

# RJK60S5DPE

600V - 20A - SJ MOS FET  
High Speed Power Switching

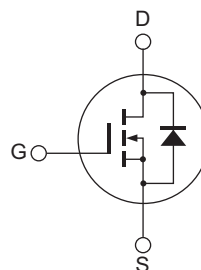
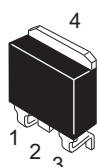
R07DS0639EJ0200  
Rev.2.00  
Oct 12, 2012

## Features

- Superjunction MOSFET
- Low on-resistance  
 $R_{DS(on)} = 0.150 \Omega$  typ. (at  $I_D = 10$  A,  $V_{GS} = 10$  V,  $T_a = 25^\circ\text{C}$ )
- High speed switching  
 $t_f = 23$  ns typ. (at  $I_D = 10$  A,  $V_{GS} = 10$  V,  $R_L = 30 \Omega$ ,  $R_g = 10 \Omega$ ,  $T_a = 25^\circ\text{C}$ )

## Outline

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



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

## Absolute Maximum Ratings

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

| Item                                        | Symbol                           | Ratings     | Unit                      |
|---------------------------------------------|----------------------------------|-------------|---------------------------|
| Drain to source voltage                     | $V_{DSS}$                        | 600         | V                         |
| Gate to source voltage                      | $V_{GSS}$                        | +30, -20    | V                         |
| Drain current                               | $I_D$ <sup>Note1</sup>           | 20          | A                         |
|                                             | $I_D$ <sup>Note1</sup>           | 12.6        | A                         |
| Drain peak current                          | $I_{D(pulse)}$ <sup>Note1</sup>  | 40          | A                         |
| Body-drain diode reverse drain current      | $I_{DR}$ <sup>Note1</sup>        | 20          | A                         |
| Body-drain diode reverse drain peak current | $I_{DR(pulse)}$ <sup>Note1</sup> | 40          | A                         |
| Avalanche current                           | $I_{AP}$ <sup>Note3</sup>        | 5           | A                         |
| Avalanche energy                            | $E_{AR}$ <sup>Note3</sup>        | 1.36        | mJ                        |
| MOSFET dv/dt ruggedness                     | $dv/dt$ <sup>Note4</sup>         | 150         | V/ns                      |
| Channel dissipation                         | $P_{ch}$ <sup>Note2</sup>        | 125         | W                         |
| Channel to case thermal impedance           | $\theta_{ch-c}$                  | 1.0         | $^\circ\text{C}/\text{W}$ |
| Channel temperature                         | $T_{ch}$                         | 150         | $^\circ\text{C}$          |
| Storage temperature                         | $T_{stg}$                        | -55 to +150 | $^\circ\text{C}$          |

- Notes: 1. Limited by  $T_{ch}$  max.  
2. Value at  $T_c = 25^\circ\text{C}$   
3.  $ST_{ch} = 25^\circ\text{C}$ ,  $T_{ch} \leq 150^\circ\text{C}$   
4. Value at  $T_j = 25^\circ\text{C}$ ,  $V_{DS} \leq 480$  V

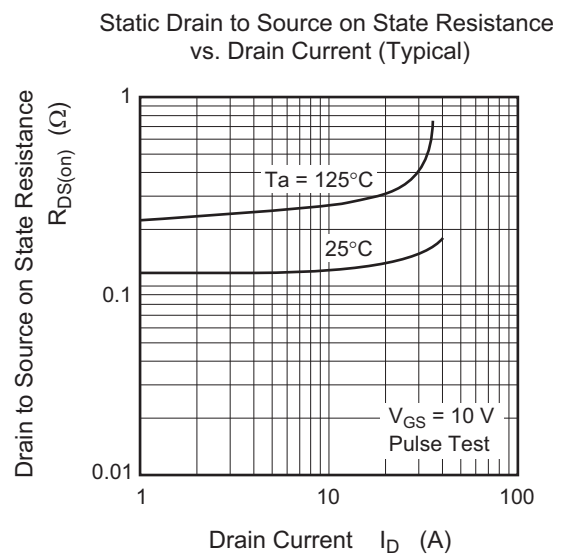
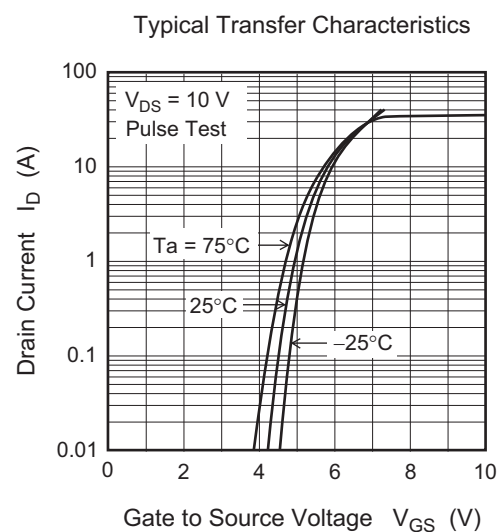
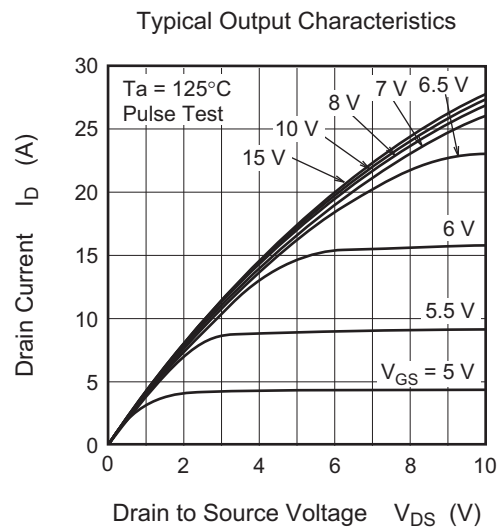
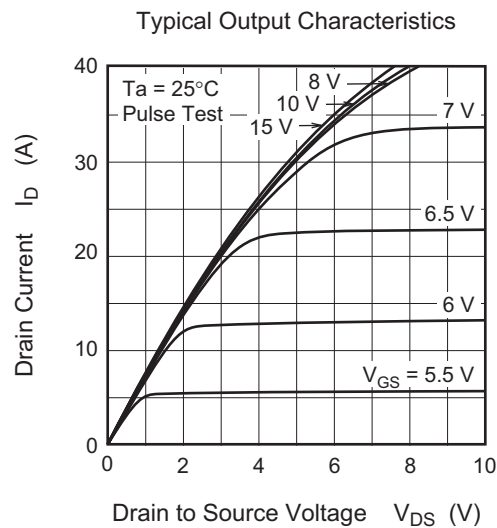
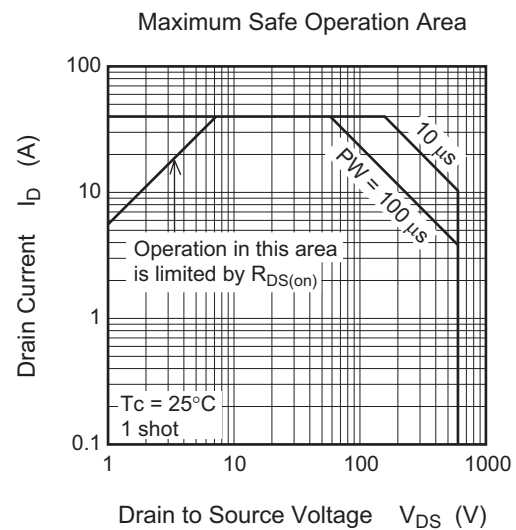
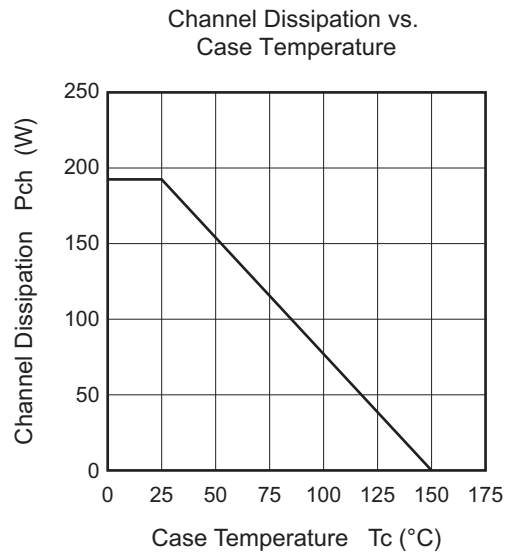
## Electrical Characteristics

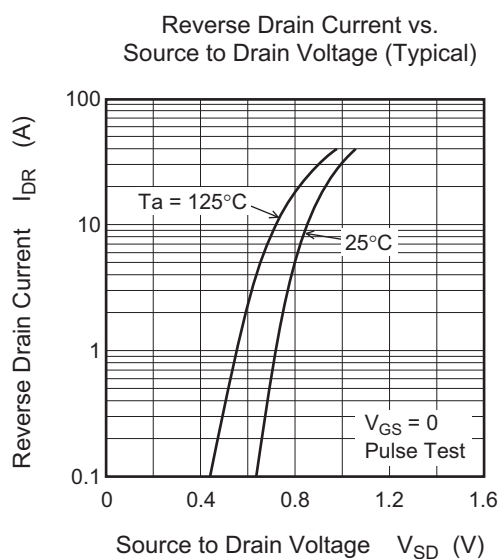
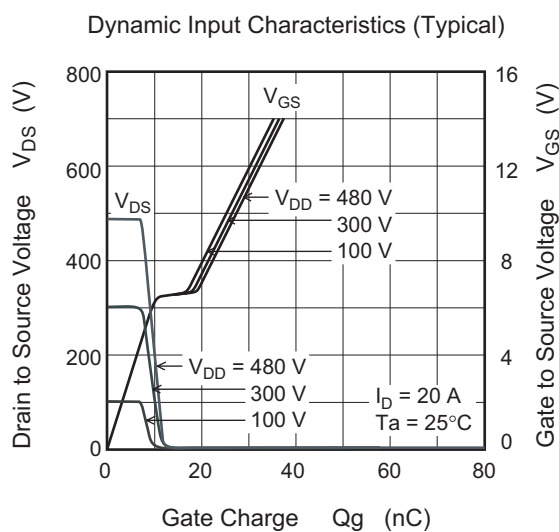
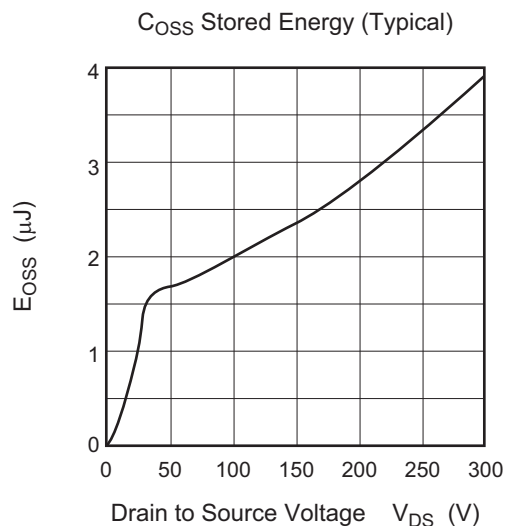
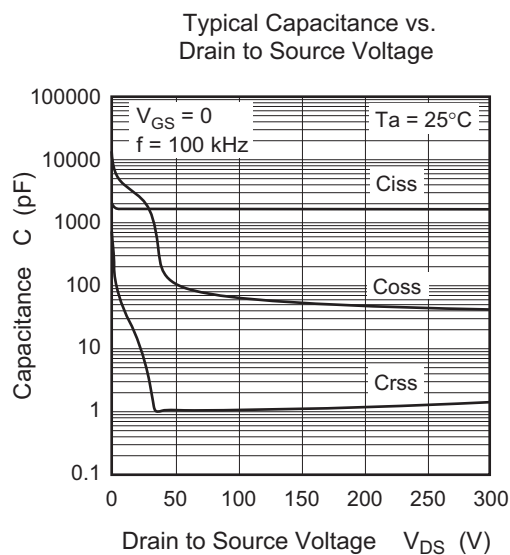
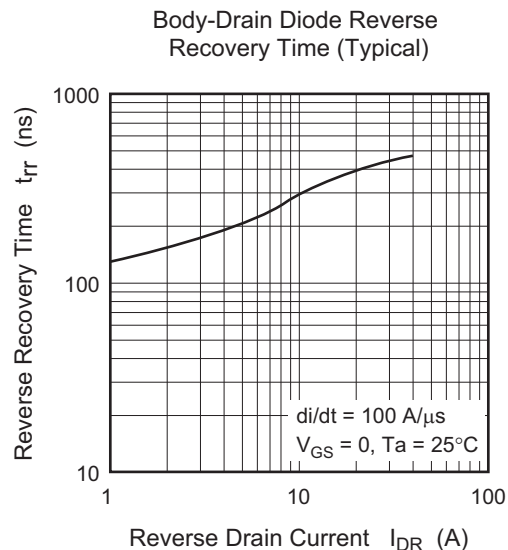
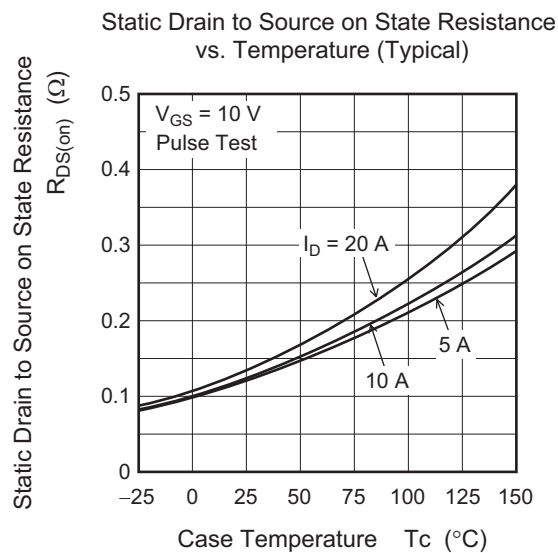
(Ta = 25°C)

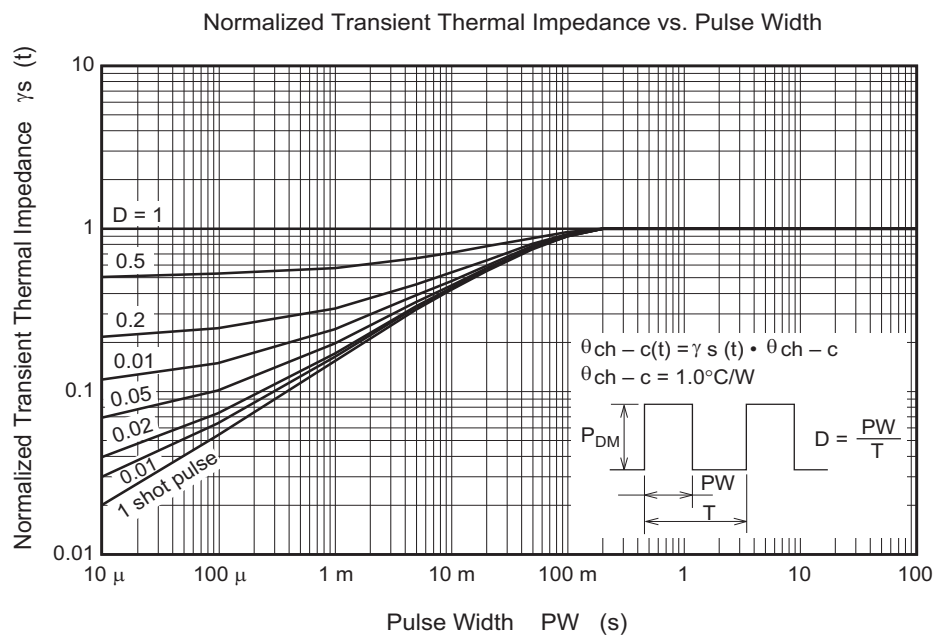
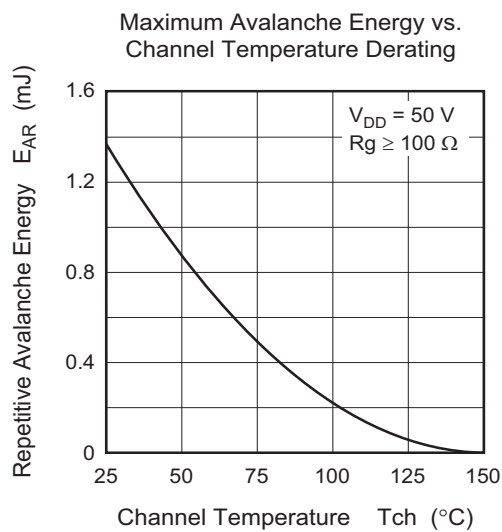
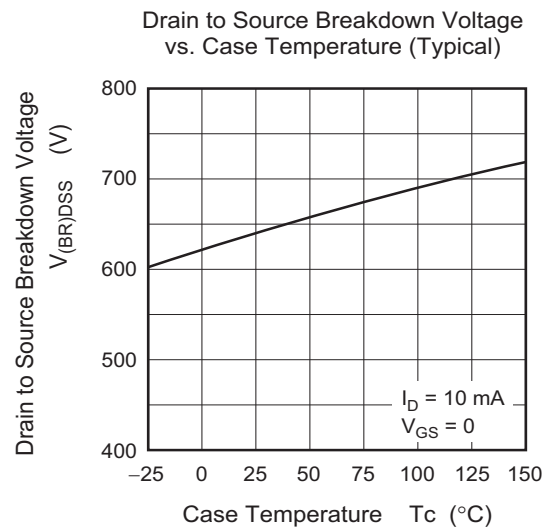
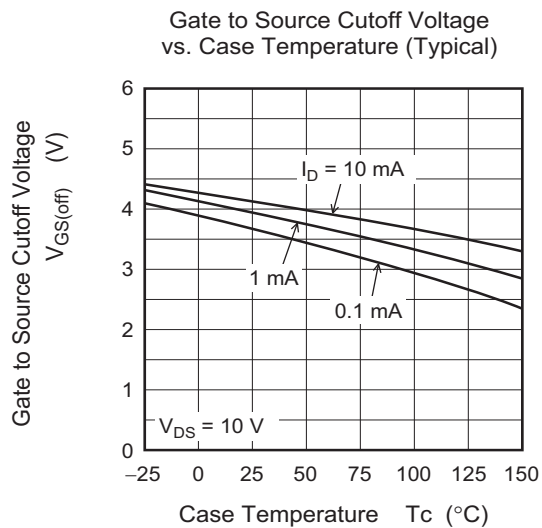
| Item                                       | Symbol        | Min | Typ   | Max       | Unit          | Test conditions                                                                                            |
|--------------------------------------------|---------------|-----|-------|-----------|---------------|------------------------------------------------------------------------------------------------------------|
| Drain to source breakdown voltage          | $V_{(BR)DSS}$ | 600 | —     | —         | V             | $I_D = 10 \text{ mA}$ , $V_{GS} = 0$                                                                       |
| Zero gate voltage drain current            | $I_{DSS}$     | —   | —     | 1         | mA            | $V_{DS} = 600 \text{ V}$ , $V_{GS} = 0$                                                                    |
| Gate to source leak current                | $I_{GSS}$     | —   | —     | $\pm 0.1$ | $\mu\text{A}$ | $V_{GS} = +30\text{V}$ , $-20 \text{ V}$ , $V_{DS} = 0$                                                    |
| Gate to source cutoff voltage              | $V_{GS(off)}$ | 3   | —     | 5         | V             | $V_{DS} = 10 \text{ V}$ , $I_D = 1 \text{ mA}$                                                             |
| Static drain to source on state resistance | $R_{DS(on)}$  | —   | 0.150 | 0.178     | $\Omega$      | $I_D = 10 \text{ A}$ , $V_{GS} = 10 \text{ V}$ <sup>Note5</sup>                                            |
|                                            | $R_{DS(on)}$  | —   | 0.375 | —         | $\Omega$      | Ta = 150°C<br>$I_D = 10 \text{ A}$ , $V_{GS} = 10 \text{ V}$ <sup>Note5</sup>                              |
| Gate resistance                            | Rg            | —   | 2.5   | —         | $\Omega$      | f = 1 MHz<br>$V_{DS} = 25 \text{ V}$ , $V_{GS} = 0$                                                        |
| Input capacitance                          | Ciss          | —   | 1600  | —         | pF            | $V_{DS} = 25 \text{ V}$                                                                                    |
| Output capacitance                         | Coss          | —   | 2160  | —         | pF            | $V_{GS} = 0$                                                                                               |
| Reverse transfer capacitance               | Crss          | —   | 8.2   | —         | pF            | f = 100kHz                                                                                                 |
| Turn-on delay time                         | $t_{d(on)}$   | —   | 23    | —         | ns            | $I_D = 10 \text{ A}$<br>$V_{GS} = 10 \text{ V}$<br>$R_L = 30 \Omega$<br>$R_g = 10 \Omega$ <sup>Note5</sup> |
| Rise time                                  | $t_r$         | —   | 25    | —         | ns            |                                                                                                            |
| Turn-off delay time                        | $t_{d(off)}$  | —   | 49    | —         | ns            |                                                                                                            |
| Fall time                                  | $t_f$         | —   | 23    | —         | ns            |                                                                                                            |
| Total gate charge                          | Qg            | —   | 27    | —         | nC            | $V_{DD} = 480 \text{ V}$                                                                                   |
| Gate to source charge                      | Qgs           | —   | 10.5  | —         | nC            | $V_{GS} = 10 \text{ V}$                                                                                    |
| Gate to drain charge                       | Qgd           | —   | 8.5   | —         | nC            | $I_D = 20 \text{ A}$ <sup>Note5</sup>                                                                      |
| Body-drain diode forward voltage           | $V_{DF}$      | —   | 0.96  | 1.60      | V             | $I_F = 20 \text{ A}$ , $V_{GS} = 0$ <sup>Note5</sup>                                                       |
| Body-drain diode reverse recovery time     | $t_{rr}$      | —   | 400   | —         | ns            | $I_F = 20 \text{ A}$<br>$V_{GS} = 0$<br>$di_F/dt = 100 \text{ A}/\mu\text{s}$ <sup>Note5</sup>             |
| Body-drain diode reverse recovery current  | $I_{rr}$      | —   | 25    | —         | A             |                                                                                                            |
| Body-drain diode reverse recovery charge   | $Q_{rr}$      | —   | 5.6   | —         | $\mu\text{C}$ |                                                                                                            |

Notes: 5. Pulse test

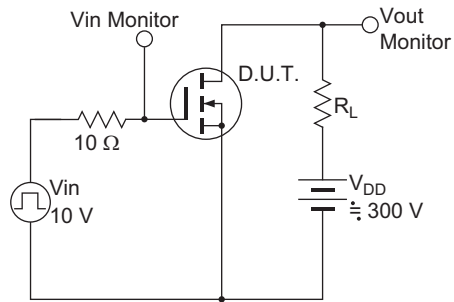
## Main Characteristics



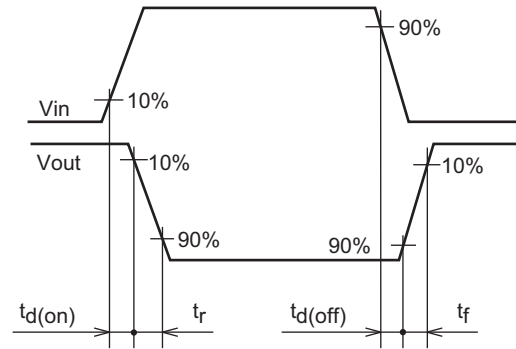




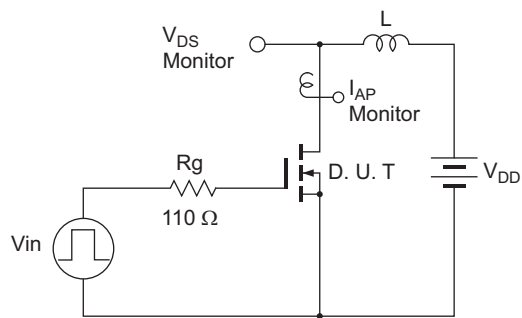
Switching Time Test Circuit



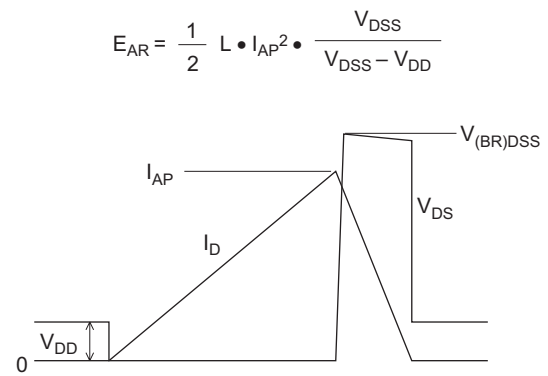
Waveform



Avalanche Test Circuit



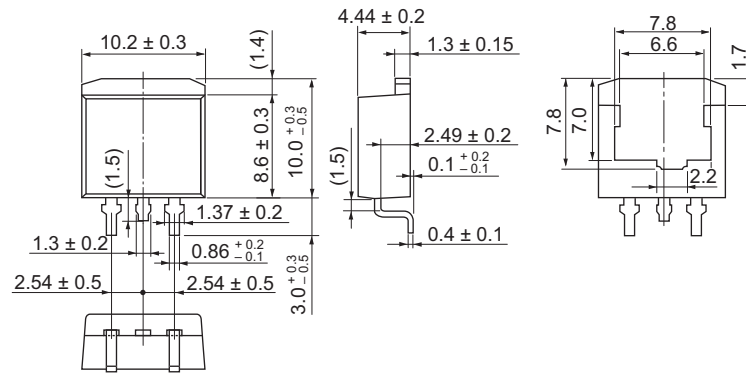
Avalanche Waveform



## Package Dimension

| Package Name | JEITA Package Code | RENESAS Code | Previous Code                | MASS[Typ.] |
|--------------|--------------------|--------------|------------------------------|------------|
| LDBAK(S)-(1) | SC-83              | PRSS0004AE-B | LDBAK(S)-(1) / LDBAK(S)-(1)V | 1.30g      |

Unit: mm



## Ordering Information

| Orderable Part Number | Quantity | Shipping Container |
|-----------------------|----------|--------------------|
| RJK60S5DPE-00#J3      | 1000 pcs | Taping             |

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