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Kind regards,

Team Nexperia
PBSS2515VPN
15 V low $V_{CE(sat)}$ NPN/PNP transistor

Product data sheet
Supersedes data of 2001 Nov 07
15 V low $V_{\text{CE\sat}}$ NPN/PNP transistor

**FEATURES**
- 300 mW total power dissipation
- Very small 1.6 x 1.2 mm ultra thin package
- Excellent coplanarity due to straight leads
- Low collector-emitter saturation voltage
- High current capability
- Improved thermal behaviour due to flat lead
- Replaces two SC75/SC89 packaged low $V_{\text{CE\sat}}$ transistors on same PCB area
- Reduces required PCB area
- Reduced pick and place costs.

**APPLICATION**
- General purpose switching and muting
- Low frequency driver circuits
- LCD backlighting
- Audio frequency general purpose amplifier applications
- Battery driven equipment (mobile phones, video cameras and hand-held devices).

**DESCRIPTION**
NPN/PNP low $V_{\text{CE\sat}}$ transistor pair in a SOT666 plastic package.

**MARKING**

<table>
<thead>
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<th>TYPE NUMBER</th>
<th>MARKING CODE</th>
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<td>PBSS2515VPN</td>
<td>N8</td>
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**QUICK REFERENCE DATA**

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<th>PARAMETER</th>
<th>MAX.</th>
<th>UNIT</th>
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<tr>
<td>$V_{\text{CEO}}$</td>
<td>collector-emitter voltage</td>
<td>15</td>
<td>V</td>
</tr>
<tr>
<td>$I_{\text{CM}}$</td>
<td>peak collector current</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>$R_{\text{CE\sat}}$</td>
<td>equivalent on-resistance</td>
<td>&lt;500</td>
<td>mΩ</td>
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</table>

**PINNING**

<table>
<thead>
<tr>
<th>PIN</th>
<th>DESCRIPTION</th>
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<tr>
<td>1, 4</td>
<td>emitter TR1; TR2</td>
</tr>
<tr>
<td>2, 5</td>
<td>base TR1; TR2</td>
</tr>
<tr>
<td>6, 3</td>
<td>collector TR1; TR2</td>
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**ORDERING INFORMATION**

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<th>PACKAGE</th>
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<td>NAME</td>
</tr>
<tr>
<td></td>
<td>DESCRIPTION</td>
</tr>
<tr>
<td></td>
<td>plastic surface mounted package; 6 leads</td>
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</table>

2005 Jan 11
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></td>
<td>collector-base voltage</td>
<td>open emitter</td>
<td>–</td>
<td>15</td>
<td>V</td>
</tr>
<tr>
<td>V_CBO</td>
<td>collector-emitter voltage</td>
<td>open base</td>
<td>–</td>
<td>15</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 (DC)</td>
<td>–</td>
<td>500</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>I_CM</td>
<td>peak collector current</td>
<td>–</td>
<td>1</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>I_BM</td>
<td>peak base current</td>
<td>–</td>
<td>100</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>P_tot</td>
<td>total power dissipation</td>
<td>T_amb ≤ 25 °C; note 1</td>
<td>–</td>
<td>200</td>
<td>mW</td>
</tr>
<tr>
<td>T_stg</td>
<td>storage temperature</td>
<td>–65</td>
<td>+150</td>
<td>°C</td>
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</tr>
<tr>
<td>T_J</td>
<td>junction temperature</td>
<td>–</td>
<td>150</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>T_amb</td>
<td>operating ambient temperature</td>
<td>–65</td>
<td>+150</td>
<td>°C</td>
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</tr>
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</table>

Per device

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>CONDITIONS</th>
<th>VALUE</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>P_tot</td>
<td>total power dissipation</td>
<td>T_amb ≤ 25 °C; note 1</td>
<td>–</td>
<td>300</td>
</tr>
</tbody>
</table>

Note
1. Transistor mounted on an FR4 printed-circuit board.

THERMAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>CONDITIONS</th>
<th>VALUE</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>R_th(J-a)</td>
<td>thermal resistance from junction to ambient</td>
<td>notes 1 and 2</td>
<td>416</td>
<td>K/W</td>
</tr>
</tbody>
</table>

Notes
1. Transistor mounted on an FR4 printed-circuit board.
2. The only recommended soldering method is reflow soldering.
## CHARACTERISTICS

$T_{\text{amb}} = 25 \, ^\circ\text{C}$ unless otherwise specified.

<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>$I_{\text{CBO}}$</td>
<td>collector-base cut-off current</td>
<td>$V_{\text{CB}} = 15 , \text{V}; I_{\text{E}} = 0 , \text{A}$</td>
<td>–</td>
<td>–</td>
<td>100</td>
<td>nA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{\text{CB}} = 15 , \text{V}; I_{\text{E}} = 0 , \text{A}; T_{\text{j}} = 150 , ^\circ\text{C}$</td>
<td>–</td>
<td>–</td>
<td>50</td>
<td>μA</td>
</tr>
<tr>
<td>$I_{\text{EBO}}$</td>
<td>emitter-base cut-off current</td>
<td>$V_{\text{EB}} = 5 , \text{V}; I_{\text{C}} = 0 , \text{A}$</td>
<td>–</td>
<td>–</td>
<td>100</td>
<td>nA</td>
</tr>
<tr>
<td>$h_{\text{FE}}$</td>
<td>DC current gain</td>
<td>$V_{\text{CE}} = 2 , \text{V}; I_{\text{C}} = 10 , \text{mA}$</td>
<td>200</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{\text{CE}} = 2 , \text{V}; I_{\text{C}} = 100 , \text{mA}; \text{note 1}$</td>
<td>150</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{\text{CE}} = 2 , \text{V}; I_{\text{C}} = 500 , \text{mA}; \text{note 1}$</td>
<td>90</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>$V_{\text{CE sat}}$</td>
<td>collector-emitter saturation voltage</td>
<td>$I_{\text{C}} = 10 , \text{mA}; I_{\text{B}} = 0.5 , \text{mA}$</td>
<td>–</td>
<td>–</td>
<td>25</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{\text{C}} = 200 , \text{mA}; I_{\text{B}} = 10 , \text{mA}$</td>
<td>–</td>
<td>–</td>
<td>150</td>
<td>mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{\text{C}} = 500 , \text{mA}; I_{\text{B}} = 50 , \text{mA}; \text{note 1}$</td>
<td>–</td>
<td>–</td>
<td>250</td>
<td>mV</td>
</tr>
<tr>
<td>$R_{\text{CE sat}}$</td>
<td>equivalent on-resistance</td>
<td>$I_{\text{C}} = 500 , \text{mA}; I_{\text{B}} = 50 , \text{mA}; \text{note 1}$</td>
<td>–</td>
<td>300</td>
<td>&lt;500</td>
<td>mΩ</td>
</tr>
<tr>
<td>$V_{\text{BE sat}}$</td>
<td>base-emitter saturation voltage</td>
<td>$I_{\text{C}} = 500 , \text{mA}; I_{\text{B}} = 50 , \text{mA}; \text{note 1}$</td>
<td>–</td>
<td>–</td>
<td>1.1</td>
<td>V</td>
</tr>
<tr>
<td>$V_{\text{BE}}$</td>
<td>base-emitter turn-on voltage</td>
<td>$V_{\text{CE}} = 2 , \text{V}; I_{\text{C}} = 100 , \text{mA}; \text{note 1}$</td>
<td>–</td>
<td>–</td>
<td>0.9</td>
<td>V</td>
</tr>
</tbody>
</table>

### NPN transistor

- $f_t$ | transition frequency | $I_{\text{C}} = 100 \, \text{mA}; V_{\text{CE}} = 5 \, \text{V}; f = 100 \, \text{MHz}$ | 250 | 420 | – | MHz |
- $C_c$ | collector capacitance | $V_{\text{CB}} = 10 \, \text{V}; I_{\text{E}} = I_{\text{B}} = 0 \, \text{A}; f = 1\,\text{MHz}$ | – | 4.4 | 6 | pF |

### PNP transistor

- $f_t$ | transition frequency | $I_{\text{C}} = -100 \, \text{mA}; V_{\text{CE}} = -5 \, \text{V}; f = 100 \, \text{MHz}$ | 100 | 280 | – | MHz |
- $C_c$ | collector capacitance | $V_{\text{CB}} = -10 \, \text{V}; I_{\text{E}} = I_{\text{B}} = 0 \, \text{A}; f = 1\,\text{MHz}$ | – | – | 10 | pF |

#### Note

1. Pulse test: $t_p \leq 300 \, \mu\text{s}; \delta \leq 0.02$. 
15 V low $V_{CE(sat)}$ NPN/PNP transistor

**Fig. 2** DC current gain as a function of collector current; typical values.

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

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

**Fig. 5** Base-emitter saturation voltage as a function of collector current; typical values.
**TR1 (NPN) IC/IB = 20.**

(1) T<sub>amb</sub> = 150 °C.

(2) T<sub>amb</sub> = 25 °C.

(3) T<sub>amb</sub> = -55 °C.

**Fig. 6** Equivalent on-resistance as a function of collector current; typical values.

**TR1 (NPN) T<sub>amb</sub> = 25 °C.**

(1) I<sub>b</sub> = 4.6 mA.

(2) I<sub>b</sub> = 4.14 mA.

(3) I<sub>b</sub> = 3.68 mA.

(4) I<sub>b</sub> = 3.22 mA.

(5) I<sub>b</sub> = 2.76 mA.

(6) I<sub>b</sub> = 2.3 mA.

(7) I<sub>b</sub> = 1.84 mA.

(8) I<sub>b</sub> = 1.38 mA.

(9) I<sub>b</sub> = 0.92 mA.

(10) I<sub>b</sub> = 0.46 mA.

**Fig. 7** Collector current as a function of collector-emitter voltage; typical values.
15 V low $V_{CE(sat)}$ NPN/PNP transistor

Fig. 8 DC current gain as a function of collector current; typical values.

TR2 (PNP) $V_{CE} = -2 \text{ V}$.
(1) $T_{amb} = 150 \degree \text{ C}$.
(2) $T_{amb} = 25 \degree \text{ C}$.
(3) $T_{amb} = -55 \degree \text{ C}$.

Fig. 9 Base-emitter voltage as a function of collector current; typical values.

TR2 (PNP) $V_{CE} = -2 \text{ V}$.
(1) $T_{amb} = -55 \degree \text{ C}$.
(2) $T_{amb} = 25 \degree \text{ C}$.
(3) $T_{amb} = 150 \degree \text{ C}$.

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

TR2 (PNP) $I_{C}/I_{B} = 20$.
(1) $T_{amb} = 150 \degree \text{ C}$.
(2) $T_{amb} = 25 \degree \text{ C}$.
(3) $T_{amb} = -55 \degree \text{ C}$.

Fig. 11 Base-emitter saturation voltage as a function of collector current; typical values.

TR2 (PNP) $I_{C}/I_{B} = 20$.
(1) $T_{amb} = 150 \degree \text{ C}$.
(2) $T_{amb} = 25 \degree \text{ C}$.
(3) $T_{amb} = -55 \degree \text{ C}$.
15 V low $V_{CE(sat)}$ NPN/PNP transistor

PBSS2515VPN

**Fig. 12** Equivalent on-resistance as a function of collector current; typical values.

**TR2 (PNP) $I_C/I_B = 20$.**

1. $T_{amb} = 150 \, ^\circ C$.
2. $T_{amb} = 25 \, ^\circ C$.
3. $T_{amb} = -55 \, ^\circ C$.

**Fig. 13** Collector current as a function of collector-emitter voltage; typical values.

**TR2 (PNP) $T_{amb} = 25 \, ^\circ C$.**

1. $I_B = -7 \, mA$.
2. $I_B = -6.3 \, mA$.
3. $I_B = -5.6 \, mA$.
4. $I_B = -4.9 \, mA$.
5. $I_B = -4.2 \, mA$.
6. $I_B = -3.5 \, mA$.
7. $I_B = -2.8 \, mA$.
8. $I_B = -2.1 \, mA$.
9. $I_B = -1.4 \, mA$.
10. $I_B = -0.7 \, mA$. 

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15 V low $V_{CE\text{(sat)}}$ NPN/PNP transistor

PBSS2515VPN

PACKAGE OUTLINE

Plastic surface-mounted package; 6 leads

SOT666

DIMENSIONS (mm are the original dimensions)

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<tr>
<th>UNIT</th>
<th>A</th>
<th>$b_p$</th>
<th>c</th>
<th>D</th>
<th>E</th>
<th>e</th>
<th>$e_1$</th>
<th>$H_E$</th>
<th>$l_p$</th>
<th>w</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
<td>0.6</td>
<td>0.27</td>
<td>0.18</td>
<td>1.7</td>
<td>1.3</td>
<td>1.0</td>
<td>0.5</td>
<td>1.7</td>
<td>0.3</td>
<td>0.1</td>
<td>0.1</td>
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<th>REFERENCES</th>
<th>EUROPEAN PROJECTION</th>
<th>ISSUE DATE</th>
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<td>IEC</td>
<td>JEDEC</td>
<td>Jeita</td>
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04-11-08 06-03-16

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15 V low $V_{CE(sat)}$ NPN/PNP transistor

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DATA SHEET STATUS

<table>
<thead>
<tr>
<th>DOCUMENT STATUS(1)</th>
<th>PRODUCT STATUS(2)</th>
<th>DEFINITION</th>
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<tbody>
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<td>Objective data sheet</td>
<td>Development</td>
<td>This document contains data from the objective specification for product development.</td>
</tr>
<tr>
<td>Preliminary data sheet</td>
<td>Qualification</td>
<td>This document contains data from the preliminary specification.</td>
</tr>
<tr>
<td>Product data sheet</td>
<td>Production</td>
<td>This document contains the product specification.</td>
</tr>
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</table>

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