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In data sheets and application notes which still contain NXP or Philips Semiconductors references, use the references to Nexperia, as shown below.


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Kind regards,

Team Nexperia
BSP126
N-channel enhancement mode vertical D-MOS transistor

Product specification
Supersedes data of 1997 Jun 23
N-channel enhancement mode vertical D-MOS transistor

BSP126

FEATURES
- Direct interface to C-MOS, TTL, etc.
- High-speed switching
- No secondary breakdown.

APPLICATIONS
- Line current interruptor in telephone sets
- Relay, high-speed and line transformer drivers.

DESCRIPTION
N-channel enhancement mode vertical D-MOS transistor in a miniature SOT223 package.

MARKING
<table>
<thead>
<tr>
<th>TYPE NUMBER</th>
<th>MARKING CODE</th>
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<td>BSP126</td>
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QUICK REFERENCE DATA

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<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>CONDITIONS</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_DS</td>
<td>drain-source voltage (DC)</td>
<td></td>
<td>–</td>
<td>250</td>
<td>V</td>
</tr>
<tr>
<td>I_D</td>
<td>drain current (DC)</td>
<td></td>
<td>–</td>
<td>375</td>
<td>mA</td>
</tr>
<tr>
<td>P_tot</td>
<td>total power dissipation</td>
<td>T_amb ≤ 25 °C</td>
<td>–</td>
<td>1.5</td>
<td>W</td>
</tr>
<tr>
<td>R_DSon</td>
<td>drain-source on-state resistance</td>
<td>I_D = 300 mA; V_GS = 10 V</td>
<td>2.8</td>
<td>5</td>
<td>Ω</td>
</tr>
<tr>
<td>V_GSth</td>
<td>gate-source threshold voltage</td>
<td>I_D = 1 mA; V_DS = V_GS</td>
<td>–</td>
<td>2</td>
<td>V</td>
</tr>
</tbody>
</table>

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_DS</td>
<td>drain-source voltage (DC)</td>
<td></td>
<td>–</td>
<td>250</td>
<td>V</td>
</tr>
<tr>
<td>V_GSO</td>
<td>gate-source voltage (DC)</td>
<td>open drain</td>
<td>–</td>
<td>±20</td>
<td>V</td>
</tr>
<tr>
<td>I_D</td>
<td>drain current (DC)</td>
<td></td>
<td>–</td>
<td>375</td>
<td>mA</td>
</tr>
<tr>
<td>I_DM</td>
<td>peak drain current</td>
<td></td>
<td>–</td>
<td>1.3</td>
<td>A</td>
</tr>
<tr>
<td>P_tot</td>
<td>total power dissipation</td>
<td>T_amb ≤ 25 °C; note 1</td>
<td>–</td>
<td>1.5</td>
<td>W</td>
</tr>
<tr>
<td>T_stg</td>
<td>storage temperature</td>
<td></td>
<td>–55</td>
<td>+150</td>
<td>°C</td>
</tr>
<tr>
<td>T_J</td>
<td>junction temperature</td>
<td></td>
<td>–</td>
<td>150</td>
<td>°C</td>
</tr>
</tbody>
</table>

Note
1. Device mounted on a 40 × 40 × 1.5 mm epoxy printed-circuit board; mounting pad for the drain tab minimum 6 cm².
Philips Semiconductors  

N-channel enhancement mode  
vertical D-MOS transistor  

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THERMAL CHARACTERISTICS  

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>PARAMETER</th>
<th>VALUE</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_{th,j-a}$</td>
<td>thermal resistance from junction to ambient; note 1</td>
<td>83.3</td>
<td>K/W</td>
</tr>
</tbody>
</table>

Note  
1. Device mounted on a 40 × 40 × 1.5 mm epoxy printed-circuit board; mounting pad for the drain tab minimum 6 cm².

CHARACTERISTICS  

$T_j = 25$ °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>$V_{BR(DS)}$</td>
<td>drain-source breakdown voltage</td>
<td>$I_D = 10 , \mu A; , V_{GS} = 0$</td>
<td>250</td>
<td>–</td>
<td>–</td>
<td>V</td>
</tr>
<tr>
<td>$I_{GSS}$</td>
<td>gate-source leakage current</td>
<td>$V_{GS} = \pm 20 , V; , V_{DS} = 0$</td>
<td>–</td>
<td>–</td>
<td>±100</td>
<td>nA</td>
</tr>
<tr>
<td>$V_{GSS}$</td>
<td>gate-source threshold voltage</td>
<td>$I_D = 1 , mA; , V_{DS} = V_{GS}$</td>
<td>0.8</td>
<td>–</td>
<td>2</td>
<td>V</td>
</tr>
<tr>
<td>$R_{DS(on)}$</td>
<td>drain-source on-state resistance</td>
<td>$I_D = 20 , mA; , V_{GS} = 2.4 , V$</td>
<td>–</td>
<td>–</td>
<td>7.5</td>
<td>Ω</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_D = 300 , mA; , V_{GS} = 10 , V$</td>
<td>–</td>
<td>2.8</td>
<td>5</td>
<td>Ω</td>
</tr>
<tr>
<td>$I_{DSS}$</td>
<td>drain-source leakage current</td>
<td>$V_{DS} = 200 , V; , V_{GS} = 0$</td>
<td>–</td>
<td>–</td>
<td>1</td>
<td>μA</td>
</tr>
<tr>
<td>$</td>
<td>Y_{fs}</td>
<td>$</td>
<td>transfer admittance</td>
<td>$I_D = 300 , mA; , V_{DS} = 25 , V$</td>
<td>200</td>
<td>600</td>
</tr>
<tr>
<td>$C_{iss}$</td>
<td>input capacitance</td>
<td>$V_{DS} = 25 , V; , V_{GS} = 0; , f = 1 , MHz$</td>
<td>–</td>
<td>100</td>
<td>120</td>
<td>pF</td>
</tr>
<tr>
<td>$C_{oss}$</td>
<td>output capacitance</td>
<td>$V_{DS} = 25 , V; , V_{GS} = 0; , f = 1 , MHz$</td>
<td>–</td>
<td>21</td>
<td>30</td>
<td>pF</td>
</tr>
<tr>
<td>$C_{rss}$</td>
<td>feedback capacitance</td>
<td>$V_{DS} = 25 , V; , V_{GS} = 0; , f = 1 , MHz$</td>
<td>–</td>
<td>10</td>
<td>15</td>
<td>pF</td>
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</table>

Switching times (see Figs 2 and 3)  

<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>$t_{on}$</td>
<td>turn-on time</td>
<td>$I_D = 250 , mA; , V_{DD} = 50 , V; , V_{GS} = 0$ to 10 V</td>
<td>–</td>
<td>6</td>
<td>10</td>
<td>ns</td>
</tr>
<tr>
<td>$t_{off}$</td>
<td>turn-off time</td>
<td>$I_D = 250 , mA; , V_{DD} = 50 , V; , V_{GS} = 10$ to 0 V</td>
<td>–</td>
<td>47</td>
<td>60</td>
<td>ns</td>
</tr>
</tbody>
</table>
N-channel enhancement mode
vertical D-MOS transistor

Fig.2 Switching times test circuit.

Fig.3 Input and output waveforms.

Fig.4 Power derating curve.

Fig.5 Typical output characteristics.

$V_{DD} = 50 \text{ V}$

$V_{GS} = 10 \text{ V}$

$V_{GS} = 5 \text{ V}$

$V_{GS} = 4 \text{ V}$

$V_{GS} = 3.5 \text{ V}$

$V_{GS} = 3 \text{ V}$

$V_{GS} = 2.5 \text{ V}$

$V_{GS} = 2 \text{ V}$

$0 \text{ V}$

$10 \text{ V}$

$50 \Omega$

$10 \text{ V}$

$0 \text{ V}$

$V_{DS}$

$T_{amb}$

$P_{tot}$

$ID$

$V_{GS}$

$T_j = 25 \degree \text{C}$.

(1) $V_{GS} = 10 \text{ V}$.

(2) $V_{GS} = 5 \text{ V}$.

(3) $V_{GS} = 4 \text{ V}$.

(4) $V_{GS} = 3.5 \text{ V}$.

(5) $V_{GS} = 3 \text{ V}$.

(6) $V_{GS} = 2.5 \text{ V}$.

(7) $V_{GS} = 2 \text{ V}$.
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Fig. 6 Typical transfer characteristics.

$$V_{DS} = 10 \text{ V}; T_j = 25 \, ^\circ\text{C}.$$  

Fig. 7 Drain-source on-state resistance as a function of drain current; typical values.

$$T_j = 25 \, ^\circ\text{C}.$$  

(1) $V_{GS} = 2.5 \text{ V}$.  
(2) $V_{GS} = 3 \text{ V}$.  
(3) $V_{GS} = 3.5 \text{ V}$.  
(4) $V_{GS} = 4 \text{ V}$.  
(5) $V_{GS} = 5 \text{ V}$.  
(6) $V_{GS} = 10 \text{ V}$.  

Fig. 8 Input, output and feedback capacitance as functions of drain-source voltage; typical values.

$$V_{GS} = 0; f = 1 \text{ MHz}; T_j = 25 \, ^\circ\text{C}.$$
**Philips Semiconductors Product specification**

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**Fig. 9** Temperature coefficient of drain-source on-state resistance; typical values.

\[
k = \frac{R_{DS(on)} at T_j}{R_{DS(on)} at 25 \, ^\circ C}
\]

*Typical \( R_{DS(on)} \):*

1. \( I_D = 250 \, mA; \, V_{GS} = 10 \, V \).
2. \( I_D = 20 \, mA; \, V_{GS} = 2.4 \, V \).

---

**Fig. 10** Temperature coefficient of gate-source threshold voltage; typical values.

\[
k = \frac{V_{GS(th)} at T_j}{V_{GS(th)} at 25 \, ^\circ C}
\]

*Typical \( V_{GS(th)} \) at 1 mA.*
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PACKAGE OUTLINE

Plastic surface mounted package; collector pad for good heat transfer; 4 leads

SOT223

DIMENSIONS (mm are the original dimensions)

<table>
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<tr>
<th>UNIT</th>
<th>A</th>
<th>A1</th>
<th>b_p</th>
<th>b1</th>
<th>c</th>
<th>D</th>
<th>E</th>
<th>e</th>
<th>e1</th>
<th>HE</th>
<th>Lp</th>
<th>Q</th>
<th>v</th>
<th>w</th>
<th>y</th>
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<td>mm</td>
<td>1.8</td>
<td>0.10</td>
<td>0.80</td>
<td>3.1</td>
<td>0.32</td>
<td>6.7</td>
<td>3.7</td>
<td>4.6</td>
<td>2.3</td>
<td>7.3</td>
<td>1.1</td>
<td>0.95</td>
<td>0.2</td>
<td>0.1</td>
<td>0.1</td>
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<td></td>
<td>1.5</td>
<td>0.01</td>
<td>0.60</td>
<td>2.9</td>
<td>0.22</td>
<td>6.3</td>
<td>3.3</td>
<td></td>
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OUTLINE VERSION

| SOT223 |

REFERENCES

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EUROPEAN PROJECTION

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DATA SHEET STATUS

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<th>DEFINITIONS</th>
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<tr>
<td>Objective data</td>
<td>Development</td>
<td>This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.</td>
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<tr>
<td>Preliminary data</td>
<td>Qualification</td>
<td>This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.</td>
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<tr>
<td>Product data</td>
<td>Production</td>
<td>This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Changes will be communicated according to the Customer Product/Process Change Notification (CPCN) procedure SNW-SQ-650A.</td>
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Notes

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