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

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2SK2936

Silicon N Channel MOS FET
High Speed Power Switching

RENESAS

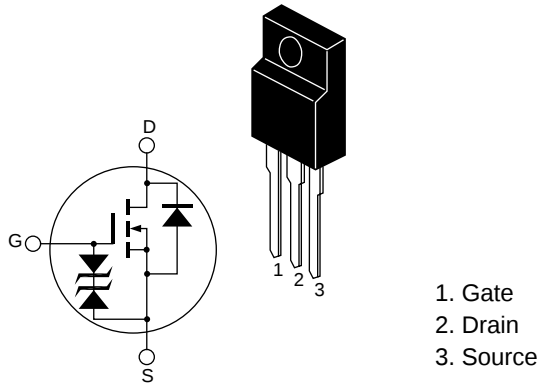
ADE-208-559B (Z)
3rd. Edition
Jul. 1998

Features

- Low on-resistance
 $R_{DS} = 0.010 \Omega$ typ.
- High speed switching
- 4V gate drive device can be driven from 5V source

Outline

TO-220CFM



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	45	A
Drain peak current	$I_{D(pulse)}^{Note1}$	180	A
Body-drain diode reverse drain current	I_{DR}	45	A
Avalanche current	I_{AP}^{Note3}	45	A
Avalanche energy	E_{AR}^{Note3}	173	mJ
Channel dissipation	Pch^{Note2}	35	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	−55 to +150	°C

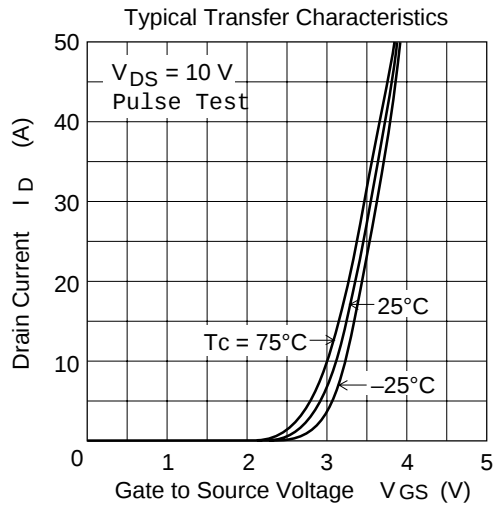
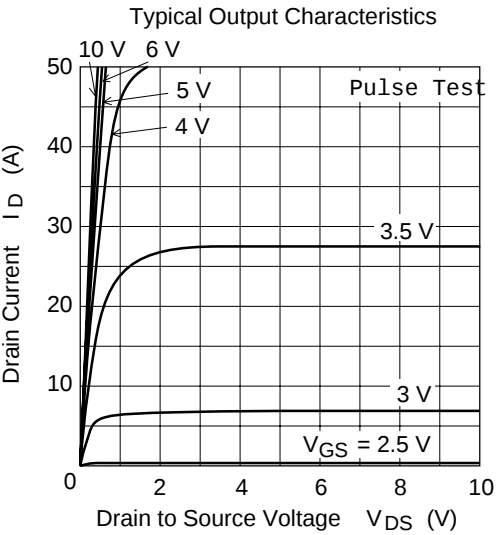
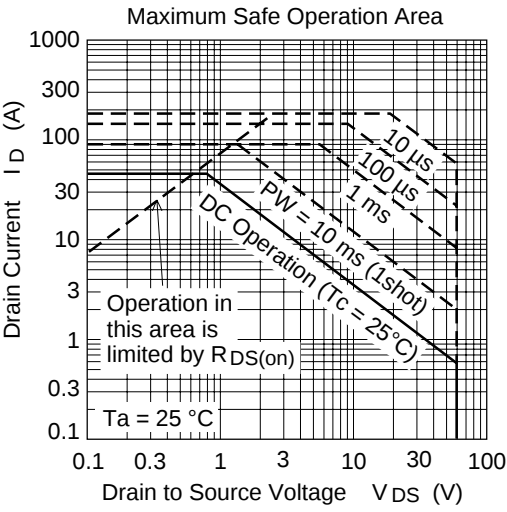
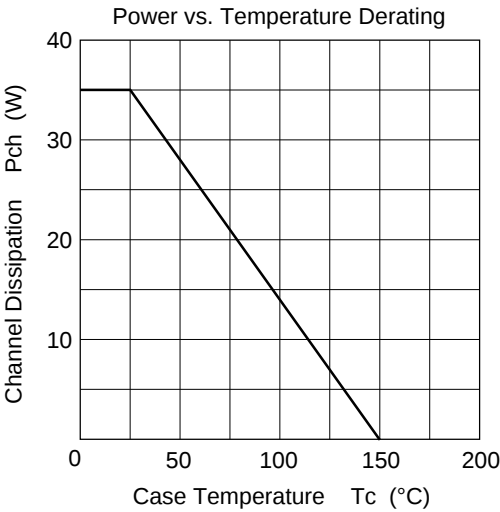
Note: 1. $PW \leq 10\mu s$, duty cycle $\leq 1\%$
2. Value at Tc = 25°C
3. Value at Tch = 25°C, Rg 50Ω

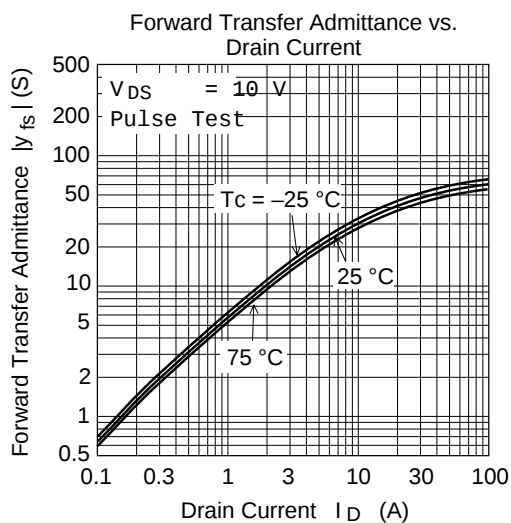
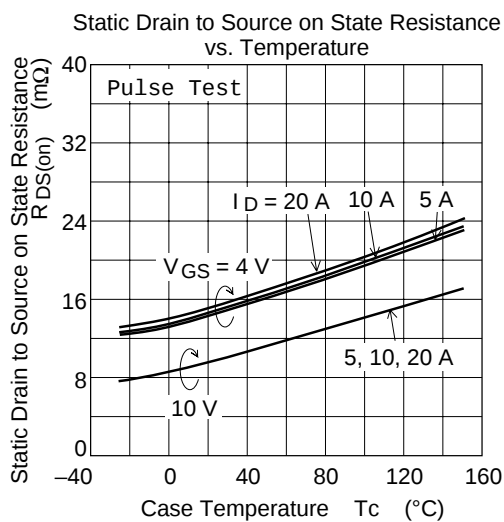
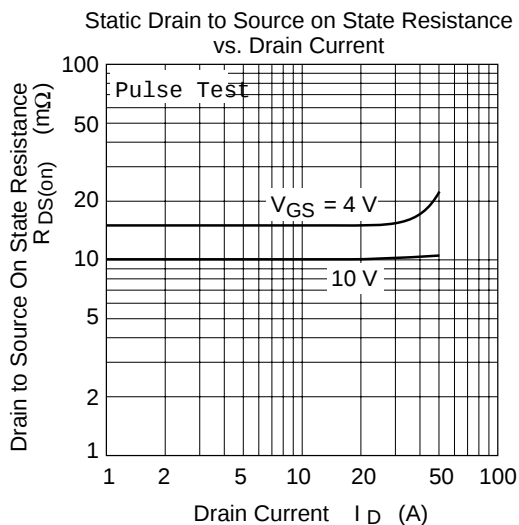
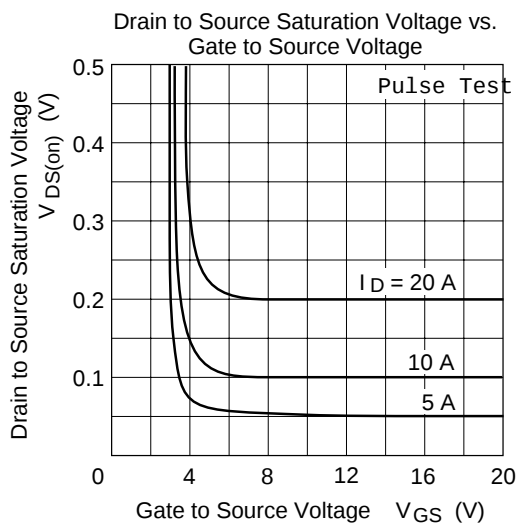
Electrical Characteristics (Ta = 25°C)

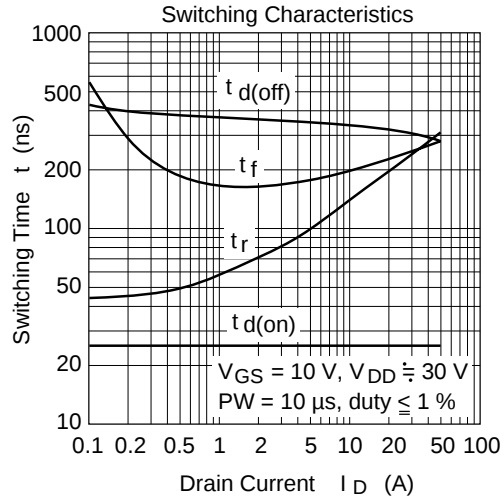
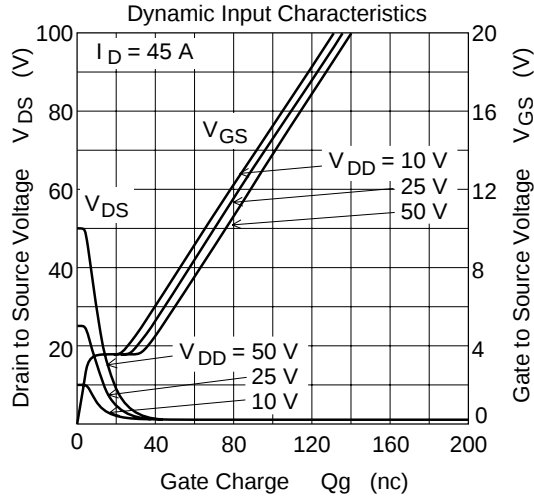
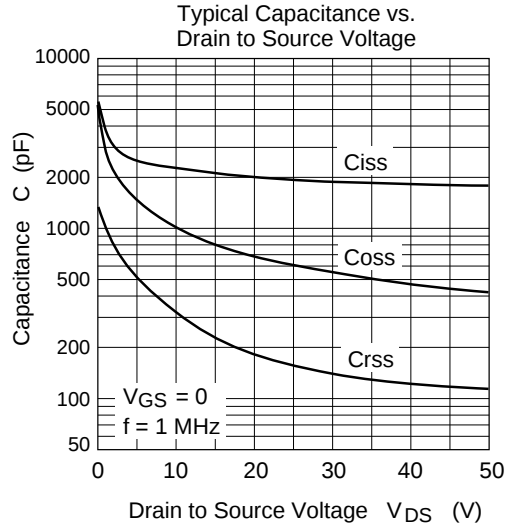
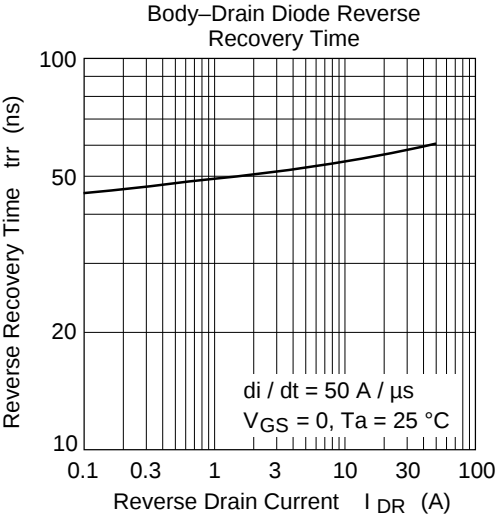
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	60	—	—	V	$I_D = 10\text{mA}$, $V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	± 20	—	—	V	$I_G = \pm 100\mu\text{A}$, $V_{DS} = 0$
Gate to source leak current	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 16\text{V}$, $V_{DS} = 0$
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	$R_{DS(on)}$	—	0.010	0.013	Ω	$I_D = 20\text{A}$, $V_{GS} = 10\text{V}$ ^{Note4}
	$R_{DS(on)}$	—	0.015	0.025	Ω	$I_D = 20\text{A}$, $V_{GS} = 4\text{V}$ ^{Note4}
Forward transfer admittance	$ y_{fs} $	24	40	—	S	$I_D = 20\text{A}$, $V_{DS} = 10\text{V}$ ^{Note4}
Input capacitance	C_{iss}	—	2200	—	pF	$V_{DS} = 10\text{V}$
Output capacitance	C_{oss}	—	1050	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	C_{rss}	—	320	—	pF	$f = 1\text{MHz}$
Turn-on delay time	$t_{d(on)}$	—	25	—	ns	$I_D = 20\text{A}$, $V_{GS} = 10\text{V}$
Rise time	t_r	—	200	—	ns	$V_{GS} = 10\text{V}$, $I_D = 20\text{A}$
Turn-off delay time	$t_{d(off)}$	—	320	—	ns	$R_L = 1.5$
Fall time	t_f	—	240	—	ns	
Body-drain diode forward voltage	V_{DF}	—	0.95	—	V	$I_F = 45\text{A}$, $V_{GS} = 0$
Body-drain diode reverse recovery time	t_{rr}	—	60	—	ns	$I_F = 45\text{A}$, $V_{GS} = 0$ $di_F/dt = 50\text{A}/\mu\text{s}$

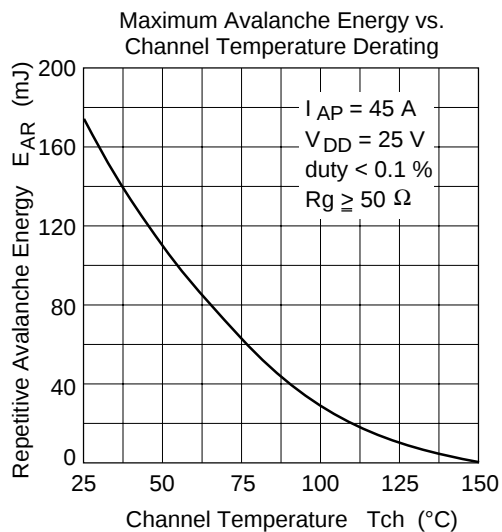
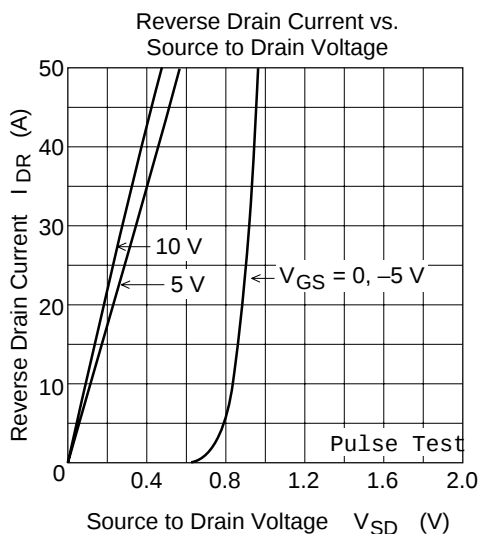
Note: 4. Pulse test

Main Characteristics

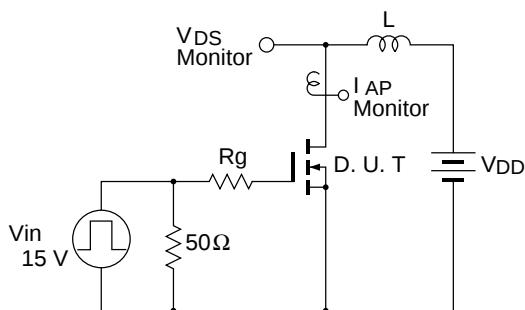






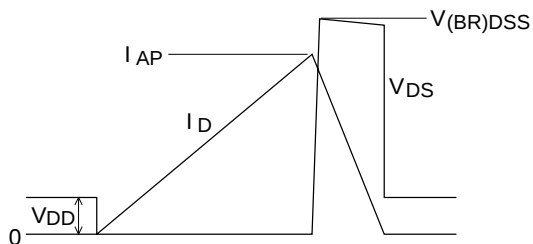


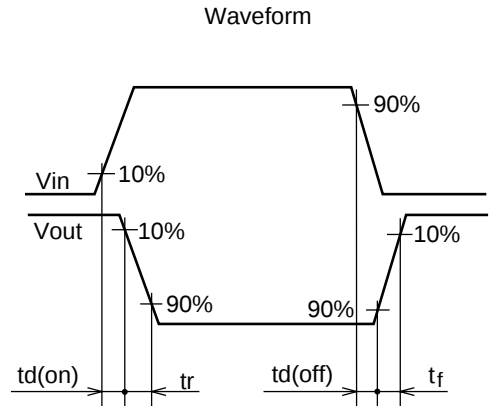
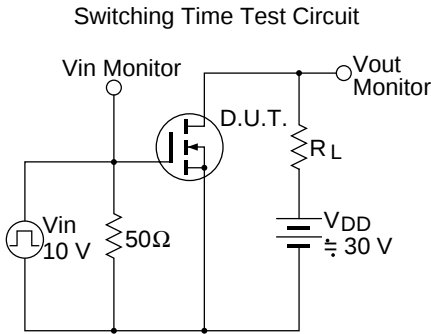
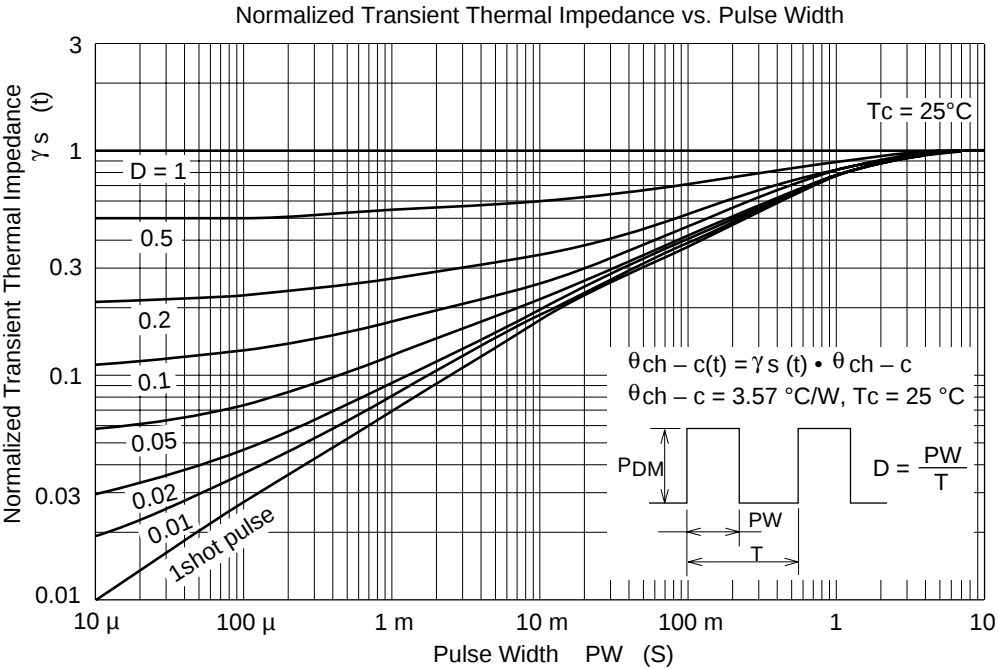
Avalanche Test Circuit



Avalanche Waveform

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

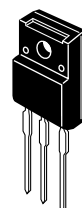
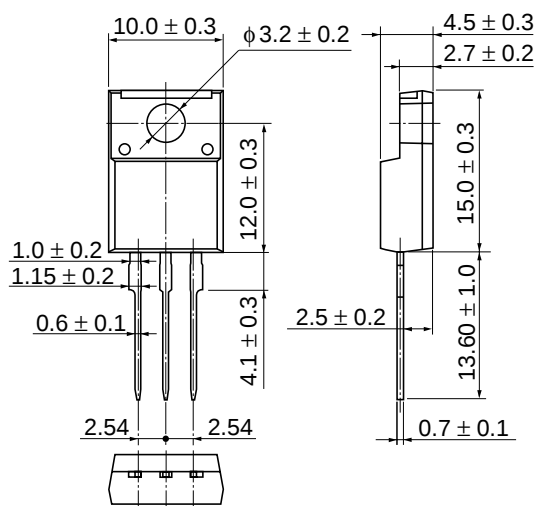




Package Dimensions

As of January, 2001

Unit: mm



Hitachi Code	TO-220CFM
JEDEC	—
EIAJ	—
Mass (reference value)	1.9 g

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