



N 沟道增强型场效应晶体管

N-CHANNEL MOSFET

FHP150N06B

主要参数 MAIN CHARACTERISTICS

|                       |        |
|-----------------------|--------|
| ID                    | 150 A  |
| VDSS                  | 60 V   |
| Rdson-typ ( @Vgs=10V) | 2.85mΩ |
| Qg-typ                | 186nC  |

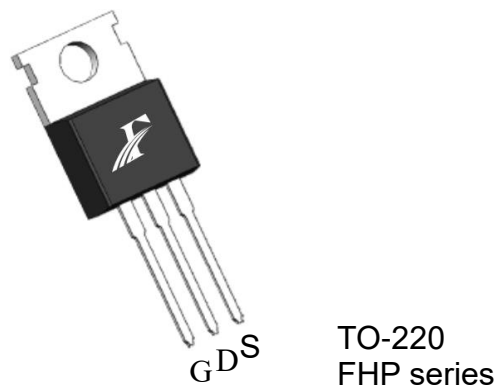
用途 APPLICATIONS

|       |                                       |
|-------|---------------------------------------|
| 逆变电源  | Power management for inverter systems |
| 功率开关  | switch mode power supplies            |
| 不间断电源 | UPS(Uninterruptible Power Supplies)   |

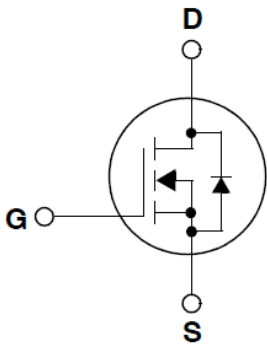
产品特性 FEATURES

|              |                       |
|--------------|-----------------------|
| 低栅极电荷        | Low gate charge       |
| 开关速度快        | Fast switching        |
| 100%经过热阻测试   | 100% DVDS tested      |
| 100%经过雪崩测试   | 100% avalanche tested |
| 100%经过 Rg 测试 | 100% Rg tested        |
| 满足 RoHS      | RoHS Compliant        |

封装形式 Package



等效电路 Equivalent Circuit



绝对最大额定值 ABSOLUTE RATINGS (Tc=25℃)

| 项目<br>Parameter                                             | 符号<br>Symbol      | 数值<br>Value | 单位<br>Unit |
|-------------------------------------------------------------|-------------------|-------------|------------|
|                                                             |                   | FHP150N06B  |            |
| 最高漏极－源极直流电压<br>Drain-Source Voltage                         | VDS               | 60          | V          |
| 连续漏极电流*<br>Drain Current -continuous *                      | ID (Tc=25℃)       | 150         | A          |
|                                                             | ID (Tc=100℃)      | 105         | A          |
| 最大脉冲漏极电流 (注 1)<br>Drain Current – pulse (note 1)            | IDM               | 600         | A          |
| 最高栅源电压<br>Gate-Source Voltage                               | VGS               | ±20         | V          |
| 单脉冲雪崩能量 (注 2)<br>Single Pulsed Avalanche Energy (note 2)    | EAS               | 760         | mJ         |
| 雪崩电流 (注 1)<br>Avalanche Current (note 1)                    | IAS               | 39          | A          |
| 重复雪崩能量 (注 1)<br>Repetitive Avalanche Current (note 1)       | EAR               | 30          | mJ         |
| 二极管反向恢复最大电压变化速率 (注 3)<br>Peak Diode Recovery dv/dt (note 3) | dv/dt             | 5           | V/ns       |
| 耗散功率<br>Power Dissipation                                   | PD (TC=25℃)       | 211         | W          |
|                                                             | -Derate above 25℃ | 1.45        | W/℃        |
| 最高结温及存储温度<br>Operating and Storage Temperature Range        | TJ, TSTG          | -55~+175    | ℃          |
| 引线最高焊接温度<br>Maximum Lead Temperature for Soldering Purposes | TL                | 300         | ℃          |

\*漏极电流由最高结温限制

\*Drain current limited by maximum junction temperature

电特性 ELECTRICAL CHARACTERISTICS

| 项目<br>Parameter                                                              | 符号<br>Symbol                         | 测试条件<br>Tests conditions                                                                                   | 最小<br>Min | 典型<br>Typ | 最大<br>Max | 单位<br>Units |
|------------------------------------------------------------------------------|--------------------------------------|------------------------------------------------------------------------------------------------------------|-----------|-----------|-----------|-------------|
| 关态特性 <b>Off –Characteristics</b>                                             |                                      |                                                                                                            |           |           |           |             |
| 漏－源击穿电压<br>Drain-Source Voltage                                              | BV <sub>DSS</sub>                    | I <sub>D</sub> =250μA, V <sub>GS</sub> =0V                                                                 | 60        | -         | -         | V           |
| 击穿电压温度特性<br>Breakdown Voltage<br>Temperature Coefficient                     | ΔBV <sub>DSS</sub> /Δ T <sub>J</sub> | I <sub>D</sub> =250μA, referenced to 25℃                                                                   | -         | 0.01      | -         | V/℃         |
| 零栅压下漏极漏电流<br>Zero Gate Voltage Drain<br>Current                              | I <sub>DSS</sub>                     | V <sub>DS</sub> =60V, V <sub>GS</sub> =0V, T <sub>C</sub> =25℃                                             | -         | -         | 1         | μA          |
|                                                                              |                                      | V <sub>DS</sub> =48V, T <sub>C</sub> =125℃                                                                 | -         | -         | 100       | μA          |
| 栅极体漏电流<br>Gate-body leakage current                                          | I <sub>GSS</sub> (F/R)               | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                                                                 | -         | -         | ±100      | nA          |
| 通态特性 <b>On-Characteristics</b>                                               |                                      |                                                                                                            |           |           |           |             |
| 阈值电压<br>Gate Threshold Voltage                                               | V <sub>GS(th)</sub>                  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA                                                  | 2.0       | 3.0       | 4.0       | V           |
| 静态导通电阻<br>Static Drain-Source<br>On-Resistance                               | R <sub>DS(ON)</sub>                  | V <sub>GS</sub> =10V , I <sub>D</sub> =75A                                                                 | -         | 2.85      | 4.2       | mΩ          |
| 正向跨导<br>Forward Transconductance                                             | g <sub>fs</sub>                      | V <sub>DS</sub> = 50V, I <sub>D</sub> =75A (note 4)                                                        | -         | 180       | -         | S           |
| 动态特性 <b>Dynamic Characteristics</b>                                          |                                      |                                                                                                            |           |           |           |             |
| 栅电阻<br>Gate Resistance                                                       | R <sub>g</sub>                       | f=1.0MHz,<br>V <sub>DS</sub> OPEN                                                                          | -         | 1.8       | -         | Ω           |
| 输入电容<br>Input capacitance                                                    | C <sub>iss</sub>                     | V <sub>DS</sub> =25V,<br>V <sub>GS</sub> =0V,<br>f=1.0MHz                                                  | -         | 8200      | -         | pF          |
| 输出电容<br>Output capacitance                                                   | C <sub>oss</sub>                     |                                                                                                            | -         | 760       | -         |             |
| 反向传输电容<br>Reverse transfer capacitance                                       | C <sub>rss</sub>                     |                                                                                                            | -         | 680       | -         |             |
| 开关特性 <b>Switching Characteristics</b>                                        |                                      |                                                                                                            |           |           |           |             |
| 延迟时间<br>Turn-On delay time                                                   | t <sub>d(on)</sub>                   | V <sub>DS</sub> =30V,<br>I <sub>D</sub> =40A,<br>R <sub>G</sub> =3Ω<br>V <sub>GS</sub> =10V<br>(note 4, 5) | -         | 27        | -         | ns          |
| 上升时间<br>Turn-On rise time                                                    | t <sub>r</sub>                       |                                                                                                            | -         | 25        | -         | ns          |
| 延迟时间<br>Turn-Off delay time                                                  | t <sub>d(off)</sub>                  |                                                                                                            | -         | 90        | -         | ns          |
| 下降时间<br>Turn-Off Fall time                                                   | t <sub>f</sub>                       |                                                                                                            | -         | 40        | -         | ns          |
| 栅极电荷总量<br>Total Gate Charge                                                  | Q <sub>g</sub>                       | V <sub>DS</sub> =60V ,<br>I <sub>D</sub> =40A ,<br>V <sub>GS</sub> =10V<br>(note 4, 5)                     | -         | 186       | -         | nC          |
| 栅－源电荷<br>Gate-Source charge                                                  | Q <sub>gs</sub>                      |                                                                                                            | -         | 46        | -         | nC          |
| 栅－漏电荷<br>Gate-Drain charge                                                   | Q <sub>gd</sub>                      |                                                                                                            | -         | 70        | -         | nC          |
| 漏－源二极管特性及最大额定值 <b>Drain-Source Diode Characteristics and Maximum Ratings</b> |                                      |                                                                                                            |           |           |           |             |
| 正向最大连续电流<br>Maximum Continuous Drain<br>-Source Diode Forward<br>Current     | I <sub>S</sub>                       |                                                                                                            | -         | -         | 150       | A           |
| 正向最大脉冲电流<br>Maximum Pulsed<br>Drain-Source Diode Forward<br>Current          | I <sub>SM</sub>                      |                                                                                                            | -         | -         | 600       | A           |
| 正向压降<br>Drain-Source Diode Forward<br>Voltage                                | V <sub>SD</sub>                      | V <sub>GS</sub> =0V, I <sub>S</sub> =50A                                                                   | -         | 0.9       | 1.3       | V           |
| 反向恢复时间<br>Reverse recovery time                                              | t <sub>rr</sub>                      | V <sub>GS</sub> =0V, I <sub>S</sub> =50A ,dI <sub>F</sub> /dt=100A/μs<br>(note 4)                          | -         | 40        | -         | ns          |
| 反向恢复电荷<br>Reverse recovery charge                                            | Q <sub>rr</sub>                      |                                                                                                            | -         | 50        | -         | nC          |

热特性 THERMAL CHARACTERISTIC

| 项目<br>Parameter                                    | 符号<br>Symbol | FHP150N06B | 单位<br>Unit |
|----------------------------------------------------|--------------|------------|------------|
| 结到管壳的热阻<br>Thermal Resistance, Junction to Case    | Rth(j-c)     | 0.7        | ℃/W        |
| 结到环境的热阻<br>Thermal Resistance, Junction to Ambient | Rth(j-A)     | 62.5       | ℃/W        |

- 注释:
- 1: 脉冲宽度由最高结温限制
  - 2: L=1mH, IAS=39A, VDD=48V, RG=25 Ω,起始结温 TJ=25℃
  - 3: ISD ≤150A,di/dt ≤100A/μs,VDD≤BVDSS,起始结温 TJ=25℃
  - 4: 脉冲测试: 脉冲宽度 ≤300μs,占空比≤2%
  - 5: 基本与工作温度无关

- Notes:
- 1: Pulse width limited by maximum junction temperature
  - 2: L=1mH, IAS=39A, VDD=48V, RG=25 Ω,Starting TJ=25℃
  - 3: ISD ≤150A,di/dt ≤100A/μs,VDD≤BVDSS, Starting TJ=25℃
  - 4: Pulse Test: Pulse Width ≤300μs,Duty Cycle≤2%
  - 5: Essentially independent of operating temperatur

## Typical Characteristics

### 典型特性曲线

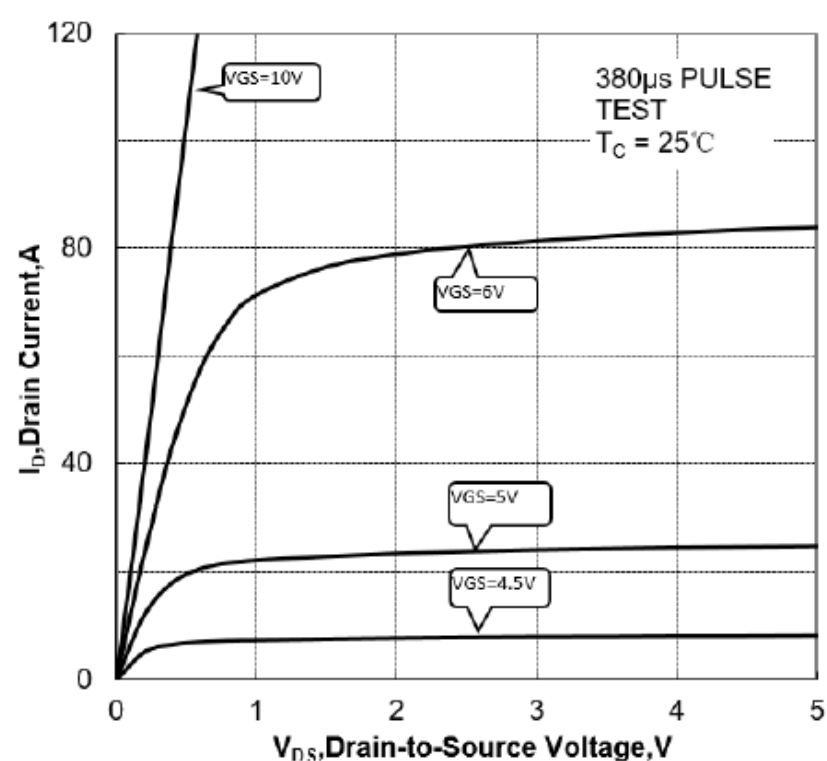


Figure 1 Output Characteristics

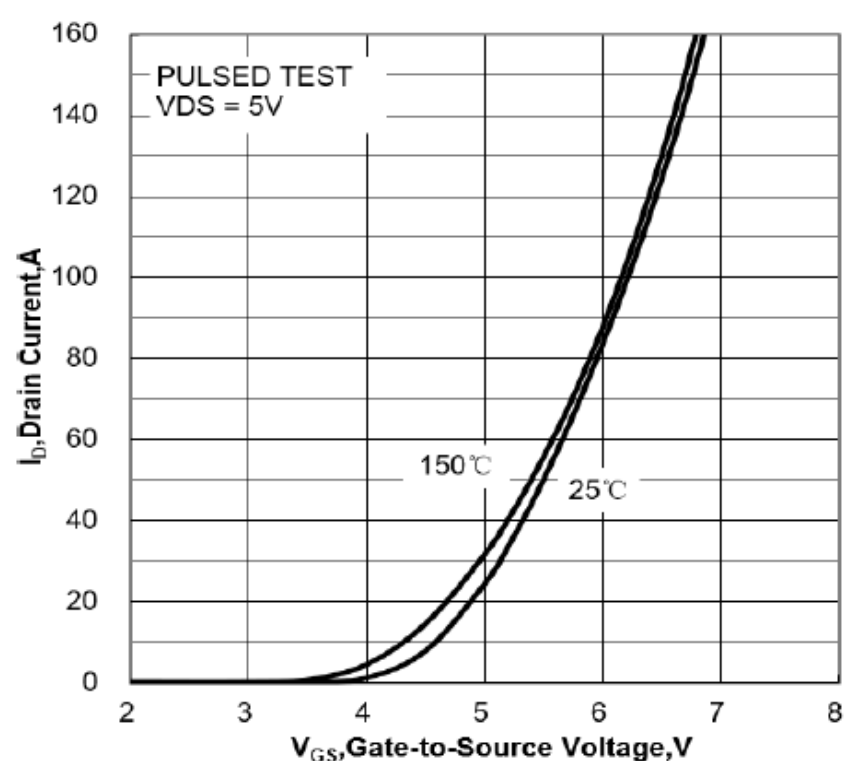


Figure 2 Transfer Characteristics

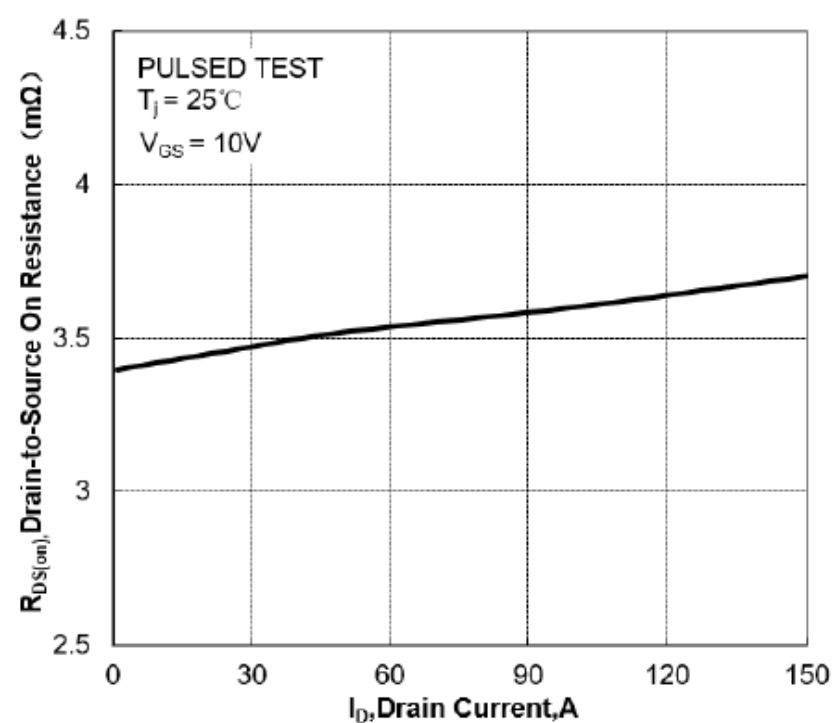


Figure 3 On-Resistance vs.  $I_D$  and  $V_{GS}$

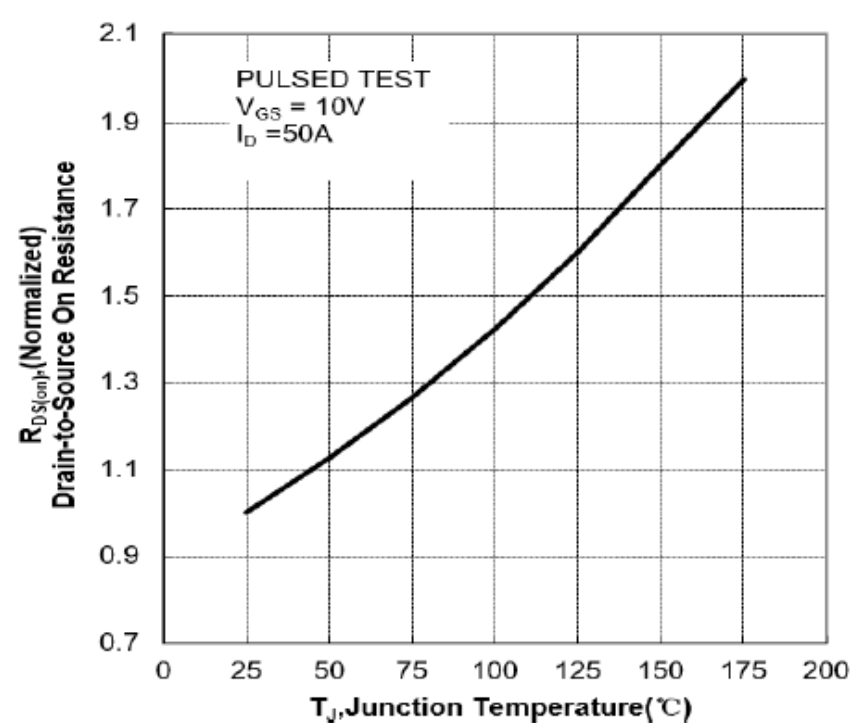


Figure 4 On-Resistance vs. Junction Temperature

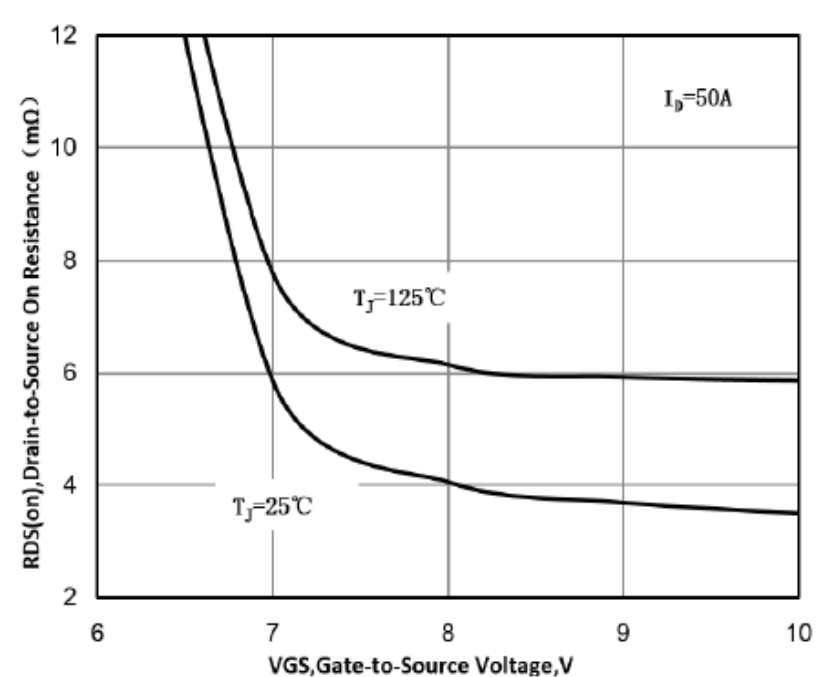


Figure 5 On-Resistance vs.  $V_{GS}$

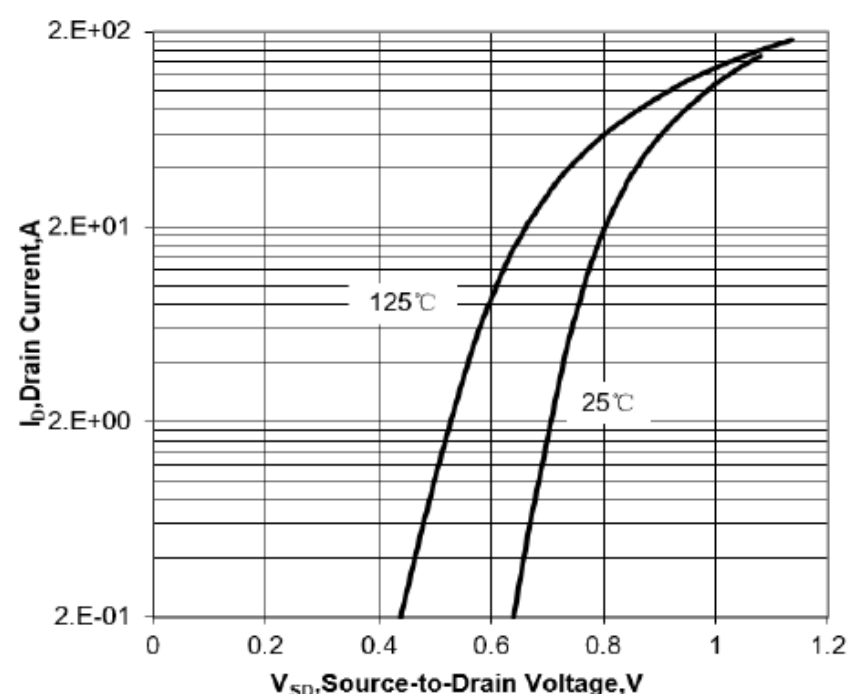


Figure 6 Body Diode Forward Voltage

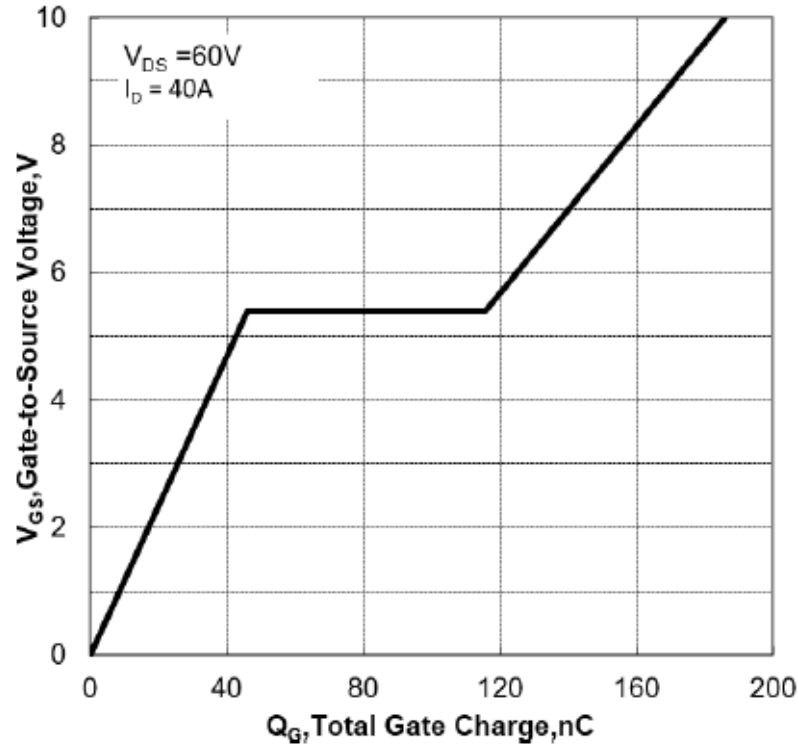


Figure 7 Gate-Charge Characteristics

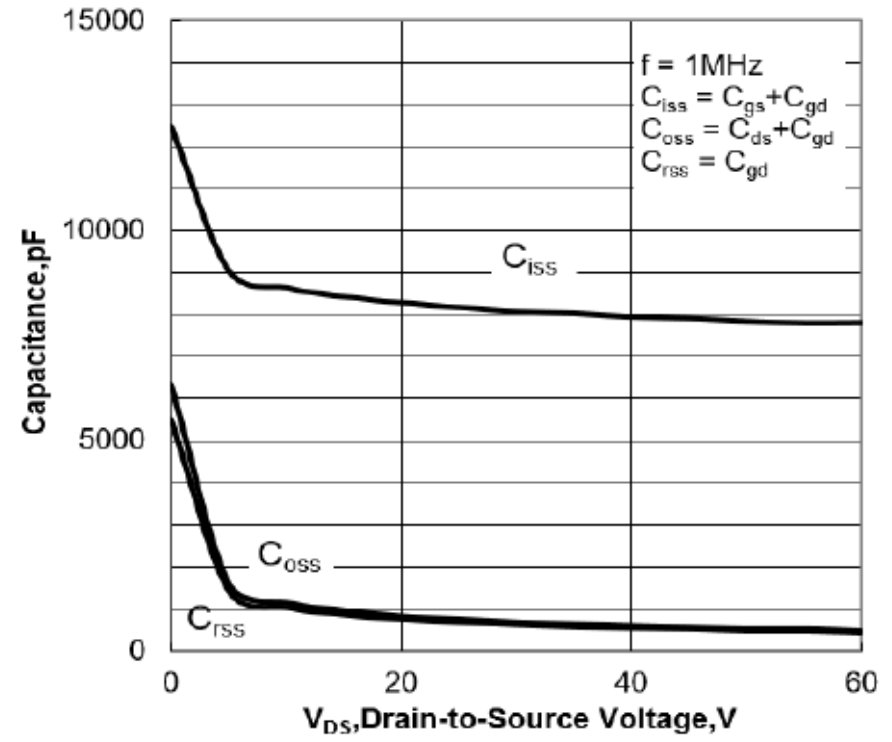


Figure 8 Capacitance Characteristics

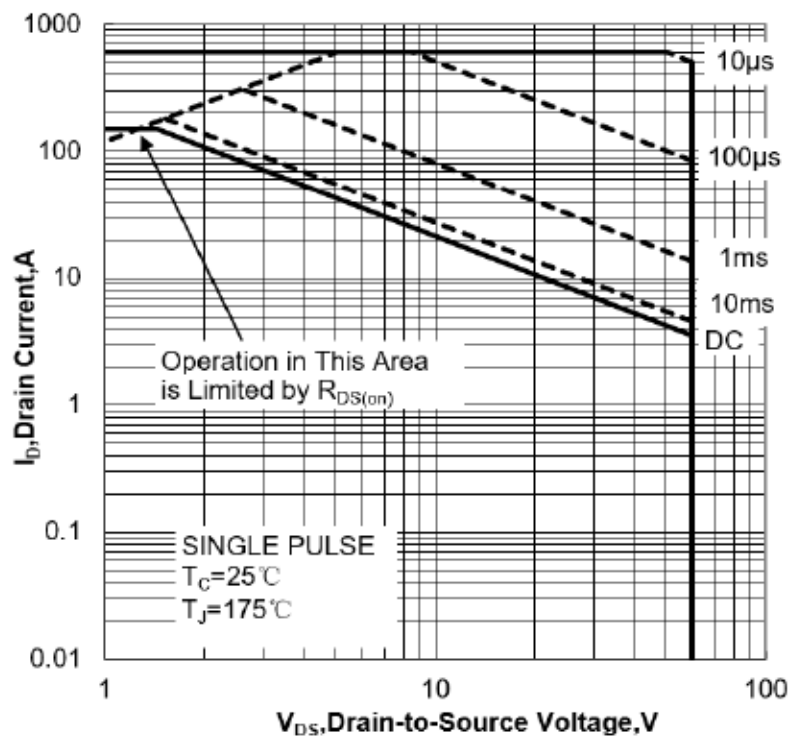


Figure 9 Maximum Forward Biased Safe Operation Area

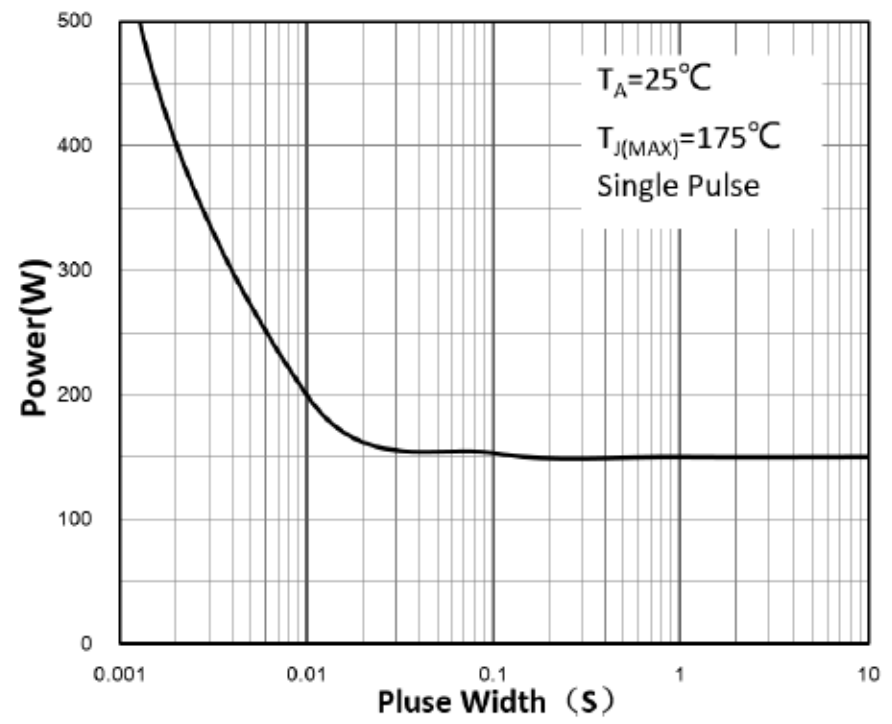


Figure 10 Single Pulse Power Rating Junction-to-Ambient

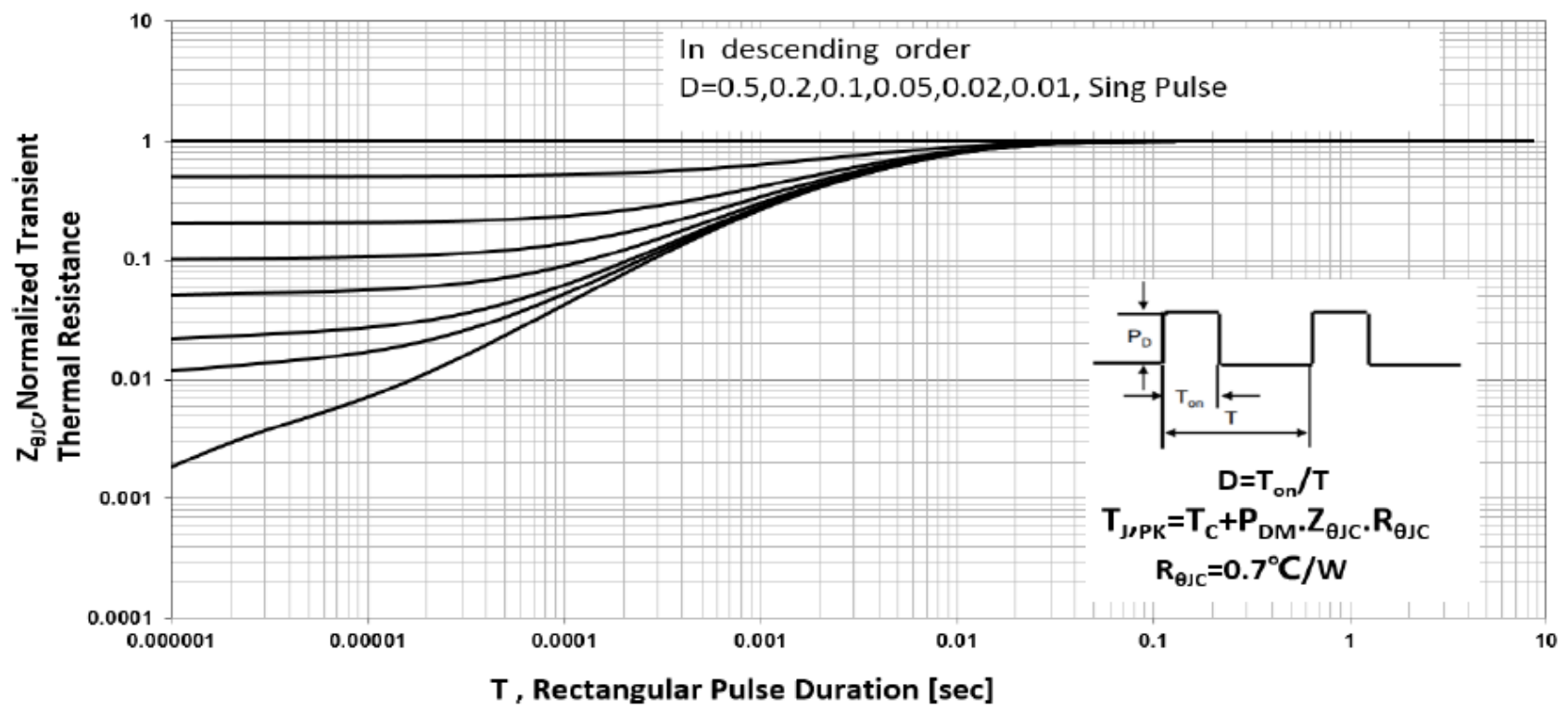
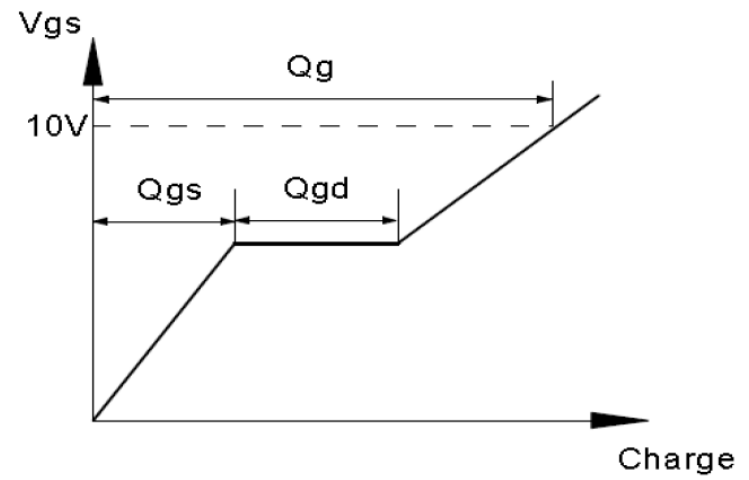
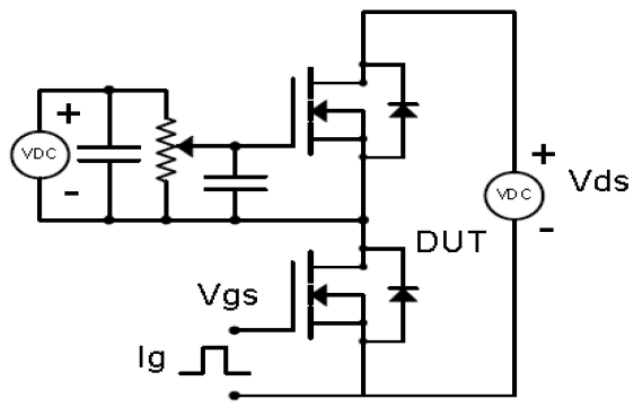


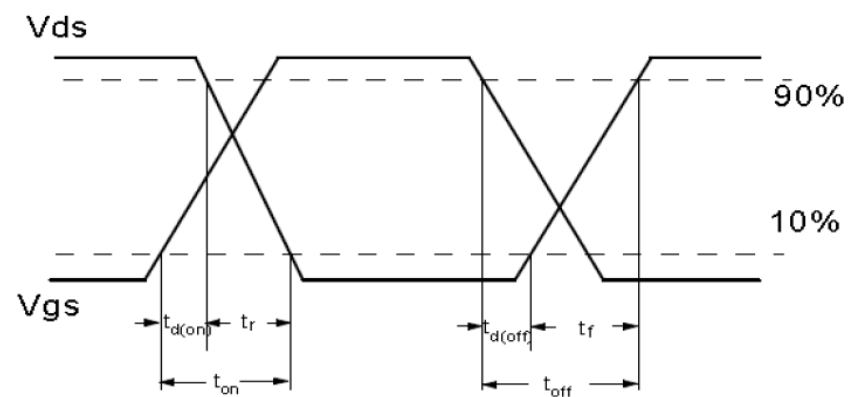
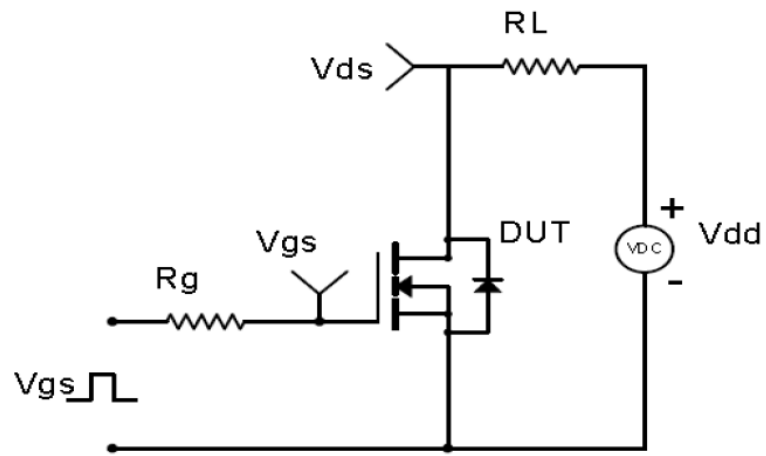
Figure 11 Normalized Maximum Transient Thermal Impedance

## Test Circuit & Waveform

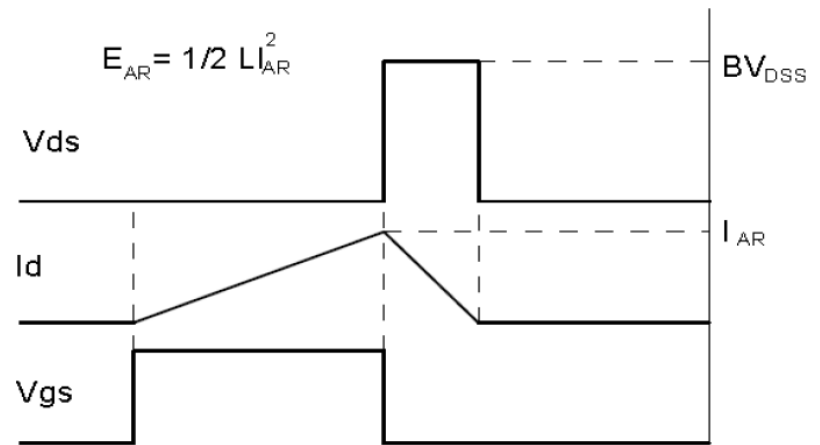
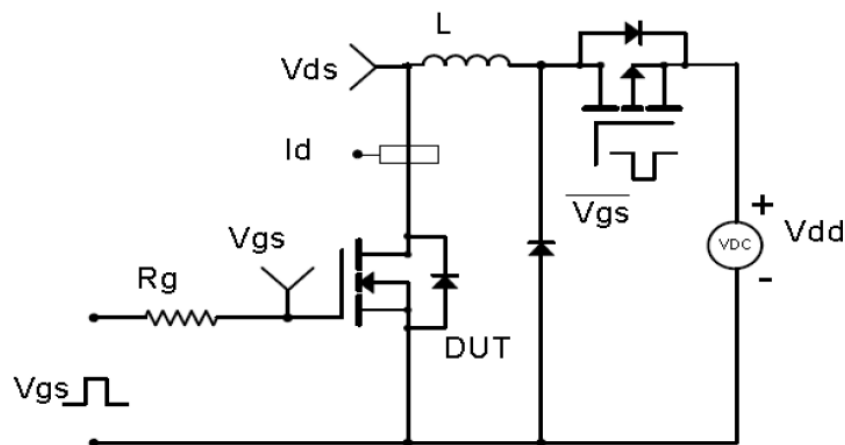
Gate Charge Test Circuit & Waveform



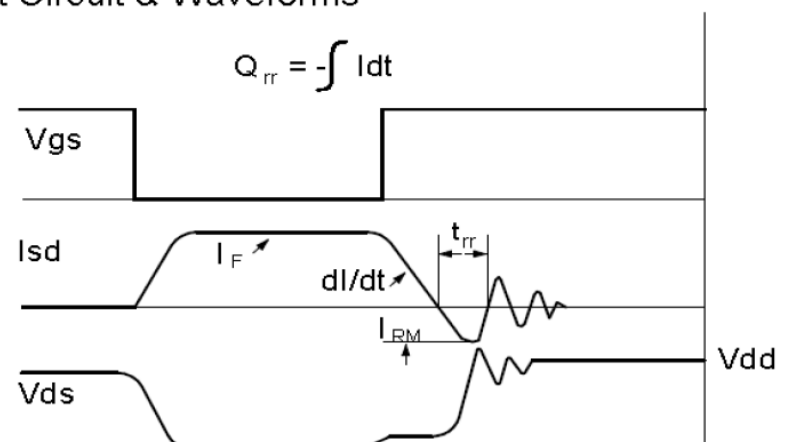
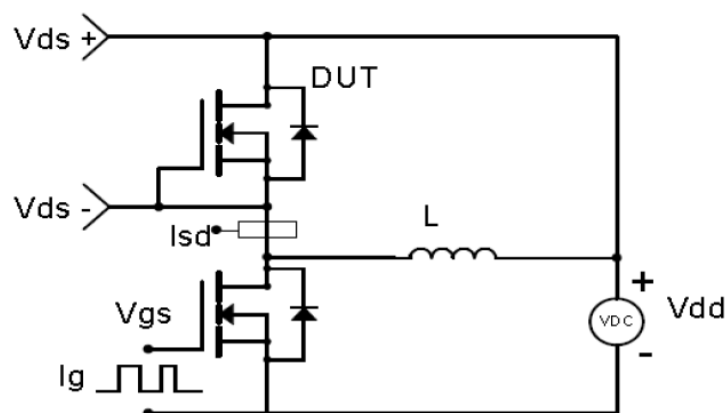
Resistive Switching Test Circuit & Waveforms



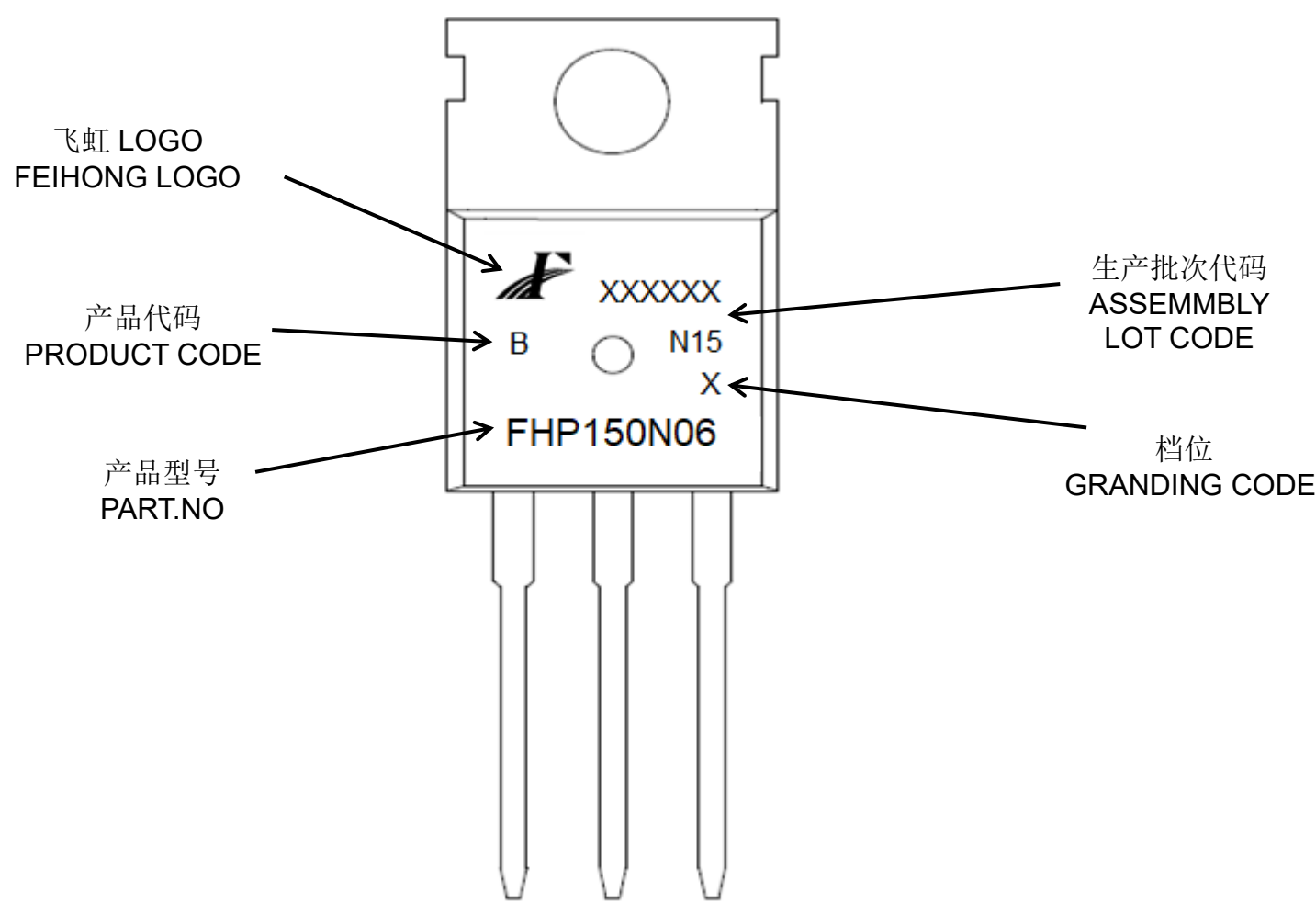
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



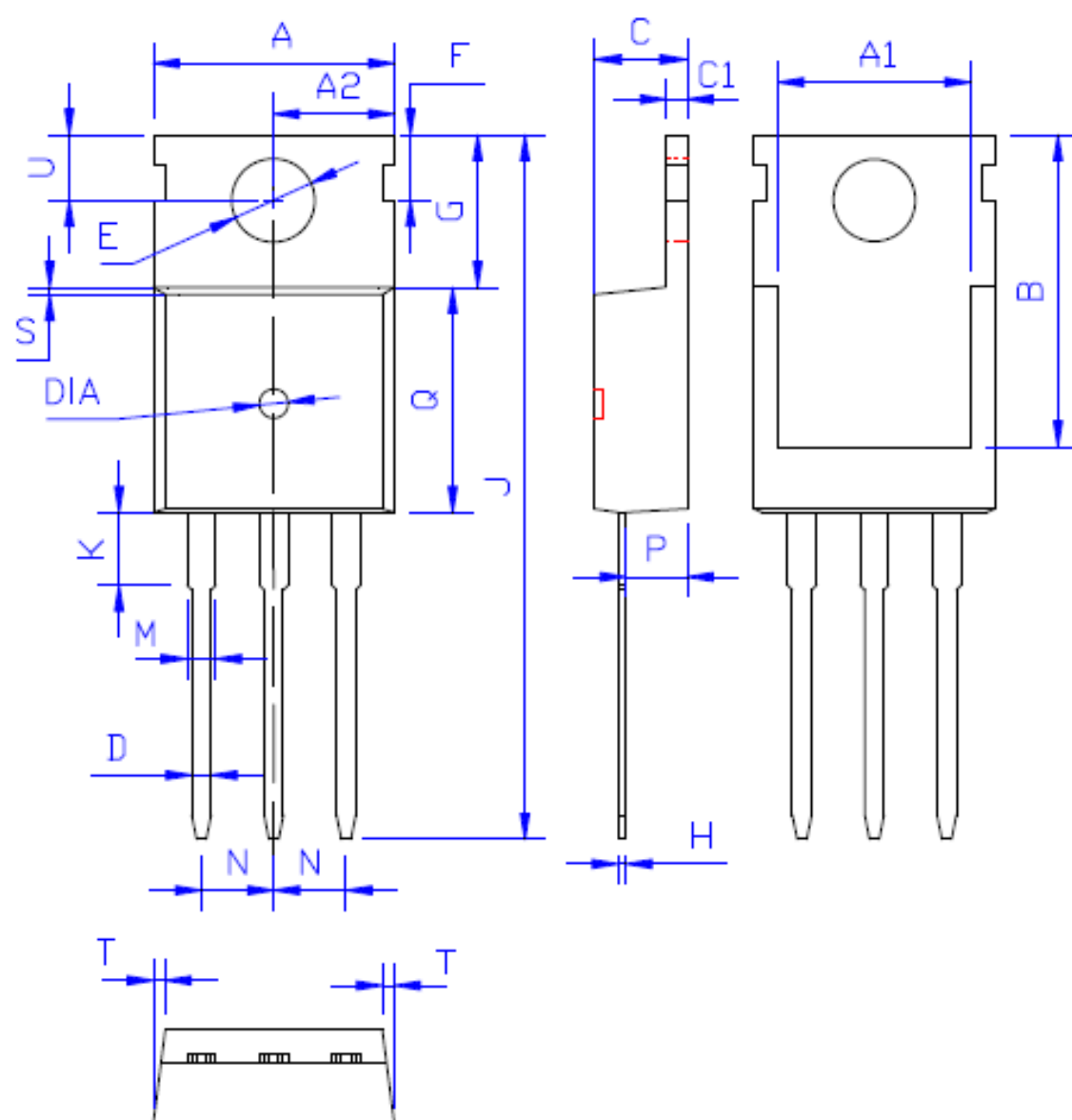
印记 Marking:



外形尺寸:

Package Dimension:

## TO-220



| DIM | MILLIMETERS               |
|-----|---------------------------|
| A   | 10.00±0.30                |
| A1  | 8.00±0.30                 |
| A2  | 5.00±0.30                 |
| B   | 13.20±0.40                |
| C   | 4.50±0.20                 |
| C1  | 1.30±0.20                 |
| D   | 0.80±0.20                 |
| E   | 3.60±0.20                 |
| F   | 3.00±0.30                 |
| G   | 6.60±0.40                 |
| H   | 0.50±0.20                 |
| J   | 28.88±0.50                |
| K   | 3.00±0.30                 |
| M   | 1.30±0.30                 |
| N   | Typical 2.54              |
| P   | 2.40±0.40                 |
| Q   | 9.20±0.40                 |
| S   | 0.25±0.15                 |
| T   | 0.25±0.15                 |
| U   | 2.80±0.30                 |
| DIA | 宽 1.50±0.10<br>深 0.50 MAX |

(Unit: mm)