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

Cautions

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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H7N0312AB

Silicon N Channel MOS FET
High Speed Power Switching

RENESAS

ADE-208-1571B(Z)

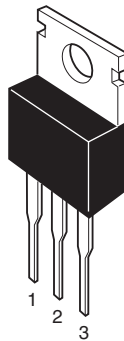
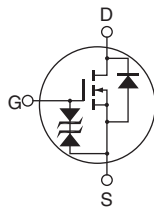
3rd. Edition
Aug. 2002

Features

- Low on-resistance
- $R_{DS(on)} = 2.6\text{m}\Omega$ typ.
- Low drive current
- 4.5 V gate drive device can be driven from 5 V source

Outline

TO-220AB



1. Gate
2. Drain
(Frangé)
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	85	A
Drain peak current	I _{D(pulse)} ^{Note 1}	340	A
Body-drain diode reverse drain current	I _{DR}	85	A
Channel dissipation	Pch ^{Note 2}	125	W
Channel to Case Thermal Impedance	θch-c	1.0	°C/W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	–55 to +150	°C

Notes: 1. PW ≤ 10 μs, duty cycle ≤ 1 %

2. Value at Tc = 25°C

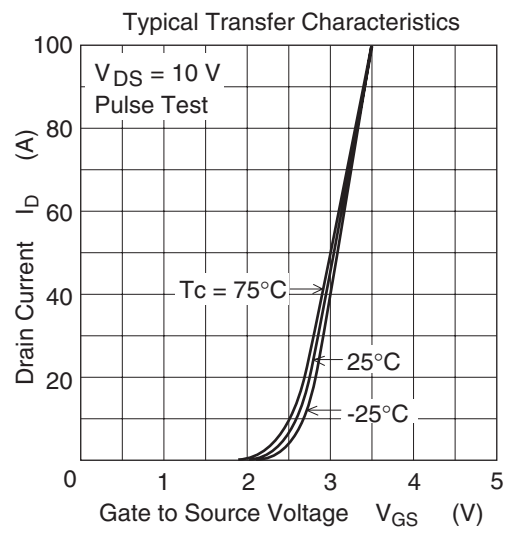
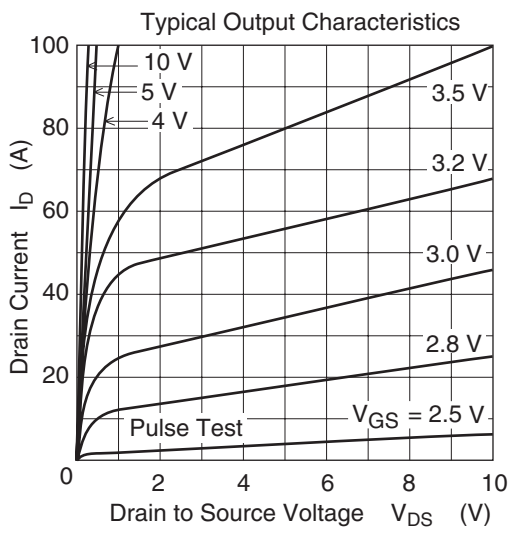
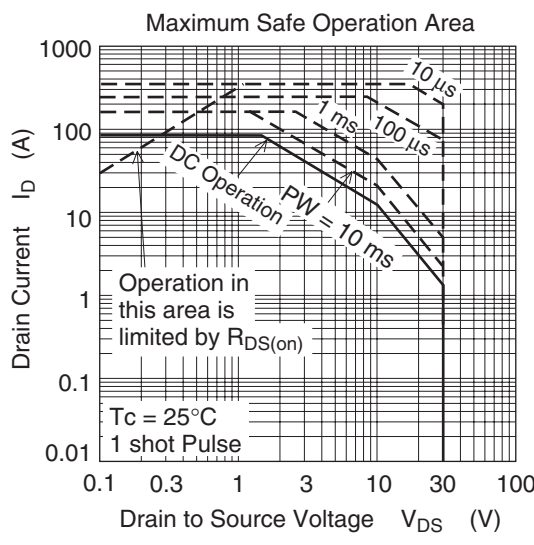
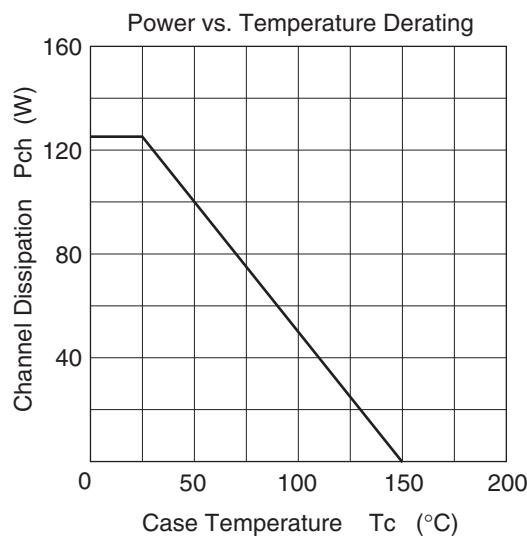
Electrical Characteristics

(Ta = 25°C)

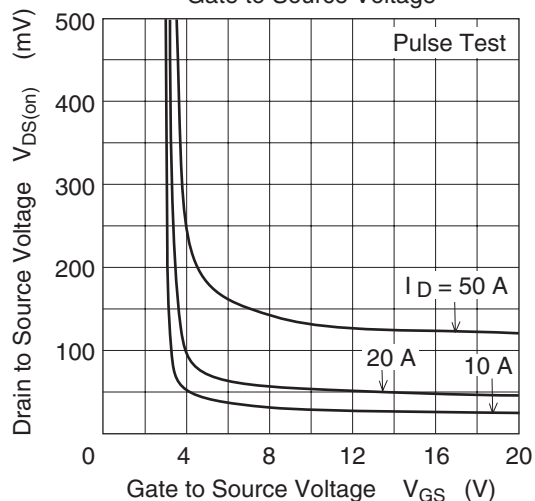
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	30	—	—	V	$I_D = 10 \text{ mA}$, $V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	±20	—	—	V	$I_G = \pm 100 \text{ } \mu\text{A}$, $V_{DS} = 0$
Gate to source leak current	I_{GSS}	—	—	±10	μA	$V_{GS} = \pm 16 \text{ V}$, $V_{DS} = 0$
Zero gate voltage drain current	I_{DSS}	—	—	10	μA	$V_{DS} = 30 \text{ V}$, $V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	1.0	—	2.5	V	$I_D = 1 \text{ mA}$, $V_{DS} = 10 \text{ V}$ ^{Note1}
Static drain to source on state resistance	$R_{DS(on)}$	—	2.6	3.3	mΩ	$I_D = 42.5 \text{ A}$, $V_{GS} = 10 \text{ V}$ ^{Note1}
		—	4.0	5.8	mΩ	$I_D = 42.5 \text{ A}$, $V_{GS} = 4.5 \text{ V}$ ^{Note1}
Forward transfer admittance	$ y_{fs} $	75	125	—	S	$I_D = 42.5 \text{ A}$, $V_{DS} = 10 \text{ V}$ ^{Note1}
Input capacitance	C_{iss}	—	6900	—	pF	$V_{DS} = 10 \text{ V}$
Output capacitance	C_{oss}	—	1750	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	C_{rss}	—	820	—	pF	$f = 1 \text{ MHz}$
Total gate charge	Q_g	—	115	—	nc	$V_{DD} = 10 \text{ V}$
Gate to source charge	Q_{gs}	—	24	—	nc	$V_{GS} = 10 \text{ V}$
Gate to drain charge	Q_{gd}	—	24	—	nc	$I_D = 85 \text{ A}$
Turn-on delay time	$t_{d(on)}$	—	45	—	ns	$V_{GS} = 10 \text{ V}$, $I_D = 42.5 \text{ A}$
Rise time	t_r	—	380	—	ns	$R_L = 0.24 \text{ } \Omega$
Turn-off delay time	$t_{d(off)}$	—	125	—	ns	$R_g = 4.7 \text{ } \Omega$
Fall time	t_f	—	50	—	ns	
Body-drain diode forward voltage	V_{DF}	—	0.92	—	V	$I_F = 85 \text{ A}$, $V_{GS} = 0$
Body-drain diode reverse recovery time	t_{rr}	—	75	—	ns	$I_F = 85 \text{ A}$, $V_{GS} = 0$ $di_F/dt = 50 \text{ A}/\mu\text{s}$

Notes: 1. Pulse test

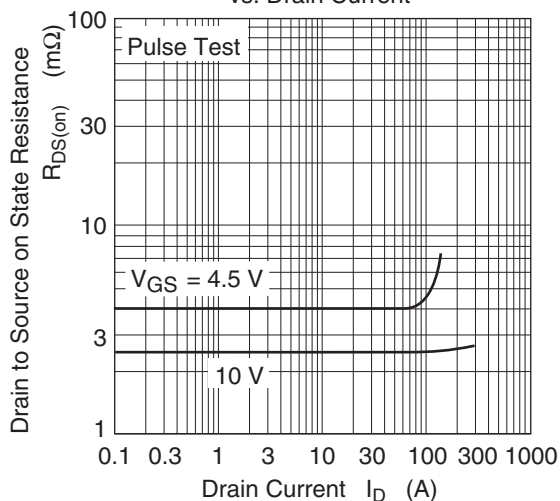
Main Characteristics



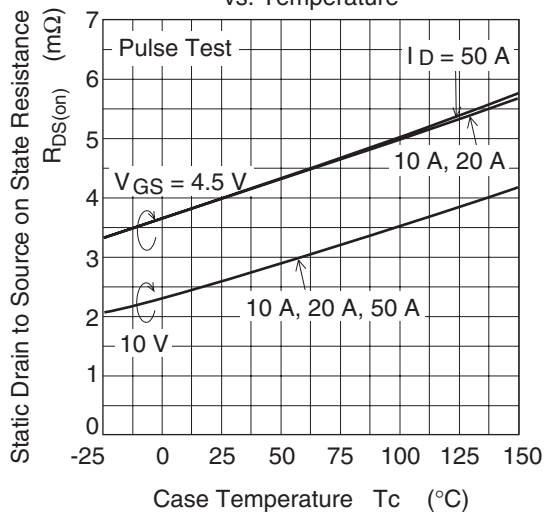
Drain to Source Saturation Voltage vs.
Gate to Source Voltage



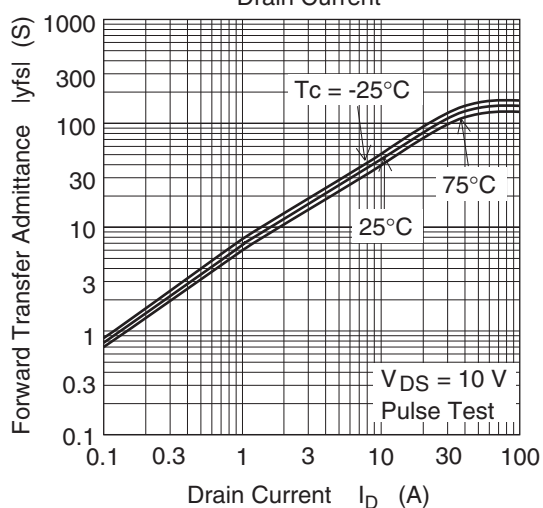
Static Drain to Source on State Resistance
vs. Drain Current



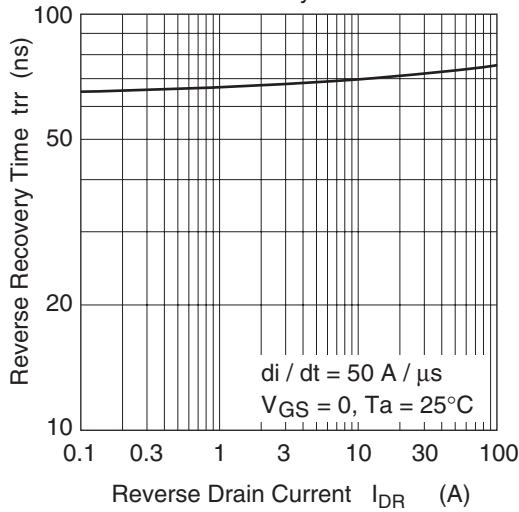
Static Drain to Source on State Resistance
vs. Temperature



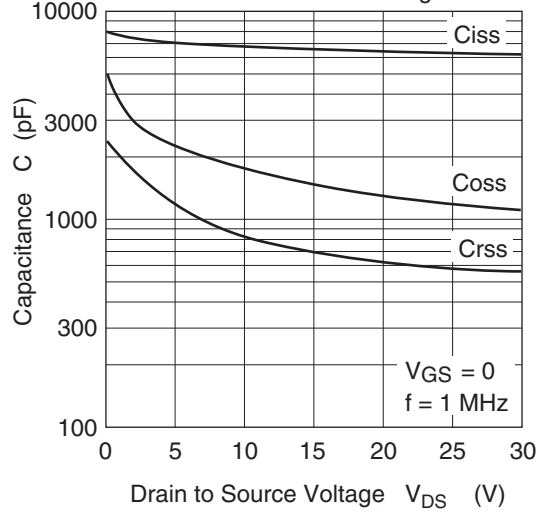
Forward Transfer Admittance vs.
Drain Current



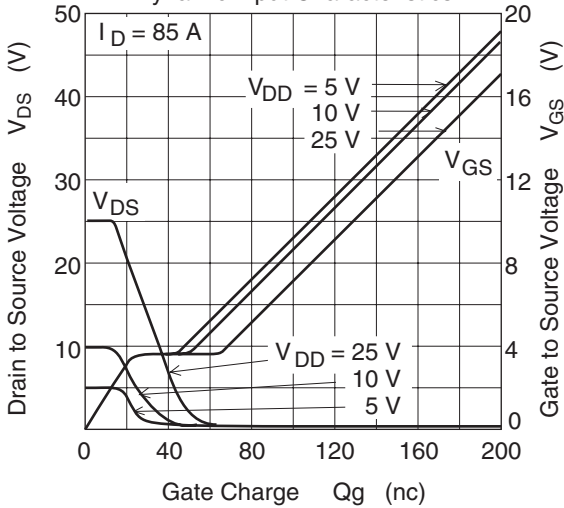
Body-Drain Diode Reverse
Recovery Time



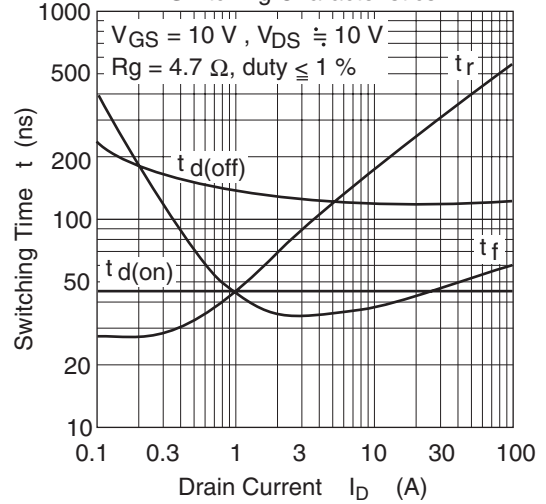
Typical Capacitance vs.
Drain to Source Voltage

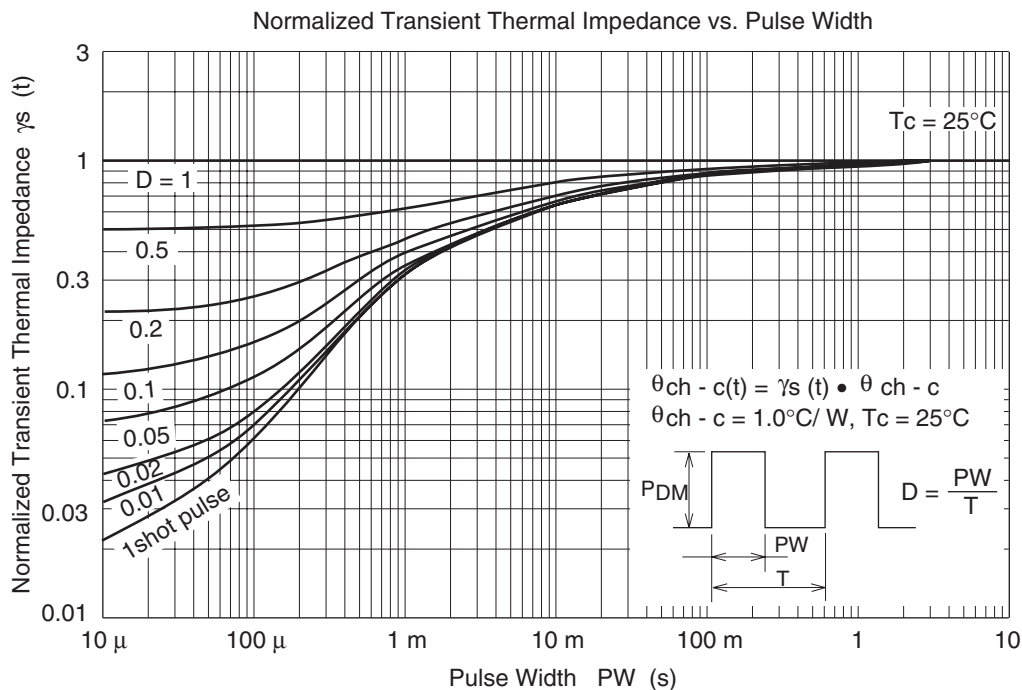
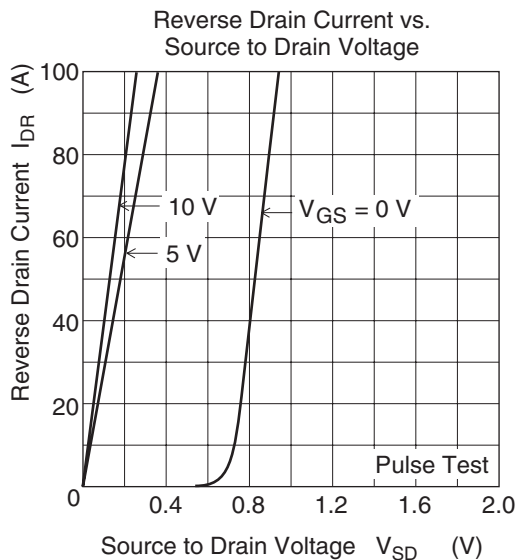


Dynamic Input Characteristics



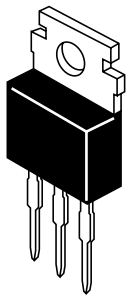
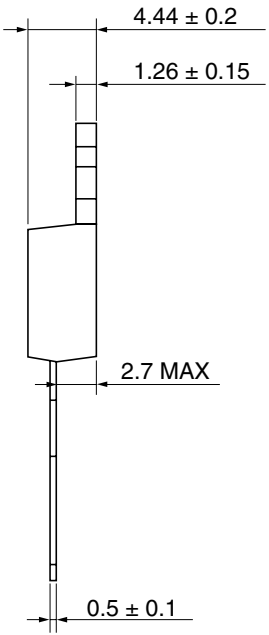
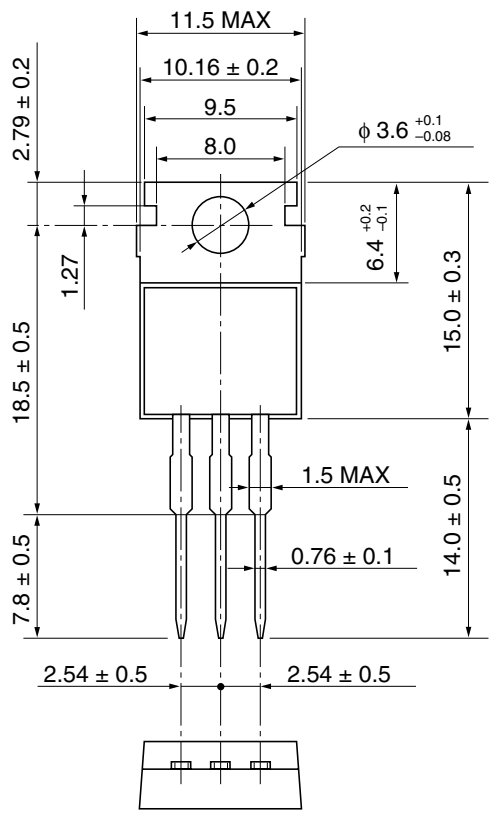
Switching Characteristics





Package Dimensions

As of January, 2002
Unit: mm



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

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Sales Offices

HITACHI

Hitachi, Ltd.

Semiconductor & Integrated Circuits
Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan
Tel: (03) 3270-2111 Fax: (03) 3270-5109

URL <http://www.hitachisemiconductor.com/>

For further information write to:

Hitachi Semiconductor (America) Inc.
179 East Tasman Drive
San Jose, CA 95134
Tel: <1> (408) 433-1990
Fax: <1> (408) 433-0223

Hitachi Europe Ltd.
Electronic Components Group
Whitebrook Park
Lower Cookham Road
Maidenhead
Berkshire SL6 8YA, United Kingdom
Tel: <44> (1628) 585000
Fax: <44> (1628) 778322

Hitachi Europe GmbH
Electronic Components Group
Dornacher Str 3
D-85622 Feldkirchen
Postfach 201, D-85619 Feldkirchen
Germany
Tel: <49> (89) 9 9180-0
Fax: <49> (89) 9 29 30 00

Hitachi Asia Ltd.
Hitachi Tower
16 Collyer Quay #20-00
Singapore 049318
Tel: <65>-6538-6533/6538-8577
Fax: <65>-6538-6933/6538-3877
URL: <http://semiconductor.hitachi.com.sg>

Hitachi Asia Ltd.
(Taipei Branch Office)
4/F, No. 167, Tun Hwa North Road
Hung-Kuo Building
Taipei (105), Taiwan
Tel: <886>-(2)-2718-3666
Fax: <886>-(2)-2718-8180
Telex: 23222 HAS-TP
URL: <http://semiconductor.hitachi.com.tw>

Hitachi Asia (Hong Kong) Ltd.
Group III (Electronic Components)
7/F., North Tower
World Finance Centre,
Harbour City, Canton Road
Tsim Sha Tsui, Kowloon Hong Kong
Tel: <852>-2735-9218
Fax: <852>-2730-0281
URL: <http://semiconductor.hitachi.com.hk>

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