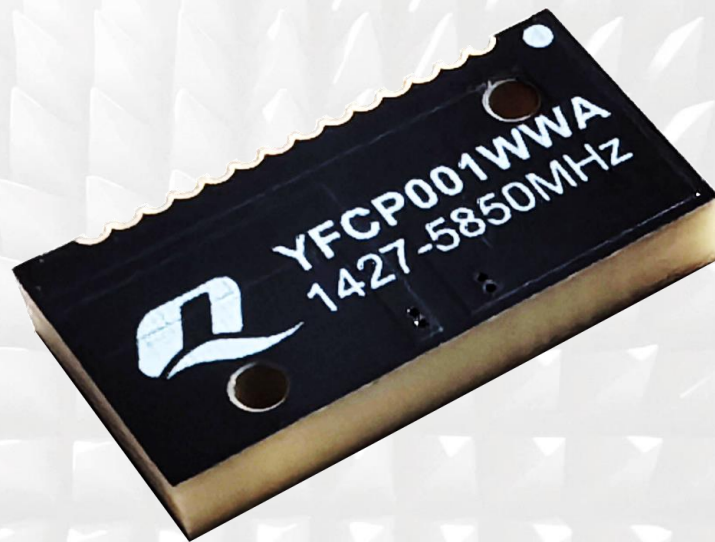




Antenna Datasheet

Product OC (Antenna Only): YFCP001WWA

Product OC (Antenna + EVB): YFCP001WWAEVB

Version: 1.0

Date: 2024-4-25

Status: Released

Product Name: 5G SMT Mount FR4 Chip Monopole Antenna

Key Features:

Frequency band: 1427-5850 MHz

Efficiency: Up to 59 %

Dimensions: 20.0 × 10.0 × 3.0 mm

RoHS & REACH Compliant

Overview

The Quectel YFCP001WWA is a compact form factor SMT mount fr4 chip antenna for 5G applications. Due to the dimensions of $20.0 \times 10.0 \times 3.0$ mm, it is designed for very small space requirements for smart metering, remote monitoring, vehicle tracking and telematics, and many other IoT devices. The YFCP001WWA is a ground-dependend monopole antenna, uses main PCB as its ground plane. It is delivered on tape and reel.

The YFCP001WWA is a fr4 chip antenna, which can be mounted on super compact space require terminals. Despite of this small factor, it has up to 59 % efficiency in working bands. This antenna is developed on a 60×20 mm evaluation board. If the devices have different ground sizes, matching circuit can be used to tune the resonant frequency correctly. We also offer gerber file, 2D & 3D documents for PCB layout.

The YFCP001WWA allows high efficiency, stable signal transmission and reception for 5G working bands in 1427-5850 MHz. This product is RoHS & REACH compliant.

Typical applications include:

- Asset Tracking
- Smart Metering
- Fleet Management
- IoT Sensors and Modules

Quectel provides comprehensive antenna design support such as simulation, testing and manufacturing for custom antenna solutions to meet your specific application needs. We have regional R & D centers to offer quick response to meet your requirements. Please contact our sales & FAEs if you have any requests.

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1 Specification

Test Condition: Assembled On 60 × 20 mm EVB

1.1. Electrical

Electrical	
Frequency Range	1427–5850 MHz
Impedance	50 Ω
Polarization	Linear
Radiation Pattern	Omni-directional

Electrical - Detail												
SPEC	Band	B71	B12 /B13 /B28	B5 /B8 /B26	n74 /n75 /n76	B1 /B2 /B3	B40	Wi-Fi 2G	B38 /B41	B42 /B48 /n77	n79	Wi-Fi 5G
	Freq. (MHz)	600– 700	700– 810	810– 960	1420– 1520	1700– 2170	2300– 2400	2400– 2500	2500– 2690	3300– 4200	4400– 5000	5150– 5850
Max VSWR		-	-	-	4.8	4.7	3.0	2.8	2.5	3.8	4.5	6.4
Max Return Loss (dB)		-	-	-	-3.6	-3.8	-6.1	-6.5	-7.2	-4.7	-3.9	-2.7
AVG Eff. (%)		-	-	-	44.0	50.7	52.1	44.7	50.3	41.0	38.5	35.8
AVG Gain (dB)		-	-	-	-3.6	-3.0	-2.8	-3.5	-3.0	-3.9	-4.1	-4.5
Max Peak Gain (dBi)		-	-	-	-0.1	0.8	1.2	0.4	1.6	2.0	1.6	2.7
Frequency (MHz)		-	-	-	(1420)	(1980)	(2345)	(2400)	(2645)	(4015)	(4605)	(5465)
VSWR						≤ 6.4						
Return Loss						≤ -2.7 dB						
Peak Gain						≤ 2.7 dBi						

Gain - Detail			
	Band	Freq. (MHz)	Max peak Gain (dBi)
FDD < 3 dBi	B1	1920-1980	0.8
	B3/n3	1710-1785	-0.1
	B8	880-915	-
	B18	815-830	-
	B19	830-845	-
	B26	814-849	-
	B28/n28	703-748	-
	n77/n78	3400-4100	2.0
	n79	4500-4900	1.6
	B40	2300-2400	1.2
TDD < 4 dBi	B39	1888-1920	0.7
	B41/n41 (Disable HPUE)	2496-2690	1.6
	B42	3400-3600	1.4

1.2. Supported Bands

5G NR / LTE / LTE-Advanced / WCDMA / HSPA / HSPA+ / GPRS / GSM / NB-IoT				
Band	Frequency (MHz)	Uplink (MHz)	Downlink (MHz)	Covered
1	2100	1920–1980	2110–2170	√
2	1900	1850–1910	1930–1990	√
3	1800	1710–1785	1805–1880	√
4	1700	1710–1755	2110–2155	√
5	850	824–849	869–894	-
7	2600	2500–2570	2620–2690	√
8	900	880–915	925–960	-
9	1800	1749.9-1784.9	1844.9-1879.9	√
11	1500	1427.9–1447.9	1475.9–1495.9	√
12	700	699–716	729–746	-
13	700	777–787	746–756	-
14	700	788–798	758–768	-
17	700	704–716	734–746	-
18	850	815–830	860–875	-
19	850	830–845	875–890	-
20	800	832–862	791–821	-
21	1500	1447.9–1462.9	1495.9–1510.9	√
22	3500	3410–3490	3510–3590	√
23	2100	2000–2020	2180–2200	√
24	1600	1626.5–1660.5	1525–1559	-
25	1900	1850–1915	1930–1995	√
26	850	814–849	859–894	-
28	700	703–748	758–803	-

31	450	452.5–457.5	462.5–467.5	-
34	2100	2010–2025		√
38	2600	2570–2620		√
39	1900	1880–1920		√
40	2300	2300–2400		√
41	2500	2496–2690		√
42	3500	3400–3600		√
48	3500	3550–3700		√
66	1700	1710–1780	2110–2200	√
71	600	663–698	617–652	-
74	1500	1427–1470	1475–1518	√
77	3500	3300–4200		√
78	3500	3300–3800		√
79	4500	4400–5000		√

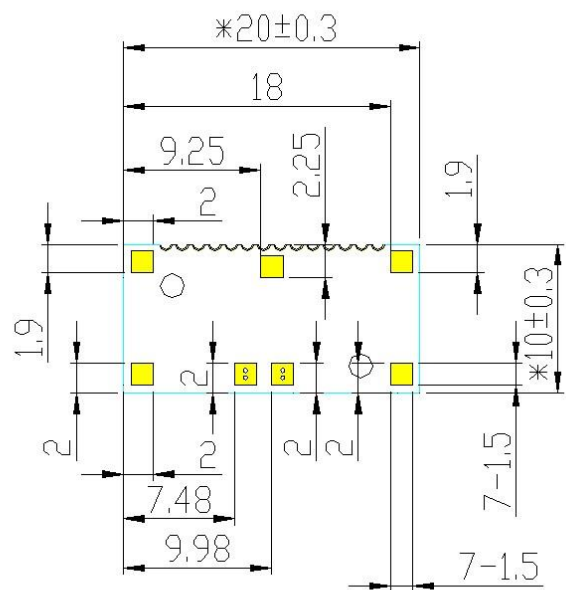
Note:

- Covered √ means efficiency > 20%.
- Based on 60 × 20 mm EVB.

1.3. Mechanical & Environmental

Mechanical	
Antenna Size	20.0 × 10.0 × 3.0 mm
Material & Color	PCB & Black
Antenna Weight	Typ. 1.2 g
Mounting Type	SMD
Environmental	
Operation Temperature	-40 °C to +85 °C
Storage Temperature	-40 °C to +85 °C
RoHS & REACH Compliant	Yes

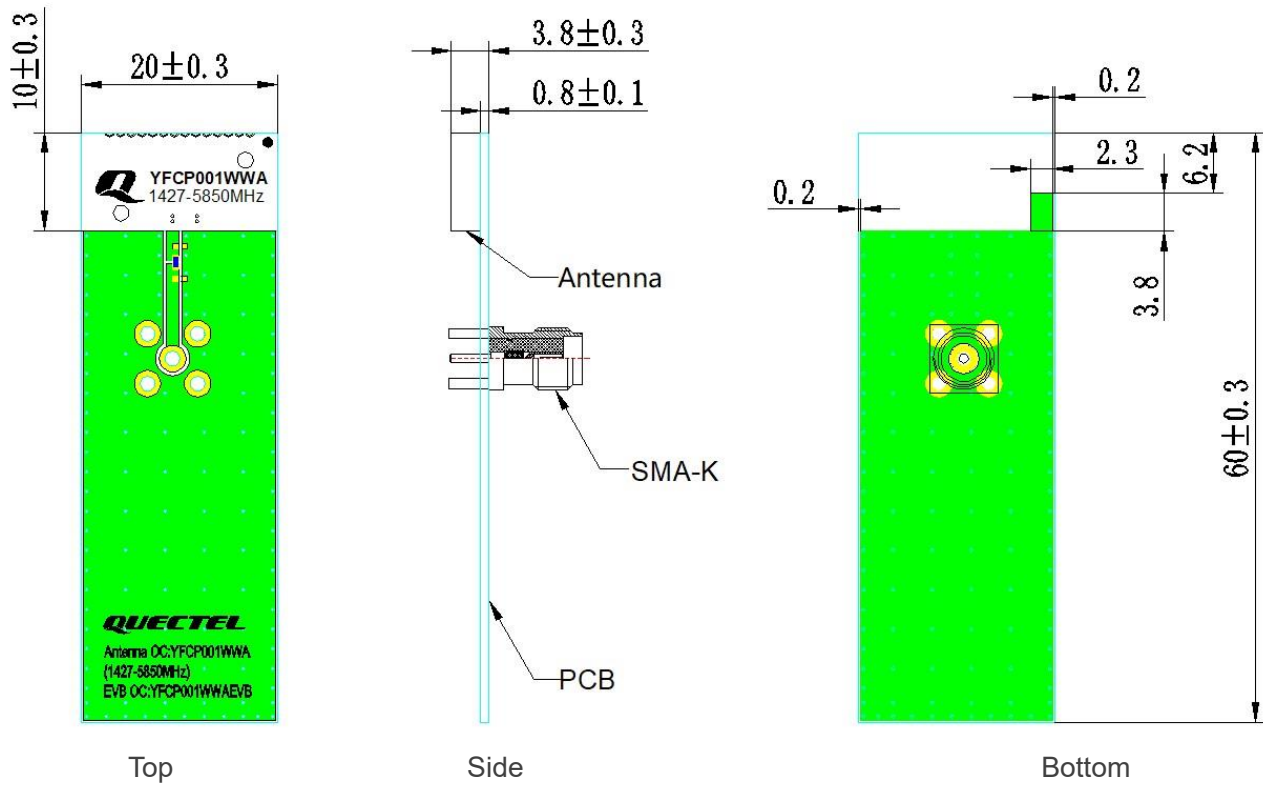
2.1. Antenna



Bottom

All dimensions are in mm.

2.2. Rectangular EVB

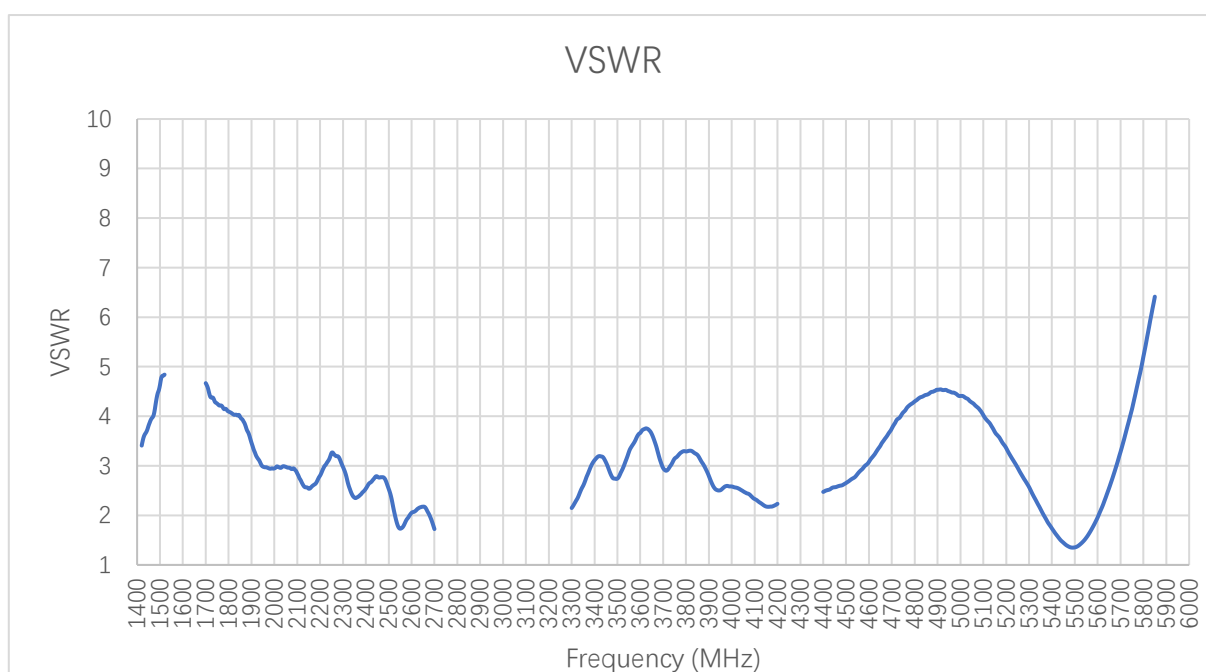


All dimensions are in mm.

3 Detailed Performance

3.1. S-Parameter Test

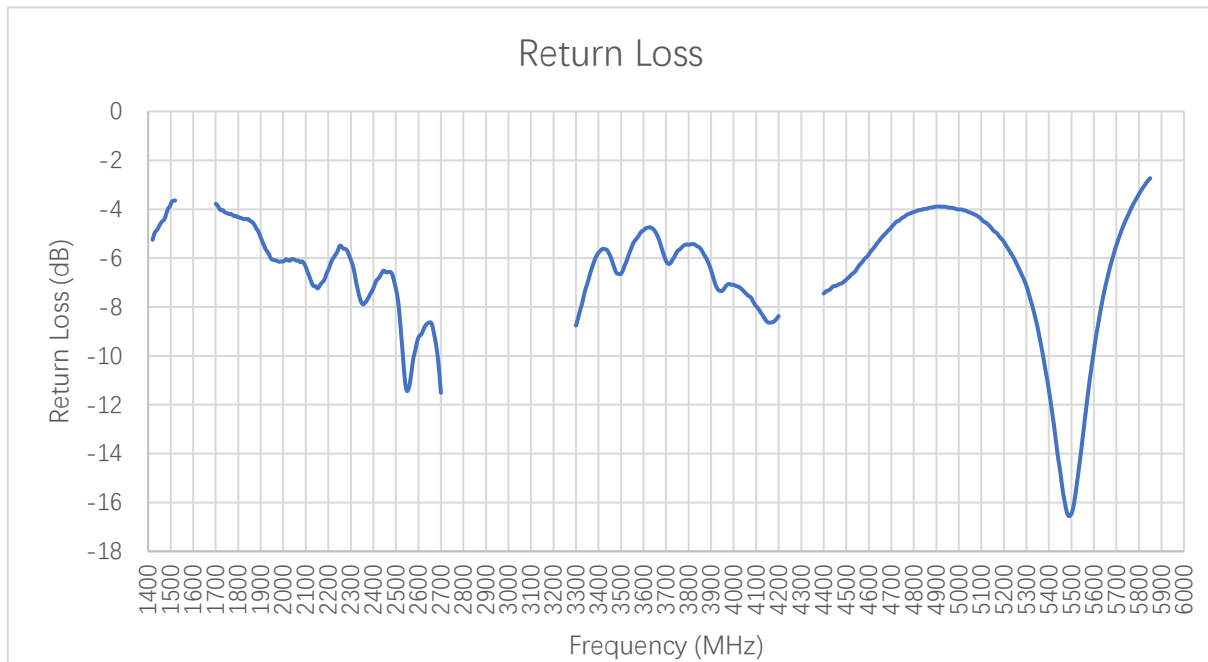
3.1.1. VSWR



VSWR

Frequency (MHz)	600	630	710	830	900	960	1440	1710	1740	1880
VSWR	-	-	-	-	-	-	3.7	4.6	4.3	3.7
Frequency (MHz)	1950	2140	2350	2450	2600	3600	4700	5000	5500	5850
VSWR	3.0	2.6	2.4	2.8	2.1	3.7	3.8	4.4	1.4	6.4

3.1.2. Return Loss

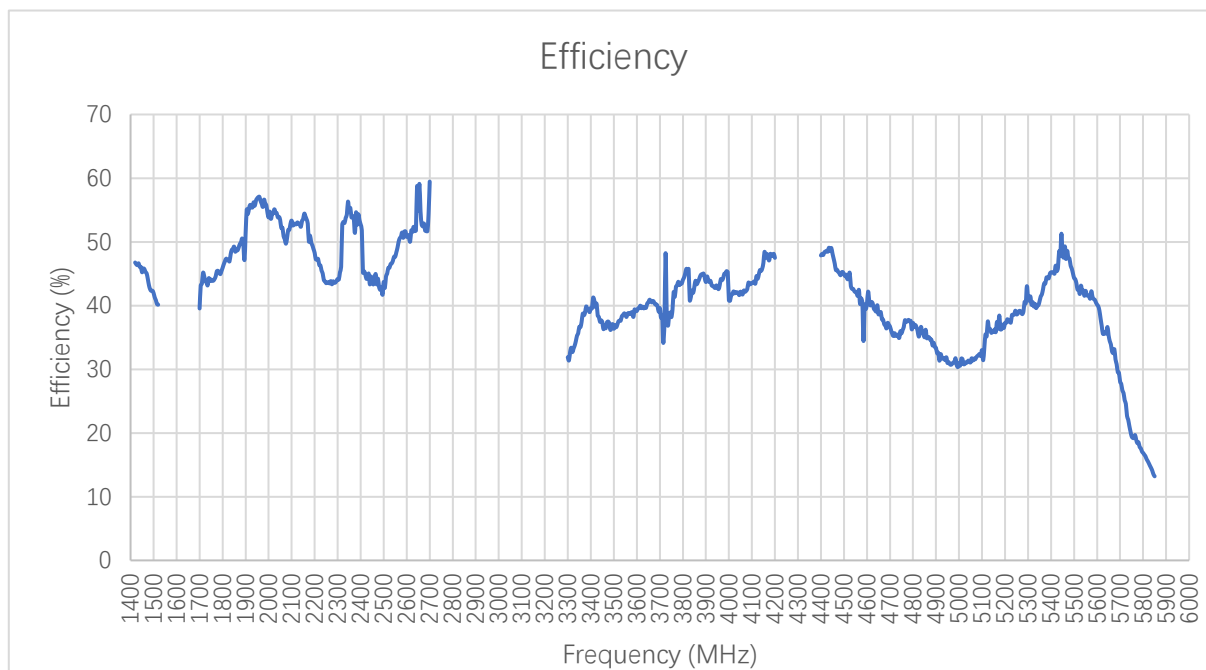


Return Loss (dB)

Frequency (MHz)	600	630	710	830	900	960	1440	1710	1740	1880
Return Loss (dB)	-	-	-	-	-	-	-4.8	-3.9	-4.1	-4.8
Frequency (MHz)	1950	2140	2350	2450	2600	3600	4700	5000	5500	5850
Return Loss (dB)	-6.1	-7.1	-7.9	-6.5	-9.3	-4.9	-4.7	-4.0	-16.5	-2.7

3.2. Radiation Performance Test

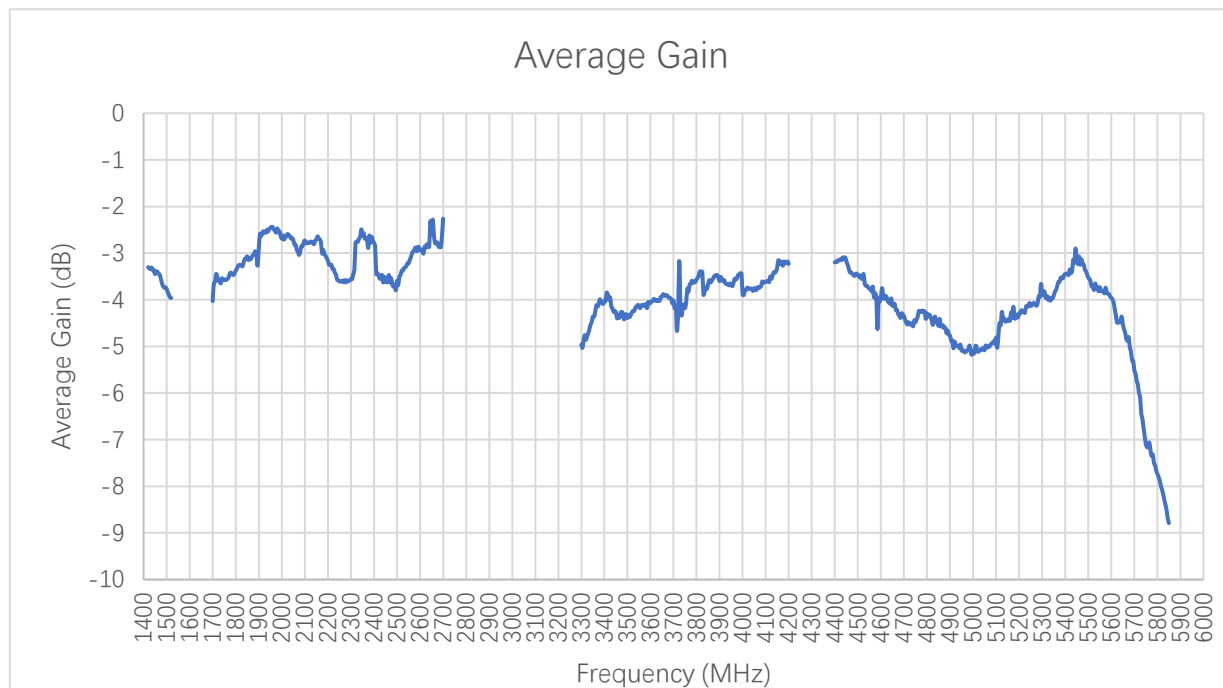
3.2.1. Efficiency



Efficiency (%)

Frequency (MHz)	600	630	710	830	900	960	1440	1710	1740	1880
Efficiency (%)	-	-	-	-	-	-	46.1	43.4	44.3	50.0
Frequency (MHz)	1950	2140	2350	2450	2600	3600	4700	5000	5500	5850
Efficiency (%)	56.8	52.4	54.7	43.9	50.8	39.2	36.7	31.0	44.3	13.2

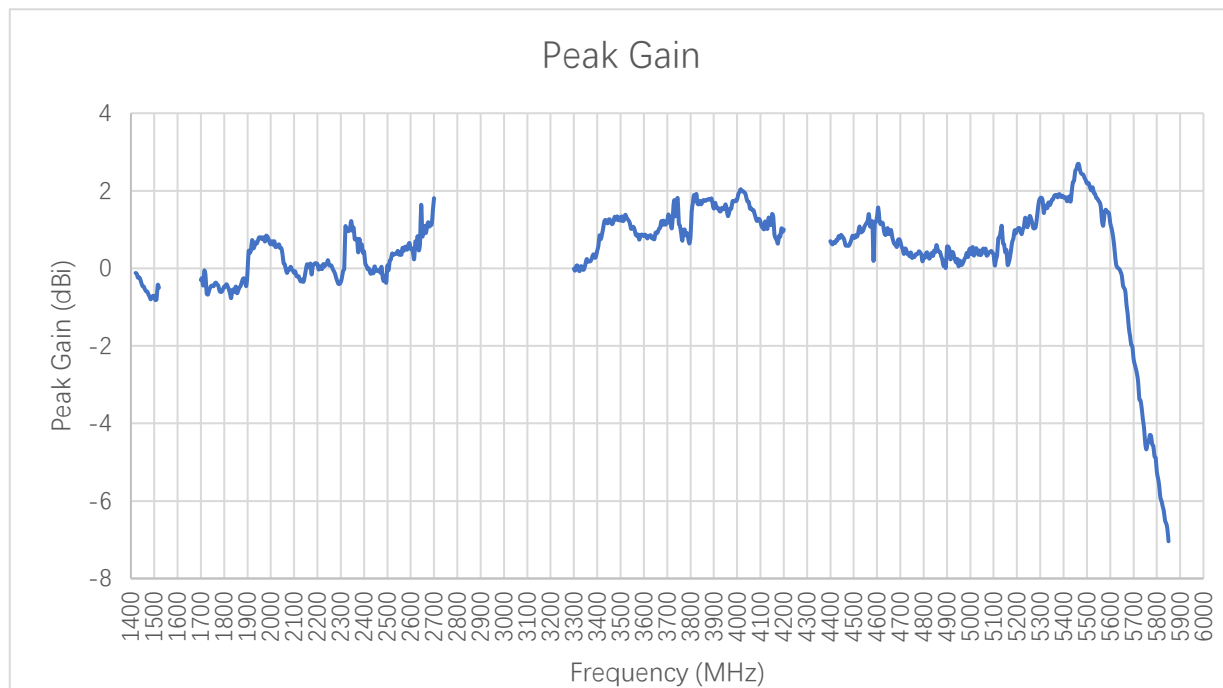
3.2.2. Average Gain



Average Gain (dB)

Frequency (MHz)	600	630	710	830	900	960	1440	1710	1740	1880
Average Gain (dB)	-	-	-	-	-	-	-3.4	-3.6	-3.5	-3.0
Frequency (MHz)	1950	2140	2350	2450	2600	3600	4700	5000	5500	5850
Average Gain (dB)	-2.5	-2.8	-2.6	-3.6	-2.9	-4.1	-4.4	-5.1	-3.5	-8.8

3.2.3. Peak Gain



Peak Gain (dBi)

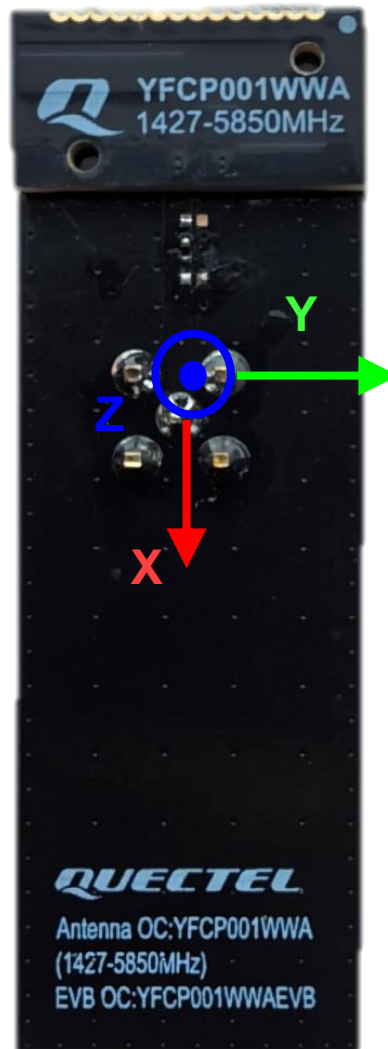
Frequency (MHz)	600	630	710	830	900	960	1440	1710	1740	1880
Peak Gain (dBi)	-	-	-	-	-	-	-0.3	-0.4	-0.5	-0.3
Frequency (MHz)	1950	2140	2350	2450	2600	3600	4700	5000	5500	5850
Peak Gain (dBi)	0.8	-0.4	1.0	-0.1	0.5	0.8	0.7	0.5	2.2	-7.0

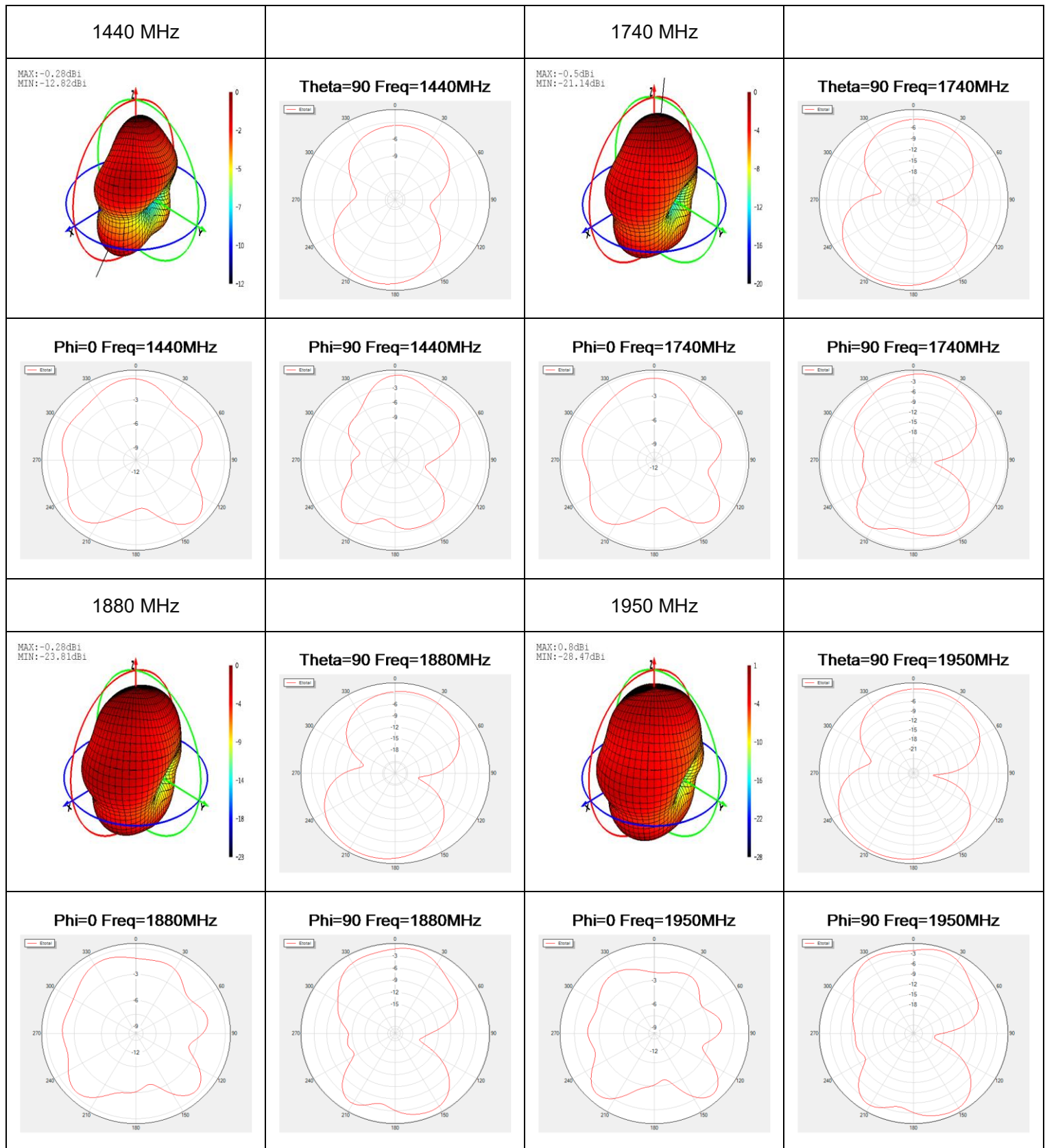
Max Peak Gain (dBi)

Band	B71	B12 /B13 /B28	B5 /B8 /B26	N74 /N75 /N76	B1 /B2 /B3	B40	Wi-Fi 2G	B38 /B41	B42 /B48 /N77	N79	Wi-Fi 5G
Frequency (MHz)	-	-	-	1420	1980	2345	2400	2645	4015	4605	5465
Peak Gain (dBi)	-	-	-	-0.1	0.8	1.2	0.4	1.6	2.0	1.6	2.7

3.2.4. 3D & 2D Radiation Pattern

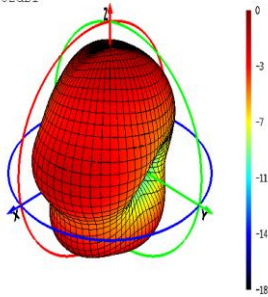
- Test Status: Assembled on 60 × 20 mm EVB
- Test Chamber: FS-S-1



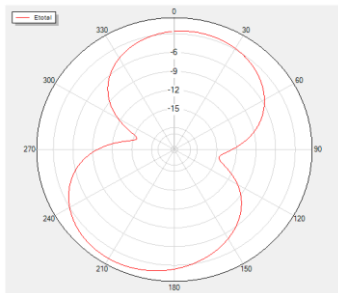


2140 MHz

MAX:-0.35dBi
MIN:-19.02dBi

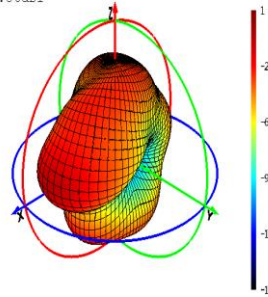


Theta=90 Freq=2140MHz

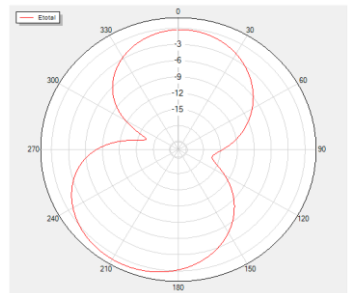


2350 MHz

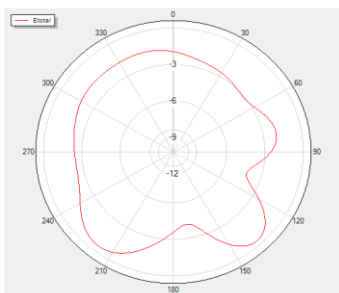
MAX:0.97dBi
MIN:-16.56dBi



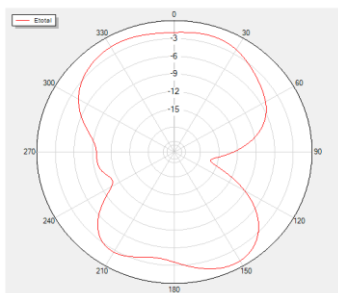
Theta=90 Freq=2350MHz



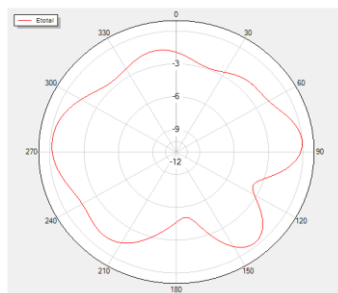
Phi=0 Freq=2140MHz



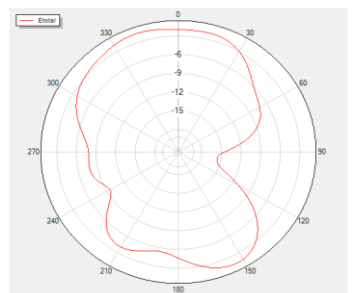
Phi=90 Freq=2140MHz



Phi=0 Freq=2350MHz

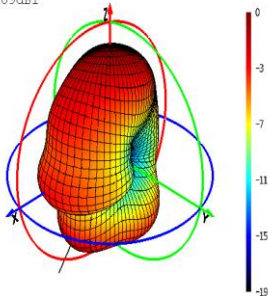


Phi=90 Freq=2350MHz

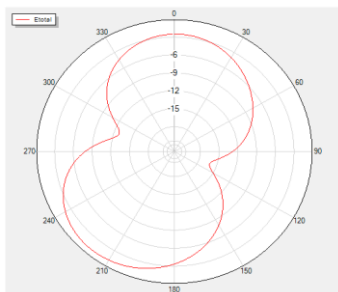


2450 MHz

MAX:-0.05dBi
MIN:-19.09dBi

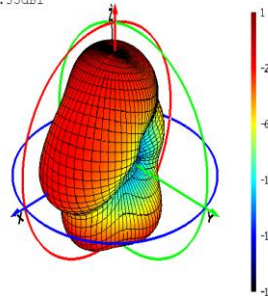


Theta=90 Freq=2450MHz

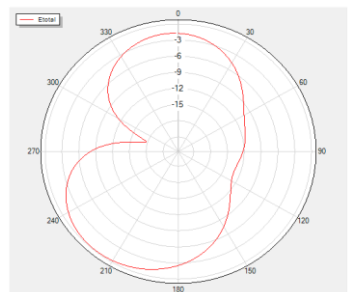


2600 MHz

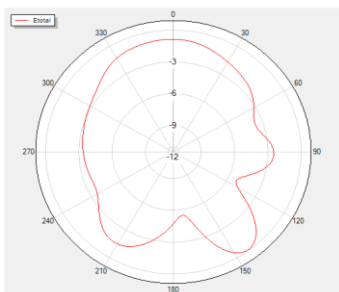
MAX:0.5dBi
MIN:-18.35dBi



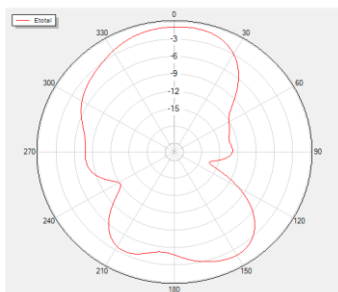
Theta=90 Freq=2600MHz



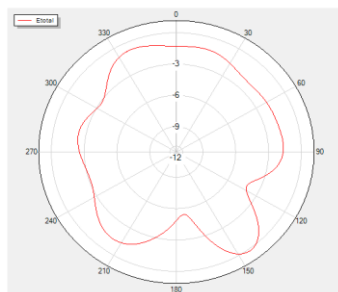
Phi=0 Freq=2450MHz



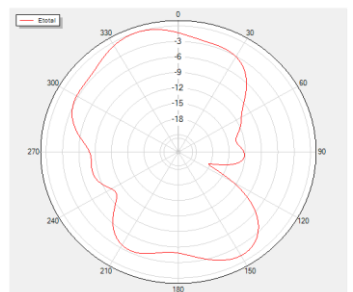
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Phi=0 Freq=2600MHz

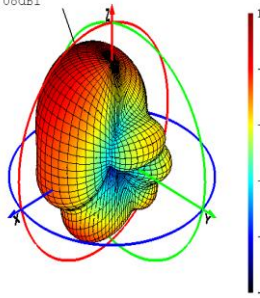


Phi=90 Freq=2600MHz

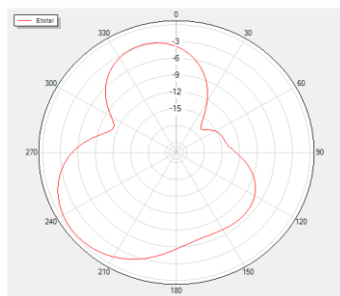


3600 MHz

MAX:0.83dBi
MIN:-21.06dBi

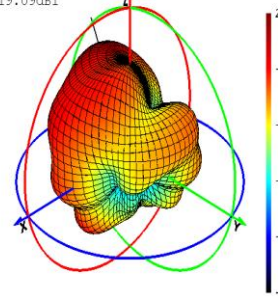


Theta=90 Freq=3600MHz

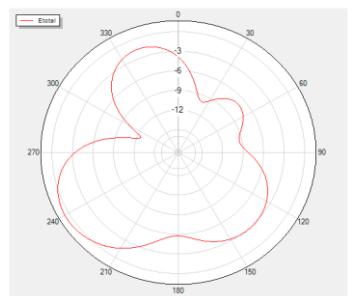


4000 MHz

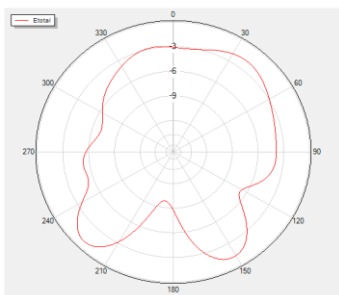
MAX:1.78dBi
MIN:-19.09dBi



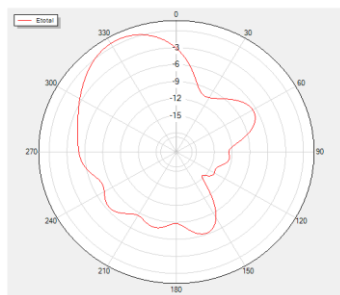
Theta=90 Freq=4000MHz



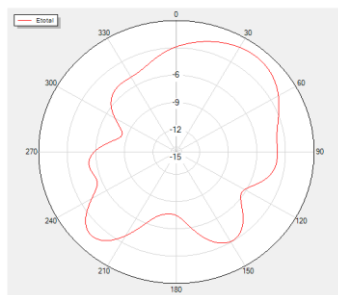
Phi=0 Freq=3600MHz



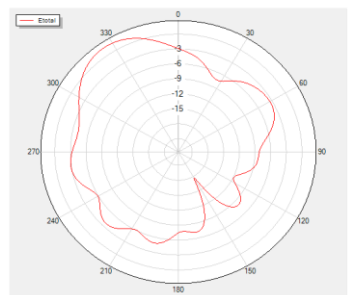
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Phi=0 Freq=4000MHz

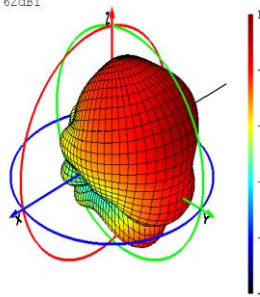


Phi=90 Freq=4000MHz

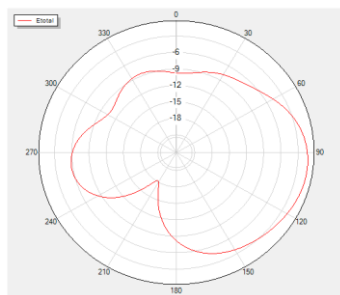


4700 MHz

MAX:0.69dBi
MIN:-18.62dBi

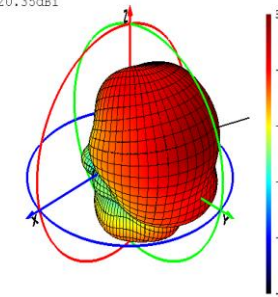


Theta=90 Freq=4700MHz

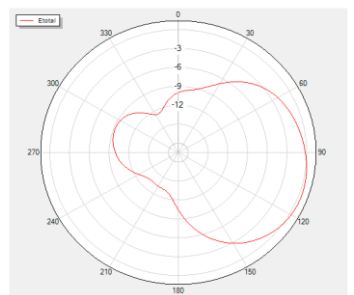


5500 MHz

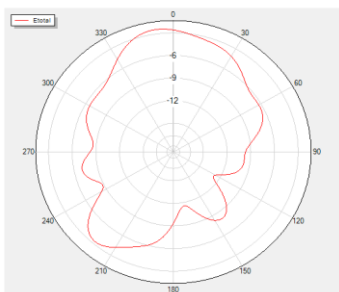
MAX:2.19dBi
MIN:-20.35dBi



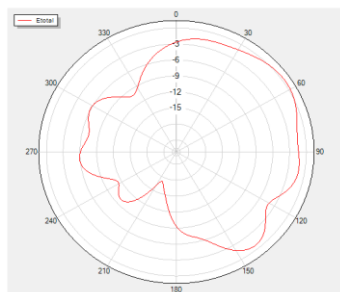
Theta=90 Freq=5500MHz



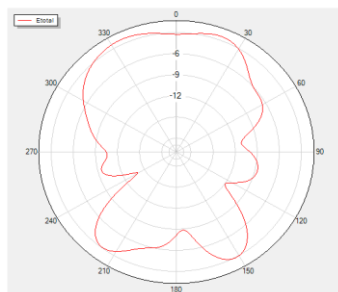
Phi=0 Freq=4700MHz



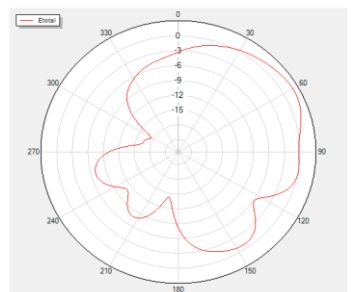
Phi=90 Freq=4700MHz



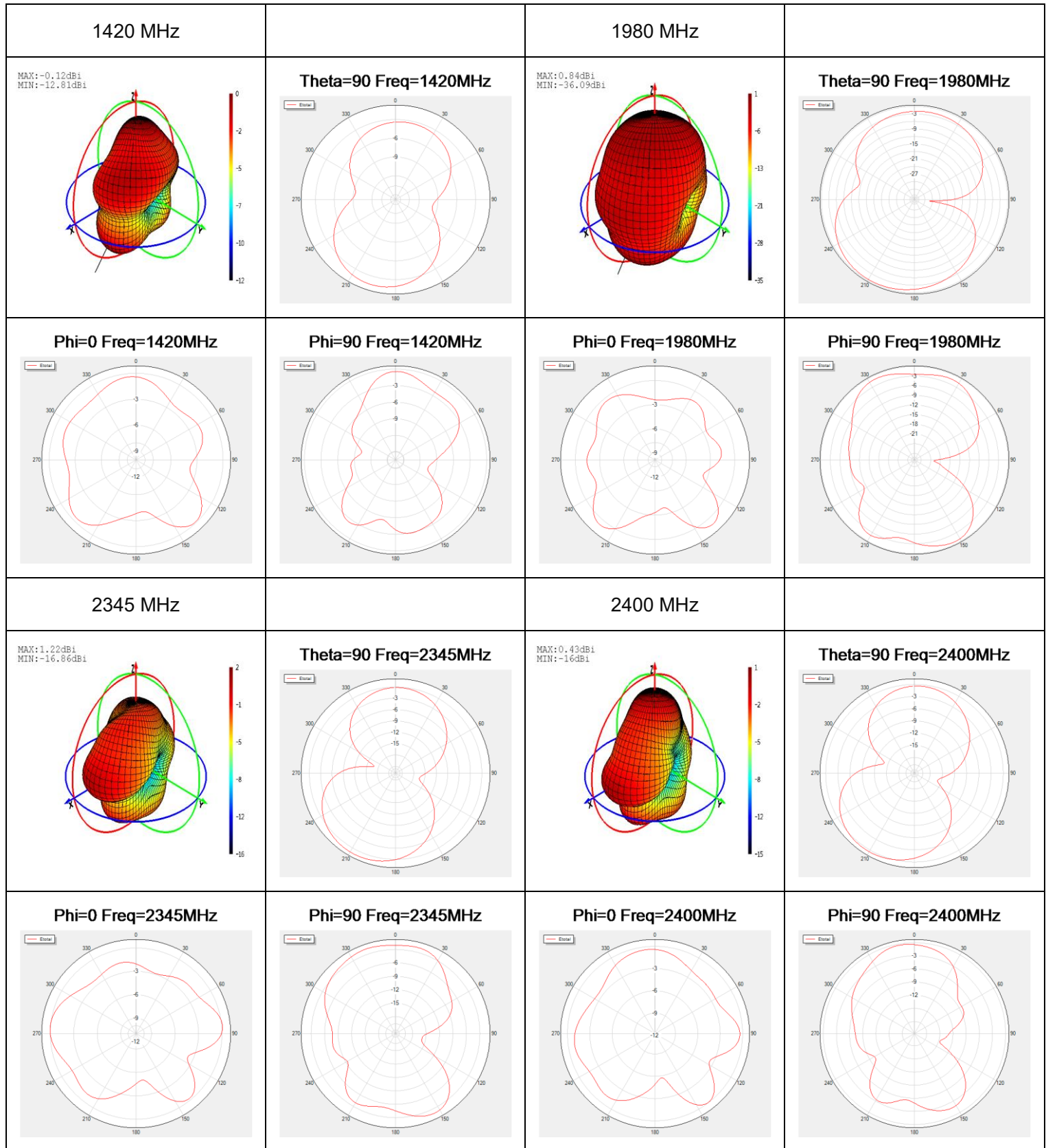
Phi=0 Freq=5500MHz



Phi=90 Freq=5500MHz

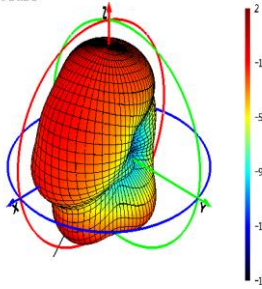


● **Max Peak Gain**

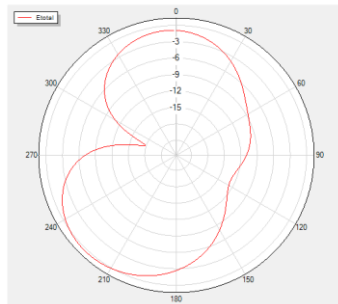


2645 MHz

MAX:1.64dBi
MIN:-17.81dBi

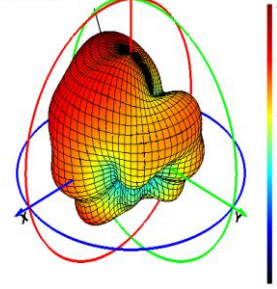


Theta=90 Freq=2645MHz

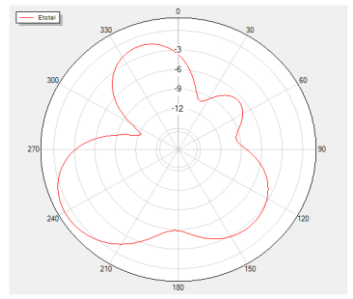


4015 MHz

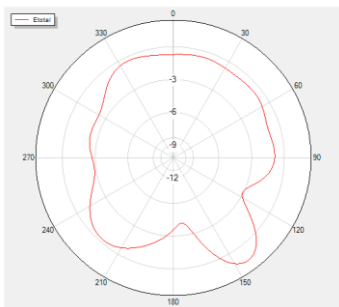
MAX:2.04dBi
MIN:-19.94dBi



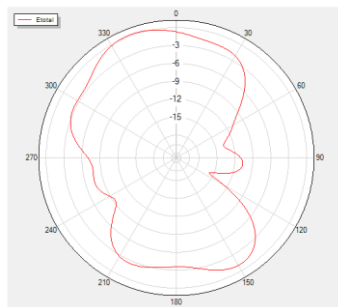
Theta=90 Freq=4015MHz



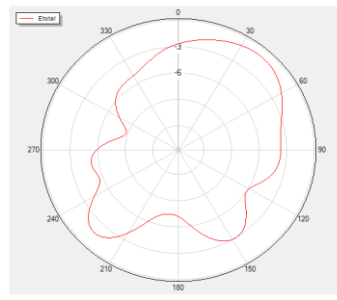
Phi=0 Freq=2645MHz



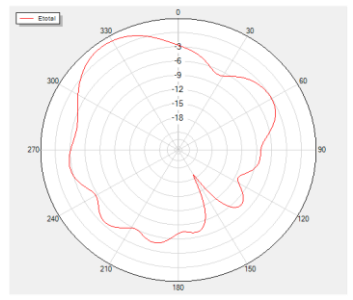
Phi=90 Freq=2645MHz



Phi=0 Freq=4015MHz

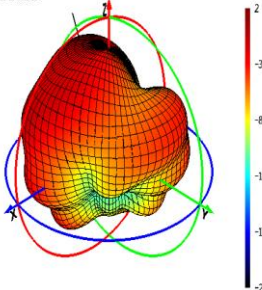


Phi=90 Freq=4015MHz

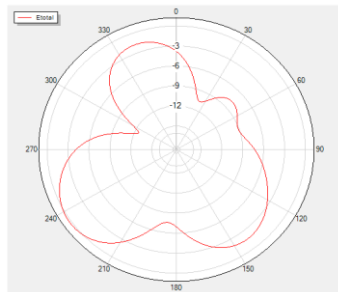


4105 MHz

MAX:1.08dBi
MIN:-24.21dBi

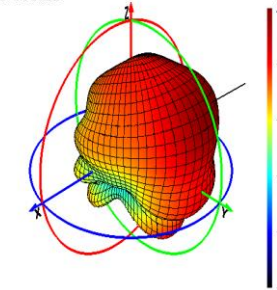


Theta=90 Freq=4105MHz

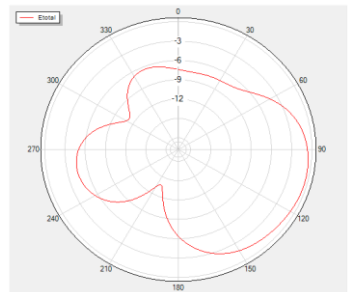


4605 MHz

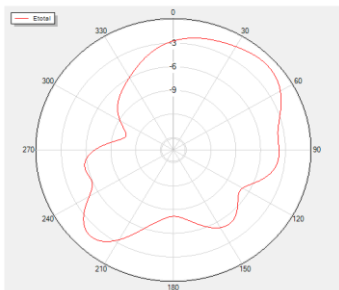
MAX:1.57dBi
MIN:-17.51dBi



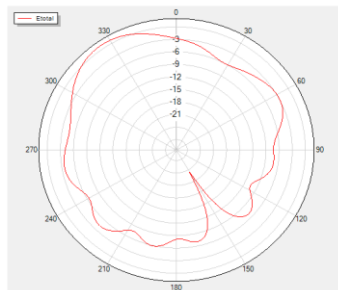
Theta=90 Freq=4605MHz



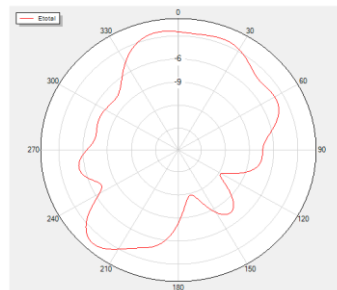
Phi=0 Freq=4105MHz



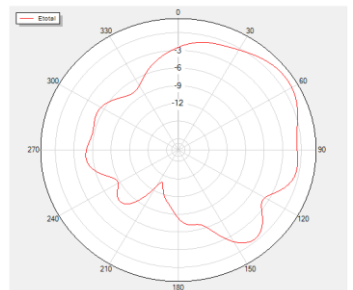
Phi=90 Freq=4105MHz



Phi=0 Freq=4605MHz

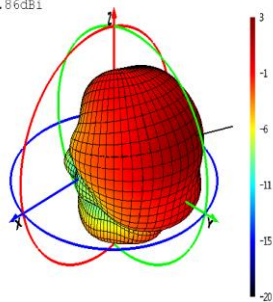


Phi=90 Freq=4605MHz

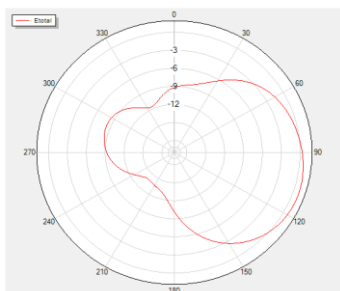


5465 MHz

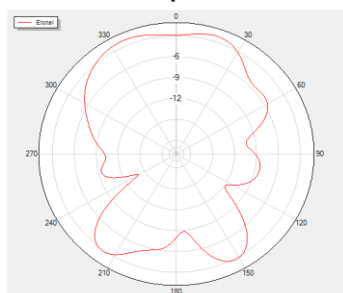
MAX:2.69dBi
MIN:-20.86dBi



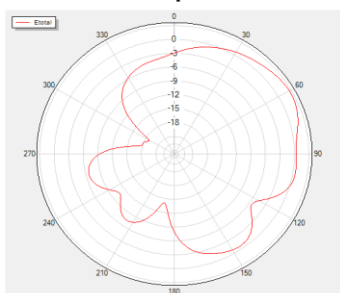
Theta=90 Freq=5465MHz



Phi=0 Freq=5465MHz



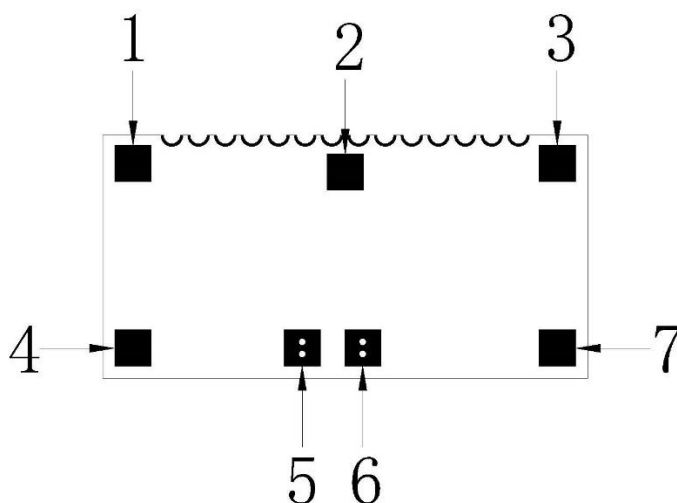
Phi=90 Freq=5465MHz



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 7 pins, only one of which works. All other pins are for mechanical strength.

Pin	Description
6	Return / GND
5	Feed
1, 2, 3, 4, 7	Not used (Mechanical only)



5 Transmission Line

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

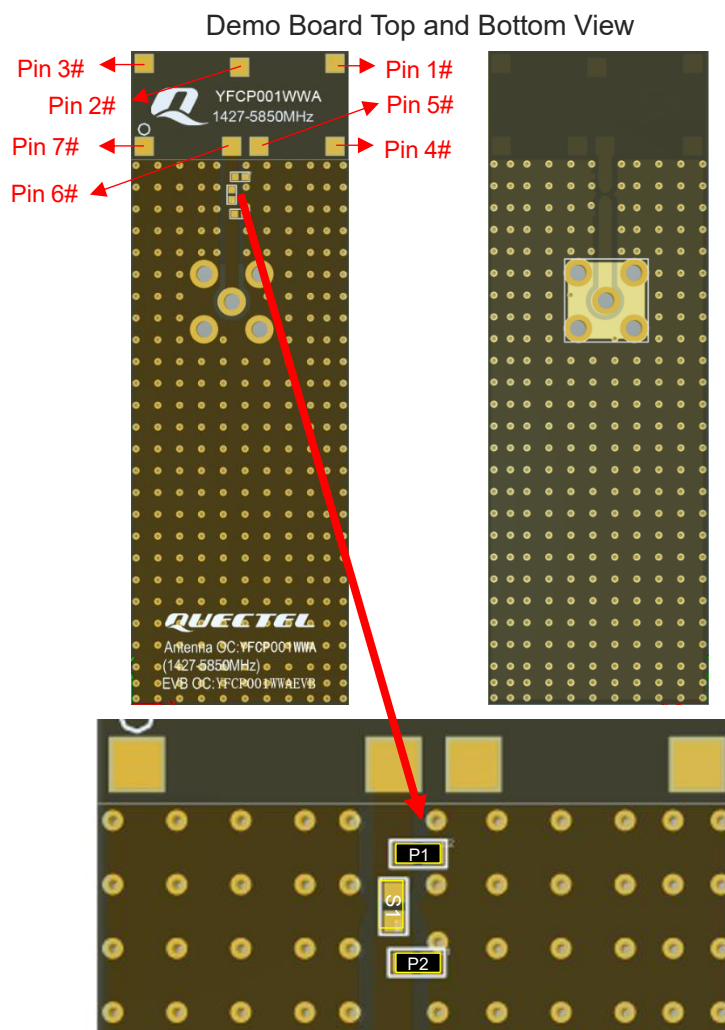
- The length of the transmission lines should be kept as short as possible.
- Any other part of the RF system, such as transceiver, power amplifiers, etc., shall also be designed with an impedance of 50 Ω .

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 .

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.



7 Matching Circuit

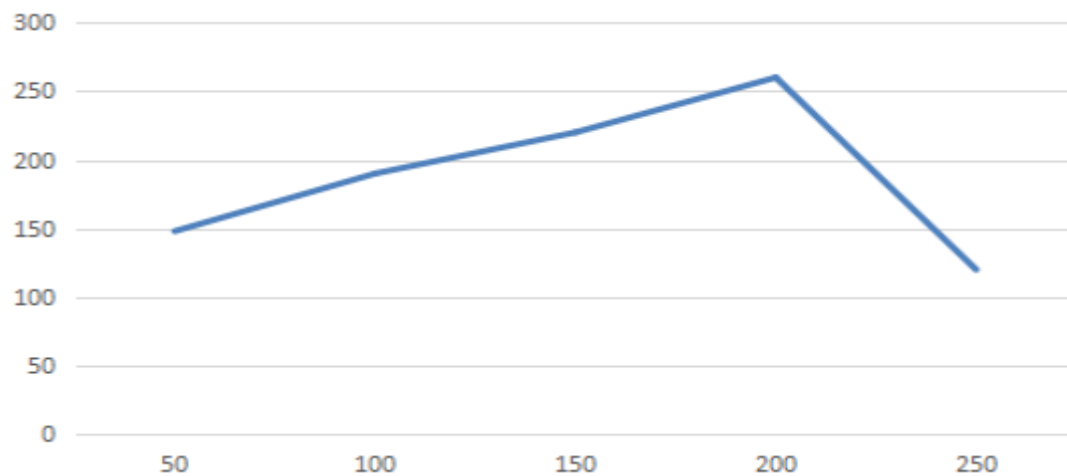


	P1	S1	P2
Default Matching	DNI	0 Ohm	DNI
Tolerance	N/A	-	N/A
Pin #	Description		
6	Return / GND		
5	Feed		
1, 2, 3, 4, 7	Dummy Pad		

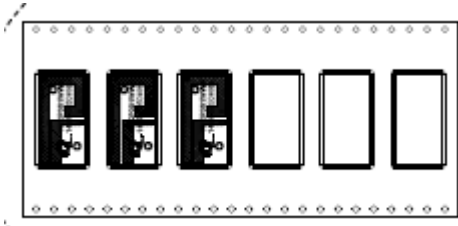
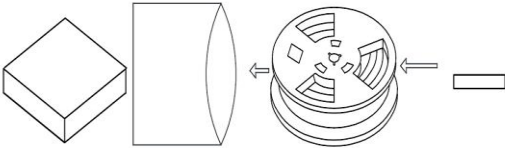
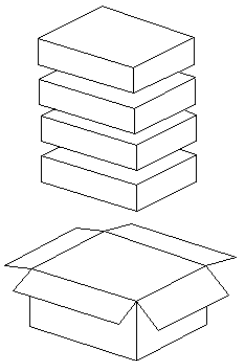
8 Soldering Temperature

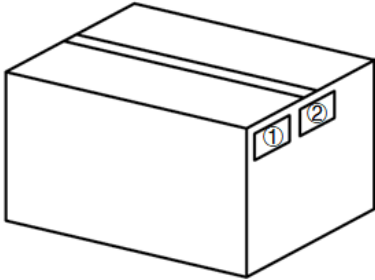
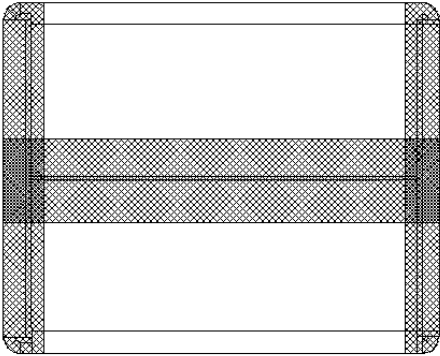
Phase	Profile Features	PB-Free Assembly
RAMP-UP	Avg. Ramp-up Rate (T _{smax} to T _p)	3 °C/second (Max.)
PREHEAT	Temperature Min (T _{smin}) Temperature Max (T _{smax}) Time (T _{smin} to T _{smax})	148 °C 190 °C 125 seconds (Max.)
REFLOW	Temperature (T _L) Total Time above T _L (T _L)	220°C 50 seconds (Max.)
PEAK	Temperature (T _p) Time (T _p)	260 °C 10 seconds (Max.)
RAMP-DOWN	Rate	5 °C/second (Max.)

9 Reflow Profile



10 Packaging

Step	Packaging picture / 2D picture	Description
1		Reel
2		1100 Antenna Products / Reel The reel tape is vacuumed into the inner box.
3		4 Inner Boxes / Carton Box (4400 PCS / 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 “Γ” type sealing cartons

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:

Quectel Wireless Solutions Co., Ltd.

Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China

Tel: +86 21 5108 6236

Email: info@quectel.com

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

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Revision History

Version	Date	Author	Note
-	2024-04-25	Mordecai LIU/ Jason LONG/ David LIU/ Aria CHU	Creation of the document
1.0	2024-04-25	Mordecai LIU/ Jason LONG/ David LIU/ Aria CHU	First official release



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