PQ30VBI 1

Variable output Low Power-Loss Voltage Regulator(Built-in Overheat Shut-Down Function)

■ Features

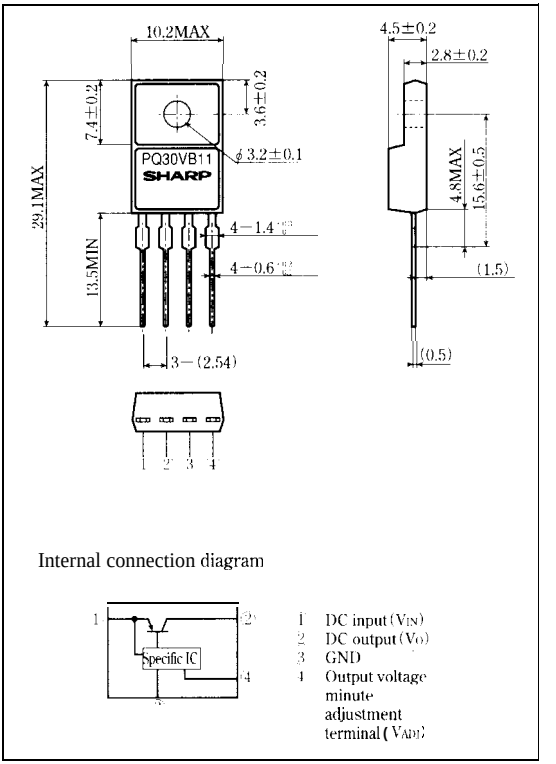
- Compact resin full-mold package
- Low power-loss (Dropout voltage : MAX, 0.5V)
- Overheat shut-down function (keep shut-down output until power-on again)
- Variable output voltage (Setting range :1,5 to 30V)
- Overcurrent protection type
- High-precision output type (Reference voltage precision : ±2.0%)

■ Applications

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

■ Outline Dimensions

(Unit : mm)



Internal connection diagram

■ Absolute Maximum Ratings

(Ta=25℃)

Parameter	Symbol	Rating	Unit
*1 Input voltage	V_{IN}	35	V
*1 Output adjustment terminal voltage	V_{ADJ}	7	V
Output current	10	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	℃
Operating temperature	T_{opr}	−20 to +80	℃
Storage temperature	T_{stg}	−40 to +150	℃
*3 Soldering temperature	T_{sol}	260	℃

*1 All are open except GND and applicable terminals.
*2 Overheat shut-down function operates at $T_j \geqq 110$℃
*3 For 10s

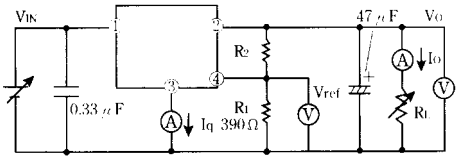
Please refer to the chapter "Handling Precautions"

■ Electrical Characteristics (Unless otherwise specified condition shall be V_{IN}=15V, V_O=10V, I_O=0.5A, 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_{egL}	I_O=5mA to 1A		0.3	1.0	%
Line regulation	R_{egI}	V_{IN}=11 to 28V		0.5	2.5	%
Ripple rejection	RR	Refer to Fig.2	45	55		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		%
Dropout voltage	V_{i-O}	*4, I_O=0.5A			0.5	V
Quiescent current	I_q	I_O=0			7	mA
Overheat shut-down temperature	T_{sd}		110	130		

*4 Input voltage shall be the value when output voltage is 95% in comparison with the initial value.

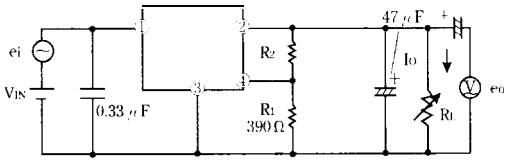
Fig. 1 Test Circuit



$$V_O = V_{ref} \times \left(1 + \frac{R_2}{R_1}\right) \fallingdotseq 1.25 \times \left(1 + \frac{R_2}{R_1}\right)$$

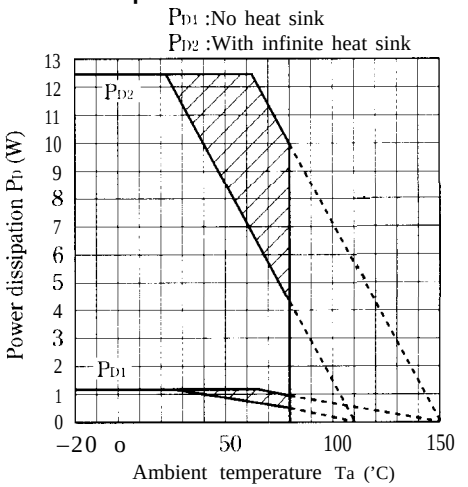
【R_1=390Ω, V_{ref}≒1.25V】

Fig. 2 Test Circuit of Ripple Rejection



I_O=0.5A
f=120Hz (sine wave)
ei=0.5Vrms
RR=20log(ei/eo)

Fig. 3 Power Dissipation vs. Ambient Temperature



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

Fig. 4 Overcurrent Protection Characteristics (Typical Value)

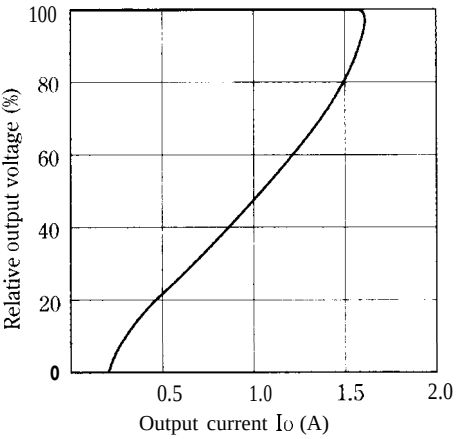


Fig. 5 Output Voltage Adjustment Characteristics

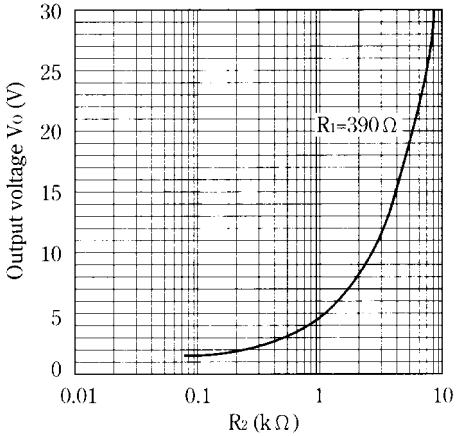


Fig. 6 Output Voltage vs. Input Voltage

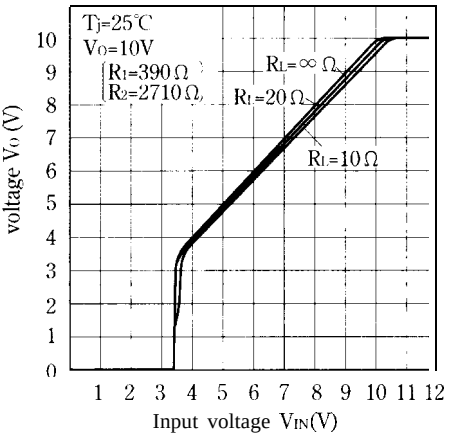


Fig. 7 Dropout Voltage vs. Junction Temperature

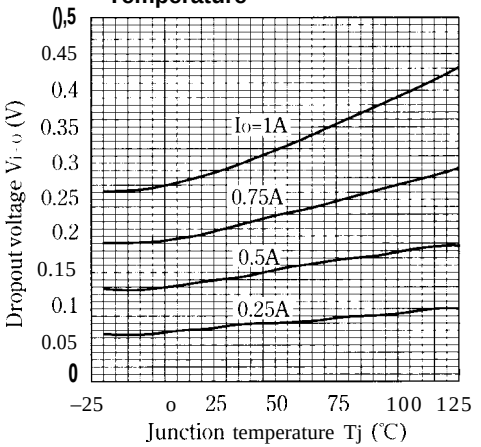


Fig. 8 Circuit Operating Current vs. Input Voltage

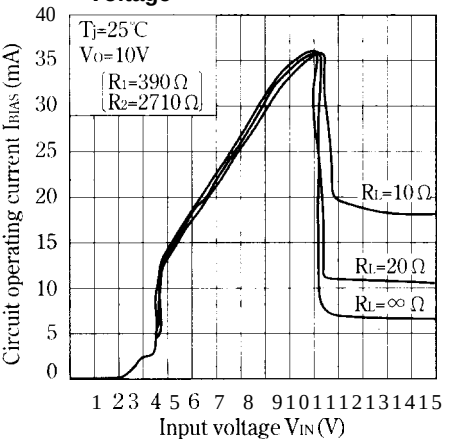
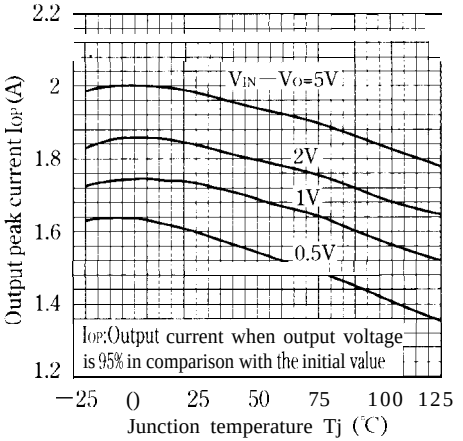
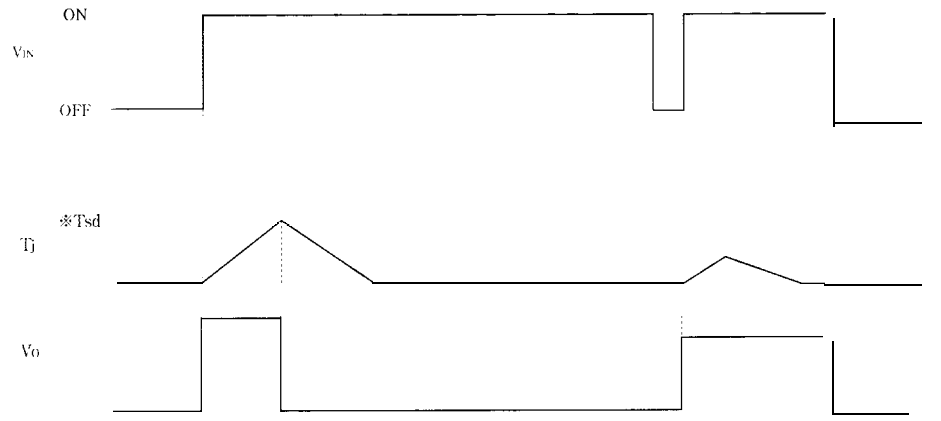


Fig. 9 Output Peak Current vs. Junction Temperature

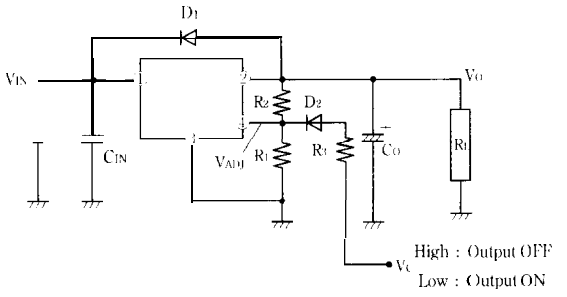


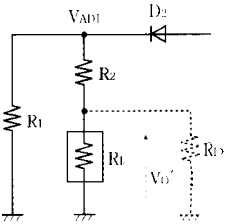
■ Overheat Shut-down Characteristics



※ Tsd : Overheat shut-down temperature (Tj ≧ 110°C)
1 Overheat shut-down operates at Tj=Tsd and output OFF-state is maintained
2 OFF-state is kept until VIN is once turned off.

■ 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_1 from V_{ADJ} through R_2. Therefore the value of R_2 must be as high as possible.
- $V_O' = V_{ADJ} \times R_L / (R_1 + R_2)$

  occurs at the load, OFF-state equivalent circuit R_L 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 nutput 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.