

描述 / Descriptions

TO-220F 塑封封装 双向可控硅。Triac in a TO-220F Plastic Package.

特征 / Features

中电流可控硅，低通态压降，高可靠性和稳定性，热敏电阻特性低，绝缘 BTA。

Medium current triac, Low on state voltage drop, High reliability and stability, Low thermal resistance, insulated BTA.

用途 / Applications

用于开关交流转换。如固态继电器、调光器和家电电机速度控制器等。

For power AC switching operations. Such as static relays, light dimmers and appliance motors speed controllers, etc.

内部等效电路 / Equivalent Circuit**引脚排列 / Pinning**

PIN1 : Main Terminal 1 PIN 2 : Main Terminal 2 PIN 3: Gate

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
Repetitive peak off-state voltages	$V_{\text{DRM}}/V_{\text{RRM}}$	600/800	V
RMS on-state current(full sine wave $T_C=90^\circ\text{C}$)	$I_{\text{T(RMS)}}$	12	A
Non repetitive surge peak on-state current(full cycle, T_j initial =25°C)	$I_{\text{TSM}}(F=50\text{Hz}$ $t=20\text{ms})$	120	A
Non repetitive surge peak on-state current(full cycle, T_j initial =25°C)	$I_{\text{TSM}}(F=60\text{Hz}$ $t=16.7\text{ms})$	126	A
I_t^2 value for fusing	$I_t^2(t_p=10\text{ms})$	78	A ² s
Critical rate of rise of on-state current $I_G=2 \times I_{\text{GT}}$, $t_r \leq 100\text{ ns}$ ($F=120\text{Hz}$ $T_j=125^\circ\text{C}$)	di/dt	50	A/ μs
Non repetitive surge peak off-state Voltage($t_p=10\text{ ms}$ $T_j=25^\circ\text{C}$)	$V_{\text{DSM}}/V_{\text{RSM}}$	$V_{\text{DRM}}/V_{\text{RRM}}$ + 100	V
Peak gate current($t_p=20\mu\text{s}$ $T_j=125^\circ\text{C}$)	I_{GM}	4.0	A
Average gate power dissipation($T_j=125^\circ\text{C}$)	$P_{\text{G(AV)}}$	1.0	W
Operating junction temperature range	T_j	-40~125	°C
Storage junction temperature range	T_{stg}	-40~150	°C
Junction to ambient	$R_{\text{th(j-a)}}$	60	°C/W
Junction to case (AC)	$R_{\text{th(j-c)}}$	2.3	°C/W

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

免缓冲器和逻辑电平 (3 象限) / Snubberless and logic level (3 quadrants)

符号 Symbol	测试条件 Test Conditions	信号区 Quadrant		BTA12F				单位 Unit
				TW	SW	CW	BW	
I _{GT} ⁽¹⁾	V _D =12V R _L =30Ω	I-II-III	Max.	5	10	35	50	mA
V _{GT}	V _D =12V R _L =30Ω	I-II-III	Max.	1.3				V
V _{GD}	V _D =V _{DRM} R _L =3.3KΩ T _j =125°C	I-II-III	Min.	0.2				V
I _H ⁽²⁾	I _T =100mA		Max.	10	15	35	50	mA
I _L	I _G =1.2I _{GT}	I-III	Max.	10	25	50	70	mA
		II		15	30	60	80	
dV/dt ⁽²⁾	V _D = 67 % V _{DRM} gate open T _j = 125° C		Min.	20	40	500	1000	V/μs
(dI/dt) _c ⁽²⁾	(dV/dt) _c = 0.1V/μS T _j = 125° C		Min.	3.5	6.5			A/mS
	(dV/dt) _c = 10V/μS T _j = 125° C		Min.	1.0	2.9			
	Without snubber T _j = 125° C		Min.			6.5	12	

Note 1: minimum I_{GT} is guaranteed at 5% of I_{GT} max.

Note 2: for both polarities of A2 referenced to A1.

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

标准 (4 象限) / Standard (4 quadrants)

符号 Symbol	测试条件 Test Conditions	信号区 Quadrant		BTA12F		单位 Unit
				C	B	
$I_{GT}^{(1)}$	$V_D=12V$ $R_L=30\Omega$	I-II-III IV	Max.	25 50	50 100	mA
V_{GT}	$V_D=12V$ $R_L=30\Omega$	ALL	Max.	1.3		V
V_{GD}	$V_D=V_{DRM}$ $R_L=3.3K\Omega$ $T_j=125^\circ C$	ALL	Min.	0.2		V
$I_H^{(2)}$	$I_T=500mA$		Max.	25	50	mA
I_L	$I_G=1.2I_{GT}$	I-III- IV	Max.	40	50	mA
		II		80	100	
$(dV/dt)^{(2)}$	$V_D=67\%$ V_{DRM} gate open $T_j=125^\circ C$		Min.	200	400	V/ μs
$(dV/dt)c^{(2)}$	$(dI/dt)c=5.3A/ms$ $T_j=125^\circ C$		Min.	5.0	10	

Note 1: minimum I_{GT} is guaranteed at 5% of I_{GT} max.

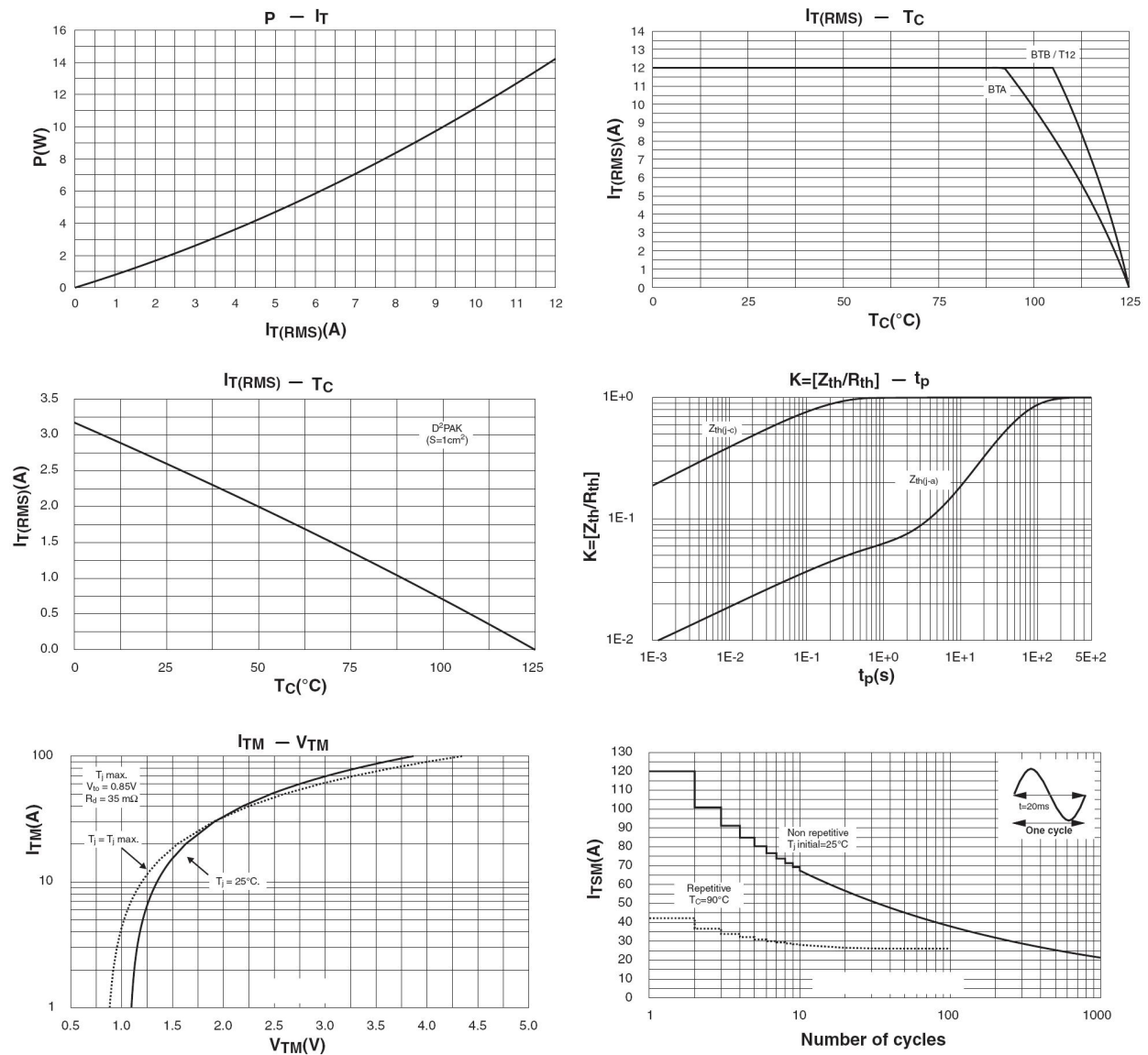
Note 2: for both polarities of A2 referenced to A1.

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

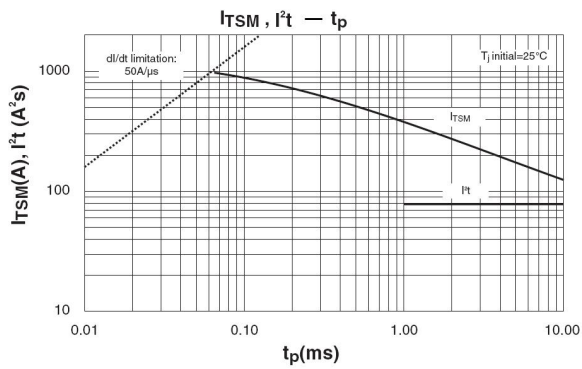
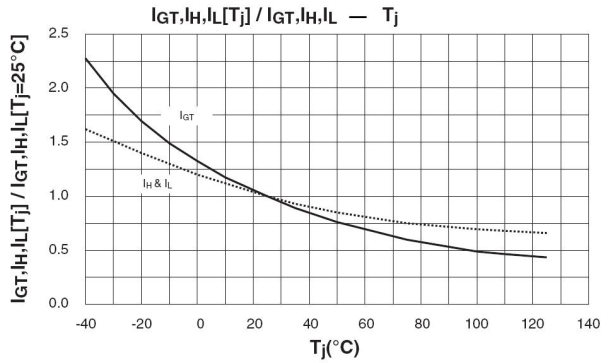
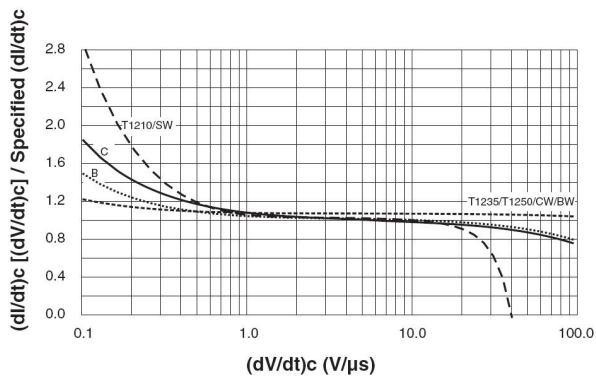
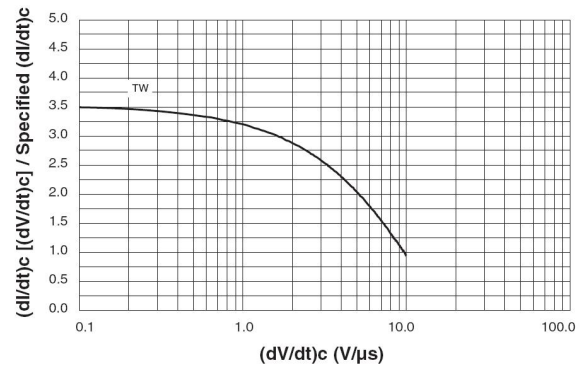
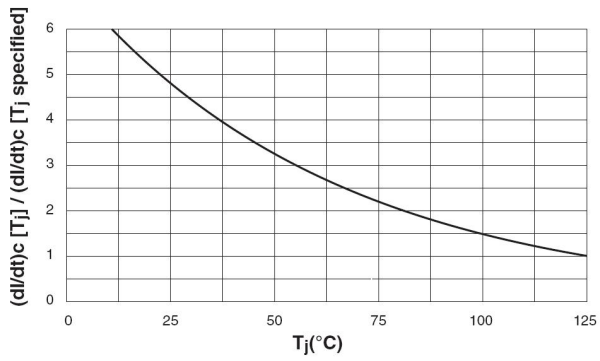
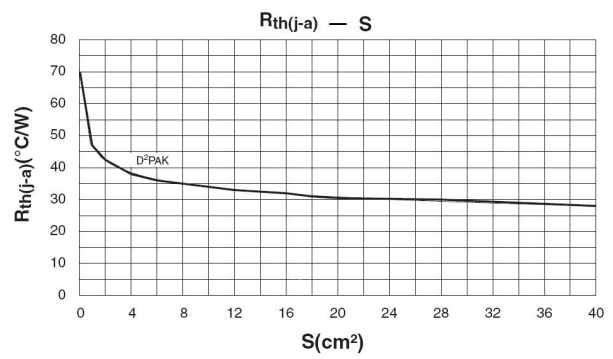
符号 Symbol	测试条件 Test Conditions			数值 Value	单位 Unit	
$V_{TM}^{(1)}$	$I_{TM}=17A$	$t_p=380\mu s$	$T_j=25^{\circ}C$	Max.	1.55	V
$V_{to}^{(1)}$	Threshold voltage		$T_j=125^{\circ}C$	Max.	0.85	V
$R_d^{(1)}$	Dynamic resistance		$T_j=125^{\circ}C$	Max.	35	mΩ
I_{DRM} I_{RRM}	$V_{DRM} = V_{RRM}$	$T_j=25^{\circ}C$	Max.	5.0	μA	
		$T_j=125^{\circ}C$	Max.	1.0	mA	

Note1. for both polarities of A2 referenced to A1

电参数曲线图 / Electrical Characteristic Curve



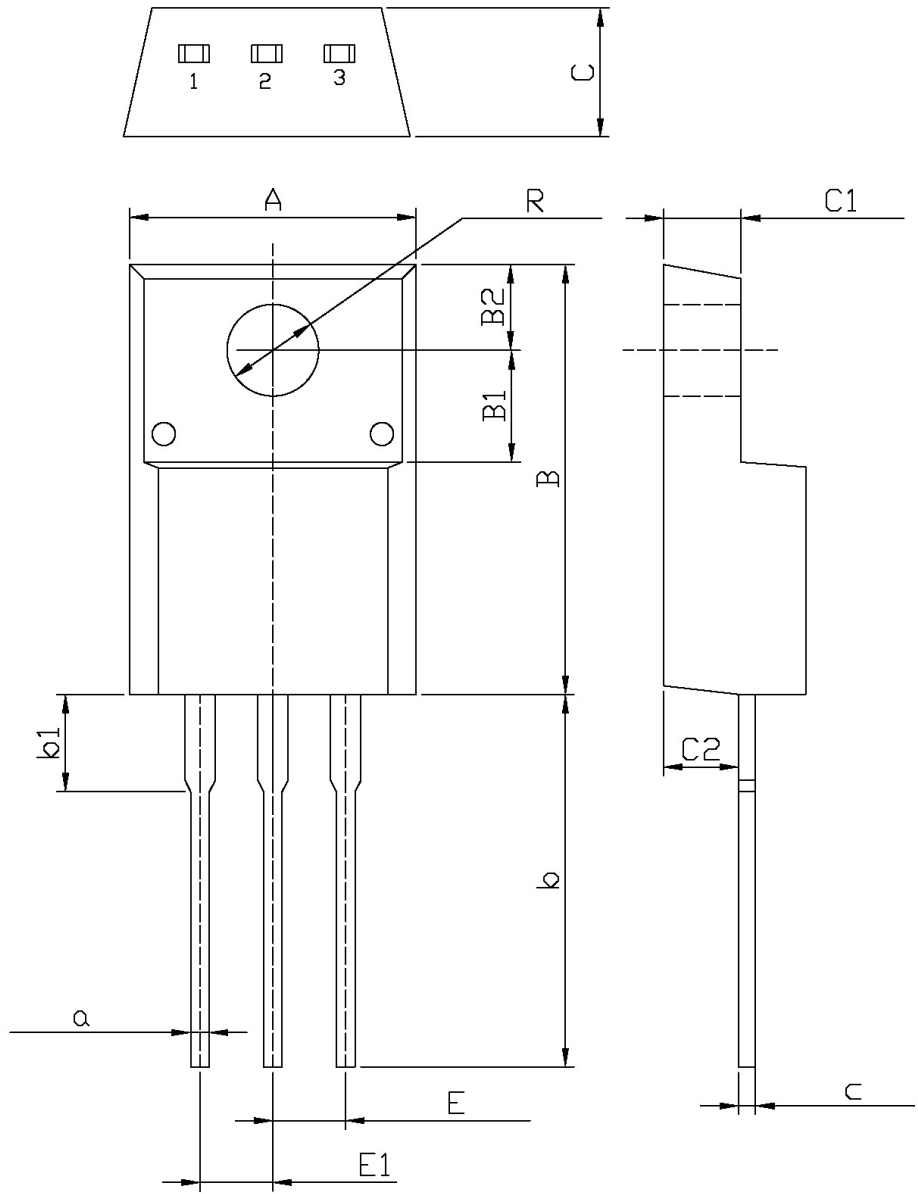
电参数曲线图 / Electrical Characteristic Curve



外形尺寸图 / Package Dimensions

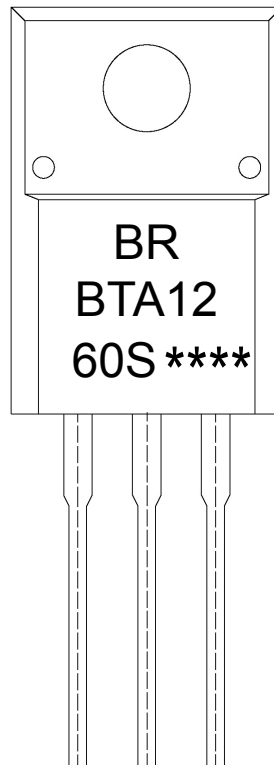
T□-220F

单位: mm



Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
C	4.3	4.7	b1	2.9	3.9
A	9.7	10.3	a	0.55	0.75
B	14.7	15.3	E	2.29	2.79
B1	3.8	4.0	E1	2.29	2.79
B2	2.9	3.1	C1	2.5	2.9
R	3.0	3.4	C2	2.5	2.7
b	12.5	13.5	c	0.5	0.7

印章说明 / Marking Instructions



说明：

BR： 为公司代码

BTA12： 为产品型号

60S： 为 V_{RRM} 和 I_{GT} 分档代码

****： 为生产批号代码，随生产批号变化。

Note:

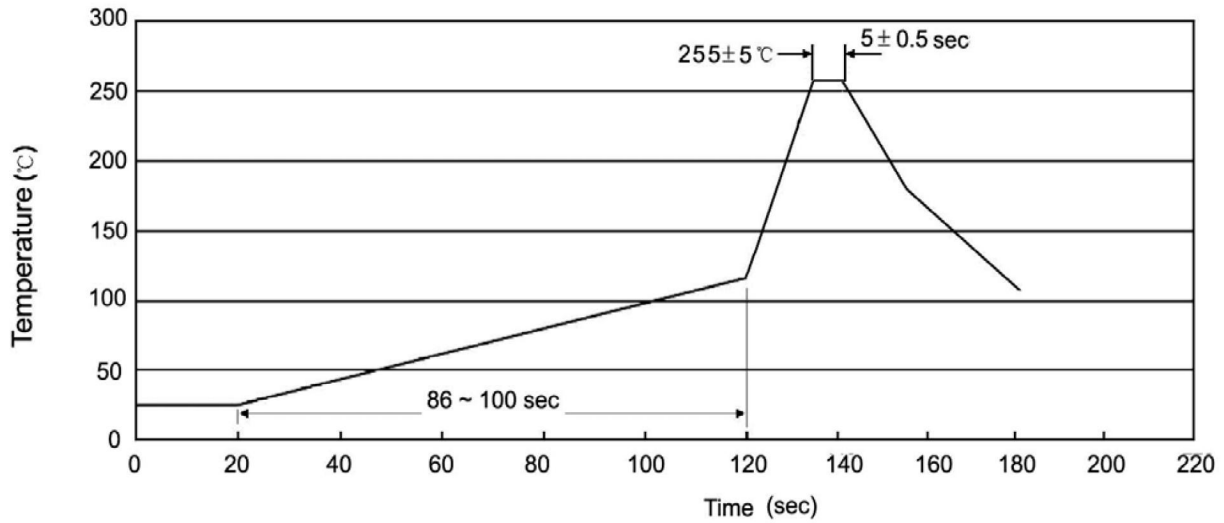
BR: Company Code

BTA12: Product Type.

60S: V_{RRM}/I_{GT} Bracket code

****: 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-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 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-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