

# WP58 Pro antenna report

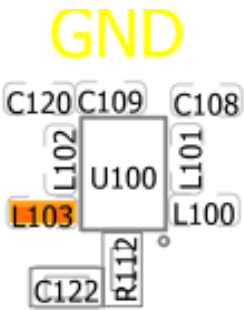
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- Report Version: 2025.8.26

Introduction to Project Debugging

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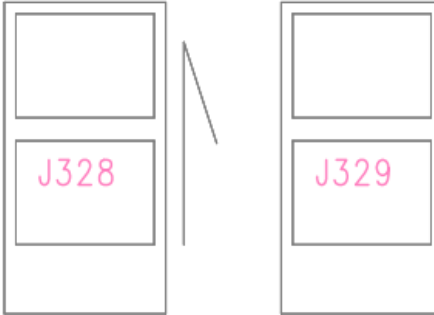
|                  |                              |                |                                                                                                                                                                                      |                |              |  |
|------------------|------------------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------|--|
| Plate type       | complete machine             |                |                                                                                                                                                                                      |                |              |  |
| Antenna Overview | main antenna                 | frequency band |                                                                                                                                                                                      | Antenna status | Antenna form |  |
|                  |                              | 2G             | GSM: (B2/B3/B5/B8)<br>WCDMA: (B1/B2/B4/B5/B8)<br>LTE-TDD: (38. 40. 41)<br>FDD: (1. 2. 3. 4. 5. 7. 8. 12. 17. 20. 25. 26. 28. 66. )<br>N1/N3/N5/N7/N8/N20/N26/N28/N66/N38/N41/N77/N78 | FPC            | PIFA         |  |
|                  |                              | 3G             |                                                                                                                                                                                      |                |              |  |
|                  |                              | 4G             |                                                                                                                                                                                      |                |              |  |
|                  | Other antennas               | 5G             | 2. 4G+5g                                                                                                                                                                             | FPC            | PIFA         |  |
|                  |                              | BT/WIFI        |                                                                                                                                                                                      |                |              |  |
|                  |                              | GPS            | 1575. 42MHz                                                                                                                                                                          | FPC            | PIFA         |  |
| Prototype status | DVT trial production machine |                | environmental treatment                                                                                                                                                              |                |              |  |

# Switch logic and matching )

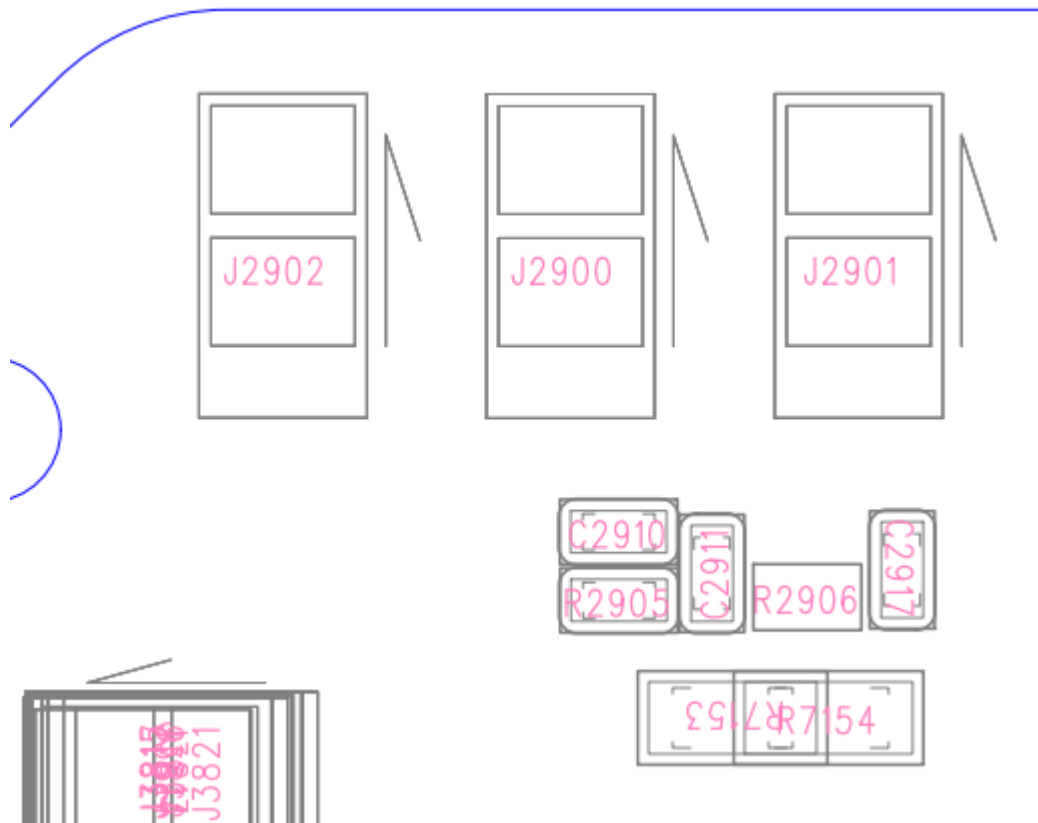
| The RF switch frequency band splitting of the lower antenna is as follows():                                                                                                       |                |       |                                                                                                                                                                                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| frequency band                                                                                                                                                                     | Switch channel | match | Remarks                                                                                                                                                                                 |
| <div>TRX</div> <div>GSM:8 WCDMA:B8</div> <div>LTE:8 NR:8</div> <div>DRX:GSMB2/3</div> <div>WCDMA:B1/B2/B4</div> <div>LTE:1/2/3/4/7/25/66/38/40/41</div> <div>NR: 1/3/7/25/66</div> | RF1            |       | <div>L100:0Europe</div> <div>L101:5.6NH inductance</div> <div>L103:18NH inductance</div> <div></div> |
| <div>TRX</div> <div>GSMB5</div> <div>WCDMA:B5</div> <div>LTE:B5/B20/B26</div> <div>NR: 5/20</div>                                                                                  | RF2            |       | <div></div>                                                                                        |
| <div>TRX</div> <div>LTE:12/17/28</div> <div>NR:28</div>                                                                                                                            | RF3            |       |                                                                                                                                                                                         |
|                                                                                                                                                                                    |                |       |                                                                                                                                                                                         |

# DPDT Logic and matching (motherboard) ANT2

The frequency band splitting of the upper antenna RF switch is as follows():

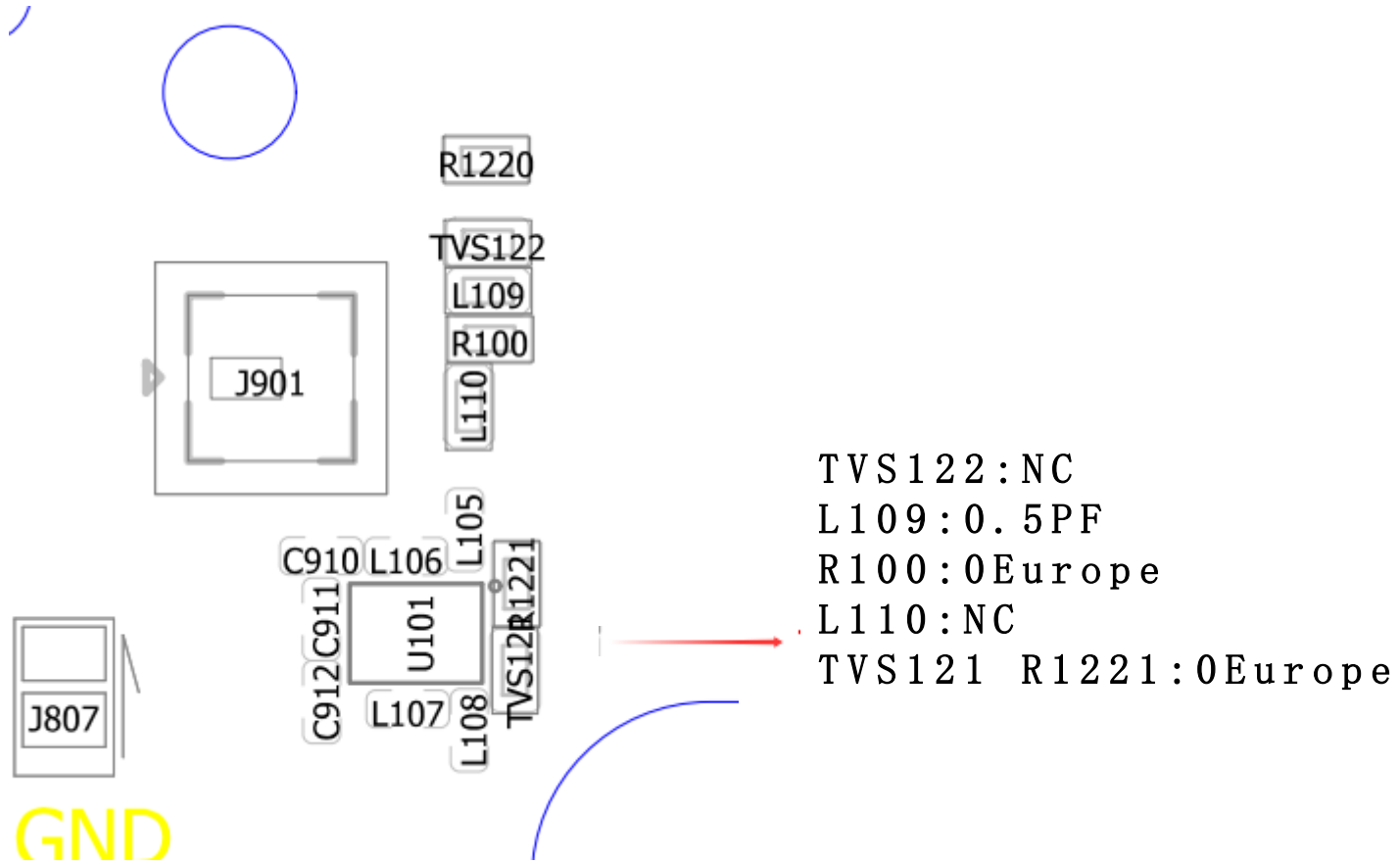
| frequency band                                                                                                                              | Switch channel | match | Remarks                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DRX</b><br>GSM:8 WCDMA:B8<br>LTE:B8 NR:8<br><b>TRX:</b> GSMB2/3<br>WCDMA:B1/B2/B4<br>LTE:1/2/3/4/7/25/66/<br>38/40/41<br>NR: 1/3/7/25/66 | RF1            |       | C2329:1PFcapacitance<br>R3028:3.3NHinductance<br>C2330:NC<br> |
| <b>DRX</b><br>GSMB5<br>WCDMA:B5<br>LTE:B5/B20/B26<br>NR: 5/20                                                                               | RF2            |       |                                                                                                                                                   |
| <b>DRX</b><br>LTE:12/17/28<br>NR:28                                                                                                         | RF3            |       |                                                                                                                                                   |

# ANT7Motherboard matching modification



C2910: NC  
R2905: 0Europe  
C2911: NC  
R2906: 0Europe  
C2917: NC

# ANT4Small board matching modification



Motherboard conduction (wireless loss point measurement)

|         | Channel | EVTspot<br>measuremen<br>t |         | Channel | EVTspot<br>measuremen<br>t |         | Channel | EVTspot<br>measurement |          | Channel | EVTspot<br>measurement |     | Channel | EVTspot<br>measuremen<br>t |  |
|---------|---------|----------------------------|---------|---------|----------------------------|---------|---------|------------------------|----------|---------|------------------------|-----|---------|----------------------------|--|
| FDD B1  | LOW     | 22.01                      | FDD B17 | LOW     | 22.06                      | TDD B34 | LOW     | 22.3                   | GSM 850  | 128     | 31.88                  | W 1 | LOW     | 21.75                      |  |
|         | medium  | 22.1                       |         | medium  | 22.15                      |         | medium  | 21.89                  |          | 190     | 31.58                  |     | medium  | 21.64                      |  |
|         | high    | 22.1                       |         | high    | 22.11                      |         | high    | 21.54                  |          | 251     | 31.39                  |     | high    | 21.58                      |  |
| FDD B2  | LOW     | 22.05                      | FDD B18 | LOW     | 22.82                      | TDD B38 | LOW     | 21.34                  | GSM 900  | 1       | 31.18                  | W 2 | LOW     | 22.1                       |  |
|         | medium  | 21.87                      |         | medium  | 22.83                      |         | medium  | 21.32                  |          | 62      | 31.05                  |     | medium  | 22.24                      |  |
|         | high    | 22.1                       |         | high    | 22.7                       |         | high    | 21.47                  |          | 124     | 31.07                  |     | high    | 22.34                      |  |
| FDD B3  | LOW     | 21.8                       | FDD B19 | LOW     | 21.9                       | TDD B39 | LOW     | 22.34                  | DCS 1800 | 512     | 28.57                  | W 4 | LOW     | 21.34                      |  |
|         | medium  | 21.95                      |         | medium  | 21.91                      |         | medium  | 22.12                  |          | 698     | 28.63                  |     | medium  | 21.57                      |  |
|         | high    | 22.1                       |         | high    | 21.89                      |         | high    | 22.22                  |          | 885     | 28.75                  |     | high    | 21.64                      |  |
| FDD B4  | LOW     | 22.5                       | FDD B20 | LOW     | 22.14                      | TDD B40 | LOW     | 21.3                   | PCS 1900 | 512     | 28.56                  | W 5 | LOW     | 22.12                      |  |
|         | medium  | 22.46                      |         | medium  | 22.08                      |         | medium  | 21.14                  |          | 661     | 28.49                  |     | medium  | 21.96                      |  |
|         | high    | 22.34                      |         | high    | 21.93                      |         | high    | 21.31                  |          | 810     | 28.50                  |     | high    | 22.02                      |  |
| FDD B5  | LOW     | 22.6                       | FDD B25 | LOW     | 22.14                      | TDD B41 | LOW     | 21.24                  |          |         |                        | W 8 | LOW     | 21.57                      |  |
|         | medium  | 22.43                      |         | medium  | 21.86                      |         | medium  | 21.56                  |          |         |                        |     | medium  | 21.52                      |  |
|         | high    | 22.33                      |         | high    | 21.95                      |         | high    | 21.34                  |          |         |                        |     | high    | 21.04                      |  |
| FDD B7  | LOW     | 21.52                      | FDD B26 | LOW     | 22.04                      |         |         |                        |          |         |                        |     |         |                            |  |
|         | medium  | 21.34                      |         | medium  | 22.14                      |         |         |                        |          |         |                        |     |         |                            |  |
|         | high    | 21.75                      |         | high    | 21.94                      |         |         |                        |          |         |                        |     |         |                            |  |
| FDD B8  | LOW     | 22.08                      | FDD B28 | LOW     | 21.84                      |         |         |                        |          |         |                        |     |         |                            |  |
|         | medium  | 22.29                      |         | medium  | 21.96                      |         |         |                        |          |         |                        |     |         |                            |  |
|         | high    | 22.13                      |         | high    | 21.38                      |         |         |                        |          |         |                        |     |         |                            |  |
| FDD B12 | LOW     | 21.61                      | FDD B66 | LOW     | 21.51                      |         |         |                        |          |         |                        |     |         |                            |  |
|         | medium  | 22.09                      |         | medium  | 21.6                       |         |         |                        |          |         |                        |     |         |                            |  |
|         | high    | 22.08                      |         | high    | 21.44                      |         |         |                        |          |         |                        |     |         |                            |  |

Motherboard conducted data (wireless loss point measurement)

|           | Channel | TRP (dBm) |           | Channel | TRP (dBm) |
|-----------|---------|-----------|-----------|---------|-----------|
| 5G SA N1  | LOW     | 22.24     | 5G SA N28 | LOW     | 21.75     |
|           | medium  | 22.04     |           | medium  | 21.64     |
|           | high    | 22.14     |           | high    | 21.81     |
| 5G SA N3  | LOW     | 22.03     | 5G SA N66 | LOW     | 22.07     |
|           | medium  | 22.3      |           | medium  | 21.89     |
|           | high    | 22.14     |           | high    | 21.98     |
| 5G SA N5  | LOW     | 22.01     | 5G SA N38 | LOW     | 22.24     |
|           | medium  | 22.24     |           | medium  | 22.01     |
|           | high    | 21.97     |           | high    | 22.31     |
| 5G SA N7  | LOW     | 22.34     | 5G SA N40 | LOW     | 22.79     |
|           | medium  | 22.14     |           | medium  | 22.68     |
|           | high    | 22.04     |           | high    | 22.60     |
| 5G SA N8  | LOW     | 21.89     | 5G SA N41 | LOW     | 25.04     |
|           | medium  | 21.96     |           | medium  | 24.98     |
|           | high    | 21.88     |           | high    | 25.21     |
| 5G SA N12 | LOW     | 21.75     | 5G SA N77 | LOW     | 25.11     |
|           | medium  | 22.04     |           | medium  | 24.86     |
|           | high    | 22.64     |           | high    | 24.79     |
| 5G SA N20 | LOW     | 21.86     | 5G SA N78 | LOW     | 24.57     |
|           | medium  | 21.93     |           | medium  | 24.67     |
|           | high    | 22.04     |           | high    | 24.59     |
| 5G SA N25 | LOW     | 21.76     |           |         |           |
|           | medium  | 21.59     |           |         |           |
|           | high    | 21.68     |           |         |           |

Main antenna darkroom data

|          | Channel | TRP (dBm) | TIS (dBm) | Aging<br>bright<br>screen |     | Channel | TRP (dBm) | TIS (dBm) | Aging bright<br>screen |
|----------|---------|-----------|-----------|---------------------------|-----|---------|-----------|-----------|------------------------|
| GSM 850  | 128     | 25.51     |           |                           | W 1 | LOW     | 17.54     |           |                        |
|          | 190     | 25.49     |           |                           |     | medium  | 17.34     |           |                        |
|          | 251     | 26.05     | -102.0    |                           |     | high    | 17.42     | -104.0    |                        |
| GSM 900  | 1       | 26.02     |           | -100.28                   | W 2 | LOW     | 17.64     |           | -102.2                 |
|          | 62      | 25.41     |           |                           |     | medium  | 17.24     |           |                        |
|          | 124     | 25.61     | -101.5    |                           |     | high    | 17.04     | -103.2    |                        |
| DCS 1800 | 512     | 24.23     |           | -99.64                    | W 4 | LOW     | 16.76     |           | -102.4                 |
|          | 698     | 24.38     |           |                           |     | medium  | 17.04     |           |                        |
|          | 885     | 25.45     | -103.0    |                           |     | high    | 17.35     | -103.2    |                        |
| PCS 1900 | 512     | 24.94     |           | -101.5                    | W 5 | LOW     | 15.34     |           | -101.5                 |
|          | 661     | 24.83     |           |                           |     | medium  | 15.53     |           |                        |
|          | 810     | 24.53     | -102.5    |                           |     | high    | 16.16     | -101.5    |                        |
|          |         |           |           | -101                      | W 8 | LOW     | 16.21     |           | -99.56                 |
|          |         |           |           |                           |     | medium  | 16.30     |           |                        |
|          |         |           |           |                           |     | high    | 16.2      | -101.5    |                        |
|          |         |           |           |                           |     |         |           |           | -99.5                  |
|          |         |           |           |                           |     |         |           |           |                        |
|          |         |           |           |                           |     |         |           |           |                        |
|          |         |           |           |                           |     |         |           |           |                        |
|          |         |           |           |                           |     |         |           |           |                        |
|          |         |           |           |                           |     |         |           |           |                        |
|          |         |           |           |                           |     |         |           |           |                        |
|          |         |           |           |                           |     |         |           |           |                        |
|          |         |           |           |                           |     |         |           |           |                        |

|         | Channel | TRP（dBm） | TIS（dBm） | Aging<br>bright<br>screen |         | Channel | TRP（dBm） | TIS（dBm） | Aging<br>bright<br>screen |         | Channel | TRP（dBm） | TIS（dBm） | Aging<br>bright<br>screen |       |       |       |       |
|---------|---------|----------|----------|---------------------------|---------|---------|----------|----------|---------------------------|---------|---------|----------|----------|---------------------------|-------|-------|-------|-------|
| FDD B1  | LOW     | 17.58    |          | -89.5                     | FDD B17 | LOW     | 15.12    |          | -85.2                     | FDD B66 | LOW     | 16.76    |          | -89.4                     |       |       |       |       |
|         | medium  | 17.55    |          |                           |         | medium  | 15.29    |          |                           |         | medium  | 17.04    |          |                           |       |       |       |       |
|         | high    | 17.65    | -91.5    |                           |         | high    | 15.23    | -89.4    |                           |         | high    | 17.24    | -90.25   |                           |       |       |       |       |
| FDD B2  | LOW     | 18.15    |          |                           | FDD B18 | LOW     | 15.12    |          |                           | -86.78  | TDD B38 | LOW      | 17.09    |                           |       | -88.0 |       |       |
|         | medium  | 18.2     |          |                           |         | medium  | 15.20    |          |                           |         |         | medium   | 17.14    |                           |       |       |       |       |
|         | high    | 17.75    | -91.3    |                           |         | high    | 15.19    | -90.3    |                           |         |         | high     | 17.22    |                           | -89.3 |       |       |       |
| FDD B3  | LOW     | 17.44    |          |                           | FDD B19 | LOW     | 15.61    |          |                           |         | -86.2   | TDD B40  | LOW      |                           | 18.15 |       |       | -90.2 |
|         | medium  | 18.22    |          |                           |         | medium  | 15.87    |          |                           |         |         |          | medium   |                           | 18.38 |       |       |       |
|         | high    | 18.3     | -91.0    |                           |         | high    | 15.92    | -89.0    |                           |         |         |          | high     |                           | 18.18 |       | -91.0 |       |
| FDD B4  | LOW     | 17.57    |          | FDD B20                   | LOW     | 15.81   |          | -86.5    | TDD B41                   |         |         | LOW      | 17.13    |                           | -89.3 |       |       |       |
|         | medium  | 17.16    |          |                           | medium  | 15.91   |          |          |                           |         |         | medium   | 16.77    |                           |       |       |       |       |
|         | high    | 17.99    | -91.2    |                           | high    | 15.37   | -89.5    |          |                           |         |         | high     | 17.34    | -90.4                     |       |       |       |       |
| FDD B5  | LOW     | 15.21    |          | FDD B25                   | LOW     | 17.52   |          |          | -88.6                     |         |         |          |          |                           |       |       |       |       |
|         | medium  | 15.25    |          |                           | medium  | 17.26   |          |          |                           |         |         |          |          |                           |       |       |       |       |
|         | high    | 15.54    | -90.0    |                           | high    | 17.54   | -90.1    |          |                           |         |         |          |          |                           |       |       |       |       |
| FDD B7  | LOW     | 17.04    |          | FDD B26                   | LOW     | 15.41   |          |          |                           | -87.0   |         |          |          |                           |       |       |       |       |
|         | medium  | 17.11    |          |                           | medium  | 15.25   |          |          |                           |         |         |          |          |                           |       |       |       |       |
|         | high    | 17.06    | -90.4    |                           | high    | 15.51   | -90.3    |          |                           |         |         |          |          |                           |       |       |       |       |
| FDD B8  | LOW     | 16.05    |          | FDD B28A                  | LOW     | 15.44   |          | -85.37   |                           |         |         |          |          |                           |       |       |       |       |
|         | medium  | 16.06    |          |                           | medium  | 15.32   |          |          |                           |         |         |          |          |                           |       |       |       |       |
|         | high    | 16.18    | -89.0    |                           | high    | 15.25   | -89.2    |          |                           |         |         |          |          |                           |       |       |       |       |
| FDD B12 | LOW     | 15.08    |          | FDD B28B                  | LOW     | 15.25   |          |          |                           |         |         |          |          |                           |       |       |       |       |
|         | medium  | 15.18    |          |                           | medium  | 15.33   |          |          |                           |         |         |          |          |                           |       |       |       |       |
|         |         |          |          |                           |         |         |          |          |                           |         |         |          |          |                           |       |       |       |       |

|        | Channel | TRP（dBm） | TIS（dBm） | Aging<br>bright<br>screen<br><br>-90.34<br><br>-89.4<br><br>-86.52<br><br>-88.5<br><br>-86.43<br><br>-85.64<br><br>-87.3<br><br>-87.64 |        | Channel | TRP（dBm） | TIS（dBm） | Aging<br>bright<br>screen<br><br>-86.59<br><br>-86.28 |        | Channel | TRP（dBm） | TIS（dBm） | Aging<br>bright<br>screen<br><br>-89.31<br><br>-89.4<br><br>-83.64<br><br>-85.28<br><br>-84.3 |        |       |  |
|--------|---------|----------|----------|----------------------------------------------------------------------------------------------------------------------------------------|--------|---------|----------|----------|-------------------------------------------------------|--------|---------|----------|----------|-----------------------------------------------------------------------------------------------|--------|-------|--|
|        |         |          |          |                                                                                                                                        |        |         |          |          |                                                       |        |         |          |          |                                                                                               |        |       |  |
| NR N1  | LOW     | 17.41    |          |                                                                                                                                        | NR N28 | LOW     | 15.54    |          |                                                       | NR N38 | LOW     | 16.12    |          |                                                                                               | medium | 16.06 |  |
|        | medium  | 17.55    |          |                                                                                                                                        |        | medium  | 15.06    |          |                                                       |        | high    | 16.21    | -90.36   |                                                                                               |        |       |  |
|        | high    | 16.35    | -91.6    |                                                                                                                                        |        | high    | 15.16    | -90.1    |                                                       |        |         |          |          |                                                                                               |        |       |  |
| NR N3  | LOW     | 17.12    |          |                                                                                                                                        | NR N66 | LOW     | 17.29    |          |                                                       | NR N40 | LOW     | 18.09    |          |                                                                                               | medium | 18.67 |  |
|        | medium  | 16.79    |          |                                                                                                                                        |        | medium  | 17.19    |          |                                                       |        | high    | 18.16    | -90.54   |                                                                                               |        |       |  |
|        | high    | 16.29    | -91.5    |                                                                                                                                        |        | high    | 16.37    | -89.42   |                                                       |        |         |          |          |                                                                                               |        |       |  |
| NR N5  | LOW     | 15.53    |          |                                                                                                                                        |        |         |          |          |                                                       | NR N41 | LOW     | 18.24    |          |                                                                                               | medium | 18.34 |  |
|        | medium  | 15.64    |          |                                                                                                                                        |        |         |          | high     |                                                       |        | 18.03   | -85.13   |          |                                                                                               |        |       |  |
|        | high    | 15.42    | -89.0    |                                                                                                                                        |        |         |          |          |                                                       |        |         |          |          |                                                                                               |        |       |  |
| NR N7  | LOW     | 17.45    |          |                                                                                                                                        |        |         |          |          |                                                       | NR N77 | LOW     | 19.2     |          |                                                                                               | medium | 19.17 |  |
|        | medium  | 17.22    |          |                                                                                                                                        |        |         |          |          |                                                       |        | high    | 19.20    | -86.4    |                                                                                               |        |       |  |
|        | high    | 17.16    | -90.0    |                                                                                                                                        |        |         |          |          |                                                       |        |         |          |          |                                                                                               |        |       |  |
| NR N8  | LOW     | 16.08    |          |                                                                                                                                        |        |         |          |          |                                                       | NR N78 | LOW     | 19.24    |          |                                                                                               | medium | 19.53 |  |
|        | medium  | 16.17    |          |                                                                                                                                        |        |         |          |          |                                                       |        | high    | 19.3     | -86.2    |                                                                                               |        |       |  |
|        | high    | 15.77    | -89.0    |                                                                                                                                        |        |         |          |          |                                                       |        |         |          |          |                                                                                               |        |       |  |
| NR N12 | LOW     | 15.21    |          |                                                                                                                                        |        |         |          |          |                                                       |        |         |          |          |                                                                                               |        |       |  |
|        | medium  | 15.31    |          |                                                                                                                                        |        |         |          |          |                                                       |        |         |          |          |                                                                                               |        |       |  |
|        | high    | 15.21    | -88.0    |                                                                                                                                        |        |         |          |          |                                                       |        |         |          |          |                                                                                               |        |       |  |
| NR N20 | LOW     | 15.50    |          |                                                                                                                                        |        |         |          |          |                                                       |        |         |          |          |                                                                                               |        |       |  |
|        | medium  | 15.46    |          |                                                                                                                                        |        |         |          |          |                                                       |        |         |          |          |                                                                                               |        |       |  |
|        | high    | 15.34    | -90.5    |                                                                                                                                        |        |         |          |          |                                                       |        |         |          |          |                                                                                               |        |       |  |
| NR N25 | LOW     | 16.24    |          |                                                                                                                                        |        |         |          |          |                                                       |        |         |          |          |                                                                                               |        |       |  |
|        | medium  | 17.14    |          |                                                                                                                                        |        |         |          |          |                                                       |        |         |          |          |                                                                                               |        |       |  |
|        | high    | 17.34    | -89.3    |                                                                                                                                        |        |         |          |          |                                                       |        |         |          |          |                                                                                               |        |       |  |

Main antenna darkroom data head hand data

|          | Channel | TRP (dBm) | TIS (dBm) |  |     | Channel | TRP (dBm) | TIS (dBm) |  |
|----------|---------|-----------|-----------|--|-----|---------|-----------|-----------|--|
| GSM 850  | 128     | 21.46     |           |  | W 1 | LOW     | 14.54     |           |  |
|          | 190     | 20.79     |           |  |     | medium  | 14.34     |           |  |
|          | 251     | 21.29     | -97.23    |  |     | high    | 14.33     | -100.3    |  |
| GSM 900  | 1       | 21.35     |           |  | W 2 | LOW     | 13.45     |           |  |
|          | 62      | 20.54     |           |  |     | medium  | 12.97     |           |  |
|          | 124     | 20.43     | -97.04    |  |     | high    | 13.76     | -100.64   |  |
| DCS 1800 | 512     | 21.34     |           |  | W 4 | LOW     | 13.35     |           |  |
|          | 698     | 21.69     |           |  |     | medium  | 13.64     |           |  |
|          | 885     | 22.36     | -100.5    |  |     | high    | 13.34     | -100.6    |  |
| PCS 1900 | 512     | 21.46     |           |  | W 5 | LOW     | 11.69     |           |  |
|          | 661     | 22.51     |           |  |     | medium  | 11.14     |           |  |
|          | 810     | 22.34     | -100.64   |  |     | high    | 10.82     | -97.01    |  |
|          |         |           |           |  | W 8 | LOW     | 11.2      |           |  |
|          |         |           |           |  |     | medium  | 11.17     |           |  |
|          |         |           |           |  |     | high    | 10.77     | -97.0     |  |
|          |         |           |           |  |     |         |           |           |  |
|          |         |           |           |  |     |         |           |           |  |
|          |         |           |           |  |     |         |           |           |  |
|          |         |           |           |  |     |         |           |           |  |
|          |         |           |           |  |     |         |           |           |  |
|          |         |           |           |  |     |         |           |           |  |
|          |         |           |           |  |     |         |           |           |  |
|          |         |           |           |  |     |         |           |           |  |
|          |         |           |           |  |     |         |           |           |  |

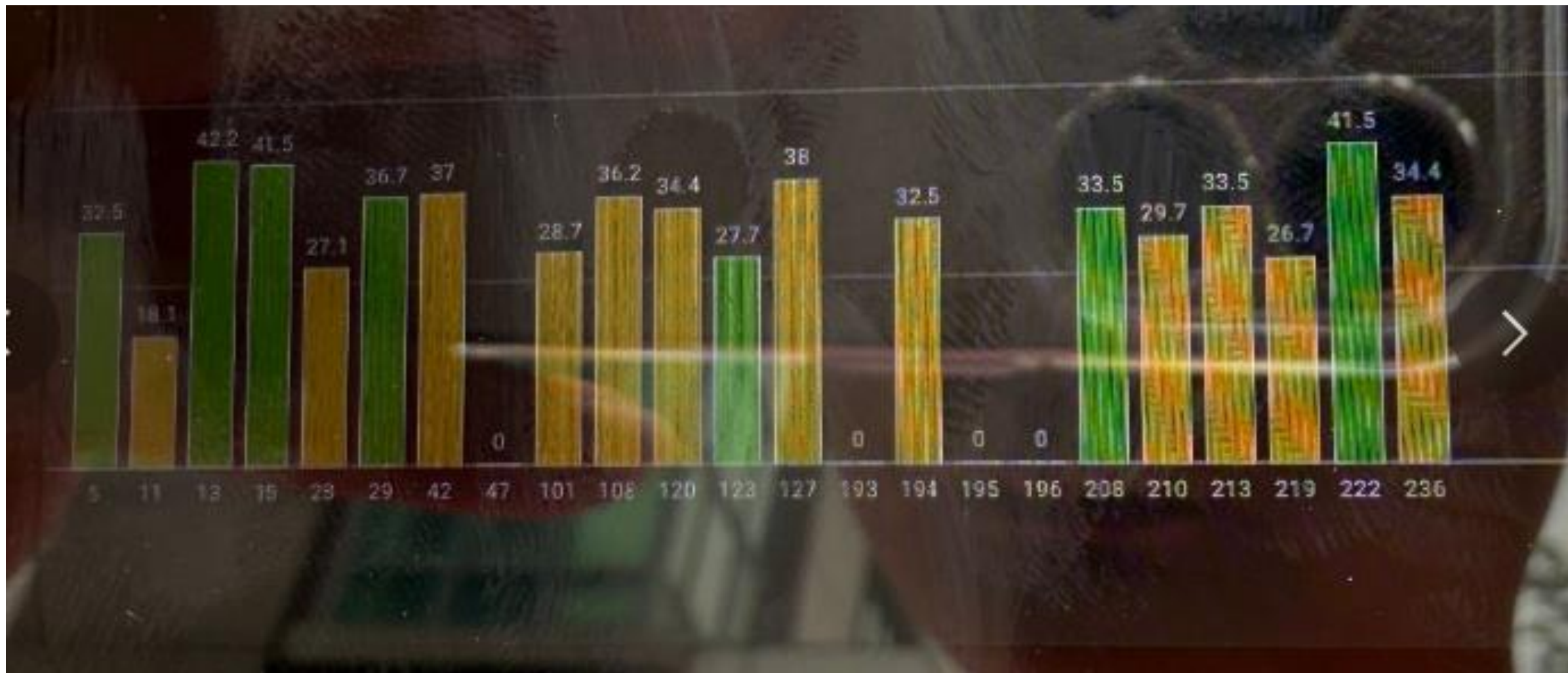
Main antenna darkroom data head hand data

|         | Channel | TRP (dBm) | TIS (dBm) |  |          | Channel | TRP (dBm) | TIS (dBm) |  |         | Channel | TRP (dBm) | TIS (dBm) |  |
|---------|---------|-----------|-----------|--|----------|---------|-----------|-----------|--|---------|---------|-----------|-----------|--|
| FDD B1  | LOW     | 15.77     |           |  | FDD B17  | LOW     | 11.31     |           |  | FDD B66 | LOW     | 14.67     |           |  |
|         | medium  | 14.23     |           |  |          | medium  | 11.60     |           |  |         | medium  | 14.46     |           |  |
|         | high    | 14.5      | -87.1     |  |          | high    | 10.73     | -86.35    |  |         | high    | 14.31     | -88       |  |
| FDD B2  | LOW     | 14.5      |           |  | FDD B18  | LOW     | 10.86     |           |  | TDD B38 | LOW     | 15.53     |           |  |
|         | medium  | 14.02     |           |  |          | medium  | 10.46     |           |  |         | medium  | 14.46     |           |  |
|         | high    | 13.07     | -87.42    |  |          | high    | 10.34     | -85.5     |  |         | high    | 14.42     | -87.5     |  |
| FDD B3  | LOW     | 14.8      |           |  | FDD B19  | LOW     | 11.36     |           |  | TDD B40 | LOW     | 15.75     |           |  |
|         | medium  | 14.03     |           |  |          | medium  | 11.31     |           |  |         | medium  | 15.23     |           |  |
|         | high    | 14.11     | -87.56    |  |          | high    | 11.32     | -85.42    |  |         | high    | 14.47     | -88.3     |  |
| FDD B4  | LOW     | 14.36     |           |  | FDD B20  | LOW     | 11.76     |           |  | TDD B41 | LOW     | 14.32     |           |  |
|         | medium  | 14.25     |           |  |          | medium  | 12.35     |           |  |         | medium  | 13.53     | -88.12    |  |
|         | high    | 13.67     | -86.3     |  |          | high    | 11.64     | -85.4     |  |         | high    | 14.36     |           |  |
| FDD B5  | LOW     | 11.37     |           |  | FDD B25  | LOW     | 14.05     |           |  |         |         |           |           |  |
|         | medium  | 10.67     |           |  |          | medium  | 13.37     |           |  |         |         |           |           |  |
|         | high    | 11.36     | -85.04    |  |          | high    | 13.52     | -87.4     |  |         |         |           |           |  |
| FDD B7  | LOW     | 14.04     |           |  | FDD B26  | LOW     | 11.05     |           |  |         |         |           |           |  |
|         | medium  | 14.95     |           |  |          | medium  | 11.26     |           |  |         |         |           |           |  |
|         | high    | 14.61     | -87.31    |  |          | high    | 11.2      | -85.5     |  |         |         |           |           |  |
| FDD B8  | LOW     | 11.19     |           |  | FDD B28A | LOW     | 11.65     |           |  |         |         |           |           |  |
|         | medium  | 11.58     |           |  |          | medium  | 11.45     |           |  |         |         |           |           |  |
|         | high    | 10.75     | -84.64    |  |          | high    | 10.34     | -85.0     |  |         |         |           |           |  |
| FDD B12 | LOW     | 11.35     |           |  | FDD B28B | LOW     | 11.59     |           |  |         |         |           |           |  |
|         | medium  | 11.13     |           |  |          | medium  | 11.42     |           |  |         |         |           |           |  |
|         | high    | 11.45     | -86.4     |  |          | high    | 10.70     | -85.42    |  |         |         |           |           |  |

Main antenna darkroom data head hand data

|        | Channel | TRP (dBm) | TIS (dBm) |  |        | Channel | TRP (dBm) | TIS (dBm) |  |        | Channel | TRP (dBm) | TIS (dBm) |  |
|--------|---------|-----------|-----------|--|--------|---------|-----------|-----------|--|--------|---------|-----------|-----------|--|
| NR N1  | LOW     | 15.04     |           |  | NR N28 | LOW     | 11.16     |           |  | NR N38 | LOW     | 14.42     |           |  |
|        | medium  | 14.46     |           |  |        | medium  | 11.31     |           |  |        | medium  | 13.67     |           |  |
|        | high    | 14.22     | -87.6     |  |        | high    | 10.67     | -85.5     |  |        | high    | 13.97     | -87.1     |  |
| NR N3  | LOW     | 14.64     |           |  | NR N66 | LOW     | 13.05     |           |  | NR N40 | LOW     | 16.19     |           |  |
|        | medium  | 13.75     |           |  |        | medium  | 14.13     |           |  |        | medium  | 15.52     |           |  |
|        | high    | 14.09     | -87.01    |  |        | high    | 13.12     | -87.32    |  |        | high    | 15.19     | -87.69    |  |
| NR N5  | LOW     | 11.26     |           |  |        |         |           |           |  | NR N41 | LOW     | 15.09     |           |  |
|        | medium  | 11.31     |           |  |        |         |           |           |  |        | medium  | 14.34     |           |  |
|        | high    | 11.24     | -85.02    |  |        |         |           |           |  |        | high    | 15.04     | -83.52    |  |
| NR N7  | LOW     | 14.34     |           |  |        |         |           |           |  | NR N77 | LOW     | 16.24     |           |  |
|        | medium  | 13.28     |           |  |        |         |           |           |  |        | medium  | 16.36     |           |  |
|        | high    | 14.39     | -87.75    |  |        |         |           |           |  |        | high    | 16.31     | -84.46    |  |
| NR N8  | LOW     | 11.23     |           |  |        |         |           |           |  | NR N78 | LOW     | 16.15     |           |  |
|        | medium  | 10.74     |           |  |        |         |           |           |  |        | medium  | 16.19     |           |  |
|        | high    | 10.69     | -85.06    |  |        |         |           |           |  |        | high    | 16.25     | -84.16    |  |
| NR N12 | LOW     | 11.21     |           |  |        |         |           |           |  |        |         |           |           |  |
|        | medium  | 11.31     |           |  |        |         |           |           |  |        |         |           |           |  |
|        | high    | 10.76     | -85.0     |  |        |         |           |           |  |        |         |           |           |  |
| NR N20 | LOW     | 11.24     |           |  |        |         |           |           |  |        |         |           |           |  |
|        | medium  | 10.79     |           |  |        |         |           |           |  |        |         |           |           |  |
|        | high    | 11.07     | -85.5     |  |        |         |           |           |  |        |         |           |           |  |
| NR N25 | LOW     | 13.75     |           |  |        |         |           |           |  |        |         |           |           |  |
|        | medium  | 13.04     |           |  |        |         |           |           |  |        |         |           |           |  |
|        | high    | 13.46     | -86.76    |  |        |         |           |           |  |        |         |           |           |  |

# GPS test results



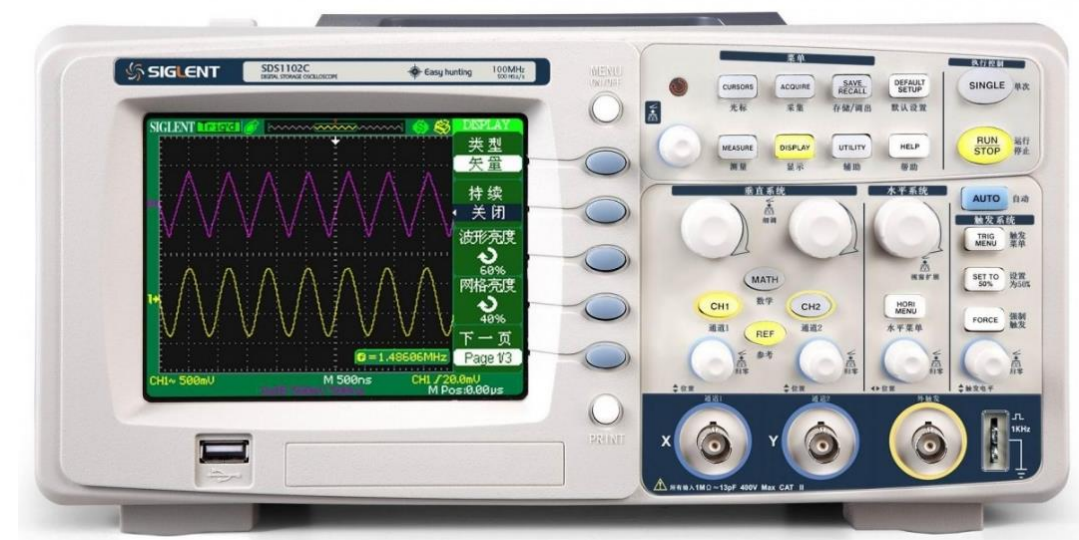
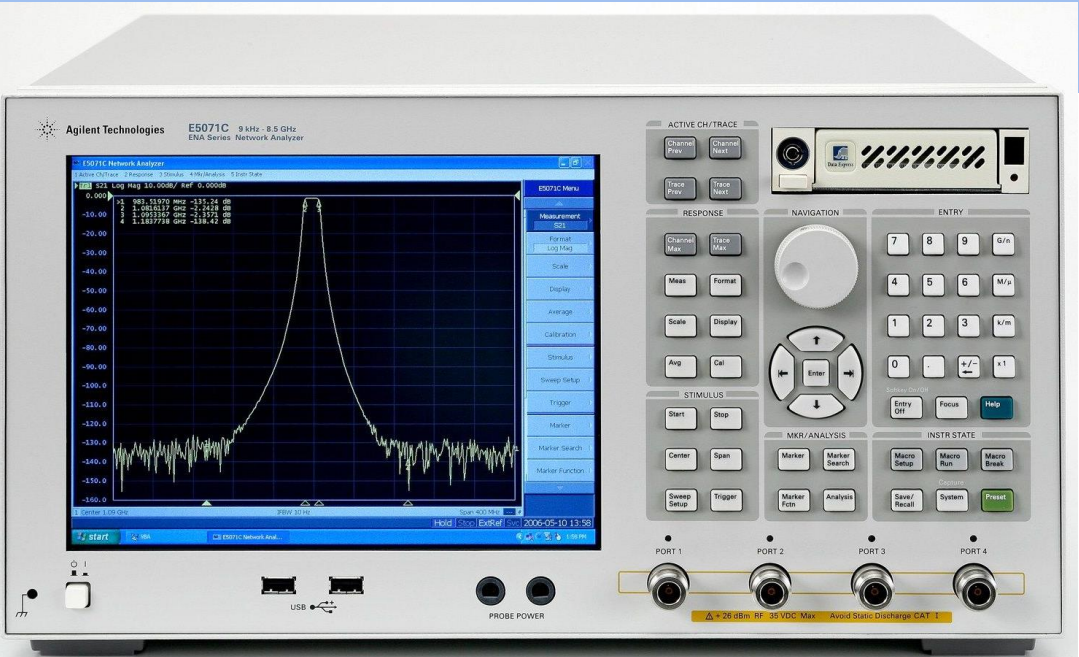
 WIFI test effect:

|           |          |        |       |           |        |       |
|-----------|----------|--------|-------|-----------|--------|-------|
|           |          |        |       |           |        |       |
| BAND      | 2.4GWIFI |        |       | 5. G WIFI |        |       |
| CHANNEL   | low      | medium | high  | low       | medium | high  |
| TRP (dBm) | 11.64    | 10.64  | 11.24 | 10.5      | 10.32  | 10.54 |
| TIS (dBm) | -79.76   | -80.31 | -80.5 | -70.02    | -70.64 | -71.0 |

 BT testing effect:

|           |         |         |         |
|-----------|---------|---------|---------|
|           |         |         |         |
| BAND      | BT      |         |         |
| CHANNEL   | low     | medium  | high    |
| TRP (dBm) | 2. 58   | 2. 79   | 3. 24   |
| TIS (dBm) | -84. 24 | -84. 16 | -84. 34 |

# 1. NFC Passive Devices



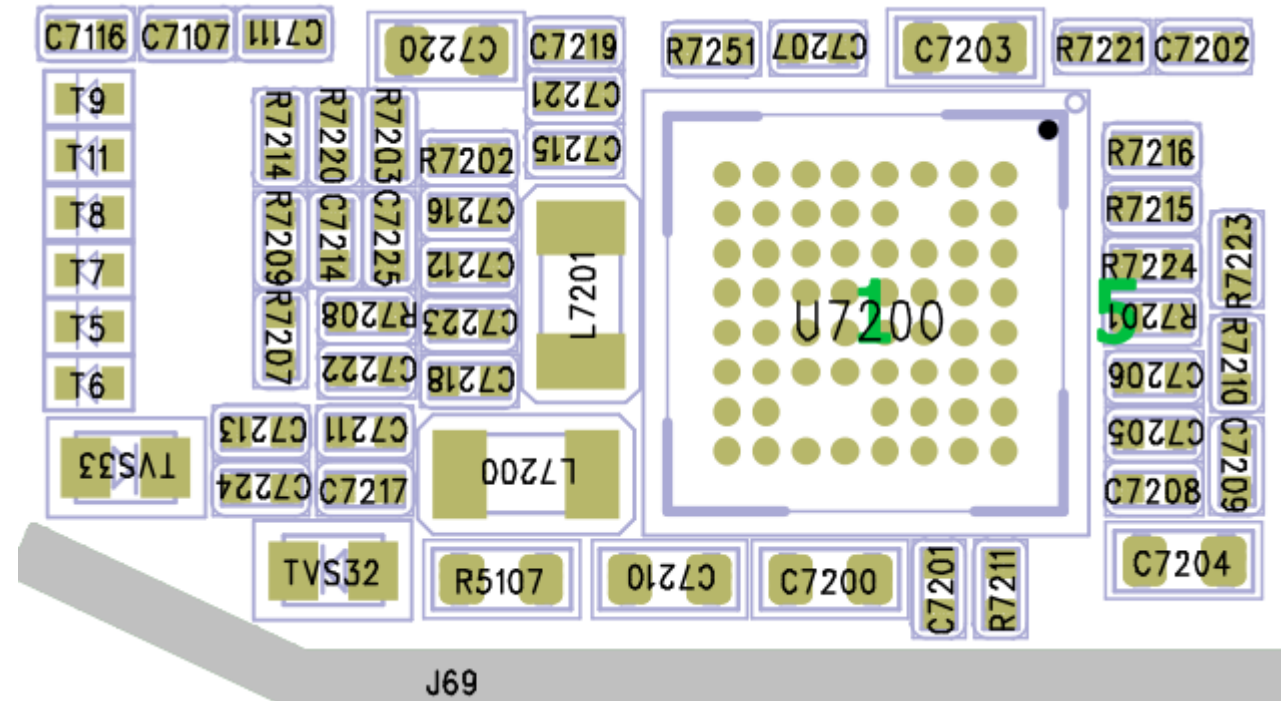
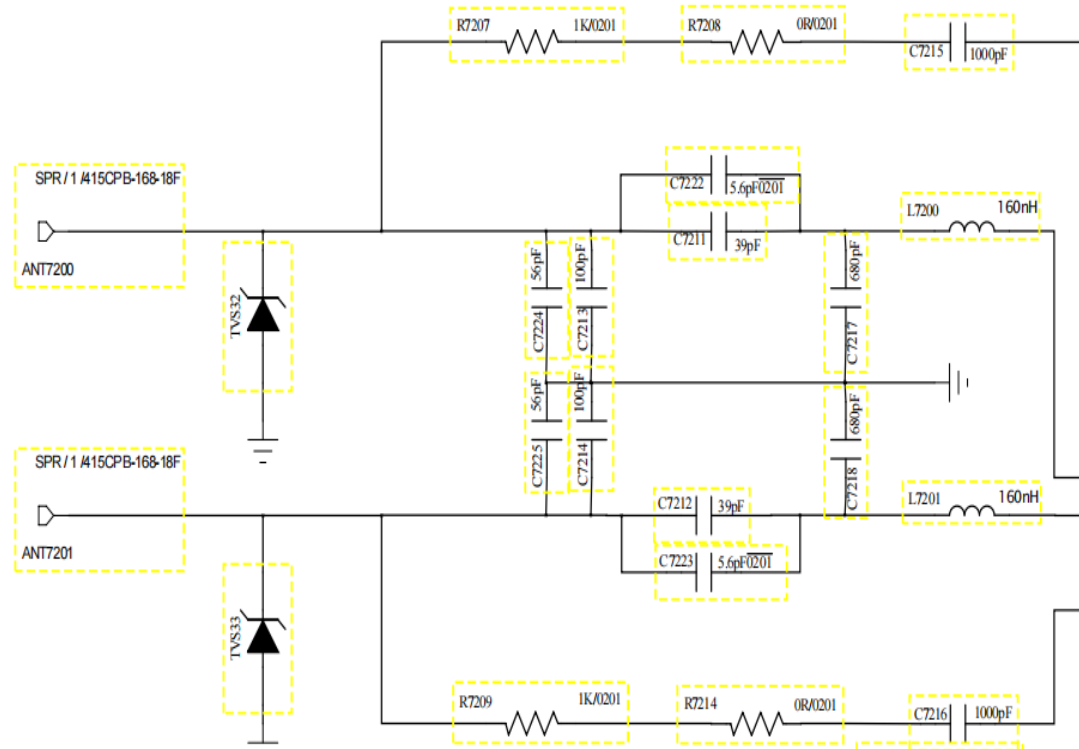
## 2. NFC Passive Debugging



### 3. NFC Q value

| 1 <sup>st</sup> Iteration: Measurement of Antenna parameters                               |               |      |
|--------------------------------------------------------------------------------------------|---------------|------|
| Antenna:                                                                                   | linear view   | unit |
| $L_a =$                                                                                    | 1.376E-06     | [H]  |
| $R_s =$                                                                                    | 1.264E+00     | [Ω]  |
| $R_p =$                                                                                    | 2.022E+03     | [Ω]  |
| $f_{ra} =$                                                                                 | 5.058E+07     | [Hz] |
| $R_p (13.56\text{MHz}) =$                                                                  | 3.905E+03     | [Ω]  |
| $R_a =$                                                                                    | 4.786         | [Ω]  |
| $C_a =$                                                                                    | 7.192E-12     | [F]  |
|  $Q_a =$ | <b>24.504</b> |      |
| $R_Q =$                                                                                    | -0.438        | [Ω]  |

## 4. NFC matching debugging

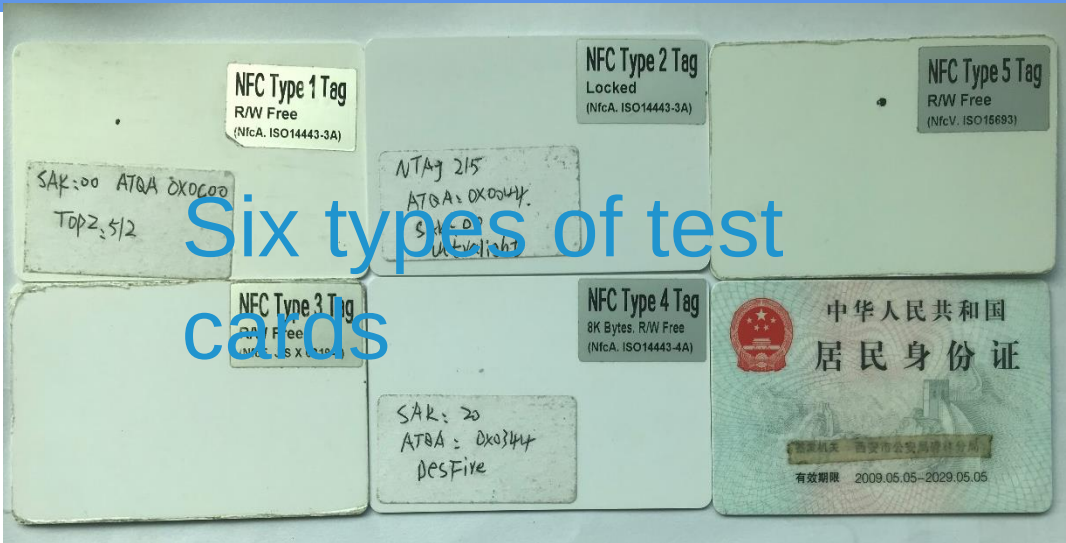


Attention: The matching parameters that need to be modified are shown in the table below (note: DVT trial production changes are as follows)

| number      | position | adjusted | Remarks                                           |
|-------------|----------|----------|---------------------------------------------------|
| C7225/C7224 |          | NC       | encapsulation: 0201 , Brand: Murata, error 5% 50V |
|             |          |          |                                                   |
|             |          |          |                                                   |
|             |          |          |                                                   |
|             |          |          |                                                   |
|             |          |          |                                                   |

# 5. NFC card reading distance

| Card Type                 | distance (cm) | Antenna material |
|---------------------------|---------------|------------------|
| Type1 (Topaz-512)         | 3.5           | FPC+ ferrite     |
| Type2 (Mifare-Ultralight) | 3.0           |                  |
| Type3 (Sony-Felica)       | 3.0           |                  |
| Type4 (Mifare-Desfire)    | 1.7           |                  |
| Type5 (ISO15693)          | 3.5           |                  |



# 6. Product Analysis and Summary

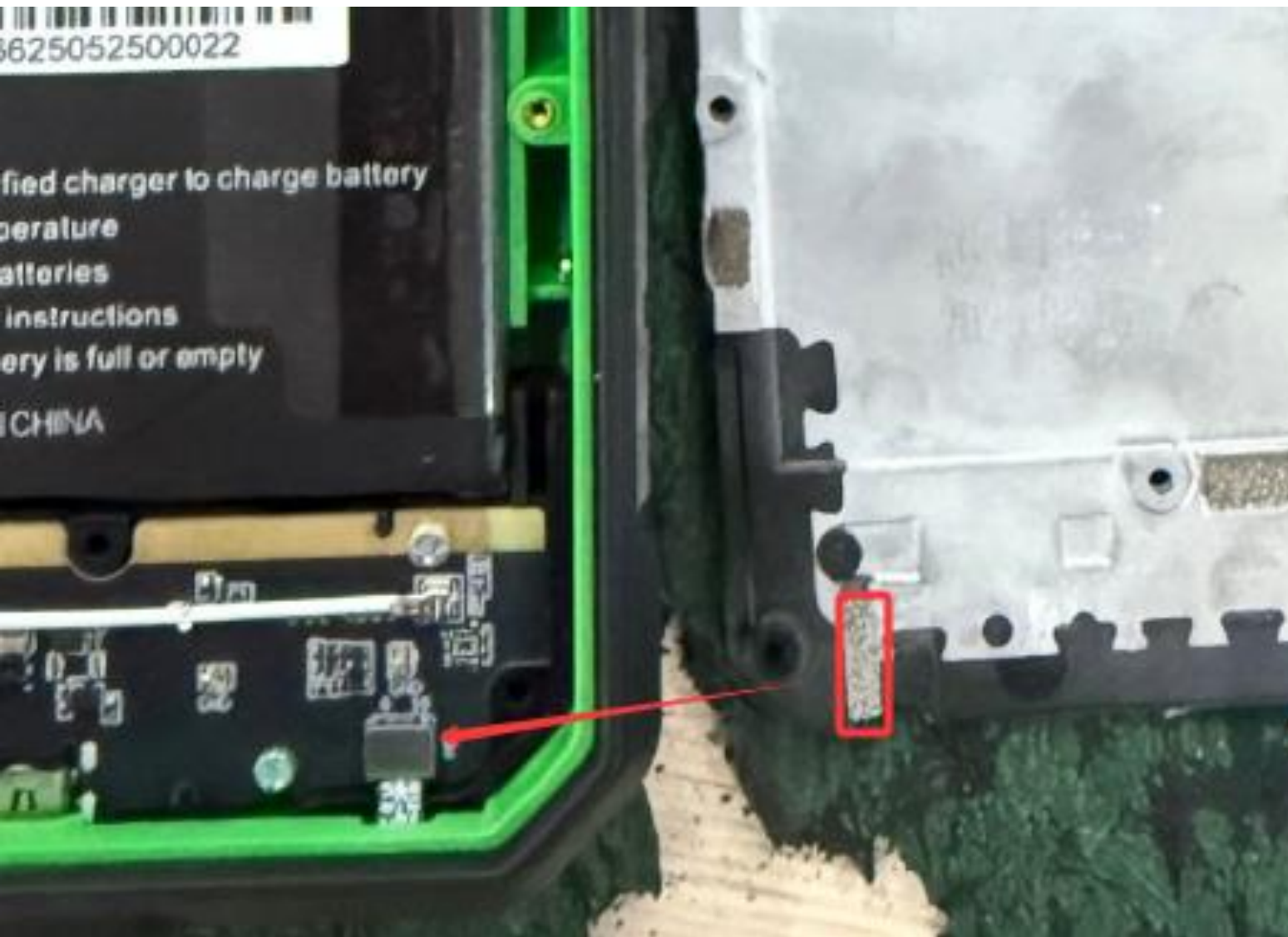
- 4.1. The reading distance is related to the compatibility of the card, and the above distance is only for testing the card
- 4.2. It is recommended to use higher precision capacitors

# New addition to environmental treatment



This conductive cloth is extended and folded in to wrap the screen cable IC  
(Affects bright screen TIS 12/17/28 10DB or more)

# environmental treatment



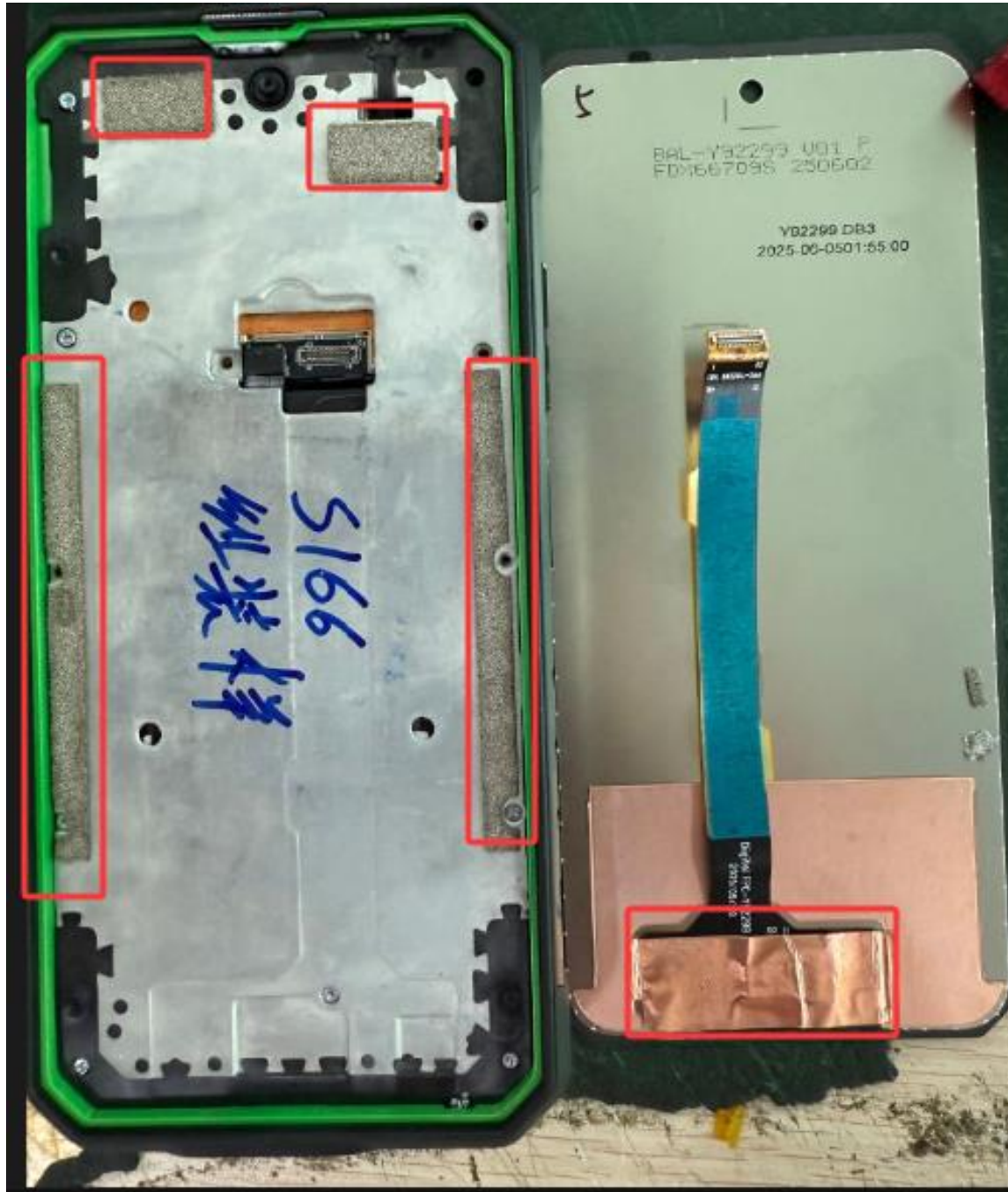
MIC cable grounding

environmental treatment



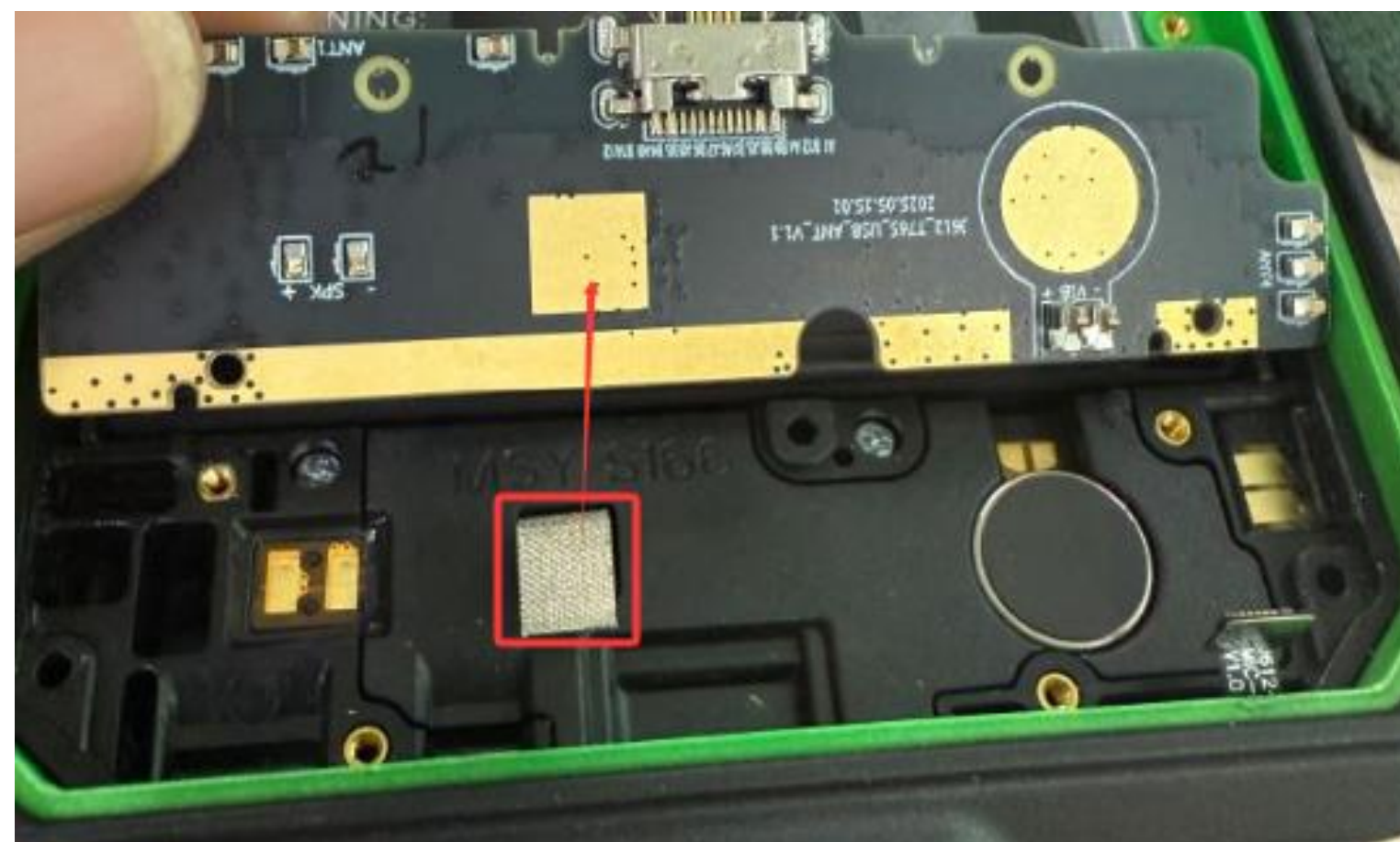
main board grounding, small board  
grounding

environmental treatment



Screen grounding (sufficient  
grounding must be ensured)  
Screen cable with conductive copper  
foil shielding

environmental treatment

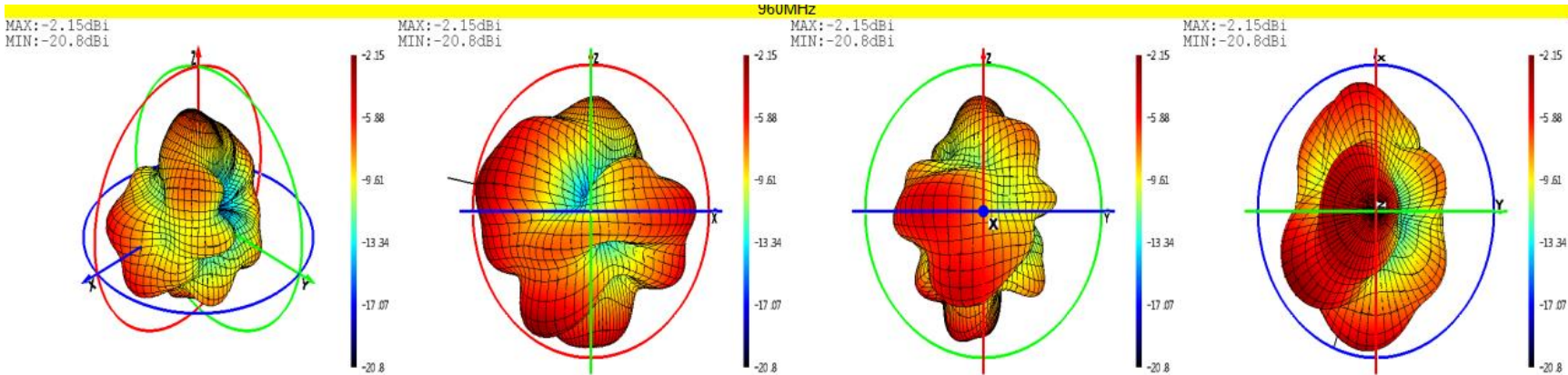
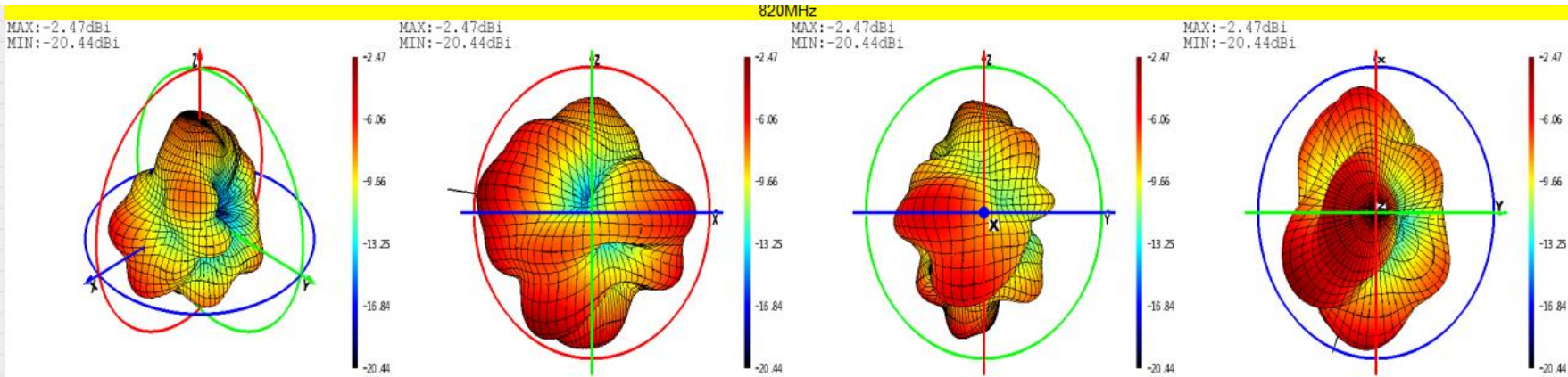
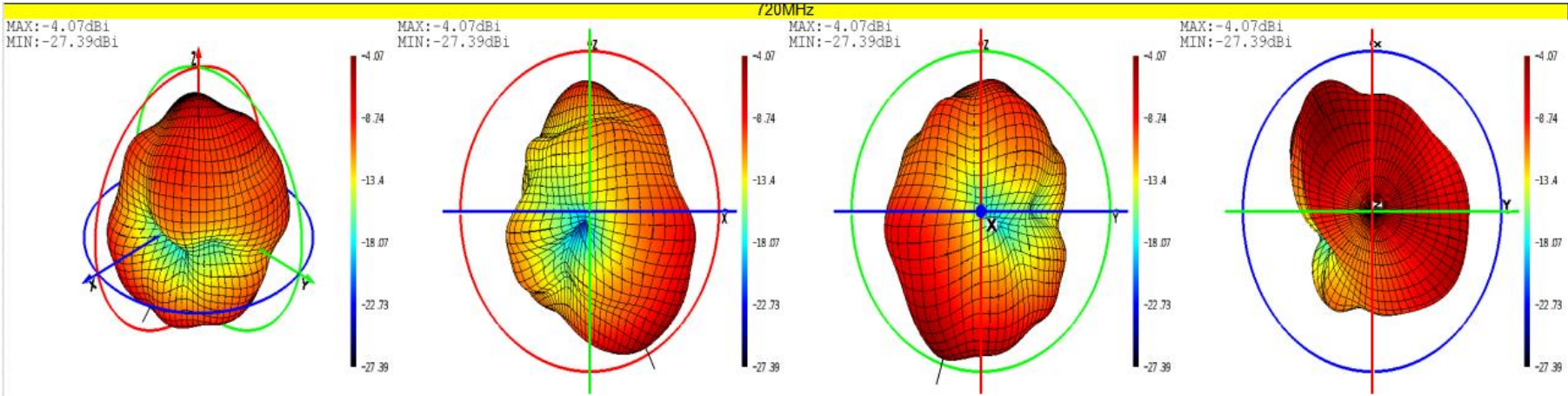


Horn grounding

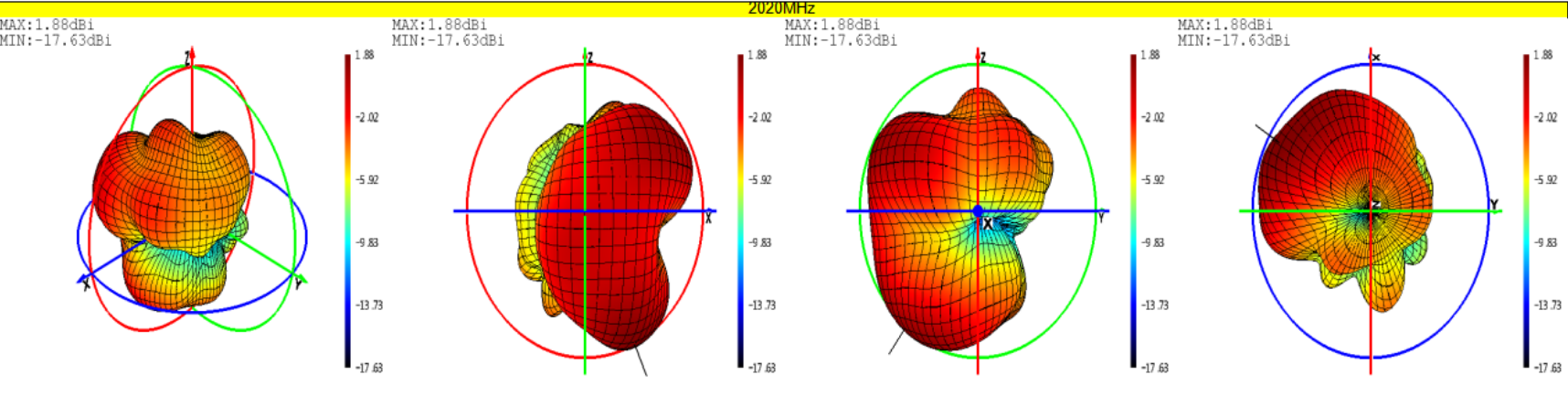
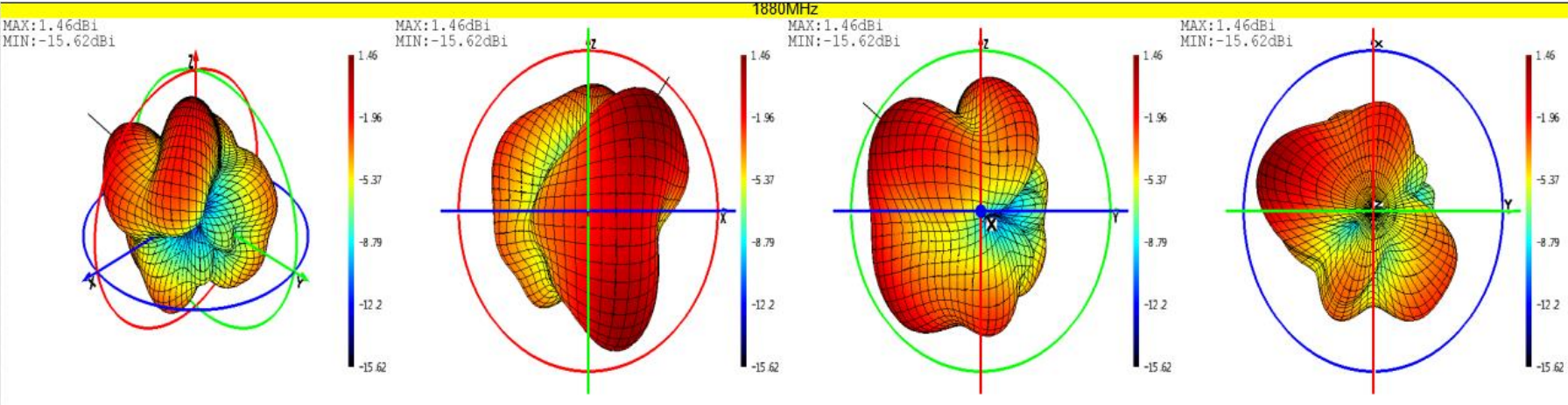
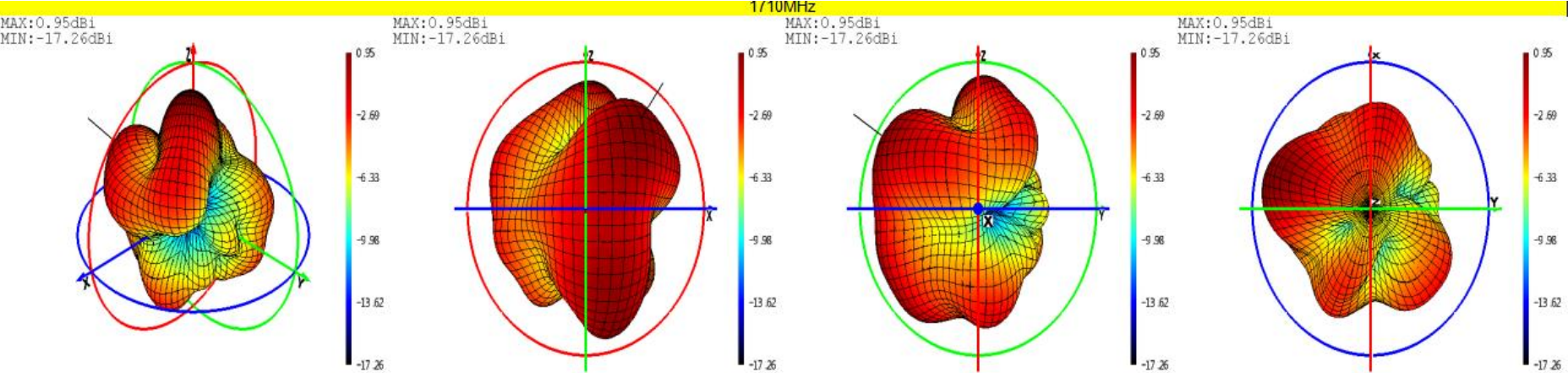
# (Antenna gain)

| Standard | Band (LTE) | Band(NR) | Frequency | Gain(dbi) |           |          |      |       |
|----------|------------|----------|-----------|-----------|-----------|----------|------|-------|
| TDD_LTE  | TDD_B34    |          | 2020      | 1.88      | WCDMA     | WCDMA_B1 | 2100 | 1.36  |
| TDD_LTE  | TDD_B38    | NR -N38  | 2580      | 2.34      | WCDMA     | WCDMA_B2 | 1880 | 1.46  |
| TDD_LTE  | TDD_B39    |          | 1880      | 1.46      | WCDMA     | WCDMA_B4 | 1710 | 0.95  |
| TDD_LTE  | TDD_B40    | NR -N40  | 2300      | 2.17      | WCDMA     | WCDMA_B5 | 820  | -2.47 |
| TDD_LTE  | TDD_B41    | NR -N41  | 2580      | 2.34      | WCDMA     | WCDMA_B8 | 960  | -2.15 |
| FDD_LTE  | FDD_B1     | NR -N1   | 2100      | 1.36      |           |          |      |       |
| FDD_LTE  | FDD_B2     |          | 1880      | 1.46      | GSM       | GSM850   | 820  | -2.47 |
| FDD_LTE  | FDD_B3     | NR -N3   | 1710      | 0.95      | GSM       | GSM900   | 960  | -2.15 |
| FDD_LTE  | FDD_B4     |          | 1710      | 0.95      | GSM       | DCS1800  | 1710 | 0.95  |
| FDD_LTE  | FDD_B5     | NR -N5   | 820       | -2.47     | GSM       | PCS1900  | 1880 | 1.46  |
| FDD_LTE  | FDD_B7     | NR -N7   | 2580      | 2.34      |           |          |      |       |
| FDD_LTE  | FDD_B8     | NR -N8   | 960       | -2.15     | NR        | NR -N77  | 3700 | 2.58  |
| FDD_LTE  | FDD_B12    | NR -N12  | 720       | -4.07     | NR        | NR -N78  | 3700 | 2.58  |
| FDD_LTE  | FDD_B17    |          | 720       | -4.07     |           |          |      |       |
| FDD_LTE  | FDD_B18    |          | 820       | -2.47     |           |          |      |       |
| FDD_LTE  | FDD_B19    |          | 820       | -2.47     |           |          |      |       |
| FDD_LTE  | FDD_B20    | NR -N20  | 820       | -2.47     | 2.4G WIFI |          | 2450 | 1.27  |
| FDD_LTE  | FDD_B25    | NR -N25  | 1880      | 1.46      | 5G WIFI   |          | 5500 | 0.33  |
| FDD_LTE  | FDD_B26    |          | 820       | -2.47     |           |          |      |       |
| FDD_LTE  | FDD_B28    | NR -N28  | 720       | -4.07     | GPS       | L1       | 1575 | 2.27  |
| FDD_LTE  | FDD_B66    | NR -N66  | 1710      | 0.95      | BT        |          | 2450 | 1.27  |

MIMO antenna apple map

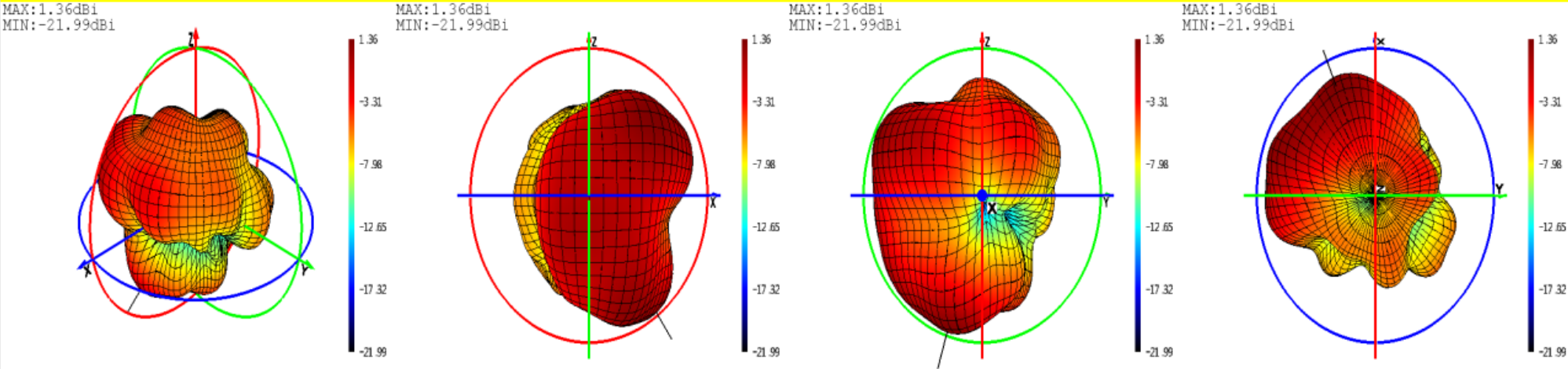


# MIMO antenna apple map

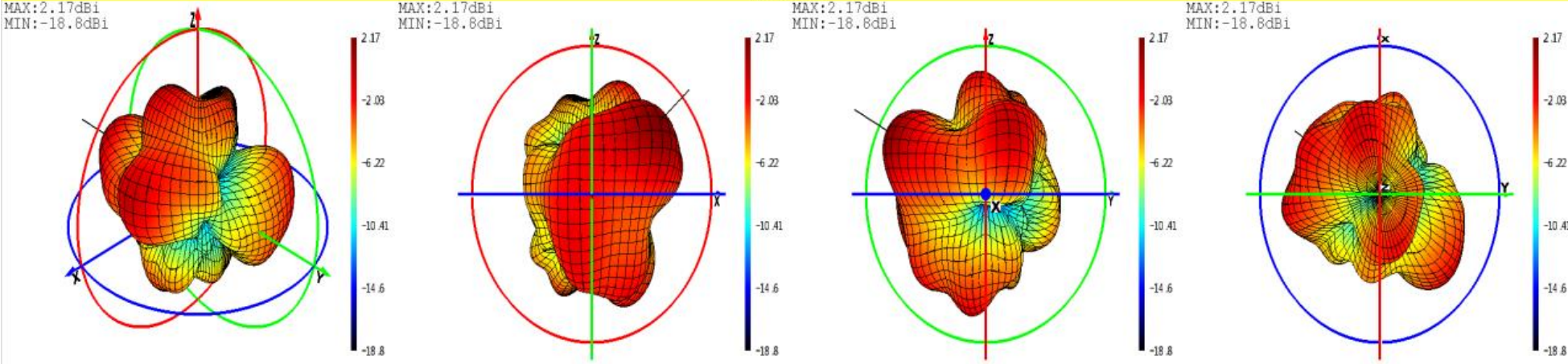


# MIMO antenna apple map

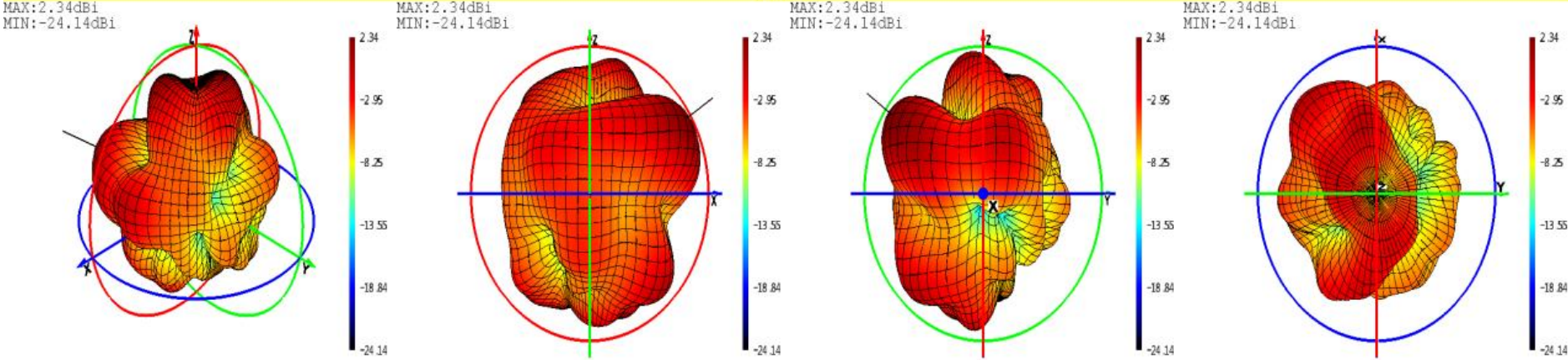
2100MHz



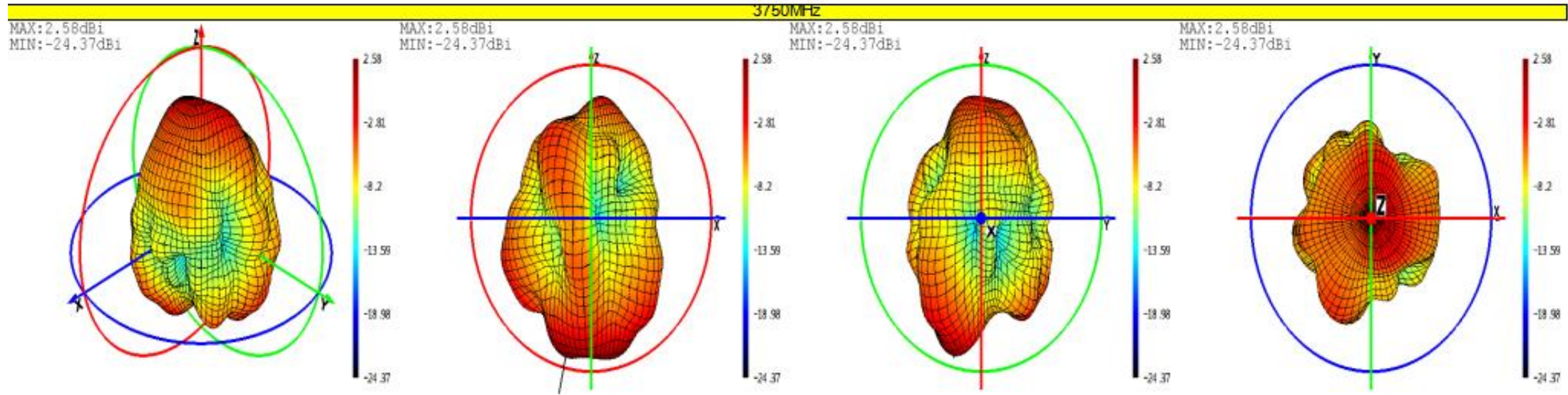
2300MHz



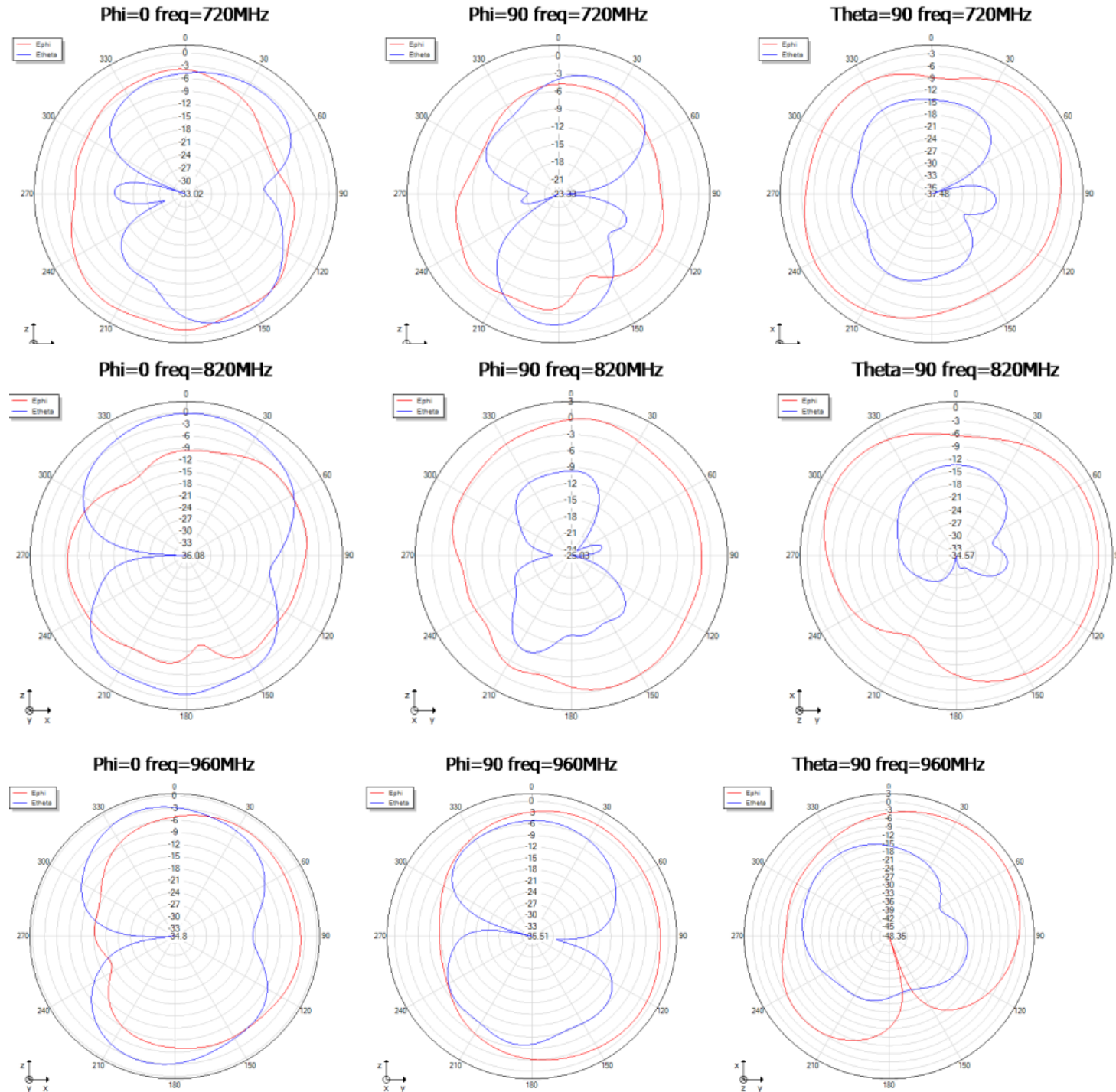
2580MHz



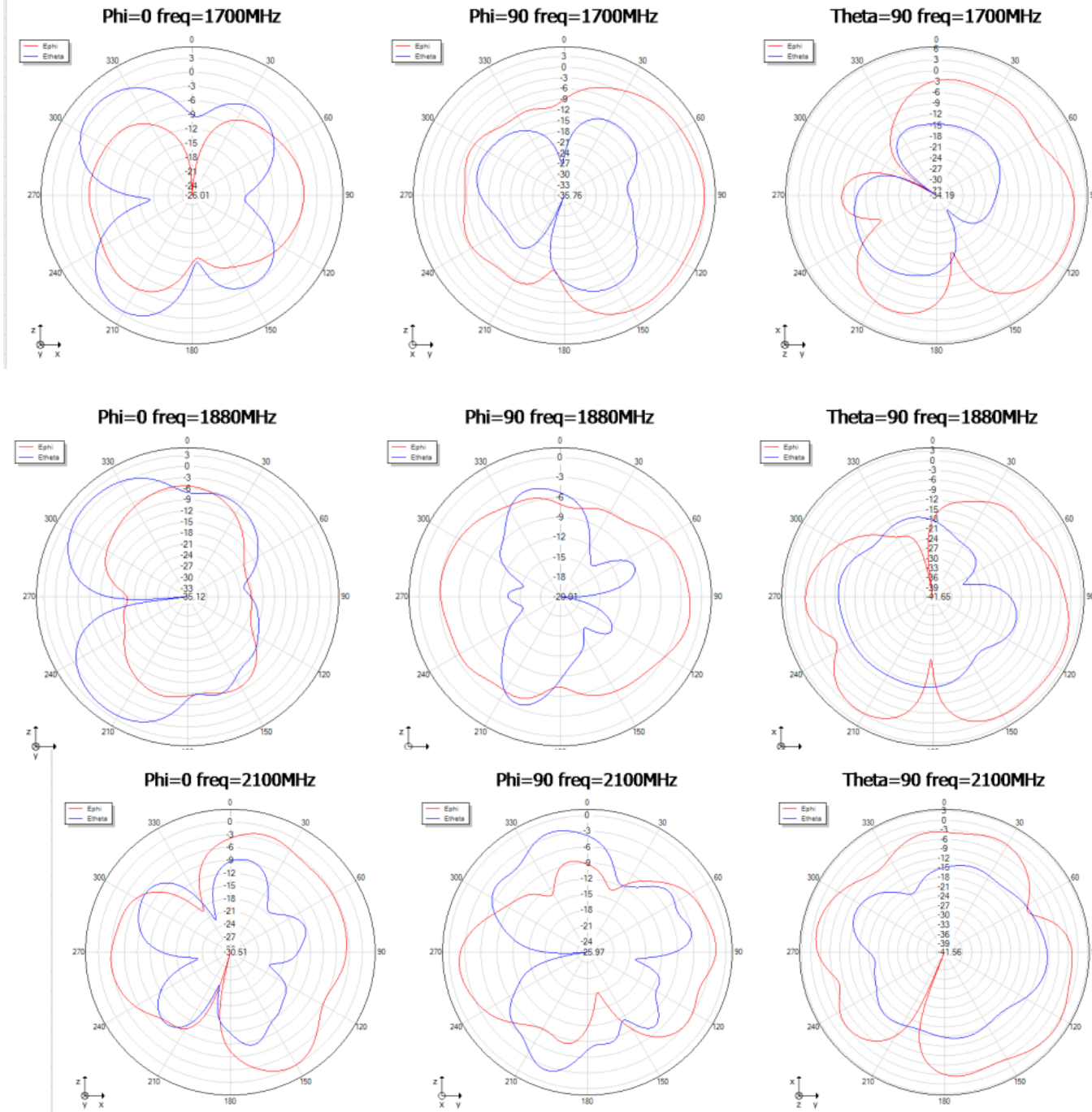
# MIMO antenna apple map



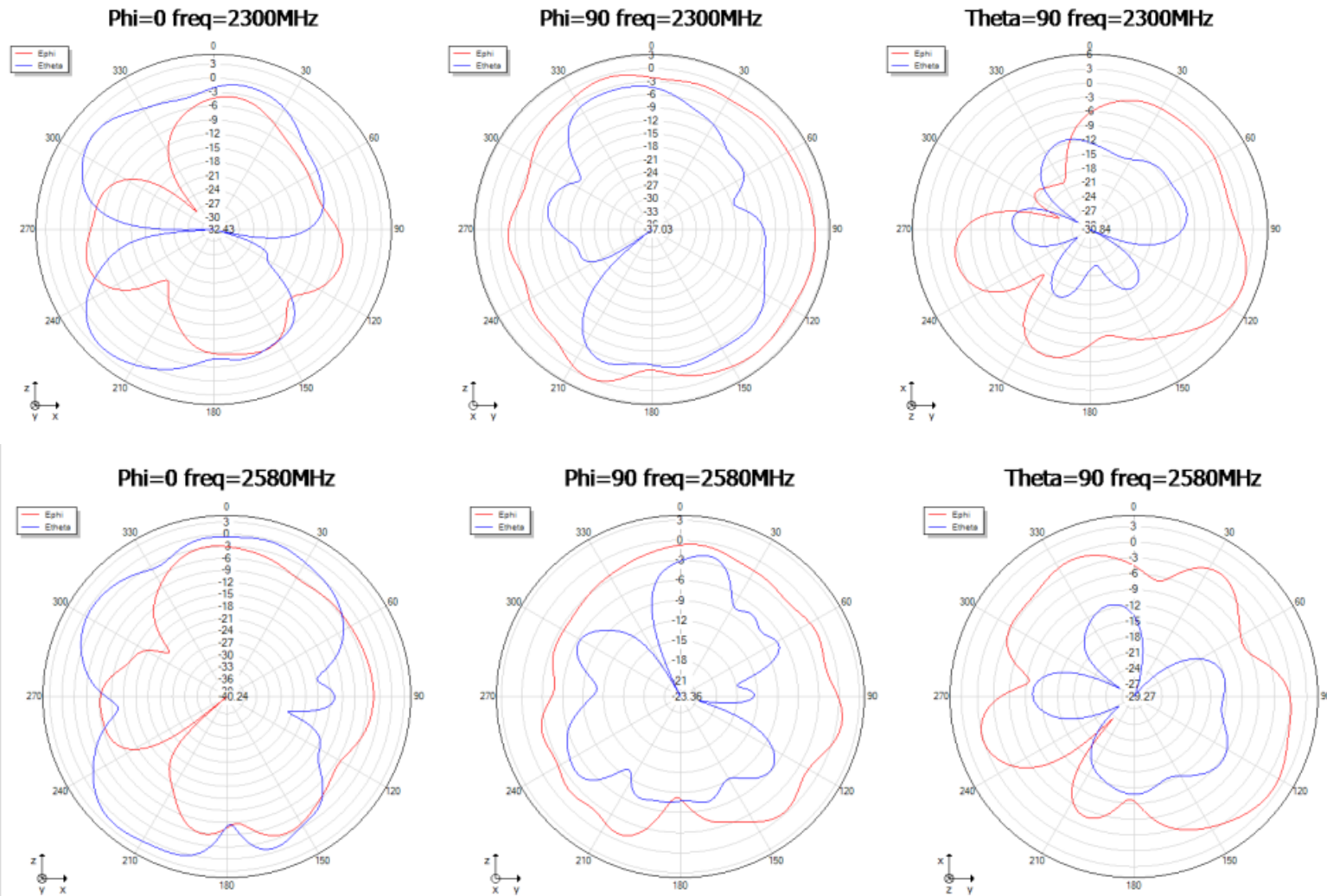
# (MIMO antenna) PolarGraphs/EtotalGraphs



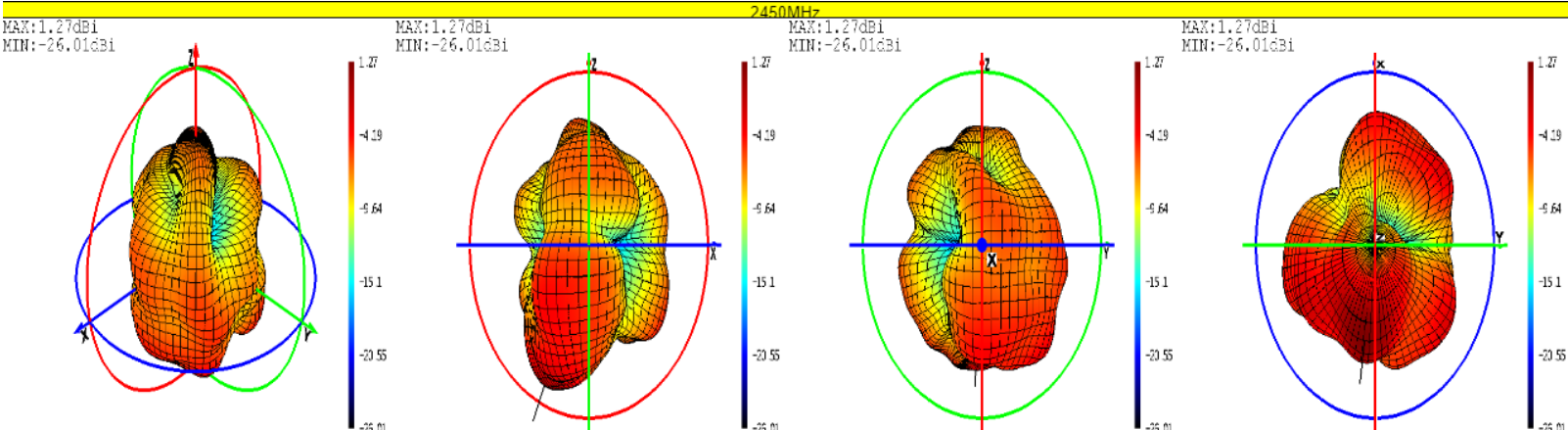
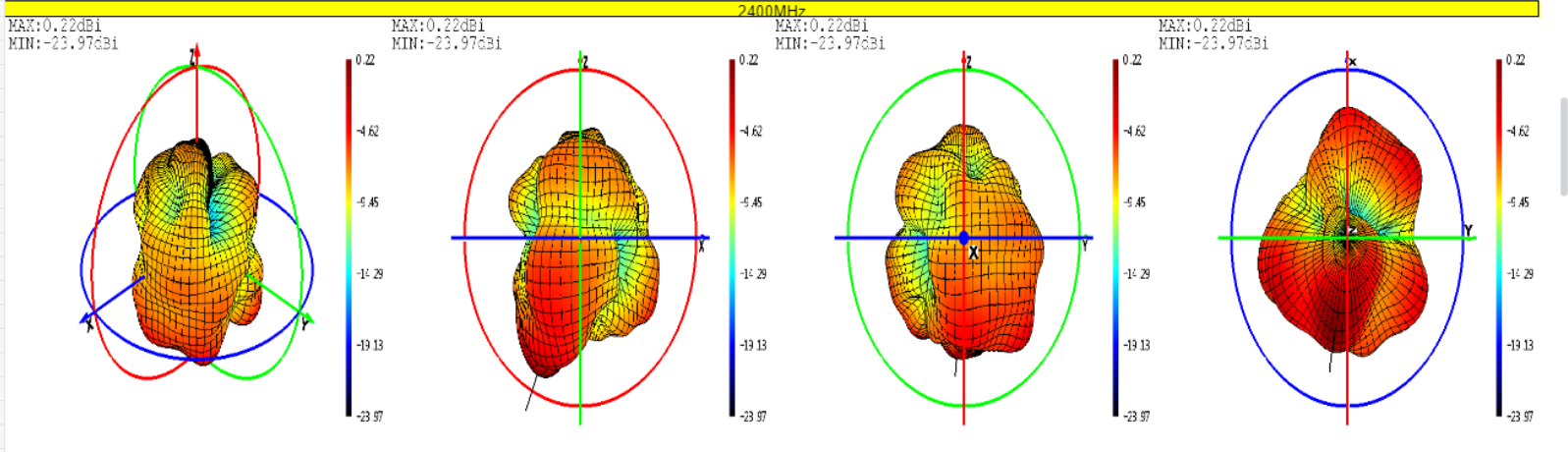
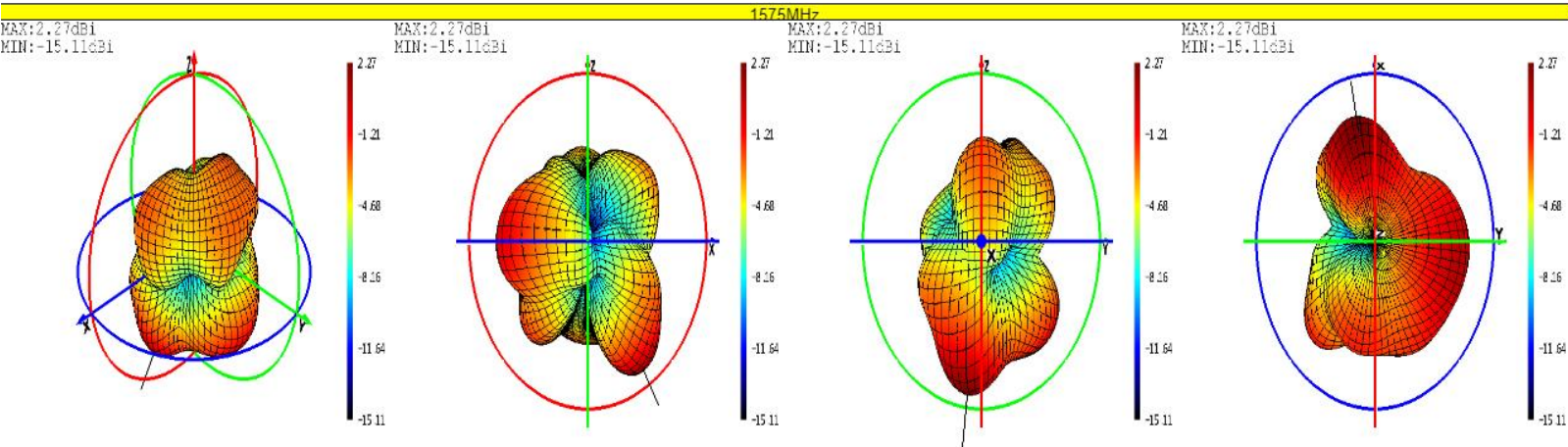
# (MIMO antenna) PolarGraphs/EtotalGraphs



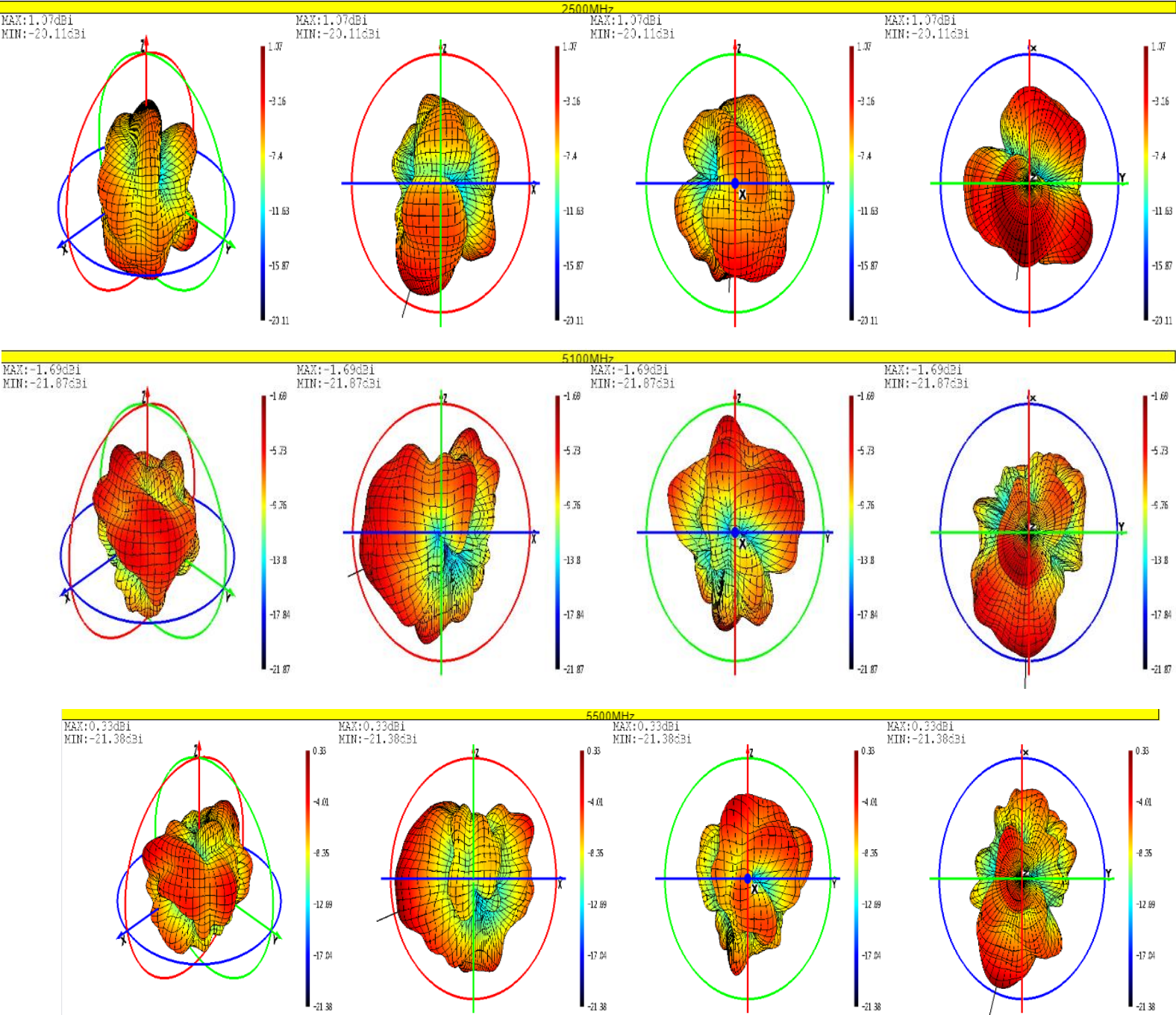
## (MIMO antenna) PolarGraphs/EtotalGraphs



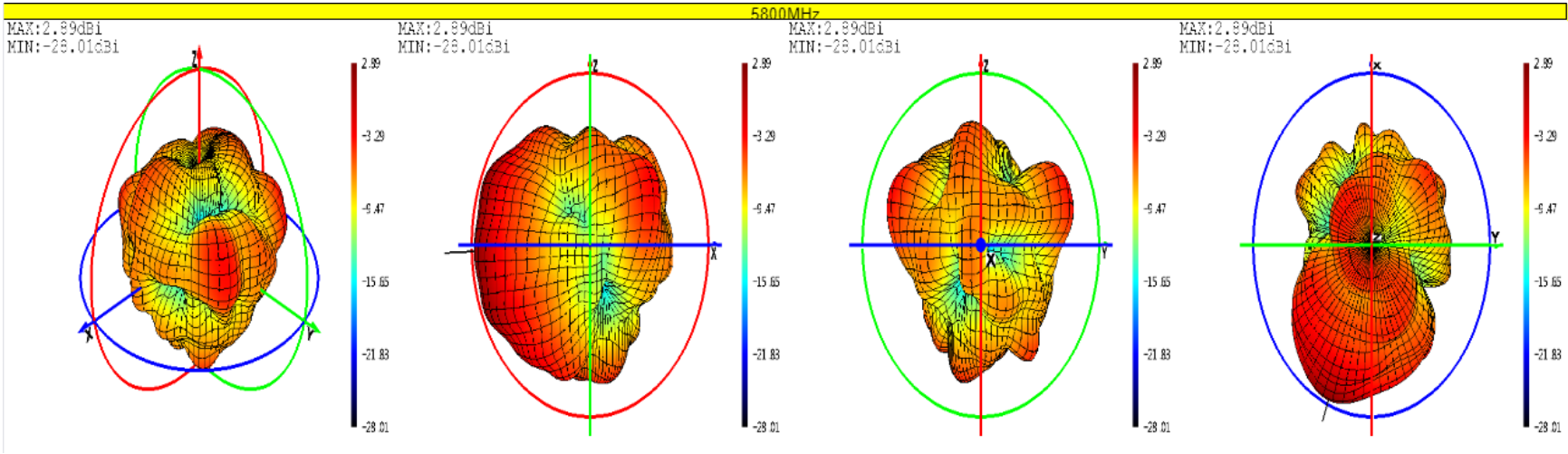
(GPS antenna) + (2.4G/5G WIFI/BT antenna) apple  
Map



(GPS antenna) + (2.4G/5G WIFI/BT antenna) apple  
Map

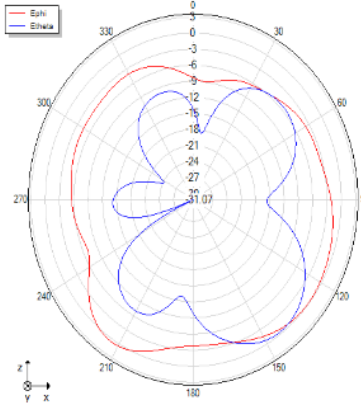


(GPS antenna) + (2.4G/5G WIFI/BT antenna) apple  
Map

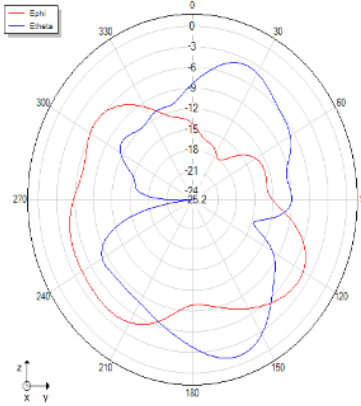


# (GPS antenna) + (2.4G/5G WIFI/BT antenna) PolarGraphs/EtotalGraphs

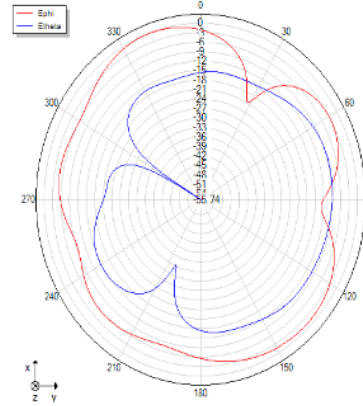
Phi=0 freq=1575MHz



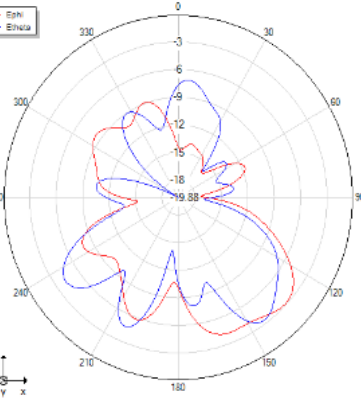
Phi=90 freq=1575MHz



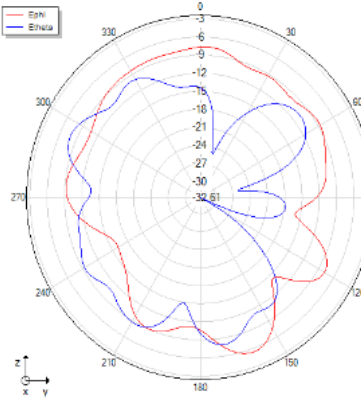
Theta=90 freq=1575MHz



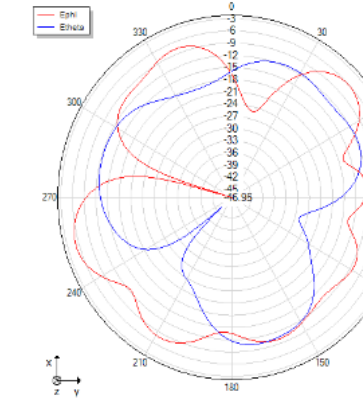
Phi=0 freq=2400MHz



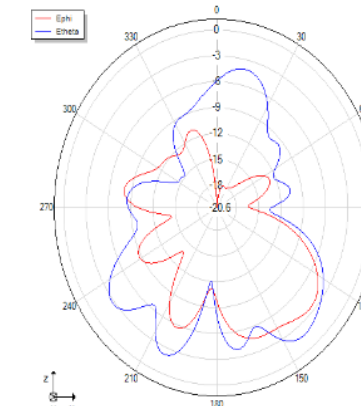
Phi=90 freq=2400MHz



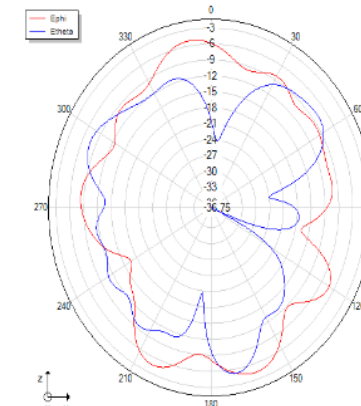
Theta=90 freq=2400MHz



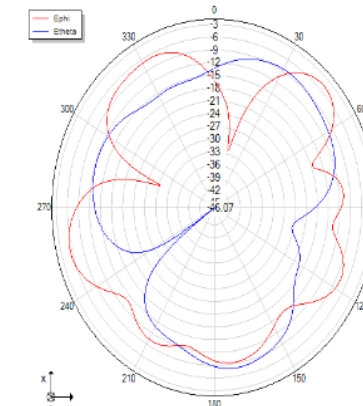
Phi=0 freq=2450MHz



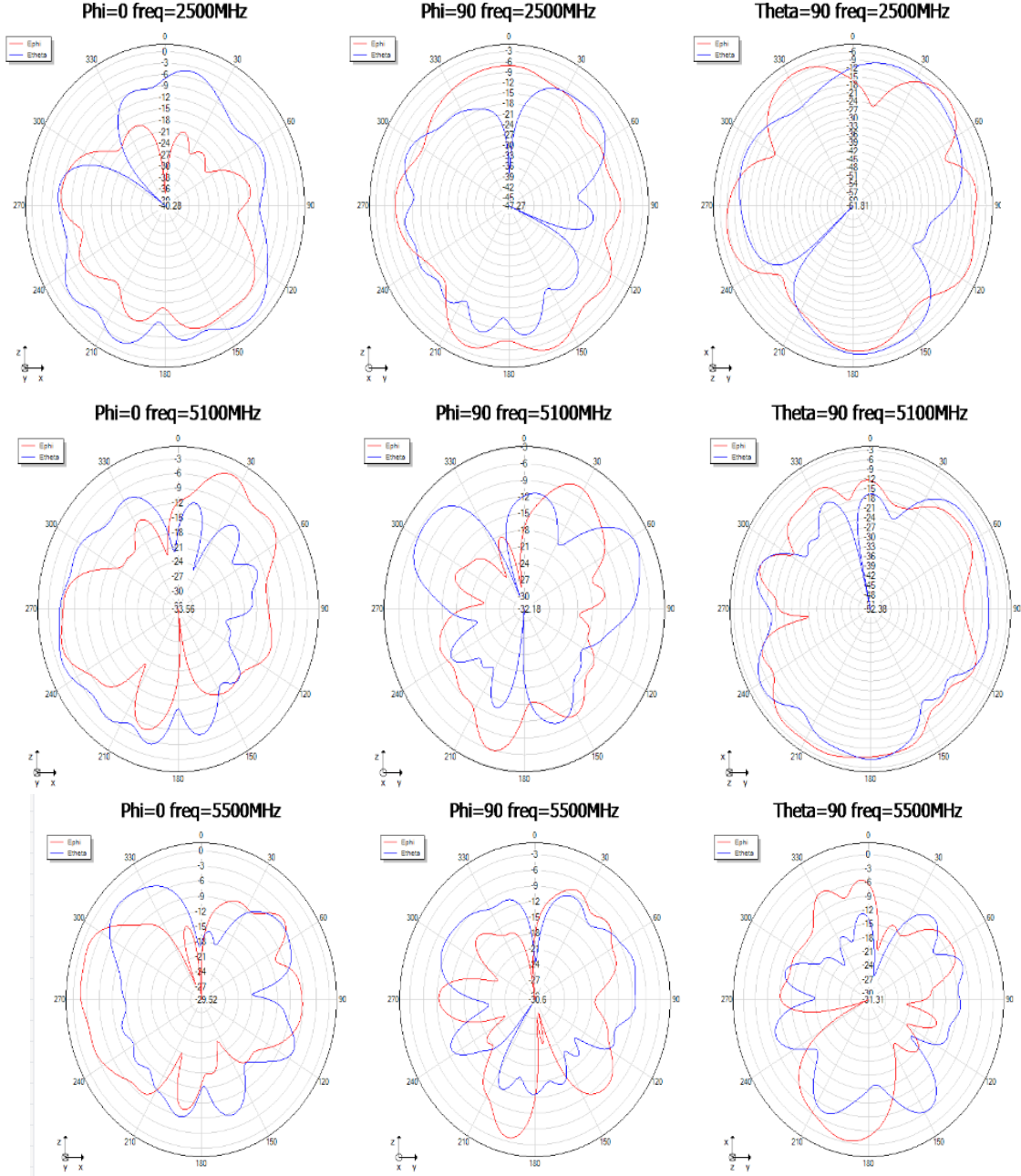
Phi=90 freq=2450MHz



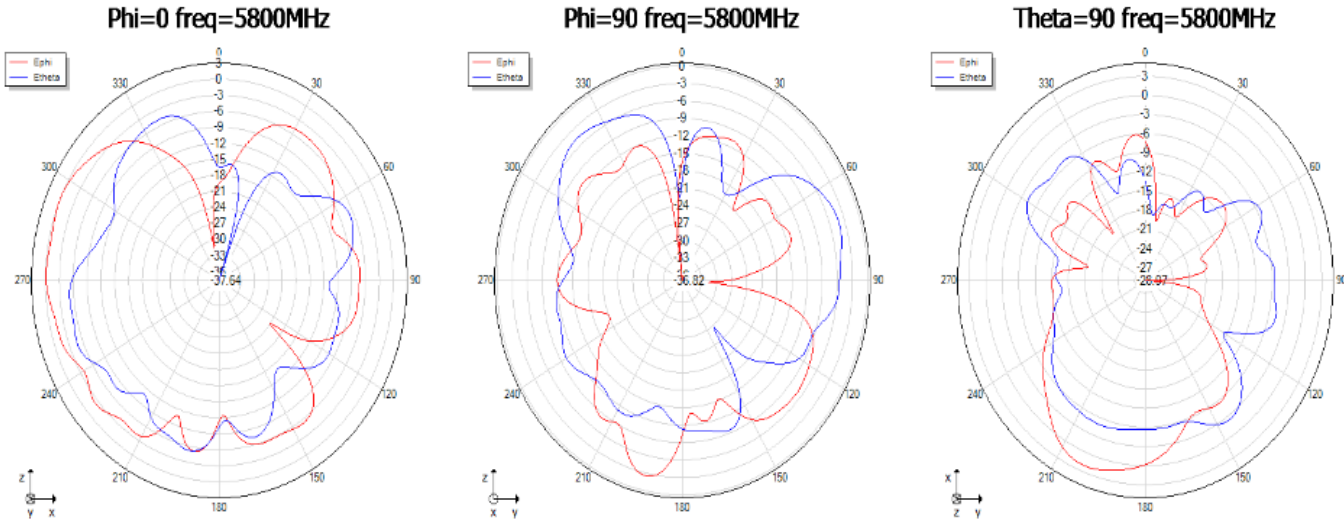
Theta=90 freq=2450MHz



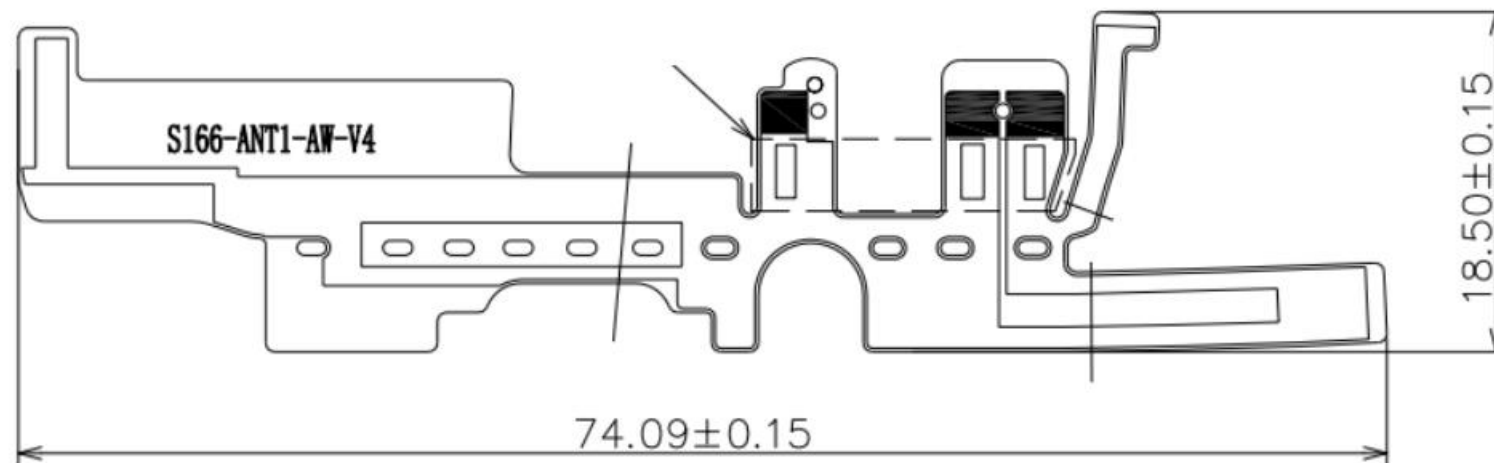
# (GPS antenna) + (2.4G/5G WIFI/BT antenna) PolarGraphs/EtotalGraphs



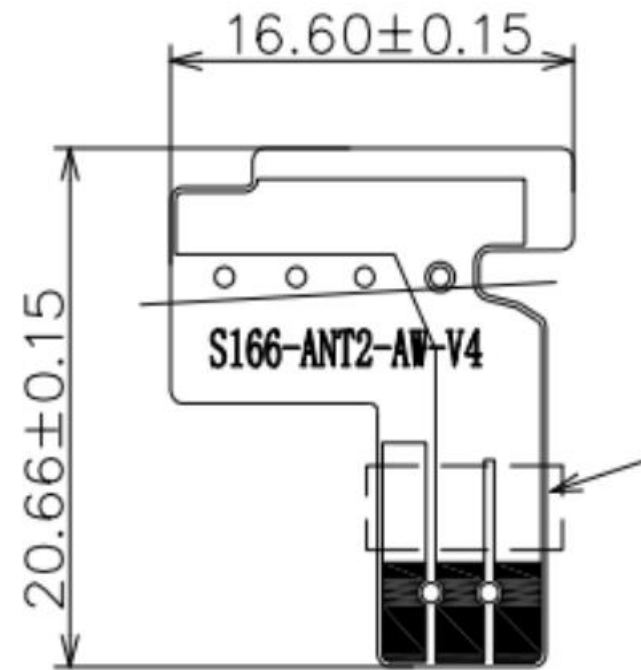
# (GPS antenna) + (2.4G/5G WIFI/BT antenna) PolarGraphs/EtotalGraphs



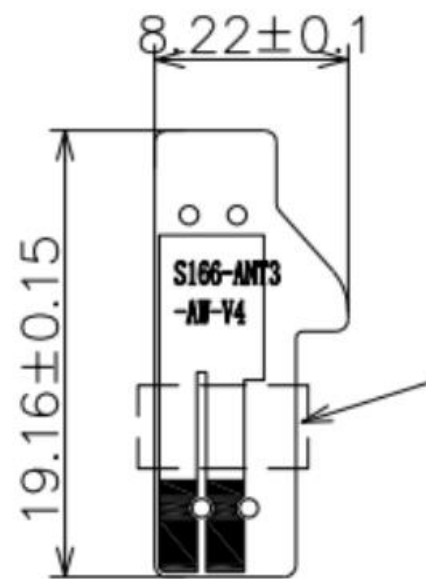
ANT1 antenna



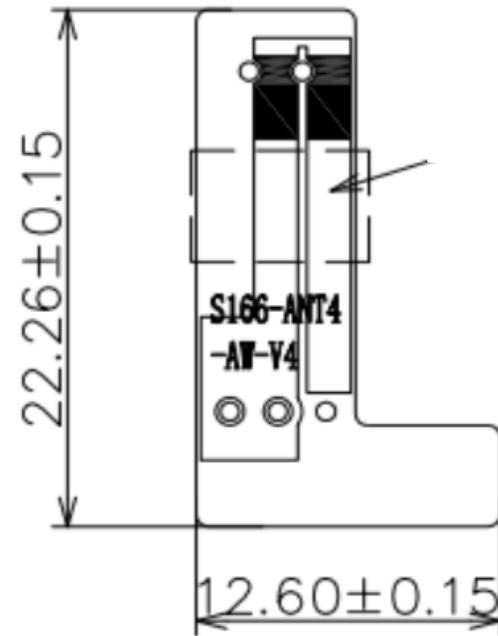
ANT2 antenna



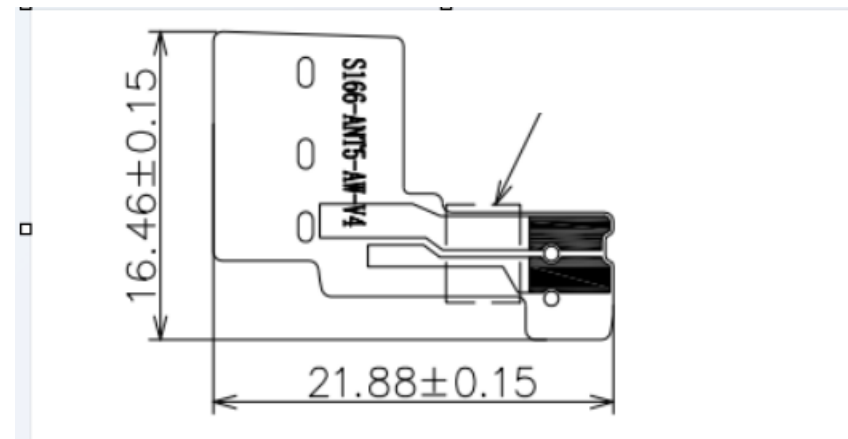
ANT3 antenna



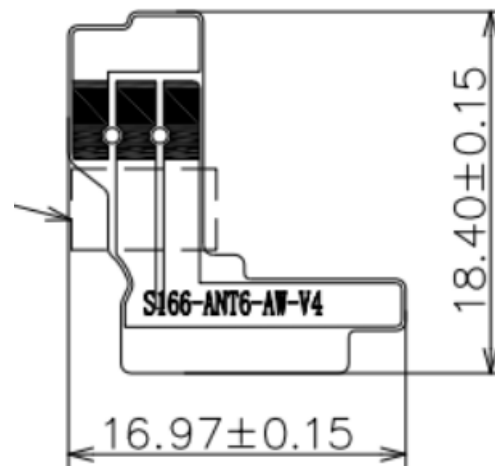
ANT4 antenna



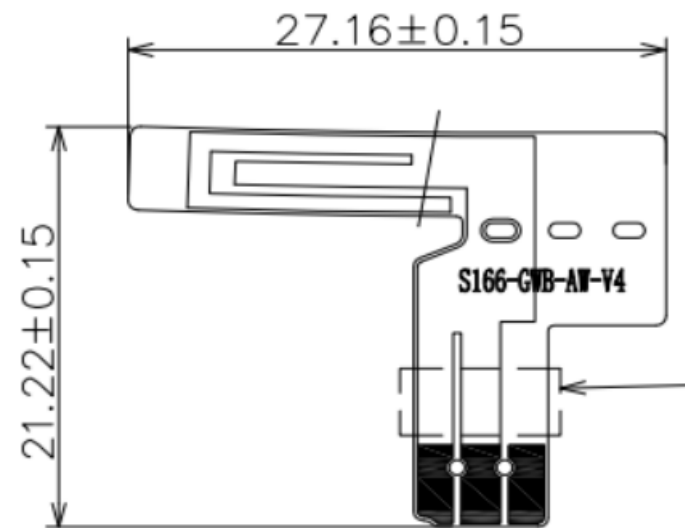
ANT5 antenna



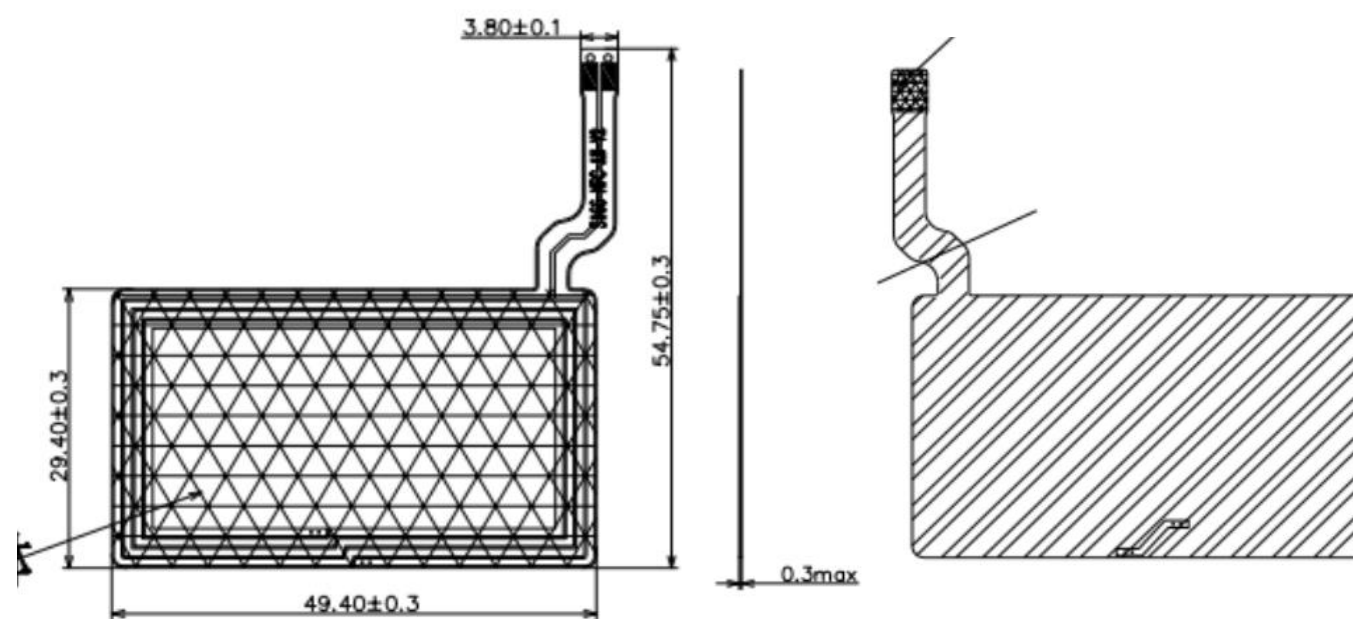
ANT6 antenna



GPS antenna



NFC antenna



Thank you