DATA SHEET

J210; J211; J212
N-channel field-effect transistors

Product specification
File under Discrete Semiconductors, SC07

1997 Dec 01

Philips
Semiconductors

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FEATURES

- High speed switching
- Interchangeability of drain and source connections
- High impedance.

APPLICATIONS

- Analog switches
- Choppers, multiplexers and commutators
- Audio amplifiers.

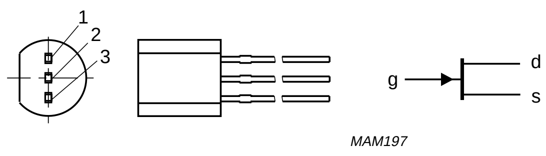
DESCRIPTION

N-channel symmetrical junction field-effect transistor in a TO-92 (SOT54) package.

CAUTION
This product is supplied in anti-static packing to prevent damage caused by electrostatic discharge during transport and handling. For further information, refer to Philips specs.: SNW-EQ-608, SNW-FQ-302A and SNW-FQ-302B.

PINNING - TO-92 (SOT54)

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



Marking codes:
J210: J210.
J211: J211.
J212: J212.

Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	±25	V
V_{GSoff}	gate-source cut-off voltage	I_D = 1 nA; V_{DS} = 15 V			
	J210		–1	–3	V
	J211		–2.5	–4.5	V
	J212		–4	–6	V
I_{DSS}	drain current	V_{GS} = 0; V_{DS} = 15 V			
	J210		2	15	mA
	J211		7	20	mA
	J212		15	40	mA
P_{tot}	total power dissipation	T_{amb} ≤ 50 °C	–	400	mW
$\|y_{fs}\|$	common-source transfer admittance	V_{GS} = 0; V_{DS} = 15 V			
	J210		4	12	mS
	J211		6	12	mS
	J212		7	12	mS

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	±25	V
V_{GSO}	gate-source voltage	open drain	–	–25	V
V_{DGO}	drain-gate voltage	open source	–	–25	V
I_G	forward gate current (DC)		–	10	mA
P_{tot}	total power dissipation	$T_{amb} \leq 50$ °C; note 1; see Fig.13	–	400	mW
T_{stg}	storage temperature		–65	150	°C
T_j	operating junction temperature		–	150	°C

Note

1. Device mounted on a 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	250	K/W

Note

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

STATIC CHARACTERISTICS

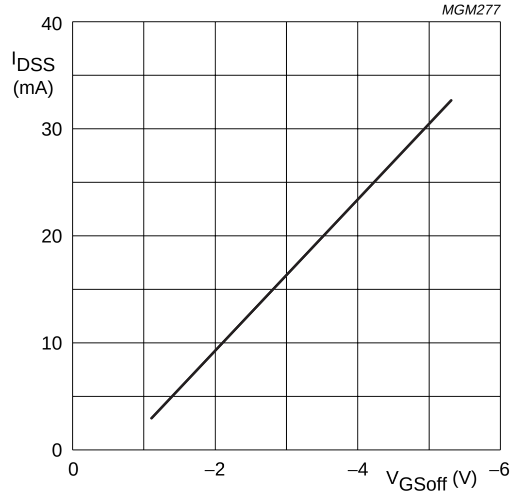
T_j = 25 °C.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)GSS}$	gate-source breakdown voltage	I_G = –1 μA; V_{DS} = 0	–	–25	V
V_{GSoff}	gate-source cut-off voltage	I_D = 1 nA; V_{DS} = 15 V			
	J210		–1	–3	V
	J211		–2.5	–4.5	V
	J212		–4	–6	V
V_{GSS}	gate-source forward voltage	I_G = 0; V_{DS} = 0	–	1	V
I_{DSS}	drain current	V_{GS} = 0; V_{DS} = 15 V			
	J10		2	15	mA
	J11		7	20	mA
	J12		15	40	mA
I_{GSS}	reverse gate leakage current	V_{GS} = –15 V; V_{DS} = 0	–	–100	pA
$\lvert y_{fs} \rvert$	common-source transfer admittance	V_{GS} = 0; V_{DS} = 15 V			
	J210		4	12	mS
	J211		6	12	mS
	J212		7	12	mS
$\lvert y_{os} \rvert$	common source output admittance	V_{GS} = 0; V_{DS} = 15 V			
	J210		–	150	μS
	J211		–	200	μS
	J212		–	200	μS

DYNAMIC CHARACTERISTICS

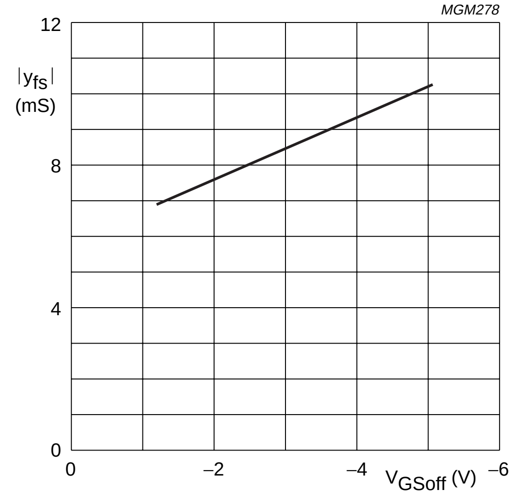
T_{amb} = 25 °C.

SYMBOL	PARAMETER	CONDITIONS	TYP.	UNIT
C_{is}	input capacitance	V_{DS} = 15 V; V_{GS} = –10 V; f = 1 MHz	2	pF
		V_{DS} = 15 V; V_{GS} = 0; f = 1 MHz	4	pF
C_{os}	output 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	2	pF
C_{rs}	feedback 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} = 15 V; V_{GS} = 0; f = 100 MHz	70	μS
		V_{DS} = 15 V; V_{GS} = 0; f = 450 MHz	1.1	mS
g_{fs}	common source transfer conductance	V_{DS} = 15 V; V_{GS} = 0; f = 100 MHz	7.5	mS
		V_{DS} = 15 V; V_{GS} = 0; f = 450 MHz	7.5	mS
g_{rs}	common source feedback conductance	V_{DS} = 15 V; V_{GS} = 0; f = 100 MHz	–8	μS
		V_{DS} = 15 V; V_{GS} = 0; f = 450 MHz	–90	μS
g_{os}	common source output conductance	V_{DS} = 15 V; V_{GS} = 0; f = 100 MHz	95	μS
		V_{DS} = 15 V; V_{GS} = 0; f = 450 MHz	200	μS
V_n	equivalent input noise voltage	V_{DS} = 15 V; V_{GS} = 0; f = 1 kHz	5	nV/√Hz



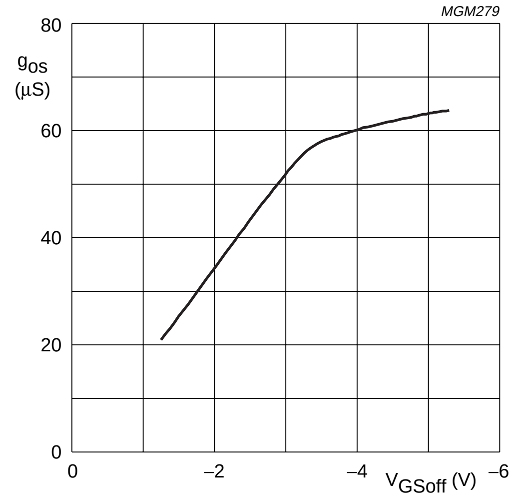
V_{DS} = 15 V; T_j = 25 °C.

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



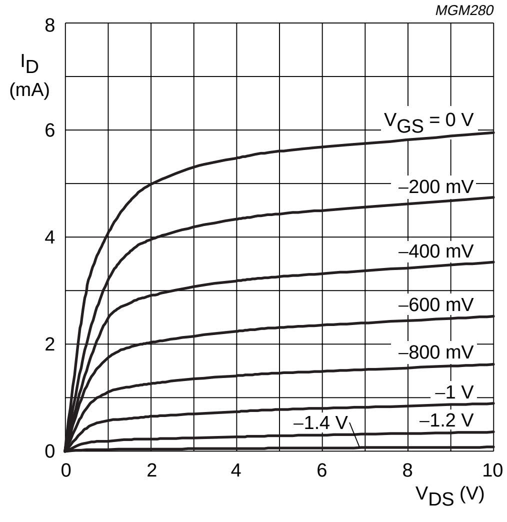
V_{DS} = 15 V; T_j = 25 °C.

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



V_{DS} = 15 V; T_{amb} = 25 °C.

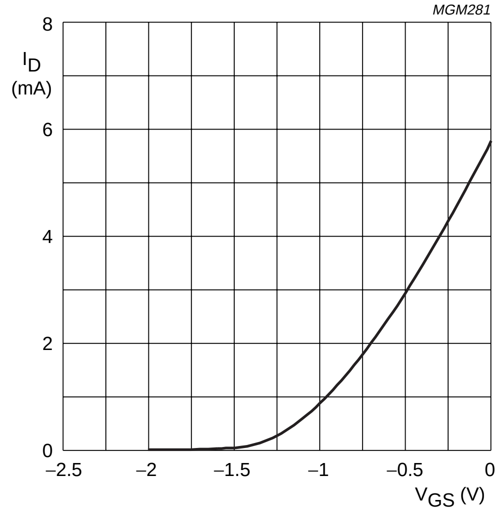
Fig.4 Common-source output conductance as a function of gate-source cut-off voltage; typical values.



J210.

T_j = 25 °C.

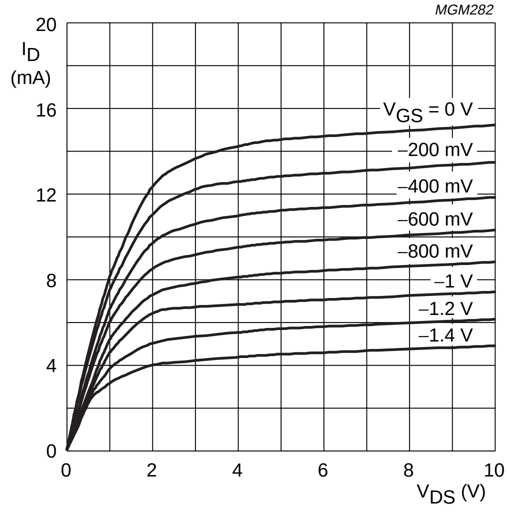
Fig.5 Output characteristics; typical values.



J210.

V_{DS} = 10 V; T_j = 25 °C.

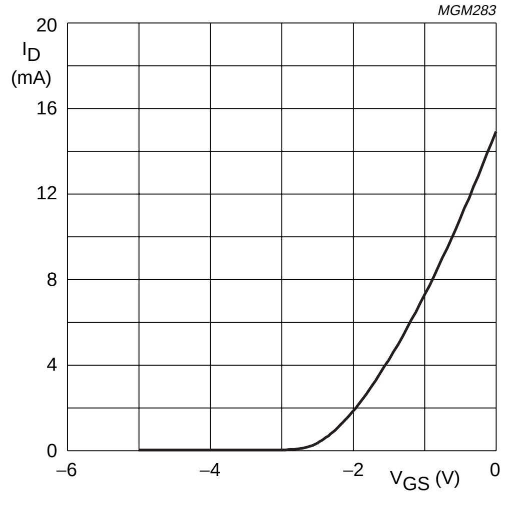
Fig.6 Input characteristics; typical values.



J211.

T_j = 25 °C.

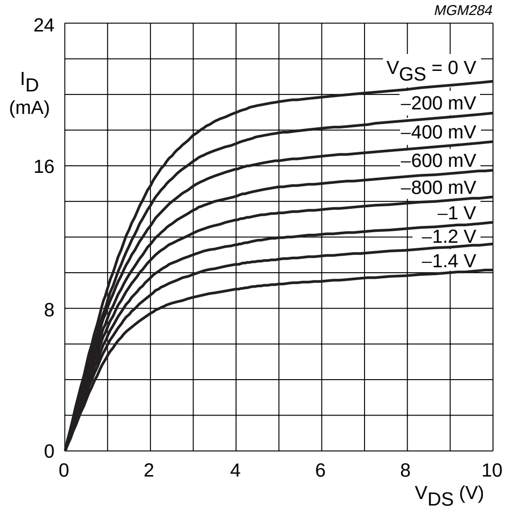
Fig.7 Output characteristics; typical values.



J211.

V_{DS} = 10 V; T_j = 25 °C.

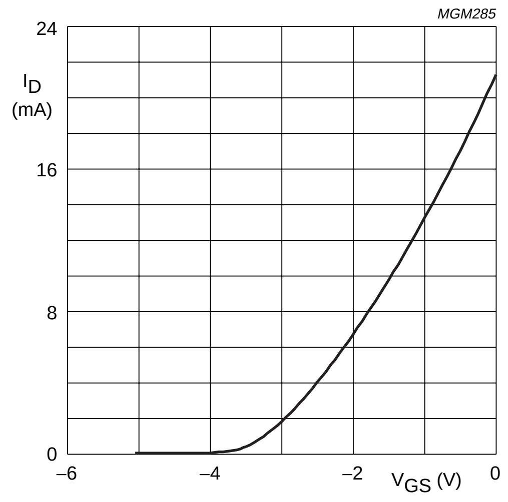
Fig.8 Input characteristics; typical values.



J212.

T_j = 25 °C.

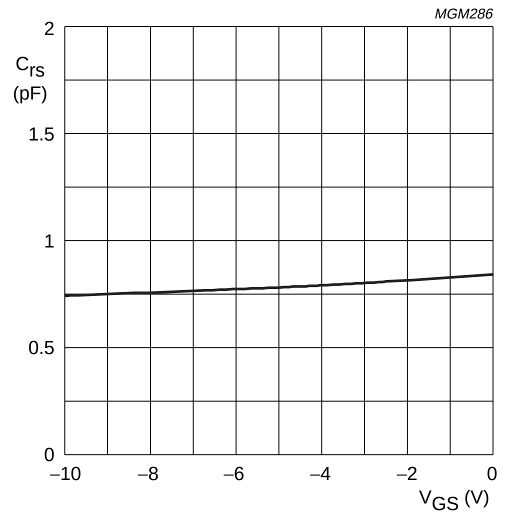
Fig.9 Output characteristics; typical values.



J212.

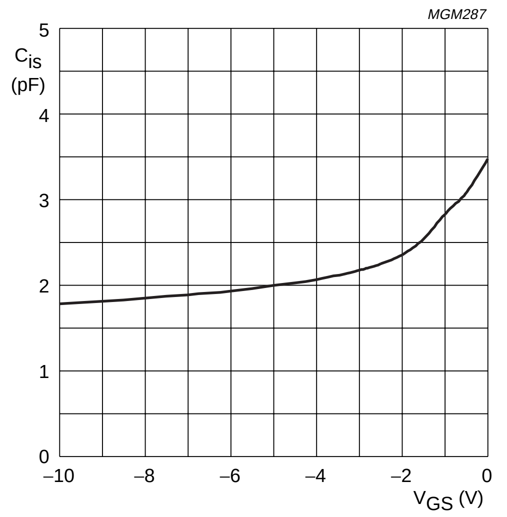
V_{DS} = 10 V; T_j = 25 °C.

Fig.10 Input characteristics; typical values.



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

Fig.11 Feedback capacitance as a function of gate-source voltage; typical values.



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

Fig.12 Input capacitance as a function of gate-source voltage; typical values.

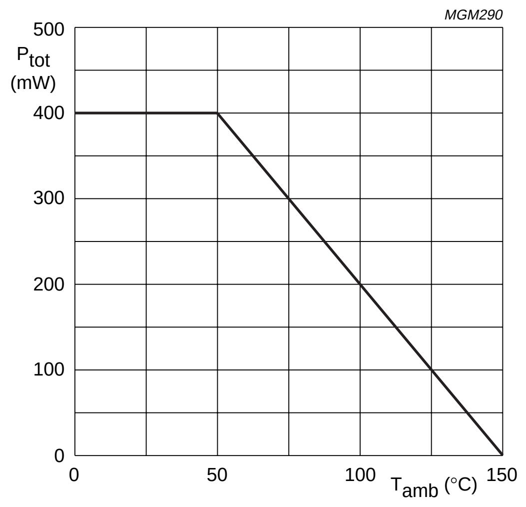
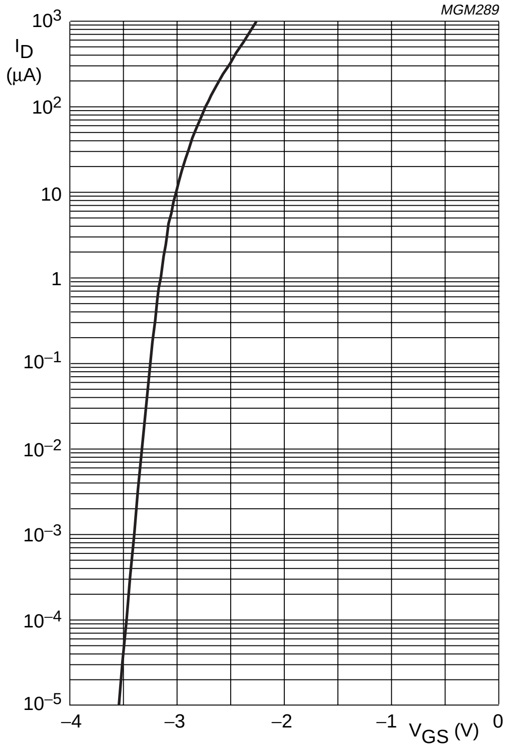
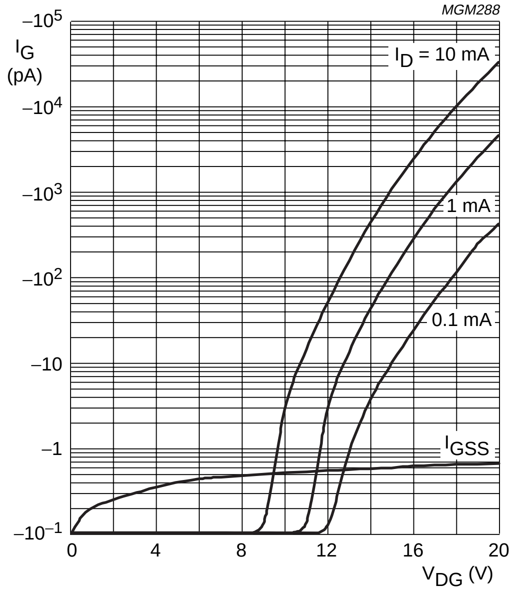


Fig.13 Power derating curve.



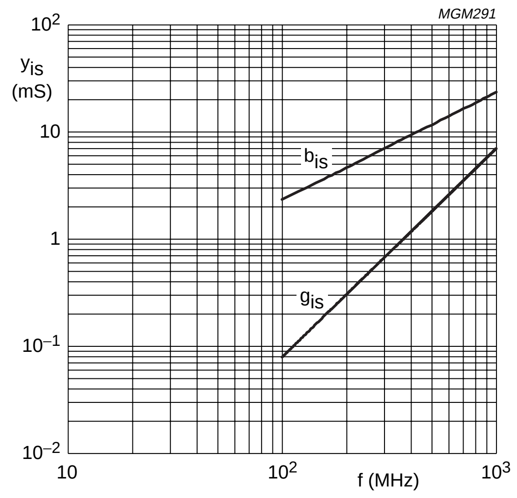
V_{DS} = 15 V; T_j = 25 °C.

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



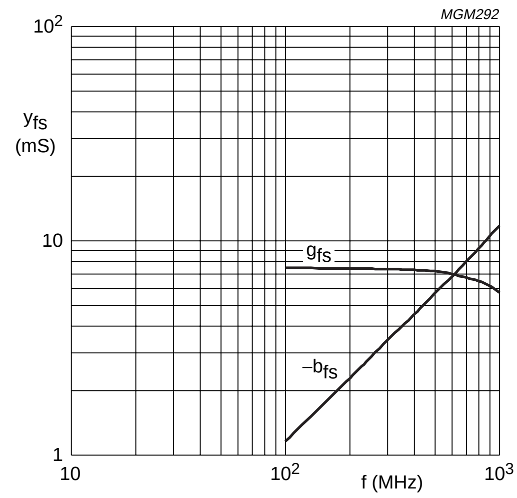
T_j = 25 °C.

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



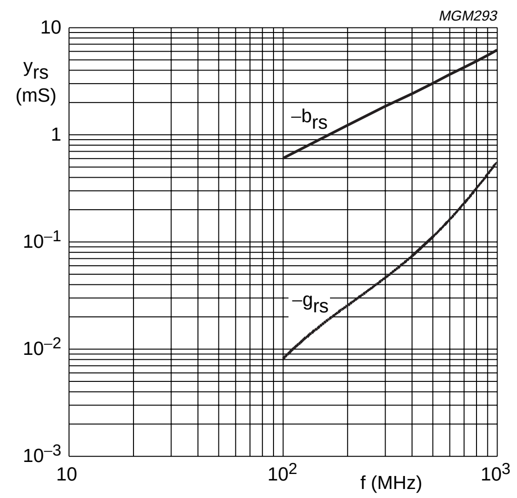
V_{DS} = 15 V; V_{GS} = 0; T_{amb} = 25 °C.

Fig.16 Common source input admittance as a function of frequency; typical values.



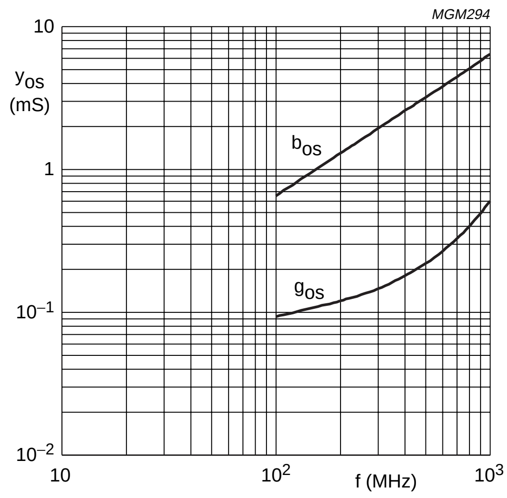
V_{DS} = 15 V; V_{GS} = 0; T_{amb} = 25 °C.

Fig.17 Common source transfer admittance as a function of frequency; typical values.



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

Fig.18 Common source reverse admittance as a function of frequency; typical values.

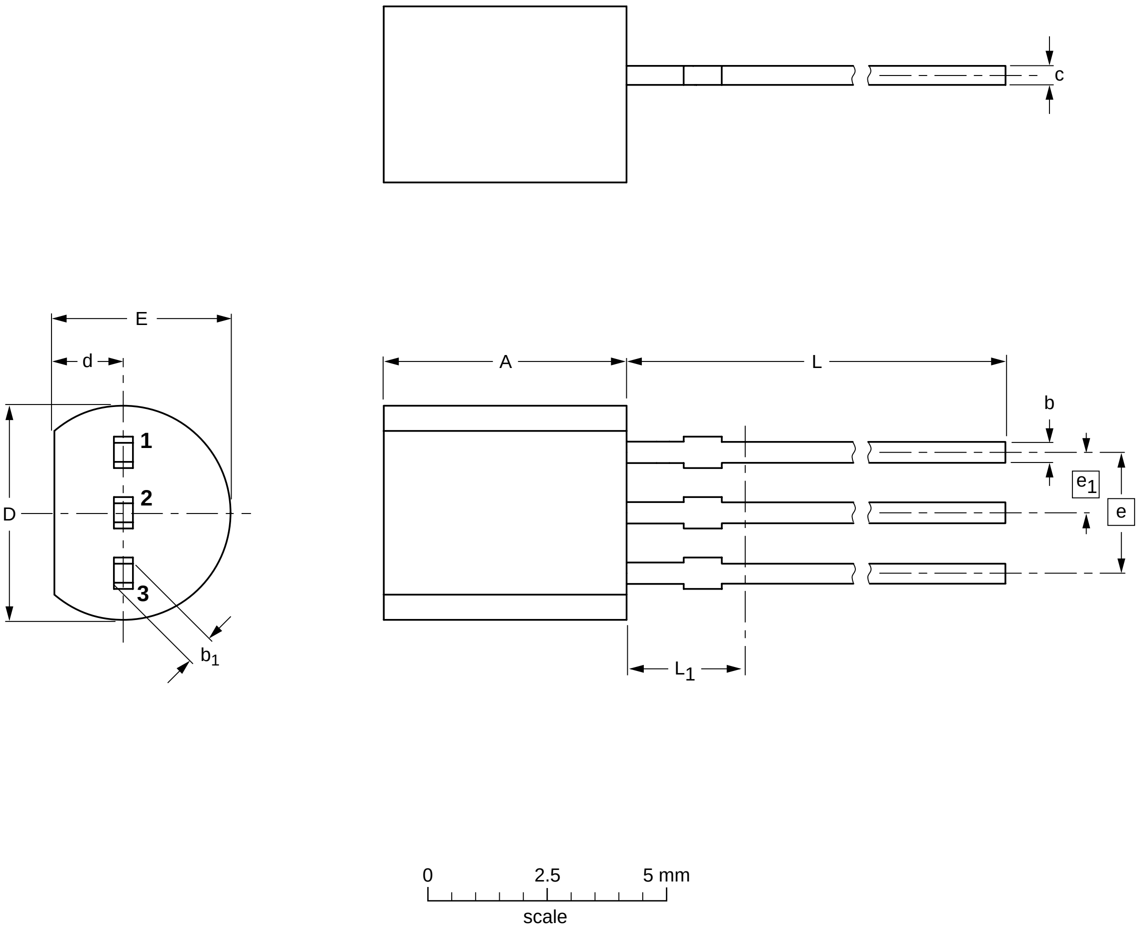


V_{DS} = 15 V; V_{GS} = 0; T_{amb} = 25 °C.

Fig.19 Common source output admittance as a function of frequency; typical values.

PACKAGE OUTLINE

Plastic single-ended leaded (through hole) package; 3 leads **SOT54**

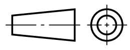


DIMENSIONS (mm are the original dimensions)

UNIT	A	b	b_1	c	D	d	E	e	e_1	L	$L_1^{(1)}$
mm	5.2 5.0	0.48 0.40	0.66 0.56	0.45 0.40	4.8 4.4	1.7 1.4	4.2 3.6	2.54	1.27	14.5 12.7	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	EIAJ			
SOT54		TO-92	SC-43			97-02-28

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.

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