



Antenna Test Report

UNA Watch

Manufacturer Address:

**Signal Plus Technology Co.,Ltd.
Room 605, Building 30, No.69, Guiqing Road, Shanghai, China**

**BLE Antenna Size: 35 x 13mm
GNSS Antenna Size: 35 x 13mm**

Antenna Type: Integral Antenna

Data Preview

Free space state

BT

Freq.(MHz)	2400	2450	2500
VSWR	1.80	1.06	1.82
Gain(dBi)	2.79	3.83	3.31
Eff.%	41.0	49.2	43.4

Free space state

GNSS

Freq.(MHz)	1166	1176	1186	1561	1575.42	1602
VSWR	3.10	2.69	2.40	1.15	1.28	1.39
Gain(dBi)	0.19	0.21	0.5	0.07	0.03	0.15
Eff.%	31.0	31.2	33.0	32.4	34.2	34.7

Hand model status

BT

Freq.(MHz)	2400	2450	2500
VSWR	1.34	1.29	2.07
Gain(dBi)	-0.6	-0.31	-1.21
Eff.%	19.4	20.8	18.2

Hand model status

GNSS

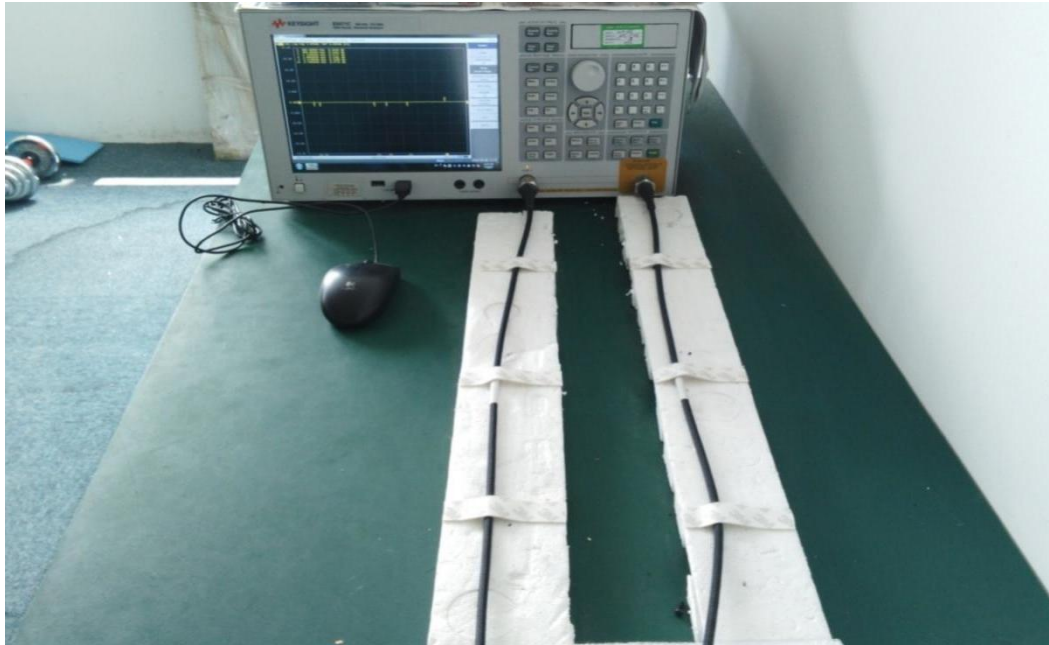
Freq.(MHz)	1166	1176	1186	1561	1575.42	1602
VSWR	2.55	2.30	2.12	1.36	1.49	1.55
Gain(dBi)	-2.08	-2.23	-2.26	-3.38	-3.56	-3.33
Eff.%	16.5	16.3	16.8	15.1	14.4	13.8

1. RF Fixture Experiment

1.1 Test Setup

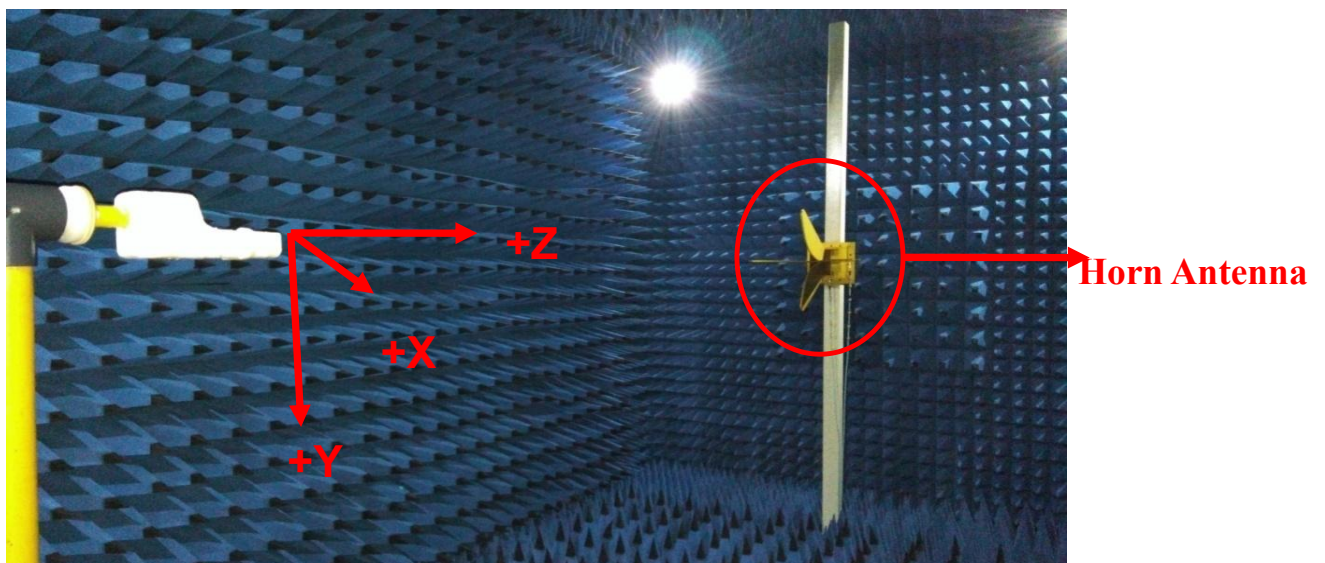
1.1.1 VNA Test Setup

VSWR and Return Loss measurements (S_{11}) were performed using an Keysight E5071C Network Analyzer. The isolation between antennas is also tested. The testing was performed with apparatus in free space.

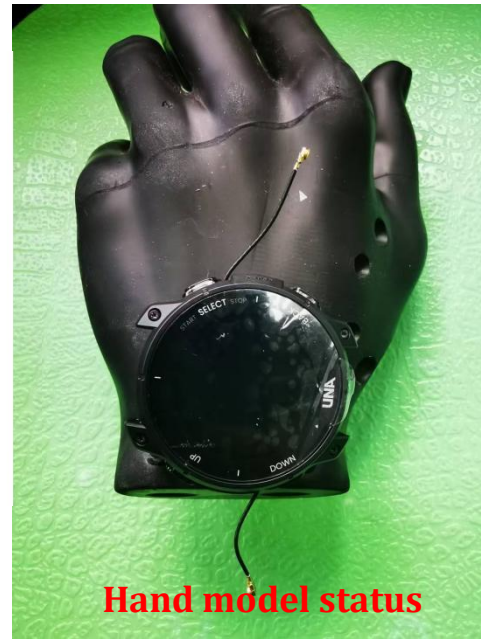
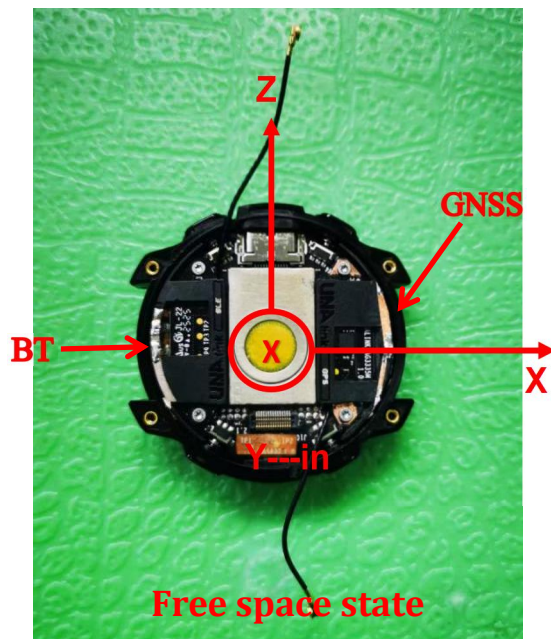


1.1.2 Anechoic Chamber Test Setup

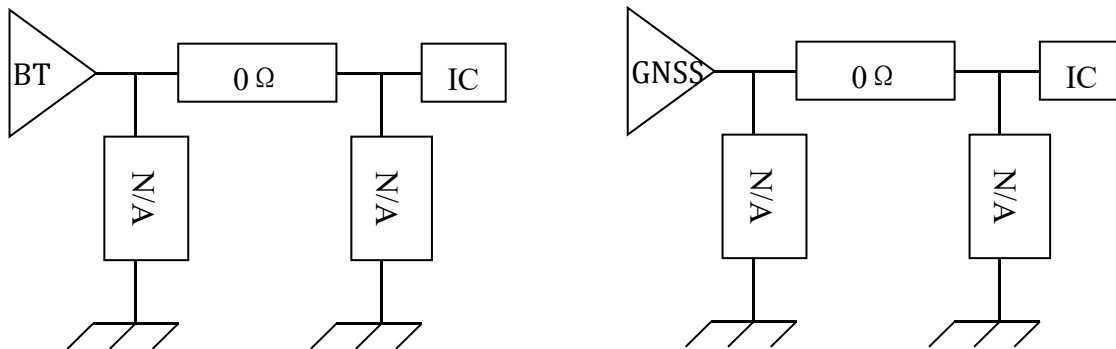
The gain of the antenna was measured in the anechoic chamber. The chamber provides less than -30 dB reflectivity from 400 MHz through 6 GHz. The chamber size is: 7m*4m*3m. The measurement results are calibrated using a leaky wave horn standard. We can measure the antenna gain and efficiency accurately.



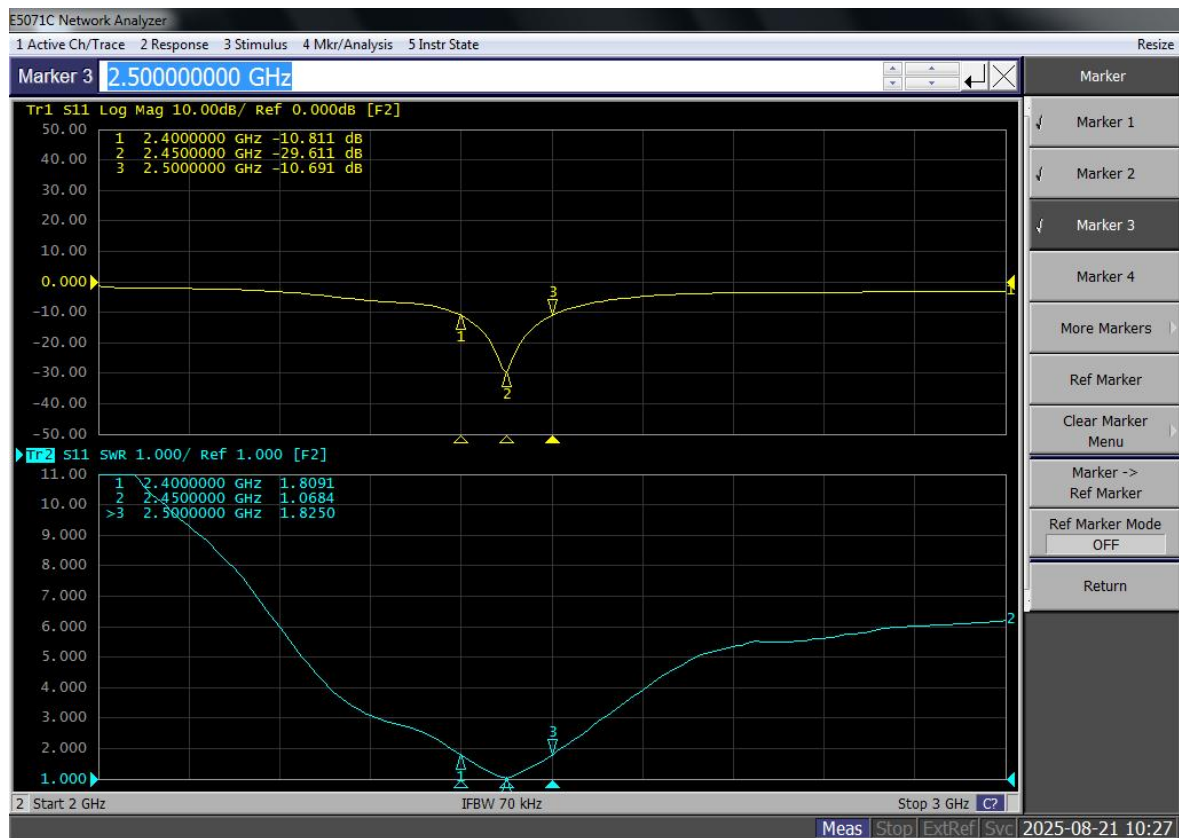
2. Antenna Solution



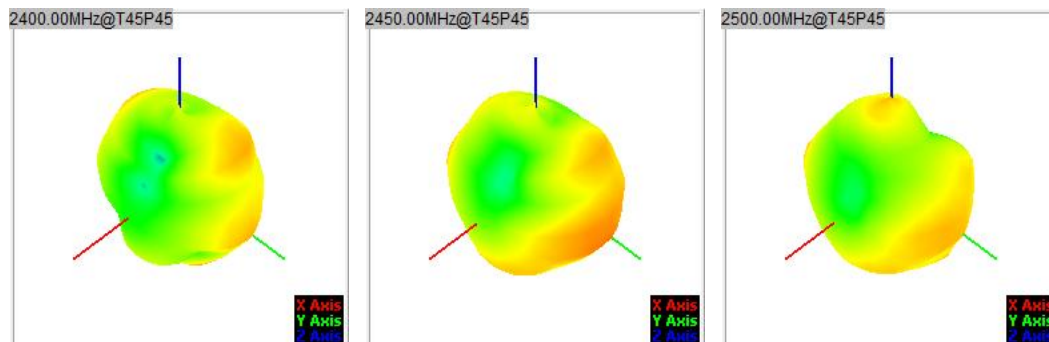
3. RF matching circuit for different antennas



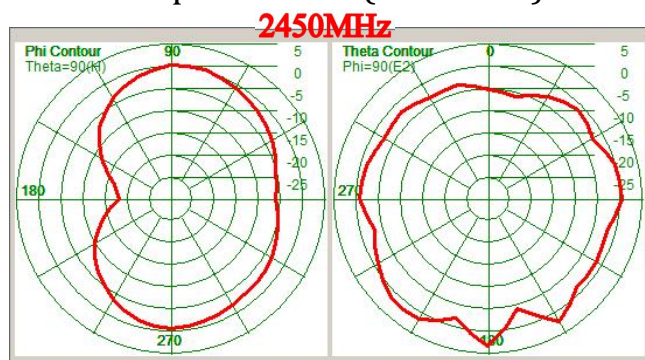
Free space state BT(S11)



Radiation patterns:3D



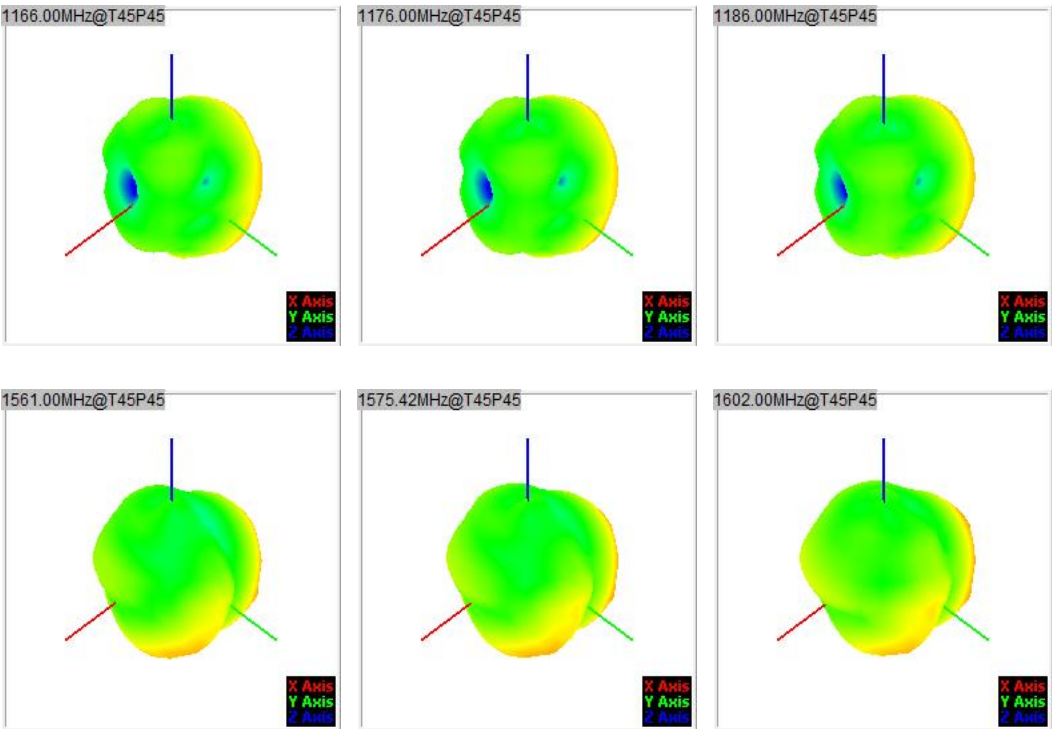
Radiation patterns:2D(2450MHz)



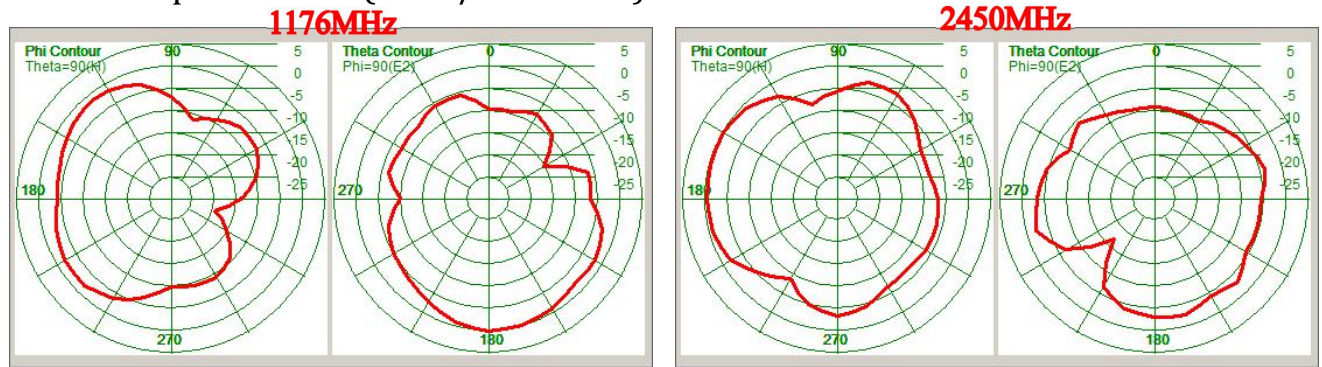
Free space state
GNSS(S11)



Radiation patterns:3D



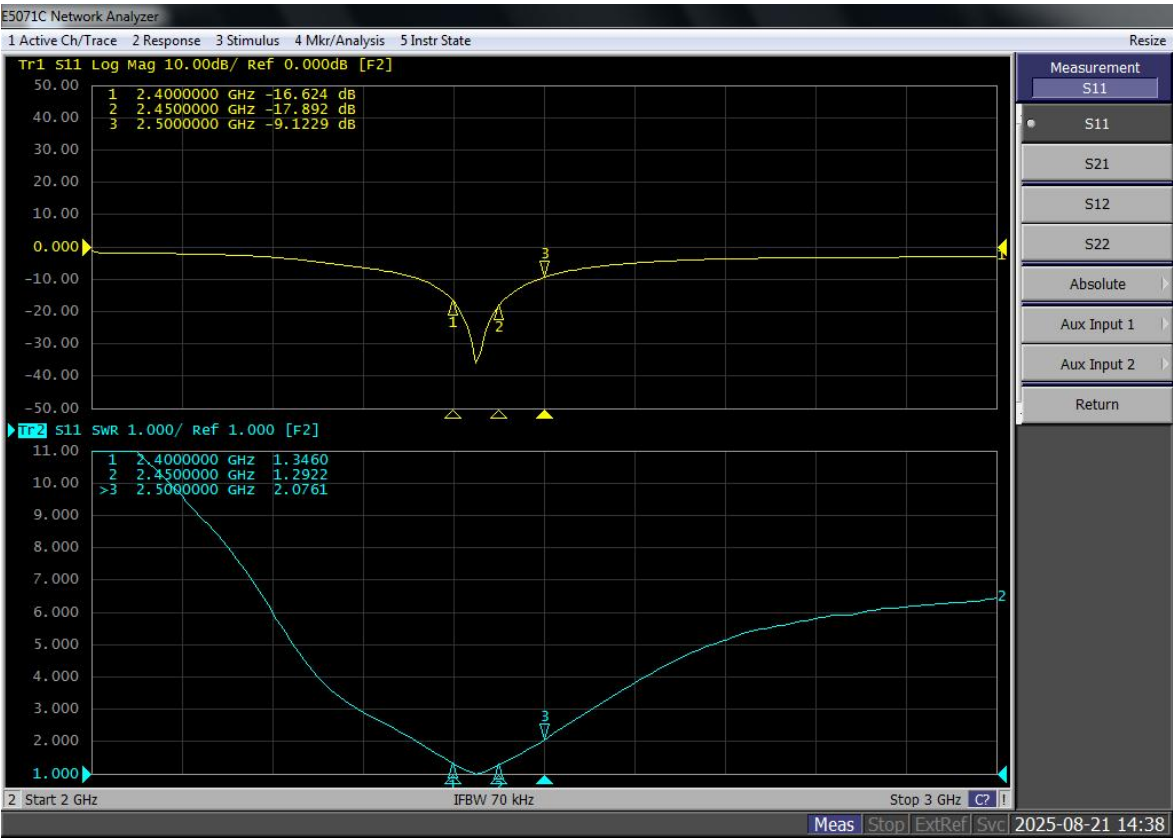
Radiation patterns:2D(1176/2450MHz)



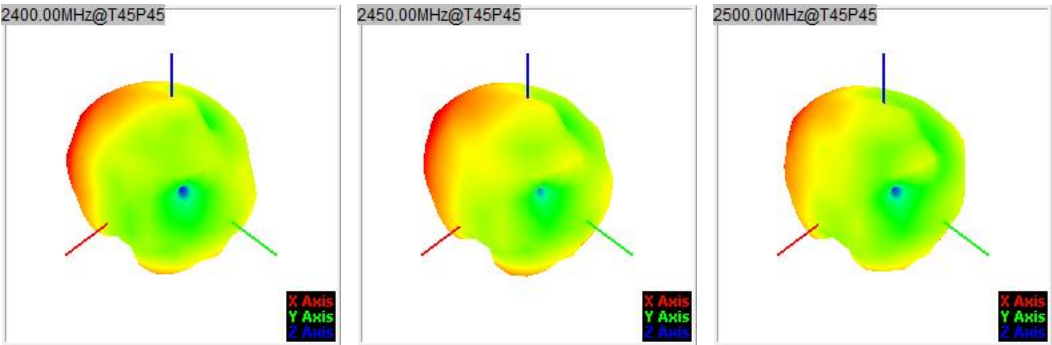
Free space state BT&GNSS(S21)



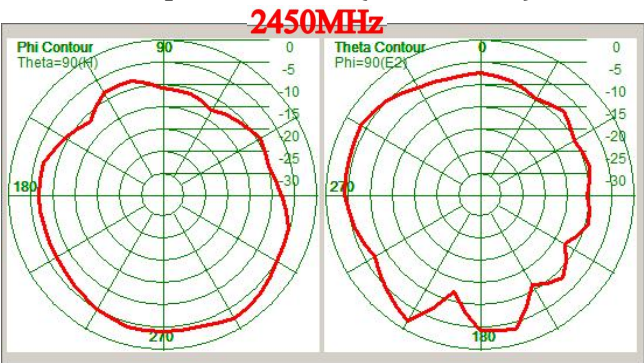
Hand model status
BT(S11)



Radiation patterns:3D



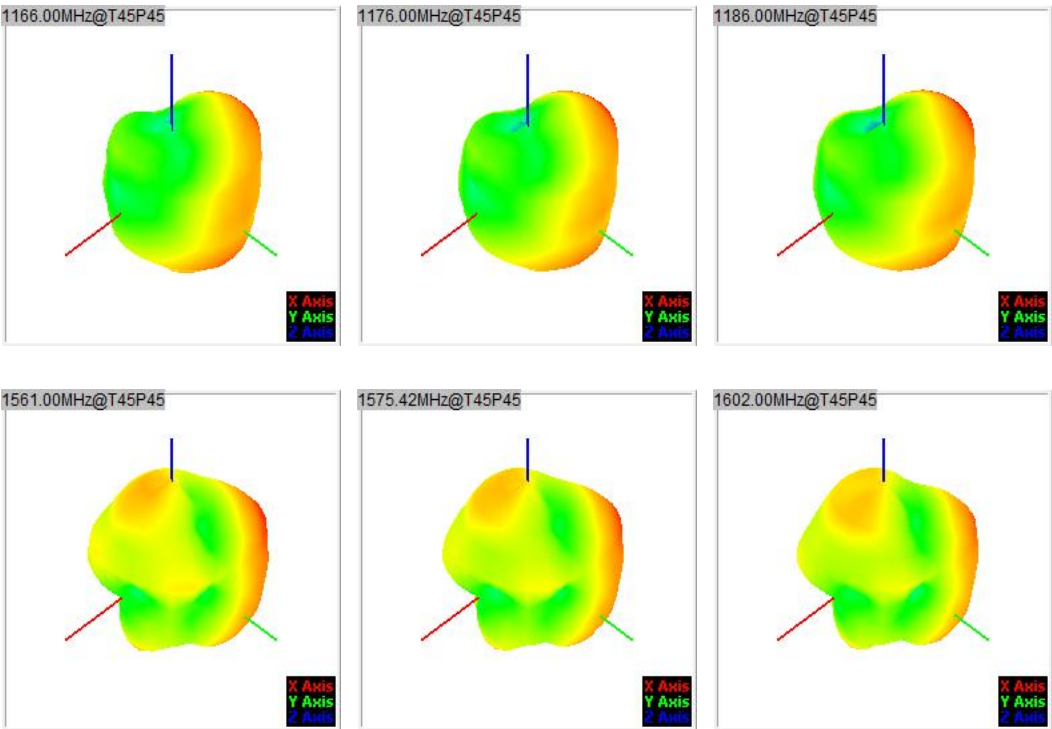
Radiation patterns:2D(2450MHz)



Hand model status
GNSS(S11)



Radiation patterns:3D



Radiation patterns:2D(1176/2450MHz)



Hand model status BT&GNSS(S21)

