

# DATA SHEET

## **BF410A to D** N-channel silicon field-effect transistors

Product specification  
File under Discrete Semiconductors, SC07

December 1990

**N-channel silicon field-effect transistors**

**BF410A to D**

**DESCRIPTION**

Asymmetrical N-channel planar epitaxial junction field-effect transistors in a plastic TO-92 variant; intended for applications up to the VHF range.

These FETs can be supplied in four  $I_{DSS}$  groups. Special features are the low feedback capacitance and the low noise figure. Thanks to these special features the BF410 is very suitable for applications such as the RF stages in FM portables (type A), car radios (type B) and mains radios (type C) or the mixer stage (type D).

**PINNING - TO-92 VARIANT**

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

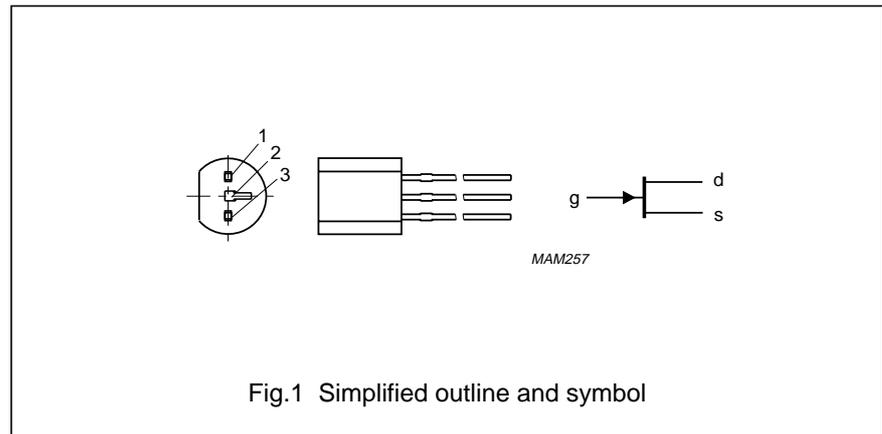


Fig.1 Simplified outline and symbol

**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 $T_{amb} = 75\text{ }^\circ\text{C}$	$P_{tot}$	max.	300	mW		
			<b>BF410A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Drain current $V_{DS} = 10\text{ V}; V_{GS} = 0$	$I_{DSS}$	min.	0.7	2.5	6	10 mA
		max.	3.0	7.0	12	18 mA
Transfer admittance $V_{DS} = 10\text{ V}; V_{GS} = 0; f = 1\text{ kHz}$	$ y_{fs} $	min.	2.5	4	6	7 mS
Feedback capacitance $V_{DS} = 10\text{ V}; V_{GS} = 0$	$C_{rs}$	typ.	0.5	0.5	–	– pF
$V_{DS} = 10\text{ V}; I_D = 5\text{ mA}$	$C_{rs}$	typ.	–	–	0.5	0.5 pF
Noise figure at optimum source admittance $G_S = 1\text{ mS}; -B_S = 3\text{ mS}; f = 100\text{ MHz}$						
$V_{DS} = 10\text{ V}; V_{GS} = 0$	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 $T_{amb} = 75\text{ }^\circ\text{C}$	$P_{tot}$	max.	300 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 in free air	$R_{th\ j-a}$	=	250 K/W
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**STATIC CHARACTERISTICS**

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

			<b>BF410A</b>	<b>B</b>	<b>C</b>	<b>D</b>	
Gate cut-off current $-V_{GS} = 0.2\text{ V}; V_{DS} = 0$	$-I_{GSS}$	max.	10	10	10	10	nA
Gate-drain breakdown voltage $I_S = 0; -I_D = 10\text{ }\mu\text{A}$	$-V_{(BR)GDO}$	min.	20	20	20	20	V
Drain current $V_{DS} = 10\text{ V}; V_{GS} = 0$	$I_{DSS}$	min.	0.7	2.5	6	10	mA
		max.	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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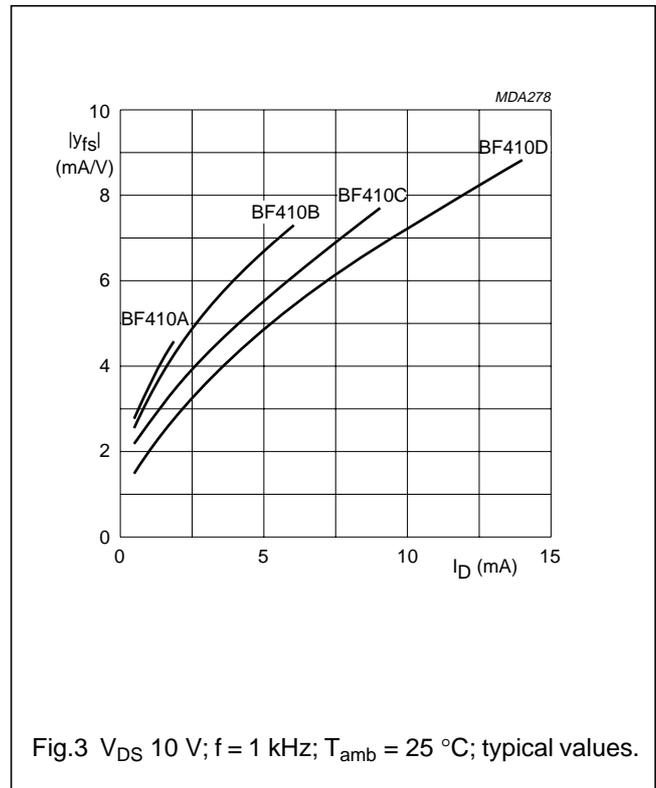
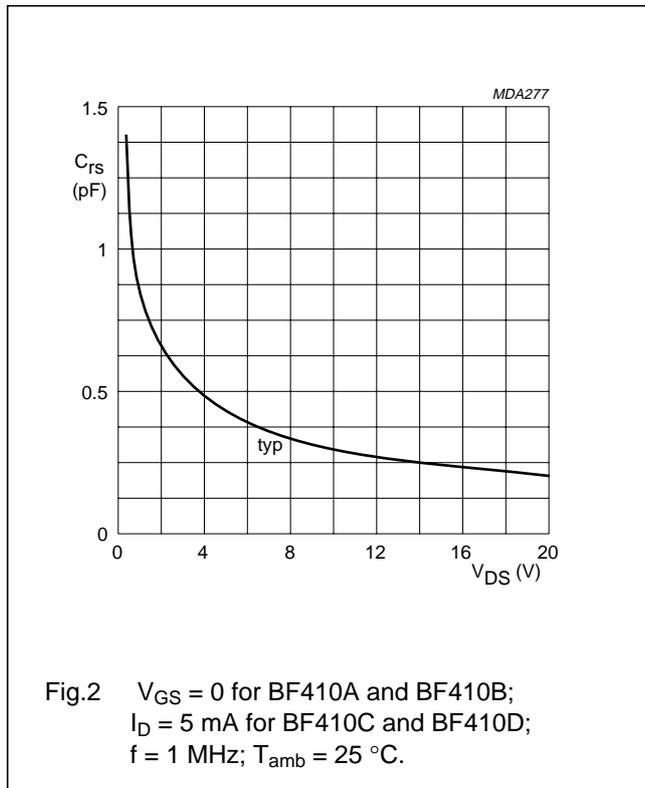
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**DYNAMIC CHARACTERISTICS**

**Measuring conditions (common source):**  $V_{DS} = 10\text{ V}$ ;  $V_{GS} = 0$ ;  $T_{amb} = 25\text{ }^\circ\text{C}$  for BF410A and B  
 $V_{DS} = 10\text{ V}$ ;  $I_D = 5\text{ mA}$ ;  $T_{amb} = 25\text{ }^\circ\text{C}$  for BF410C and D

**y-parameters (common source)**

			BF410A	B	C	D
Input capacitance at $f = 1\text{ MHz}$	$C_{is}$	max.	5	5	5	5 pF
Input conductance at $f = 100\text{ MHz}$	$g_{is}$	typ.	100	90	60	50 $\mu\text{S}$
Feedback capacitance at $f = 1\text{ MHz}$	$C_{rs}$	typ.	0.5	0.5	0.5	0.5 pF
		max.	0.7	0.7	0.7	0.7 pF
Transfer admittance at $f = 1\text{ kHz}$ $V_{GS} = 0$ instead of $I_D = 5\text{ mA}$	$ y_{fs} $	min.	2.5	4.0	4.0	3.5 mS
	$ y_{fs} $	min.	–	–	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 $f = 1\text{ MHz}$	$C_{os}$	max.	3	3	3	3 pF
Output conductance at $f = 1\text{ MHz}$	$g_{os}$	max.	60	80	100	120 $\mu\text{S}$
Output conductance at $f = 100\text{ MHz}$	$g_{os}$	typ.	35	55	70	90 $\mu\text{S}$
<b>Noise figure</b> 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



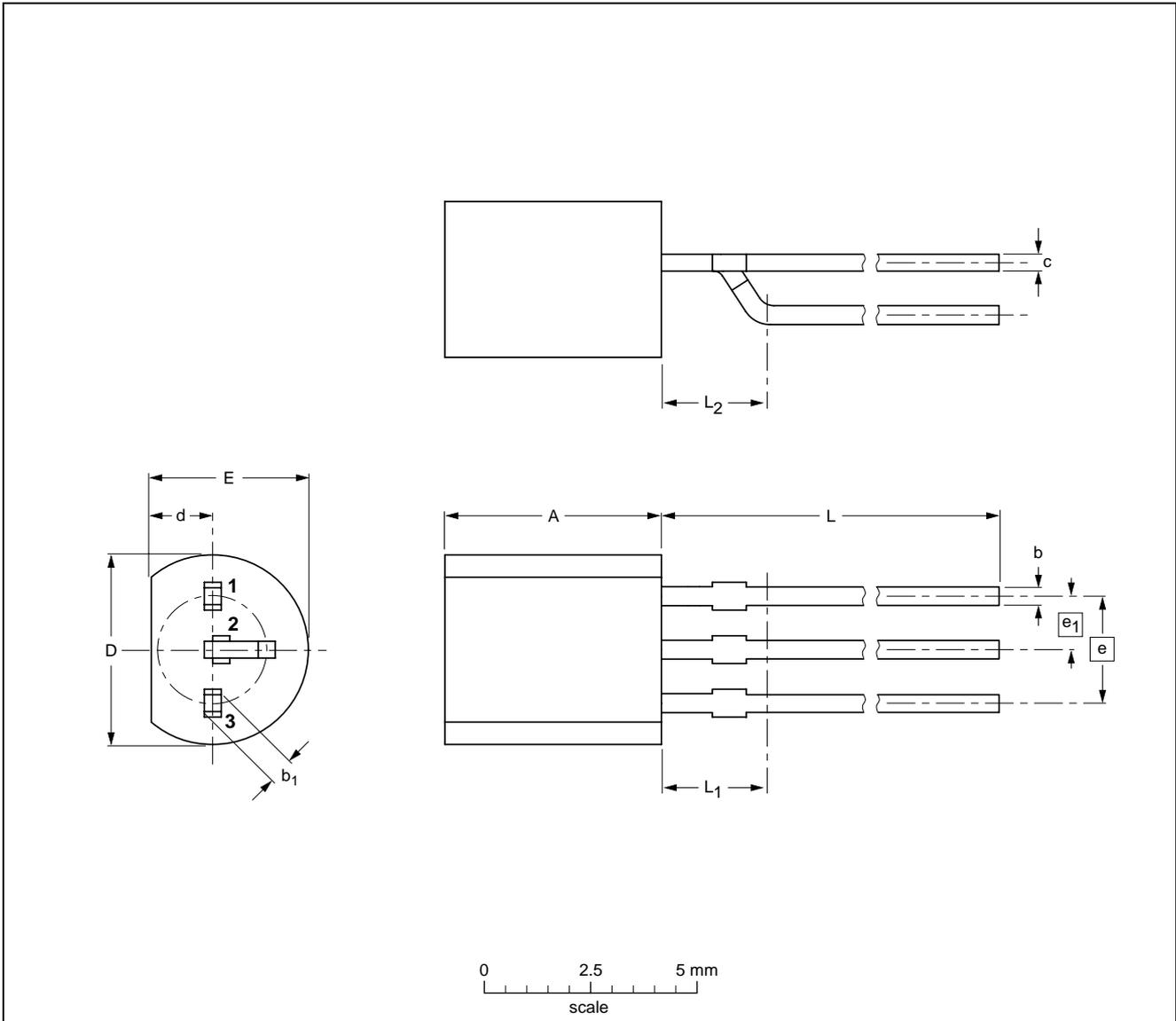
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PACKAGE OUTLINE

Plastic single-ended leaded (through hole) package; 3 leads (on-circle)

SOT54 variant



DIMENSIONS (mm are the original dimensions)

UNIT	A	b	b <sub>1</sub>	c	D	d	E	e	e <sub>1</sub>	L	L <sub>1</sub> <sup>(1)</sup> max	L <sub>2</sub> max
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	2.5

Notes

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 variant		TO-92	SC-43		97-04-14

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**DEFINITIONS**

<b>Data sheet status</b>	
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.
Short-form specification	The data in this specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.
<b>Limiting values</b>	
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.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	

**LIFE SUPPORT APPLICATIONS**

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