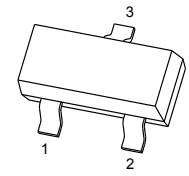
# SOT-23 Plastic-Encapsulate MOSFETS

**20V N-Channel Enhancement Mode MOSFET**

**VDS= 20V**
**RDS(ON), Vgs@ 4.5V, Ids@ 2.0A＜50mΩ**
**RDS(ON), Vgs@ 2.5V, Ids@ 1.0A＜80mΩ**

**SOT-23**

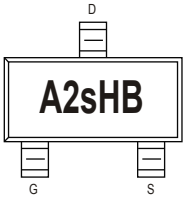



1. GATE
2. SOURCE
3. DRAIN

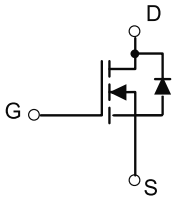
**Features**

Advanced trench process technology
High Density Cell Design For Ultra Low On-Resistance

**MARKING**




**Equivalent circuit**




**PACKAGE SPECIFICATIONS**

| Package | Reel Size | Reel DIA. (mm) | Q'TY/Reel (pcs) | Box Size (mm) | QTY/Box (pcs) | Carton Size (mm) | Q'TY/Carton (pcs) |
|---|---|---|---|---|---|---|---|
| SOT-23 | 7' | 330 | 3000 | 203×203×195 | 45000 | 438×438×220 | 180000 |

Maximum Ratings and Thermal Characteristics (TA = 25°C unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 20 | V |
| Gate-Source Voltage | $V_{GS}$ | ±12 | |
| Continuous Drain Current | $I_D$ | 2.3 | A |
| Pulsed Drain Current [1)] | $I_{DM}$ | 6 | |
| Maximum Power Dissipation [2)] | $P_D$ | 0.6 | W |
| Operating Junction and Storage Temperature Range | $T_J$, $T_{stg}$ | -55 to 150 | °C |

Notes
1) Pulse width limited by maximum junction temperature.
2) Surface Mounted on FR4 Board, t ≤ 5 sec.

The above data are for reference only.

## MOSFET ELECTRICAL CHARACTERISTICS

### $T_a$=25℃ unless otherwise specified

| Parameter | Symbol | Test Condition | Min. | Typ. | Miax. | Unit |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$ = 0V, $I_D$ = 250uA | 20 | | | V |
| Drain-Source On-State Resistance[1)] | $R_{DS(on)}$ | $V_{GS}$ = 4.5V, $I_D$ = 2.0A | | | 50 | mΩ |
| | | $V_{GS}$ = 2.5V, $I_D$ = 1.0A | | | 80 | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ =$V_{GS}$, $I_D$ = 250uA | 0.6 | | 1.1 | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 19.5V, $V_{GS}$ = 0V | | | 1 | uA |
| Gate Body Leakage | $I_{GSS}$ | $V_{GS}$ =12V, $V_{DS}$ = 0V | | | 100 | nA |
| Forward Transconductance[1)] | $g_{fs}$ | $V_{DS}$ = 5V, $I_D$ = 2.3A | | 10 | — | S |
| **Dynamic** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$ = 10V, $I_D$ = 2.3A<br>$V_{GS}$ = 4.5V | | 5.4 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 0.65 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 1.6 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$ = 10V, RL=5.5Ω<br>$I_D$ ≅ 2.3A,$V_{GEN}$ = 4.5V<br>$R_G$ = 6Ω | | 12 | | ns |
| Turn-On Rise Time | $t_r$ | | | 36 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 34 | | |
| Turn-Off Fall Time | $t_f$ | | | 10 | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ = 10V, $V_{GS}$ = 0V<br>f = 1.0 MHz | | 340 | | pF |
| Output Capacitance | $C_{oss}$ | | | 115 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 33 | | |
| Diode Forward Voltage | $V_{SD}$ | $I_S$ = 1.0A, $V_{GS}$ = 0V | | | 1.2 | V |

1) Pulse test: pulse width <= 300us, duty cycle<= 2%

## Typical ElectricalL and Thermal Characteristics

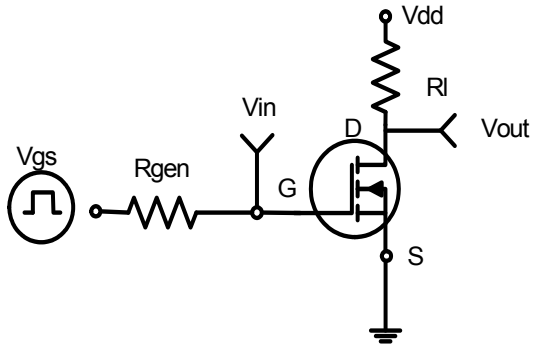



**Figure 1:Switching Test Circuit**

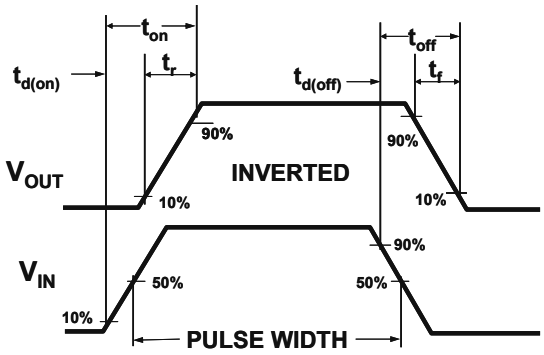



**Figure 2:Switching Waveforms**

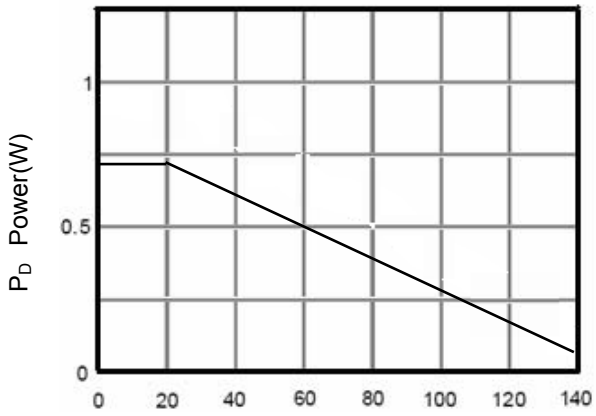



**Figure 3 Power Dissipation**

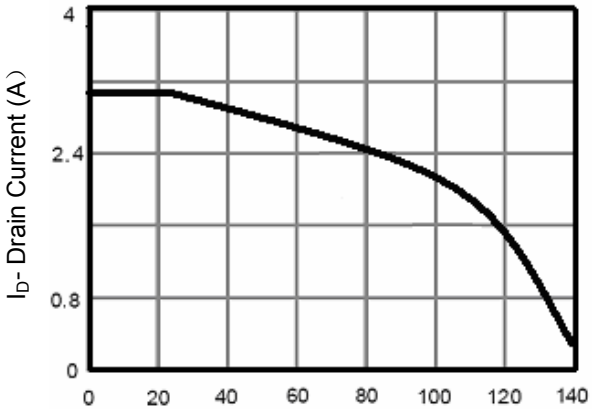



**Figure 4 Drain Current**

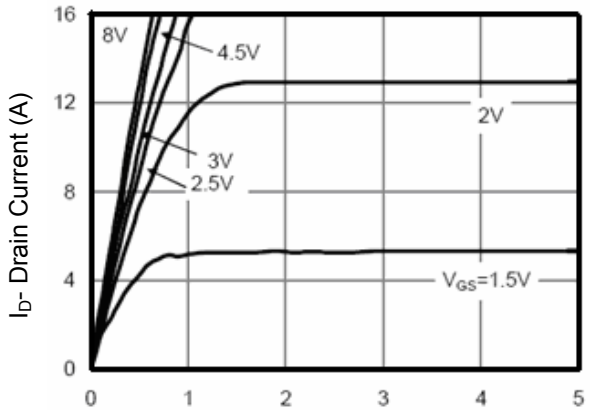



**Figure 5 Output Characteristics**

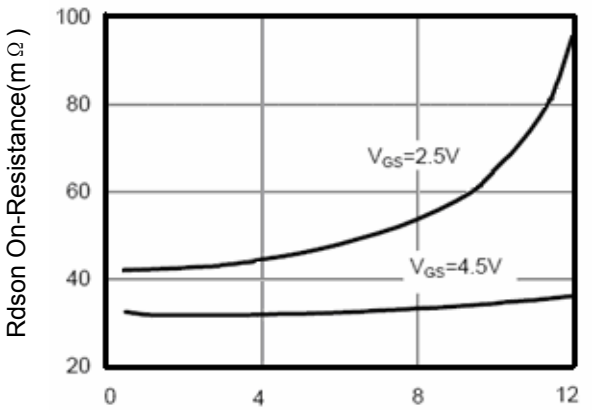
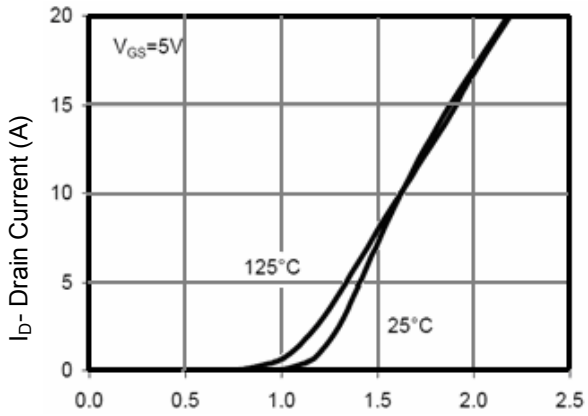
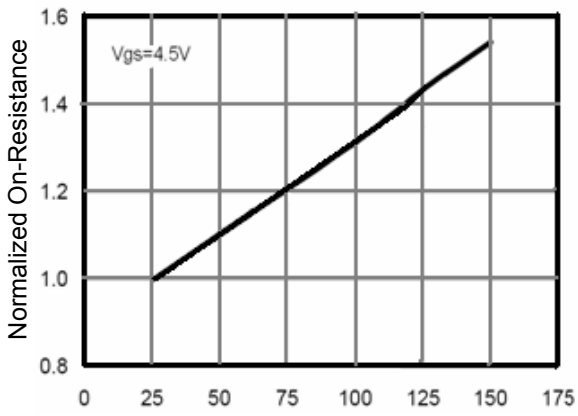



**Figure 6 Drain-Source On-Resistance**



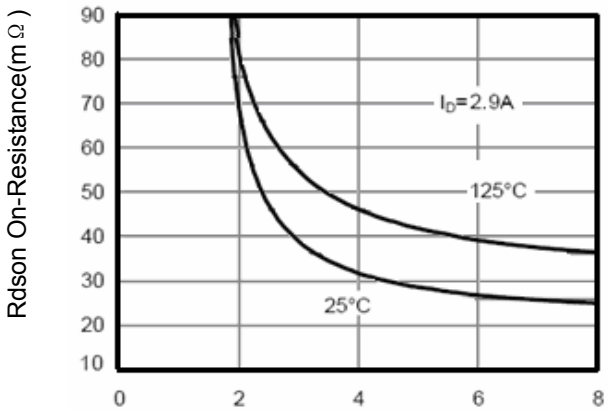

Vgs Gate-Source Voltage (V)

**Figure 7 Transfer Characteristics**



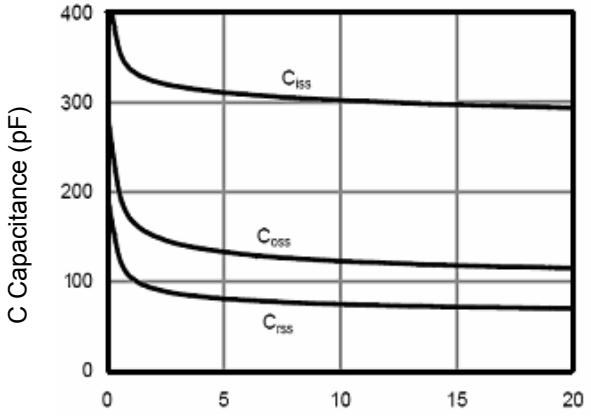

$T_J$-Junction Temperature(℃)

**Figure 8 Drain-Source On-Resistance**



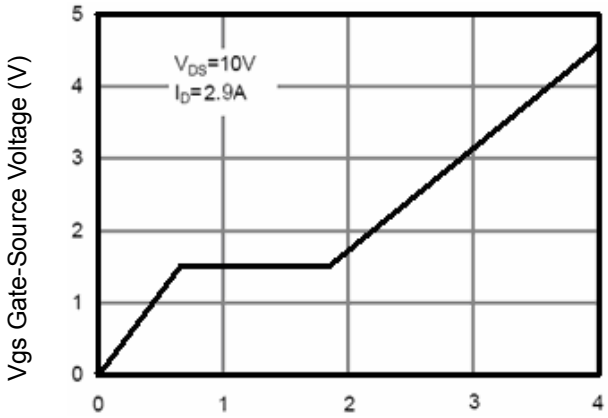

Vgs Gate-Source Voltage (V)

**Figure 9 Rdson vs Vgs**



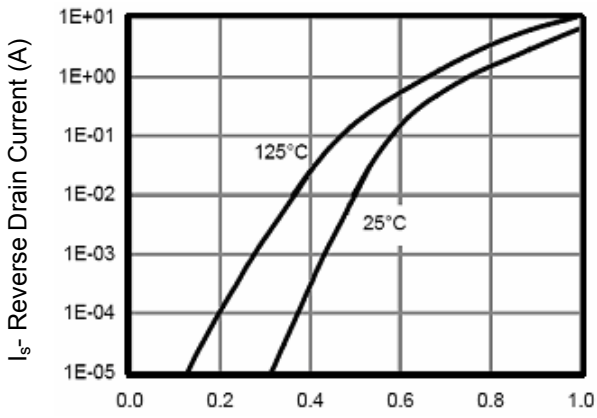

Vds Drain-Source Voltage (V)

**Figure 10 Capacitance vs Vds**




Qg Gate Charge (nC)

**Figure 11 Gate Charge**




Vsd Source-Drain Voltage (V)

**Figure 12 Source- Drain Diode Forward**

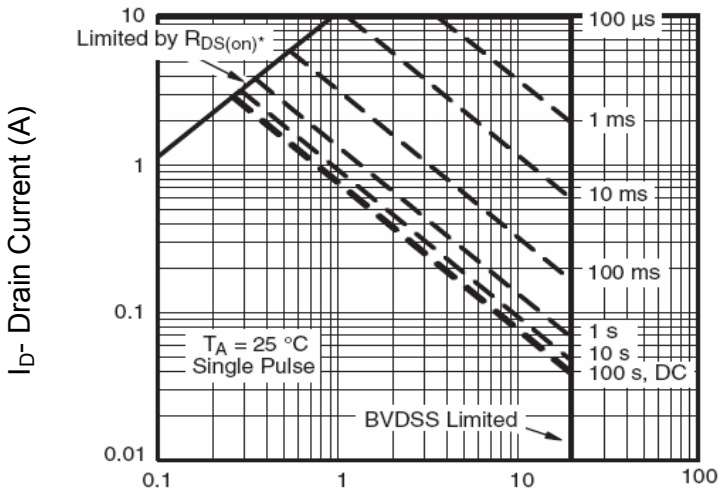



**Figure 13 Safe Operation Area**

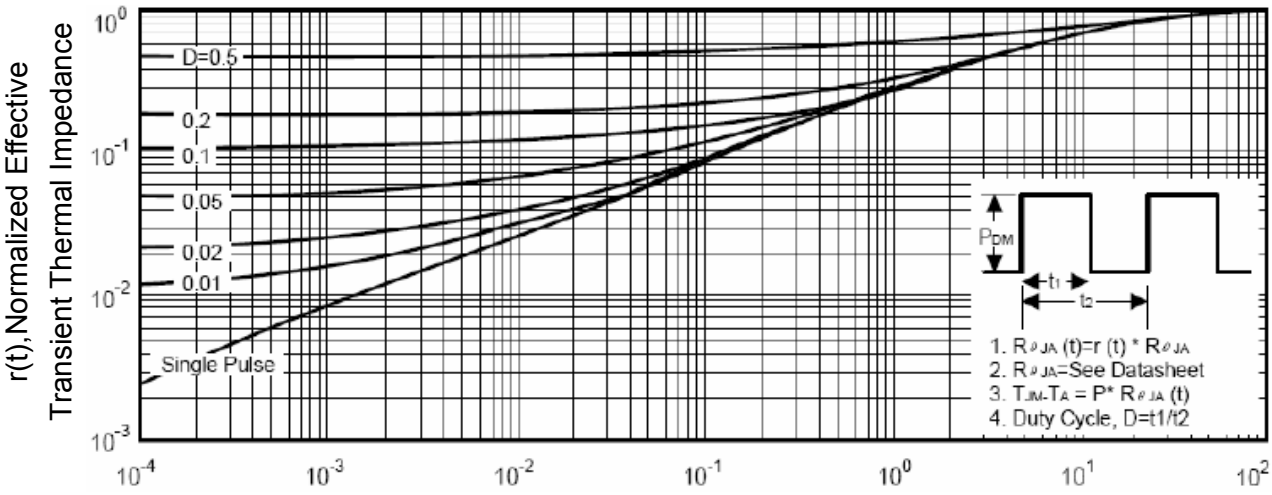
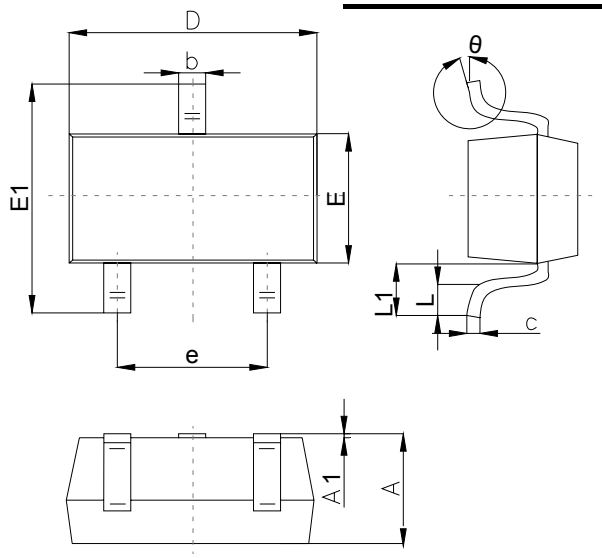



**Figure 14 Normalized Maximum Transient Thermal Impedance**

The curve above is for reference only.

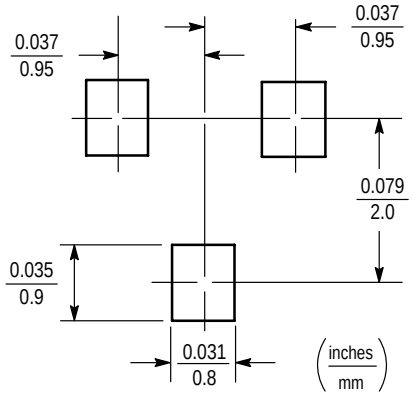
## Outlitne Drawing

SOT-23 Package Outline Dimensions




| Symbol | Dimensions In Millimeters | | |
|---|---|---|---|
| | Min | Typ | Max |
| A | 0.90 | | 1.40 |
| A1 | 0.00 | | 0.10 |
| b | 0.30 | | 0.50 |
| c | 0.08 | | 0.20 |
| D | 2.80 | 2.90 | 3.10 |
| E | 1.20 | | 1.60 |
| E1 | 2.25 | | 2.80 |
| e | 1.80 | 1.90 | 2.00 |
| L | 0.10 | | 0.50 |
| L1 | 0.4 | | 0.55 |
| θ | 0° | | 10° |

## Suggested Pad Layout




Note:
1.Controlling dimension:in/millimeters.
2.General tolerance: ±0.05mm.
3.The pad layout is for reference purposes only.