



Antenna Datasheet

Product OC (Antenna Only): YCGS010AA

Product OC (Antenna + Rectangular EVB): YCGS010AAEVB

Version: 2.0

Date: 2024-04-18

Status: Released

Product Name: Passive GNSS L1/L2/L5, E6, B3 Antenna

Key Features:

Frequency Band: 1176.45–1278.75 MHz; 1575.42 MHz

Dimensions: 5 mm × 3 mm × 0.5 mm

RoHS and REACH Compliant

Overview

This Quectel GNSS antenna adopts a diversity of forms to guarantee the most suitable polarization type. Quectel's positioning products support single-band or multi-band operation modes to meet various high-precision positioning requirements of customers' products. Quectel provides both passive and active antennas to satisfy the customer demand for high gain. Such antenna supports different installation or connection methods such as pin mount, surface mount, magnetic mount, internal cable, and external SMA. Customized connector type and cable length are provided according to requirements.

Contents

Overview.....	1
Contents	2
1 Specification.....	3
1.1. Electrical.....	3
1.2. Mechanical & Environmental	4
1.3. Supported GNSS Frequency Bands.....	5
2 Drawing	7
2.1. Antenna.....	7
2.2. Rectangular EVB.....	8
3 Detailed Performance	9
3.1. S-Parameter Test	9
3.1.1. VSWR.....	9
3.1.2. Return Loss	10
3.2. Radiation Performance Test.....	11
3.2.1. Efficiency	11
3.2.2. Peak Gain.....	12
3.2.3. 3D & 2D Radiation Pattern.....	13
4 Schematic Symbol and Pin Definition	16
5 Transmission Line	17
6 Recommended PCB Layout.....	18
7 Matching Circuit.....	19
8 Soldering Temperature.....	20
9 Reflow Profile	21
10 Packaging	22
Contact Us.....	24
Legal Notices	25
Revision History	27

1 Specification

Test Condition: On 80 mm × 40 mm EVB

1.1. Electrical

Electrical	
Frequency Range	1176.45–1278.75 MHz; 1575.42 MHz
Impedance	50 Ω
Polarization	Linear
Radiation Pattern	Omni-directional

Band Frequency (MHz)	GPS L5 GALILEO E5a BEIDOU B2a-B2I QZSS L5 IRNSS L5	GALILEO E5b BEIDOU B2b	GPS L2 QZSS L2C	GLONASS G2	BEIDOU B3	BEIDOU B1I	GPS L1 GALILEO E1 BEIDOU B1C QZSS L1	GLONASS G1
	1176	1207	1227	1248	1268	1561	1575	1602
VSWR	1.5	1.6	2.3	3.0	3.3	1.5	1.4	1.4
Return Loss (dB)	-13.8	-12.7	-8.0	-6.1	-5.4	-13.5	-15.7	-16.4
Efficiency (%)	49.5	50.1	49.6	44.8	42.7	71.8	70.5	73.9
Peak Gain (dBi)	1.3	1.0	0.6	0.3	0.0	2.1	2.0	2.2

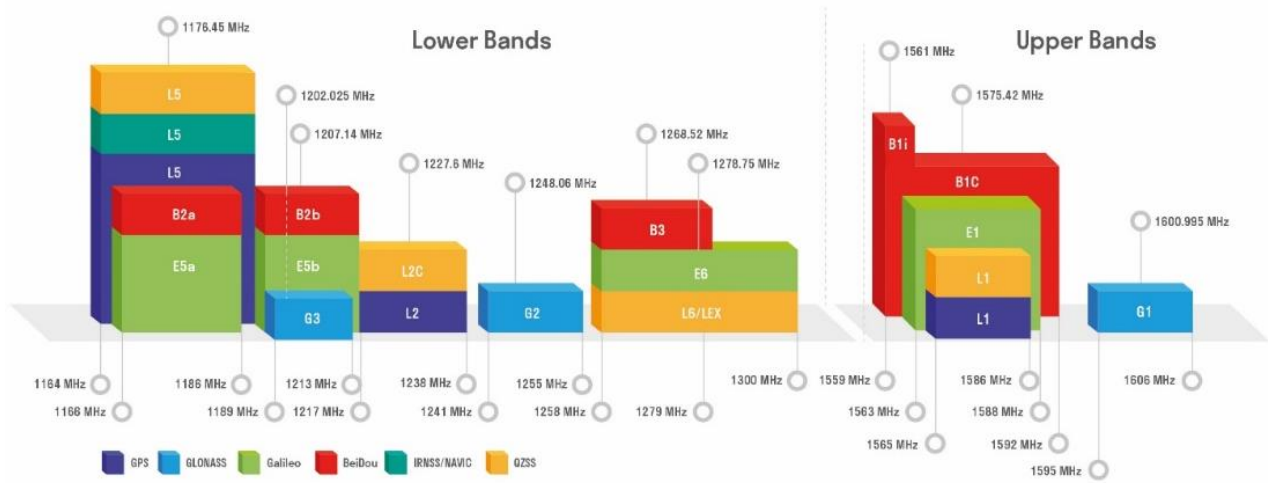
1.2. Mechanical & Environmental

Mechanical	
Antenna Dimensions	5 mm × 3 mm × 0.5 mm
Material & Color	Ceramic & White
Mounting Type	SMD
Weight	Typ. 0.025 g
Recommended EVB Size	Rectangular EVB: 80 × 40 mm
Environmental	
Operation Temperature	-40 °C to +85 °C
Storage Temperature	-40 °C to +85 °C
RoHS and REACH Compliant	Yes

1.3. Supported GNSS Frequency Bands

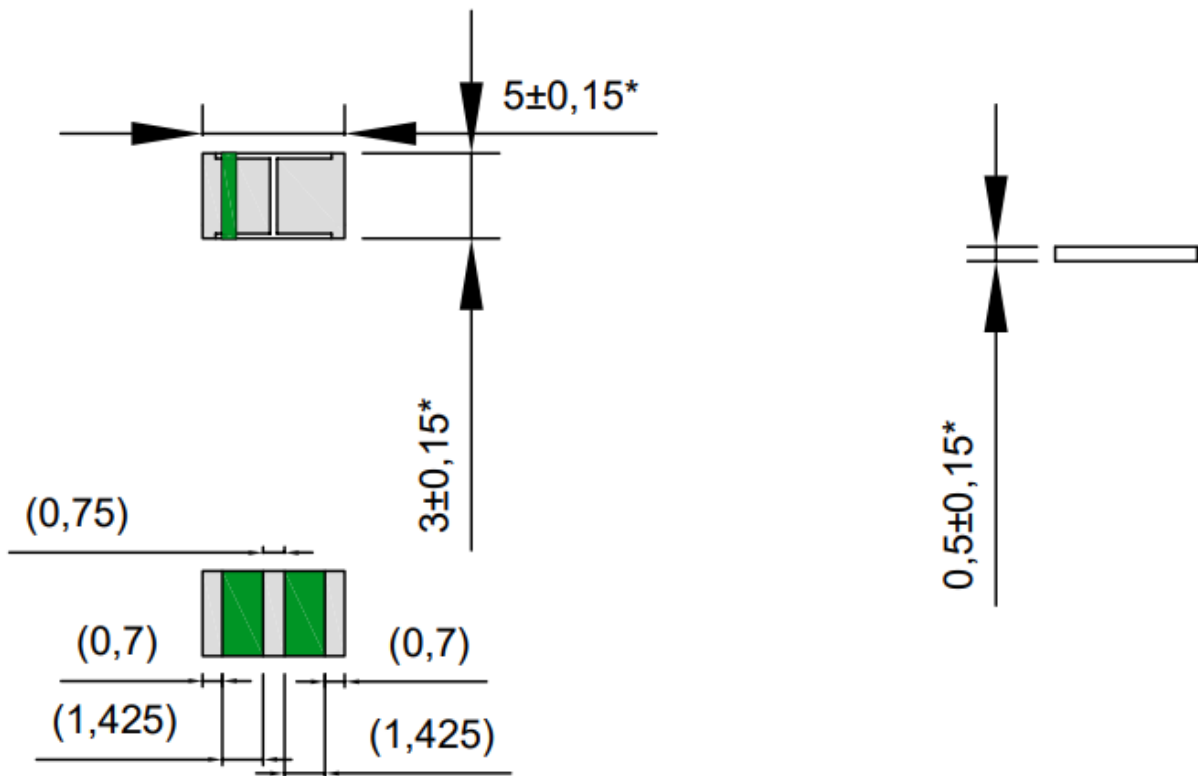
GNSS Frequency Bands (MHz)					
GPS	L1 Centre 1575.42 (1565–1586)	L2 Centre 1227.6 (1217–1238)	L5 Centre 1176.45 (1164–1189)		
	√	√	√		
GLONASS	G1-L10C-L10F Centre 1601 (1595–1606)	G2-L20C-L20F Centre 1248.06 (1241–1255)	G3-L30C Centre 1202.025 (1189–1213)		
	√	-	-		
GALILEO	E1 Centre 1575.42 (1563–1588)	E5a Centre 1176.45 (1166–1187)	E5b Centre 1207.14 (1197–1218)	E6 Centre 1278.75 (1258–1300)	
	√	√	-	√	
BEIDOU	B1I Centre 1561.098 (1559–1564)	B1C (BeiDou-3) Centre 1575.42 (1559–1592)	B2a Centre 1176.45 (1166–1187)	B2b-B2I Centre 1207.14 (1197–1217)	B3 Centre 1268.52 (1258–1279)
	-	√	√	-	√
QZSS	L1 Centre 1575.42 (1573–1578)	L2C Centre 1227.6 (1226–1229)	L5 Centre 1176.45 (1166–1187)	L6 Centre 1278.75 (1257–1300)	
	√	√	√	√	
IRNSS	L5 Centre 1176.45 (1164–1189)				
	√				

GNSS Bands and Constellations

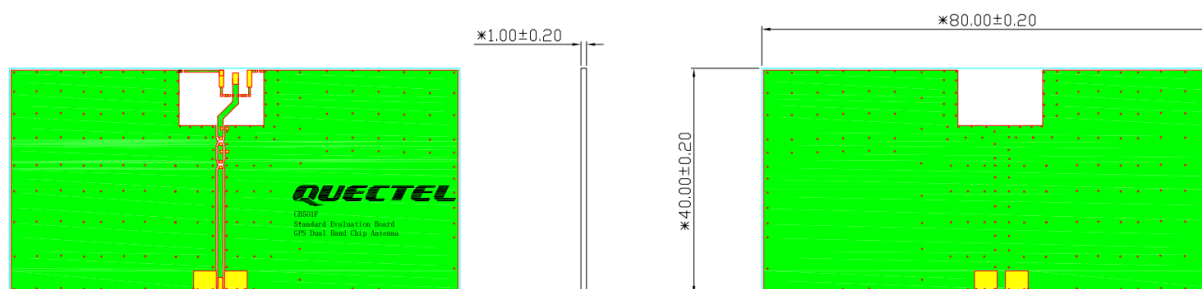


2 Drawing

2.1. Antenna



2.2. Rectangular EVB

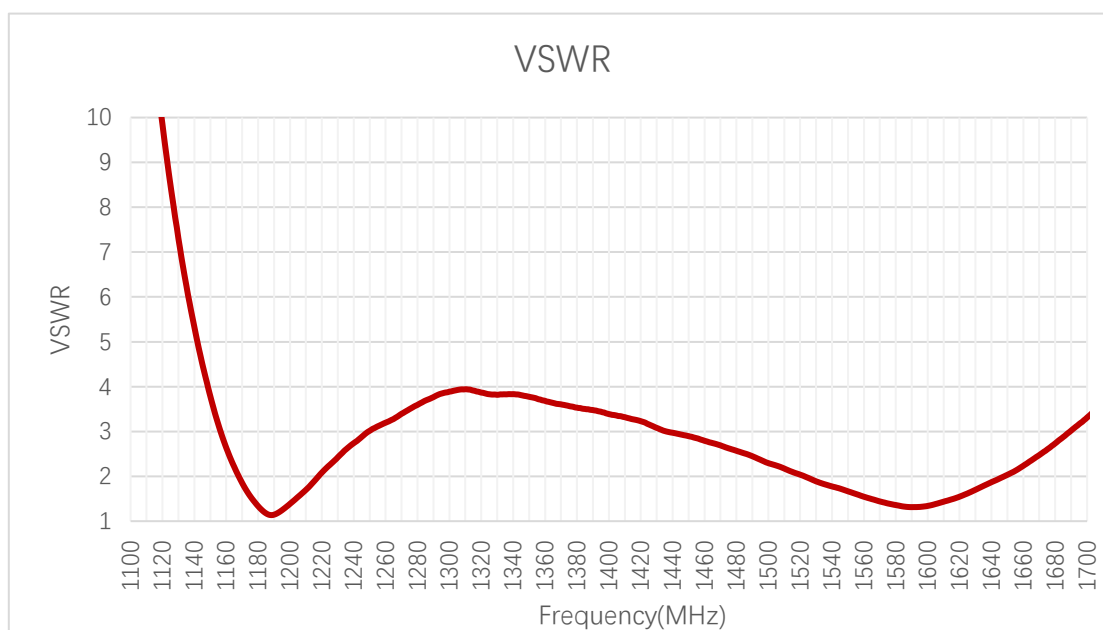


All dimensions are in mm.

3 Detailed Performance

3.1. S-Parameter Test

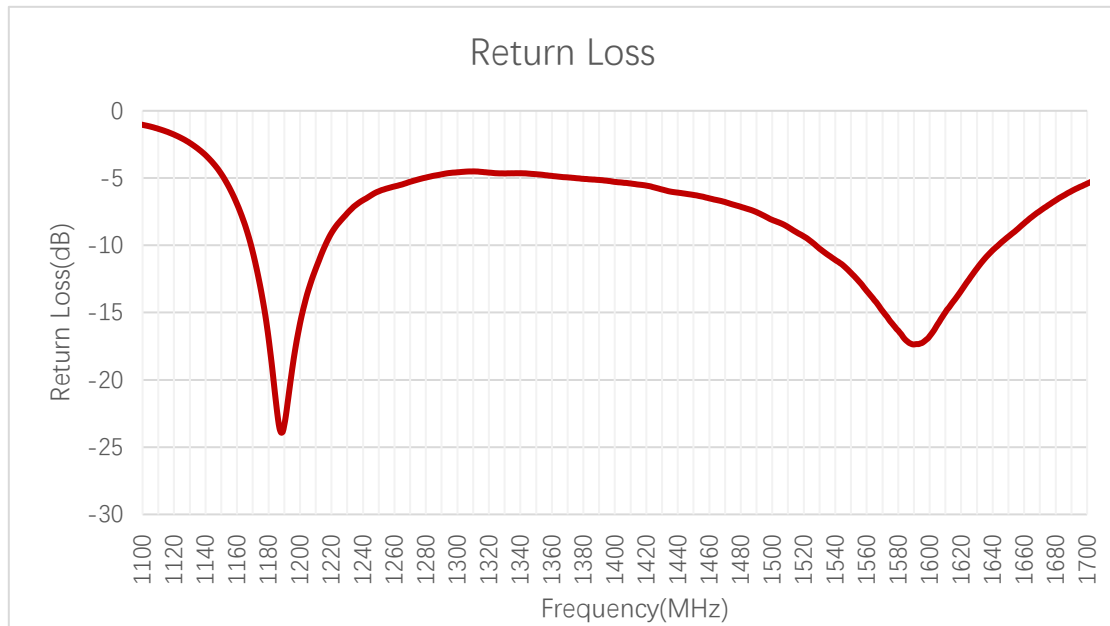
3.1.1. VSWR



VSWR

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
VSWR	1.5	1.6	2.3	3.0	3.3	1.5	1.4	1.4

3.1.2. Return Loss

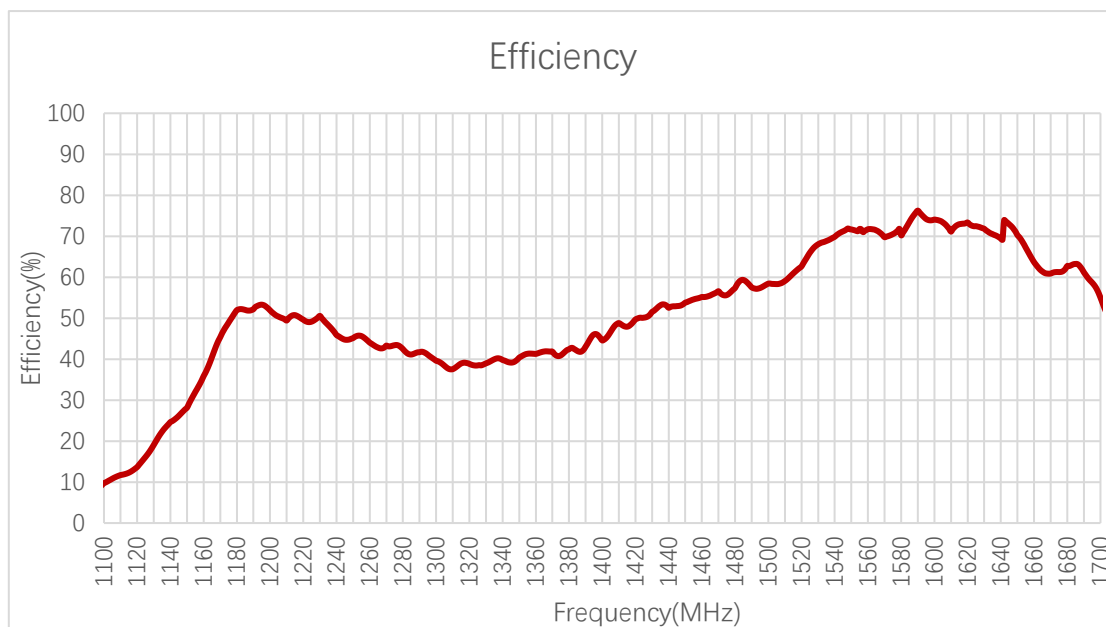


Return Loss (dB)

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Return Loss (dB)	-13.8	-12.7	-8.0	-6.1	-5.4	-13.5	-15.7	-16.4

3.2. Radiation Performance Test

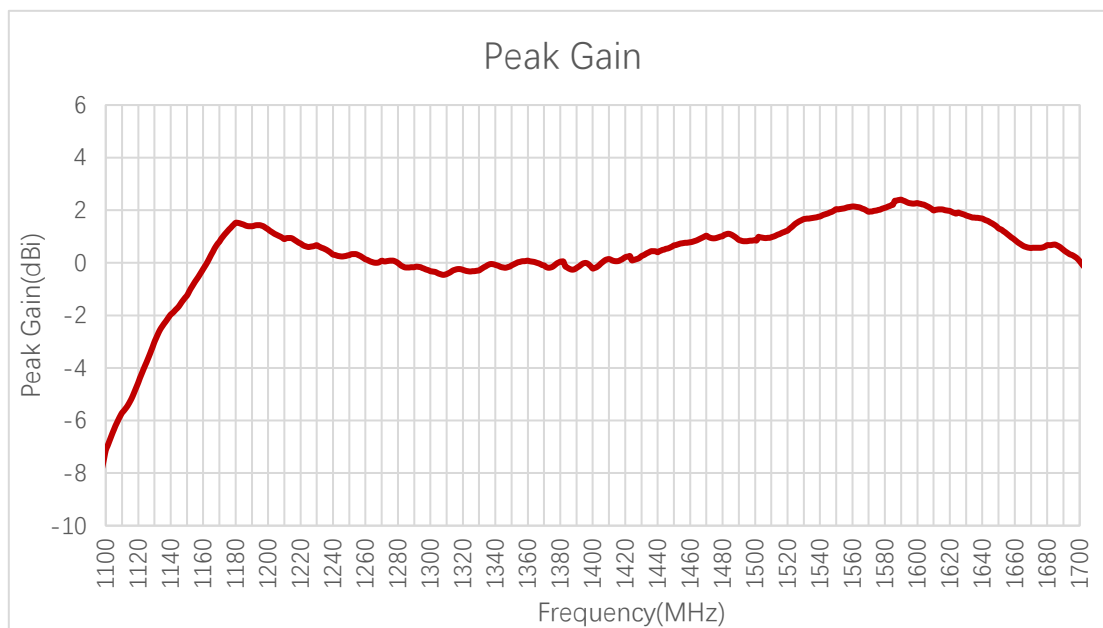
3.2.1. Efficiency



Efficiency (%)

Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Efficiency (%)	49.5	50.1	49.6	44.8	42.7	71.8	70.5	73.9

3.2.2. Peak Gain

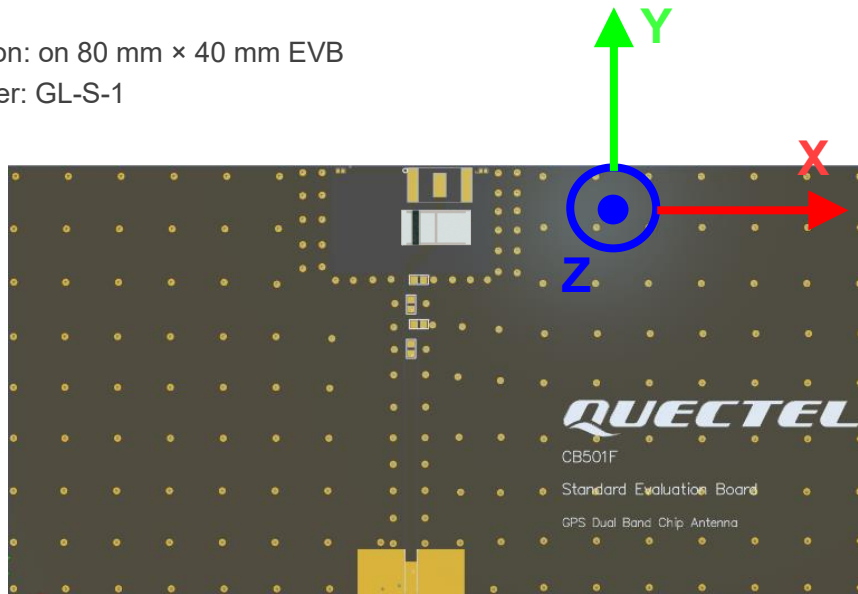


Peak Gain (dBi)

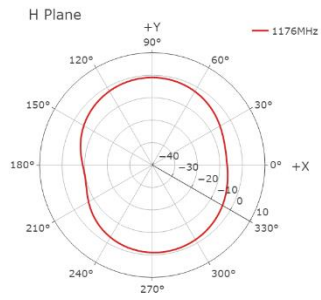
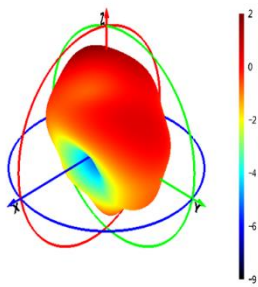
Frequency (MHz)	1176	1207	1227	1248	1268	1561	1575	1602
Peak Gain (dBi)	1.3	1.0	0.6	0.3	0.0	2.1	2.0	2.2

3.2.3. 3D & 2D Radiation Pattern

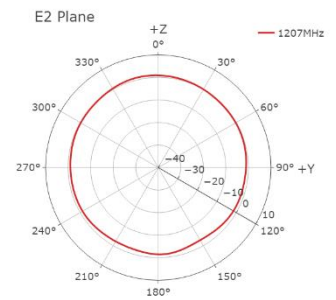
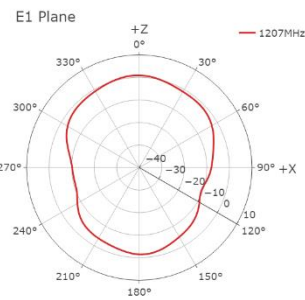
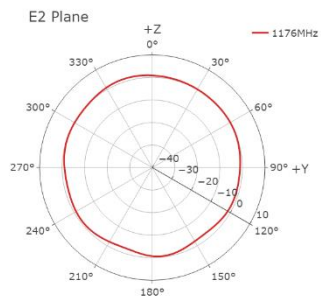
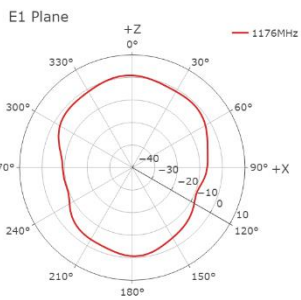
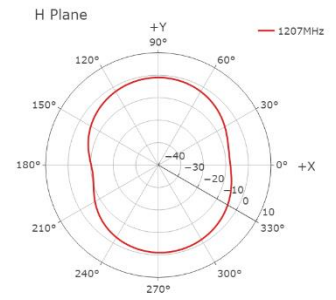
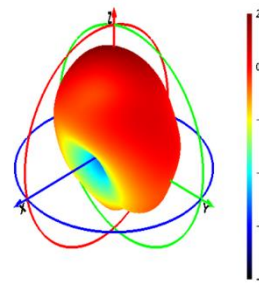
- Test Condition: on 80 mm × 40 mm EVB
- Test Chamber: GL-S-1



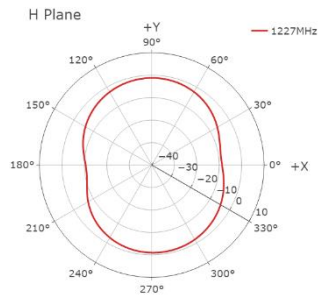
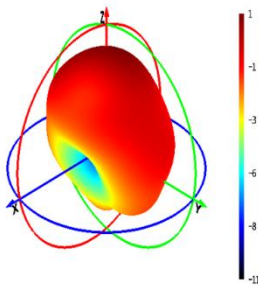
1176 MHz



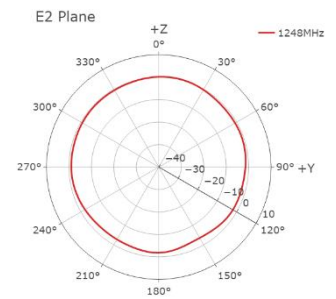
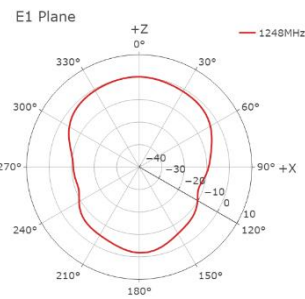
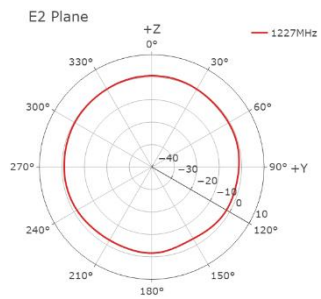
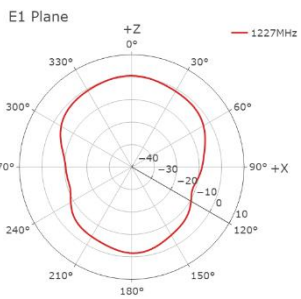
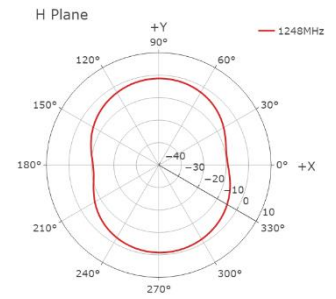
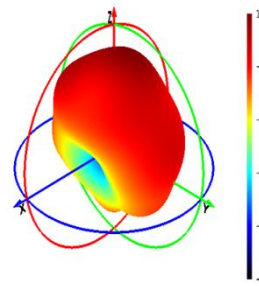
1207 MHz

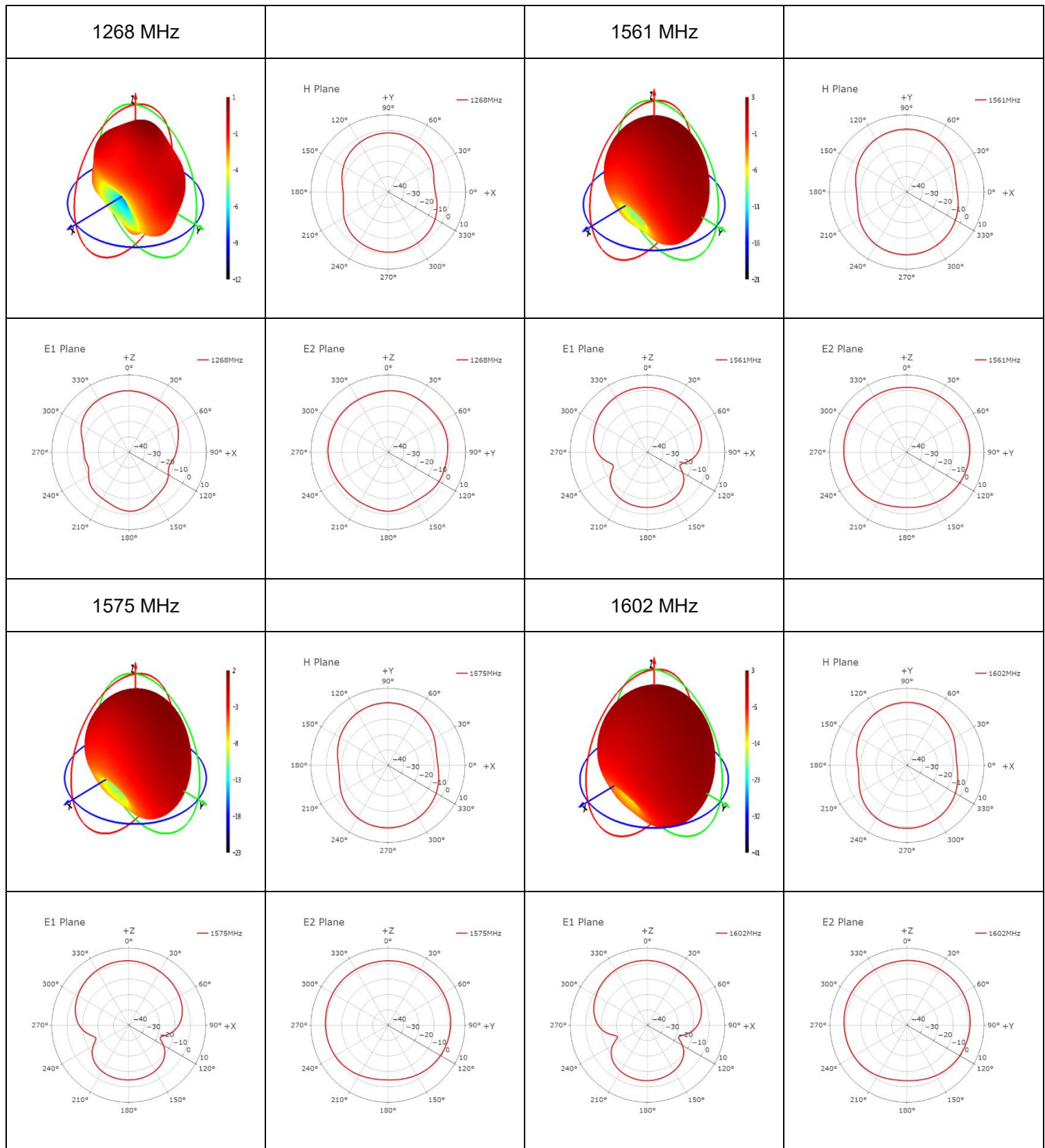


1227 MHz



1248 MHz

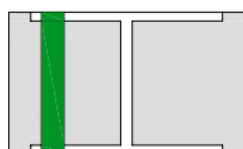




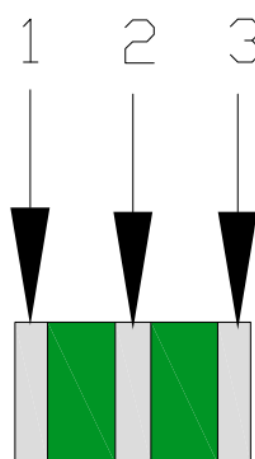
4 Schematic Symbol and Pin Definition

- The pin assignment for the antenna is as follows.
- The circuit symbol for the antenna is shown below. The antenna has 2 pins, only one of which works. All other pins are for mechanical strength.

Pin	Description
1,3	Return / GND
2	Feed



TOP



Bottom

5 Transmission Line

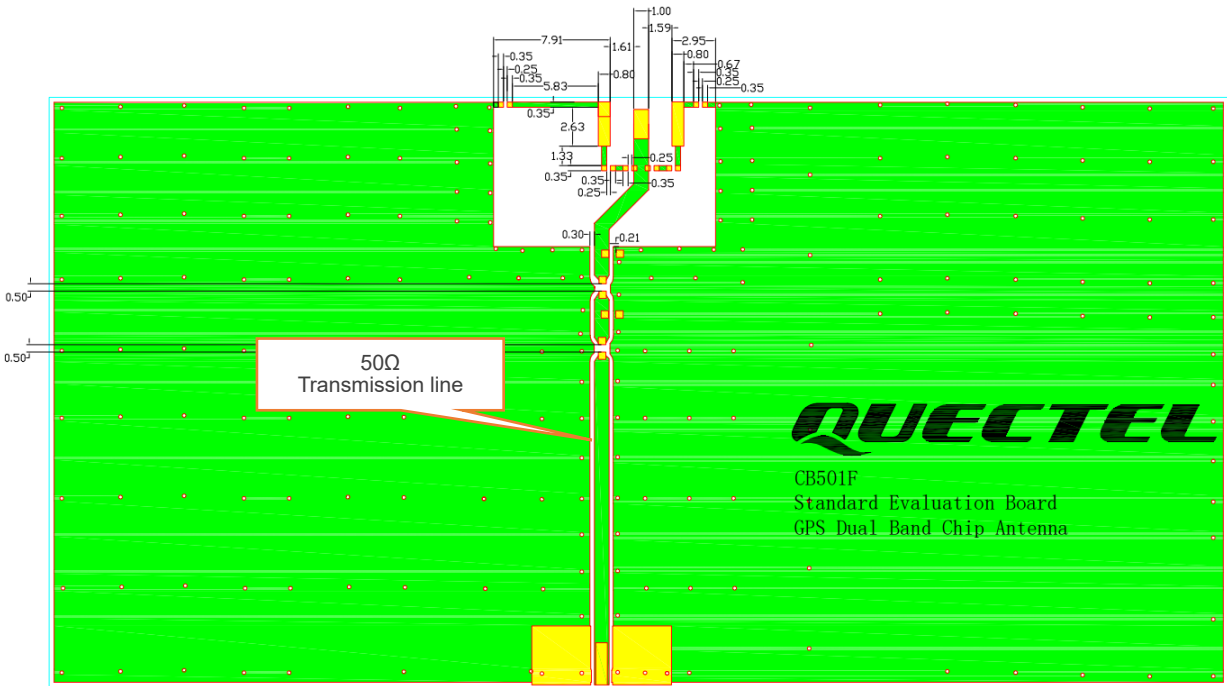
The characteristic impedance of all transmission lines shall be designed as 50 Ω .

- The length of the transmission lines should be kept as short as possible.
- Any other part of the RF system, such as transceiver, power amplifiers, etc., shall also be designed with an impedance of 50 Ω .

Once the material for the PCB has been chosen (PCB thickness and dielectric constant), a coplanar transmission line can easily be designed using any of the commercial software packages for transmission line design. For the chosen PCB thickness, copper thickness and substrate dielectric constant, the program will calculate the appropriate transmission line width and gaps on either side of the track so the characteristic impedance of the coplanar transmission is 50 Ω .

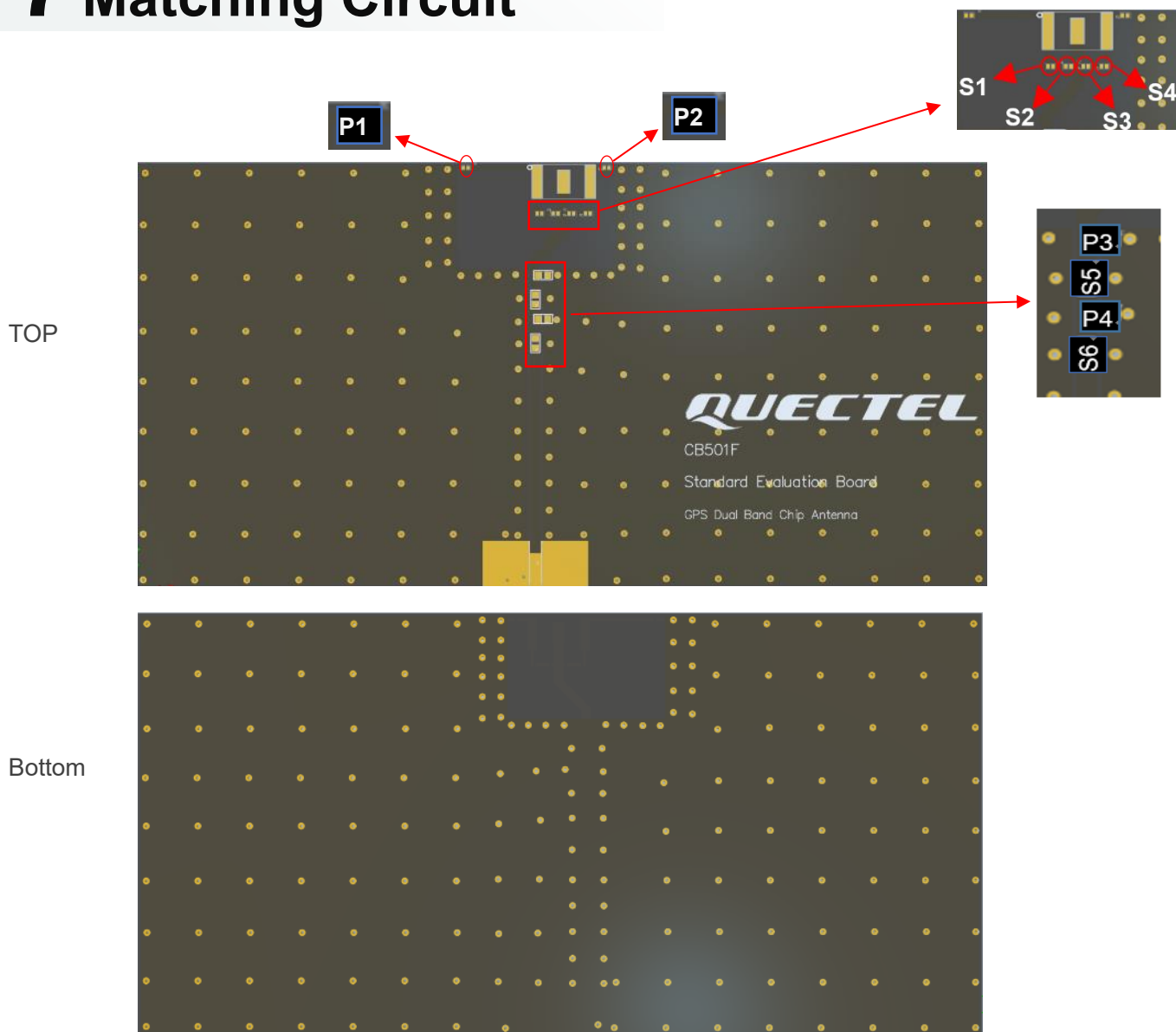
100

The host PCB must be designed using the PCB footprint shown with the correct clearances. An example of the PCB layout shows the antenna footprint. Please note this clearance area is critical to the performance of the antenna and must be applied through all layers of the PCB.



All dimensions are in mm.

7 Matching Circuit



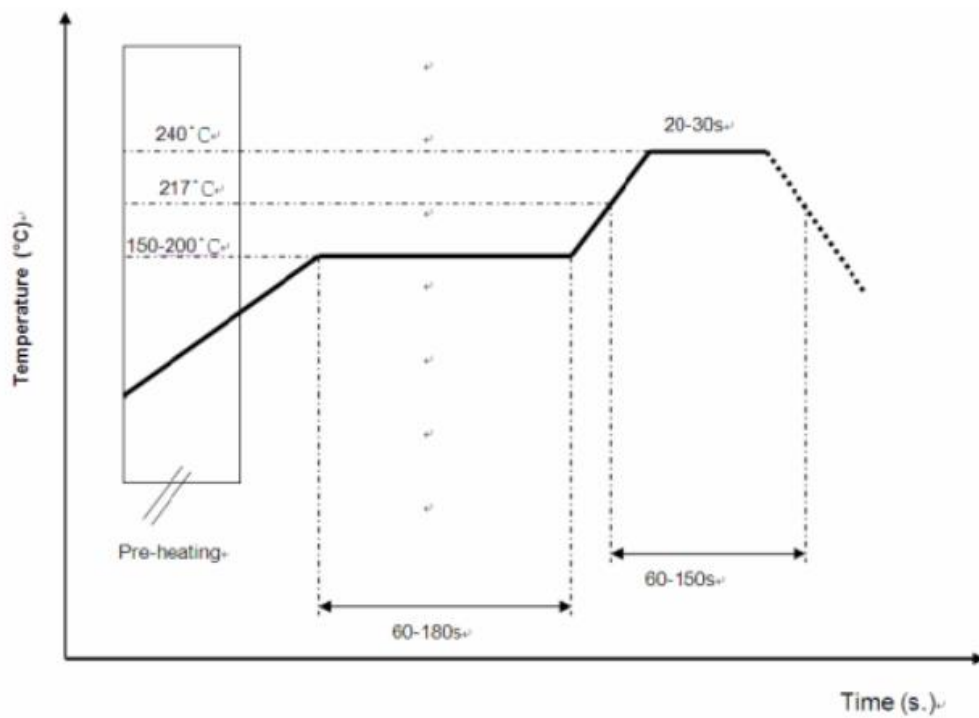
	P1	P2	P3	P4	S1-S4	S5	S6
Default Matching	6.8pF (0201)	2.7pF (0201)	1.5PF (0402)	N/A	N/A	3.6pF (0402)	N/A
Tolerance	±0.1pF	±0.1pF	±0.05pF	-	-	±0.01pF	-

8 Soldering Temperature

Phase	Profile Features	PB-Free Assembly
RAMP-UP	Avg. Ramp-up Rate (T _{smax} to T _p)	3 °C/second (Max.)
PREHEAT	Temperature Min (T _{smin}) Temperature Max (T _{smax}) Time (t _{smin} to t _{smax})	150 °C 190 °C 110 seconds (Max.)
REFLOW	Temperature (T _L) Total Time above T _L (t _l)	220 °C 90 seconds (Max.)
PEAK	Temperature (T _p)	230–250 °C
RAMP-DOWN	Rate	-1 °C/second (Max.)

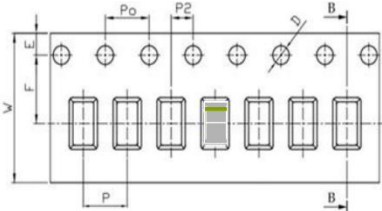
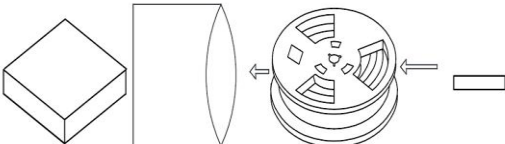
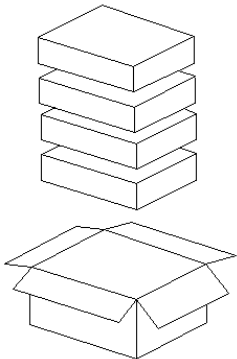
9 Reflow Profile

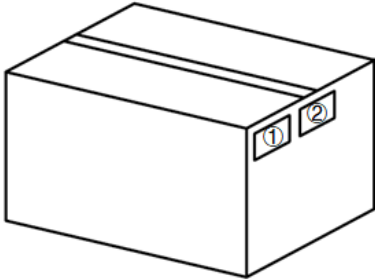
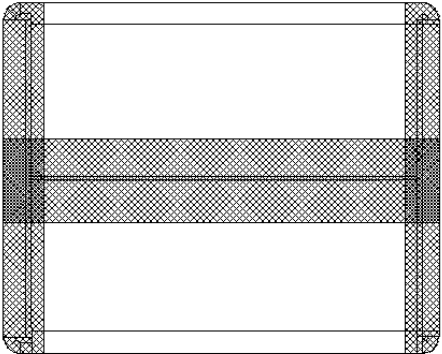
Typical Soldering Profile for Lead-free Process



*Recommended solder paste alloy: SAC305 (Sn96.5 /Ag3 /Cu0.5) Lead Free solder paste.

10 Packaging

Step	Packaging Picture / 2D Picture	Description
1		Reel
2		(6000 PCS Antenna Products / Reel) 2 Reel tape is vacuumed into the inner box
3		(4 Inner Boxes / Per Carton Box) (48000 PCS Antennas / Per Carton Box) Estimated quantity Products that cannot fill the entire carton box are packed in a suitable size carton box. <u>Carton Size:</u> <u>L × W × H = 370 × 370 × 295 mm</u>

4		Position for Attaching Labels ① Carton Label ② Quality Label
5		Sealing Cartons “I” type sealing cartons
Note	The initial packaging method described above is for reference only, and the final actual packaging method shall be subject to the actual shipping packaging.	

Contact Us

At Quectel, our aim is to provide timely and comprehensive services to our customers. If you require any assistance, please contact our headquarters:

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Or our local offices. For more information, please visit:

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Revision History

Version	Date	Author	Note
-	2022-05-27	Junsen LI/ Joye WANG	Creation of the document
1.0	2022-05-27	Junsen LI/ Joye WANG	First official release
1.1	2022-09-20	Junsen LI	Added Chapter 7.
2.0	2024-04-18	Black LI/ Lucky FENG/ David LIU/ Aria CHU	Numerous changes were made to this document. It should be read in its entirety.



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