To our customers,

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

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RENESAS

MOS FIELD EFFECT TRANSISTOR
2SK3366

SWITCHING
N-CHANNEL POWER MOS FET

DESCRIPTION

The 2SK3366 is N-Channel MOS Field Effect Transistor designed for DC/DC converter application of notebook computers.

FEATURES

- Low on-resistance
  $R_{DS(on)1}$ = 21 mΩ (MAX.) (V_{GS} = 10 V, I_D = 10 A)
  $R_{DS(on)2}$ = 33 mΩ (MAX.) (V_{GS} = 4.5 V, I_D = 10 A)
  $R_{DS(on)3}$ = 43 mΩ (MAX.) (V_{GS} = 4.0 V, I_D = 10 A)
- Low C_{iss} : C_{iss} = 730 pF (TYP.)
- Built-in gate protection diode

ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3366	TO-251 (MP-3)
2SK3366-Z	TO-252 (MP-3Z)

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	30	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	±20	V
Drain Current (DC)	$I_{D(DC)}$	±20	A
Drain Current (Pulse) **Note**	$I_{D(pulse)}$	±80	A
Total Power Dissipation (T_C = 25 °C)	P_T	30	W
Total Power Dissipation (T_A = 25 °C)	P_T	1.0	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	–55 to + 150	°C

Note PW ≤ 10 μs, Duty cycle ≤ 1 %

THERMAL RESISTANCE

Channel to case Thermal Resistance	$R_{th(ch-C)}$	4.17	°C/W
Channel to ambient Thermal Resistance	$R_{th(ch-A)}$	125	°C/W

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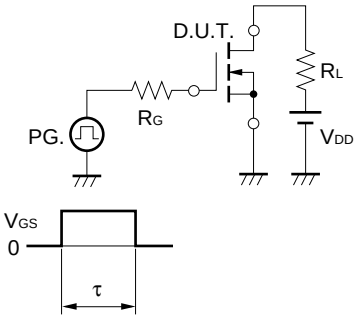
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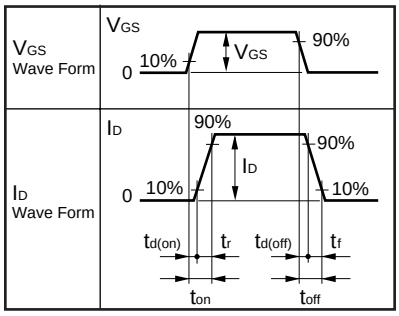
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	$R_{DS(on)1}$	V_{GS} = 10 V, I_D = 10 A		17.2	21	mΩ
	$R_{DS(on)2}$	V_{GS} = 4.5 V, I_D = 10 A		26	33	mΩ
	$R_{DS(on)3}$	V_{GS} = 4.0 V, I_D = 10 A		33	43	mΩ
Gate to Source Cut-off Voltage	$V_{GS(off)}$	V_{DS} = 10 V, I_D = 1 mA	1.5	2.0	2.5	V
Forward Transfer Admittance	$\|y_{fs}\|$	V_{DS} = 10 V, I_D = 10 A	5	10		S
Drain Leakage Current	I_{DSS}	V_{DS} = 30 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, V_{GS} = 0 V, f = 1 MHz		730		pF
Output Capacitance	C_{oss}			250		pF
Reverse Transfer Capacitance	C_{rss}			120		pF
Turn-on Delay Time	$t_{d(on)}$	I_D = 10 A, V_{GS} = 10 V, V_{DD} = 15 V,		28		ns
Rise Time	t_r	R_G = 10 Ω		420		ns
Turn-off Delay Time	$t_{d(off)}$			47		ns
Fall Time	t_f			64		ns
Total Gate Charge	Q_G	I_D = 20 A, V_{DD} = 24 V, V_{GS} = 10 V		15		nC
Gate to Source Charge	Q_{GS}			2.8		nC
Gate to Drain Charge	Q_{GD}			4.1		nC
Body Diode forward Voltage	$V_{F(S-D)}$	I_F = 20 A, V_{GS} = 0 V		1.0		V
Reverse Recovery Time	t_{rr}	I_F = 20 A, V_{GS} = 0 V		30		ns
Reverse Recovery Charge	Q_{rr}	di/dt = 100 A/μs		26		nC

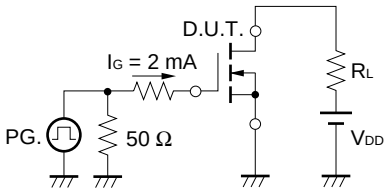
TEST CIRCUIT 1 SWITCHING TIME



τ = 1 μs
Duty Cycle ≤ 1%



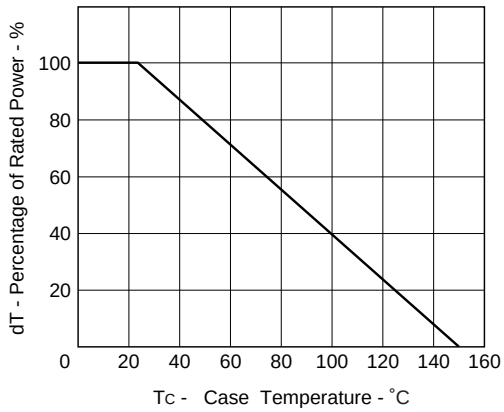
TEST CIRCUIT 2 GATE CHARGE



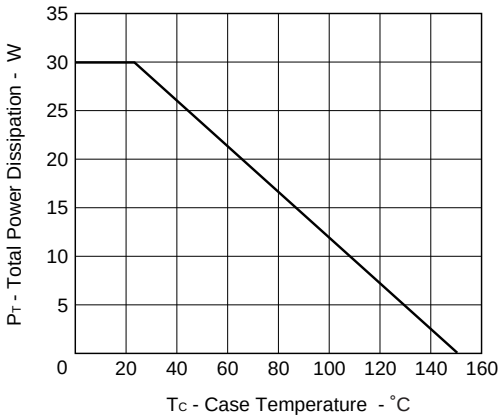
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TYPICAL CHARACTERISTICS (T_A = 25 °C)

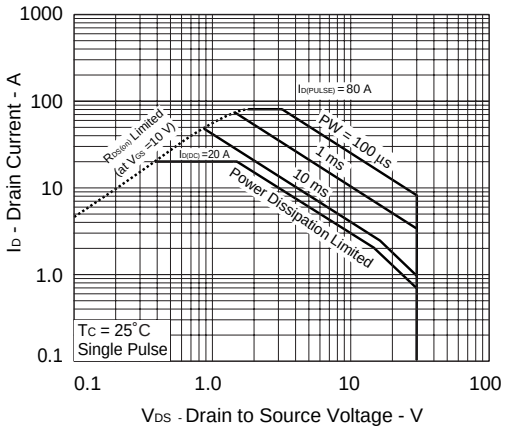
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



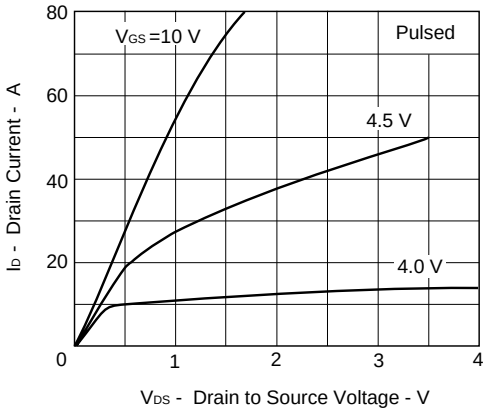
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



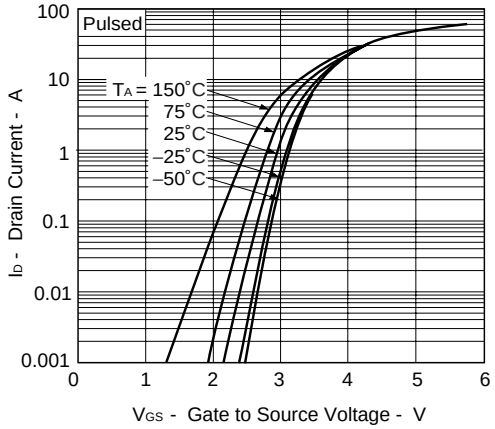
FORWARD BIAS SAFE OPERATING AREA



DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE

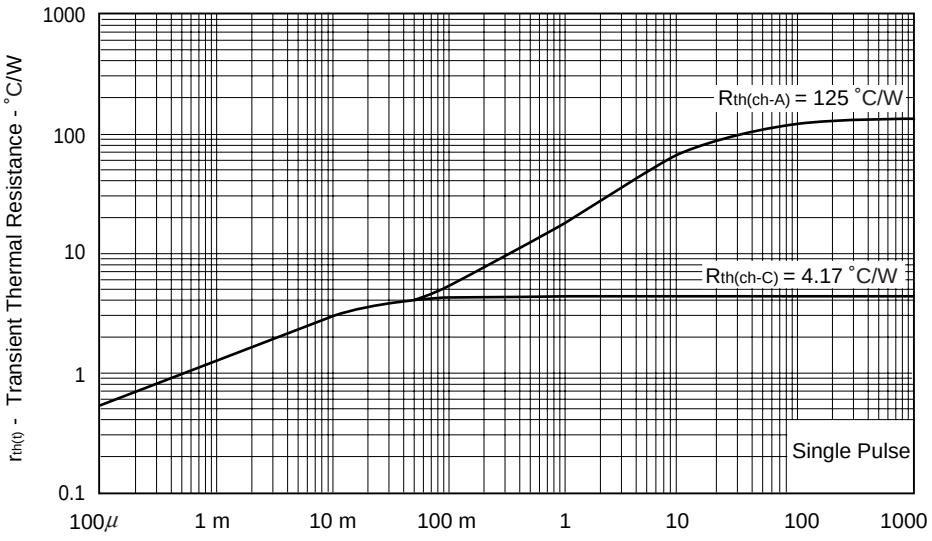


FORWARD TRANSFER CHARACTERISTICS

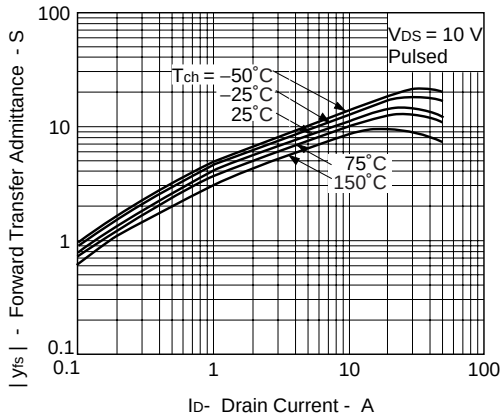


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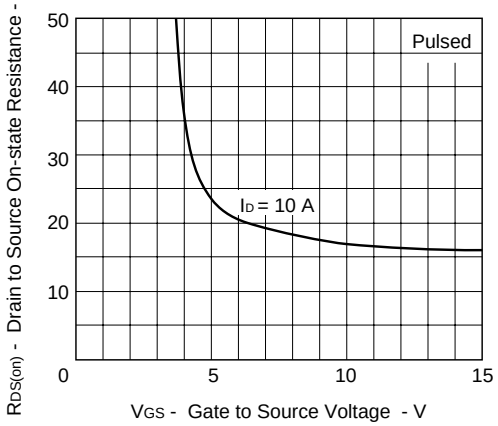
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



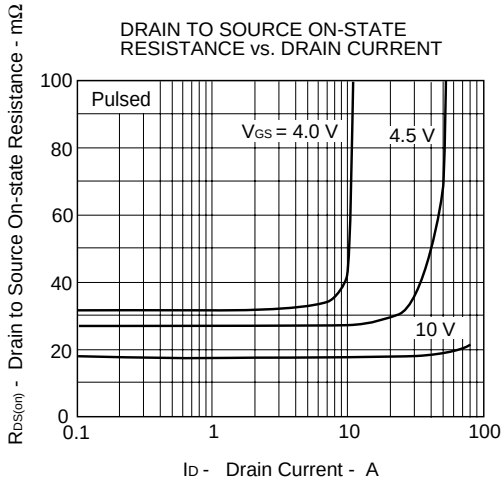
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



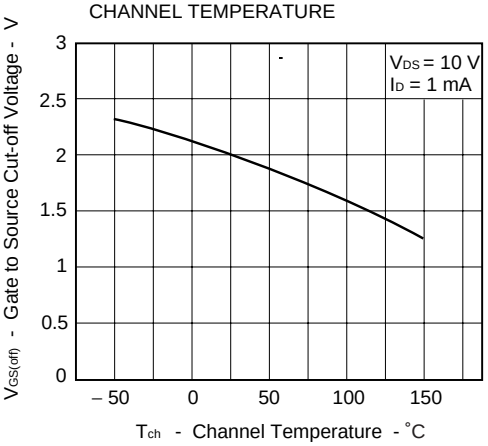
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT

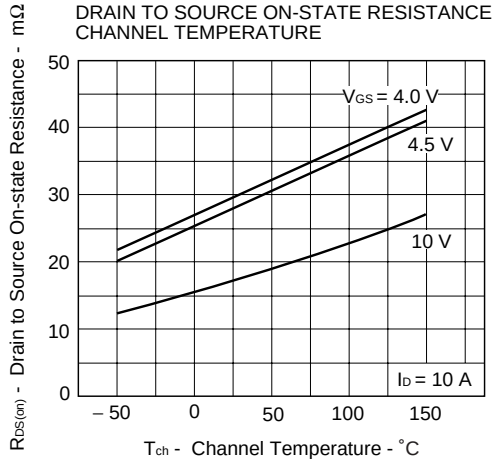


GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE

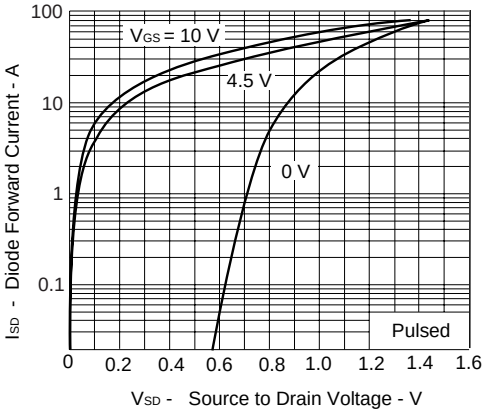


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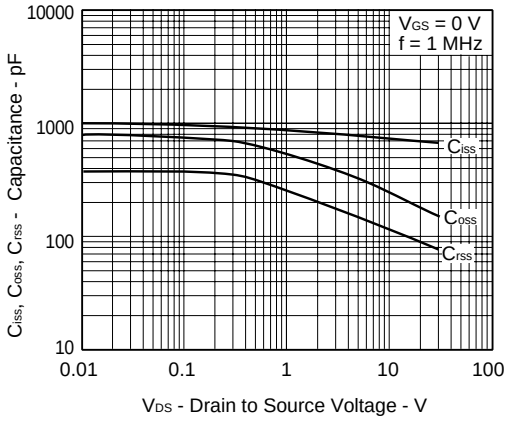
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



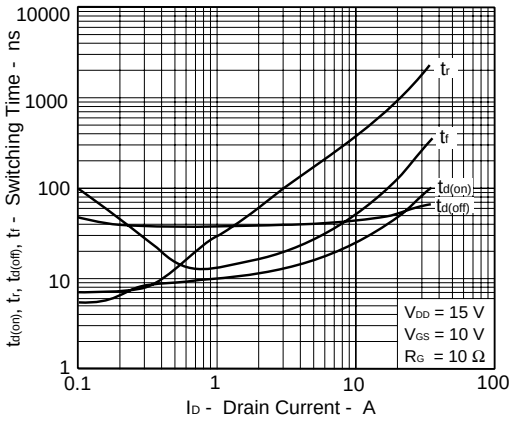
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



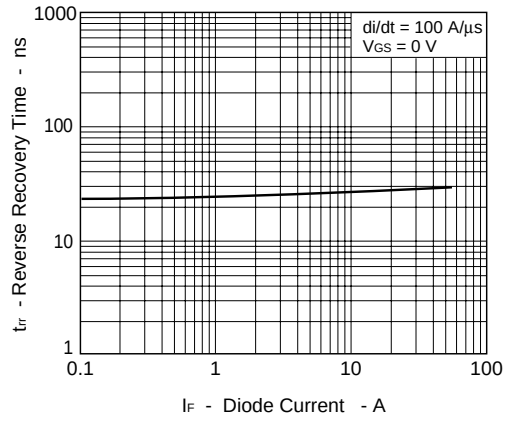
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



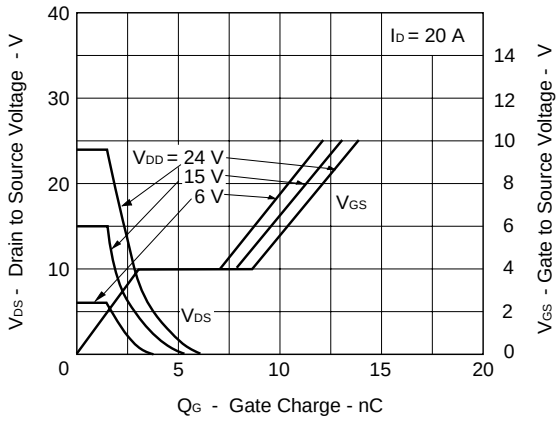
SWITCHING CHARACTERISTICS



REVERSE RECOVERY TIME vs. DRAIN CURRENT



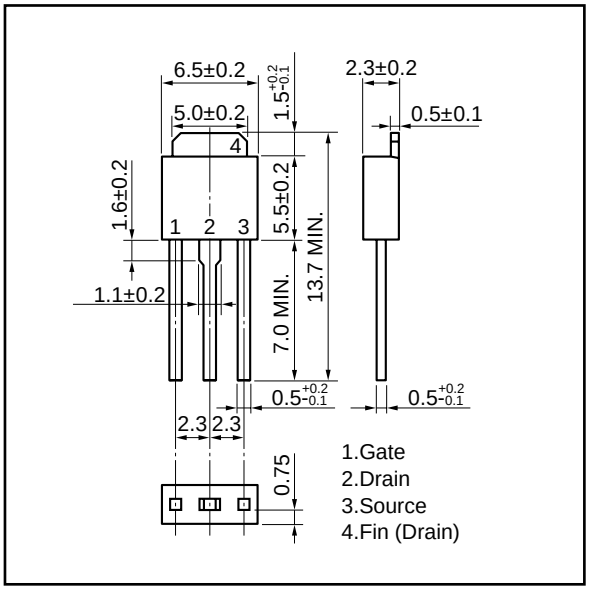
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



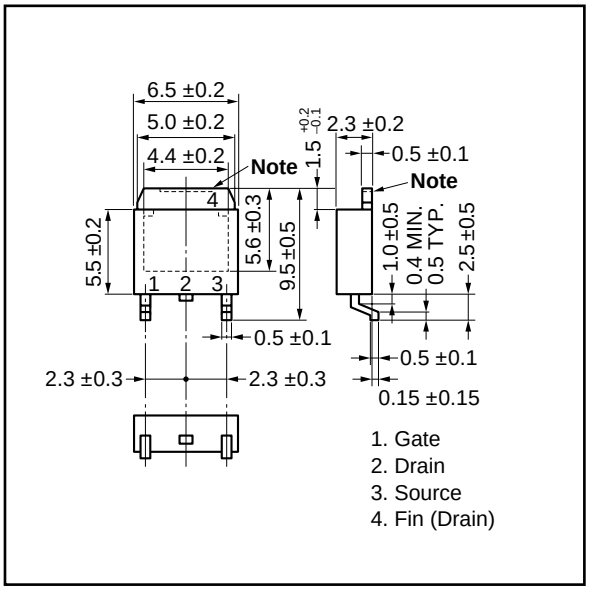
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PACKAGE DRAWINGS (Unit : mm)

1) TO-251 (MP-3)

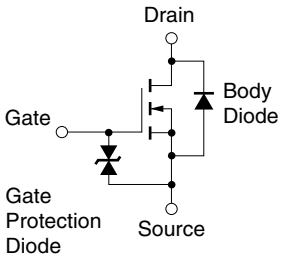


<R> **2) TO-252 (MP-3Z)**



Note The depth of notch at the top of the fin is from 0 to 0.2 mm.

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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