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

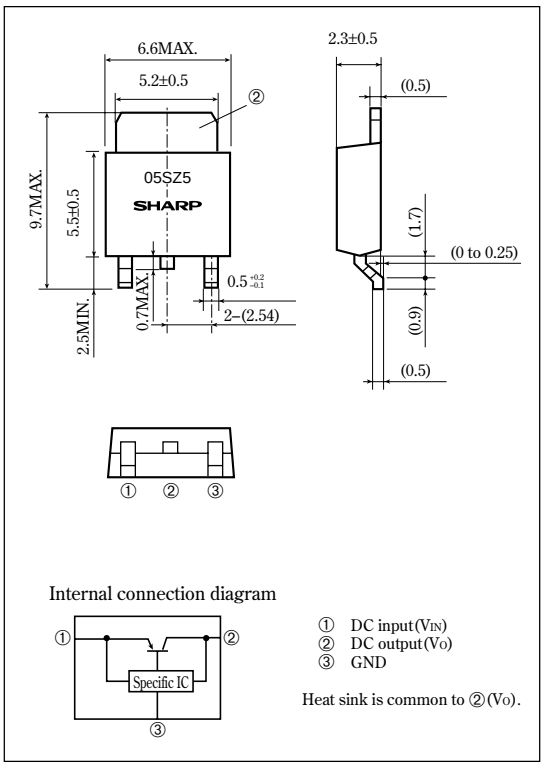
- Portable equipment
- Notebook PC

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)

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 infinite 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

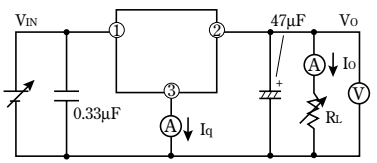
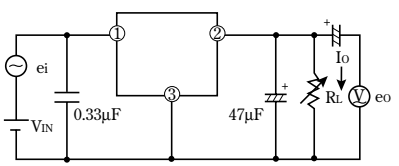


Fig.2 Test Circuit of Ripple Rejection



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

Fig.3 Overcurrent Protection Characteristics (Typical Value)

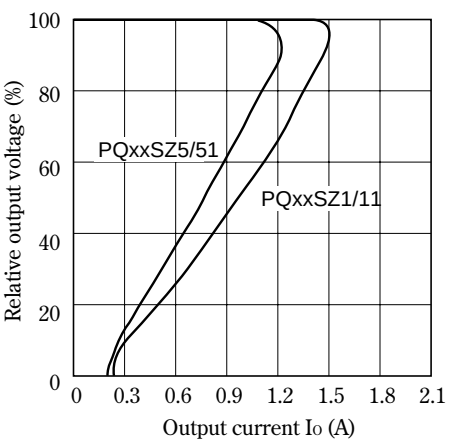
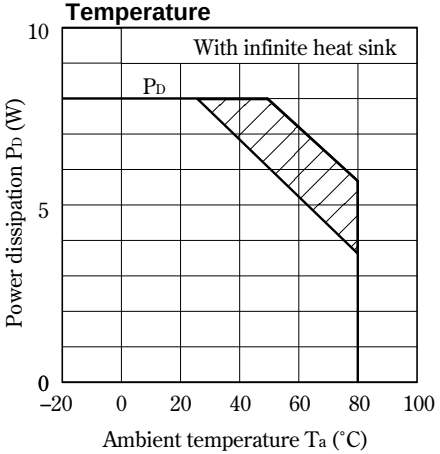


Fig.4 Power Dissipation vs. Ambient Temperature



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

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

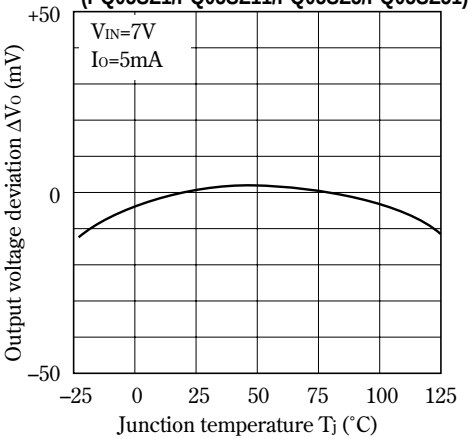


Fig.6 Output Voltage Deviation vs. Junction Temperature (PQ09SZ1/PQ09SZ11/PQ09SZ5/PQ09SZ51)

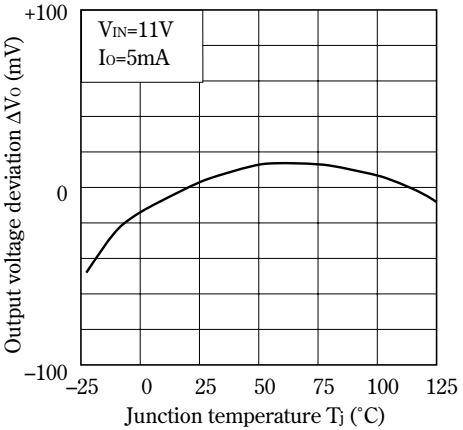


Fig.7 Output Voltage Deviation vs. Junction Temperature (PQ12SZ1/PQ12SZ11/PQ12SZ5/PQ12SZ51)

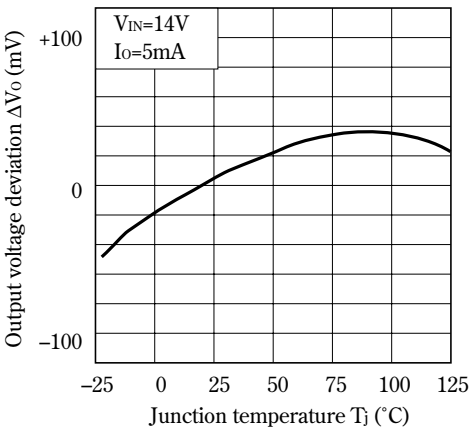


Fig.8 Output Voltage vs. Input Voltage (PQ05SZ1/PQ05SZ11)

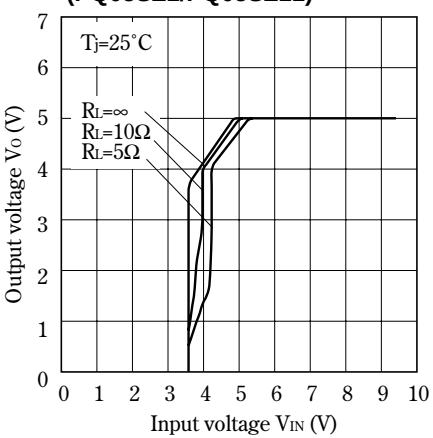


Fig.9 Output Voltage vs. Input Voltage (PQ05SZ5/PQ05SZ51)

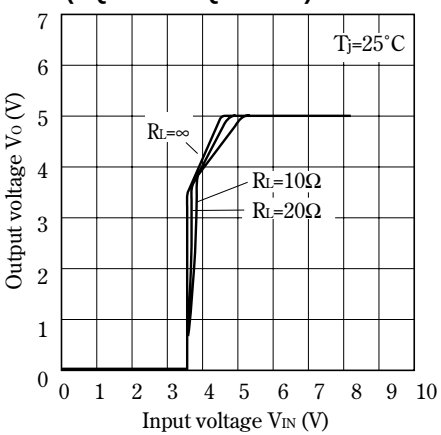


Fig.10 Output Voltage vs. Input Voltage (PQ09SZ1/PQ09SZ11)

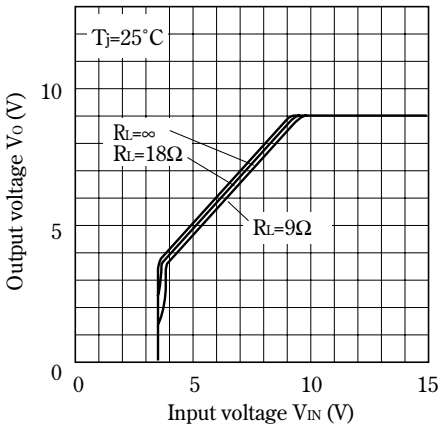


Fig.11 Output Voltage vs. Input Voltage (PQ09SZ5/PQ09SZ51)

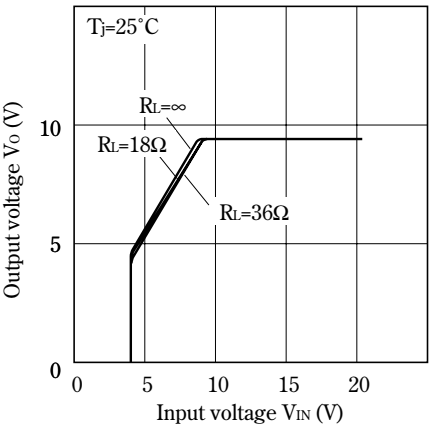


Fig.12 Output Voltage vs. Input Voltage (PQ12SZ1/PQ12SZ11)

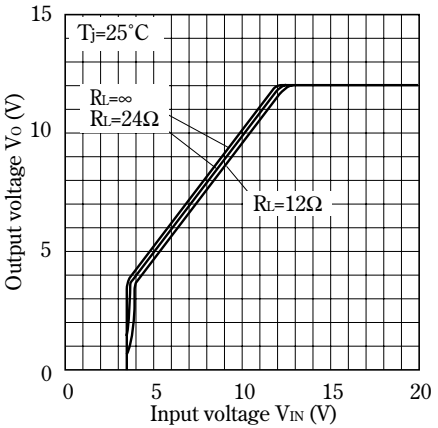


Fig.13 Output Voltage vs. Input Voltage (PQ12SZ5/PQ12SZ51)

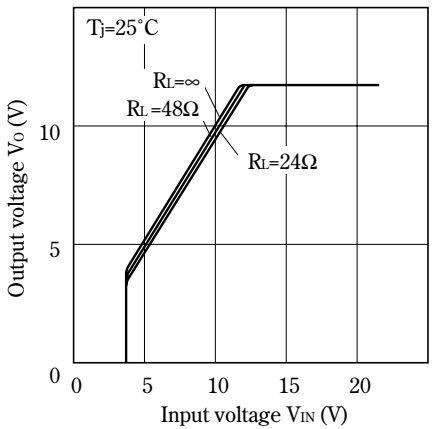


Fig.14-a Dropout Voltage vs. Junction Temperature (PQ05SZ5/51 Series)

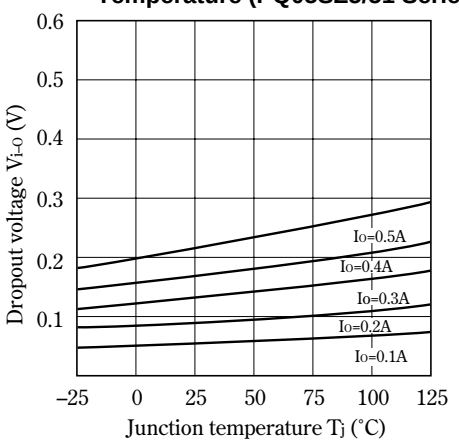


Fig.14-b Dropout Voltage vs. Junction Temperature (PQ05SZ1/11 Series)

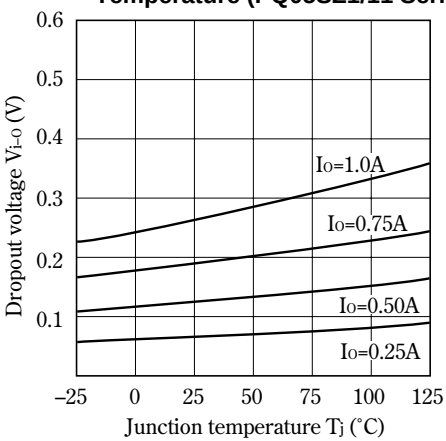


Fig.15 Circuit Operating Current vs. Input Voltage (PQ05SZ1/PQ05SZ11)

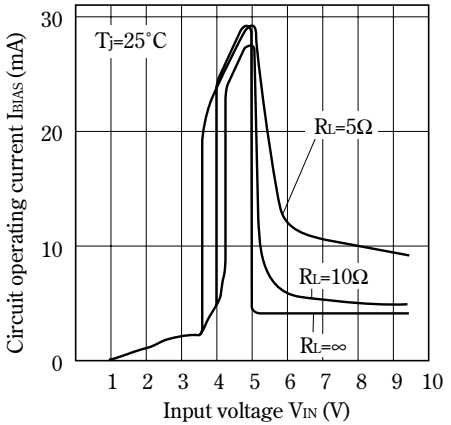


Fig.16 Circuit Operating Current vs. Input Voltage (PQ05SZ5/PQ05SZ51)

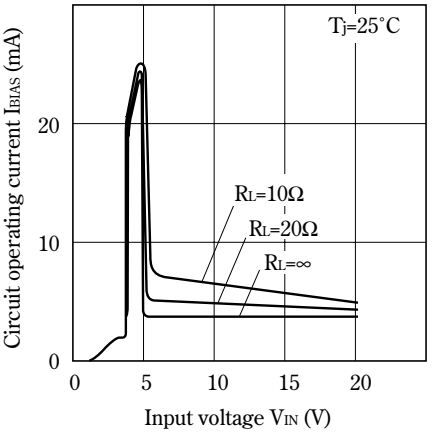


Fig.17 Circuit Operating Current vs. Input Voltage (PQ09SZ1/PQ09SZ11)

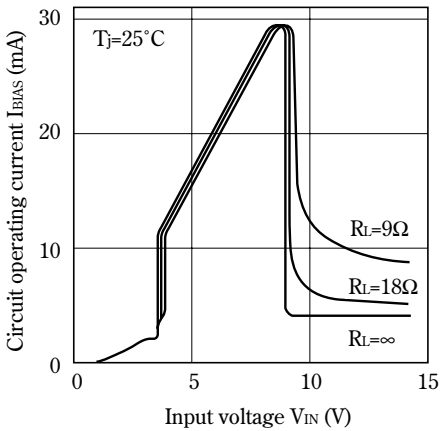


Fig.18 Circuit Operating Current vs. Input Voltage (PQ09SZ5/PQ09SZ51)

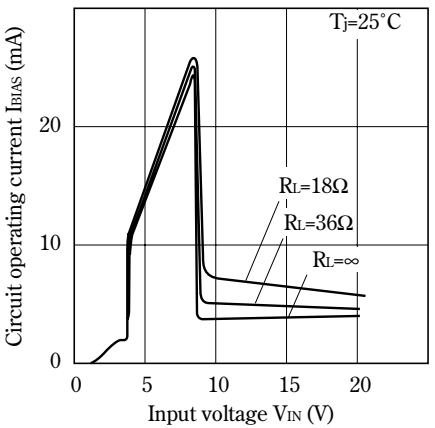


Fig.19 Circuit Operating Current vs. Input Voltage (PQ12SZ1/PQ12SZ11)

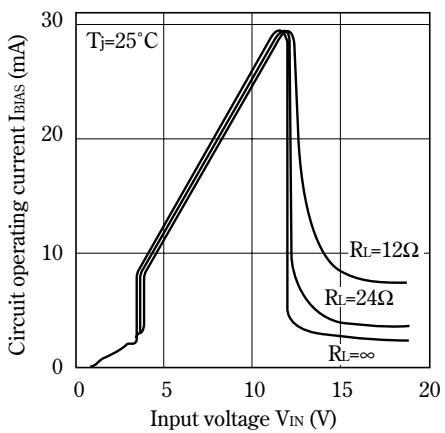


Fig.20 Circuit Operating Current vs. Input Voltage (PQ12SZ5/PQ12SZ51)

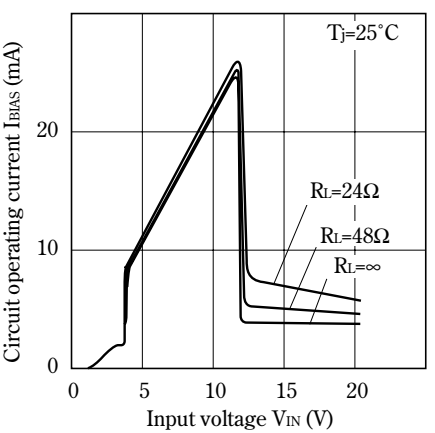


Fig.21 Quiescent Current vs. Junction Temperature
(PQ05SZ1/PQ05SZ11/PQ09SZ1/PQ09SZ11/PQ12SZ1/PQ12SZ11)

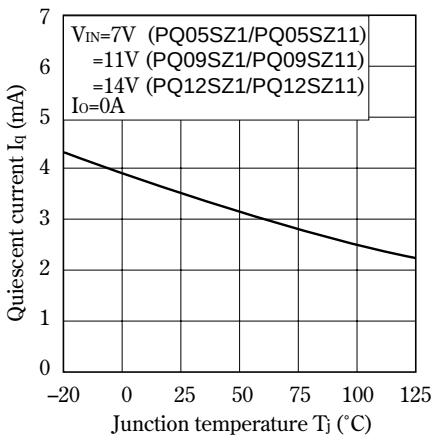


Fig.22 Ripple Rejection vs. Input Ripple Frequency
(PQ05SZ1/PQ05SZ11/PQ09SZ1/PQ09SZ11/PQ12SZ1/PQ12SZ11)

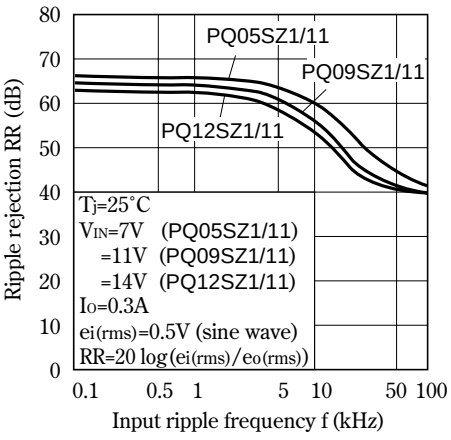


Fig.23 Ripple Rejection vs. Input Ripple Frequency
(PQ05SZ5/PQ05SZ51/PQ09SZ5/PQ09SZ51/PQ12SZ5/PQ12SZ51)

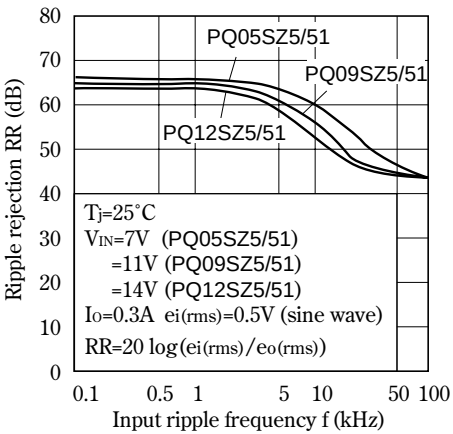


Fig.24 Ripple Rejection vs. Output Current (PQ05SZ1/11/ PQ09SZ1/11/ PQ12SZ1/11)

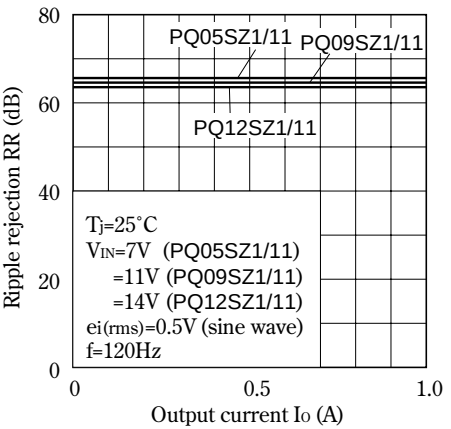


Fig.25 Ripple Rejection vs. Output Current (PQ05SZ5/51/ PQ09SZ5/51/ PQ12SZ5/51)

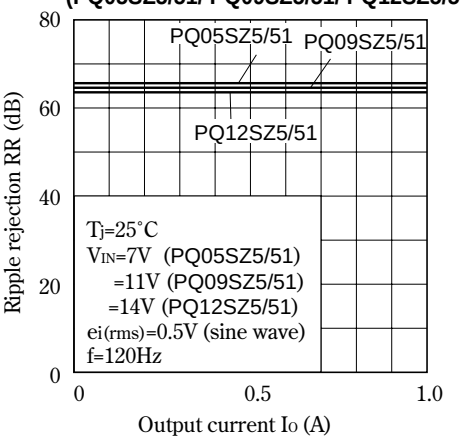


Fig.26 Input-Output Reverse Current vs. Input-Output Reverse Voltage

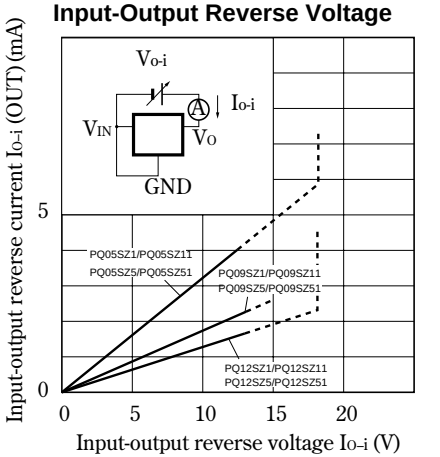


Fig.27 Power Dissipation vs. Ambient Temperature (Typical Value)

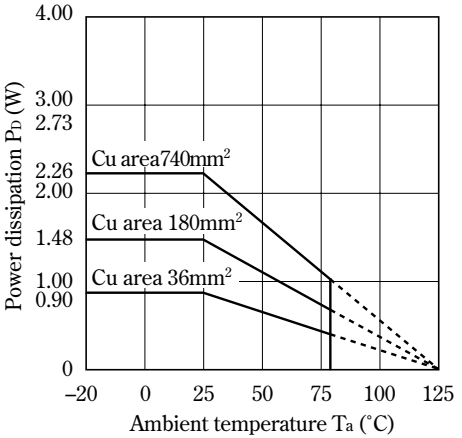
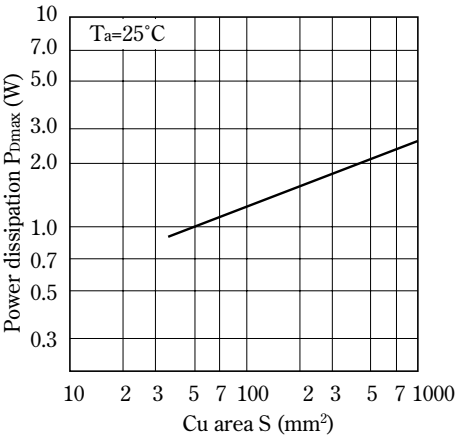
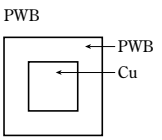


Fig.28 Power Dissipation vs. Cu Area





Material : Glass-cloth epoxy resin
Size : 50×50×1.6mm
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

NOTICE

- The circuit application examples in this publication are provided to explain representative applications of SHARP devices and are not intended to guarantee any circuit design or license any intellectual property rights. SHARP takes no responsibility for any problems related to any intellectual property right of a third party resulting from the use of SHARP's devices.
- Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device. SHARP reserves the right to make changes in the specifications, characteristics, data, materials, structure, and other contents described herein at any time without notice in order to improve design or reliability. Manufacturing locations are also subject to change without notice.
- Observe the following points when using any devices in this publication. SHARP takes no responsibility for damage caused by improper use of the devices which does not meet the conditions and absolute maximum ratings to be used specified in the relevant specification sheet nor meet the following conditions:

  (i) The devices in this publication are designed for use in general electronic equipment designs such as:
  --- Personal computers
  --- Office automation equipment
  --- Telecommunication equipment [terminal]
  --- Test and measurement equipment
  --- Industrial control
  --- Audio visual equipment
  --- Consumer electronics

  (ii) Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when SHARP devices are used for or in connection with equipment that requires higher reliability such as:
  --- Transportation control and safety equipment (i.e., aircraft, trains, automobiles, etc.)
  --- Traffic signals
  --- Gas leakage sensor breakers
  --- Alarm equipment
  --- Various safety devices, etc.

  (iii) SHARP devices shall not be used for or in connection with equipment that requires an extremely high level of reliability and safety such as:
  --- Space applications
  --- Telecommunication equipment [trunk lines]
  --- Nuclear power control equipment
  --- Medical and other life support equipment (e.g., scuba).

- Contact a SHARP representative in advance when intending to use SHARP devices for any "specific" applications other than those recommended by SHARP or when it is unclear which category mentioned above controls the intended use.
- If the SHARP devices listed in this publication fall within the scope of strategic products described in the Foreign Exchange and Foreign Trade Control Law of Japan, it is necessary to obtain approval to export such SHARP devices.
-
- Contact and consult with a SHARP representative if there are any questions about the contents of this publication.