PQ05RG1/PQ05RG11 Series

Low Power-Loss Voltage Regulators (Built-in Reverse Voltage Protection Function Between Input and Output)

■ Features

- Low power-loss (Dropout voltage : MAX. 0.5V)
- Compact resin full-mold package
- 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. (Vo-i ≦ 15V)
- Built-in ON/OFF control function

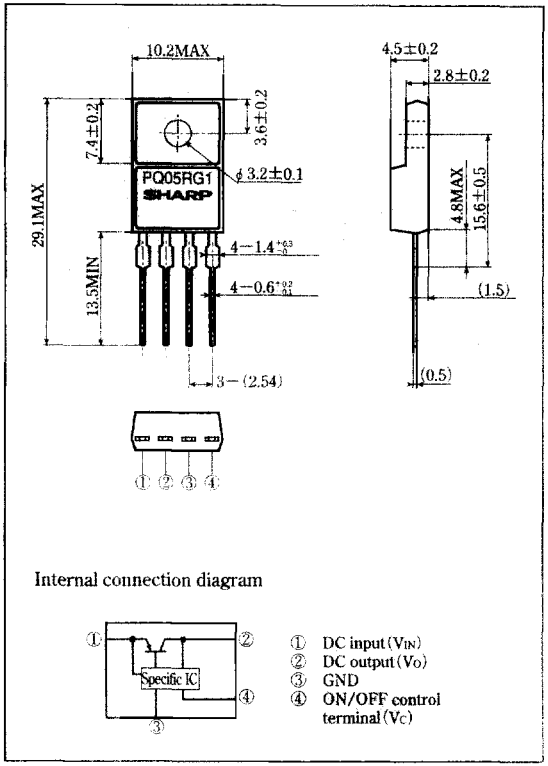
■ Applications

- Series power supply for various electronic equipment such as VCRs and musical instruments

■ Model Line-ups

Output voltage	5V output	9V output	12V output
Output voltage precision:± 5 %	PQ05RG1	PQ09RG1	PQ12RG1
Output voltage precision:±2.5%	PQ05RG11	PQ09RG11	PQ12RG11

■ Outline Dimensions (Unit : mm)



Internal connection diagram

① DC input (V_{IN})
② DC output (V_O)
③ GND
④ ON/OFF control terminal (V_C)

■ Absolute Maximum Ratings (T_a=25℃)

Parameter	Symbol	Rating	Unit
※1 Input voltage	V_{IN}	35	V
※1 ON/OFF control terminal voltage	V_C	35	V
※2 Input-output reverse voltage	V_{O-i}	15	V
Output current	I_O	1.0	A
Power dissipation(No heat sink)	P_{D1}	1.5	W
Power dissipation (With infinite heat sink)	P_{D2}	15	
※3 Junction temperature	T_j	150	℃
Operating temperature	T_{opr}	-20 to +80	℃
Storage temperature	T_{stg}	-40 to +150	℃
Soldering temperature	T_{sol}	260 (For 10s)	℃

※1 All are open except GND and applicable terminals.
※2 Vo terminal applicable voltage from external : Vo (characteristics value) to 25V
※3 Overheat protection may operate at 125≦Tj≦150℃

· Please refer to the chapter "Handling Precautions".

Notice In the absence of confirmation by device specification sheets, SHARP takes no responsibility for any defects that may occur in equipment using any SHARP devices shown in catalogs, data books, etc. Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device.
Internet Internet address for Electronic Components Group http://www.sharp.co.jp/ecg/

■ Electrical Characteristics

(Unless otherwise specified, condition shall be I_O=0.5A, T_a=25℃ *4)

Parameter		Symbol	Conditions		MIN.	TYP.	MAX.	Unit
Output voltage	PQ05RG1	V_O	V_{IN}= 7V	I_O=0.5A	4.75	5.0	5.25	V
	PQ09RG1		V_{IN}=11V		8.55	9.0	9.45	
	PQ12RG1		V_{IN}=14V		11.4	12.0	12.6	
	PQ05RG11		V_{IN}= 7V		4.88	5.0	5.12	
	PQ09RG11		V_{IN}=11V		8.78	9.0	9.22	
	PQ12RG11		V_{IN}=14V		11.7	12.0	12.3	
Load regulation		R_{egL}	*4		—	0.3	2.0	%
Line regulation		R_{egI}	I_O=5mA, *5		—	0.1	2.5	%
Temperature coefficient of output voltage		T_cV_O	I_O=5mA, T_j=0 to 125℃, *6		—	±0.01	—	%/℃
Ripple rejection		RR	Refer to Fig. 2		45	60	—	dB
Dropout voltage		V_{i-O}	*7, I_O=0.5A		—	0.2	0.5	V
*8 ON-state voltage for control		$V_{C(ON)}$	*6, I_O=0.5A		2.0	—	—	V
ON-state current for current		$I_{C(ON)}$	*6, I_O=0.5A, V_C=2.7V		—	—	20	μA
OFF-state voltage for control		$V_{C(OFF)}$	*6		—	—	0.8	V
OFF-state current for control		$I_{C(OFF)}$	*6, V_O=0.4A		—	—	-0.4	mA
Quiescent current		I_q	I_O=0A, *6		—	6.0	10.0	mA

*4 PQ05RG1/11:V_{IN}= 7V, I_O=5mA to 1.0A
PQ09RG1/11:V_{IN}=11V, I_O=5mA to 1.0A
PQ12RG1/11:V_{IN}=14V, I_O=5mA to 1.0A

*5 PQ05RG1/11:V_{IN}= 6 to 16V
PQ09RG1/11:V_{IN}=10 to 20V
PQ12RG1/11:V_{IN}=13 to 23V

*6 PQ05RG1/11:V_{IN}= 7V
PQ09RG1/11:V_{IN}=11V
PQ12RG1/11:V_{IN}=14V

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

*8 In case of opening control terminal ④, output voltage turns on.

Fig. 1 Test Circuit

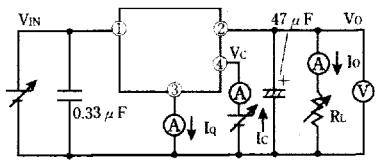
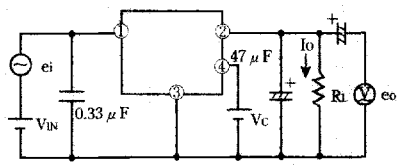
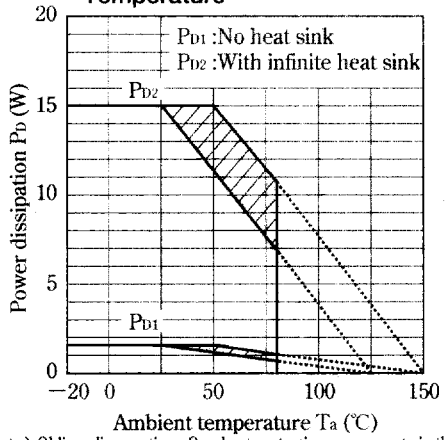


Fig. 2 Test Circuit of Ripple Rejection



f=120Hz (sine wave)
ei=0.5Vrms
V_{IN}= 7V (PQ05RG1/PQ05RG11)
V_{IN}=11V (PQ09RG1/PQ09RG11)
V_{IN}=14V (PQ12RG1/PQ12RG11)
I_O=0.5A
RR=20 log (ei/eo)

Fig. 3 Power Dissipation vs. Ambient Temperature



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

Fig. 4 Overcurrent Protection Characteristics (Typical Value)

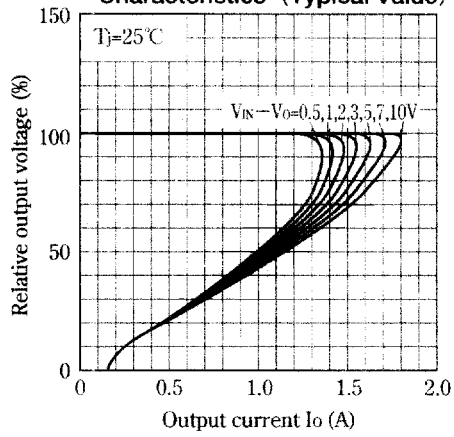


Fig. 5 Overcurrent Protection Characteristics (Typical Value)

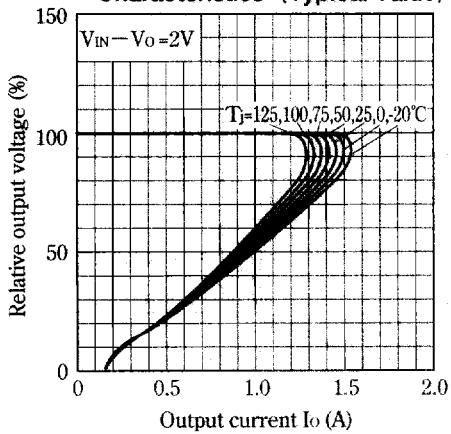


Fig. 6 Output Voltage Deviation vs. Junction Temperature (PQ05RG1/11)

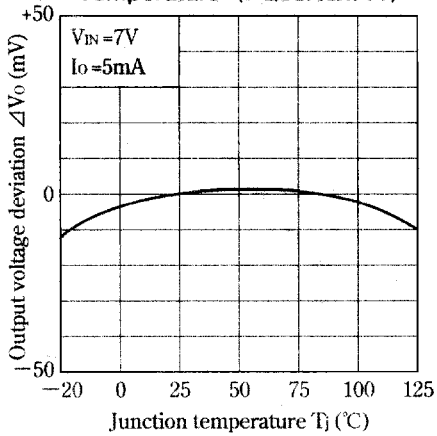


Fig. 7 Output Voltage Deviation vs. Junction Temperature (PQ09RG1/11)

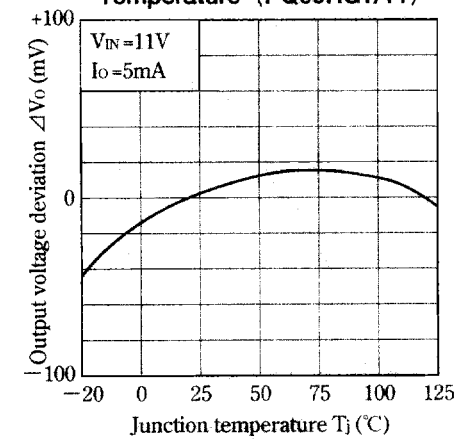


Fig. 8 Output Voltage Deviation vs. Junction Temperature (PQ12RG1/11)

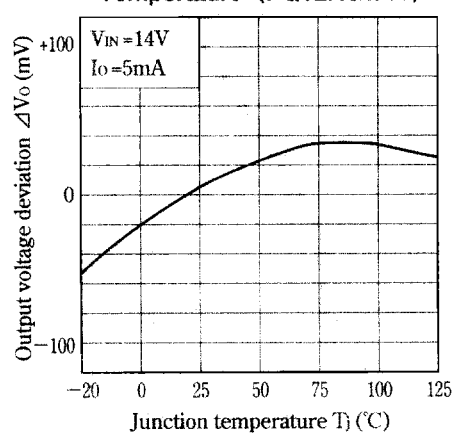


Fig. 9 Output Voltage vs. Input Voltage (PQ05RG1/11)

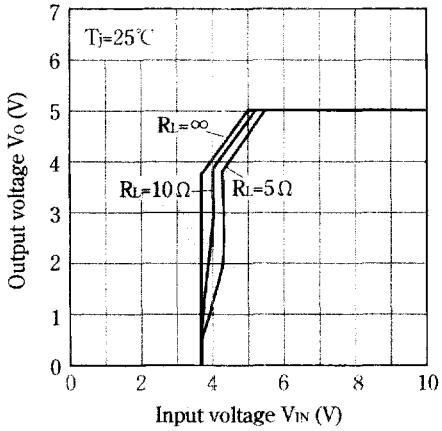


Fig.10 Output Voltage vs. Input Voltage (PQ09RG1/11)

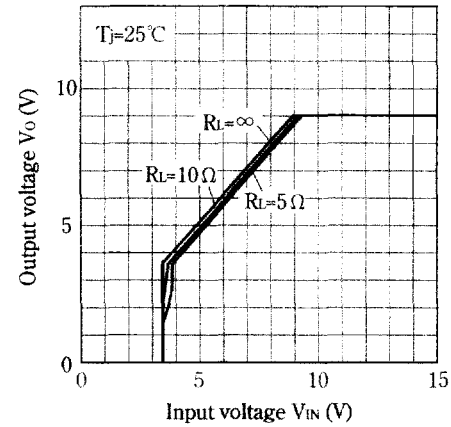


Fig.11 Output Voltage vs. Input Voltage (PQ12RG1/11)

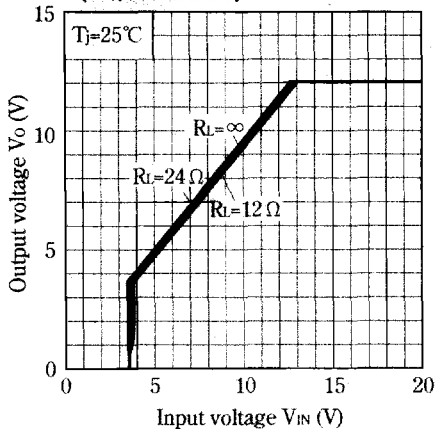


Fig.12 Circuit Operating Current vs. Input Voltage (PQ05RG1/11)

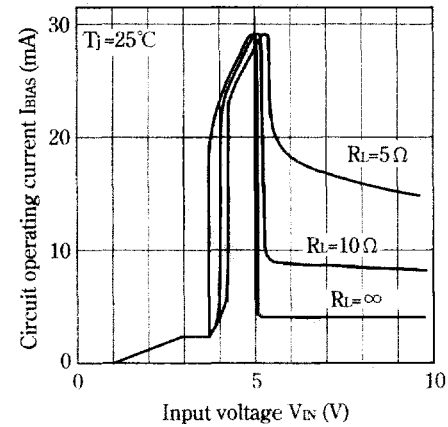


Fig.13 Circuit Operating Current vs. Input Voltage (PQ09RG1/11)

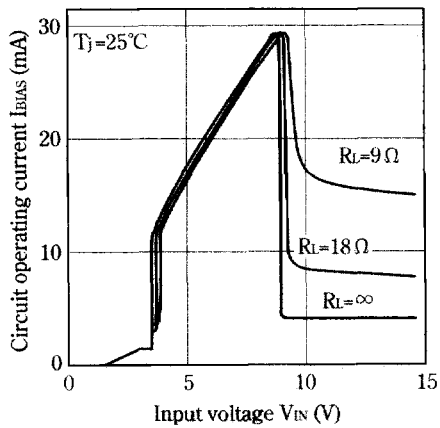


Fig.14 Circuit Operating Current vs. Input Voltage (PQ12RG1/11)

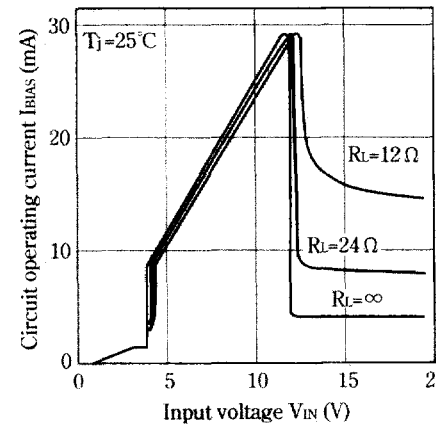


Fig.15 Dropout Voltage vs. Junction Temperature

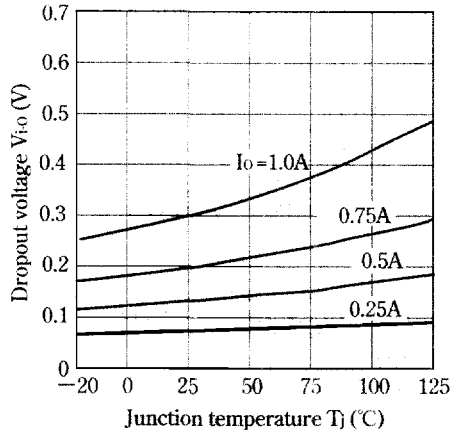


Fig.16 Quiescent Current vs. Input Voltage (PQ05RG1/11)

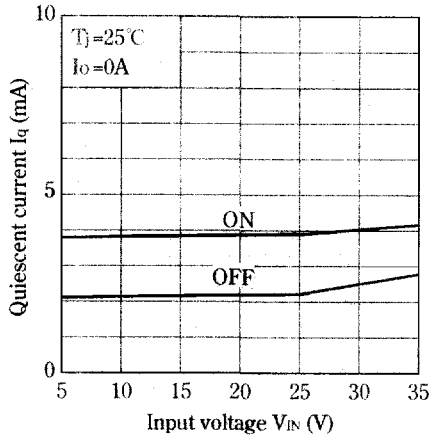


Fig.17 Quiescent Current vs. Input Voltage (PQ09RG1/11)

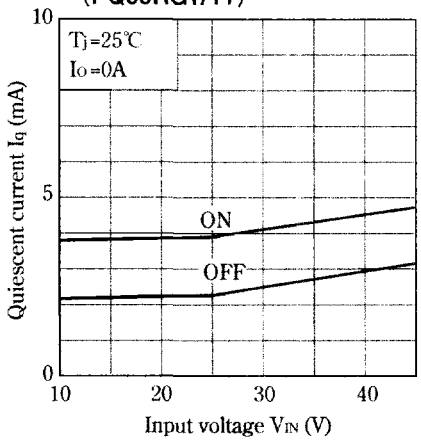


Fig.18 Quiescent Current vs. Input Voltage (PQ12RG1/11)

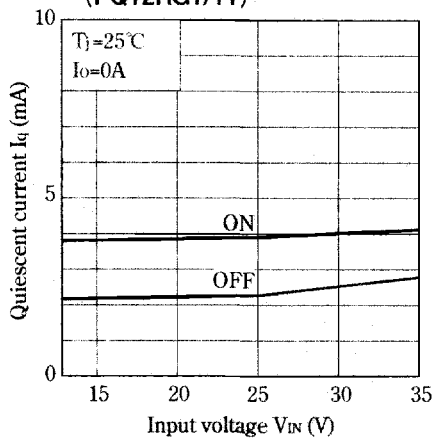


Fig.19 Quiescent Current vs. Junction Temperature

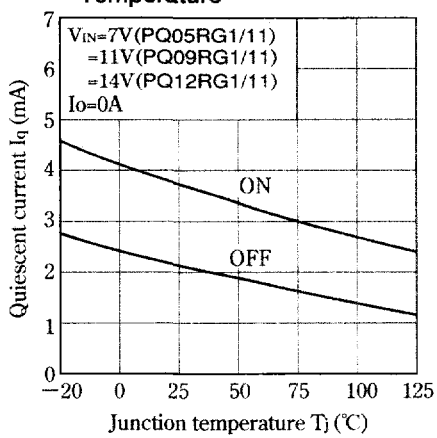


Fig.20 Ripple Rejection vs. Output Current

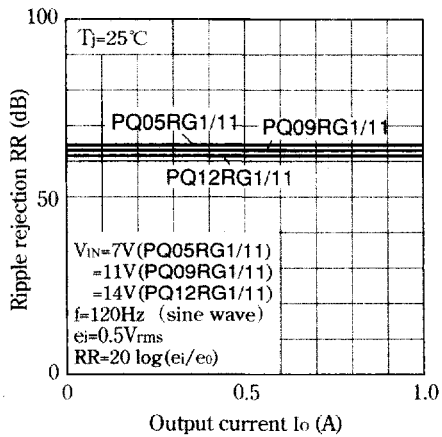


Fig.21 Ripple Rejection vs. Input Ripple Frequency

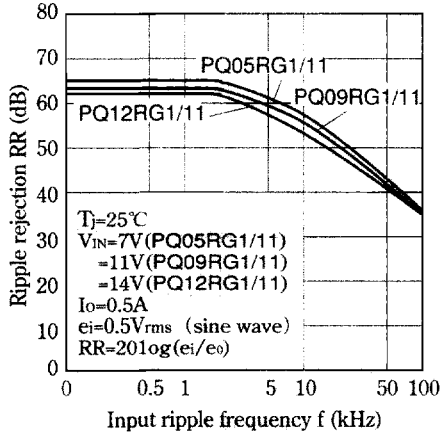


Fig.22 Input-Output Reverse Current vs. Input-Output Reverse Voltage

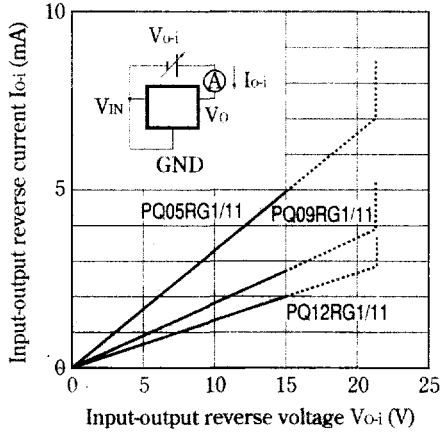
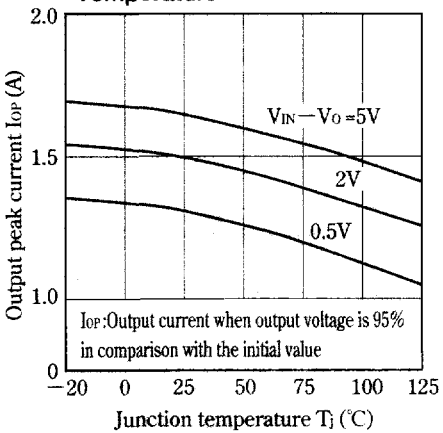



Fig.23 Output Peak Current vs. Junction Temperature