# N 沟道增强型场效应晶体管
# N-CHANNEL MOSFET
# FHP80N07D/FHS80N07D/FHD80N07D

## 主要参数 MAIN CHARACTERISTICS

| | |
|---|---|
| ID | 81A |
| VDSS | 68 V |
| Rdson-typ（ @Vgs=10V） | 6.9 mΩ |
| Qg-typ | 98nC |

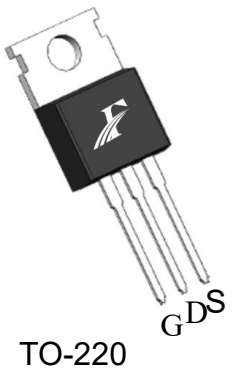
## 产品特性 FEATURES

| | |
|---|---|
| 低栅极电荷 | Low gate charge |
| 低 Crss (典型值 262pF) | Low Crss (typical 262pF ) |
| 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 |

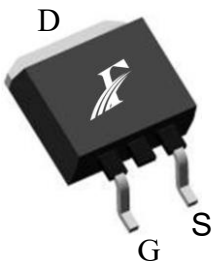
## 用途 APPLICATIONS

| | |
|---|---|
| 电池管理系统 | BMS |
| 电机控制和驱动 | Motor control and drive |
| 逆变电源 | Power management for inverter systems |

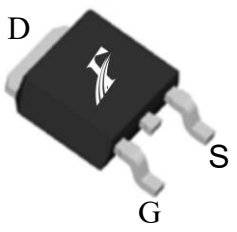
## 封装形式 Package




TO-220
FHP series

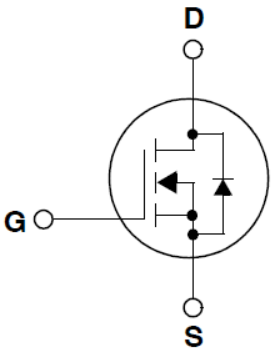



TO-263
FHS series




TO-252
FHD series

## 等效电路 Equivalent Circuit




## 绝对最大额定值 ABSOLUTE RATINGS (Tc=25℃)

| 项目 **Parameter** | 符号 **Symbol** | 数值 **Value** | | | 单位 **Unit** |
|---|---|---|---|---|---|
| | | **FHP80N07D** | **FHS80N07D** | **FHD80N07D** | |
| 最高漏极－源极直流电压 Drain-Source Voltage | $V_{DS}$ | 68 | | | V |
| 连续漏极电流* | $I_D$（$T_C$=25℃） | 81 | | | A |
| Drain Current -continuous * | $I_D$（$T_C$=100℃) | 58 | | | A |
| 最大脉冲漏极电流（注 1） Drain Current – pulse（note 1） | $I_{DM}$ | 324 | | | A |
| 最高栅源电压 Gate-Source Voltage | $V_{GS}$ | ±20 | | | V |
| 单脉冲雪崩能量（注 2） Single Pulsed Avalanche Energy（note 2） | $E_{AS}$ | 132 | | | mJ |
| 雪崩电流（注 1） Avalanche Current（note 1） | $I_{AR}$ | 23 | | | A |
| 重复雪崩能量（注 1） Repetitive Avalanche Current（note 1） | $E_{AR}$ | 16 | | | mJ |
| 二极管反向恢复最大电压变化速率（注 3） Peak Diode Recovery dv/dt（note 3） | dv/dt | 5.0 | | | V/ns |
| 耗散功率 | $P_D$ （TC=25℃） | 151 | 151 | 63 | W |
| Power Dissipation | -Derate above 25℃ | 1.2 | 1.2 | 0.5 | W/℃ |
| 最高结温及存储温度 Operating and Storage Temperature Range | $T_J$，$T_{STG}$ | -55～+150 | | | ℃ |
| 引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes | $T_L$ | 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 **Off –Characteristics** | | | | | | |
| 漏一源击穿电压 Drain-Source Voltage | $BV_{DSS}$ | $I_D$=250μA, $V_{GS}$=0V | 68 | - | - | V |
| 击穿电压温度特性<br>Breakdown Voltage Temperature Coefficient | $\Delta BV_{DSS}/\Delta T_J$ | $I_D$=250μA, referenced to 25℃ | - | 0.06 | - | V/℃ |
| 零栅压下漏极漏电流<br>Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=60V,$V_{GS}$=0V, $T_C$=25℃ | - | - | 1 | μA |
| | | $V_{DS}$=48V, $T_C$=125℃ | - | - | 100 | μA |
| 栅极体漏电流<br>Gate-body leakage current | $I_{GSS}$（F/R） | $V_{DS}$=0V, $V_{GS}$ =±20V | - | - | ±100 | nA |
| 通态特性 **On-Characteristics** | | | | | | |
| 阈值电压<br>Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$=250μA | 2 | 3 | 4 | V |
| 静态导通电阻<br>Static Drain-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$ =10V , $I_D$=40A | - | 6.9 | 8.5 | mΩ |
| 正向跨导<br>Forward Transconductance | gfs | $V_{DS}$ = 5V, $I_D$=40A（note 4） | - | 133 | - | S |
| 动态特性 **Dynamic Characteristics** | | | | | | |
| 栅电阻<br>Gate Resistance | Rg | f=1.0MHz,<br>$V_{DS}$ OPEN | - | 1.2 | - | Ω |
| 输入电容<br>Input capacitance | Ciss | $V_{DS}$=32V,<br>$V_{GS}$ =0V,<br>f=1.0MHz | - | 4496 | - | pF |
| 输出电容<br>Output capacitance | Coss | | - | 360 | - | |
| 反向传输电容<br>Reverse transfer capacitance | Crss | | - | 262 | - | |
| 开关特性 **Switching Characteristics** | | | | | | |
| 延迟时间<br>Turn-On delay time | td(on) | $V_{DS}$=32V,<br>$I_D$=40A,<br>$R_G$=2.7Ω<br>$V_{GS}$ =10V<br>（note 4，5） | - | 18 | - | ns |
| 上升时间<br>Turn-On rise time | tr | | - | 69 | - | ns |
| 延迟时间<br>Turn-Off delay time | td(off) | | - | 51 | - | ns |
| 下降时间<br>Turn-Off Fall time | tf | | - | 69 | - | ns |
| 栅极电荷总量<br>Total Gate Charge | Qg | $V_{DS}$ =32V ,<br>$I_D$=40A ,<br>$V_{GS}$ =10V<br>（note 4，5） | - | 98 | - | nC |
| 栅一源电荷<br>Gate-Source charge | Qgs | | - | 26 | - | nC |
| 栅一漏电荷<br>Gate-Drain charge | Qgd | | - | 58 | - | nC |
| 漏一源二极管特性及最大额定值 **Drain-Source Diode Characteristics and Maximum Ratings** | | | | | | |
| 正向最大连续电流<br>Maximum Continuous Drain - Source Diode Forward Current | $I_S$ | | - | - | 81 | A |
| 正向最大脉冲电流<br>Maximum Pulsed Drain-Source Diode Forward Current | $I_{SM}$ | | - | - | 324 | A |
| 正向压降<br>Drain-Source Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V, $I_S$=40A | - | 0.9 | 1.3 | V |
| 反向恢复时间<br>Reverse recovery time | trr | $V_{GS}$=0V, $I_S$=40A ,$dI_F/dt$=100A/μs<br>(note 4) | - | 39 | - | ns |
| 反向恢复电荷<br>Reverse recovery charge | Qrr | | - | 60 | - | nC |

## 热特性 THERMAL CHARACTERISTIC

| 项目<br>Parametere | 符号<br>Symbol | FHP80N07D | FHS80N07D | FHD80N07D | 单位<br>Unit |
|---|---|---|---|---|---|
| 结到管壳的热阻<br>Thermal Resistance, Junction to Case | Rth(j-c) | 0.65 | 0.65 | 1.98 | ℃/W |
| 结到环境的热阻<br>Thermal Resistance, Junction to Ambient | Rth(j-A) | 62.5 | 62.5 | 105 | ℃/W |

注释:
1：脉冲宽度由最高结温限制
2：L=0.5mH, $I_{AS}$=23A, $V_{DD}$=48V, $R_G$=25 Ω,起始结温 $T_J$=25℃
3：$I_{SD}$ ≤81A,di/dt ≤300A/μs,$V_{DD}$≤$BV_{DSS}$,起始结温 $T_J$=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=0.5mH, $I_{AS}$=23A, $V_{DD}$=48V, $R_G$=25 Ω,Starting $T_J$=25℃
3：$I_{SD}$ ≤81A,di/dt ≤300A/μs,$V_{DD}$≤$BV_{DSS}$, Starting $T_J$=25℃
4：Pulse Test：Pulse Width ≤300μs,Duty Cycle≤2%
5：Essentially independent of operating temperature

## Typical Characteristics

## 典型特性曲线

Fig 1: Output Characteristics

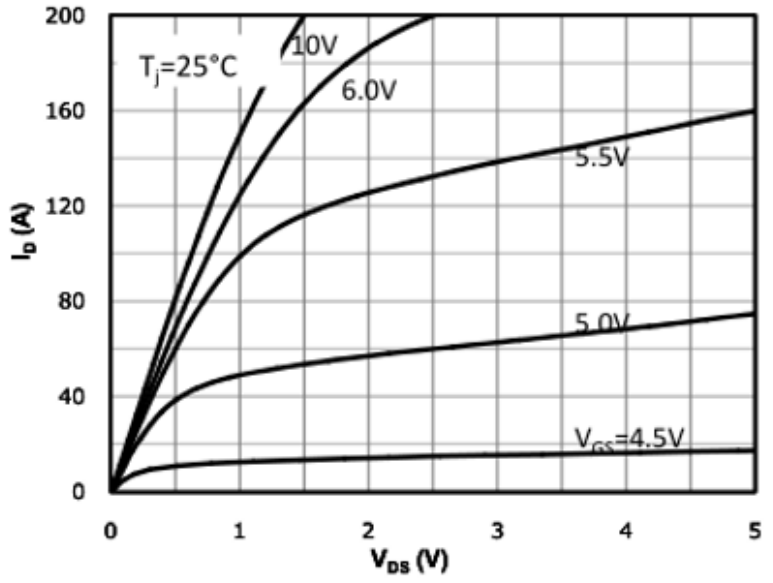



Fig 2: Transfer Characteristics

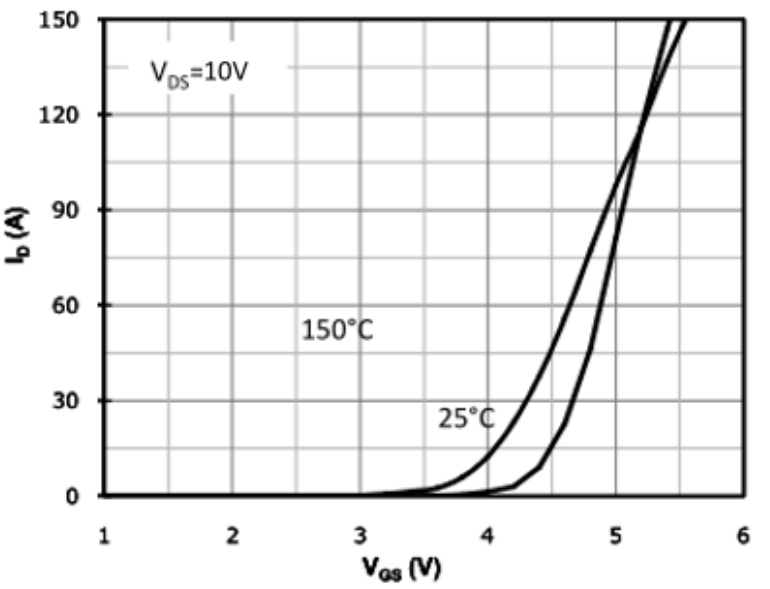



Fig 3: Rds(on) vs Drain Current and Gate Voltage

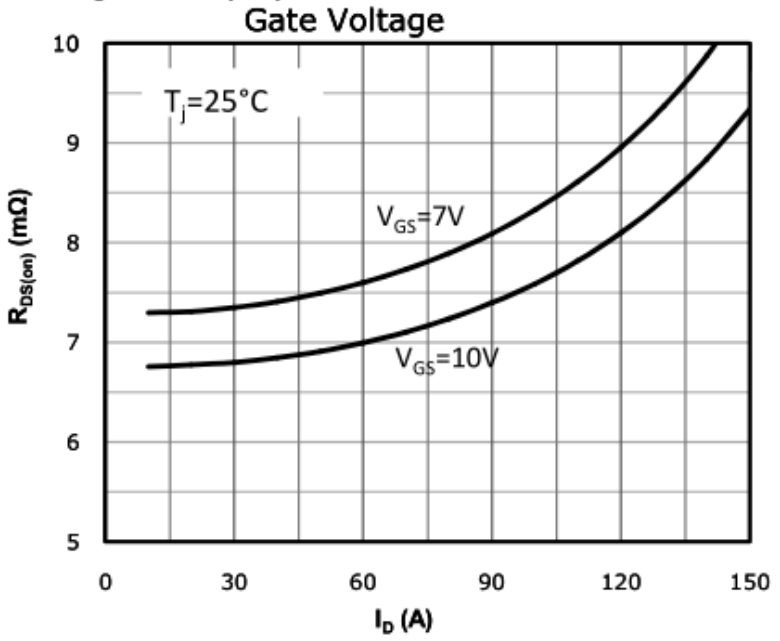



Fig 4: Rds(on) vs Gate Voltage

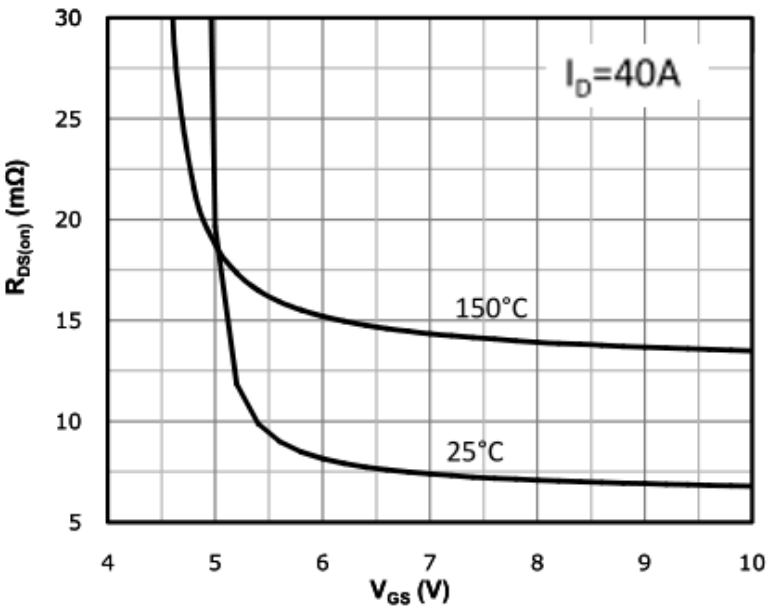



Fig 5: Rds(on) vs. Temperature

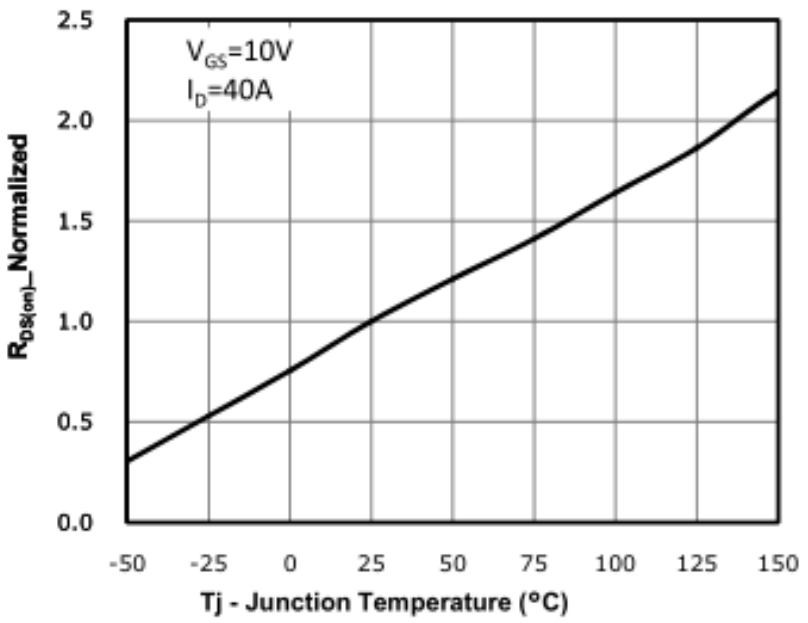



Fig 6: Capacitance Characteristics

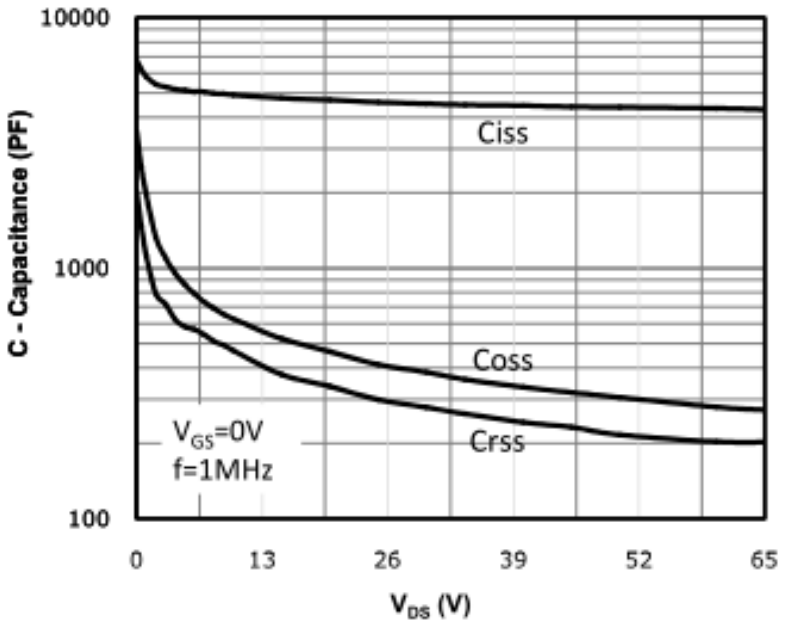


Fig 7: Gate Charge Characteristics

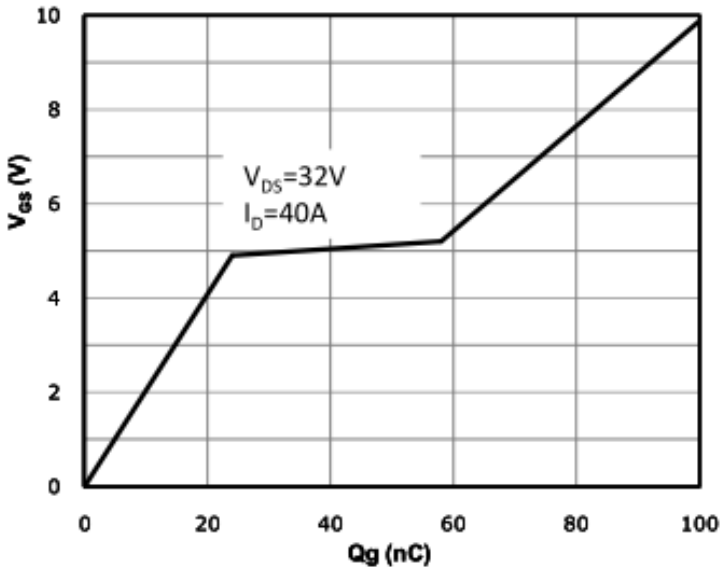



Fig 8: Body-diode Forward Characteristics

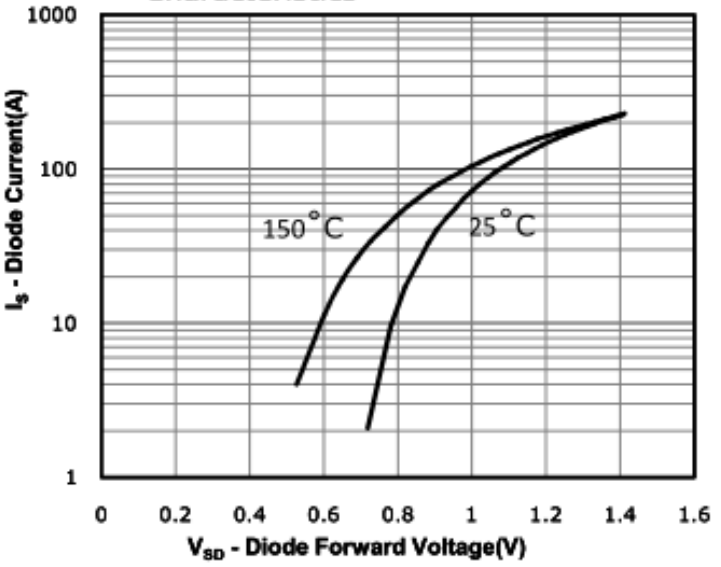



Fig 9: Power Dissipation

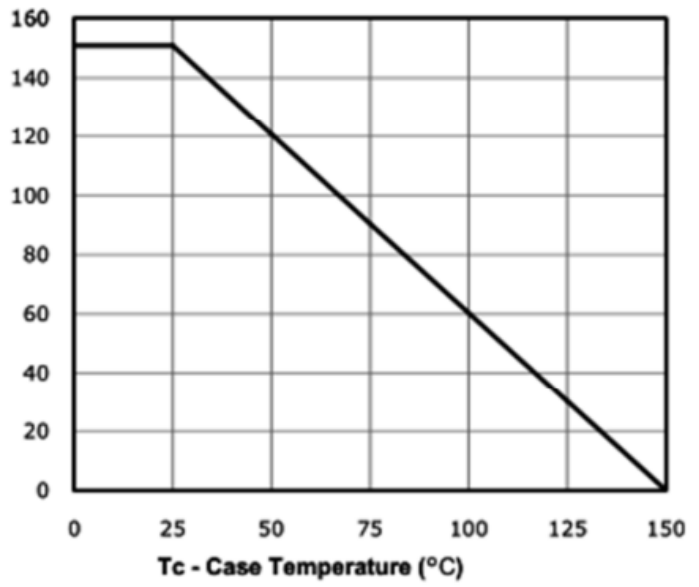



Fig 10: Drain Current Derating

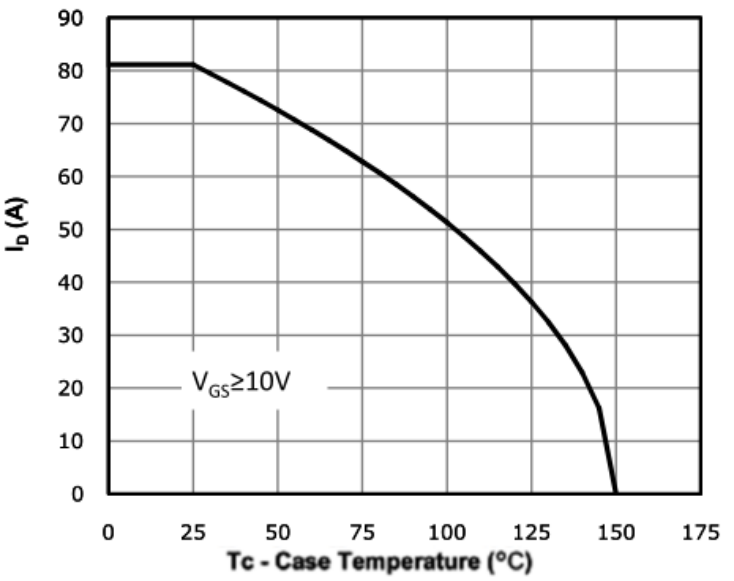



Fig 11: Safe Operating Area

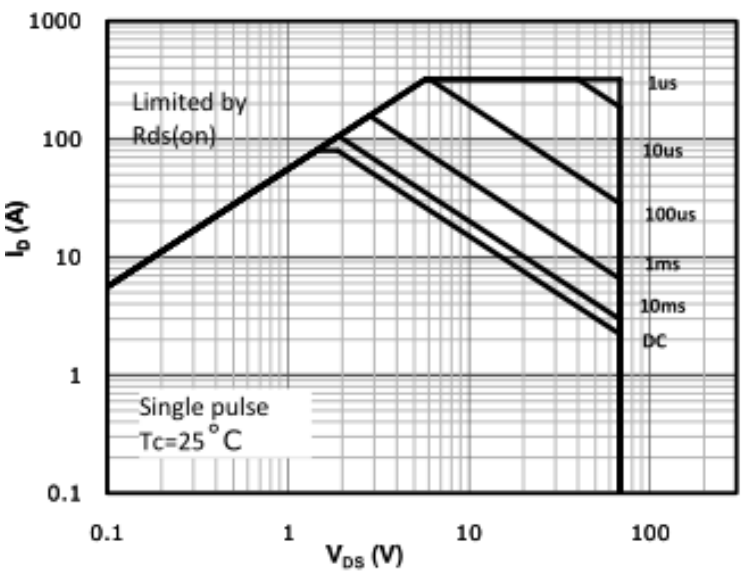
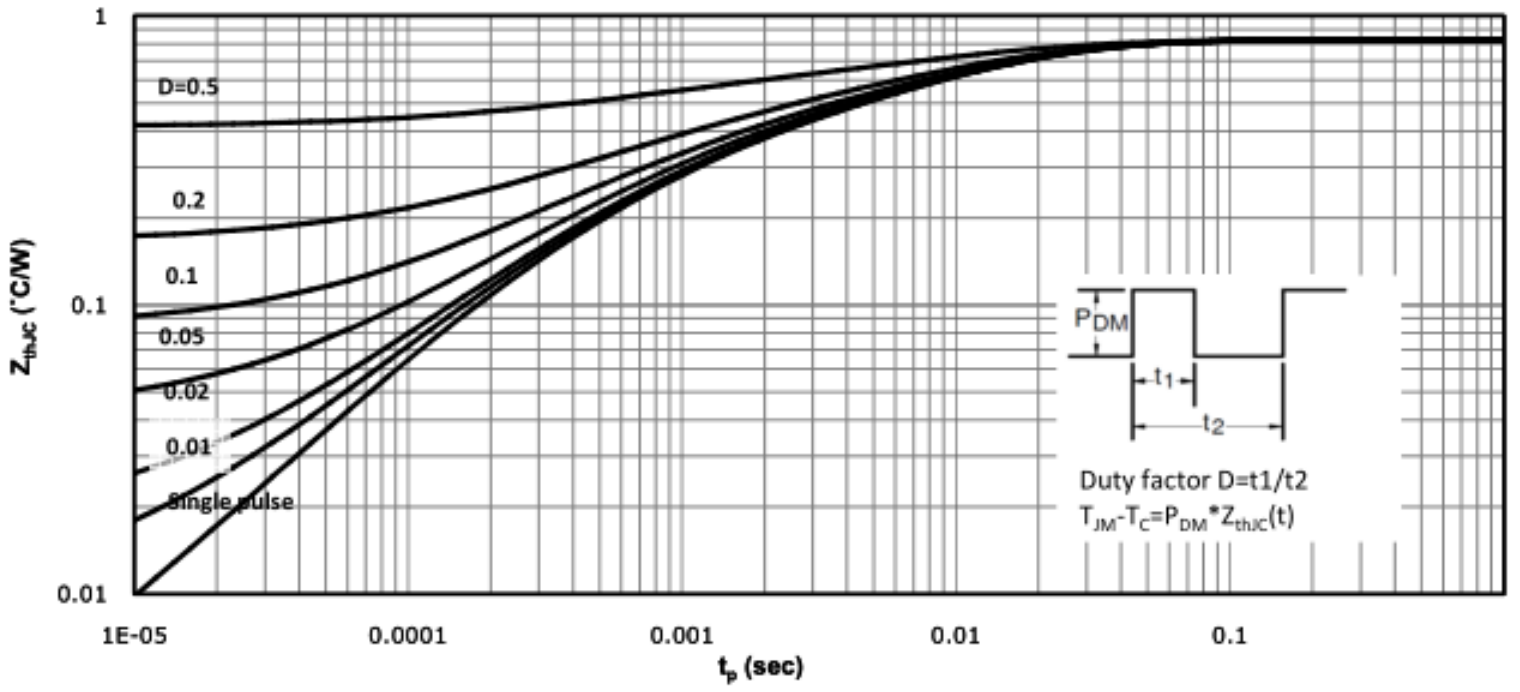
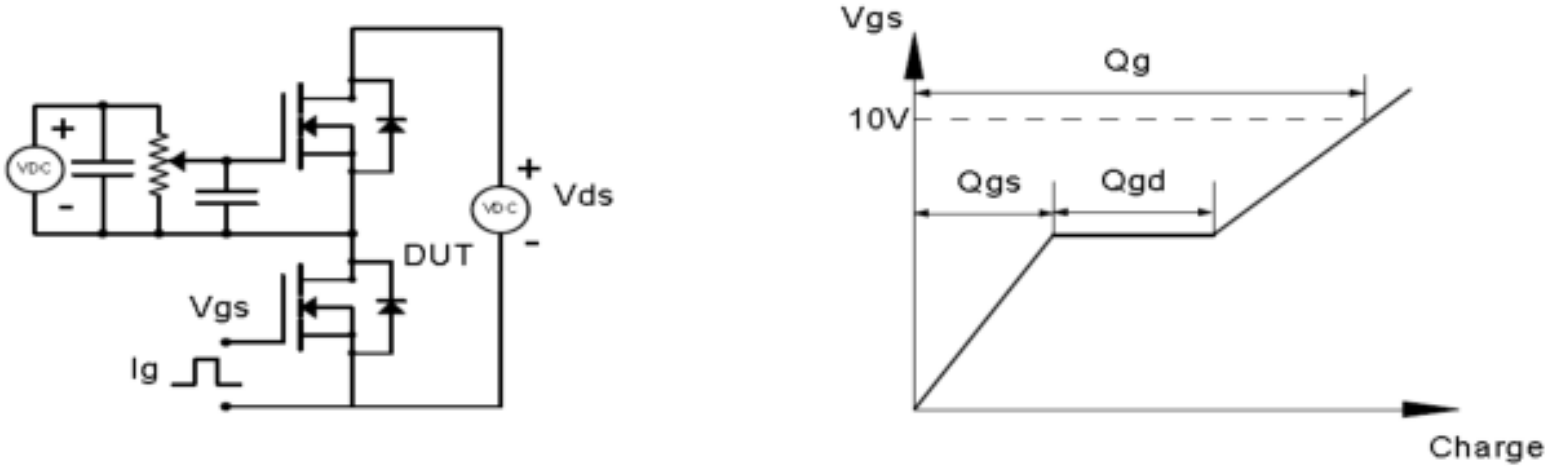



Fig 12: Max. Transient Thermal Impedance

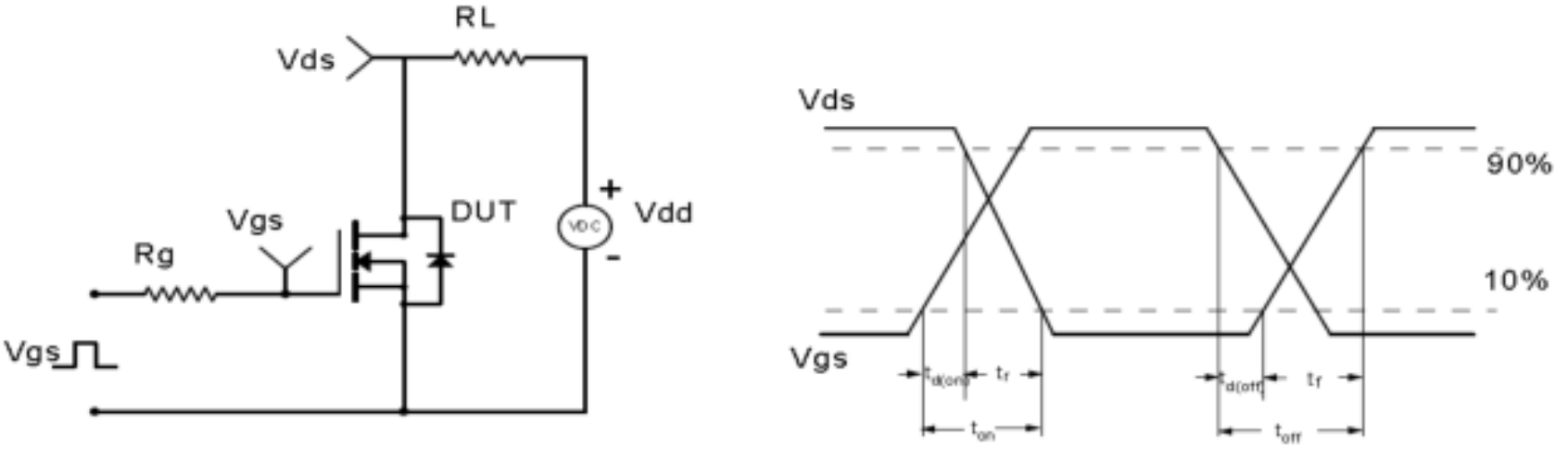


## Test Circuit & Waveform

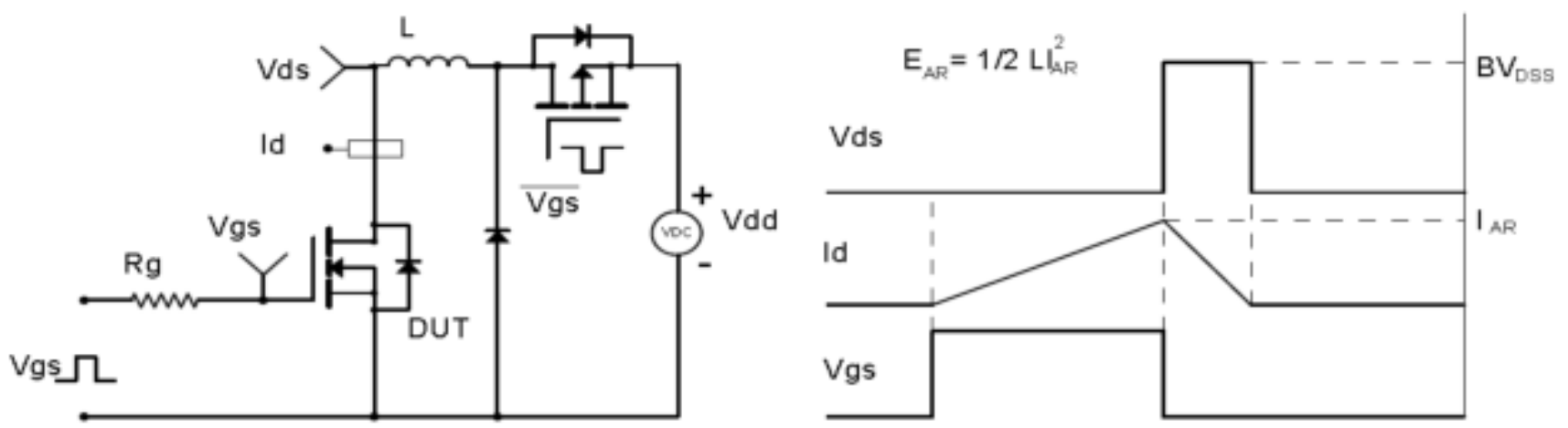
Gate Charge Test Circuit & Waveform



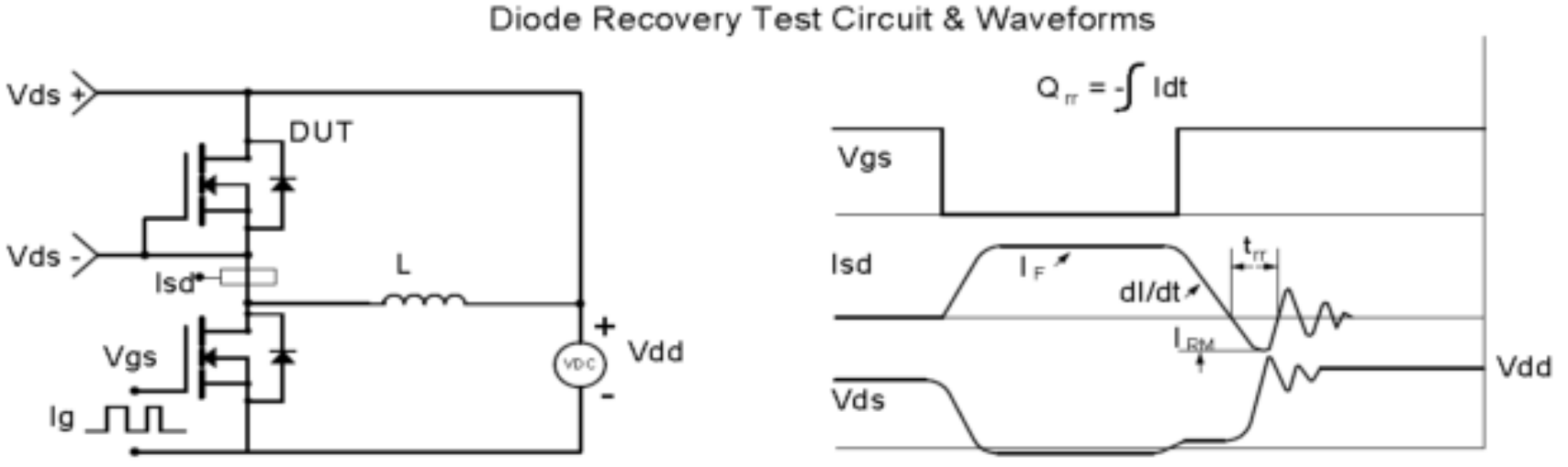

Resistive Switching Test Circuit & Waveforms



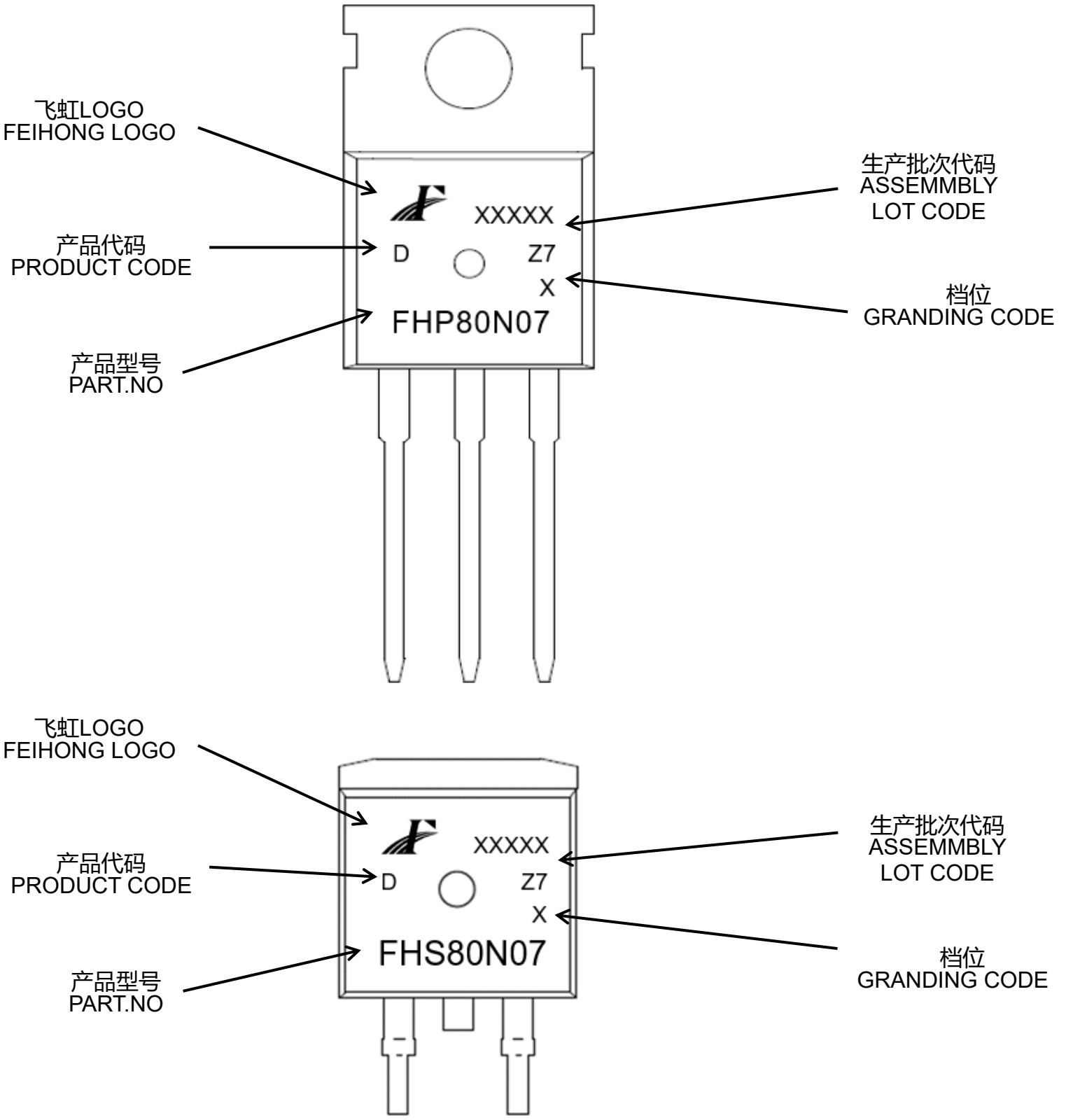

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms




Diode Recovery Test Circuit & Waveforms



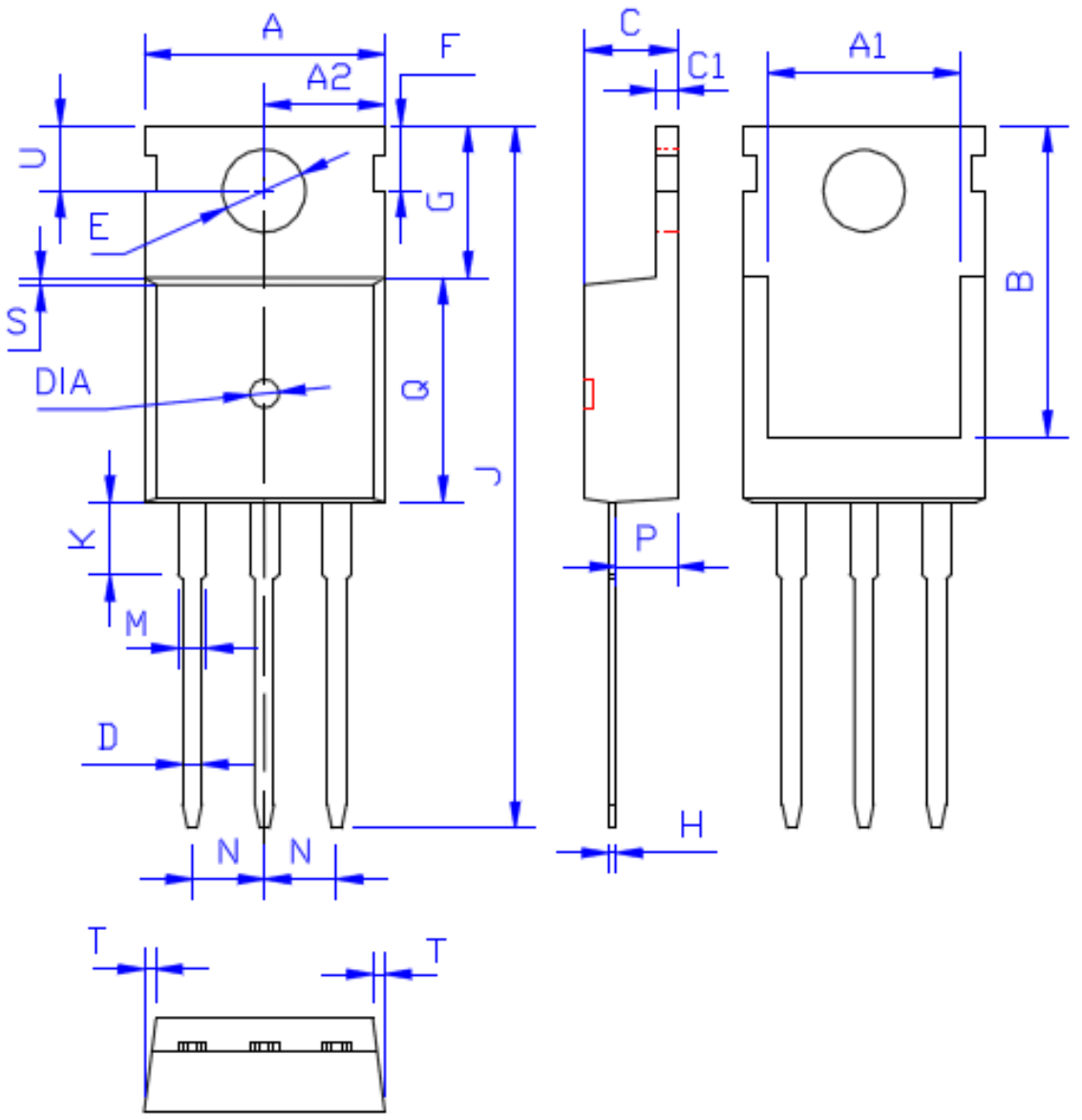
## 印记 Marking:


飞虹LOGO
FEIHONG LOGO
产品代码
PRODUCT CODE
产品型号
PART.NO
XXXXX
D
Z7
X
FHP80N07
生产批次代码
ASSEMMBLY
LOT CODE
档位
GRANDING CODE
飞虹LOGO
FEIHONG LOGO
产品代码
PRODUCT CODE
产品型号
PART.NO
XXXXX
D
Z7
X
FHS80N07
生产批次代码
ASSEMMBLY
LOT CODE
档位
GRANDING CODE
飞虹LOGO
FEIHONG LOGO
产品代码
PRODUCT CODE
产品型号
PART.NO
XXXXXX
D
Z7
FHD80N07
生产批次代码
ASSEMMBLY
LOT CODE

外形尺寸：

Package Dimension：

TO-220



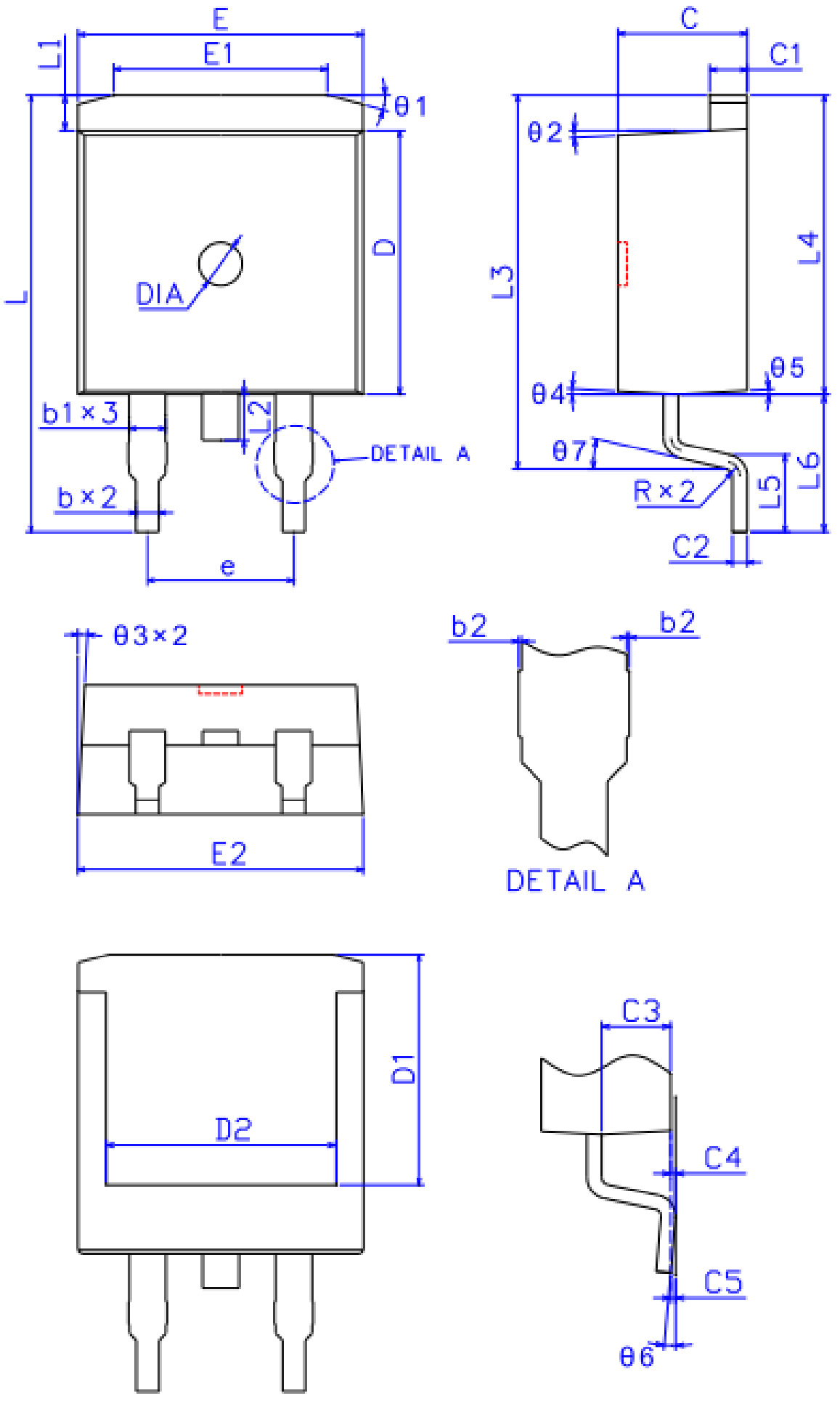

| DIM | MILLIMETERS |
|---|---|
| A | 10.00±0.30 |
| A1 | 8.00±0.30 |
| A2 | 5.00±0.30 |
| B | 13.20±0.40 |
| C | 4.50±0.20 |
| C1 | 1.30±0.20 |
| D | 0.80±0.20 |
| E | 3.60±0.20 |
| F | 3.00±0.30 |
| G | 6.60±0.40 |
| H | 0.50±0.20 |
| J | 28.88±0.50 |
| K | 3.00±0.30 |
| M | 1.30±0.30 |
| N | Typical 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）

外形尺寸：

Package Dimension：

TO-263

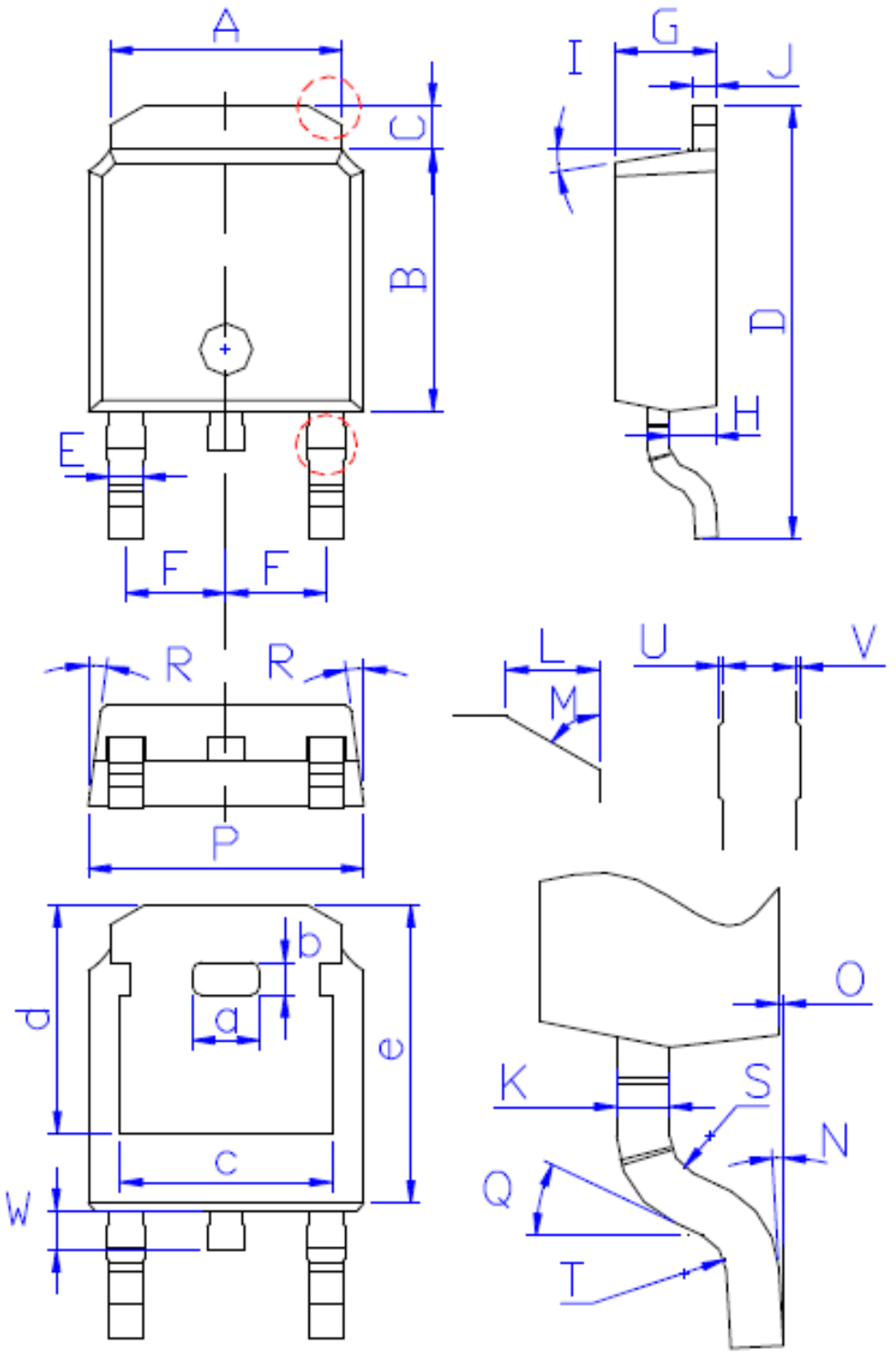



| 标注 | 尺寸(mm) |
|---|---|
| E | 9.88±0.10 |
| E1 | 7.40±0.20 |
| E2 | 9.90±0.15 |
| L | 15.20±0.25 |
| L1 | 1.30±0.15 |
| L2 | 1.60±0.10 |
| L3 | 13.00±0.20 |
| L4 | 10.40±0.15 |
| L5 | 2.60±0.15 |
| L6 | 4.80±0.20 |
| b | 0.80±0.07 |
| b1 | 1.27±0.07 |
| b2 | 0.05±0.07 |
| C | 4.48±0.10 |
| C1 | 1.30±0.07 |
| C2 | 0.50±0.07 |
| C3 | 2.40±0.06 |
| C4 | 0.10±0.08 |
| C5 | 0.10±0.08 |
| D | 9.20±0.10 |
| D1 | 8.00±0.10 |
| D2 | 8.00±0.10 |
| R | 0.50±0.10 |
| θ1 | 15° ±2° |
| θ2 | 3° ±2° |
| θ3 | 3° ±2° |
| θ4 | 3° ±2° |
| θ5 | 3° ±2° |
| θ6 | 0° ~6° |
| θ7 | 13° ±2° |
| e | 5.08±0.10 |
| DIA | 宽 1.50±0.10<br>深 0.30±0.15 |

外形尺寸：

Package Dimension：

TO-252




| DIM | MILLIMETERS |
|---|---|
| A | 5.34±0.30 |
| B | 6.00±0.30 |
| C | 1.05±0.30 |
| D | 9.95±0.30 |
| E | 0.76±0.15 |
| F | 2.28±0.15 |
| G | 2.30±0.30 |
| H | 1.06±0.30 |
| I | (4-10)° |
| J | 0.51±0.15 |
| K | 0.52±0.15 |
| L | 0.80±0.30 |
| M | 60° |
| N | (0-10)° |
| O | 0.05±0.05 |
| P | 6.60±0.30 |
| Q | 25° |
| R | (4-8.5)° |
| S | R0.40 |
| T | R0.40 |
| U | 0.05±0.05 |
| V | 0.05±0.05 |
| W | 0.90±0.30 |
| a | 1.80±0.30 |
| b | 0.75±0.30 |
| c | 4.85±0.30 |
| d | 5.30±0.30 |
| e | 6.90±0.30 |

(Units: mm)