

DATA SHEET

BF510 to 513

N-channel silicon field-effect
transistors

Product specification

December 1997



N-channel silicon field-effect transistors

BF510 to 513

DESCRIPTION

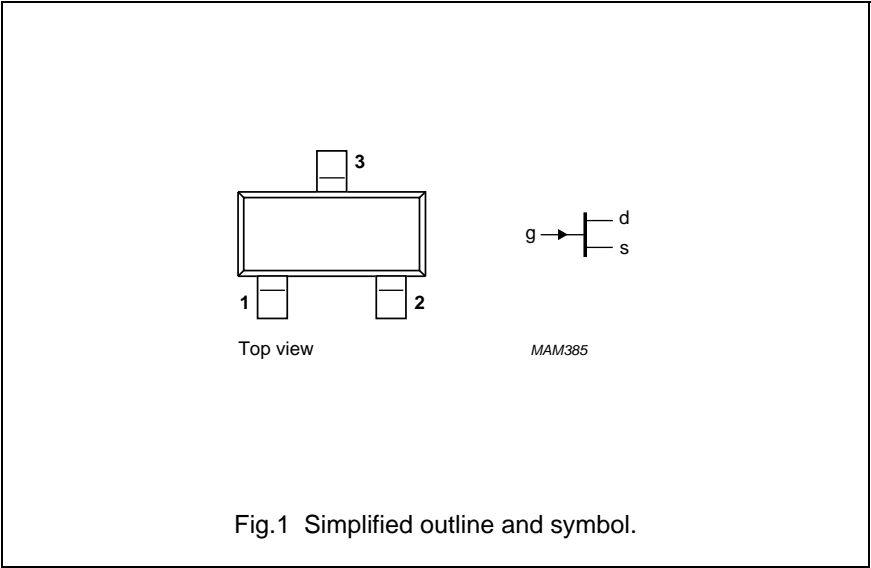
Asymmetrical N-channel planar epitaxial junction field-effect transistors in the miniature plastic envelope intended for applications up to the v.h.f. range in hybrid thick and thin-film circuits. Special features are the low feedback capacitance and the low noise figure. These features make the product very suitable for applications such as the r.f. stages in f.m. portables (BF510), car radios (BF511) and mains radios (BF512) or the mixer stage (BF513).

PINNING - SOT23

- 1 = gate
- 2 = drain
- 3 = source

MARKING CODE

- BF510 = S6p
- BF511 = S7p
- BF512 = S8p
- BF513 = S9p



QUICK REFERENCE DATA

Drain-source voltage	V_{DS}	max.	20				V
Drain current (DC or average)	I_D	max.	30				mA
Total power dissipation up to $T_{amb} = 40\text{ }^{\circ}\text{C}$	P_{tot}	max.	250				mW
			BF510	511	512	513	
Drain current	I_{DSS}	$>$	0.7	2.5	6	10	mA
$V_{DS} = 10\text{ V}; V_{GS} = 0$	I_{DSS}	$<$	3.0	7.0	12	18	mA
Transfer admittance (common source) $V_{DS} = 10\text{ V}; V_{GS} = 0; f = 1\text{ kHz}$	$ y_{fs} $	$>$	2.5	4	6	7	mS
Feedback capacitance $V_{DS} = 10\text{ V}; V_{GS} = 0$	C_{rs}	typ.	0.3	0.3	—	—	pF
$V_{DS} = 10\text{ V}; I_D = 5\text{ mA}$	C_{rs}	typ.	—	—	0.3	0.3	pF
Noise figure at optimum source admittance $G_S = 1\text{ mS}; -B_S = 3\text{ mS}; f = 100\text{ MHz}$	F	typ.	1.5	1.5	—	—	dB
$V_{DS} = 10\text{ V}; V_{GS} = 0$	F	typ.	—	—	1.5	1.5	dB
$V_{DS} = 10\text{ V}; I_D = 5\text{ mA}$	F	typ.	—	—	1.5	1.5	dB

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RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Drain-source voltage	V_{DS}	max.	20 V
Drain-gate voltage (open source)	V_{DGO}	max.	20 V
Drain current (DC or average)	I_D	max.	30 mA
Gate current	$\pm I_G$	max.	10 mA
Total power dissipation up to $T_{amb} = 40\text{ }^{\circ}\text{C}$ (note 1)	P_{tot}	max.	250 mW
Storage temperature range	T_{stg}	–65 to + 150	$^{\circ}\text{C}$
Junction temperature	T_j	max.	150 $^{\circ}\text{C}$

THERMAL RESISTANCE

From junction to ambient (note 1)	$R_{th\ j-a}$	=	430 K/W
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Note

1. Mounted on a ceramic substrate of 8 mm × 10 mm × 0.7 mm.

STATIC CHARACTERISTICS $T_{amb} = 25\text{ }^{\circ}\text{C}$

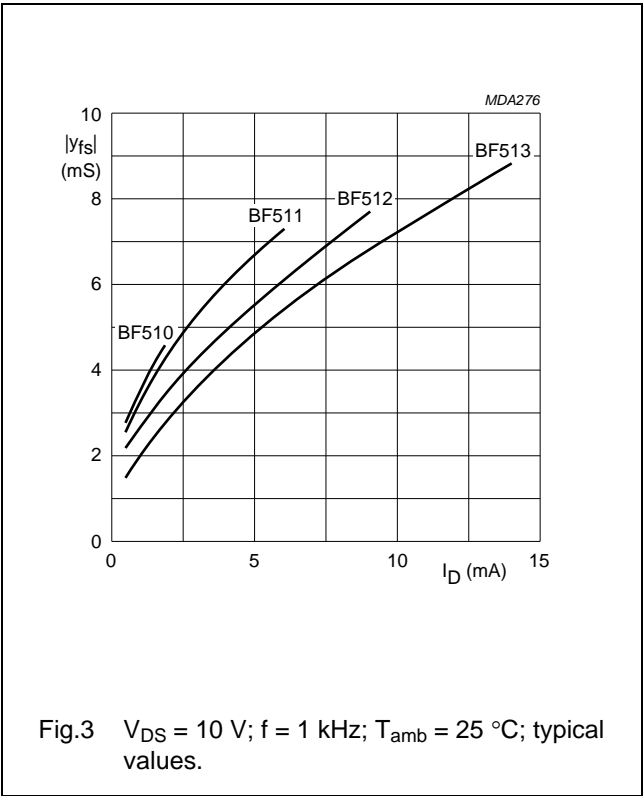
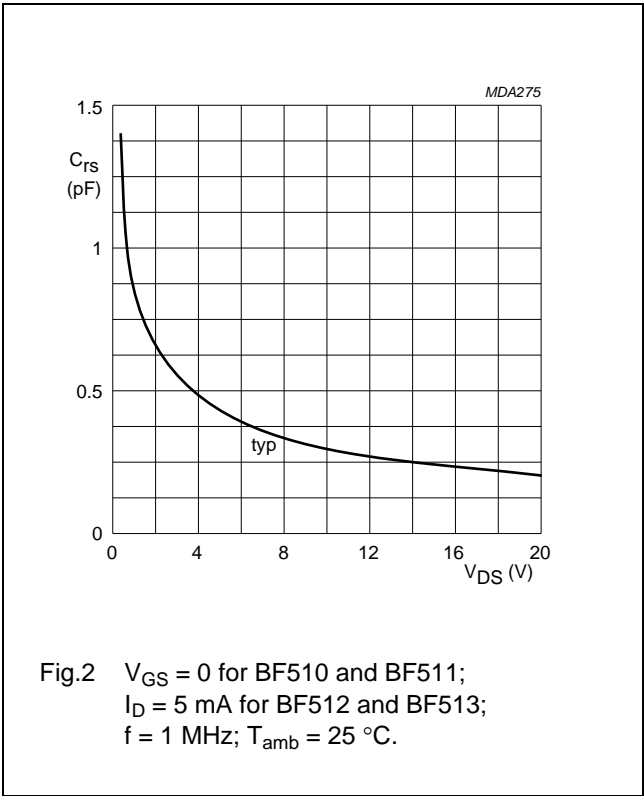
			BF510	511	512	513
Gate cut-off current						
– $V_{GS} = 0.2\text{ V}$; $V_{DS} = 0$	$-I_{GSS}$	<	10	10	10	10 nA
Gate-drain breakdown voltage						
$I_S = 0$; $-I_D = 10\text{ }\mu\text{A}$	$-V_{(BR)GDO}$	>	20	20	20	20 V
Drain current						
$V_{DS} = 10\text{ V}$; $V_{GS} = 0$	I_{DSS}	>	0.7	2.5	6	10 mA
		<	3.0	7.0	12	18 mA
Gate-source cut-off voltage						
$I_D = 10\text{ }\mu\text{A}$; $V_{DS} = 10\text{ V}$	$-V_{(P)GS}$	typ.	0.8	1.5	2.2	3 V

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DYNAMIC CHARACTERISTICS

Measuring conditions (common source):			$V_{DS} = 10\text{ V}; V_{GS} = 0; T_{amb} = 25\text{ }^{\circ}\text{C}$ for BF510 and BF511			
			$V_{DS} = 10\text{ V}; I_D = 5\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$ for BF512 and BF513			
y-parameters (common source)			BF510	511	512	513
Input capacitance at $f = 1\text{ MHz}$	C_{is}	<	5	5	5	5 pF
Input conductance at $f = 100\text{ MHz}$	g_{is}	typ.	100	90	60	50 μS
Feedback capacitance at $f = 1\text{ MHz}$	C_{rs}	typ.	0.4	0.4	0.4	0.4 pF
		<	0.5	0.5	0.5	0.5 pF
Transfer admittance at $f = 1\text{ kHz}$	$ y_{fs} $	>	2.5	4.0	4.0	3.5 mS
$V_{GS} = 0$ instead of $I_D = 5\text{ mA}$	$ y_{fs} $	>	—	—	6.0	7.0 mS
Transfer admittance at $f = 100\text{ MHz}$	$ y_{fs} $	typ.	3.5	5.5	5.0	5.0 mS
Output capacitance at $f = 1\text{ MHz}$	C_{os}	<	3	3	3	3 pF
Output conductance at $f = 1\text{ MHz}$	g_{os}	<	60	80	100	120 μS
Output conductance at $f = 100\text{ MHz}$	g_{os}	typ.	35	55	70	90 μS
Noise figure at optimum source admittance						
$G_S = 1\text{ mS}; -B_S = 3\text{ mS};$						
$f = 100\text{ MHz}$	F	typ.	1.5	1.5	1.5	1.5 dB



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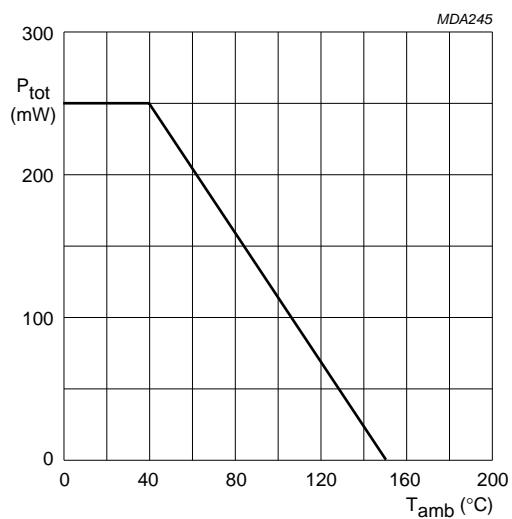


Fig.4 Power derating curve.

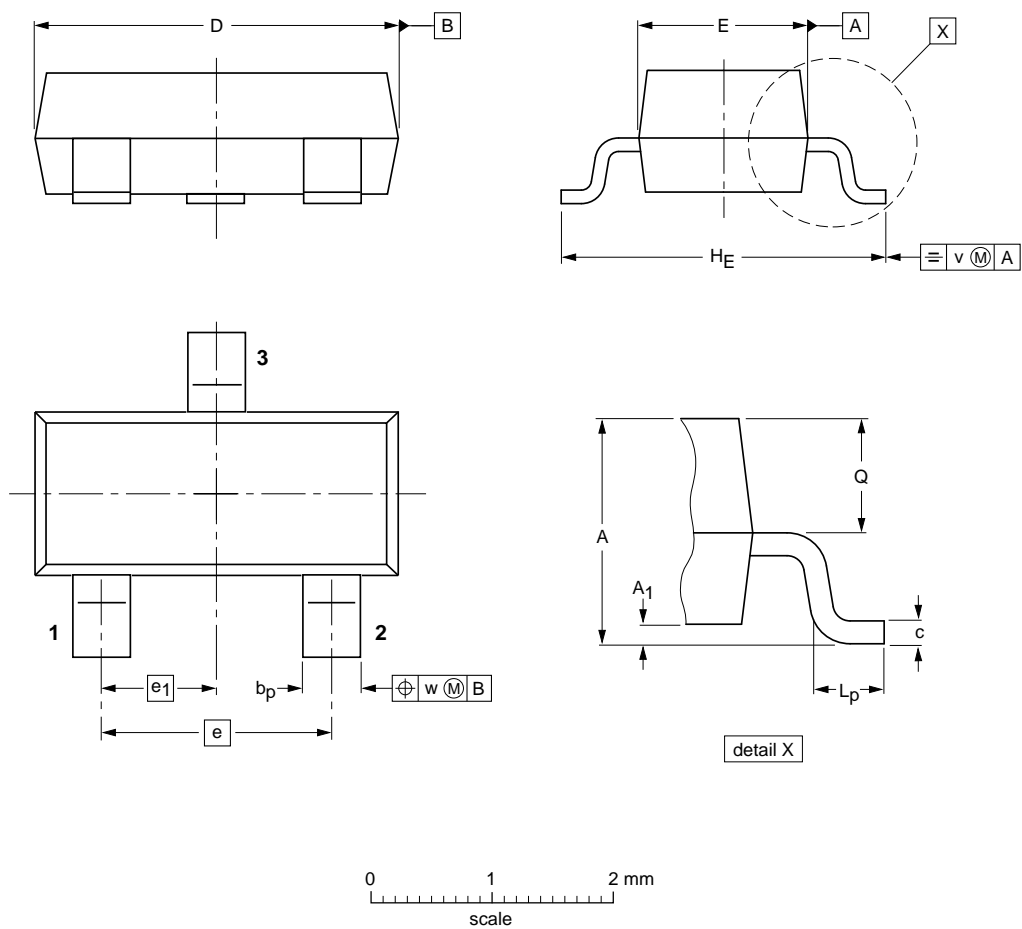
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PACKAGE OUTLINE

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

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DATA SHEET STATUS

DOCUMENT STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾	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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