

PQ05RB11 Series

Low Power-Loss Voltage Regulators (Built-in Overheat Shut-Down Function)

■ Features

- Compact resin full-mold package
- Low power-loss (Dropout voltage : MAX.0.5V)
- Overheat shut-down function (Keep shut-down output until power-on again)
- Overcurrent protection type
- Built-in ON/OFF control function
- High-precision output type
(Output voltage precision : $\pm 2.5\%$)

■ Applications

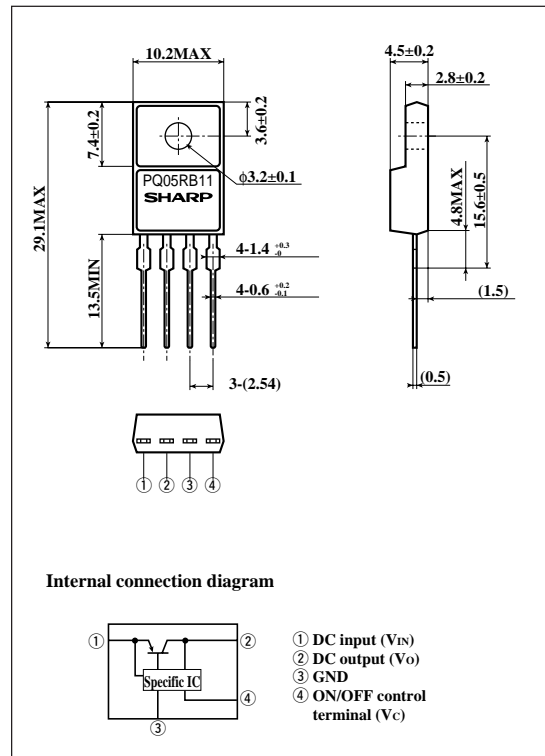
- Series power supply for TVs and VCRs
- Switching power supply

■ Model Line-ups

Output	5V	9V	12V
Model No.	PQ05RB11	PQ09RB11	PQ12RB11

■ Outline Dimensions

(Unit : mm)



■ Absolute Maximum Ratings

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

Parameter	Symbol	Rating	Unit
*1 Input voltage	V_{IN}	35	V
*1 ON/OFF control terminal voltage	V_C	35	V
Output current	I_O	1	A
Power dissipation (No heat sink)	P_{D1}	1.25	W
Power dissipation (With infinite heat sink)	P_{D2}	12.5	W
*2 Junction temperature	T_j	150	$^\circ\text{C}$
Operating temperature	T_{opr}	-20 to +80	$^\circ\text{C}$
Storage temperature	T_{str}	-40 to +150	$^\circ\text{C}$
*3 Soldering temperature	T_{sol}	260	$^\circ\text{C}$

*1 All are open except GND and applicable terminals.

*2 Overheat shut-down function operates at $T_j \geq 110^\circ\text{C}$

*3 For 10s

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, condition shall be $I_o=0.5A$, $V_{IN}=^*4$, $T_a=25^{\circ}C$)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_o	-	4.88	5.0	5.12	V
			8.78	9.0	9.22	
			11.7	12.0	12.3	
Load regulation	R_{eL}	$I_o=5mA$ to 1A	-	0.1	2.0	%
Line regulation	R_{eI}	^{*5}	-	0.5	2.5	%
Temperature coefficient of output voltage	T_cV_o	$T_j=0$ to $125^{\circ}C$, $I_o=5mA$	-	± 0.02	-	%/°C
Ripple rejection	RR	Refer to Fig.2	45	55	-	dB
Dropout voltage	V_{i-o}	^{*6} , $I_o=0.5A$	-	-	0.5	V
ON-state voltage for control	$V_{C(ON)}$	-	2.0 ^{*7}	-	-	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
Overheat shut-down temperature	T_{SD}	-	110	130	150	°C

^{*4} PQ05RB11: $V_{IN}=7V$, PQ09RB11: $V_{IN}=15V$, PQ12RB11: $V_{IN}=18V$

^{*5} PQ05RB11: $V_{IN}=6$ to $12V$, PQ09RB11: $V_{IN}=10$ to $25V$, PQ12RB11: $V_{IN}=13$ to $29V$

^{*6} Input voltage shall be the value when output voltage is 95% in comparison with the initial value.

^{*7} In case of opening control terminal ④, output voltage turns on.

Fig.1 Test Circuit

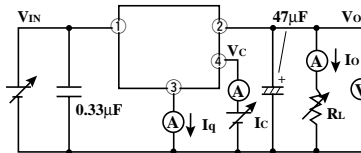
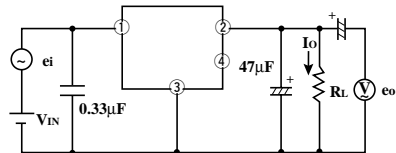
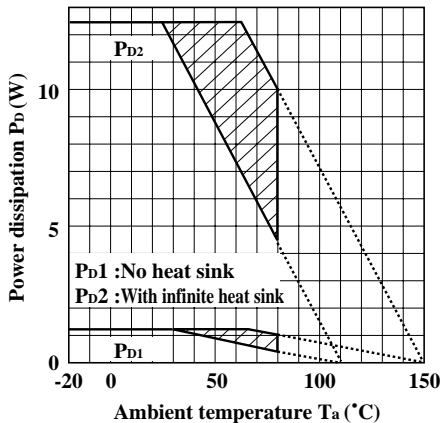


Fig.2 Test Circuit of Ripple Rejection



$f=120Hz$ (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 operates in this area.

Fig.4 Overcurrent Protection Characteristics (Typical Value)

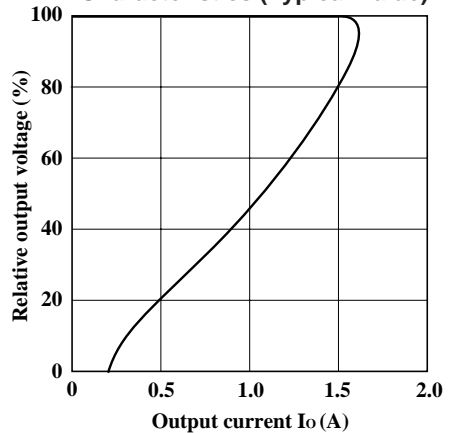


Fig.5 Output Voltage vs. Input Voltage (PQ05RB11)

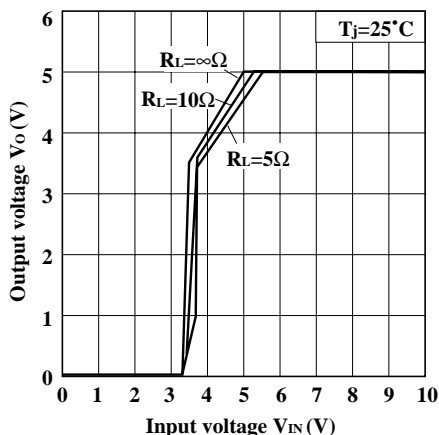


Fig.6 Output Voltage vs. Input Voltage (PQ09RB11)

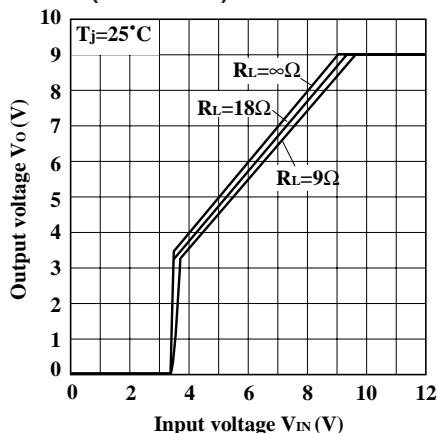


Fig.7 Output Voltage vs. Input Voltage (PQ12RB11)

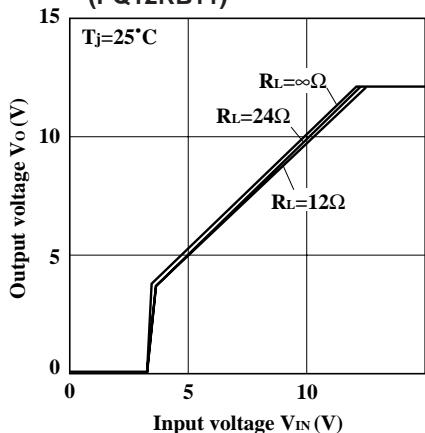


Fig.8 Dropout Voltage vs. Junction Temperature

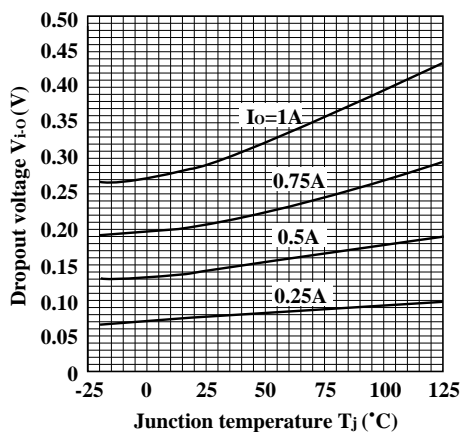


Fig.9 Circuit Operating Current vs. Input Voltage (PQ05RB11)

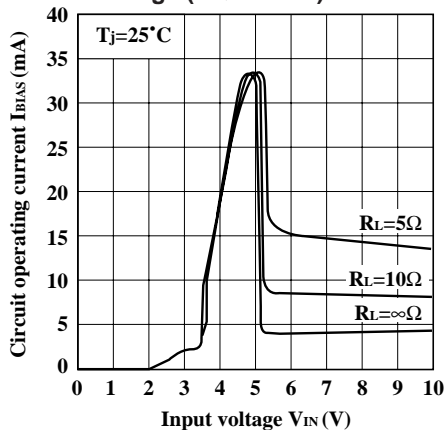


Fig.10 Circuit Operating Current vs. Input Voltage (PQ09RB11)

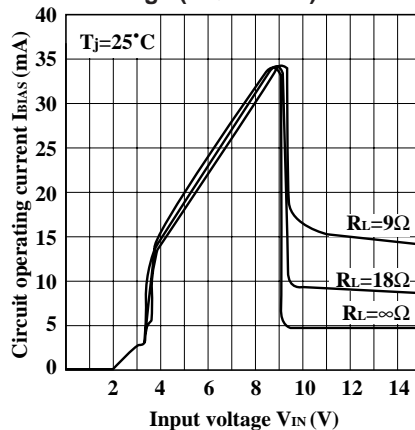


Fig.11 Circuit Operating Current vs. Input Voltage (PQ12RB11)

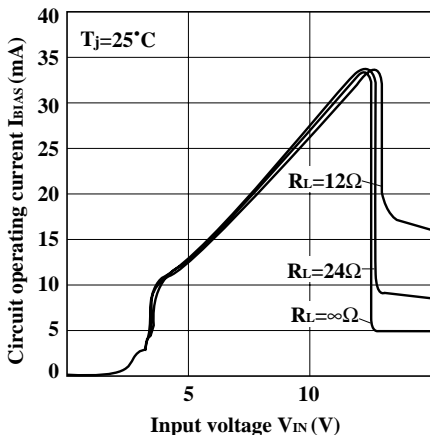
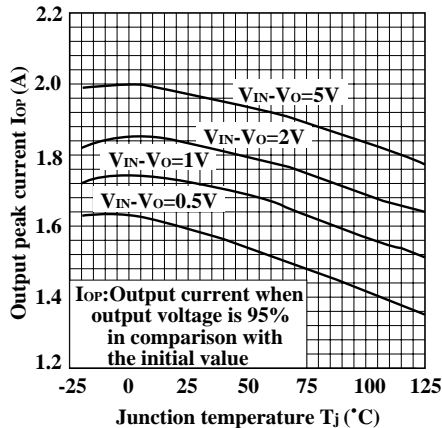
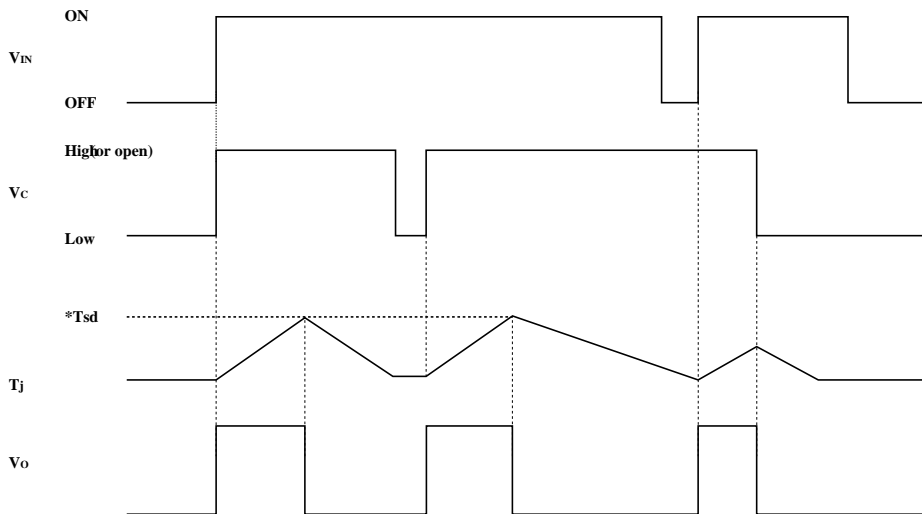


Fig.12 Output Peak Current vs. Junction Temperature



Overheat Shut-down Characteristics



* T_{sd} : Overheat shut-down temperature ($T_j \geq 110^\circ\text{C}$)

- (1) Overheat shut-down operates at $T_j = T_{sd}$ and output OFF-state is maintained.
- (2) OFF-state is kept until V_{IN} is once turned off or V_C is turned down to the "L" level.

Typical Applications

