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PQ20RX05/PQ20RX11

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

Features

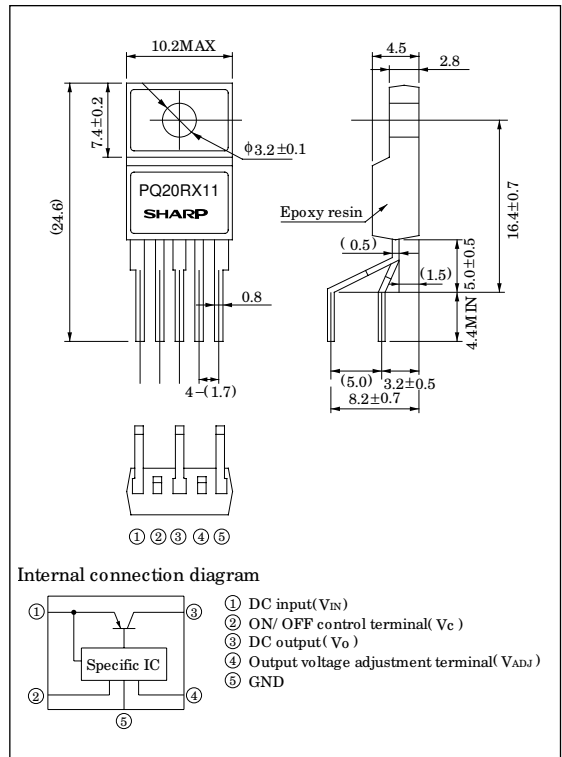
- Low power-loss
(Dropout voltage: MAX. 0.5V)
- Compact resin full mold package
(Equivalent to TO-220)
- With built-in ON/ OFF control function
- Variable output voltage (setting range:3.0 to 20V)
- 0.5A output (PQ20RX05)
1.0A output (PQ20RX11)
- Reference voltage precision: $\pm 2.5\%$
- With built-in 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 $125 \leq T_j \leq 150^\circ\text{C}$.

• Please refer to the chapter " Handling Precautions ".

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Electrical Characteristics

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

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}	*5	—	—	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 $125^\circ C$, $I_o=5mA$	—	± 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	μA
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	μA
Output OFF-state consumption current	I_{qs}	$V_C=0.4V$	—	—	5.0	μA

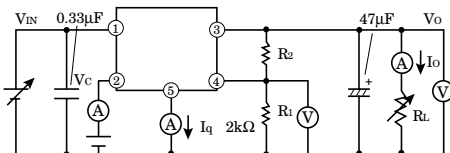
*4 PQ20RX05: $I_o=0.3A$, PQ20RX11: $I_o=0.5A$

*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.

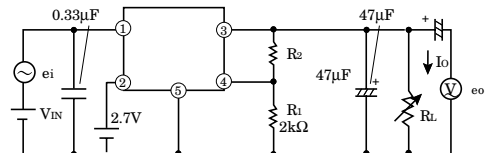
Fig. 1 Test Circuit



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

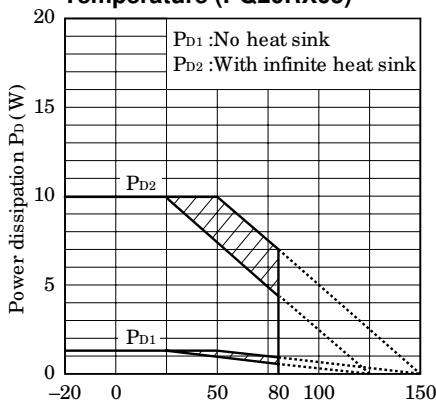
[$R_1=2k\Omega$, V_{ref} Nearly = 2.64V]

Fig. 2 Test Circuit of Ripple Rejection



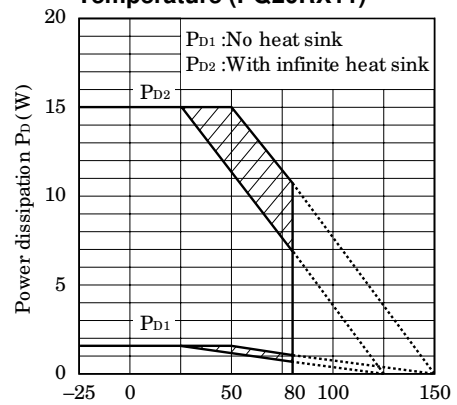
$f=120Hz$ (sine wave)
 $e_i=0.5V_{rms}$
 $I_o=0.3A$
 $RR=20 \log(e_i/e_o)$
 $V_{IN}=5V$
 $V_O=3.3V(R_1=2k\Omega)$

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)

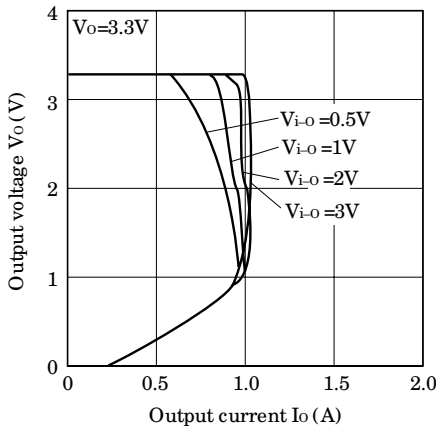


Fig. 6 Overcurrent Protection Characteristics (Typical Value) (PQ20RX11)

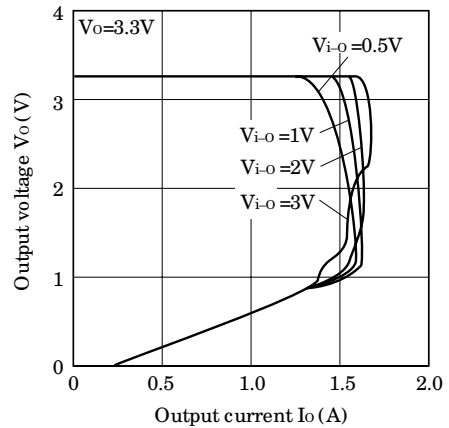


Fig. 7 Output Voltage Adjustment Characteristics

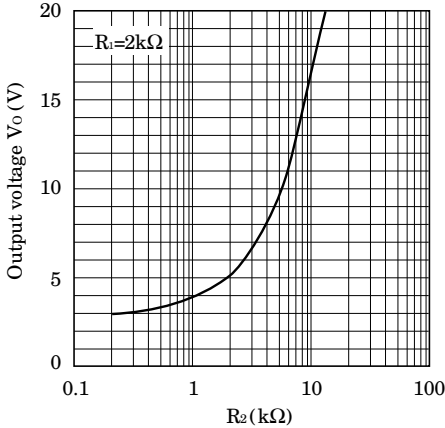


Fig. 8 Reference Voltage Deviation vs. Junction Temperature (Typical Value)

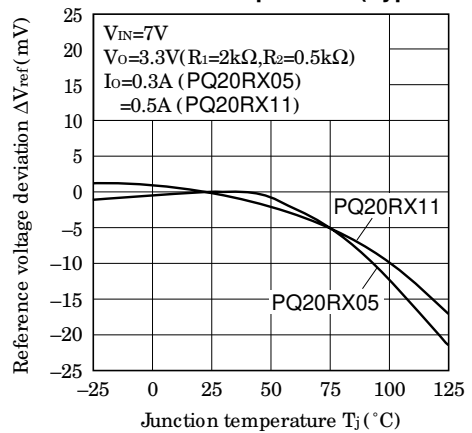


Fig. 9 Output Voltage vs. Input Voltage (PQ20RX05)

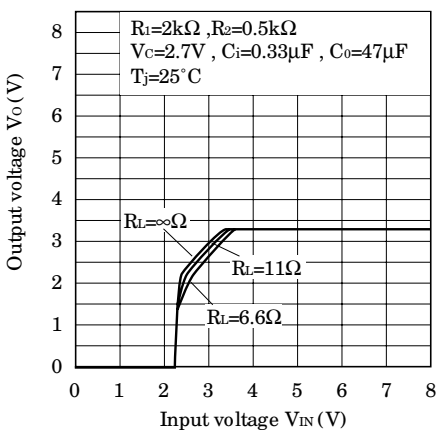


Fig.10 Output Voltage vs. Input Voltage (PQ20RX11)

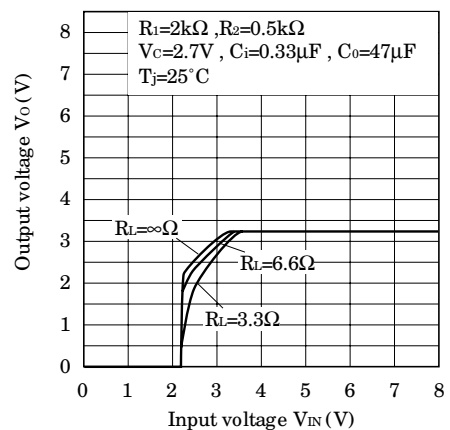


Fig.11 Dropout Voltage vs. Junction Temperature (PQ20RX05)

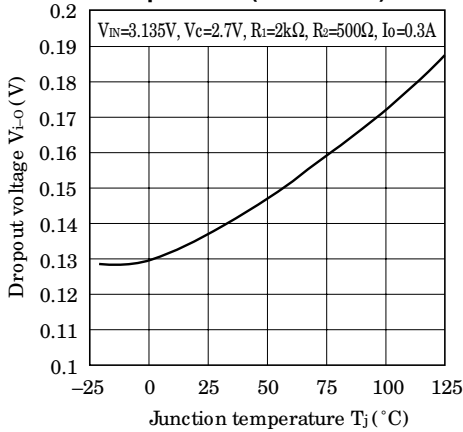


Fig.12 Dropout Voltage vs. Junction Temperature (PQ20RX11)

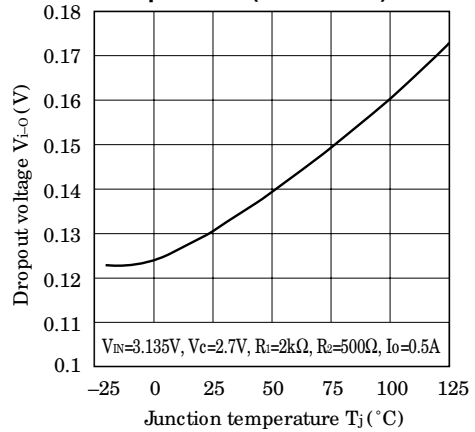


Fig.13 Quiescent Current vs. Junction Temperature

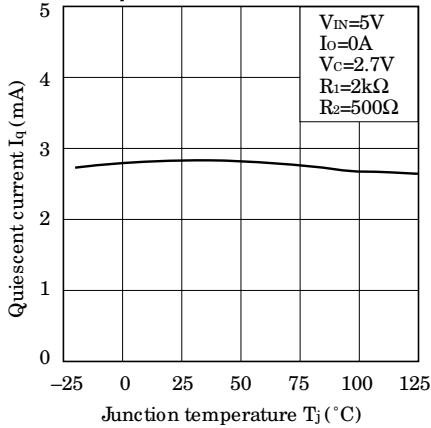


Fig.14 Ripple Rejection vs. Input Ripple Frequency

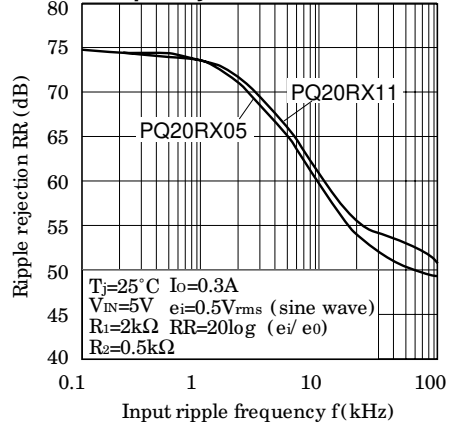


Fig.15 Ripple Rejection vs. Output Current (PQ20RX05)

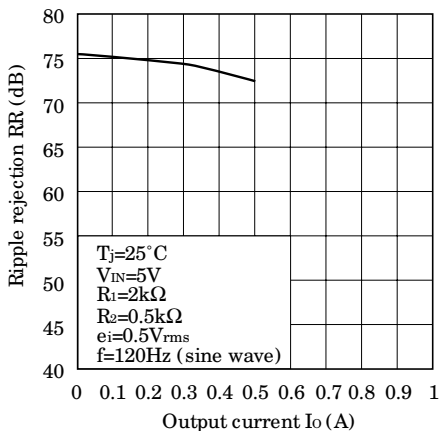


Fig.16 Ripple Rejection vs. Output Current (PQ20RX11)

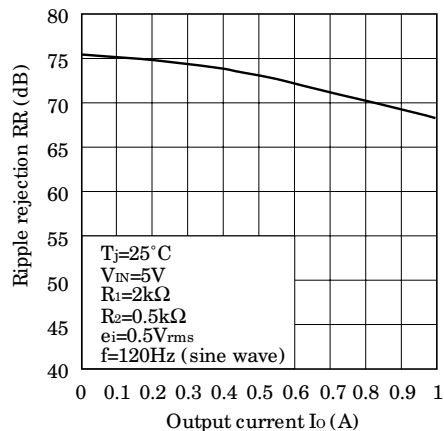


Fig.17 Circuit Operating Current vs. Input Voltage (PQ20RX05)

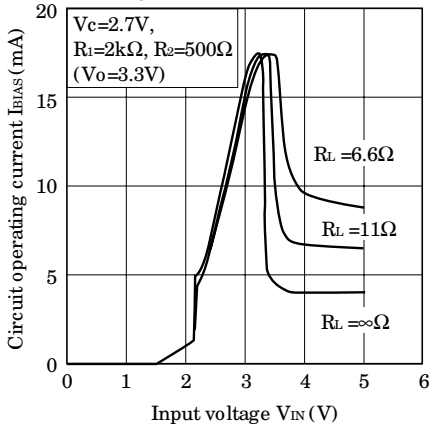
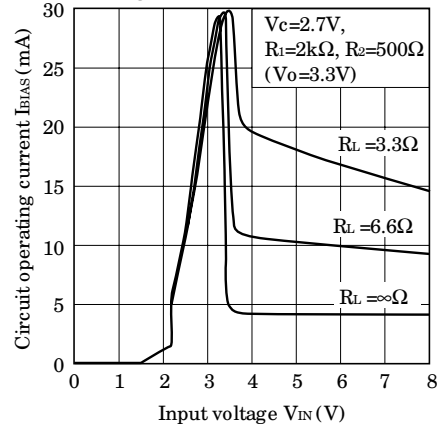
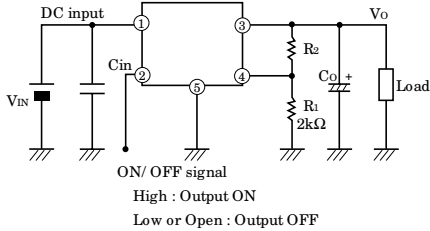


Fig.18 Circuit Operating Current vs. Input Voltage (PQ20RX11)



Typical Application



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