

HAT3004R

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

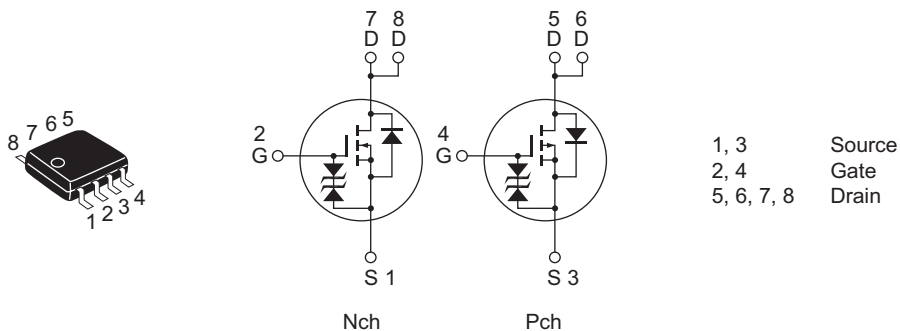
REJ03G1196-1100
(Previous: ADE-208-500I)
Rev.11.00
Sep 07, 2005

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_{DSS}	30	-30	V
Gate to source voltage	V_{GSS}	±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	$V_{DS} = 10 \text{ V}$
Output capacitance	C_{oss}	—	220	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	C_{rss}	—	100	—	pF	$f = 1 \text{ MHz}$
Turn-on delay time	$t_{d(on)}$	—	17	—	ns	$V_{GS} = 4 \text{ V}$, $I_D = 3 \text{ A}$
Rise time	t_r	—	190	—	ns	$V_{DD} \cong 10 \text{ V}$
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

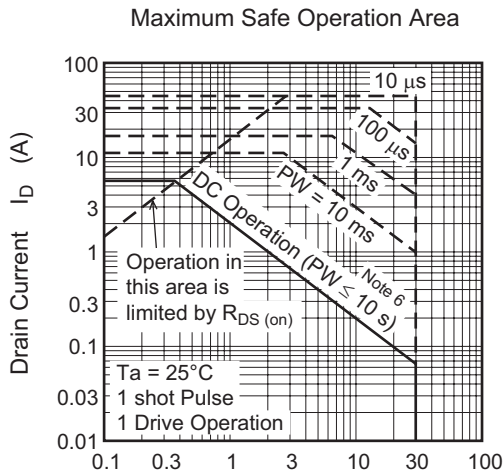
(Ta = 25°C)

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	$I_G = \pm 100 \mu\text{A}$, $V_{DS} = 0$
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	$V_{DS} = -10 \text{ V}$
Output capacitance	C_{oss}	—	230	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	C_{rss}	—	75	—	pF	$f = 1 \text{ MHz}$
Turn-on delay time	$t_{d(on)}$	—	18	—	ns	$V_{GS} = -4 \text{ V}$, $I_D = -2 \text{ A}$
Rise time	t_r	—	110	—	ns	$V_{DD} \equiv -10 \text{ V}$
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

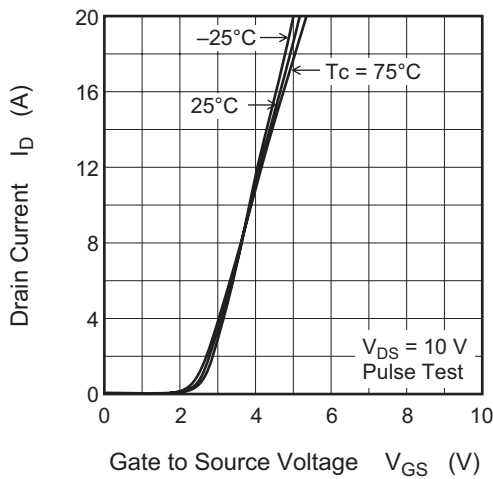


Drain to Source Voltage V_{DS} (V)

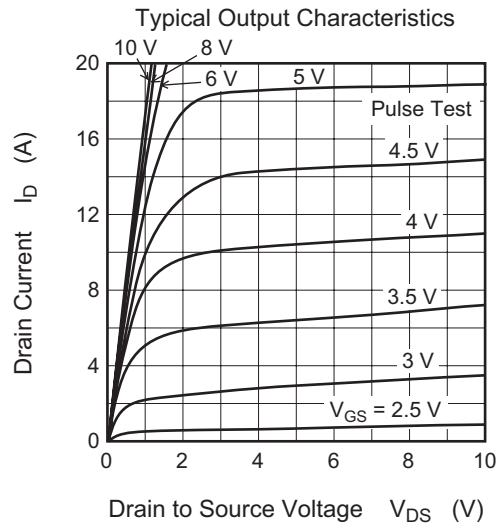
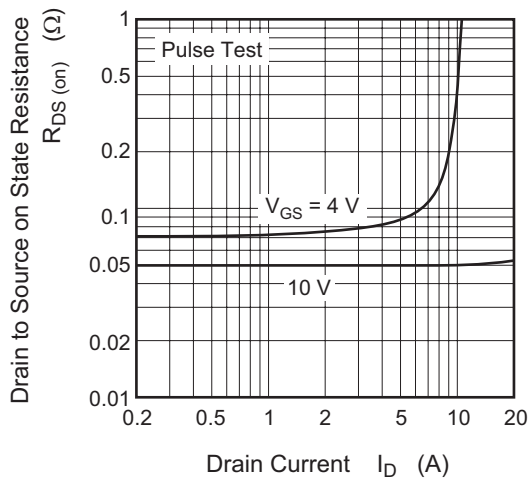
Note 6:

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

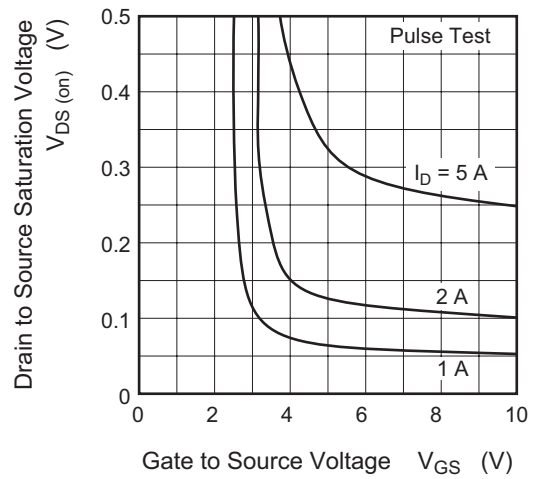
Typical Transfer Characteristics



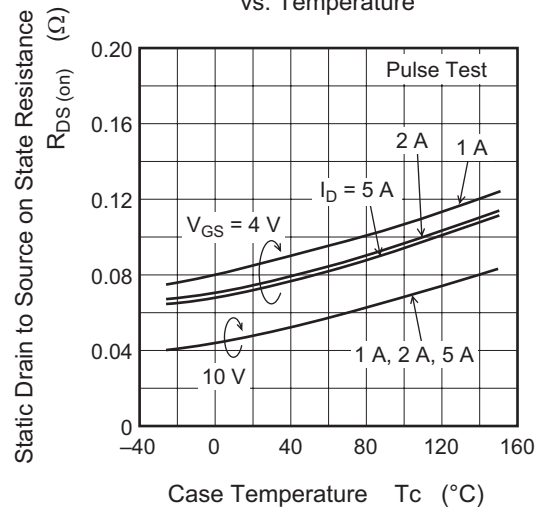
Static Drain to Source on State Resistance vs. Drain Current

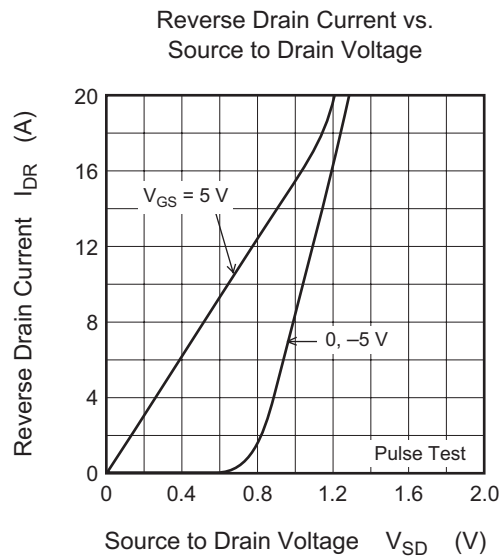
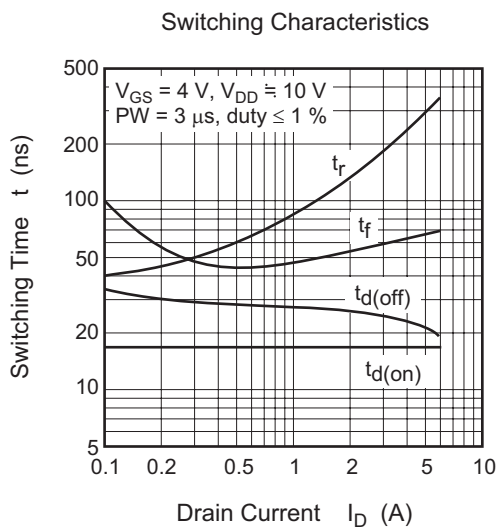
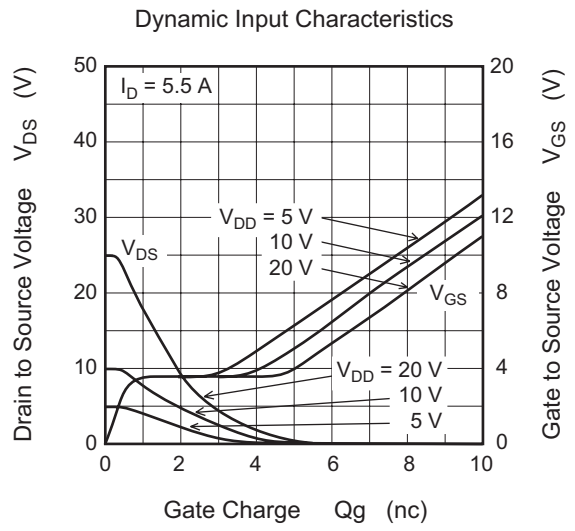
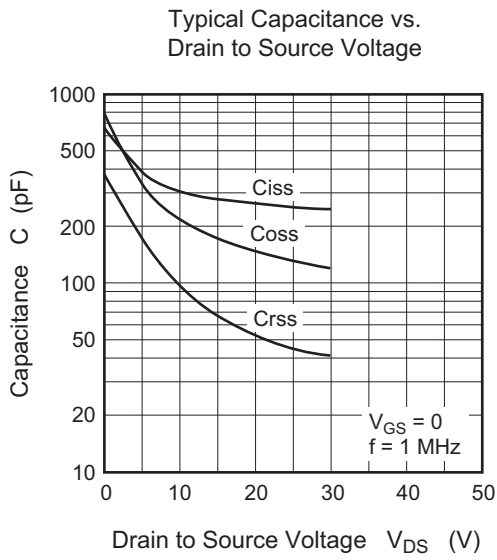
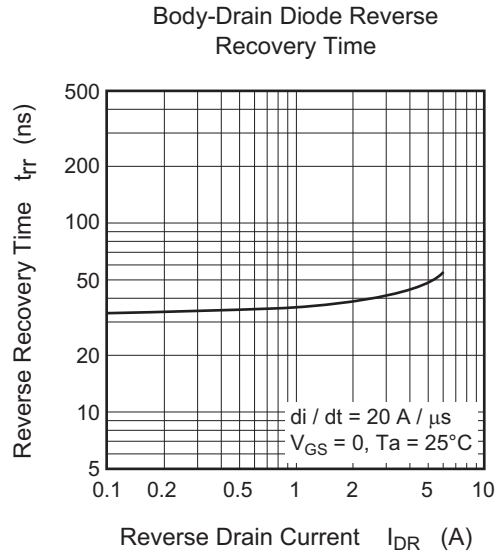
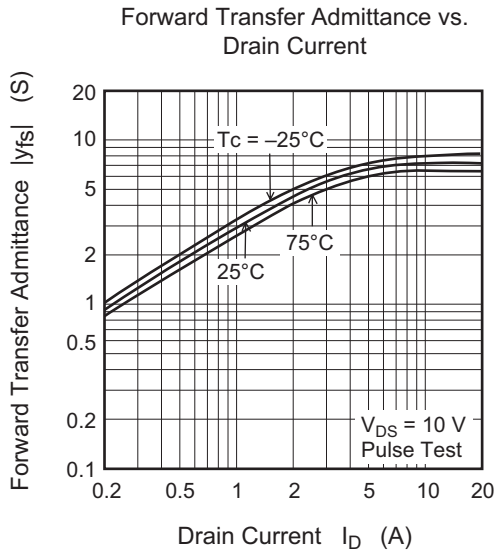


Drain to Source Saturation Voltage vs. Gate to Source Voltage



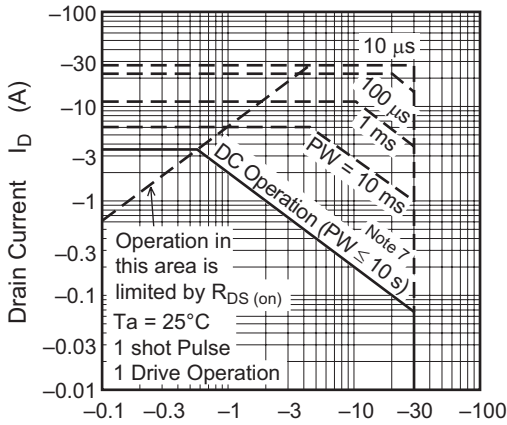
Static Drain to Source on State Resistance vs. Temperature





P Channel

Maximum Safe Operation Area

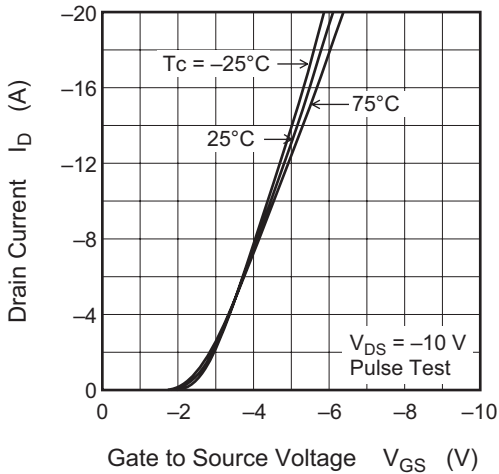


Drain to Source Voltage V_{DS} (V)

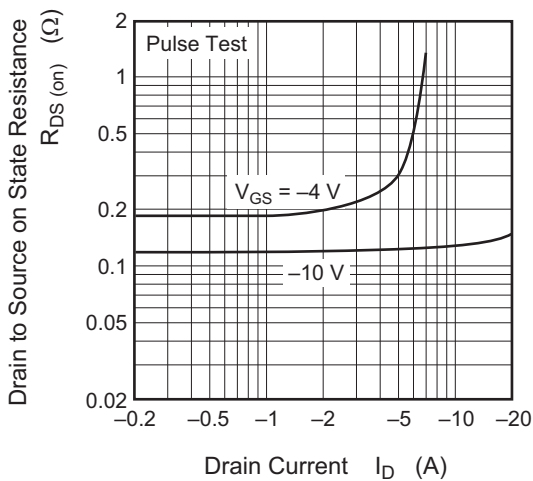
Note 7:

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

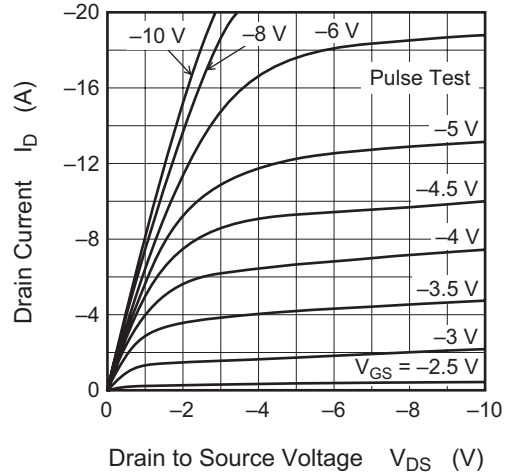
Typical Transfer Characteristics



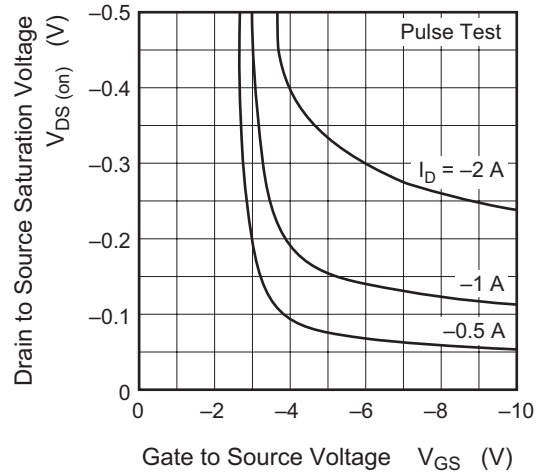
Static Drain to Source on State Resistance vs. Drain Current



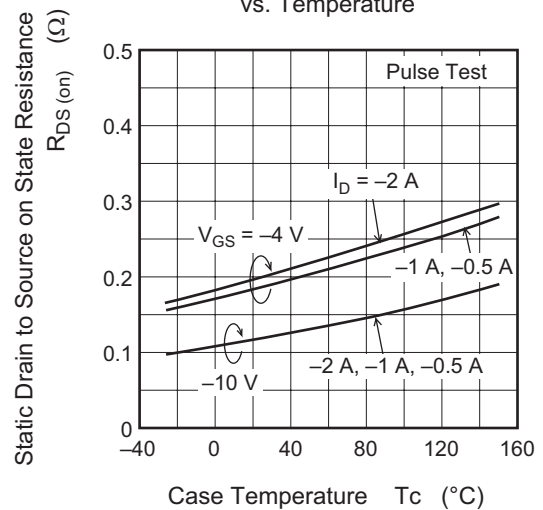
Typical Output Characteristics

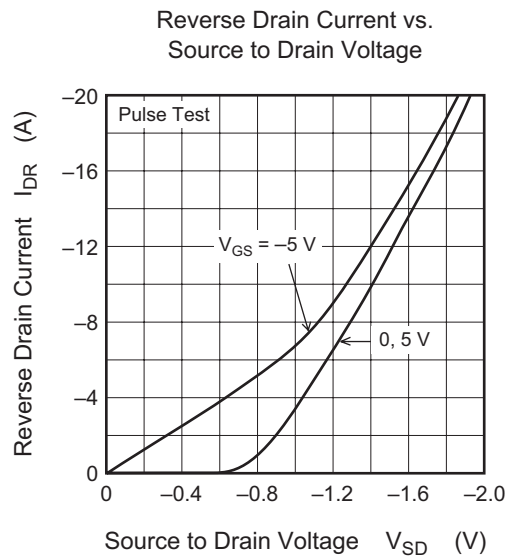
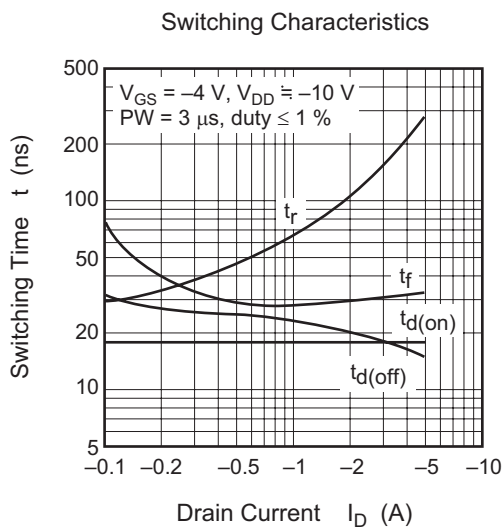
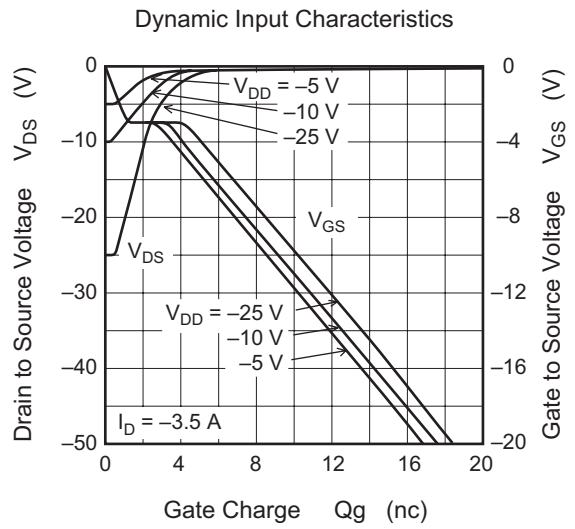
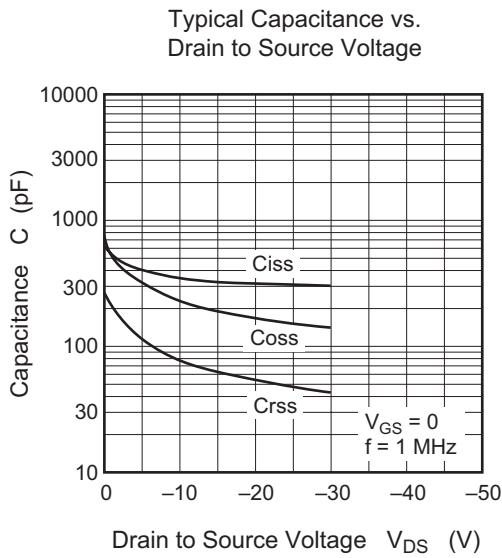
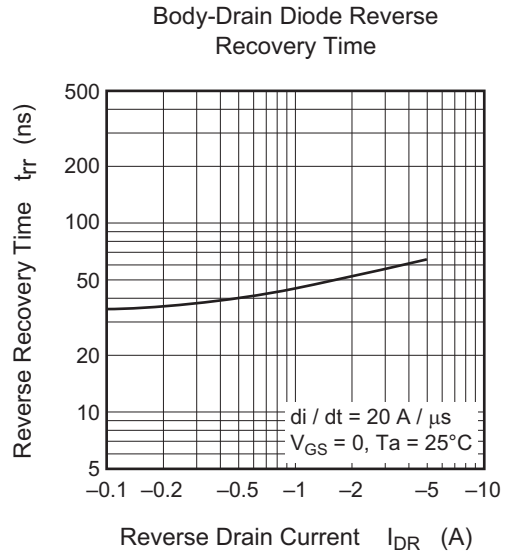
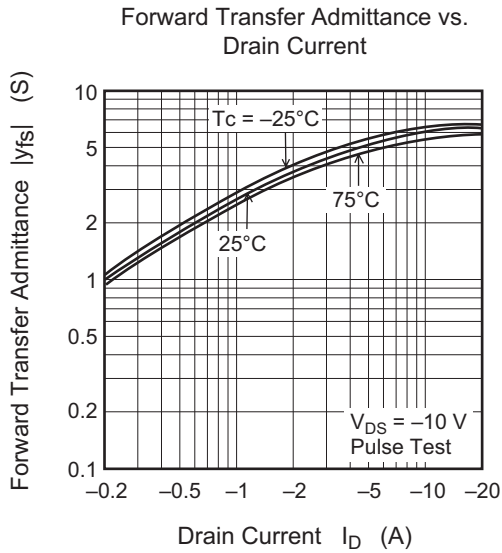


Drain to Source Saturation Voltage vs. Gate to Source Voltage

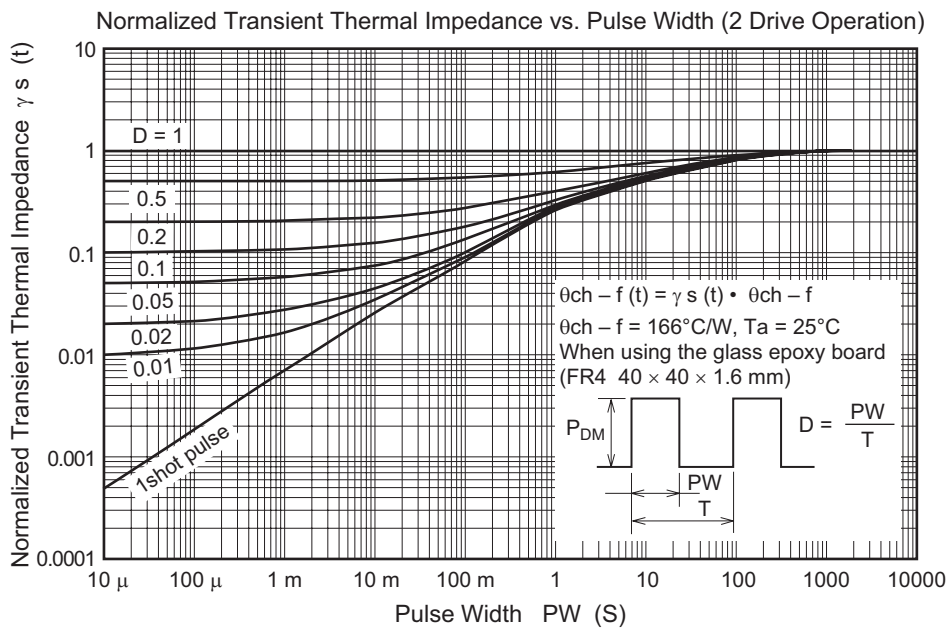
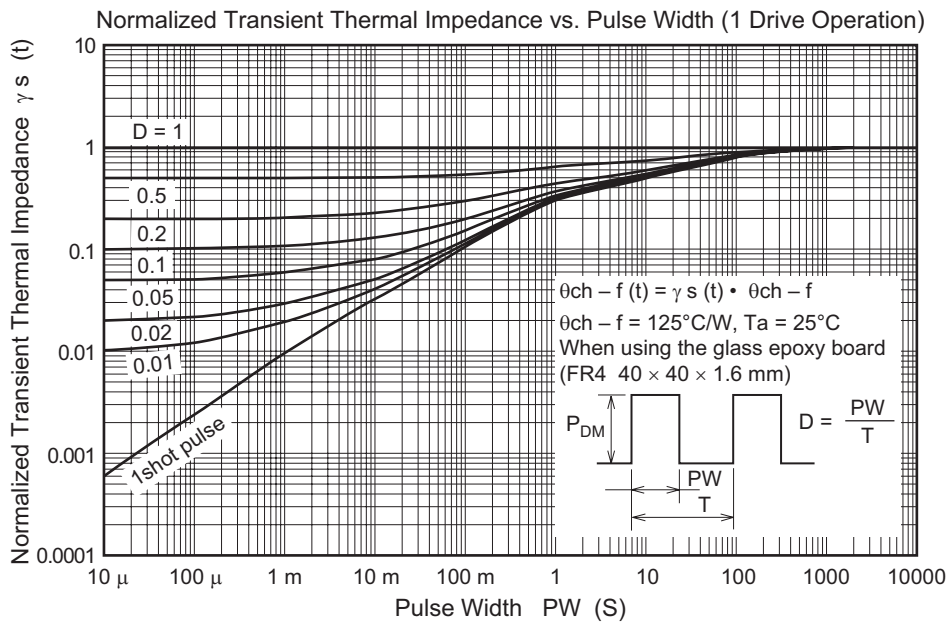
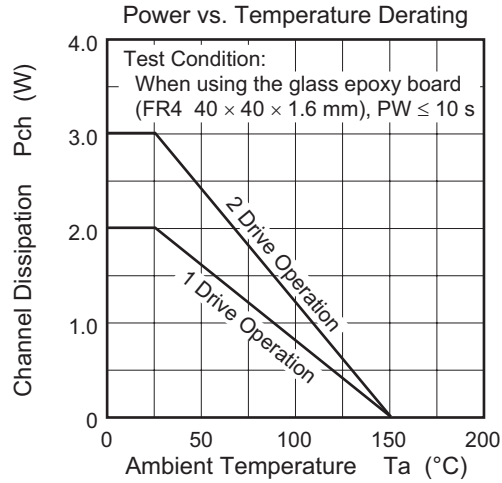


Static Drain to Source on State Resistance vs. Temperature



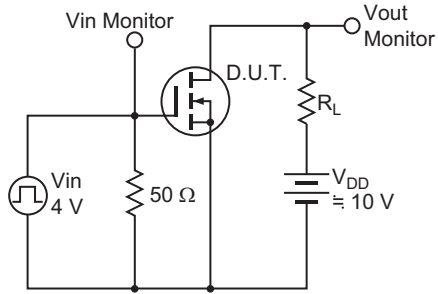


Common

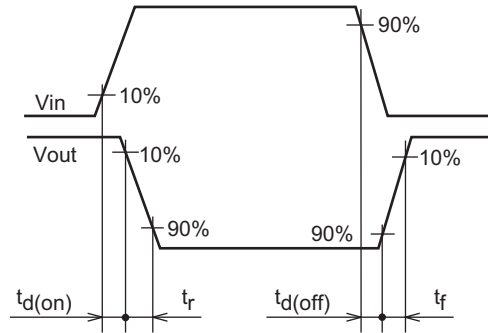


N channel

Switching Time Test Circuit

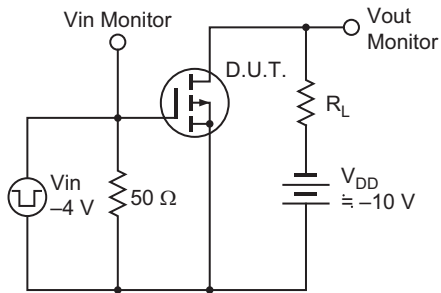


Switching Time Waveform

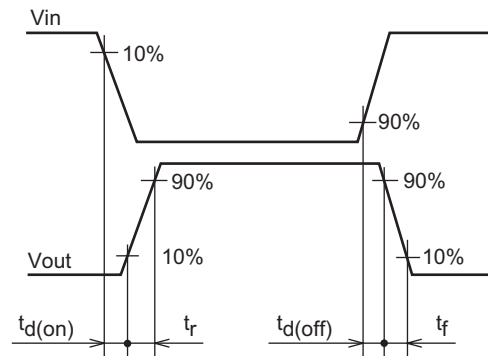


P channel

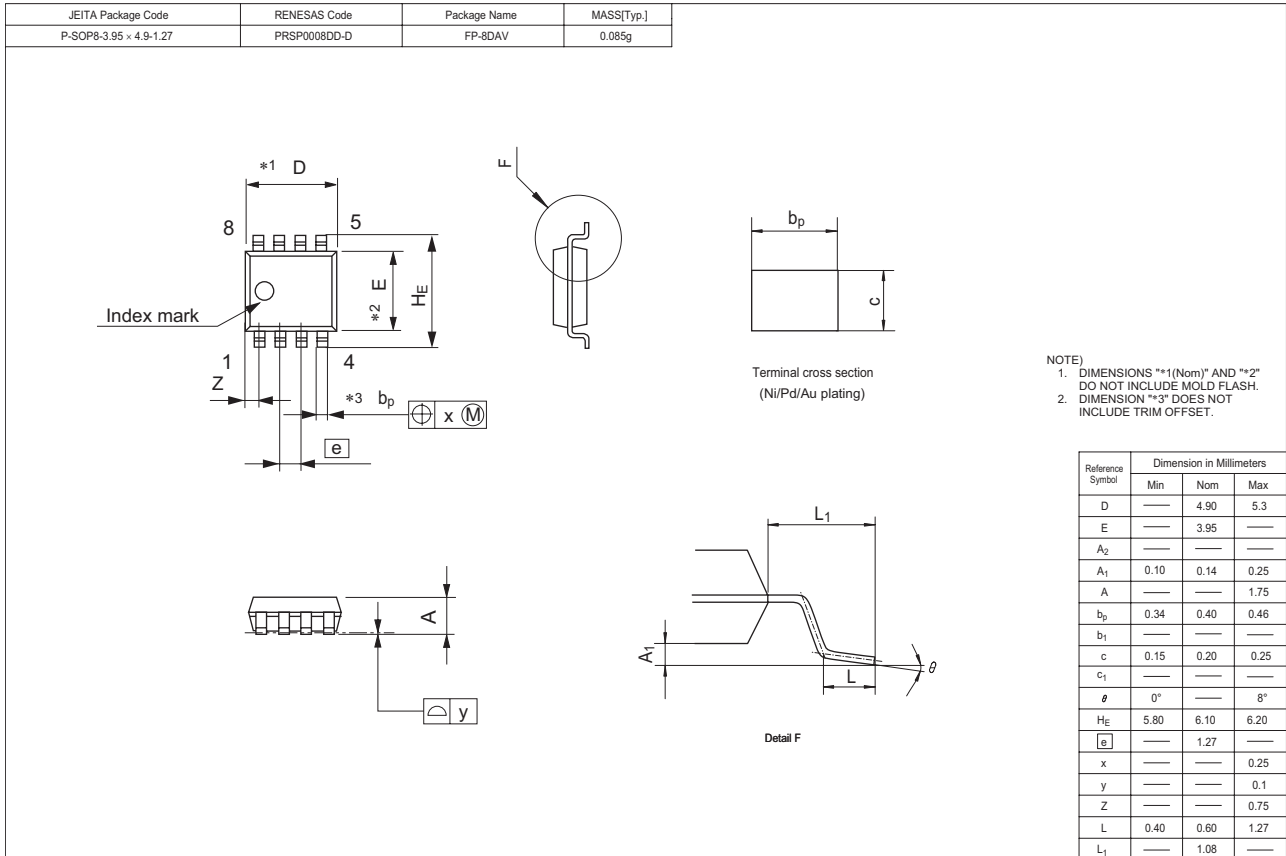
Switching Time Test Circuit



Switching Time Waveform



Package Dimensions



Ordering Information

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

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