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 Io=60mA)
- High ripple rejection(TYP.55dB)
- Low current operation type
  (Dissipation current at no load: TYP. 170μA)
- Built-in ON/OFF control function
  (Dissipation current at OFF-state: MAX. 0.1μA)
- Overcurrent, overheat protection functions

■ Applications

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

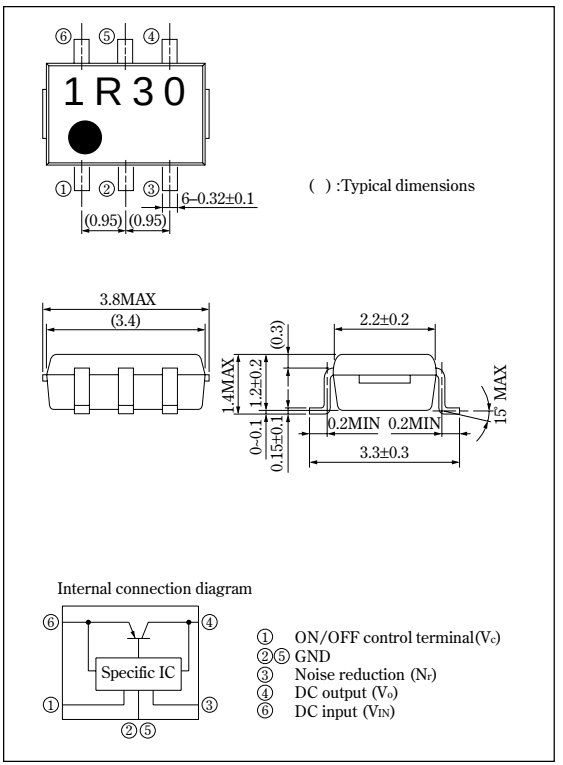
■ Model Line-ups

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)

■ Outline Dimensions

(Unit : mm)



■ Absolute Maximum Ratings

(Ta=25°C)

Parameter	Symbol	Rating	Unit
※1 Input voltage	V_{IN}	16	V
※1 ON/OFF control terminal voltage	Vc	16	V
Output current	Io	240	mA
※2 Power dissipation	P_D	400	mW
※3 Junction temperature	T_j	150	°C
Operating temperature	T_{opr}	−30 to +80	°C
Storage temperature	T_{stg}	−55 to +150	°C
Soldering temperature	T_{sol}	260 (For 10s)	°C

※1 All are open except GND and applicable terminals.

※2 At mounted on PCB

※3 Overheat protection may operate at 125<=Tj<=150°C.

• Please refer to the chapter " Handling Precautions ".

■ Electrical Characteristics

(Unless otherwise specified, ※4 Io=30mA, Vc=1.8V, Ta=25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output voltage	V_O	—	Refer to the following table.			V
Output current	I_O	※5	180	240	—	mA
Recommended output current	—	—	—	—	150	mA
Load regulation	$R_{eg}L$	I_O=5mA to 60mA	—	10	50	mV
		I_O=5mA to 100mA	—	20	100	
		I_O=5mA to 150mA	—	40	160	
Line regulation	$R_{eg}I$	V_i=V_O(TYP)+1V to V_O(TYP)+6V	—	3.0	20	mV
Temperature coefficient of output voltage	T_CV_O	I_O=10mA, T_j=−25 to +75°C	—	0.05	—	%/°C
Ripple rejection	RR	—	—	55	—	dB
Output noise voltage	Vno(rms)	10Hz<f<100kHz, C_n=0.1µF, I_O=30mA	Refer to the following table.			µV
Dropout voltage	V_{i-O}(1)	I_O=60mA, ※6	—	0.16	0.26	V
	V_{i-O}(2)	I_O=150mA, ※6	—	0.29	0.4	
※7 ON-state voltage for control	$V_{C(ON)}$	—	1.8	—	—	V
ON-state current for control	$I_{C(ON)}$	V_C=1.8V	—	12	30	µA
OFF-state voltage for control	$V_{C(OFF)}$	—	—	—	0.6	V
Quiescent current	I_q	I_O=0mA	—	170	350	µA
Output OFF-state dissipation current	I_{qs}	V_{IN}=8V, V_C=0.4V	—	—	0.1	µA
Response time(Rise time)	T_r	I_O=30mA, V_C=0→1.8V	—	0.3	—	ms
Noise control terminal voltage	—	—	—	1.25	—	V

※4 V_{IN}=V_O (TYP)+1.0V

※5 Output current shall be the value when output voltage lowers 0.3V from the voltage at Io=30mA.

※6 Dropout voltage when output voltage lowers 5% from the voltage at V_{IN}=Vo+1V.

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

■ Output Voltage Line-ups

(V_{IN}=V_O(TYP)+1.0V, Io=30mA, Vc=1.8V, Ta=25°C)

Model No.	Symbol	MIN.	TYP.	MAX.	Unit
PQ1R22	V_O	2.120	2.2	2.280	V
PQ1R25	V_O	2.420	2.5	2.580	V
PQ1R27	V_O	2.620	2.7	2.780	V
PQ1R28	V_O	2.720	2.8	2.880	V
PQ1R29	V_O	2.820	2.9	2.980	V
PQ1R30	V_O	2.920	3.0	3.080	V
PQ1R31	V_O	3.020	3.1	3.180	V
PQ1R33	V_O	3.215	3.3	3.385	V
PQ1R34	V_O	3.315	3.4	3.485	V
PQ1R36	V_O	3.510	3.6	3.690	V
PQ1R38	V_O	3.705	3.8	3.895	V
PQ1R40	V_O	3.900	4.0	4.100	V
PQ1R47	V_O	4.580	4.7	4.820	V
PQ1R49	V_O	4.775	4.9	5.025	V
PQ1R50	V_O	4.875	5.0	5.125	V
PQ1R52	V_O	5.070	5.2	5.330	V

■ Output Noise Voltage Line-ups

(V_{IN}=V_O(TYP)+1.0V, Io=30mA, Vc=1.8V, Cn=0.1µF, 10Hz<f<100kHz, Ta=25°C)

Model No.	Symbol	MIN.	TYP.	MAX.	Unit
PQ1R22	Vno	—	20	—	µVrms
PQ1R25	Vno	—	25	—	µVrms
PQ1R27	Vno	—	25	—	µVrms
PQ1R28	Vno	—	25	—	µVrms
PQ1R29	Vno	—	25	—	µVrms
PQ1R30	Vno	—	30	—	µVrms
PQ1R31	Vno	—	30	—	µVrms
PQ1R33	Vno	—	30	—	µVrms
PQ1R34	Vno	—	30	—	µVrms
PQ1R36	Vno	—	35	—	µVrms
PQ1R38	Vno	—	35	—	µVrms
PQ1R40	Vno	—	40	—	µVrms
PQ1R47	Vno	—	45	—	µVrms
PQ1R49	Vno	—	45	—	µVrms
PQ1R50	Vno	—	50	—	µVrms
PQ1R52	Vno	—	50	—	µVrms

Fig. 1 Test Circuit

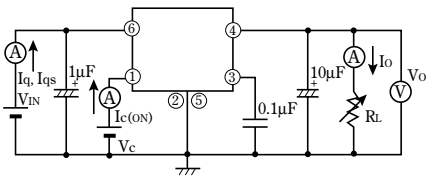
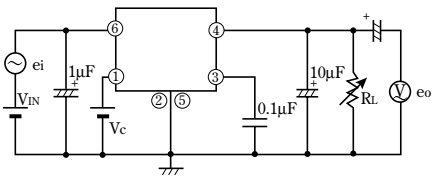
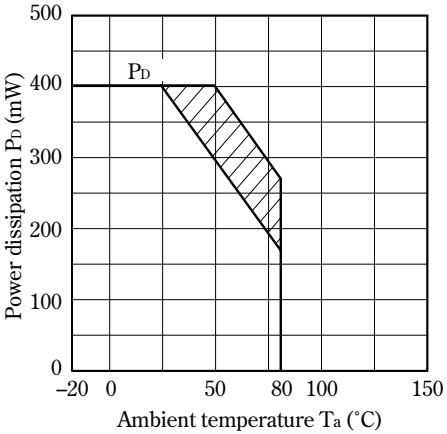


Fig. 2 Test Circuit of Ripple Rejection



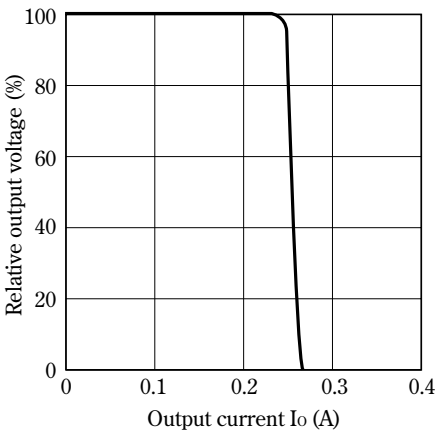
f=400Hz (sine wave)
ei(rms)=100mV
VIN=Vo(TYP)+1.0V
Io=10mA
RR=20 log(ei(rms)/eo(rms))

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)



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

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

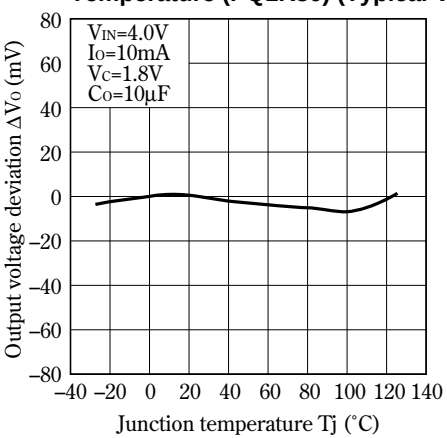


Fig. 6 Output Voltage vs. Input Voltage (PQ1R30) (Typical Value)

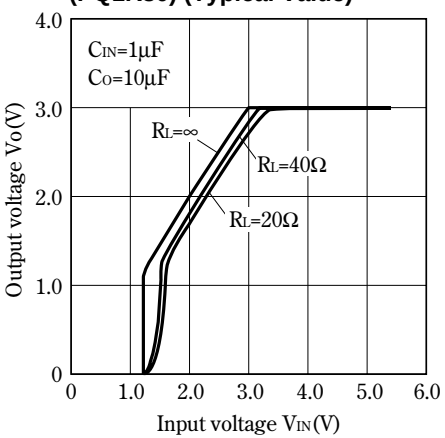


Fig. 7 Circuit Operating Current vs. Input Voltage (PQ1R30) (Typical Value)

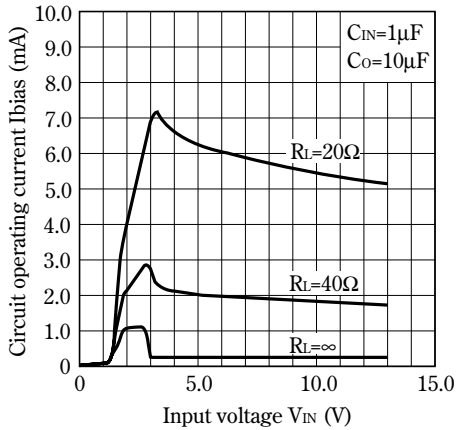


Fig. 8 Dropout Voltage vs. Junction Temperature (PQ1R30) (Typical Value)

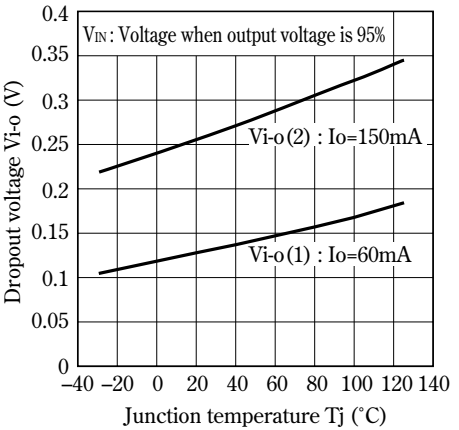


Fig. 9 Quiescent Current vs. Junction Temperature

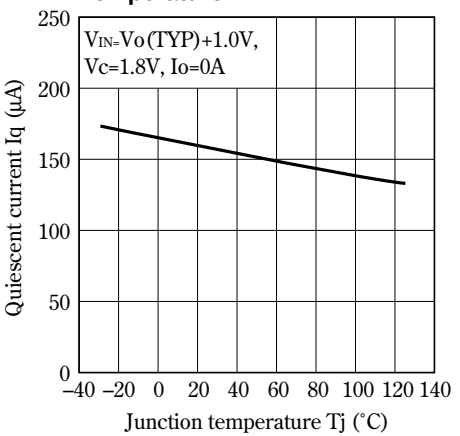


Fig.10 Ripple Rejection vs. Input Ripple Frequency

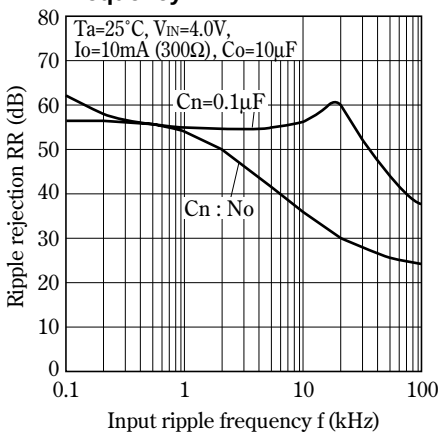


Fig.11 Dropout Voltage vs. Output Current

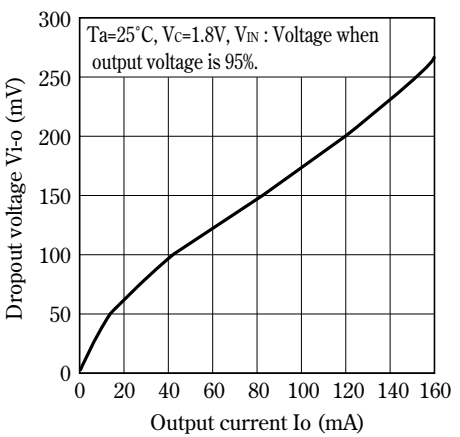
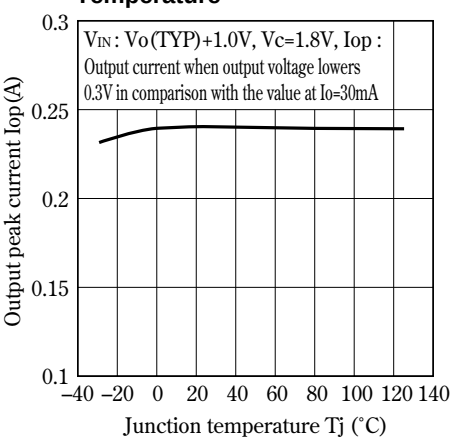
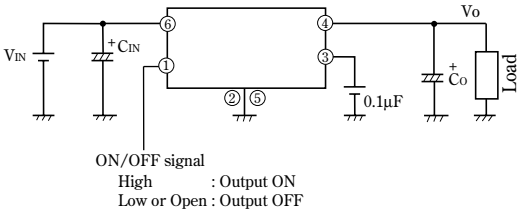


Fig.12 Output Peak Current vs. Junction Temperature



■ ON/OFF Operation



ON/OFF signal
High : Output ON
Low or Open : Output OFF

NOTICE

- The circuit application examples in this publication are provided to explain representative applications of SHARP devices and are not intended to guarantee any circuit design or license any intellectual property rights. SHARP takes no responsibility for any problems related to any intellectual property right of a third party resulting from the use of SHARP's devices.
- Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device. SHARP reserves the right to make changes in the specifications, characteristics, data, materials, structure, and other contents described herein at any time without notice in order to improve design or reliability. Manufacturing locations are also subject to change without notice.
- Observe the following points when using any devices in this publication. SHARP takes no responsibility for damage caused by improper use of the devices which does not meet the conditions and absolute maximum ratings to be used specified in the relevant specification sheet nor meet the following conditions:

  (i) The devices in this publication are designed for use in general electronic equipment designs such as:
  --- Personal computers
  --- Office automation equipment
  --- Telecommunication equipment [terminal]
  --- Test and measurement equipment
  --- Industrial control
  --- Audio visual equipment
  --- Consumer electronics

  (ii) Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when SHARP devices are used for or in connection with equipment that requires higher reliability such as:
  --- Transportation control and safety equipment (i.e., aircraft, trains, automobiles, etc.)
  --- Traffic signals
  --- Gas leakage sensor breakers
  --- Alarm equipment
  --- Various safety devices, etc.

  (iii) SHARP devices shall not be used for or in connection with equipment that requires an extremely high level of reliability and safety such as:
  --- Space applications
  --- Telecommunication equipment [trunk lines]
  --- Nuclear power control equipment
  --- Medical and other life support equipment (e.g., scuba).

- Contact a SHARP representative in advance when intending to use SHARP devices for any "specific" applications other than those recommended by SHARP or when it is unclear which category mentioned above controls the intended use.
- If the SHARP devices listed in this publication fall within the scope of strategic products described in the Foreign Exchange and Foreign Trade Control Law of Japan, it is necessary to obtain approval to export such SHARP devices.
-
- Contact and consult with a SHARP representative if there are any questions about the contents of this publication.