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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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H5N6001P

Silicon N-Channel MOSFET
High-Speed Power Switching

RENESAS

ADE-208-1425A (Z)

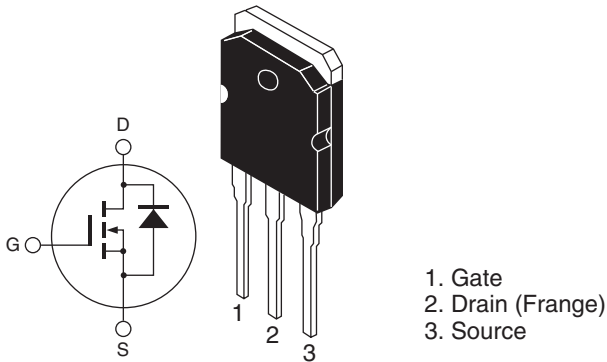
2nd. Edition
May 2001

Features

- Low on-resistance
- Low leakage current
- High speed switching
- Low gate charge (Qg)

Outline

TO-3P



Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Value	Unit
Drain to source voltage	V_{DSS}	600	V
Gate to source voltage	V_{GSS}	±30	V
Drain current	I_D	20	A
Drain peak current	I_D (pulse) ^{*1}	80	A
Body-drain diode reverse drain current	I_{DR}	20	A
Body-drain diode reverse drain peak current	I_{DR} (pulse) ^{*1}	80	A
Avalanche current	I_{AP} ^{*3}	6.5	A
Channel dissipation	P_{ch} ^{*2}	150	W
Channel to case thermal impedance	θ_{ch-c}	0.833	°C/W
Channel temperature	T_{ch}	150	°C
Storage temperature	T_{stg}	-55 to +150	°C

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

2. Value at $T_c = 25^\circ C$

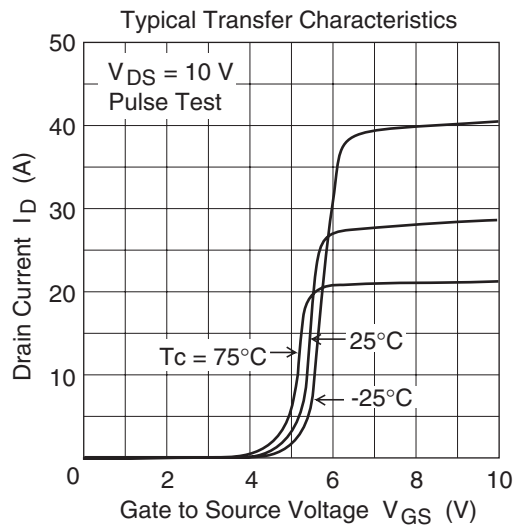
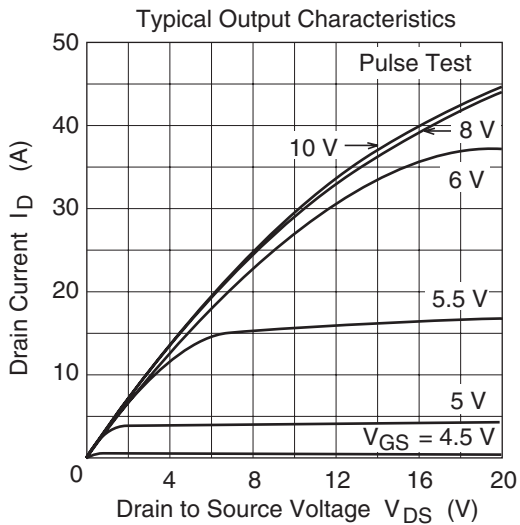
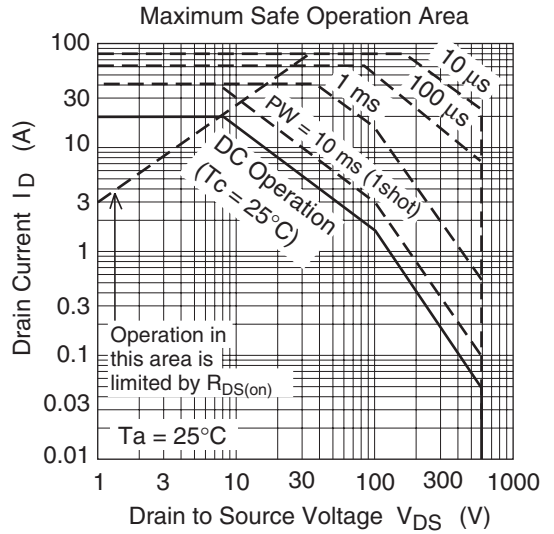
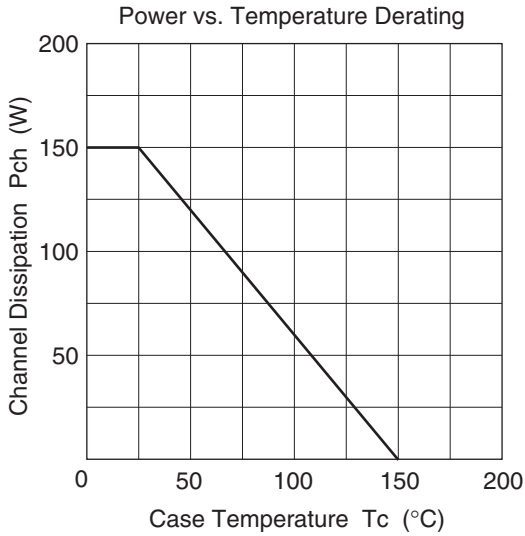
3. $T_{ch} \leq 150^\circ C$

Electrical Characteristics (Ta = 25°C)

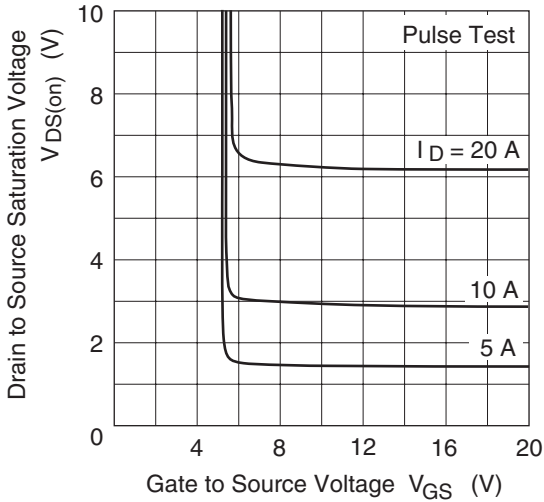
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	600	—	—	V	$I_D = 10 \text{ mA}$, $V_{GS} = 0$
Zero gate voltage drain current	I_{DSS}	—	—	1	μA	$V_{DS} = 600 \text{ V}$, $V_{GS} = 0$
Gate to source leak current	I_{GSS}	—	—	± 0.1	μA	$V_{GS} = \pm 30 \text{ V}$, $V_{DS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	3.0	—	4.0	V	$V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$
Forward transfer admittance	$ y_{fs} $	12	20	—	S	$I_D = 10 \text{ A}$, $V_{DS} = 10 \text{ V}^{*4}$
Static drain to source on state resistance	$R_{DS(on)}$	—	0.30	0.38	Ω	$I_D = 10 \text{ A}$, $V_{GS} = 10 \text{ V}^{*4}$
Input capacitance	C_{iss}	—	4640	—	pF	$V_{DS} = 25 \text{ V}$
Output capacitance	C_{oss}	—	340	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	C_{rss}	—	70	—	pF	$f = 1 \text{ MHz}$
Turn-on delay time	$t_{d(on)}$	—	60	—	ns	$V_{DD} \cong 300 \text{ V}$, $I_D = 10 \text{ A}$
Rise time	t_r	—	100	—	ns	$V_{GS} = 10 \text{ V}$
Turn-off delay time	$t_{d(off)}$	—	220	—	ns	$R_L = 30 \Omega$
Fall time	t_f	—	90	—	ns	$R_g = 10 \Omega$
Total gate charge	Q_g	—	135	—	nC	$V_{DD} = 480 \text{ V}$
Gate to source charge	Q_{gs}	—	20	—	nC	$V_{GS} = 10 \text{ V}$
Gate to drain charge	Q_{gd}	—	65	—	nC	$I_D = 20 \text{ A}$
Body-drain diode forward voltage	V_{DF}	—	0.9	1.4	V	$I_F = 20 \text{ A}$, $V_{GS} = 0$
Body-drain diode reverse recovery time	t_{rr}	—	590	—	ns	$I_F = 20 \text{ A}$, $V_{GS} = 0$ $diF/dt = 100 \text{ A}/\mu\text{s}$
Body-drain diode reverse recovery charge	Q_{rr}	—	6.5	—	μC	

Note: 4. Pulse test

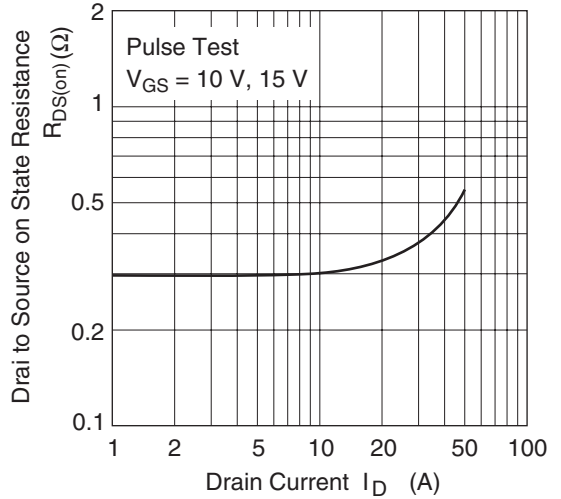
Main Characteristics



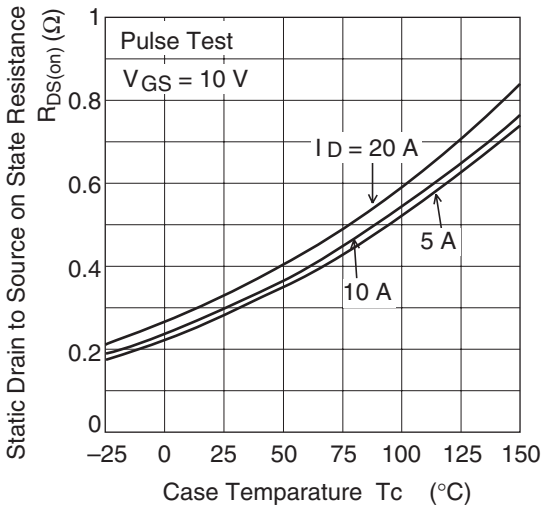
Drain to Source Saturation Voltage VS. Gate to Source Voltage



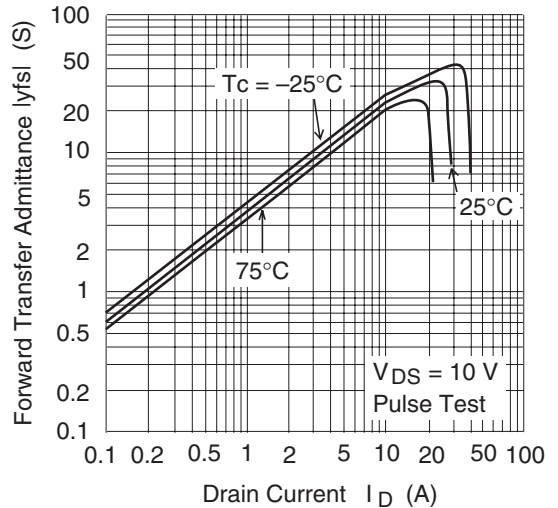
Static Drain to Source on State Resistance vs. Drain Current



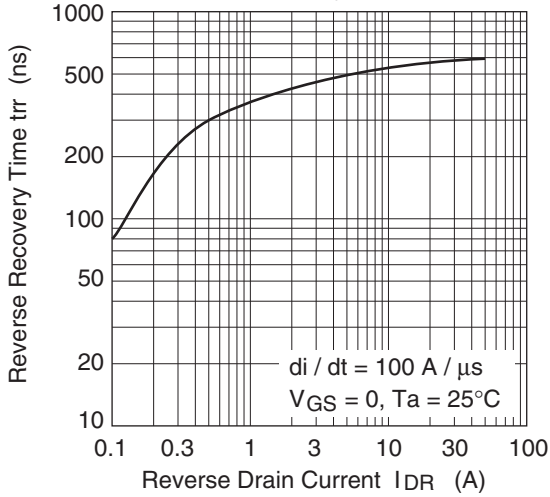
Static Drain to Source on State Resistance vs. Temperature



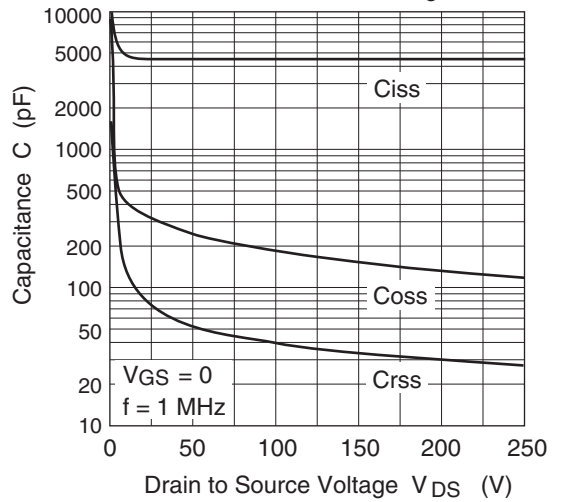
Forward Transfer Admittance vs. Drain Current



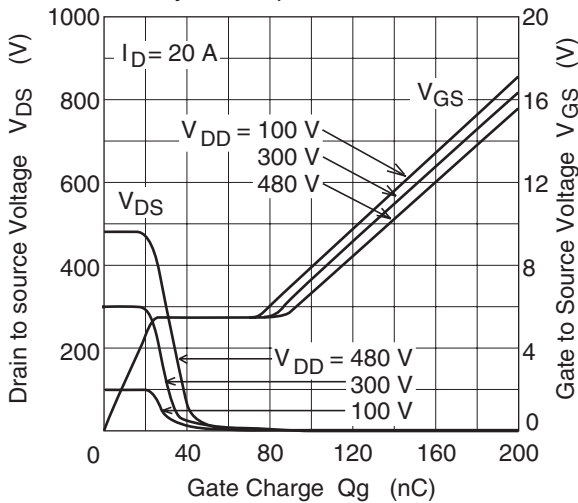
Body-Drain Diode Reverse Recovery Time



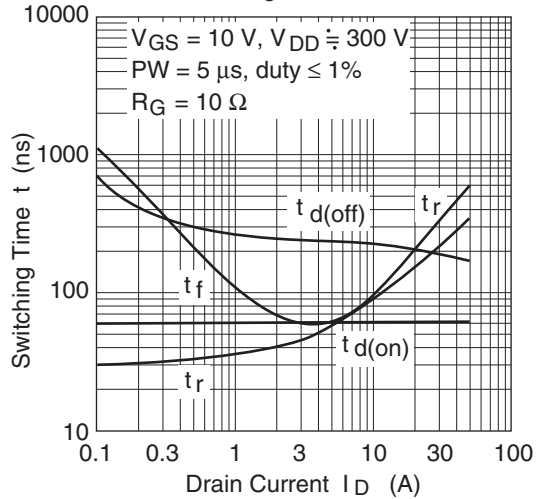
Typical Capacitance vs. Drain to Source Voltage



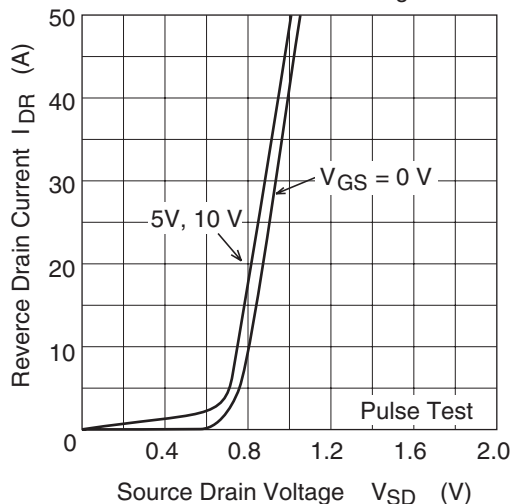
Dynamic Input Characteristics



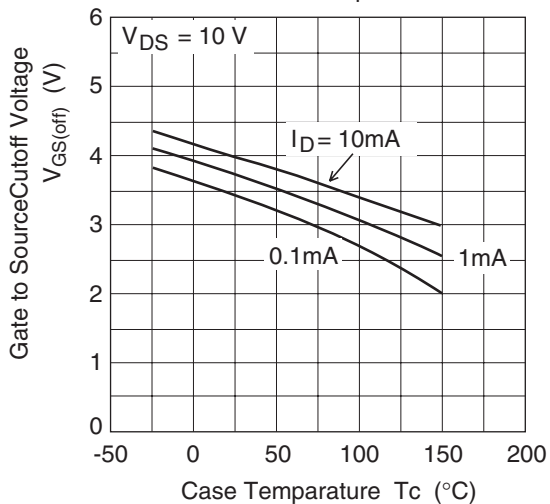
Switching Characteristics



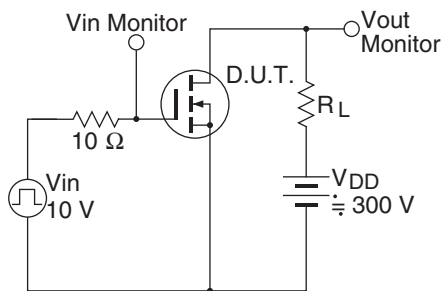
Reverse Drain Current vs. Source to Drain Voltage



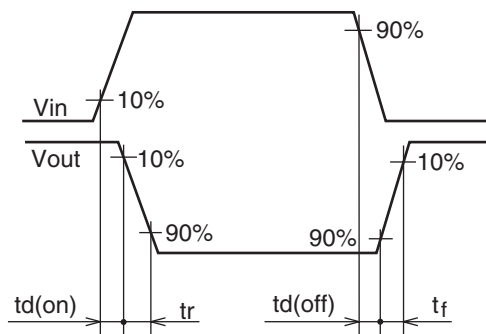
Gate to Source Cutoff Voltage vs. Case Temperature

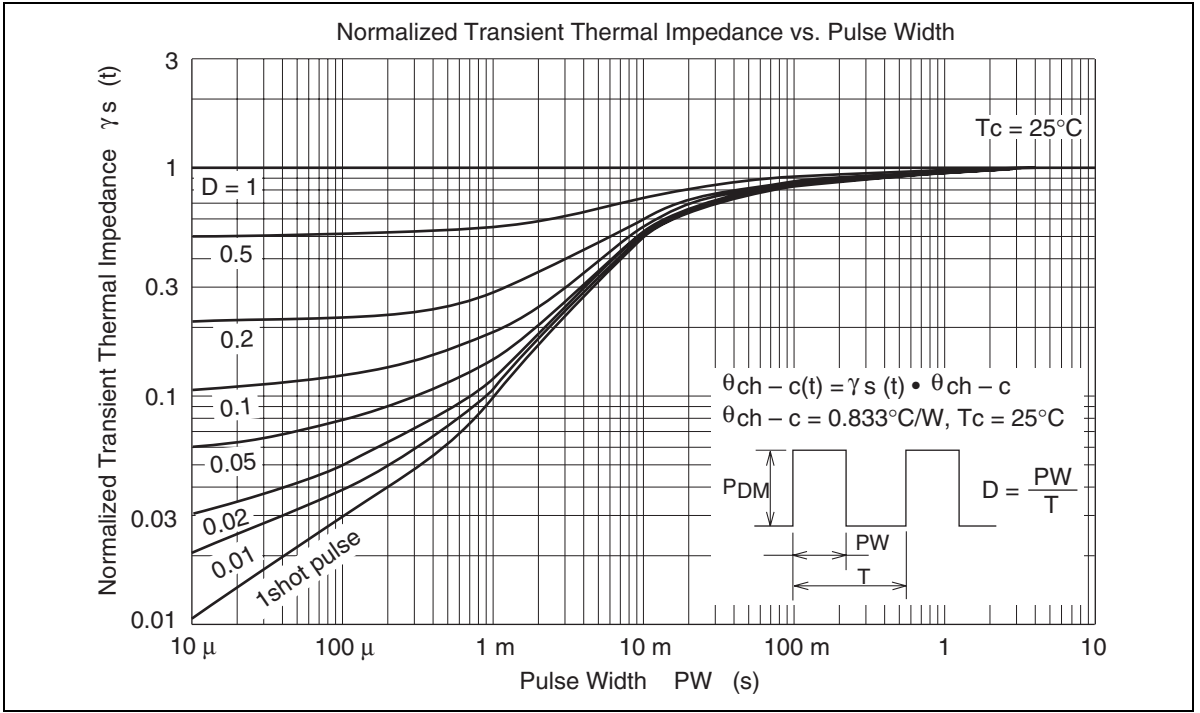


Switching Time Test Circuit

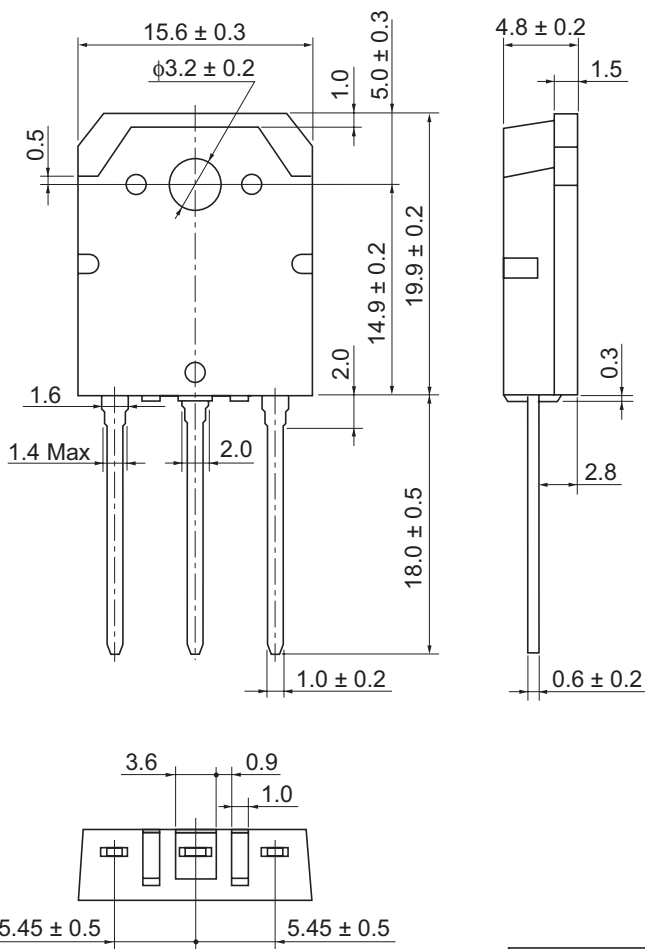


Waveform

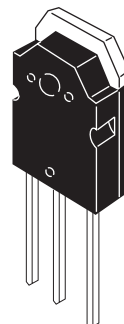




Package Dimensions



As of January, 2001
Unit: mm



Hitachi Code	TO-3P
JEDEC	—
EIAJ	Conforms
Mass (reference value)	5.0 g

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