

PQ05TZ51/PQ05TZ11 Series

Surface Mount Type Low Power-Loss Voltage Regulators

Features

- Low power-loss(Dropout voltage: MAX 0.5V)
- Surface mount type package(Equivalent to EIAJ SC-63)
- Output current:
(0.5A : PQ2TZ55, PQ3TZ50/53, PQ05TZ51 series)
(1.0A : PQ2TZ15, PQ05TZ11 series)
- Output voltage precision: $\pm 2.5\%$
- Built-in ON/OFF control function
- Low dissipation current at OFF-state(I_{qs} : MAX.5 μ A)
- Tape packaged type is also available.
($\phi 330$ mm reel: 3 000pcs.)

Applications

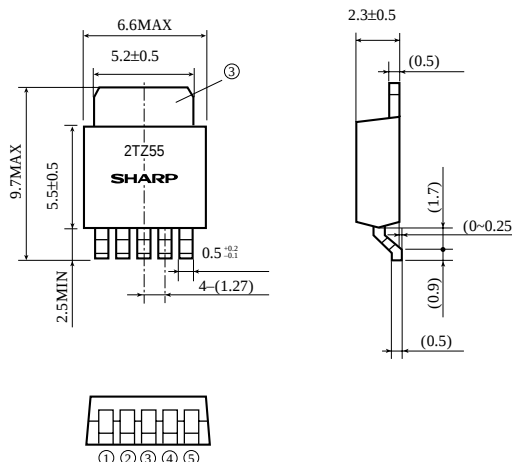
- Personal computers
- Personal information tools(PDA)
- Various OA equipment

Model Line-ups

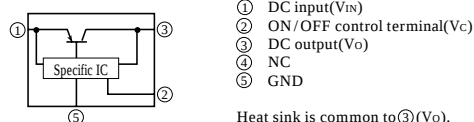
	0.5A output	1.0A output
2.5V output	PQ2TZ55	PQ2TZ15
3.0V output	PQ3TZ50	
3.3V output	PQ3TZ53	
5V output	PQ05TZ51	PQ05TZ11
9V output	PQ09TZ51	PQ09TZ11
12V output	PQ12TZ51	PQ12TZ11

Outline Dimensions

(Unit : mm)



Internal connection diagram



Absolute Maximum Ratings

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

Parameter		Symbol	Rating		Unit
			PQ2TZx5	PQxxTZ51	
			PQ3TZ5x	PQxxTZ11	
*1 Input voltage		VIN	10	24	V
*1 ON/OFF control terminal voltage		VC	10	24	V
Output current	PQ2TZ55, PQ3TZ50/53, PQ05TZ51 series	Io	0.5		A
	PQ2TZ15, PQ05TZ11 series		1		
*2 Power dissipation		PD	8		W
*3 Junction temperature		Tj	150		°C
Operating temperature		Topr	−20 to +80		°C
Storage temperature		Tstg	−40 to +150		°C
Soldering temperature		Tsol	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 $125^\circ\text{C} \leq T_j < 150^\circ\text{C}$

• Please refer to the chapter "Handling Precautions".

SHARP

Electrical Characteristics

(Unless otherwise specified, conditions shall be^④, $V_C=2.7V$, $T_a=25^{\circ}C$)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input voltage	PQ2TZ55/15	V_{IN}	—	3.0	—	10.0	V
	PQ3TZ50			3.4	—	10.0	
	PQ3TZ53			3.7	—	10.0	
Output voltage	PQ2TZ55/15	V_O	⑤, ⑨	2.438	2.5	2.562	V
	PQ3TZ50			2.925	3.0	3.075	
	PQ3TZ53			3.218	3.3	3.382	
	PQ05TZ51/11			4.88	5.0	5.12	
	PQ09TZ51/11			8.87	9.0	9.22	
	PQ12TZ51/11			11.7	12.0	12.3	
Load regulation		RegL	⑤, ⑥	—	0.2	2.0	%
Line regulation		RegI	$I_O=5mA$, ⑩	—	0.1	2.5	%
Temperature coefficient of output voltage		TcVo	$T_J=0$ to $125^{\circ}C$, $I_O=5mA$, ⑤	—	± 0.01	—	%/ $^{\circ}C$
Ripple rejection		RR	Refer to Fig.2	45	60	—	dB
Dropout voltage	PQ05TZ51/11	V_{i-o}	⑦, ⑨	—	0.2	0.5	V
	PQ2TZ55/15			—	—	0.5	
	PQ3TZ50/53			—	—	0.5	
④ ON-state voltage for control		$V_{C(on)}$	⑤, ⑧, ⑨	2.0	—	—	V
ON-state current for control		$I_{C(on)}$	⑤, ⑨	—	—	200	μA
OFF-state voltage for control		$V_{C(off)}$	⑤	—	—	0.8	V
OFF-state current for control	PQ05TZ51/11	$I_{C(off)}$	⑤, $V_C=0.4V$	—	—	2	μA
	PQ2TZ55/15			—	—	2	
	PQ3TZ50/53			—	—	2	
Quiescent current	PQ05TZ51/11	I_q	⑤, $I_O=0A$	—	4	10	mA
	PQ2TZ55/15			—	—	10	
	PQ3TZ50/53			—	—	10	
Output OFF-state consumption current		I_{qs}	⑤, ⑪, $V_C=0.4V$	—	—	5	μA

④ PQ2TZ55 : $I_O=0.3A$, $V_{IN}=3.3V$, PQ2TZ15 : $I_O=0.5A$, $V_{IN}=3.3V$

⑤ PQ2TZ51/11 : $V_{IN}=7V$, PQ09TZ51/11 : $V_{IN}=11V$, PQ12TZ51/11 : $V_{IN}=14V$, PQ3TZ50/53 : $V_{IN}=5V$

⑥ PQxxTZ51, PQ3TZ50/53, PQ2TZ55 : $I_O=5mA$ to $0.5A$, PQxxTZ51, PQ2TZ15 : $I_O=5mA$ to $1.0A$

⑦ Input voltage shall be the value when output voltage is 95% in comparison with the initial value.

⑧ In case of opening control terminal ②, output voltage turns off.

⑨ PQxxTZ51, PQ3TZ50/53 : $I_O=0.3A$, PQxxTZ11, PQ2TZ55 : $I_O=0.5A$, PQ2TZ15 : $I_O=1.0A$

PQ3TZ50 : $V_{IN}=3.4V$, PQ3TZ53 : $V_{IN}=3.7V$, PQ2TZ55/15 : $V_{IN}=3V$

⑩ PQ05TZ51/11 : $V_{IN}=6V$ to $16V$, PQ09TZ51/11 : $V_{IN}=10V$ to $20V$, PQ12TZ51/11 : $V_{IN}=13V$ to $23V$, PQ3TZ50/53 : $V_{IN}=4V$ to $10V$, PQ2TZ55/15 : $V_{IN}=3V$ to $10V$

⑪ PQxxTZ51/11, PQ2TZ55/15 : $I_O=0A$, PQ3TZ50/53 : $I_O=0.3A$

Fig. 1 Test Circuit

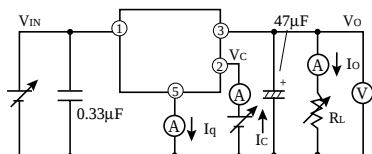
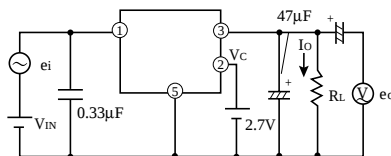


Fig. 2 Test Circuit for Ripple Rejection



$f=120Hz$ (sine wave)

$e_i=0.5V_{rms}$

$V_{IN}=3.3V$ (PQ2TZ55/15)

5V(PQ3TZ50/53)

7V(PQ05TZ51/11)

11V(PQ09TZ51/11)

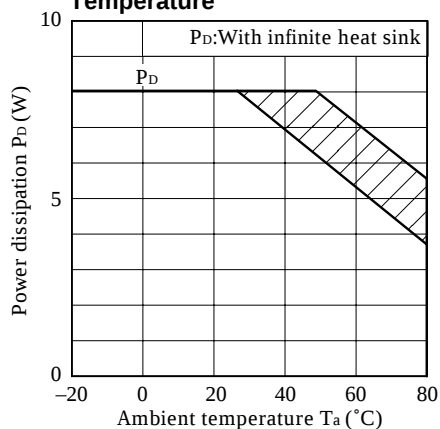
14V(PQ12TZ51/11)

$I_O=0.5A$ (PQ2TZ15)

$I_O=0.3A$ (PQ2TZ55/PQ3TZ50/53/PQxxTZ51/11)

$RR=20 \log(e_i/e_o)$

Fig. 3 Power Dissipation vs. Ambient Temperature



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

Fig. 5 Overcurrent Protection Characteristics(PQ2TZ15)

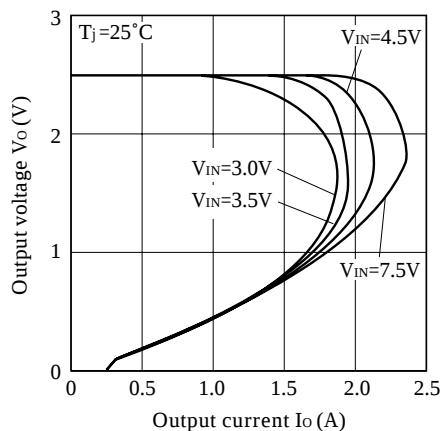


Fig. 4 Overcurrent Protection Characteristics (PQ2TZ55)

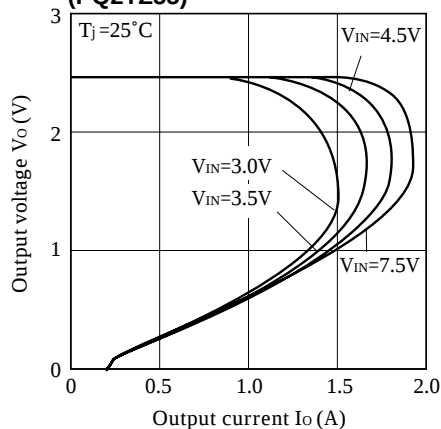


Fig. 6 Overcurrent Protection Characteristics (Typical Value)(PQ3TZ50/53)

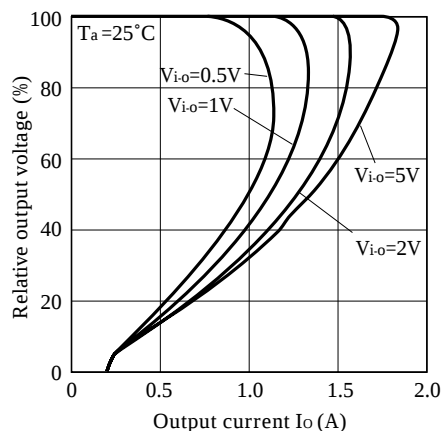


Fig. 7 Overcurrent Protection Characteristics (Typical Value)(PQxxTZ51/11)

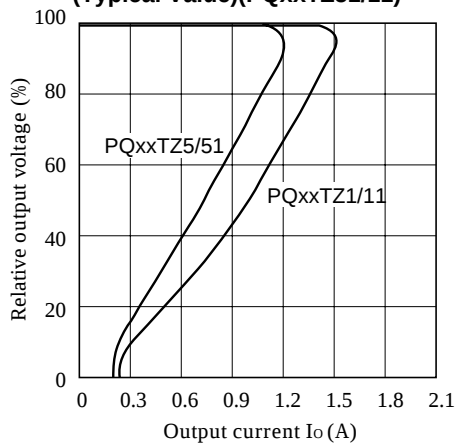


Fig. 8 Output Voltage Deviation vs. Junction Temperature(PQ2TZ55)

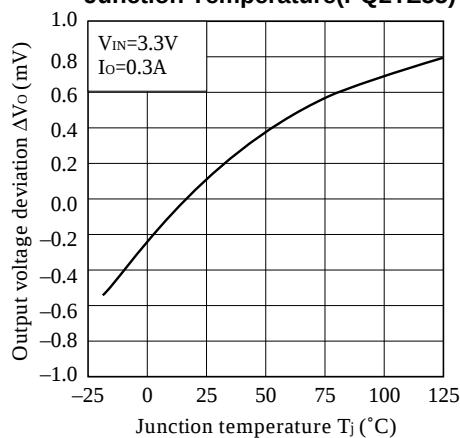


Fig. 9 Output Voltage Deviation vs. Junction Temperature (PQ2TZ15)

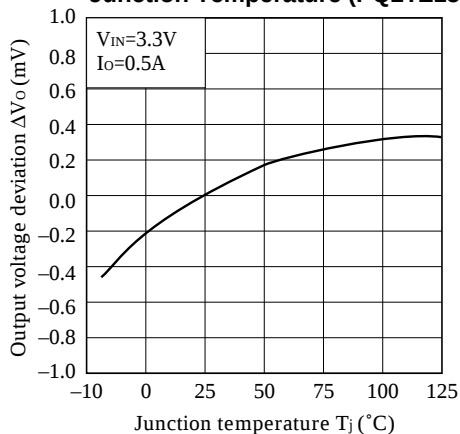


Fig.10 Output Voltage Deviation vs. Junction Temperature(PQ3TZ50/PQ3TZ53)

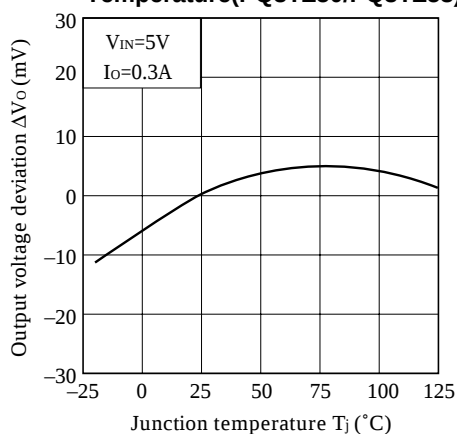


Fig.11 Output Voltage Deviation vs. Junction Temperature(PQ05TZ51/11)

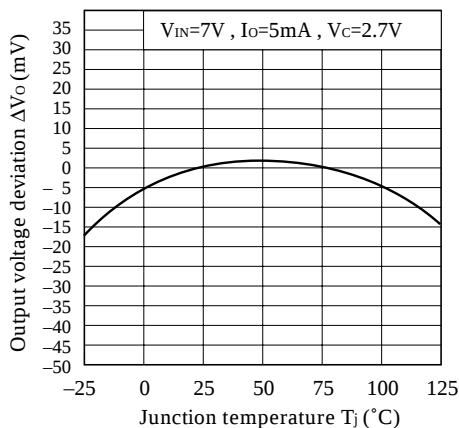


Fig.12 Output Voltage Deviation vs. Junction Temperature(PQ09TZ51/11)

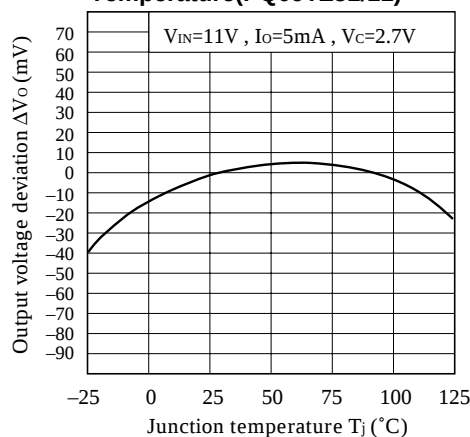


Fig.13 Output Voltage Deviation vs. Junction Temperature(PQ12TZ51/11)

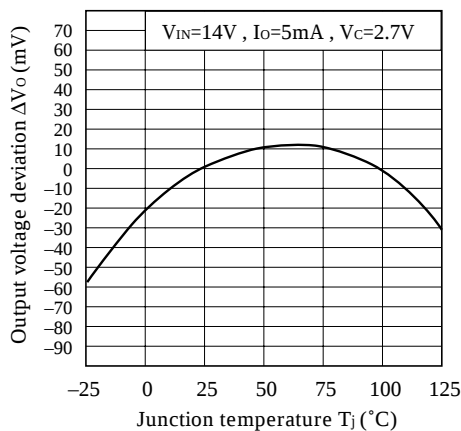


Fig.14 Output Voltage vs. Input Voltage (PQ2TZ55)

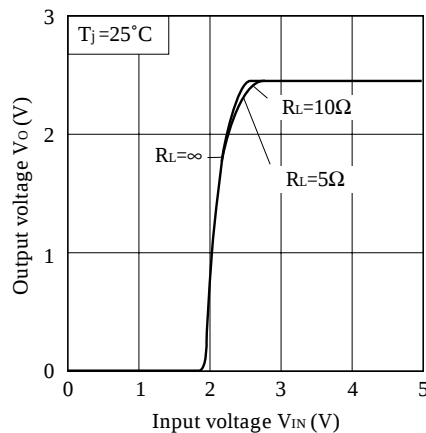


Fig.15 Output Voltage vs. Input Voltage (PQ2TZ15)

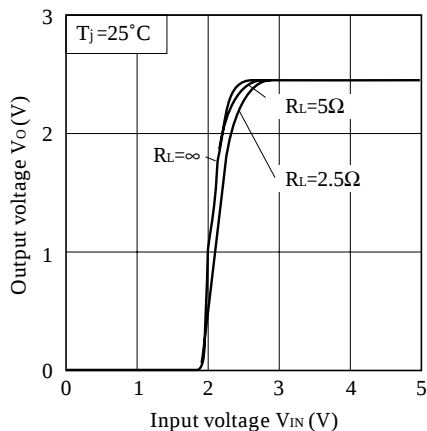


Fig.16 Output Voltage vs. Input Voltage (PQ3TZ50)

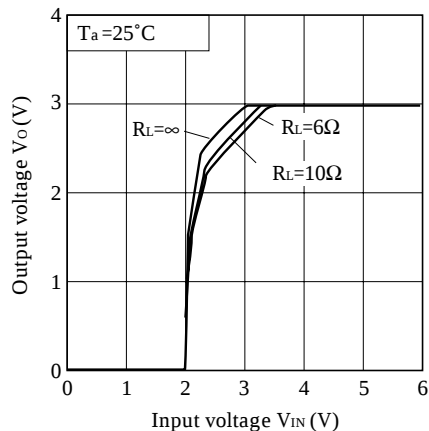


Fig.17 Output Voltage vs. Input Voltage (PQ3TZ53)

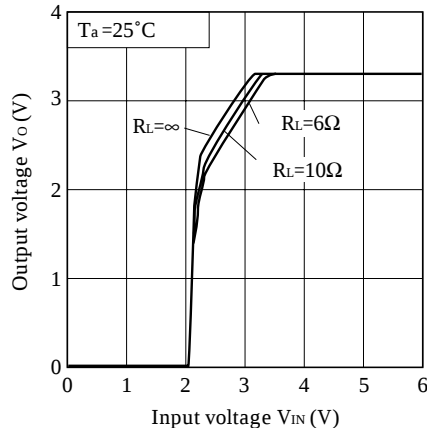


Fig.18 Output Voltage vs. Input Voltage (PQ05TZ51)

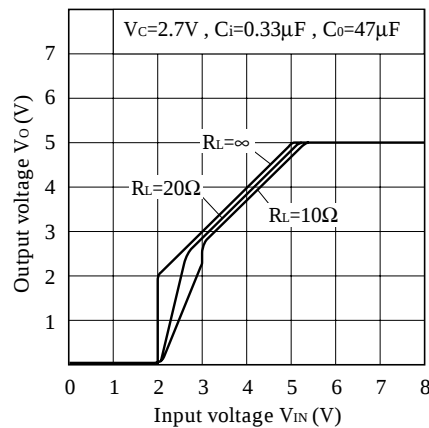


Fig.19 Output Voltage vs. Input Voltage (Typical Value) (PQ09TZ51)

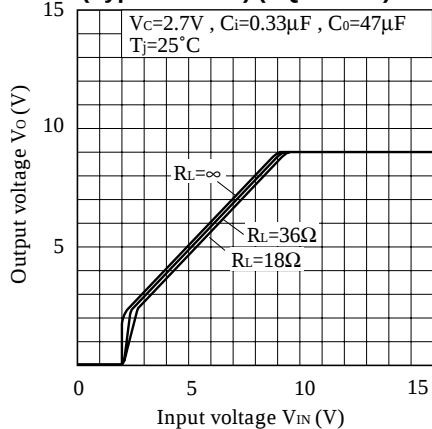


Fig.20 Output Voltage vs. Input Voltage (Typical Value) (PQ12TZ51)

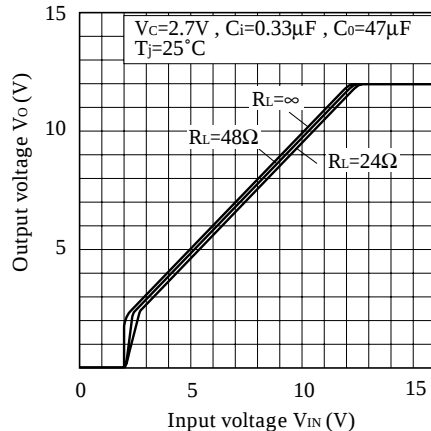


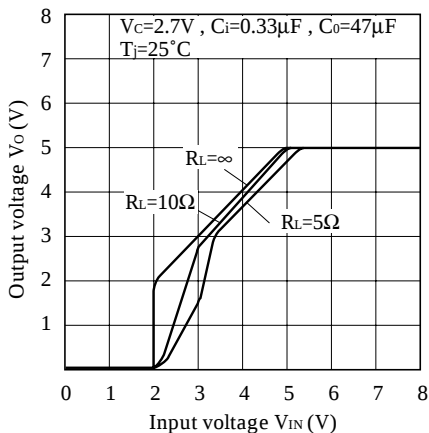
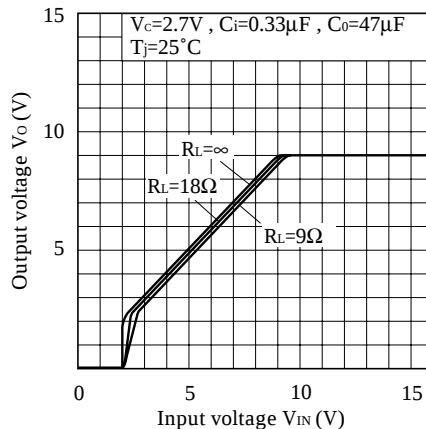
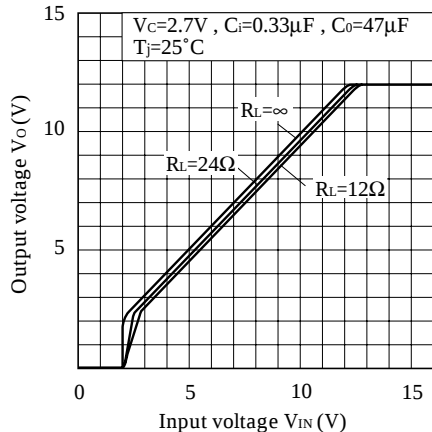
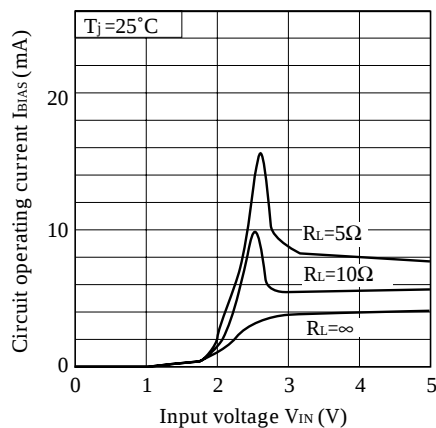
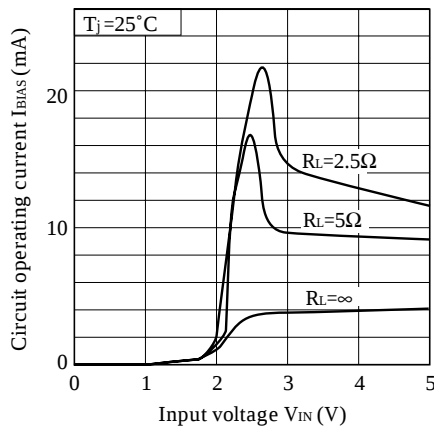
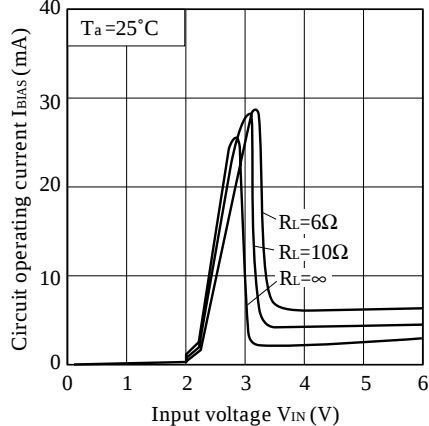
Fig.21 Output Voltage vs. Input Voltage (Typical Value) (PQ05TZ11)**Fig.22 Output Voltage vs. Input Voltage (PQ09TZ11)****Fig.23 Output Voltage vs. Input Voltage (PQ12TZ11)****Fig.24 Circuit Operating Current vs. Input Voltage (PQ2TZ55)****Fig.25 Circuit Operating Current vs. Input Voltage (PQ2TZ15)****Fig.26 Circuit Operating Current vs. Input Voltage (PQ3TZ50)**

Fig.27 Circuit Operating Current vs. Input Voltage (PQ3TZ53)

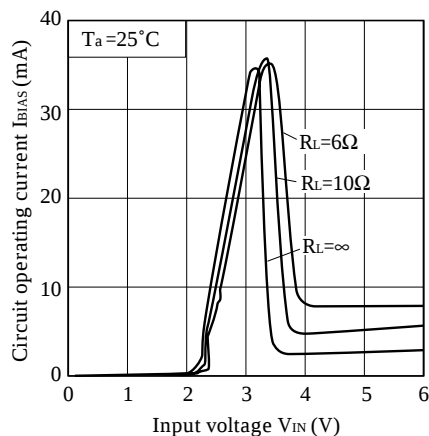


Fig.28 Circuit Operating Current vs. Input Voltage (PQ05TZ51)

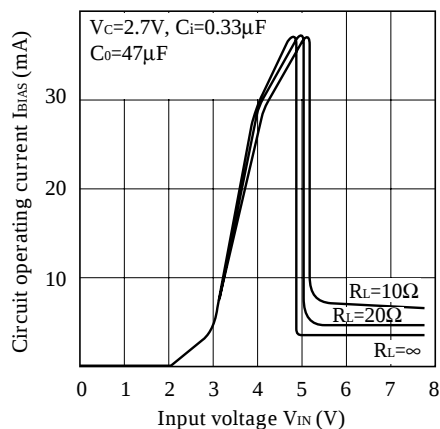


Fig.29 Circuit Operating Current vs. Input Voltage (PQ09TZ51)

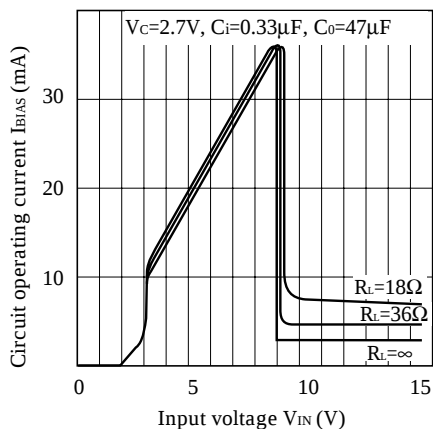


Fig.30 Circuit Operating Current vs. Input Voltage (PQ12TZ51)

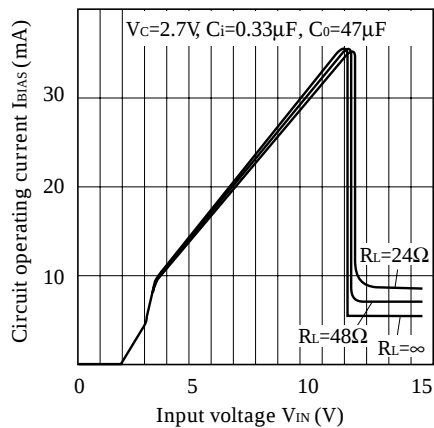


Fig.31 Circuit Operating Current vs. Input Voltage (PQ05TZ11)

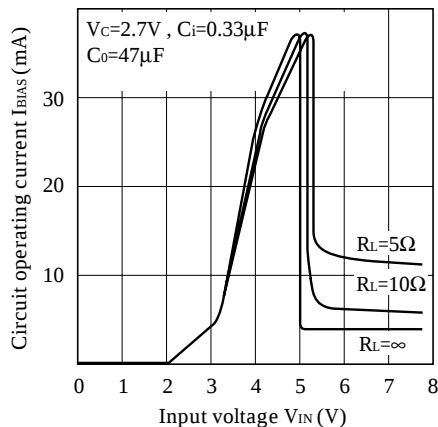


Fig.32 Circuit Operating Current vs. Input Voltage (PQ09TZ11)

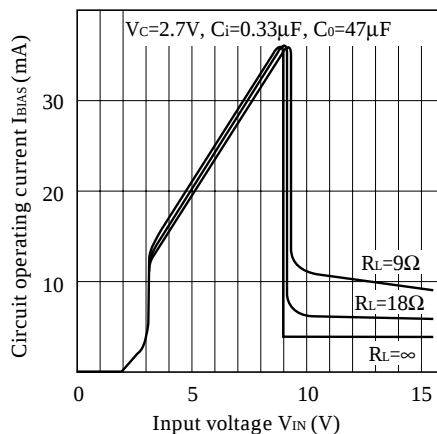


Fig.33 Circuit Operating Current vs. Input Voltage (PQ12TZ11)

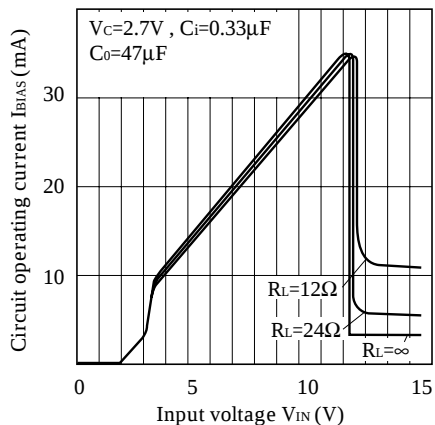


Fig.34 Dropout Voltage vs. Junction Temperature (PQ3TZ50/PQ3TZ53)

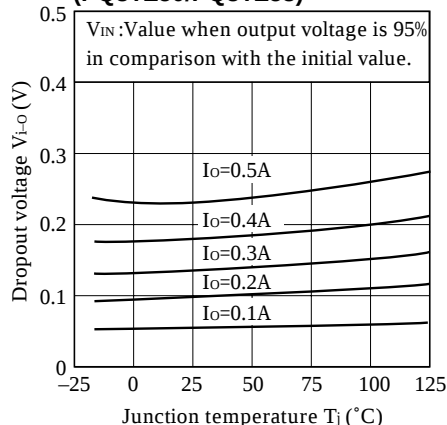


Fig.35 Dropout Voltage vs. Junction Temperature (PQ05TZ51/PQ09TZ51/PQ12TZ51)

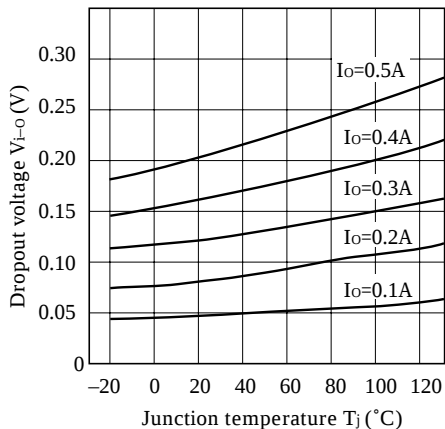


Fig.36 Dropout Voltage vs. Junction Temperature (PQ05TZ11/PQ09TZ11/PQ12TZ11)

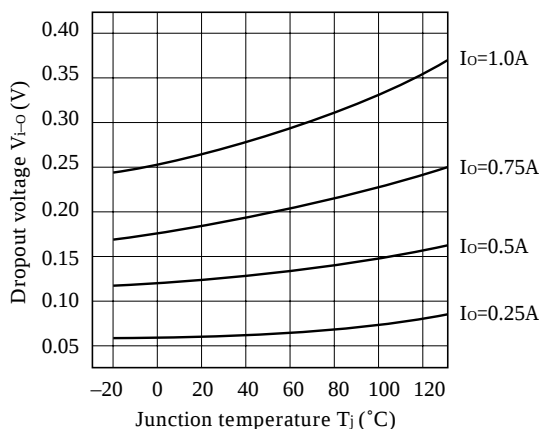


Fig.37 Quiescent Current vs. Junction Temperature (PQ2TZ55)

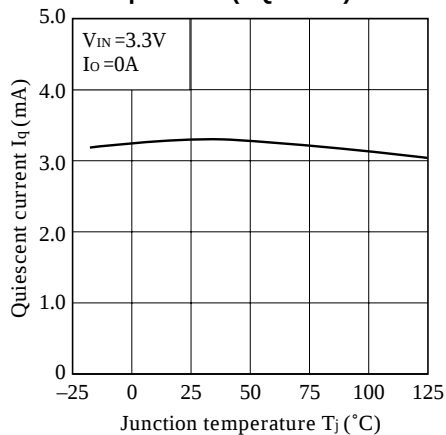


Fig.38 Quiescent Current vs. Junction Temperature (PQ2TZ15)

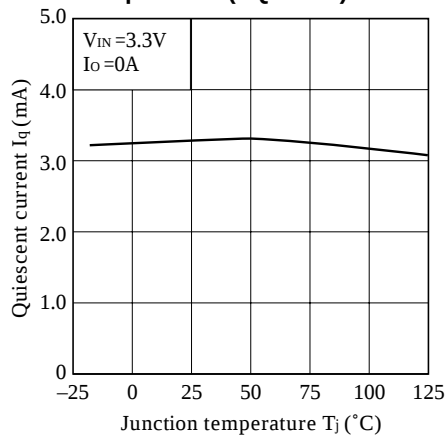


Fig.39 Quiescent Current vs. Junction Temperature (Typical Value) (PQ3TZ50/PQ3TZ53)

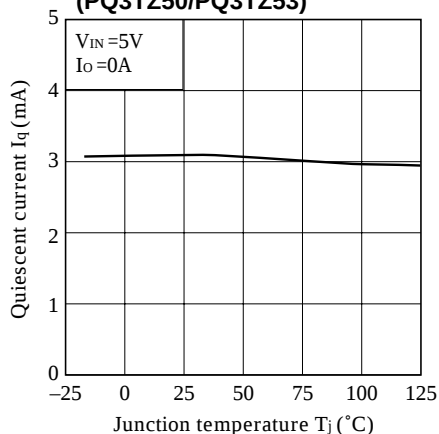


Fig.40 Quiescent Current vs. Junction Temperature (PQxxTZ51/11)

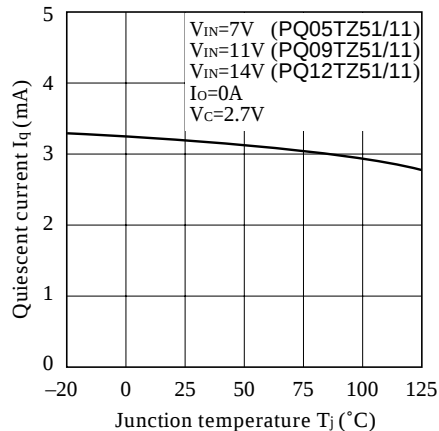


Fig.41 ON-state Voltage for Control vs. Junction Temperature(Typical Value) (PQ3TZ50/PQ3TZ53)

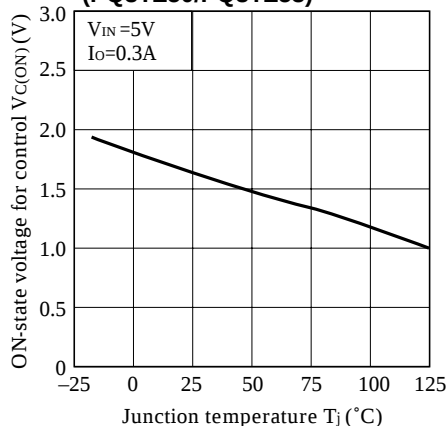


Fig.42 Ripple Rejection vs. Input Ripple Frequency (PQ3TZ50/PQ3TZ53)

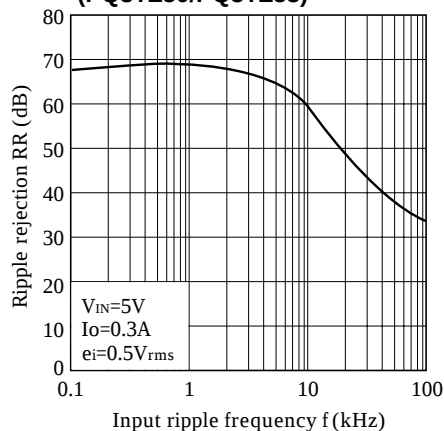


Fig.43 Ripple Rejection vs. Input Ripple Frequency (PQ05TZ51/PQ09TZ51/PQ12TZ51)

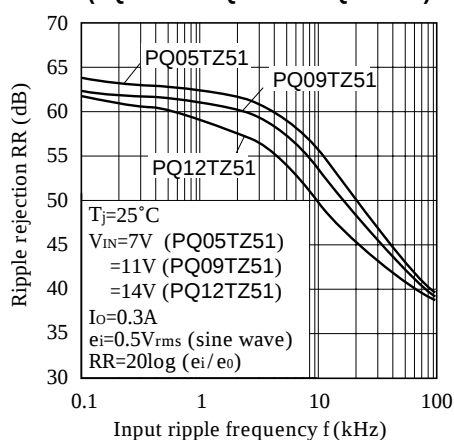


Fig.44 Ripple Rejection vs. Input Ripple Frequency (PQ05TZ11/PQ09TZ11/PQ12TZ11)

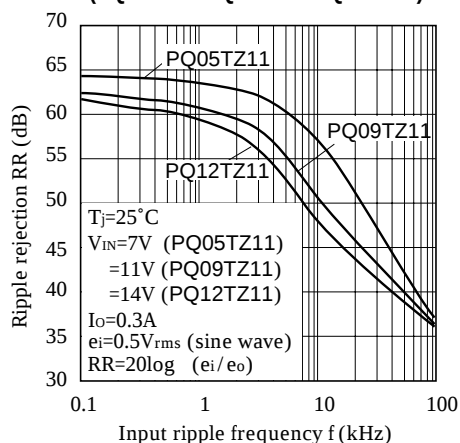


Fig.45 Ripple Rejection vs. Output Current (PQ05TZ51/PQ09TZ51/PQ12TZ51)

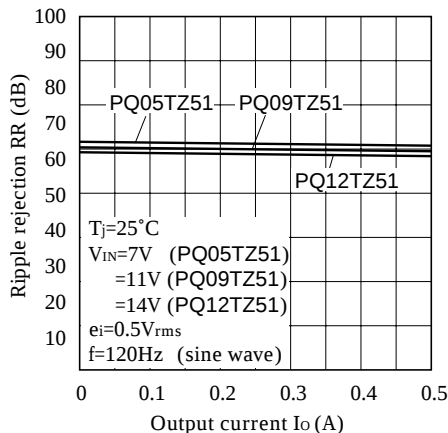


Fig.46 Ripple Rejection vs. Output Current (PQ05TZ11/PQ09TZ11/PQ12TZ11)

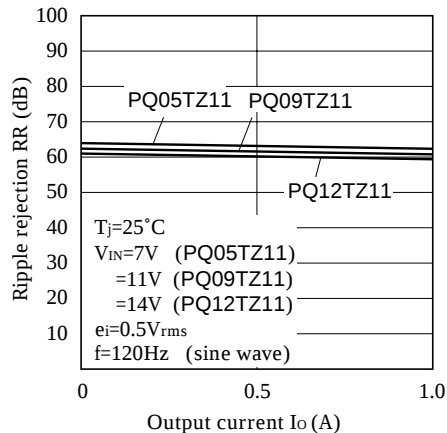


Fig.47 Output Peak Current vs. Junction Temperature (Typical Value) (PQ3TZ50/PQ3TZ53)

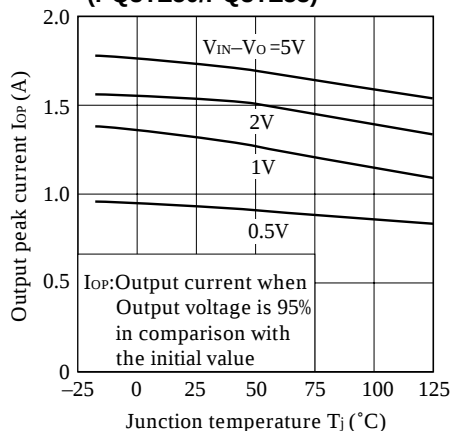


Fig.48 Output Peak Current vs. Dropout Voltage (PQ05TZ51/PQ09TZ51/PQ12TZ51)

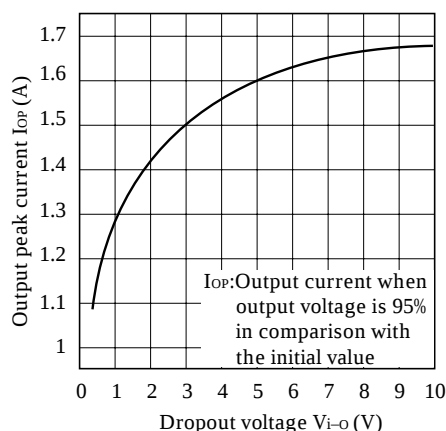


Fig.49 Output Peak Current vs. Dropout Voltage (PQ05TZ11/PQ09TZ11/PQ12TZ11)

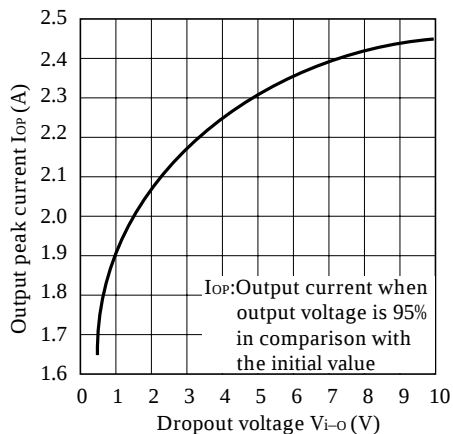


Fig.50 Output Peak Current vs. Junction Temperature (PQ05TZ51/PQ09TZ51/PQ12TZ51)

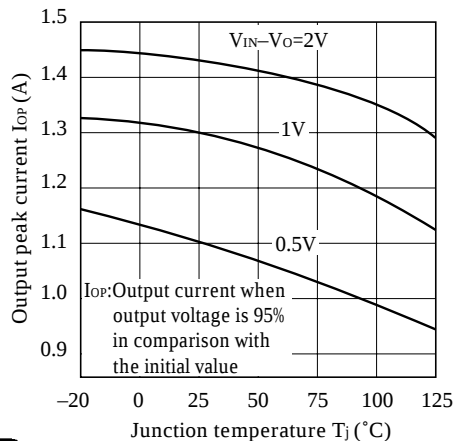


Fig.51 Output Peak Current vs. Junction Temperature
(PQ05TZ11/PQ09TZ11/PQ12TZ11)

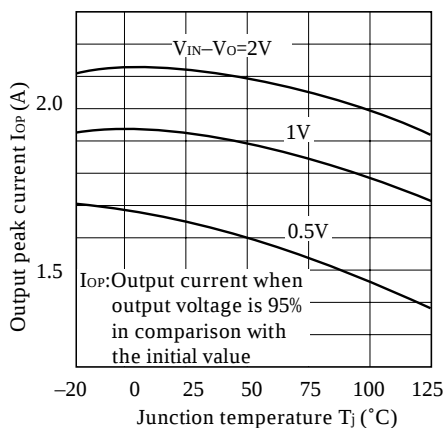
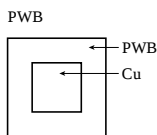
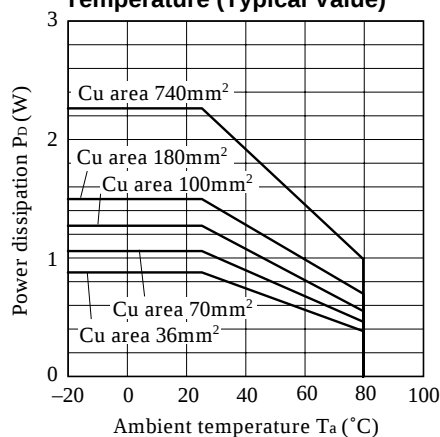


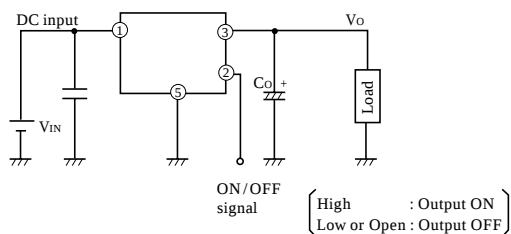
Fig.52 Power Dissipation vs. Ambient Temperature (Typical Value)



Material : Glass-cloth epoxy resin
Size : 50x50x1.6mm³
Cu thickness : 35μm

ON/OFF Operation

As shown in the figure, ON/OFF control function is available.



Model Line-ups for Tape-packaged Products

	Sleeve-packaged products		Tape-packaged products	
Output current	Standard type	High-precision output type	Standard type	High-precision output type
0.5A output	—	PQ2TZ55U/PQ3TZ50U/PQ05TZ51 series	—	PQ2TZ55U/PQ3TZ50U/PQ05TZ5U series
1.0A output	—	PQ2TZ15U/PQ3TZ53U/PQ05TZ11 series	—	PQ2TZ15U/PQ3TZ53U/PQ05TZ1U series

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 - Industrial control
 - Audio visual equipment
 - Consumer electronics
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 - Gas leakage sensor breakers
 - Alarm equipment
 - Various safety devices, etc.
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