

Surface Mount, Large Output Current Type Low Power-Loss Voltage Regulator

1. Low power-loss

- (Dropout voltage:MAX.0.5V)
- 2. Surface mount type (10.6×13.7×3.5mm)
- 3. Large output current
- 4. Low voltage operation (minimum operating voltage:2.35V)
- 5. High-precision output type
(Reference voltage precision:±1.0%)
- 6. Overcurrent, overheat protection functions

1. Peripheral equipment of personal computers
2. Power supplies for various electronic equipment such as AV or OA equipment

Output current (I _o)	Package type	Variable output
3.5A	Taping	PQ05VY3H3ZP
	Sleeve	PQ05VY3H3ZZ
5A	Taping	PQ05VY053ZP
	Sleeve	PQ05VY053ZZ

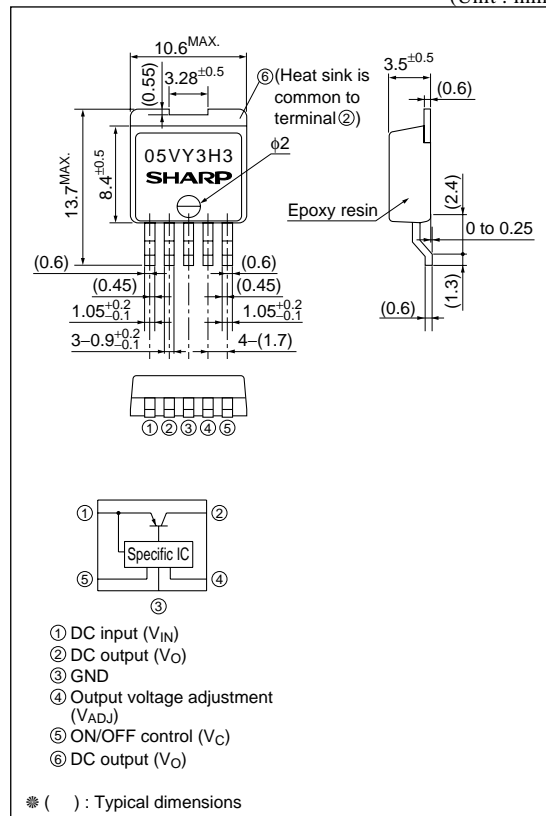
Parameter	Symbol	Rating	Unit
Input voltage	V _{IN}	7	V
Extremes of input-output voltage	V _{I-O}	4	V
*1 Output control voltage	V _C	7	V
*1 Output adjustment terminal voltage	V _{ADJ}	5	V
Output current	PQ05VY3H3Z	3.5	A
	PQ05VY053Z	5	
*2 Power dissipation	P _D	35	W
*3 Junction temperature	T _j	150	°C
Operating temperature	T _{opr}	−20 to +80	°C
Storage temperature	T _{stg}	−40 to +150	°C
Soldering temperature	T _{sol}	260 (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 $T_j=125^{\circ}\text{C}$ to 150°C

(Unit : mm)



Electrical Characteristics

(Unless otherwise specified, condition shall be $V_{IN}=5V$, $I_O=1.75A$ (PQ05VY3H3Z), $I_O=2.5A$ (PQ05VY053Z), $V_O=3V$ ($R_L=2k\Omega$), $T_a=25^\circ C$)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input voltage	V_{IN}	—	2.35	—	7	V
Output voltage	V_O	—	1.5	—	5	V
Reference voltage	V_{ref}	—	1.2276	1.24	1.2524	V
Load regulation	<div> <div>PQ05VY3H3Z</div> <div>PQ05VY053Z</div> </div> R_{egL}	$I_O=5mA$ to 3.5A	—	0.1	0.5	%
		$I_O=5mA$ to 5A				
Line regulation	R_{egI}	$V_{IN}=4$ to 7V, $I_O=5mA$	—	0.05	0.1	%
Reference voltage fluctuation	$T_C V_{ref}$	$T_J=0$ to $125^\circ C$, $I_O=5mA$	—	± 1	—	%
Ripple Rejection	RR	Refer to Fig.2	60	70	—	dB
Dropout voltage	<div> <div>PQ05VY3H3Z</div> <div>PQ05VY053Z</div> </div> V_{I-O}	$I_O=3.5A$	—	—	0.5	V
		$I_O=5A$				
*5 Output on control voltage	$V_C(ON)$	—	2	—	—	V
Output on control current	$I_C(ON)$	$V_C=2.7V$	—	—	20	μA
Output off control voltage	$V_C(OFF)$	—	—	—	0.8	V
Output off control current	$I_C(OFF)$	$V_C=0.4V$	—	—	-0.4	mA
Quiescent current	I_q	$I_O=0A$	—	5	10	mA

*4 The values of input voltage when output voltage goes 0.95V

*5 In case of opening control terminal ⑤, output voltage turns on

Fig.1 Standard Test Circuit

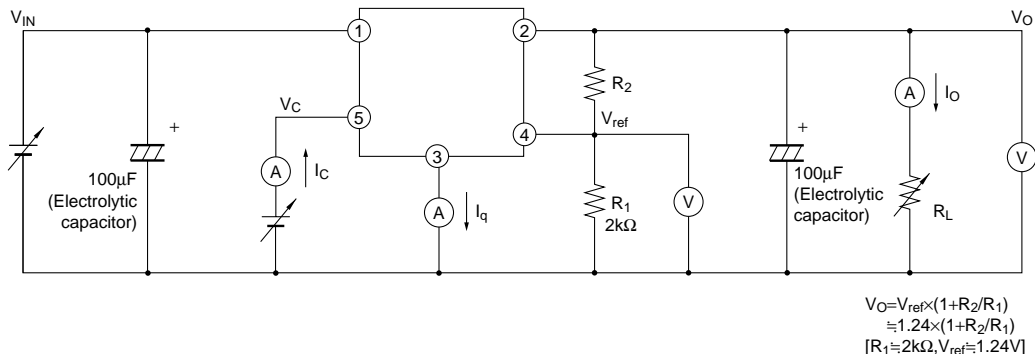


Fig.2 Test Circuit for Ripple Rejection

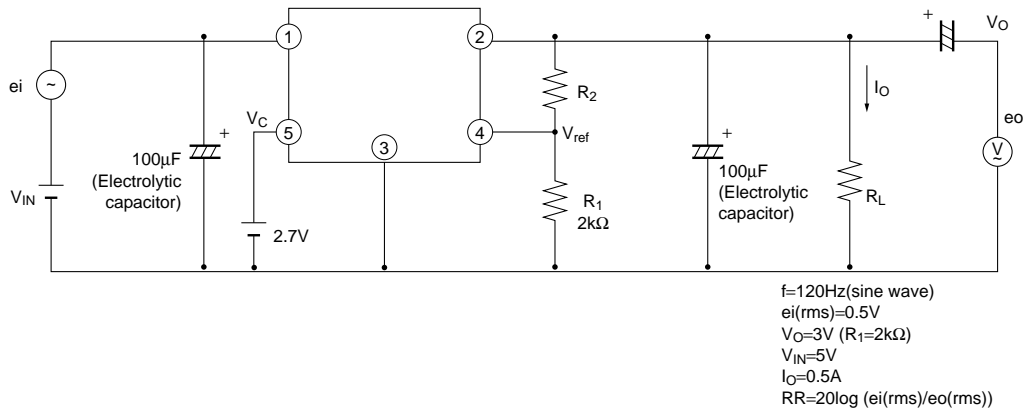
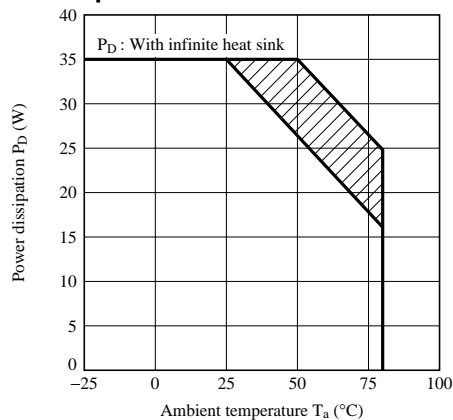


Fig.3 Power Dissipation vs. Ambient Temperature



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

Fig.4 Overcurrent Protection Characteristics (PQ05VY3H3Z)

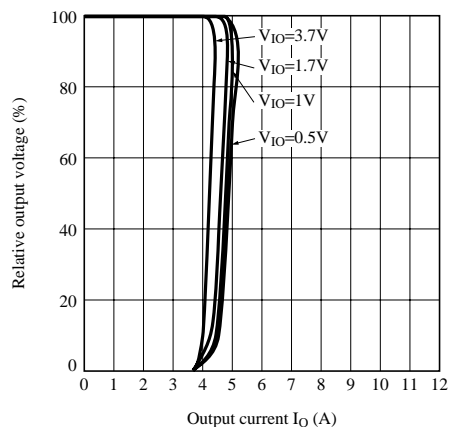


Fig.5 Overcurrent Protection Characteristics (PQ05VY053Z)

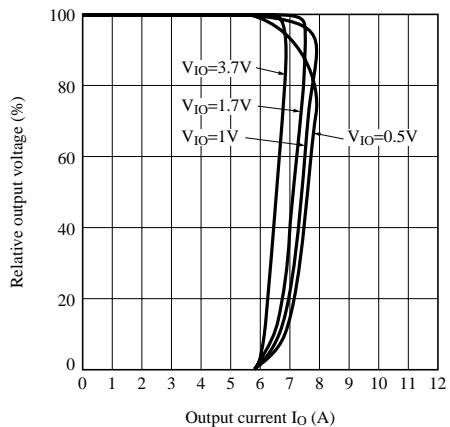


Fig.6 Reference Voltage Fluctuation vs. Ambient Temperature

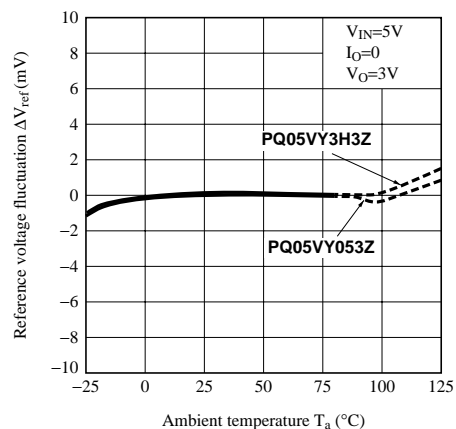


Fig.7 Output Voltage vs. Input Voltage (PQ05VY3H3Z)

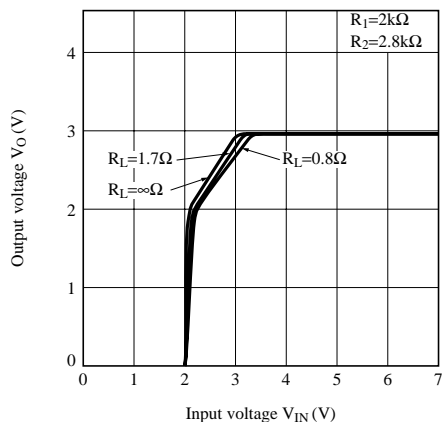


Fig.8 Output Voltage vs. Input Voltage (PQ05VY053Z)

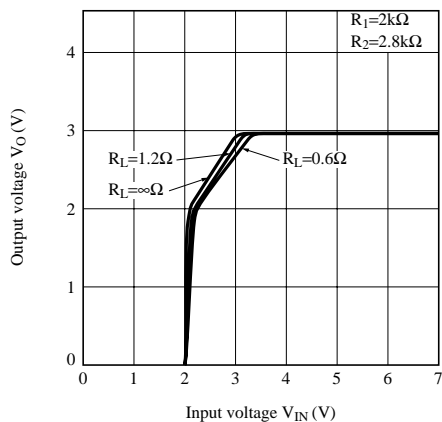


Fig.9 Circuit Operating Current vs. Input Voltage (PQ05VY3H3Z)

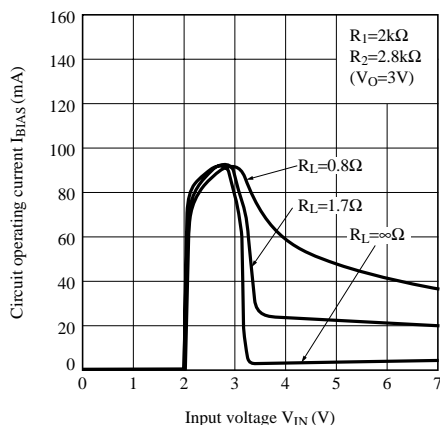


Fig.10 Circuit Operating Current vs. Input Voltage (PQ05VY053Z)

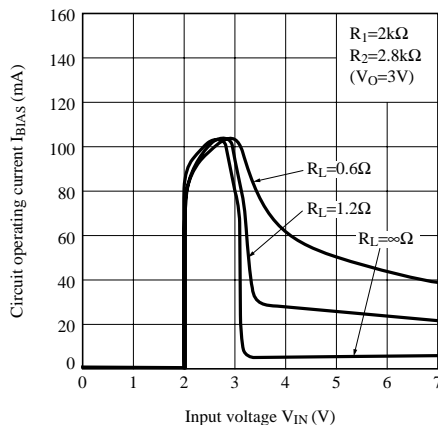


Fig.11 Dropout Voltage vs. Junction Temperature

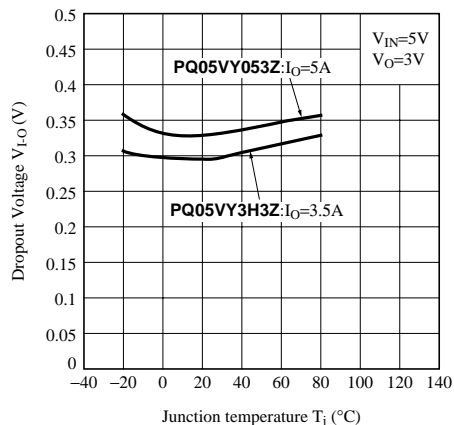


Fig.12 Quiescent Current vs. Junction Temperature

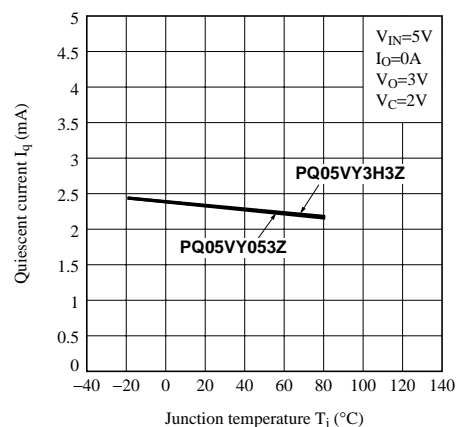
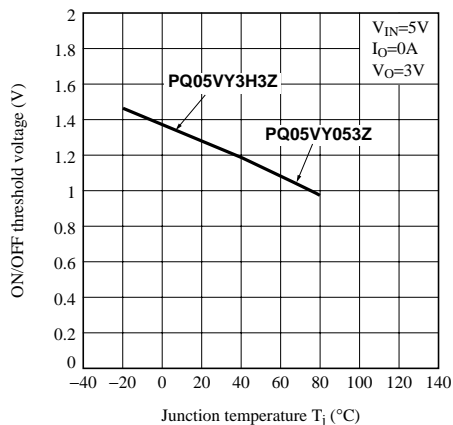
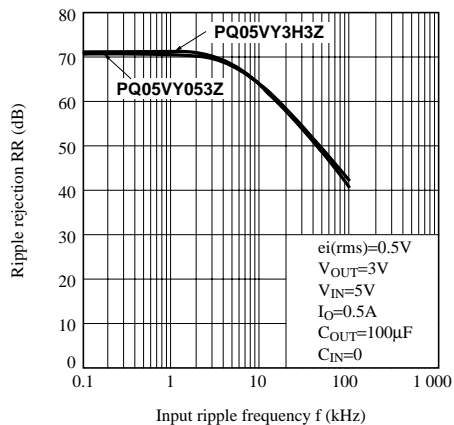
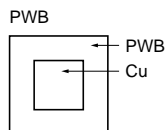
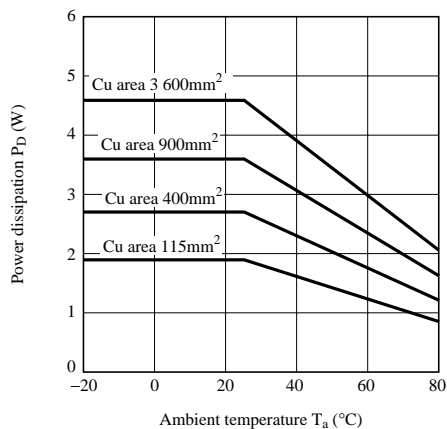


Fig.13 ON-OFF Threshold Voltage vs. Junction Temperature

Fig.14 Ripple Rejection vs. Input Ripple Frequency

Fig.15 Power Dissipation vs. Ambient Temperature (Typical Value)


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

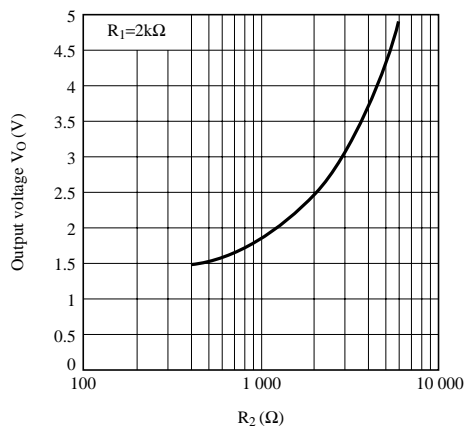
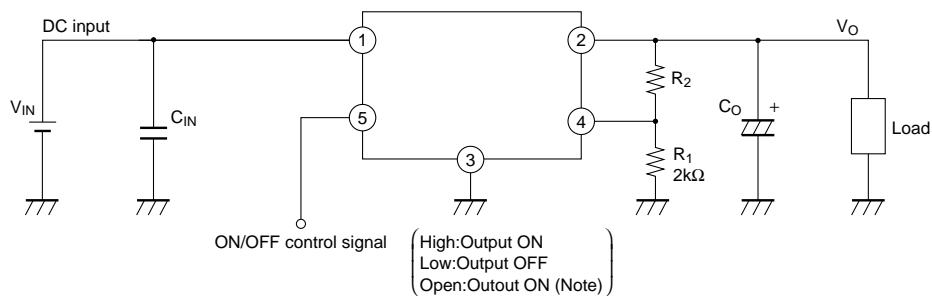
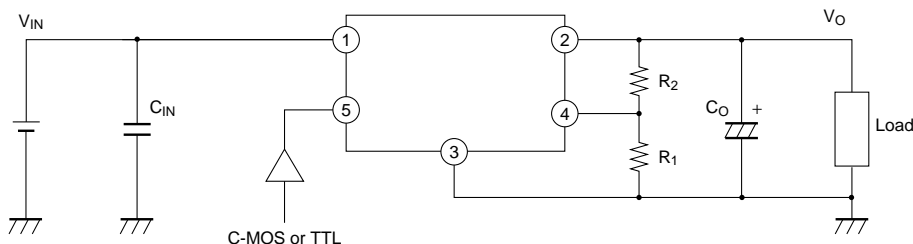
Fig.16 Output Voltage Adjustment Characteristics (Typical Value)


Fig.17 Example of Application



⌘ Please make sure to use this device, pulling up to the power supply with less than 7V at the resistor less than 50k Ω in switching ON/OFF with open collector output or in not using ON/OFF function (in keeping "ON"), because input impedance is high in ON/OFF terminals.

■ Precautions for Use



1. External connection

- (1) The connecting wiring of C_O and each terminal must be as short as possible. Owing to type, value and wiring condition of capacitor, it may oscillate. Confirm the output waveform under the actual condition before using.
- (2) ON/OFF control terminal ⑤ is compatible with LS-TTL. It enables to be directly drive by TTL or C-MOS standard logic (RCA4000 series). Please make sure to use this device, pulling up to the power supply with less than 7V at the resistor less than 50k Ω in switching ON/OFF with open collector output or in not using ON/OFF function (in keeping "ON"), because input impedance is high in ON/OFF terminals.
- (3) If voltage is applied under the conditions that the device pin is connected divergently or reversely, the deterioration of characteristics or damage may occur. Never allow improper mounting.
- (4) If voltage exceeding the voltage of DC input terminal ① is applied to the output terminal ②, the element may be damaged. Especially when the DC input terminal ① is short-circuited to the GND in ordinary operating state, charges accumulated in the output capacitor C_O flow to the input side, causing damage to the element. In this case, connect the ordinary silicon diode as shown in the figure.

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.

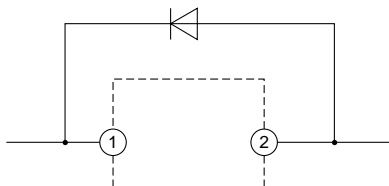
In the external area of the safety operation area shown by the derating curve, the overheat protection circuit may operate to shut-down output. However please avoid keeping such condition for a long time.

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.

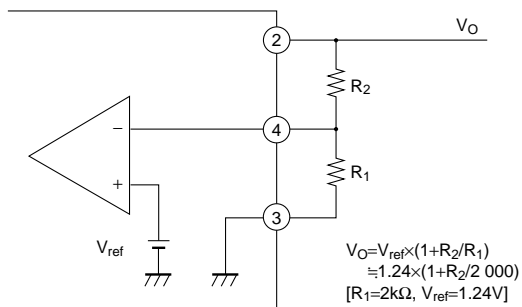
- (1) Human body must be grounded to discharge the electro charge which is charged in the body or cloth.
- (2) Anything that is in contact with the device such as workbench, inserter, or measuring instrument must be grounded.
- (3) Use a soldering dip basin with a minimum leak current (isolation resistance 10M Ω 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 ②, ③, ④ allows the output voltage to be fine tuned from 1.5V to 5V. Refer to Fig.16 when connecting external resistors for fine tuning output voltage.



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