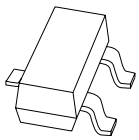


BF545A; BF545B; BF545C

N-channel silicon junction field-effect transistors

Rev. 03 — 5 August 2004 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

- 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

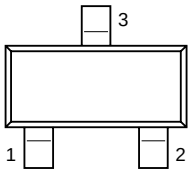
Table 1: Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage		-	-	±30	V
V_{GSoff}	gate-source cut-off voltage	I_D = 1 μA; 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	$T_{amb} \leq 25$ °C	-	-	250	mW
$\lvert y_{fs} \rvert$	forward transfer admittance	V_{GS} = 0 V; V_{DS} = 15 V	3	-	6.5	mS

PHILIPS

2. Pinning information

Table 2: Pinning

Pin	Description	Simplified outline	Symbol
1	source (s)	 SOT23	 sym054
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 [1]
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)			-	±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	$T_{amb} \leq 25$ °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^2.

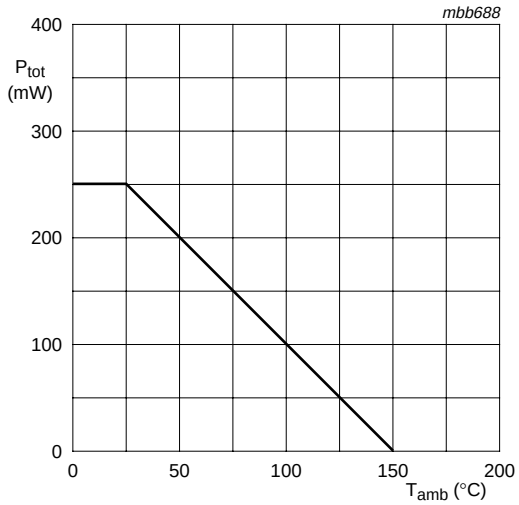


Fig 1. Power derating curve.

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^2.

7. Static characteristics

Table 7: Static characteristics

T_j = 25 °C unless otherwise specified.

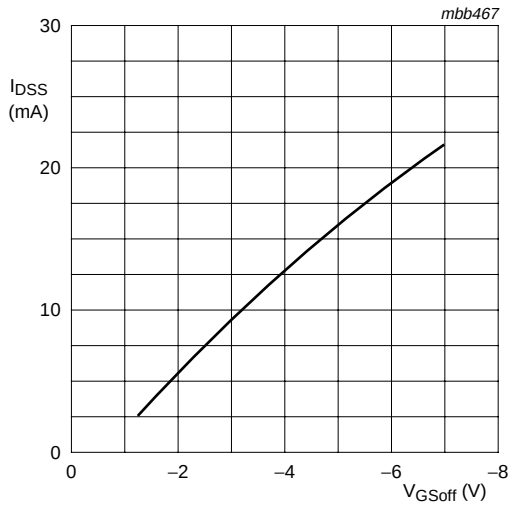
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)GSS}$	gate-source breakdown voltage	I_G = –1 µA; V_{DS} = 0 V	–30	-	-	V
V_{GSoff}	gate-source cut-off voltage	I_D = 200 µA; V_{DS} = 15 V				
		BF545A	–0.4	-	–2.2	V
		BF545B	–1.6	-	–3.8	V
		BF545C	–3.2	-	–7.8	V
		I_D = 1 µA; V_{DS} = 15 V	–0.4	-	–7.5	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
I_{GSS}	gate-source leakage current	V_{GS} = –20 V; V_{DS} = 0 V	-	–0.5	–1000	pA
		V_{GS} = –20 V; V_{DS} = 0 V; T_j = 125 °C	-	-	–100	nA
$\|y_{fs}\|$	forward transfer admittance	V_{GS} = 0 V; V_{DS} = 15 V	3	-	6.5	mS
$\|y_{os}\|$	common source output admittance	V_{GS} = 0 V; V_{DS} = 15 V	-	40	-	µS

8. Dynamic characteristics

Table 8: Dynamic characteristics

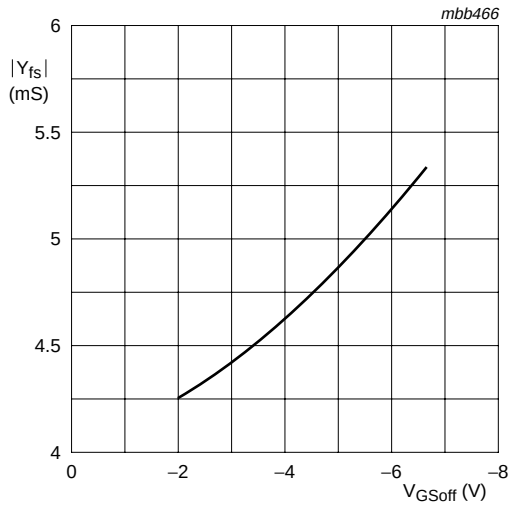
T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
C_{iss}	input capacitance	V_{DS} = 15 V; f = 1 MHz				
		V_{GS} = –10 V	-	1.7	-	pF
		V_{GS} = 0 V	-	3	-	pF
C_{rss}	reverse transfer capacitance	V_{DS} = 15 V; f = 1 MHz				
		V_{GS} = –10 V	-	0.8	-	pF
		V_{GS} = 0 V	-	0.9	-	pF
g_{is}	common source input conductance	V_{DS} = 10 V; I_D = 1 mA				
		f = 100 MHz	-	15	-	µS
		f = 450 MHz	-	300	-	µS
g_{fs}	common source transfer conductance	V_{DS} = 10 V; I_D = 1 mA				
		f = 100 MHz	-	2	-	mS
		f = 450 MHz	-	1.8	-	mS
g_{rs}	common source reverse conductance	V_{DS} = 10 V; I_D = 1 mA				
		f = 100 MHz	-	–6	-	µS
		f = 450 MHz	-	–40	-	µS
g_{os}	common source output conductance	V_{DS} = 10 V; I_D = 1 mA				
		f = 100 MHz	-	30	-	µS
		f = 450 MHz	-	60	-	µS



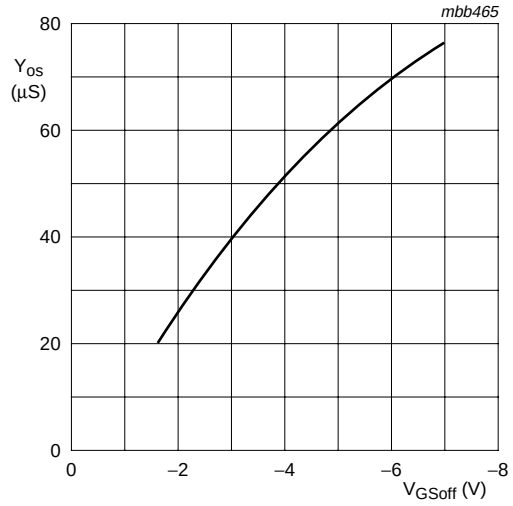
V_{DS} = 15 V; T_j = 25 °C.

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



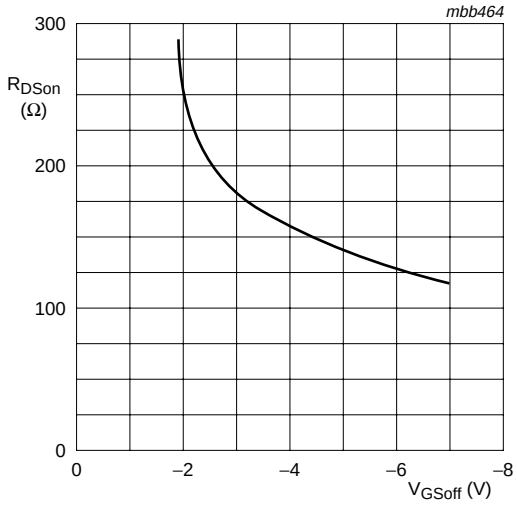
V_{DS} = 15 V; V_{GS} = 0 V; T_j = 25 °C.

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



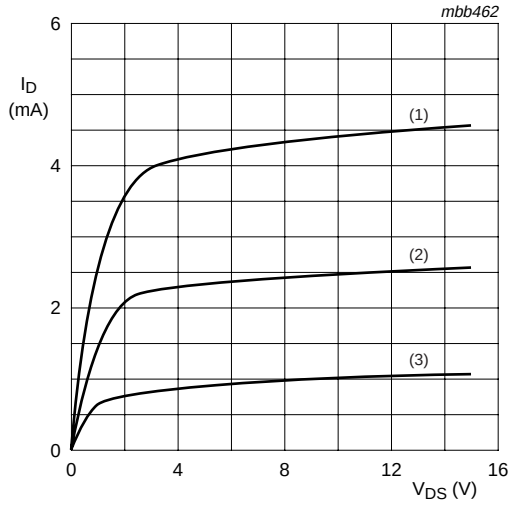
V_{DS} = 15 V; V_{GS} = 0 V; T_j = 25 °C.

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



V_{DS} = 100 mV; V_{GS} = 0 V; T_j = 25 °C.

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



BF545A

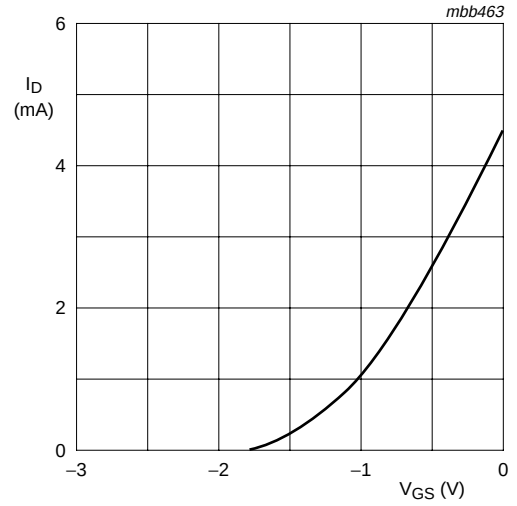
T_j = 25 °C.

(1) V_{GS} = 0 V.

(2) V_{GS} = −0.5 V.

(3) V_{GS} = −1.0 V.

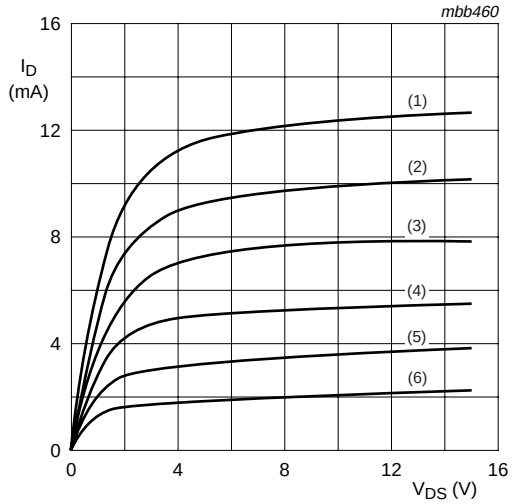
Fig 6. Typical output characteristics.



BF545A

V_{DS} = 15 V; T_j = 25 °C.

Fig 7. Typical input characteristics.



BF545B

T_j = 25 °C.

(1) V_{GS} = 0 V.

(2) V_{GS} = −0.5 V.

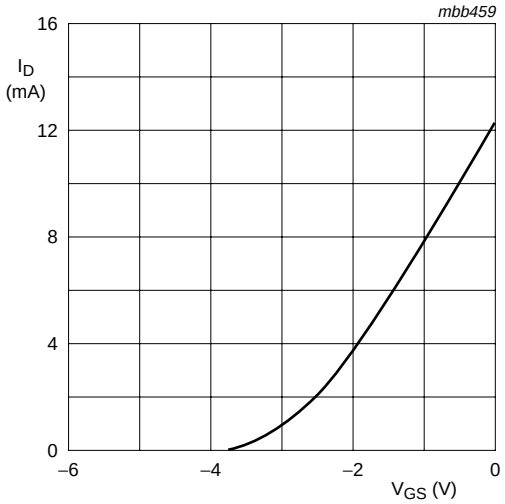
(3) V_{GS} = −1.0 V.

(4) V_{GS} = −1.5 V.

(5) V_{GS} = −2.0 V.

(6) V_{GS} = −2.5 V.

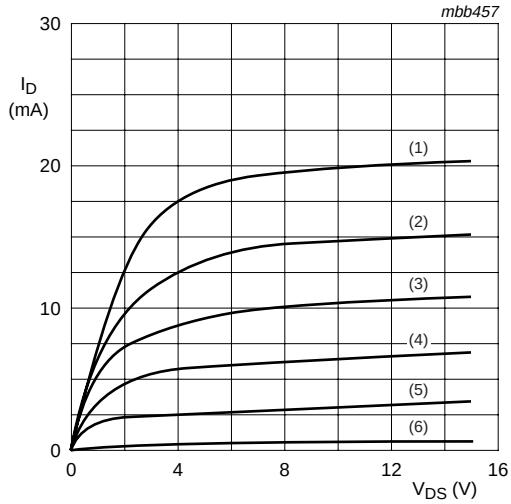
Fig 8. Typical output characteristics.



BF545B

V_{DS} = 15 V; T_j = 25 °C.

Fig 9. Typical input characteristics.



BF545C

T_j = 25 °C.

(1) V_{GS} = 0 V.

(2) V_{GS} = −1.0 V.

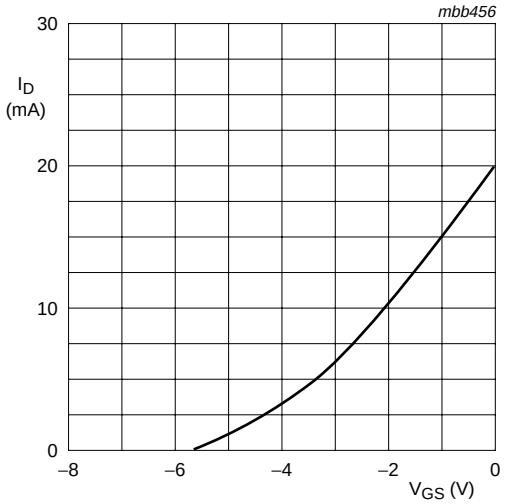
(3) V_{GS} = −2.0 V.

(4) V_{GS} = −3.0 V.

(5) V_{GS} = −4.0 V.

(6) V_{GS} = −5.0 V.

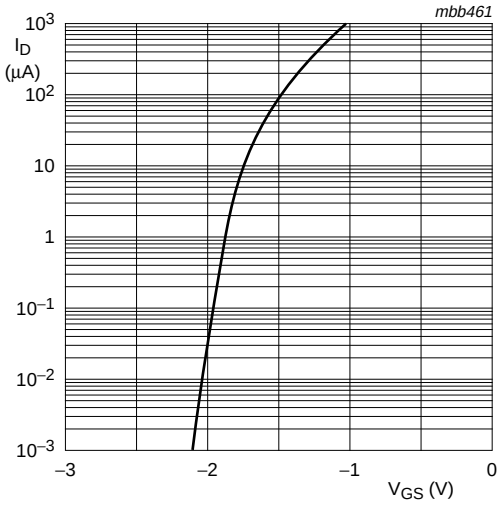
Fig 10. Typical output characteristics.



BF545C

V_{DS} = 15 V; T_j = 25 °C.

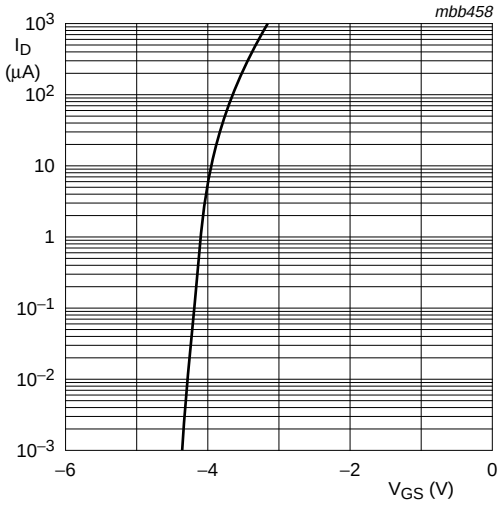
Fig 11. Typical input characteristics.



BF545A

V_{DS} = 15 V; T_j = 25 °C.

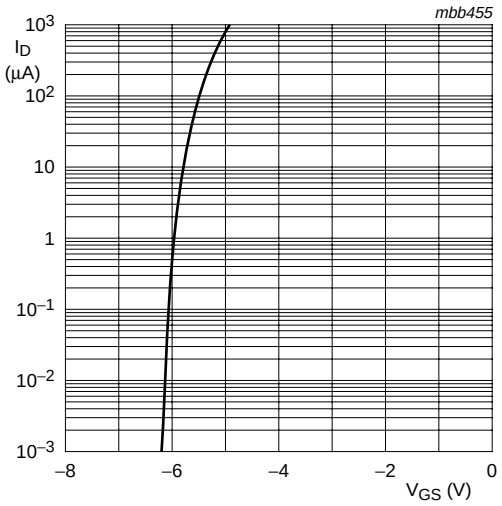
Fig 12. Drain current as a function of gate-source voltage; typical values.



BF545B

V_{DS} = 15 V; T_j = 25 °C.

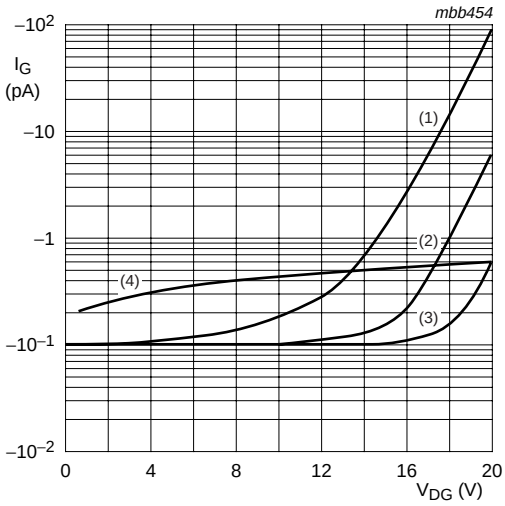
Fig 13. Drain current as a function of gate-source voltage; typical values.



BF545C

V_{DS} = 15 V; T_j = 25 °C.

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



I_D = 10 mA only for BF545B and BF545C; T_j = 25 °C.

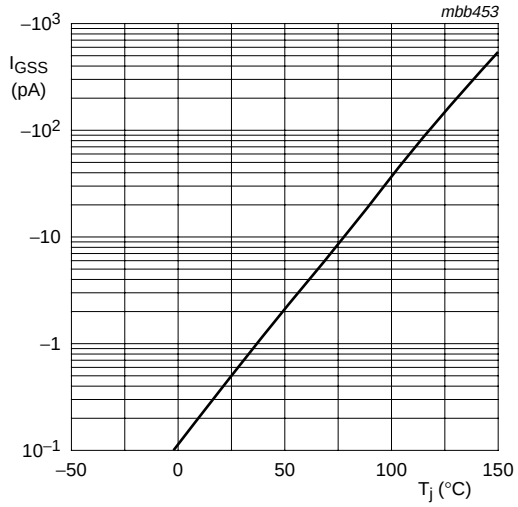
(1) I_D = 10 mA.

(2) I_D = 1 mA.

(3) I_D = 0.1 mA.

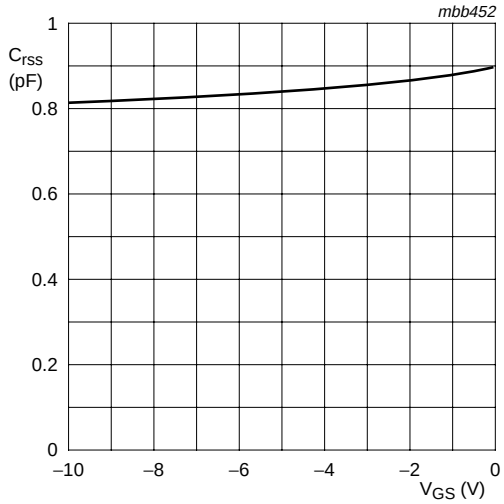
(4) I_{GSS}.

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



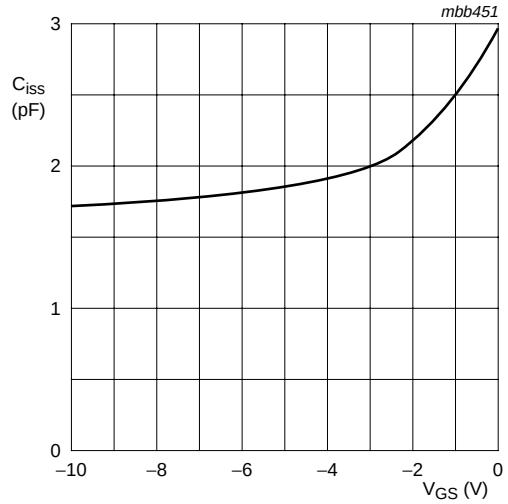
V_{DS} = 0 V; V_{GS} = −20 V.

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



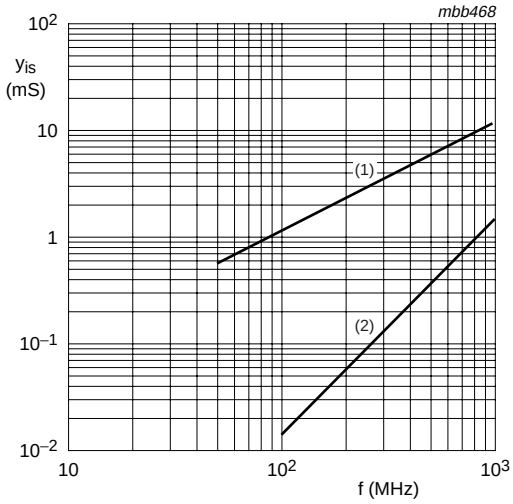
V_{DS} = 15 V; T_j = 25 °C.

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



V_{DS} = 15 V; T_j = 25 °C.

Fig 18. Typical input capacitance.

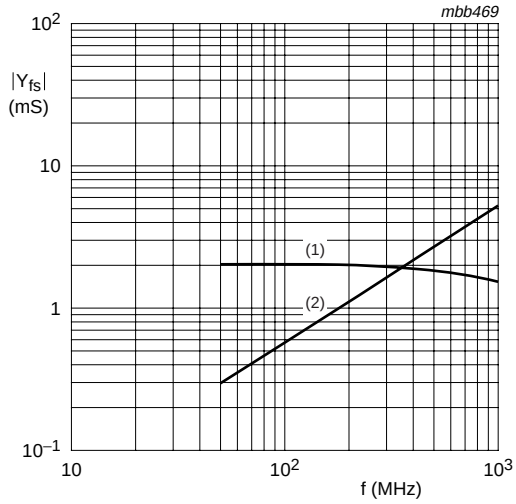


V_{DS} = 10 V; I_D = 1 mA; T_{amb} = 25 °C.

(1) b_{is}.

(2) g_{is}.

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

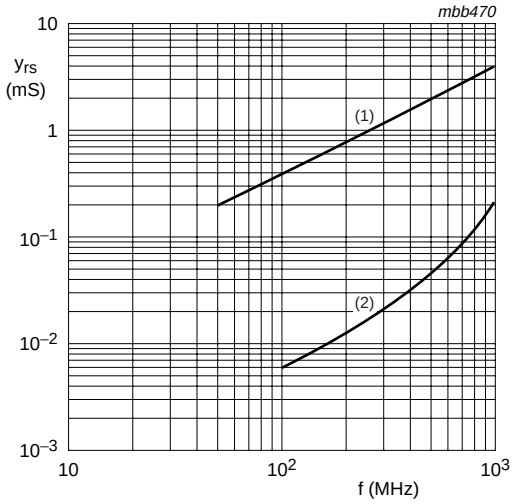


V_{DS} = 10 V; I_D = 1 mA; T_{amb} = 25 °C.

(1) g_{fs}.

(2) $-b_{fs}$.

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

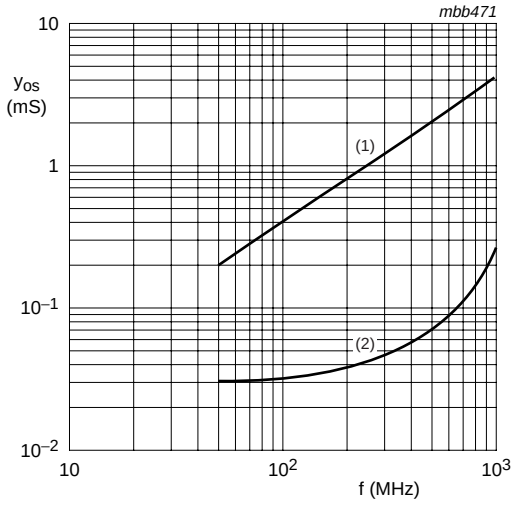


V_{DS} = 10 V; I_D = 1 mA; T_{amb} = 25 °C.

(1) $-b_{rs}$.

(2) $-g_{rs}$.

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



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

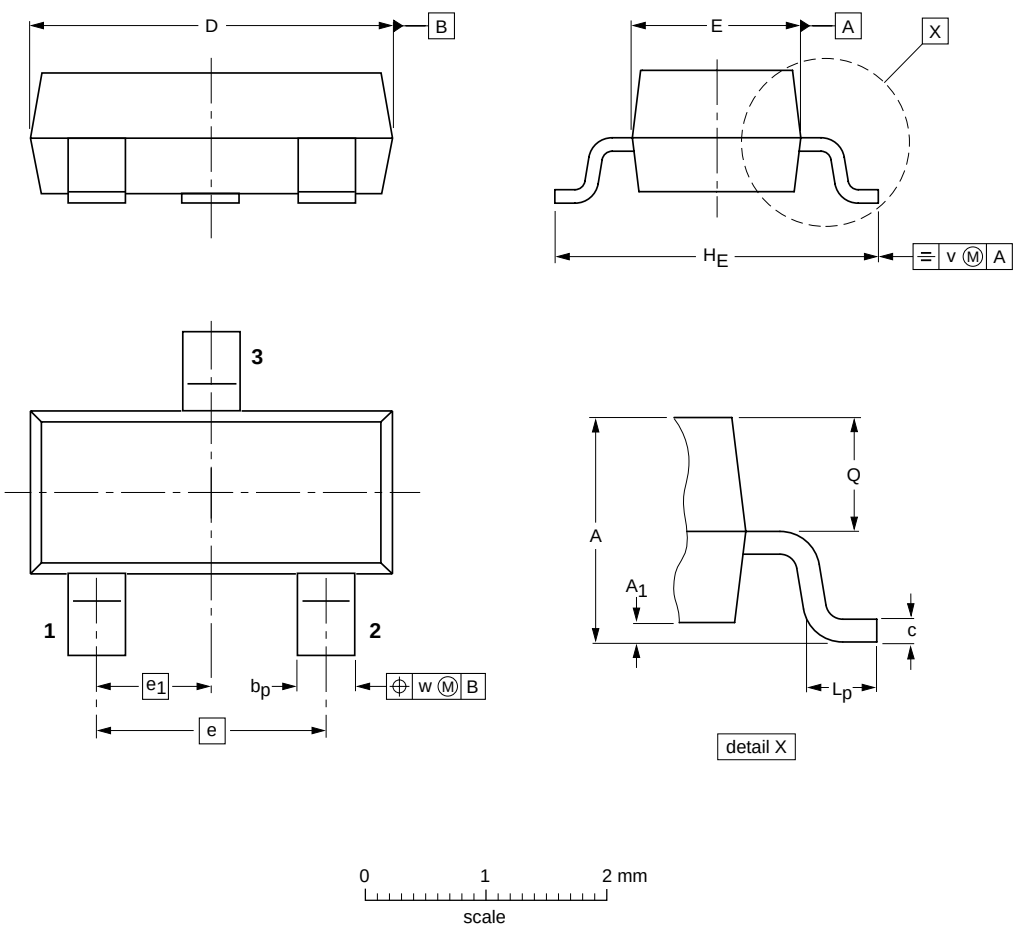
(1) b_{os}.

(2) g_{os}.

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

9. Package outline

Plastic surface mounted package; 3 leads **SOT23**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1 max.	b_p	c	D	E	e	e_1	H_E	L_p	Q	v	w
mm	1.1 0.9	0.1	0.48 0.38	0.15 0.09	3.0 2.8	1.4 1.2	1.9	0.95	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT23		TO-236AB				~~97-02-28~~ 99-09-13

Fig 23. Package outline.

10. Revision history

Table 9: Revision history

Document ID	Release date	Data sheet status	Change notice	Order number	Supersedes
BF545A_BF545B_ BF545C_3	20040805	Product data sheet	-	9397 750 13391	BF545A-B-C_2
Modifications:	• The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors • Marking code changed, see Table 4.				
BF545A-B-C_2	19960729	Product specification	-	-	-

11. Data sheet status

Level	Data sheet status [1]	Product status [2] [3]	Definition
I	Objective data	Development	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.
II	Preliminary data	Qualification	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.
III	Product data	Production	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. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

[1] Please consult the most recently issued data sheet before initiating or completing a design.

[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL http://www.semiconductors.philips.com.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

12. Definitions

Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

Application information — Applications that are described herein for any of these products are for illustrative purposes only. Philips Semiconductors make no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

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For sales office addresses, send an email to: **sales.addresses@www.semiconductors.philips.com**

15. Contents

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