

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

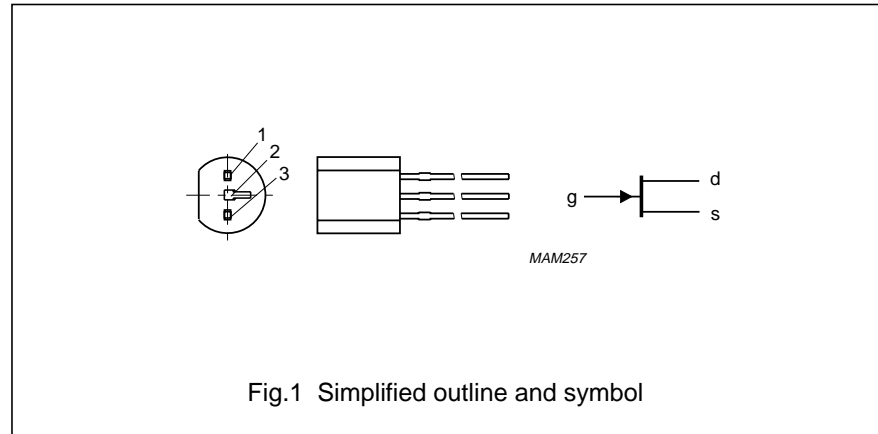


Fig.1 Simplified outline and symbol

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 |

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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 |

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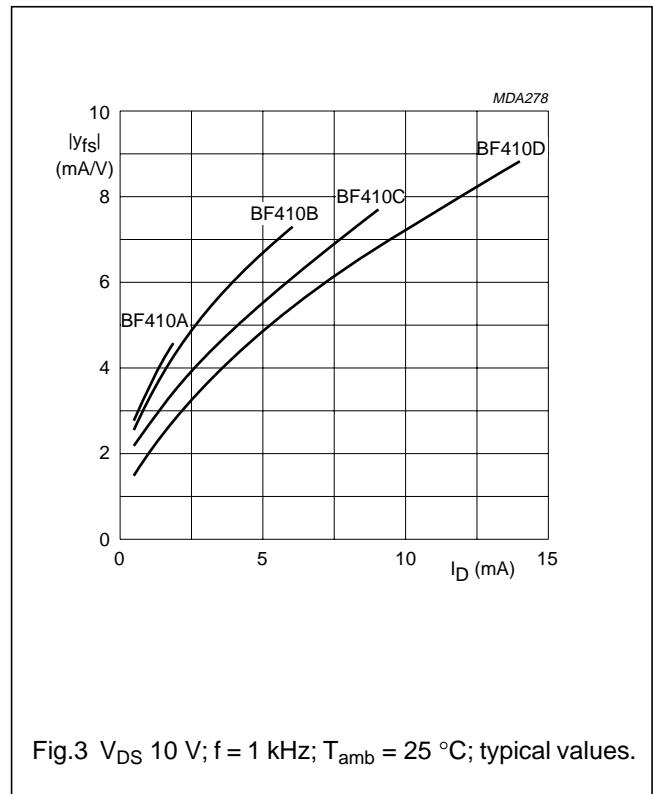
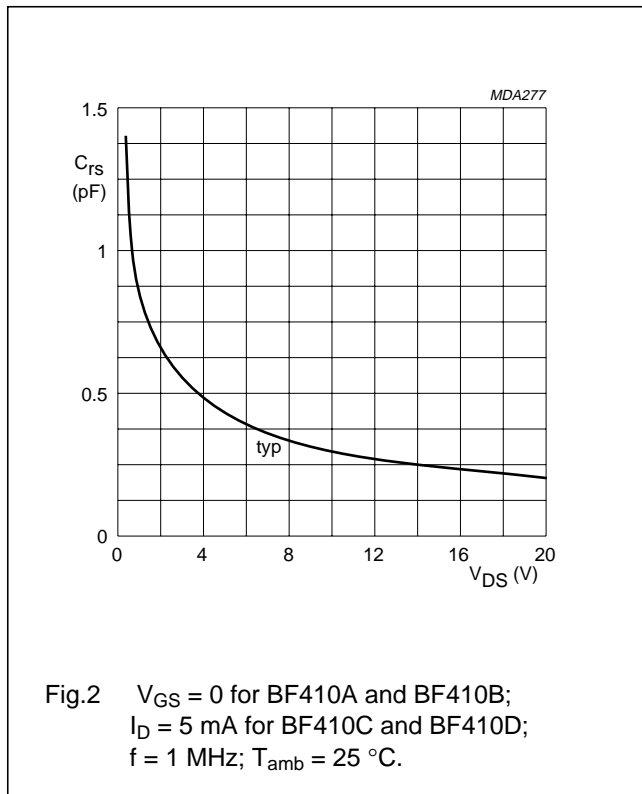
BF410A to D

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 |
| | | 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 |



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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. | |

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