

# PQxxxENA1ZPH Series

Low Voltage Operation, Compact Surface Mount type Low Power-Loss Voltage Regulators

## ■ Features

1. Low voltage operation  
(Minimum operating voltage: 2.35V)
2. Output current : 1A
3. Low dissipation current  
(Dissipation current at no load: MAX. 2mA  
Output OFF-state dissipation current: MAX. 5μA)
4. Compliant Ceramic capacitors
5. Built-in ON/OFF function
6. Built-in overcurrent and overheat protection functions
7. Conform to Flow Soldering SC-63 package
8. RoHS directive compliant

## ■ Applications

1. Personal computers and peripheral equipment
2. Power supplies for various digital electronic equipment such as DVD player or STB

## ■ Model Line-up

Output Voltage (TYP.)	Model No.
1.5V	<b>PQ015ENA1ZPH</b>
1.8V	<b>PQ018ENA1ZPH</b>
2.5V	<b>PQ025ENA1ZPH</b>
3.3V	<b>PQ033ENA1ZPH</b>

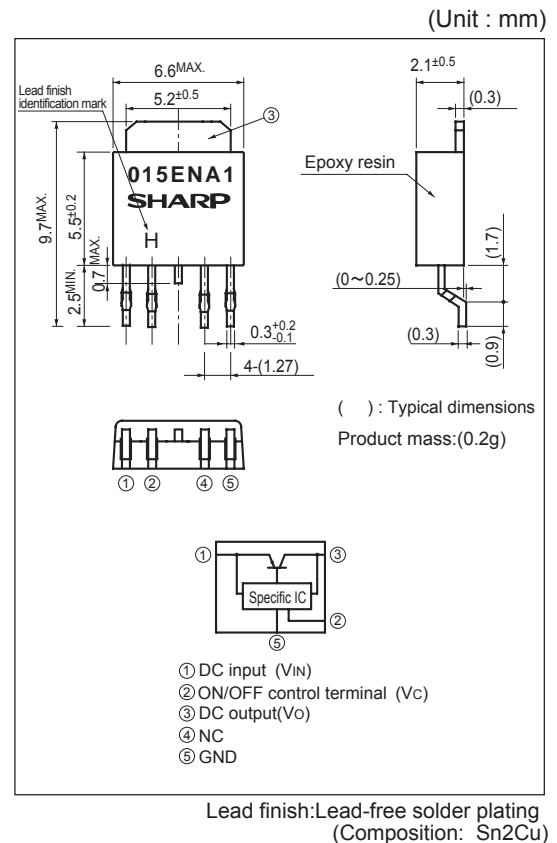
## ■ Absolute Maximum Ratings

(Ta=25°C)

Parameter	Symbol	Rating	Unit
*1 Input voltage	V <sub>IN</sub>	10	V
*1 Output control voltage	V <sub>C</sub>	10	V
Output current	I <sub>O</sub>	1	A
*2 Power dissipation	P <sub>D</sub>	8	W
*3 Junction temperature	T <sub>J</sub>	150	°C
Operating temperature	T <sub>opr</sub>	-40 to +85	°C
Storage temperature	T <sub>stg</sub>	-40 to +150	°C
Soldering temperature	T <sub>sol</sub>	260(10s)	°C

\*1 All are open except GND and applicable terminals.  
 \*2 At surface-mounted condition  
 \*3 Overheat protection may operate at T<sub>J</sub>:125°C to 150°C

## ■ Outline Dimensions



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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, condition shall be  $V_{IN}=V_O(TYP.)+1V, I_O=0.5A, V_C=2.7V, T_a=25^\circ C$ )

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input voltage	$V_{IN}$	-	Refer to the following table.1			V
Output voltage	$V_O$	-	Refer to the following table.2			V
Load regulation	RegL	$I_O=5mA$ to 1.0A	-	0.2	1.0	%
Line regulation	Regl	$V_{IN}=V_O(TYP.)+1V$ to $V_O(TYP.)+6V, I_O=5mA$	-	0.1	1.0	%
Temperature coefficient of output voltage	$T_C V_O$	$T_j=0$ to $+125^\circ C, I_O=5mA$	-	$\pm 0.01$	-	%/ $^\circ C$
Ripple rejection	RR	Refer to Fig.3	-	60	-	dB
*4 Dropout voltage	$V_{I-O}$	$I_O=0.5A$ *5	-	0.2	0.5	V
*6 ON-state voltage for control	$V_{C(ON)}$	-	2.0	-	-	V
ON-state current for control	$I_{C(ON)}$	-	-	-	200	$\mu A$
OFF-state voltage for control	$V_{C(OFF)}$	-	-	-	0.6	V
OFF-state current for control	$I_{C(OFF)}$	$V_C=0.4V$	-	-	5	$\mu A$
Quiescent current	$I_q$	$I_O=0A$	-	1	2	mA
Output OFF-state dissipation current	$I_{qs}$	$I_O=0A, V_C=0.4V$	-	-	5	$\mu A$

\*4 Applied to PQ033ENA1ZPH

\*5 Input voltage shall be the value when output voltage is 95% in comparison with the initial value.

\*6 In case of opening control terminal ②, output voltage turns off

Table.1 Input Voltage range

(Unless otherwise specified, condition shall be  $I_O=0.5A, V_C=2.7V, T_a=25^\circ C$ )

Model No.	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
PQ015ENA1ZPH	$V_{IN}$	-	2.35	-	10	V
PQ018ENA1ZPH	$V_{IN}$	-	2.35	-	10	V
PQ025ENA1ZPH	$V_{IN}$	-	3.0	-	10	V
PQ033ENA1ZPH	$V_{IN}$	-	3.8	-	10	V

Table.2 Output Voltage

(Unless otherwise specified, condition shall be  $V_{IN}=V_O(TYP.)+1V, I_O=0.5A, V_C=2.7V, T_a=25^\circ C$ )

Model No.	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
PQ015ENA1ZPH	$V_O$	-	1.47	1.5	1.53	V
PQ018ENA1ZPH	$V_O$	-	1.764	1.8	1.836	V
PQ025ENA1ZPH	$V_O$	-	2.45	2.5	2.55	V
PQ033ENA1ZPH	$V_O$	-	3.234	3.3	3.366	V

Fig.1 Typical Application

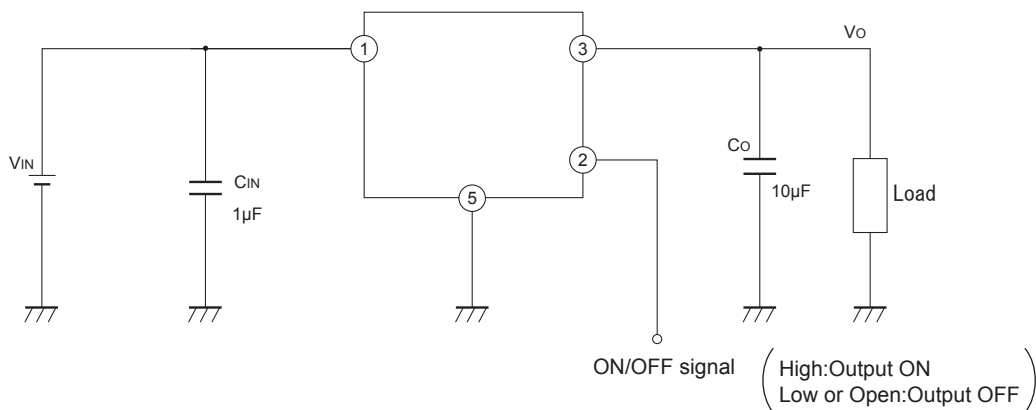


Fig.2 Test Circuit

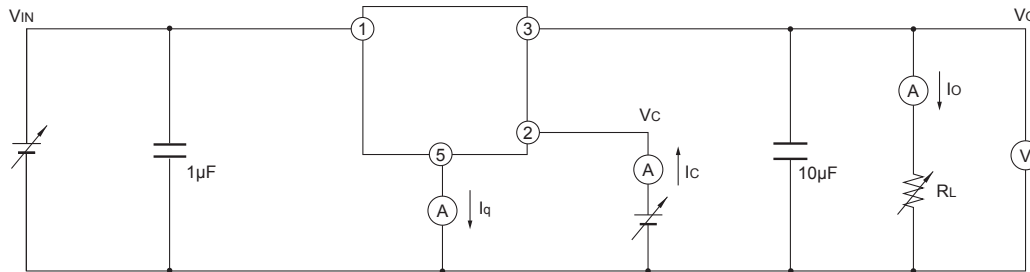


Fig.3 Test Circuit for Ripple Rejection

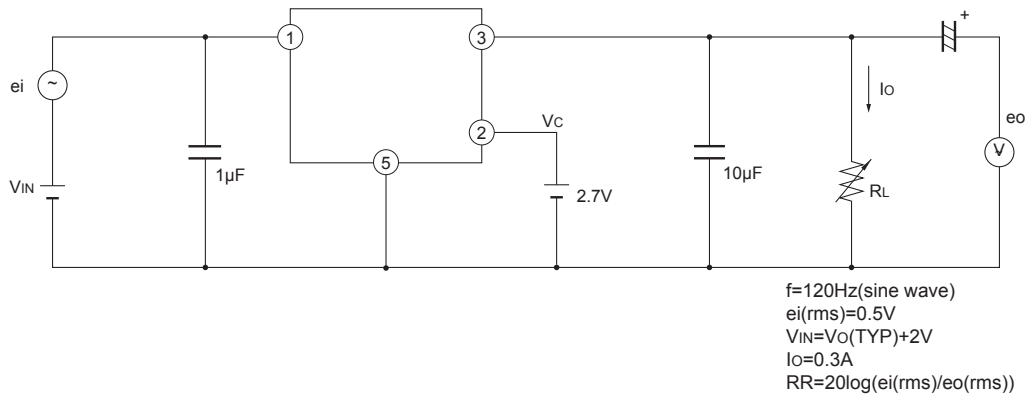
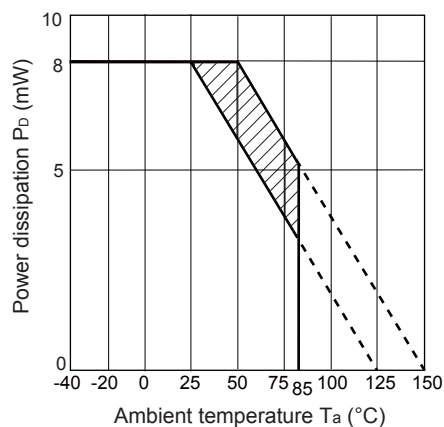


Fig.4 Power Dissipation vs. Ambient Temperature



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

Fig.5 Overcurrent Protection Characteristics (PQ015ENA1ZPH)

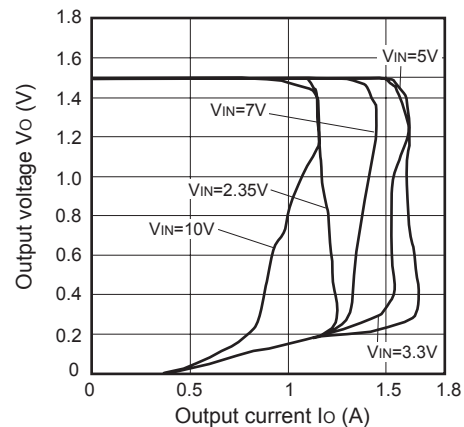


Fig.6 Overcurrent Protection Characteristics (PQ018ENA1ZPH)

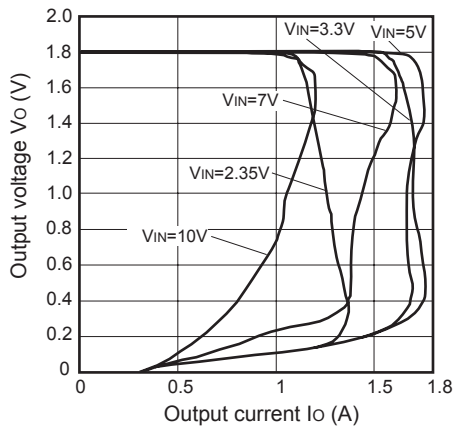


Fig.7 Overcurrent Protection Characteristics (PQ025ENA1ZPH)

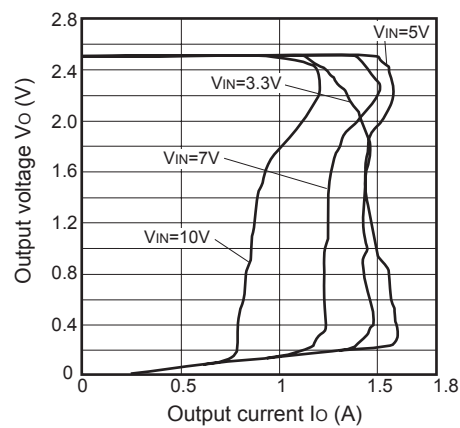


Fig.8 Overcurrent Protection Characteristics (PQ033ENA1ZPH)

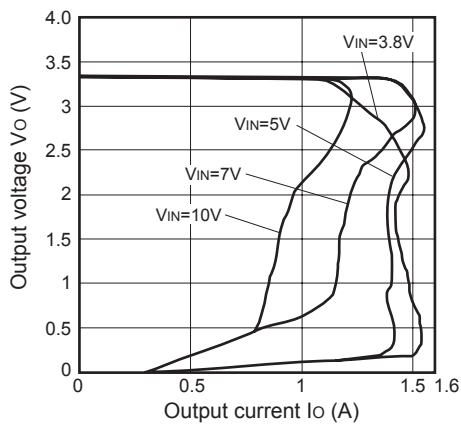


Fig.9 Output Voltage vs. Ambient Temperature (PQ025ENA1ZPH)

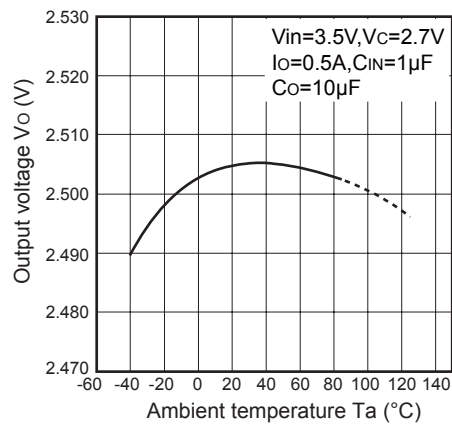


Fig.10 Output Voltage vs. Ambient Temperature (PQ033ENA1ZPH)

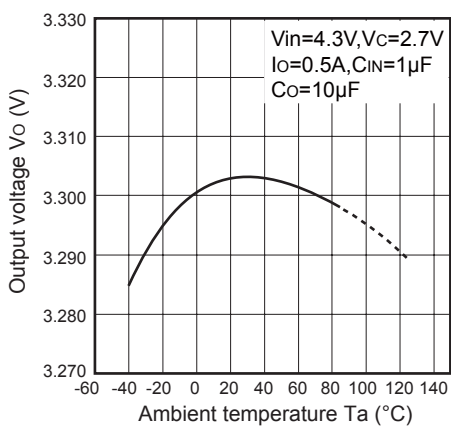


Fig.11 Dropout Voltage vs. Ambient Temperature (PQ025ENA1ZPH, PQ033ENA1ZPH)

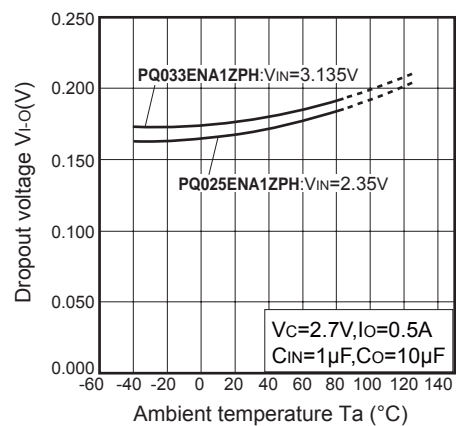


Fig.12 Line Regulation vs. Ambient Temperature

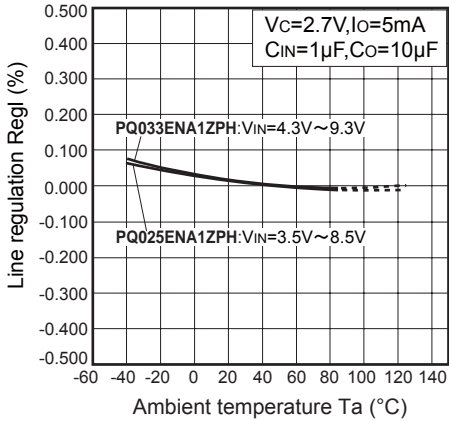


Fig.13 Load Regulation vs. Ambient Temperature

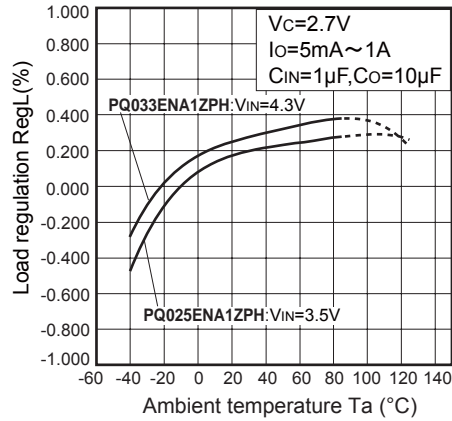


Fig.14 Quiescent Current vs. Ambient Temperature (PQxxxENA1ZPH)

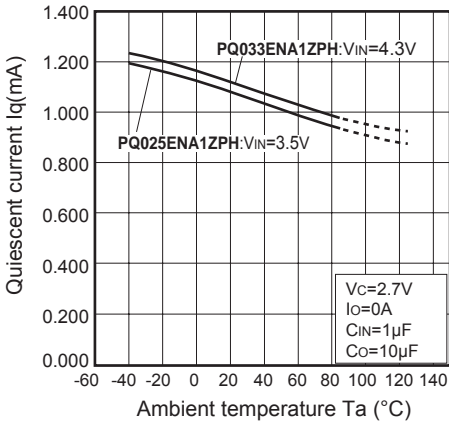


Fig.15 Output Voltage vs. ON/OFF Control Voltage (PQ033ENA1ZPH)

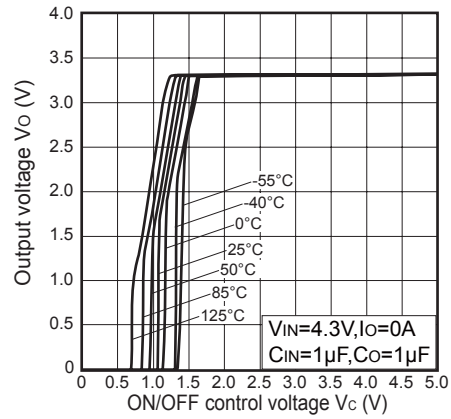


Fig.16 Output Voltage Deviation vs. Input Voltage (PQ025ENA1ZPH)

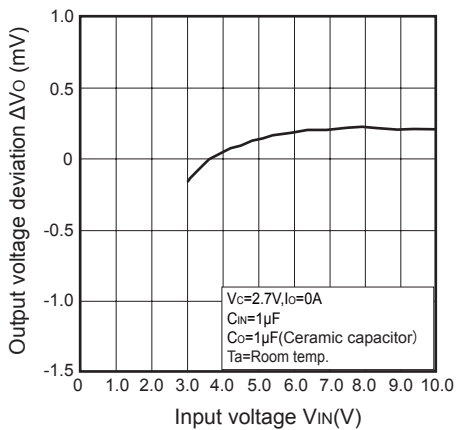


Fig.17 Output Voltage Deviation vs. Input Voltage (PQ033ENA1ZPH)

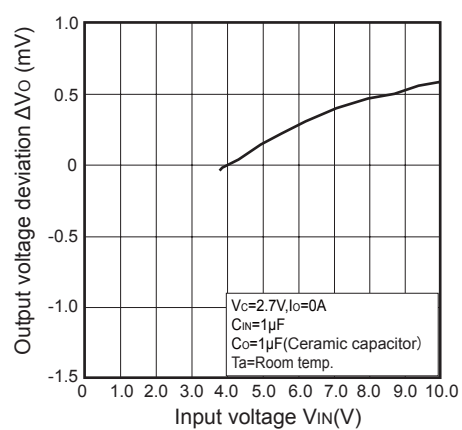


Fig.18 Output Voltage Deviation vs. Output Current

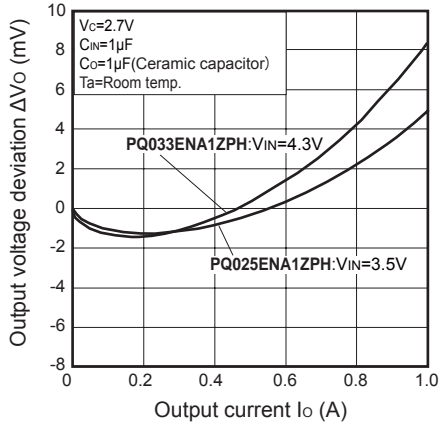


Fig.19 Output Voltage vs. Input Voltage (PQ025ENA1ZPH)

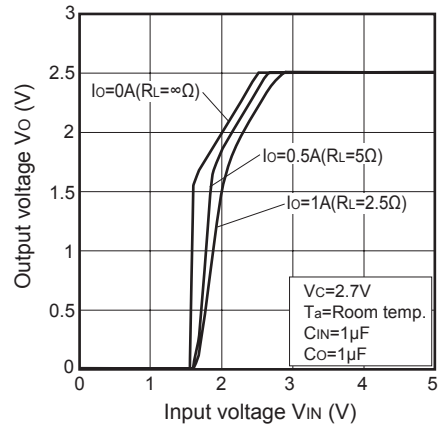


Fig.20 Output Voltage vs. Input Voltage (PQ033ENA1ZPH)

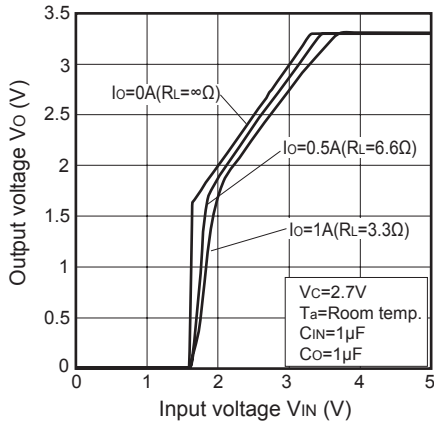


Fig.21 Circuit Operating Current vs. Input Voltage (PQ025ENA1ZPH)

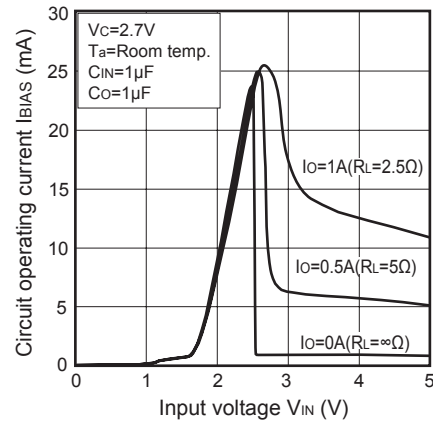


Fig.22 Circuit Operating Current vs. Input Voltage (PQ033ENA1ZPH)

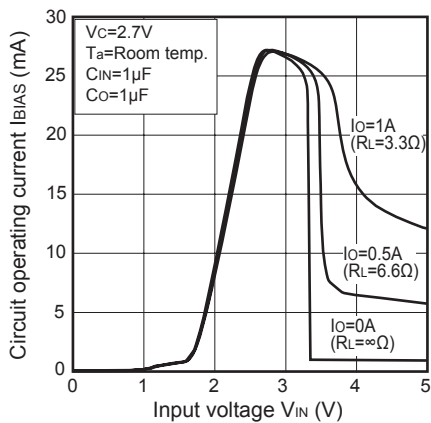


Fig.23 Dropout Voltage vs. Output Current (PQ025ENA1ZPH)

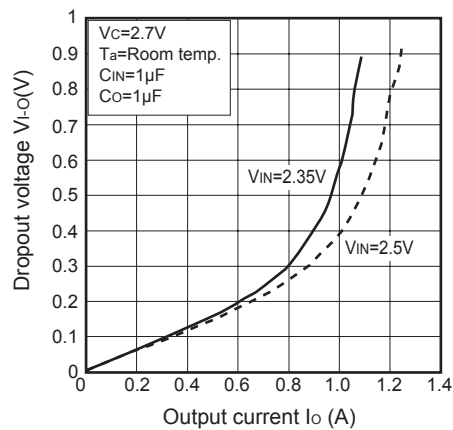


Fig.24 Dropout Voltage vs. Output Current (PQ033ENA1ZPH)

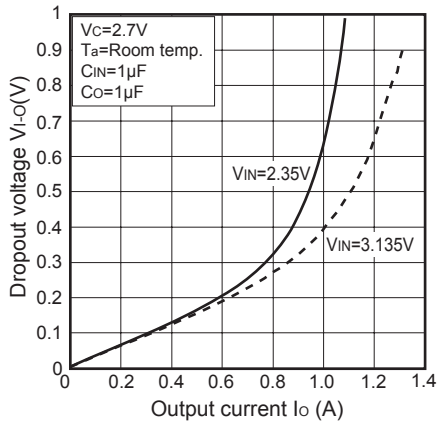


Fig.25 Ripple Rejection vs. Input Ripple Frequency (PQxxxENA1ZPH)

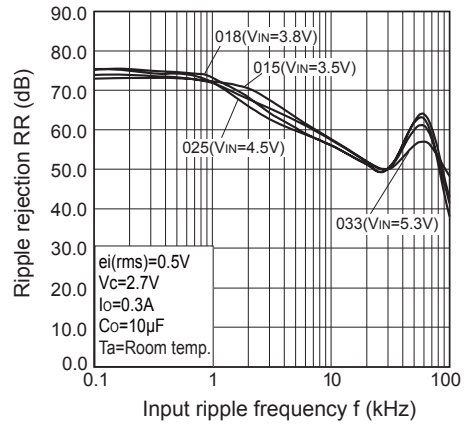


Fig.26 Ripple Rejection vs. Output Current (PQxxxENA1ZPH)

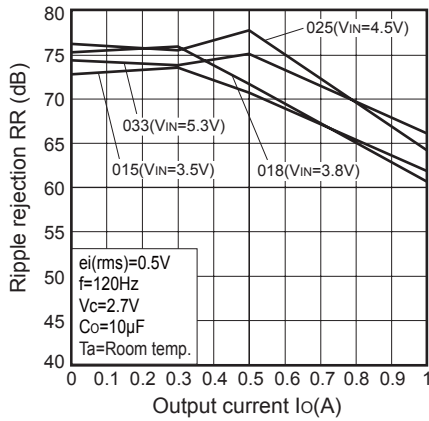
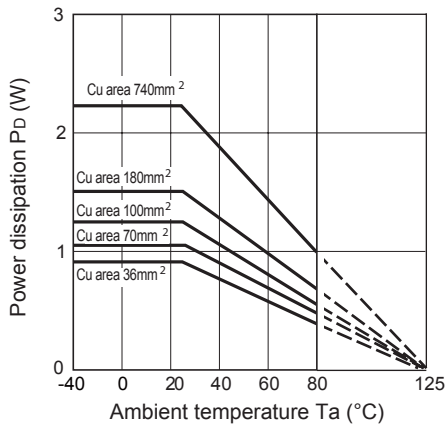
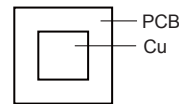


Fig.27 Power Dissipation vs. Ambient Temperature (Typical Value)



Mounting PCB



Material : Glass-cloth epoxy resin  
 Size :  $50 \times 50 \times 1.6mm$   
 Cu thickness :  $35\mu m$

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