

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

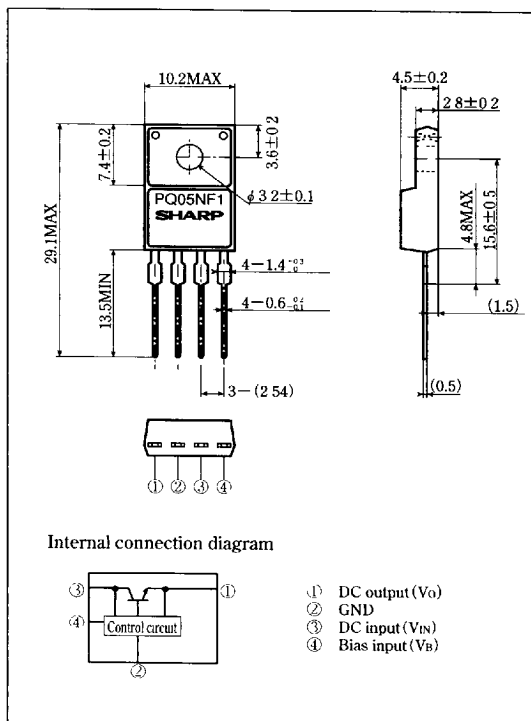
- Power supplies for various electronic equipment such as TVs, VCRs, CD stereos etc.

Model Line-ups

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

Outline Dimensions

(Unit : mm)



Absolute Maximum Ratings

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

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	$^\circ\text{C}$
Operating temperature	T_{opr}	-20 to +85	$^\circ\text{C}$
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 $125 \leq T_j \leq 150^\circ\text{C}$.

· Please refer to the chapter "Handling Precautions"

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"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."

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■ Electrical Characteristics

(Unless otherwise specified, $I_o=0.5A$ /^{*3}/^{*4}/ $T_a=25^{\circ}C$)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output voltage	PQ05NF1	$V_{IN}=7V$	4.8	5.0	5.2	V
	PQ09NF1	$V_{IN}=11V$	8.64	9.0	9.36	
	PQ12NF1	$V_{IN}=14V$	11.52	12.0	12.48	
Load regulation	$RegL$	$I_o=5mA$ to $1A$	—	—	2.0	%
Line regulation	$RegI$	^{*5} , ^{*6}	—	—	2.0	%
Temperature coefficient of output voltage	TcV_o	$T_j=0$ 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}	^{*7} , $V_B \geq V_o + 2.5V$	—	—	0.5	V
Bias inflow current	I_{B1}	$V_{IN}=V_o+1V$	—	—	15	mA
Bias limitation current	$I_B(l)$	$V_{IN}=0$ 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

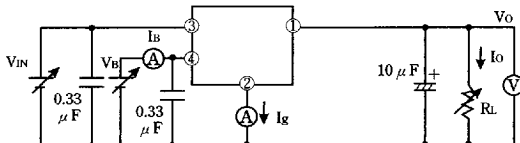
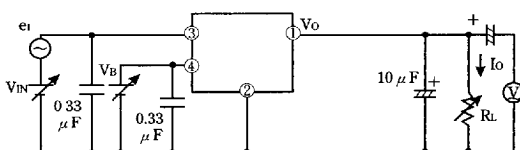
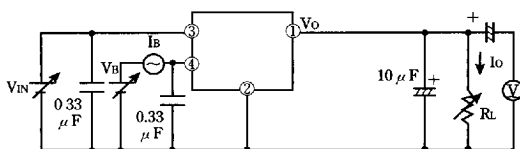


Fig. 2 Test Circuit of Ripple Rejection (1)



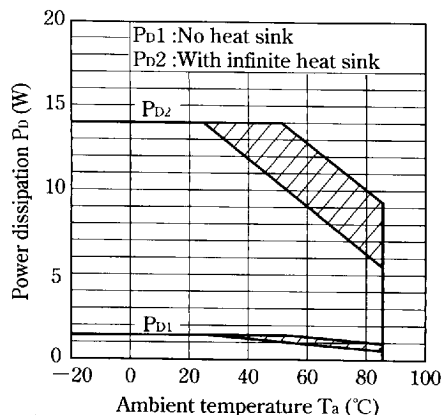
$f=120Hz$ (Sine wave)
 $I_o=0.5A$
 $e_i=0.5V_{rms}$
 $RR=20 \log(e_i/e_o)$

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)

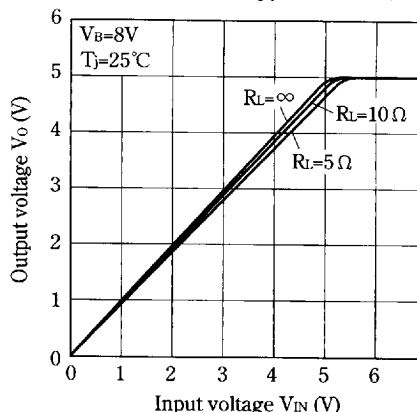


Fig. 6 Output Voltage vs. Input Voltage (PQ09NF1) (Typical value)

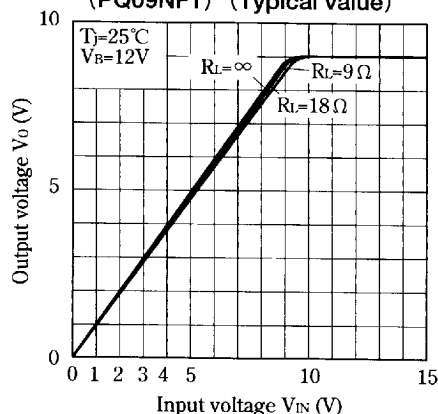


Fig. 7 Output Voltage vs. Input Voltage (PQ12NF1) (Typical value)

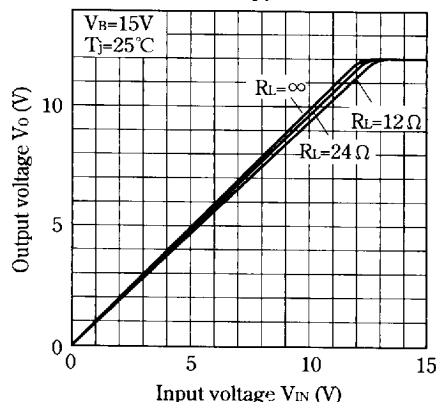


Fig. 8 Output Voltage vs. Bias Supply Voltage (PQ05NF1) (Typical value)

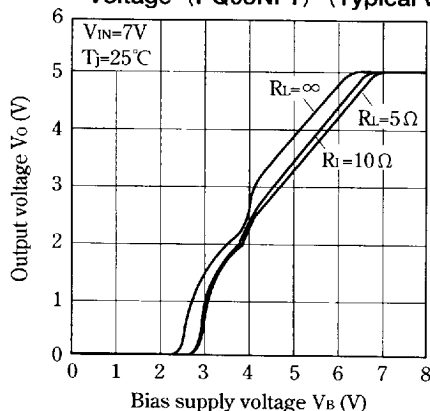
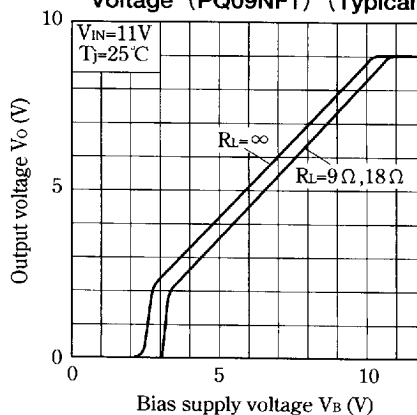
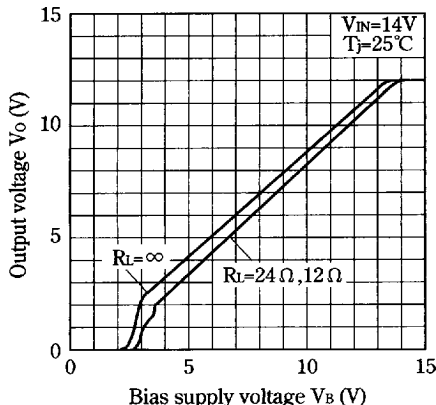
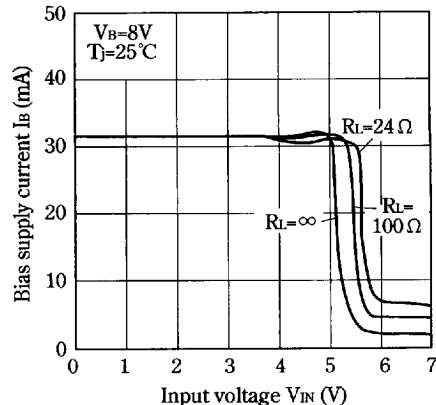
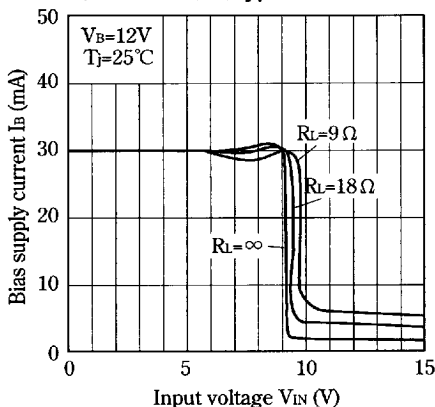
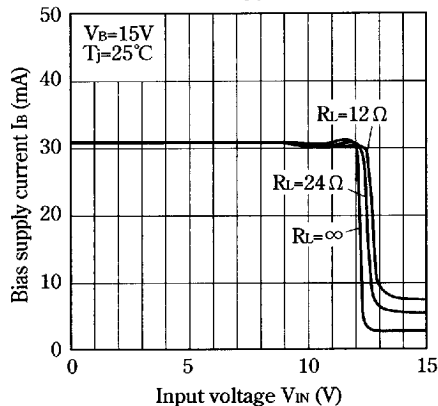
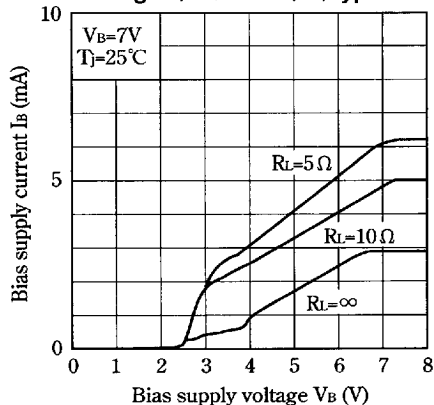
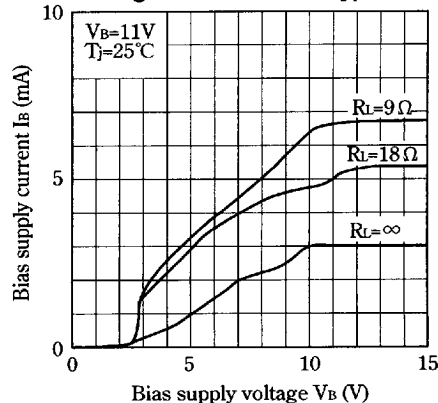


Fig. 9 Output Voltage vs. Bias Supply Voltage (PQ09NF1) (Typical value)

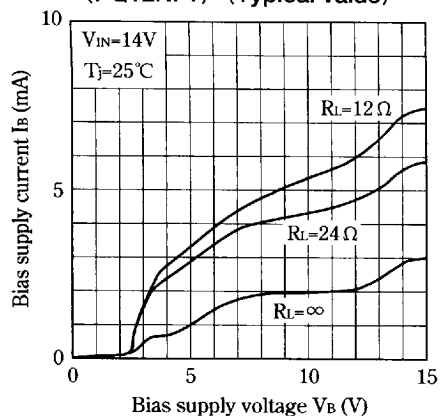


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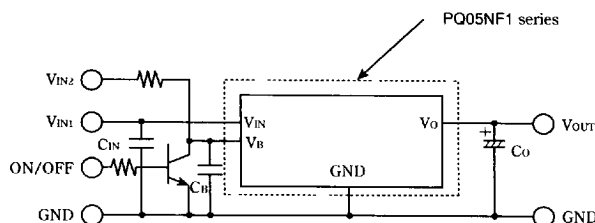
Fig.10 Output Voltage vs. Bias Supply Voltage (PQ12NF1) (Typical value)**Fig.11 Bias Supply Current vs. Input Voltage (PQ05NF1) (Typical value)****Fig.12 Bias Supply Current vs. Input Voltage (PQ09NF1) (Typical value)****Fig.13 Bias Supply Current vs. Input Voltage (PQ12NF1) (Typical value)****Fig.14 Bias Supply Current vs. Bias Supply Voltage (PQ05NF1) (Typical value)****Fig.15 Bias Supply Current vs. Bias Supply Voltage (PQ09NF1) (Typical value)**

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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, $V_B \leq 0.8V$ 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.