

To our customers,

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## Old Company Name in Catalogs and Other Documents

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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# RJK0456DPB

## Silicon N Channel Power MOS FET Power Switching

REJ03G1879-0200

Rev.2.00

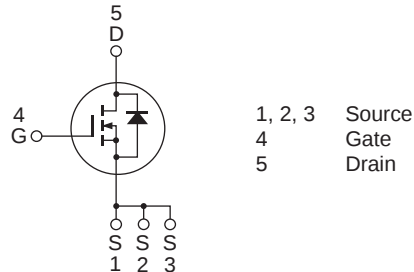
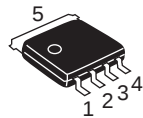
Mar 04, 2010

### Features

- High speed switching
- Low drive current
- Low on-resistance
- $R_{DS(on)} = 2.6 \text{ m}\Omega$  typ. (at  $V_{GS} = 10 \text{ V}$ )
- Pb-free
- Halogen-free
- High density mounting

### Outline

RENESAS Package code: PTZZ0005DA-A  
(Package name: LFPAK)



### Absolute Maximum Ratings

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

| Item                                   | Symbol                          | Ratings     | Unit               |
|----------------------------------------|---------------------------------|-------------|--------------------|
| Drain to source voltage                | $V_{DSS}$                       | 40          | V                  |
| Gate to source voltage                 | $V_{GSS}$                       | $\pm 20$    | V                  |
| Drain current                          | $I_D$                           | 50          | A                  |
| Drain peak current                     | $I_{D(pulse)}$ <sup>Note1</sup> | 200         | A                  |
| Body-drain diode reverse drain current | $I_{DR}$                        | 50          | A                  |
| Avalanche current                      | $I_{AP}$ <sup>Note 2</sup>      | 50          | A                  |
| Avalanche energy                       | $E_{AR}$ <sup>Note 2</sup>      | 20          | mJ                 |
| Channel dissipation                    | $P_{ch}$ <sup>Note3</sup>       | 65          | W                  |
| Channel to Case Thermal Resistance     | $\theta_{ch-C}$                 | 1.92        | $^\circ\text{C/W}$ |
| 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. Value at  $L=10\mu\text{H}$ ,  $T_{ch} = 25^\circ\text{C}$ ,  $R_g \geq 50 \Omega$   
 3.  $T_c = 25^\circ\text{C}$

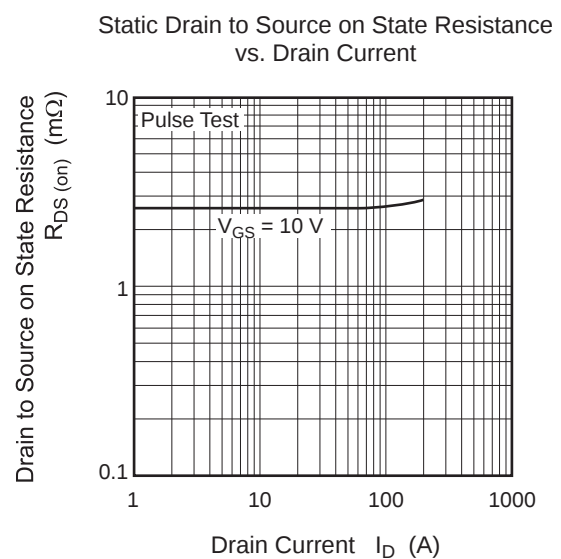
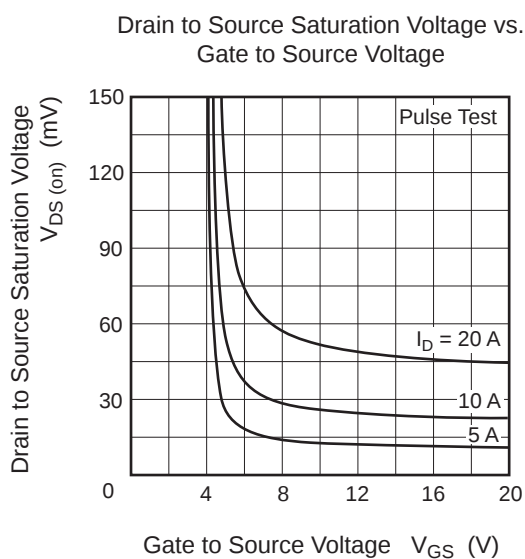
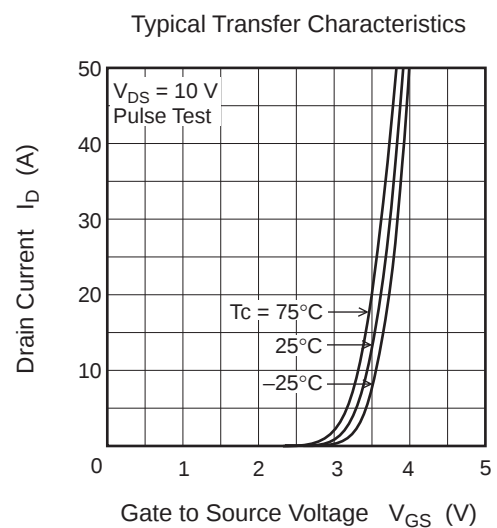
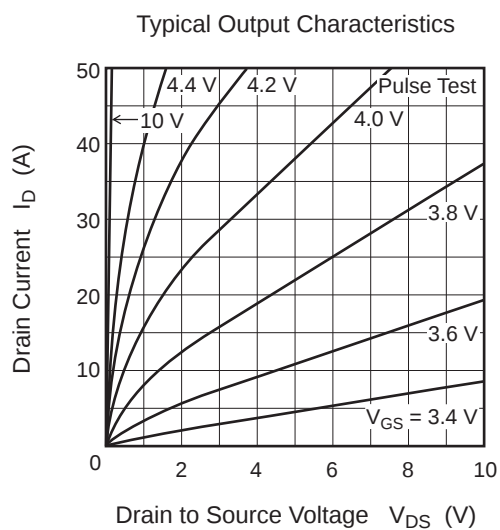
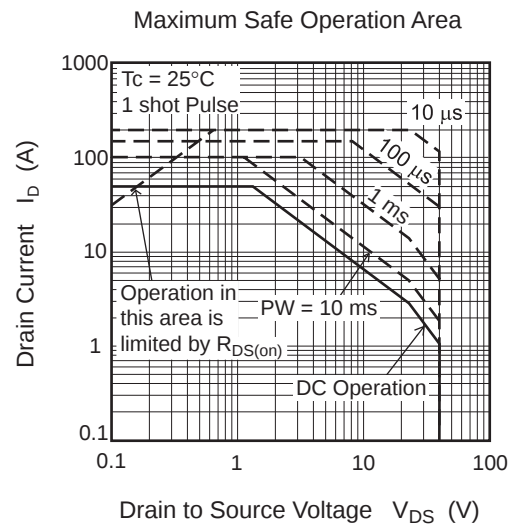
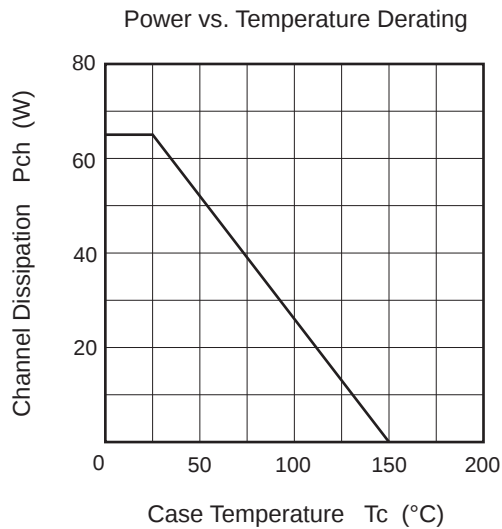
## Electrical Characteristics

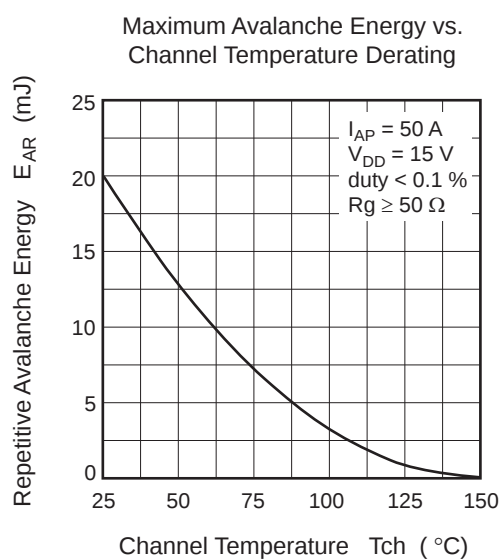
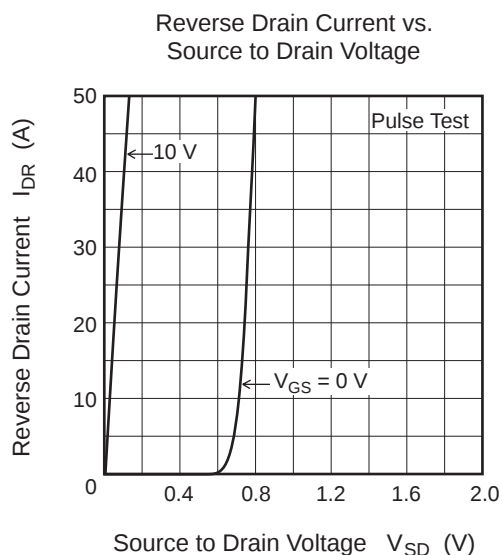
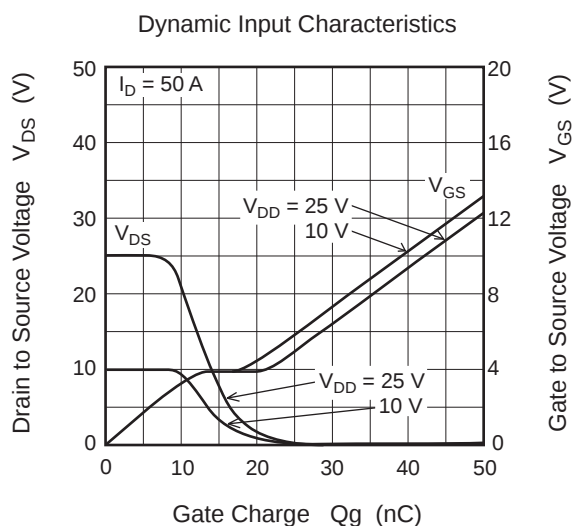
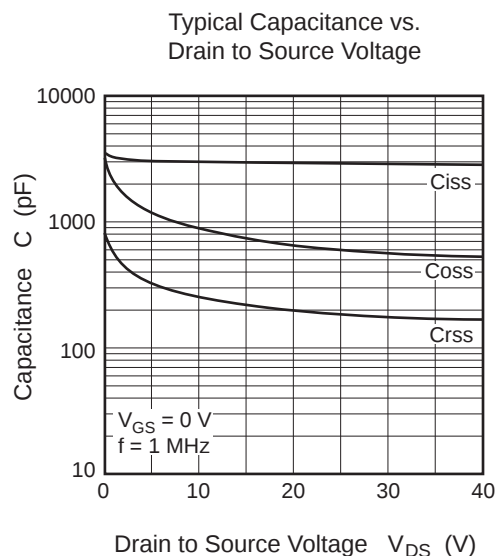
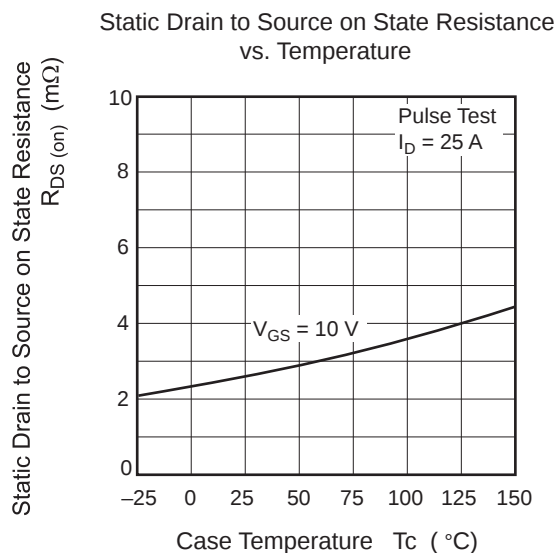
(Ta = 25°C)

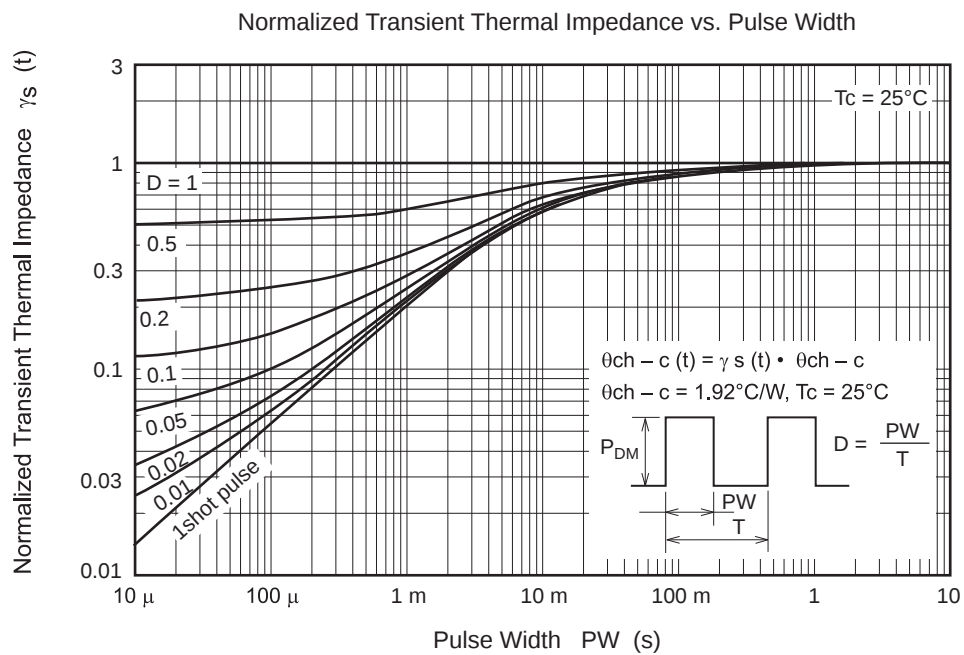
| Item                                       | Symbol        | Min | Typ  | Max       | Unit             | Test Conditions                                                                                                              |
|--------------------------------------------|---------------|-----|------|-----------|------------------|------------------------------------------------------------------------------------------------------------------------------|
| Drain to source breakdown voltage          | $V_{(BR)DSS}$ | 40  | —    | —         | V                | $I_D = 10 \text{ mA}$ , $V_{GS} = 0 \text{ V}$                                                                               |
| Gate to source leak current                | $I_{GSS}$     | —   | —    | $\pm 0.1$ | $\mu\text{A}$    | $V_{GS} = \pm 20 \text{ V}$ , $V_{DS} = 0 \text{ V}$                                                                         |
| Zero gate voltage drain current            | $I_{DSS}$     | —   | —    | 1         | $\mu\text{A}$    | $V_{DS} = 40 \text{ V}$ , $V_{GS} = 0 \text{ V}$                                                                             |
| Gate to source cutoff voltage              | $V_{GS(off)}$ | 2.0 | —    | 4.0       | V                | $V_{DS} = 10 \text{ V}$ , $I_D = 1 \text{ mA}$                                                                               |
| Static drain to source on state resistance | $R_{DS(on)}$  | —   | 2.6  | 3.2       | $\text{m}\Omega$ | $I_D = 25 \text{ A}$ , $V_{GS} = 10 \text{ V}$ <sup>Note4</sup>                                                              |
| Forward transfer admittance                | $ y_{fs} $    | —   | 67   | —         | S                | $I_D = 25 \text{ A}$ , $V_{DS} = 10 \text{ V}$ <sup>Note4</sup>                                                              |
| Input capacitance                          | $C_{iss}$     | —   | 3000 | —         | pF               | $V_{DS} = 10 \text{ V}$ , $V_{GS} = 0 \text{ V}$ ,<br>$f = 1 \text{ MHz}$                                                    |
| Output capacitance                         | $C_{oss}$     | —   | 900  | —         | pF               |                                                                                                                              |
| Reverse transfer capacitance               | $C_{rss}$     | —   | 260  | —         | pF               |                                                                                                                              |
| Gate Resistance                            | $R_g$         | —   | 0.5  | —         | $\Omega$         |                                                                                                                              |
| Total gate charge                          | $Q_g$         | —   | 39   | —         | nC               | $V_{DD} = 10 \text{ V}$ , $V_{GS} = 10 \text{ V}$ ,<br>$I_D = 50 \text{ A}$                                                  |
| Gate to source charge                      | $Q_{gs}$      | —   | 13   | —         | nC               |                                                                                                                              |
| Gate to drain charge                       | $Q_{gd}$      | —   | 6.0  | —         | nC               |                                                                                                                              |
| Turn-on delay time                         | $t_{d(on)}$   | —   | 14   | —         | ns               | $V_{GS} = 10 \text{ V}$ , $I_D = 25 \text{ A}$ ,<br>$V_{DD} \cong 10 \text{ V}$ , $R_L = 0.4 \Omega$ ,<br>$R_g = 4.7 \Omega$ |
| Rise time                                  | $t_r$         | —   | 6.8  | —         | ns               |                                                                                                                              |
| Turn-off delay time                        | $t_{d(off)}$  | —   | 34   | —         | ns               |                                                                                                                              |
| Fall time                                  | $t_f$         | —   | 8.0  | —         | ns               |                                                                                                                              |
| Body-drain diode forward voltage           | $V_{DF}$      | —   | 0.8  | 1.1       | V                | $I_F = 50 \text{ A}$ , $V_{GS} = 0 \text{ V}$ <sup>Note4</sup>                                                               |
| Body-drain diode reverse recovery time     | $t_{rr}$      | —   | 41   | —         | ns               | $I_F = 50 \text{ A}$ , $V_{GS} = 0 \text{ V}$<br>$di_F/dt = 100 \text{ A}/\mu\text{s}$                                       |

Notes: 4. Pulse test

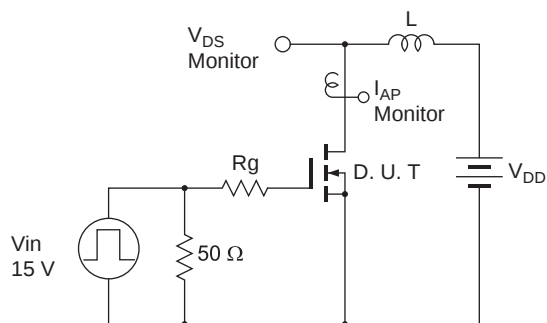
## Main Characteristics



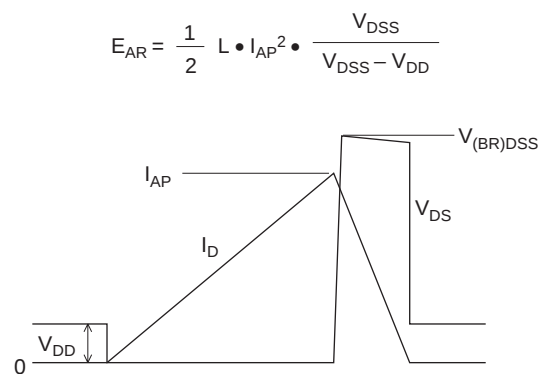




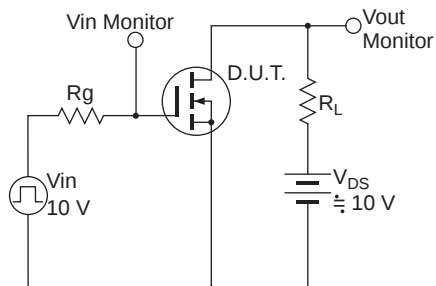
Avalanche Test Circuit



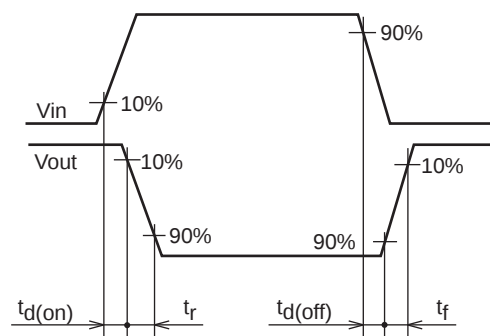
Avalanche Waveform



Switching Time Test Circuit



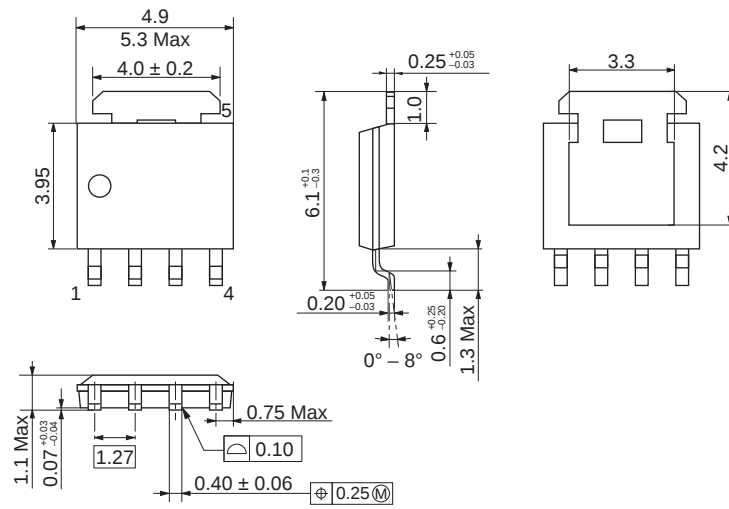
Switching Time Waveform



## Package Dimensions

| Package Name | JEITA Package Code | RENESAS Code | Previous Code | MASS[Typ.] |
|--------------|--------------------|--------------|---------------|------------|
| LPAK         | SC-100             | PTZZ0005DA-A | LPAKV         | 0.080g     |

Unit: mm



(Ni/Pd/Au plating)

## Ordering Information

| Part No.         | Quantity | Shipping Container |
|------------------|----------|--------------------|
| RJK0456DPB-00-J5 | 2500 pcs | Taping             |

Notes:

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Tel: <1> (408) 382-7500, Fax: <1> (408) 382-7501

**Renesas Technology Europe Limited**  
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.  
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Tel: <86> (21) 5877-1818, Fax: <86> (21) 6887-7858/7898

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Tel: <852> 2265-6688, Fax: <852> 2377-3473

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Kukje Center Bldg. 18th Fl., 191, 2-ka, Hangang-ro, Yongsan-ku, Seoul 140-702, Korea  
Tel: <82> (2) 796-3115, Fax: <82> (2) 796-2145

**Renesas Technology Malaysia Sdn. Bhd**  
Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No.18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia  
Tel: <603> 7955-9390, Fax: <603> 7955-9510