

SWITCHING
N-CHANNEL POWER MOS FET
INDUSTRIAL USE

DESCRIPTION

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

FEATURE

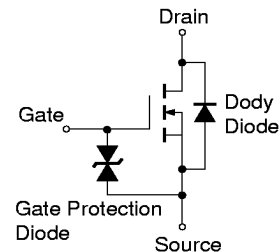
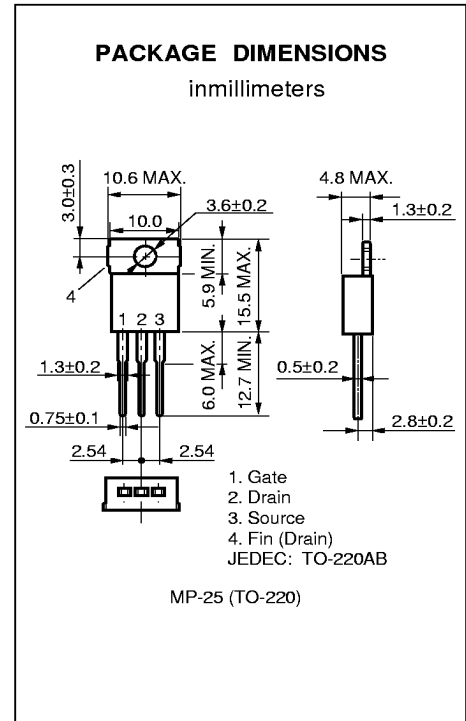
- Low On-Resistance
 $R_{DS(on)1} = 14 \text{ m}\Omega$ Typ. ($V_{GS} = 10 \text{ V}$, $I_D = 18 \text{ A}$)
 $R_{DS(on)2} = 22 \text{ m}\Omega$ Typ. ($V_{GS} = 4 \text{ V}$, $I_D = 18 \text{ A}$)
- Low C_{iss} $C_{iss} = 1250 \text{ pF}$ Typ.
- Built-in G-S Protection Diode

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

Maximum Voltages and Currents

| | | | |
|---------------------------------------------------------------|----------------|--------------|------------------|
| Drain to Source Voltage | V_{DSS} | 30 | V |
| Gate to Source Voltage | V_{GSS} | ± 20 | V |
| Drain Current (DC) | $I_{D(DC)}$ | ± 35 | A |
| Drain Current (Pulse)* | $I_{D(Pulse)}$ | ± 140 | A |
| Maximum Power Dissipation | | | |
| Total Power Dissipation ($T_A = 25 \text{ }^\circ\text{C}$) | P_T | 1.5 | W |
| Total Power Dissipation ($T_C = 25 \text{ }^\circ\text{C}$) | P_T | 60 | W |
| Maximum Temperature | | | |
| Channel Temperature | T_{ch} | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | -55 to + 125 | $^\circ\text{C}$ |

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



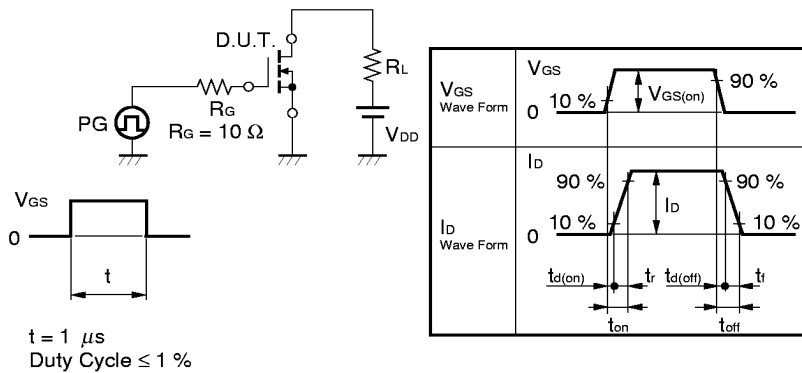
The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device acutally used, an additional protection circuit is externally required if voltage exceeding the rated voltage may be applied to this device.

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

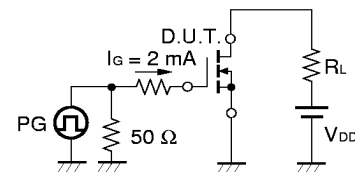
ELECTRICAL CHARACTERISTICS (TA = 25 °C)

| CHARACTERISTIC | SYMBOL | MIN. | TYP. | MAX. | UNIT | TEST CONDITION |
|-------------------------------------|---------------|------|------|------|------|-------------------------------------------------------------------------------------------|
| Drain to Source On-State Resistance | $R_{DS(on)1}$ | | 14 | 20 | mΩ | $V_{GS} = 10\text{ V}, I_D = 18\text{ A}$ |
| | $R_{DS(on)2}$ | | 22 | 33 | mΩ | $V_{GS} = 4\text{ V}, I_D = 18\text{ A}$ |
| Gate to Source Cutoff Voltage | $V_{GS(off)}$ | 1.0 | 1.5 | 2.0 | V | $V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$ |
| Forward Transfer Admittance | $ y_{fs} $ | 8.0 | 25 | | S | $V_{DS} = 10\text{ V}, I_D = 18\text{ A}$ |
| Drain Leakage Current | I_{DDs} | | | 10 | μA | $V_{DS} = 30\text{ V}, V_{GS} = 0$ |
| Gate to Source Leakage Current | I_{GSS} | | | ±10 | μA | $V_{GS} = \pm 20\text{ V}, V_{DS} = 0$ |
| Input Capacitance | C_{iss} | | 1250 | | pF | $V_{DS} = 10\text{ V}, V_{GS} = 0, f = 1\text{ MHz}$ |
| Output Capacitance | C_{oss} | | 900 | | pF | |
| Reverse Transfer Capacitance | C_{rss} | | 460 | | pF | |
| Turn-on Delay Time | $t_{d(on)}$ | | 40 | | ns | $I_D = 18\text{ A}, V_{GS(on)} = 10\text{ V}$ $V_{DD} = 15\text{ V}, R_G = 10\ \Omega$ |
| Rise Time | t_r | | 430 | | ns | |
| Turn-off Delay Time | $t_{d(off)}$ | | 160 | | ns | |
| Fall Time | t_f | | 220 | | ns | |
| Total Gate Charge | Q_G | | 50 | | nC | $I_D = 35\text{ A}, V_{DD} = 24\text{ V},$ $V_{GS} = 10\text{ V}$ |
| Gate to Source Charge | Q_{GS} | | 4.5 | | nC | |
| Gate to Drain Charge | Q_{GD} | | 21 | | nC | |
| Body Diode Forward Voltage | $V_{F(S-D)}$ | | 1.0 | | V | $I_F = 35\text{ A}, V_{GS} = 0$ |
| Reverse Recovery Time | t_{rr} | | 65 | | ns | $I_F = 35\text{ A}, V_{GS} = 0,$ $di/dt = 100\text{ A}/\mu\text{s}$ |
| Reverse Recovery Charge | Q_{rr} | | 90 | | nC | |

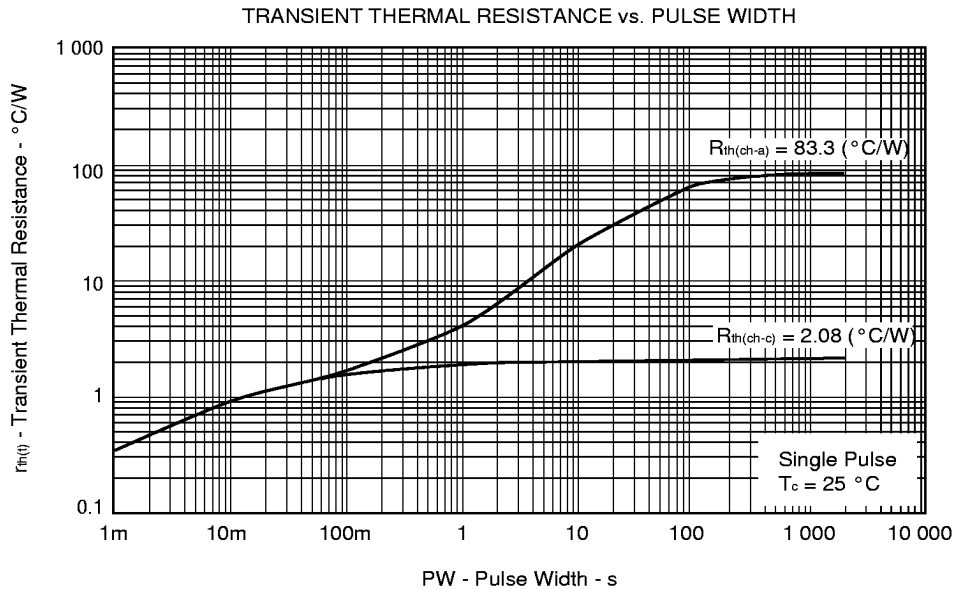
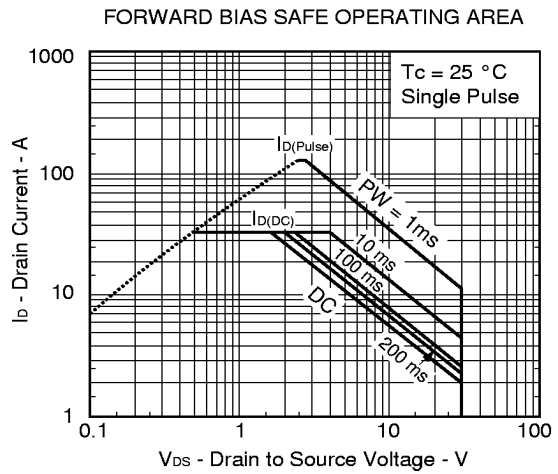
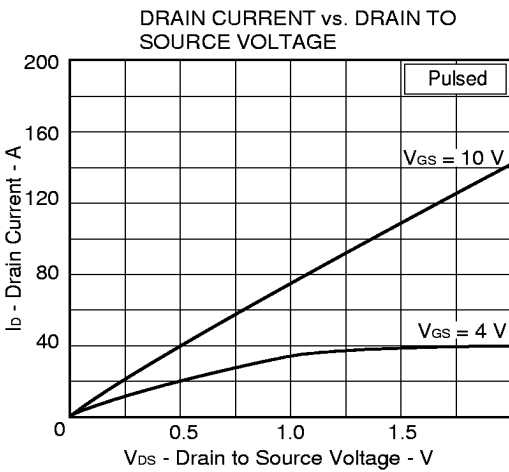
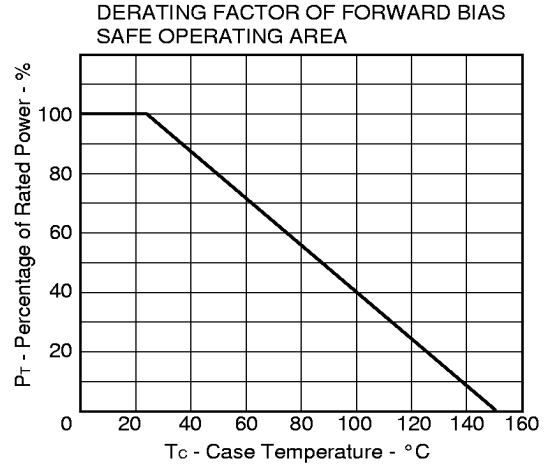
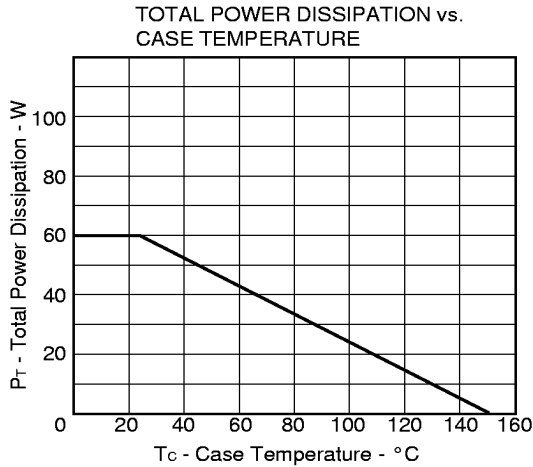
Test Circuit 1 Switching Time

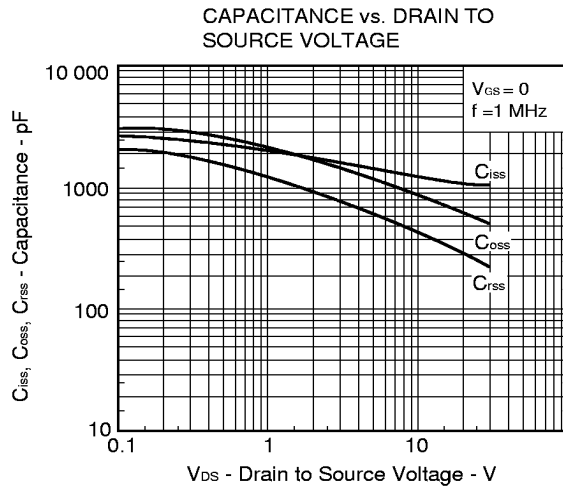
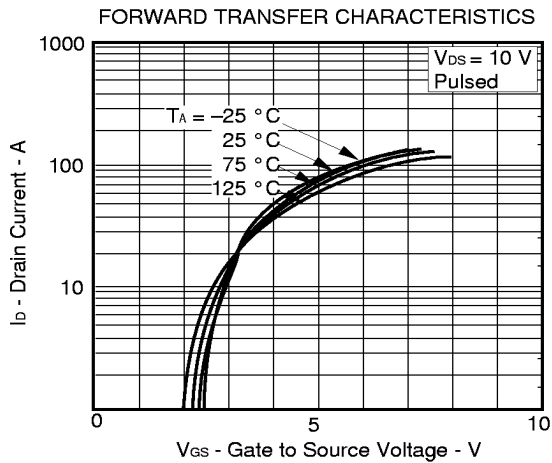
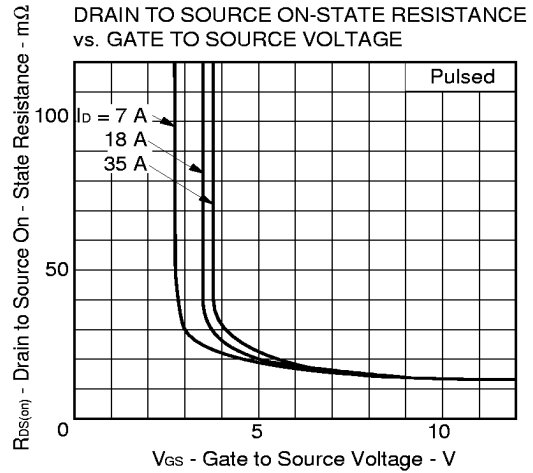
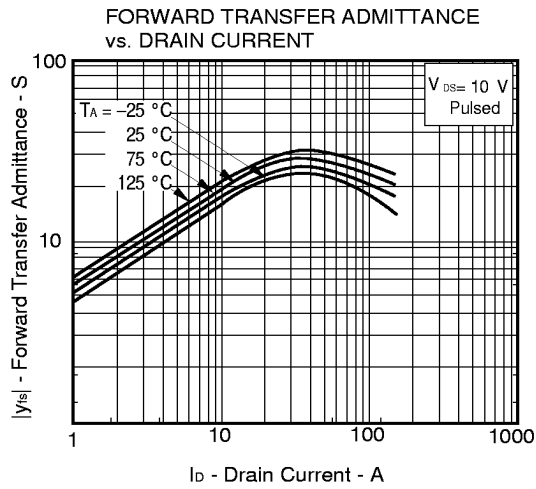
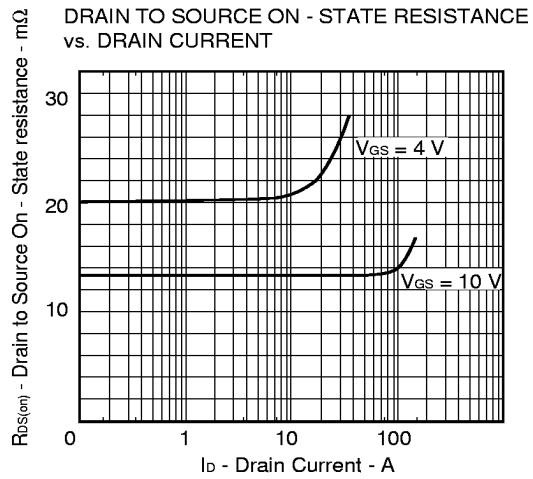
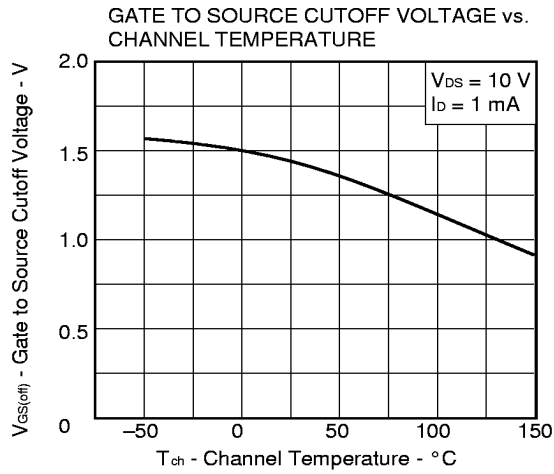


Test Circuit 2 Gate Charge

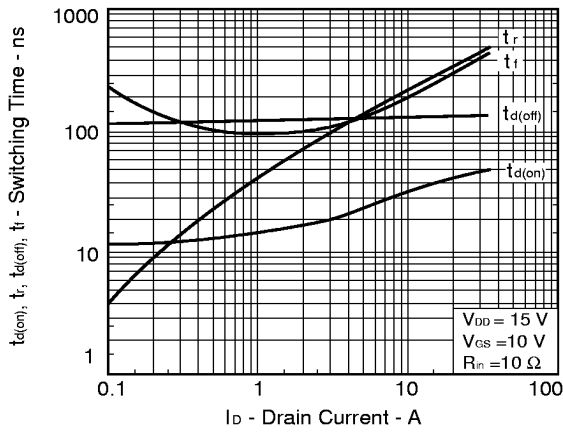


ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

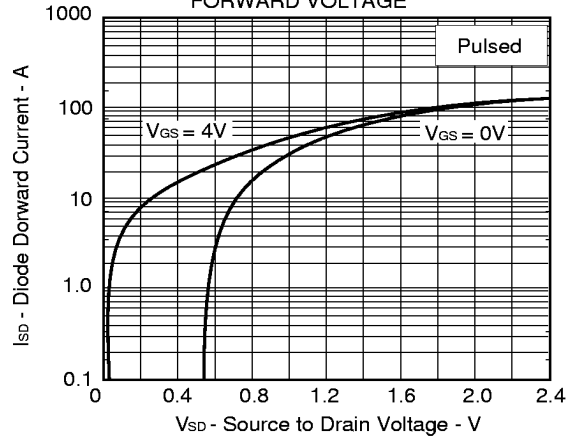




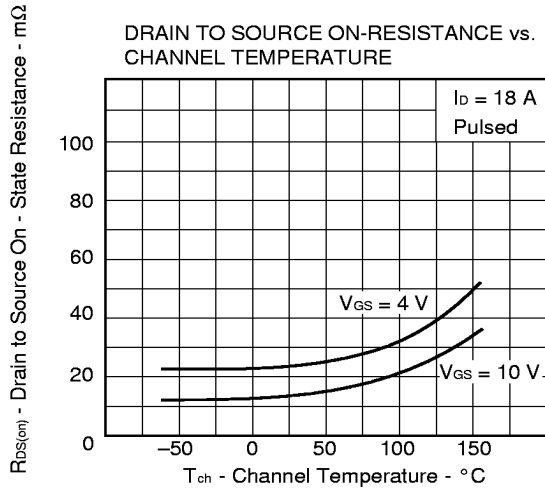
SWITCHING CHARACTERISTICS



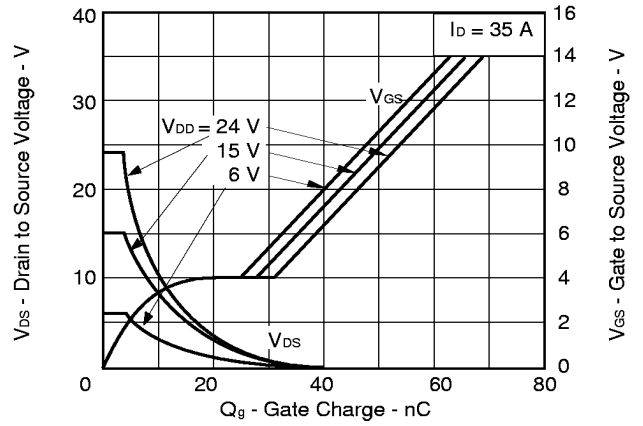
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



DRAIN TO SOURCE ON-RESISTANCE vs. CHANNEL TEMPERATURE



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



REVERSE RECOVERY TIME vs. DRAIN CURRENT

