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. ($V_{O\text{-}i}$=<15V)
- Built-in ON/OFF control function

■ Applications

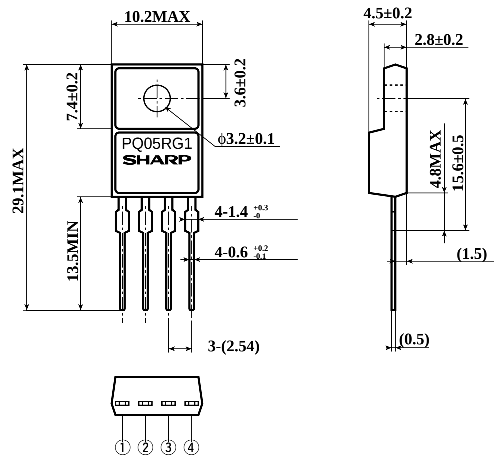
- Series power supply for various electronic equipment such as VCRs and musical instruments

■ Model Line-ups

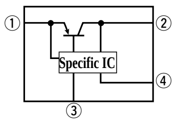
Output voltage	5V output	9V output	12V output
Output voltage precision:±5%	PQ05RG1	PQ09RG1	PQ12RG1
Output voltage precision:±2.5%	PQ05RG11	PQ09RG11	PQ12RG11

■ 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˚C)

	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	$V_{O\text{-}i}$	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	˚C
	Operating temperature	T_{opr}	-20 to +80	˚C
	Storage temperature	T_{stg}	-40 to +150	˚C
	Soldering temperature	T_{sol}	260 (For 10s)	˚C

*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=<T_j=<150˚C

· Please refer to the chapter“ Handling Precautions ”.

■ Electrical Characteristics

(Unless otherwise specified, condition shall be I_O=0.5A,T_a=25˚C*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		$R_{eg}L$	*4		-	0.3	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		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

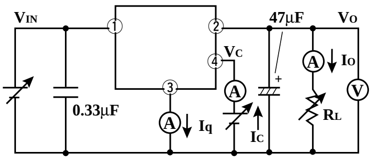
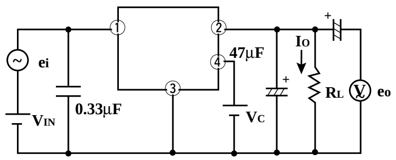
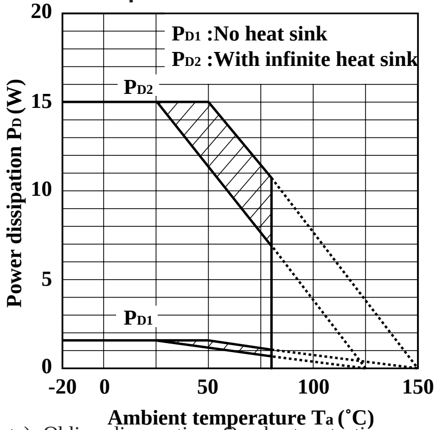


Fig.2 Test Circuit of Ripple Rejection



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

Fig.3 Power Dissipation vs. Ambient Temperature



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

Fig.4 Overcurren Protection Characteristics (Typical Value)

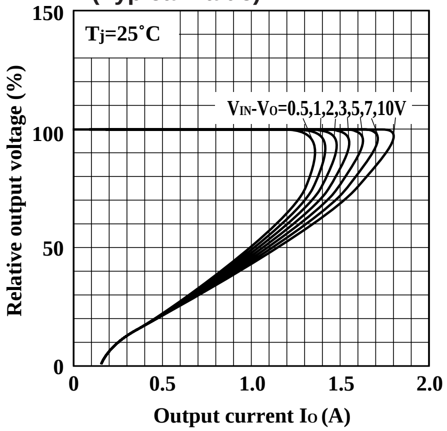


Fig.5 Overcurrent Protection Characteristics (Typical Value)

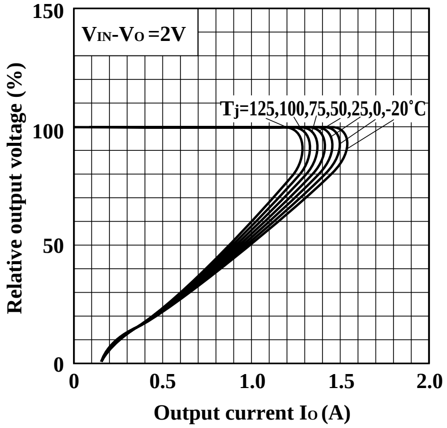


Fig.6 Output Voltage Deviation vs. Junction Temperature (PQ05RG1/11)

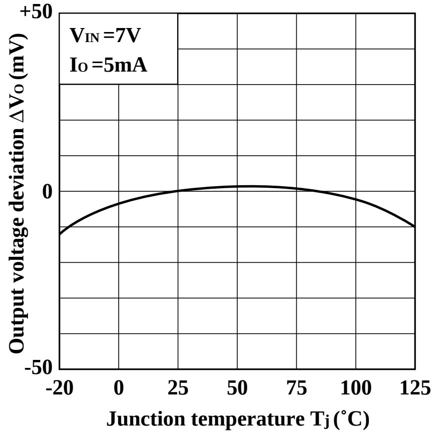


Fig.7 Output Voltage Deviation vs. Junction Temperature (PQ09RG1/11)

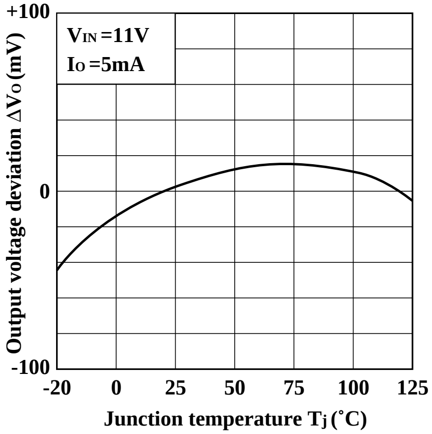


Fig.8 Output Voltage Deviation vs. Junction Temperature (PQ12RG1/11)

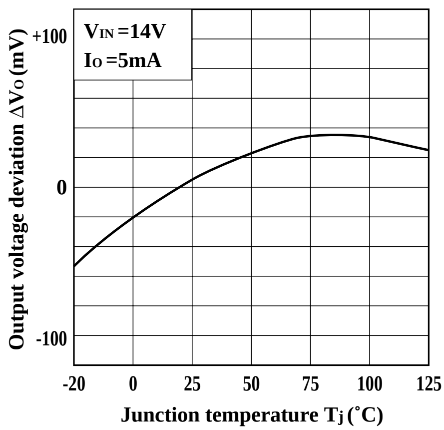


Fig.9 Output Voltage vs. Input Voltage (PQ05RG1/11)

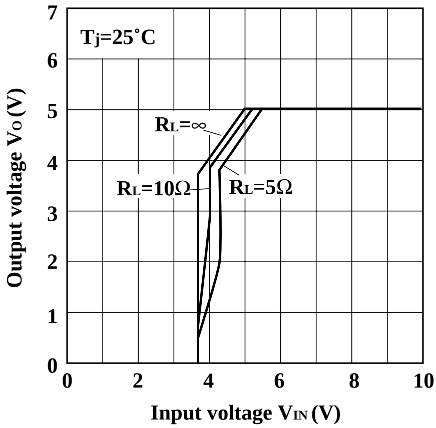


Fig.10 Output Voltage vs. Input Voltage (PQ09RG1/11)

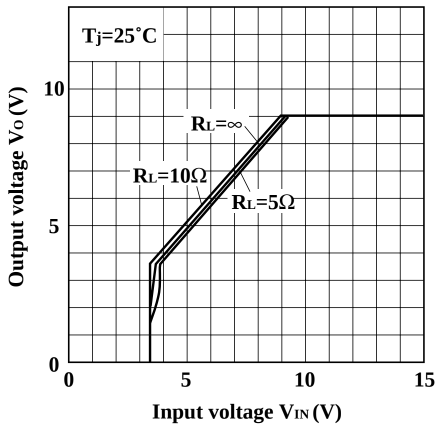


Fig.11 Output Voltage vs. Input Voltage (PQ12RG1/11)

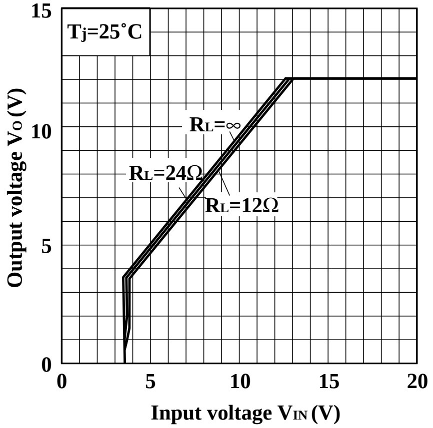


Fig.12 Circuit Operating Current vs. Input Voltage (PQ05RG1/11)

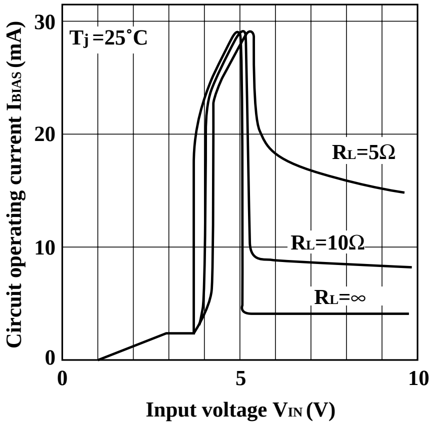


Fig.13 Circuit Operating Current vs. Input Voltage (PQ09RG1/11)

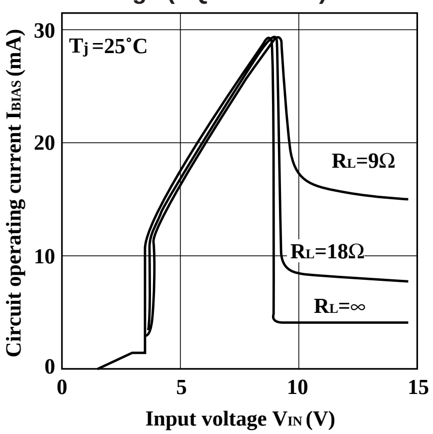


Fig.14 Circuit Operating Current vs. Input Voltage (PQ12RG1/11)

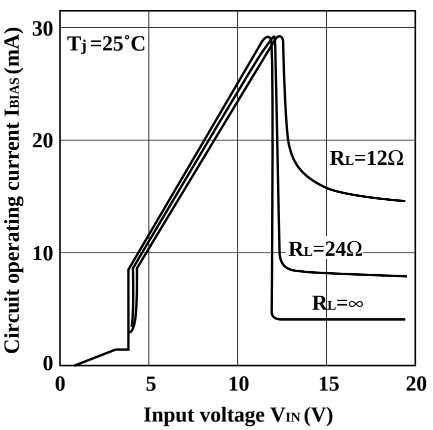


Fig.15 Dropout Voltage vs. Junction Temperature

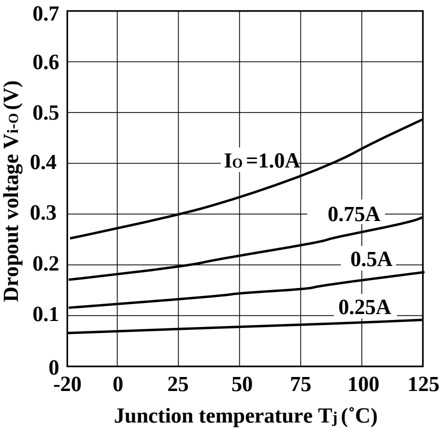


Fig.16 Quiescent Current vs. Input Voltage (PQ05RG1/11)

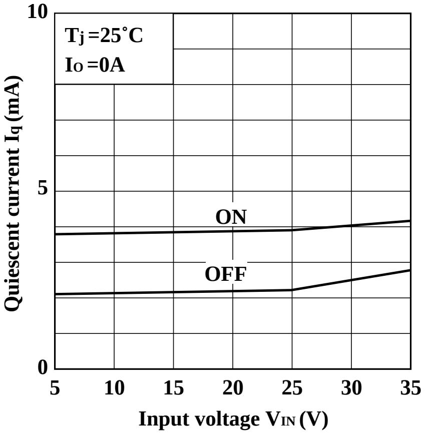


Fig.17 Quiescent Current vs. Input Voltage (PQ09RG1/11)

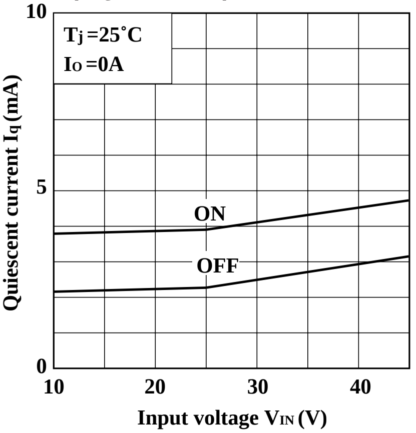


Fig.18 Quiescent Current vs. Input Voltage (PQ12RG1/11)

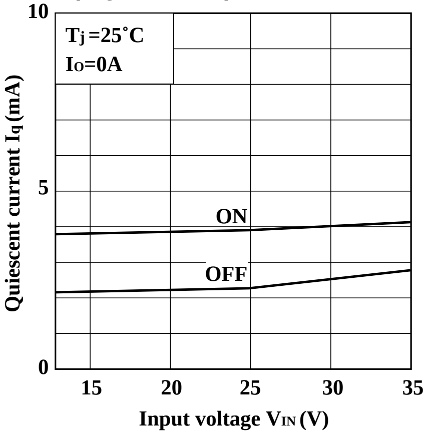


Fig.19 Quiescent Current vs. Junction Temperature

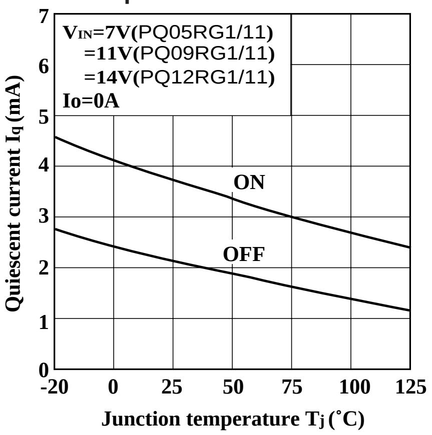


Fig.20 Ripple Rejection vs. Output Current

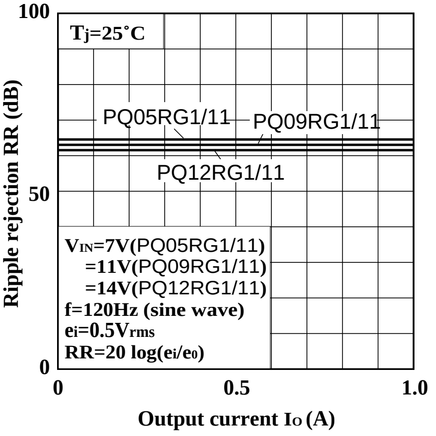


Fig.21 Ripple Rejection vs. Input Ripple Frequency

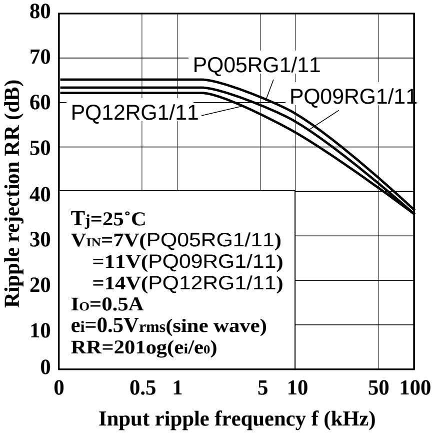


Fig.22 Input-Output Reverse Current vs. Input-Output Reverse Voltage

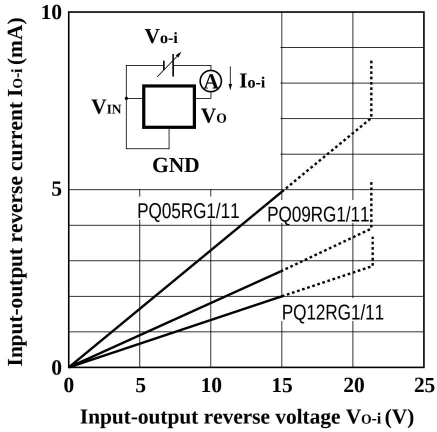


Fig.23 Output Peak Current vs. Junction Temperature