

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

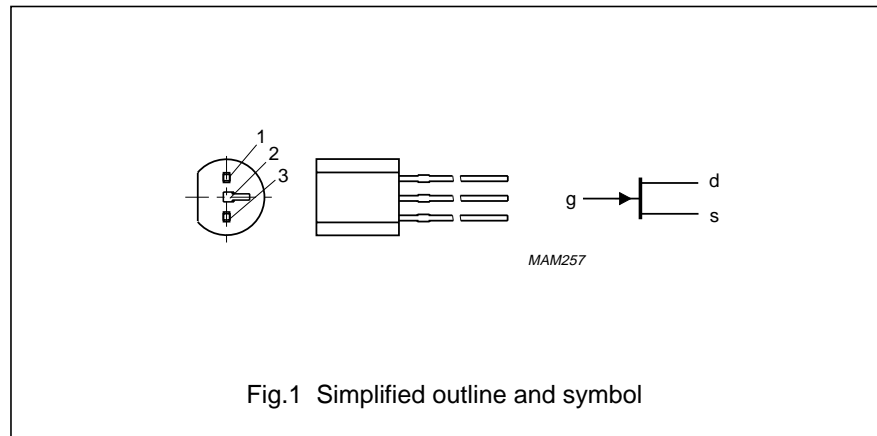


Fig.1 Simplified outline and symbol

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
				BF410A	B	C	D
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

N-channel silicon field-effect transistors

BF410A to D

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
--------------------------------------	---------------	---	---------

STATIC CHARACTERISTICS

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

			BF410A	B	C	D	
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

N-channel silicon field-effect transistors

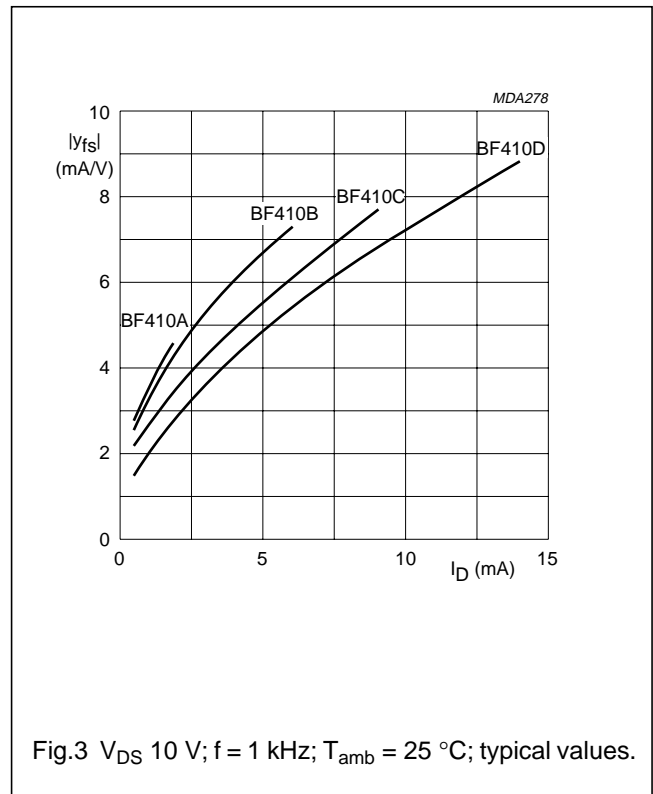
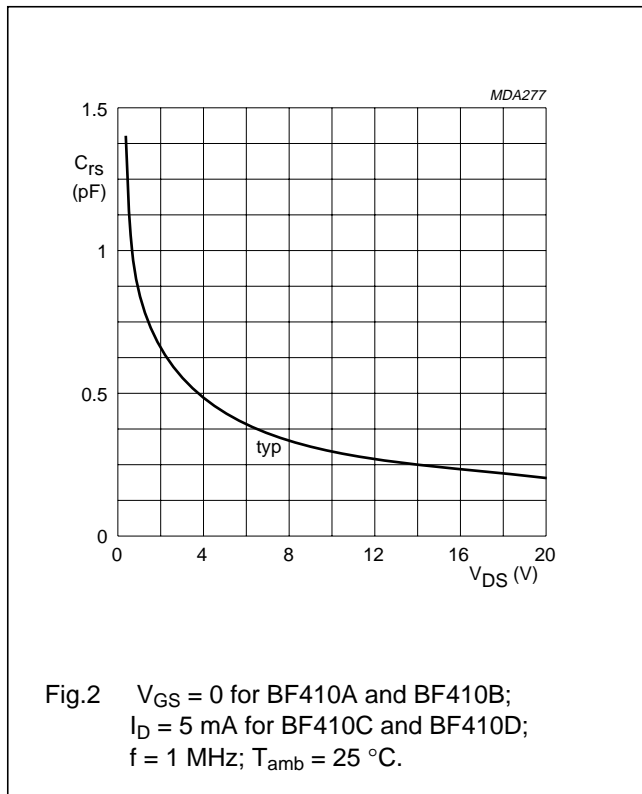
BF410A to D

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 μS	
Feedback capacitance at $f = 1\text{ MHz}$	C_{rs} typ.	0.5	0.5	0.5	0.5 pF	
	C_{rs} 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 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



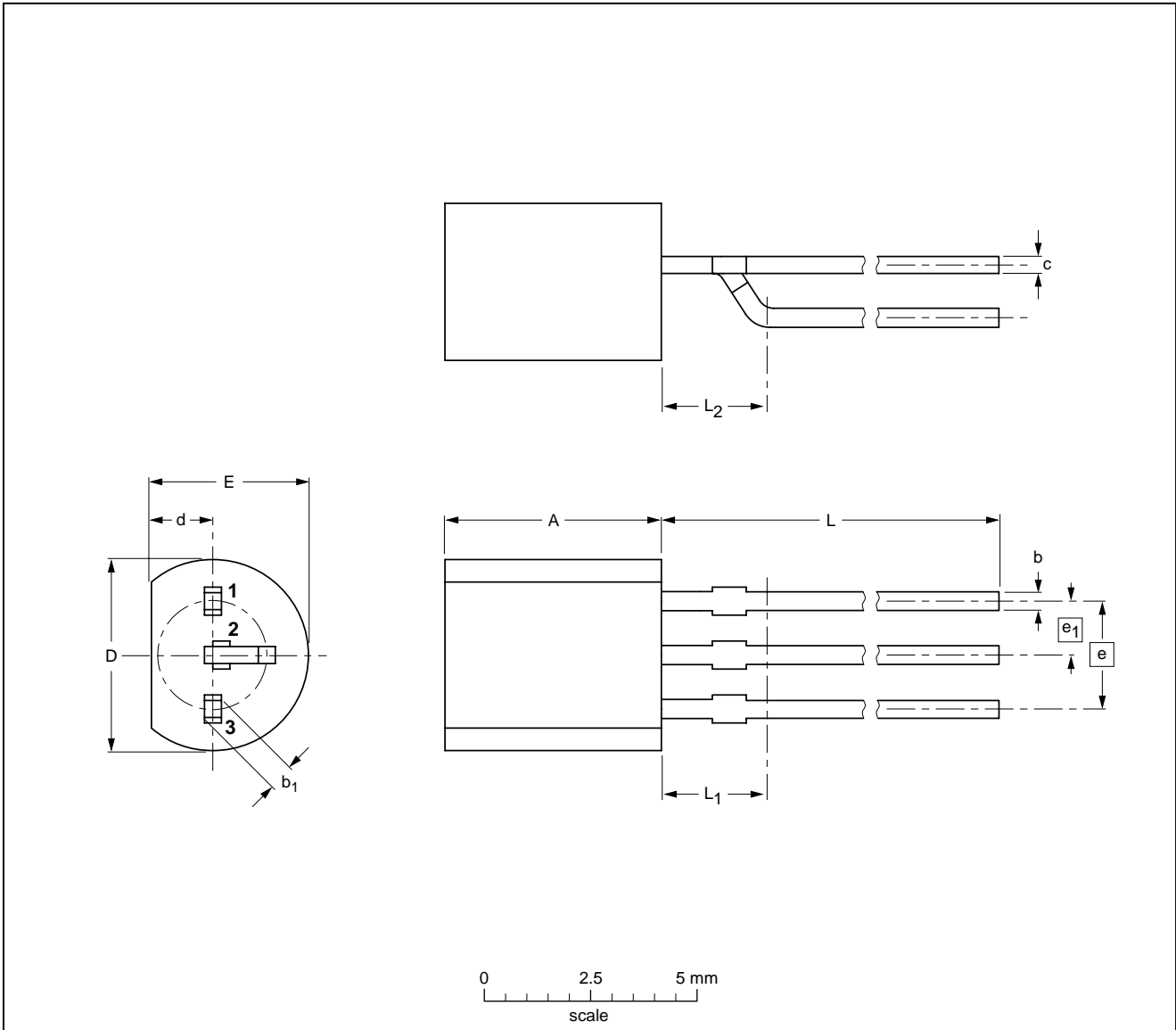
N-channel silicon field-effect transistors

BF410A to D

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 ₁	c	D	d	E	e	e ₁	L	L ₁ ⁽¹⁾ max	L ₂ 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

N-channel silicon field-effect transistors

BF410A to D

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.
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.
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.