

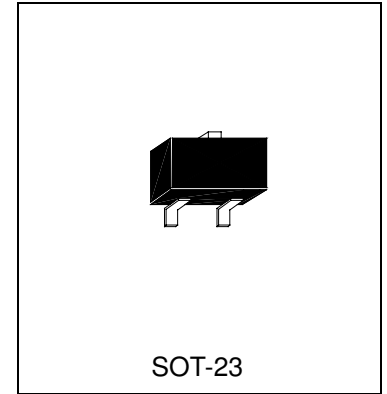


# HMBT4401

NPN EPITAXIAL PLANAR TRANSISTOR

## Description

The HMBT4401 is designed for general purpose switching and amplifier applications.



## Absolute Maximum Ratings

- Maximum Temperatures
  - Storage Temperature..... -55 ~ +150 °C
  - Junction Temperature..... +150 °C
- Maximum Power Dissipation
  - Total Power Dissipation (T<sub>A</sub>=25°C)..... 225 mW
- Maximum Voltages and Currents (T<sub>A</sub>=25°C)
  - V<sub>CBO</sub> Collector to Base Voltage ..... 60 V
  - V<sub>CEO</sub> Collector to Emitter Voltage..... 40 V
  - V<sub>EBO</sub> Emitter to Base Voltage..... 6 V
  - I<sub>C</sub> Collector Current..... 600 mA

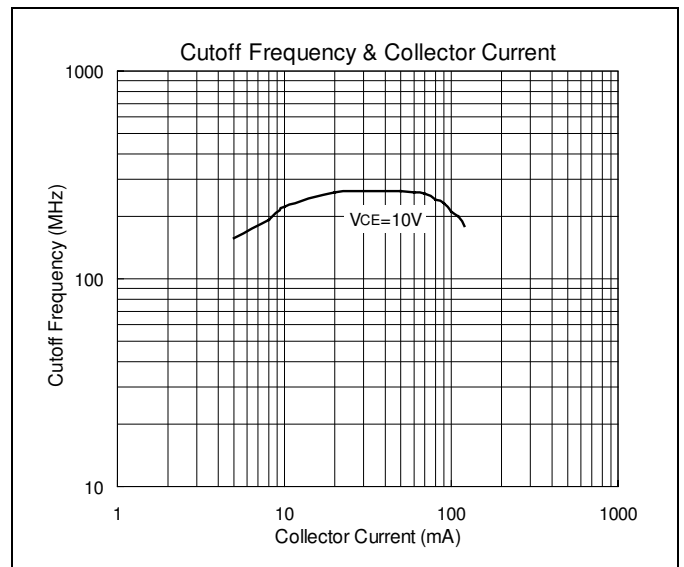
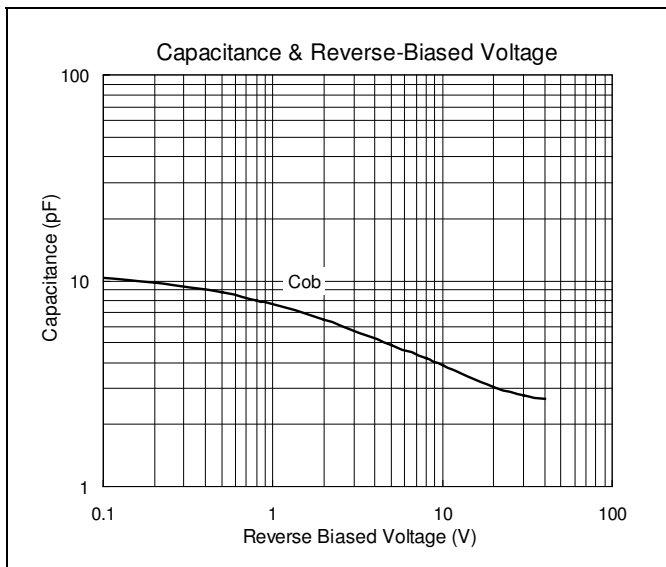
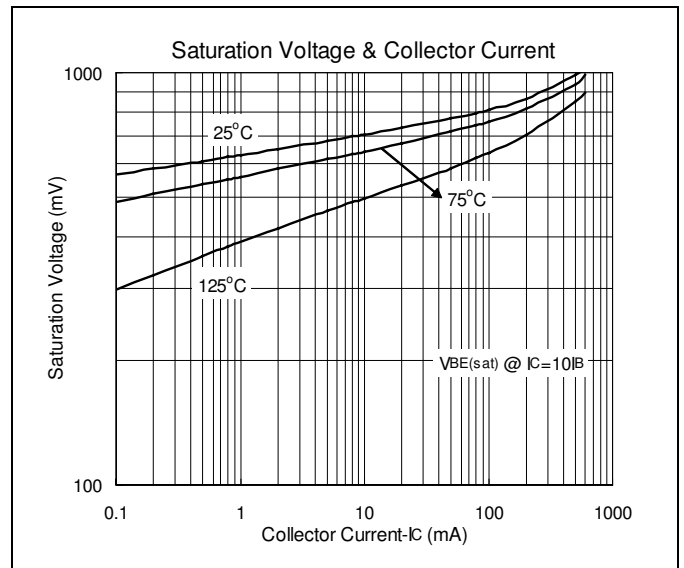
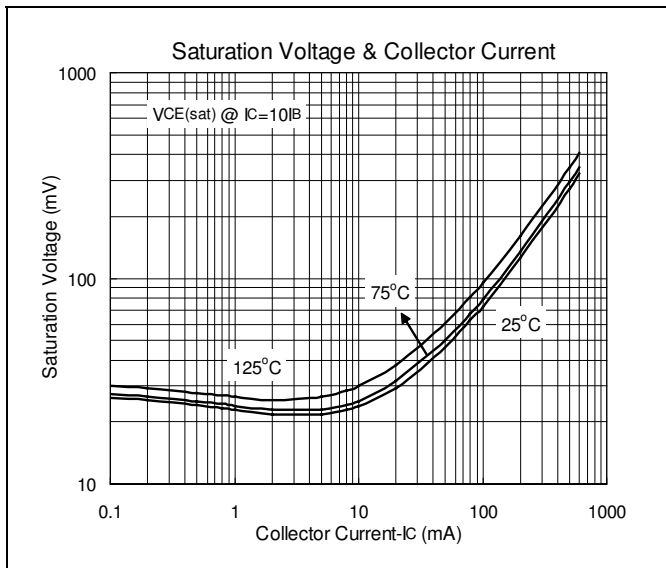
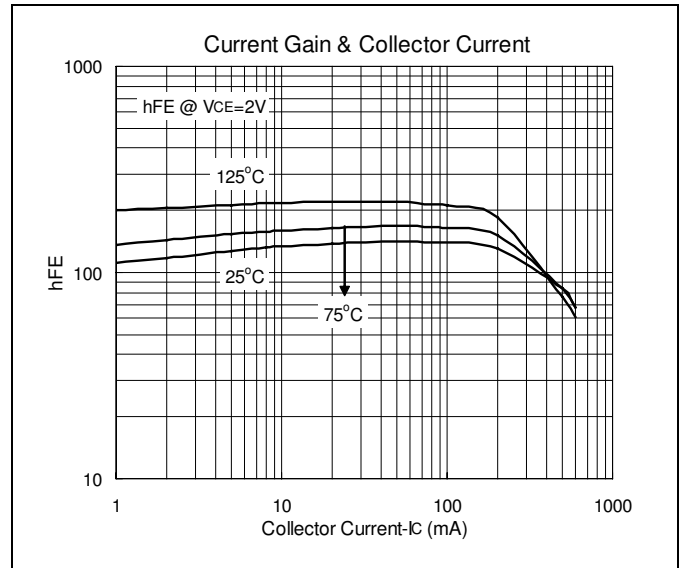
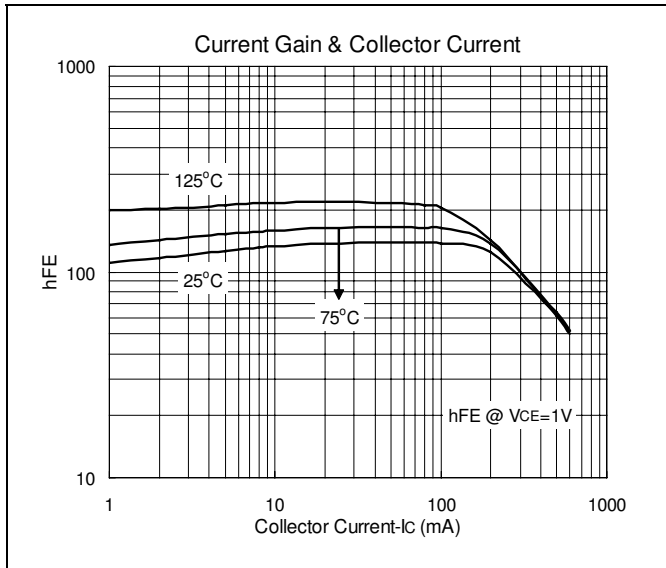
## Electrical Characteristics (T<sub>A</sub>=25°C)

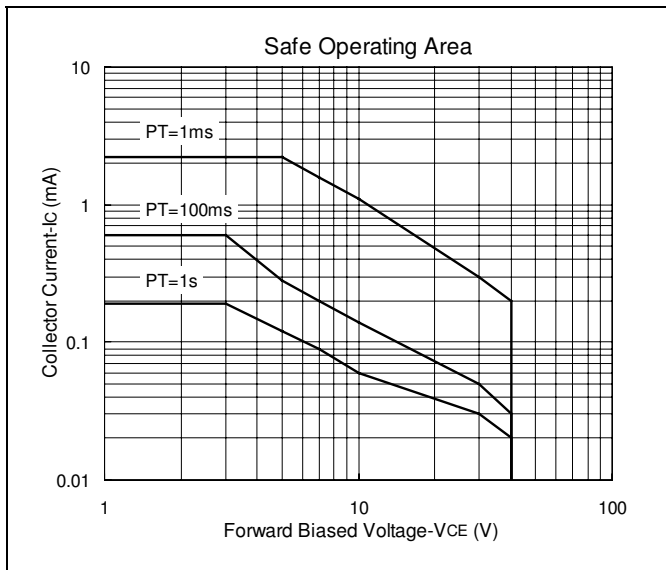
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV <sub>CBO</sub>	60	-	-	V	I <sub>C</sub> =100uA
BV <sub>CEO</sub>	40	-	-	V	I <sub>C</sub> =1mA
BV <sub>EBO</sub>	6	-	-	V	I <sub>E</sub> =10uA
I <sub>CEX</sub>	-	-	100	nA	V <sub>CE</sub> =35V, V <sub>BE</sub> =-0.4V
*V <sub>CE(sat)1</sub>	-	-	0.4	V	I <sub>C</sub> =150mA, I <sub>B</sub> =15mA
*V <sub>CE(sat)2</sub>	-	-	750	mV	I <sub>C</sub> =500mA, I <sub>B</sub> =50mA
*V <sub>BE(sat)1</sub>	-	-	950	mV	I <sub>C</sub> =150mA, I <sub>B</sub> =15mA
*V <sub>BE(sat)2</sub>	-	-	1.2	V	I <sub>C</sub> =500mA, I <sub>B</sub> =50mA
*h <sub>FE1</sub>	20	-	-		V <sub>CE</sub> =1V, I <sub>C</sub> =0.1mA
*h <sub>FE2</sub>	40	-	-		V <sub>CE</sub> =1V, I <sub>C</sub> =1mA
*h <sub>FE3</sub>	80	-	-		V <sub>CE</sub> =1V, I <sub>C</sub> =10mA
*h <sub>FE4</sub>	100	-	300		V <sub>CE</sub> =1V, I <sub>C</sub> =150mA
*h <sub>FE5</sub>	40	-	-		V <sub>CE</sub> =2V, I <sub>C</sub> =500mA
f <sub>T</sub>	250	-	-	MHz	V <sub>CE</sub> =10V, I <sub>C</sub> =20mA, f=100MHz
Cob	-	-	6.5	PF	V <sub>CB</sub> =5V, f=1MHz

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



### Characteristics Curve







### SOT-23 Dimension

3-Lead SOT-23 Plastic  
Surface Mounted Package  
HSMC Package Code: N

**Marking:**

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

Note: Pb-free product can distinguish by the green label or the extra description on the right side of the label.

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

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	2.80	3.04
B	1.20	1.60
C	0.89	1.30
D	0.30	0.50
G	1.70	2.30
H	0.013	0.10
J	0.085	0.177
K	0.32	0.67
L	0.85	1.15
S	2.10	2.75
V	0.25	0.65

\*: Typical, Unit: mm

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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



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T <sub>L</sub> to T <sub>p</sub> )	<3°C/sec	<3°C/sec
Preheat		
- Temperature Min (T <sub>smin</sub> )	100°C	150°C
- Temperature Max (T <sub>smax</sub> )	150°C	200°C
- Time (min to max) (ts)	60~120 sec	60~180 sec
T <sub>smax</sub> to T <sub>L</sub>		
- Ramp-up Rate	<3°C/sec	<3°C/sec
Time maintained above:		
- Temperature (T <sub>L</sub> )	183°C	217°C
- Time (t <sub>L</sub> )	60~150 sec	60~150 sec
Peak Temperature (T <sub>p</sub> )	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature (t <sub>p</sub> )	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