



# N 沟道增强型场效应晶体管

## N-CHANNEL MOSFET

### FHA150N06C

#### 主要参数 MAIN CHARACTERISTICS

|                       |        |
|-----------------------|--------|
| ID                    | 150 A  |
| VDSS                  | 55 V   |
| Rdson-typ ( @Vgs=10V) | 7.2 mΩ |
| Qg-typ                | 118nC  |

#### 用途 APPLICATIONS

|          |   |
|----------|---|
| 12V 逆变电源 | Power management for 12V inverter systems |
| 同步整流     | Synchronous Rectification                 |

#### 产品特性 FEATURES

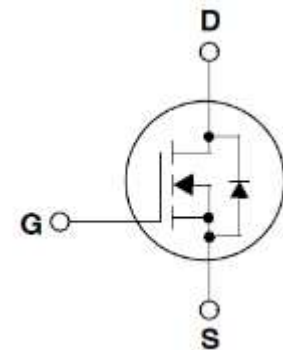
|                    |                           |
|--------------------|---------------------------|
| 低栅极电荷              | Low gate charge           |
| 低 Crss (典型值 850pF) | Low Crss (typical 850pF)  |
| 开关速度快              | Fast switching            |
| 100% 经过雪崩测试        | 100% avalanche tested     |
| 高抗 dv/dt 能力        | Improved dv/dt capability |
| RoHS 产品            | RoHS product              |
| 平面工艺               | Plane process             |

#### 封装形式 Package



TO-3PN  
FHA series

#### 等效电路 Equivalent Circuit



#### 绝对最大额定值 ABSOLUTE RATINGS (Tc=25°C)

| 项目<br>Parameter   | 符号<br>Symbol       | 数值<br>Value | 单位<br>Unit |
|---|--------------------|-------------|------------|
|   |                    | FHA150N06C  |            |
| 最高漏极-源极直流电压<br>Drain-Source Voltage                         | VDS                | 55          | V          |
| 连续漏极电流*<br>Drain Current -continuous *                      | ID (Tc=25°C)       | 150         | A          |
|   | ID (Tc=100°C)      | 105         | A          |
| 最大脉冲漏极电流 (注 1)<br>Drain Current – pulse (note 1)            | IDM                | 450         | 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                | 1500        | mJ         |
| 雪崩电流 (注 1)<br>Avalanche Current (note 1)                    | IAR                | 25          | A          |
| 重复雪崩能量 (注 1)<br>Repetitive Avalanche Current (note 1)       | EAR                | 20          | 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              | 5.0         | V/ns       |
|   |                    |             |            |
| 耗散功率<br>Power Dissipation                                   | PD (TC=25°C)       | 290         | W          |
|   | -Derate above 25°C | 1.69        | W/°C       |
| 最高结温及存储温度<br>Operating and Storage Temperature Range        | TJ, TSTG           | -55~+175    | °C         |
| 引线最高焊接温度<br>Maximum Lead Temperature for Soldering Purposes | TL                 | 300         | °C         |

\*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   | 55        | -         | -         | V           |
| 击穿电压温度特性<br>Breakdown Voltage<br>Temperature Coefficient                     | ΔBV <sub>DSS</sub> /ΔT <sub>J</sub> | I <sub>D</sub> =250μA, referenced to 25°C  | -         | 0.055     | -         | V/°C        |
| 零栅压下漏极漏电流<br>Zero Gate Voltage Drain<br>Current                              | I <sub>DSS</sub>                    | V <sub>DS</sub> =55V, V <sub>GS</sub> =0V, T <sub>C</sub> =25°C  | -         | -         | 1         | μA          |
|  |                                     | V <sub>DS</sub> =44V, T <sub>C</sub> =125°C  | -         | -         | 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> =40A   | -         | 7.2       | 11.5      | mΩ          |
| 正向跨导<br>Forward Transconductance   | g <sub>fs</sub>                     | V <sub>DS</sub> = 20V, I <sub>D</sub> =40A (note 4)  | 40        | -         | -         | 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  | -         | 1.7       | -         | 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  | -         | 3000      | -         | pF          |
| 输出电容<br>Output capacitance   | C <sub>oss</sub>                    |  | -         | 2100      | -         |             |
| 反向传输电容<br>Reverse transfer capacitance                                       | C <sub>rss</sub>                    |  | -         | 850       | -         |             |
| 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> =75A,<br>R <sub>G</sub> =4.5Ω<br>V <sub>GS</sub> =10V<br>(note 4, 5) | -         | 14        | -         | ns          |
| 上升时间<br>Turn-On rise time  | t <sub>r</sub>                      |  | -         | 101       | -         | ns          |
| 延迟时间<br>Turn-Off delay time  | t <sub>d(off)</sub>                 |  | -         | 50        | -         | ns          |
| 下降时间<br>Turn-Off Fall time   | t <sub>f</sub>                      |  | -         | 65        | -         | ns          |
| 栅极电荷总量<br>Total Gate Charge  | Q <sub>g</sub>                      | V <sub>DS</sub> =30V ,<br>I <sub>D</sub> =75A ,<br>V <sub>GS</sub> =10V<br>(note 4, 5)                       | -         | 118       | -         | nC          |
| 栅-源电荷<br>Gate-Source charge  | Q <sub>gs</sub>                     |  | -         | 30        | -         | nC          |
| 栅-漏电荷<br>Gate-Drain charge   | Q <sub>gd</sub>                     |  | -         | 55        | -         | 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>  | -         | -         | 450       | 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> =62A   | -         | 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> =62A ,dI <sub>F</sub> /dt=100A/μs<br>(note 4)                            | -         | 69        | -         | ns          |
| 反向恢复电荷<br>Reverse recovery charge  | Q <sub>rr</sub>                     |  | -         | 143       | -         | nC          |

## 热特性 THERMAL CHARACTERISTIC

| 项目<br>Parameter                                    | 符号<br>Symbol | 最大值<br>Max | 单位<br>Unit |
|--|--------------|------------|------------|
| 结到管壳的热阻<br>Thermal Resistance, Junction to Case    | Rth(j-c)     | 0.31       | °C/W       |
| 结到环境的热阻<br>Thermal Resistance, Junction to Ambient | Rth(j-A)     | 40         | °C/W       |

注释:

- 1: 脉冲宽度由最高结温限制
- 2: L=1mH, IAS=25A, VDD=44V, RG=25 Ω, 起始结温 TJ=25°C
- 3: ISD ≤150A, di/dt ≤300A/μs, VDD≤BVDS, 起始结温 TJ=25°C
- 4: 脉冲测试: 脉冲宽度 ≤300μs, 占空比≤2%
- 5: 基本与工作温度无关

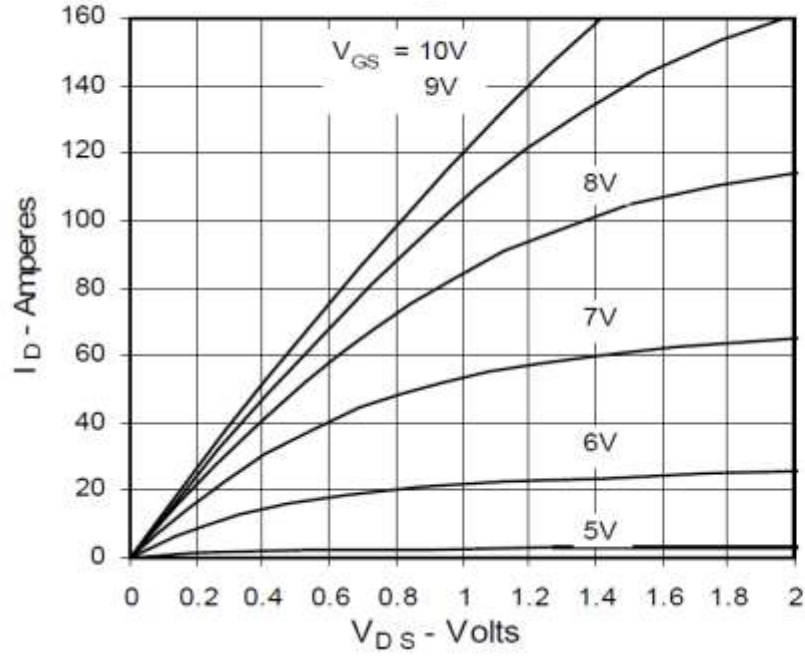
Notes:

- 1: Pulse width limited by maximum junction temperature
- 2: L=1mH, IAS=25A, VDD=44V, RG=25 Ω, Starting TJ=25°C
- 3: ISD ≤150A, di/dt ≤300A/μs, VDD≤BVDS, Starting TJ=25°C
- 4: Pulse Test: Pulse Width ≤300μs, Duty Cycle≤2%
- 5: Essentially independent of operating temperatur

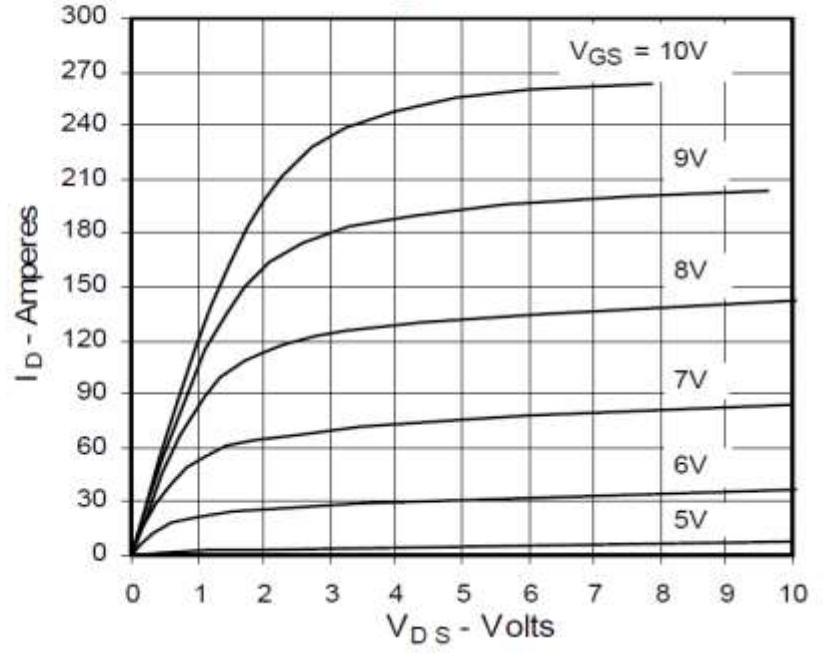
# 特性曲线

## Typical Characteristics

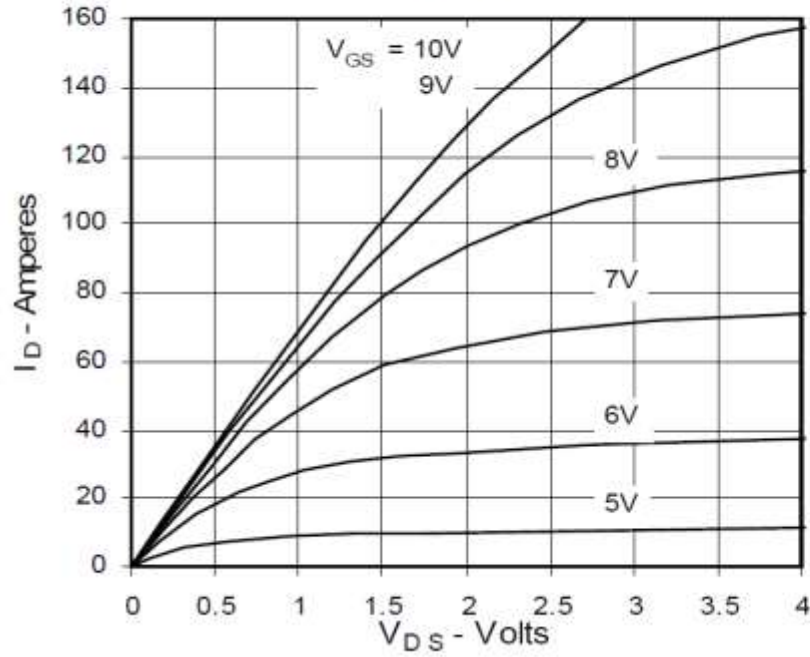
**Fig. 1. Output Characteristics @ 25°C**



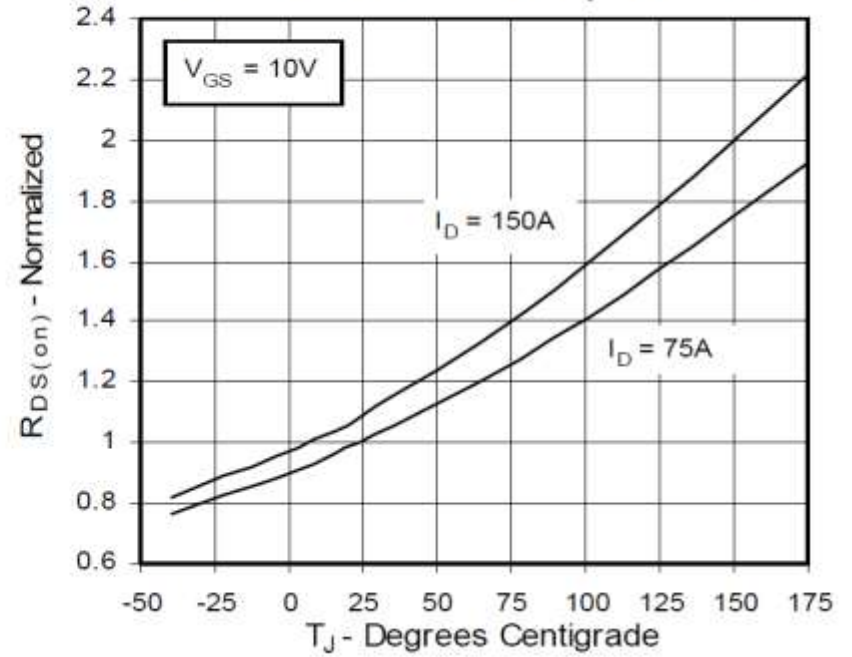
**Fig. 2. Extended Output Characteristics @ 25°C**



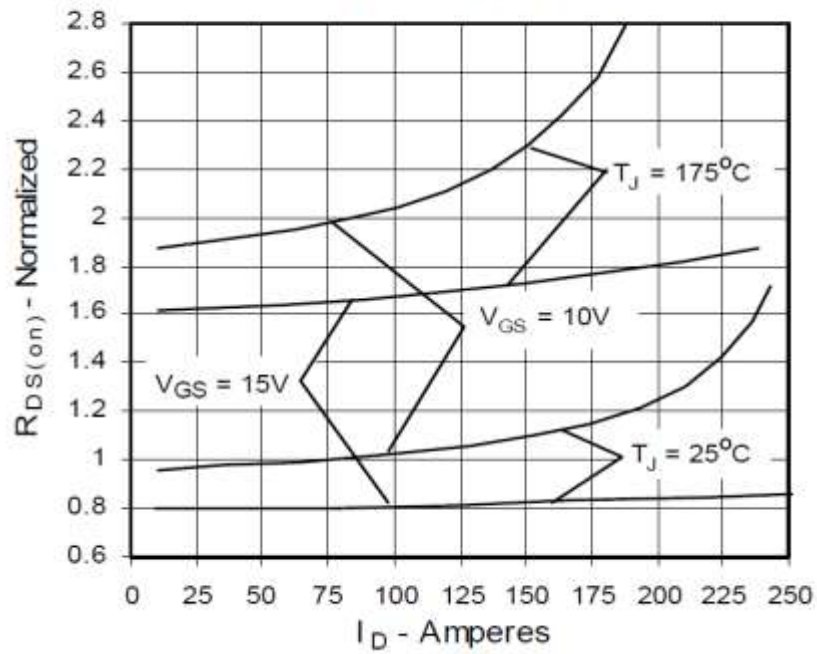
**Fig. 3. Output Characteristics @ 150°C**



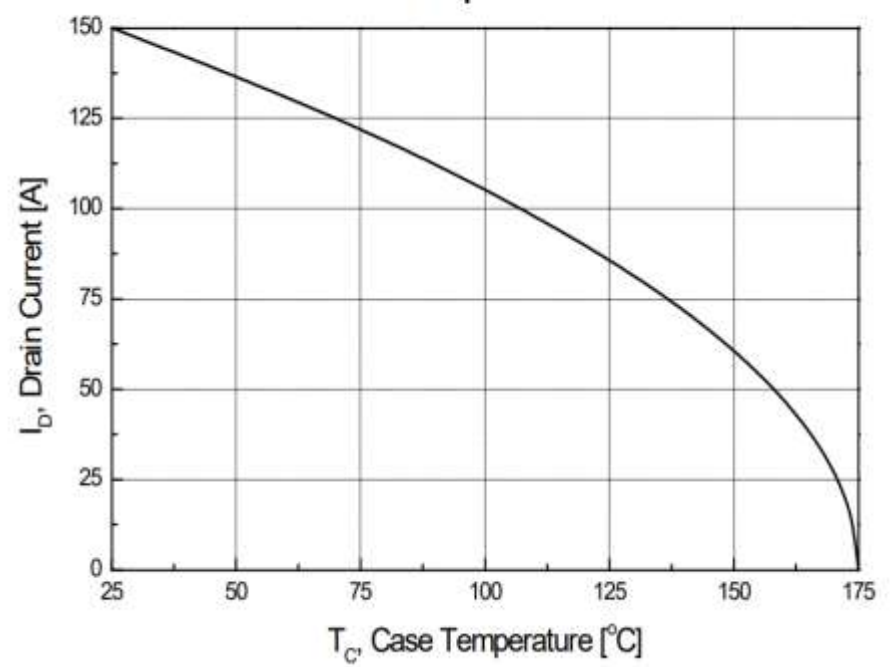
**Fig. 4.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$  Value vs. Junction Temperature**



**Fig. 5.  $R_{DS(on)}$  Normalized to 0.5  $I_{D25}$  Value vs. Drain Current**

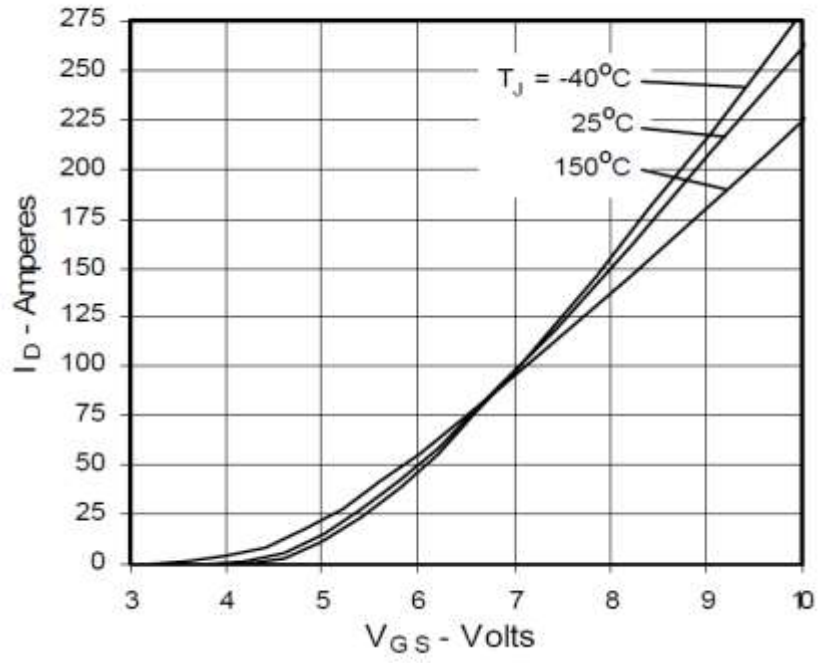


**Fig. 6. Drain Current vs. Case Temperature**

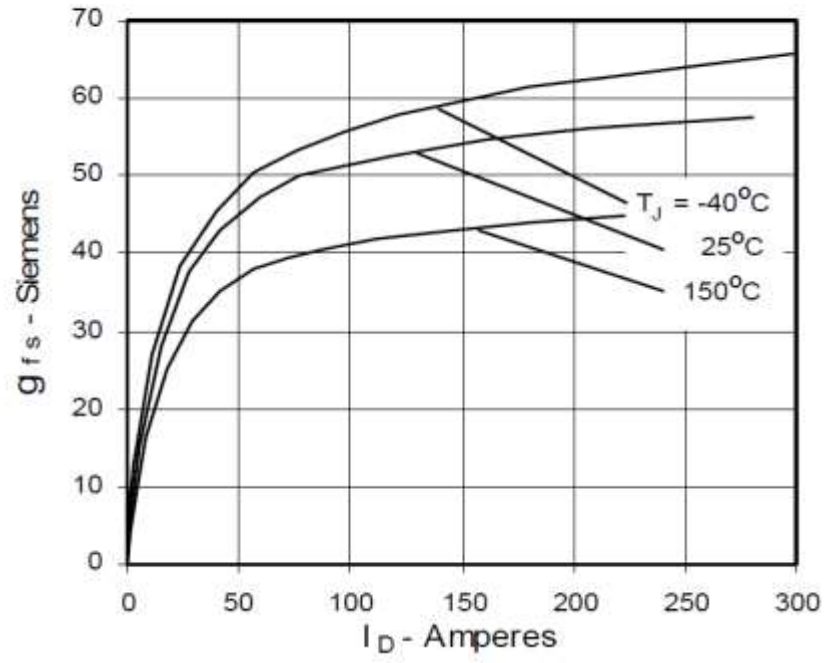




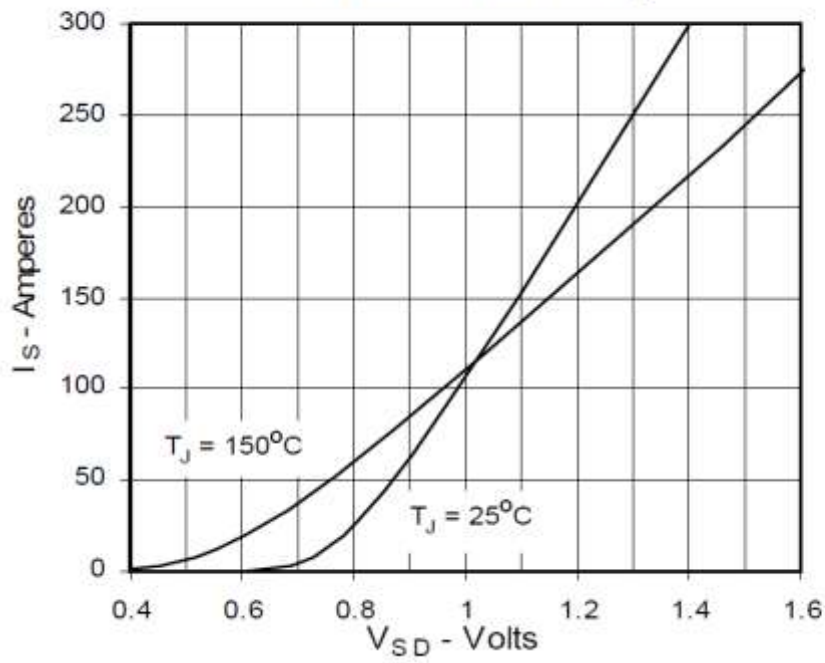
**Fig. 7. Input Admittance**



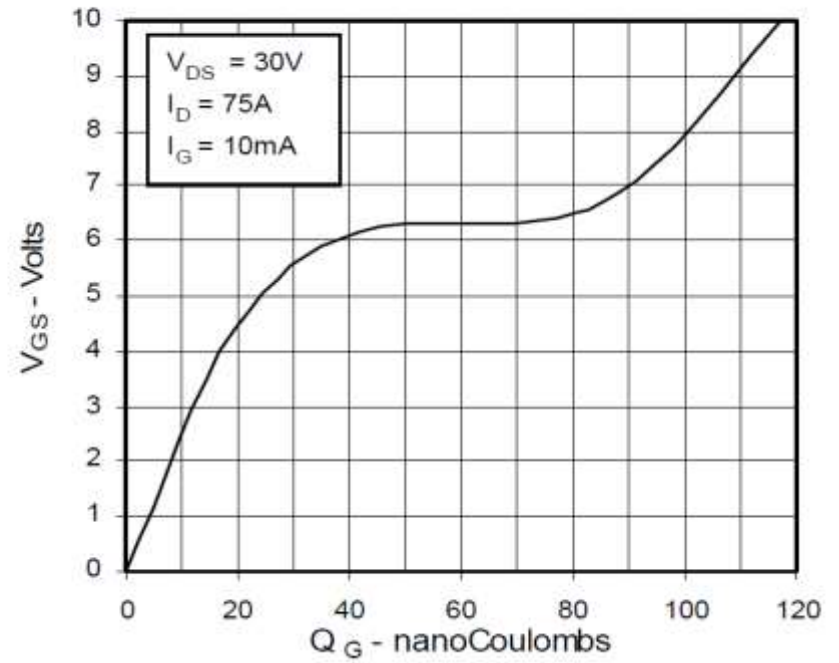
**Fig. 8. Transconductance**



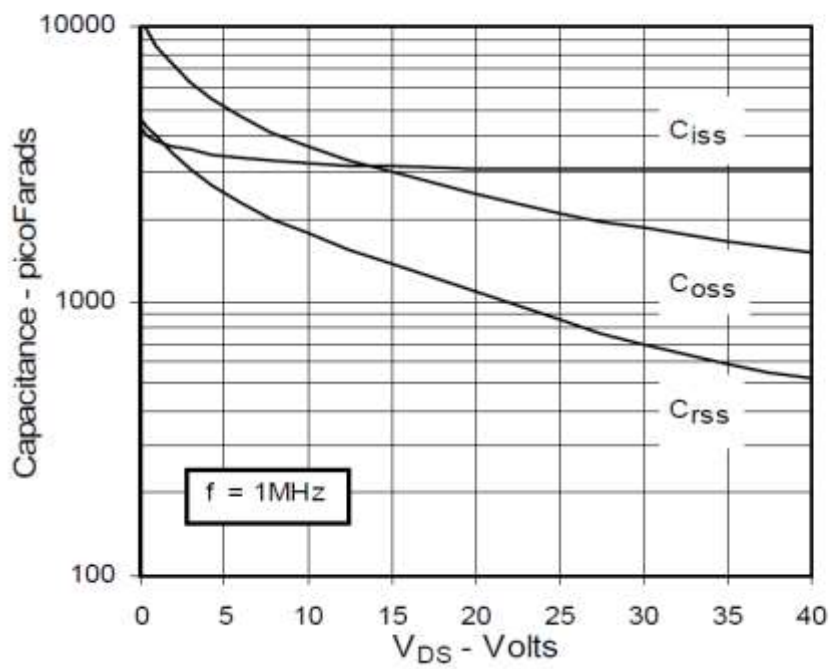
**Fig. 9. Source Current vs. Source-To-Drain Voltage**



**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



**Fig. 12. Forward-Bias Safe Operating Area**

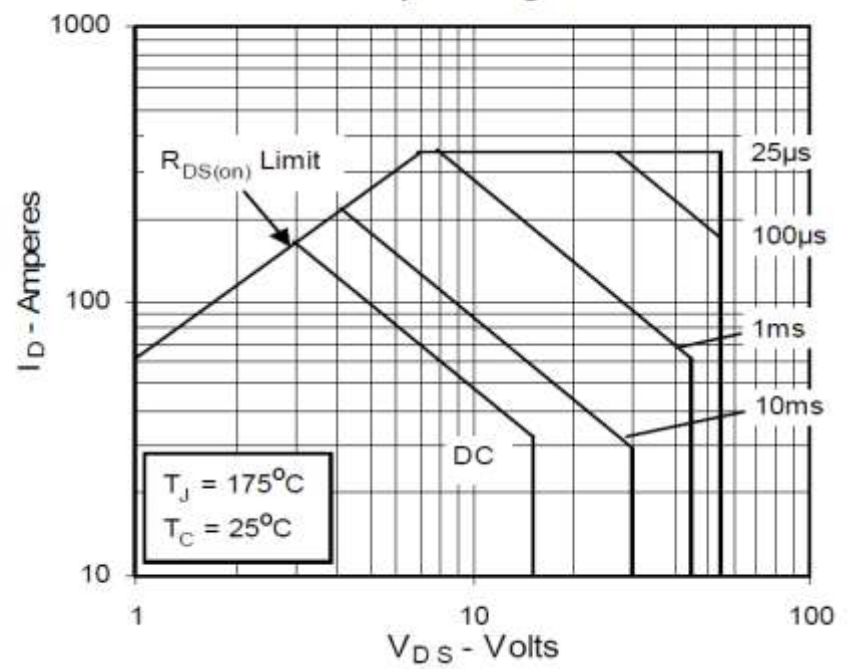
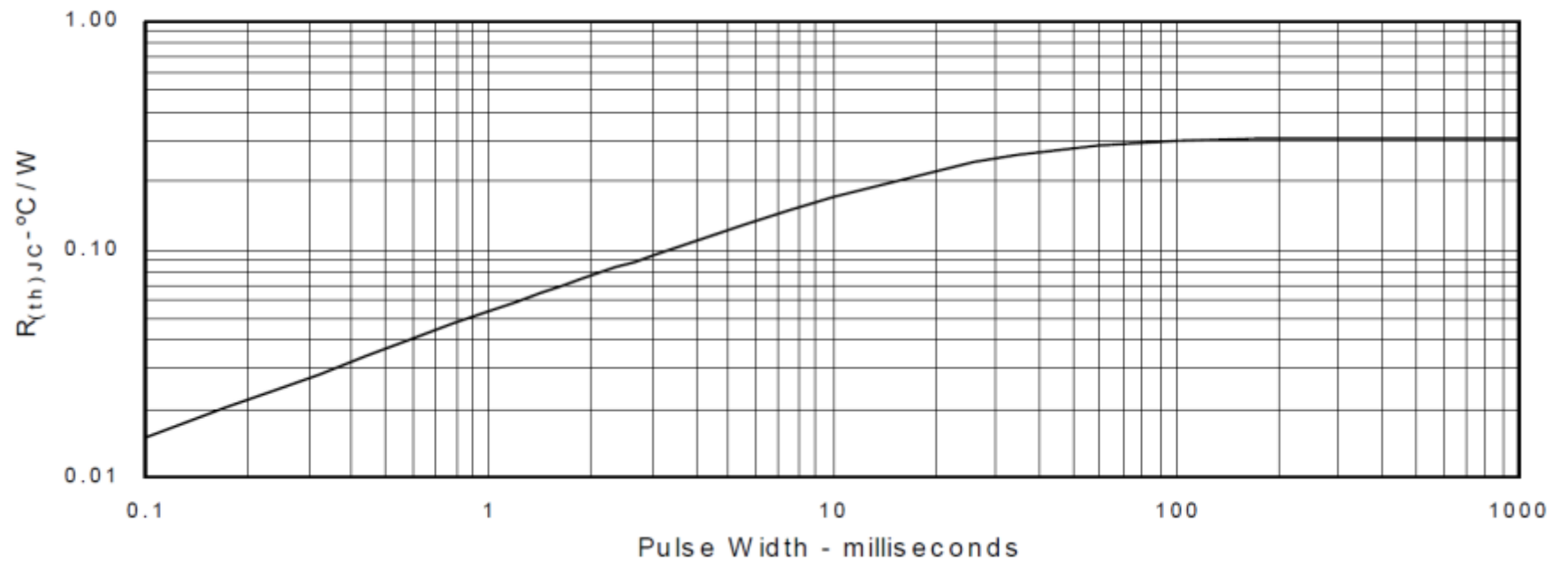
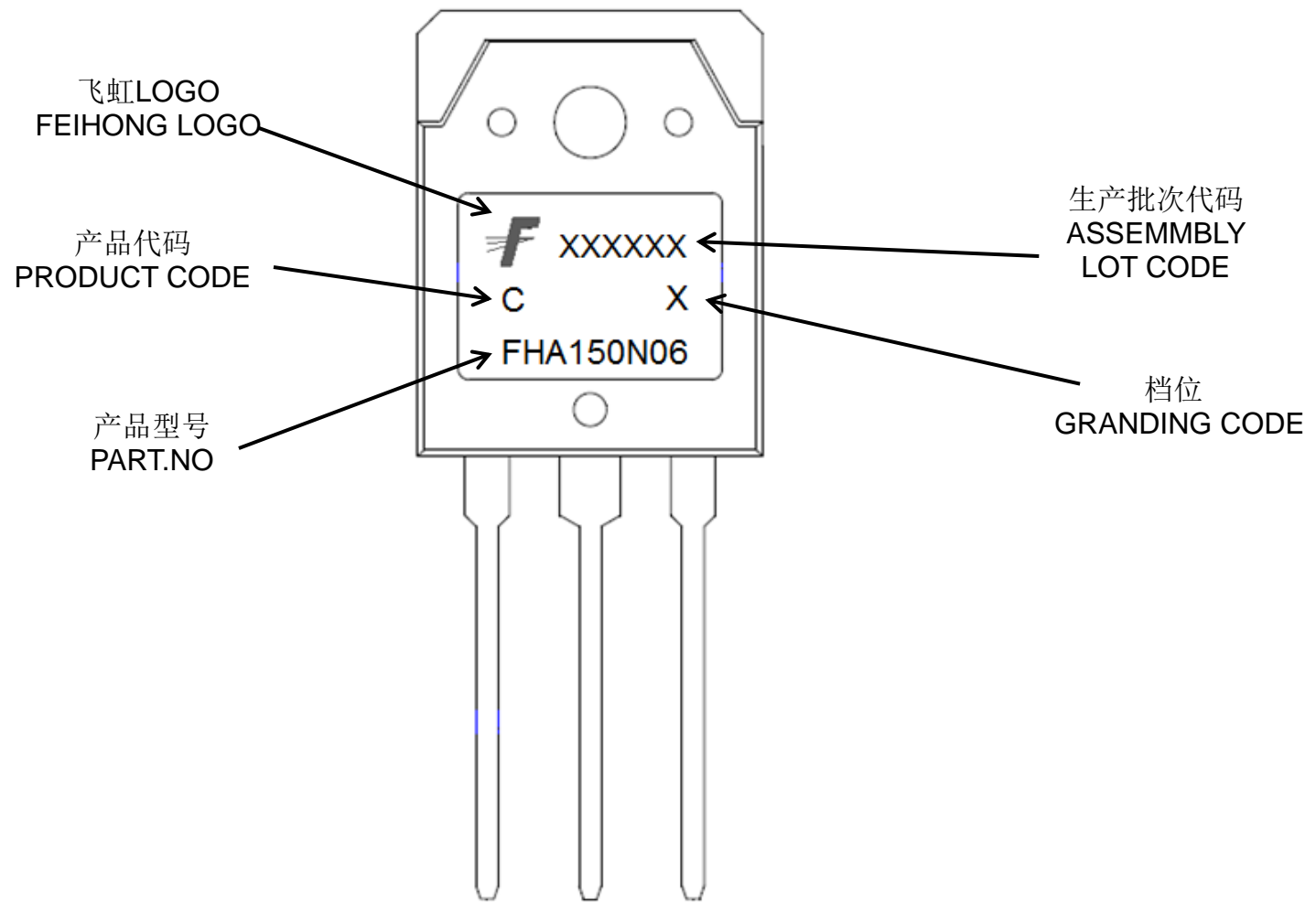


Fig. 13. Maximum Transient Thermal Resistance



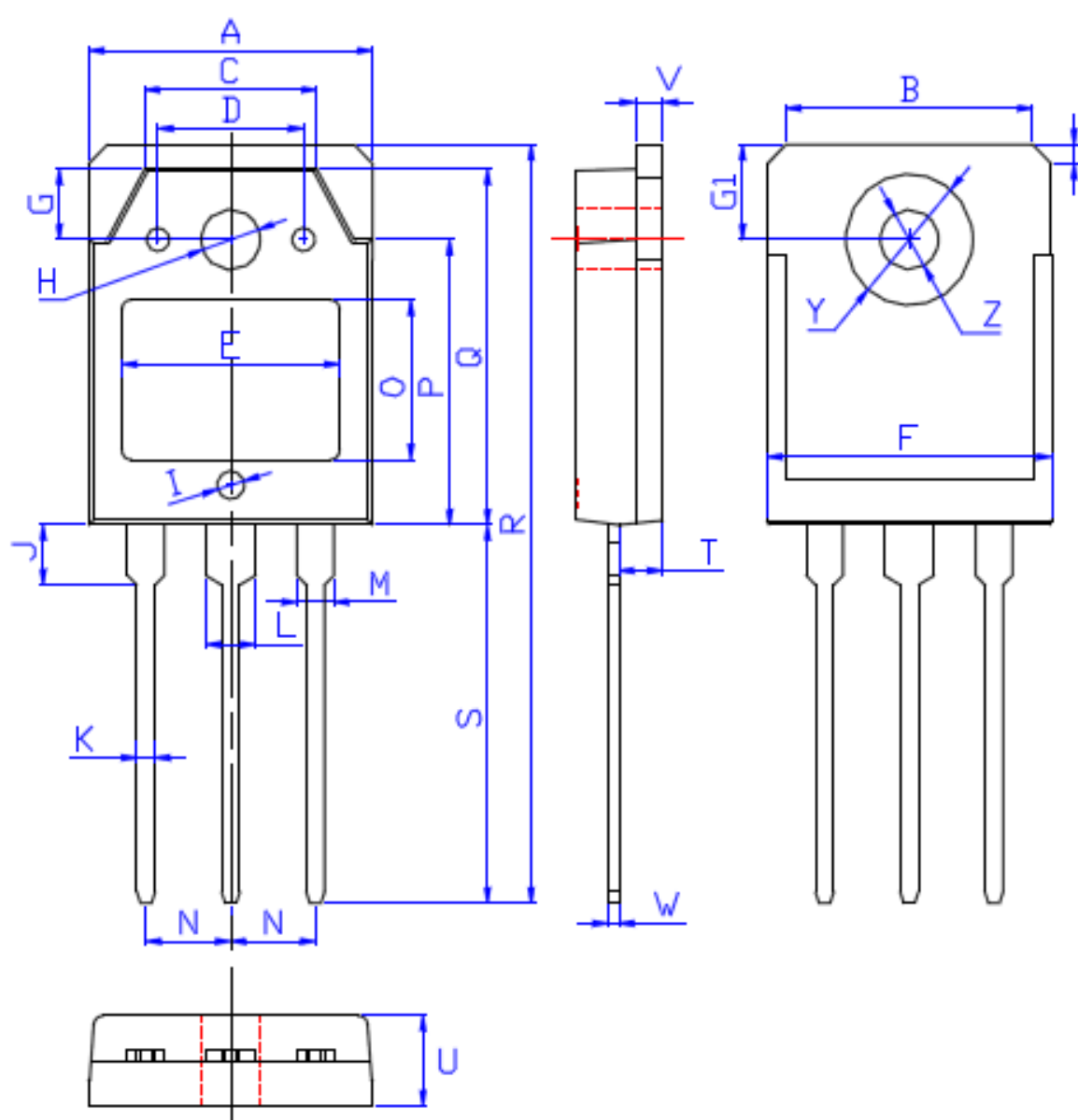
印记 Marking:



外形尺寸:

Package Dimension:

### TO-3PN



| DIM | MILLIMETERS              |
|-----|--------------------------|
| A   | 15.60±0.30               |
| B   | 13.60±0.30               |
| C   | 9.50±0.30                |
| D   | 8.00±0.30                |
| E   | 11.85±0.30               |
| F   | 15.65±0.30               |
| G   | 3.80±0.30                |
| G1  | 5.00±0.30                |
| H   | Φ3.50±0.30               |
| I   | Φ1.50±0.30<br>深0.15±0.15 |
| J   | 3.20±0.30                |
| K   | 1.00±0.15                |
| L   | 3.10±0.15                |
| M   | 2.10±0.15                |
| N   | 5.45±0.30                |
| O   | 8.40±0.30                |
| P   | 13.90±0.30               |
| Q   | 18.70±0.30               |
| R   | 40.00±0.60               |
| S   | 20.00±0.40               |
| T   | 2.40±0.30                |
| U   | 4.80±0.30                |
| V   | 1.50±0.15                |
| W   | 0.60±0.15                |
| X   | 1.80±0.40                |
| Y   | 7.00±0.30                |
| Z   | 3.20±0.30                |

(Unit: mm)