

MMBT3904T

Rev.E Mar.-2016

/ Descriptions

SOT-89 NPN Silicon NPN transistor in a SOT-89 Plastic Package.

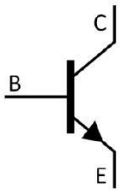
/ Features

Low current, Low voltage.

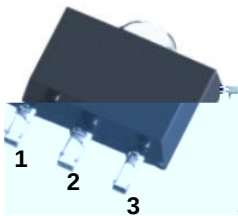
/ Applications

General purpose amplifier and switching.

/ Equivalent Circuit



/ Pinning



PIN1 Base PIN 2 Collector PIN 3 Emitter

/ Marking

Marking	H1A ‡
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/ Absolute Maximum Ratings($T_a=25^\circ\text{C}$)

Parameter	Symbol	Rating	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 - Continuous	I_C	200	mA
Collector Power Dissipation	P_C	200	mW
Collector Power Dissipation*	$*P_C$	350	mW
Junction Temperature	T_j	150	
Storage Temperature Range	T_{stg}	-55 150	

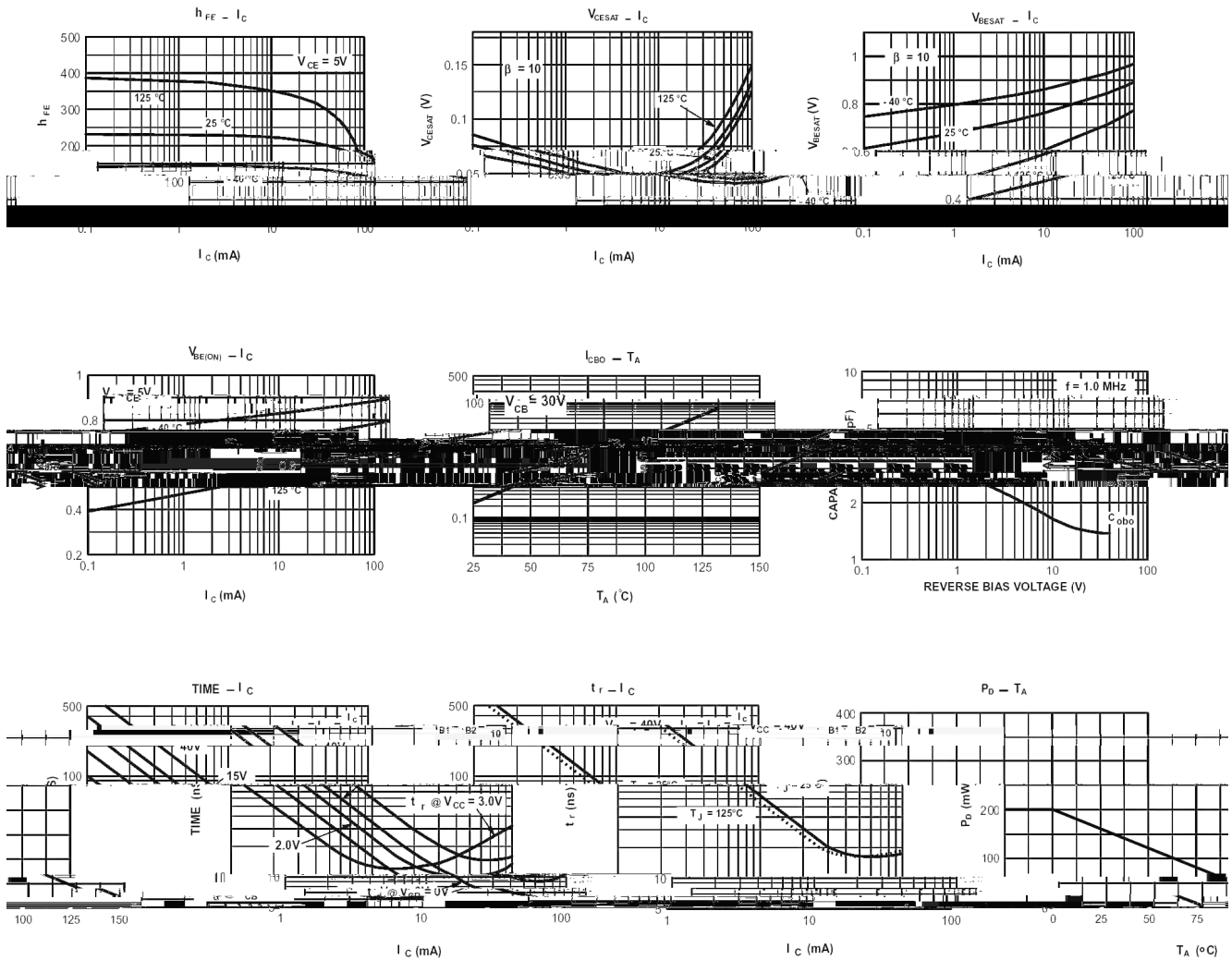
* $7\times 5\times 0.6\text{mm}$ *When mounted on a $7\times 5\times 0.6\text{mm}$ ceramic board/ Electrical Characteristics($T_a=25^\circ\text{C}$)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector to Base Breakdown Voltage	V_{CBO}	$I_C=10\text{ A}$ $I_E=0$	60			V
Collector to Emitter Breakdown Voltage	V_{CEO}	$I_C=1.0\text{mA}$ $I_B=0$	40			V
Emitter to Base Breakdown Voltage	V_{EBO}	$I_E=10\text{ A}$ $I_C=0$	6.0			V
Collector Cut-Off Current	I_{CBO}	$V_{CB}=30\text{V}$ $I_E=0$			0.05	A
Emitter Base Cut-Off Current	I_{EBO}	$V_{EB}=3.0\text{V}$ $I_C=0$			0.05	A
DC Current Gain	$h_{FE(1)}$	$V_{CE}=1.0\text{V}$ $I_C=10\text{mA}$	100		300	
	$h_{FE(2)}$	$V_{CE}=1.0\text{V}$ $I_C=100\text{mA}$	30			
	$h_{FE(3)}$	$V_{CE}=1.0\text{V}$ $I_C=50\text{mA}$	60			
	$h_{FE(4)}$	$V_{CE}=1.0\text{V}$ $I_C=1\text{mA}$	70			
	$h_{FE(5)}$	$V_{CE}=1.0\text{V}$ $I_C=0.1\text{mA}$	40			
Collector to Emitter Saturation Voltage	$V_{CE(sat) (1)}$	$I_C=10\text{mA}$ $I_B=1.0\text{mA}$			0.2	V
	$V_{CE(sat) (2)}$	$I_C=50\text{mA}$ $I_B=5.0\text{mA}$			0.3	V
Emitter to Base Saturation Voltage	$V_{BE(sat) (1)}$	$I_C=10\text{mA}$ $I_B=1.0\text{mA}$	0.65		0.85	V

/ Electrical Characteristics(Ta=25)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Emitter to Base Saturation Voltage	$V_{BE(sat)} (2)$	$I_C=50mA$ $I_B=5.0mA$			0.95	V
Transition Frequency	f_T	$I_C=10mA$ $V_{CE}=20V$ $f=100MHz$	300			MHz
Collector 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

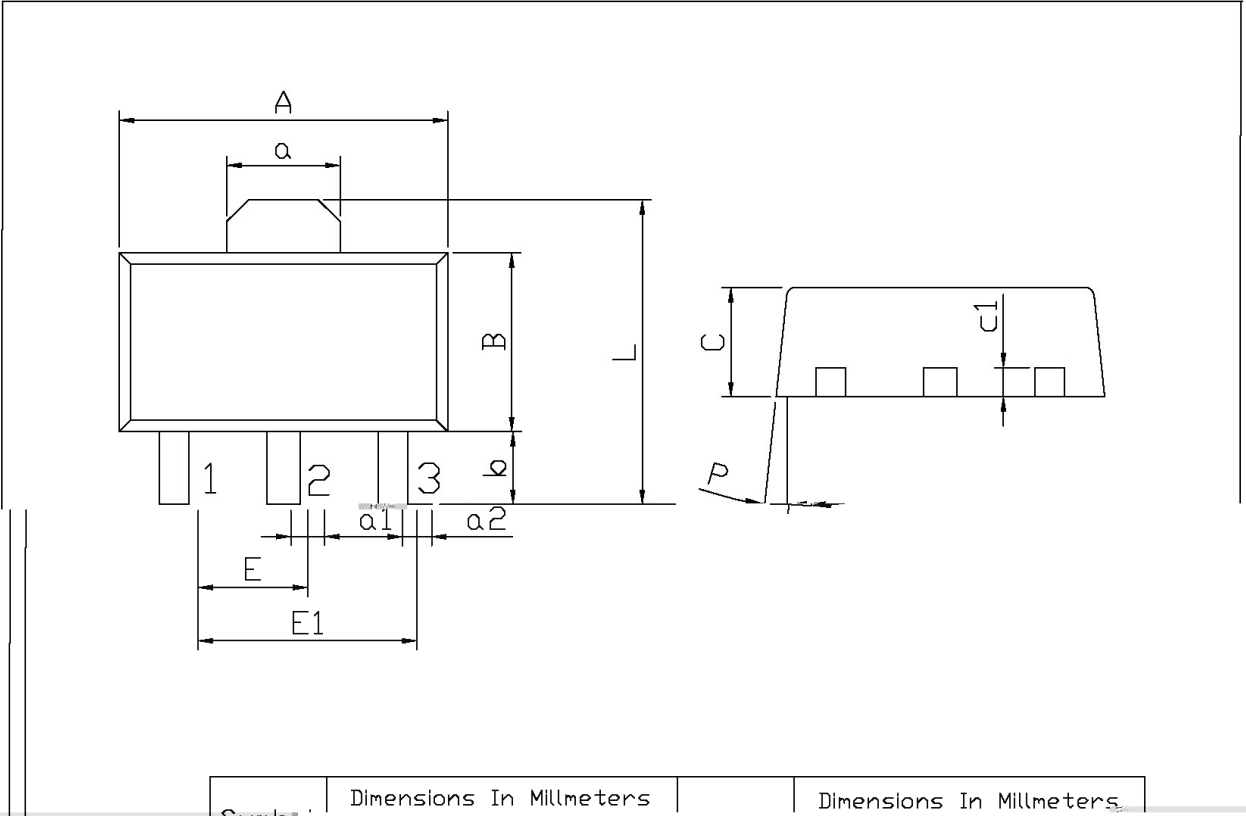
/ Electrical Characteristic Curve



/ Package Dimensions

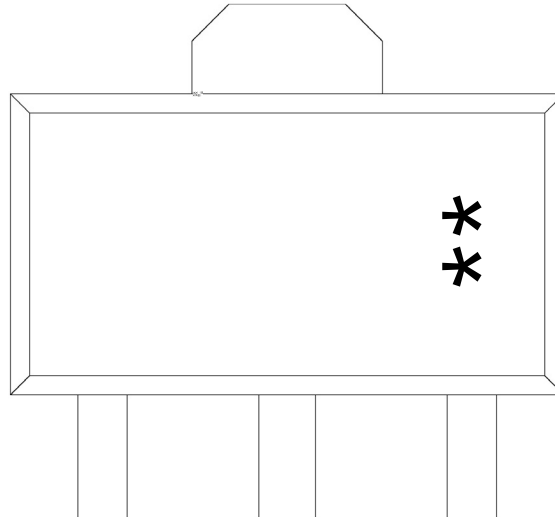
SOT-89

单位: mm



Symbol	Dimensions In Millimeters	Dimensions In Millimeters
L	3.878	4.478
a	1.45	1.65
E	1.40	1.60
E1	2.80	3.20
b	0.80	1.20
C	1.40	1.70
a1	0.35	0.50
P	6°	

/ Marking Instructions



H

1A

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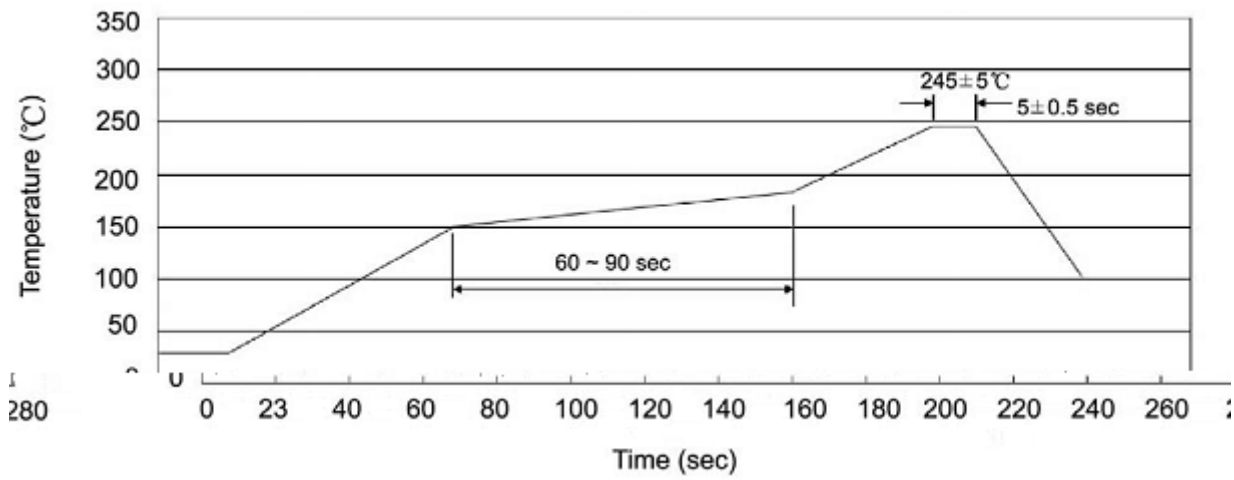
Note:

H: Company Code.

1A: Product Type.

** : Lot No. Code, code change with Lot No.

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Note:

- 1

25 150

60 90sec;

1.Preheating:25~150 , Time:60~90sec.
- 2

245±5

5±0.5sec;

2.Peak Temp.:245±5 , Duration:5±0.5sec.
- 3

2 10 /sec.

3. Cooling Speed: 2~10 /sec.

/ Resistance to Soldering Heat Test Conditions

260±5 10±1 sec. Temp.:260±5 Time:10±1 sec

/ Packaging SPEC.

/ REEL

Package Type	Units					Dimension		(unit mm ³)

/ Notices