

**SWITCHING**  
**N-CHANNEL POWER MOS FET**  
**INDUSTRIAL USE**

**DESCRIPTION**

The 2SK3353 is N-channel MOS Field Effect Transistor designed for high current switching applications.

**FEATURES**

- Super low on-state resistance:
- ★  $R_{DS(on)1} = 9.5 \text{ m}\Omega \text{ MAX.}$  ( $V_{GS} = 10 \text{ V}$ ,  $I_D = 41 \text{ A}$ )
- ★  $R_{DS(on)2} = 14 \text{ m}\Omega \text{ MAX.}$  ( $V_{GS} = 4 \text{ V}$ ,  $I_D = 41 \text{ A}$ )
- ★ • Low  $C_{iss}$ :  $C_{iss} = 4650 \text{ pF TYP.}$
- Built-in gate protection diode

**ORDERING INFORMATION**

PART NUMBER	PACKAGE
2SK3353	TO-220AB
2SK3353-S	TO-262
2SK3353-Z	TO-220SMD

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

Drain to Source Voltage	$V_{DSS}$	60	V
Gate to Source Voltage	$V_{GSS(AC)}$	$\pm 20$	V
Drain Current (DC)	$I_{D(DC)}$	$\pm 82$	A
★ Drain Current (pulse) <sup>Note1</sup>	$I_{D(pulse)}$	$\pm 328$	A
★ Total Power Dissipation ( $T_C = 25^\circ\text{C}$ )	$P_T$	95	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 to +150	$^\circ\text{C}$
★ Single Avalanche Current <sup>Note2</sup>	$I_{AS}$	45	A
★ Single Avalanche Energy <sup>Note2</sup>	$E_{AS}$	202	mJ

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

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

**THERMAL RESISTANCE**

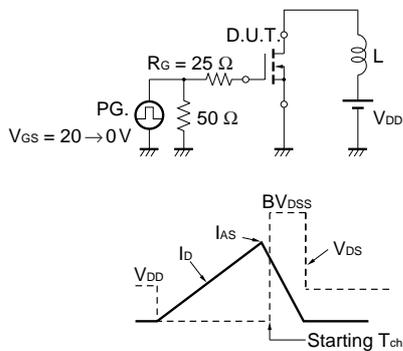
★ Channel to Case	$R_{th(ch-C)}$	1.32	$^\circ\text{C/W}$
Channel to Ambient	$R_{th(ch-A)}$	83.3	$^\circ\text{C/W}$

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

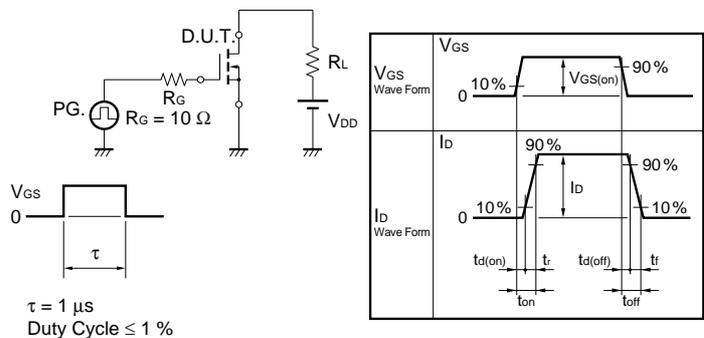
★ ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain to Source On-state Resistance	R <sub>DS(on)1</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 41 A		7.5	9.5	mΩ
	R <sub>DS(on)2</sub>	V <sub>GS</sub> = 4V, I <sub>D</sub> = 41 A		10.5	14	mΩ
Gate to Source Cut-off Voltage	V <sub>GS(off)</sub>	V <sub>DS</sub> = 10V, I <sub>D</sub> = 1 mA	1.5	2.0	2.5	V
Forward Transfer Admittance	y <sub>fs</sub>	V <sub>DS</sub> = 10V, I <sub>D</sub> = 41 A	30	50		S
Drain Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0 V			10	μA
Gate to Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0 V			±10	μA
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0 V, f = 1 MHz		4650		pF
Output Capacitance	C <sub>oss</sub>			780		pF
Reverse Transfer Capacitance	C <sub>rss</sub>			380		pF
Turn-on Delay Time	t <sub>d(on)</sub>	I <sub>D</sub> = 41 A, V <sub>GS(on)</sub> = 10 V, V <sub>DD</sub> = 30 V, R <sub>G</sub> = 10 Ω		100		ns
Rise Time	t <sub>r</sub>			1550		ns
Turn-off Delay Time	t <sub>d(off)</sub>			280		ns
Fall Time	t <sub>f</sub>			420		ns
Total Gate Charge	Q <sub>G</sub>	I <sub>D</sub> = 82 A, V <sub>DD</sub> = 48 V, V <sub>GS</sub> = 10 V		90		nC
Gate to Source Charge	Q <sub>GS</sub>			14		nC
Gate to Drain Charge	Q <sub>GD</sub>			38		nC
Body Diode Forward Voltage	V <sub>F(S-D)</sub>	I <sub>F</sub> = 82 A, V <sub>GS</sub> = 0 V		1.0		V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 82 A, V <sub>GS</sub> = 0 V, di/dt = 100 A/μs		60		ns
Reverse Recovery Charge	Q <sub>rr</sub>			110		nC

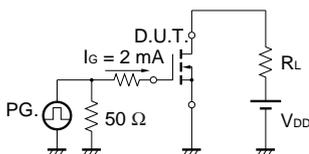
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME

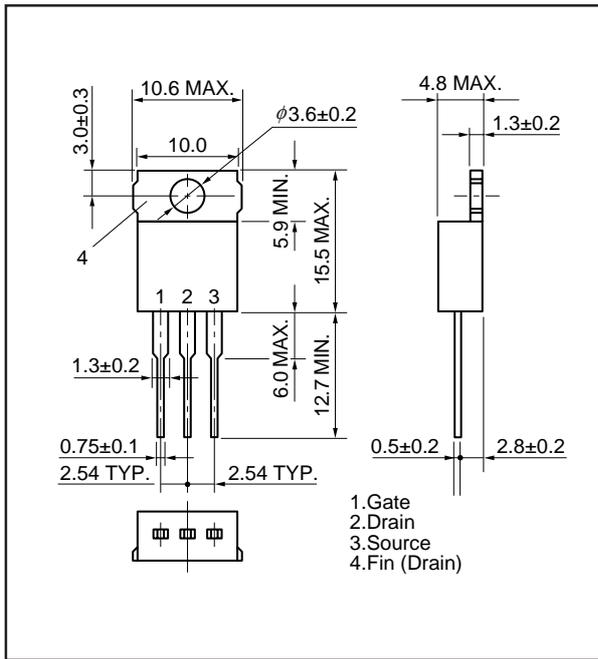


TEST CIRCUIT 3 GATE CHARGE

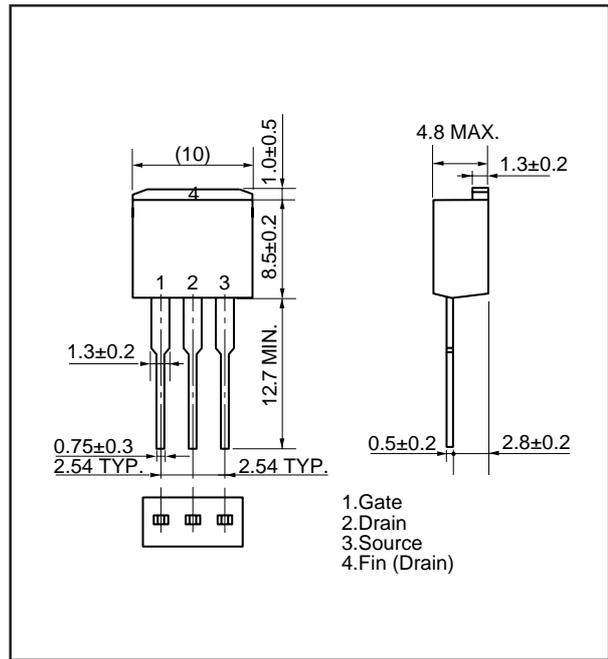


PACKAGE DRAWING (Unit: mm)

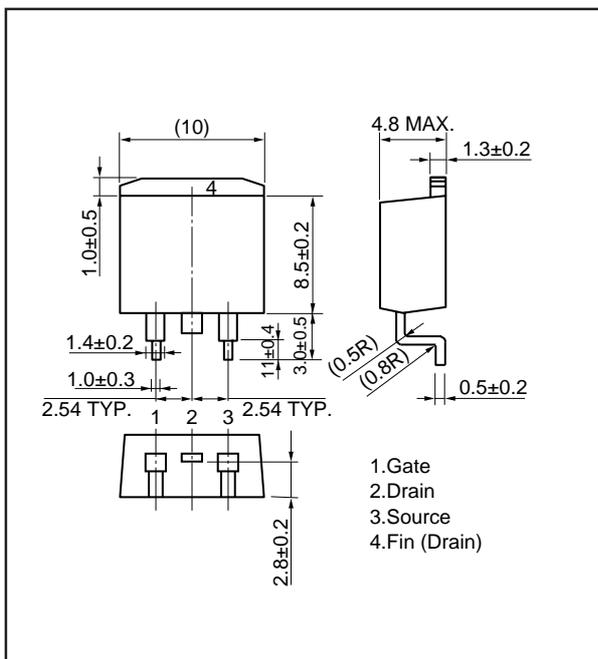
1) TO-220AB (MP-25)



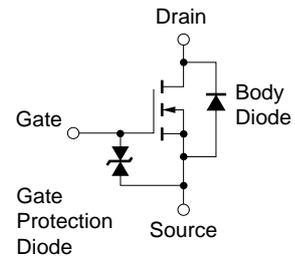
2) TO-262 (MP-25 Fin Cut)



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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    - Specific: Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.
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