

To all our customers

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Renesas Technology Corp.  
Customer Support Dept.  
April 1, 2003

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Keep safety first in your circuit designs!

1. Renesas Technology Corporation puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.

Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

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# 2SK2959

Silicon N Channel MOS FET  
High Speed Power Switching

**RENESAS**

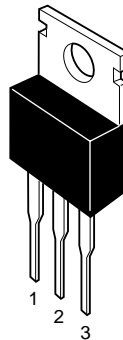
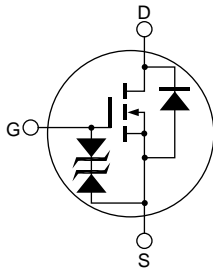
ADE-208-569C (Z)  
4th. Edition  
Jul. 1998

## Features

- Low on-resistance  
 $R_{DS(on)} = 7m\Omega$  typ.
- 4V gate drive devices.
- High speed switching

## Outline

TO-220AB



1. Gate
2. Drain (Flange)
3. Source

## Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	$V_{DSS}$	30	V
Gate to source voltage	$V_{GSS}$	±20	V
Drain current	$I_D$	50	A
Drain peak current	$I_{D(pulse)}$ <sup>Note1</sup>	200	A
Body-drain diode reverse drain current	$I_{DR}$	50	A
Channel dissipation	Pch <sup>Note2</sup>	75	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	-55 to +150	°C

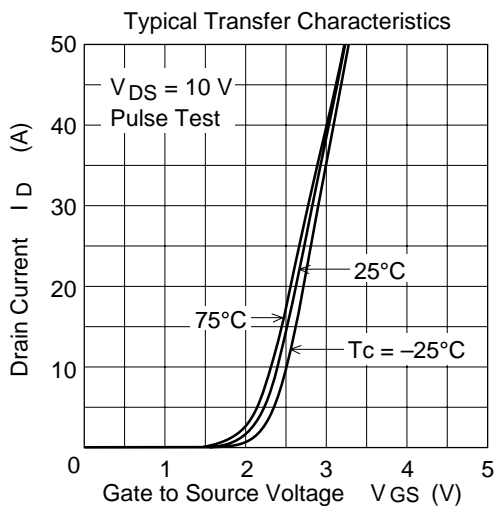
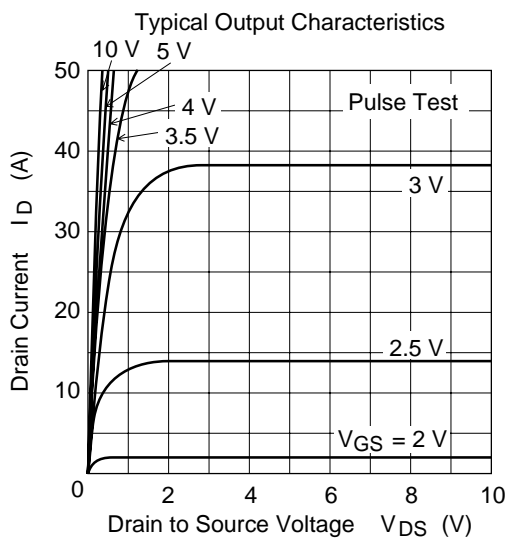
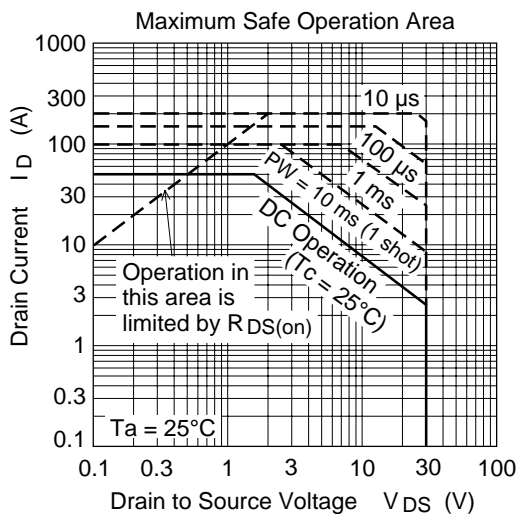
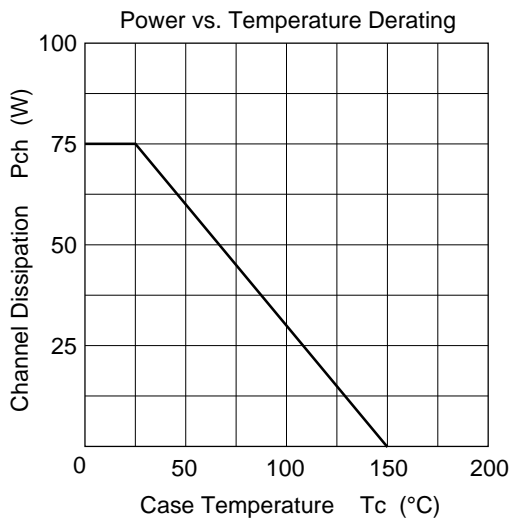
Note: 1.  $PW \leq 10\mu s$ , duty cycle  $\leq 1\%$   
 2. Value at  $T_c = 25^\circ C$

## Electrical Characteristics (Ta = 25°C)

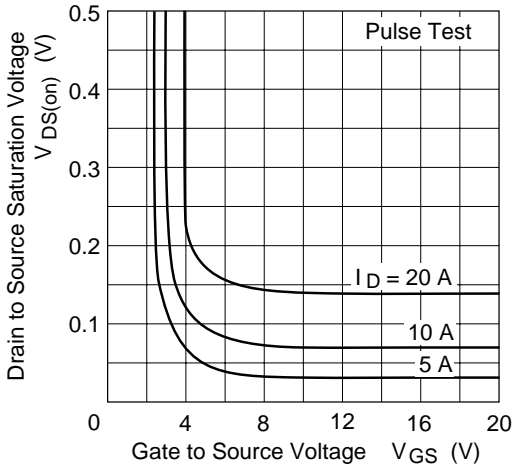
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	30	—	—	V	$I_D = 10mA, V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	±20	—	—	V	$I_G = \pm 100\mu A, V_{DS} = 0$
Zero gate voltage drain current	$I_{DSS}$	—	—	10	μA	$V_{DS} = 30V, V_{GS} = 0$
Gate to source leak current	$I_{GSS}$	—	—	±10	μA	$V_{GS} = \pm 16V, V_{DS} = 0$
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	$R_{DS(on)}$	—	7.0	10	mΩ	$I_D = 25A, V_{GS} = 10V$ <sup>Note3</sup>
Static drain to source on state resistance	$R_{DS(on)}$	—	12	18	mΩ	$I_D = 25A, V_{GS} = 4V$ <sup>Note3</sup>
Forward transfer admittance	$ y_{fs} $	25	45	—	S	$I_D = 25A, V_{DS} = 10V$ <sup>Note3</sup>
Input capacitance	Ciss	—	2000	—	pF	$V_{DS} = 10V$
Output capacitance	Coss	—	1500	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	Crss	—	350	—	pF	$f = 1MHz$
Turn-on delay time	$t_{d(on)}$	—	20	—	ns	$V_{GS} = 10V, I_D = 25A$
Rise time	$t_r$	—	330	—	ns	$R_L = 0.4\Omega$
Turn-off delay time	$t_{d(off)}$	—	190	—	ns	
Fall time	$t_f$	—	190	—	ns	
Body-drain diode forward voltage	$V_{DF}$	—	0.95	—	V	$I_F = 50A, V_{GS} = 0$
Body-drain diode reverse recovery time	$t_{rr}$	—	60	—	ns	$I_F = 50A, V_{GS} = 0$ $diF/dt = 50A/\mu s$

Note: 3. Pulse test

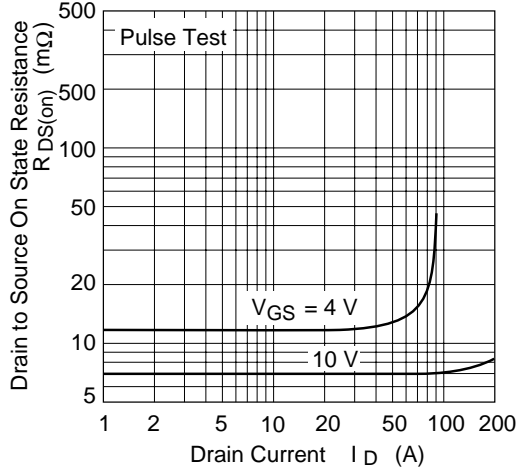
## Main Characteristics



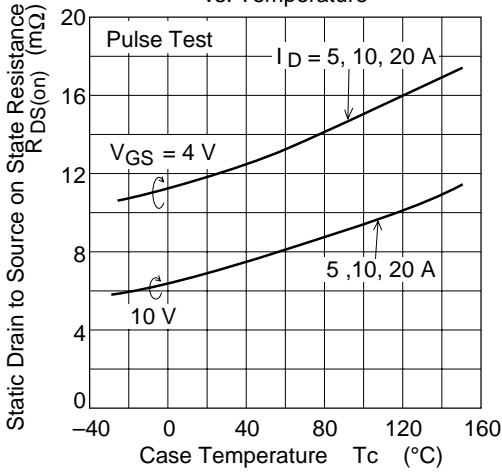
Drain to Source Saturation Voltage vs. Gate to Source Voltage



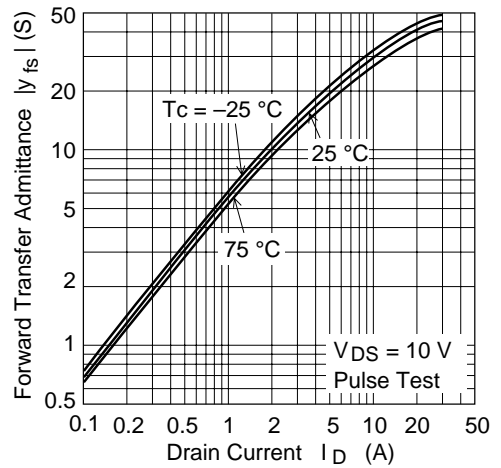
Static Drain to Source on State Resistance vs. Drain Current



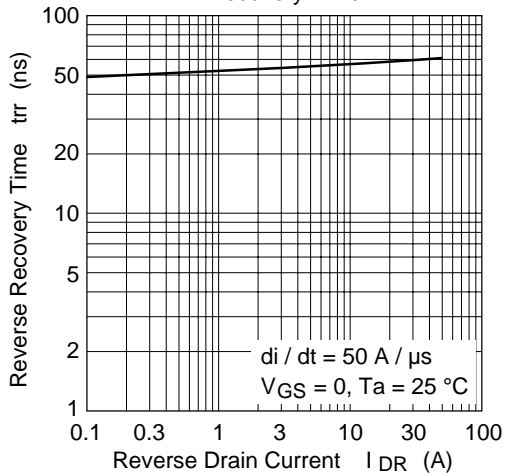
Static Drain to Source on State Resistance vs. Temperature



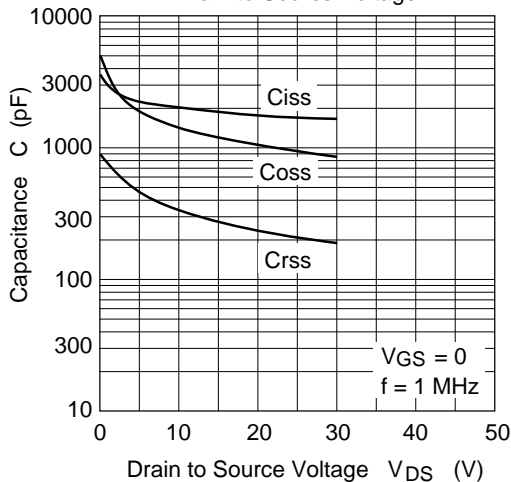
Forward Transfer Admittance vs. Drain Current



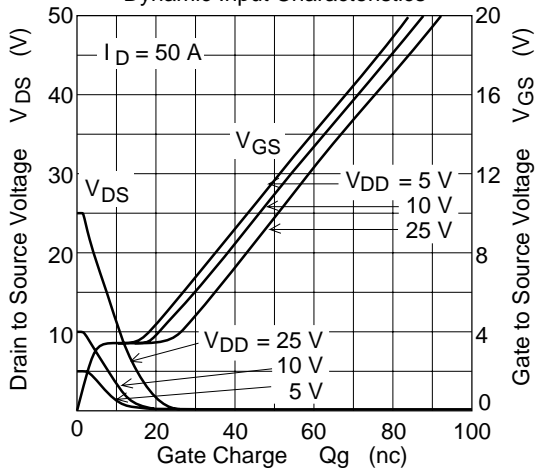
Body-Drain Diode Reverse Recovery Time



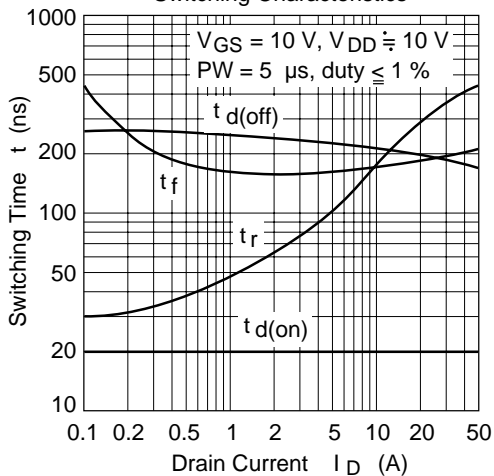
Typical Capacitance vs. Drain to Source Voltage

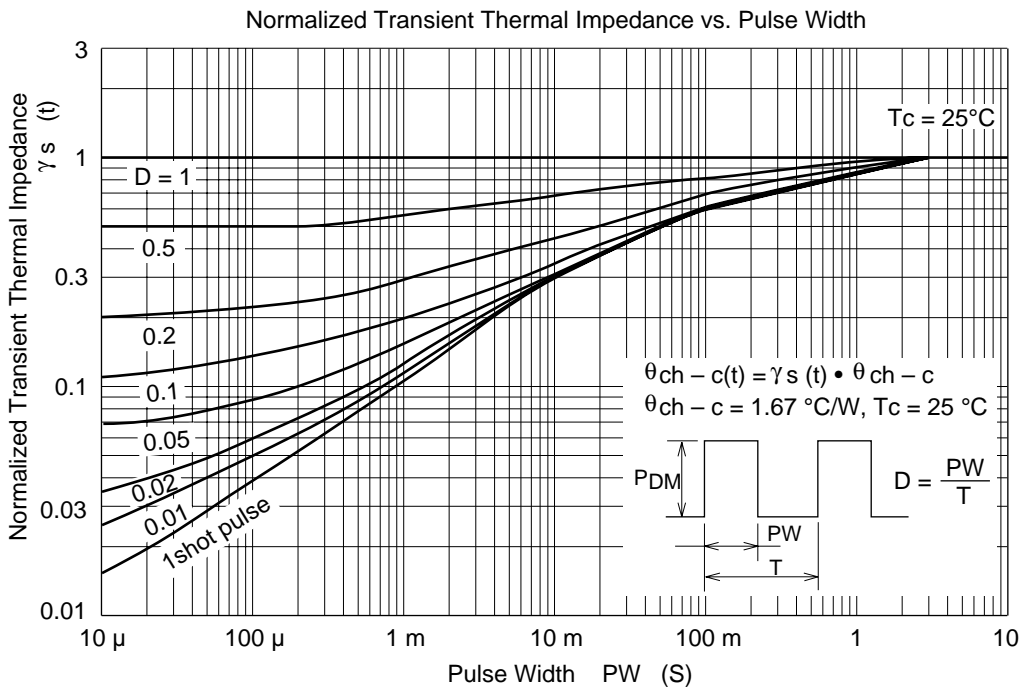
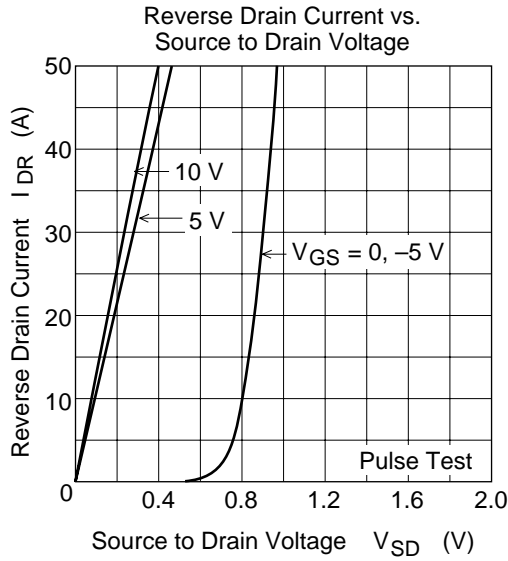


Dynamic Input Characteristics

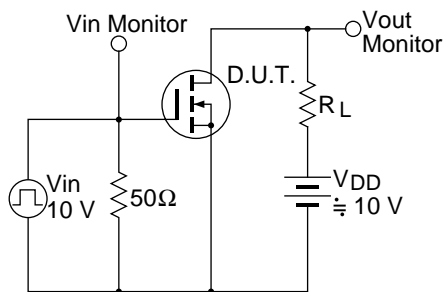


Switching Characteristics

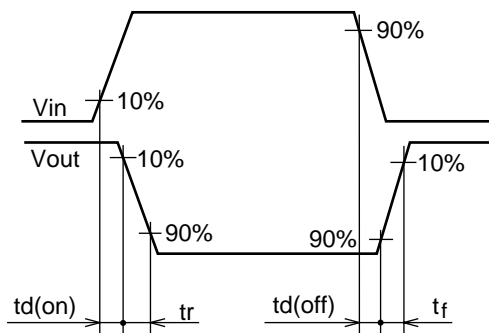




Switching Time Test Circuit

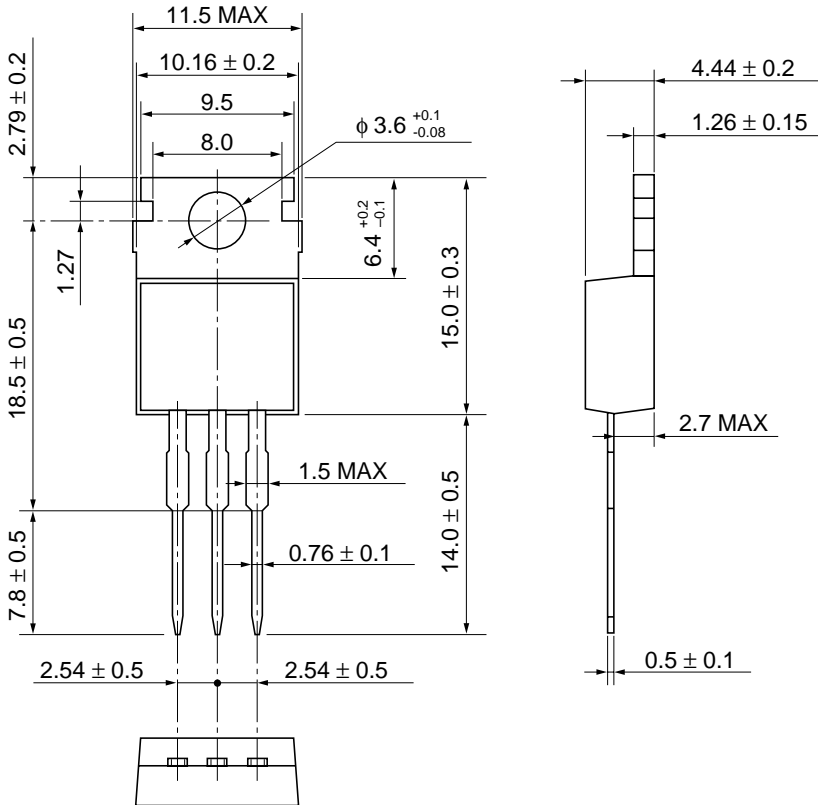


Waveform



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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