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

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Keep safety first in your circuit designs!

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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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2SK2800

Silicon N Channel MOS FET High Speed Power Switching

RENESAS

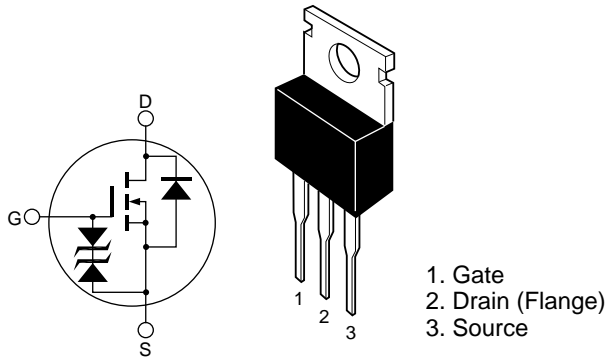
ADE-208-513G (Z)
8th. Edition
Jul. 1998

Features

- Low on-resistance
 $R_{DS(on)} = 15 \text{ m}\Omega$ typ.
- High speed switching
- Low drive current
- 4V gate drive device can be driven from 5V source

Outline

TO-220AB



Absolute Maximum Ratings (Ta = 25°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	40	A
Drain peak current	I _{D(pulse)} ^{Note1}	160	A
Body-drain diode reverse drain current	I _{DR}	40	A
Avalanche current	I _{AP} ^{Note3}	40	A
Avalanche energy	E _{AR} ^{Note3}	137	mJ
Channel dissipation	Pch ^{Note2}	50	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	-55 to +150	°C

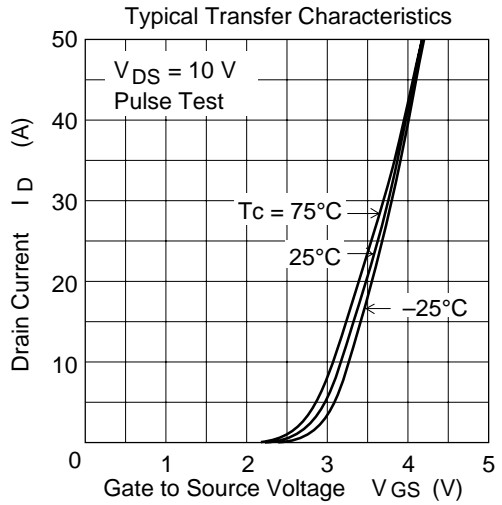
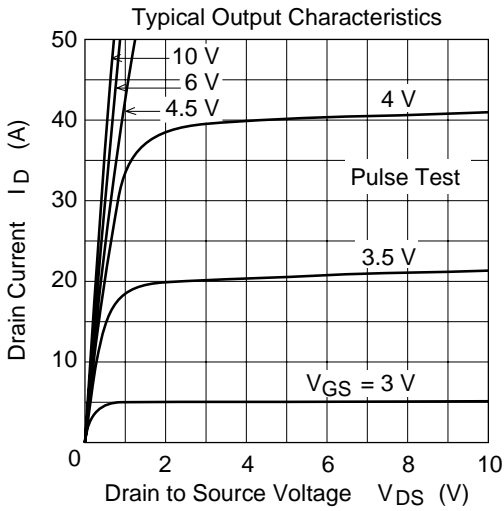
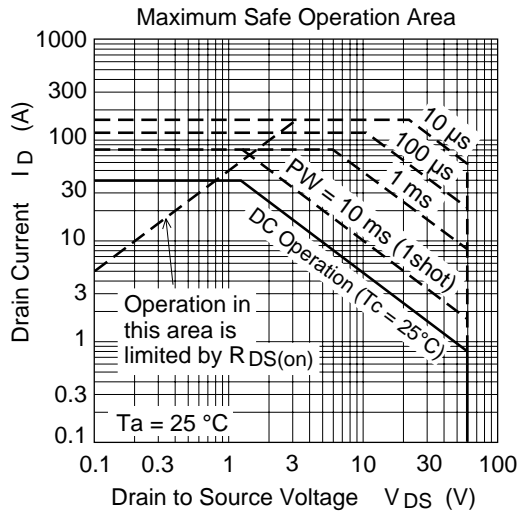
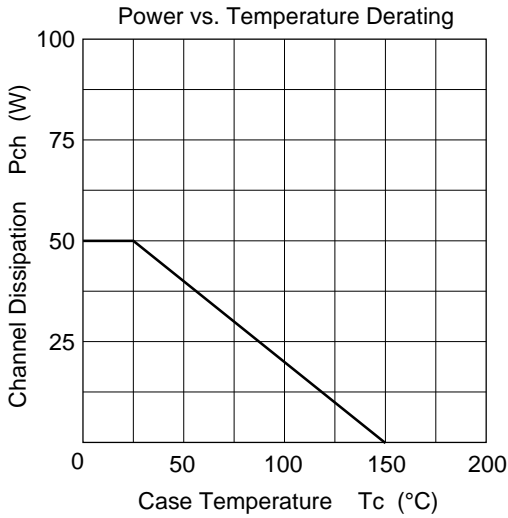
Note: 1. PW ≤ 10μs, duty cycle ≤ 1 %
2. Value at Tc = 25°C
3. Value at Tch = 25°C, Rg 50Ω

Electrical Characteristics (Ta = 25°C)

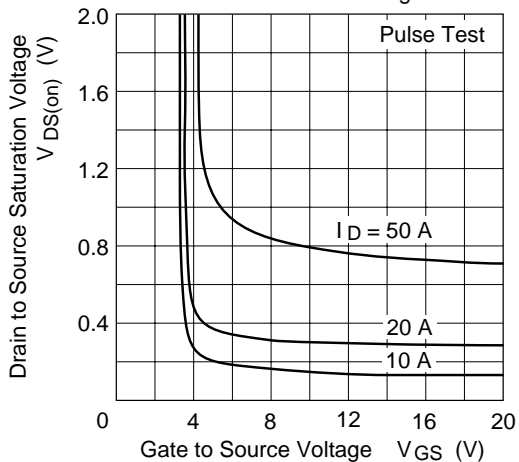
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	60	—	—	V	$I_D = 10\text{mA}$, $V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	± 20	—	—	V	$I_G = \pm 100\mu\text{A}$, $V_{DS} = 0$
Gate to source leak current	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 16\text{V}$, $V_{DS} = 0$
Zero gate voltage drain current	I_{DSS}	—	—	10	μA	$V_{DS} = 60\text{V}$, $V_{GS} = 0$
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	$R_{DS(on)}$	—	15	20	$\text{m}\Omega$	$I_D = 20\text{A}$, $V_{GS} = 10\text{V}$ ^{Note4}
	$R_{DS(on)}$	—	25	40	$\text{m}\Omega$	$I_D = 20\text{A}$, $V_{GS} = 4\text{V}$ ^{Note4}
Forward transfer admittance	$ y_{fs} $	20	35	—	S	$I_D = 20\text{A}$, $V_{DS} = 10\text{V}$ ^{Note4}
Input capacitance	Ciss	—	1500	—	pF	$V_{DS} = 10\text{V}$
Output capacitance	Coss	—	720	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	Crss	—	200	—	pF	$f = 1\text{MHz}$
Turn-on delay time	$t_{d(on)}$	—	20	—	ns	$I_D = 20\text{A}$, $R_L = 1.5\Omega$
Rise time	t_r	—	180	—	ns	$V_{GS} = 10\text{V}$
Turn-off delay time	$t_{d(off)}$	—	200	—	ns	
Fall time	t_f	—	200	—	ns	
Body-drain diode forward voltage	V_{DF}	—	0.95	—	V	$I_F = 40\text{A}$, $V_{GS} = 0$
Body-drain diode reverse recovery time	t_{rr}	—	70	—	V	$I_F = 40\text{A}$, $V_{GS} = 0$ $diF/dt = 50\text{A}/\mu\text{s}$

Note: 4. Pulse test

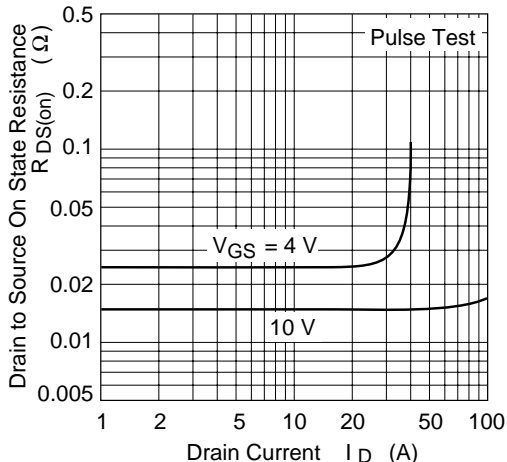
Main Characteristics



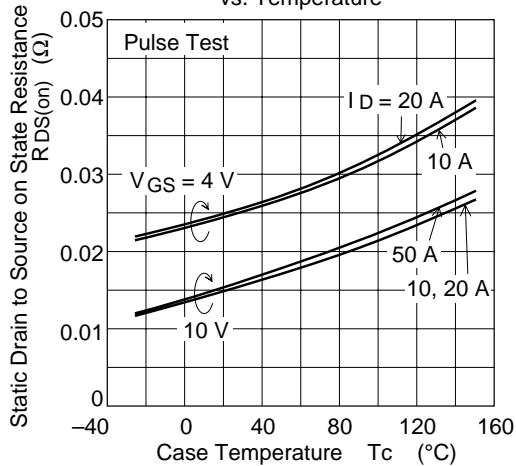
Drain to Source Saturation Voltage vs. Gate to Source Voltage



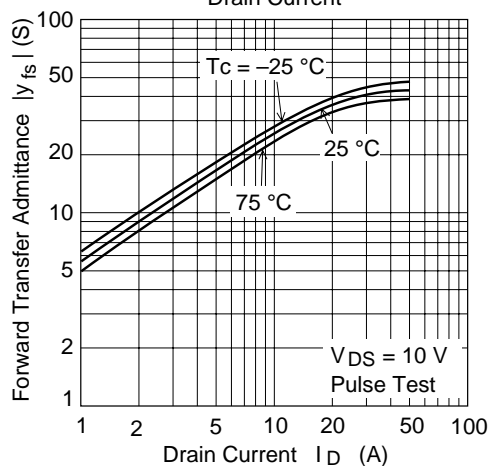
Static Drain to Source on State Resistance vs. Drain Current



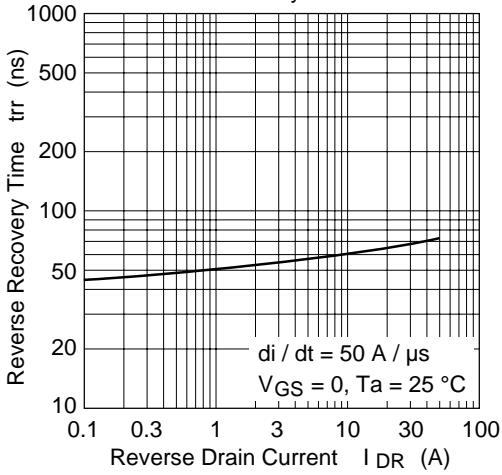
Static Drain to Source on State Resistance vs. Temperature



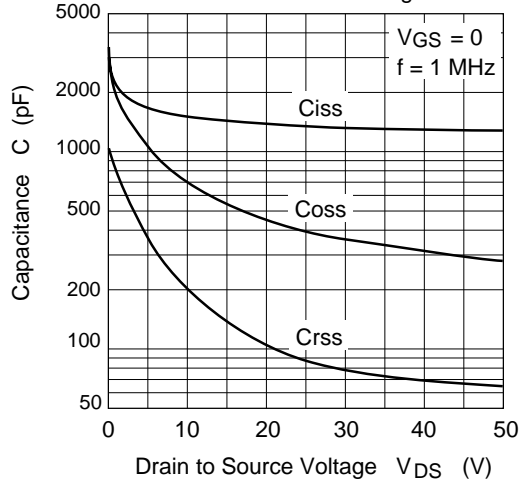
Forward Transfer Admittance vs. Drain Current



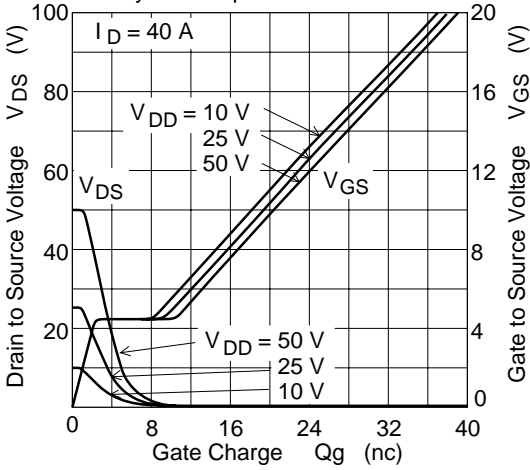
Body-Drain Diode Reverse Recovery Time



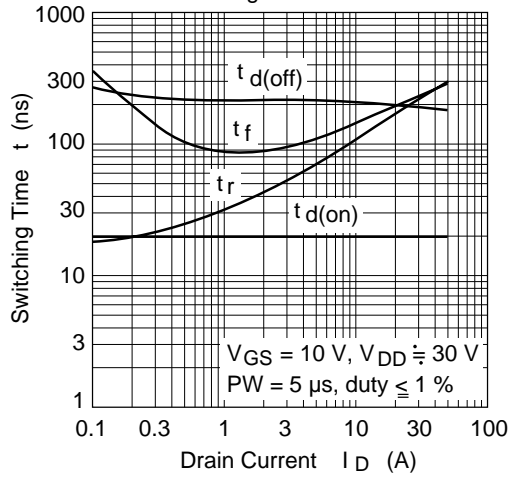
Typical Capacitance vs. Drain to Source Voltage



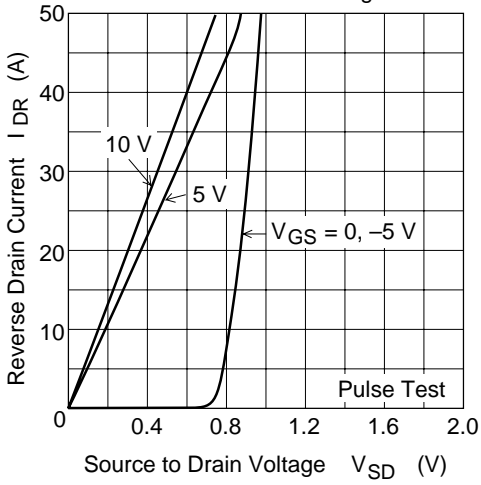
Dynamic Input Characteristics



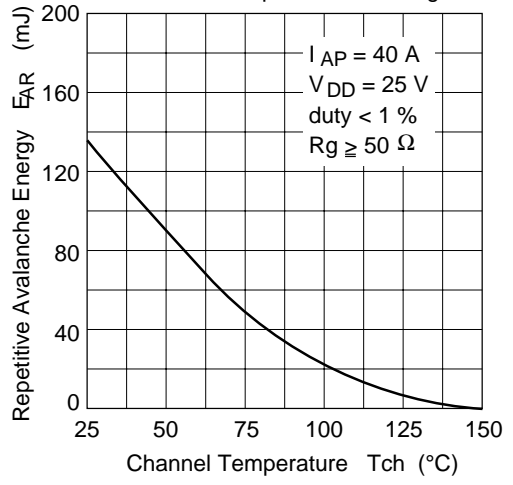
Switching Characteristics



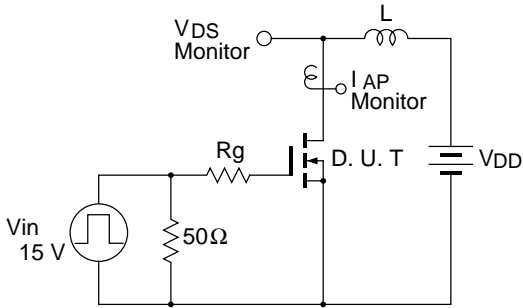
Reverse Drain Current vs. Source to Drain Voltage



Maximum Avalanche Energy vs. Channel Temperature Derating

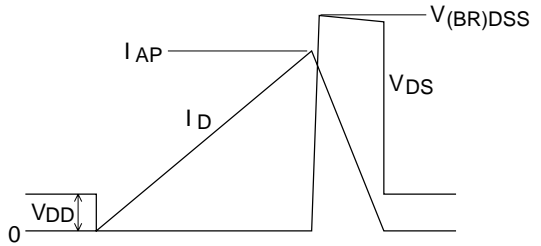


Avalanche Test Circuit

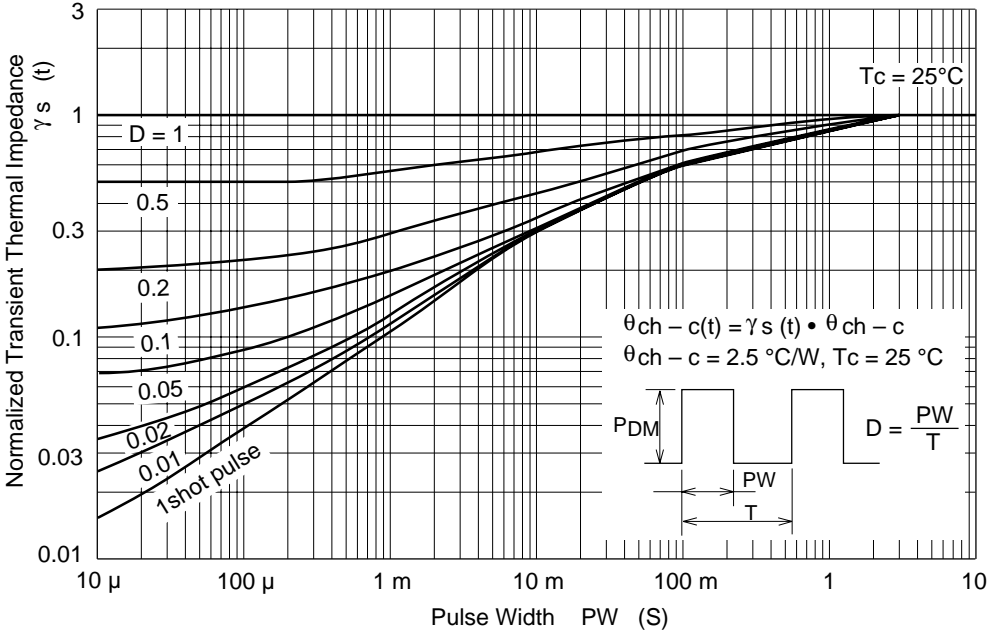


Avalanche Waveform

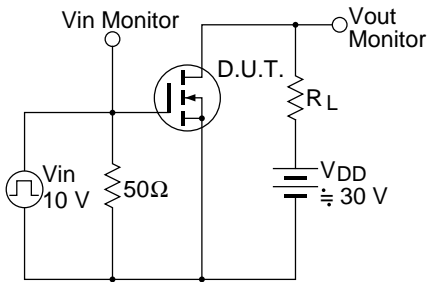
$$E_{AR} = \frac{1}{2} \cdot L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$



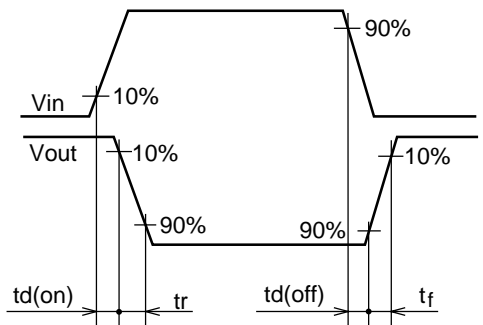
Normalized Transient Thermal Impedance vs. Pulse Width



Switching Time Test Circuit



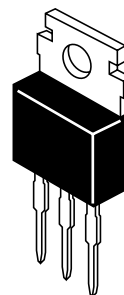
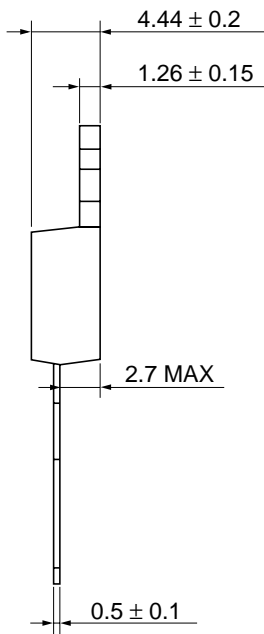
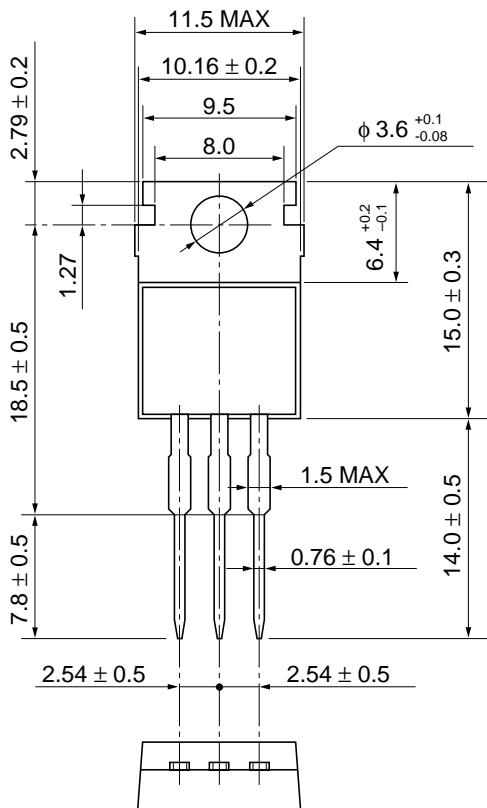
Waveform



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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