

PQ05RD21 Series/PQ3RD23

2.0A Output Type Low Power-Loss Voltage Regulator

Features

- Low power-loss (Dropout voltage: MAX 0.5V at $I_o=2.0A$)
- 2.0A output type
- Compact resin package (equivalent to TO-220)
- Available 3.3V/5V/9V/12V output type
- Output voltage precision: $\pm 3.0\%$
- Built-in ON/OFF control function
- Built in overcurrent, overheat protection functions, ASO protection circuit.
- Lead forming type is also available.

Applications

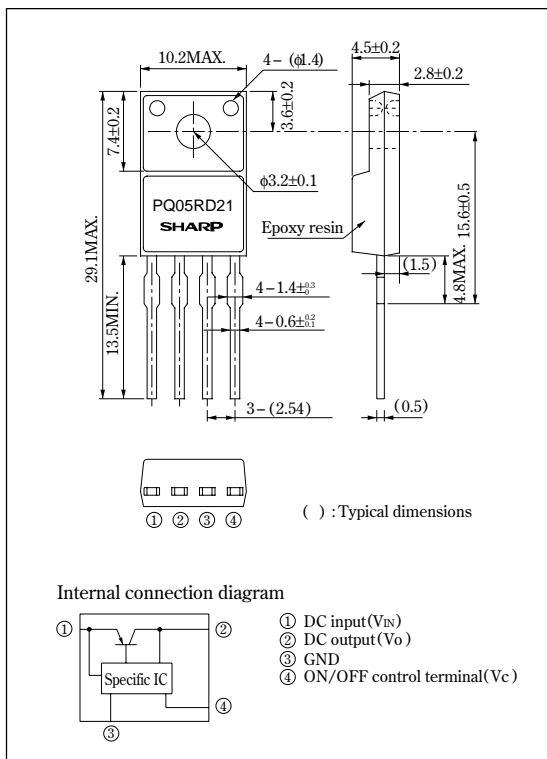
- Power supplies for various electronic equipment such as AV, OA equipment

Model Line-ups

	2.0A output
3.3V output	PQ3RD23
5.0V output	PQ05RD21
9.0V output	PQ09RD21
12.0V output	PQ12RD21

Outline Dimensions

(Unit : mm)



($T_a=25^\circ C$)

Parameter	Symbol	Rating	Unit
*1 Input voltage	V_{IN}	20	V
*1 ON/OFF control terminal voltage	V_c	20	V
Output current	I_o	2.0	A
	P_{D1}	1.4	W
*2 Power dissipation	P_{D2}	15	W
	T_j	150	$^\circ C$
*3 Junction temperature	T_{opr}	-20 to +80	$^\circ C$
Operating temperature	T_{stg}	-40 to +150	$^\circ C$
Storage temperature	T_{sol}	260 (For 10s)	$^\circ C$
Soldering temperature			

*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 $125 \leq T_j \leq 150^\circ C$.

• Please refer to the chapter " Handling Precautions ".

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Electrical Characteristics

(Unless otherwise specified, $I_o=1.0A$, #4, $T_a=25^\circ C$)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	
Output voltage	V_o	#4	PQ3RD23	3.201	3.3	3.399	V
			PQ05RD21	4.85	5.0	5.15	
			PQ09RD21	8.73	9.0	9.27	
			PQ12RD21	11.64	12.0	12.36	
Load regulation	$RegL$	$I_o=5mA$ to $2.0A$, #4	—	0.1	2.0	%	
Line regulation	$RegI$	#5, $I_o=5mA$	PQ3RD23	—	0.1	2.5	%
			PQ05RD21 series	—	0.5	2.5	
Temperature coefficient of output voltage	TcV_o	$T_j=0$ to $125^\circ C$, $I_o=5mA$	—	± 0.02	—	%/ $^\circ C$	
Ripple rejection	RR	Refer to Fig.2	45	55	—	dB	
Dropout voltage	V_{i-o}	#6, $I_o=2A$	—	—	0.5	V	
#7 ON-state voltage for control	$V_{C(ON)}$	#4	2.0	—	—	V	
ON-state current for control	$I_{C(ON)}$	$V_C=2.7V$, #4	—	—	20	μA	
OFF-state voltage for control	$V_{C(OFF)}$	#4	—	—	0.8	V	
OFF-state current for control	$I_{C(OFF)}$	$V_C=0.4V$, #4	—	—	-0.4	mA	
Quiescent current	I_q	$I_o=0A$, #4	—	—	10	mA	

#4 PQ3RD23: $V_{IN}=5V$, PQ05RD21: $V_{IN}=7V$, PQ09RD21: $V_{IN}=11V$, PQ12RD21: $V_{IN}=14V$

#5 PQ3RD23: $V_{IN}=4$ to $10V$, PQ05RD21: $V_{IN}=6$ to $12V$, PQ09RD21: $V_{IN}=10$ to $16V$, PQ12RD21: $V_{IN}=13$ to $19V$

#6 Input voltage shall be the value when output voltage is 95% in comparison with the initial value. PQ3RD23: $V_{IN}=3.7V$

#7 In case of opening control terminal ④, output voltage turns on.

Fig. 1 Test Circuit

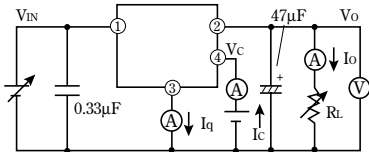
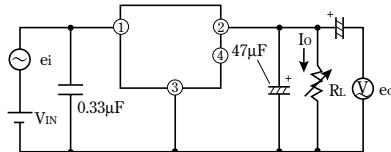
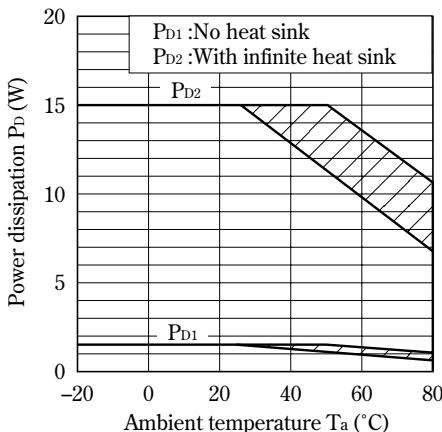


Fig. 2 Test Circuit of Ripple Rejection



$f=120Hz$ (sine wave)
 $e_i(rms)=0.5V$
 $V_{IN}=5V$ (PQ3RD23)
 $7V$ (PQ05RD21)
 $11V$ (PQ09RD21)
 $14V$ (PQ12RD21)
 $I_o=0.5A$
 $RR=20 \log (e_i(rms)/e_o(rms))$

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) (PQ3RD23)

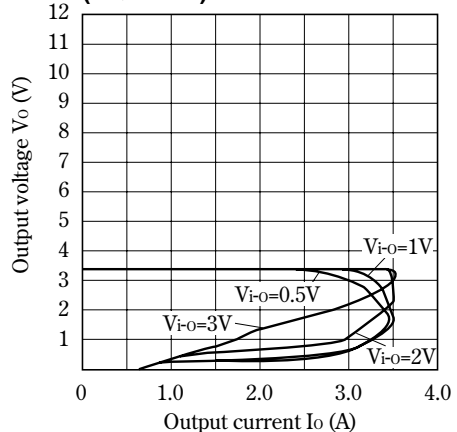


Fig. 5 Overcurrent Protection Characteristics (Typical Value) (PQ05RD21)

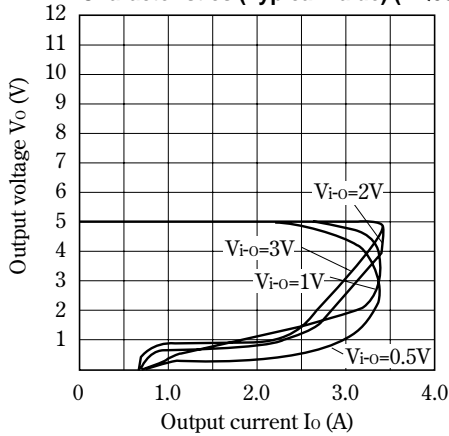


Fig. 6 Overcurrent Protection Characteristics (Typical Value) (PQ09RD21)

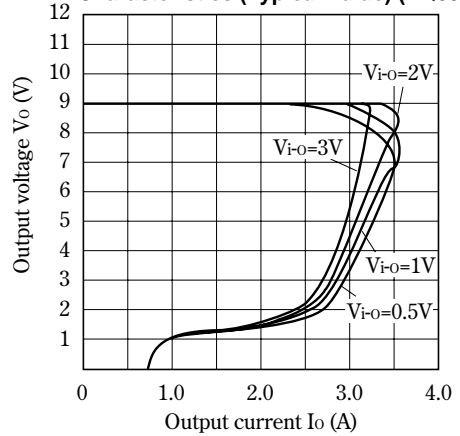


Fig. 7 Overcurrent Protection Characteristics (Typical Value) (PQ12RD21)

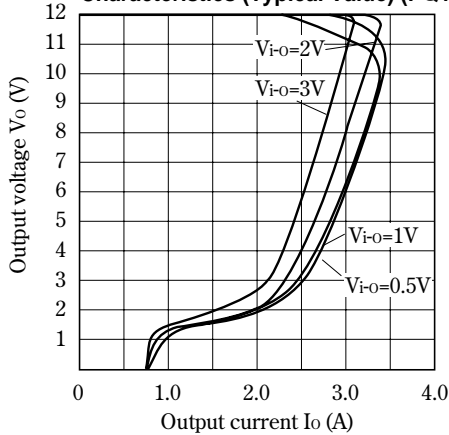


Fig. 8 Output Voltage Deviation vs. Junction Temperature (PQ3RD23)

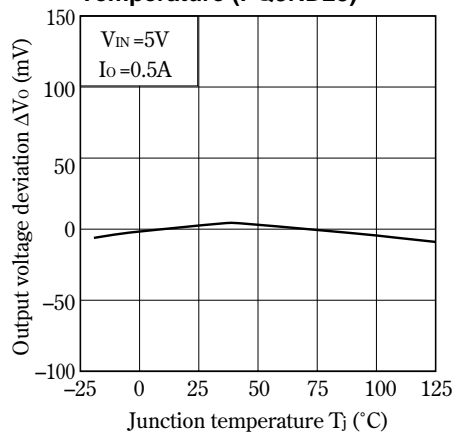


Fig. 9 Output Voltage Deviation vs. Junction Temperature (PQ05RD21)

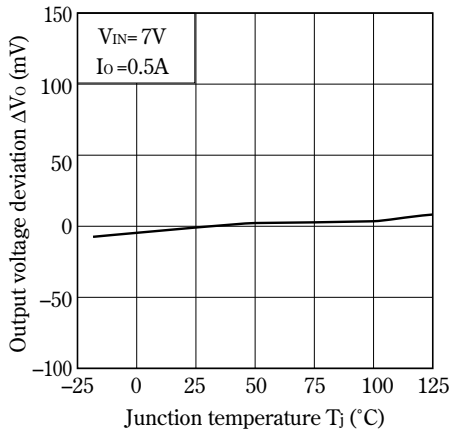


Fig.10 Output Voltage Deviation vs. Junction Temperature (PQ09RD21)

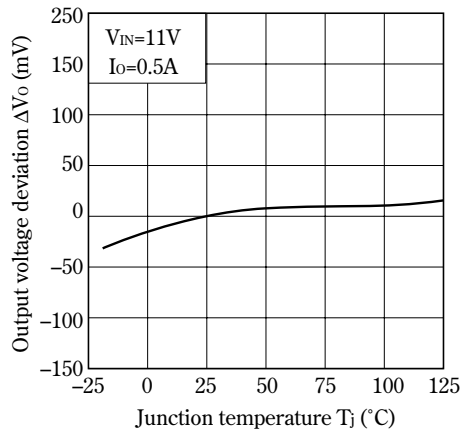


Fig.11 Output Voltage Deviation vs. Junction Temperature (PQ12RD21)

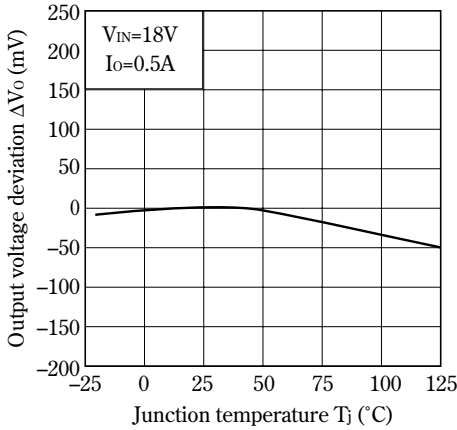


Fig.12 Output Voltage vs. Input Voltage (PQ3RD23)

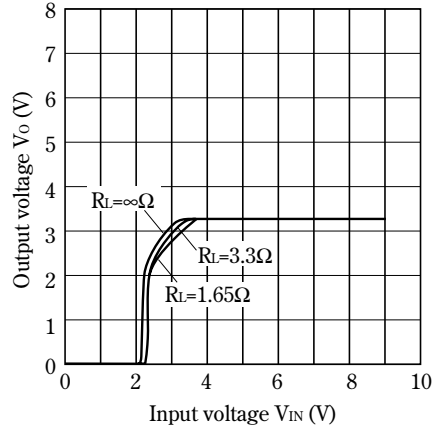


Fig.13 Output Voltage vs. Input Voltage (PQ05RD21)

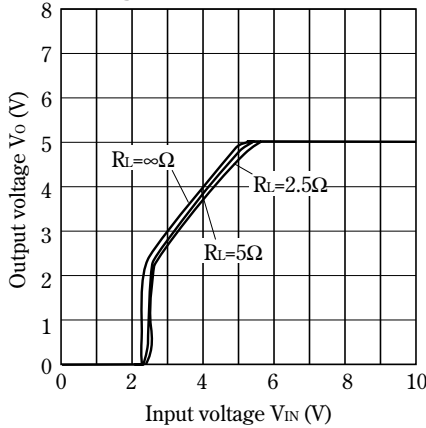


Fig.14 Output Voltage vs. Input Voltage (PQ09RD21)

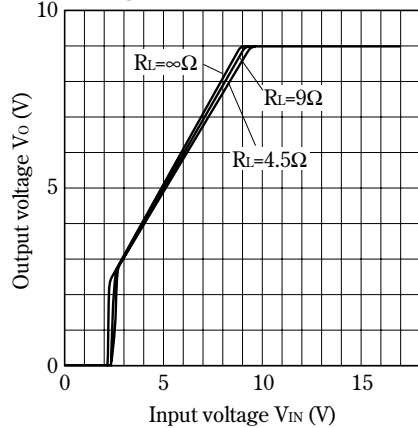


Fig.15 Output Voltage vs. Input Voltage (PQ12RD21)

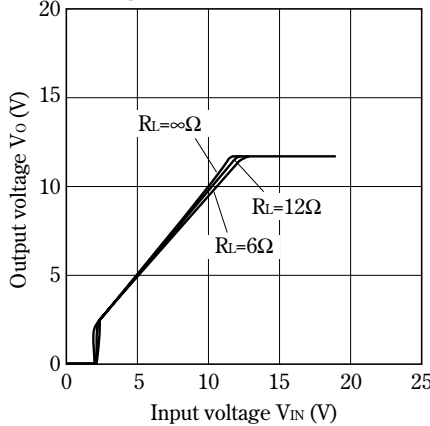


Fig.16 Circuit Operating Current vs. Input Voltage (PQ3RD23)

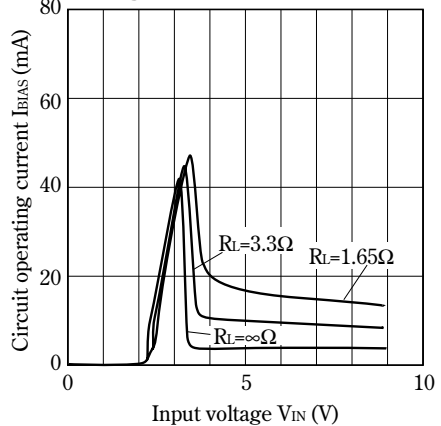


Fig.17 Circuit Operating Current vs. Input Voltage (PQ05RD21)

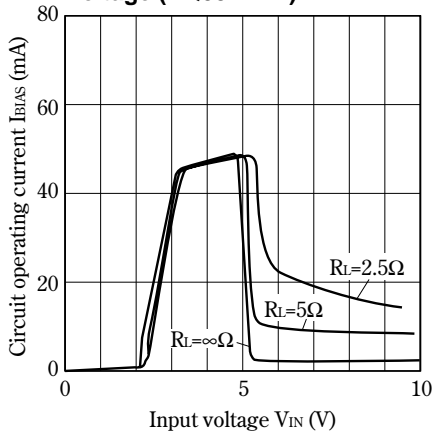


Fig.18 Circuit Operating Current vs. Input Voltage (PQ09RD21)

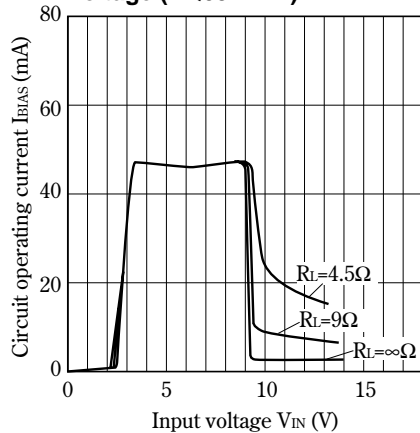


Fig.19 Circuit Operating Current vs. Input Voltage (PQ12RD21)

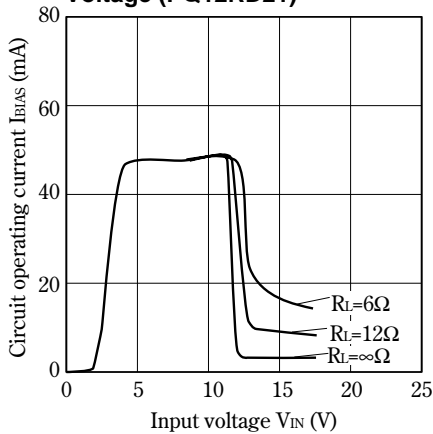


Fig.20 Dropout Voltage vs. Junction Temperature

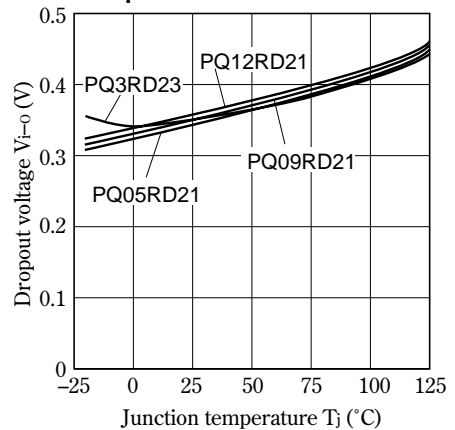


Fig.21 Quiescent Current vs. Junction Temperature

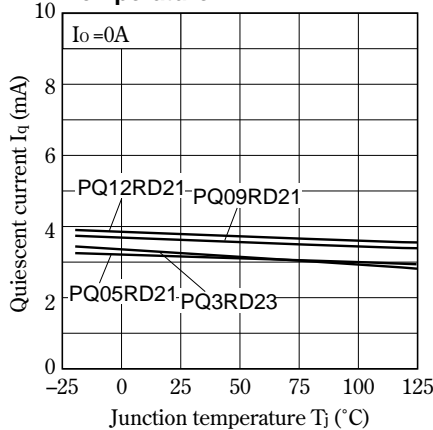
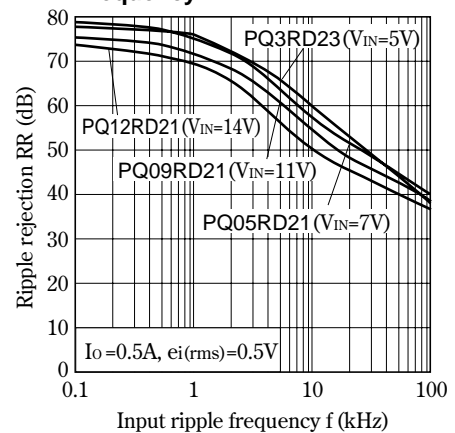
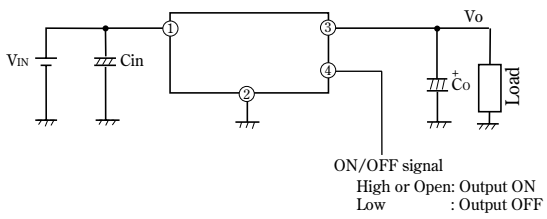


Fig.22 Ripple Rejection vs. Input Ripple Frequency



■ ON/OFF Operation



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