PQxxxDNA1ZPH Series

Compact Surface Mount type
Low Power-Loss Voltage Regulators

■ Features

1.Output current : 1A
2.High isolation voltage V_{IN}:MAX.24 V
3.Low dissipation current
(Dissipation current at no load: MAX. 8mA
Output OFF-state dissipation current: MAX.5μA)
4.Built-in ON/OFF function
5.Built-in overcurrent and overheat protection functions
6.Built-in ASO protection function
7.Ceramic capacitor compatible
8.RoHS directive compliant

■ Applications

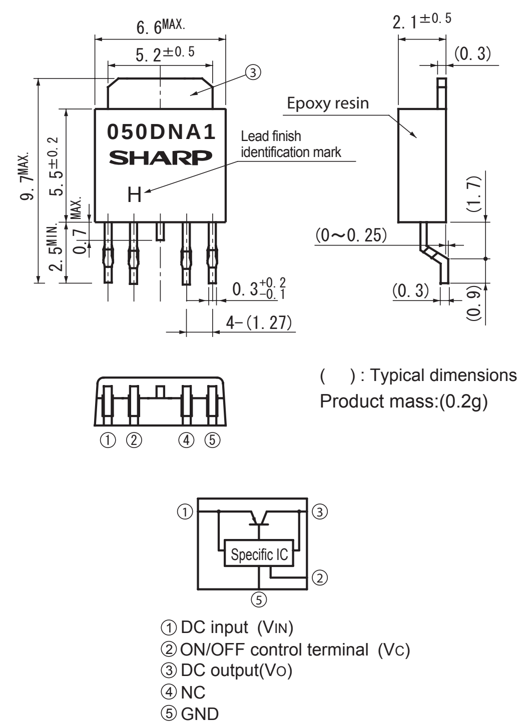
1.AV equipment
2.OA equipment

■ Model Line-up

Output Voltage (TYP.)	Model No.
3.3V	**PQ033DNA1ZPH**
5.0V	**PQ050DNA1ZPH**
8.0V	**PQ080DNA1ZPH**
9.0V	**PQ090DNA1ZPH**
12.0V	**PQ120DNA1ZPH**

■ Outline Dimensions

(Unit : mm)



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

■ Absolute Maximum Ratings

(Ta=25°C)

Parameter	Symbol	Rating	Unit
*1 Input voltage	V_{IN}	24	V
*1 Output control voltage	V_C	24	V
Output current	I_O	1	A
*2 Power dissipation	P_D	8	W
*3 Junction temperature	T_j	150	°C
Operating temperature	T_{opr}	-40 to +85	°C
Storage temperature	T_{stg}	-40 to +150	°C
Soldering temperature	T_{sol}	260(10s)	°C

*1 All are open except GND and applicable terminals.
*2 P_D: With infinite heat sink
*3 Overheat protection may operate at Tj:125°C to 150°C

Electrical Characteristics

(1) PQ033DNA1ZPH

(Unless otherwise specified,condition shall be V_{IN}=5V,I_O=0.5A,V_C=2.7V,Ta=25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output voltage	V_O	-	3.218	3.3	3.382	V
Load regulation	RegL	I_O=5mA to 1A	-	0.2	1.0	%
Line regulation	RegI	V_{IN}=4 to 14V,I_O=5mA	-	0.2	1.0	%
Temperature coefficient of output voltage	T_CV_O	Tj=0 to +125°C, I_O=5mA	-	±0.01	-	%/°C
Ripple rejection	RR	Refer to Fig.3	-	60	-	dB
Dropout voltage	V_{I-O}	V_{IN}=3.5V,I_O=0.5A	-	0.2	0.5	V
※5 ON-state voltage for control	$V_{C(ON)}$	-	2.0	-	-	V
ON-state current for control	$I_{C(ON)}$	V_C=2.7V	-	-	200	μA
OFF-state voltage for control	$V_{C(OFF)}$	-	-	-	0.8	V
OFF-state current for control	$I_{C(OFF)}$	V_C=0.4V	-	-	2	μA
Quiescent current	I_q	I_O=0A	-	4	8	mA
Output OFF-state dissipation current	I_{qs}	I_O=0A, V_C=0.4V	-	-	5	μA

※5 In case of opening control terminal ②, output voltage turns off

(2) PQ050DNA1ZPH

(Unless otherwise specified,condition shall be V_{IN}=7V,I_O=0.5A,V_C=2.7V,Ta=25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output voltage	V_O	-	4.875	5.0	5.125	V
Load regulation	RegL	I_O=5mA to 1A	-	0.2	1.0	%
Line regulation	RegI	V_{IN}=6 to 16V,I_O=5mA	-	0.2	1.0	%
Temperature coefficient of output voltage	T_CV_O	Tj=0 to +125°C, I_O=5mA	-	±0.01	-	%/°C
Ripple rejection	RR	Refer to Fig.3	-	60	-	dB
Dropout voltage	V_{I-O}	※4,I_O=0.5A	-	0.2	0.5	V
※5 ON-state voltage for control	$V_{C(ON)}$	-	2.0	-	-	V
ON-state current for control	$I_{C(ON)}$	V_C=2.7V	-	-	200	μA
OFF-state voltage for control	$V_{C(OFF)}$	-	-	-	0.8	V
OFF-state current for control	$I_{C(OFF)}$	V_C=0.4V	-	-	2	μA
Quiescent current	I_q	I_O=0A	-	4	8	mA
Output OFF-state dissipation current	I_{qs}	I_O=0A, V_C=0.4V	-	-	5	μA

※4 Input voltage shall be the value when output voltage is 95% in comparison with the initial value.
※5 In case of opening control terminal ②, output voltage turns off

(3) PQ080DNA1ZPH

(Unless otherwise specified,condition shall be V_{IN}=10V,I_O=0.5A,V_C=2.7V,Ta=25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output voltage	V_O	-	7.8	8.0	8.2	V
Load regulation	RegL	I_O=5mA to 1A	-	0.2	1.0	%
Line regulation	RegI	V_{IN}=9 to 19V,I_O=5mA	-	0.2	1.0	%
Temperature coefficient of output voltage	T_CV_O	Tj=0 to +125°C, I_O=5mA	-	±0.01	-	%/°C
Ripple rejection	RR	Refer to Fig.3	-	60	-	dB
Dropout voltage	V_{I-O}	※4,I_O=0.5A	-	0.2	0.5	V
※5 ON-state voltage for control	$V_{C(ON)}$	-	2.0	-	-	V
ON-state current for control	$I_{C(ON)}$	V_C=2.7V	-	-	200	μA
OFF-state voltage for control	$V_{C(OFF)}$	-	-	-	0.8	V
OFF-state current for control	$I_{C(OFF)}$	V_C=0.4V	-	-	2	μA
Quiescent current	I_q	I_O=0A	-	4	8	mA
Output OFF-state dissipation current	I_{qs}	I_O=0A, V_C=0.4V	-	-	5	μA

※4 Input voltage shall be the value when output voltage is 95% in comparison with the initial value.
※5 In case of opening control terminal ②, output voltage turns off

(4) **PQ090DNA1ZPH**

(Unless otherwise specified,condition shall be V_{IN}=11V,I_O=0.5A,V_C=2.7V,Ta=25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output voltage	V_O	-	8.775	9.0	9.225	V
Load regulation	RegL	I_O=5mA to 1A	-	0.2	1.0	%
Line regulation	RegI	V_{IN}=10 to 20V,I_O=5mA	-	0.2	1.0	%
Temperature coefficient of output voltage	T_CV_O	Tj=0 to +125°C, I_O=5mA	-	±0.01	-	%/°C
Ripple rejection	RR	Refer to Fig.3	-	60	-	dB
Dropout voltage	V_{I-O}	※4,I_O=0.5A	-	0.2	0.5	V
※5 ON-state voltage for control	$V_{C(ON)}$	-	2.0	-	-	V
ON-state current for control	$I_{C(ON)}$	V_C=2.7V	-	-	200	μA
OFF-state voltage for control	$V_{C(OFF)}$	-	-	-	0.8	V
OFF-state current for control	$I_{C(OFF)}$	V_C=0.4V	-	-	2	μA
Quiescent current	I_q	I_O=0A	-	4	8	mA
Output OFF-state dissipation current	I_{qs}	I_O=0A, V_C=0.4V	-	-	5	μA

※4 Input voltage shall be the value when output voltage is 95% in comparison with the initial value.
※5 In case of opening control terminal ②, output voltage turns off

(5) **PQ120DNA1ZPH**

(Unless otherwise specified,condition shall be V_{IN}=14V,I_O=0.5A,V_C=2.7V,Ta=25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output voltage	V_O	-	11.7	12.0	12.3	V
Load regulation	RegL	I_O=5mA to 1A	-	0.2	1.0	%
Line regulation	RegI	V_{IN}=13 to 23V,I_O=5mA	-	0.2	1.0	%
Temperature coefficient of output voltage	T_CV_O	Tj=0 to +125°C, I_O=5mA	-	±0.01	-	%/°C
Ripple rejection	RR	Refer to Fig.3	-	60	-	dB
Dropout voltage	V_{I-O}	※4,I_O=0.5A	-	0.2	0.5	V
※5 ON-state voltage for control	$V_{C(ON)}$	-	2.0	-	-	V
ON-state current for control	$I_{C(ON)}$	V_C=2.7V	-	-	200	μA
OFF-state voltage for control	$V_{C(OFF)}$	-	-	-	0.8	V
OFF-state current for control	$I_{C(OFF)}$	V_C=0.4V	-	-	2	μA
Quiescent current	I_q	I_O=0A	-	4	8	mA
Output OFF-state dissipation current	I_{qs}	I_O=0A, V_C=0.4V	-	-	5	μA

※4 Input voltage shall be the value when output voltage is 95% in comparison with the initial value.
※5 In case of opening control terminal ②, output voltage turns off

Fig.1 Example of application

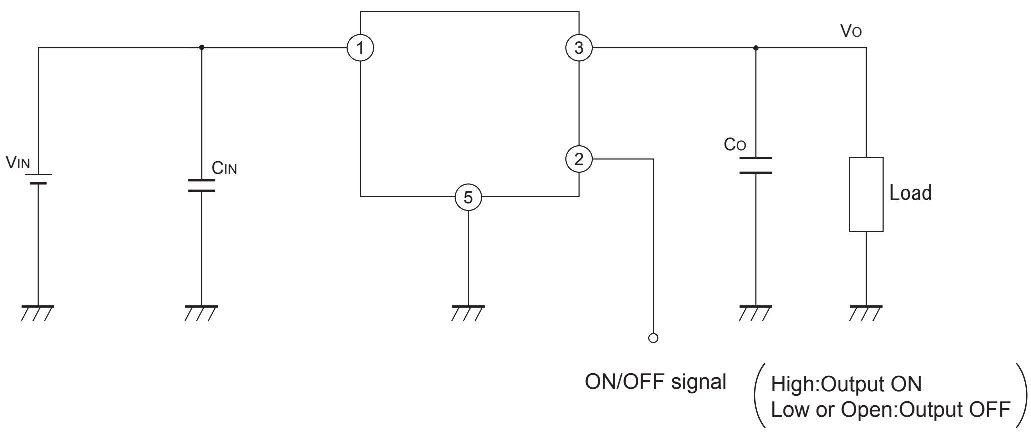


Fig.2 Test Circuit

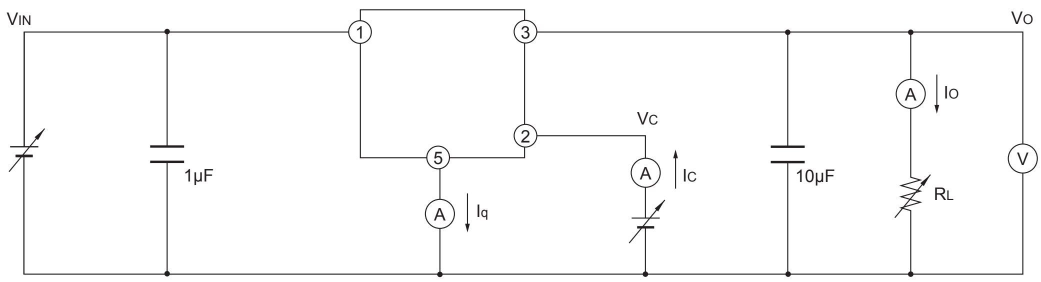
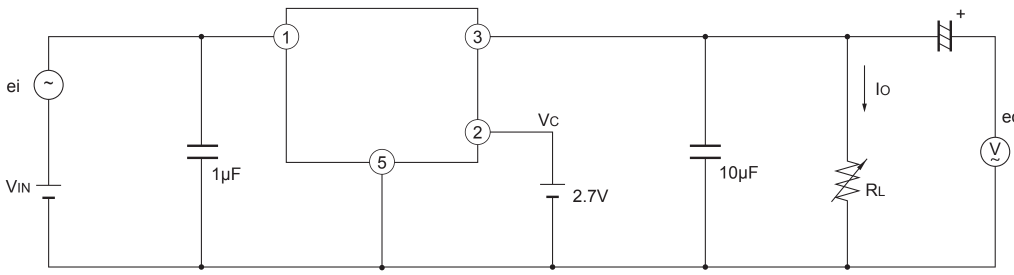
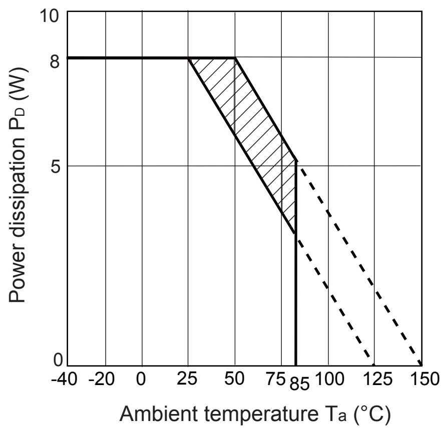


Fig.3 Test Circuit for Ripple Rejection



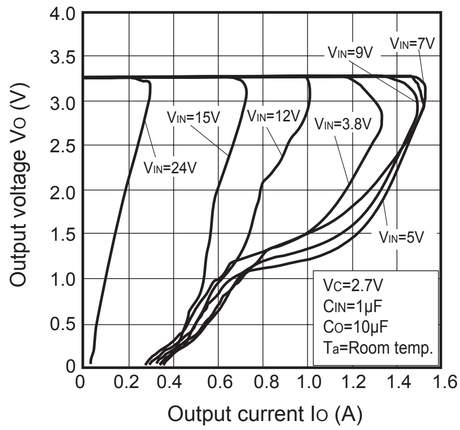
f=120Hz(sine wave)
ei(rms)=0.5V
V_{IN}= 5V (PQ033DNA1ZPH)
7V (PQ050DNA1ZPH)
10V (PQ080DNA1ZPH)
11V (PQ090DNA1ZPH)
14V (PQ120DNA1ZPH)
I_O=0.3A
RR=20log(ei(rms)/eo(rms))

Fig.4 Power Dissipation vs. Ambient Temperature



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

Fig.5 Overcurrent Protection Characteristics (**PQ033DNA1ZPH**)



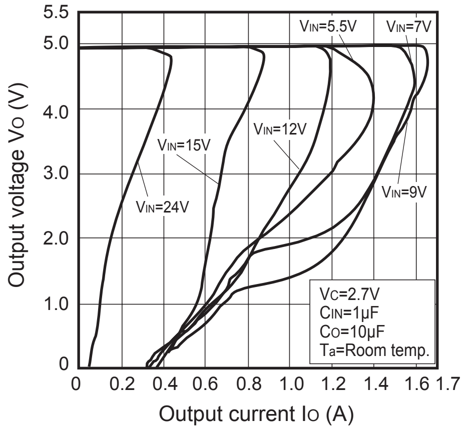


Fig.6 Overcurrent Protection Characteristics (**PQ050DNA1ZPH**)

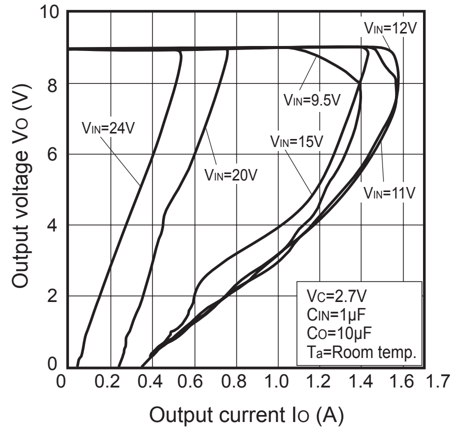


Fig.7 Overcurrent Protection Characteristics (**PQ090DNA1ZPH**)

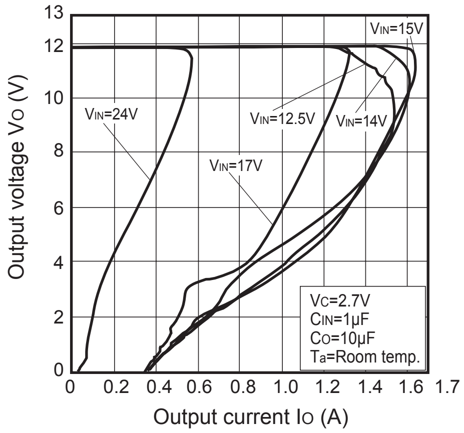


Fig.8 Overcurrent Protection Characteristics (**PQ120DNA1ZPH**)

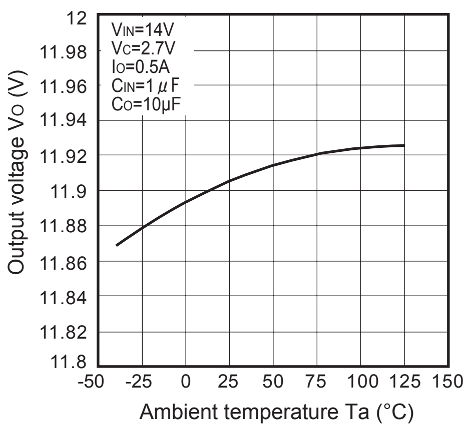


Fig.9 Output Voltage vs. Ambient Temperature (**PQ120DNA1ZPH**)

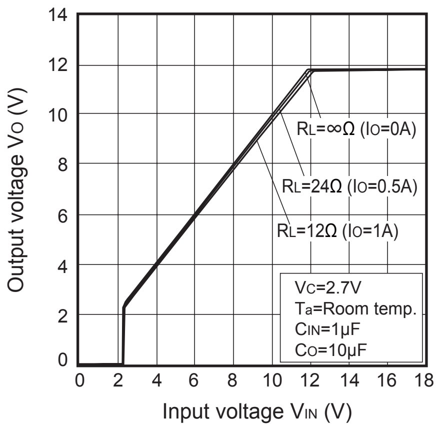


Fig.10 Output Voltage vs. Input Voltage (**PQ120DNA1ZPH**)

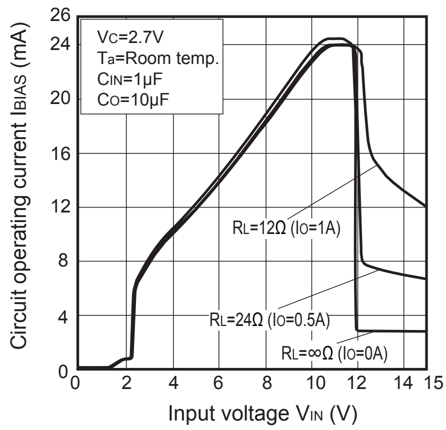


Fig.11 Circuit Operating Current vs. Input Voltage (**PQ120DNA1ZPH**)

Fig.12 Quiescent Current vs. Ambient Temperature (**PQ120DNA1ZPH**)

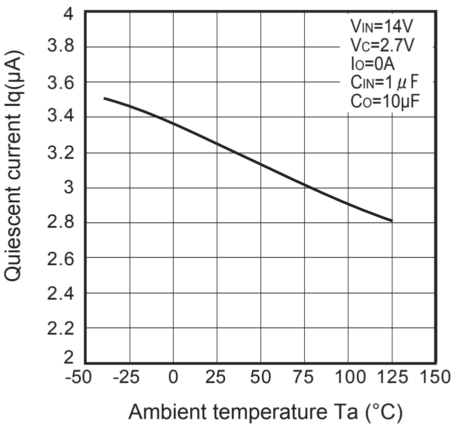


Fig.13 Dropout Voltage vs. Ambient Temperature (**PQ120DNA1ZPH**)

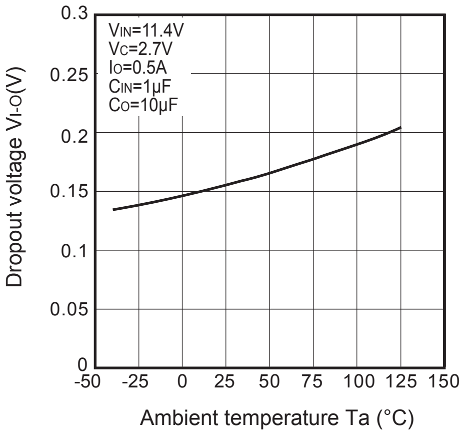


Fig.14 Ripple Rejection vs. Input Ripple Frequency (**PQ120DNA1ZPH**)

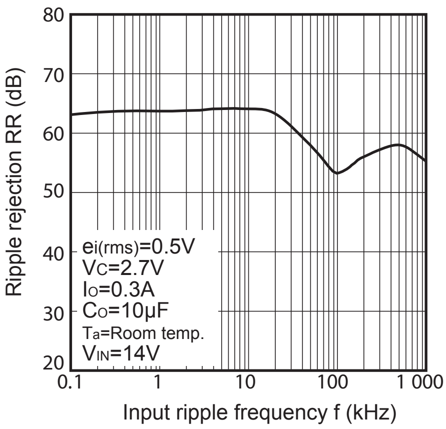


Fig.15 Ripple Rejection vs. Output Current (**PQ120DNA1ZPH**)

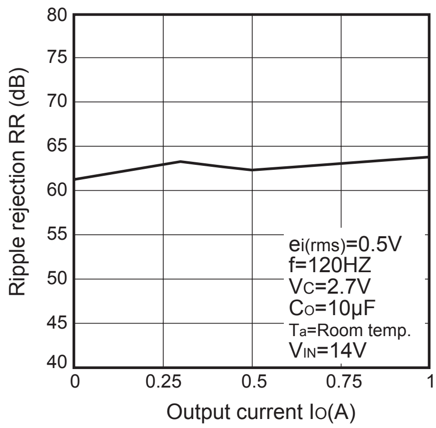
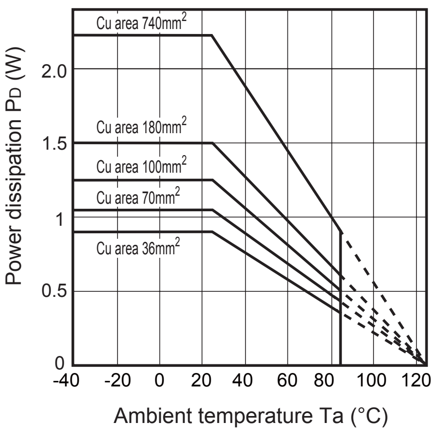
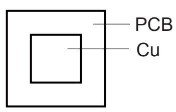


Fig.16 Power Dissipation vs. Ambient Temperature (Typical Value)



Mounting PCB



Material : Glass-cloth epoxy resin
Size : 50×50×1.6mm
Cu thickness : 35μm