

# MMBT3904

Rev.E Mar.-2016

## 描述 / Descriptions

SOT-23 塑封封装 NPN 半导体三极管。Silicon NPN transistor in a SOT-23 Plastic Package.

## 特征 / Features

低电压，低电流。

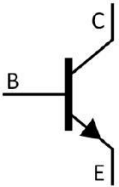
Low current, Low voltage。

## 用途 / Applications

用于普通放大及开关。

General purpose amplifier and switching.

## 内部等效电路 / Equivalent Circuit



## 引脚排列 / Pinning



PIN 1 : Base      PIN 2 : Emitter      PIN 3 : Collector

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

$h_{FE}$ Range	100~300
Marking	H1A

**极限参数 / Absolute Maximum Ratings(Ta=25°C)**

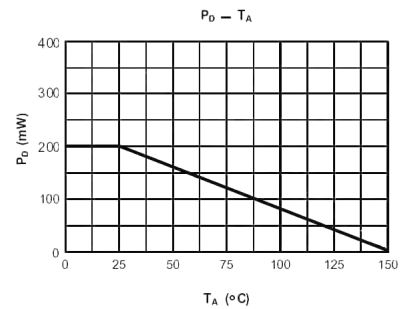
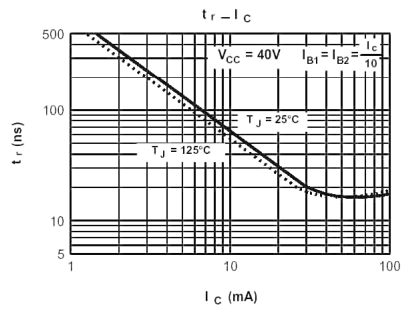
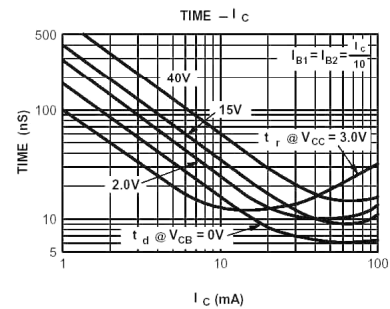
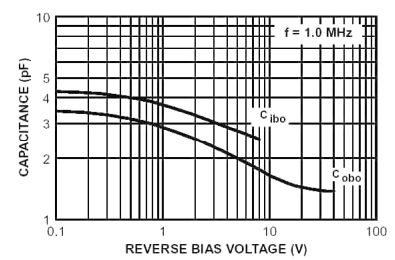
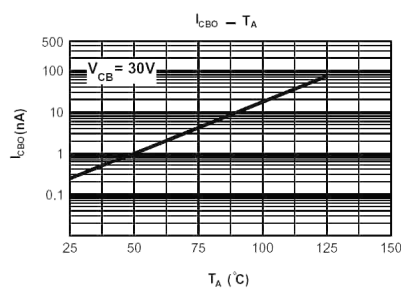
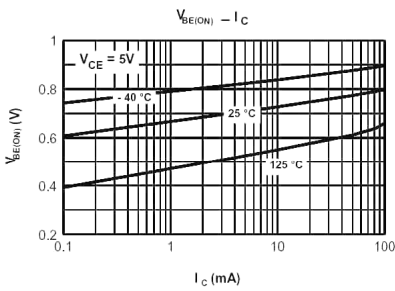
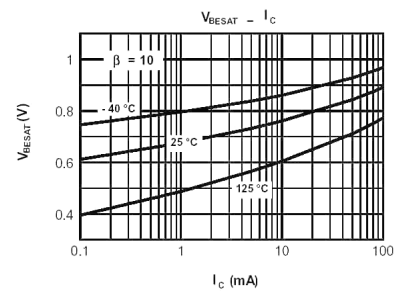
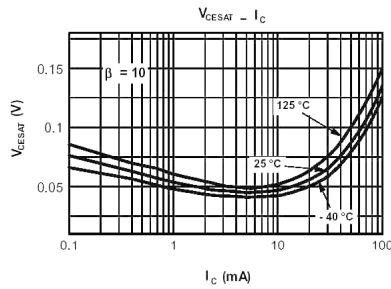
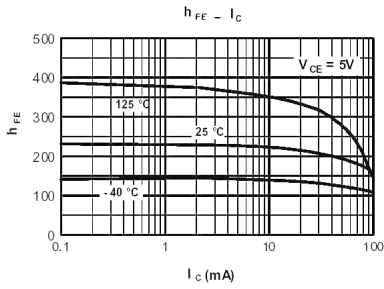
参数 Parameter	符号 Symbol	数值 Rating	单位 Unit
Collector to Base Voltage	$V_{CBO}$	60	V
Collector to Emitter Voltage	$V_{CEO}$	40	V
Emitter to Base Voltage	$V_{EBO}$	6.0	V
Collector Current	$I_C$	200	mA
Collector Power Dissipation	$P_C$	200	mW
	* $P_C$	350	mW
Junction Temperature	$T_j$	150	°C
Storage Temperature Range	$T_{stg}$	-55~150	°C

\*在 7×5×0.6mm 陶瓷板上 \*When mounted on a 7×5×0.6mm ceramic board

**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
Collector to Base Breakdown Voltage	$V_{CBO}$	$I_C=10\mu A$ $I_E=0$	60			V
Collector to Emitter Breakdown Voltage	$V_{CEO}$	$I_C=1.0mA$ $I_B=0$	40			V
Emitter to Base Breakdown Voltage	$V_{EBO}$	$I_E=10\mu A$ $I_C=0$	6.0			V
Collector Cut-Off Current	$I_{CBO}$	$V_{CB}=30V$ $I_E=0$			0.05	$\mu A$
Emitter Cut-Off Current	$I_{EBO}$	$V_{EB}=3.0V$ $I_C=0$			0.05	$\mu A$
DC Current Gain	$h_{FE(1)}$	$V_{CE}=1.0V$ $I_C=10mA$	100		300	
	$h_{FE(2)}$	$V_{CE}=1.0V$ $I_C=100mA$	30			
	$h_{FE(3)}$	$V_{CE}=1.0V$ $I_C=50mA$	60			
	$h_{FE(4)}$	$V_{CE}=1.0V$ $I_C=1.0mA$	70			
	$h_{FE(5)}$	$V_{CE}=1.0V$ $I_C=0.1mA$	40			
Collector-Emitter Saturation Voltage	$V_{CE(sat)(1)}$	$I_C=10mA$ $I_B=1.0mA$			0.2	V
	$V_{CE(sat)(2)}$	$I_C=50mA$ $I_B=5.0mA$			0.3	V
Base-Emitter Saturation Voltage	$V_{BE(sat)(1)}$	$I_C=10mA$ $I_B=1.0mA$	0.65		0.85	V
	$V_{BE(sat)(2)}$	$I_C=50mA$ $I_B=5.0mA$			0.95	V
Transition Frequency	$f_T$	$V_{CE}=20V$ $I_C=10mA$ $f=100MHz$	300			MHz
Output Capacitance	$C_{ob}$	$V_{CB}=5.0V$ $f=1.0MHz$			4.0	pF
Storage Time	$t_{stg}$	$V_{CC}=3.0V$ $I_C=10mA$ $I_{B1}=-I_{B2}=1.0mA$			200	ns
Fall Time	$t_f$	$V_{CC}=3.0V$ $I_C=10mA$ $I_{B1}=-I_{B2}=1.0mA$			50	ns
Delay Time	$t_d$	$V_{CC}=3.0V$ $V_{BE}=0.5V$ $I_C=10mA$ $I_{B1}=1.0mA$			35	ns
Rise Time	$t_r$	$V_{CC}=3.0V$ $V_{BE}=0.5V$ $I_C=10mA$ $I_{B1}=1.0mA$			35	ns
Input Capacitance	$C_{ib}$	$V_{EB}=0.5V$ $f=1.0MHz$			8.0	pF

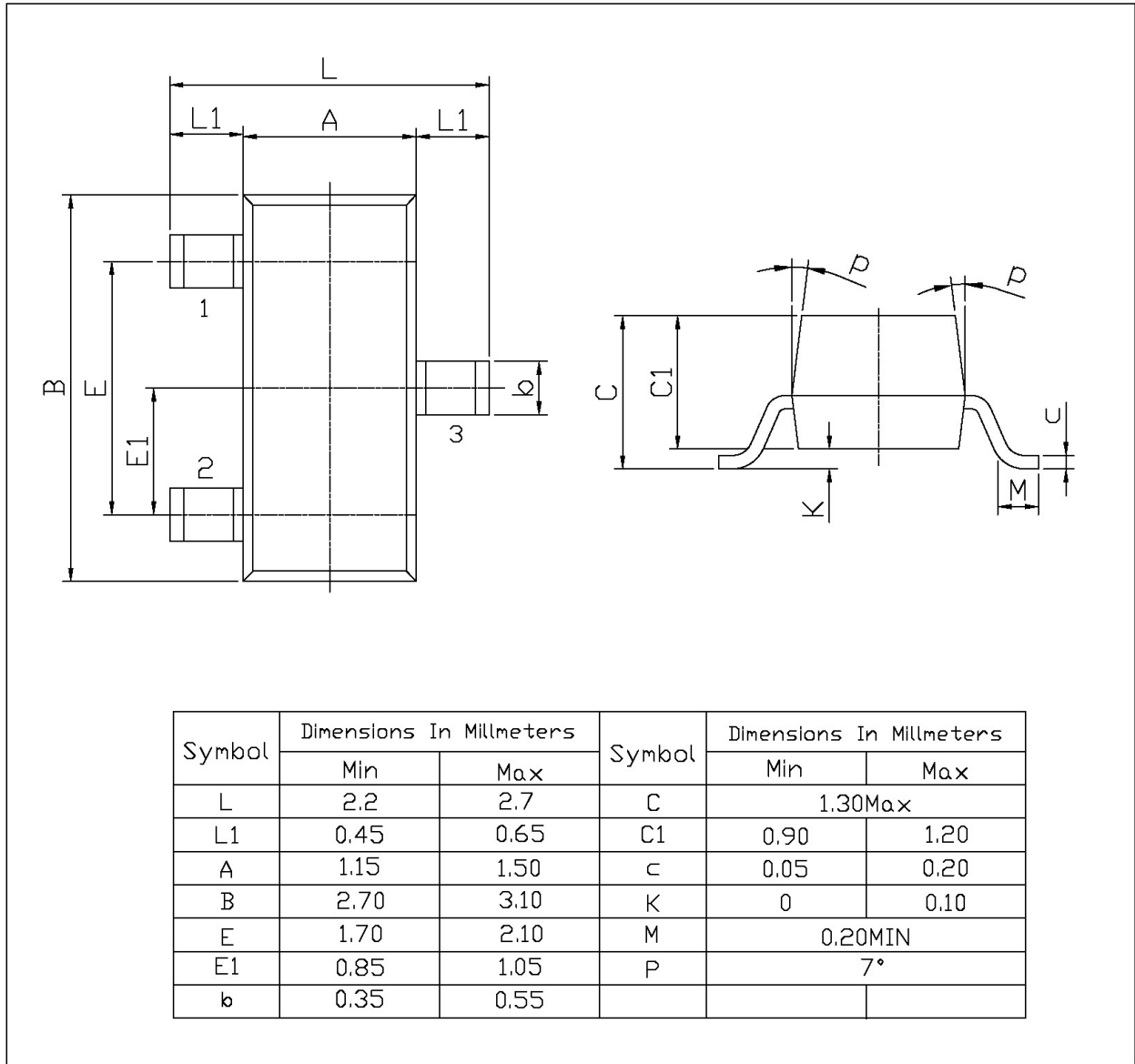
电参数曲线图 / Electrical Characteristic Curve



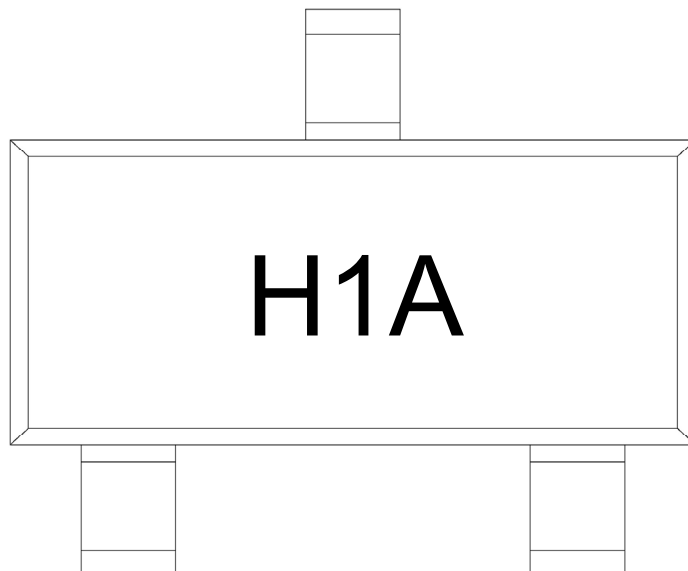
外形尺寸图 / Package Dimensions

SOT-23

单位: mm



印章说明 / Marking Instructions



说明：

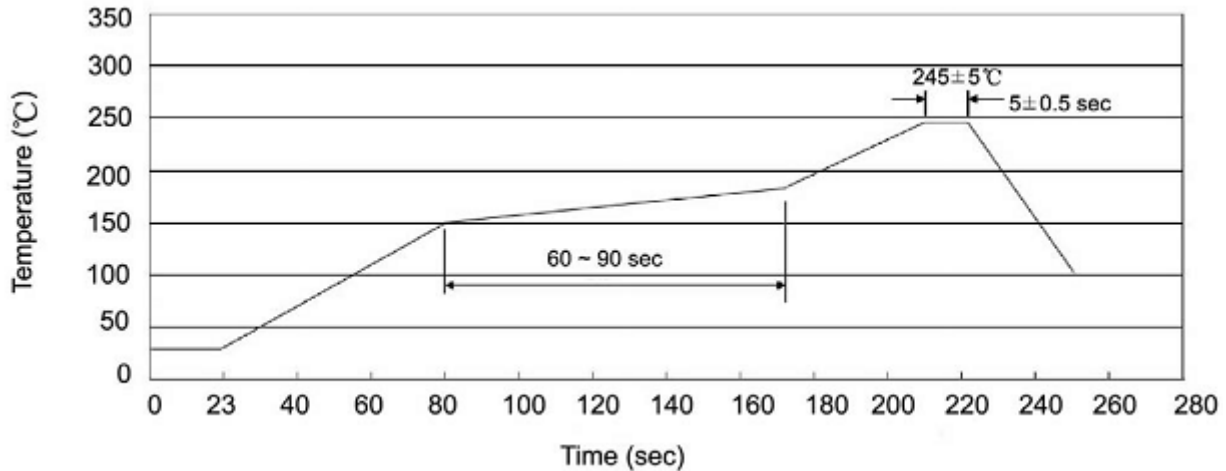
H： 为公司代码

1A： 为型号代码

Note:

H： Company Code

1A： Product Type Code

**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 25~150°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:25~150°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 <sup>3</sup> )		
	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
SOT-23	3,000	10	30,000	6	180,000	7" ×8	180×120×180	390×385×205

**使用说明 / Notices**