PQ070XZ5MZ/ PQ070XZ01Z

SC-63 Package, 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. Low dissipation current
   Dissipation current at no load:MAX.2mA
   (Conventional model:MAX.10mA)
   OFF-state dissipation current:MAX.5µA

■ Applications

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

■ Model Line-up

Output current (I_O)	Package type	Variable output
0.5A	Taping	**PQ070XZ5MZP**
	Sleeve	**PQ070XZ5MZZ**
1A	Taping	**PQ070XZ01ZP**
	Sleeve	**PQ070XZ01ZZ**

■ Absolute Maximum Ratings

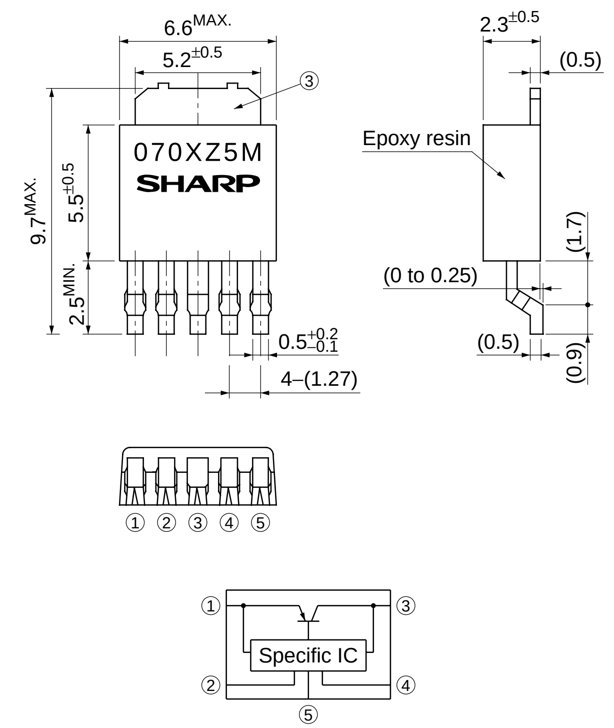
(Ta=25°C)

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	**PQ070XZ5MZ**	I_O	0.5	A
	PQ070XZ01Z		1	
*2 Power dissipation		P_D	8	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 T_j=125˚C to 150˚C

■ Outline Dimensions

(Unit : mm)



① DC input (V_{IN})
② ON/OFF control (V_C)
③ DC output (V_O)
④ Output voltage adjustment (V_{ADJ})
⑤ GND

❋ ( ) : Typical dimensions

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Internet Internet address for Electronic Components Group http://www.sharp.co.jp/ecg/

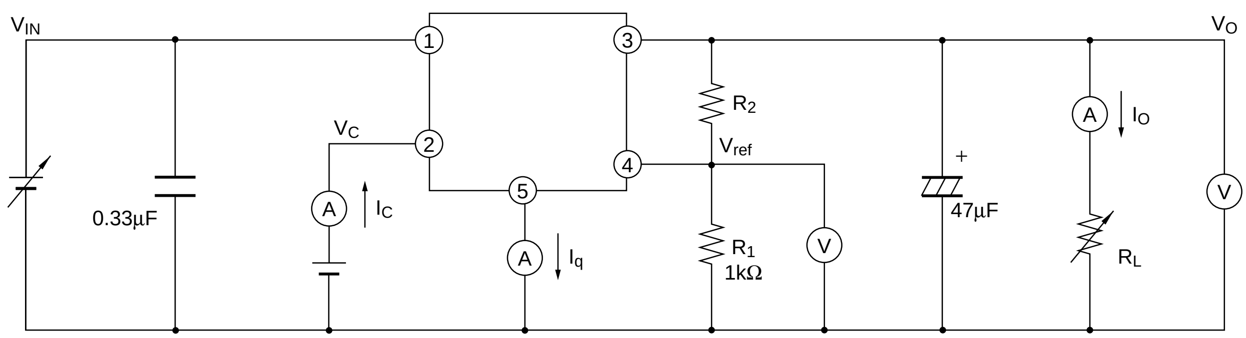
■ Electrical Characteristics

(Unless otherwise specified, condition shall be V_{IN}=5V, V_O=3V(R_1=1kΩ), I_O=0.3A, V_C=2.7V, Ta=25˚C, (**PQ070XZ5MZ**))
(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, (**PQ070XZ01Z**))

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input voltage range		V_{IN}	–	2.35	–	10	V
Output voltage		V_O	–	1.5	–	7	V
Load regulation	**PQ070XZ5MZ**	$R_{eg}L$	I_O=5mA to 0.5A	–	0.2	2	%
	PQ070XZ01Z		I_O=5mA to 1A				
Line regulation		$R_{eg}I$	V_{IN}=4 to 8V, I_O=5mA	–	0.2	1	%
Ripple Rejection		RR	Refer to Fig.2	45	60	–	dB
Dropout voltage	**PQ070XZ5MZ**	V_{I-O}	V_{IN}=2.85V, I_O=0.3mA	–	–	0.5	V
	PQ070XZ01Z		V_{IN}=2.85V, I_O=0.5mA				
Reference voltage		V_{ref}	–	1.225	±1.25	1.275	V
Reference voltage temperature coefficient		T_CV_{ref}	T_j=0 to 125˚C, I_O=5mA	–	±1.0	–	%
*4 Output on control voltage		$V_{C\,(ON)}$	*4	2	–	–	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}	V_C=0.4V	–	–	5	µA

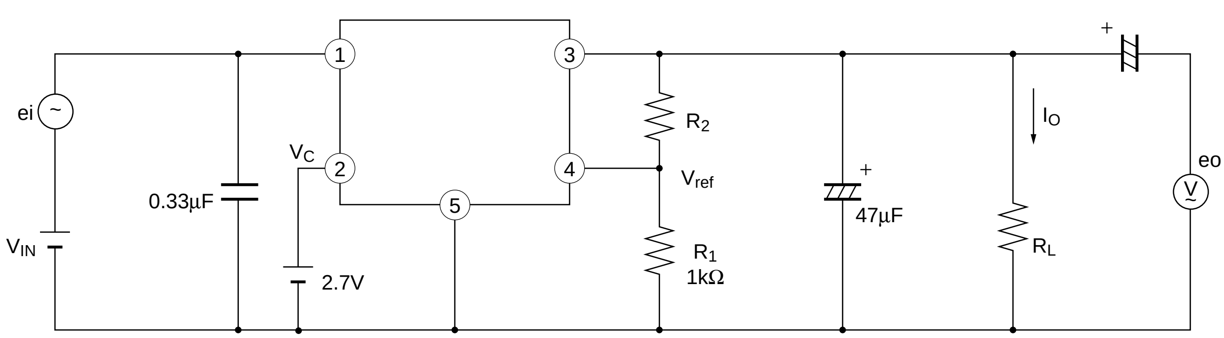
*4 In case of opening control terminal ②, output voltage turns off

Fig.1 Standard Test Circuit



V_O=V_{ref}×(1+R_2/R_1)
≒1.25×(1+R_2/R_1)
[R_1=1kΩ, V_{ref}≒1.25V]

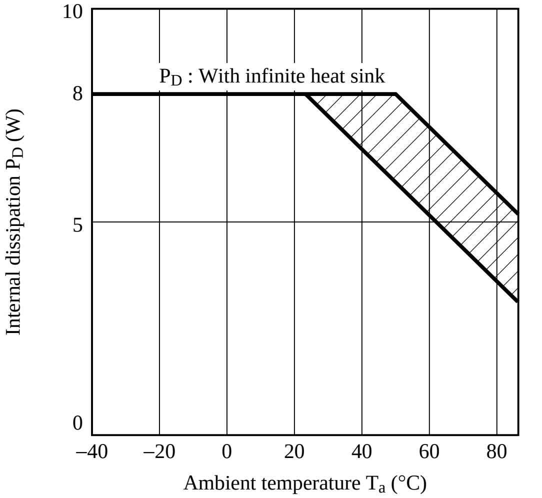
Fig.2 Test Circuit for Ripple Rejection



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 Internal Dissipation vs. Ambient Temperature



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

Fig.4 Overcurrent Protection Characteristics (PQ070XZ01Z)

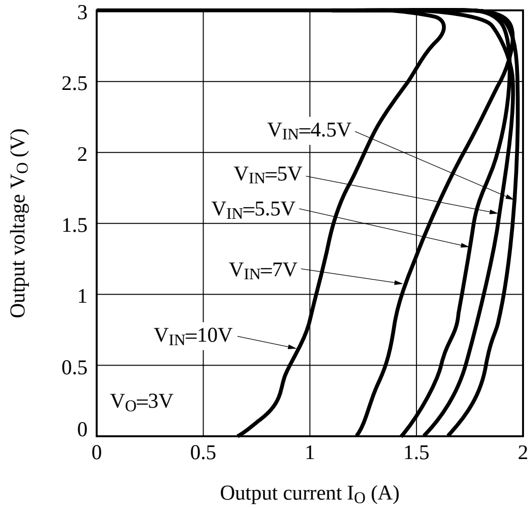


Fig.5 Overcurrent Protection Characteristics (PQ070XZ5MZ)

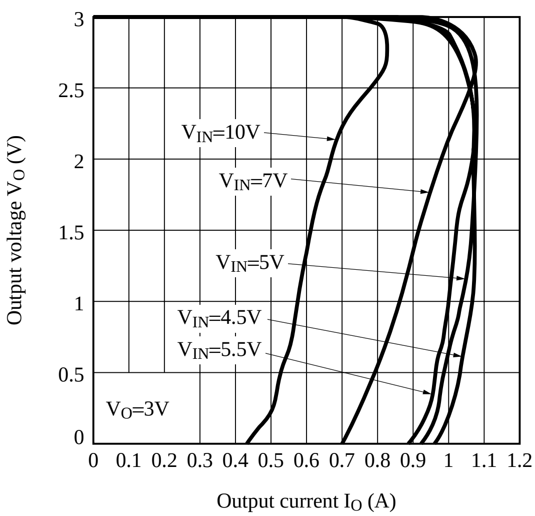


Fig.6 Reference Voltage vs. Ambient Temperature

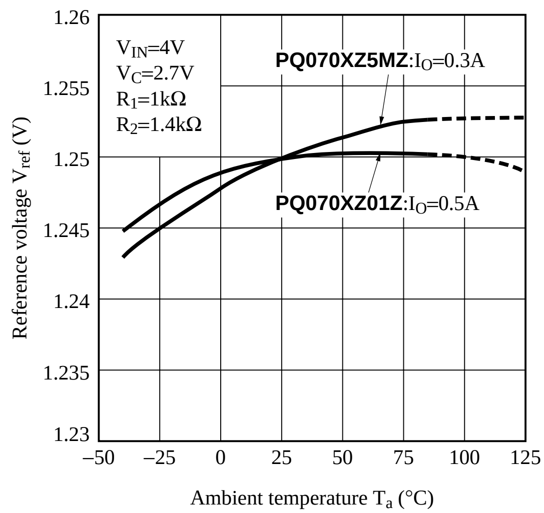


Fig.7 Output Voltage vs. Input Voltage (PQ070XZ5MZ)

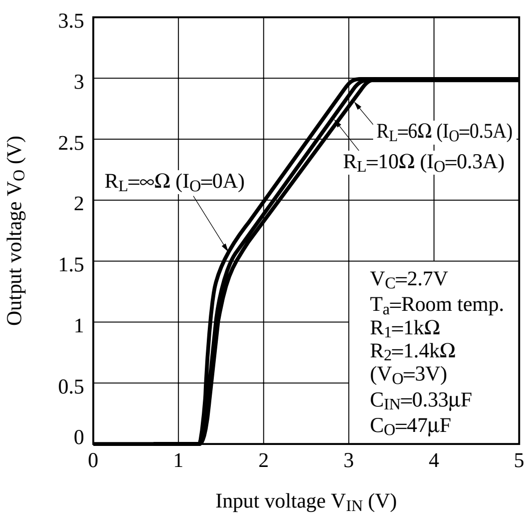


Fig.8 Output Voltage vs. Input Voltage (PQ070XZ01Z)

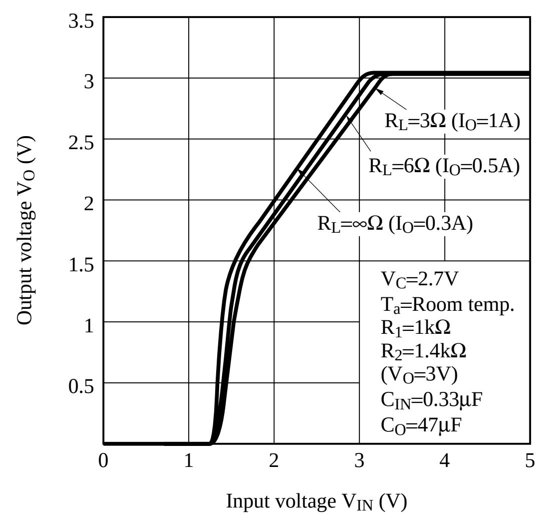


Fig.9 Circuit Operating Current vs. Input Voltage (PQ070XZ5MZ)

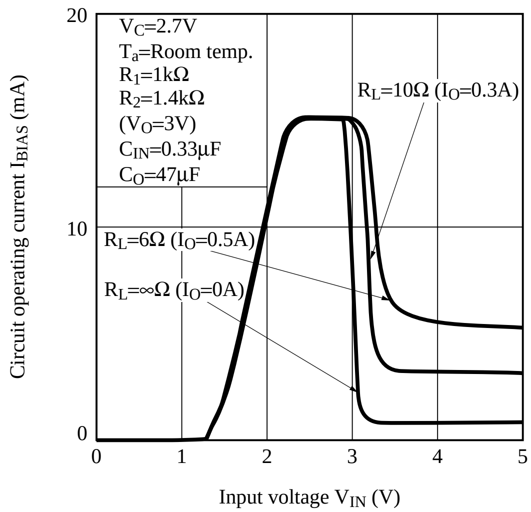


Fig.10 Circuit Operating Current vs. Input Voltage (PQ070XZ01Z)

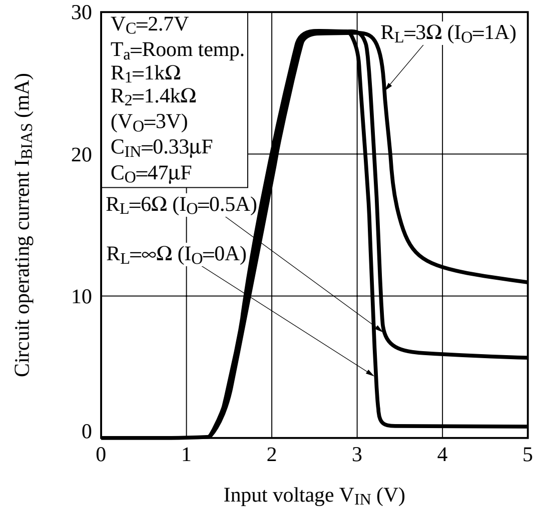


Fig.11 Dropout Voltage vs. Ambient Temperature

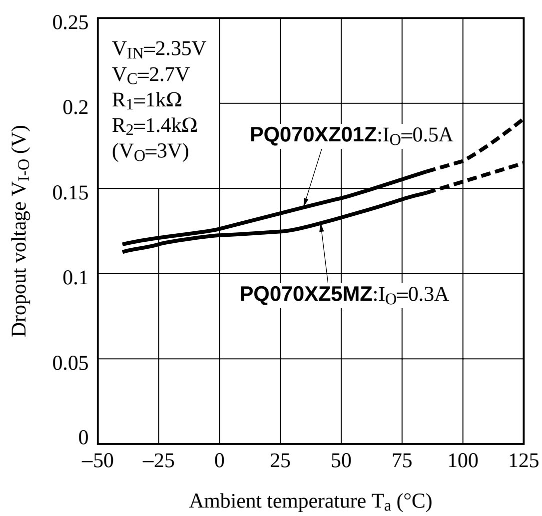


Fig.12 Quiescent Current vs. Ambient Temperature

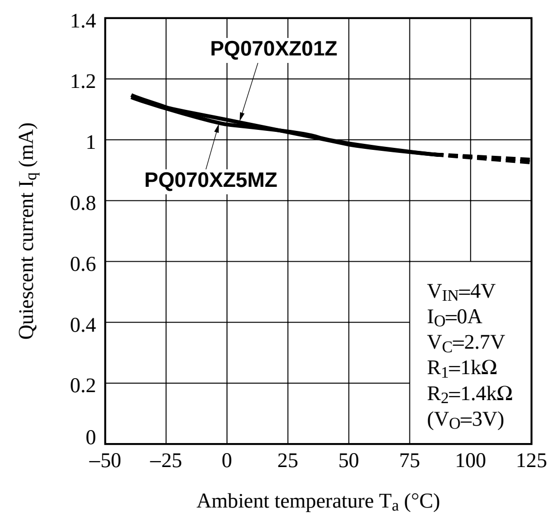


Fig.13 Ripple Rejection vs. Input Ripple Frequency

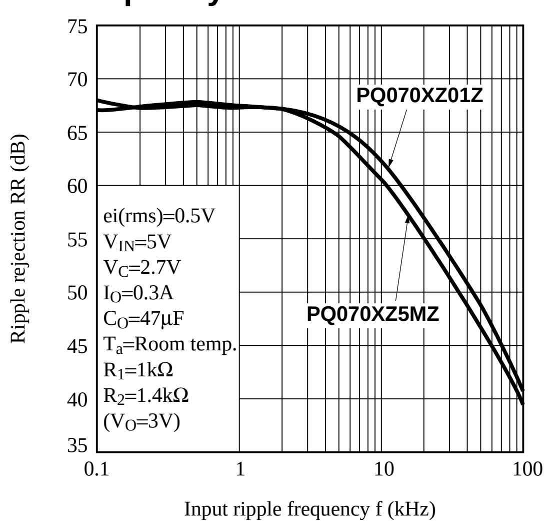


Fig.14 Ripple Rejection vs. Output Current

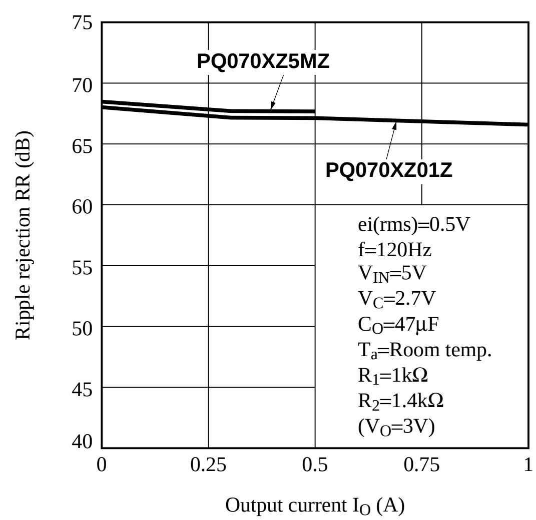


Fig.15 Example of Application

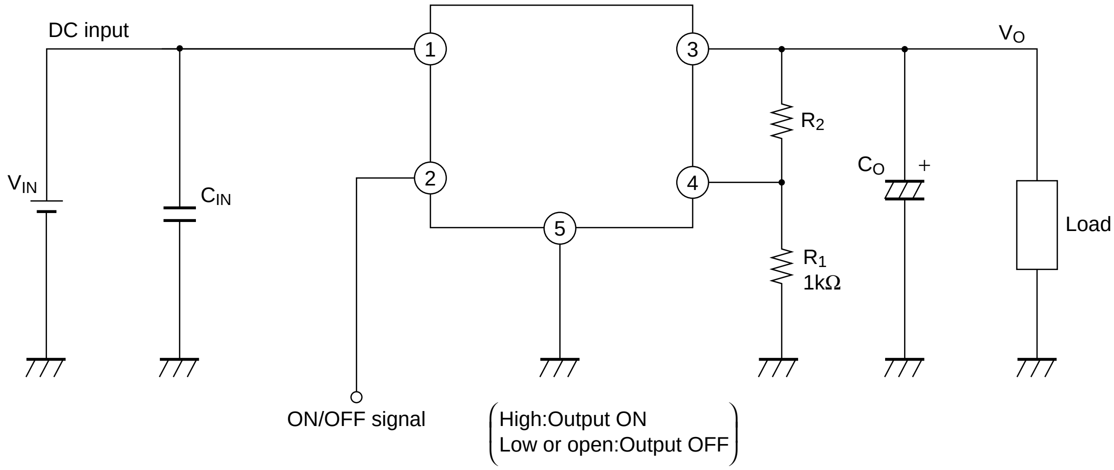
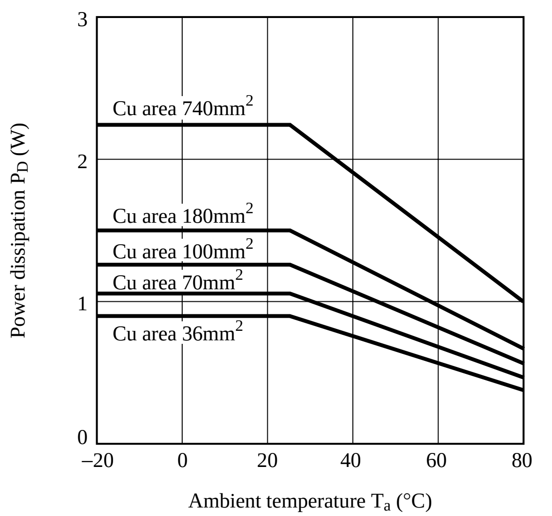
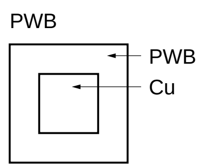


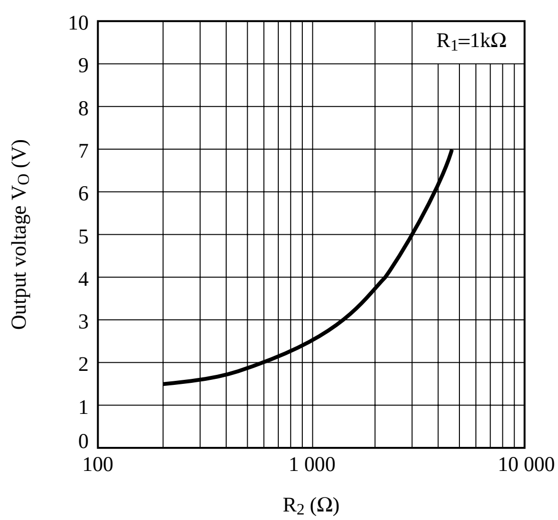
Fig.16 Power Dissipation vs. Ambient Temperature (Typical Value)



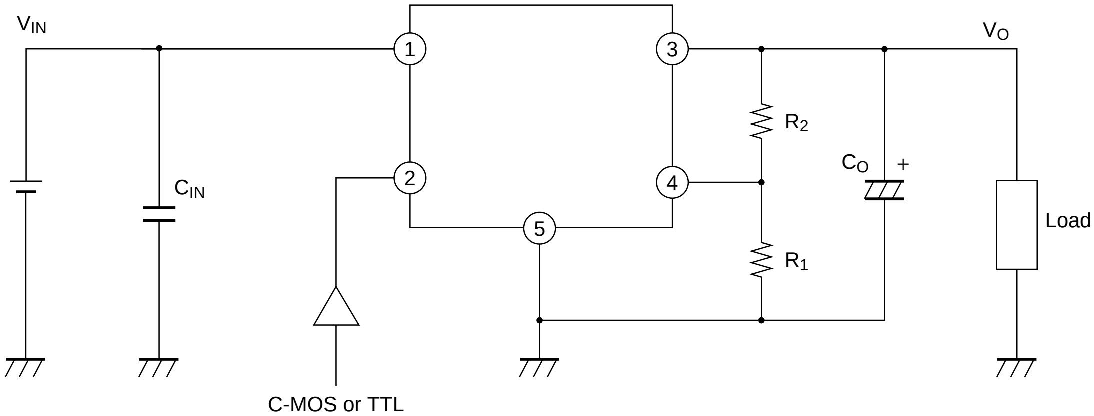


Material : Glass-cloth epoxy resin
Size : 50×50×1.6mm
Cu thickness : 35µm

Fig.17 Output Voltage vs. R2



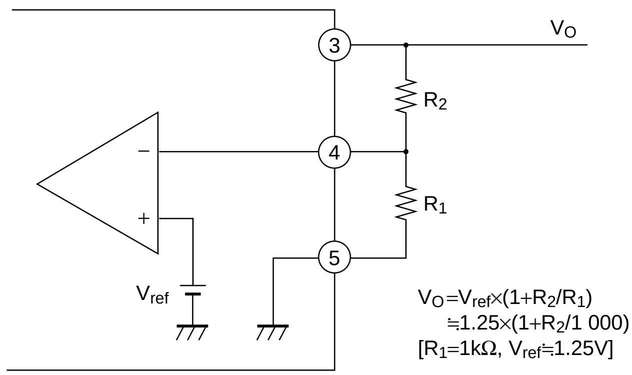
■ Precautions for Use



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
   Maximum 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 (MAX.) 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.17 when connecting external resistors for fine tuning output voltage.



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

  (ii) Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when SHARP devices are used for or in connection with equipment that requires higher reliability such as:
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  - Traffic signals
  - Gas leakage sensor breakers
  - Alarm equipment
  - Various safety devices, etc.

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