

描述 / Descriptions

TO-251 塑封封装 N 沟道 650V 超结工艺功率场效应管。

N-CHANNEL 650V Super-Junction Power MOSFET in a TO-251 Plastic Package.

特征 / Features

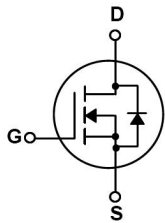
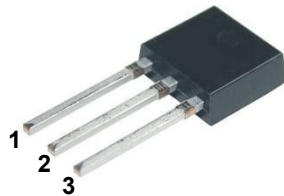
低 $R_{DS(on)} \times Q_g$, 100%雪崩测试, 符合 ROHS 标准。

Very low $R_{DS(on)} \times Q_g$, 100%avalanche tested, RoHS compliant.

用途 / Applications

用于开关电源, 不间断电源, 功率因素校正。

For switch mode power supply, uninterruptible power supply, power factor correction.

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°C)

参数 Parameter	符号 Symbol	数值 Rating	单位 Unit
Drain-Source Voltage	V_{DS}	650	V
Drain Current	$I_D(T_c=25^{\circ}\text{C})$	11	A
Drain Current - Pulsed(note1)	I_{DM}	33	A
Gate-Source Voltage	V_{GS}	± 30	V
Single Pulsed Avalanche Energy(note2)	E_{AS}	65	mJ
Repetitive Avalanche Energy(note1)	E_{AR}	1.0	mJ
Avalanche Current(note1)	I_{AR}	11	A
Power Dissipation	$P_D(T_c=25^{\circ}\text{C})$	73	W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^{\circ}\text{C}$
Junction-to-Case	$R_{\theta JC}$	1.7	$^{\circ}\text{C/W}$
Junction-to-Ambient	$R_{\theta JA}$	62	$^{\circ}\text{C/W}$

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_{DS}	$V_{GS}=0V$ $I_D=250\mu A$	650			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=650V$ $V_{GS}=0V$ $T_J=25^{\circ}\text{C}$			1.0	μA
		$V_{DS}=650V$ $T_J=150^{\circ}\text{C}$			100	μA
Gate-Body Leakage Current, Forward	I_{GSS}	$V_{GS}=\pm 30V$			± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$ $I_D=250\mu A$	2.5		4.5	V
Static Drain-Source On-Resistance(note3)	$R_{DS(on)}$	$V_{GS}=10V$ $I_D=5.0A$		0.34	0.38	Ω
Forward Transconductance(note3)	g_{FS}	$V_{DS}=10V$ $I_D=10A$		10		S
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V$ $I_{SD}=11A$ $T_J=25^{\circ}\text{C}$		0.9	1.2	V
Input Capacitance	C_{iss}	$V_{DS}=50V$ $V_{GS}=0V$ $f=1.0\text{MHz}$		800		pF
Output Capacitance	C_{oss}			110		pF
Reverse Transfer Capacitance	C_{rss}			7.0		pF
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=300V$ $I_D=11A$ $R_G=25\Omega$		24	52	ns
Turn-On Rise Time	t_r			54	110	ns
Turn-Off Delay Time	$t_{d(off)}$			88	180	ns
Turn-Off Fall Time	t_f			25	54	ns

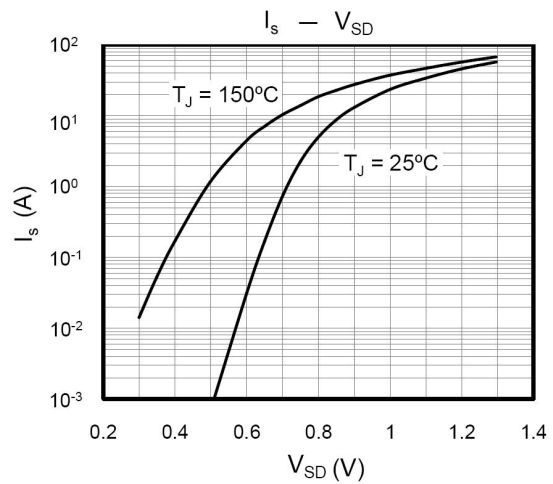
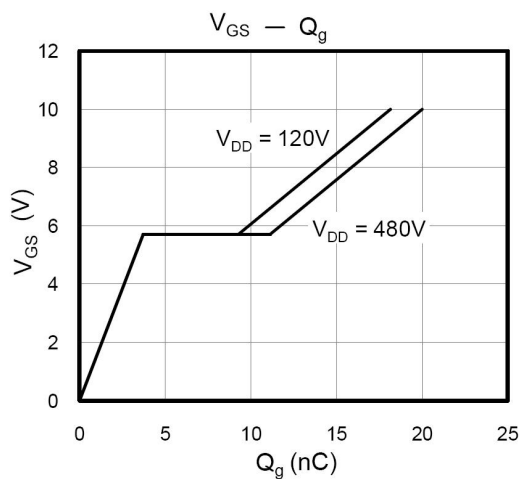
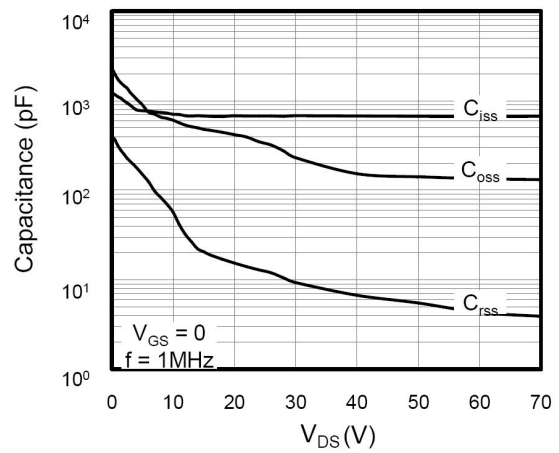
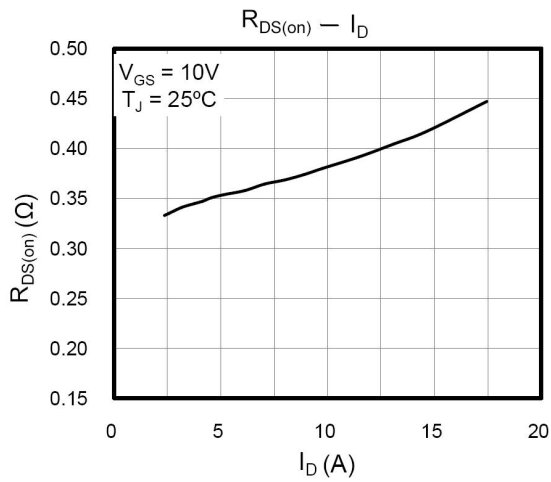
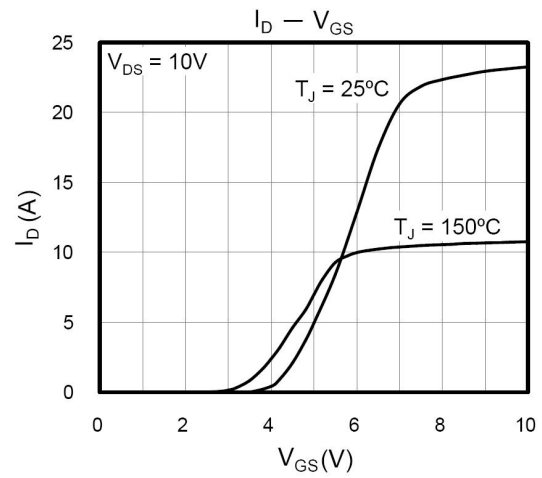
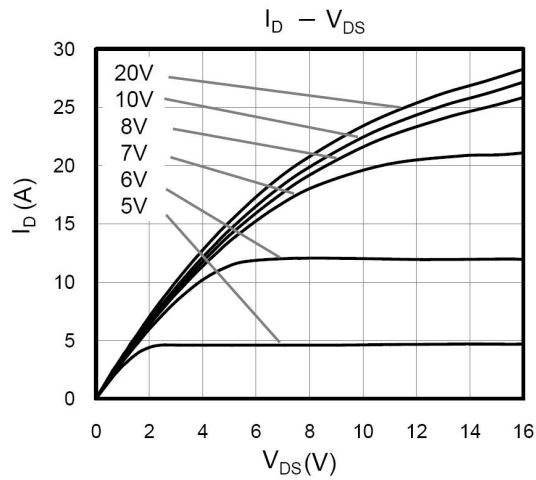
电性能参数 / Electrical Characteristics(Ta=25°C)

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
Continuous Body Diode Current	I_S				11	A
Pulsed Diode Forward Current	I_{SM}				33	A
Total Gate Charge	Q_g	$V_{DD}=480V \quad I_D=11A$ $V_{GS}=10V$		20		nC
Gate-Source Charge	Q_{gs}			4.0		nC
Gate-Drain Charge	Q_{gd}			6.0		nC
Reverse Recovery Time	t_{rr}	$V_R=480V \quad I_F=I_S$ $di_F/dt=100A/\mu s$		220		ns
Reverse Recovery Charge	Q_{rr}			2.0		μC
Peak Reverse Recovery Current	I_{rrm}			12		A

Notes

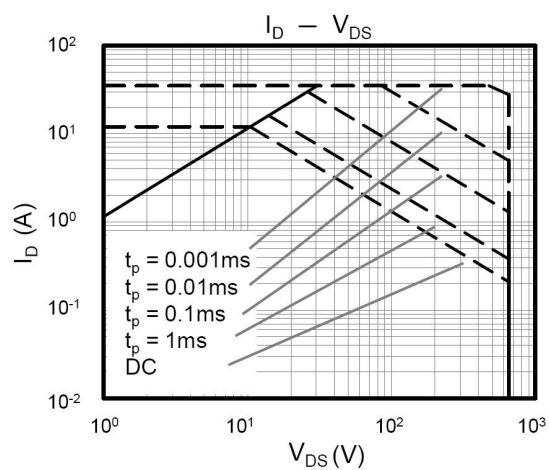
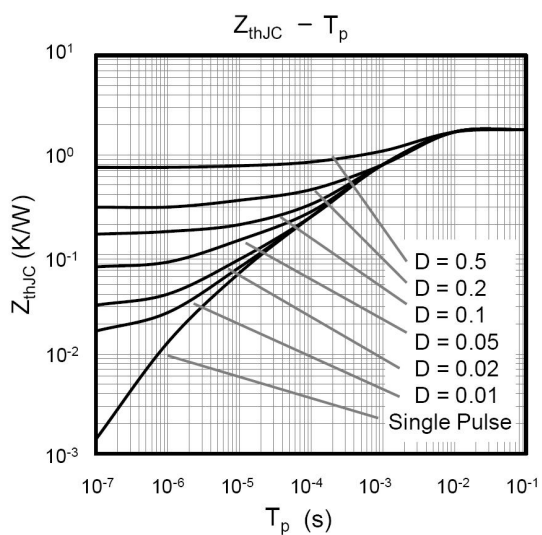
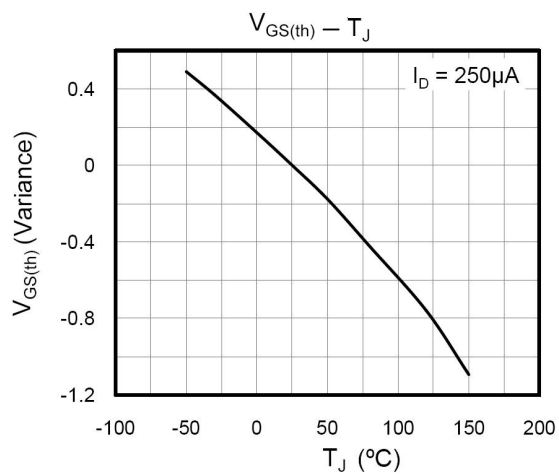
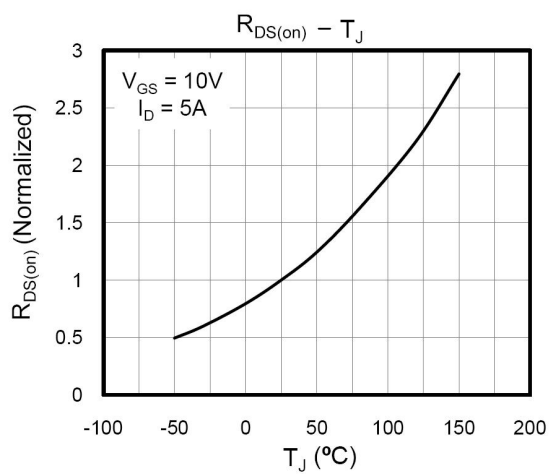
- 1.Repetitive Rating: Pulse width limited by maximum junction temperature
2. $I_{AS}=3.5A$, $V_{DD}=50V$, $R_G=25\Omega$, Starting $T_J=25^\circ C$
- 3.Pulse Test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 1\%$

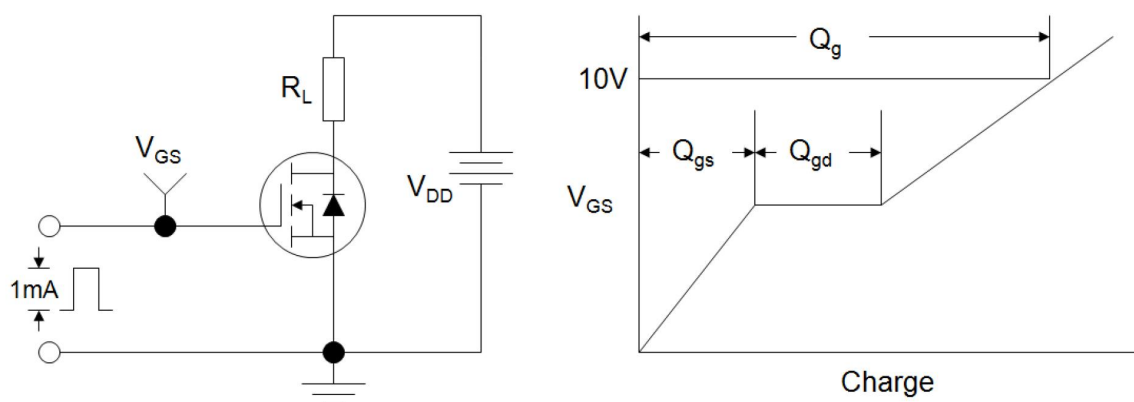
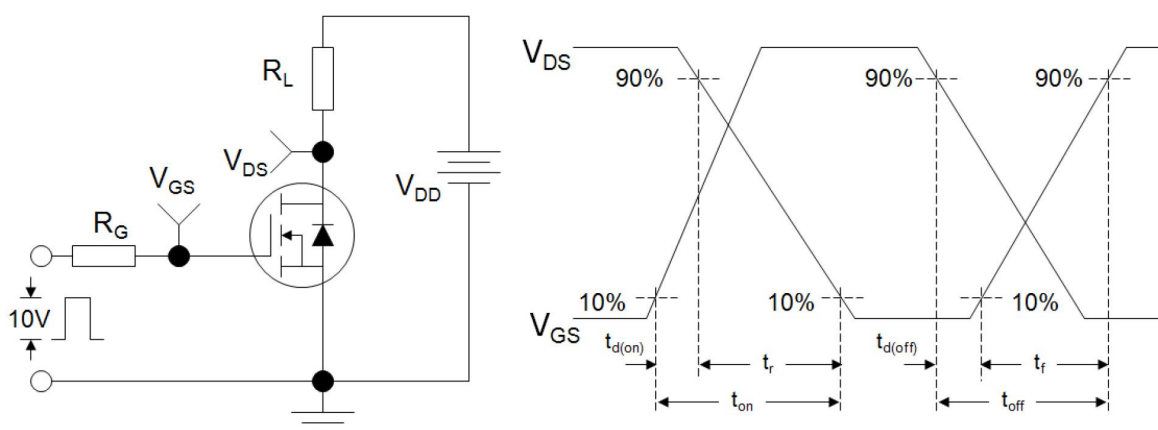
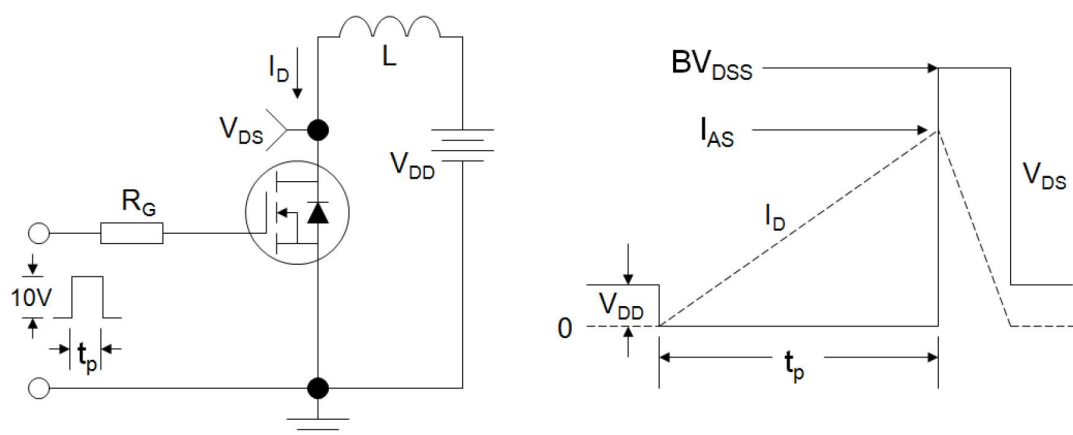
电参数曲线图 / Electrical Characteristic Curve



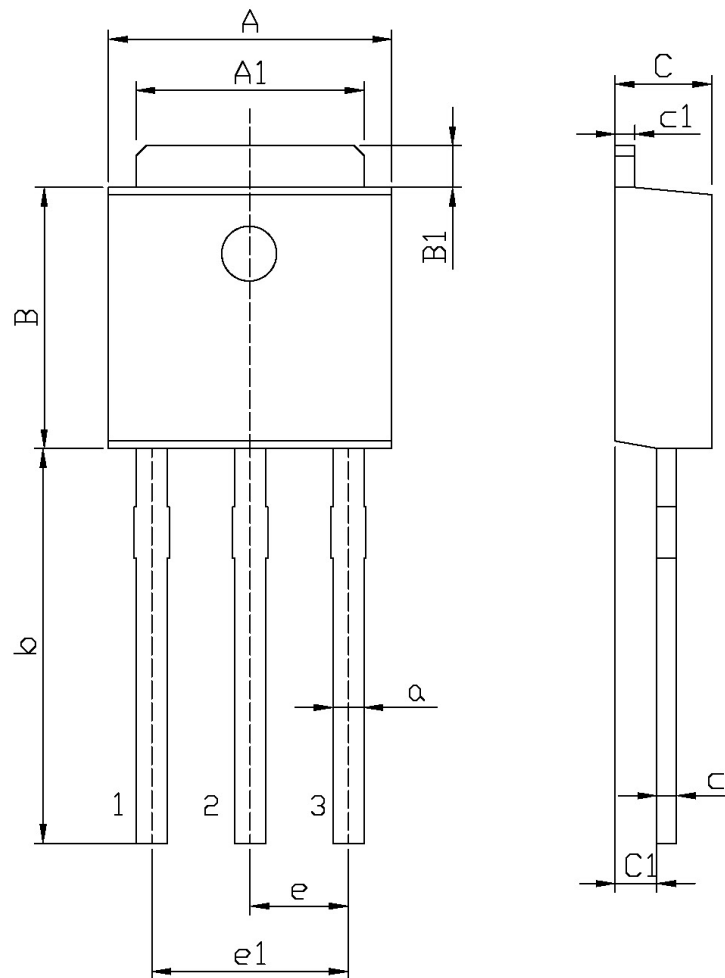


电参数曲线图 / Electrical Characteristic Curve



测试电路与波形图 / Test Circuit and Waveform Curve
Gate Charge Test Circuit and Waveform

Resistive Switching Test Circuit and Waveform

Unclamped Inductive Switching Test Circuit and Waveform


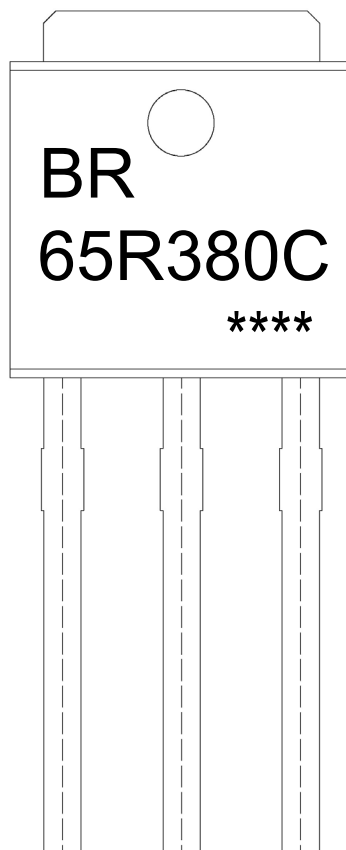
外形尺寸图 / Package Dimensions



单位: mm

Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	6.45	6.75	a	0.50	0.70
A1	5.10	5.50	b	9.00	9.40
B	5.95	6.25	C	0.45	0.55
B1	0.95	1.25	C1	0.45	0.55
C	2.20	2.40	e	2.24	2.34
C1	0.95	1.15	e1	4.43	4.73

TO-251

印章说明 / Marking Instructions

说明：

BR： 为公司代码

65R380C： 为型号代码

****： 为生产批号代码，随生产批号变化。

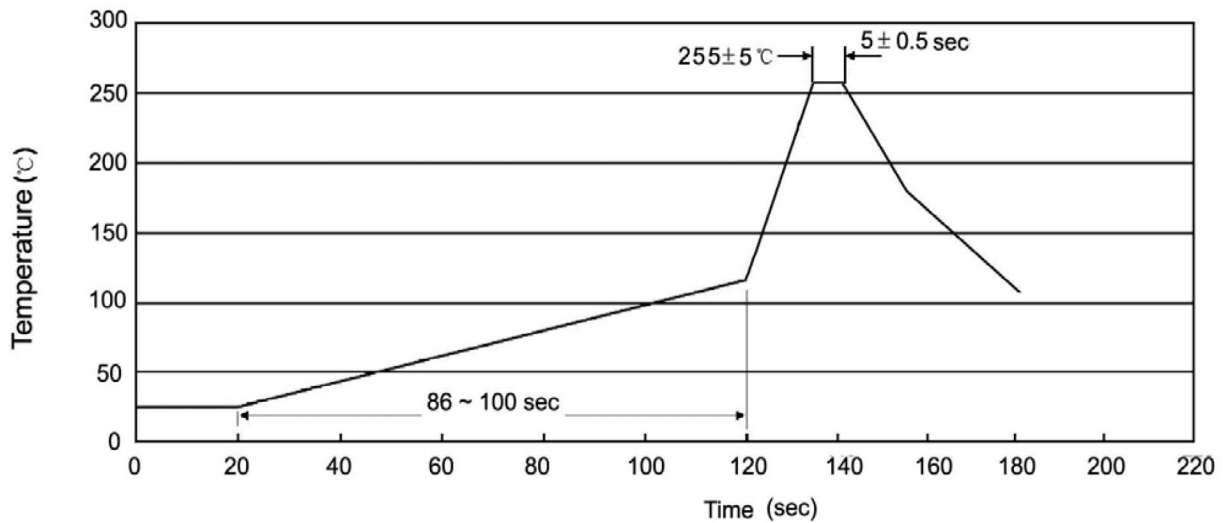
Note:

BR: Company Code

65R380C: 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 ³)		
	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-251	1,000	10	10,000	5	50,000	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 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