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

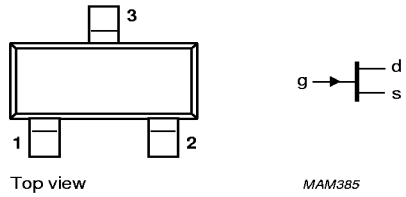


Fig.1 Simplified outline and symbol.

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 °C	P_{tot}	max.		250			mW
			BF510	**511**	**512**	**513**	
Drain current		>	0.7	2.5	6	10	mA
V_{DS} = 10 V; V_{GS} = 0	I_{DSS}	<	3.0	7.0	12	18	mA
Transfer admittance (common source)							
V_{DS} = 10 V; V_{GS} = 0; f = 1 kHz	$\lvert y_{fs} \rvert$	>	2.5	4	6	7	mS
Feedback capacitance							
V_{DS} = 10 V; V_{GS} = 0	C_{rs}	typ.	0.3	0.3	–	–	pF
V_{DS} = 10 V; I_D = 5 mA	C_{rs}	typ.	–	–	0.3	0.3	pF
Noise figure at optimum source admittance							
G_S = 1 mS; $-B_S$ = 3 mS; f = 100 MHz							
V_{DS} = 10 V; V_{GS} = 0	F	typ.	1.5	1.5	–	–	dB
V_{DS} = 10 V; I_D = 5 mA	F	typ.	–	–	1.5	1.5	dB

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 °C (note 1)	P_{tot}	max.	250	mW
Storage temperature range	T_{stg}	−65 to +	150	°C
Junction temperature	T_j	max.	150	°C

THERMAL RESISTANCE

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

Note

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

STATIC CHARACTERISTICS

T_{amb} = 25 °C

			BF510	511	512	513	
Gate cut-off current							
$-V_{GS}$ = 0.2 V; V_{DS} = 0	$-I_{GSS}$	<	10	10	10	10	nA
Gate-drain breakdown voltage							
I_S = 0; $-I_D$ = 10 μA	$-V_{(BR)GDO}$	>	20	20	20	20	V
Drain current							
V_{DS} = 10 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 μA; V_{DS} = 10 V	$-V_{(P)GS}$	typ.	0.8	1.5	2.2	3	V

DYNAMIC CHARACTERISTICS

Measuring conditions (common source): V_{DS} = 10 V; V_{GS} = 0; T_{amb} = 25 °C for BF510 and BF511
V_{DS} = 10 V; I_D = 5 mA; T_{amb} = 25 °C for BF512 and BF513

y-parameters (common source)			BF510	511	512	513	
Input capacitance at f = 1 MHz	C_{is}	<	5	5	5	5	pF
Input conductance at f = 100 MHz	g_{is}	typ.	100	90	60	50	µS
Feedback capacitance at f = 1 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 kHz	$\|y_{fs}\|$	>	2.5	4.0	4.0	3.5	mS
V_{GS} = 0 instead of I_D = 5 mA	$\|y_{fs}\|$	>	–	–	6.0	7.0	mS
Transfer admittance at f = 100 MHz	$\|y_{fs}\|$	typ.	3.5	5.5	5.0	5.0	mS
Output capacitance at f = 1 MHz	C_{os}	<	3	3	3	3	pF
Output conductance at f = 1 MHz	g_{os}	<	60	80	100	120	µS
Output conductance at f = 100 MHz	g_{os}	typ.	35	55	70	90	µS
Noise figure at optimum source admittance G_S = 1 mS; $-B_S$ = 3 mS; f = 100 MHz	F	typ.	1.5	1.5	1.5	1.5	dB

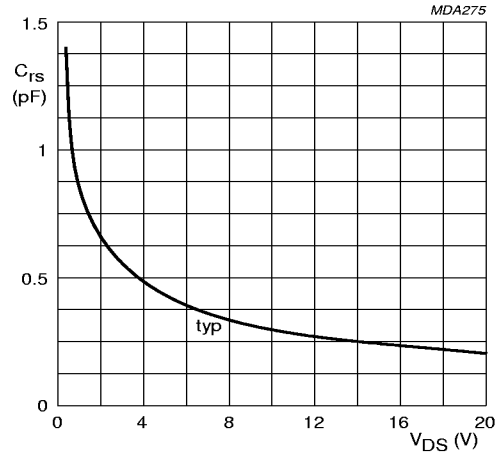


Fig.2 V_{GS} = 0 for BF510 and BF511; I_D = 5 mA for BF512 and BF513; f = 1 MHz; T_{amb} = 25 °C.

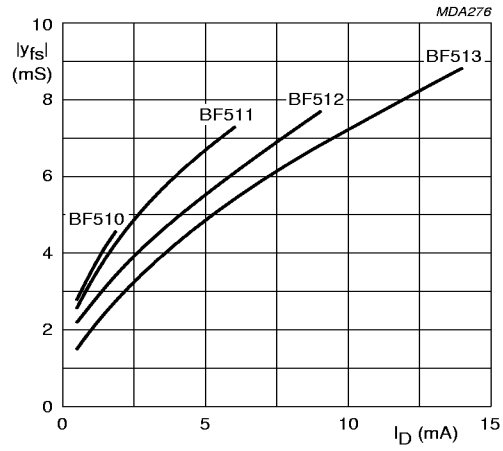


Fig.3 V_{DS} = 10 V; f = 1 kHz; T_{amb} = 25 °C; typical values.

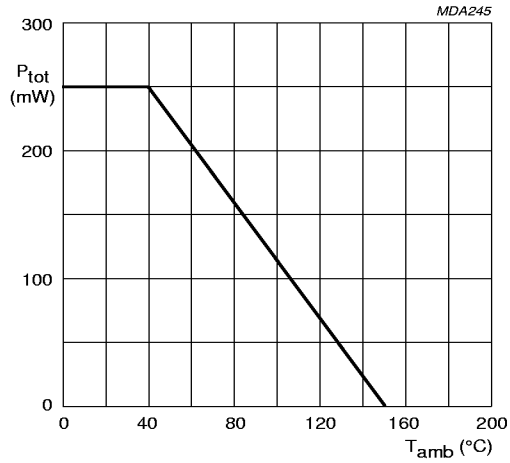
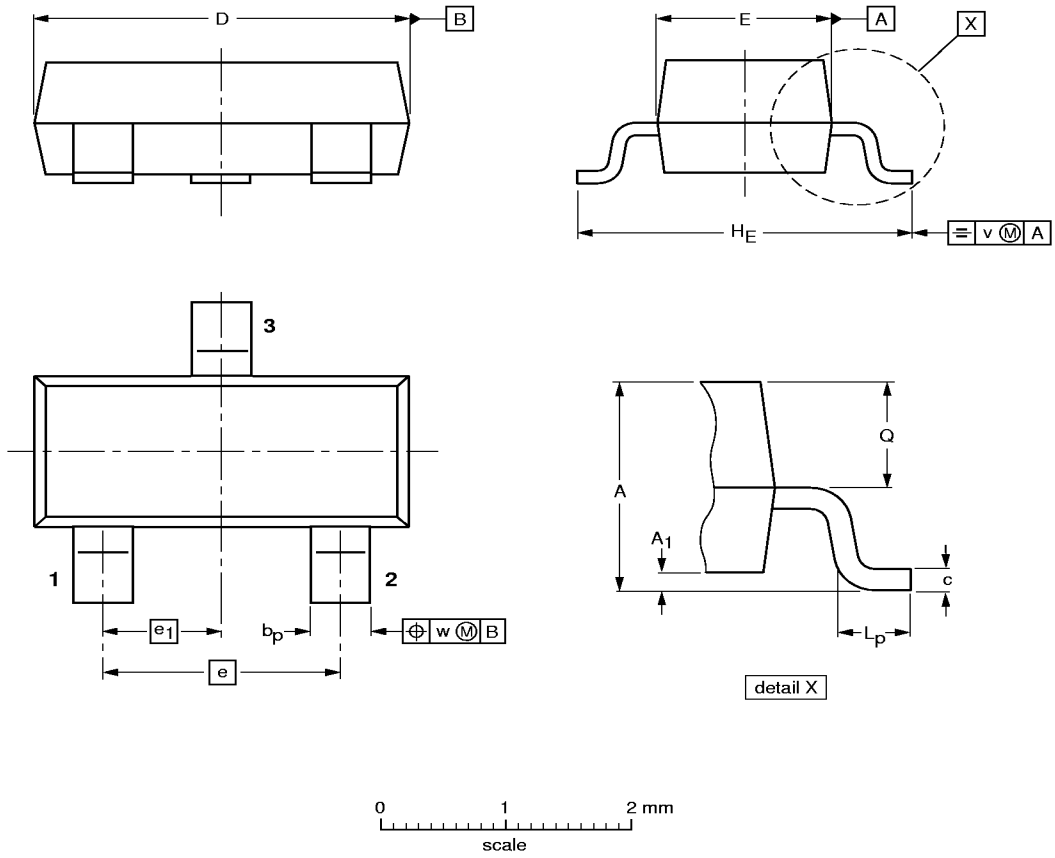


Fig.4 Power derating curve.

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	EIAJ			
SOT23						97-02-28