

# MOS FIELD EFFECT TRANSISTOR 2SK4035

## 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  
 $C_{iss} = 74 \text{ pF TYP.}$
- Low on-state resistance  
 $R_{DS(on)} = 4.5 \Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 0.25 \text{ A)}$
- 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 ( $T_A = 25^\circ\text{C}$ )

Drain to Source Voltage ( $V_{GS} = 0 \text{ V}$ )	$V_{DSS}$	250	V
Gate to Source Voltage ( $V_{DS} = 0 \text{ V}$ )	$V_{GSS}$	$\pm 30$	V
Drain Current (DC) ( $T_A = 25^\circ\text{C}$ )	$I_{D(DC)}$	$\pm 0.5$	A
Drain Current (pulse) <sup>Note1</sup>	$I_{D(pulse)}$	$\pm 2.0$	A
Total Power Dissipation ( $T_A = 25^\circ\text{C}$ )	$P_{T1}$	0.2	W
Total Power Dissipation ( $T_A = 25^\circ\text{C}$ ) <sup>Note2</sup>	$P_{T2}$	1.25	W
Channel Temperature	$T_{ch}$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$

**Notes 1.**  $PW \leq 10 \mu\text{s}$ , Duty Cycle  $\leq 1\%$

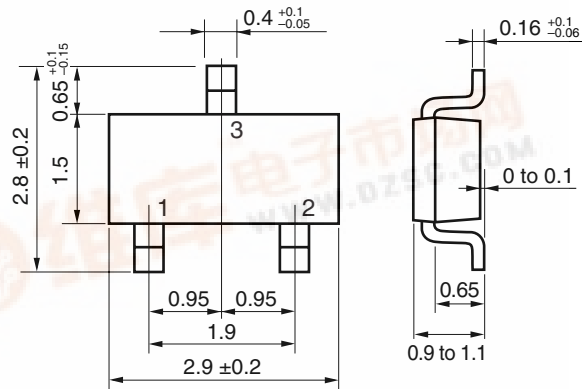
**2.** Mounted on FR-4 board of 50 mm x 50 mm x 1.6 mm,  $t \leq 5 \text{ sec}$

**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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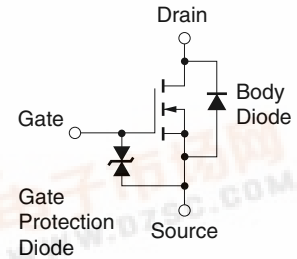
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### PACKAGE DRAWING (Unit: mm)



1. Gate
2. Source
3. Drain

### EQUIVALENT CIRCUIT

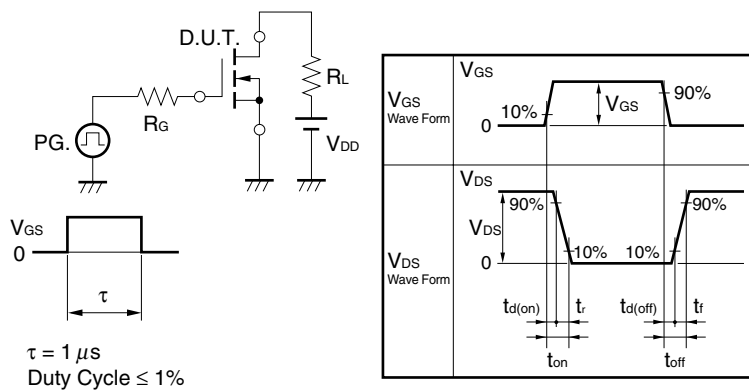


**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

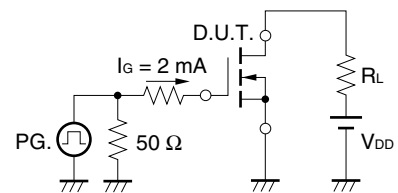
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 250 V, V <sub>GS</sub> = 0 V			10	μA
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±30 V, V <sub>DS</sub> = 0 V			±10	μA
Gate Cut-off Voltage	V <sub>GS(off)</sub>	V <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

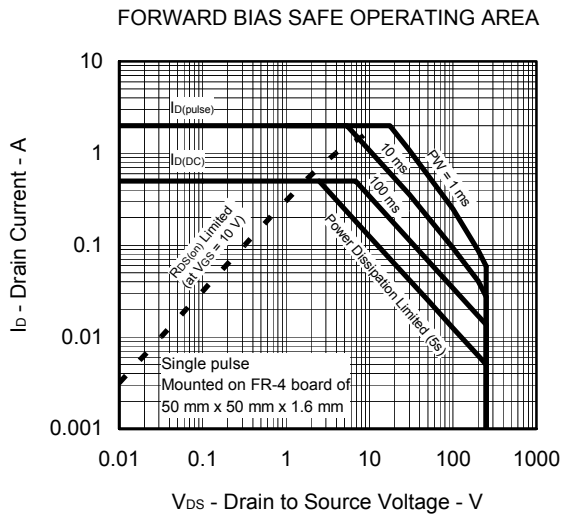
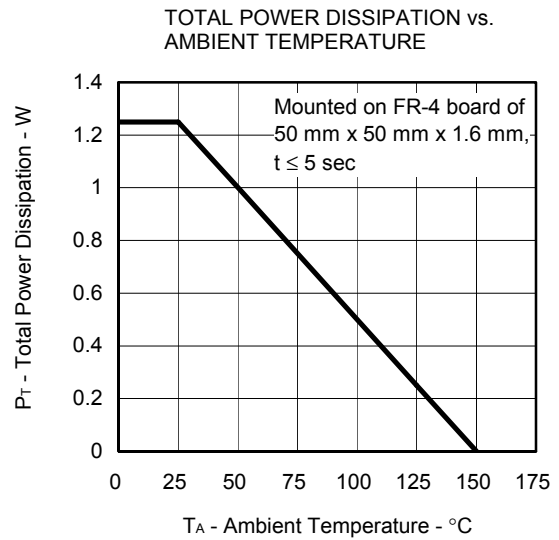
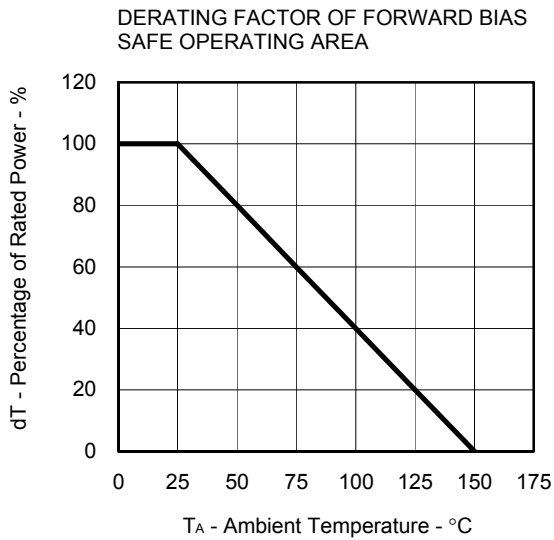
**TEST CIRCUIT 1 SWITCHING TIME**



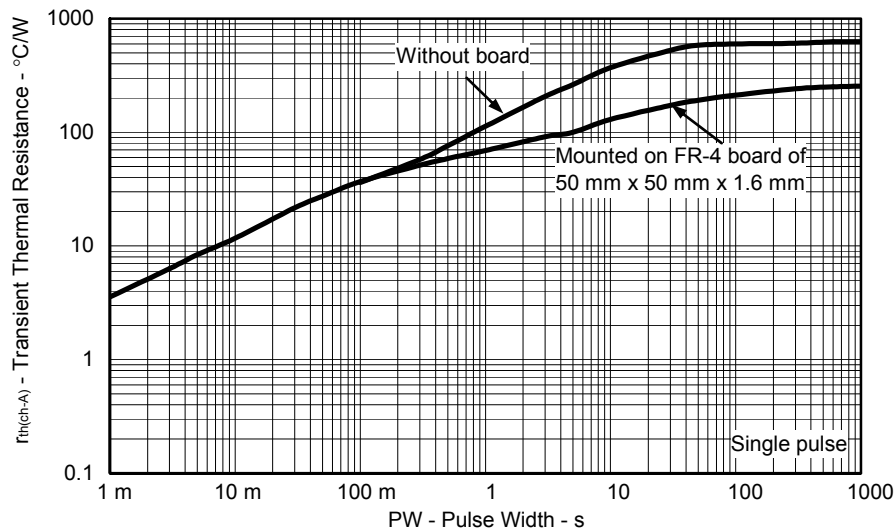
**TEST CIRCUIT 2 GATE CHARGE**



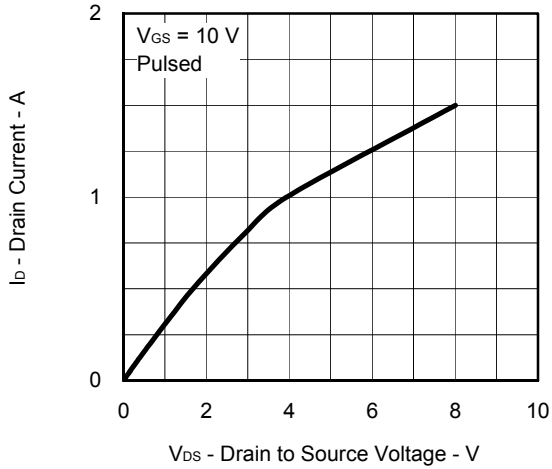
TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)



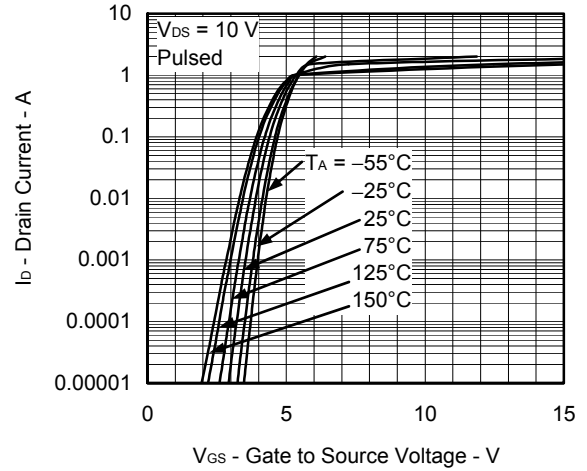
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



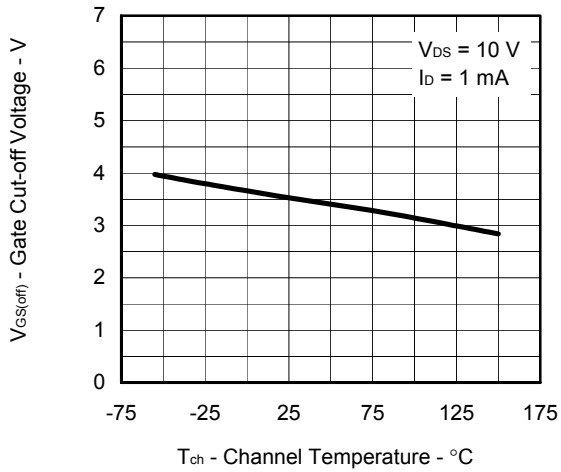
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



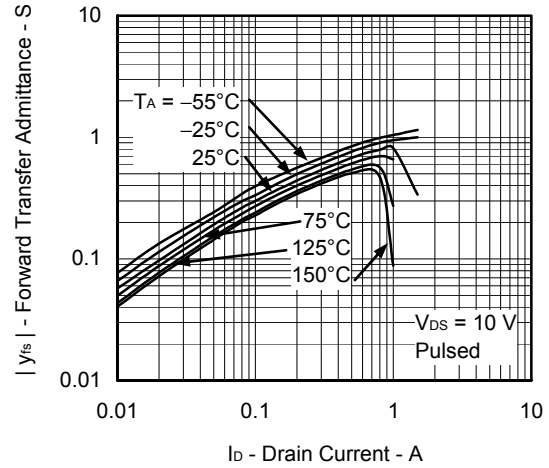
FORWARD TRANSFER CHARACTERISTICS



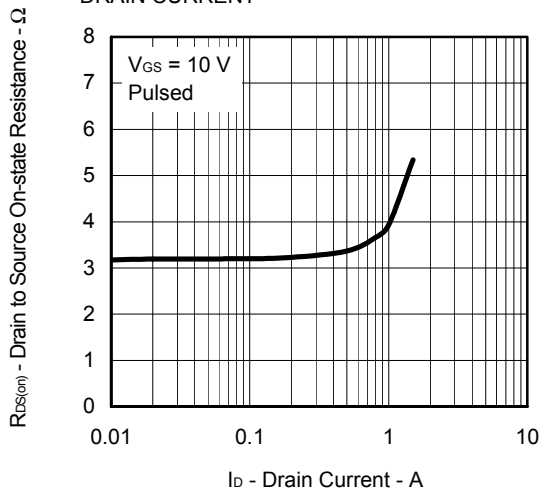
GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



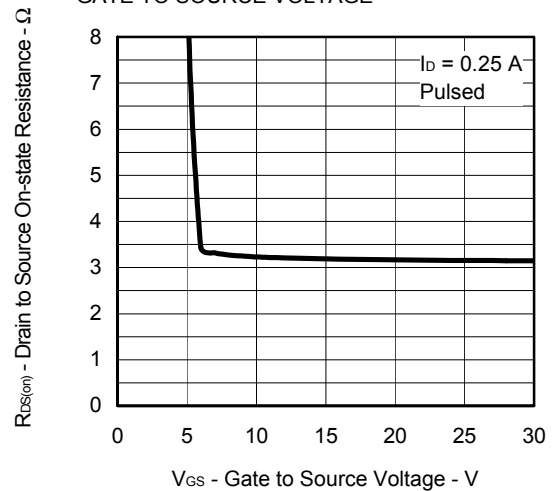
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



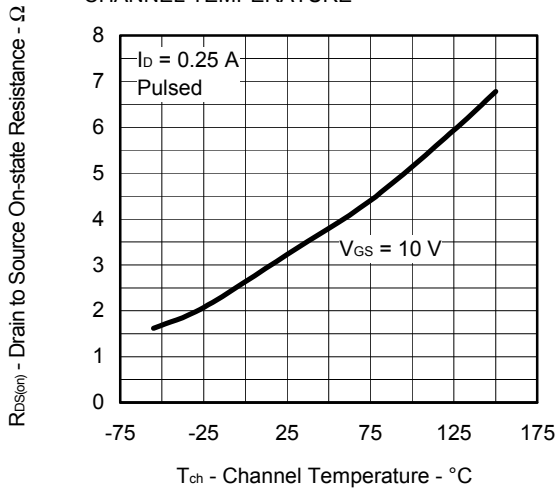
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



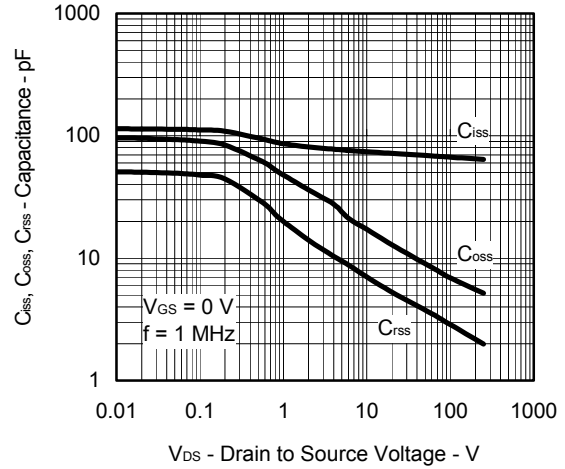
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



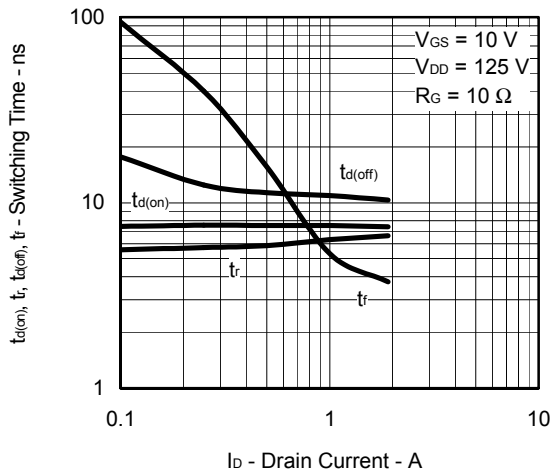
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



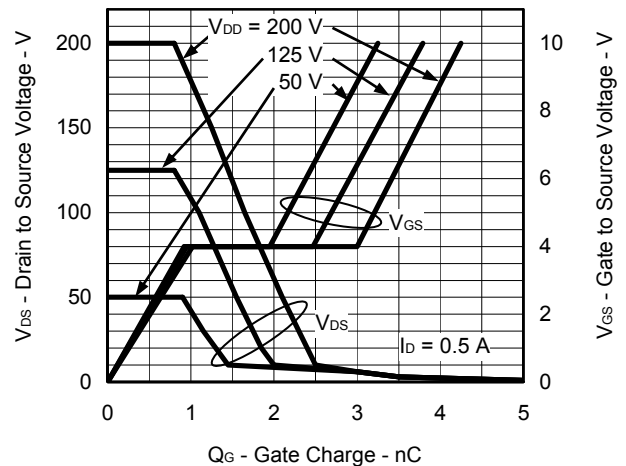
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



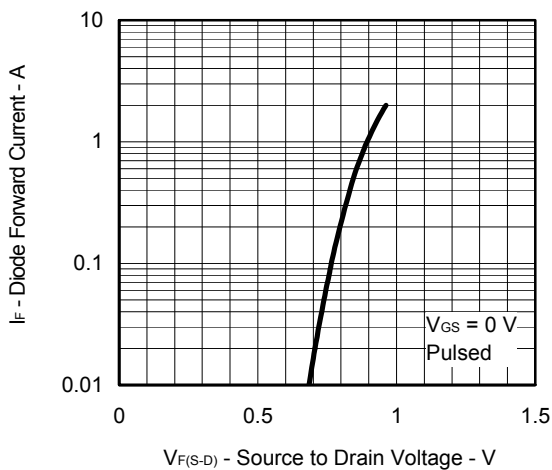
SWITCHING CHARACTERISTICS



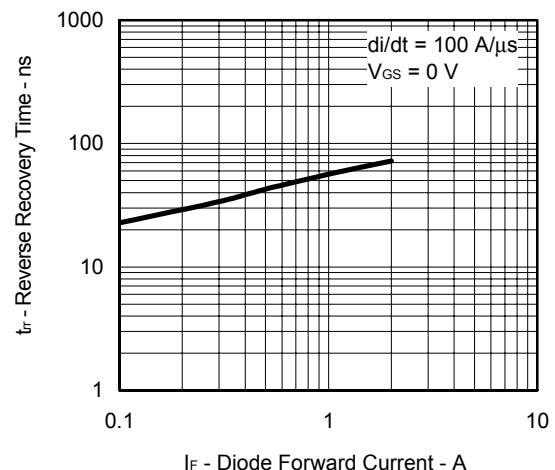
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT



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