To all our customers

Regarding the change of names mentioned in the document, such as Hitachi Electric and Hitachi XX, to Renesas Technology Corp.

The semiconductor operations of Mitsubishi Electric and Hitachi were transferred to Renesas Technology Corporation on April 1st 2003. These operations include microcomputer, logic, analog and discrete devices, and memory chips other than DRAMs (flash memory, SRAMs etc.) Accordingly, although Hitachi, Hitachi, Ltd., Hitachi Semiconductors, and other Hitachi brand names are mentioned in the document, these names have in fact all been changed to Renesas Technology Corp. Thank you for your understanding. Except for our corporate trademark, logo and corporate statement, no changes whatsoever have been made to the contents of the document, and these changes do not constitute any alteration to the contents of the document itself.

Renesas Technology Home Page: http://www.renesas.com

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

RENESAS
Renesas Technology Corp.

Cautions

2SK3160

Silicon N Channel MOS FET
High Speed Power Switching

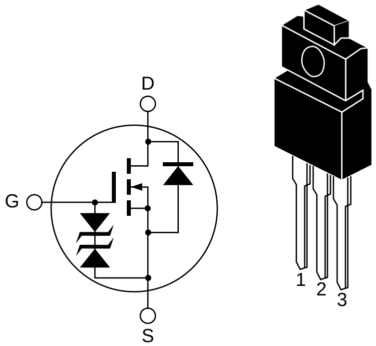
ADE-208-751A (Z)
2nd. Edition
Mar. 2001

Features

- Low on-resistance
  R_{DS} =130mΩ typ.
- High speed switching
- 4V gate drive device can be driven from 5V source

Outline

TO–220FM



1. Gate
2. Drain
3. Source

Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	200	V
Gate to source voltage	V_{GSS}	±20	V
Drain current	I_D	10	A
Drain peak current	$I_{D(pulse)}$ Note1	40	A
Body-drain diode reverse drain current	I_{DR}	10	A
Avalanche current	I_{AP} Note3	10	A
Avalanche energy	E_{AR} Note3	6.6	mJ
Channel dissipation	Pch Note2	30	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

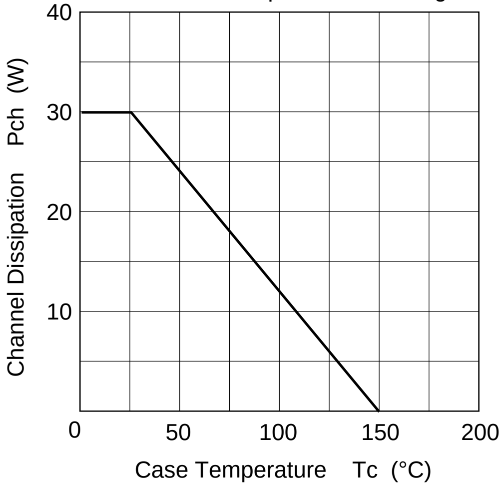
Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	200	—	—	V	I_D = 10mA, V_{GS} = 0
Gate to source breakdown voltage	$V_{(BR)GSS}$	±20	—	—	V	I_G = ±100μA, V_{DS} = 0
Gate to source leak current	I_{GSS}	—	—	±10	μA	V_{GS} = ±16V, V_{DS} = 0
Zero gate voltege drain current	I_{DSS}	—	—	10	μA	V_{DS} = 200 V, V_{GS} = 0
Gate to source cutoff voltage	$V_{GS(off)}$	1.0	—	2.5	V	I_D = 1mA, V_{DS} = 10V
Static drain to source on state resistance	$R_{DS(on)}$	—	130	170	mΩ	I_D = 5A, V_{GS} = 10V Note4
	$R_{DS(on)}$	—	150	190	mΩ	I_D = 5A, V_{GS} = 4V Note4
Forward transfer admittance	$\|y_{fs}\|$	8	13	—	S	I_D = 5A, V_{DS} = 10V Note4
Input capacitance	Ciss	—	1100	—	pF	V_{DS} = 10V
Output capacitance	Coss	—	300	—	pF	V_{GS} = 0
Reverse transfer capacitance	Crss	—	150	—	pF	f = 1MHz
Turn-on delay time	$t_{d(on)}$	—	15	—	ns	I_D = 5A, V_{GS} = 10V
Rise time	t_r	—	75	—	ns	R_L = 6Ω
Turn-off delay time	$t_{d(off)}$	—	280	—	ns	
Fall time	t_f	—	110	—	ns	
Body–drain diode forward voltage	V_{DF}	—	0.85	—	V	I_F = 10A, V_{GS} = 0
Body–drain diode reverse recovery time	t_{rr}	—	100	—	ns	I_F = 10A, V_{GS} = 0 diF/ dt =50A/μs

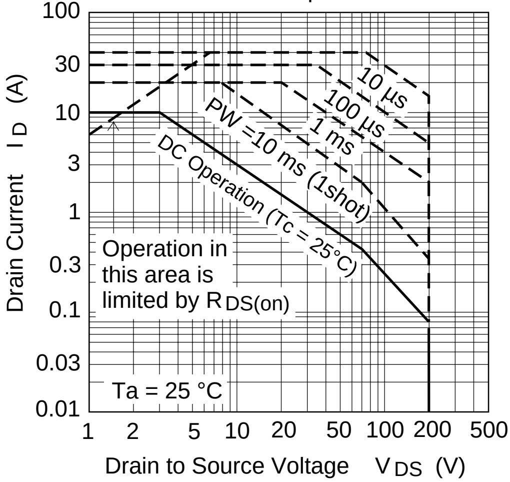
Note: 4. Pulse test

Main Characteristics

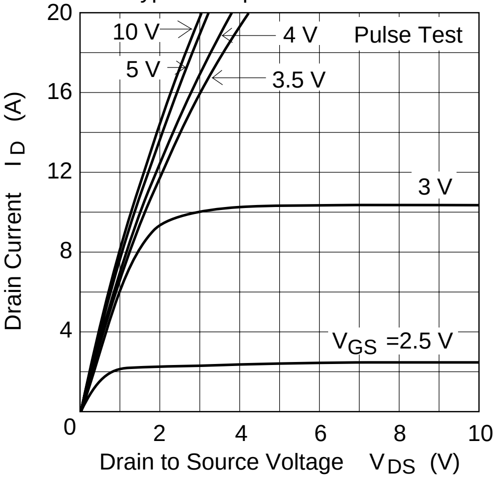
Power vs. Temperature Derating



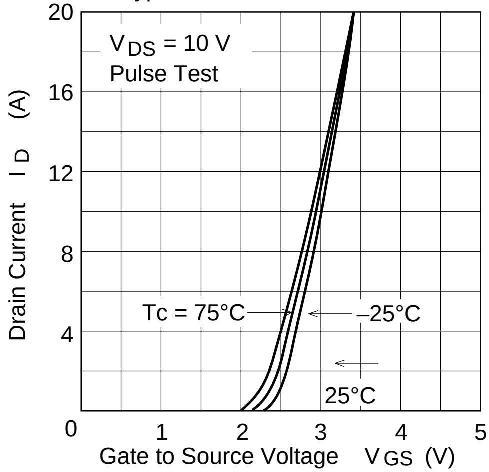
Maximum Safe Operation Area



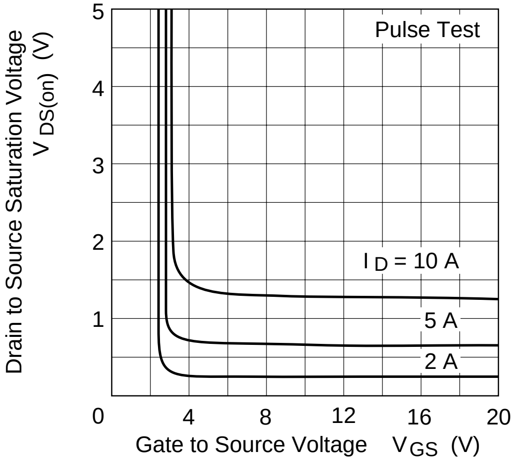
Typical Output Characteristics



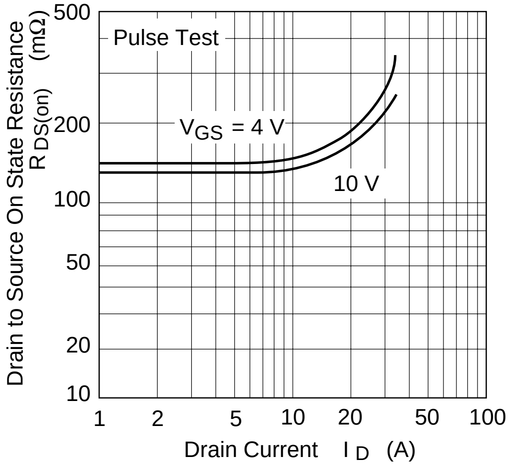
Typical Transfer Characteristics



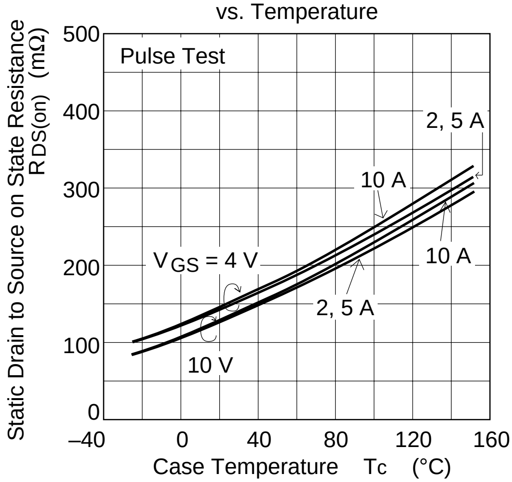
Drain to Source Saturation Voltage vs. Gate to Source Voltage



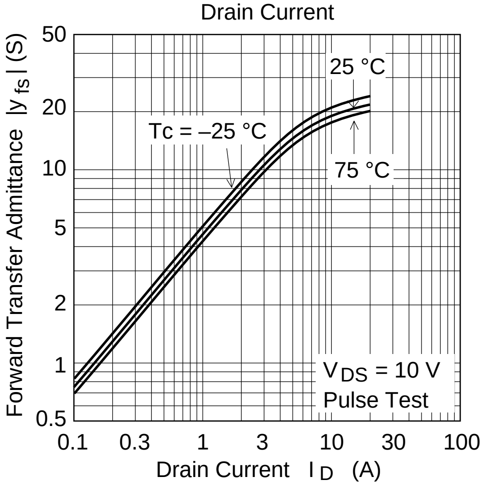
Static Drain to Source on State Resistance vs. Drain Current



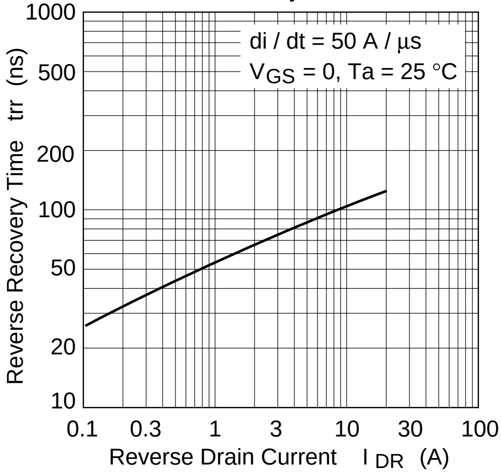
Static Drain to Source on State Resistance vs. Temperature



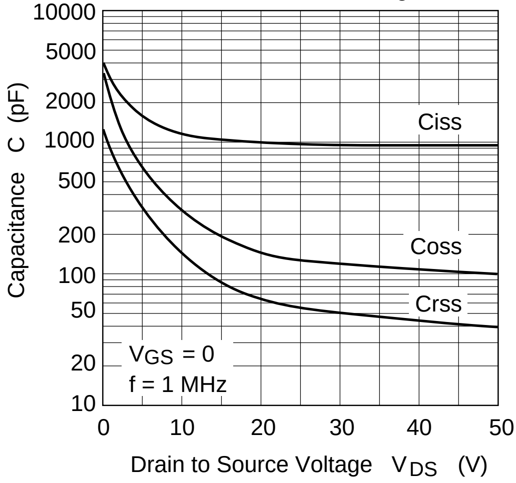
Forward Transfer Admittance vs. Drain Current



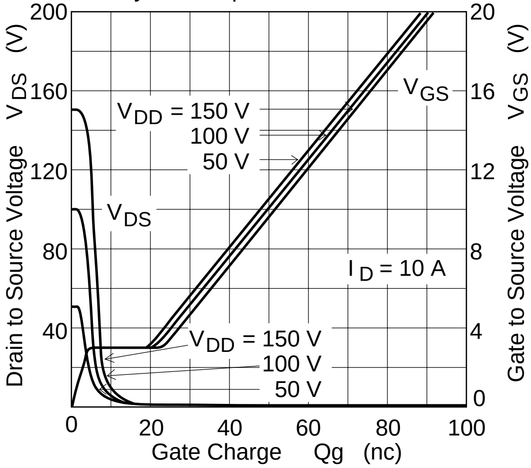
Body–Drain Diode Reverse Recovery Time



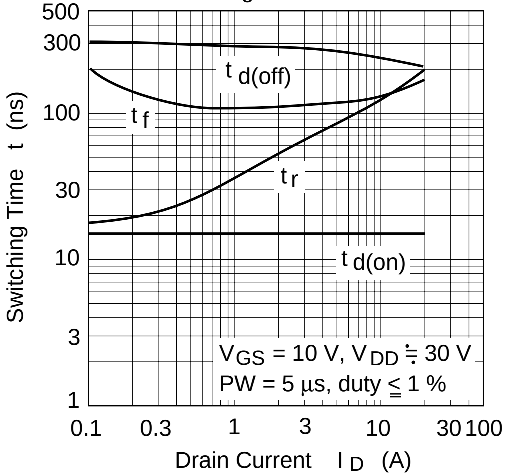
Typical Capacitance vs. Drain to Source Voltage



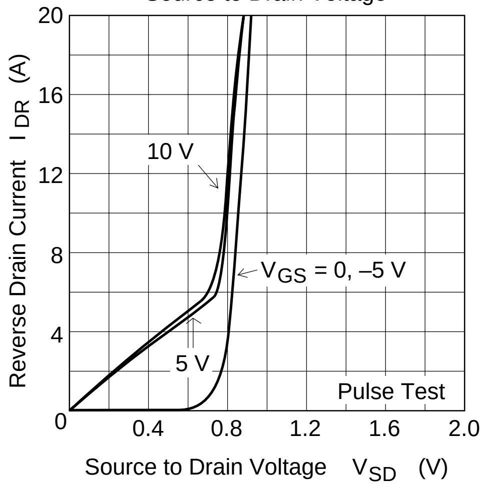
Dynamic Input Characteristics



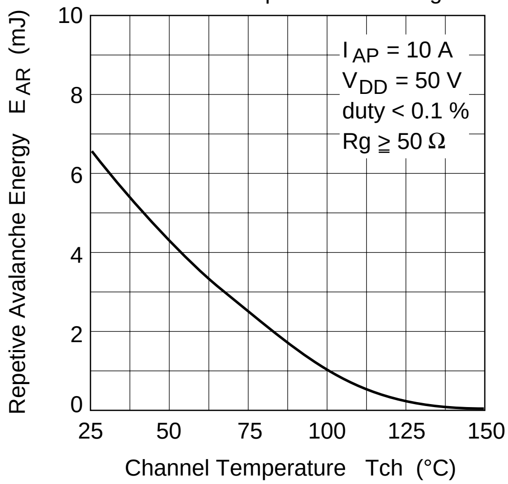
Switching Characteristics



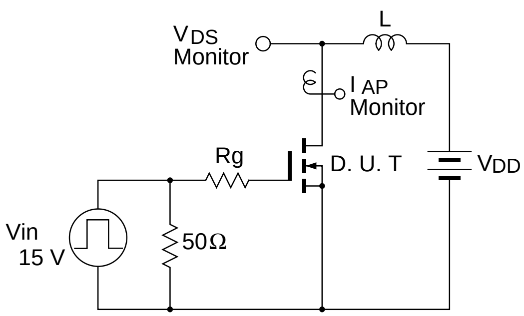
Reverse Drain Current vs. Source to Drain Voltage



Maximun Avalanche Energy vs. Channel Temperature Derating

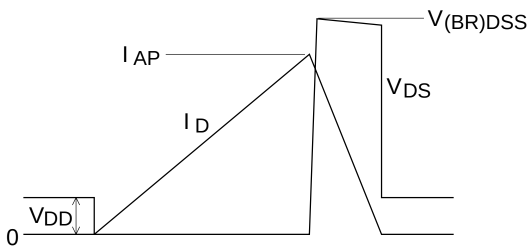


Avalanche Test Circuit

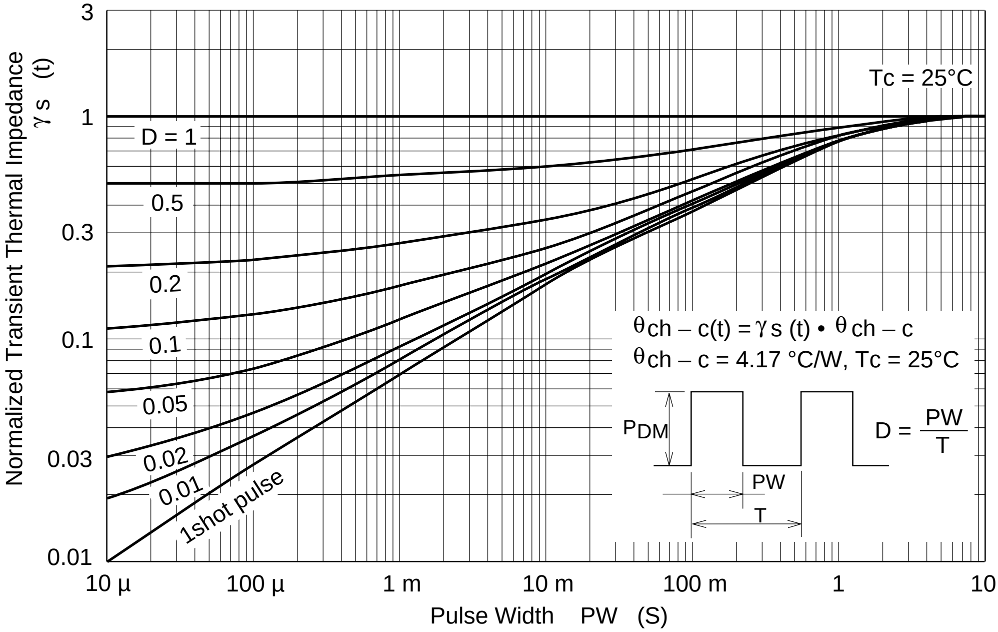


Avalanche Waveform

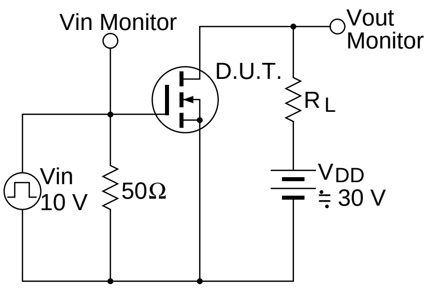
$$E_{AR} = \frac{1}{2} \cdot L \cdot I_{AP}^{2} \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$



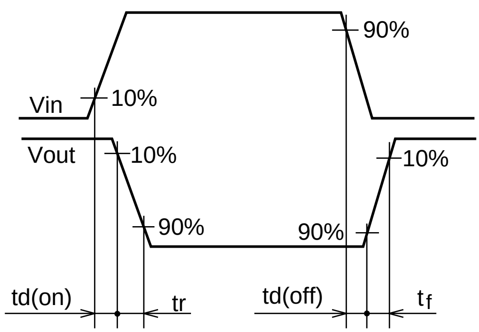
Normalized Transient Thermal Impedance vs. Pulse Width



Switching Time Test Circuit



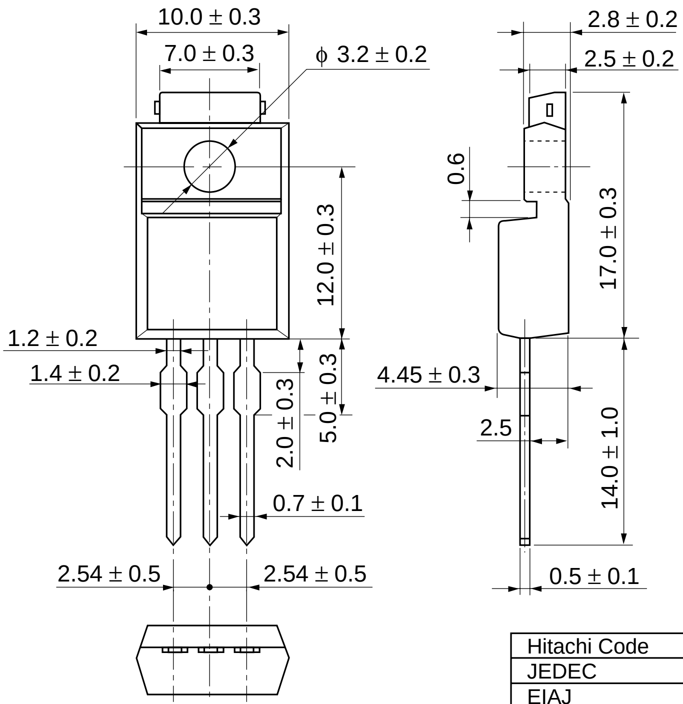
Waveform

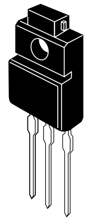


Package Dimensions

As of January, 2001

Unit: mm





Hitachi Code	TO-220FM
JEDEC	—
EIAJ	Conforms
Mass (reference value)	1.8 g

Cautions

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