

SWITCHING N-CHANNEL POWER MOS FET INDUSTRIAL USE

DESCRIPTION

The 2SK3433 is N-channel MOS Field Effect Transistor designed for high current switching applications.

FEATURES

- Super low on-state resistance:
 $R_{DS(on)1} = 26 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 20 \text{ A)}$
- ★ $R_{DS(on)2} = 41 \text{ m}\Omega \text{ MAX. (} V_{GS} = 4.0 \text{ V, } I_D = 20 \text{ A)}$
- Low C_{iss} : $C_{iss} = 1500 \text{ pF TYP.}$
- Built-in gate protection diode

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

Drain to Source Voltage	V_{DSS}	60	V
Gate to Source Voltage	V_{GSS}	± 20	V
Drain Current (DC)	$I_{D(DC)}$	± 40	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	± 160	A
★ Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_T	47	W
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	P_T	1.5	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	$-55 \text{ to } +150$	$^\circ\text{C}$
★ Single Avalanche Current ^{Note2}	I_{AS}	21	A
★ Single Avalanche Energy ^{Note2}	E_{AS}	44	mJ

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

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

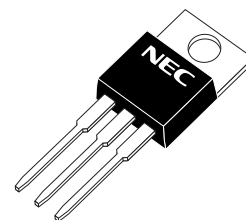
THERMAL RESISTANCE

★ Channel to Case	$R_{th(ch-C)}$	2.66	$^\circ\text{C/W}$
Channel to Ambient	$R_{th(ch-A)}$	83.3	$^\circ\text{C/W}$

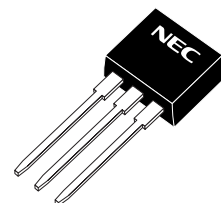
ORDERING INFORMATION

PART NUMBER	PACKAGE
2SK3433	TO-220AB
2SK3433-S	TO-262
2SK3433-Z	TO-220SMD

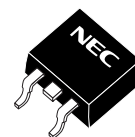
(TO-220AB)



(TO-262)



(TO-220SMD)

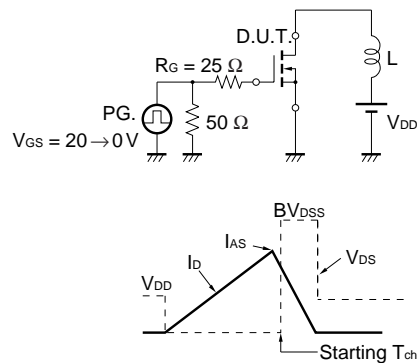


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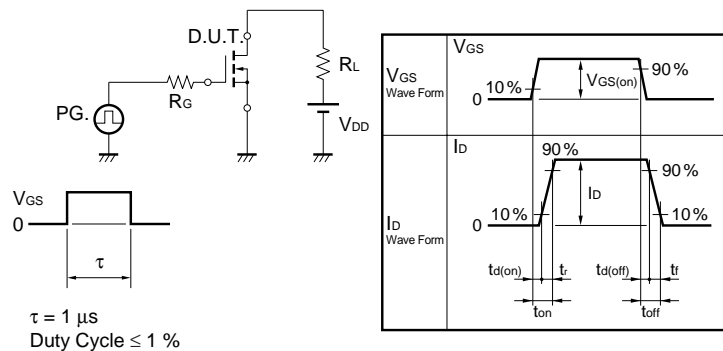
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
★ Drain to Source On-state Resistance	R _{DS(on)1}	V _{GS} = 10 V, I _D = 20 A		22	26	mΩ
	R _{DS(on)2}	V _{GS} = 4.0 V, I _D = 20 A		29	41	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 = 20 A	11	22		S
Drain Leakage Current	I _{DSS}	V _{DS} = 60 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		1500		pF
Output Capacitance	C _{oss}			250		pF
Reverse Transfer Capacitance	C _{rss}			120		pF
★ Turn-on Delay Time	t _{d(on)}	I _D = 20 A, V _{GS(on)} = 10 V, V _{DD} = 30 V, R _G = 10 Ω		35		ns
★ Rise Time	t _r			320		ns
★ Turn-off Delay Time	t _{d(off)}			89		ns
★ Fall Time	t _f			120		ns
Total Gate Charge	Q _G	I _D = 40 A, V _{DD} = 48 V, V _{GS} = 10 V		30		nC
Gate to Source Charge	Q _{GS}			5		nC
Gate to Drain Charge	Q _{GD}			8		nC
Body Diode Forward Voltage	V _{F(S-D)}	I _F = 40 A, V _{GS} = 0 V		1.0		V
★ Reverse Recovery Time	t _{rr}	I _F = 40 A, V _{GS} = 0 V, di/dt = 100 A/μs		44		ns
★ Reverse Recovery Charge	Q _{rr}			60		nC

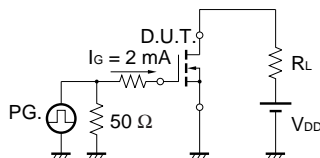
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME

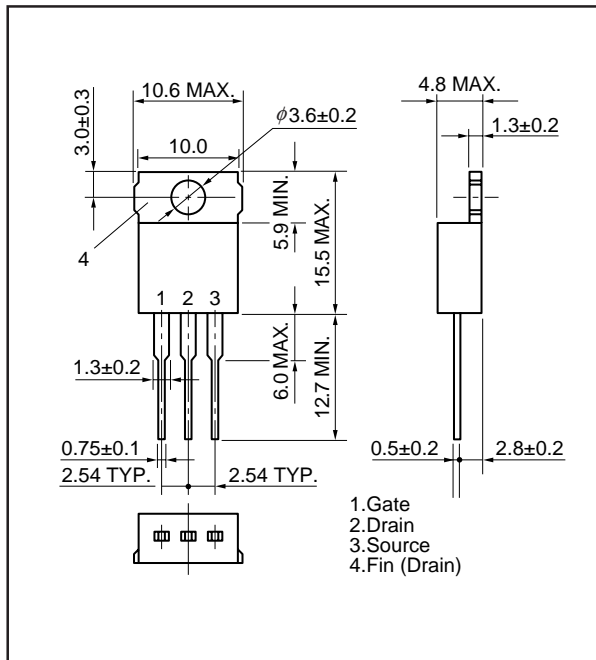


TEST CIRCUIT 3 GATE CHARGE

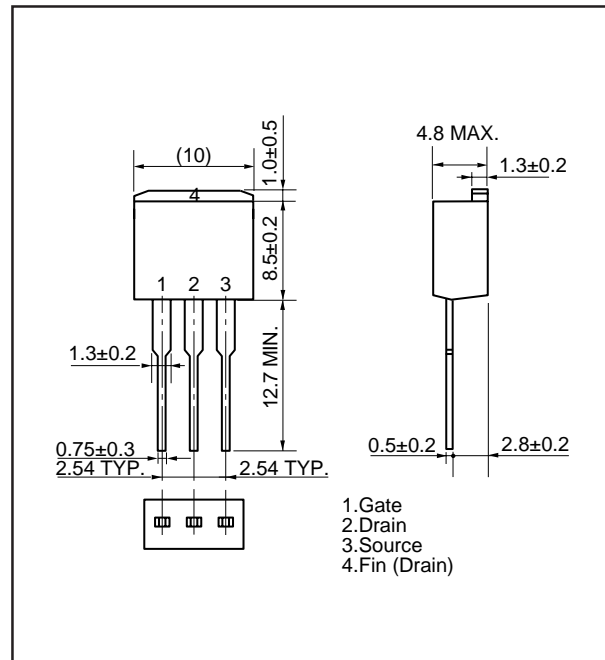


PACKAGE DRAWINGS (Unit: mm)

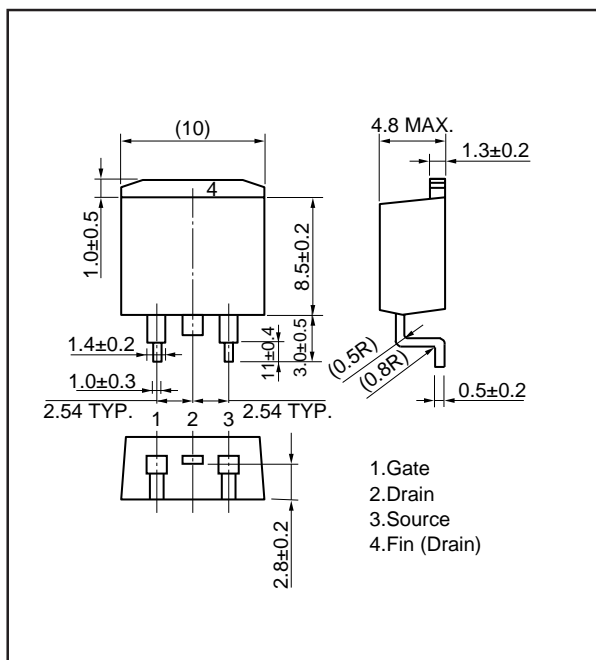
1) TO-220AB (MP-25)



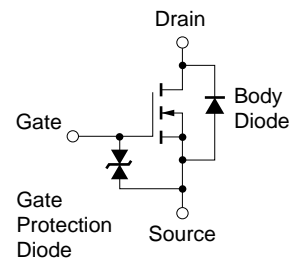
2) TO-262 (MP-25 Fin Cut)



3) TO-220SMD (MP-25Z)



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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