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 : ±3.0%
- Built-in ON/OFF control function
- Low dissipation current at OFF-state (Iqs : MAX. 5μA)
- Built-in overcurrent protection, overheat protection function, ASO protection function
- Available tape-packaged products
  (ø330mm reel : 3 000 pcs., PQ05DZ5U/1U series, PQ3DZ53U/13U)

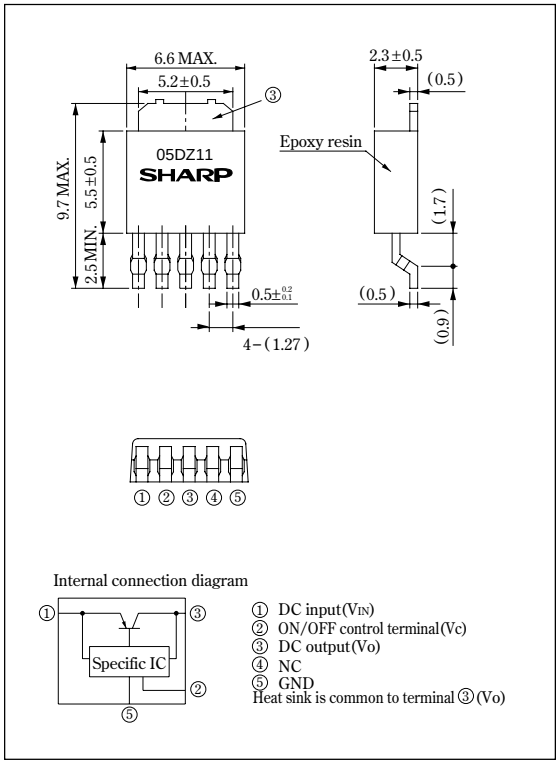
■ Applications

- 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

■ Outline Dimensions (Unit : mm)



■ Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Rating		Unit
		PQ05DZ51 series PQ3DZ53	PQ05DZ11 series PQ3DZ13	
※1 Input voltage	V_{IN}	24		V
※1 ON/OFF control terminal voltage	Vc	24		V
Output current	Io	0.5	1.0	A
※2 Power dissipation	P_D	8		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 (for 10s)		°C

※1 All are open except GND and applicable terminals.
※2 P_D : With infinite heat sink
※3 Overheat protection may operate at 125<=Tj<=150°C

• Please refer to the chapter " Handling Precautions ".

■ Electrical Characteristics

(Unless otherwise specified, conditions shall be Vc=2.7V, Io=0.3A[PQ05DZ51 series/PQ3DZ53], Io=0.5A[PQ05DZ11 series/PQ3DZ13]※4, Ta=25°C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output voltage	PQ3DZ53/PQ3DZ13	Vo	※4	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	PQ05DZ51 series	RegL	Io=5mA to 0.5A, ※4	—	※8 0.2	2.0	%
	PQ05DZ11 series		Io=5mA to 1.0A, ※4				
Line regulation		RegI	※5, Io=5mA	—	※8 0.1	2.5	%
Temperature coefficient of output voltage		TcVo	Tj=0 to 125°C, Io=5mA, ※4	—	※9 ±0.01	—	%/°C
Ripple rejection		RR	Refer to Fig.2	45	60	—	dB
Dropout voltage	PQ05DZ51 series/PQ3DZ53	Vi-o	※6, Io=0.3A	—	※8 0.2	0.5	V
	PQ05DZ11 series/PQ3DZ13		※6, Io=0.5A				
※7 ON-state voltage for control		Vc(ON)	※4	2.0	—	—	V
ON-state current for control		Ic(ON)	※4	—	—	200	µA
OFF-state voltage for control		Vc(OFF)	Io=0A, ※4	—	—	0.8	V
OFF-state current for control		Ic(OFF)	Vc=0.4V, Io=0A, ※4	—	—	2	µA
Quiescent current		Iq	Io=0A, ※4	—	※8 4	10	mA
Output OFF-state consumption current		Iqs	Vc=0.4V, Io=0A, ※4	—	—	5	µA

※4 PQ3DZ53/PQ3DZ13:VIN=5V, PQ05DZ51/11:VIN =7V, PQ09DZ51/11:VIN =11V, PQ12DZ51/11: VIN =14V

※5 PQ3DZ53/13:VIN=4 to 10V, PQ05DZ51/11:VIN = 6 to 16V, PQ09DZ51/11:VIN =10 to 20V, PQ12DZ51/11: VIN =13 to 23V

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

※7 In case of opening control terminal ②, output voltage turns off.

※8 Applied only to PQ05DZ51/11 series.

※9 PQ3DZ53/PQ3DZ13:±0.02

Fig. 1 Test Circuit

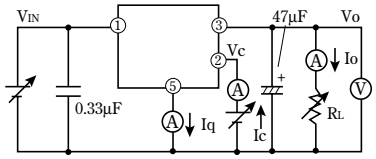
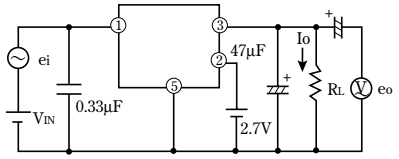


Fig. 2 Test Circuit of Ripple Rejection



f=120Hz(sine wave)
ei(rms)=0.5V
VIN=5V(PQ3DZ53/13)
7V(PQ05DZ51/11)
11V(PQ09DZ51/11)
14V(PQ12DZ51/11)
Io=0.3A
RR=20 log(ei(rms)/eo(rms))

Fig. 3 Power Dissipation vs. Ambient Temperature

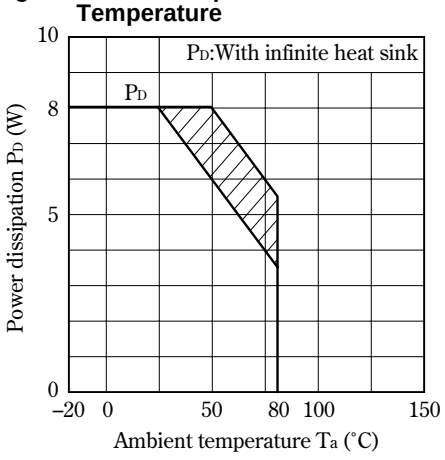
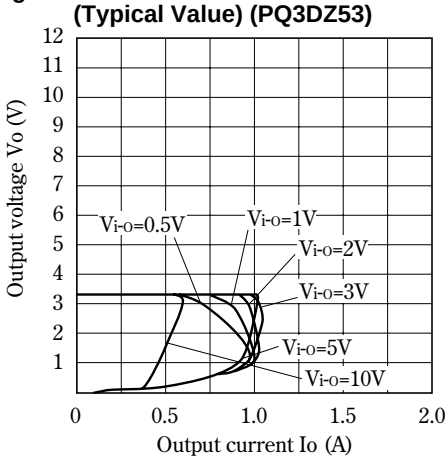


Fig. 4 Overcurrent Protection Characteristics (Typical Value) (PQ3DZ53)



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

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

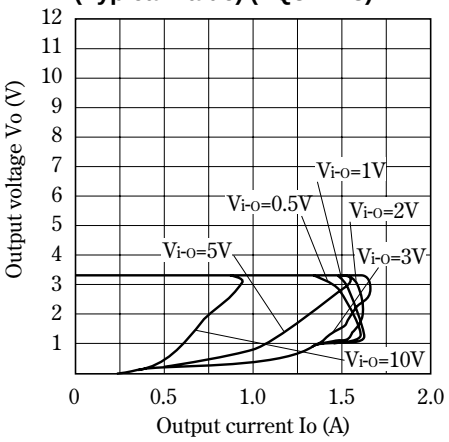


Fig. 6 Overcurrent Protection Characteristics (Typical Value) (PQ05DZ51)

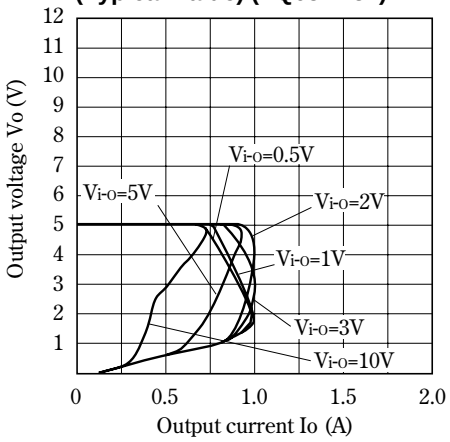


Fig. 7 Overcurrent Protection Characteristics (Typical Value) (PQ09DZ51)

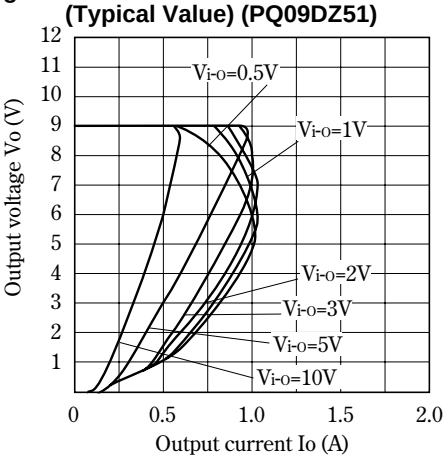


Fig. 8 Overcurrent Protection Characteristics (Typical Value) (PQ12DZ51)

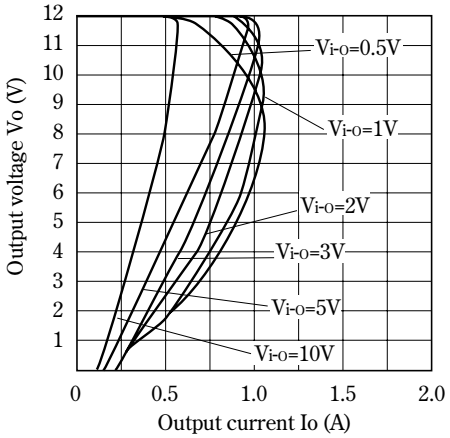


Fig. 9 Overcurrent Protection Characteristics (Typical Value)(PQ05DZ11)

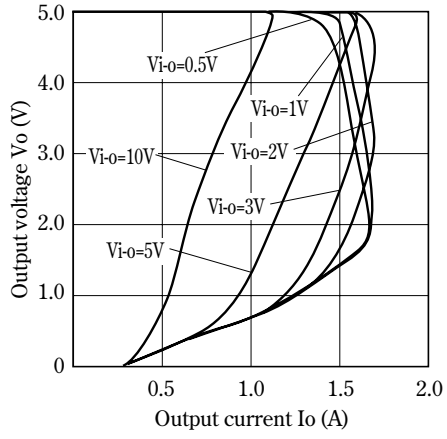


Fig.10 Overcurrent Protection Characteristics (Typical Value)(PQ09DZ11)

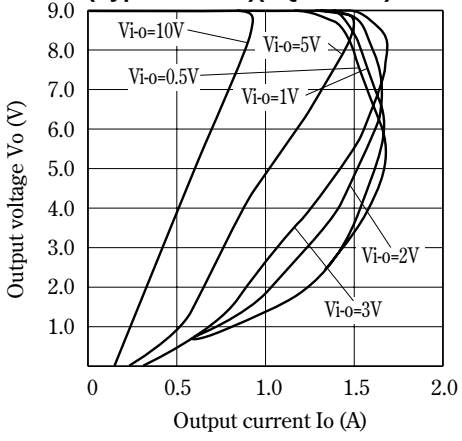


Fig.11 Overcurrent Protection characteristics (Typical Value)(PQ12DZ11)

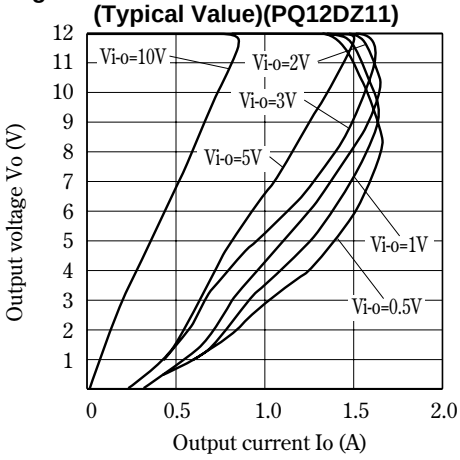
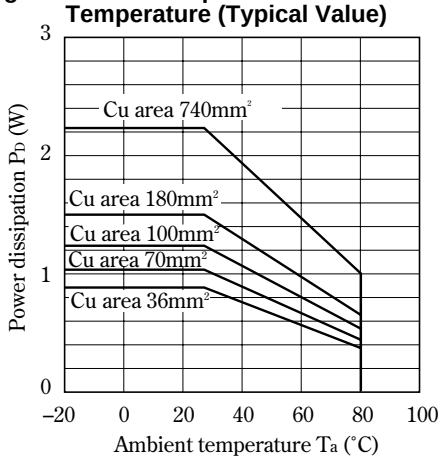
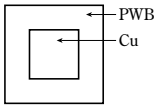


Fig.12 Power Dissipation vs. Ambient Temperature (Typical Value)



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)

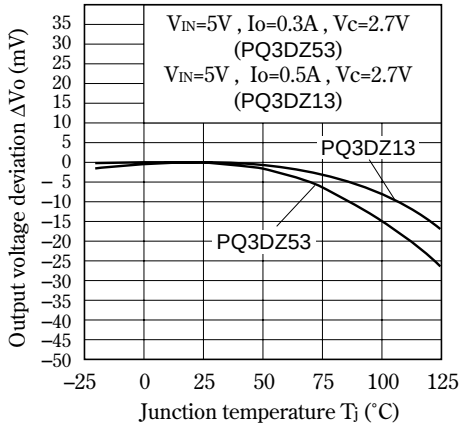


Fig.14 Output Voltage Deviation vs. Junction Temperature (PQ05DZ51/11)

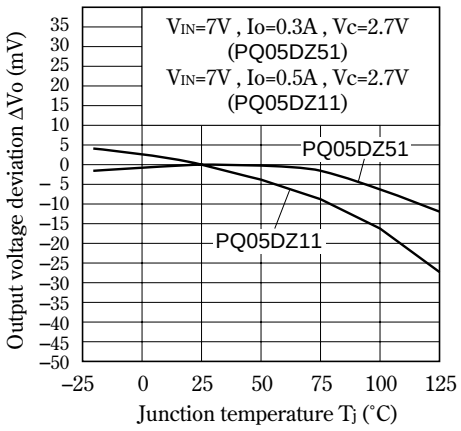


Fig.15 Output Voltage Deviation vs. Junction Temperature (PQ09DZ51/11)

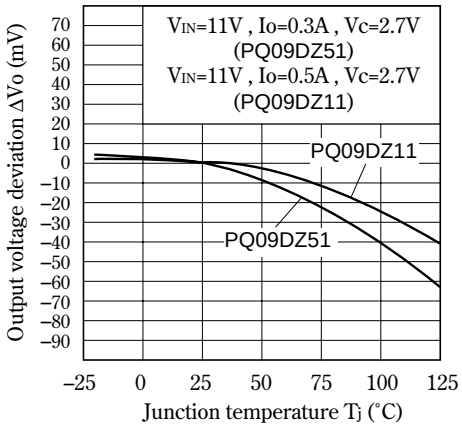


Fig.16 Output Voltage Deviation vs. Junction Temperature (PQ12DZ51/11)

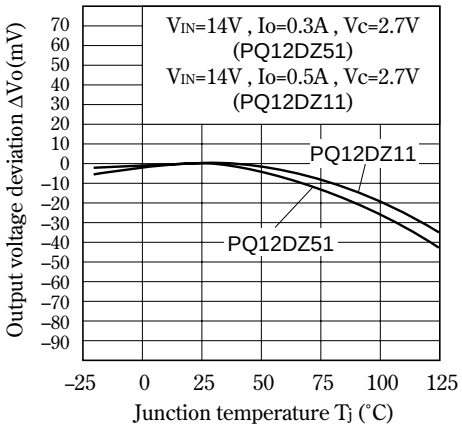


Fig.17 Output Voltage vs. Input Voltage (Typical Value) (PQ3DZ53)

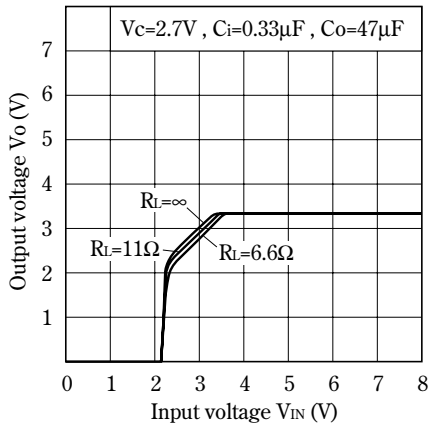


Fig.18 Output Voltage vs. Input Voltage (Typical Value) (PQ05DZ51)

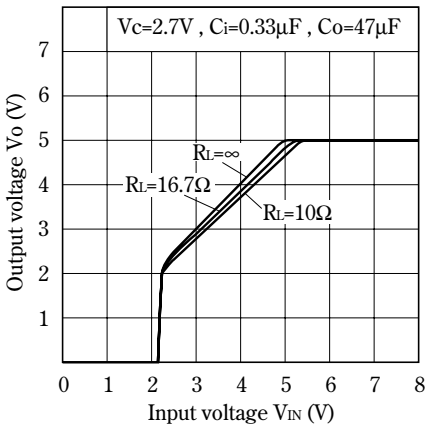


Fig.19 Output Voltage vs. Input Voltage (Typical Value) (PQ09DZ51)

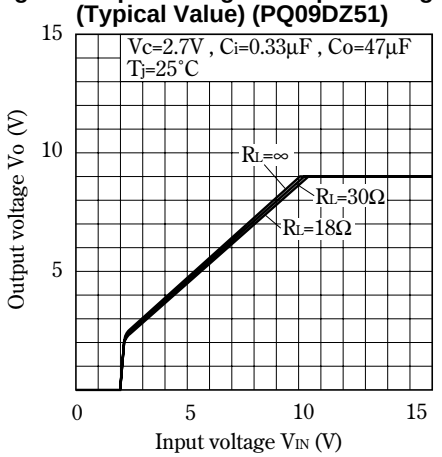


Fig.20 Output Voltage vs. Input Voltage (Typical Value) (PQ12DZ51)

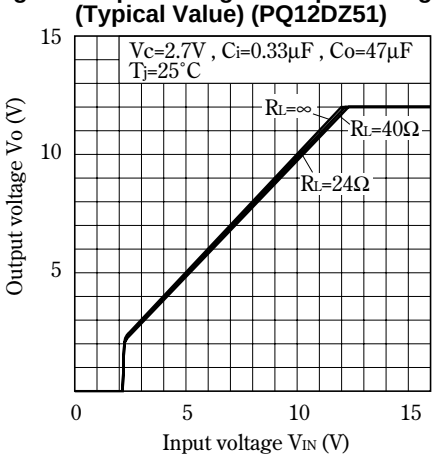


Fig.21 Output Voltage vs. Input Voltage (Typical Value) (PQ3DZ13)

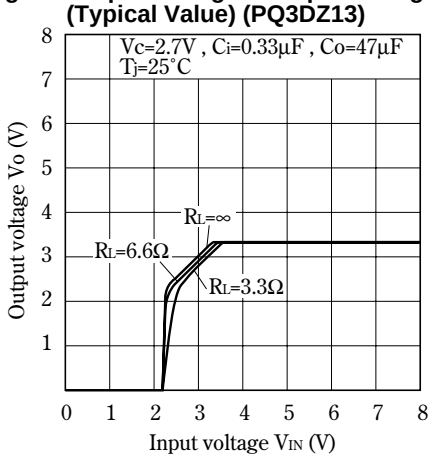


Fig.22 Output Voltage vs. Input Voltage (Typical Value) (PQ05DZ11)

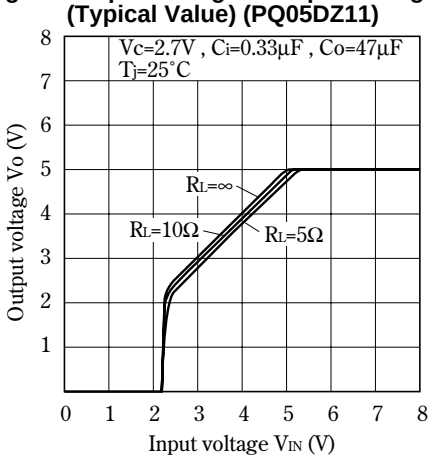


Fig.23 Output Voltage vs. Input Voltage (Typical Value) (PQ09DZ11)

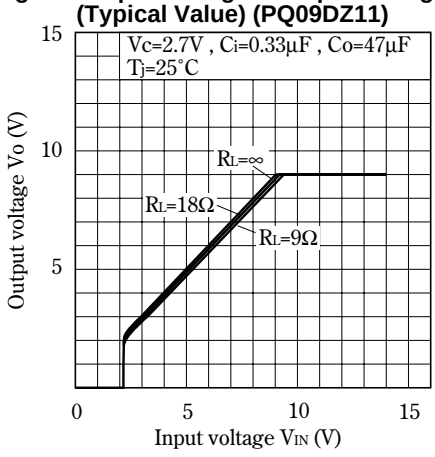


Fig.24 Output Voltage vs. Input Voltage (Typical Value) (PQ12DZ11)

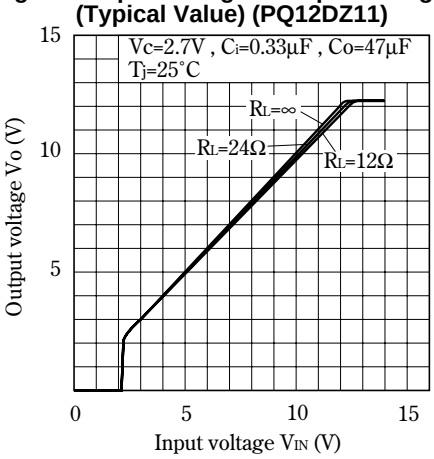


Fig.25 Circuit Operating Current vs. Input Voltage (PQ3DZ53)

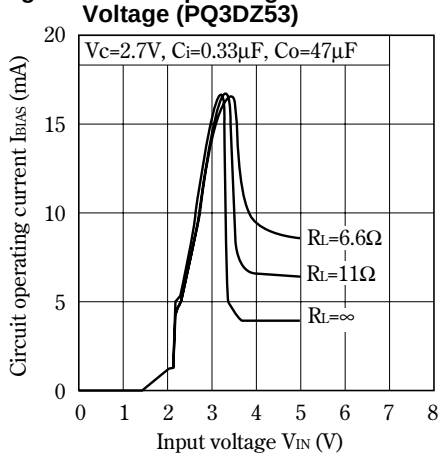


Fig.26 Circuit Operating Current vs. Input Voltage (PQ05DZ51)

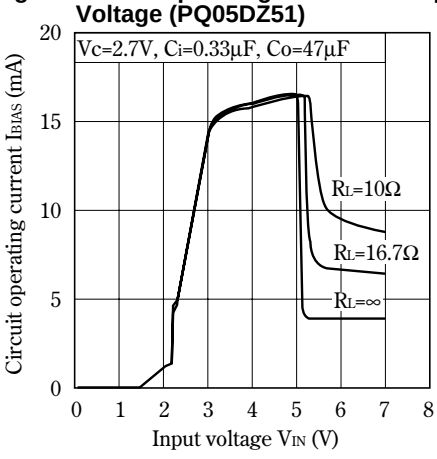


Fig.27 Circuit Operating Current vs. Input Voltage (PQ09DZ51)

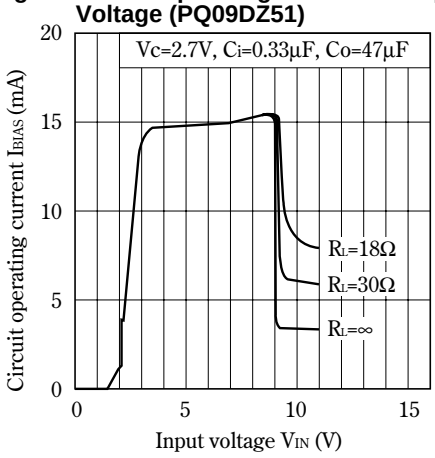


Fig.28 Circuit Operating Current vs. Input Voltage (PQ12DZ51)

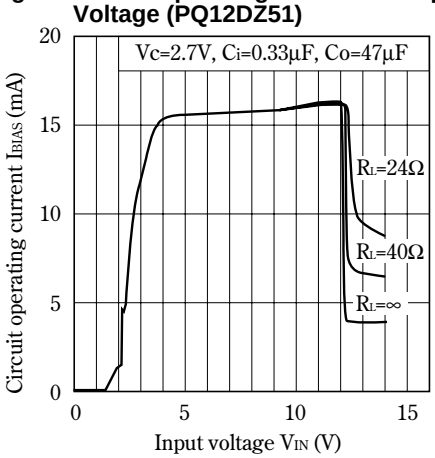


Fig.29 Circuit Operating Current vs. Input Voltage (PQ3DZ13)

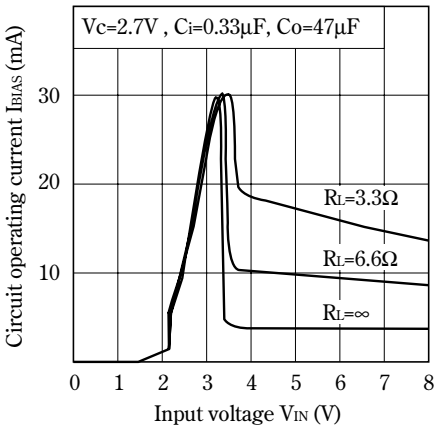


Fig.30 Circuit Operating Current vs. Input Voltage (PQ05DZ11)

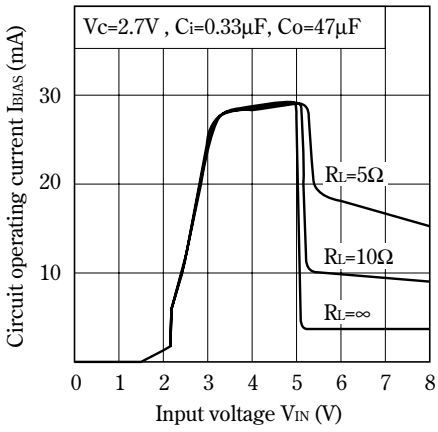


Fig.31 Circuit Operating Current vs. Input Voltage (PQ09DZ11)

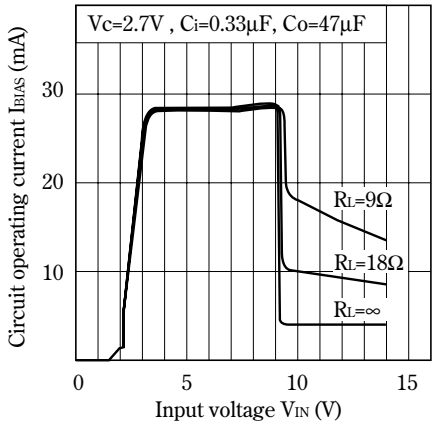


Fig.32 Circuit Operating Current vs. Input Voltage (PQ12DZ11)

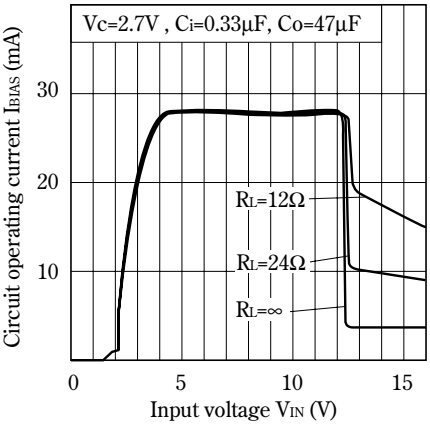


Fig.33 Dropout Voltage vs. Junction Temperature (PQ05DZ51series/PQ3DZ53)

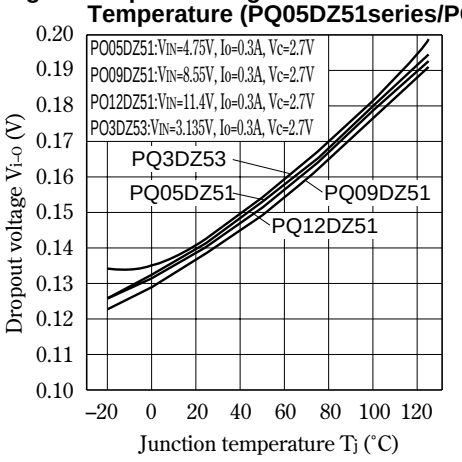


Fig.34 Dropout Voltage vs. Junction Temperature (PQ05DZ11series/PQ3DZ13)

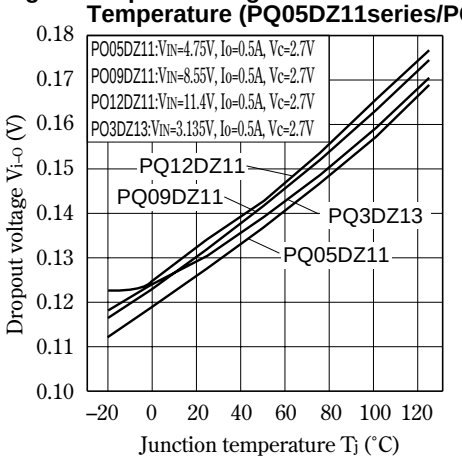


Fig.35 Quiescent Current vs. Junction Temperature (PQ05DZ51series/PQ3DZ53)

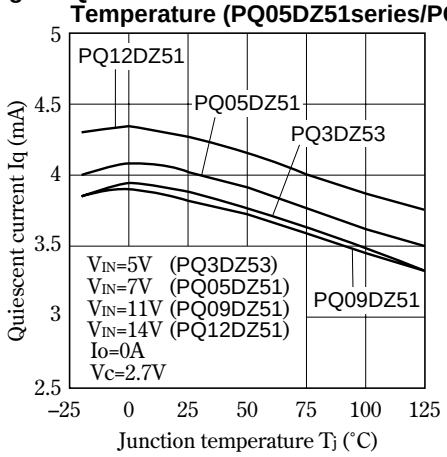


Fig.36 Quiescent Current vs. Junction Temperature (PQ05DZ11series/PQ3DZ13)

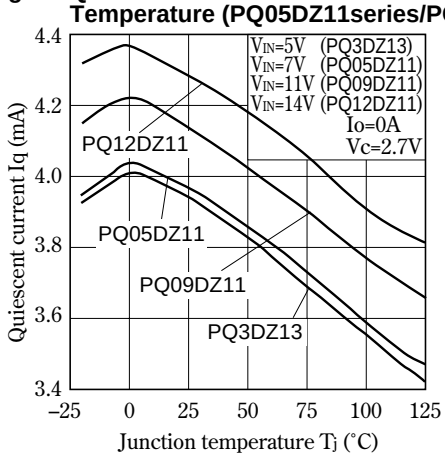


Fig.37 Ripple Rejection vs. Input Ripple Frequency (PQ05DZ51series/PQ3DZ53)

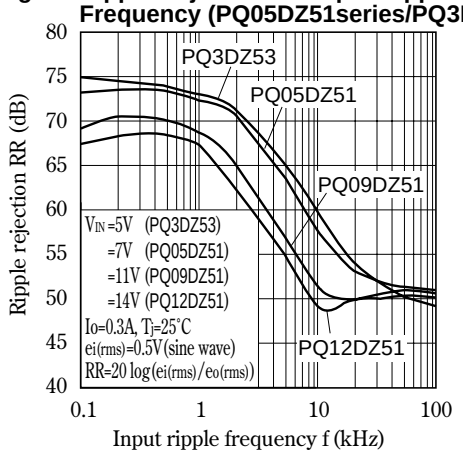


Fig.38 Ripple Rejection vs. Input Ripple Frequency (PQ05DZ11series/PQ3DZ13)

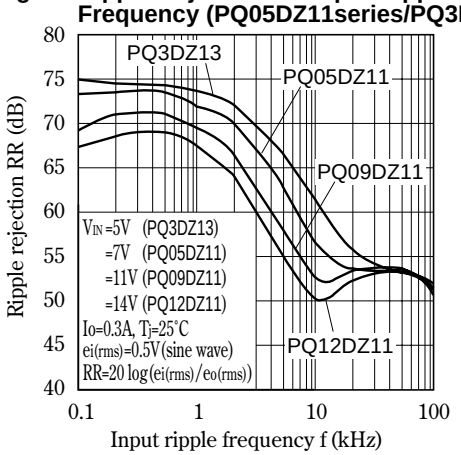


Fig.39 Ripple Rejection vs. Output Current (PQ05DZ51series/PQ3DZ53)

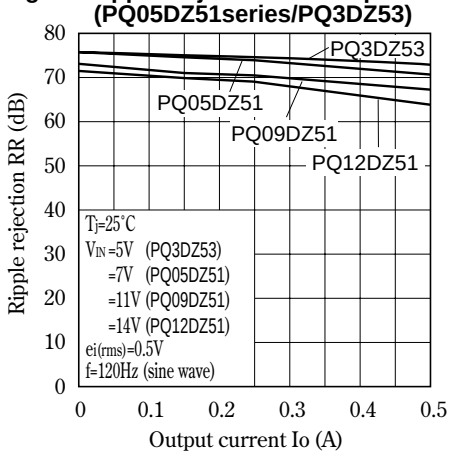
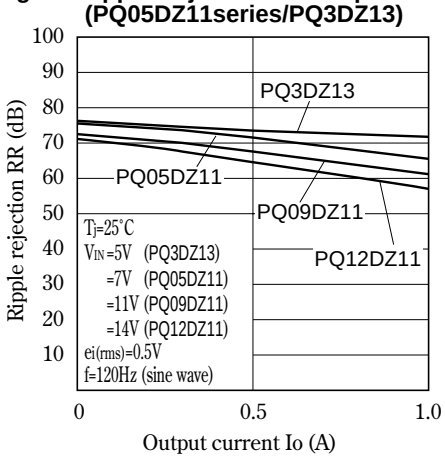
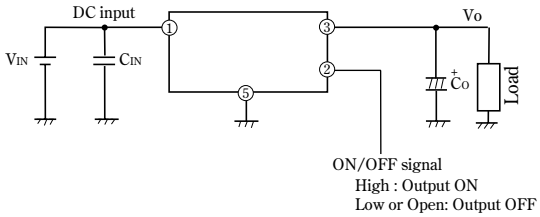


Fig.40 Ripple Rejection vs. Output Current (PQ05DZ11series/PQ3DZ13)



■ 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

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  (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).

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