BF556A; BF556B; BF556C

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.

1.3 Applications

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

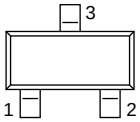
1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{DS}	drain-source voltage (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; V_{DS} = 15 V				
		BF556A	3	-	7	mA
		BF556B	6	-	13	mA
		BF556C	11	-	18	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	4.5	-	-	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
BF556A	-	plastic surface mounted package; 3 leads	SOT23
BF556B			
BF556C			

4. Marking

Table 4. Marking

Type number	Marking code[1]
BF556A	24*
BF556B	25*
BF556C	26*

[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.

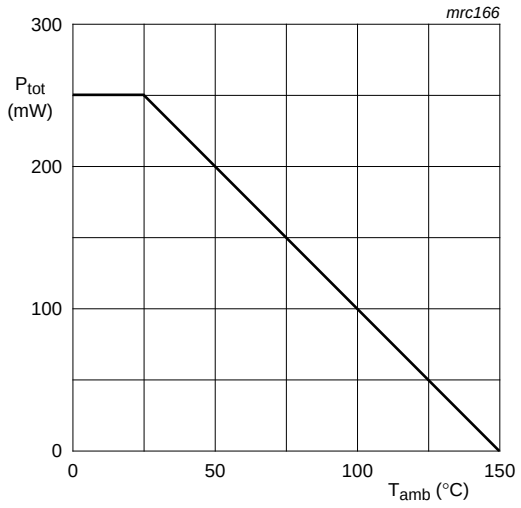


Fig 1. Power derating curve.

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.

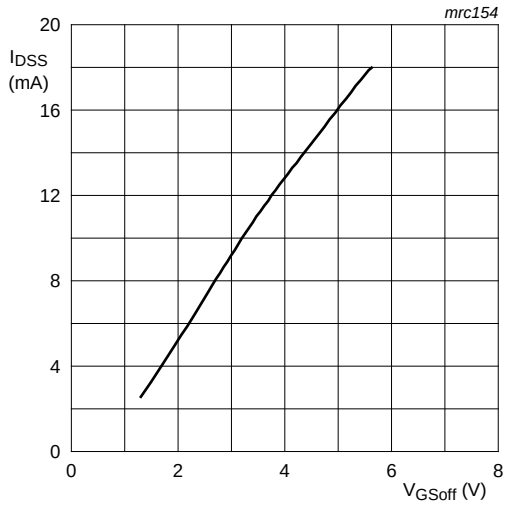
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)GSS}$	gate-source breakdown voltage	I_G = −1 μA; V_{DS} = 0 V	−30	-	-	V
V_{GSoff}	gate-source cut-off voltage	I_D = 200 μA; V_{DS} = 15 V	−0.5	-	−7.5	V
I_{DSS}	drain current	V_{GS} = 0 V; V_{DS} = 15 V				
		BF556A	3	-	7	mA
		BF556B	6	-	13	mA
		BF556C	11	-	18	mA
I_{GSS}	gate-source leakage current	V_{GS} = −20 V; V_{DS} = 0 V	-	−0.5	−5000	pA
$\lvert y_{fs} \rvert$	forward transfer admittance	V_{GS} = 0 V; V_{DS} = 15 V	4.5	-	-	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

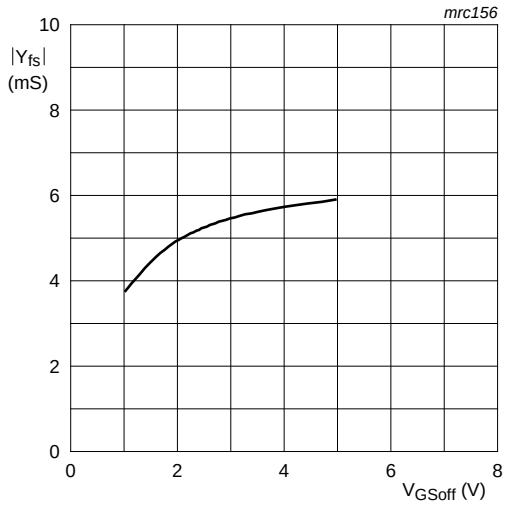
T_j = 25 °C unless otherwise specified.

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	-	−6	-	µS
		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_n	equivalent input noise voltage	V_{DS} = 10 V; I_D = 1 mA; f = 100 Hz	-	40	-	nV/√Hz



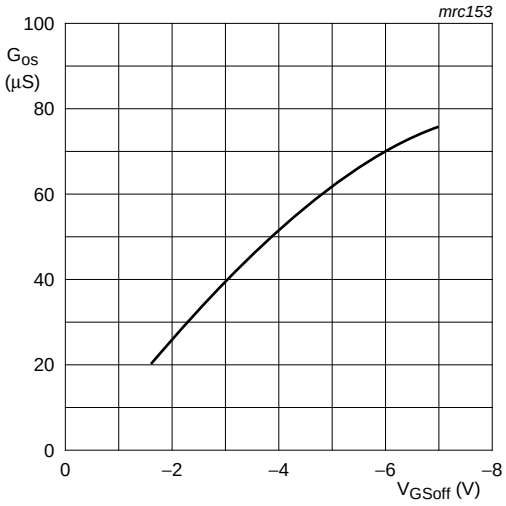
V_{DS} = 15 V.

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



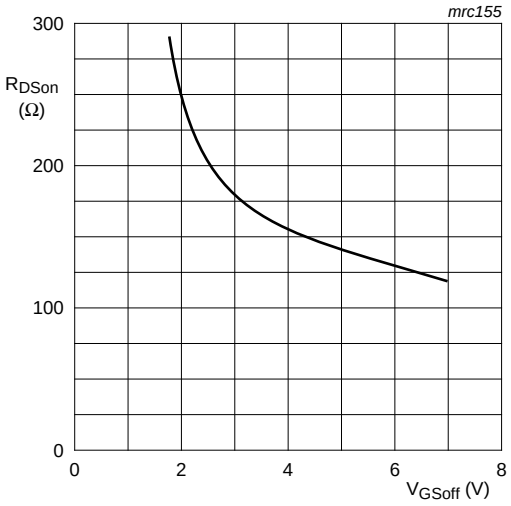
V_{DS} = 15 V; I_D = 1 µA.

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



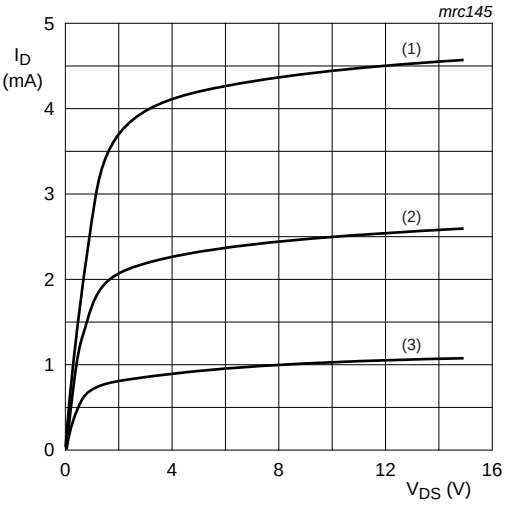
V_{DS} = 15 V.

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



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

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



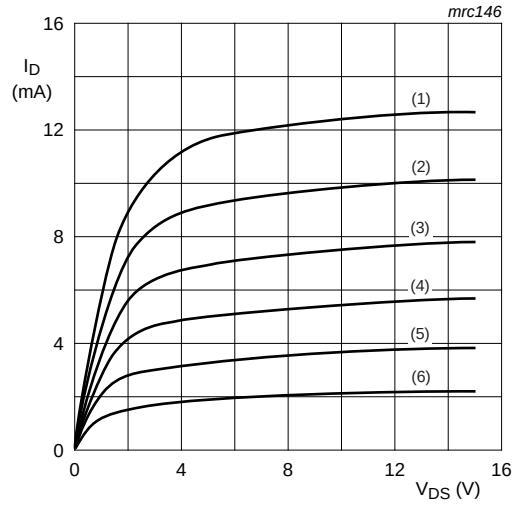
BF556A

(1) V_{GS} = 0 V.

(2) V_{GS} = −0.5 V.

(3) V_{GS} = −1.0 V.

Fig 6. Typical output characteristics.



BF556B

(1) V_{GS} = 0 V.

(2) V_{GS} = −0.5 V.

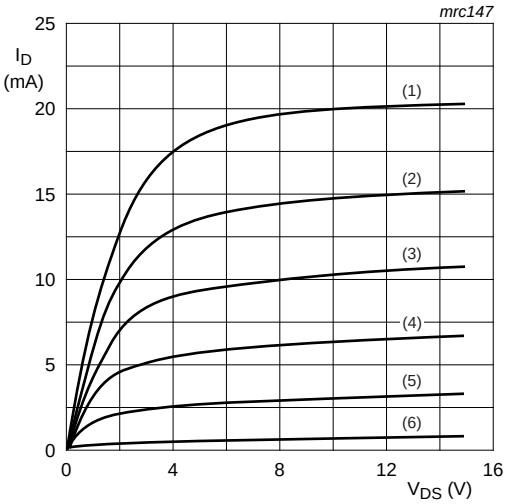
(3) V_{GS} = −1.0 V.

(4) V_{GS} = −1.5 V.

(5) V_{GS} = −2.0 V.

(6) V_{GS} = −2.5 V.

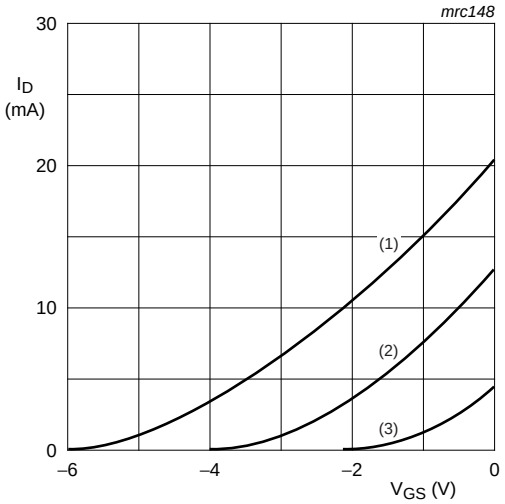
Fig 7. Typical output characteristics.



BF556C

(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.

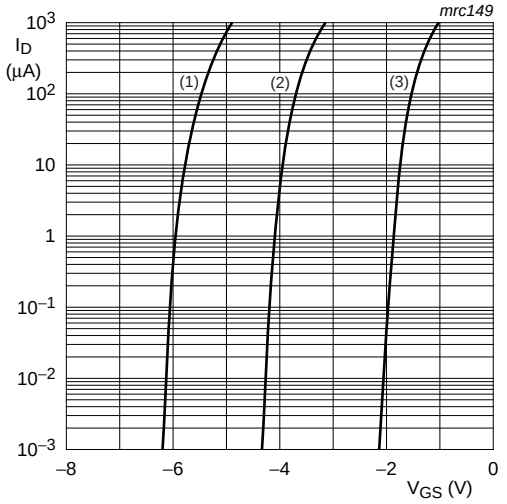
Fig 8. Typical output characteristics.



V_{DS} = 15 V.

(1) BF556C.
(2) BF556B.
(3) BF556A.

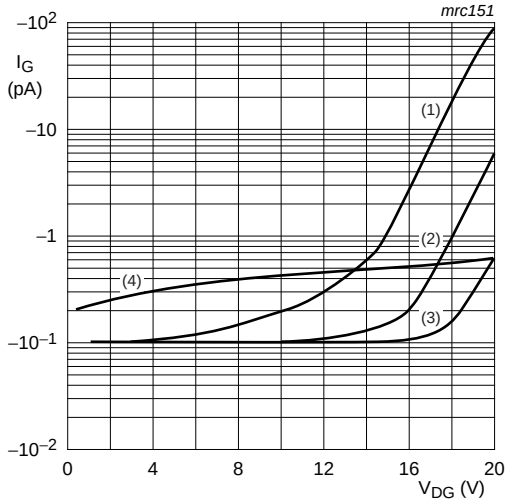
Fig 9. Typical input characteristics.



V_{DS} = 15 V.

(1) BF556C.
(2) BF556B.
(3) BF556A.

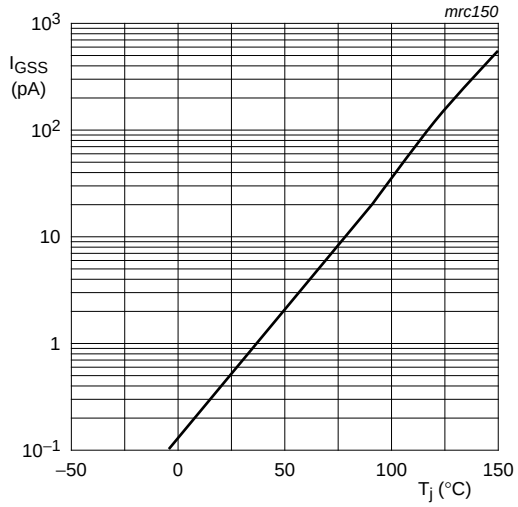
Fig 10. Drain current as a function of gate-source voltage; typical values.



I_D = 10 mA only for BF556B and BF556C.

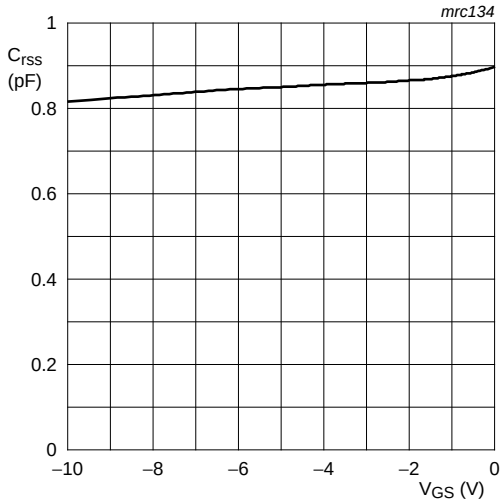
(1) I_D = 10 mA.
(2) I_D = 1 mA.
(3) I_D = 0.1 mA.
(4) I_{GSS}.

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



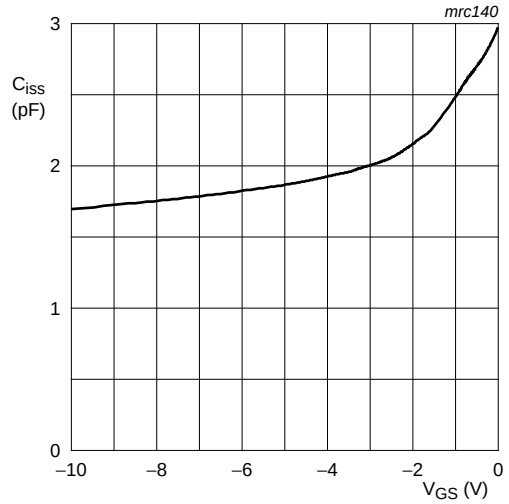
V_{DS} = 0 V; V_{GS} = −20 V.

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



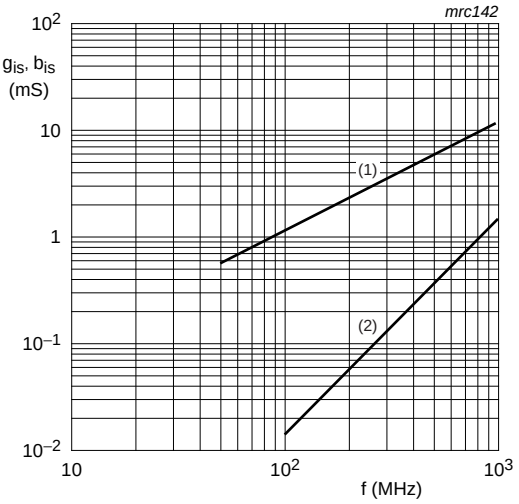
V_{DS} = 15 V.

Fig 13. Reverse transfer capacitance; typical values.



V_{DS} = 15 V.

Fig 14. Input capacitance; typical values.

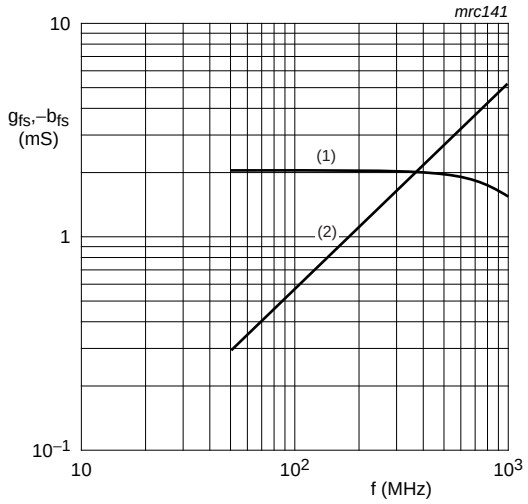


V_{DS} = 10 V; I_D = 1 mA; T_{amb} = 25 °C.

(1) b_{is}.

(2) g_{is}.

Fig 15. Common-source input admittance; typical values.

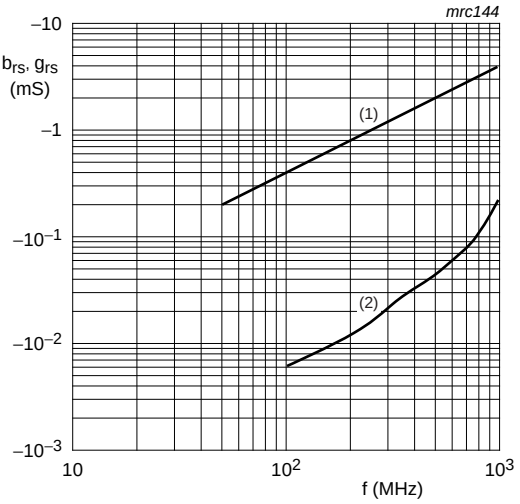


V_{DS} = 10 V; I_D = 1 mA; T_{amb} = 25 °C.

(1) g_{fs}.

(2) $-b_{fs}$.

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

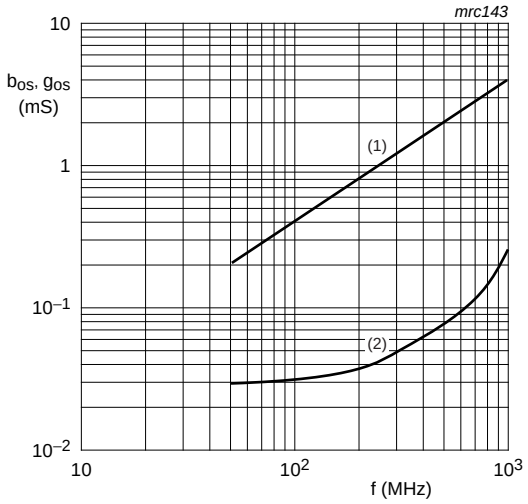


V_{DS} = 10 V; I_D = 1 mA; T_{amb} = 25 °C.

(1) b_{rs}.

(2) g_{rs}.

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

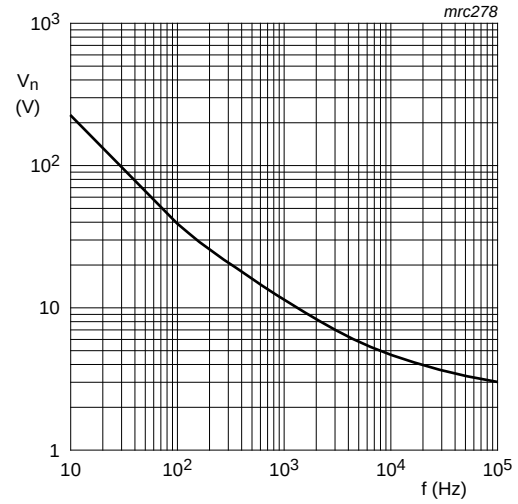


V_{DS} = 10 V; I_D = 1 mA; T_{amb} = 25 °C.

(1) b_{os}.

(2) g_{os}.

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

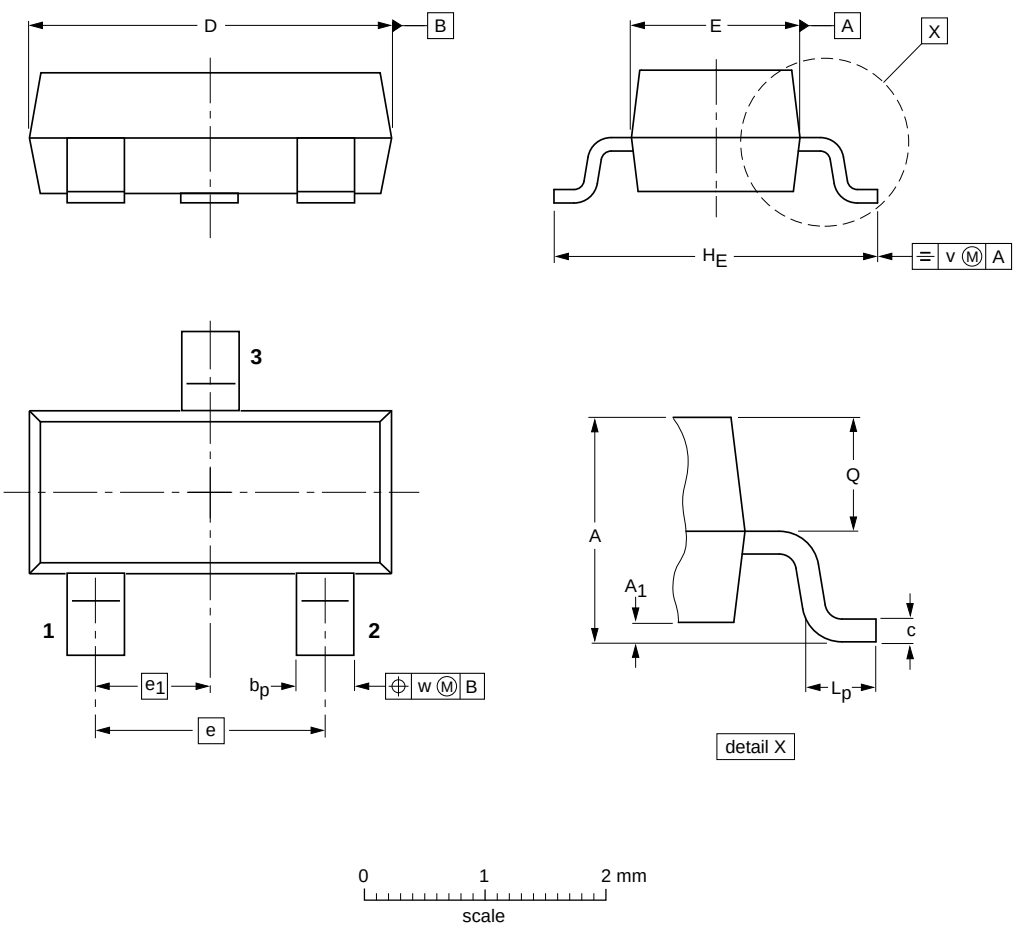


V_{DS} = 10 V; I_D = 1 mA.

Fig 19. Equivalent noise voltage as a function of frequency.

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 20. Package outline.

10. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BF556A_BF556B_BF556C v.4	20110915	Product data sheet	-	BF556A_BF556B_BF556C 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.			
BF556A_BF556B_BF556C v.3 (9397 750 13393)	20040805	Product data sheet	-	BF556A-B-C v.2
BF556A-B-C v.2	19960729	Product data sheet	-	-

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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13. Contents

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Date of release: 15 September 2011

Document identifier: BF556A_BF556B_BF556C

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