

## HAT3006R

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

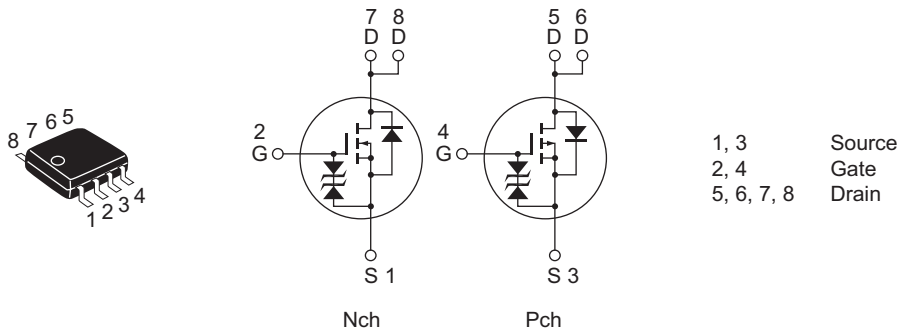
REJ03G1197-0800  
(Previous: ADE-208-480F)  
Rev.8.00  
Sep 07, 2005

### 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	$V_{GSS}$	$\pm 20$	$\pm 20$	V
Drain current	$I_D$	6.5	-4.5	A
Drain peak current	$I_{D(pulse)}$ <sup>Note 1</sup>	52	-36	A
Body-drain diode reverse drain current	$I_{DR}$	6.5	-4.5	A
Channel dissipation	$P_{ch}$ <sup>Note 2</sup>	2		W
Channel dissipation	$P_{ch}$ <sup>Note 3</sup>	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	$V_{(BR)GSS}$	$\pm 20$	—	—	V	$I_G = \pm 100 \mu A$ , $V_{DS} = 0$
Gate to source leak current	$I_{GSS}$	—	—	$\pm 10$	$\mu A$	$V_{GS} = \pm 16 \text{ V}$ , $V_{DS} = 0$
Zero gate voltage drain current	$I_{DSS}$	—	—	10	$\mu A$	$V_{DS} = 30 \text{ V}$ , $V_{GS} = 0$
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	$\Omega$	$I_D = 4 \text{ A}$ , $V_{GS} = 10 \text{ V}$ <sup>Note 4</sup>
	$R_{DS(on)}$	—	0.05	0.08	$\Omega$	$I_D = 4 \text{ A}$ , $V_{GS} = 4 \text{ V}$ <sup>Note 4</sup>
Forward transfer admittance	$ y_{fs} $	5	8	—	S	$I_D = 4 \text{ A}$ , $V_{DS} = 10 \text{ V}$ <sup>Note 4</sup>
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	$I_F = 6.5 \text{ A}$ , $V_{GS} = 0$ <sup>Note 4</sup>
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

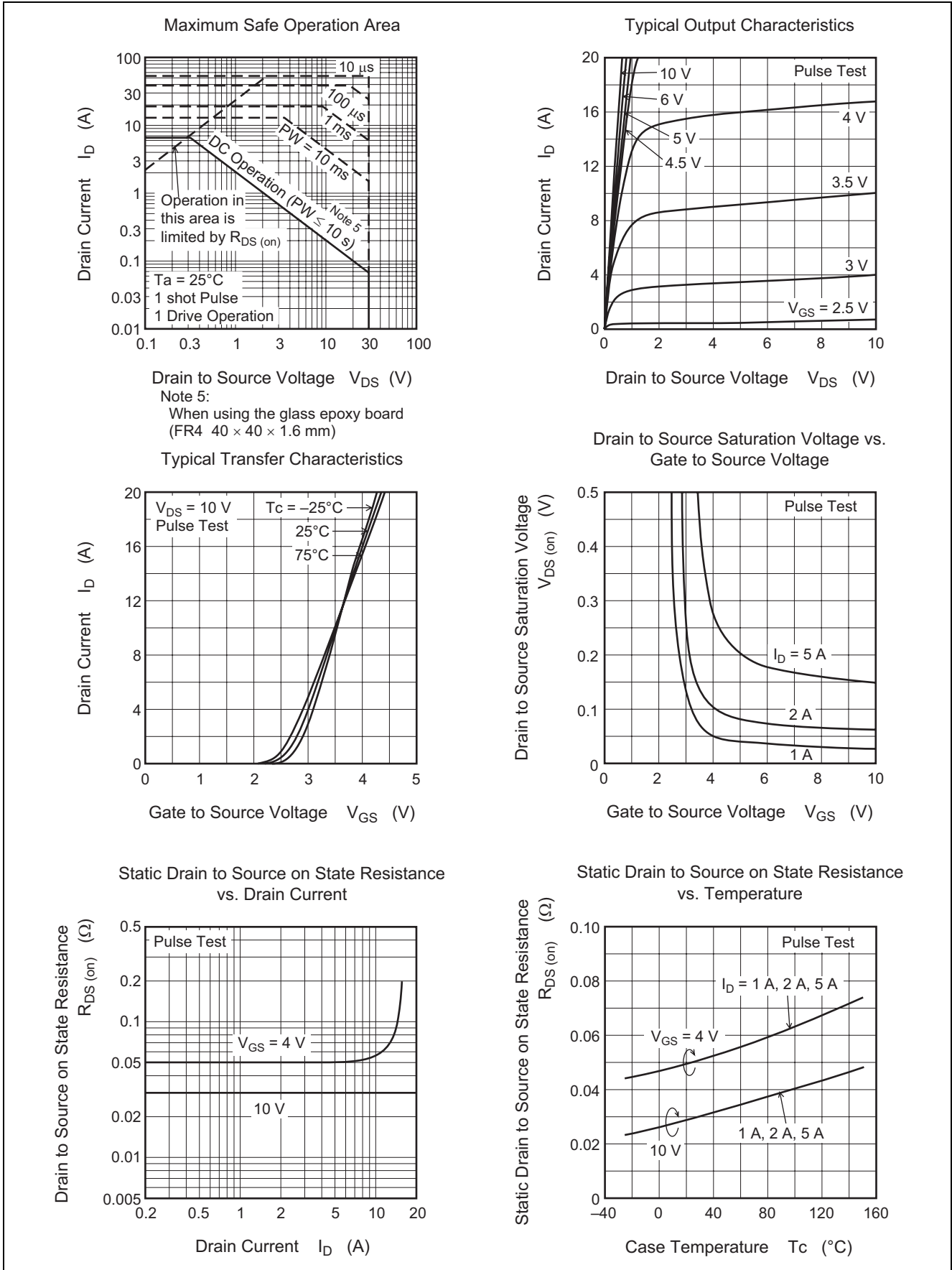
(Ta = 25°C)

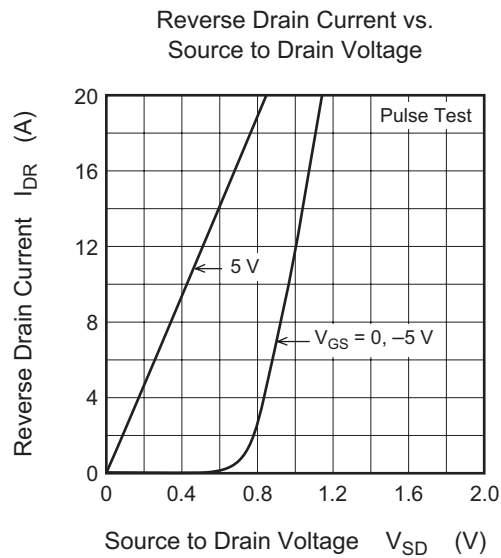
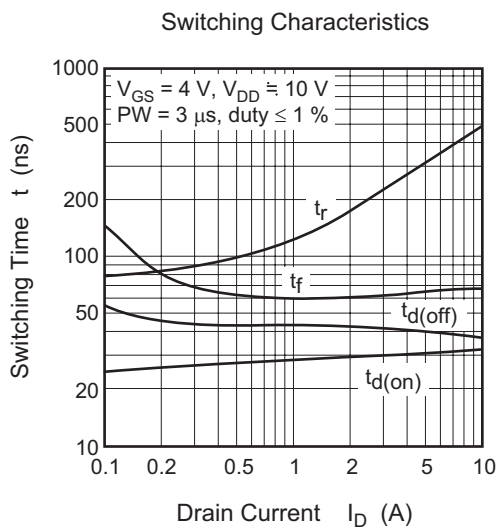
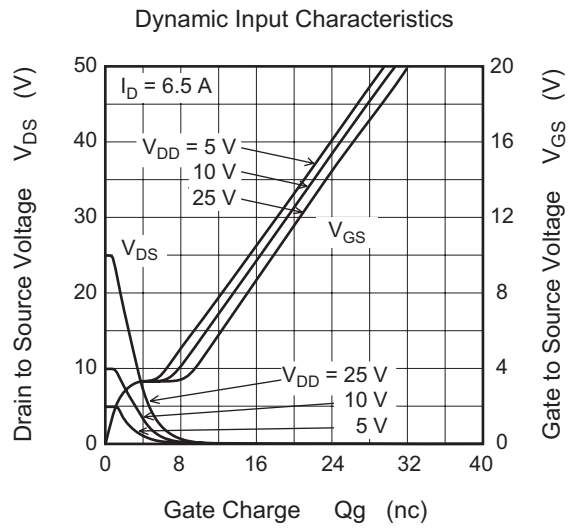
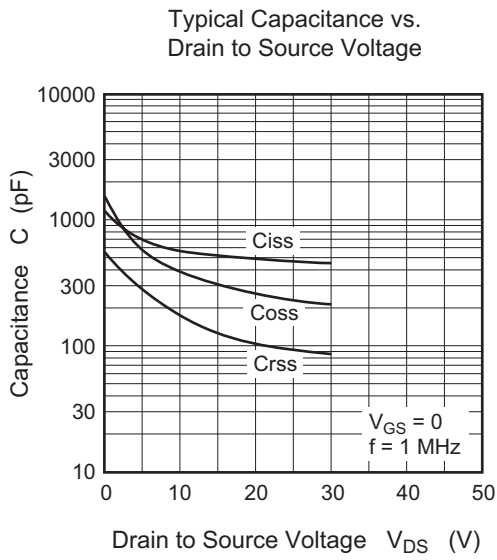
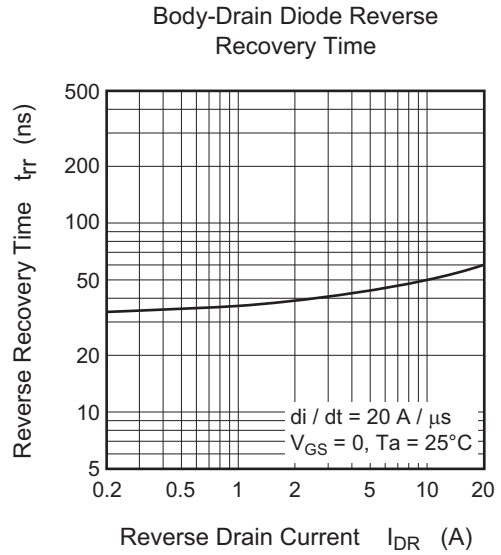
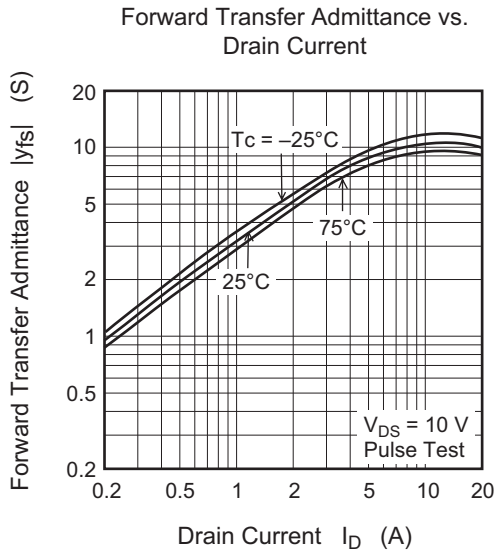
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	-30	—	—	V	$I_D = -10 \text{ mA}$ , $V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	$\pm 20$	—	—	V	$I_G = \pm 100 \text{ }\mu\text{A}$ , $V_{DS} = 0$
Gate to source leak current	$I_{GSS}$	—	—	$\pm 10$	$\mu\text{A}$	$V_{GS} = \pm 16 \text{ V}$ , $V_{DS} = 0$
Zero gate voltage drain current	$I_{DSS}$	—	—	-10	$\mu\text{A}$	$V_{DS} = -30 \text{ V}$ , $V_{GS} = 0$
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	$\Omega$	$I_D = -3 \text{ A}$ , $V_{GS} = -10 \text{ V}$ <sup>Note 5</sup>
	$R_{DS(on)}$	—	0.11	0.18	$\Omega$	$I_D = -3 \text{ A}$ , $V_{GS} = -4 \text{ V}$ <sup>Note 5</sup>
Forward transfer admittance	$ y_{fs} $	4	6	—	S	$I_D = -3 \text{ A}$ , $V_{DS} = -10 \text{ V}$ <sup>Note 5</sup>
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	$I_F = -4.5 \text{ A}$ , $V_{GS} = 0$ <sup>Note 5</sup>
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

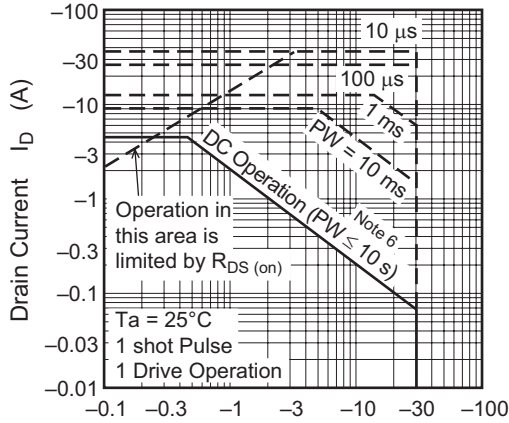
## N Channel





P Channel

Maximum Safe Operation Area

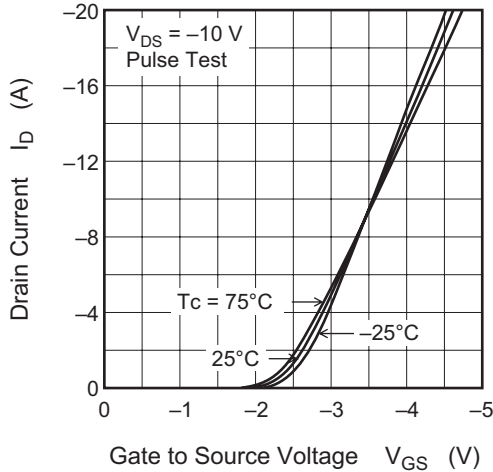


Drain to Source Voltage  $V_{DS}$  (V)

Note 6:

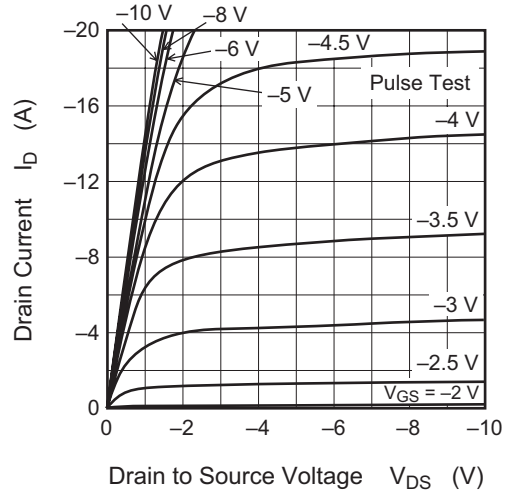
When using the glass epoxy board (FR4 40 × 40 × 1.6 mm)

Typical Transfer Characteristics



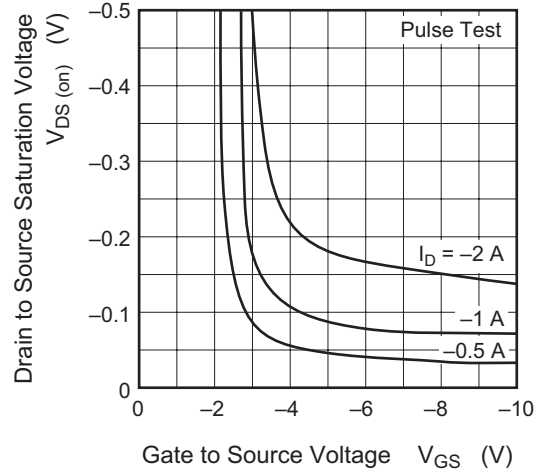
Gate to Source Voltage  $V_{GS}$  (V)

Typical Output Characteristics

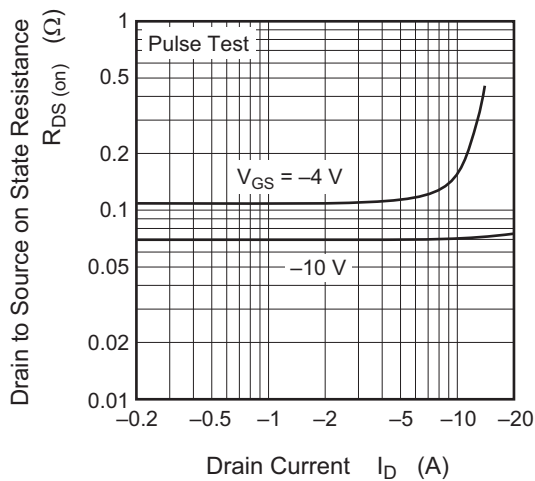


Drain to Source Voltage  $V_{DS}$  (V)

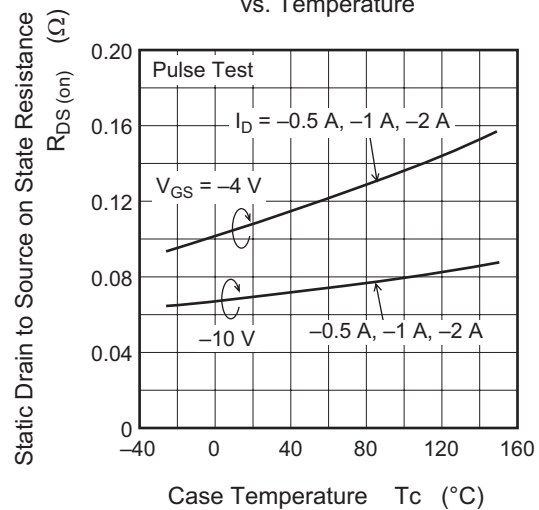
Drain to Source Saturation Voltage vs. Gate to Source Voltage

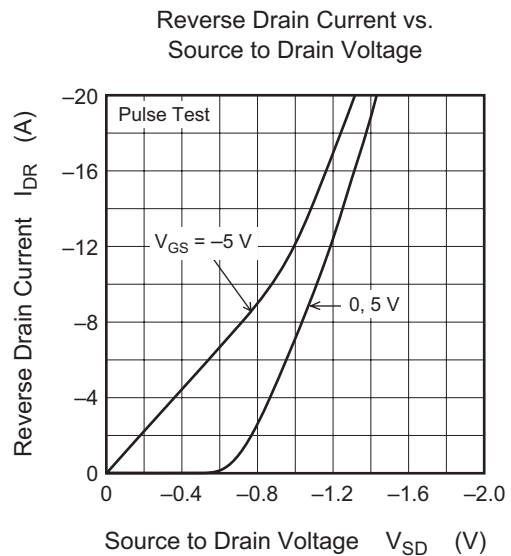
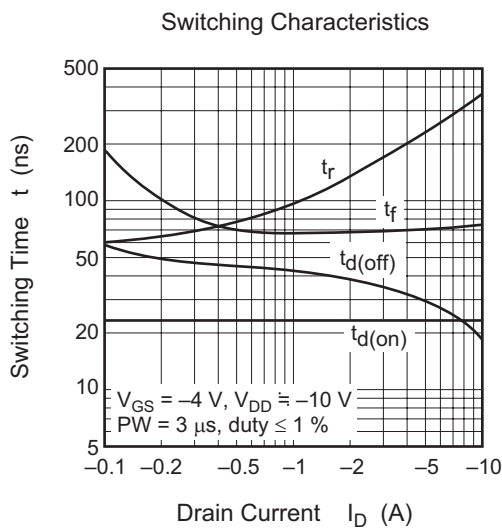
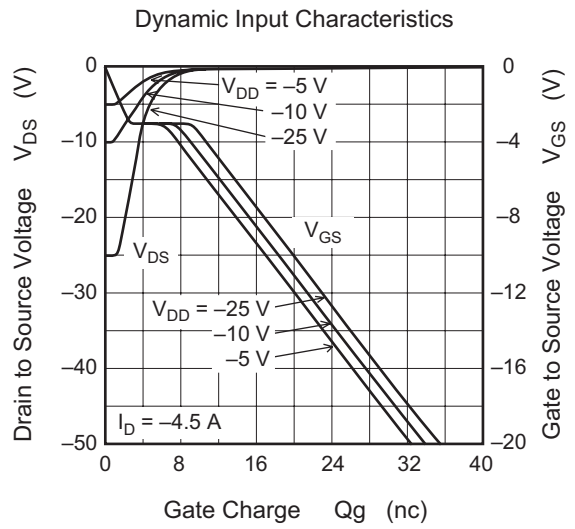
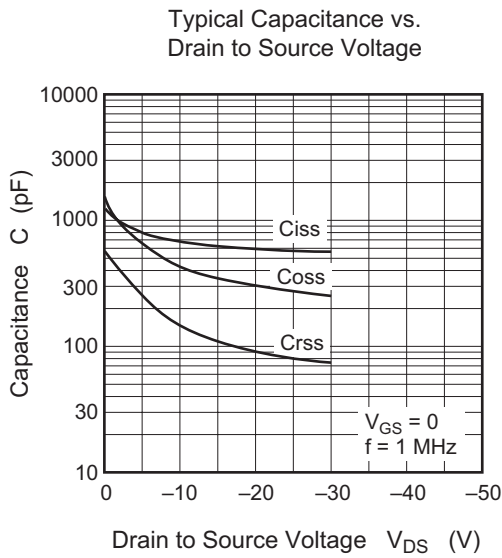
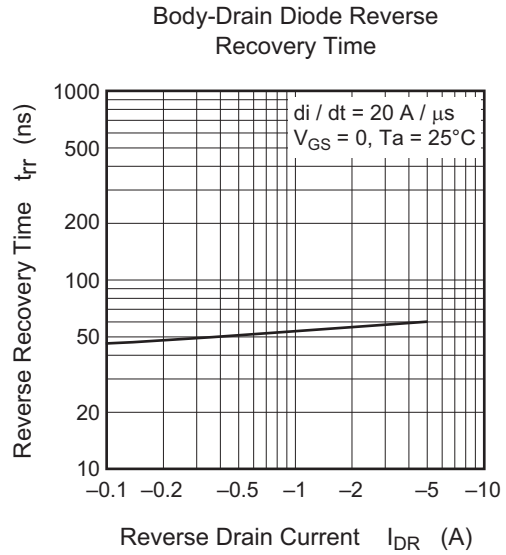
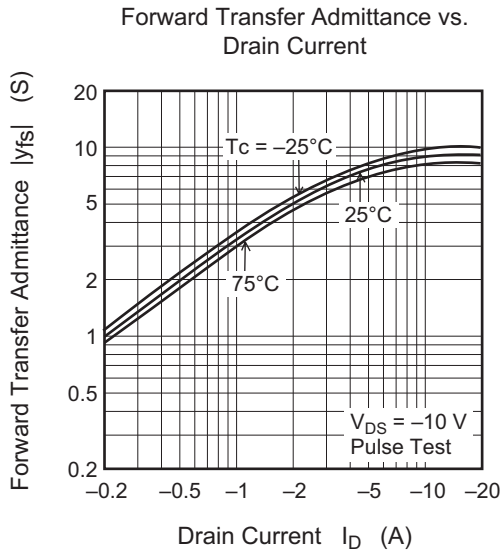


Static Drain to Source on State Resistance vs. Drain Current

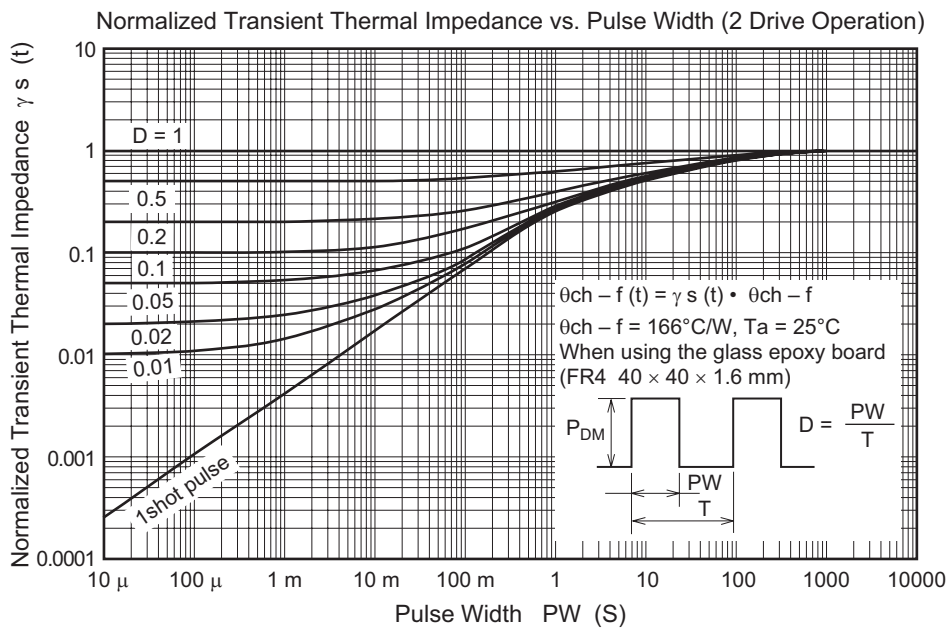
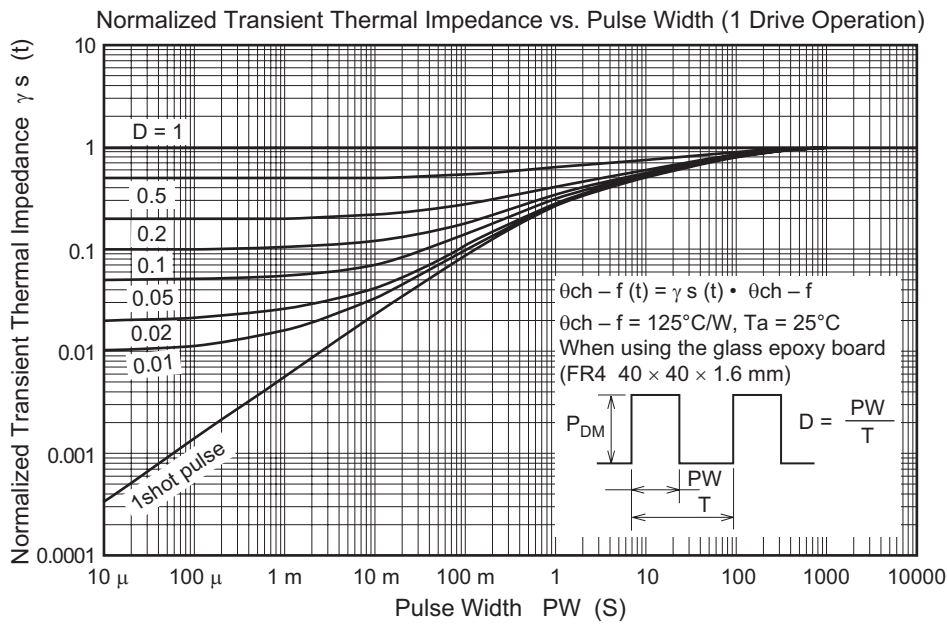
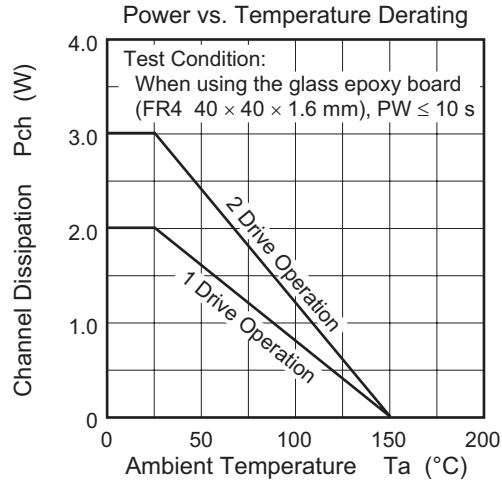


Static Drain to Source on State Resistance vs. Temperature



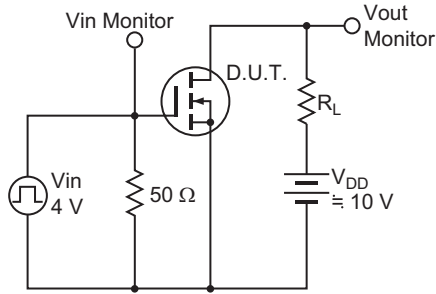


Common

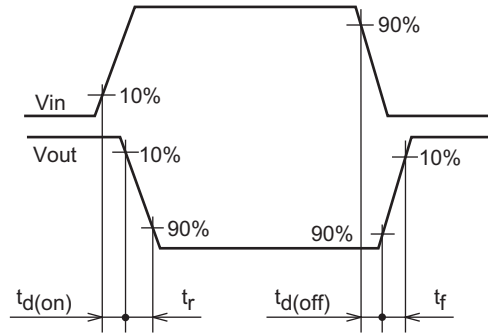


N channel

Switching Time Test Circuit

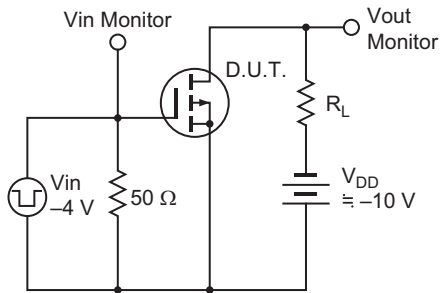


Switching Time Waveform

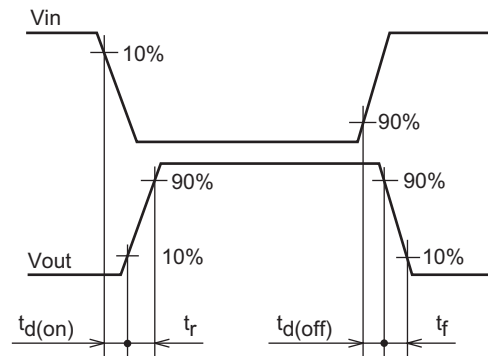


P channel

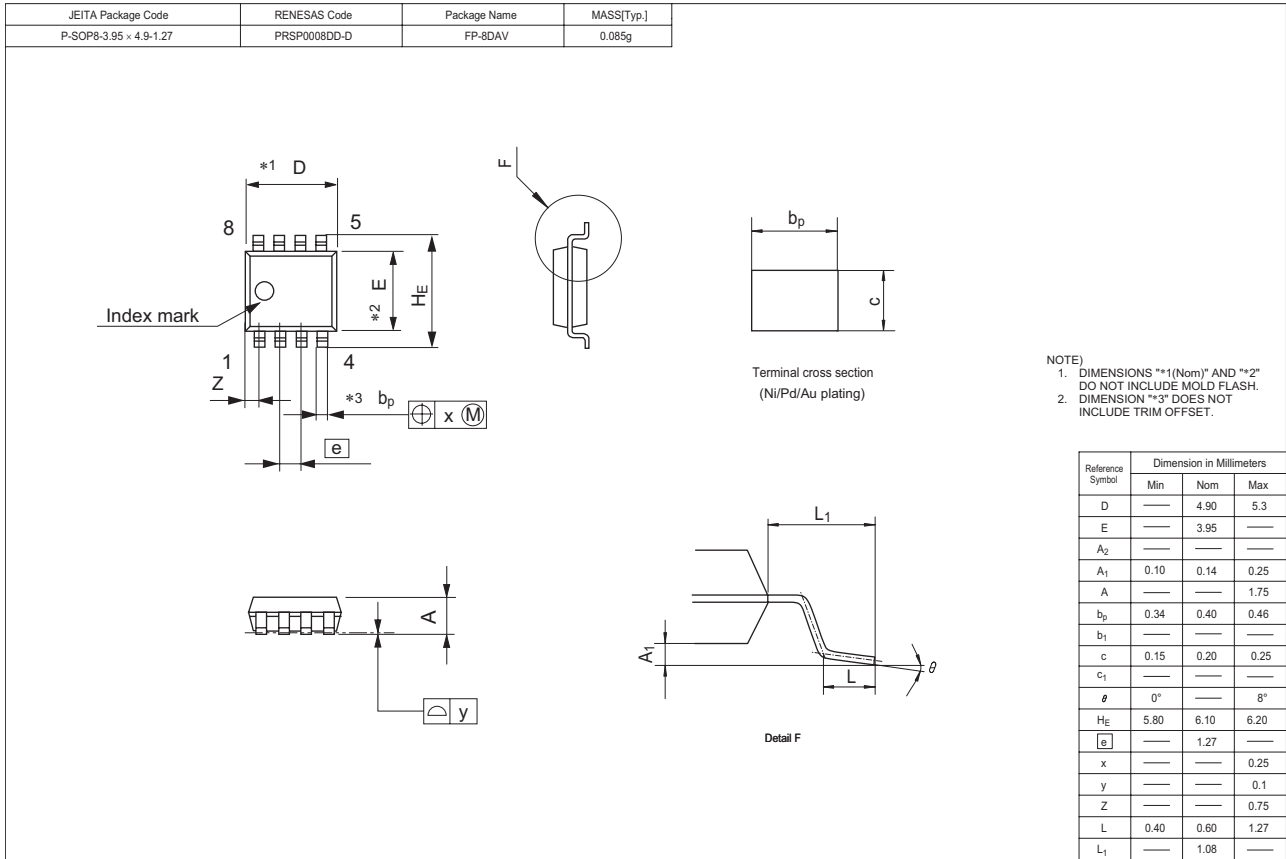
Switching Time Test Circuit



Switching Time Waveform



### Package Dimensions



### Ordering Information

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

Note: For some grades, production may be terminated. Please contact the Renesas sales office to check the state of production before ordering the product.

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Tel: <603> 7955-9390, Fax: <603> 7955-9510