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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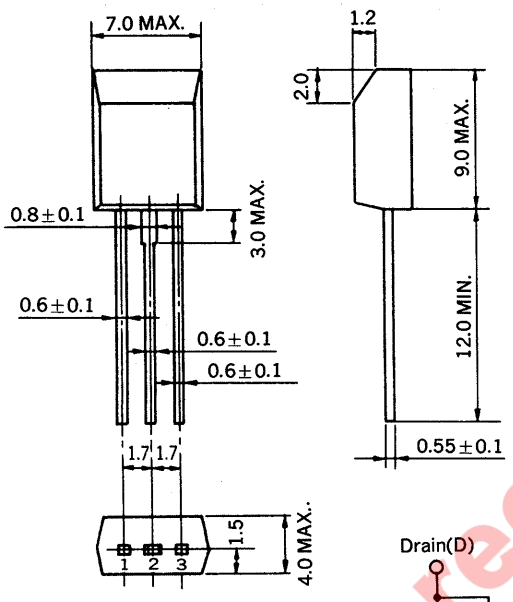
RENESAS

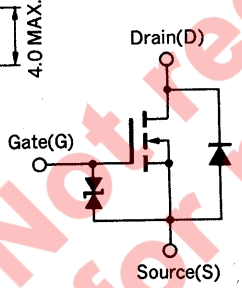
MOS FIELD EFFECT TRANSISTOR
2SK681A

N-CHANNEL MOS FET
FOR HIGH SPEED SWITCHING

PACKAGE DIMENSIONS (Unit : mm)



1. Gate
2. Drain
3. Source



(Diode in the figure is the parasitic diode.)

The 2SK681A, N-channel vertical type MOS FET, is a switching device which can be driven directly by the output of ICs having a 5 V power source.

The MOS FET has excellent switching characteristics and is suitable for use as a high-speed switching device in digital circuits.

FEATURES

- Directly driven by ICs having a 5 V power source.
- Not necessary to consider driving current because of its high input impedance.
- Possible to reduce the number of parts by omitting the bias resistor.
- Low ON-state resistance
  $R_{DS(on)}$ = 1.0 Ω TYP. at V_{GS} = 4 V, I_D = 0.5 A
  $R_{DS(on)}$ = 0.7 Ω TYP. at V_{GS} = 10 V, I_D = 0.5 A

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)

PARAMETER	SYMBOL	RATINGS	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	$I_{D(DC)}$	±1.0	A	
Drain Current	$I_{D(pulse)}$	±2.0	A	PW ≦ 10 ms, Duty Cycle ≦ 50 %
Total Power Dissipation	P_T	1.0	W	
Channel Temperature	T_{ch}	150	°C	
Storage Temperature	T_{stg}	−55 to +150	°C	

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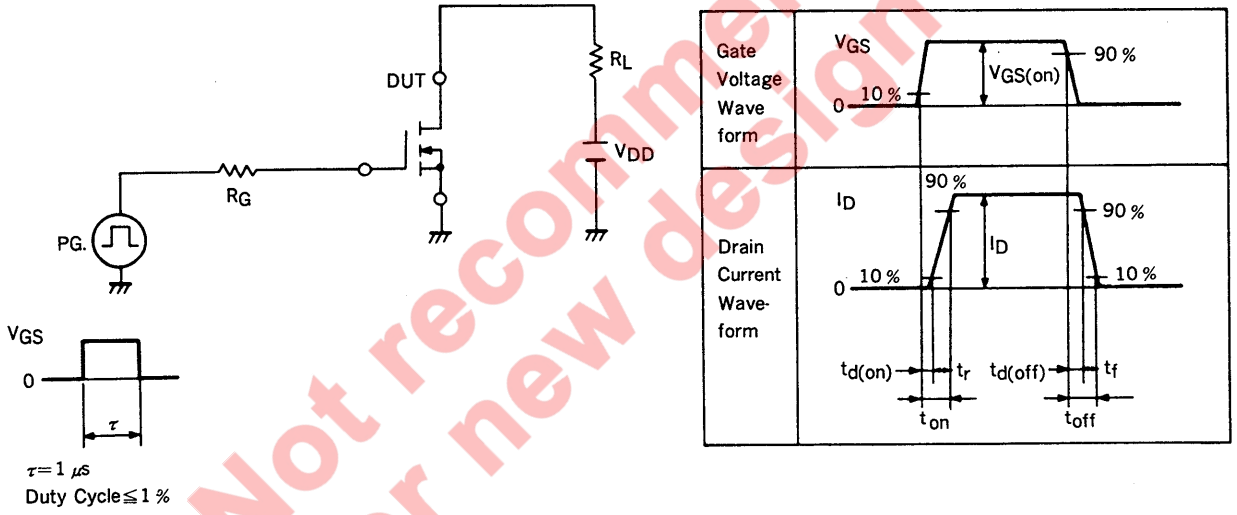
Printed in Japan

ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

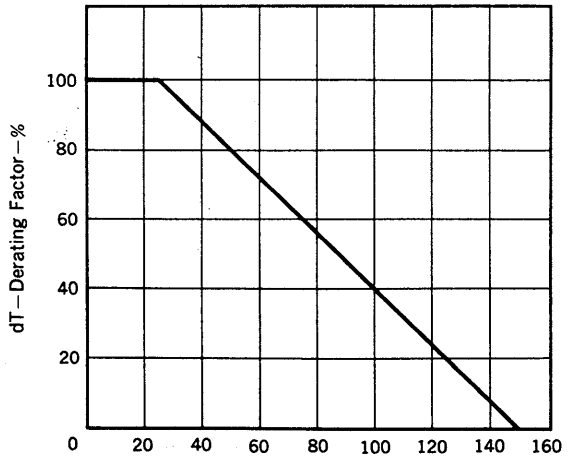
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain Cut-off Current	I_{DSS}			10	μA	V_{DS} = 30 V, V_{GS} = 0
Gate Leakage Current	I_{GSS}			±10	μA	V_{GS} = ±20 V, V_{DS} = 0
Gate Cut-off Voltage	$V_{GS(off)}$	1.0	1.6	2.5	V	V_{DS} = 10 V, I_D = 1 mA
Forward Transfer Admittance	$\|y_{fs}\|$	0.4			S	V_{DS} = 10 V, I_D = 0.5 A
Drain to Source On-State Resistance	$R_{DS(on)1}$		0.6	1.0	Ω	V_{GS} = 4.0 V, I_D = 0.5 A
Drain to Source On-State Resistance	$R_{DS(on)2}$		0.4	0.7	Ω	V_{GS} = 10 V, I_D = 0.5 A
Input Capacitance	C_{iss}		130		pF	V_{DS} = 5.0 V, V_{GS} = 0, f = 1 MHz
Output Capacitance	C_{oss}		70		pF	
Feedback Capacitance	C_{rss}		30		pF	
Turn-On Delay Time	$t_{d(on)}$		12		ns	$V_{GS(on)}$ = 10 V, R_G = 10 Ω V_{DD} = 25 V, I_D = 0.5 A R_L = 50 Ω
Rise Time	t_r		44		ns	
Turn-Off Delay Time	$t_{d(off)}$		310		ns	
Fall Time	t_f		160		ns	

SWITCHING TIME MEASUREMENT CIRCUIT AND CONDITIONS

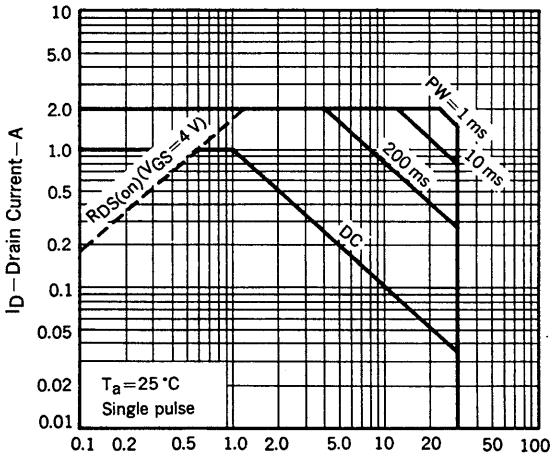


TYPICAL CHARACTERISTICS (T_a = 25 °C)

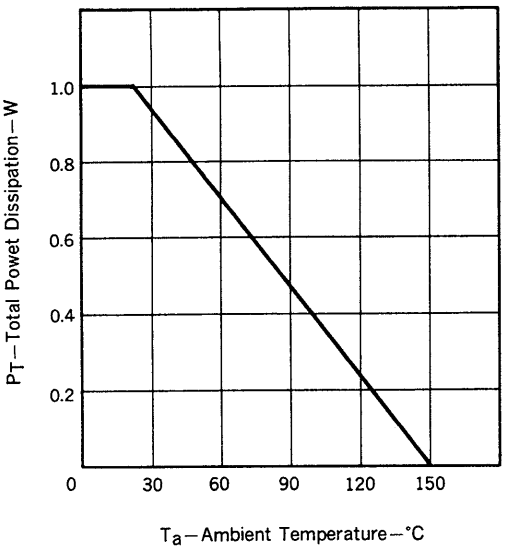
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



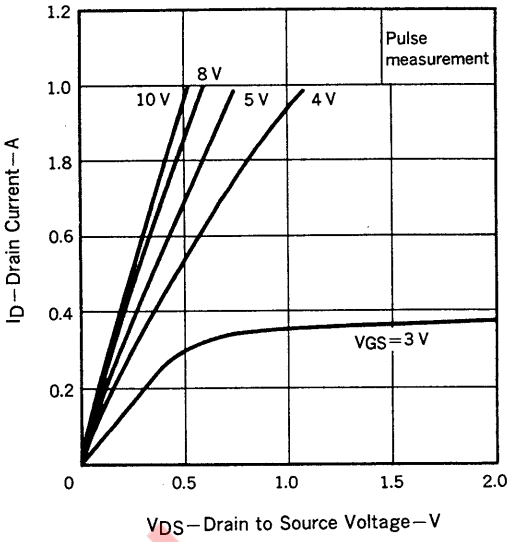
FORWARD BIAS SAFE OPERATING AREA



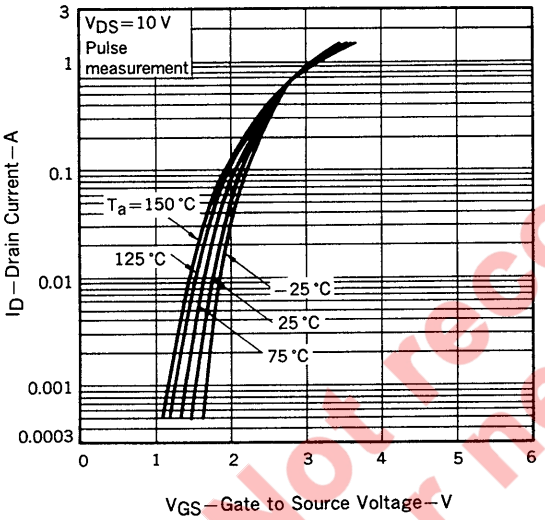
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



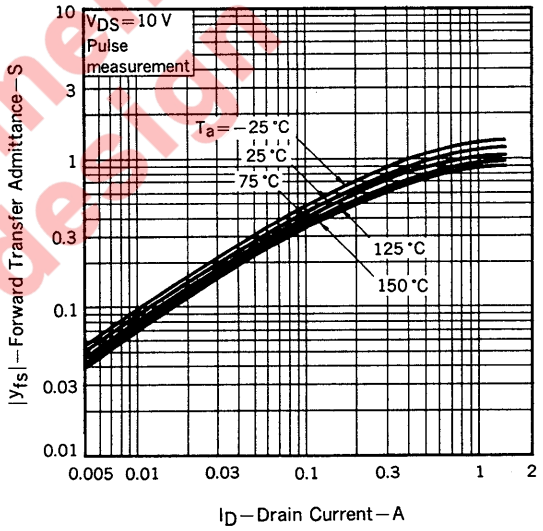
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



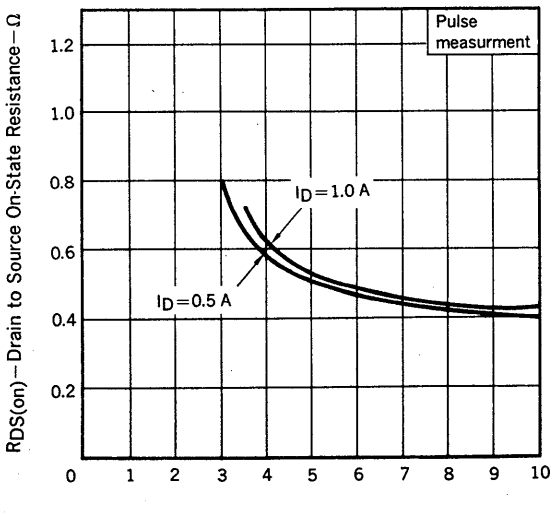
TRANSFER CHARACTERISTICS



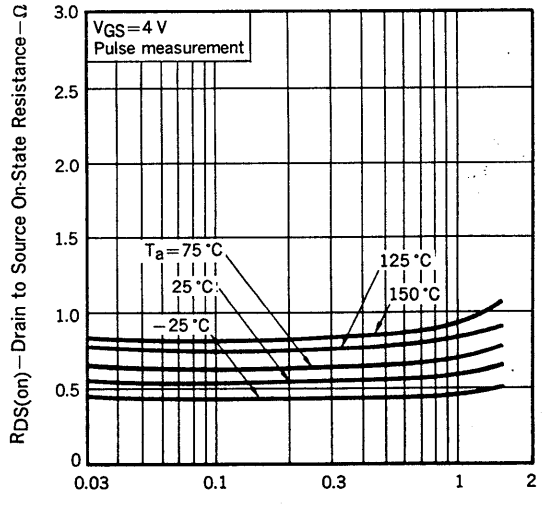
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



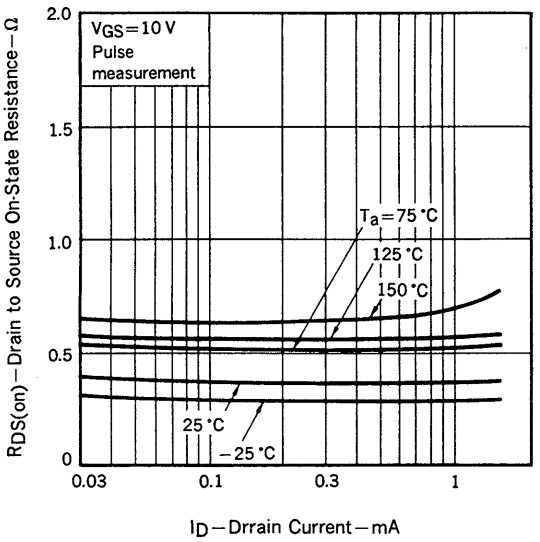
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



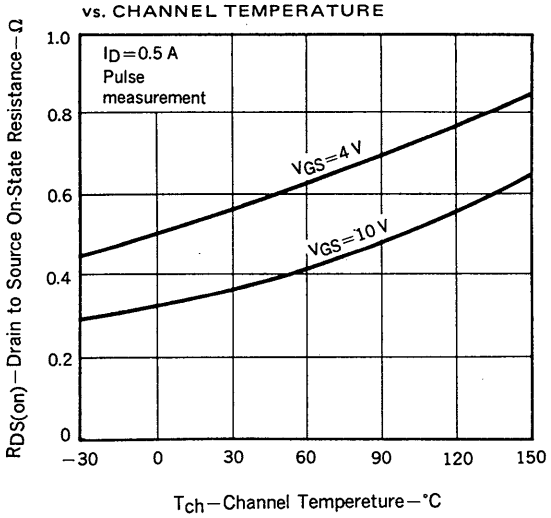
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



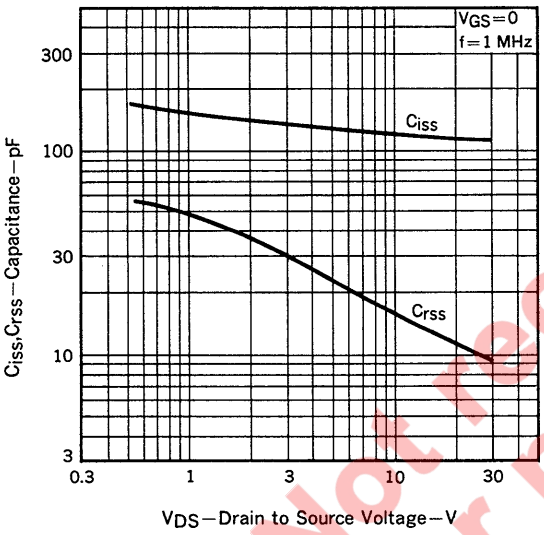
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



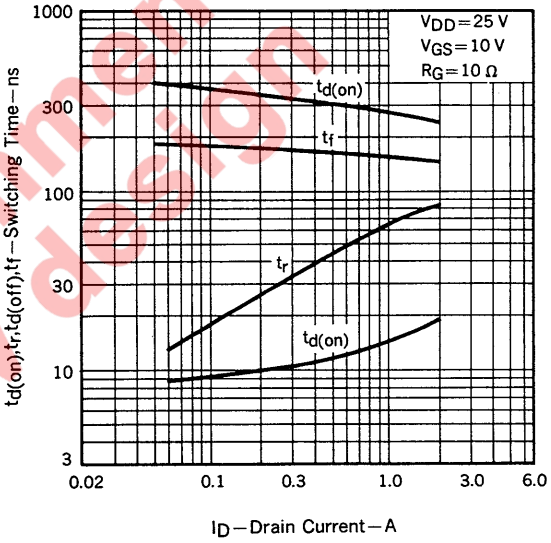
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



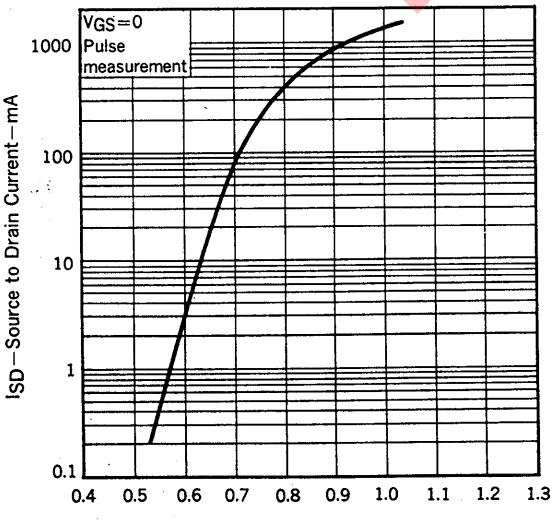
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



SWITCHING CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



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]