

# PQ05RH1/PQ05RH11 Series

1.5A output, Low Power-Loss Voltage Regulators

## ■ Features

- Low power-loss (Dropout voltage : MAX. 0.5V)
- Compact resin full-mold package
- Built-in ON/OFF\* control terminal
- High-precision output (output voltage precision :  $\pm 2.5\%$ ) (PQ05RH11 Series)

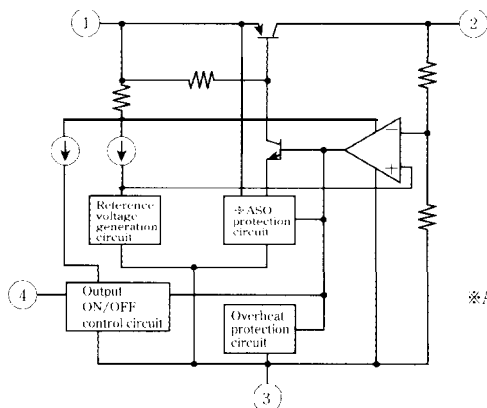
## ■ Applications

- Series power supply for various electronic equipment such as VCRs and OA equipment.

## ■ Model Line-ups

output voltage	5V output	9V output	12V output
output voltage precision: $\pm 5\%$	PQ05RH1	PQ09RHI	PQ12RH1
output voltage precision: $\pm 2.5\%$	PQ05RH11	PQ09RHI 1	PQ12RH11

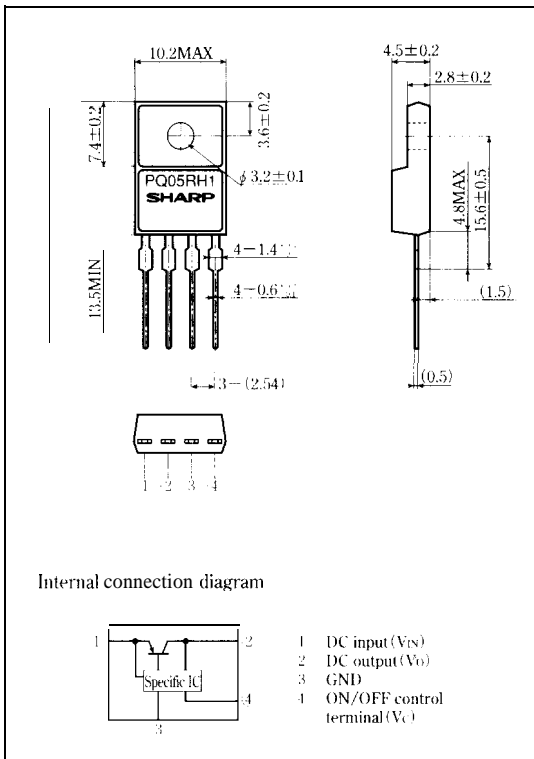
## Equivalent Circuit Diagram



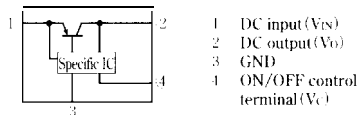
\*ASO Area of Safety Operation

## ■ Outline Dimensions

(Unit: mm)



Internal connection diagram



\* Please refer to the chapter "Handling Precautions"

**Absolute Maximum Ratings**

( $T_a=25\text{ }^\circ\text{C}$ )

Parameter	Symbol	Rating	Unit
*1 Input voltage	$V_{IN}$	35	V
*1 ON/OFF <sup>†</sup> control terminal voltage	$V_C$	35	V
output current	$I_O$	1.5	A
Power dissipation (No heat sink)	$P_{D1}$	1.5	W
Power dissipation (With infinite heat sink)	$P_{D2}$	18	W
*2 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	$T_{sol}$	260 (For 10s)	$^\circ\text{C}$

\*1 All are open except GND and applicable terminals.

\*2 Overheat protection may operate at  $125 \leq T_j \leq 150\text{ }^\circ\text{C}$ .

**Electrical Characteristics**

(Unless otherwise specified condition shall be  $I_O=0.5\text{A}$ ,  $T_a=25\text{ }^\circ\text{C}$ \*)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
output voltage	$V_O$		4.75	<b>5.0</b>	5.25	V
			8.55	9.0	9.45	
			11.4	12.0	12.6	
			4.88	5.0	5.12	
			8.78	9.0	9.22	
			11.7	12.0	12.3	
Load regulation	$R_{gL}$	$I_O=5\text{mA}$ to 1.5A		0.3	<b>2.0</b>	%
Line regulation	$R_{eG}$	*4		0.5	2.5	%
Temperature coefficient of output voltage	$T_C V_O$	$T_j=0$ to $125\text{ }^\circ\text{C}$		$\pm 0.02$		$\% / ^\circ\text{C}$
Ripple rejection	RR	Refer to Figs.2	45	55		dB
Dropout voltage	$V_{i-o}$	*5			<b>0.5</b>	V
ON-state voltage for control	$V_C(\text{ON})$		2.0	*6		V
ON-state current for control	$I_C(\text{ON})$	$V_C=2.7\text{V}$			20	$\mu\text{A}$
OFF-state voltage for control	$V_C(\text{OFF})$				0.8	V
OFF-state current for control	$I_C(\text{OFF})$	$V_C=0.4\text{V}$			<b>-0.4</b>	MA
Quiescent current	$I_Q$	$k=0$			10	MA

\*1 PQ05RH1 series:  $V_{IN}=7\text{V}$ , PQ09RH1 series:  $V_{IN}=15\text{V}$ , PQ12RH1 series:  $V_{IN}=18\text{V}$

\*4 PQ05RH1/PQ05RH11:  $V_{IN}=6$  to  $12\text{V}$

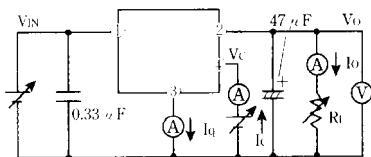
PQ09RH1/PQ09RH11:  $V_{IN}=10$  to  $25\text{V}$

PQ12RH1/PQ12RH11:  $V_{IN}=13$  to  $29\text{V}$

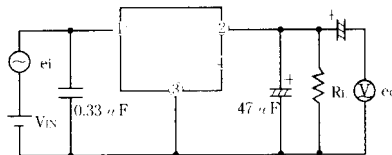
\*5 Input voltage shall be the value when output voltage is 95% in comparison with the initial value.

\*6 In case of opening control terminal 1, output voltage turns on.

**Fig. 1 Test Circuit**



**Fig. 2 Test Circuit of Ripple Rejection**

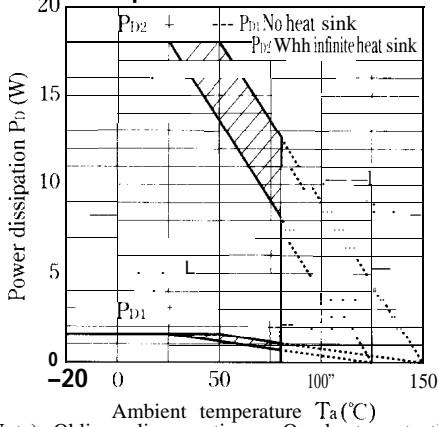


$f=120\text{Hz}$  (sine wave)

$e_i=0.5V_{rms}$

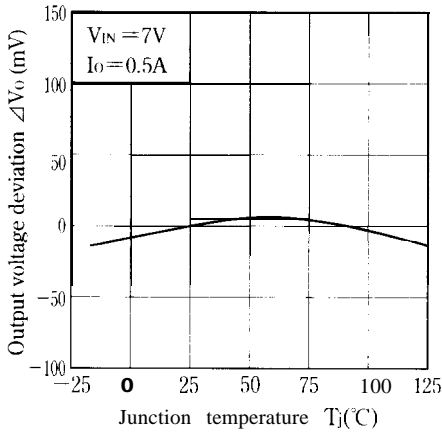
$RR=20 \log(e_i/e_o)$

**Fig. 3 Power Dissipation vs. Ambient Temperature**

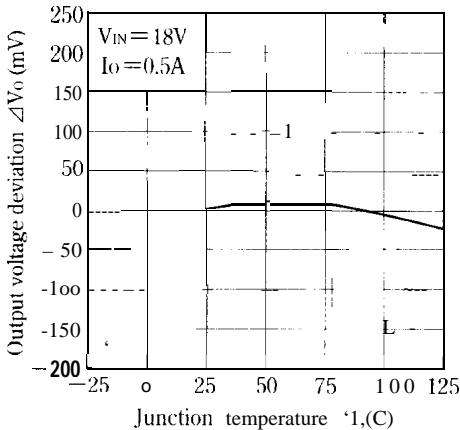


Note) Oblique line portion : Overheat protection may operate in this area.

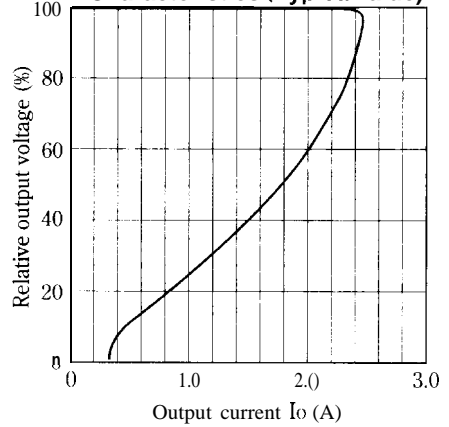
**Fig. 5 Output Voltage Deviation vs. Junction Temperature (PQ05RHI/PQ05RHI 1 )**



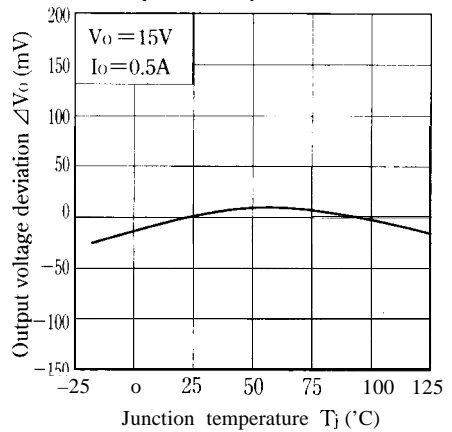
**Fig. 7 Output Voltage Deviation vs. Junction Temperature (PQ12RH1/PQ12RH1 1 )**



**Fig. 4 Overcurrent Protection Characteristics (Typical value)**



**Fig. 6 Output Voltage Deviation vs. Junction Temperature (PQ09RHI/PQ09RHI 1 )**



**Fig. 8 Output Voltage vs. Input Voltage (PQ05RH1/PQ05RH11)**

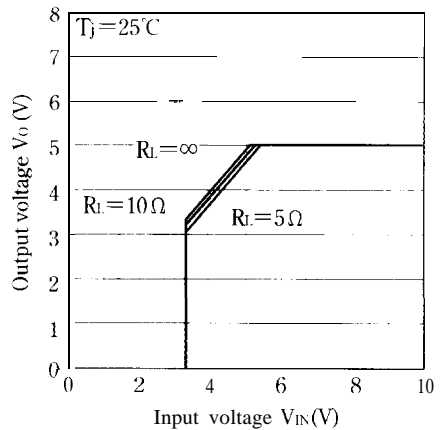


Fig. 9 Output Voltage vs. Input Voltage (PQ09RH1/PQ09RH11)

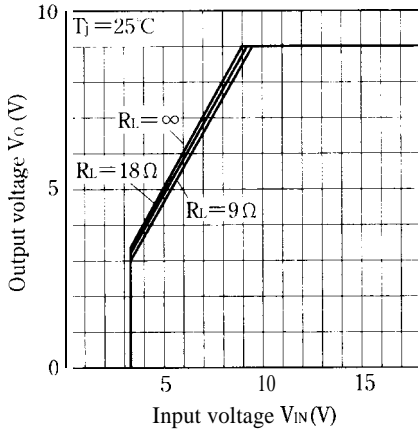


Fig.10 Output Voltage vs. Input Voltage (PQ12RH1/PQ12RH11)

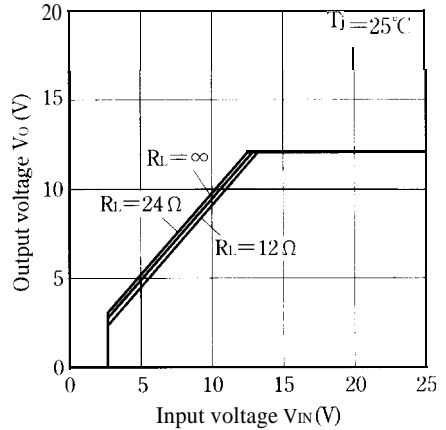


Fig.11 Circuit Operating Current vs. Input Voltage (PQ05RH1/PQ05RH11)

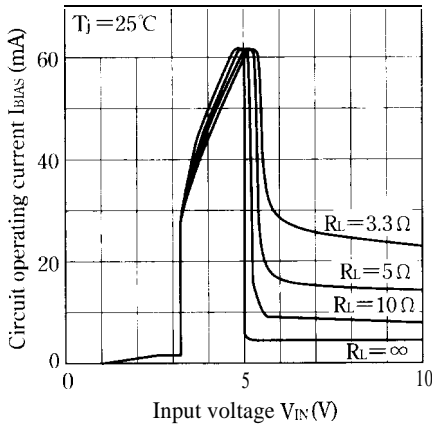


Fig.12 Circuit Operating Current vs. Input Voltage (PQ09RH1/PQ09RH11)

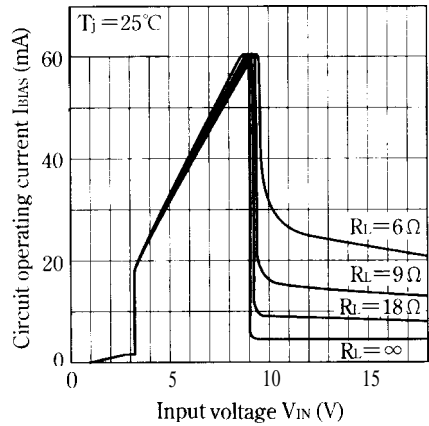


Fig.13 Circuit Operating Current vs. Input Voltage (PQ12RH1/PQ12RH11)

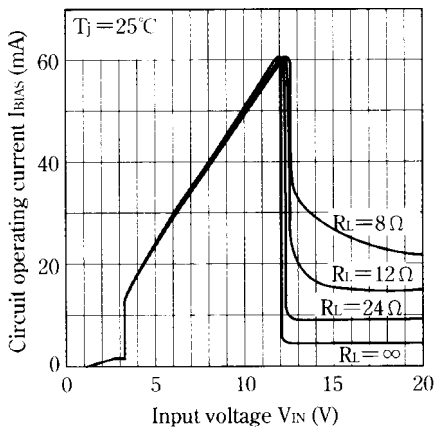


Fig.14 Dropout Voltage vs. Junction Temperature

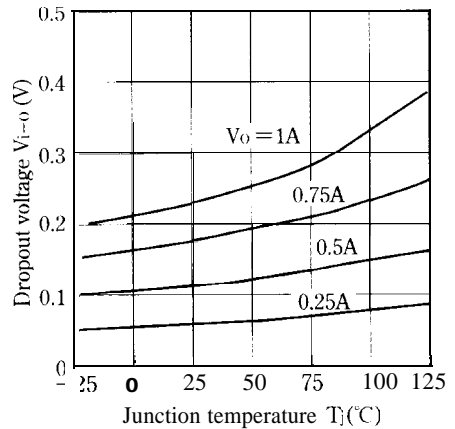


Fig.15 Quiescent Current vs. Junction Temperature

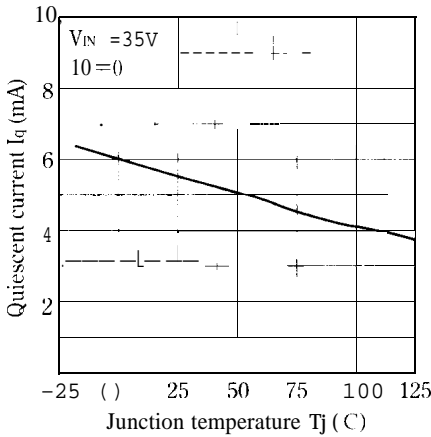


Fig.16 Repple Rejection vs. Input Ripple Frequency

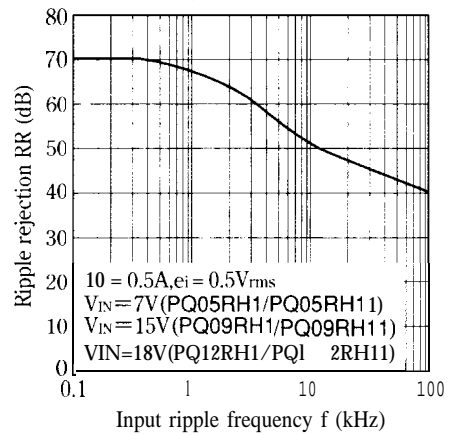


Fig.17 Ripple Rejection vs. Output Current

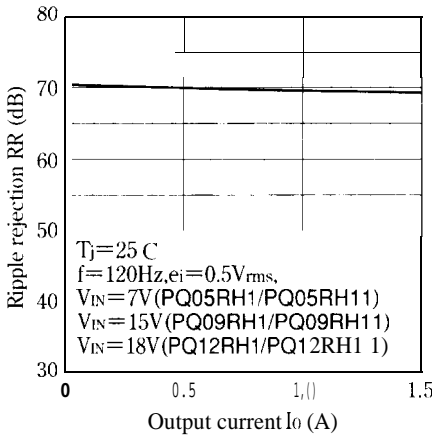
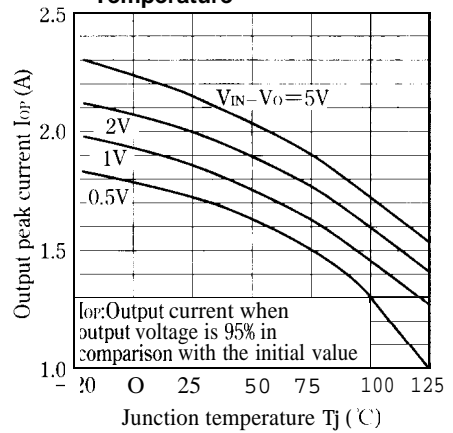
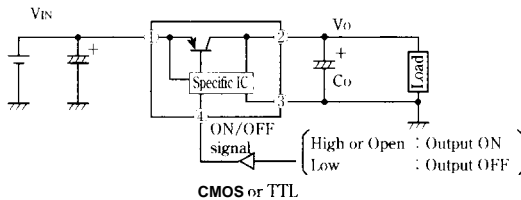


Fig.18 Output Peak Current vs. Junction Temperature



■ Typical Application

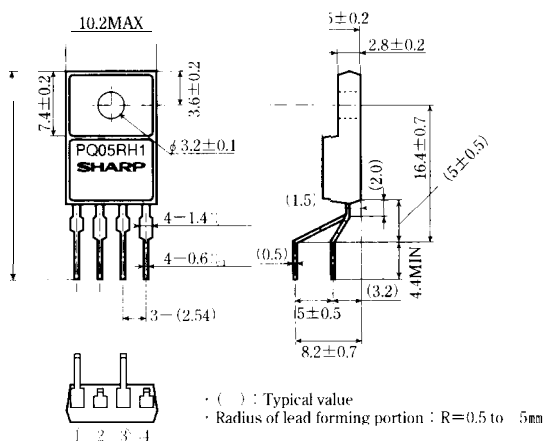


■ Model Line-ups for Lead Forming Type

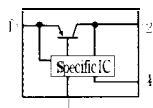
Output voltage	5V Output	9V Output	12V Output
Output voltage precision: $\pm 5\%$	PQ05RH1A	PQ09RH1A	PQ12RH1A
Output voltage precision: $\pm 2.5\%$	PQ05RH1B	PQ09RH1B	PQ12RH1B

■ Outline Dimensions (PQ05RH1A/PQ05RH1B Series)

(Unit: mm)



Internal connection diagram



- 1 : DC input (Vin)
- 2 : DC output (Vo)
- 4 : GND
- 1 : ON/OFF control terminal (Vc)

Note) The value of absolute maximum ratings and electrical characteristics is same as ones of PQ05RH 1/11 series.