



# BF545A; BF545B; BF545C

N-channel silicon junction field-effect transistors

Rev. 4 — 15 September 2011

Product data sheet

## 1. Product profile

### 1.1 General description

N-channel symmetrical silicon junction field-effect transistors in a SOT23 package.

#### CAUTION



This device is sensitive to ElectroStatic Discharge (ESD). Therefore care should be taken during transport and handling.

### 1.2 Features and benefits

- Low leakage level (typ. 500 fA)
- High gain
- Low cut-off voltage (max. 2.2 V for BF545A).

### 1.3 Applications

- Impedance converters in e.g. electret microphones and infra-red detectors
- VHF amplifiers in oscillators and mixers.

### 1.4 Quick reference data

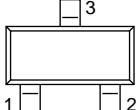

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DS}$	drain-source voltage		-	-	$\pm 30$	V
$V_{GSoff}$	gate-source cut-off voltage	$I_D = 1 \mu A; V_{DS} = 15 V$	-0.4	-	-7.8	V
$I_{DSS}$	drain current	$V_{GS} = 0 V; V_{DS} = 15 V$				
		BF545A	2	-	6.5	mA
		BF545B	6	-	15	mA
		BF545C	12	-	25	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25 \text{ }^\circ\text{C}$	-	-	250	mW
$ y_{fs} $	forward transfer admittance	$V_{GS} = 0 V; V_{DS} = 15 V$	3	-	6.5	mS



## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Symbol
1	source (s)		
2	drain (d)		
3	gate (g)		

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BF545A	-	plastic surface mounted package; 3 leads	SOT23
BF545B			
BF545C			

## 4. Marking

Table 4. Marking

Type number	Marking code <sup>[1]</sup>
BF545A	20*
BF545B	21*
BF545C	22*

[1] \* = p: made in Hong Kong.

\* = t: made in Malaysia.

\* = W: made in China.

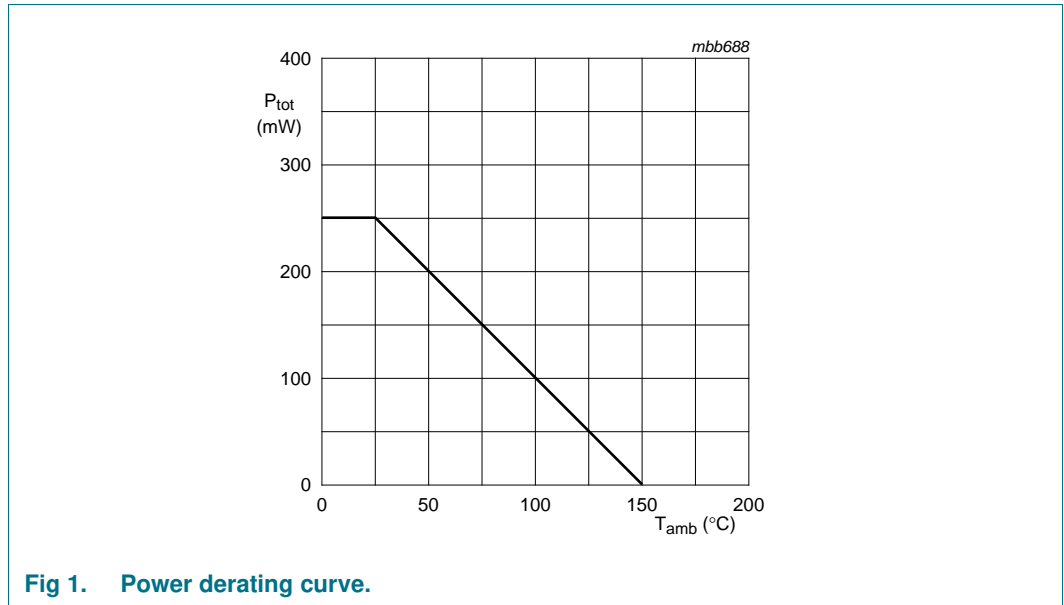
**5. Limiting values**

**Table 5. Limiting values**

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

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DS}$	drain-source voltage (DC)		-	$\pm 30$	V
$V_{GSO}$	gate-source voltage	open drain	-	-30	V
$V_{GDO}$	gate-drain voltage (DC)	open source	-	-30	V
$I_G$	forward gate current (DC)		-	10	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[1]	250	mW
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	junction temperature		-	150	°C

[1] Device mounted on an FR4 printed-circuit board, maximum lead length 4 mm; mounting pad for the drain lead 10 mm<sup>2</sup>.



**Fig 1. Power derating curve.**

**6. Thermal characteristics**

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient		[1] 500	K/W

[1] Device mounted on an FR4 printed-circuit board, maximum lead length 4 mm; mounting pad for the drain lead 10 mm<sup>2</sup>.

## 7. Static characteristics

**Table 7. Static characteristics**

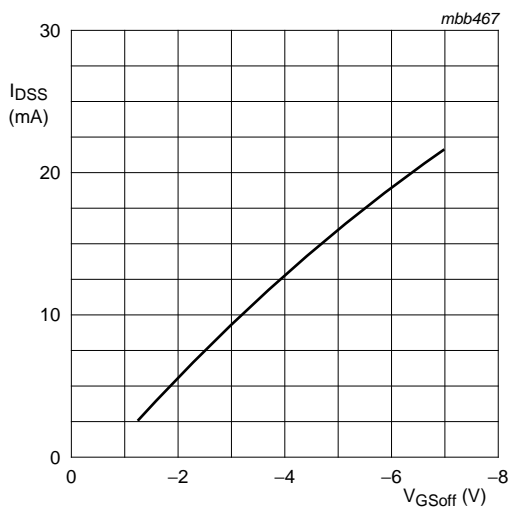
$T_j = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)GSS}$	gate-source breakdown voltage	$I_G = -1\ \mu\text{A}$ ; $V_{DS} = 0\ \text{V}$	-30	-	-	V
$V_{GSoff}$	gate-source cut-off voltage	$I_D = 200\ \mu\text{A}$ ; $V_{DS} = 15\ \text{V}$				
		BF545A	-0.4	-	-2.2	V
		BF545B	-1.6	-	-3.8	V
		BF545C	-3.2	-	-7.8	V
$I_{DSS}$	drain current	$V_{GS} = 0\ \text{V}$ ; $V_{DS} = 15\ \text{V}$				
		BF545A	2	-	6.5	mA
		BF545B	6	-	15	mA
		BF545C	12	-	25	mA
$I_{GSS}$	gate-source leakage current	$V_{GS} = -20\ \text{V}$ ; $V_{DS} = 0\ \text{V}$	-	-0.5	-1000	pA
		$V_{GS} = -20\ \text{V}$ ; $V_{DS} = 0\ \text{V}$ ; $T_j = 125\text{ °C}$	-	-	-100	nA
$ y_{fs} $	forward transfer admittance	$V_{GS} = 0\ \text{V}$ ; $V_{DS} = 15\ \text{V}$	3	-	6.5	mS
$ y_{os} $	common source output admittance	$V_{GS} = 0\ \text{V}$ ; $V_{DS} = 15\ \text{V}$	-	40	-	$\mu\text{S}$

## 8. Dynamic characteristics

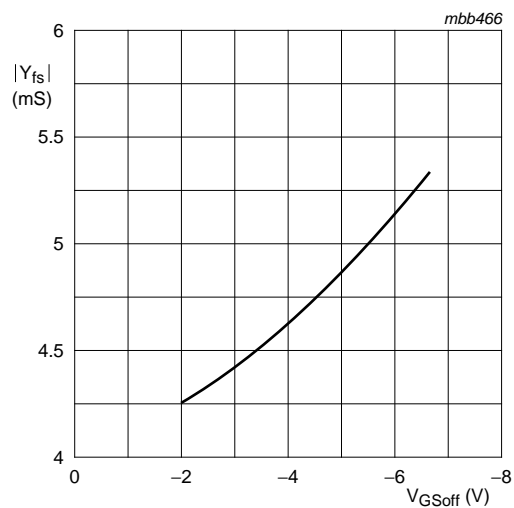
**Table 8. Dynamic characteristics**  
*T<sub>amb</sub> = 25 °C unless otherwise specified.*

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
C <sub>iss</sub>	input capacitance	V <sub>DS</sub> = 15 V; f = 1 MHz				
		V <sub>GS</sub> = -10 V	-	1.7	-	pF
		V <sub>GS</sub> = 0 V	-	3	-	pF
C <sub>rss</sub>	reverse transfer capacitance	V <sub>DS</sub> = 15 V; f = 1 MHz				
		V <sub>GS</sub> = -10 V	-	0.8	-	pF
		V <sub>GS</sub> = 0 V	-	0.9	-	pF
g <sub>is</sub>	common source input conductance	V <sub>DS</sub> = 10 V; I <sub>D</sub> = 1 mA				
		f = 100 MHz	-	15	-	μS
		f = 450 MHz	-	300	-	μS
g <sub>fs</sub>	common source transfer conductance	V <sub>DS</sub> = 10 V; I <sub>D</sub> = 1 mA				
		f = 100 MHz	-	2	-	mS
		f = 450 MHz	-	1.8	-	mS
g <sub>rs</sub>	common source reverse conductance	V <sub>DS</sub> = 10 V; I <sub>D</sub> = 1 mA				
		f = 100 MHz	-	-6	-	μS
		f = 450 MHz	-	-40	-	μS
g <sub>os</sub>	common source output conductance	V <sub>DS</sub> = 10 V; I <sub>D</sub> = 1 mA				
		f = 100 MHz	-	30	-	μS
		f = 450 MHz	-	60	-	μS



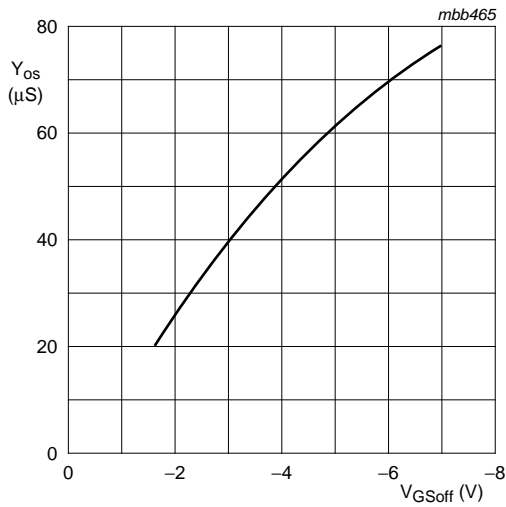
V<sub>DS</sub> = 15 V; T<sub>j</sub> = 25 °C.

**Fig 2. Drain current as a function of gate-source cut-off voltage; typical values.**



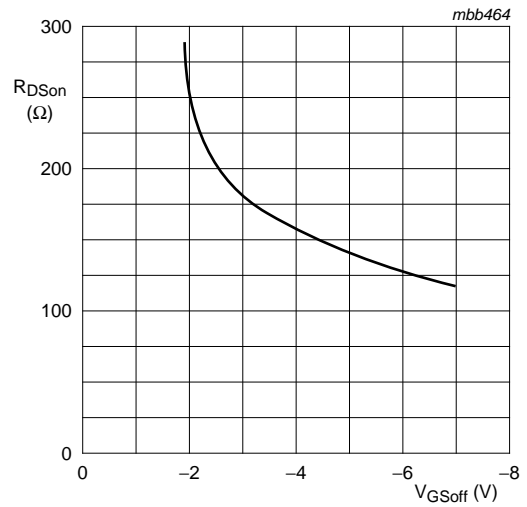
V<sub>DS</sub> = 15 V; V<sub>GS</sub> = 0 V; T<sub>j</sub> = 25 °C.

**Fig 3. Forward transfer admittance as a function of gate-source cut-off voltage; typical values.**



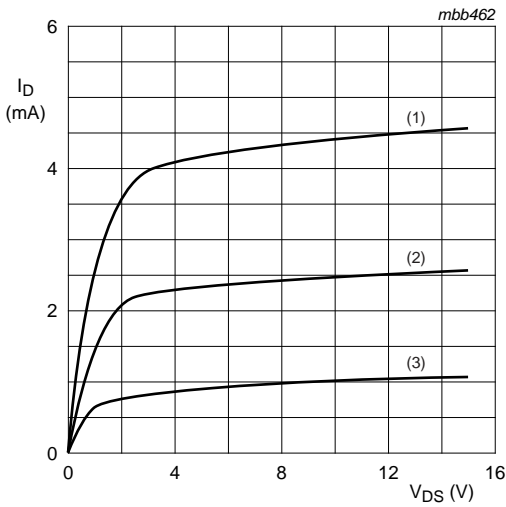
$V_{DS} = 15\text{ V}; V_{GS} = 0\text{ V}; T_j = 25\text{ }^\circ\text{C}.$

**Fig 4. Common-source output admittance as a function of gate-source cut-off voltage; typical values.**



$V_{DS} = 100\text{ mV}; V_{GS} = 0\text{ V}; T_j = 25\text{ }^\circ\text{C}.$

**Fig 5. Drain-source on-resistance as a function of gate-source cut-off voltage; typical values.**

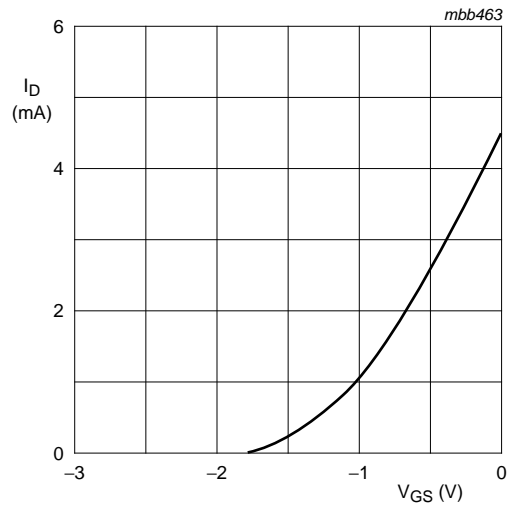


**BF545A**

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

- (1)  $V_{GS} = 0\text{ V}.$
- (2)  $V_{GS} = -0.5\text{ V}.$
- (3)  $V_{GS} = -1.0\text{ V}.$

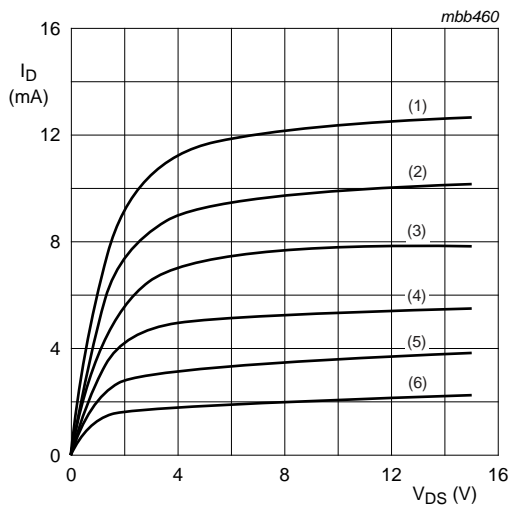
**Fig 6. Typical output characteristics.**



**BF545A**

$V_{DS} = 15\text{ V}; T_j = 25\text{ }^\circ\text{C}.$

**Fig 7. Typical input characteristics.**

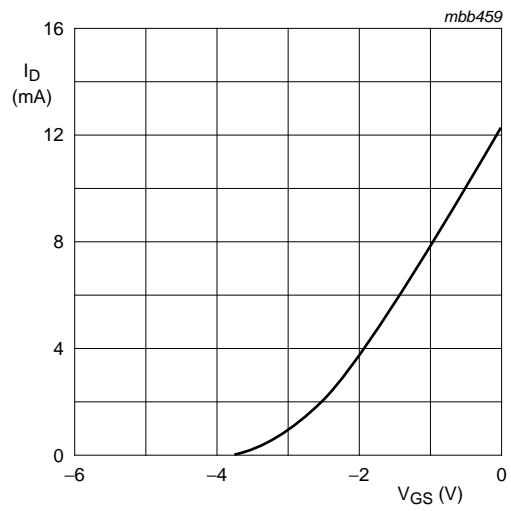


**BF545B**

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

- (1)  $V_{GS} = 0\text{ V}$ .
- (2)  $V_{GS} = -0.5\text{ V}$ .
- (3)  $V_{GS} = -1.0\text{ V}$ .
- (4)  $V_{GS} = -1.5\text{ V}$ .
- (5)  $V_{GS} = -2.0\text{ V}$ .
- (6)  $V_{GS} = -2.5\text{ V}$ .

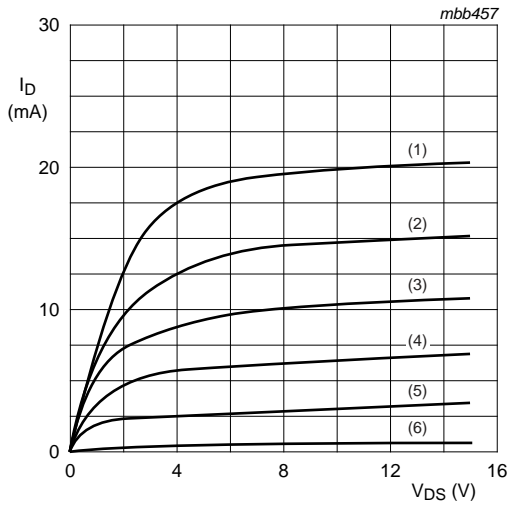
**Fig 8. Typical output characteristics.**



**BF545B**

$V_{DS} = 15\text{ V}$ ;  $T_j = 25\text{ }^\circ\text{C}$ .

**Fig 9. Typical input characteristics.**

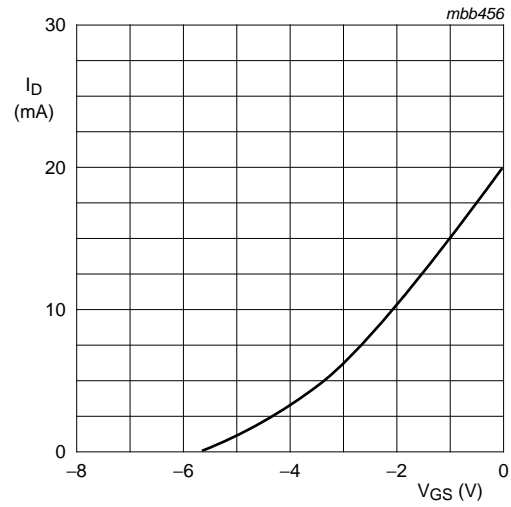


**BF545C**

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

- (1)  $V_{GS} = 0\text{ V}$ .
- (2)  $V_{GS} = -1.0\text{ V}$ .
- (3)  $V_{GS} = -2.0\text{ V}$ .
- (4)  $V_{GS} = -3.0\text{ V}$ .
- (5)  $V_{GS} = -4.0\text{ V}$ .
- (6)  $V_{GS} = -5.0\text{ V}$ .

**Fig 10. Typical output characteristics.**

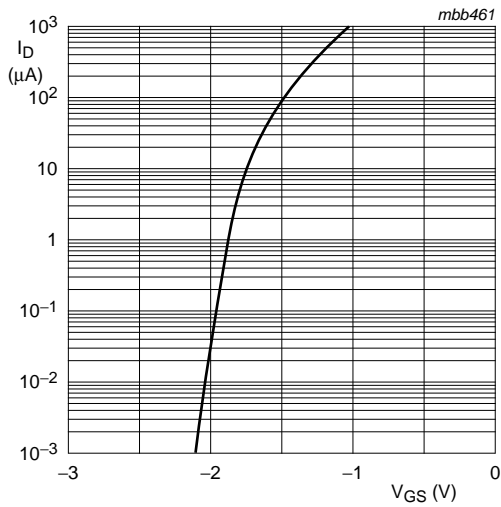


**BF545C**

$V_{DS} = 15\text{ V}$ ;  $T_j = 25\text{ }^\circ\text{C}$ .

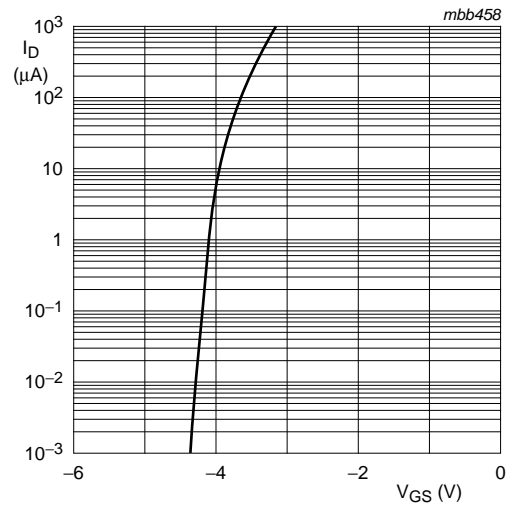
**Fig 11. Typical input characteristics.**





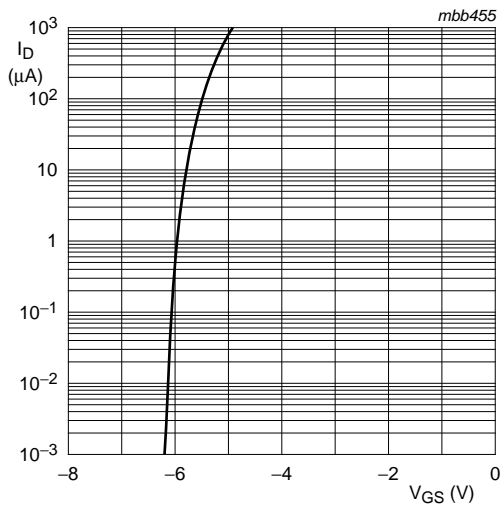
**BF545A**  
 $V_{DS} = 15 \text{ V}; T_j = 25 \text{ }^\circ\text{C}.$

**Fig 12. Drain current as a function of gate-source voltage; typical values.**



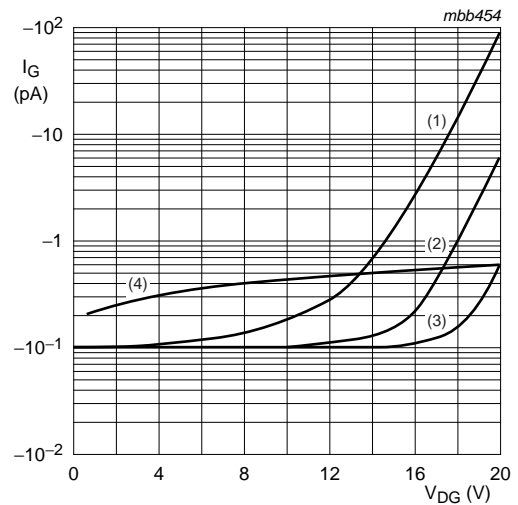
**BF545B**  
 $V_{DS} = 15 \text{ V}; T_j = 25 \text{ }^\circ\text{C}.$

**Fig 13. Drain current as a function of gate-source voltage; typical values.**



**BF545C**  
 $V_{DS} = 15 \text{ V}; T_j = 25 \text{ }^\circ\text{C}.$

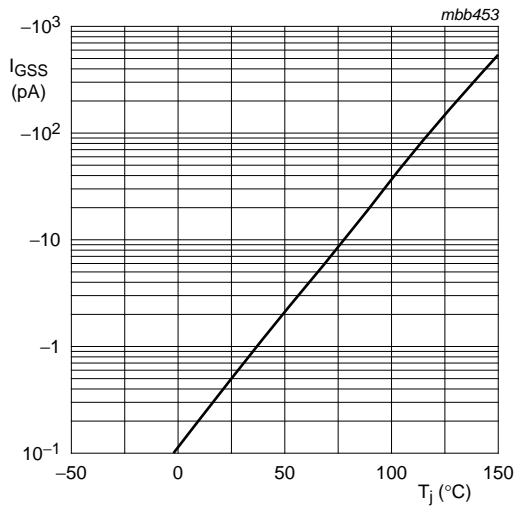
**Fig 14. Drain current as a function of gate-source voltage; typical values.**



$I_D = 10 \text{ mA}$  only for BF545B and BF545C;  $T_j = 25 \text{ }^\circ\text{C}.$

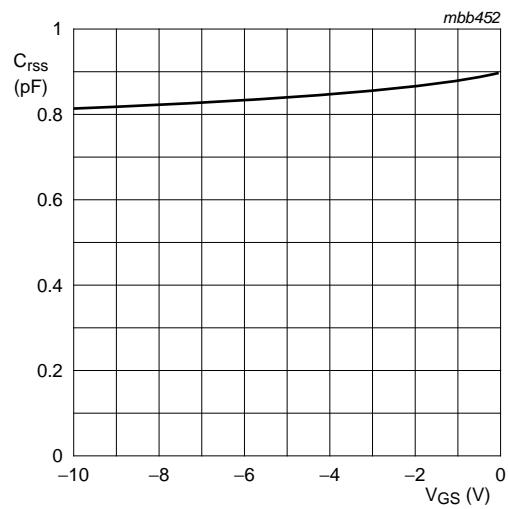
- (1)  $I_D = 10 \text{ mA}.$
- (2)  $I_D = 1 \text{ mA}.$
- (3)  $I_D = 0.1 \text{ mA}.$
- (4)  $I_{GSS}.$

**Fig 15. Gate current as a function of drain-gate voltage; typical values.**



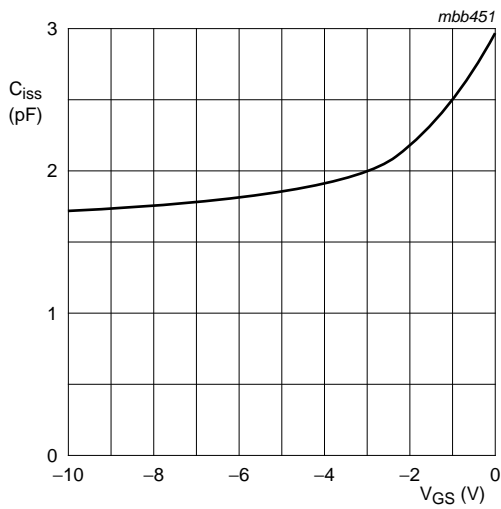
$V_{DS} = 0\text{ V}; V_{GS} = -20\text{ V}.$

**Fig 16. Gate current as a function of junction temperature; typical values.**



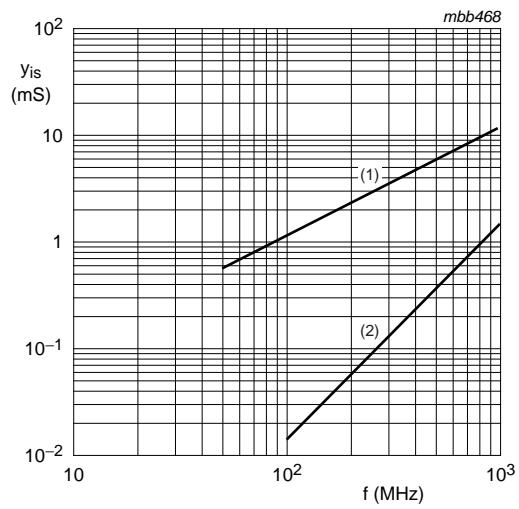
$V_{DS} = 15\text{ V}; T_j = 25\text{ °C}.$

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



$V_{DS} = 15\text{ V}; T_j = 25\text{ °C}.$

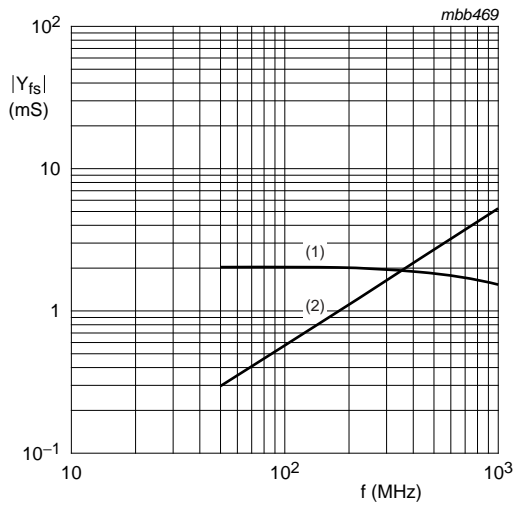
**Fig 18. Typical input capacitance.**



$V_{DS} = 10\text{ V}; I_D = 1\text{ mA}; T_{amb} = 25\text{ °C}.$

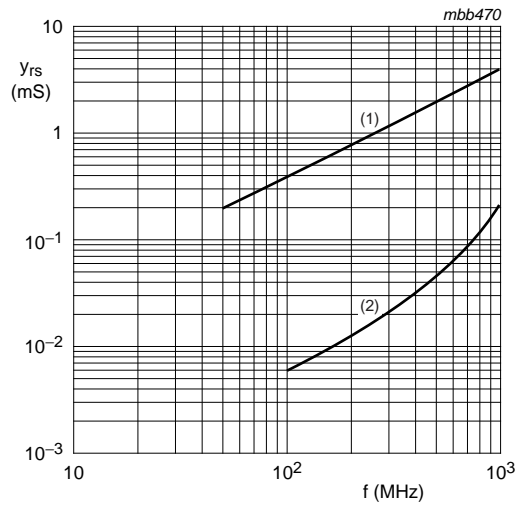
- (1)  $b_{is}$ .
- (2)  $g_{is}$ .

**Fig 19. Common-source input admittance; typical values.**



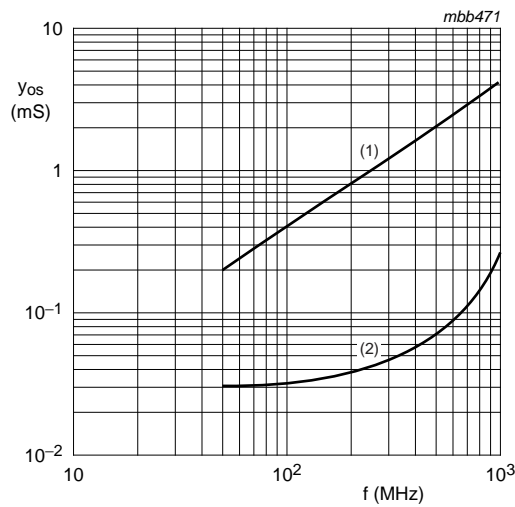
$V_{DS} = 10\text{ V}; I_D = 1\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}.$   
 (1)  $g_{fs}$   
 (2)  $-b_{fs}$

**Fig 20. Common-source forward transfer admittance; typical values.**



$V_{DS} = 10\text{ V}; I_D = 1\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}.$   
 (1)  $-b_{rs}$   
 (2)  $-g_{rs}$

**Fig 21. Common-source reverse transfer admittance; typical values.**



$V_{DS} = 10\text{ V}; I_D = 1\text{ mA}; T_{amb} = 25\text{ }^\circ\text{C}.$   
 (1)  $b_{os}$   
 (2)  $g_{os}$

**Fig 22. Common-source output admittance; typical values.**

**9. Package outline**

Plastic surface-mounted package; 3 leads

SOT23

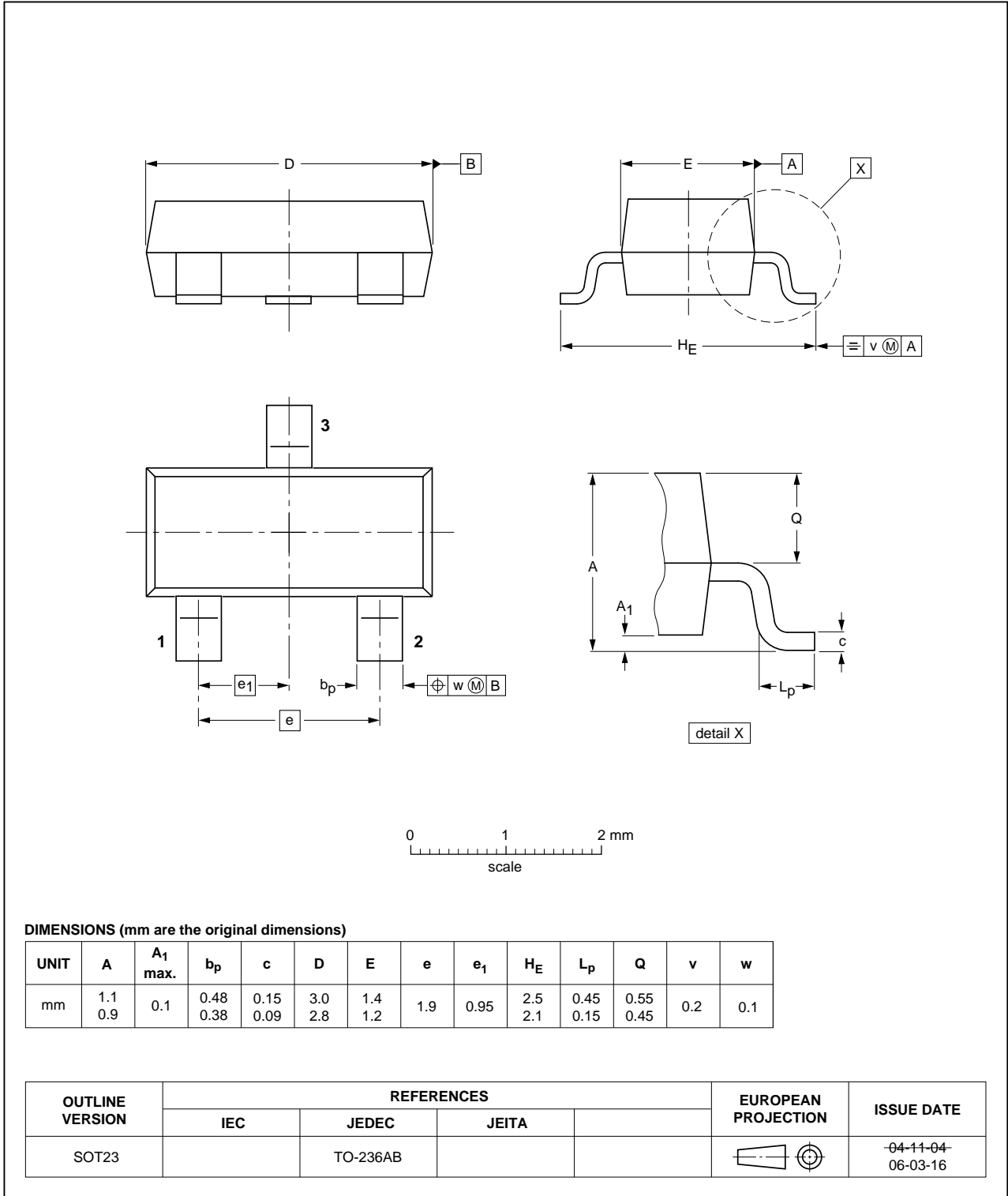


Fig 23. Package outline.

## 10. Revision history

**Table 9. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BF545A_BF545B_BF545C v.4	20110915	Product data sheet	-	BF545A_BF545B_BF545C v.3
Modifications:				
				<ul style="list-style-type: none"><li>• The format of this data sheet 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>• Package outline drawings have been updated to the latest version.</li></ul>
BF545A_BF545B_BF545C v.3 (9397 750 13391)	20040805	Product data sheet	-	BF545A-B-C v.2
BF545A-B-C v.2	19960729	Product specification	-	-

## 11. Legal information

### 11.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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For sales office addresses, please send an email to: [salesaddresses@nxp.com](mailto:salesaddresses@nxp.com)

## 13. Contents

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Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

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For sales office addresses, please send an email to: [salesaddresses@nxp.com](mailto:salesaddresses@nxp.com)

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