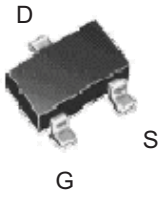
# N-Channel Enhancement Mode Field Effect Transistor

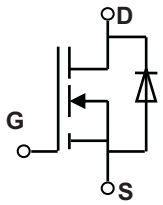
## FEATURES

- Super high dense cell design for low $R_{DS(ON)}$
- Rugged and reliable
- Simple drive requirement
- SOT-23 package

| PRODUCT SUMMARY | | |
|---|---|---|
| $V_{DSS}$ | $I_D$ | $R_{DS(ON)}$ (mΩ) Typ |
| 20V | 4.2A | 18 @ $V_{GS}$=10V |
| | | 21 @ $V_{GS}$=4.5V |

NOTE：The MT2300 is available in a lead-free package




## ABSOLUTE MAXIMUM RATINGS（$T_A$=25℃ unless otherwise noted）

| Parameter | Symbol | Limit | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 20 | V |
| Gate-Source Voltage | $V_{GS}$ | ± 12 | V |
| Drain Current-Continuous[a] @Tj=125℃ | $I_D$ | 4.2 | A |
| - Pulse [b] | $I_{DM}$ | 12 | A |
| Drain-source Diode Forward Current[a] | $I_S$ | 1.25 | A |
| Maximum Power Dissipation[a] | $P_D$ | 1.25 | W |
| Operating Junction and Storage Temperature Range | $T_J$,$T_{STG}$ | -55 to 150 | ℃ |

## THERMAL CHARACTERISTICS

| | | | |
|---|---|---|---|
| Thermal Resistance, Junction-to Ambient[a] | Rth $J_A$ | 100 | ℃/W |

## ELECTRICAL CHARACTERISTICS ($T_A$=25℃ unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V,$I_D$=250μA | 20 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=16V,$V_{GS}$=0V | | | 1 | μA |
| Gate-Body Leakage | $I_{GSS}$ | $V_{GS}$=±8V,$V_{DS}$=0V | | | ±100 | nA |
| ON CHARACTERITICS | | | | | | |
| Gate Threshold Voltage | $V_{GS}$(th) | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 0.5 | 0.8 | 1.5 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V,$I_D$=2.8A | | 18 | 21 | mΩ |
| | | $V_{GS}$=4.5V,$I_D$=2.0A | | 21 | 25 | |
| Forward Transconductance | $g_{FS}$ | $V_{GS}$=7V,$I_D$=5A | | 5 | | S |
| DYNAMIC CHARACTERISTICS | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{DS}$=10V,$V_{GS}$=0V f=1.0MHz | | 608 | | pF |
| Output Capacitance | $C_{OSS}$ | | | 115 | | pF |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | 86 | | pF |
| SWITCHING CHARACTERISISTICS | | | | | | |
| Turn-On Delay Time | $t_{D(ON)}$ | $V_{DD}$=10V $I_D$=3.6A, $V_{GEN}$=4.5V $R_L$=10ohm $R_{GEN}$=10ohm | | 10 | | ns |
| Rise Time | tr | | | 14 | | ns |
| Turn-Off Delay Time | $t_{D(OFF)}$ | | | 39 | | ns |
| Fall Time | tf | | | 26 | | ns |
| Total Gate Charge | Qg | $V_{DS}$=10V,$I_D$=1A $V_{GS}$=4.5V | | 9.2 | | nC |
| Gate-Source Charge | Qgs | | | 1.6 | | nC |
| Gate-Drain Charge | Qgd | | | 2.6 | | nC |

## ELECTRICAL CHARACTERICS (TA=25℃ unless otherwise noted)

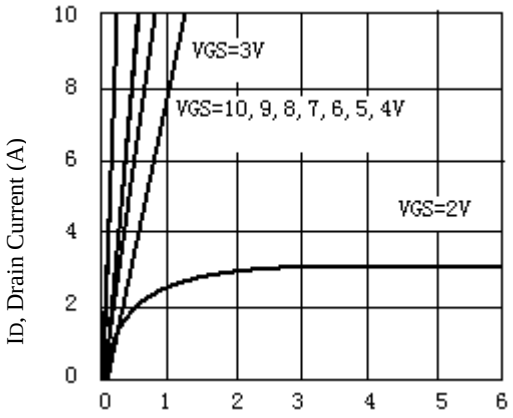
| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| DRAIN-SOURCE DIODE CHARACTERISTICS | | | | | | |
| Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V,$I_S$=1.25A | | 0.84 | 1.3 | V |

Notes

a. Surface Mounted on FR4 Board, t≦10sec

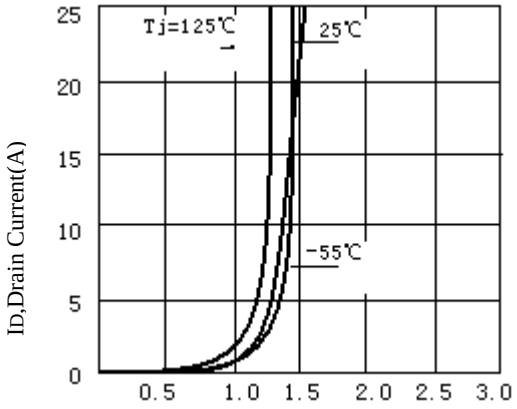
b. Pulse Test: Pulse Width≦300Us, Duty Cycle≦2%

c. Guaranteed by design, not subject to production testing.



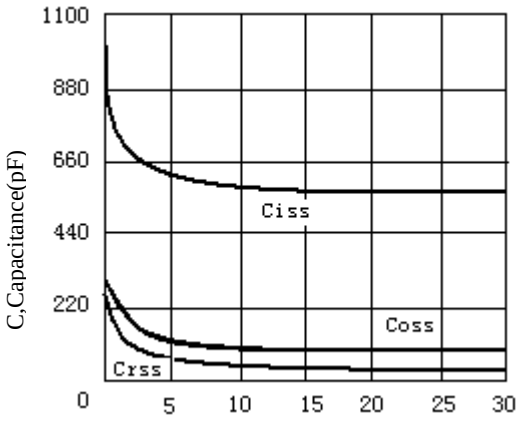

$V_{DS}$, Drain-to-Source Voltage (V)

Figure 1. Output Characteristics




$V_{GS}$, Gate-to-source Voltage (V)

Figure 2. Transfer Characteristics




VGS, Drain-to Source Voltage

Figure3. Capacitance

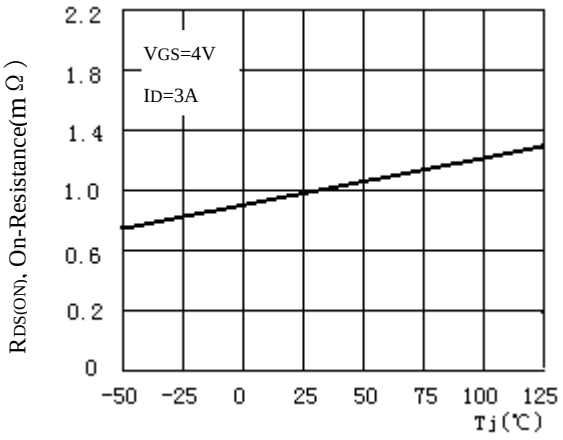



Figure4. On-Resistance Variation with Temperature

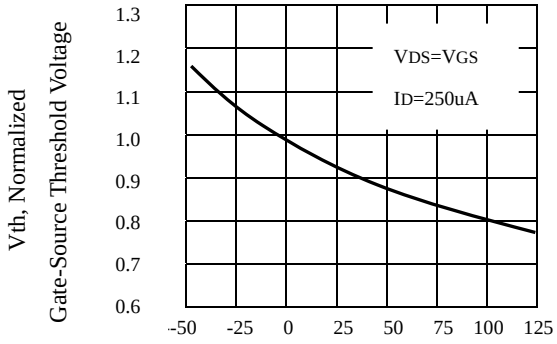



Figure5.Gate Threshold Variation With Temperature

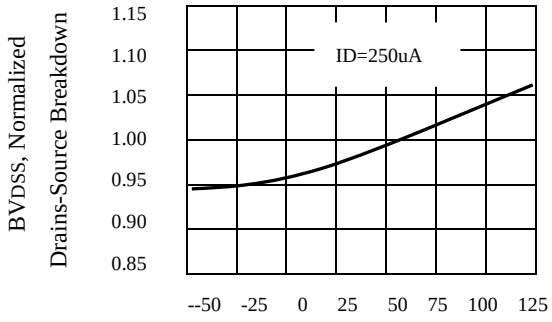



Figure6.Breakdown Voltage Variation With Temperature

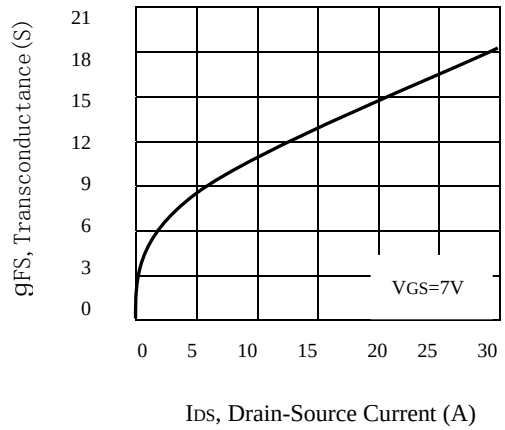



Figure7.Transconductance Variation With Drain Current

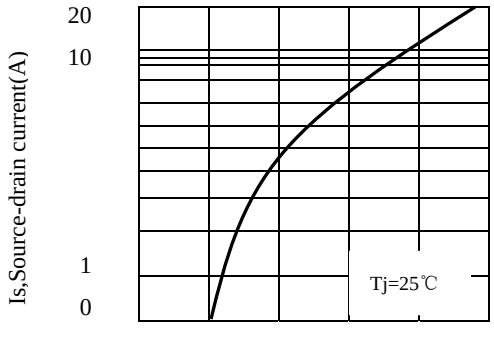



Figure8.Body Diode Forward Voltage Variation with Source Current

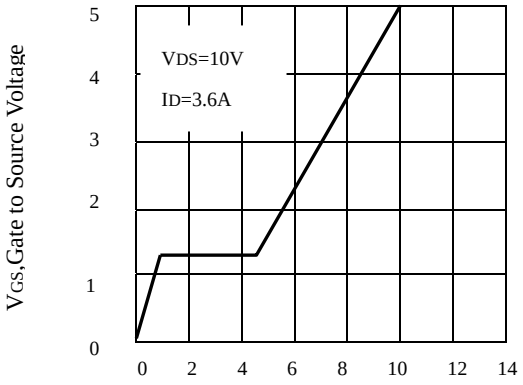



Figure9. Gate Charge

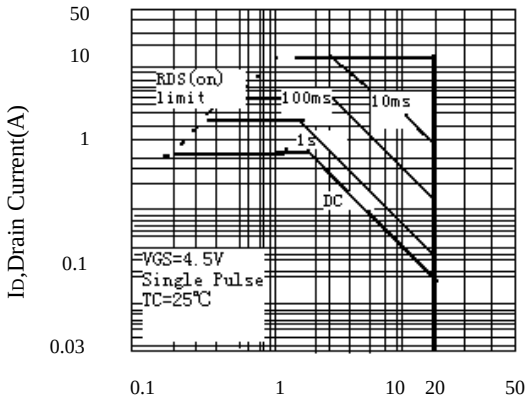



Figure10.Maximum Safe Operating Area

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