

# DATA SHEET

## **2.45 GHz ISM-band antenna for Bluetooth and WLAN IEEE 802.11b** Surface-mount ceramic multilayer antennas

Product specification  
Supersedes data of 5th February 2001

2001 Sep 27 Rev.1

## Surface-mount ceramic multilayer antennas

## 2.45 GHz ISM-band antenna for Bluetooth and WLAN IEEE 802.11b

### FEATURES

- Designed for 2.45 GHz ISM-band
- Simplifies antenna circuitry
- NiSn lead-free terminations
- suitable for wave and reflow soldering
- Supplied in tape on reel.

### APPLICATIONS

- Telecommunications
- Computing (PCs, printers, PDAs)
- Wireless office data communications including WLAN
- Consumer electronics (wireless headphones).

### DESCRIPTION

This 2.45 GHz ceramic multilayer antenna has been designed to meet the requirements of the Bluetooth™<sup>(1)</sup> and IEEE 802.11b wireless communications protocol. It consists of a rectangular block of low-dielectric ceramic material and is fabricated in a water-based non-toxic process. The antenna is capable of providing good connectivity using near 50  $\Omega$  microstrip directly onto the PC board.

(1) Bluetooth is a trademark owned by Telefonieaktiebolaget L M Ericsson, Sweden.

### ENVIRONMENTAL CARE



The foil making process uses an environment-friendly aqueous-solvent technology that fully complies with today's green-product design requirements. All terminations are lead-free. Packing materials can be recycled.

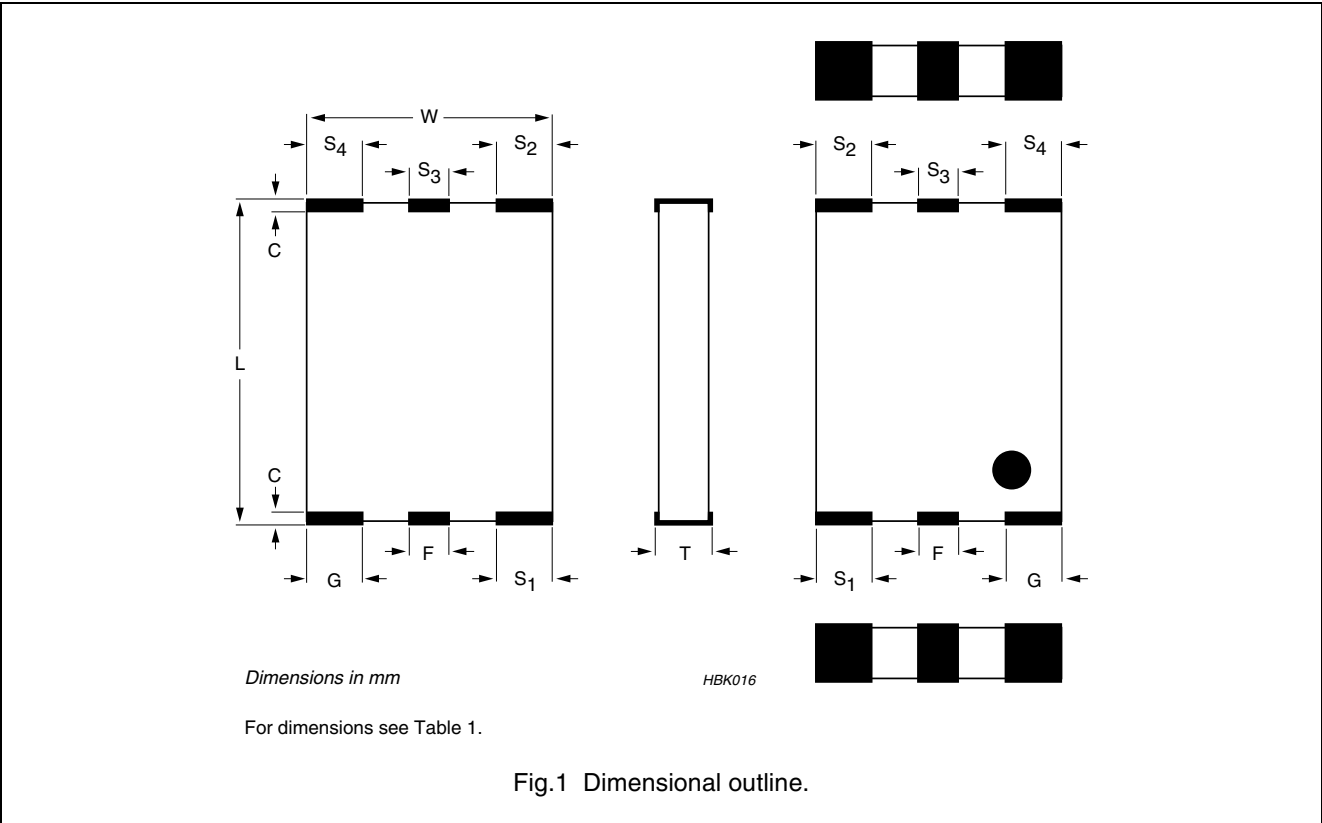
### QUICK REFERENCE DATA

DESCRIPTION	VALUE
Center frequency	2.45, 2.60 and 2.70 GHz
Bandwidth	100 MHz
Gain	1.2 dBi max.
VSWR	2 max.
Polarization	Linear
Azimuth beamwidth	Omni-directional
Impedance	50 $\Omega$
Power dissipation	1 W
Operating temperature	-55 to +125 °C
Terminations	NiSn
Resistance to soldering heat	260 °C for 10 s
Weight	0.16 g

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MECHANICAL DATA



Physical dimensions

Table 1    Antenna dimensions

L	W	T	F	G	C	S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>	S <sub>4</sub>
–	–	–	feed termination	optional <sup>1)</sup> ground termination	–	NC solder termination	NC solder termination	NC solder termination	NC solder termination
Dimensions in millimetres									
7.35 ±0.25	5.5 ±0.2	1.3 ±0.2	0.9 ±0.25	1.25 ±0.35	0.5 ±0.3	1.25 ±0.35	1.25 ±0.35	0.9 ±0.25	1.25 ±0.35

Note

1. The antenna has built-in circuitry to the ground termination. Connecting the antenna's ground point to the system's RF ground plane is optional. If good matching is achieved, the ground termination is then used as a solder joint (like S1, S2, S3, and S4) to fix the antenna to the substrate only.

Device marking

CENTER FREQUENCY (GHZ)	MARKING CODE
2.45	no marking
2.60	6
2.70	7

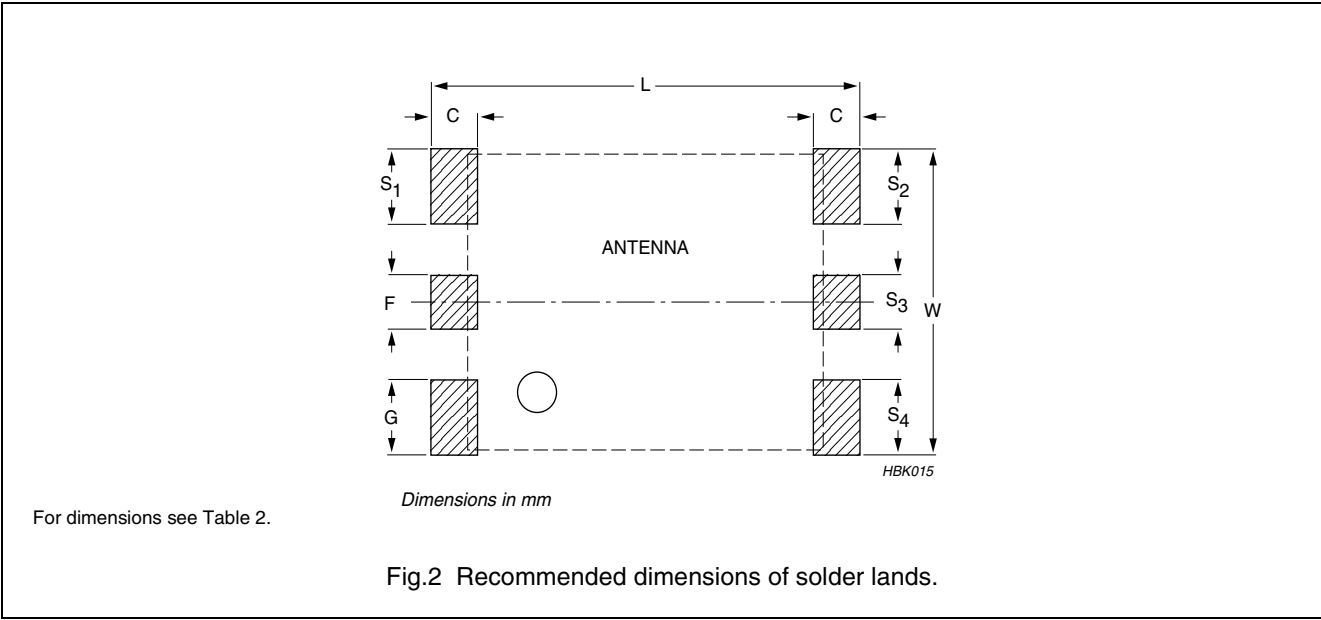
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ELECTRICAL CHARACTERISTICS

DESCRIPTION	VALUE
Center frequency	2.45, 2.60 and 2.70 GHz
Bandwidth	100 MHz
Gain	1.2 dBi max.
VSWR	2 max.
Polarization	Linear
Azimuth beamwidth	Omni-directional
Impedance	50 Ω
Power dissipation	1 W
Operating temperature	−55 to +125 °C
Terminations	NiSn
Resistance to soldering heat	260 °C, 10 sec.

FOOTPRINT DIMENSIONS



Physical dimensions

Table 2 Recommended solder land pattern

L	W	F	G	C	S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>	S <sub>4</sub>
–	–	feed pad	optional ground pad	–	NC mounting pad	NC mounting pad	NC mounting pad	NC mounting pad
Dimensions in millimetres								
8.30 ±0.10	5.70 ±0.10	1.00 ±0.10	1.40 ±0.10	0.90 ±0.10	1.40 ±0.10	1.40 ±0.10	1.00 ±0.10	1.40 ±0.10

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### STANDARD TEST BOARD FOR RADIATION PATTERN AND SWR MEASUREMENTS

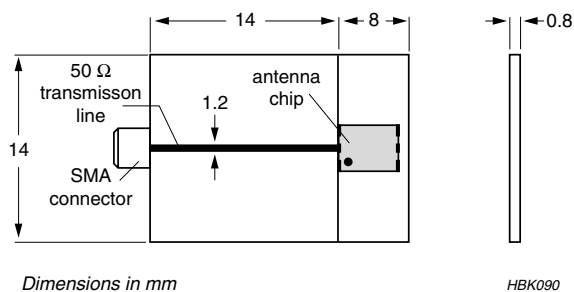
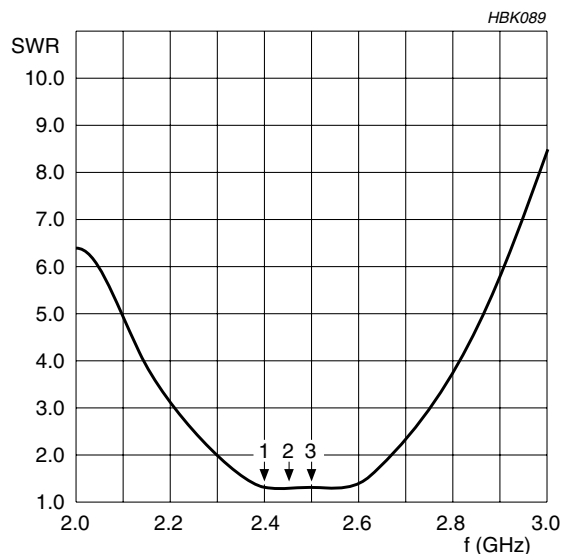
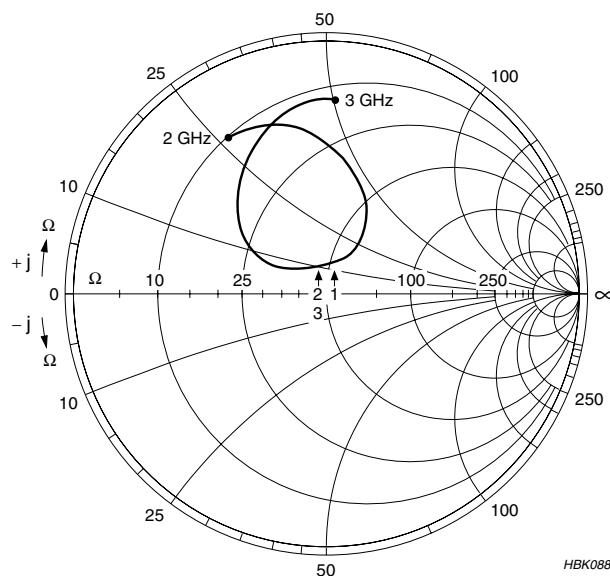


Fig.3 Typical FR4 test board.



Marker data:  
1: SWR = 1.28; f = 2.400 GHz  
2: SWR = 1.34; f = 2.450 GHz  
3: SWR = 1.34; f = 2.500 GHz.

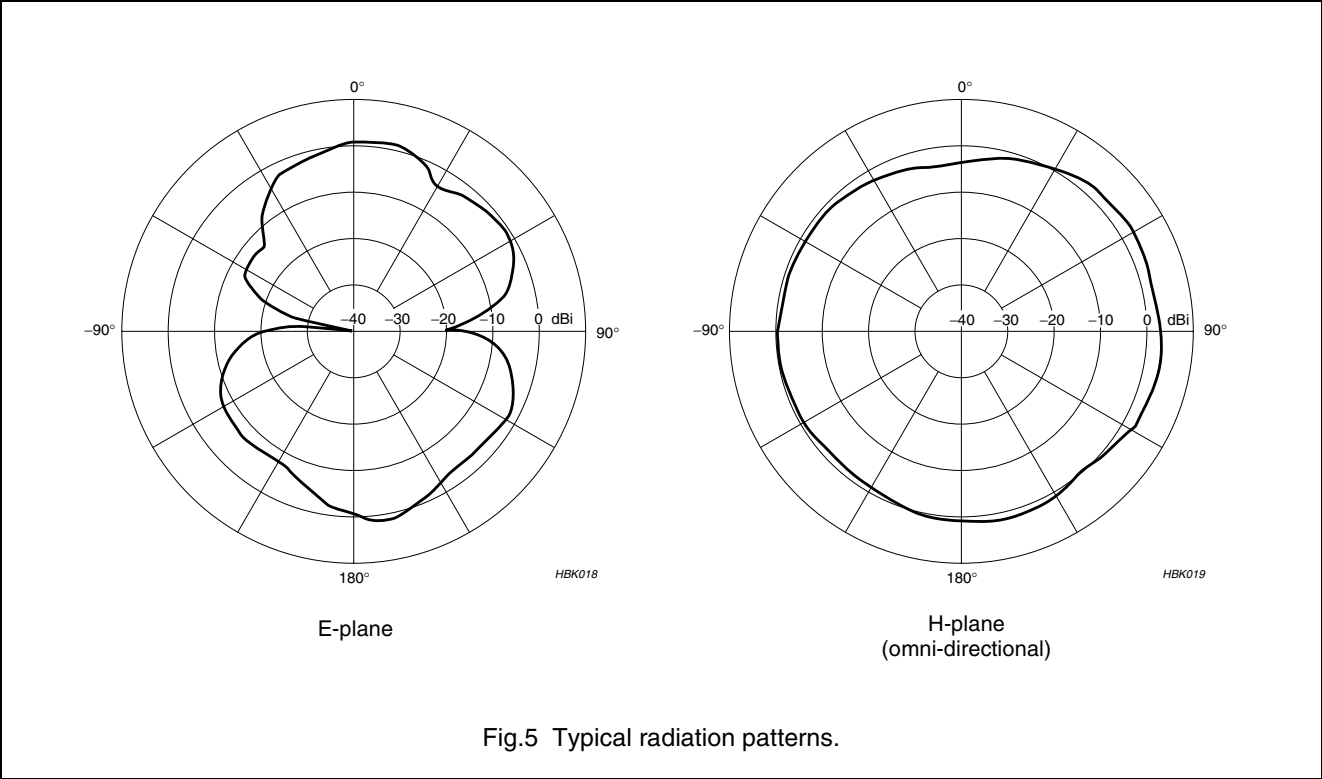


Marker data:  
1: 50.75 Ω/12.36 Ω; f = 2.400 GHz  
2: 44.98 Ω/12.83 Ω; f = 2.450 GHz  
3: 43.99 Ω/12.27 Ω; f = 2.500 GHz.

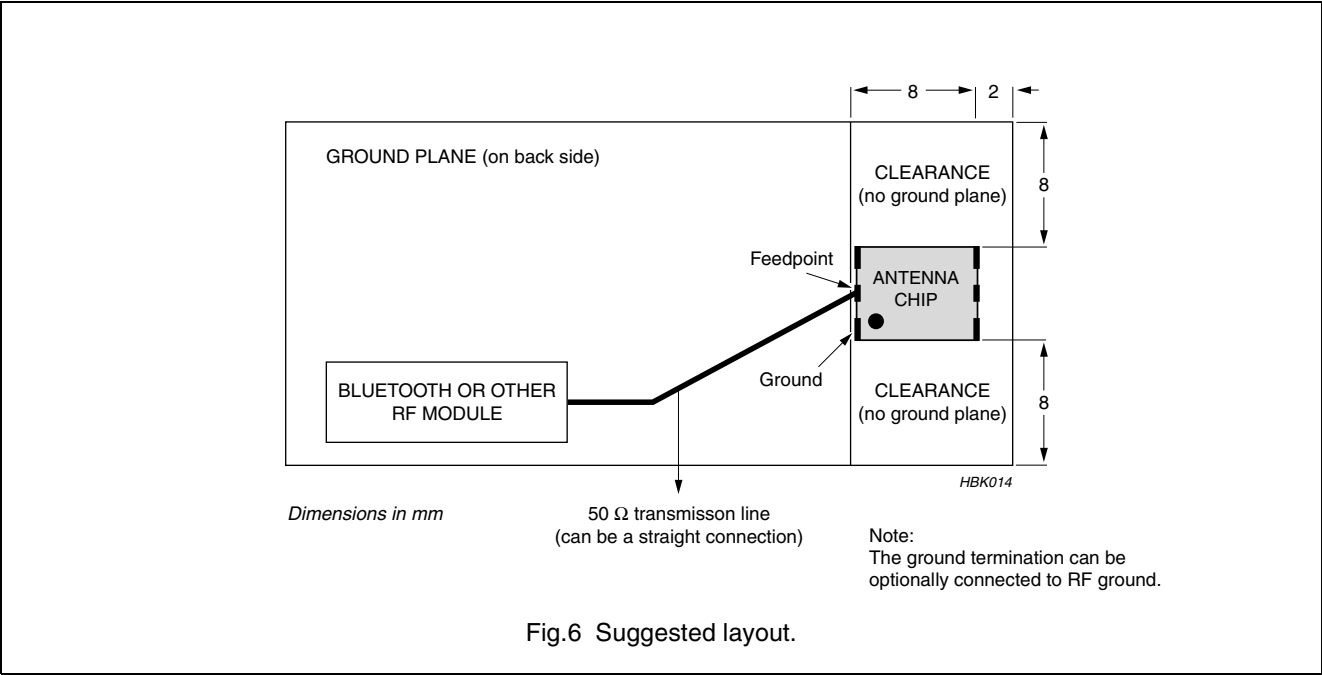
Fig.4 Typical SWR and characteristic impedance measurements.

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APPLICATION EXAMPLE



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ORDERING INFORMATION

Components may be ordered by using either a simple 16-digit clear text code or Phycomp’s unique 12NC.

Ordering example for a 2.45 GHz antenna, 1000 pieces supplied in blister tape on 180 mm reel.

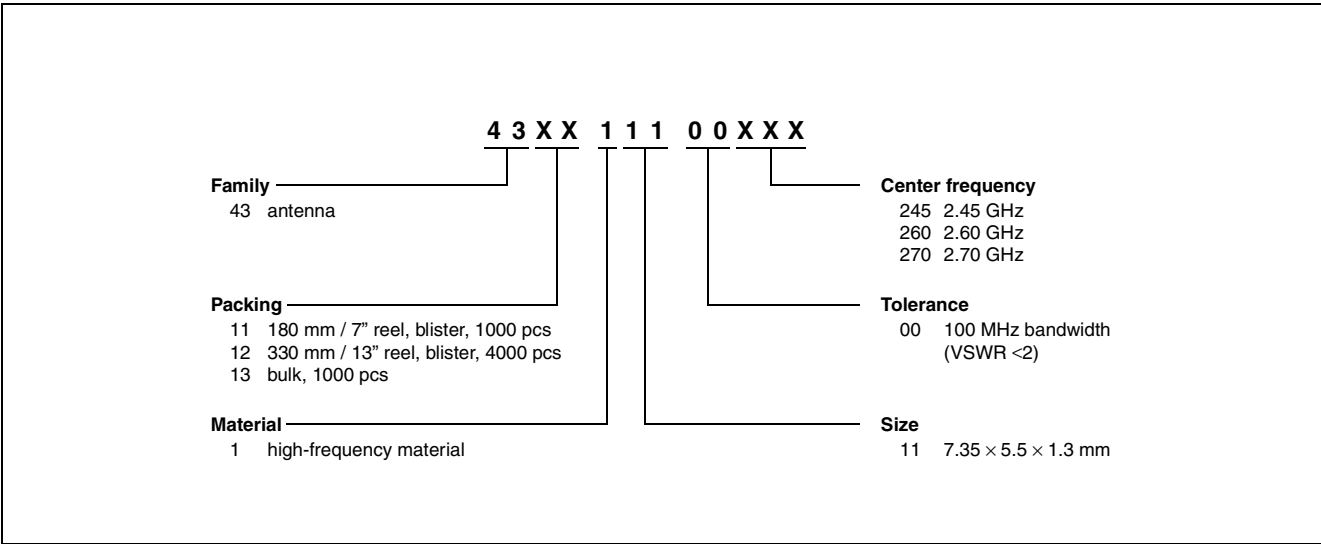
Clear text ordering code

EXAMPLE: AN2450000707051K

PRODUCT	CENTER FREQUENCY	BANDWIDTH	MATERIAL	SIZE	QUANTITY	PACKING
AN	2450	00	07	0705	1	K
AN = antenna	2450 = 2.45 GHz 2600 = 2.60 GHz 2700 = 2.70 GHz	00 = 100 MHz	07 = K7	0705 = 7.35 × 5.5 × 1.3 mm	1 = 1000 pcs 4 = 4000 pcs	K = 180 mm; 7" blister F = 330 mm; 13" blister B = bulk case

12NC ordering code

EXAMPLE: 4311 111 00XXX



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## TESTS AND REQUIREMENTS

**Table 3** Test procedures and requirements

IEC 60 384-10 CECC 32 100 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS
4.4		mounting	The antenna may be mounted on a printed-circuit boards or ceramic substrates by applying wave soldering, reflow soldering (including vapour phase soldering) or conductive adhesive	no visual damage
4.5		visual inspection and dimension check	any applicable method using $\times 10$ magnification	no cracks or fissures larger than 4 mm
4.6.1		antenna	frequency: 2.45 GHz @ 20 °C	standard test board from Fig.3
4.8		adhesion	a force of 5 N applied for 10 s to the line joining the terminations and in a plane parallel to the substrate	no visible damage
4.9		bond strength of plating on end face	mounted in accordance with CECC 32 100, paragraph 4.4	no visible damage
			conditions: bending 1 mm at a rate of 1 mm/s; radius jig: 340 mm; 2 mm warp on FR4 board of 90 mm length	no visible damage
4.10	20 (Tb)	resistance to soldering heat	260 $\pm$ 5 °C for 10 $\pm$ 0.5 s in a static solder bath	the terminations shall be well tinned after recovery; center frequency shift within $\pm 6\%$
		resistance to leaching	260 $\pm$ 5 °C for 30 $\pm$ 1 s in a static solder bath	using visual enlargement of $\times 10$ ; dissolution of the terminations shall not exceed 10%
4.11	20 (Ta)	solderability	zero hour test and test after storage (20 to 24 months) in original packing in normal atmosphere; unmounted chips completely immersed for 2 $\pm$ 0.5 s in a solder bath at 235 $\pm$ 5 °C	the terminations must be well tinned for at least 75%
4.12	4 (Na)	rapid change of temperature	–55 °C (30 minutes) to +125 °C (30 minutes); 100 cycles	no visual damage; center frequency shift within $\pm 6\%$
4.14	3 (Ca)	damp heat	500 $\pm$ 12 hours at 60 °C; 90 to 95% RH	no visual damage; 2 hours recovery; center frequency shift within $\pm 6\%$
4.15		endurance	500 $\pm$ 12 hours at 125 °C	no visual damage; 2 hours recovery; center frequency shift within $\pm 6\%$



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## PACKING

### Tape and reel specifications

Tape and reel specifications are in accordance with "IEC 60286-3". Basic dimensions are given in Figs 7 and 8, and Tables 4 and 5.

### Peel-off force

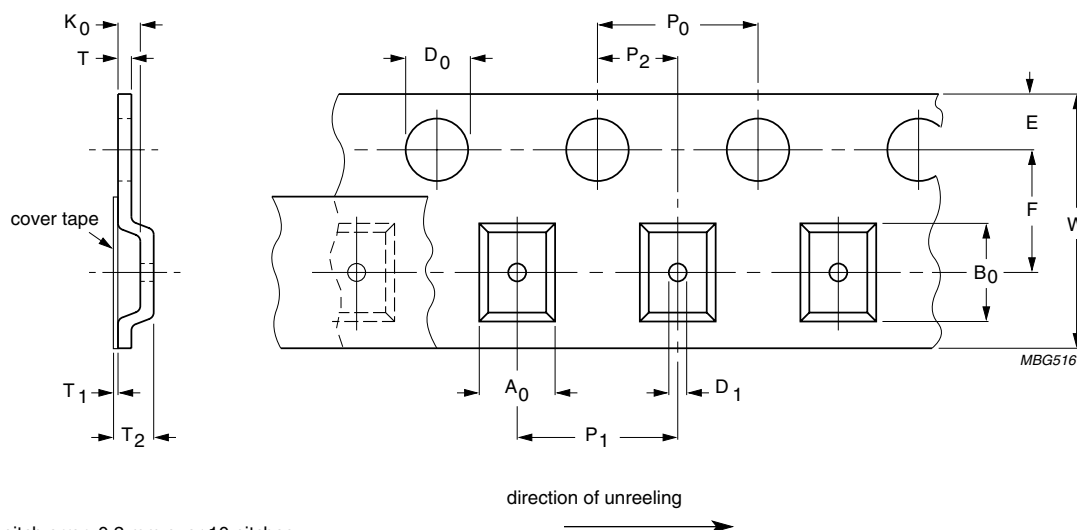
Peel-off force of the blister tape is in accordance with "IEC 60286-3"; that is, at a peel-off speed of  $300 \pm 10$  mm/minute, 0.1 N to 1.3 N for 16 mm tape. The peel-off angle should be between  $165^\circ$  and  $180^\circ$ .

## Blister tape

### ENVIRONMENTAL CONSIDERATIONS

- Cover tape, carrier tape and reel do not contain environmentally-harmful PVC materials.
- Tape and reel are antistatic.
- Because the carrier tape is made of polycarbonate, a homogeneous material (mono-plastic), it is ideally suited for recycling.
- Compared to other PVC-free materials polycarbonate shows excellent stiffness and very little deformation with temperature.

### Blister tape specifications



Cumulative pitch error: 0.2 mm over 10 pitches.

Cumulative tolerance over 10 holes:  $\pm 0.2$  mm.

$K_0$ : chosen so that the orientation of the component cannot change.

For dimensions see Table 4.

Fig.7 Blister tape.

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**Table 4** Dimensions of blister tape; see Fig.7

SYMBOL	DIMENSION	TOL.	UNIT
A <sub>0</sub> nominal clearance; note 1	5.85	±0.10	mm
B <sub>0</sub> nominal clearance; note 1	7.60	±0.10	mm
K <sub>0</sub> minimum clearance; note 1	1.70	±0.10	mm
W	16.0	±0.3	mm
E	1.75	±0.10	mm
F	7.50	±0.10	mm
D <sub>0</sub>	1.55	±0.10	mm
D <sub>1</sub>	1.50	±0.10	mm
P <sub>0</sub> ; note 2	4.0	±0.1	mm
P <sub>1</sub>	8.0	±0.1	mm
P <sub>2</sub>	2.0	±0.1	mm
T	0.30	±0.10	mm

## Notes

1. Possible product displacement in pocket.
2. P<sub>0</sub> pitch tolerance over any 10 pitches is ±0.2 mm.

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Reel specifications

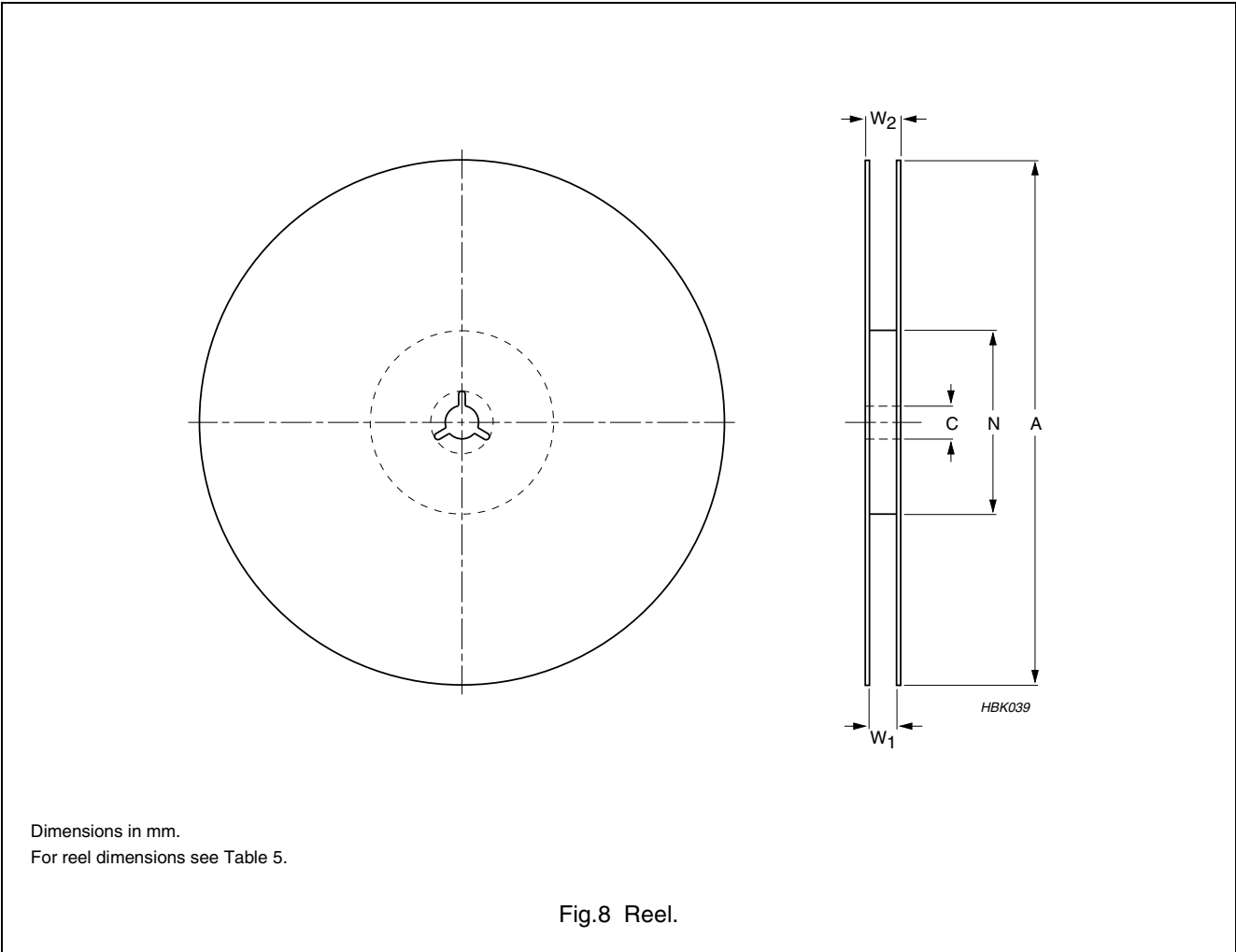


Table 5 Reel dimensions; see Fig.8

QUANTITY PER REEL	TAPE WIDTH (mm)	A (mm)	C (mm)	N (mm)	W <sub>1</sub> (mm)	W <sub>2</sub> (mm)
1000	16	180 ±0.1	13.0 ±0.5	62 ±0.5	16.0 +1/-0	20.5 ±0.2
4000		330 ±0.1	13.5 ±0.1	100 ±0.1	16.5 ±0.1	21.1 ±0.1

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**REVISION HISTORY**

Revision	Date	Change Notification	Description
Rev.0	2001 Feb 05	–	- First issue of this specification
Rev.1	2001 Sep 27	–	<ul style="list-style-type: none"><li>- Specification status changed from “Preliminary” to “Product specification”</li><li>- Product range expanded with 2.60 and 2.70 GHz devices</li><li>- Revised antenna dimensions (see Table 1)</li><li>- 180 mm tape-and-reel and bulk packing options added</li><li>- Blister tape-and-reel specifications added</li><li>- Clear-text code ordering information added</li></ul>