HAT3021R

Silicon N/P Channel Power MOS FET
Power Switching

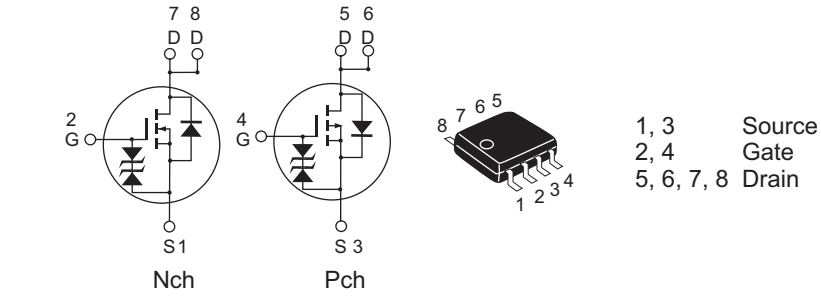
REJ03G0415-0200
Rev.2.00
Oct.06.2004

Features

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

Outline

SOP-8



Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings		Unit
		Nch	Pch	
Drain to source voltage	V_{DSS}	80	–80	V
Gate to source voltage	V_{GSS}	±20	±20	V
Drain current	I_D	3.4	–2.6	A
Drain peak current	$I_{D(pulse)}$ Note1	20.4	–15.6	A
Body-drain diode reverse drain current	I_{DR}	3.4	–2.6	A
Channel dissipation	Pch Note2	1.5	1.5	W
Channel temperature	Tch	150		°C
Storage temperature	Tstg	–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

Electrical Characteristics

(Ta = 25°C)

• N Channel

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	80	—	—	V	I_D = 10 mA, V_{GS} = 0
Gate to source breakdown voltage	$V_{(BR)GSS}$	±20	—	—	V	I_G = ±100 µA, V_{DS} = 0
Gate to source leak current	I_{GSS}	—	—	± 10	µA	V_{GS} = ±16 V, V_{DS} = 0
Zero gate voltage drain current	I_{DSS}	—	—	1	µA	V_{DS} = 80 V, V_{GS} = 0
Gate to source cutoff voltage	$V_{GS(off)}$	1.0	—	2.5	V	V_{DS} = 10 V, I_D = 1 mA
Static drain to source on state resistance	$R_{DS(on)}$	—	90	115	mΩ	I_D = 1.7 A, V_{GS} = 10 V Note4
	$R_{DS(on)}$	—	100	145	mΩ	I_D = 1.7 A, V_{GS} = 4.5 V Note4
Forward transfer admittance	$\|y_{fs}\|$	4.2	7.0	—	S	I_D = 1.7 A, V_{DS} = 10 V Note4
Input capacitance	Ciss	—	400	—	pF	V_{DS} = 10 V V_{GS} = 0 f = 1 MHz
Output capacitance	Coss	—	57	—	pF	
Reverse transfer capacitance	Crss	—	24	—	pF	
Total gate charge	Qg	—	7.3	—	nC	V_{DD} = 25 V V_{GS} = 10 V I_D = 3.4 A
Gate to source charge	Qgs	—	1.1	—	nC	
Gate to drain charge	Qgd	—	1.3	—	nC	
Turn-on delay time	$t_{d(on)}$	—	6.0	—	ns	V_{GS} = 10 V, I_D = 1.7 A V_{DD} ≅ 30 V R_L = 17.6 Ω Rg = 4.7 Ω
Rise time	t_r	—	4.0	—	ns	
Turn-off delay time	$t_{d(off)}$	—	39	—	ns	
Fall time	t_f	—	3.5	—	ns	
Body–drain diode forward voltage	V_{DF}	—	0.83	1.08	V	IF = 3.4 A, V_{GS} = 0 Note4
Body–drain diode reverse recovery time	t_{rr}	—	30	—	ns	IF = 3.4 A, V_{GS} = 0 diF/ dt = 100 A/ µs

Notes: 4. Pulse test

• P Channel

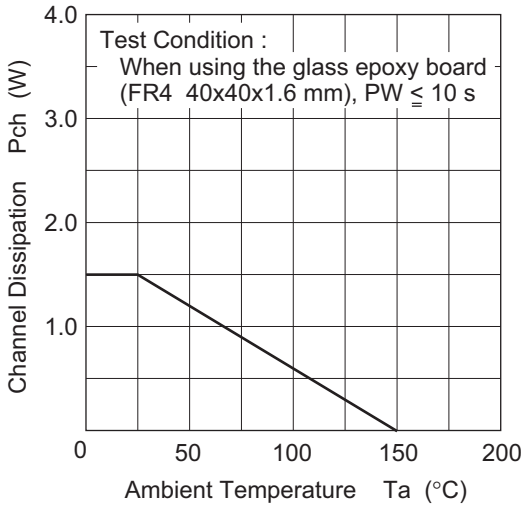
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	–80	—	—	V	I_D = –10 mA, V_{GS} = 0
Gate to source breakdown voltage	$V_{(BR)GSS}$	±20	—	—	V	I_G = ±100 µA, V_{DS} = 0
Gate to source leak current	I_{GSS}	—	—	±10	µA	V_{GS} = ±16 V, V_{DS} = 0
Zero gate voltage drain current	I_{DSS}	—	—	–1	µA	V_{DS} = –80 V, V_{GS} = 0
Gate to source cutoff voltage	$V_{GS(off)}$	–1.0	—	–2.5	V	V_{DS} = –10 V, I_D = –1 mA
Static drain to source on state resistance	$R_{DS(on)}$	—	165	210	mΩ	I_D = –1.3 A, V_{GS} = –10 V Note4
	$R_{DS(on)}$	—	200	290	mΩ	I_D = –1.3 A, V_{GS} = – 4.5 V Note4
Forward transfer admittance	$\|y_{fs}\|$	2.0	3.3	—	S	I_D = –1.3 A, V_{DS} = –10 V Note4
Input capacitance	Ciss	—	930	—	pF	V_{DS} = –10 V V_{GS} = 0 f = 1MHz
Output capacitance	Coss	—	90	—	pF	
Reverse transfer capacitance	Crss	—	56	—	pF	
Total gate charge	Qg	—	16	—	nC	V_{DD} = –25 V V_{GS} = –10 V I_D = -2.6 A
Gate to source charge	Qgs	—	2.1	—	nC	
Gate to drain charge	Qgd	—	2.4	—	nC	
Turn-on delay time	$t_{d(on)}$	—	20	—	ns	V_{GS} = –10 V, I_D = –1.3 A V_{DD} ≈ –30 V R_L = 23.0 Ω R_g = 4.7 Ω
Rise time	t_r	—	12	—	ns	
Turn-off delay time	$t_{d(off)}$	—	40	—	ns	
Fall time	t_f	—	5.5	—	ns	
Body–drain diode forward voltage	V_{DF}	—	–0.83	–1.08	V	IF = –2.6 A, V_{GS} = 0 Note4
Body–drain diode reverse recovery time	t_{rr}	—	30	—	ns	IF = –2.6 A, V_{GS} = 0 diF/ dt =100A/µs

Notes: 4. Pulse test

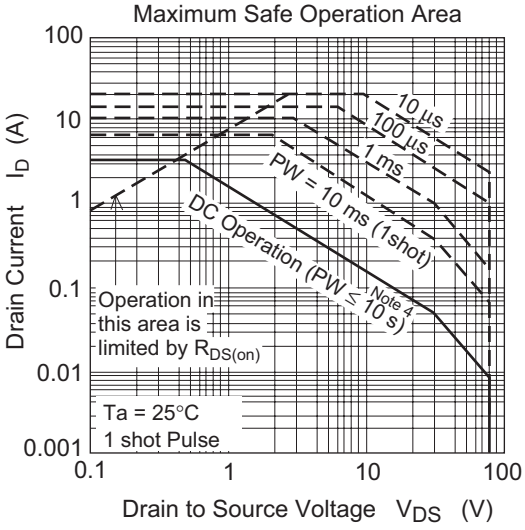
Main Characteristics

• **N Channel**

Power vs. Temperature Derating

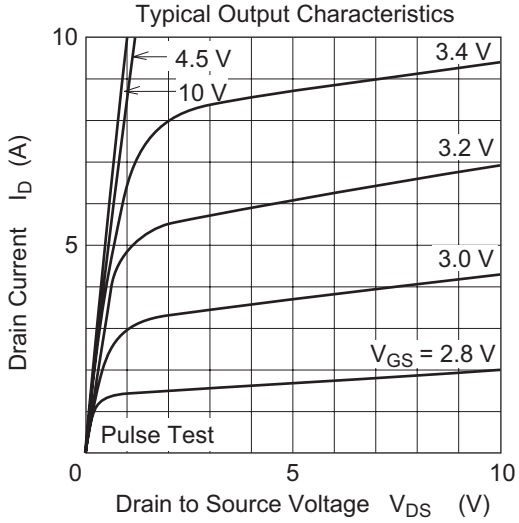


Maximum Safe Operation Area

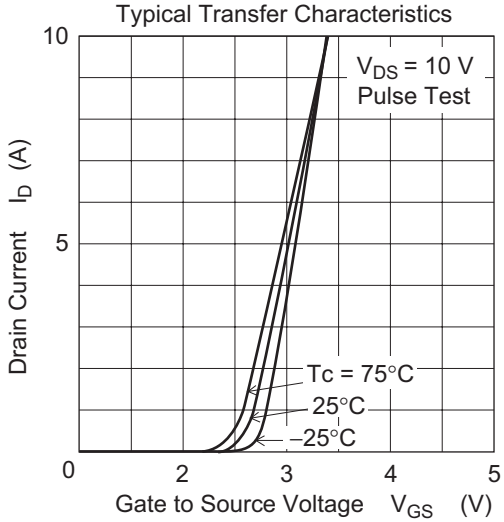


Note 4 :
When using the glass epoxy board
(FR4 40x40x1.6 mm)

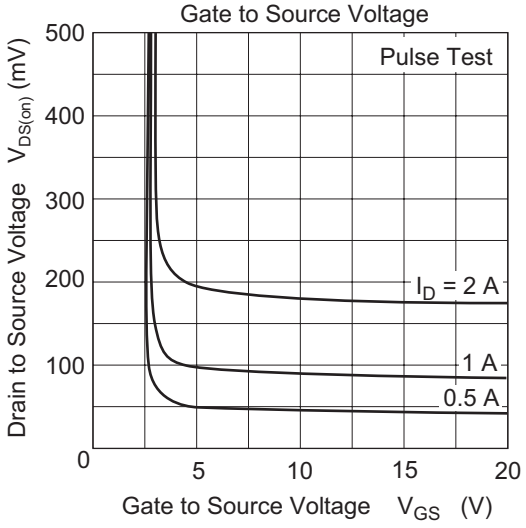
Typical Output Characteristics



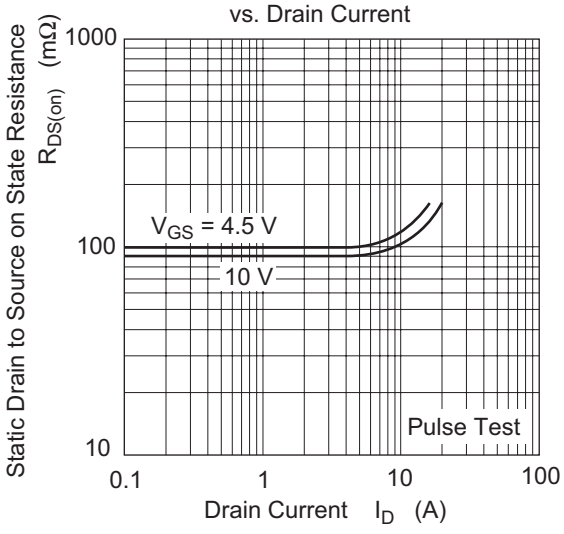
Typical Transfer Characteristics



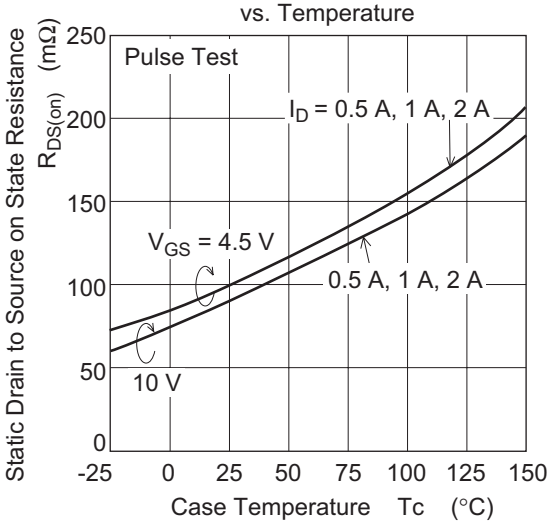
Drain to Source Saturation Voltage vs
Gate to Source Voltage



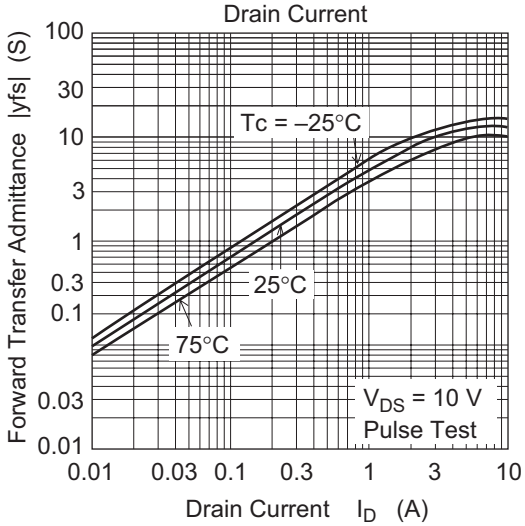
Static Drain to Source on State Resistance
vs. Drain Current



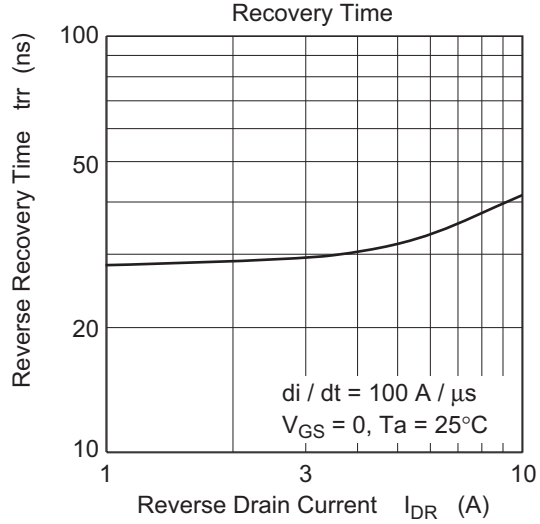
Static Drain to Source on State Resistance vs. Temperature



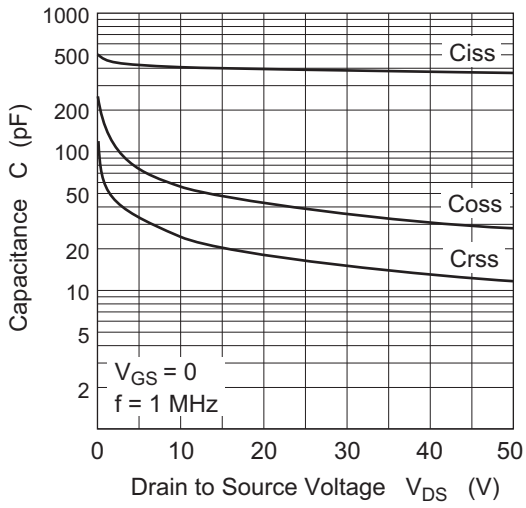
Forward Transfer Admittance vs. Drain Current



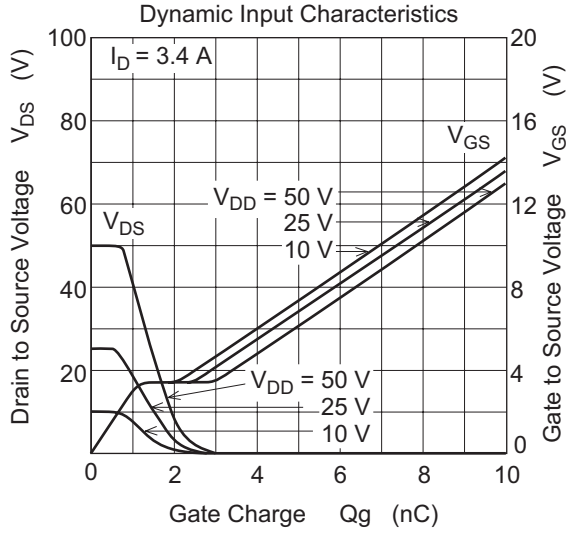
Body-Drain Diode Reverse Recovery Time



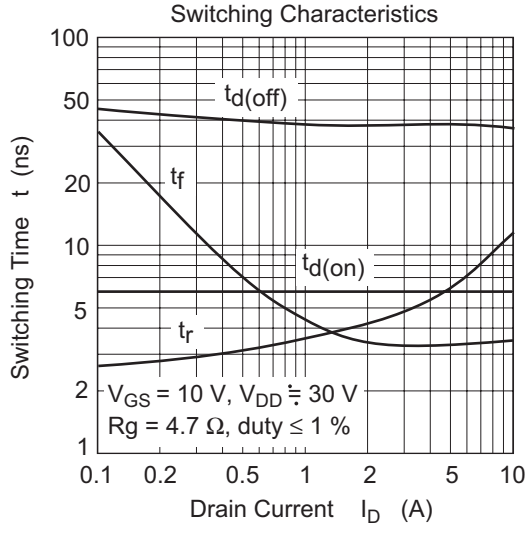
Typical Capacitance vs. Drain to Source Voltage



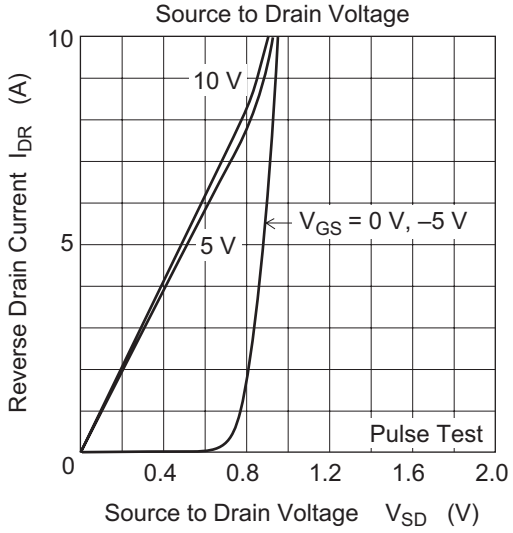
Dynamic Input Characteristics



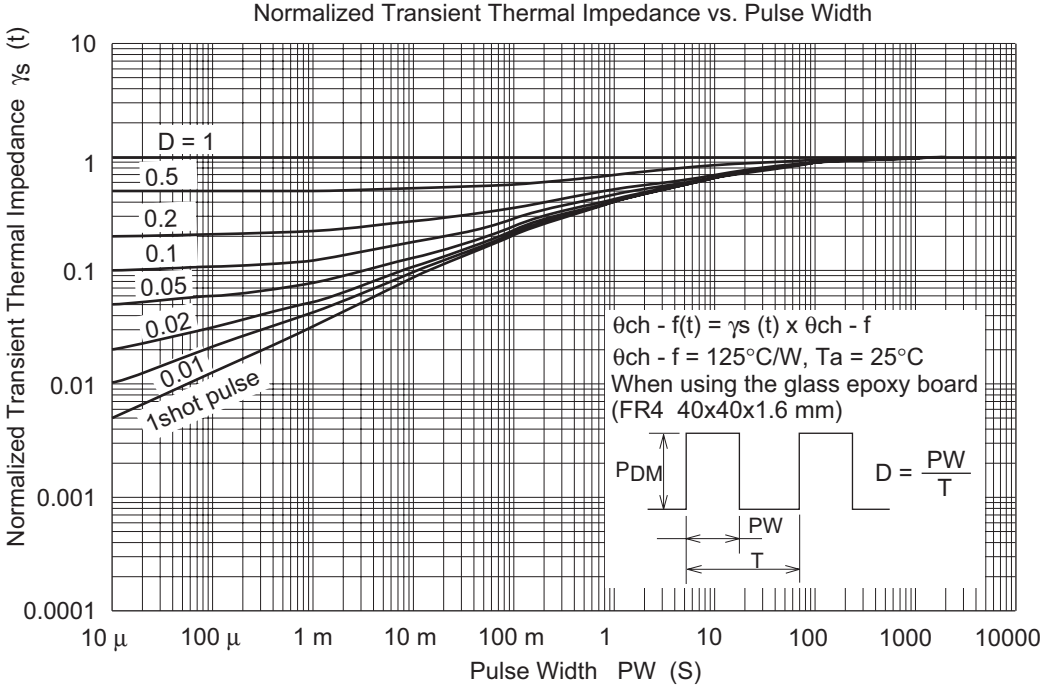
Switching Characteristics



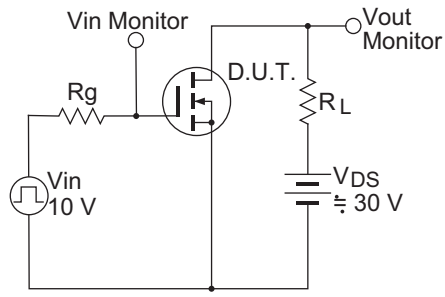
Reverse Drain Current vs.
Source to Drain Voltage



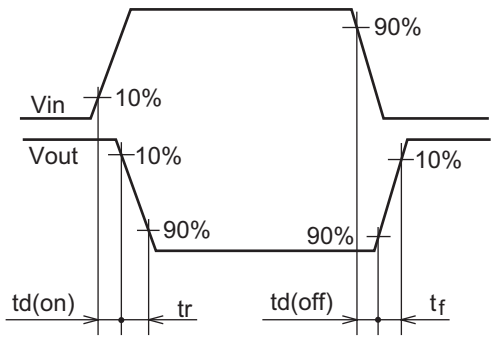
Normalized Transient Thermal Impedance vs. Pulse Width



Switching Time Test Circuit

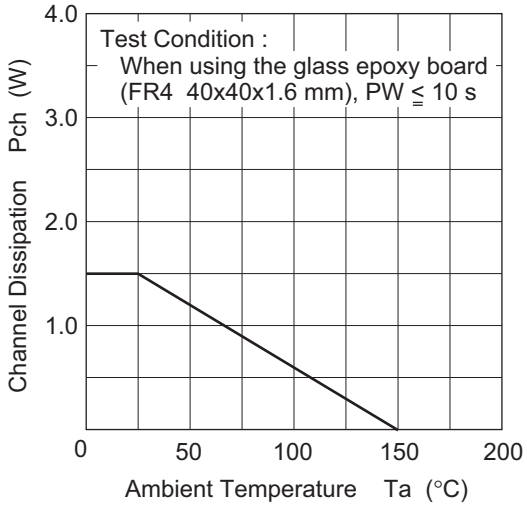


Switching Time Waveform

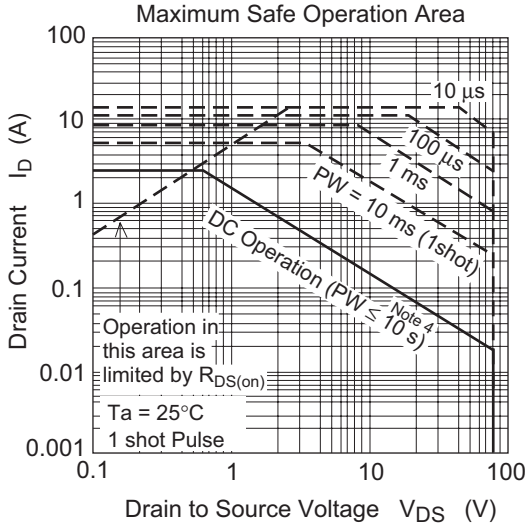


• **P Channel**

Power vs. Temperature Derating

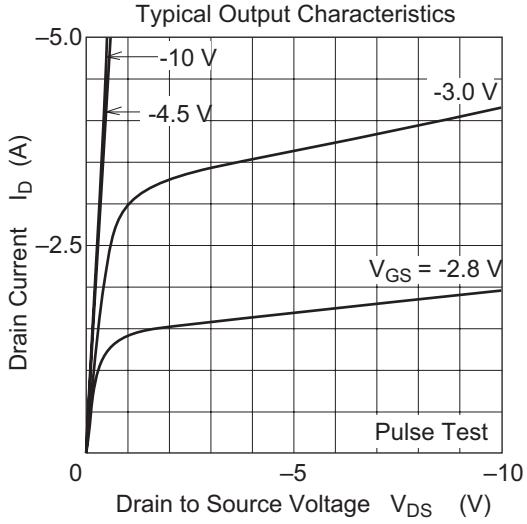


Maximum Safe Operation Area

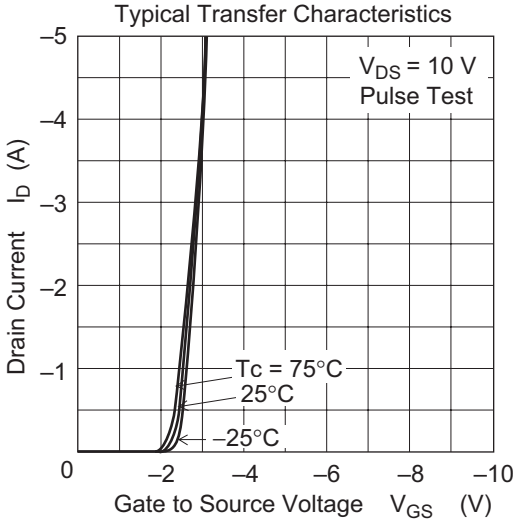


Note 4 :
When using the glass epoxy board
(FR4 40x40x1.6 mm)

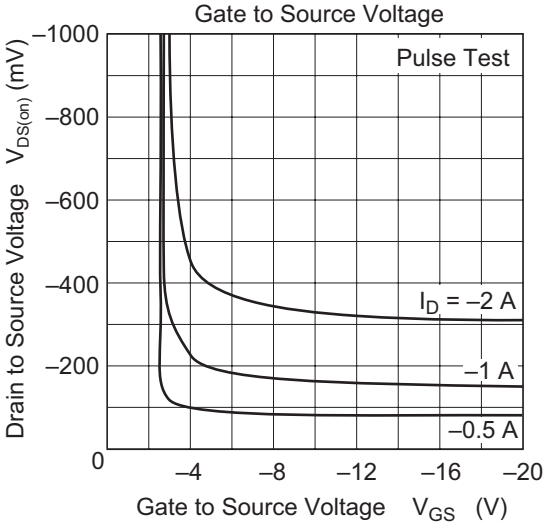
Typical Output Characteristics



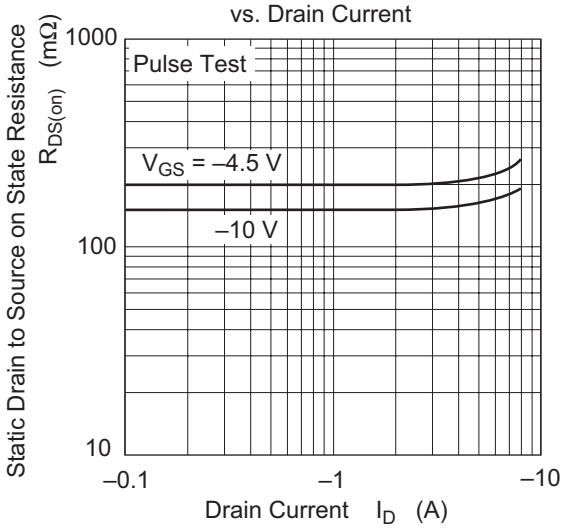
Typical Transfer Characteristics



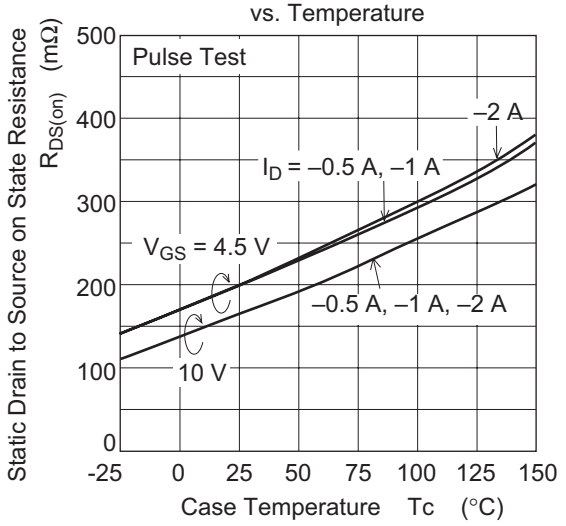
Drain to Source Saturation Voltage vs Gate to Source Voltage



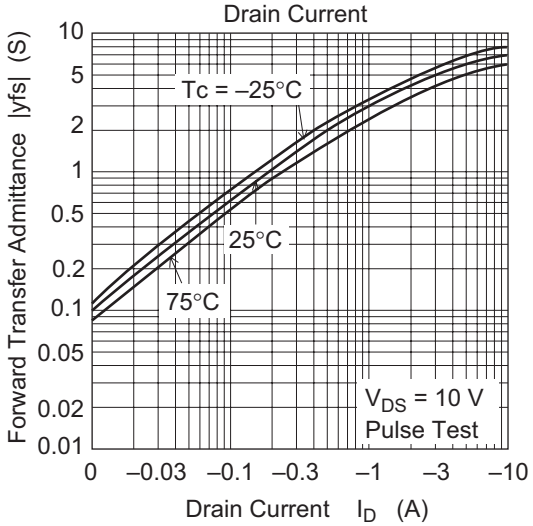
Static Drain to Source on State Resistance vs. Drain Current



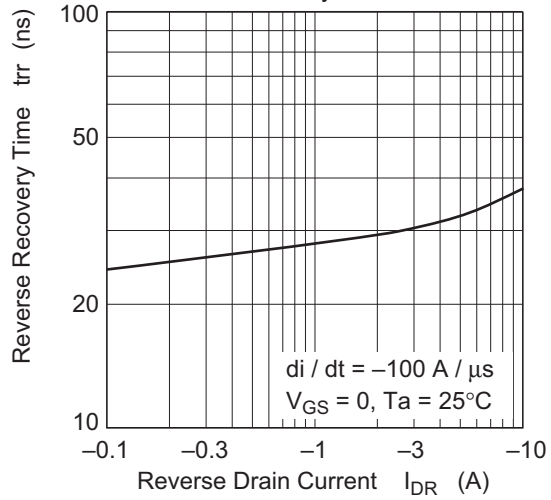
Static Drain to Source on State Resistance vs. Temperature



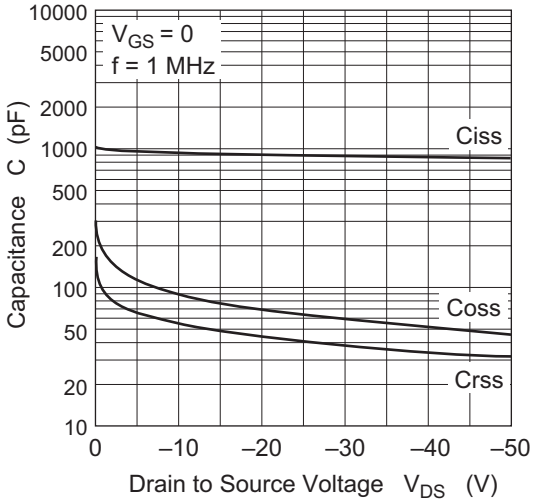
Forward Transfer Admittance vs. Drain Current



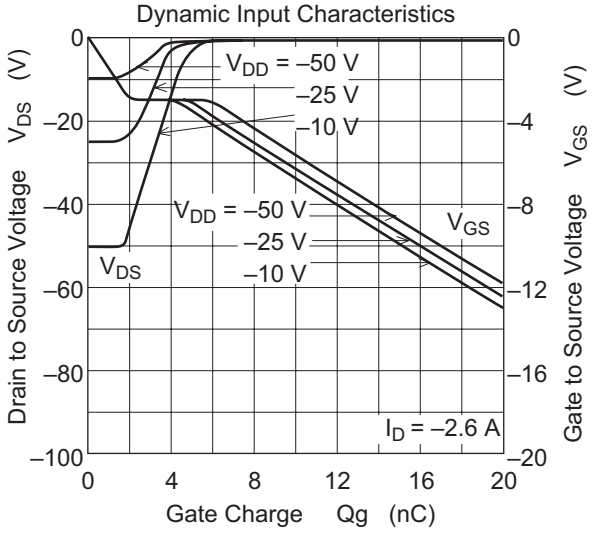
Body-Drain Diode Reverse Recovery Time



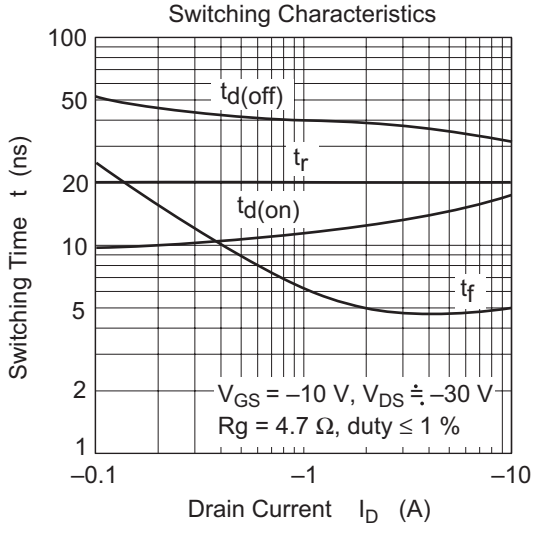
Typical Capacitance vs. Drain to Source Voltage



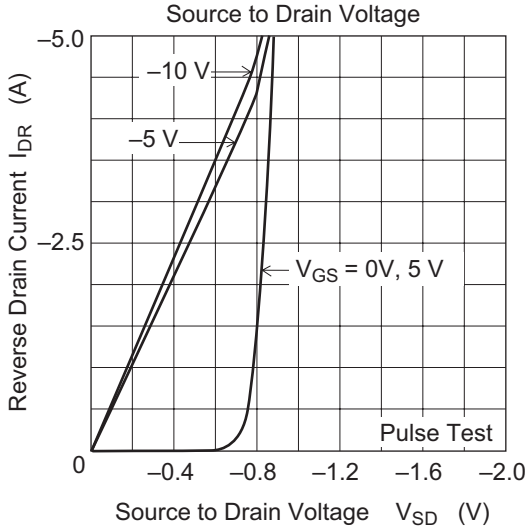
Dynamic Input Characteristics



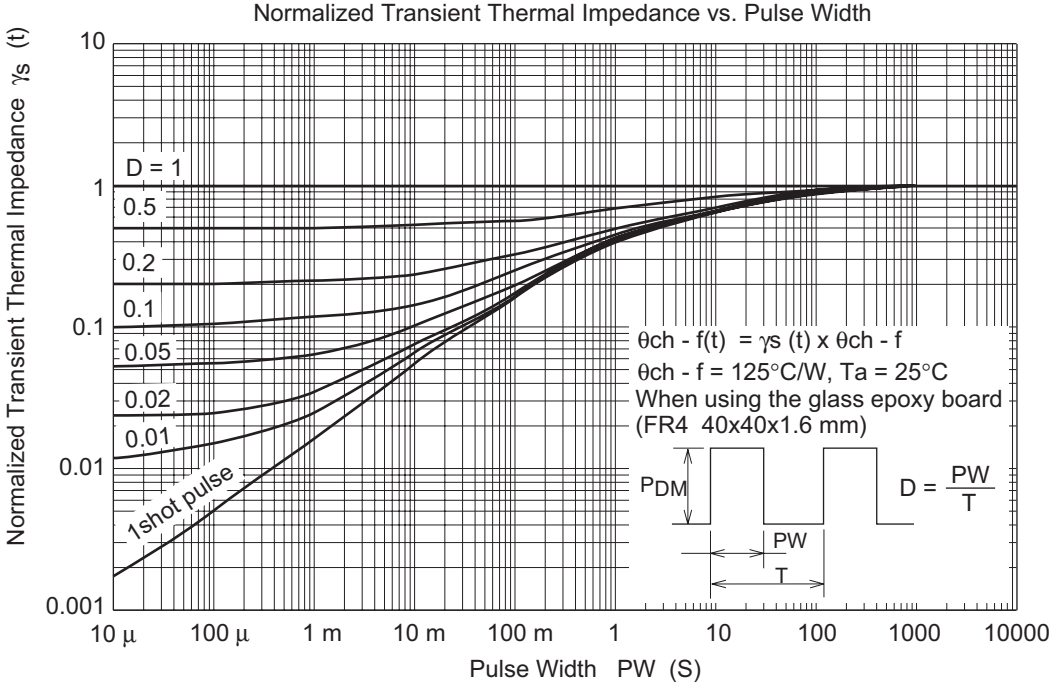
Switching Characteristics



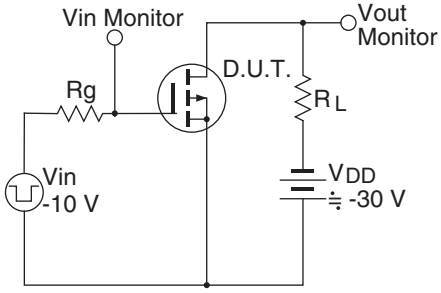
Reverse Drain Current vs.
Source to Drain Voltage



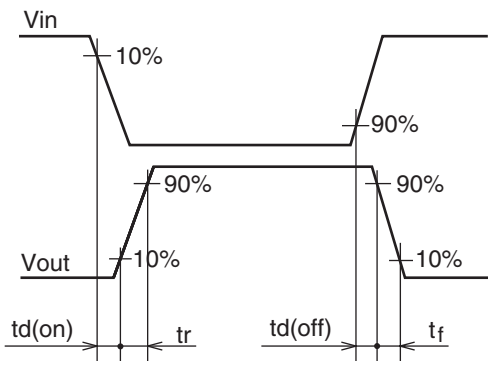
Normalized Transient Thermal Impedance vs. Pulse Width



Switching Time Test Circuit



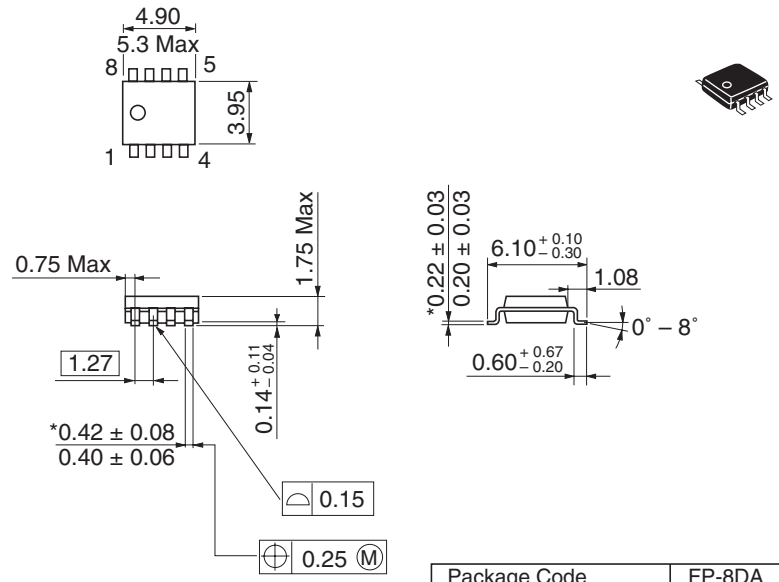
Switching Time Waveform



Package Dimensions

As of January, 2003

Unit: mm



*Dimension including the plating thickness
Base material dimension

Package Code	FP-8DA
JEDEC	Conforms
JEITA	—
Mass (reference value)	0.085 g

Ordering Information

Part Name	Quantity	Shipping Container
HAT3021R-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.

Renesas Technology Corp. Sales Strategic Planning Div. Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan

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Colophon .2.0