

# BRCS020N03RA

Rev.A Jun.-2022

## 描述 / Descriptions

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

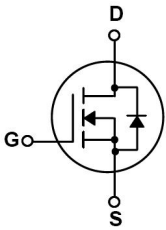
## 特征 / Features

低电阻,开关速度快。  
Ultra Low On-Resistance,fast switching.

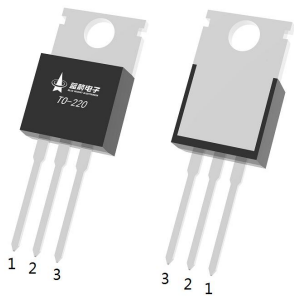
## 用途 / Applications

该器件适用于高效电源模块, 主动式 PFC 电路和基于半桥拓扑结构的电子节能灯。  
These devices are well suited for high efficient switched mode power supplies, Active power factor correction, electronic lamp ballast based on half bridge topology.

## 内部等效电路 / Equivalent Circuit



## 引脚排列 / Pinning



PIN1 : G      PIN 2、 4 : D      PIN 3 : S

## 印章代码 / Marking

见印章说明。 See Marking Instructions.

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

参数 Parameter	符号 Symbol	数值 Rating	单位 Unit
Drain-Source Voltage	$V_{DS}$	30	V
Drain Current	$I_D(T_C=25^\circ\text{C})$	217	A
Pulsed Drain Current	$I_{DM}$	770	A
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Single Pulsed Avalanche Energy L=0.5mH	$E_{AS}$	590	mJ
Avalanche Current	$I_{AS}$	33.5	A
Total Power Dissipation	$P_D(T_C=25^\circ\text{C})$	150	W
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$
Thermal Resistance-Junction to Ambient	$t \leq 10\text{s}$	$R_{\theta JA}$	15
	Steady-State		60
Thermal Resistance-Junction to Case	Steady-State	$R_{\theta JC}$	0.8

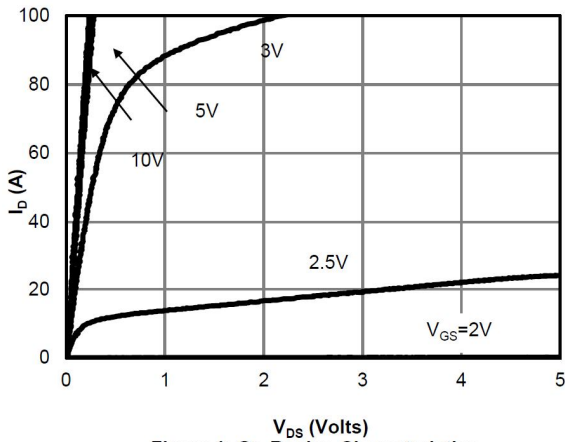
**电性能参数 / Electrical Characteristics(Ta=25°C)**

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	$BV_{DSS}$	$V_{GS}=0\text{V}$ $I_D=250\mu\text{A}$	30	35		V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=30\text{V}$ $V_{GS}=0\text{V}$			1	$\mu\text{A}$
Gate-Body Leakage Current Forward	$I_{GSS}$	$V_{GS}=\pm 20\text{V}$ $V_{DS}=0\text{V}$			$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$ $I_D=250\mu\text{A}$	1	1.5	3	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10\text{V}$ $I_D=20\text{A}$		1.8	2	m $\Omega$
		$V_{GS}=4.5\text{V}$ $I_D=10\text{A}$		2.5	3	
Forward On Voltage	$V_{SD}$	$V_{GS}=0\text{V}$ $I_S=1\text{A}$			1.2	V
Input Capacitance	$C_{iss}$	$V_{DS}=25\text{V}$ $V_{GS}=0\text{V}$ $f=1\text{MHz}$		5700		pF
Output Capacitance	$C_{oss}$			610		
Reverse Transfer Capacitance	$C_{rss}$			460		

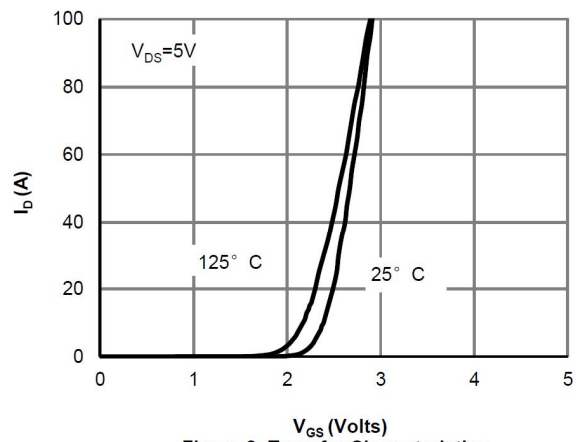
## 电性能参数 / Electrical Characteristics(Ta=25°C)

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
Gate resistance	$R_g$	$f=1\text{MHz}$		1.5		$\Omega$
Total Gate Charge	$Q_g(10\text{V})$	$V_{GS}=10\text{V}$ $V_{DS}=20\text{V}$ $I_D=20\text{A}$		67		nC
Total Gate Charge	$Q_g(4.5\text{V})$			29		
Gate Source Charge	$Q_{gs}$			16.7		
Gate Drain Charge	$Q_{gd}$			4.8		
Turn-On Delay Time	$t_{d(on)}$	$V_{GS}=10\text{V}$ $V_{DS}=20\text{V}$ $R_L=1\Omega$ $R_{GEN}=3\Omega$		12.7		ns
Turn-On Rise Time	$t_r$			9.5		
Turn-Off Delay Time	$t_{d(off)}$			58		
Turn-Off Fall Time	$t_f$			11		

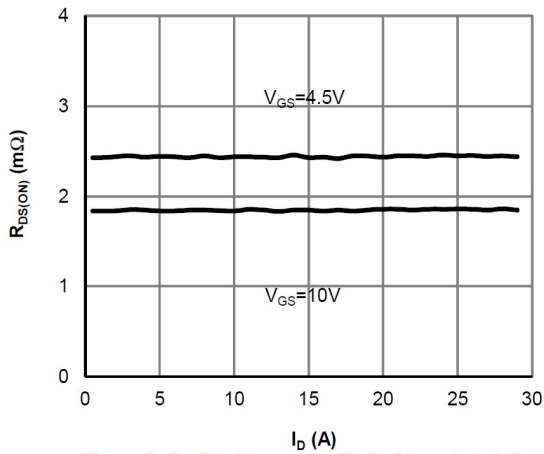
**电参数曲线图 / Electrical Characteristic Curve**



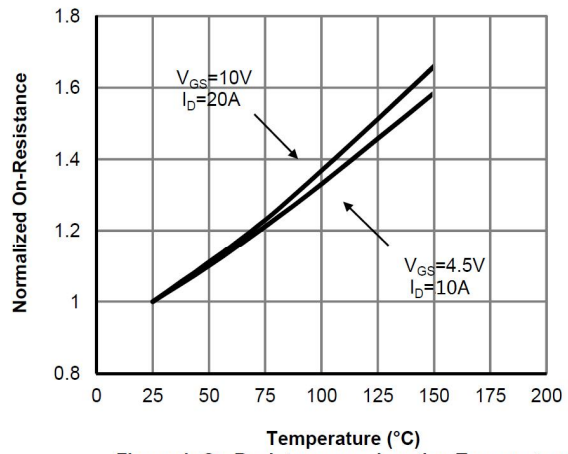
**Figure 1: On-Region Characteristics**



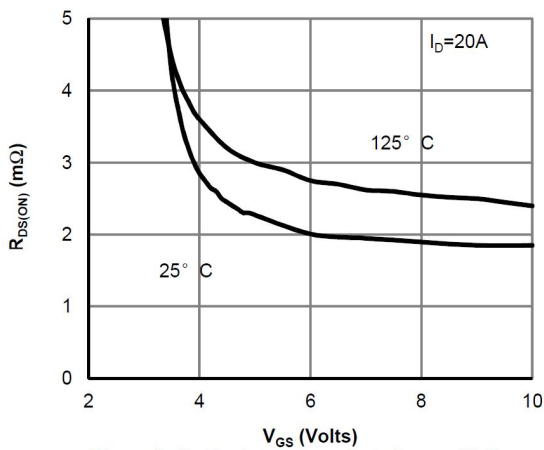
**Figure 2: Transfer Characteristics**



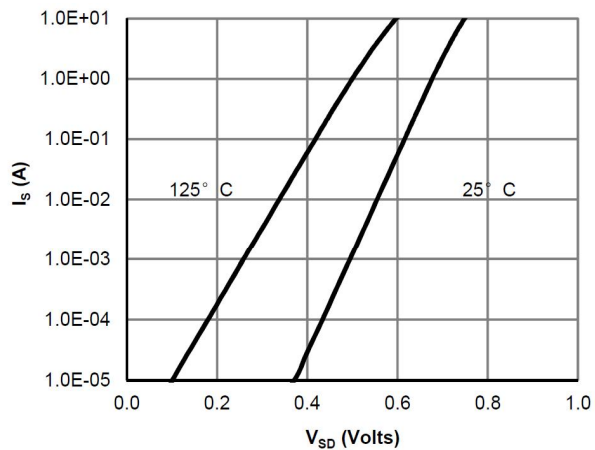
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage**



**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

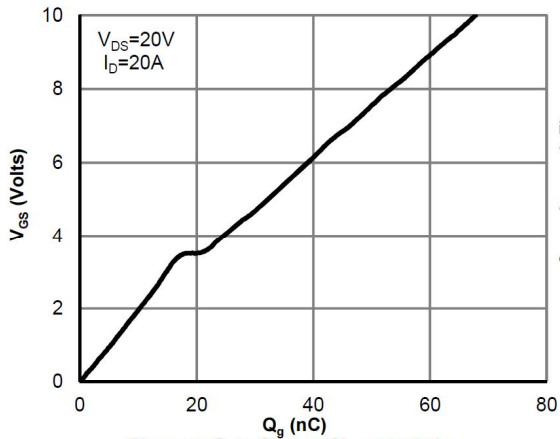


Figure 7: Gate-Charge Characteristics

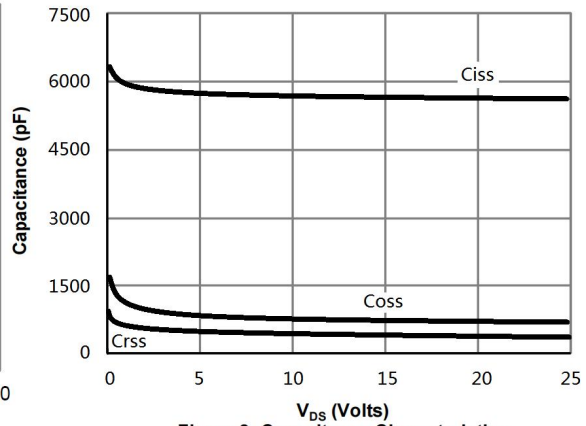


Figure 8: Capacitance Characteristics

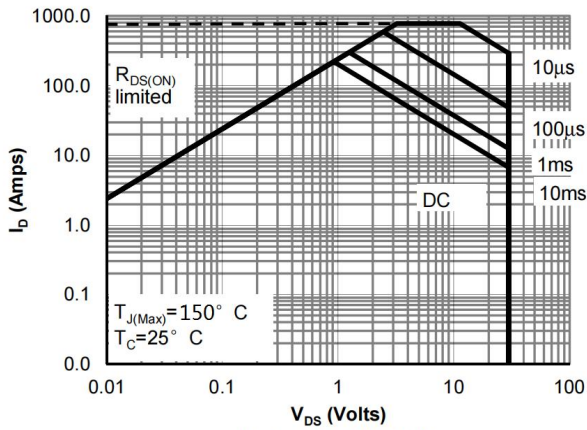


Figure 9: Maximum Forward Biased Safe Operating Area

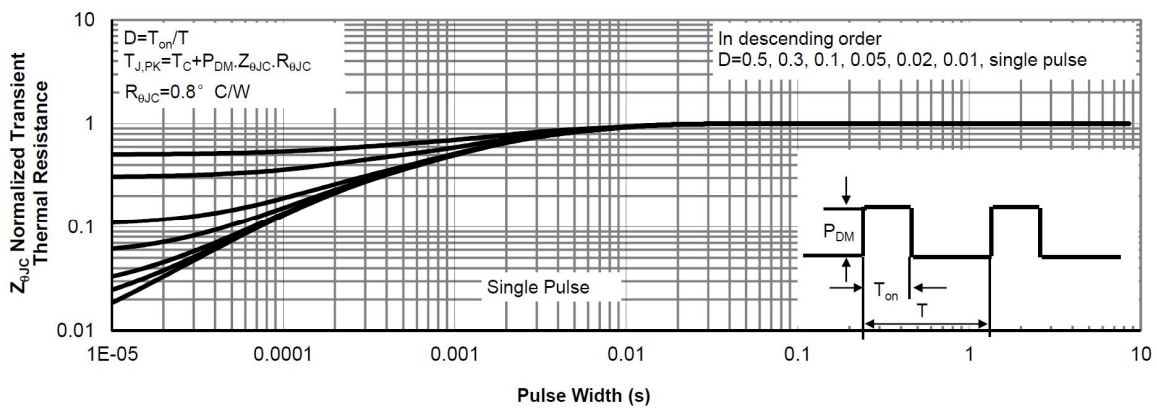
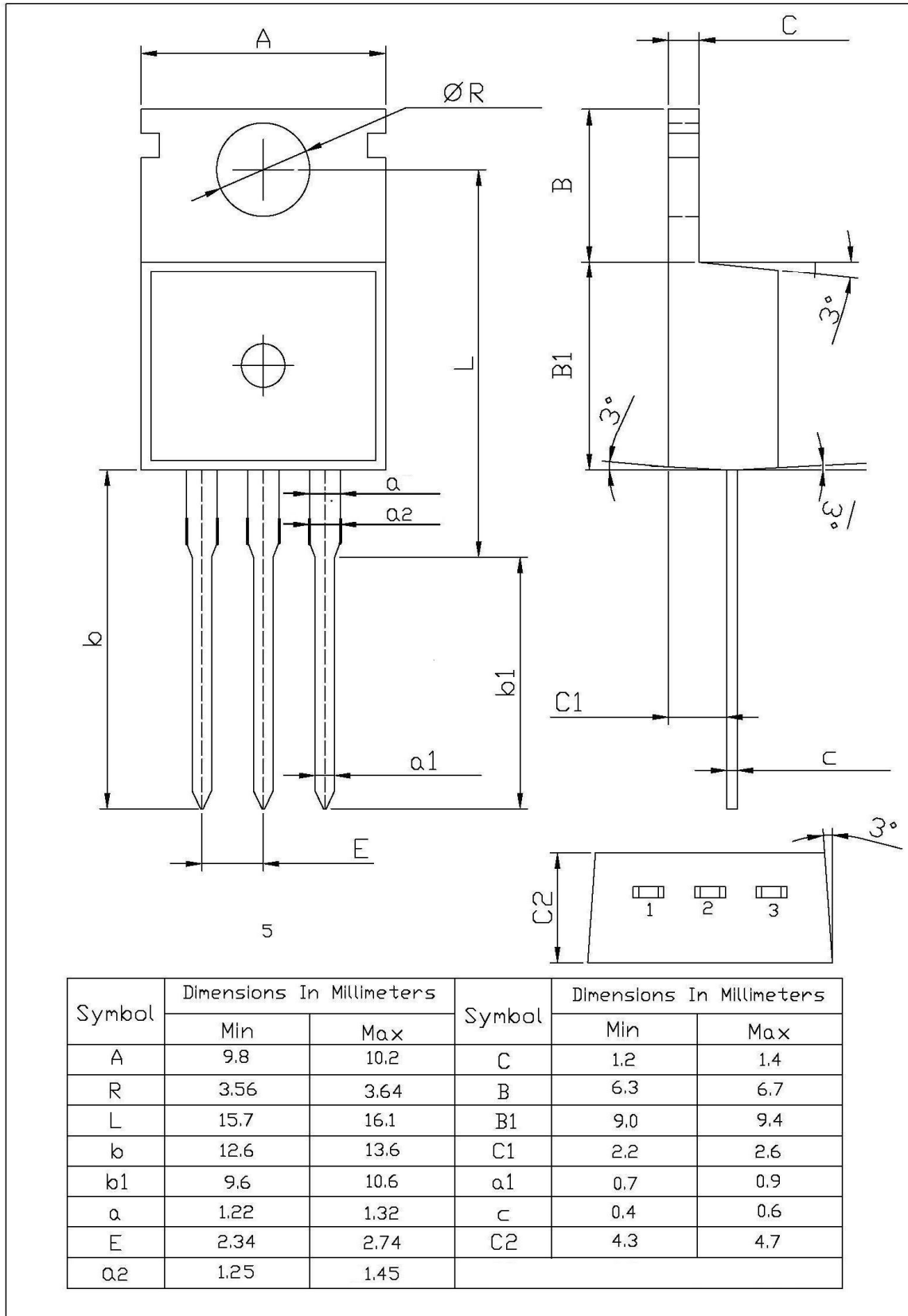


Figure 10: Normalized Maximum Transient Thermal Impedance

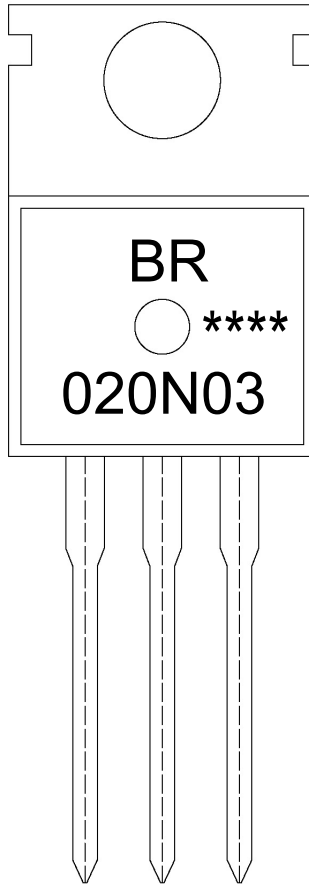
**外形尺寸图 / Package Dimensions**

T0-220

单位: mm



**印章说明 / Marking Instructions**



说明：

BR： 为公司代码

020N03： 为型号代码

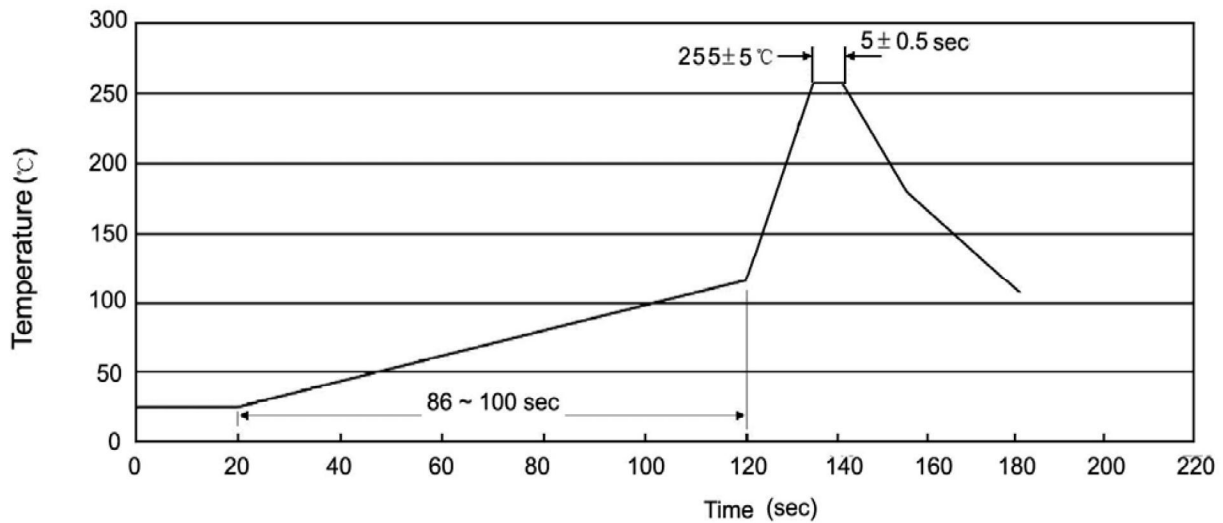
\*\*\*\*： 为生产批号代码，随生产批号变化

Note:

BR: Company Code

020N03: 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°C，时间 60 ~ 90sec；
- 2、峰值温度 255±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:25~150°C, Time:60~90sec.
- 2.Peak Temp.:255±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：270±5°C

时间：10±1 sec.

Temp.:270±5°C

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: mm <sup>3</sup> )		
	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: mm <sup>3</sup> )		
	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**



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