1. General description

PNP high-voltage low V_{CEsat} transistor in a SOT23 (TO-263AB) small Surface-Mounted Device (SMD) plastic package. NPN complement PBHV8115T-Q.

2. Features and benefits

- High voltage
- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C and I_{CM}
- High collector current gain (h_{FE}) at high I_C
- Small SMD plastic package
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- LED driver for LED chain module
- LCD backlighting
- High Intensity Discharge (HID) front lighting
- Automotive motor management
- Hook switch for wired telecom
- Switch Mode Power Supply (SMPS)

4. Quick reference data

Table 1. Quick reference data

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_{CEO}</td>
<td>collector-emitter voltage</td>
<td>open base</td>
<td>-</td>
<td>-</td>
<td>-150</td>
<td>V</td>
</tr>
<tr>
<td>I_C</td>
<td>collector current</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-1</td>
<td>A</td>
</tr>
<tr>
<td>h_{FE}</td>
<td>DC current gain</td>
<td>V_{CE} = -10 V; I_C = -50 mA; T_{amb} = 25 °C</td>
<td>100</td>
<td>220</td>
<td>-</td>
<td></td>
</tr>
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</table>
5. Pinning information

Table 2. Pinning information

<table>
<thead>
<tr>
<th>Pin</th>
<th>Symbol</th>
<th>Description</th>
<th>Simplified outline</th>
<th>Graphic symbol</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>B</td>
<td>base</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>E</td>
<td>emitter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>collector</td>
<td></td>
<td></td>
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</table>

6. Ordering information

Table 3. Ordering information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package</th>
<th>Name</th>
<th>Description</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBHV9115T-Q</td>
<td>SOT23</td>
<td>plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body</td>
<td>SOT23</td>
<td></td>
</tr>
</tbody>
</table>

7. Marking

Table 4. Marking codes

<table>
<thead>
<tr>
<th>Type number</th>
<th>Marking code[1]</th>
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</thead>
<tbody>
<tr>
<td>PBHV9115T-Q</td>
<td>W7%</td>
</tr>
</tbody>
</table>

[1] % = placeholder for manufacturing site code
Table 5. Limiting values

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

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{CBO}$</td>
<td>collector-base voltage</td>
<td>open emitter</td>
<td>-</td>
<td>-200</td>
<td>V</td>
</tr>
<tr>
<td>$V_{CEO}$</td>
<td>collector-emitter voltage</td>
<td>open base</td>
<td>-</td>
<td>-150</td>
<td>V</td>
</tr>
<tr>
<td>$V_{EBO}$</td>
<td>emitter-base voltage</td>
<td>open collector</td>
<td>-</td>
<td>-6</td>
<td>V</td>
</tr>
<tr>
<td>$I_C$</td>
<td>collector current</td>
<td></td>
<td>-1</td>
<td>-</td>
<td>A</td>
</tr>
<tr>
<td>$I_{CM}$</td>
<td>peak collector current</td>
<td>single pulse; $t_p \leq 1$ ms</td>
<td>-2</td>
<td>-</td>
<td>A</td>
</tr>
<tr>
<td>$I_{BM}$</td>
<td>peak base current</td>
<td></td>
<td>-400</td>
<td>-</td>
<td>mA</td>
</tr>
<tr>
<td>$P_{tot}$</td>
<td>total power dissipation</td>
<td>$T_{amb} \leq 25$ °C</td>
<td>-300</td>
<td>-</td>
<td>mW</td>
</tr>
<tr>
<td>$T_j$</td>
<td>junction temperature</td>
<td></td>
<td>-150</td>
<td>-</td>
<td>°C</td>
</tr>
<tr>
<td>$T_{amb}$</td>
<td>ambient temperature</td>
<td></td>
<td>-55</td>
<td>150</td>
<td>°C</td>
</tr>
<tr>
<td>$T_{stg}$</td>
<td>storage temperature</td>
<td></td>
<td>-65</td>
<td>150</td>
<td>°C</td>
</tr>
</tbody>
</table>


Fig. 1. Power derating curve
9. Thermal characteristics

Table 6. Thermal characteristics

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


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

### Table 7. Characteristics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>I&lt;sub&gt;CBO&lt;/sub&gt;</td>
<td>collector-base cut-off current</td>
<td>$V_{CB} = -120 , V$; $I_E = 0 , A$; $T_{amb} = 25 , ^\circ C$</td>
<td>-</td>
<td>-</td>
<td>-100</td>
<td>nA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{CB} = -120 , V$; $I_E = 0 , A$; $T_j = 150 , ^\circ C$</td>
<td>-</td>
<td>-</td>
<td>-10</td>
<td>µA</td>
</tr>
<tr>
<td>I&lt;sub&gt;CES&lt;/sub&gt;</td>
<td>collector-emitter cut-off current</td>
<td>$V_{CE} = -120 , V$; $V_{BE} = 0 , V$; $T_{amb} = 25 , ^\circ C$</td>
<td>-</td>
<td>-</td>
<td>-100</td>
<td>nA</td>
</tr>
<tr>
<td>I&lt;sub&gt;EBO&lt;/sub&gt;</td>
<td>emitter-base cut-off current</td>
<td>$V_{EB} = -4 , V$; $I_C = 0 , A$; $T_{amb} = 25 , ^\circ C$</td>
<td>-</td>
<td>-</td>
<td>-100</td>
<td>nA</td>
</tr>
<tr>
<td>$h_{FE}$</td>
<td>DC current gain</td>
<td>$V_{CE} = -10 , V$; $I_C = -50 , mA$; $T_{amb} = 25 , ^\circ C$</td>
<td>100</td>
<td>220</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{CE} = -10 , V$; $I_C = -100 , mA$; $T_{amb} = 25 , ^\circ C$</td>
<td>100</td>
<td>220</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{CE} = -10 , V$; $I_C = -1 , A$; pulsed; $t_p \leq 300 , \mu s$; $\delta \leq 0.02$; $T_{amb} = 25 , ^\circ C$</td>
<td>10</td>
<td>30</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>$V_{CEsat}$</td>
<td>collector-emitter saturation voltage</td>
<td>$I_C = -100 , mA$; $I_B = -10 , mA$; $T_{amb} = 25 , ^\circ C$</td>
<td>-</td>
<td>-60</td>
<td>-120</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_C = -100 , mA$; $I_B = -20 , mA$; $T_{amb} = 25 , ^\circ C$</td>
<td>-</td>
<td>-50</td>
<td>-100</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_C = -500 , mA$; $I_B = -100 , mA$; $T_{amb} = 25 , ^\circ C$</td>
<td>-</td>
<td>-150</td>
<td>-300</td>
<td>mV</td>
</tr>
<tr>
<td>$V_{BEsat}$</td>
<td>base-emitter saturation voltage</td>
<td>$I_C = -1 , A$; $I_B = -200 , mA$; pulsed; $t_p \leq 300 , \mu s$; $\delta \leq 0.02$; $T_{amb} = 25 , ^\circ C$</td>
<td>-</td>
<td>-1.05</td>
<td>-1.2</td>
<td>V</td>
</tr>
<tr>
<td>$t_d$</td>
<td>delay time</td>
<td>$V_{CC} = -6 , V$; $I_C = -0.5 , A$; $I_{Bon} = -0.1 , A$; $I_{Boff} = 0.1 , A$; $T_{amb} = 25 , ^\circ C$</td>
<td>-</td>
<td>8</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$t_r$</td>
<td>rise time</td>
<td></td>
<td>-</td>
<td>282</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$t_{on}$</td>
<td>turn-on time</td>
<td></td>
<td>-</td>
<td>290</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$t_s$</td>
<td>storage time</td>
<td></td>
<td>-</td>
<td>430</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$t_f$</td>
<td>fall time</td>
<td></td>
<td>-</td>
<td>300</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$t_{off}$</td>
<td>turn-off time</td>
<td></td>
<td>-</td>
<td>730</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>$f_T$</td>
<td>transition frequency</td>
<td>$V_{CE} = -10 , V$; $I_C = -10 , mA$; $f = 100 , MHz$; $T_{amb} = 25 , ^\circ C$</td>
<td>-</td>
<td>115</td>
<td>-</td>
<td>MHz</td>
</tr>
<tr>
<td>$C_{c}$</td>
<td>collector capacitance</td>
<td>$V_{CB} = -20 , V$; $I_C = 0 , A$; $I_E = 0 , A$; $f = 1 , MHz$; $T_{amb} = 25 , ^\circ C$</td>
<td>-</td>
<td>10</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>$C_e$</td>
<td>emitter capacitance</td>
<td>$V_{EB} = -0.5 , V$; $I_C = 0 , A$; $I_E = 0 , A$; $f = 1 , MHz$; $T_{amb} = 25 , ^\circ C$</td>
<td>-</td>
<td>150</td>
<td>-</td>
<td>pF</td>
</tr>
</tbody>
</table>
**PBHV9115T-Q**

150 V, 1 A PNP high-voltage low VCEsat transistor

---

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

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

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

- $I_B (mA) = -400$ to $-40$
- $V_{CE} (V) = -5$ to $0$

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

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

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Product data sheet 22 March 2022
Nexperia

150 V, 1 A PNP high-voltage low VCEsat transistor

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

\[ V_{CE\text{sat}}(V) \]

-10
-1
-10
-10
1

\[ I_C (mA) \]

-10
-10
-10
-10
1

\[ I_C (mA) \]

(1) \( T_{\text{amb}} = 100 \degree \text{C} \)
(2) \( T_{\text{amb}} = 25 \degree \text{C} \)
(3) \( T_{\text{amb}} = -55 \degree \text{C} \)

\[ I_C/I_B = 5 \]

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

\[ V_{CE\text{sat}}(V) \]

-10
-10
-10
-10
1

\[ I_C (mA) \]

-10
-10
-10
-10
1

\[ I_C (mA) \]

(1) \( T_{\text{amb}} = 25 \degree \text{C} \)
(2) \( I_C/I_B = 10 \)
(3) \( I_C/I_B = 5 \)

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

\[ R_{CE\text{sat}}(\Omega) \]

-10
-10
-10
-10
1

\[ I_C (mA) \]

-10
-10
-10
-10
1

\[ I_C (mA) \]

(1) \( I_C/I_B = 20 \)
(2) \( I_C/I_B = 10 \)
(3) \( I_C/I_B = 5 \)

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

\[ R_{CE\text{sat}}(\Omega) \]

-10
-10
-10
-10
1

\[ I_C (mA) \]

-10
-10
-10
-10
1

\[ I_C (mA) \]
11. Test information

![Test circuit for switching times](image)

**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

![Package outline SOT23](image)

**Dimensions in mm**

1.9

1.2

1.0

0.9

0.38

0.15

0.09

0.8

0.48

0.45

1.1

2.8

2.1

1.2

1.4

2.5

3.0

3

2.8


Fig. 12. Package outline SOT23
13. Soldering

**Fig. 13. Reflow soldering footprint for SOT23**

![Reflow soldering footprint for SOT23]

**Fig. 14. Wave soldering footprint for SOT23**

![Wave soldering footprint for SOT23]
14. Revision history

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<th>Release date</th>
<th>Data sheet status</th>
<th>Change notice</th>
<th>Supersedes</th>
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<td>PBHV9115T-Q v.1</td>
<td>20220322</td>
<td>Product data sheet</td>
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Data sheet status

<table>
<thead>
<tr>
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<td>[1][2]</td>
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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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