

# PQ5EV3/PQ5EV5/ PQ5EV7

## Large Output Current Type Low Power-Loss Voltage Regulator

### ■ Features

1. Low power-loss  
(Dropout voltage: MAX.0.5V)
2. Package with exposed radiation fin  
(Equivalent to TO-220)
3. Large output current  
3.5A:**PQ5EV3**, 5A:**PQ5EV5**, 7.5A:**PQ5EV7**
4. Variable output voltage (1.5V to 5V)
5. High-precision output type  
(Reference voltage precision:±1.0%)
6. Overcurrent, overheat protection functions

### ■ Applications

1. Personal computers
2. Power supplies for various electronic equipment such as AV or OA

### ■ Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Rating	Unit
*1 Input voltage	V <sub>IN</sub>	7	V
Dropout voltage	V <sub>I-O</sub>	4	V
*1 Output control voltage	V <sub>C</sub>	7	V
*1 Output adjustment terminal voltage	V <sub>ADJ</sub>	5	V
Output current	<b>PQ5EV3</b>	3.5	A
	<b>PQ5EV5</b>	5.0	
	<b>PQ5EV7</b>	7.5	
*2 Power dissipation	P <sub>D1</sub>	1.6	W
	P <sub>D2</sub>	45	W
*3 Junction temperature	T <sub>J</sub>	150	°C
Operating temperature	T <sub>opr</sub>	-20 to +80	°C
Storage temperature	T <sub>stg</sub>	-40 to +150	°C
*4 Soldering temperature	T <sub>sol</sub>	260	°C

\*1 All are open except GND and applicable terminals

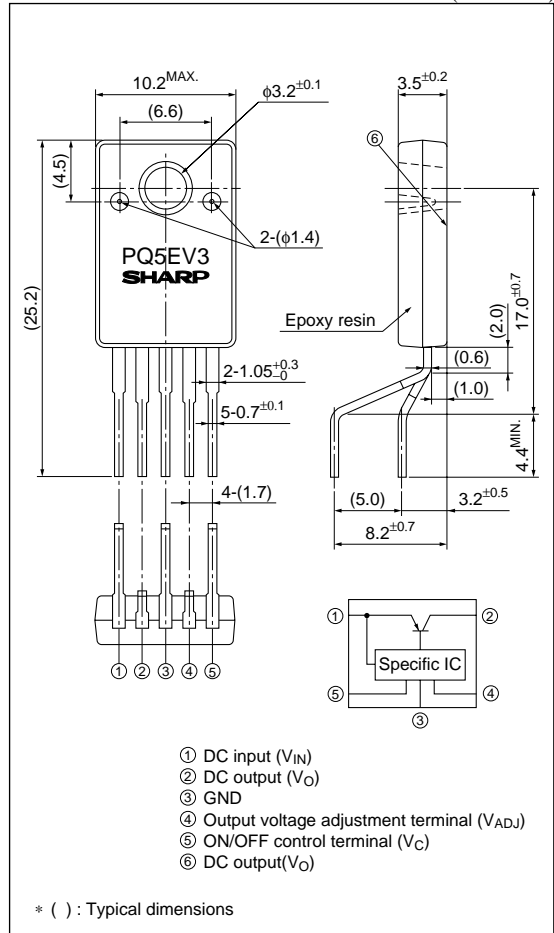
\*2 P<sub>D1</sub>:No heat sink, P<sub>D2</sub>:With infinite heat sink

\*3 Overheat protection may operate at the condition T<sub>J</sub>:125°C to 150°C

\*4 For 10s

### ■ Outline Dimensions

(Unit : mm)



## ■ Electrical Characteristics

(Unless otherwise specified,  $V_{IN}=5V$ , <sup>\*5</sup>,  $V_O=3V$  ( $R_1=2k\Omega$ ),  $T_a=25^\circ C$ )

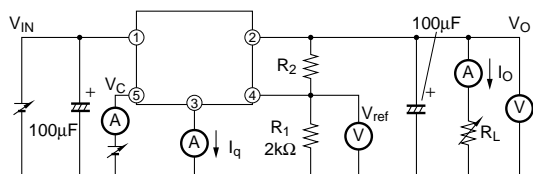
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input voltage	$V_{IN}$	—	2.35	—	7	V
Output voltage	$V_O$	—	1.5	—	5	V
Reference voltage	$V_{ref}$	—	1.2276	1.24	1.2524	V
Load line regulation	$R_{egL}$	$I_o=5mA$ to rating	—	0.1	0.5	%
Input line regulation	$R_{egI}$	$V_{IN}=4$ to $7V$ , $I_o=5mA$	—	0.05	0.1	%
Reference voltage temperature coefficient	$T_c V_{ref}$	$T_j=0$ to $125^\circ C$	—	$\pm 1$	—	%
Ripple Rejection	RR	Refer to Fig.2	60	70	—	dB
Dropout voltage	$V_{I-O}$	<sup>*6</sup>	—	—	0.5	V
<sup>*7</sup> Output on control voltage	$V_{C(ON)}$	—	2	—	—	V
Output on control current	$I_{C(ON)}$	$V_C=2.7V$	—	—	20	$\mu A$
Output off control voltage	$V_{C(OFF)}$	—	—	—	0.8	V
Output off control current	$I_{C(OFF)}$	$V_C=0.4V$	—	—	-0.4	mA
Non-operating dissipation current	$I_q$	$I_o=0A$	—	10	15	mA

<sup>\*5</sup> PQ5EV3: $I_o=1.75A$ , PQ5EV5: $I_o=2.5A$ , PQ5EV7: $I_o=3.75A$

<sup>\*6</sup> PQ5EV3: $I_o=3.5A$ , PQ5EV5: $I_o=5A$ , PQ5EV7: $I_o=7.5A$ . Input voltage shall be the value when output voltage is 95% in comparison with the initial value

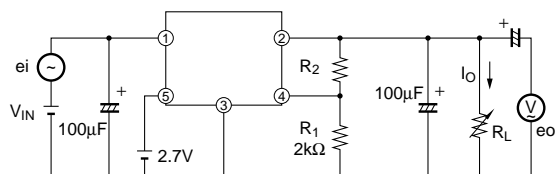
<sup>\*7</sup> In case of opening control terminal 5, output voltage turns on.

Fig.1 Standard Test Circuit



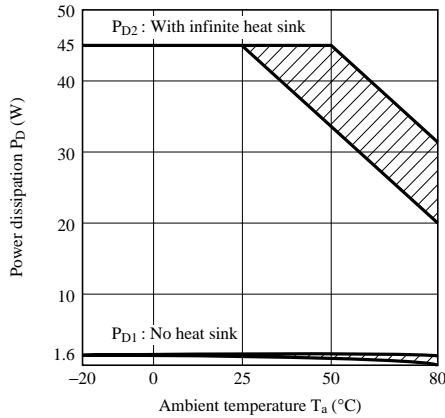
$$V_O = V_{ref} \times (1 + R_2/R_1) \\ = 1.24 \times (1 + R_2/R_1) \\ [R_1 = 2k\Omega, V_{ref} = 1.24V]$$

Fig.2 Test Circuit for Ripple Rejection

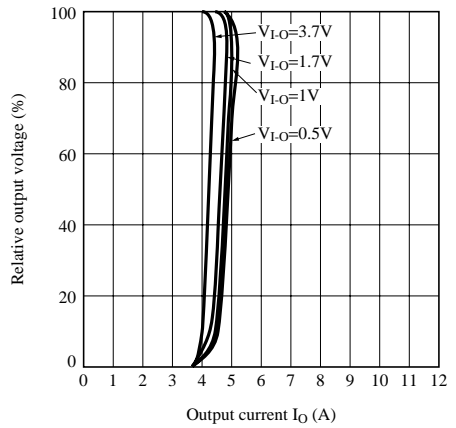


$$f = 120\text{Hz (sine wave)} \\ e_i(\text{rms}) = 0.5V \\ V_O = 3V (R_1 = 2k\Omega) \\ V_{IN} = 5V \\ I_o = 0.5A \\ RR = 20\log(e_i(\text{rms})/e_o(\text{rms}))$$

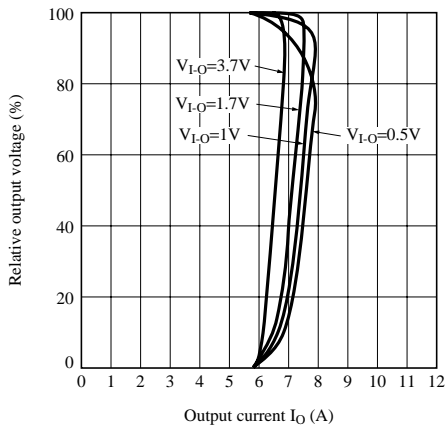
**Fig.3 Power Dissipation vs. Ambient Temperature**



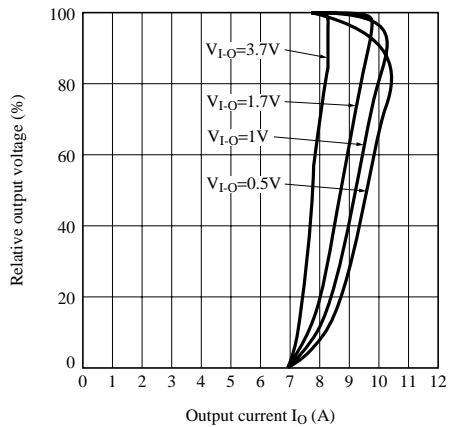
**Fig.4 Overcurrent Protection Characteristics (PQ5EV3)**



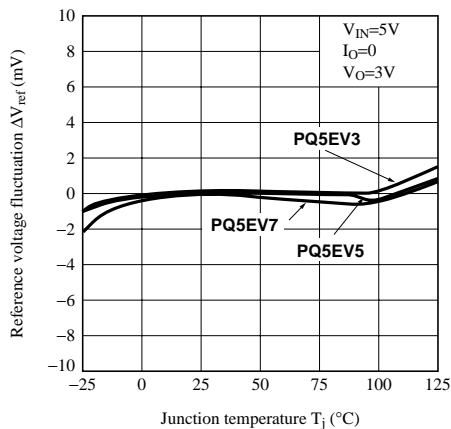
**Fig.5 Overcurrent Protection Characteristics (PQ5EV5)**



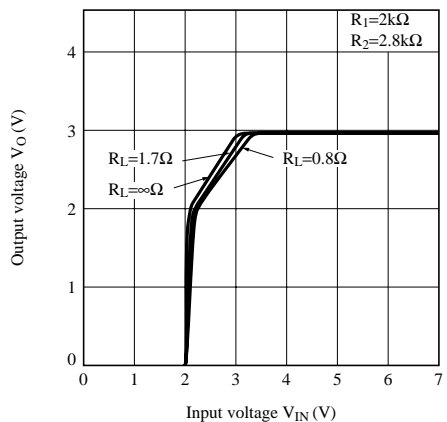
**Fig.6 Overcurrent Protection Characteristics (PQ5EV7)**



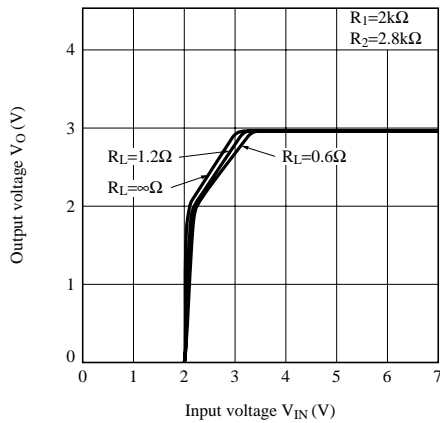
**Fig.7 Reference Voltage Fluctuation vs. Junction Temperature**



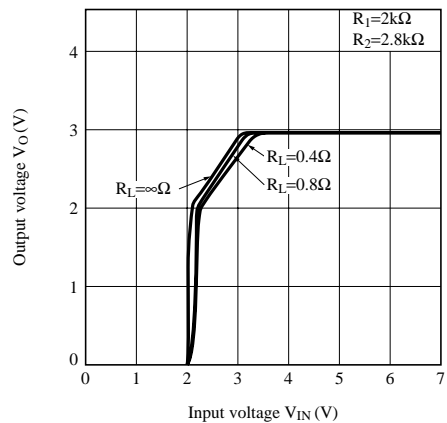
**Fig.8 Output Voltage vs. Input Voltage (PQ5EV3)**



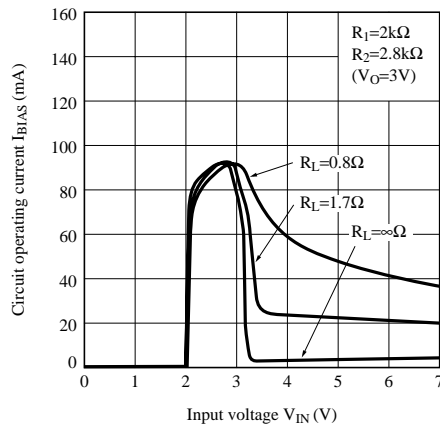
**Fig.9 Output Voltage vs. Input Voltage (PQ5EV5)**



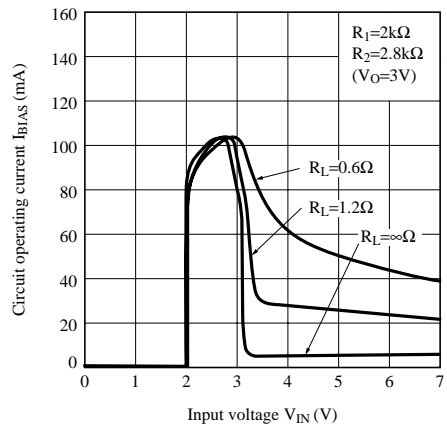
**Fig.10 Output Voltage vs. Input Voltage (PQ5EV7)**



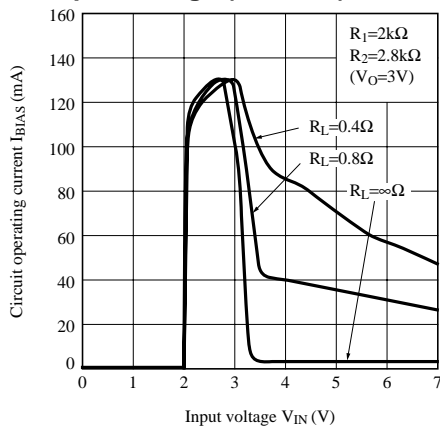
**Fig.11 Circuit Operating Current vs. Input Voltage (PQ5EV3)**



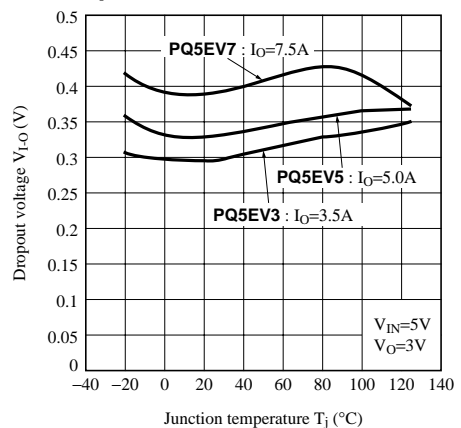
**Fig.12 Circuit Operating Current vs. Input Voltage (PQ5EV5)**



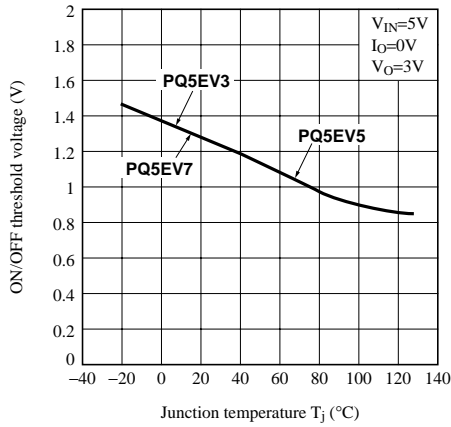
**Fig.13 Circuit Operating Current vs. Input Voltage (PQ5EV7)**



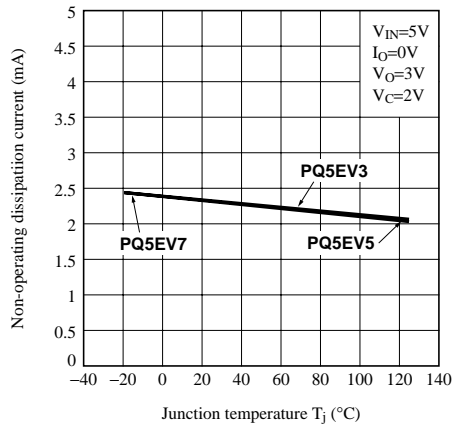
**Fig.14 Dropout Voltage vs. Junction Temperature**



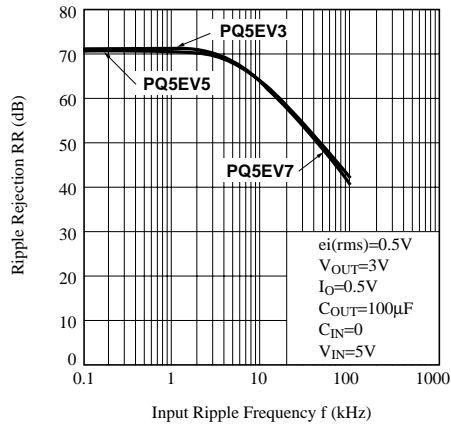
**Fig.15 ON-OFF Threshold Voltage vs. Junction Temperature**



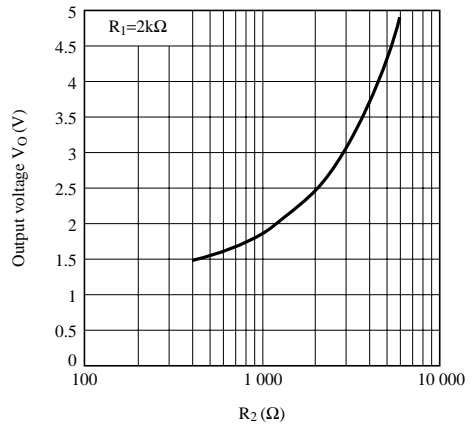
**Fig.16 Non-operating Dissipation Current vs. Junction Temperature**



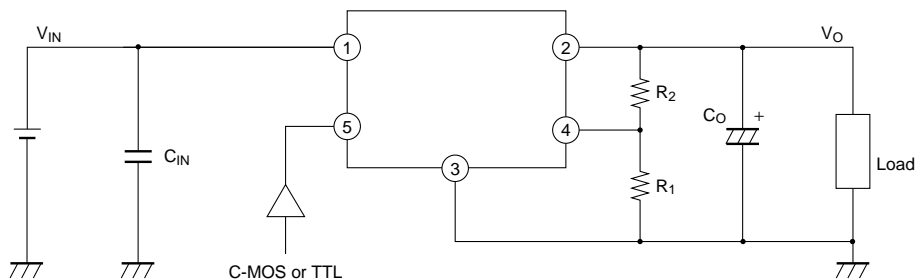
**Fig.17 Ripple Rejection vs. Input Ripple Frequency**



**Fig.18 Output Voltage Adjustment Characteristics**

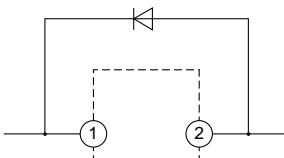


**Fig.19 External Connection**



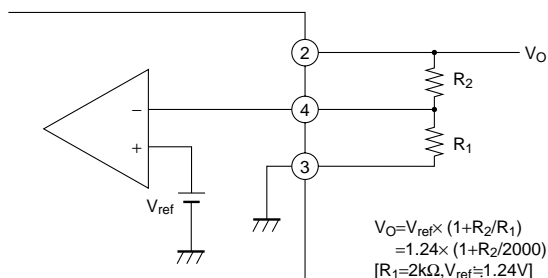
## ■ Precautions for Use

1. The connecting wiring of  $C_O$  and each terminal must be as short as possible. Owing to type, value and wiring condition of capacitor, it may oscillate. Confirm the output waveform under the actual condition before using.
2. ON/OFF control terminal ⑤ is compatible with LS-TTL. It enables to be directly drive by TTL or C-MOS standard logic (RCA4000 series) . If ON/OFF control terminal is not used, it is recommended to directly connect applicable terminals with input terminal.
3. If voltage is applied under the conditions that the device pin is connected divergently or reversely, the deterioration of characteristics or damage may occur. Never allow improper mounting.
4. 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 the GND in ordinary operating state, charges accumulated in the output capacitor  $C_O$  flow to the input side, causing damage to the element. In this case, connect the ordinary silicon diode as shown in the figure.



## ■ Adjustment of Output Voltage

1. Output voltage is able to set (1.5V to 5V) when resistors  $R_1$ ,  $R_2$  are attached to ②, ③, ④ terminals. As for the external resistors to set output voltage, refer to the following figure and Fig.18.



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