

MOS FIELD EFFECT TRANSISTOR 2SK3112

SWITCHING N-CHANNEL POWER MOS FET INDUSTRIAL USE

DESCRIPTION

The 2SK3112 is N-channel MOS FET device that features a low on-state resistance and excellent switching characteristics, and designed for high voltage applications such as DC/DC converter, actuator driver.

FEATURES

- Gate voltage rating ± 30 V
- Low on-state resistance
 $R_{DS(on)} = 110 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 13 \text{ A)}$
- Low input capacitance
 $C_{iss} = 1600 \text{ pF TYP. (} V_{DS} = 10 \text{ V, } V_{GS} = 0 \text{ V)}$
- Avalanche capability rated
- Built-in gate protection diode
- Surface mount device available

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

| | | | |
|--|----------------|-------------|------------------|
| Drain to Source Voltage ($V_{GS} = 0 \text{ V}$) | V_{DSS} | 200 | V |
| Gate to Source Voltage ($V_{DS} = 0 \text{ V}$) | V_{GSS} | ± 30 | V |
| Drain Current (DC) ($T_C = 25^\circ\text{C}$) | $I_{D(DC)}$ | ± 25 | A |
| Drain Current (pulse) ^{Note1} | $I_{D(pulse)}$ | ± 75 | A |
| Total Power Dissipation ($T_C = 25^\circ\text{C}$) | P_{T1} | 100 | W |
| Total Power Dissipation ($T_A = 25^\circ\text{C}$) | P_{T2} | 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} | 25 | A |
| Single Avalanche Energy ^{Note2} | E_{AS} | 250 | mJ |

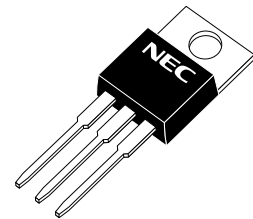
Notes 1. $PW \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$

2. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = 100 \text{ V}$, $R_G = 25 \Omega$, $V_{GS} = 20 \text{ V} \rightarrow 0 \text{ V}$

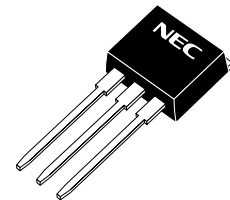
ORDERING INFORMATION

| PART NUMBER | PACKAGE |
|-------------|-----------------|
| 2SK3112 | TO-220AB |
| 2SK3112-S | TO-262 |
| 2SK3112-ZJ | TO-263(MP-25ZJ) |

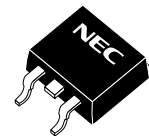
(TO-220AB)



(TO-262)



(TO-263)

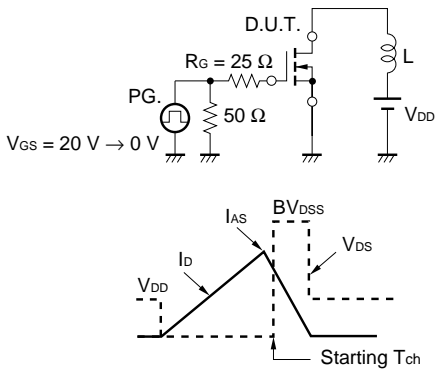


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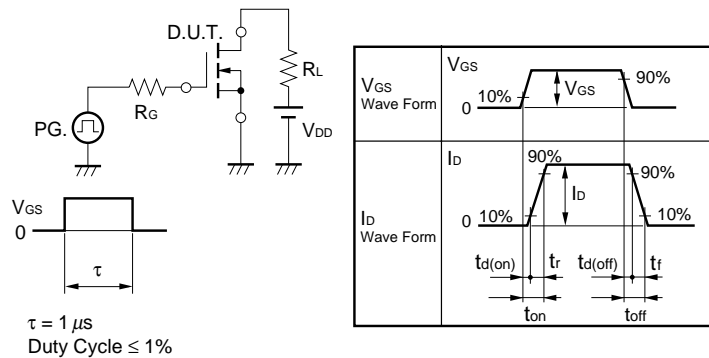
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

| Characteristics | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|-------------------------------------|----------------------|--|------|------|------|------|
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = 200 V, V _{GS} = 0 V | | | 100 | μA |
| Gate Leakage Current | I _{GSS} | V _{GS} = ±30 V, V _{DS} = 0 V | | | ±10 | μA |
| Gate Cut-off Voltage | V _{GS(off)} | V _{DS} = 10 V, I _D = 1 mA | 2.5 | | 4.5 | V |
| Forward Transfer Admittance | y _{fs} | V _{DS} = 10 V, I _D = 13 A | 6.0 | | | S |
| Drain to Source On-state Resistance | R _{DS(on)} | V _{GS} = 10 V, I _D = 13 A | | 76 | 110 | mΩ |
| Input Capacitance | C _{iss} | V _{DS} = 10 V | | 1600 | | pF |
| Output Capacitance | C _{oss} | V _{GS} = 0 V | | 430 | | pF |
| Reverse Transfer Capacitance | C _{rss} | f = 1 MHz | | 280 | | pF |
| Turn-on Delay Time | t _{d(on)} | V _{DD} = 100 V, I _D = 13 A | | 35 | | ns |
| Rise Time | t _r | V _{GS} = 10 V | | 140 | | ns |
| Turn-off Delay Time | t _{d(off)} | R _G = 10 Ω | | 110 | | ns |
| Fall Time | t _f | | | 70 | | ns |
| Total Gate Charge | Q _G | V _{DD} = 160 V | | 60 | | nC |
| Gate to Source Charge | Q _{GS} | V _{GS} = 10 V | | 11 | | nC |
| Gate to Drain Charge | Q _{GD} | I _D = 25 A | | 40 | | nC |
| Body Diode Forward Voltage | V _{F(S-D)} | I _F = 25 A, V _{GS} = 0 V | | 1.0 | | V |
| Reverse Recovery Time | t _{rr} | I _F = 25 A, V _{GS} = 0 V | | 300 | | ns |
| Reverse Recovery Charge | Q _{rr} | di/dt = 50 A/μs | | 1.8 | | μC |

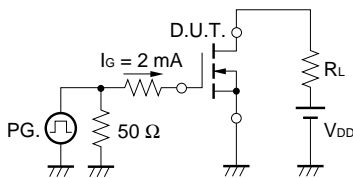
TEST CIRCUIT 1 AVALANCHE CAPABILITY



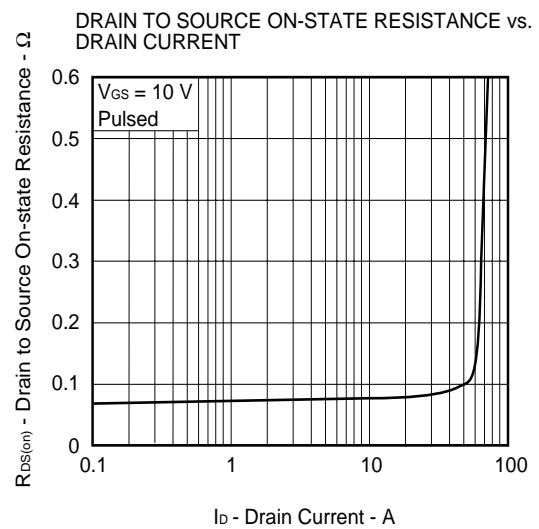
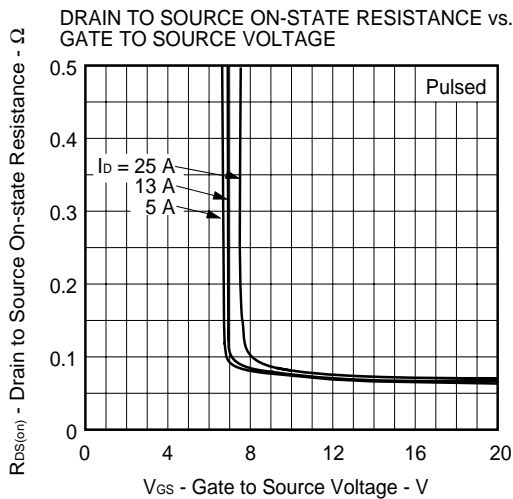
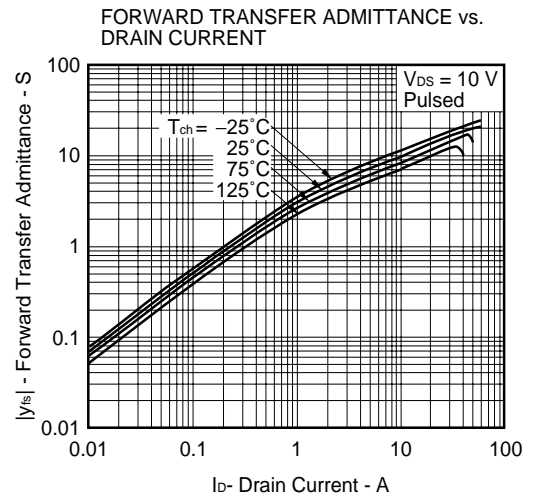
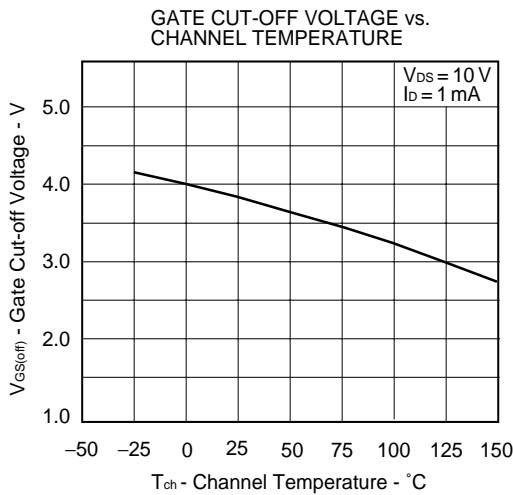
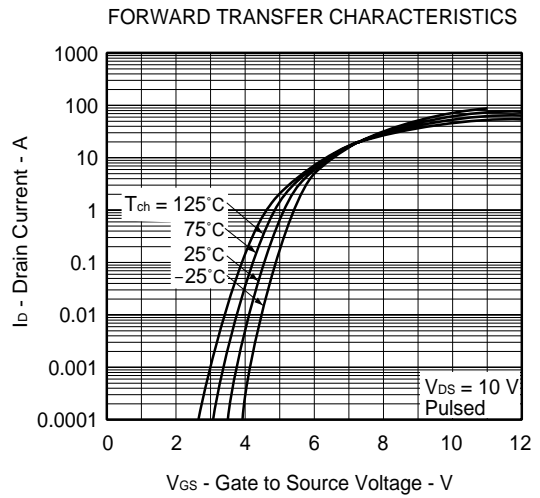
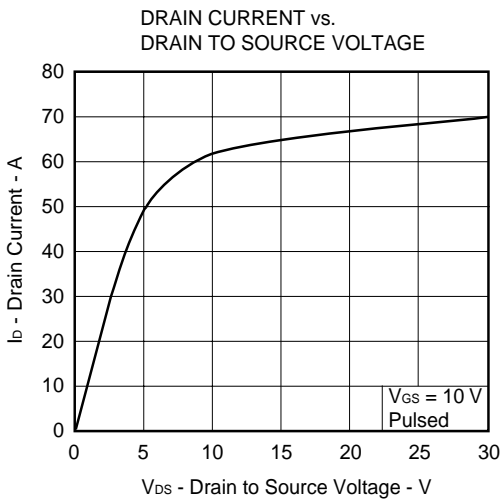
TEST CIRCUIT 2 SWITCHING TIME

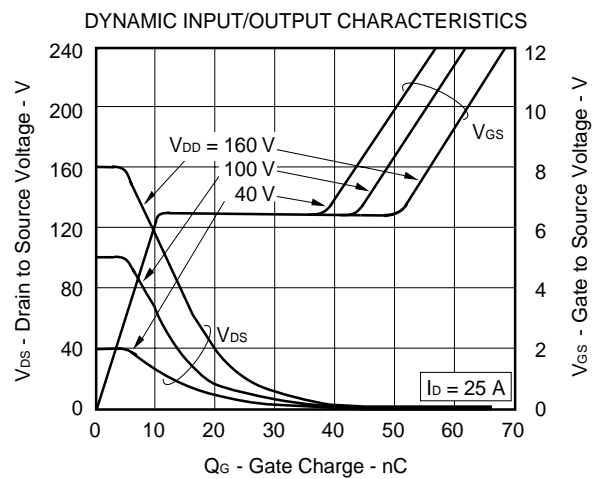
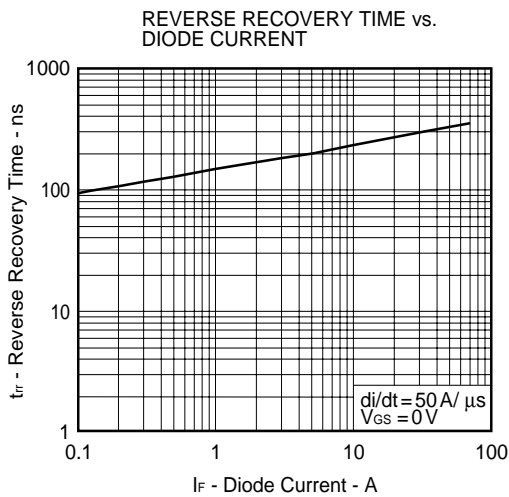
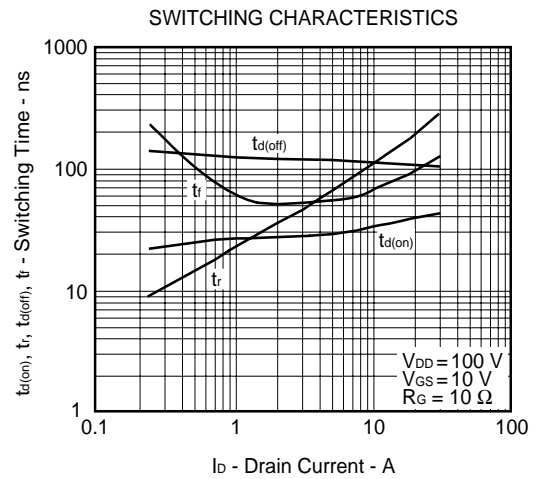
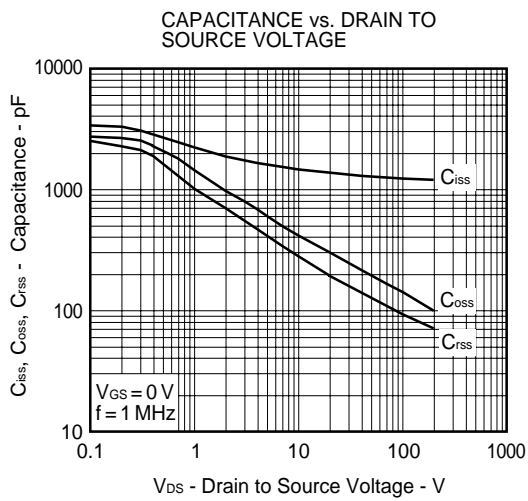
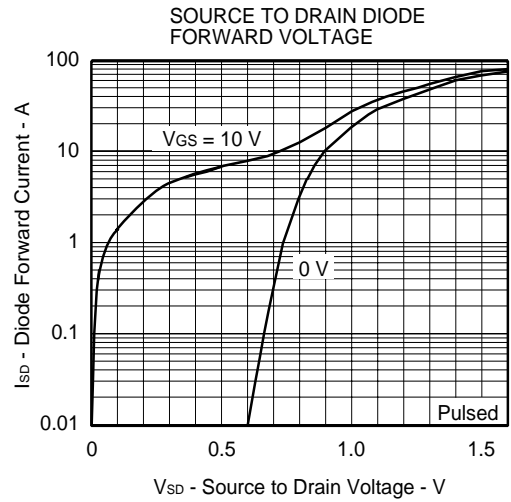
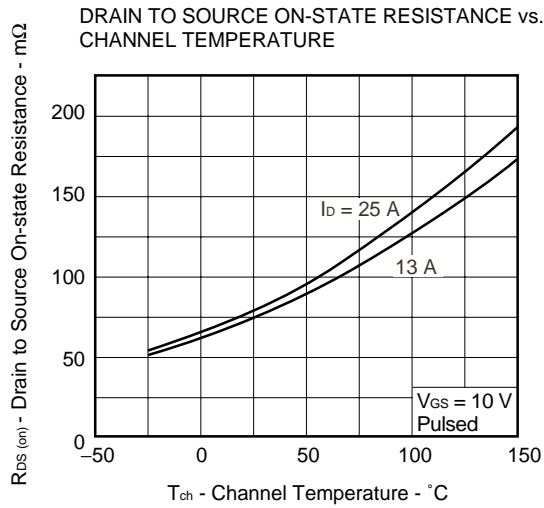


TEST CIRCUIT 3 GATE CHARGE

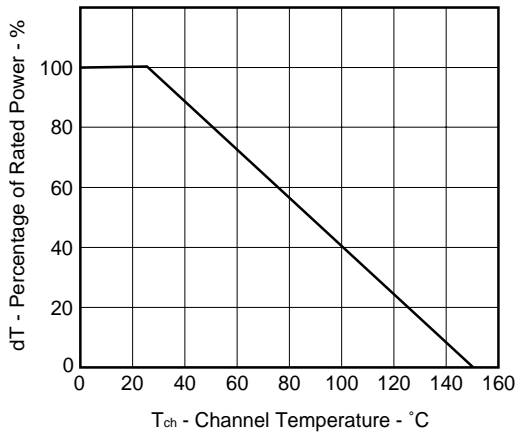


TYPICAL CHARACTERISTICS (T_A = 25°C)

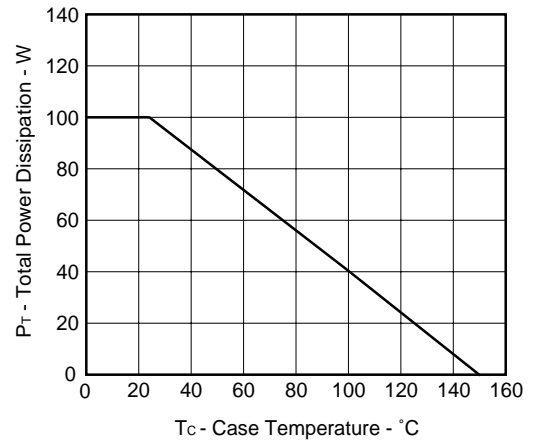




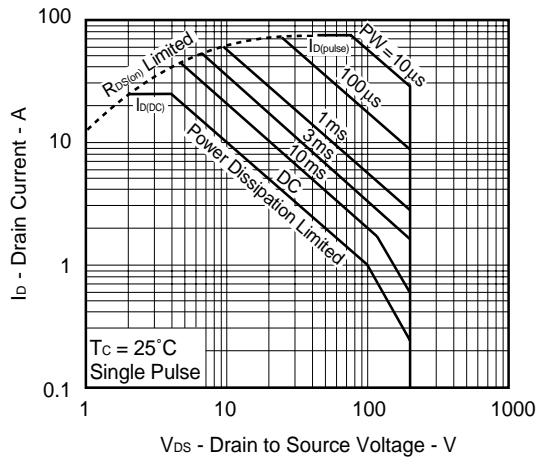
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



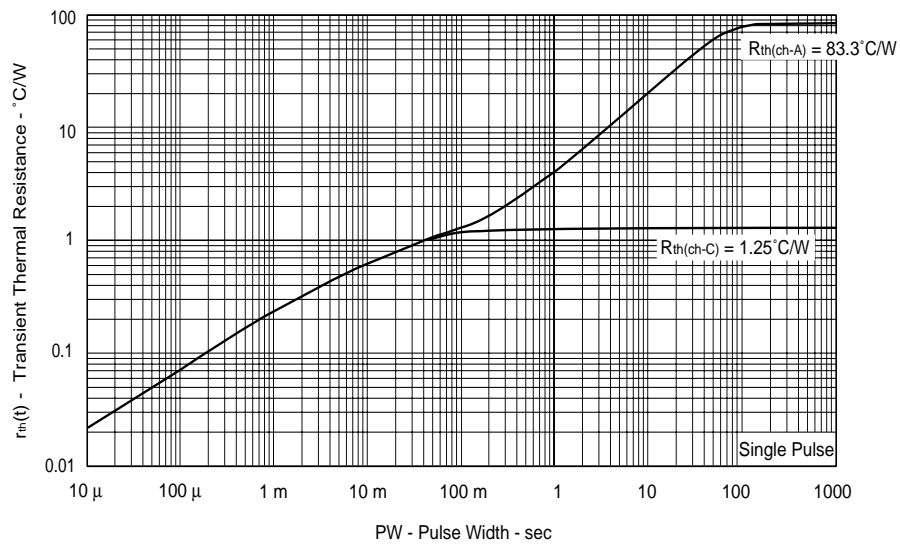
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE

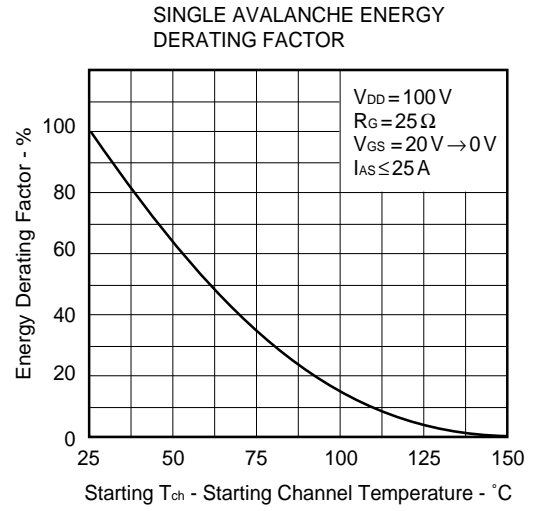
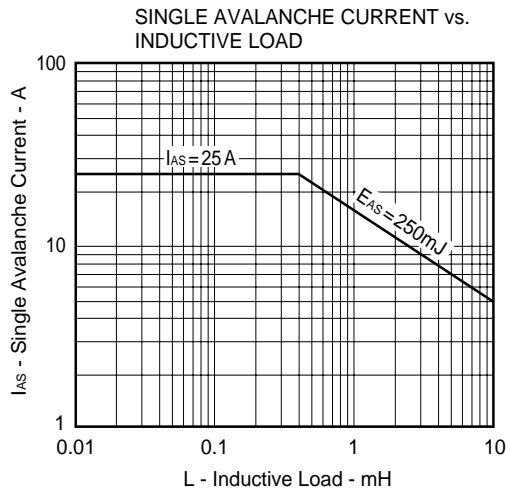


FORWARD BIAS SAFE OPERATING AREA



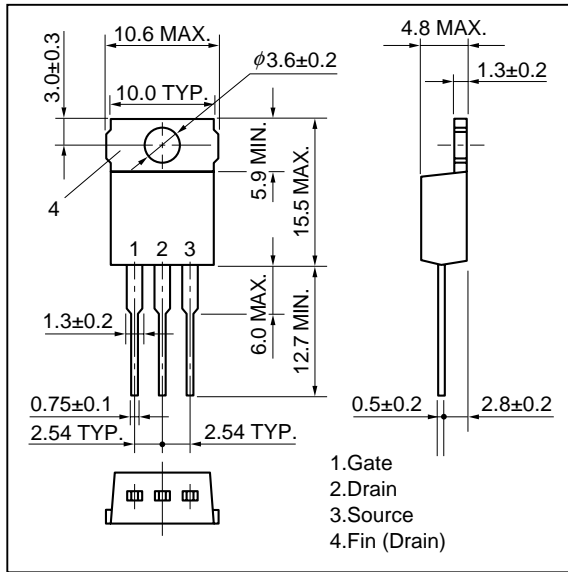
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



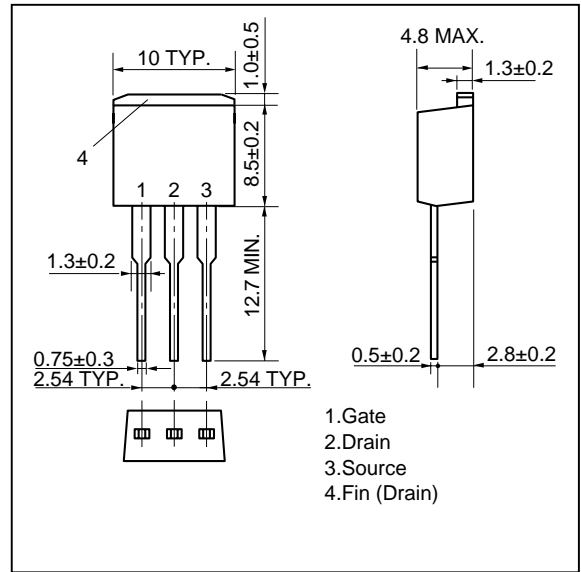


PACKAGE DRAWINGS (Unit : mm)

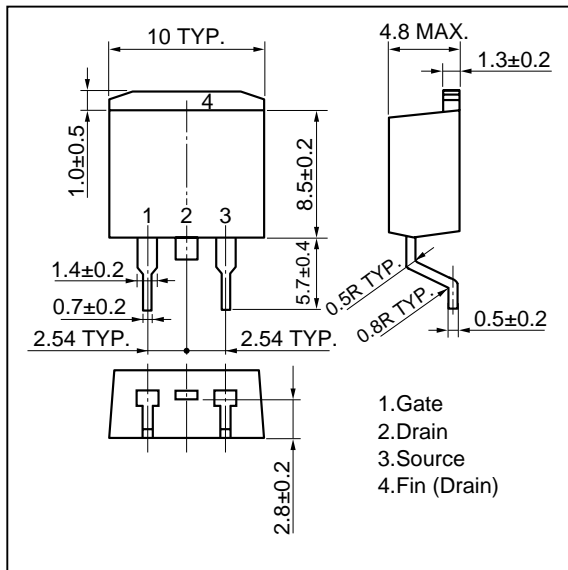
1)TO-220AB (MP-25)



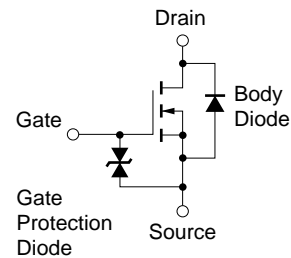
2)TO-262



3)TO-263 (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.

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