# PQxxxENAHZPH 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 : 1.5A
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.Correspond to flow soldering
8.RoHS directive compliant

## ■ Applications

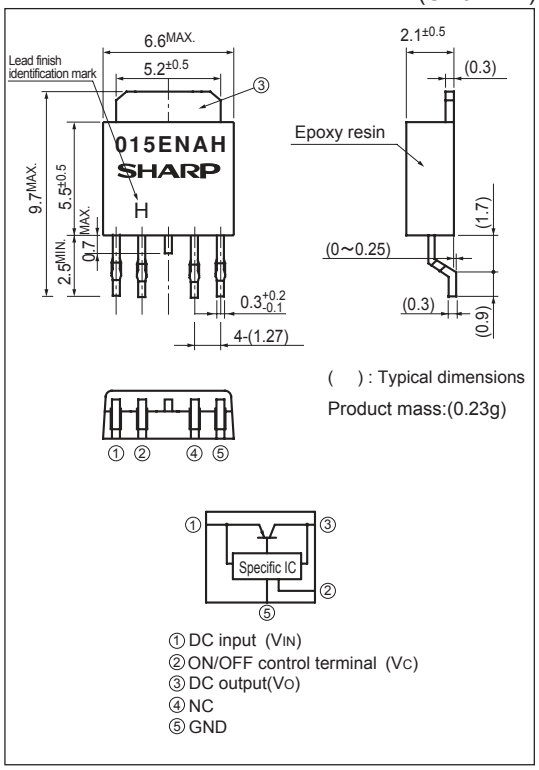
1.Personal computers and peripheral equipment
2.Power supplies for various digital electronic equipment such as DVD player or STB

## ■ Model Line-up

| Output Voltage (TYP.) | Model No. |
|---|---|
| 1.5V | **PQ015ENAHZPH** |
| 1.8V | **PQ018ENAHZPH** |
| 2.5V | **PQ025ENAHZPH** |
| 3.3V | **PQ033ENAHZPH** |

## ■ 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 | $V_{IN}$ | 10 | V |
| *1 Output control voltage | $V_C$ | 10 | V |
| Output current | $I_O$ | 1.5 | 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 Pd:With infinite heat sink
*3 There is case that over heat protection operates at the temperature Tj:125°C to 150°C, so this item cannot be used in this temperature range.

## ■ Electrical Characteristics

Unless otherwise specified,condition shall be $V_{IN}$=$V_O$(TYP.)+1V,$I_O$=0.5A,$V_C$=2.7V,Ta=25°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 | $R_{egL}$ | $I_O$=5mA to 1.5A,$V_{IN}$=$V_O$+1.5V | - | 0.5 | 2.0 | % |
| Line regulation | $R_{egI}$ | $V_{IN}$=$V_O$(TYP.)+1V to $V_O$(TYP.)+6V , $I_O$=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 |
| ※4 Dropout voltage | $V_{I-O}$ | $I_O$=1.2A※5 | - | - | 0.9 | V |
| ※6 ON-state voltage for control | $V_{C(ON)}$ | - | 2.0 | - | - | V |
| ON-state current for control | $I_{C(ON)}$ | - | - | - | 200 | μA |
| OFF-state voltage for control | $V_{C(OFF)}$ | - | - | - | 0.6 | V |
| OFF-state current for control | $I_{C(OFF)}$ | $V_C$=0.4V | - | - | 5 | μA |
| 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 | μA |

※4 Applied to **PQ033ENAHZPH**
※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,Ta=25°C

| Model No. | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|---|---|---|---|---|---|---|
| **PQ015ENAHZPH** | $V_{IN}$ | - | 2.35 | - | 10 | V |
| **PQ018ENAHZPH** | $V_{IN}$ | - | 2.35 | - | 10 | V |
| **PQ025ENAHZPH** | $V_{IN}$ | - | 3.0 | - | 10 | V |
| **PQ033ENAHZPH** | $V_{IN}$ | - | 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,Ta=25°C

| Model No. | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|---|---|---|---|---|---|---|
| **PQ015ENAHZPH** | $V_O$ | - | 1.47 | 1.5 | 1.53 | V |
| **PQ018ENAHZPH** | $V_O$ | - | 1.764 | 1.8 | 1.836 | V |
| **PQ025ENAHZPH** | $V_O$ | - | 2.45 | 2.5 | 2.55 | V |
| **PQ033ENAHZPH** | $V_O$ | - | 3.234 | 3.3 | 3.366 | V |

### Fig.1 Typical Application

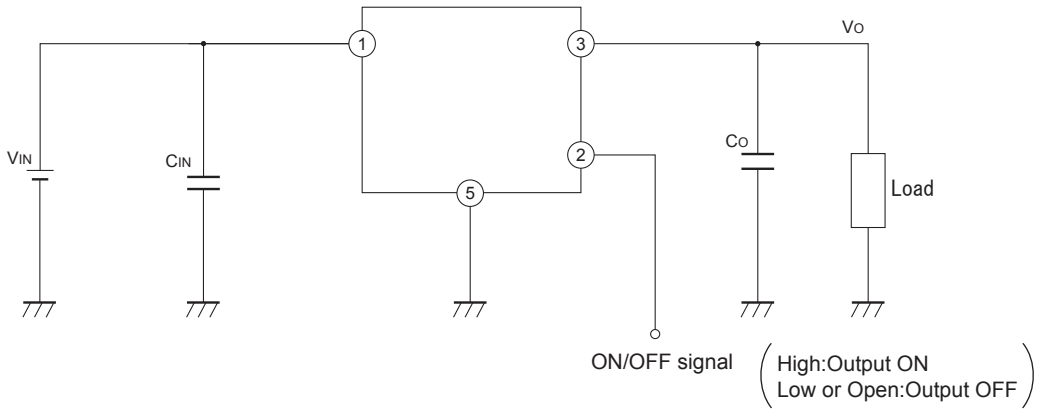


Fig.2 Test Circuit

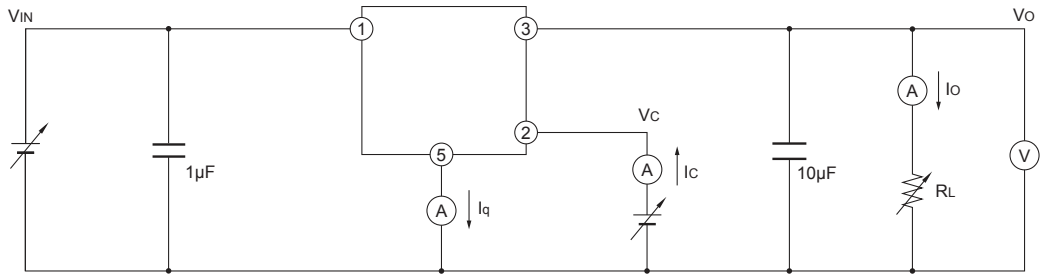
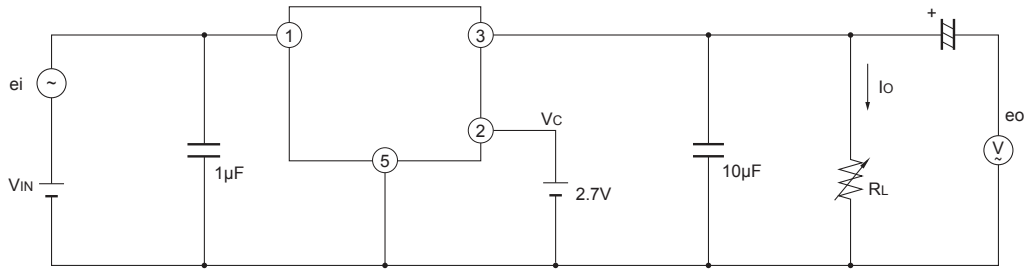
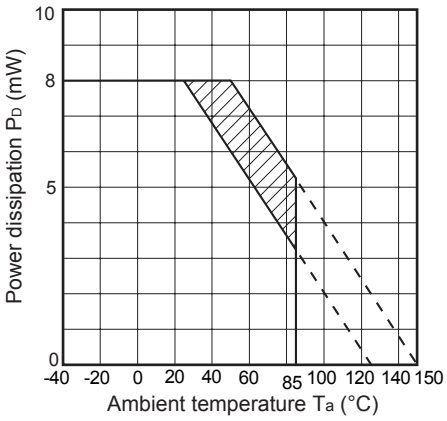



Fig.3 Test Circuit for Ripple Rejection




f=120Hz(sine wave)
ei(rms)=0.5V
VIN=VO(TYP)+2V
IO=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 (**PQ018ENAHZPH**)

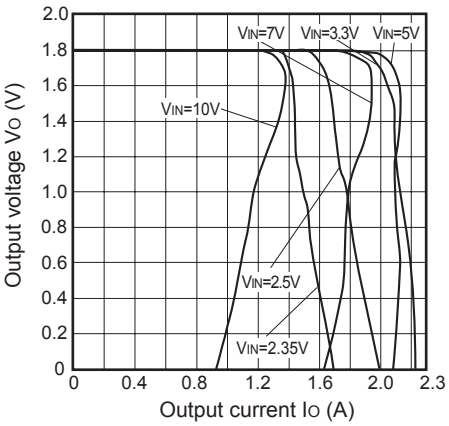


Fig.6 Output Voltage vs. Ambient Temperature (**PQ018ENAHZPH**)

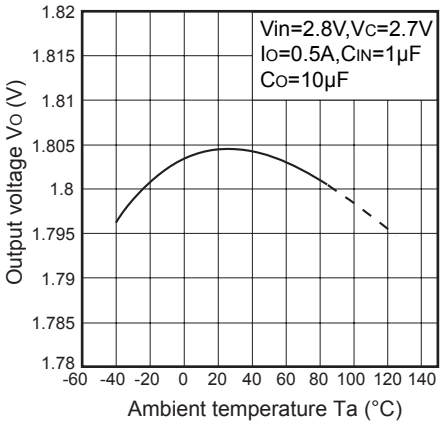



Fig.7 Dropout Voltage vs. Ambient Temperature (**PQ033ENAHZPH**)

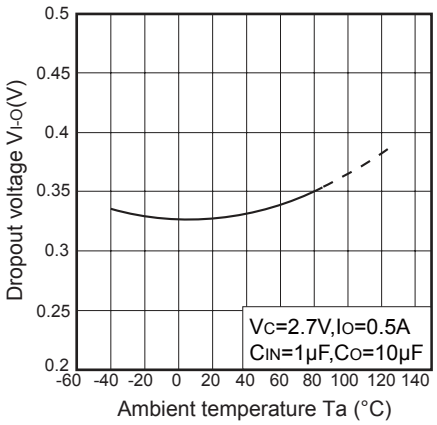



Fig.8 Line Regulation vs. Ambient Temperature

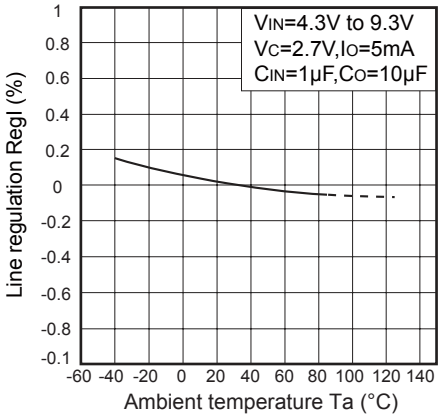



Fig.9 Load Regulation vs. Ambient Temperature(**PQ018ENAHZPH**)

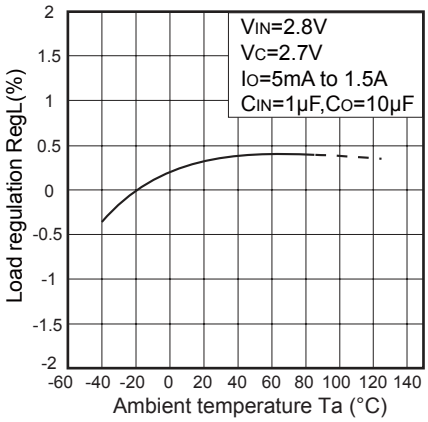



Fig.10 Quiescent Current vs. Ambient Temperature (**PQ018ENAHZPH**)

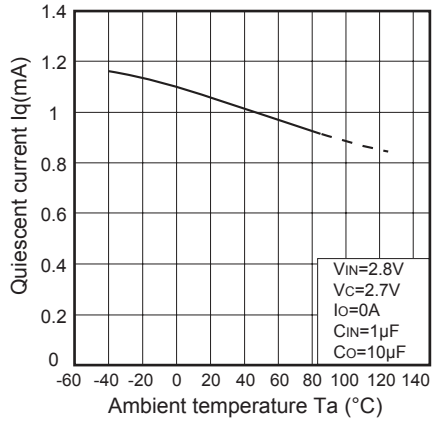



Fig.11 Output Voltage vs. ON/OFF Control Voltage (**PQ018ENAHZPH**)

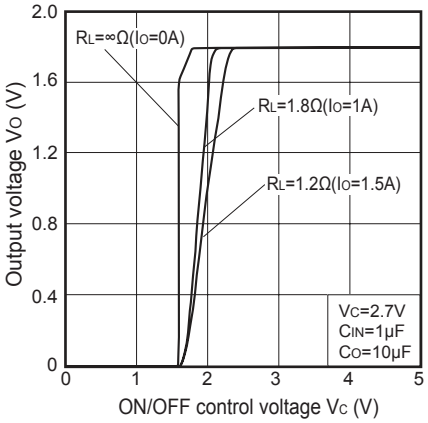


Fig.12 Circuit Operating Current vs. Input Voltage (**PQ018ENAHZPH**)

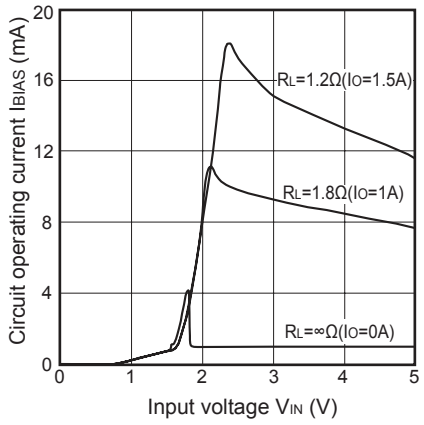



Fig.13 Dropout Voltage vs. Output Current (**PQ033ENAHZPH**)

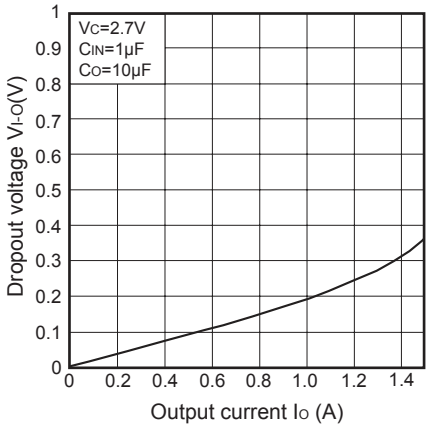



Fig.14 Ripple Rejection vs. Input Ripple Frequency (**PQxxxENAHZPH**)

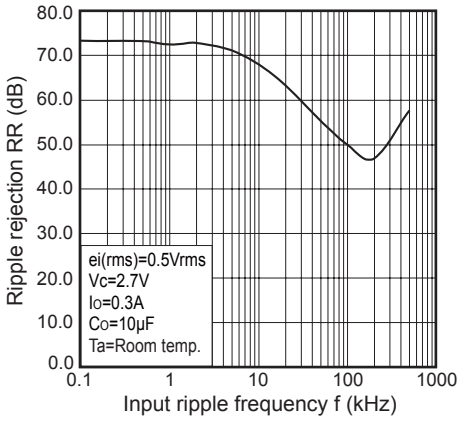



Fig.15 Ripple Rejection vs. Output Current (**PQ018ENAHZPH**)

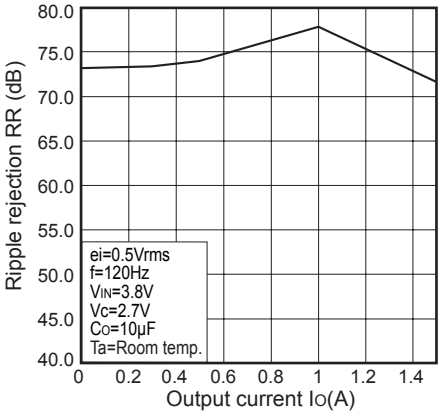
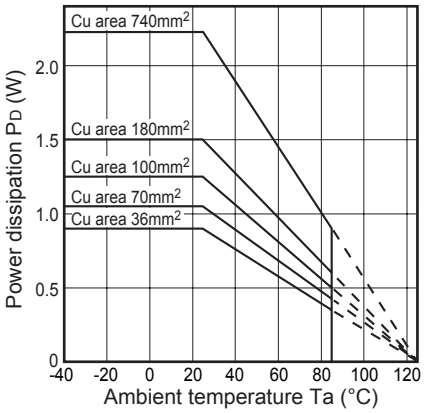
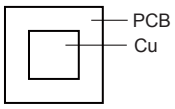



Fig.16 Power Dissipation vs. Ambient Temperature (Typical Value)




Mounting PCB




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