# RJL5014DPP-A0

## 500V - 19A - MOS FET
## High Speed Power Switching

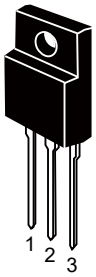
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Rev.1.00
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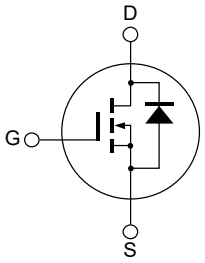
### Features

- Built-in fast recovery diode
- Low on-resistance
  $R_{DS(on)}$ = 0.32 Ω typ. (at $I_D$ = 9.5 A, $V_{GS}$ = 10 V, Ta = 25 °C)
- Low leakage current
- High speed switching
- Quality grade: Standard

### Outline

RENESAS Package code: PRSS0003AP-A
(Package name: TO-220FPA)




1. Gate
2. Drain
3. Source

### Absolute Maximum Ratings

(Ta = 25 °C)

| Item | Symbol | Ratings | Unit |
|---|---|---|---|
| Drain to source voltage | $V_{DSS}$ | 500 | V |
| Gate to source voltage | $V_{GSS}$ | ±30 | V |
| Drain current | $I_D$ Notes4 | 19 | A |
| Drain peak current | $I_{D\ (pulse)}$ Notes1 | 57 | A |
| Body-drain diode reverse drain current | $I_{DR}$ | 19 | A |
| Body-drain diode reverse drain peak current | $I_{DR\ (pulse)}$ Notes1 | 57 | A |
| Avalanche current | $I_{AP}$ Notes3 | 4 | A |
| Avalanche energy | $E_{AR}$ Notes3 | 0.88 | mJ |
| Channel dissipation | Pch Notes2 | 35 | W |
| Channel temperature | Tch | 150 | °C |
| Storage temperature | Tstg | –55 to +150 | °C |

Note: Continuous heavy condition (e.g. high temperature/voltage/current or high variation of temperature) may affect a reliability even if it is within the absolute maximum ratings. Please consider derating condition for appropriate reliability in reference Renesas Semiconductor Reliability Handbook (Recommendation for Handling and Usage of Semiconductor Devices) and individual reliability data.

Notes: 1. PW ≤ 10 μs, duty cycle ≤ 1 %
2. Value at Tc = 25 °C
3. STch = 25 °C, Tch ≤ 150 °C
4. Limited by maximum safe operation area

## Thermal Resistance Characteristics

(Ta = 25 °C)

| Item | Symbol | Max. Value Notes5 | Unit |
|---|---|---|---|
| Channel to case thermal impedance | θch-c | 3.57 | °C/W |

Notes: 5. Designed target value on Renesas measurement condition. (Not tested)

## Electrical Characteristics

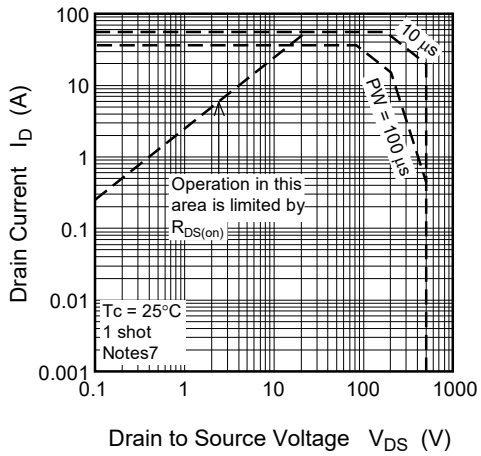
(Ta = 25 °C)

| Item | Symbol | Min | Typ | Max | Unit | Test conditions |
|---|---|---|---|---|---|---|
| Drain to source breakdown voltage | $V_{(BR)DSS}$ | 500 | — | — | V | $I_D$ = 10 mA, $V_{GS}$ = 0 |
| Zero gate voltage drain current | $I_{DSS}$ | — | — | 10 | μA | $V_{DS}$ = 500 V, $V_{GS}$ = 0 |
| Gate to source leak current | $I_{GSS}$ | — | — | ±0.1 | μA | $V_{GS}$ = ±30 V, $V_{DS}$ = 0 |
| Gate to source cutoff voltage | $V_{GS(off)}$ | 2.0 | — | 4.0 | V | $V_{DS}$ = 10 V, $I_D$ = 1 mA |
| Static drain to source on state resistance | $R_{DS(on)}$ | — | 0.32 | 0.40 | Ω | $I_D$ = 9.5 A, $V_{GS}$ = 10 V Notes6 |
| Input capacitance | Ciss | — | 1700 | — | pF | $V_{DS}$ = 25 V<br>$V_{GS}$ = 0<br>f = 1 MHz |
| Output capacitance | Coss | — | 190 | — | pF | |
| Reverse transfer capacitance | Crss | — | 23 | — | pF | |
| Turn-on delay time | $t_{d(on)}$ | — | 32 | — | ns | $I_D$ = 9.5 A<br>$V_{GS}$ = 10 V<br>$R_L$ = 26.3 Ω<br>Rg = 10 Ω |
| Rise time | $t_r$ | — | 27 | — | ns | |
| Turn-off delay time | $t_{d(off)}$ | — | 95 | — | ns | |
| Fall time | $t_f$ | — | 20 | — | ns | |
| Total gate charge | Qg | — | 43 | — | nC | $V_{DD}$ = 400 V<br>$V_{GS}$ = 10 V<br>$I_D$ = 19 A |
| Gate to source charge | Qgs | — | 8.2 | — | nC | |
| Gate to drain charge | Qgd | — | 21.8 | — | nC | |
| Body-drain diode forward voltage | $V_{DF}$ | — | 1.00 | 1.65 | V | $I_F$ = 19 A, $V_{GS}$ = 0 Notes6 |
| Body-drain diode reverse recovery time | $t_{rr}$ | — | 160 | — | ns | $I_F$ = 19 A, $V_{GS}$ = 0<br>$di_F/dt$ = 100 A/μs |

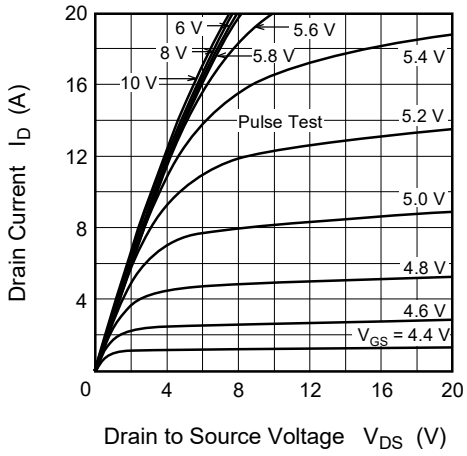
Notes: 6. Pulse test

## Main Characteristics

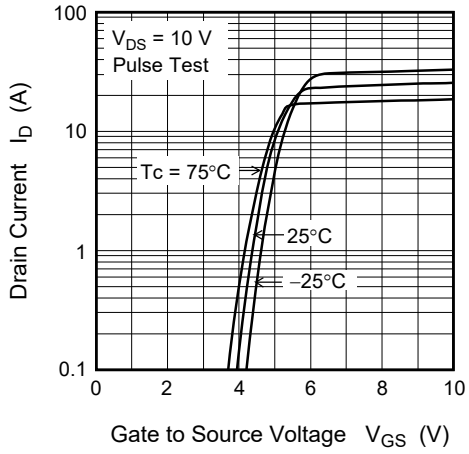
Maximum Safe Operation Area



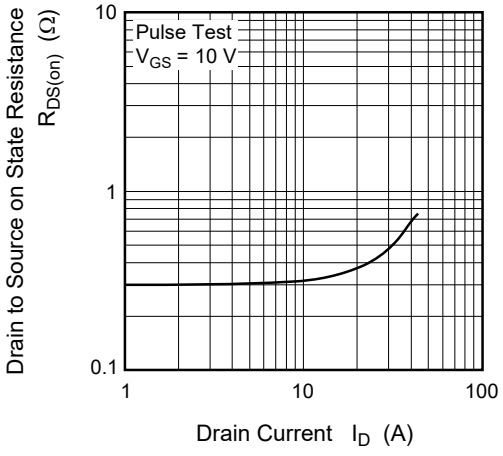

Typical Output Characteristics



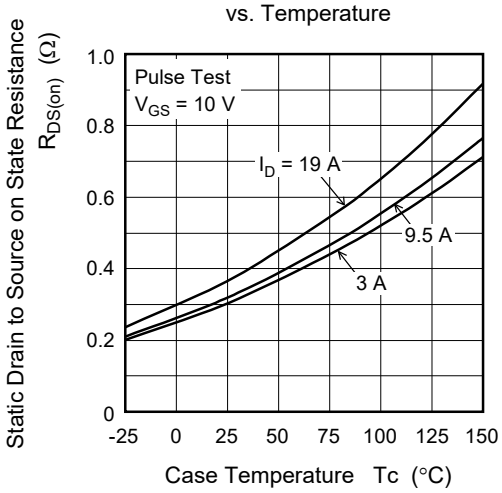

Typical Transfer Characteristics



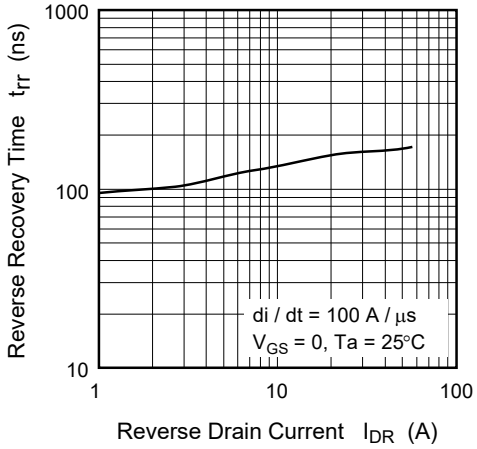

Static Drain to Source on State Resistance vs. Drain Current




Static Drain to Source on State Resistance vs. Temperature

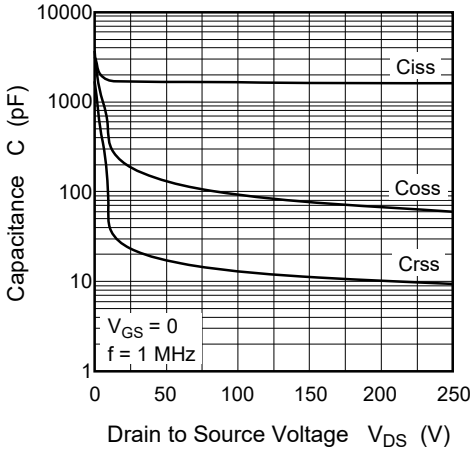



Body-Drain Diode Reverse Recovery Time

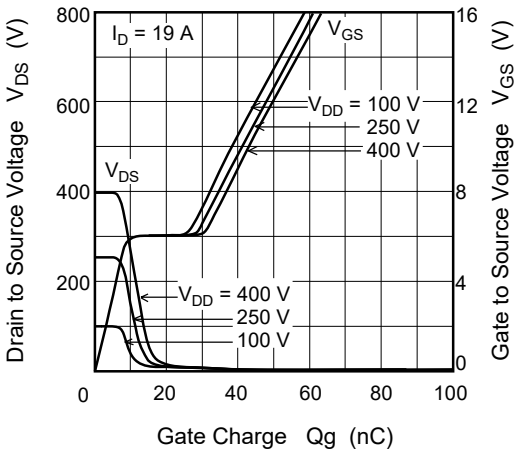



Notes: 7. Designed target value on Renesas measurement condition. (Not tested)
Renesas recommends that operating conditions are designed according to a document “Power MOS FET・IGBT Attention of Handling Semiconductor Devices”.

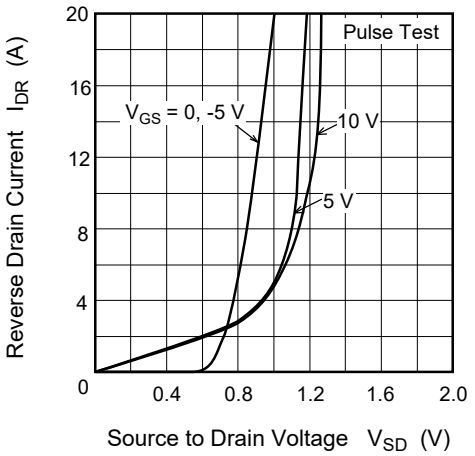
Typical Capacitance vs.
Drain to Source Voltage



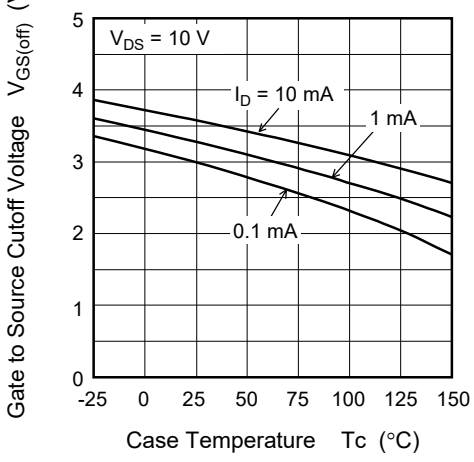

Dynamic Input Characteristics



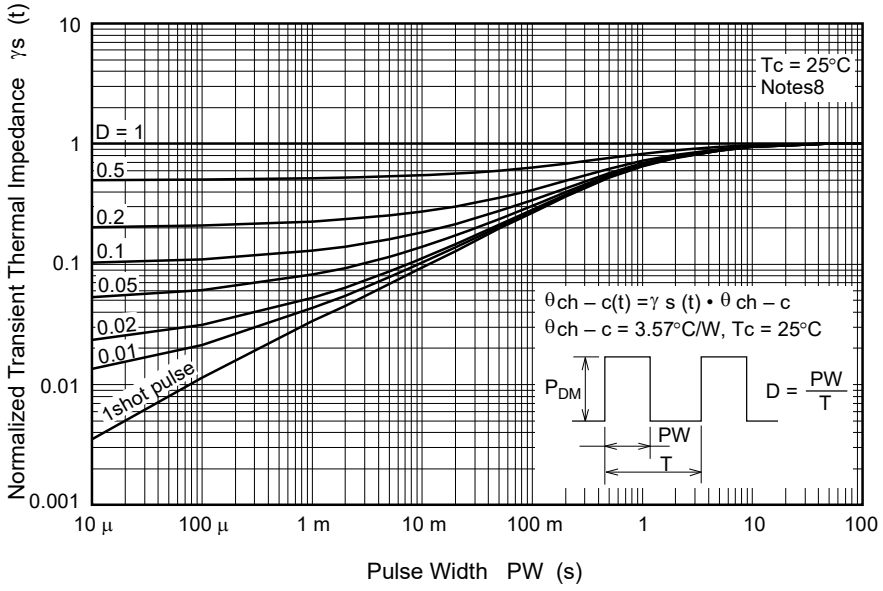

Reverse Drain Current vs.
Source to Drain Voltage



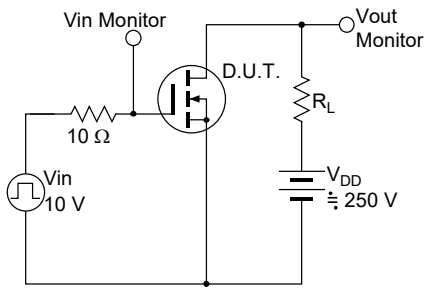

Gate to Source Cutoff Voltage
vs. Case Temperature



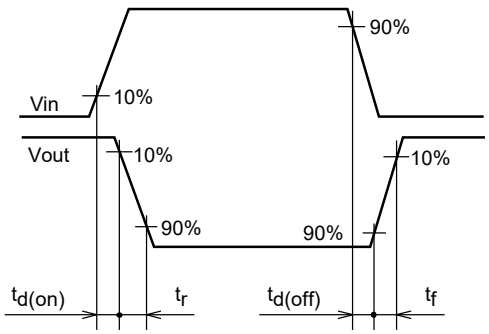
Normalized Transient Thermal Impedance vs. Pulse Width




Switching Time Test Circuit




Waveform

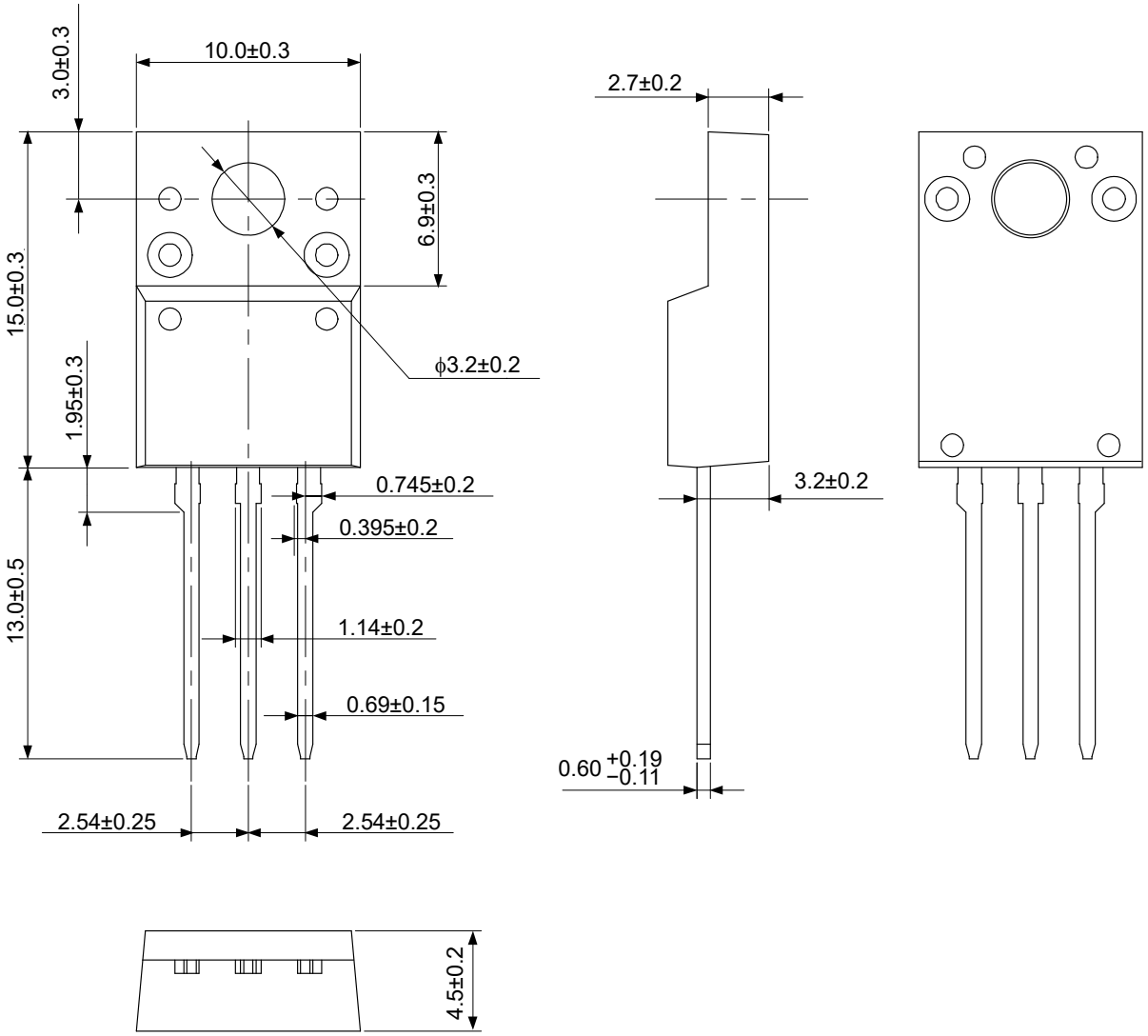



Notes: 8. Designed target value on Renesas measurement condition. (Not tested)

## Package Dimensions

| Package Name | JEITA Package Code | RENESAS Code | Previous Code | MASS (Typ) [g] |
|---|---|---|---|---|
| TO-220FPA | — | PRSS0003AP-A | TO-220FPA | 1.65 |

Unit: mm




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## Ordering Information

| Orderable Part No. | Quantity | Shipping Container |
|---|---|---|
| RJL5014DPP-A0#T2 | 2500 pcs | Box (Tube) |

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