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April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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HAT2070R

Silicon N Channel Power MOS FET
Power Switching

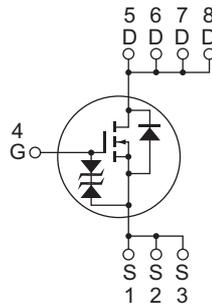
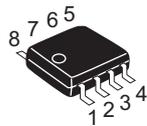
REJ03G1177-0400
(Previous: ADE-208-1226B)
Rev.4.00
Sep 07, 2005

Features

- Capable of 4.5 V gate drive
- Low drive current
- High density mounting
- Low on-resistance
 $R_{DS(on)} = 11 \text{ m}\Omega$ typ (at $V_{GS} = 10 \text{ V}$)

Outline

RENESAS Package code: PRSP0008DD-D
(Package name: SOP-8 <FP-8DAV>)



1, 2, 3 Source
4 Gate
5, 6, 7, 8 Drain

Absolute Maximum Ratings

(Ta = 25°C)

| Item | Symbol | Value | Unit |
|--|--|-------------|------|
| Drain to source voltage | V _{DSS} | 30 | V |
| Gate to source voltage | V _{GSS} | ±20 | V |
| Drain current | I _D | 12 | A |
| Drain peak current | I _{D (pulse)} ^{Note 1} | 96 | A |
| Body-drain diode reverse drain current | I _{DR} | 12 | A |
| Channel dissipation | P _{ch} ^{Note 2} | 2.5 | W |
| Channel to ambient thermal impedance | θ _{ch-a} ^{Note 2} | 50 | °C/W |
| Channel temperature | T _{ch} | 150 | °C |
| Storage temperature | T _{stg} | -55 to +150 | °C |

Notes: 1. PW ≤ 10 μs, duty cycle ≤ 1%

2. When using the glass epoxy board (FR4 40 × 40 × 1.6 mm), PW ≤ 10 s

Electrical Characteristics

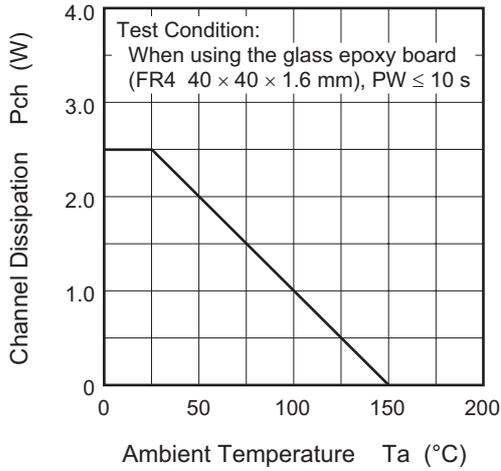
(Ta = 25°C)

| 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 breakdown voltage | V _{(BR) GSS} | ±20 | — | — | V | I _G = ±100 μA, V _{DS} = 0 |
| Gate to source leak current | I _{GSS} | — | — | ±10 | μA | V _{GS} = ±16 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)} | 1.0 | — | 2.5 | V | V _{DS} = 10 V, I _D = 1 mA |
| Static drain to source on state resistance | R _{DS (on)} | — | 11 | 14 | mΩ | I _D = 6 A, V _{GS} = 10 V ^{Note 3} |
| | R _{DS (on)} | — | 15 | 22 | mΩ | I _D = 6 A, V _{GS} = 4.5 V ^{Note 3} |
| Forward transfer admittance | y _{fs} | 12 | 20 | — | S | I _D = 6 A, V _{DS} = 10 V ^{Note 3} |
| Input capacitance | C _{iss} | — | 1400 | — | pF | V _{DS} = 10 V V _{GS} = 0 f = 1 MHz |
| Output capacitance | C _{oss} | — | 340 | — | pF | |
| Reverse transfer capacitance | C _{rss} | — | 190 | — | pF | |
| Total gate charge | Q _g | — | 23 | — | nC | V _{DD} = 10 V |
| Gate to source charge | Q _{gs} | — | 4 | — | nC | V _{GS} = 10 V |
| Gate to drain charge | Q _{gd} | — | 4 | — | nC | I _D = 12 A |
| Turn-on delay time | t _{d (on)} | — | 15 | — | ns | V _{GS} = 10 V, I _D = 6 A |
| Rise time | t _r | — | 18 | — | ns | V _{DD} ≅ 10 V |
| Turn-off delay time | t _{d (off)} | — | 50 | — | ns | R _L = 1.67 Ω |
| Fall time | t _f | — | 9 | — | ns | R _g = 4.7 Ω |
| Body-drain diode forward voltage | V _{DF} | — | 0.85 | 1.10 | V | I _F = 12 A, V _{GS} = 0 ^{Note 3} |
| Body-drain diode reverse recovery time | t _{rr} | — | 50 | — | ns | I _F = 12 A, V _{GS} = 0 di _F /dt = 50 A/μs |

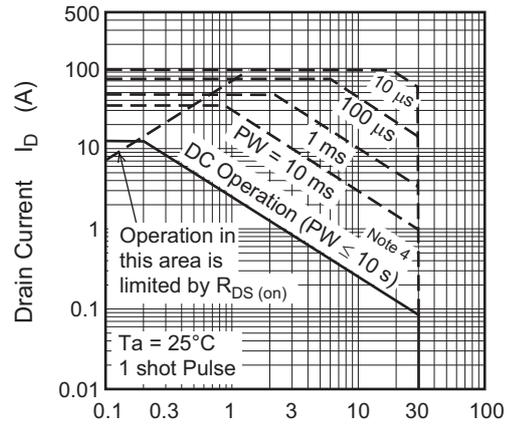
Note: 3. Pulse test

Main Characteristics

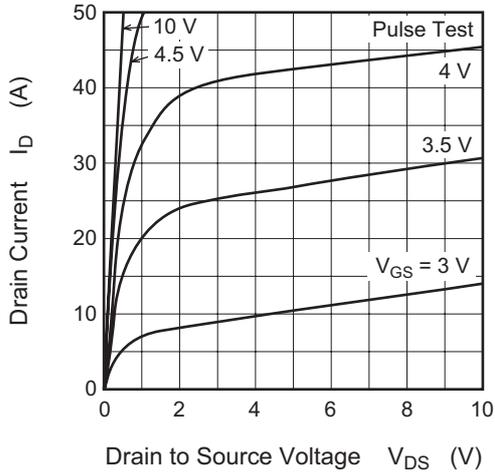
Power vs. Temperature Derating



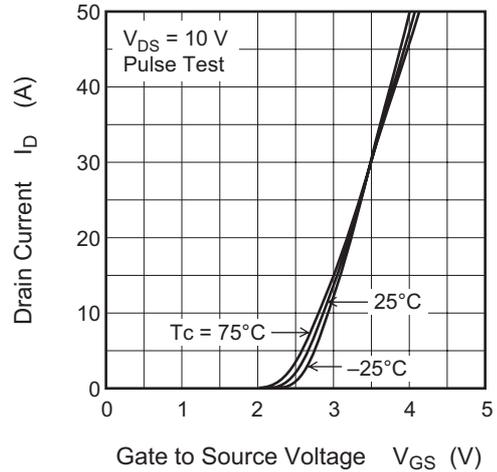
Maximum Safe Operation Area



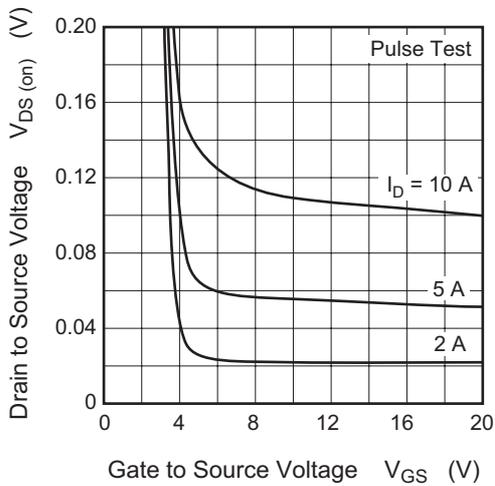
Typical Output Characteristics



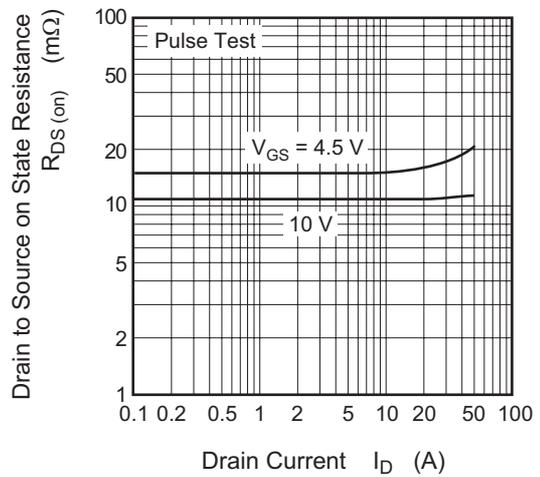
Typical Transfer Characteristics



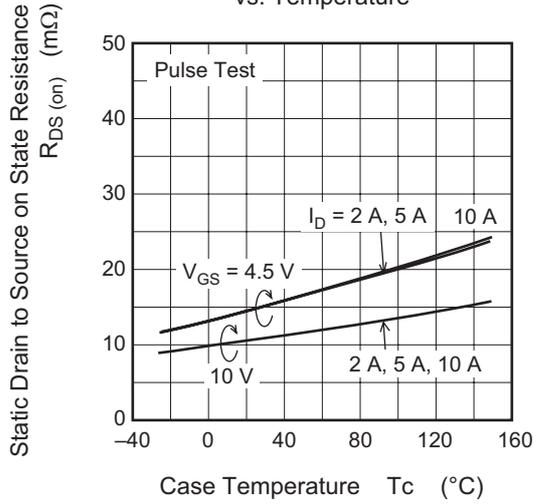
Drain to Source Saturation Voltage vs. Gate to Source Voltage



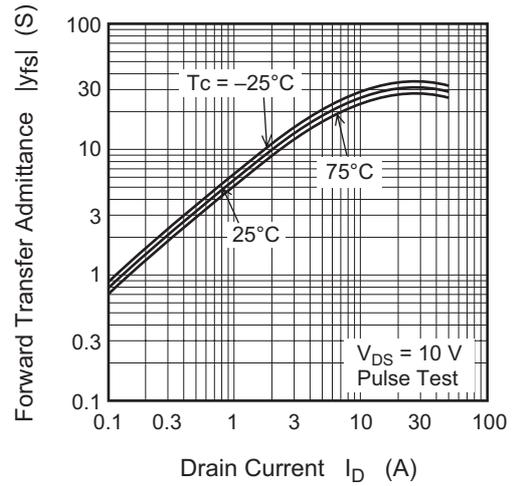
Static Drain to Source on State Resistance vs. Drain Current



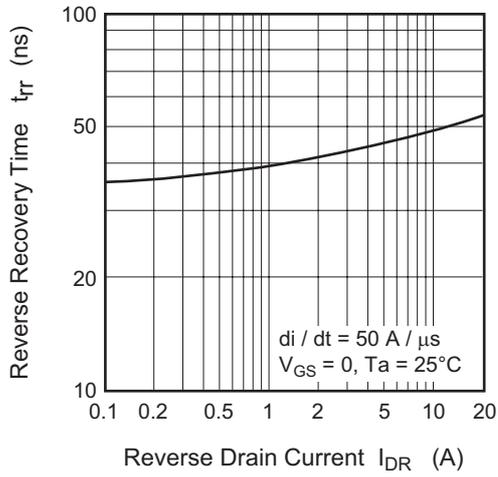
Static Drain to Source on State Resistance vs. Temperature



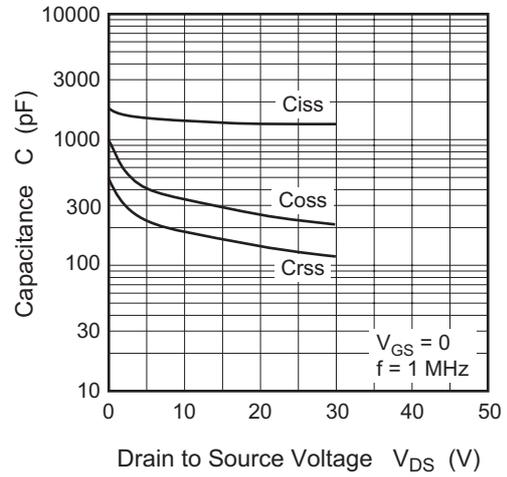
Forward Transfer Admittance vs. Drain Current



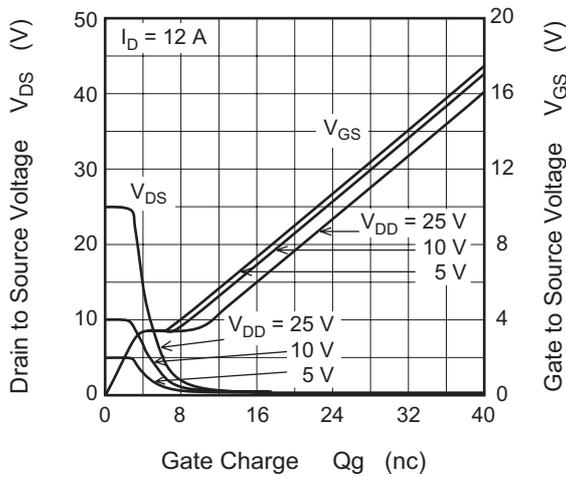
Body-Drain Diode Reverse Recovery Time



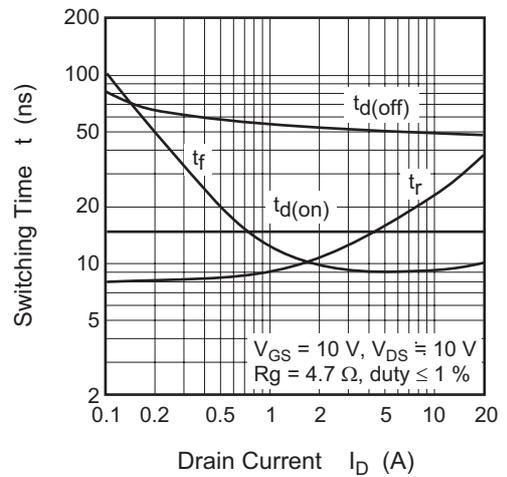
Typical Capacitance vs. Drain to Source Voltage



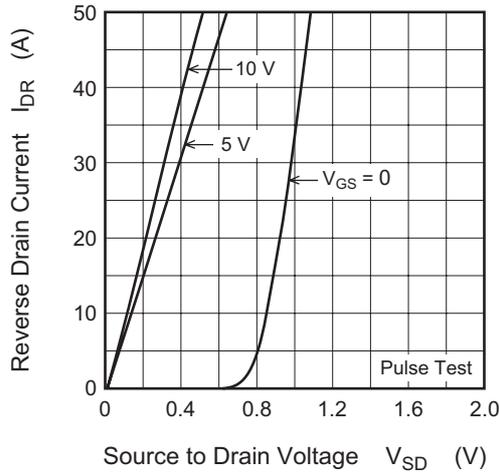
Dynamic Input Characteristics



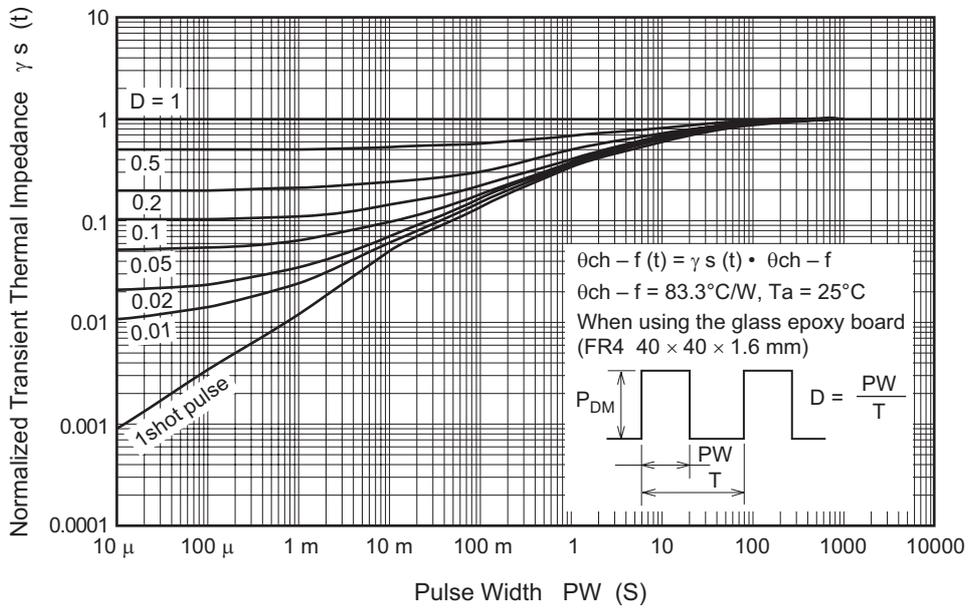
Switching Characteristics



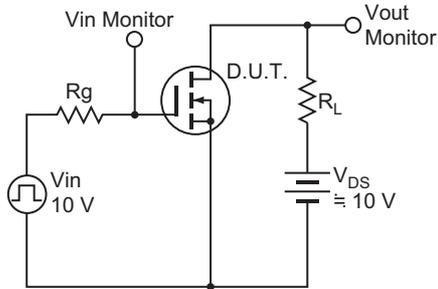
Reverse Drain Current vs. Source to Drain Voltage



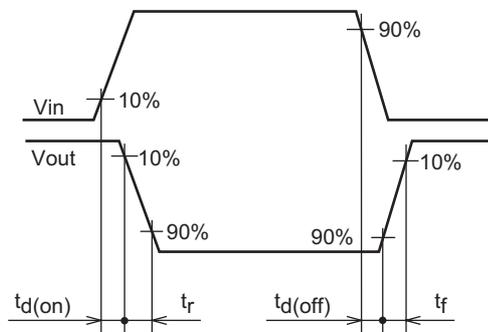
Normalized Transient Thermal Impedance vs. Pulse Width



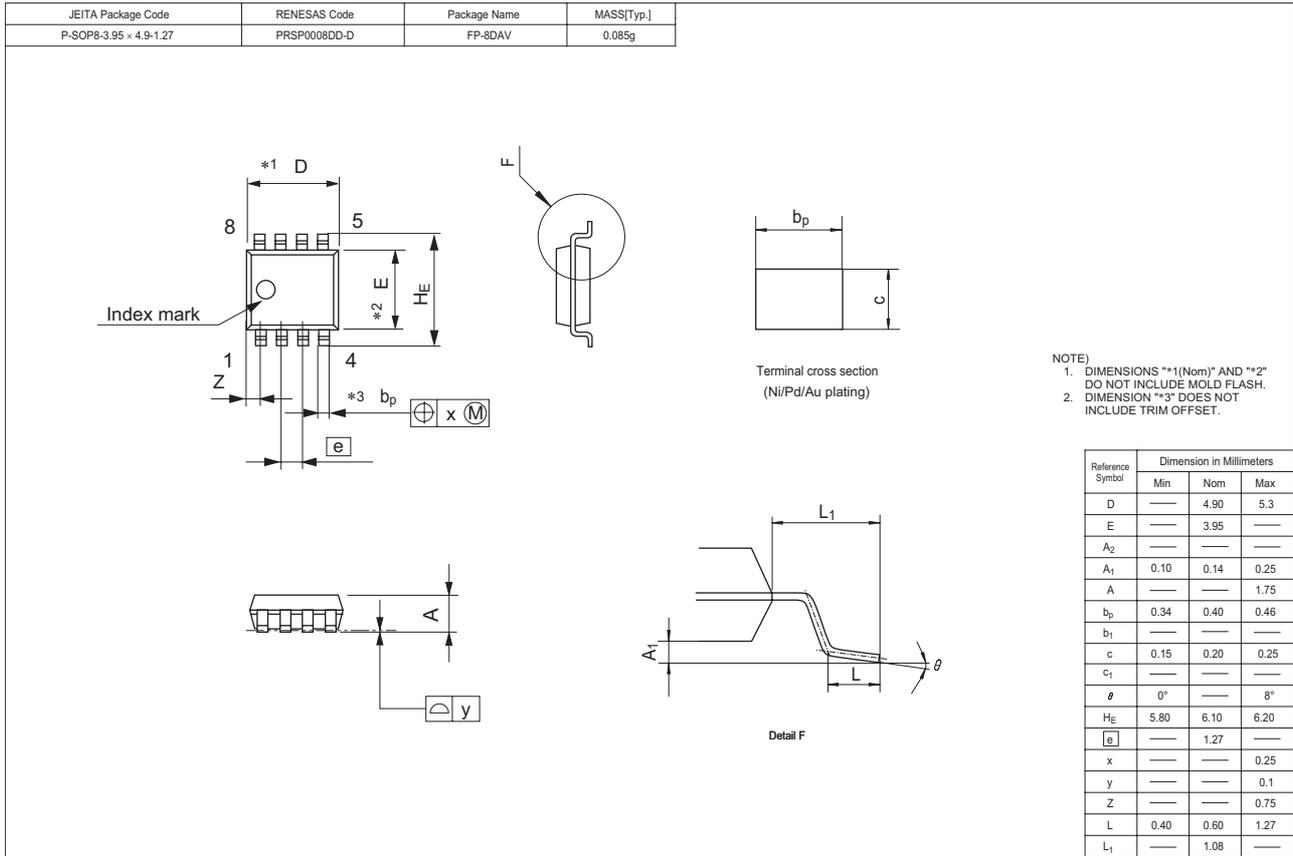
Switching Time Test Circuit



Switching Time Waveform



Package Dimensions



Ordering Information

| Part Name | Quantity | Shipping Container |
|---------------|----------|--------------------|
| HAT2070R-EL-E | 2500 pcs | Taping |

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