## 描述 / Descriptions

TO-220F 塑封封装 N 沟道 MOS 场效应管。N-CHANNEL MOSFET in a TO-220F Plastic Package.

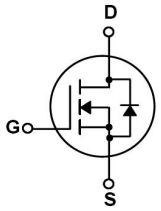
## 特征 / Features

低栅电荷,低反馈电容,开关速度快。
Low gate charge, low crss, fast switching.

## 用途 / Applications

用于高功率 DC/DC 转换和功率开关。
These devices are well suited for high efficiency switching DC/DC converters and switch mode power supplies.

## 内部等效电路 / Equivalent Circuit




## 引脚排列 / Pinning




PIN1：G　　PIN 2：D　　PIN 3：S

## 放大及印章代码 / $h_{FE}$ Classifications & Marking

见印章说明。See Marking Instructions.

## 极限参数 / Absolute Maximum Ratings(Ta=25℃)

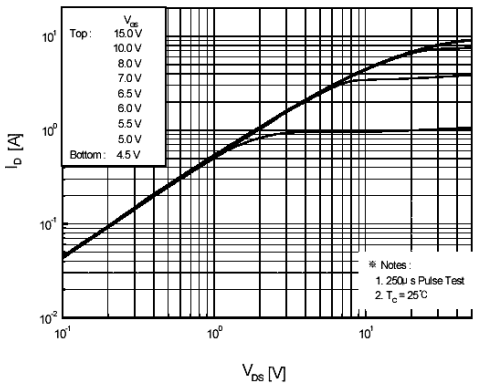
| 参数 Parameter | 符号 Symbol | 数值 Rating | 单位 Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DSS}$ | 650 | V |
| Drain Current | $I_D$(Tc=25℃) | 5.0 | A |
| Drain Current | $I_D$(Tc=100℃) | 2.6 | A |
| Drain Current - Pulsed | $I_{DM}$ | 18 | A |
| Gate-Source Voltage | $V_{GSS}$ | ±30 | V |
| Single Pulsed Avalanche Energy | $E_{AS}$ | 210 | mJ |
| Repetitive Avalanche Energy | $E_{AR}$ | 10 | mJ |
| Avalanche Current | $I_{AR}$ | 4.5 | A |
| Power Dissipation | $P_D$(Tc=25℃) | 54 | W |
| Operating and Storage Temperature Range | $T_J$,$T_{STG}$ | -55 to 150 | ℃ |

## 电性能参数 / Electrical Characteristics(Ta=25℃)

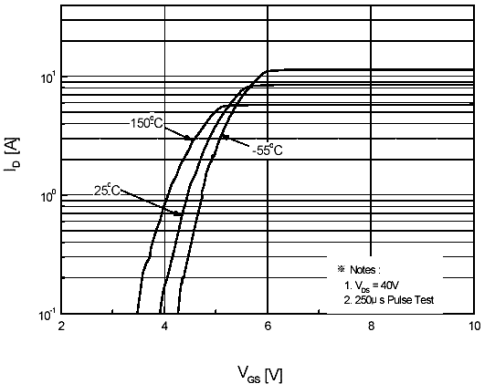
| 参数 Parameter | 符号 Symbol | 测试条件 Test Conditions | | 最小值 Min | 典型值 Typ | 最大值 Max | 单位 Unit |
|---|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V | $I_D$=250μA | 650 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=650V | $V_{GS}$=0V | | | 1.0 | μA |
| | | $V_{DS}$=480V | $T_C$=125℃ | | | 10 | μA |
| Gate-Body Leakage Current, Forward | $I_{GSS}$ | $V_{GS}$=±30V | $V_{DS}$=0V | | | ±0.1 | μA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$ | $I_D$=250μA | 2.0 | | 4.0 | V |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$=10V | $I_D$=2.25A | | 2.0 | 2.5 | Ω |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=40V | $I_D$=2.25A | | 4.7 | | S |
| Drain-Source Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V | $I_S$=4.5A | | | 1.4 | V |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=25V f=1.0MHz | $V_{GS}$=0V | | 515 | 670 | pF |
| Output Capacitance | $C_{oss}$ | | | | 55 | 72 | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | | | | 6.5 | 8.5 | pF |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$=300V $R_G$=25Ω | $I_D$=4.5A | | 10 | 30 | ns |
| Turn-On Rise Time | $t_r$ | | | | 42 | 90 | ns |
| Turn-Off Delay Time | $t_{d(off)}$ | | | | 38 | 85 | ns |
| Turn-Off Fall Time | $t_f$ | | | | 46 | 100 | ns |

## 电参数曲线图 / Electrical Characteristic Curve

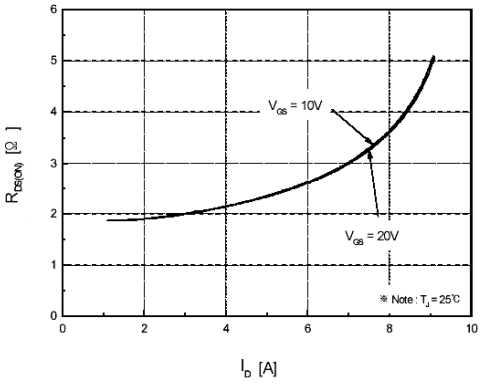
$I_D$ — $V_{DS}$



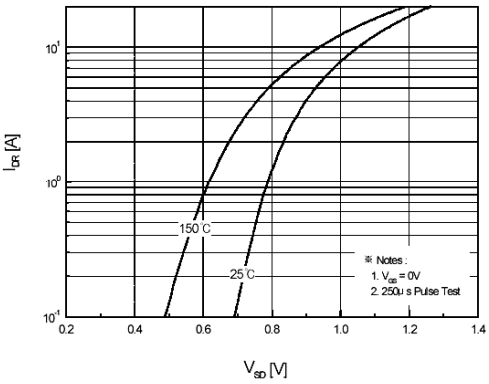

$I_D$ — $V_{GS}$

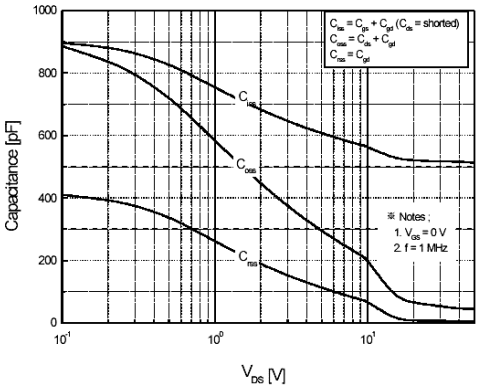



$R_{DS(ON)}$ — $I_D$

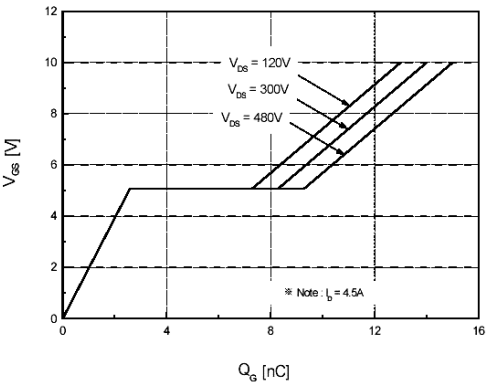



$I_{DR}$ — $V_{SD}$



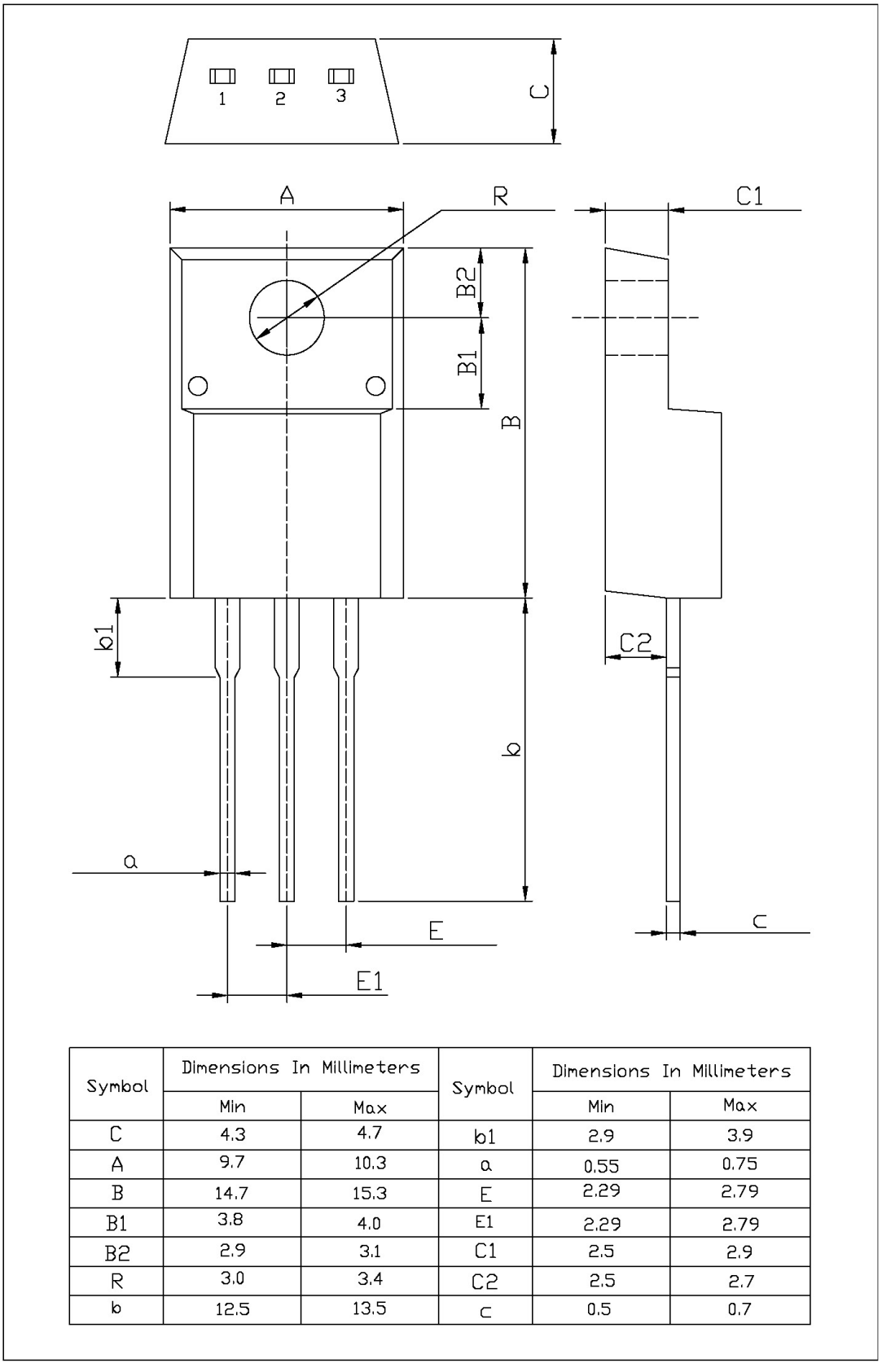




$V_{GS}$ — $Q_G$



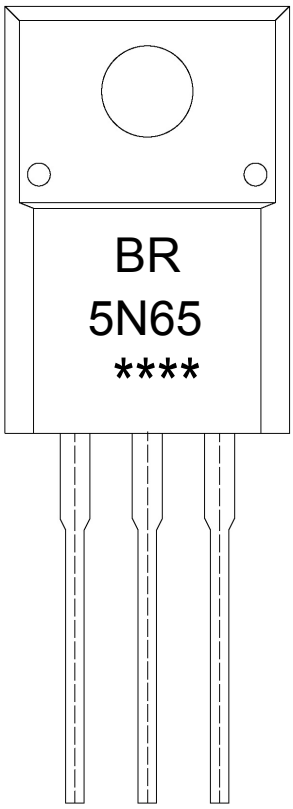
## 外形尺寸图 / Package Dimensions

TO-220F 单位：mm




| Symbol | Dimensions In Millimeters | | Symbol | Dimensions In Millimeters | |
|---|---|---|---|---|---|
| | Min | Max | | Min | Max |
| C | 4.3 | 4.7 | b1 | 2.9 | 3.9 |
| A | 9.7 | 10.3 | a | 0.55 | 0.75 |
| B | 14.7 | 15.3 | E | 2.29 | 2.79 |
| B1 | 3.8 | 4.0 | E1 | 2.29 | 2.79 |
| B2 | 2.9 | 3.1 | C1 | 2.5 | 2.9 |
| R | 3.0 | 3.4 | C2 | 2.5 | 2.7 |
| b | 12.5 | 13.5 | c | 0.5 | 0.7 |

## 印章说明 / Marking Instructions



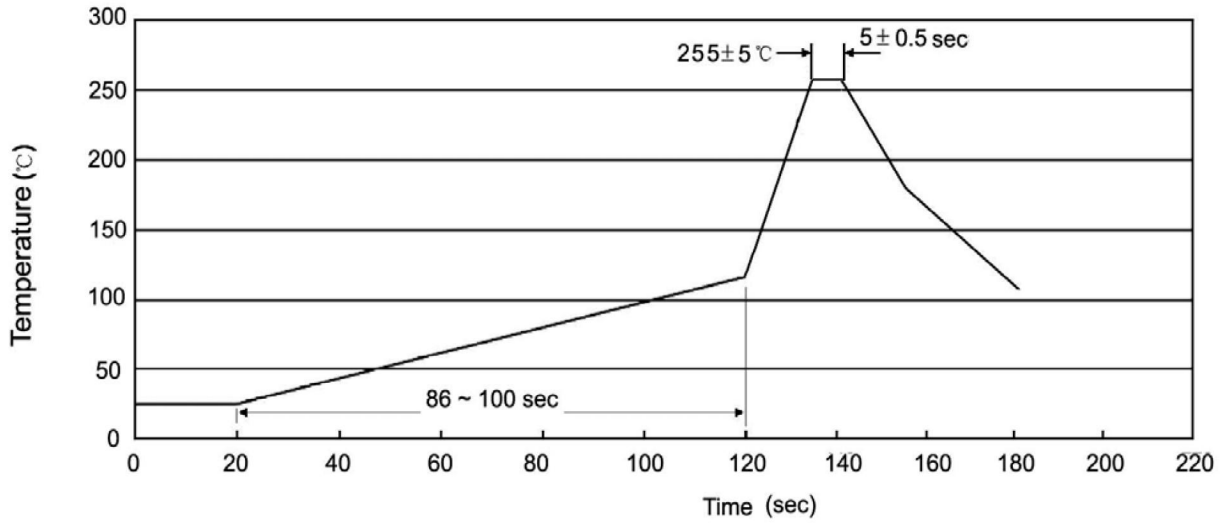

说明：

| | |
|---|---|
| BR： | 为公司代码 |
| 5N65： | 为型号代码 |
| ****： | 为生产批号代码，随生产批号变化。 |

Note:

| | |
|---|---|
| BR: | Company Code |
| 5N65: | Product Type. |
| ****: | Lot No. Code, code change with Lot No. |

## 波峰焊温度曲线图(无铅) / Temperature Profile for Dip Soldering(Pb-Free)




说明：

1、预热温度 25～150℃，时间 60～90sec;

2、峰值温度 255±5℃，时间持续为 5±0.5sec;

3、焊接制程冷却速度为 2～10℃/sec.

Note:

1.Preheating:25~150℃, Time:60~90sec.

2.Peak Temp.:255±5℃, Duration:5±0.5sec.

3. Cooling Speed: 2~10℃/sec.

## 耐焊接热试验条件 / Resistance to Soldering Heat Test Conditions

温度：270±5℃　　时间：10±1 sec.　　Temp.:270±5℃　　Time:10±1 sec

## 包装规格 / Packaging SPEC.

散件包装 / BULK

| Package Type 封装形式 | Units 包装数量 | | | | | Dimension 包装尺寸 (unit: mm³) | | |
|---|---|---|---|---|---|---|---|---|
| | Units/Bag 只/袋 | Bags/Inner Box 袋/盒 | Units/Inner Box 只/盒 | Inner Boxes/Outer Box 盒/箱 | Units/Outer Box 只/箱 | Bag 袋 | Inner Box 盒 | Outer Box 箱 |
| TO-220/F | 200 | 10 | 2,000 | 5 | 10,000 | 135×190 | 237×172×102 | 560×245×195 |

套管包装 / TUBE

| Package Type 封装形式 | Units 包装数量 | | | | | Dimension 包装尺寸 (unit: mm³) | | |
|---|---|---|---|---|---|---|---|---|
| | Units/Tube 只/套管 | Tubes/Inner Box 套管/盒 | Units/Inner Box 只/盒 | Inner Boxes/Outer Box 盒/箱 | Units/Outer Box 只/箱 | Tube 套管 | Inner Box 盒 | Outer Box 箱 |
| TO-220/F | 50 | 20 | 1,000 | 5 | 5,000 | 532×31.4×5.5 | 555×164×50 | 575×290×180 |

## 使用说明 / Notices