# BRD15N10

Rev. J Jul.-2019

## 描述 / Descriptions

TO-252 塑封封装 N 沟道场效应管。

N-CHANNEL MOSFET in a TO-252 Plastic Package.

## 特征 / Features

$R_{DS(on)}$小，门电荷低，$C_{iss}$小，开关速度快。无卤产品。

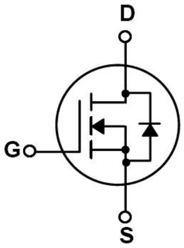
Low $R_{DS(on)}$,low gate charge, low $C_{iss}$, fast switching. Halogen-free Product.

## 用途 / Applications

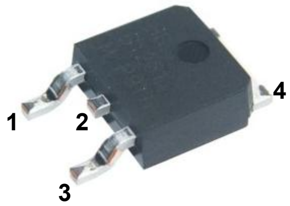
用于低压电路如：汽车电路、DC/DC 转换、便携式产品的电源高效转换。

Suited for low voltage applications such as automotive, DC/DC Converters, and high efficiency switching for power management in portable and battery operated products.

## 内部等效电路 / Equivalent Circuit



## 引脚排列 / Pinning



PIN1：G PIN 2：D PIN 3：S PIN 4：D

## 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<br>Parameter | | 符号<br>Symbol | 数值<br>Rating | 单位<br>Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DSS}$ | 100 | V |
| Drain Current | | $I_D$(Tc=25℃) | 15 | A |
| Drain Current | | $I_D$(Tc=100℃) | 10 | A |
| Drain Current - Pulsed* | | $I_{DM}$ | 45 | A |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Single Pulsed Avalanche Energy | | $E_{AS}$ | 90 | mJ |
| Avalanche Current | | $I_{AS}$ | 9.1 | A |
| Power Dissipation | | $P_D$(Tc=25℃) | 39 | W |
| Operating and Storage Temperature Range | | $T_j$ $T_{stg}$ | -55～150 | ℃ |
| Junction-to-Ambient | t≤10s | $R_{\theta JA}$ | 20 | ℃/W |
| Junction-to-Ambient | Steady-State | | 50 | |
| Junction-to-Case | Steady-State | $R_{\theta JC}$ | 3.2 | |

*Repetitive rating; pulse width limited by max. junction temperature.

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

| 参数<br>Parameter | 符号<br>Symbol | 测试条件<br>Test Conditions | 最小值<br>Min | 典型值<br>Typ | 最大值<br>Max | 单位<br>Unit |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V $I_D$=250μA | 100 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=100V $V_{GS}$=0V | | | 1.0 | μA |
| | | $T_J$=125℃ | | | 50 | |
| Gate-Body Leakage Current Forward | $I_{GSS}$ | $V_{GS}$=±20V $V_{DS}$=0V | | | ±100 | nA |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$ $I_D$=250μA | 1 | 1.9 | 3 | V |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$=10V $I_D$=8.5A | | 75 | 90 | mΩ |
| | | $T_J$=125℃ | | 142 | | |
| Drain-Source Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V $I_S$=15A | | 1.0 | 1.2 | V |
| Gate resistance | $R_g$ | $V_{GS}$=0V $V_{DS}$=0V f=1MHz | | 1.3 | | Ω |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=25V $V_{GS}$=0V f=1.0MHz | | 250 | | pF |
| Output Capacitance | $C_{oss}$ | | | 125 | | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 20 | | pF |
| Total Gate Charge(10V) | $Q_g$ | $V_{GS}$=10V $V_{DS}$=50V $I_D$=5A | | 5.8 | | nC |
| Total Gate Charge(4.5V) | $Q_g$ | | | 2.8 | | nC |
| Gate Source Charge | $Q_{gs}$ | | | 1.1 | | nC |
| Gate Drain Charge | $Q_{gd}$ | | | 1.2 | | nC |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{GS}$=10V $V_{DS}$=50V $R_L$=10Ω $R_{GEN}$=3Ω | | 6 | | ns |
| Turn-On Rise Time | $t_r$ | | | 2.5 | | ns |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 18 | | ns |
| Turn-Off Fall Time | $t_f$ | | | 2.5 | | ns |

## 电参数曲线图 / Electrical Characteristic Curve

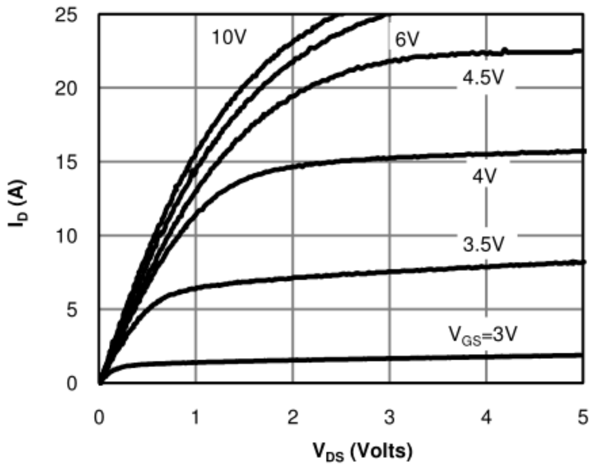


Fig 1: On-Region Characteristics

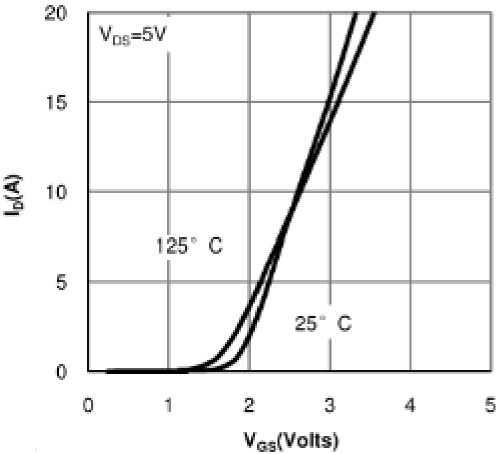


Figure 2: Transfer Characteristics

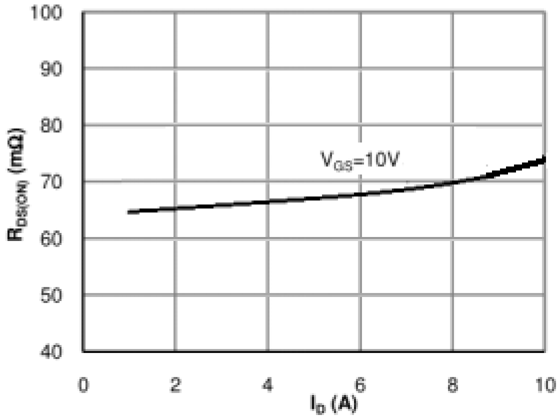


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

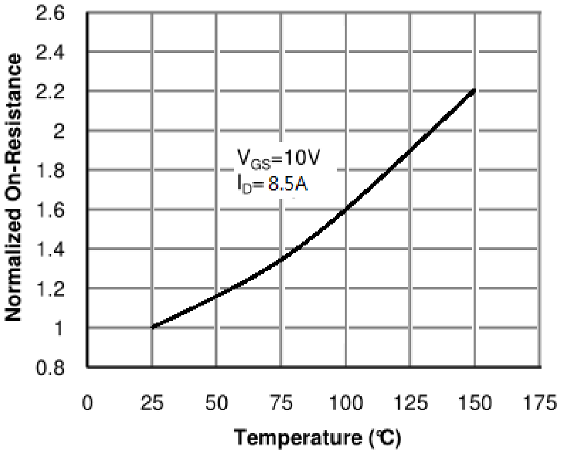


Figure 4: On-Resistance vs. Junction Temperature

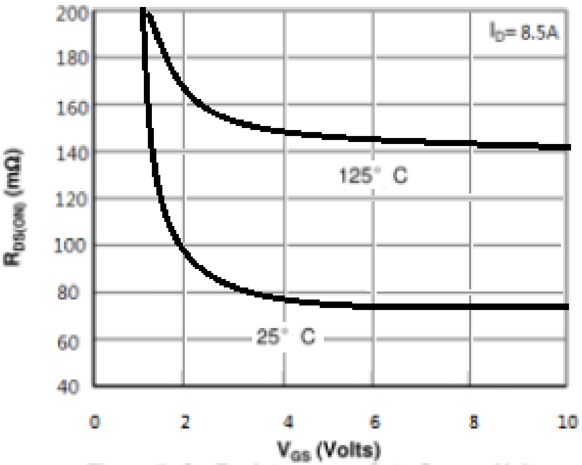


Figure 5: On-Resistance vs. Gate-Source Voltage

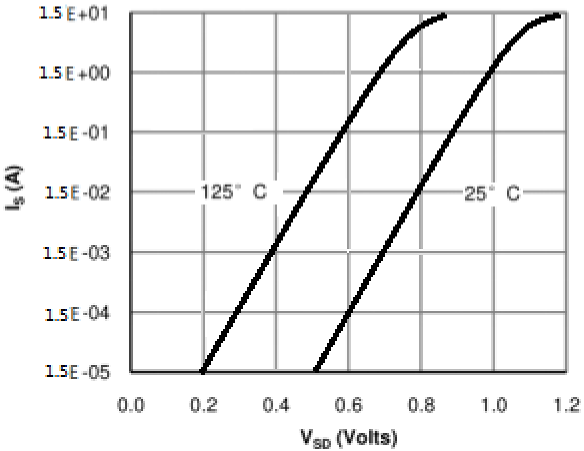


Figure 6: Body-Diode Characteristics

## 电参数曲线图 / Electrical Characteristic Curve

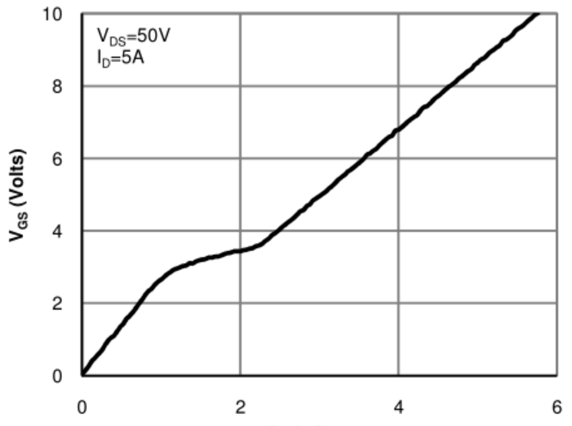


Figure 7: Gate-Charge Characteristics

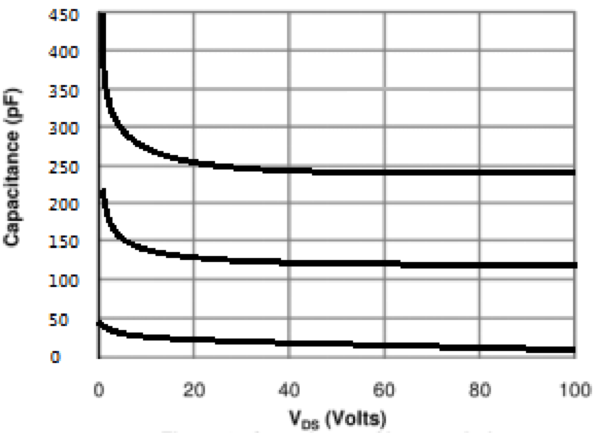


Figure 8: Capacitance Characteristics

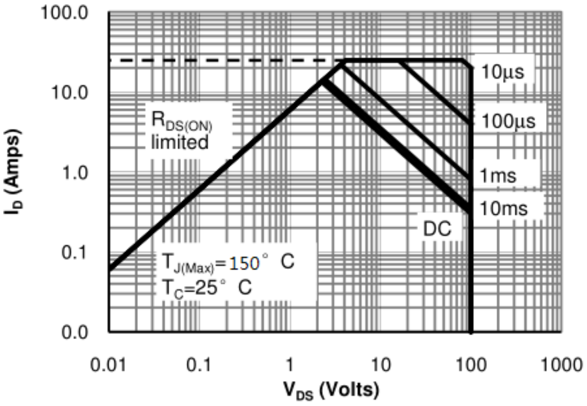


Figure 9: Maximum Forward Biased Safe Operating Area

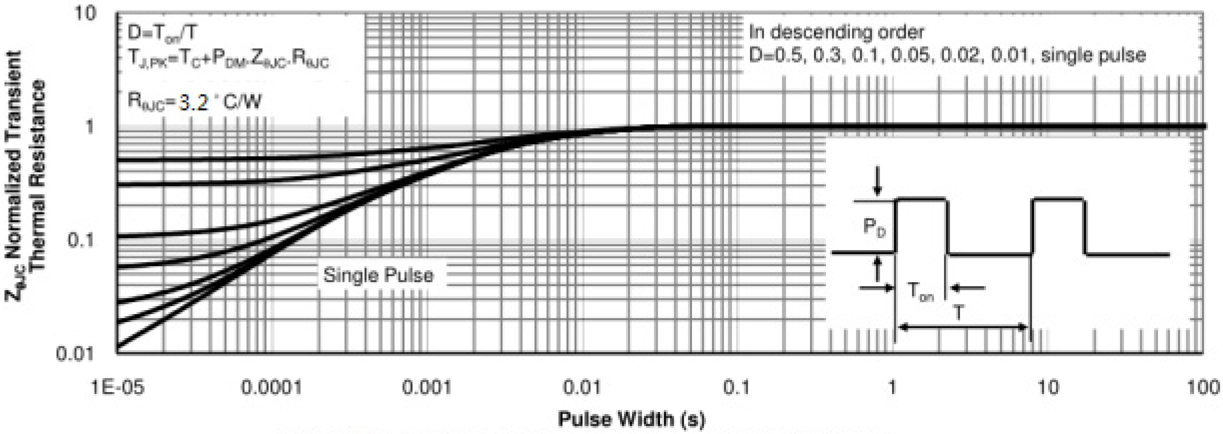
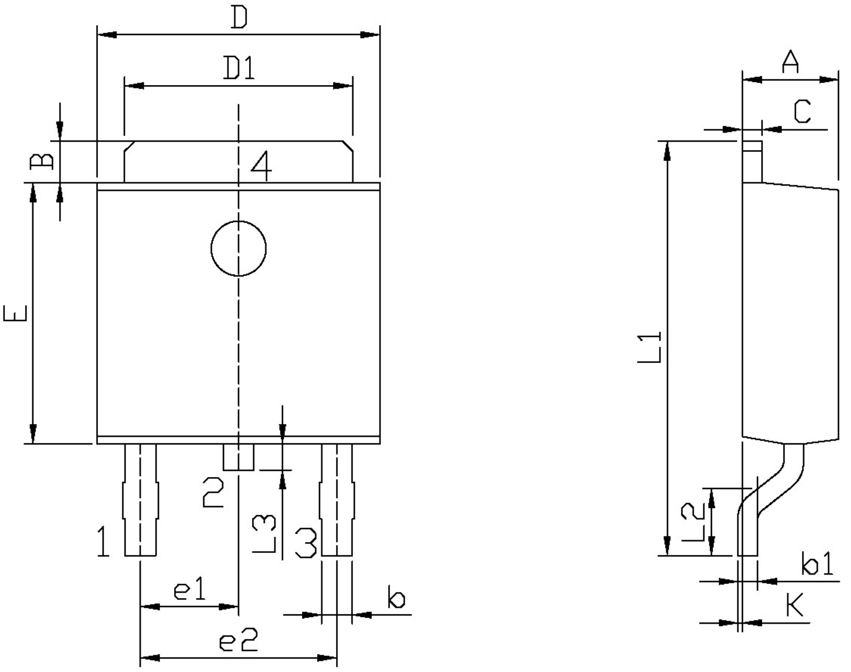


Figure 10 : Normalized Maximum Transient Thermal Impedance

## 外形尺寸图 / Package Dimensions

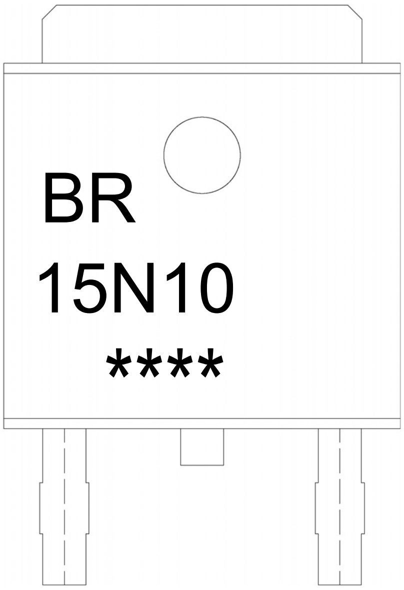


单位：mm

| Symbol | Dimensions In Millimeters | | Symbol | Dimensions In Millimeters | |
|---|---|---|---|---|---|
| | Min | Max | | Min | Max |
| A | 2.20 | 2.40 | E | 5.95 | 6.25 |
| B | 0.95 | 1.25 | e1 | 2.24 | 2.34 |
| b | 0.50 | 0.70 | e2 | 4.43 | 4.73 |
| b1 | 0.45 | 0.55 | L1 | 9.45 | 9.95 |
| C | 0.45 | 0.55 | L2 | 1.25 | 1.75 |
| D | 6.45 | 6.75 | L3 | 0.60 | 0.90 |
| D1 | 5.10 | 5.50 | K | 0.00 | 0.10 |

TO-252

## 印章说明 / Marking Instructions



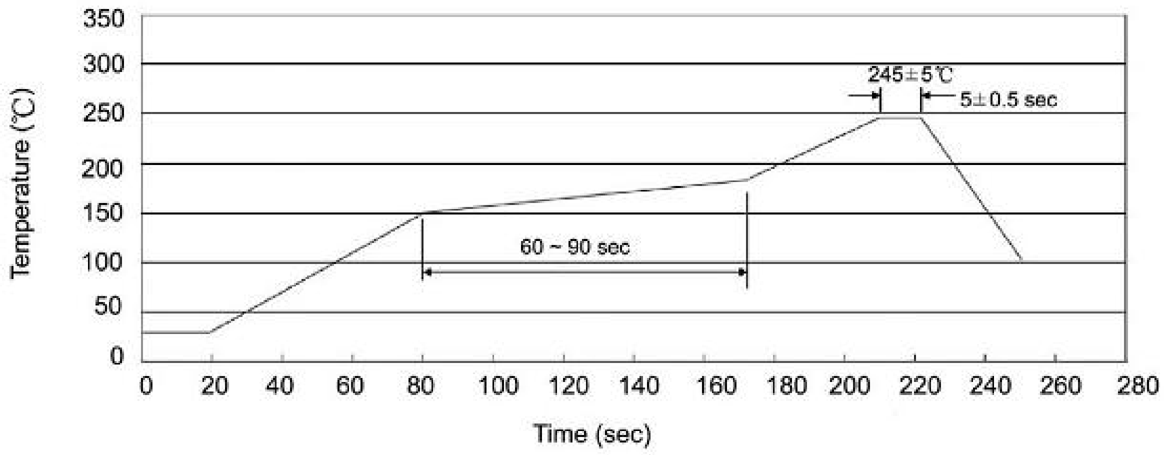
说明：

| | |
|---|---|
| BR： | 为公司代码 |
| 15N10： | 为型号代码 |
| ****： | 为生产批号代码，随生产批号变化。 |

Note:

| | |
|---|---|
| BR: | Company Code |
| 15N10: | Product Type. |
| ****: | Lot No. Code, code change with Lot No. |

## 回流焊温度曲线图(无铅) / Temperature Profile for IR Reflow Soldering(Pb-Free)



说明：

1、预热温度,150～180℃，时间 60～90sec;

2、峰值温度 245±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:150~180℃, Time:60~90sec.

2.Peak Temp.:245±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：260±5℃　　时间：10±1 sec.

Temp.:260±5℃　　Time:10±1 sec

## 包装规格 / Packaging SPEC.

### 卷盘包装 / REEL

| Package Type 封装形式 | Units 包装数量 | | | | | Dimension 包装尺寸 (unit: $mm^3$) | | |
|---|---|---|---|---|---|---|---|---|
| | Units/Reel 只/卷盘 | Reels/Inner Box 卷盘/盒 | Units/Inner Box 只/盒 | Inner Boxes/Outer Box 盒/箱 | Units/Outer Box 只/箱 | Reel | Inner Box 盒 | Outer Box 箱 |
| TO-252 | 2,500 | 2 | 5,000 | 5 | 25,000 | 13″ ×16 | 360×360×50 | 385×257×392 |

### 套管包装 / TUBE

| Package Type 封装形式 | Units 包装数量 | | | | | Dimension 包装尺寸 (unit: $mm^3$) | | |
|---|---|---|---|---|---|---|---|---|
| | 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-251/252 | 75 | 48 | 3,600 | 5 | 18,000 | 526×20.5×5.25 | 555×164×50 | 575×290×180 |

## 使用说明 / Notices