Introduction

New!

Fuji Smart power device  **M-POWER2**

for Multi-oscillated current resonant type power supply

Summary

System: The ideal and Fuji’s original system
   It includes many functions (Soft-switching, stand-by).

Device: Multiple-chip Power Device: M-POWER2
   contains IC and two MOSFETs in SIP-13pin package.
   M-POWER has various types of protection functions.
Features

1. High efficiency (a reduction in SMPS size is possible.)
   DC/DC : 92.3%(DC input:400V, output:16V)
   PFC+DC/DC : 87.0%(AC100V), 89.5%(AC200V)

2. Built in stand-by mode (An auxiliary power supply is unnecessary.)
   \[ P_{in} < 0.4W \text{ at } P_{out} = 0.0W \]
   \[ P_{in} < 1.0W \text{ at } P_{out} = 0.5W \]
   \[ P_{in} < 4.0W \text{ at } P_{out} = 2.0W \]

3. Low noise
   (a reduction in the noise suppression parts is possible.)
   MOSFETs: Turn-on : ZVS+ZCS
   Turn-off : ZVS
   Diodes (secondary side)
   Surge voltage does not occur at reverse recovery.

4. Fail-safety (Built in protection functions: OC, SC, OV, Tj(OH))

5. Easy design power supply (Reduction of design time)

Down size your SMPS
Circuit configuration

Multi-oscillated current resonant type power supply

Q1 ------ PWM oscillation
Q2 ------ self-oscillation (driven by winding voltage).
Features of the Multi-oscillation

1) No arm-short circuit.

2) It is high efficiency at light load too.
Efficiency comparison

PFM V.S. M-POWER2(Multi oscillation)

It is high efficiency at light load too.

Vo=15V
With PFC

PFM  V.S. M-POWER2(Multi oscillation)
Switching waveforms

Ultra Low Noise

MOSFETs (Q1, Q2)

Condition: Ed = 400V, Po = 65W, Vo = 16V

Diodes (Secondary side)

Turn-on: ZVS+ZCS
Turn-off: ZVS
No surge voltage at reverse recovery

Turn-on: ZVS+ZCS
No surge voltage at Turn-off

No surge voltage

Sine wave-like current
Rectangle wave-like voltage

Reduction in the noise suppression parts is possible.

MT5F11478c
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High efficiency

Down size your SMPS

DC/DC : 92.3%
(DC input: 400V, output: 16V)

PFC+DC/DC: 87.0%
(AC100V), 89.5%(AC200V)
Performance

Power saving operation

‘Soft-start and soft-end switching of M-POWER2 reduce transformer noise.'
Characteristic: Power saving operation

Input power – output power characteristic at standby mode

No sub power supply required for stand-by

- $P_{in} < 0.4\text{W}$ at $P_{out} = 0.0\text{W}$
- $P_{in} < 1.0\text{W}$ at $P_{out} = 0.5\text{W}$
- $P_{in} < 4.0\text{W}$ at $P_{out} = 2.0\text{W}$
# M-POWER2

<table>
<thead>
<tr>
<th>Type name</th>
<th>Main-MOSFET</th>
<th>Sub-MOSFET</th>
<th>Control IC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$V_{DS}$</td>
<td>$R_{DS(ON)}$</td>
<td>$V_{DS}$</td>
</tr>
<tr>
<td>F9221L</td>
<td>500V</td>
<td>0.9</td>
<td>500V</td>
</tr>
<tr>
<td>F9222L</td>
<td>500V</td>
<td>0.6</td>
<td>500V</td>
</tr>
</tbody>
</table>

### External view of M-POWER2

PKG: H:10.2mm W:31.0mm T:3.5mm

Unit:mm