

# DATA SHEET

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

Product specification  
Supersedes data of April 1995

1996 Jul 30



## N-channel silicon field-effect transistors

BF245A; BF245B;  
BF245C

## 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.

## CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static discharge during transport or handling.

## PINNING

PIN	SYMBOL	DESCRIPTION
1	d	drain
2	s	source
3	g	gate

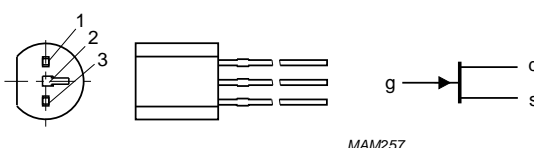


Fig.1 Simplified outline (TO-92 variant) and symbol.

## 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	$I_D = 10 \text{ nA}$ ; $V_{DS} = 15 \text{ V}$	–0.25	–	–8	V
$V_{GSO}$	gate-source voltage	open drain	–	–	–30	V
$I_{DSS}$	drain current BF245A BF245B BF245C	$V_{DS} = 15 \text{ V}$ ; $V_{GS} = 0$	2 6 12	– – –	6.5 15 25	mA mA mA
$P_{tot}$	total power dissipation	$T_{amb} = 75 \text{ }^\circ\text{C}$	–	–	300	mW
$ y_{fs} $	forward transfer admittance	$V_{DS} = 15 \text{ V}$ ; $V_{GS} = 0$ ; $f = 1 \text{ kHz}$ ; $T_{amb} = 25 \text{ }^\circ\text{C}$	3	–	6.5	mS
$C_{rs}$	reverse transfer capacitance	$V_{DS} = 20 \text{ V}$ ; $V_{GS} = -1 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $T_{amb} = 25 \text{ }^\circ\text{C}$	–	1.1	–	pF

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**LIMITING VALUES**

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{DS}$	drain-source voltage		–	$\pm 30$	V
$V_{GDO}$	gate-drain voltage	open source	–	–30	V
$V_{GSO}$	gate-source voltage	open drain	–	–30	V
$I_D$	drain current		–	25	mA
$I_G$	gate current		–	10	mA
$P_{tot}$	total power dissipation	up to $T_{amb} = 75\text{ }^{\circ}\text{C}$ ;	–	300	mW
		up to $T_{amb} = 90\text{ }^{\circ}\text{C}$ ; note 1	–	300	mW
$T_{stg}$	storage temperature		–65	+150	$^{\circ}\text{C}$
$T_j$	operating junction temperature		–	150	$^{\circ}\text{C}$

**Note**

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

**THERMAL CHARACTERISTICS**

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-a}$	thermal resistance from junction to ambient	in free air	250	K/W
	thermal resistance from junction to ambient		200	K/W

**STATIC CHARACTERISTICS**

$T_j = 25\text{ }^{\circ}\text{C}$ ; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)GSS}$	gate-source breakdown voltage	$I_G = -1\text{ }\mu\text{A}$ ; $V_{DS} = 0$	–30	–	V
$V_{GSoff}$	gate-source cut-off voltage	$I_D = 10\text{ nA}$ ; $V_{DS} = 15\text{ V}$	–0.25	–8.0	V
$V_{GS}$	gate-source voltage	$I_D = 200\text{ }\mu\text{A}$ ; $V_{DS} = 15\text{ V}$			
	BF245A		–0.4	–2.2	V
	BF245B		–1.6	–3.8	V
	BF245C		–3.2	–7.5	V
$I_{DSS}$	drain current	$V_{DS} = 15\text{ V}$ ; $V_{GS} = 0$ ; note 1			
	BF245A		2	6.5	mA
	BF245B		6	15	mA
	BF245C		12	25	mA
$I_{GSS}$	gate cut-off current	$V_{GS} = -20\text{ V}$ ; $V_{DS} = 0$	–	–5	nA
		$V_{GS} = -20\text{ V}$ ; $V_{DS} = 0$ ; $T_j = 125\text{ }^{\circ}\text{C}$	–	–0.5	$\mu\text{A}$

**Note**

- Measured under pulse conditions:  $t_p = 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$ .

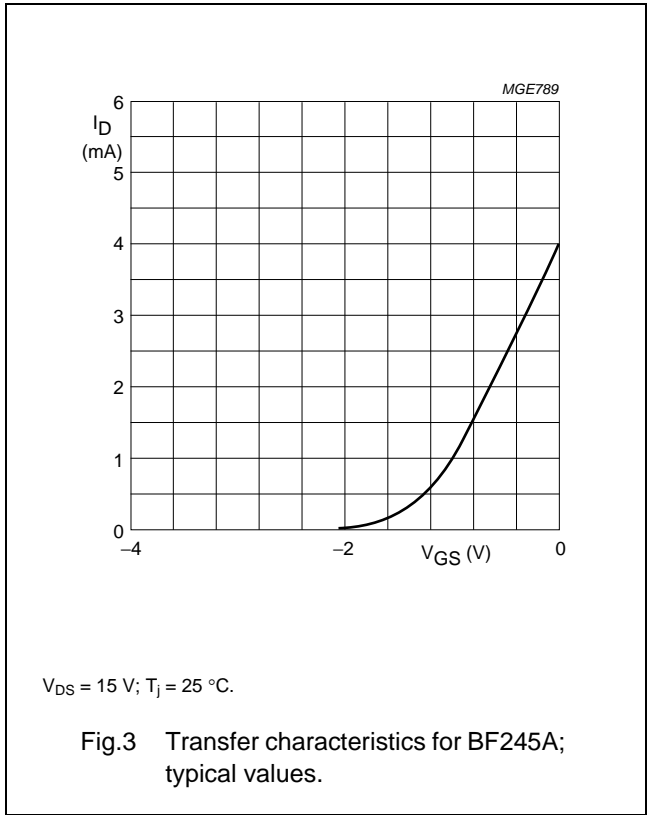
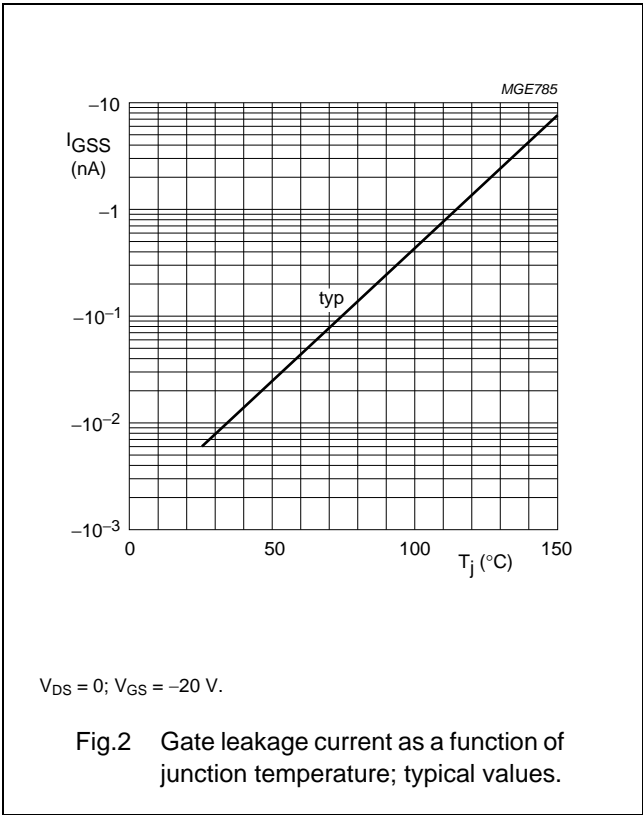
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DYNAMIC CHARACTERISTICS

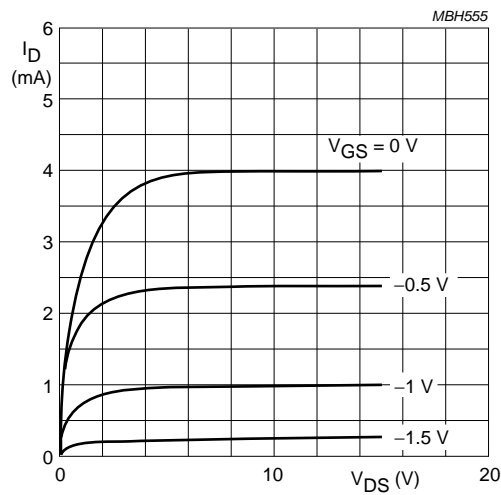
Common source;  $T_{amb} = 25\text{ }^{\circ}\text{C}$ ; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$C_{is}$	input capacitance	$V_{DS} = 20\text{ V}$ ; $V_{GS} = -1\text{ V}$ ; $f = 1\text{ MHz}$	–	4	–	pF
$C_{rs}$	reverse transfer capacitance	$V_{DS} = 20\text{ V}$ ; $V_{GS} = -1\text{ V}$ ; $f = 1\text{ MHz}$	–	1.1	–	pF
$C_{os}$	output capacitance	$V_{DS} = 20\text{ V}$ ; $V_{GS} = -1\text{ V}$ ; $f = 1\text{ MHz}$	–	1.6	–	pF
$g_{is}$	input conductance	$V_{DS} = 15\text{ V}$ ; $V_{GS} = 0$ ; $f = 200\text{ MHz}$	–	250	–	$\mu\text{S}$
$g_{os}$	output conductance	$V_{DS} = 15\text{ V}$ ; $V_{GS} = 0$ ; $f = 200\text{ MHz}$	–	40	–	$\mu\text{S}$
$ y_{fs} $	forward transfer admittance	$V_{DS} = 15\text{ V}$ ; $V_{GS} = 0$ ; $f = 1\text{ kHz}$	3	–	6.5	mS
		$V_{DS} = 15\text{ V}$ ; $V_{GS} = 0$ ; $f = 200\text{ MHz}$	–	6	–	mS
$ y_{rs} $	reverse transfer admittance	$V_{DS} = 15\text{ V}$ ; $V_{GS} = 0$ ; $f = 200\text{ MHz}$	–	1.4	–	mS
$ y_{os} $	output admittance	$V_{DS} = 15\text{ V}$ ; $V_{GS} = 0$ ; $f = 1\text{ kHz}$	–	25	–	$\mu\text{S}$
$f_{gfs}$	cut-off frequency	$V_{DS} = 15\text{ V}$ ; $V_{GS} = 0$ ; $g_{fs} = 0.7$ of its value at 1 kHz	–	700	–	MHz
F	noise figure	$V_{DS} = 15\text{ V}$ ; $V_{GS} = 0$ ; $f = 100\text{ MHz}$ ; $R_G = 1\text{ k}\Omega$ (common source); input tuned to minimum noise	–	1.5	–	dB



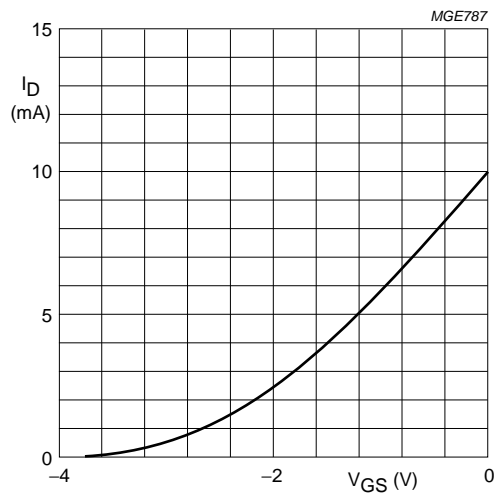
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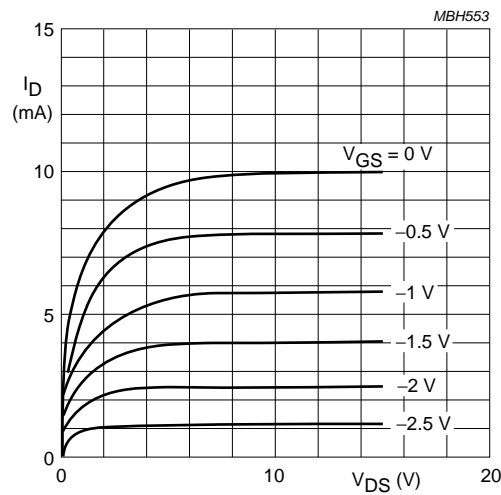
$V_{DS} = 15\text{ V}$ ;  $T_j = 25\text{ }^\circ\text{C}$ .

Fig.4 Output characteristics for BF245A; typical values.



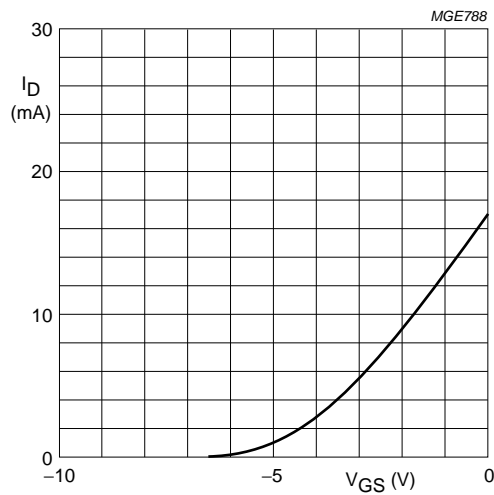
$V_{DS} = 15\text{ V}$ ;  $T_j = 25\text{ }^\circ\text{C}$ .

Fig.5 Transfer characteristics for BF245B; typical values.



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

Fig.6 Output characteristics for BF245B; typical values.

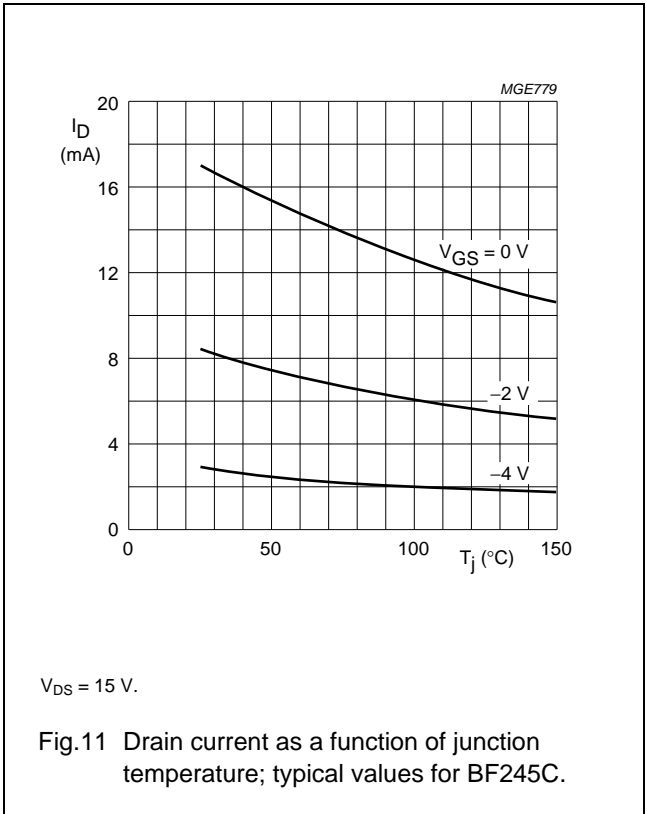
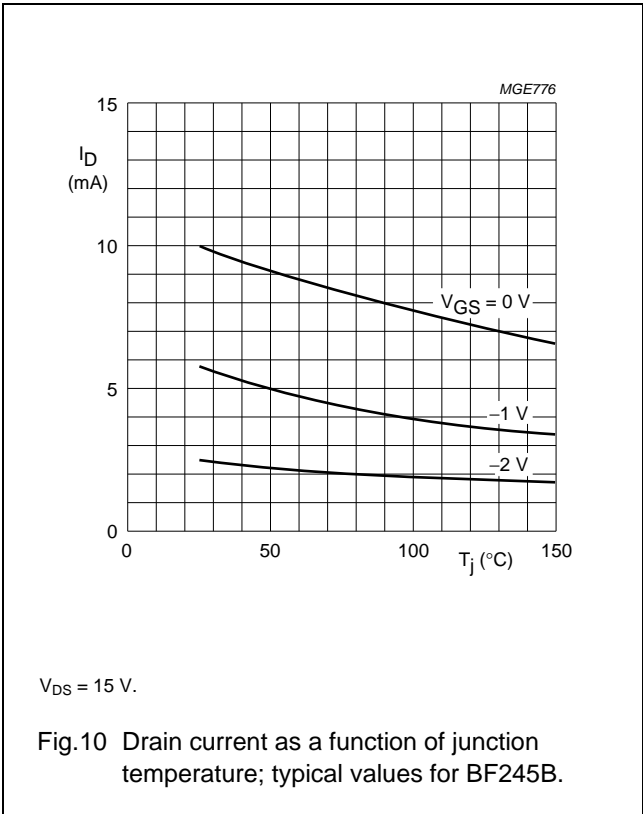
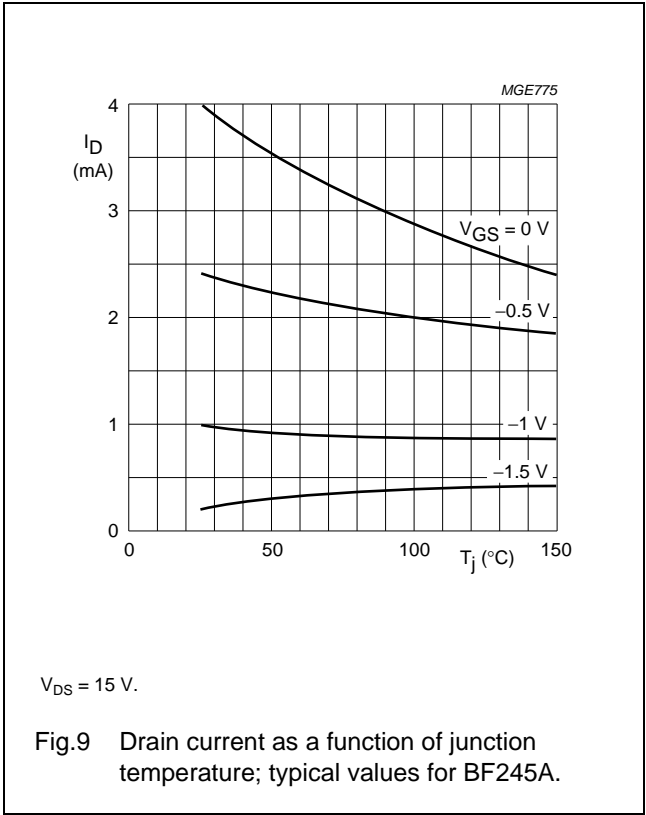
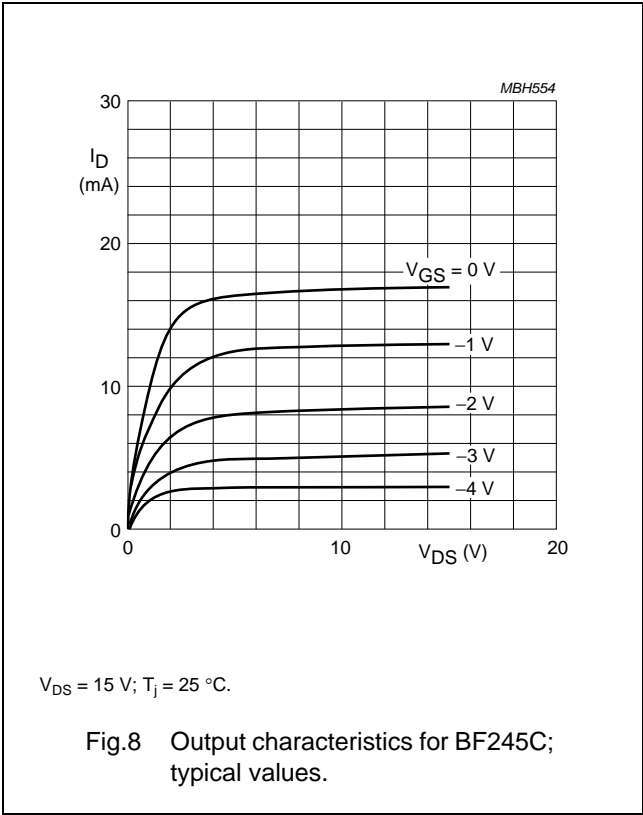


$V_{DS} = 15\text{ V}$ ;  $T_j = 25\text{ }^\circ\text{C}$ .

Fig.7 Transfer characteristics for BF245C; typical values.

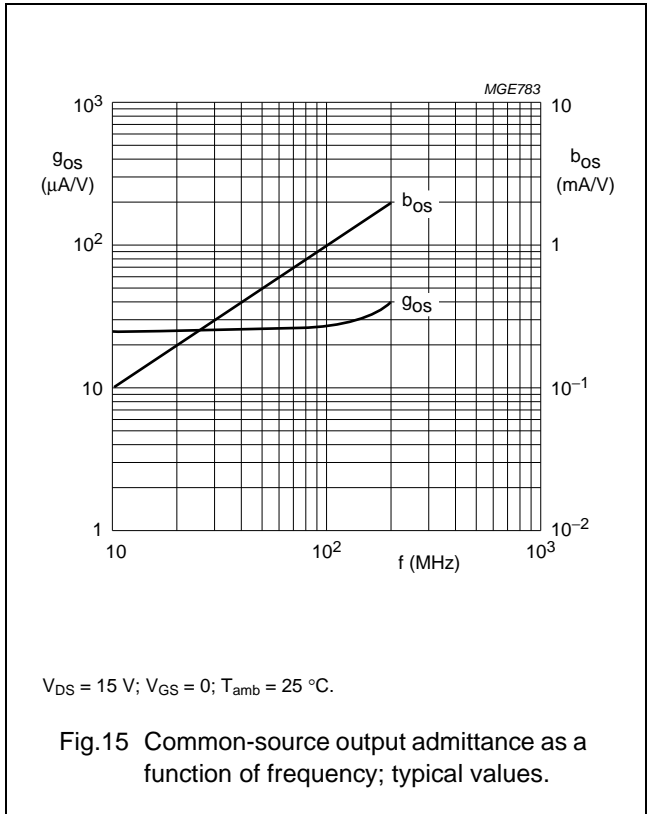
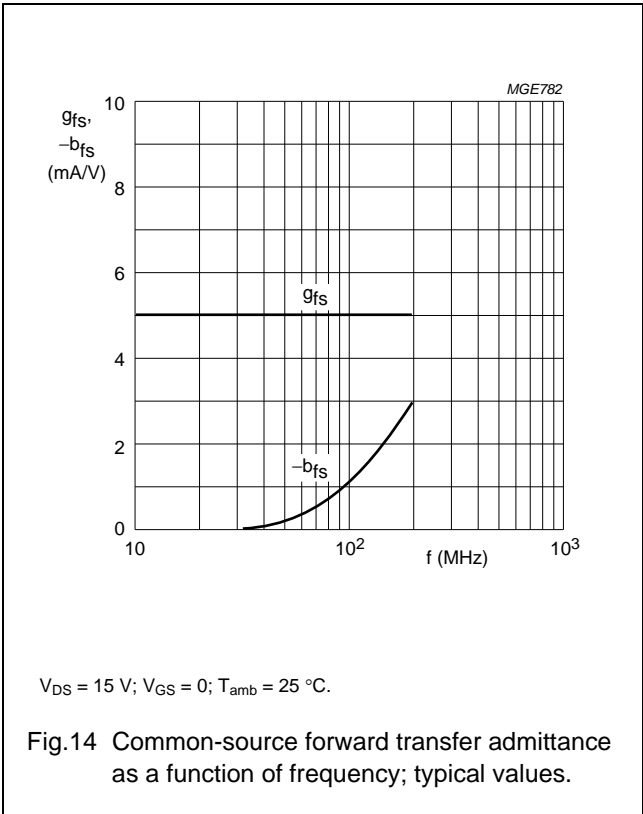
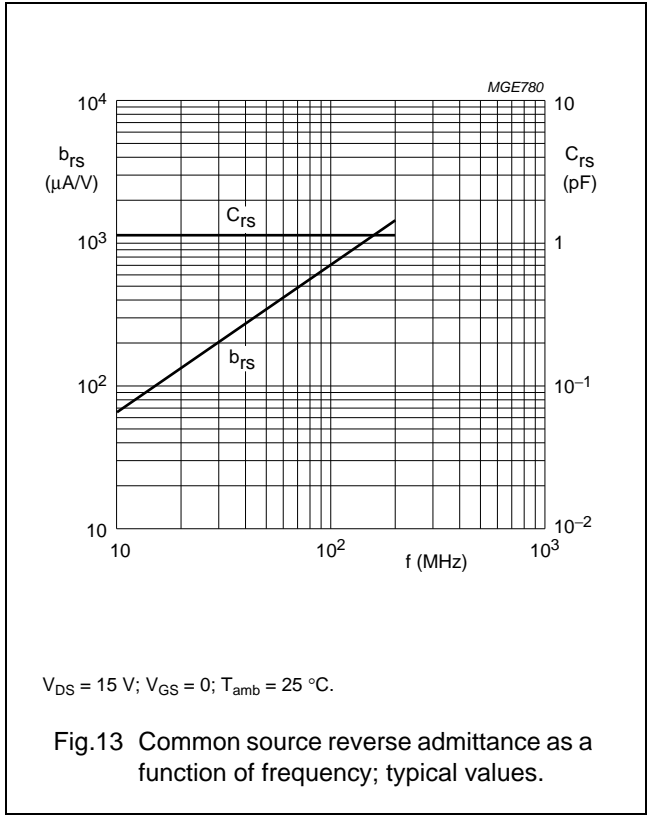
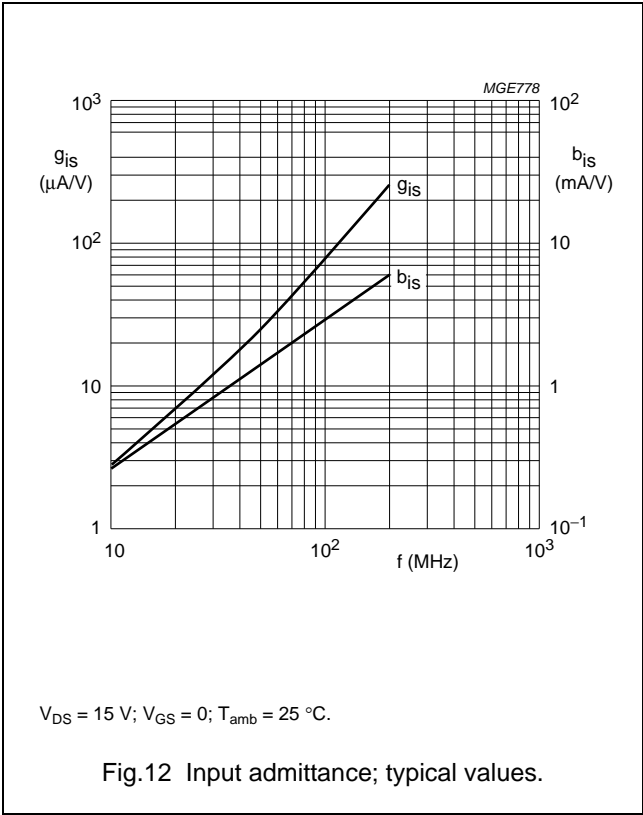
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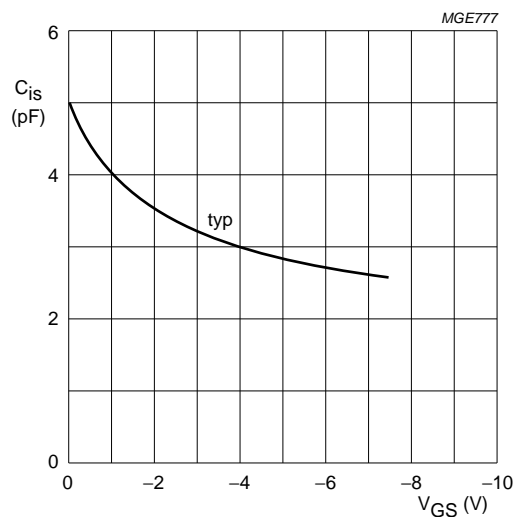
N-channel silicon field-effect transistors

BF245A; BF245B; BF245C



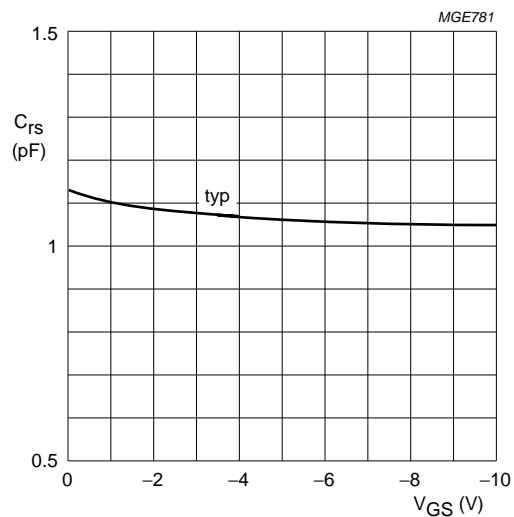
N-channel silicon field-effect transistors

BF245A; BF245B; BF245C



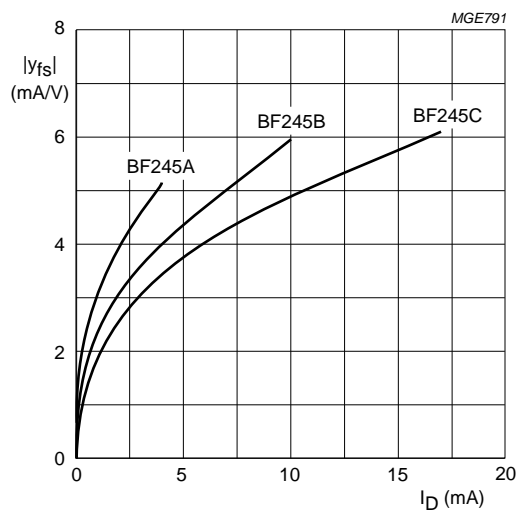
$V_{DS} = 20\text{ V}$ ;  $f = 1\text{ MHz}$ ;  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .

Fig.16 Input capacitance as a function of gate-source voltage; typical values.



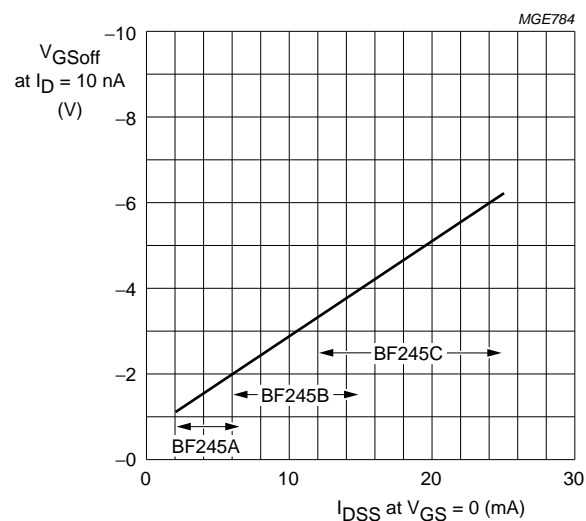
$V_{DS} = 20\text{ V}$ ;  $f = 1\text{ MHz}$ ;  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .

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



$V_{DS} = 15\text{ V}$ ;  $f = 1\text{ kHz}$ ;  $T_{amb} = 25\text{ }^{\circ}\text{C}$ .

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



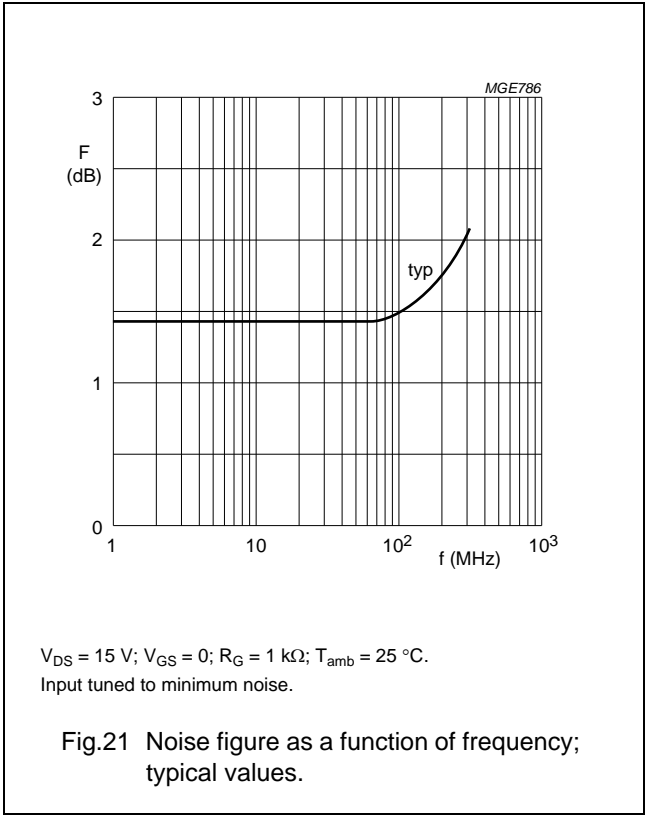
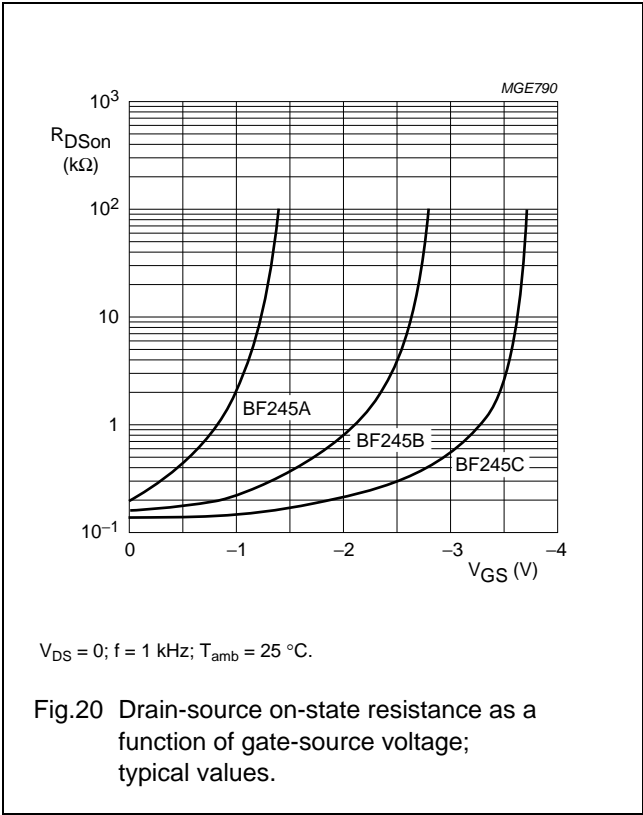
$V_{DS} = 15\text{ V}$ ;  $T_j = 25\text{ }^{\circ}\text{C}$ .

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



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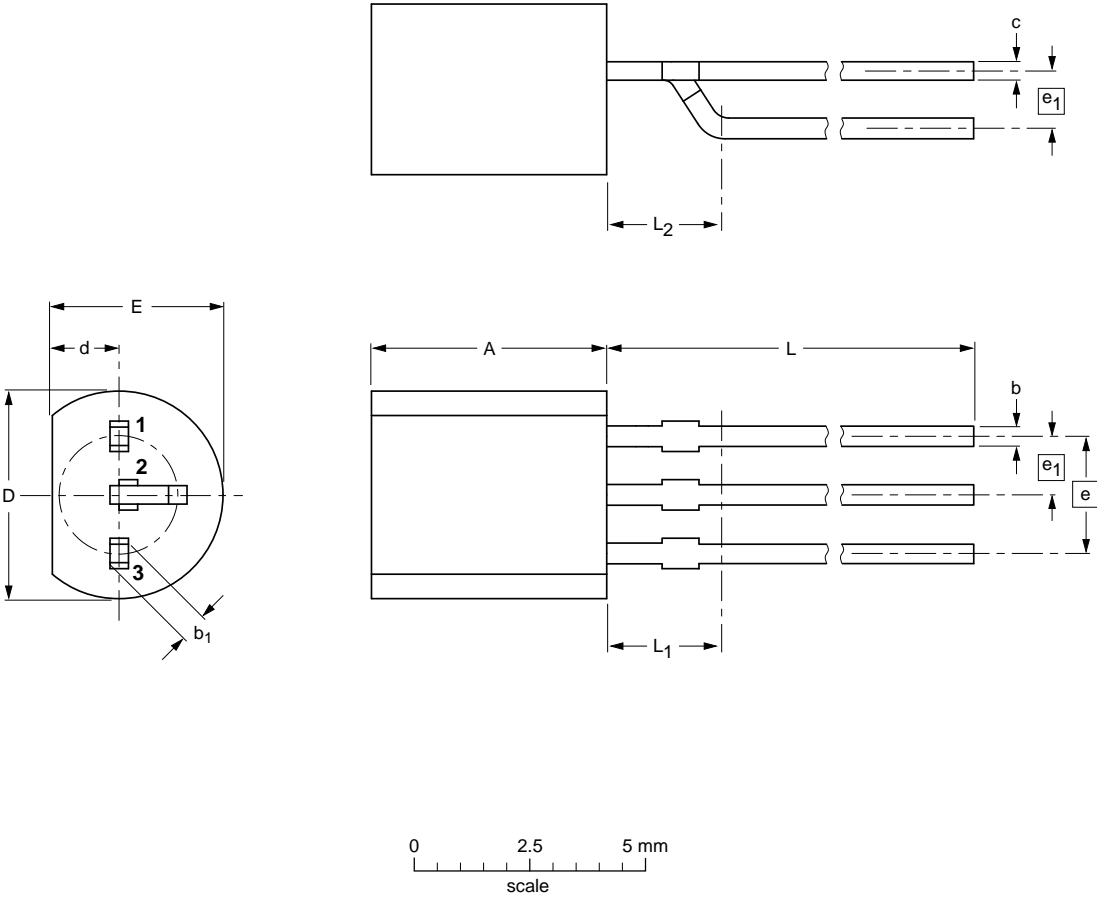
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PACKAGE OUTLINE

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

SOT54 variant



DIMENSIONS (mm are the original dimensions)

UNIT	A	b	b <sub>1</sub>	c	D	d	E	e	e <sub>1</sub>	L	L <sub>1</sub> <sup>(1)</sup> max	L <sub>2</sub> max
mm	5.2 5.0	0.48 0.40	0.66 0.55	0.45 0.38	4.8 4.4	1.7 1.4	4.2 3.6	2.54	1.27	14.5 12.7	2.5	2.5

Note

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

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT54 variant						-04-06-28- 05-01-10

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## DATA SHEET STATUS

DOCUMENT STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)</sup>	DEFINITION
Objective data sheet	Development	This document contains data from the objective specification for product development.
Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
Product data sheet	Production	This document contains the product specification.

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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.

## **Contact information**

For additional information please visit: <http://www.nxp.com>

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