

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™⁽¹⁾ 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 Ω 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.

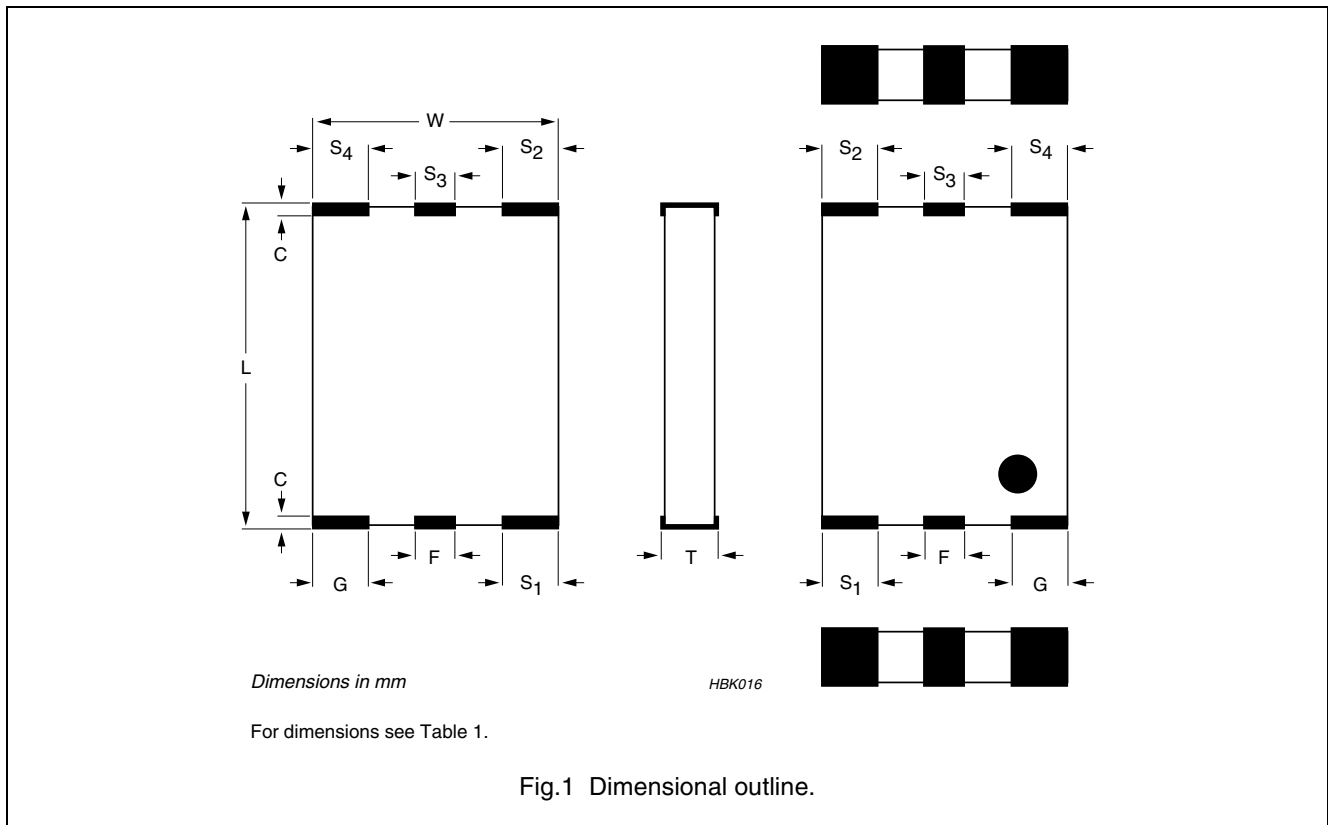
QUICK REFERENCE DATA

| 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 Ω |
| 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 |

Surface-mount ceramic multilayer antennas

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MECHANICAL DATA



Physical dimensions

Table 1 Antenna dimensions

| L | W | T | F | G | C | S ₁ | S ₂ | S ₃ | S ₄ |
|----------------------------------|----------|----------|------------------|---|----------|-----------------------|-----------------------|-----------------------|-----------------------|
| - | - | - | feed termination | optional ¹⁾ 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

- 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 |

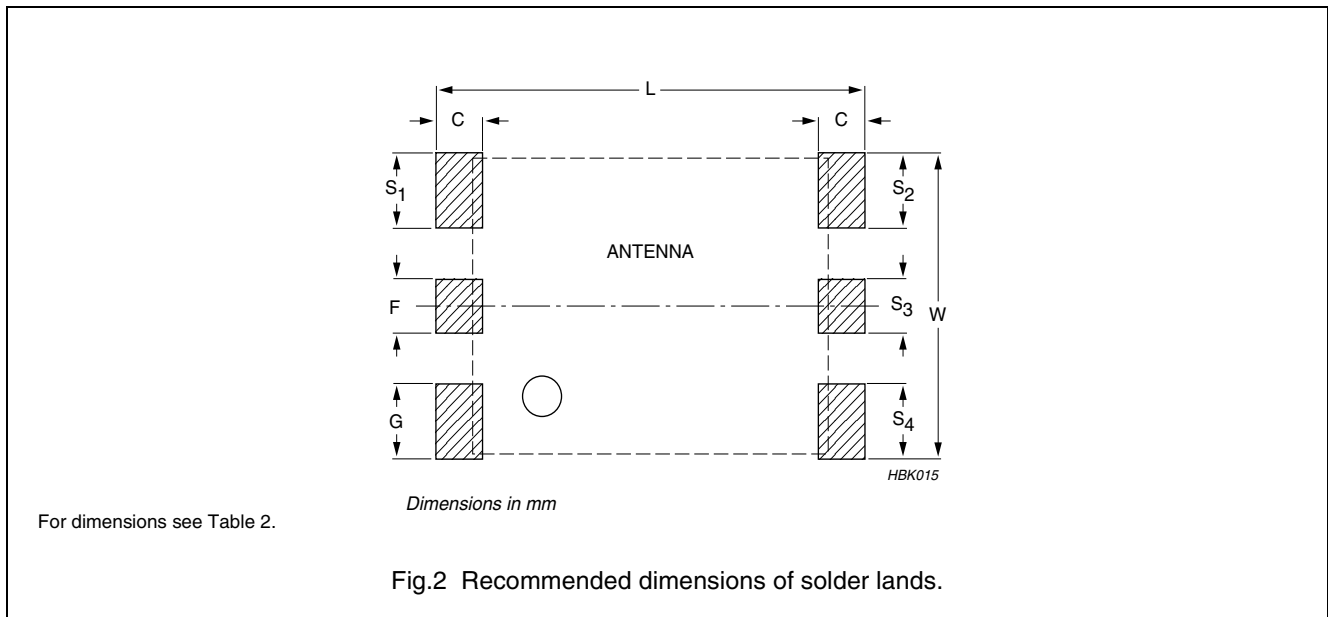
Surface-mount ceramic multilayer antennas

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

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 ₁ | S ₂ | S ₃ | S ₄ |
|----------------------------------|------------|------------|---------------------|------------|-----------------|-----------------|-----------------|-----------------|
| - | - | 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

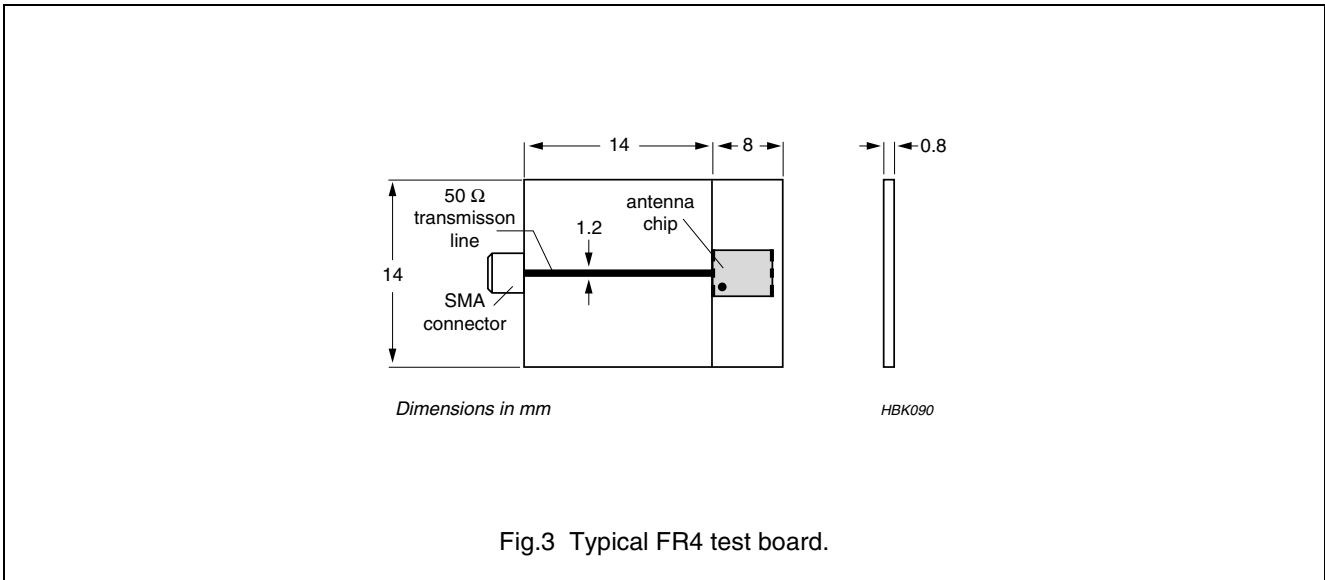


Fig.3 Typical FR4 test board.

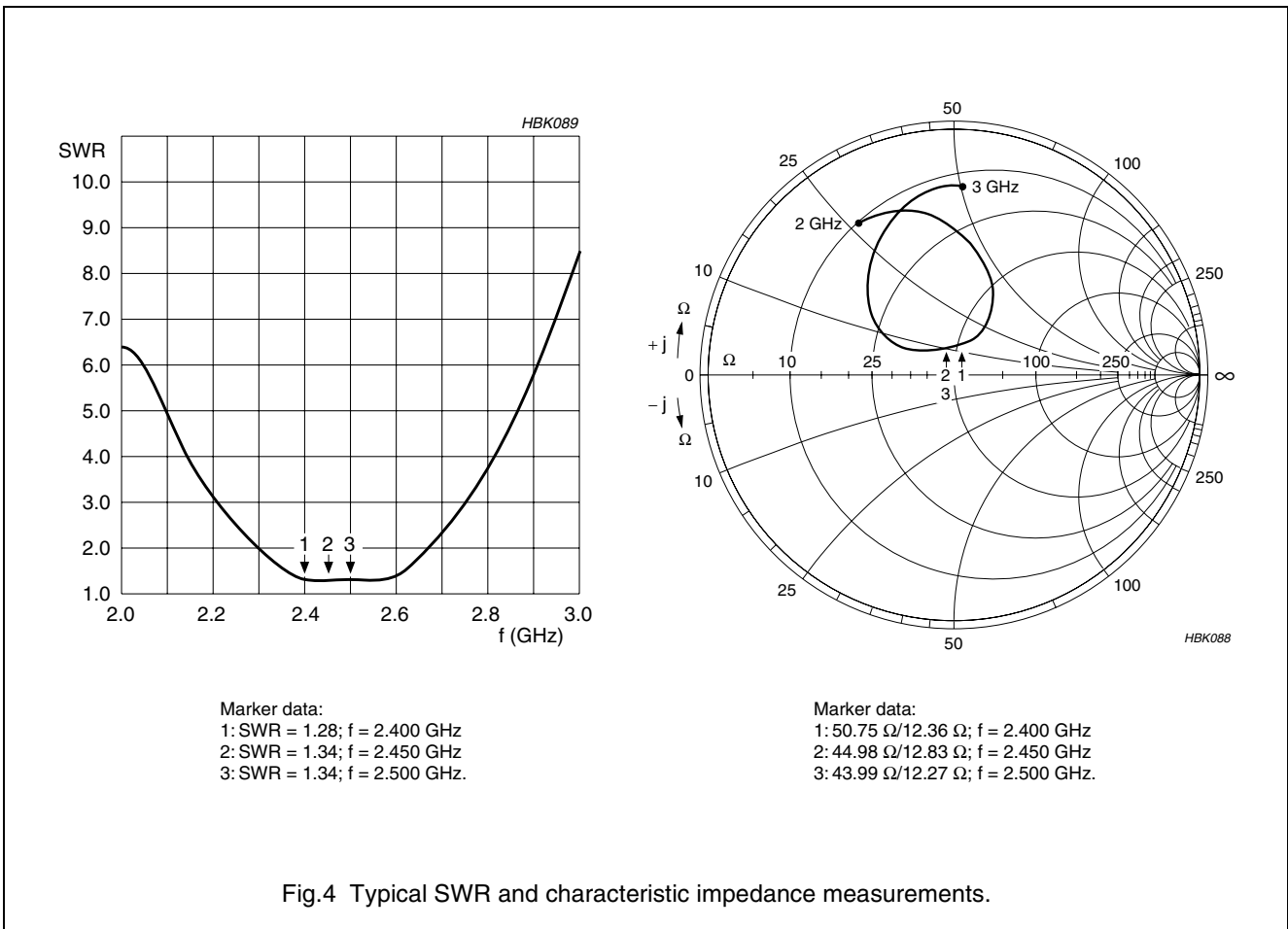
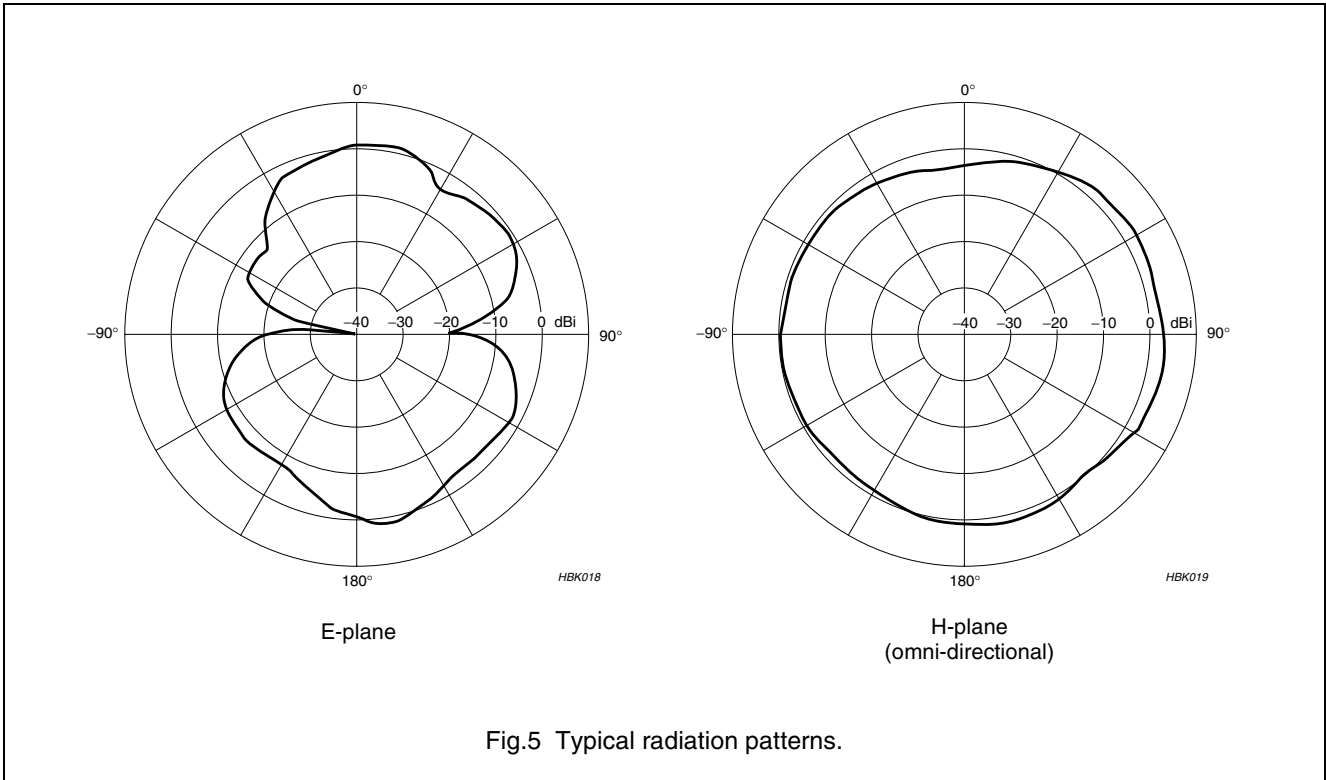


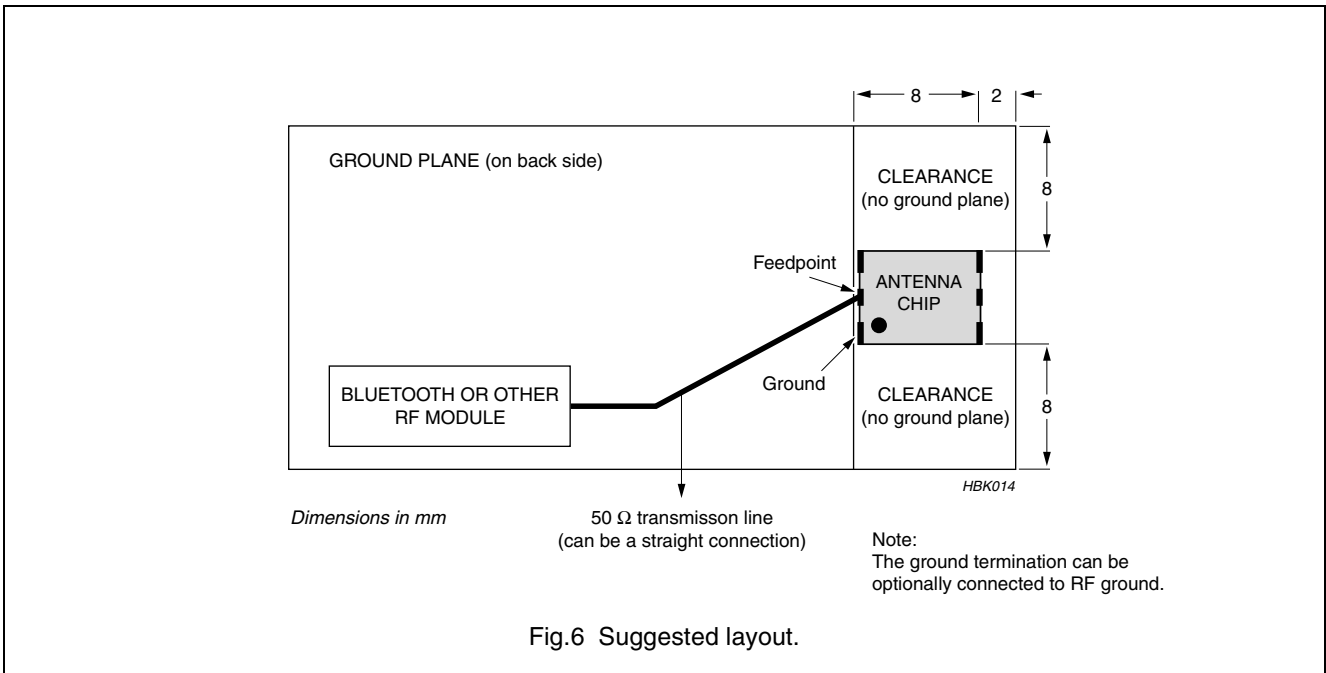
Fig.4 Typical SWR and characteristic impedance measurements.

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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.

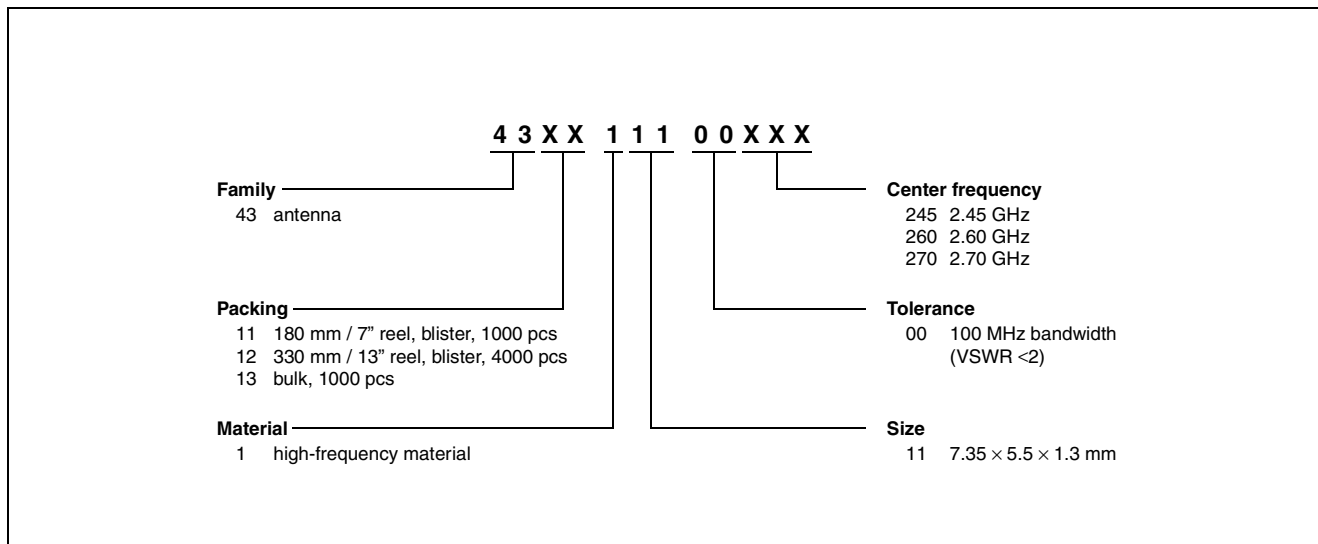
Clear text ordering code

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



Surface-mount ceramic multilayer antennas

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

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

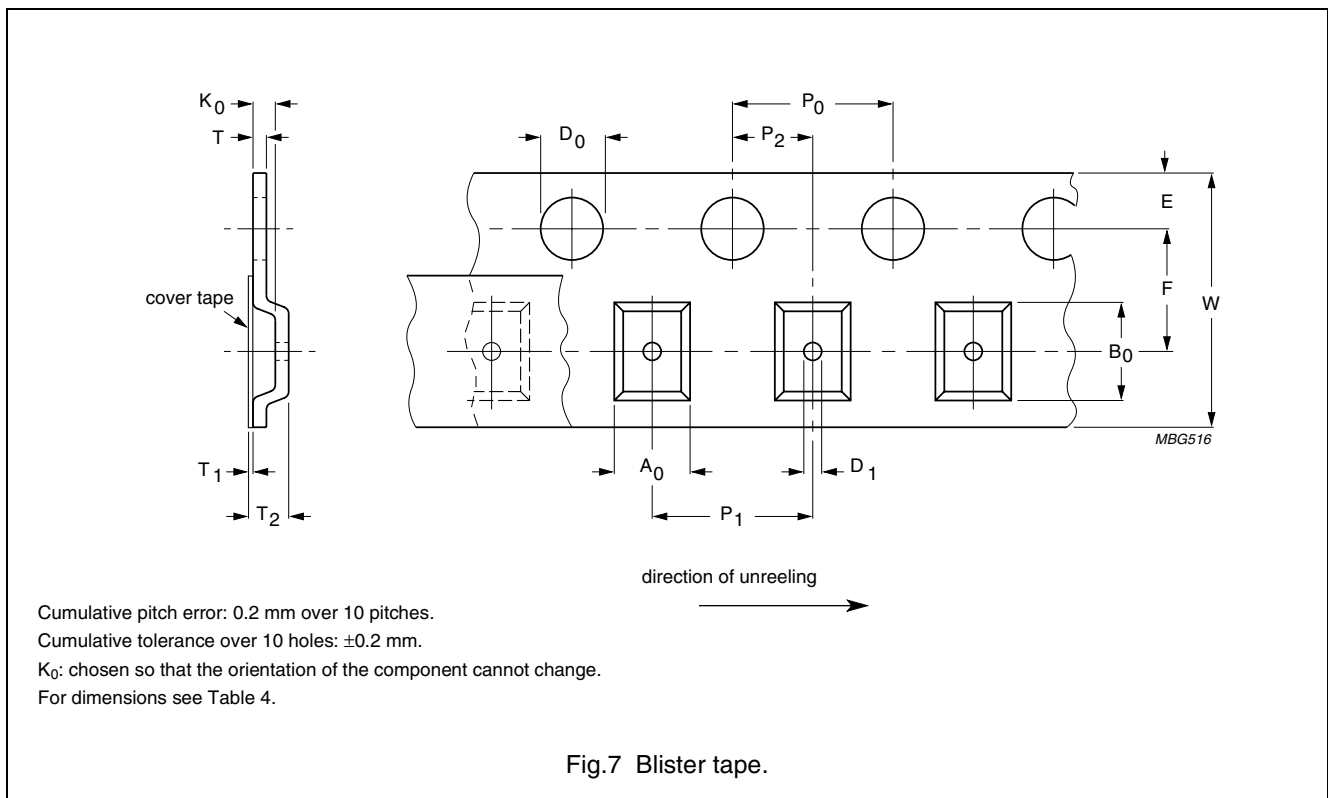
Peel-off force of the blister tape is in accordance with "IEC 60286-3"; that is, at a peel-off speed of 300 ± 10 mm/minute, 0.1 N to 1.3 N for 16 mm tape. The peel-off angle should be between 165° and 180° .

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



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Table 4 Dimensions of blister tape; see Fig.7

| SYMBOL | DIMENSION | TOL. | UNIT |
|--|-----------|-------|------|
| A ₀ nominal clearance; note 1 | 5.85 | ±0.10 | mm |
| B ₀ nominal clearance; note 1 | 7.60 | ±0.10 | mm |
| K ₀ 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 ₀ | 1.55 | ±0.10 | mm |
| D ₁ | 1.50 | ±0.10 | mm |
| P ₀ ; note 2 | 4.0 | ±0.1 | mm |
| P ₁ | 8.0 | ±0.1 | mm |
| P ₂ | 2.0 | ±0.1 | mm |
| T | 0.30 | ±0.10 | mm |

Notes

1. Possible product displacement in pocket.
2. P₀ pitch tolerance over any 10 pitches is ±0.2 mm.

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

Reel specifications

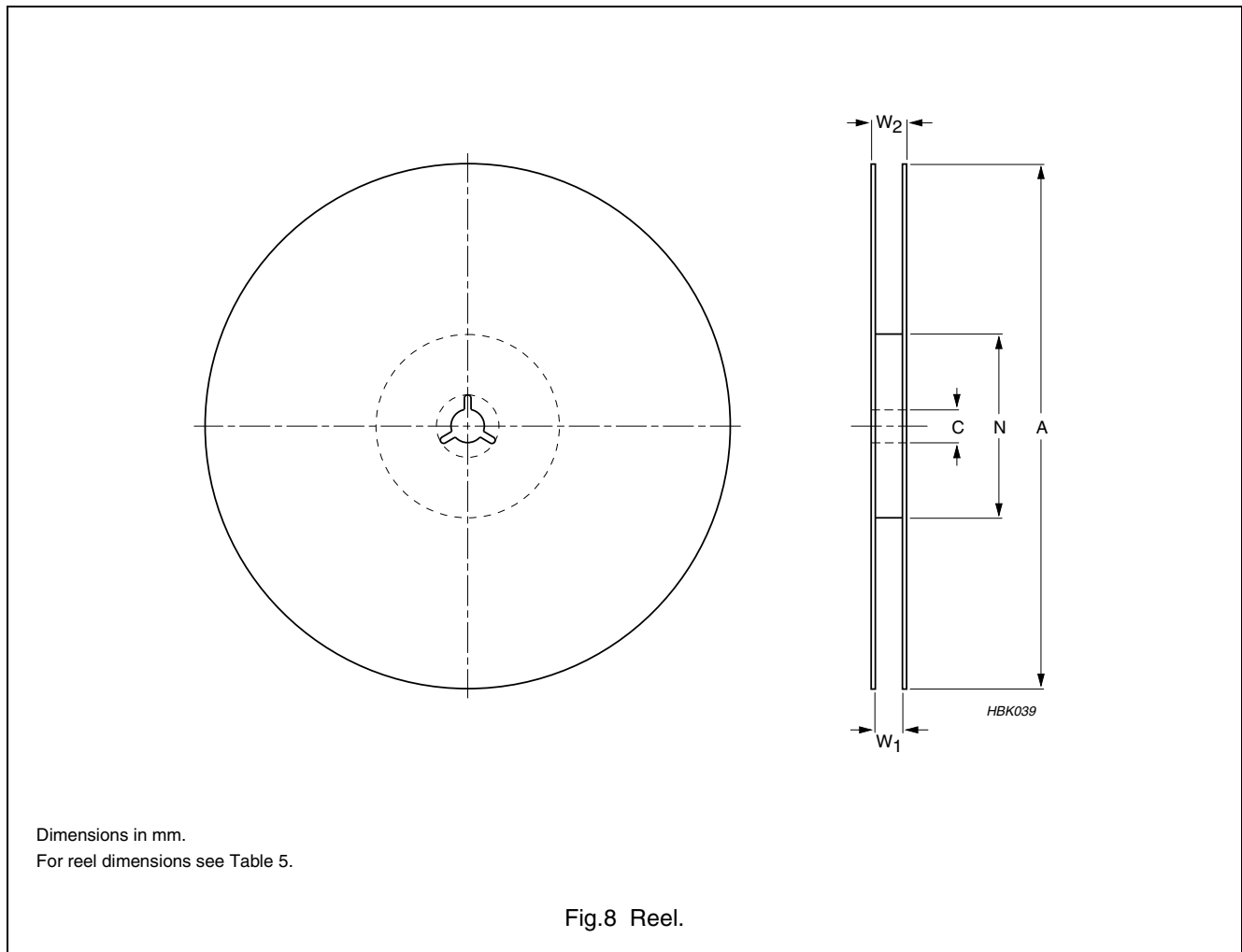


Table 5 Reel dimensions; see Fig.8

| QUANTITY PER REEL | TAPE WIDTH (mm) | A (mm) | C (mm) | N (mm) | W ₁ (mm) | W ₂ (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 | – | - Specification status changed from “Preliminary” to “Product specification” - Product range expanded with 2.60 and 2.70 GHz devices - Revised antenna dimensions (see Table 1) - 180 mm tape-and-reel and bulk packing options added - Blister tape-and-reel specifications added - Clear-text code ordering information added |