

2SK2928

Silicon N Channel MOS FET
High Speed Power Switching

HITACHI

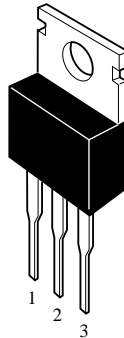
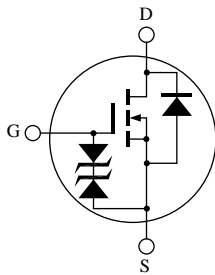
ADE-208-551B (Z)
3rd. Edition
Sep. 1997

Features

- Low on-resistance
 $R_{DS(on)} = 0.040\Omega$ typ.
- 4V gate drive devices.
- High speed switching

Outline

TO-220AB



1. Gate
2. Drain(Flange)
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	15	A
Drain peak current	$I_{D(pulse)}^{Note1}$	60	A
Body-drain diode reverse drain current	I_{DR}	15	A
Avalanche current	I_{AP}^{Note3}	15	A
Avalanche energy	E_{AR}^{Note3}	19	mJ
Channel dissipation	P_{ch}^{Note2}	40	W
Channel temperature	Tch	150	$^\circ\text{C}$
Storage temperature	Tstg	-55 to +150	$^\circ\text{C}$

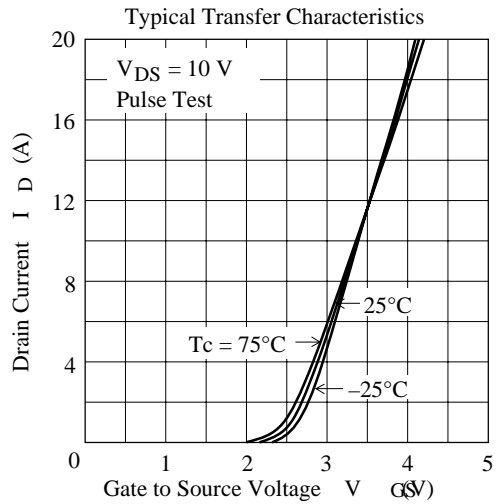
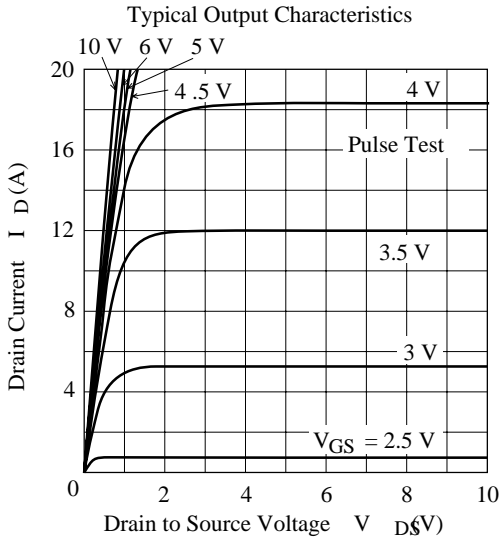
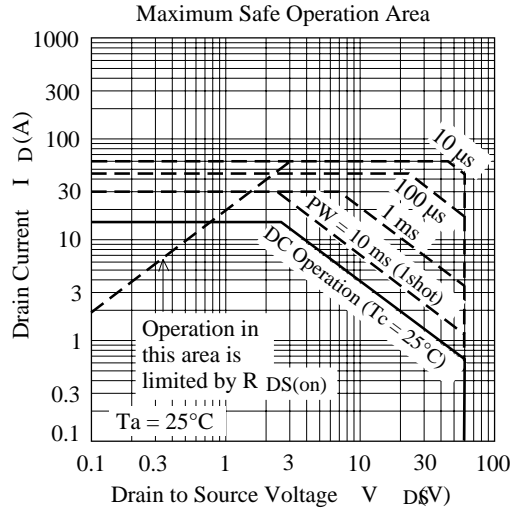
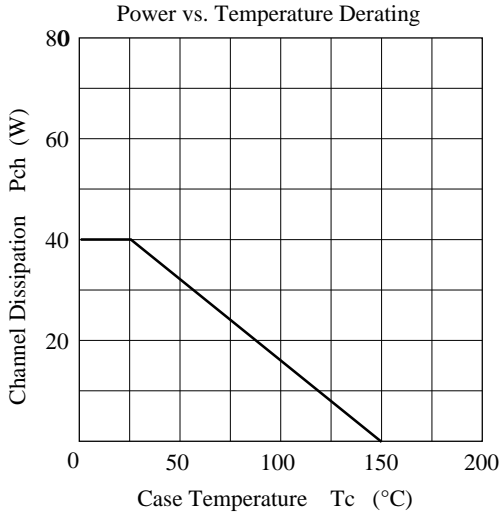
Note: 1. $PW \leq 10\mu\text{s}$, duty cycle $\leq 1\%$
2. Value at $T_a = 25^\circ\text{C}$
3. Value at Tch = 25°C , $R_g \geq 50\ \Omega$

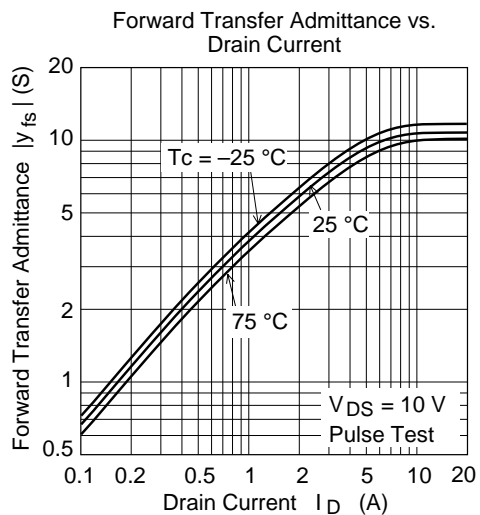
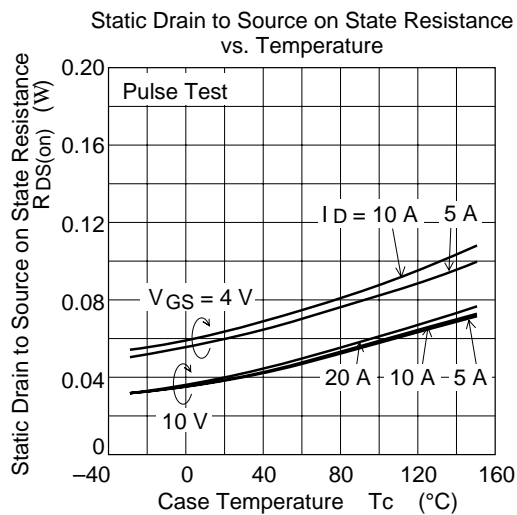
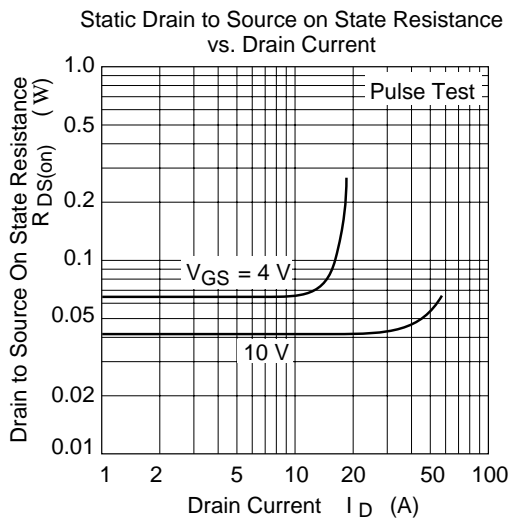
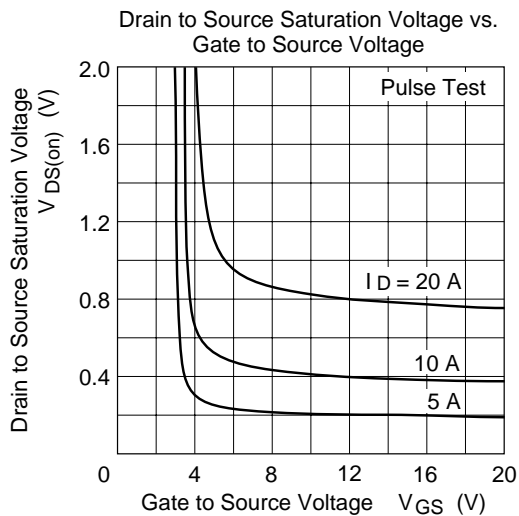
Electrical Characteristics (Ta = 25°C)

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	$V_{GS(off)}$	1.5	—	2.5	V	$I_D = 1\text{mA}, V_{DS} = 10\text{V}$
Static drain to source on state resistance	$R_{DS(on)}$	—	0.040	0.052	Ω	$I_D = 8\text{A}, V_{GS} = 10\text{V}$ ^{Note4}
	$R_{DS(on)}$	—	0.060	0.105	Ω	$I_D = 8\text{A}, V_{GS} = 4\text{V}$ ^{Note4}
Forward transfer admittance	$ y_{fs} $	7	11	—	S	$I_D = 8\text{A}, V_{DS} = 10\text{V}$ ^{Note4}
Input capacitance	C_{iss}	—	500	—	pF	$V_{DS} = 10\text{V}$
Output capacitance	C_{oss}	—	260	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	C_{rss}	—	110	—	pF	$f = 1\text{MHz}$
Turn-on delay time	$t_{d(on)}$	—	10	—	ns	$V_{GS} = 10\text{V}, I_D = 8\text{A}$
Rise time	t_r	—	80	—	ns	$R_L = 3.75\Omega$
Turn-off delay time	$t_{d(off)}$	—	100	—	ns	
Fall time	t_f	—	110	—	ns	
Body-drain diode forward voltage	V_{DF}	—	0.9	—	V	$I_F = 15\text{A}, V_{GS} = 0$
Body-drain diode reverse recovery time	t_{rr}	—	50	—	ns	$I_F = 15\text{A}, V_{GS} = 0$ $diF/dt = 50\text{A}/\mu\text{s}$

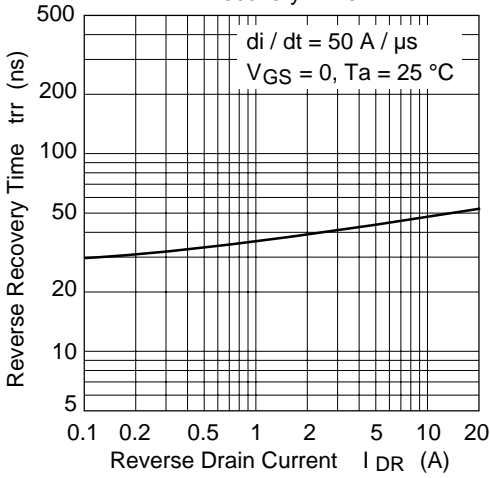
Note: 4. Pulse test

Main Characteristics

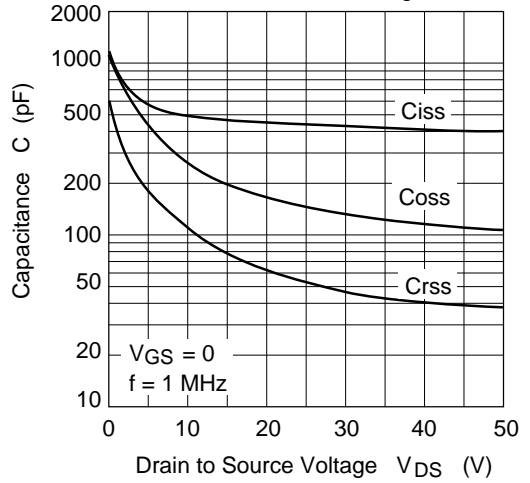




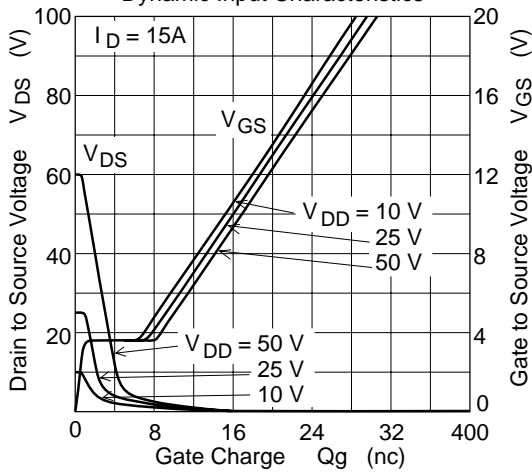
Body-Drain Diode Reverse Recovery Time



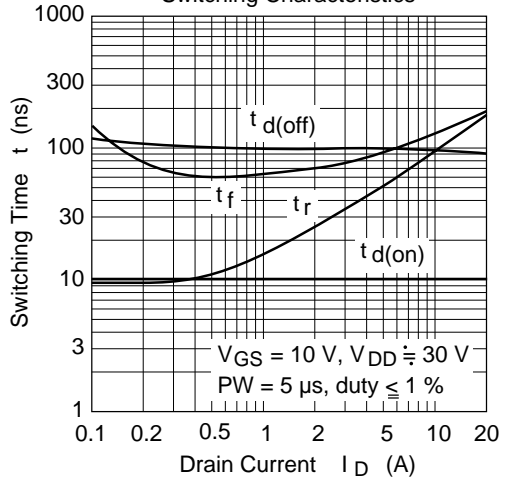
Typical Capacitance vs. Drain to Source Voltage

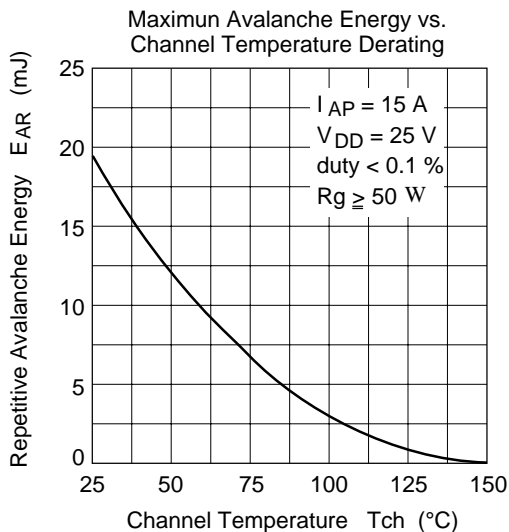
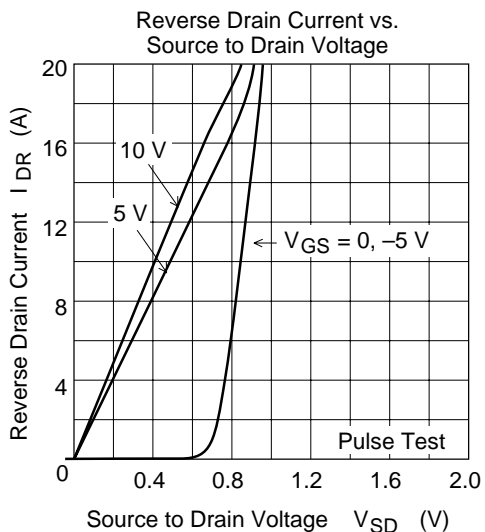


Dynamic Input Characteristics

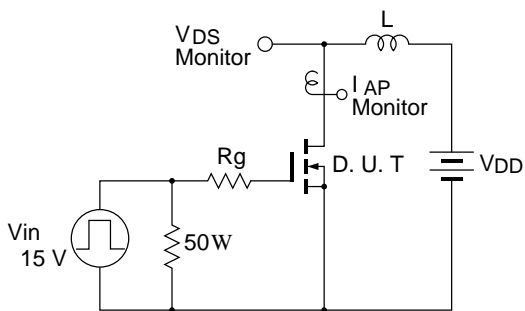


Switching Characteristics



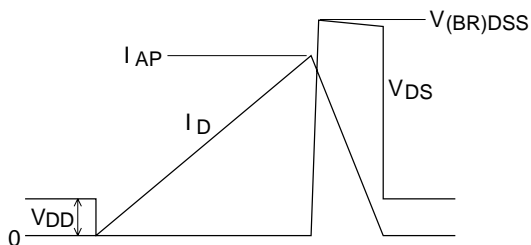


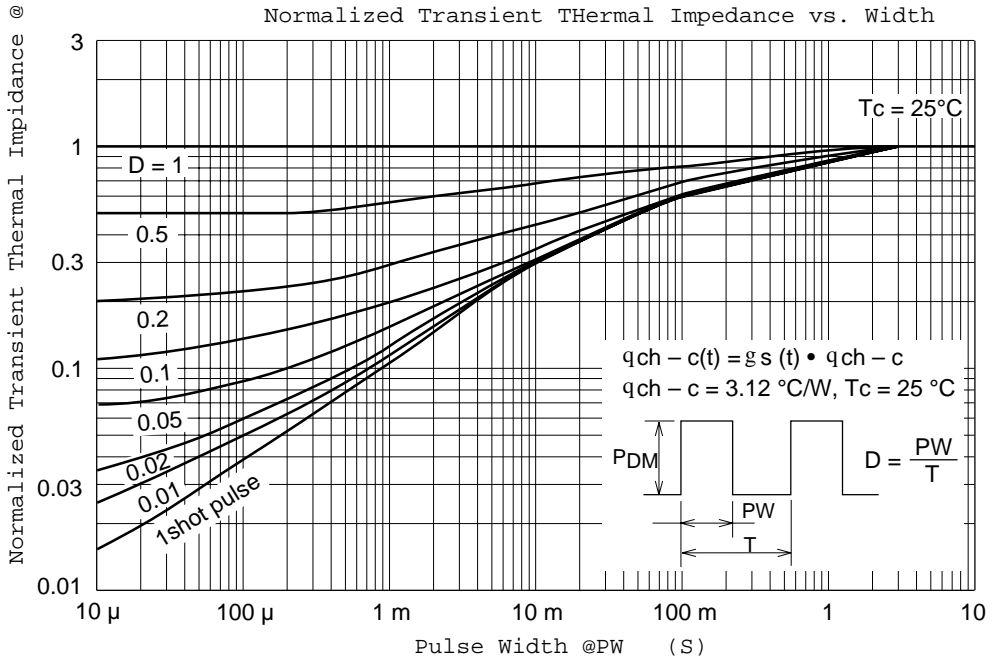
Avalanche Test Circuit



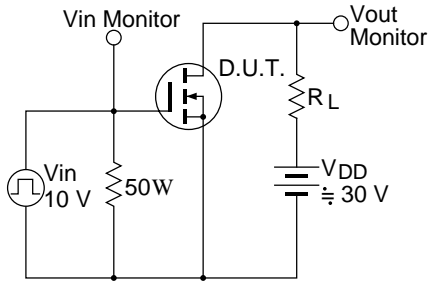
Avalanche Waveform

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

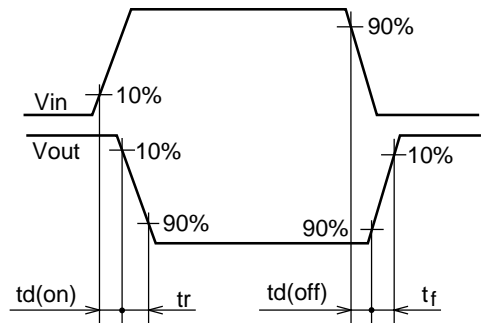




Switching Time Test Circuit

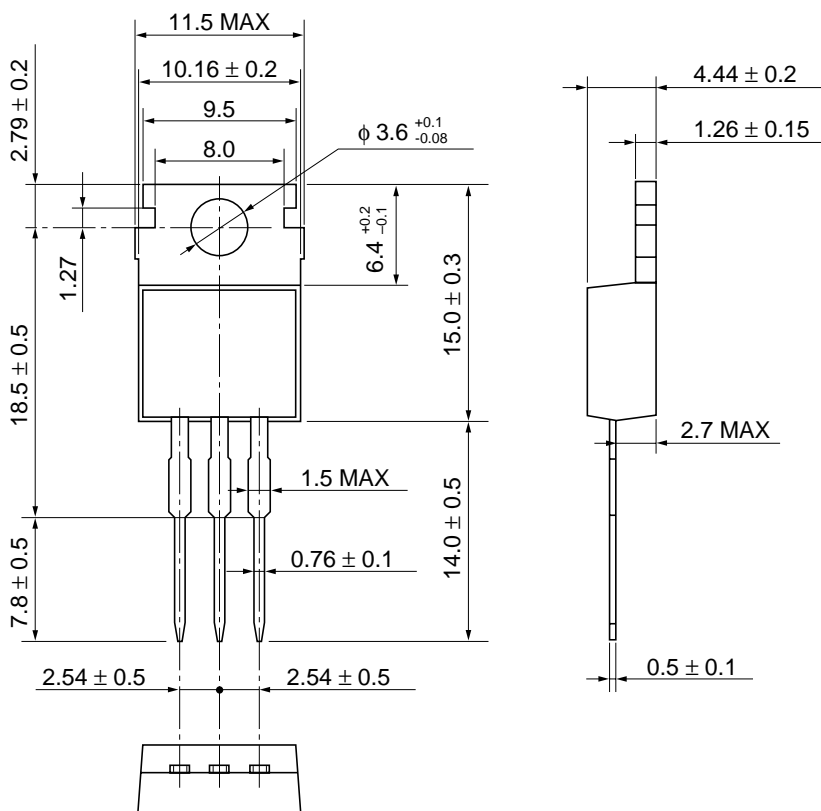


Waveform



Package Dimensions

As of January, 2001
Unit: mm



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

Cautions

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