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PQ1Uxx1M2ZP Series

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

■ Features

1. Compact surface mount package (2.9×1.6×1.1mm)
2. Low power-loss
   (Dropout voltage:TYP. 0.11 V at I_O=60mA)
3. High ripple rejection (TYP. 60dB)
4. Built-in ON/OFF control function
   (Dissipation current at OFF-state:MAX. 1μA)
6. Overcurrent, overheat protection functions

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

■ Applications

1. Cellular phones
2. Cordless phones
3. Personal information tools(PDA)
4. Cameras/Camcoders
5. PCMCIA cards for notebook PCs

■ Model Line-up

Output Voltage (TYP.)	Model No.	Output Voltage (TYP.)	Model No.
2.5V	**PQ1U251M2ZP**	3.5V	**PQ1U351M2ZP**
2.8V	**PQ1U281M2ZP**	3.6V	**PQ1U361M2ZP**
3.0V	**PQ1U301M2ZP**	3.8V	**PQ1U381M2ZP**
3.3V	**PQ1U331M2ZP**	4.0V	**PQ1U401M2ZP**
3.4V	**PQ1U341M2ZP**	5.0V	**PQ1U501M2ZP**

■ Absolute Maximum Ratings

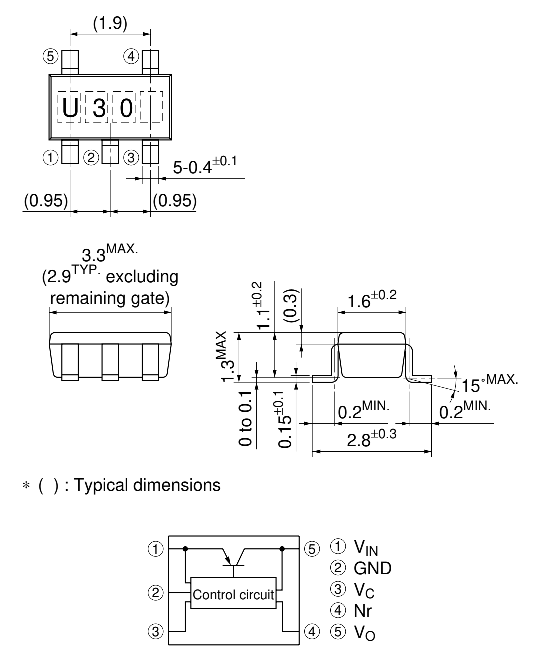
(Ta=25°C)

Parameter	Symbol	Rating	Unit
*1 Input voltage	V_{IN}	16	V
*1 Output control voltage	V_C	16	V
Output current	I_O	300	mA
*2 Power dissipation	P_D	350	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 (10s)	˚C

*1 All are open except GND and applicable terminals, refer to Fig.3
*2 At mounting PCB
*3 Overheat protection may operate at the condition T_j:125°C to 150°C

■ Outline Dimensions

(Unit : mm)



■ Electrical Characteristics

(Unless otherwise specified, V_{IN}=V_O(TYP)+1.0V, I_O=30mA, V_C=1.8V, Ta=25˚C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output voltage	V_O	–	Refer to the following table.1			V
*4 Output peak current	I_{op}	–	180	300	–	mA
Recommended output current	–	–	–	–	150	mA
Load regulation	$R_{eg}L1$	I_O=5 to 60mA	–	10	50	mV
	$R_{eg}L2$	I_O=5 to 100mA	–	20	100	mV
	$R_{eg}L3$	I_O=5 to 150mA	–	30	160	mV
Line regulation	$R_{eg}I$	V_{IN}=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	–	mV/˚C
Ripple rejection	RR	Refer to Fig.2	–	70	–	dB
Output noise voltage	$V_{no\ (rms)}$	10Hz<f<100kHz, C_n=0.1μF, I_O=30mA	Refer to the following table.2			μV
Dropout voltage	$V_{I\text{-}O}1$	I_O=60mA *5	–	0.11	0.26	V
	$V_{I\text{-}O}2$	I_O=150mA *5	–	0.20	0.4	
*6 ON-state voltage for control	$V_{C\ (ON)}$	–	1.8	–	–	V
ON-state current for control	$I_{C\ (ON)}$	V_C=1.8V	–	5	30	μA
OFF-state voltage for control	$V_{C\ (OFF)}$	–	–	–	0.4	V
Quiescent current	I_q	I_O=0mA	–	130	200	μA
Output OFF-state dissipation current	I_{qs}	V_C=0.2V	–	–	1	μA

*4 Output current shall be the value when output voltage lowers 0.3V from the voltage at I_O=30mA
*5 Input voltage when output voltage falls 0.1V from that at Vin=Vo(TYP)+1.0V.
*6 In case that the control terminal (③ pin) is non-connection, output voltage should be OFF state.

Table.1 Output Voltage Line-up

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

Model No.	Symbol	MIN.	TYP.	MAX.	Unit
PQ1U251M2ZP	V_O	2.440	2.5	2.560	V
PQ1U281M2ZP	V_O	2.740	2.8	2.860	V
PQ1U301M2ZP	V_O	2.940	3.0	3.060	V
PQ1U331M2ZP	V_O	3.234	3.3	3.366	V
PQ1U341M2ZP	V_O	3.332	3.4	3.468	V
PQ1U351M2ZP	V_O	3.430	3.5	3.570	V
PQ1U361M2ZP	V_O	3.528	3.6	3.672	V
PQ1U381M2ZP	V_O	3.724	3.8	3.876	V
PQ1U401M2ZP	V_O	3.920	4.0	4.080	V
PQ1U501M2ZP	V_O	4.900	5.0	5.100	V

Table.2 Output Noise Voltage Line-up

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

Model No.	Symbol	MIN.	TYP.	MAX.	Unit
PQ1U251M2ZP	$V_{no(rms)}$	–	25	–	V
PQ1U281M2ZP	$V_{no(rms)}$	–	25	–	V
PQ1U301M2ZP	$V_{no(rms)}$	–	30	–	V
PQ1U331M2ZP	$V_{no(rms)}$	–	30	–	V
PQ1U341M2ZP	$V_{no(rms)}$	–	30	–	V
PQ1U351M2ZP	$V_{no(rms)}$	–	35	–	V
PQ1U361M2ZP	$V_{no(rms)}$	–	35	–	V
PQ1U381M2ZP	$V_{no(rms)}$	–	35	–	V
PQ1U401M2ZP	$V_{no(rms)}$	–	40	–	V
PQ1U501M2ZP	$V_{no(rms)}$	–	50	–	V

Fig.1 Standard Test Circuit

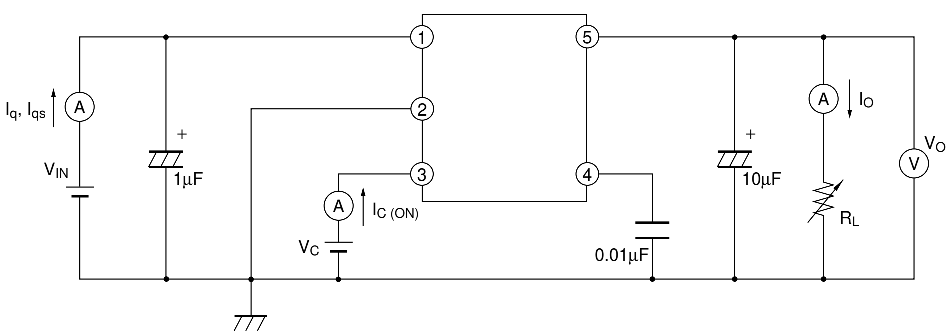
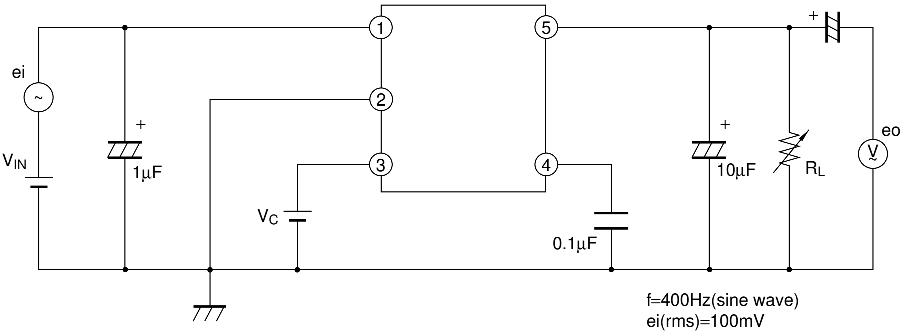


Fig.2 Test Circuit for Ripple Rejection



f=400Hz(sine wave)
ei(rms)=100mV
$V_{IN}=V_O(TYP)+1.0V$
$V_C=1.8V$
$I_O=10mA$
RR=20log(ei(rms)/eo(rms))

Fig.3 Power Dissipation vs. Ambient Temperature

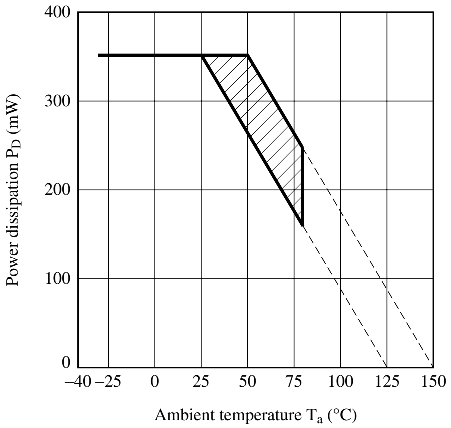


Fig.4 Overcurrent Protection Characteristics (Typical Value)

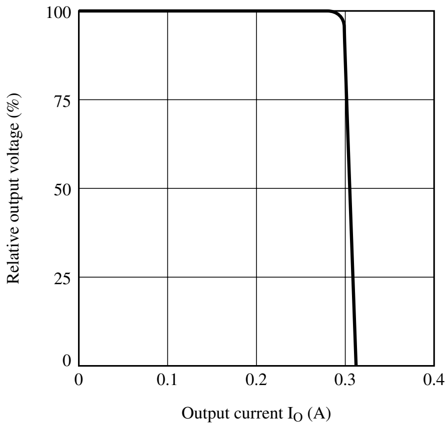


Fig.5 Output Voltage Fluctuation vs. Junction Temperature (PQ1U281M2ZP)(Typical Value)

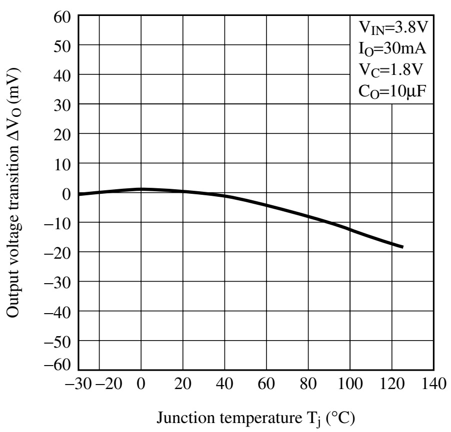


Fig.6 Output Voltage vs. Input Voltage (PQ1U281M2ZP)(Typical Value)

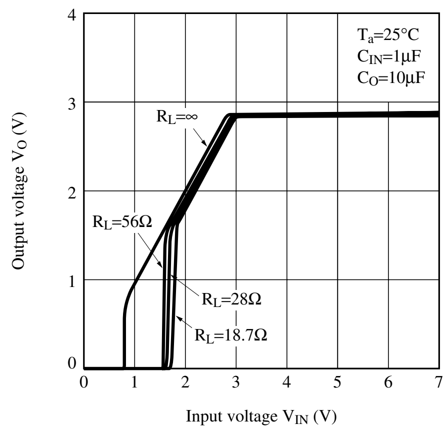


Fig.7 Operating Consumption Current vs. Input Voltage (PQ1U281M2ZP)(Typical Value)

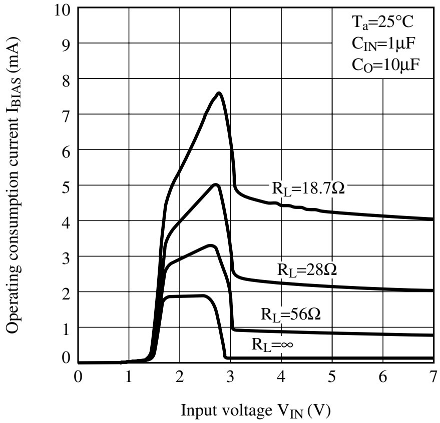


Fig.8 Dropout Voltage vs. Junction Temperature (PQ1U281M2ZP)(Typical Value)

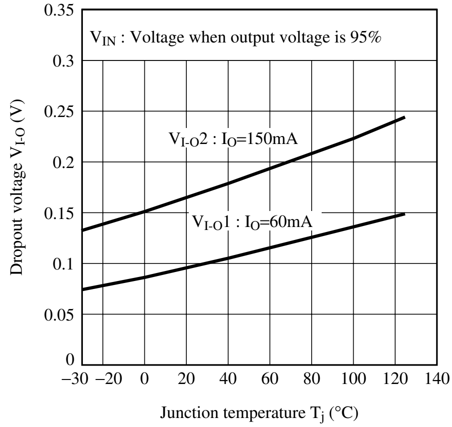


Fig.9 Quiescent Current vs. Junction Temperature (Typical Value)

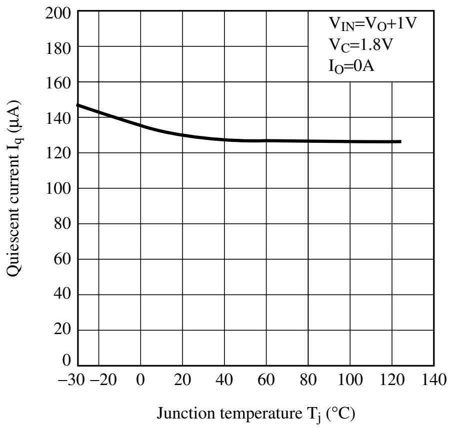


Fig.10 Ripple Rejection vs. Input Frequency (PQ1U281M2ZP)(Typical Value)

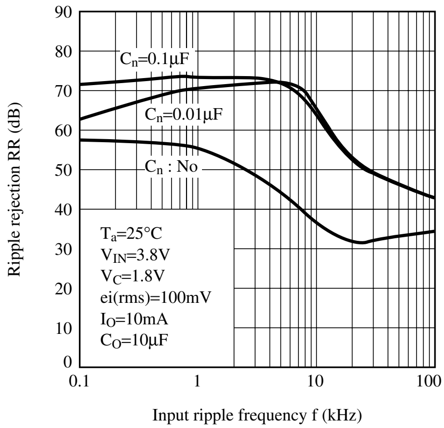


Fig.11 Dropout Voltage vs. Output Current

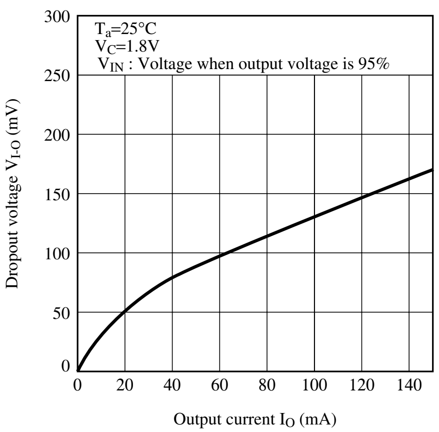
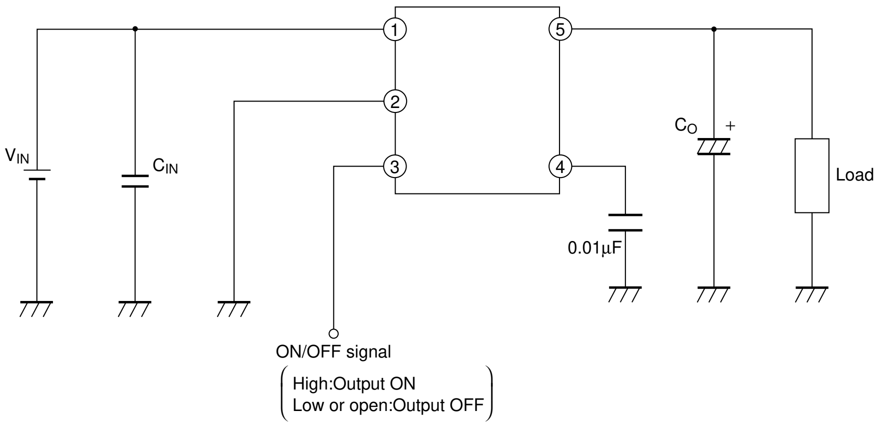


Fig.12 Example of Application



1. External connection
   (1) Please perform shortest wiring for connection between C_O or Cin and the individual terminal. There is case that oscillation occurs easily by kinds of capacity capacity and how to wire. Before you use this device, you should confirm output voltage in your actual using conditions.
   (2) The input terminal for ON/OFF output control is compatible with LS-TTL, and direct driving by TTL or C-MOS standard logic (RCA 4000 series) is also available.
   (3) If voltage is applied under the conditions that the device pin is connected divergently or reversely, the deterioration of characteristics or damage may occur. Never allow improper mounting.
2. Thermal protection design
   Maximum power dissipation of devices is obtained by the following equation.
   $P_D=V_{IN}\times I_{IN}-V_O\times I_O$
   When ambient temperature T_a and power dissipation P_D (MAX.) during operation are determined, use a heat sink which allows the element to operate within the safety operation area specified by the derating curve. Insufficient radiation gives an unfavorable influence to the normal operation and reliability of the device.
   In the external area of the safety operation area shown by the derating curve, the overheat protection circuit may operate to shut-down output. However please avoid keeping such condition for a long time.
3. ESD (Electro Static Discharge)
   Be careful not to apply electro static discharge to the device since this device employs a bipolar IC and may be damaged by electro static discharge. Followings are some methods against excessive voltage caused by electro static discharge.
   (1) Human body must be grounded to discharge the static electricity from the body or cloth.
   (2) Anything that is in contact with the device such as workbench, inserter, or measuring instrument must be grounded.
   (3) Use a solder dip basin with a minimum leak current (isolation resistance 10MΩ or more) from the commercial power supply. Also the solder dip basin must be grounded.

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— 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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