



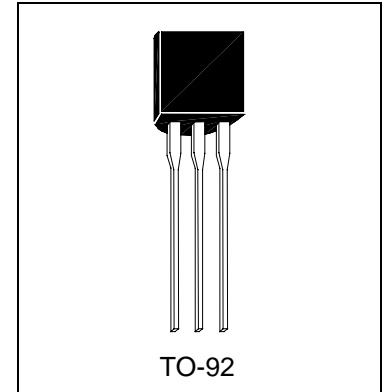
# HTIP112A

## SILICON NPN POWER DARLINGTON TRANSISTOR

- Monolithic Darlington Configuration
- Integrated Antiparallel Collector-Emitter Diode

### Description

The device is a silicon Epitaxial-Base NPN transistor in monolithic Darlington configuration mounted in TO-92 plastic package. It is intended for use in linear and switching applications.



### Applications

Linear and Switching Industrial Equipment

### Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
$V_{CBO}$	Collector-Base Voltage ( $I_E=0$ )	100	V
$V_{CEO}$	Collector-Emitter Voltage ( $I_B=0$ )	100	V
$V_{EBO}$	Emitter-Base Voltage ( $I_C=0$ )	5	V
$I_C$	Collector Current	2	A
$I_{CM}$	Collector Peak Current	4	A
$I_B$	Base Current	50	mA
$P_{tot}$	Total Dissipation at $T_{amb}=25^\circ\text{C}$	1.2	W
$T_{stg}$	Storage Temperature	-65 to 150	$^\circ\text{C}$
$T_j$	Max. Operating Junction Temperature	150	$^\circ\text{C}$

### Thermal Data

$R_{thj-amb}$	Thermal Resistance Junction-ambient (Max.)	104	$^\circ\text{C/W}$
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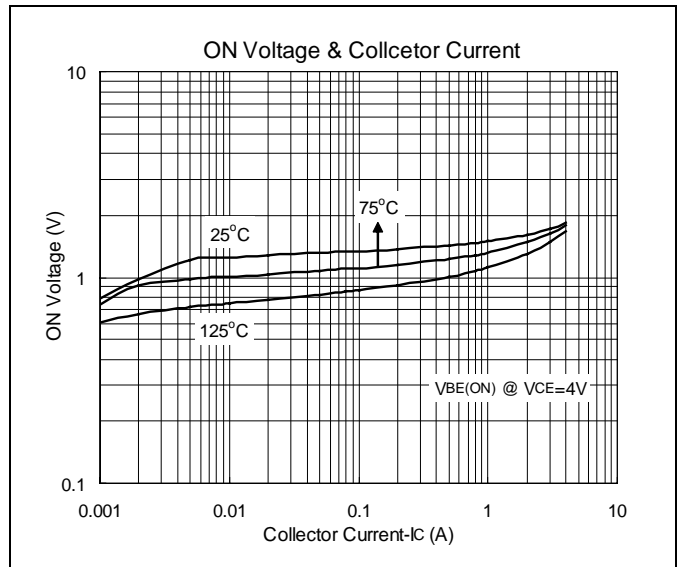
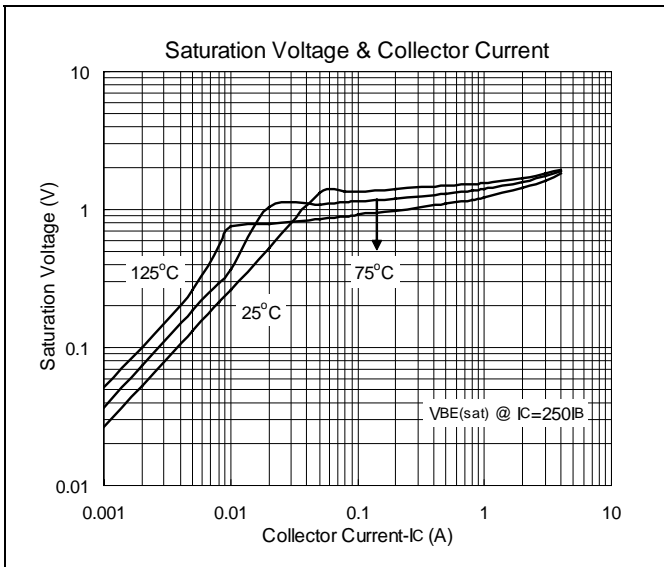
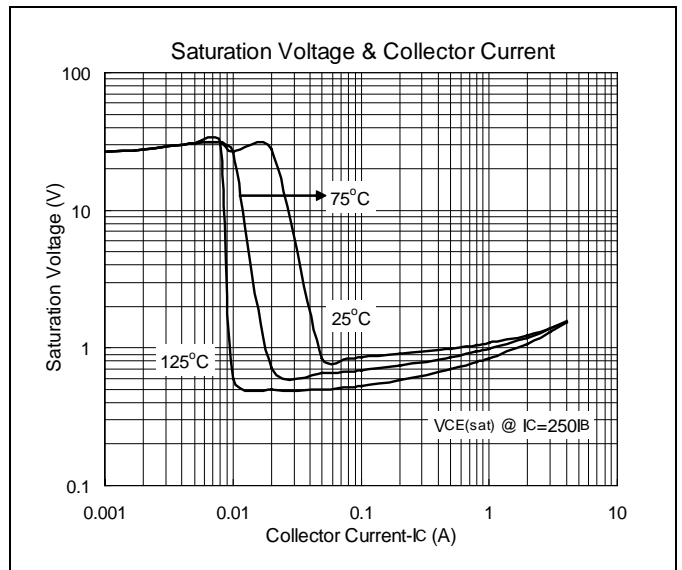
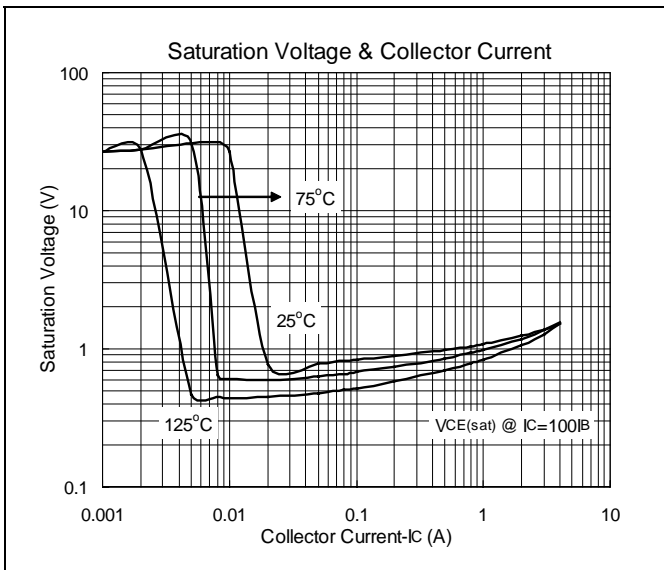
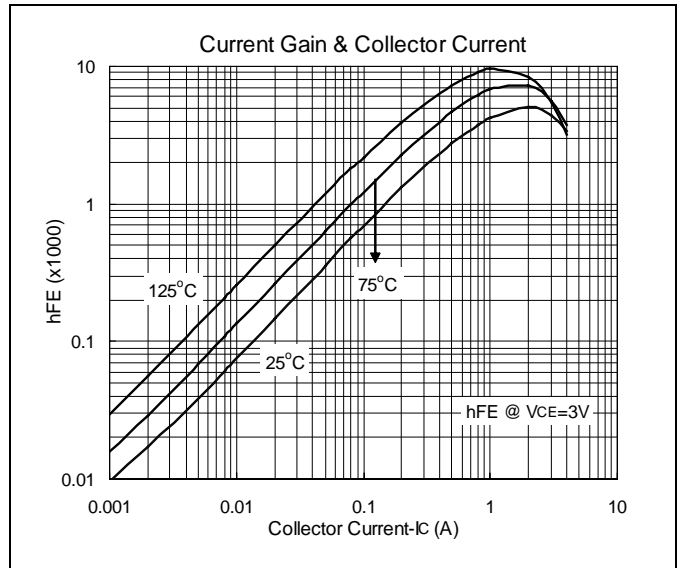
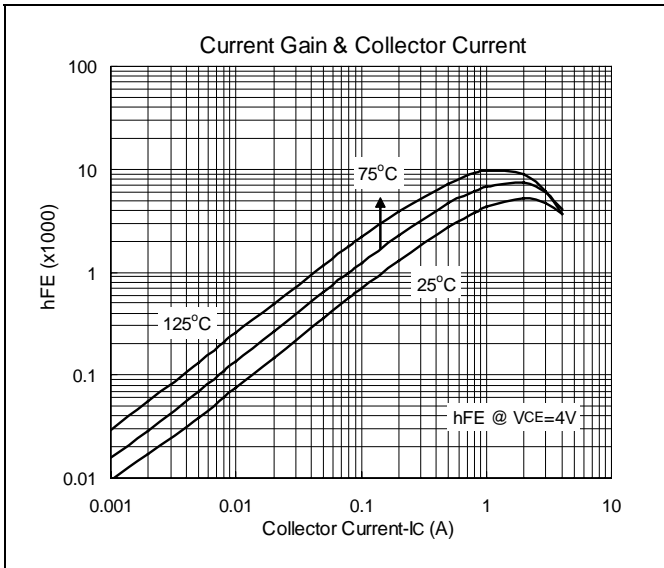
### Electrical Characteristics ( $T_{case}=25^\circ\text{C}$ , unless otherwise specified)

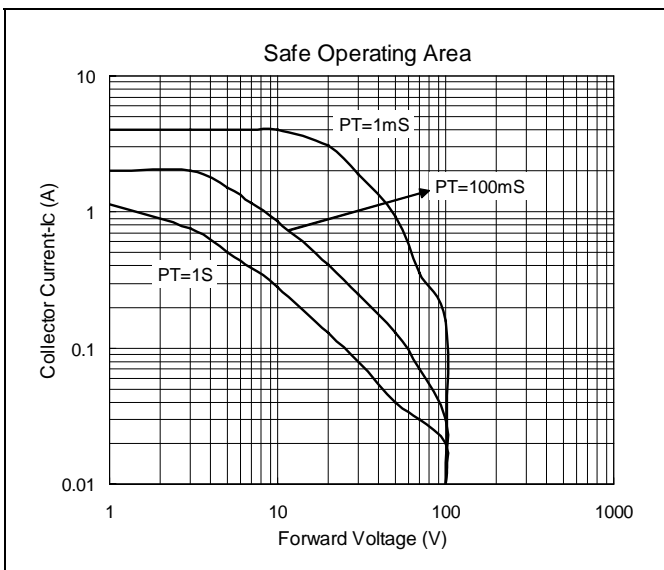
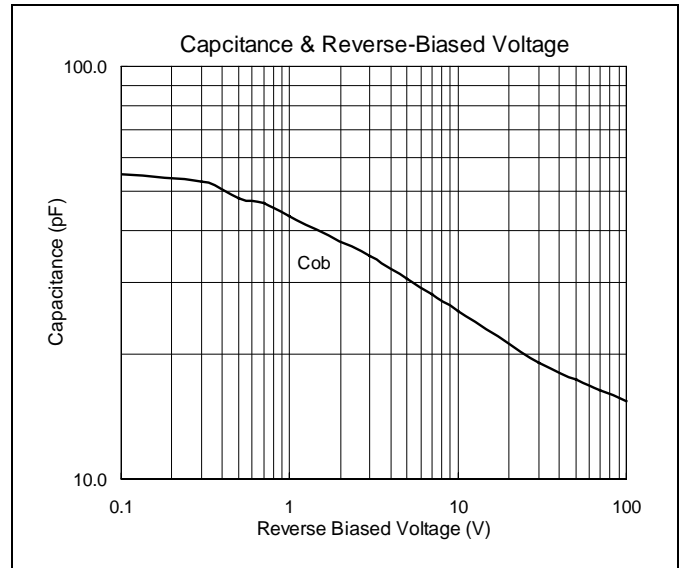
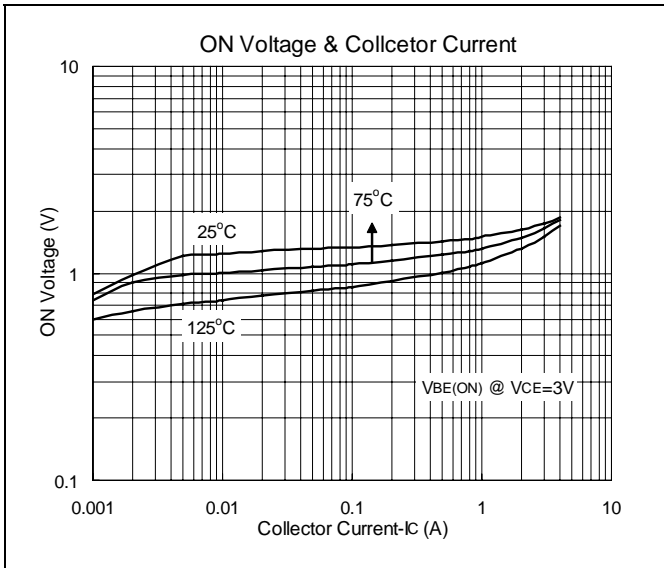
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CEO}$	Collector Cut-off Current ( $I_B=0$ )	$V_{CE}=50\text{V}$	-	-	2	mA
$I_{CBO}$	Collector Cut-off Current ( $I_E=0$ )	$V_{CB}=100\text{V}$	-	-	1	mA
$I_{EBO}$	Emitter Cut-off Current ( $I_C=0$ )	$V_{EB}=5\text{V}$	-	-	2	mA
$V_{CE(sus)}$	Collector-Emitter Sustaining Voltage ( $I_B=0$ )	$I_C=30\text{mA}$	100	-	-	V
* $V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=2\text{A}$ , $I_B=8\text{mA}$	-	-	2.5	V
* $V_{BE}$	Base-Emitter Voltage	$I_C=2\text{A}$ , $V_{CE}=4\text{V}$	-	-	2.8	V
* $h_{FE}$	DC Current Gain	$I_C=1\text{A}$ , $V_{CE}=4\text{V}$ $I_C=2\text{A}$ , $V_{CE}=4\text{V}$	1000 500	- -	- -	

\*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

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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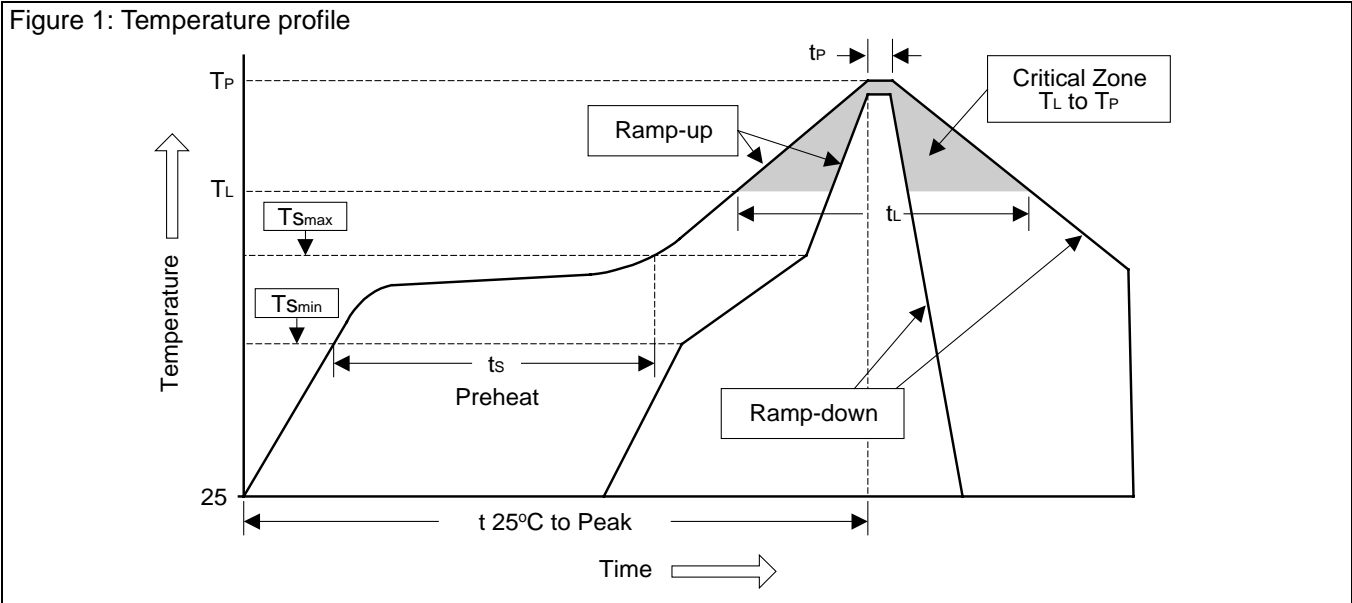
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### Soldering Methods for HSMC's Products

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



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate ( $T_L$ to $T_P$ )	<math><3^{\circ}\text{C}/\text{sec}</math>	<math><3^{\circ}\text{C}/\text{sec}</math>
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	<math><3^{\circ}\text{C}/\text{sec}</math>	<math><3^{\circ}\text{C}/\text{sec}</math>
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	<math><6^{\circ}\text{C}/\text{sec}</math>	<math><6^{\circ}\text{C}/\text{sec}</math>
Time 25°C to Peak Temperature	<math><6</math> minutes	<math><8</math> 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