PQ05RF12/13 Series

1A Output, Low Power-Loss Voltage Regulators Considering Power Line Voltage Drop

■ General Description

The sharp's PQ05RF12/PQ05RF13 series low power-loss voltage regulators provide 1A output and employ the compact resin full-mold package. They are multi-function regulators with overcurrent protection function and overheat protection function. They are best suited to constant voltage power supply for various electronic equipment such as VCRs.

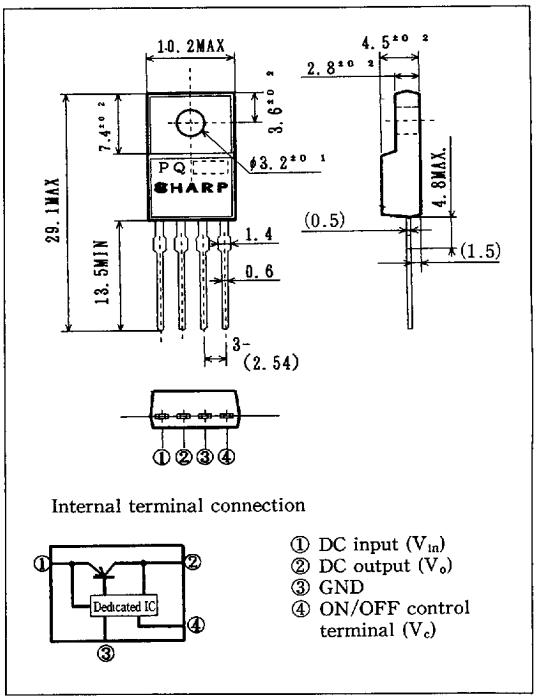
■ Features

(1) Low power-loss (voltage difference between input and output : MAX. 0.5V)
(2) Compact resin full-mold package
(3) Output voltage value (5.3V, 9.3V, 12.3V) with an allowance for power line voltage drop
(4) The high-precision output voltage models are also available. (output voltage precision: ±2.5%)
(5) Built-in ON/OFF control function.

■ Model Line-ups

	5.3V output	9.3V output	12.3V output
Output voltage precision:±5%	PQ05RF12	PQ09RF12	PQ12RF12
Output voltage precision: ±2.5%	PQ05RF13	PQ09RF13	PQ12RF13

■ Outline Dimensions (Unit : mm)



■ Applications

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

■ Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Rating	Unit
*1Input voltage	V_{in}	35	V
*1ON/OFF control terminal voltage	V_c	35	V
Output corrent	I_o	1	A
Power dissipation	Pd1	1.5	W
	Pd2	15	W
*2Junction temperature	Tj	150	°C
Operating temperature	T_{opr}	−20 to + 80	°C
Storage temperature	T_{stg}	−40 to +150	°C
*3Soldering temperature	T_{sol}	260	°C

*1 All are open except GND and applicable terminals.
*2 Over heat protection opetates at Tj>125°C *3 For 10 s
Pd1: No heat sink
Pd2: With infinite heat sink

■ Electrical Characteristics

Unless otherwise specified condition shall be $\left\{\begin{array}{ll} V_{in}= 8V, I_o=0.5A & \text{(PQ05RF12/PQ05RF13)} \\ V_{in}=12V, I_o=0.5A & \text{(PQ09RF12/PQ09RF13)} \\ V_{in}=15V, I_o=0.5A & \text{(PQ12RF12/PQ12RF13)} \end{array}\right.$ (Ta=25°C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output voltage	PQ05RF12	V_o	—	5.04	5.3	5.56	V
	PQ09RF12			8.84	9.3	9.76	
	PQ12RF12			11.69	12.3	12.91	
	PQ05RF13			5.17	5.3	5.43	
	PQ09RF13			9.07	9.3	9.53	
	PQ12RF13			12.0	12.3	12.6	
Load regulation		$R_{eg}L$	I_o=5mA to 1A	—	0.1	2.0	%
Line regulation	PQ05RF12/13	$R_{eg}I$	V_{in}=7 to 17V	—	0.5	2.5	%
	PQ09RF12/13		V_{in}=11 to 21V				
	PQ12RF12/13		V_{in}=14 to 24V				
Temperature coefficient of output voltage		T_cV_o	Tj=0 to 125°C	—	±0.02	—	%/°C
Ripple rejection		RR	Refer to Fig. 2	45	55	—	dB
Dropout voltage		V_{I-O}	*4	—	—	0.5	V
ON-state voltage for control		$V_{c(on)}$	*5	2.0	—	—	V
ON-state current for control		$I_{c(on)}$	V_c=2.7V	—	—	20	μA
OFF-state voltage for control		$V_{c(off)}$	—	—	—	0.8	V
OFF-state current for control		$I_{c(off)}$	V_c=0.4V	—	—	−0.4	mA
Quiescent current		I_q	I_o=0A	—	—	10	mA

*4 Input voltage shall be the value when output voltage is 95% in comparison with the initial value.
*5 In case of opening control terminal, output voltage turns on.

Fig. 1 Test Circuit

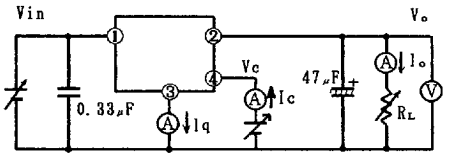


Fig. 2 Test Circuit of Ripple Rejection

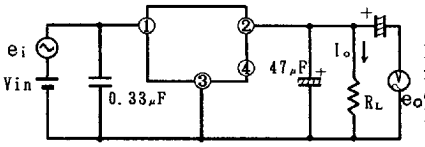


Fig. 3 Internal Dissipation vs. Ambient Temperature

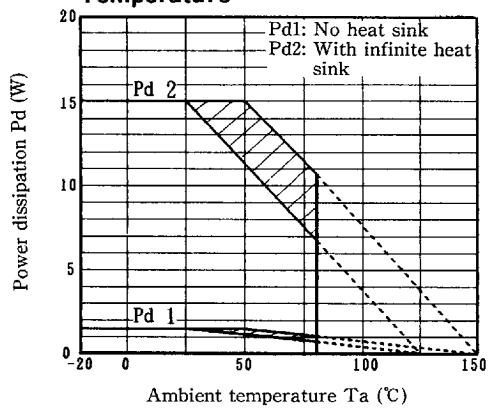
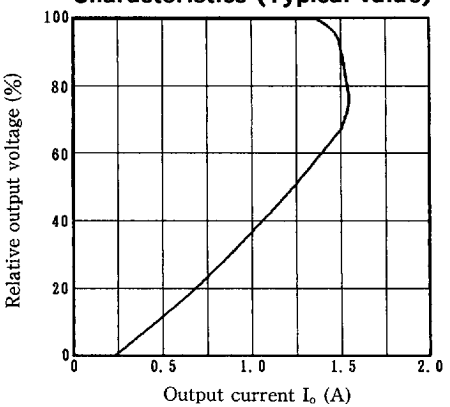


Fig. 4 Overcurrent Protection Characteristics (Typical value)



(Note) Oblique line portion
: Operating area of overheat protection

Fig. 5 Output Voltage Deviation vs. Junction Temperature (PQ05RF12/PQ05RF13)

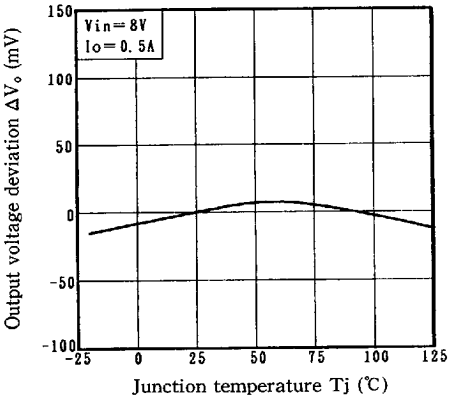


Fig. 6 Output Voltage Deviation vs. Junction Temperature (PQ09RF12/PQ09RF13)

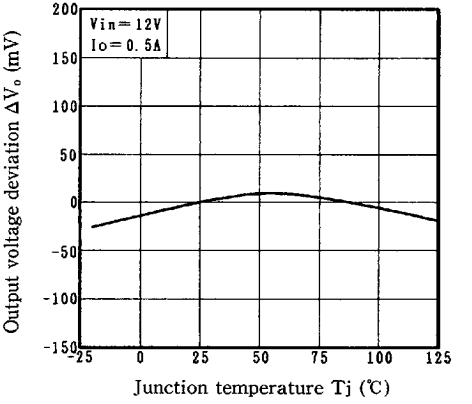


Fig. 7 Output Voltage Deviation vs. Junction Temperature (PQ12RF12/PQ12RF13)

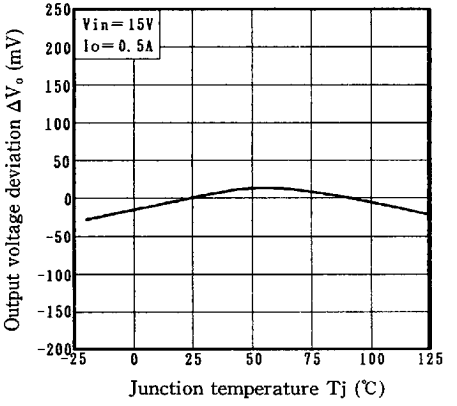


Fig. 8 Output Voltage vs. Input Voltage (PQ05RF12/PQ05RF13)

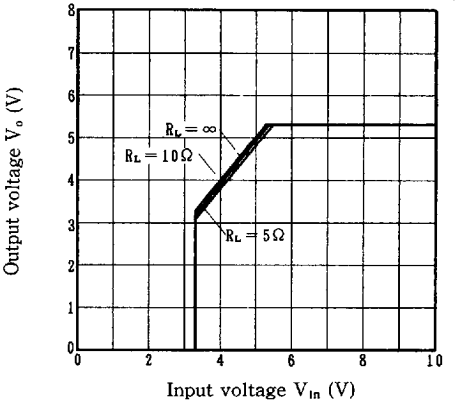


Fig. 9 Output Voltage vs. Input Voltage (PQ09RF12/PQ09RF13)

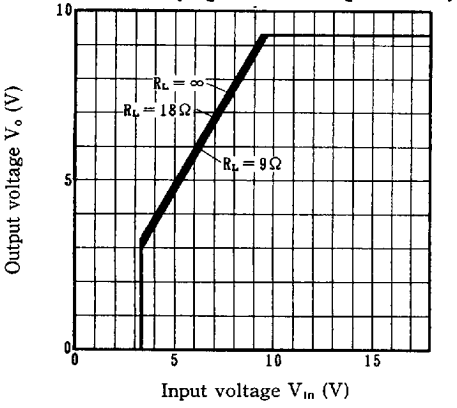


Fig. 10 Output Voltage vs. Input Voltage (PQ12RF12/PQ12RF13)

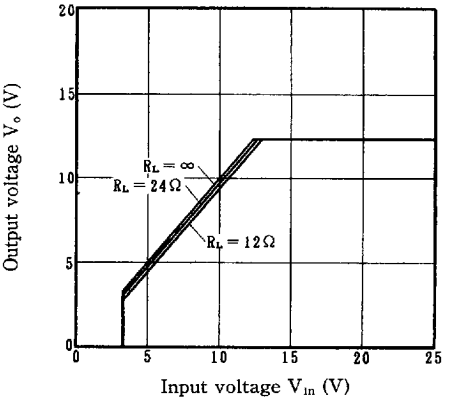


Fig. 11 Circuit Operating Current vs. Input Voltage (PQ05PF12/PQ05RF13)

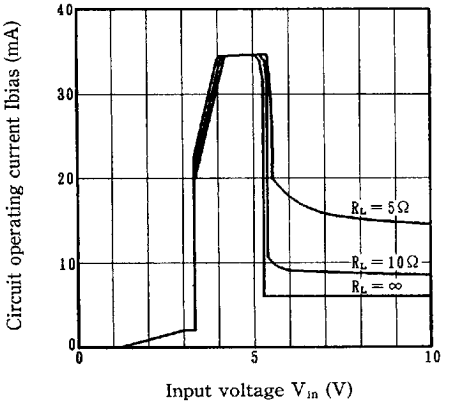


Fig. 12 Circuit Operating Current vs. Input Voltage (PQ09RF12/PQ09RF13)

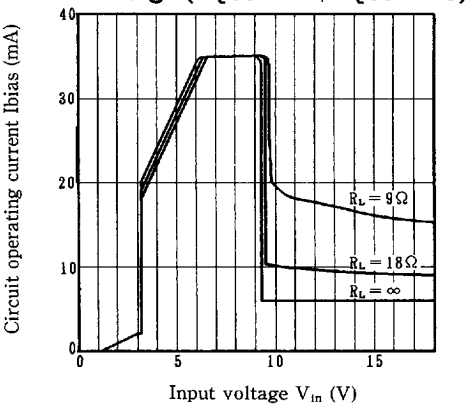


Fig. 13 Circuit Operating Current vs. Input Voltage (PQ12RF12/PQ12RF13)

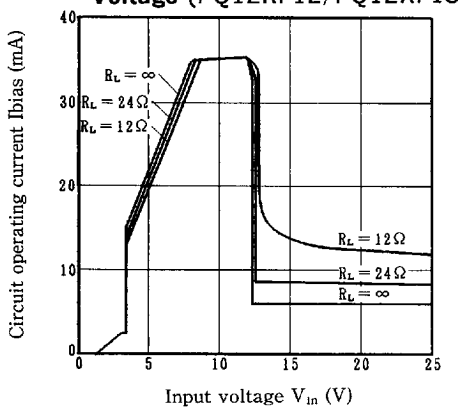


Fig. 14 Dropout Voltage vs. Junction Temperature

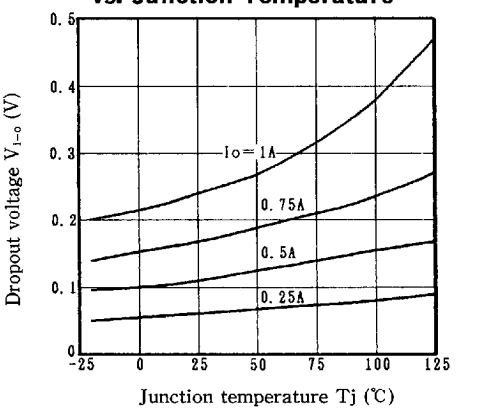


Fig. 15 Quiescent Current vs. Junction Temperature

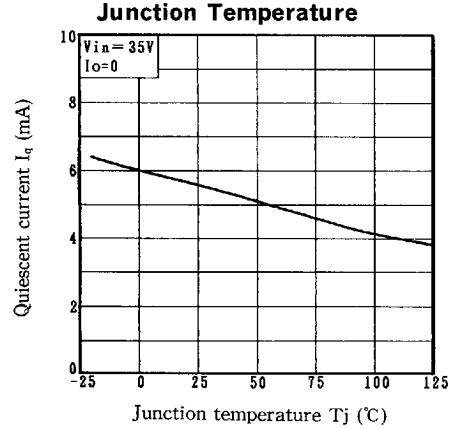


Fig. 16 Ripple Rejection vs. Input Ripple Frequency

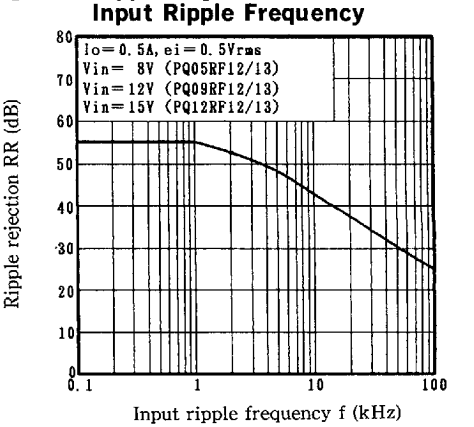


Fig. 17 Ripple Rejection vs. Output Current

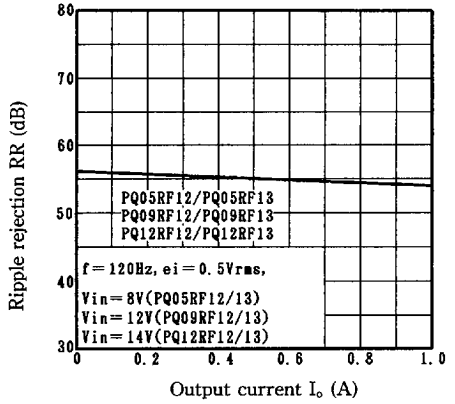


Fig. 18 Output Peak Current vs. Dropout Voltage

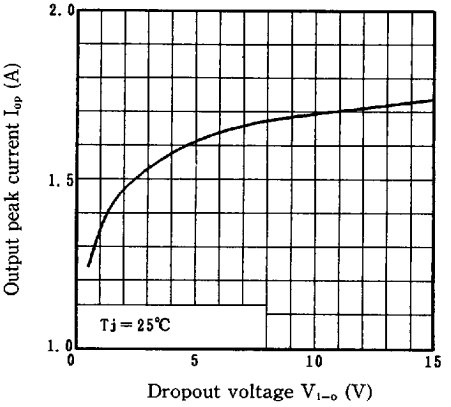
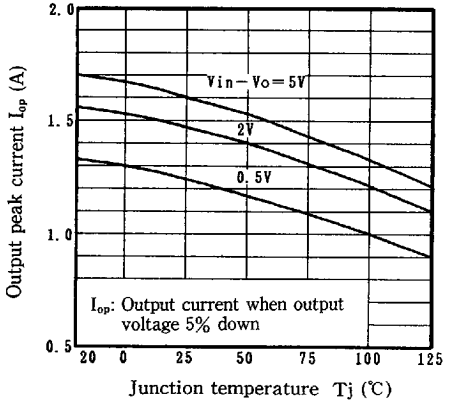
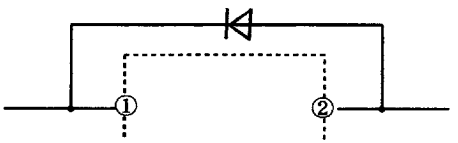


Fig. 19 Output Peak Current vs. Junction Temperature



■ Precautions for Use

If voltage exceeding the voltage of DC input terminal ① is applied to the output terminal ②, the element may be damaged, Especially when the DC input terminal ① is short-circuited to GND in ordinary operating state, the output terminal voltage rises above the voltage of DC input terminal, charges accumulated in the output capacitor Co flow to the input side, causing damage to the element. In this case connect the ordinary silicon diode as shown in the figure.



Note:
The specification is subject to change for improvement.
Cares when handling:
Be sure to observe the requirements described in the specification and data book.