HAT1046R

Silicon P Channel Power MOS FET
High Speed Power Switching

HITACHI

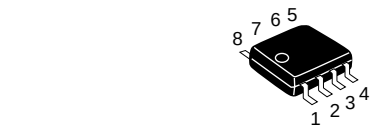
ADE-208-1222 (Z)
1st. Edition
Mar. 2001

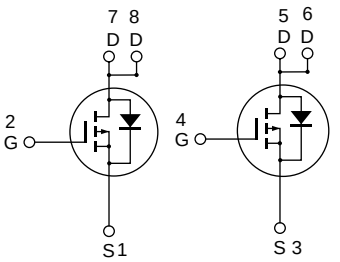
Features

- Low-voltage drive (2.5 V drive)
- Low on resistance
- Capable of 4 V gate drive
- Low on-resistance
  $R_{DS(on)}$ = 30 mΩ typ. (at VGS = –4 V)

External View

SOP-8





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

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Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Value	Unit
Drain to source voltage	V_{DSS}	–20	V
Gate to source voltage	V_{GSS}	±12	V
Drain current	I_D	–6	A
Drain peak current	I_D (pulse)*[1]	–48	A
Body-drain diode reverse drain current	I_{DR}	–6	A
Permissible channel loss	Pch*[2]	2.0	W
	Pch*[2]	3.0	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 ≤ 10 s
3. 2 Drive operation ; When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), PW ≤ 10 s
4. Value at Tch=25°C, Rg ≥ 50Ω

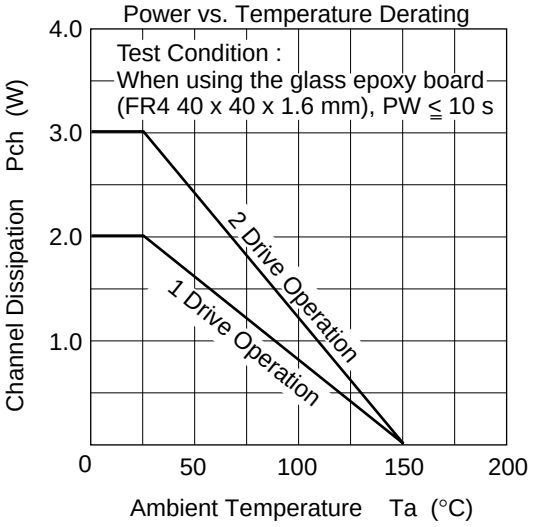
Electrical Characteristics

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	–20	—	—	V	I_D = –10 mA, V_{GS} = 0
Gate to source cutoff current	I_{GSS}	—	—	±0.1	µA	V_{GS} = ±12 V, V_{DS} = 0
Zero gate voltage drain current	I_{DSS}	—	—	–1	µA	V_{DS} = –20 V, V_{GS} = 0
Gate to source cutoff voltage	$V_{GS(off)}$	–0.4	—	–1.4	V	V_{DS} = –10 V, I_D = –1 mA
Forward transfer admittance	$\|y_{fs}\|$	6.5	11	—	S	I_D = –3 A, V_{DS} = –10 V*[1]
Static drain to source on state resistance	$R_{DS(on)}$	—	30	40	mΩ	I_D = –3 A, V_{GS} = –4 V*[1]
	$R_{DS(on)}$	—	45	60	mΩ	I_D = –3 A, V_{GS} = –2.5 V*[1]
Input capacitance	Ciss	—	1630	—	pF	V_{DS} = –10 V, V_{GS} = 0
Output capacitance	Coss	—	700	—	pF	f = 1 MHz
Reverse transfer capacitance	Crss	—	410	—	pF	
Total gate charge	Qg	—	12	—	nc	V_{DD} = –10 V
Gate to source charge	Qgs	—	8	—	nc	V_{GS} = –4 V
Gate to drain charge	Qgd	—	4	—	nc	I_D = –6 A
Turn-on delay time	td(on)	—	35	—	ns	V_{GS} = –4 V, I_D = –3 A
Rise time	tr	—	180	—	ns	V_{DD} ≅ –10 V
Turn-off delay time	td(off)	—	155	—	ns	
Fall time	tf	—	185	—	ns	
Body-drain diode forward voltage	V_{DF}	—	–0.85	–1.11	V	I_F = –6 A, V_{GS} = 0*[4]
Body-drain diode reverse recovery time	trr	—	65	—	ns	I_F = –6 A, V_{GS} = 0 diF/dt = 20 A/µs

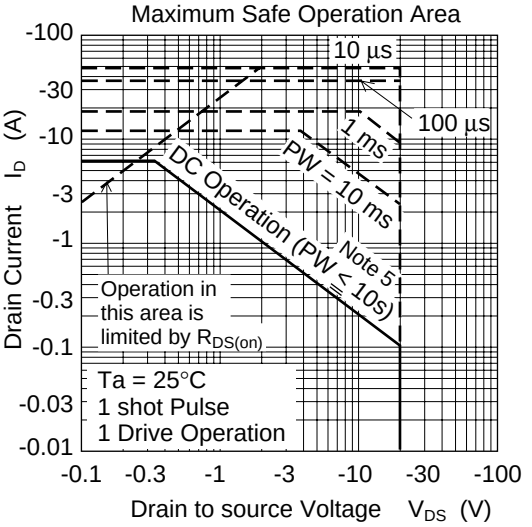
Note: 1. Pulse measurement

Main Characteristics

Power vs. Temperature Derating

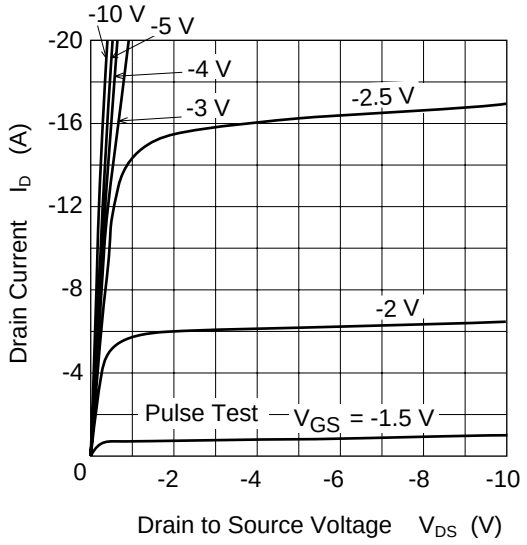


Maximum Safe Operation Area

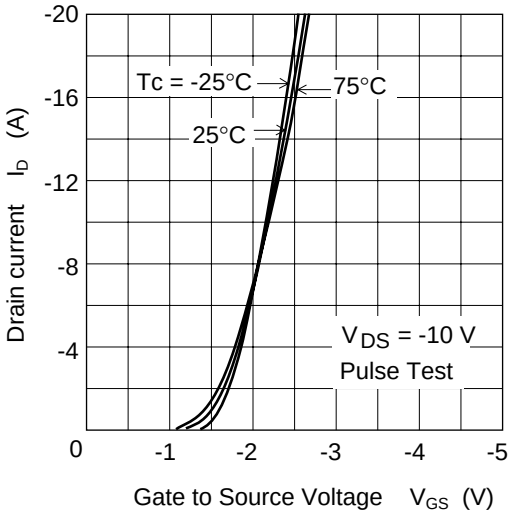


Note 6: When using the glass epoxy board (FR4 40 x 40 x 1.6 mm)

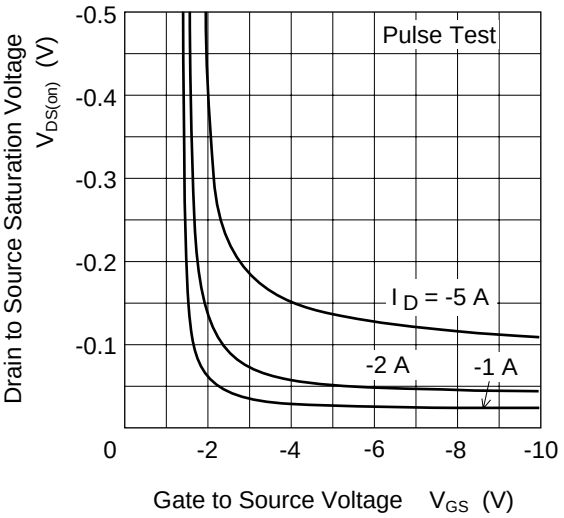
Typical Output Characteristics



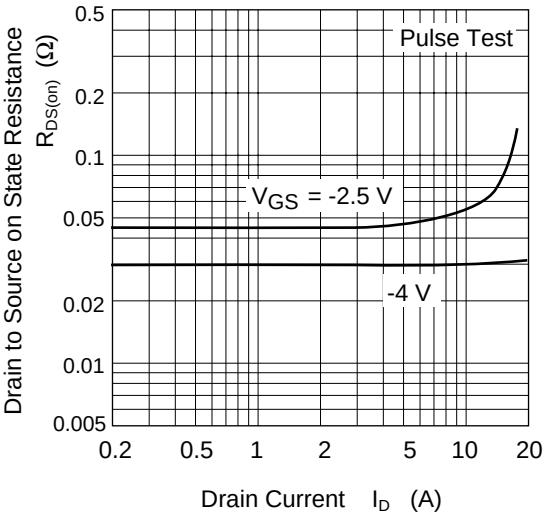
Typical Transfer Characteristics



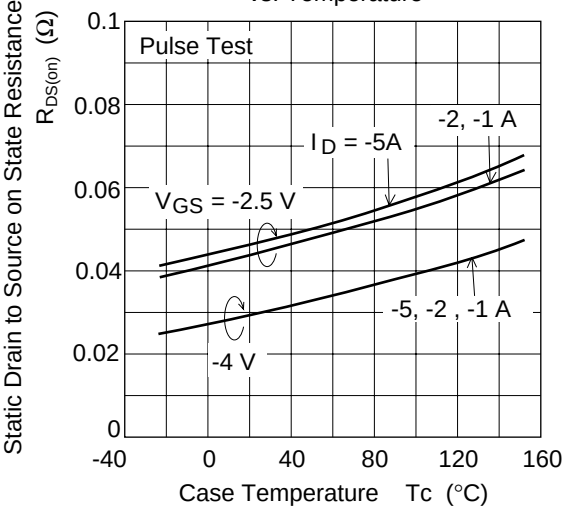
Drain to Source Saturation Voltage vs. Gate to Source Voltage



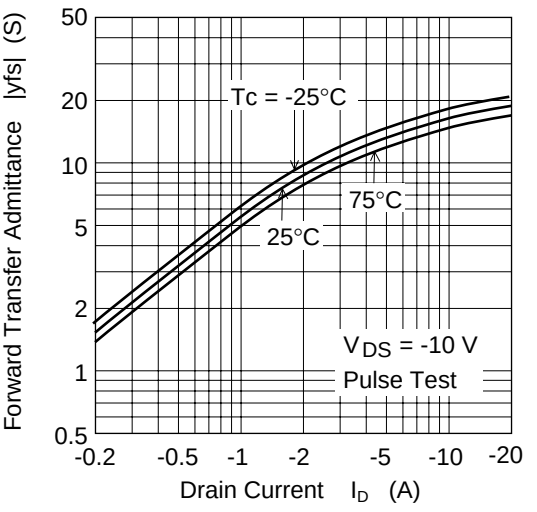
Static Drain to Source on State Resistance vs. Drain Current



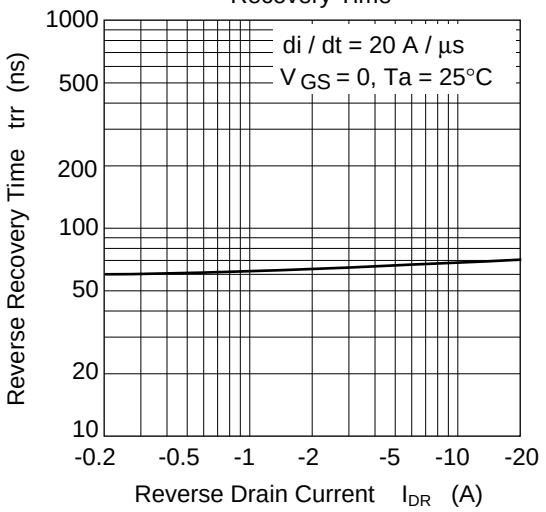
Static Drain to Source on State Resistance vs. Temperature



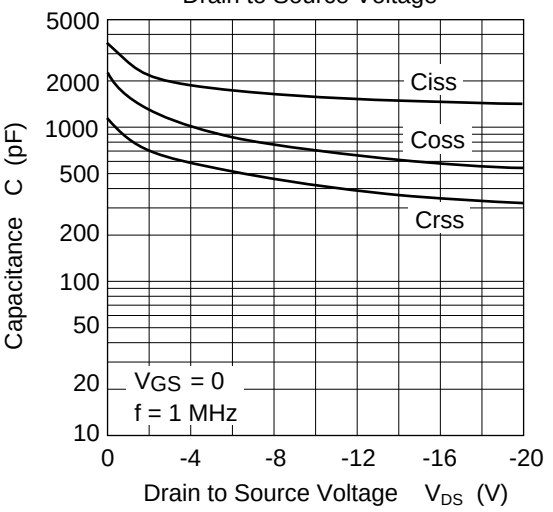
Forward Transfer Admittance vs. Drain Current



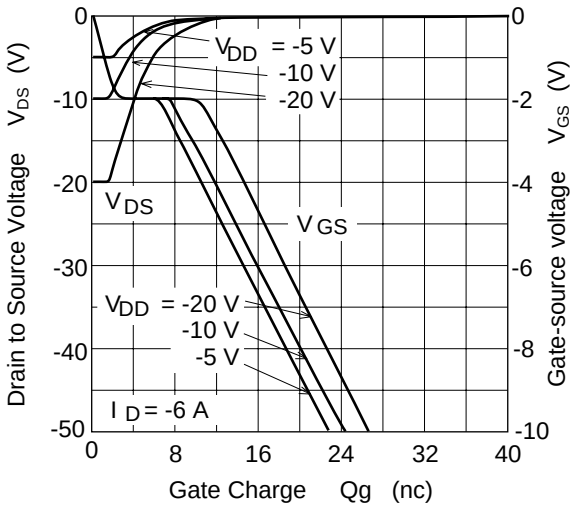
Body-Drain Diode Reverse Recovery Time



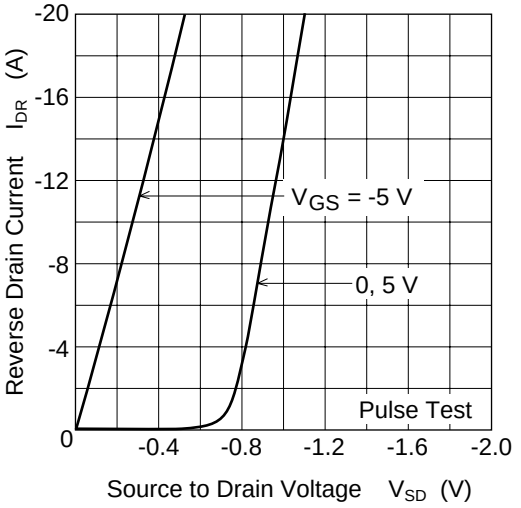
Typical Capacitance vs. Drain to Source Voltage



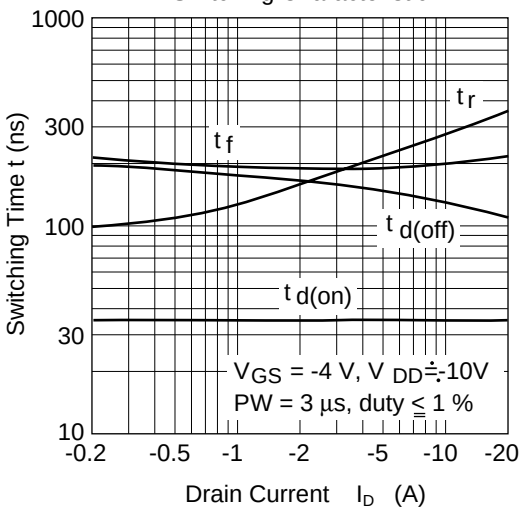
Dynamic Input Characteristics



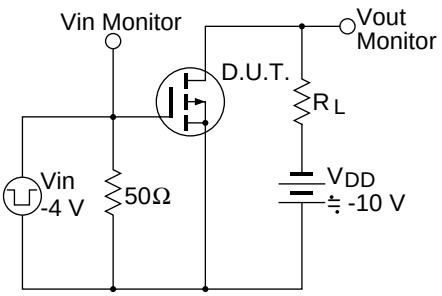
Reverse Drain Current vs. Source to Drain Voltage



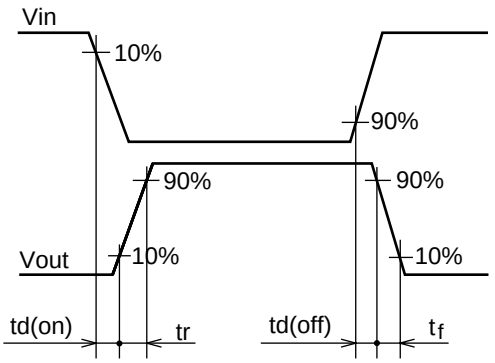
Switching Characteristic



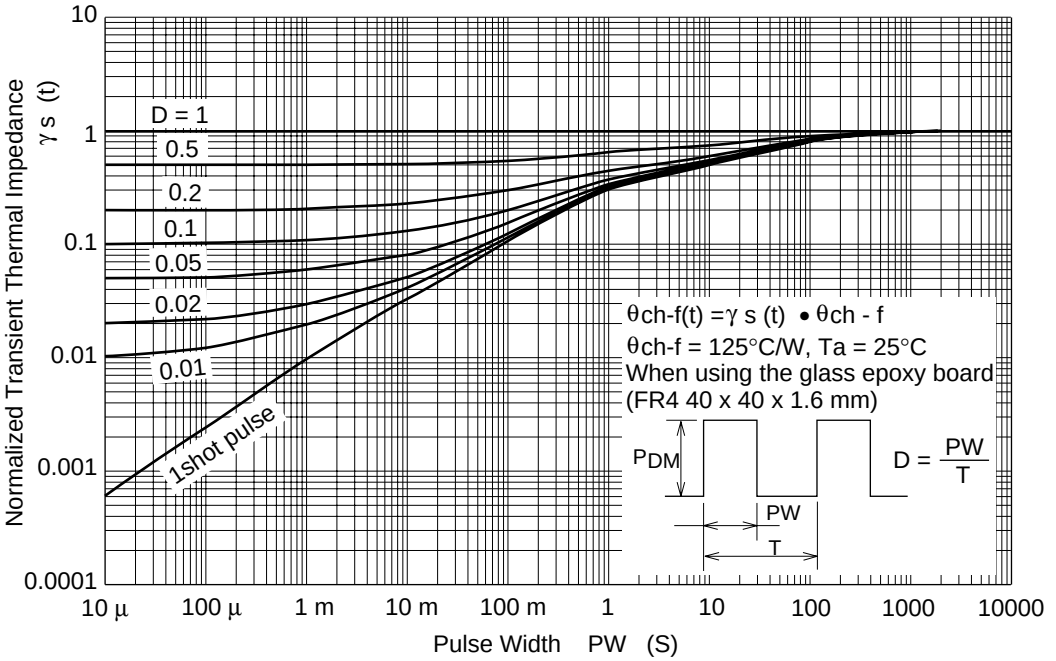
Switching Time Test Circuit



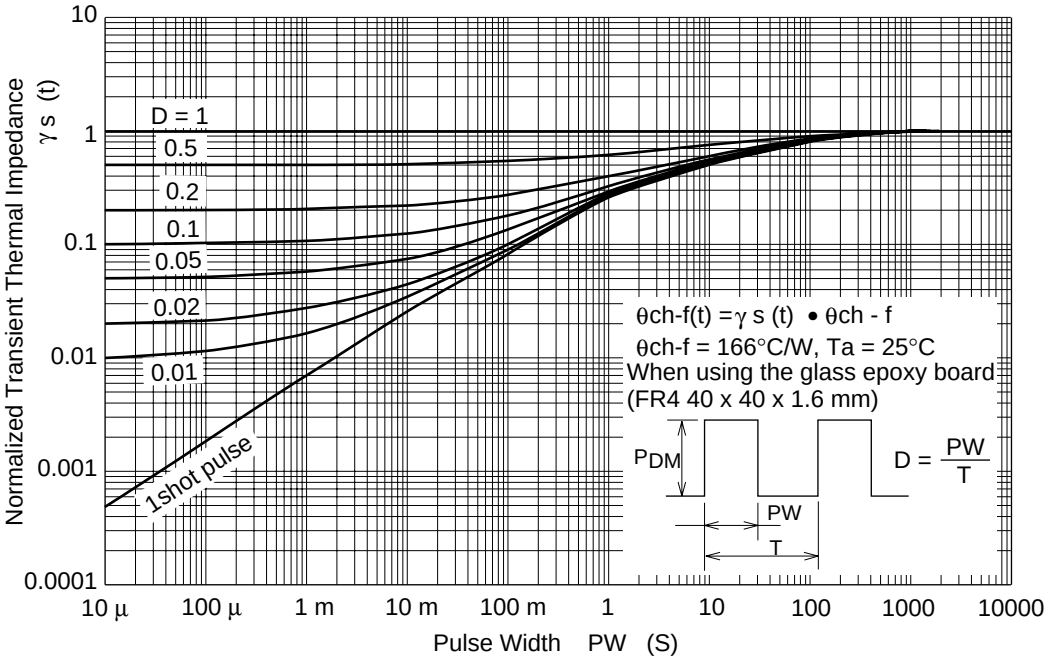
Switching Time Waveform



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

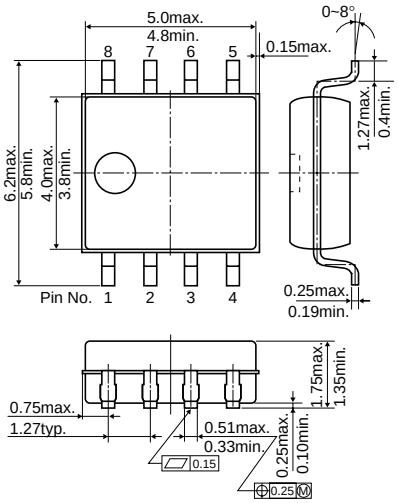


Normalized Transient Thermal Impedance vs. Pulse Width (2 Drive Operation)



Package Dimensions

Unit: mm



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