

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 μ 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

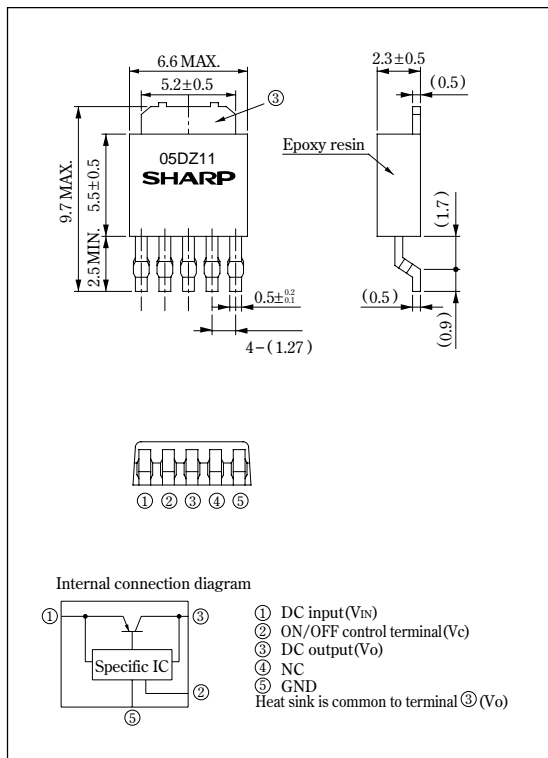
($T_a=25^\circ\text{C}$)

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)		$^\circ\text{C}$

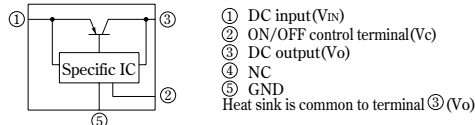
- *1 All are open except GND and applicable terminals.
- *2 P_D : With infinite heat sink
- *3 Overheat protection may operate at $125 \leq T_j < 150^\circ\text{C}$

Outline Dimensions

(Unit : mm)



Internal connection diagram



• Please refer to the chapter " Handling Precautions ".

SHARP

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]^{#4}, $T_a=25^\circ C$)

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_{oL}	PQ05DZ51 series	—	*8 0.2	2.0	%	
		PQ05DZ11 series	—				
Line regulation	R_{eI}	*5, $I_o=5mA$	—	*8 0.1	2.5	%	
Temperature coefficient of output voltage	TcV_o	$T_j=0$ to $125^\circ C$, $I_o=5mA$, *4	—	*9 ± 0.01	—	%/ $^\circ C$	
Ripple rejection	RR	Refer to Fig.2	45	60	—	dB	
Dropout voltage	V_{i-o}	PQ05DZ51 series/PQ3DZ53	—	*6, $I_o=0.3A$	0.5	V	
		PQ05DZ11 series/PQ3DZ13	—	*6, $I_o=0.5A$			
*7 ON-state voltage for control	$V_{C(ON)}$	*4	2.0	—	—	V	
ON-state current for control	$I_{C(ON)}$	*4	—	—	200	μA	
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	μA	
Quiescent current	I_q	$I_o=0A$, *4	—	—	10	mA	
Output OFF-state consumption current	I_{qs}	$V_C=0.4V$, $I_o=0A$, *4	—	—	5	μA	

*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 $\textcircled{2}$, output voltage turns off.

*8 Applied only to PQ05DZ51/11 series.

*9 PQ3DZ53/PQ3DZ13: ± 0.02

Fig. 1 Test Circuit

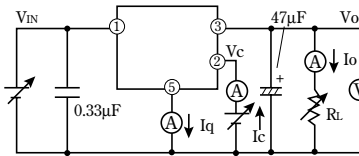


Fig. 2 Test Circuit of Ripple Rejection

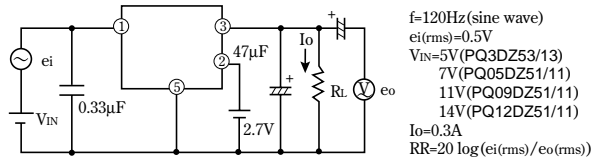


Fig. 3 Power Dissipation vs. Ambient Temperature

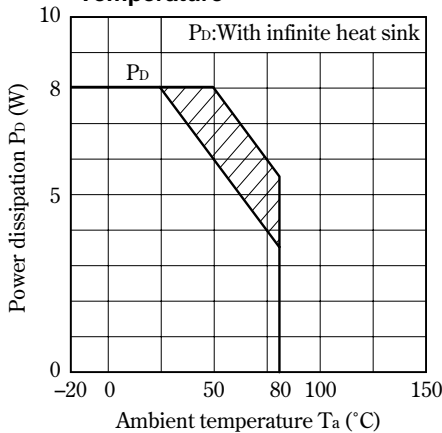
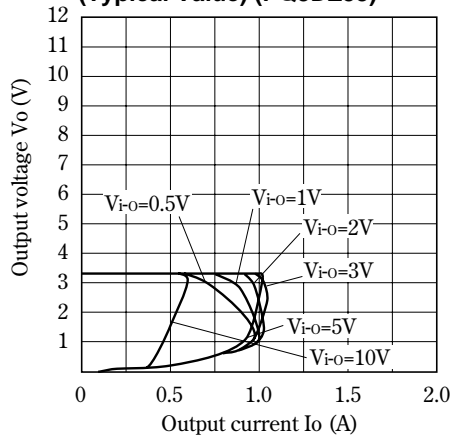


Fig. 4 Overcurrent Protection Characteristics (Typical Value) (PQ3DZ53)



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

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

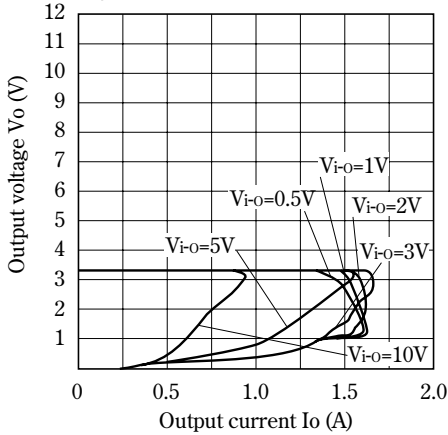


Fig. 6 Overcurrent Protection Characteristics (Typical Value) (PQ05DZ51)

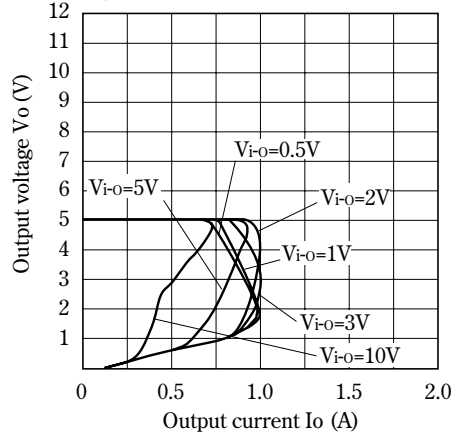


Fig. 7 Overcurrent Protection Characteristics (Typical Value) (PQ09DZ51)

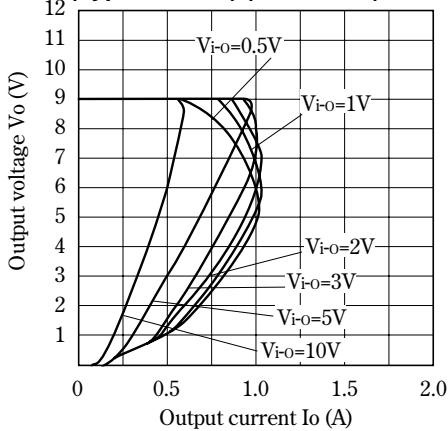


Fig. 8 Overcurrent Protection Characteristics (Typical Value) (PQ12DZ51)

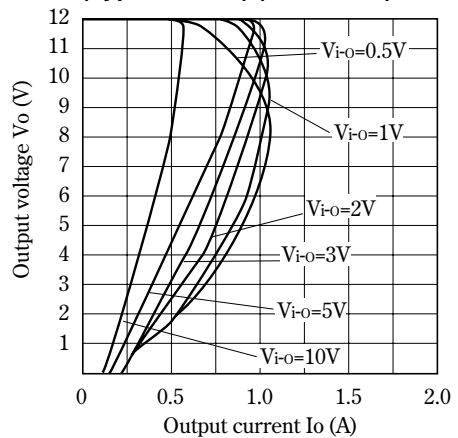


Fig. 9 Overcurrent Protection Characteristics (Typical Value)(PQ05DZ11)

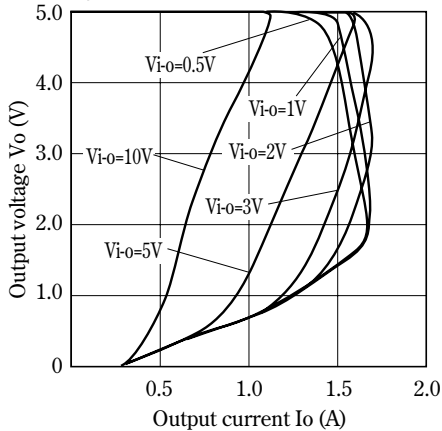


Fig.10 Overcurrent Protection Characteristics (Typical Value)(PQ09DZ11)

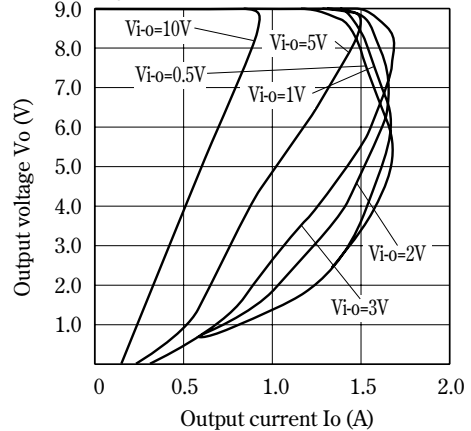


Fig.11 Overcurrent Protection characteristics (Typical Value)(PQ12DZ11)

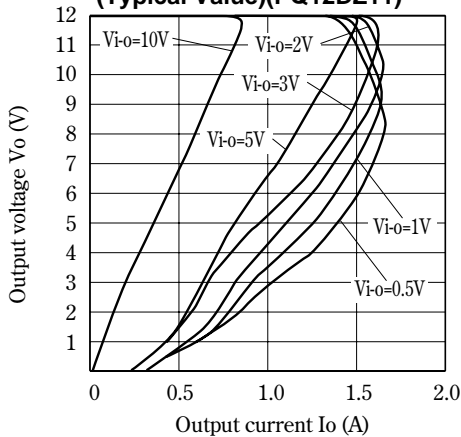
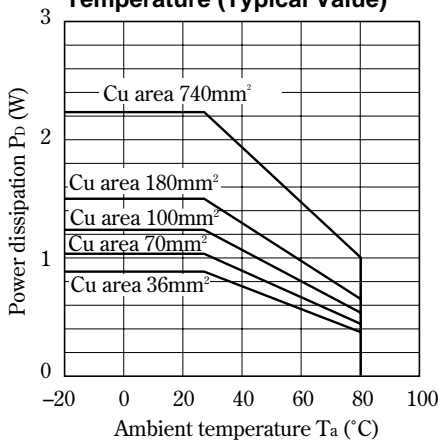
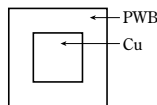


Fig.12 Power Dissipation vs. Ambient Temperature (Typical Value)



PWB



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

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

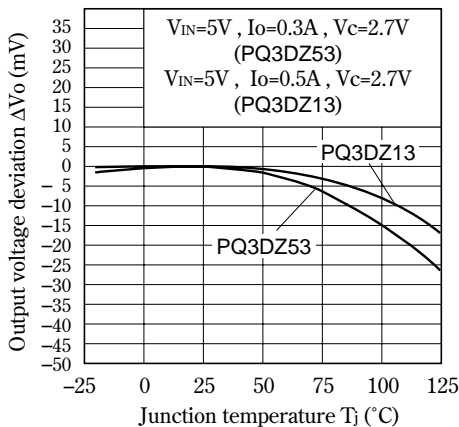


Fig.14 Output Voltage Deviation vs. Junction Temperature (PQ05DZ51/11)

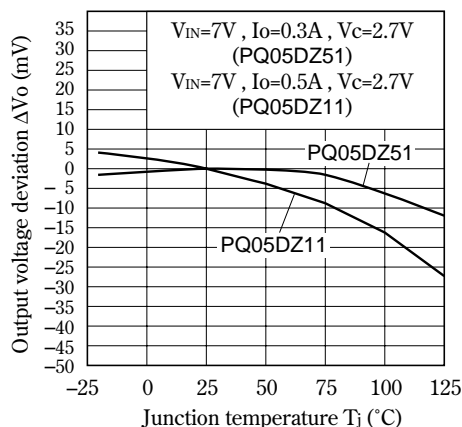


Fig.15 Output Voltage Deviation vs. Junction Temperature (PQ09DZ51/11)

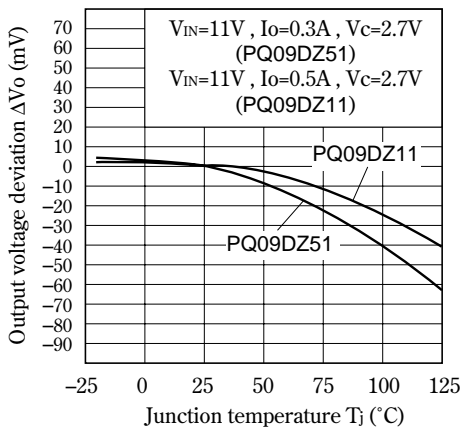


Fig.16 Output Voltage Deviation vs. Junction Temperature (PQ12DZ51/11)

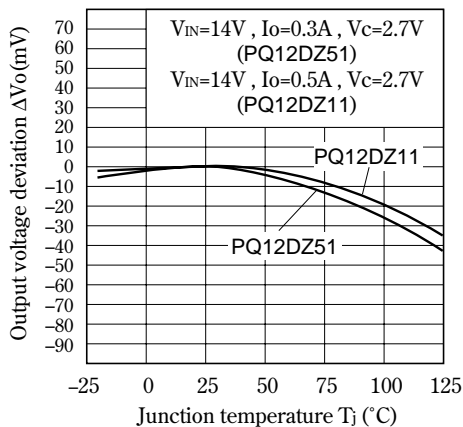


Fig.17 Output Voltage vs. Input Voltage (Typical Value) (PQ3DZ53)

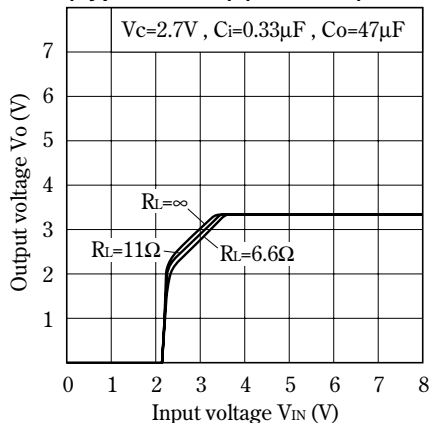


Fig.18 Output Voltage vs. Input Voltage (Typical Value) (PQ05DZ51)

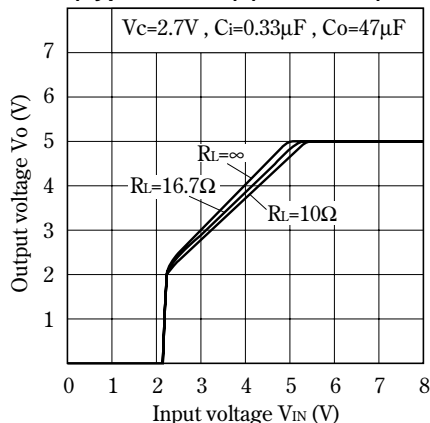


Fig.19 Output Voltage vs. Input Voltage (Typical Value) (PQ09DZ51)

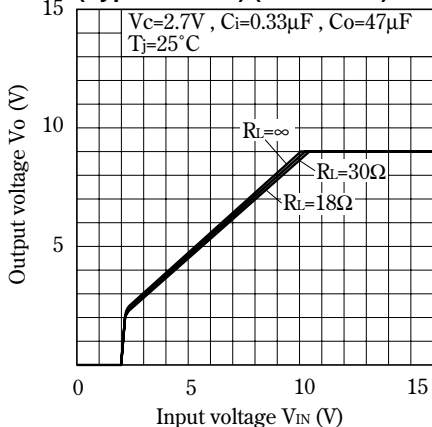


Fig.20 Output Voltage vs. Input Voltage (Typical Value) (PQ12DZ51)

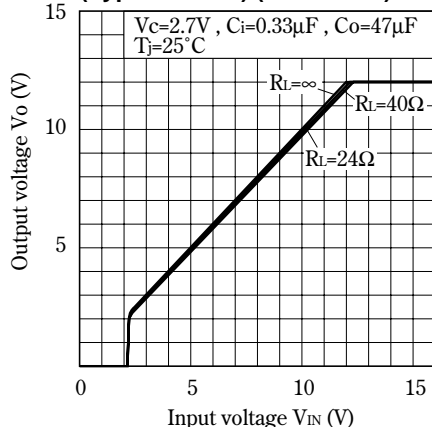


Fig.21 Output Voltage vs. Input Voltage (Typical Value) (PQ3DZ13)

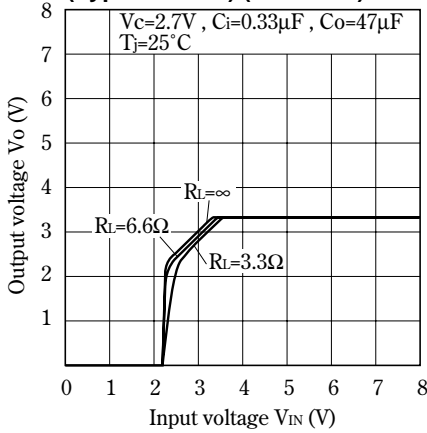


Fig.22 Output Voltage vs. Input Voltage (Typical Value) (PQ05DZ11)

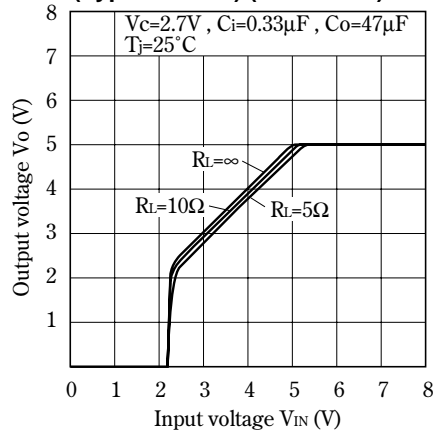


Fig.23 Output Voltage vs. Input Voltage (Typical Value) (PQ09DZ11)

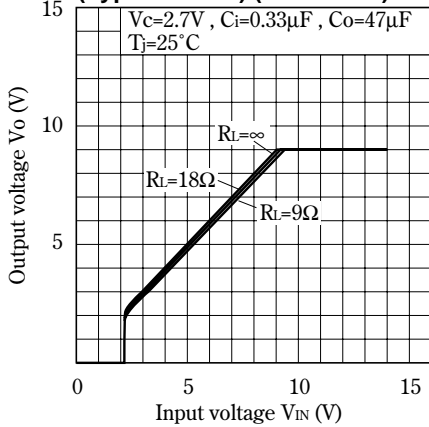


Fig.24 Output Voltage vs. Input Voltage (Typical Value) (PQ12DZ11)

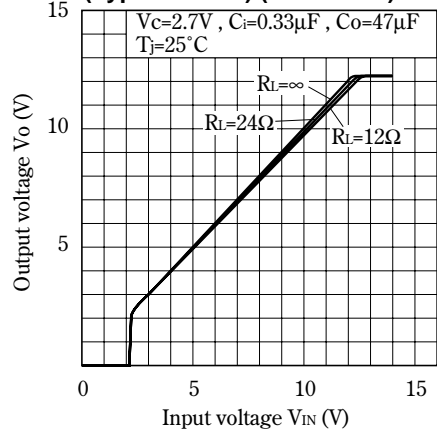


Fig.25 Circuit Operating Current vs. Input Voltage (PQ3DZ53)

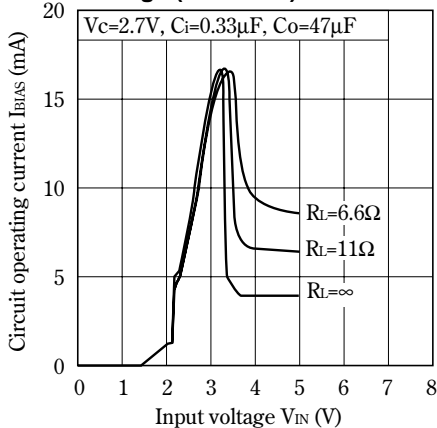


Fig.26 Circuit Operating Current vs. Input Voltage (PQ05DZ51)

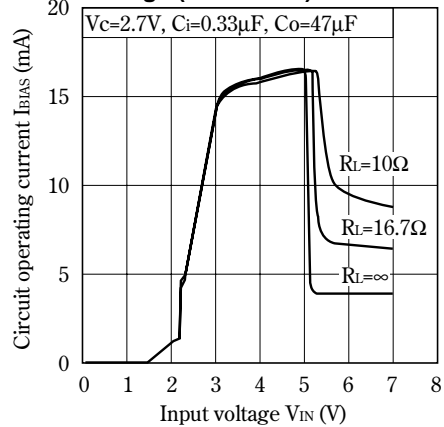


Fig.27 Circuit Operating Current vs. Input Voltage (PQ09DZ51)

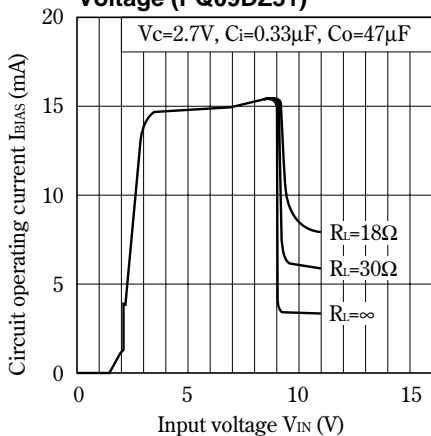


Fig.28 Circuit Operating Current vs. Input Voltage (PQ12DZ51)

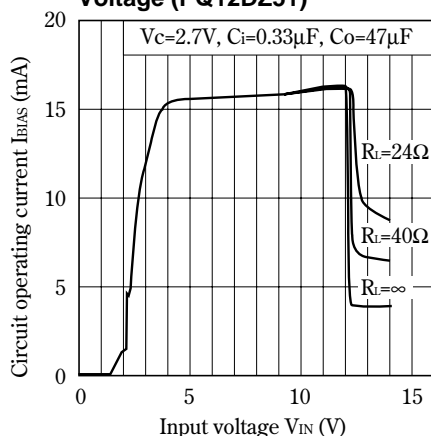


Fig.29 Circuit Operating Current vs. Input Voltage (PQ3DZ13)

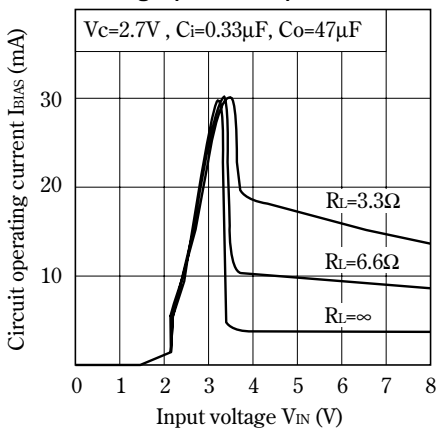


Fig.30 Circuit Operating Current vs. Input Voltage (PQ05DZ11)

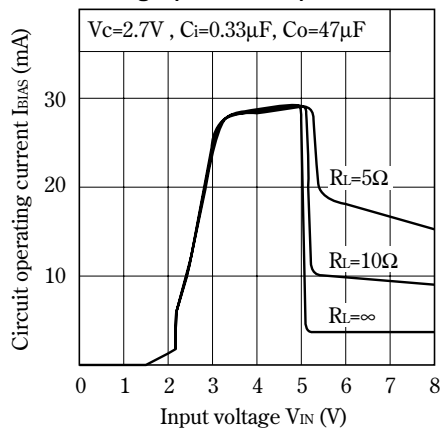


Fig.31 Circuit Operating Current vs. Input Voltage (PQ09DZ11)

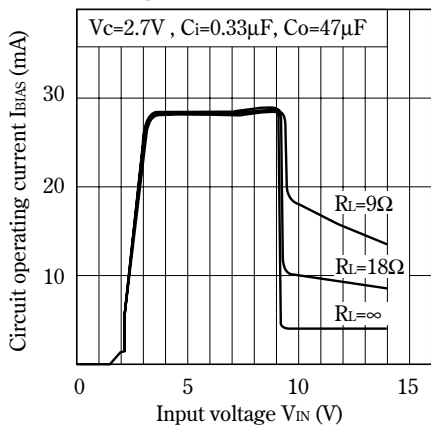


Fig.32 Circuit Operating Current vs. Input Voltage (PQ12DZ11)

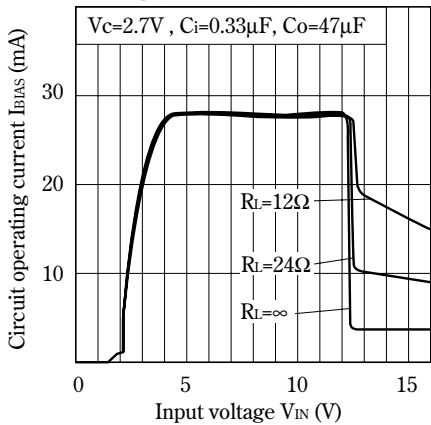


Fig.33 Dropout Voltage vs. Junction Temperature (PQ05DZ51series/PQ3DZ53)

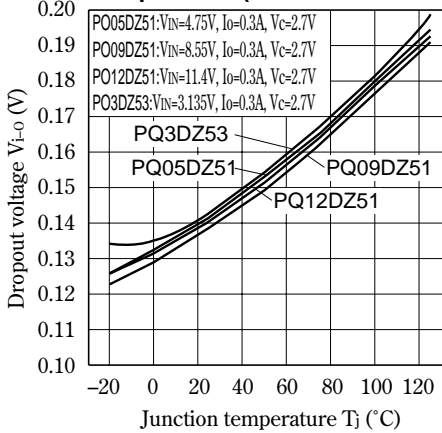


Fig.34 Dropout Voltage vs. Junction Temperature (PQ05DZ11series/PQ3DZ13)

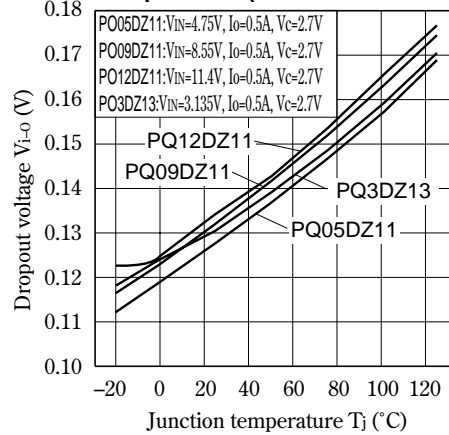


Fig.35 Quiescent Current vs. Junction Temperature (PQ05DZ51series/PQ3DZ53)

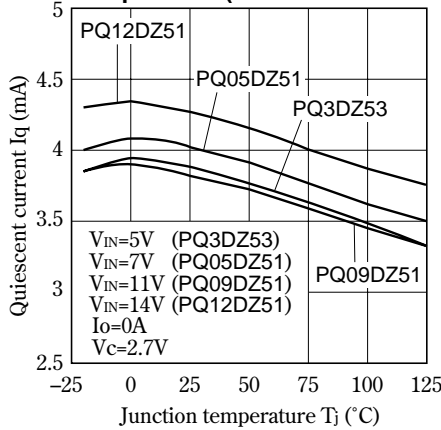


Fig.36 Quiescent Current vs. Junction Temperature (PQ05DZ11series/PQ3DZ13)

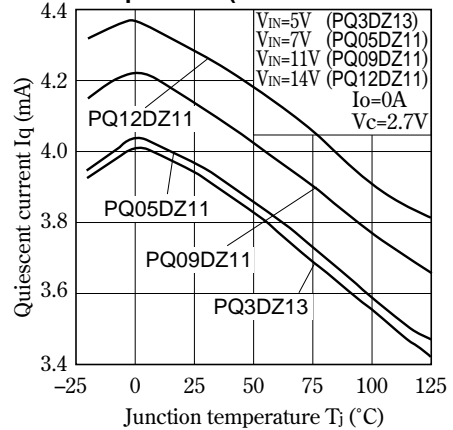


Fig.37 Ripple Rejection vs. Input Ripple Frequency (PQ05DZ51series/PQ3DZ53)

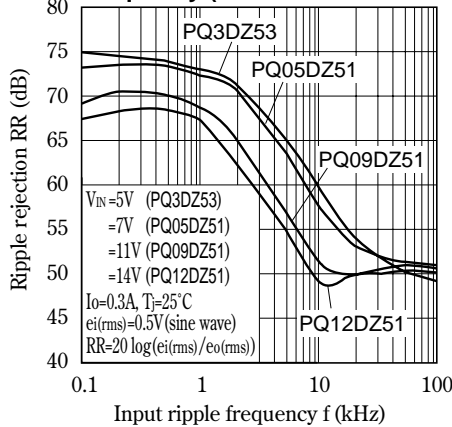


Fig.38 Ripple Rejection vs. Input Ripple Frequency (PQ05DZ11series/PQ3DZ13)

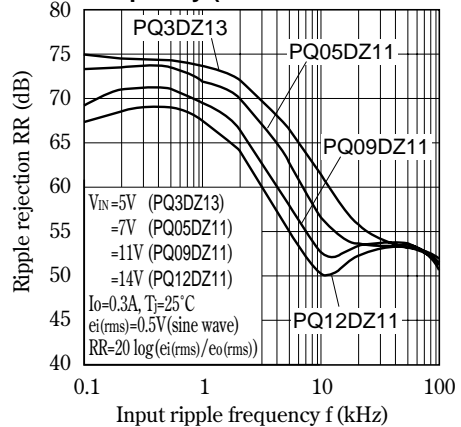


Fig.39 Ripple Rejection vs. Output Current (PQ05DZ51series/PQ3DZ53)

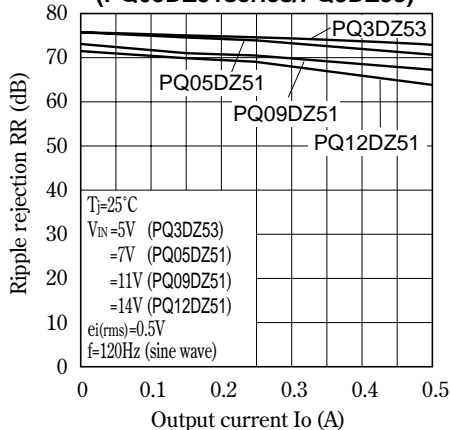
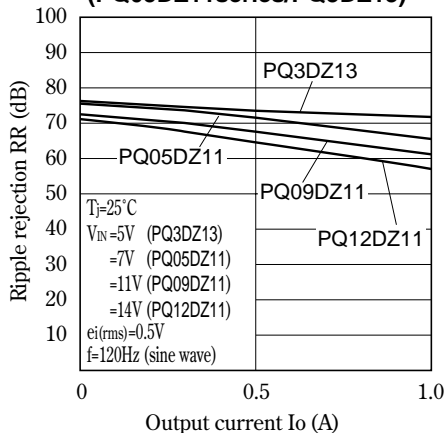
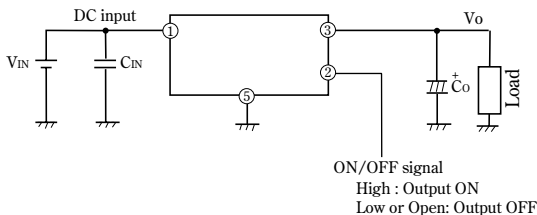


Fig.40 Ripple Rejection vs. Output Current (PQ05DZ11series/PQ3DZ13)



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

NOTICE

- The circuit application examples in this publication are provided to explain representative applications of SHARP devices and are not intended to guarantee any circuit design or license any intellectual property rights. SHARP takes no responsibility for any problems related to any intellectual property right of a third party resulting from the use of SHARP's devices.
- Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device. SHARP reserves the right to make changes in the specifications, characteristics, data, materials, structure, and other contents described herein at any time without notice in order to improve design or reliability. Manufacturing locations are also subject to change without notice.
- Observe the following points when using any devices in this publication. SHARP takes no responsibility for damage caused by improper use of the devices which does not meet the conditions and absolute maximum ratings to be used specified in the relevant specification sheet nor meet the following conditions:
 - (i) The devices in this publication are designed for use in general electronic equipment designs such as:
 - 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:
 - Transportation control and safety equipment (i.e., aircraft, trains, automobiles, etc.)
 - Traffic signals
 - Gas leakage sensor breakers
 - Alarm equipment
 - Various safety devices, etc.
 - (iii) SHARP devices shall not be used for or in connection with equipment that requires an extremely high level of reliability and safety such as:
 - Space applications
 - Telecommunication equipment [trunk lines]
 - Nuclear power control equipment
 - Medical and other life support equipment (e.g., scuba).
- Contact a SHARP representative in advance when intending to use SHARP devices for any "specific" applications other than those recommended by SHARP or when it is unclear which category mentioned above controls the intended use.
- If the SHARP devices listed in this publication fall within the scope of strategic products described in the Foreign Exchange and Foreign Trade Control Law of Japan, it is necessary to obtain approval to export such SHARP devices.
- This publication is the proprietary product of SHARP and is copyrighted, with all rights reserved. Under the copyright laws, no part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, in whole or in part, without the express written permission of SHARP. Express written permission is also required before any use of this publication may be made by a third party.
- Contact and consult with a SHARP representative if there are any questions about the contents of this publication.