BF245A; BF245B; BF245C
N-channel silicon field-effect transistors
N-channel silicon field-effect transistors

**FEATURES**
- Interchangeability of drain and source connections
- Frequencies up to 700 MHz.

**APPLICATIONS**
- LF, HF and DC amplifiers.

**DESCRIPTION**
General purpose N-channel symmetrical junction field-effect transistors in a plastic TO-92 variant package.

**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_{DS}</td>
<td>drain-source voltage</td>
<td>–</td>
<td>–</td>
<td>-30</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>V_{GS,off}</td>
<td>gate-source cut-off voltage</td>
<td>I_D = 10 nA; V_{DS} = 15 V</td>
<td>-0.25</td>
<td>–</td>
<td>-8</td>
<td>V</td>
</tr>
<tr>
<td>V_{GSO}</td>
<td>gate-source voltage</td>
<td>open drain</td>
<td>–</td>
<td>–</td>
<td>–30</td>
<td>V</td>
</tr>
<tr>
<td>I_{DSS}</td>
<td>drain current</td>
<td>V_{DS} = 15 V; V_{GS} = 0</td>
<td>BF245A</td>
<td>2</td>
<td>–</td>
<td>6.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BF245B</td>
<td>6</td>
<td>–</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BF245C</td>
<td>12</td>
<td>–</td>
<td>25</td>
</tr>
<tr>
<td>P_{tot}</td>
<td>total power dissipation</td>
<td>T_{amb} = 75 °C</td>
<td>–</td>
<td>–</td>
<td>300</td>
<td>mW</td>
</tr>
<tr>
<td>|Y_{fs}</td>
<td></td>
<td>forward transfer admittance</td>
<td>V_{DS} = 15 V; V_{GS} = 0; f = 1 kHz; T_{amb} = 25 °C</td>
<td>3</td>
<td>–</td>
<td>6.5</td>
</tr>
<tr>
<td>C_{rs}</td>
<td>reverse transfer capacitance</td>
<td>V_{DS} = 20 V; V_{GS} = -1 V; f = 1 MHz; T_{amb} = 25 °C</td>
<td>–</td>
<td>–</td>
<td>1.1</td>
<td>pF</td>
</tr>
</tbody>
</table>
N-channel silicon field-effect transistors  BF245A; BF245B; BF245C

LIMITING VALUES
In accordance with the Absolute Maximum Rating System (IEC 134).

<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</td>
<td></td>
<td>–</td>
<td>±30</td>
<td>V</td>
</tr>
<tr>
<td>V_{GDO}</td>
<td>gate-drain voltage</td>
<td>open source</td>
<td>–</td>
<td>–30</td>
<td>V</td>
</tr>
<tr>
<td>V_{GSO}</td>
<td>gate-source voltage</td>
<td>open drain</td>
<td>–</td>
<td>–30</td>
<td>V</td>
</tr>
<tr>
<td>I_D</td>
<td>drain current</td>
<td></td>
<td>–</td>
<td>25</td>
<td>mA</td>
</tr>
<tr>
<td>I_G</td>
<td>gate current</td>
<td></td>
<td>–</td>
<td>10</td>
<td>mA</td>
</tr>
<tr>
<td>P_{tot}</td>
<td>total power dissipation</td>
<td>up to T_{amb} = 75 °C;</td>
<td>–</td>
<td>300</td>
<td>mW</td>
</tr>
<tr>
<td></td>
<td></td>
<td>up to T_{amb} = 90 °C; note 1</td>
<td>–</td>
<td>300</td>
<td>mW</td>
</tr>
<tr>
<td>T_{stg}</td>
<td>storage temperature</td>
<td></td>
<td>–65</td>
<td>+150</td>
<td>°C</td>
</tr>
<tr>
<td>T_j</td>
<td>operating junction temp.</td>
<td></td>
<td>–</td>
<td>150</td>
<td>°C</td>
</tr>
</tbody>
</table>

Note
1. Device mounted on a printed-circuit board, minimum lead length 3 mm, mounting pad for drain lead minimum 10 mm x 10 mm.

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</td>
<td>in free air</td>
<td>250</td>
<td>K/W</td>
</tr>
<tr>
<td></td>
<td>to ambient</td>
<td>thermal resistance from junction</td>
<td>200</td>
<td>K/W</td>
</tr>
</tbody>
</table>

STATIC CHARACTERISTICS

T_j = 25 °C; unless otherwise specified.

<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_{BR(GS)}</td>
<td>gate-source breakdown voltage</td>
<td>I_G = -1 μA; V_{DS} = 0</td>
<td>–30</td>
<td>–</td>
<td>V</td>
</tr>
<tr>
<td>V_{GSOff}</td>
<td>gate-source cut-off voltage</td>
<td>I_D = 10 nA; V_{DS} = 15 V</td>
<td>–0.25</td>
<td>–8.0</td>
<td>V</td>
</tr>
<tr>
<td>V_GS</td>
<td>gate-source voltage</td>
<td>I_D = 200 μA; V_{DS} = 15 V</td>
<td>–0.4</td>
<td>–2.2</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BF245A</td>
<td>–1.6</td>
<td>–3.8</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BF245B</td>
<td>–3.2</td>
<td>–7.5</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BF245C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I_{DSS}</td>
<td>drain current</td>
<td>V_{DS} = 15 V; V_{GS} = 0; note 1</td>
<td>2</td>
<td>6.5</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BF245A</td>
<td>6</td>
<td>15</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BF245B</td>
<td>12</td>
<td>25</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BF245C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I_{GSS}</td>
<td>gate cut-off current</td>
<td>V_{GS} = -20 V; V_{DS} = 0</td>
<td>–</td>
<td>–5</td>
<td>nA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V_{GS} = -20 V; V_{DS} = 0; T_j =</td>
<td>–</td>
<td>–0.5</td>
<td>μA</td>
</tr>
</tbody>
</table>

Note
1. Measured under pulse conditions: t_p = 300 μs; δ ≤ 0.02.
DYNAMIC CHARACTERISTICS
Common source; \( T_{\text{amb}} = 25 \, ^\circ\text{C} \); 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>( C_{\text{gs}} )</td>
<td>input capacitance</td>
<td>( V_{\text{DS}} = 20 , \text{V}; , V_{\text{GS}} = -1 , \text{V}; , f = 1 , \text{MHz} )</td>
<td>–</td>
<td>4</td>
<td>–</td>
<td>pF</td>
</tr>
<tr>
<td>( C_{\text{rs}} )</td>
<td>reverse transfer capacitance</td>
<td>( V_{\text{DS}} = 20 , \text{V}; , V_{\text{GS}} = -1 , \text{V}; , f = 1 , \text{MHz} )</td>
<td>–</td>
<td>1.1</td>
<td>–</td>
<td>pF</td>
</tr>
<tr>
<td>( C_{\text{os}} )</td>
<td>output capacitance</td>
<td>( V_{\text{DS}} = 20 , \text{V}; , V_{\text{GS}} = -1 , \text{V}; , f = 1 , \text{MHz} )</td>
<td>–</td>
<td>1.6</td>
<td>–</td>
<td>pF</td>
</tr>
<tr>
<td>( g_{\text{ds}} )</td>
<td>input conductance</td>
<td>( V_{\text{DS}} = 15 , \text{V}; , V_{\text{GS}} = 0; , f = 200 , \text{MHz} )</td>
<td>–</td>
<td>250</td>
<td>–</td>
<td>( \mu \text{S} )</td>
</tr>
<tr>
<td>( g_{\text{os}} )</td>
<td>output conductance</td>
<td>( V_{\text{DS}} = 15 , \text{V}; , V_{\text{GS}} = 0; , f = 200 , \text{MHz} )</td>
<td>–</td>
<td>40</td>
<td>–</td>
<td>( \mu \text{S} )</td>
</tr>
<tr>
<td>(</td>
<td>y_{\text{fs}}</td>
<td>)</td>
<td>forward transfer admittance</td>
<td>( V_{\text{DS}} = 15 , \text{V}; , V_{\text{GS}} = 0; , f = 1 , \text{kHz} )</td>
<td>–</td>
<td>3</td>
</tr>
<tr>
<td>(</td>
<td>y_{\text{rs}}</td>
<td>)</td>
<td>reverse transfer admittance</td>
<td>( V_{\text{DS}} = 15 , \text{V}; , V_{\text{GS}} = 0; , f = 200 , \text{MHz} )</td>
<td>–</td>
<td>6</td>
</tr>
<tr>
<td>(</td>
<td>y_{\text{os}}</td>
<td>)</td>
<td>output admittance</td>
<td>( V_{\text{DS}} = 15 , \text{V}; , V_{\text{GS}} = 0; , f = 1 , \text{kHz} )</td>
<td>–</td>
<td>1.4</td>
</tr>
<tr>
<td>( f_{\text{gfs}} )</td>
<td>cut-off frequency</td>
<td>( V_{\text{DS}} = 15 , \text{V}; , V_{\text{GS}} = 0; , g_{\text{fs}} = 0.7 ) of its value at 1 kHz</td>
<td>–</td>
<td>700</td>
<td>–</td>
<td>MHz</td>
</tr>
<tr>
<td>( F )</td>
<td>noise figure</td>
<td>( V_{\text{DS}} = 15 , \text{V}; , V_{\text{GS}} = 0; , f = 100 , \text{MHz}; , R_{\text{G}} = 1 , \text{k\Omega} ) (common source); input tuned to minimum noise</td>
<td>–</td>
<td>1.5</td>
<td>–</td>
<td>dB</td>
</tr>
</tbody>
</table>
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Fig. 4 Output characteristics for BF245A; typical values.

V_DS = 15 V; Tj = 25 °C.

Fig. 5 Transfer characteristics for BF245B; typical values.

V_DS = 15 V; Tj = 25 °C.

Fig. 6 Output characteristics for BF245B; typical values.

V_DS = 15 V; Tj = 25 °C.

Fig. 7 Transfer characteristics for BF245C; typical values.

V_DS = 15 V; Tj = 25 °C.
N-channel silicon field-effect transistors

BF245A; BF245B; BF245C

Fig. 8 Output characteristics for BF245C; typical values.

Fig. 9 Drain current as a function of junction temperature; typical values for BF245A.

Fig. 10 Drain current as a function of junction temperature; typical values for BF245B.

Fig. 11 Drain current as a function of junction temperature; typical values for BF245C.
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Fig. 12  Input admittance; typical values.

Fig. 13  Common source reverse admittance as a function of frequency; typical values.

Fig. 14  Common-source forward transfer admittance as a function of frequency; typical values.

Fig. 15  Common-source output admittance as a function of frequency; typical values.
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**Fig. 16** Input capacitance as a function of gate-source voltage; typical values. 

![Input Capacitance Graph](image1)

\[C_{IS} \text{(pF)} \text{ vs. } V_{GS} \text{(V)}\]

-\[V_{DS} = 20 \text{ V; } f = 1 \text{ MHz; } T_{amb} = 25 \text{ °C.}\]

**Fig. 17** Reverse transfer capacitance as a function of gate-source voltage; typical values. 

![Reverse Transfer Capacitance Graph](image2)

\[C_{RS} \text{(pF)} \text{ vs. } V_{GS} \text{(V)}\]

-\[V_{DS} = 20 \text{ V; } f = 1 \text{ MHz; } T_{amb} = 25 \text{ °C.}\]

**Fig. 18** Forward transfer admittance as a function of drain current; typical values. 

![Forward Transfer Admittance Graph](image3)

\[|Y_{FS}| \text{(mA/V)} \text{ vs. } I_{D} \text{(mA)}\]

-\[V_{DS} = 15 \text{ V; } f = 1 \text{ kHz; } T_{j} = 25 \text{ °C.}\]

**Fig. 19** Gate-source cut-off voltage as a function of drain current; typical values. 

![Gate-source Cut-off Voltage Graph](image4)

\[V_{GS(off)} \text{(V)} \text{ vs. } I_{D} \text{(mA)}\]

-\[V_{DS} = 15 \text{ V; } T_{j} = 25 \text{ °C.}\]
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**Fig.20** Drain-source on-state resistance as a function of gate-source voltage; typical values.

\[
R_{DSon} (k\Omega) \quad \text{vs} \quad V_{GS} (V)
\]

\[V_{DS} = 0; \quad f = 1 \text{ kHz}; \quad T_{\text{amb}} = 25^\circ \text{C}.\]

**Fig.21** Noise figure as a function of frequency; typical values.

\[
F (\text{dB}) \quad \text{vs} \quad f (\text{MHz})
\]

\[V_{DS} = 15 \text{ V}; \quad V_{GS} = 0; \quad R_{G} = 1 \text{ k}\Omega; \quad T_{\text{amb}} = 25^\circ \text{C}.\]

Input tuned to minimum noise.
PACKAGE OUTLINE

Plastic single-ended leaded (through hole) package; 3 leads (on-circle)  
SOT54 variant

DIMENSIONS (mm are the original dimensions)

<table>
<thead>
<tr>
<th>UNIT</th>
<th>A</th>
<th>b</th>
<th>b1</th>
<th>c</th>
<th>D</th>
<th>d</th>
<th>E</th>
<th>e</th>
<th>e1</th>
<th>L</th>
<th>Lf(1) max</th>
<th>L2 max</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
<td>5.2</td>
<td>5.0</td>
<td>0.48</td>
<td>0.40</td>
<td>0.66</td>
<td>0.45</td>
<td>4.8</td>
<td>1.4</td>
<td>4.2</td>
<td>1.7</td>
<td>4.2</td>
<td>2.54</td>
</tr>
</tbody>
</table>

Note

1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.
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DATA SHEET STATUS

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<th>PRODUCT STATUS(2)</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<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>
</tbody>
</table>

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This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content, except for package outline drawings which were updated to the latest version.

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