PQ070XH01Z

Low Voltage Operation Low Power-loss Voltage Regulator

■ Features

1. Low voltage operation (minimum operating voltage:2.35V)
   2.5V input → available 1.5 to 1.8V
2. Large output current type (I_O:1A)
3. Low dissipation current
   (Dissipation current at no load:MAX.2mA
   OFF-state dissipation current:MAX.5μA)
4. Low power-loss
5. Built-in overcurrent and overheat protection functions
6. TO-263 package
   PQ070XH01ZZ:Sleeve-packaged product
   PQ070XH01ZP:Tape-packaged product

■ Applications

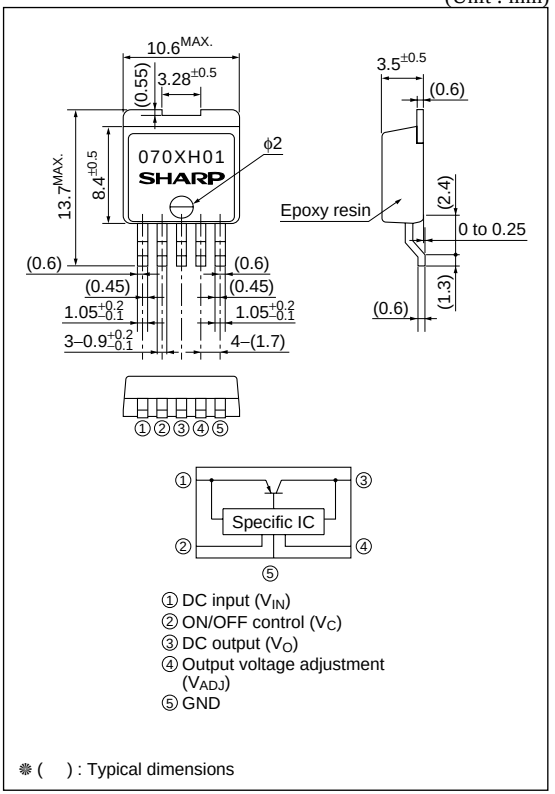
1. Peripheral equipment of personal computers
2. Power supplies for various electronic equipment such as DVD player or STB

■ Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Rating	Unit
*1 Input voltage	V_{IN}	10	V
*1 Output control voltage	V_C	10	V
*1 Output adjustment terminal voltage	V_{ADJ}	5	V
Output current	I_O	1	A
*2 Power dissipation	P_D	35	W
*3 Junction temperature	T_j	150	˚C
Operating temperature	T_{opr}	−40 to +85	˚C
Storage temperature	T_{stg}	−40 to +150	˚C
Soldering temperature	T_{sol}	260 (10s)	˚C

*1 All are open except GND and applicable terminals
*2 P_D:With infinite heat sink
*3 Overheat protection may operate at the condition Tj=125˚C to 150˚C

■ Outline Dimensions (Unit : mm)



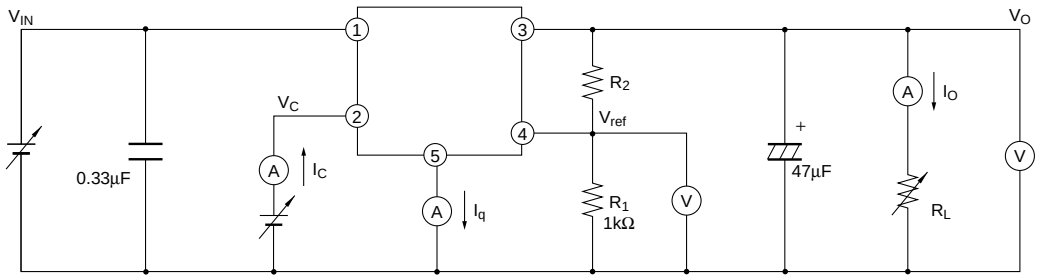
■ Electrical Characteristics

(Unless otherwise specified, condition shall be V_{IN}=5V, V_O=3V (R_1=1kΩ), I_O=0.5A, V_C=2.7V, Ta=25˚C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input voltage range	V_{IN}	–	2.35	–	10	V
Output voltage	V_O	–	1.5	–	7	V
Reference voltage	V_{ref}	–	1.225	1.25	1.275	V
Load regulation	$R_{eg}L$	I_O=5mA to 1A	–	0.2	2	%
Line regulation	$R_{eg}I$	V_{IN}=4 to 8V, I_O=5mA	–	0.2	1	%
Reference voltage temperature coefficient	T_CV_{ref}	T_j=0 to 125˚C, I_O=5mA	–	±1.0	–	%
Ripple Rejection	RR	Refer to Fig.2	45	60	–	dB
Dropout voltage	V_{I-O}	V_{IN}=2.85V, I_O=0.5A	–	–	0.5	V
*4 Output on control voltage	$V_{C\ (ON)}$	–	2.0	–	–	V
Output on control current	$I_{C\ (ON)}$	–	–	–	200	µA
Output off control voltage	$V_{C\ (OFF)}$	I_O=0A	–	–	0.8	V
Output off control current	$I_{C\ (OFF)}$	I_O=0A, V_C=0.4V	–	–	2	µA
Quiescent current	I_q	I_O=0A	–	1	2	mA
Output off dissipation current	I_{qs}	I_O=0A, V_C=0.4V	–	–	5	µA

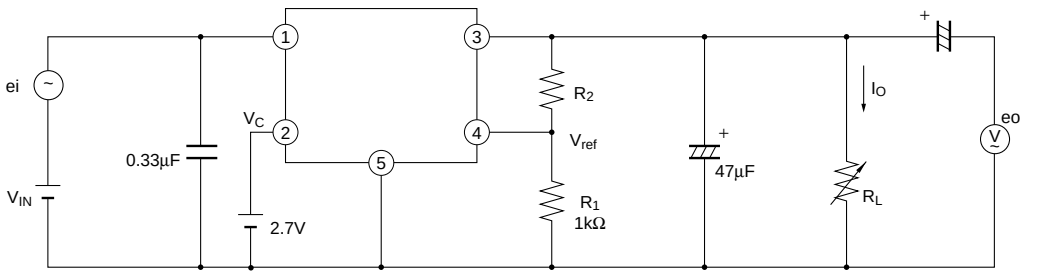
*4 In case of opening control terminal ②, output voltage turns off

Fig.1 Standard Test Circuit



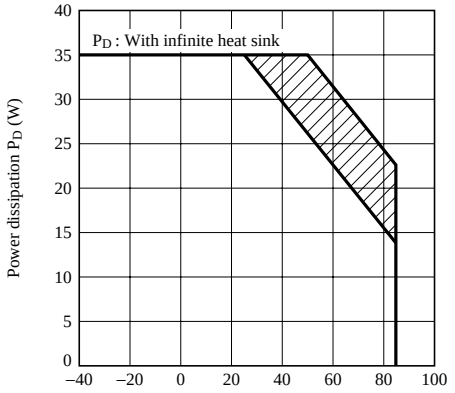
$V_O=V_{ref}\times(1+R_2/R_1)$
$\fallingdotseq 1.25\times(1+R_2/R_1)$
[R_1=1kΩ, $V_{ref}\fallingdotseq$1.25V]

Fig.2 Test Circuit for Ripple Rejection



f=120Hz(sine wave)
ei(rms)=0.5V
V_O=3V(R_1=1kΩ)
V_{IN}=5V
I_O=0.3A
RR=20log(ei(rms)/eo(rms))

Fig.3 Power Dissipation vs. Ambient Temperature



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

Fig.4 Overcurrent Protection Characteristics

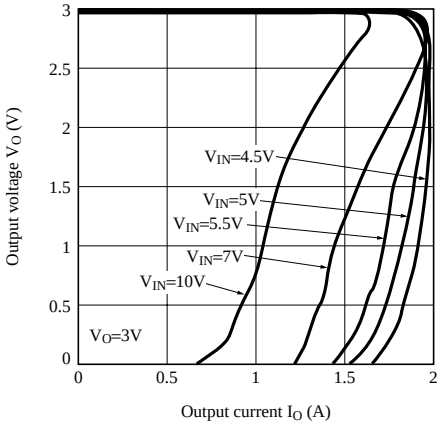


Fig.5 Reference Voltage vs. Ambient Temperature

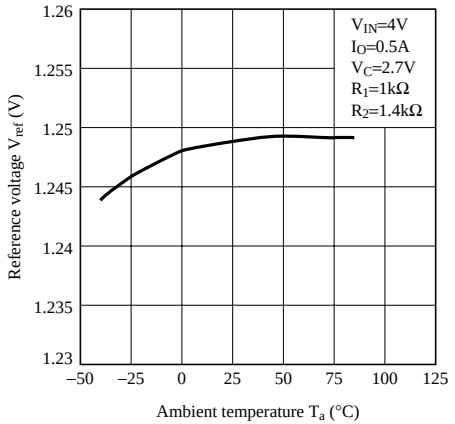


Fig.6 Output Voltage vs. Input Voltage

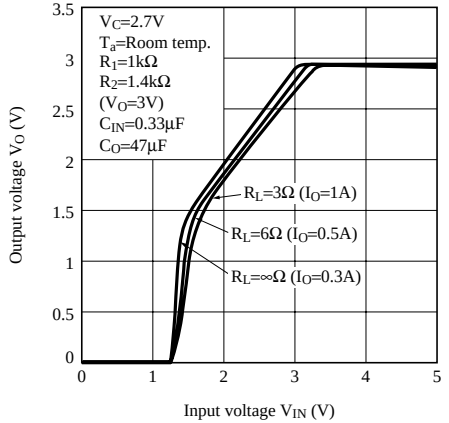


Fig.7 Circuit Operating Current vs. Input Voltage

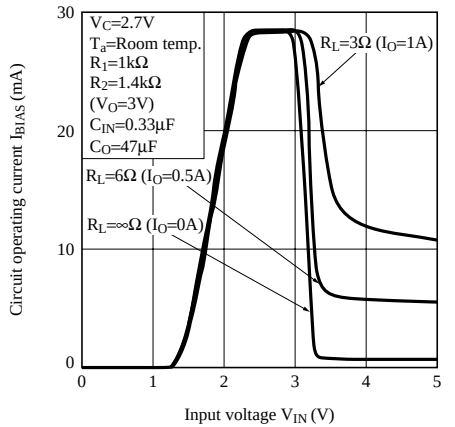


Fig.8 Dropout Voltage vs. Junction Temperature

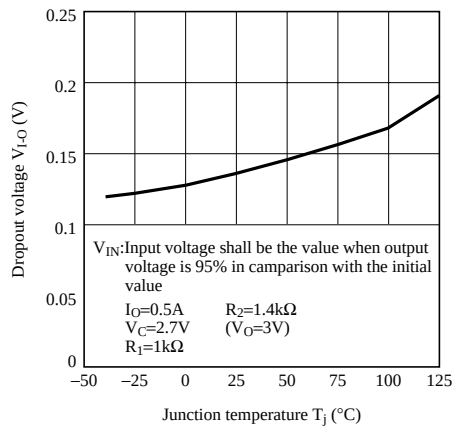


Fig.9 ON-OFF Threshold Voltage vs. Ambient Temperature

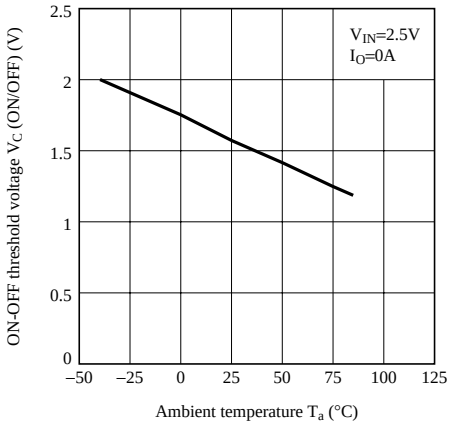


Fig.10 Quiescent Current vs. Ambient Temperature

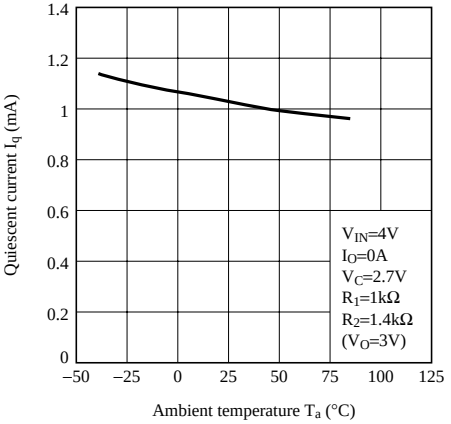


Fig.11 Ripple Rejection vs. Input Ripple Frequency

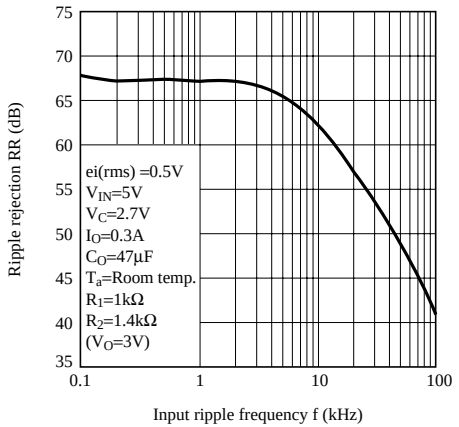


Fig.12 Ripple Rejection vs. Output Current

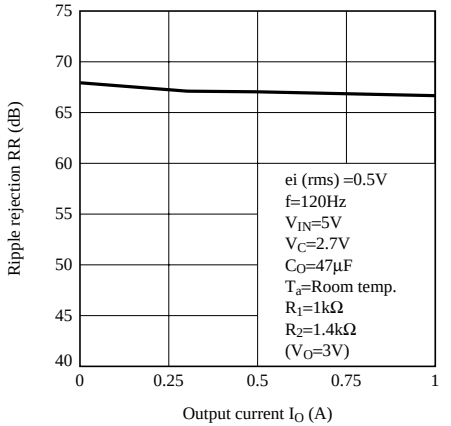
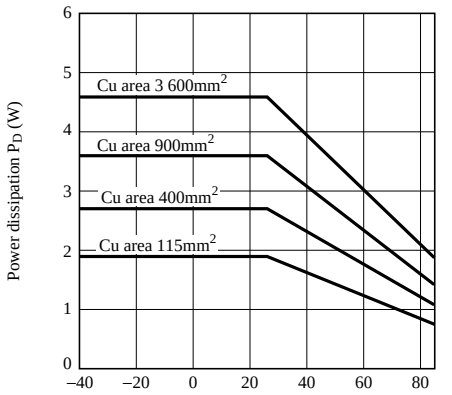
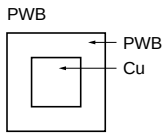


Fig.13 Power Dissipation vs. Ambient Temperature





Material : Glass-cloth epoxy resin
Size : 60×60×1.6mm
Cu thickness : 65µm

Fig.14 Output Voltage vs. R2 (Typical Value)

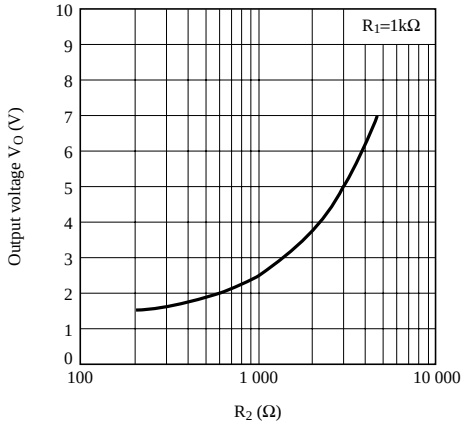
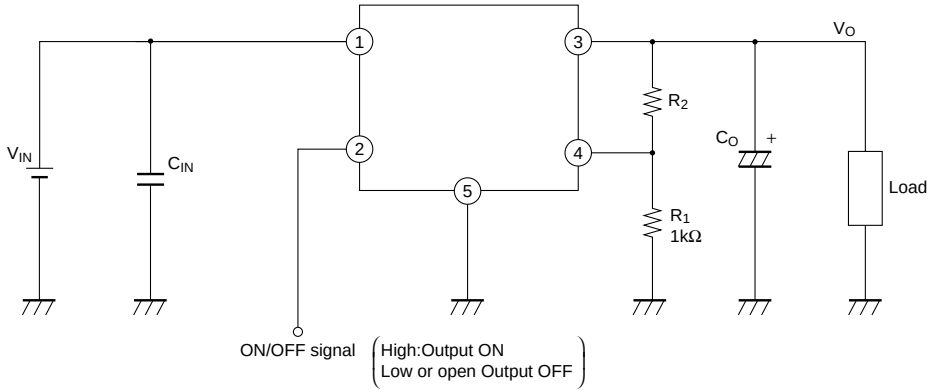
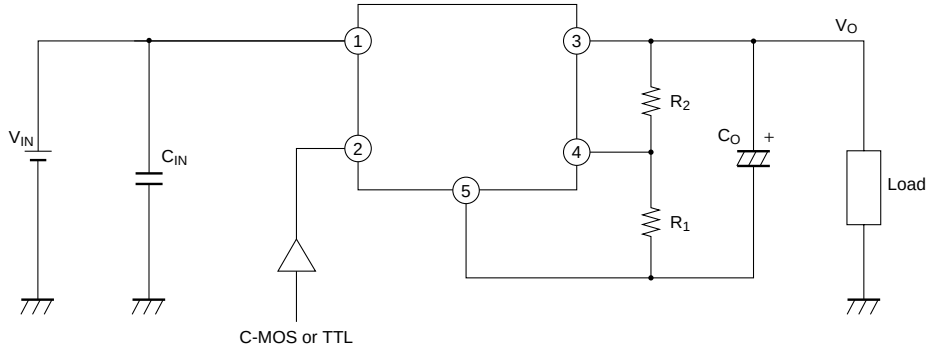


Fig.15 Example of Application



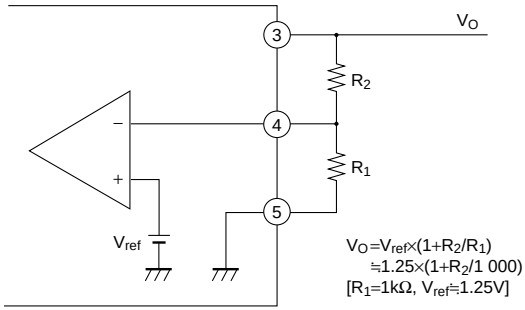
■ Precautions for Use



1. External connection
   (1) The connecting wiring of C_O, C_{IN} and each terminal, fin portion must be as short as possible. It may oscillate by type, value and wiring condition of capacitor. Confirm the output wareform in actual using condition beforehand.
   (2) ON/OFF control terminal ② is compatible with LS-TTL. It enables to be direcrly driven by TTL or C-MOS standard logic (RCA4000 series).
   (3) If voltage is applied under the conditions that device pin is connected divergently or reversely, the deterioration of characteristics or damage may occur. Never allow improper mounting.
2. Thermal protection design
   Power dissipation of devices is obtained by the following equation.
   $P_D=I_O\times(V_{IN}-V_O)+V_{IN}\times I_q$
   When ambient temperature T_a and power dissipation P_D during operation are determined, operate element within the safety operation area specified by the derating curve. Insufficient radiation gives an unfavorable influence to the normal operation and reliability of the device.
   In the external area of the safety operation area shown by the derating curve, the overheat protection circuit may operate to shut-down output. However please avoid keeping such condition for a long time.
3. ESD (Electrostatic Sensitivity Discharge)
   Be careful not to apply electrostatic discharge to the device since this device employs a bipolar IC and may be damaged by electro static discharge. Followings are some methods against excessive voltage caused by electro static discharge.
   (1) Human body must be grounded to discharge the electro charge which is charged in the body or cloth.
   (2) Anything that is in contact with the device such as workbench, inserter, or measuring instrument must be grounded.
   (3) Use a soldering dip basin with a minimum leak current (isolation resistance 10MΩ or more) from the AC power supply line. Also the soldering dip basin must be grounded.

■ Output Voltage Fine Tuning

1. Connecting external resistors R_1 and R_2 to terminals ③, ④, ⑤ allows the output voltage to be fine tuned from 1.5V to 7V. Refer to the figure below and Fig.14 when connecting external resistors for fine tuning output voltage.



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— Office automation equipment
— Telecommunication equipment [terminal]
— Test and measurement equipment
— Industrial control
— Audio visual equipment
— Consumer electronics

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— Traffic signals
— Gas leakage sensor breakers
— Alarm equipment
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