

## PQ1Mxx5M2SPQ 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.500mA
- 3.Power dissipation : MAX.900mW  
(At mounting PCB shown in Fig.3)
- 4.Low power-loss  
(Dropout voltage : MAX. 0.7V at  $I_o=500mA$ )
- 5.High ripple rejection(TYP.65dB)
- 6.Built-in ON/OFF control function
- 7.Built-in overcurrent, overheat protection functions
- 8.Use of ceramic capacitor is possible as output smooth capacitor
- 9.RoHS directive compliant

### Applications

- 1.CD-ROM drives
- 2.DVD-ROM drives
- 3.Digital Still Cameras

### Model Line-up

| Output Voltage (TYP.) | Model No.    |
|-----------------------|--------------|
| 1.5V                  | PQ1M155M2SPQ |
| 1.8V                  | PQ1M185M2SPQ |
| 2.5V                  | PQ1M255M2SPQ |
| 3.3V                  | PQ1M335M2SPQ |
| 5.0V                  | PQ1M505M2SPQ |

### Absolute Maximum Ratings

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

| Parameter                          | Symbol    | Rating      | Unit        |
|------------------------------------|-----------|-------------|-------------|
| *1 Input voltage                   | $V_{IN}$  | 9           | V           |
| *1 ON/OFF control terminal voltage | $V_C$     | 9           | V           |
| Output current                     | $I_o$     | 500         | 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)    | $^{\circ}C$ |

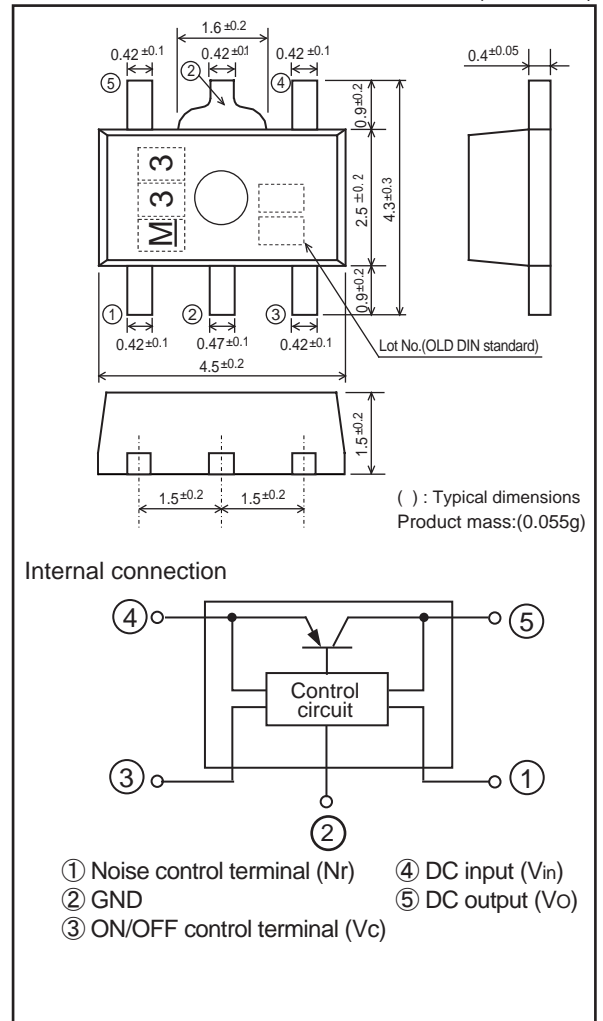
\*1 All are open except GND and applicable terminals.

\*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: SnBi)

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### Electrical Characteristics

(Unless otherwise specified,  $V_{IN}=3.0V, I_o=30mA, V_c=1.8V, T_a=25^\circ C$  (PQ1M155M2SPQ, PQ1M185M2SPQ))  
 (Unless otherwise specified,  $V_{IN}=V_o(TYP.)+1.0V, I_o=30mA, V_c=1.8V, T_a=25^\circ C$  (PQ1M255M2SPQ, PQ1M335M2SPQ, PQ1M505M2SPQ))

| Parameter                                  | Symbol        | Conditions                                     | MIN.                      | TYP. | MAX. | Unit           |
|--|---------------|--|---------------------------|------|------|----------------|
| Output voltage                             | $V_o$         | -  | Refer to the table below. |      |      | V              |
| Load regulation                            | $RegL$        | $I_o=5mA$ to $500mA$                           | -                         | 60   | 200  | mV             |
| Line regulation                            | $Regl$        | $V_{IN}=3.0V$ to $7.5V$                        | -                         | 3.0  | 20   | mV             |
|  |               | $V_{IN}=3.0V$ to $7.8V$                        |                           |      |      |                |
|  |               | $V_{IN}=V_o(TYP.)+1V$ to $V_o(TYP.)+6V(MAX9V)$ |                           |      |      |                |
| 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                                 | -                         | 65   | -    | dB             |
| Output noise voltage                       | $V_{no(rms)}$ | $10kHz < f < 100kHz, C_n=0.1\mu F, I_o=30mA$   | -                         | 30   | -    | $\mu V$        |
|  |               | $10kHz < f < 100kHz, C_n=0.1\mu F, I_o=30mA$   | -                         | 40   | -    |                |
| <sup>*4</sup> Dropout voltage              | $V_{i-o}$     | $I_o=500mA$ <sup>*5</sup>                      | -                         | 0.4  | 0.7  | V              |
| <sup>*6</sup> ON-state voltage for control | $V_{C(ON)}$   | -  | 1.8                       | -    | -    | V              |
| ON-state current for control               | $I_{C(ON)}$   | $V_c=1.8V$                                     | -                         | 20   | 70   | $\mu A$        |
| OFF-state voltage for control              | $V_{C(OFF)}$  | -  | -                         | -    | 0.4  | V              |
| Quiescent current                          | $I_q$         | $I_o=0mA$                                      | -                         | 0.6  | 1    | mA             |
| Output OFF-state dissipation current       | $I_{qs}$      | $V_c=0.2V$                                     | -                         | -    | 1    | $\mu A$        |

\*4 Excluding PQ1M155M2SPQ, PQ1M185M2SPQ

\*5 Dropout voltage when output voltage lowers 0.1V from the voltage at  $V_{IN}=V_o+1V$ .

\*6 In case of opening control terminal ③, output voltage turns off.

Table.1 Output Voltage

$V_{IN}=3.0V, I_o=30mA, V_c=1.8V, T_a=25^\circ C$  (PQ1M155M2SPQ, PQ1M185M2SPQ)  
 $V_{IN}=V_o(TYP.)+1.0V, I_o=30mA, V_c=1.8V, T_a=25^\circ C$  (PQ1M255M2SPQ, PQ1M335M2SPQ, PQ1M505M2SPQ)

| Model No.    | Symbol | Conditions | MIN.  | TYP. | MAX.  | Unit |
|--------------|--------|------------|-------|------|-------|------|
| PQ1M155M2SPQ | $V_o$  | -          | 1.44  | 1.5  | 1.56  | V    |
| PQ1M185M2SPQ |        |            | 1.74  | 1.8  | 1.86  |      |
| PQ1M255M2SPQ |        |            | 2.440 | 2.5  | 2.560 |      |
| PQ1M335M2SPQ |        |            | 3.234 | 3.3  | 3.366 |      |
| PQ1M505M2SPQ |        |            | 4.900 | 5.0  | 5.100 |      |

Fig.1 Test Circuit

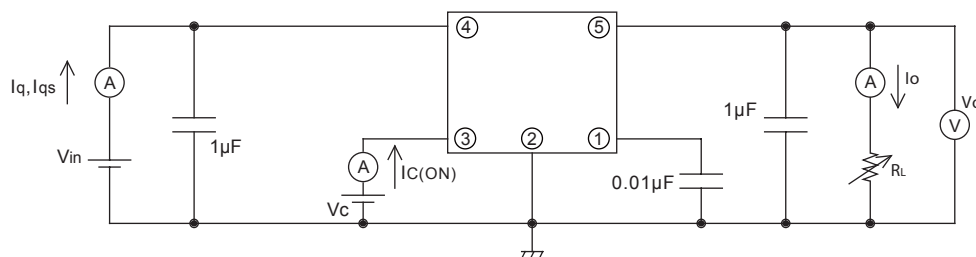


Fig.2 Test Circuit for Ripple Rejection

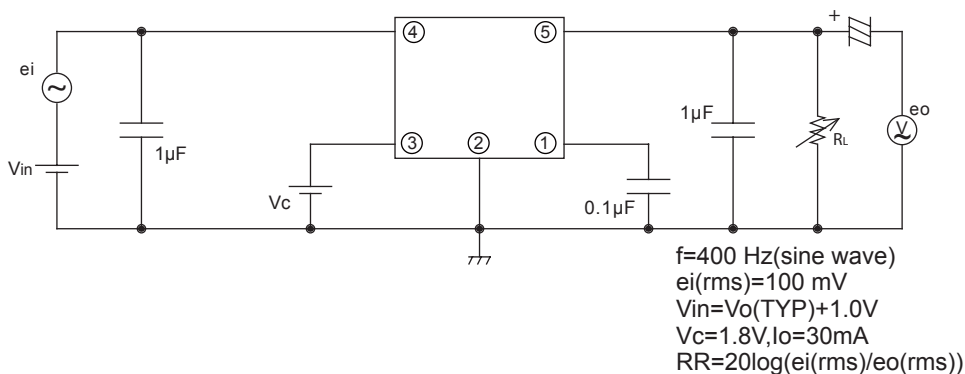
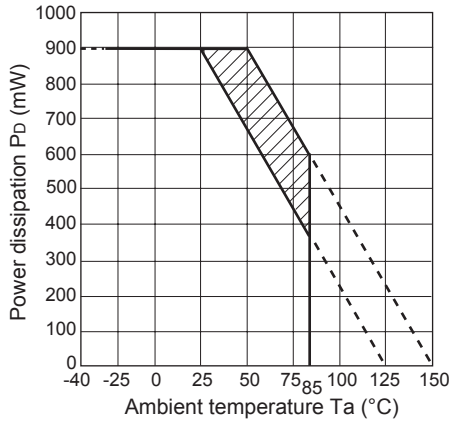
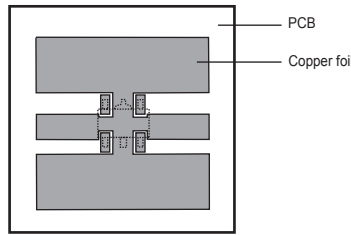


Fig.3 Power Dissipation vs. Ambient Temperature



Mounting PCB



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

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

Fig.4 Overcurrent Protection Characteristics (Typical Value)

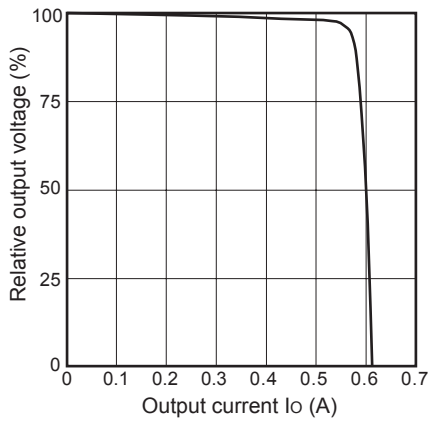


Fig.5 Output Voltage vs. Input Voltage (Typical Value) (PQ1M335M2SPQ)

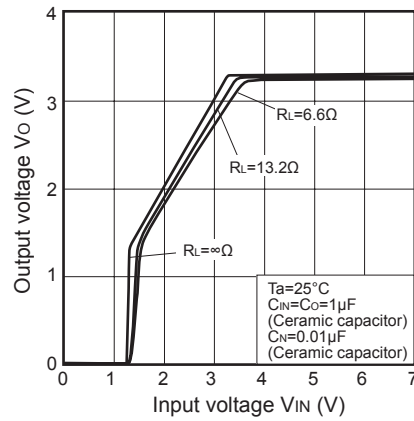


Fig.6 Circuit Operating Current vs. Input Voltage (Typical Value) (PQ1M335M2SPQ)

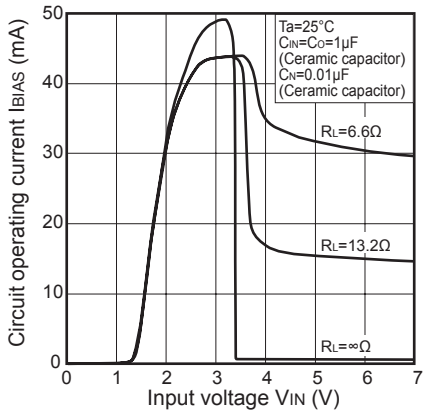


Fig.7 Quiescent Current vs. Junction Temperature (Typical Value)

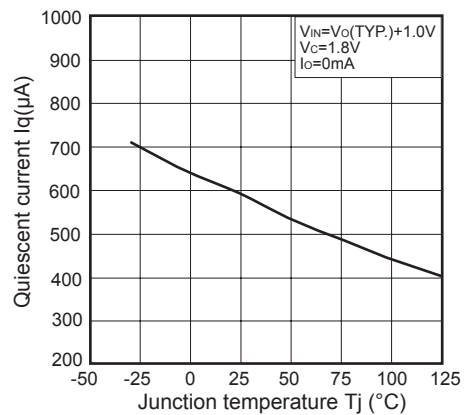


Fig.8 Dropout Voltage vs. Junction Temperature (Typical Value) (PQ1M335M2SPQ)

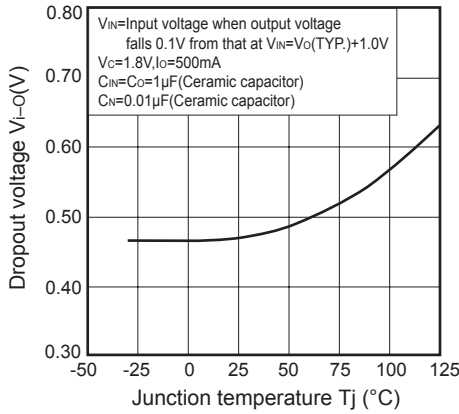


Fig.9 Output Voltage Deviation vs. Junction Temperature (Typical Value) (PQ1M335M2SPQ)

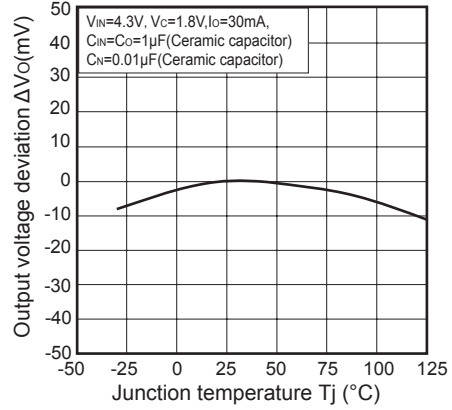


Fig.10 Dropout Voltage vs. Output Current (Typical Value)

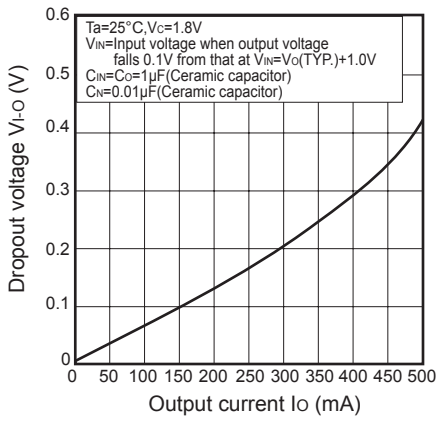


Fig.11 Ripple Rejection vs. Input Ripple Frequency (Typical Value) (PQ1M335M2SPQ)

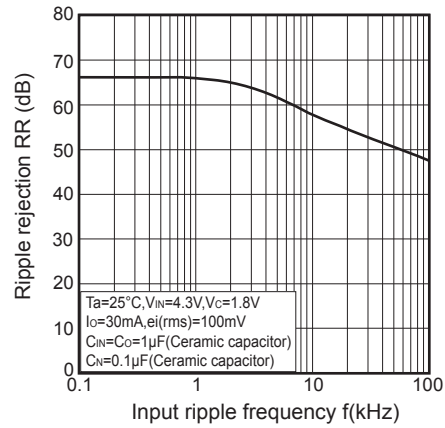
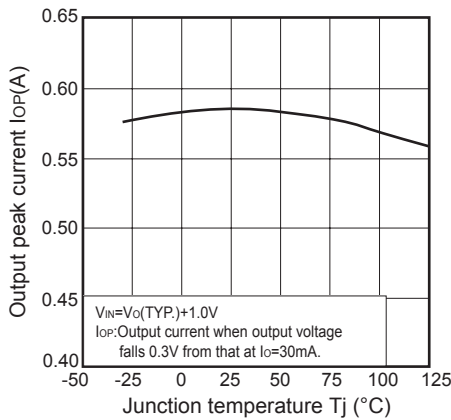


Fig.12 Output Peak Current vs. Junction Temperature (Typical Value)



■ Example of application

