

众驰电子

# ZC-W1

Antenna made of PCB

# USER MANUAL

# ZC-W1

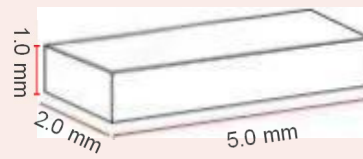
Independent package, Apply to SMT process.

Operating Rang:

2400~2500 MHz

Dimenision :

5mm\*2.0mm\*1.0mm

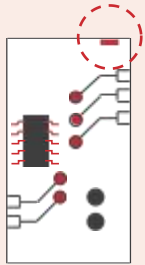


「ZC-W1」

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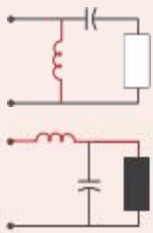
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# How to embed an Antenna



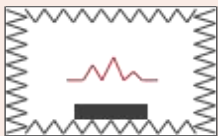
## STEP 1: Place the antenna component

1. Select one corner of your PCB
2. Design the feeder of antenna and connect it with antenna at clearance area,
3. Make sure that the space around the antenna maintains a clearance of 5mm, away from metal objects and circuits.



## STEP 2: Design your matching network

1. It is recommended to control the impedance of RF microstrip feeder by 50 ohms , and reserve  $\pi$  - type LC matching network to adjust the antenna and module for optimal impedance matching, to avoid antenna signal transmission loss.
2. It is very important to fine-tune the matching network in the design process to obtain the best signal.



## STEP 3: Test your device

1. Perform a field test in which your antenna is placed in its final housing. Fine-tune the MN if needed
2. Use network analyzer to adjust mismatch
3. Test the antenna efficiency with an anechoic chamber.

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# Antenna Specifications

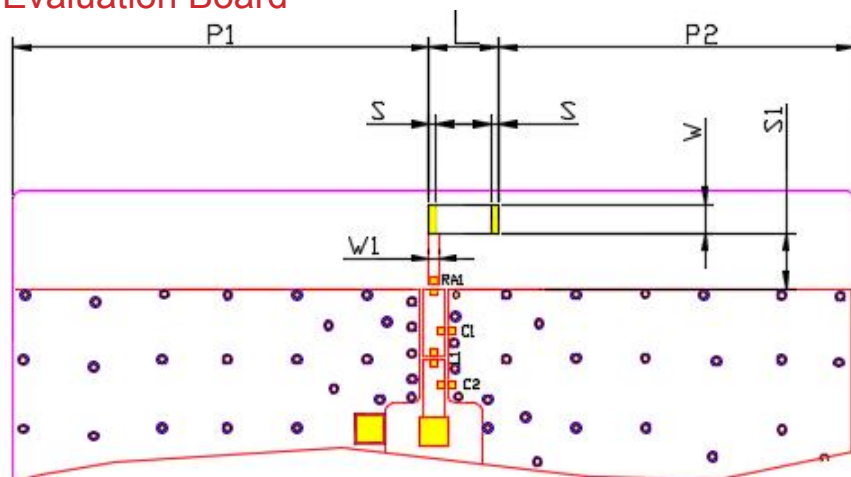
The W1 antenna power amplifier is specifically designed to enhance Bluetooth and WiFi performance in wireless devices with limited space requirements. Here, we will use our evaluation board to compare the performance in the 2.4GHz frequency band, and also demonstrate a common placement example of the W1. Finally, by utilizing the test port to select a matching network, we will be able to test, capture, and analyze VSWR, total efficiency, gain, and radiation patterns.

## Quick Reference Guide

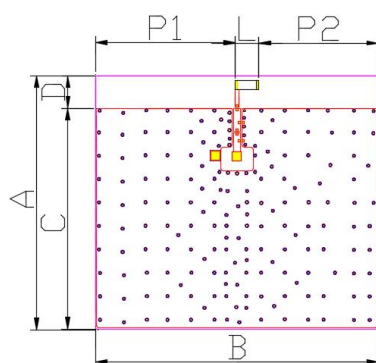
Technical features	BT	WiFi
	2400~2500Mhz	2400~2500Mhz
Average Efficiency	> 61%	> 61%
Peak Gain	3 dBi	3 dBi
VSWR	< 2.1	
Radiation Pattern	Omnidirectional	
Polarization	Linear	
Weight <small>(approx.)</small>	0.05 g	
Temperature	-40 to +125 °C	
Impedance	50 Ω	
Dimensions <small>(L x W x H)</small>	5.0 mm x 2.0 mm x 1.0 mm	

Table 1 – Technical Features. Measures from the Evaluation Board.

## Evaluation Board



Measure	mm	Measure	mm
A	54	P2	25.55
B	60.4	S	0.5
C	47	S1	4
D	7	W	2
L	5	W1	0.7
P1	29.85		

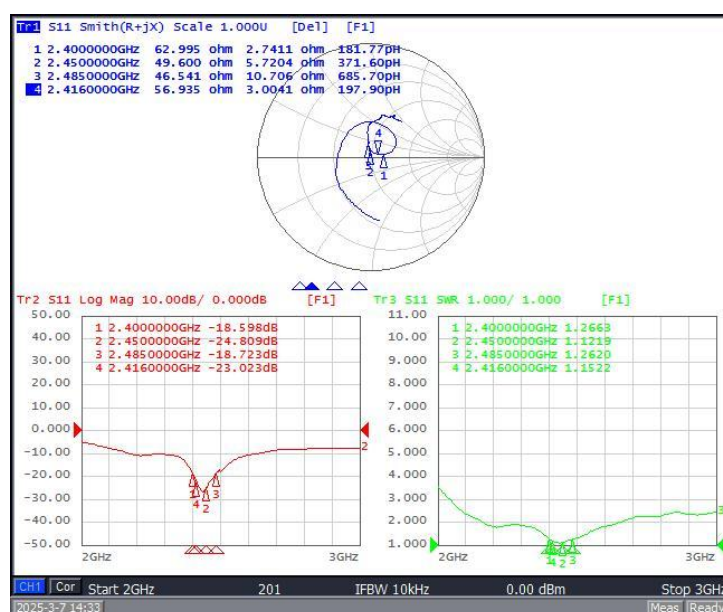


Tolerance:  $\pm 0.2$  mm

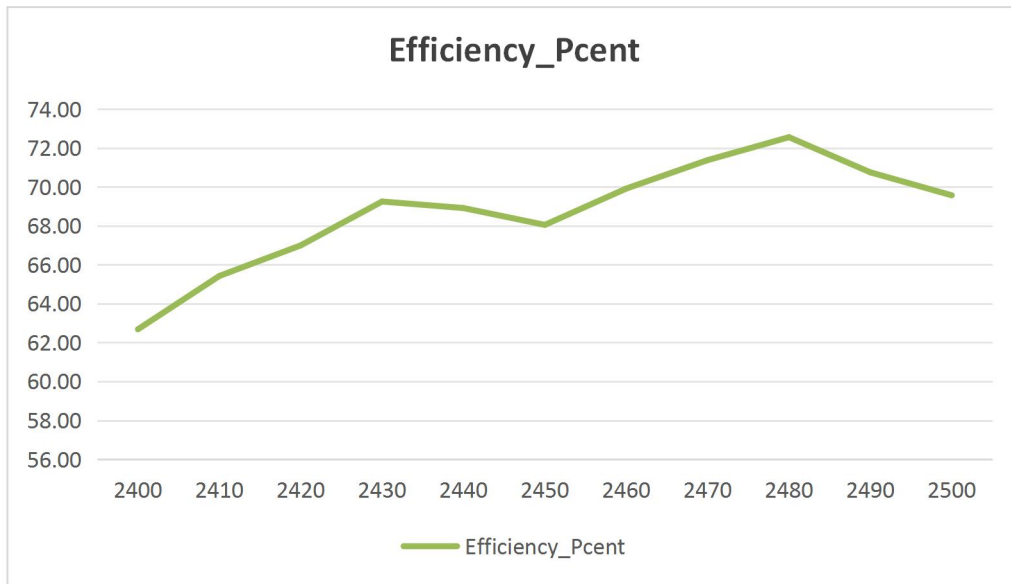
Figure 1–Evaluation Board

Material: The Evaluation Boards are built on FR4 substrate. Thickness is 1.5 mm.

## Antenna S11 parametetr



## Radiation Patterns, Gain and Efficiency

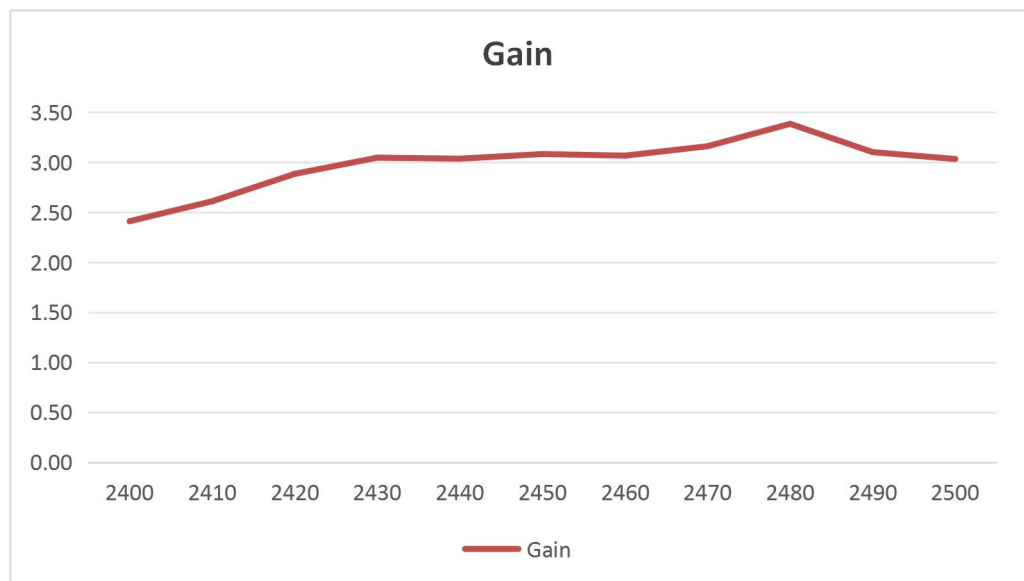


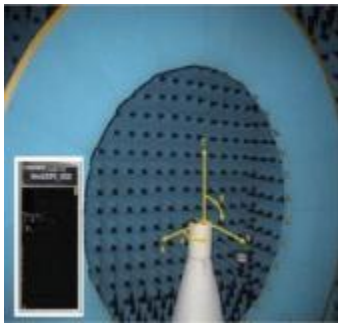
Frequency&Gain chart

>>>

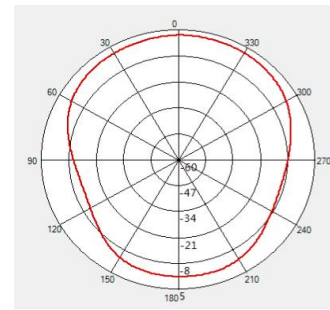
Frequency&Efficiency chart

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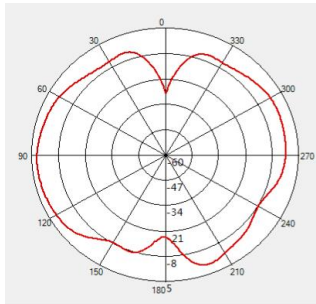




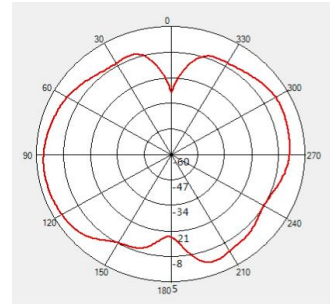
Measurement System Set-Up  
Evaluation Board in Plane XY



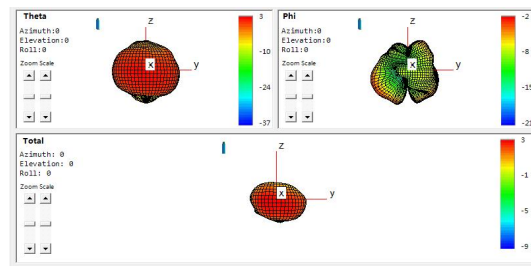
$\theta = 90^\circ$  Plane XY at 2.450 GHz



$\phi = 0^\circ$  Plane XY at 2.450 GHz



$\phi = 90^\circ$  Plane XY at 2.450 GHz



3D Radiation Pattern at 2.450GHz

Gain and efficiency	2400M-2500MHz
Peak Gain	3.39dBi
Average Gain across the band	2.98dBi
Gain Range across the band	2.42dBi ~ 3.39dBi
Efficiency	72.13%
Average Efficiency across the band	68.34%
Efficiency Range across the band	62%~72%

Table 2: – The performance evaluation sheet for WiFi and Bluetooth antennas.

## Recommended Antenna Footprint for Evaluation Board

Assuming that the W1 antenna booster is placed in the middle of the PCB, see below the recommended footprint dimensions.

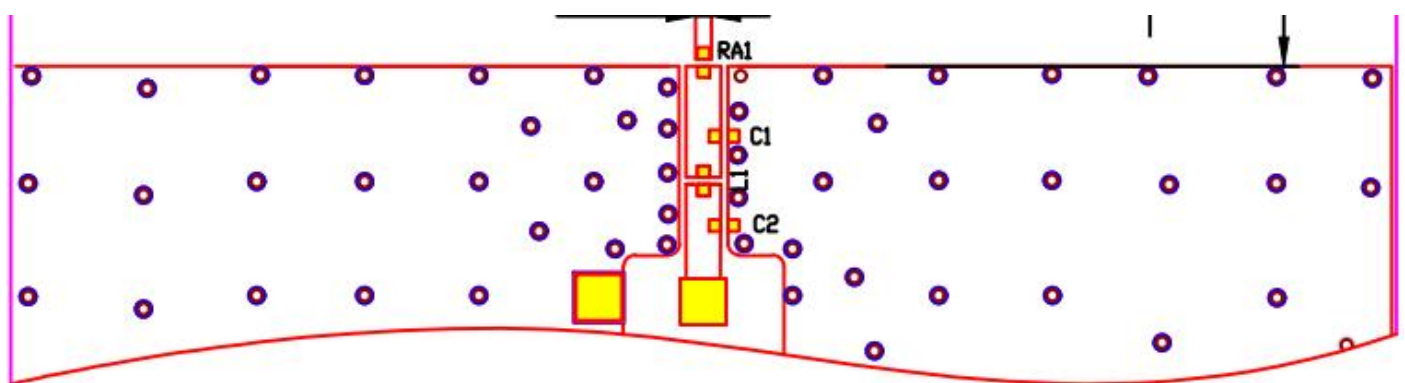


Figure 2 – Footprint dimensions for the evaluation board

Component matching value	Series Circuit RA1	0 $\Omega$
	Series Circuit L1	2.4nH
	Parallel Circuit C1	1.3pF
	Parallel Circuit C2	4.3nH

Tolerance :  $\pm 0.05\text{mm}$

For additional support in the integration process, please contact [jackchen@dgzhongchi.cn](mailto:jackchen@dgzhongchi.cn)

Next graphic shows temperature profile (grey zone) for the W1 antenna booster assembly process reflow ovens..

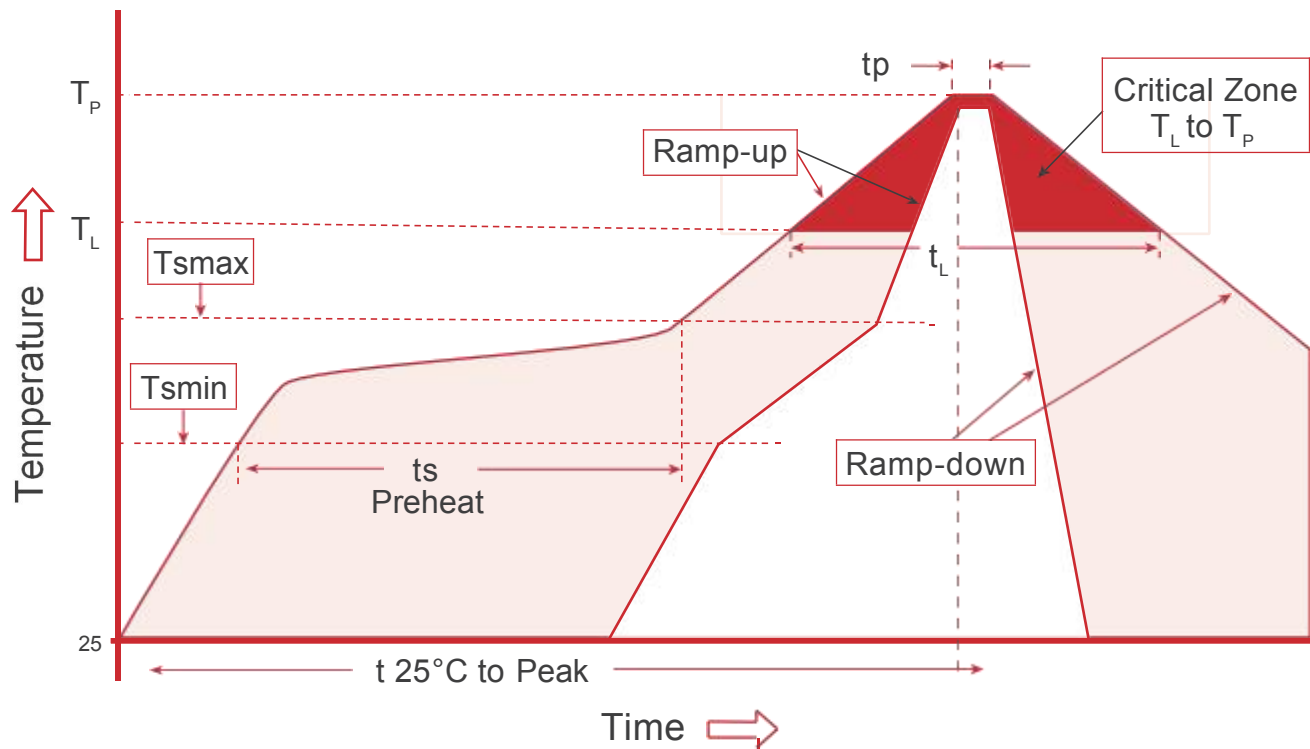
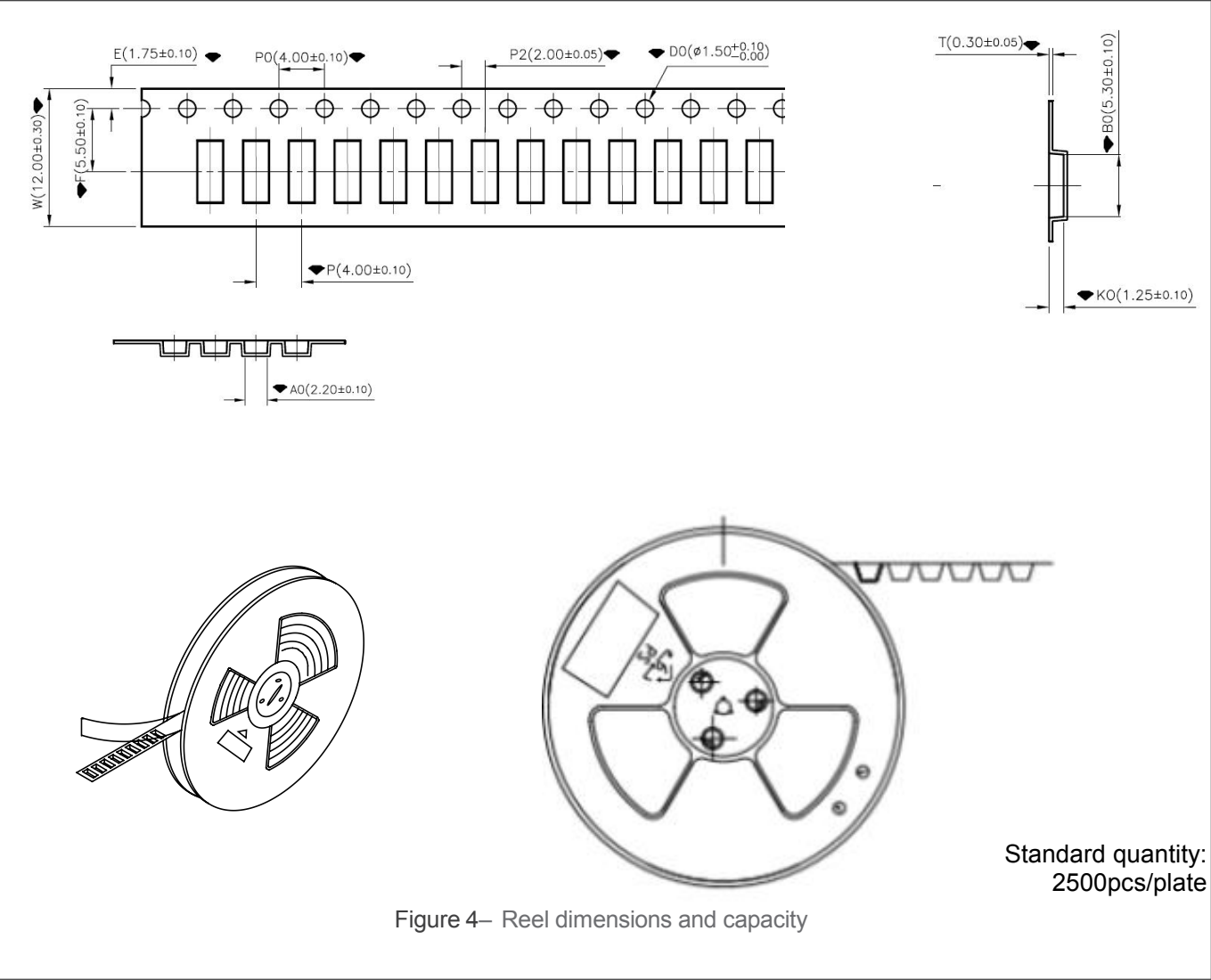


Figure 3 – Temperature profile

# Packaging

The W1 antenna booster is delivered in plastic tape and reel packaging.



ITEM	W	A <sub>0</sub>	B <sub>0</sub>	K <sub>0</sub>	P	F	E	D <sub>0</sub>	P <sub>0</sub>	P <sub>2</sub>	T <sub>0</sub>
DIM	12.0±0.1	2.2±0.1	5.3±0.1	1.25±0.3	4.0±0.1	5.5±0.3	1.75±0.1	1.5±0.1	4.0±0.1	2.0±0.1	0.3±0.05