PQ05RD21 Series/PQ3RD23

2.0A Output Type Low Power-Loss Voltage Regulator

■ Features

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

■ Applications

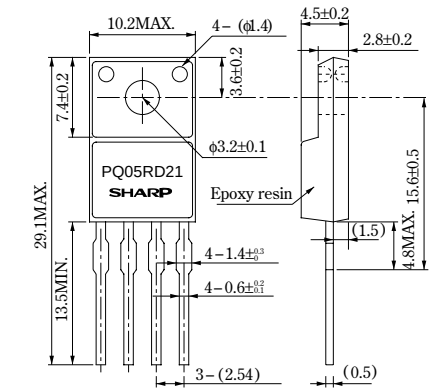
- Power supplies for various electronic equipment such as AV, OA equipment

■ Model Line-ups

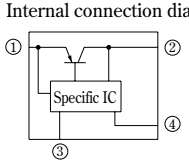
	2.0A output
3.3V output	PQ3RD23
5.0V output	PQ05RD21
9.0V output	PQ09RD21
12.0V output	PQ12RD21

■ Outline Dimensions

(Unit : mm)



Internal connection diagram



① DC input(V_{IN})
② DC output(Vo)
③ GND
④ ON/OFF control terminal(Vc)

(T_a=25˚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
※2 Power dissipation	P_{D1}	1.4	W
	P_{D2}	15	W
※3 Junction temperature	T_j	150	˚C
Operating temperature	T_{opr}	–20 to +80	˚C
Storage temperature	T_{stg}	–40 to +150	˚C
Soldering temperature	T_{sol}	260 (For 10s)	˚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<=Tj<=150˚C.

• Please refer to the chapter " Handling Precautions ".

■ Electrical Characteristics

(Unless otherwise specified, I_O=1.0A, ※4, T_a=25°C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output voltage	PQ3RD23	V_O	※4	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		$R_{eg}L$	I_O=5mA to 2.0A, ※4	—	0.1	2.0	%
Line regulation	PQ3RD23	$R_{eg}I$	※5, I_O=5mA	—	0.1	2.5	%
	PQ05RD21 series			—	0.5	2.5	
Temperature coefficient of output voltage		T_CV_O	Tj=0 to 125°C, I_O=5mA	—	±0.02	—	%/°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 teminal④, output voltage turns on.

Fig. 1 Test Circuit

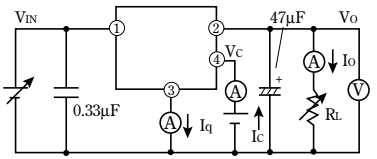
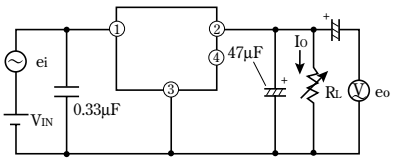
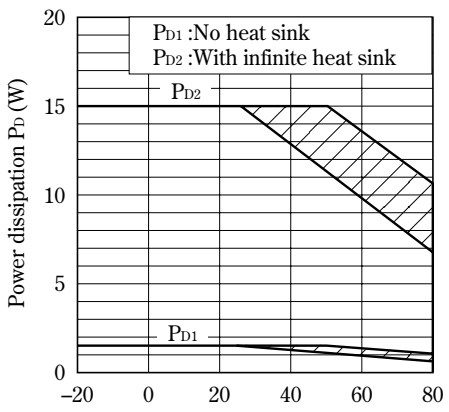


Fig. 2 Test Circuit of Ripple Rejection



f=120Hz (sine wave)
ei(rms)=0.5V
V_{IN}=5V (PQ3RD23)
7V (PQ05RD21)
11V (PQ09RD21)
14V (PQ12RD21)
I_O=0.5A
RR=20 log (ei(rms)/eo(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)

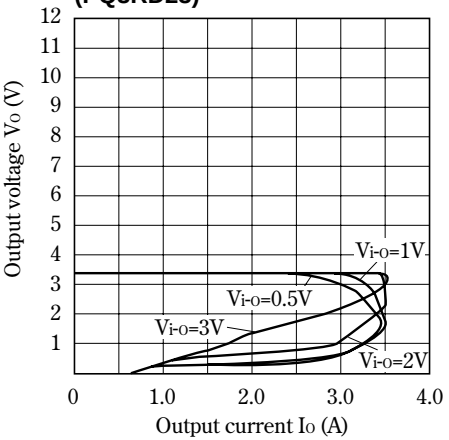


Fig. 5 Overcurrent Protection Characteristics (Typical Value) (PQ05RD21)

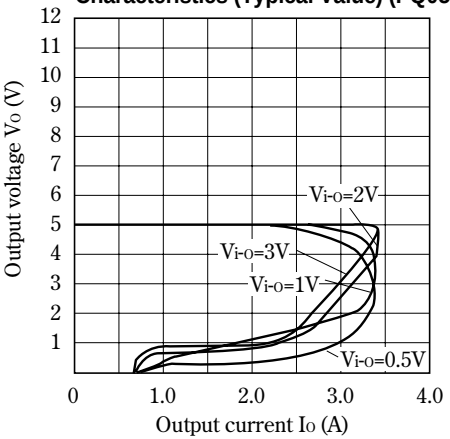


Fig. 6 Overcurrent Protection Characteristics (Typical Value) (PQ09RD21)

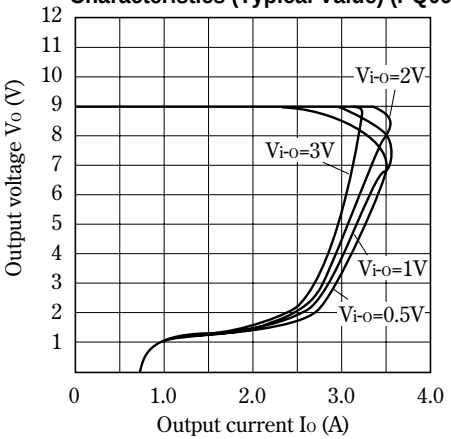


Fig. 7 Overcurrent Protection Characteristics (Typical Value) (PQ12RD21)

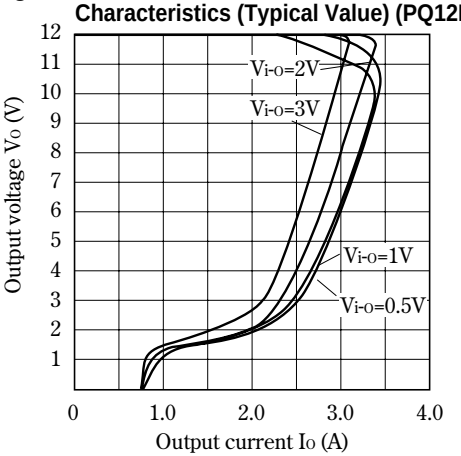


Fig. 8 Output Voltage Deviation vs. Junction Temperature (PQ3RD23)

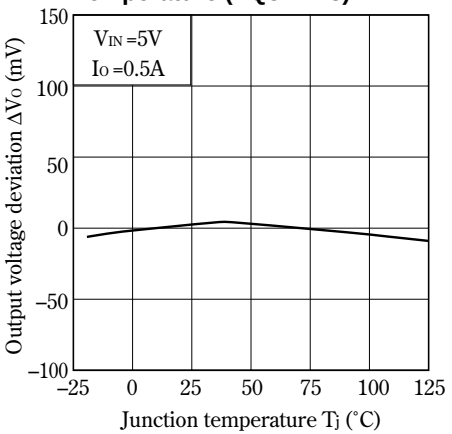


Fig. 9 Output Voltage Deviation vs. Junction Temperature (PQ05RD21)

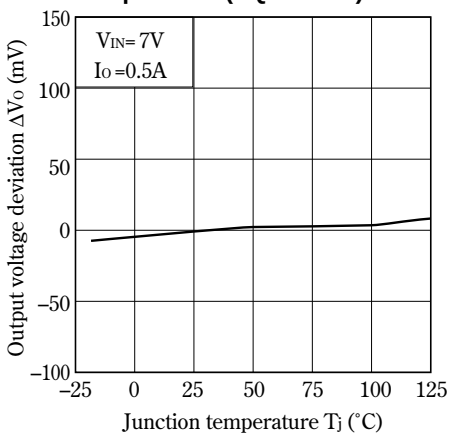


Fig.10 Output Voltage Deviation vs. Junction Temperature (PQ09RD21)

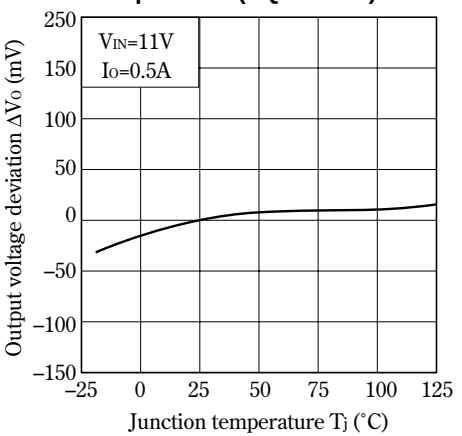


Fig.11 Output Voltage Deviation vs. Junction Temperature (PQ12RD21)

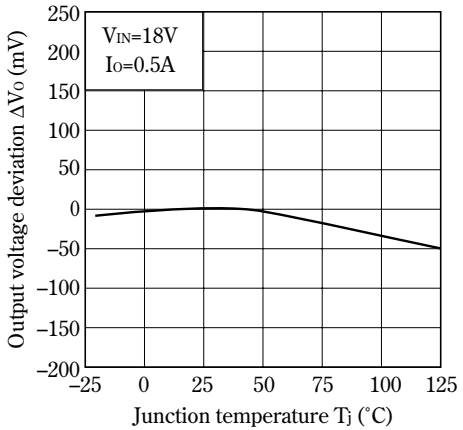


Fig.12 Output Voltage vs. Input Voltage (PQ3RD23)

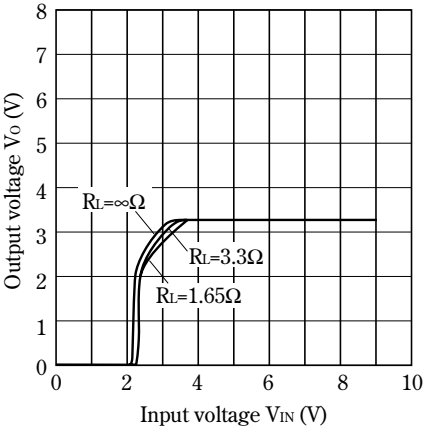


Fig.13 Output Voltage vs. Input Voltage (PQ05RD21)

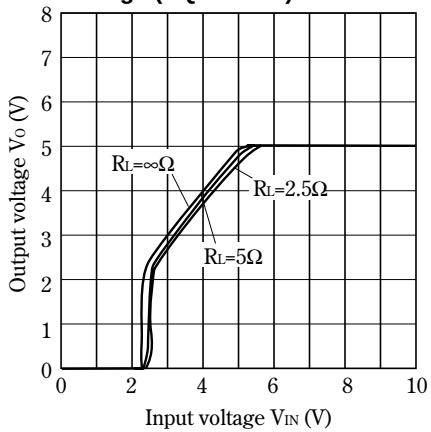


Fig.14 Output Voltage vs. Input Voltage (PQ09RD21)

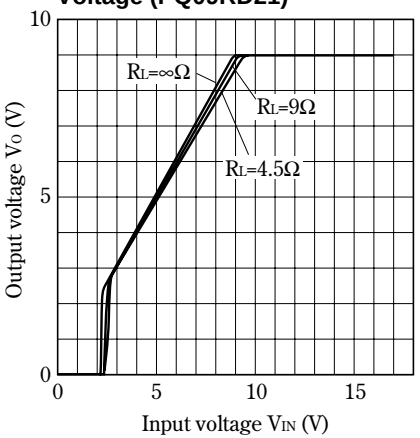


Fig.15 Output Voltage vs. Input Voltage (PQ12RD21)

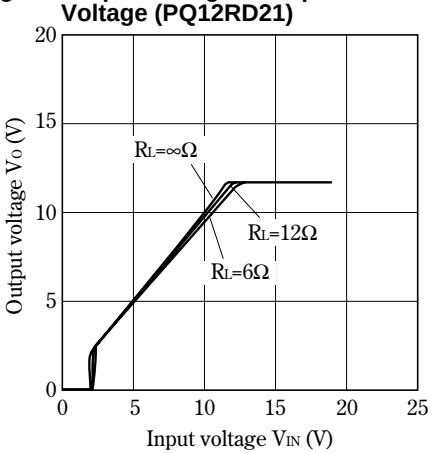


Fig.16 Circuit Operating Current vs. Input Voltage (PQ3RD23)

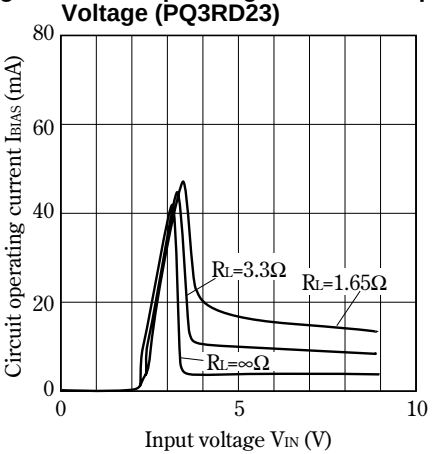


Fig.17 Circuit Operating Current vs. Input Voltage (PQ05RD21)

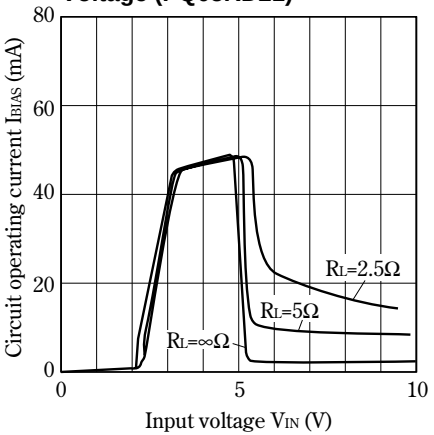


Fig.18 Circuit Operating Current vs. Input Voltage (PQ09RD21)

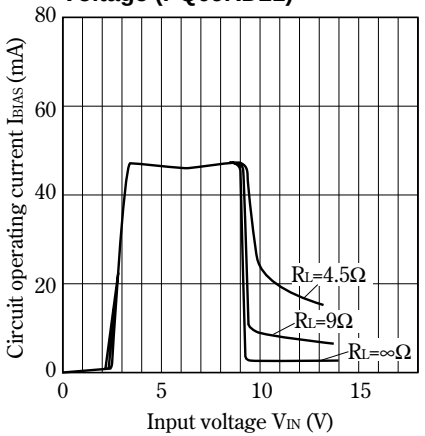


Fig.19 Circuit Operating Current vs. Input Voltage (PQ12RD21)

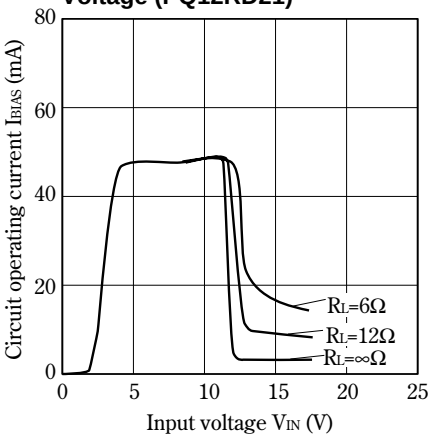


Fig.20 Dropout Voltage vs. Junction Temperature

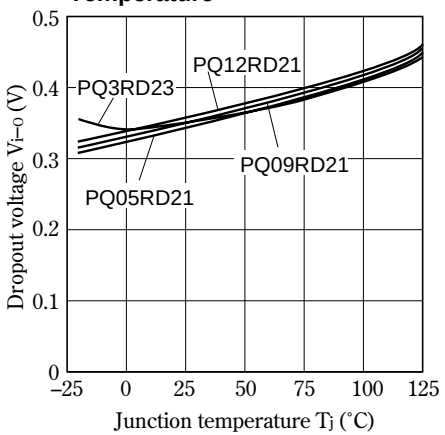


Fig.21 Quiescent Current vs. Junction Temperature

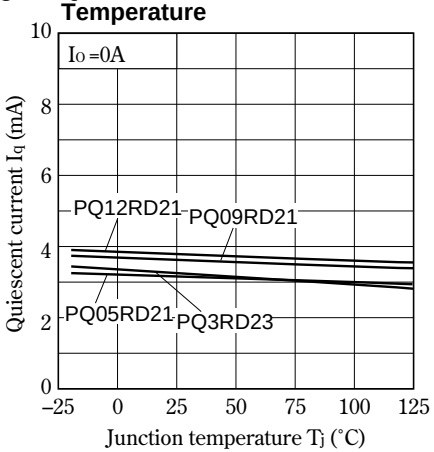
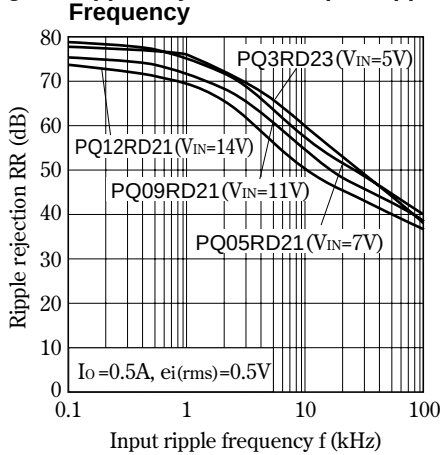
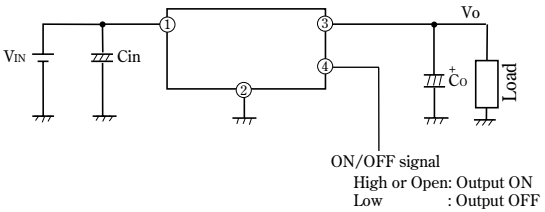


Fig.22 Ripple Rejection vs. Input Ripple Frequency



■ ON/OFF Operation



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  --- Test and measurement equipment
  --- Industrial control
  --- Audio visual equipment
  --- Consumer electronics

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