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.

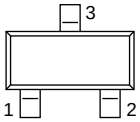
1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage		-	-	±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

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[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.

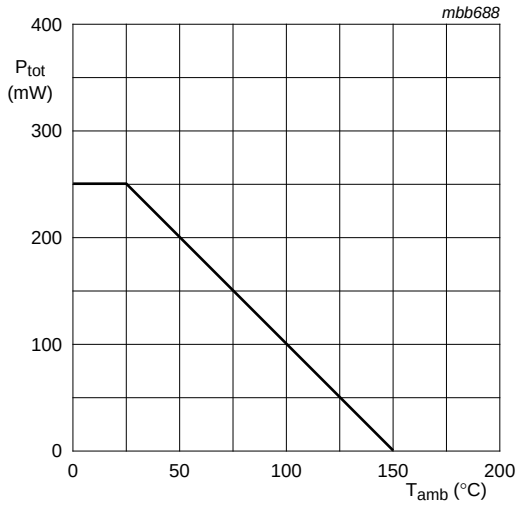


Fig 1. Power derating curve.

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.

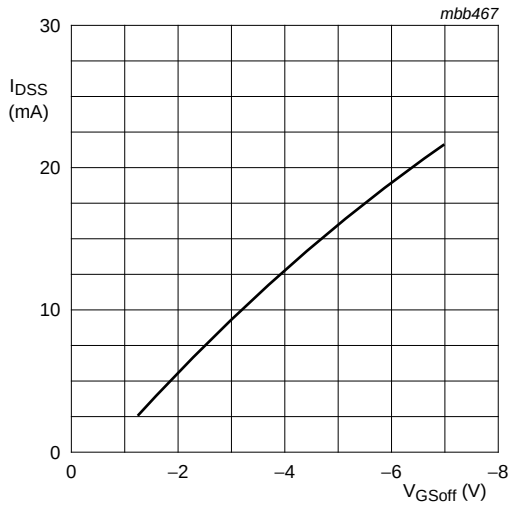
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)GSS}$	gate-source breakdown voltage	I_G = –1 μA; V_{DS} = 0 V	–30	-	-	V
V_{GSoff}	gate-source cut-off voltage	I_D = 200 μA; V_{DS} = 15 V				
		BF545A	–0.4	-	–2.2	V
		BF545B	–1.6	-	–3.8	V
		BF545C	–3.2	-	–7.8	V
		I_D = 1 μA; V_{DS} = 15 V	–0.4	-	–7.5	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
$\lvert y_{fs} \rvert$	forward transfer admittance	V_{GS} = 0 V; V_{DS} = 15 V	3	-	6.5	mS
$\lvert y_{os} \rvert$	common source output admittance	V_{GS} = 0 V; V_{DS} = 15 V	-	40	-	μS

8. Dynamic characteristics

Table 8. Dynamic characteristics

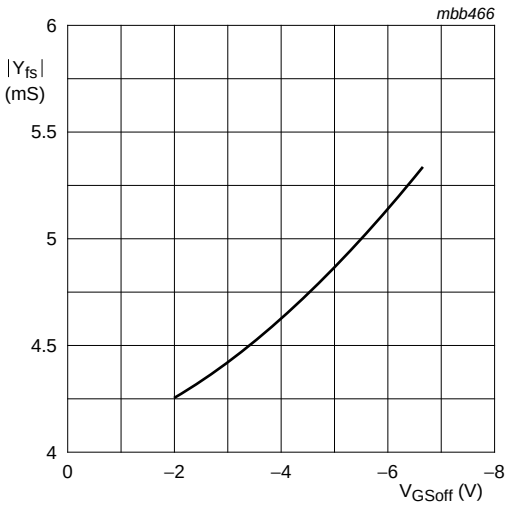
T_{amb} = 25 °C unless otherwise specified.

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



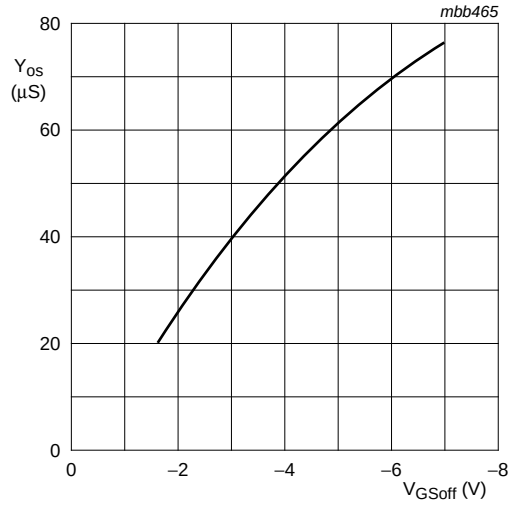
V_{DS} = 15 V; T_j = 25 °C.

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



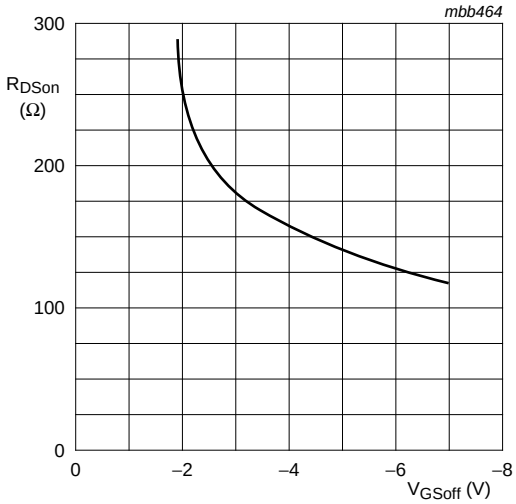
V_{DS} = 15 V; V_{GS} = 0 V; T_j = 25 °C.

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



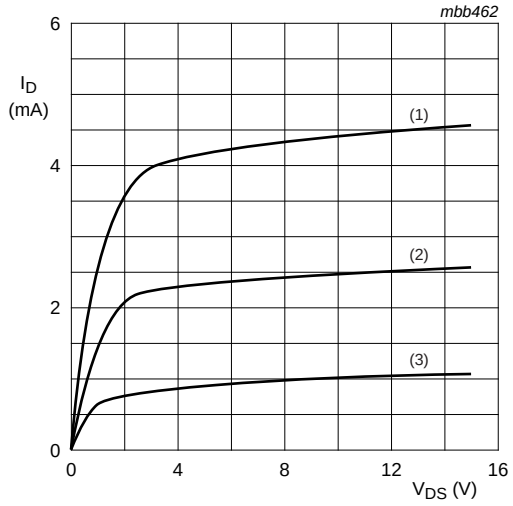
V_{DS} = 15 V; V_{GS} = 0 V; T_j = 25 °C.

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

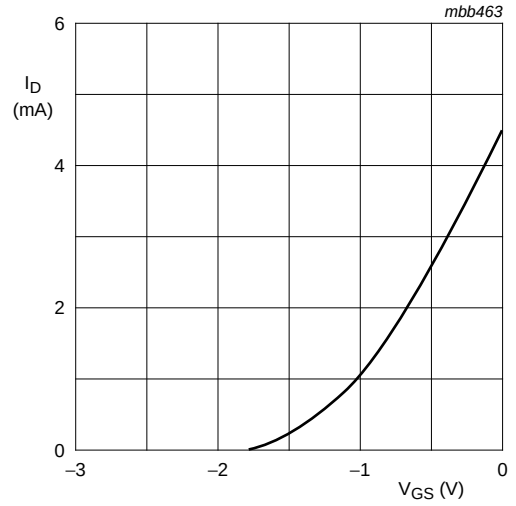
T_j = 25 °C.

(1) V_{GS} = 0 V.

(2) V_{GS} = −0.5 V.

(3) V_{GS} = −1.0 V.

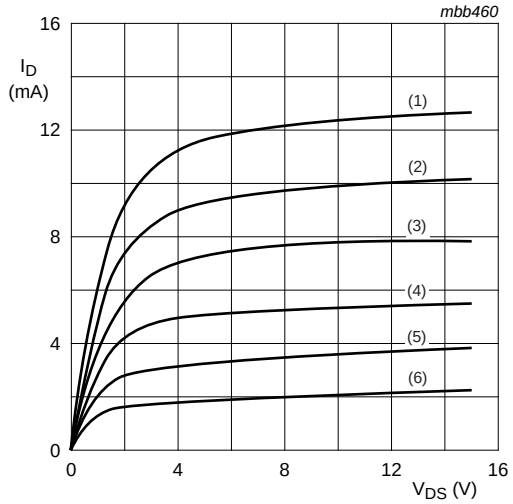
Fig 6. Typical output characteristics.



BF545A

V_{DS} = 15 V; T_j = 25 °C.

Fig 7. Typical input characteristics.

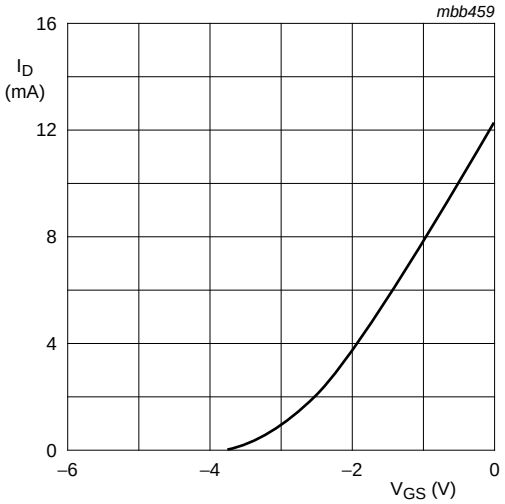


BF545B

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.

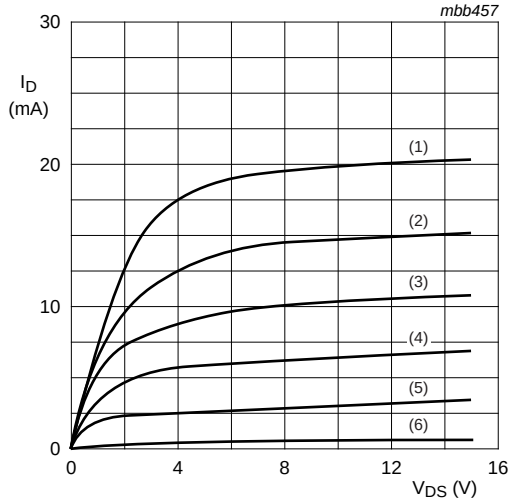
Fig 8. Typical output characteristics.



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.

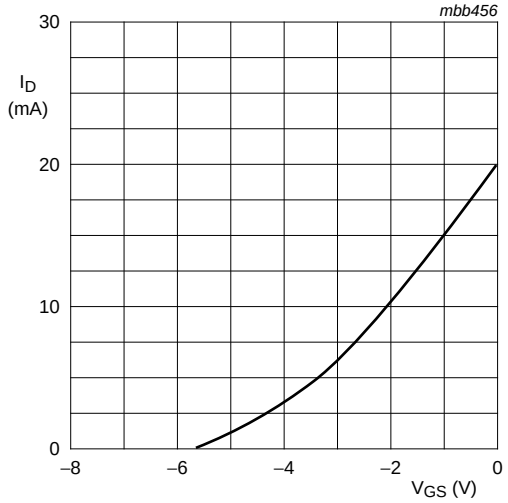
(3) V_{GS} = −2.0 V.

(4) V_{GS} = −3.0 V.

(5) V_{GS} = −4.0 V.

(6) V_{GS} = −5.0 V.

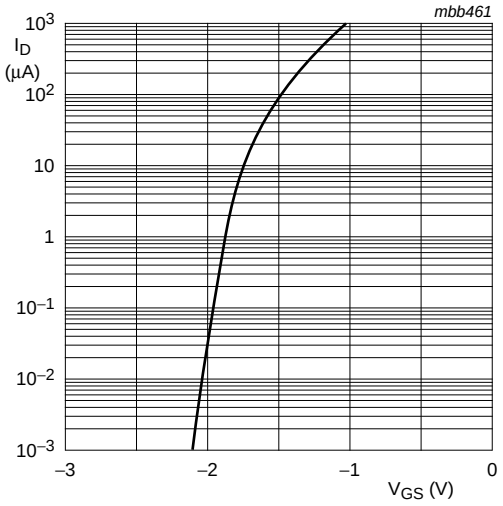
Fig 10. Typical output characteristics.



BF545C

V_{DS} = 15 V; T_j = 25 °C.

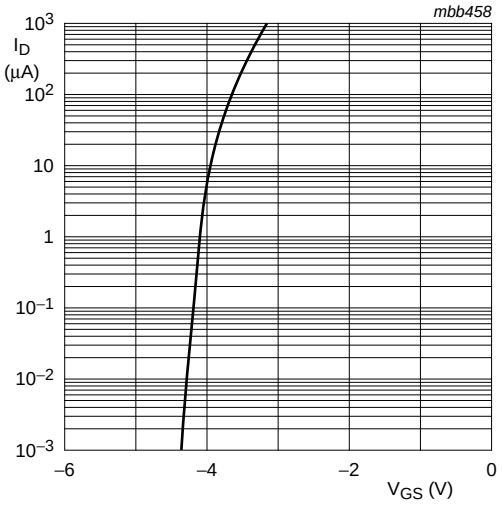
Fig 11. Typical input characteristics.



BF545A

V_{DS} = 15 V; T_j = 25 °C.

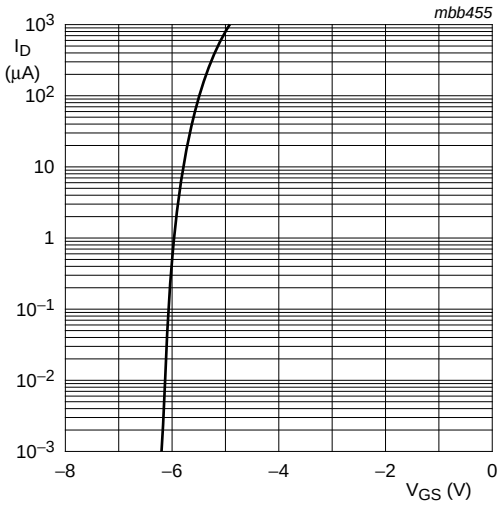
Fig 12. Drain current as a function of gate-source voltage; typical values.



BF545B

V_{DS} = 15 V; T_j = 25 °C.

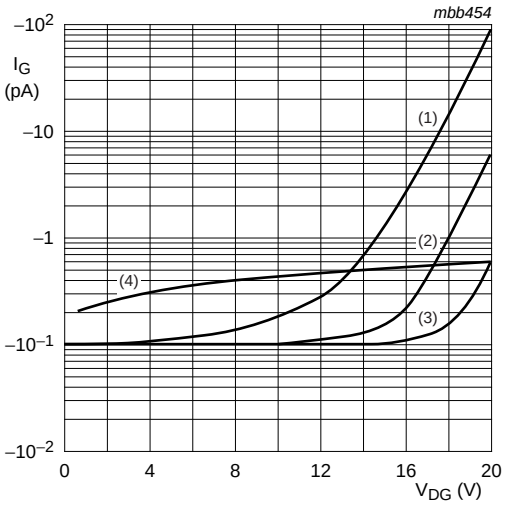
Fig 13. Drain current as a function of gate-source voltage; typical values.



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.

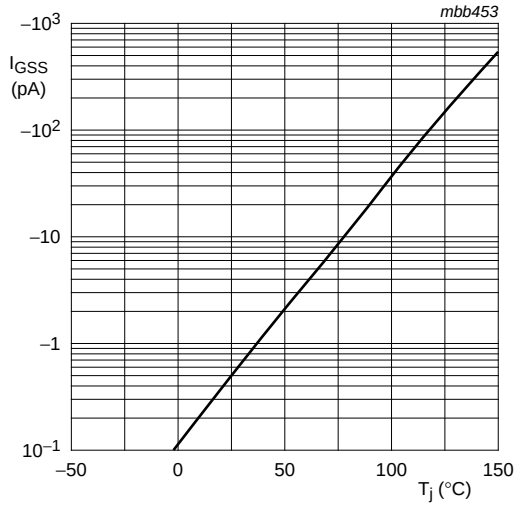
(1) I_D = 10 mA.

(2) I_D = 1 mA.

(3) I_D = 0.1 mA.

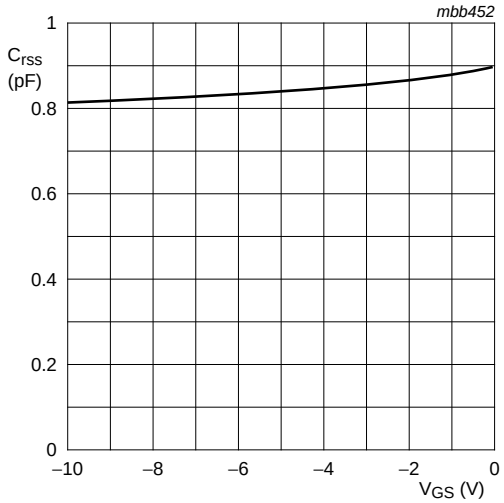
(4) I_{GSS}.

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



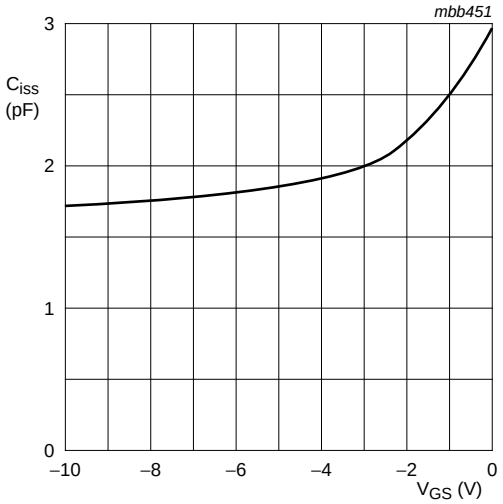
V_{DS} = 0 V; V_{GS} = −20 V.

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



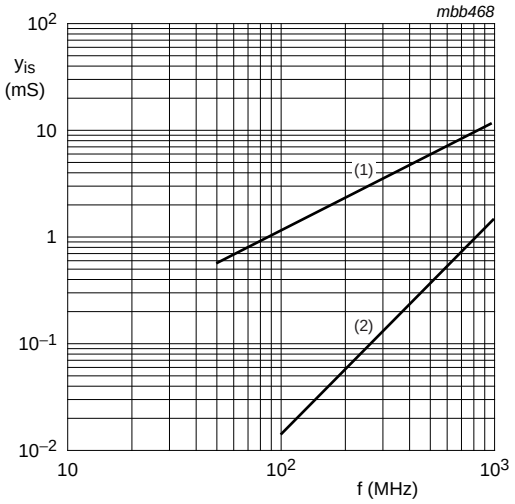
V_{DS} = 15 V; T_j = 25 °C.

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.

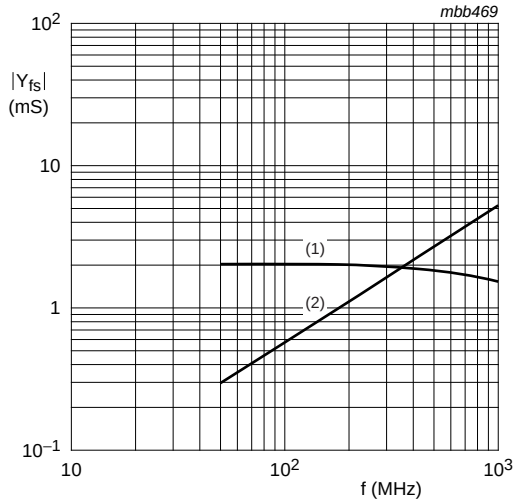


V_{DS} = 10 V; I_D = 1 mA; T_{amb} = 25 °C.

(1) b_{is}.

(2) g_{is}.

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

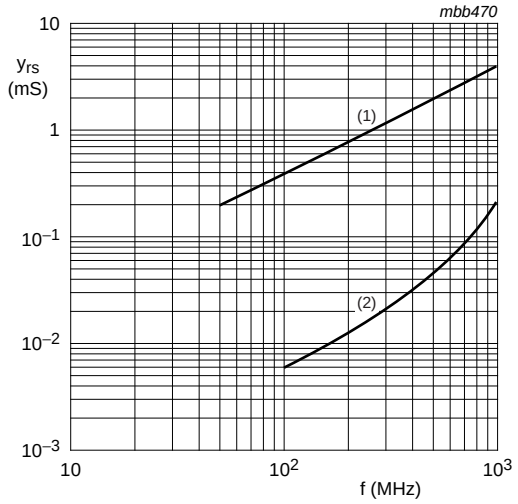


V_{DS} = 10 V; I_D = 1 mA; T_{amb} = 25 °C.

(1) g_{fs}.

(2) $-b_{fs}$.

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

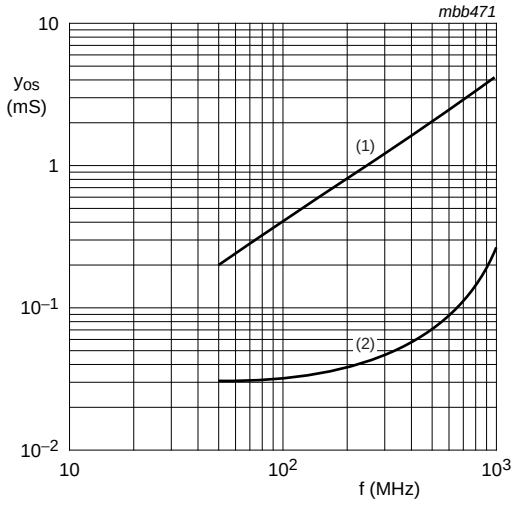


V_{DS} = 10 V; I_D = 1 mA; T_{amb} = 25 °C.

(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.

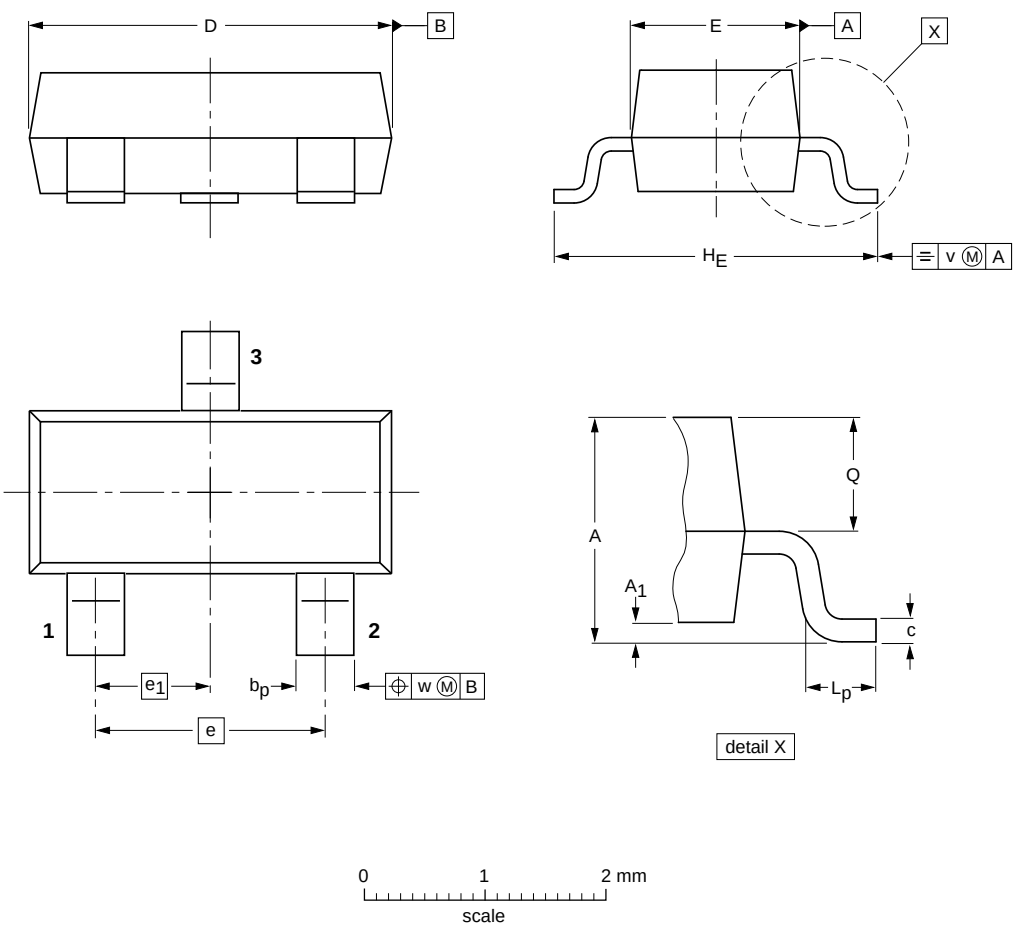
(1) b_{os}.

(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	JEITA			
SOT23		TO-236AB				~~04-11-04~~ 06-03-16

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:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Package outline drawings have been updated to the latest version.			
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[1][2]	Product status[3]	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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In the event that customer uses the product for design-in and use in automotive applications to automotive specifications and standards, customer (a) shall use the product without NXP Semiconductors' warranty of the product for such automotive applications, use and specifications, and (b) whenever customer uses the product for automotive applications beyond NXP Semiconductors' specifications such use shall be solely at customer's own risk, and (c) customer fully indemnifies NXP Semiconductors for any liability, damages or failed product claims resulting from customer design and use of the product for automotive applications beyond NXP Semiconductors' standard warranty and NXP Semiconductors' product specifications.

11.4 Trademarks

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12. Contact information

For more information, please visit: **http://www.nxp.com**

For sales office addresses, please send an email to: **salesaddresses@nxp.com**

13. Contents

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