

H5N5006FM

Silicon N Channel MOS FET
High Speed Power Switching

HITACHI

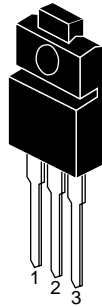
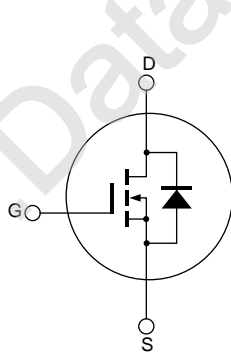
ADE-208-1112 (Z)
1st. Edition
Mar. 2001

Features

- Low on-resistance: $R_{DS(on)} = 2.5$ typ.
- Low leakage current: $IDSS = 1 \mu A$ max (at $V_{DS} = 500 V$)
- High speed switching: $t_f = 15 ns$ typ (at $V_{GS} = 10 V$, $V_{DD} = 250 V$, $I_D = 1.5 A$)
- Low gate charge: $Q_g = 14 nC$ typ (at $V_{DD} = 400 V$, $V_{GS} = 10 V$, $I_D = 3 A$)
- Avalanche ratings

Outline

TO-220FM



1. Gate
2. Drain
3. Source

Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	500	V
Gate to source voltage	V_{GSS}	±30	V
Drain current	I_D	3	A
Drain peak current	$I_{D (pulse)}$ ^{Note1}	12	A
Body-drain diode reverse drain current	I_{DR}	3	A
Body-drain diode reverse drain peak current	$I_{DR (pulse)}$ ^{Note1}	12	A
Avalanche current	I_{AP} ^{Note3}	3	A
Channel dissipation	P_{ch} ^{Note2}	25	W
Channel to case Thermal Impedance	θ_{ch-c}	5.0	°C/W
Channel temperature	T_{ch}	150	°C
Storage temperature	T_{stg}	-55 to +150	°C

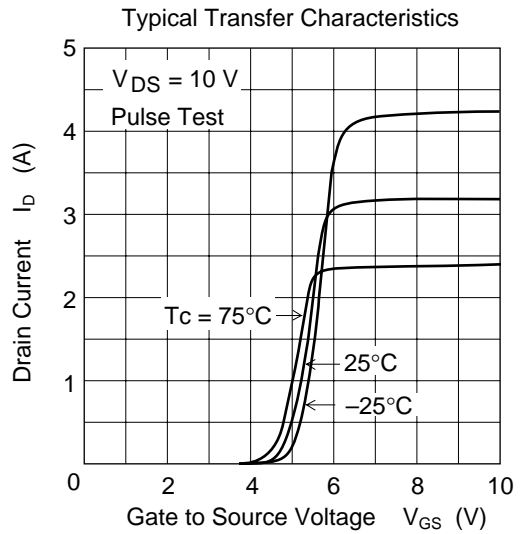
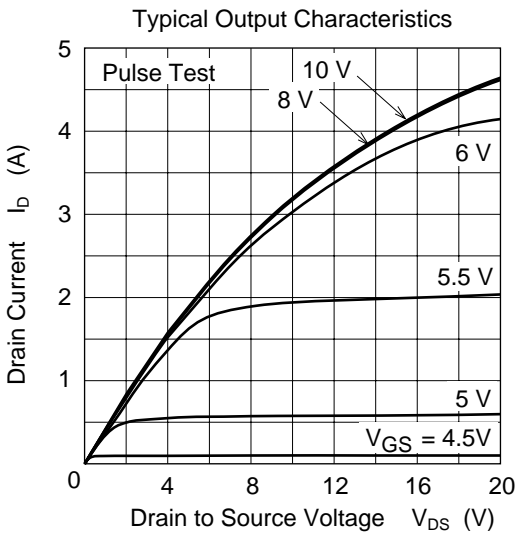
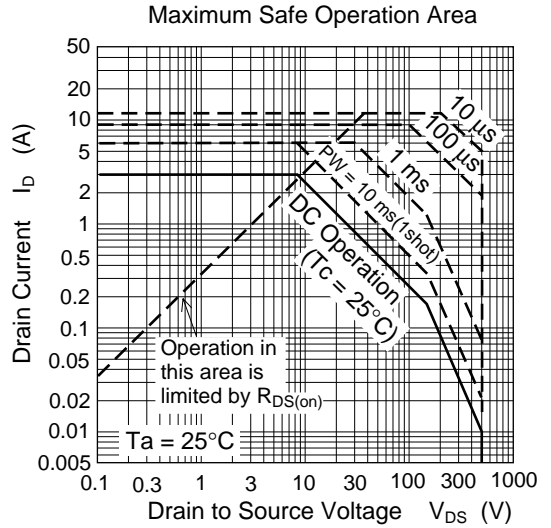
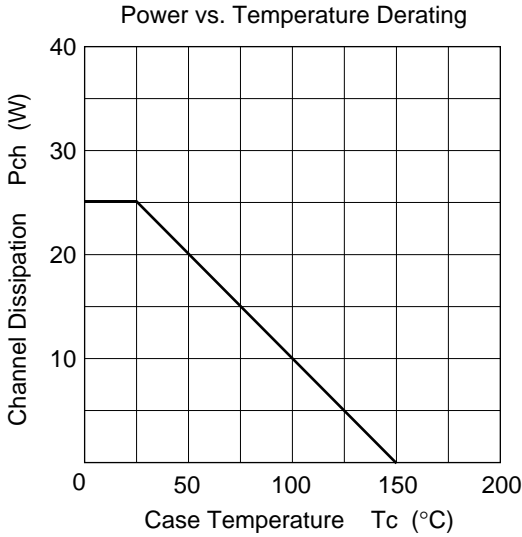
- Notes: 1. PW 10 μ s, duty cycle 1%
2. Value at Tc = 25°C
3. Tch 150°C

Electrical Characteristics (Ta = 25°C)

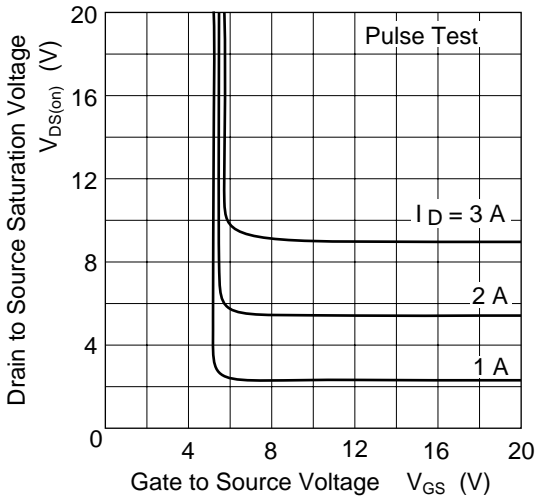
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	500	—	—	V	$I_D = 10 \text{ mA}$, $V_{GS} = 0$
Gate to source leak current	I_{GSS}	—	—	± 0.1	μA	$V_{GS} = \pm 30 \text{ V}$, $V_{DS} = 0$
Zero gate voltage drain current	I_{DSS}	—	—	1	μA	$V_{DS} = 500 \text{ V}$, $V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	3.0	—	4.5	V	$V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$
Static drain to source on state resistance	$R_{DS(on)}$	—	2.5	3.0		$I_D = 1.5 \text{ A}$, $V_{GS} = 10 \text{ V}$ ^{Note4}
Forward transfer admittance	$ y_{fs} $	1.5	2.5	—	S	$I_D = 1.5 \text{ A}$, $V_{DS} = 10 \text{ V}$ ^{Note4}
Input capacitance	C_{iss}	—	365	—	pF	$V_{DS} = 25 \text{ V}$
Output capacitance	C_{oss}	—	35	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	C_{rss}	—	8	—	pF	$f = 1 \text{ MHz}$
Turn-on delay time	$td(on)$	—	20	—	ns	$I_D = 1.5 \text{ A}$
Rise time	tr	—	12	—	ns	$V_{GS} = 10 \text{ V}$
Turn-off delay time	$td(off)$	—	48	—	ns	$R_L = 167$
Fall time	tf	—	15	—	ns	$R_g = 10$
Total gate charge	Q_g	—	14	—	nC	$V_{DD} = 400 \text{ V}$
Gate to source charge	Q_{gs}	—	2	—	nC	$V_{GS} = 10 \text{ V}$
Gate to drain charge	Q_{gd}	—	8	—	nC	$I_D = 3 \text{ A}$
Body-drain diode forward voltage	V_{DF}	—	0.85	1.3	V	$I_F = 3 \text{ A}$, $V_{GS} = 0$
Body-drain diode reverse recovery time	trr	—	270	—	ns	$I_F = 3 \text{ A}$, $V_{GS} = 0$
Body-drain diode reverse recovery charge	Q_{rr}	—	0.8	—	μC	$diF/dt = 100 \text{ A}/\mu\text{s}$

Note: 4. Pulse test

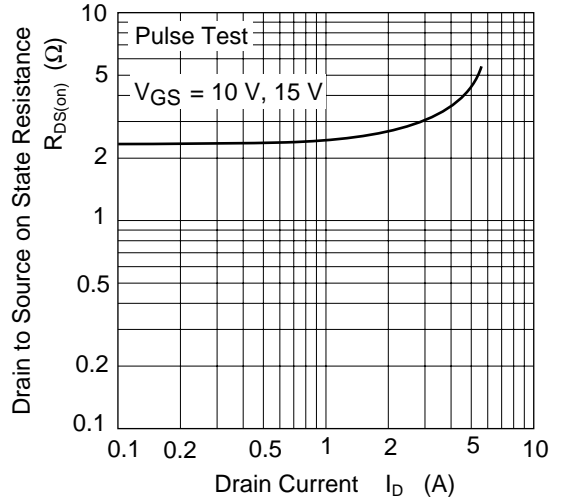
Main Characteristics



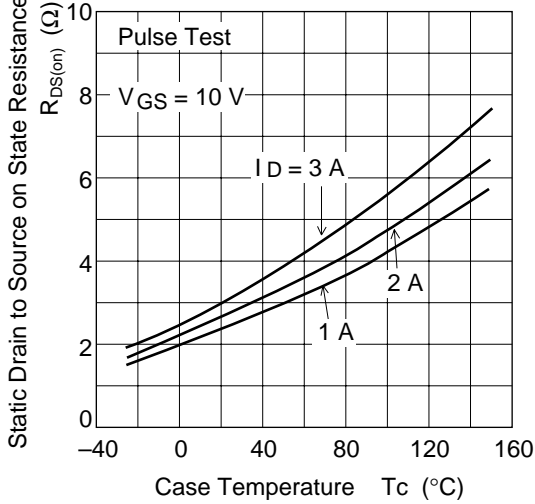
Drain to Source Saturation Voltage vs. Gate to Source Voltage



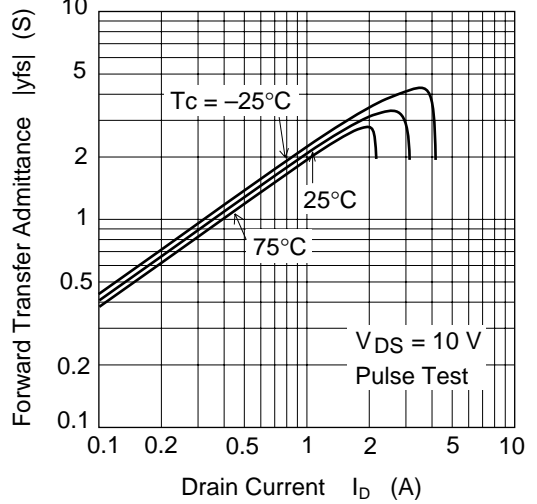
Static Drain to Source on State Resistance vs. Drain Current



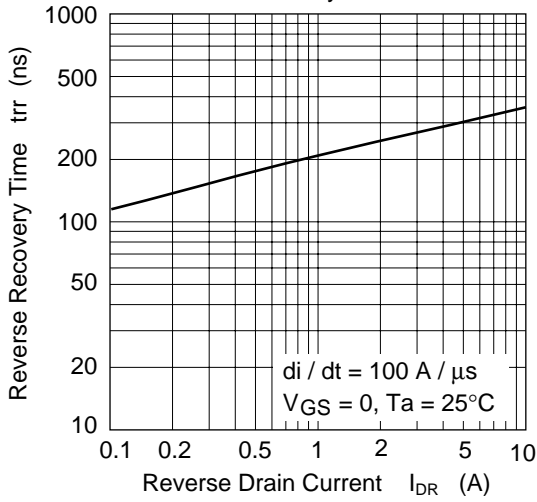
Static Drain to Source on State Resistance vs. Temperature



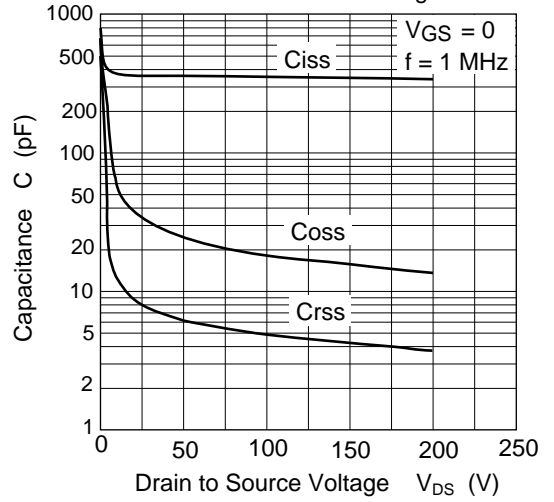
Forward Transfer Admittance vs. Drain Current



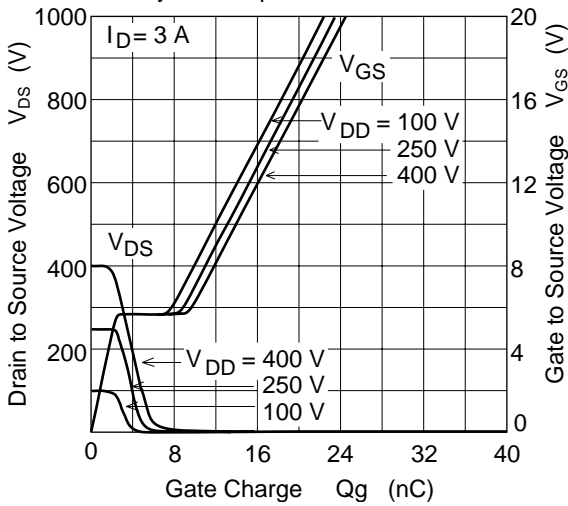
Body-Drain Diode Reverse Recovery Time



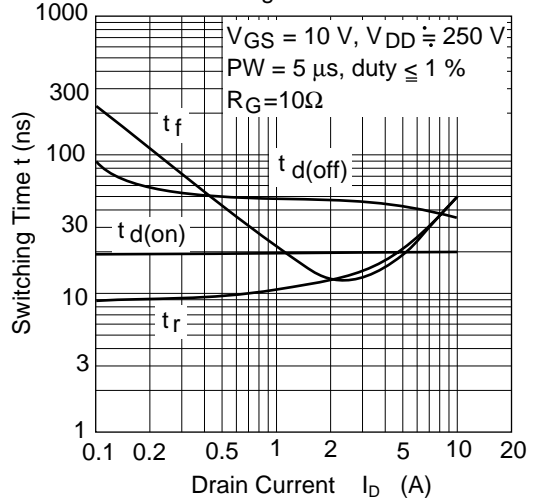
Typical Capacitance vs. Drain to Source Voltage



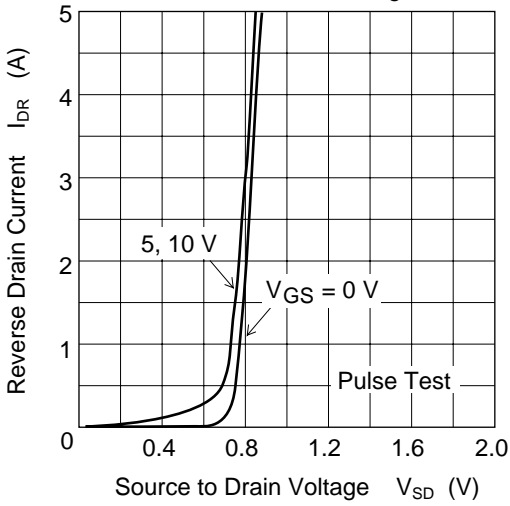
Dynamic Input Characteristics



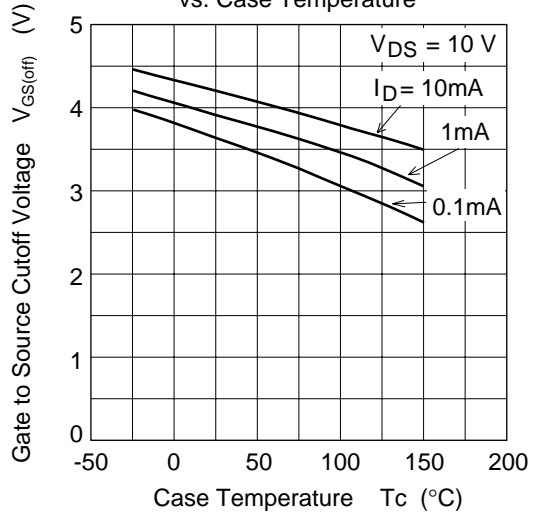
Switching Characteristics



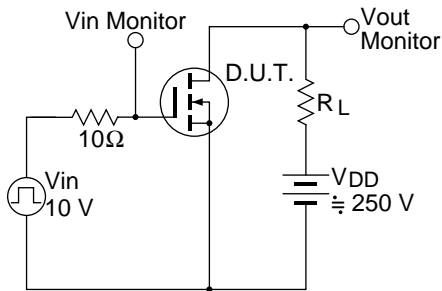
Reverse Drain Current vs. Source to Drain Voltage



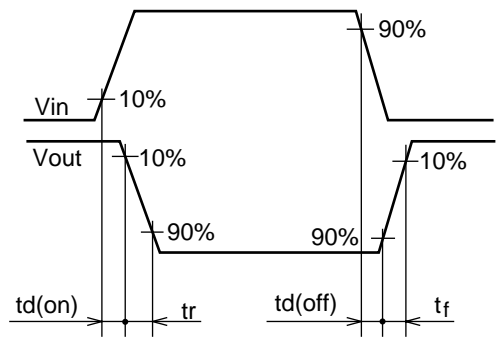
Gate to Source Cutoff Voltage vs. Case Temperature

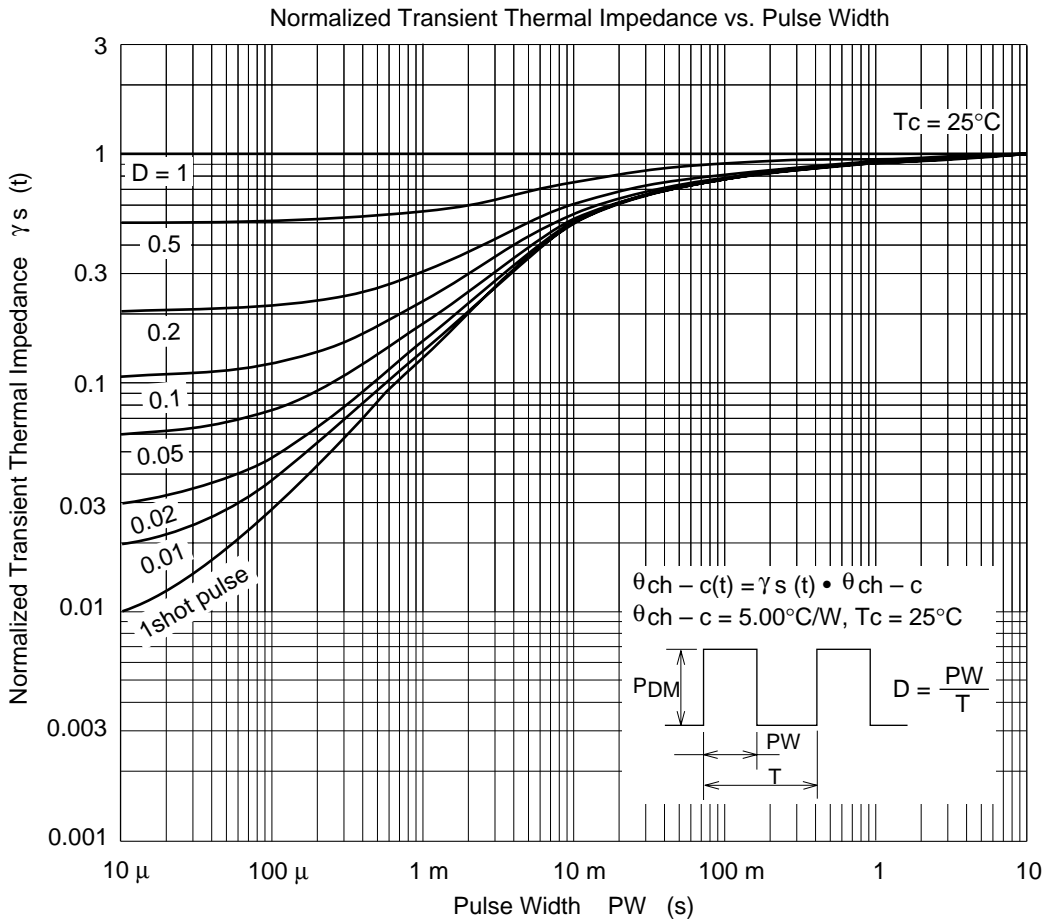


Switching Time Test Circuit

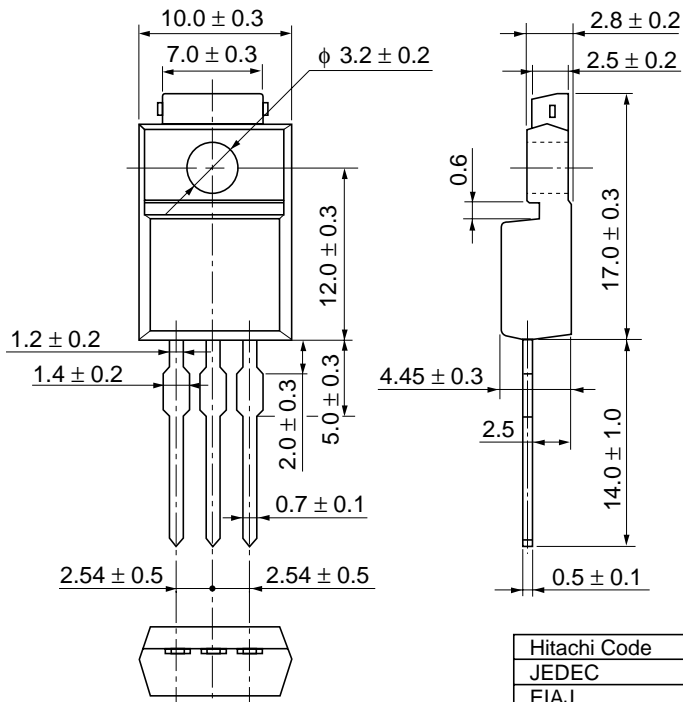


Waveform

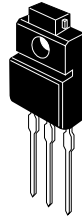




Package Dimensions



As of January, 2001
Unit: mm



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

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