

# DATA SHEET

## **BSN20**

**N-channel enhancement mode  
vertical D-MOS transistor**

Product specification  
Supersedes data of April 1995  
File under Discrete Semiconductors, SC13b

1997 Jun 18

# N-channel enhancement mode vertical D-MOS transistor

**BSN20**

**FEATURES**

- Direct interface to C-MOS, TTL, etc.
- High-speed switching
- No secondary breakdown.

**APPLICATIONS**

- Thin and thick film circuits
- General purpose fast switching applications.

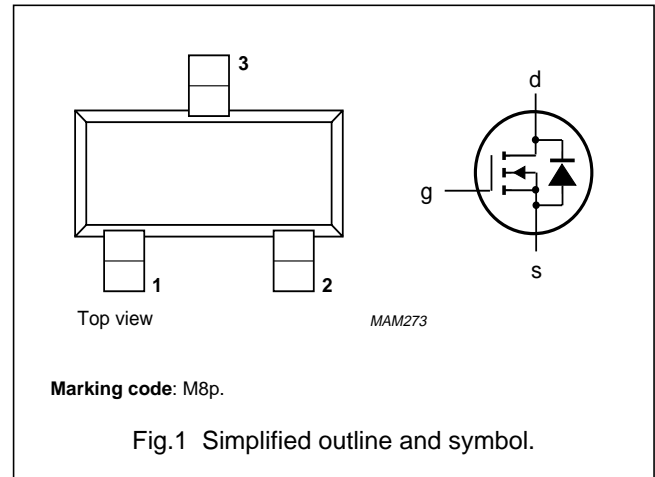
**DESCRIPTION**

N-channel enhancement mode vertical D-MOS transistor in a SOT23 SMD package.

<b>CAUTION</b>
The device is supplied in an antistatic package. The gate-source input must be protected against static discharge during transport or handling.

**PINNING - SOT23**

<b>PIN</b>	<b>SYMBOL</b>	<b>DESCRIPTION</b>
1	g	gate
2	s	source
3	d	drain



**QUICK REFERENCE DATA**

<b>SYMBOL</b>	<b>PARAMETER</b>	<b>CONDITIONS</b>	<b>MAX.</b>	<b>UNIT</b>
$V_{DS}$	drain-source voltage (DC)		50	V
$I_D$	drain current (DC)		100	mA
$R_{DSon}$	drain-source on-state resistance	$I_D = 100 \text{ mA}; V_{GS} = 10 \text{ V}$	15	$\Omega$
$V_{GSth}$	gate-source threshold voltage	$I_D = 1 \text{ mA}; V_{GS} = V_{DS}$	1.8	V

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## LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{DS}$	drain-source voltage (DC)		–	50	V
$V_{GSO}$	gate-source voltage (DC)	open drain	–	$\pm 20$	V
$I_D$	drain current (DC)		–	100	mA
$I_{DM}$	peak drain current		–	300	mA
$P_{tot}$	total power dissipation	up to $T_{amb} = 25\text{ }^\circ\text{C}$ ; note 1	–	300	mW
		up to $T_{amb} = 25\text{ }^\circ\text{C}$ ; note 2	–	250	mW
$T_{stg}$	storage temperature		–65	+150	$^\circ\text{C}$
$T_j$	junction temperature		–	150	$^\circ\text{C}$

## THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-a}$	thermal resistance from junction to ambient	note 1	430	K/W
		note 2	500	K/W

### Notes to the Limiting values and Thermal characteristics

1. Device mounted on a ceramic substrate,  $10 \times 8 \times 0.7$  mm.
2. Device mounted on a printed-circuit board.

## CHARACTERISTICS

$T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified.

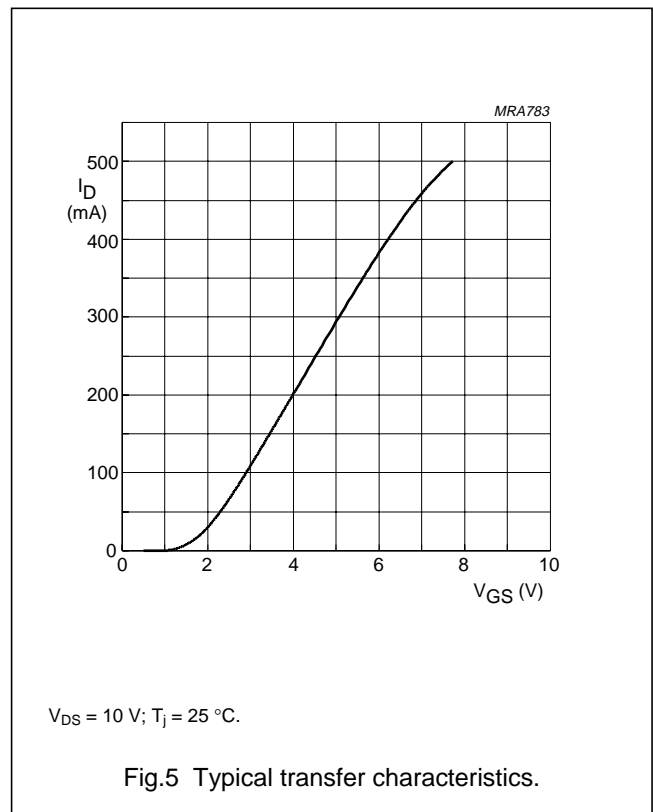
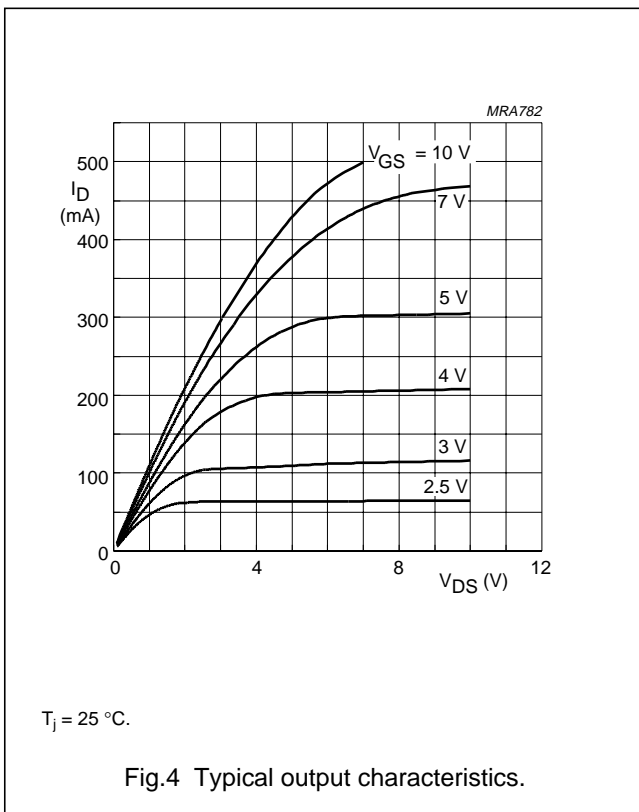
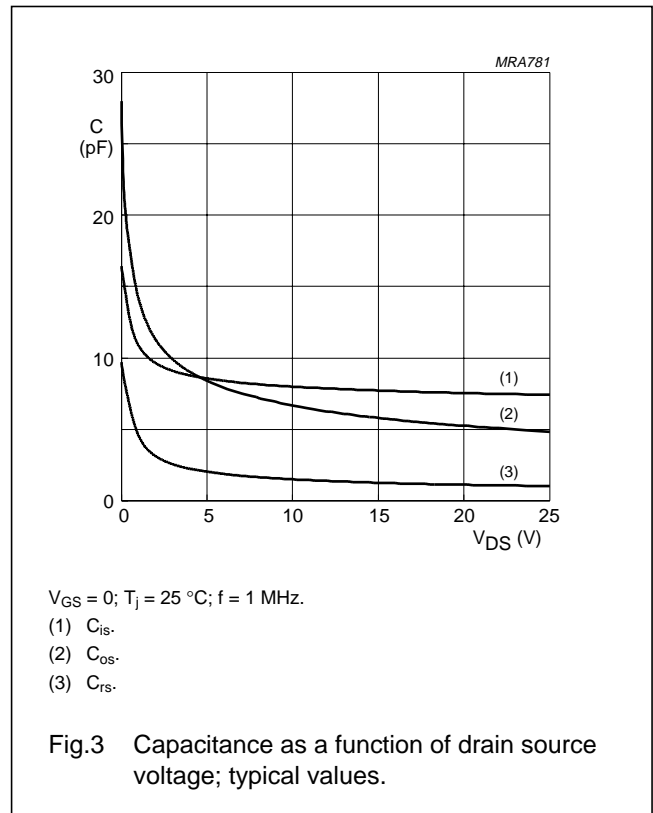
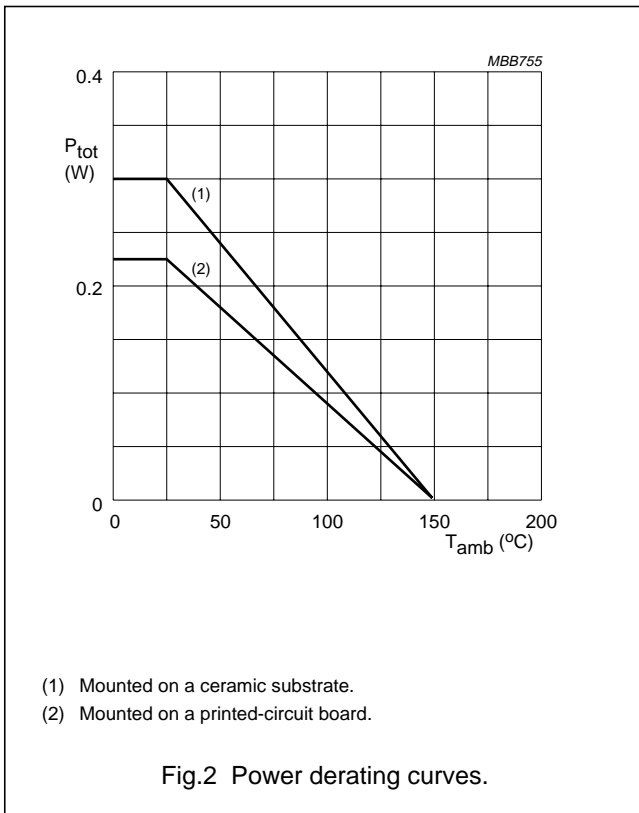
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0$ ; $I_D = 10\text{ }\mu\text{A}$	50	–	–	V
$V_{GSth}$	gate-source threshold voltage	$V_{DS} = V_{GS}$ ; $I_D = 1\text{ mA}$	0.4	–	1.8	V
$I_{DSS}$	drain-source leakage current	$V_{GS} = 0$ ; $V_{DS} = 40\text{ V}$	–	–	1	$\mu\text{A}$
$I_{GSS}$	gate-source leakage current	$V_{DS} = 0$ ; $V_{GS} = \pm 20\text{ V}$	–	–	$\pm 100$	nA
$R_{DSon}$	drain-source on-state resistance	$V_{GS} = 10\text{ V}$ ; $I_D = 100\text{ mA}$	–	8	15	$\Omega$
		$V_{GS} = 5\text{ V}$ ; $I_D = 100\text{ mA}$	–	14	20	$\Omega$
		$V_{GS} = 2.5\text{ V}$ ; $I_D = 10\text{ mA}$	–	18	30	$\Omega$
$ y_{fs} $	forward transfer admittance	$V_{DS} = 10\text{ V}$ ; $I_D = 100\text{ mA}$	40	80	–	mS
$C_{iss}$	input capacitance	$V_{GS} = 0$ ; $V_{DS} = 10\text{ V}$ ; $f = 1\text{ MHz}$	–	8	15	pF
$C_{oss}$	output capacitance	$V_{GS} = 0$ ; $V_{DS} = 10\text{ V}$ ; $f = 1\text{ MHz}$	–	7	15	pF
$C_{rss}$	reverse transfer capacitance	$V_{GS} = 0$ ; $V_{DS} = 10\text{ V}$ ; $f = 1\text{ MHz}$	–	2	5	pF

### Switching times

$t_{on}$	turn-on time	$V_{GS} = 0$ to $10\text{ V}$ ; $V_{DD} = 20\text{ V}$ ; $I_D = 100\text{ mA}$	–	2	5	ns
$t_{off}$	turn-off time	$V_{GS} = 10$ to $0\text{ V}$ ; $V_{DD} = 20\text{ V}$ ; $I_D = 100\text{ mA}$	–	5	10	ns

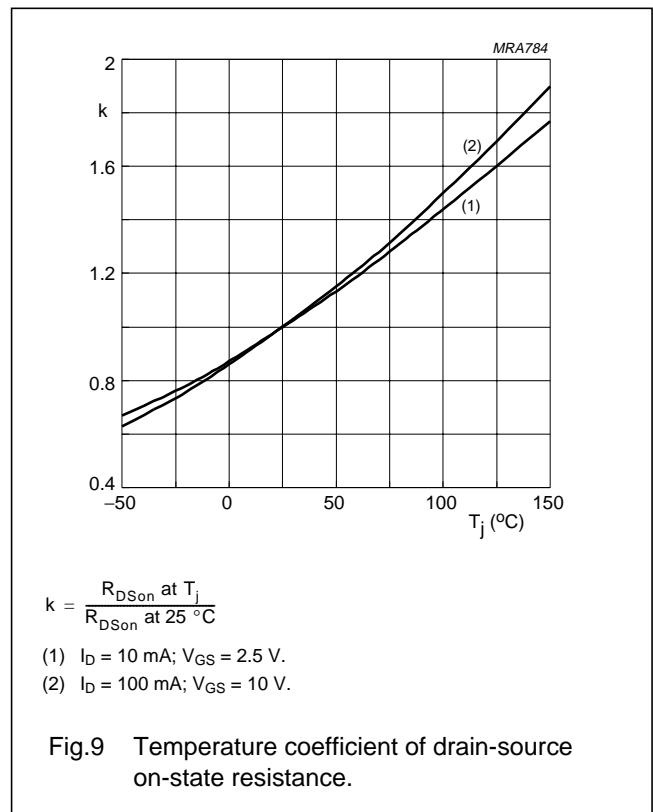
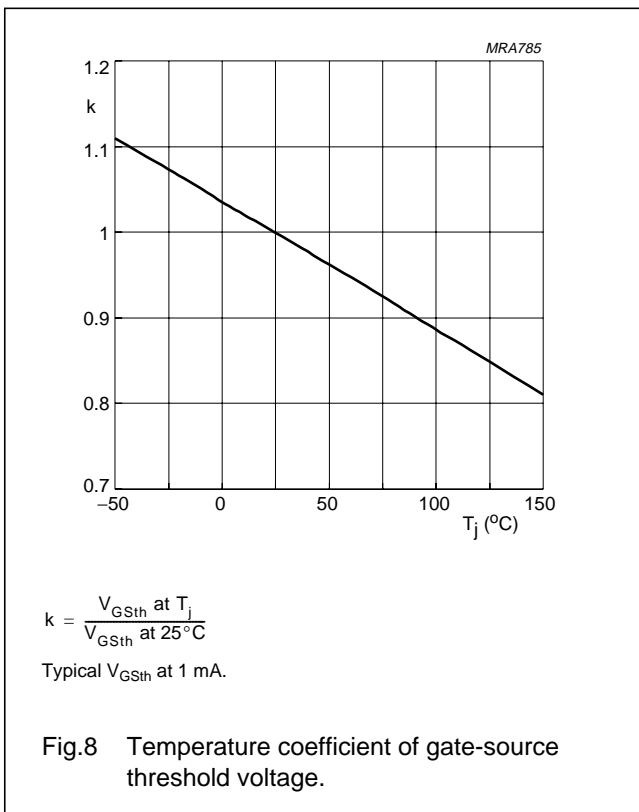
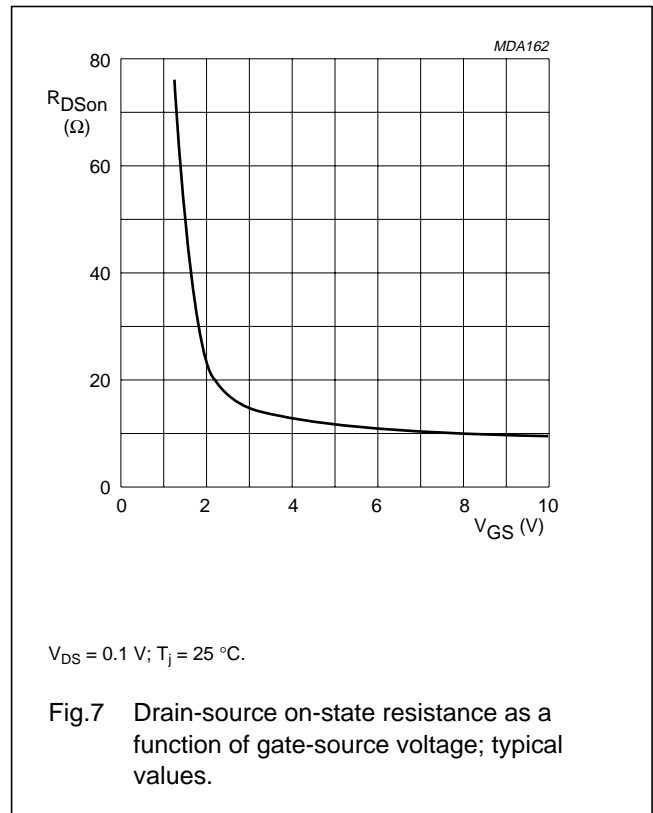
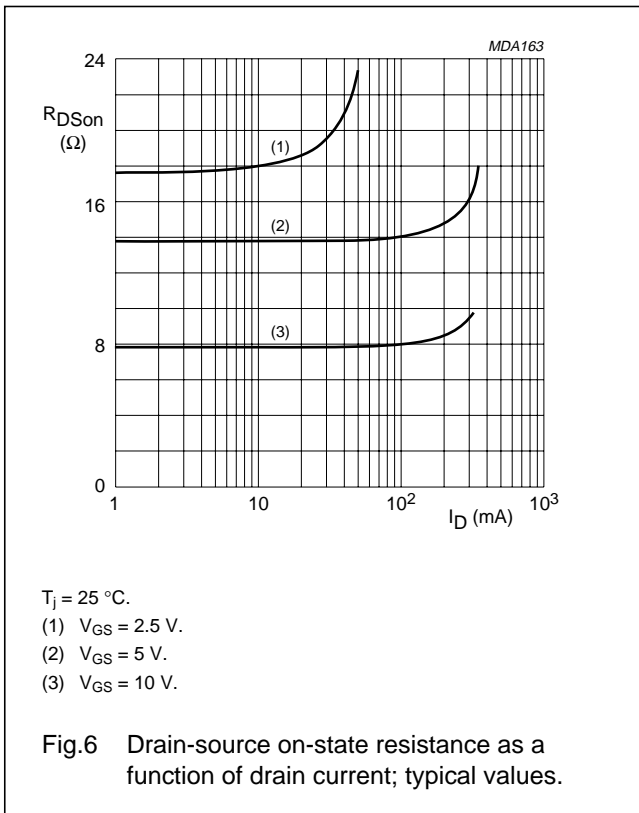
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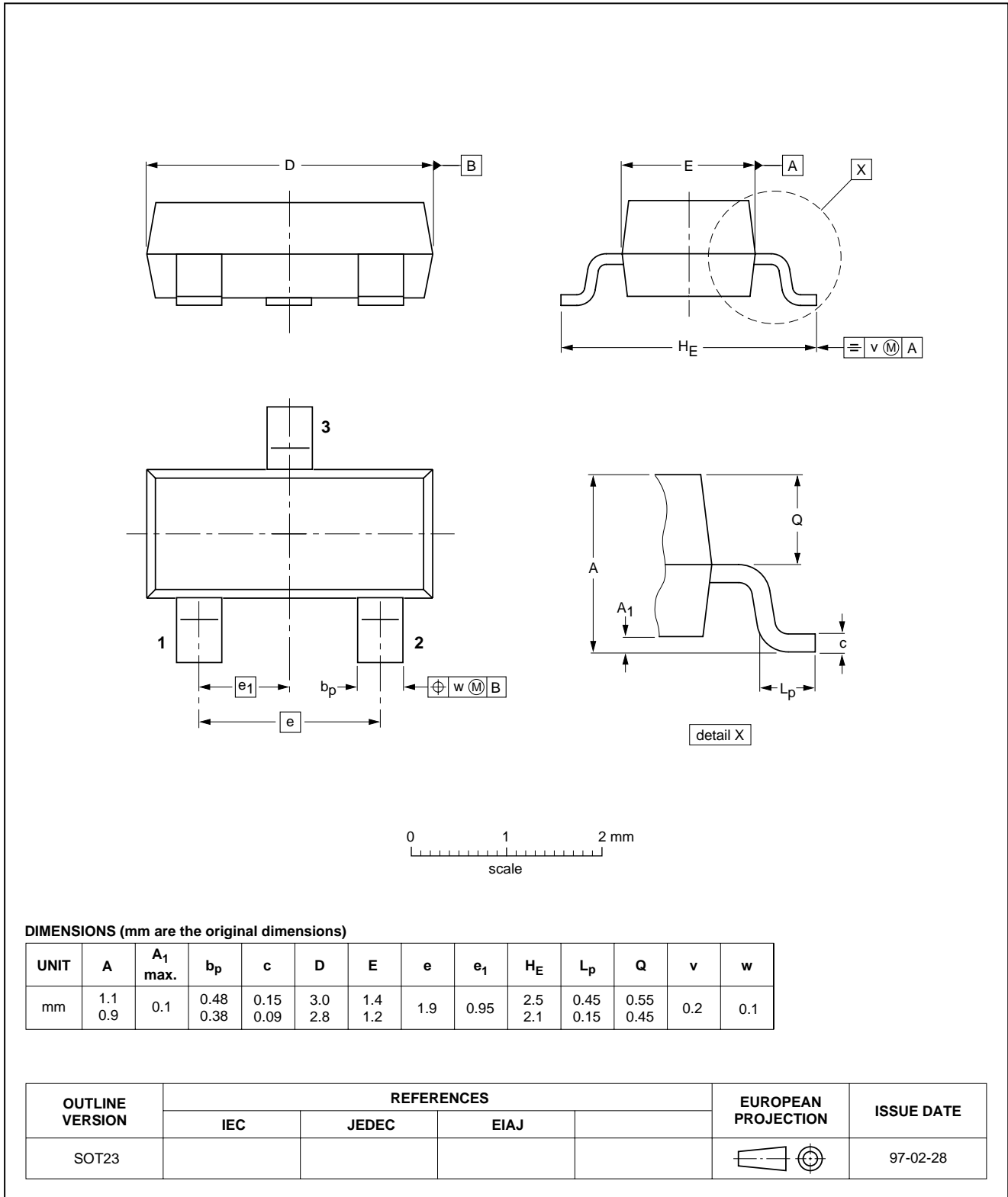
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PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT23



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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.
<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.	

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