To all our customers

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

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2SJ504

Silicon P Channel MOS FET
High Speed Power Switching

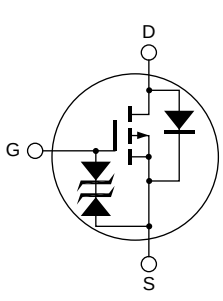
ADE-208-546B (Z)
3rd. Edition
Jun. 1998

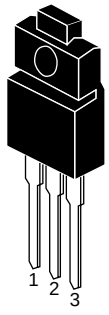
Features

- Low on-resistance
  $R_{DS(on)}$ = 0.042Ω typ.
- Low drive current.
- 4V gate drive devices.
- High speed switching.

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}	–60	V
Gate to source voltage	V_{GSS}	±20	V
Drain current	I_D	–20	A
Drain peak current	$I_{D(pulse)}$*[1]	–80	A
Body to drain diode reverse drain current	I_{DR}	–20	A
Avalanche current	I_{AP}*[3]	–20	A
Avalanche energy	E_{AR}*[3]	34	mJ
Channel dissipation	Pch*[2]	30	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	–55 to +150	°C

Notes: 1. PW ≤ 10µs, duty cycle ≤ 1 %
2. Value at Tc = 25°C
3. Value at Ta = 25°C, Rg ≥ 50 Ω, L=100µH

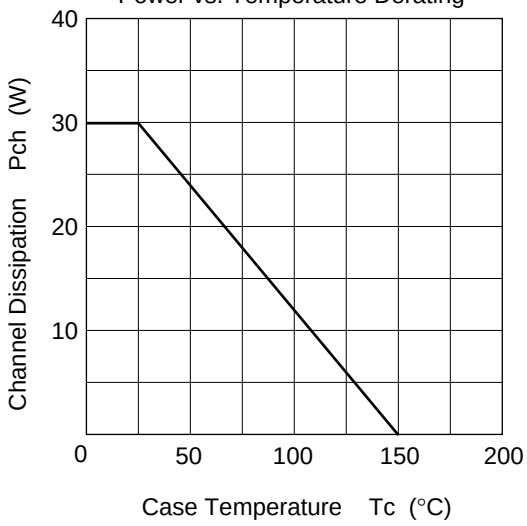
Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	–60	—	—	V	I_D = –10mA, V_{GS} = 0
Gate to source breakdown voltage	$V_{(BR)GSS}$	±20	—	—	V	I_G = ±100µA, V_{DS} = 0
Zero gate voltege drain current	I_{DSS}	—	—	–10	µA	V_{DS} = –60 V, V_{GS} = 0
Gate to source leak current	I_{GSS}	—	—	±10	µA	V_{GS} = ±16V, V_{DS} = 0
Gate to source cutoff voltage	$V_{GS(off)}$	–1.0	—	–2.0	V	I_D = –1mA, V_{DS} = –10V
Static drain to source on state resistance	$R_{DS(on)}$	—	0.042	0.055	Ω	I_D = –10A, V_{GS} = –10V*[1]
	$R_{DS(on)}$	—	0.065	0.095	Ω	I_D = –10A, V_{GS} = –4V*[1]
Forward transfer admittance	$\|y_{fs}\|$	10	16	—	S	I_D = 10A, V_{DS} = 10V*[1]
Input capacitance	Ciss	—	1750	—	pF	V_{DS} = –10V
Output capacitance	Coss	—	800	—	pF	V_{GS} = 0
Reverse transfer capacitance	Crss	—	180	—	pF	f = 1MHz
Turn-on delay time	$t_{d(on)}$	—	16	—	ns	V_{GS} = –10V, I_D = –10A
Rise time	t_r	—	100	—	ns	R_L = 3Ω
Turn-off delay time	$t_{d(off)}$	—	230	—	ns	
Fall time	t_f	—	140	—	ns	
Body to drain diode forward voltage	V_{DF}	—	–1.0	—	V	I_F = –20A, V_{GS} = 0
Body to drain diode reverse recovery time	t_{rr}	—	100	—	ns	I_F = –20A, V_{GS} = 0 diF/ dt = 50A/µs

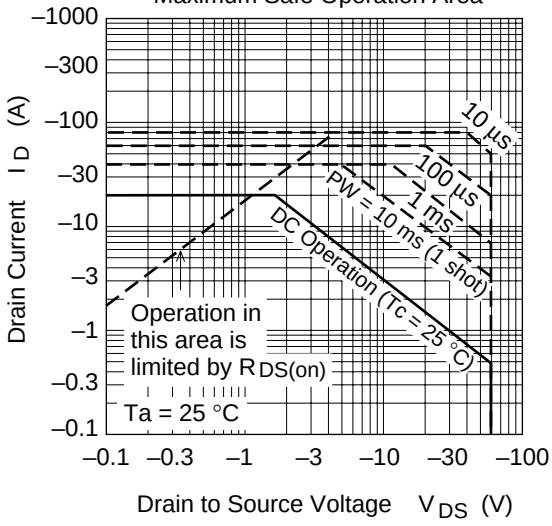
Note: 1. Pulse test

Main Characteristics

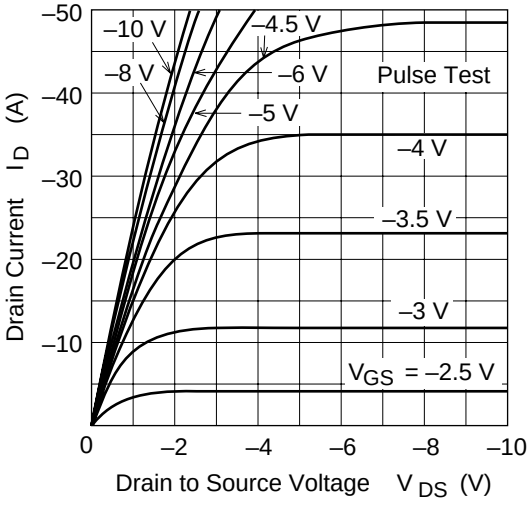
Power vs. Temperature Derating



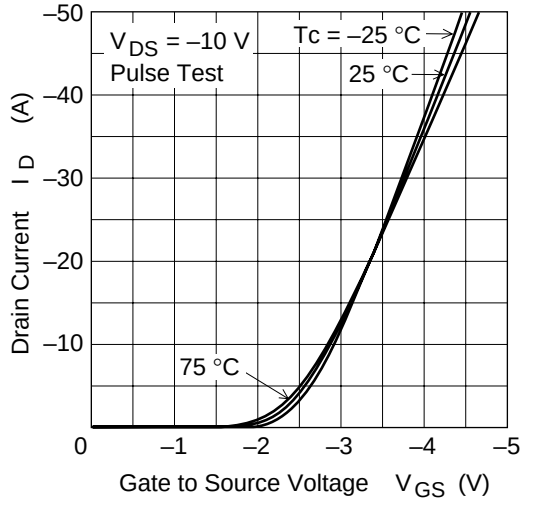
Maximum Safe Operation Area



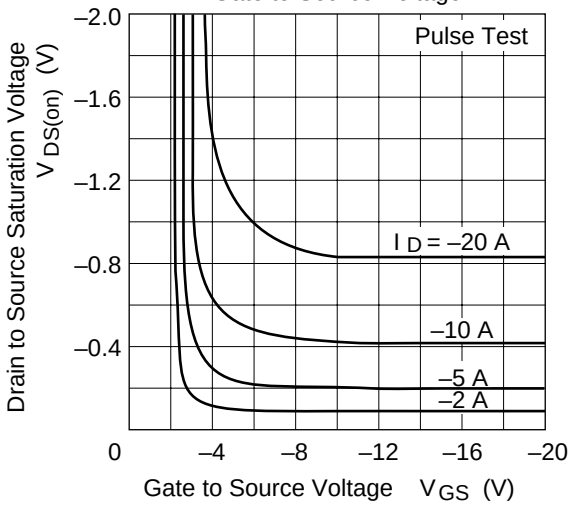
Typical Output Characteristics



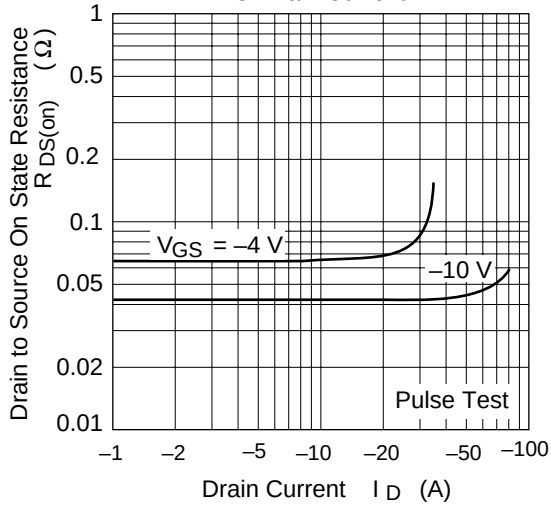
Typical Transfer Characteristics



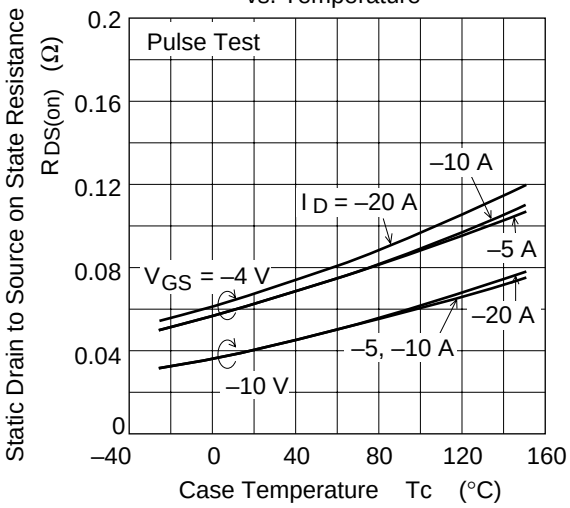
Drain to Source Saturation Voltage vs. Gate to Source Voltage



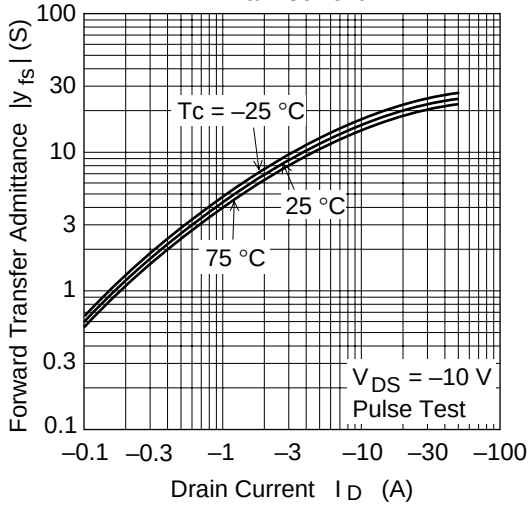
Static Drain to Source on State Resistance vs. Drain Current



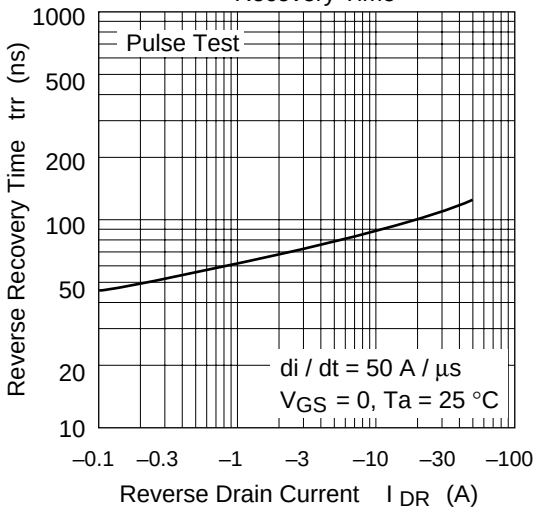
Static Drain to Source on State Resistance vs. Temperature



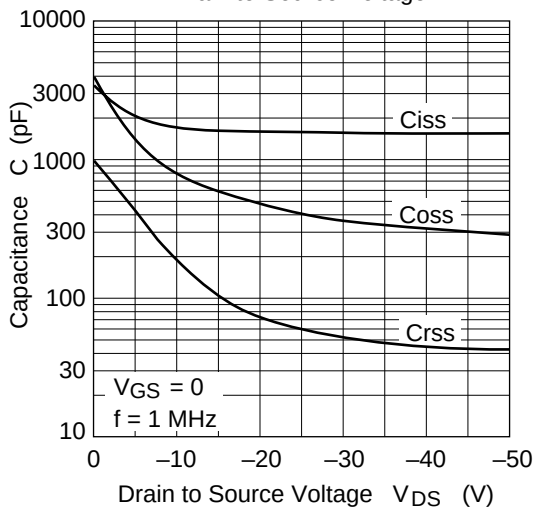
Forward Transfer Admittance vs. Drain Current



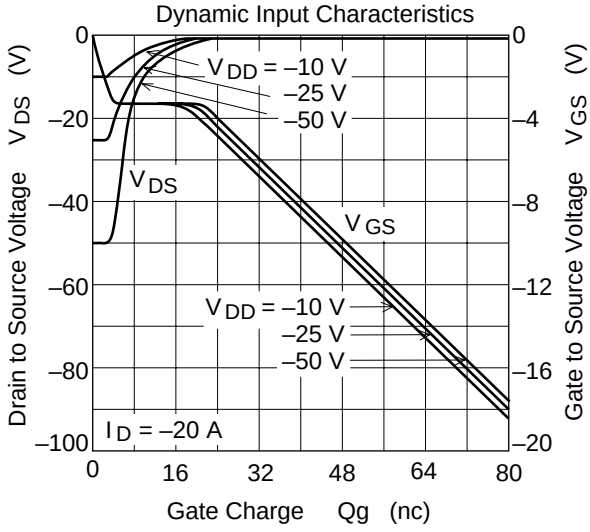
Body to Drain Diode Reverse Recovery Time



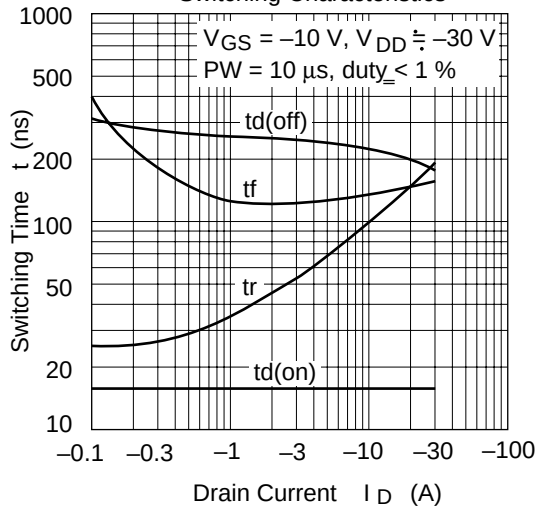
Typical Capacitance vs. Drain to Source Voltage



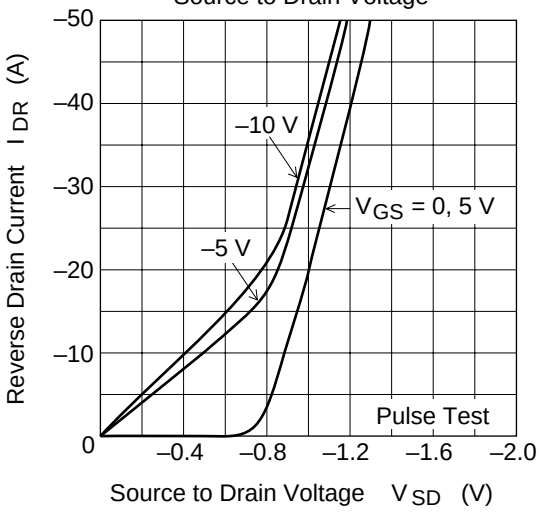
Dynamic Input Characteristics



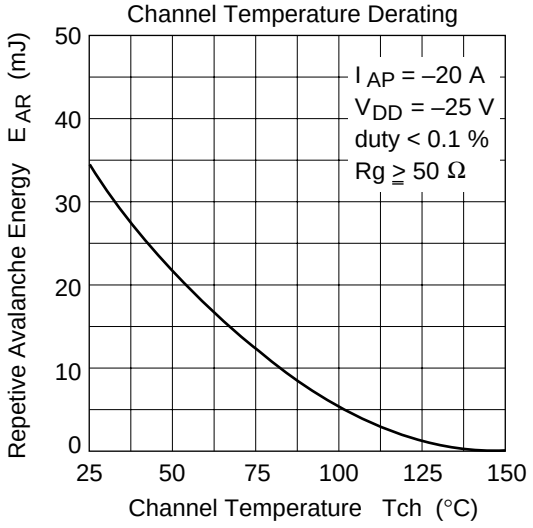
Switching Characteristics



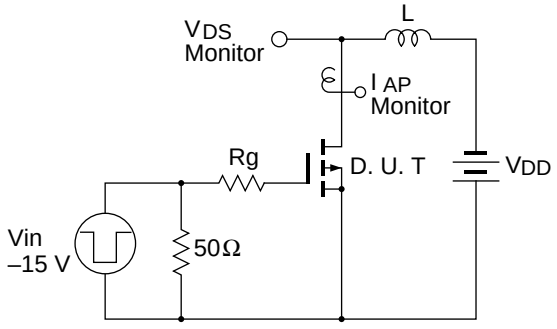
Reverse Drain Current vs.
Source to Drain Voltage



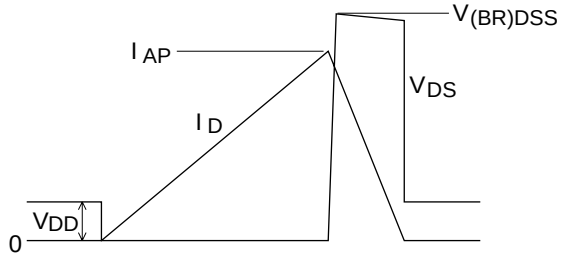
Maximun Avalanche Energy vs.
Channel Temperature Derating



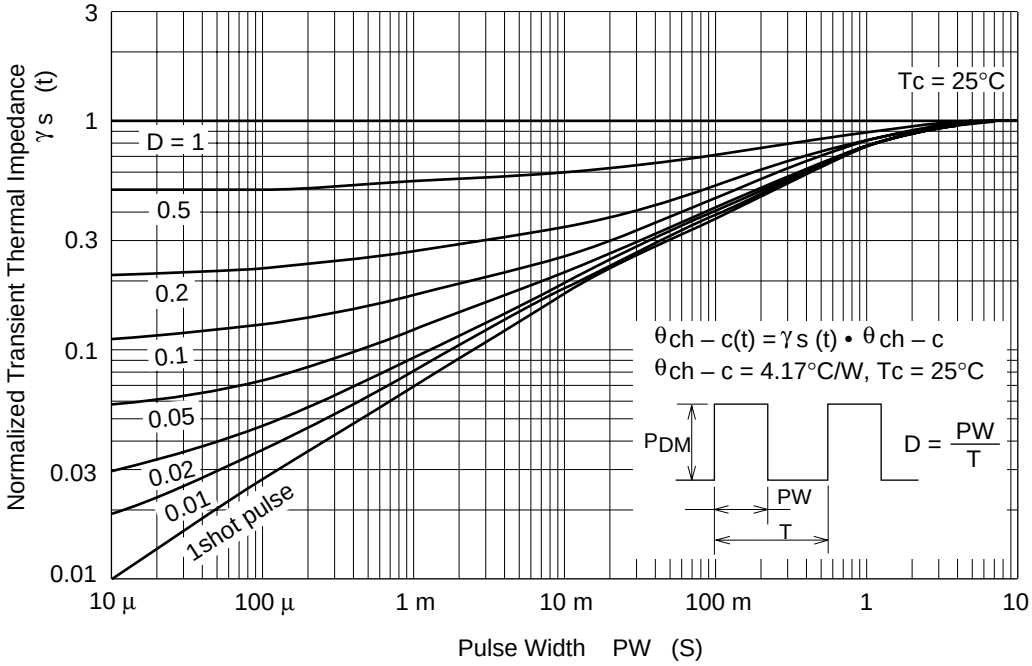
Avalanche Test Circuit and Waveform



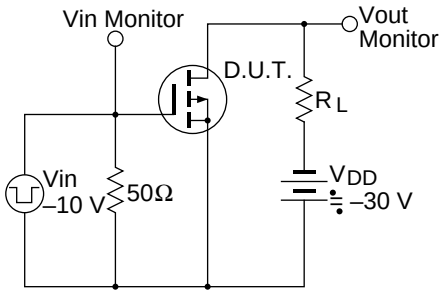
$$E_{AR} = \frac{1}{2} \bullet L \bullet I_{AP}^{2} \bullet \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$



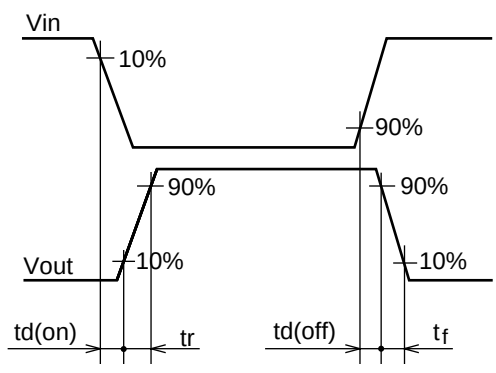
Normalized Transient Thermal Impedance vs. Pulse Width



Switching Time Test Circuit



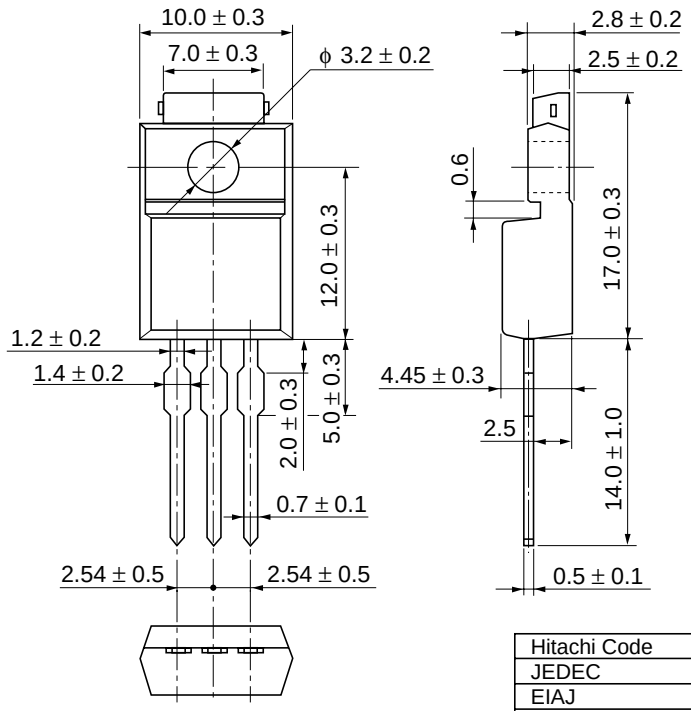
Waveforms

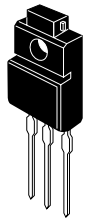


Package Dimensions

As of January, 2001

Unit: mm





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

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