

Chapter 1 Antenna Overview

1.1 Antenna Description

Antenna name: EP30 WIFI 3-in-1

Antenna model: RD542101LB93-2

1.2 Antenna Photo



Figure 1 EP30 WIFI-3in-1 antenna photo

1.3 Manufacturer

Shenzhen Etheta Communication Technology Co., LTD.

Chapter 2 Antenna Specifications

2.1 Antenna Specifications

Table 1 WiFi Antenna Performance Specifications

Frequency (MHz)	2400-2500 & 5150 -5850 MHz
Bandwidth (MHz)	100&700
Standing wave ratio	<3.5
Return Loss (dB)	<-5
Efficiency (%)	≥ 20
Maximum Gain(dBi)	<4
Impedance (Ω)	50
Polarization	Linear polarization

Table 2 Performance Specifications of BT Antenna

Frequency (MHz)	2400-2500
Bandwidth (MHz)	100
Standing wave ratio	<3.5
Return Loss (dB)	<-5
Efficiency (%)	≥ 15
Maximum Gain(dBi)	<4
Impedance (Ω)	50
Polarization	Linear polarization

Table 3 NFC Antenna Performance Specifications

Frequency (MHz)	13.56MHz
Standing wave ratio	<3.5
Return Loss (dB)	<-5
Communication Distance(mm)	>10
Impedance (Ω)	30

2.2 Antenna circuit parameter test

2.2.1 Wi-Fi antenna return loss:



Figure 2 Wi-Fi Antenna Return Loss

2.2.2 Wi-Fi antenna standing wave ratio:

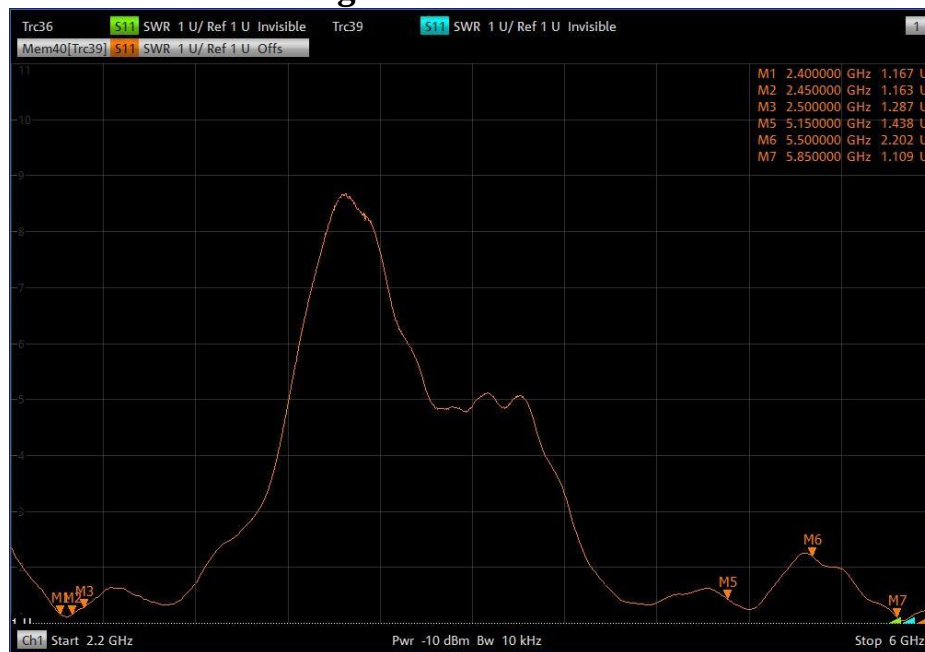


Figure 3 Wi-Fi antenna standing wave ratio

2.2.3 Wi-Fi antenna Smith circle diagram:

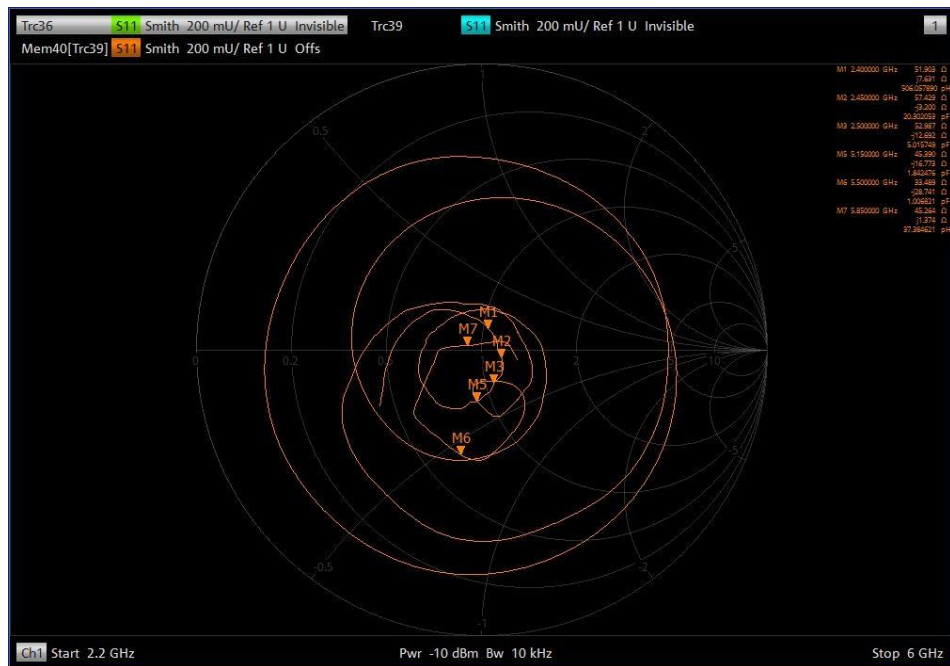


Figure 4 Wi-Fi antenna Smith circle diagram

2.2.4 BT antenna return loss:



Figure 5 BT antenna Return Loss

2.2.5 BT antenna standing wave ratio:

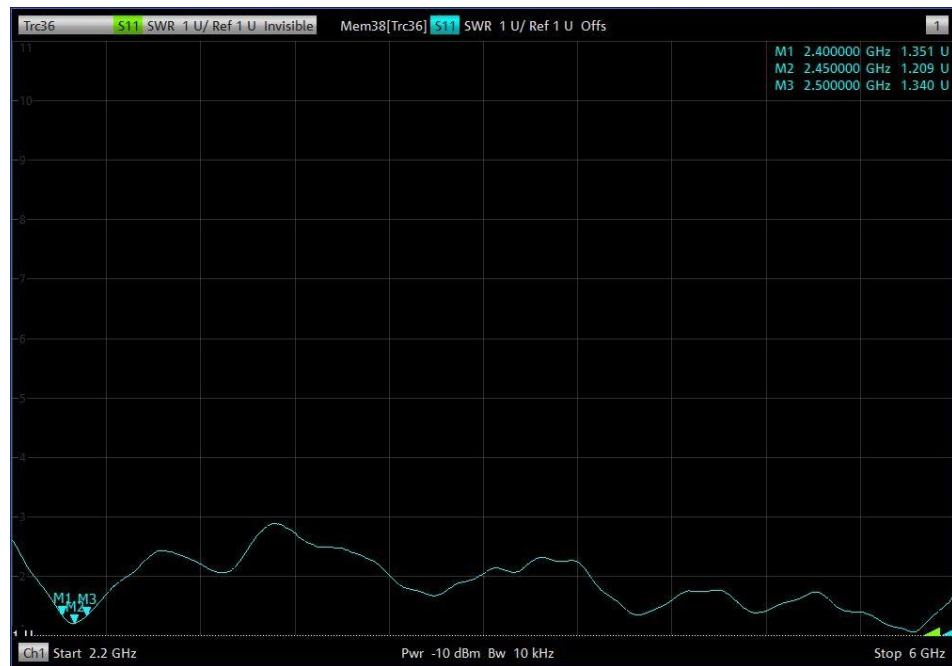


Figure 6 BT antenna standing wave ratio

2.2.6 BT antenna Smith circle diagram:



Figure 7 Smith circle diagram of BT antenna

2.2.7 Return loss, standing wave ratio and Smith circle diagram of the NFC antenna

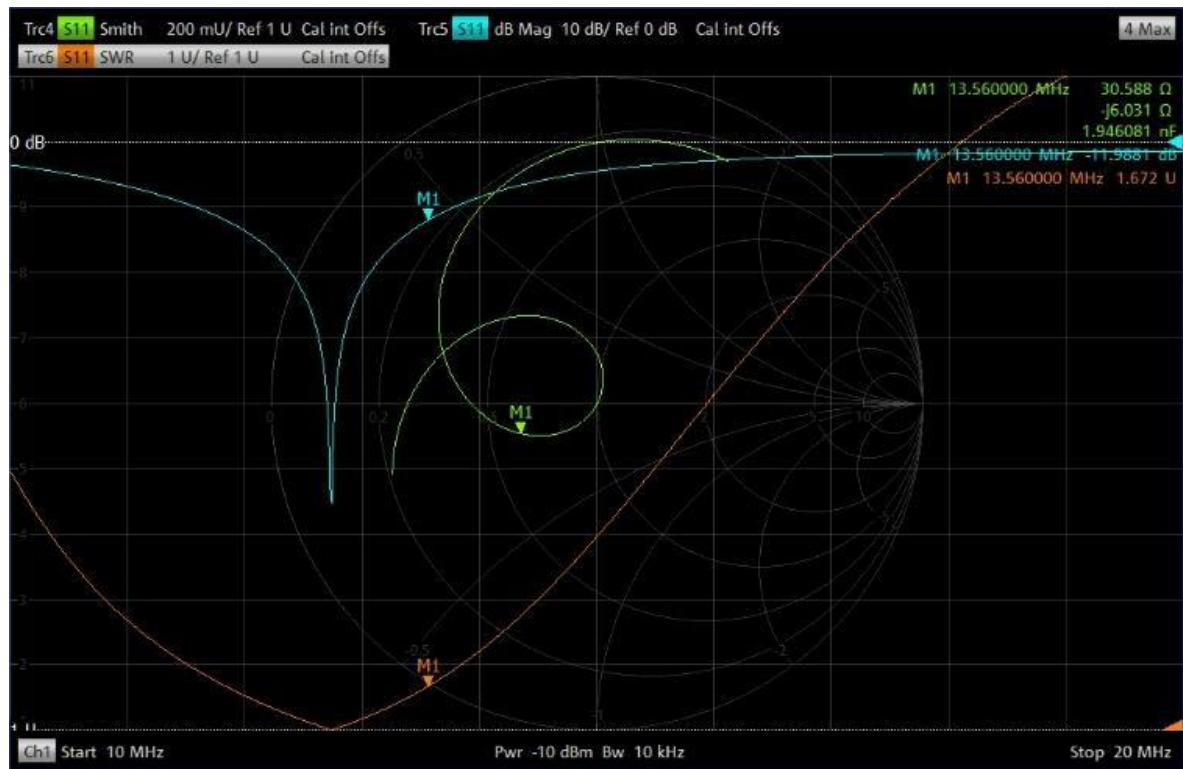
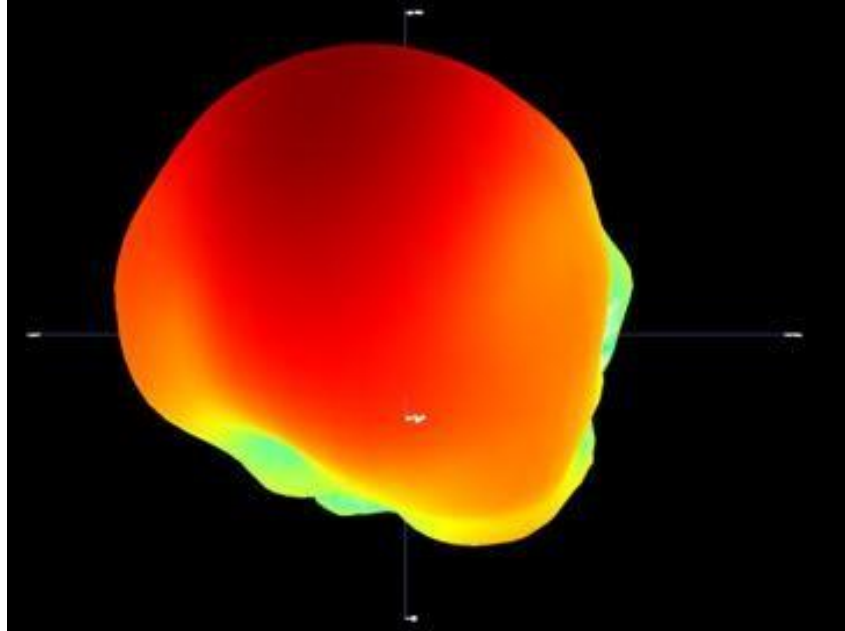


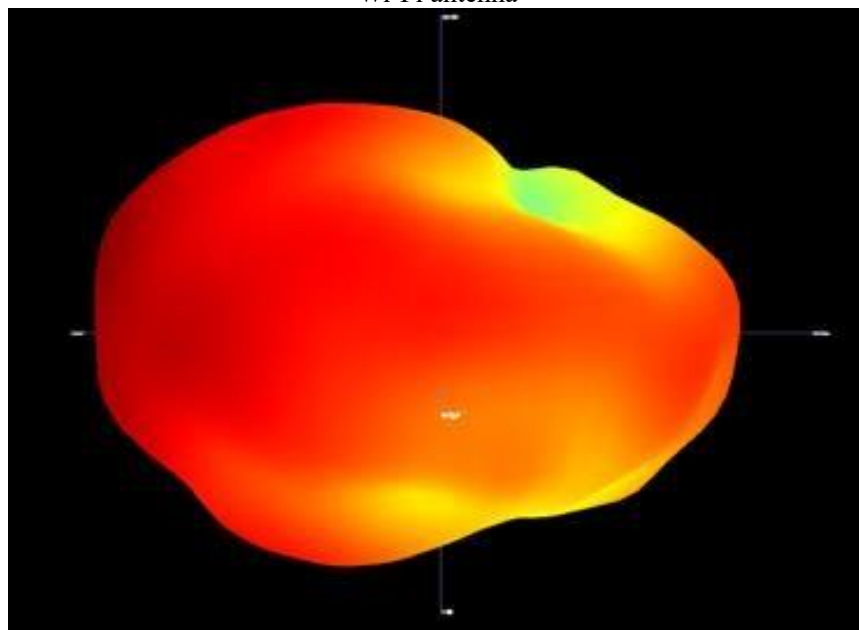
Figure 8 NFC antenna wave loss, standing wave ratio, and Smith circle diagram

2.3 Antenna radiation pattern test

2.3.1 3D Direction



Wi-Fi antenna

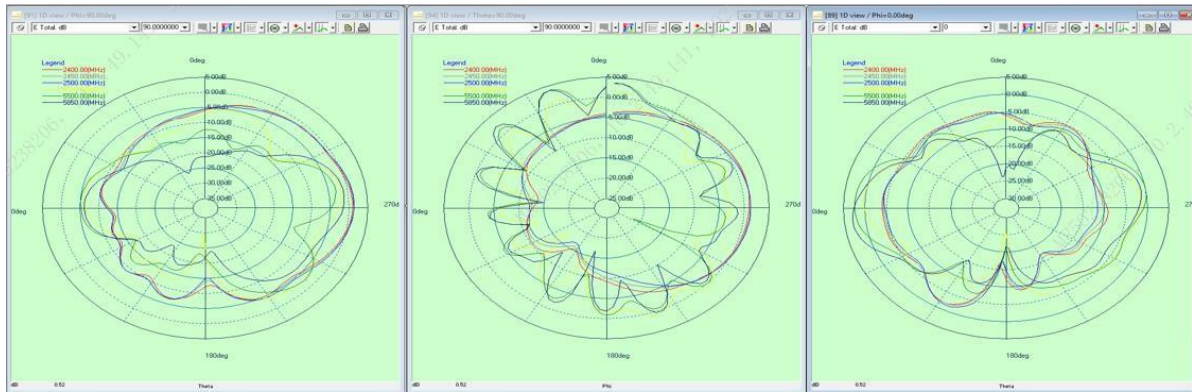


BT antenna

Figure 9 3-in-1 antenna 3D direction map

2.3.2 2D Direction

Wi-Fi antenna

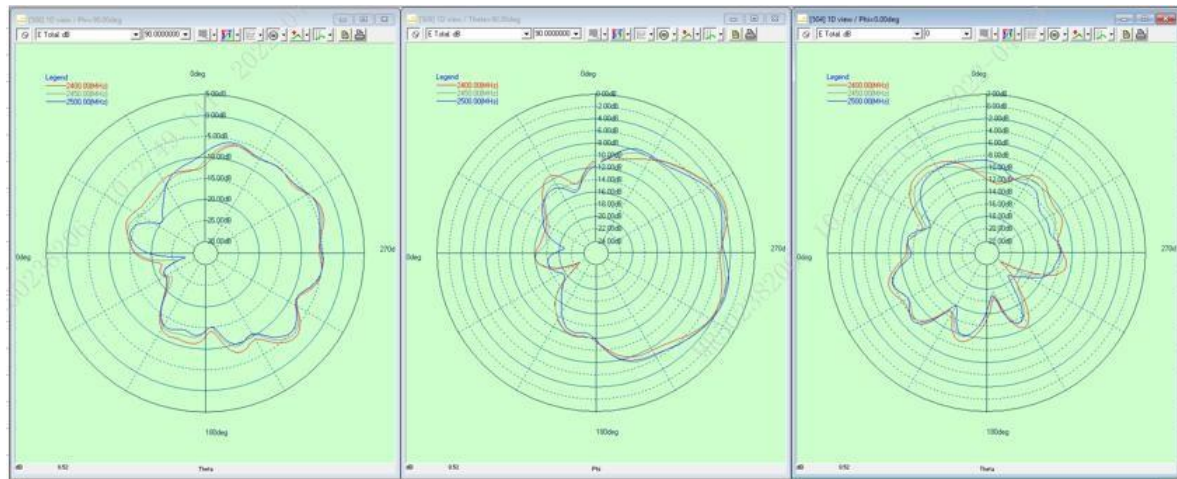


Phi90

Phi0

Theta90

BT antenna



Phi90

Phi0

Theta90

Figure 10 EP30 WIFI Version 3-in-1 Antenna 2D Direction Diagram

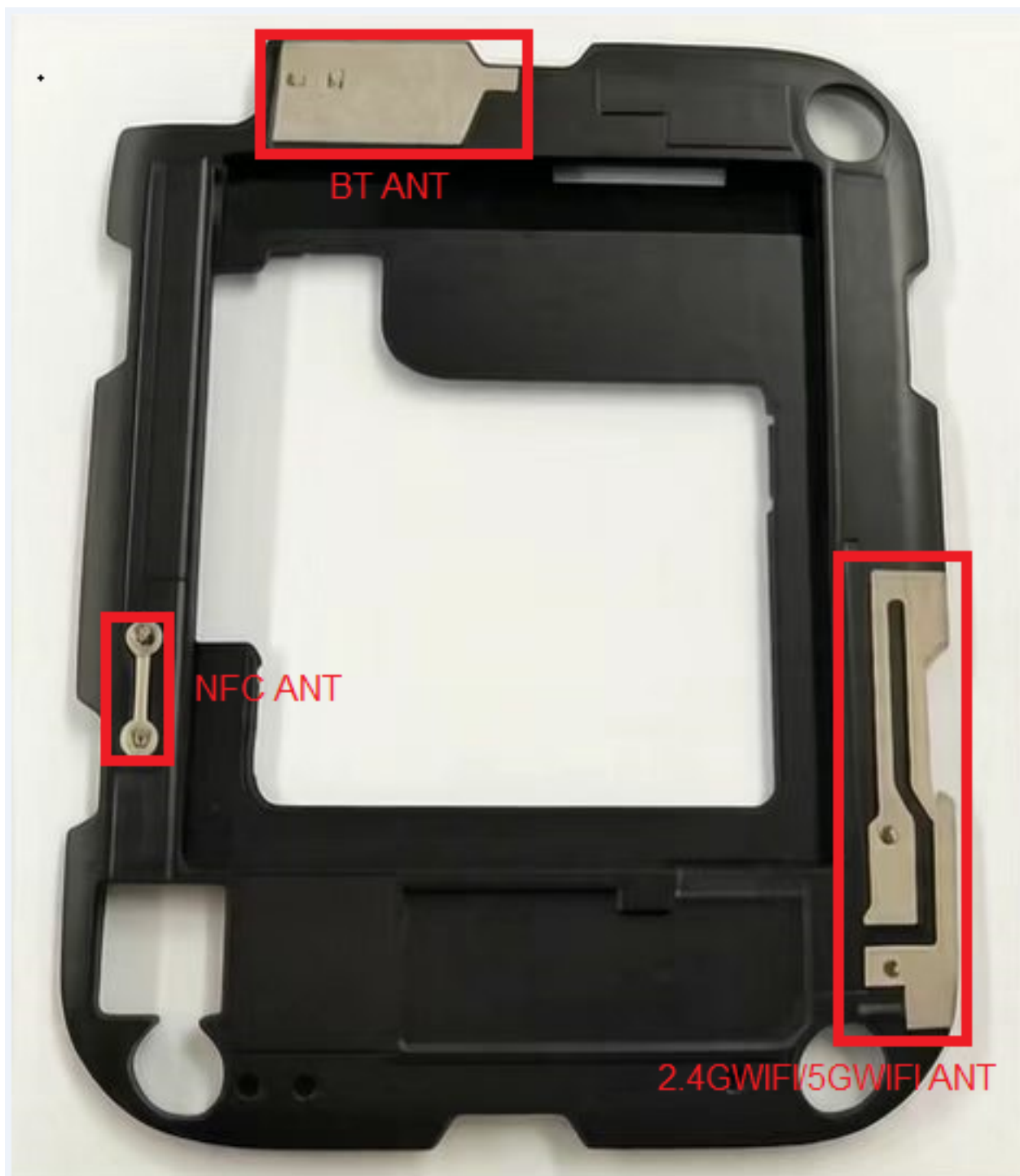
2.4 Radiation Efficiency and Gain Test

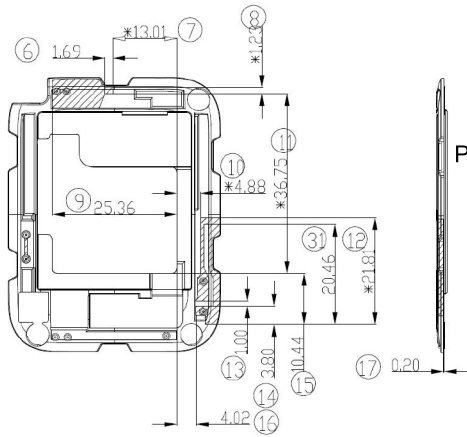
WiFi antenna, 2400 -2500 MHz&5150 -5850 MHz

Frequency	FS		Hand	
	Efficiency	Peak Gain	Efficiency	Peak Gain
2400	43%	2.6	25%	-0.8
2410	41%	2.1	25%	-0.9
2420	41%	1.8	25%	-0.9
2430	41%	1.6	25%	-1.0
2440	40%	1.5	25%	-1.0
2450	40%	1.5	24%	-0.9
2460	39%	1.6	24%	-1.2
2470	38%	1.5	24%	-1.0
2480	36%	1.1	24%	-1.3
2490	35%	0.5	24%	-1.4
2500	34%	0.1	24%	-1.7
5150	28%	0.3	31%	0.7
5200	31%	1.2	34%	0.7
5250	31%	2.1	36%	1.0
5300	30%	2.3	35%	1.7
5350	31%	2.6	34%	1.5
5400	33%	3.1	33%	1.6
5450	33%	3.3	32%	2.0
5500	35%	3.7	32%	1.7
5550	38%	4.1	31%	1.8
5600	39%	4.0	31%	1.7
5650	40%	3.8	30%	1.1
5700	41%	3.9	30%	0.6
5750	41%	3.7	29%	0.6
5800	46%	3.8	29%	0.7
5850	46%	3.8	28%	0.0

BT antenna, 2400 -2500 MHz

Frequency	FS		Hand	
	Efficiency	Peak Gain	Efficiency	Peak Gain
2400	26%	-2.1	17%	0.8
2410	26%	-1.9	18%	0.9
2420	26%	-1.7	19%	1.1
2430	26%	-1.7	19%	0.9
2440	26%	-1.5	19%	0.9
2450	27%	-1.0	20%	0.9
2460	28%	-0.8	21%	0.8
2470	28%	-1.3	20%	0.6
2480	27%	-1.7	19%	0.3
2490	27%	-1.0	19%	0.3
2500	26%	-0.9	18%	0.2





Positioning line

