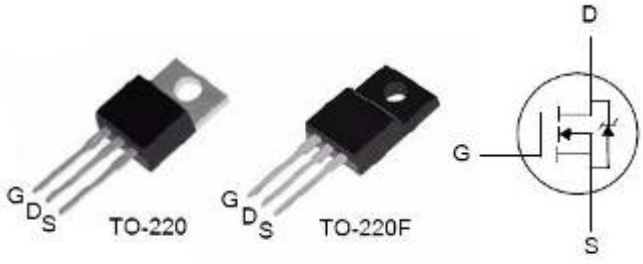
# 400V N 沟道 MOS 场效应管

| $BV_{DSS}$ | $R_{DS(ON)}$ (Max.) | $I_D$ |
|---|---|---|
| 400V | 1.0Ω | 5.5A |

## 产品特点

- 低的导通电阻
- 低的栅极电荷(典型值为18.6nC)
- 开关速度快
- 100%雪崩测试
- 符合RoHS标准/无铅封装




## 产品应用

- 高效开关电源
- 适配器/充电器
- 有源功率因数校正
- 液晶面板电源

## 订购代码

| 器件型号 | 封装形式 | 标识 |
|---|---|---|
| FTP06N40 | TO-220 | FTP06N40 |
| FTA06N40 | TO-220F | FTA06N40 |

## 极限值

除非另有说明，均指$T_C$=25℃

| 符号 | 参数描述 | FTP06N40 | FTA06N40 | 单位 |
|---|---|---|---|---|
| $V_{DSS}$ | 漏极-源极电压[1] | 400 | | V |
| $I_D$ | 漏极电流连续值（$T_C$=25℃） | 5.5 | 5.5* | A |
| $I_D$@100℃ | 漏极电流连续值（$T_C$=100℃） | Figure 3 | | |
| $I_{DM}$ | 漏极电流脉冲值[2] | Figure 6 | | |
| $P_D$ | 功耗（$T_C$=25℃） | 95 | 25 | W |
| | 功耗降额因子（$T_C$ > 25℃） | 0.76 | 0.2 | W/℃ |
| $V_{GS}$ | 栅极-源极电压 | ±30 | | V |
| $E_{AS}$ | 单脉冲雪崩能量 L=18mH, $I_D$=5.5A | 270 | | mJ |
| dv/dt | 二极管反向恢复dv/dt尖峰值[3] | 4.5 | | V/ns |
| $T_L$ | 焊接温度<br>(距离管壳1.6mm处，10秒) | 300 | | ℃ |
| $T_J$ 和 $T_{STG}$ | 结温和储存温度 | -55 to 150 | | |

*漏极电流受最高结温的限制.

注意：施加的电的或热的应力大于“极限值”表中所列参数值，可能导致器件永久的损坏。

## 热特性

| 符号 | 参数描述 | FTP06N40 | FTA06N40 | 单位 |
|---|---|---|---|---|
| $R_{\theta JC}$ | 结-管壳热阻 | 1.32 | 5.0 | ℃/W |
| $R_{\theta JA}$ | 结-环境热阻 | 65 | 65 | |

# 电特性

## 关断特性

除非另有说明，均指$T_C$ =25℃

| 符号 | 参数描述 | 最小值 | 典型值 | 最大值 | 单位 | 测试条件 |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | 漏极-源极击穿电压 | 400 | -- | -- | V | $V_{GS}$=0V, $I_D$=250μA |
| $\triangle BV_{DSS}/\triangle T_J$ | 击穿电压温度系数 | -- | 0.6 | -- | V/℃ | 以25℃为参考，$I_D$=250μA |
| $I_{DSS}$ | 漏极-源极泄漏电流 | -- | -- | 12 | μA | $V_{DS}$=400V, $V_{GS}$=0V |
| | | -- | -- | 100 | | $V_{DS}$=320V, $V_{GS}$=0V, $T_C$=125℃ |
| $I_{GSS}$ | 栅极-源极泄漏电流 | -- | -- | 100 | nA | $V_{GS}$=+30V |
| | | -- | -- | -100 | | $V_{GS}$=-30V |

## 导通特性

除非另有说明，均指$T_C$ =25℃

| 符号 | 参数描述 | 最小值 | 典型值 | 最大值 | 单位 | 测试条件 |
|---|---|---|---|---|---|---|
| $R_{DS(ON)}$ | 漏极-源极导通电阻 | -- | 0.8 | 1.0 | Ω | $V_{GS}$=10V, $I_D$=3.3A[4] |
| $V_{GS(TH)}$ | 栅极阈值电压 | 2.0 | -- | 4.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$=250μA |
| gfs | 正向跨导 | -- | 5.7 | -- | S | $V_{DS}$ =15V, $I_D$=5.5A[4] |

## 动态特性

基本上与工作温度无关

| 符号 | 参数描述 | 最小值 | 典型值 | 最大值 | 单位 | 测试条件 |
|---|---|---|---|---|---|---|
| $C_{ISS}$ | 输入电容 | -- | 622 | -- | pF | $V_{GS}$=0V<br>$V_{DS}$=25V<br>f=1.0MHz<br>Figure 14 |
| $C_{OSS}$ | 输出电容 | -- | 65 | -- | | |
| $C_{RSS}$ | 反向传输电容 | -- | 13.3 | -- | | |
| $Q_G$ | 栅极总电荷 | -- | 18.6 | -- | nC | $V_{DD}$=200V<br>$I_D$=5.5A<br>Figure 15 |
| $Q_{GS}$ | 栅极-源极电荷 | -- | 1.7 | -- | | |
| $Q_{GD}$ | 栅极-漏极（密勒）电荷 | -- | 6.8 | -- | | |

## 开关特性

基本上与工作温度无关

| 符号 | 参数描述 | 最小值 | 典型值 | 最大值 | 单位 | 测试条件 |
|---|---|---|---|---|---|---|
| $t_{d(ON)}$ | 开启延迟时间 | -- | 17 | -- | ns | $V_{DD}$=200V<br>$I_D$=5.5A<br>$V_{GS}$=10V<br>$R_G$=20Ω |
| $t_{rise}$ | 上升时间 | -- | 61 | -- | | |
| $t_{d(OFF)}$ | 关断延迟时间 | -- | 26 | -- | | |
| $t_{fall}$ | 下降时间 | -- | 36 | -- | | |

## 体二极管特性

除非另有说明，均指$T_C$ =25℃

| 符号 | 参数描述 | 最小值 | 典型值 | 最大值 | 单位 | 测试条件 |
|---|---|---|---|---|---|---|
| $I_{SD}$ | 体二极管连续电流 | -- | -- | 5.5 | A | Integral P-N diode in MOSFET |
| $I_{SM}$ | 体二极管最大脉冲电流 | -- | -- | 22 | A | |
| $V_{SD}$ | 体二极管正向压降 | -- | -- | 1.2 | V | $I_S$=5.5A, $V_{GS}$=0V |
| $t_{rr}$ | 反向恢复时间 | -- | 208 | -- | ns | $V_{GS}$=0V<br>$I_F$=5.5A,di/dt=100A/μs |
| $Q_{rr}$ | 反向恢复电荷 | -- | 1000 | -- | nC | |

注意：

[1] $T_J$=+25℃ to +150℃
[2] 重复性极限值，脉冲宽度受最高结温限制
[3] $I_{SD}$=5.5A, di/dt≤100A/μs, $V_{DD}$≤$BV_{DSS}$, $T_J$=+150℃
[4] 脉冲宽度≤380μs; 占空比≤2%.

**Figure 1. Maximum Effective Thermal Impedance, Junction-to-Case**

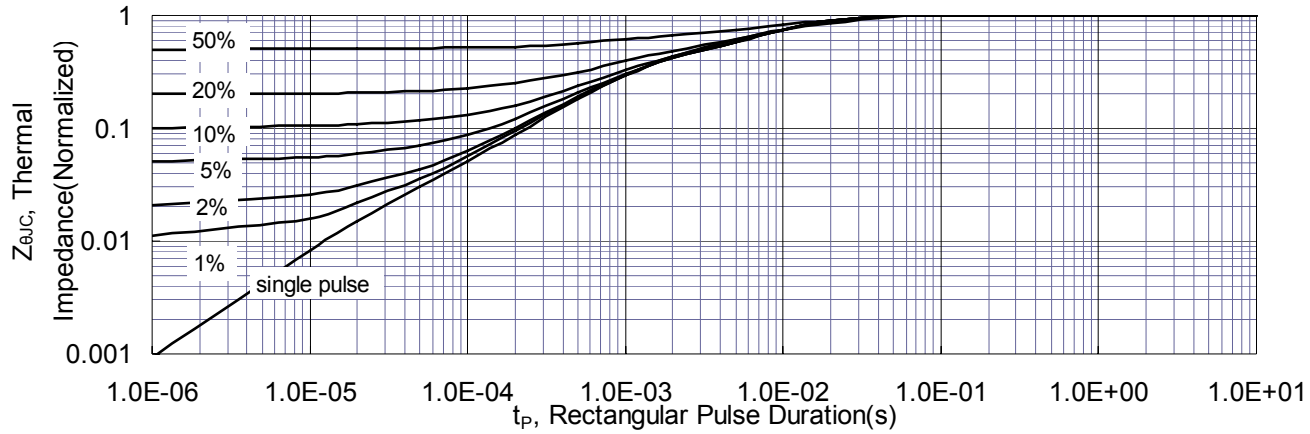



**Figure 2. Maximum Power Dissipation vs. Case Temperature**

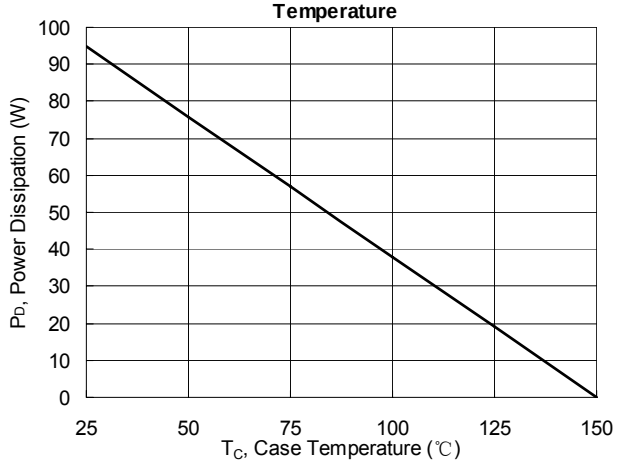



**Figure 3. Maximum Continuous Drain Current vs Case Temperature**

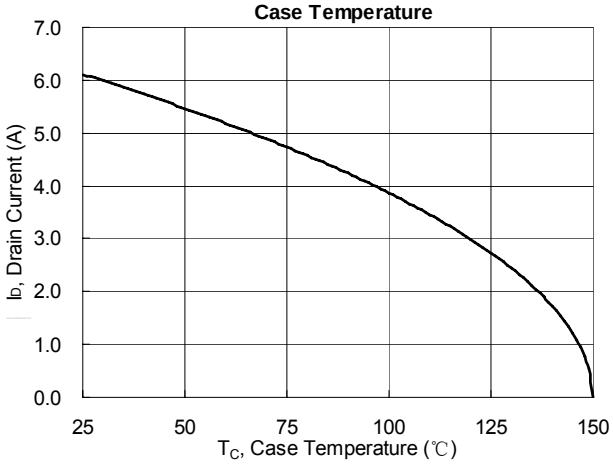



**Figure 4. Typical Output Characteristics**

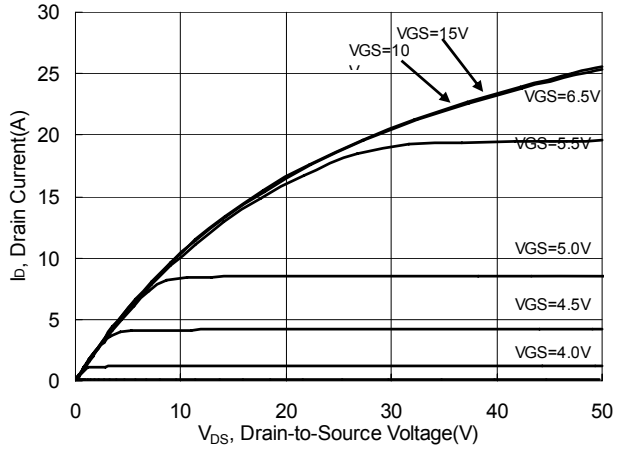



**Figure 5. Typical Drain-to-Source ON Resistance vs. Gate Voltage and Drain Current**

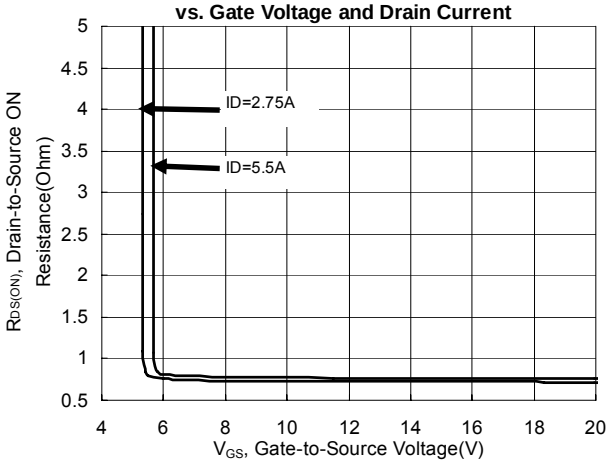


**Figure 6. Maximum Peak Current Capability**

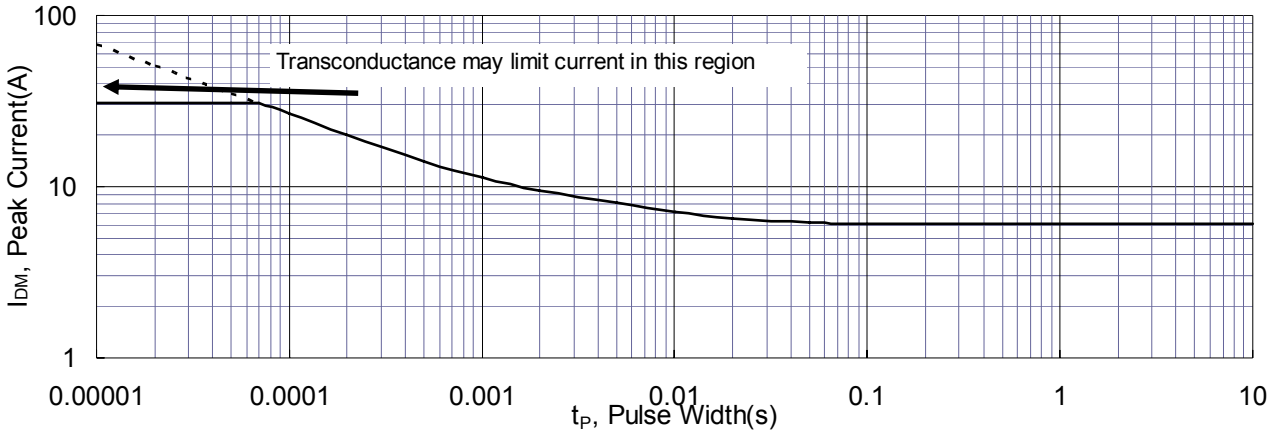



**Figure 7. Typical Transfer Characteristics**

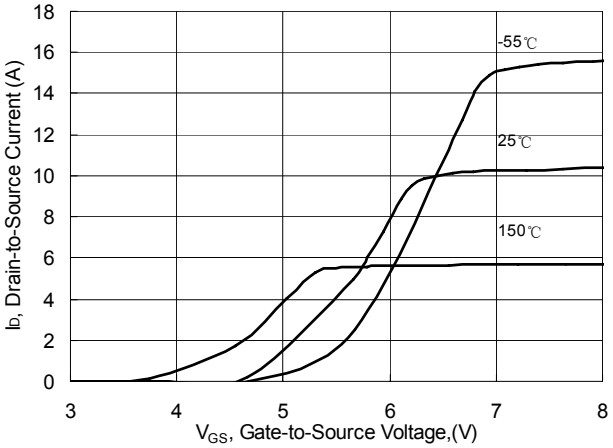



**Figure 8. Unclamped Inductive Switching Capability**

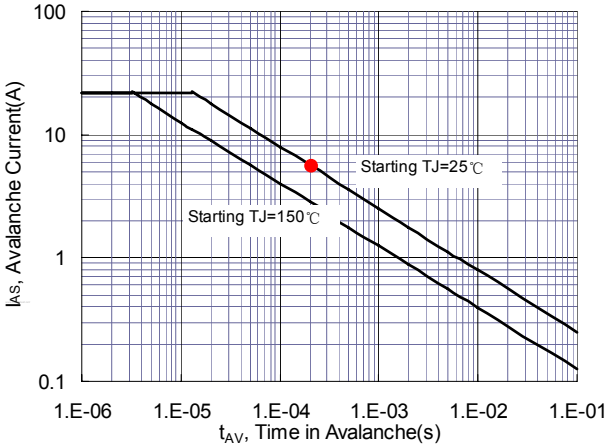



**Figure 9. Typical Drain-to-Source ON Resistance**

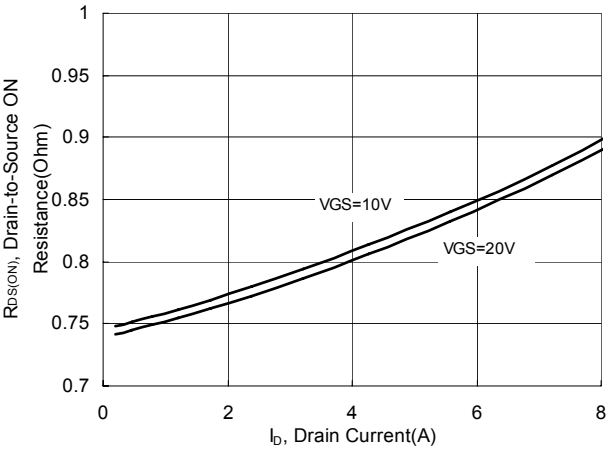



**Figure 10. Typical Drain-to-Source On Resistance vs. Junction Temperature**

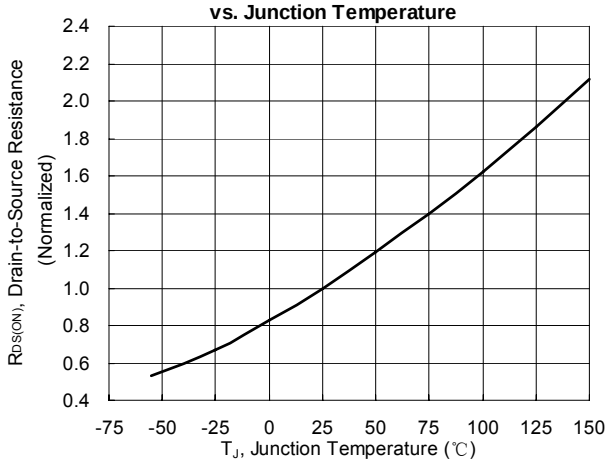


Figure 11.Typical Breakdown Voltage vs. Junction Temperature

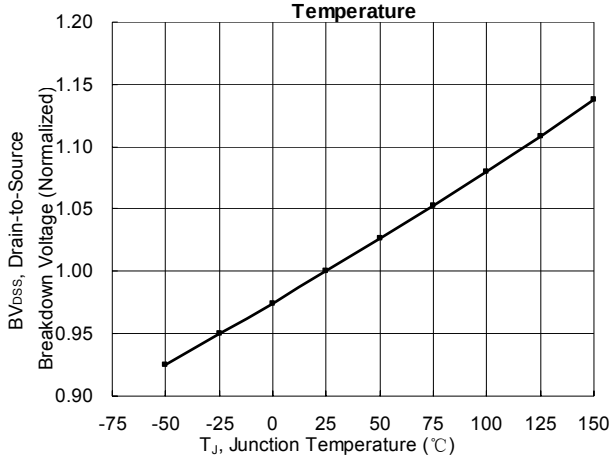



Figure 12.Typical Threshold Voltage vs. Junction Temperature

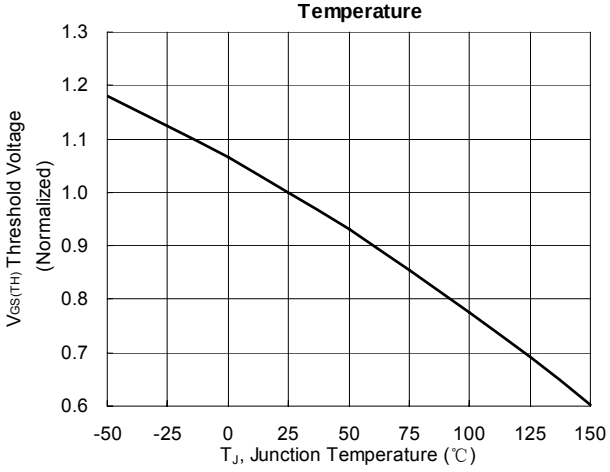



Figure 13. Maximum Forward Safe Operation Area

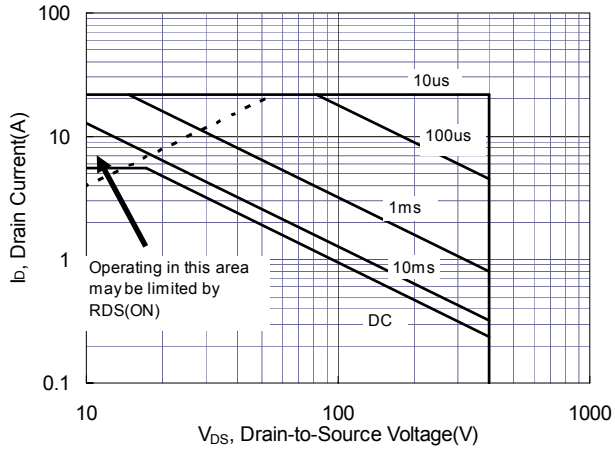



Figure 14. Typical Capacitance vs. Drain-to-Source Voltage

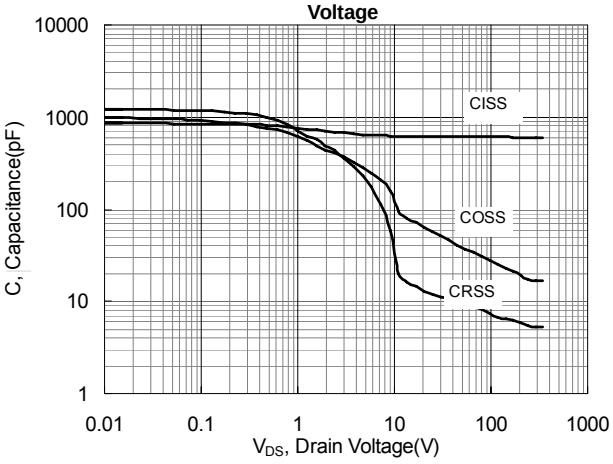



Figure 15. Typical Gate Charge vs. Gate-to-Source Voltage

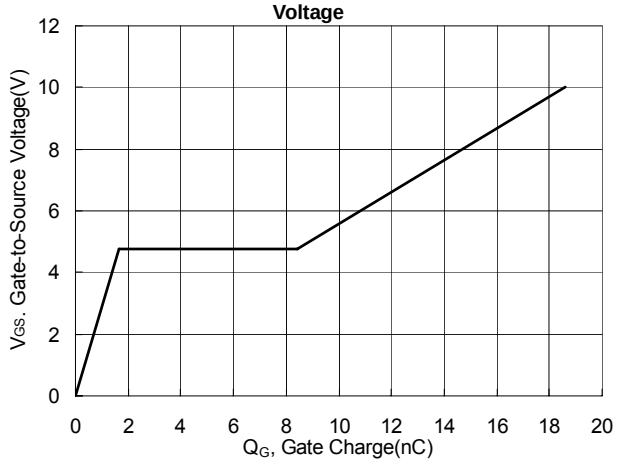
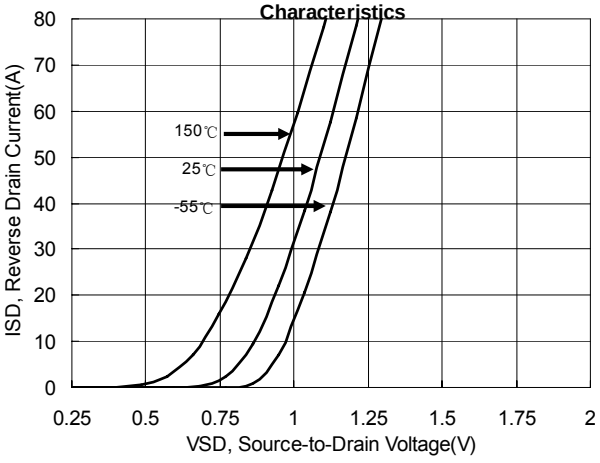



Figure 16. Typical Body Diode Transfer Characteristics



## 测试电路

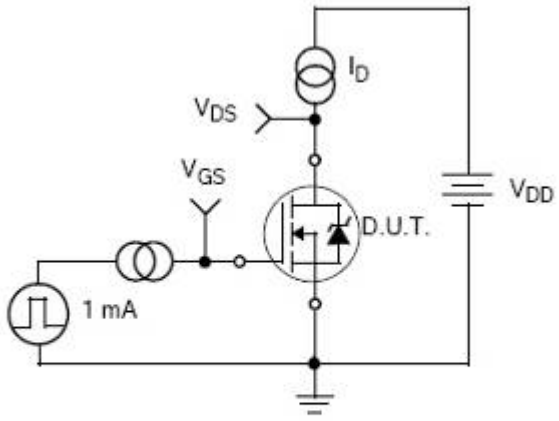



Figure 17. Gate Charge Test Circuit

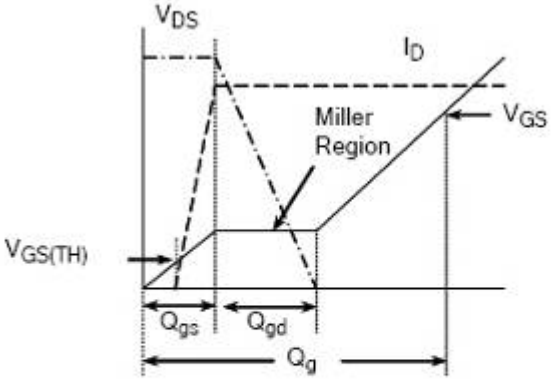



Figure 18. Gate Charge Waveform

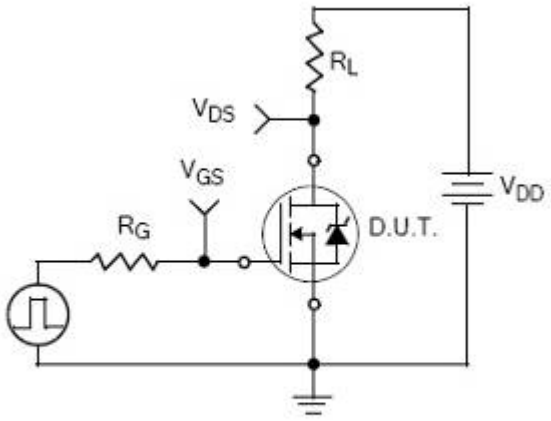



Figure 19. Resistive Switching Test Circuit

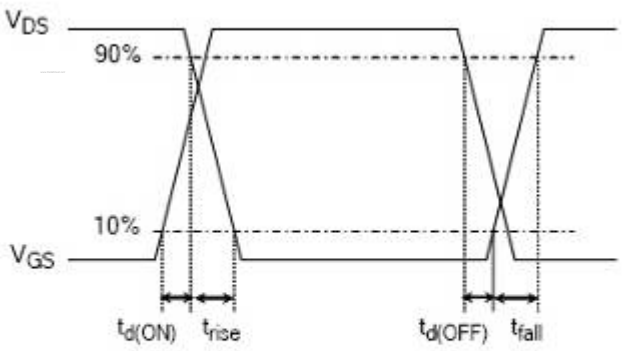



Figure 20. Resistive Switching Waveforms

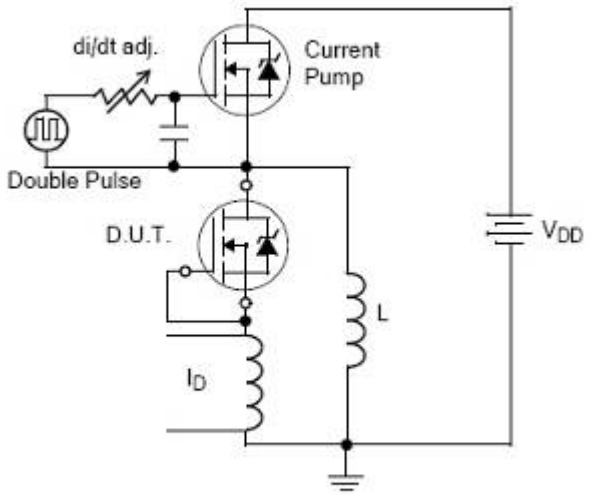



Figure 21. Diode Reverse Recovery Test Circuit

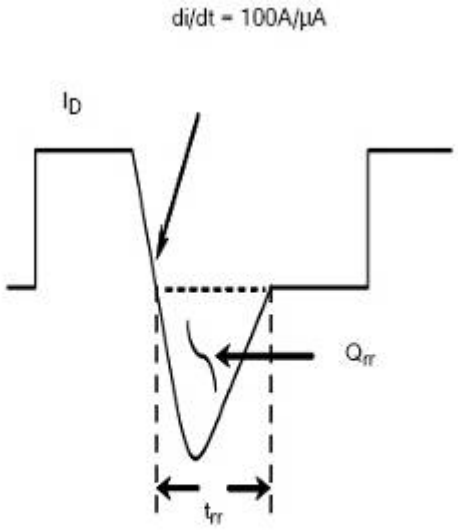



Figure 22. Diode Reverse Recovery Waveform

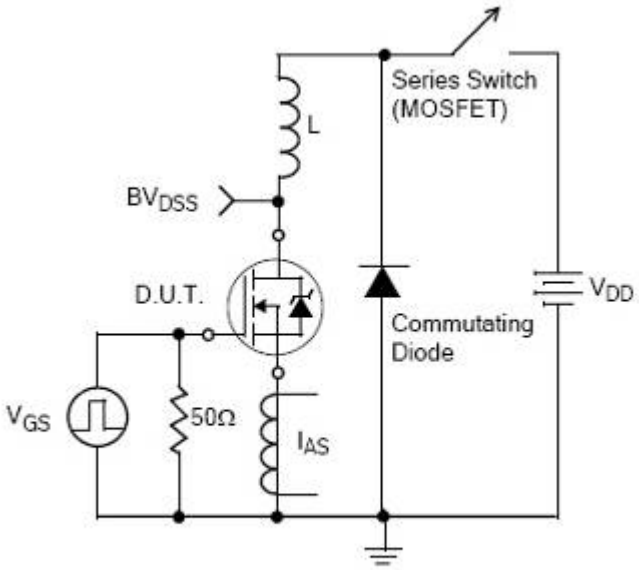



Figure 23. Unclamped Inductive Switching Test Circuit

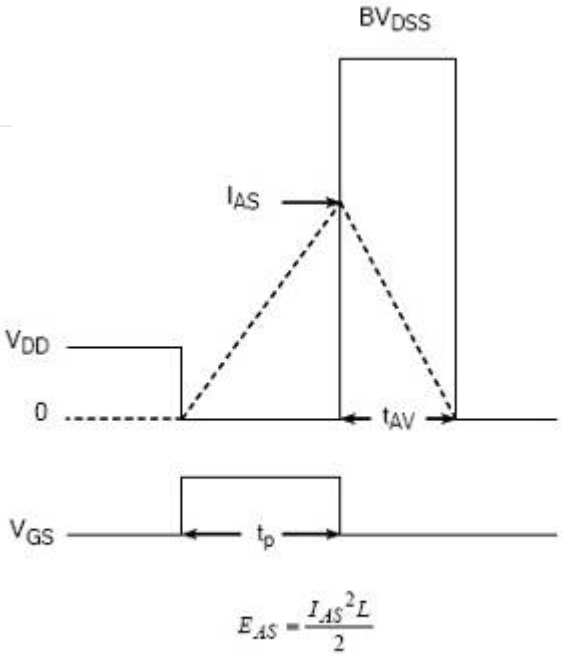
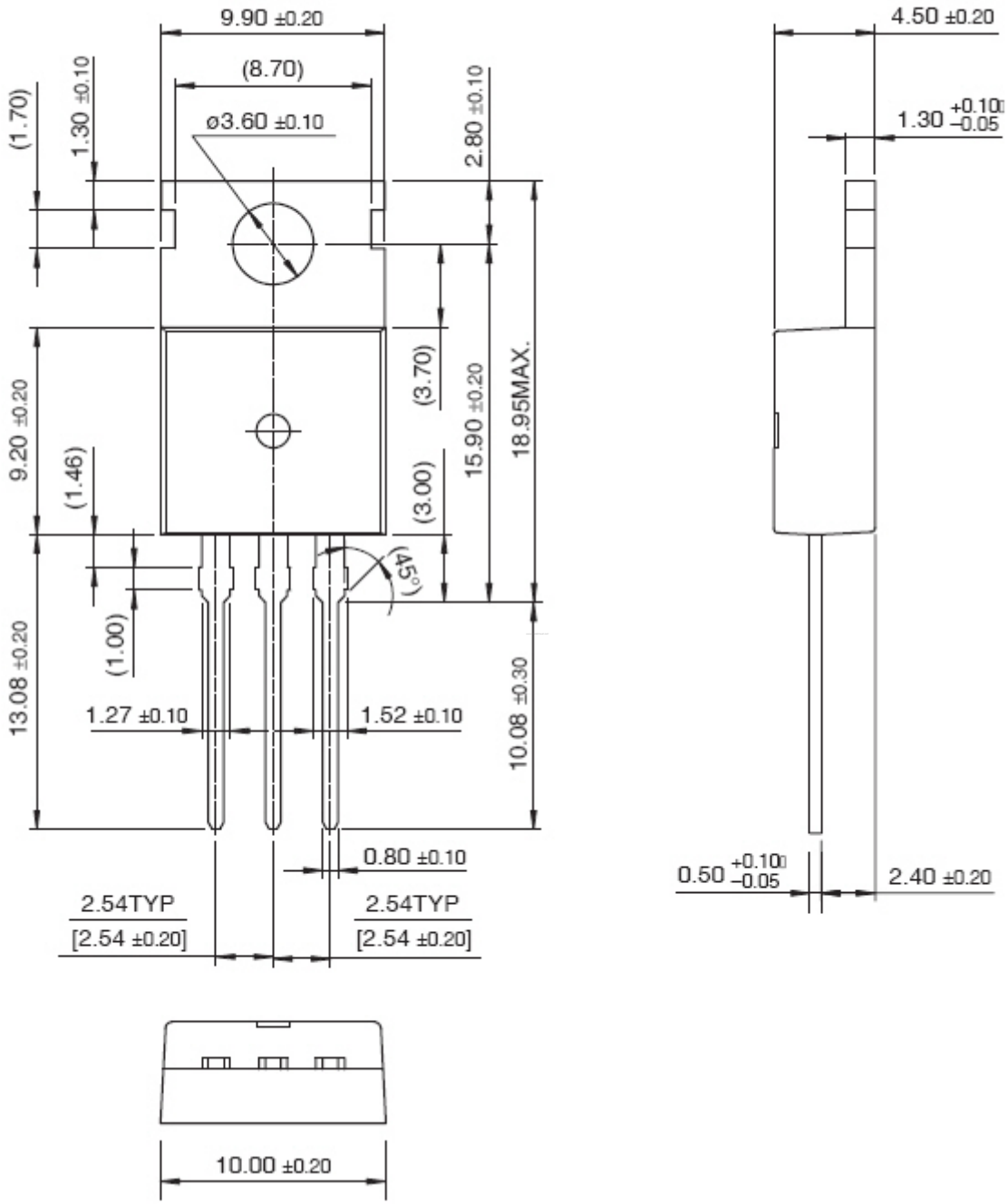


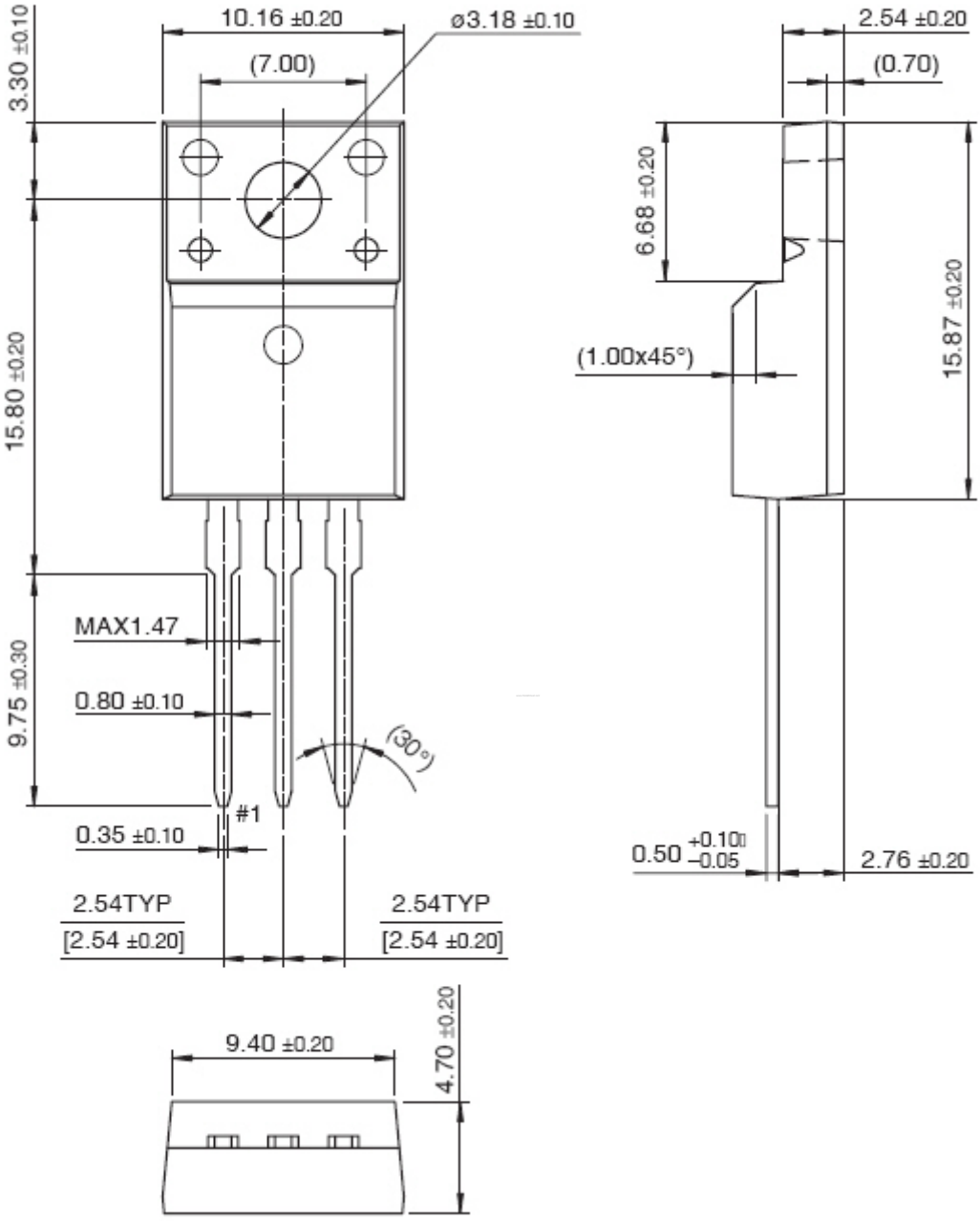

Figure 24. Unclamped Inductive Switching Waveforms

封装尺寸

TO-220


9.90 ±0.20
(8.70)
ø3.60 ±0.10
(1.70)
1.30 ±0.10
2.80 ±0.10
9.20 ±0.20
(1.46)
(3.70)
(3.00)
15.90 ±0.20
18.95MAX.
(1.00)
13.08 ±0.20
1.27 ±0.10
1.52 ±0.10
10.08 ±0.30
(45°)
0.80 ±0.10
2.54TYP
[2.54 ±0.20]
2.54TYP
[2.54 ±0.20]
10.00 ±0.20
4.50 ±0.20
1.30 +0.10 −0.05
0.50 +0.10 −0.05
2.40 ±0.20

# TO-220F


10.16 ±0.20
ø3.18 ±0.10
(7.00)
3.30 ±0.10
15.80 ±0.20
9.75 ±0.30
MAX1.47
0.80 ±0.10
(30°)
#1
0.35 ±0.10
2.54TYP
[2.54 ±0.20]
2.54TYP
[2.54 ±0.20]
9.40 ±0.20
4.70 ±0.20
2.54 ±0.20
(0.70)
6.68 ±0.20
15.87 ±0.20
(1.00x45°)
0.50 +0.10 −0.05
2.76 ±0.20

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