



# HMJE13001

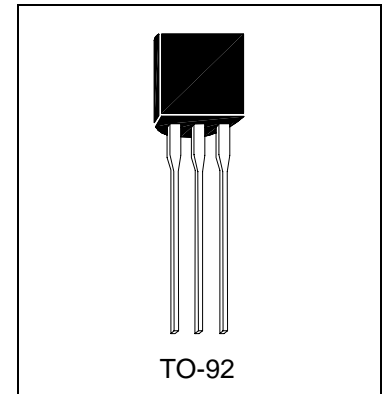
NPN Triple Diffused Planar Type High Voltage Transistor

## Description

The HMJE13001 is a medium power transistor designed for use in switching applications.

## Features

- High breakdown voltage
- Low collector saturation voltage
- Fast switching speed



## Absolute Maximum Ratings

- Maximum Temperatures
  - Storage Temperature ..... -55 ~ +150 °C
  - Junction Temperature ..... +150 °C
- Maximum Power Dissipation
  - Total Power Dissipation ( $T_A=25^{\circ}\text{C}$ ) ..... 1 W
  - Total Power Dissipation ( $T_C=25^{\circ}\text{C}$ ) ..... 10 W
- Maximum Voltages and Currents
  - $BV_{CBO}$  Collector to Base Voltage ..... 600 V
  - $BV_{CEO}$  Collector to Emitter Voltage ..... 400 V
  - $BV_{EBO}$  Emitter to Base Voltage ..... 6 V
  - $I_C$  Collector Current (DC) ..... 300 mA
  - $I_C$  Collector Current (Pulse) ..... 600 mA
  - $I_B$  Base Current (DC) ..... 40 mA
  - $I_B$  Base Current (Pulse) ..... 100 mA

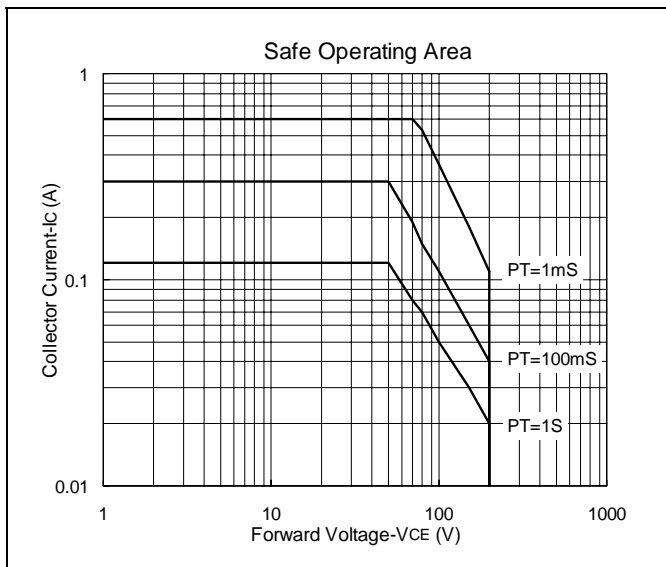
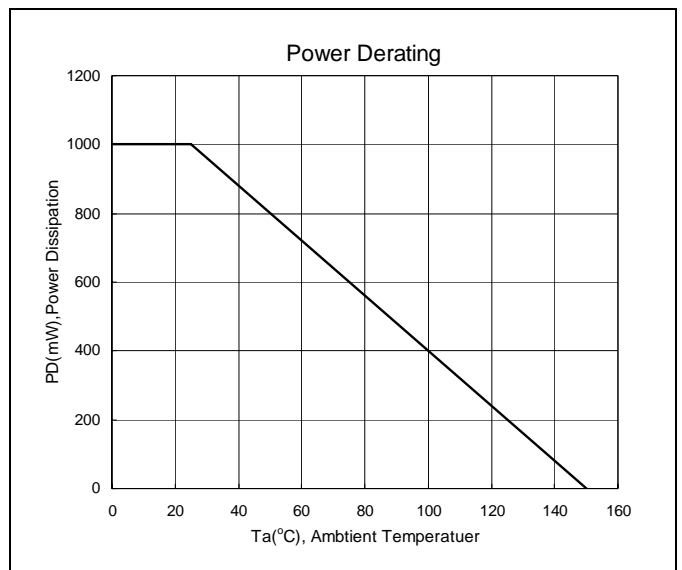
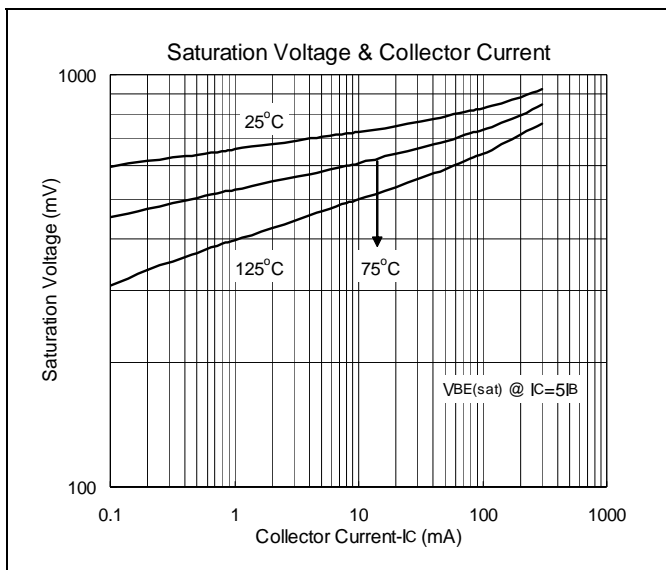
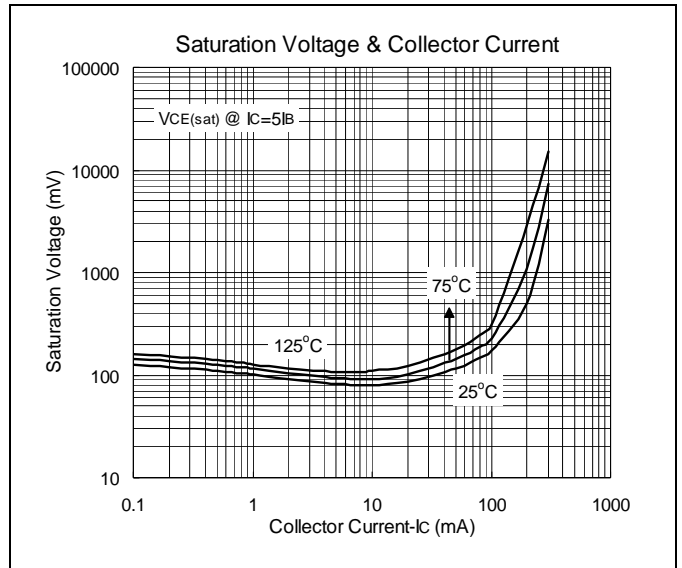
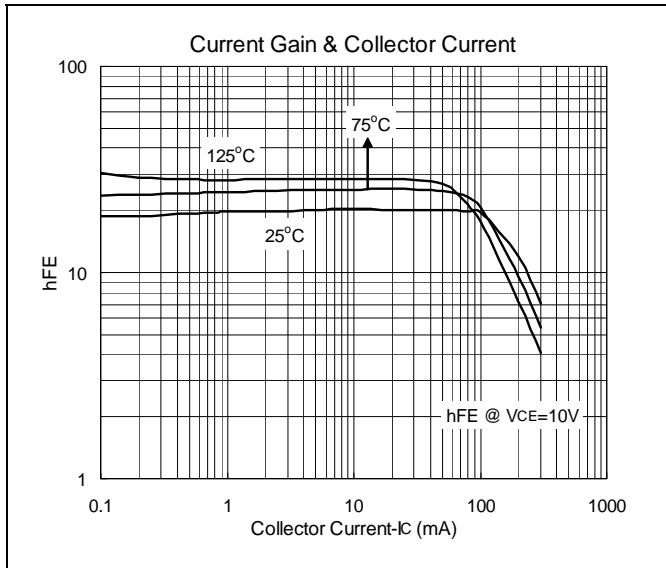
## Electrical Characteristics ( $T_A=25^{\circ}\text{C}$ )

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
$BV_{CBO}$	600	-	-	V	$I_C=100\mu\text{A}$
$BV_{CEO}$	400	-	-	V	$I_C=10\text{mA}$
$BV_{EBO}$	6	-	-	V	$I_E=10\mu\text{A}$
$I_{CBO}$	-	-	10	$\mu\text{A}$	$V_{CB}=550\text{V}$
$I_{CEO}$	-	-	10	$\mu\text{A}$	$V_{CB}=400\text{V}$
$I_{EBO}$	-	-	10	$\mu\text{A}$	$V_{EB}=6\text{V}$
* $V_{CE(sat)1}$	-	-	400	mV	$I_C=50\text{mA}, I_B=10\text{mA}$
* $V_{CE(sat)2}$	-	-	750	mV	$I_C=100\text{mA}, I_B=20\text{mA}$
* $V_{BE(sat)}$	-	-	1	V	$I_C=50\text{mA}, I_B=10\text{mA}$
* $\eta_{FE1}$	8	-	-		$V_{CE}=10\text{V}, I_C=10\text{mA}$
* $\eta_{FE2}$	10	-	36		$V_{CE}=10\text{V}, I_C=50\text{mA}$

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



### Characteristics Curve





### TO-92 Dimension

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

**Marking:**

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

H	M	J	E
1	3	0	1

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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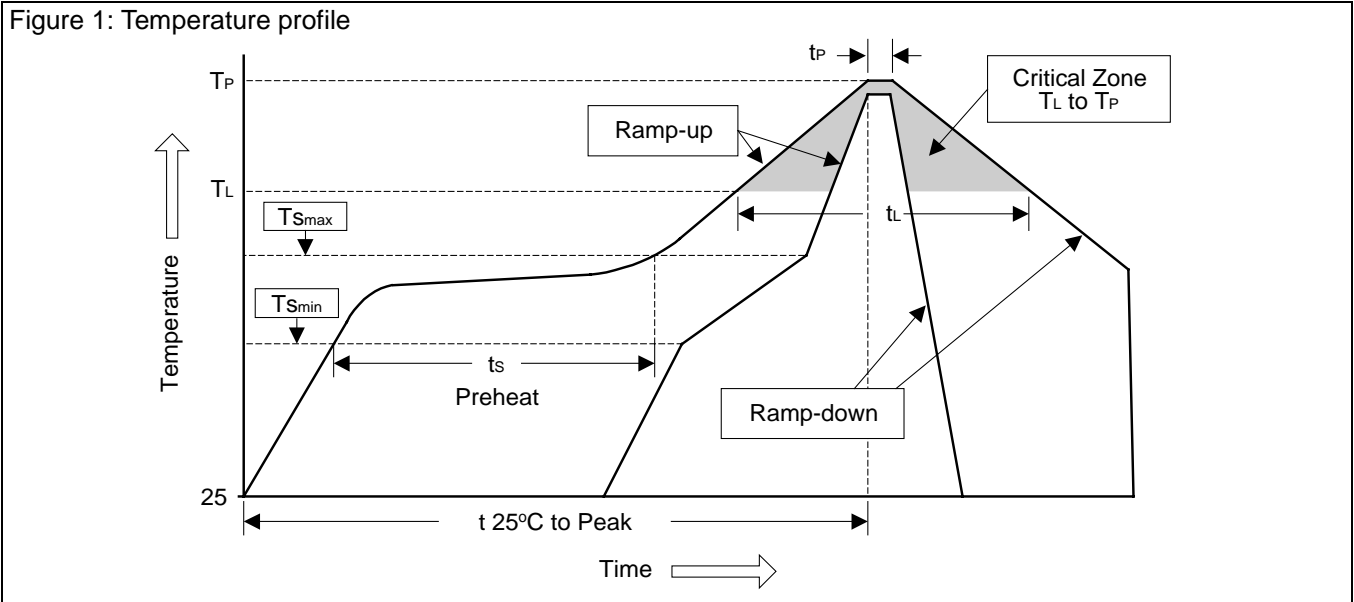
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### Soldering Methods for HSMC's Products

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 ( $T_L$ 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