

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 | $V_{GSS(AC)}$ | ± 20 | V |
| Drain Current (DC) | $I_{D(DC)}$ | ± 82 | A |
| ★ Drain Current (pulse) ^{Note1} | $I_{D(pulse)}$ | ± 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 ^{Note2} | I_{AS} | 45 | A |
| ★ Single Avalanche Energy ^{Note2} | E_{AS} | 202 | 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

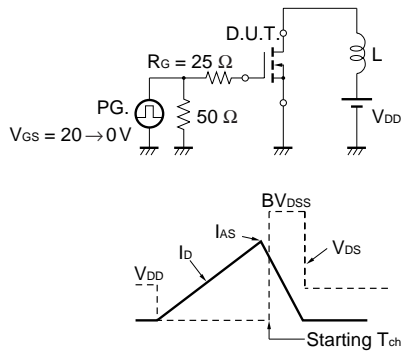
| | | | |
|--------------------|----------------|------|--------------------|
| ★ Channel to Case | $R_{th(ch-C)}$ | 1.32 | $^\circ\text{C/W}$ |
| Channel to Ambient | $R_{th(ch-A)}$ | 83.3 | $^\circ\text{C/W}$ |

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

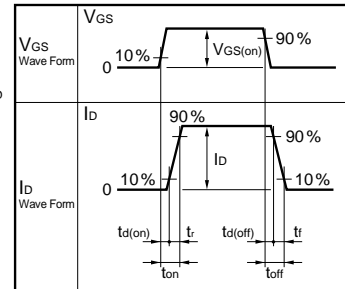
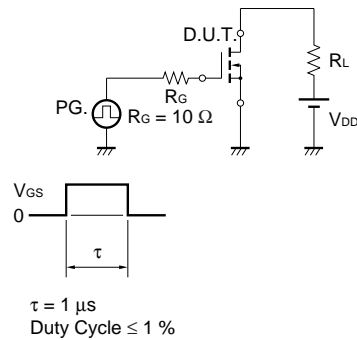
★ ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

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

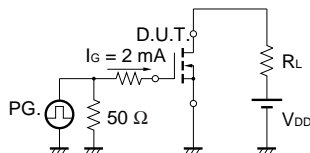
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME

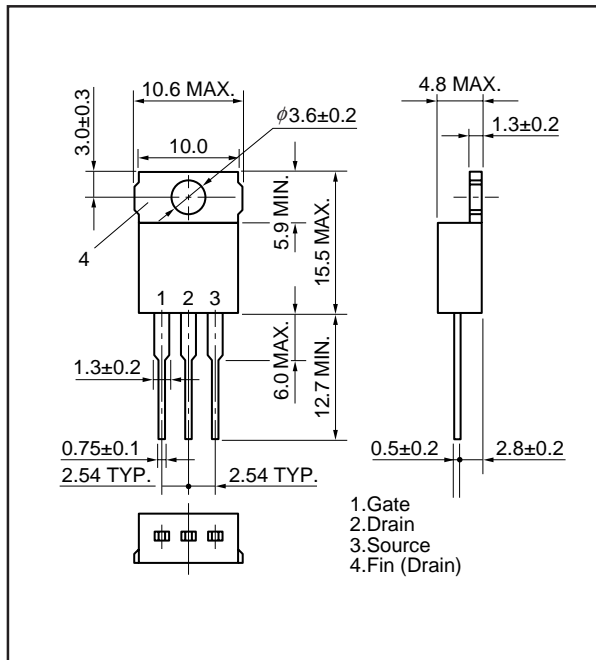


TEST CIRCUIT 3 GATE CHARGE

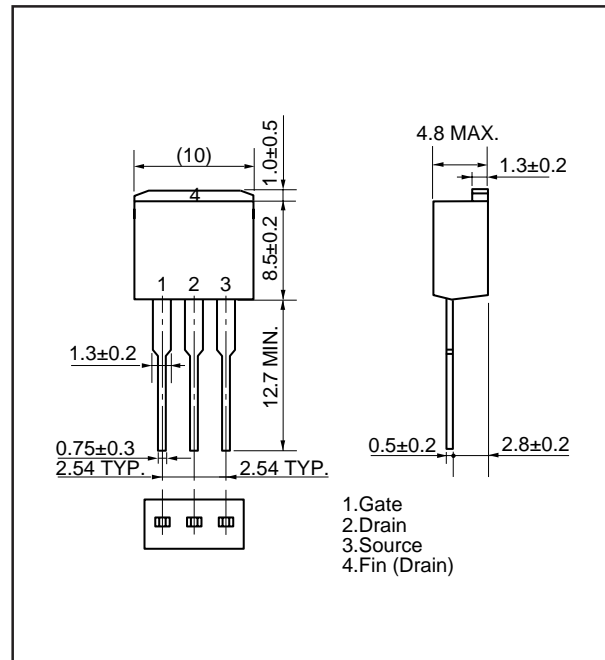


PACKAGE DRAWING (Unit: mm)

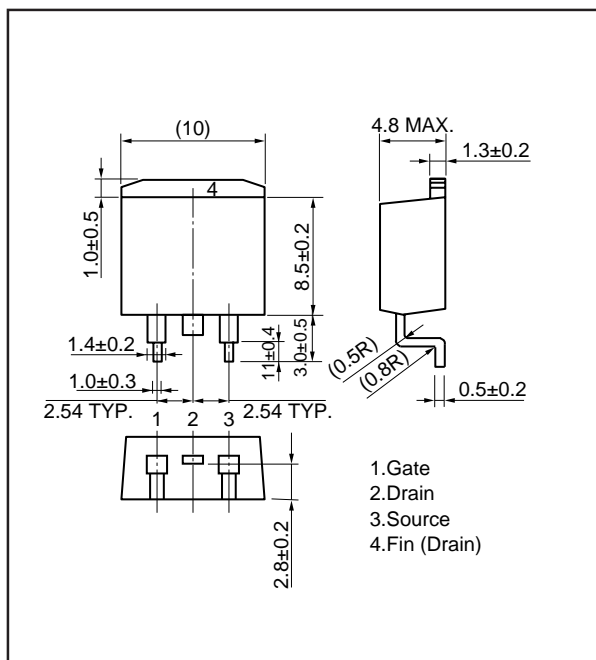
1) TO-220AB (MP-25)



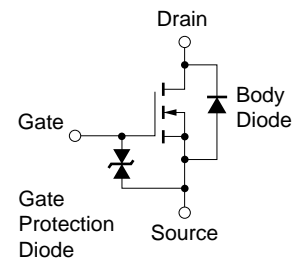
2) TO-262 (MP-25 Fin Cut)



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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