

Zhejiang Haitong communications electronic Limited by Share Ltd. (Shenzhen Haitong)

Customer: TCL Communication Ltd.

Project name: T702M

Product name: T702W - Cellular & wifi antenna

| Description | Manufacturer | Model | Cal Date |
|-------------------------|----------------------|--------|------------|
| Vector Network Analyzer | Agilent Technologies | E5071C | 2023.10.18 |
| Anechoic Chamber | SATIMO | SG24 | 2023.10.18 |

Date: 2024.01.15

1. Antenna specification and test location

Antenna 0/1/2/3/4/5/6/7

Material: FPC

Manufacturer: Shenzhen Haitong

Manufacturer Address: Southern District, Phoenix Tower, 15 Nanshan District science and Technology North Road, Shenzhen, Guangdong.

Antenna gain and radiation pattern measured in SATIMO anechoic chamber.

Project date: 2023.10.19 - 2024.01.15

Test engineer: youqiang zheng

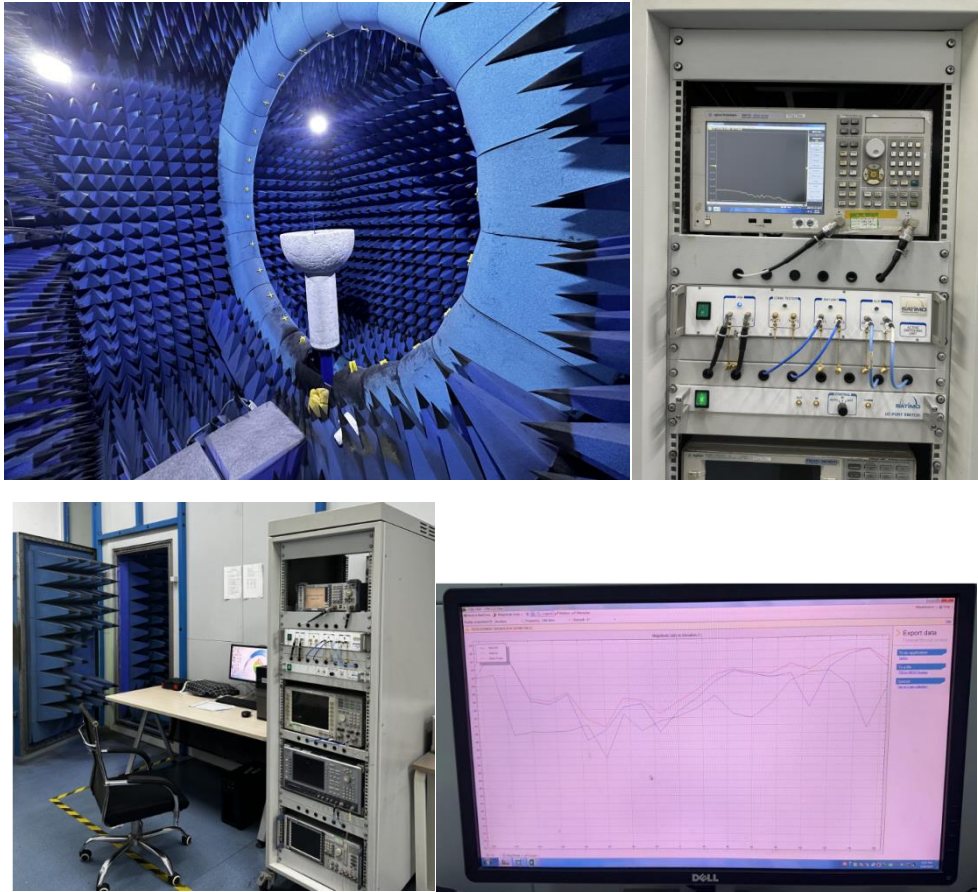


Test Equipment list

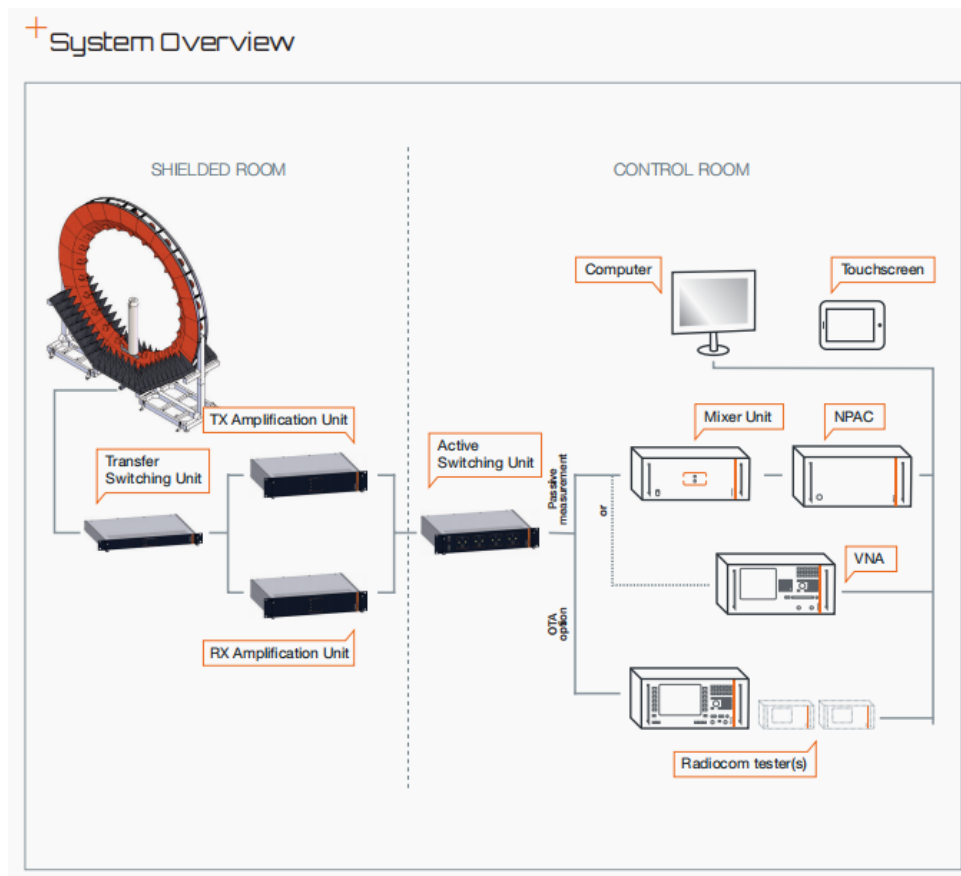
2. Test system introduction

2.1 Anechoic chamber

Our company has a number of anechoic chamber for OTA test. It is ranging from 400 MHz to 8.5 GHz, which can provide passive test and active test, including OTA overall 2G, 3G, 4G, 5G FR test, WiFi multi-mode test, GPS active test, Bluetooth active test. The test system can provide antenna gain, efficiency, radiation pattern, upper and lower hemisphere efficiency values and mutual disturbance correlation coefficient analysis.



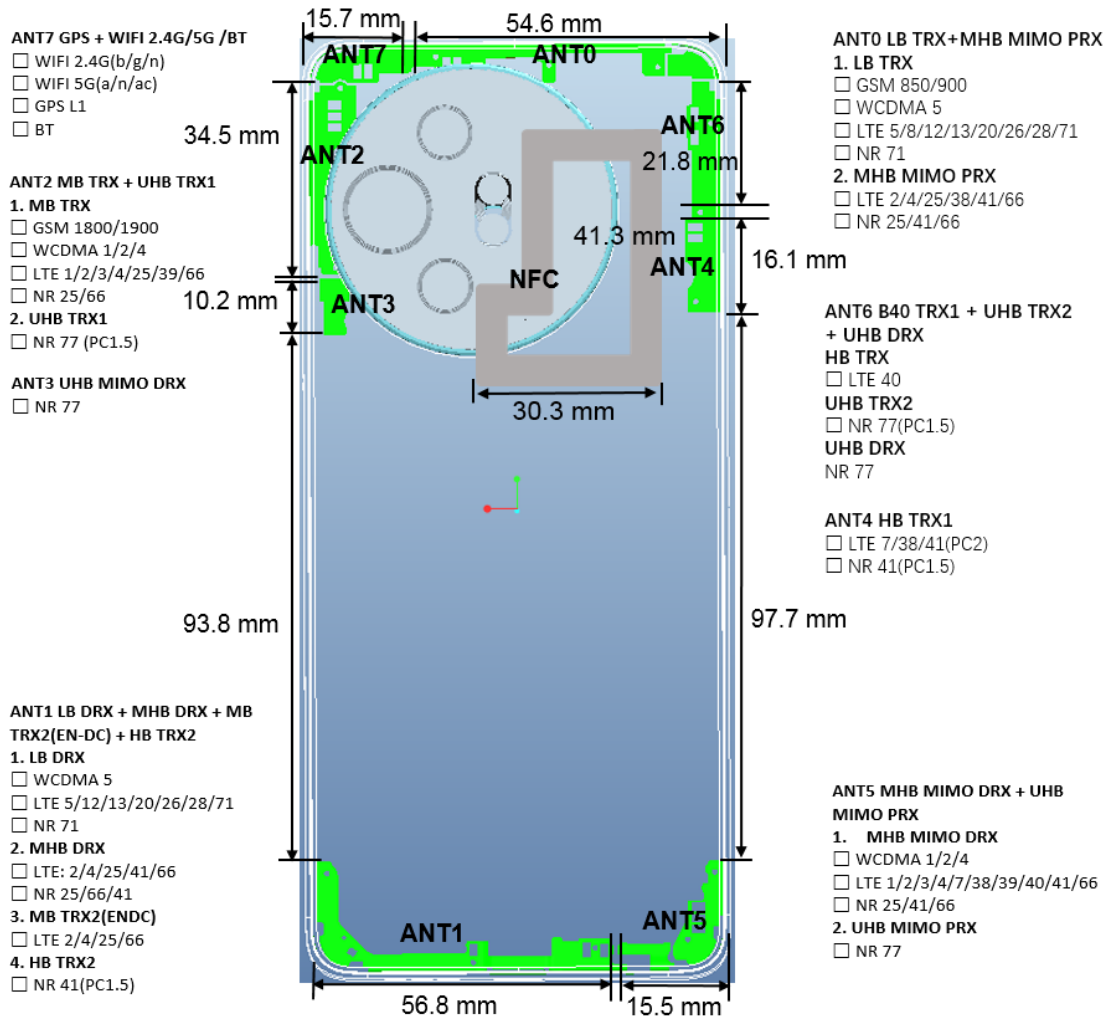
2.2 Test system architecture



The figure above shows the connection and control process between the anechoic chamber of our company and the testing system and computer. The testing system has the characteristics of accurate, fast and simple testing. The operation interface is simple and humanized.

3. Test result

3.1 Antenna placement:



| Antenna | Type | Description |
|---------|------|----------------------------------------------------------|
| 0 | FPC | LB TRX+MHB MIMO PRX antenna |
| 1 | FPC | LB DRX + MHB MIMO DRX + MB TRX2(EN-DC) + HB TRX2 antenna |
| 2 | FPC | MB TRX + UHB TRX1 antenna |
| 3 | FPC | UHB MIMO DRX antenna |
| 4 | FPC | HB TRX1 antenna |
| 5 | FPC | MB MIMO DRX + UHB MIMO PRX antenna |
| 6 | FPC | B40 TRX1 + UHB TRX2 + UHB DRX antenna |
| 7 | FPC | GPS + WIFI 2.4G/5G antenna |

3.2 Antenna Gain

Gain of Antenna 0

| Band | Gain average(dBi) | Gain Peak (dBi) |
|----------|-------------------|-----------------|
| GSM850 | -7 | -3.8 |
| GSM900 | -10 | -6.1 |
| WCDMA B5 | -7 | -3.8 |
| LTE B5 | -7 | -3.8 |
| LTE B8 | -11.1 | -9.2 |
| LTE B12 | -6.7 | -3.3 |
| LTE B13 | -6.6 | -3.1 |
| LTE B20 | -6.8 | -3.5 |
| LTE B26 | -7.1 | -3.8 |
| LTE B28 | -6.7 | -3.4 |
| LTE B71 | -6.6 | -3.4 |
| NR n5 | -7 | -3.8 |
| NR n71 | -6.7 | -3.5 |

Gain of Antenna 1

| Band | Gain average(dBi) | Gain Peak (dBi) |
|---------------|-------------------|-----------------|
| (ENDC)LTE B2 | -4.8 | -1.3 |
| (ENDC)LTE B4 | -4.6 | -1 |
| (ENDC)LTE B25 | -4.8 | -1.3 |
| (ENDC)LTE B66 | -4.6 | -1 |

Gain of Antenna 2

| Band | Gain average(dBi) | Gain Peak (dBi) |
|----------|-------------------|-----------------|
| GSM1800 | -6 | -2.3 |
| GSM1900 | -5 | -1.6 |
| WCDMA B1 | -5 | -1.3 |
| WCDMA B2 | -5 | -1.6 |
| WCDMA B4 | -5.7 | -2.6 |
| LTE B1 | -5 | -1.3 |
| LTE B2 | -5 | -1.6 |
| LTE B3 | -6 | -2.3 |
| LTE B4 | -5.7 | -2.6 |
| LTE B25 | -5 | -1.6 |
| LTE B66 | -5.7 | -2.6 |
| NR n25 | -5 | -1.6 |
| NR n66 | -5.7 | -2.6 |
| n77 | -5.5 | -1.1 |

Gain of Antenna 4

| Band | Gain average(dBi) | Gain Peak (dBi) |
|---------|-------------------|-----------------|
| LTE B7 | -5.3 | -1.5 |
| LTE B38 | -5 | -0.9 |
| LTE B41 | -5.1 | -1.1 |
| NR n41 | -5.1 | -1.1 |

Gain of Antenna 6

| Band | Gain average(dBi) | Gain Peak (dBi) |
|---------|-------------------|-----------------|
| LTE B40 | -8 | -4.1 |

Gain of Antenna 7

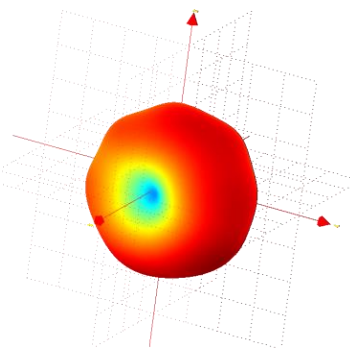
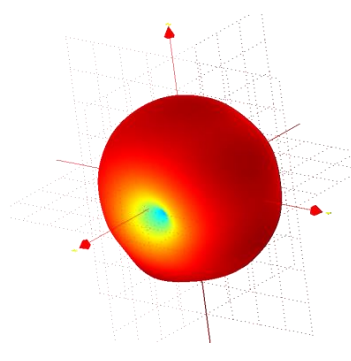
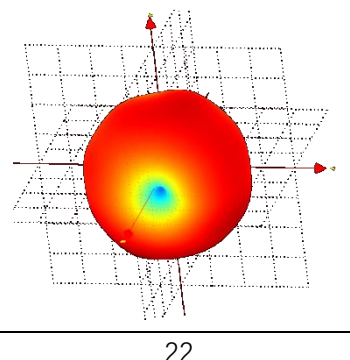
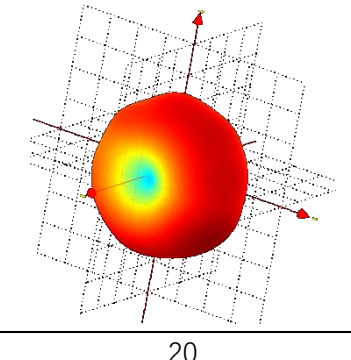
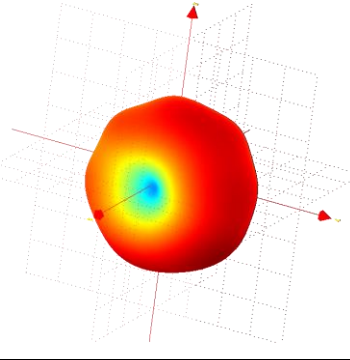
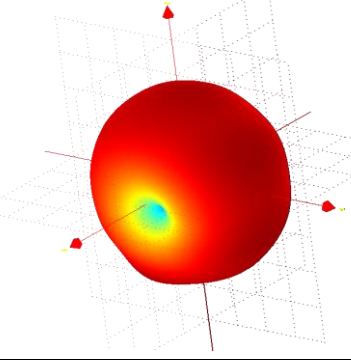
| Band | Gain average(dBi) | Gain Peak (dBi) |
|---------------|-------------------|-----------------|
| Wi-Fi 2.4G/BT | -5.3 | -0.8 |
| Wi-Fi 5G | -6.1 | -1.2 |

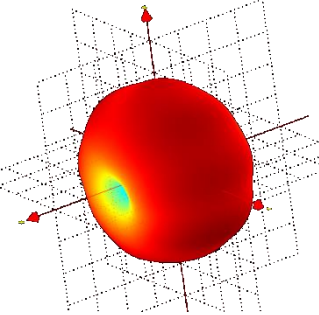
NFC antenna gain description:

The device does not support the test of NFC gain. In addition, all measurements were performed radiated and therefore additional antenna gain documentation is not required.

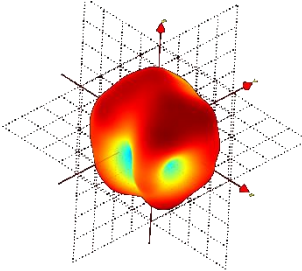
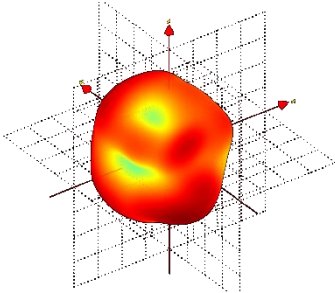
3.3 Radiation Pattern

Antenna 0

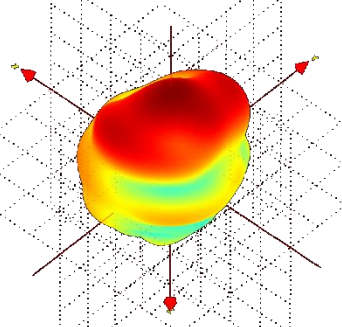
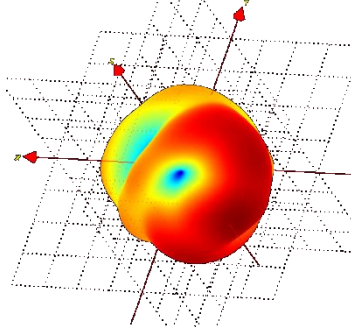
| | | |
|----------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| (Frequency Band) | GSM850/LTE B5/WCDMA B5/NR n5 | B12 |
| 3D Radiation Pattern |  |  |
| Efficiency[%] | 19 | 21 |
| Avg Gain [dBi] | -7 | -6.7 |
| Peak Gain [dBi] | -3.8 | -3.3 |
| (Frequency Band) | B13 | B20 |
| 3D Radiation Pattern |  |  |
| Efficiency[%] | 22 | 20 |
| Avg Gain [dBi] | -6.6 | -6.8 |
| Peak Gain [dBi] | -3.1 | -3.5 |
| (Frequency Band) | B26 | B28 |
| 3D Radiation Pattern |  |  |
| Efficiency[%] | 19 | 21 |
| Avg Gain [dBi] | -7.1 | -6.7 |
| Peak Gain [dBi] | -3.8 | -3.4 |

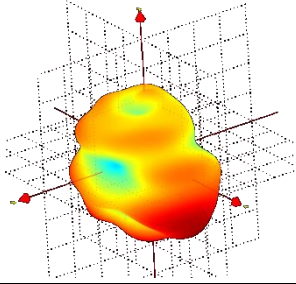
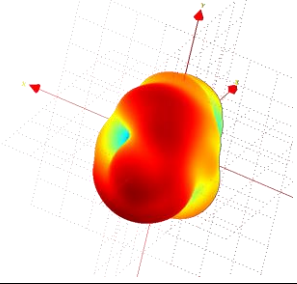
| | |
|----------------------|------------------------------------------------------------------------------------|
| (Frequency Band) | LTE B71/NR n71 |
| 3D Radiation Pattern |  |
| Efficiency[%] | 22 |
| Avg Gain [dBi] | -6.6 |
| Peak Gain [dBi] | -3.4 |

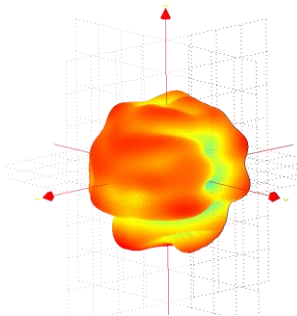
Antenna 1

| | | |
|----------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| (Frequency Band) | B2/B25 | B4/B66 |
| 3D Radiation Pattern |  |  |
| Efficiency[%] | 33 | 35 |
| Avg Gain [dBi] | -4.8 | -4.6 |
| Peak Gain [dBi] | -1.3 | -1 |

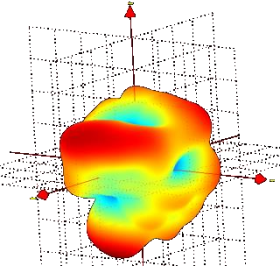
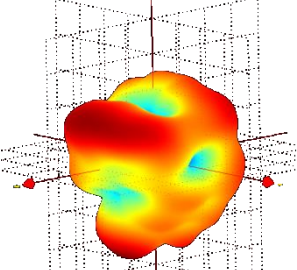
Antenna 2

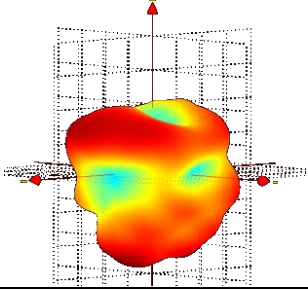
| | | |
|----------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| (Frequency Band) | WCDMA B1/LTE B1 | GSM1900/WCDMA B2/LTE B2/B25/NR n25 |
| 3D Radiation Pattern |  |  |
| Efficiency[%] | 31 | 30 |
| Avg Gain [dBi] | -5.0 | -5 |
| Peak Gain [dBi] | -1.3 | -1.6 |

| | | |
|----------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| (Frequency Band) | GSM1800/LTE B3 | WCDMA B4/LTE B4/B66/NR n66 |
| 3D Radiation Pattern |  |  |
| Efficiency[%] | 26 | 27 |
| Avg Gain [dBi] | -6.0 | -5.7 |
| Peak Gain [dBi] | -2.3 | -2.6 |

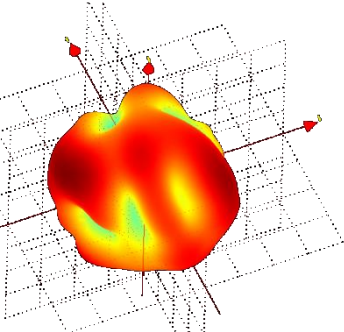
| | | |
|----------------------|-------------------------------------------------------------------------------------|--|
| (Frequency Band) | n77 | |
| 3D Radiation Pattern |  | |
| Efficiency[%] | 28 | |
| Avg Gain [dBi] | -5.5 | |
| Peak Gain [dBi] | -1.1 | |

Antenna 4

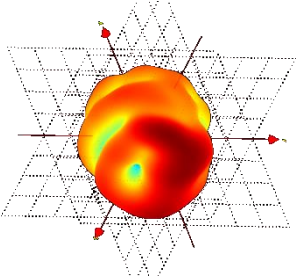
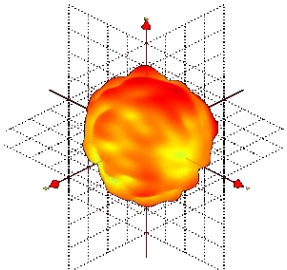
| | | |
|----------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| (Frequency Band) | B7 | B38 |
| 3D Radiation Pattern |  |  |
| Efficiency[%] | 30 | 31 |
| Avg Gain [dBi] | -5.3 | -5 |
| Peak Gain [dBi] | -1.5 | -0.9 |
| (Frequency Band) | LTE B41/NR n41 | |

| | |
|-------------------------|------------------------------------------------------------------------------------|
| 3D Radiation Pattern |  |
| Efficiency[%] | 31 |
| Avg Gain [dBi] | -5.1 |
| Peak Gain [dBi] | -1.1 |

Antenna 6

| | | |
|-------------------------|-------------------------------------------------------------------------------------|--|
| (Frequency Band) | B40 | |
| 3D Radiation Pattern |  | |
| Efficiency[%] | 16 | |
| Avg Gain [dBi] | -8 | |
| Peak Gain [dBi] | -4.1 | |

Antenna 7

| | | |
|-------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| (Frequency Band) | WiFi 2.4G/BT | WiFi 5G |
| 3D Radiation Pattern |  |  |
| Efficiency[%] | 30 | 24 |
| Avg Gain [dBi] | -5.3 | -6.1 |
| Peak Gain [dBi] | -0.8 | -1.2 |