## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)TYP}$ | $I_D$ |
|---|---|---|
| 110V | 2.9mΩ@10V | 220A |

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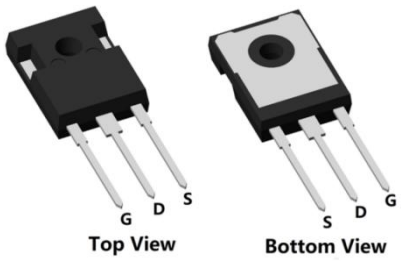
## Feature

- Fast Switching
- Low Gate Charge and Rdson
- Advanced Split Gate Trench Technology
- 100% Single Pulse avalanche energy Test

## Applications

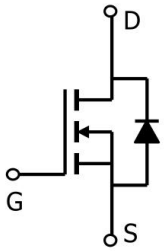
- Power switching application
- DC-DC Converter
- Power Management

## Package

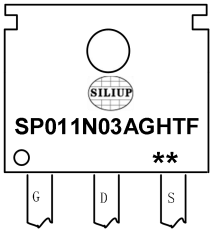



TO-247(1:G 2:D 3:S)

## Circuit diagram




## Marking




**SP011N03AGHTF : Product code**
**** : Week code**

## Order Information

| Device | Package | Unit/Tube |
|---|---|---|
| SP011N03AGHTF | TO-247 | 30 |

## Absolute maximum ratings (Ta=25℃,unless otherwise noted)

| Parameter | Symbol | Rating | Units |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 110 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | V |
| Continuous Drain Current (Tc=25℃) | $I_D$ | 220 | A |
| Continuous Drain Current (Tc=100℃) | $I_D$ | 150 | A |
| Pulsed Drain Current | $I_{DM}$ | 880 | A |
| Single Pulse Avalanche Energy[1] | $E_{AS}$ | 1260 | mJ |
| Power Dissipation (Tc=25℃) | $P_D$ | 245 | W |
| Thermal Resistance Junction-to-Case | $R_{\theta JC}$ | 0.51 | ℃/W |
| Storage Temperature Range | $T_{STG}$ | -55 to 150 | ℃ |
| Operating Junction Temperature Range | $T_J$ | -55 to 150 | ℃ |

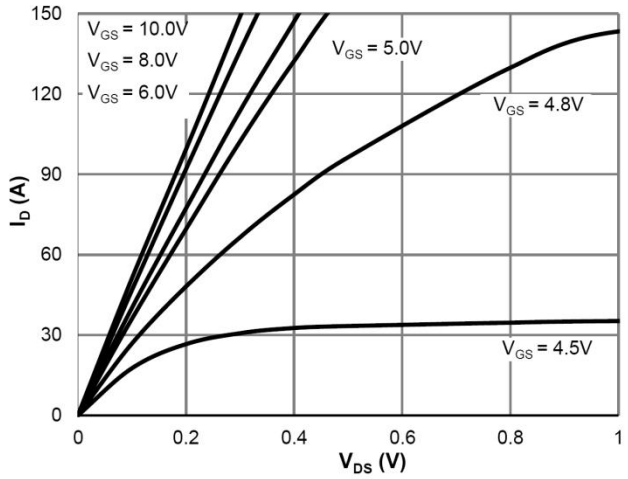
## Electrical characteristics (Ta=25℃, unless otherwise noted)

| Characteristics | Symbol | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | VGS=0V , ID=250uA | 110 | - | - | V |
| Drain Cut-Off Current | $I_{DSS}$ | VDS=80V , VGS=0V , TJ=25℃ | - | - | 1 | μA |
| Gate Leakage Current | $I_{GSS}$ | VGS=±20V , VDS=0V | - | - | ±0.1 | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | 2.0 | 3.0 | 4.0 | V |
| Drain-Source ON Resistance | $R_{DS(ON)}$ | $V_{GS}$ = 10V, $I_D$ = 30A | - | 2.9 | 3.7 | mΩ |
| **Dynamic Characteristics** | | | | | | |
| Input Capacitance | $C_{iss}$ | VDS=50V , VGS=0V , f=1MHz | - | 6190 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 1002 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 33 | - | |
| Total Gate Charge | $Q_g$ | VDS=50V , VGS=10V , ID=125A | - | 136.5 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 46 | - | |
| Gate-Drain Charge | $Q_{gd}$ | | - | 23 | - | |
| **Switching Characteristics** | | | | | | |
| Turn-On Delay Time | $t_{d(on)}$ | VDD=50V, VGS=10V , RG=6Ω, ID=125A | - | 22.5 | - | nS |
| Rise Time | $t_r$ | | - | 65 | - | |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 75 | - | |
| Fall Time | $t_f$ | | - | 26 | - | |
| **Drain-Source Body Diode Characteristics** | | | | | | |
| Source-Drain Diode Forward Voltage | $V_{SD}$ | $I_S$ = 1A, VGS = 0V | - | - | 1.2 | V |
| Maximum Body-Diode Continuous Current | $I_S$ | | - | - | 220 | A |
| Reverse Recovery Time | Trr | $I_S$=50A, di/dt=100A/us, TJ=25℃ | - | 88 | - | nS |
| Reverse Recovery Charge | Qrr | | - | 195 | - | nC |

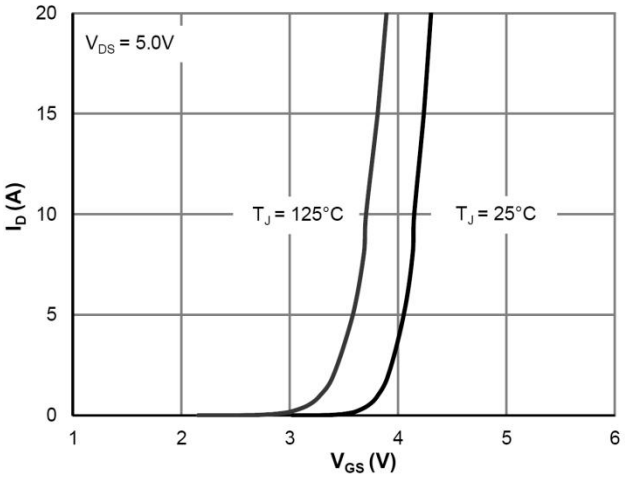
**Note :**

**1.** The test condition is VDD=50V,VGS=10V,L=0.5mH,RG=25Ω

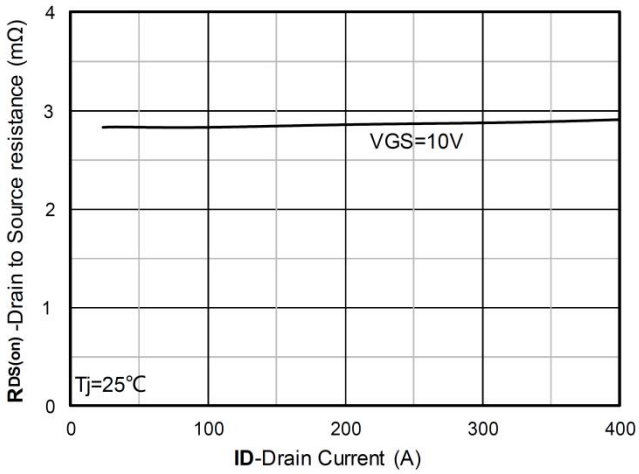
## Typical Characteristics



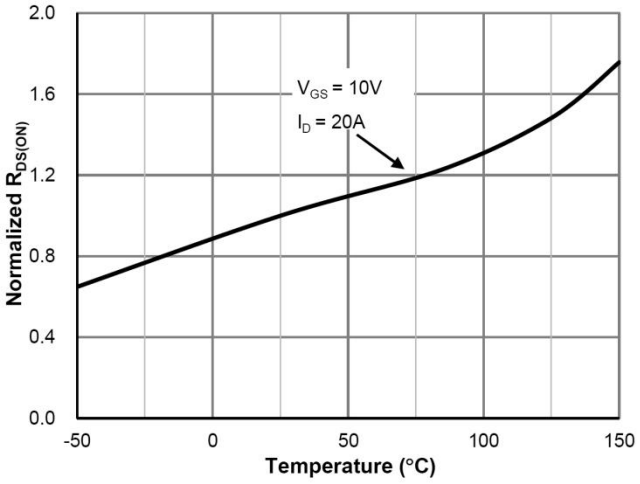

Saturation Characteristics



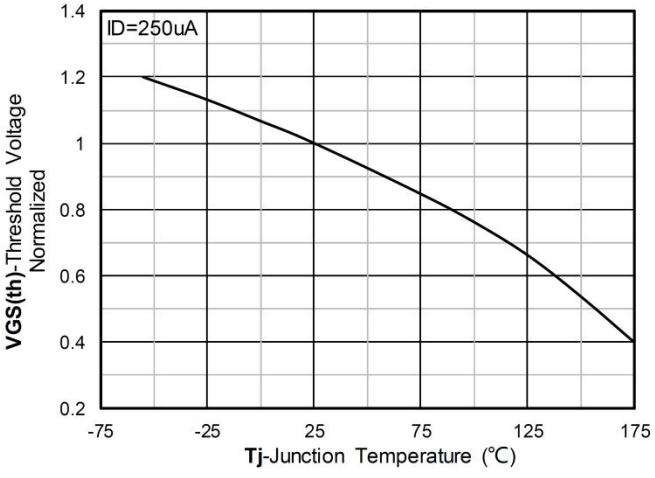

Transfer Characteristics



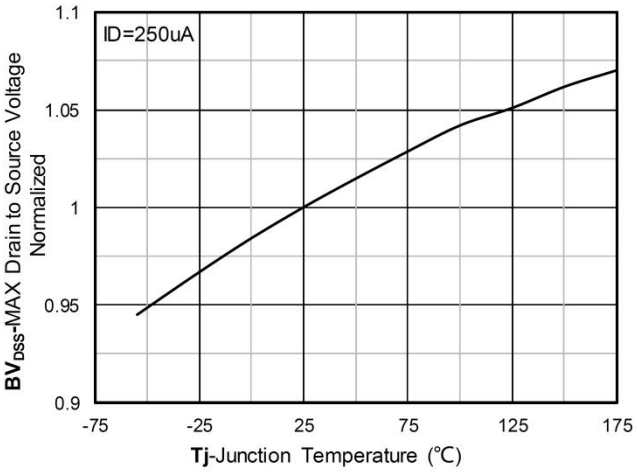

$R_{DS(ON)}$ vs. Drain Current



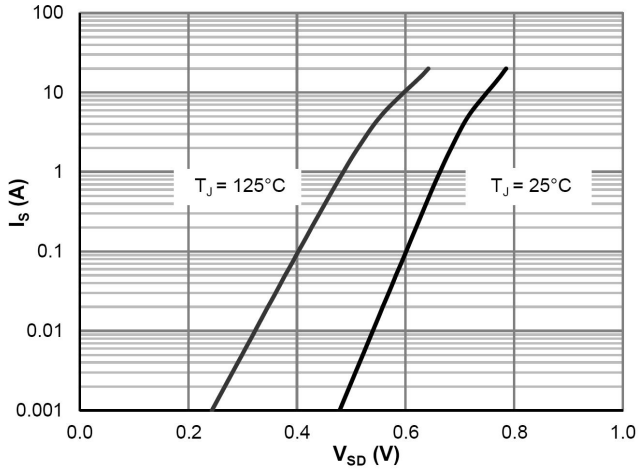

$R_{DS(ON)}$ vs. Junction Temperature



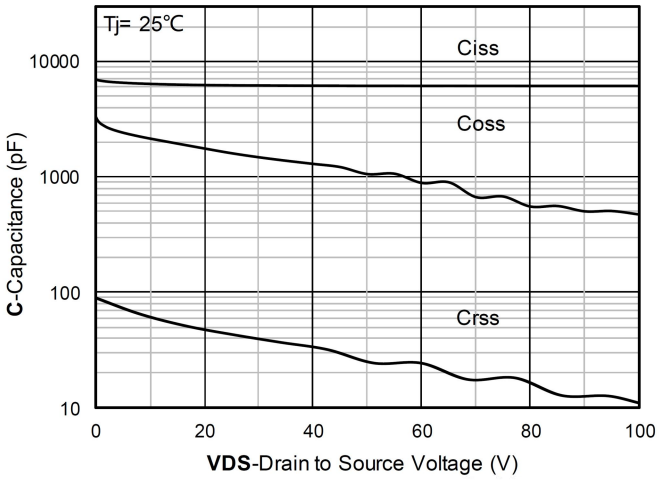

$V_{GS(th)}$ vs. Junction Temperature



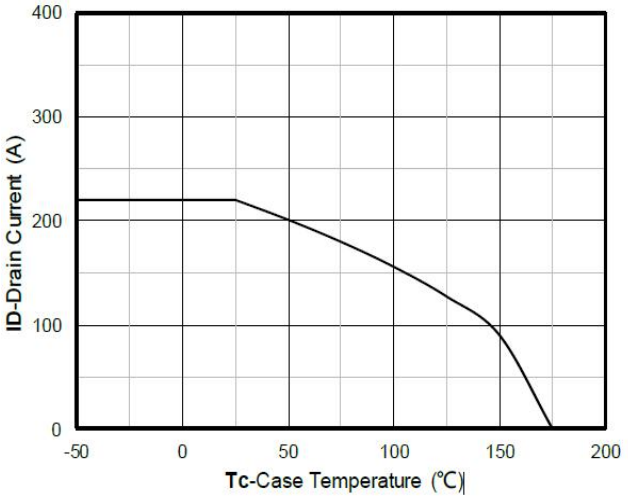

$V_{BR(DSS)}$ vs. Junction Temperature



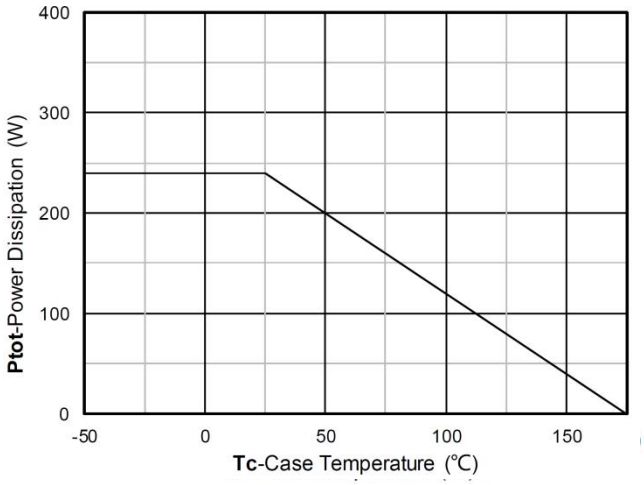

**Body-Diode Characteristics**



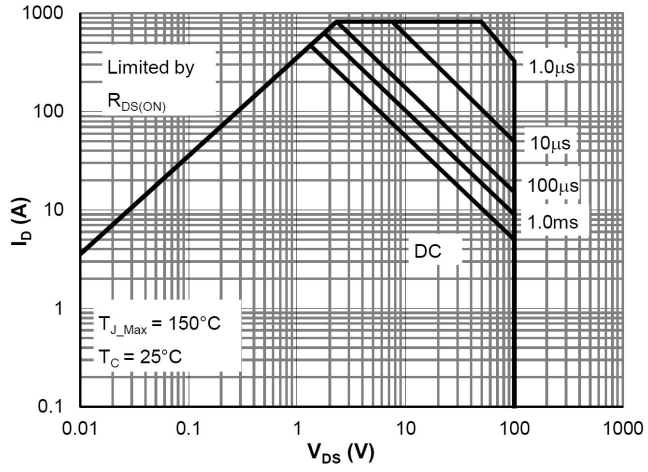

**Capacitance Characteristics**



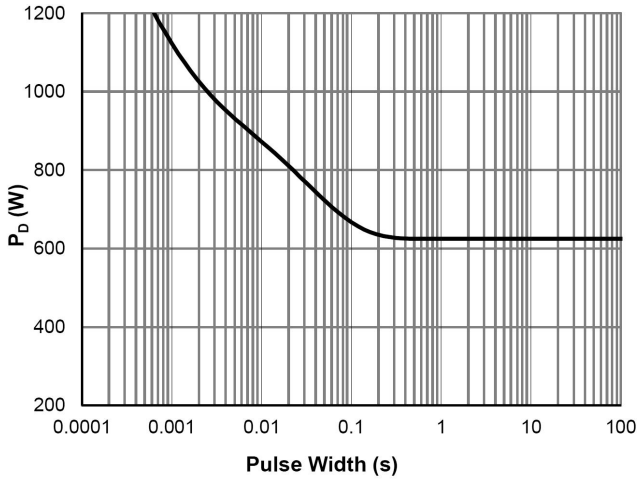

**Current De-rating**




**Power De-rating**

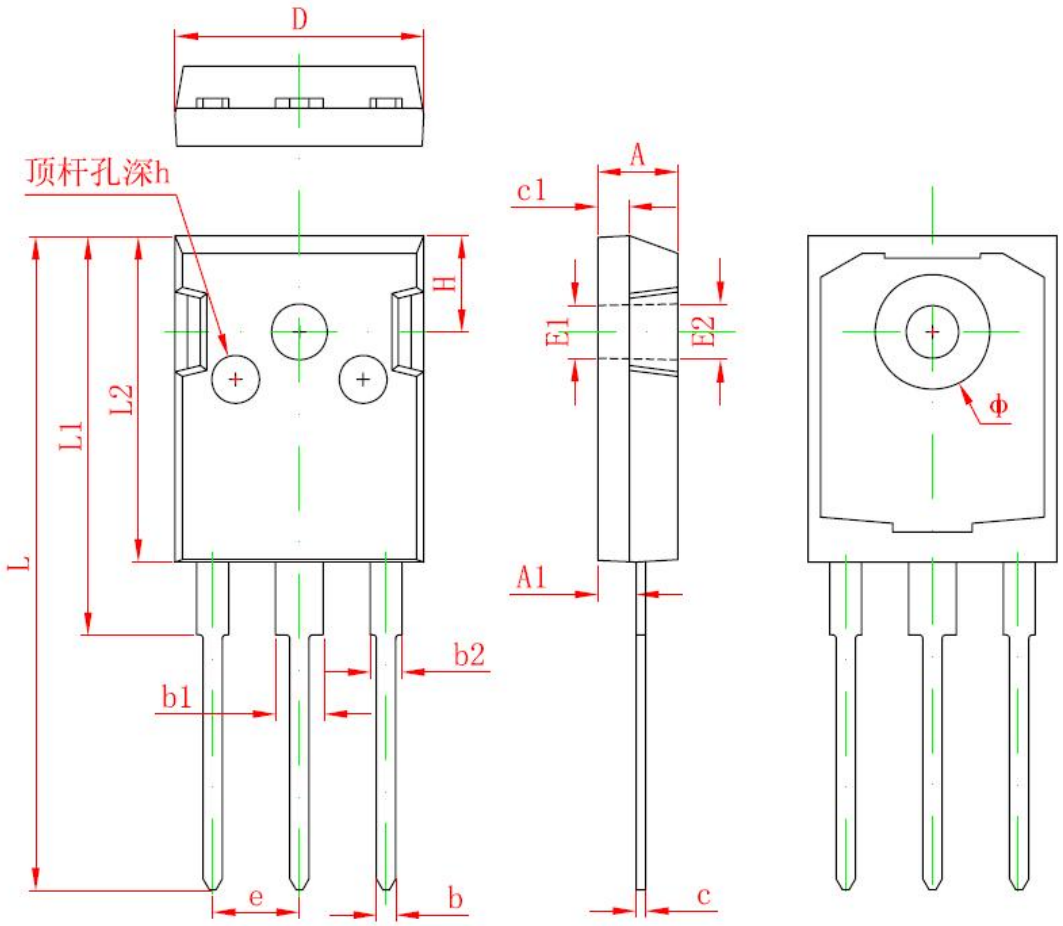



**Maximum Safe Operating Area**




**Single Pulse Power Rating, Junction-to-Case**

## TO-247 Package Outline Dimensions




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 4.850 | 5.150 | 0.191 | 0.200 |
| A1 | 2.200 | 2.600 | 0.087 | 0.102 |
| b | 1.000 | 1.400 | 0.039 | 0.055 |
| b1 | 2.800 | 3.200 | 0.110 | 0.126 |
| b2 | 1.800 | 2.200 | 0.071 | 0.087 |
| c | 0.500 | 0.700 | 0.020 | 0.028 |
| c1 | 1.900 | 2.100 | 0.075 | 0.083 |
| D | 15.450 | 15.750 | 0.608 | 0.620 |
| E1 | 3.500 REF. | | 0.138 REF. | |
| E2 | 3.600 REF. | | 0.142 REF. | |
| L | 40.900 | 41.300 | 1.610 | 1.626 |
| L1 | 24.800 | 25.100 | 0.976 | 0.988 |
| L2 | 20.300 | 20.600 | 0.799 | 0.811 |
| Φ | 7.100 | 7.300 | 0.280 | 0.287 |
| e | 5.450 TYP. | | 0.215 TYP. | |
| H | 5.980 REF. | | 0.235 REF. | |
| h | 0.000 | 0.300 | 0.000 | 0.012 |