2SK1318

Silicon N Channel MOS FET
High Speed Power Switching

HITACHI

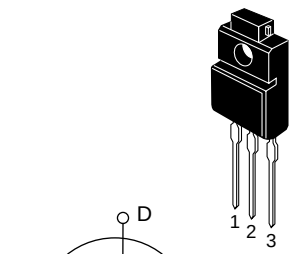
ADE-208-1269 (Z)
1st. Edition
Jan. 2001

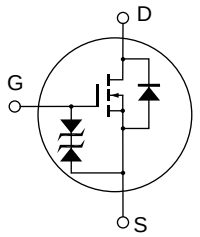
Features

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

Outline

TO-220FM





1. Gate
2. Drain
3. Source

Hitachi semiconductor

Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	120	V
Gate to source voltage	V_{GSS}	±20	V
Drain current	I_D	20	A
Drain peak current	$I_{D\ (peak)}$*[1]	80	A
Body to drain diode reverse drain current	I_{DR}	20	A
Channel dissipation	Pch*[2]	35	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	–55 to +150	°C

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

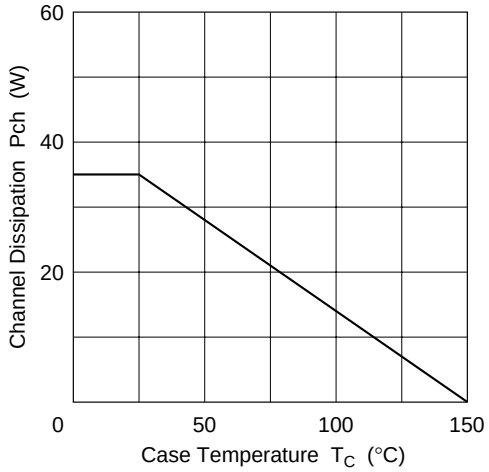
Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	120	—	—	V	I_D = 10mA, V_{GS} = 0
Gate to source breakdown voltage	$V_{(BR)GSS}$	±20	—	—	V	I_G = ±100µA, V_{DS} = 0
Gate to source leak current	I_{GSS}	—	—	±10	µA	V_{GS} = ±16V, V_{DS} = 0
Zero gate voltege drain current	I_{DSS}	—	—	250	µA	V_{DS} = 100V, V_{GS} = 0
Gate to source cutoff voltage	$V_{GS(off)}$	1.0	—	2.0	V	I_D = 1mA, V_{DS} = 10V
Static drain to source on state resistance	$R_{DS(on)}$	—	0.095	0.12		I_D = 10A, V_{GS} = 10V*[1]
		—	0.11	0.16		I_D = 10A, V_{GS} = 4V*[1]
Forward transfer admittance	$\|y_{fs}\|$	10	17	Å\	S	I_D = 10A, V_{DS} = 10V*[1]
Input capacitance	Ciss	—	1300	Å\	pF	V_{DS} = 10V, V_{GS} = 0, f = 1MHz
Output capacitance	Coss	—	430	—	pF	
Reverse transfer capacitance	Crss	—	60	—	pF	
Turn-on delay time	td (on)	—	14	—	ns	I_D = 10A, V_{GS} = 10V, R_L = 3
Rise time	tr	—	70	—	ns	
Turn-off delay time	td (off)	—	210	—	ns	
Fall time	tf	—	90	—	ns	
Body–drain diode forward voltage	V_{DF}	—	1.4	—	V	I_F = 20A, V_{GS} = 0
Body–drain diode reverse recovery time	trr	—	280	—	ns	I_F = 20A, V_{GS} = 0, diF / dt = 50A / µs

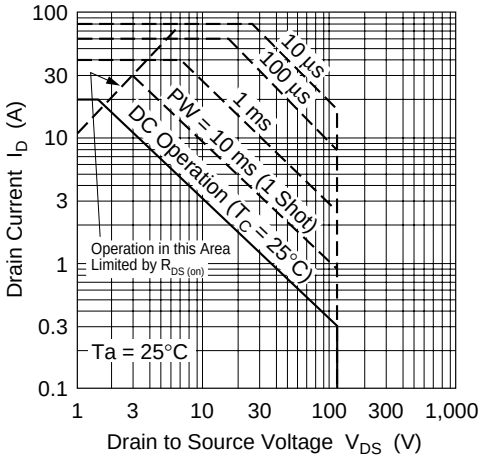
Note: 1. Pulse test

Main Characteristics

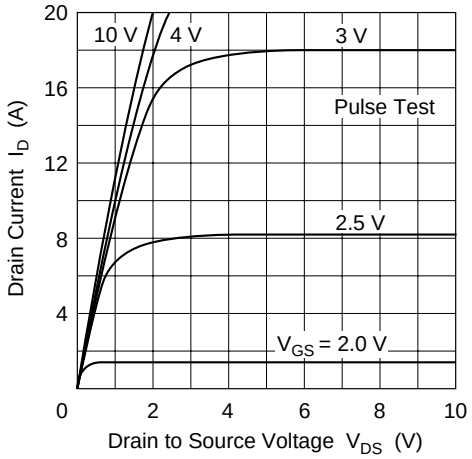
Power vs. Temperature Derating



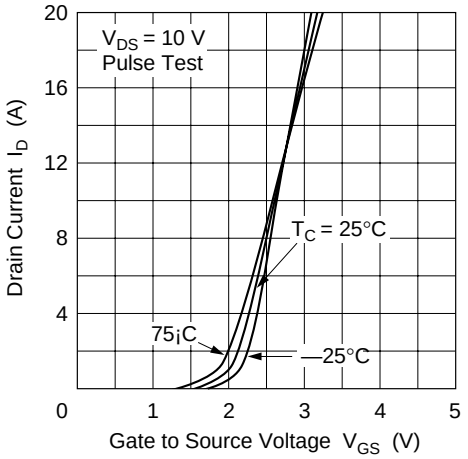
Maximum Safe Operation Area



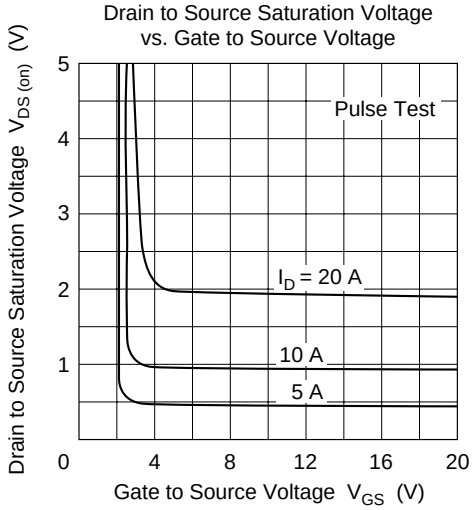
Typical Output Characteristics



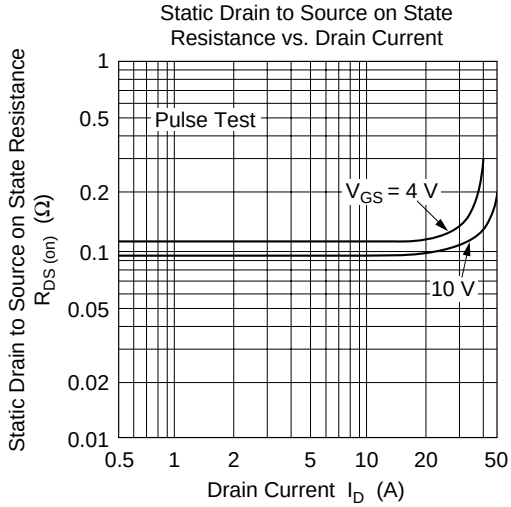
Typical Transfer Characteristics



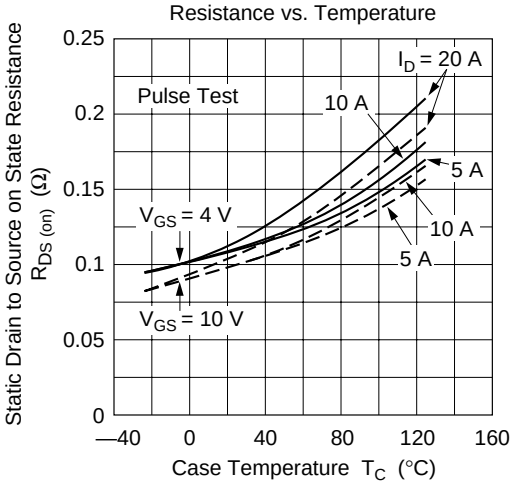
Drain to Source Saturation Voltage vs. Gate to Source Voltage



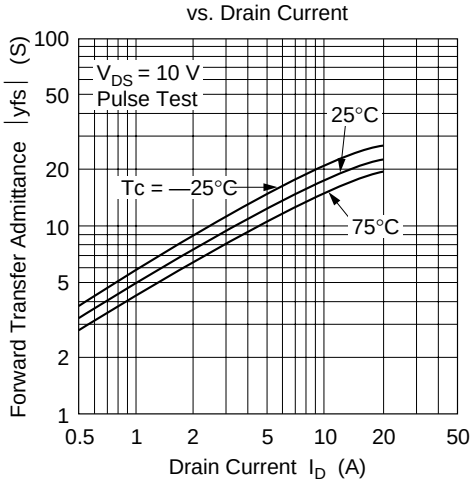
Static Drain to Source on State Resistance vs. Drain Current



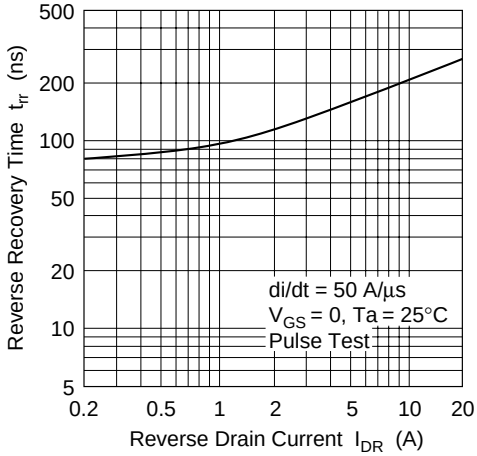
Static Drain to Source on State Resistance vs. Temperature



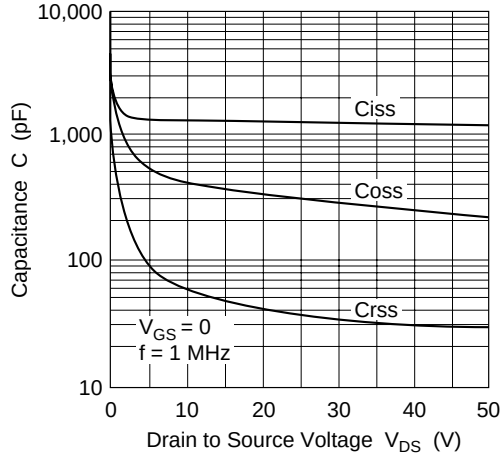
Forward Transfer Admittance vs. Drain Current



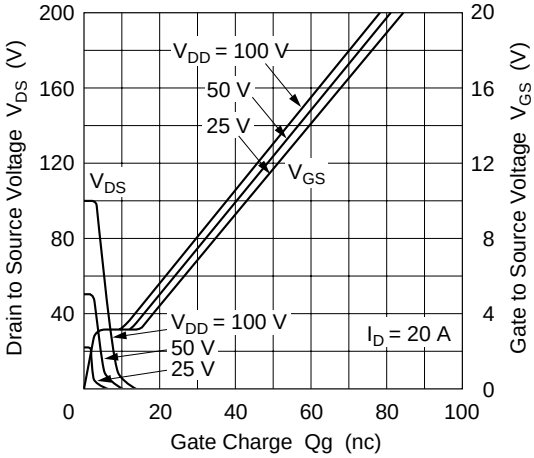
Body to Drain Diode Reverse Recovery Time



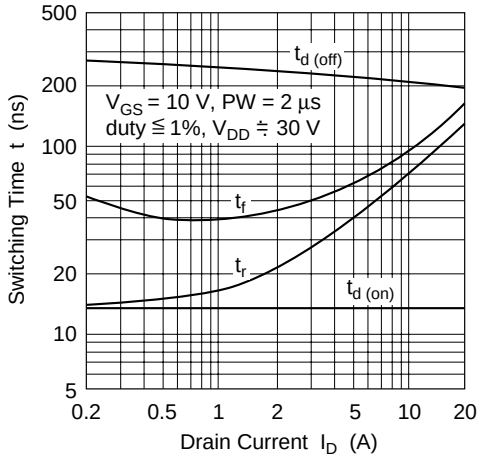
Typical Capacitance vs. Drain to Source Voltage

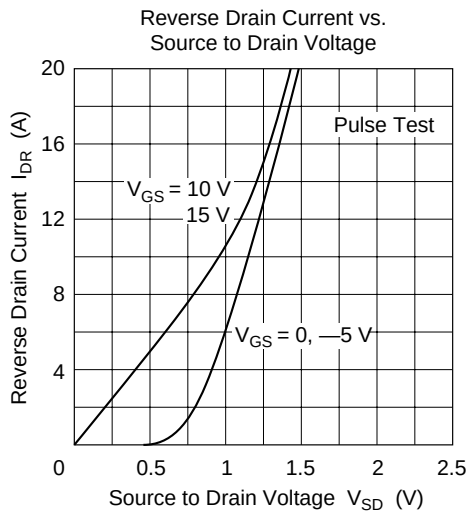


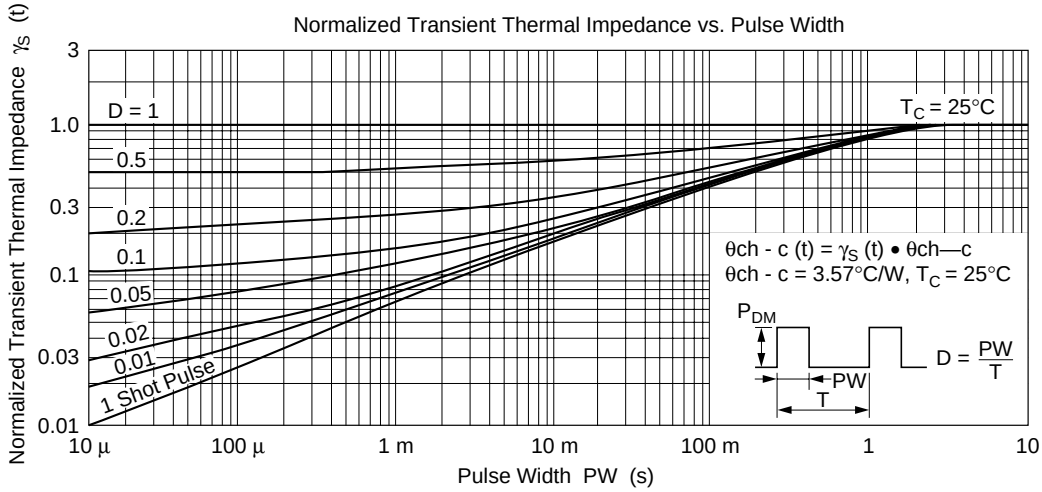
Dynamic Input Characteristics



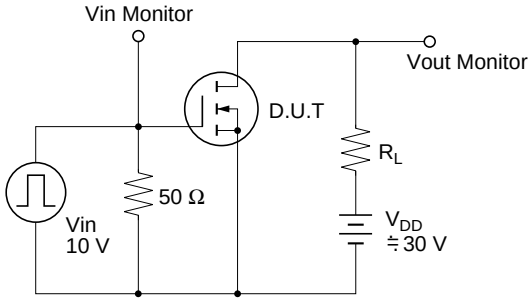
Switching Characteristics



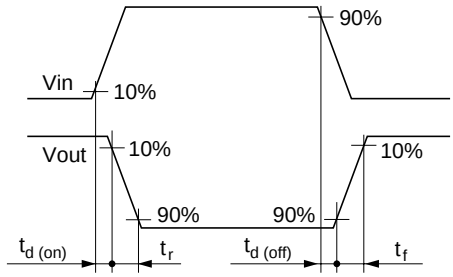

Reverse Drain Current vs.
Source to Drain Voltage
Reverse Drain Current I_{DR} (A)
Source to Drain Voltage V_{SD} (V)
Pulse Test
V_{GS} = 10 V
15 V
V_{GS} = 0, —5 V
20
16
12
8
4
0
0.5
1
1.5
2
2.5


Normalized Transient Thermal Impedance vs. Pulse Width
Normalized Transient Thermal Impedance γ_S (t)
Pulse Width PW (s)
D = 1
0.5
0.2
0.1
0.05
0.02
0.01
1 Shot Pulse
T_C = 25°C
θch - c (t) = γ_S (t) • θch—c
θch - c = 3.57°C/W, T_C = 25°C
P_{DM}
D = PW/T
PW
T
3
1.0
0.3
0.1
0.03
0.01
10 μ
100 μ
1 m
10 m
100 m
1
10

Switching Time Test Circuit



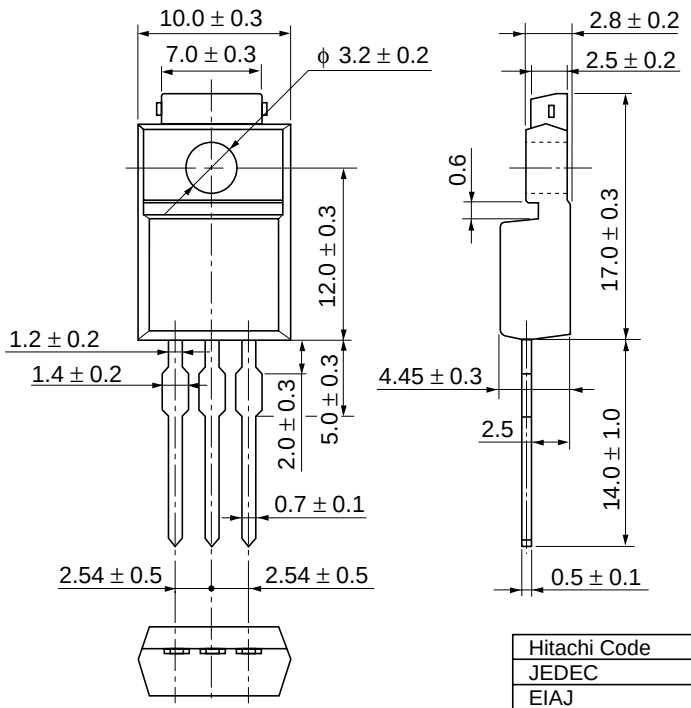
Waveforms

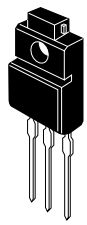


Package Dimensions

As of January, 2001

Unit: mm





Hitachi Code	TO-220FM
JEDEC	—
EIAJ	Conforms
Mass (reference value)	1.8 g

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