

**描述 / Descriptions**

N 沟道 TO-252 塑封封装场效应管。N-CHANNEL MOSFET in a TO-252 Plastic Package.

**特征 / Features**

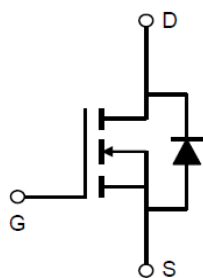
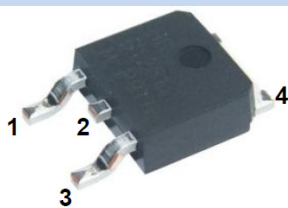
RDS(on) 小, 门电荷低, Crss 小, 开关速度快。无卤产品。

Low RDS(on), low gate charge, low Crss, fast switching. HF 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、TV/Monitor 电源板卡。

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

**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<sub>FE</sub> Classifications & Marking**

见印章说明。See Marking Instructions.

**极限参数 / Absolute Maximum Ratings(Ta=25°C)**

| 参数<br>Parameter                                |                         | 符号<br>Symbol    | 数值<br>Rating | 单位<br>Unit         |
|------------------------------------------------|-------------------------|-----------------|--------------|--------------------|
| Drain-Source Voltage                           |                         | $V_{DS}$        | 150          | V                  |
| Gate-Source Voltage                            |                         | $V_{GS}$        | $\pm 20$     | V                  |
| Continuous Drain Current                       | $T_C=25^\circ\text{C}$  | $I_D$           | 15           | A                  |
|                                                | $T_C=100^\circ\text{C}$ |                 | 8            |                    |
| Pulsed Drain Current <sup>C</sup>              |                         | $I_{DM}$        | 40           |                    |
| Avalanche Current <sup>C</sup>                 |                         | $I_{AS}$        | 14.5         | A                  |
| Avalanche energy $L=0.1\text{mH}$ <sup>C</sup> |                         | $E_{AS}$        | 12.5         | mJ                 |
| Power Dissipation <sup>B</sup>                 | $T_C=25^\circ\text{C}$  | $P_D$           | 105          | W                  |
|                                                | $T_C=100^\circ\text{C}$ |                 | 41.5         |                    |
| Junction and Storage Temperature Range         |                         | $T_J, T_{STG}$  | -55 to 150   | $^\circ\text{C}$   |
| Maximum Junction-to-Ambient <sup>A</sup>       | $t \leq 10\text{s}$     | $R_{\theta JA}$ | 20           | $^\circ\text{C/W}$ |
| Maximum Junction-to-Ambient <sup>AD</sup>      | Steady-State            |                 | 50           | $^\circ\text{C/W}$ |
| Maximum Junction-to-Case                       | Steady-State            | $R_{\theta JC}$ | 1.4          | $^\circ\text{C/W}$ |

**电性能参数 / Electrical Characteristics(Ta=25°C)**

| 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    | $BV_{DSS}$   | $I_D=250\mu\text{A}, V_{GS}=0\text{V}$    | 150        | 156        |            | V                |
| Zero Gate Voltage Drain Current   | $I_{DSS}$    | $V_{DS}=150\text{V}, V_{GS}=0\text{V}$    |            |            | 1          | $\mu\text{A}$    |
|                                   |              | $T_J=125^\circ\text{C}$                   |            |            | 5          |                  |
| Gate-Body leakage current         | $I_{GSS}$    | $V_{DS}=0\text{V}, V_{GS}=\pm 20\text{V}$ |            |            | $\pm 100$  | nA               |
| Gate Threshold Voltage            | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu\text{A}$       | 2          |            | 4          | V                |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}=10\text{V}, I_D=8\text{A}$        |            | 110        | 140        | $\text{m}\Omega$ |
|                                   |              | $V_{GS}=7\text{V}, I_D=5\text{A}$         |            | 125        | 200        |                  |
| Diode Forward Voltage             | $V_{SD}$     | $I_S=1\text{A}, V_{GS}=0\text{V}$         |            |            | 1          | V                |

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

| 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 |
|------------------------------------|--------------|---------------------------------------------------------------|------------|------------|------------|------------|
| Input Capacitance                  | $C_{iss}$    | $V_{GS}=0V, V_{DS}=25V,$<br>$f=1MHz$                          |            | 1700       |            | pF         |
| Output Capacitance                 | $C_{oss}$    |                                                               |            | 4.5        |            |            |
| Reverse Transfer Capacitance       | $C_{rss}$    |                                                               |            | 58         |            |            |
| Gate resistance                    | $R_g$        | $V_{GS}=0V, V_{DS}=0V$<br>$f=1MHz$                            |            | 3.4        |            | $\Omega$   |
| Total Gate Charge                  | $Q_g(10V)$   | $V_{GS}=10V, V_{DS}=75V,$<br>$I_D=10A$                        |            | 15.5       | 22         | nC         |
| Total Gate Charge                  | $Q_g(4.5V)$  |                                                               |            | 7          | 10         |            |
| Gate Source Charge                 | $Q_{gs}$     |                                                               |            | 4          |            |            |
| Gate Drain Charge                  | $Q_{gd}$     |                                                               |            | 1.2        |            |            |
| Turn-On Delay Time                 | $t_{D(on)}$  | $V_{GS}=10V, V_{DS}=75V,$<br>$R_L=7.5\Omega, R_{GEN}=3\Omega$ |            | 6.5        |            | ns         |
| Turn-On Rise Time                  | $t_r$        |                                                               |            | 5          |            |            |
| Turn-Off Delay Time                | $t_{D(off)}$ |                                                               |            | 23         |            |            |
| Turn-Off Fall Time                 | $t_f$        |                                                               |            | 2.5        |            |            |
| Body Diode Reverse Recovery Time   | $t_{rr}$     | $IF=10A, dI/dt=500A/ms$                                       |            | 37         |            | ns         |
| Body Diode Reverse Recovery Charge | $Q_{rr}$     | $IF=10A, dI/dt=500A/ms$                                       |            | 265        |            | nC         |

A. The value of  $R_{\theta JA}$  is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ C$ . The

Power dissipation PDSM is based on  $R_{\theta JA}$  and the maximum allowed junction temperature of  $150^\circ C$ . The value in any given application depends on the user's specific board design, and the maximum temperature of  $150^\circ C$  may be used if the PCB allows it.

B. The power dissipation  $P_D$  is based on  $T_{J(MAX)}=150^\circ C$ , using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. Repetitive rating, pulse width limited by junction temperature  $T_{J(MAX)}=150^\circ C$ . Ratings are based on low frequency and duty cycles to keep initial  $T_J=25^\circ C$ .

D. The  $R_{\theta JA}$  is the sum of the thermal impedance from junction to case  $R_{\theta JC}$  and case to ambient.

## 电参数曲线图 / Electrical Characteristic Curve

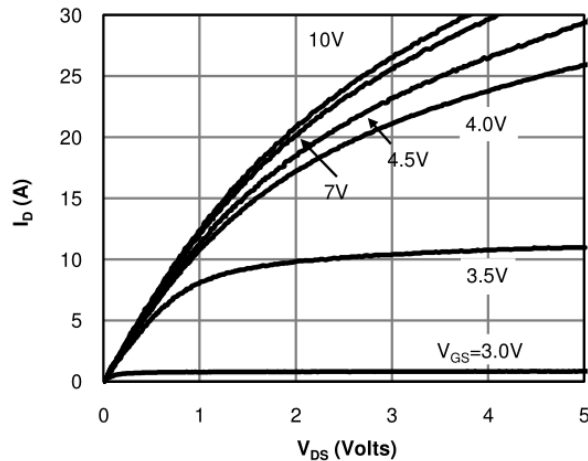


Fig 1: On-Region Characteristics

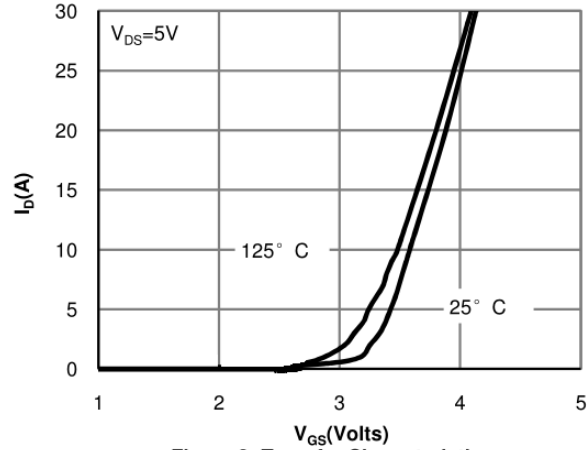


Figure 2: Transfer Characteristics

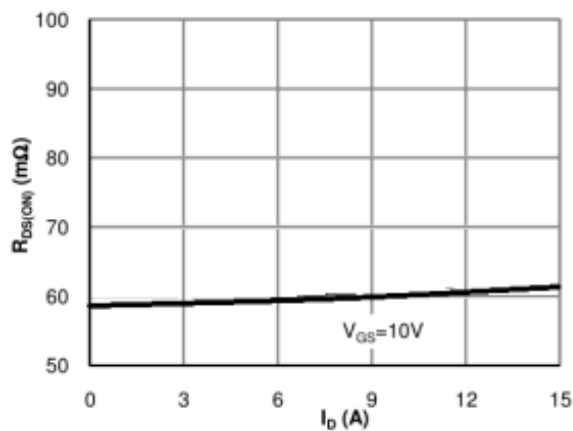


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

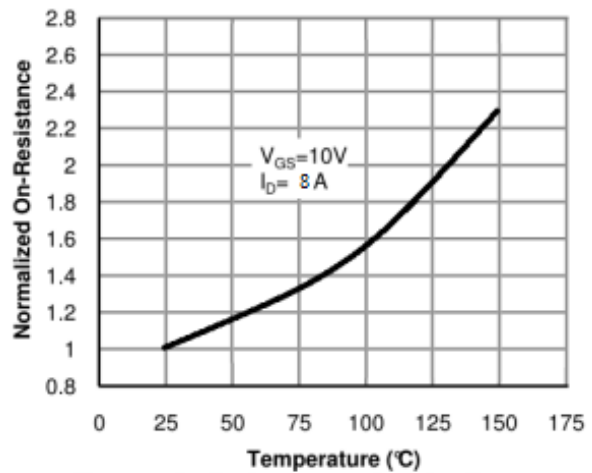


Figure 4: On-Resistance vs. Junction Temperature

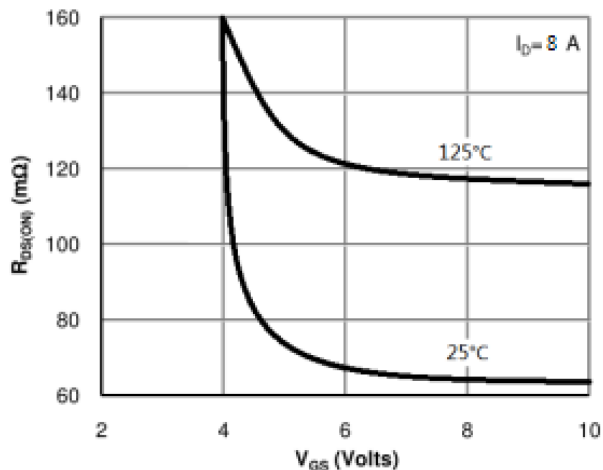


Figure 5: On-Resistance vs. Gate-Source Voltage

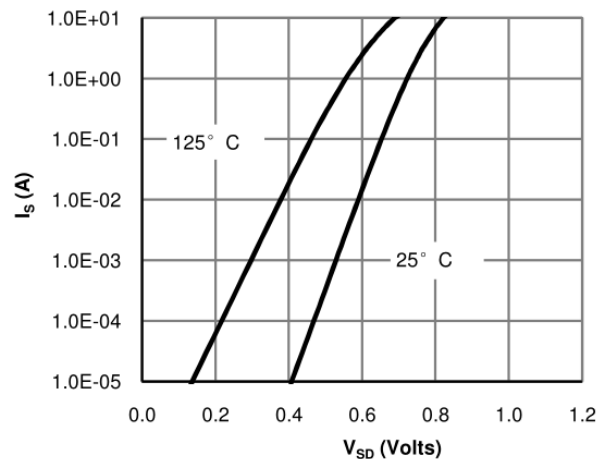
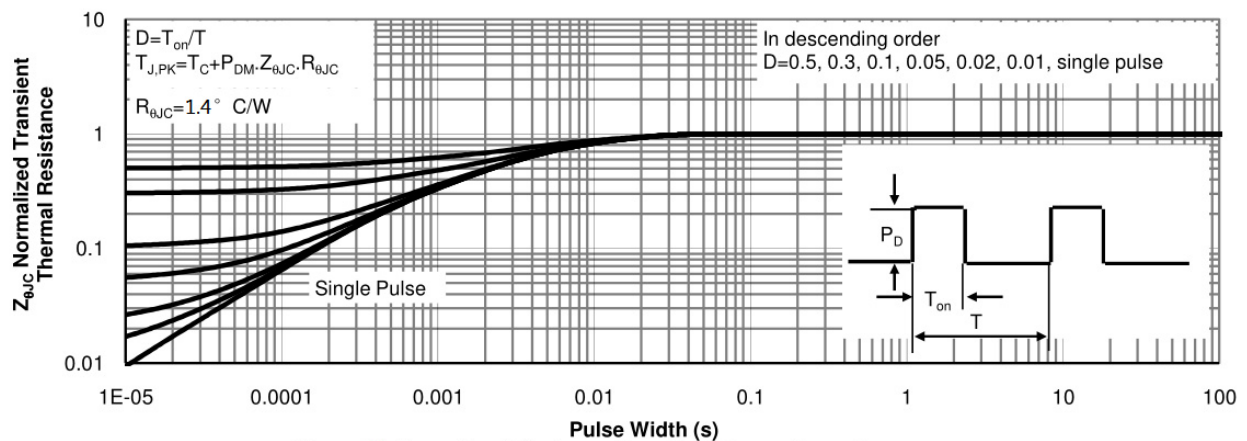
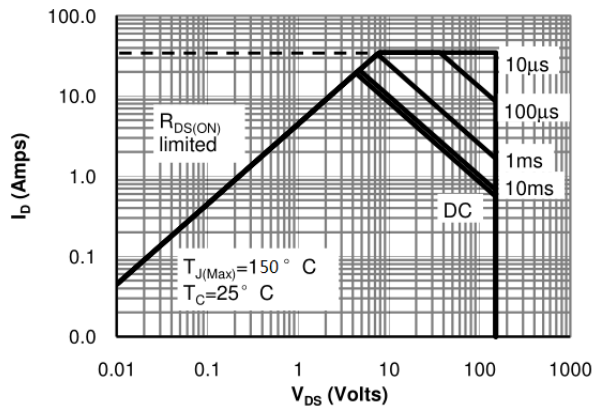
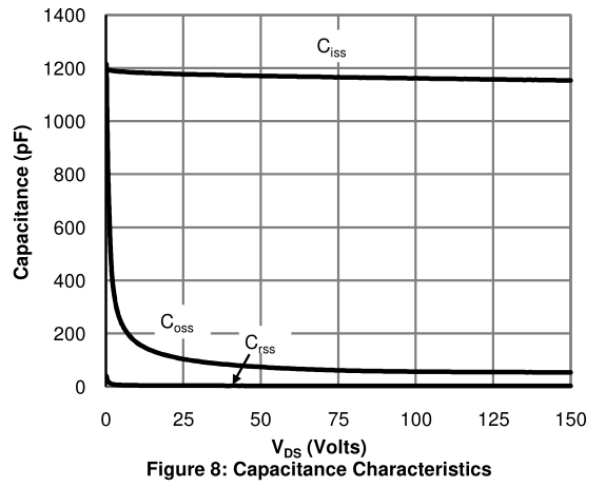
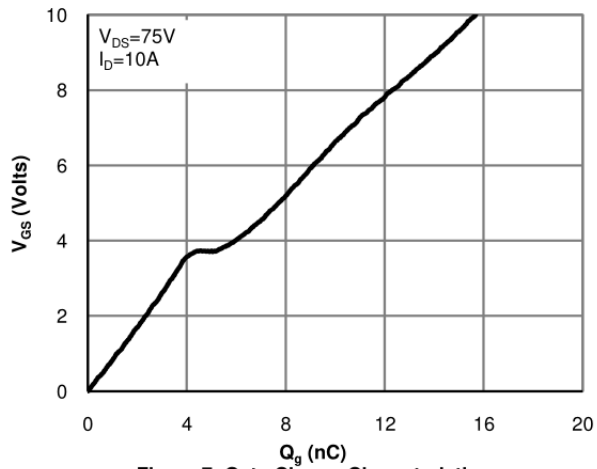
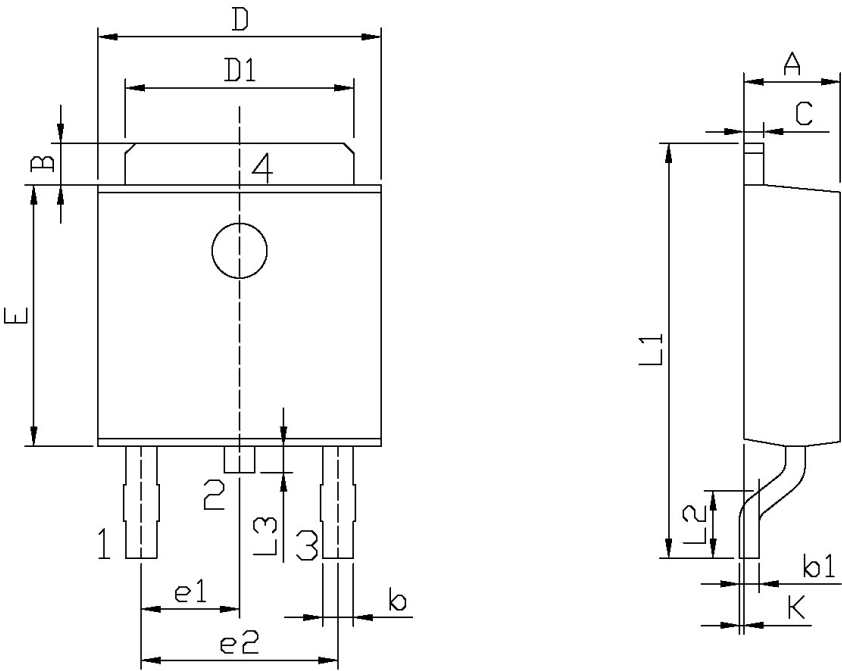


Figure 6: Body-Diode Characteristics

## 电参数曲线图 / Electrical Characteristic Curve



外形尺寸图 / Package Dimensions

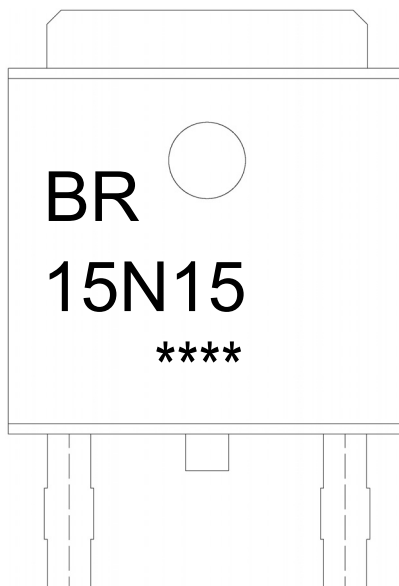


单位：mm

| 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

15N15 为型号代码

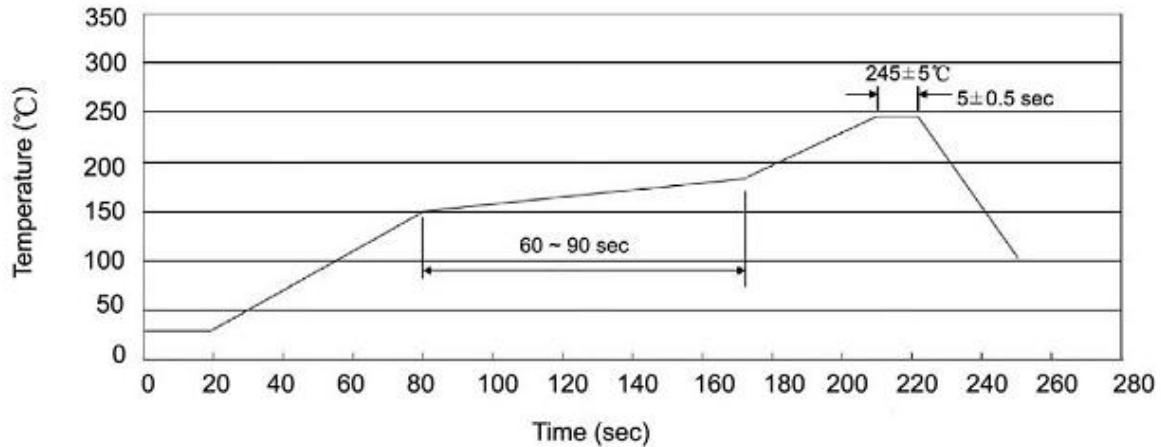
\*\*\*\*： 为生产批号代码，随生产批号变化。

Note:

BR: Company Code

15N15 : Product Type Code.

\*\*\*\*: 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°C，时间 60 ~ 90sec;
- 2、峰值温度 245±5°C，时间持续为 5±0.5sec;
- 3、焊接制程冷却速度为 2 ~ 10°C/sec.

Note:

- 1.Preheating:150~180°C, Time:60~90sec.
- 2.Peak Temp.:245±5°C, Duration:5±0.5sec.
3. Cooling Speed: 2~10°C/sec.

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

温度：260±5°C

时间：10±1 sec.

Temp.:260±5°C

Time:10±1 sec

**包装规格 / Packaging SPEC.**

卷盘包装 / REEL

| Package Type<br>封装形式 | Units 包装数量         |                         |                        |                              |                        | Dimension 包装尺寸 (unit: mm <sup>3</sup> ) |             |             |
|----------------------|--------------------|-------------------------|------------------------|------------------------------|------------------------|-----------------------------------------|-------------|-------------|
|                      | Units/Reel<br>只/卷盘 | Reels/Inner Box<br>卷盘/盒 | Units/Inner Box<br>只/盒 | Inner Boxes/Outer Box<br>盒/箱 | Units/Outer Box<br>只/箱 | Reel                                    | Inner Box 盒 | Outer Box 箱 |
| TO-252               | 2,500              | 2                       | 5,000                  | 6                            | 30,000                 | 13" ×16                                 | 360×360×50  | 380×335×366 |

套管包装 / TUBE

| Package Type<br>封装形式 | Units 包装数量         |                         |                        |                              |                        | Dimension 包装尺寸 (unit: mm <sup>3</sup> ) |             |             |
|----------------------|--------------------|-------------------------|------------------------|------------------------------|------------------------|-----------------------------------------|-------------|-------------|
|                      | Units/Tube<br>只/套管 | Tubes/Inner Box<br>套管/盒 | Units/Inner Box<br>只/盒 | Inner Boxes/Outer Box<br>盒/箱 | Units/Outer Box<br>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**