

SWITCHING
N-CHANNEL POWER MOS FET
DESCRIPTION

The 2SK3322 is N-Channel DMOS FET device that features a low gate charge and excellent switching characteristics, and designed for high voltage applications such as switching power supply, AC adapter.

ORDERING INFORMATION

| PART NUMBER | PACKAGE |
|--------------|------------------|
| 2SK3322 | TO-220AB (MP-25) |
| 2SK3322-S | TO-262 |
| 2SK3322-ZJ | TO-263(MP-25ZJ) |
| ★ 2SK3322-ZK | TO-263(MP-25ZK) |

FEATURES

- ★ • Low gate charge :
 $Q_G = 15 \text{ nC TYP. (} V_{DD} = 450 \text{ V, } V_{GS} = 10 \text{ V, } I_D = 5.5 \text{ A)}$
- Gate voltage rating : $\pm 30 \text{ V}$
- Low on-state resistance :
 $R_{DS(on)} = 2.2 \Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 2.8 \text{ A)}$
- Avalanche capability ratings
- Surface mount package available

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

| | | | |
|---|-----------------------|-------------|----|
| Drain to Source Voltage (V _{GS} = 0 V) | V _{DSS} | 600 | V |
| Gate to Source Voltage (V _{DS} = 0 V) | V _{GSS} | ±30 | V |
| Drain Current (DC) (T _C = 25°C) | I _{D(DC)} | ±5.5 | A |
| Drain Current (pulse) ^{Note1} | I _{D(pulse)} | ±20 | A |
| Total Power Dissipation (T _A = 25°C) | P _{T1} | 1.5 | W |
| Total Power Dissipation (T _C = 25°C) | P _{T2} | 65 | W |
| Channel Temperature | T _{ch} | 150 | °C |
| Storage Temperature | T _{stg} | -55 to +150 | °C |
| Single Avalanche Current ^{Note2} | I _{AS} | 4.0 | A |
| Single Avalanche Energy ^{Note2} | E _{AS} | 10.7 | mJ |

- Notes 1.** PW ≤ 10 μs, Duty Cycle ≤ 1%
2. Starting T_{ch} = 25°C, V_{DD} = 150 V, R_G = 25 Ω, V_{GS} = 20 → 0 V

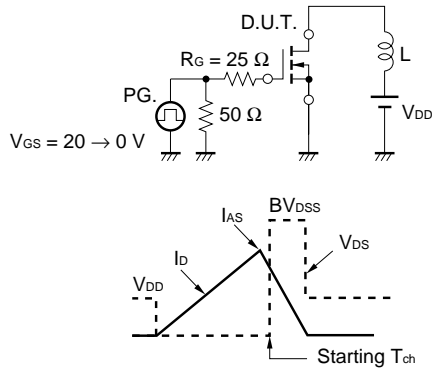
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ELECTRICAL CHARACTERISTICS (T_A = 25°C)

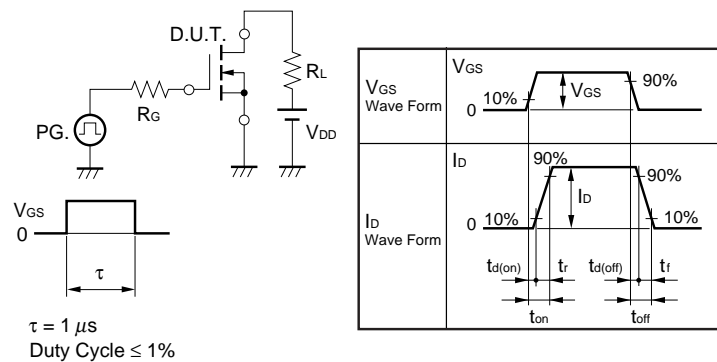
| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|----------------------|--|------|------|------|------|
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} = 600 V, V _{GS} = 0 V | | | 100 | μA |
| Gate Leakage Current | I _{GSS} | V _{GS} = ±30 V, V _{DS} = 0 V | | | ±10 | μA |
| Gate Cut-off Voltage | V _{GS(off)} | V _{DS} = 10 V, I _D = 1 mA | 2.5 | | 3.5 | V |
| Forward Transfer Admittance Note | y _{fs} | V _{DS} = 10 V, I _D = 2.8 A | 1.0 | | | S |
| Drain to Source On-state Resistance Note | R _{DS(on)} | V _{GS} = 10 V, I _D = 2.8 A | | 1.7 | 2.2 | Ω |
| Input Capacitance | C _{iss} | V _{DS} = 10 V, | | 550 | | pF |
| Output Capacitance | C _{oss} | V _{GS} = 0 V, | | 115 | | pF |
| Reverse Transfer Capacitance | C _{rss} | f = 1 MHz | | 13 | | pF |
| Turn-on Delay Time | t _{d(on)} | V _{DD} = 150 V, I _D = 2.8 A, | | 12 | | Ns |
| Rise Time | t _r | V _{GS} = 10 V, | | 10 | | ns |
| Turn-off Delay Time | t _{d(off)} | R _G = 10 Ω | | 35 | | ns |
| Fall Time | t _f | | | 12 | | ns |
| Total Gate Charge | Q _G | V _{DD} = 450 V, | | 15 | | nC |
| Gate to Source Charge | Q _{GS} | V _{GS} = 10 V, | | 4 | | nC |
| Gate to Drain Charge | Q _{GD} | I _D = 5.5 A | | 4.4 | | nC |
| Body Diode Forward Voltage Note | V _{F(S-D)} | I _F = 5.5 A, V _{GS} = 0 V | | 1.0 | | V |
| Reverse Recovery Time | t _{rr} | I _F = 5.5 A, V _{GS} = 0 V, | | 1.6 | | μs |
| Reverse Recovery Charge | Q _{rr} | di/dt = 50 A/μs | | 5.3 | | μC |

Note Pulsed

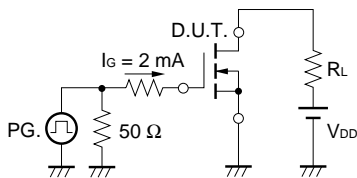
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME

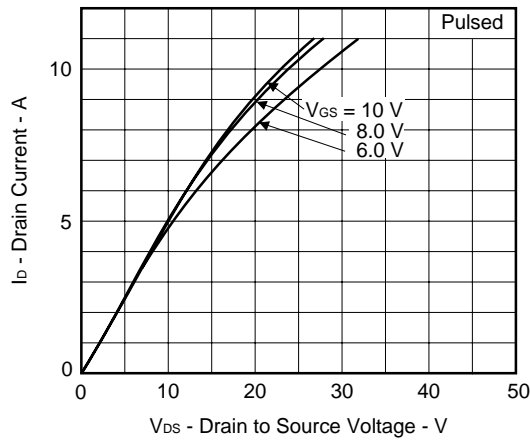


TEST CIRCUIT 3 GATE CHARGE

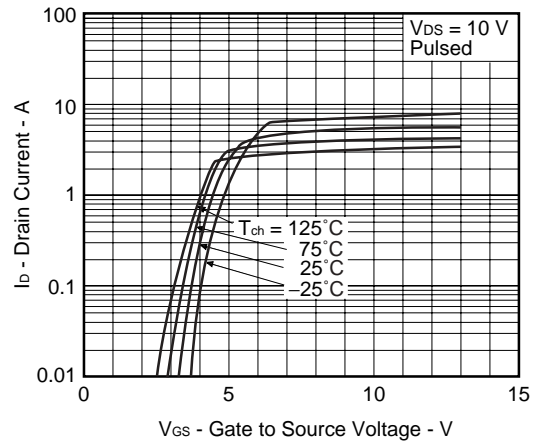


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TYPICAL CHARACTERISTICS (T_A = 25°C)

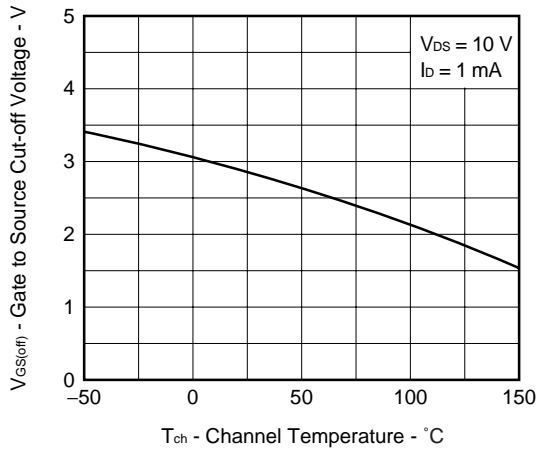
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



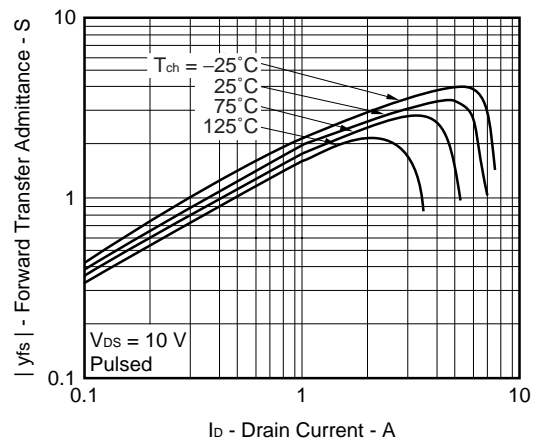
FORWARD TRANSFER CHARACTERISTICS



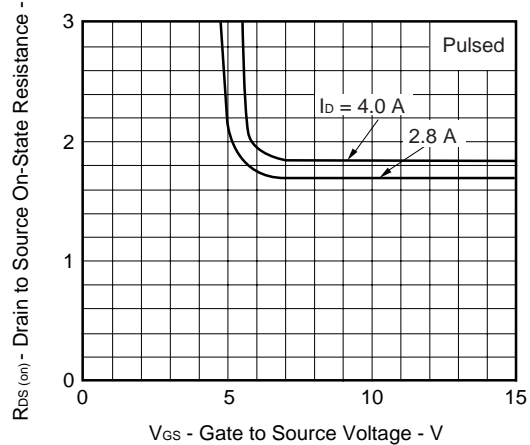
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



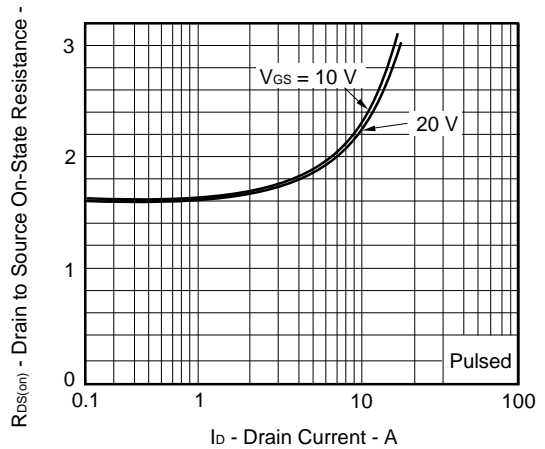
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



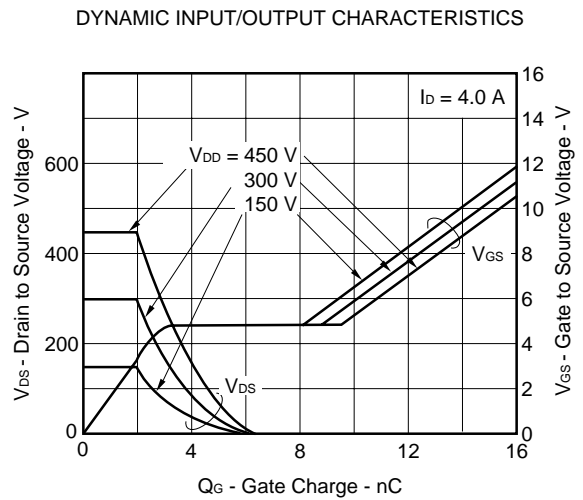
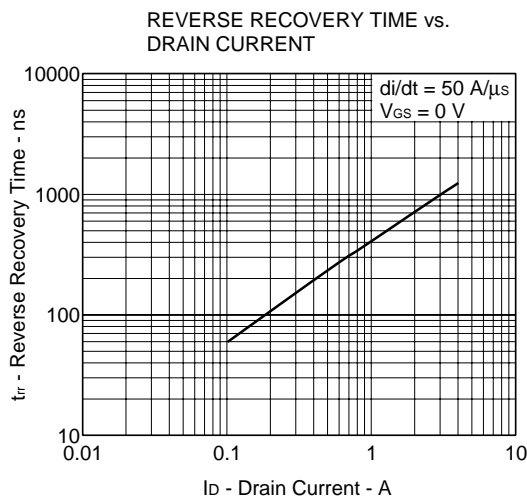
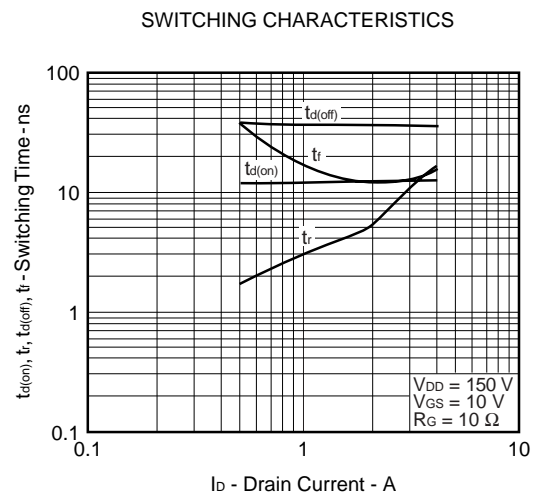
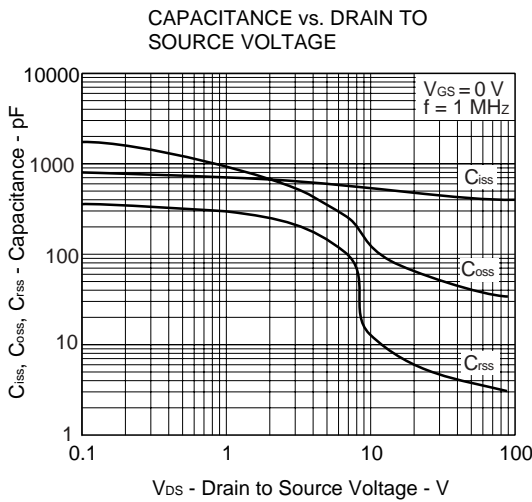
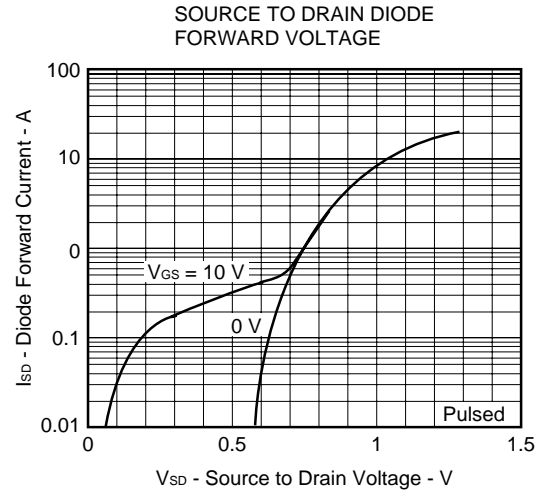
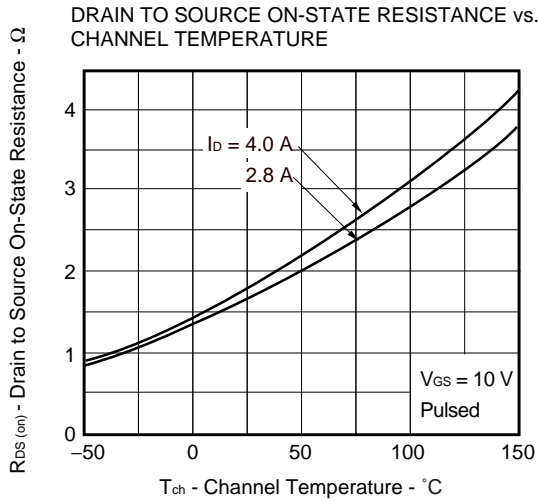
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT

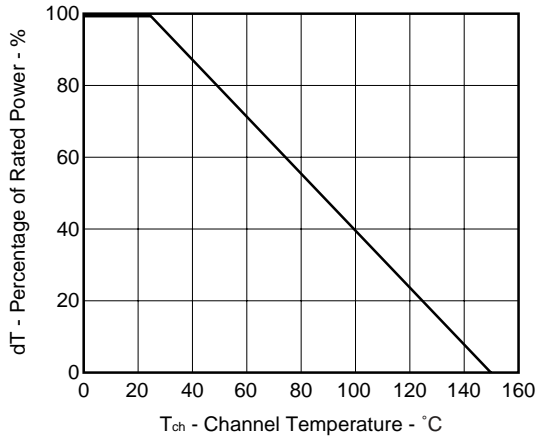


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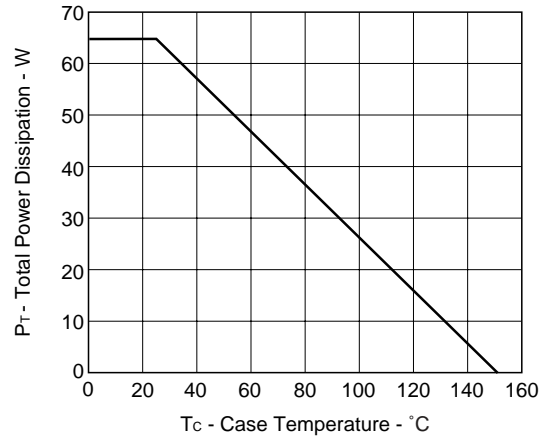


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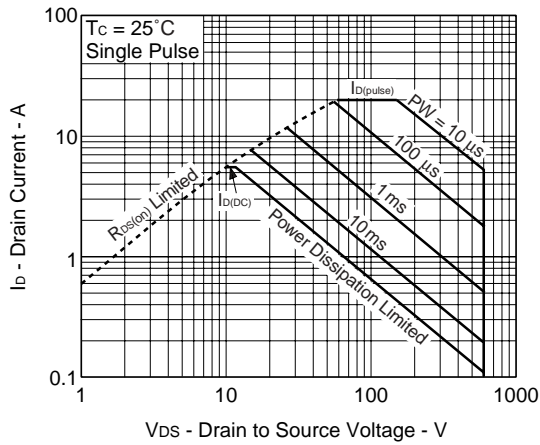
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



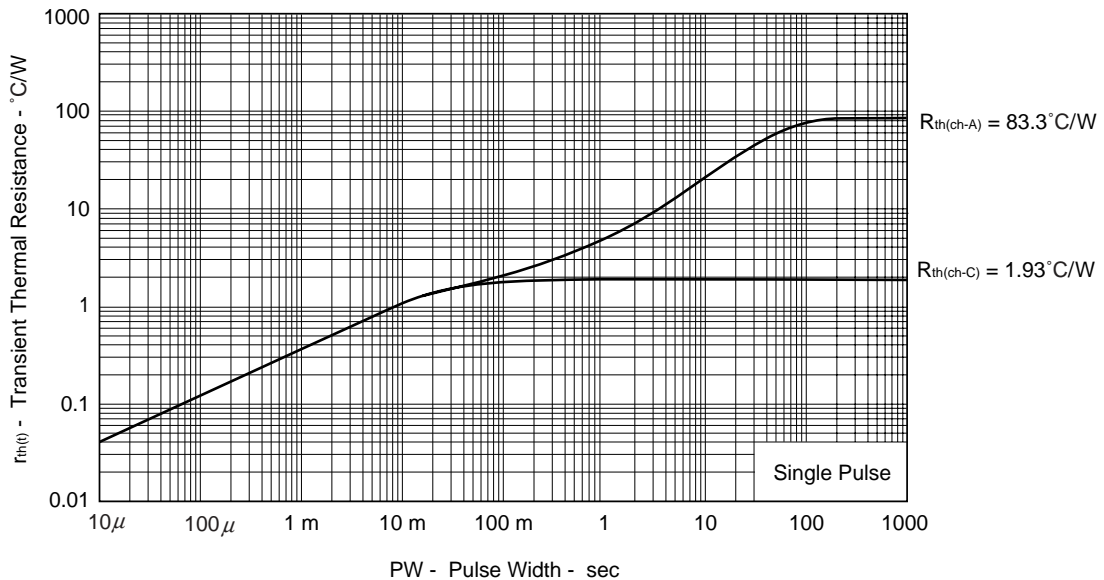
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



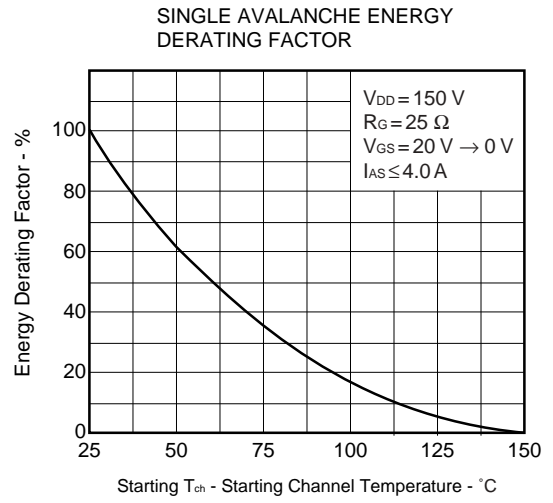
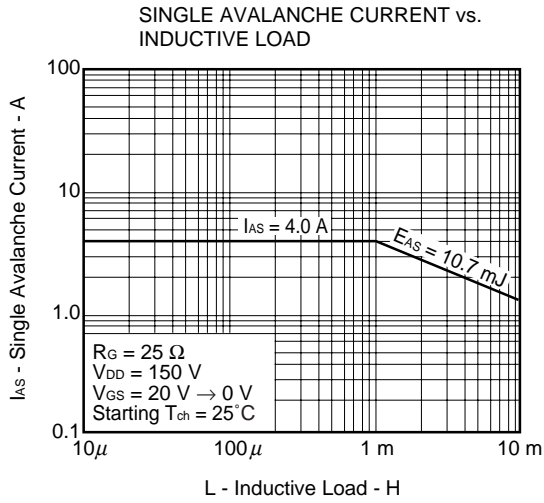
FORWARD BIAS SAFE OPERATING AREA



TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH

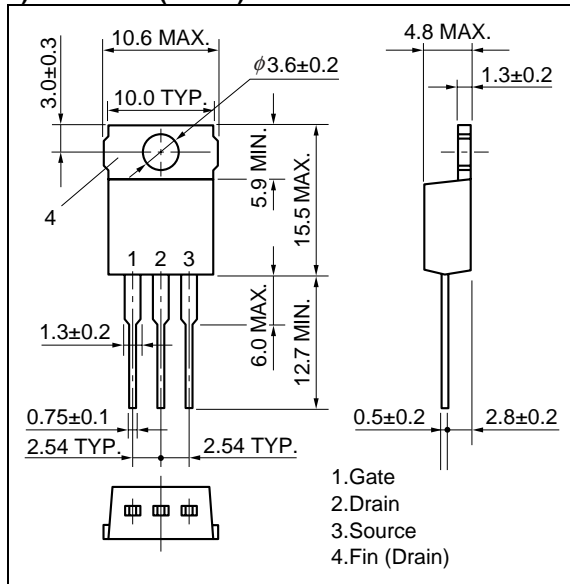


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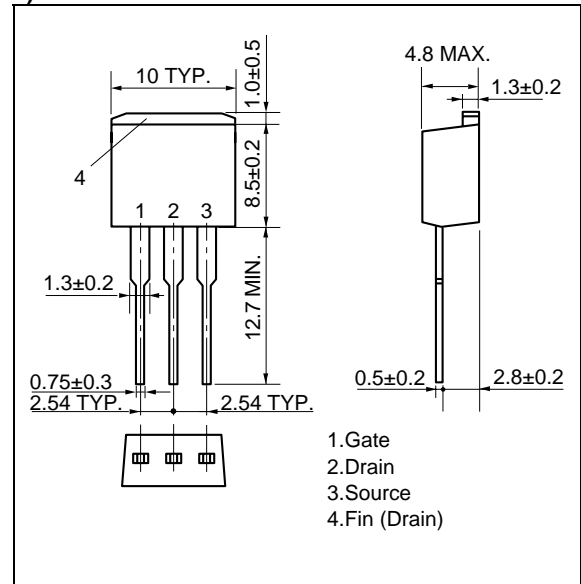


PACKAGE DRAWINGS (Unit: mm)

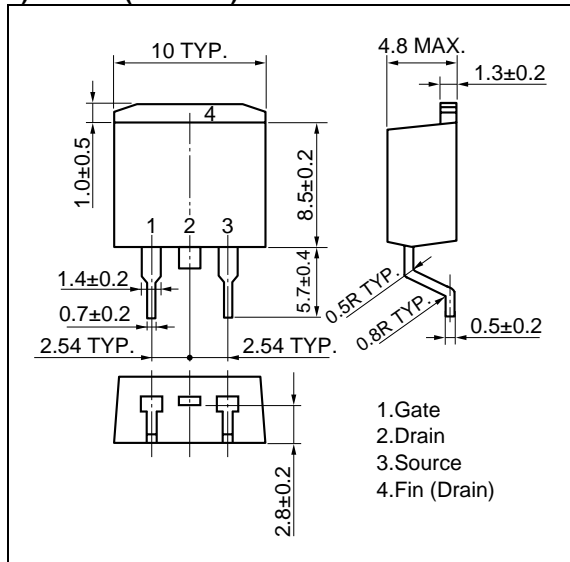
1) TO-220AB (MP-25)



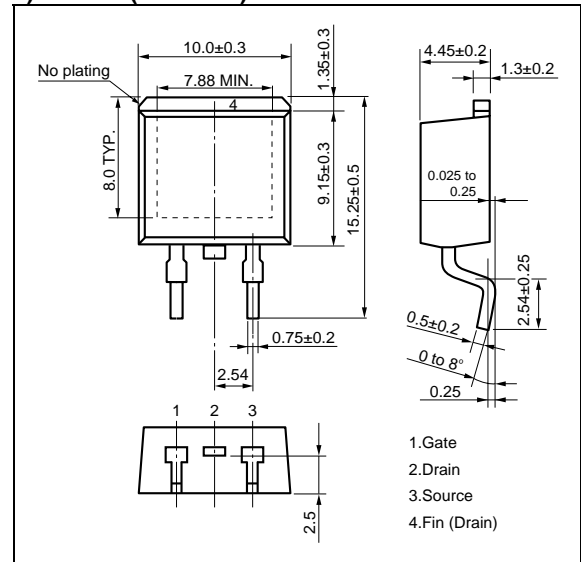
2) TO-262



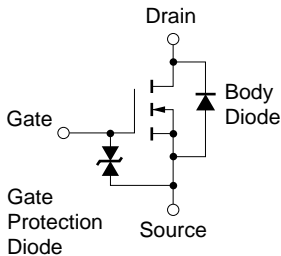
3) TO-263 (MP-25ZJ)



4) TO-263 (MP-25ZK)



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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