NEC

MOS FIELD EFFECT TRANSISTOR

2SK3433

SWITCHING
N-CHANNEL POWER MOS FET
INDUSTRIAL USE

DESCRIPTION

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

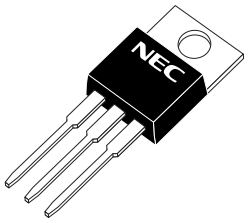
ORDERING INFORMATION

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

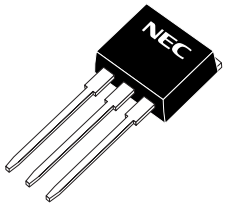
FEATURES

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

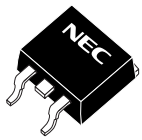
(TO-220AB)



(TO-262)



(TO-220SMD)



ABSOLUTE MAXIMUM RATINGS (T_A = 25°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°C)	P_T	47	W
	Total Power Dissipation (T_A = 25°C)	P_T	1.5	W
	Channel Temperature	T_{ch}	150	°C
	Storage Temperature	T_{stg}	–55 to +150	°C
★	Single Avalanche Current Note2	I_{AS}	21	A
★	Single Avalanche Energy Note2	E_{AS}	44	mJ

Notes 1. PW ≤ 10 μs, Duty cycle ≤ 1 %

2. Starting T_{ch} = 25 °C, R_G = 25 Ω, V_{GS} = 20 V → 0 V

THERMAL RESISTANCE

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

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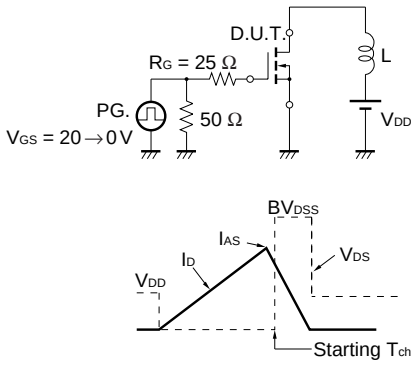
The mark ★ shows major revised points.

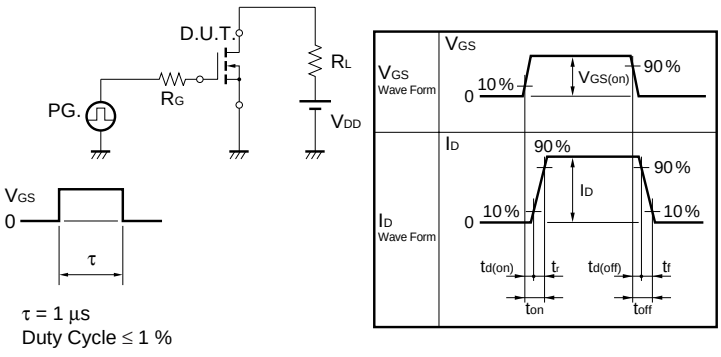
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

	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,		35		ns
★	Rise Time	t_r	R_G = 10 Ω		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,		44		ns
★	Reverse Recovery Charge	Q_{rr}	di/dt = 100 A/μs		60		nC

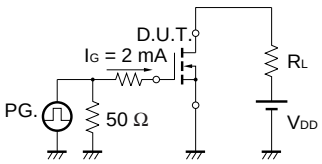
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME

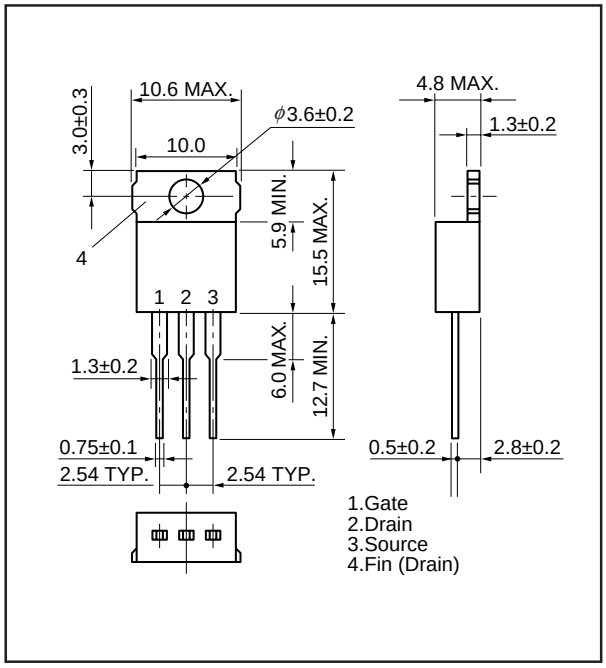


TEST CIRCUIT 3 GATE CHARGE

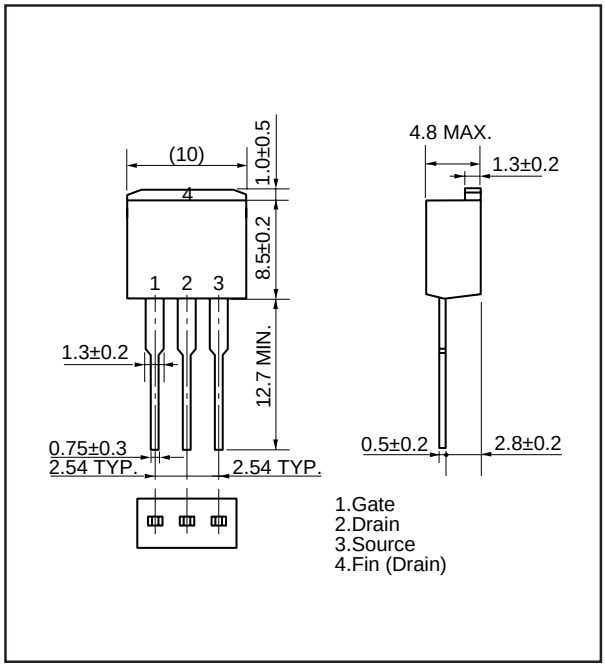


PACKAGE DRAWINGS (Unit: mm)

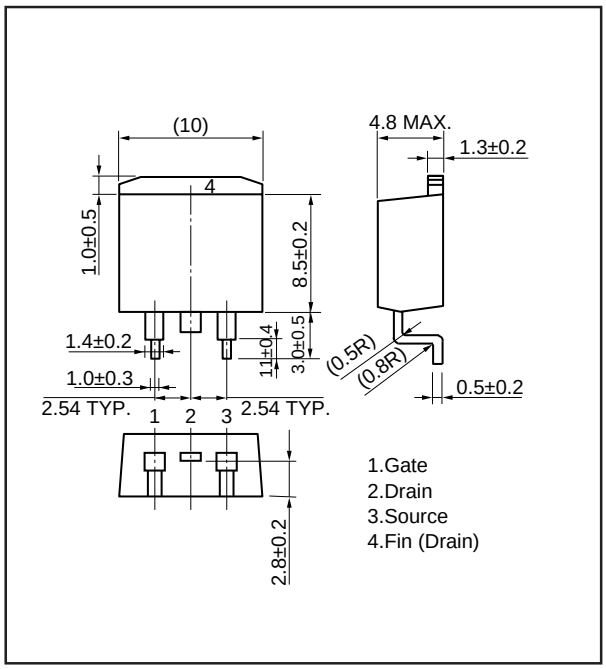
1) TO-220AB (MP-25)



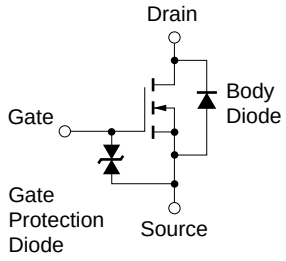
2) TO-262 (MP-25 Fin Cut)



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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