

HAT3004R

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

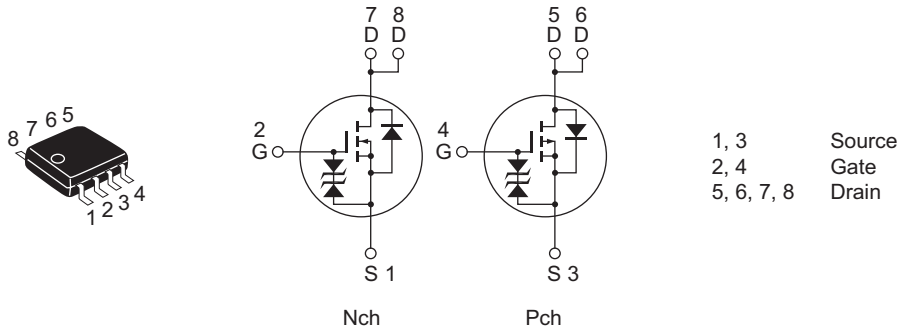
REJ03G1196-1100
(Previous: ADE-208-500I)
Rev.11.00
Sep 07, 2005

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_{DS}	30	-30	V
Gate to source voltage	V_{GS}	± 20	± 20	V
Drain current	I_D	5.5	-3.5	A
Drain peak current	$I_{D(pulse)}$ ^{Note 1}	44	-28	A
Body-drain diode reverse drain current	I_{DR}	5.5	-3.5	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	$R_{DS(on)}$	—	0.050	0.065	Ω	$I_D = 3 \text{ A}$, $V_{GS} = 10 \text{ V}$ ^{Note 4}
	$R_{DS(on)}$	—	0.078	0.11	Ω	$I_D = 3 \text{ A}$, $V_{GS} = 4 \text{ V}$ ^{Note 4}
Forward transfer admittance	$ y_{fs} $	3.5	5.5	—	S	$I_D = 3 \text{ A}$, $V_{DS} = 10 \text{ V}$ ^{Note 4}
Input capacitance	C_{iss}	—	310	—	pF	$V_{DS} = 10 \text{ V}$ $V_{GS} = 0$ $f = 1 \text{ MHz}$
Output capacitance	C_{oss}	—	220	—	pF	
Reverse transfer capacitance	C_{rss}	—	100	—	pF	
Turn-on delay time	$t_{d(on)}$	—	17	—	ns	$V_{GS} = 4 \text{ V}$, $I_D = 3 \text{ A}$ $V_{DD} \cong 10 \text{ V}$
Rise time	t_r	—	190	—	ns	
Turn-off delay time	$t_{d(off)}$	—	25	—	ns	
Fall time	t_f	—	60	—	ns	
Body-drain diode forward voltage	V_{DF}	—	0.9	1.4	V	$I_F = 5.5 \text{ A}$, $V_{GS} = 0$ ^{Note 4}
Body-drain diode reverse recovery time	t_{rr}	—	50	—	ns	$I_F = 5.5 \text{ A}$, $V_{GS} = 0$ $di_F/dt = 20 \text{ A}/\mu s$

Note: 4. Pulse test

P Channel

(Ta = 25°C)

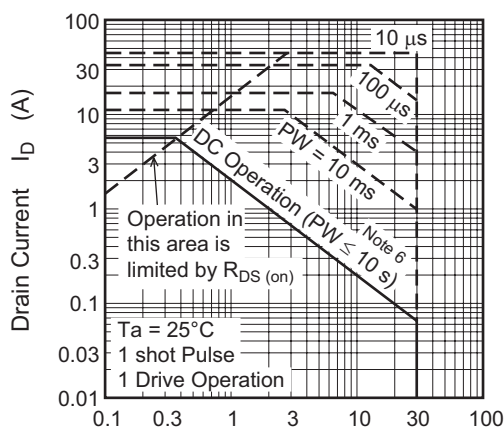
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR) DSS}$	-30	—	—	V	$I_D = -10 \text{ mA}$, $V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR) GSS}$	± 20	—	—	V	$I_G = \pm 100 \text{ }\mu\text{A}$, $V_{DS} = 0$
Gate to source leak current	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 16 \text{ V}$, $V_{DS} = 0$
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	$R_{DS(on)}$	—	0.12	0.16	Ω	$I_D = -2 \text{ A}$, $V_{GS} = -10 \text{ V}$ ^{Note 5}
	$R_{DS(on)}$	—	0.20	0.34	Ω	$I_D = -2 \text{ A}$, $V_{GS} = -4 \text{ V}$ ^{Note 5}
Forward transfer admittance	$ y_{fs} $	2.5	3.5	—	S	$I_D = -2 \text{ A}$, $V_{DS} = -10 \text{ V}$ ^{Note 5}
Input capacitance	C_{iss}	—	350	—	pF	$V_{DS} = -10 \text{ V}$ $V_{GS} = 0$ $f = 1 \text{ MHz}$
Output capacitance	C_{oss}	—	230	—	pF	
Reverse transfer capacitance	C_{rss}	—	75	—	pF	
Turn-on delay time	$t_{d(on)}$	—	18	—	ns	$V_{GS} = -4 \text{ V}$, $I_D = -2 \text{ A}$ $V_{DD} \cong -10 \text{ V}$
Rise time	t_r	—	110	—	ns	
Turn-off delay time	$t_{d(off)}$	—	20	—	ns	
Fall time	t_f	—	30	—	ns	
Body-drain diode forward voltage	V_{DF}	—	-1.0	-1.5	V	$I_F = -3.5 \text{ A}$, $V_{GS} = 0$ ^{Note 5}
Body-drain diode reverse recovery time	t_{rr}	—	60	—	ns	$I_F = -3.5 \text{ A}$, $V_{GS} = 0$ $di_F/dt = 20 \text{ A}/\mu\text{s}$

Note: 5. Pulse test

Main Characteristics

N Channel

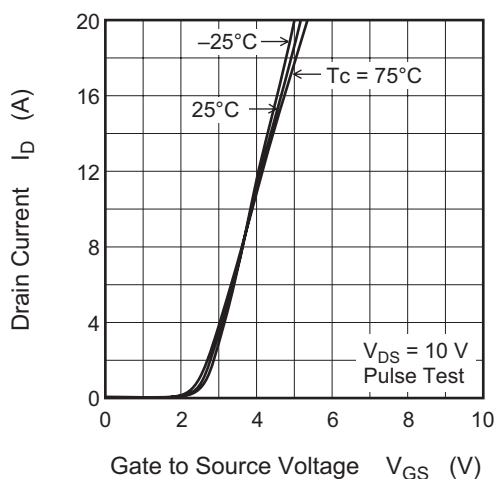
Maximum Safe Operation Area

Drain to Source Voltage V_{DS} (V)

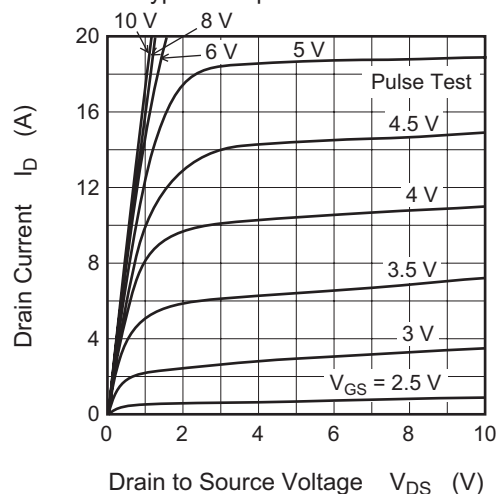
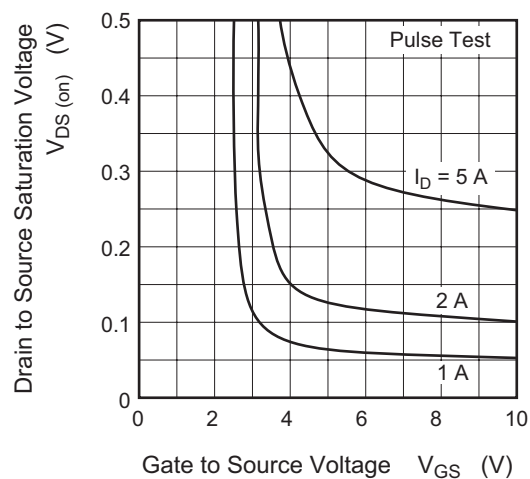
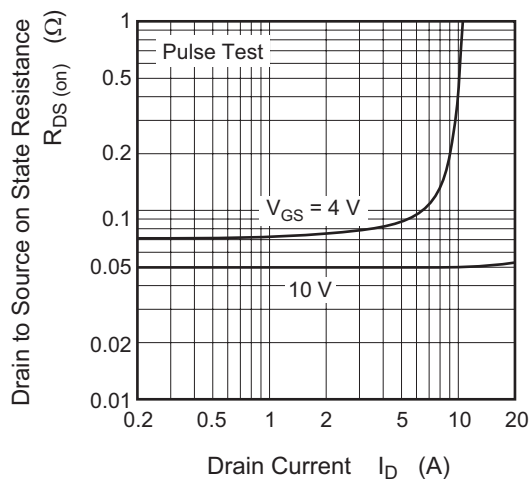
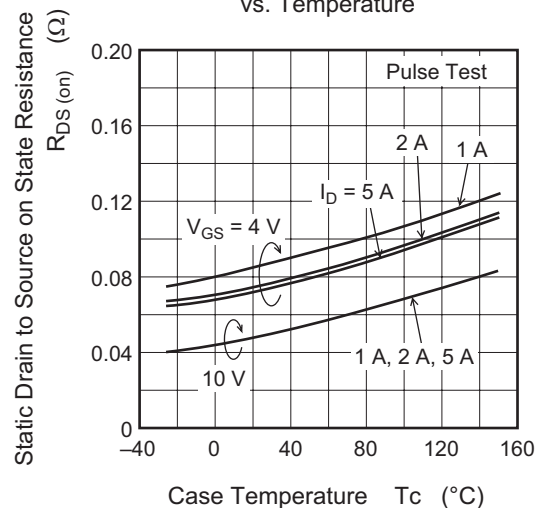
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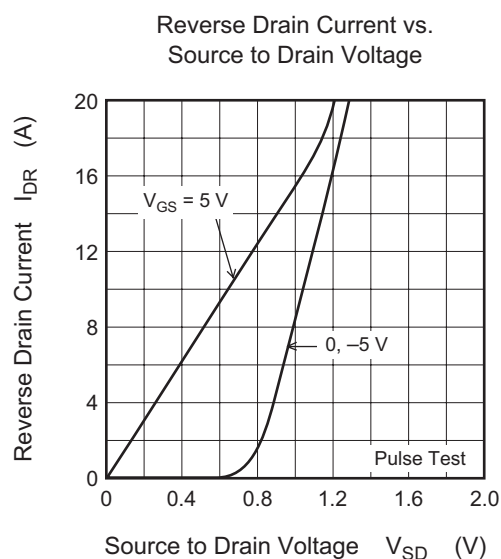
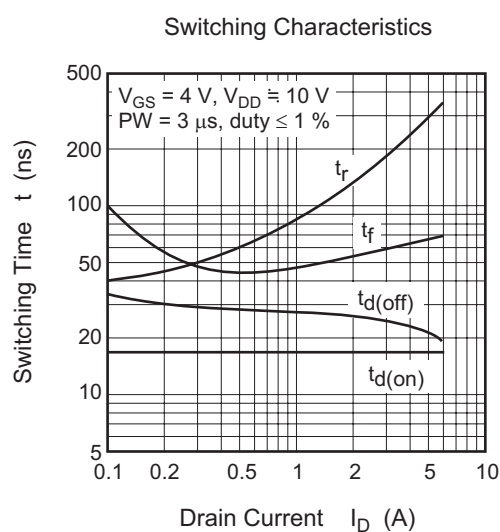
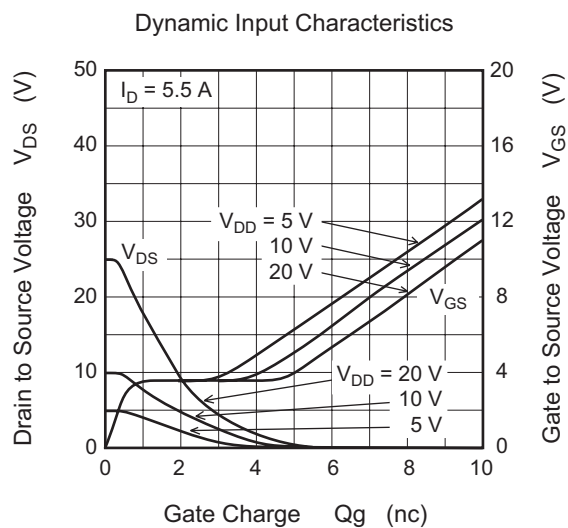
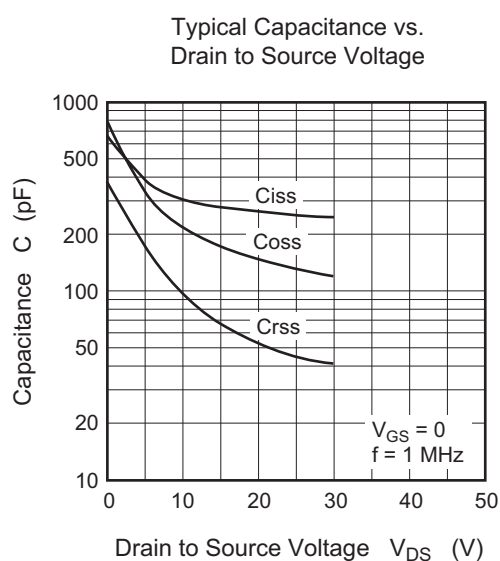
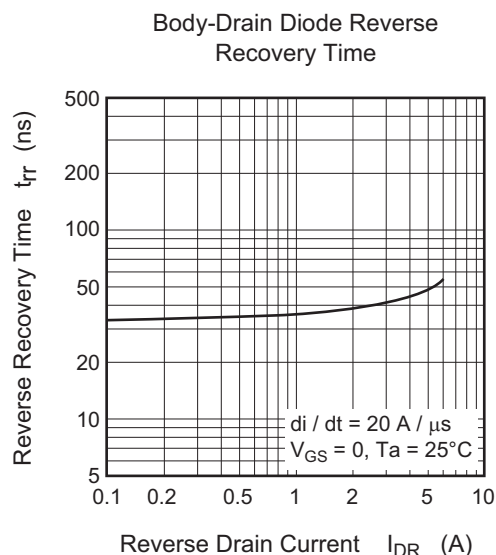
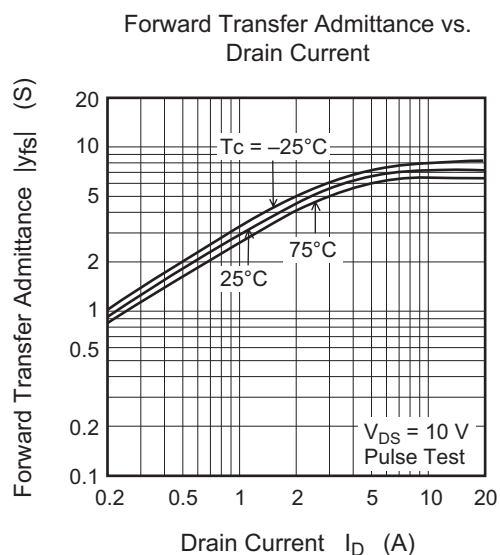
When using the glass epoxy board
(FR4 40 × 40 × 1.6 mm)

Typical Transfer Characteristics

Gate to Source Voltage V_{GS} (V)

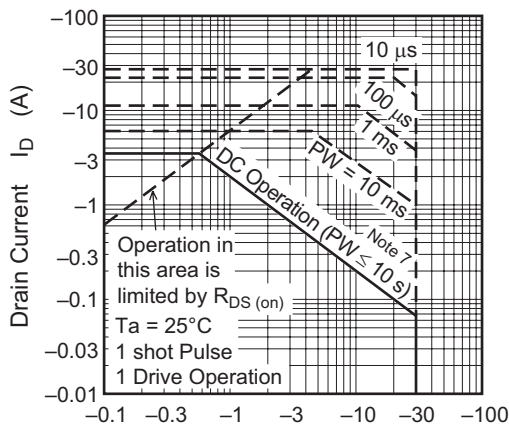
Typical Output Characteristics

Drain to Source Voltage V_{DS} (V)Drain to Source Saturation Voltage vs.
Gate to Source VoltageStatic Drain to Source on State Resistance
vs. Drain CurrentDrain Current I_D (A)Static Drain to Source on State Resistance
vs. TemperatureCase Temperature T_c (°C)



P Channel

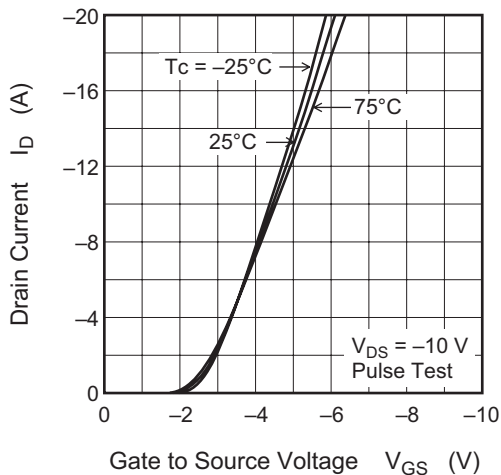
Maximum Safe Operation Area

Drain to Source Voltage V_{DS} (V)

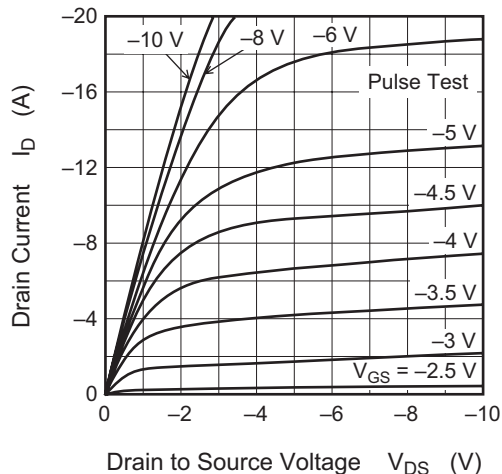
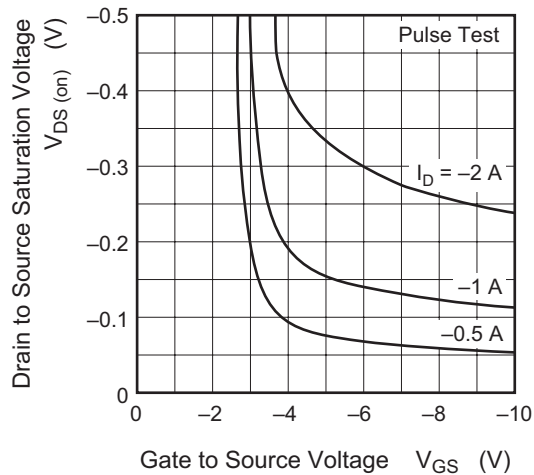
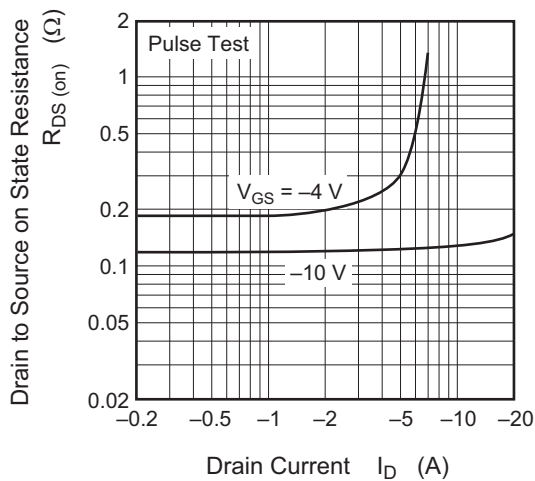
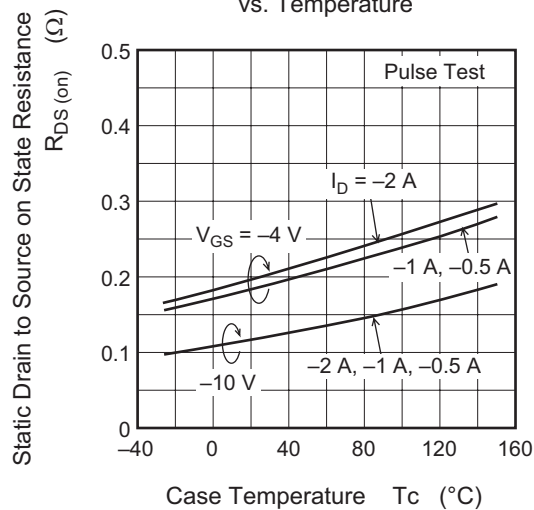
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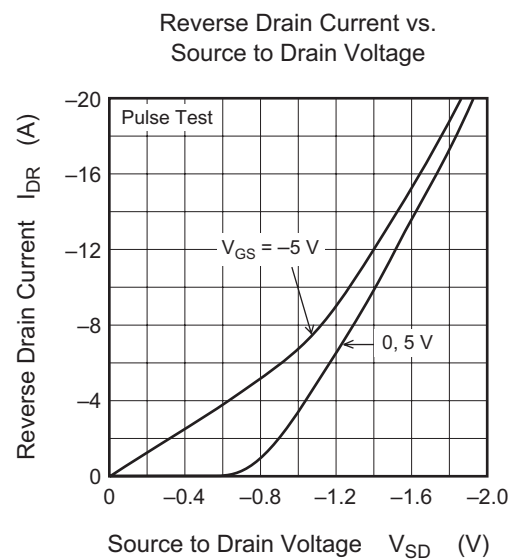
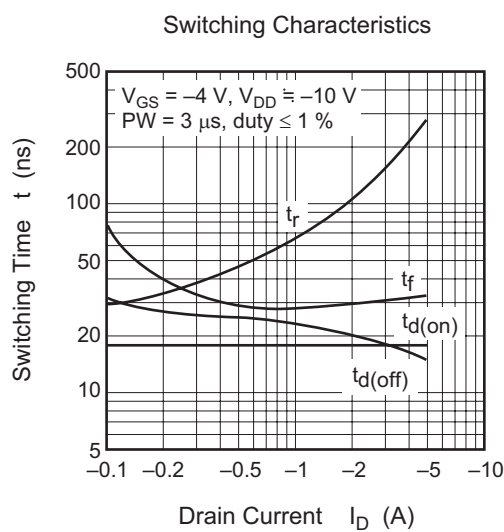
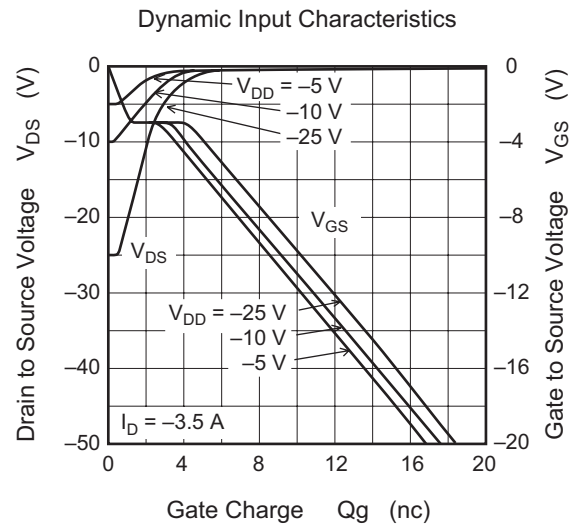
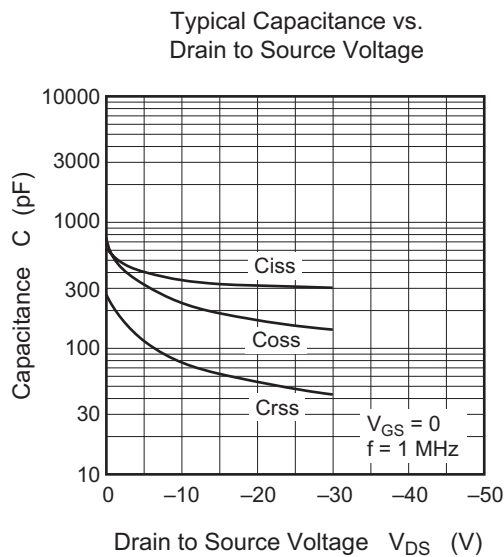
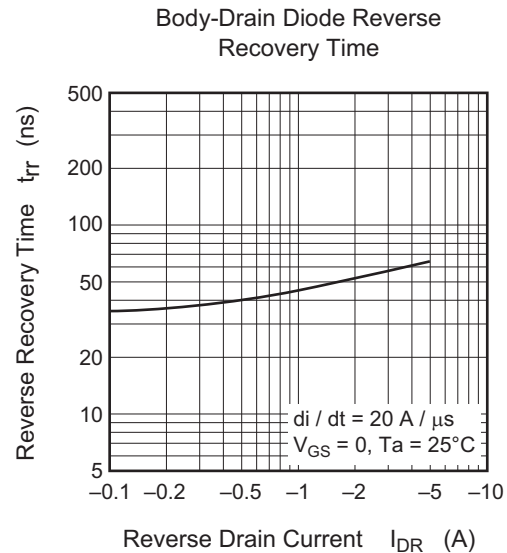
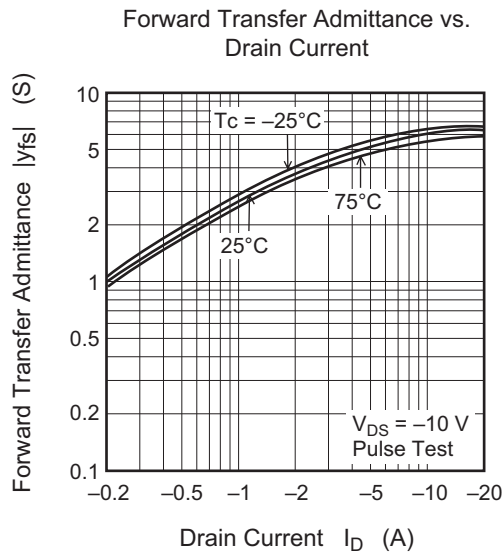
When using the glass epoxy board
(FR4 40 × 40 × 1.6 mm)

Typical Transfer Characteristics

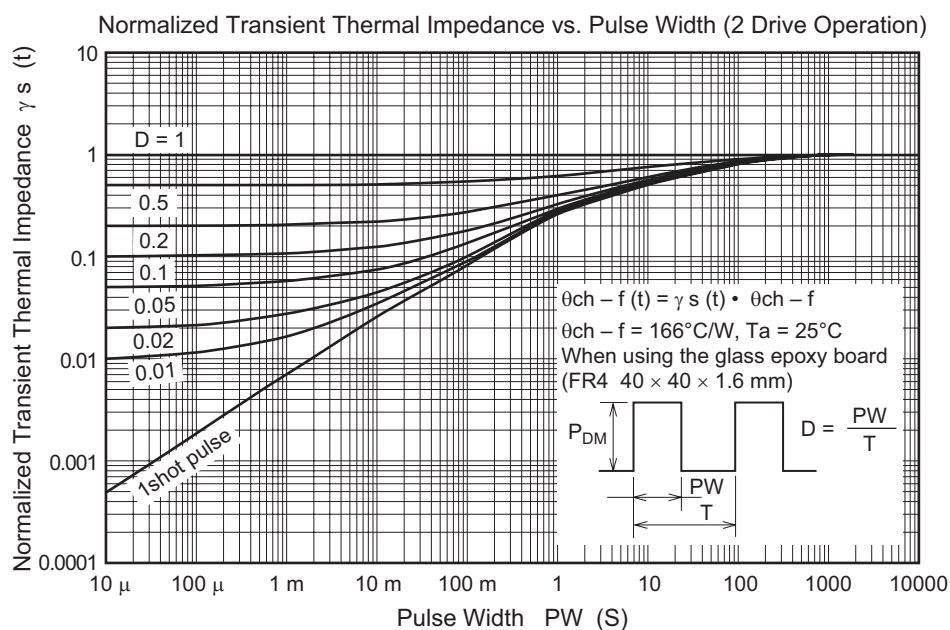
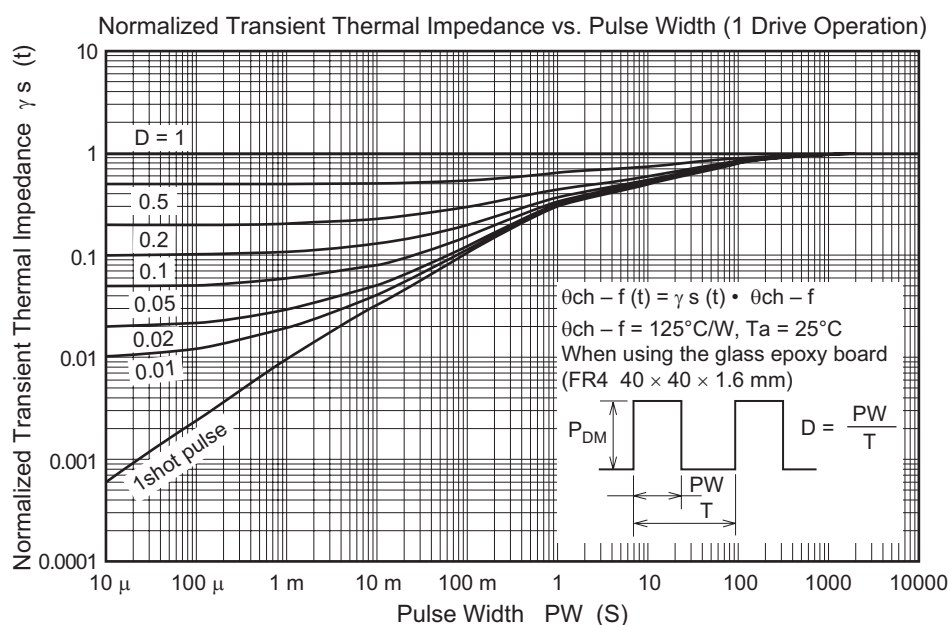
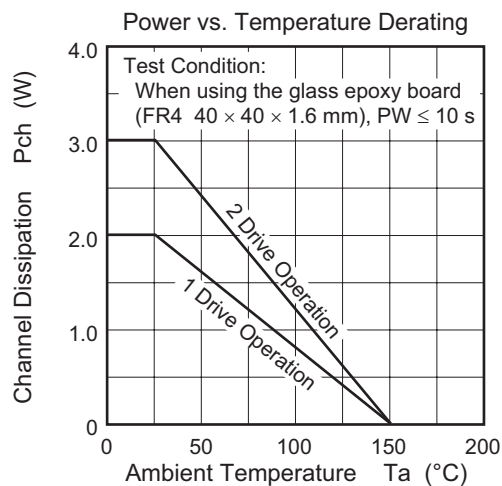
Gate to Source Voltage V_{GS} (V)

Typical Output Characteristics

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vs. Drain CurrentDrain Current I_D (A)Static Drain to Source on State Resistance
vs. Temperature

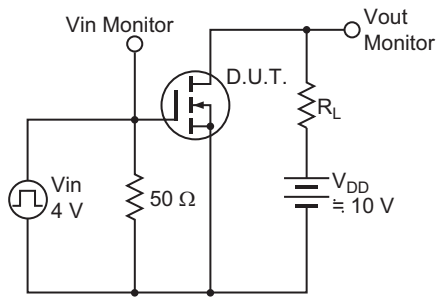


Common

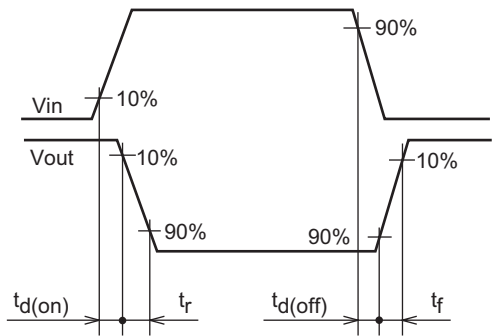


N channel

Switching Time Test Circuit

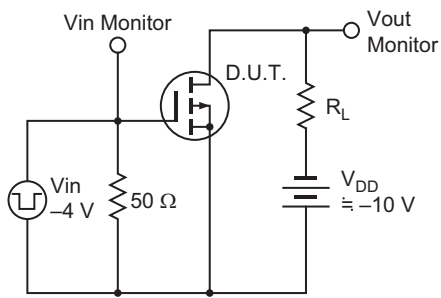


Switching Time Waveform

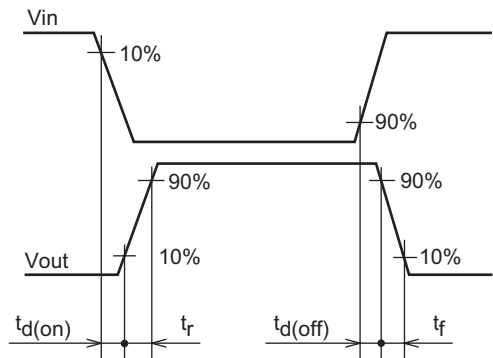


P channel

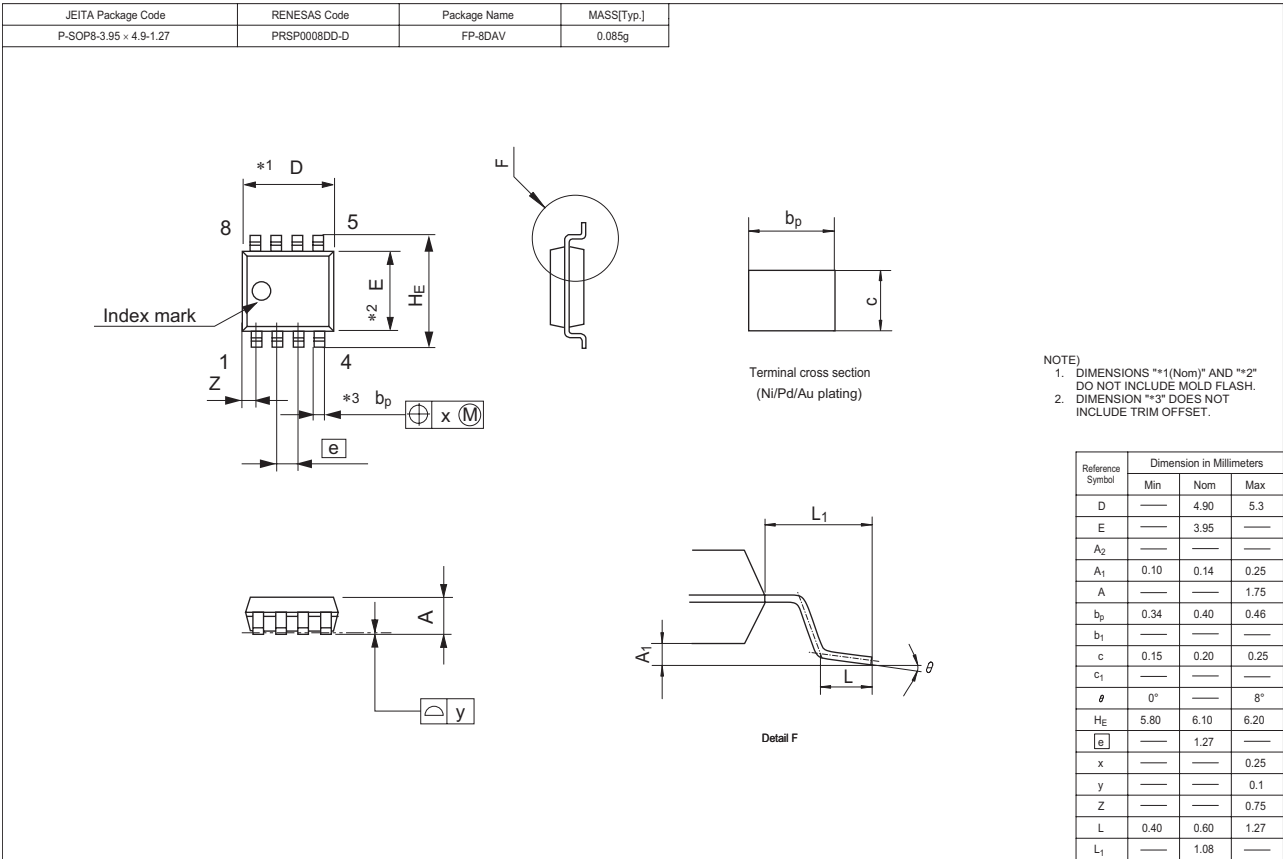
Switching Time Test Circuit



Switching Time Waveform



Package Dimensions



Ordering Information

Part Name	Quantity	Shipping Container
HAT3004R-EL-E	2500 pcs	Taping

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