

# PQ20RX05/PQ20RX11

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

## Features

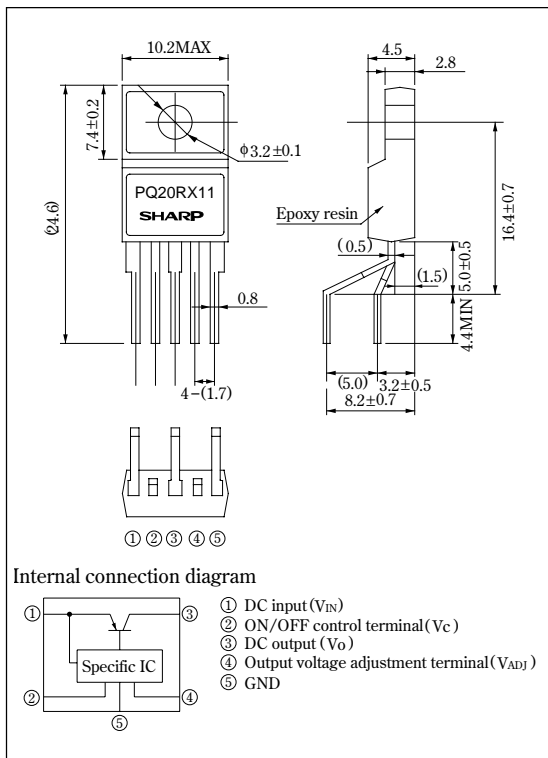
- Low power-loss  
(Dropout voltage: MAX. 0.5V)
- Compact resin full mold package  
(Equivalent to TO-220)
- With built-in ON/OFF control function
- Variable output voltage (setting range: 3.0 to 20V)
- 0.5A output (PQ20RX05)  
1.0A output (PQ20RX11)
- Reference voltage precision:  $\pm 2.5\%$
- With 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,  $V_{IN}=5V$ ,  $V_O=3.3V$ , \*4,  $R_1=2k\Omega$ ,  $R_2=500\Omega$ ,  $V_C=2.7V$ ,  $T_a=25^\circ C$ )

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	$RegL$	*5	—	—	2.0	%
Line regulation	$RegI$	$V_{IN}=4$ 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	$V_{iO}$	*4, *6	—	—	0.5	V
Quiescent current	$I_q$	$I_o=0A$	—	—	8	mA
*7 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	$\mu A$

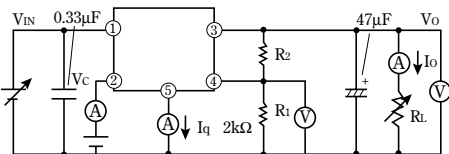
\*4 PQ20RX05:  $I_o=0.3A$ , PQ20RX11:  $I_o=0.5A$

\*5 PQ20RX05:  $I_o=5mA$  to  $0.5A$ , PQ20RX11:  $I_o=5mA$  to  $1.0A$

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

\*7 In case of opening ON/OFF control terminalⓂ, output voltage turns off.

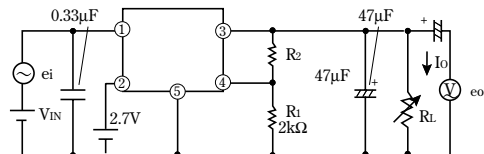
**Fig. 1 Test Circuit**



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

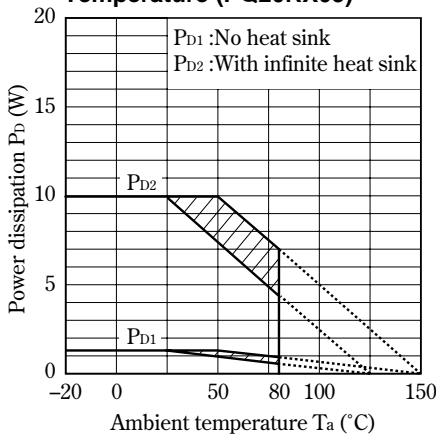
[ $R_1=2k\Omega$ ,  $V_{ref}$  Nearly=2.64V]

**Fig. 2 Test Circuit of Ripple Rejection**



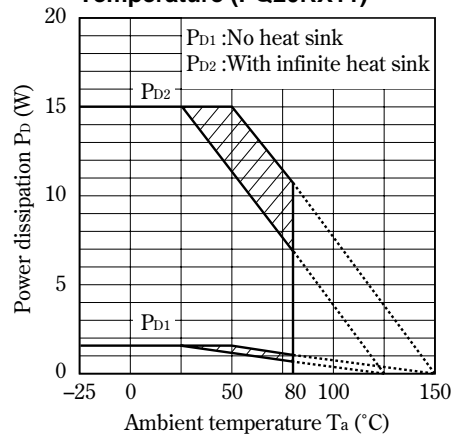
$f=120Hz$  (sine wave)  
 $e_i(rms)=0.5V$   
 $I_o=0.3A$   
 $RR=20 \log(e_i(rms)/e_o(rms))$   
 $V_{IN}=5V$   
 $V_O=3.3V$  ( $R_1=2k\Omega$ )

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



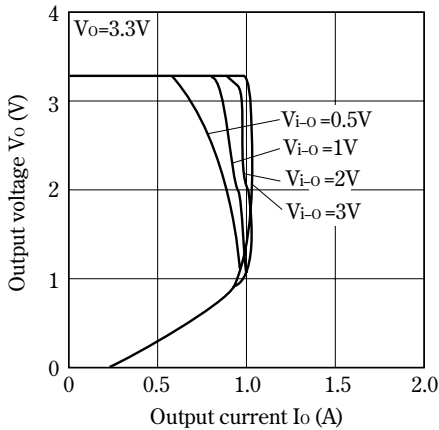
Note) Oblique line portion : Overheat protection may operate in this area.

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

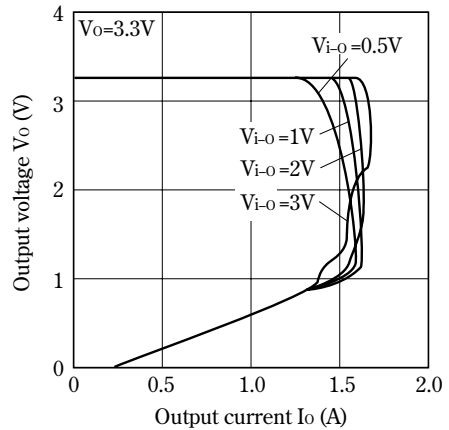


Note) Oblique line portion : Overheat protection may operate in this area.

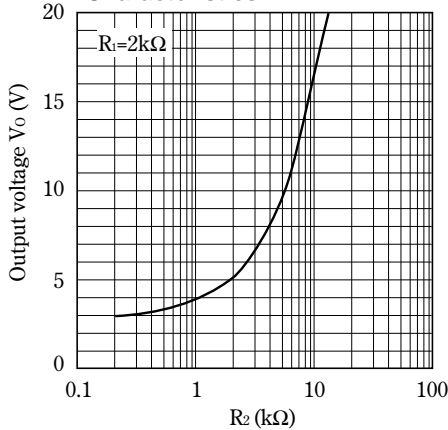
**Fig. 5 Overcurrent Protection Characteristics (Typical Value) (PQ20RX05)**



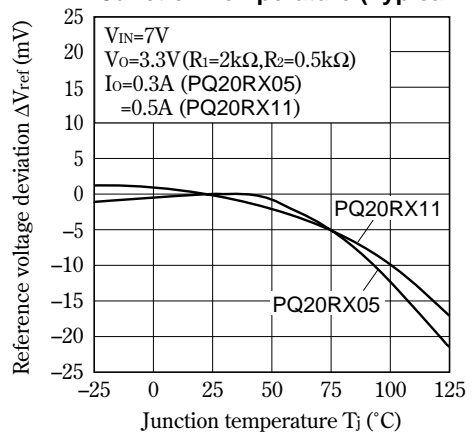
**Fig. 6 Overcurrent Protection Characteristics (Typical Value) (PQ20RX11)**



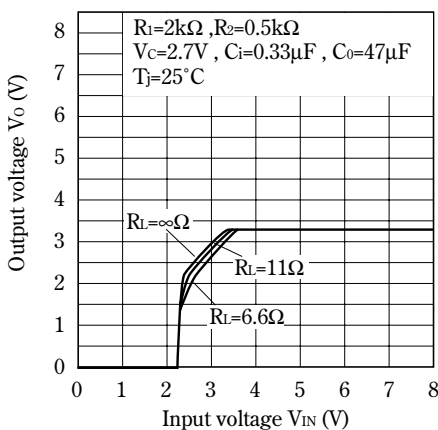
**Fig. 7 Output Voltage Adjustment Characteristics**



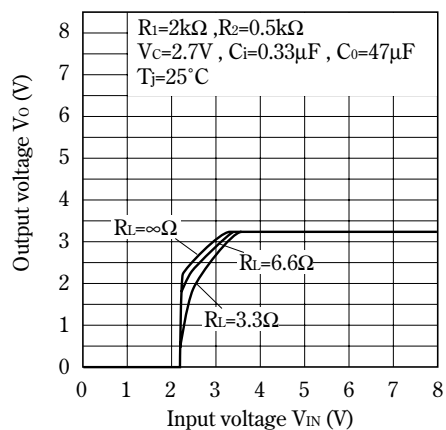
**Fig. 8 Reference Voltage Deviation vs. Junction Temperature (Typical Value)**



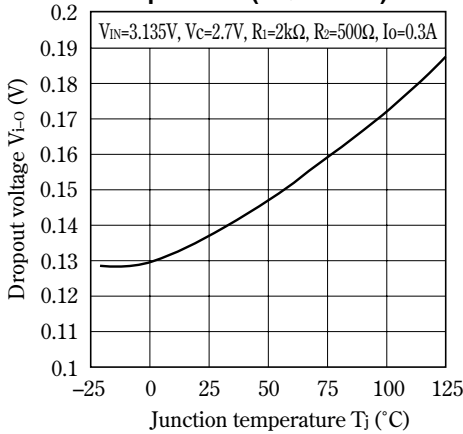
**Fig. 9 Output Voltage vs. Input Voltage (PQ20RX05)**



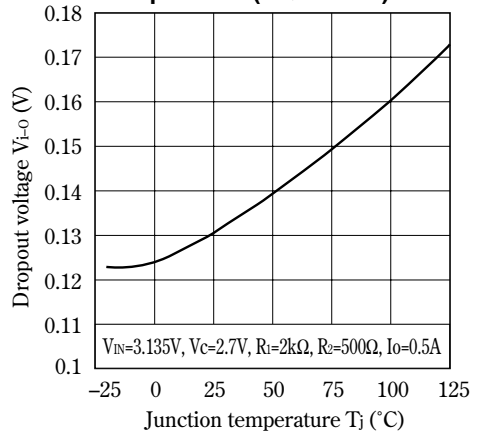
**Fig.10 Output Voltage vs. Input Voltage (PQ20RX11)**



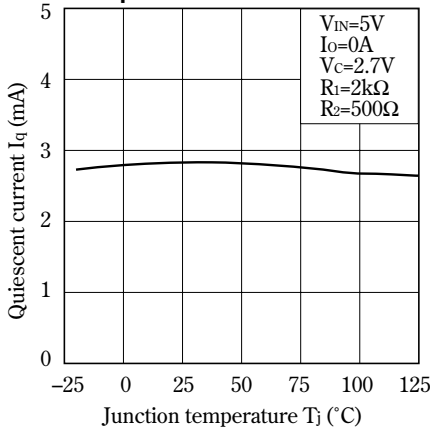
**Fig.11 Dropout Voltage vs. Junction Temperature (PQ20RX05)**



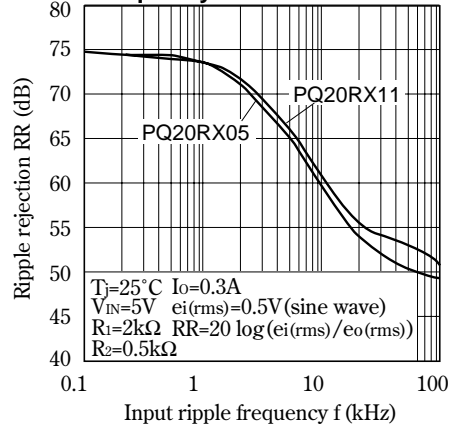
**Fig.12 Dropout Voltage vs. Junction Temperature (PQ20RX11)**



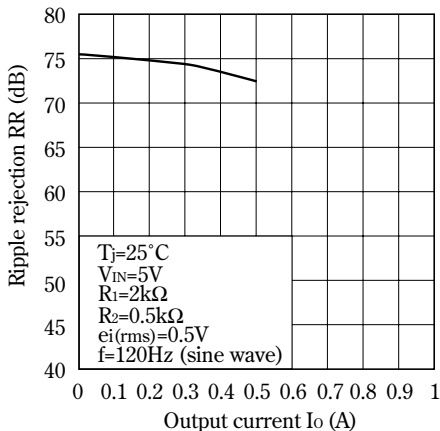
**Fig.13 Quiescent Current vs. Junction Temperature**



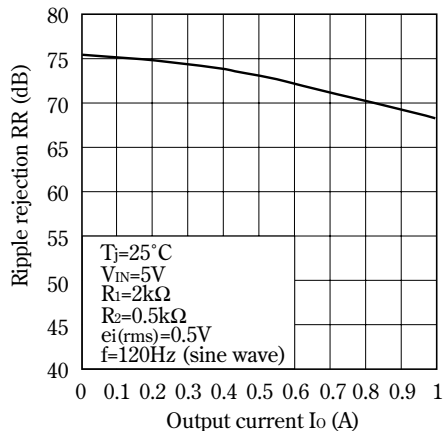
**Fig.14 Ripple Rejection vs. Input Ripple Frequency**



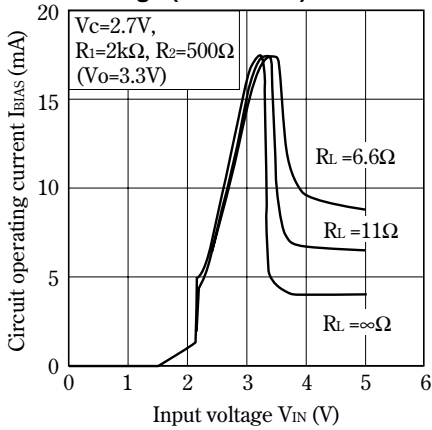
**Fig.15 Ripple Rejection vs. Output Current (PQ20RX05)**



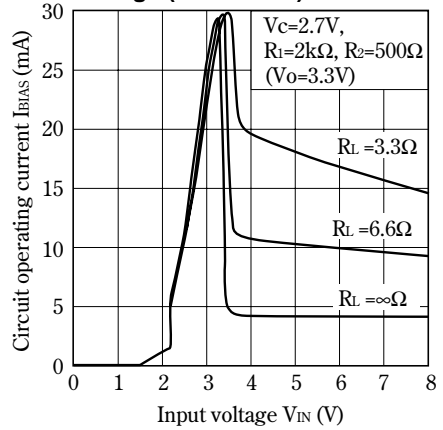
**Fig.16 Ripple Rejection vs. Output Current (PQ20RX11)**



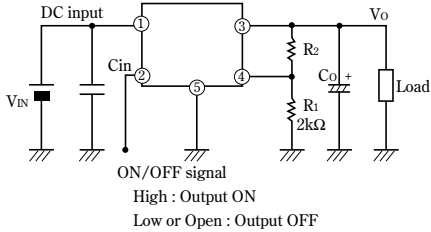
**Fig.17 Circuit Operating Current vs. Input Voltage (PQ20RX05)**



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



**Typical Application**



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