

To our customers,

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## Old Company Name in Catalogs and Other Documents

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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Not recommended  
for new design

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SWITCHING  
N-CHANNEL POWER MOSFET

DESCRIPTION

2SK4035 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 because it is the small size surface mounting externals, is the best for the high-speed switching usage of the equipment that promotes the automation of space-saving and mounting.

FEATURES

- Low input capacitance  
C<sub>iss</sub> = 74 pF TYP.
- Low on-state resistance  
R<sub>DS(on)</sub> = 4.5 Ω MAX. (V<sub>GS</sub> = 10 V, I<sub>D</sub> = 0.25 A)
- Small and surface mount package (SC-96)

ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK4035	SC-96 (Mini Mold Thin Type)
2SK4035-A <sup>Note</sup>	SC-96 (Mini Mold Thin Type)

**Note** Pb-free (This product does not contain Pb in external electrode and other parts.)

**Marking:** XP

ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C)

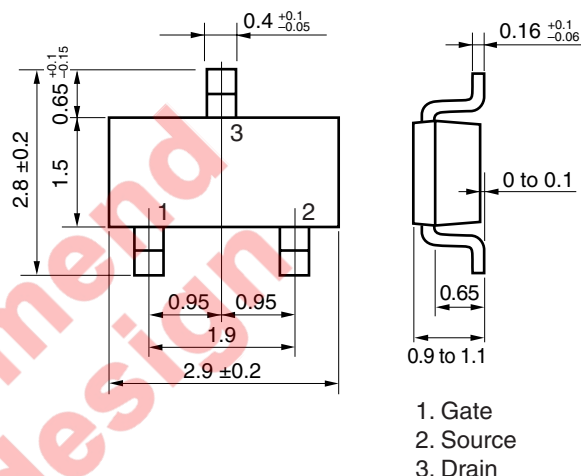
Drain to Source Voltage (V <sub>GS</sub> = 0 V)	V <sub>DSS</sub>	250	V
Gate to Source Voltage (V <sub>DS</sub> = 0 V)	V <sub>GSS</sub>	±30	V
Drain Current (DC) (T <sub>A</sub> = 25°C)	I <sub>D(DC)</sub>	±0.5	A
Drain Current (pulse) <sup>Note1</sup>	I <sub>D(pulse)</sub>	±2.0	A
Total Power Dissipation (T <sub>A</sub> = 25°C)	P <sub>T1</sub>	0.2	W
Total Power Dissipation (T <sub>A</sub> = 25°C) <sup>Note2</sup>	P <sub>T2</sub>	1.25	W
Channel Temperature	T <sub>ch</sub>	150	°C
Storage Temperature	T <sub>stg</sub>	-55 to +150	°C

- Notes** 1. PW ≤ 10 μs, Duty Cycle ≤ 1%  
2. Mounted on FR-4 board of 50 mm x 50 mm x 1.6 mm, t ≤ 5 sec

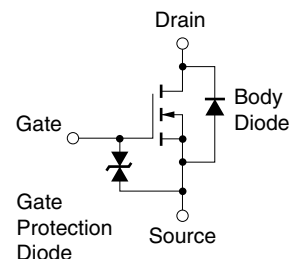
**Remark** The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

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PACKAGE DRAWING (Unit: mm)



EQUIVALENT CIRCUIT

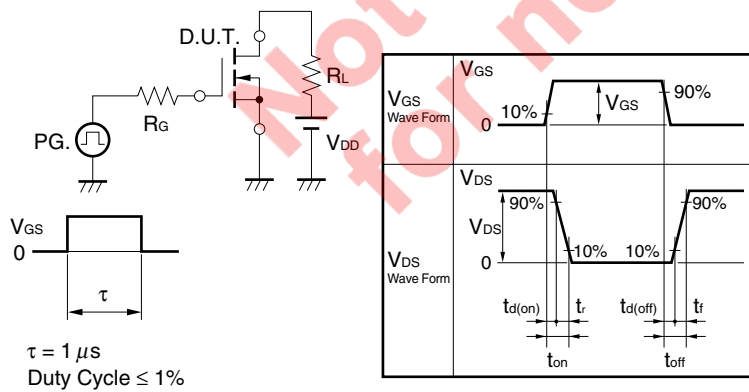


**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

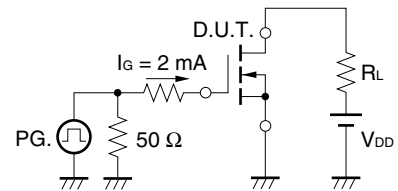
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 250 V, V <sub>GS</sub> = 0 V			10	μA
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±30 V, V <sub>DS</sub> = 0 V			±10	μA
Gate Cut-off Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1.0 mA	2.5	3.5	4.5	V
Forward Transfer Admittance <b>Note</b>	y <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 0.25 A	0.2	0.5		S
Drain to Source On-state Resistance <b>Note</b>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 0.25 A		3.2	4.5	Ω
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 10 V		74		pF
Output Capacitance	C <sub>oss</sub>	V <sub>GS</sub> = 0 V		16		pF
Reverse Transfer Capacitance	C <sub>rss</sub>	f = 1.0 MHz		7		pF
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 125 V, I <sub>D</sub> = 0.25 A		7		ns
Rise Time	t <sub>r</sub>	V <sub>GS</sub> = 10 V		5		ns
Turn-off Delay Time	t <sub>d(off)</sub>	R <sub>G</sub> = 10 Ω		12		ns
Fall Time	t <sub>f</sub>			40		ns
Total Gate Charge	Q <sub>G</sub>	V <sub>DD</sub> = 200 V		4		nC
Gate to Source Charge	Q <sub>GS</sub>	V <sub>GS</sub> = 10 V		0.9		nC
Gate to Drain Charge	Q <sub>GD</sub>	I <sub>D</sub> = 0.5 A		2		nC
Body Diode Forward Voltage <b>Note</b>	V <sub>F(S-D)</sub>	I <sub>F</sub> = 0.5 A, V <sub>GS</sub> = 0 V		0.84		V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 0.5 A, V <sub>GS</sub> = 0 V		42		ns
Reverse Recovery Charge	Q <sub>rr</sub>	di/dt = 100 A/μs		57		nC

**Note** Pulsed

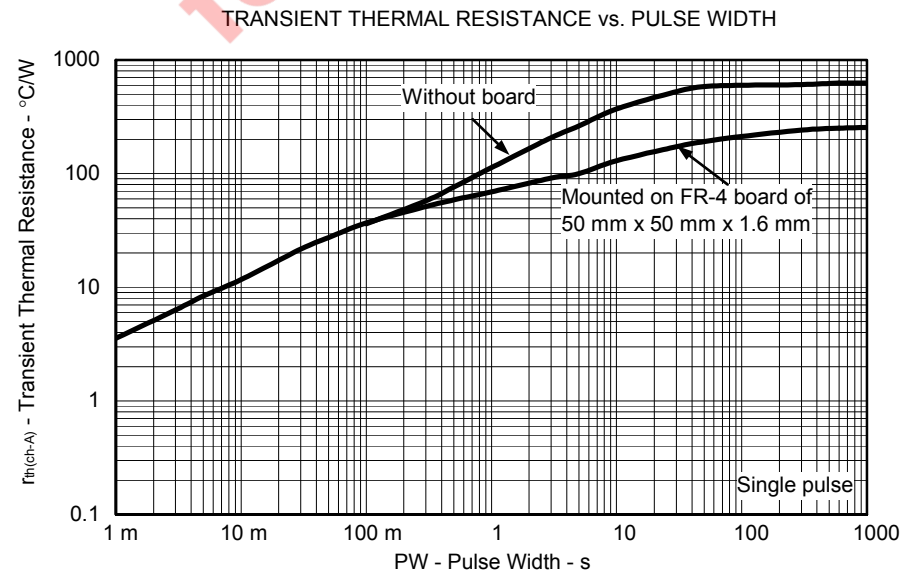
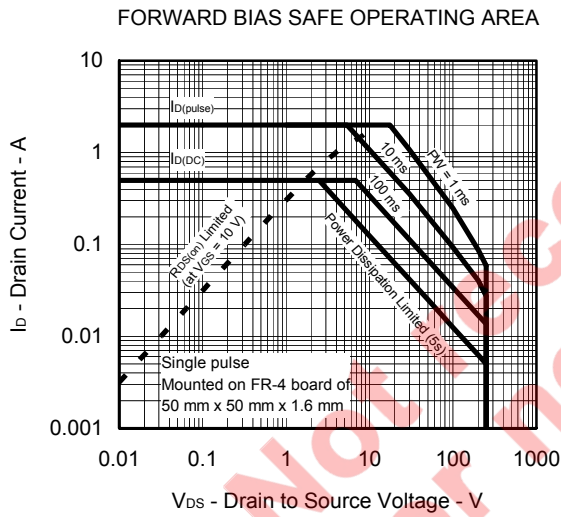
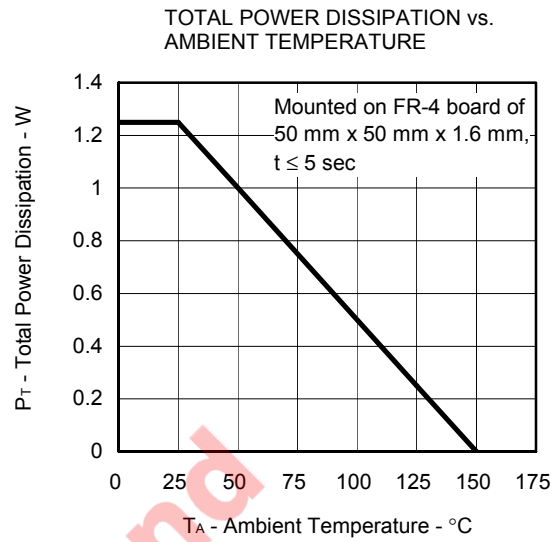
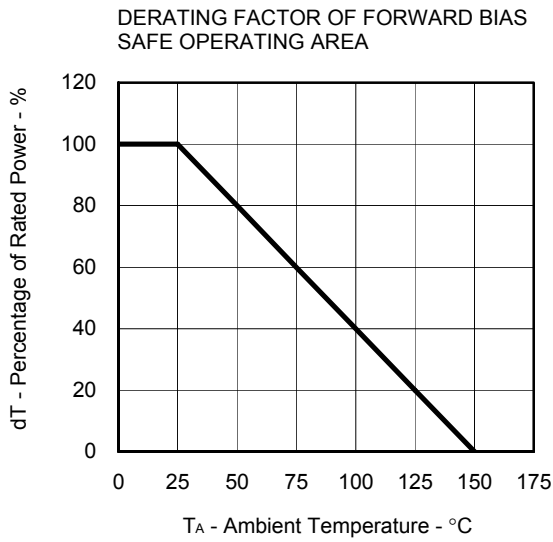
**TEST CIRCUIT 1 SWITCHING TIME**



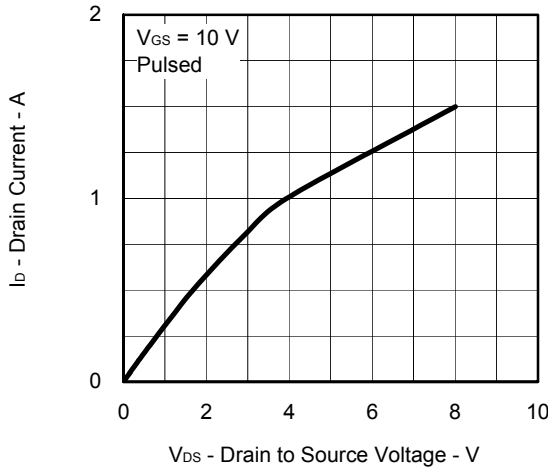
**TEST CIRCUIT 2 GATE CHARGE**



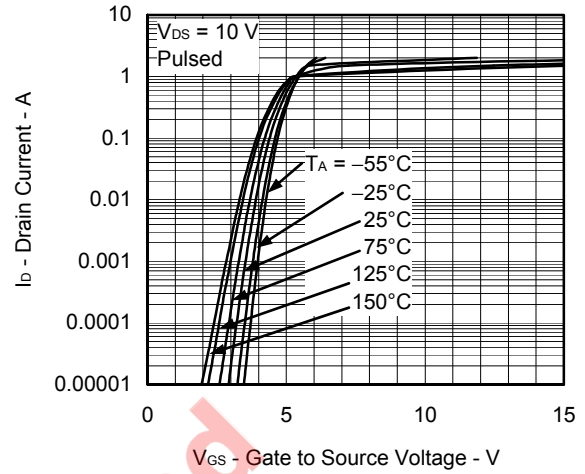
TYPICAL CHARACTERISTICS (TA = 25°C)



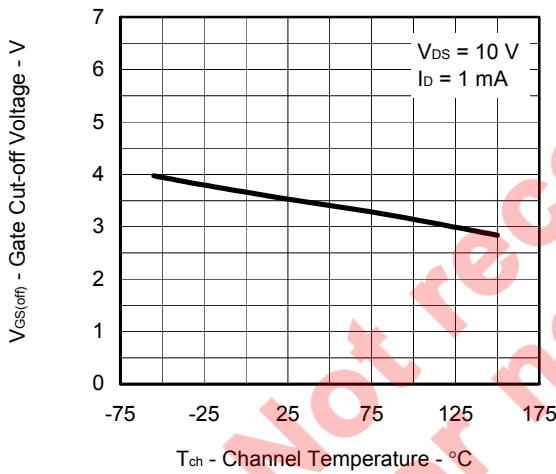
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



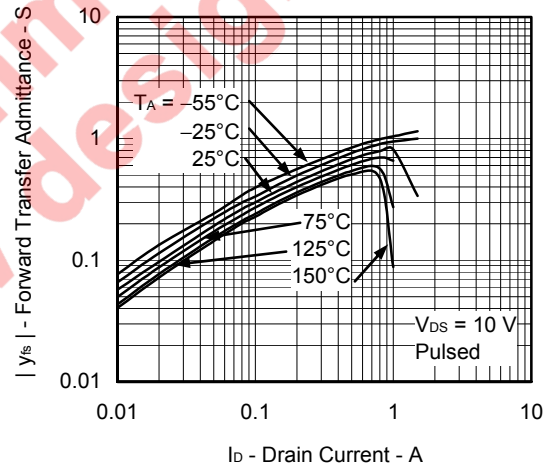
FORWARD TRANSFER CHARACTERISTICS



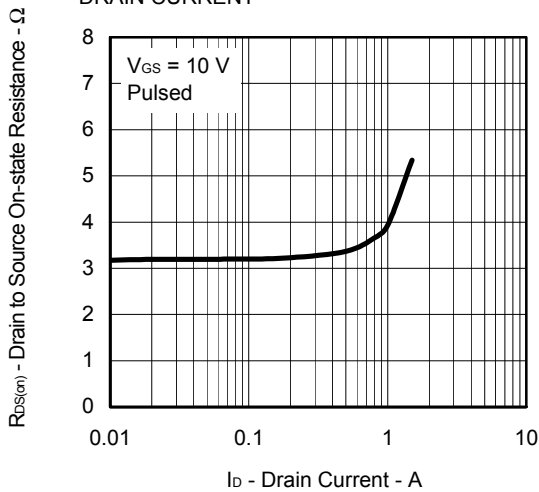
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



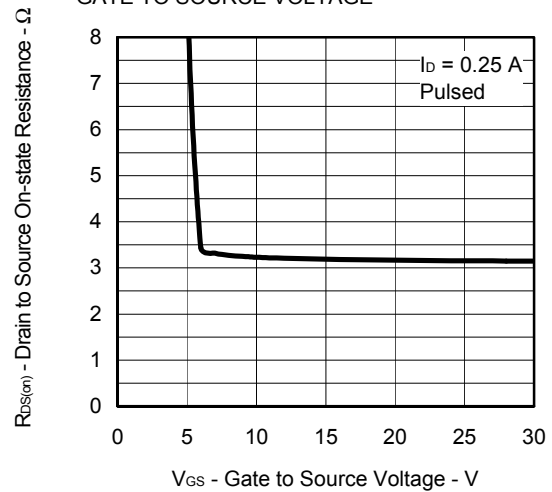
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



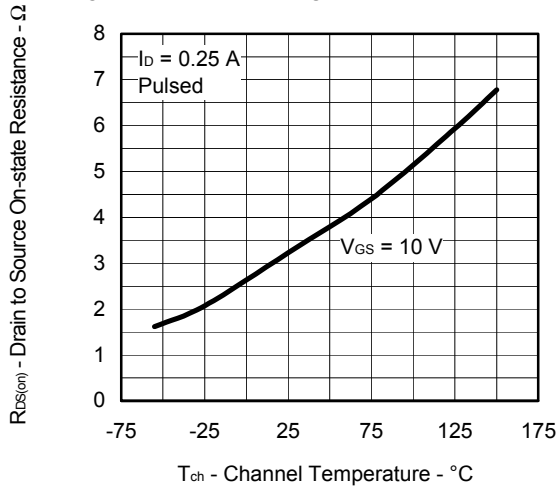
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



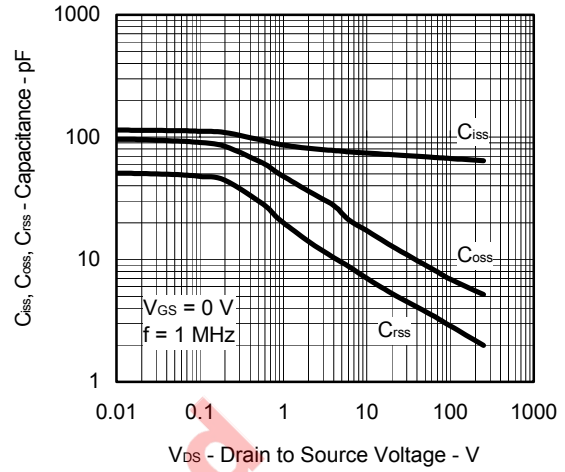
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



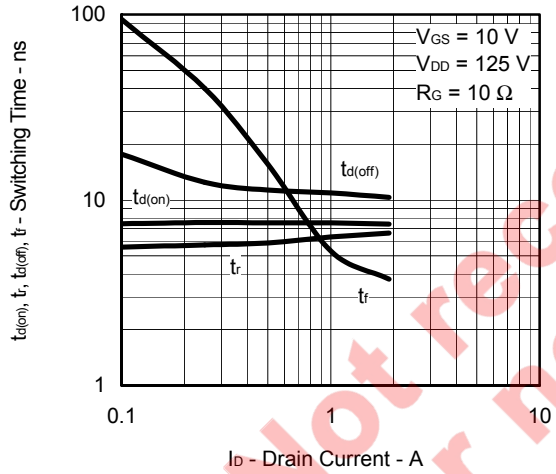
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



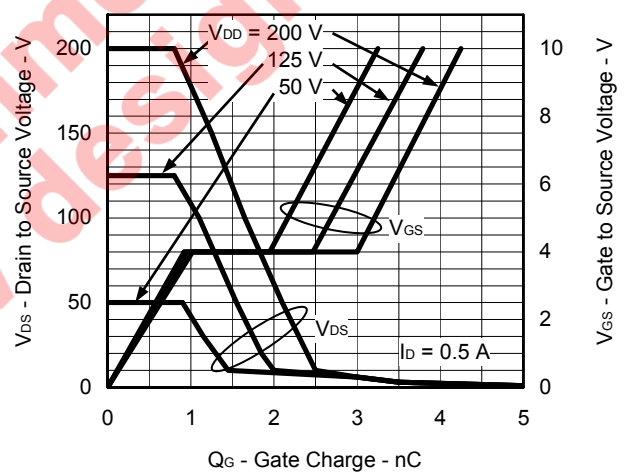
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



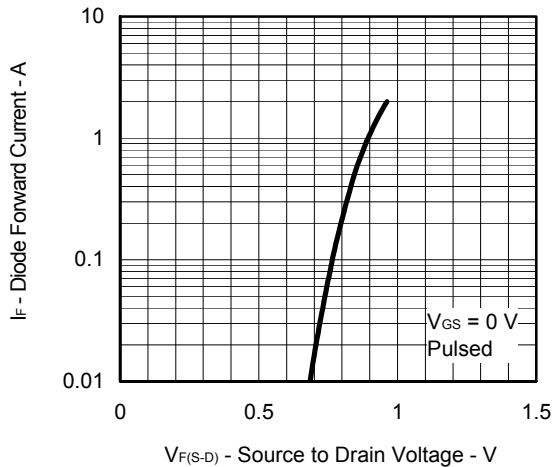
SWITCHING CHARACTERISTICS



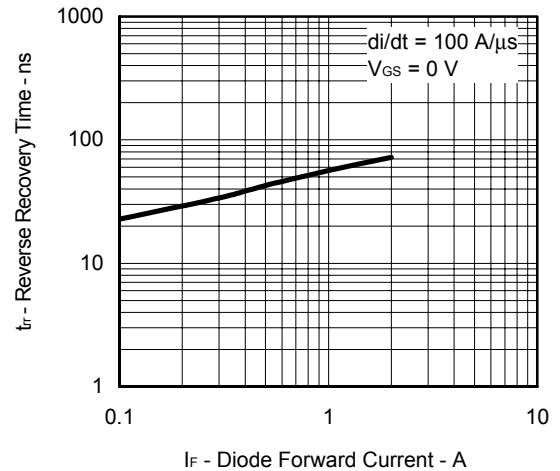
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT



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