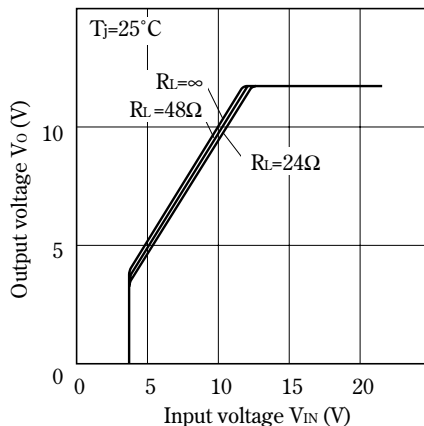


Fig.14-a Dropout Voltage vs. Junction Temperature (PQ05SZ5/51 Series)

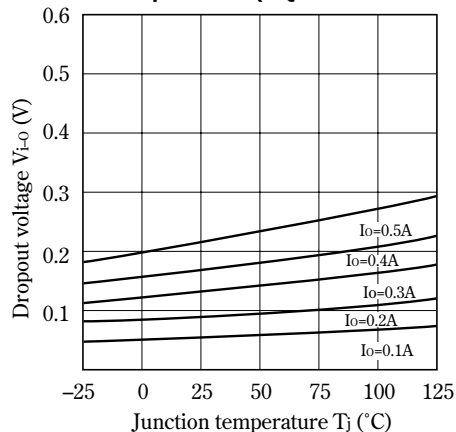


Fig.14-b Dropout Voltage vs. Junction Temperature (PQ05SZ1/11 Series)

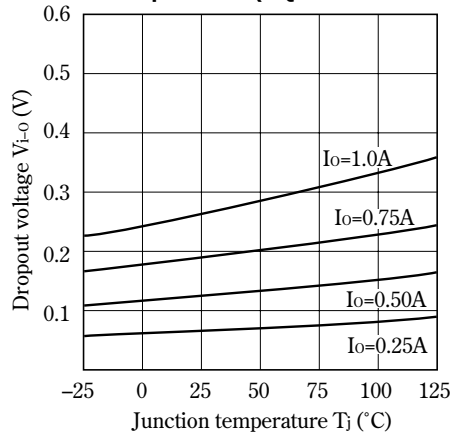


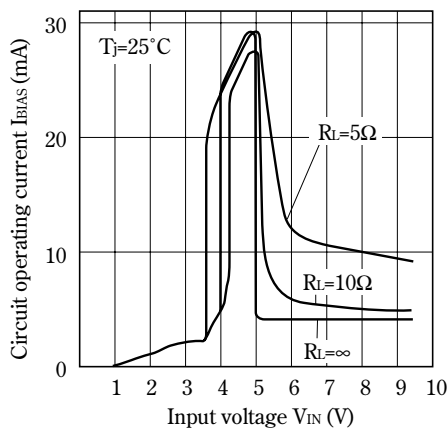
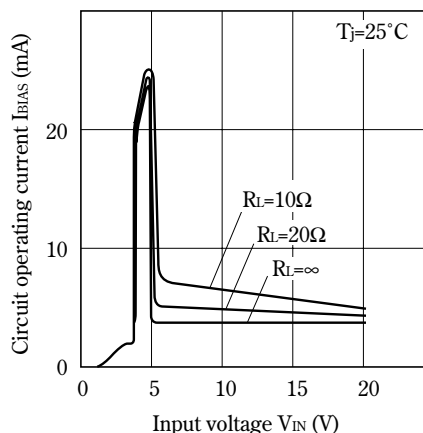
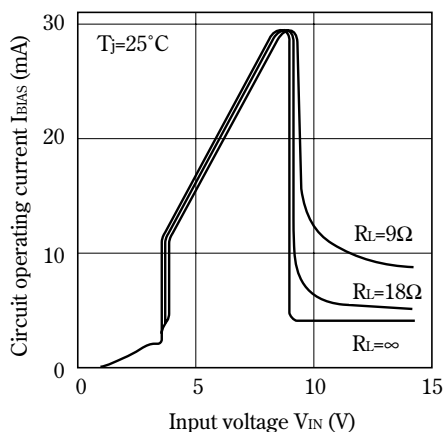
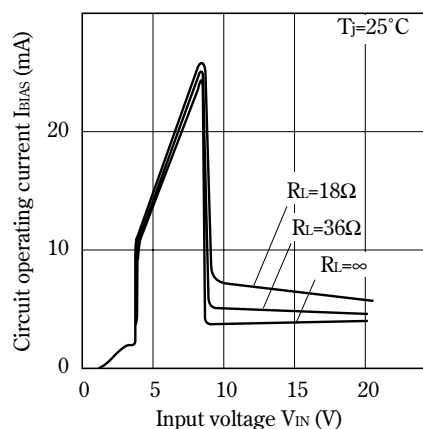
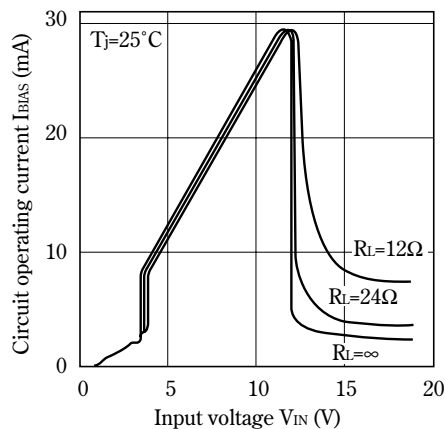
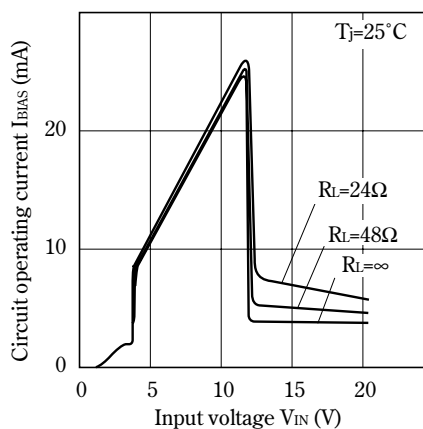
Fig.15 Circuit Operating Current vs. Input Voltage (PQ05SZ1/PQ05SZ11)**Fig.16 Circuit Operating Current vs. Input Voltage (PQ05SZ5/PQ05SZ51)****Fig.17 Circuit Operating Current vs. Input Voltage (PQ09SZ1/PQ09SZ11)****Fig.18 Circuit Operating Current vs. Input Voltage (PQ09SZ5/PQ09SZ51)****Fig.19 Circuit 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)

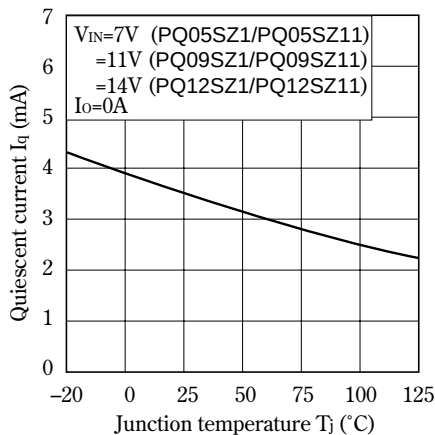


Fig.22 Ripple Rejection vs. Input Ripple Frequency
(PQ05SZ1/PQ05SZ11/PQ09SZ1/PQ09SZ11/PQ12SZ1/PQ12SZ11)

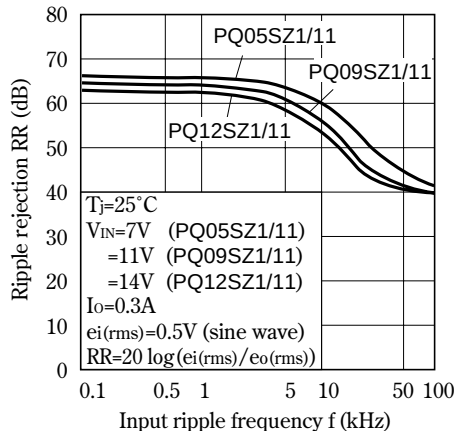


Fig.23 Ripple Rejection vs. Input Ripple Frequency
(PQ05SZ5/PQ05SZ51/PQ09SZ5/PQ09SZ51/PQ12SZ5/PQ12SZ51)

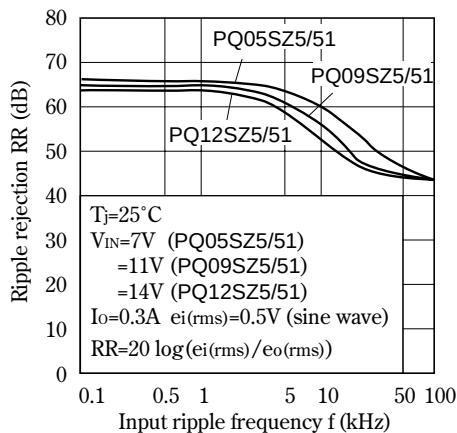


Fig.24 Ripple Rejection vs. Output Current
(PQ05SZ1/11/ PQ09SZ1/11/ PQ12SZ1/11)

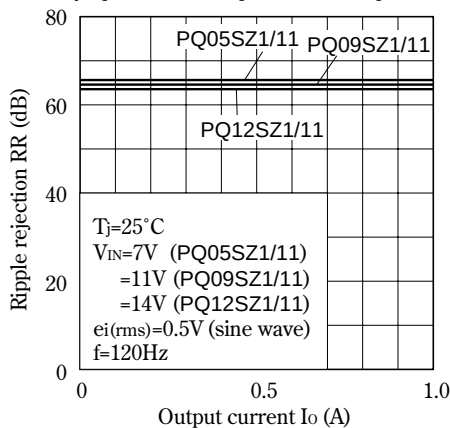


Fig.25 Ripple Rejection vs. Output Current
(PQ05SZ5/51/ PQ09SZ5/51/ PQ12SZ5/51)

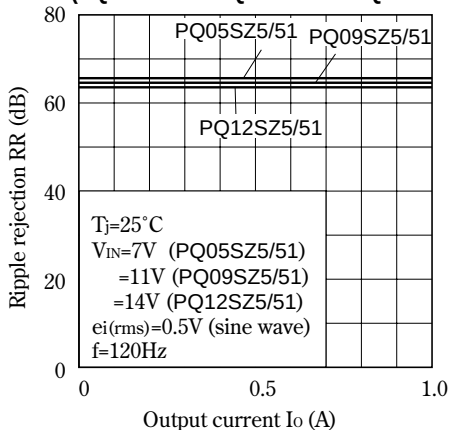


Fig.26 Input-Output Reverse Current vs. Input-Output Reverse Voltage

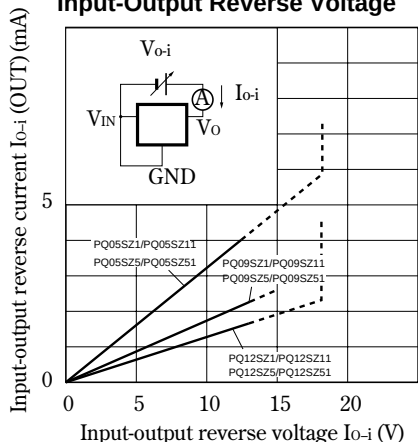


Fig.27 Power Dissipation vs. Ambient Temperature (Typical Value)

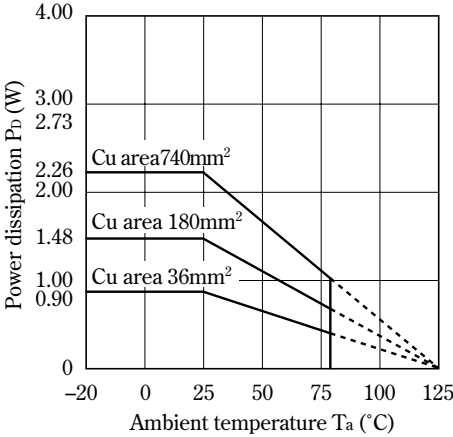
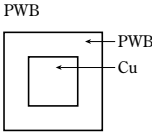
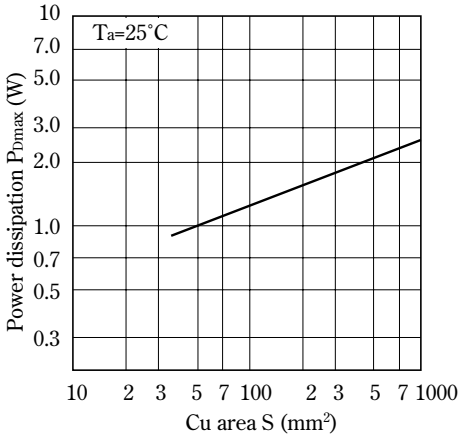


Fig.28 Power Dissipation vs. Cu Area



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

Model Line-ups for Tape-packaged Products

Output current	Sleeve-packaged products		Tape-packaged products	
	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

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 - Industrial control
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 - Consumer electronics
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