



**THE DATASHEET OF  
PQ1U251M2ZPH**



## PQ1Uxx1M2ZPH 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  $I_o=60\text{mA}$ )
3. High ripple rejection (TYP. 70dB)
4. Built-in ON/OFF control function  
(Dissipation current at OFF-state: MAX. 1μA)
5. Built-in overcurrent, overheat protection functions  
\*It is available for every 0.1V of output voltage (1.3V to 5.0V)
6. RoHS directive compliant

### 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.
1.8V	PQ1U181M2ZPH	3.5V	PQ1U351M2ZPH
2.5V	PQ1U251M2ZPH	5.0V	PQ1U501M2ZPH
2.8V	PQ1U281M2ZPH		
3.0V	PQ1U301M2ZPH		
3.3V	PQ1U331M2ZPH		

### Absolute Maximum Ratings

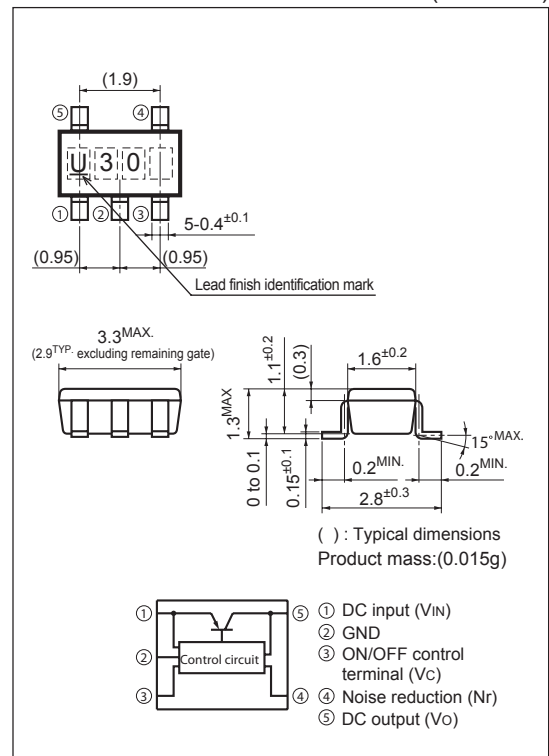
( $T_a=25^\circ\text{C}$ )

Parameter	Symbol	Rating	Unit
*1 Input voltage	$V_{IN}$	16	V
*1 ON/OFF control terminal voltage	$V_C$	16	V
Output current	$I_o$	300	mA
*2 Power dissipation	$P_D$	350	mW
*3 Junction temperature	$T_j$	150	$^\circ\text{C}$
Operating temperature	$T_{opr}$	-30 to +85	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$
Soldering temperature	$T_{sol}$	270(10s)	$^\circ\text{C}$

- \*1 All are open except GND and applicable terminals.  
\*2 At mounted on PCB  
\*3 Overheat protection may operate at  $T_j=125^\circ\text{C}$  to  $150^\circ\text{C}$

### Outline Dimensions

(Unit : mm)



Lead finish: Lead-free solder plating  
(Composition: Sn2Cu)

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### Electrical Characteristics

(Unless otherwise specified,  $V_{IN}=V_O(TYP) + 1.0V$ ,  $I_o=30mA$ ,  $V_C=1.8V$ ,  $T_a=25^\circ C$ )

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	RegL1	$I_o=5$ to 60mA	-	10	50	mV
	RegL2	$I_o=5$ to 100mA	-	20	100	mV
	RegL3	$I_o=5$ to 150mA	-	30	160	mV
Line regulation	RegL	$V_{IN}=V_O(TYP)+1V$ to $V_O(TYP)+6V$	-	3.0	20	mV
Temperature coefficient of output voltage	$T_C V_O$	$I_o=10mA$ , $T_j=-25$ to $+75^\circ C$	-	0.05	-	mV/ $^\circ C$
Ripple rejection	RR	Refer to Fig.2	-	70	-	dB
Output noise voltage	$V_{no}(rms)$	$10Hz < f < 100kHz$ , $C_n=0.1\mu F$ , $I_o=30mA$	Refer to the following table.2			$\mu V$
*8 Dropout voltage	$V_{I-O1}$	$I_o=60mA$ *5	-	0.11	0.26	V
	$V_{I-O2}$	$I_o=150mA$ *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	$\mu A$
OFF-state voltage for control	$V_{C(OFF)}$	-	-	-	0.4	V
Quiescent current	$I_q$	$I_o=0mA$	-	130	200	$\mu A$
Output OFF-state dissipation current	$I_{qs}$	$V_C=0.2V$	-	-	1	$\mu A$

- \*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  $V_{IN}=V_O(TYP)+1.0V$ .
- \*6 In case that the control terminal (③ pin) is open, output voltage should be OFF state.
- \*7 In case of **PQ1U181M2ZPH**,  $V_{IN}$  minimum=2.3V.
- \*8 Excluding **PQ1U181M2ZPH**

Table.1 Output Voltage

$(V_{IN}=V_O(TYP)+1.0V, I_o=30mA, V_C=1.8V, T_a=25^\circ C)$

Model No.	Symbol	MIN.	TYP.	MAX.	Unit
<b>PQ1U181M2ZPH</b>	$V_O$	1.740	1.8	1.860	V
<b>PQ1U251M2ZPH</b>		2.440	2.5	2.560	
<b>PQ1U281M2ZPH</b>		2.740	2.8	2.860	
<b>PQ1U301M2ZPH</b>		2.940	3.0	3.060	
<b>PQ1U331M2ZPH</b>		3.234	3.3	3.366	
<b>PQ1U351M2ZPH</b>		3.430	3.5	3.570	
<b>PQ1U501M2ZPH</b>		4.900	5.0	5.100	

Table.2 Output Noise Voltage

$(V_{IN}=V_O(TYP)+1.0V, I_o=30mA, V_C=1.8V, C_n=0.1\mu F, 10Hz < f < 100kHz, T_a=25^\circ C)$

Model No.	Symbol	MIN.	TYP.	MAX.	Unit
<b>PQ1U181M2ZPH</b>	$V_{no}(rms)$	-	15	-	$\mu V$
<b>PQ1U251M2ZPH</b>		-	25	-	
<b>PQ1U281M2ZPH</b>		-	25	-	
<b>PQ1U301M2ZPH</b>		-	30	-	
<b>PQ1U331M2ZPH</b>		-	30	-	
<b>PQ1U351M2ZPH</b>		-	35	-	
<b>PQ1U501M2ZPH</b>		-	50	-	

Fig.1 Test Circuit

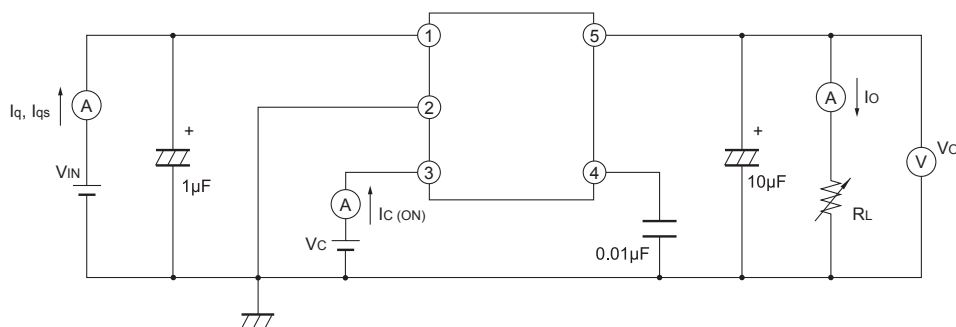


Fig.2 Test Circuit for Ripple Rejection

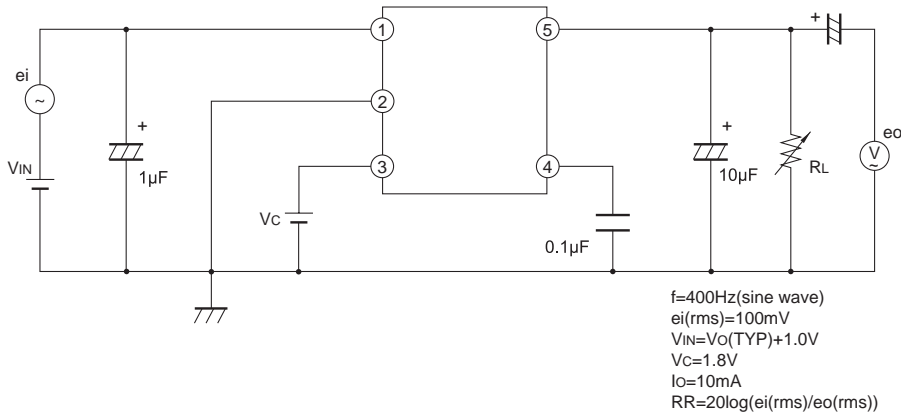
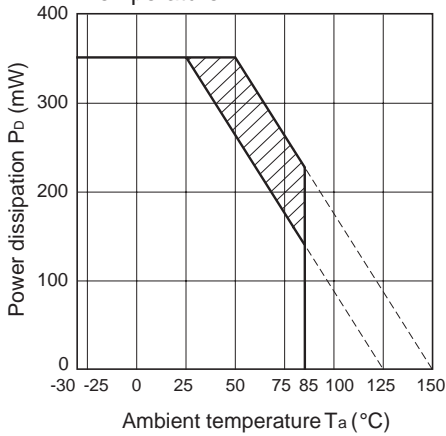


Fig.3 Power Dissipation vs. Ambient Temperature



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

Fig.4 Overcurrent Protection Characteristics (Typical Value)

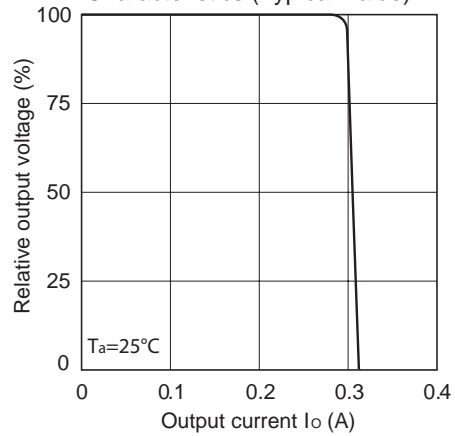


Fig.5 Output Voltage Fluctuation vs. Junction Temperature (PQ1U281M2ZPH)(Typical Value)

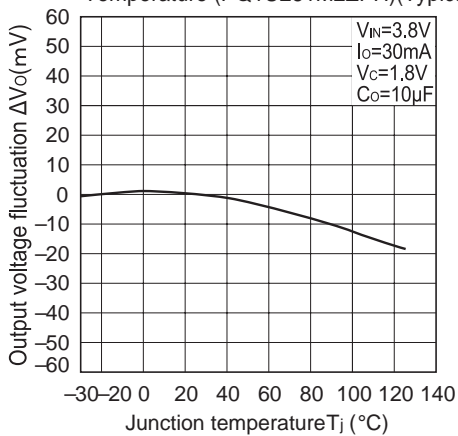


Fig.6 Output Voltage vs. Input Voltage (PQ1U281M2ZPH)(Typical Value)

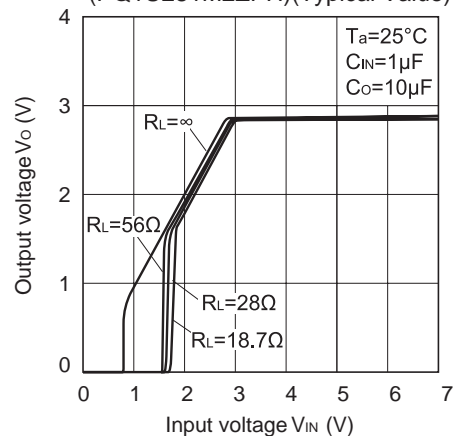


Fig.7 Circuit Operating Current vs. Input Voltage (PQ1U281M2ZPH)(Typical Value)

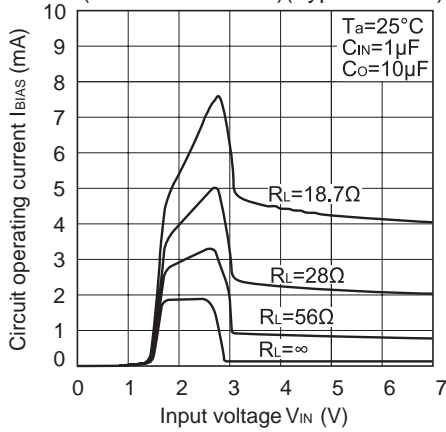


Fig.8 Dropout Voltage vs. Junction Temperature (PQ1U281M2ZPH)(Typical Value)

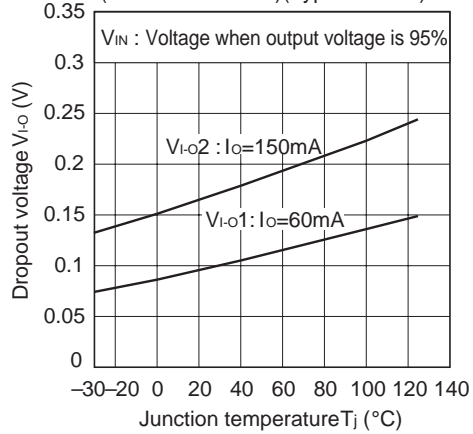


Fig.9 Quiescent Current vs. Junction Temperature (Typical Value)

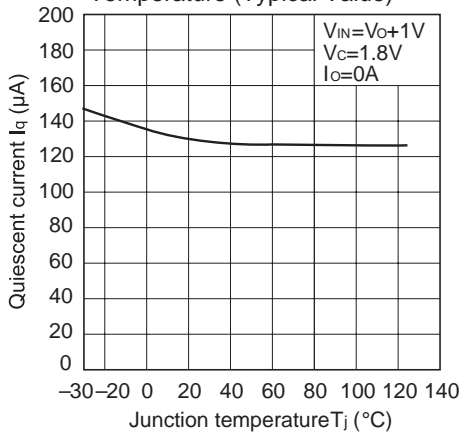


Fig.10 Ripple Rejection vs. Input Ripple Frequency (PQ1U281M2ZPH)(Typical Value)

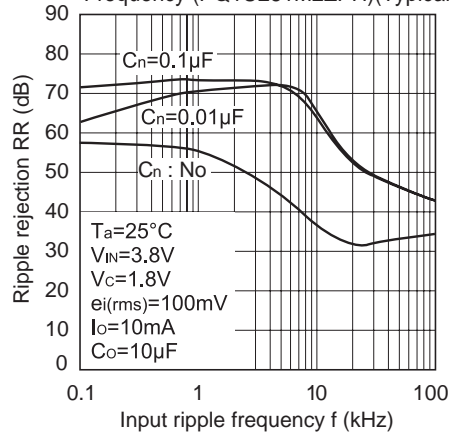
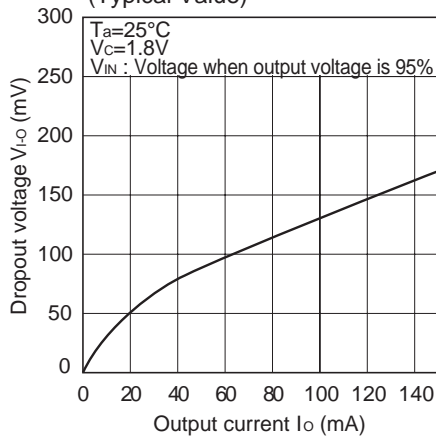


Fig.11 Dropout Voltage vs. Output Current (Typical Value)



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