

# PQ05DZ51/11 Series / PQ3DZ53/13

0.5A/ 1.0A Output, General Purpose, Surface Mount Type Low Power-Loss Voltage Regulator

## ■ Features

- Low power-loss  
(Dropout voltage : MAX. 0.5V)
- Surface mount package (equivalent to SC-63)
- Available 3.3V, 5V, 9V, 12V output type
- Output current (0.5A : PQ05DZ51 series/PQ3DZ53)  
(1.0A : PQ05DZ11 series/PQ3DZ13)
- Output voltage precision :  $\pm 3.0\%$
- Built-in ON/ OFF control function
- Low dissipation current at OFF-state ( $I_{qs}$  : MAX. 5 $\mu$ A)
- Built-in overcurrent protection, overheat protection function, ASO protection function
- Available tape-packaged products  
( $\phi 330$ mm reel : 3 000 pcs., PQ05DZ5U/1U series,  
PQ3DZ53U/13U)

## ■ Applications

- Personal computers
- CD-ROM drives
- Power supplies for various OA equipment

## ■ Model Line-ups

	0.5A output	1.0A output
3.3V output	PQ3DZ53	PQ3DZ13
5.0V output	PQ05DZ51	PQ05DZ11
9.0V output	PQ09DZ51	PQ09DZ11
12.0V output	PQ12DZ51	PQ12DZ11

## ■ Absolute Maximum Ratings

( $T_a=25^\circ\text{C}$ )

Parameter	Symbol	Rating		Unit
		PQ05DZ51 series PQ3DZ53	PQ05DZ11 series PQ3DZ13	
*1 Input voltage	$V_{IN}$	24		V
*1 ON/ OFF control terminal voltage	$V_C$	24		V
Output current	$I_o$	0.5	1.0	A
*2 Power dissipation	$P_D$	8		W
*3 Junction temperature	$T_j$	150		$^\circ\text{C}$
Operating temperature	$T_{opr}$	-20 to +80		$^\circ\text{C}$
Storage temperature	$T_{stg}$	-40 to +150		$^\circ\text{C}$
Soldering temperature	$T_{sol}$	260 (for 10s)		$^\circ\text{C}$

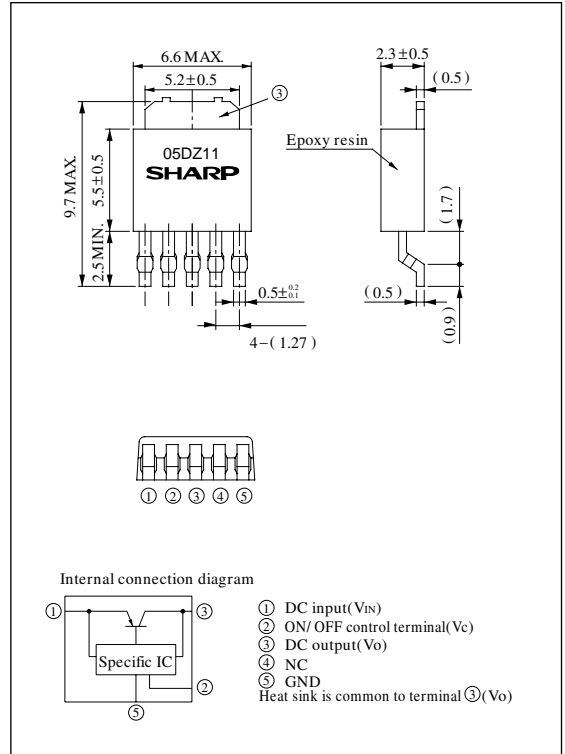
\*1 All are open except GND and applicable terminals.

\*2  $P_D$  : With infinite heat sink

\*3 Overheat protection may operate at  $125 \leq T_j < 150^\circ\text{C}$

## ■ Outline Dimensions

(Unit : mm)



Internal connection diagram

- ① DC input( $V_{IN}$ )
  - ② ON/ OFF control terminal( $V_C$ )
  - ③ DC output( $V_O$ )
  - ④ NC
  - ⑤ GND
- Heat sink is common to terminal ③( $V_O$ )

• Please refer to the chapter " Handling Precautions ".

**Electrical Characteristics**

(Unless otherwise specified, conditions shall be  $V_c=2.7V$ ,  $I_o=0.3A$ [PQ05DZ51 series/PQ3DZ53],  $I_o=0.5A$ [PQ05DZ11 series/PQ3DZ13]<sup>※4</sup>,  $T_a=25^\circ C$ )

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	
Output voltage	$V_o$	※4	PQ3DZ53/PQ3DZ13	3.201	3.3	3.399	V
			PQ05DZ51/PQ05DZ11	4.85	5.0	5.15	
			PQ09DZ51/PQ09DZ11	8.73	9.0	9.27	
			PQ12DZ51/PQ12DZ11	11.64	12.0	12.36	
Load regulation	$R_{egL}$	$I_o=5mA$ to $0.5A$ , ※4 $I_o=5mA$ to $1.0A$ , ※4	—	※8 0.2	2.0	%	
			Line regulation	$R_{egI}$	※5, $I_o=5mA$		—
Temperature coefficient of output voltage	$T_c V_o$	$T_j=0$ to $125^\circ C$ , $I_o=5mA$ , ※4	—	※9 $\pm 0.01$	—	$\% / ^\circ C$	
Ripple rejection	RR	Refer to Fig.2	45	60	—	dB	
Dropout voltage	$V_{i-o}$	※6, $I_o=0.3A$ ※6, $I_o=0.5A$	—	※8 0.2	0.5	V	
			※7 ON-state voltage for control	$V_{C(ON)}$	※4		2.0
ON-state current for control	$I_{C(ON)}$	※4	—	—	200	$\mu A$	
OFF-state voltage for control	$V_{C(OFF)}$	$I_o=0A$ , ※4	—	—	0.8	V	
OFF-state current for control	$I_{C(OFF)}$	$V_c=0.4V$ , $I_o=0A$ , ※4	—	—	2	$\mu A$	
Quiescent current	$I_q$	$I_o=0A$ , ※4	—	—	※8 4	10	mA
Output OFF-state consumption current	$I_{qS}$	$V_c=0.4V$ , $I_o=0A$ , ※4	—	—	5	$\mu A$	

※4 PQ3DZ53/PQ3DZ13:  $V_{IN}=5V$ , PQ05DZ51/11:  $V_{IN}=7V$ , PQ09DZ51/11:  $V_{IN}=11V$ , PQ12DZ51/11:  $V_{IN}=14V$

※5 PQ3DZ53/13:  $V_{IN}=4$  to  $10V$ , PQ05DZ51/11:  $V_{IN}=6$  to  $16V$ , PQ09DZ51/11:  $V_{IN}=10$  to  $20V$ , PQ12DZ51/11:  $V_{IN}=13$  to  $23V$

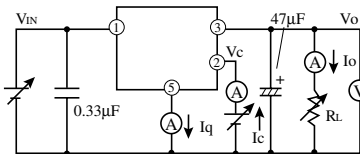
※6 Input voltage shall be the value when output voltage is 95% in comparison with the initial value. PQ3DZ53/13:  $V_{IN}=3.7V$

※7 In case of opening control terminal  $\odot$ , output voltage turns off.

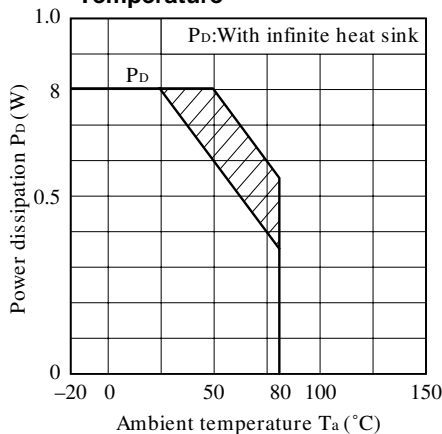
※8 Applied only to PQ05DZ51/11 series.

※9 PQ3DZ53/PQ3DZ13:  $\pm 0.02$

**Fig. 1 Test Circuit**

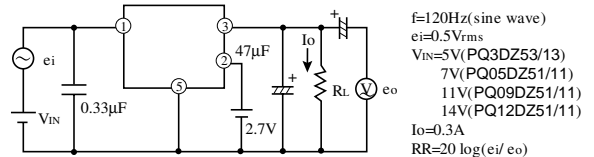


**Fig. 3 Power Dissipation vs. Ambient Temperature**

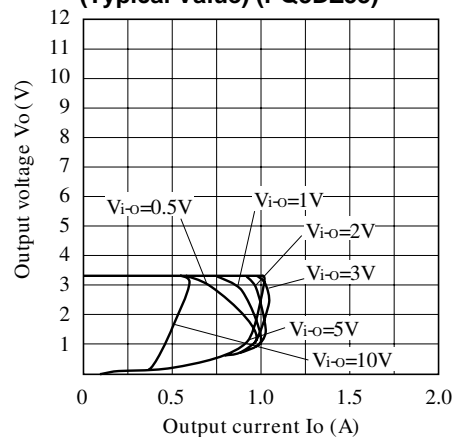


Note) Oblique line portion : Overheat protection may operate in this area.

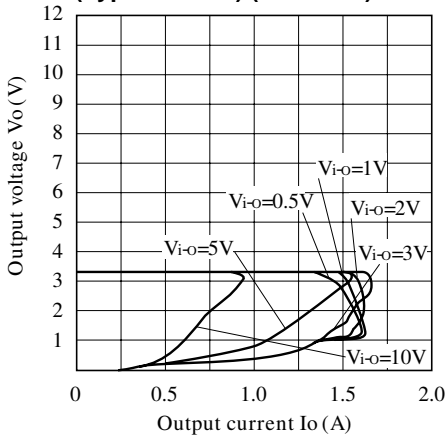
**Fig. 2 Test Circuit of Ripple Rejection**



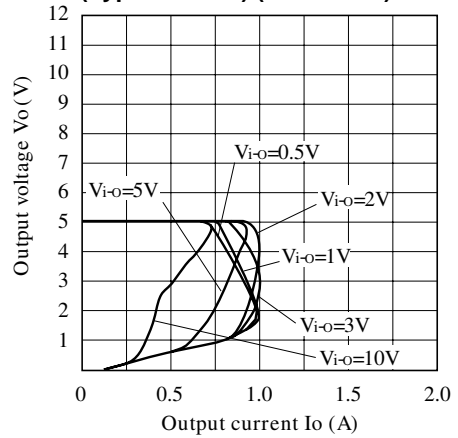
**Fig. 4 Overcurrent Protection Characteristics (Typical Value) (PQ3DZ53)**



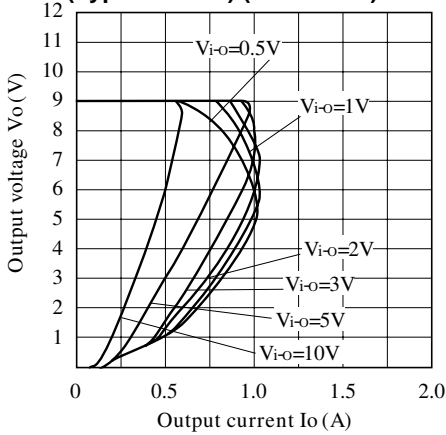
**Fig. 5 Overcurrent Protection Characteristics (Typical Value) (PQ3DZ13)**



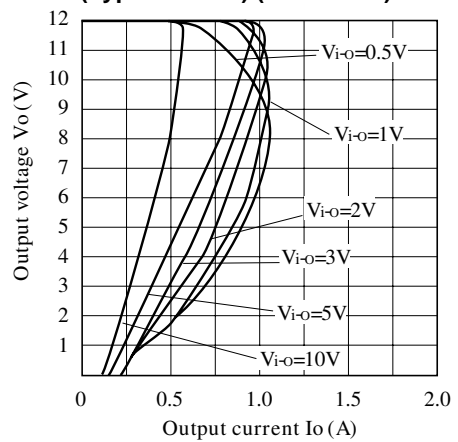
**Fig. 6 Overcurrent Protection Characteristics (Typical Value) (PQ05DZ51)**



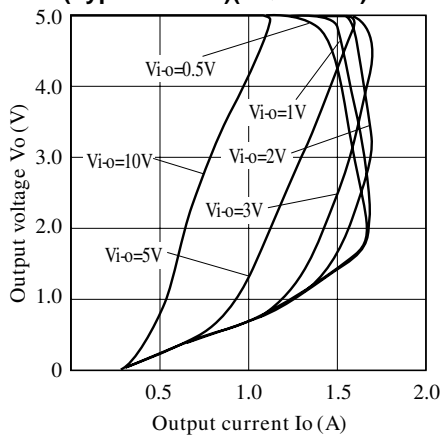
**Fig. 7 Overcurrent Protection Characteristics (Typical Value) (PQ09DZ51)**



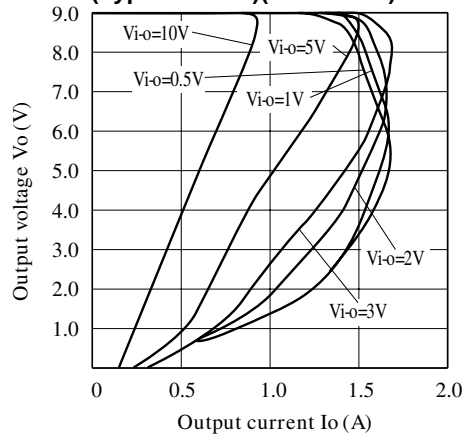
**Fig. 8 Overcurrent Protection Characteristics (Typical Value) (PQ12DZ51)**



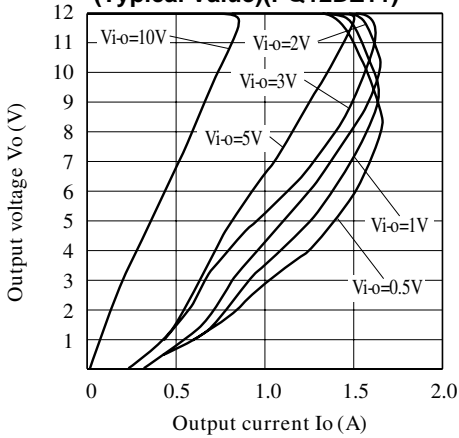
**Fig. 9 Overcurrent Protection Characteristics (Typical Value)(PQ05DZ11)**



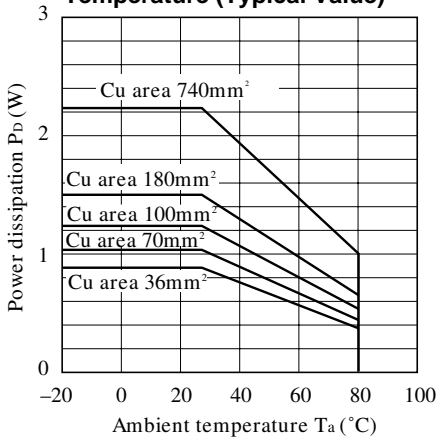
**Fig.10 Overcurrent Protection Characteristics (Typical Value)(PQ09DZ11)**



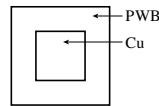
**Fig.11 Overcurrent Protection characteristics (Typical Value)(PQ12DZ11)**



**Fig.12 Power Dissipation vs. Ambient Temperature (Typical Value)**

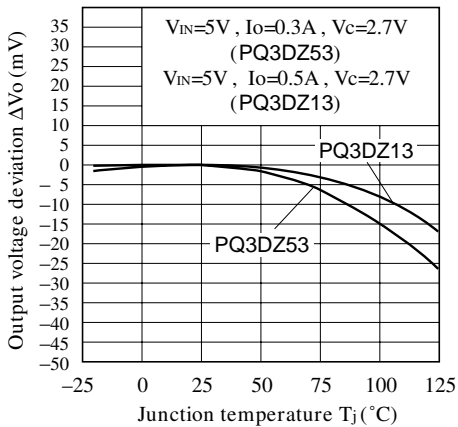


PWB

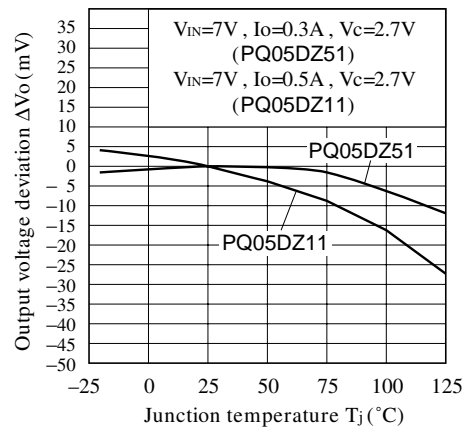


Material : Glass-cloth epoxy resin  
 Size : 50 x 50 x 1.6mm<sup>3</sup>  
 Cu thickness : 35μm

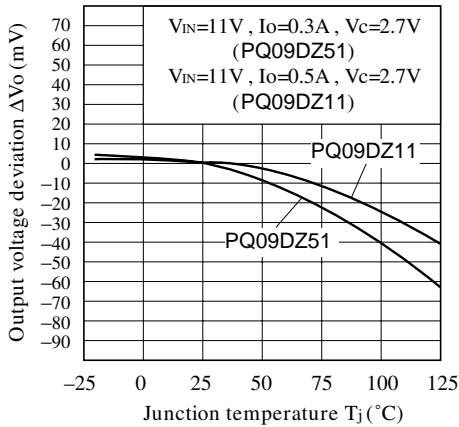
**Fig.13 Output Voltage Deviation vs. Junction Temperature (PQ3DZ53/13)**



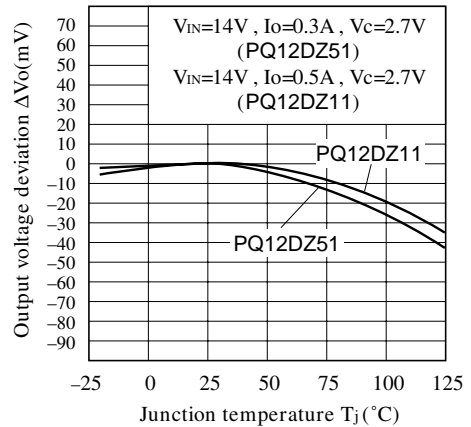
**Fig.14 Output Voltage Deviation vs. Junction Temperature (PQ05DZ51/11)**



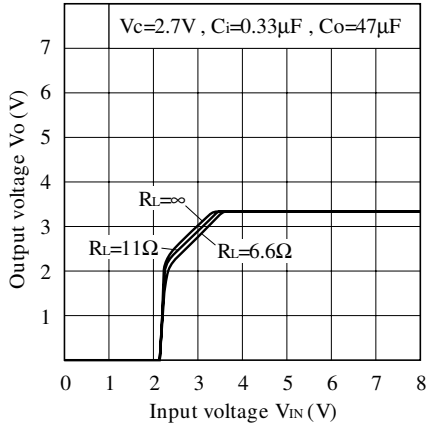
**Fig.15 Output Voltage Deviation vs. Junction Temperature (PQ09DZ51/11)**



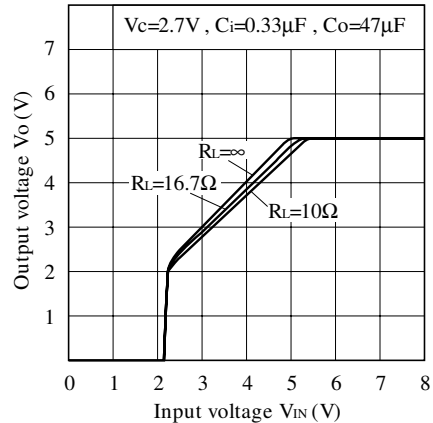
**Fig.16 Output Voltage Deviation vs. Junction Temperature (PQ12DZ51/11)**



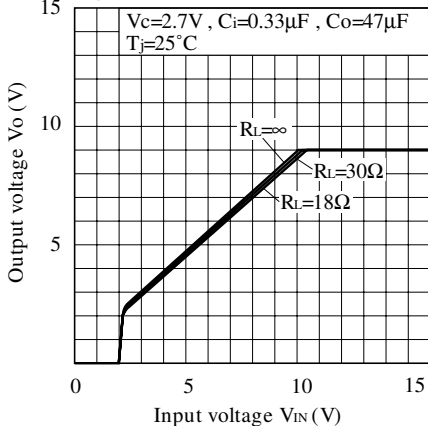
**Fig.17 Output Voltage vs. Input Voltage (Typical Value) (PQ3DZ53)**



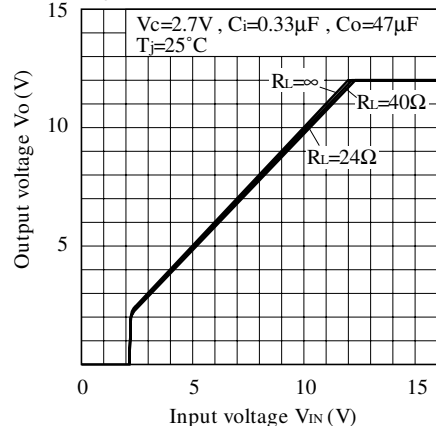
**Fig.18 Output Voltage vs. Input Voltage (Typical Value) (PQ05DZ51)**



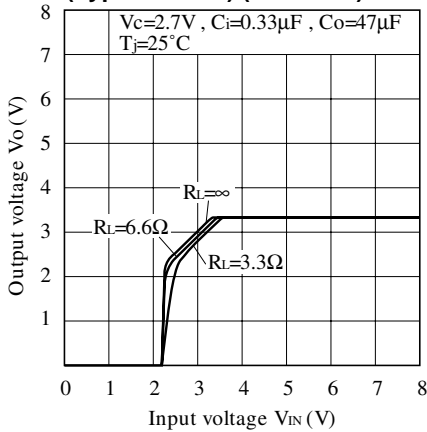
**Fig.19 Output Voltage vs. Input Voltage (Typical Value) (PQ09DZ51)**



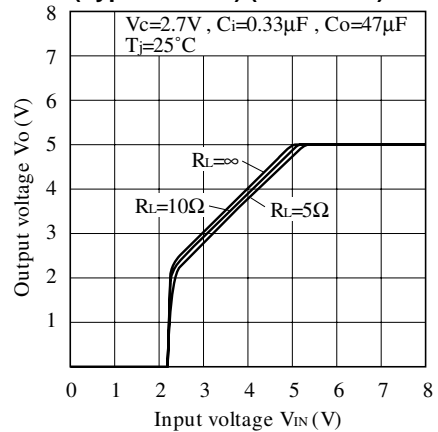
**Fig.20 Output Voltage vs. Input Voltage (Typical Value) (PQ12DZ51)**



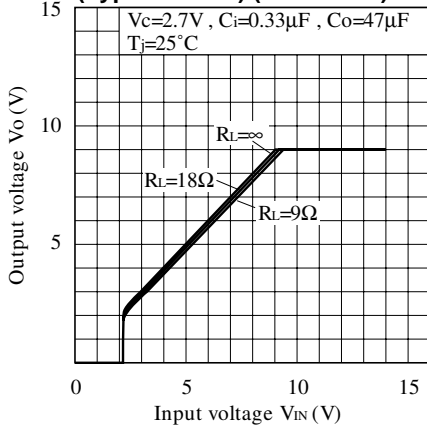
**Fig.21 Output Voltage vs. Input Voltage (Typical Value) (PQ3DZ13)**



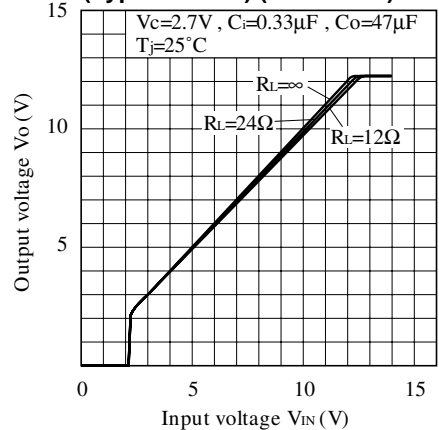
**Fig.22 Output Voltage vs. Input Voltage (Typical Value) (PQ05DZ11)**



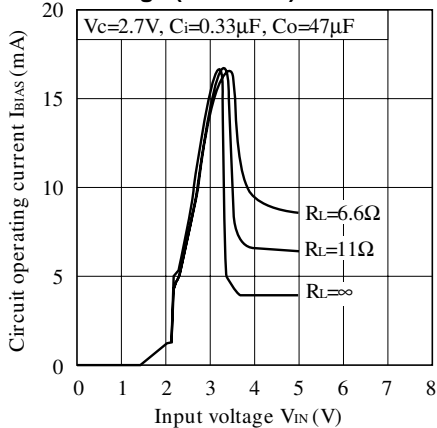
**Fig.23 Output Voltage vs. Input Voltage (Typical Value) (PQ09DZ11)**



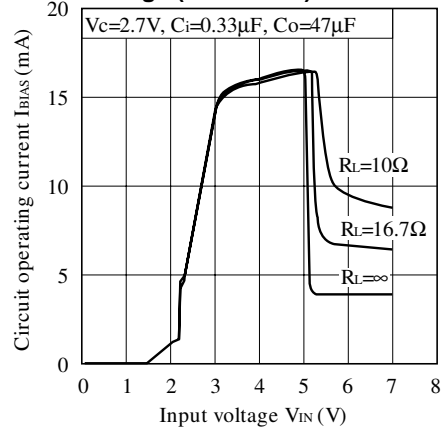
**Fig.24 Output Voltage vs. Input Voltage (Typical Value) (PQ12DZ11)**



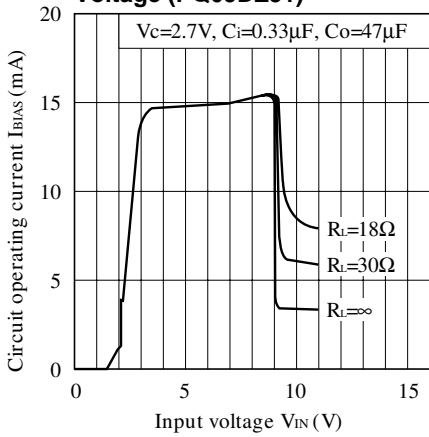
**Fig.25 Circuit Operating Current vs. Input Voltage (PQ3DZ53)**



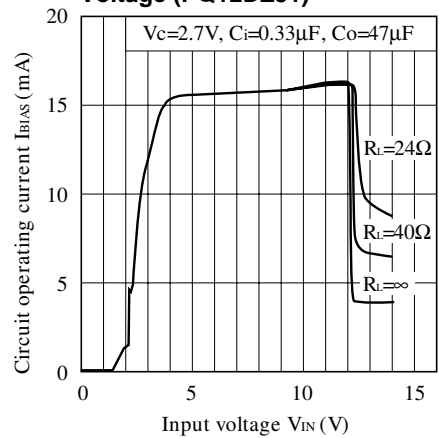
**Fig.26 Circuit Operating Current vs. Input Voltage (PQ05DZ51)**



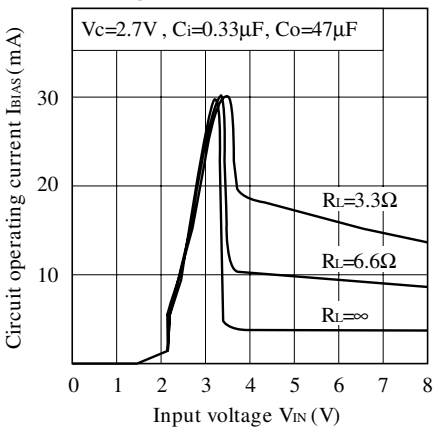
**Fig.27 Circuit Operating Current vs. Input Voltage (PQ09DZ51)**



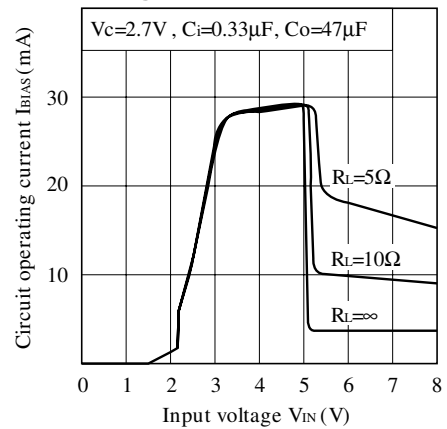
**Fig.28 Circuit Operating Current vs. Input Voltage (PQ12DZ51)**



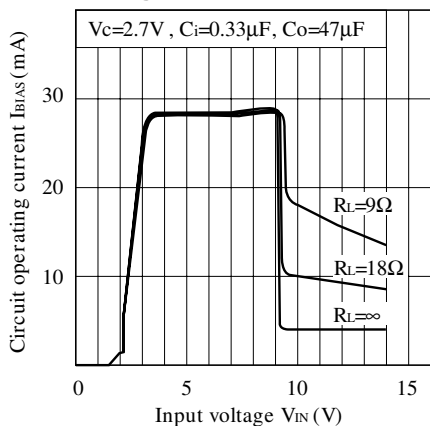
**Fig.29 Circuit Operating Current vs. Input Voltage (PQ3DZ13)**



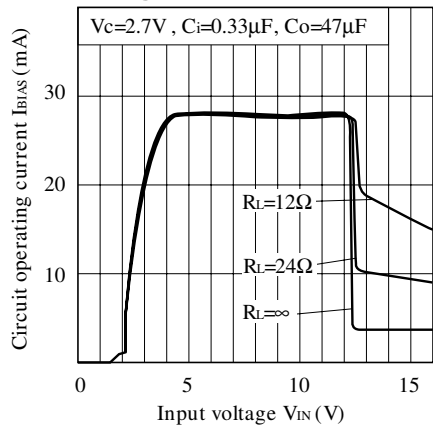
**Fig.30 Circuit Operating Current vs. Input Voltage (PQ05DZ11)**



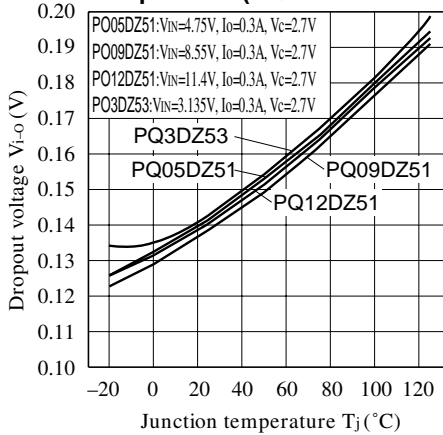
**Fig.31 Circuit Operating Current vs. Input Voltage (PQ09DZ11)**



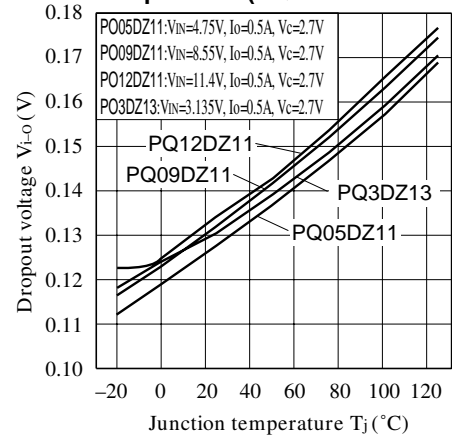
**Fig.32 Circuit Operating Current vs. Input Voltage (PQ12DZ11)**



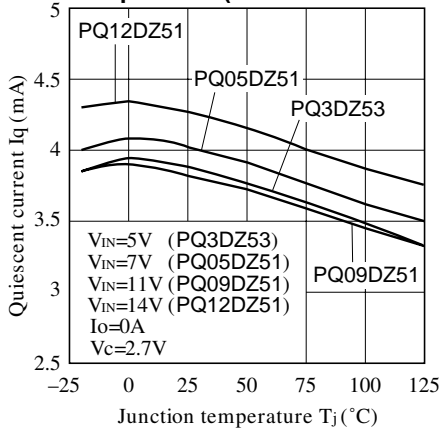
**Fig.33 Dropout Voltage vs. Junction Temperature (PQ05DZ51series/PQ3DZ53)**



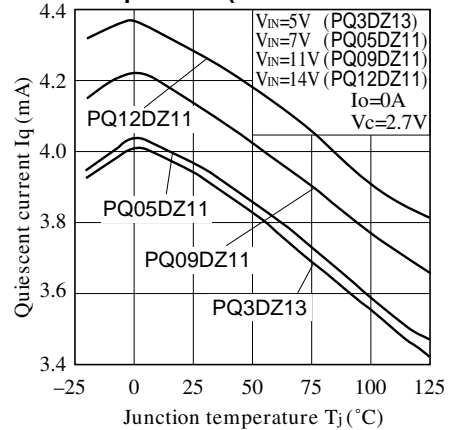
**Fig.34 Dropout Voltage vs. Junction Temperature (PQ05DZ11series/PQ3DZ13)**



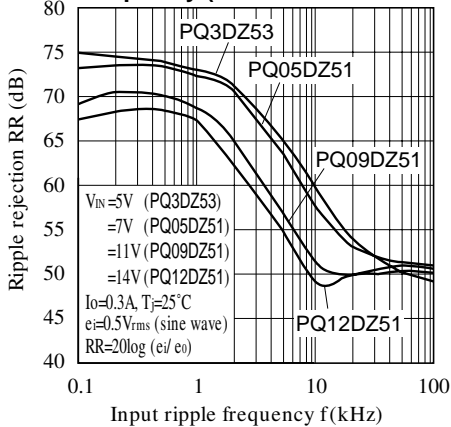
**Fig.35 Quiescent Current vs. Junction Temperature (PQ05DZ51series/PQ3DZ53)**



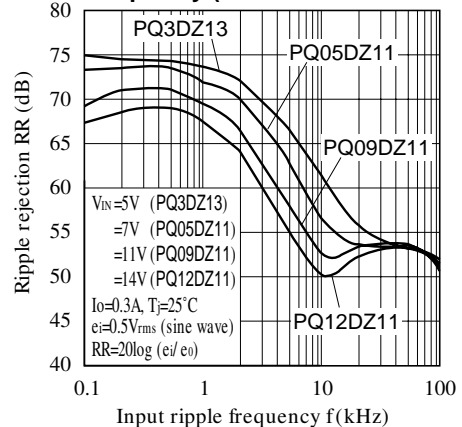
**Fig.36 Quiescent Current vs. Junction Temperature (PQ05DZ11series/PQ3DZ13)**



**Fig.37 Ripple Rejection vs. Input Ripple Frequency (PQ05DZ51series/PQ3DZ53)**

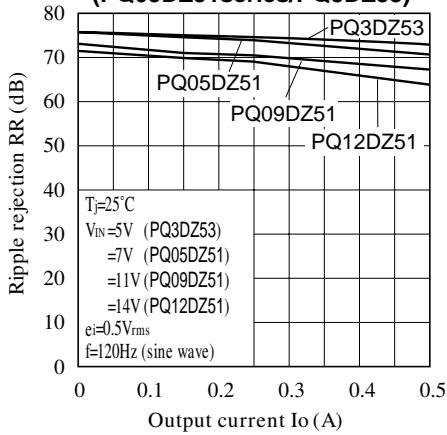


**Fig.38 Ripple Rejection vs. Input Ripple Frequency (PQ05DZ11series/PQ3DZ13)**

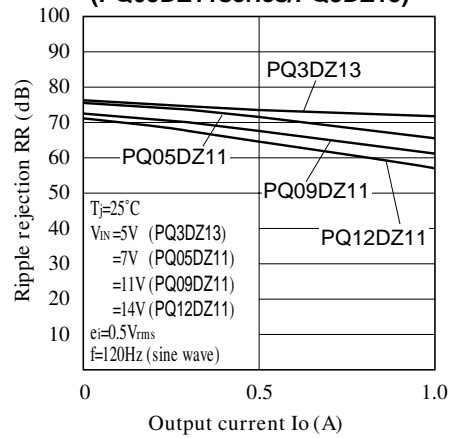




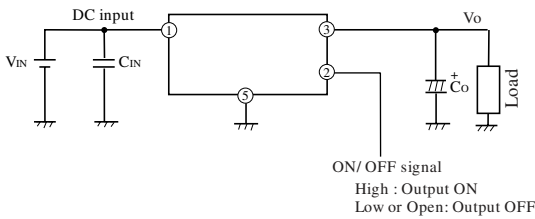
**Fig.39 Ripple Rejection vs. Output Current (PQ05DZ51series/PQ3DZ53)**



**Fig.40 Ripple Rejection vs. Output Current (PQ05DZ11series/PQ3DZ13)**



**Typical Application**



**Model Line-ups for Tape-packaged Products**

Output current	Sleeve-packaged products	Tape-packaged products
0.5A output	PQ3DZ53	PQ3DZ53U
	PQ05DZ51	PQ05DZ5U
	PQ09DZ51	PQ09DZ5U
	PQ12DZ51	PQ12DZ5U
1.0A output	PQ3DZ13	PQ3DZ13U
	PQ05DZ11	PQ05DZ1U
	PQ09DZ11	PQ09DZ1U
	PQ12DZ11	PQ12DZ1U

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