Notification about the transfer of the semiconductor business

The semiconductor business of Panasonic Corporation will be transferred on September 1, 2020 to Nuvoton Technology Corporation (hereinafter referred to as "Nuvoton"). Accordingly, Panasonic Semiconductor Solutions Co., Ltd. will come under the umbrella of the Nuvoton Group, with the new name of Nuvoton Technology Corporation Japan (hereinafter referred to as "NTCJ").

In accordance with this transfer, semiconductor products will be handled as NTCJ-made products after September 1, 2020. However, such products will be continuously sold through Panasonic Corporation.

Publisher of this Document is NTCJ.
If you would find description “Panasonic” or “Panasonic semiconductor solutions”, please replace it with NTCJ.
※ Except below description page
  “Request for your special attention and precautions in using the technical information and semiconductors described in this book”

Nuvoton Technology Corporation Japan
FCAB22420L
Gate resistor installed Dual N-channel MOS FET
For lithium-ion secondary battery protection circuits

- Features
  - Source-source On-state Resistance: RSS(on) typ. = 2.6 mΩ (VGS = 3.8 V)
  - CSP (Chip Size Package)
  - Halogen-free / RoHS compliant (EU RoHS / UL-94 V-0 / MSL: Level 1)

- Marking Symbol: 97

- Packaging
  Embossed type (Thermo-compression sealing): 8 000 pcs/reel (standard)

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<td></td>
</tr>
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<td>Pulsed(^4)</td>
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<table>
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<td>Parameter</td>
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<tr>
<td>Thermal Resistance (ch-a)</td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>

Note
- **1** Mounted on FR4 board (25.4 mm × 25.4 mm × 1.0 mm).
- FR4 board partially covered with copper pad (42 mm² area, 36 µm thickness).
- **2** Mounted on FR4 board (25.4 mm × 25.4 mm × 1.0 mm).
- FR4 board fully covered with copper pad (605 mm² area, 36 µm thickness).
- **3** Mounted on Ceramic board (70 mm × 70 mm × 1.0 mm).
- **4** t = 10 µs, Duty Cycle ≤ 1 %
ADVANCE INFORMATION

Product Standards

MOS FET

FCAB22420L

**Electrical Characteristics  Ta = 25 °C ± 3 °C**

<table>
<thead>
<tr>
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<th>Symbol</th>
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<th>Typ</th>
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<td>23</td>
<td></td>
<td></td>
<td>V</td>
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<tr>
<td>Zero Gate Voltage Source Current</td>
<td>ISSS</td>
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<td></td>
<td>1.0</td>
<td></td>
<td>μA</td>
</tr>
<tr>
<td>Gate-source Leakage Current</td>
<td>IGSS1</td>
<td>VGS = ±8 V, VSS = 0 V</td>
<td></td>
<td>±10</td>
<td></td>
<td>μA</td>
</tr>
<tr>
<td></td>
<td>IGSS2</td>
<td>VGS = ±5 V, VSS = 0 V</td>
<td></td>
<td>±1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gate-source Threshold Voltage</td>
<td>Vth</td>
<td>IS = 1.31 mA, VSS = 10 V</td>
<td>0.35</td>
<td>0.9</td>
<td>1.4</td>
<td>V</td>
</tr>
<tr>
<td>Source-source On-state Resistance</td>
<td>RSS(on)1</td>
<td>IS = 6.5 A, VGS = 4.5 V</td>
<td>1.75</td>
<td>2.4</td>
<td>3.15</td>
<td>mΩ</td>
</tr>
<tr>
<td></td>
<td>RSS(on)2</td>
<td>IS = 6.5 A, VGS = 3.8 V</td>
<td>1.9</td>
<td>2.6</td>
<td>3.4</td>
<td>mΩ</td>
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<tr>
<td></td>
<td>RSS(on)3</td>
<td>IS = 6.5 A, VGS = 3.1 V</td>
<td>2.05</td>
<td>3.0</td>
<td>4.95</td>
<td>mΩ</td>
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<td>RSS(on)4</td>
<td>IS = 6.5 A, VGS = 2.5 V</td>
<td>2.25</td>
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<td>7.5</td>
<td>mΩ</td>
</tr>
<tr>
<td>Body Diode Forward Voltage</td>
<td>VF(s-s)</td>
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<td></td>
<td>1.0</td>
<td>V</td>
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<tr>
<td>Input Capacitance</td>
<td>Ciss</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Output Capacitance</td>
<td>Coss</td>
<td>VSS = 10 V, VGS = 0 V, f = 1 kHz</td>
<td></td>
<td>490</td>
<td></td>
<td>pF</td>
</tr>
<tr>
<td>Reverse Transfer Capacitance</td>
<td>Crss</td>
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<td></td>
<td>450</td>
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<td>1.4</td>
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<td></td>
<td>μs</td>
</tr>
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<td>Rise Time</td>
<td>tr</td>
<td>IS = 6.5 A</td>
<td>3.1</td>
<td></td>
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<td>μs</td>
</tr>
<tr>
<td>Turn-off Delay Time</td>
<td>td(off)</td>
<td>VDD = 10 V, VGS = 4 to 0 V</td>
<td>7.2</td>
<td></td>
<td></td>
<td>μs</td>
</tr>
<tr>
<td>Fall Time</td>
<td>tf</td>
<td>IS = 6.5 A</td>
<td>4.8</td>
<td></td>
<td></td>
<td>μs</td>
</tr>
<tr>
<td>Total Gate Charge</td>
<td>Qg</td>
<td>VDD = 10 V</td>
<td>39</td>
<td></td>
<td></td>
<td>nC</td>
</tr>
<tr>
<td>Gate-source Charge</td>
<td>Qgs</td>
<td>VGS = 0 to 4 V</td>
<td>19</td>
<td></td>
<td></td>
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<td>Gate-drain Charge</td>
<td>Qgd</td>
<td>IS = 13 A</td>
<td>14</td>
<td></td>
<td></td>
<td>nC</td>
</tr>
</tbody>
</table>

**Note**

- Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 Measuring methods for transistors.
- *1 Guaranteed by design, not subject to production testing.
- *2 Measurement circuit for Turn-on Delay Time / Rise Time / Turn-off Delay Time / Fall Time.
Technical Data (reference)

**IS - VSS** †

- $V_{GS} = 4.5 \text{ V}$
- $V_{GS} = 3.8 \text{ V}$
- $V_{GS} = 3.1 \text{ V}$
- $V_{GS} = 2.5 \text{ V}$

$T_a = 25 \, ^\circ \text{C}$

**RSS(on) - IS** †

- $V_{GS} = 4.5 \text{ V}$
- $V_{GS} = 3.8 \text{ V}$
- $V_{GS} = 3.1 \text{ V}$
- $V_{GS} = 2.5 \text{ V}$

$T_a = 25 \, ^\circ \text{C}$

**IS - V GS** †

- $T_a = 85 \, ^\circ \text{C}$
- $25 \, ^\circ \text{C}$
- $-40 \, ^\circ \text{C}$

$V_{SS} = 10 \text{ V}$

**IF - VF(s-s)** †

- $V_{GS} = 0 \text{ V}$

- $T_a = 85 \, ^\circ \text{C}$
- $25 \, ^\circ \text{C}$
- $-40 \, ^\circ \text{C}$

$V_{GS} = 0 \text{ V}$

**IGS - V GS** †

- $T_a = 85 \, ^\circ \text{C}$
- $25 \, ^\circ \text{C}$
- $-40 \, ^\circ \text{C}$

$V_{GS} = 0 \text{ V}$

Source Current, IS (A)

Source-current Voltage, VSS (V)

Source Current, IS (A)

Gate-source Voltage, VGS (V)

Diode Forward Current, IF (A)

Body Diode Forward Voltage, VF(s-s) (V)

Gate-source Leakage Current, IGS (A)

Gate-source Voltage, VGS (V)

Source-source On-state Resistance, RSS(on) (mΩ)

Gate-source On-state Resistance, RSS(on) (mΩ)
Technical Data (reference)

**Gate-source Voltage, VGS (V)**

**Zero Gate Voltage Source Current**

**ISS (A)**

**Rth - tsw**

**Safe Operating Area**

**Thermal Resistance, Rth (°C/W)**

**Source Current, IS (A)**

**Dynamic Input/Output Characteristics**

**Source-source Voltage, VSS (V)**

**Total Gate Charge, Qg (nC)**

**Normalized Effective Transient Thermal Impedance**

**Square Wave Pulse Duration, t1 (s)**

**Duty Cycle = t1 / t2**

**Limited by RSS(on) (VGS = 3.8 V)**

**Absolute Maximum Rating**

**VDD = 10 V**

**IS = 13 A**

**Ta = 25 °C**

**Ta = 25 °C**

**Ta = 25 °C**

**Note**

*1 Pulse measurement.

*2 Mounted on FR4 board (25.4 mm × 25.4 mm × t1.0 mm).

FR4 board partially covered with copper pad
(42 mm² area, 36 μm thickness).

*3 Mounted on FR4 board (25.4 mm × 25.4 mm × t1.0 mm).

FR4 board fully covered with copper pad
(605 mm² area, 36 μm thickness).

*4 Mounted on Ceramic board (70 mm × 70 mm × t1.0 mm).
**ADVANCE INFORMATION**

**Product Standards**

**MOS FET**

**FCAB22420L**

### Outline

(Top View)

(Front View)

(Bottom View)

#### Land Pattern (reference)

Unit: mm

#### Stencil Pattern (reference)

Unit: mm
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