

SWITCHING P-CHANNEL POWER MOS FET INDUSTRIAL USE

DESCRIPTION

This product is P-Channel MOS Field Effect Transistor designed for DC/DC converters and motor/lamp driver circuits.

FEATURES

- Low on-state resistance
 $R_{DS(on)1} = 100 \text{ m}\Omega$ (MAX.) ($V_{GS} = -10 \text{ V}$, $I_D = -10 \text{ A}$)
 $R_{DS(on)2} = 185 \text{ m}\Omega$ (MAX.) ($V_{GS} = -4 \text{ V}$, $I_D = -10 \text{ A}$)
- Low C_{iss} : $C_{iss} = 1210 \text{ pF}$ (TYP.)
- Built-in gate protection diode

ORDERING INFORMATION

| PART NUMBER | PACKAGE |
|-------------|----------|
| 2SJ492 | TO-220AB |
| 2SJ492-S | TO-262 |
| 2SJ492-ZJ | TO-263 |

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

| | | | |
|--|----------------|-------------|------------------|
| Drain to Source Voltage ($V_{GS} = 0 \text{ V}$) | V_{DSS} | -60 | V |
| Gate to Source Voltage ($V_{DS} = 0 \text{ V}$) | $V_{GSS(AC)}$ | ∓ 20 | V |
| Gate to Source Voltage ($V_{DS} = 0 \text{ V}$) ^{Note1} | $V_{GSS(DC)}$ | -20, 0 | V |
| Drain Current (DC) | $I_{D(DC)}$ | ∓ 20 | A |
| Drain Current (pulse) ^{Note2} | $I_{D(pulse)}$ | ∓ 80 | 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 | 70 | W |
| Channel Temperature | T_{ch} | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | -55 to +150 | $^\circ\text{C}$ |
| Single Avalanche Current ^{Note3} | I_{AS} | -20 | A |
| Single Avalanche Energy ^{Note3} | E_{AS} | 40 | mJ |

- Notes**
1. $f = 20 \text{ kHz}$, Duty Cycle $\leq 10\%$ (+Side)
 2. $PW \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$
 3. Starting $T_{ch} = 25^\circ\text{C}$, $R_A = 25 \Omega$, $V_{GS} = -20 \text{ V} \rightarrow 0$

THERMAL RESISTANCE

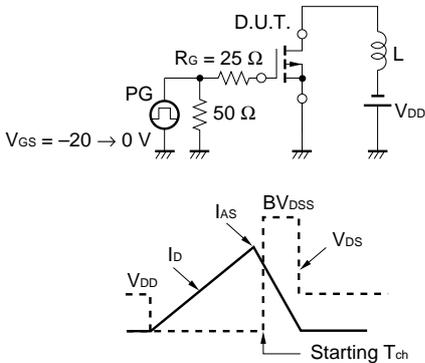
| | | | |
|--------------------|----------------|------|--------------------|
| Channel to Case | $R_{th(ch-C)}$ | 1.79 | $^\circ\text{C/W}$ |
| Channel to Ambient | $R_{th(ch-A)}$ | 83.3 | $^\circ\text{C/W}$ |

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

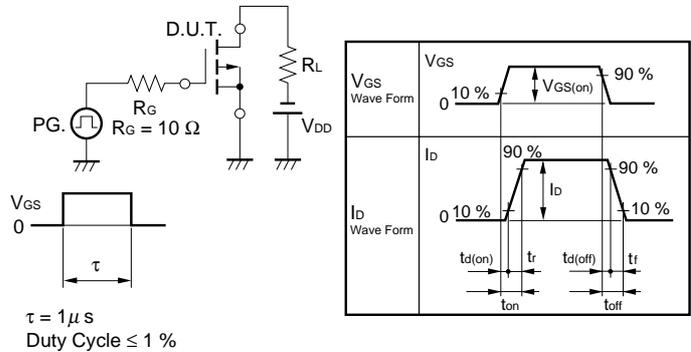
ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|-------------------------------------|----------------------|---|------|------|------|------|
| Drain to Source On-state Resistance | R _{DS(on)1} | V _{GS} = -10 V, I _D = -10 A | | 70 | 100 | mΩ |
| | R _{DS(on)2} | V _{GS} = -4 V, I _D = -10 A | | 120 | 185 | mΩ |
| Gate to Source Cut-off Voltage | V _{GS(off)} | V _{DS} = -10 V, I _D = -1 mA | -1.0 | -1.5 | -2.0 | V |
| Forward Transfer Admittance | y _{fs} | V _{DS} = -10 V, I _D = -10 A | 5.0 | 12 | | S |
| Drain Leakage Current | I _{DSS} | V _{DS} = -60 V, 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 | | 1210 | | pF |
| Output Capacitance | C _{oss} | V _{GS} = 0 V | | 520 | | pF |
| Reverse Transfer Capacitance | C _{rss} | f = 1 MHz | | 180 | | pF |
| Turn-on Delay Time | t _{d(on)} | I _D = -10 A | | 16 | | ns |
| Rise Time | t _r | V _{GS(on)} = -10 V | | 140 | | ns |
| Turn-off Delay Time | t _{d(off)} | V _{DD} = -30 V | | 90 | | ns |
| Fall Time | t _f | R _G = 10 Ω | | 80 | | ns |
| Total Gate Charge | Q _G | I _D = -20 A | | 42 | | nC |
| Gate to Source Charge | Q _{GS} | V _{DD} = -48 V | | 8.0 | | nC |
| Gate to Drain Charge | Q _{GD} | V _{GS} = -10 V | | 10 | | nC |
| Body Diode Forward Voltage | V _{F(S-D)} | I _F = -20 A, V _{GS} = 0 V | | 1.0 | | V |
| Reverse Recovery Time | t _{rr} | I _F = -20 A, V _{GS} = 0 V | | 125 | | ns |
| Reverse Recovery Charge | Q _{rr} | di/dt = 50 A/μs | | 280 | | nC |

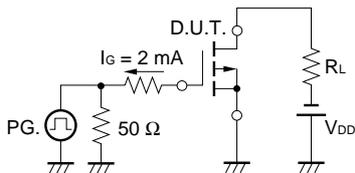
TEST CIRCUIT 1 AVALANCHE CAPABILITY



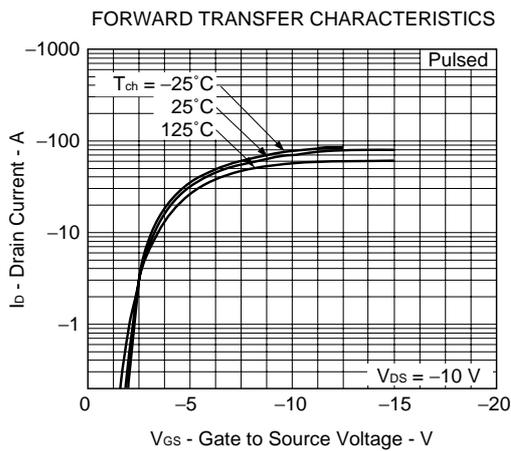
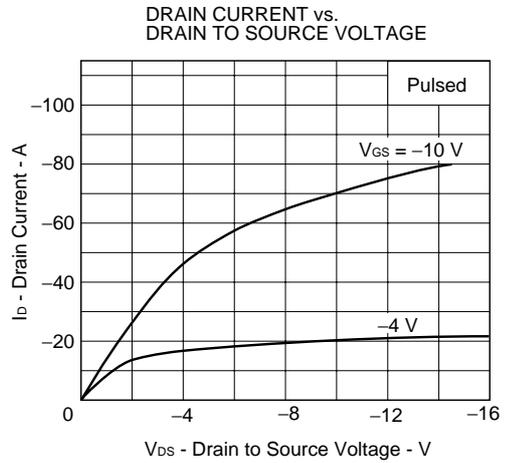
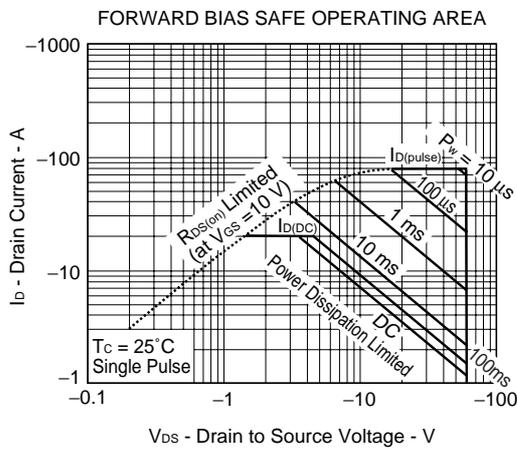
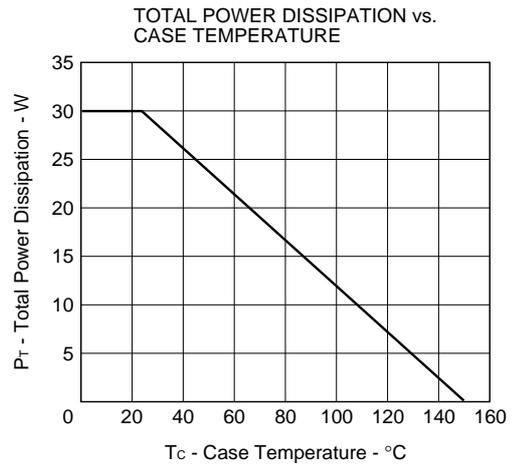
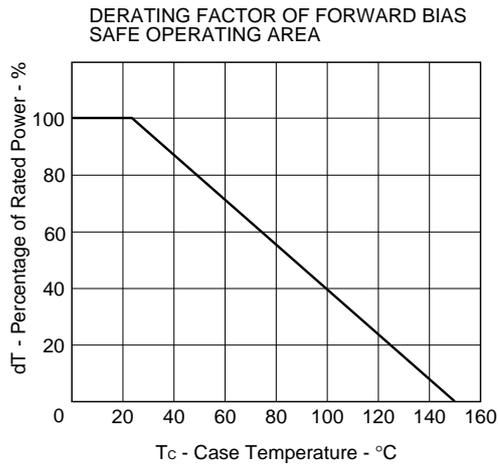
TEST CIRCUIT 2 SWITCHING TIME



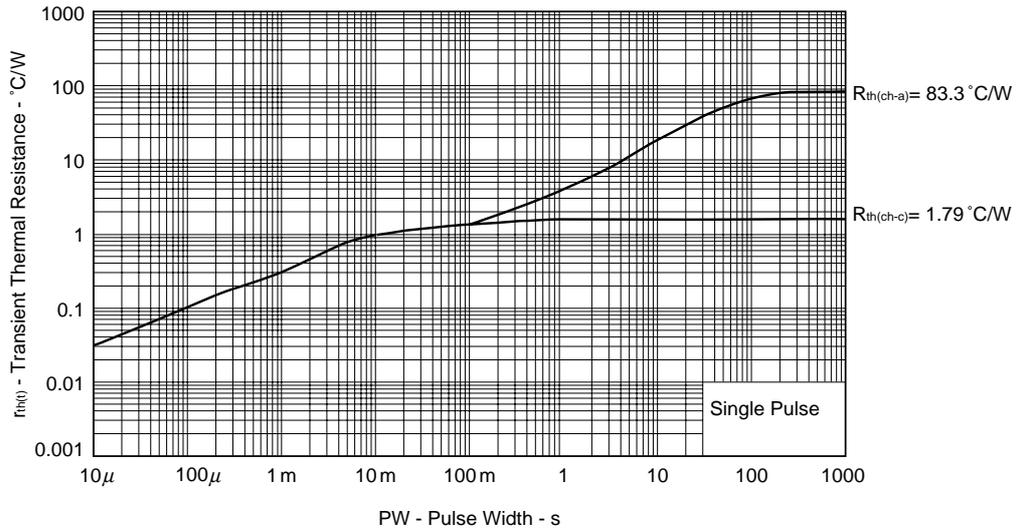
TEST CIRCUIT 3 GATE CHARGE



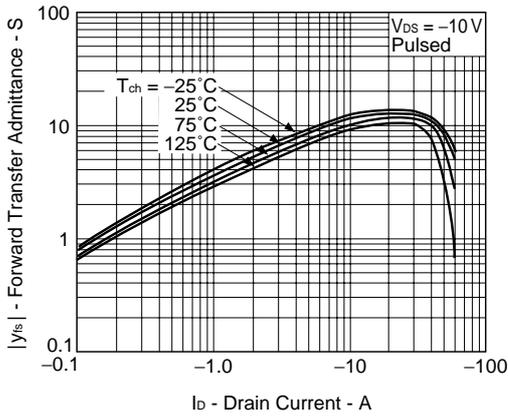
TYPICAL CHARACTERISTICS (T_A = 25 °C)



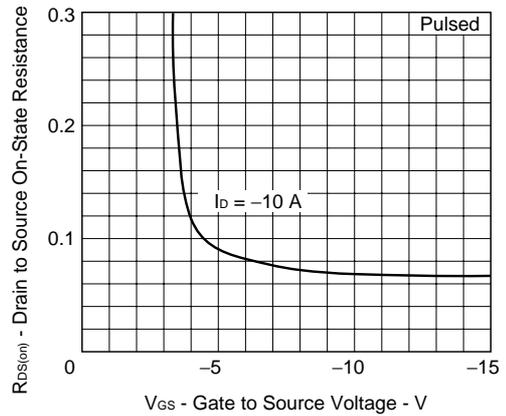
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



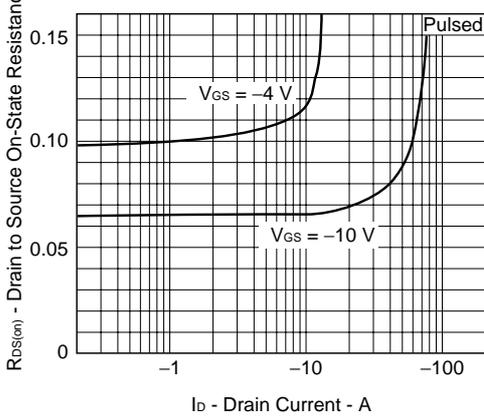
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



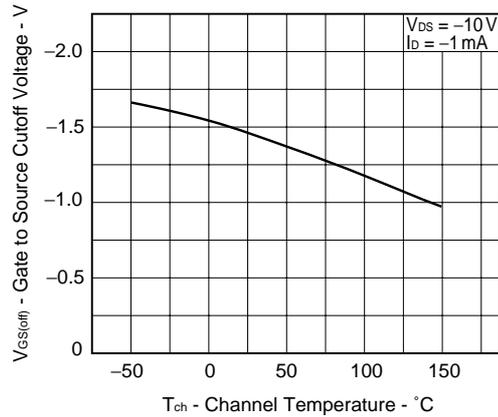
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



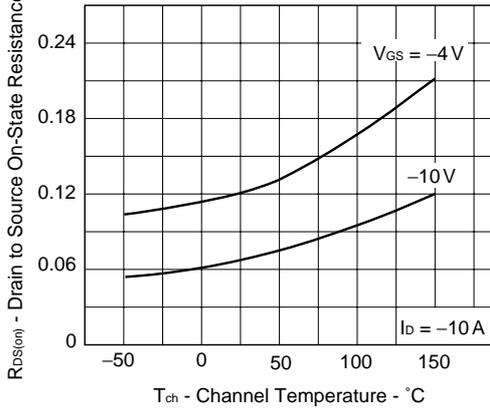
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



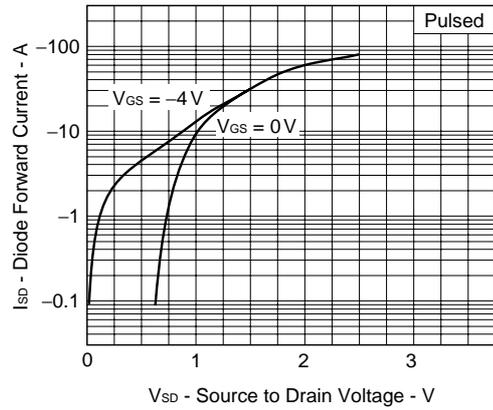
GATE TO SOURCE CUTOFF VOLTAGE vs. CHANNEL TEMPERATURE



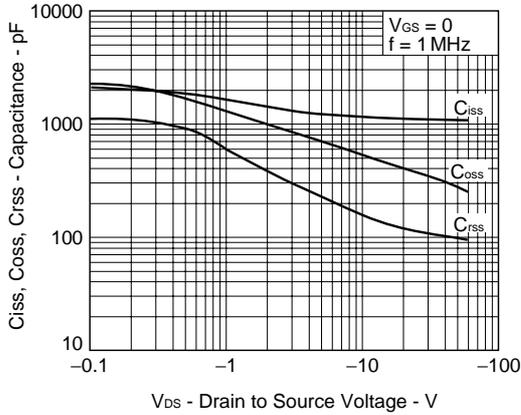
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



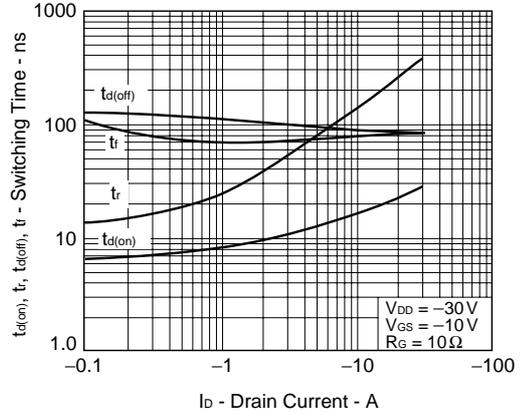
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



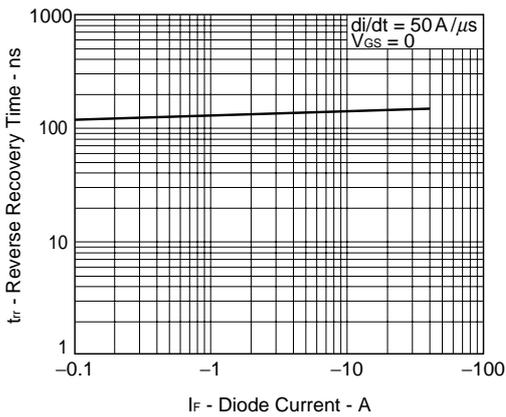
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



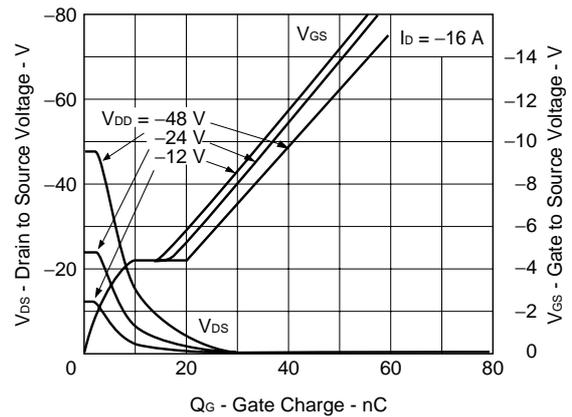
SWITCHING CHARACTERISTICS

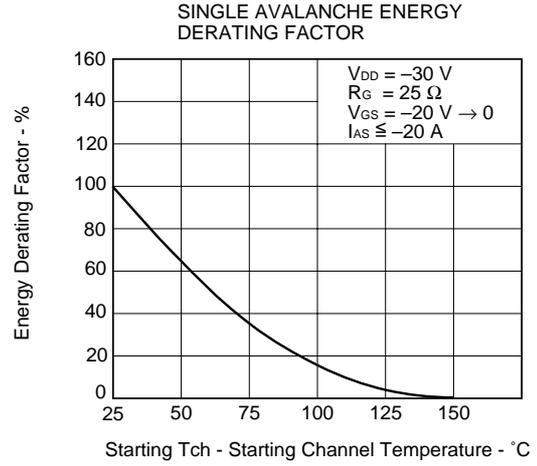
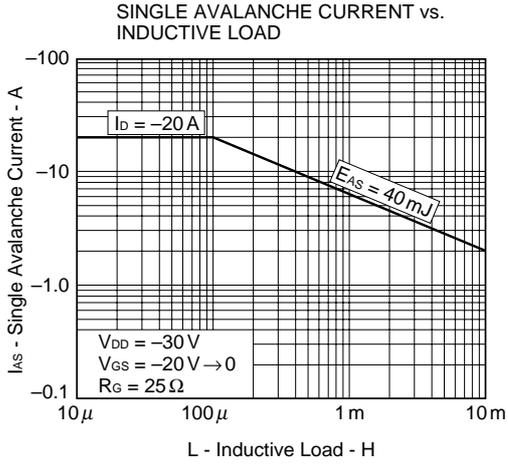


REVERSE RECOVERY TIME vs. DRAIN CURRENT



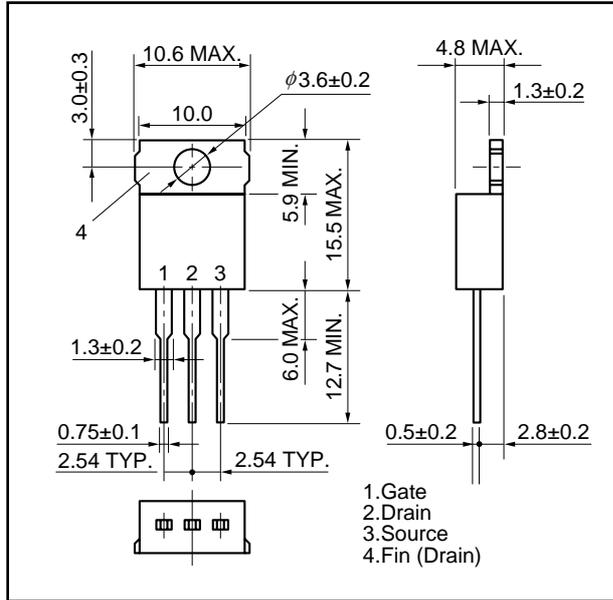
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



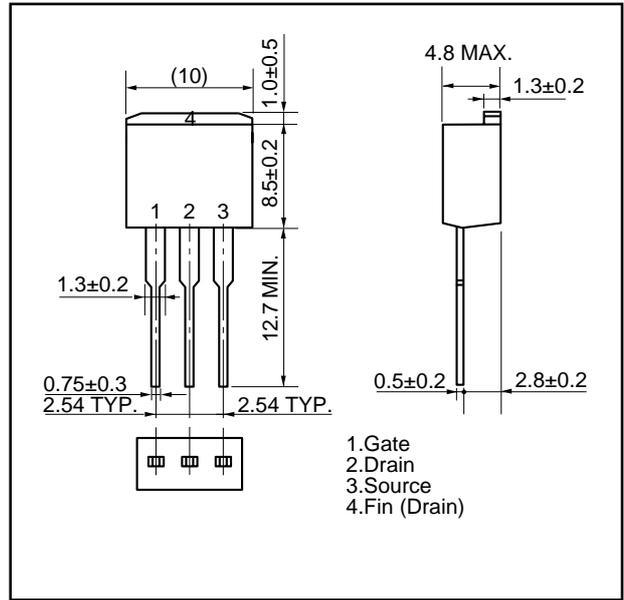


PACKAGE DRAWING (Unit: mm)

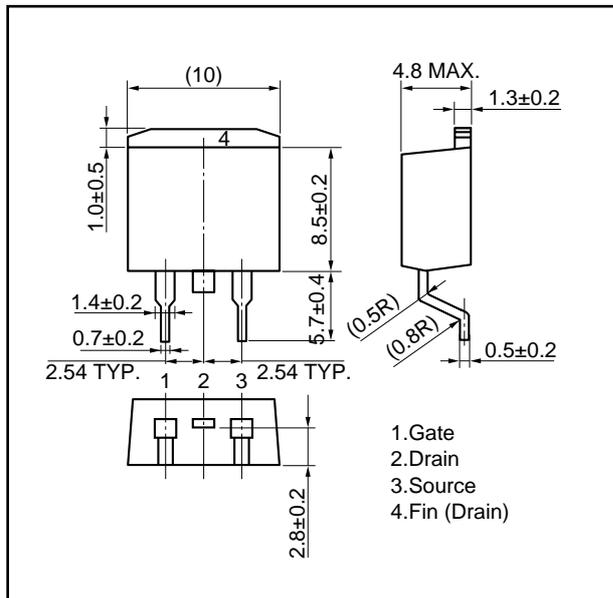
1) TO-220AB (MP-25)



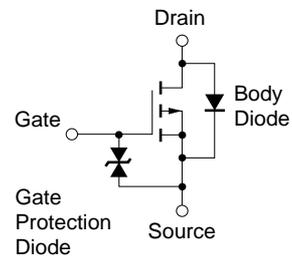
2) TO-262 (MP-25 Fin Cut)



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.

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Anti-radioactive design is not implemented in this product.