To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

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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RENESAS

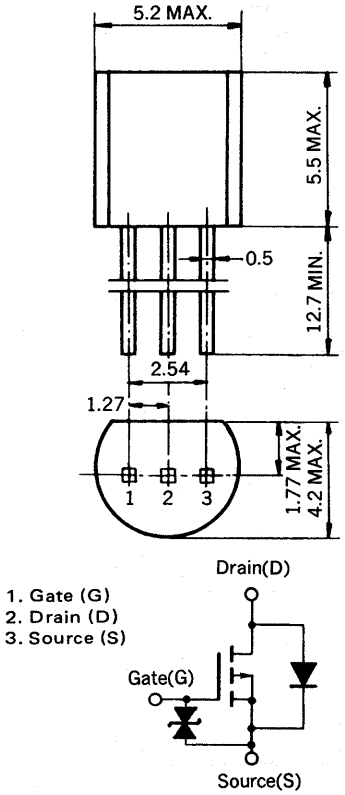
MOS FIELD-EFFECT TRANSISTOR

Phase-out/Discontinued

2SJ178

P-CHANNEL MOS FET
FOR HIGH-SPEED SWITCHING

OUTLINE DIMENSIONS (Unit : mm)



(Diode in the above figure is a parasitic diode.)

The 2SJ178 is a p-channel vertical type MOS FET switching device which can be directly driven from an IC operating with a 5 V single power supply. The device featuring low ON-state resistance is of the voltage drive type and thus is ideal for driving actuators such as motors, solenoids, and relays.

FEATURES

- Low ON-state resistance
  $R_{DS(on)}$ = 1.5 Ω MAX. at V_{GS} = –4 V, I_D = –0.5 A
  $R_{DS(on)}$ = 1.0 Ω MAX. at V_{GS} = –10 V, I_D = –0.5 A
- Voltage drive at logic level (V_{GS} = –4 V) is possible.
- Bidirectional zener diode for protection is incorporated in between the gate and the source.
- Inductive loads can be driven without protective circuit thanks to the improved breakdown voltage between the drain and source.

QUALITY GRADE

Standard

Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

ABSOLUTE MAXIMUM RATINGS (T_a = 25 °C)

ITEM	SYMBOL	RATING	UNIT	TEST CONDITIONS
Drain to Source Voltage	V_{DSS}	–30	V	V_{GS} = 0
Gate to Source Voltage	V_{GSS}	±20	V	V_{DS} = 0
Drain Current (DC)	$I_{D(DC)}$	±1.0	A	
Drain Current (pulse)	$I_{D(pulse)}$	±2.0	A	PW ≦10 ms, Duty Cycle ≦ 50 %
Total Power Dissipation	P_T	750	mW	T_a = 25 °C
Channel Temperature	T_{ch}	150	°C	
Storage Temperature	T_{stg}	–55 to +150	°C	

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(O.D.No. TC–7584)
Date Published April 1991 M
Printed in Japan

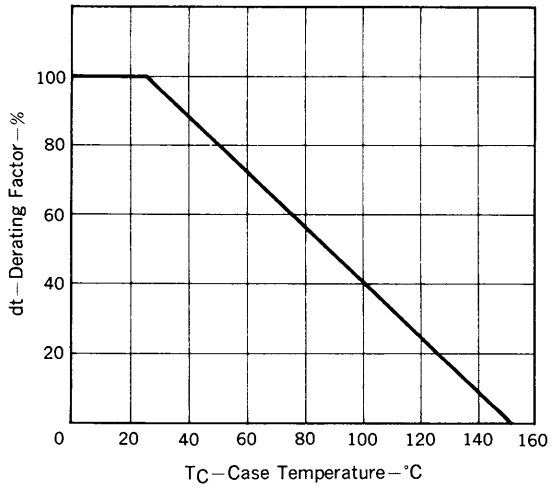
Phase-out/Discontinued

ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

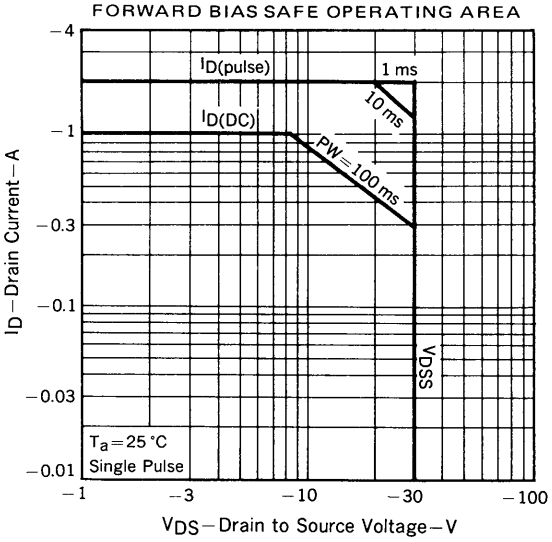
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain Breaking Current	I_{DSS}			−10	μA	V_{DS} = −30 V, V_{GS} = 0
Gate Leakage Current	I_{GSS}			∓10	μA	V_{GS} = ∓20 V, V_{DS} = 0
Gate Cutoff Voltage	$V_{GS(off)}$	−1.0	−2.2	−3.0	V	V_{DS} = −10 V, I_D = −1 mA
Forward Transfer Admittance	$\|y_{fs}\|$	0.4			S	V_{DS} = −10 V, I_D = −0.5 A
Drain to Source ON-State Resistance 1	$R_{DS(on)1}$		0.8	1.5	Ω	V_{GS} = −4 V, I_D = −0.5 A
Drain to Source ON-State Resistance 2	$R_{DS(on)2}$		0.4	1.0	Ω	V_{GS} = −10 V, I_D = −0.5 A
Input Capacitance	C_{iss}		210		pF	V_{DS} = −10 V, V_{GS} = 0, f = 1 MHz
Output Capacitance	C_{oss}		130		pF	
Feedback Capacitance	C_{rss}		3		pF	
ON-State Delay Time	$t_{d(on)}$		35		ns	I_D = −0.5 A, R_L = 50 Ω, $V_{GS(on)}$ = −10 V, R_G = 10 Ω, V_{DD} ≒ −25 V
Rise Time	t_r		70		ns	
OFF-State Delay Time	$t_{d(off)}$		380		ns	
Fall Time	t_f		200		ns	

CHARACTERISTIC CURVES (T_a = 25 °C)

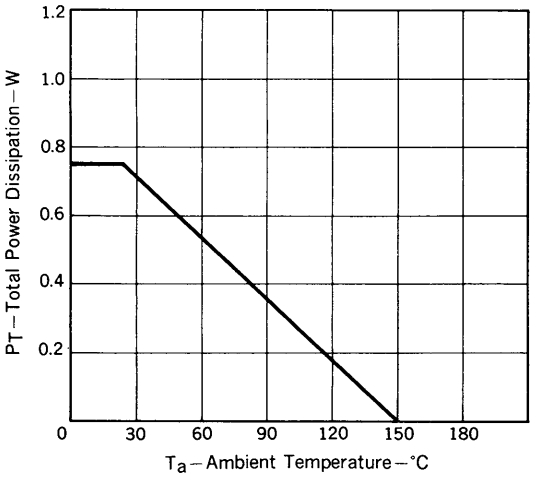
OPERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



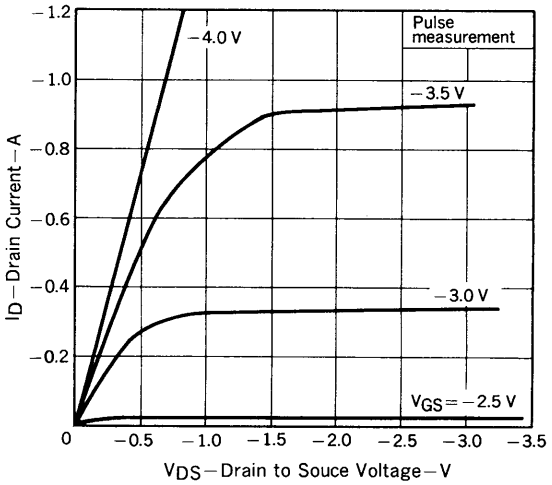
FORWARD BIAS SAFE OPERATING AREA



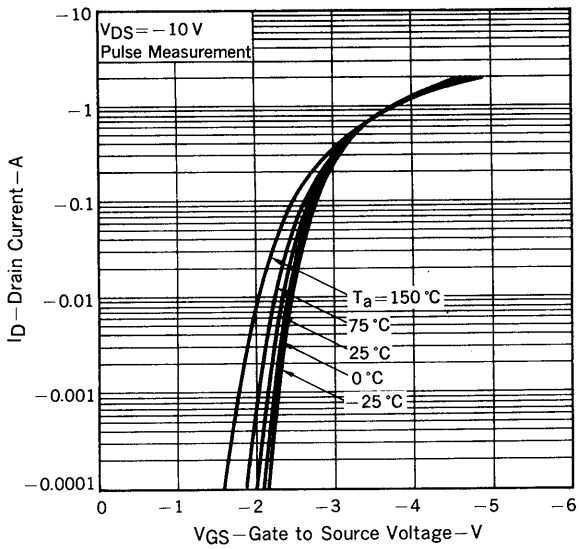
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



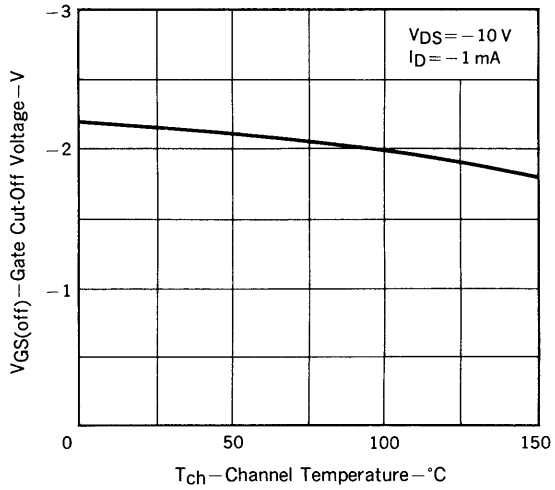
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



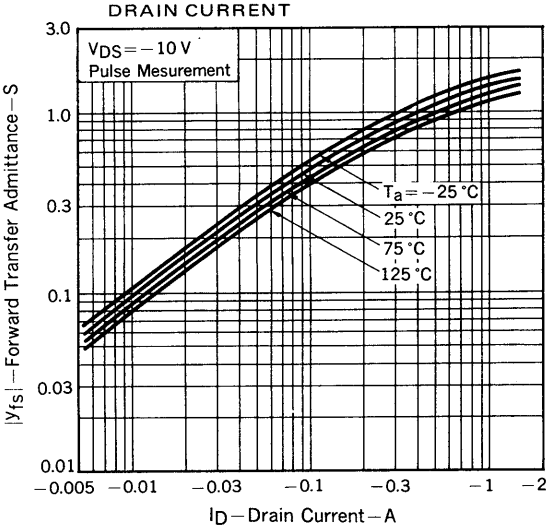
TRANSFER CHARACTERISTICS



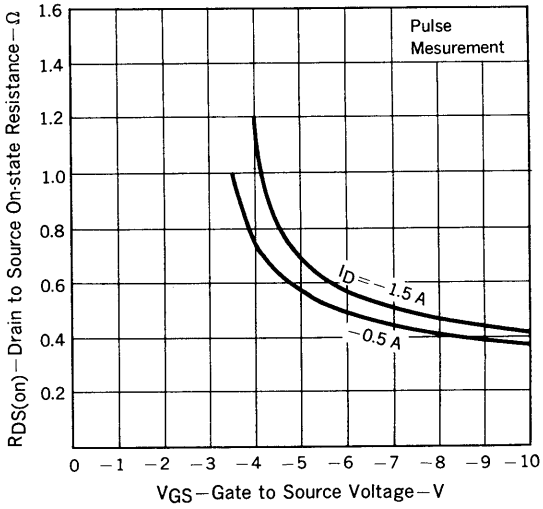
GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE



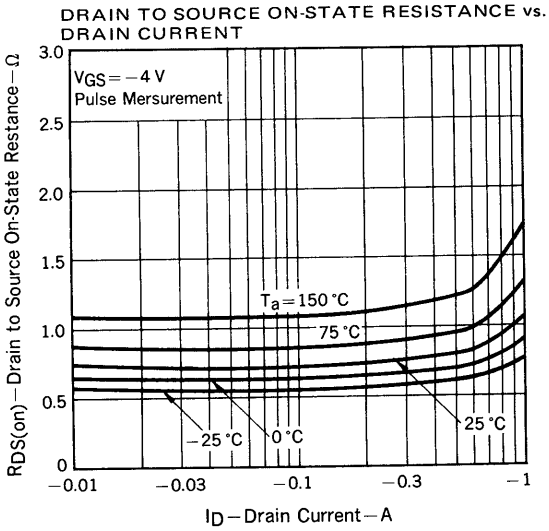
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



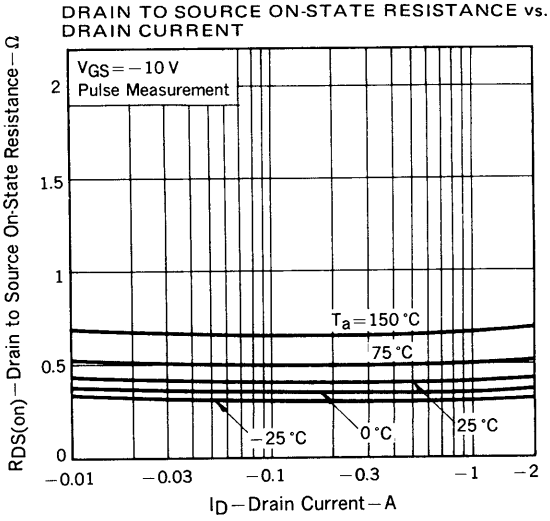
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



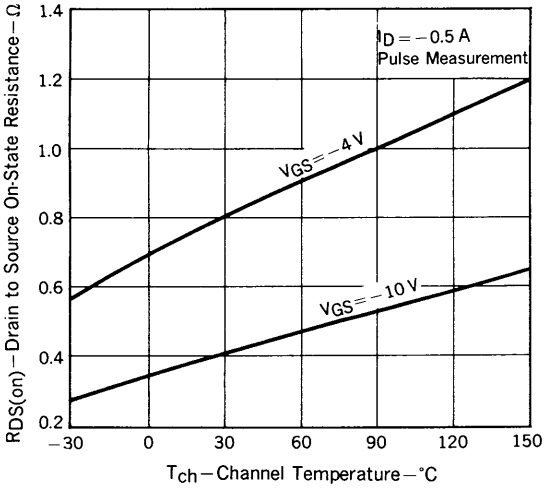
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



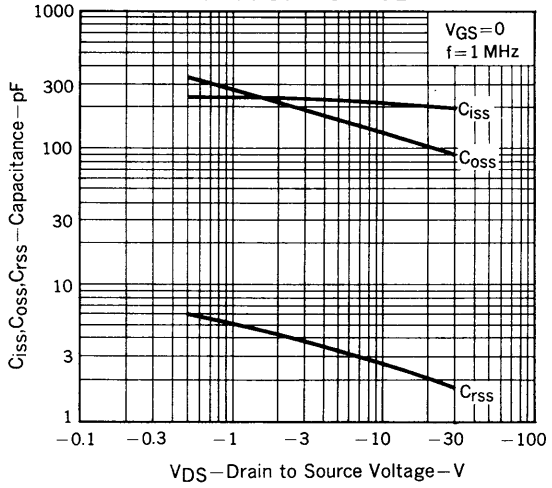
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



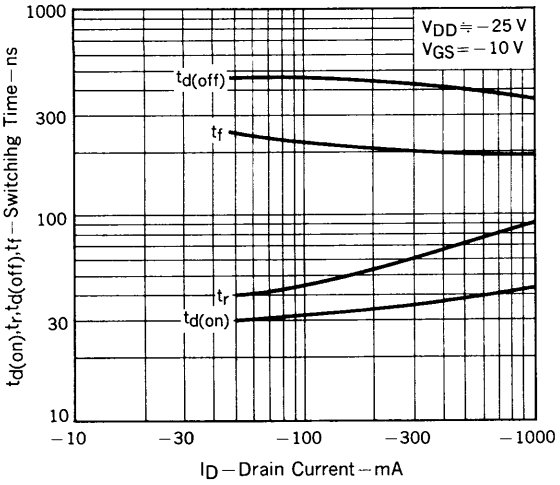
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



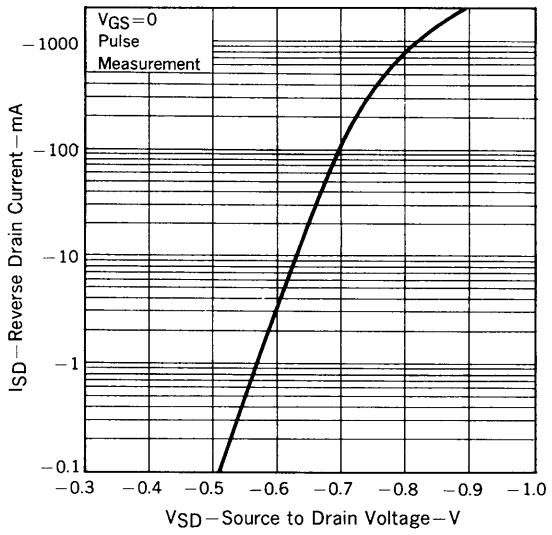
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



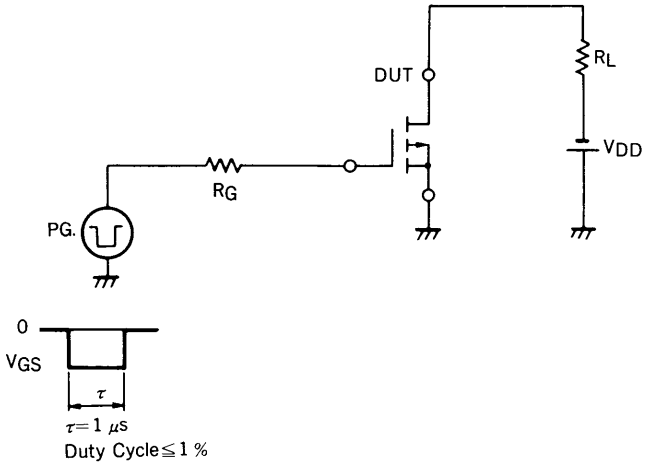
SWITCHING CHARACTERISTICS

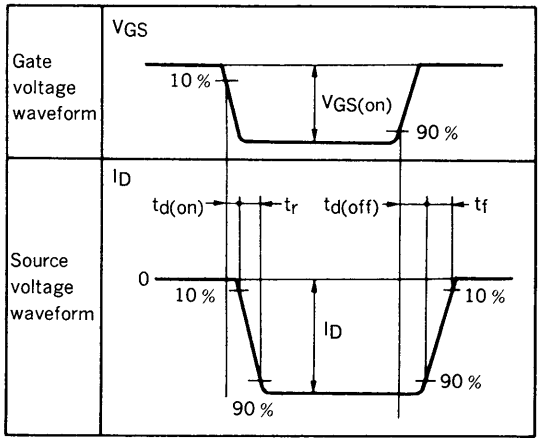


SOURCE TO DRAIN DIODE FORWARD VOLTAGE



SWITCHING TIME MEASUREMENT CIRCUIT & MEASUREMENT CONDITIONS





RECOMMENDED SOLDERING CONDITIONS

Solder this product under the following recommended conditions.
For soldering methods or soldering conditions other than those recommended in the table, please consult our NEC salespeople.

Insert type

Soldering method	Soldering conditions	Recommended condition code
Wave soldering	Solder bath temperature: 260 °C max. Soldering time: 10 sec max.	

[MEMO]