描述 / Descriptions

N 沟道 TO-220 塑封封装场效应管。

N-Channel MOSFET in a TO-220 Plastic Package.

特征 / Features

低栅电荷,导通电阻低，快速切换应用的优化。

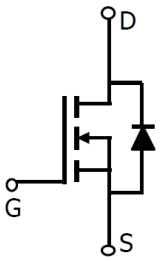
Low gate charge,Low $R_{DS(on)}$,Optimized for fast-switching applications.

用途 / Applications

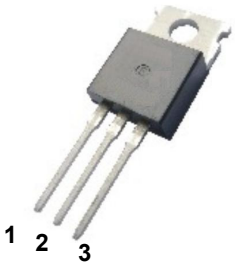
用于低压电路如：汽车电路、DC/DC 转换、便携式产品的电源高效转换。

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

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}	200	V
Drain Current[G]		I_D(Tc=25℃)	18	A
		I_D(Tc=100℃)	13	A
Drain Current - Pulsed[C]		I_{DM}	45	A
Gate-Source Voltage		V_{GSS}	±20	V
Single Pulsed Avalanche Energy(L=10mH)		E_{AS}	125	mJ
Avalanche Current[C](L=10mH)		I_{AS}	9.5	A
Power Dissipation[B]		P_D(Tc=25℃)	132	W
		P_D(Tc=100℃)	52	W
Operating and Storage Temperature Range		T_J,T_{STG}	-55 to 150	℃
Maximum Junction-to-Ambient[A]	t≤10s	$R_{\theta JA}$	24	℃/W
Maximum Junction-to-Ambient[AD]	Steady-State		54	
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	0.95	

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	200			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=200V V_{GS}=0V			1	μA
		V_{DS}=200V T_J=55℃			5	
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	1.0		3.0	V
Total gate charge	$R_{DS(on)}$	V_{GS}=10V I_D=9A		130	170	mΩ
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=0V I_S=18A			1.45	V

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
Gate resistance	R_g	V_{GS}=0V V_{DS}=0V f=1MHz		6.5		Ω
Input Capacitance	C_{iss}	V_{DS}=25V V_{GS}=0V f=1.0MHz		832		pF
Output Capacitance	C_{oss}			149		
Reverse Transfer Capacitance	C_{rss}			65		
Total Gate Charge	$Q_{g(10V)}$	V_{GS}=10V V_{DS}=100V I_D=18A		27	40	nC
Total Gate Charge	$Q_{g(4.5V)}$			12	20	
Gate Source Charge	Q_{gs}			7		
Gate Drain Charge	Q_{gd}			3		
Turn-On Delay Time	$t_{d(on)}$	V_{GS}=10V V_{DS}=100V R_L=5.5Ω R_{GEN}=3Ω		8		ns
Turn-On Rise Time	t_r			10		ns
Turn-Off Delay Time	$t_{d(off)}$			30		ns
Turn-Off Fall Time	t_f			4		ns
Body Diode Reverse Recovery Time	t_{rr}	I_F=18A dI/dt=500A/μs		60		ns
Body Diode Reverse Recovery Charge	Q_{rr}	I_F=18A dI/dt=500A/μs		800		nC

A: The value of $R_{\theta JA}$ is measured with the device in a still air environment with T_A =25°C.

B. The power dissipation PD is based on TJ(MAX)=150°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°C.

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

E. The static characteristics in Figures 1 to 6 are obtained using <300 μs pulses, duty cycle 0.5%max.

F. These curves are based on the junction-to-case thermal impedence which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$=150°C.

G. The maximum current rating is limited by bond-wires.

电参数曲线图 / Electrical Characteristic Curve

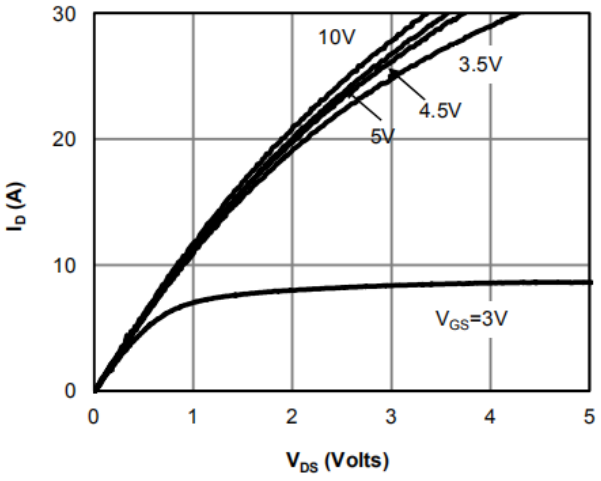


Figure 1: On-Region Characteristics

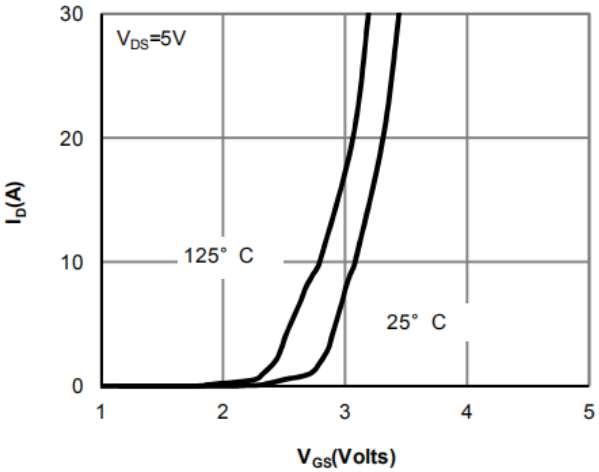


Figure 2: Transfer Characteristics

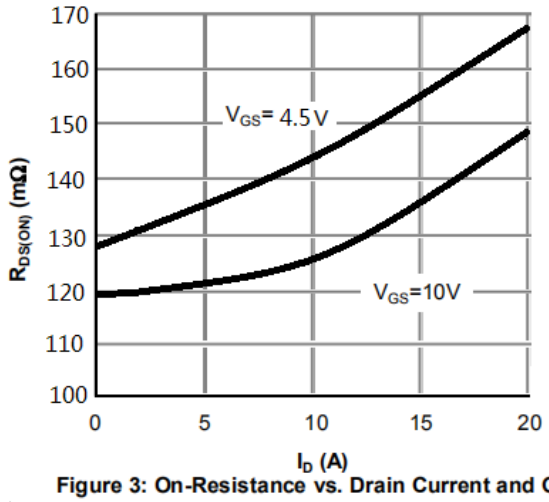


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

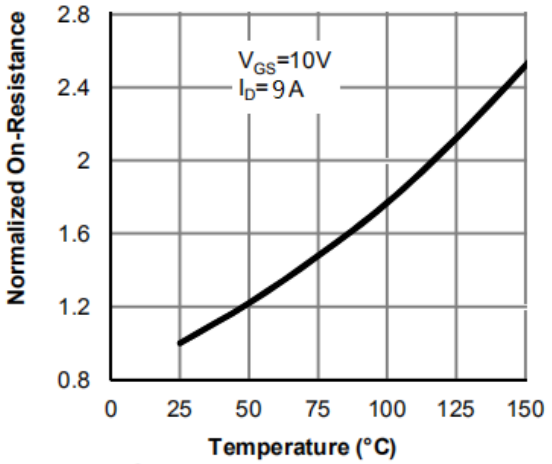


Figure 4: On-Resistance vs. Junction Temperature

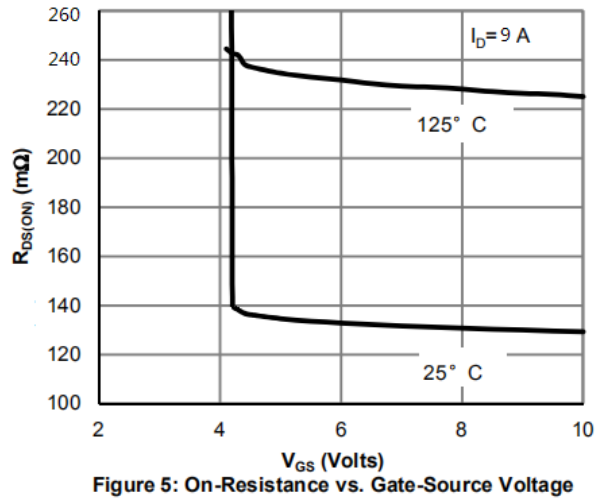


Figure 5: On-Resistance vs. Gate-Source Voltage

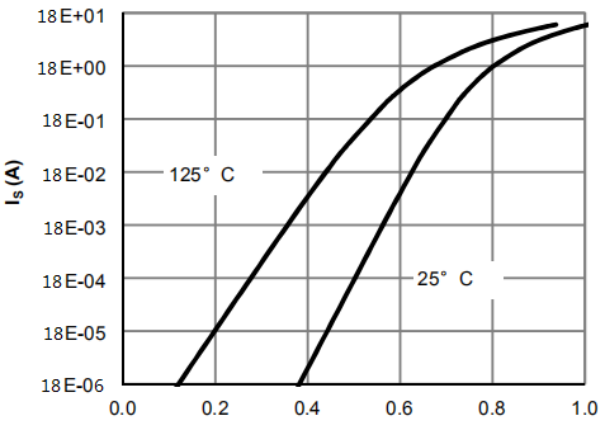


Figure 6: Body-Diode Characteristics

电参数曲线图 / Electrical Characteristic Curve

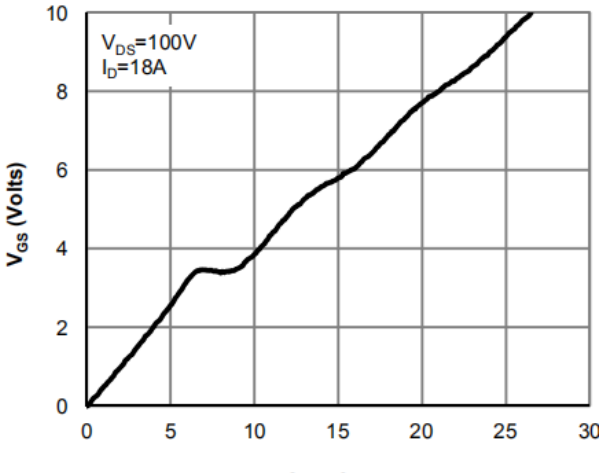


Figure 7: Gate-Charge Characteristics

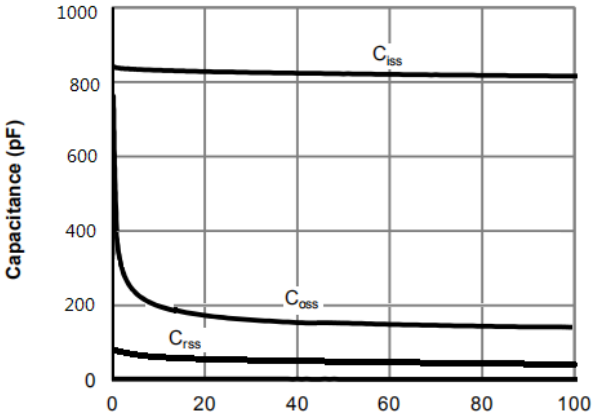


Figure 8: Capacitance Characteristics

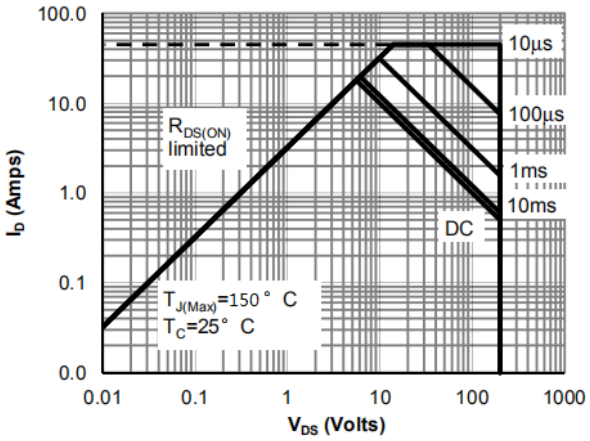


Figure 9: Maximum Forward Biased Safe Operating Area

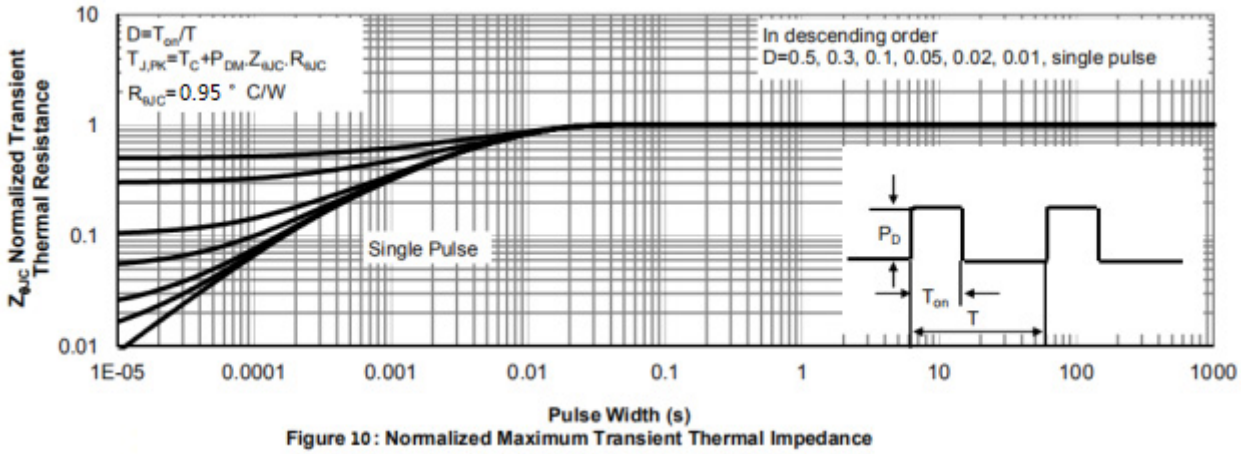
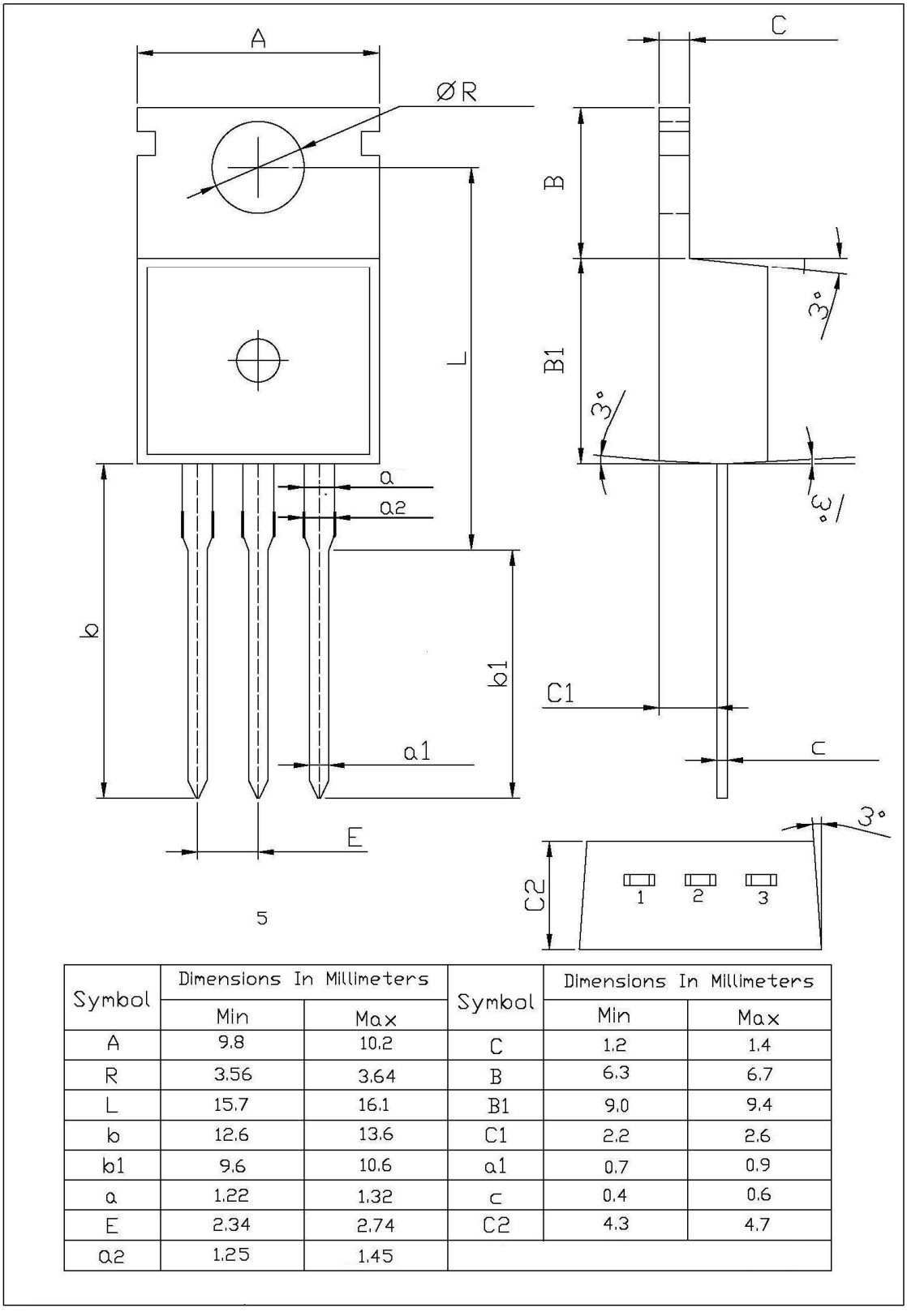


Figure 10 : Normalized Maximum Transient Thermal Impedance

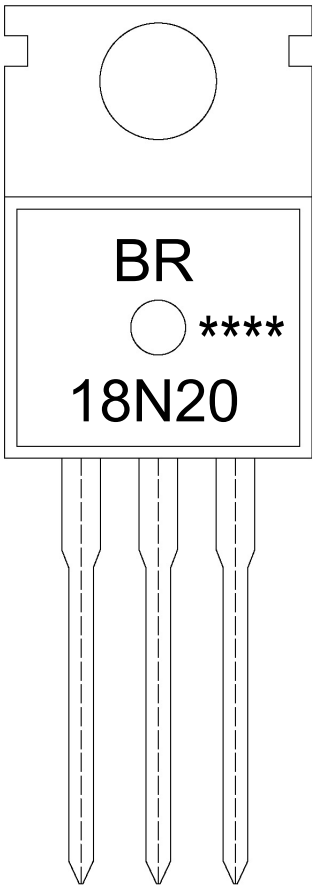
外形尺寸图 / Package Dimensions

TO-220 单位：mm



Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	9.8	10.2	C	1.2	1.4
R	3.56	3.64	B	6.3	6.7
L	15.7	16.1	B1	9.0	9.4
b	12.6	13.6	C1	2.2	2.6
b1	9.6	10.6	a1	0.7	0.9
a	1.22	1.32	c	0.4	0.6
E	2.34	2.74	C2	4.3	4.7
a2	1.25	1.45			

印章说明 / Marking Instructions



说明：

BR： 为公司代码

18N20： 为型号代码

****： 为生产批号代码，随生产批号变化。

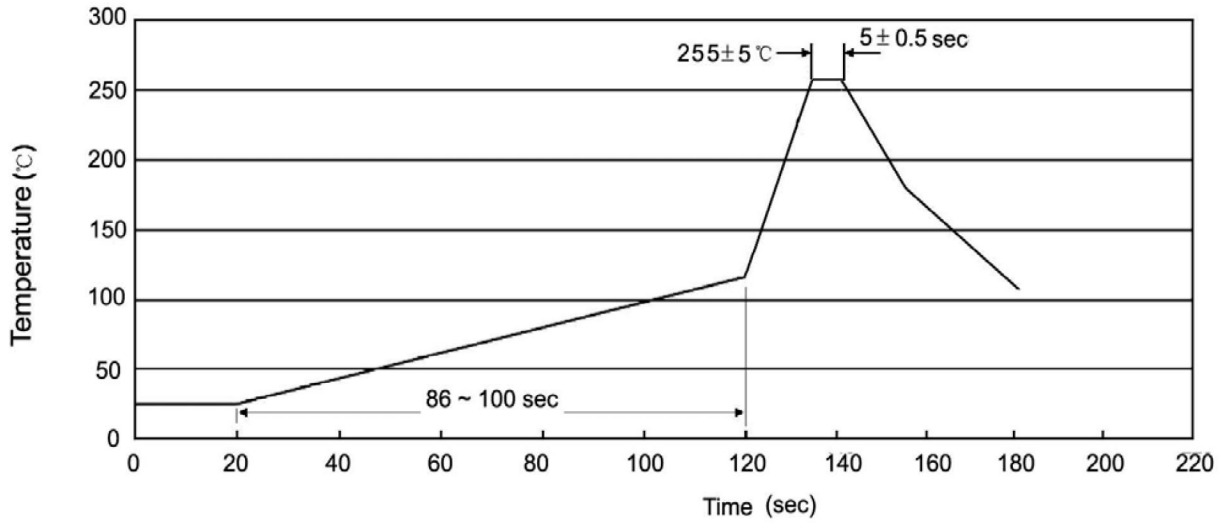
Note:

BR: Company Code

18N20: 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