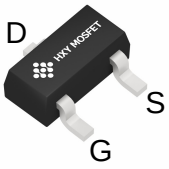
## Description

The MGSF1N03LT1 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

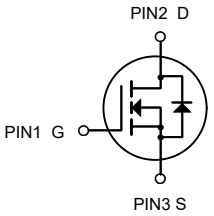



SOT-23

### General Features

$V_{DS}$ = 30V $I_D$ =4A

$R_{DS(ON)}$ < 38mΩ @ $V_{GS}$=10V




N-Channel MOSFET

### Application

Battery protection

Load switch

Uninterruptible power supply

### Package Marking and Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|---|---|---|---|
| MGSF1N03LT1 | SOT-23 | HXY MOSFET | 3000 |

### Absolute Maximum Ratings ($T_A$=25℃unless otherwise noted)

| Symbol | Parameter | Limit | Unit |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 30 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$ | Drain Current-Continuous | 4 | A |
| $I_{DM}$ | Drain Current-Pulsed (Note 1) | 16.4 | A |
| $P_D$ | Maximum Power Dissipation | 1 | W |
| $T_J$,$T_{STG}$ | Operating Junction and Storage Temperature Range | -55 To 150 | ℃ |
| $R_{\theta JA}$ | Thermal Resistance,Junction-to-Ambient (Note 2) | 125 | ℃/W |

**Electrical Characteristics ($T_J$=25 ℃, unless otherwise noted)**

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=250μA | 30 | - | - | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=30V, $V_{GS}$=0V, | - | - | 1.0 | μA |
| $I_{GSS}$ | Gate to Body Leakage Current | $V_{DS}$=0V, $V_{GS}$= ±20V | - | - | ±100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=250μA | 1.0 | 1.5 | 2.5 | V |
| $R_{DS(on)}$ | Static Drain-Source on-Resistance note2 | $V_{GS}$=10V, $I_D$=4A | - | 29 | 38 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=3A | - | 45 | 65 | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=15V, $V_{GS}$=0V, f=1.0MHz | - | 233 | - | pF |
| $C_{oss}$ | Output Capacitance | | - | 44 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 33 | - | pF |
| $Q_g$ | Total Gate Charge | $V_{DS}$=15V, $I_D$=2A, $V_{GS}$=10V | - | 3 | - | nC |
| $Q_{gs}$ | Gate-Source Charge | | - | 0.5 | - | nC |
| $Q_{gd}$ | Gate-Drain(“Miller”) Charge | | - | 0.8 | - | nC |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DS}$=15V, $I_D$=4A, $R_{GEN}$=3Ω, $V_{GS}$=10V | - | 4 | - | ns |
| $t_r$ | Turn-on Rise Time | | - | 2.1 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | | - | 15 | - | ns |
| $t_f$ | Turn-off Fall Time | | - | 3.2 | - | ns |
| $I_S$ | Maximum Continuous Drain to Source Diode Forward Current | | - | - | 4 | A |
| $I_{SM}$ | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | 16 | A |
| $V_{SD}$ | Drain to Source Diode Forward Voltage | $V_{GS}$=0V, $I_S$=4A | - | - | 1.2 | V |

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

## Typical Characteristics

**Figure1:** Output Characteristics

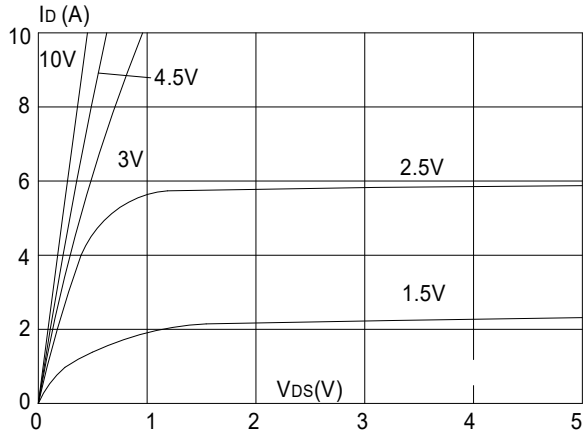



**Figure 2:** Typical Transfer Characteristics

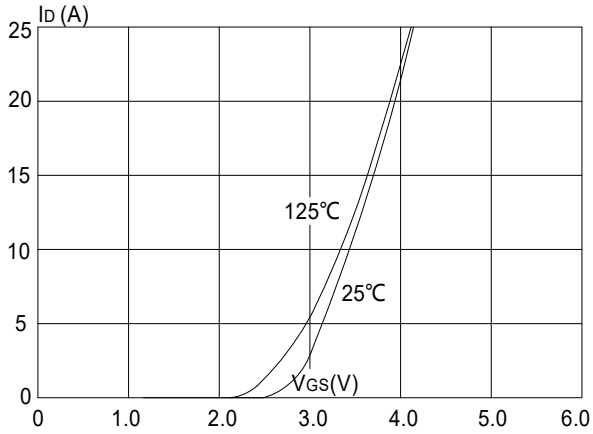



**Figure 3:**On-resistance vs. Drain Current

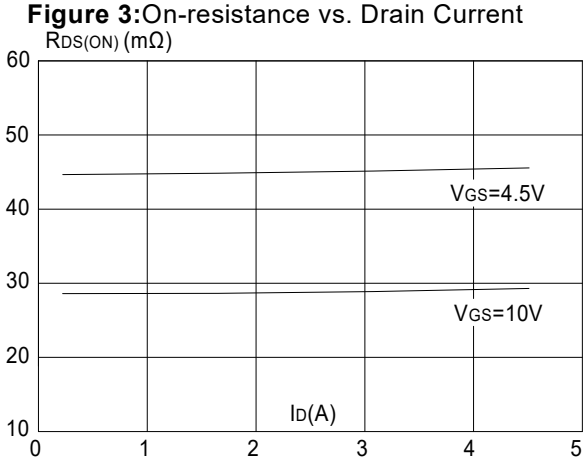



**Figure 4**: Body Diode Characteristics

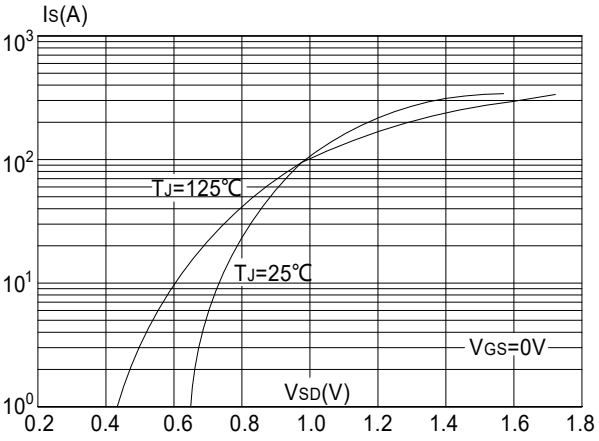



**Figure 5:** Gate Charge Characteristics

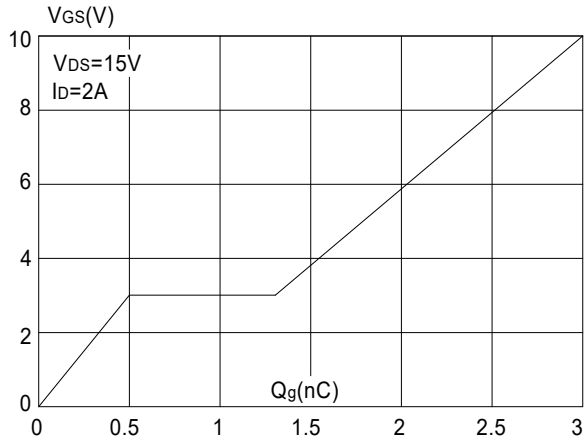



**Figure 6:** Capacitance Characteristics

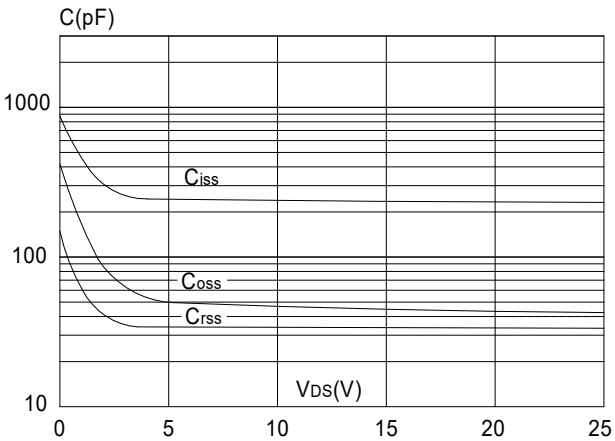


**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature

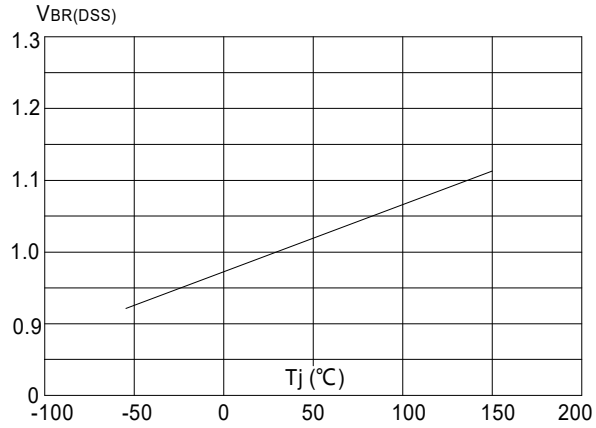



**Figure 8:** Normalized on Resistance vs. Junction Temperature

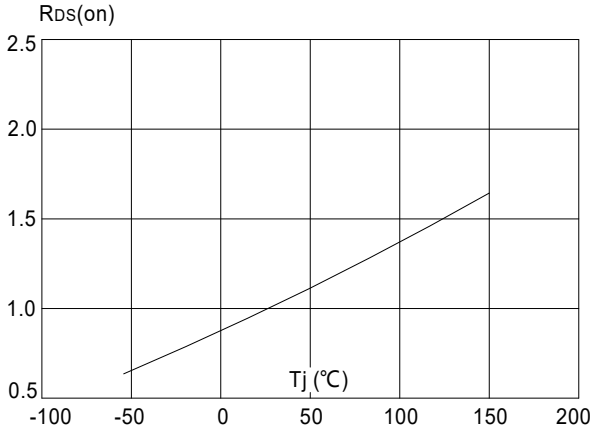



**Figure 9:** Maximum Safe Operating Area

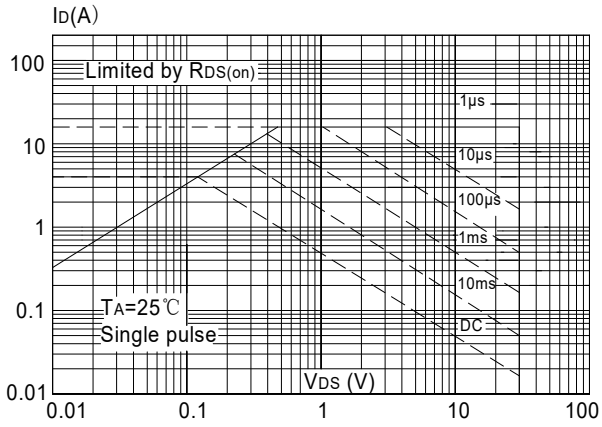



**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature

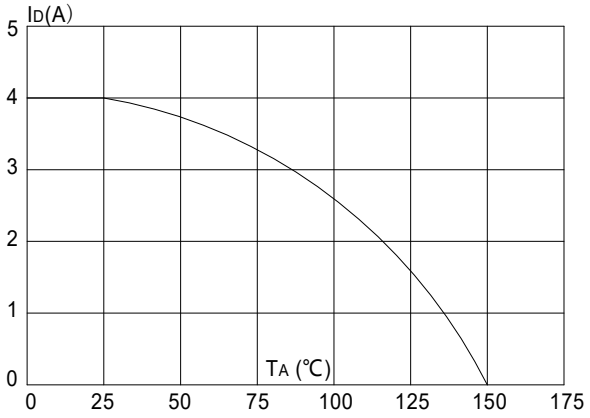
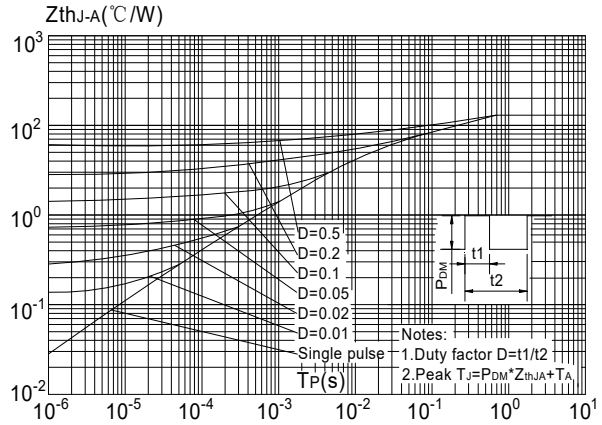
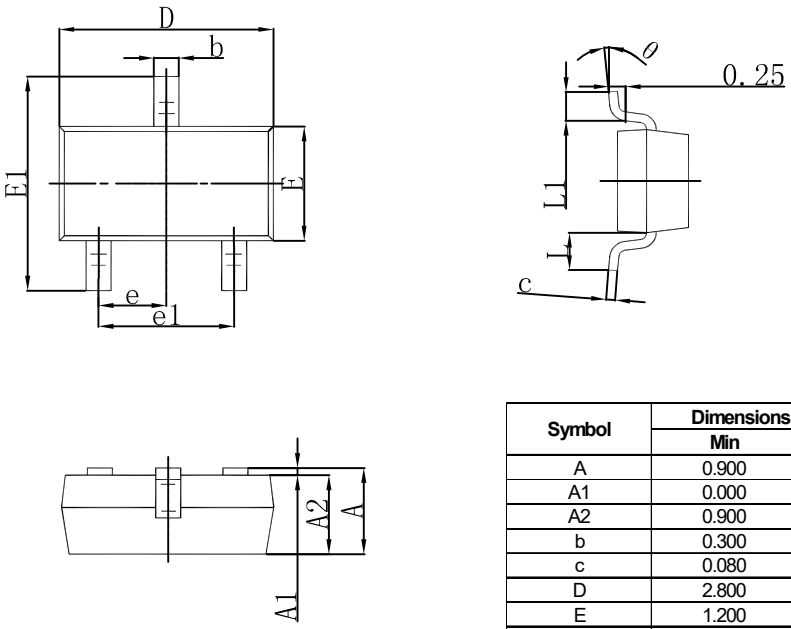



**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

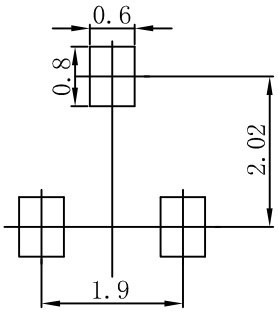


## SOT-23 Package Outline Dimensions




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 0.900 | 1.150 | 0.035 | 0.045 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 0.900 | 1.050 | 0.035 | 0.041 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.080 | 0.150 | 0.003 | 0.006 |
| D | 2.800 | 3.000 | 0.110 | 0.118 |
| E | 1.200 | 1.400 | 0.047 | 0.055 |
| E1 | 2.250 | 2.550 | 0.089 | 0.100 |
| e | 0.950 TYP | | 0.037 TYP | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.550 REF | | 0.022 REF | |
| L1 | 0.300 | 0.500 | 0.012 | 0.020 |
| θ | 0° | 8° | 0° | 8° |

## SOT-23 Suggested Pad Layout




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

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