

# RJK0406JPE

Silicon N Channel MOS FET  
High Speed Power Switching

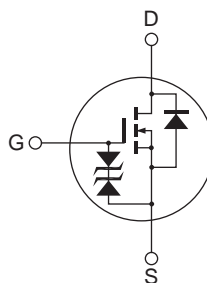
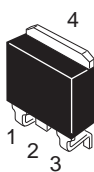
R07DS0335EJ0200  
Rev.2.00  
Dec 19, 2011

## Features

- For Automotive application
- AEC-Q101 compliant
- Low on-resistance :  $R_{DS(on)} = 1.65 \text{ m}\Omega$  typ.
- High current devices :  $I_D = 160 \text{ A}$
- Low input capacitance :  $C_{iss} = 6300 \text{ pF}$  typ

## Outline

RENESAS Package code: PRSS0004AE-B  
(Package name: LDPAK(S)-(1) )



1. Gate
2. Drain
3. Source
4. Drain

## Absolute Maximum Ratings

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

| Item  | Symbol                            | Value       | Unit             |
|---|-----------------------------------|-------------|------------------|
| Drain to source voltage                     | $V_{DSS}$                         | 40          | V                |
| Gate to source voltage                      | $V_{GSS}$                         | +20 / -5    | V                |
| Drain current                               | $I_D$ <sup>Note3</sup>            | 160         | A                |
| Drain peak current                          | $I_D$ (pulse) <sup>Note1</sup>    | 640         | A                |
| Body-drain diode reverse drain current      | $I_{DR}$ <sup>Note3</sup>         | 160         | A                |
| Body-drain diode reverse drain peak current | $I_{DR}$ (pulse) <sup>Note1</sup> | 640         | A                |
| Avalanche current                           | $I_{AP}$ <sup>Note2</sup>         | 70          | A                |
| Avalanche energy                            | $E_{AR}$ <sup>Note2</sup>         | 653         | mJ               |
| Channel dissipation                         | $P_{ch}$ <sup>Note3</sup>         | 192         | W                |
| Channel temperature                         | $T_{ch}$ <sup>Note4</sup>         | 175         | $^\circ\text{C}$ |
| Storage temperature                         | $T_{stg}$                         | -55 to +150 | $^\circ\text{C}$ |

- Notes: 1.  $PW \leq 10 \mu\text{s}$ , duty cycle  $\leq 1\%$   
 2.  $T_{ch} = 25^\circ\text{C}$ ,  $R_g \geq 50 \Omega$   
 3.  $T_c = 25^\circ\text{C}$   
 4. AEC-Q101 compliant

## Thermal Impedance Characteristics

- Channel to case thermal impedance  $\theta_{ch-c}$ :  $0.781^\circ\text{C/W}$

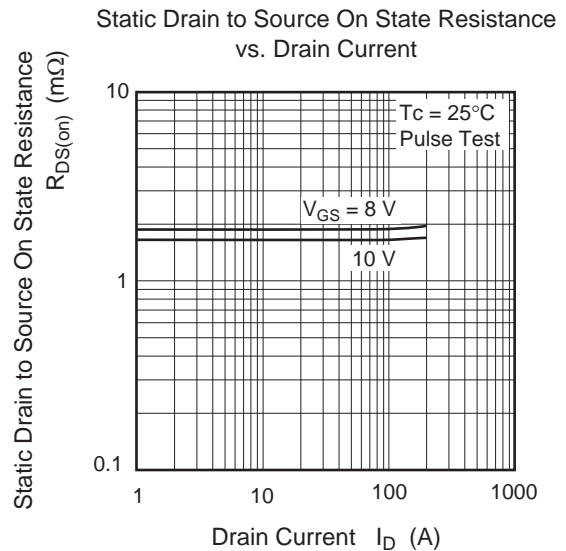
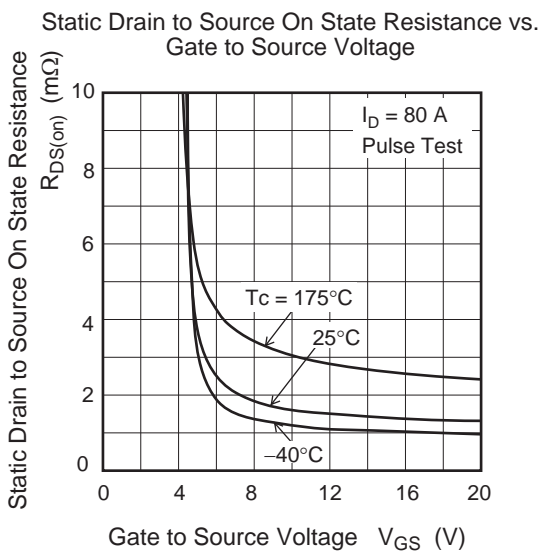
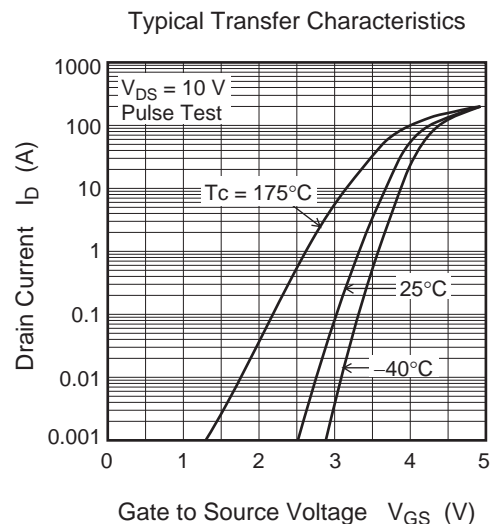
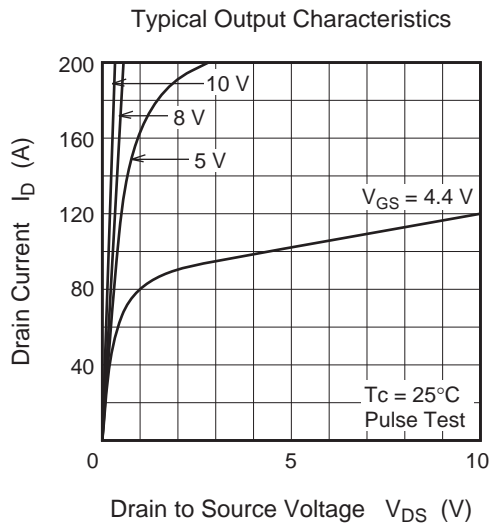
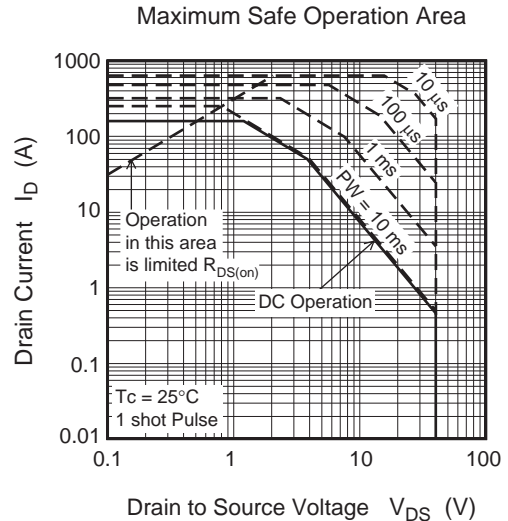
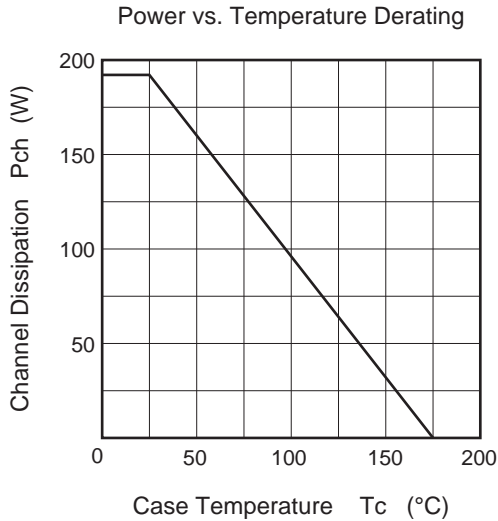
## Electrical Characteristics

(Ta = 25°C)

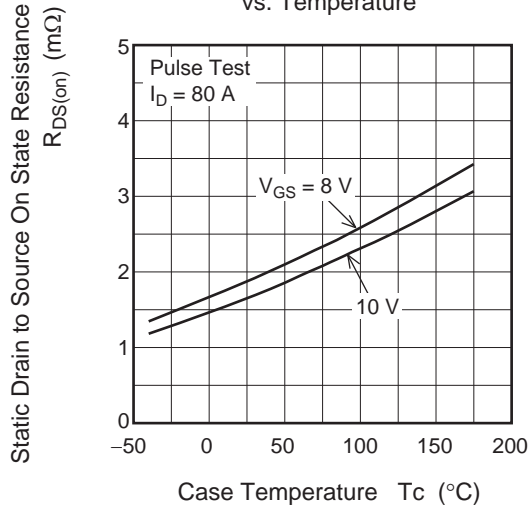
| Item                                       | Symbol        | Min | Typ  | Max  | Unit | Test Conditions  |
|--|---------------|-----|------|------|------|--|
| Gate to source leak current                | $I_{GSS}$     | —   | —    | ±10  | μA   | $V_{GS} = +20/-5 V, V_{DS} = 0$  |
| Zero gate voltage drain current            | $I_{DSS}$     | —   | —    | 1    | μA   | $V_{DS} = 40 V, V_{GS} = 0$  |
| Gate to source cutoff voltage              | $V_{GS(off)}$ | 2.0 | —    | 3.5  | V    | $I_D = 1 mA, V_{DS} = 10 V$  |
| Static drain to source on state resistance | $R_{DS(on)}$  | —   | 1.65 | 2.0  | mΩ   | $I_D = 80 A, V_{GS} = 10 V$ <sup>Note5</sup>                                     |
| Input capacitance                          | $C_{iss}$     | —   | 6300 | —    | pF   | $V_{DS} = 10 V,$<br>$V_{GS} = 0$<br>$f = 1 MHz$                                  |
| Output capacitance                         | $C_{oss}$     | —   | 2200 | —    | pF   |  |
| Reverse transfer capacitance               | $C_{rss}$     | —   | 1900 | —    | pF   |  |
| Total gate charge                          | $Q_g$         | —   | 155  | —    | nC   | $V_{DD} = 25 V,$<br>$V_{GS} = 10 V,$<br>$I_D = 80 A$                             |
| Gate to source charge                      | $Q_{gs}$      | —   | 20   | —    | nC   |  |
| Gate to drain charge                       | $Q_{gd}$      | —   | 70   | —    | nC   |  |
| Turn-on delay time                         | $t_{d(on)}$   | —   | 40   | —    | ns   | $I_D = 80 A,$<br>$R_L = 0.375 \Omega,$<br>$V_{GS} = 10 V,$<br>$R_G = 4.7 \Omega$ |
| Rise time                                  | $t_r$         | —   | 80   | —    | ns   |  |
| Turn-off delay time                        | $t_{d(off)}$  | —   | 110  | —    | ns   |  |
| Fall time                                  | $t_f$         | —   | 75   | —    | ns   |  |
| Body-drain diode forward voltage           | $V_{DF}$      | —   | 0.94 | 1.22 | V    | $I_F = 160 A, V_{GS} = 0$ <sup>Note5</sup>                                       |
| Body-drain diode reverse recovery time     | $t_{rr}$      | —   | 60   | —    | ns   | $I_F = 80 A, V_{GS} = 0,$<br>$di_F/dt = 100 A/\mu s$                             |

Note: 5. Pulse test

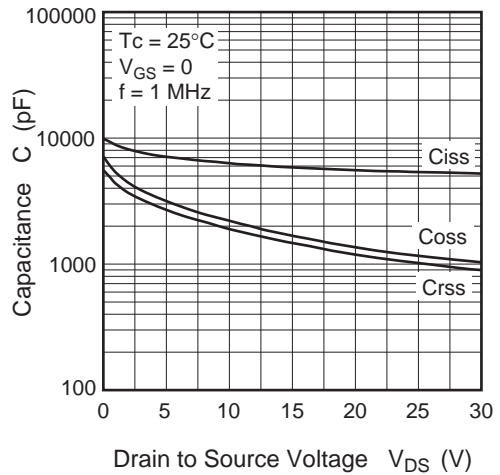
### Main Characteristics



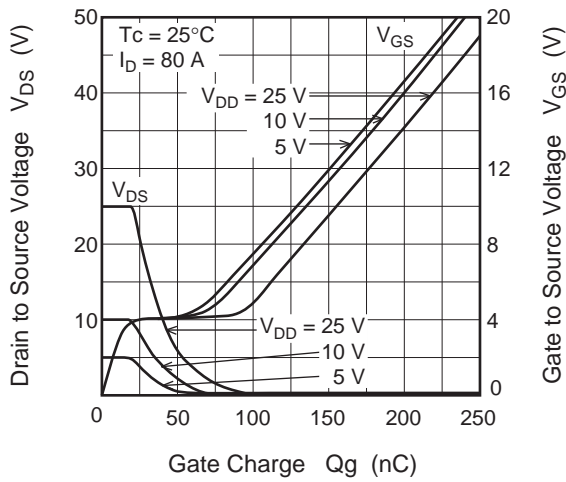
Static Drain to Source On State Resistance vs. Temperature



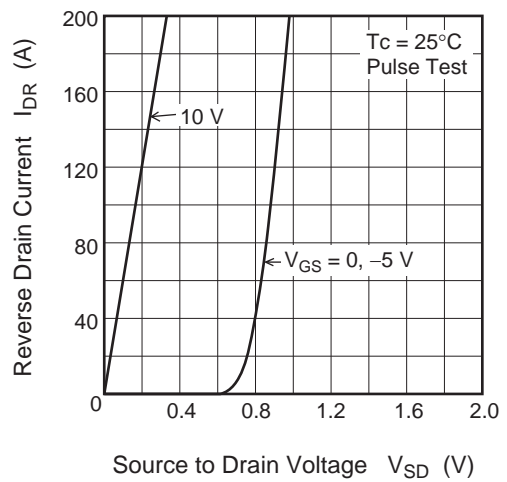
Typical Capacitance vs. Drain to Source Voltage



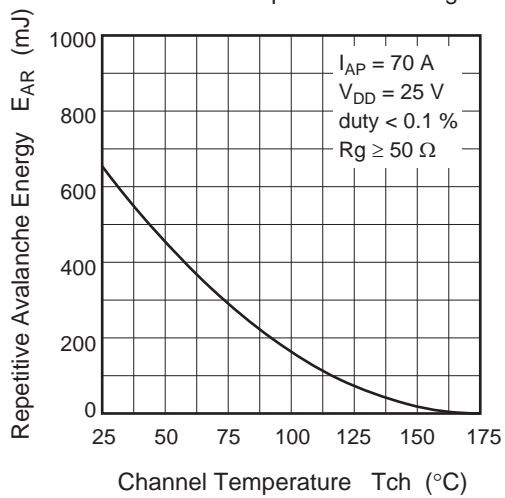
Dynamic Input Characteristics

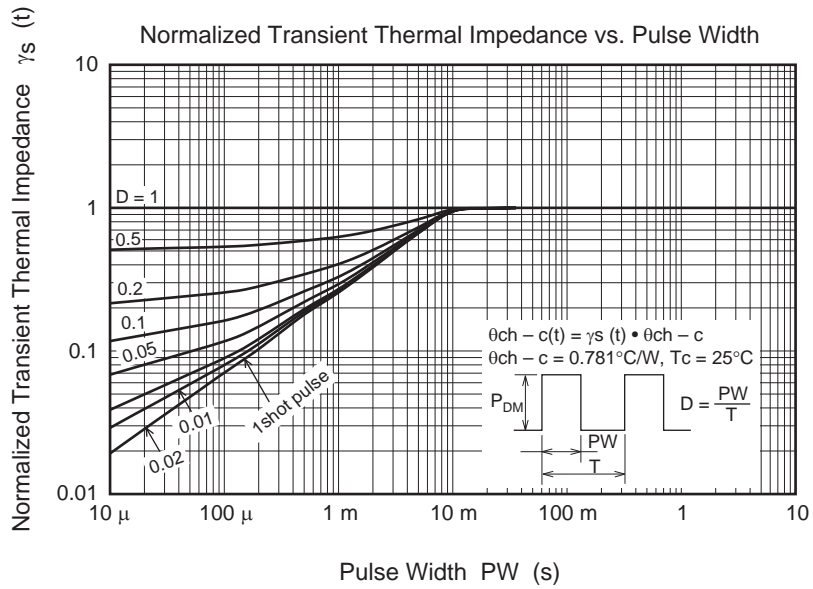


Reverse Drain Current vs. Source to Drain Voltage

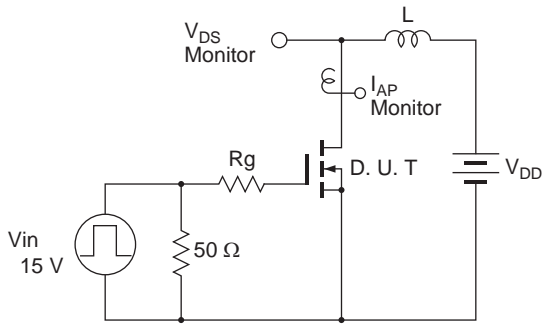


Avalanche Energy vs. Channel Temperature Derating

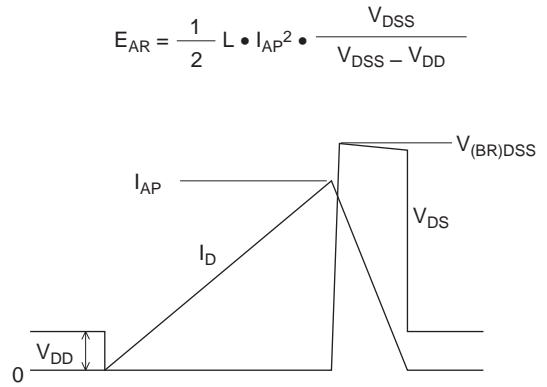




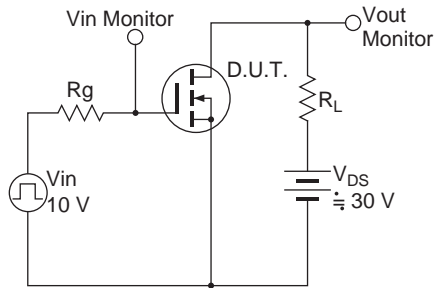
Avalanche Test Circuit



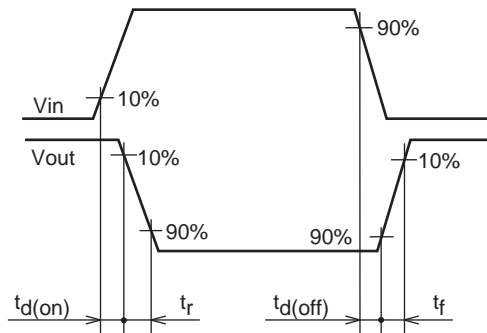
Avalanche Waveform



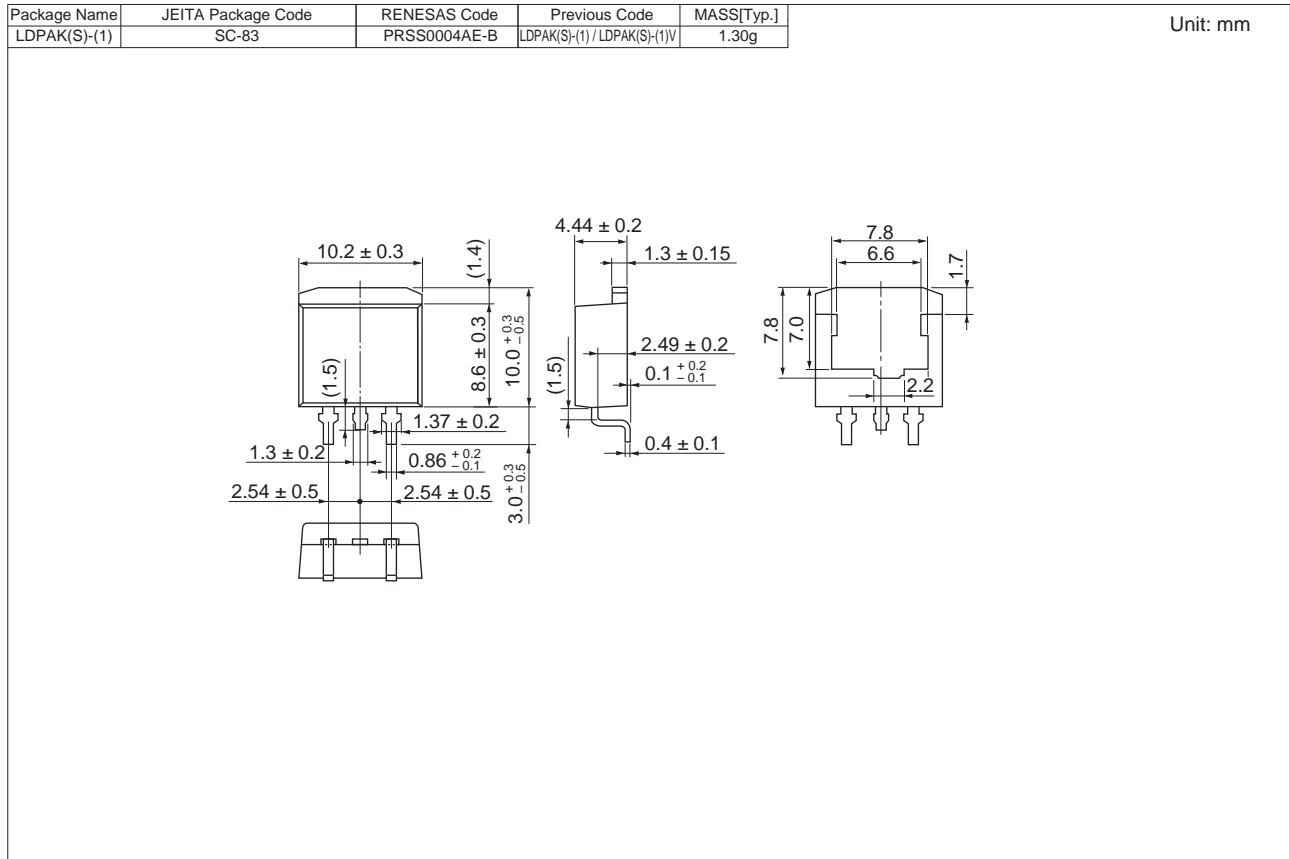
Switching Time Test Circuit



Switching Time Waveform



### Package Dimensions



### Ordering Information

| Orderable Part Number | Quantity | Shipping Container   |
|-----------------------|----------|----------------------|
| RJK0406JPE-00-J3      | 1000 pcs | Taping (Sinistrorse) |

Note: The symbol of a "#" are occasionally presented as a "-".

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Tel: +1-408-588-6000, Fax: +1-408-588-6130

**Renesas Electronics Canada Limited**  
1101 Nicholson Road, Newmarket, Ontario L3Y 9C3, Canada  
Tel: +1-905-898-5441, Fax: +1-905-898-3220

**Renesas Electronics Europe Limited**  
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.  
Tel: +44-1628-585-100, Fax: +44-1628-585-900

**Renesas Electronics Europe GmbH**  
Arcadiastrasse 10, 40472 Düsseldorf, Germany  
Tel: +49-211-65030, Fax: +49-211-6503-1327

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7th Floor, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100083, P.R.China  
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

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Tel: +86-21-5877-1818, Fax: +86-21-6887-7858 / -7898

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Tel: +852-2886-9318, Fax: +852 2886-9022/9044

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Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

**Renesas Electronics Korea Co., Ltd.**  
11F., Samik Lavied' or Bldg., 720-2 Yeoksam-Dong, Kangnam-Ku, Seoul 135-080, Korea  
Tel: +82-2-558-3737, Fax: +82-2-558-5141