

PQ12RD21 Datasheet



DiGi Electronics Part Number	PQ12RD21-DG
Manufacturer	Sharp Microelectronics
Manufacturer Product Number	PQ12RD21
Description	IC REG LINEAR 12V 2A TO220-4
Detailed Description	Linear Voltage Regulator IC Positive Fixed 1 Output 2A TO-220-4

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Manufacturer Product Number:

PQ12RD21

Series:

-

Output Configuration:

Positive

Number of Regulators:

1

Voltage - Output (Min/Fixed):

12V

Voltage Dropout (Max):

0.5V @ 2A

Current - Quiescent (Iq):

10 mA

Control Features:

Enable

Operating Temperature:

-20°C ~ 80°C

Package / Case:

TO-220-4

Base Product Number:

PQ12

Manufacturer:

Sharp Microelectronics

Product Status:

Obsolete

Output Type:

Fixed

Voltage - Input (Max):

20V

Voltage - Output (Max):

-

Current - Output:

2A

PSRR:

55dB (120Hz)

Protection Features:

Over Current, Over Temperature

Mounting Type:

Through Hole

Supplier Device Package:

TO-220-4

Environmental & Export classification

RoHS Status:

RoHS non-compliant

ECCN:

EAR99

Moisture Sensitivity Level (MSL):

1 (Unlimited)

HTSUS:

8542.39.0001

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

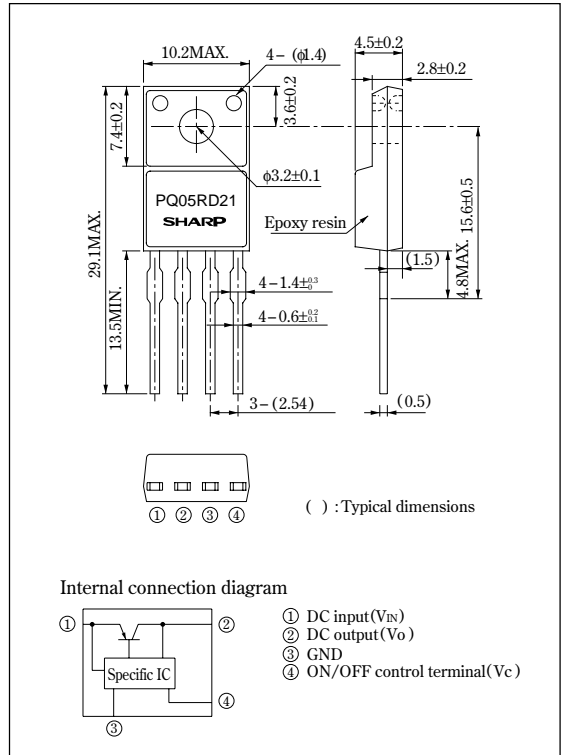
- Power supplies for various electronic equipment such as AV, OA equipment

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	$^\circ C$
	T_{stg}	-40 to +150	$^\circ C$
	T_{sol}	260 (For 10s)	$^\circ C$

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

• 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	Reg_L	$I_o=5mA$ to 2.0A, #4	—	0.1	2.0	%	
Line regulation	Reg_I	#5, $I_o=5mA$	PQ3RD23	—	0.1	2.5	%
			PQ05RD21 series	—	0.5	2.5	
Temperature coefficient of output voltage	$T_C V_o$	$T_j=0$ 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

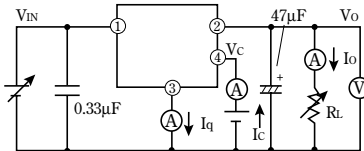
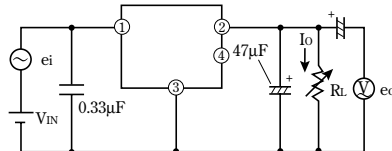
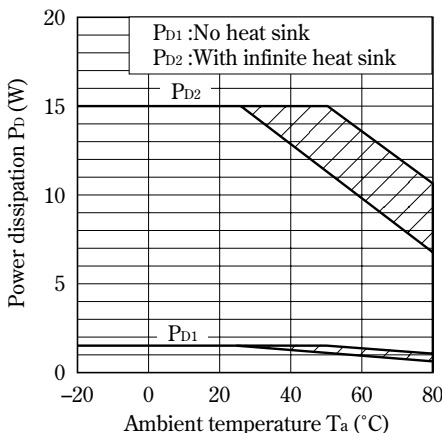


Fig. 2 Test Circuit of Ripple Rejection



$f=120Hz$ (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)

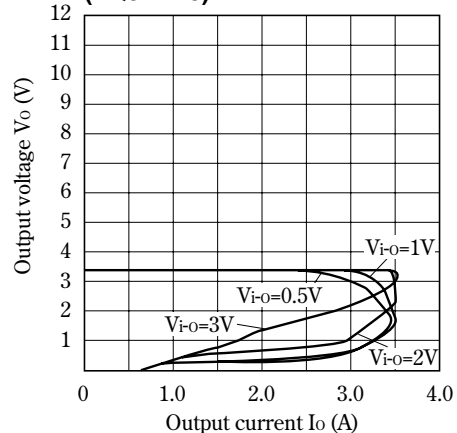


Fig. 5 Overcurrent Protection Characteristics (Typical Value) (PQ05RD21)

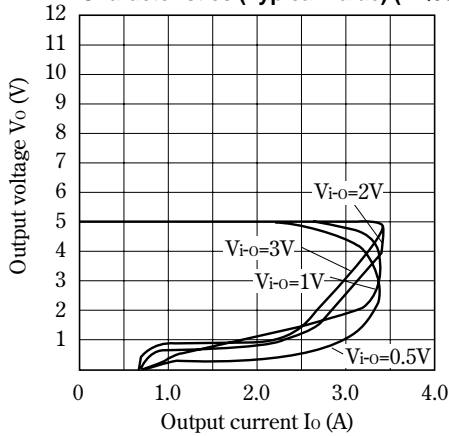


Fig. 6 Overcurrent Protection Characteristics (Typical Value) (PQ09RD21)

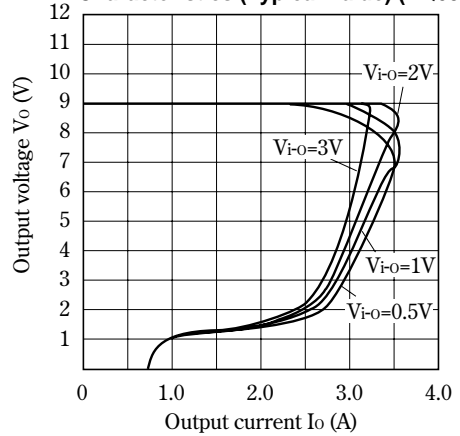


Fig. 7 Overcurrent Protection Characteristics (Typical Value) (PQ12RD21)

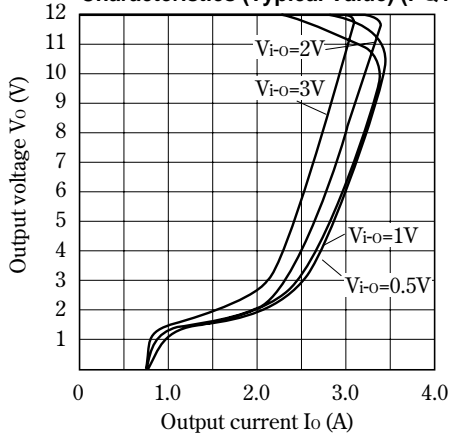


Fig. 8 Output Voltage Deviation vs. Junction Temperature (PQ3RD23)

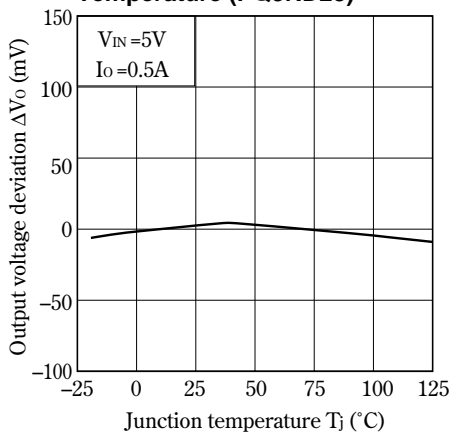


Fig. 9 Output Voltage Deviation vs. Junction Temperature (PQ05RD21)

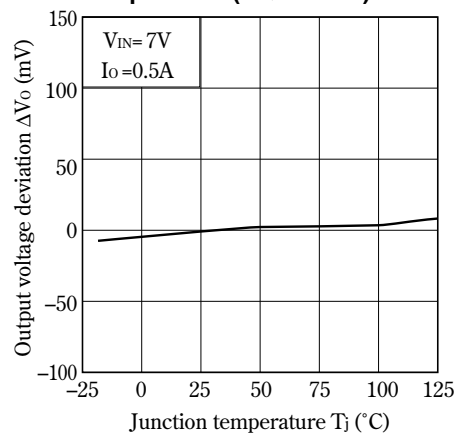


Fig.10 Output Voltage Deviation vs. Junction Temperature (PQ09RD21)

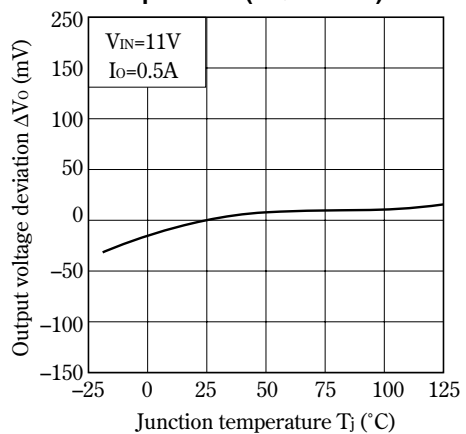


Fig.11 Output Voltage Deviation vs. Junction Temperature (PQ12RD21)

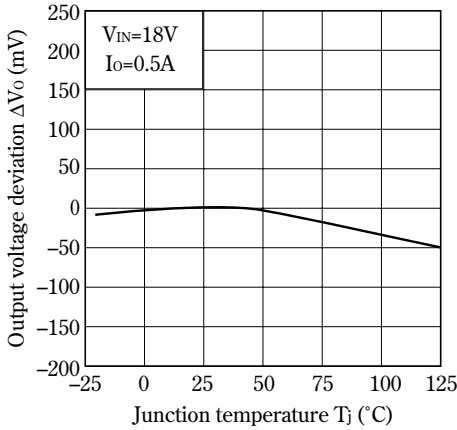


Fig.12 Output Voltage vs. Input Voltage (PQ3RD23)

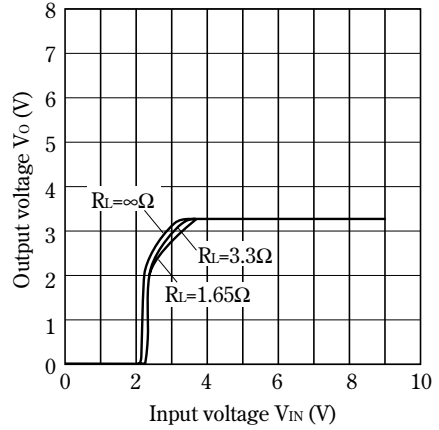


Fig.13 Output Voltage vs. Input Voltage (PQ05RD21)

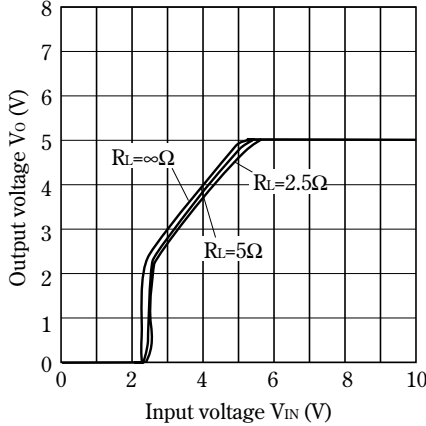


Fig.14 Output Voltage vs. Input Voltage (PQ09RD21)

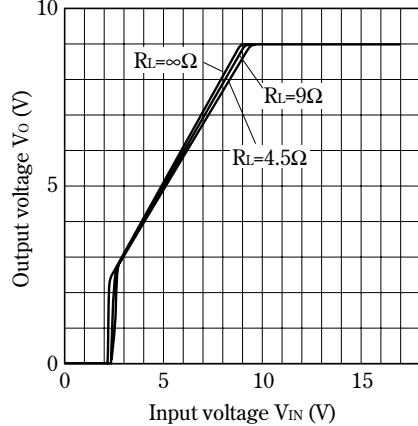


Fig.15 Output Voltage vs. Input Voltage (PQ12RD21)

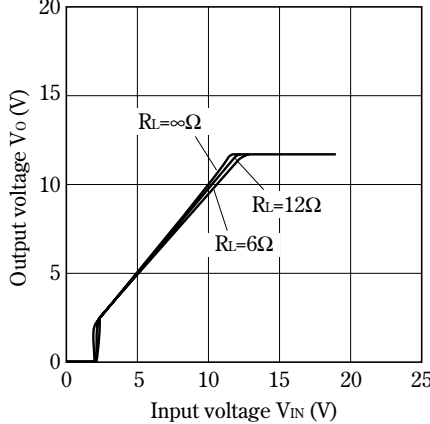


Fig.16 Circuit Operating Current vs. Input Voltage (PQ3RD23)

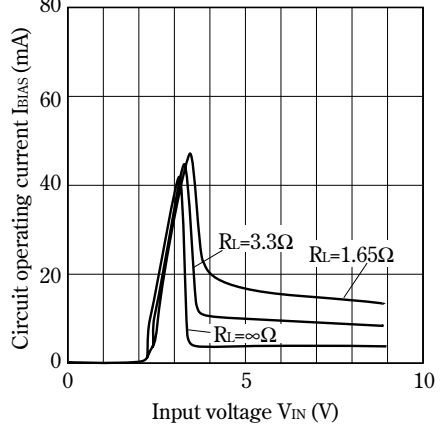


Fig.17 Circuit Operating Current vs. Input Voltage (PQ05RD21)

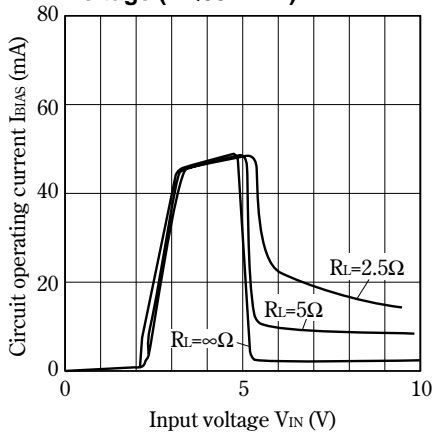


Fig.18 Circuit Operating Current vs. Input Voltage (PQ09RD21)

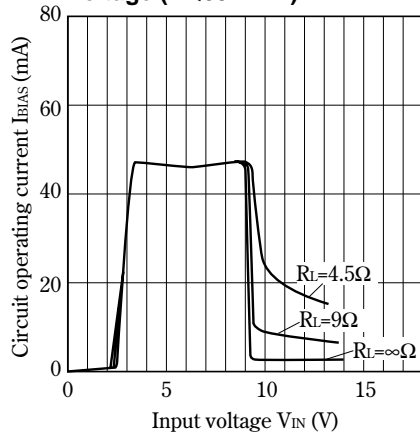


Fig.19 Circuit Operating Current vs. Input Voltage (PQ12RD21)

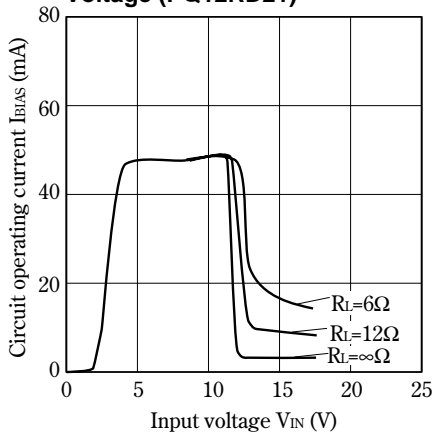


Fig.20 Dropout Voltage vs. Junction Temperature

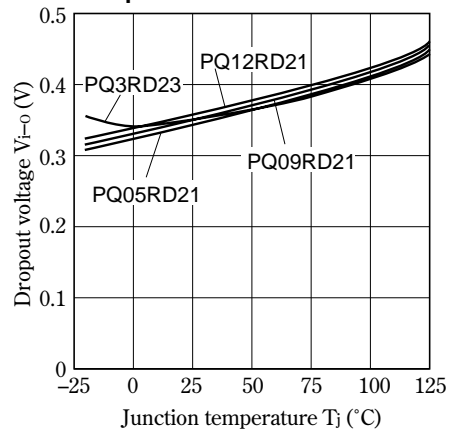


Fig.21 Quiescent Current vs. Junction Temperature

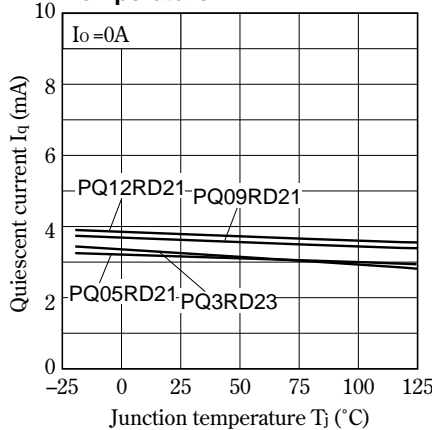
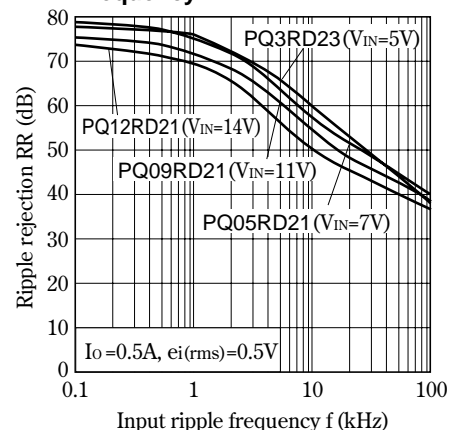
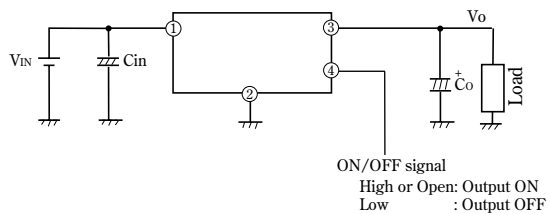


Fig.22 Ripple Rejection vs. Input Ripple Frequency



■ **ON/OFF Operation**



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