

SWITCHING P-CHANNEL POWER MOS FET

DESCRIPTION

The 2SJ598 is P-channel MOS Field Effect Transistor designed for solenoid, motor and lamp driver.

FEATURES

- Low on-state resistance:
 $R_{DS(on)1} = 130 \text{ m}\Omega \text{ MAX. (} V_{GS} = -10 \text{ V, } I_D = -6 \text{ A)}$
 $R_{DS(on)2} = 190 \text{ m}\Omega \text{ MAX. (} V_{GS} = -4.0 \text{ V, } I_D = -6 \text{ A)}$
- Low C_{iss} : $C_{iss} = 720 \text{ pF TYP.}$
- Built-in gate protection diode
- TO-251/TO-252 package

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} | ∓ 20 | V |
| Drain Current (DC) ($T_C = 25^\circ\text{C}$) | $I_{D(DC)}$ | ∓ 12 | A |
| Drain Current (pulse) ^{Note1} | $I_{D(pulse)}$ | ∓ 30 | A |
| Total Power Dissipation ($T_C = 25^\circ\text{C}$) | P_T | 23 | W |
| Total Power Dissipation ($T_A = 25^\circ\text{C}$) | P_T | 1.0 | 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} | -12 | A |
| Single Avalanche Energy ^{Note2} | E_{AS} | 14.4 | mJ |

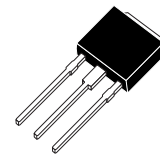
Notes 1. $PW \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$

2. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = -30 \text{ V}$, $R_G = 25 \Omega$, $V_{GS} = -20 \rightarrow 0 \text{ V}$

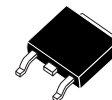
★ ORDERING INFORMATION

| PART NUMBER | PACKAGE |
|-------------|----------------|
| 2SJ598 | TO-251 (MP-3) |
| 2SJ598-Z | TO-252 (MP-3Z) |

(TO-251)



(TO-252)

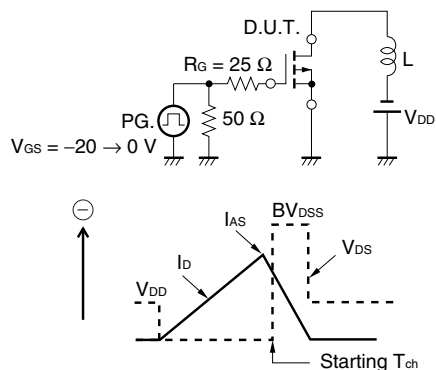


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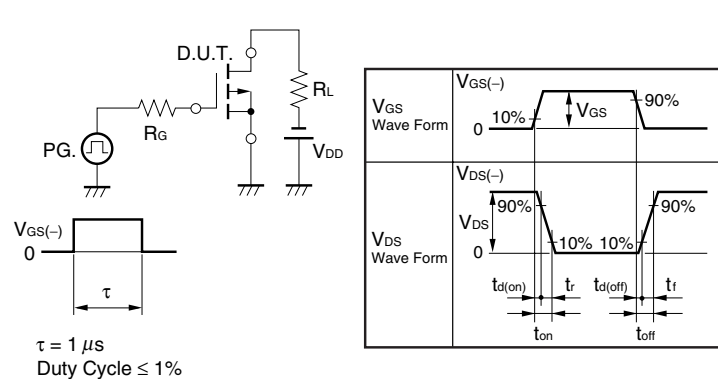
ELECTRICAL CHARACTERISTICS (TA = 25°C)

| CHARACTERISTICS | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|-------------------------------------|---------------|---------------------------------|------|------|----------|------------|
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = -60V, V_{GS} = 0V$ | | | -10 | μA |
| Gate Leakage Current | I_{GSS} | $V_{GS} = \mp 16V, V_{DS} = 0V$ | | | ∓ 10 | μA |
| Gate Cut-off Voltage | $V_{GS(off)}$ | $V_{DS} = -10V, I_D = -1mA$ | -1.5 | -2.0 | -2.5 | V |
| Forward Transfer Admittance | $ y_{fs} $ | $V_{DS} = -10V, I_D = -6A$ | 5 | 11 | | S |
| Drain to Source On-state Resistance | $R_{DS(on)1}$ | $V_{GS} = -10V, I_D = -6A$ | | 102 | 130 | m Ω |
| | $R_{DS(on)2}$ | $V_{GS} = -4.0V, I_D = -6A$ | | 131 | 190 | m Ω |
| Input Capacitance | C_{iss} | $V_{DS} = -10V$ | | 720 | | pF |
| Output Capacitance | C_{oss} | $V_{GS} = 0V$ | | 150 | | pF |
| Reverse Transfer Capacitance | C_{rss} | $f = 1MHz$ | | 50 | | pF |
| Turn-on Delay Time | $t_{d(on)}$ | $I_D = -6A$ | | 7 | | ns |
| Rise Time | t_r | $V_{GS} = -10V$ | | 4 | | ns |
| Turn-off Delay Time | $t_{d(off)}$ | $V_{DD} = -30V$ | | 35 | | ns |
| Fall Time | t_f | $R_G = 0\Omega$ | | 10 | | ns |
| Total Gate Charge | Q_G | $I_D = -12A$ | | 15 | | nC |
| Gate to Source Charge | Q_{GS} | $V_{DD} = -48V$ | | 3 | | nC |
| Gate to Drain Charge | Q_{GD} | $V_{GS} = -10V$ | | 4 | | nC |
| Body Diode Forward Voltage | $V_{F(S-D)}$ | $I_F = 12A, V_{GS} = 0V$ | | 0.98 | | V |
| Reverse Recovery Time | t_{rr} | $I_F = 12A, V_{GS} = 0V$ | | 50 | | ns |
| Reverse Recovery Charge | Q_{rr} | $di/dt = 100A/\mu s$ | | 100 | | nC |

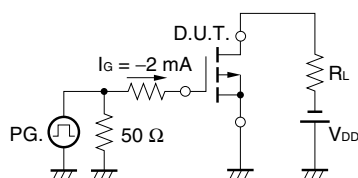
TEST CIRCUIT 1 AVALANCHE CAPABILITY



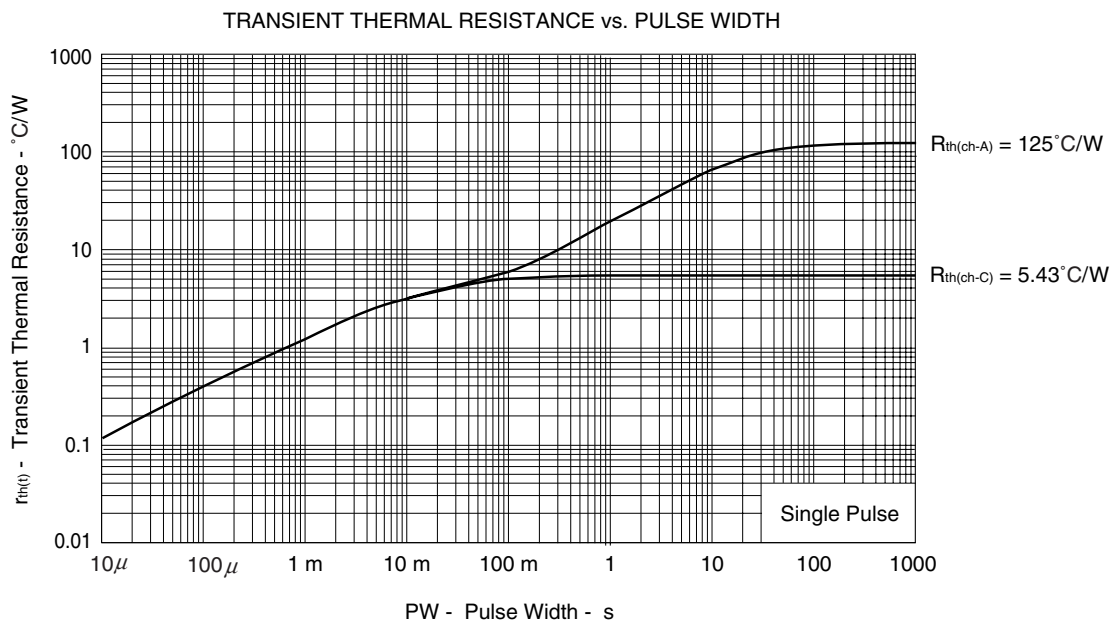
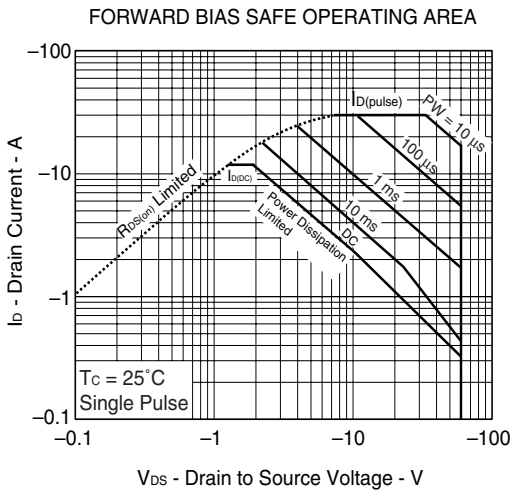
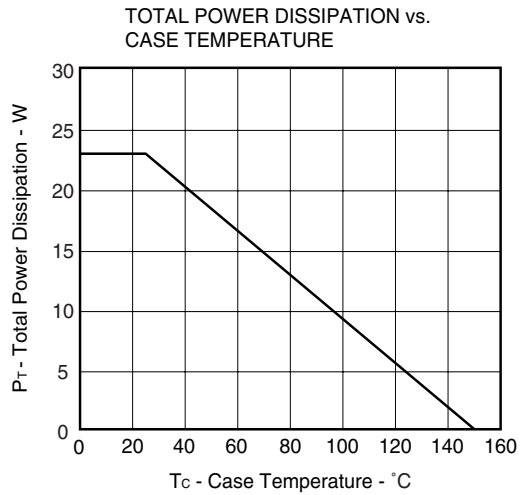
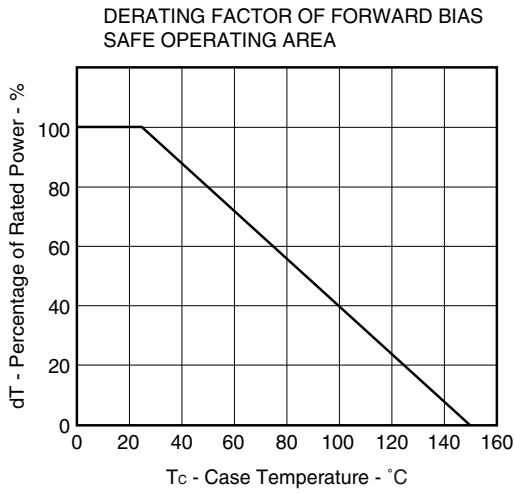
TEST CIRCUIT 2 SWITCHING TIME



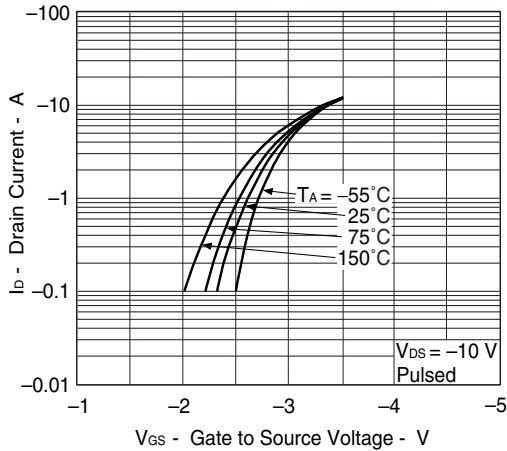
TEST CIRCUIT 3 GATE CHARGE



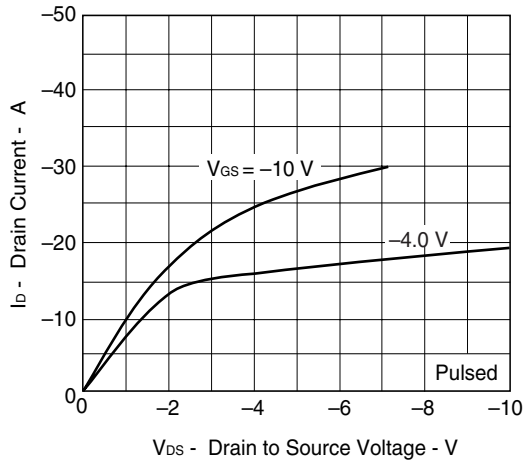
TYPICAL CHARACTERISTICS (T_A = 25°C)



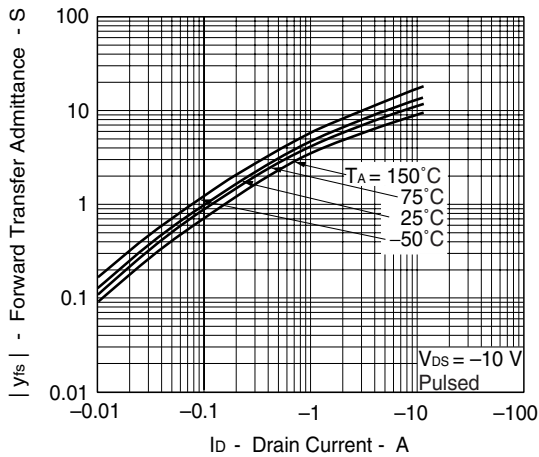
FORWARD TRANSFER CHARACTERISTICS



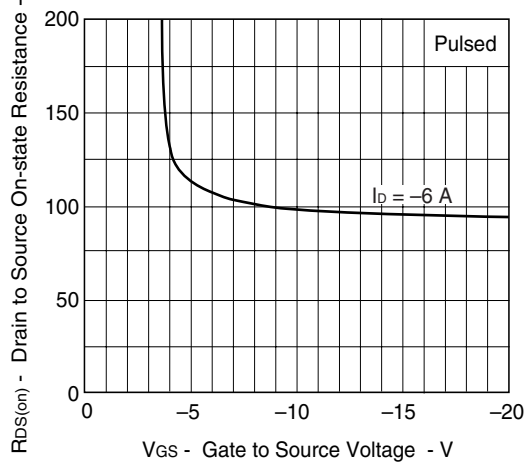
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



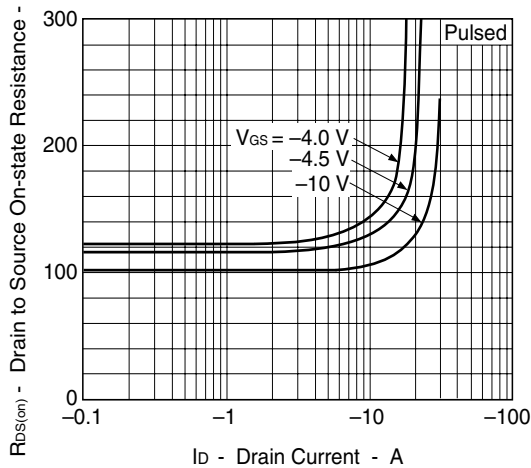
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



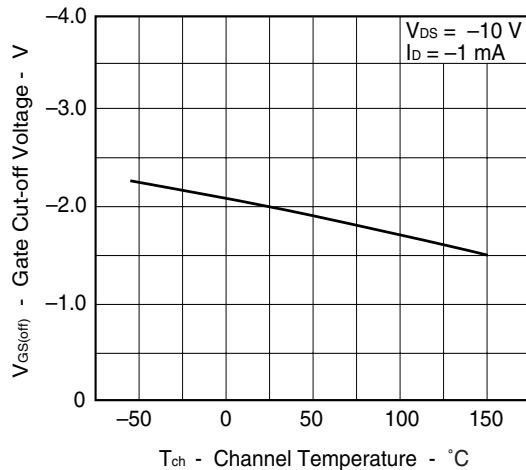
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

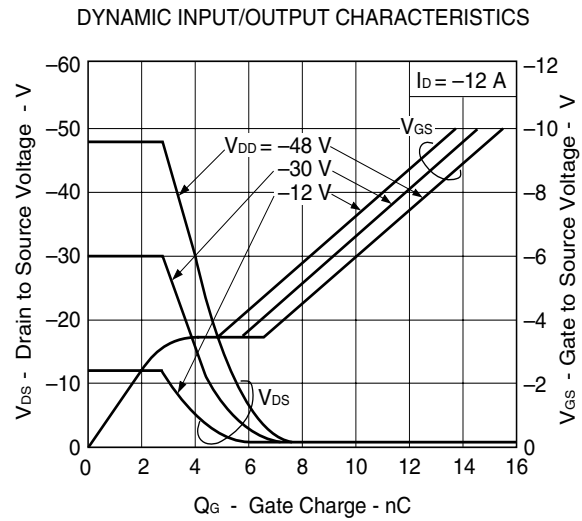
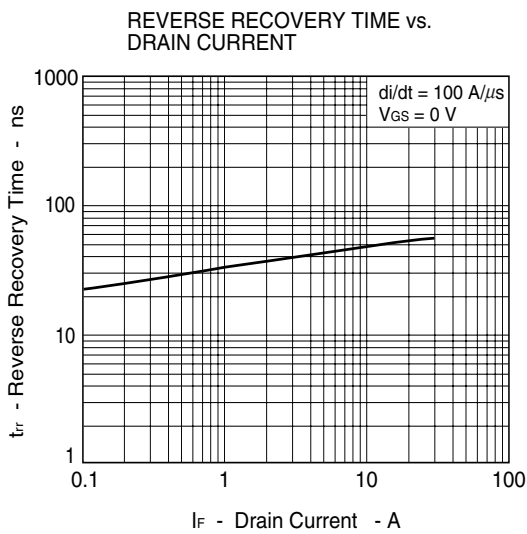
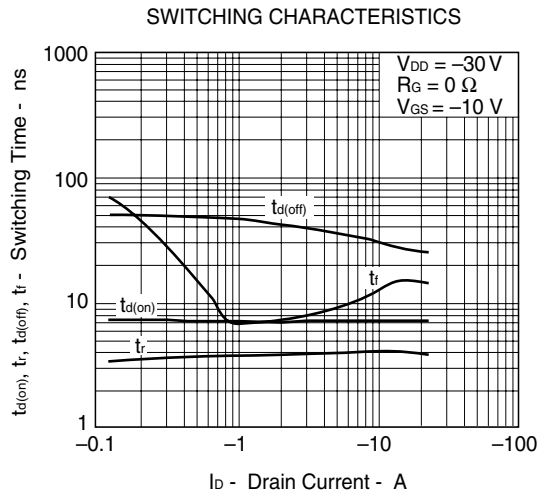
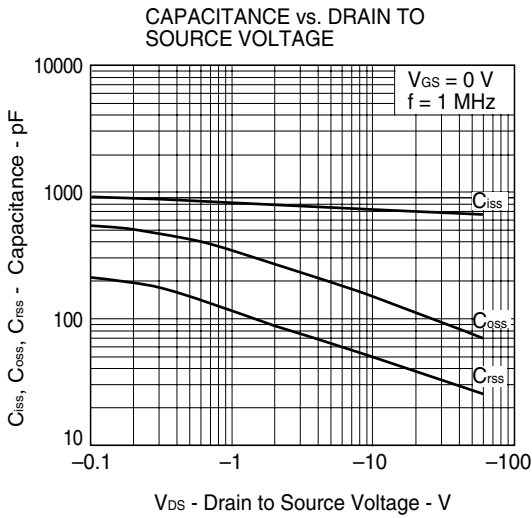
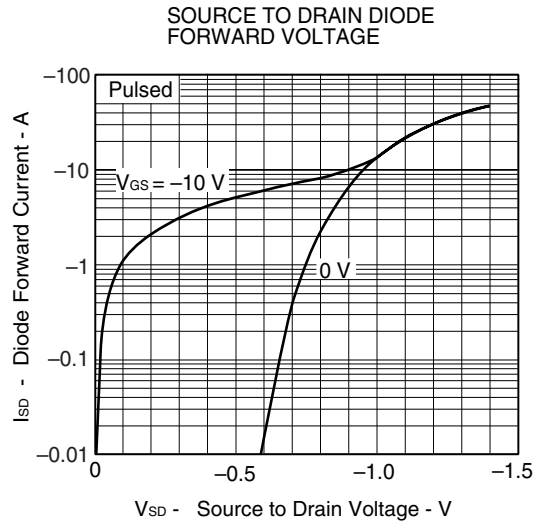
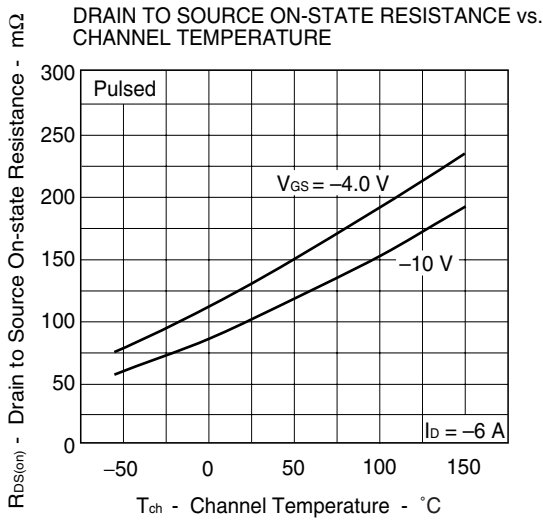


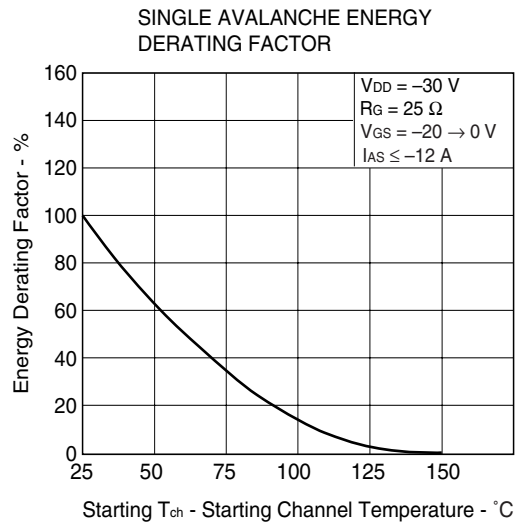
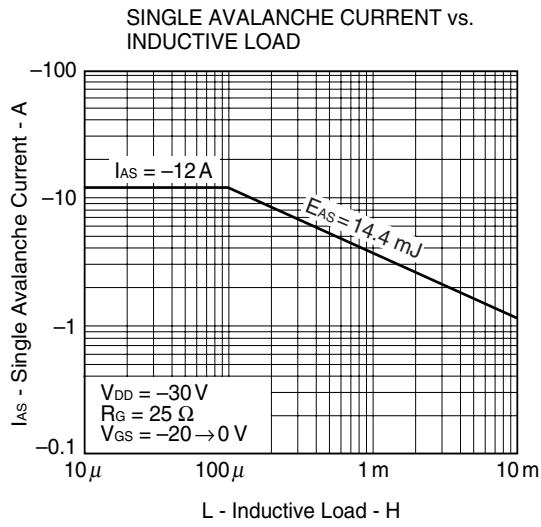
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



GATE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE

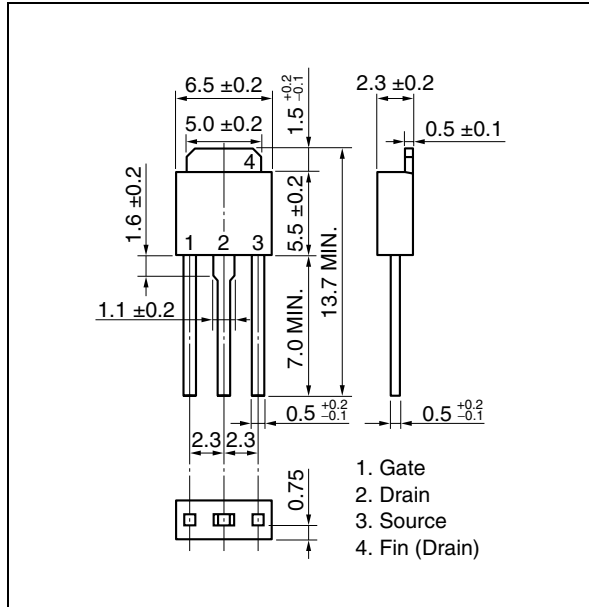




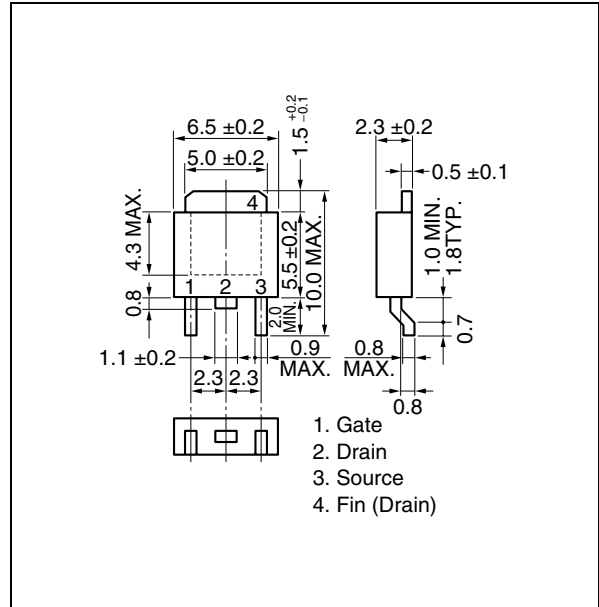


★ PACKAGE DRAWINGS (Unit: mm)

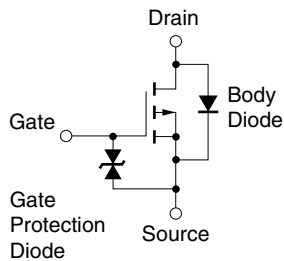
1) TO-251 (MP-3)



2) TO-252 (MP-3Z)



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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