PQ05VY3H3Z/ PQ05VY053Z

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

■ Features

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-preision output type
   (Reference voltage precision:±1.0%)
6. Overcurrent, overheat protection functions

■ Applications

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

■ Model Line-up

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

■ Absolute Maximum Ratings

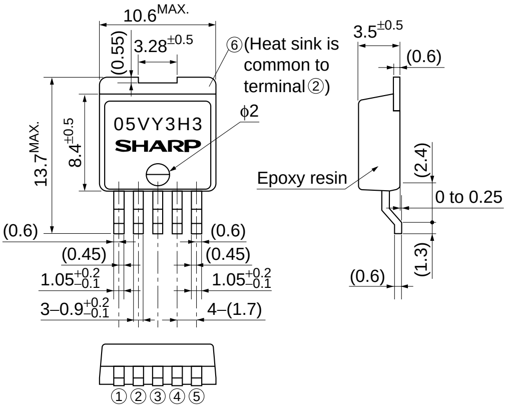
(Ta=25°C)

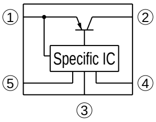
Parameter		Symbol	Rating	Unit
Input voltage		V_{IN}	7	V
Extremes of input-output voltage		V_{I-O}	4	V
*1 Output control voltage		V_C	7	V
*1 Output adjustment terminal voltage		V_{ADJ}	5	V
Output current	**PQ05VY3H3Z**	I_O	3.5	A
	PQ05VY053Z		5	
*2 Power dissipation		P_D	35	W
*3 Junction temperature		T_j	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˚C to 150˚C

■ Outline Dimensions

(Unit : mm)





① DC input (V_{IN})
② DC output (V_O)
③ GND
④ Output voltage adjustment (V_{ADJ})
⑤ ON/OFF control (V_C)
⑥ DC output (V_O)

❋ ( ) : Typical dimensions

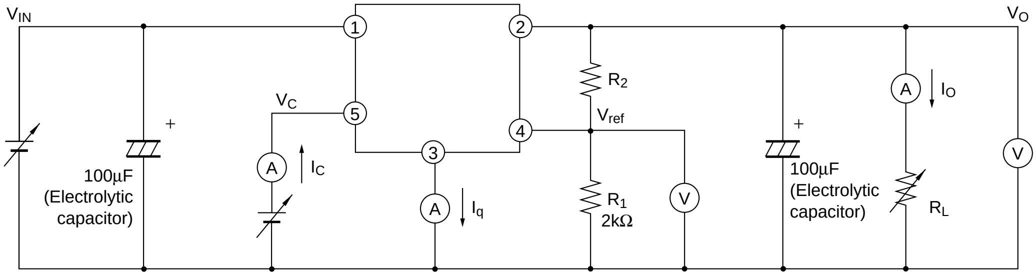
■ Electrical Characteristics

(Unless otherwise specified, condition shall be V_{IN}=5V, I_O=1.75A(**PQ05VY3H3Z**), I_O=2.5A(**PQ05VY053Z**), V_O=3V(R_1=2kΩ), Ta=25˚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	**PQ05VY3H3Z**	$R_{eg}L$	I_O=5mA to 3.5A	–	0.1	0.5	%
	PQ05VY053Z		I_O=5mA to 5A				
Line regulation		$R_{eg}I$	V_{IN}=4 to 7V, I_O=5mA	–	0.05	0.1	%
Reference voltage fluctuation		T_CV_{ref}	T_j=0 to 125˚C, I_O=5mA	–	±1	–	%
Ripple Rejection		RR	Refer to Fig.2	60	70	–	dB
Dropout voltage	**PQ05VY3H3Z**	V_{I-O}	*4 I_O=3.5A	–	–	0.5	V
	PQ05VY053Z		*4 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

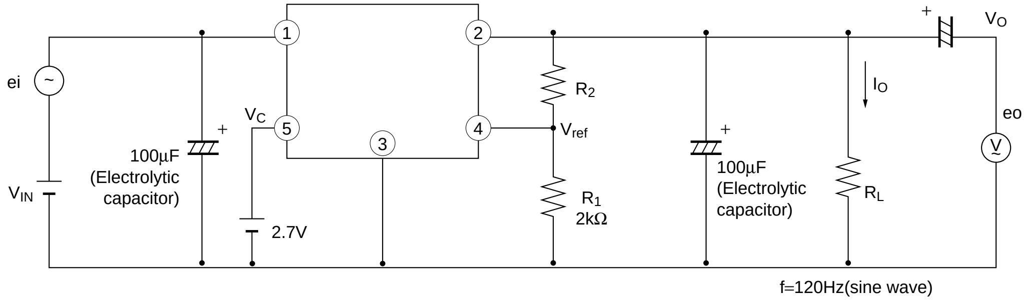
*4 The values of input voltage when output voltage goes 0.95V
*5 In case of opening control terminal ⑤, output voltage turns on

Fig.1 Standard Test Circuit



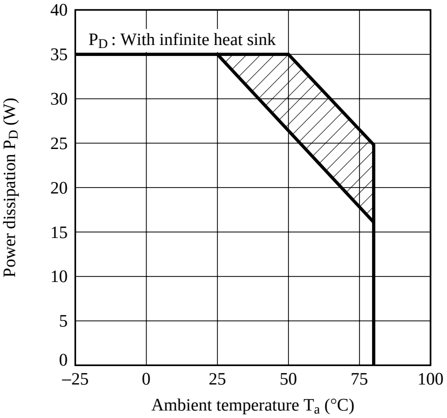
$V_O=V_{ref}\times(1+R_2/R_1)$
$\fallingdotseq 1.24\times(1+R_2/R_1)$
[$R_1\fallingdotseq 2k\Omega, V_{ref}\fallingdotseq 1.24V$]

Fig.2 Test Circuit for Ripple Rejection



f=120Hz(sine wave)
ei(rms)=0.5V
V_O=3V (R_1=2kΩ)
V_{IN}=5V
I_O=0.5A
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 (PQ05VY3H3Z)

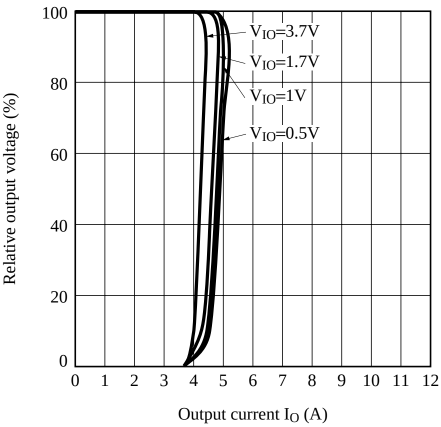


Fig.5 Overcurrent Protection Characteristics (PQ05VY053Z)

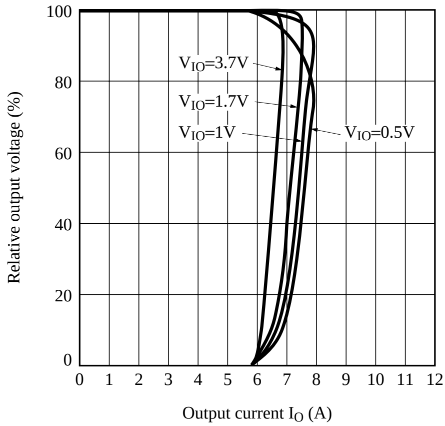


Fig.6 Reference Voltage Fluctuation vs. Ambient Temperature

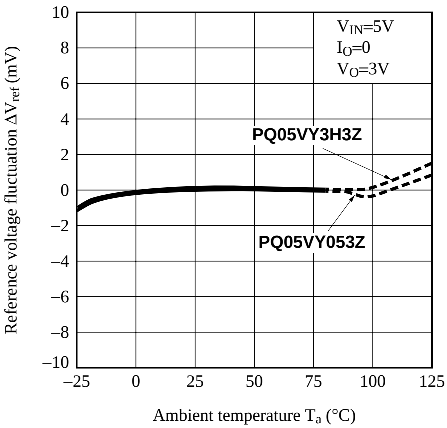


Fig.7 Output Voltage vs. Input Voltage (PQ05VY3H3Z)

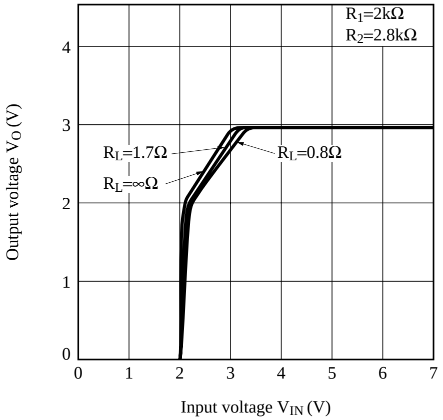


Fig.8 Output Voltage vs. Input Voltage (PQ05VY053Z)

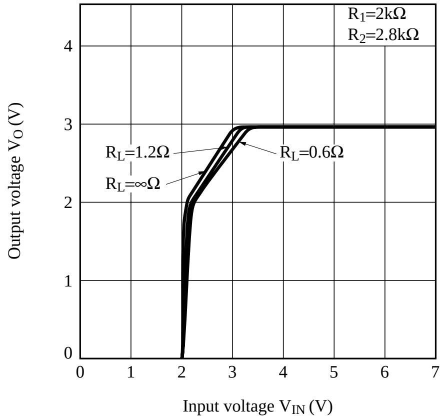


Fig.9 Circuit Operating Current vs. Input Voltage (PQ05VY3H3Z)

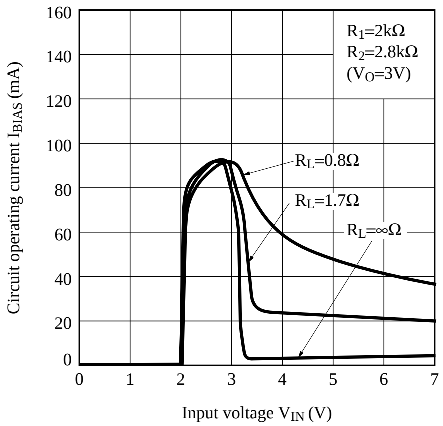


Fig.10 Circuit Operating Current vs. Input Voltage (PQ05VY053Z)

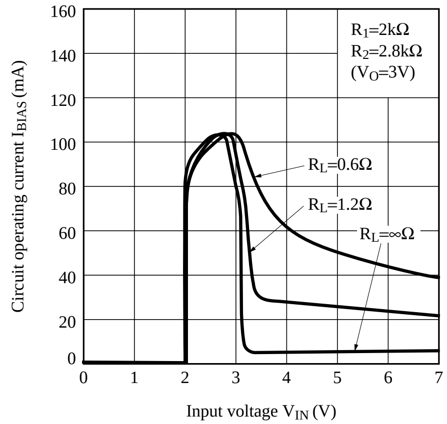


Fig.11 Dropout Voltage vs. Junction Temperature

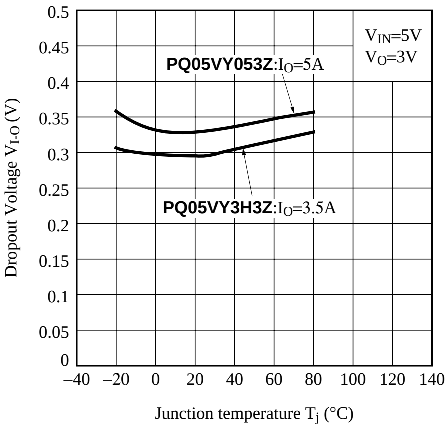


Fig.12 Quiescent Current vs. Junctiion Temperature

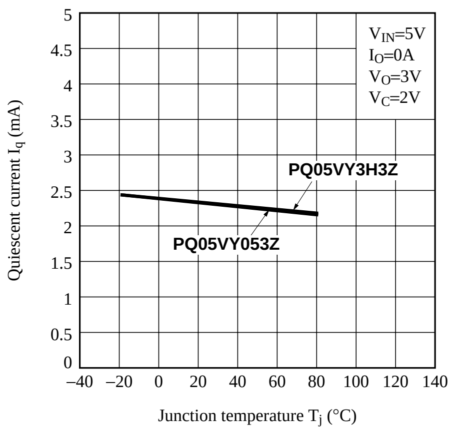


Fig.13 ON-OFF Threshold Voltage vs. Junction Temperature

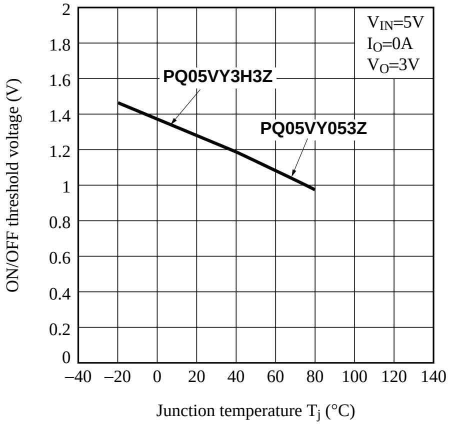


Fig.14 Ripple Rejection vs. Input Ripple Frequency

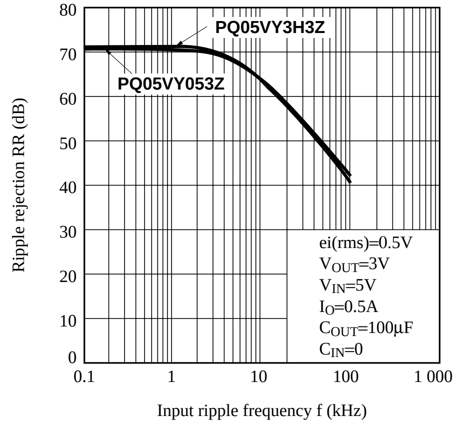
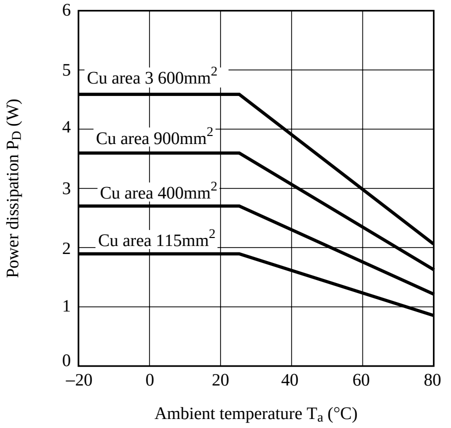
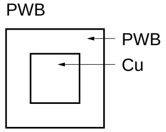


Fig.15 Power Dissipation vs. Ambient Temperature (Typical Value)





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

Fig.16 Output Voltage Adjustment Characteristics (Typical Value)

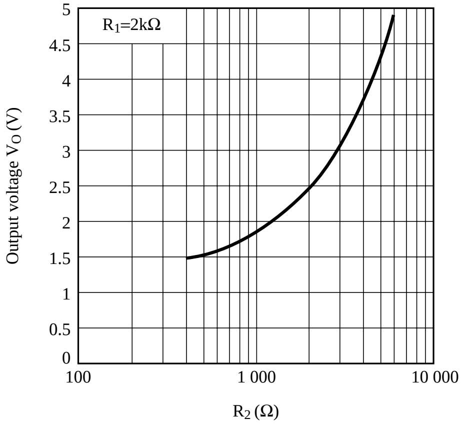
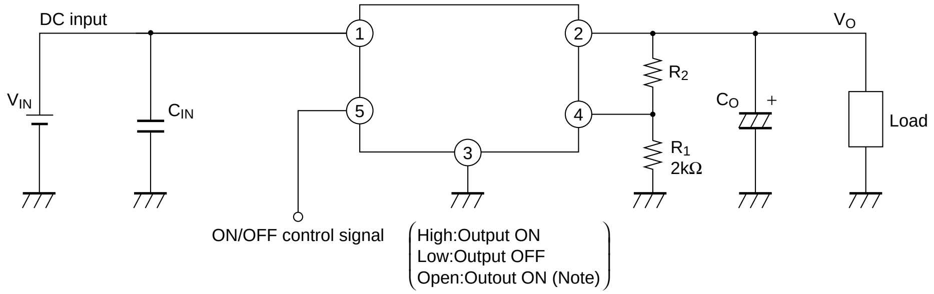
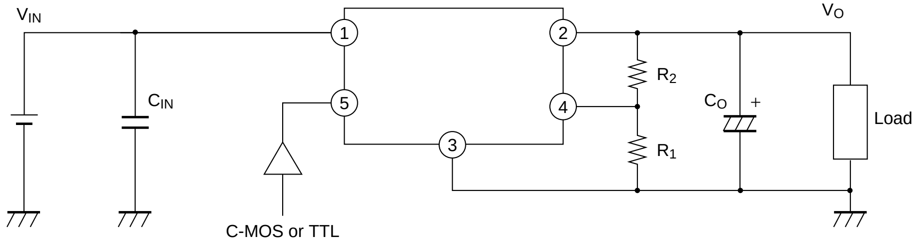


Fig.17 Example of Application

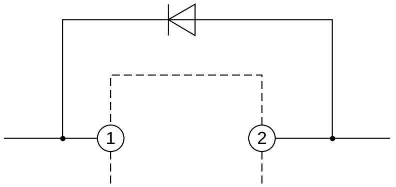


❋ Please make sure to use this device, pulling up to the power supply with less than 7V at the resistor less than 50kΩ in switching ON/OFF with open collector output or in not using ON/OFF function (in keeping "ON"), because input impedance is high in ON/OFF terminals.

■ Precautions for Use

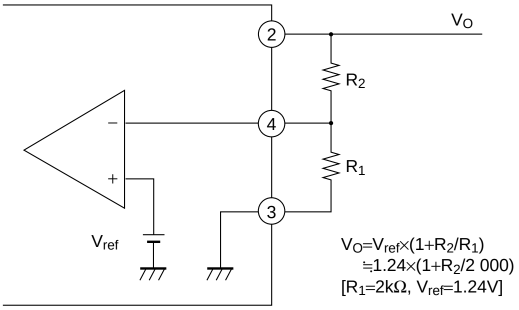


1. External connection
   (1) The connecting wiring of C_O and each terminal must be as short as possible. Owing to type, value and wiring condition of capacitor, it may oscillate. Confirm the output waveform under the actual condition before using.
   (2) ON/OFF control terminal ⑤ is compatible with 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 50kΩ 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 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 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.



NOTICE