

2SJ531

Silicon P Channel MOS FET
High Speed Power Switching

HITACHI

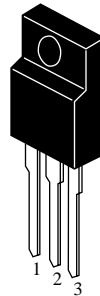
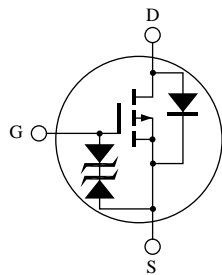
ADE-208-646A (Z)
2nd. Edition
Jul. 1998

Features

- Low on-resistance
 $R_{DS(on)} = 0.050\Omega$ typ.
- Low drive current.
- 4V gate drive devices.
- High speed switching.

Outline

TO-220CFM



1. Gate
2. Drain
3. Source

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	-60	V
Gate to source voltage	V_{GSS}	± 20	V
Drain current	I_D	-18	A
Drain peak current	$I_{D(pulse)}^{Note1}$	-72	A
Body-drain diode reverse drain current	I_{DR}	-18	A
Avalanche current	I_{AP}^{Note3}	-18	A
Avalanche energy	E_{AR}^{Note3}	27	mJ
Channel dissipation	P_{ch}^{Note2}	30	W
Channel temperature	Tch	150	$^\circ\text{C}$
Storage temperature	Tstg	-55 to +150	$^\circ\text{C}$

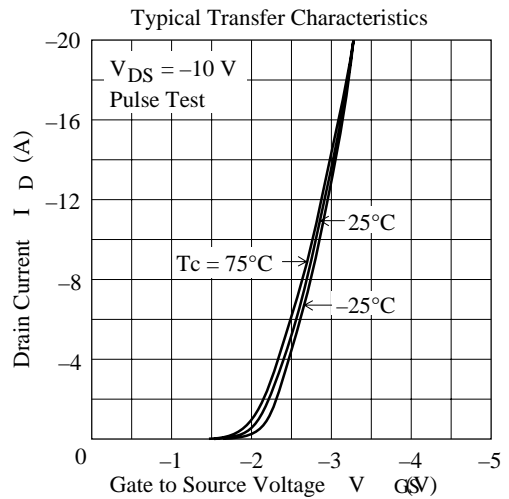
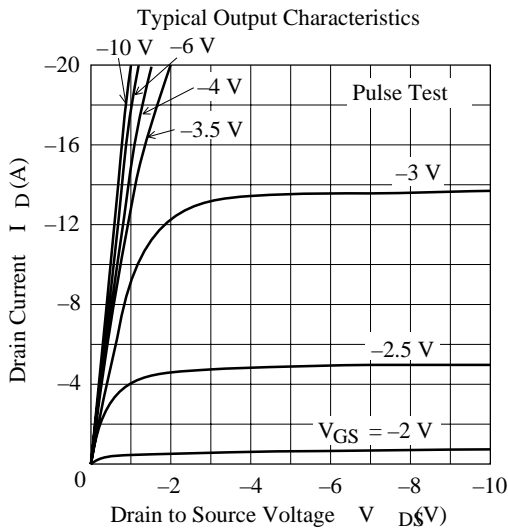
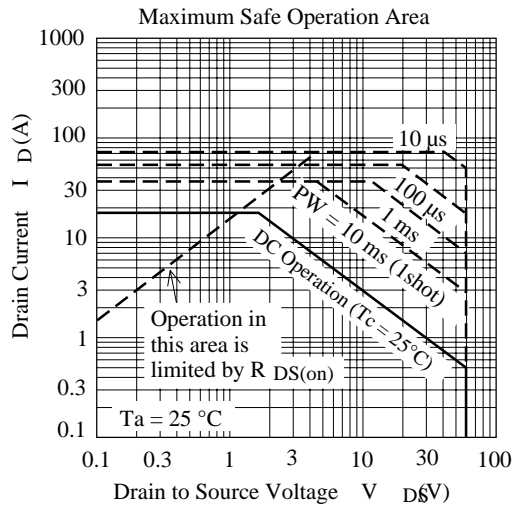
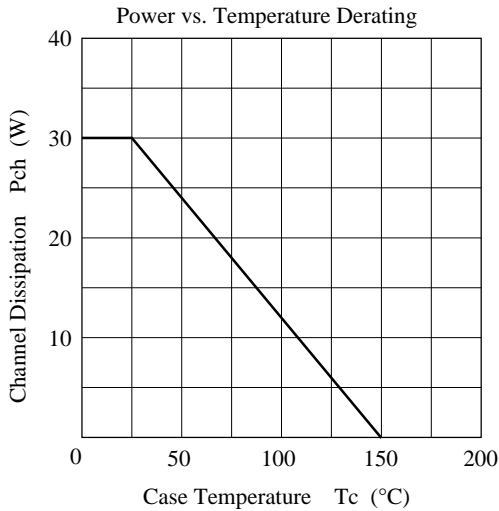
Note: 1. $PW \leq 10\mu\text{s}$, duty cycle $\leq 1\%$
2. Value at $T_c = 25^\circ\text{C}$
3. Value at $T_{ch} = 25^\circ\text{C}$, $R_g \geq 50\ \Omega$

Electrical Characteristics (Ta = 25°C)

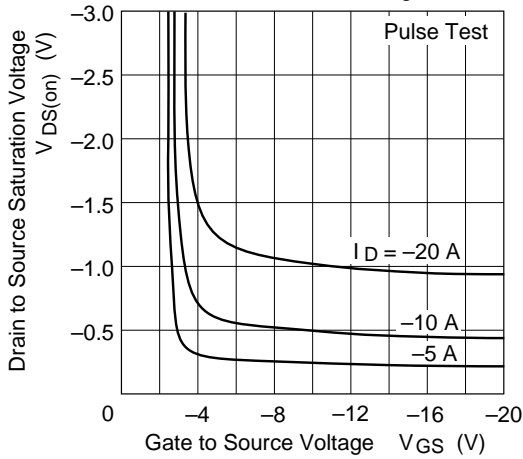
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	-60	—	—	V	$I_D = -10\text{mA}$, $V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	± 20	—	—	V	$I_G = \pm 100\mu\text{A}$, $V_{DS} = 0$
Zero gate voltage drain current	I_{DSS}	—	—	-10	μA	$V_{DS} = -60\text{V}$, $V_{GS} = 0$
Gate to source leak current	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 16\text{V}$, $V_{DS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	-1.0	—	-2.0	V	$I_D = -1\text{mA}$, $V_{DS} = -10\text{V}$
Static drain to source on state resistance	$R_{DS(on)}$	—	0.050	0.065	Ω	$I_D = -9\text{A}$, $V_{GS} = -10\text{V}$ ^{Note4}
	$R_{DS(on)}$	—	0.070	0.110	Ω	$I_D = -9\text{A}$, $V_{GS} = -4\text{V}$ ^{Note4}
Forward transfer admittance	$ y_{fs} $	10	16	—	S	$I_D = -9\text{A}$, $V_{DS} = -10\text{V}$ ^{Note4}
Input capacitance	C_{iss}	—	1300	—	pF	$V_{DS} = -10\text{V}$
Output capacitance	C_{oss}	—	650	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	C_{rss}	—	180	—	pF	$f = 1\text{MHz}$
Turn-on delay time	$t_{d(on)}$	—	14	—	ns	$V_{GS} = -10\text{V}$, $I_D = -9\text{A}$
Rise time	t_r	—	95	—	ns	$R_L = 3.33\Omega$
Turn-off delay time	$t_{d(off)}$	—	190	—	ns	
Fall time	t_f	—	135	—	ns	
Body-drain diode forward voltage	V_{DF}	—	-1.0	—	V	$I_F = -18\text{A}$, $V_{GS} = 0$
Body-drain diode reverse recovery time	t_{rr}	—	70	—	ns	$I_F = -18\text{A}$, $V_{GS} = 0$ $di_F/dt = 50\text{A}/\mu\text{s}$

Note: 4. Pulse test

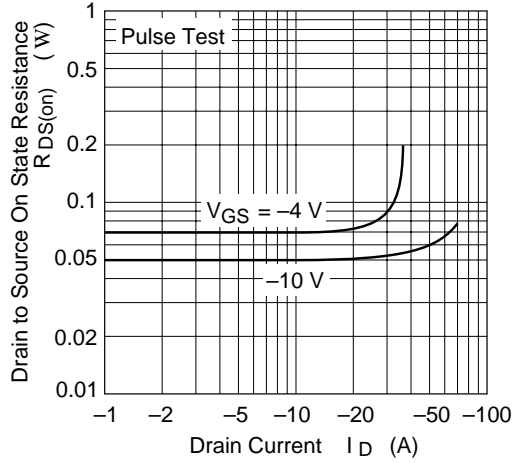
Main Characteristics



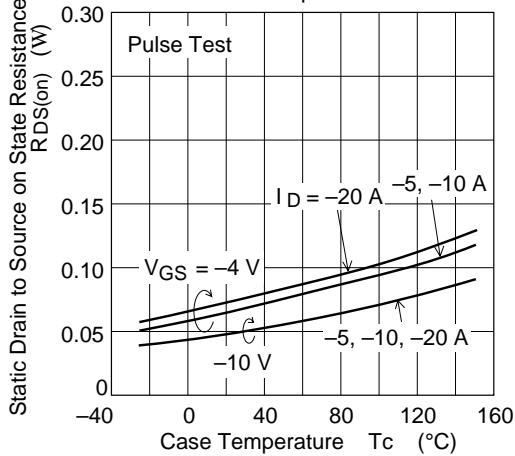
Drain to Source Saturation Voltage vs. Gate to Source Voltage



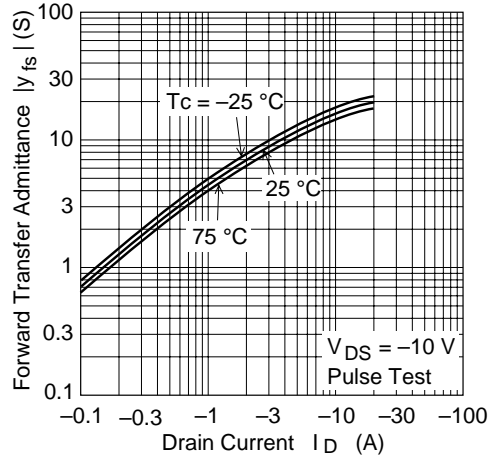
Static Drain to Source on State Resistance vs. Drain Current

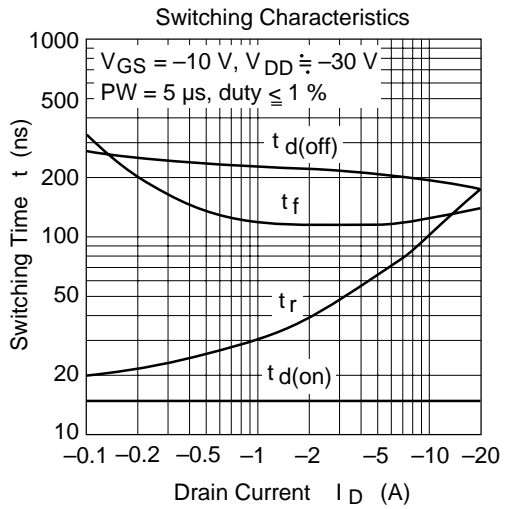
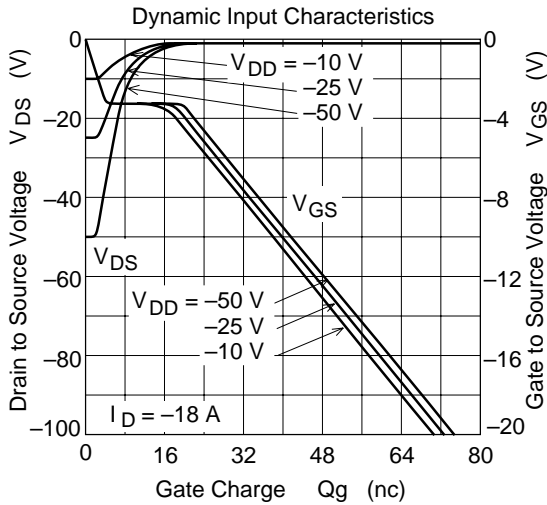
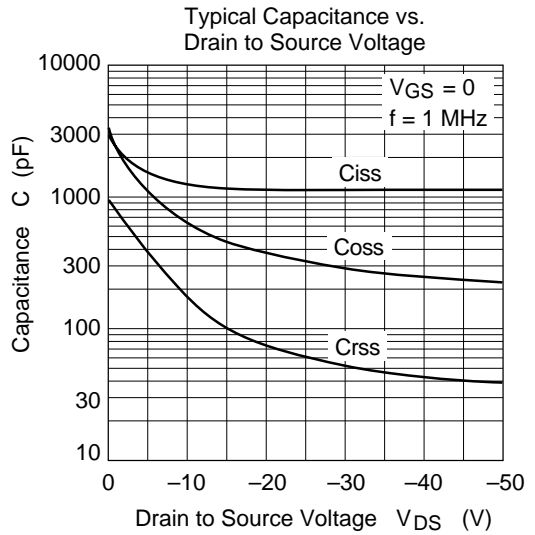
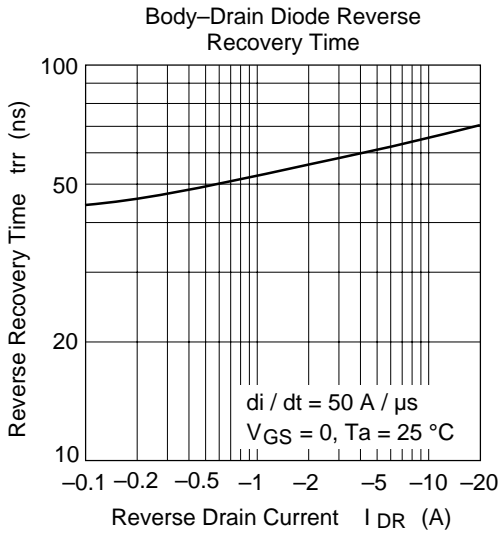


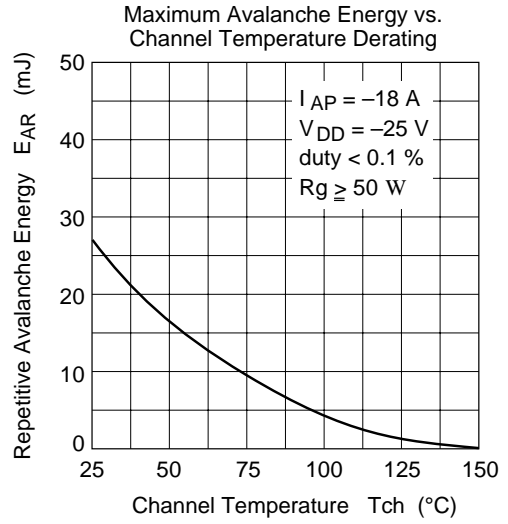
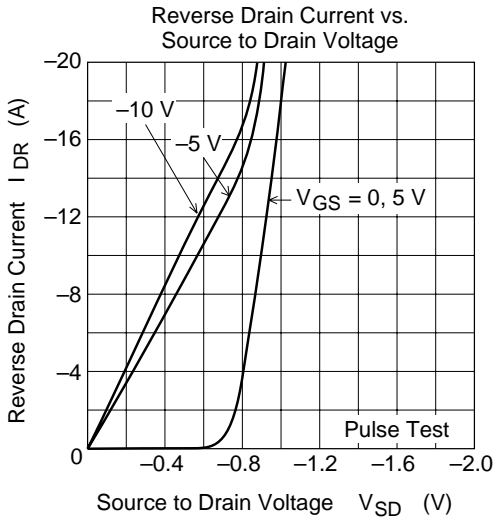
Static Drain to Source on State Resistance vs. Temperature



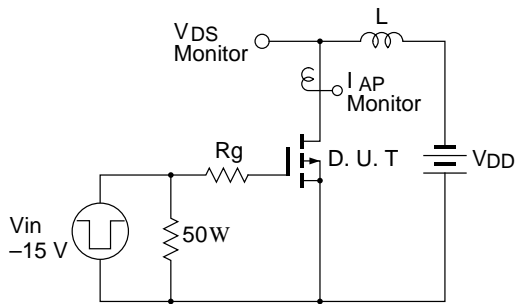
Forward Transfer Admittance vs. Drain Current





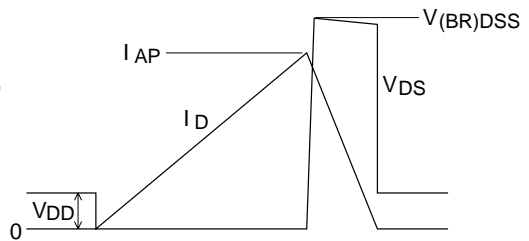


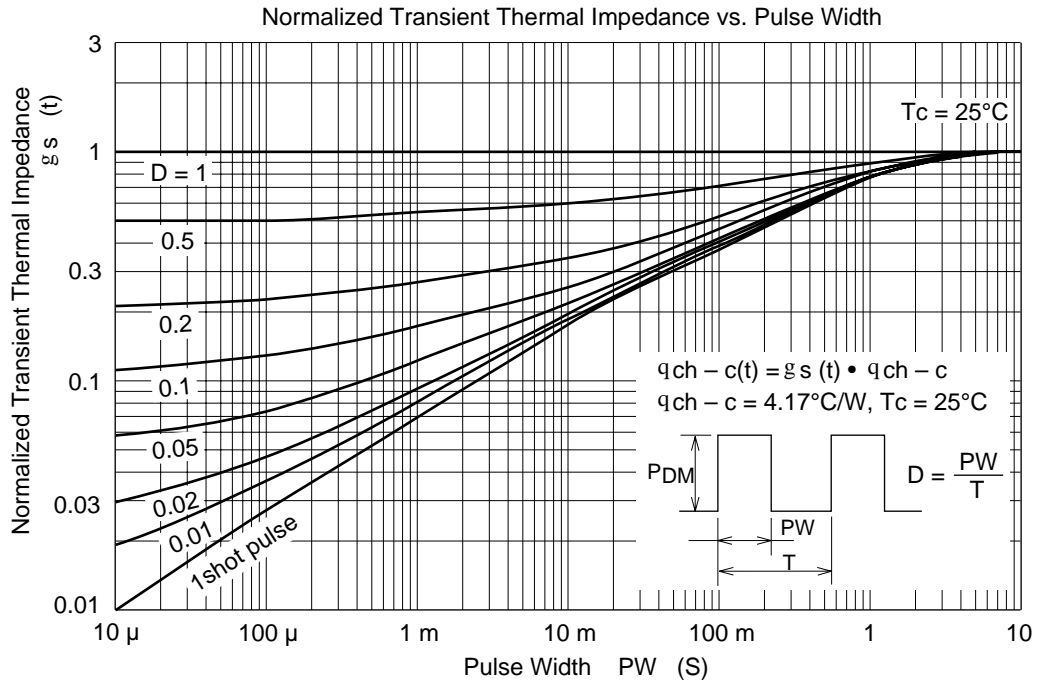
Avalanche Test Circuit



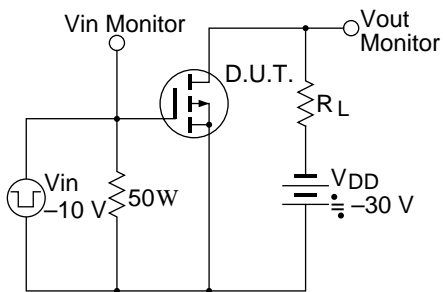
Avalanche Waveform

$$E_{AR} = \frac{1}{2} \cdot L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$

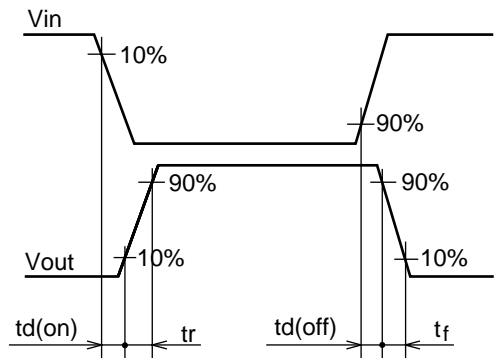




Switching Time Test Circuit



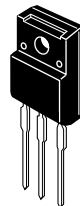
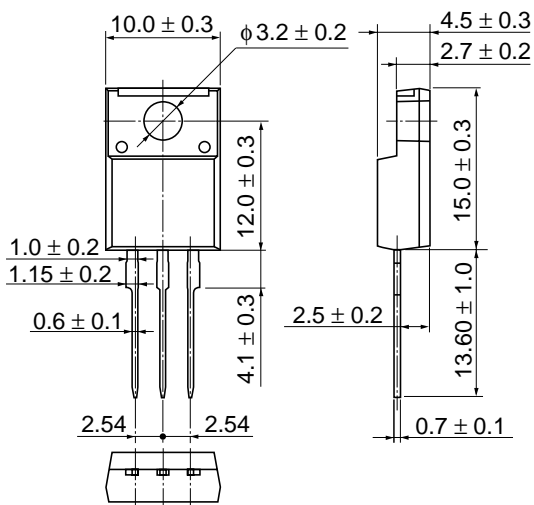
Waveform



Package Dimensions

As of January, 2001

Unit: mm



Hitachi Code	TO-220CFM
JEDEC	—
EIAJ	—
Mass (reference value)	1.9 g

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