DATA SHEET

BF556A; BF556B; BF556C
N-channel silicon junction field-effect transistors

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

1996 Jul 29

Philips Semiconductors

PHILIPS

N-channel silicon junction field-effect transistors

BF556A; BF556B; BF556C

FEATURES

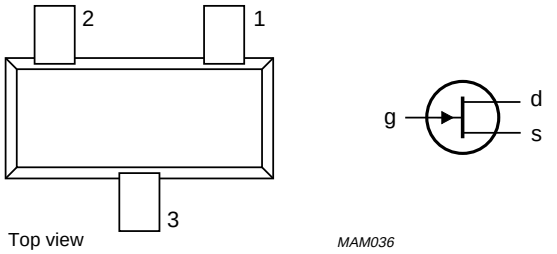
- Low leakage level (typ. 500 fA)
- High gain
- Low cut-off voltage.

APPLICATIONS

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

DESCRIPTION

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



Marking codes:
BF556A: M84.
BF556B: M85.
BF556C: M86.

Fig.1 Simplified outline and symbol.

PINNING - SOT23

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

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

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage (DC)		–	±30	V
V_{GSoff}	gate-source cut-off voltage	I_D = 200 μA; V_{DS} = 15 V	–0.5	–7.5	V
I_{DSS}	drain current	V_{GS} = 0; V_{DS} = 15 V			
	BF556A		3	7	mA
	BF556B		6	13	mA
	BF556C		11	18	mA
P_{tot}	total power dissipation	up to T_{amb} = 25 °C	–	250	mW
$\lvert y_{fs} \rvert$	forward transfer admittance	V_{GS} = 0; V_{DS} = 15 V	4.5	–	mS

LIMITING VALUES

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

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	up to T_{amb} = 25 °C; note 1	–	250	mW
T_{stg}	storage temperature		–65	150	°C
T_j	operating junction temperature		–	150	°C

Note

1. Device mounted on an FR4 printed-circuit board, maximum lead length 4 mm; mounting pad for the drain lead 10 mm^2.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient; note 1	500	K/W

Note

1. Device mounted on an FR4 printed-circuit board, maximum lead length 4 mm; mounting pad for the drain lead 10 mm^2.

STATIC CHARACTERISTICS

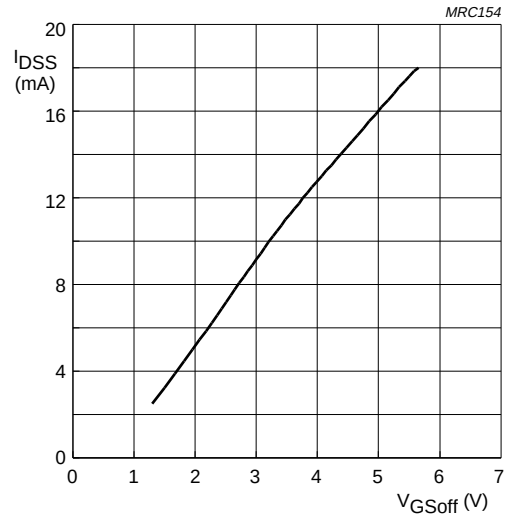
T_j = 25 °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)GSS}$	gate-source breakdown voltage	I_G = –1 μA; V_{DS} = 0	–30	–	–	V
V_{GSoff}	gate-source cut-off voltage	I_D = 200 μA; V_{DS} = 15 V	–0.5		–7.5	V
I_{DSS}	drain current	V_{GS} = 0; V_{DS} = 15 V				
	BF556A		3	–	7	mA
	BF556B		6	–	13	mA
	BF556C		11	–	18	mA
I_{GSS}	gate leakage current	V_{GS} = –20 V; V_{DS} = 0	–	–0.5	–5000	pA
$\lvert y_{fs} \rvert$	forward transfer admittance	V_{GS} = 0; V_{DS} = 15 V	4.5	–	–	mS
$\lvert y_{os} \rvert$	common source output admittance	V_{GS} = 0; V_{DS} = 15 V	–	40	–	μS

DYNAMIC CHARACTERISTICS

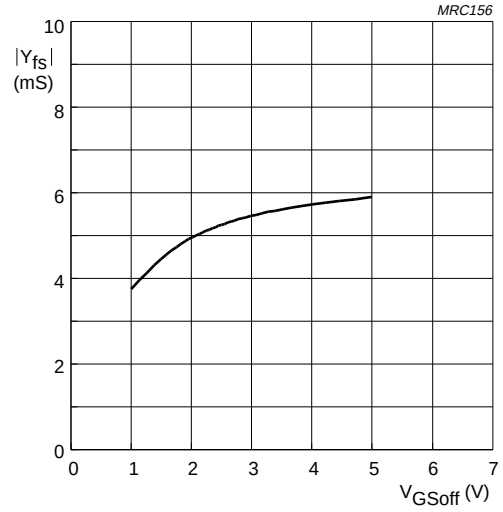
T_{amb} = 25 °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	TYP.	UNIT
C_{is}	input capacitance	V_{DS} = 15 V; V_{GS} = –10 V; f = 1 MHz	1.7	pF
		V_{DS} = 15 V; V_{GS} = 0; f = 1 MHz	3	pF
C_{rs}	reverse transfer capacitance	V_{DS} = 15 V; V_{GS} = –10 V; f = 1 MHz	0.8	pF
		V_{DS} = 15 V; V_{GS} = 0; f = 1 MHz	0.9	pF
g_{is}	common source input conductance	V_{DS} = 10 V; I_D = 1 mA; f = 100 MHz	15	µS
		V_{DS} = 10 V; I_D = 1 mA; f = 450 MHz	300	µS
g_{fs}	common source transfer conductance	V_{DS} = 10 V; I_D = 1 mA; f = 100 MHz	2	mS
		V_{DS} = 10 V; I_D = 1 mA; 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
		V_{DS} = 10 V; I_D = 1 mA; f = 450 MHz	–40	µS
g_{os}	common source output conductance	V_{DS} = 10 V; I_D = 1 mA; f = 100 MHz	30	µS
		V_{DS} = 10 V; I_D = 1 mA; f = 450 MHz	60	µS
V_n	equivalent input noise voltage	V_{DS} = 10 V; I_D = 1 mA; f = 100 Hz	40	nV/√Hz



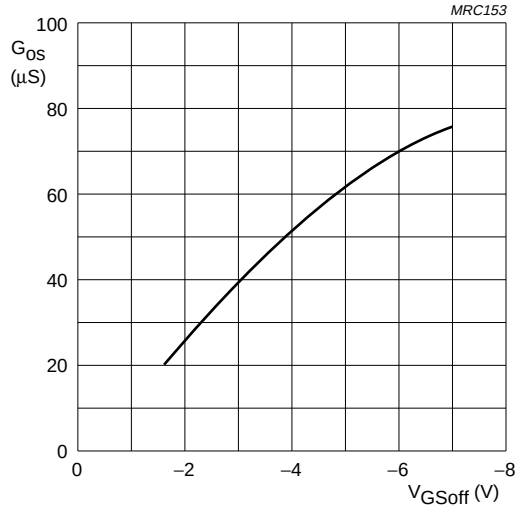
V_{DS} = 15 V.

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



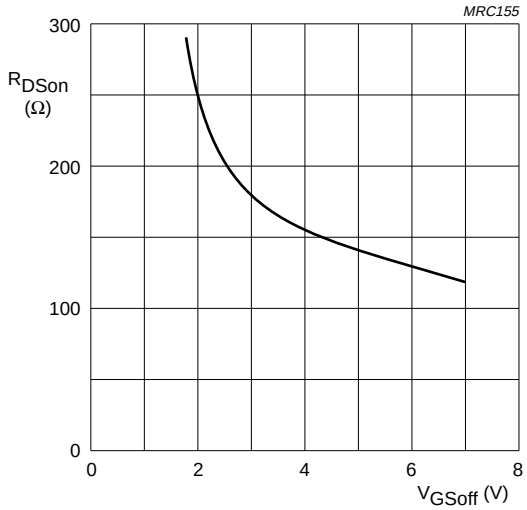
V_{DS} = 15 V; I_D = 1 µA.

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



V_{DS} = 15 V.

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



V_{DS} = 100 mV; V_{GS} = 0.

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

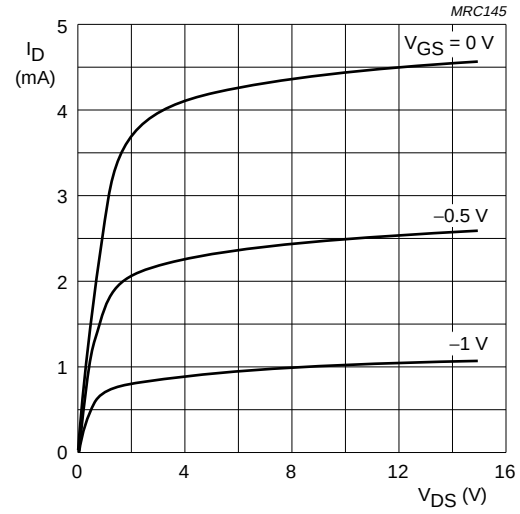


Fig.6 Typical output characteristics; BF556A.

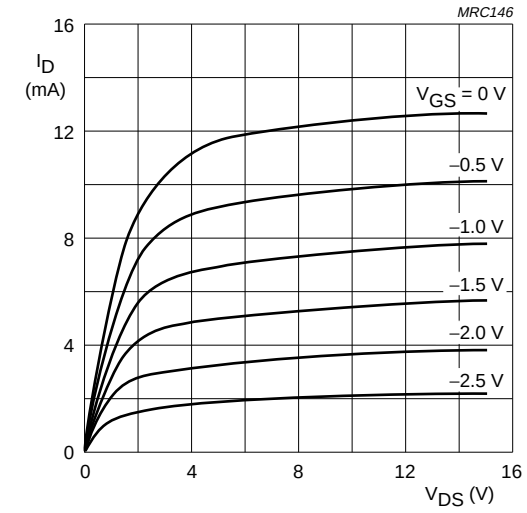


Fig.7 Typical output characteristics; BF556B.

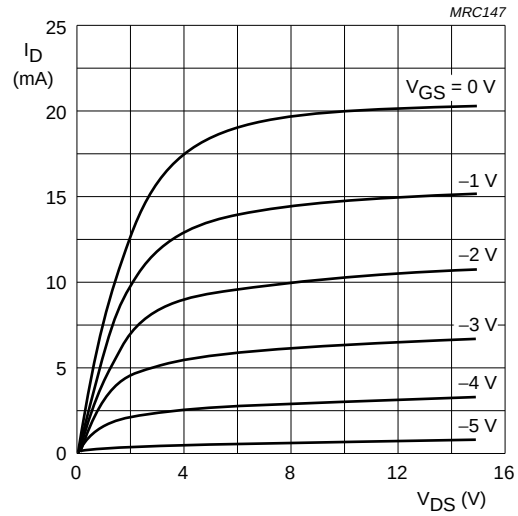
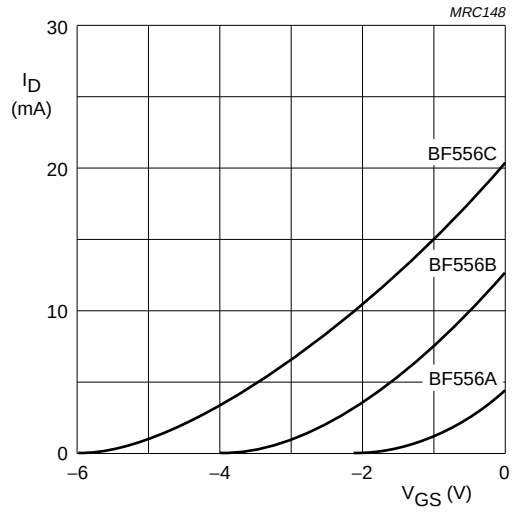
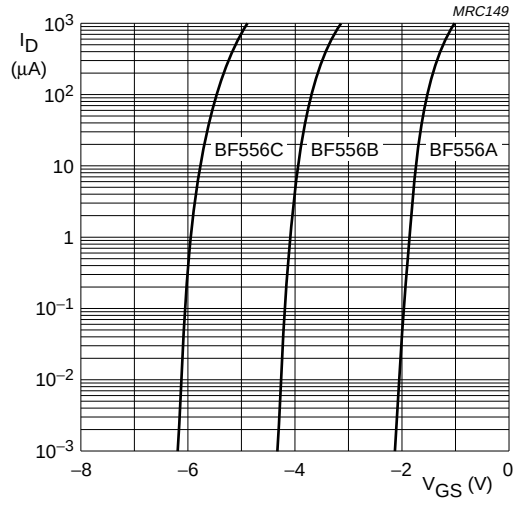


Fig.8 Typical output characteristics; BF556C.



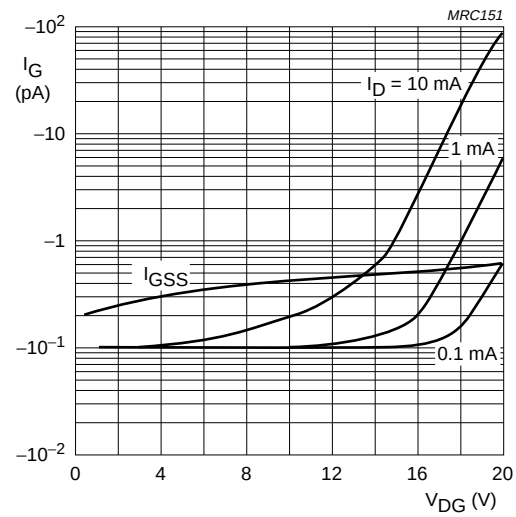
V_{DS} = 15 V.

Fig.9 Typical input characteristics.



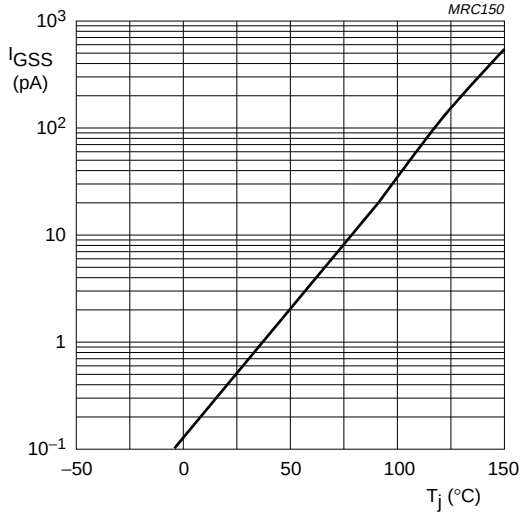
V_{DS} = 15 V.

Fig.10 Drain current as a function of gate-source voltage; typical values.



I_D = 10 mA only for BF556B and BF556C.

Fig.11 Gate current as a function of drain-gate voltage; typical values.



V_{DS} = 0; V_{GS} = –20 V.

Fig.12 Gate current as a function of junction temperature; typical values.

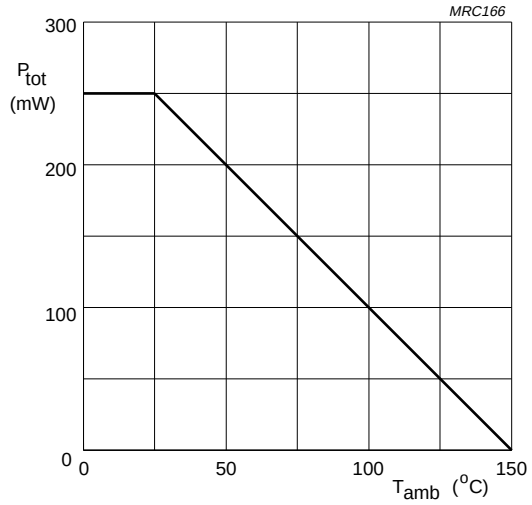
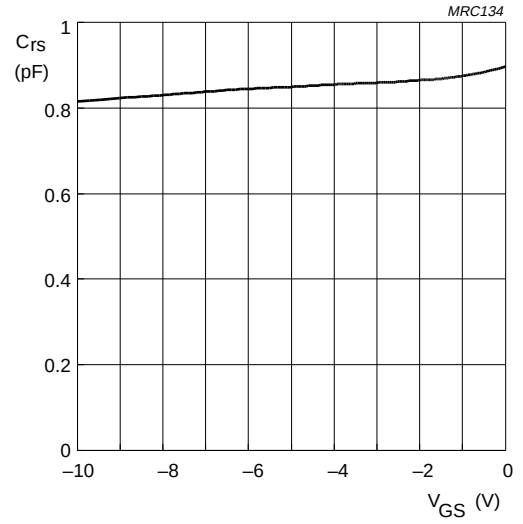
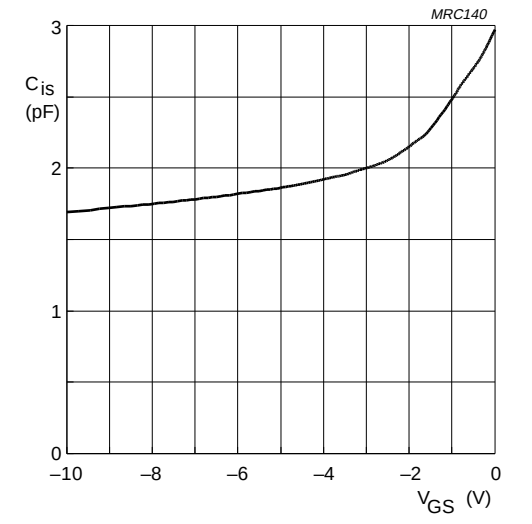


Fig.13 Power derating curve.



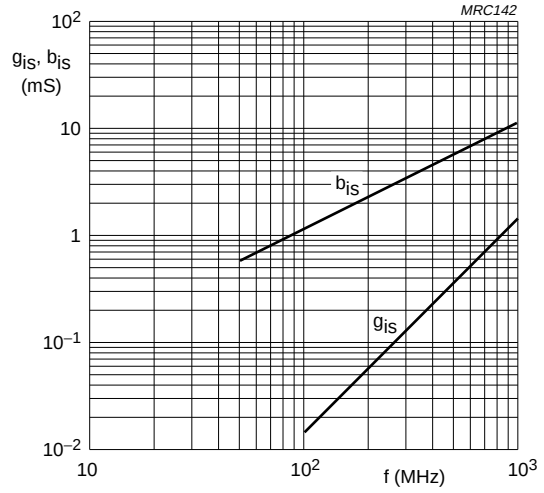
V_{DS} = 15 V.

Fig.14 Reverse transfer capacitance; typical values.



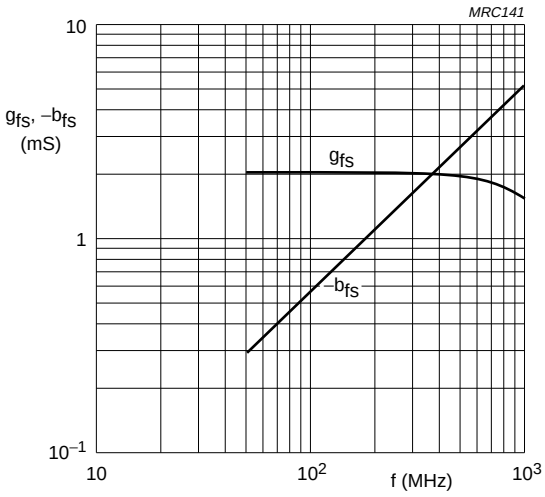
V_{DS} = 15 V.

Fig.15 Input capacitance; typical values.



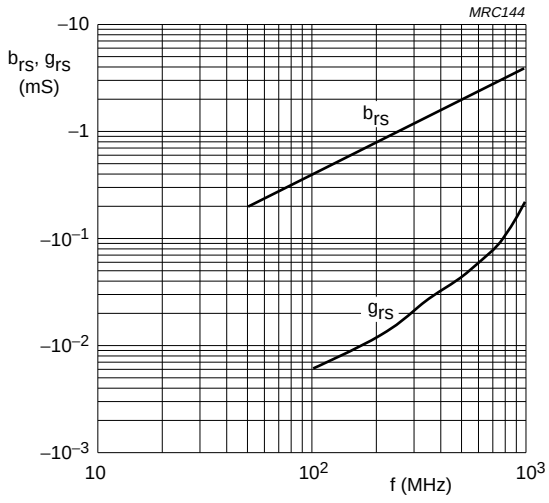
V_{DS} = 10 V; I_D = 1 mA; T_{amb} = 25 °C.

Fig.16 Common-source input admittance; typical values.



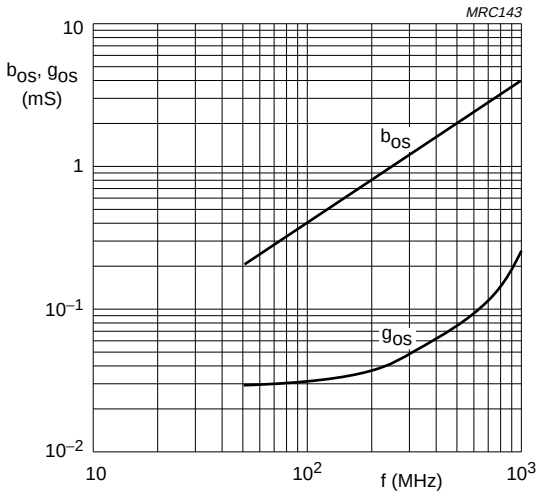
V_{DS} = 10 V; I_D = 1 mA; T_{amb} = 25 °C.

Fig.17 Common-source transfer admittance; typical values.



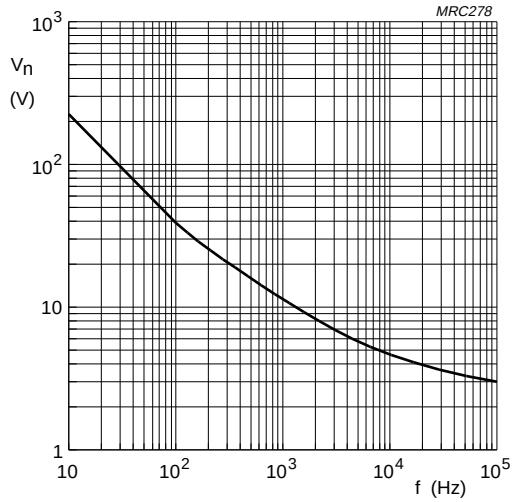
V_{DS} = 10 V; I_D = 1 mA; T_{amb} = 25 °C.

Fig.18 Common-source reverse admittance; typical values.



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

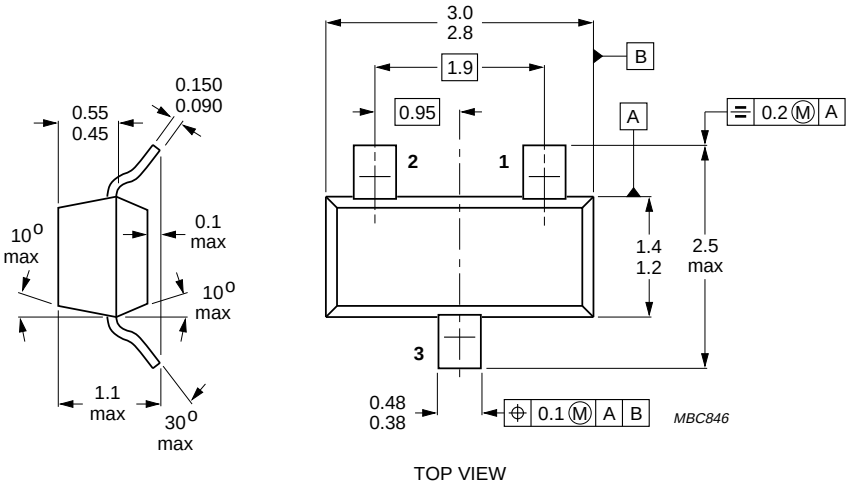
Fig.19 Common-source output admittance; typical values.



V_{DS} = 10 V; I_D = 1 mA.

Fig.20 Equivalent noise voltage as a function of frequency.

PACKAGE OUTLINE



TOP VIEW

Dimensions in mm.

Fig.21 SOT23.

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.