

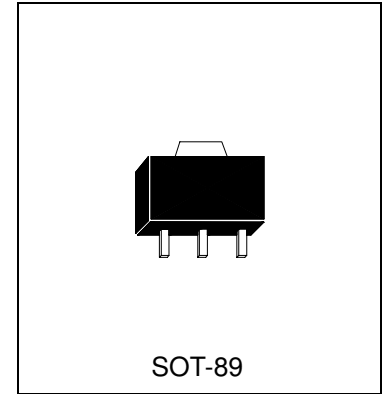


# HM4033

PNP EPITAXIAL PLANAR TRANSISTOR

## Description

The HM4033 is designed for high current general purpose amplifier applications.



## Absolute Maximum Ratings

- Maximum Temperatures
  - Storage Temperature ..... -55 ~ +150 °C
  - Junction Temperature ..... +150 °C Maximum
- Maximum Power Dissipation
  - Total Power Dissipation (T<sub>A</sub>=25°C) ..... 1 W
- Maximum Voltages and Currents (T<sub>A</sub>=25°C)
  - V<sub>CBO</sub> Collector to Base Voltage ..... -80 V
  - V<sub>CEO</sub> Collector to Emitter Voltage ..... -80 V
  - V<sub>EBO</sub> Emitter to Base Voltage ..... -5 V
  - I<sub>C</sub> Collector Current ..... -1 A

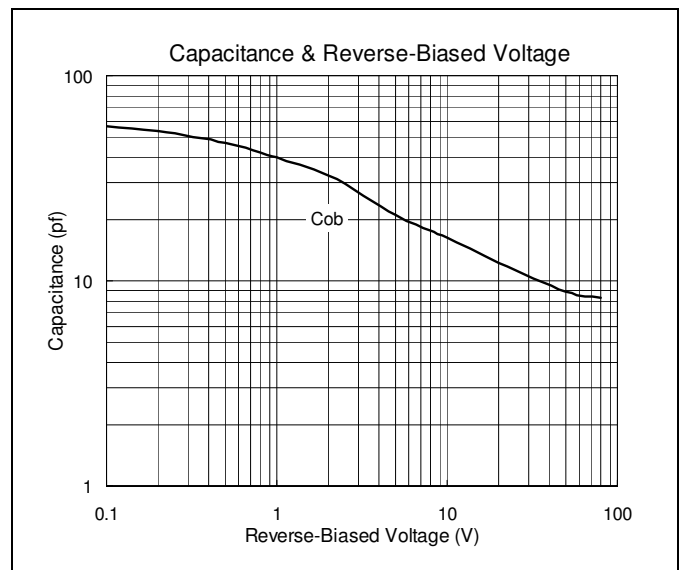
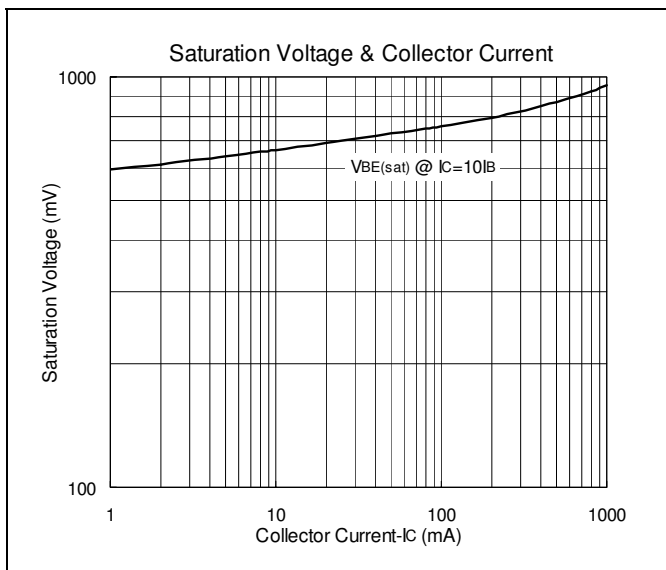
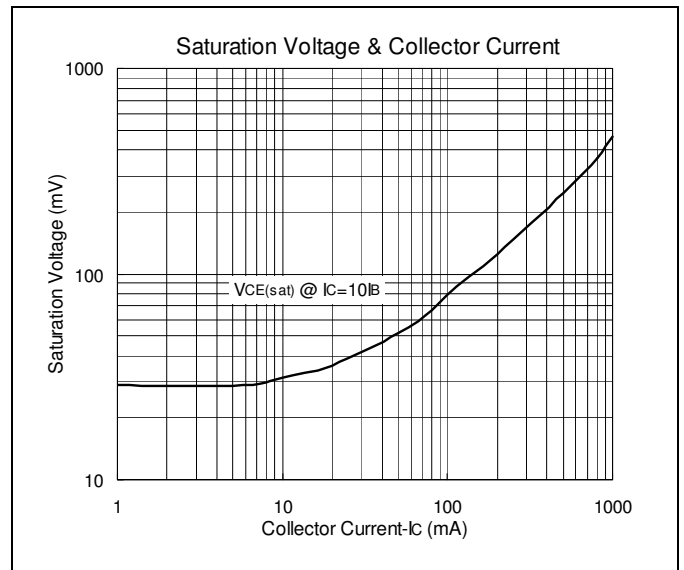
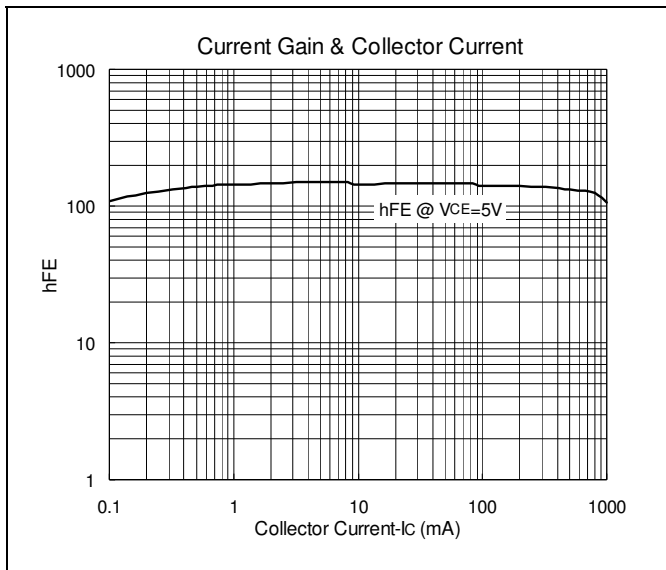
## Electrical Characteristics (T<sub>A</sub>=25°C)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV <sub>CBO</sub>	-80	-	-	V	I <sub>C</sub> =-10uA, I <sub>E</sub> =0
BV <sub>CEO</sub>	-80	-	-	V	I <sub>C</sub> =-10mA, I <sub>B</sub> =0
BV <sub>EBO</sub>	-5	-	-	V	I <sub>C</sub> =-10uA, I <sub>C</sub> =0
I <sub>CBO</sub>	-	-	-100	nA	V <sub>CB</sub> =-60V, I <sub>E</sub> =0
I <sub>EBO</sub>	-	-	-100	nA	V <sub>EB</sub> =-5V, I <sub>C</sub> =0
*V <sub>CE(sat)1</sub>	-	-	-150	mV	I <sub>C</sub> =-150mA, I <sub>B</sub> =-15mA
*V <sub>CE(sat)2</sub>	-	-	-500	mV	I <sub>C</sub> =-500mA, I <sub>B</sub> =-50mA
*V <sub>BE(sat)1</sub>	-	-	-900	mV	I <sub>C</sub> =-150mA, I <sub>B</sub> =-15mA
*V <sub>BE(sat)2</sub>	-	-	-1.1	V	I <sub>C</sub> =-500mA, I <sub>B</sub> =-50mA
*h <sub>FE1</sub>	75	-	-		V <sub>CE</sub> =-5V, I <sub>C</sub> =-0.1mA
*h <sub>FE2</sub>	100	-	-		V <sub>CE</sub> =-5V, I <sub>C</sub> =-100mA
*h <sub>FE3</sub>	70	-	-		V <sub>CE</sub> =-5V, I <sub>C</sub> =-500mA
*h <sub>FE4</sub>	25	-	-		V <sub>CE</sub> =-5V, I <sub>C</sub> =-1A
f <sub>T</sub>	100	-	-	MHz	V <sub>CE</sub> =-10V, I <sub>C</sub> =-50mA, f=100MHz
Cob	-	-	20	pF	V <sub>CB</sub> =-10V, I <sub>E</sub> =0, f=1MHz

\*Pulse Test: Pulse Width ≤380us, Duty Cycle≤2%



### Characteristics Curve





### SOT-89 Dimension

**Marking:**

Date Code      Control Code

Pb Free Mark  
 Pb-Free: "●" (Note)  
 Normal: None

Note: Green label is used for pb-free packing

Pin Style: 1.Base 2.Collector 3.Emitter

Material:

- Lead solder plating: Sn60/Pb40 (Normal), Sn/3.0Ag/0.5Cu or Pure-Tin (Pb-free)
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

DIM	Min.	Max.
A	4.40	4.60
B	4.05	4.25
C	1.50	1.70
D	2.40	2.60
E	0.36	0.51
F	*1.50	-
G	*3.00	-
H	1.40	1.60
I	0.35	0.41

\*: Typical, Unit: mm

3-Lead SOT-89 Plastic  
 Surface Mounted Package  
 HSMC Package Code: M

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**Head Office And Factory:**

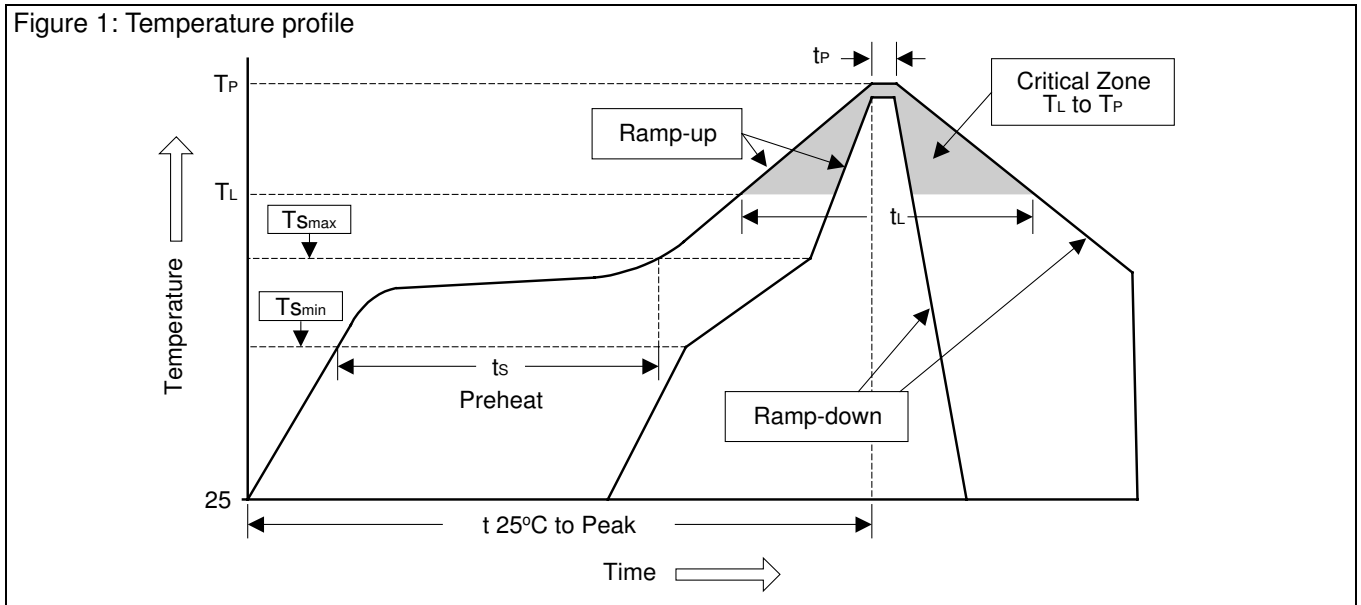
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### Soldering Methods for HSMC's Products

1. Storage environment: Temperature=10°C~35°C Humidity=65%±15%
2. Reflow soldering of surface-mount devices

Figure 1: Temperature profile



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate ( $T_L$ to $T_P$ )	<3°C/sec	<3°C/sec
Preheat		
- Temperature Min ( $T_{smin}$ )	100°C	150°C
- Temperature Max ( $T_{smax}$ )	150°C	200°C
- Time (min to max) ( $t_s$ )	60~120 sec	60~180 sec
$T_{smax}$ to $T_L$		
- Ramp-up Rate	<3°C/sec	<3°C/sec
Time maintained above:		
- Temperature ( $T_L$ )	183°C	217°C
- Time ( $t_L$ )	60~150 sec	60~150 sec
Peak Temperature ( $T_P$ )	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature ( $t_p$ )	10~30 sec	20~40 sec
Ramp-down Rate	<6°C/sec	<6°C/sec
Time 25°C to Peak Temperature	<6 minutes	<8 minutes

### 3. Flow (wave) soldering (solder dipping)

Products	Peak temperature	Dipping time
Pb devices.	245°C ±5°C	5sec ±1sec
Pb-Free devices.	260°C +0/-5°C	5sec ±1sec