



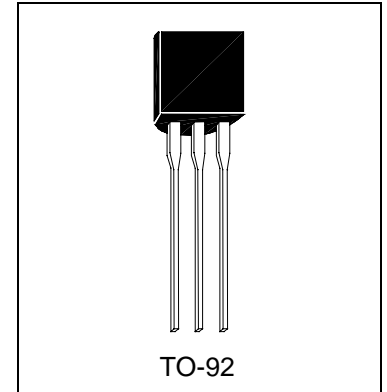
# HBF421

PNP EPITAXIAL PLANAR TRANSISTOR

## Description

Video B-class Power stages in TV-receivers

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## Absolute Maximum Ratings

- Maximum Temperatures
  - Storage Temperature ..... -55 ~ +150 °C
  - Junction Temperature ..... +150 °C Maximum
- Maximum Power Dissipation
  - Total Power Dissipation (Ta=25°C) ..... 830 mW
- Maximum Voltages and Currents (Ta=25°C)
  - V<sub>CBO</sub> Collector to Base Voltage ..... -300 V
  - V<sub>CEO</sub> Collector to Emitter Voltage ..... -300 V
  - V<sub>EBO</sub> Emitter to Base Voltage ..... -5 V
  - I<sub>C</sub> Collector Current ..... -50 mA
  - I<sub>BM</sub> Peak Base Current ..... -50 mA
  - I<sub>CM</sub> Peak Collector Current ..... -100 mA

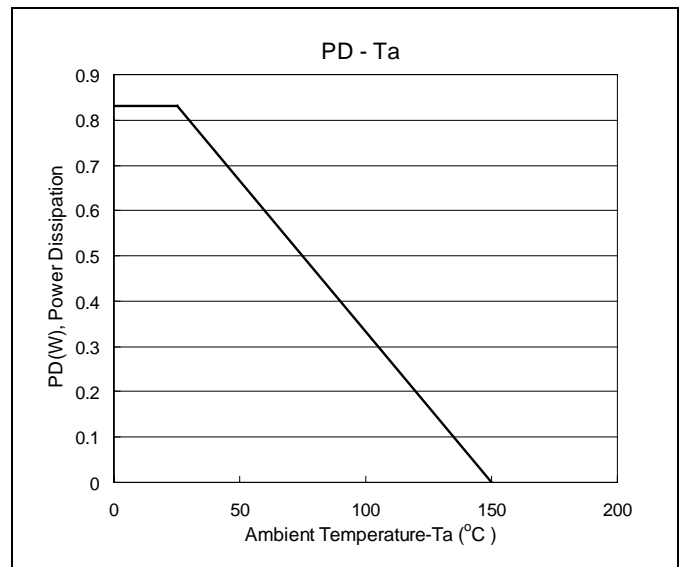
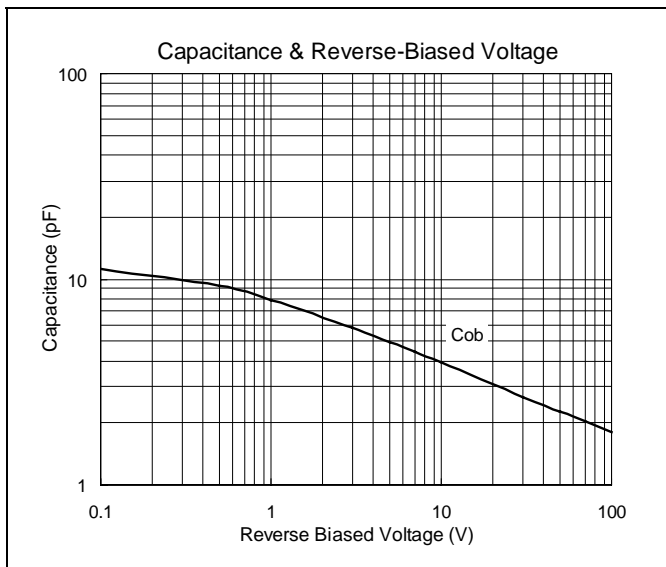
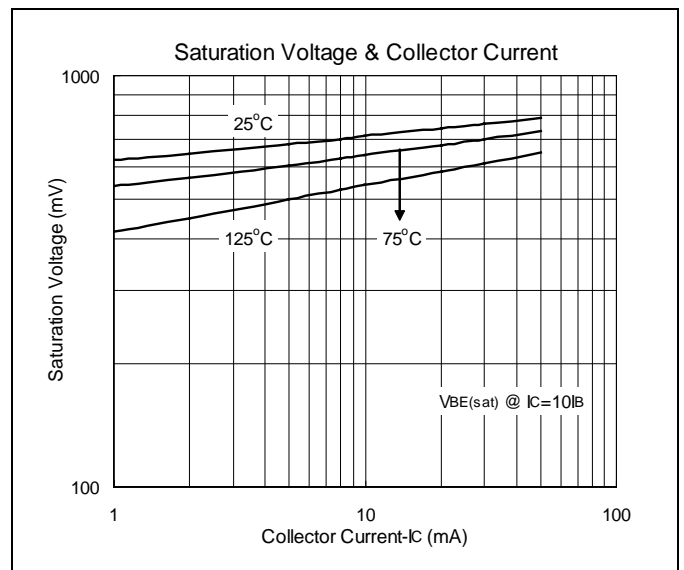
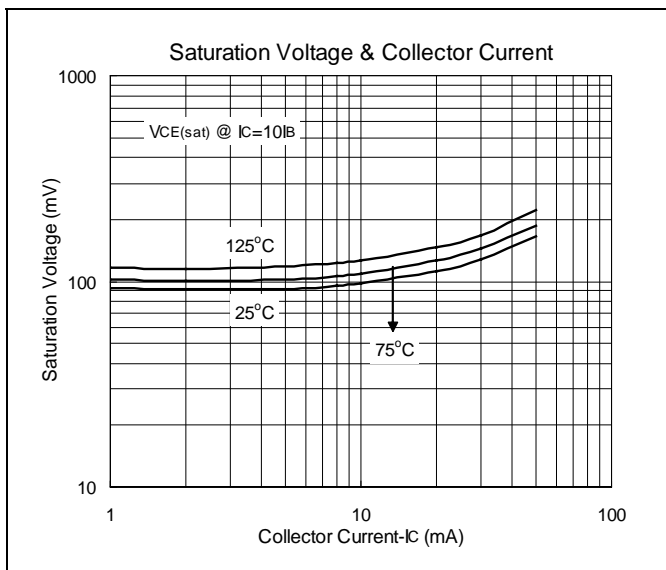
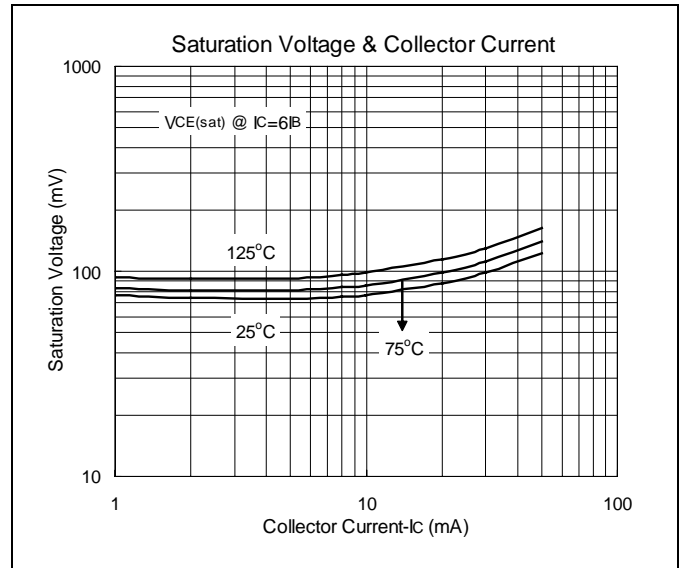
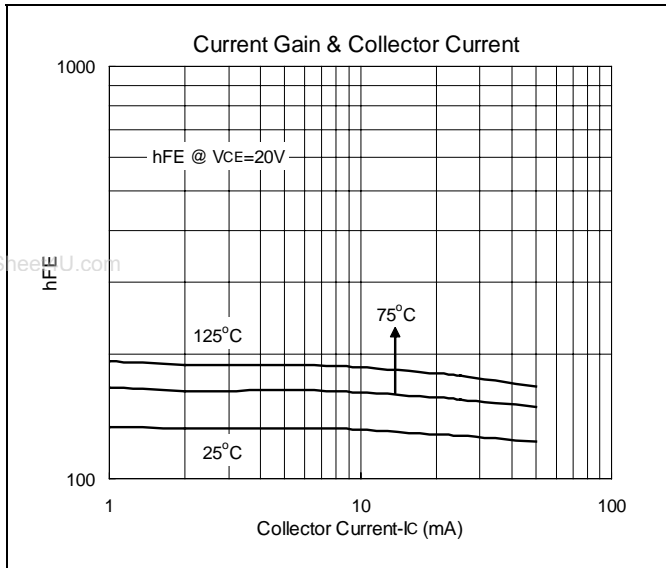
## Electrical Characteristics (Ta=25°C)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV <sub>CBO</sub>	-300	-	-	V	I <sub>C</sub> =-100uA, I <sub>E</sub> =0
BV <sub>CEO</sub>	-300	-	-	V	I <sub>C</sub> =-1mA, I <sub>B</sub> =0
BV <sub>EBO</sub>	-5	-	-	V	I <sub>E</sub> =-10uA, I <sub>C</sub> =0
I <sub>CBO</sub>	-	-	-100	nA	V <sub>CB</sub> =-200V, I <sub>E</sub> =0
I <sub>EBO</sub>	-	-	-100	nA	V <sub>EB</sub> =-5V, I <sub>E</sub> =0
*V <sub>CE(sat)</sub>	-	-	-0.6	V	I <sub>C</sub> =-30mA, I <sub>B</sub> =-3mA
*h <sub>FE</sub>	50	-	-		V <sub>CE</sub> =-20V, I <sub>C</sub> =-25mA
f <sub>T</sub>	60	-	-	MHz	I <sub>E</sub> =-10mA, V <sub>CE</sub> =-10V, f=100MHz

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



### Characteristics Curve





### TO-92 Dimension

3-Lead TO-92 Plastic Package  
HSMC Package Code: A

**Marking:**

Pb Free Mark  
 Pb-Free: " \* " (Note)  
 Normal: None

Date Code      Control Code

Note: Green label is used for pb-free packing

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

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	4.33	4.83
B	4.33	4.83
C	12.70	-
D	0.36	0.56
E	-	*1.27
F	3.36	3.76
G	0.36	0.56
H	-	*2.54
I	-	*1.27
$\alpha 1$	-	*5°
$\alpha 2$	-	*2°
$\alpha 3$	-	*2°

\*: Typical, Unit: mm

### TO-92 Taping Dimension

DIM	Min.	Max.
A	4.33	4.83
D	3.80	4.20
D1	0.36	0.53
D2	4.33	4.83
F1,F2	2.40	2.90
H	15.50	16.50
H1	8.50	9.50
H2	-	1
H2A	-	1
H3	-	27
H4	-	21
L	-	11
L1	2.50	-
P	12.50	12.90
P1	5.95	6.75
P2	50.30	51.30
T	-	0.55
T1	-	1.42
T2	0.36	0.68
W	17.50	19.00
W1	5.00	7.00

Unit: mm

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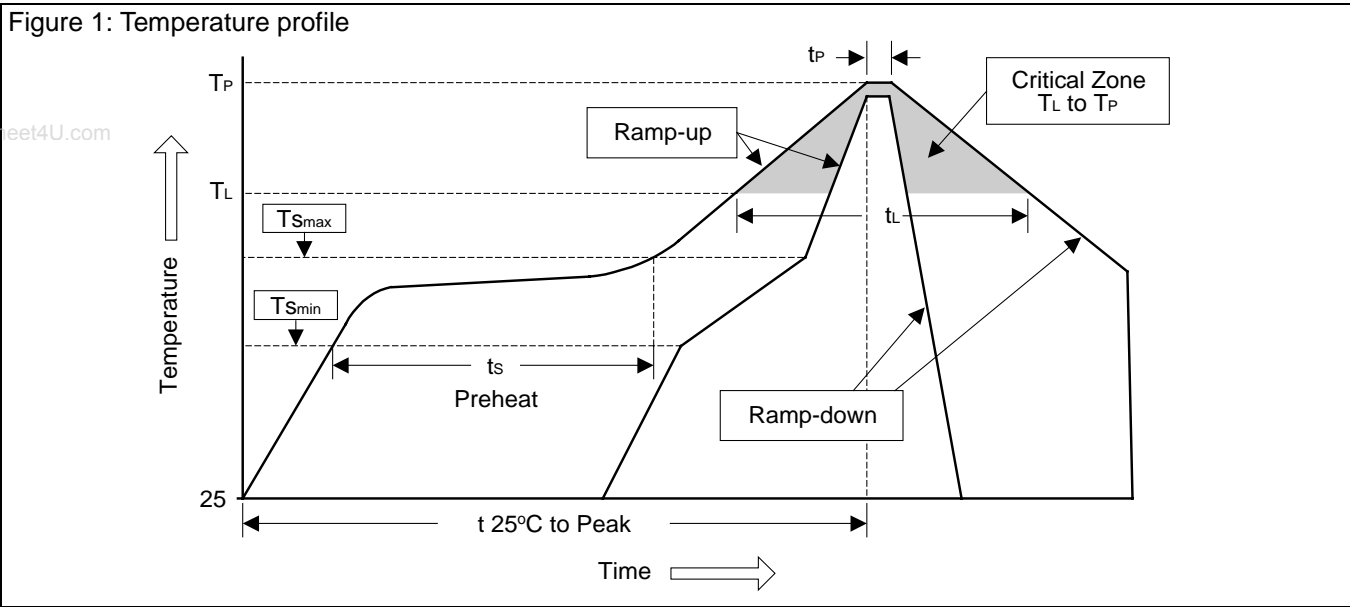
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### Soldering Methods for HSMC's Products

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 <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) (t <sub>s</sub> )	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