

PQ30RV31

Variable Output Low Power-Loss Voltage Regulator

Features

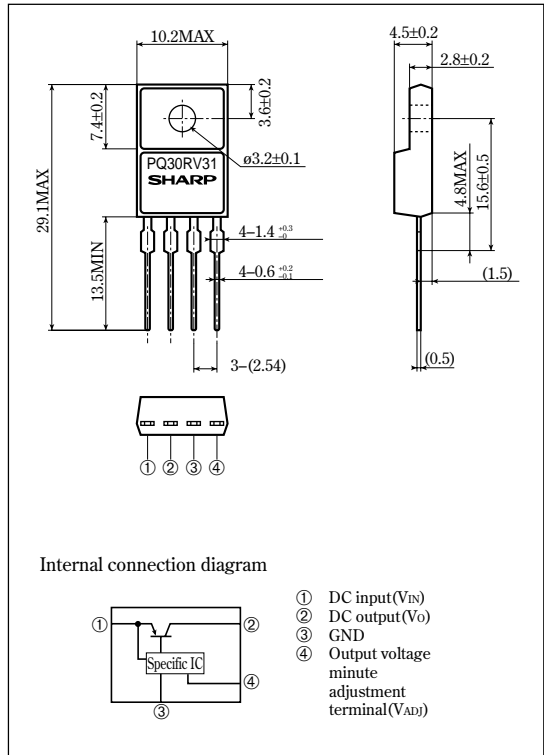
- Maximum output current: 3A
- Compact resin full-mold package
- Low power-loss(Dropout voltage: MAX.0.5V)
- Variable output voltage(setting range: 1.5 to 30V)
- Built-in ON/OFF control function.

Applications

- Power supply for print concentration control of word processors
- Series power supply for motors and solenoid
- Series power supply for VCRs and TVs

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 Output adjustment terminal voltage	V_{ADJ}	7	V
Output current	I_O	3	A
Power dissipation(No heat sink)	P_{D1}	2.0	W
Power dissipation(With infinite heat sink)	P_{D2}	20	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 function may operate at $125 \leq T_j \leq 150^\circ\text{C}$.

•Please refer to the chapter " Handling Precautions ".

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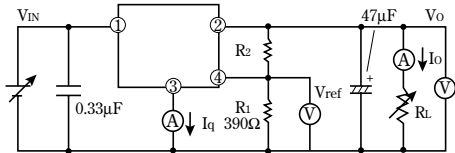
Electrical Characteristics

(Unless otherwise specified, condition shall be $V_{IN}=12V$, $V_O=10V$, $I_O=1.5A$, $R_1=390\Omega$, $T_a=25^\circ C$)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input voltage	V_{IN}	—	4.5	—	35	V
output voltage	V_O	—	1.5	—	30	V
Load regulation	R_{regL}	$I_O=5mA$ to 3A	—	0.5	2.0	%
Line regulation	R_{regI}	$V_{IN}=11$ to 21V, $I_O=0.5mA$	—	0.5	2.5	%
Ripple rejection	RR	Refer to Fig. 2	45	70	—	dB
Reference voltage	V_{ref}	—	1.225	1.25	1.275	V
Temperature coefficient of reference voltage	$T_c V_{ref}$	$T_j=0$ to $125^\circ C$, $I_O=5mA$	—	± 1.0	—	%/ $^\circ C$
Dropout voltage	V_{I-O}	*3 , $I_O=3A$	—	0.3	1.0	V
		*3 , $I_O=2A$	—	0.2	0.5	
Quiescent current	I_q	$I_O=0$	—	—	7	mA

^{*3} Input voltage shall be the value when output voltage is 95% in comparison with the initial value.

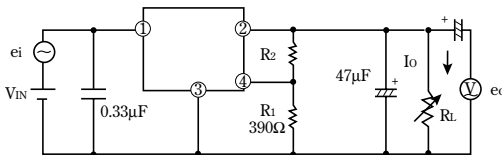
Fig. 1 Test Circuit



$$V_O = V_{ref} \times \left(1 + \frac{R_2}{R_1} \right)$$

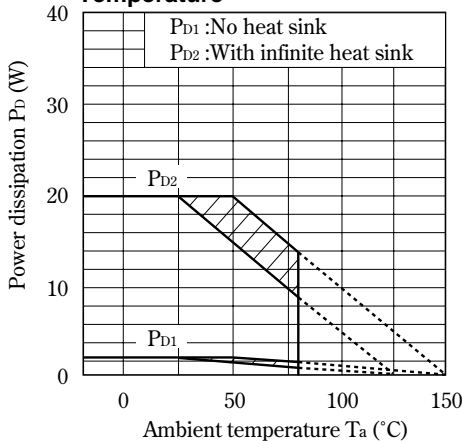
[$R_1=390\Omega$, V_{ref} Nearly=1.25V]

Fig. 2 Test Circuit of Ripple Rejection



$I_O=0.5A$, $V_{IN}=12V$, $V_O=10V$
 $f=120Hz$ (sine wave)
 $e_i(rms)=0.5Vrms$
 $RR=20 \log(e_i(rms)/e_o(rms))$

Fig. 3 Power Dissipation vs. Ambient Temperature



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

Fig. 4 Overcurrent Protection Characteristics (Typical Value)

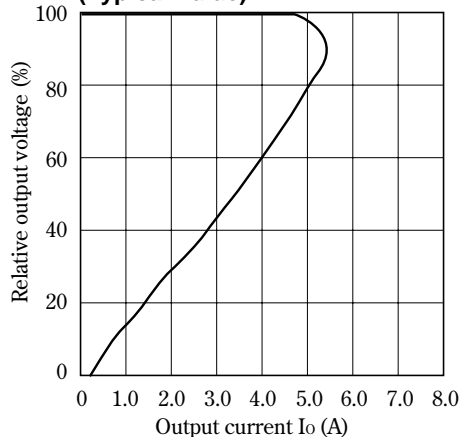


Fig. 5 Output Voltage Adjustment Characteristics (Typical value)

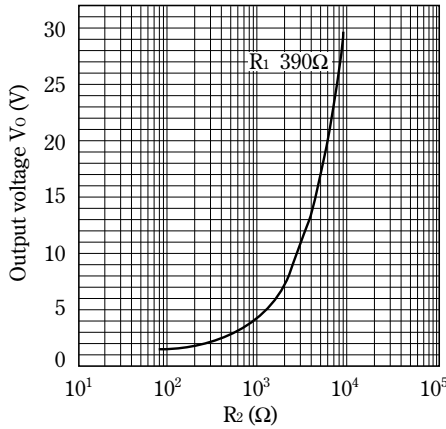


Fig. 6 Output Voltage vs. Input Voltage

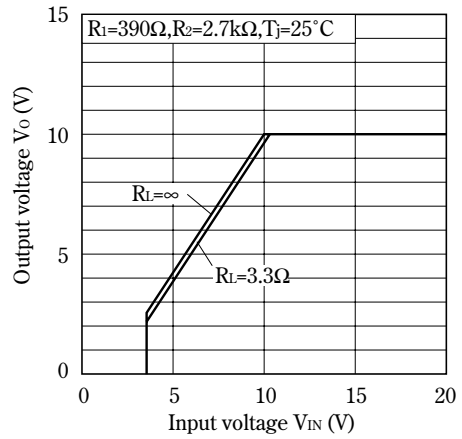


Fig. 7 Dropout Voltage vs. Junction Temperature

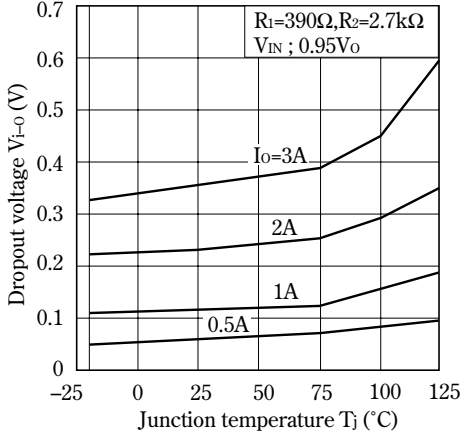


Fig. 8 Ripple Rejection vs. Input Ripple Frequency

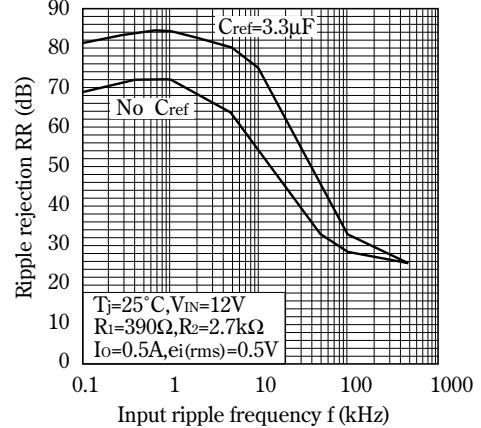


Fig. 9 Ripple Rejection vs. Output Current

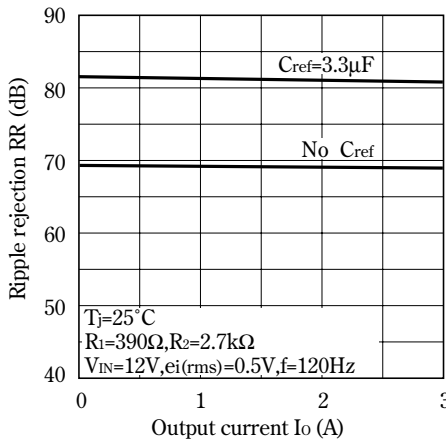


Fig.10 Output Peak Current vs. Dropout Voltage (Typical value)

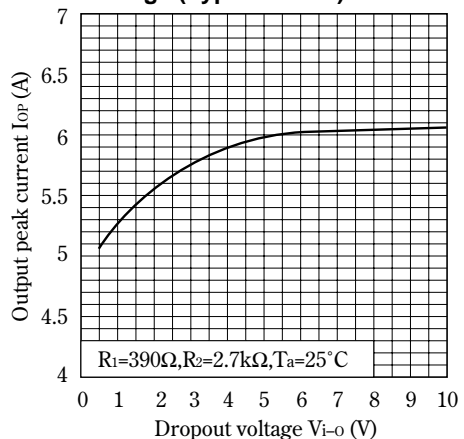
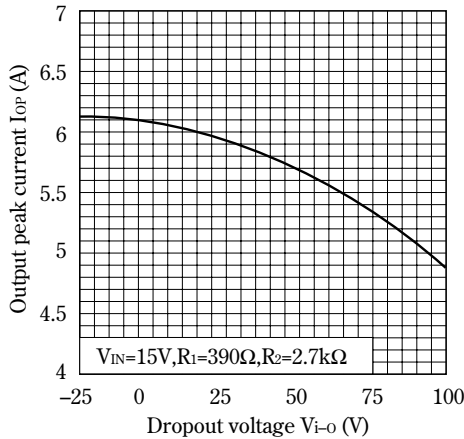
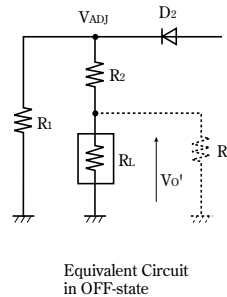
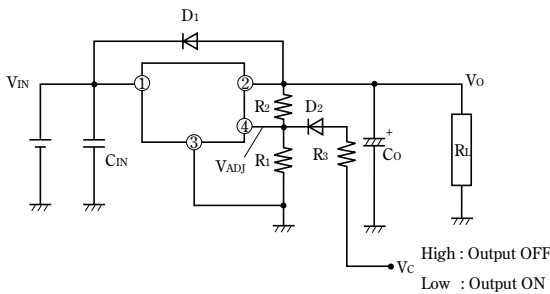


Fig.11 Ripple Rejection vs. Input Ripple Frequency



ON/OFF Operation



- ON/OFF operation is available by mounting externally D_2 and R_3 .
- When V_{ADJ} is forcibly raised above V_{REF} (1.25V TYP) by applying the external signal, the output is turned off (pass transistor of regulator is turned off). When the output is OFF, V_{ADJ} must be higher than $V_{REF MAX.}$, and at the same time must be lower than maximum rating 7V.

In OFF-state, the load current flows to R_L from V_{ADJ} through R_2 . Therefore the value of R_2 must be as high as possible.

• $V_{O'} = V_{ADJ} \times R_L / (R_L + R_2)$

occurs at the load. OFF-state equivalent circuit R_1 up to 10k Ω is allowed. Select as high value of R_L and R_2 as possible in this range. In some case, as output voltage is getting lower ($V_{O'} < 1V$), impedance of load resistance rises. In such condition, it is sometime impossible to obtain the minimum value of $V_{O'}$. So add the dummy resistance indicated by R_D in the figure to the circuit parallel to the load.

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