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Kind regards,

Team Nexperia



# PBSS5130T

30 V; 1 A PNP low  $V_{CEsat}$  (BISS) transistor

9 July 2013

Product data sheet

## 1. General description

PNP low  $V_{CEsat}$  Breakthrough In Small Signal (BISS) transistor in a small SOT23 Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

- Small SMD plastic package
- Low collector-emitter saturation voltage  $V_{CEsat}$
- High collector current capability:  $I_C$  and  $I_{CM}$
- Higher efficiency due to less heat generation
- AEC-Q101 qualified

## 3. Applications

- DC-to-DC conversion
- Supply line switching
- Battery charger
- LCD backlighting
- Driver in low supply voltage applications (e.g. lamps and LEDs)

## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CEO}$	collector-emitter voltage	open base	-	-	-30	V
$I_C$	collector current		-	-	-1	A
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1$ ms	-	-	-3	A
$R_{CEsat}$	collector-emitter saturation resistance	$I_C = -500$ mA; $I_B = -50$ mA; pulsed; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ; $T_{amb} = 25$ °C	-	-	220	m $\Omega$

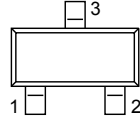
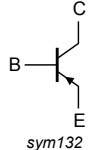


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## 5. Pinning information

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
PBSS5130T	TO-236AB	plastic surface-mounted package; 3 leads	SOT23

## 7. Marking

Table 4. Marking codes

Type number	Marking code
PBSS5130T	%3E [1]

[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		-	-30	V
$V_{CEO}$	collector-emitter voltage	open base		-	-30	V
$V_{EBO}$	emitter-base voltage	open collector		-	-5	V
$I_C$	collector current			-	-1	A
$I_{CM}$	peak collector current	single pulse; $t_p \leq 1$ ms		-	-3	A
$I_{BM}$	peak base current			-	-300	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	300	mW
			[2]	-	480	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.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.

## 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	[1]	-	-	417	K/W
			[2]	-	-	260	K/W

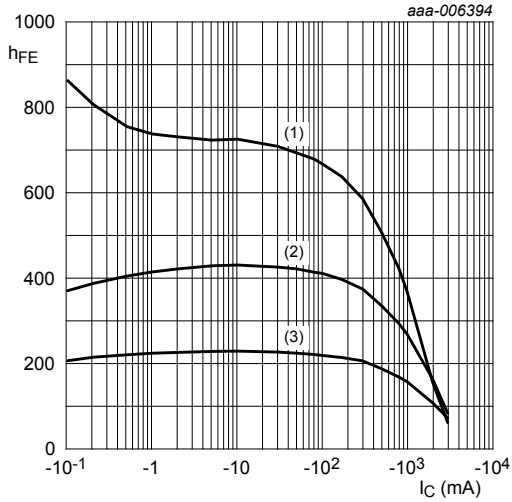
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm<sup>2</sup>.

## 10. Characteristics

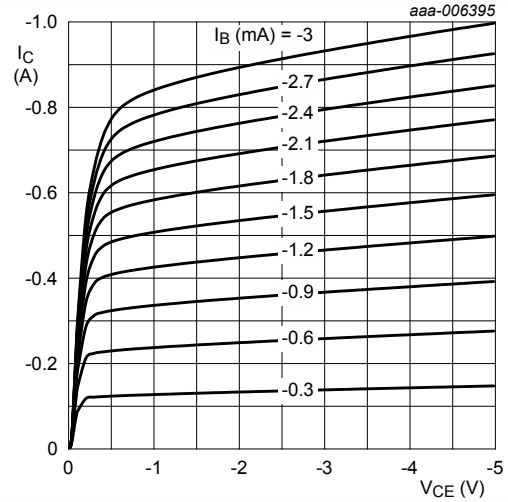
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I <sub>CBO</sub>	collector-base cut-off current	V <sub>CB</sub> = -30 V; I <sub>E</sub> = 0 A; T <sub>amb</sub> = 25 °C	-	-	-100	nA
		V <sub>CB</sub> = -30 V; I <sub>E</sub> = 0 A; T <sub>j</sub> = 150 °C	-	-	-50	μA
I <sub>EBO</sub>	emitter-base cut-off current	V <sub>EB</sub> = -4 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> = -2 V; I <sub>C</sub> = -100 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C	300	450	-	
		V <sub>CE</sub> = -2 V; I <sub>C</sub> = -500 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C	260	350	-	
		V <sub>CE</sub> = -2 V; I <sub>C</sub> = -1 A; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C	210	290	-	
V <sub>CEsat</sub>	collector-emitter saturation voltage	I <sub>C</sub> = -100 mA; I <sub>B</sub> = -1 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C	-	-	-100	mV
		I <sub>C</sub> = -1 A; I <sub>B</sub> = -50 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C	-	-	-225	mV
R <sub>CEsat</sub>	collector-emitter saturation resistance	I <sub>C</sub> = -500 mA; I <sub>B</sub> = -50 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C	-	-	220	mΩ
V <sub>BEsat</sub>	base-emitter saturation voltage	I <sub>C</sub> = -2 A; I <sub>B</sub> = -200 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C	-	-	-1.1	V
V <sub>BEon</sub>	base-emitter turn-on voltage	V <sub>CE</sub> = -2 V; I <sub>C</sub> = -100 mA; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>amb</sub> = 25 °C	-	-	-0.75	V
f <sub>T</sub>	transition frequency	V <sub>CE</sub> = -10 V; I <sub>C</sub> = -100 mA; f = 100 MHz; T <sub>amb</sub> = 25 °C	100	200	-	MHz
C <sub>c</sub>	collector capacitance	V <sub>CB</sub> = -10 V; I <sub>E</sub> = 0 A; i <sub>e</sub> = 0 A; f = 1 MHz; T <sub>amb</sub> = 25 °C	-	-	28	pF



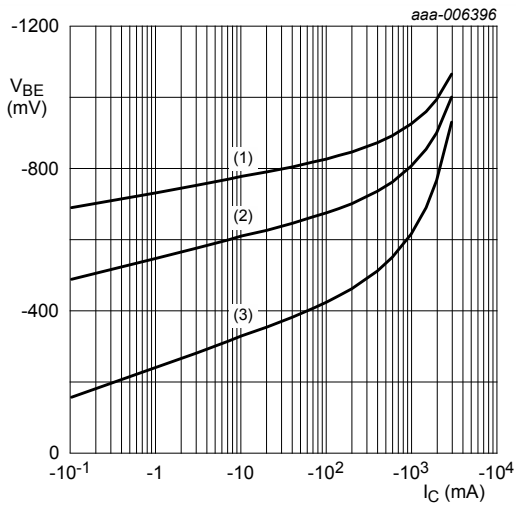
$V_{CE} = -2$  V  
 (1)  $T_{amb} = 150^\circ\text{C}$   
 (2)  $T_{amb} = 25^\circ\text{C}$   
 (3)  $T_{amb} = -55^\circ\text{C}$

**Fig. 1. DC current gain as a function of collector current; typical values**



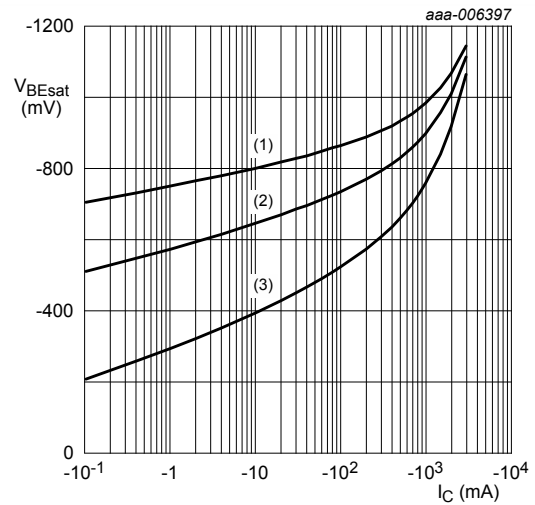
$T_{amb} = 25^\circ\text{C}$

**Fig. 2. Collector current as a function of collector-emitter voltage; typical values**



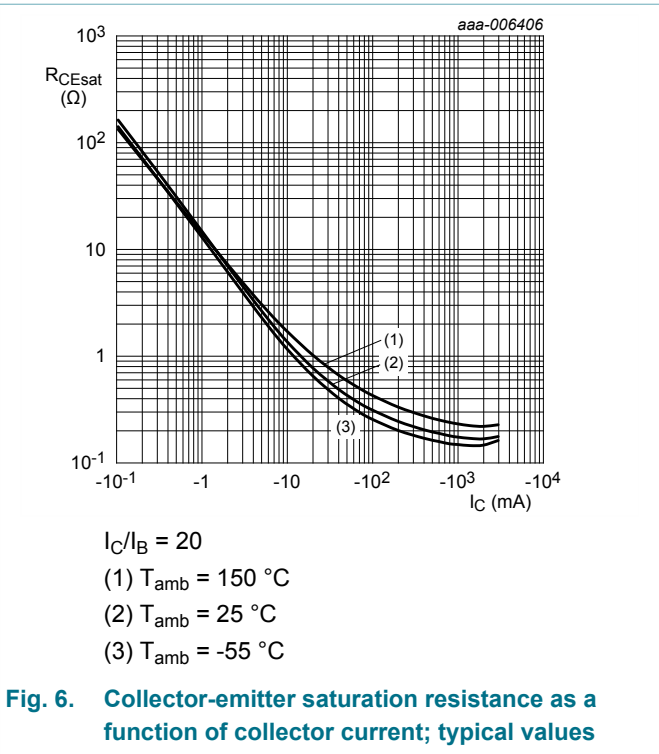
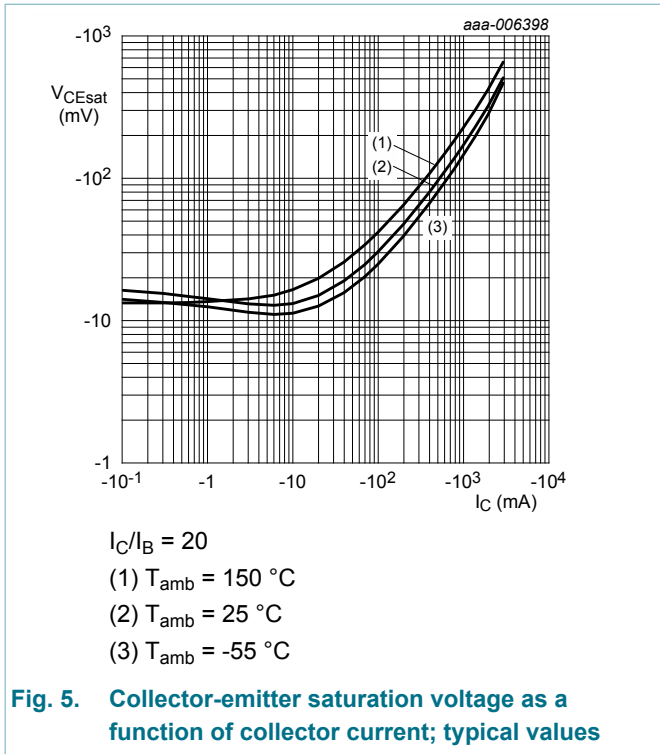
$V_{CE} = -2$  V  
 (1)  $T_{amb} = 150^\circ\text{C}$   
 (2)  $T_{amb} = 25^\circ\text{C}$   
 (3)  $T_{amb} = -55^\circ\text{C}$

**Fig. 3. Base-emitter voltage as a function of collector current; typical values**



$I_C/I_B = 20$   
 (1)  $T_{amb} = -55^\circ\text{C}$   
 (2)  $T_{amb} = 25^\circ\text{C}$   
 (3)  $T_{amb} = 150^\circ\text{C}$

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

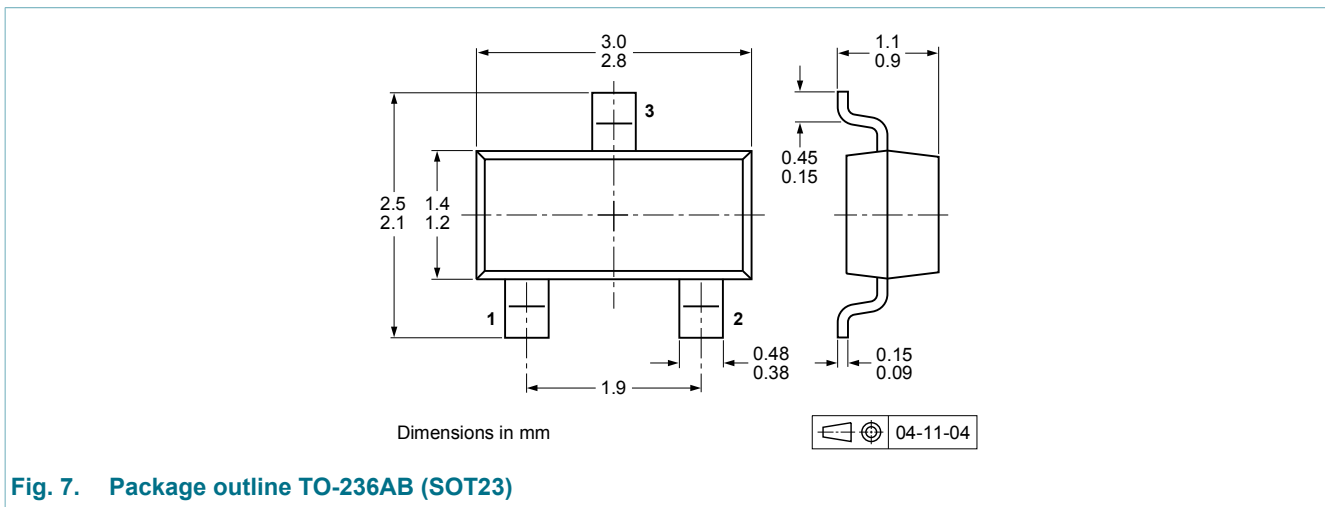


## 11. Test information

### 11.1 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



### 13. Soldering

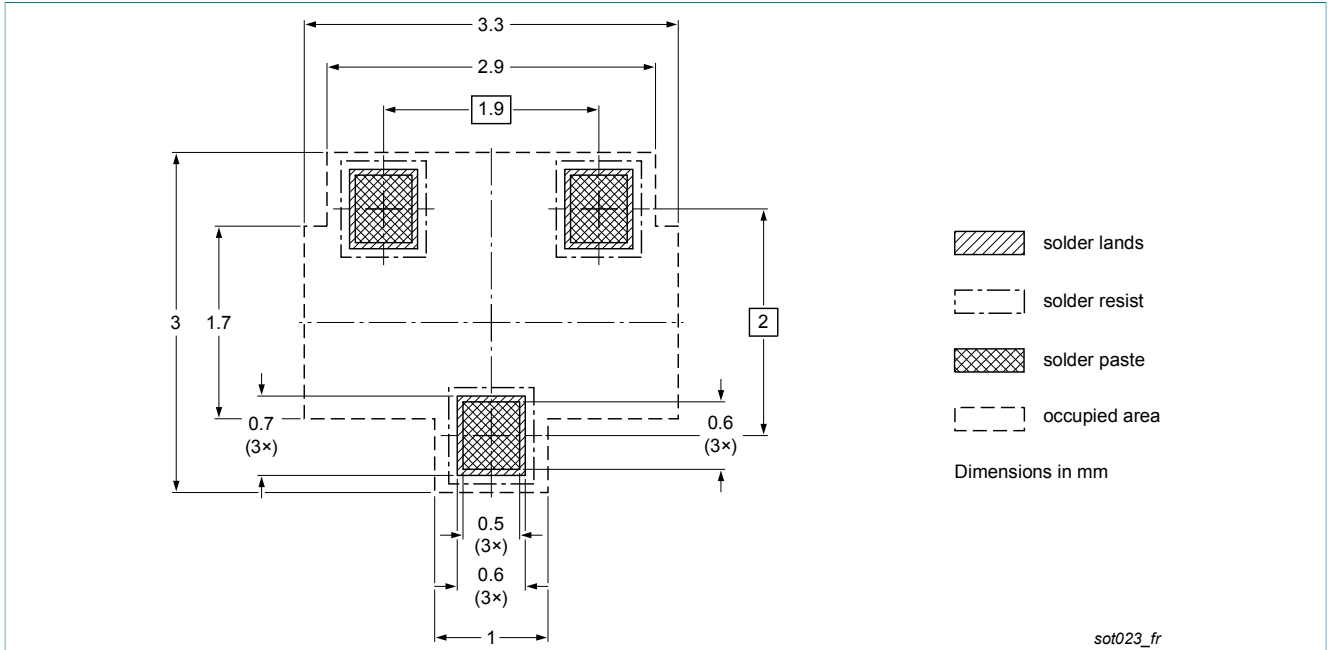


Fig. 8. Reflow soldering footprint for TO-236AB (SOT23)

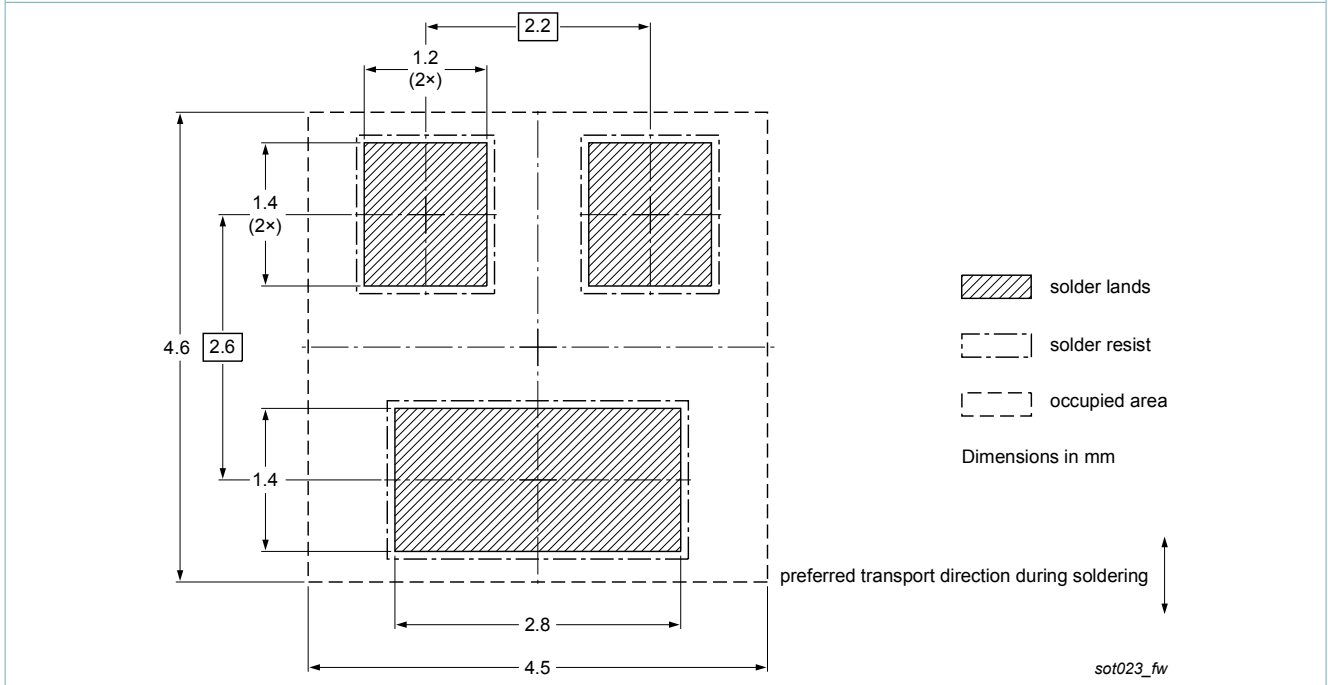


Fig. 9. Wave soldering footprint for TO-236AB (SOT23)



## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
PBSS5130T v.2	20130709	Product data sheet	-	PBSS5130T v.1
Modifications:	<ul style="list-style-type: none"> <li>The format of this document has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li>Sections "General description", "Features and benefits" and "Applications": updated</li> <li>Section "Marking": updated</li> <li>Table "Limiting values": ambient temperature <math>T_{amb}</math> updated</li> <li>Table "Characteristics": base-emitter saturation voltage <math>V_{BEsat}</math> added</li> <li>Figures 1 to 6: added</li> <li>Section "Test information": added</li> <li>Figure "Package outline TO-236AB (SOT23)": replaced by minimized outline drawing</li> <li>Section "Soldering": added</li> <li>Section "Legal information": updated</li> </ul>			
PBSS5130T v.1	20031212	Product data sheet	-	-

## 15. Legal information

### 15.1 Data sheet status

Document status [1][2]	Product status [3]	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.

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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