

PQ05TZ51/PQ05TZ11 Series

Low Power-Loss Voltage Regulators with OFF-state Low Dissipation Current

■ Features

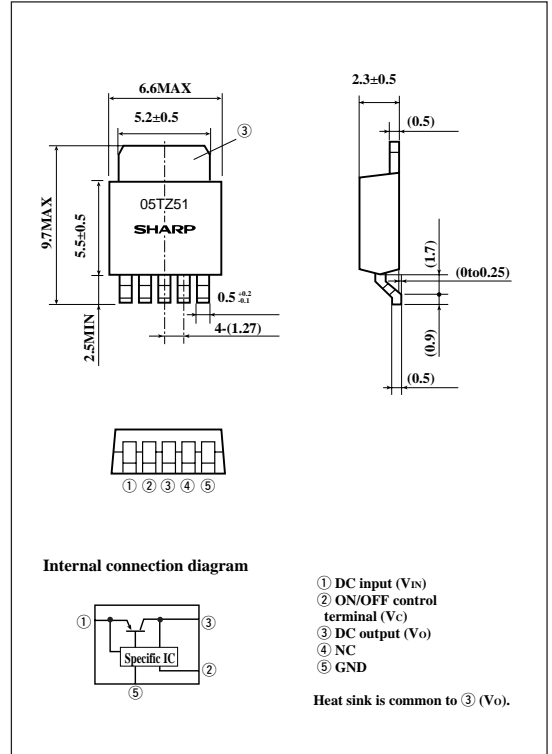
- Low power-loss (Dropout voltage : MAX 0.5V)
- Surface mount type package (Equivalent to EIAJ SC-63)
- Both the 0.5A output PQ05TZ51 series and the 1A output PQ05TZ11 series have high-precision output ($\pm 2.5\%$)
- Low dissipation current at OFF-state ($I_{qs}: \text{MAX.} 5\mu\text{A}$)
- Built-in ON/OFF control function

■ Model Line-ups

| | Output voltage | 5V Output | 9V Output | 12V Output |
|-------------|---------------------------------------|-----------|-----------|------------|
| 0.5A Output | Output voltage precision: $\pm 2.5\%$ | PQ05TZ51 | PQ09TZ51 | PQ12TZ51 |
| 1.0A Output | Output voltage precision: $\pm 2.5\%$ | PQ05TZ11 | PQ09TZ11 | PQ12TZ11 |

■ Outline Dimensions

(Unit : mm)



■ Absolute Maximum Ratings

(xx=05,09,12, $T_a=25^\circ\text{C}$)

| Parameter | Symbol | Rating | | Unit |
|---------------------------|-----------|---------------|----------|------------------|
| | | PQxxTZ51 | PQxxTZ11 | |
| *1 Input voltage | V_{IN} | 24 | | V |
| *1 Output control 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 With infinite heat sink.

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

· Please refer to the chapter "Handling Precautions".

SHARP

"In the absence of confirmation by device specification sheets, SHARP takes no responsibility for any defects that may occur in equipment using any SHARP devices shown in catalogs, data books, etc. Contact SHARP in order to obtain the latest version of the device specification sheets before using any SHARP's device."

■ Electrical Characteristics

(Unless otherwise specified, $V_C=2.7V, T_a=25^\circ C$)

| Parameter | | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|---|-------------|------------|---|------|------------|------|---------------|
| Output voltage | PQ05TZ51/11 | V_O | *3,*7 | 4.88 | 5.0 | 5.12 | V |
| | PQ09TZ51/11 | | | 8.78 | 9.0 | 9.22 | |
| | PQ12TZ51/11 | | | 11.7 | 12.0 | 12.3 | |
| Load regulation | | R_{egL} | *3,*4 | - | 0.2 | 2.0 | % |
| Line regulation | | R_{egI} | $I_o=5mA,^{*8}$ | - | 0.1 | 2.5 | % |
| Temperature coefficient of output voltage | | $T_C V_O$ | $^{*3}, I_o=5mA, T_j=0 \text{ to } 125^\circ C$ | - | ± 0.01 | - | $\%/^\circ C$ |
| Ripple rejection | | RR | Refer to Fig. 2 | 45 | 60 | - | dB |
| Dropout voltage | | V_{i-o} | *7,*5 | - | 0.2 | 0.5 | V |
| ON-state voltage for control | | $V_C(ON)$ | *3,*6,*7 | 2.0 | - | - | V |
| ON-state current for control | | $I_C(ON)$ | *3,*7 | - | - | 200 | μA |
| OFF-state voltage for control | | $V_C(OFF)$ | *3 | - | - | 0.8 | V |
| OFF-state current for control | | $I_C(OFF)$ | $^{*3}, V_C=0.4V$ | - | - | 10 | μA |
| Quiescent current | | I_q | $^{*3}, I_o=0A$ | - | 4 | 10 | mA |
| Output OFF-state dissipation current | | I_{qs} | $^{*3}, V_C=0.4V, I_o=0A$ | - | - | 5 | μA |

*3 PQ05TZ51/11: $V_{IN}=7V$
 PQ09TZ51/11: $V_{IN}=11V$
 PQ12TZ51/11: $V_{IN}=14V$

*4 PQxxTZ51: $I_o=5mA$ to 0.5A, PQxxTZ51: $I_o=5mA$ to 1.0A

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

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

*7 PQxxTZ51: $I_o=0.3A$, PQxxTZ11: $I_o=0.5A$

*8 PQ05TZ51/11: $V_{IN}=6V$ to 16V
 PQ09TZ51/11: $V_{IN}=10V$ to 20V
 PQ12TZ51/11: $V_{IN}=13V$ to 23V

Fig.1 Test Circuit

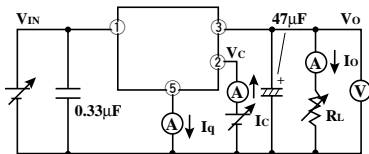
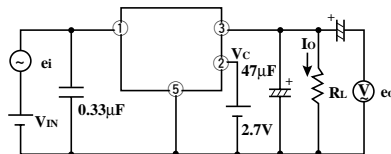
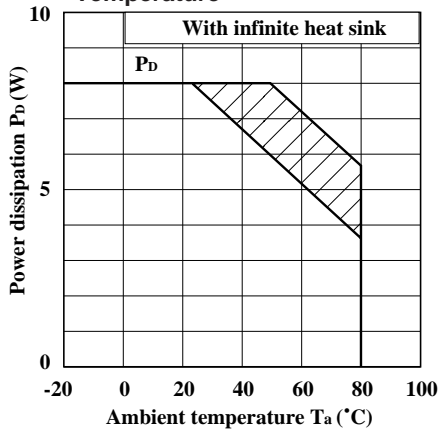


Fig.2 Test Circuit of Ripple Rejection



$f=120Hz$ (sine wave)
 $e_i=0.5V_{rms}$
 $V_{IN}=7V$ (PQ05TZ51/11)
 $V_{IN}=11V$ (PQ09TZ51/11)
 $V_{IN}=14V$ (PQ12TZ51/11)
 $I_o=0.3A$
 $RR=20 \log (e_i/e_o)$

Fig.3 Power Dissipation vs. Ambient Temperature



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

Fig.4 Overcurrent Protection Characteristics (Typical Value) (xx=05,09,12)

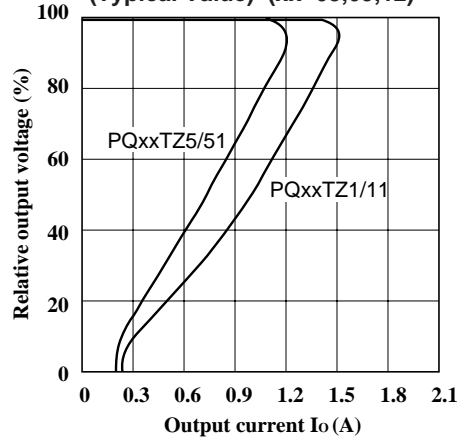


Fig.5 Output Voltage Deviation vs. Junction Temperature (PQ05TZ51/11)

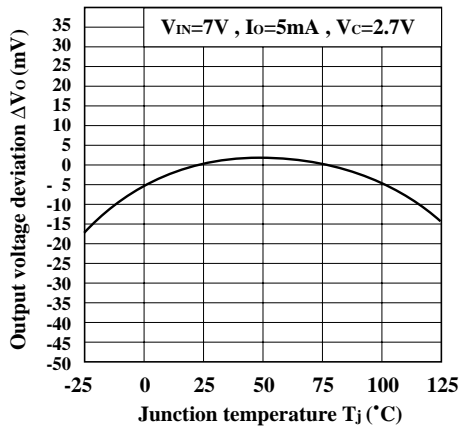


Fig.6 Output Voltage Deviation vs. Junction Temperature (PQ09TZ51/11)

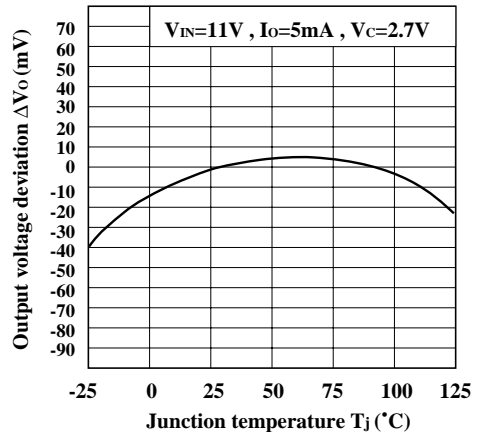


Fig.7 Output Voltage Deviation vs. Junction Temperature (PQ12TZ51/11)

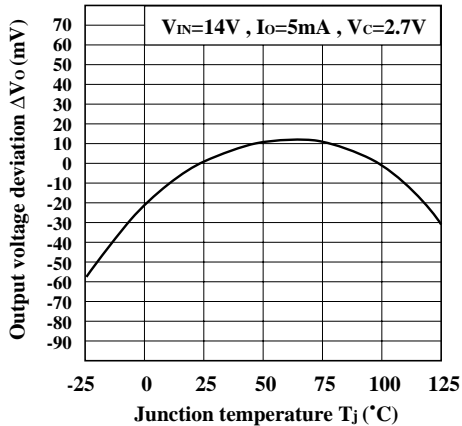


Fig.8 Output Voltage vs. Input Voltage (PQ05TZ51)

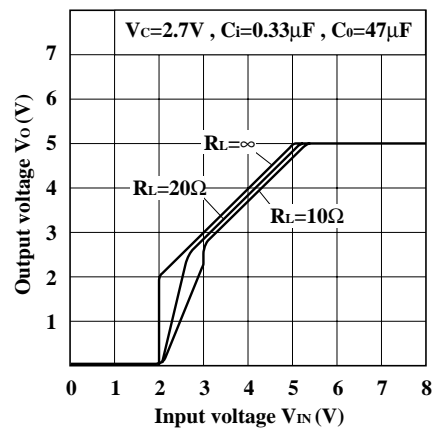


Fig.9 Output Voltage vs. Input Voltage (Typical Value) (PQ09TZ51)

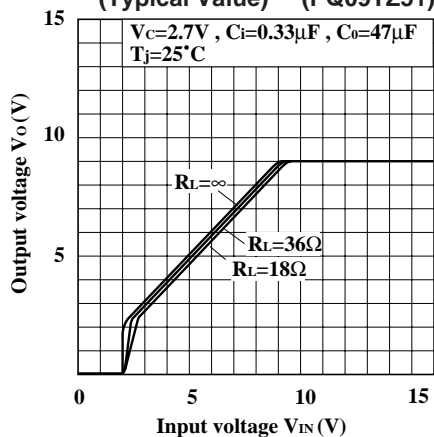


Fig.10 Output Voltage vs. Input Voltage (Typical Value) (PQ12TZ51)

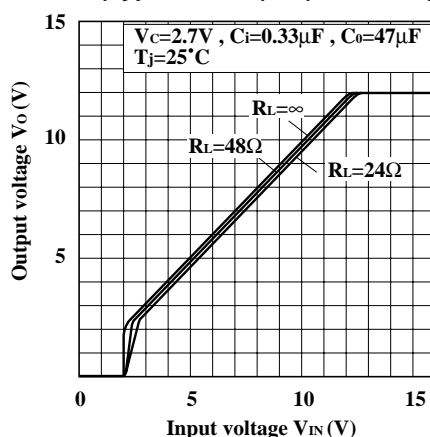


Fig.11 Output Voltage vs. Input Voltage (Typical Value) (PQ05TZ11)

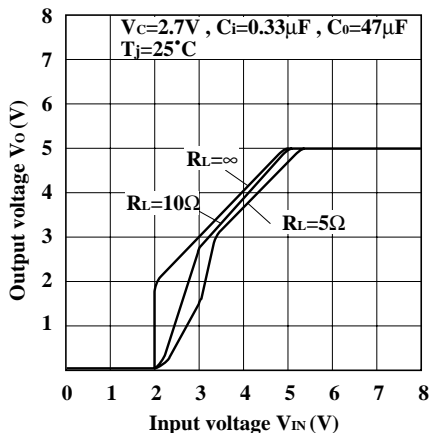


Fig.12 Output Voltage vs. Input Voltage (PQ09TZ11)

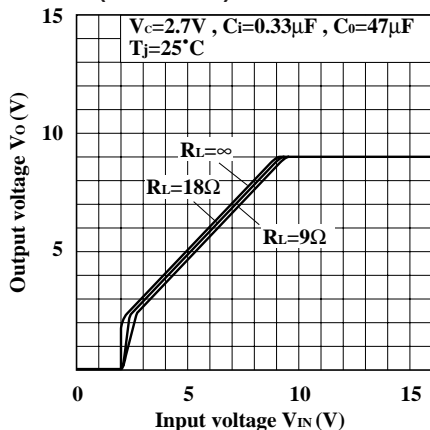


Fig.13 Output Voltage vs. Input Voltage (PQ12TZ11)

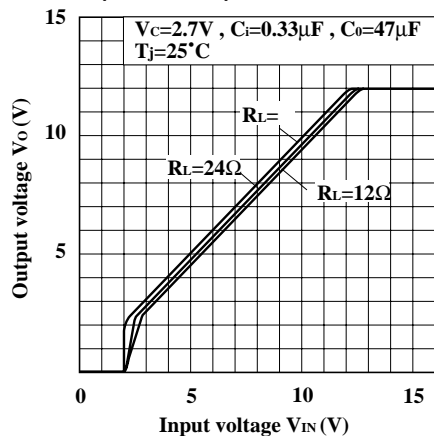


Fig.14 Dropout Voltage vs. Junction Temperature (PQ05TZ51/PQ09TZ51/PQ12TZ51)

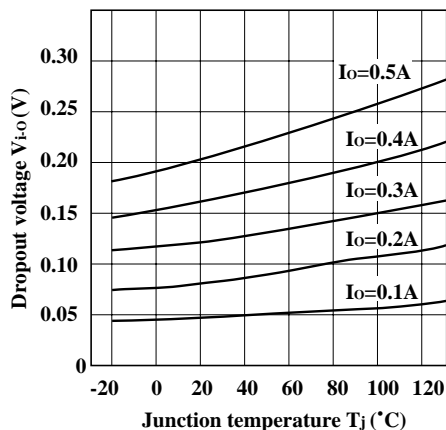


Fig.15 Dropout Voltage vs. Junction Temperature (PQ05TZ11/PQ09TZ11/PQ12TZ11)

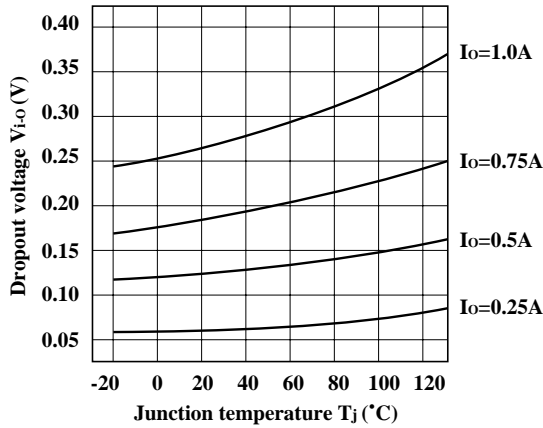


Fig.16 Circuit Operating Current vs. Input Voltage (PQ05TZ51)

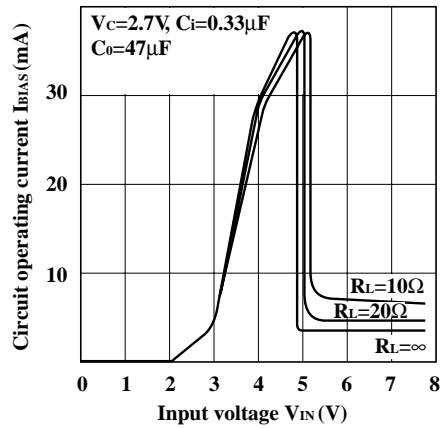


Fig.17 Circuit Operating Current vs. Input Voltage (PQ09TZ51)

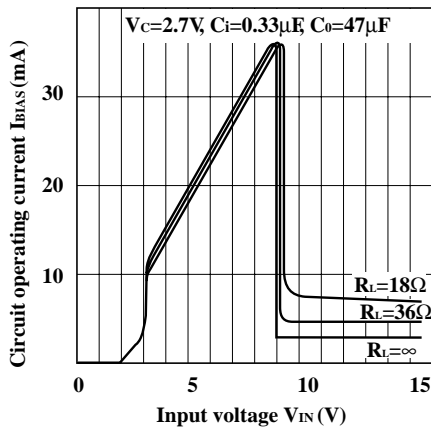


Fig.18 Circuit Operating Current vs. Input Voltage (PQ12TZ51)

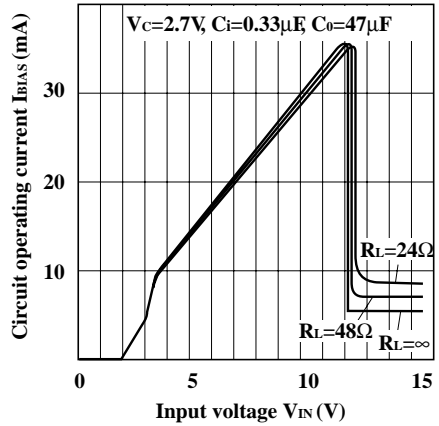


Fig.19 Circuit Operating Current vs. Input Voltage (PQ05TZ11)

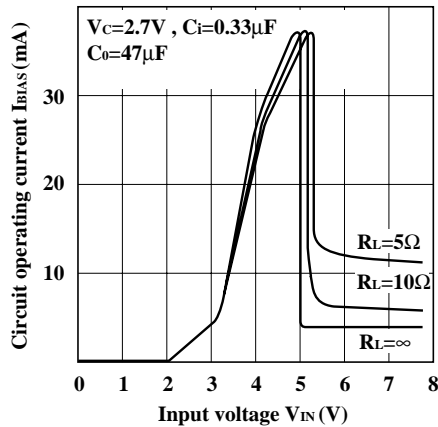


Fig.20 Circuit Operating Current vs. Input Voltage (PQ09TZ11)

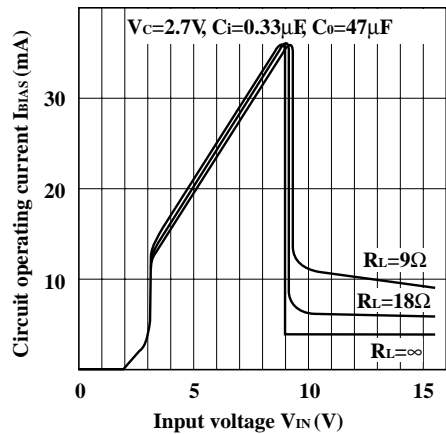


Fig.21 Circuit Operating Current vs. Input Voltage (PQ12TZ11)

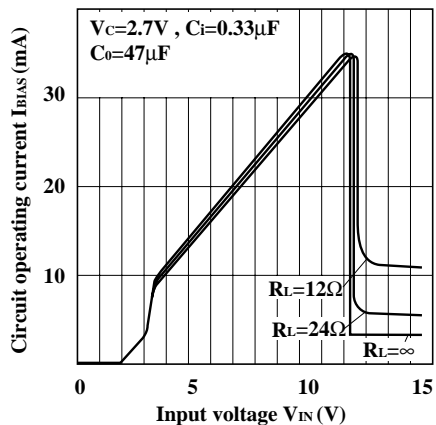


Fig.22 Quiescent Current vs. Junction Temperature

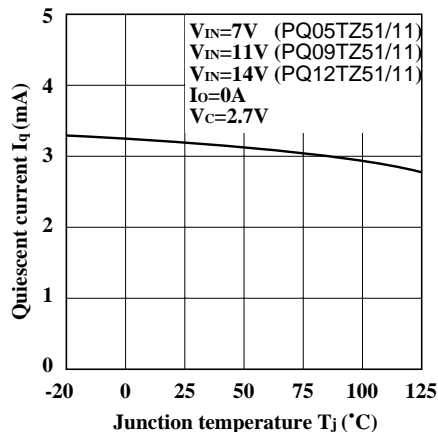


Fig.23 Ripple Rejection vs. Input Ripple Frequency (PQ05TZ51/PQ09TZ51/PQ12TZ51)

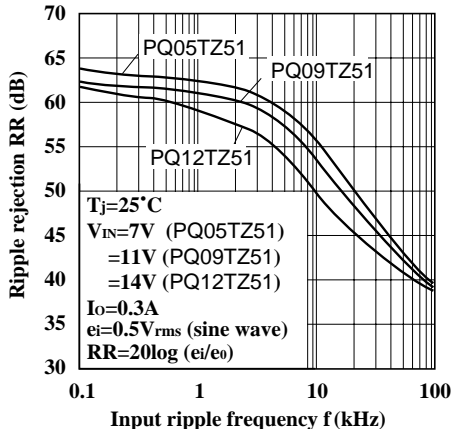


Fig.24 Ripple Rejection vs. Input Ripple Frequency (PQ05TZ11/PQ09TZ11/PQ12TZ11)

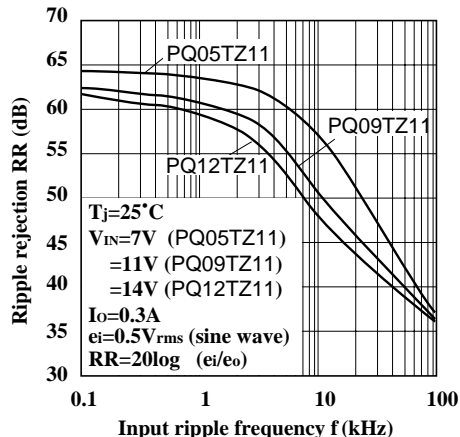


Fig.25 Ripple Rejection vs. Output Current (PQ05TZ51/PQ09TZ51/PQ12TZ51)

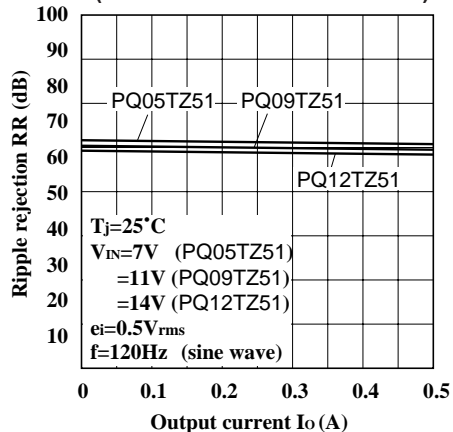


Fig.26 Ripple Rejection vs. Output Current (PQ05TZ11/PQ09TZ11/PQ12TZ11)

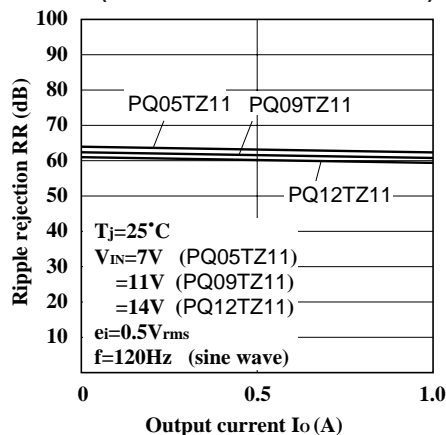


Fig.27 Output Peak Current vs. Dropout Voltage (PQ05TZ51/PQ09TZ51/PQ12TZ51)

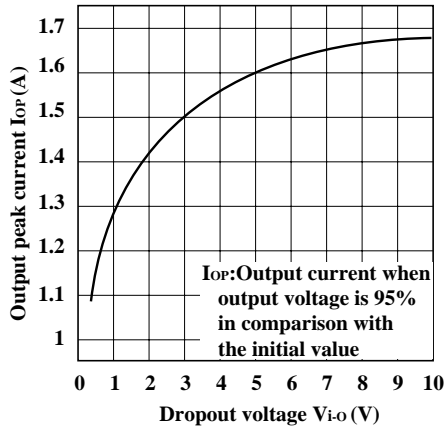


Fig.28 Output Peak Current vs. Dropout Voltage (PQ05TZ11/PQ09TZ11/PQ12TZ11)

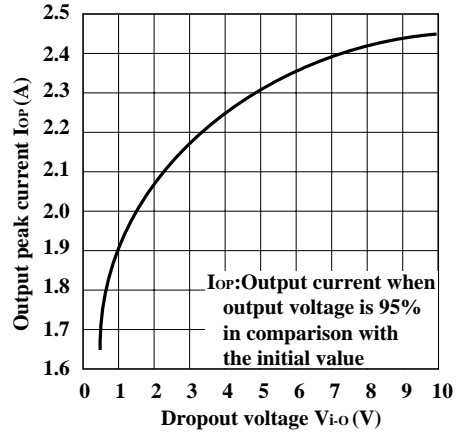


Fig.29 Output Peak Current vs. Junction Temperature (PQ05TZ51/PQ09TZ51/PQ12TZ51)

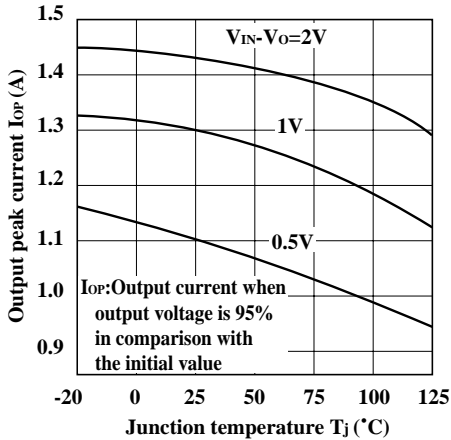


Fig.30 Output Peak Current vs. Junction Temperature (PQ05TZ11/PQ09TZ11/PQ12TZ11)

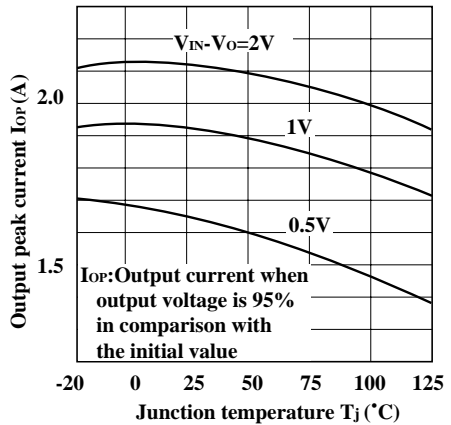
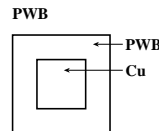
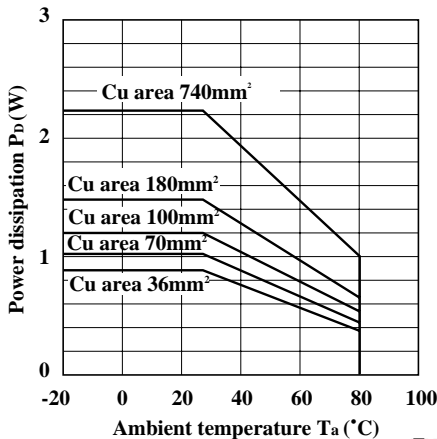


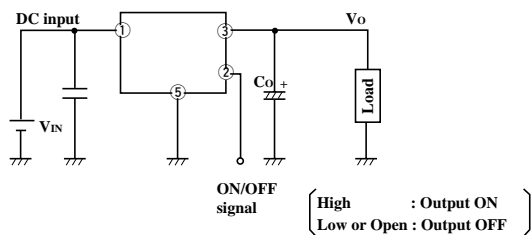
Fig.31 Power Dissipation vs. Ambient Temperature(Typical Value)



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

| Output current | Sleeve-packaged products | | Tape-packaged products | |
|----------------|--------------------------|----------------------------|------------------------|----------------------------|
| | Standard type | High-precision output type | Standard type | High-precision output type |
| 0.5A output | - | PQ05TZ51 Series | - | PQ05TZ5U Series |
| 1.0A output | - | PQ05TZ11 Series | - | PQ05TZ1U Series |