

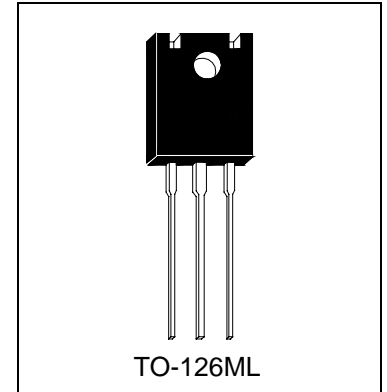


# HSD1609

NPN EPITAXIAL PLANAR TRANSISTOR

## Features

- Low frequency high voltage amplifier
- Complementary pair with HSB1109



## Absolute Maximum Ratings (T<sub>A</sub>=25°C)

- Maximum Temperatures  
 Storage Temperature ..... -50 ~ +150 °C  
 Junction Temperature ..... +150 °C Maximum
- Maximum Power Dissipation  
 Total Power Dissipation (T<sub>A</sub>=25°C) ..... 1.25 W
- Maximum Voltages and Currents  
 BV<sub>CBO</sub> Collector to Base Voltage ..... 160 V  
 BV<sub>CEO</sub> Collector to Emitter Voltage ..... 160 V  
 BV<sub>EBO</sub> Emitter to Base Voltage ..... 5 V  
 I<sub>C</sub> Collector Current ..... 100 mA

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV <sub>CBO</sub>	160	-	-	V	I <sub>C</sub> =10uA
BV <sub>CEO</sub>	160	-	-	V	I <sub>C</sub> =1mA
BV <sub>EBO</sub>	5	-	-	V	I <sub>E</sub> =10uA
I <sub>CBO</sub>	-	-	10	uA	V <sub>CB</sub> =140V
*V <sub>CE(sat)</sub>	-	-	2	V	I <sub>C</sub> =30mA, I <sub>B</sub> =3mA
V <sub>BE(on)</sub>	-	-	1.5	V	I <sub>C</sub> =10mA, V <sub>CE</sub> =5V
*h <sub>FE1</sub>	60	-	320		I <sub>C</sub> =10mA, V <sub>CE</sub> =5V
*h <sub>FE2</sub>	30	-	-		I <sub>C</sub> =1mA, V <sub>CE</sub> =5V
f <sub>T</sub>	145	-	-	MHz	I <sub>C</sub> =10mA, V <sub>CE</sub> =5V
Cob	-	3.8	-	pF	V <sub>CB</sub> =10V, f=1MHz

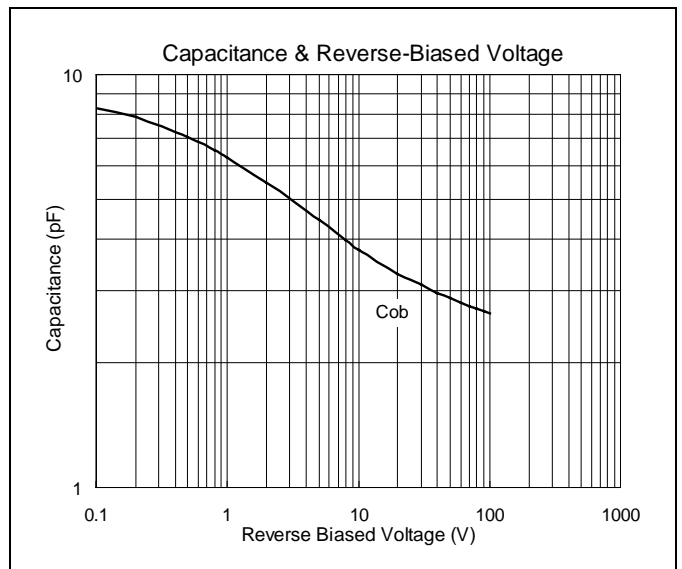
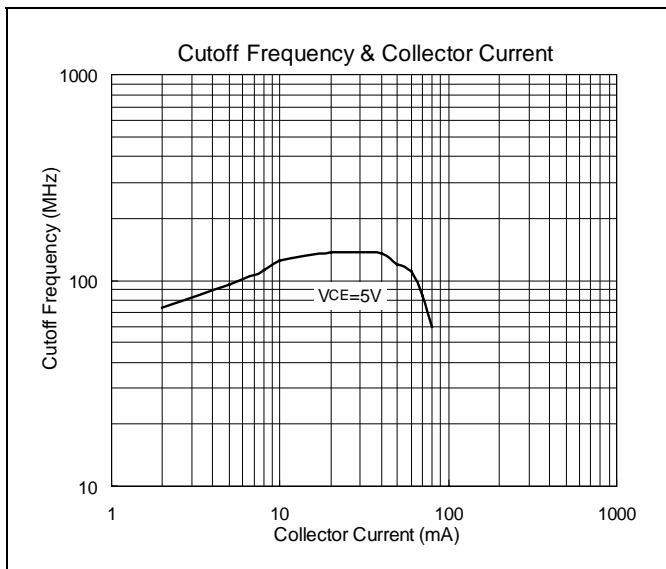
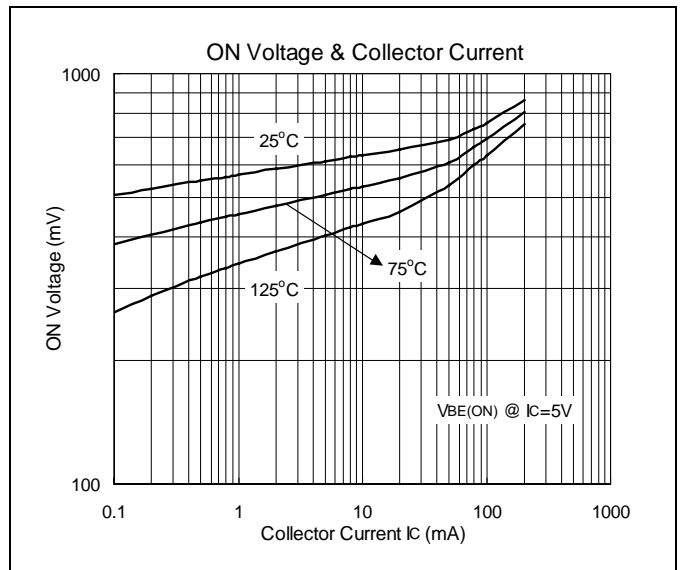
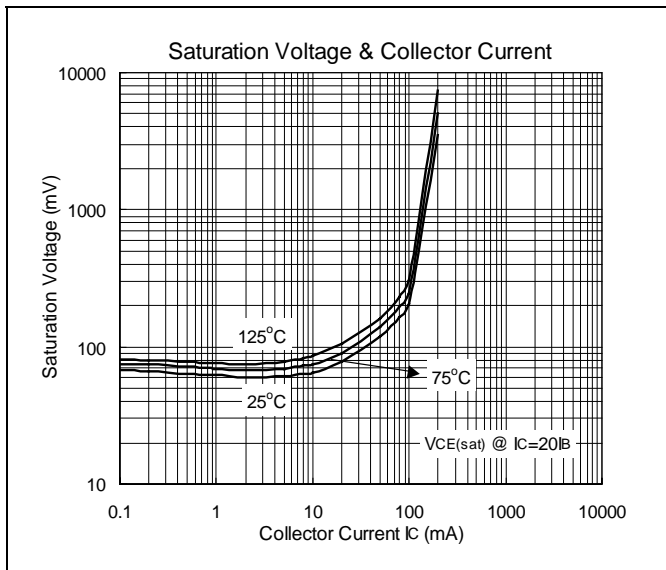
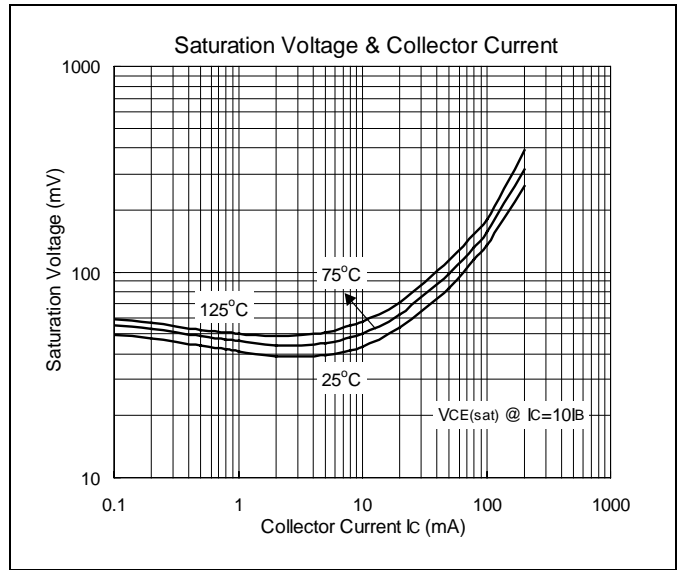
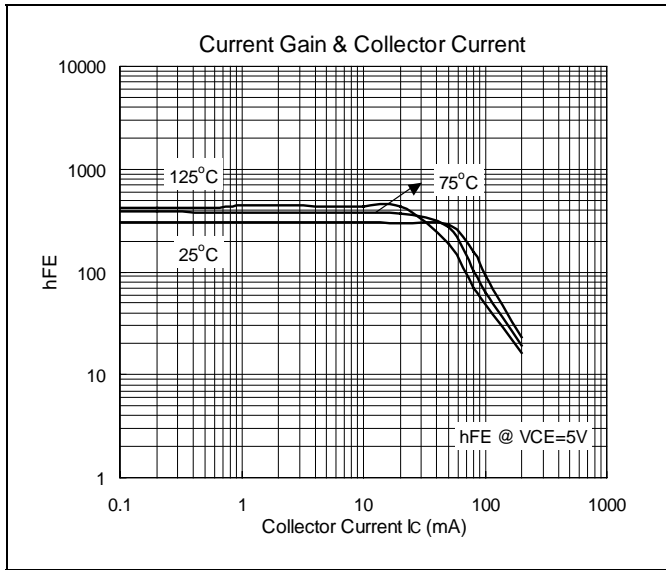
\*Pulse Test: Pulse Width ≤380us, Duty Cycle≤2%

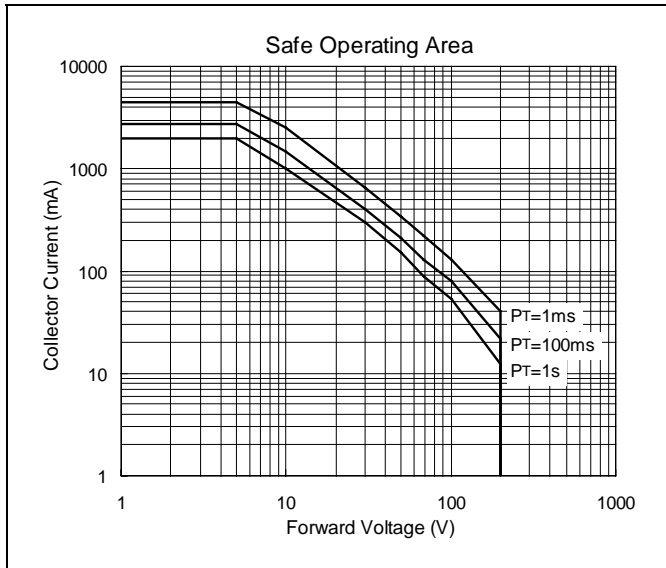
## Classification Of hFE1

Rank	B	C	D
Range	60-120	100-200	160-320



### Characteristics Curve





### TO-126ML Dimension

The drawing shows a top view and a side view of the package. Dimensions are labeled as follows: A (width), B (height), C (lead spacing), D (lead thickness), E (lead height), F (lead length), G (total height), H (lead diameter), I (lead diameter), J (lead diameter), K (lead diameter), L (lead length), M (lead length), and N (lead length).

**Marking:**

**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	7.74	8.24
B	10.87	11.37
C	0.88	1.12
D	1.28	1.52
E	3.50	3.75
F	2.61	3.37
G	13	-
H	1.18	1.42
I	2.88	3.12
J	0.68	0.84
K	-	2.30
L	3.44	3.70
M	1.88	2.14
N	0.50	0.51

\*: Typical, Unit: mm

3-Lead TO-126ML  
 Plastic Package  
 HSMC Package Code: D

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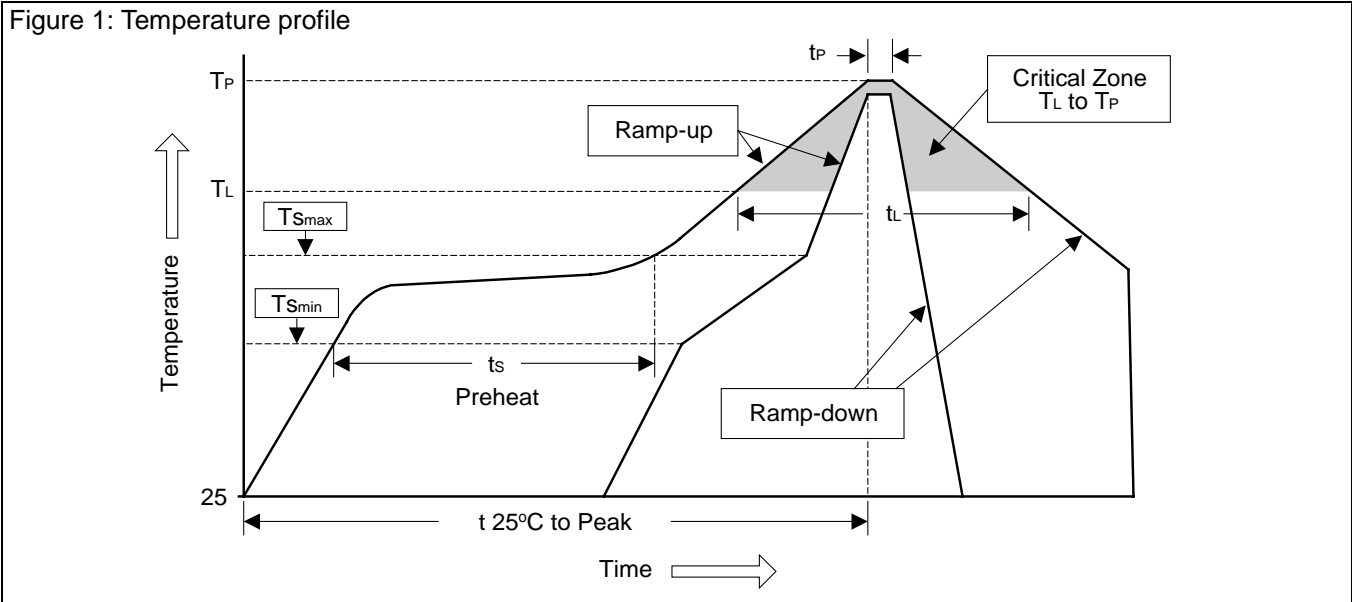
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### Soldering Methods for HSMC's Products

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



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate ( $T_L$ to $T_P$ )	$<3^{\circ}\text{C}/\text{sec}$	$<3^{\circ}\text{C}/\text{sec}$
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	$<3^{\circ}\text{C}/\text{sec}$	$<3^{\circ}\text{C}/\text{sec}$
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	$<6^{\circ}\text{C}/\text{sec}$	$<6^{\circ}\text{C}/\text{sec}$
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	10sec ±1sec
Pb-Free devices.	260°C ±5°C	10sec ±1sec