



HE9015

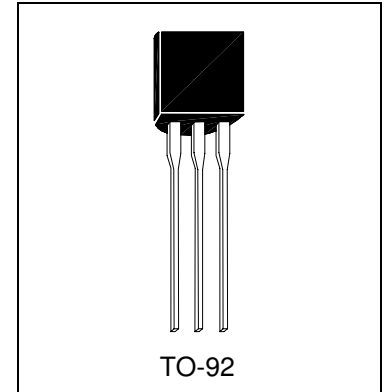
PNP EPITAXIAL PLANAR TRANSISTOR

Description

The HE9015 is designed for use in pre-amplifier of low level and low noise.

Features

- High Total Power Dissipation (P_D : 450mW)
- Complementary to HE9014
- High h_{FE} and Good Linearity



Absolute Maximum Ratings

- Maximum Temperatures
Storage Temperature -55 ~ +150 °C
Junction Temperature +150 °C Maximum
- Maximum Power Dissipation
Total Power Dissipation ($T_A=25^\circ\text{C}$) 450 mW
- Maximum Voltages and Currents ($T_A=25^\circ\text{C}$)
 V_{CBO} Collector to Base Voltage -50 V
 V_{CEO} Collector to Emitter Voltage -45 V
 V_{EBO} Emitter to Base Voltage -5 V
 I_C Collector Current -100 mA

Electrical Characteristics ($T_A=25^\circ\text{C}$)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV_{CBO}	-50	-	-	V	$I_C=-100\mu\text{A}$, $I_E=0$
BV_{CEO}	-45	-	-	V	$I_C=-1\text{mA}$, $I_B=0$
BV_{EBO}	-5	-	-	V	$I_E=-100\mu\text{A}$, $I_C=0$
I_{CBO}	-	-	-50	nA	$V_{CB}=-50\text{V}$, $I_E=0$
I_{EBO}	-	-	-50	nA	$V_{EB}=-5\text{V}$, $I_C=0$
$*V_{CE(sat)}$	-	-0.20	-0.7	V	$I_C=-100\text{mA}$, $I_B=-5\text{mA}$
$*V_{BE(sat)}$	-	-0.82	-1	V	$I_C=-100\text{mA}$, $I_B=-5\text{mA}$
$V_{BE(on)}$	-0.6	-0.65	-0.75	V	$V_{CE}=-5\text{V}$, $I_C=-2\text{mA}$
$*h_{FE}$	100	200	600		$V_{CE}=-5\text{V}$, $I_C=-1\text{mA}$
Cob	-	4.5	7	pF	$V_{CB}=-10\text{V}$, $f=1\text{MHz}$, $I_E=0$
f_T	100	190	-	MHz	$V_{CE}=-5\text{V}$, $I_C=-10\text{mA}$

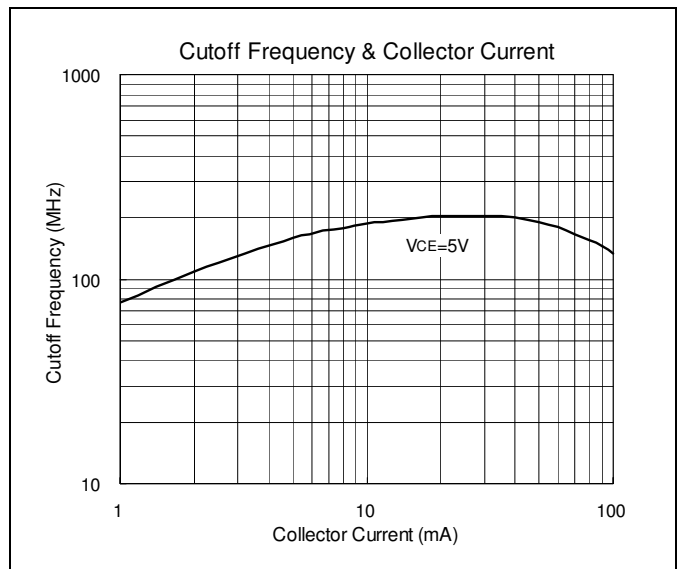
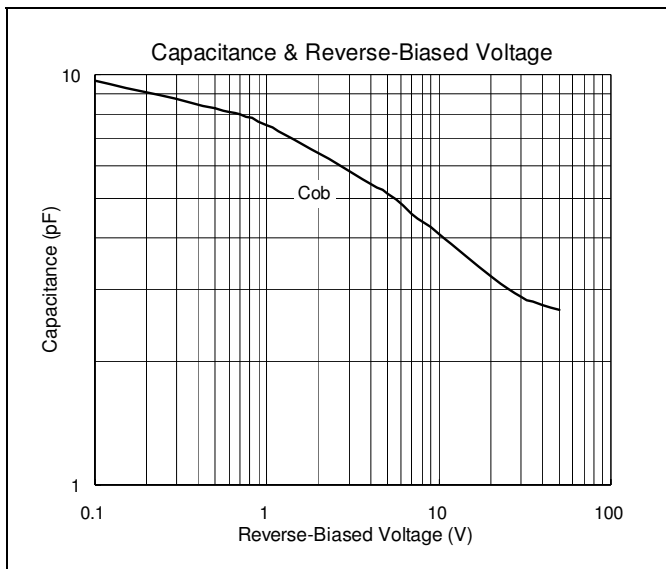
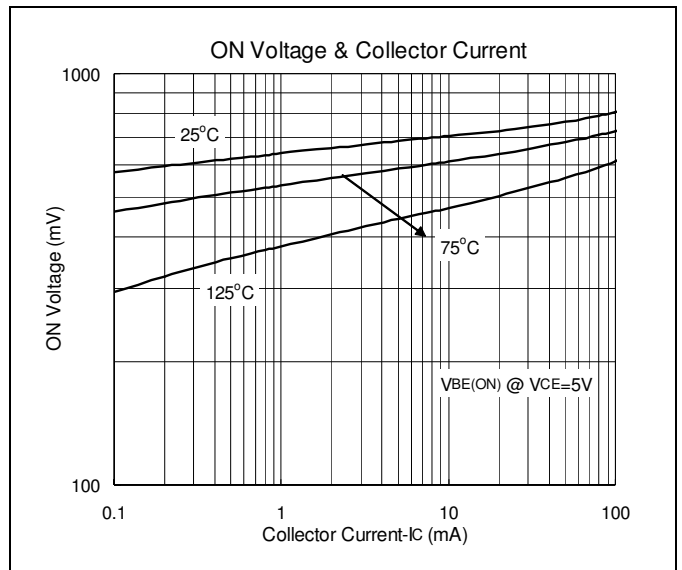
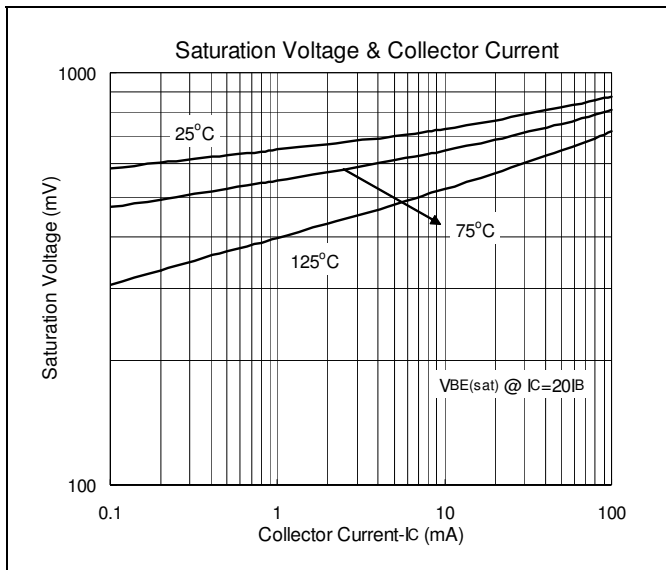
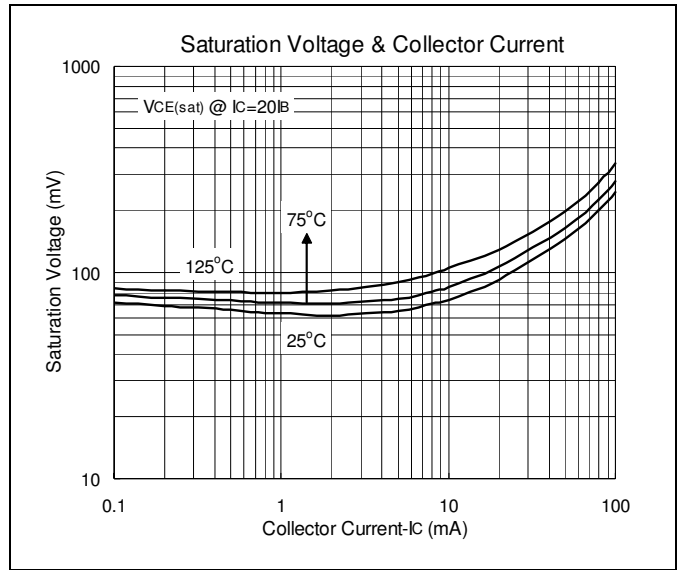
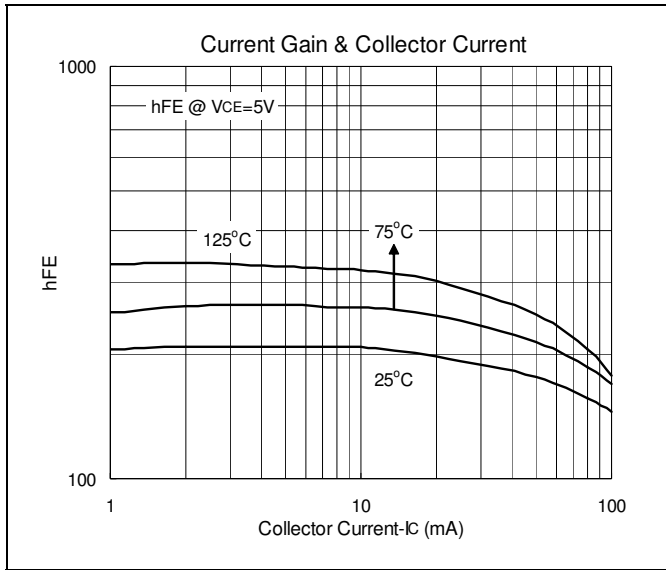
*Pulse Test: Pulse Width $\leq 380\mu\text{s}$, Duty Cycle $\leq 2\%$

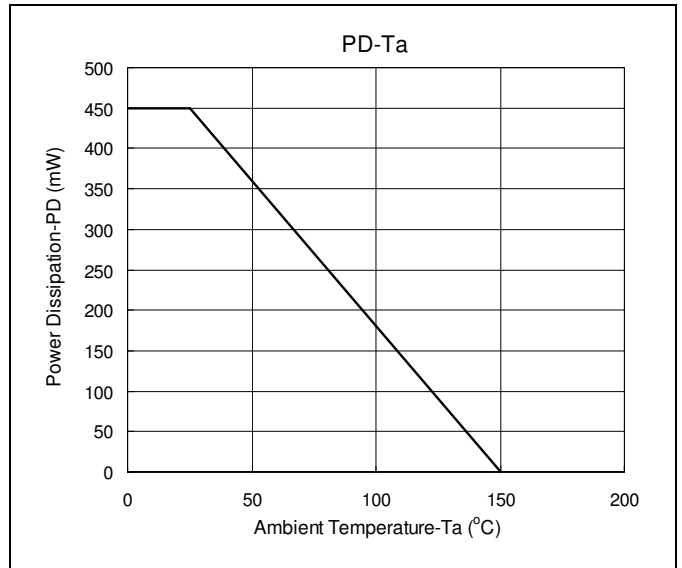
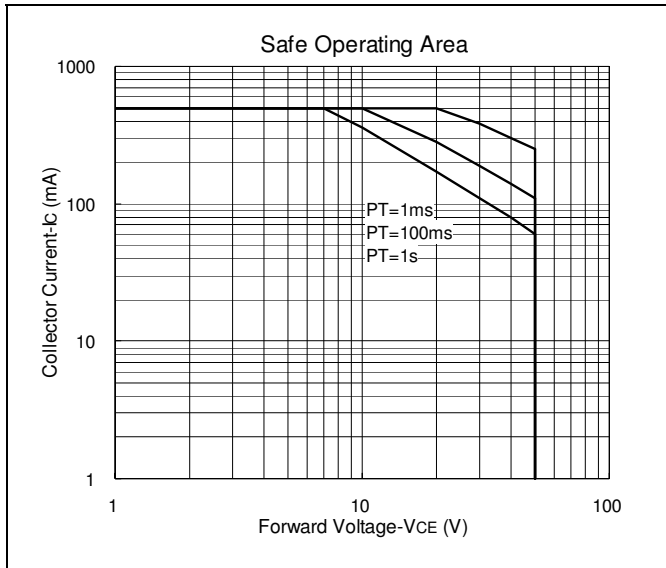
Classification on h_{FE1}

Rank	B	C
Range	100-300	200-600



Characteristics Curve







TO-92 Dimension

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.Base 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	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

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

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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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°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