

描述 / Descriptions

TO-251 塑封封装 N 沟道 MOS 场效应管。N-CHANNEL MOSFET in a TO-251 astic Package.

特征 / Features

低栅电荷,低反馈电容,开关速度快。

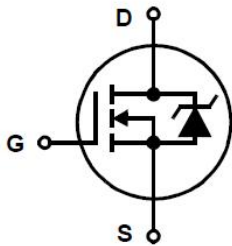
Low gate charge, low crss, fast switching.

用途 / Applications

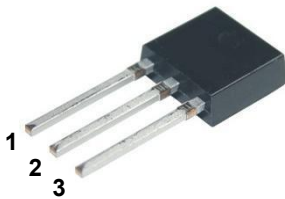
用于低压电路如：汽车电路、DC/DC 转换、便携式产品的电源高效转换。

Suited for low voltage applications such as automotive,DC/DC Converters,and high efficiency switching for power management in protable 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°C)

参数 Parameter	符号 Symbol	数值 Rating	单位 Unit
Drain-Source Voltage	V_{DSS}	60	V
Drain Current	$I_D(T_C=25^\circ\text{C})$	20	A
	$I_D(T_C=100^\circ\text{C})$	20	A
Gate-Source Voltage	V_{GS}	± 20	V
Power Dissipation	$P_D(T_C=25^\circ\text{C})$	85	W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ\text{C}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.7	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	100	$^\circ\text{C/W}$

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_{DSS}	$V_{GS}=0V$ $I_D=250\mu A$	60			V	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=60V$ $V_{GS}=0V$			1	μA	
		$V_{DS}=60V$ $T_C=150^\circ\text{C}$			250	μA	
Gate-Body Leakage Current Forward	I_{GSS}	$V_{GS}=\pm 20V$ $V_{DS}=0V$			± 100	nA	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$ $I_D=250\mu A$	1.0		3.0	V	
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V$ $I_D=6A$		0.025	0.037	Ω	
		$V_{GS}=4.5V$ $I_D=4A$		0.030	0.042	Ω	
Input Capacitance	C_{iss}	$V_{DS}=25V$ $V_{GS}=0V$ $f=1.0\text{MHz}$		1060		pF	
Output Capacitance	C_{oss}			315		pF	
Reverse Transfer Capacitance	C_{rss}			65		pF	
Turn-On Time	t_{ON}	$V_{DD}=30V$ $I_D=20A$ $R_{GS}=10\Omega$ $V_{GS}=4.5V$			240	ns	
Turn-On Delay Time	$t_{d(on)}$			12		ns	
Turn-On Rise Time	t_r			145		ns	
Turn-Off Delay Time	$t_{d(off)}$			27		ns	
Turn-Off Fall Time	t_f			50		ns	
Turn-Off Time	t_{off}					120	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
Turn-On Time	t_{ON}	$V_{DD}=30V$ $I_D=20A$ $R_{GS}=10\Omega$ $V_{GS}=10V$			65	ns
Turn-On Delay Time	$t_{d(on)}$			7		ns
Turn-On Rise Time	t_r			35		ns
Turn-Off Delay Time	$t_{d(off)}$			52		ns
Turn-Off Fall Time	t_f			50		ns
Turn-Off Time	t_{off}					155
Total Gate Charge	$Q_{g(TOT)}$	$V_{GS} = 0V$ to $10V$		28	34	nC
Gate Charge at 5V	$Q_{g(5)}$	$V_{GS} = 0V$ to $5V$		16	20	nC
Threshold Gate Charge	$Q_{g(TH)}$	$V_{GS} = 0V$ to $1V$		1.2	1.5	nC
Gate to Source Gate Charge	Q_{gs}			3.5		nC
Gate to Drain "Miller" Charge	Q_{gd}			7		nC
Source to Drain Diode Voltage	V_{SD}	$I_{SD} = 20A$			1.25	V
Reverse Recovery Time	t_{rr}	$I_{SD} = 20A, dI_{SD}/dt = 100A/\mu s$			90	ns
Reverse Recovered Charge	Q_{RR}	$I_{SD} = 20A, dI_{SD}/dt = 100A/\mu s$			225	nC

电参数曲线图 / Electrical Characteristic Curve

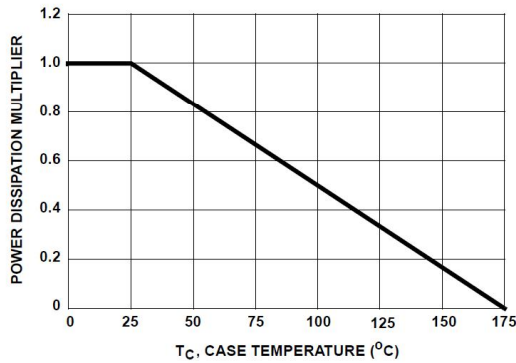


FIGURE 1. NORMALIZED POWER DISSIPATION vs CASE TEMPERATURE

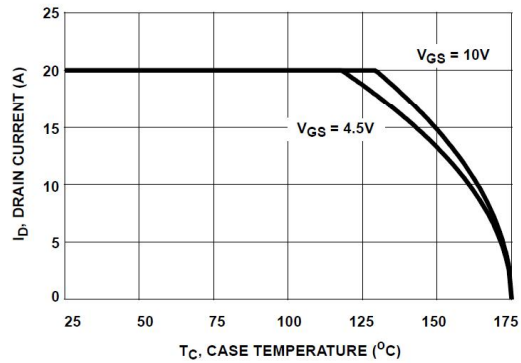


FIGURE 2. MAXIMUM CONTINUOUS DRAIN CURRENT vs CASE TEMPERATURE

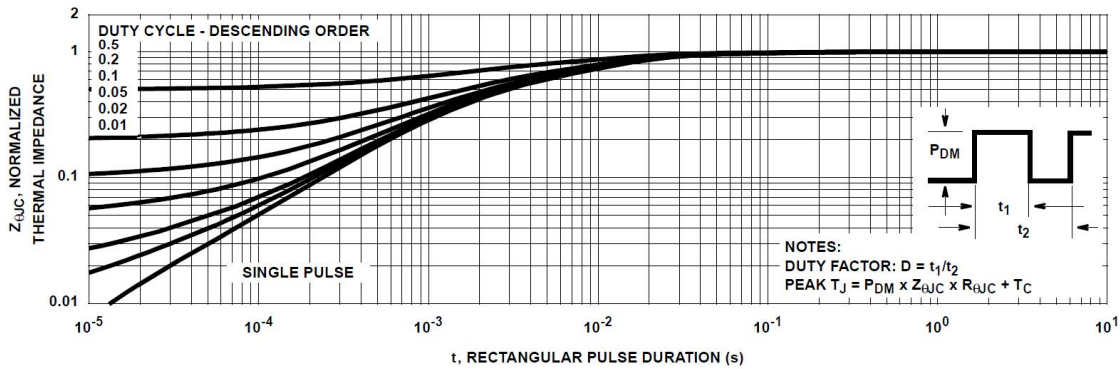


FIGURE 3. NORMALIZED MAXIMUM TRANSIENT THERMAL IMPEDANCE

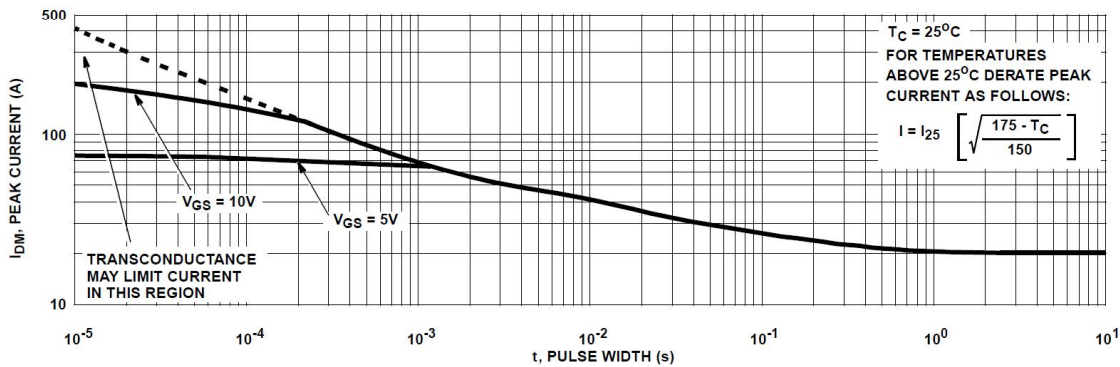


FIGURE 4. PEAK CURRENT CAPABILITY

电参数曲线图 / Electrical Characteristic Curve

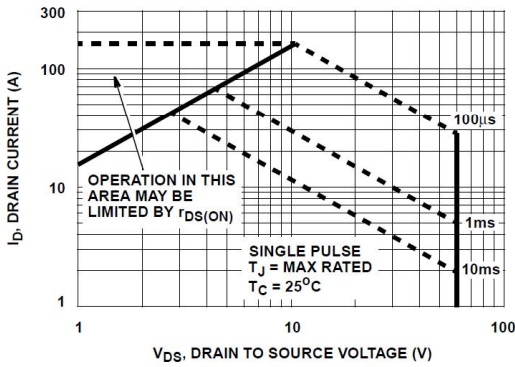
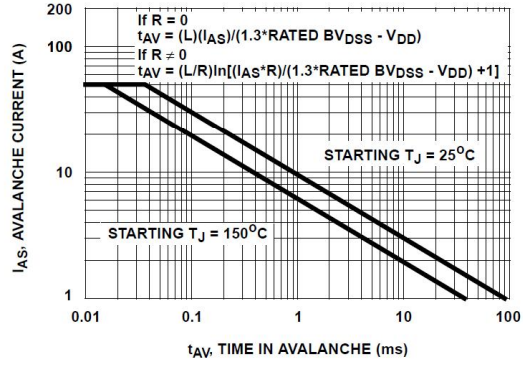


FIGURE 5. FORWARD BIAS SAFE OPERATING AREA



NOTE: Refer to Fairchild Application Notes AN9321 and AN9322.

FIGURE 6. UNCLAMPED INDUCTIVE SWITCHING CAPABILITY

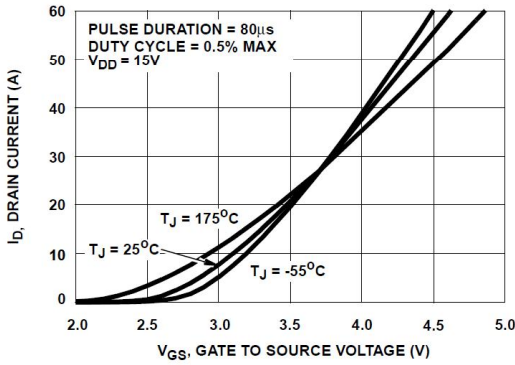


FIGURE 7. TRANSFER CHARACTERISTICS

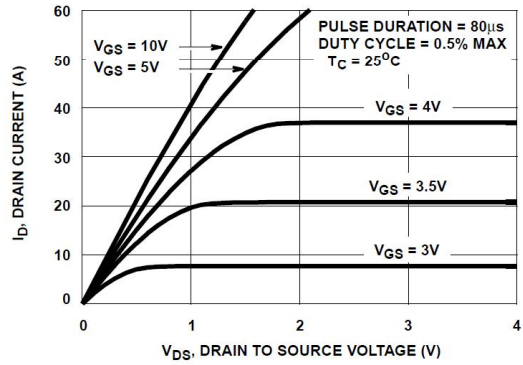


FIGURE 8. SATURATION CHARACTERISTICS

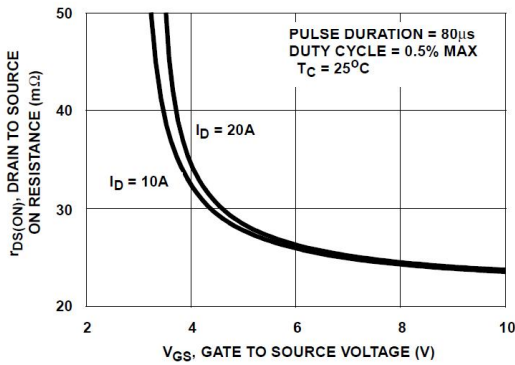


FIGURE 9. DRAIN TO SOURCE ON RESISTANCE vs GATE VOLTAGE AND DRAIN CURRENT

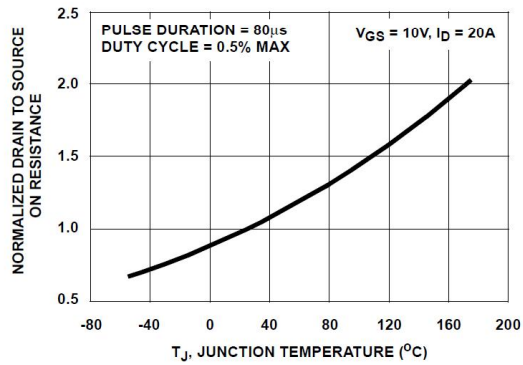


FIGURE 10. NORMALIZED DRAIN TO SOURCE ON RESISTANCE vs JUNCTION TEMPERATURE

电参数曲线图 / Electrical Characteristic Curve

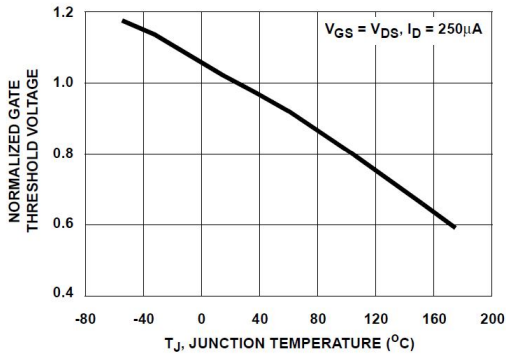


FIGURE 11. NORMALIZED GATE THRESHOLD VOLTAGE vs JUNCTION TEMPERATURE

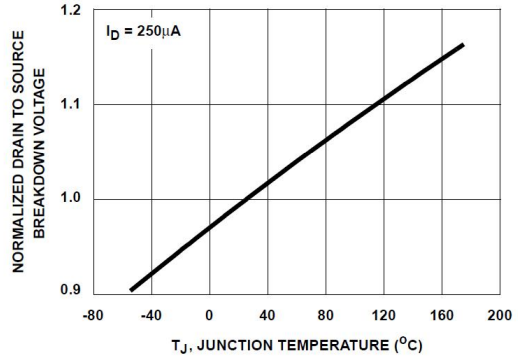


FIGURE 12. NORMALIZED DRAIN TO SOURCE BREAKDOWN VOLTAGE vs JUNCTION TEMPERATURE

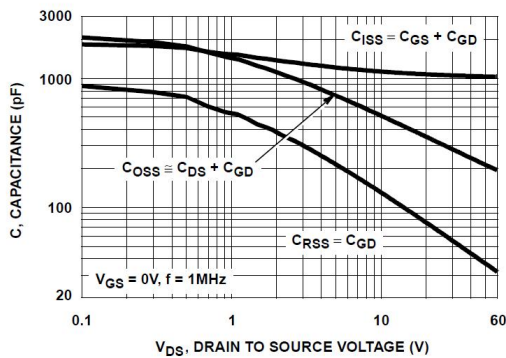
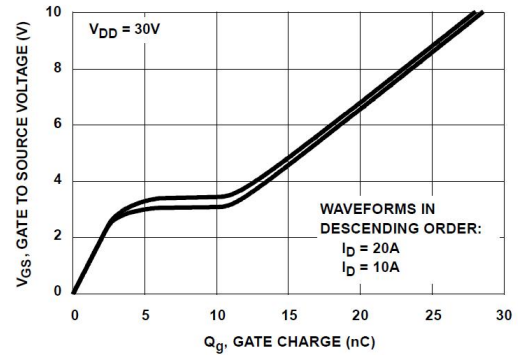


FIGURE 13. CAPACITANCE vs DRAIN TO SOURCE VOLTAGE



NOTE: Refer to Fairchild Application Notes AN7254 and AN7260.

FIGURE 14. GATE CHARGE WAVEFORMS FOR CONSTANT GATE CURRENT

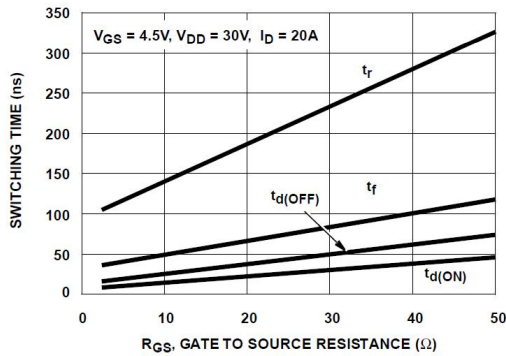


FIGURE 15. SWITCHING TIME vs GATE RESISTANCE

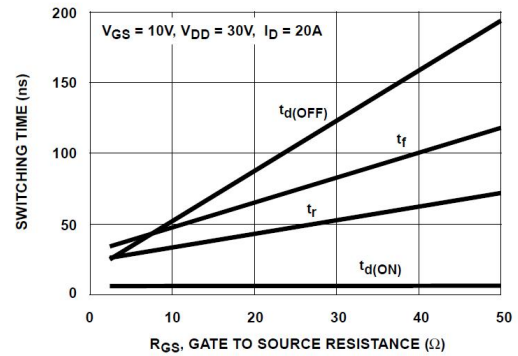


FIGURE 16. SWITCHING TIME vs GATE RESISTANCE

测试电路图&典型应用图 Test circuits & Typical Application

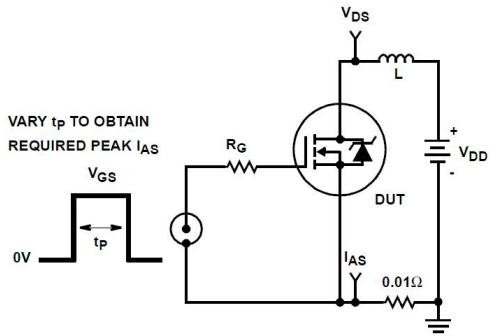


FIGURE 17. UNCLAMPED ENERGY TEST CIRCUIT

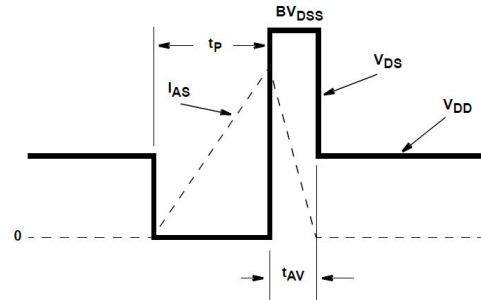


FIGURE 18. UNCLAMPED ENERGY WAVEFORMS

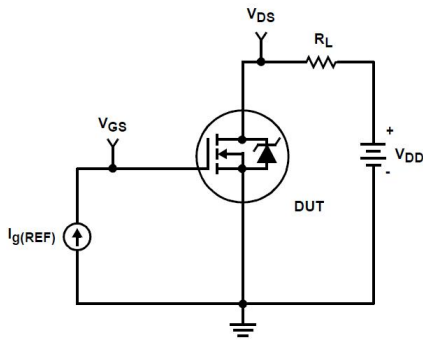


FIGURE 19. GATE CHARGE TEST CIRCUIT

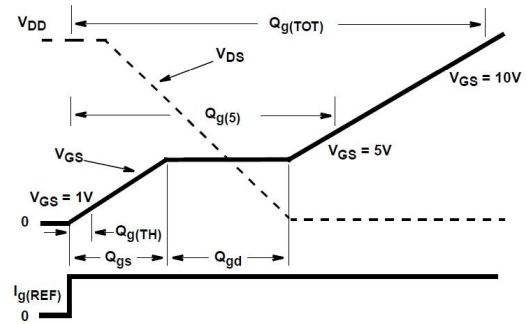


FIGURE 20. GATE CHARGE WAVEFORMS

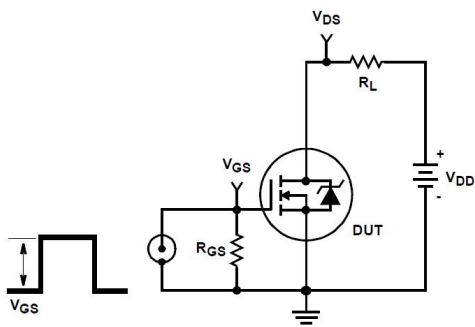


FIGURE 21. SWITCHING TIME TEST CIRCUIT

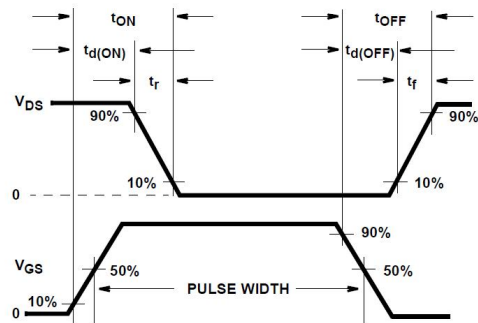
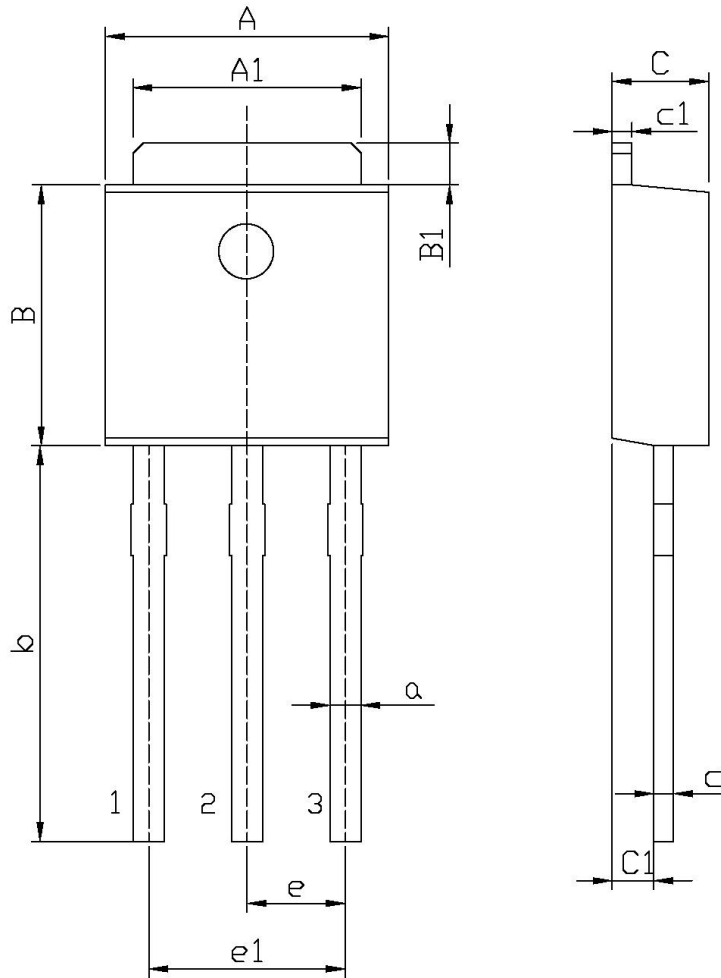


FIGURE 22. SWITCHING TIME WAVEFORM

外形尺寸图 / Package Dimensions

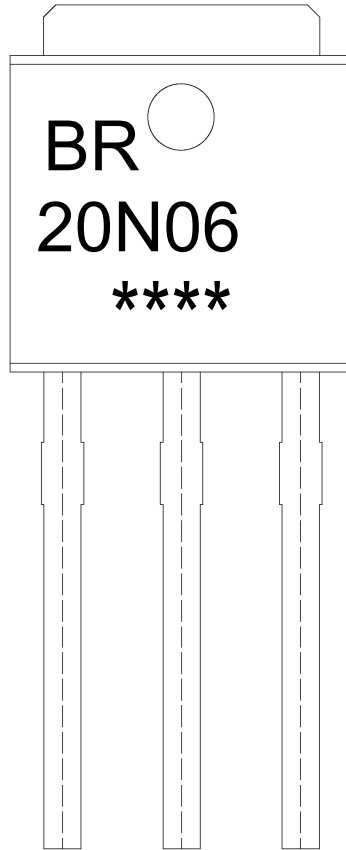


单位: mm

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

20N06： 为型号代码

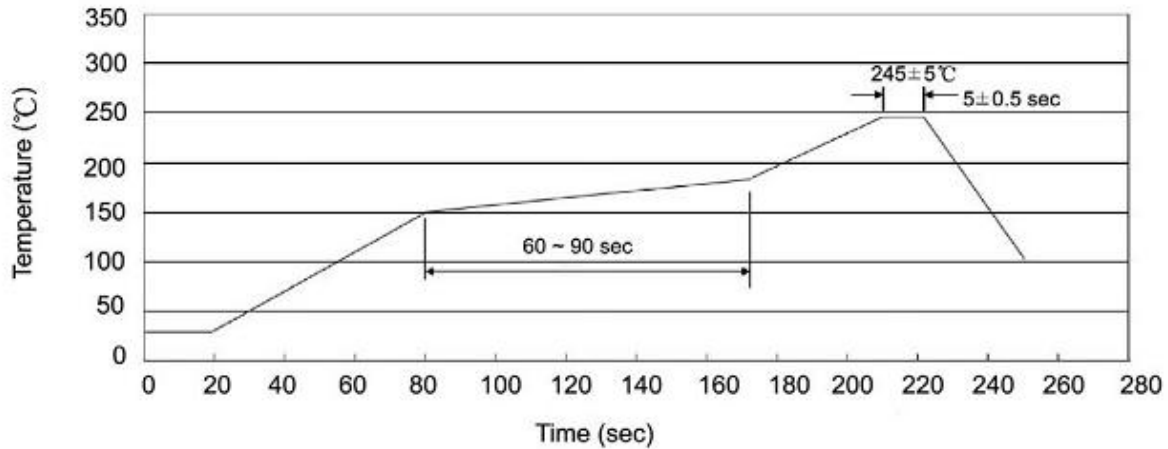
****： 为生产批号代码，随生产批号变化。

Note:

BR: Company Code

20N06: 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 150~180°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:150~180°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