

PQ30RV31

Variable Output Low Power-Loss Voltage Regulator

Features

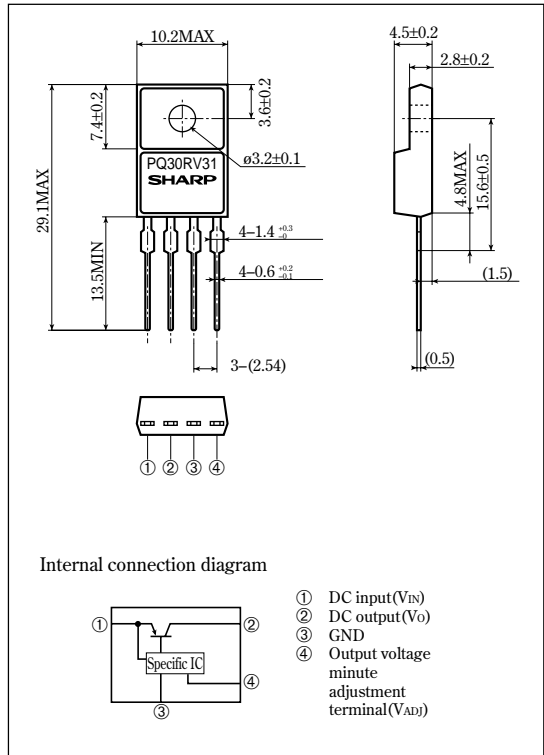
- Maximum output current: 3A
- Compact resin full-mold package
- Low power-loss(Dropout voltage: MAX.0.5V)
- Variable output voltage(setting range: 1.5 to 30V)
- Built-in ON/OFF control function.

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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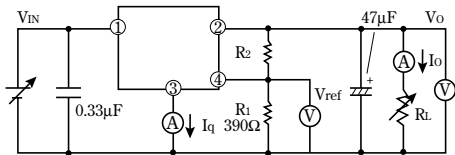
Electrical Characteristics

(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_{egL} | $I_O=5mA$ to 3A | — | 0.5 | 2.0 | % |
| Line regulation | R_{egI} | $V_{IN}=11$ 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.

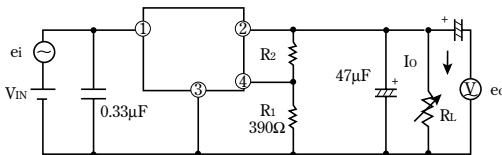
Fig. 1 Test Circuit



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

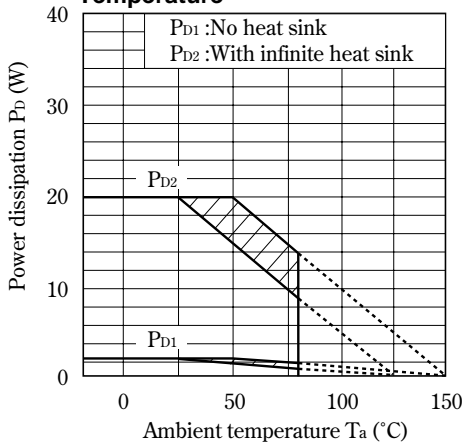
[$R_1=390\Omega$, V_{ref} Nearly=1.25V]

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)

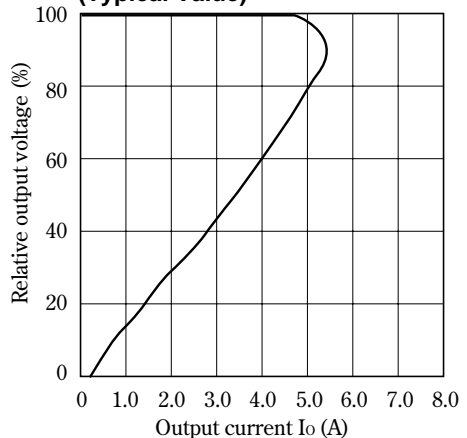


Fig. 5 Output Voltage Adjustment Characteristics (Typical value)

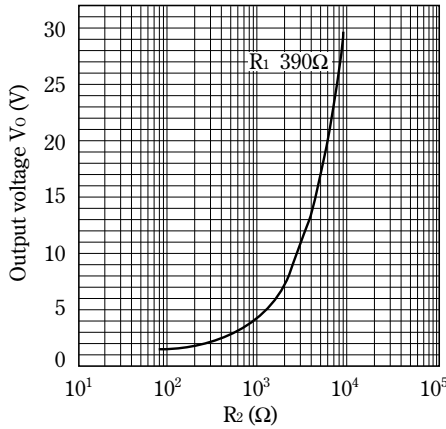


Fig. 6 Output Voltage vs. Input Voltage

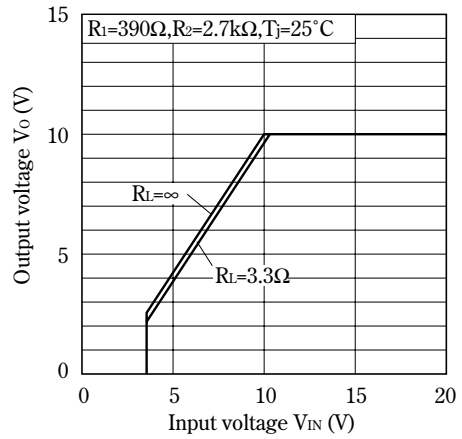


Fig. 7 Dropout Voltage vs. Junction Temperature

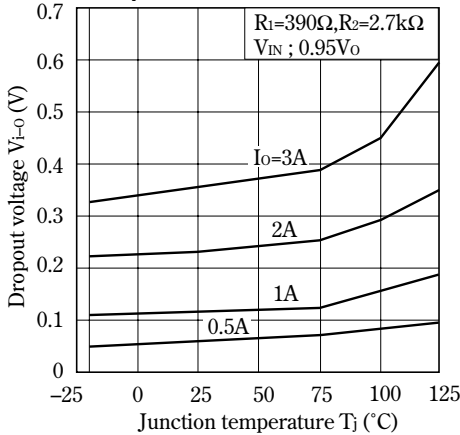


Fig. 8 Ripple Rejection vs. Input Ripple Frequency

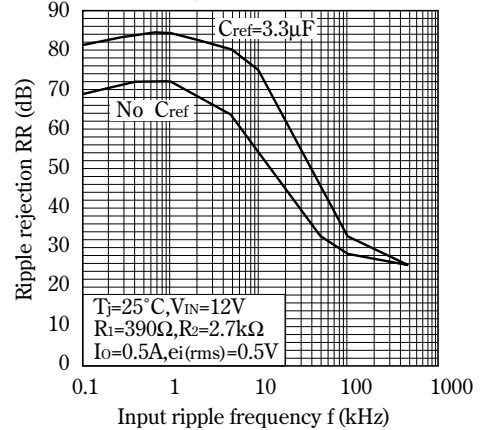


Fig. 9 Ripple Rejection vs. Output Current

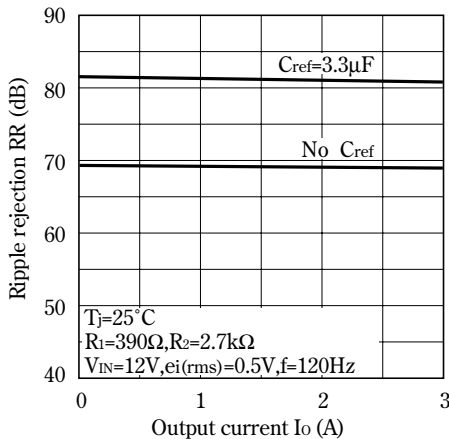


Fig.10 Output Peak Current vs. Dropout Voltage (Typical value)

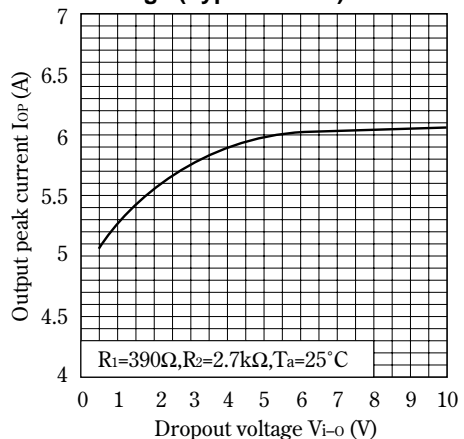
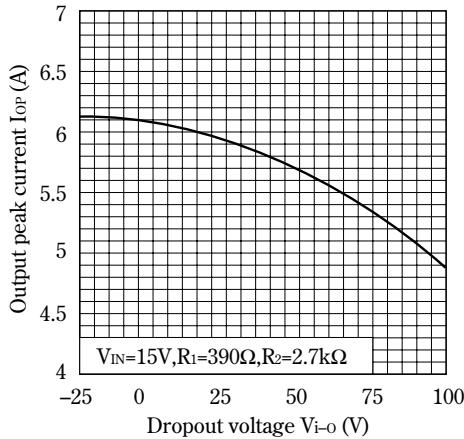
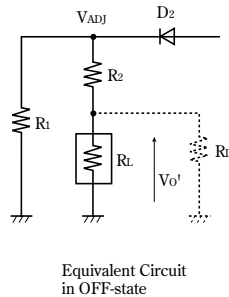
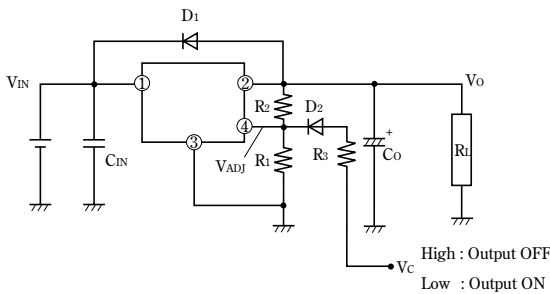


Fig.11 Ripple Rejection vs. Input Ripple Frequency



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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