

# PQ05NF1 Series

1A Output, General Purpose Low Power-Loss Voltage Regulators

## ■ Features

- TO-220 package
- Low power-loss (Dropout voltage : MAX.0.5V)  
[Applying the voltage exceeding  $V_o+2.5V$  to control terminal]
- Built-in ON/OFF control function
- Output voltage precision :  $\pm 4\%$

## ■ Applications

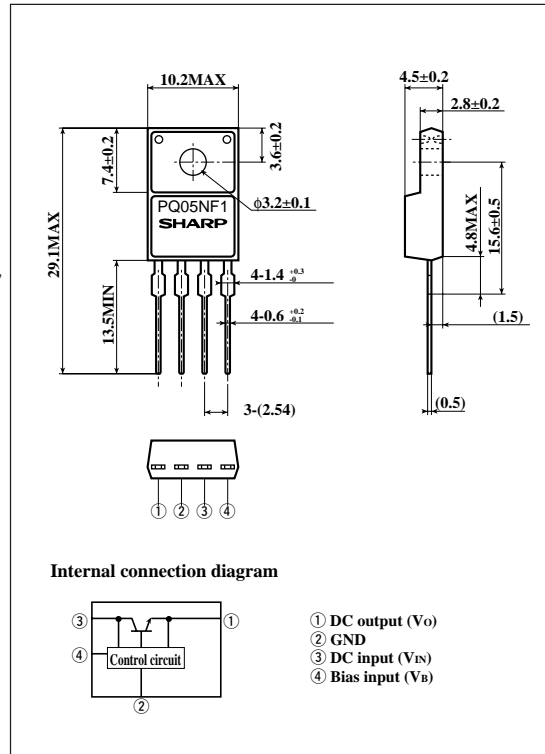
- Power supplies for various electronic equipment such as TVs, VCRs, CD stereos etc.

## ■ Model Line-ups

5V output	9V output	12V output
PQ05NF1	PQ09NF1	PQ12NF1

## ■ Outline Dimensions

(Unit : mm)



## ■ Absolute Maximum Ratings

( $T_a=25^\circ C$ )

Parameter	Symbol	Rating	Unit
*1 Input voltage	$V_{IN}$	24	V
*1 Bias supply voltage	$V_B$	24	V
Output current	$I_o$	1	A
Power dissipation (No heat sink)	$P_{D1}$	1.4	W
Power dissipation (With infinite heat sink)	$P_{D2}$	14	W
*2 Junction temperature	$T_j$	150	$^\circ C$
Operating temperature	$T_{opr}$	-20 to +85	$^\circ C$
Storage temperature	$T_{stg}$	-40 to +150	$^\circ C$
Soldering temperature	$T_{sol}$	260 (For 10s)	$^\circ C$

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

\*2 Overheat protection may operate at  $125 < T_j < 150^\circ C$

· Please refer to the chapter " Handling Precautions ".

**SHARP**

" 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 version of the device specification sheets before using any SHARP's device. "

■ Electrical Characteristics

(Unless otherwise specified,  $I_o=0.5A^{(I_3)^3/I_4}/T_a=25^{\circ}C$ )

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output voltage	$V_o$	$V_{IN}=7V$	4.8	5.0	5.2	V
		$V_{IN}=11V$	8.64	9.0	9.36	
		$V_{IN}=14V$	11.52	12.0	12.48	
Load regulation	$R_{egL}$	$I_o=5mA$ to 1A	-	-	2.0	%
Line regulation	$R_{egI}$	<sup>*5,*6</sup>	-	-	2.0	%
Temperature coefficient of output voltage	$T_{CVo}$	$T_j=0$ to $125^{\circ}C$	-	-	-	%/ $^{\circ}C$
Ripple rejection	$RR_1$	Refer to Fig.2	45	-	-	dB
	$RR_2$	Refer to Fig.3	45	-	-	dB
Dropout voltage	$V_{i-o}$	<sup>*7</sup> , $V_B \geq V_o + 2.5V$	-	-	0.5	V
Bias inflow current	$I_{B1}$	$V_{IN}=V_o+1V$	-	-	15	mA
Bias limitation current	$I_B(I)$	$V_{IN}=0$ to 24V, $V_B=0$ to 24V	-	-	40	mA
Ground current	$I_g$	$I_o=0A$	-	3.5	8	mA
OFF-state bias supply voltage	$V_B(OFF)$		-	-	0.8	V

\*3 PQ05NF1:  $V_{IN}=7V$ , PQ09NF1:  $V_{IN}=11V$ , PQ12NF1:  $V_{IN}=14V$

\*4 PQ05NF1:  $V_B=8V$ , PQ09NF1:  $V_B=12V$ , PQ12NF1:  $V_B=15V$

\*5 PQ05NF1:  $V_{IN}=6V$  to 16V, PQ09NF1:  $V_{IN}=10V$  to 20V, PQ12NF1:  $V_{IN}=13V$  to 23V

\*6 PQ05NF1:  $V_B=8V$  to 24V, PQ09NF1:  $V_B=12V$  to 24V, PQ12NF1:  $V_B=15V$  to 24V

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

Fig.1 Test Circuit

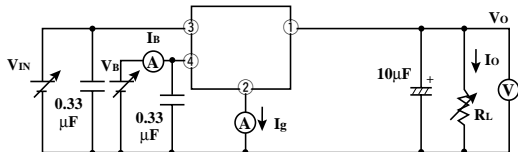
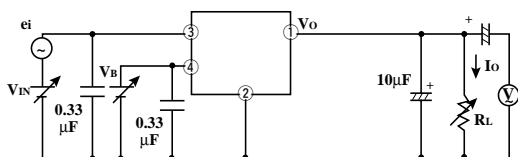
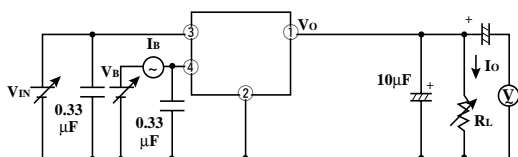


Fig.2 Test Circuit of Ripple Rejection(1)



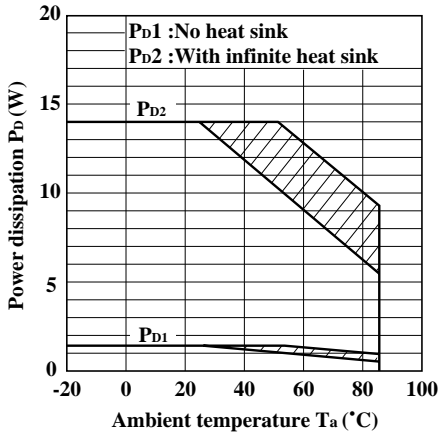
$f=120Hz$  (Sine wave)  
 $I_o=0.5A$   
 $e_i=0.5V_{rms}$   
 $RR=20 \log (e_i/e_o)$

Fig.3 Test Circuit of Ripple Rejection(2)



$f=120Hz$  (Sine wave)  
 $I_o=0.5A$   
 $e_i=0.5V_{rms}$   
 $RR=20 \log (e_i/e_o)$

Fig.4 Power Dissipation vs. Ambient Temperature



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

Fig.5 Output Voltage vs. Input Voltage (PQ05NF1) (Typical value)

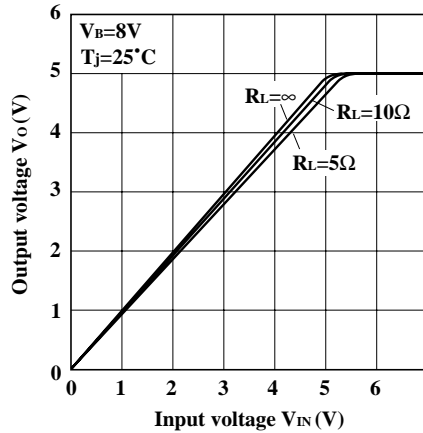


Fig.6 Output Voltage vs. Input Voltage (PQ09NF1) (Typical value)

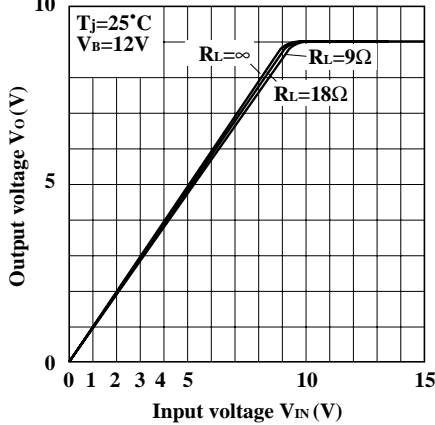


Fig.7 Output Voltage vs. Input Voltage (PQ12NF1) (Typical value)

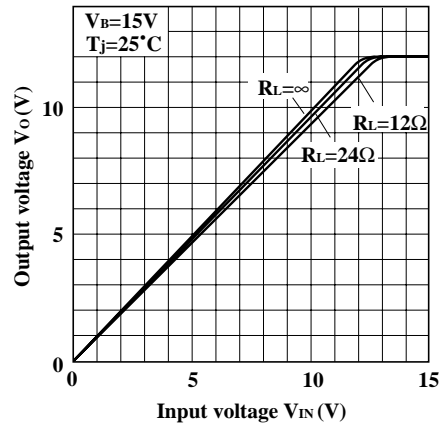


Fig.8 Output Voltage vs. Bias Supply Voltage (PQ05NF1) (Typical value)

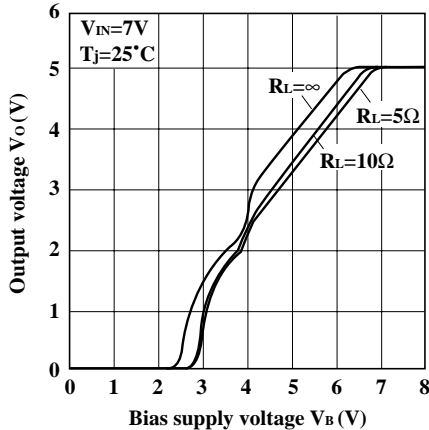


Fig.9 Output Voltage vs. Bias Supply Voltage (PQ09NF1) (Typical value)

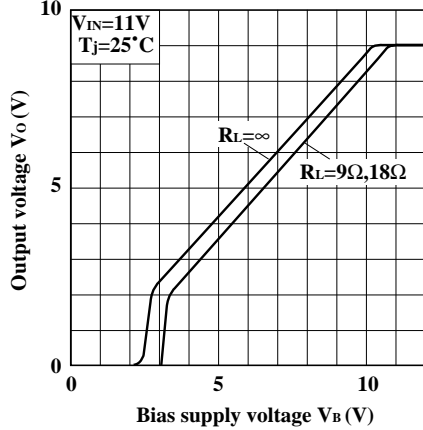


Fig.10 Output Voltage vs. Bias Supply Voltage (PQ12NF1) (Typical value)

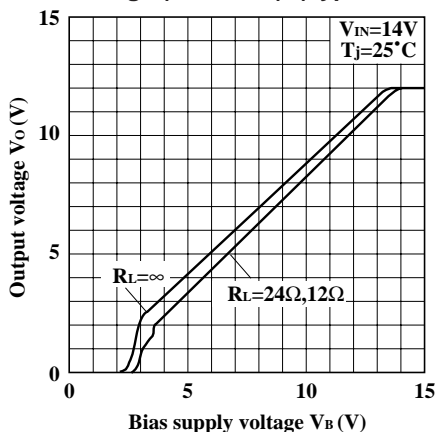


Fig.11 Bias Supply Current vs. Input Voltage (PQ05NF1) (Typical value)

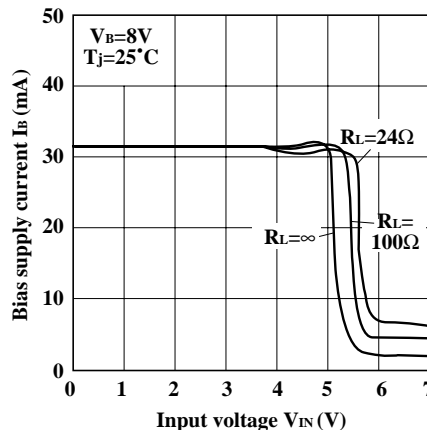


Fig.12 Bias Supply Current vs. Input Voltage (PQ09NF1) (Typical value)

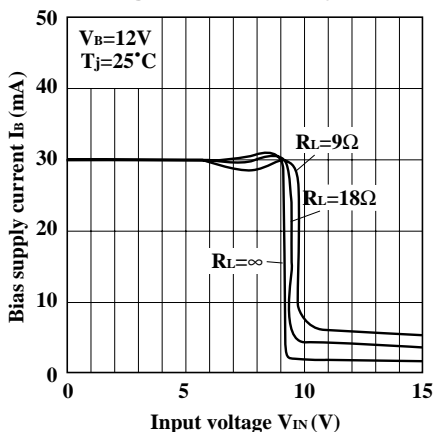


Fig.13 Bias Supply Current vs. Input Voltage (PQ12NF1) (Typical value)

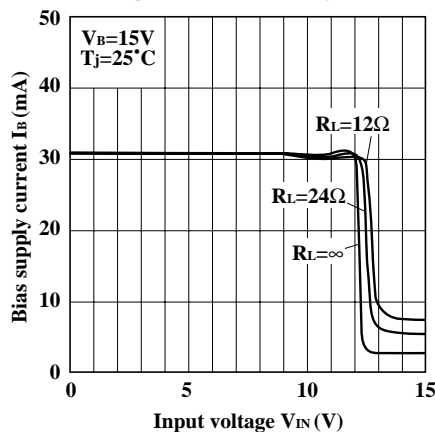


Fig.14 Bias Supply Current vs. Bias Supply Voltage (PQ05NF1) (Typical value)

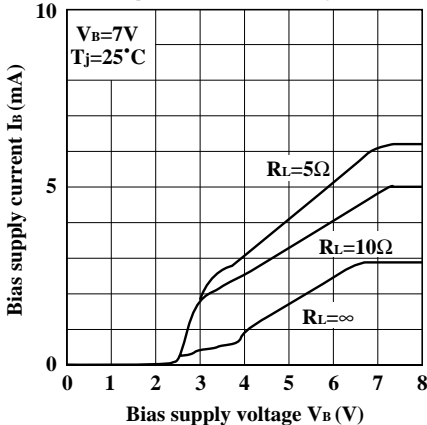


Fig.15 Bias Supply Current vs. Bias Supply Voltage (PQ09NF1) (Typical value)

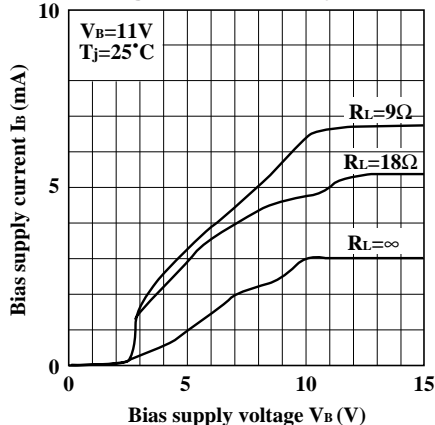
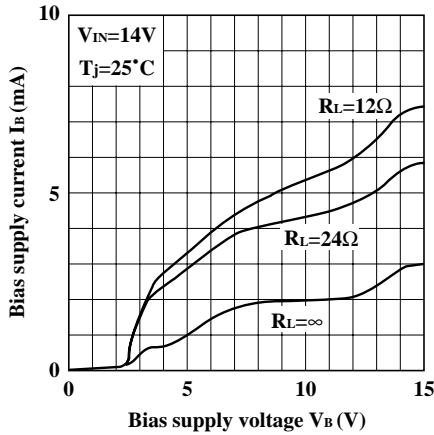
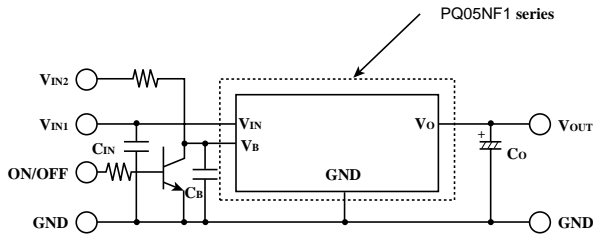


Fig.16 Bias Supply Current vs. Bias Supply Voltage (PQ12NF1) (Typical value)



■ Typical Application



- (1) This device can be used as a low power-loss voltage regulator, applying the voltage exceeding  $V_o+2.5V$  to bias input terminal ④ ( $V_B$ ) When bias input ( $V_B$ ) is open or less than  $0.8V$ , OFF-state is available.  
( $V_B \geq V_o+2.5V$ :output ON,  $V_B < 0.8V$  or open:output OFF)
- (2) It can be used as a general regulator with single power supply (dropout voltage : MAX2.5V) by connecting bias input terminal ④ ( $V_B$ ) with DC input terminal ③.