

To our customers,

Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

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

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HAT3006R

Silicon N Channel / P Channel Power MOS FET
High Speed Power Switching

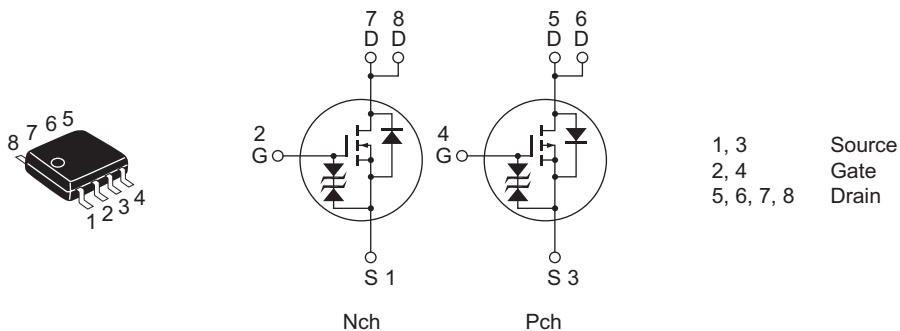
REJ03G1197-0800
(Previous: ADE-208-480F)
Rev.8.00
Sep 07, 2005

Features

- Low on-resistance
- Capable of 4 V gate drive
- Low drive current
- High density mounting

Outline

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



Absolute Maximum Ratings

(Ta = 25°C)

| Item | Symbol | Value | | Unit |
|--|----------------------------------|-------------|------|------|
| | | Nch | Pch | |
| Drain to source voltage | V_{DSS} | 30 | -30 | V |
| Gate to source voltage | V_{GSS} | ±20 | ±20 | V |
| Drain current | I_D | 6.5 | -4.5 | A |
| Drain peak current | $I_{D(pulse)}$ ^{Note 1} | 52 | -36 | A |
| Body-drain diode reverse drain current | I_{DR} | 6.5 | -4.5 | A |
| Channel dissipation | P_{ch} ^{Note 2} | 2 | | W |
| Channel dissipation | P_{ch} ^{Note 3} | 3 | | W |
| Channel temperature | T_{ch} | 150 | | °C |
| Storage temperature | T_{stg} | -55 to +150 | | °C |

Notes: 1. $PW \leq 10 \mu s$, duty cycle $\leq 1\%$ 2. 1 Drive operation: When using the glass epoxy board (FR4 40 × 40 × 1.6 mm), $PW \leq 10 s$ 3. 2 Drive operation: When using the glass epoxy board (FR4 40 × 40 × 1.6 mm), $PW \leq 10 s$

Electrical Characteristics

N Channel

(Ta = 25°C)

| Item | Symbol | Min | Typ | Max | Unit | Test Conditions |
|--|---------------|-----|------|-------|------|--|
| Drain to source breakdown voltage | $V_{(BR)DSS}$ | 30 | — | — | V | $I_D = 10 \text{ mA}$, $V_{GS} = 0$ |
| Gate to source breakdown voltage | $V_{(BR)GSS}$ | ±20 | — | — | V | $I_G = \pm 100 \mu A$, $V_{DS} = 0$ |
| Gate to source leak current | I_{GSS} | — | — | ±10 | μA | $V_{GS} = \pm 16 \text{ V}$, $V_{DS} = 0$ |
| Zero gate voltage drain current | I_{DSS} | — | — | 10 | μA | $V_{DS} = 30 \text{ V}$, $V_{GS} = 0$ |
| Gate to source cutoff voltage | $V_{GS(off)}$ | 1.0 | — | 2.0 | V | $V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$ |
| Static drain to source on state resistance | $R_{DS(on)}$ | — | 0.03 | 0.045 | Ω | $I_D = 4 \text{ A}$, $V_{GS} = 10 \text{ V}$ ^{Note 4} |
| | $R_{DS(on)}$ | — | 0.05 | 0.08 | Ω | $I_D = 4 \text{ A}$, $V_{GS} = 4 \text{ V}$ ^{Note 4} |
| Forward transfer admittance | $ y_{fs} $ | 5 | 8 | — | S | $I_D = 4 \text{ A}$, $V_{DS} = 10 \text{ V}$ ^{Note 4} |
| Input capacitance | C_{iss} | — | 560 | — | pF | $V_{DS} = 10 \text{ V}$ |
| Output capacitance | C_{oss} | — | 380 | — | pF | $V_{GS} = 0$ |
| Reverse transfer capacitance | C_{rss} | — | 170 | — | pF | $f = 1 \text{ MHz}$ |
| Turn-on delay time | $t_{d(on)}$ | — | 30 | — | ns | $V_{GS} = 4 \text{ V}$, $I_D = 4 \text{ A}$ |
| Rise time | t_r | — | 270 | — | ns | $V_{DD} \cong 10 \text{ V}$ |
| Turn-off delay time | $t_{d(off)}$ | — | 40 | — | ns | |
| Fall time | t_f | — | 65 | — | ns | |
| Body-drain diode forward voltage | V_{DF} | — | 0.9 | 1.4 | V | $I_F = 6.5 \text{ A}$, $V_{GS} = 0$ ^{Note 4} |
| Body-drain diode reverse recovery time | t_{rr} | — | 45 | — | ns | $I_F = 6.5 \text{ A}$, $V_{GS} = 0$ $di_F/dt = 20 \text{ A}/\mu s$ |

Note: 4. Pulse test

P Channel

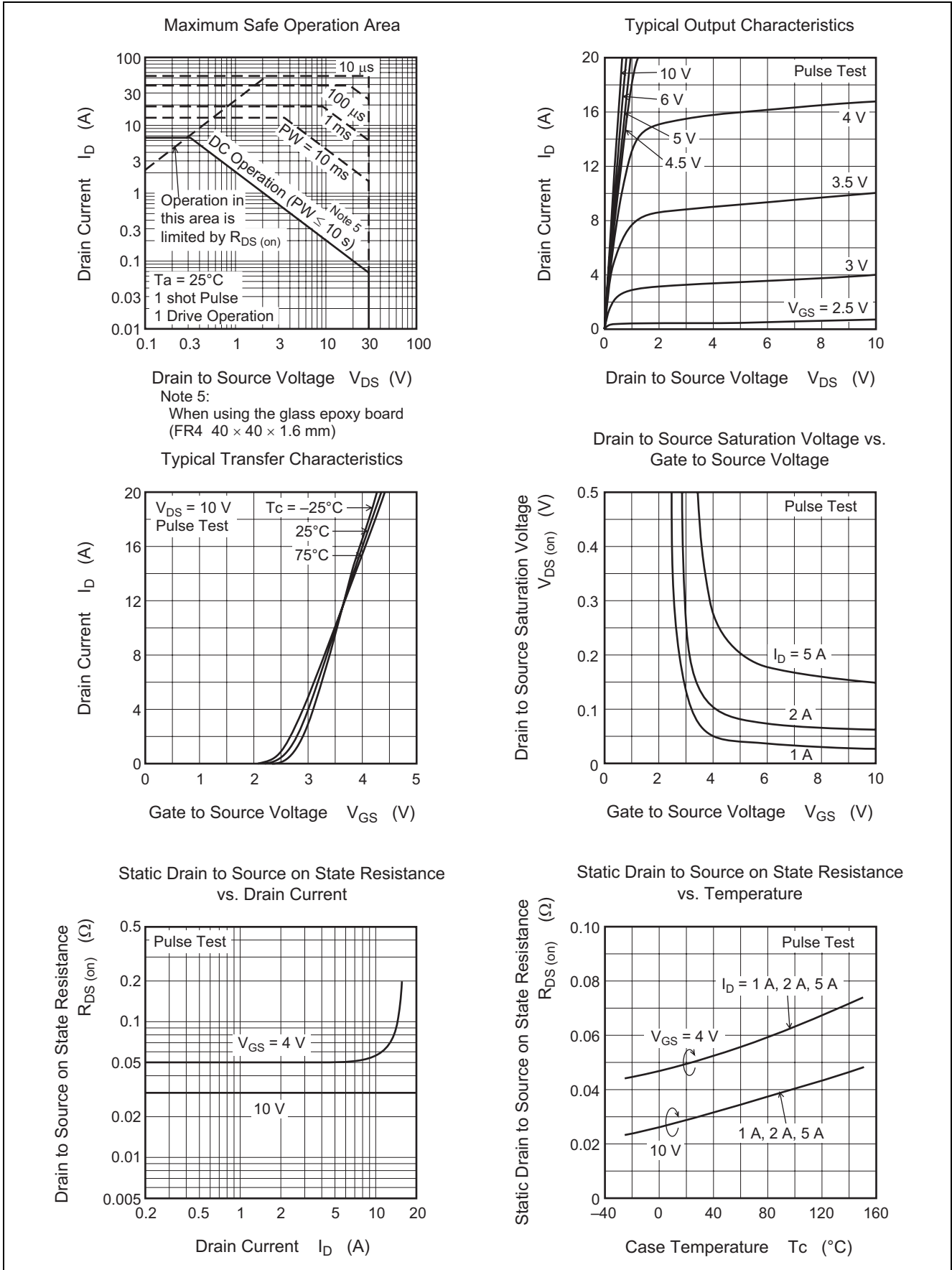
(Ta = 25°C)

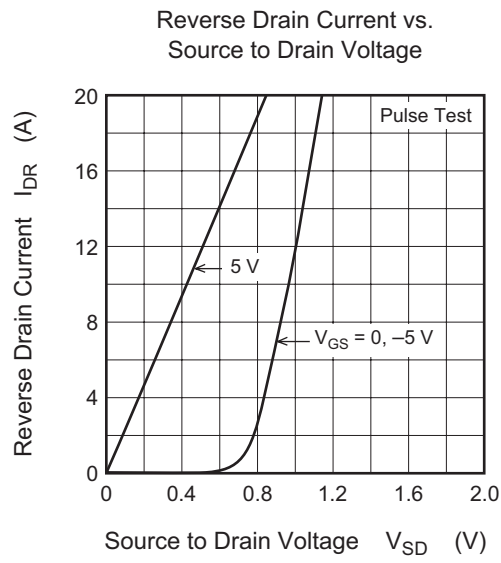
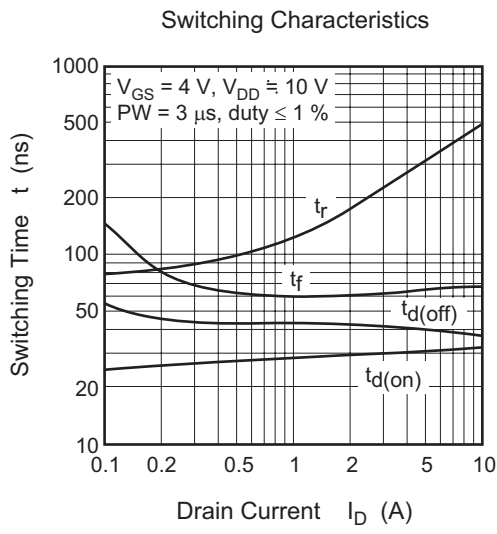
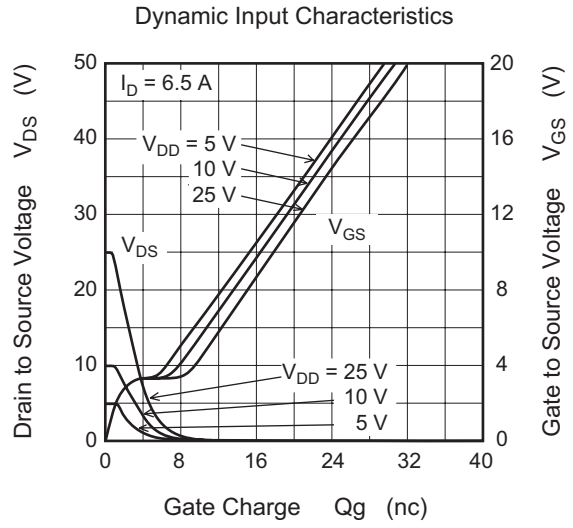
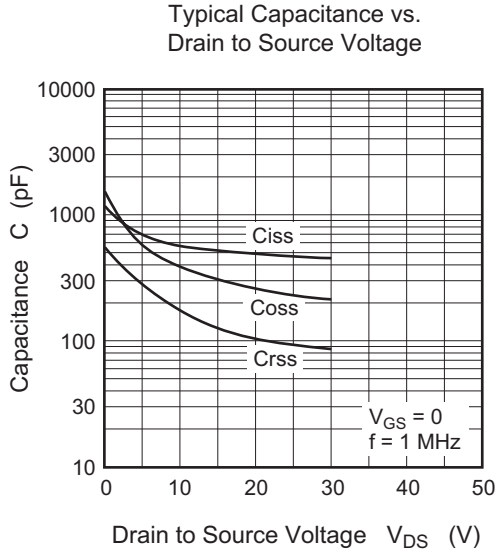
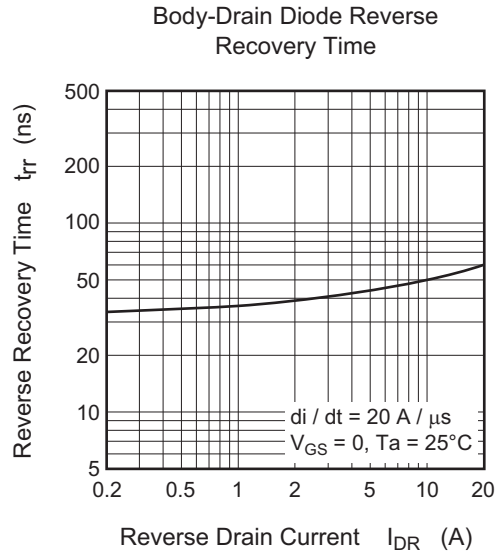
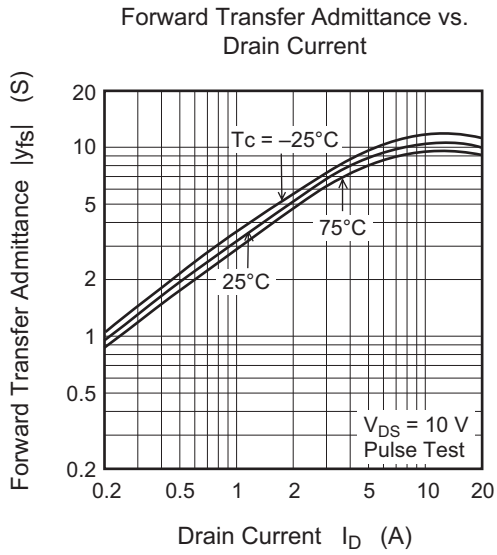
| Item | Symbol | Min | Typ | Max | Unit | Test Conditions |
|--|---------------|----------|------|----------|---------------|---|
| Drain to source breakdown voltage | $V_{(BR)DSS}$ | -30 | — | — | V | $I_D = -10 \text{ mA}$, $V_{GS} = 0$ |
| Gate to source breakdown voltage | $V_{(BR)GSS}$ | ± 20 | — | — | V | $I_G = \pm 100 \mu\text{A}$, $V_{DS} = 0$ |
| Gate to source leak current | I_{GSS} | — | — | ± 10 | μA | $V_{GS} = \pm 16 \text{ V}$, $V_{DS} = 0$ |
| Zero gate voltage drain current | I_{DSS} | — | — | -10 | μA | $V_{DS} = -30 \text{ V}$, $V_{GS} = 0$ |
| Gate to source cutoff voltage | $V_{GS(off)}$ | -1.0 | — | -2.5 | V | $V_{DS} = -10 \text{ V}$, $I_D = -1 \text{ mA}$ |
| Static drain to source on state resistance | $R_{DS(on)}$ | — | 0.07 | 0.09 | Ω | $I_D = -3 \text{ A}$, $V_{GS} = -10 \text{ V}$ ^{Note 5} |
| | $R_{DS(on)}$ | — | 0.11 | 0.18 | Ω | $I_D = -3 \text{ A}$, $V_{GS} = -4 \text{ V}$ ^{Note 5} |
| Forward transfer admittance | $ y_{fs} $ | 4 | 6 | — | S | $I_D = -3 \text{ A}$, $V_{DS} = -10 \text{ V}$ ^{Note 5} |
| Input capacitance | C_{iss} | — | 660 | — | pF | $V_{DS} = -10 \text{ V}$ |
| Output capacitance | C_{oss} | — | 440 | — | pF | $V_{GS} = 0$ |
| Reverse transfer capacitance | C_{rss} | — | 140 | — | pF | $f = 1 \text{ MHz}$ |
| Turn-on delay time | $t_{d(on)}$ | — | 24 | — | ns | $V_{GS} = -4 \text{ V}$, $I_D = -3 \text{ A}$ |
| Rise time | t_r | — | 165 | — | ns | $V_{DD} \cong -10 \text{ V}$ |
| Turn-off delay time | $t_{d(off)}$ | — | 35 | — | ns | |
| Fall time | t_f | — | 70 | — | ns | |
| Body-drain diode forward voltage | V_{DF} | — | -0.9 | -1.4 | V | $I_F = -4.5 \text{ A}$, $V_{GS} = 0$ ^{Note 5} |
| Body-drain diode reverse recovery time | t_{rr} | — | 60 | — | ns | $I_F = -4.5 \text{ A}$, $V_{GS} = 0$ $di_F/dt = 20 \text{ A}/\mu\text{s}$ |

Note: 5. Pulse test

Main Characteristics

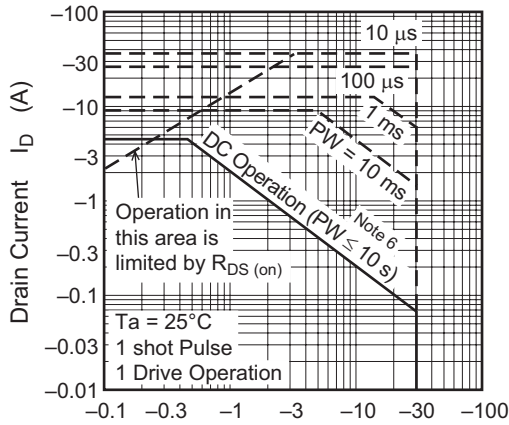
N Channel





P Channel

Maximum Safe Operation Area

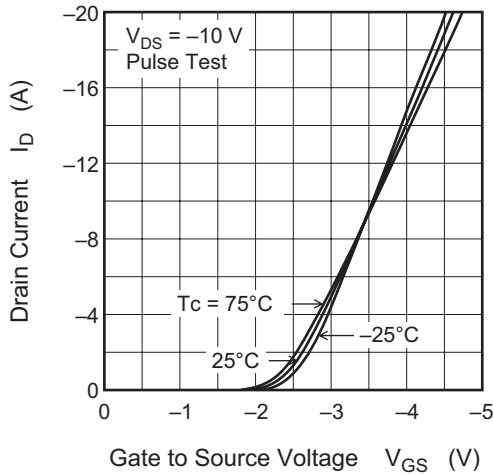


Drain to Source Voltage V_{DS} (V)

Note 6:

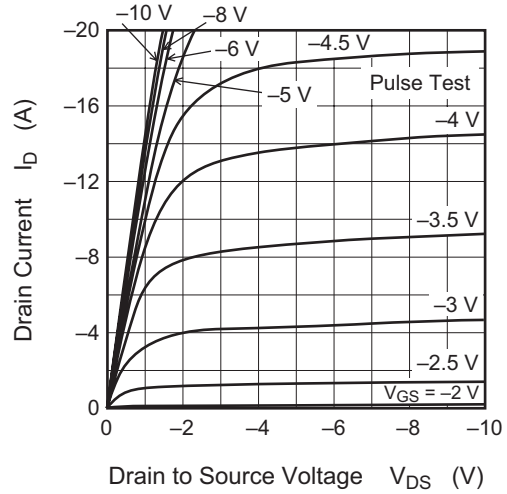
When using the glass epoxy board (FR4 40 × 40 × 1.6 mm)

Typical Transfer Characteristics



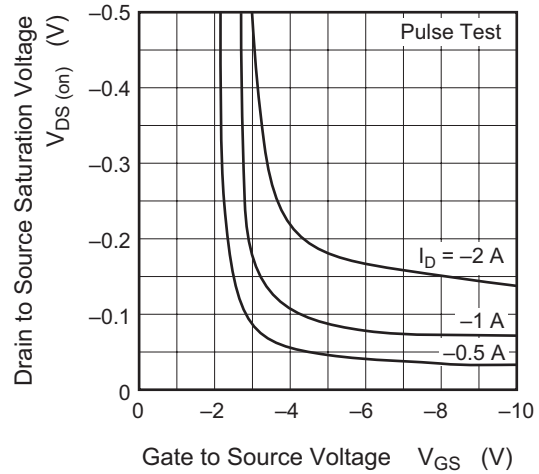
Gate to Source Voltage V_{GS} (V)

Typical Output Characteristics

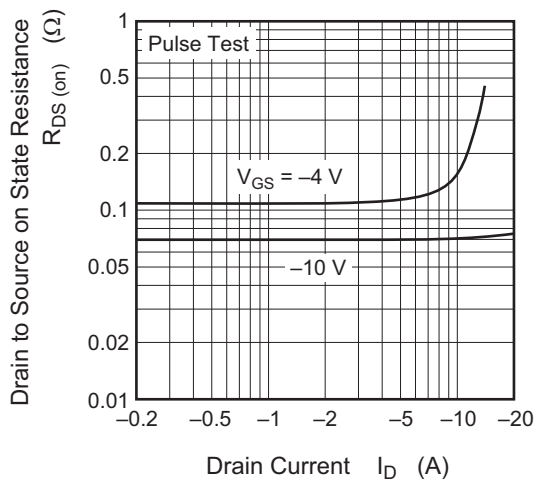


Drain to Source Voltage V_{DS} (V)

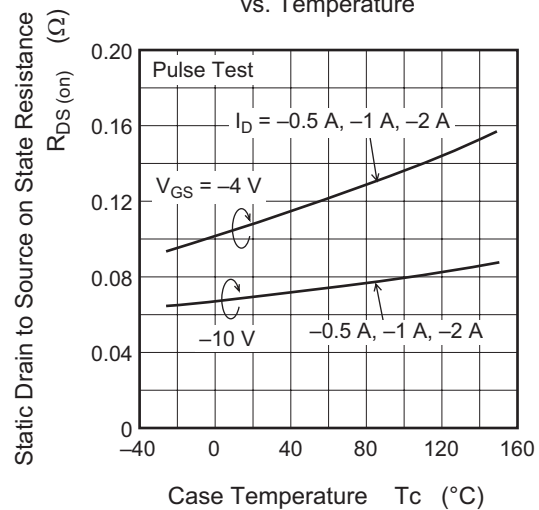
Drain to Source Saturation Voltage vs. Gate to Source Voltage

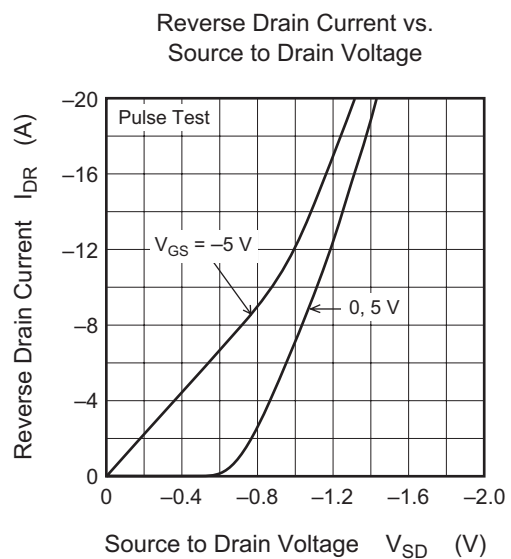
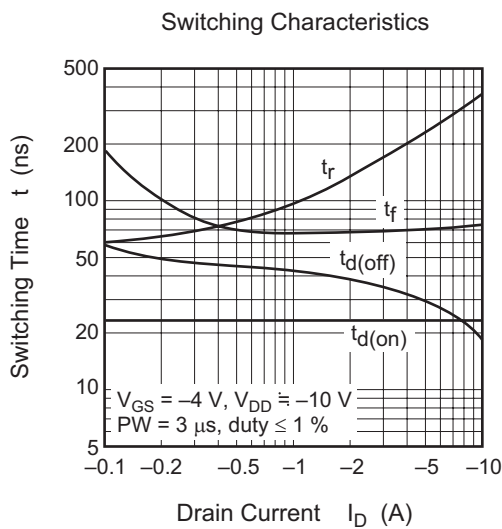
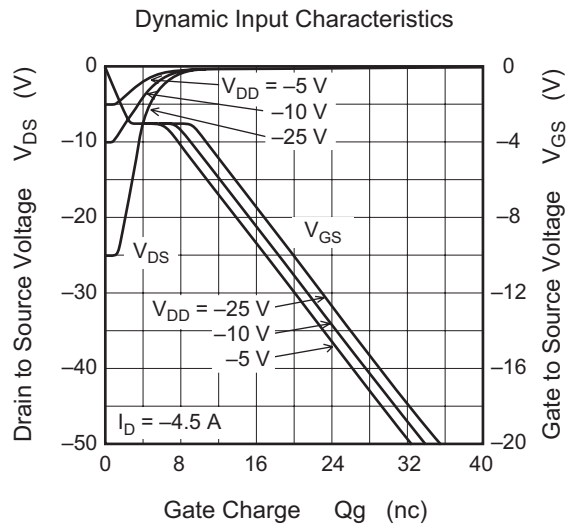
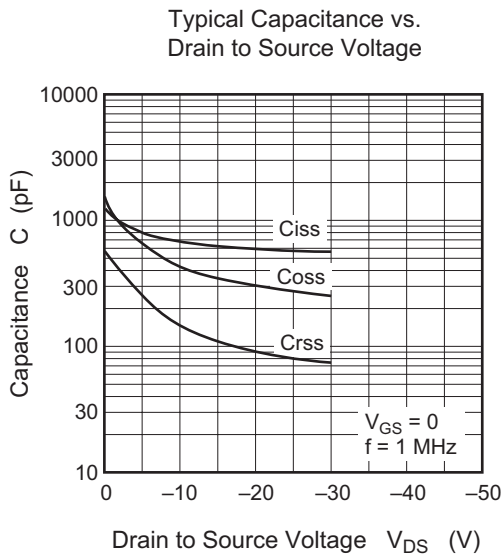
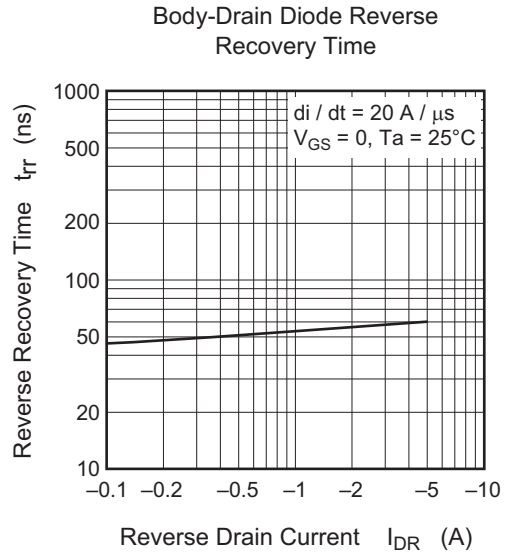
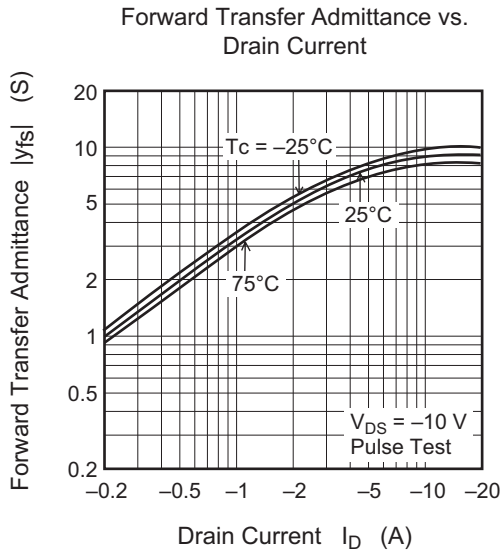


Static Drain to Source on State Resistance vs. Drain Current

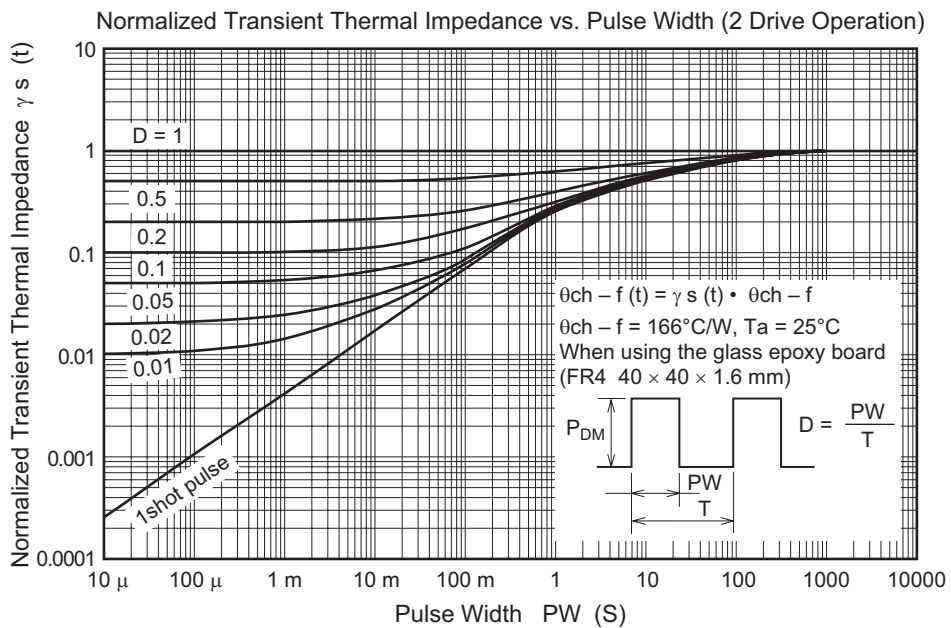
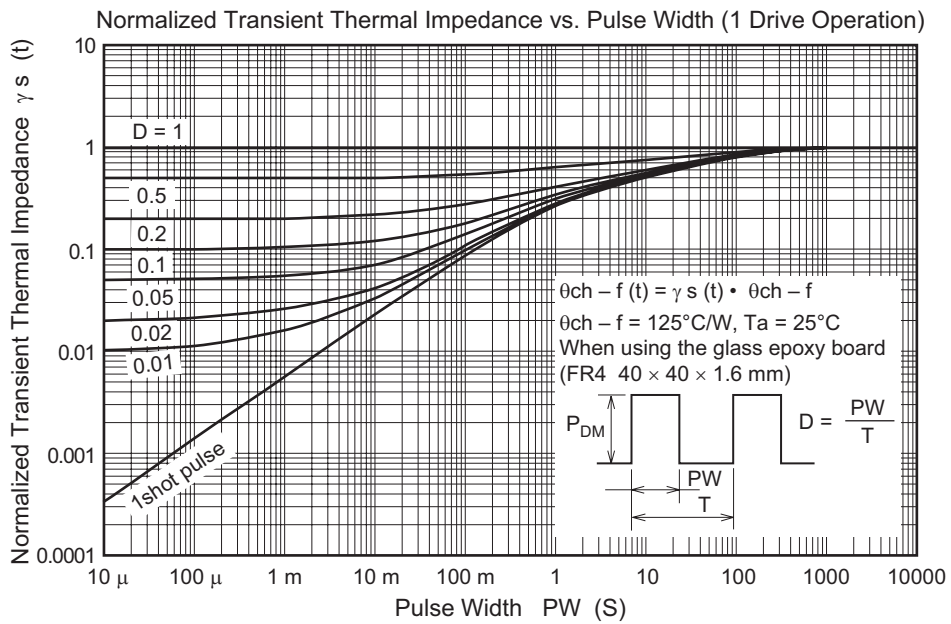
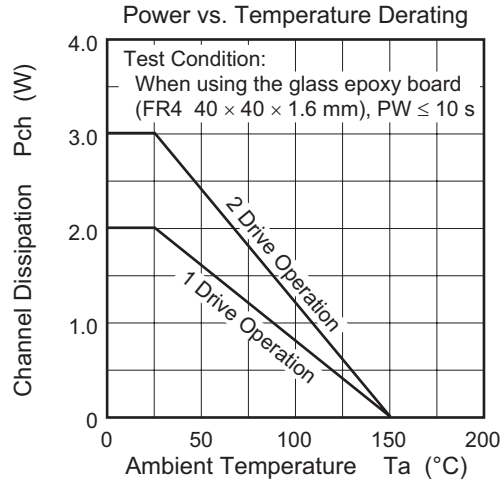


Static Drain to Source on State Resistance vs. Temperature



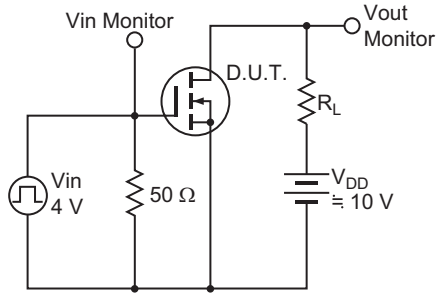


Common

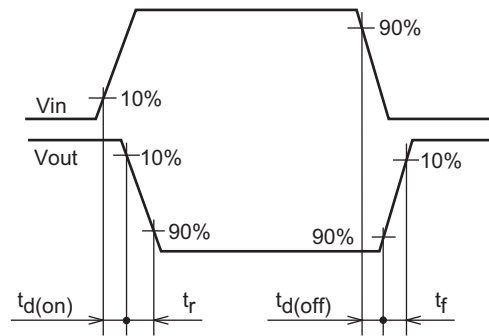


N channel

Switching Time Test Circuit

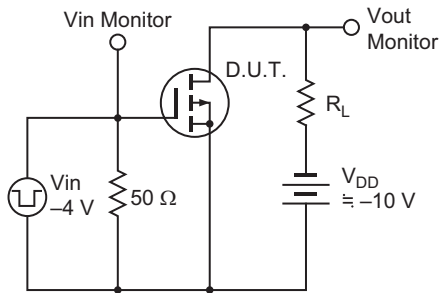


Switching Time Waveform

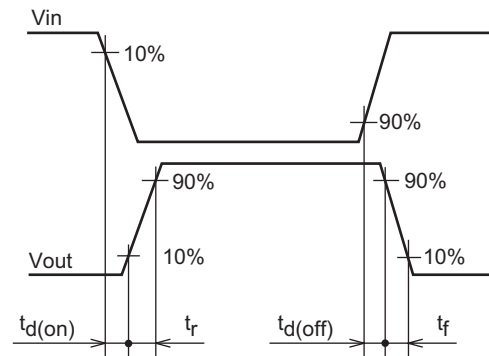


P channel

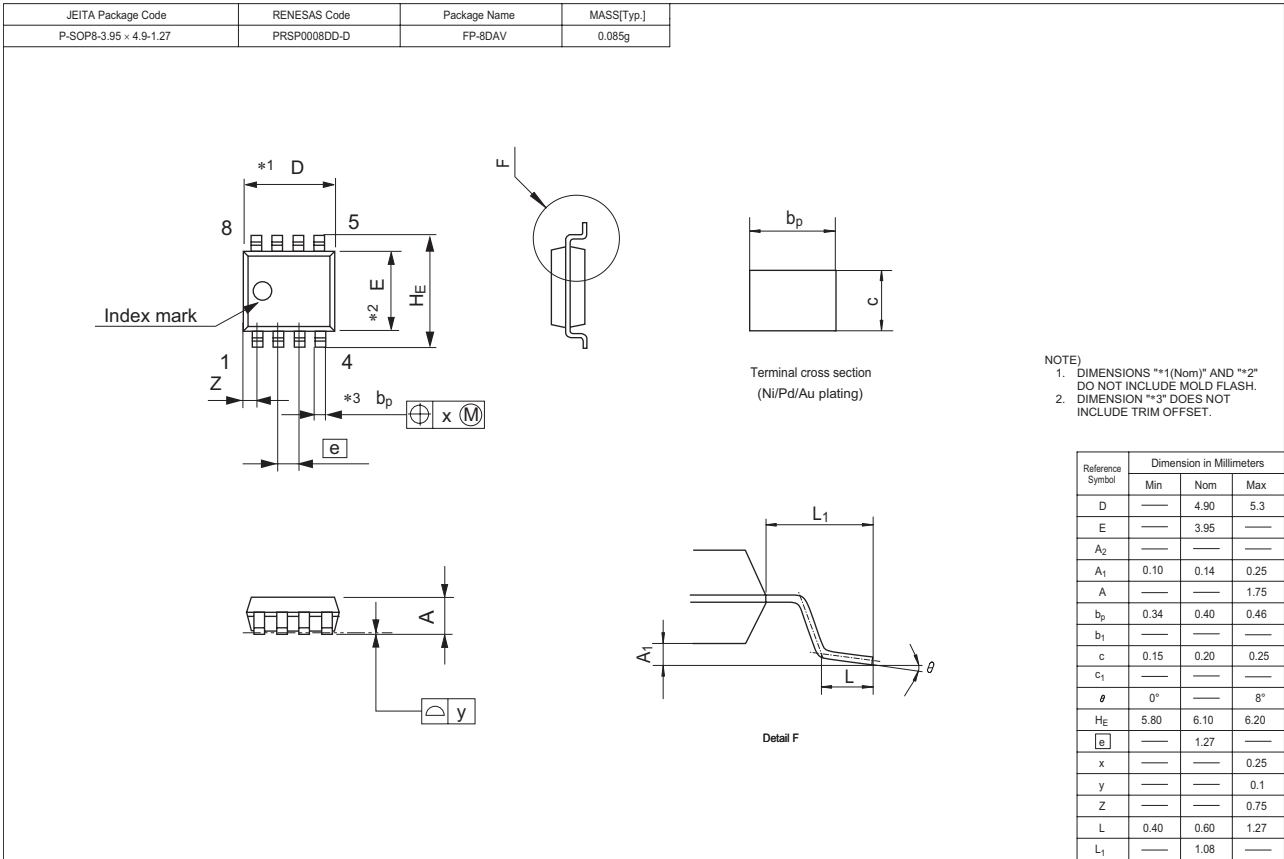
Switching Time Test Circuit



Switching Time Waveform



Package Dimensions



Ordering Information

| Part Name | Quantity | Shipping Container |
|---------------|----------|--------------------|
| HAT3006R-EL-E | 2500 pcs | Taping |

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450 Holger Way, San Jose, CA 95134-1368, U.S.A
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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Renesas Technology Hong Kong Ltd.

7th Floor, North Tower, World Finance Centre, Harbour City, 1 Canton Road, Tsimshatsui, Kowloon, Hong Kong
Tel: <852> 2265-6688, Fax: <852> 2730-6071

Renesas Technology Taiwan Co., Ltd.

10th Floor, No.99, Fushing North Road, Taipei, Taiwan
Tel: <886> (2) 2715-2888, Fax: <886> (2) 2713-2999

Renesas Technology (Shanghai) Co., Ltd.

Unit2607 Ruijing Building, No.205 Maoming Road (S), Shanghai 200020, China
Tel: <86> (21) 6472-1001, Fax: <86> (21) 6415-2952

Renesas Technology Singapore Pte. Ltd.

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Tel: <65> 6213-0200, Fax: <65> 6278-8001

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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, Jalan Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: <603> 7955-9390, Fax: <603> 7955-9510