

# HAT2196C

## Silicon N Channel MOS FET Power Switching

REJ03G1235-0500

Rev.5.00

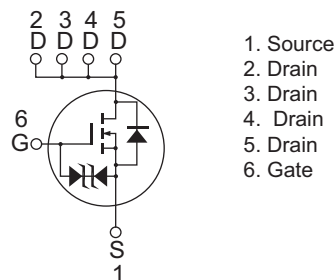
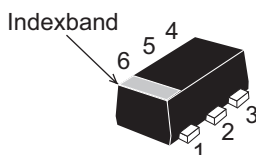
Jun. 13, 2005

### Features

- Low on-resistance  
 $R_{DS(on)} = 45 \text{ m}\Omega$  typ. (at  $V_{GS} = 4.5 \text{ V}$ )
- Low drive current.
- High density mounting
- 2.5 V gate drive devices.

### Outline

RENESAS Package code: PWSF0006JA-A  
(Package name: CMFPAK-6)



### Absolute Maximum Ratings

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

| Item                                     | Symbol                          | Ratings     | Unit             |
|--|---------------------------------|-------------|------------------|
| Drain to source voltage                  | $V_{DSS}$                       | 20          | V                |
| Gate to source voltage                   | $V_{GSS}$                       | $\pm 12$    | V                |
| Drain current                            | $I_D$                           | 2.5         | A                |
| Drain peak current                       | $I_D$ (pulse) <sup>Note 1</sup> | 10          | A                |
| Body - Drain diode reverse drain current | $I_{DR}$                        | 2.5         | A                |
| Channel dissipation                      | $P_{ch}$ <sup>Note 2</sup>      | 850         | mW               |
| Channel temperature                      | $T_{ch}$                        | 150         | $^\circ\text{C}$ |
| Storage temperature                      | $T_{stg}$                       | -55 to +150 | $^\circ\text{C}$ |

Notes 1.  $PW \leq 10 \mu\text{s}$ , duty cycle  $\leq 1\%$

2. When using the glass epoxy board. (FR4  $40 \times 40 \times 1.6 \text{ mm}$ )

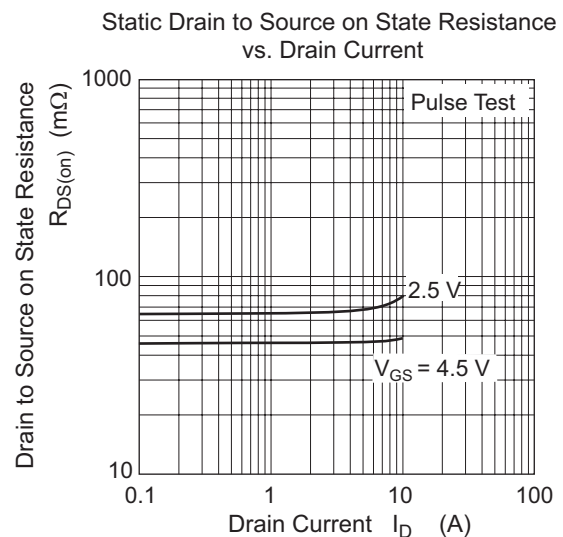
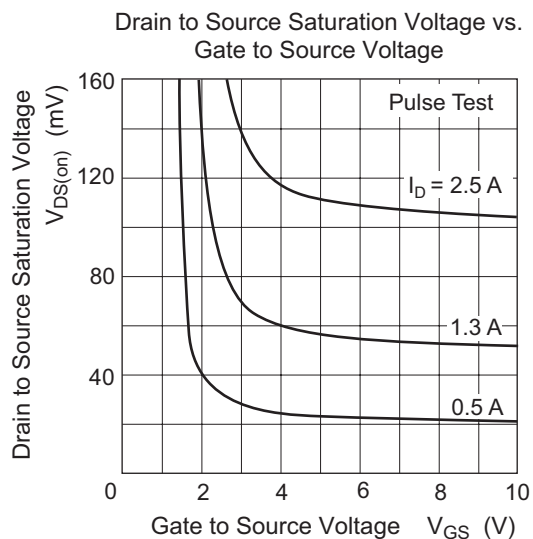
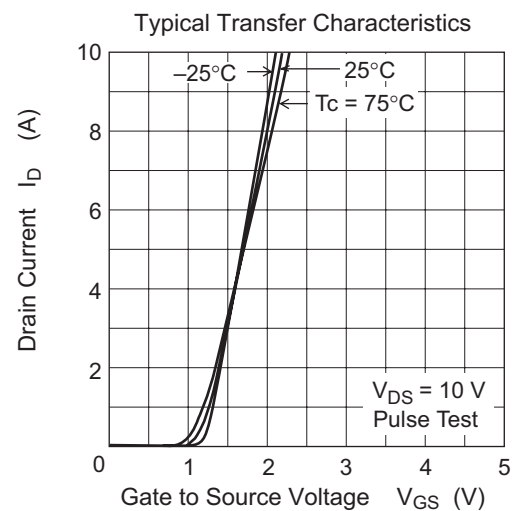
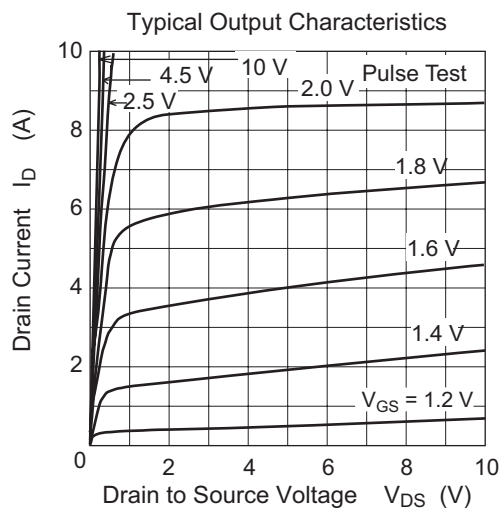
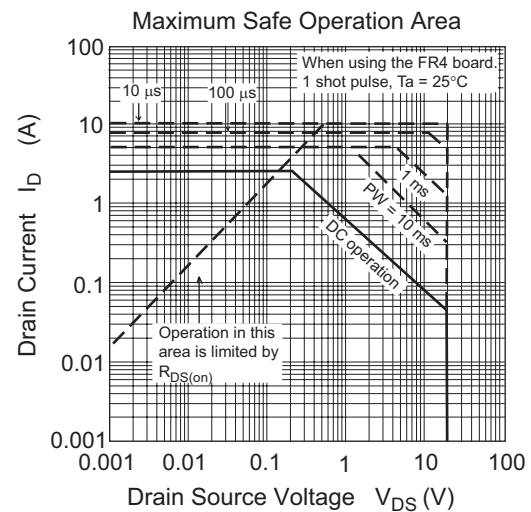
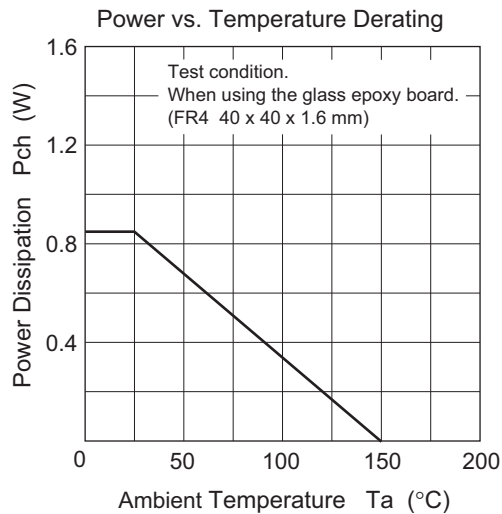
## Electrical Characteristics

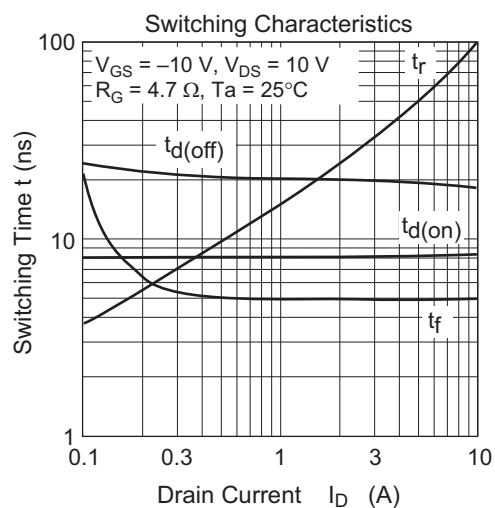
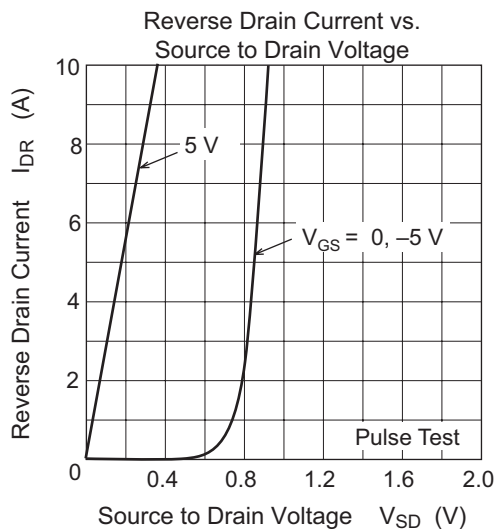
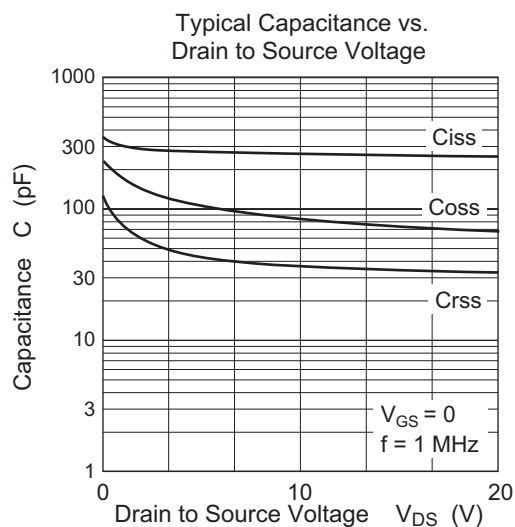
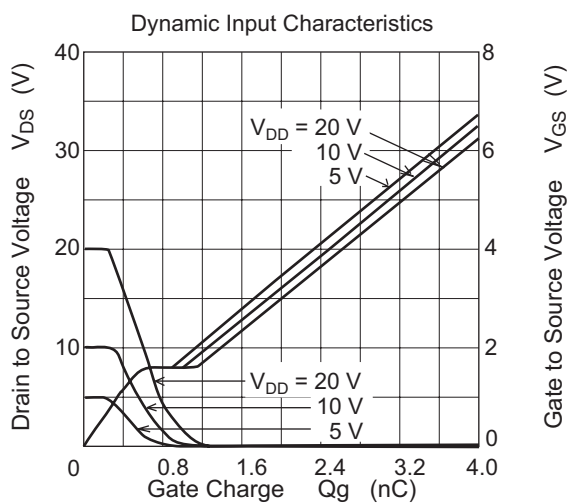
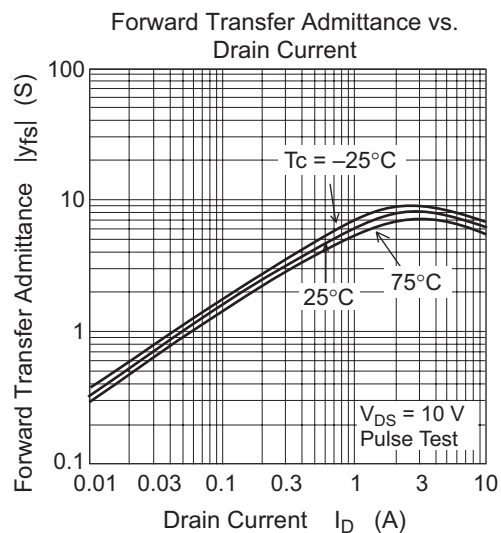
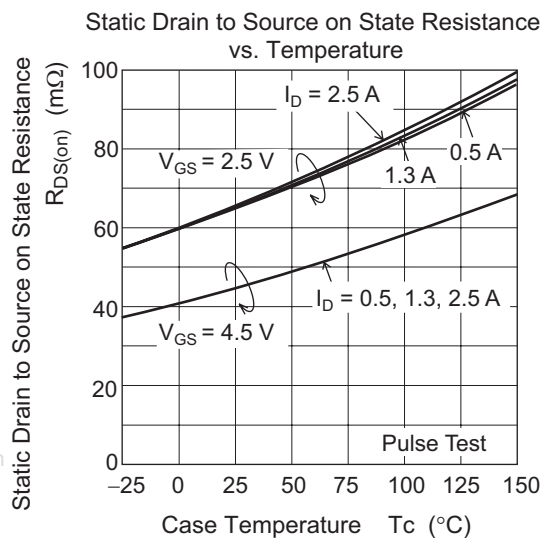
(Ta = 25°C)

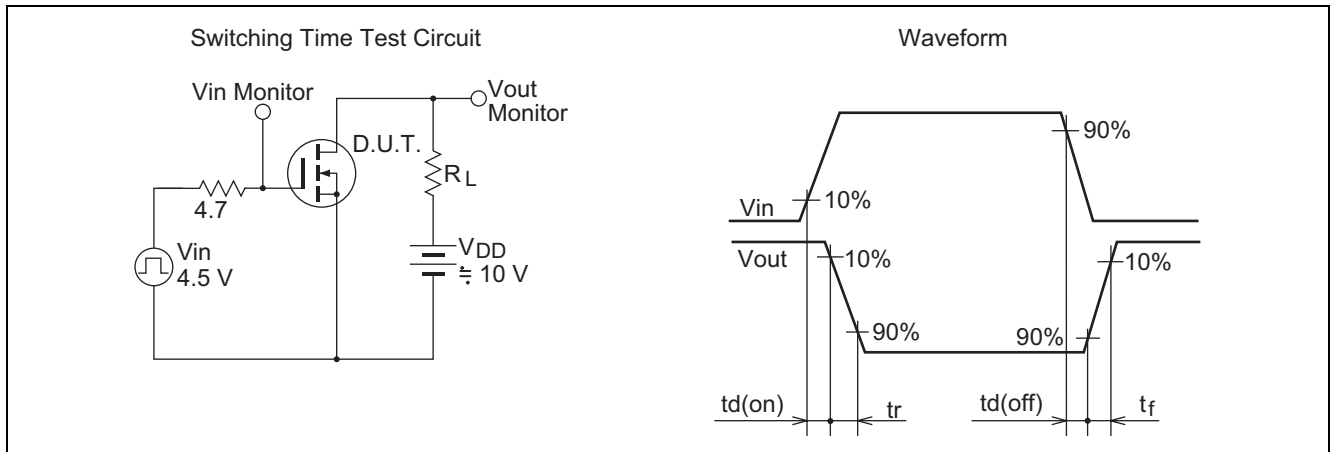
| Item                                | Symbol        | Min      | Typ | Max      | Unit             | Test Conditions  |
|-------------------------------------|---------------|----------|-----|----------|------------------|--|
| Drain to Source breakdown voltage   | $V_{(BR)DSS}$ | 20       | —   | —        | V                | $I_D = 10 \text{ mA}$ , $V_{GS} = 0$   |
| Gate to Source breakdown voltage    | $V_{(BR)GSS}$ | $\pm 12$ | —   | —        | V                | $I_G = \pm 10 \text{ }\mu\text{A}$ , $V_{DS} = 0$  |
| Gate to Source leakage current      | $I_{GSS}$     | —        | —   | $\pm 10$ | $\mu\text{A}$    | $V_{GS} = \pm 10 \text{ V}$ , $V_{DS} = 0$   |
| Drain to Source leakage current     | $I_{DSS}$     | —        | —   | 1        | $\mu\text{A}$    | $V_{DS} = 20 \text{ V}$ , $V_{GS} = 0$   |
| Gate to Source cutoff voltage       | $V_{GS(off)}$ | 0.4      | —   | 1.4      | V                | $I_D = 1 \text{ mA}$ , $V_{DS} = 10 \text{ V}$   |
| Drain to Source on state resistance | $R_{DS(on)}$  | —        | 45  | 58       | $\text{m}\Omega$ | $I_D = 1.3 \text{ A}$ , $V_{GS} = 4.5 \text{ V}$ <sup>Note3</sup>  |
|                                     |               | —        | 66  | 93       | $\text{m}\Omega$ | $I_D = 1.3 \text{ A}$ , $V_{GS} = 2.5 \text{ V}$ <sup>Note3</sup>  |
| Forward transfer admittance         | $ y_{fs} $    | 4.5      | 7   | —        | S                | $I_D = 1.3 \text{ A}$ , $V_{GS} = 10 \text{ V}$ <sup>Note3</sup>   |
| Input capacitance                   | $C_{iss}$     | —        | 270 | —        | pF               | $V_{GS} = 0$ , $f = 1 \text{ MHz}$ ,<br>$V_{DS} = 10 \text{ V}$  |
| Output capacitance                  | $C_{oss}$     | —        | 85  | —        | pF               |  |
| Reverse transfer capacitance        | $C_{rss}$     | —        | 35  | —        | pF               |  |
| Total gate charge                   | $Q_g$         | —        | 2.8 | —        | nC               | $V_{GS} = 4.5 \text{ V}$ , $V_{DS} = 10 \text{ V}$ ,<br>$I_D = 2.5 \text{ A}$  |
| Gate to Source charge               | $Q_{gs}$      | —        | 0.6 | —        | nC               |  |
| Gate to Drain charge                | $Q_{gd}$      | —        | 0.5 | —        | nC               |  |
| Turn - on delay time                | $t_{d(on)}$   | —        | 8   | —        | ns               | $V_{GS} = 4.5 \text{ V}$ , $I_D = 1.3 \text{ A}$ ,<br>$V_{DD} = 10 \text{ V}$ ,<br>$R_L = 7.7 \text{ }\Omega$ , $R_g = 4.7 \text{ }\Omega$ |
| Rise time                           | $t_r$         | —        | 19  | —        | ns               |  |
| Turn - off delay time               | $t_{d(off)}$  | —        | 20  | —        | ns               |  |
| Fall time                           | $t_f$         | —        | 5   | —        | ns               |  |
| Body - Drain diode forward voltage  | $V_{DF}$      | —        | 0.8 | 1.1      | V                | $I_F = 2.5 \text{ A}$ , $V_{GS} = 0$ <sup>Note3</sup>  |

Notes: 3. Pulse test

## Main Characteristics

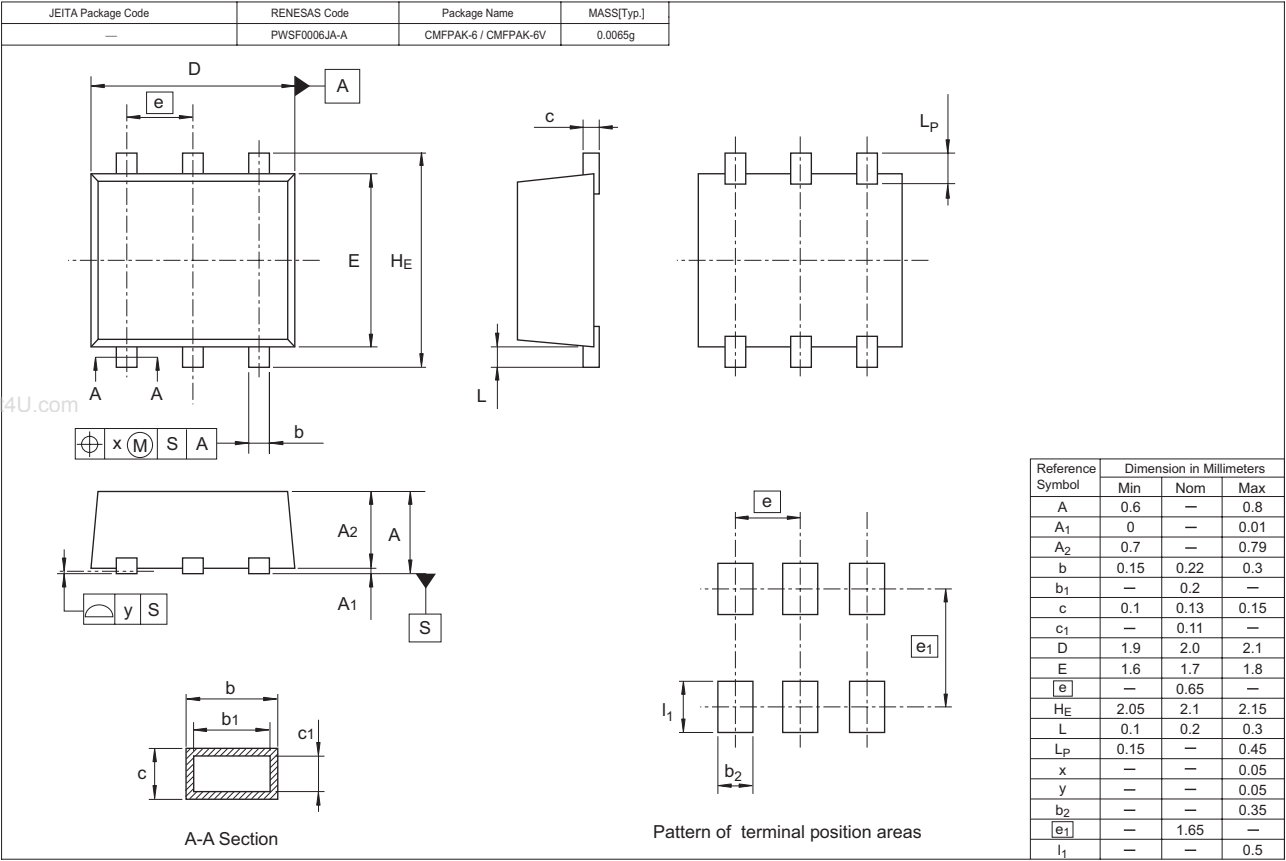






www.DataSheet4U.com

Package Dimensions



Ordering Information

| Part Name     | Quantity | Shipping Container |
|---------------|----------|--------------------|
| HAT2196C-EL-E | 3000 pcs | Taping             |

Note: For some grades, production may be terminated. Please contact the Renesas sales office to check the state of production before ordering the product.

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