**MOSFETs Silicon 100V N-Channel MOS**

## ■ Applications

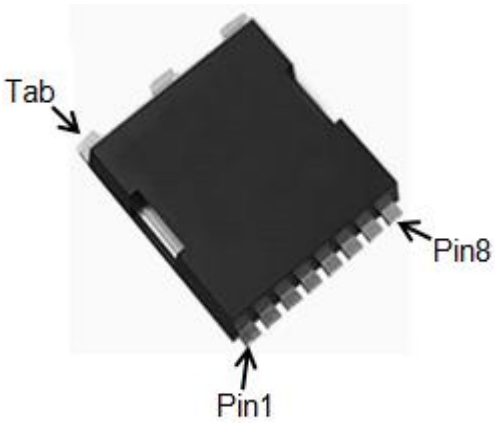
- Synchronus Rectification
- Industrial and Motor Drive
- DC/DC and AC/DC Converters
- Power Tools
- BMS

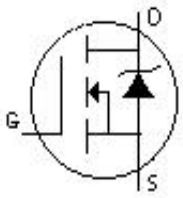
## ■ Features

- High-Speed Switching
- Low $R_{DS(ON)}$
- Low Gate Charge
- RoHS and Halogen-Free Compliant
- 100% UIS and RG Tested

## ■ Product Summary

| | | |
|---|---|---|
| $V_{DS}$ | 100 | V |
| $I_D$ | 425 | A |
| $R_{DS(ON)}$ ,Typ@10V | 1.0 | mΩ |
| $Q_g$ | 188 | nC |




Gate: Pin1

Drain: Tab

Source: Pin2~8

**TOLL**

| Marking | Package | Packaging | Min. package quantity |
|---|---|---|---|
| MT1D2R100SH | TOLL | Tape & Reel | 2000 |

## ■ Absolute Maximum Ratings（Tc=25℃ unless otherwise noted)

| Parameter | | | Symbol | Ratings | Unit |
|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DS}$ | 100 | V |
| Gate-Source Voltage | | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current | Tc=25℃ | (Note 1) | $I_D$ | 425 | A |
| Continuous Drain Current | Tc=100℃ | (Note 1) | | 300 | A |
| Drain Current-Pulsed | | (Note 1) | $I_{DM}$ | 1500 | A |
| Total Dissipation | | | $P_D$ | 469 | W |
| Junction Temperature | | | $T_j$ | 175 | ℃ |
| Storage Temperature | | | $T_{stg}$ | -55-175 | ℃ |
| Single Pulse Avalanche Energy | | (Note 2) | $E_{AS}$ | 2400 | mJ |

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

## ■ Thermal Characteristics

| Parameter | Symbol | Max | Unit |
|---|---|---|---|
| Maximum Junction-to-Case | $R_{\theta JC}$ | 0.32 | ℃/W |
| Maximum Junction-to-Ambient | $R_{\theta JA}$ | 40 | ℃/W |

Note 1：Ensure that the channel temperature does not exceed 175℃.

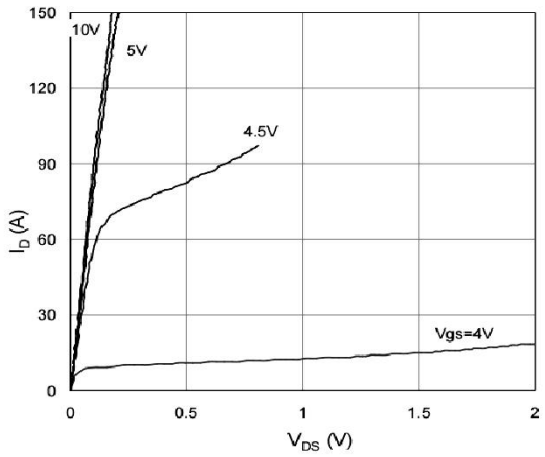
Note 2：$V_{DD}$=50V, Tch= 25℃(initial), L=0.5mH, $R_g$=25Ω.

Note：This transistor is sensitive to electrostatic discharge and should be handled with care.

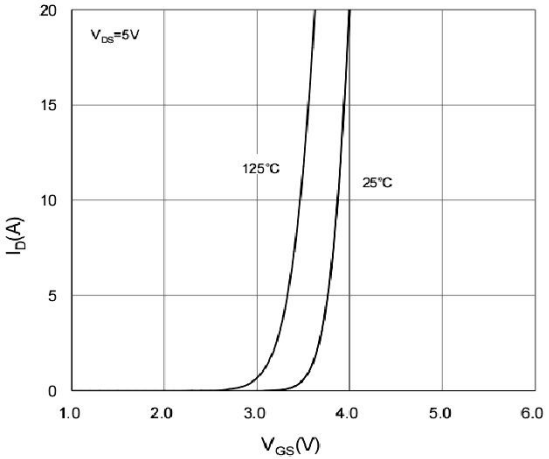
## ■ Electrical Characteristics（Tc=25℃ unless otherwise noted)

| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Parameters** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V,$I_D$=250uA | 100 | - | - | V |
| Drain-Source Leakage Current | $I_{DSS}$ | $V_{DS}$=100V,$V_{GS}$=0V | - | - | 1 | uA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$=±20V,$V_{DS}$=0V | - | - | ±100 | nA |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}$=$V_{DS}$,$I_D$=250uA | 2.0 | 3.2 | 4.0 | V |
| Drain-Source On Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V,$I_D$=20A | - | 1.0 | 1.2 | mΩ |
| | | Tj=125℃ | - | 1.8 | - | |
| **Dynamic Characteristics** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=35V,$V_{GS}$=0V, f=1.0MHz | - | 13170 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 6460 | - | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 200 | - | pF |
| Gate Resistance | $R_g$ | $V_{DS}$=0V,$V_{GS}$=0V, f=1.0MHz | - | 3.6 | - | Ω |
| **Switching Paramters** | | | | | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DS}$=50V,$I_D$=100A, $V_{GS}$=10V,$R_G$=3Ω | - | 30 | - | ns |
| Turn-On Rise Time | $t_r$ | | - | 78 | - | ns |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 95 | - | ns |
| Turn-Off Rise Time | $t_f$ | | - | 35 | - | ns |
| Total Gate Charge | $Q_g$ | $V_{DS}$=50V,$I_D$=20A, $V_{GS}$=10V | - | 188 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 61 | - | nC |
| Gate-Drain Charge | $Q_{gd}$ | | - | 40 | - | nC |
| **Source-Drain Characteristics** | | | | | | |
| Diode Forward Voltage | $V_{sd}$ | $V_{GS}$=0V, IF=10A | - | 0.75 | 1.2 | V |
| Reverse Recovery Time | $t_{rr}$ | $V_R$=50V,$I_F$=20A, di/dt=100A/us | - | 136 | - | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | - | 420 | - | nC |

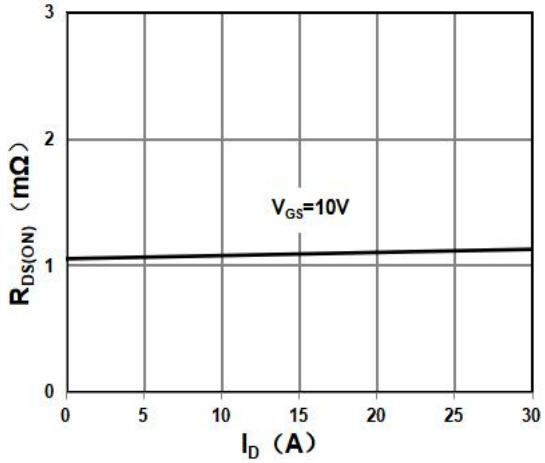
## ■ Characteristics Curves



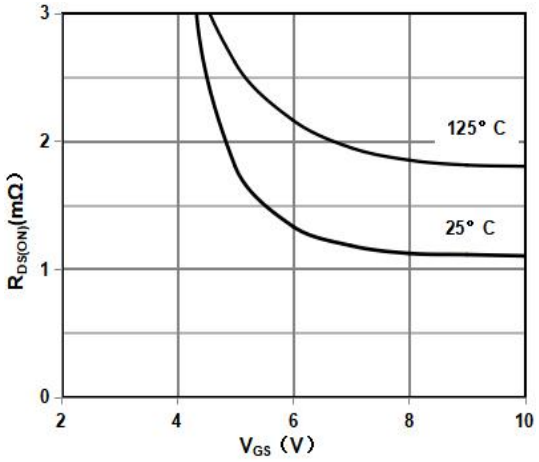

**Output Characteritsics**



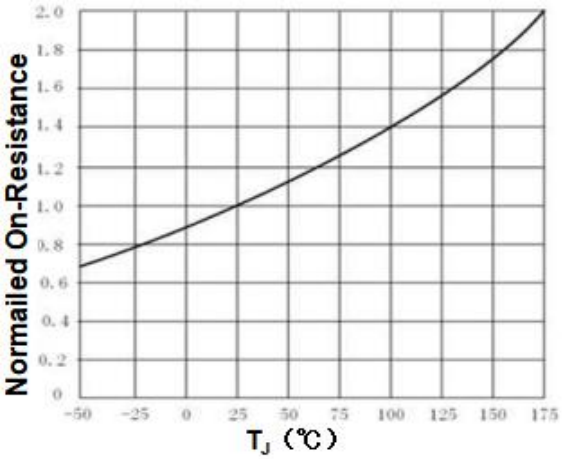

**Transfer Characteritsics**



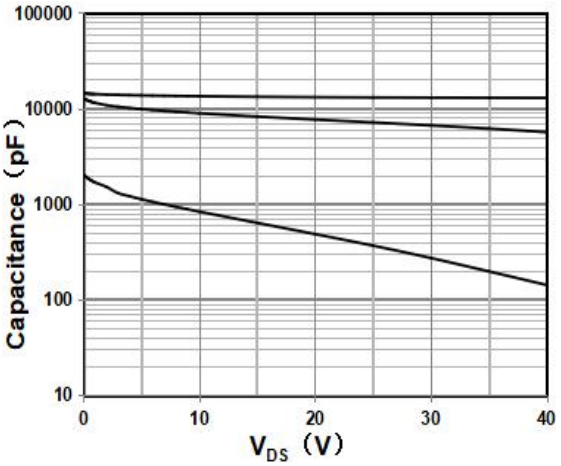

**On Resistance Vs Drain Current**



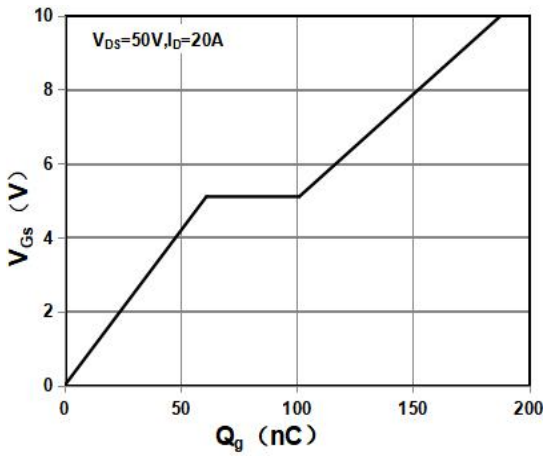

**On Resistance Vs Gate Source Voltage**



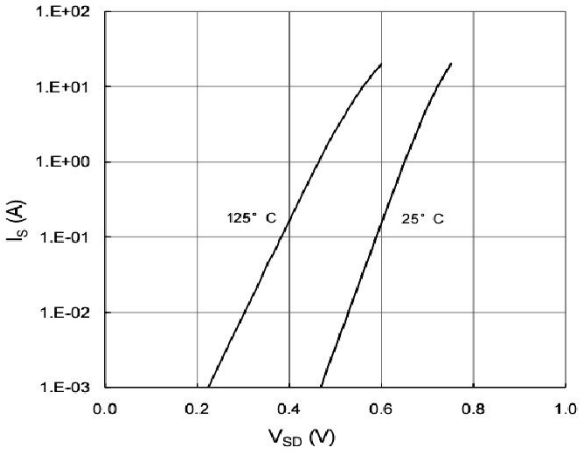

**Rdson-JunctionTemperature**



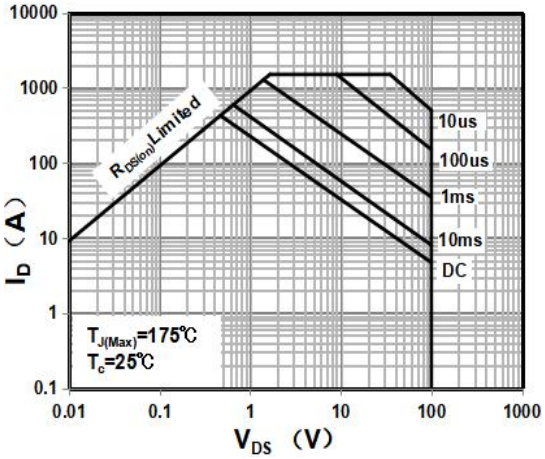

**Capacitance**




**Gate Charge Waveform**




**Source-Drain Diode Forward Voltage**

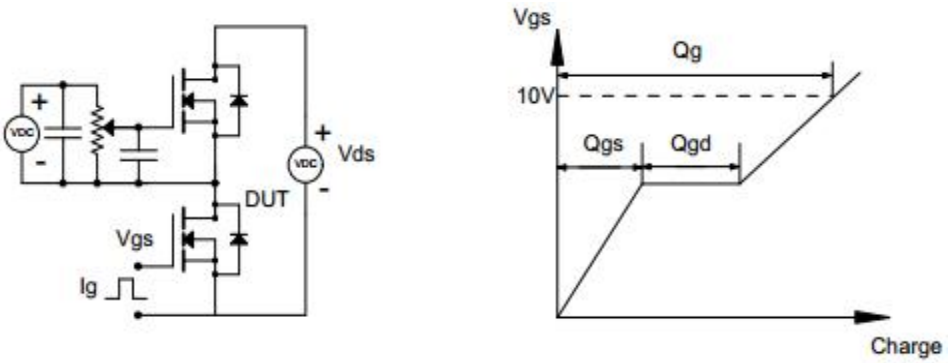



**Maximum Safe Operating Area**

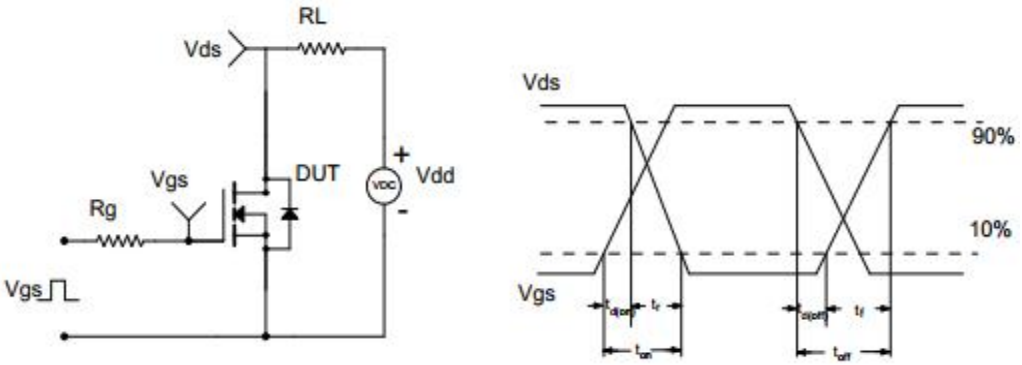
Note： The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

## ■ Test Circuit & Waveform

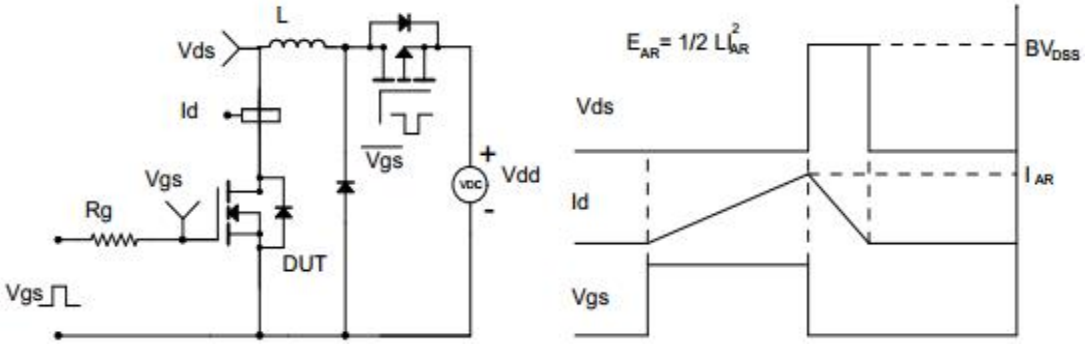
### Gate Charge Test Circuit & Waveform




### Resistive Switching Test Circuit & Waveform




### Unclamped Inductive Switching (UIS) Test Circuit & Waveform



## ■ TOLL Package Dimensions

Unit：mm

| Symbol | Min | Nom | Max | Symbol | Min | Nom | Max |
|---|---|---|---|---|---|---|---|
| A | 2.25 | 2.3 | 2.35 | e1 | | 1.225 | |
| A1 | 1.75 | 1.8 | 1.85 | E | 9.85 | 9.9 | 9.95 |
| b | 0.65 | 0.7 | 0.75 | E1 | 8 | 8.1 | 8.2 |
| b1 | 9.75 | 9.8 | 9.85 | H | 11.6 | 11.7 | 11.8 |
| b2 | 0.7 | 0.75 | 0.8 | H1 | | 6.95 | |
| c | 0.45 | 0.5 | 0.55 | K | | 3.1 | |
| D | 10.35 | 10.4 | 10.45 | L | 1.55 | 1.65 | 1.75 |
| D1 | 11 | 11.1 | 11.2 | L1 | 0.65 | 0.7 | 0.75 |
| D2 | 3.25 | 3.3 | 3.35 | L2 | 0.5 | 0.6 | 0.7 |
| D4 | 4.5 | 4.55 | 4.6 | Q | | 7.95 | |
| e | | 1.2 | | θ | | 10° | |