

HAT3019R

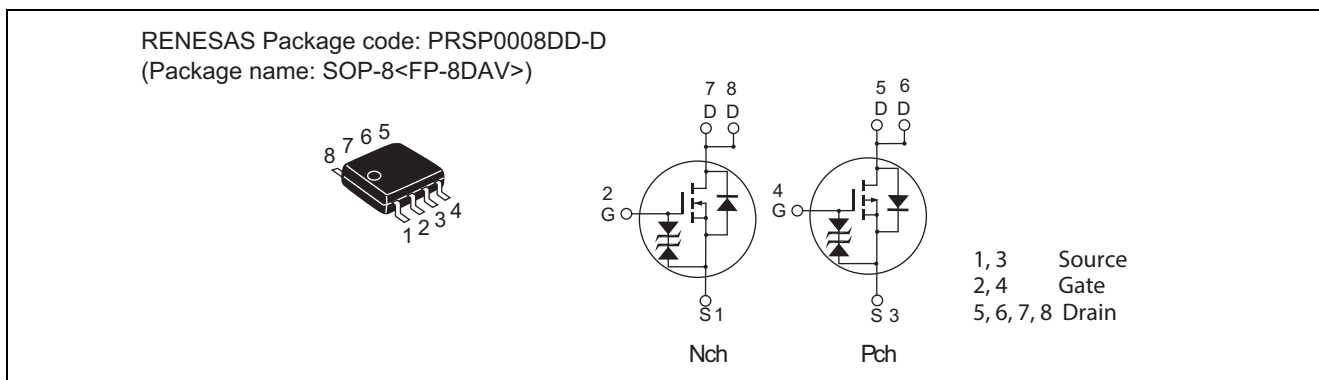
Nch 100V, 3.5A, 115mΩmax.
 Pch -100V, -2.3A, 300mΩmax
 Silicon N/P Channel Power MOS FET
 Power Switching

R07DS1324EJ0700
 Rev.7.00
 Feb 18, 2016

Features

- Capable of 4.5 V gate drive
- Low drive current
- High density mounting
- Pb-free

Outline



Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings		Unit
		Nch	Pch	
Drain to source voltage	V _{DSS}	100	-100	V
Gate to source voltage	V _{GSS}	±20	±20	V
Drain current	I _D	3.5	-2.3	A
Drain peak current	I _{D(pulse)} ^{Note1}	21	-13.8	A
Body-drain diode reverse drain current	I _{DR}	3.5	-2.3	A
Channel dissipation	P _{ch} ^{Note2}	2.0		W
Channel dissipation	P _{ch} ^{Note3}	3.0		W
Channel temperature	T _{ch}	150		°C
Storage temperature	T _{stg}	-55 to +150		°C

Notes: 1. PW ≤ 10 μs, duty cycle ≤ 1 %

2. 1 Drive operation; When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), PW ≤ 10s

3. 2 Drive operation; When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), PW ≤ 10s

Electrical Characteristics

• N Channel

(Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	100	—	—	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}	—	—	1	μA	$V_{DS} = 100 \text{ V}$, $V_{GS} = 0$
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	$R_{DS(on)}$	—	90	115	$\text{m}\Omega$	$I_D = 1.75 \text{ A}$, $V_{GS} = 10 \text{ V}$ ^{Note4}
	$R_{DS(on)}$	—	120	160	$\text{m}\Omega$	$I_D = 1.75 \text{ A}$, $V_{GS} = 4.5 \text{ V}$ ^{Note4}
Forward transfer admittance	$ y_{fs} $	3.6	6	—	S	$I_D = 1.75 \text{ A}$, $V_{DS} = 10 \text{ V}$ ^{Note4}
Input capacitance	C_{iss}	—	815	—	pF	$V_{DS} = 10 \text{ V}$
Output capacitance	C_{oss}	—	85	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	C_{rss}	—	42	—	pF	$f = 1 \text{ MHz}$
Total gate charge	Q_g	—	15	—	nC	$V_{DD} = 50 \text{ V}$
Gate to source charge	Q_{gs}	—	2.2	—	nC	$V_{GS} = 10 \text{ V}$
Gate to drain charge	Q_{gd}	—	3.2	—	nC	$I_D = 3.5 \text{ A}$
Turn-on delay time	$t_{d(on)}$	—	10	—	ns	$V_{GS} = 10 \text{ V}$, $I_D = 1.75 \text{ A}$
Rise time	t_r	—	6.5	—	ns	$V_{DD} \approx 30 \text{ V}$
Turn-off delay time	$t_{d(off)}$	—	54	—	ns	$R_L = 17.1 \Omega$
Fall time	t_f	—	6.5	—	ns	$R_g = 4.7 \Omega$
Body-drain diode forward voltage	V_{DF}	—	0.80	1.04	V	$I_F = 3.5 \text{ A}$, $V_{GS} = 0$ ^{Note4}
Body-drain diode reverse recovery time	t_{rr}	—	35	—	ns	$I_F = 3.5 \text{ A}$, $V_{GS} = 0$ $di_F/dt = 100 \text{ A}/\mu\text{s}$

Notes: 4. Pulse test

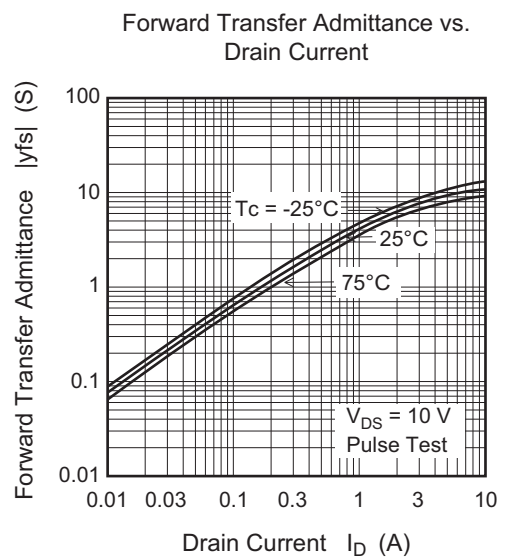
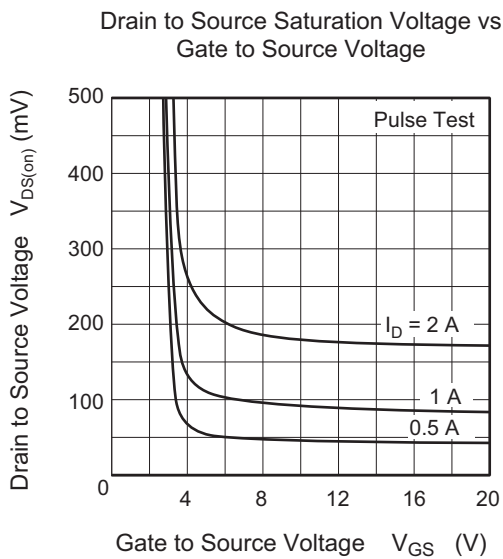
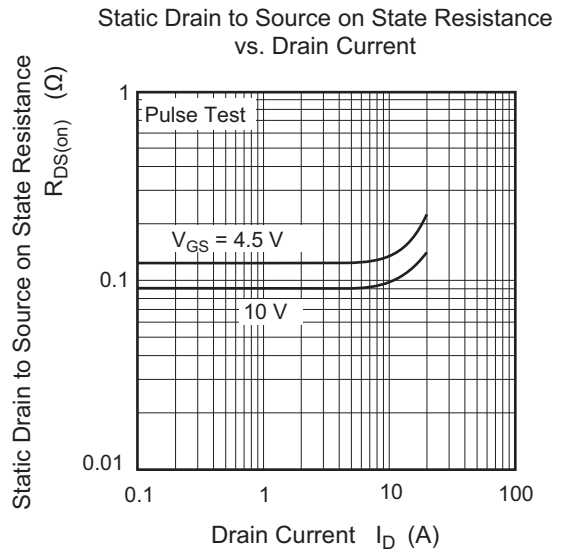
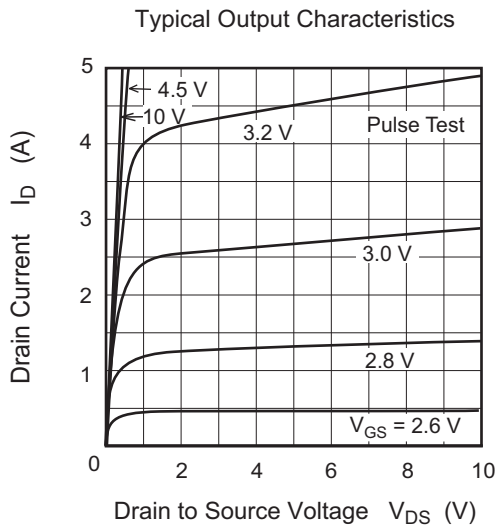
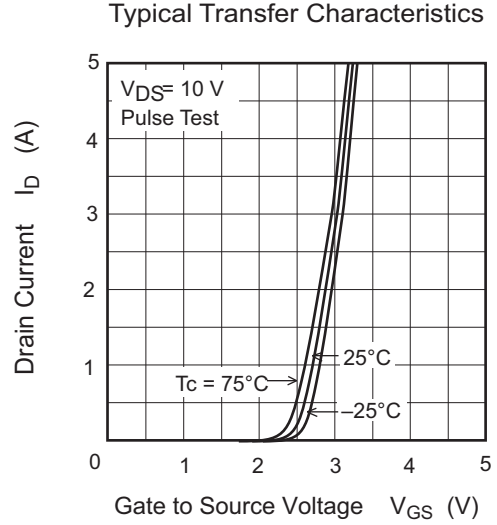
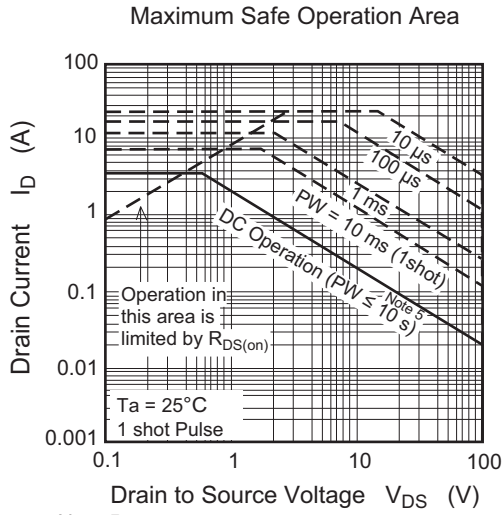
• P Channel

(Ta = 25°C)

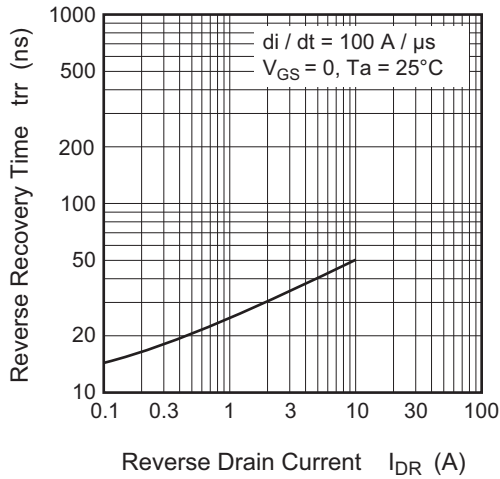
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	-100	—	—	V	$I_D = -10 \text{ mA}$, $V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	± 20	—	—	V	$I_G = \pm 100 \mu\text{A}$, $V_{DS} = 0$
Gate to source leak current	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 16 \text{ V}$, $V_{DS} = 0$
Zero gate voltage drain current	I_{DSS}	—	—	-1	μA	$V_{DS} = -100 \text{ V}$, $V_{GS} = 0$
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	$R_{DS(on)}$	—	240	300	$\text{m}\Omega$	$I_D = -1.15 \text{ A}$, $V_{GS} = -10 \text{ V}$ ^{Note4}
	$R_{DS(on)}$	—	300	500	$\text{m}\Omega$	$I_D = -1.15 \text{ A}$, $V_{GS} = -4.5 \text{ V}$ ^{Note4}
Forward transfer admittance	$ y_{fs} $	1.8	3	—	S	$I_D = -1.15 \text{ A}$, $V_{DS} = -10 \text{ V}$ ^{Note4}
Input capacitance	C_{iss}	—	930	—	pF	$V_{DS} = -10 \text{ V}$
Output capacitance	C_{oss}	—	80	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	C_{rss}	—	50	—	pF	$f = 1 \text{ MHz}$
Total gate charge	Q_g	—	16	—	nC	$V_{DD} = -50 \text{ V}$
Gate to source charge	Q_{gs}	—	2.3	—	nC	$V_{GS} = -10 \text{ V}$
Gate to drain charge	Q_{gd}	—	3.1	—	nC	$I_D = -2.3 \text{ A}$
Turn-on delay time	$t_{d(on)}$	—	18	—	ns	$V_{GS} = -10 \text{ V}$, $I_D = -1.15 \text{ A}$
Rise time	t_r	—	16	—	ns	$V_{DD} \approx -30 \text{ V}$
Turn-off delay time	$t_{d(off)}$	—	43	—	ns	$R_L = 26 \Omega$
Fall time	t_f	—	5.0	—	ns	$R_g = 4.7 \Omega$
Body-drain diode forward voltage	V_{DF}	—	-0.83	-1.08	V	$I_F = -2.3 \text{ A}$, $V_{GS} = 0$ ^{Note4}
Body-drain diode reverse recovery time	t_{rr}	—	35	—	ns	$I_F = -2.3 \text{ A}$, $V_{GS} = 0$ $di_F/dt = 100 \text{ A}/\mu\text{s}$

Notes: 4. Pulse test

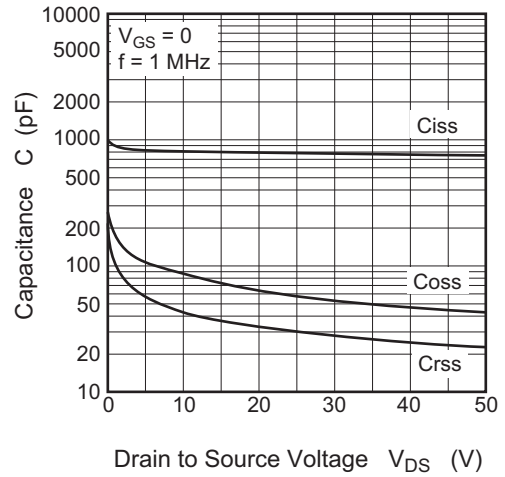
Main Characteristics N Channel



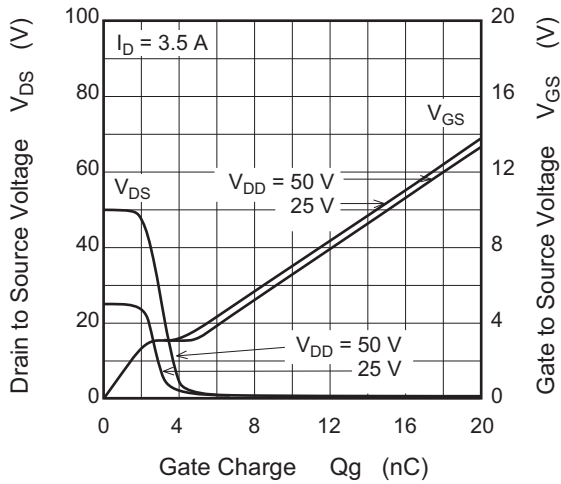
Body-Drain Diode Reverse Recovery Time



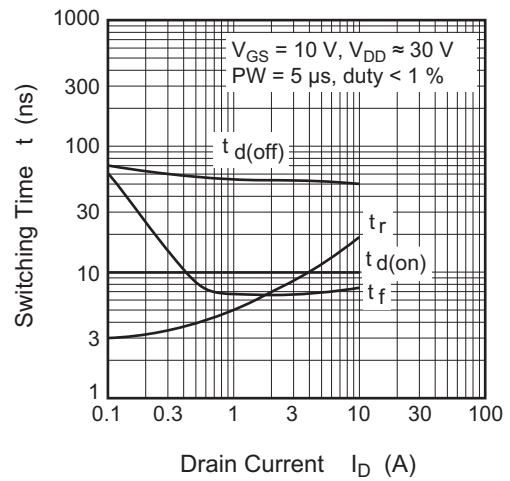
Typical Capacitance vs. Drain to Source Voltage



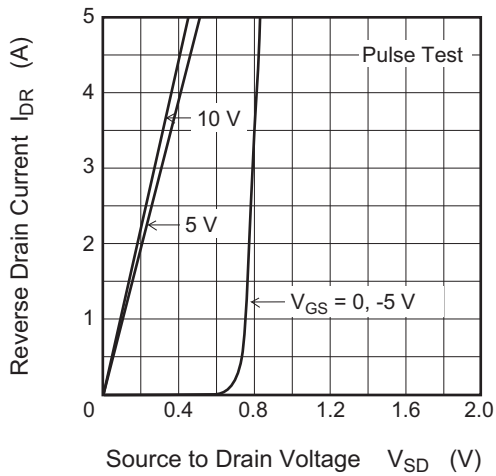
Dynamic Input Characteristics



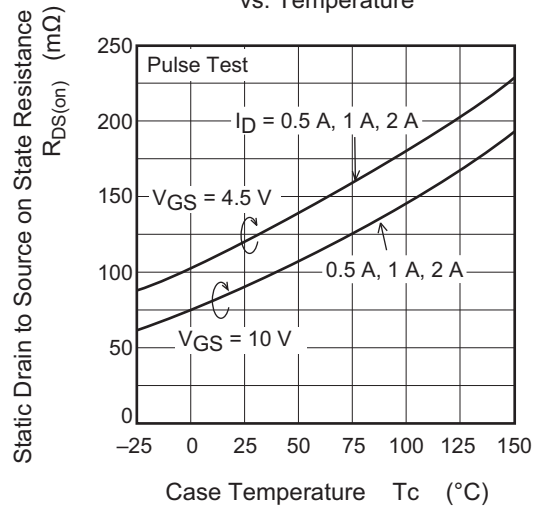
Switching Characteristics



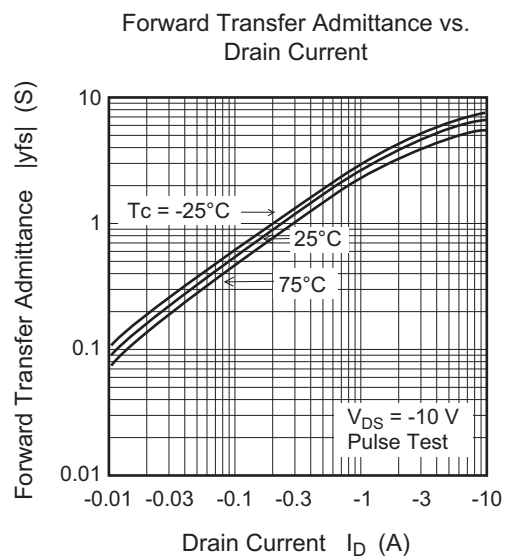
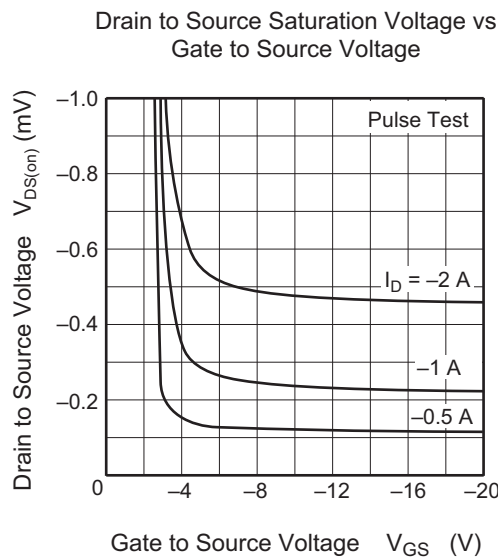
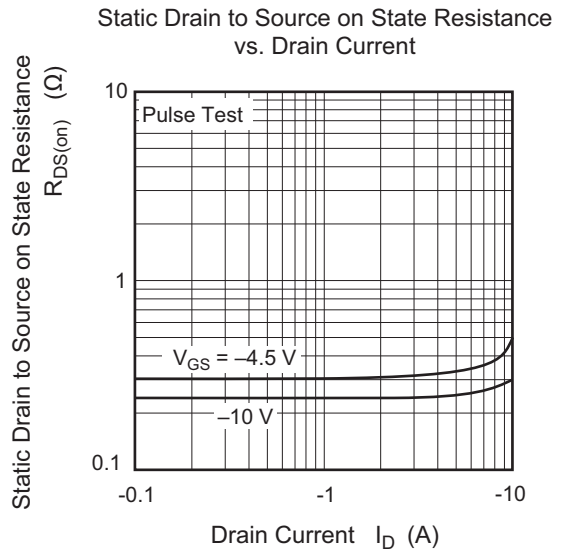
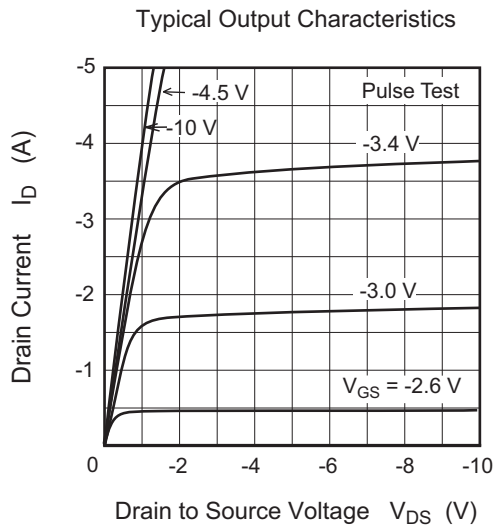
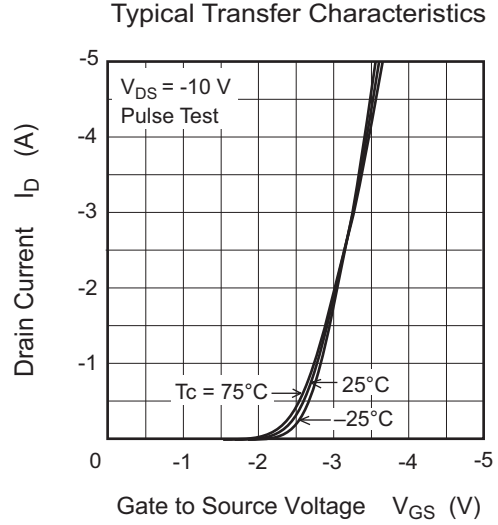
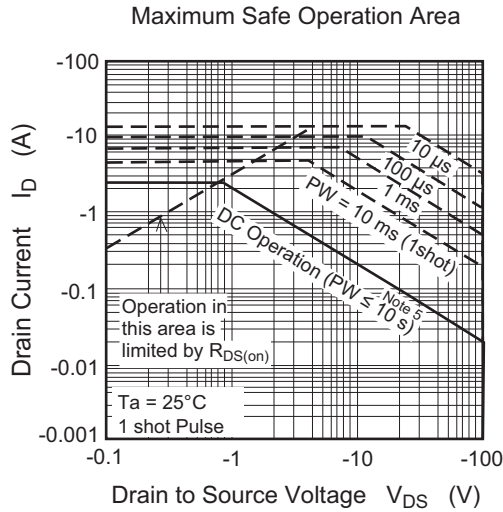
Reverse Drain Current vs. Source to Drain Voltage



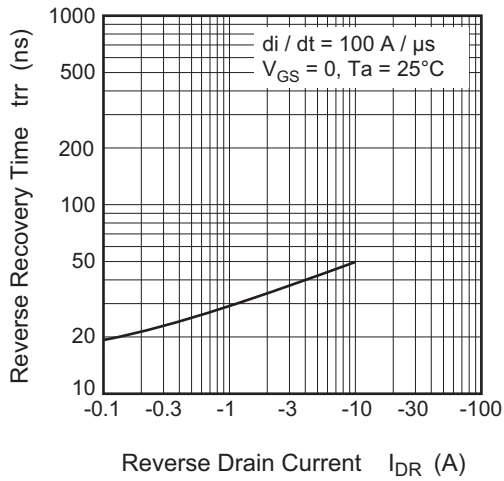
Static Drain to Source on State Resistance vs. Temperature



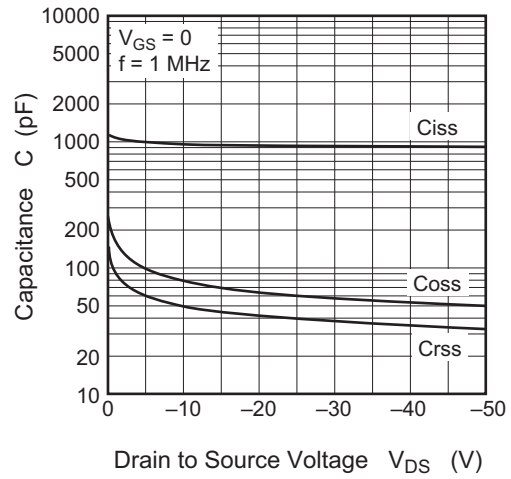
Main Characteristics P Channel



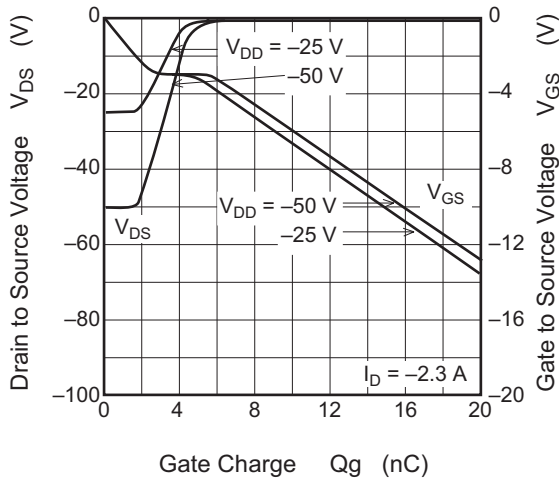
Body-Drain Diode Reverse Recovery Time



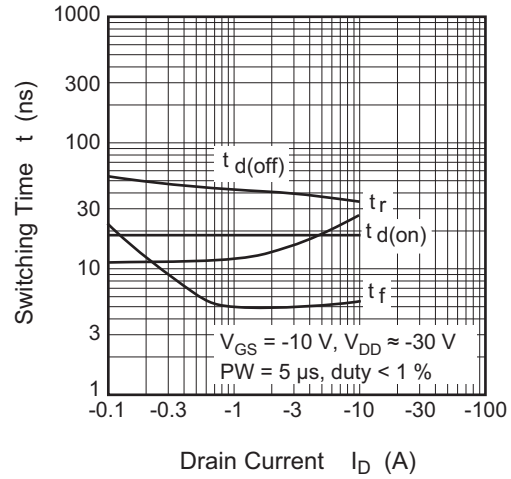
Typical Capacitance vs. Drain to Source Voltage



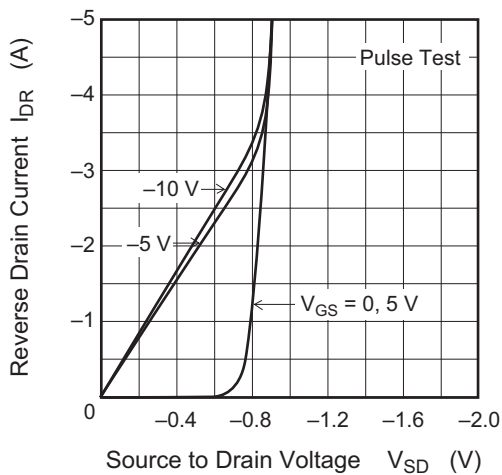
Dynamic Input Characteristics



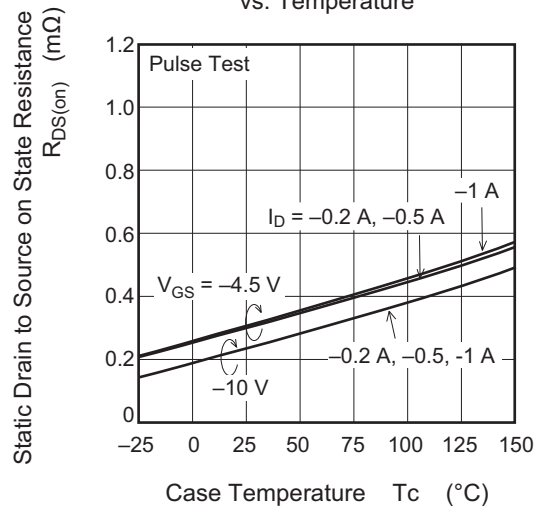
Switching Characteristics



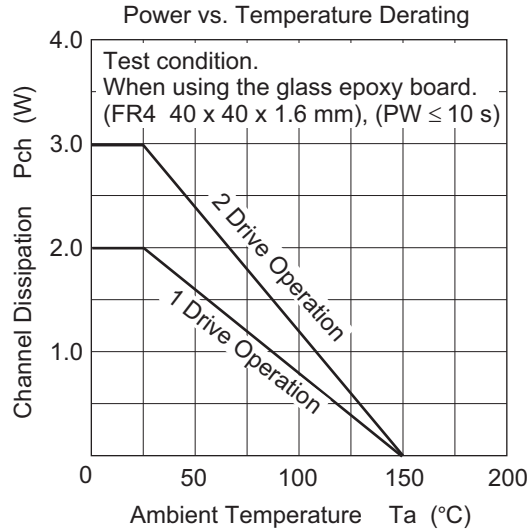
Reverse Drain Current vs. Source to Drain Voltage



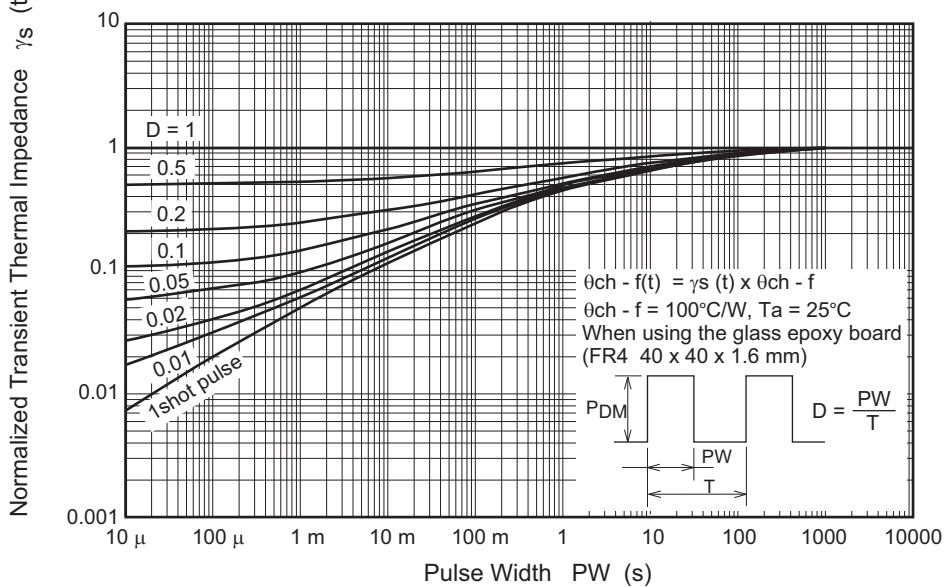
Static Drain to Source on State Resistance vs. Temperature



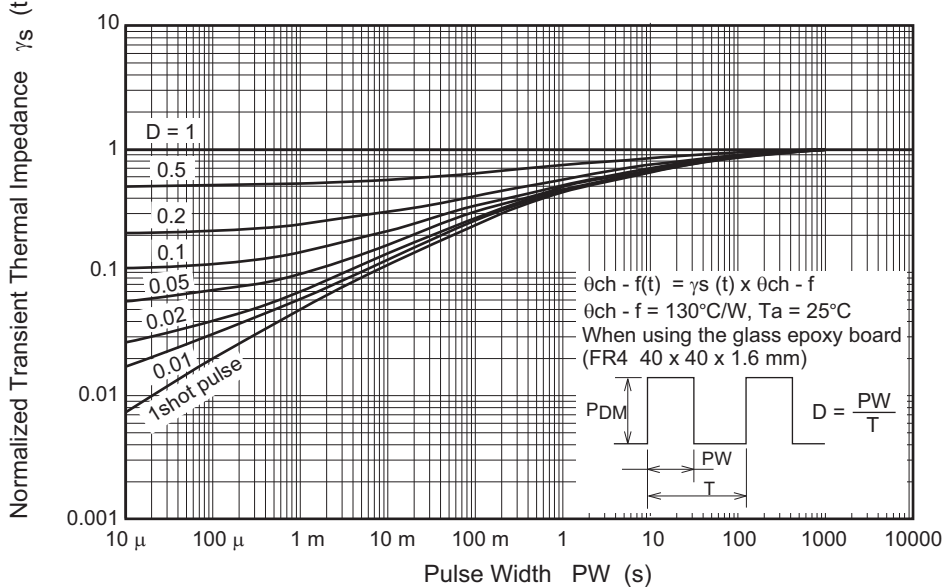
Common



Normalized Transient Thermal Impedance vs. Pulse Width(1 Drive Operation)

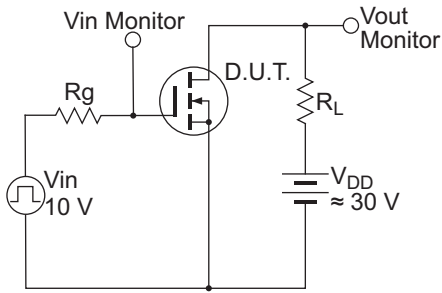


Normalized Transient Thermal Impedance vs. Pulse Width(2 Drive Operation)

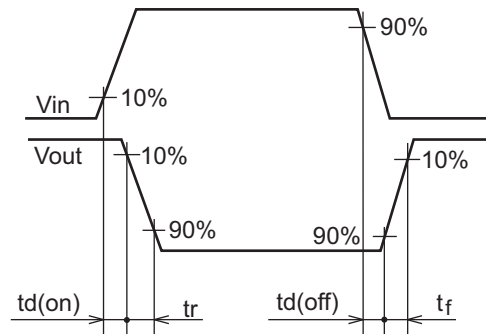


N Channel

Switching Time Test Circuit

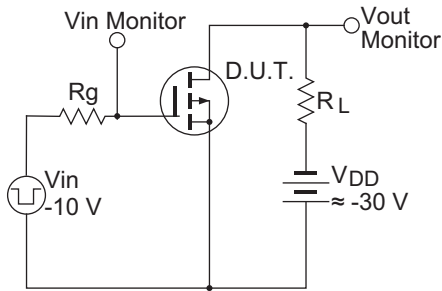


Switching Time Waveform

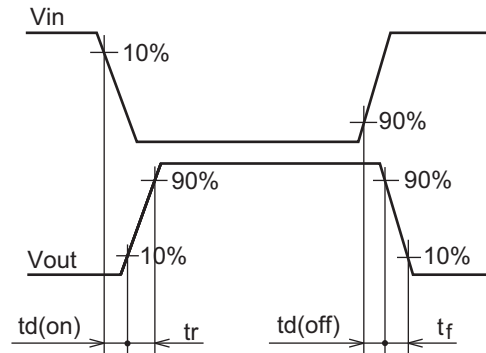


P Channel

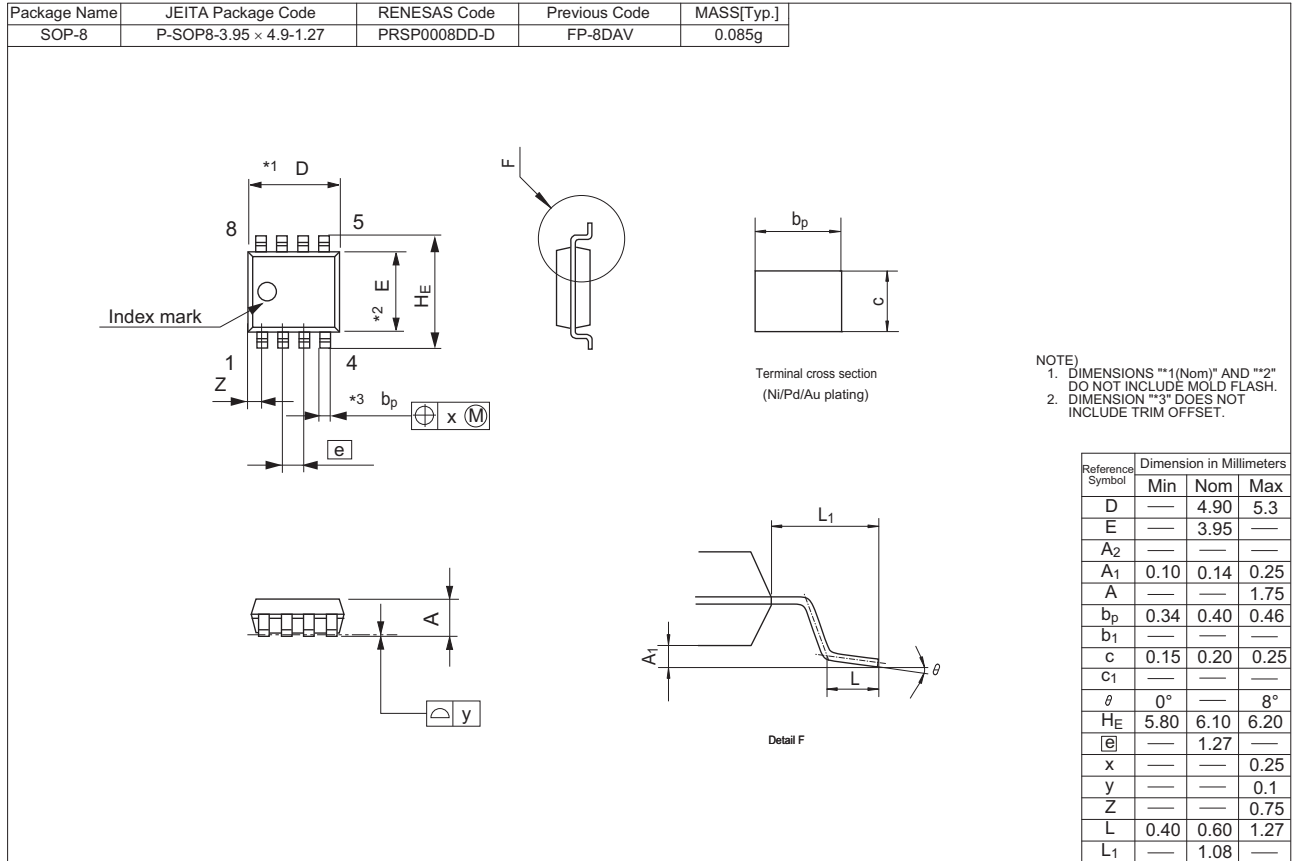
Switching Time Test Circuit



Switching Time Waveform



Package Dimensions



Ordering Information

Orderable Part Number	Quantity	Shipping Container
HAT3019R-EL-E	2500 pcs	Taping

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