

## HAT2093R

Silicon N Channel Power MOS FET  
High Speed Power Switching

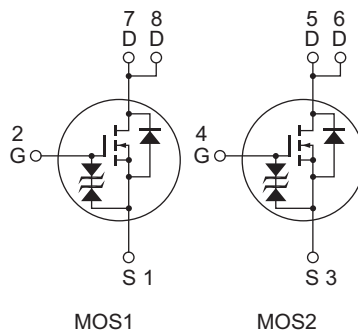
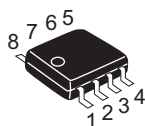
REJ03G1185-0300  
(Previous: ADE-208-1237A)  
Rev.3.00  
Sep 07, 2005

### Features

- Low on-resistance
- Capable of 4.5 V gate drive
- Low drive current
- High density mounting

### Outline

RENESAS Package code: PRSP0008DD-D  
(Package name: SOP-8 <FP-8DAV> )



1, 3      Source  
2, 4      Gate  
5, 6, 7, 8      Drain

## Absolute Maximum Ratings

(Ta = 25°C)

| Item                                   | Symbol                                   | Value       | Unit |
|--|--|-------------|------|
| Drain to source voltage                | V <sub>DSS</sub>                         | 30          | V    |
| Gate to source voltage                 | V <sub>GSS</sub>                         | ±20         | V    |
| Drain current                          | I <sub>D</sub>                           | 9           | A    |
| Drain peak current                     | I <sub>D (pulse)</sub> <sup>Note 1</sup> | 72          | A    |
| Body-drain diode reverse drain current | I <sub>DR</sub>                          | 9           | A    |
| Channel dissipation                    | P <sub>ch</sub> <sup>Note 2</sup>        | 2           | W    |
| Channel dissipation                    | P <sub>ch</sub> <sup>Note 3</sup>        | 3           | W    |
| Channel temperature                    | T <sub>ch</sub>                          | 150         | °C   |
| Storage temperature                    | T <sub>stg</sub>                         | -55 to +150 | °C   |

Notes: 1. PW ≤ 10 μs, duty cycle ≤ 1%

2. 1 Drive operation: When using the glass epoxy board (FR4 40 × 40 × 1.6 mm), PW ≤ 10 s

3. 2 Drive operation: When using the glass epoxy board (FR4 40 × 40 × 1.6 mm), PW ≤ 10 s

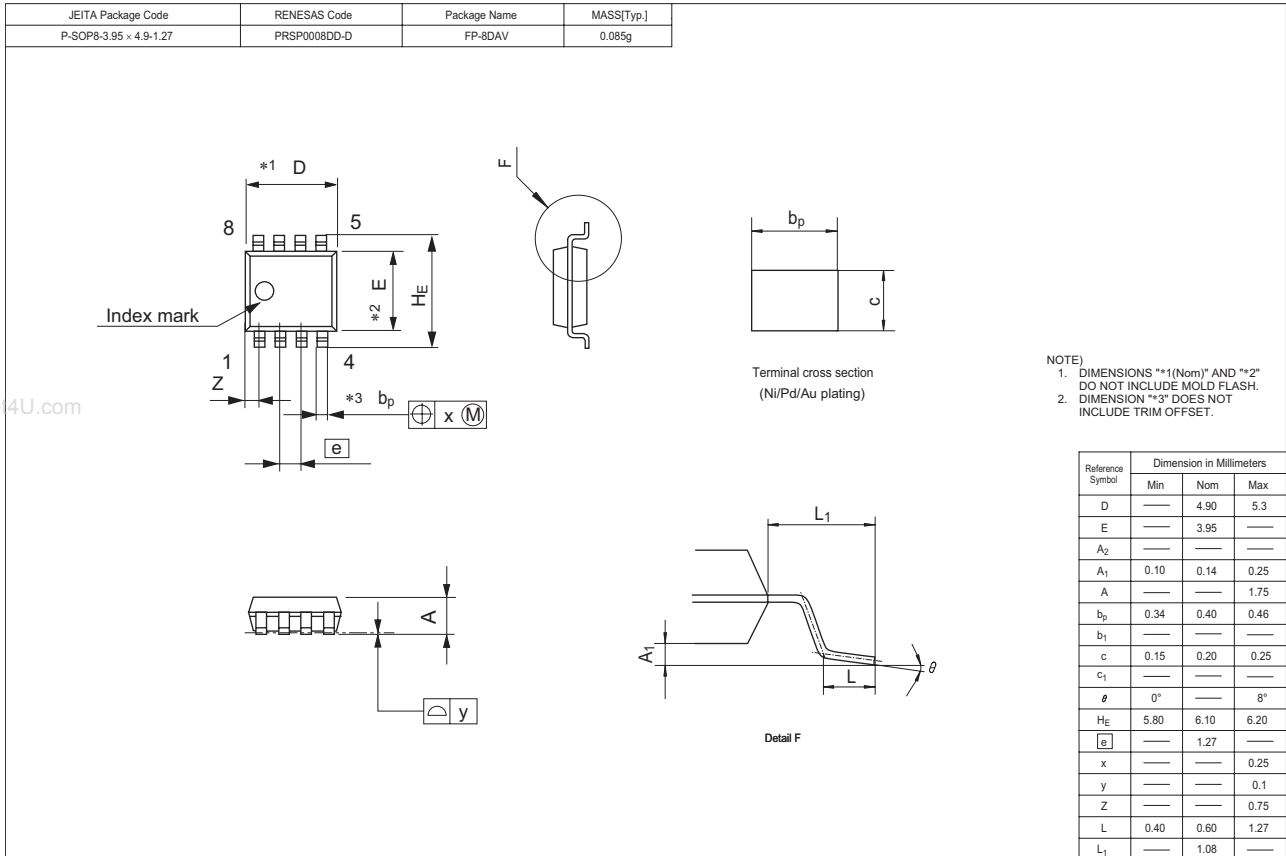
## Electrical Characteristics

(Ta = 25°C)

| Item                                       | Symbol                | Min | Typ  | Max  | Unit | Test Conditions  |
|--|-----------------------|-----|------|------|------|--|
| Drain to source breakdown voltage          | V <sub>(BR) DSS</sub> | 30  | —    | —    | V    | I <sub>D</sub> = 10 mA, V <sub>GS</sub> = 0                                |
| Gate to source breakdown voltage           | V <sub>(BR) GSS</sub> | ±20 | —    | —    | V    | I <sub>G</sub> = ±100 μA, V <sub>DS</sub> = 0                              |
| Gate to source leak current                | I <sub>GSS</sub>      | —   | —    | ±10  | μA   | V <sub>GS</sub> = ±16 V, V <sub>DS</sub> = 0                               |
| Zero gate voltage drain current            | I <sub>DSS</sub>      | —   | —    | 1    | μA   | V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0                                |
| Gate to source cutoff voltage              | V <sub>GS (off)</sub> | 1.0 | —    | 2.5  | V    | V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA                              |
| Static drain to source on state resistance | R <sub>DS (on)</sub>  | —   | 18   | 23   | mΩ   | I <sub>D</sub> = 4.5 A, V <sub>GS</sub> = 10 V <sup>Note 4</sup>           |
|  | R <sub>DS (on)</sub>  | —   | 27   | 39   | mΩ   | I <sub>D</sub> = 4.5 A, V <sub>GS</sub> = 4.5 V <sup>Note 4</sup>          |
| Forward transfer admittance                | y <sub>fs</sub>       | 9   | 15   | —    | S    | I <sub>D</sub> = 4.5 A, V <sub>DS</sub> = 10 V <sup>Note 4</sup>           |
| Input capacitance                          | C <sub>iss</sub>      | —   | 750  | —    | pF   | V <sub>DS</sub> = 10 V   |
| Output capacitance                         | C <sub>oss</sub>      | —   | 200  | —    | pF   | V <sub>GS</sub> = 0  |
| Reverse transfer capacitance               | C <sub>rss</sub>      | —   | 110  | —    | pF   | f = 1 MHz  |
| Total gate charge                          | Q <sub>g</sub>        | —   | 12   | —    | nC   | V <sub>DD</sub> = 10 V   |
| Gate to source charge                      | Q <sub>gs</sub>       | —   | 2.3  | —    | nC   | V <sub>GS</sub> = 10 V   |
| Gate to drain charge                       | Q <sub>gd</sub>       | —   | 2.2  | —    | nC   | I <sub>D</sub> = 9 A   |
| Turn-on delay time                         | t <sub>d (on)</sub>   | —   | 11   | —    | ns   | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 4.5 A                             |
| Rise time                                  | t <sub>r</sub>        | —   | 16   | —    | ns   | V <sub>DD</sub> ≅ 10 V   |
| Turn-off delay time                        | t <sub>d (off)</sub>  | —   | 40   | —    | ns   | R <sub>L</sub> = 2.22 Ω  |
| Fall time                                  | t <sub>f</sub>        | —   | 7    | —    | ns   | R <sub>g</sub> = 4.7 Ω   |
| Body-drain diode forward voltage           | V <sub>DF</sub>       | —   | 0.85 | 1.10 | V    | I <sub>F</sub> = 9 A, V <sub>GS</sub> = 0 <sup>Note 4</sup>                |
| Body-drain diode reverse recovery time     | t <sub>rr</sub>       | —   | 50   | —    | ns   | I <sub>F</sub> = 9 A, V <sub>GS</sub> = 0<br>di <sub>F</sub> /dt = 50 A/μs |

Note: 4. Pulse test

### Package Dimensions



### Ordering Information

| Part Name     | Quantity | Shipping Container |
|---------------|----------|--------------------|
| HAT2093R-EL-E | 2500 pcs | Taping             |

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