DATA SHEET

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

Product specification
Supersedes data of April 1995
File under Discrete Semiconductors, SC07

1996 Jul 30

Philips
Semiconductors

PHILIPS

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

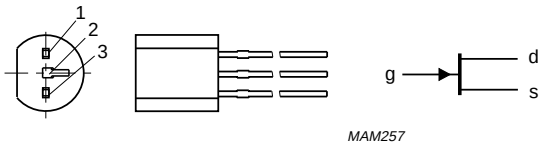


Fig.1 Simplified outline (TO-92 variant) and symbol.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{DS}	drain-source voltage		–	–	±30	V
V_{GSoff}	gate-source cut-off voltage	I_D = 10 nA; V_{DS} = 15 V	–0.25	–	–8	V
V_{GSO}	gate-source voltage	open drain	–	–	–30	V
I_{DSS}	drain current	V_{DS} = 15 V; V_{GS} = 0				
	BF245A		2	–	6.5	mA
	BF245B		6	–	15	mA
	BF245C		12	–	25	mA
P_{tot}	total power dissipation	T_{amb} = 75 °C	–	–	300	mW
$\lvert y_{fs} \rvert$	forward transfer admittance	V_{DS} = 15 V; V_{GS} = 0; f = 1 kHz; T_{amb} = 25 °C	3	–	6.5	mS
C_{rs}	reverse transfer capacitance	V_{DS} = 20 V; V_{GS} = –1 V; f = 1 MHz; T_{amb} = 25 °C	–	1.1	–	pF

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	±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 °C;	–	300	mW
		up to T_{amb} = 90 °C; note 1	–	300	mW
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	150	°C

Note

1. 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
$R_{th\ j\text{-}a}$	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 °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)GSS}$	gate-source breakdown voltage	I_G = –1 μA; V_{DS} = 0	–30	–	V
V_{GSoff}	gate-source cut-off voltage	I_D = 10 nA; V_{DS} = 15 V	–0.25	–8.0	V
V_{GS}	gate-source voltage	I_D = 200 μA; V_{DS} = 15 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 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 V; V_{DS} = 0	–	–5	nA
		V_{GS} = –20 V; V_{DS} = 0; T_j = 125 °C	–	–0.5	μA

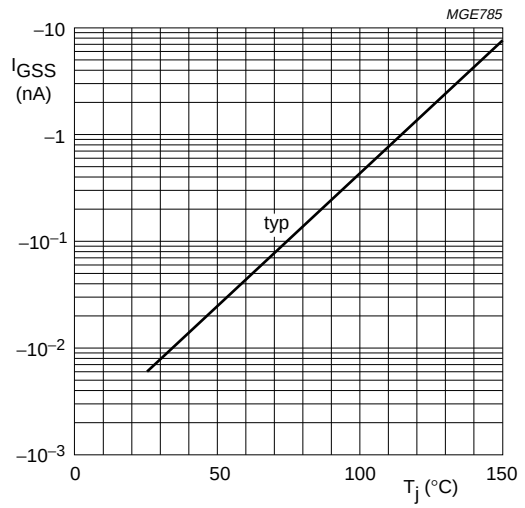
Note

1. Measured under pulse conditions: t_p = 300 μs; $\delta \leq 0.02$.

DYNAMIC CHARACTERISTICS

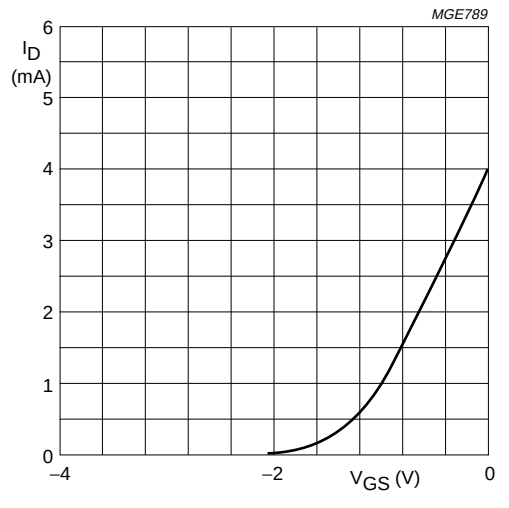
Common source; T_{amb} = 25 °C; unless otherwise specified.

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



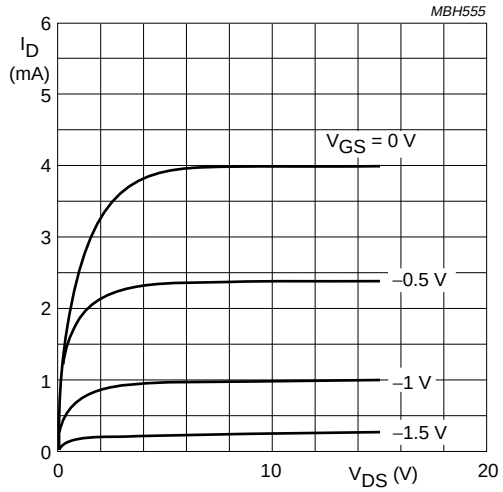
V_{DS} = 0; V_{GS} = –20 V.

Fig.2 Gate leakage current as a function of junction temperature; typical values.



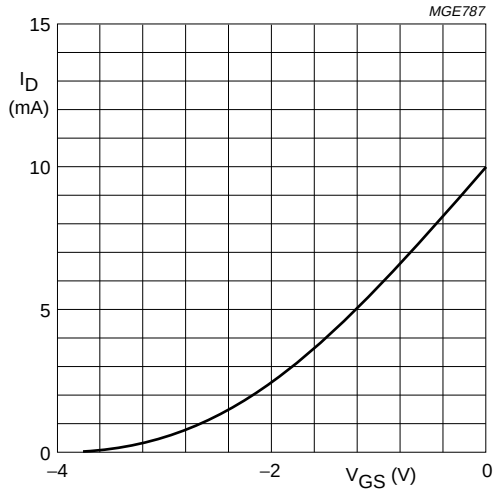
V_{DS} = 15 V; T_j = 25 °C.

Fig.3 Transfer characteristics for BF245A; typical values.



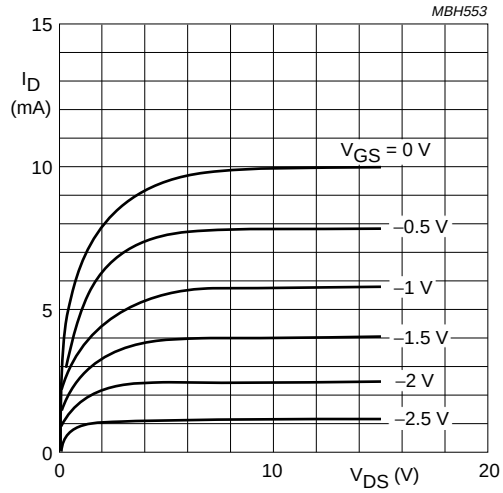
V_{DS} = 15 V; T_j = 25 °C.

Fig.4 Output characteristics for BF245A; typical values.



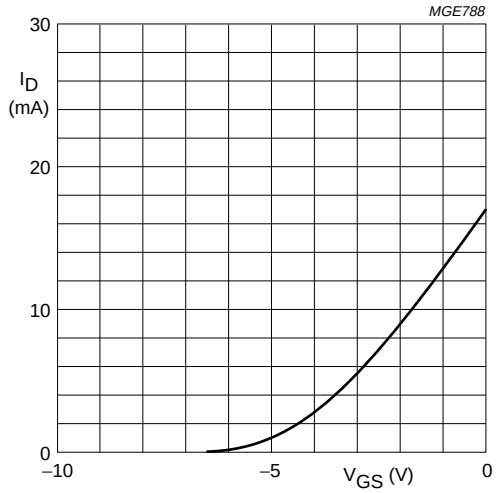
V_{DS} = 15 V; T_j = 25 °C.

Fig.5 Transfer characteristics for BF245B; typical values.



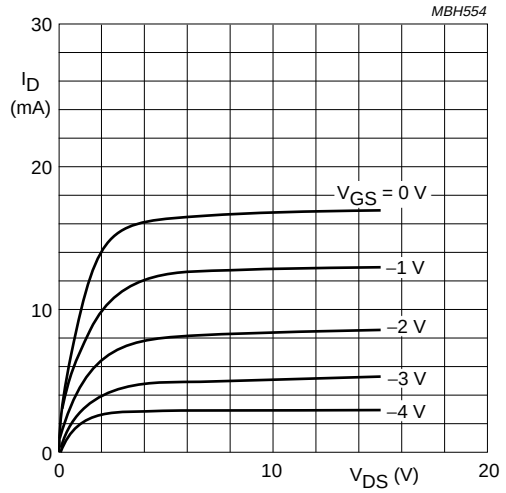
V_{DS} = 15 V; T_j = 25 °C.

Fig.6 Output characteristics for BF245B; typical values.



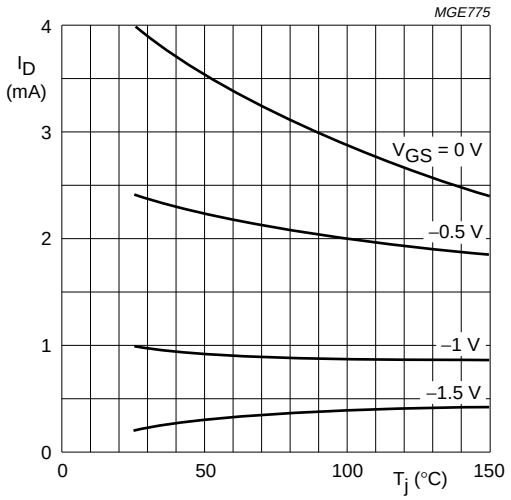
V_{DS} = 15 V; T_j = 25 °C.

Fig.7 Transfer characteristics for BF245C; typical values.



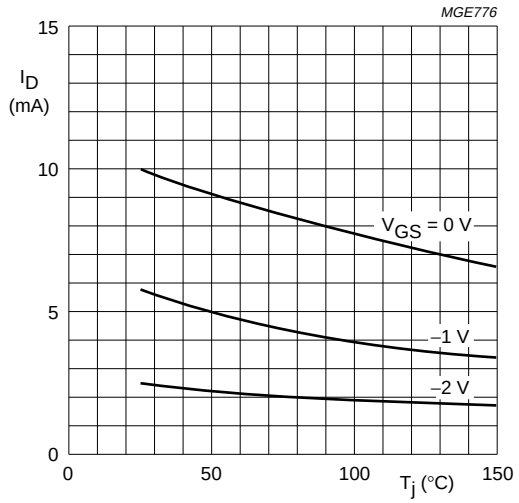
V_{DS} = 15 V; T_j = 25 °C.

Fig.8 Output characteristics for BF245C; typical values.



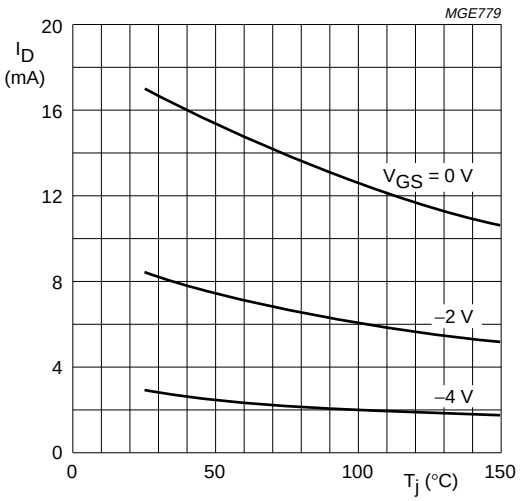
V_{DS} = 15 V.

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



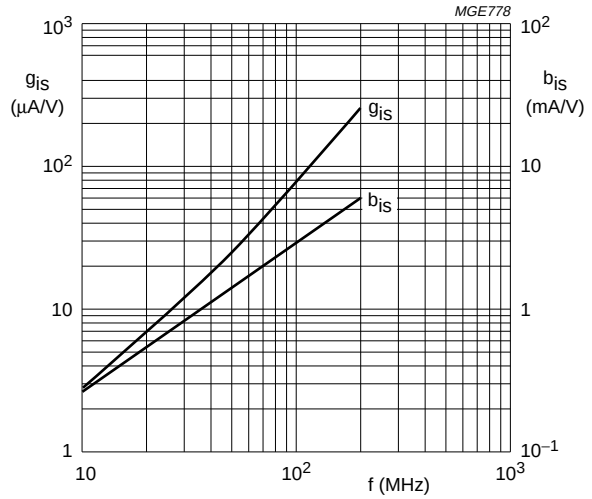
V_{DS} = 15 V.

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



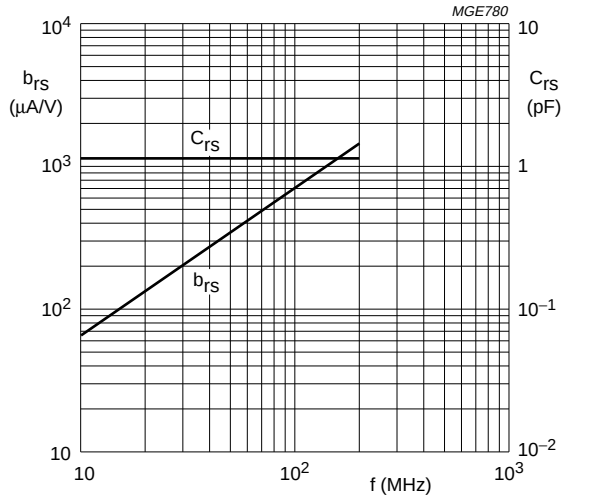
V_{DS} = 15 V.

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



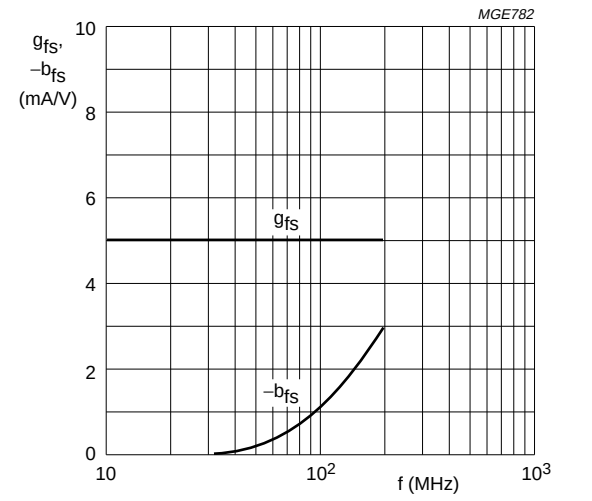
V_{DS} = 15 V; V_{GS} = 0; T_{amb} = 25 °C.

Fig.12 Input admittance; typical values.



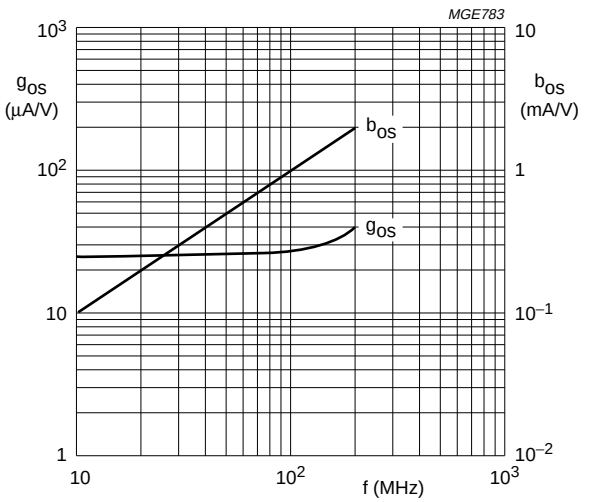
V_{DS} = 15 V; V_{GS} = 0; T_{amb} = 25 °C.

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



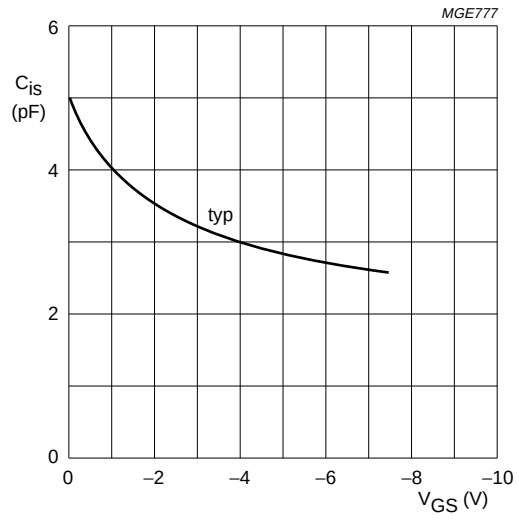
V_{DS} = 15 V; V_{GS} = 0; T_{amb} = 25 °C.

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



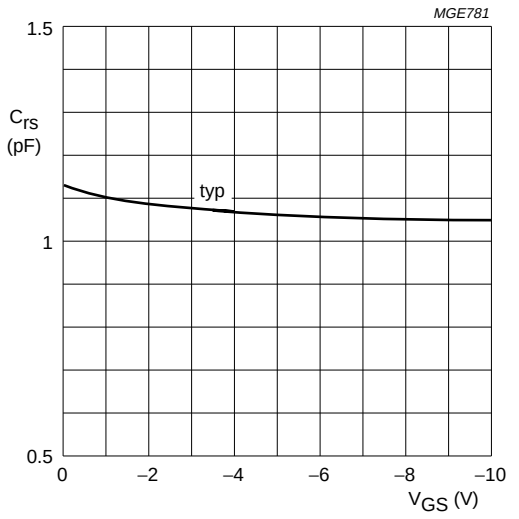
V_{DS} = 15 V; V_{GS} = 0; T_{amb} = 25 °C.

Fig.15 Common-source output admittance as a function of frequency; typical values.



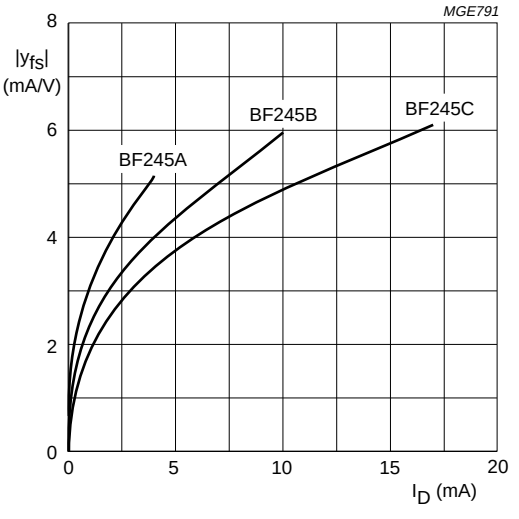
V_{DS} = 20 V; f = 1 MHz; T_{amb} = 25 °C.

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



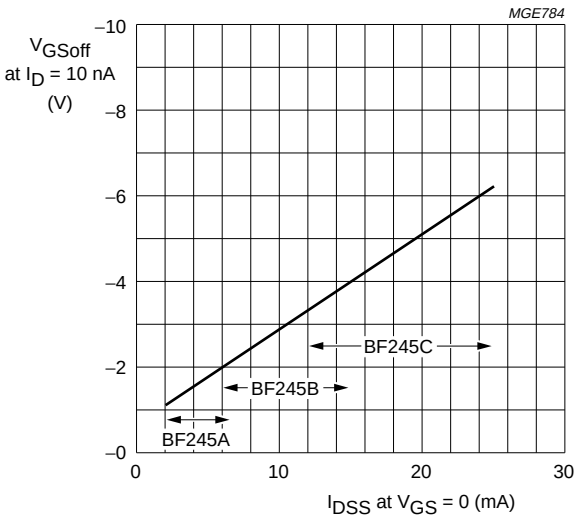
V_{DS} = 20 V; f = 1 MHz; T_{amb} = 25 °C.

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



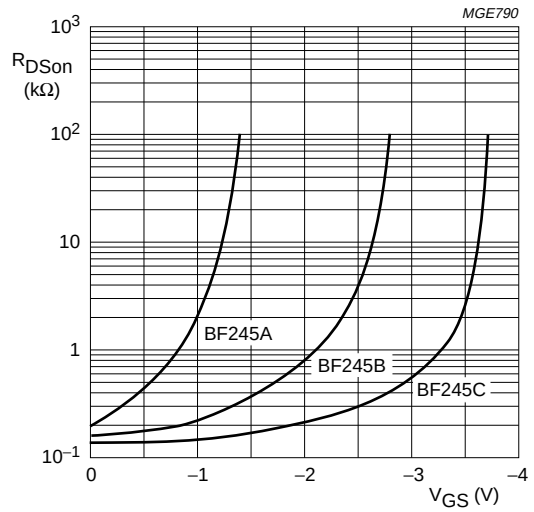
V_{DS} = 15 V; f = 1 kHz; T_{amb} = 25 °C.

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



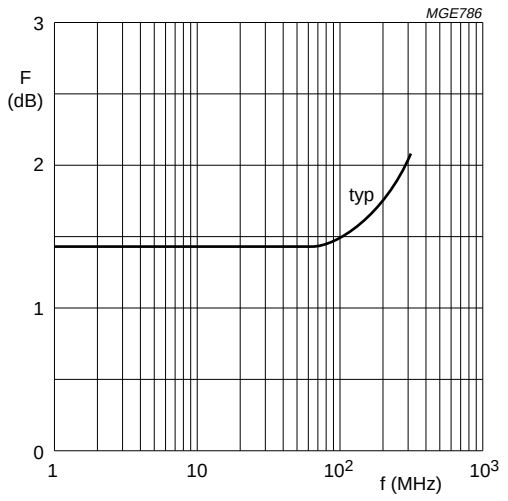
V_{DS} = 15 V; T_j = 25 °C.

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



V_{DS} = 0; f = 1 kHz; T_{amb} = 25 °C.

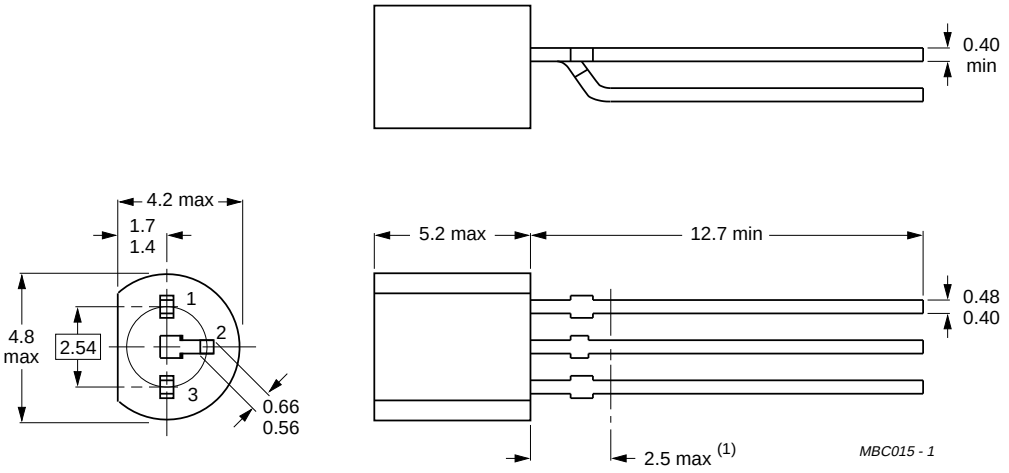
Fig.20 Drain-source on-state resistance as a function of gate-source voltage; typical values.



V_{DS} = 15 V; V_{GS} = 0; R_G = 1 kΩ; T_{amb} = 25 °C.
Input tuned to minimum noise.

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

PACKAGE OUTLINE



Dimensions in mm.

(1) Terminal dimensions within this zone are uncontrolled.

Fig.22 TO-92 variant.

DEFINITIONS

Data Sheet Status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). 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	
Where application information is given, it is advisory and does not form part of the specification.	

LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.