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PQ05RD11 Series/PQ3RD13

1A Output, General Purpose Low Power-loss Voltage Regulators

■ Features

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

■ Applications

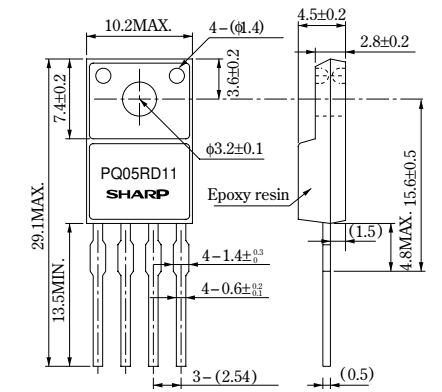
- Power supplies for various electronic equipment such as AV, OA equipment

■ Model Line-ups

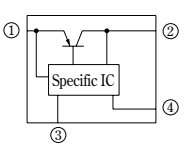
	1.0A output
3.3V output	PQ3RD13
5.0V output	PQ05RD11
9.0V output	PQ09RD11
12.0V output	PQ12RD11

■ Outline Dimensions

(Unit : mm)



Internal connection diagram



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

■ Absolute Maximum Ratings

(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	1.0	A
Power dissipation (No heat sink)	P_{D1}	1.4	W
Power dissipation (With infinite heat sink)	P_{D2}	15	
※2 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 Overheat protection may operate at 125<=T_j<=150°C.

• Please refer to the chapter " Handling Precautions ".

■ Electrical Characteristics

(Unless otherwise specified, conditions shall be I_O=0.5A,※3,T_a=25°C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output voltage	PQ03RD13	V_O	※3	3.201	3.3	3.399	V
	PQ05RD11			4.85	5.0	5.15	
	PQ09RD11			8.73	9.0	9.27	
	PQ12RD11			11.64	12.0	12.36	
Load regulation		$R_{eg}L$	I_O=5mA to 1.0A, ※3	—	0.1	2.0	%
Line regulation	PQ05RD11 Series	$R_{eg}I$	※4 , I_O=5mA	—	0.5	2.5	%
	PQ3RD13			—	0.1	2.5	
Temperature coefficient of output voltage		T_CV_O	T_j=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}	※5	—	—	0.5	V
※6 ON-state voltage for control		$V_{C\ (ON)}$	※3	2.0	—	—	V
ON-state current for control		$I_{C\ (ON)}$	V_C=2.7V, ※3	—	—	20	µA
OFF-state voltage for control		$V_{C\ (OFF)}$	※3	—	—	0.8	V
OFF-state current for control		$I_{C\ (OFF)}$	V_C=0.4V, ※3	—	—	–0.4	mA
Quiescent current		I_q	I_O=0A, ※3	—	—	10	mA

※3 PQ3RD13:V_{IN} =5V, PQ05RD11:V_{IN} =7V, PQ09RD11:V_{IN} =11V, PQ12RD11: V_{IN} =14V

※4 PQ3RD13:V_{IN} = 4 to 10V, PQ05RD11:V_{IN} = 6 to 12V, PQ09RD11:V_{IN} =10 to 16V, PQ12RD11: V_{IN} =13 to 19V

※5 Input voltage shall be the value when output voltage is 95% in comparison with the initial value.

※6 In case of opening control terminal ④, output voltage turns on.

Fig. 1 Test Circuit

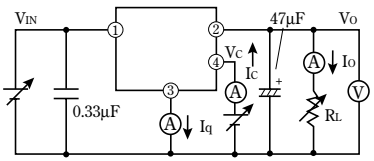
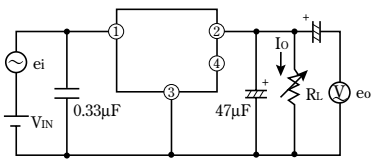
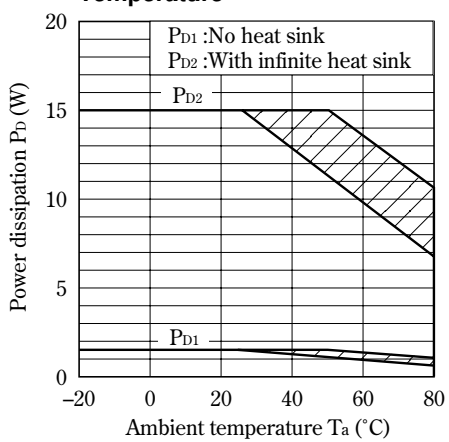


Fig. 2 Test Circuit of Ripple Rejection



f=120Hz (sine wave)
ei(rms)=0.5V
V_{IN}= 5V (PQ3RD13)
V_{IN}= 7V (PQ05RD11)
V_{IN}=11V (PQ09RD11)
V_{IN}=14V (PQ12RD11)
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)(PQ05RD11)

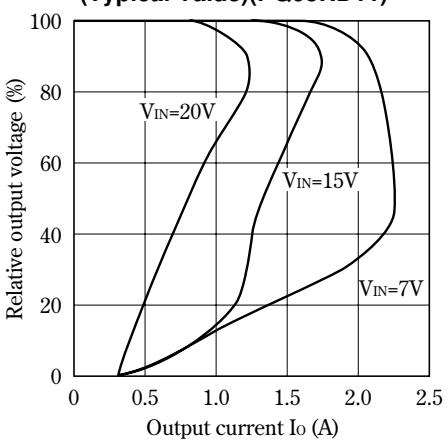


Fig. 5 Overcurrent Protection Characteristics (Typical Value) (PQ09RD11)

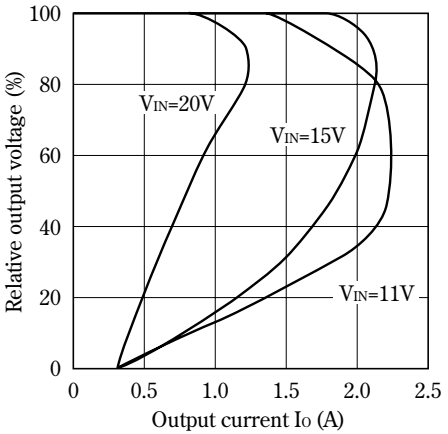


Fig. 6 Overcurrent Protection Characteristics (Typical Value) (PQ12RD11)

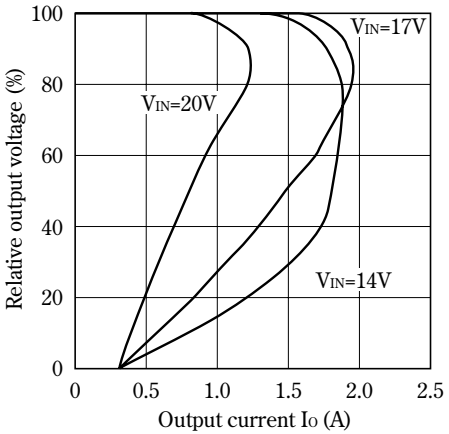


Fig. 7 Overcurrent Protection Characteristics (Typical Value) (PQ3RD13)

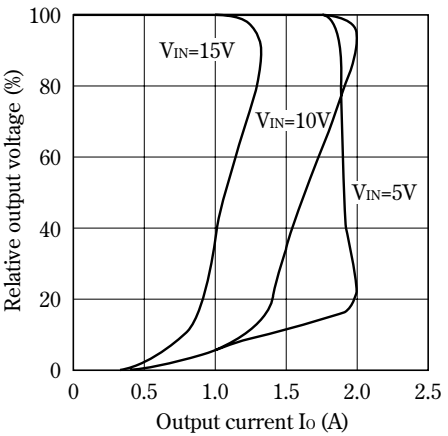


Fig. 8 Output Voltage Deviation vs. Junction Temperature (PQ05RD11)

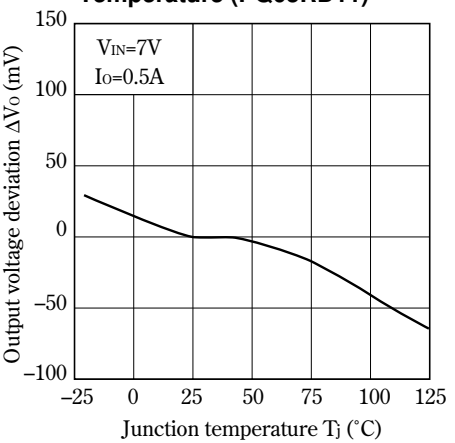


Fig. 9 Output Voltage Deviation vs. Junction Temperature (PQ09RD11)

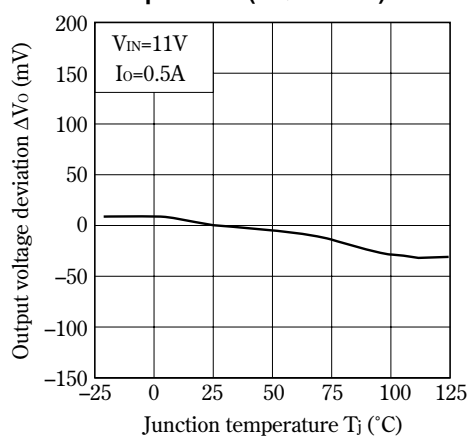


Fig.10 Output Voltage Deviation vs. Junction Temperature (PQ12RD11)

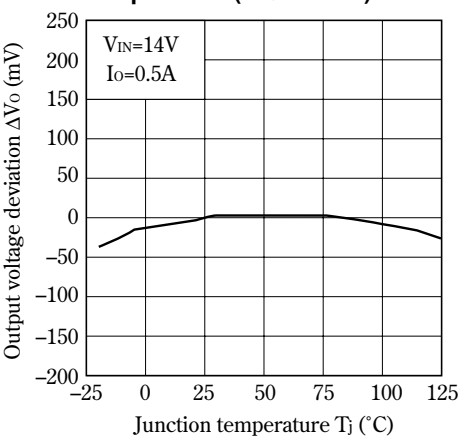


Fig.11 Output Voltage vs. Input Voltage (PQ05RD11)

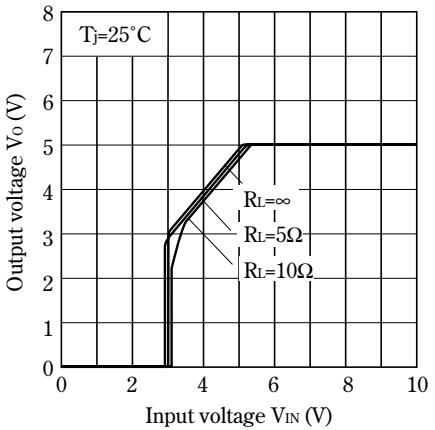


Fig.12 Output Voltage vs. Input Voltage (PQ09RD11)

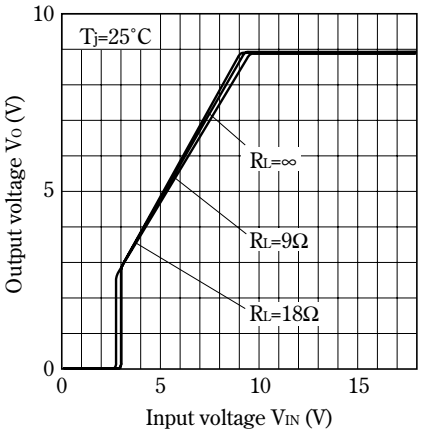


Fig.13 Output Voltage vs. Input Voltage (PQ12RD11)

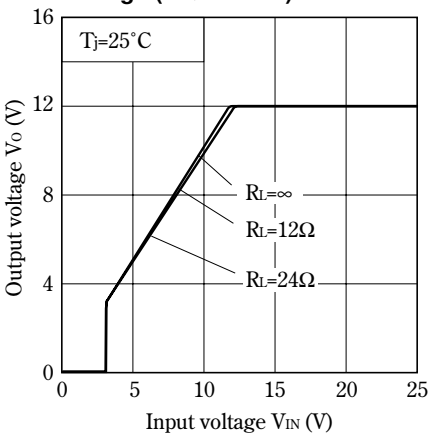


Fig.14 Circuit Operating Current vs. Input Voltage (PQ05RD11)

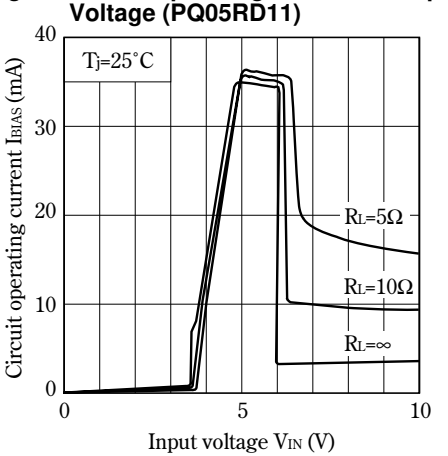


Fig.15 Circuit Operating Current vs. Input Voltage (PQ09RD11)

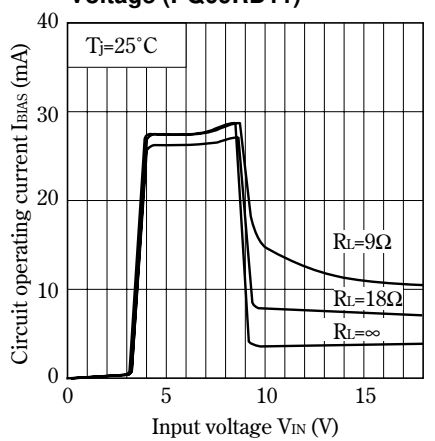


Fig.16 Circuit Operating Current vs. Input Voltage (PQ12RD11)

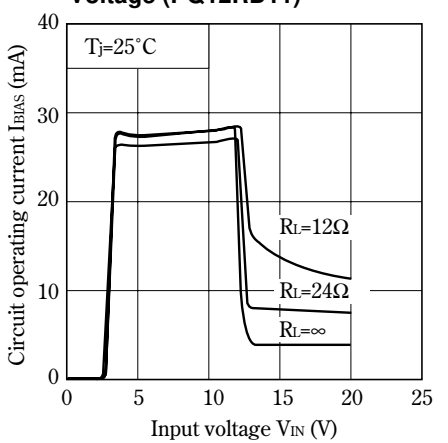


Fig.17 Dropout Voltage vs. Junction Temperature (PQ05RD11 Series)

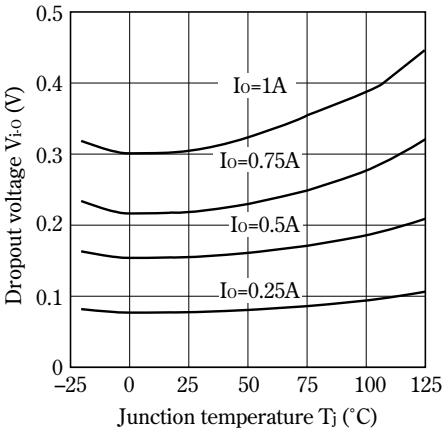


Fig.18 Quiescent Current vs. Junction Temperature (PQ05RD11 Series)

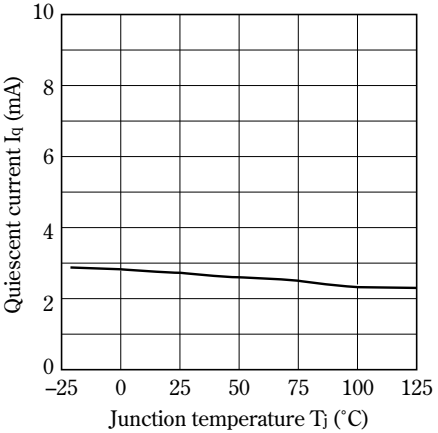


Fig.19 Ripple Rejection vs. Input Ripple Frequency (PQ05RD11 Series)

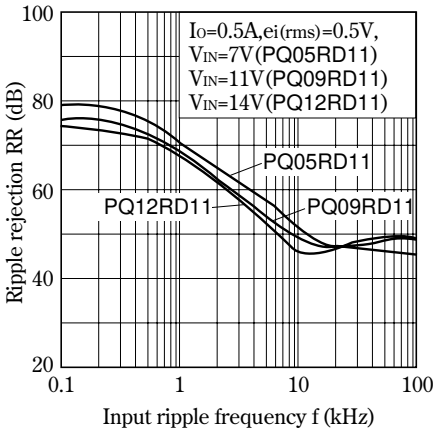


Fig.20 Ripple Rejection vs. Output Current (PQ05RD11 Series)

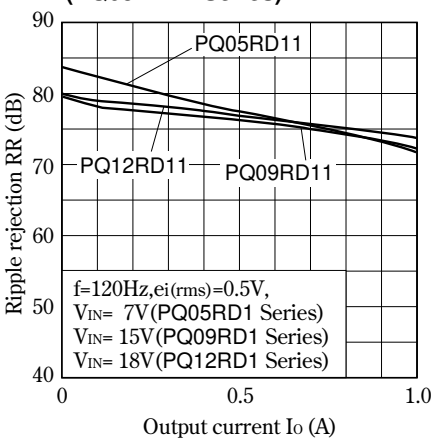
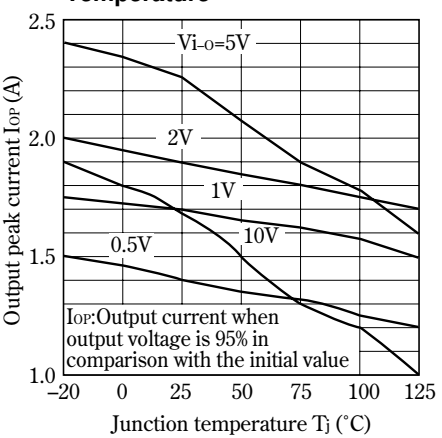
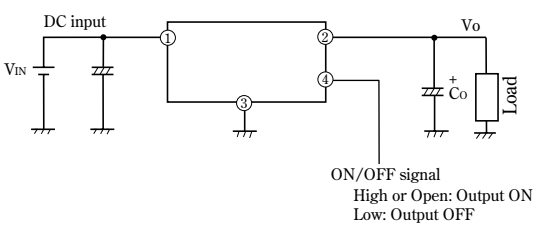


Fig.21 Output Peak Current vs. Junction Temperature



■ Typical Application



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  --- Office automation equipment
  --- Telecommunication equipment [terminal]
  --- Test and measurement equipment
  --- Industrial control
  --- Audio visual equipment
  --- Consumer electronics

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  --- Traffic signals
  --- Gas leakage sensor breakers
  --- Alarm equipment
  --- Various safety devices, etc.

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