

# HAT3029R

## Silicon N/P Channel Power MOS FET Power Switching

REJ03G1597-0600

Rev.6.00

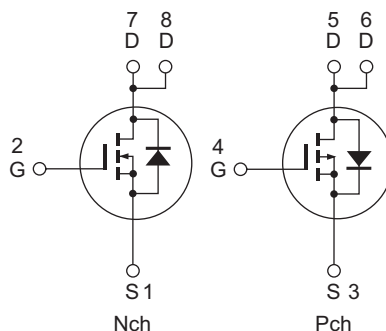
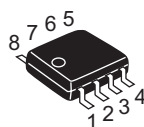
Oct 16, 2007

### Features

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

### Outline

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



1, 3 Source  
2, 4 Gate  
5, 6, 7, 8 Drain

### Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings		Unit
		Nch	Pch	
Drain to source voltage	$V_{DSS}$	30	-30	V
Gate to source voltage	$V_{GSS}$	±20	-20/+10	V
Drain current	$I_D$	6	-6	A
Drain peak current	$I_{D(pulse)}$ <sup>Note1</sup>	48	-48	A
Body-drain diode reverse drain current	$I_{DR}$	6	-6	A
Channel dissipation	$P_{ch}$ <sup>Note2</sup>	1.3		W
Channel dissipation	$P_{ch}$ <sup>Note3</sup>	2.0		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 x 40 x 1.6 mm),  $PW \leq 10s$

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

## Electrical Characteristics

(Ta = 25°C)

## • N Channel

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 leak current	$I_{GSS}$	—	—	$\pm 0.1$	$\mu\text{A}$	$V_{GS} = \pm 20 \text{ V}$ , $V_{DS} = 0$
Zero gate voltage drain current	$I_{DSS}$	—	—	1	$\mu\text{A}$	$V_{DS} = 30 \text{ V}$ , $V_{GS} = 0$
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	$R_{DS(on)}$	—	27	34	$\text{m}\Omega$	$I_D = 3 \text{ A}$ , $V_{GS} = 10 \text{ V}$ <sup>Note4</sup>
	$R_{DS(on)}$	—	40	58	$\text{m}\Omega$	$I_D = 3 \text{ A}$ , $V_{GS} = 4.5 \text{ V}$ <sup>Note4</sup>
Forward transfer admittance	$ y_{fs} $	6	10	—	S	$I_D = 3 \text{ A}$ , $V_{DS} = 10 \text{ V}$ <sup>Note4</sup>
Input capacitance	$C_{iss}$	—	410	—	pF	$V_{DS} = 10 \text{ V}$
Output capacitance	$C_{oss}$	—	110	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	$C_{rss}$	—	41	—	pF	$f = 1 \text{ MHz}$
Total gate charge	$Q_g$	—	3.1	—	nC	$V_{DD} = 10 \text{ V}$
Gate to source charge	$Q_{gs}$	—	1.1	—	nC	$V_{GS} = 4.5 \text{ V}$
Gate to drain charge	$Q_{gd}$	—	1.1	—	nC	$I_D = 6 \text{ A}$
Turn-on delay time	$t_{d(on)}$	—	5.4	—	ns	$V_{GS} = 10 \text{ V}$ , $I_D = 3 \text{ A}$
Rise time	$t_r$	—	10	—	ns	$V_{DD} \cong 10 \text{ V}$
Turn-off delay time	$t_{d(off)}$	—	36	—	ns	$R_L = 3.33 \Omega$
Fall time	$t_f$	—	3.0	—	ns	$R_g = 4.7 \Omega$
Body-drain diode forward voltage	$V_{DF}$	—	0.84	1.10	V	$I_F = 6 \text{ A}$ , $V_{GS} = 0$ <sup>Note4</sup>
Body-drain diode reverse recovery time	$t_{rr}$	—	20	—	ns	$I_F = 6 \text{ A}$ , $V_{GS} = 0$ $di_F/dt = 100 \text{ A}/\mu\text{s}$

Notes: 4. Pulse test

## • P Channel

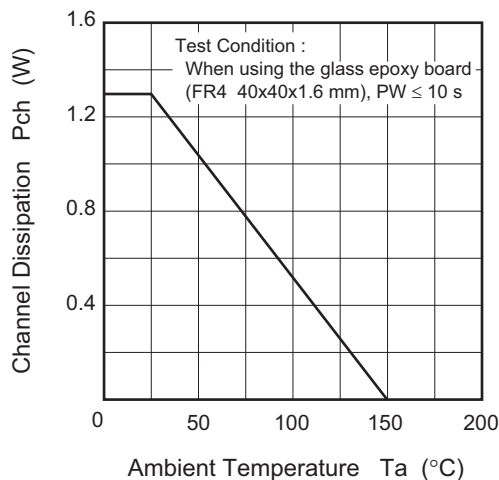
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	-30	—	—	V	$I_D = -10 \text{ mA}$ , $V_{GS} = 0$
Gate to source leak current	$I_{GSS}$	—	—	$\pm 0.1$	$\mu\text{A}$	$V_{GS} = -20, +10 \text{ V}$ , $V_{DS} = 0$
Zero gate voltage drain current	$I_{DSS}$	—	—	-1	$\mu\text{A}$	$V_{DS} = -30 \text{ V}$ , $V_{GS} = 0$
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	$R_{DS(on)}$	—	25	32	$\text{m}\Omega$	$I_D = -3 \text{ A}$ , $V_{GS} = -10 \text{ V}$ <sup>Note4</sup>
	$R_{DS(on)}$	—	36	53	$\text{m}\Omega$	$I_D = -3 \text{ A}$ , $V_{GS} = -4.5 \text{ V}$ <sup>Note4</sup>
Forward transfer admittance	$ y_{fs} $	6	10	—	S	$I_D = -3 \text{ A}$ , $V_{DS} = -10 \text{ V}$ <sup>Note4</sup>
Input capacitance	$C_{iss}$	—	1330	—	pF	$V_{DS} = -10 \text{ V}$
Output capacitance	$C_{oss}$	—	215	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	$C_{rss}$	—	155	—	pF	$f = 1 \text{ MHz}$
Total gate charge	$Q_g$	—	11.5	—	nC	$V_{DD} = -10 \text{ V}$
Gate to source charge	$Q_{gs}$	—	3.2	—	nC	$V_{GS} = -4.5 \text{ V}$
Gate to drain charge	$Q_{gd}$	—	4.4	—	nC	$I_D = -6 \text{ A}$
Turn-on delay time	$t_{d(on)}$	—	18	—	ns	$V_{GS} = -10 \text{ V}$ , $I_D = -3 \text{ A}$
Rise time	$t_r$	—	19	—	ns	$V_{DD} \cong -10 \text{ V}$
Turn-off delay time	$t_{d(off)}$	—	47	—	ns	$R_L = 3.33 \Omega$
Fall time	$t_f$	—	8	—	ns	$R_g = 4.7 \Omega$
Body-drain diode forward voltage	$V_{DF}$	—	-0.84	-1.10	V	$I_F = -6 \text{ A}$ , $V_{GS} = 0$ <sup>Note4</sup>
Body-drain diode reverse recovery time	$t_{rr}$	—	20	—	ns	$I_F = -6 \text{ A}$ , $V_{GS} = 0$ $di_F/dt = 100 \text{ A}/\mu\text{s}$

Notes: 4. Pulse test

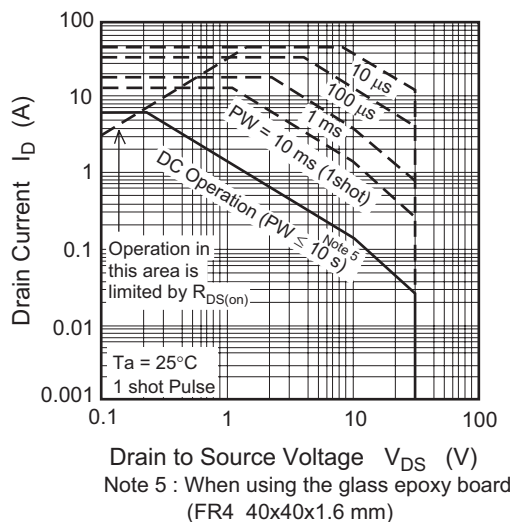
## Main Characteristics

## • N Channel

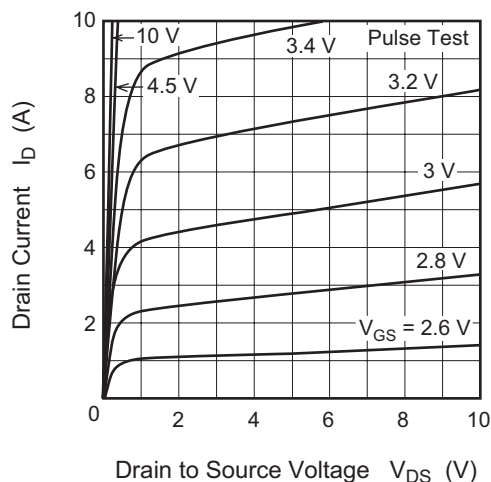
Power vs. Temperature Derating



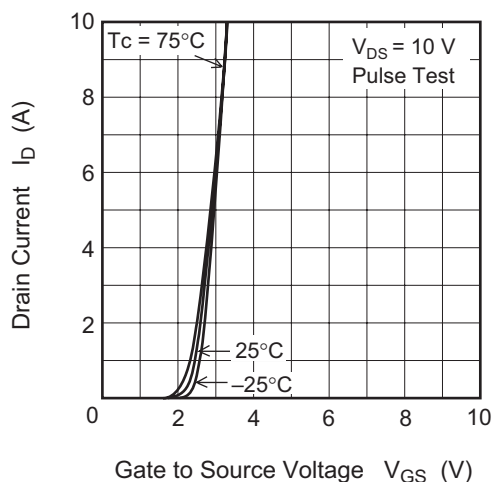
Maximum Safe Operation Area



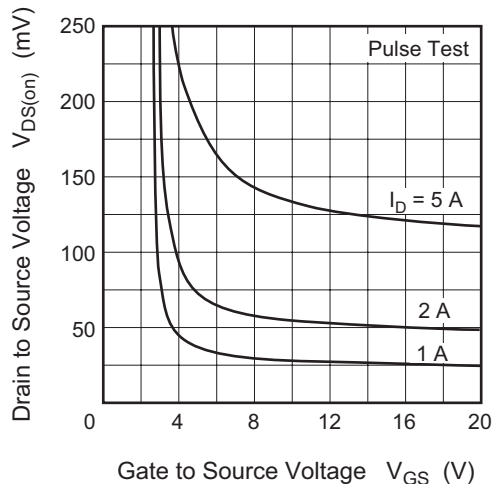
Typical Output Characteristics



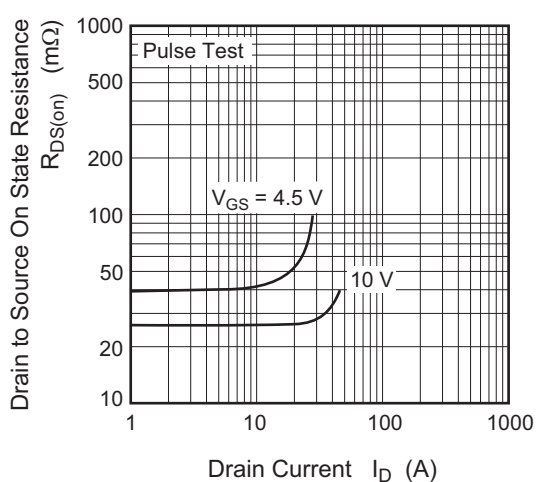
Typical Transfer Characteristics

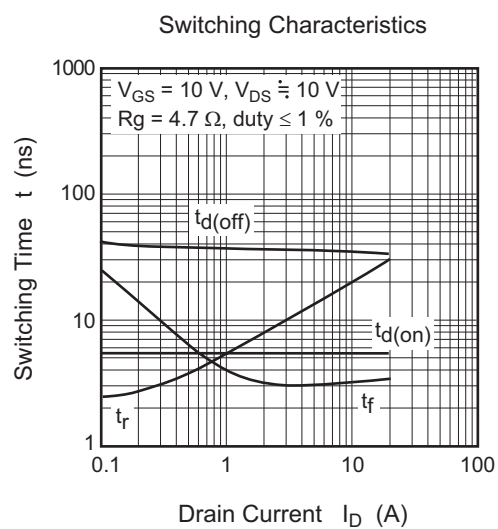
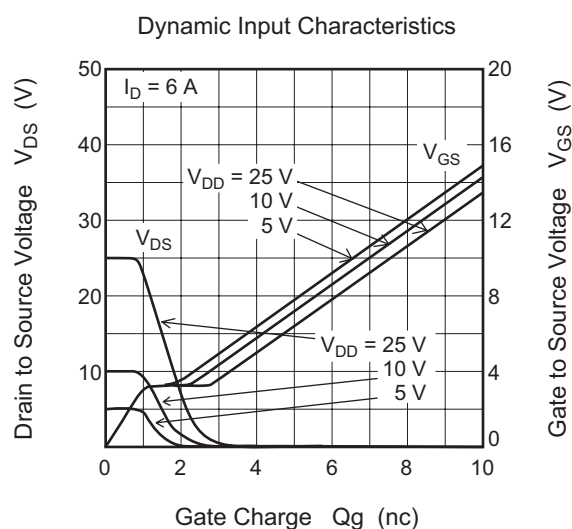
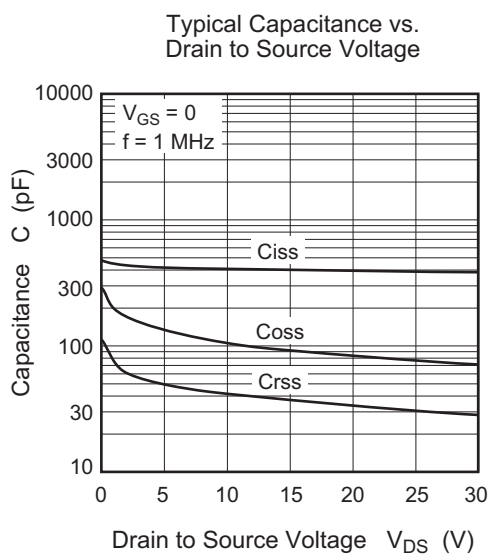
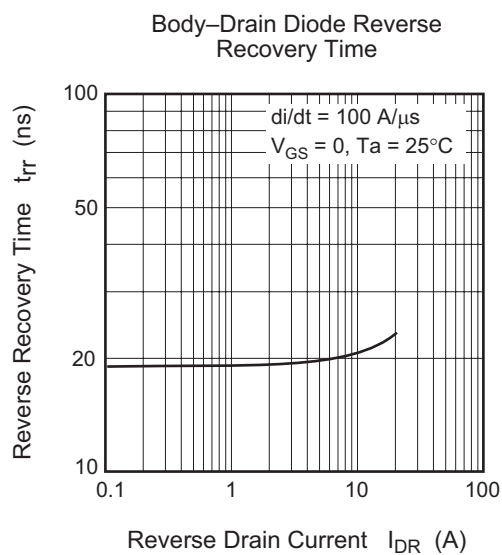
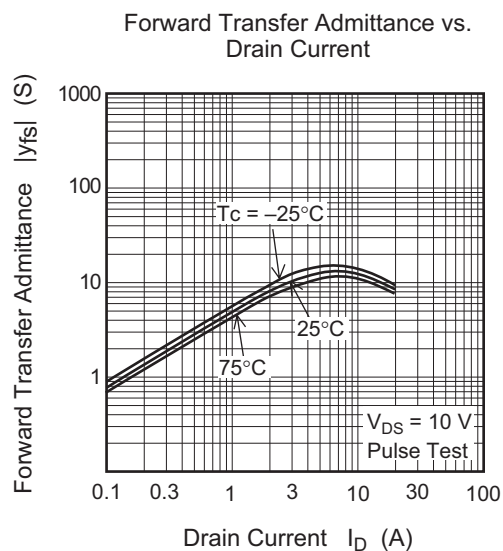
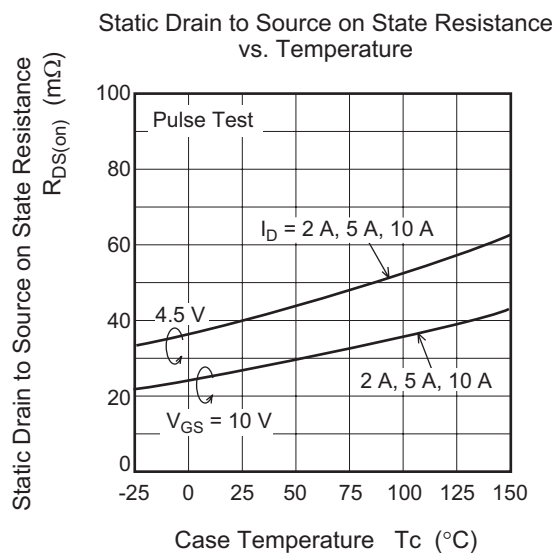


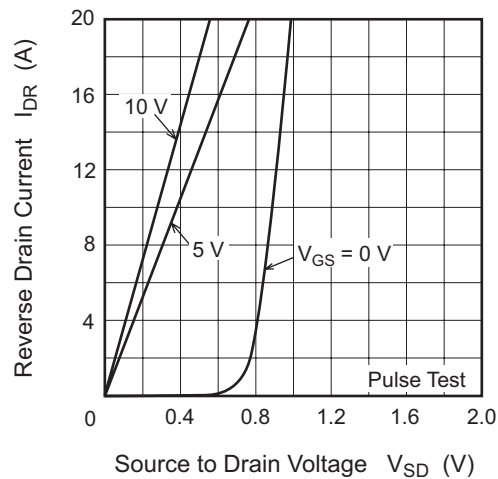
Drain to Source Saturation Voltage vs. Gate to Source Voltage



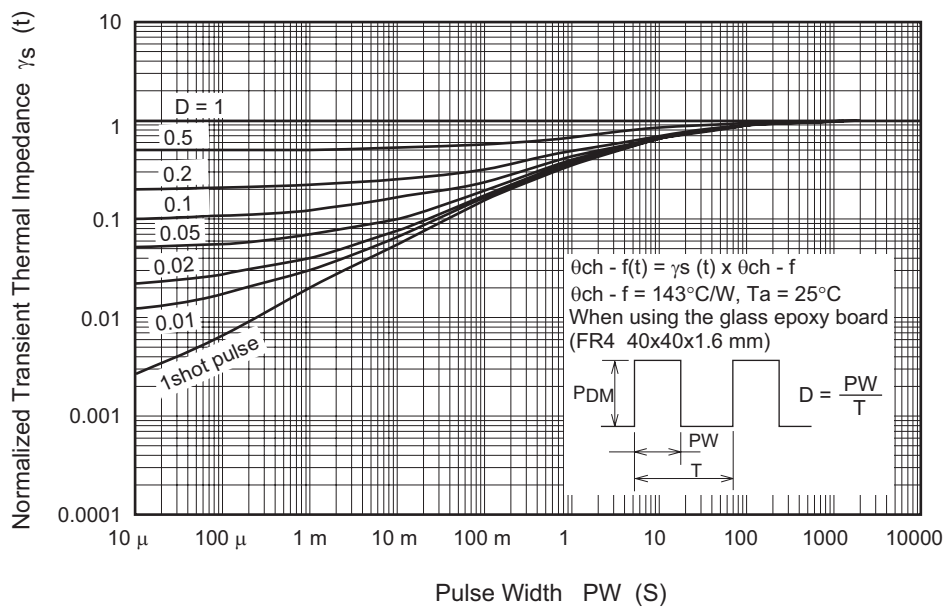
Static Drain to Source on State Resistance vs. Drain Current



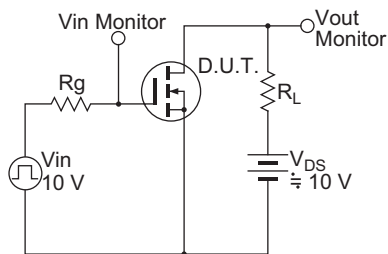


Reverse Drain Current vs.  
Source to Drain Voltage

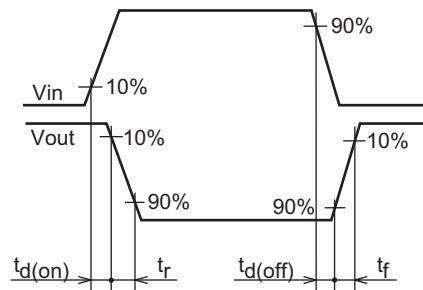
Normalized Transient Thermal Impedance vs. Pulse Width



Switching Time Test Circuit

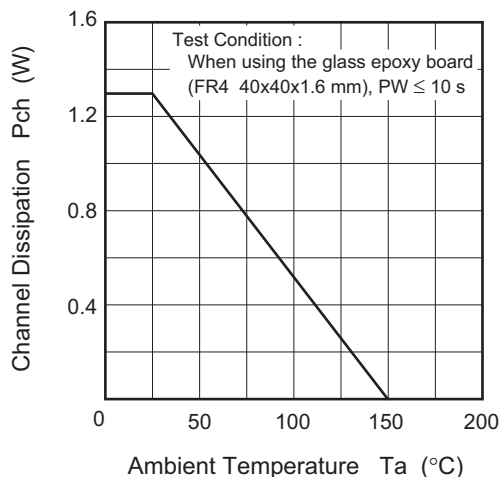


Switching Time Waveform

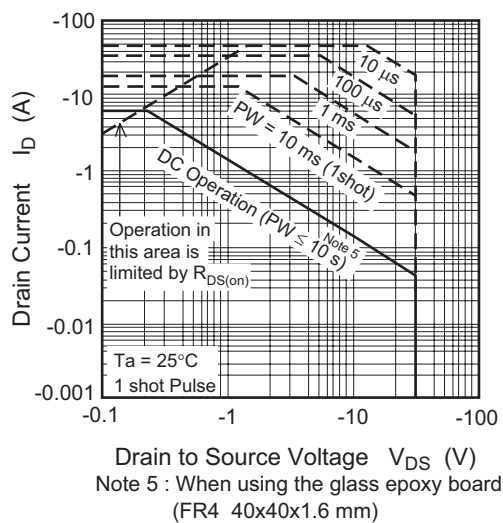


## • P Channel

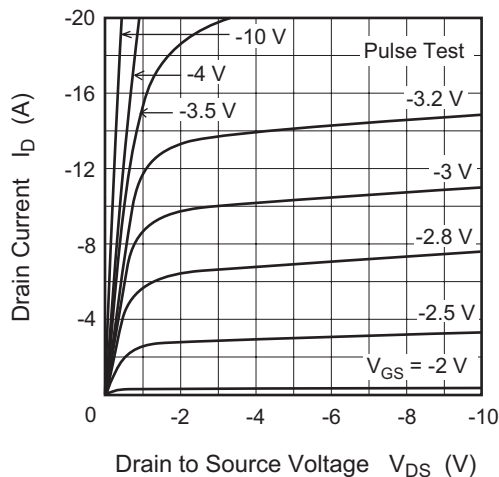
Power vs. Temperature Derating



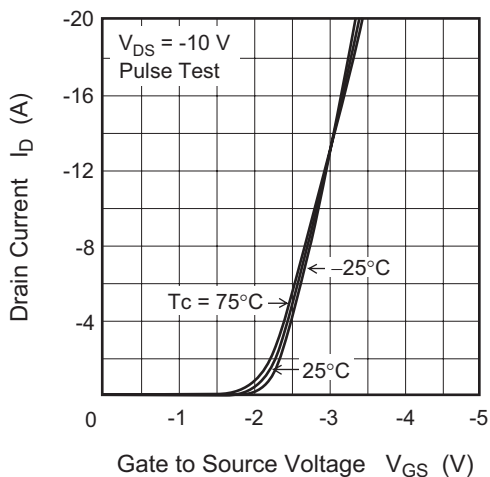
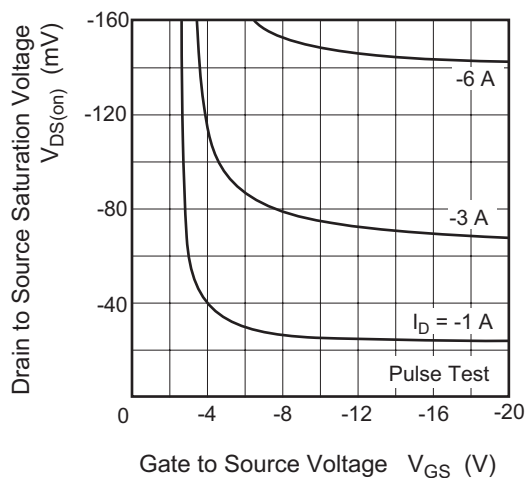
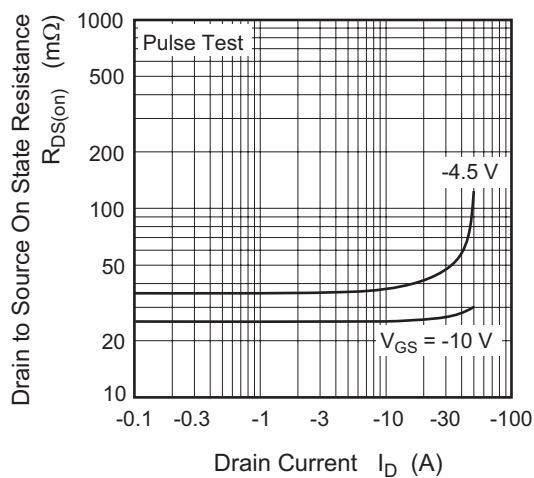
Maximum Safe Operation Area

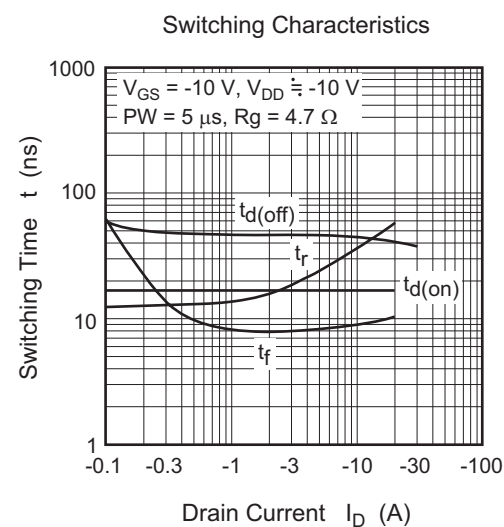
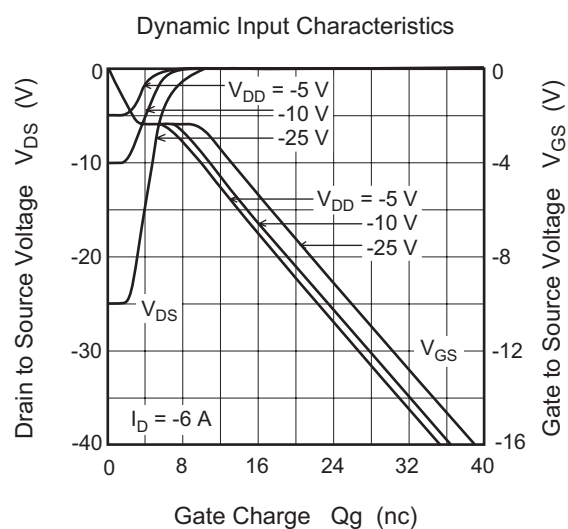
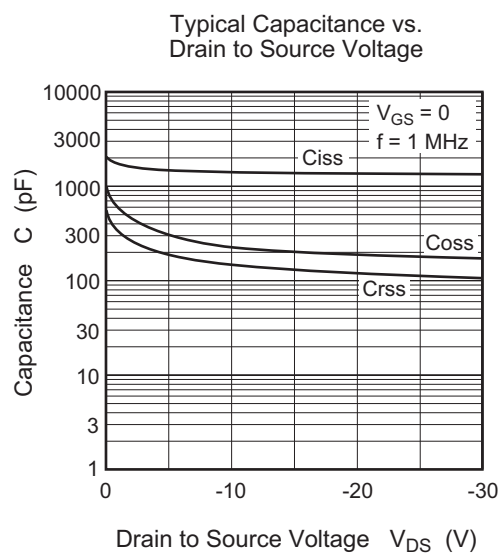
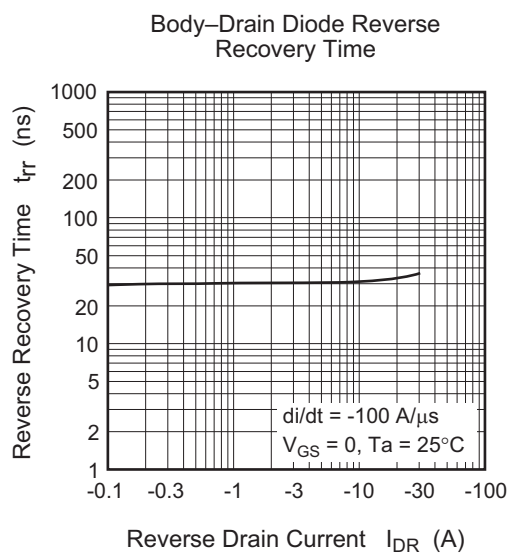
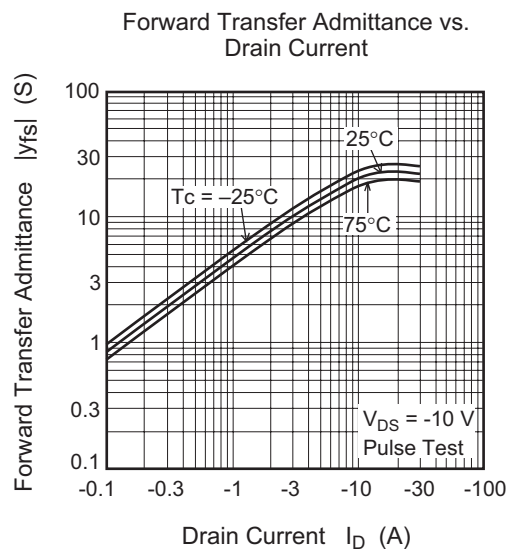
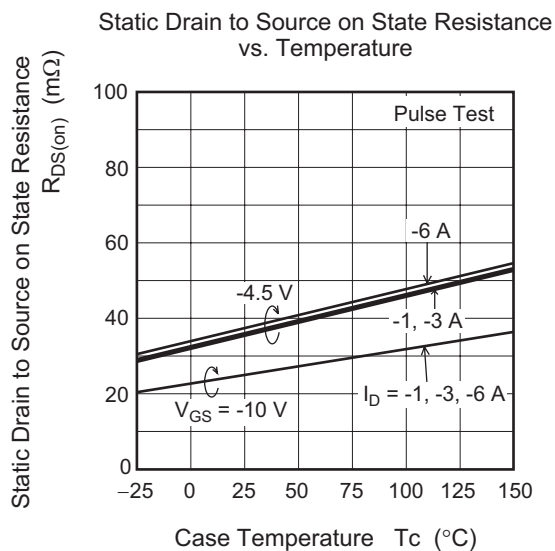


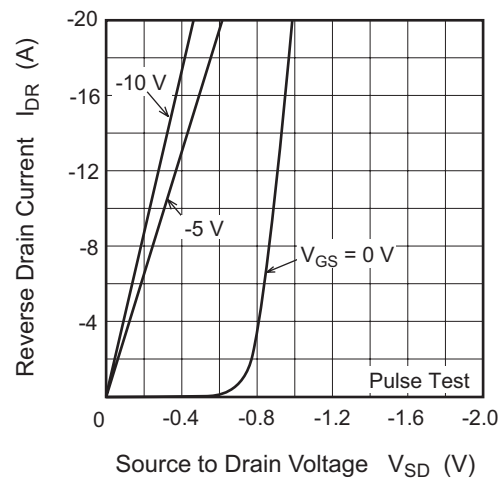
Typical Output Characteristics



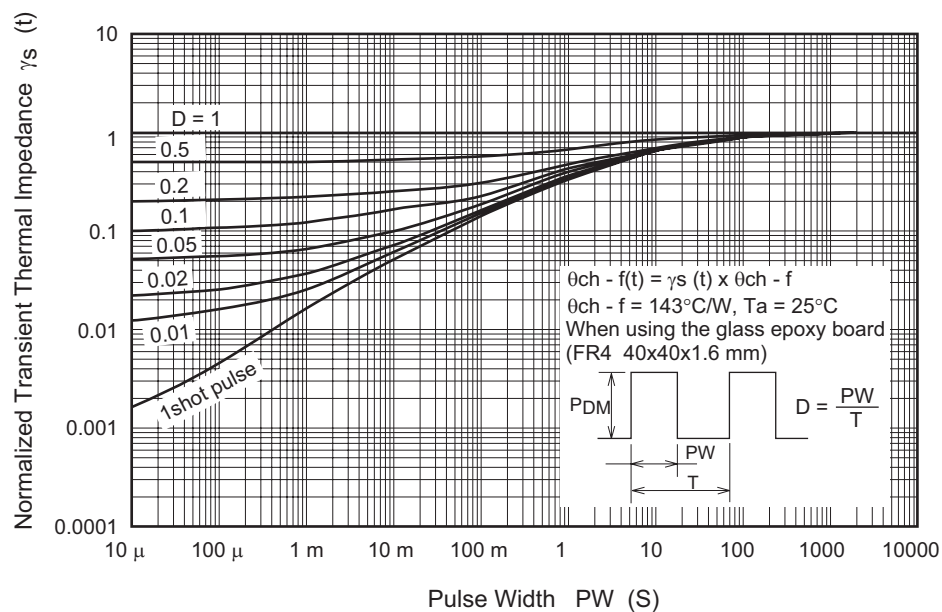
Typical Transfer Characteristics

Drain to Source Saturation Voltage vs.  
Gate to Source VoltageStatic Drain to Source on State Resistance  
vs. Drain Current

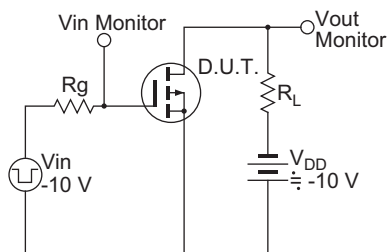


Reverse Drain Current vs.  
Source to Drain Voltage

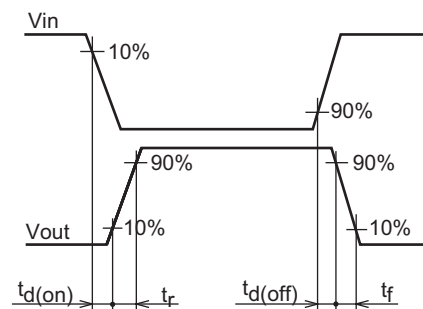
Normalized Transient Thermal Impedance vs. Pulse Width



Switching Time Test Circuit

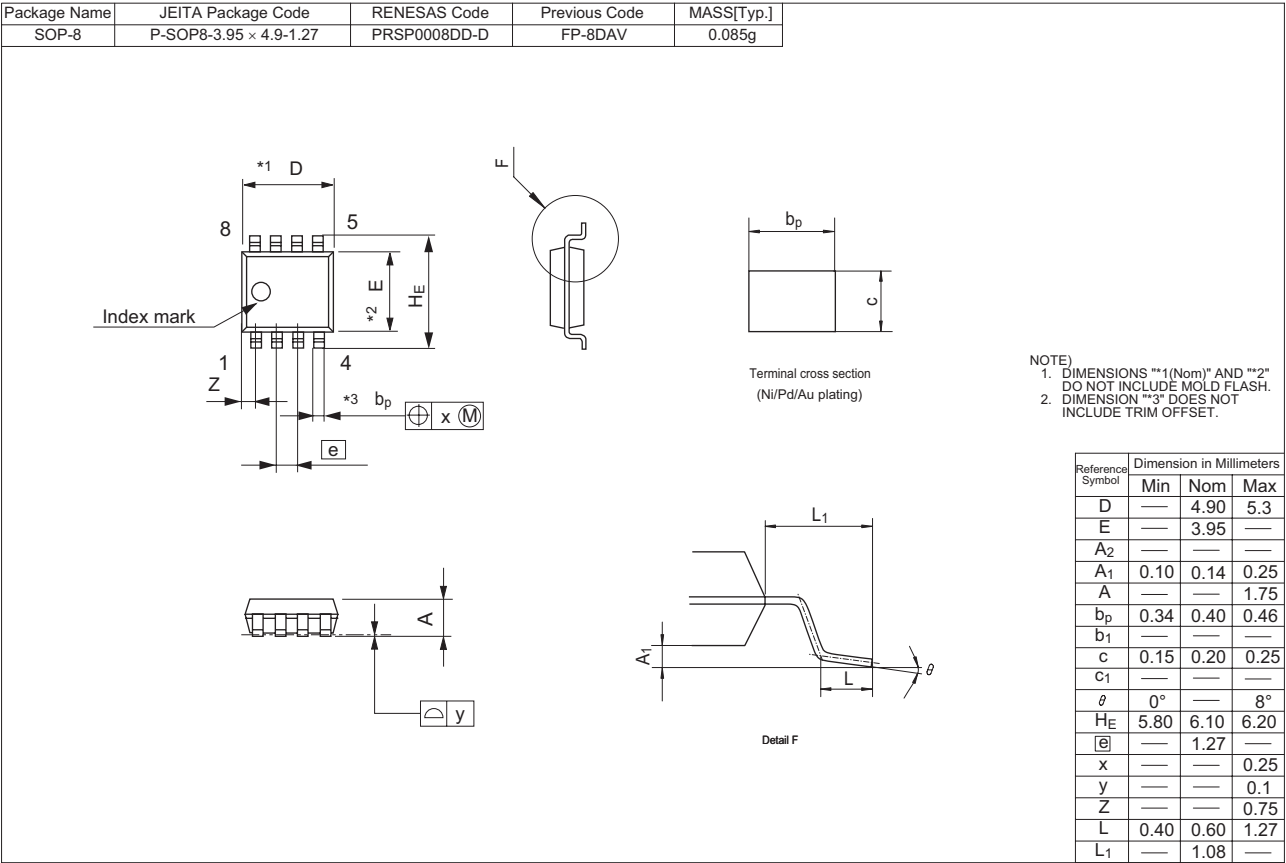


Switching Time Waveform





Package Dimensions



Ordering Information

Part Name	Quantity	Shipping Container
HAT3029R-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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