

# PQ1R30 Series

Low Output Current, Compact Surface Mount Type Low Power-Loss Voltage Regulators

## Features

- Compact surface mount package (3.4 x 2.2 x 1.2mm)
- Low power-loss  
(Dropout voltage: TYP.0.16V/MAX. 0.26V at  $I_o=60\text{mA}$ )
- High ripple rejection (TYP.55dB)
- Low current operation type  
(Dissipation current at no load: TYP. 170 $\mu\text{A}$ )
- Built-in ON/OFF control function  
(Dissipation current at OFF-state: MAX. 0.1 $\mu\text{A}$ )
- Overcurrent, overheat protection functions

## Applications

- Cellular phones
- Cordless phones
- Personal information tools (PDA)
- Cameras/Camcoders
- PCMCIA cards for notebook PCs

## Model Line-ups

Output Voltage	Model No.	Output Voltage	Model No.
2.2V	PQ1R22	3.4V	PQ1R34
2.5V	PQ1R25	3.6V	PQ1R36
2.7V	PQ1R27	3.8V	PQ1R38
2.8V	PQ1R28	4.0V	PQ1R40
2.9V	PQ1R29	4.7V	PQ1R47
3.0V	PQ1R30	4.9V	PQ1R49
3.1V	PQ1R31	5.0V	PQ1R50
3.3V	PQ1R33	5.2V	PQ1R52

\* It is available for every 0.1V (1.8V to 5.5V)

## Absolute Maximum Ratings

( $T_a=25^\circ\text{C}$ )

Parameter	Symbol	Rating	Unit
*1 Input voltage	$V_{IN}$	16	V
*1 ON/OFF control terminal voltage	$V_c$	16	V
Output current	$I_o$	240	mA
*2 Power dissipation	$P_D$	400	mW
*3 Junction temperature	$T_j$	150	$^\circ\text{C}$
Operating temperature	$T_{opr}$	-30 to +80	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$
Soldering temperature	$T_{sol}$	260 (For 10s)	$^\circ\text{C}$

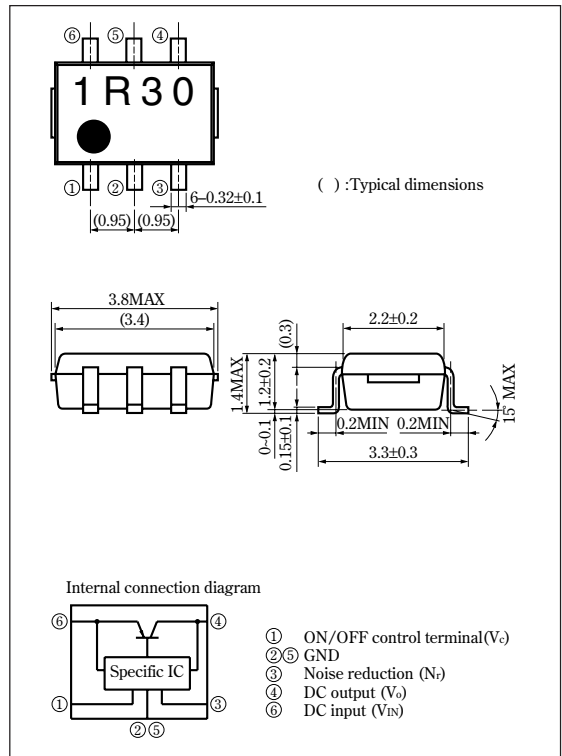
\*1 All are open except GND and applicable terminals.

\*2 At mounted on PCB

\*3 Overheat protection may operate at  $125 \leq T_j < 150^\circ\text{C}$ .

## Outline Dimensions

(Unit : mm)



• Please refer to the chapter " Handling Precautions ".

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■ Electrical Characteristics

(Unless otherwise specified, \*4 I<sub>o</sub>=30mA, V<sub>c</sub>=1.8V, T<sub>a</sub>=25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output voltage	V <sub>o</sub>	—	Refer to the following table.			V
Output current	I <sub>o</sub>	*5	180	240	—	mA
Recommended output current	—	—	—	—	150	mA
Load regulation	RegL	I <sub>o</sub> =5mA to 60mA	—	10	50	mV
		I <sub>o</sub> =5mA to 100mA	—	20	100	
		I <sub>o</sub> =5mA to 150mA	—	40	160	
Line regulation	RegI	V <sub>i</sub> =V <sub>o</sub> (TYP)+1V to V <sub>o</sub> (TYP)+6V	—	3.0	20	mV
Temperature coefficient of output voltage	T <sub>c</sub> V <sub>o</sub>	I <sub>o</sub> =10mA, T <sub>j</sub> =-25 to +75°C	—	0.05	—	mV/°C
Ripple rejection	RR	—	—	55	—	dB
Output noise voltage	V <sub>no</sub> (rms)	10Hz<f<100kHz, C <sub>n</sub> =0.1μF, I <sub>o</sub> =30mA	Refer to the following table.			μV
Dropout voltage	V <sub>i-o</sub> (1)	I <sub>o</sub> =60mA, *6	—	0.16	0.26	V
	V <sub>i-o</sub> (2)	I <sub>o</sub> =150mA, *6	—	0.29	0.4	
*7 ON-state voltage for control	V <sub>c</sub> (ON)	—	1.8	—	—	V
ON-state current for control	I <sub>c</sub> (ON)	V <sub>c</sub> =1.8V	—	12	30	μA
OFF-state voltage for control	V <sub>c</sub> (OFF)	—	—	—	0.6	V
Quiescent current	I <sub>q</sub>	I <sub>o</sub> =0mA	—	170	350	μA
Output OFF-state dissipation current	I <sub>qs</sub>	V <sub>IN</sub> =8V, V <sub>c</sub> =0.4V	—	—	0.1	μA
Response time(Rise time)	T <sub>r</sub>	I <sub>o</sub> =30mA, V <sub>c</sub> =0→1.8V	—	0.3	—	ms
Noise control terminal voltage	—	—	—	1.25	—	V

\*4 V<sub>IN</sub>=V<sub>o</sub> (TYP)+1.0V

\*5 Output current shall be the value when output voltage lowers 0.3V from the voltage at I<sub>o</sub>=30mA.

\*6 Dropout voltage when output voltage lowers 5% from the voltage at V<sub>IN</sub>=V<sub>o</sub>+1V.

\*7 In case that the control terminal ① is non-connection, output voltage should be OFF-state.

\*8 In case of PQ1R13, PQ1R15, PQ1R18, V<sub>IN</sub> minimum=2.3V

■ Output Voltage Line-ups

(V<sub>IN</sub>=V<sub>o</sub>(TYP)+1.0V, I<sub>o</sub>=30mA, V<sub>c</sub>=1.8V, T<sub>a</sub>=25°C)

Model No.	Symbol	MIN.	TYP.	MAX.	Unit
PQ1R13	V <sub>o</sub>	1.220	1.3	1.380	V
PQ1R15		1.420	1.5	1.580	
PQ1R18		1.720	1.8	1.800	
PQ1R22		2.120	2.2	2.280	
PQ1R25		2.420	2.5	2.580	
PQ1R27		2.620	2.7	2.780	
PQ1R28		2.720	2.8	2.880	
PQ1R29		2.820	2.9	2.980	
PQ1R30		2.920	3.0	3.080	
PQ1R31		3.020	3.1	3.180	
PQ1R32		3.120	3.2	3.280	
PQ1R33		3.215	3.3	3.385	
PQ1R34		3.315	3.4	3.485	
PQ1R35		3.410	3.5	3.590	
PQ1R36		3.510	3.6	3.690	
PQ1R37		3.605	3.7	3.795	
PQ1R38		3.705	3.8	3.895	
PQ1R40		3.900	4.0	4.100	
PQ1R42		4.095	4.2	4.305	
PQ1R47		4.580	4.7	4.820	
PQ1R49		4.775	4.9	5.025	
PQ1R50		4.875	5.0	5.125	
PQ1R52		5.070	5.2	5.330	

■ Output Noise Voltage Line-ups

(V<sub>IN</sub>=V<sub>o</sub>(TYP)+1.0V, I<sub>o</sub>=30mA, V<sub>c</sub>=1.8V, C<sub>n</sub>=0.1μF, 10Hz<f<100kHz, T<sub>a</sub>=25°C)

Model No.	Symbol	MIN.	TYP.	MAX.	Unit
PQ1R13	V <sub>no</sub> (rms)	—	15	—	μV
PQ1R15		—	30	—	
PQ1R18		—	15	—	
PQ1R22		—	20	—	
PQ1R25		—	25	—	
PQ1R27		—	25	—	
PQ1R28		—	25	—	
PQ1R29		—	25	—	
PQ1R30		—	30	—	
PQ1R31		—	30	—	
PQ1R32		—	30	—	
PQ1R33		—	30	—	
PQ1R34		—	30	—	
PQ1R35		—	40	—	
PQ1R36		—	35	—	
PQ1R37		—	30	—	
PQ1R38		—	35	—	
PQ1R40		—	40	—	
PQ1R42		—	30	—	
PQ1R47		—	45	—	
PQ1R49		—	45	—	
PQ1R50		—	50	—	
PQ1R52		—	50	—	

Fig. 1 Test Circuit

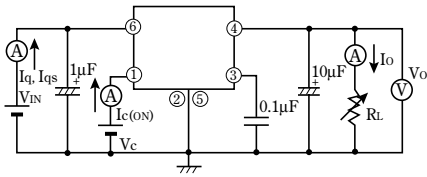
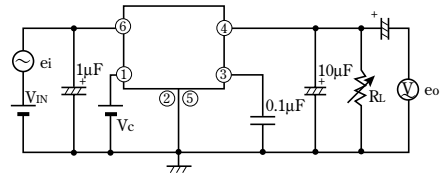
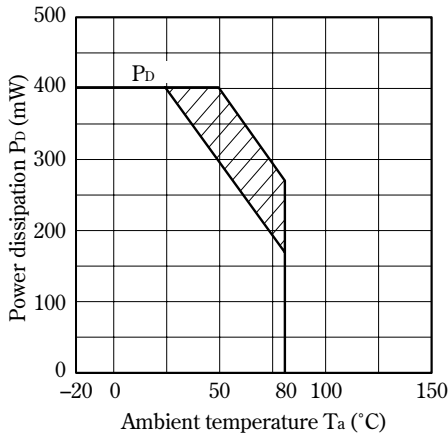


Fig. 2 Test Circuit of Ripple Rejection



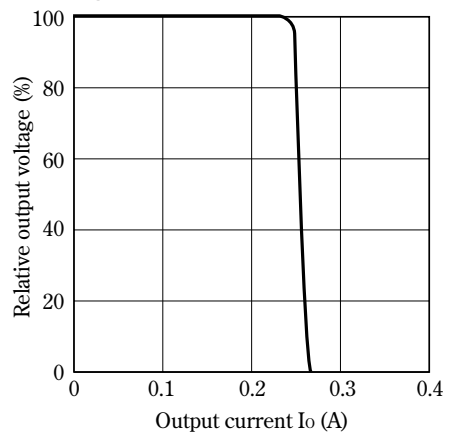
$f=400\text{Hz}$ (sine wave)  
 $e_i(\text{rms})=100\text{mV}$   
 $V_{IN}=V_o(\text{Typ})+1.0\text{V}$   
 $I_o=10\text{mA}$   
 $RR=20 \log(e_i(\text{rms})/e_o(\text{rms}))$

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)



Note) Oblique line portion : Overheat protection may operate in this area.

Fig. 5 Output Voltage Deviation vs. Junction Temperature (PQ1R30) (Typical Value)

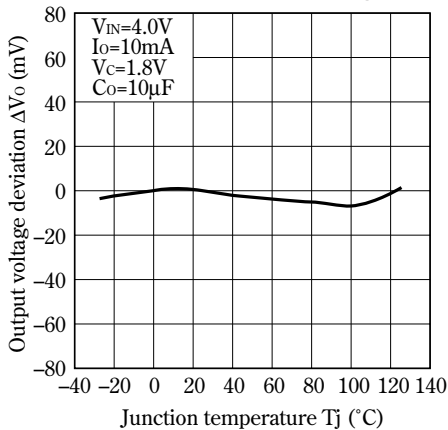
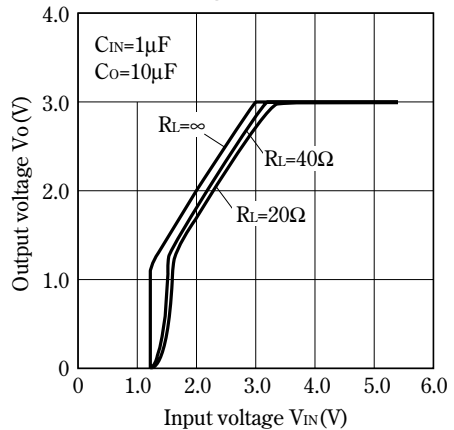
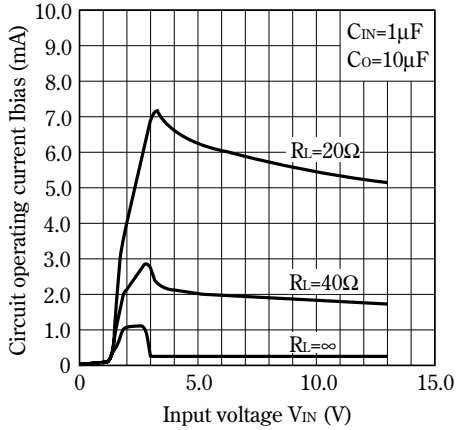


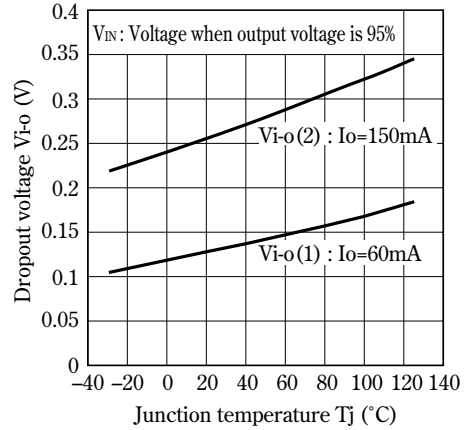
Fig. 6 Output Voltage vs. Input Voltage (PQ1R30) (Typical Value)



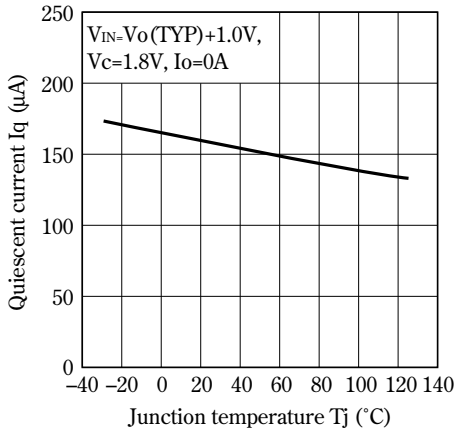
**Fig. 7 Circuit Operating Current vs. Input Voltage (PQ1R30) (Typical Value)**



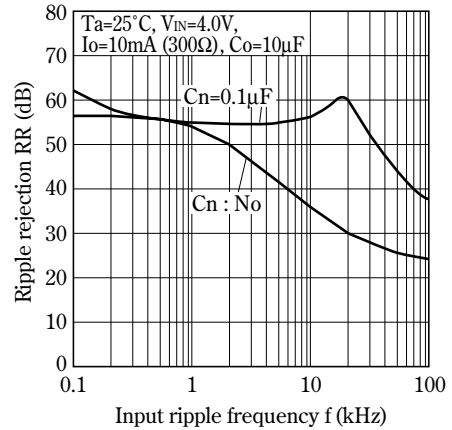
**Fig. 8 Dropout Voltage vs. Junction Temperature (PQ1R30) (Typical Value)**



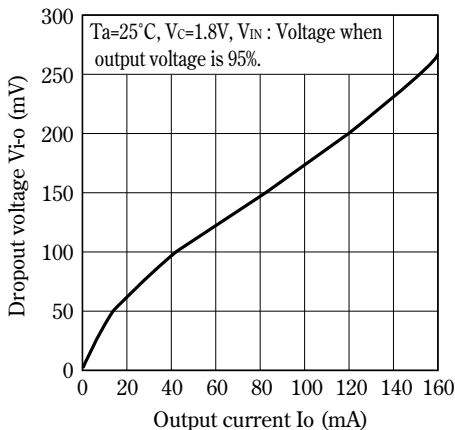
**Fig. 9 Quiescent Current vs. Junction Temperature**



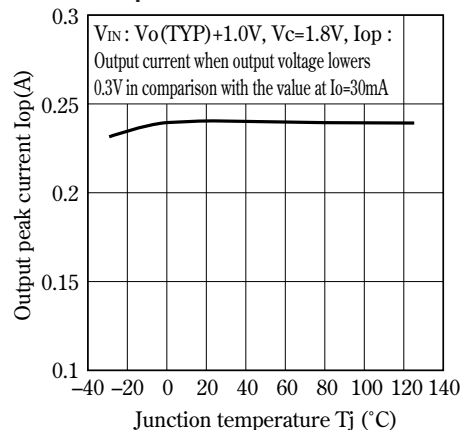
**Fig.10 Ripple Rejection vs. Input Ripple Frequency**



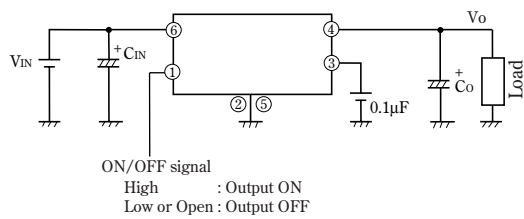
**Fig.11 Dropout Voltage vs. Output Current**



**Fig.12 Output Peak Current vs. Junction Temperature**



■ ON/OFF Operation



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    - Alarm equipment
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