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Kind regards,

Team Nexperia



# PBHV9115TLH

150 V, 1 A PNP high-voltage low V<sub>CEsat</sub> BISS transistor

16 January 2017

Product data sheet

## 1. General description

PNP high-voltage low V<sub>CEsat</sub> Breakthrough In Small Signal (BISS) transistor in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

NPN complement: PBHV8115TLH

## 2. Features and benefits

- High voltage
- Low collector-emitter saturation voltage V<sub>CEsat</sub>
- High collector current capability I<sub>C</sub> and I<sub>CM</sub>
- Small SMD plastic package
- AEC-Q101 qualified

## 3. Applications

- Power management
- LCD backlighting
- LED driver for LED chain module
- Switch Mode Power Supply (SMPS)

## 4. Quick reference data

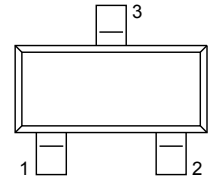
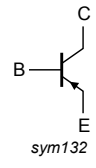
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>CEO</sub>	collector-emitter voltage	open base	-	-	-150	V
I <sub>C</sub>	collector current		-	-	-1	A
I <sub>CM</sub>	peak collector current	single pulse; t <sub>p</sub> ≤ 1 ms	-	-	-2	A
h <sub>FE</sub>	DC current gain	V <sub>CE</sub> = -10 V; I <sub>C</sub> = -50 mA; T <sub>amb</sub> = 25 °C	70	-	300	



## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	B	base	 <p>TO-236AB (SOT23)</p>	 <p>sym132</p>
2	E	emitter		
3	C	collector		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBHV9115TLH	TO-236AB	plastic surface-mounted package; 3 leads	SOT23

## 7. Marking

Table 4. Marking codes

Type number	Marking code <sup>[1]</sup>
PBHV9115TLH	FC%

[1] % = placeholder for manufacturing site code

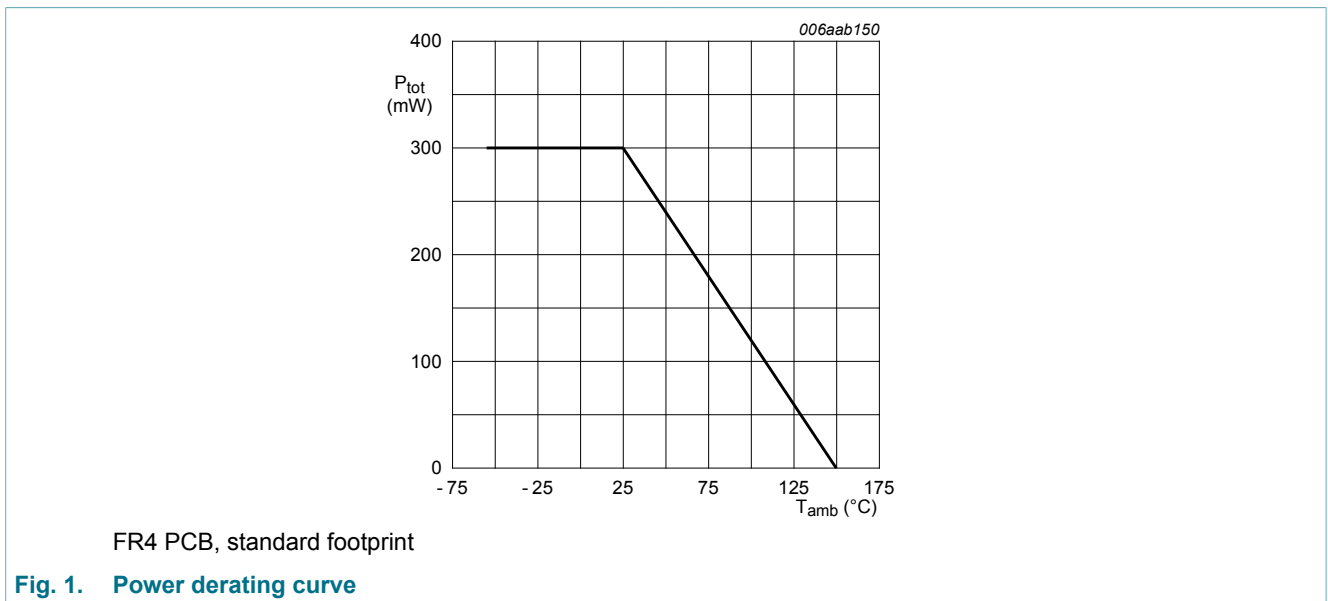
## 8. Limiting values

**Table 5. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CBO}$	collector-base voltage	open emitter	-	-200	V
$V_{CEO}$	collector-emitter voltage	open base	-	-150	V
$V_{CESM}$	collector-emitter peak voltage	$V_{BE} = 0\text{ V}$	-	-200	V
$V_{EBO}$	emitter-base voltage	open collector	-	-6	V
$I_C$	collector current		-	-1	A
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1\text{ ms}$	-	-2	A
$I_{BM}$	peak base current		-	-400	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[1]	300	mW
$T_j$	junction temperature		-	150	°C
$T_{amb}$	ambient temperature		-55	150	°C
$T_{stg}$	storage temperature		-65	150	°C

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.



## 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	-	417	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	-	70	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

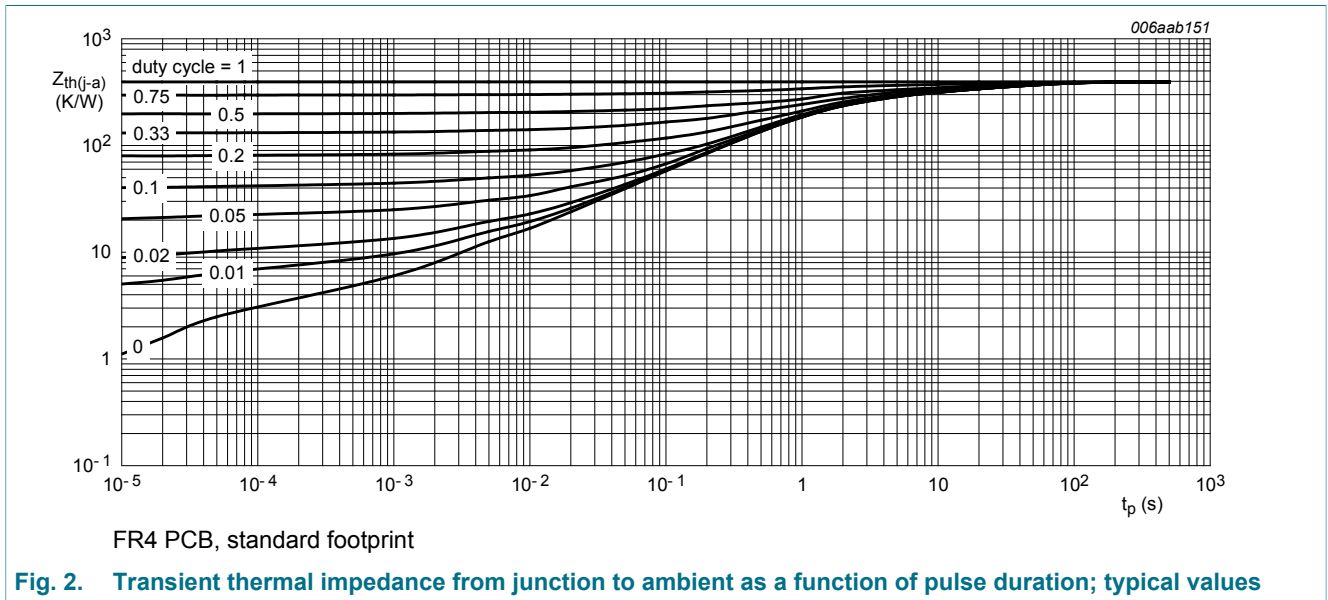
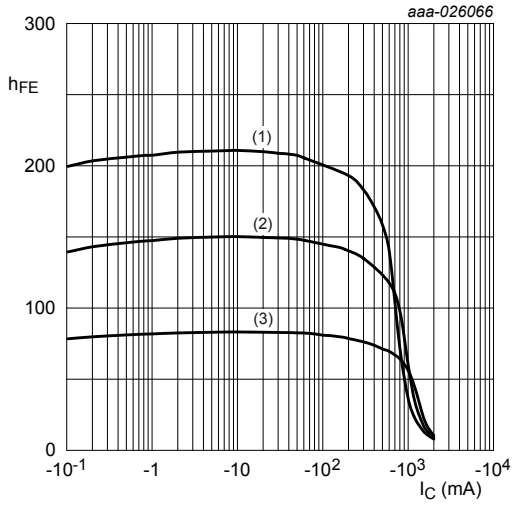


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

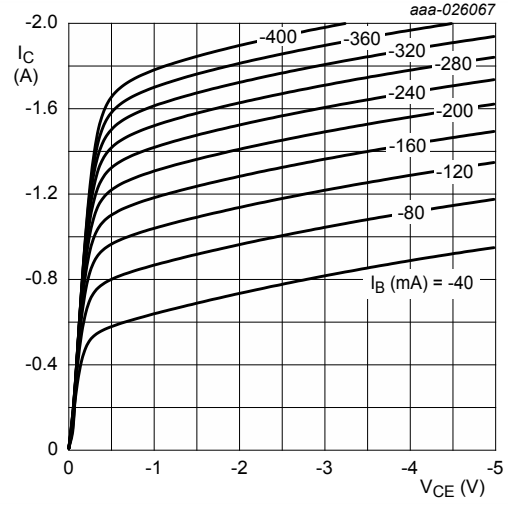
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I <sub>CBO</sub>	collector-base cut-off current	V <sub>CB</sub> = -120 V; I <sub>E</sub> = 0 A; T <sub>amb</sub> = 25 °C	-	-	-100	nA
		V <sub>CB</sub> = -120 V; I <sub>E</sub> = 0 A; T <sub>j</sub> = 150 °C	-	-	-10	μA
I <sub>CES</sub>	collector-emitter cut-off current	V <sub>CE</sub> = -120 V; V <sub>BE</sub> = 0 V; T <sub>amb</sub> = 25 °C	-	-	-100	nA
I <sub>EBO</sub>	emitter-base cut-off current	V <sub>EB</sub> = -5 V; I <sub>C</sub> = 0 A; T <sub>amb</sub> = 25 °C	-	-	-100	nA
h <sub>FE</sub>	DC current gain	V <sub>CE</sub> = -10 V; I <sub>C</sub> = -50 mA; T <sub>amb</sub> = 25 °C	70	-	300	
		V <sub>CE</sub> = -10 V; I <sub>C</sub> = -100 mA; T <sub>amb</sub> = 25 °C	60	-	300	
		V <sub>CE</sub> = -10 V; I <sub>C</sub> = -500 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02 ; T <sub>amb</sub> = 25 °C	50	-	300	
		V <sub>CE</sub> = -10 V; I <sub>C</sub> = -1 A; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02 ; T <sub>amb</sub> = 25 °C	10	-	-	
V <sub>CEsat</sub>	collector-emitter saturation voltage	I <sub>C</sub> = -100 mA; I <sub>B</sub> = -10 mA; T <sub>amb</sub> = 25 °C	-	-	-120	mV
		I <sub>C</sub> = -100 mA; I <sub>B</sub> = -20 mA; T <sub>amb</sub> = 25 °C	-	-	-100	mV
		I <sub>C</sub> = -500 mA; I <sub>B</sub> = -100 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02 ; T <sub>amb</sub> = 25 °C	-	-	-300	mV
V <sub>BEsat</sub>	base-emitter saturation voltage	I <sub>C</sub> = -1 A; I <sub>B</sub> = -200 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02 ; T <sub>amb</sub> = 25 °C	-	-	-1.2	V
t <sub>d</sub>	delay time	V <sub>CC</sub> = -6 V; I <sub>C</sub> = -0.5 A; I <sub>Bon</sub> = -0.1 mA; I <sub>Boff</sub> = 0.1 mA; T <sub>amb</sub> = 25 °C	-	10	-	ns
t <sub>r</sub>	rise time		-	285	-	ns
t <sub>on</sub>	turn-on time		-	295	-	ns
t <sub>s</sub>	storage time		-	430	-	ns
t <sub>f</sub>	fall time		-	300	-	ns
t <sub>off</sub>	turn-off time		-	730	-	ns
f <sub>T</sub>	transition frequency		V <sub>CE</sub> = -10 V; I <sub>C</sub> = -10 mA; f = 100 MHz; T <sub>amb</sub> = 25 °C	-	55	-
C <sub>c</sub>	collector capacitance	V <sub>CB</sub> = -20 V; I <sub>E</sub> = 0 A; i <sub>e</sub> = 0 A; f = 1 MHz; T <sub>amb</sub> = 25 °C	-	10	-	pF
C <sub>e</sub>	emitter capacitance	V <sub>EB</sub> = -0.5 V; I <sub>C</sub> = 0 A; i <sub>c</sub> = 0 A; f = 1 MHz; T <sub>amb</sub> = 25 °C	-	150	-	pF



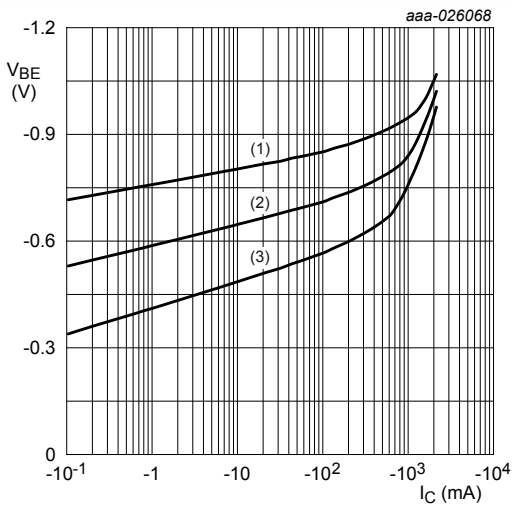
$V_{CE} = -10$  V  
 (1)  $T_{amb} = 100$  °C  
 (2)  $T_{amb} = 25$  °C  
 (3)  $T_{amb} = -55$  °C

**Fig. 3. DC current gain as a function of collector current; typical values**



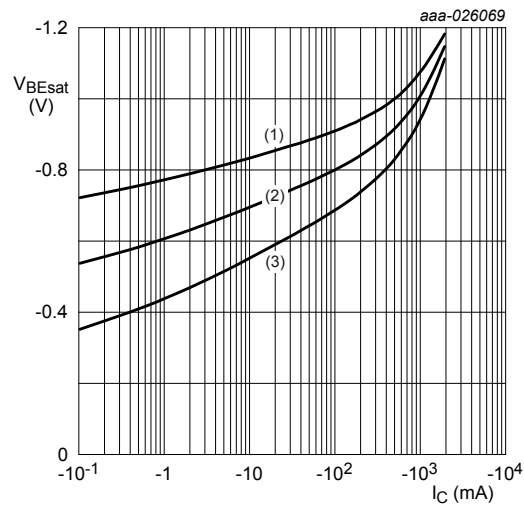
$T_{amb} = 25$  °C

**Fig. 4. Collector current as a function of collector-emitter voltage; typical values**



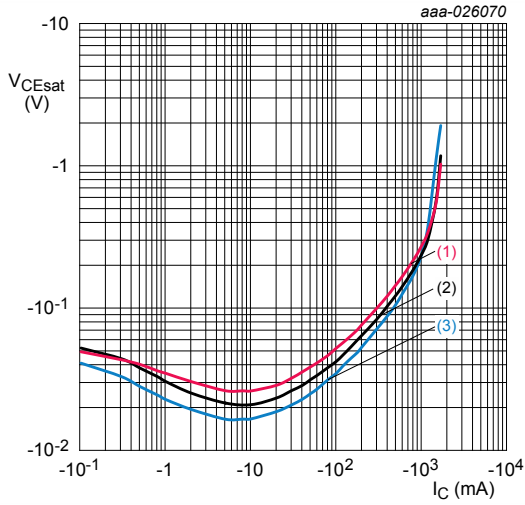
$V_{CE} = -10$  V  
 (1)  $T_{amb} = -55$  °C  
 (2)  $T_{amb} = 25$  °C  
 (3)  $T_{amb} = 100$  °C

**Fig. 5. Base-emitter voltage as a function of collector current; typical values**



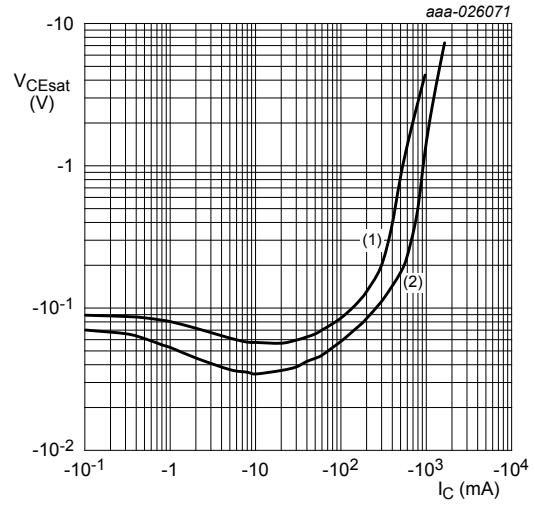
$I_C/I_B = 5$   
 (1)  $T_{amb} = -55$  °C  
 (2)  $T_{amb} = 25$  °C  
 (3)  $T_{amb} = 100$  °C

**Fig. 6. Base-emitter saturation voltage as a function of collector current; typical values**



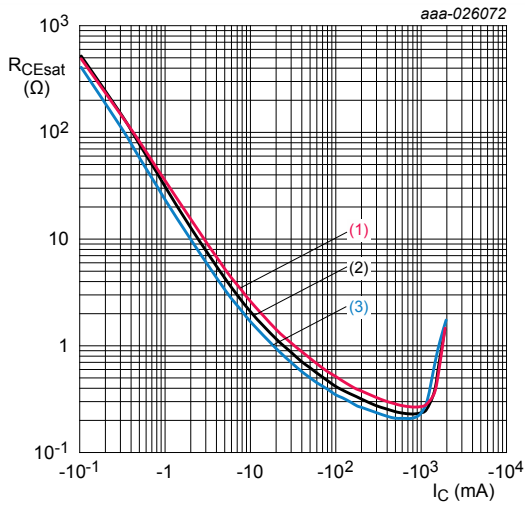
$I_C/I_B = 5$   
 (1)  $T_{amb} = 100\text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25\text{ }^\circ\text{C}$   
 (3)  $T_{amb} = -55\text{ }^\circ\text{C}$

**Fig. 7. Collector-emitter saturation voltage as a function of collector current; typical values**



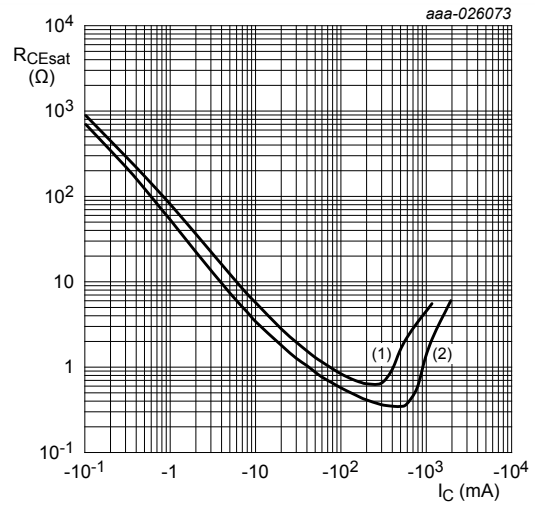
$T_{amb} = 25\text{ }^\circ\text{C}$   
 (1)  $I_C/I_B = 20$   
 (2)  $I_C/I_B = 10$

**Fig. 8. Collector-emitter saturation voltage as a function of collector current; typical values**



$I_C/I_B = 5$   
 (1)  $T_{amb} = 100\text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25\text{ }^\circ\text{C}$   
 (3)  $T_{amb} = -55\text{ }^\circ\text{C}$

**Fig. 9. Collector-emitter saturation resistance as a function of collector current; typical values**



$T_{amb} = 25\text{ }^\circ\text{C}$   
 (1)  $I_C/I_B = 20$   
 (2)  $I_C/I_B = 10$

**Fig. 10. Collector-emitter saturation resistance as a function of collector current; typical values**

### 11. Test information

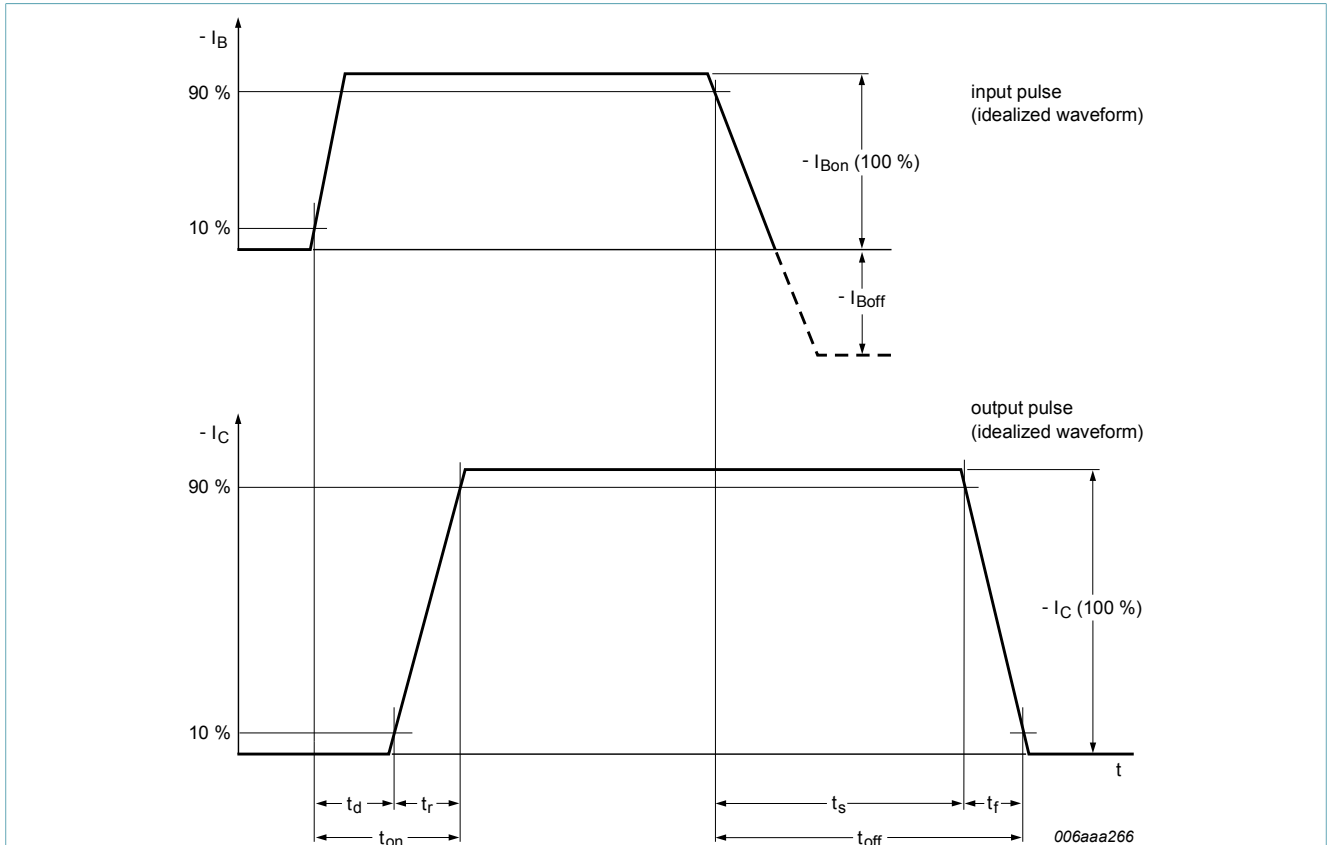


Fig. 11. BISS transistor switching time definition

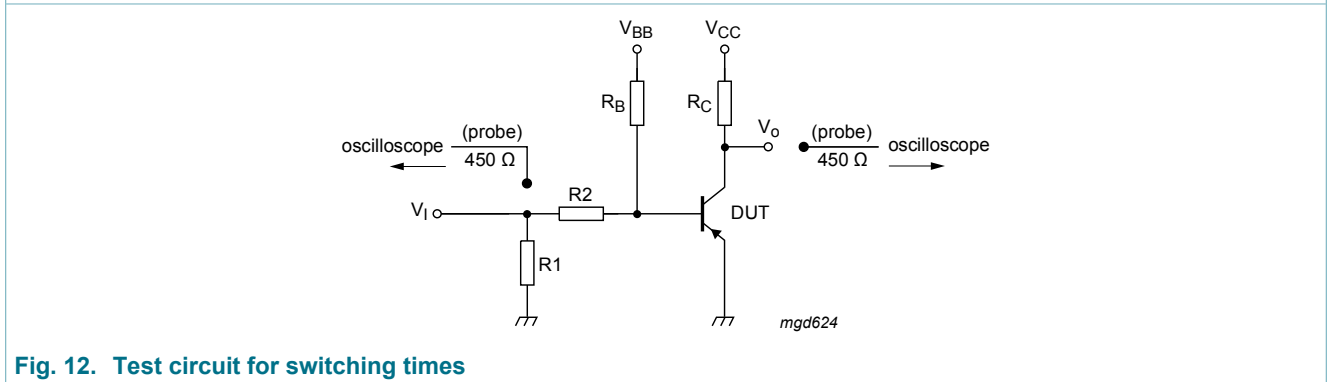


Fig. 12. Test circuit for switching times

### Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - Stress test qualification for discrete semiconductors, and is suitable for use in automotive applications.

## 12. Package outline

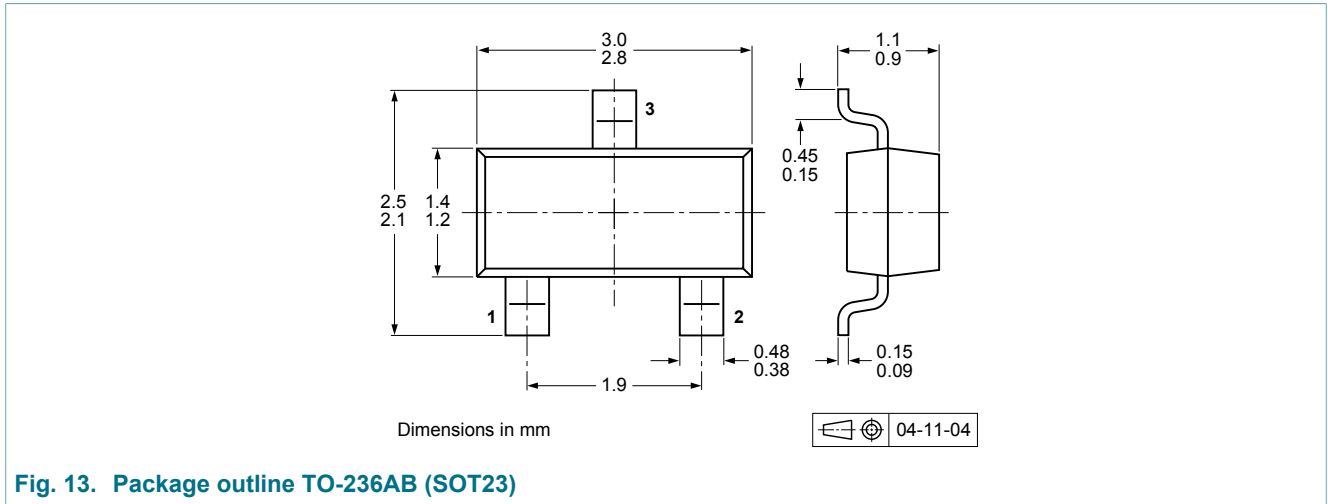


Fig. 13. Package outline TO-236AB (SOT23)

## 13. Soldering

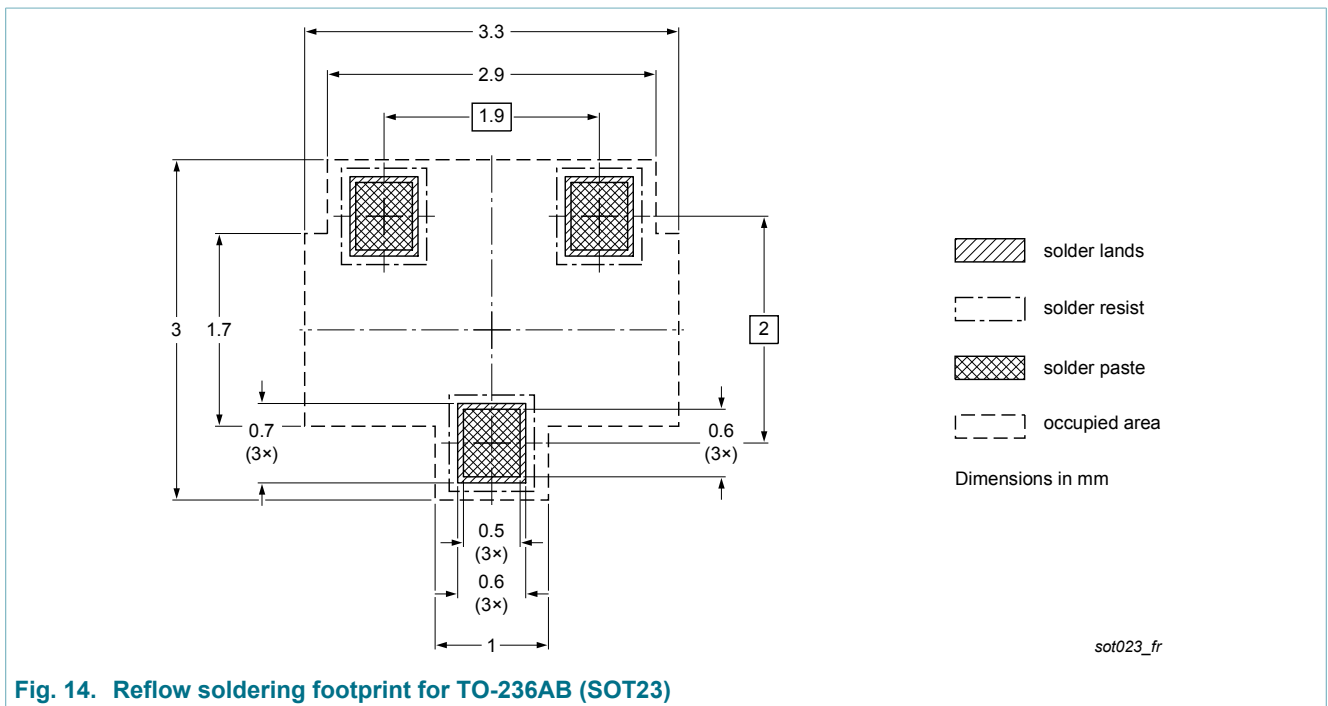


Fig. 14. Reflow soldering footprint for TO-236AB (SOT23)

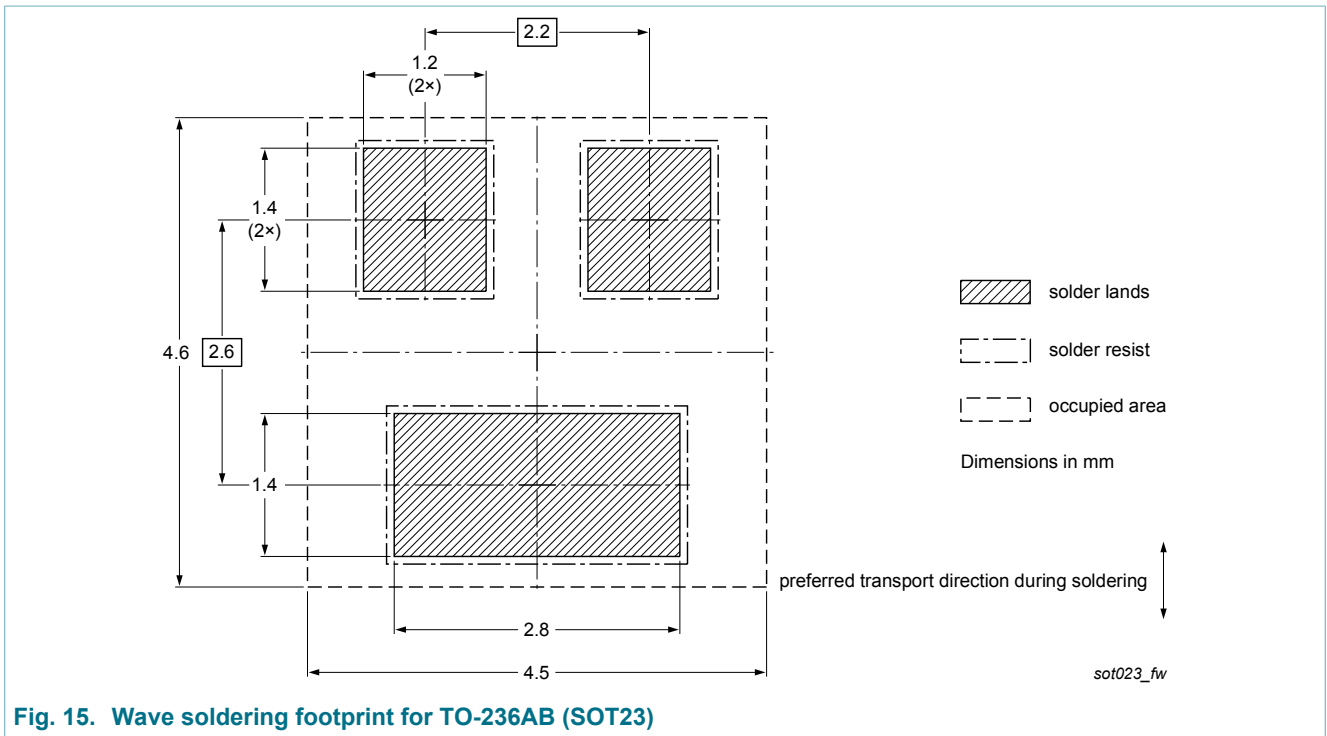


Fig. 15. Wave soldering footprint for TO-236AB (SOT23)

## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBHV9115TLH v.1	20170116	Product data sheet	-	-

## 15. Legal information

### Data sheet status

Document status <sup>[1]</sup> <sup>[2]</sup>	Product status <sup>[3]</sup>	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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Date of release: 16 January 2017

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