



# BB178

## VHF variable capacitance diode

Rev. 02 — 3 November 2004

Product data sheet

## 1. Product profile

### 1.1 General description

The BB178 is a planar technology variable capacitance diode, in a SOD523 (SC-79) ultra small plastic package. The excellent matching performance is achieved by gliding matching and a Direct Matching Assembly (DMA) procedure.

### 1.2 Features



- Excellent linearity
- Excellent matching to 2 % DMA
- Ultra small plastic SMD package
- $C_{d(28V)}$ : 2.6 pF;  $C_{d(1V)}$  to  $C_{d(28V)}$  ratio: 15
- Very low series resistance.

### 1.3 Applications

- Electronic tuning in VHF television tuners, band B up to 460 MHz
- Voltage Controlled Oscillators (VCO).

## 2. Pinning information

Table 1: Pinning

Pin	Description	Simplified outline <a href="#">[1]</a>	Symbol
1	cathode		
2	anode		

Top view

[1] The marking bar indicates the cathode.

## 3. Ordering information

Table 2: Ordering information

Type number	Package		
	Name	Description	Version
BB178	SC-79	plastic surface mounted package; 2 leads	SOD523

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## 4. Marking

**Table 3: Marking**

Type number	Marking code
BB178	8

## 5. Limiting values

**Table 4: Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
$V_R$	reverse voltage		-	32	V
$V_{RM}$	peak reverse voltage	in series with a 10 k $\Omega$ resistor	-	35	V
$I_F$	forward current		-	20	mA
$T_{stg}$	storage temperature		-55	+150	$^{\circ}\text{C}$
$T_j$	junction temperature		-55	+125	$^{\circ}\text{C}$

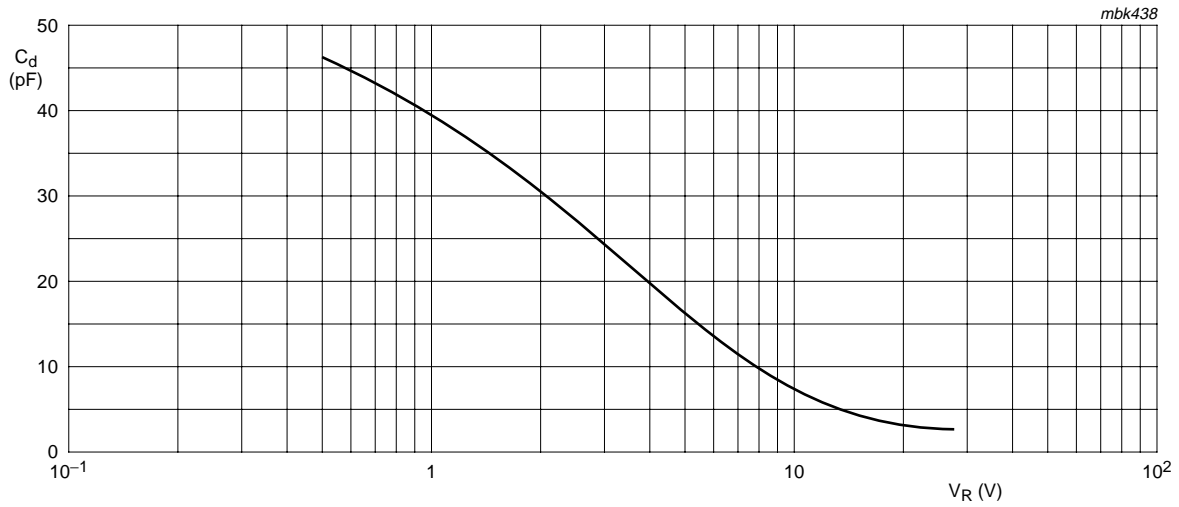
## 6. Characteristics

**Table 5: Characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_R$	reverse current	see <a href="#">Figure 2</a>				
		$V_R = 30\text{ V}$	-	-	10	nA
		$V_R = 30\text{ V}; T_j = 85^{\circ}\text{C}$	-	-	200	nA
$r_s$	diode series resistance	$f = 100\text{ MHz}$	[1]	0.65	0.8	$\Omega$
$C_d$	diode capacitance	$f = 1\text{ MHz}$ ; see <a href="#">Figure 1</a> and <a href="#">Figure 3</a>				
		$V_R = 1\text{ V}$	34.65	-	42.35	pF
		$V_R = 28\text{ V}$	2.361	2.6	2.754	pF
$\frac{C_{d(1V)}}{C_{d(2V)}}$	capacitance ratio	$f = 1\text{ MHz}$	-	1.3	-	
$\frac{C_{d(1V)}}{C_{d(28V)}}$	capacitance ratio	$f = 1\text{ MHz}$	13.5	15	-	
$\frac{C_{d(25V)}}{C_{d(28V)}}$	capacitance ratio	$f = 1\text{ MHz}$	-	1.08	-	
$\frac{\Delta C_d}{C_d}$	capacitance matching	$V_R = 1\text{ V to } 28\text{ V}$ ; in a sequence of 10 diodes (gliding)	-	-	2	%

[1]  $V_R$  is the value at which  $C_d = 30\text{ pF}$ .



$f = 1 \text{ MHz}; T_j = 25 \text{ }^\circ\text{C}.$

Fig 1. Diode capacitance as a function of reverse voltage; typical values.

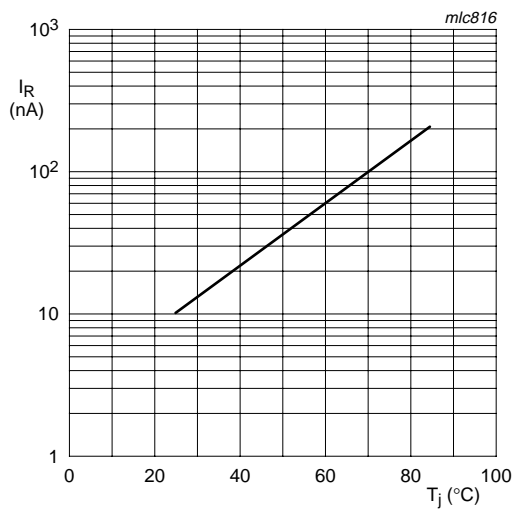
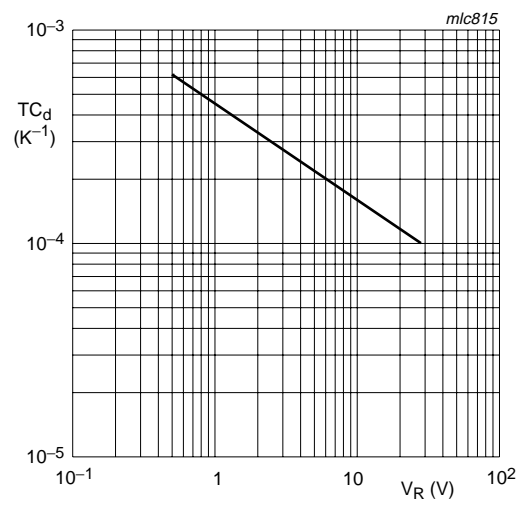


Fig 2. Reverse current as a function of junction temperature; maximum values.



$T_j = 0 \text{ }^\circ\text{C} \text{ to } 85 \text{ }^\circ\text{C}.$

Fig 3. Temperature coefficient of diode capacitance as a function of reverse voltage; typical values.

7. Package outline

Plastic surface mounted package; 2 leads

SOD523

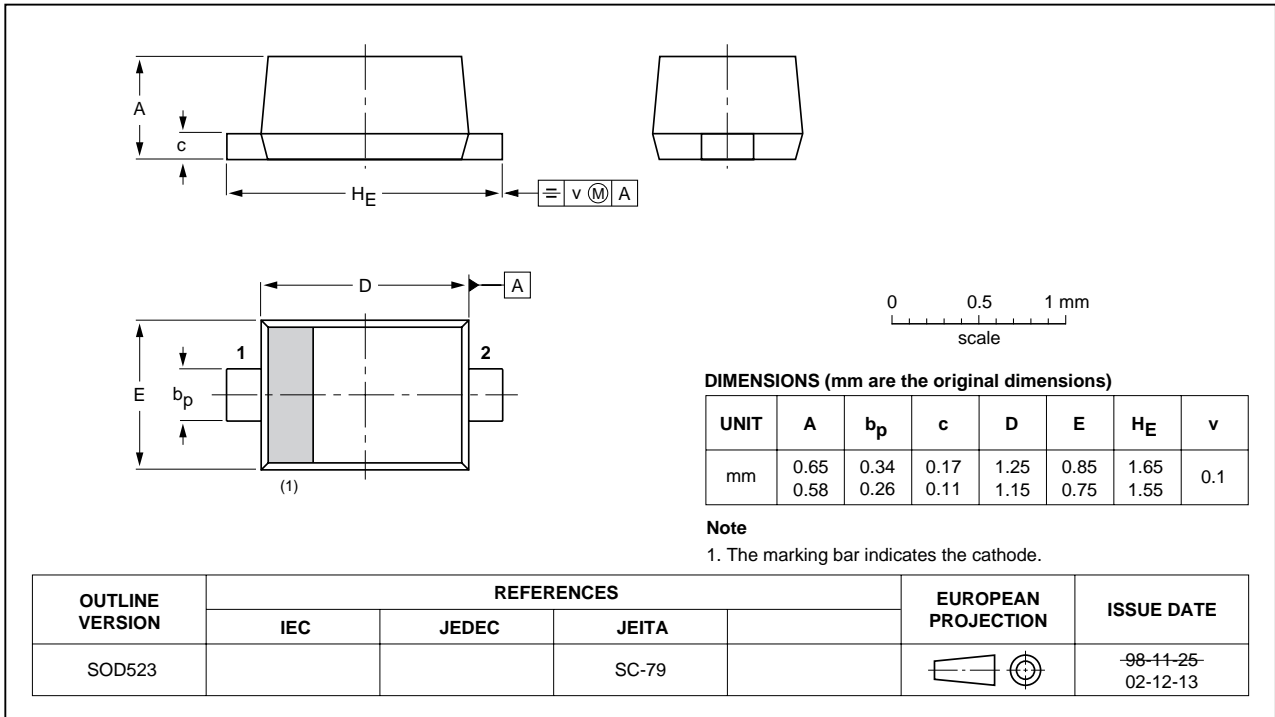


Fig 4. Package outline SOD523 (SC-79).

## 8. Revision history

Table 6: Revision history

Document ID	Release date	Data sheet status	Change notice	Doc. number	Supersedes
BB178_2	20041103	Product data sheet	-	9397 750 13831	BB178_1
Modifications:	<ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors</li> <li><a href="#">Table 5 "Characteristics"</a>: <math>\Delta C_d/C_d</math> conditions changed from sequence of 15 diodes to sequence of 10 diodes</li> <li><a href="#">Table 5 "Characteristics"</a>: added typical value of 2.6 pF for <math>C_{d(28V)}</math></li> <li><a href="#">Table 5 "Characteristics"</a>: added typical value of 15 for <math>C_{d(1V)}</math> to <math>C_{d(28V)}</math> ratio.</li> </ul>				
BB178_1	19971113	Product specification	-	9397 750 02982	-

## 9. Data sheet status

Level	Data sheet status <sup>[1]</sup>	Product status <sup>[2]</sup> <sup>[3]</sup>	Definition
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
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[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

## 10. Definitions

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**Limiting values definition** — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). 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.

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