

# MOS FIELD EFFECT TRANSISTOR

# 2SK2983

## SWITCHING

## N-CHANNEL POWER MOS FET

## INDUSTRIAL USE

### DESCRIPTION

This product is N-Channel MOS Field Effect Transistor designed for high current switching application.

### FEATURES

- Low on-resistance  
 $R_{DS(on)1} = 20 \text{ m}\Omega$  (MAX.) ( $V_{GS} = 10 \text{ V}$ ,  $I_D = 15 \text{ A}$ )  
 $R_{DS(on)2} = 27 \text{ m}\Omega$  (MAX.) ( $V_{GS} = 4.5 \text{ V}$ ,  $I_D = 15 \text{ A}$ )
- Low  $C_{iss}$   $C_{iss} = 1200 \text{ pF}$  TYP.
- Built-in gate protection diode

### ORDERING INFORMATION

| PART NUMBER | PACKAGE  |
|-------------|----------|
| 2SK2983     | TO-220AB |
| 2SK2983-S   | TO-262   |
| 2SK2983-ZJ  | TO-263   |

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

|                                                      |                |             |                  |
|------------------------------------------------------|----------------|-------------|------------------|
| Drain to Source Voltage <sup>Note1</sup>             | $V_{DSS}$      | 30          | V                |
| Gate to Source Voltage <sup>Note2</sup>              | $V_{GSS}$      | $\pm 20$    | V                |
| Drain Current (DC)                                   | $I_{D(DC)}$    | $\pm 30$    | A                |
| Drain Current (pulse) <sup>Note3</sup>               | $I_{D(pulse)}$ | $\pm 120$   | A                |
| Total Power Dissipation ( $T_A = 25^\circ\text{C}$ ) | $P_T$          | 1.5         | W                |
| Total Power Dissipation ( $T_C = 25^\circ\text{C}$ ) | $P_T$          | 50          | W                |
| Channel Temperature                                  | $T_{ch}$       | 150         | $^\circ\text{C}$ |
| Storage Temperature                                  | $T_{stg}$      | -55 to +150 | $^\circ\text{C}$ |

**Notes1.**  $V_{GS} = 0 \text{ V}$

**2.**  $V_{DS} = 0 \text{ V}$

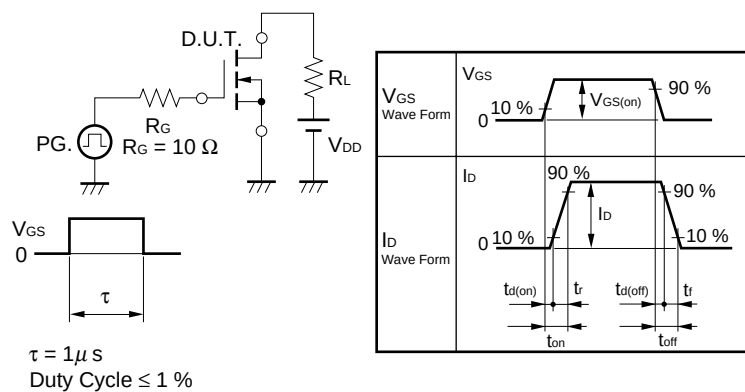
**3.**  $PW \leq 10 \mu\text{s}$ , Duty Cycle  $\leq 1 \%$

The information in this document is subject to change without notice.

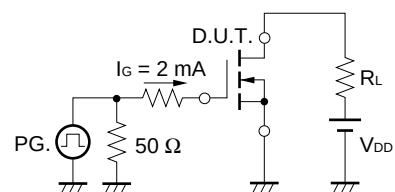
**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

| CHARACTERISTICS                     | SYMBOL               | TEST CONDITIONS                                                                                        | MIN. | TYP. | MAX. | UNIT |
|-------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------|------|------|------|------|
| Drain to Source On-state Resistance | R <sub>DS(on)1</sub> | V <sub>GS</sub> = 10 V, I <sub>D</sub> = 15 A                                                          |      | 13.0 | 20.0 | mΩ   |
|                                     | R <sub>DS(on)2</sub> | V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 15 A                                                         |      | 18.0 | 27.0 | mΩ   |
| Gate to Source Cut-off Voltage      | V <sub>GS(off)</sub> | V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1 mA                                                          | 1.0  | 1.5  | 2.0  | V    |
| Forward Transfer Admittance         | y <sub>fs</sub>      | V <sub>DS</sub> = 10 V, I <sub>D</sub> = 15 A                                                          | 9.0  | 19   |      | S    |
| Drain Leakage Current               | I <sub>DSS</sub>     | V <sub>DS</sub> = 30 V, 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                                                                                 |      | 1200 |      | pF   |
| Output Capacitance                  | C <sub>oss</sub>     | V <sub>GS</sub> = 0 V                                                                                  |      | 530  |      | pF   |
| Reverse Transfer Capacitance        | C <sub>rss</sub>     | f = 1 MHz                                                                                              |      | 250  |      | pF   |
| Turn-on Delay Time                  | t <sub>d(on)</sub>   | I <sub>D</sub> = 15 A<br>V <sub>GS(on)</sub> = 10 V<br>V <sub>DD</sub> = 15 V<br>R <sub>G</sub> = 10 Ω |      | 50   |      | ns   |
| Rise Time                           | t <sub>r</sub>       |                                                                                                        |      | 820  |      | ns   |
| Turn-off Delay Time                 | t <sub>d(off)</sub>  |                                                                                                        |      | 100  |      | ns   |
| Fall Time                           | t <sub>f</sub>       |                                                                                                        |      | 170  |      | ns   |
| Total Gate Charge                   | Q <sub>G</sub>       | I <sub>D</sub> = 30 A<br>V <sub>DD</sub> = 24 V<br>V <sub>GS</sub> = 10 V                              |      | 30   |      | nC   |
| Gate to Source Charge               | Q <sub>GS</sub>      |                                                                                                        |      | 4.5  |      | nC   |
| Gate to Drain Charge                | Q <sub>GD</sub>      |                                                                                                        |      | 7.5  |      | nC   |
| Body Diode Forward Voltage          | V <sub>F(S-D)</sub>  | I <sub>F</sub> = 30 A, V <sub>GS</sub> = 0 V                                                           |      | 0.8  |      | V    |
| Reverse Recovery Time               | t <sub>rr</sub>      | I <sub>F</sub> = 30 A, V <sub>GS</sub> = 0 V<br>di/dt = 100 A / μS                                     |      | 35   |      | ns   |
| Reverse Recovery Charge             | Q <sub>rr</sub>      |                                                                                                        |      | 65   |      | nC   |

**TEST CIRCUIT 1 SWITCHING TIME**

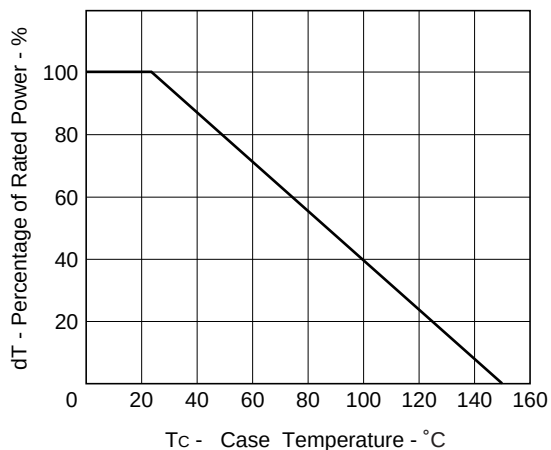


**TEST CIRCUIT 2 GATE CHARGE**

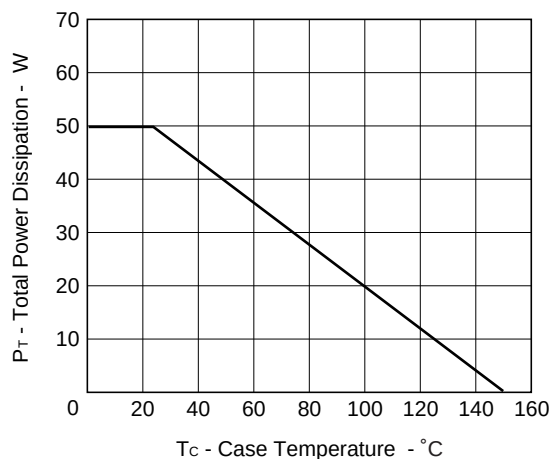


# TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

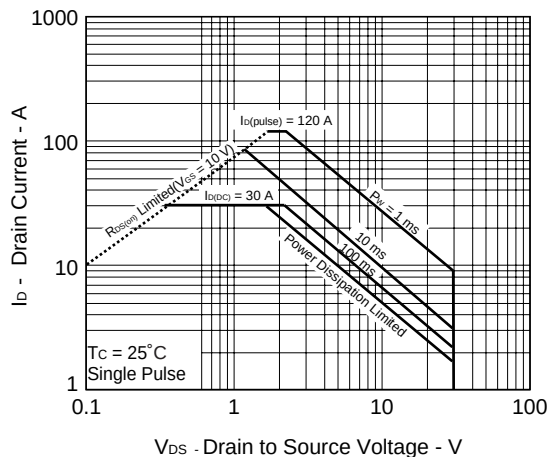
DERATING FACTOR OF FORWARD BIAS  
SAFE OPERATING AREA



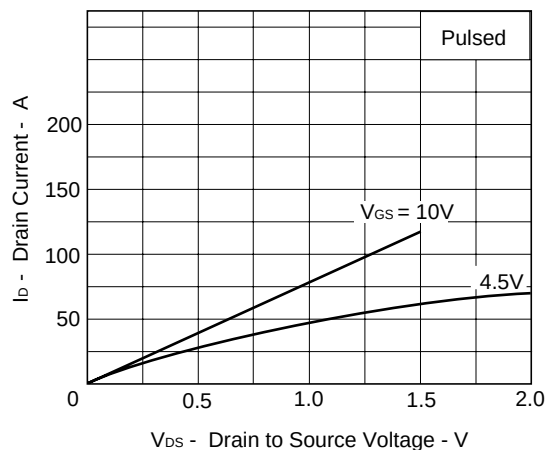
TOTAL POWER DISSIPATION vs.  
CASE TEMPERATURE



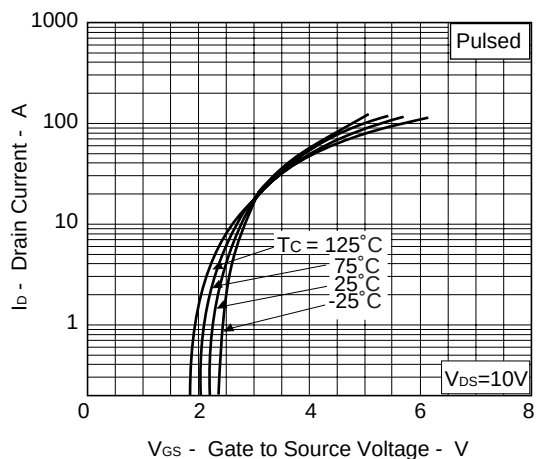
FORWARD BIAS SAFE OPERATING AREA



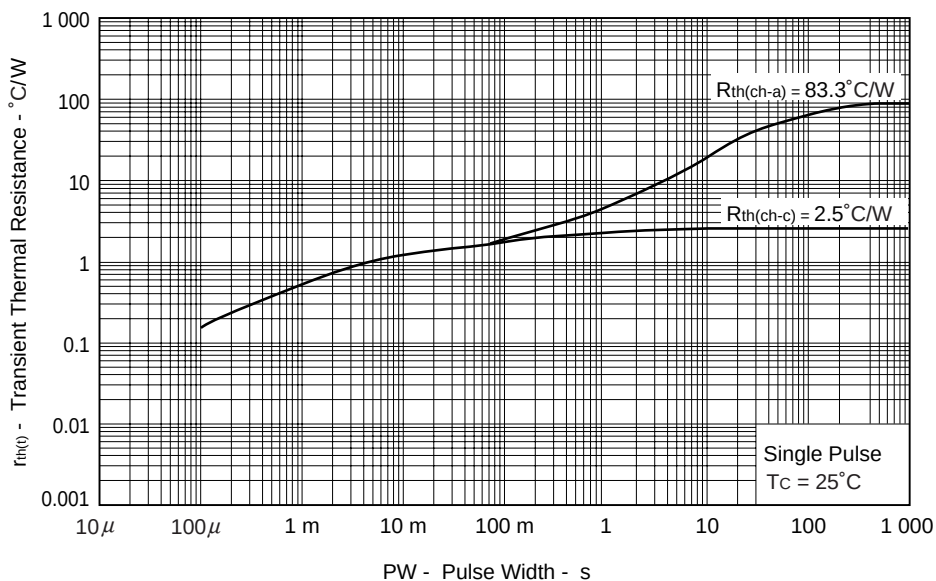
DRAIN CURRENT vs.  
DRAIN TO SOURCE VOLTAGE



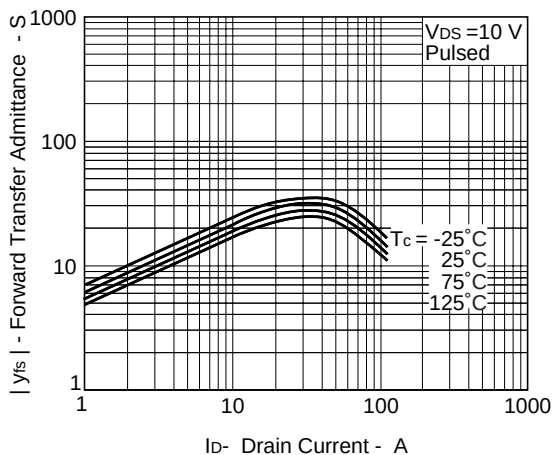
FORWARD TRANSFER CHARACTERISTICS



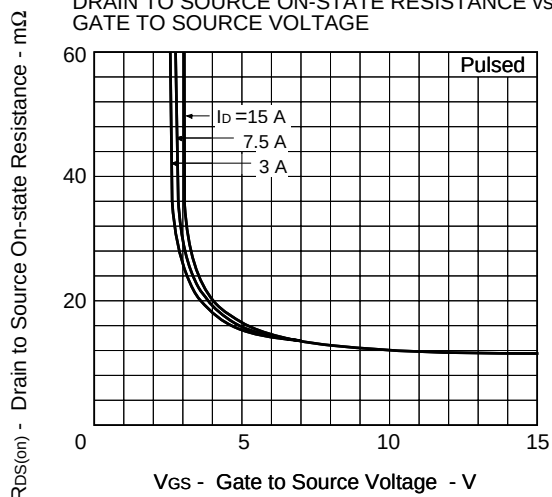
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



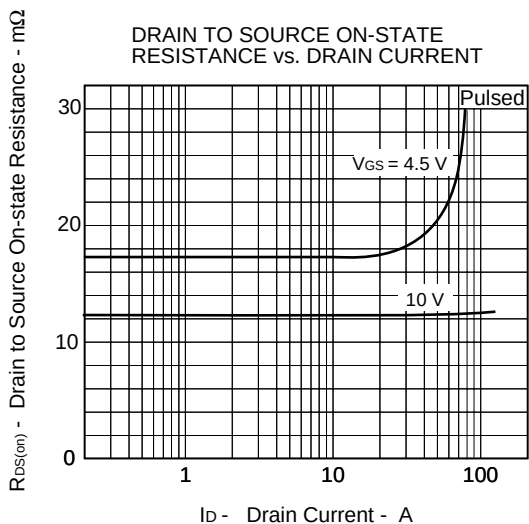
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



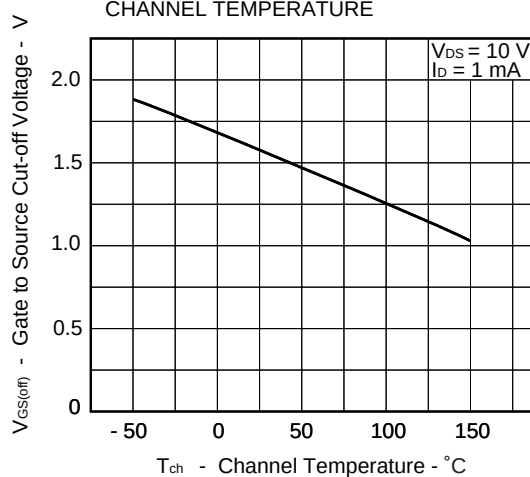
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

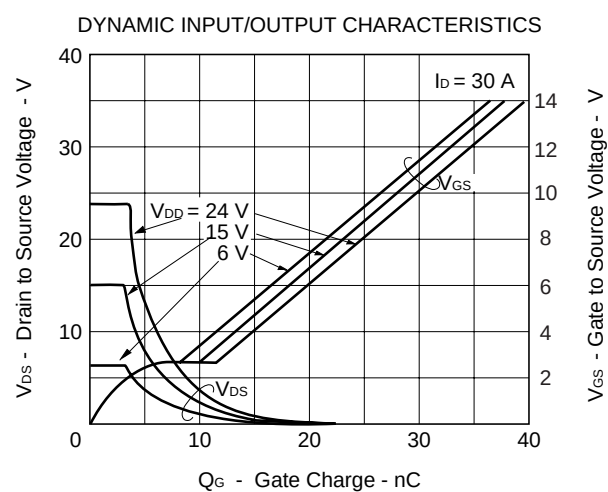
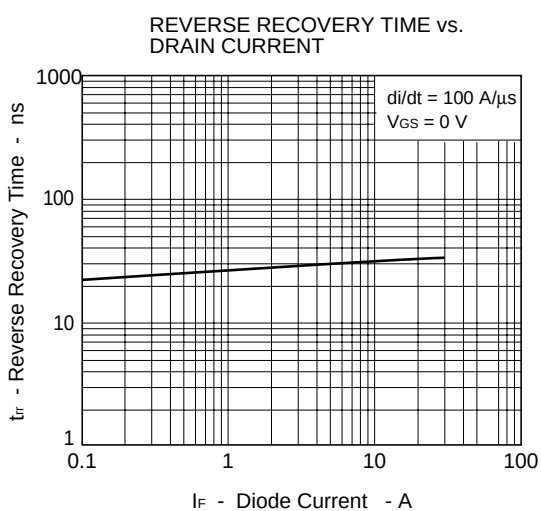
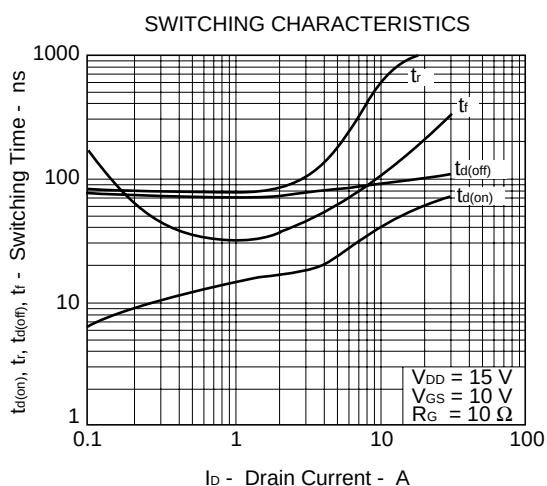
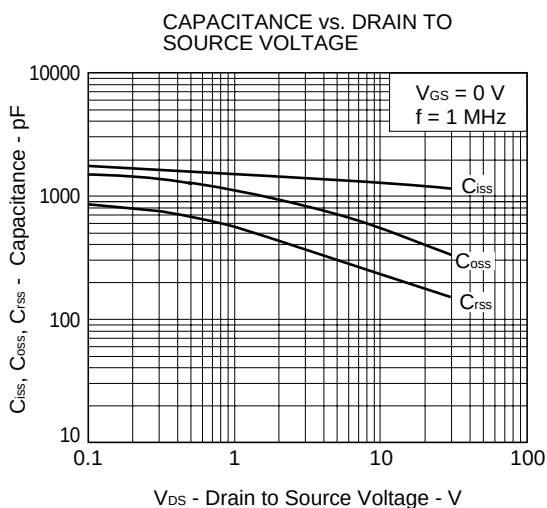
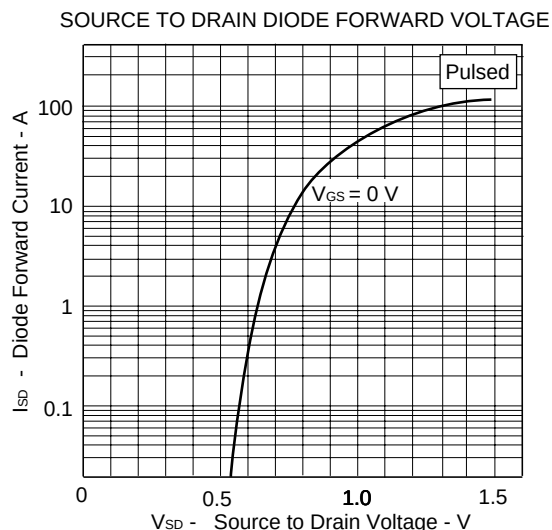
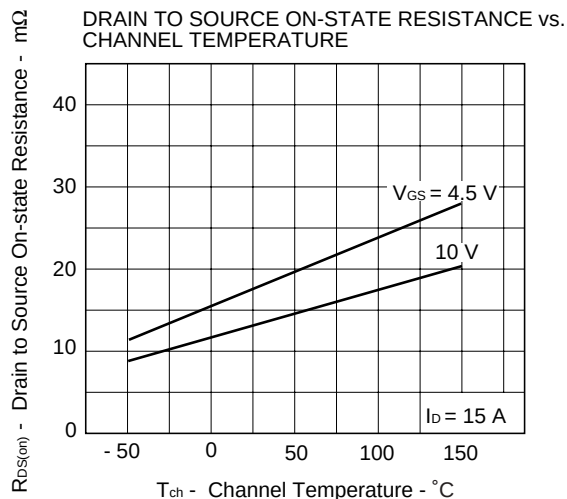


DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



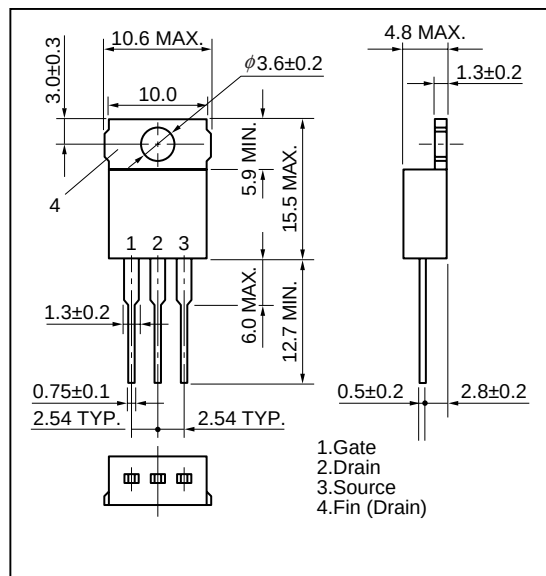
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



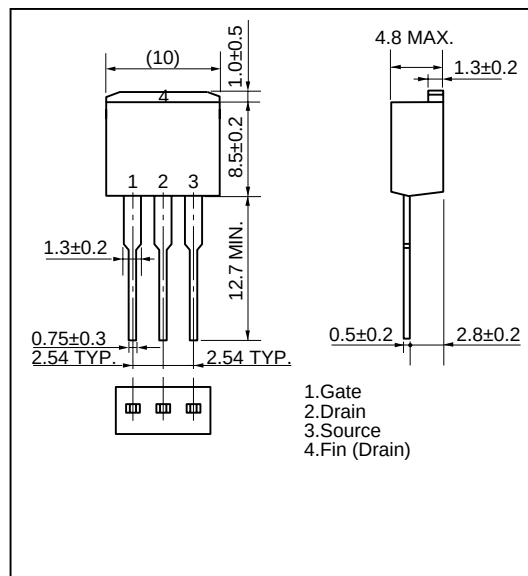


PACKAGE DRAWINGS (Unit : mm)

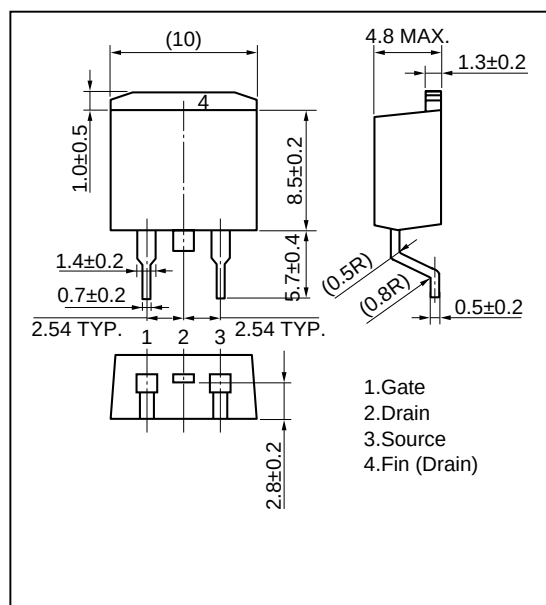
1)TO-220AB (MP-25)



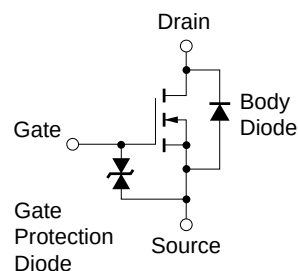
2)TO-262 (TO-220 Fin Cut:MP-25S)



3)TO-263 (JEDEC TYPE:MP-25ZJ)



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

[MEMO]

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Anti-radioactive design is not implemented in this product.