HAT1036R

Silicon P Channel Power MOS FET
Power Switching

HITACHI

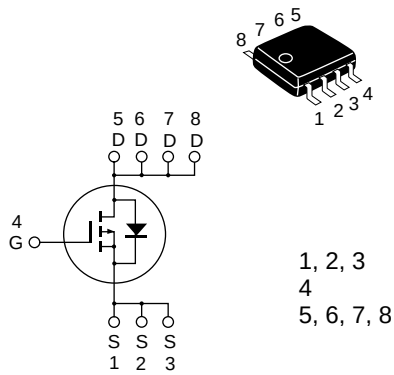
ADE-208-662D (Z)
5th. Edition
February 1999

Features

- Low on-resistance
  $R_{DS(on)}$ = 11 mΩ typ
- Capable of -4 V gate drive
- Low drive current
- High density mounting

Outline

SOP–8



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

Hitachi semiconductor

Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	-30	V
Gate to source voltage	V_{GSS}	±20	V
Drain current	I_D	-12	A
Drain peak current	$I_{D(pulse)}$ Note1	-96	A
Body-drain diode reverse drain current	I_{DR}	-12	A
Channel dissipation	Pch Note2	2.5	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	–55 to +150	°C

Notes: 1. PW ≤ 10 µs, duty cycle ≤ 1%
2. When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), PW ≤ 10 s

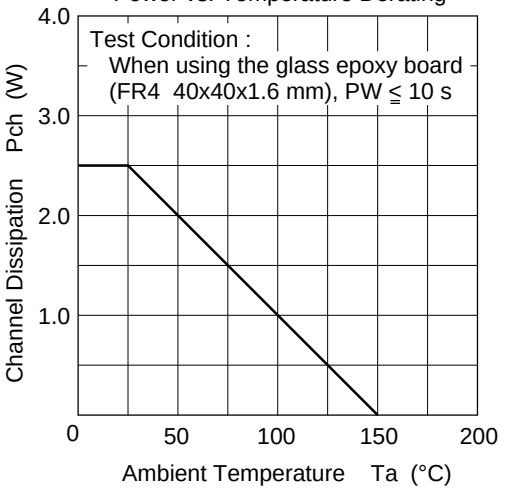
Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	-30	—	—	V	I_D = -10 mA, V_{GS} = 0
Gate to source leak current	I_{GSS}	—	—	±0.1	µA	V_{GS} = ±20 V, V_{DS} = 0
Zero gate voltege drain current	I_{DSS}	—	—	-1	µA	V_{DS} = -30 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	$R_{DS(on)}$	—	11	14	mΩ	I_D = -6 A, V_{GS} = -10 V Note1
	$R_{DS(on)}$	—	21	34	mΩ	I_D = -6 A, V_{GS} = -4 V Note1
Forward transfer admittance	$\|y_{fs}\|$	12	20	—	S	I_D = -6 A, V_{DS} = -10 V Note1
Input capacitance	Ciss	—	4200	—	pF	V_{DS} = -10 V
Output capacitance	Coss	—	870	—	pF	V_{GS} = 0
Reverse transfer capacitance	Crss	—	360	—	pF	f = 1 MHz
Total gate charge	Qg	—	70	—	nc	V_{DD} = -10 V
Gate to source charge	Qgs	—	12	—	nc	V_{GS} = -10 V
Gate to drain charge	Qgd	—	14	—	nc	I_D = -12 A
Turn-on delay time	$t_{d(on)}$	—	120	—	ns	V_{GS} = -4 V, I_D = -6 A
Rise time	t_r	—	350	—	ns	V_{DD} ≅ -10 V
Turn-off delay time	$t_{d(off)}$	—	100	—	ns	
Fall time	t_f	—	120	—	ns	
Body–drain diode forward voltage	V_{DF}	—	-0.85	-1.11	V	I_F = -12 A, V_{GS} = 0 Note1
Body–drain diode reverse recovery time	t_{rr}	—	55	—	ns	I_F = -12 A, V_{GS} = 0 diF/ dt = 20 A/ µs

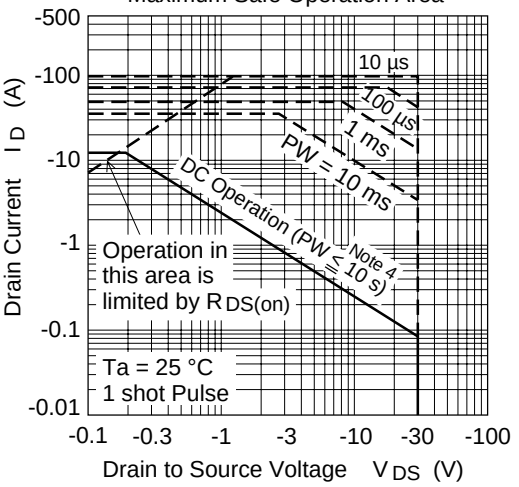
Note: 1. Pulse test

Main Characteristics

Power vs. Temperature Derating

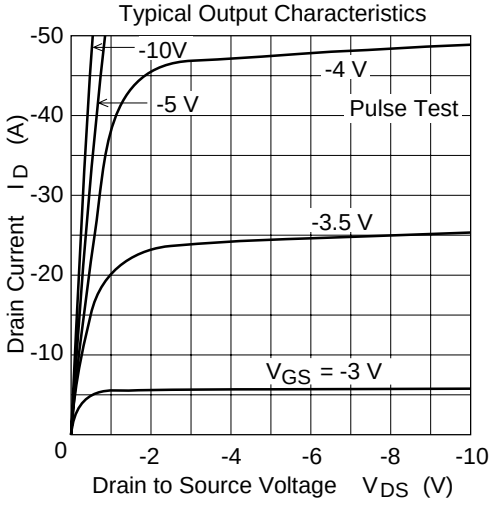


Maximum Safe Operation Area

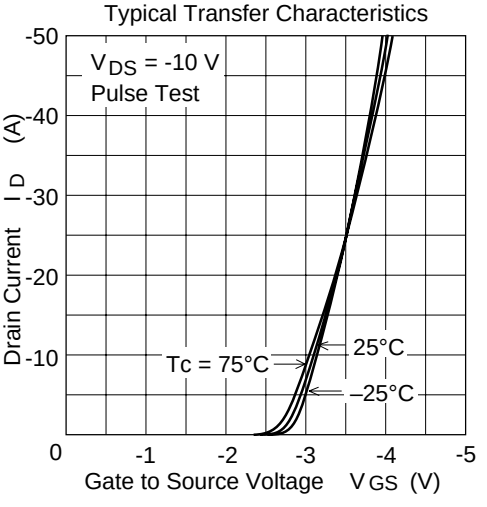


Note 4 :
When using the glass epoxy board
(FR4 40x40x1.6 mm)

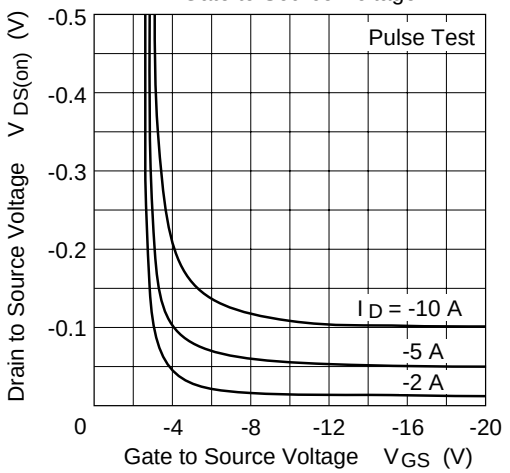
Typical Output Characteristics



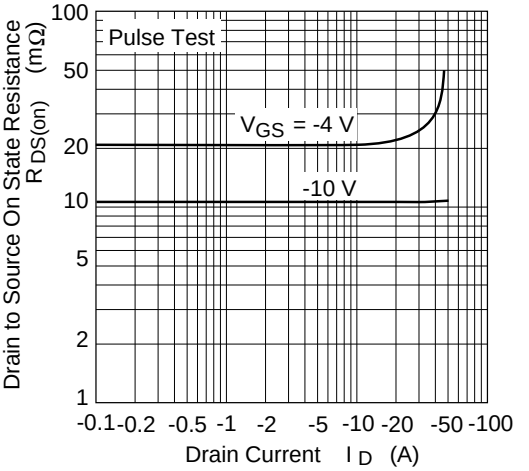
Typical Transfer Characteristics



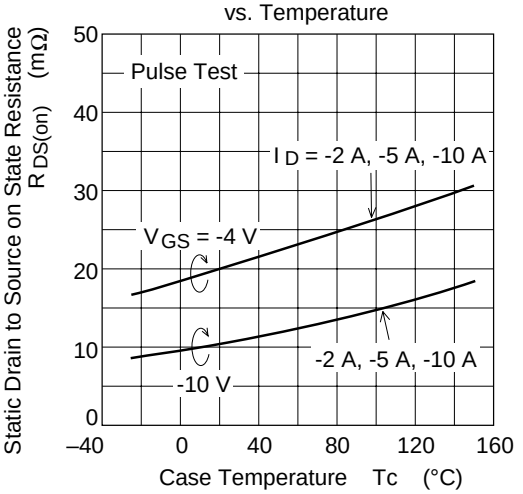
Drain to Source Saturation Voltage vs. Gate to Source Voltage



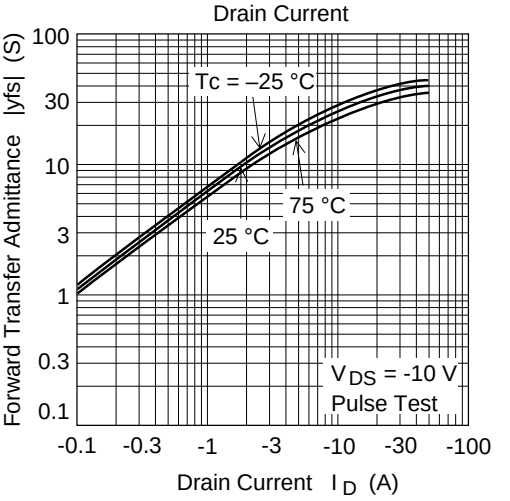
Static Drain to Source on State Resistance vs. Drain Current



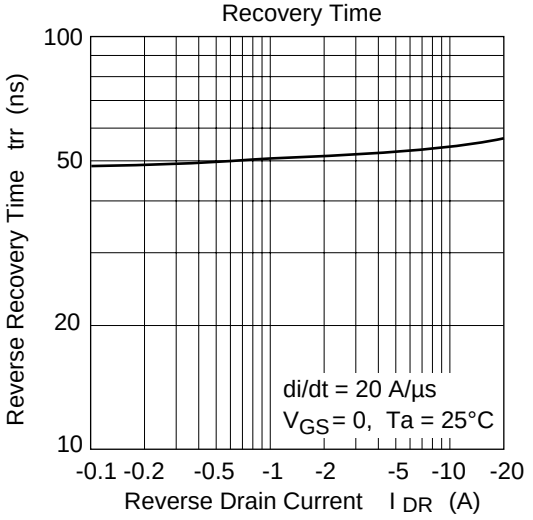
Static Drain to Source on State Resistance vs. Temperature



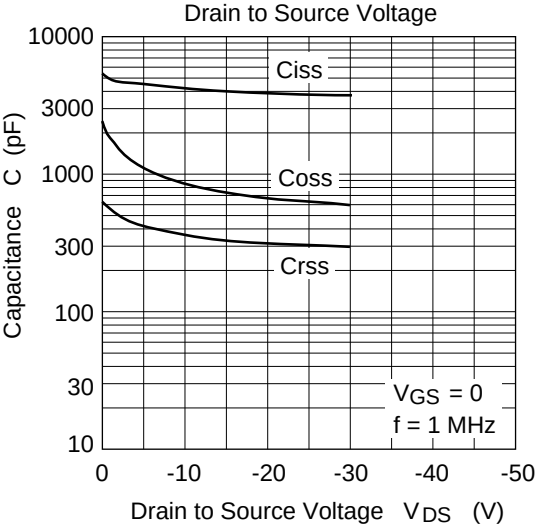
Forward Transfer Admittance vs. Drain Current



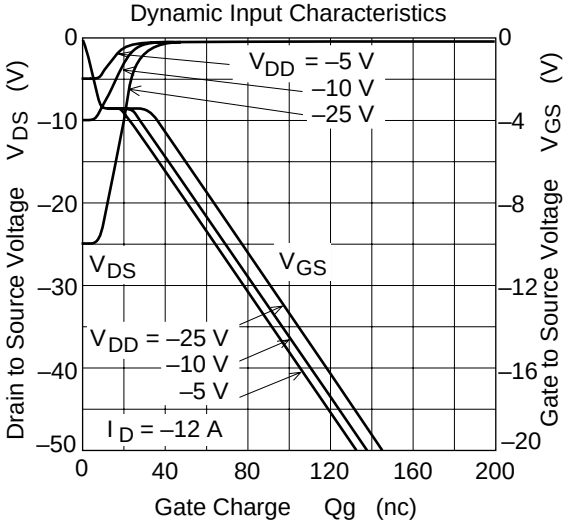
Body–Drain Diode Reverse Recovery Time



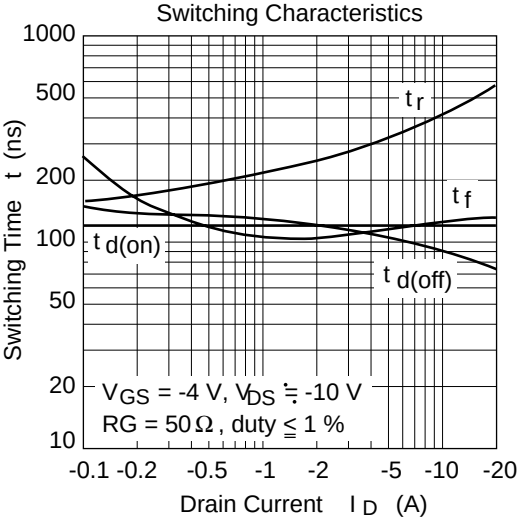
Typical Capacitance vs. Drain to Source Voltage

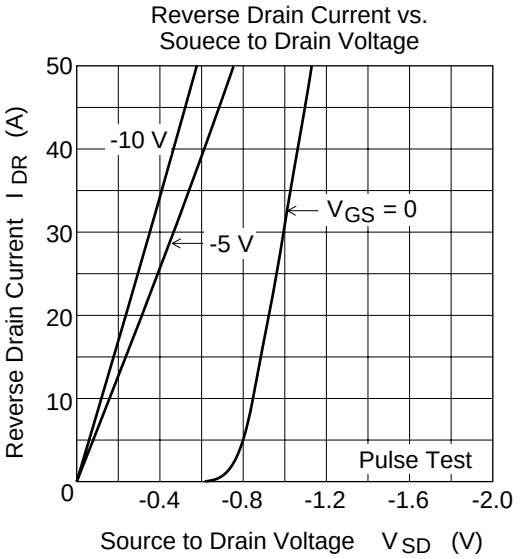


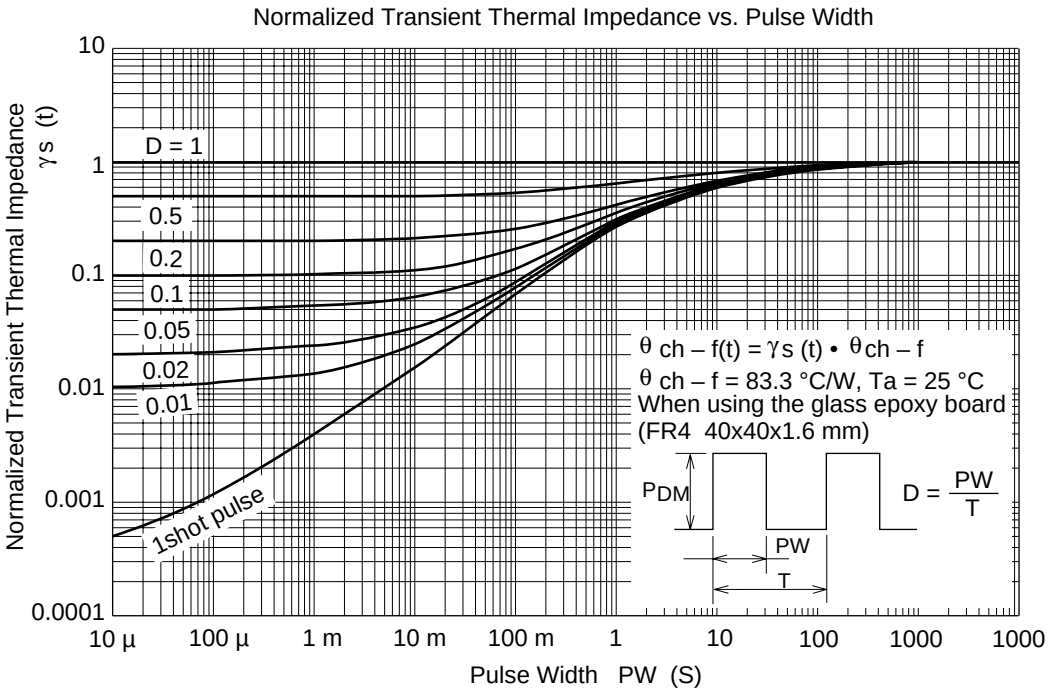
Dynamic Input Characteristics



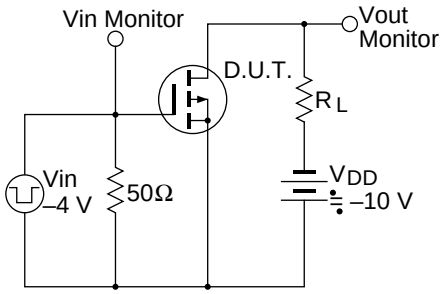
Switching Characteristics



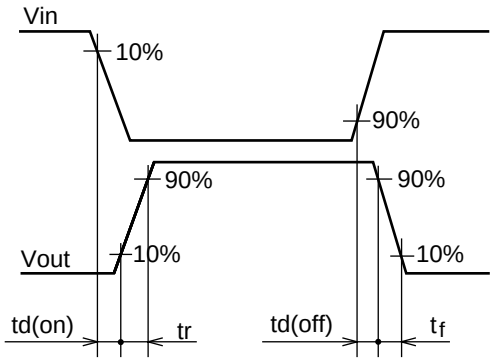

Reverse Drain Current vs.
Souece to Drain Voltage
Reverse Drain Current I DR (A)
50
40
30
20
10
0
-10 V
-5 V
VGS = 0
Pulse Test
-0.4
-0.8
-1.2
-1.6
-2.0
Source to Drain Voltage V SD (V)


Normalized Transient Thermal Impedance vs. Pulse Width
Normalized Transient Thermal Impedance γs (t)
10
1
0.1
0.01
0.001
0.0001
D = 1
0.5
0.2
0.1
0.05
0.02
0.01
1shot pulse
θ ch – f(t) = γs (t) • θch – f
θ ch – f = 83.3 °C/W, Ta = 25 °C
When using the glass epoxy board
(FR4 40x40x1.6 mm)
PDM
D = PW/T
PW
T
10 µ
100 µ
1 m
10 m
100 m
1
10
100
1000
1000
Pulse Width PW (S)

Switching Time Test Circuit

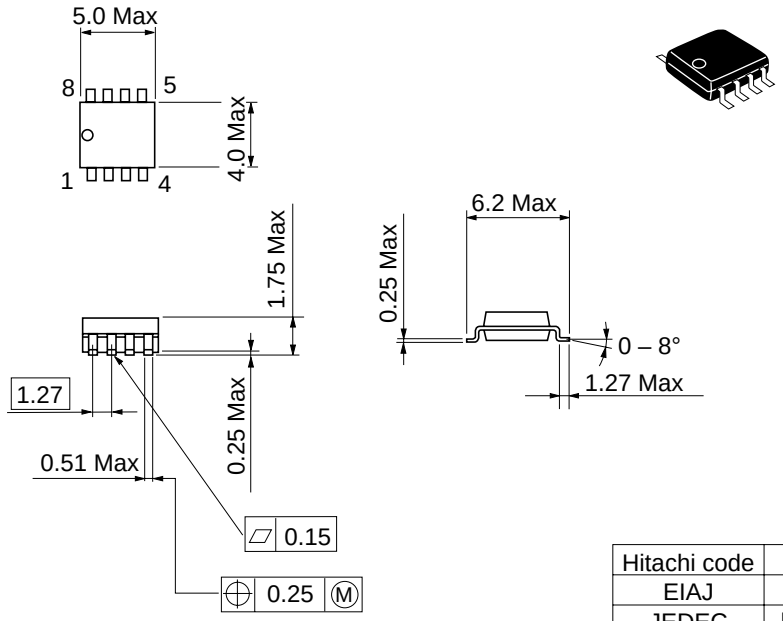


Switching Time Waveforms



Package Dimensions

Unit: mm



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