

AN1003

Multilayer Chip Antenna for 2.4GHz & 5~6GHz Wireless Communication

AN1003 Chip Antenna

◆ Features

- Light weight and low profile 10.5mm(L)X3.2mm(W)X1.9mm(H)
- Omni-directional in azimuth
- Lead (Pb) Free

◆ Applications

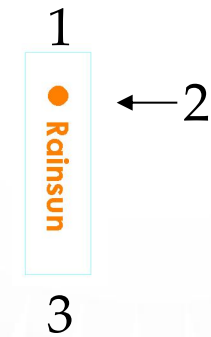
- 2.4GHz & 5~6GHz wireless communications
- 2.4GHz & 5~6GHz Modules
- 802.11a/b/g Wireless LAN System

Specifications

Center frequency	2.45GHz & 5~6GHz
Peak gain	1dBi
Operation temperature	-40 ~ +85 °C
Storage temperature	-40 ~ +85 °C
VSWR	2.0 (max)
Input Impedance	50 Ohm
Power handling	3W (max)
Bandwidth	2.45GHz 70MHz 5~6GHz 500MHz
Azimuth beamwidth	Omni-directional
Polarization	Linear

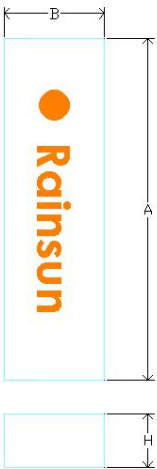
Pin configuration

Top view



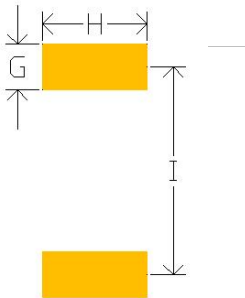
Pin No	Pin assignment
1	Feed termination
2	Feed point mark
3	Solder termination

Dimensions



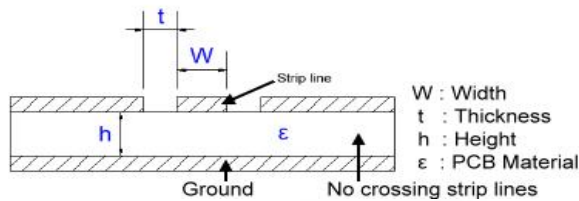
Symbol	Dimensions(mm)
A	10.5 ± 0.20
B	3.2 ± 0.20
H	1.90 ± 0.20

PCB Foot Print

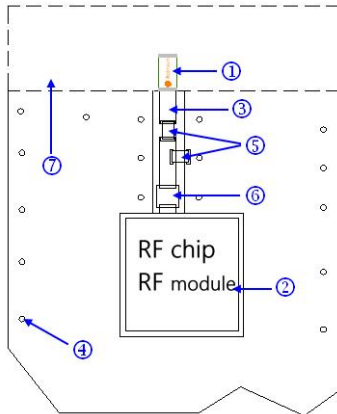


Symbol	Dimensions(mm)
G	2
H	3.0
I	8.8

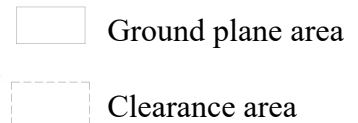
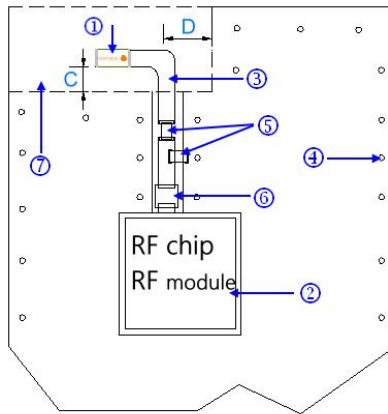
Application design guide



Best Choice



Acceptable



1. Placement of the antenna

The antenna shall be placed on a area without underlying ground plane at the edge of the PCB oriented as above. Ground plane area surrounding the antenna should be with minimum clearance 3mm.

DO NOT place the antenna on the PCB edge with V-cut. The antenna body size is bigger than passive component. Antenna may damage on the V-cut snap off. In PCB panel layout, CNC board edge is better then V-cut edge.

2. Placement of RF chip set or module

To avoid losses in the strip line, the module shall be placed as close to the antenna as possible.

3. Strip line

The strip line impedance must be dimensioned according to your specific PCB (see fig.2) to 50 Ohm. No crossing strip lines are allowed between the strip line and its ground plane.

4. Via Connections on PCB

To avoid spurious effects via connections must be made to analogue ground. Via connection depends on PCB layout design. Figure for reference only.

5. Component matching

Component values are depending on antenna placement, PCB dimensions and location of other components. PCB dimension and antenna location will effect the antenna frequency.

6. DC Block

It might be needed depending on RF Module or chip hardware design.

7. Clearance

No components allowed within the clearance area with a minimum distance to other components. The minimum distance is 3mm.

Recommended Test Board Pattern

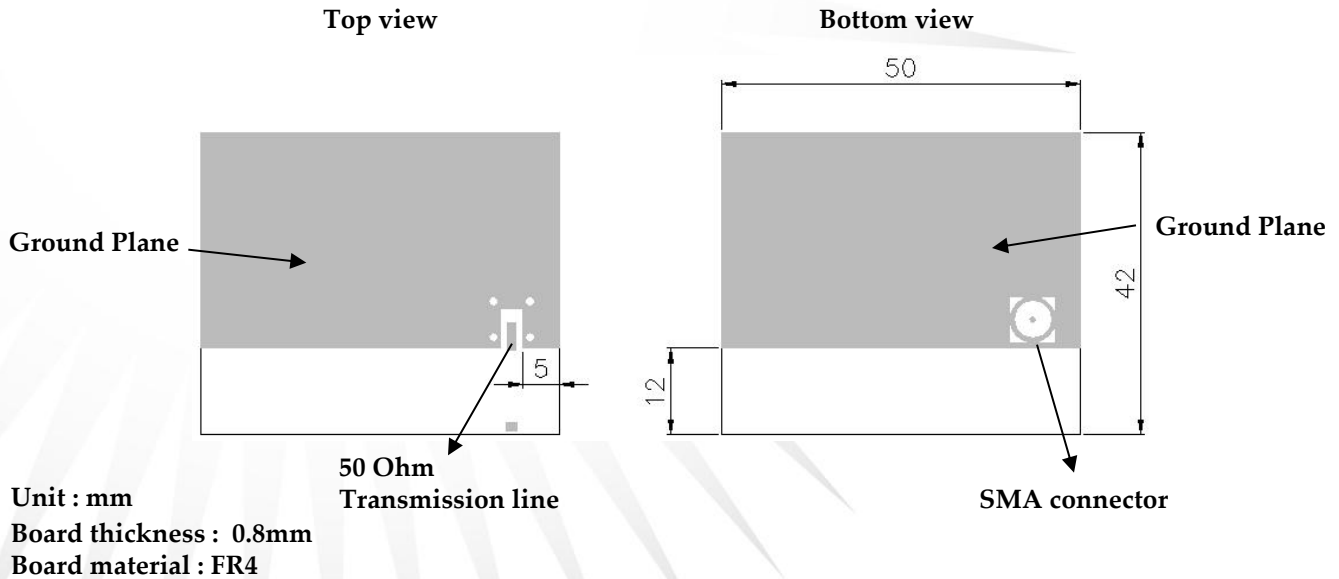
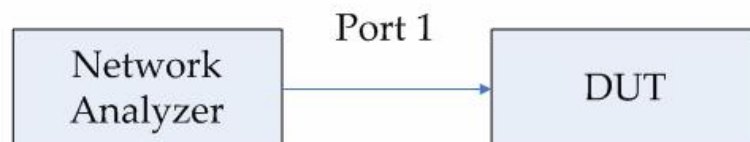


Fig-1

Testing Setup



Measurement

Testing Instrument:

Anritsu 37369C VNA(Vector Network Analyzer)

VNA calibrate with 1 path reflection only calibration sequence on test board feed point.

The test board dimension and it's layout is the same as Fig-1.

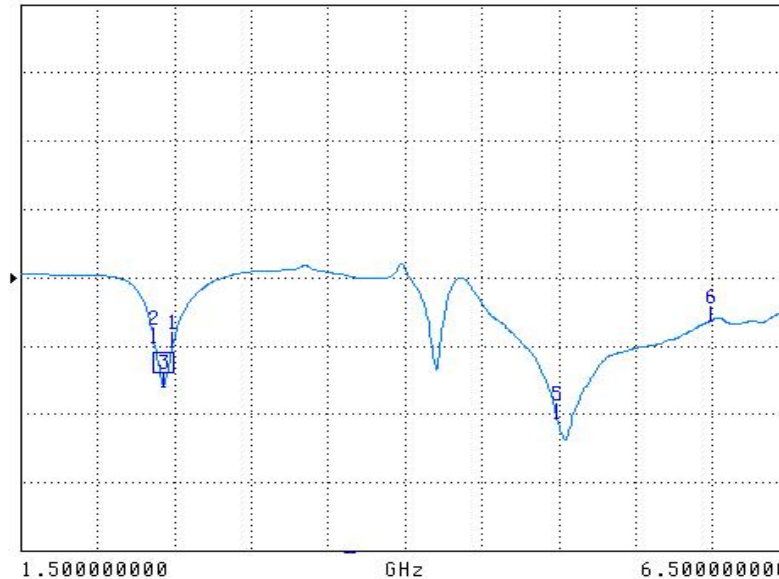


Typical Electrical Characteristics

Return loss

S22 REVERSE REFLECTION

LOG MAGNITUDE REF=0.000 dB 10.000 dB/DIV



CH 4 - S22
REFERENCE PLANE
0.0000 mm

MARKER 3
2.437500000 GHz
-15.960 dB

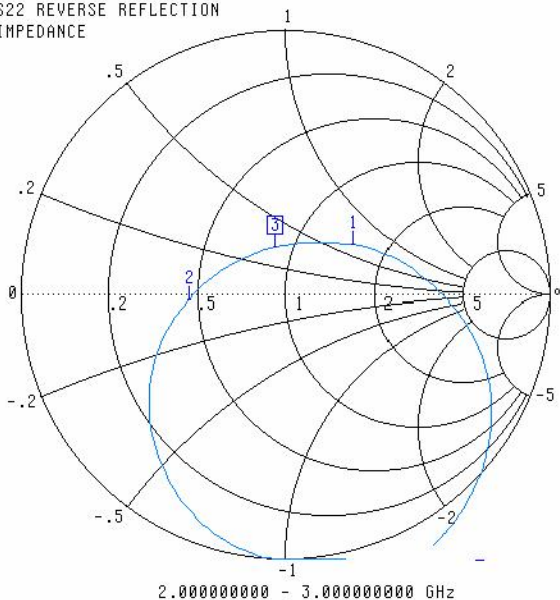
MARKER TO MAX
MARKER TO MIN

- 1 2.493750000 GHz
-10.120 dB
- 2 2.375000000 GHz
-9.441 dB
- 5 4.993750000 GHz
-20.719 dB
- 6 5.993750000 GHz
-6.313 dB

MARKER READOUT
FUNCTIONS

Smith Chart

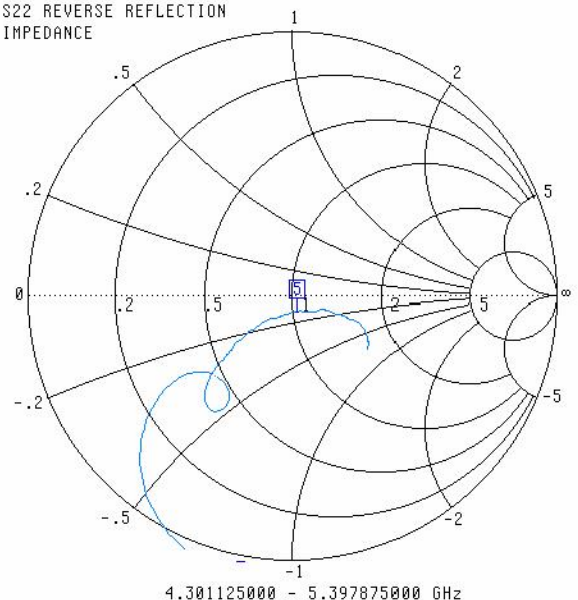
S22 REVERSE REFLECTION
IMPEDANCE



Marker data:

- 1 : f=2.493 GHz
- 2 : f=2.375 GHz
- 3 : f=2.437 GHz

S22 REVERSE REFLECTION
IMPEDANCE



Marker data:

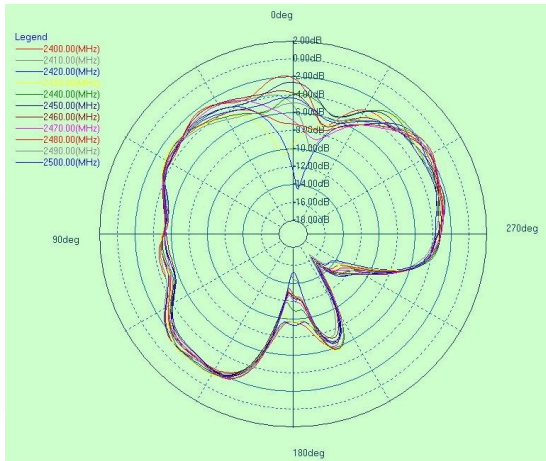
- 4 : f=4.998 GHz

Efficienty test

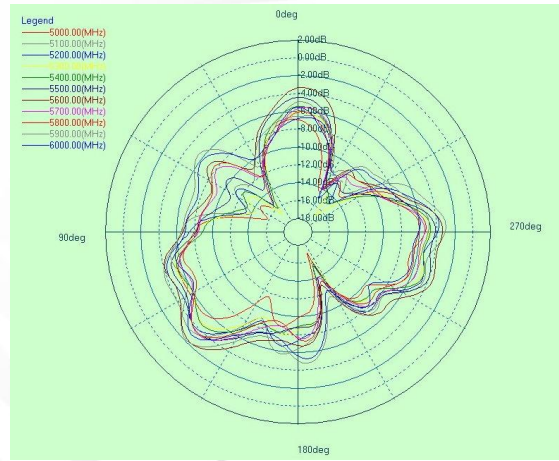
Frequency	E Total. dB(dBi)	Efficiency()
2400MHz	1.31	62%
2410MHz	1.38	62%
2420MHz	1.30	62%
2430MHz	1.38	62%
2440MHz	1.15	63%
2450MHz	1.19	62%
2460MHz	1.16	62%
2470MHz	1.13	63%
2480MHz	1.42	62%
2490MHz	1.46	60%
2500MHz	1.17	58%
5000MHz	-1.44	19%
5100MHz	1.27	31%
5200MHz	1.15	27%
5300MHz	0.18	22%
5400MHz	-0.17	21%
5500MHz	0.01	25%
5600MHz	0.54	30%
5700MHz	-1.22	21%
5800MHz	-0.96	19%
5900MHz	0.61	26%
6000MHz	-0.01	22%

Typical Radiation Patterns

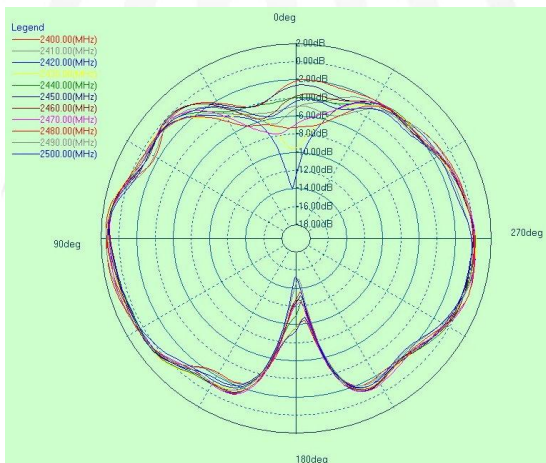
2.4 GHz Phi=0



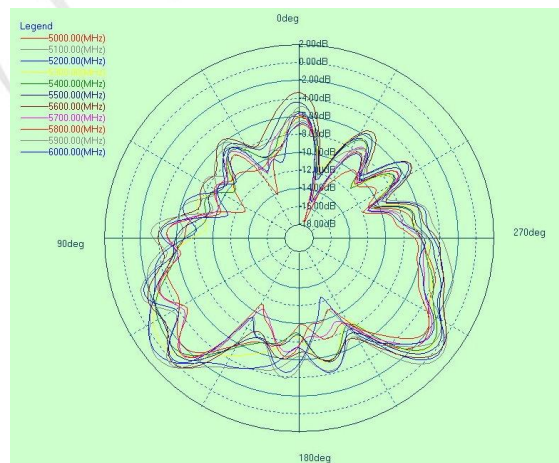
5GHz Phi=0



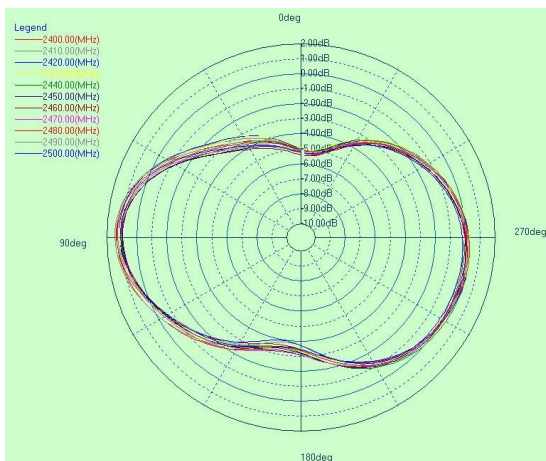
2.4 GHz Phi=90



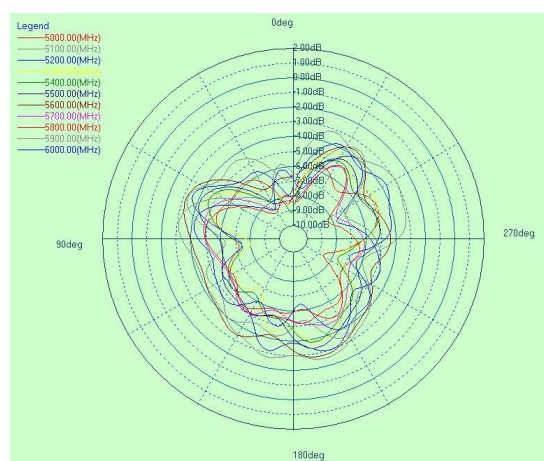
5GHz Phi=90



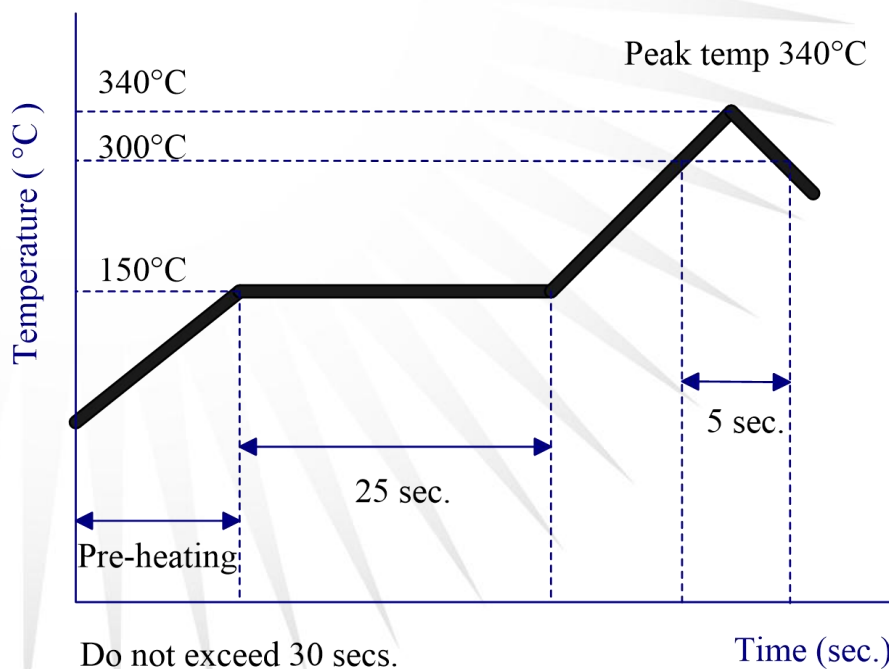
2.4 GHz Theta=90



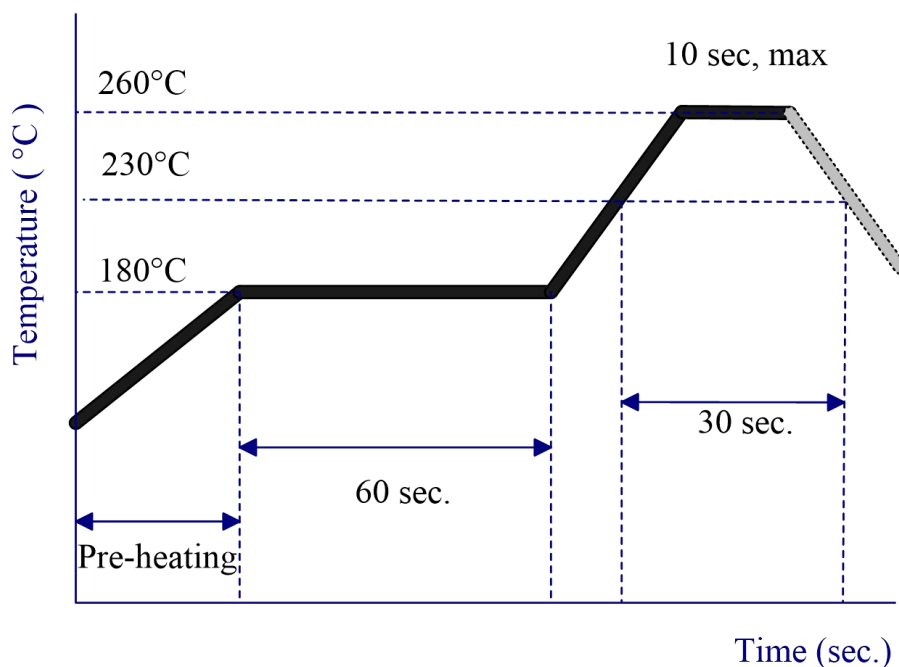
5 GHz Theta=90



Typical Soldering Profile for Lead-free Process

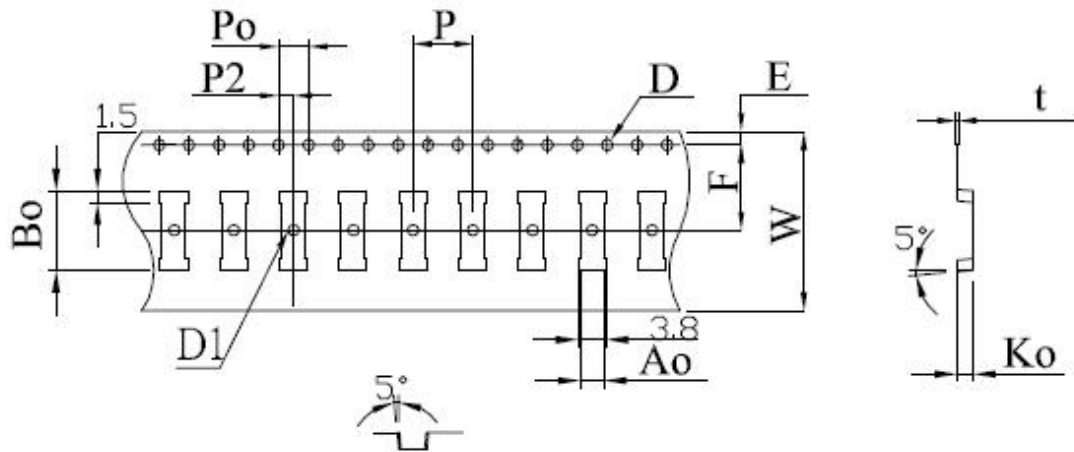


Reflow Soldering



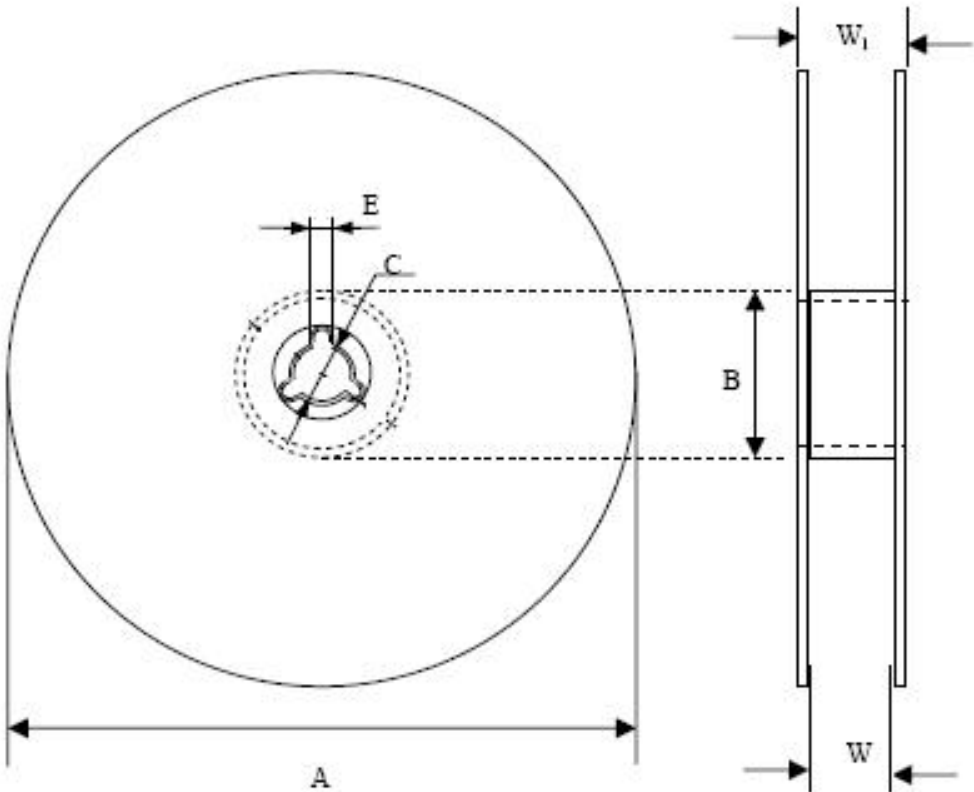
Packing

Blister Tape Specifications



Symbol	Dimension	Tolerance	Unit
W	24.00	± 0.30	mm
E	1.75	± 0.10	mm
F	11.50	± 0.10	mm
D	1.50	+ 0.10 - 0.00	mm
D_1	1.50	+ 0.25 - 0.00	mm
P_0	4.00	± 0.10	mm
P	8.00	± 0.10	mm
P_2	2.00	± 0.10	mm
A_0	3.20	+ 0.10 3.20	mm
B_0	10.60	± 0.10	mm
K_0	2.20	± 0.10	mm
t	0.30	± 0.05	mm

Reel Specifications



Quantity Per Reel	Tape Width (mm)	A (mm)	C (mm)	B (mm)	E (mm)	W (mm)	W ₁ (mm)
3,000	24	330±1	13.0±0.5	100.0±0.5	2.2±0.5	24.0±0.5	28.9±0.2