描述 / Descriptions

TO-220F 塑封封装 PNP 半导体三极管。Silicon PNP transistor in a TO-220F Plastic Package.

特征 / Features

大电流 h_{FE} 曲线特性好、集电-发射极饱和压降小、采用 TO-220 全包封不需云母绝缘可直接安装散热片。

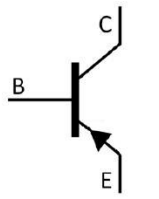
High forward current transfer ratio h_{FE} which has satisfactory linearity, low collector to emitter saturation voltage $V_{CE(sat)}$ Full-pack package which can be installed to the heat sink with one screw.

用途 / Applications

用于低频功率放大。

For low-frequency power amplification.

内部等效电路 / Equivalent Circuit



引脚排列 / Pinning



PIN1：Base PIN 2：Collector PIN 3：Emitter

放大及印章代码 / h_{FE} Classifications & Marking

h_{FE} Classifications Symbol	Q	P
h_{FE} Range	70～150	120～250

极限参数 / Absolute Maximum Ratings(Ta=25℃)

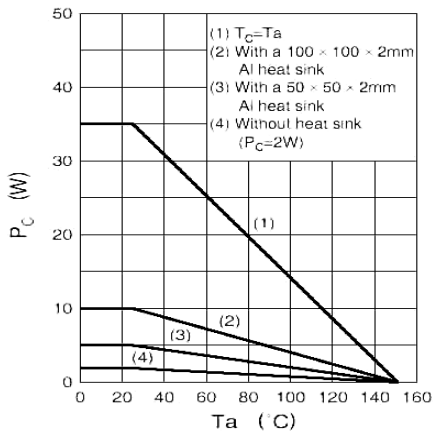
参数 Parameter	符号 Symbol	数值 Rating	单位 Unit
Collector to Base Voltage	V_{CBO}	-60	V
Collector to Emitter Voltage	V_{CEO}	-60	V
Emitter to Base Voltage	V_{EBO}	-5.0	V
Collector Current - Continuous	I_C	-3.0	A
Collector Current – Continuous(Pulse)	I_{CP}	-5.0	A
Collector Power Dissipation	P_C	2.0	W
Junction Temperature	T_j	150	℃
Storage Temperature Range	T_{stg}	-55～150	℃

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

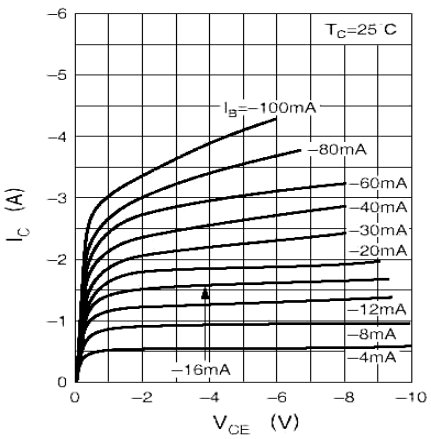
参数 Parameter	符号 Symbol	测试条件 Test Conditions	最小值 Min	典型值 Typ	最大值 Max	单位 Unit
Collector to Emitter Breakdown Voltage	V_{CEO}	I_C=-30mA I_B=0	-60			V
Collector Cut-Off Current	I_{CEO}	V_{CE}=-30V I_B=0			-300	μA
Collector Cut-Off Current	I_{CES}	V_{CE}=-60V V_{BE}=0			-200	μA
Emitter Cut-Off Current	I_{EBO}	V_{EB}=-5V I_C=0			-1	mA
DC Current Gain	$h_{FE(1)}$	V_{CE}=-4.0V I_C=-1.0A	70		250	
	$h_{FE(2)}$	V_{CE}=-4.0V I_C=-3.0 A	10			
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=-3.0A I_B=-0.375A			-1.2	V
Base to Emitter Voltage	V_{BE}	V_{CE}=-4V I_C=-3A			-1.8	V
Transition Frequency	f_T	V_{CE}=-10V I_C=-0.5A f=10MHz		30		MHz
Turn-On Time	t_{on}	I_C=-1A I_{B1}=-0.1A I_{B2}=0.1A		0.5		μS
Storage Time	t_{stg}			1.2		μS
Fall Time	t_f			0.3		μS

电参数曲线图 / Electrical Characteristic Curve

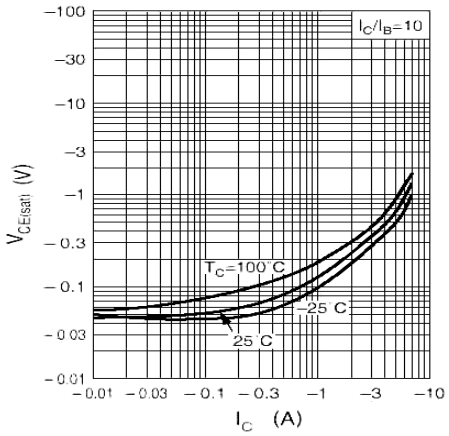
P_C — Ta



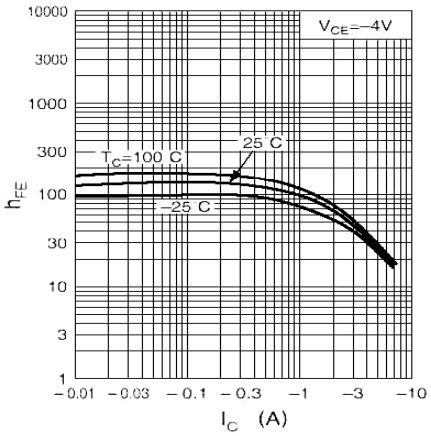
I_C — V_{CE}



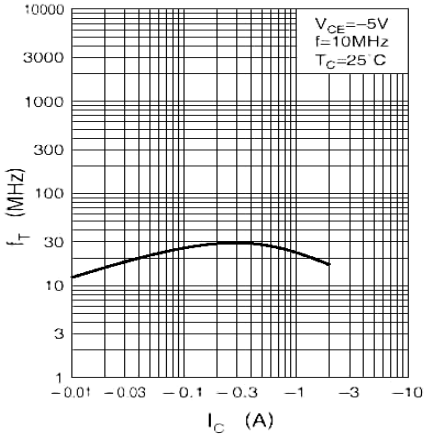
$V_{CE(sat)}$ — I_C



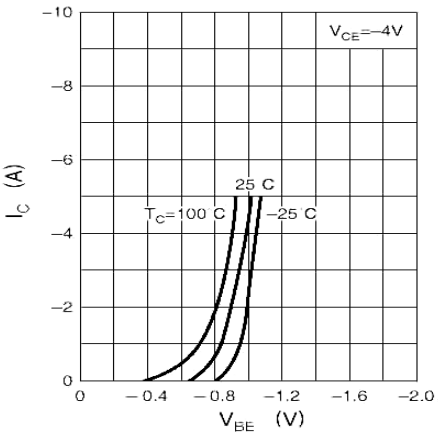
h_{FE} — I_C



f_T — I_C

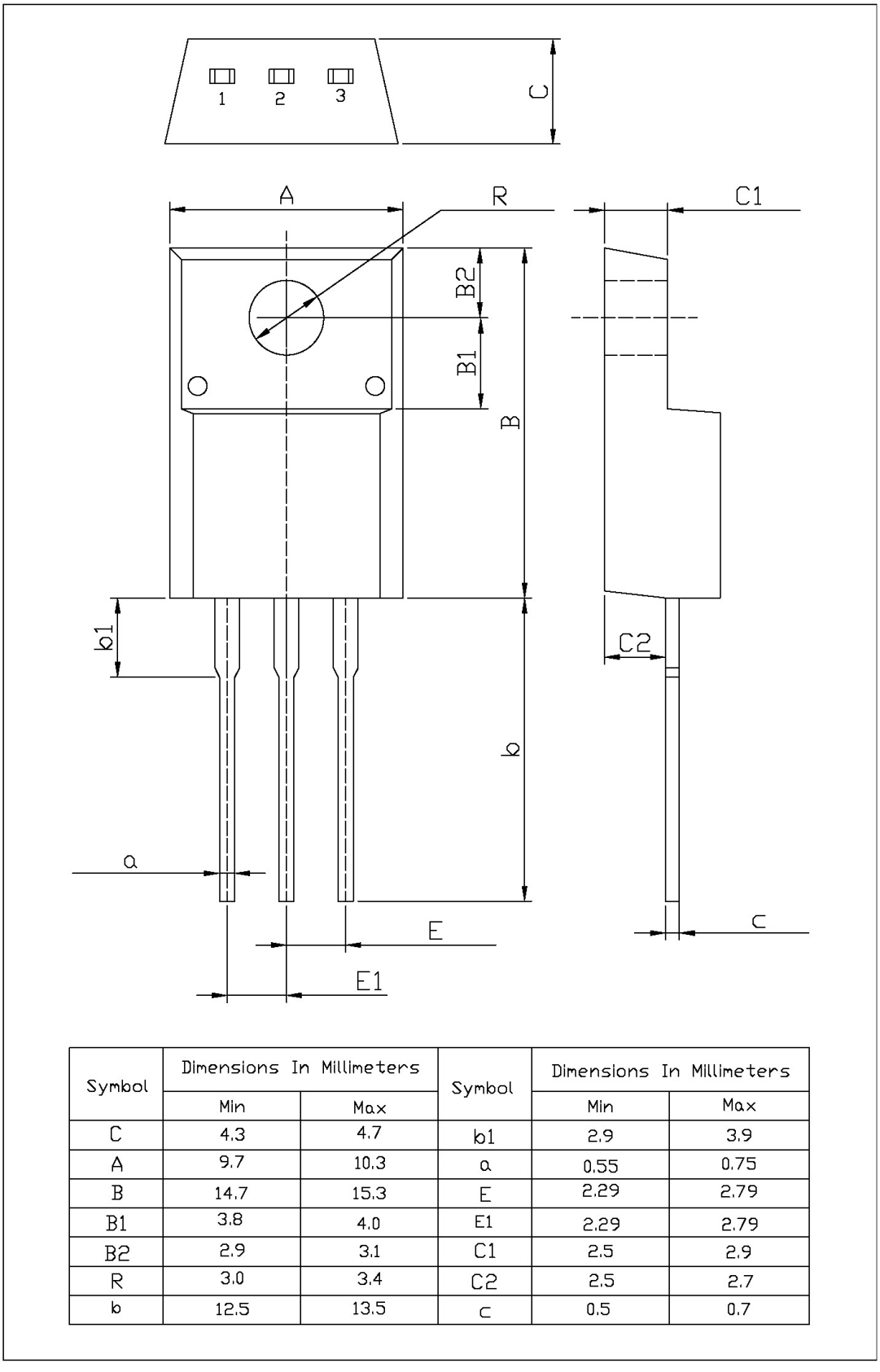


I_C — V_{BE}



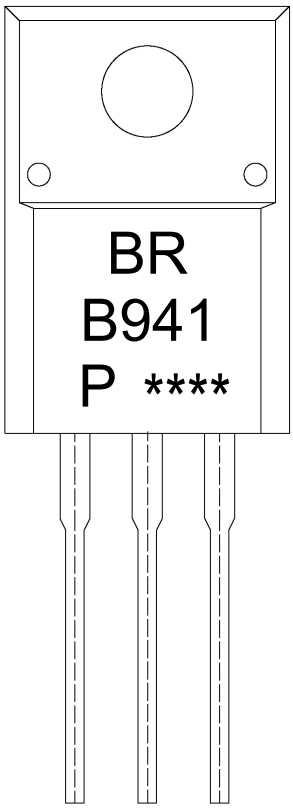
外形尺寸图 / Package Dimensions

TO-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



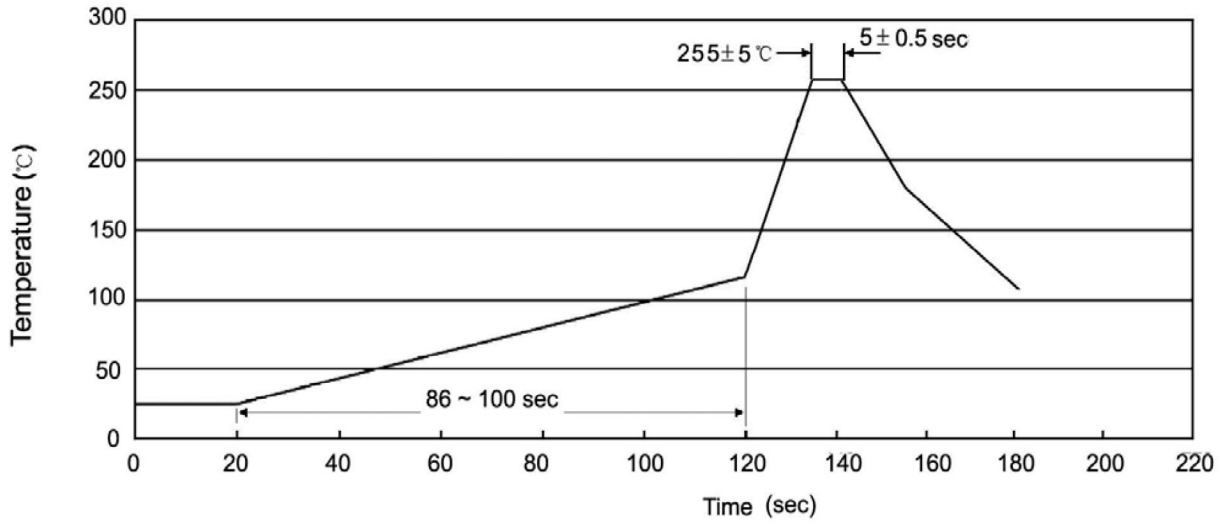
说明：

BR：	为公司代码
B941：	为型号代码
Q:	为 h_{FE} 分档代码
****：	为生产批号代码，随生产批号变化。

Note:

BR:	Company Code.
B941:	Product Type.
Q:	h_{FE} Classifications Symbol
****:	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