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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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2SK3446

Silicon N Channel Power MOS FET Power Switching

RENESAS

ADE-208-1566F (Z)

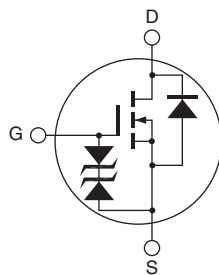
7th. Edition
Jan. 2003

Features

- Capable of 2.5 V gate drive
- Low drive current
- Low on-resistance
- $R_{DS(on)}=1.5\ \Omega$ typ. (at $V_{GS} = 4\text{ V}$)

Outline

TO-92MOD.



1. Source
2. Drain
3. Gate

Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	150	V
Gate to source voltage	V_{GSS}	±10	V
Drain current	I_D	1	A
Drain peak current	$I_{D(pulse)}$ ^{Note1}	4	A
Body-drain diode reverse drain current	I_{DR}	1	A
Channel dissipation	Pch ^{Note2}	0.9	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	-55 to +150	°C

Notes: 1. $PW \leq 10 \mu s$, duty cycle $\leq 1 \%$

2. Value at Ta = 25°C

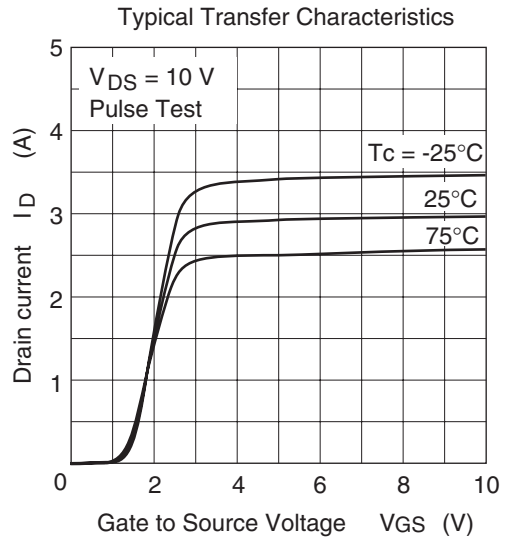
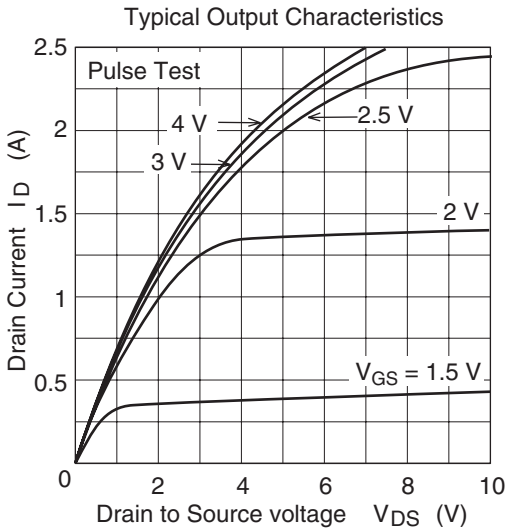
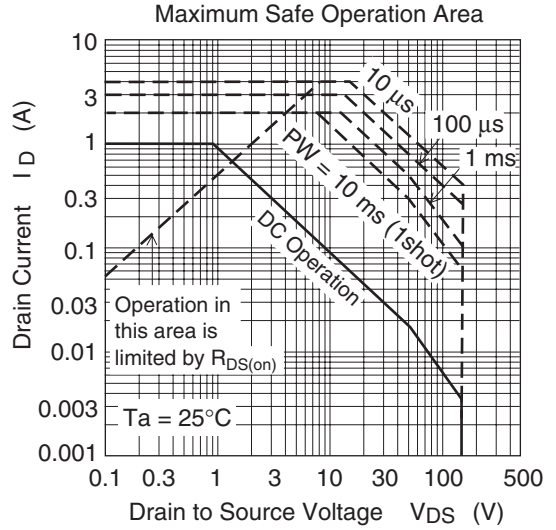
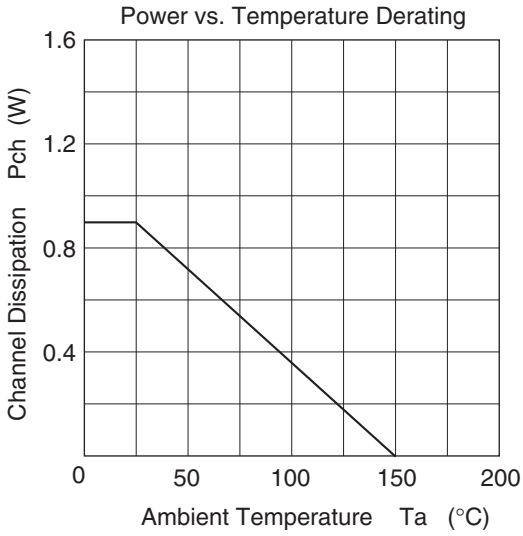
Electrical Characteristics

(Ta = 25°C)

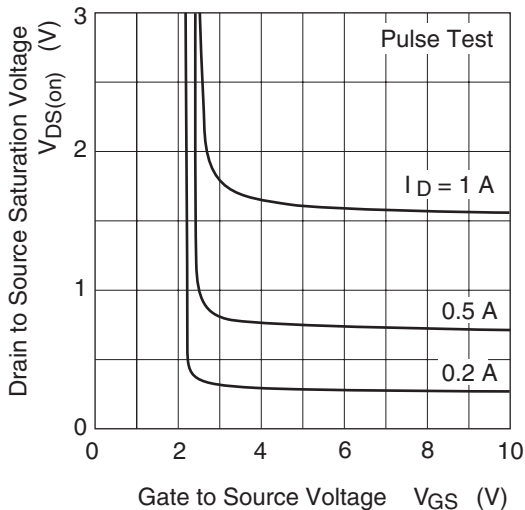
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	150	—	—	V	$I_D = 10 \text{ mA}$, $V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	± 10	—	—	V	$I_G = \pm 100 \text{ }\mu\text{A}$, $V_{DS} = 0$
Gate to source leak current	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 8 \text{ V}$, $V_{DS} = 0$
Zero gate voltage drain current	I_{DSS}	—	—	1	μA	$V_{DS} = 150 \text{ V}$, $V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	0.5	—	1.5	V	$V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$
Static drain to source on state resistance	$R_{DS(on)}$	—	1.5	1.95	Ω	$I_D = 0.5 \text{ A}$, $V_{GS} = 4 \text{ V}$ ^{Note3}
	$R_{DS(on)}$	—	1.9	2.5	Ω	$I_D = 0.5 \text{ A}$, $V_{GS} = 2.5 \text{ V}$ ^{Note3}
Forward transfer admittance	$ y_{fs} $	0.8	1.4	—	S	$I_D = 0.5 \text{ A}$, $V_{DS} = 10 \text{ V}$ ^{Note3}
Input capacitance	Ciss	—	98	—	pF	$V_{DS} = 10 \text{ V}$
Output capacitance	Coss	—	31	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	Crss	—	14	—	pF	$f = 1 \text{ MHz}$
Total gate charge	Qg	—	3.5	—	nC	$V_{DD} = 100 \text{ V}$
Gate to source charge	Qgs	—	0.5	—	nC	$V_{GS} = 4 \text{ V}$
Gate to drain charge	Qgd	—	1.8	—	nC	$I_D = 1 \text{ A}$
Turn-on delay time	$t_{d(on)}$	—	8	—	ns	$V_{GS} = 4 \text{ V}$, $I_D = 0.5 \text{ A}$
Rise time	t_r	—	12	—	ns	$R_L = 60 \text{ }\Omega$
Turn-off delay time	$t_{d(off)}$	—	34	—	ns	
Fall time	t_f	—	19	—	ns	
Body-drain diode forward voltage	V_{DF}	—	1.0	1.5	V	$I_F = 1 \text{ A}$, $V_{GS} = 0$ ^{Note3}
Body-drain diode reverse recovery time	t_{rr}	—	60	—	ns	$I_F = 1 \text{ A}$, $V_{GS} = 0$ $diF/dt = 100 \text{ A}/\mu\text{s}$

Notes: 3. Pulse test

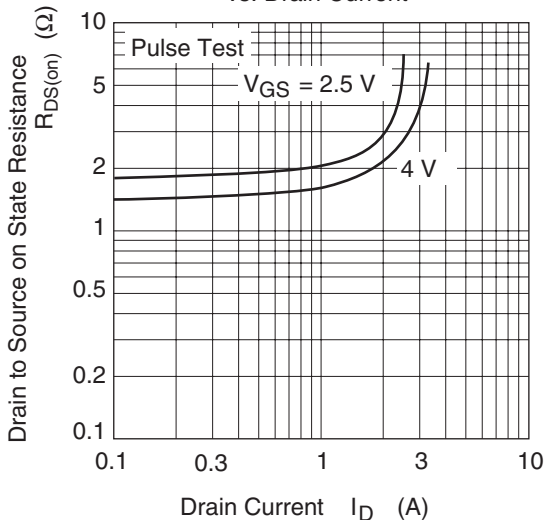
Main Characteristics



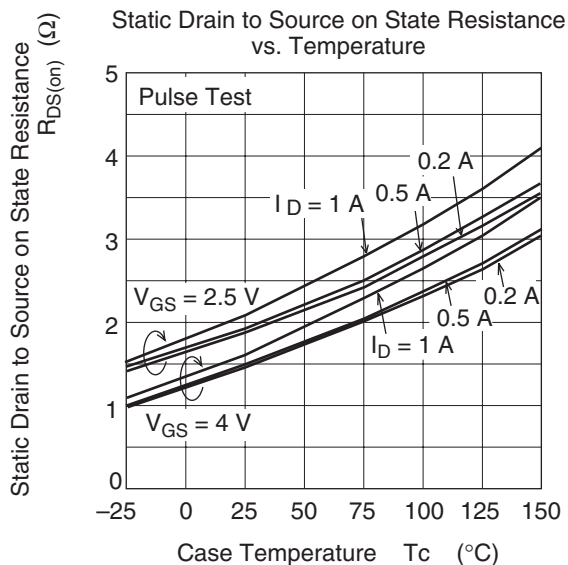
Drain to Source Saturation Voltage vs. Gate to Source Voltage



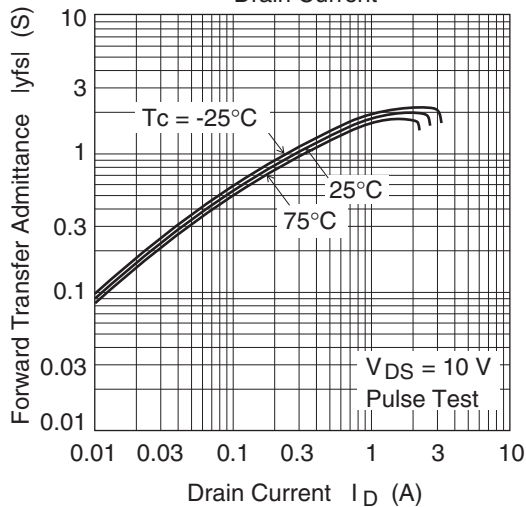
Static Drain to Source on State Resistance vs. Drain Current



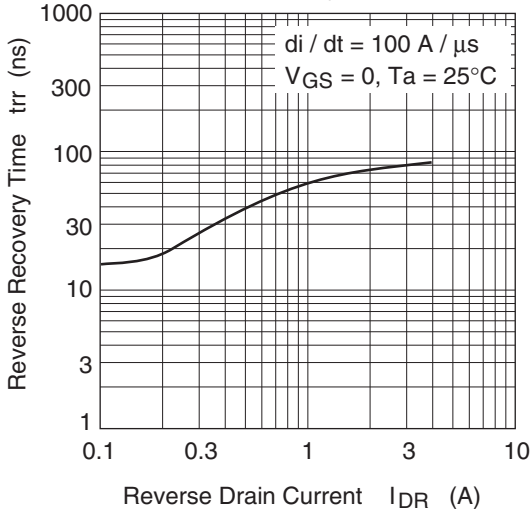
Static Drain to Source on State Resistance vs. Temperature



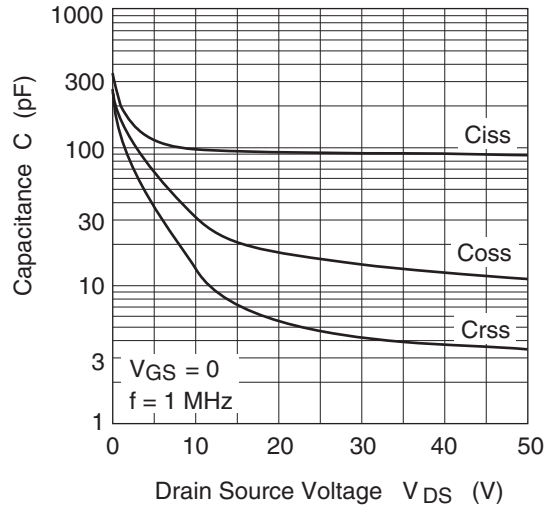
Forward Transfer Admittance vs. Drain Current



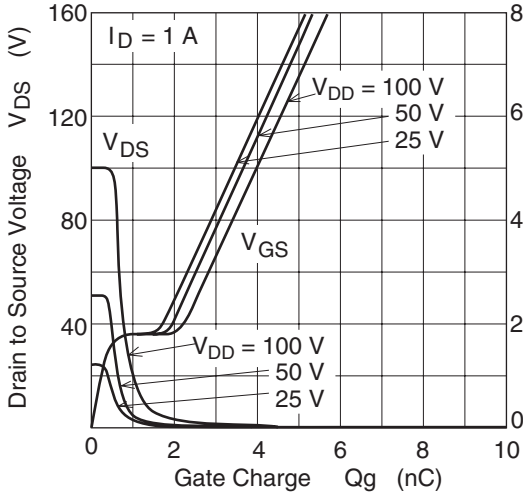
Body-Drain Diode Reverse Recovery Time



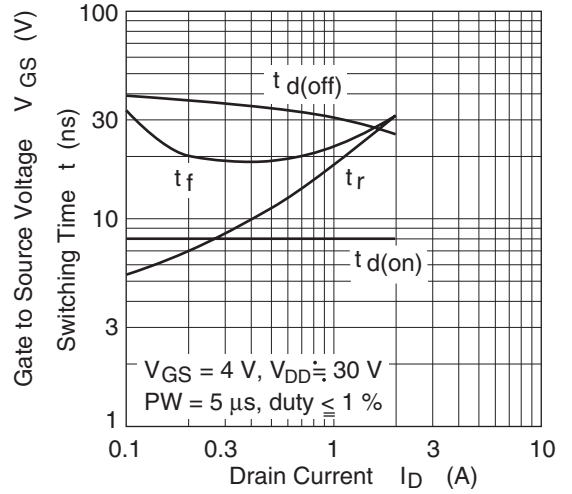
Typical Capacitance vs. Drain Source Voltage



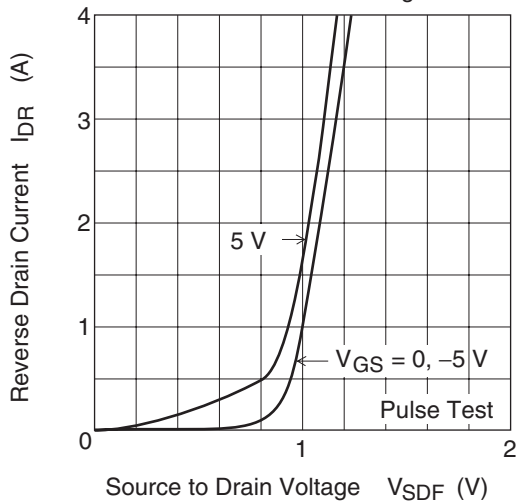
Dynamic Input Characteristics



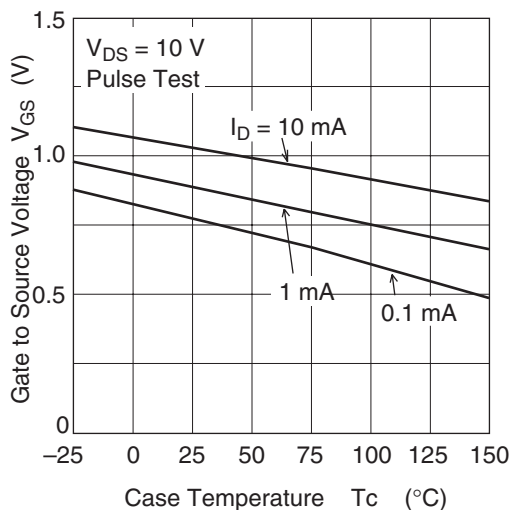
Switching Characteristics



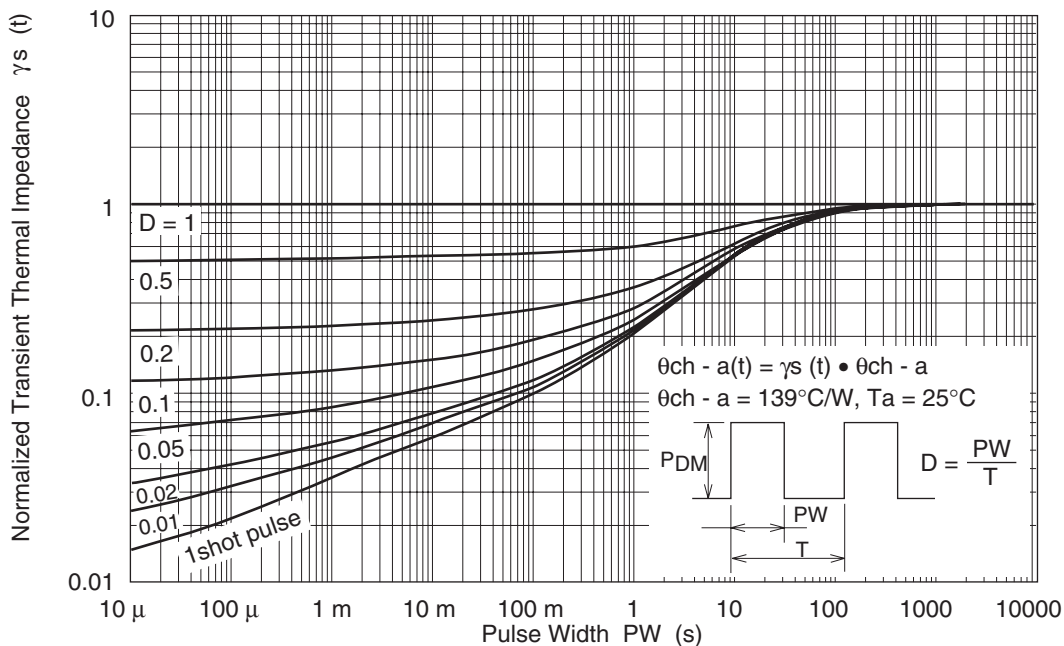
Reverse Drain Current vs. Source to Drain Voltage

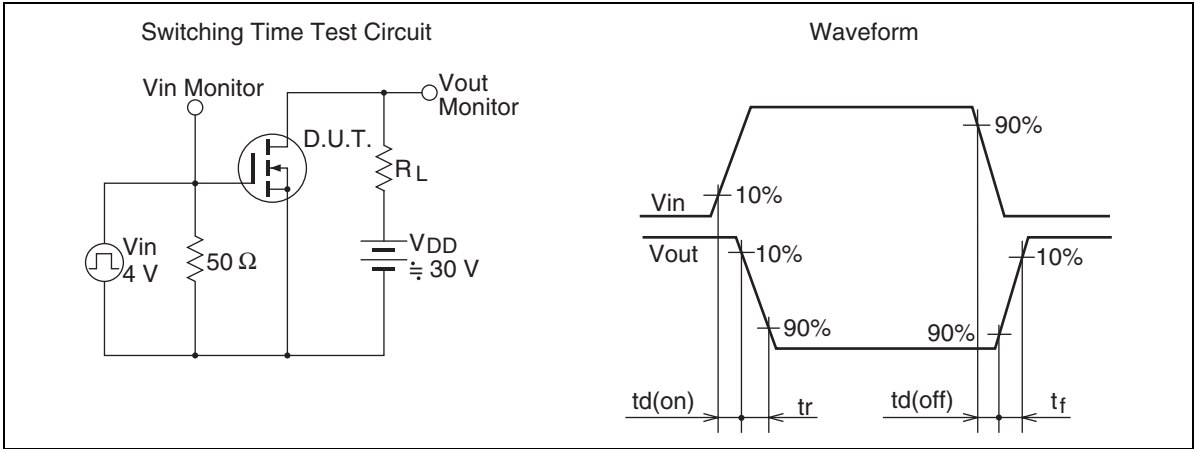


Gate to Source Voltage vs. Temperature



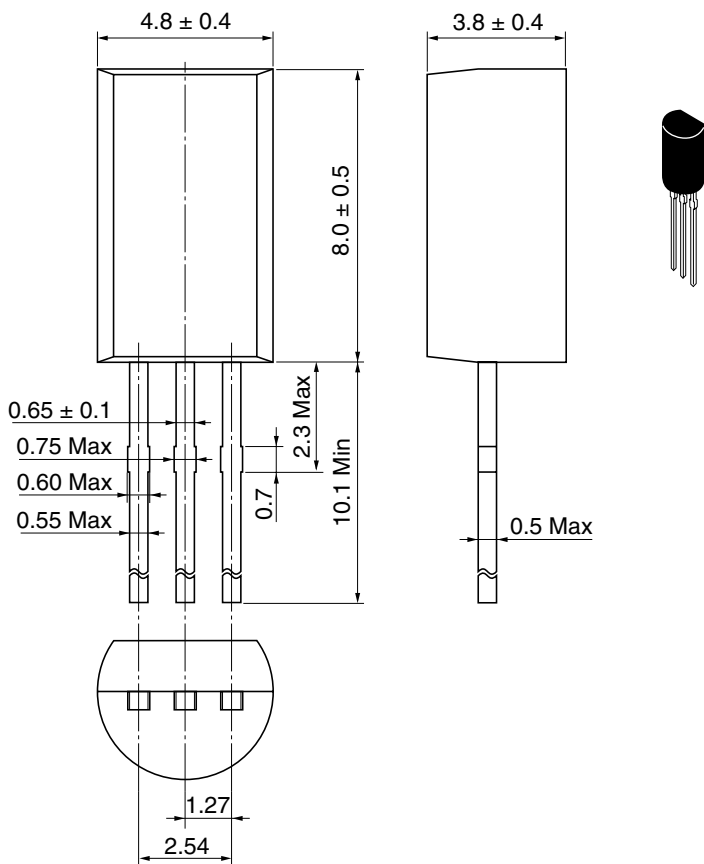
Normalized Transient Thermal Impedance vs. Pulse Width





Package Dimensions

As of July, 2002
Unit: mm



Hitachi Code	TO-92 Mod
JEDEC	—
JEITA	Conforms
Mass (reference value)	0.35 g

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