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

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

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RENESAS

MOS FIELD EFFECT TRANSISTOR

Phase-out/Discontinued

2SK4036

SWITCHING
N-CHANNEL POWER MOSFET

DESCRIPTION

The 2SK4036 is the best switching element for the DC-DC converter usage from 24 to 48 V in the direct current input voltage.

It excels in the switching characteristics in low on-state resistance, and is the best for the high-speed switching usage.

FEATURES

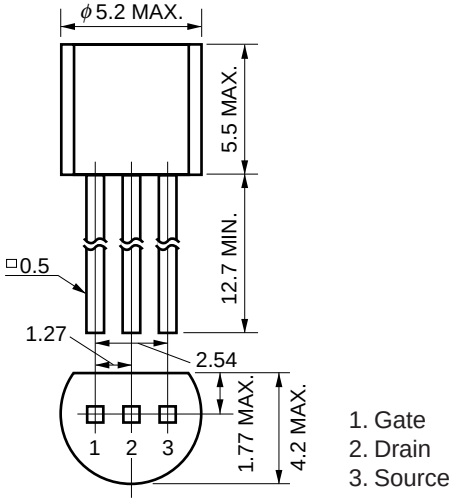
- Low input capacitance
  C_{iss} = 74 pF TYP.
- Low on-state resistance
  $R_{DS(on)}$ = 4.5 Ω MAX. (V_{GS} = 10 V, I_D = 0.25 A)
- Through hole mount package (TO-92)

ORDERING INFORMATION

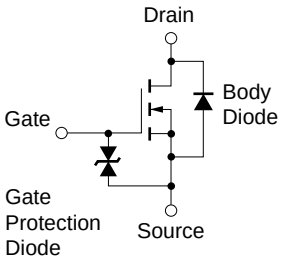
PART NUMBER	PACKAGE
2SK4036	TO-92 (SC-43A)
2SK4036-AZ **Note**	TO-92 (SC-43A)

Note Pb-free (This product does not contain Pb in external electrode.)

PACKAGE DRAWING (Unit: mm)



EQUIVALENT CIRCUIT



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	250	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	±30	V
Drain Current (DC) (T_A = 25°C)	$I_{D(DC)}$	±0.5	A
Drain Current (pulse) **Note**	$I_{D(pulse)}$	±2.0	A
Total Power Dissipation (T_A = 25°C)	P_T	0.75	W
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	−55 to +150	°C

Note PW ≤ 10 μs, Duty Cycle ≤ 1%

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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Date Published August 2006 NS CP(K)
Printed in Japan

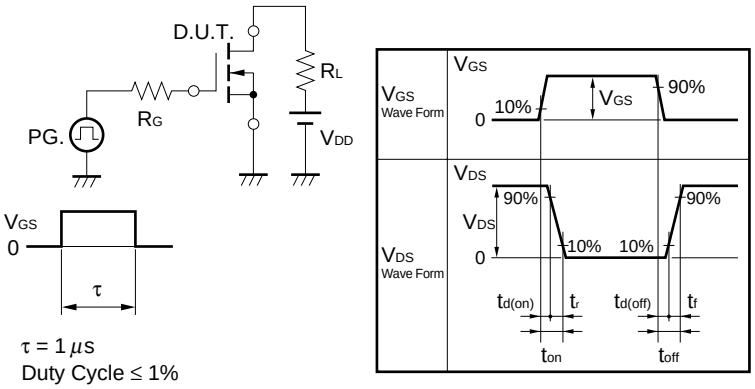
The mark <R> shows major revised points.
The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 250 V, V_{GS} = 0 V			10	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±30 V, V_{DS} = 0 V			±10	μA
Gate Cut-off Voltage	$V_{GS(off)}$	V_{DS} = 10 V, I_D = 1.0 mA	2.5	3.5	4.5	V
Forward Transfer Admittance **Note**	$\|y_{fs}\|$	V_{DS} = 10 V, I_D = 0.25 A	0.2	0.5		S
Drain to Source On-state Resistance **Note**	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 0.25 A		3.2	4.5	Ω
Input Capacitance	C_{iss}	V_{DS} = 10 V		74		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V		16		pF
Reverse Transfer Capacitance	C_{rss}	f = 1.0 MHz		7		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 125 V, I_D = 0.25 A		7		ns
Rise Time	t_r	V_{GS} = 10 V		5		ns
Turn-off Delay Time	$t_{d(off)}$	R_G = 10 Ω		12		ns
Fall Time	t_f			40		ns
Total Gate Charge	Q_G	V_{DD} = 200 V		4		nC
Gate to Source Charge	Q_{GS}	V_{GS} = 10 V		0.9		nC
Gate to Drain Charge	Q_{GD}	I_D = 0.5 A		2		nC
Body Diode Forward Voltage **Note**	$V_{F(S-D)}$	I_F = 0.5 A, V_{GS} = 0 V		0.84		V
Reverse Recovery Time	t_{rr}	I_F = 0.5 A, V_{GS} = 0 V		42		ns
Reverse Recovery Charge	Q_{rr}	di/dt = 100 A/μs		57		nC

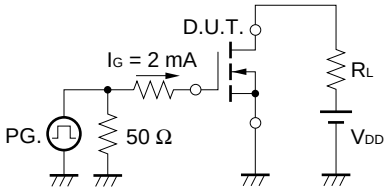
Note Pulsed

TEST CIRCUIT 1 SWITCHING TIME



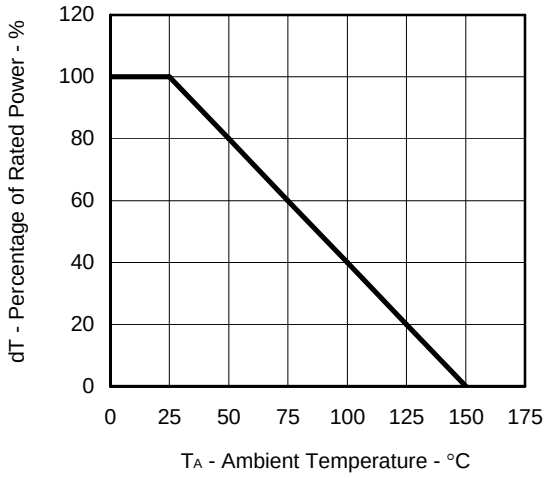
τ = 1 μs
Duty Cycle ≤ 1%

TEST CIRCUIT 2 GATE CHARGE

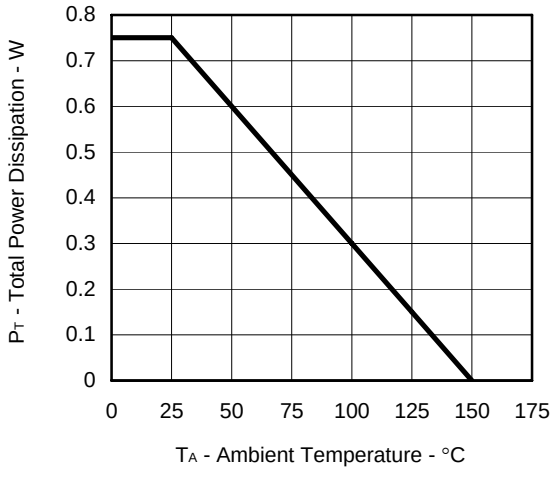


TYPICAL CHARACTERISTICS (T_A = 25°C)

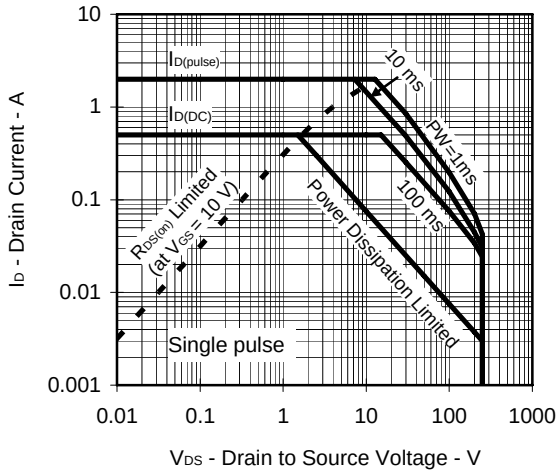
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



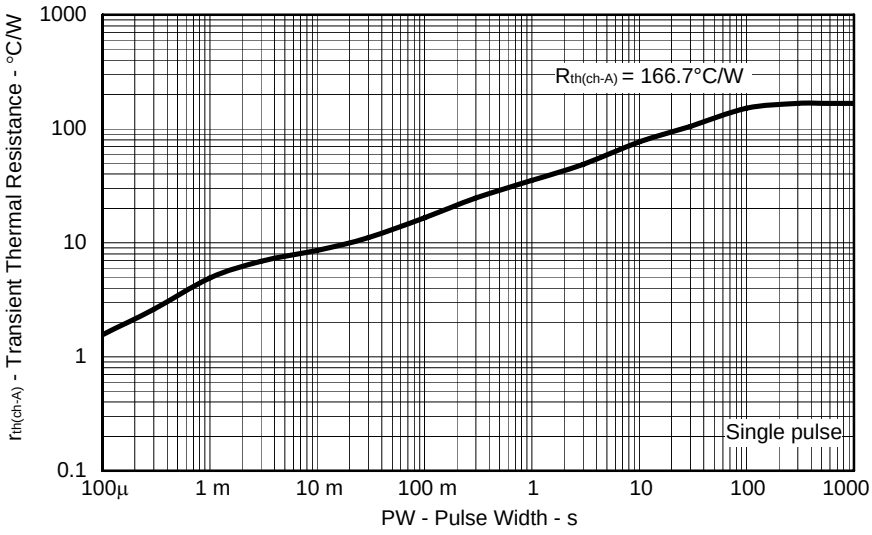
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



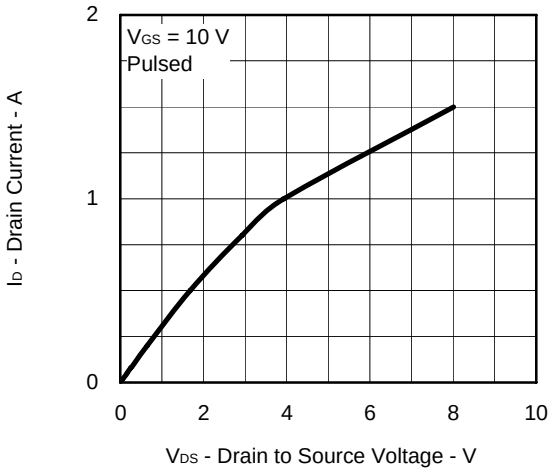
FORWARD BIAS SAFE OPERATING AREA



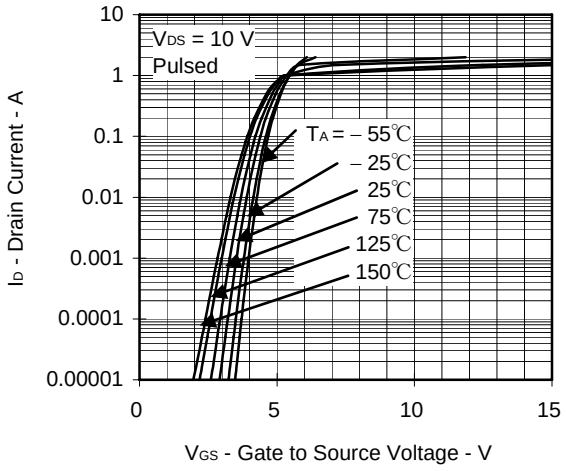
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



FORWARD TRANSFER CHARACTERISTICS



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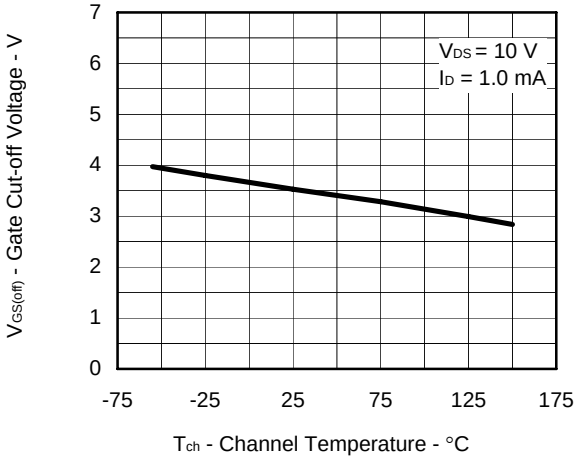
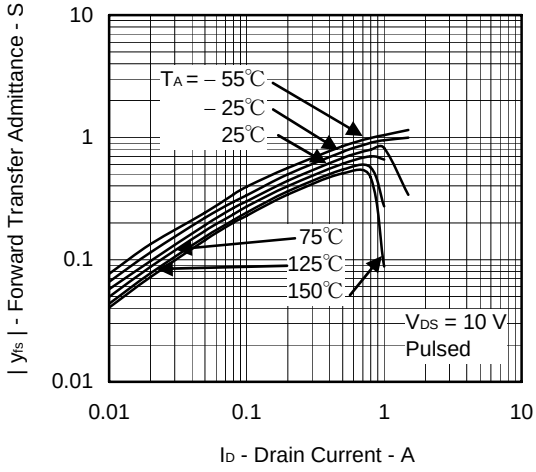
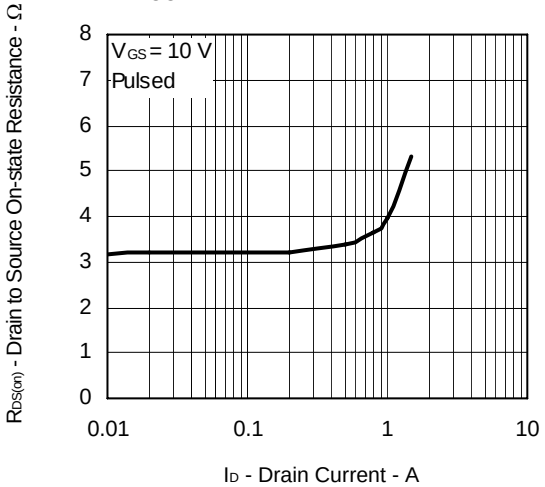
GATE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



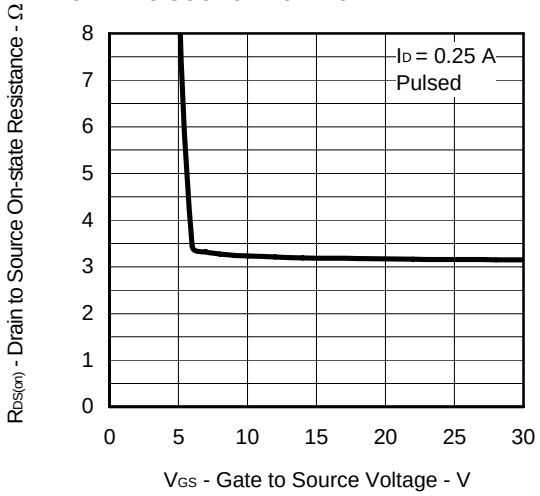
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



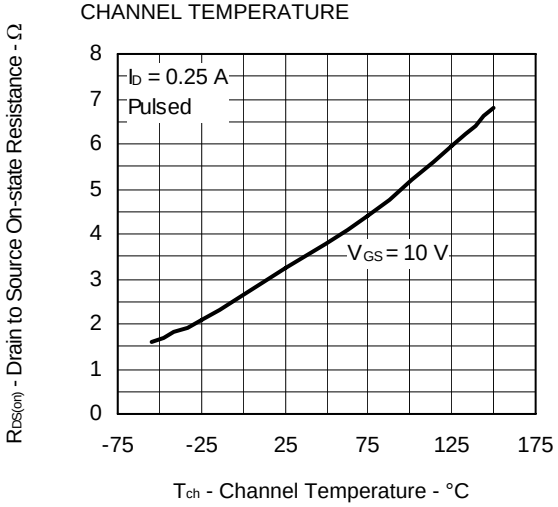
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT



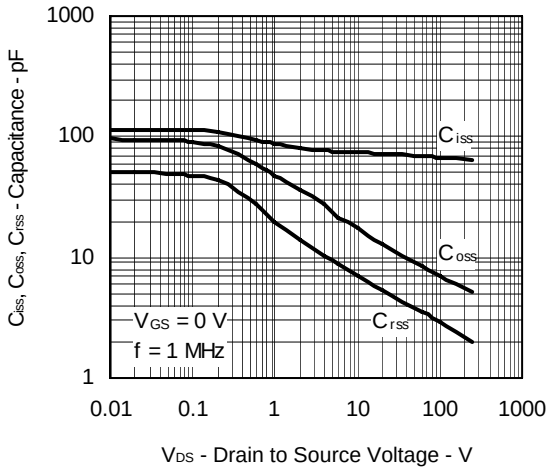
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



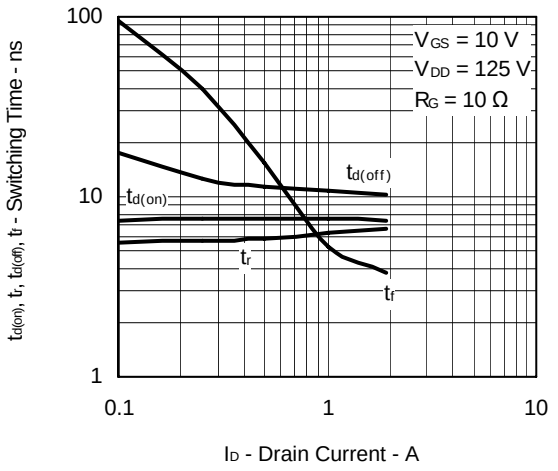
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



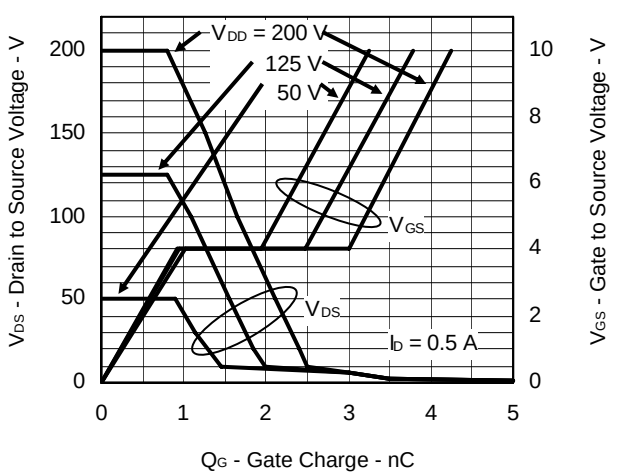
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



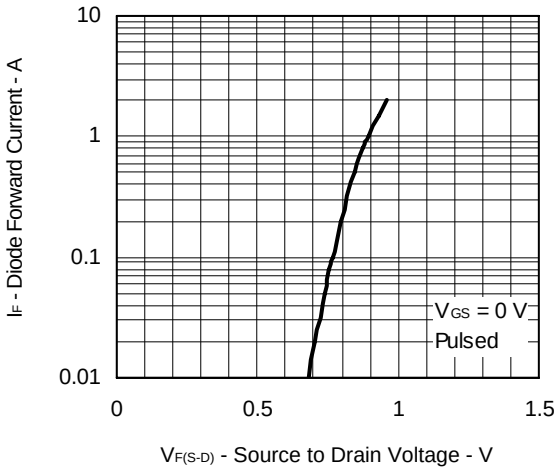
SWITCHING CHARACTERISTICS



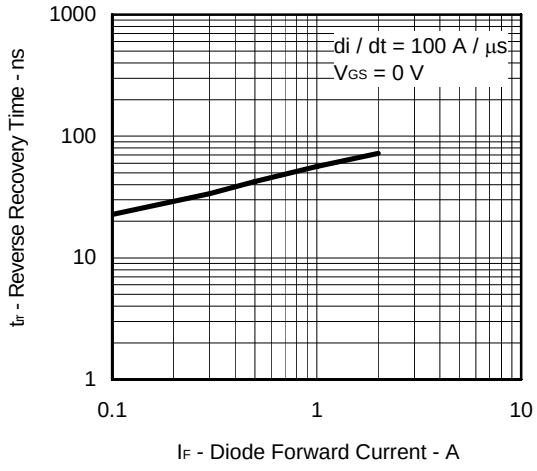
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT



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