

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

$R_{DS(on)}$ 小, 门电荷低, C_{rss} 小, 开关速度快。

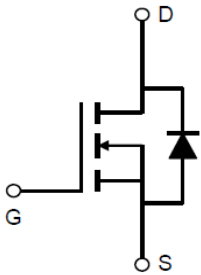
Low $R_{DS(on)}$, low gate charge, low C_{rss} , fast switching.

用途 / Applications

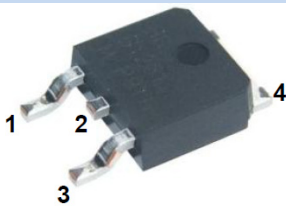
用于低压电路如: 汽车电路、DC/DC 转换、便携式产品的电源高效转换。

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

内部等效电路 / Equivalent Circuit



引脚排列 / Pinning



PIN 1 : G

PIN 2 : D

PIN 3 : S

PIN 4 : D

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}	100	V
Drain Current	$I_D(T_C=25^\circ\text{C})$	30	A
Drain Current	$I_D(T_C=100^\circ\text{C})$	20	A
Drain Current - Pulsed ^C	I_{DM}	70	A
Gate-Source Voltage	V_{GS}	± 20	V
Avalanche Current ^C	I_{AS}	18.3	A
Avalanche energy L=0.5mH ^C	E_{AS}	133	mJ
Power Dissipation ^B	$P_D(T_C=25^\circ\text{C})$	100	W
	$P_D(T_C=100^\circ\text{C})$	50	W
Power Dissipation ^A	$P_{DSM}(T_A=25^\circ\text{C})$	2.5	W
	$P_{DSM}(T_A=70^\circ\text{C})$	1.6	W
Junction and Storage Temperature Range	T_J, T_{stg}	-55~150	°C

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}	$V_{GS}=0V$ $I_D=-250\mu A$	100			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=100V$ $V_{GS}=0V$			1.0	μA
		$V_{DS}=100V$ $V_{GS}=0V$ $T_J=55^\circ C$			5.0	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	1.4	2.5	V
Static Drain-Source On-Resistance	$R_{DS(on)1}$	$V_{GS}=10V$ $I_D=30A$		48	55	m Ω
	$R_{DS(on)2}$	$V_{GS}=4.5V$ $I_D=15A$		62	70	m Ω
Diode Forward Voltage	V_{SD}	$I_S=10A$ $V_{GS}=0V$		0.8	1.0	V

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
Input Capacitance	C_{iss}	$V_{DS}=25V$ $V_{GS}=0V$ $f=1.0MHz$		888		pF
Output Capacitance	C_{oss}			9.4		
Reverse Transfer Capacitance	C_{rss}			72		
Gate resistance	R_g	$V_{GS}=0V$ $V_{DS}=0V$ $f=1MHz$		1.61		Ω
Total Gate Charge	$Q_g(10V)$	$V_{GS}=10V$ $V_{DS}=50V$ $I_D=10A$	26	34	44	nC
Total Gate Charge	$Q_g(4.5V)$		14	18	22	
Gate Source Charge	Q_{gs}		4	6	8	
Gate Drain Charge	Q_{gd}		5	9	13	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS}=10V$ $V_{DS}=50V$ $R_L=5\Omega$ $R_{GEN}=3\Omega$		7		ns
Turn-On Rise Time	t_r			7		
Turn-Off Delay Time	$t_{d(off)}$			29		
Turn-Off Fall Time	t_f			7		
Body Diode Reverse Recovery Time	t_{rr}	$I_F=10A$ $dI/dt=500A/ms$	22	32	42	ns
Body Diode Reverse Recovery Charge	Q_{rr}	$I_F=10A$ $dI/dt=500A/ms$	140	200	260	nC
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	$t \leq 10s$		14.2	20	$^{\circ}C/W$
Maximum Junction-to-Ambient ^{AD}		steady-State		39	50	$^{\circ}C/W$
Maximum Junction-to-Case	$R_{\theta JC}$	steady-State		0.8	1.5	$^{\circ}C/W$

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 P_{DSM} 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 PD 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.

E. The static characteristics in Figures 1to6 are obtained using <300ms pulses, duty cycle 0.5% max.

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

The SOA curve provides a single pulse rating.

G. The maximum current rating is package limited.

H. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^{\circ}C$.

电参数曲线图 / Electrical Characteristic Curve

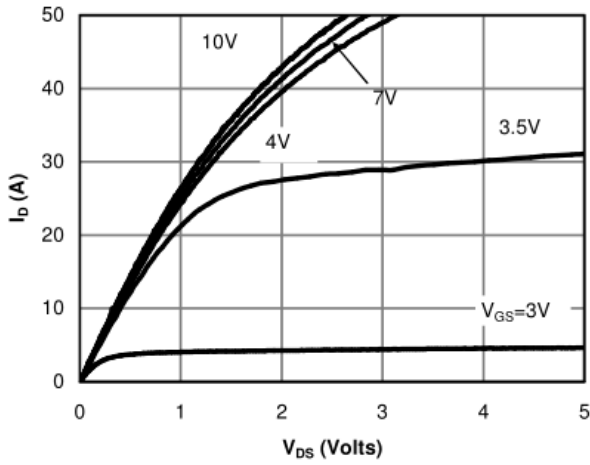


Fig 1: On-Region Characteristics

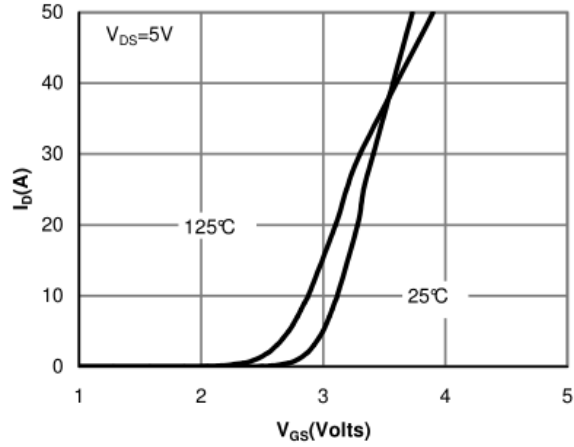


Figure 2: Transfer Characteristics

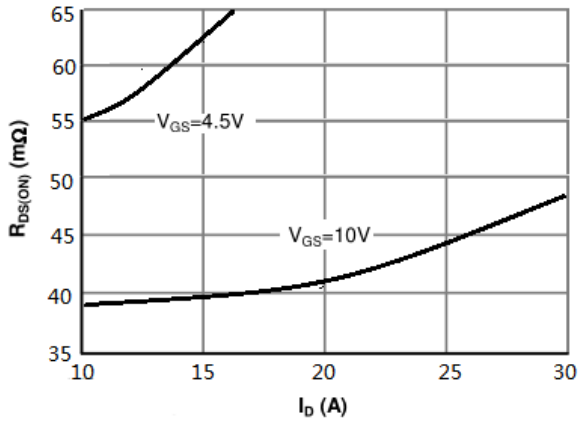


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

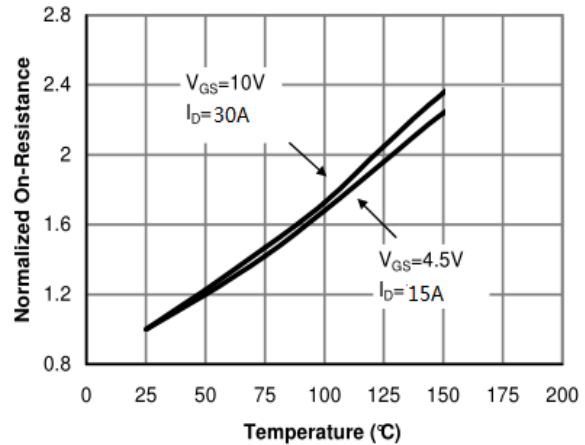


Figure 4: On-Resistance vs. Junction Temperature

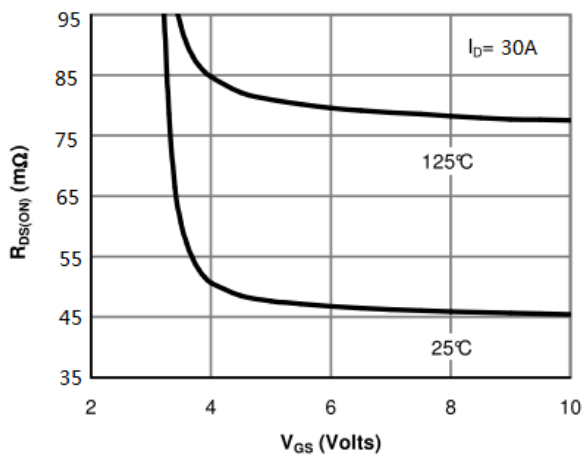


Figure 5: On-Resistance vs. Gate-Source Voltage

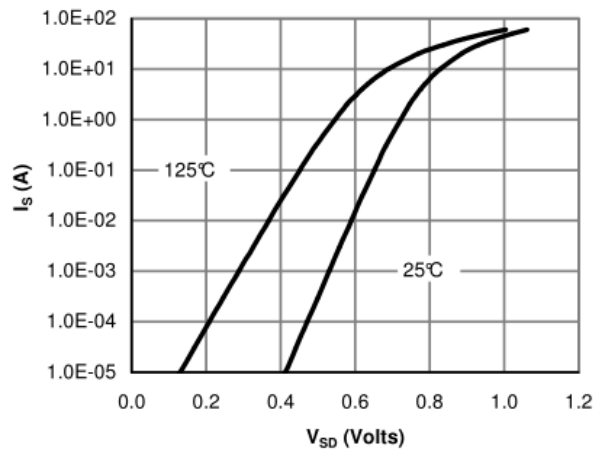


Figure 6: Body-Diode Characteristics

电参数曲线图 / Electrical Characteristic Curve

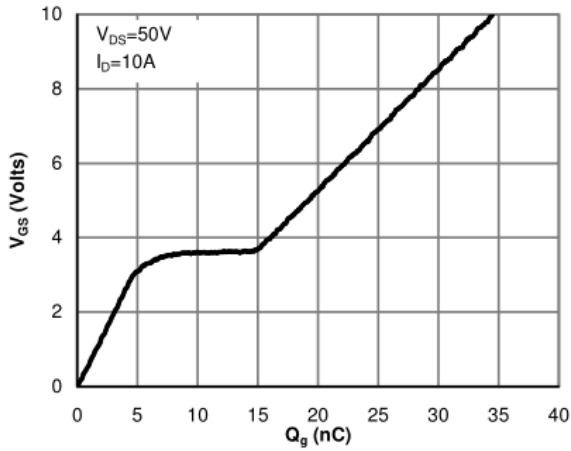


Figure 7: Gate-Charge Characteristics

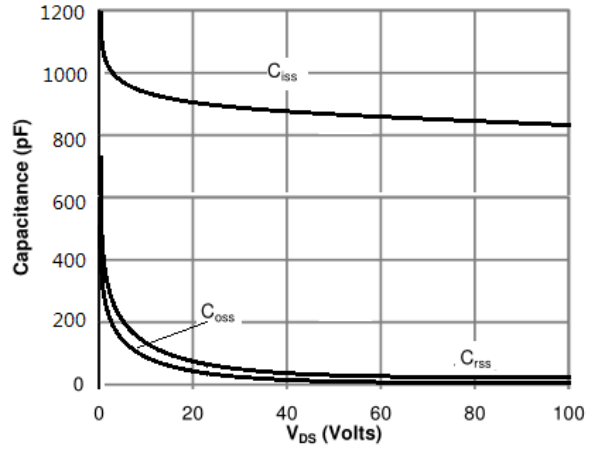


Figure 8: Capacitance Characteristics

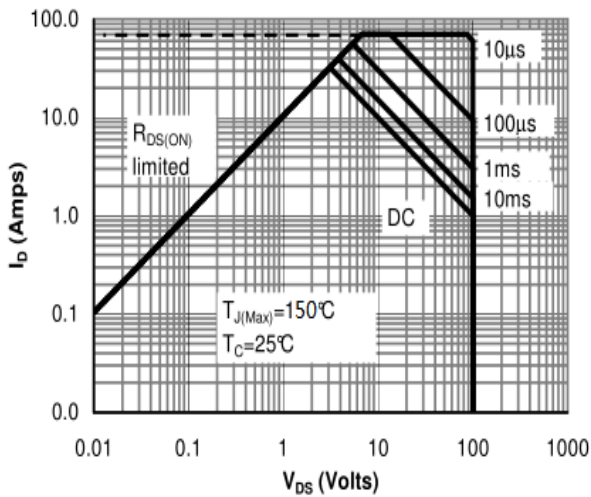


Figure 9: Maximum Forward Biased Safe Operating Area

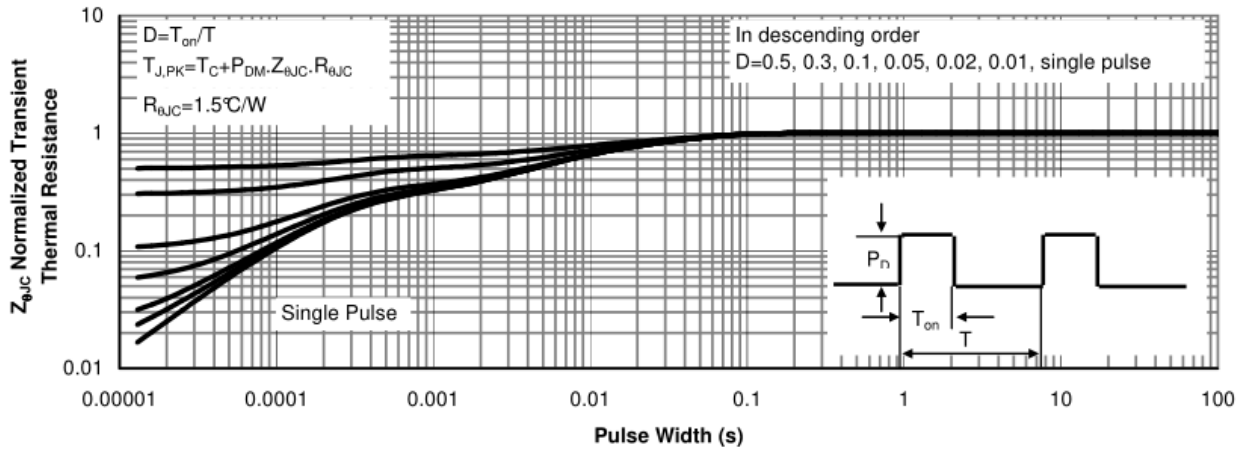
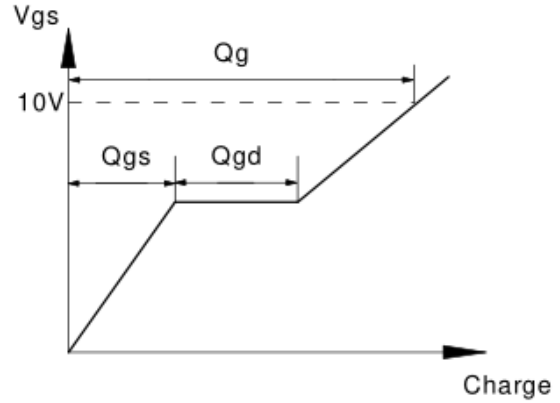
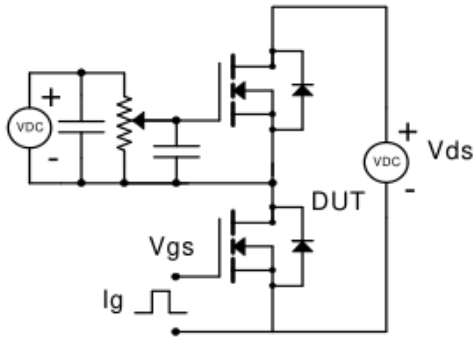


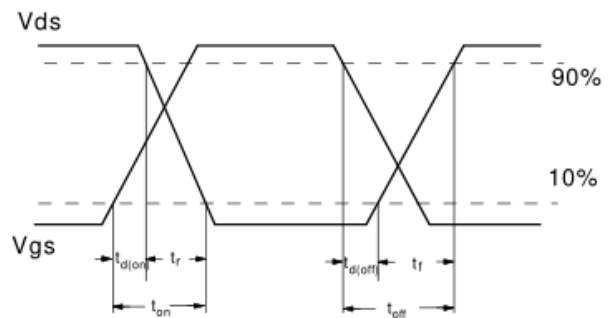
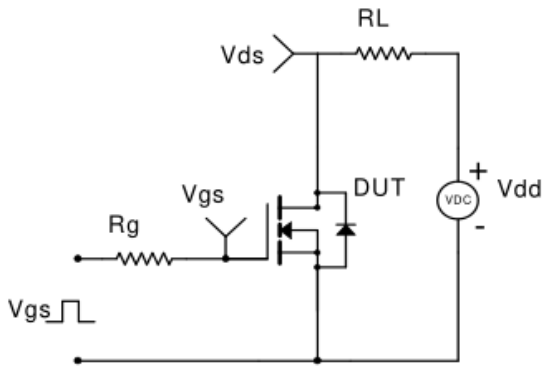
Figure 10: Normalized Maximum Transient Thermal Impedance

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

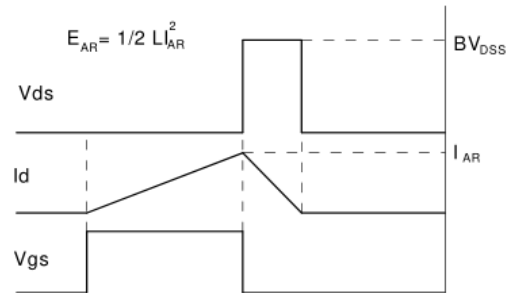
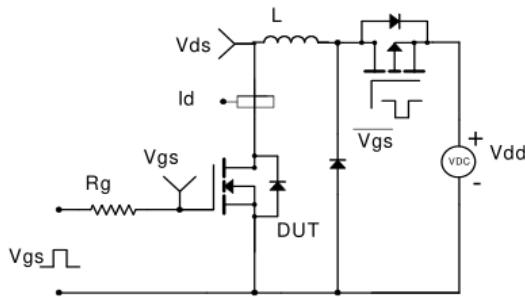
Gate Charge Test Circuit & Waveform



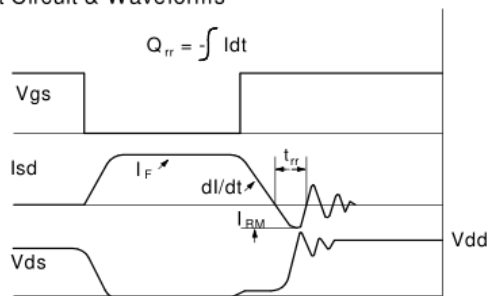
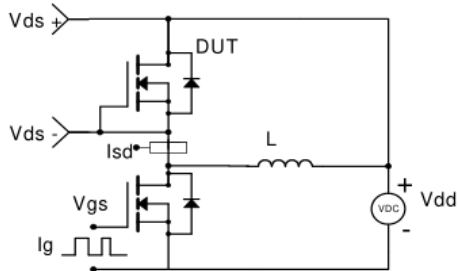
Resistive Switching Test Circuit & Waveforms



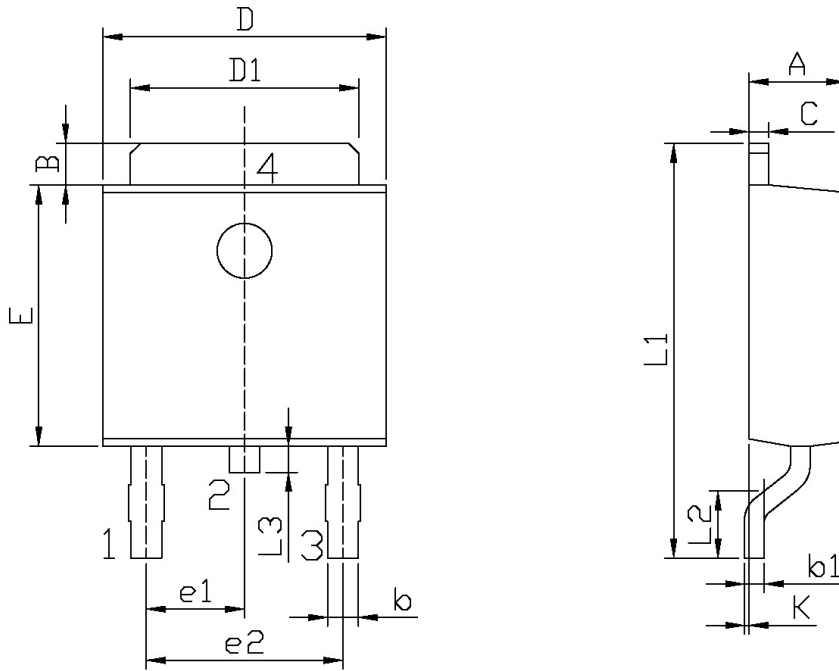
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



外形尺寸图 / Package Dimensions

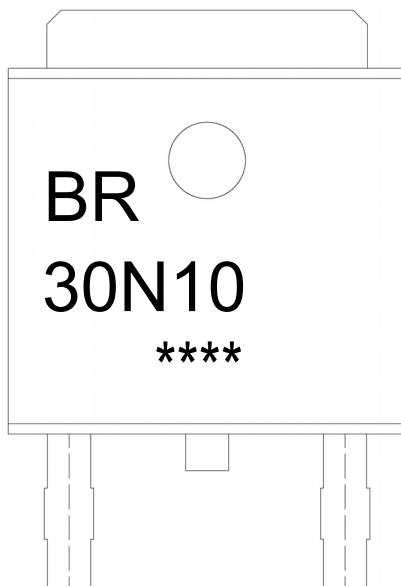


单位: mm

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

30N10： 为型号代码

****： 为生产批号代码，随生产批号变化。

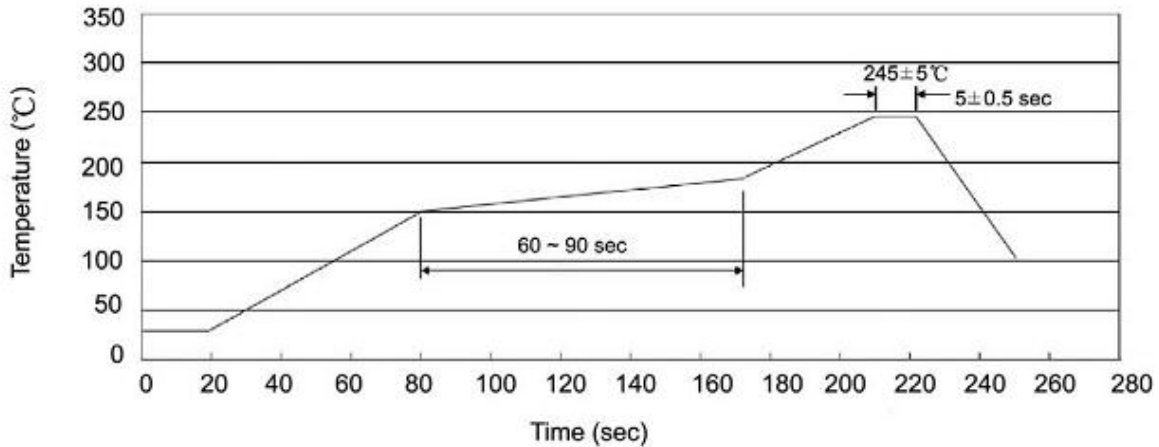
Note:

BR: Company Code

30N10: 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 封装形式	Units 包装数量					Dimension 包装尺寸 (unit: mm ³)		
	Units/Reel 只/卷盘	Reels/Inner Box 卷盘/盒	Units/Inner Box 只/盒	Inner Boxes/Outer Box 盒/箱	Units/Outer Box 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 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