PQ30RV31

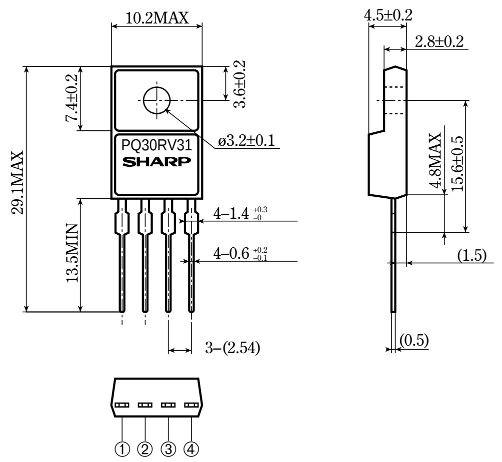
Variable Output Low Power-Loss Voltage Regulator

Features

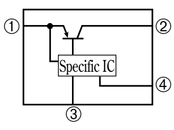
- Maximum output current: 3A
- Compact resin full-mold package
- Low power-loss (Dropout voltage: MAX.0.5V)
- Variable output voltage (setting range: 1.5 to 30V)
- Built-in ON/OFF control function.

Outline Dimensions

(Unit : mm)



Internal connection diagram



① DC input (V_{IN})
② DC output (V_O)
③ GND
④ Output voltage minute adjustment terminal (V_{ADJ})

Applications

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

Absolute Maximum Ratings

(T_a=25˚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	˚C
Operating temperature	T_{opr}	–20 to +80	˚C
Storage temperature	T_{stg}	–40 to +150	˚C
Soldering temperature	T_{sol}	260 (For 10s)	˚C

※1 All are open except GND and applicable terminals.
※2 Overheat protection function may operate at 125<=T_j<=150˚C.

• Please refer to the chapter " Handling Precautions ".

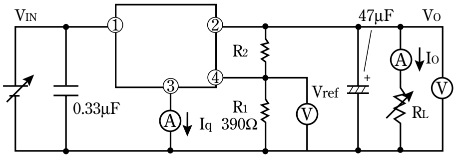
■ Electrical Characteristics

(Unless otherwise specified, condition shall be V_{IN}=12V, V_O=10V, I_O=1.5A, R_1=390Ω, T_a=25°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	$R_{eg}L$	I_O=5mA to 3A	–	0.5	2.0	%
Line regulation	$R_{eg}I$	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_cV_{ref}	T_j=0 to 125°C, I_O=5mA	–	±1.0	–	%/°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.

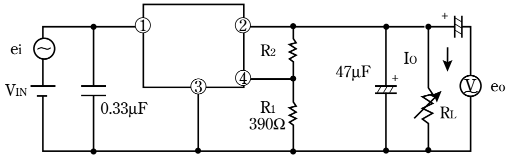
Fig. 1 Test Circuit



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

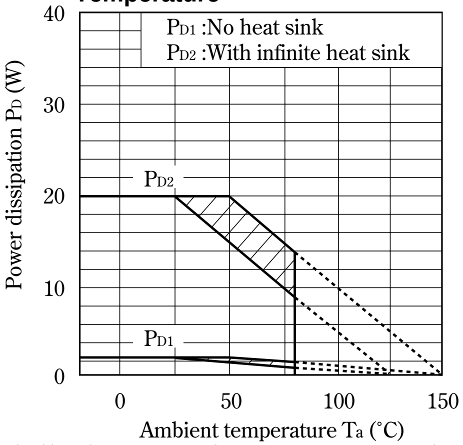
[R_1=390Ω, V_{ref} Nearly=1.25V]

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)

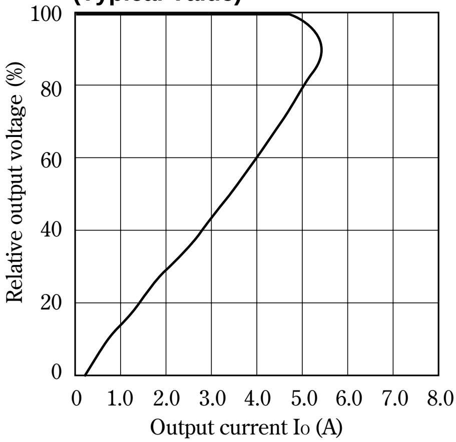


Fig. 5 Output Voltage Adjustment Characteristics (Typical value)

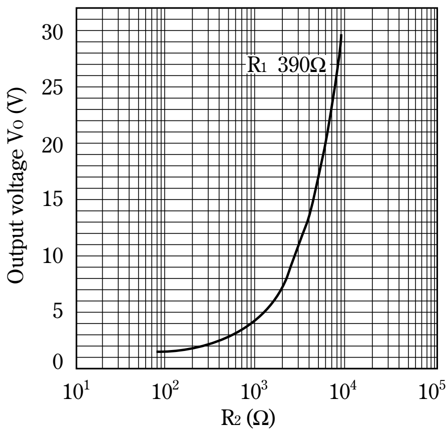


Fig. 6 Output Voltage vs. Input Voltage

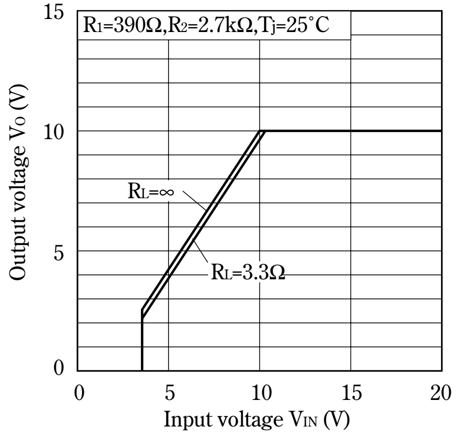


Fig. 7 Dropout Voltage vs. Junction Temperature

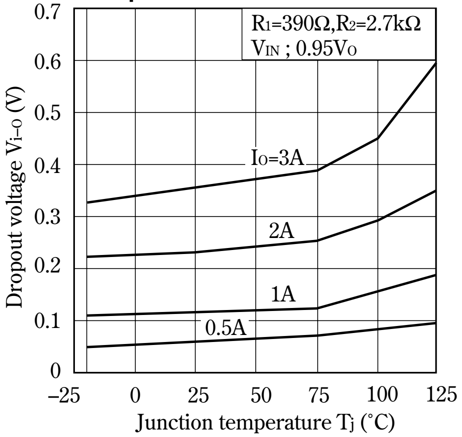


Fig. 8 Ripple Rejection vs. Input Ripple Frequency

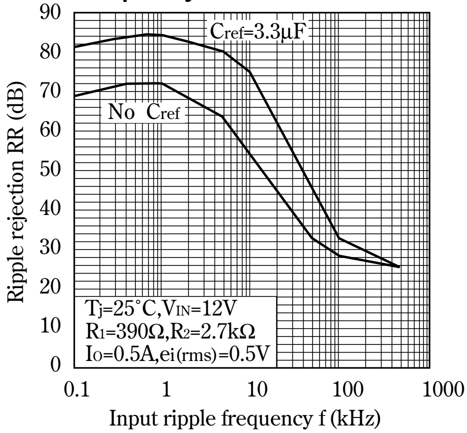


Fig. 9 Ripple Rejection vs. Output Current

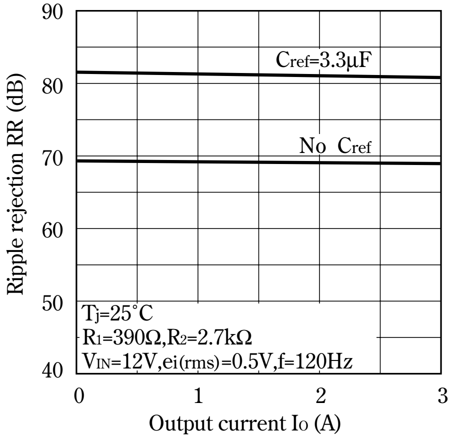


Fig.10 Output Peak Current vs. Dropout Voltage (Typical value)

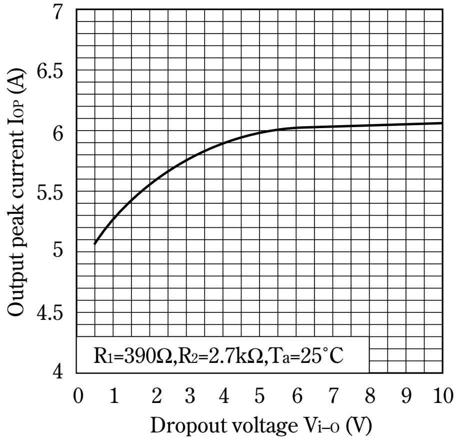
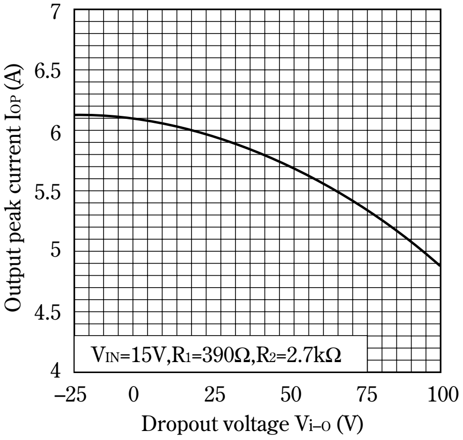
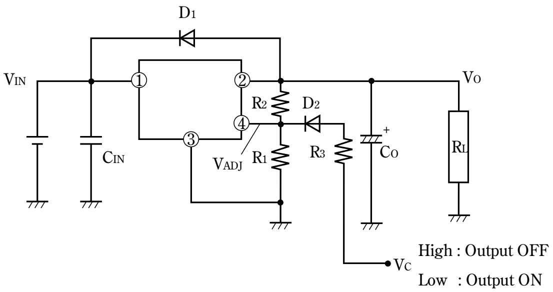
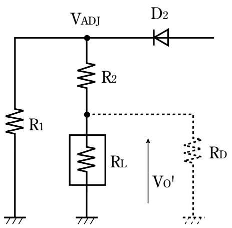


Fig.11 Ripple Rejection vs. Input Ripple Frequency



■ ON/OFF Operation





Equivalent Circuit
in OFF-state

- 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 then 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 10kΩ 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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  --- Office automation equipment
  --- Telecommunication equipment [terminal]
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