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Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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SWITCHING
P-CHANNEL POWER MOS FET
INDUSTRIAL USE

DESCRIPTION

This product is P-Channel MOS Field Effect Transistor designed for high current switching applications.

ORDERING INFORMATION

PART NUMBER	PACKAGE
2SJ493	Isolated TO-220

FEATURES

- Super low on-state resistance
 $R_{DS(on)1} = 100 \text{ m}\Omega$ (MAX.) ($V_{GS} = -10 \text{ V}$, $I_D = -8 \text{ A}$)
 $R_{DS(on)2} = 185 \text{ m}\Omega$ (MAX.) ($V_{GS} = -4 \text{ V}$, $I_D = -8 \text{ A}$)
- Low C_{iss} : $C_{iss} = 1210 \text{ pF}$ (TYP.)
- Built-in gate protection diode

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	-60	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	$V_{GSS(AC)}$	∓ 20	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$) ^{Note1}	$V_{GSS(DC)}$	-20, 0	V
Drain Current (DC)	$I_{D(DC)}$	∓ 16	A
Drain Current (pulse) ^{Note2}	$I_{D(pulse)}$	∓ 64	A
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_T	30	W
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	P_T	2.0	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +150	$^\circ\text{C}$
Single Avalanche Current ^{Note3}	I_{AS}	-16	A
Single Avalanche Energy ^{Note3}	E_{AS}	25.6	mJ

Notes 1. $f = 20 \text{ kHz}$, Duty Cycle $\leq 10\%$ (+Side)

2. $PW \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$

3. Starting $T_{ch} = 25^\circ\text{C}$, $R_A = 25 \Omega$, $V_{GS} = -20 \text{ V} \rightarrow 0$

THERMAL RESISTANCE

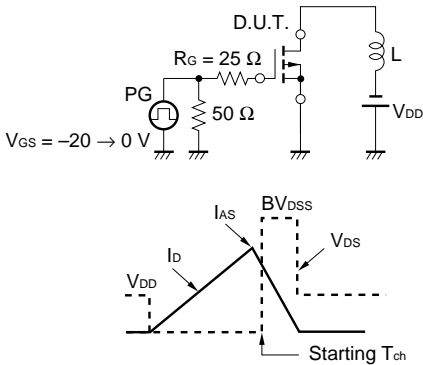
Channel to Case	$R_{th(ch-C)}$	4.17	$^\circ\text{C/W}$
Channel to Ambient	$R_{th(ch-A)}$	62.5	$^\circ\text{C/W}$

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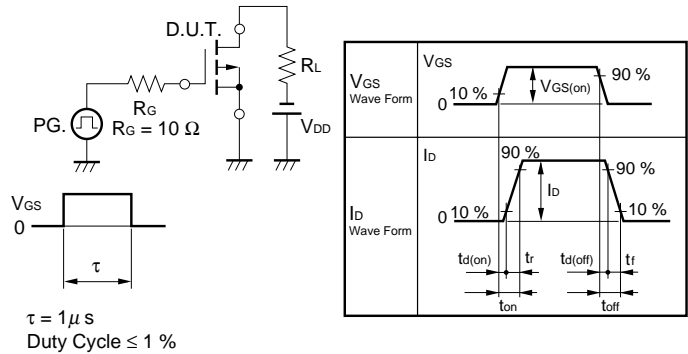
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	R _{DS(on)1}	V _{GS} = -10 V, I _D = -8 A		70	100	mΩ
	R _{DS(on)2}	V _{GS} = -4 V, I _D = -8 A		120	185	mΩ
Gate to Source Cut-off Voltage	V _{GS(off)}	V _{DS} = -10 V, I _D = -1 mA	-1.0	-1.5	-2.0	V
Forward Transfer Admittance	y _{fs}	V _{DS} = -10 V, I _D = -8 A	5.0	11		S
Drain Leakage Current	I _{DSS}	V _{DS} = -60 V, V _{GS} = 0 V			-10	μA
Gate to Source Leakage Current	I _{GSS}	V _{GS} = ± 20 V, V _{DS} = 0 V			± 10	μA
Input Capacitance	C _{iss}	V _{DS} = -10 V		1210		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V		520		pF
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		180		pF
Turn-on Delay Time	t _{d(on)}	I _D = -8 A		15		ns
Rise Time	t _r	V _{GS(on)} = -10 V		130		ns
Turn-off Delay Time	t _{d(off)}	V _{DD} = -30 V		95		ns
Fall Time	t _f	R _G = 10 Ω		80		ns
Total Gate Charge	Q _G	I _D = -16 A		42		nC
Gate to Source Charge	Q _{GS}	V _{DD} = -48 V		8.0		nC
Gate to Drain Charge	Q _{GD}	V _{GS} = -10 V		10		nC
Body Diode Forward Voltage	V _{F(S-D)}	I _F = 16 A, V _{GS} = 0 V		1.0		V
Reverse Recovery Time	t _{rr}	I _F = 16 A, V _{GS} = 0 V		120		ns
Reverse Recovery Charge	Q _{rr}	di/dt = 50 A/μs		230		nC

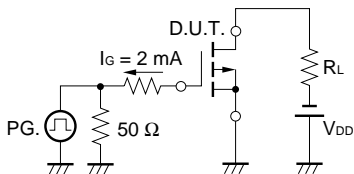
TEST CIRCUIT 1 AVALANCHE CAPABILITY



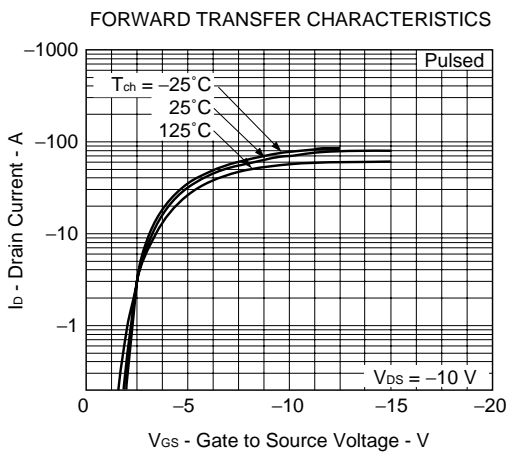
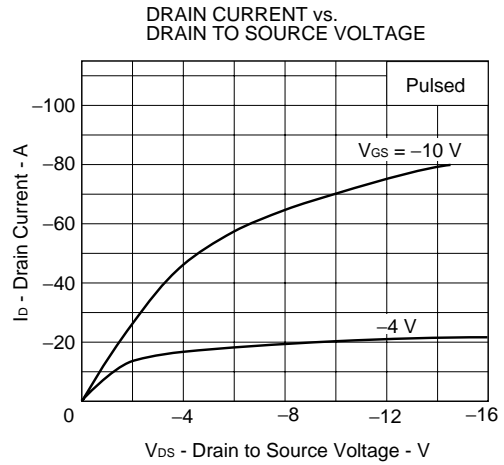
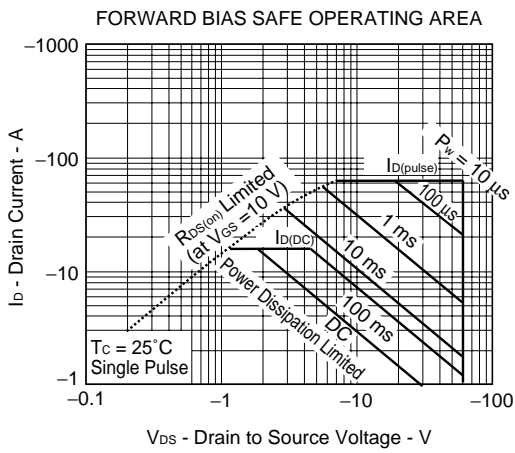
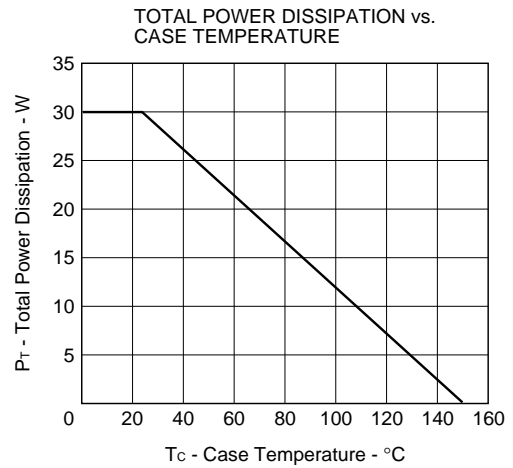
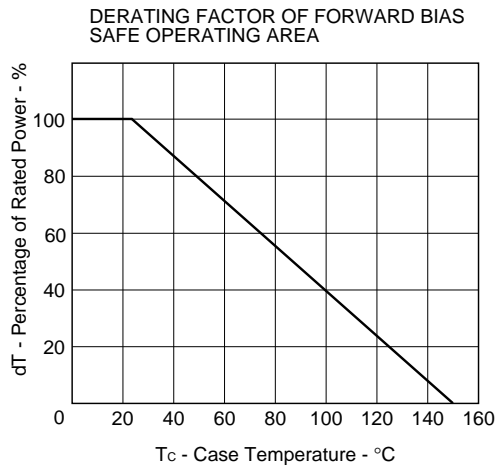
TEST CIRCUIT 2 SWITCHING TIME



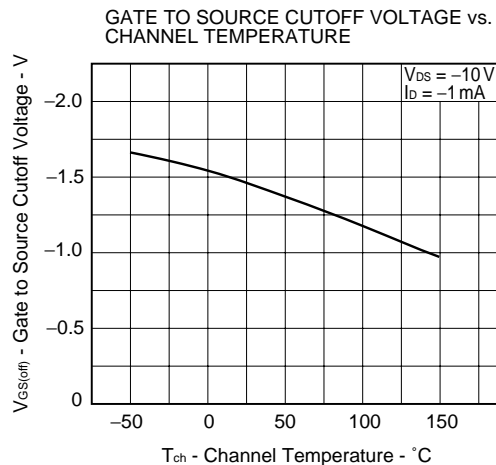
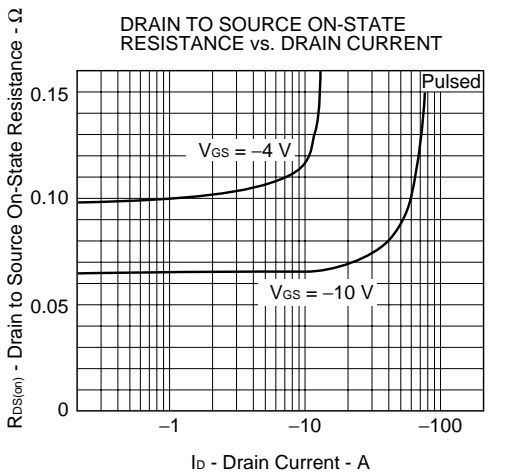
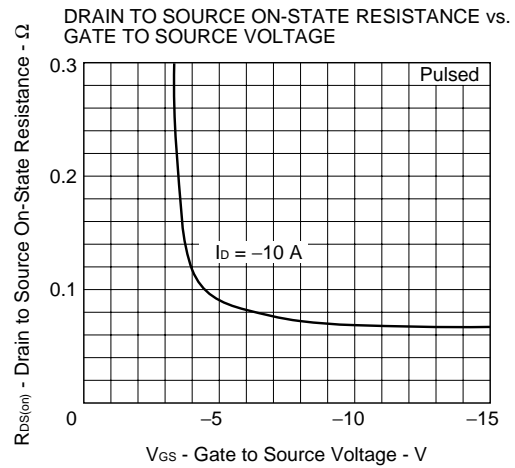
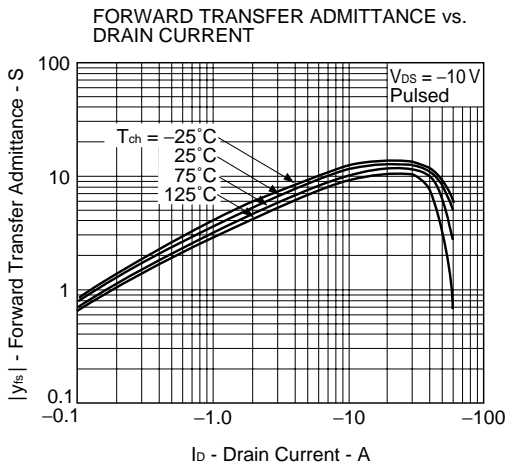
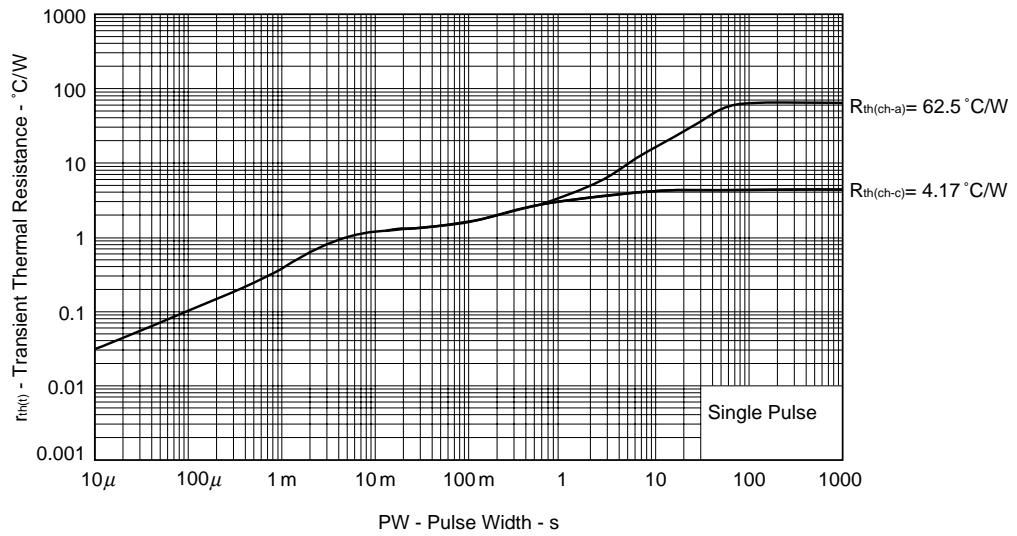
TEST CIRCUIT 3 GATE CHARGE



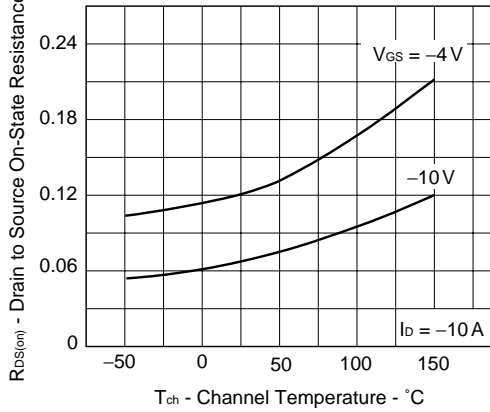
TYPICAL CHARACTERISTICS (T_A = 25 °C)



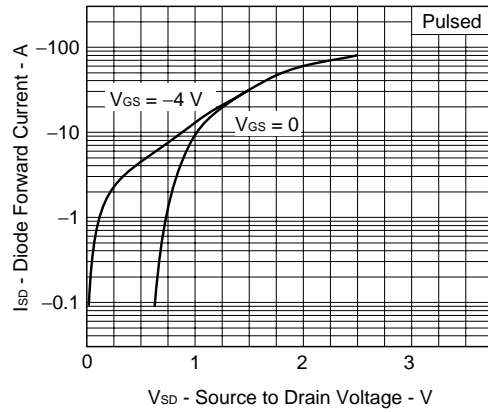
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



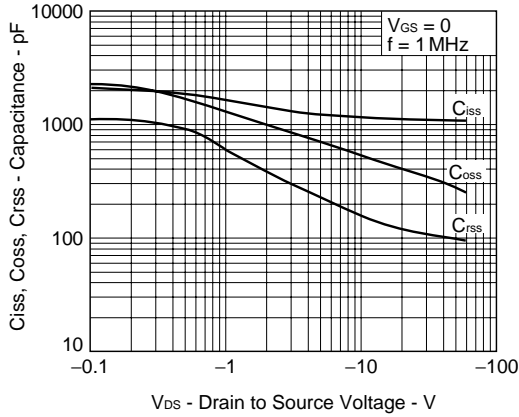
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



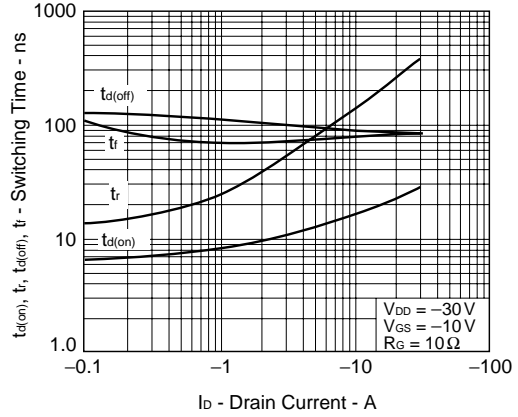
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



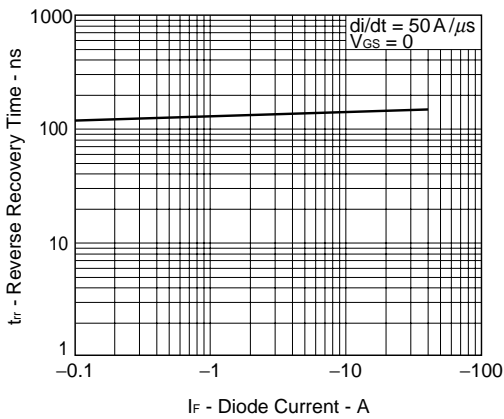
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



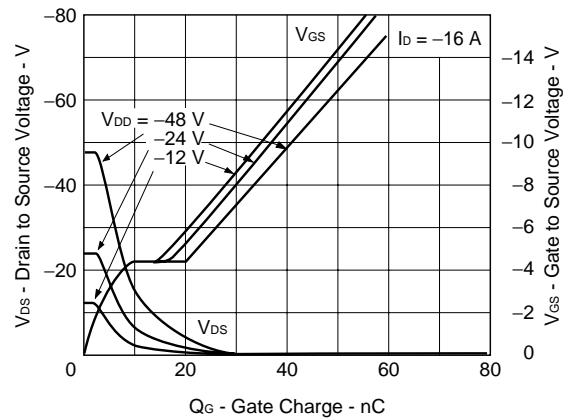
SWITCHING CHARACTERISTICS

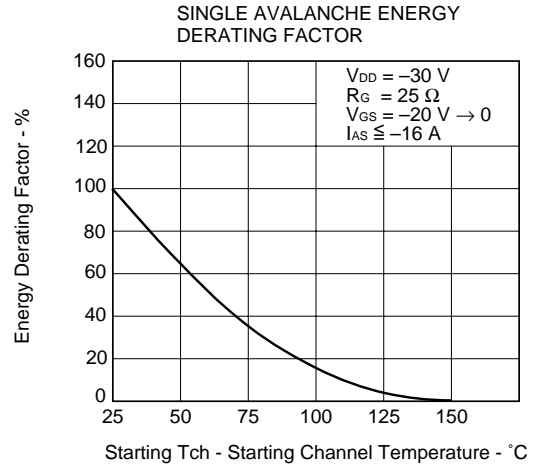
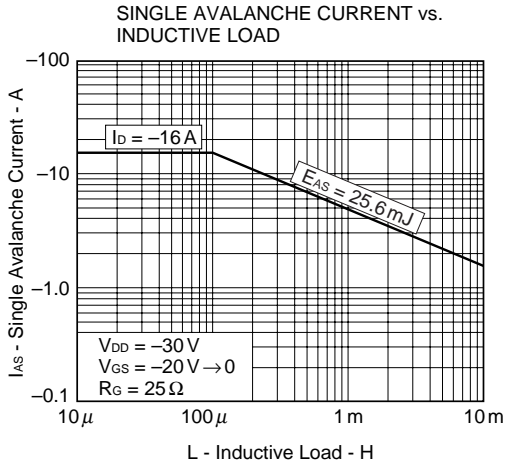


REVERSE RECOVERY TIME vs. DRAIN CURRENT



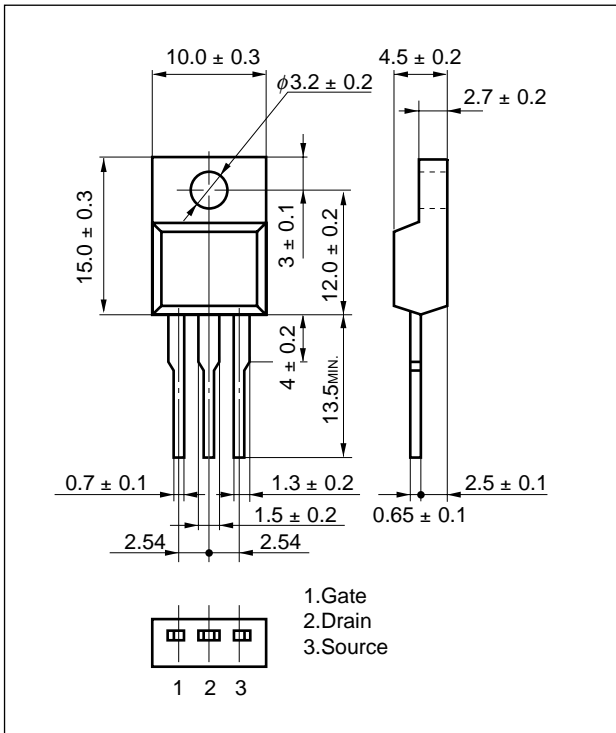
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



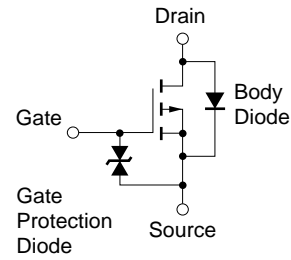


PACKAGE DRAWING (Unit: mm)

Isolated TO-220(MP-45F)



EQUIVALENT CIRCUIT



Remark The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

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Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

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