# RJK0393DPA

## Silicon N Channel Power MOS FET
## Power Switching

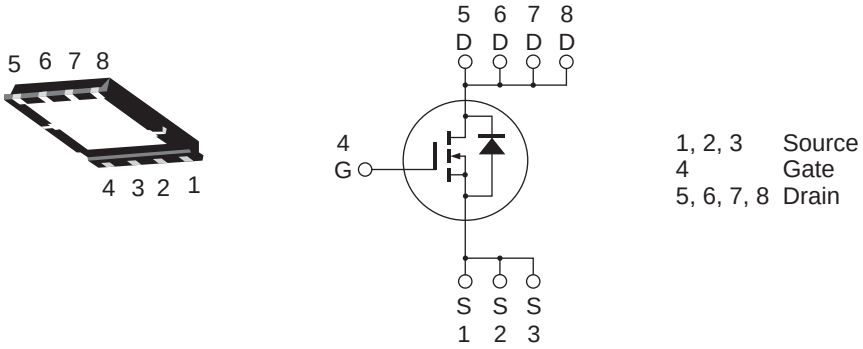
REJ03G1784-0220
Rev.2.20
May 21, 2010

### Features

- High speed switching
- Capable of 4.5V gate drive
- Low drive current
- High density mounting
- Low on-resistance
  $R_{DS(on)}$ = 3.3 mΩ typ. (at $V_{GS}$ = 10 V)
- Pb-free
- Halogen-free

### Outline

RENESAS Package code: PWSN0008DC-A
(Package name: WPAK(2))




### Absolute Maximum Ratings

(Ta = 25°C)

| Item | Symbol | Ratings | Unit |
|---|---|---|---|
| Drain to source voltage | $V_{DSS}$ | 30 | V |
| Gate to source voltage | $V_{GSS}$ | ±20 | V |
| Drain current | $I_D$ | 40 | A |
| Drain peak current | $I_{D(pulse)}$ Note1 | 160 | A |
| Body-drain diode reverse drain current | $I_{DR}$ | 40 | A |
| Avalanche current | $I_{AP}$ Note 2 | 16 | A |
| Avalanche energy | $E_{AR}$ Note 2 | 25.6 | mJ |
| Channel dissipation | Pch Note3 | 40 | W |
| Channel to case thermal impedance | θch-C | 3.13 | °C/W |
| Channel temperature | Tch | 150 | °C |
| Storage temperature | Tstg | –55 to +150 | °C |

Notes: 1. PW ≤ 10 μs, duty cycle ≤ 1%
2. Value at Tch = 25°C, Rg ≥ 50 Ω
3. Tc = 25°C

## Electrical Characteristics

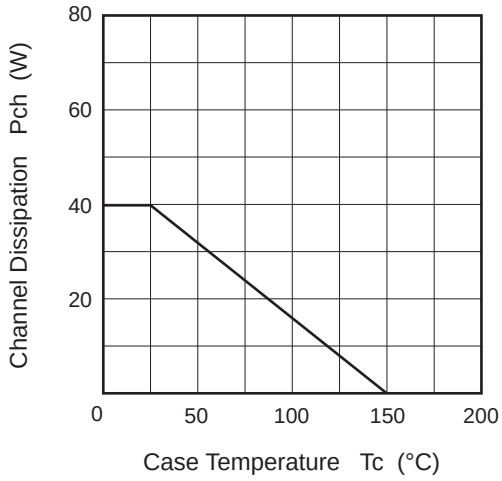
(Ta = 25°C)

| Item | Symbol | Min | Typ | Max | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| Drain to source breakdown voltage | $V_{(BR)DSS}$ | 30 | — | — | V | $I_D$ = 10 mA, $V_{GS}$ = 0 |
| Gate to source leak current | $I_{GSS}$ | — | — | ±0.1 | μA | $V_{GS}$ = ±20 V, $V_{DS}$ = 0 |
| Zero gate voltage drain current | $I_{DSS}$ | — | — | 1 | μA | $V_{DS}$ = 30 V, $V_{GS}$ = 0 |
| Gate to source cutoff voltage | $V_{GS(off)}$ | 1.2 | — | 2.5 | V | $V_{DS}$ = 10 V, $I_D$ = 1 mA |
| Static drain to source on state resistance | $R_{DS(on)}$ | — | 3.3 | 4.3 | mΩ | $I_D$ = 20 A, $V_{GS}$ = 10 V Note4 |
| | $R_{DS(on)}$ | — | 4.2 | 5.9 | mΩ | $I_D$ = 20 A, $V_{GS}$ = 4.5 V Note4 |
| Forward transfer admittance | $\|y_{fs}\|$ | — | 100 | — | S | $I_D$ = 20 A, $V_{DS}$ = 10 V Note4 |
| Input capacitance | Ciss | — | 3270 | — | pF | $V_{DS}$ = 10 V, $V_{GS}$ = 0, f = 1 MHz |
| Output capacitance | Coss | — | 430 | — | pF | |
| Reverse transfer capacitance | Crss | — | 225 | — | pF | |
| Gate Resistance | Rg | — | 1.4 | — | Ω | |
| Total gate charge | Qg | — | 21 | — | nC | $V_{DD}$ = 10 V, $V_{GS}$ = 4.5 V, $I_D$ = 40 A |
| Gate to source charge | Qgs | — | 9.5 | — | nC | |
| Gate to drain charge | Qgd | — | 4.7 | — | nC | |
| Turn-on delay time | $t_{d(on)}$ | — | 13.2 | — | ns | $V_{GS}$ = 10 V, $I_D$ = 20 A, $V_{DD}$ ≅ 10 V, $R_L$ = 0.5 Ω, Rg = 4.7 Ω |
| Rise time | $t_r$ | — | 6.0 | — | ns | |
| Turn-off delay time | $t_{d(off)}$ | — | 52 | — | ns | |
| Fall time | $t_f$ | — | 7.1 | — | ns | |
| Body–drain diode forward voltage | $V_{DF}$ | — | 0.83 | 1.08 | V | IF = 40 A, $V_{GS}$ = 0 Note4 |
| Body–drain diode reverse recovery time | $t_{rr}$ | — | 23.5 | — | ns | IF = 40 A, $V_{GS}$ = 0 $di_F/dt$ = 100 A/μs |

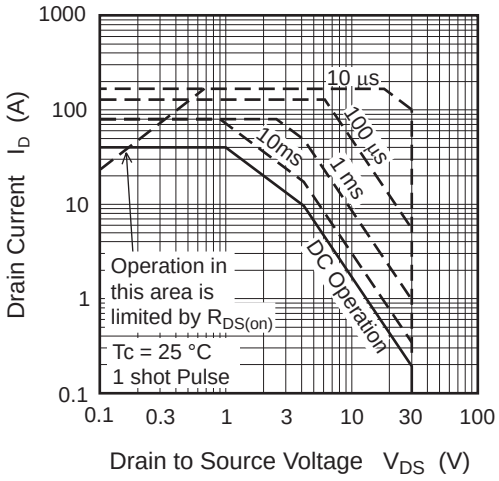
Notes: 4. Pulse test

## Main Characteristics

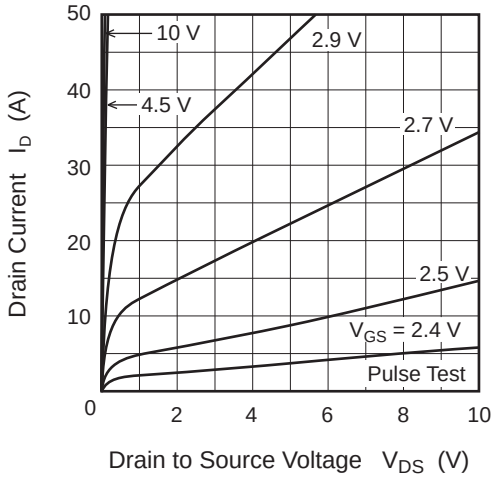
Power vs. Temperature Derating



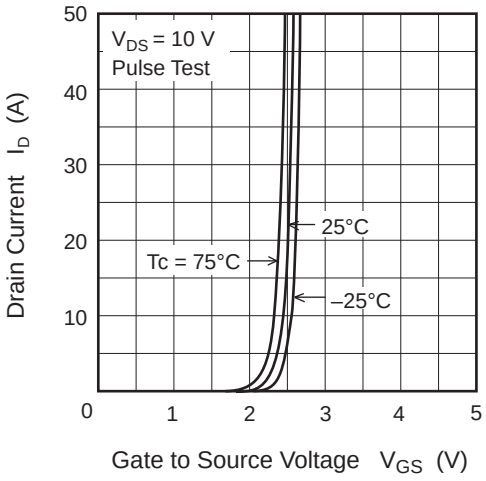

Maximum Safe Operation Area



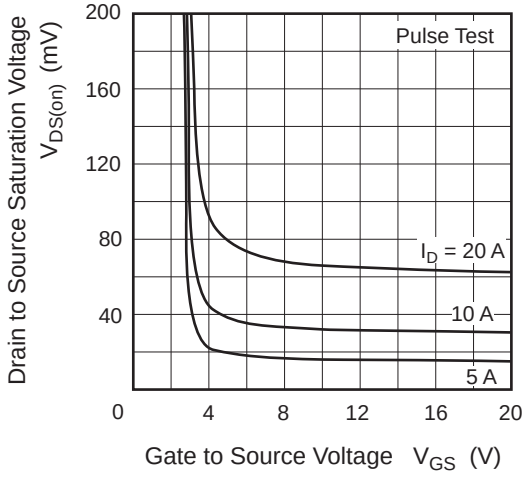

Typical Output Characteristics



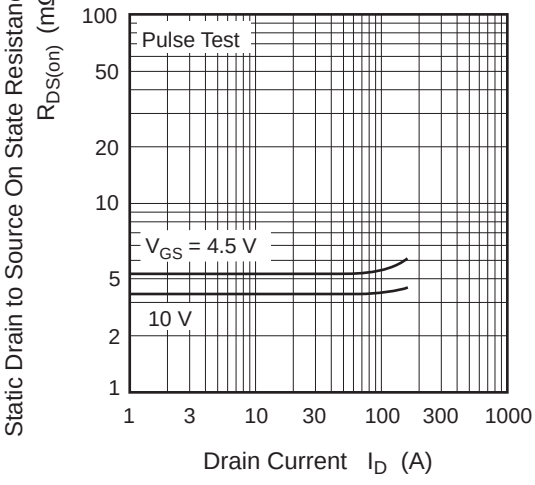

Typical Transfer Characteristics



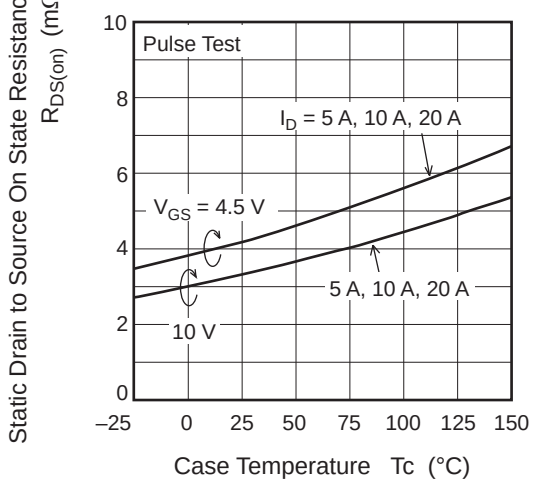

Drain to Source Saturation Voltage vs.
Gate to Source Voltage



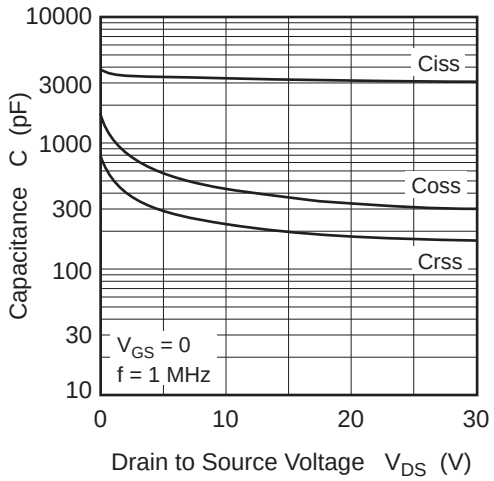

Static Drain to Source On State Resistance
vs. Drain Current



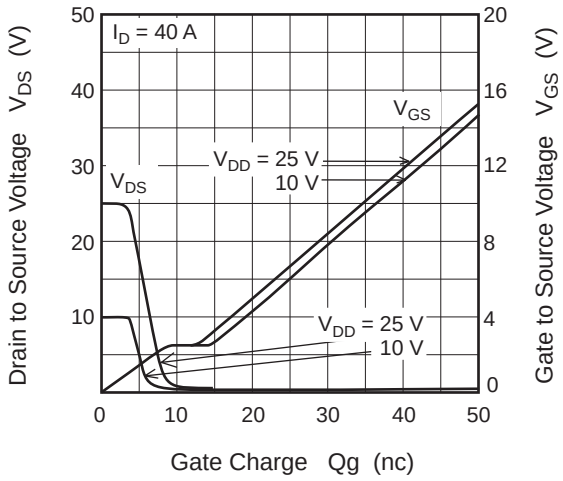
Static Drain to Source On State Resistance vs. Temperature



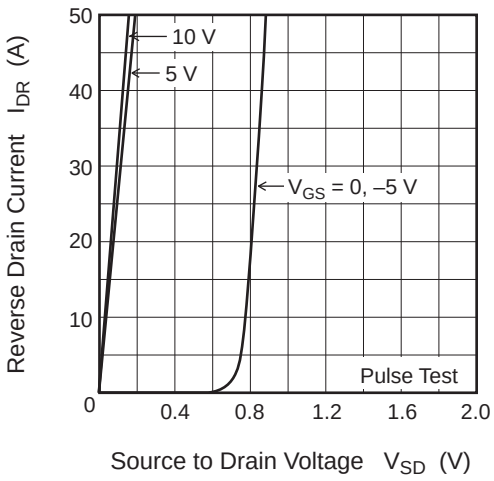

Typical Capacitance vs. Drain to Source Voltage



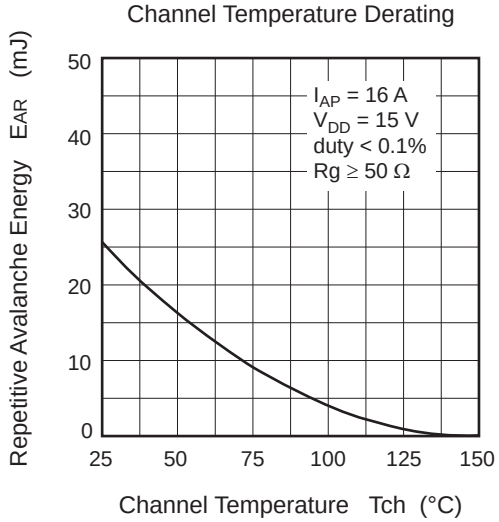

Dynamic Input Characteristics



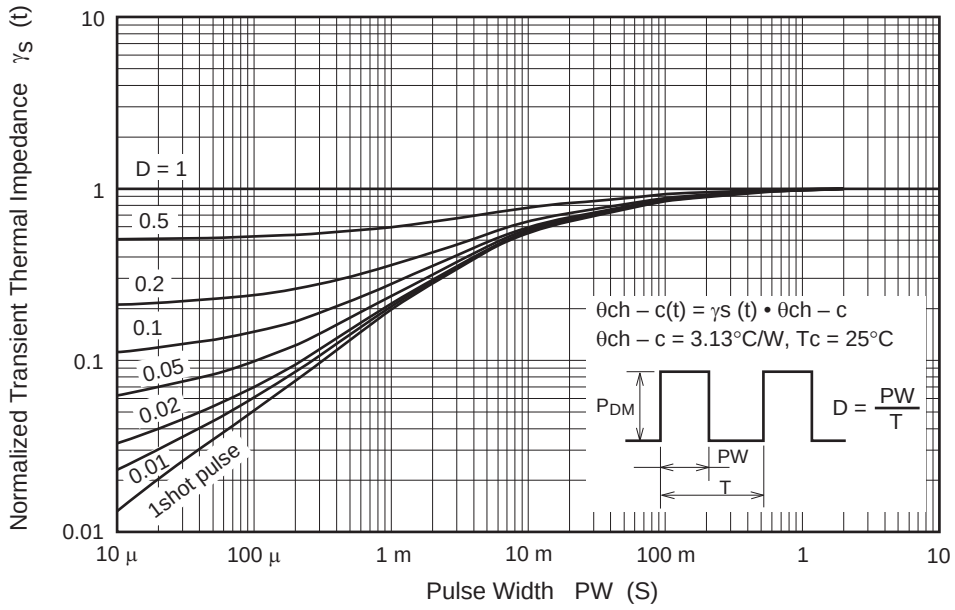

Reverse Drain Current vs. Source to Drain Voltage



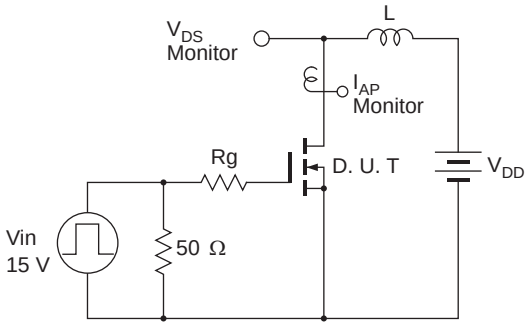

Maximum Avalanche Energy vs. Channel Temperature Derating



Normalized Transient Thermal Impedance vs. Pulse Width

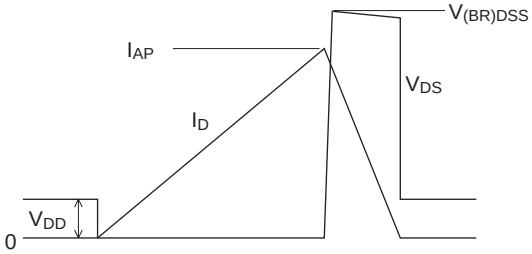



Avalanche Test Circuit

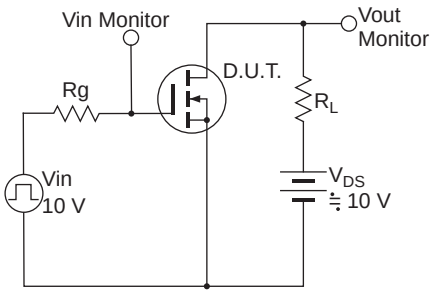



Avalanche Waveform

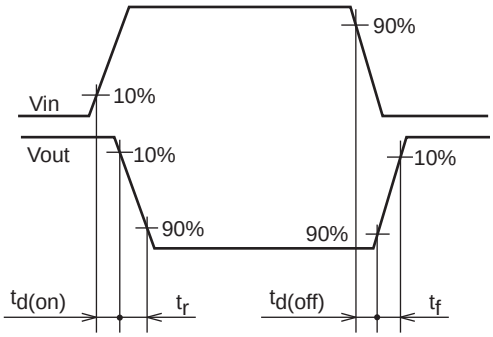
$$E_{AR} = \frac{1}{2} L \bullet I_{AP}^2 \bullet \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$




Switching Time Test Circuit



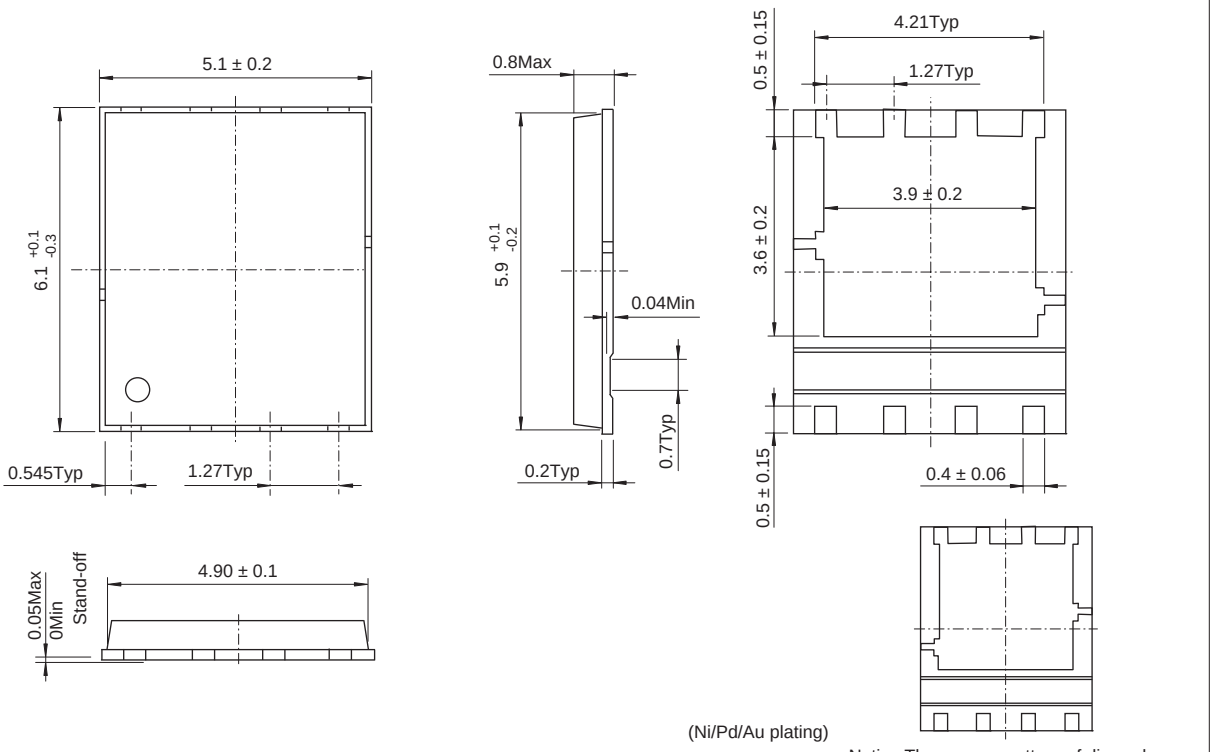

Switching Time Waveform



## Package Dimensions

| Package Name | JEITA Package Code | RENESAS Code | Previous Code | MASS[Typ.] |
|---|---|---|---|---|
| WPAK(2) | — | PWSN0008DC-A | WPAK(2)V | 0.07g |

Unit: mm




Notice: The reverse pattern of die-pad support lead described above exists.

## Ordering Information

| Part No. | Quantity | Shipping Container |
|---|---|---|
| RJK0393DPA-00-J53 | 3000 pcs | Taping |

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