

# PQ20RX05/PQ20RX11

Variable Output Type Low Power-Loss Voltage Regulator with ON/OFF Control Function

## Features

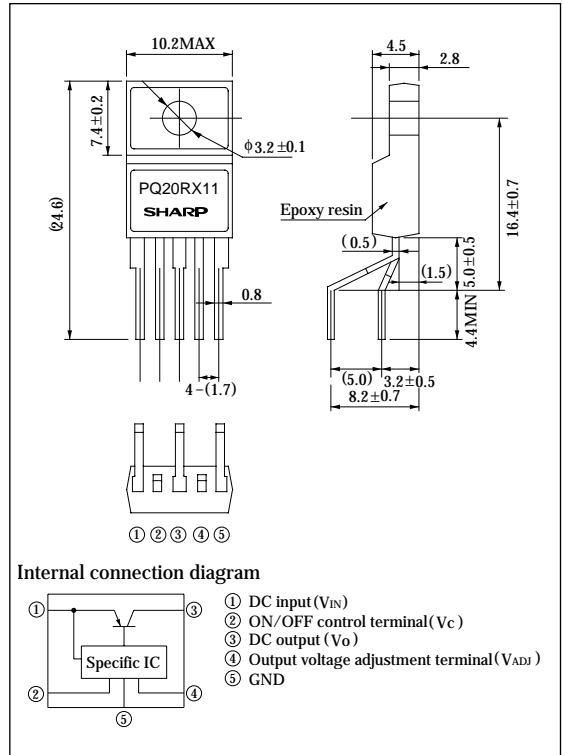
- Low power-loss  
(Dropout voltage: MAX. 0.5V)
- Compact resin full mold package  
(Equivalent to TO-220)
- With built-in ON/OFF control function
- Variable output voltage (setting range:3.0 to 20V)
- 0.5A output (PQ20RX05)  
1.0A output (PQ20RX11)
- Reference voltage precision:  $\pm 2.5\%$
- With built-in overcurrent protection, overheat protection, ASO protection circuit  
ASO: Area of Safety Operation

## Applications

- Power supplies for various electronic equipment such as AV, OA equipment
- CRT displays

## Outline Dimensions

(Unit : mm)



## Absolute Maximum Ratings

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

Parameter	Symbol	Rating	Unit
*1 Input voltage	$V_{IN}$	24	V
*1 ON/OFF control terminal voltage	$V_c$	24	V
*1 Output adjustment terminal voltage	$V_{ADJ}$	7	V
Output current	PQ20RX05	0.5	A
	PQ20RX11	1	
*2 Power dissipation	$P_{D1}$	1.5(PQ20RX11), 1.25(PQ20RX05)	W
	$P_{D2}$	15(PQ20RX11), 10(PQ20RX05)	
*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  $P_{D1}$ : No heat sink,  $P_{D2}$ : With infinite heat sink

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

• Please refer to the chapter " Handling Precautions ".

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Electrical Characteristics

(Unless otherwise specified,  $V_{IN}=5V$ ,  $V_O=3.3V$ , <sup>\*4</sup>,  $R_1=2k\Omega$ ,  $R_2=500\Omega$ ,  $V_C=2.7V$ ,  $T_a=25^\circ C$ )

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input voltage	$V_{IN}$	—	3.5	—	24	V
Output voltage	$V_O$	—	3.0	—	20	V
Load regulation	$R_{egL}$	<sup>*5</sup>	—	—	2.0	%
Line regulation	$R_{egI}$	$V_{IN}=4$ to $10V$ , $I_o=5mA$	—	—	2.5	%
Ripple rejection	RR	Refer to Fig. 2	45	—	—	dB
Reference voltage	$V_{ref}$	—	2.574	2.64	2.706	V
Temperature coefficient of reference voltage	$T_C V_{ref}$	$T_j=0$ to $125^\circ C$ , $I_o=5mA$	—	$\pm 1.0$	—	%
Dropout voltage	$V_{iO}$	<sup>*4</sup> , <sup>*6</sup>	—	—	0.5	V
Quiescent current	$I_q$	$I_o=0A$	—	—	8	mA
<sup>*7</sup> ON-state voltage for control	$V_{C(ON)}$	—	2.0	—	—	V
ON-state current for control	$I_{C(ON)}$	—	—	—	200	$\mu A$
OFF-state voltage for control	$V_{C(OFF)}$	$I_o=0A$	—	—	0.8	V
OFF-state current for control	$I_{C(OFF)}$	$I_o=0A$ , $V_C=0.4V$	—	—	2.0	$\mu A$
Output OFF-state consumption current	$I_{qs}$	$V_C=0.4V$	—	—	5.0	$\mu A$

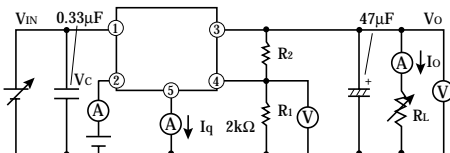
<sup>\*4</sup> PQ20RX05:  $I_o=0.3A$ , PQ20RX11:  $I_o=0.5A$

<sup>\*5</sup> PQ20RX05:  $I_o=5mA$  to  $0.5A$ , PQ20RX11:  $I_o=5mA$  to  $1.0A$

<sup>\*6</sup> Input voltage shall be the value when output voltage is 95% in comparison with the initial value.

<sup>\*7</sup> In case of opening ON/OFF control terminal  $\textcircled{2}$ , output voltage turns off.

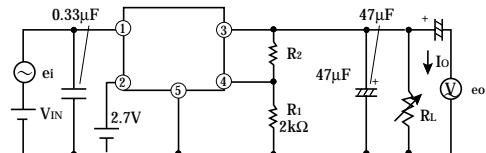
Fig. 1 Test Circuit



$$V_O = V_{ref} \times \left(1 + \frac{R_2}{R_1}\right) \text{ Nearly } = 2.64 \times \left(1 + \frac{R_2}{R_1}\right)$$

[ $R_1=2k\Omega$ ,  $V_{ref}$  Nearly  $=2.64V$ ]

Fig. 2 Test Circuit of Ripple Rejection



$f=120Hz$  (sine wave)

$e_i=0.5V_{rms}$

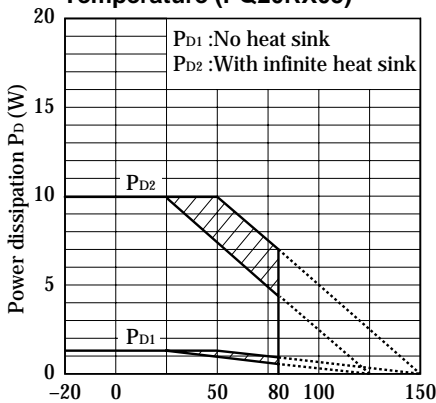
$I_o=0.3A$

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

$V_{IN}=5V$

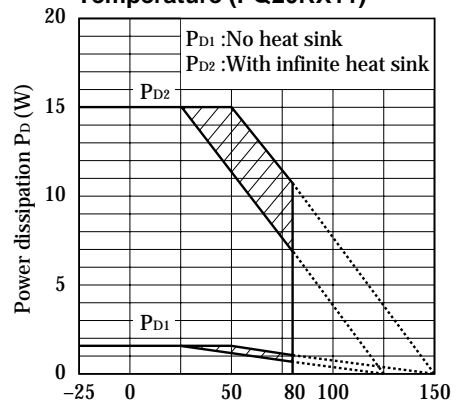
$V_O=3.3V$  ( $R_1=2k\Omega$ )

Fig. 3 Power Dissipation vs. Ambient Temperature (PQ20RX05)



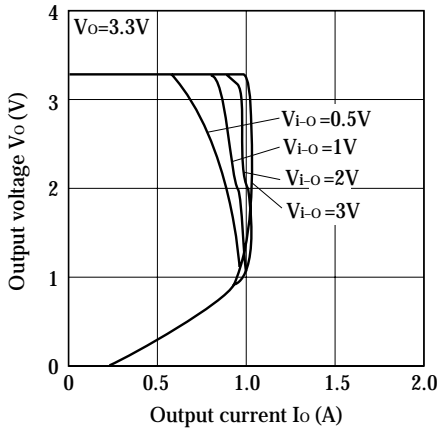
Note) Oblique line portion : Overheat protection may operate in this area.

Fig. 4 Power Dissipation vs. Ambient Temperature (PQ20RX11)

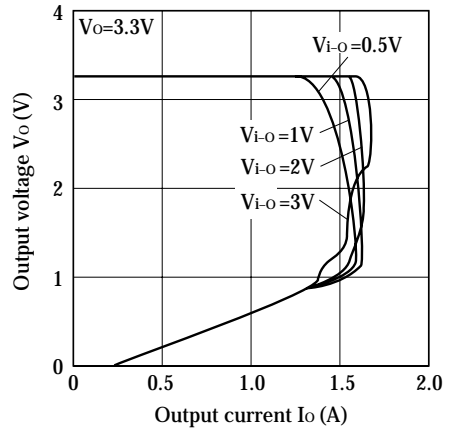


Note) Oblique line portion : Overheat protection may operate in this area.

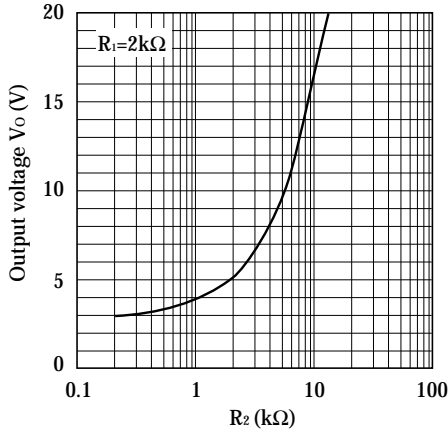
**Fig. 5 Overcurrent Protection Characteristics (Typical Value) (PQ20RX05)**



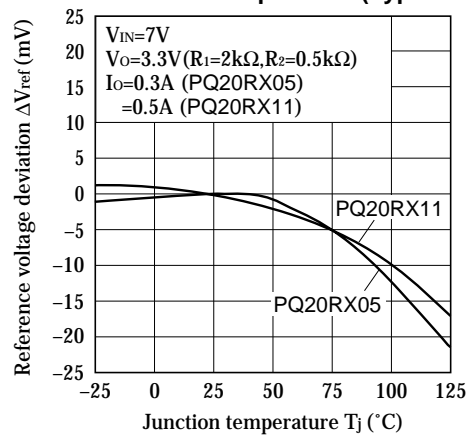
**Fig. 6 Overcurrent Protection Characteristics (Typical Value) (PQ20RX11)**



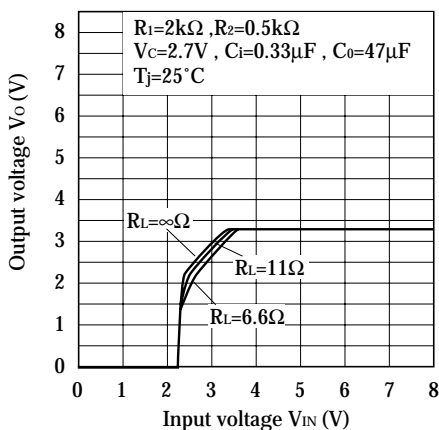
**Fig. 7 Output Voltage Adjustment Characteristics**



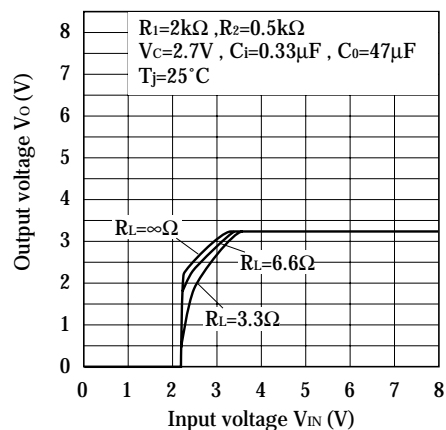
**Fig. 8 Reference Voltage Deviation vs. Junction Temperature (Typical Value)**



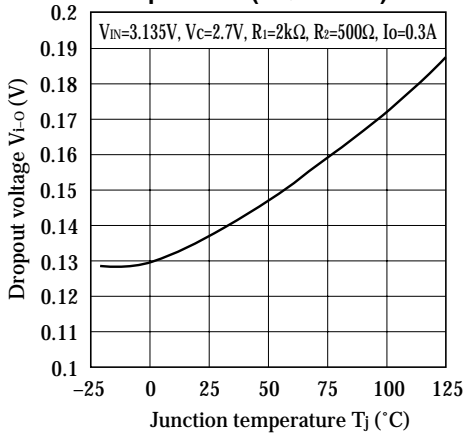
**Fig. 9 Output Voltage vs. Input Voltage (PQ20RX05)**



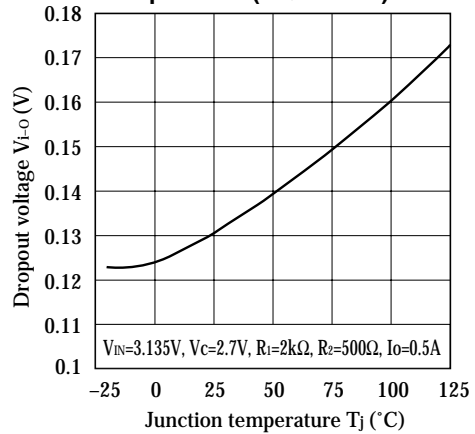
**Fig.10 Output Voltage vs. Input Voltage (PQ20RX11)**



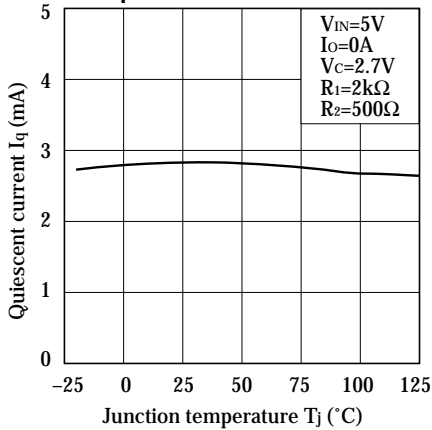
**Fig.11 Dropout Voltage vs. Junction Temperature (PQ20RX05)**



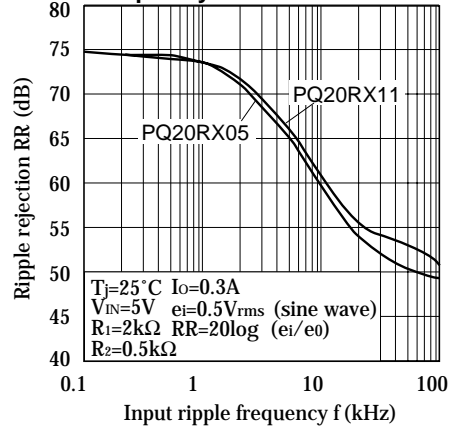
**Fig.12 Dropout Voltage vs. Junction Temperature (PQ20RX11)**



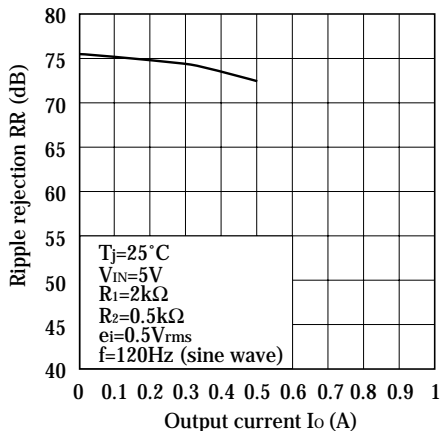
**Fig.13 Quiescent Current vs. Junction Temperature**



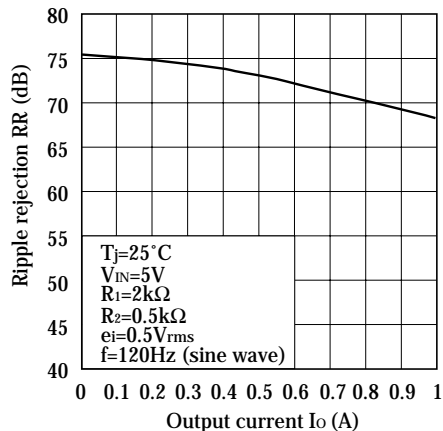
**Fig.14 Ripple Rejection vs. Input Ripple Frequency**



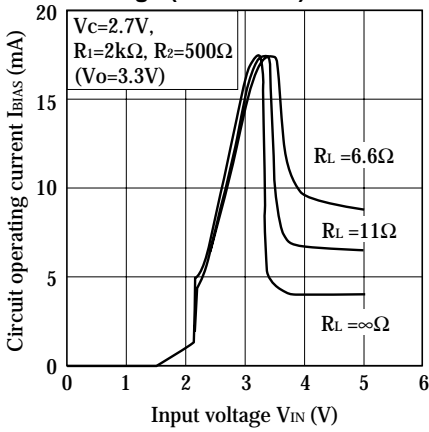
**Fig.15 Ripple Rejection vs. Output Current (PQ20RX05)**



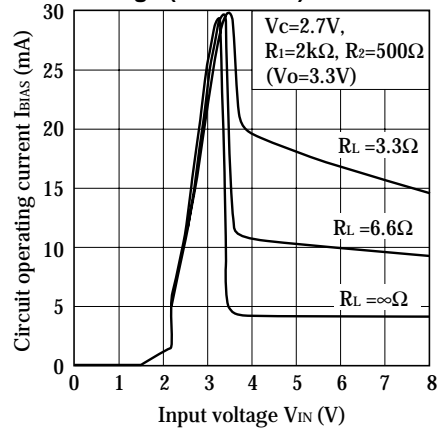
**Fig.16 Ripple Rejection vs. Output Current (PQ20RX11)**



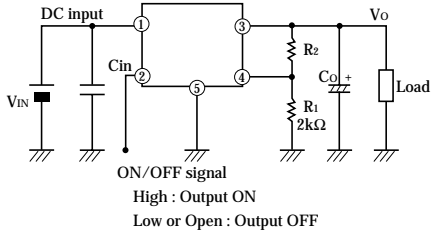
**Fig.17 Circuit Operating Current vs. Input Voltage (PQ20RX05)**



**Fig.18 Circuit Operating Current vs. Input Voltage (PQ20RX11)**



**Typical Application**



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