

SWITCHING
N-CHANNEL POWER MOS FET
INDUSTRIAL USE

DESCRIPTION

The 2SK3386 is N-Channel MOS Field Effect Transistor designed for high current switching applications.

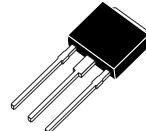
FEATURES

- Low On-state Resistance
- ★ $R_{DS(on)1} = 21 \text{ m}\Omega \text{ MAX.}$ ($V_{GS} = 10 \text{ V}$, $I_D = 17 \text{ A}$)
- ★ $R_{DS(on)2} = 36 \text{ m}\Omega \text{ MAX.}$ ($V_{GS} = 4.0 \text{ V}$, $I_D = 17 \text{ A}$)
- Low C_{iss} : $C_{iss} = 2100 \text{ pF TYP.}$
- Built-in Gate Protection Diode
- TO-251/TO-252 package

ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3386	TO-251
2SK3386-Z	TO-252

(TO-251)

ABSOLUTE MAXIMUM RATINGS ($T_A = 25 \text{ }^\circ\text{C}$)

Drain to Source Voltage	V_{DSS}	60	V
Gate to Source Voltage	V_{GSS}	± 20	V
Drain Current (DC)	$I_D(\text{DC})$	± 34	A
★ Drain Current (Pulse) ^{Note1}	$I_D(\text{pulse})$	± 120	A
★ Total Power Dissipation ($T_c = 25^\circ\text{C}$)	P_T	40	W
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	P_T	1.0	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +150	$^\circ\text{C}$
★ Single Avalanche Current ^{Note2}	I_{AS}	28	A
★ Single Avalanche Energy ^{Note2}	E_{AS}	78	mJ



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

2. Starting $T_{ch} = 25^\circ\text{C}$, $R_G = 25 \Omega$, $V_{GS} = 20 \text{ V} \rightarrow 0 \text{ V}$

THERMAL RESISTANCE

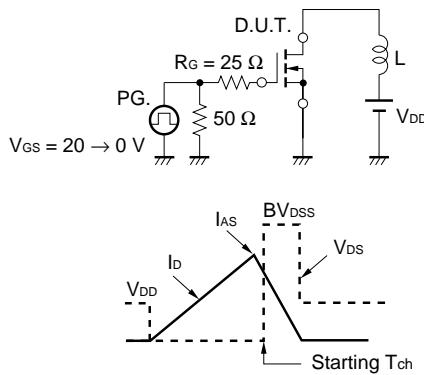
★ Channel to Case	$R_{th(\text{ch-C})}$	3.13	$^\circ\text{C/W}$
Channel to Ambient	$R_{th(\text{ch-A})}$	125	$^\circ\text{C/W}$

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Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

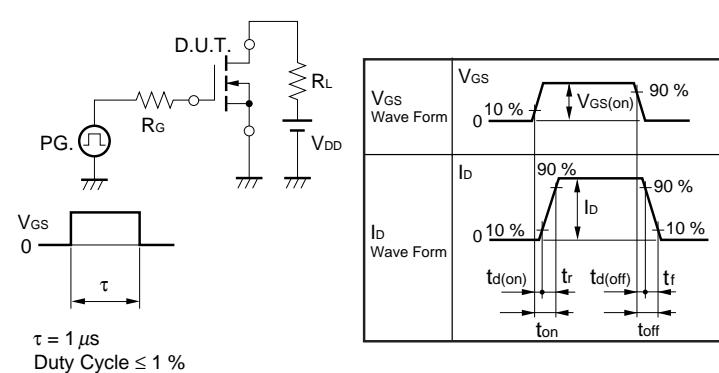
★ ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ C$)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	$R_{DS(on)1}$	$V_{GS} = 10 V, I_D = 17 A$		17	21	$m\Omega$
	$R_{DS(on)2}$	$V_{GS} = 4.0 V, I_D = 17 A$		25	36	$m\Omega$
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} $	$V_{DS} = 10 V, I_D = 17 A$	10	19		S
Drain Leakage Current	I_{DSS}	$V_{DS} = 60 V, V_{GS} = 0 V$			10	μA
Gate to Source Leakage Current	I_{GS}	$V_{GS} = \pm 20 V, V_{DS} = 0 V$			± 10	μA
Input Capacitance	C_{iss}	$V_{DS} = 10 V$ $V_{GS} = 0 V$ $f = 1 MHz$		2100		pF
Output Capacitance	C_{oss}			340		pF
Reverse Transfer Capacitance	C_{rss}			170		pF
Turn-on Delay Time	$t_{d(on)}$	$I_D = 17 A$ $V_{GS(on)} = 10 V$ $V_{DD} = 30 V$		32		ns
Rise Time	t_r			310		ns
Turn-off Delay Time	$t_{d(off)}$			98		ns
Fall Time	t_f			100		ns
Total Gate Charge	Q_G	$I_D = 34 A$ $V_{DD} = 48 V$ $V_{GS(on)} = 10 V$		39		nC
Gate to Source Charge	Q_{GS}			7.0		nC
Gate to Drain Charge	Q_{GD}			12		nC
Body Diode Forward Voltage	$V_{F(S-D)}$	$I_F = 34 A, V_{GS} = 0 V$		0.87		V
Reverse Recovery Time	t_{rr}	$I_F = 34 A, V_{GS} = 0 V$ $di/dt = 100 A/\mu s$		46		ns
Reverse Recovery Charge	Q_{rr}			84		nC

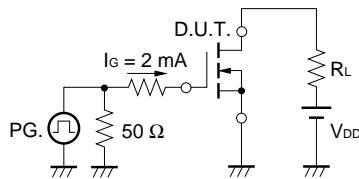
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME

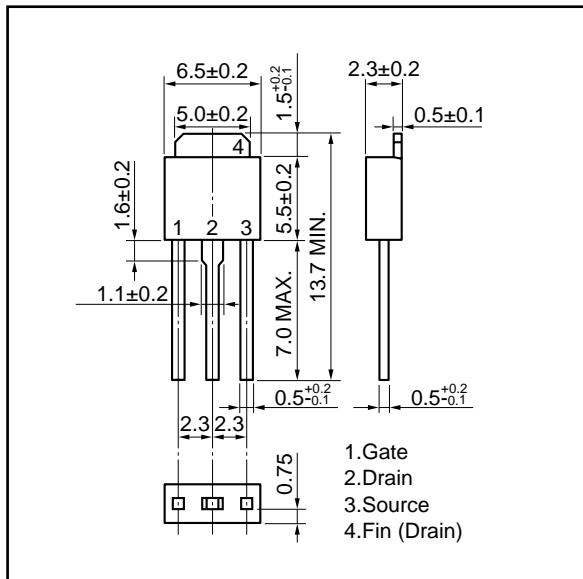


TEST CIRCUIT 3 GATE CHARGE

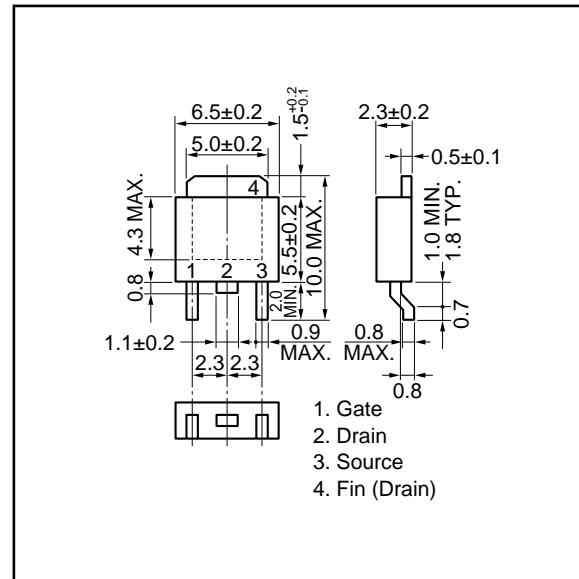


PACKAGE DRAWINGS (Unit : mm)

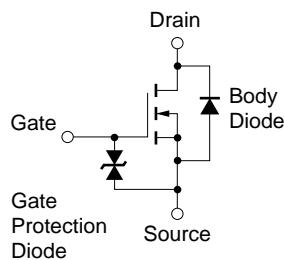
1) TO-251 (MP-3)



2) TO-252 (MP-3Z)



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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