2SJ221

Silicon P-Channel MOS FET

HITACHI

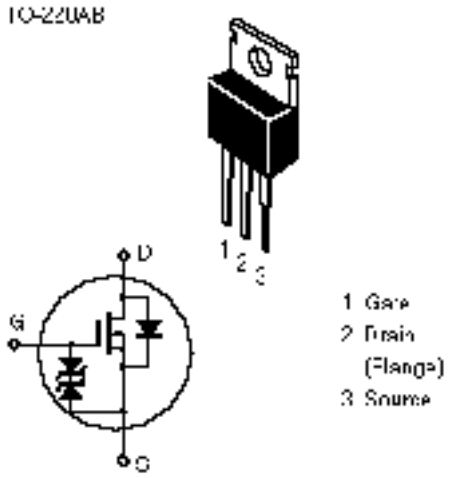
Application

High speed power switching

Features

- Low on-resistance
- High speed switching
- Low drive current
- 4 V gate drive device
  ¾ Can be driven from 5 V source
- Suitable for motor drive, DC-DC converter, power switch and solenoid drive

Outline



Hitachi semiconductor

Absolute Maximum Ratings (Ta = 25°C)

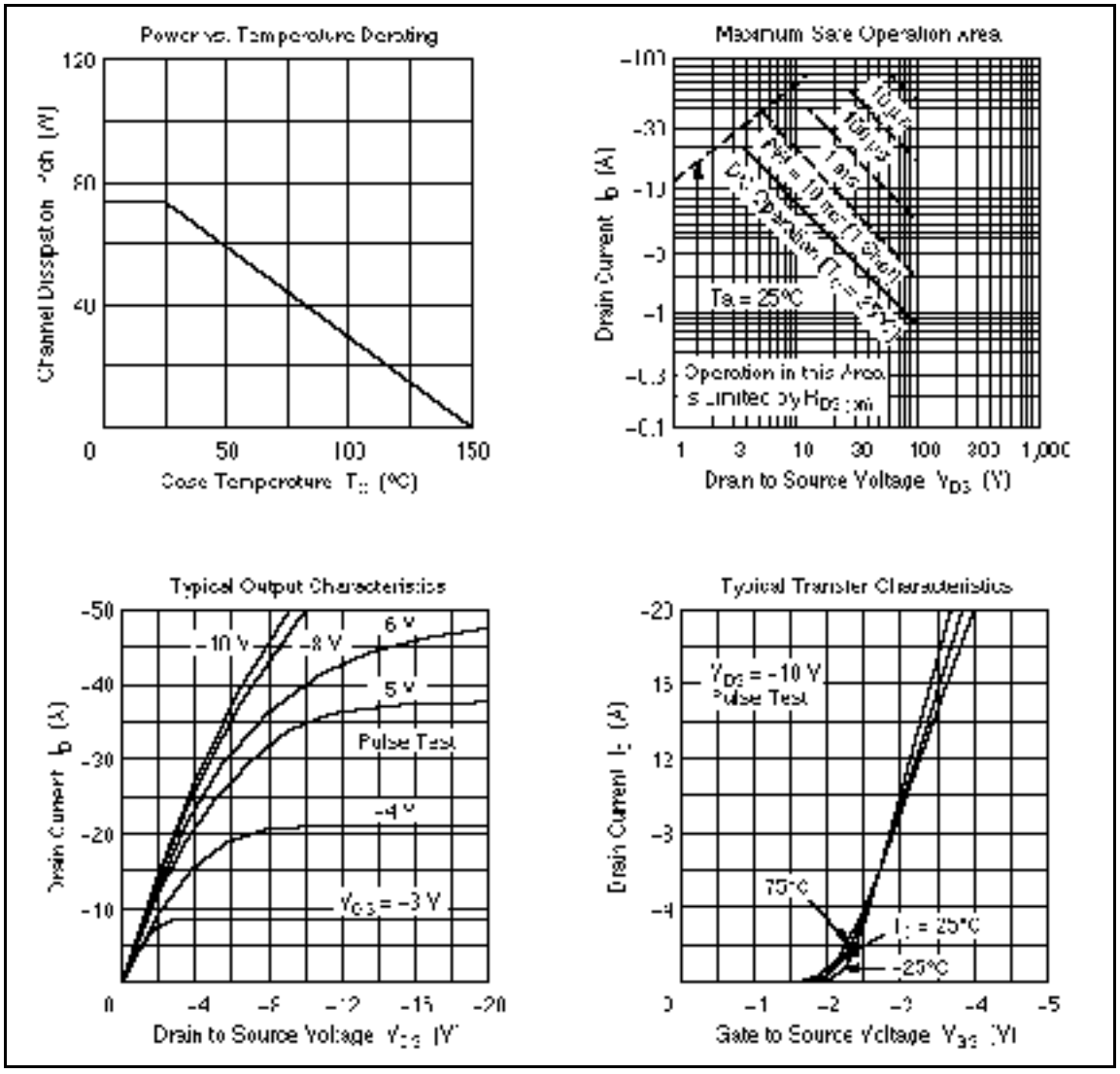
Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	–100	V
Gate to source voltage	V_{GSS}	±20	V
Drain current	I_D	–20	A
Drain peak current	$I_{D(pulse)}$*[1]	–80	A
Body to drain diode reverse drain current	I_{DR}	–20	A
Channel dissipation	Pch*[2]	75	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	–55 to +150	°C

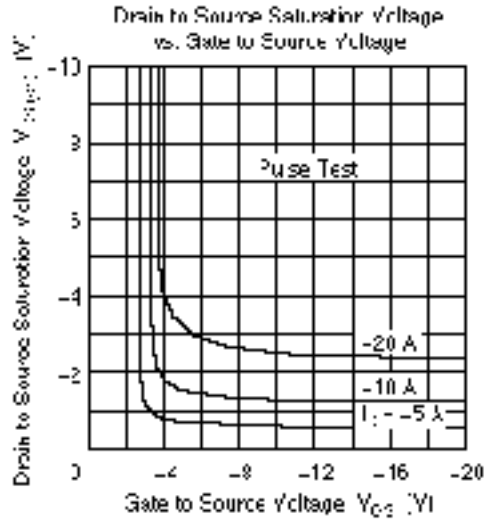
Notes: 1. PW ≤ 10 µs, duty cycle ≤ 1%
2. Value at T_C = 25°C

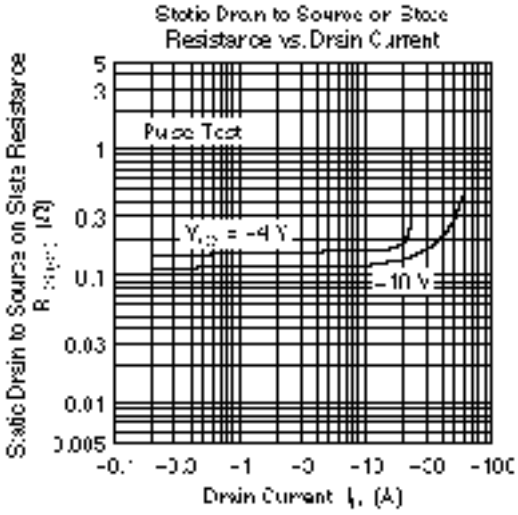
Electrical Characteristics (Ta = 25°C)

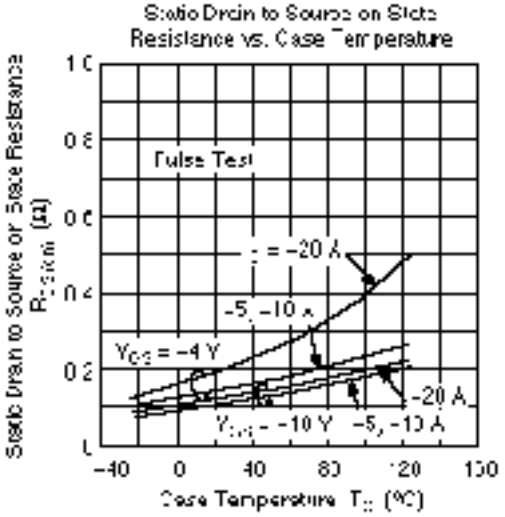
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	–100	—	—	V	I_D = –10 mA, V_{GS} = 0
Gate to source breakdown voltage	$V_{(BR)GSS}$	±20	—	—	V	I_G = ±100 µA, V_{DS} = 0
Gate to source leak current	I_{GSS}	—	—	±10	µA	V_{GS} = ±16 V, V_{DS} = 0
Zero gate voltage drain current	I_{DSS}	—	—	–250	µA	V_{DS} = –80 V, V_{GS} = 0
Gate to source cutoff voltage	$V_{GS(off)}$	–1.0	—	–2.0	V	I_D = –1 mA, V_{DS} = –10 V
Static drain to source on state resistance	$R_{DS(on)}$	—	0.12	0.16	Ω	I_D = –10 A, V_{GS} = –10 V*[1]
		—	0.16	0.22		I_D = –10 A, V_{GS} = –4 V*[1]
Forward transfer admittance	$\|y_{fs}\|$	7.5	12	—	S	I_D = –10 A, V_{DS} = –10 V*[1]
Input capacitance	Ciss	—	1800	—	pF	V_{DS} = –10 V, V_{GS} = 0, f = 1 MHz
Output capacitance	Coss	—	680	—	pF	
Reverse transfer capacitance	Crss	—	145	—	pF	
Turn-on delay time	$t_{d(on)}$	—	15	—	ns	I_D = –10 A, V_{GS} = –10 V, R_L = 3 Ω
Rise time	t_r	—	115	—	ns	
Turn-off delay time	$t_{d(off)}$	—	320	—	ns	
Fall time	t_f	—	170	—	ns	
Body to drain diode forward voltage	V_{DF}	—	–1.05	—	V	I_F = –20 A, V_{GS} = 0
Body to drain diode reverse recovery time	t_{rr}	—	280	—	ns	I_F = –20 A, V_{GS} = 0, di_F/dt = 50 A/µs

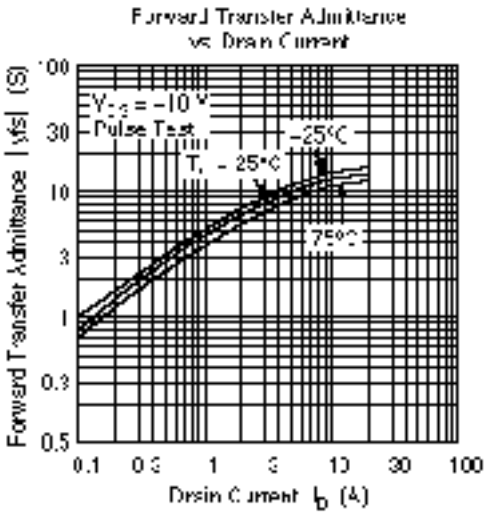
Note: 1. Pulse test

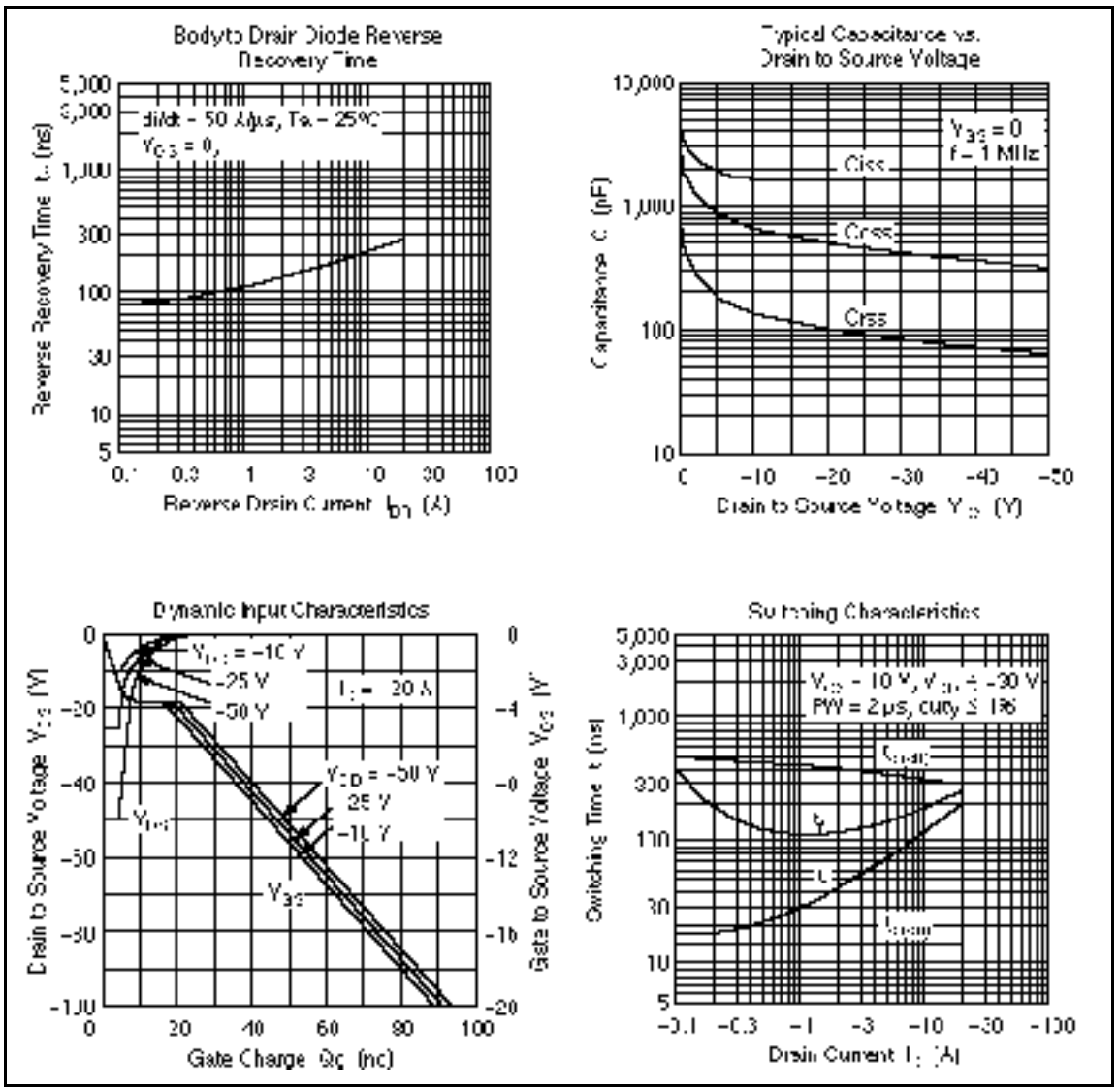

Power vs. Temperature Derating
Channel Dissipation Pch (W)
120
80
40
0
50
100
150
Case Temperature Tc (°C)
Maximum Safe Operation Area
Drain Current ID (A)
-100
-30
-10
-3
-1
-0.3
-0.1
Ta = 25°C
Operation in this Area is Limited by RDS(on)
1
3
10
30
100
300
1,000
Drain to Source Voltage VDS (V)
Typical Output Characteristics
Drain Current ID (A)
-50
-40
-30
-20
-10
-10 V
-8 V
6 V
5 V
Pulse Test
-4 V
VGS = -3 V
0
-4
-8
-12
-16
-20
Drain to Source Voltage VDS (V)
Typical Transfer Characteristics
Drain Current ID (A)
-20
-16
-12
-8
-4
VDS = -10 V
Pulse Test
75°C
Tc = 25°C
-25°C
0
-1
-2
-3
-4
-5
Gate to Source Voltage VGS (V)

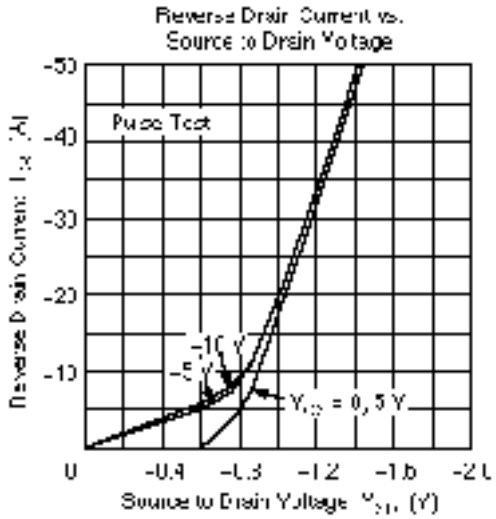

Pulse Test
-20 A
-10 A
-5 A
-4
-8
-12
-16
-20
Gate to Source Voltage

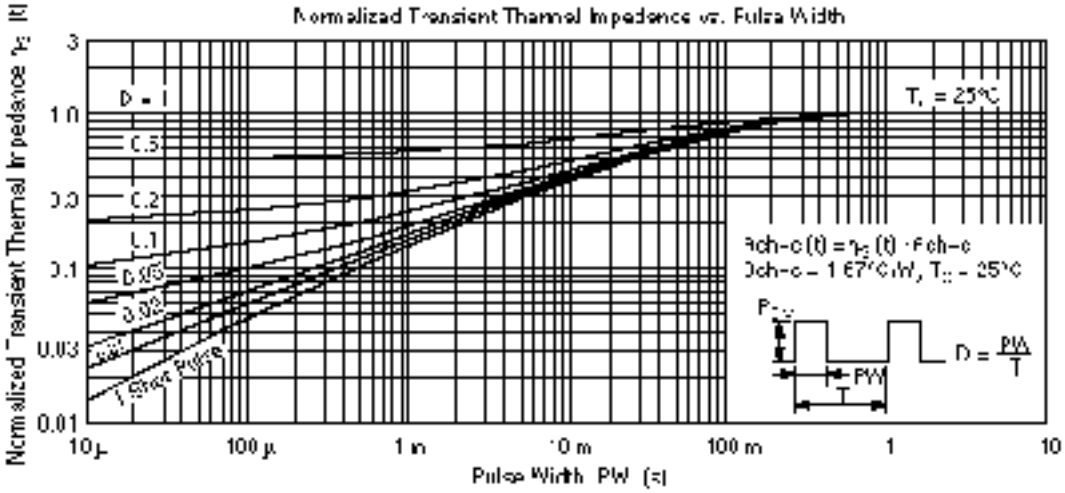

Pulse Test
-4 V
-10 V
5
3
1
0.3
0.1
0.03
0.01
0.005
-1
-3
-10
-30
-100
Drain Current

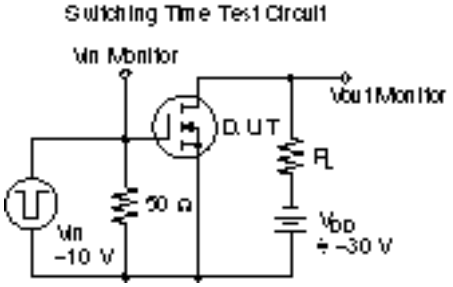

Pulse Test
-20 A
-5, -10 A
-4 V
-10 V
-5, -10 A
-20 A
1.0
0.8
0.6
0.4
0.2
-40
0
40
80
120
160
Case Temperature

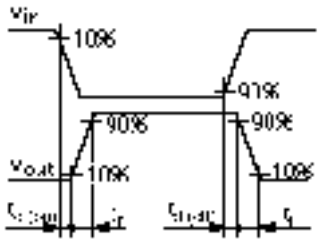

-10 V
Pulse Test
-25°C
25°C
75°C
100
30
10
3
1
0.3
0.5
0.1
0.3
1
3
10
30
100
Drain Current


Body to Drain Diode Reverse Recovery Time
Reverse Recovery Time
Reverse Drain Current
Typical Capacitance vs. Drain to Source Voltage
Ciss
Coss
Crss
Capacitance C (pF)
Drain to Source Voltage
Dynamic Input Characteristics
Drain to Source Voltage
Gate to Source Voltage
Gate Charge Qg (nc)
Switching Characteristics
Switching Time
Drain Current


Pulse Test
-10 V
-5 V
V_GS = 0, 5 V
0
-0.4
-0.8
-1.2
-1.6
-2.0
-10
-20
-30
-40
-50


D = 1
0.5
0.2
0.1
0.05
0.02
0.01
T_c = 25°C
10 µ
100 µ
1 m
10 m
100 m
1
10
3
1.0
0.3
0.1
0.03
0.01
PW
T
D = PW/T


Vin Monitor
Vout Monitor
D.U.T
RL
50 Ω
Vin
-10 V
VDD
≒ -30 V


Vin
10%
90%
Vout
10%

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