



# HLB1211

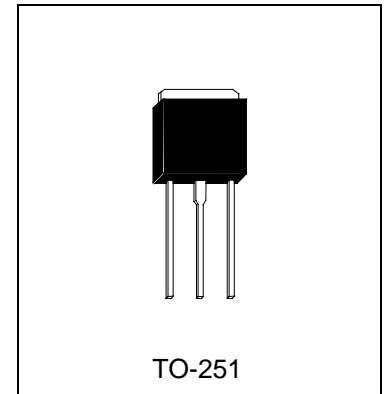
NPN Triple Diffused Planar Type High Voltage Transistor

## Description

The HLB1211 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 ( $T_A=25^\circ\text{C}$ )

- Maximum Temperatures
  - Storage Temperature ..... -55 ~ +150 °C
  - Junction Temperature ..... +150 °C
- Maximum Power Dissipation
  - 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

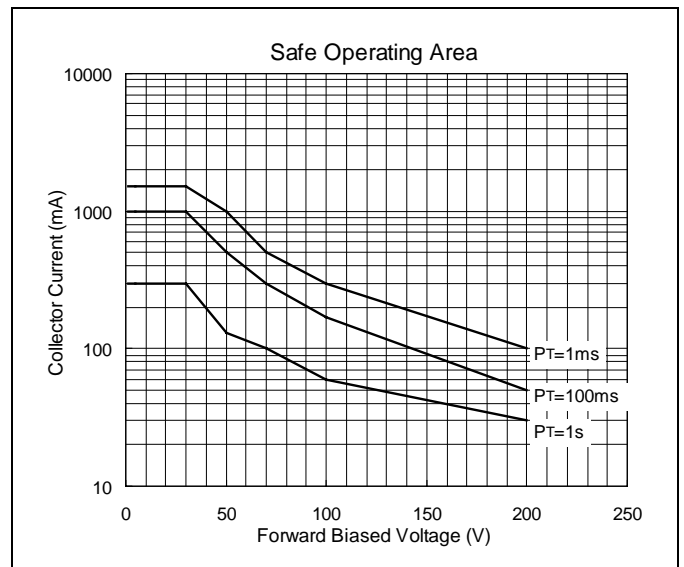
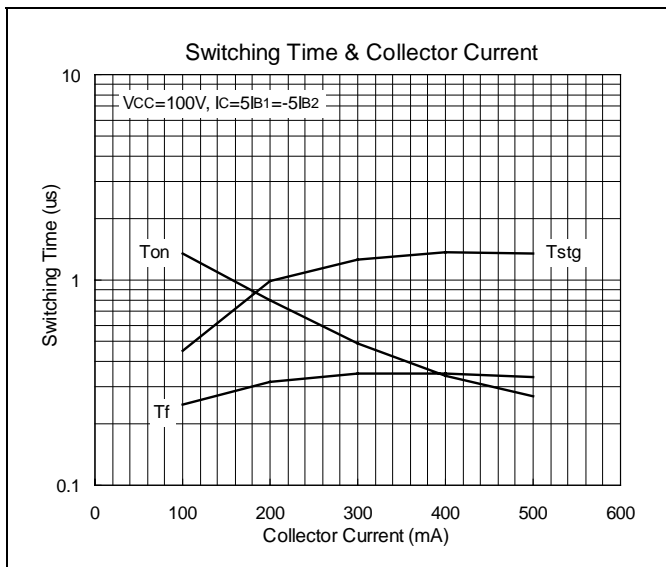
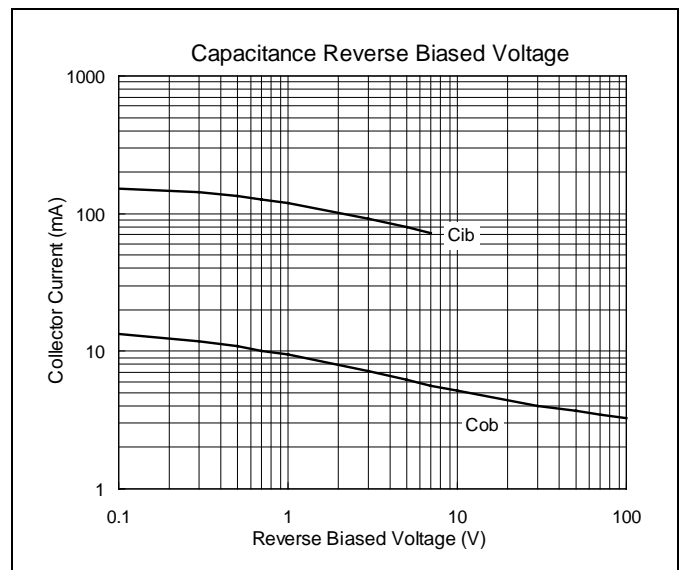
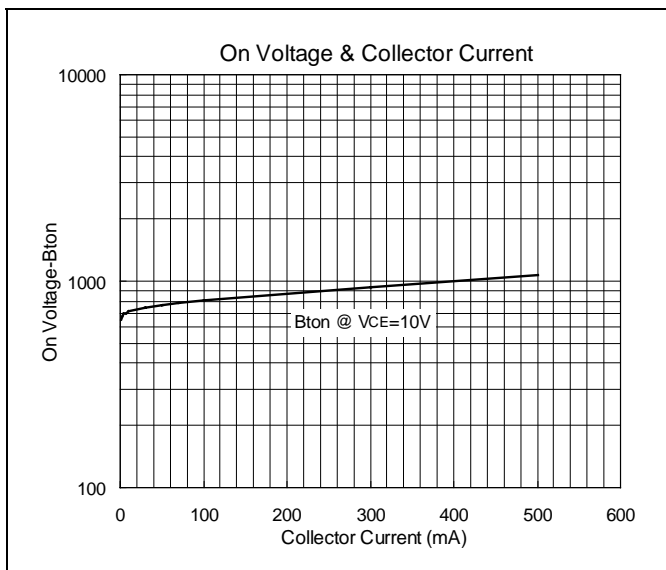
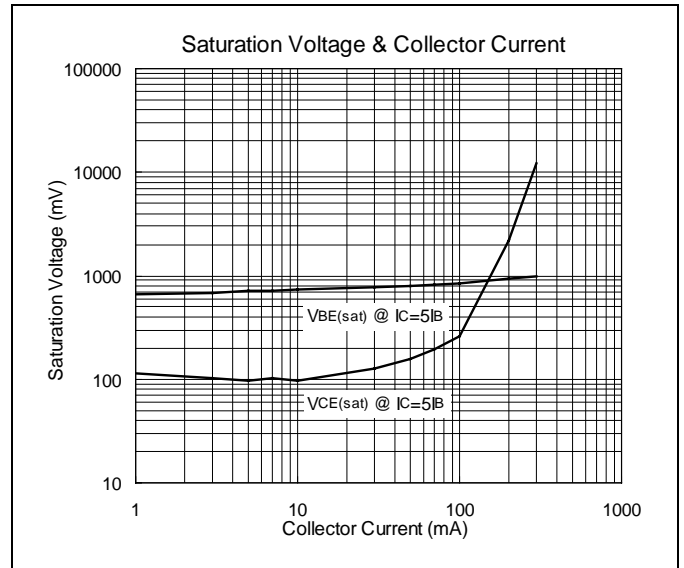
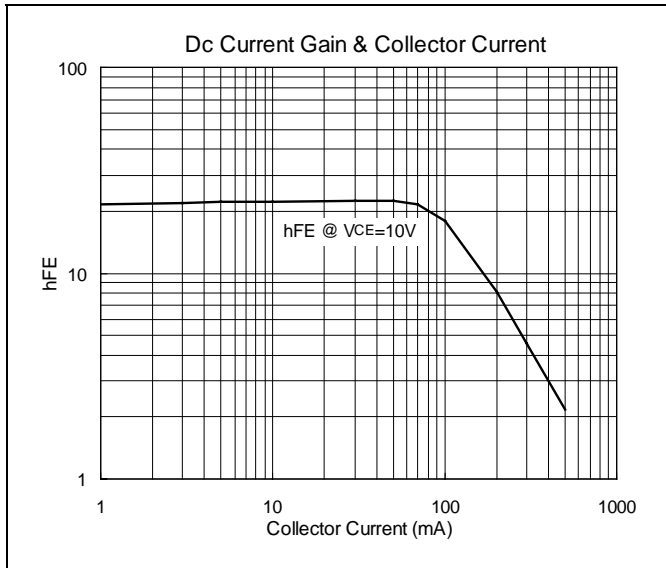
## Electrical Characteristics ( $T_A=25^\circ\text{C}$ )

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-251 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.Base 2/Tab.Collector 3.Emitter

**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	6.40	6.80
C	5.20	5.50
F	1.40	1.60
G	5.40	6.25
H	1.50	1.80
H1	7.20	9.80
K	0.60	1.10
K1	0.50	0.90
L	0.90	1.50
M	2.20	2.40
a1	0.45	0.65
a2	-	*2.30

\*: Typical, Unit: mm

3-Lead TO-251  
 Plastic Package  
 HSMC Package Code: I

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 Pb-Free: "●" (Note)  
 Normal: None

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- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

DIM	Min.	Max.
A	6.40	6.80
B	-	6.00
C	5.04	5.64
D	-	*4.34
E	0.40	0.80
F	0.50	0.90
G	5.90	6.30
H	-	*1.80
H1	-	*9.30
I	-	*16.10
J	-	*0.80
K	-	0.96
K1	-	*0.76
M	2.20	2.40
a1	0.40	0.60
a2	2.10	2.50
y1	-	5°
y2	-	3°

\*: Typical, Unit: mm

3-Lead TO-251  
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#### Head Office And Factory:

- **Head Office** (Hi-Sincerity Microelectronics Corp.): 10F.,No. 61, Sec. 2, Chung-Shan N. Rd. Taipei Taiwan R.O.C.  
 Tel: 886-2-25212056 Fax: 886-2-25632712, 25368454
- **Factory 1:** No. 38, Kuang Fu S. Rd., Fu-Kou Hsin-Chu Industrial Park Hsin-Chu Taiwan. R.O.C  
 Tel: 886-3-5983621~5 Fax: 886-3-5982931



### 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