

## PQ1Nxx3MxSPQ Series

Compact Surface Mount Type  
Low Power-Loss Voltage Regulators

### Features

1. Compact surface mount package (4.5×4.3×1.5mm)
2. Output current : MAX.350mA
3. Power dissipation : MAX.900mW
4. Low power-loss  
(Dropout voltage : MAX. 0.7V at  $I_o=350mA$ )
5. Built-in reset signal generating function
6. Built-in overcurrent, overheat protection functions
7. Use of ceramic capacitor is possible as output smooth capacitor
8. RoHS directive compliant

### Applications

1. Optical disk drive
2. DVD player

### Absolute Maximum Ratings

( $T_a=25^\circ C$ )

Parameter	Symbol	Rating	Unit
*1 Input voltage	$V_{IN}$	9	V
*1 Reset output voltage	$V_r$	9	V
Output current	$I_o$	350	mA
*1 Reset output current	$I_r$	5	mA
*2 Power dissipation	$P_D$	900	mW
*3 Junction temperature	$T_j$	150	$^\circ C$
Operating temperature	$T_{opr}$	-30 to +85	$^\circ C$
Storage temperature	$T_{stg}$	-55 to +150	$^\circ C$
Soldering temperature	$T_{sol}$	270(10s)	$^\circ C$

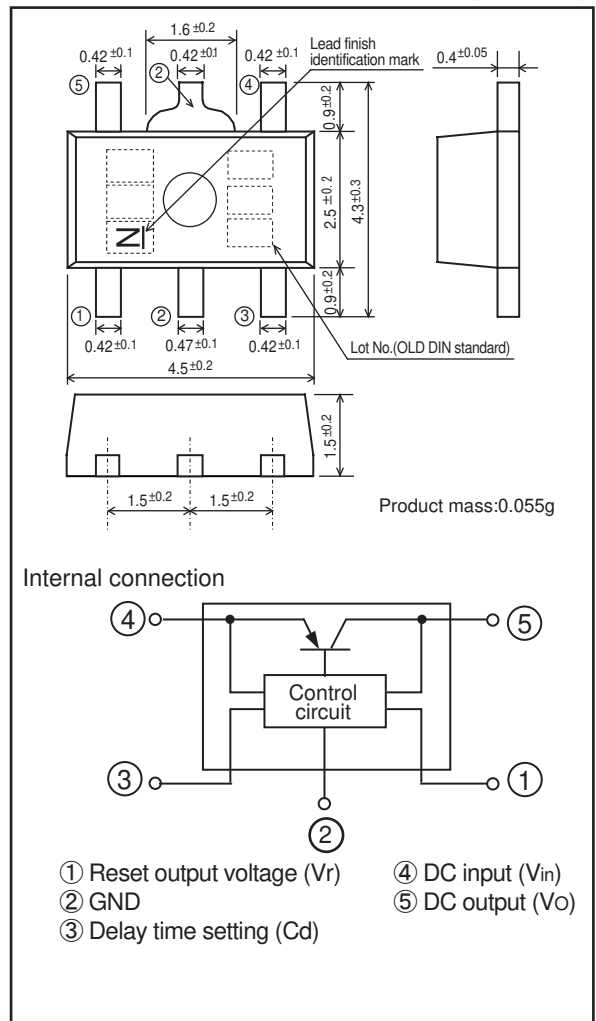
\*1 All are open except GND and applicable terminals.

\*2 At surface-mounted condition

\*3 Overheat protection may operate at  $T_j:125^\circ C$  to  $150^\circ C$

### Outline Dimensions

(Unit : mm)



Lead finish: Lead-free solder plating  
(Composition: Sn2Bi)

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In the absence of confirmation by device specification sheets, SHARP takes no responsibility for any defects that may occur in equipment using any SHARP devices shown in catalogs, data books, etc. Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device.

### Electrical Characteristics

(Unless otherwise specified,  $V_{in}=5V$ ,  $I_o=30mA$ ,  $T_a=25^\circ C$ )

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output voltage	PQ1N253MxSPQ	-	2.440	2.50	2.560	V
	PQ1N333MxSPQ		3.234	3.30	3.366	
Load regulation	RegL	$I_o=5mA$ to $350mA$	-	60	160	mV
Line regulation	Regl	$V_{in}=5$ to $9V$	-	5.0	20	mV
Temperature coefficient of output voltage	TcVo	$I_o=10mA$ , $T_j=-25$ to $+75^\circ C$	-	0.1	-	mV/ $^\circ C$
Ripple rejection	RR	Refer to Fig.2	-	55	-	dB
Output noise voltage	$V_{no(rms)}$	$10Hz < f < 100kHz$ , $I_o=30mA$	-	60	-	$\mu V$
Dropout voltage	$V_{i-o}$	$I_o=350mA$ *4	-	0.45	0.7	V
Quiescent current	$I_q$	$I_o=0mA$	-	1.0	2	mA
Input detecting voltage	$V_{ri}$	$I_o=5mA$ , $V_r < 0.8V$ , $R_r=10k\Omega$	Refer to list.1			V
Hysteresis voltage	$\Delta V_{ri}$	$I_o=5mA$ , $R_r=10k\Omega$	-	$V_{ri} \times 0.05$	-	V
Low reset output voltage	$V_{rl}$	$I_r=5mA$ , $3V < V_{in} < V_{ri}$	-	-	0.8	V
Reset output leak current	$I_{rlk}$	$V_r=5V$ , $R_r=10k\Omega$	-	-	5	$\mu A$
*5 Reset output delay time	$T_d$	$V_{in}=0 \rightarrow 5V$ , $V_r \geq 0.8V$ , $C_d=0.47\mu F$	50	100	150	ms

\*4 Input voltage when output voltage falls 0.1V from that at  $V_{in}=5V$

\*5 Reset output delay time(TYP.) is obtained by the following equation  
 $t_d(TYP.)=100 \times C_d(\mu F) \times 0.47$  (ms)

#### List.1 Input detecting voltage

( $V_{in}=V_o(TYP.)+1.0V$ ,  $V_c=1.8V$ ,  $I_o=30mA$ ,  $T_a=25^\circ C$ )

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input detecting voltage	PQ1N253MASPQ	-	4.116	4.2	4.284	V
	PQ1N253MCSPQ		3.724	3.8	3.876	
	PQ1N333MASPQ		4.116	4.2	4.284	
	PQ1N333MCSPQ		3.724	3.8	3.876	

Fig.1 Standard measuring circuit of Regulator portion

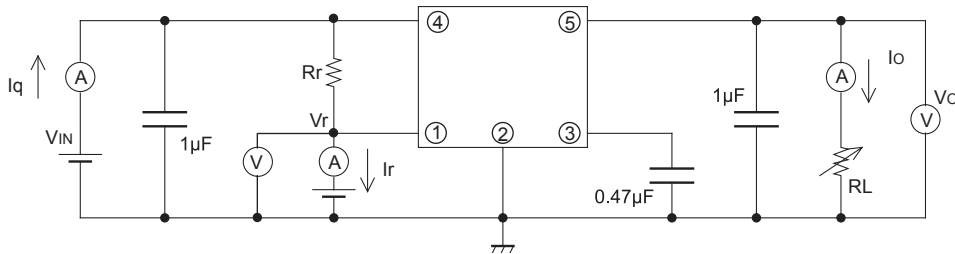
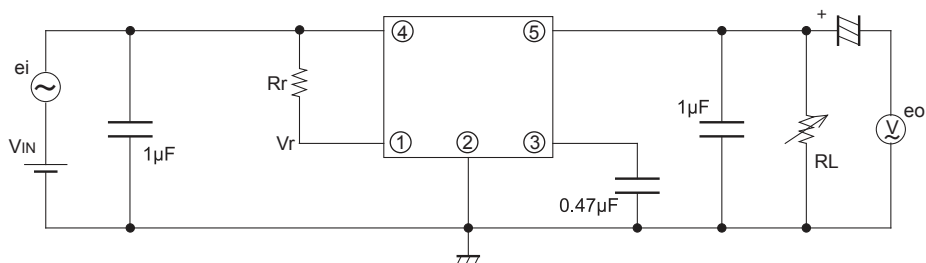
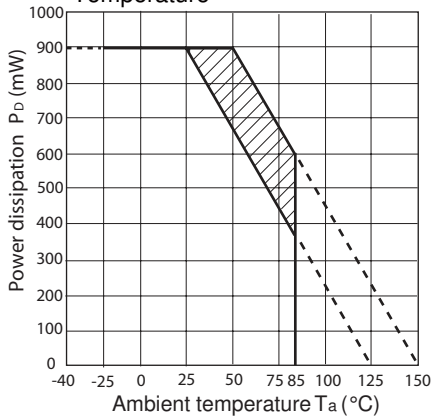


Fig.2 Standard measuring circuit of critical rate of ripple rejection



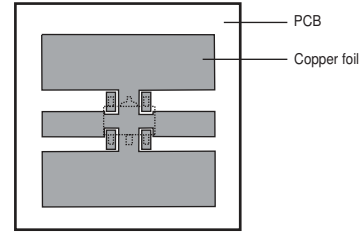
$f=400$  Hz(sine wave)  
 $e_i(rms)=100$  mV  
 $V_{in}=5.0V$   
 $R_r=10k\Omega$   
 $I_o=30mA$   
 $RR=20\log(e_i(rms)/e_o(rms))$

Fig.3 Power Dissipation vs. Ambient Temperature



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

Mounting PCB



Material : Glass-cloth epoxy resin  
 PCB Size : 20mm x 20mm x 1.0mm  
 Copper foil area : 180mm<sup>2</sup>  
 Thickness of copper : 35μm

Fig.4 Overcurrent Protection Characteristics

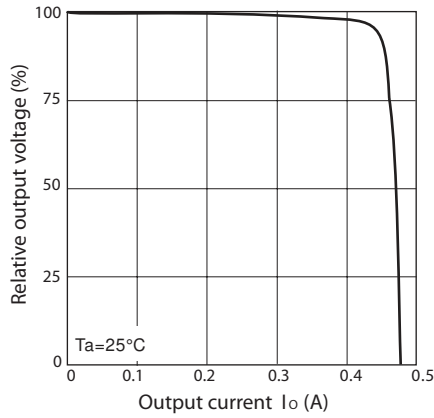


Fig.5 Output Voltage vs. Input Voltage (PQ1N333MASPQ)

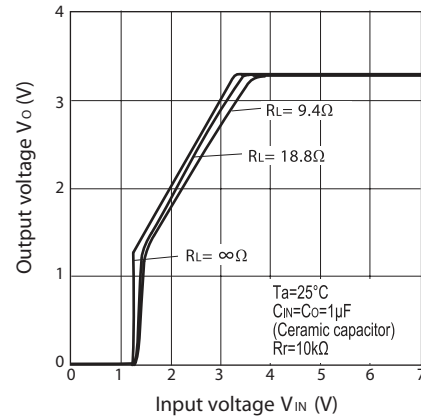


Fig.6 Circuit Operating Current vs. Input Voltage (PQ1N333MASPQ)

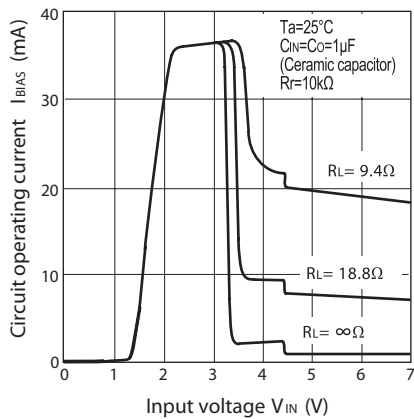


Fig.7 Quiescent Current vs. Junction Temperature

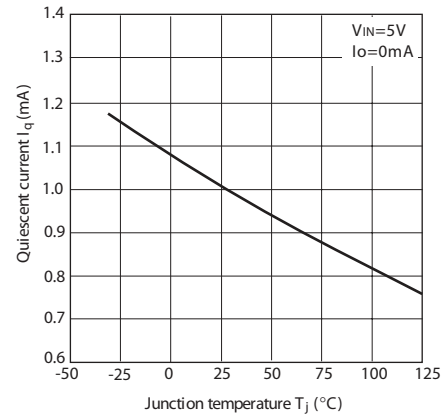


Fig.8 Dropout Voltage vs. Junction Temperature (PQ1N333MASPQ)

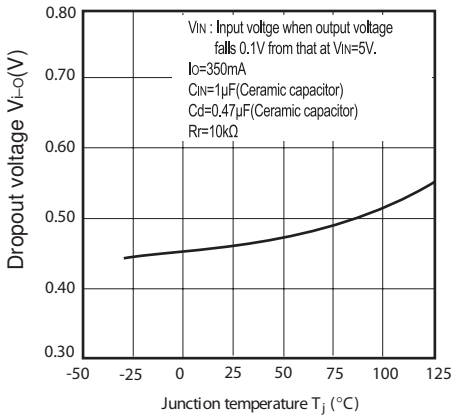


Fig.9 Reference Voltage Deviation vs. Junction Temperature (PQ1N333MASPQ)

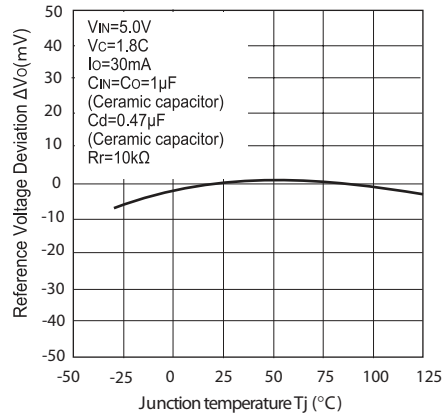


Fig.10 Dropout Voltage vs. Output Current

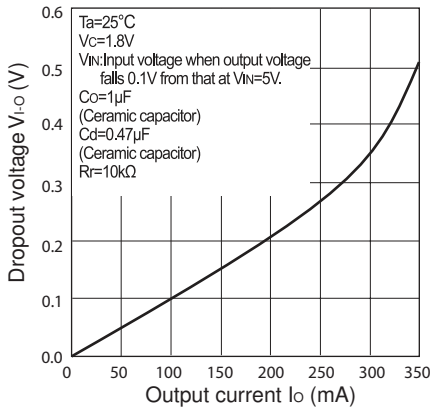


Fig.11 Reset Output Voltage vs. Input Voltage

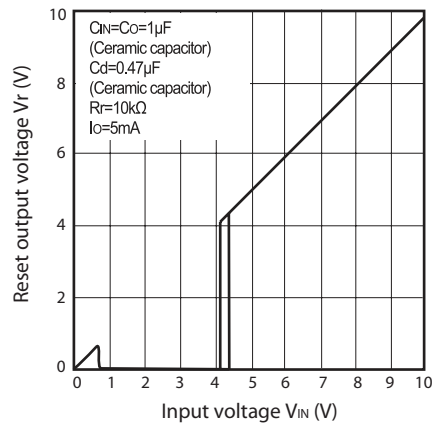


Fig.12 Input Detecting Voltage vs. Junction Temperature

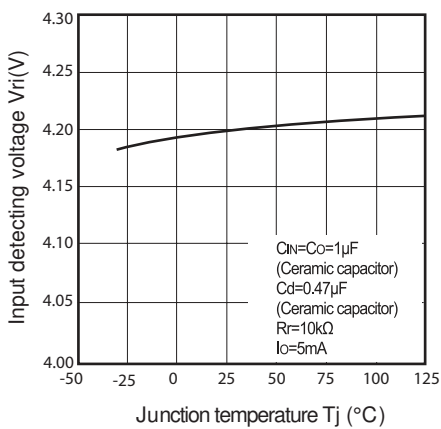


Fig.13 Hysteresis Voltage vs. Junction Temperature

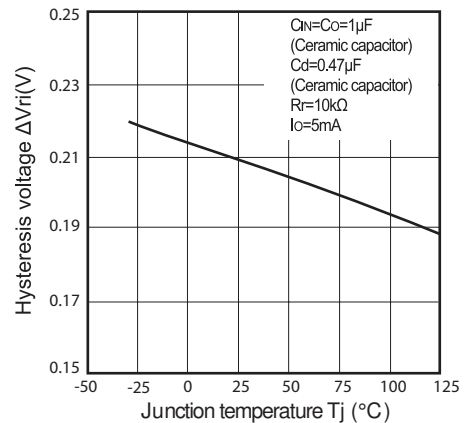


Fig.14 Ripple Rejection vs. Input Ripple Frequency (PQ1N333MASPQ)

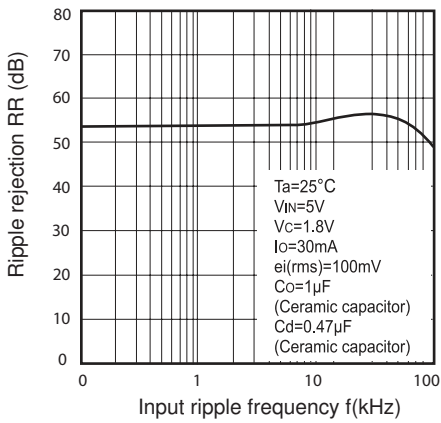


Fig.15 Reset Output Delay Time vs. Delay Time Setting

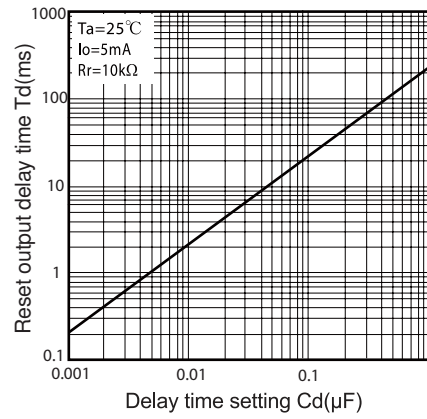


Fig.16 Output Peak Current vs. Junction Temperature

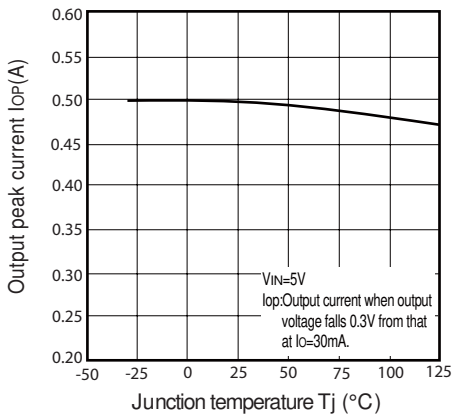


Fig.17 Example of application

