



Material name T50

Sample color black

Sample type FPC: 4G MAIN

Customer model \_\_\_\_\_

R. A

| Prepared | structure | character | ratify | Sample sending date |
|----------|-----------|-----------|--------|---------------------|
|          |           |           |        | 2021. 5. 14         |



## 1. Customer antenna debugging design demand frequency band

| frequency | frequency range                         |
|-----------|-----------------------------------------|
| 2G        | GSM900 850 1800 1900                    |
| 3G        | WCDMA1/2/5/8 TD-A/F                     |
| 4G        | LTE-B1/2/3/4/5/7/8/17/20/28/38/39/40/41 |

## 2. Antenna diagram

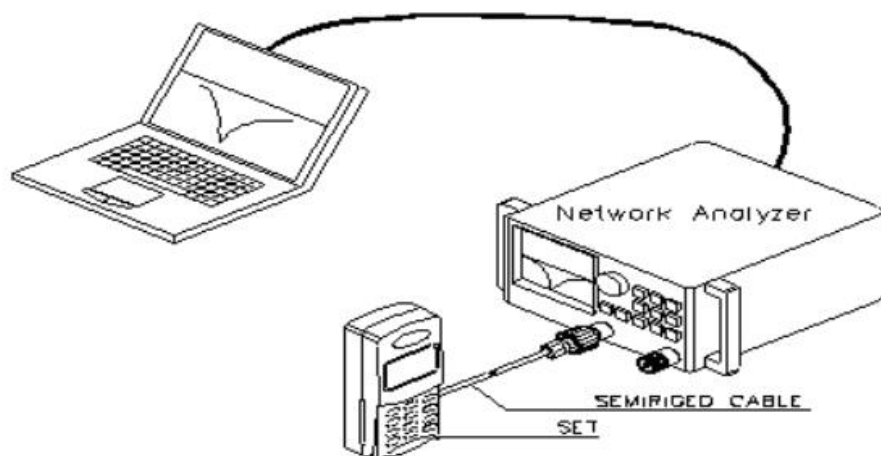


## 3. Electrical performance

### 3.1 Test method description and data

| Name                                 |                                                               |
|--------------------------------------|---------------------------------------------------------------|
| Vector Network Analyzer              | S11/Impedance/ Passive Test                                   |
| Agilent 8960<br>SP6010<br>R&S CMU200 | GSM、 GPRS、 EDGE、 CDMA2000、 1xEV-DO、<br>TD-SCDMA、 WCDMA、 HSDPA |
| R&S CMW500<br>MT8820C                | TD-SCDMA、 WCDMA、<br>HSDPA、 LTE、 WIFI、 GPS                     |
| Agilent E4438C                       | GPS                                                           |
| MVG Chamber                          | Passive Test / OTA active Test / Efficiency/Gain              |

### 3.2 Passive Test Report



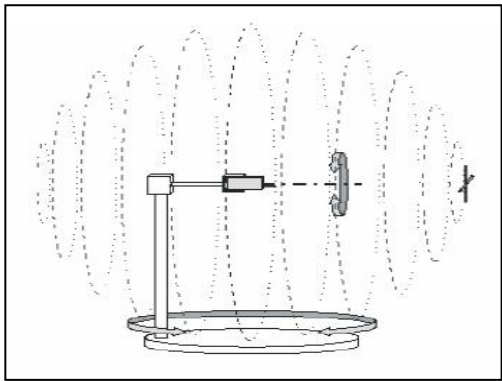
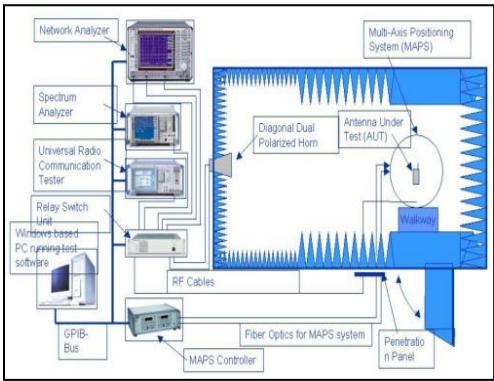
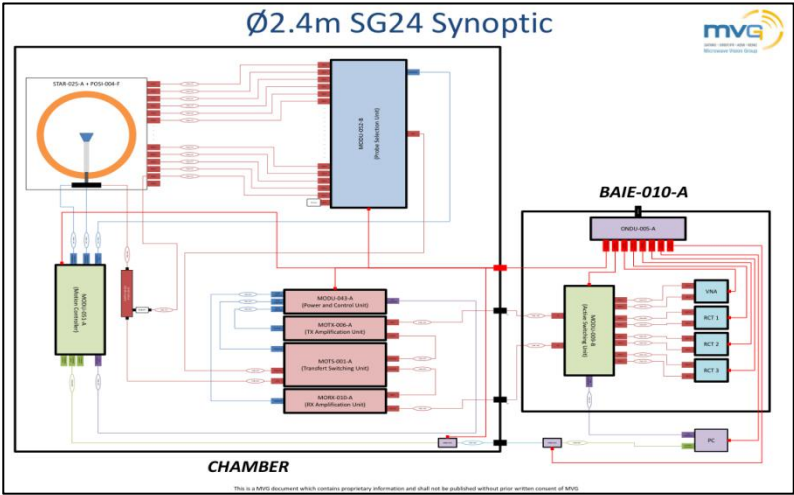
测试示意图

3.3 Active Test Report

TRP/TIS

$$TRP \cong \frac{\pi}{2NM} \sum_{i=1}^{N-1} \sum_{j=0}^{M-1} [EiRP_{\theta}(\theta_i, \phi_j) + EiRP(\theta_i, \phi_j)] \sin(\theta_i)$$

$$TIS \cong \frac{2NM}{\pi \sum_{i=1}^{N-1} \sum_{j=0}^{M-1} \left[ \frac{1}{EIS_{\theta}(\theta_i, \phi_j)} + \frac{1}{EIS_{\phi}(\theta_i, \phi_j)} \right]} \sin(\theta_i)$$



### 3.4 OTA TRP/TIS

| BAND    | GSM900 |      |        | DCS1800 |      |        |
|---------|--------|------|--------|---------|------|--------|
| CHANNEL | 1      | 62   | 124    | 512     | 698  | 885    |
| TRP     | 27.2   | 27.1 | 26.9   | 25.3    | 25.4 | 25.6   |
| TIS     |        |      | -100.8 |         |      | -101.3 |
| TIS     |        |      | -99.9  |         |      | -100.4 |

| BAND    | GSM850 |      |         | PCS1900 |      |        |
|---------|--------|------|---------|---------|------|--------|
| CHANNEL | 128    | 190  | 250     | 512     | 661  | 810    |
| TRP     | 25.7   | 26.9 | 27.7    | 25.5    | 25.5 | 24.2   |
| TIS     |        |      | -103.16 |         |      | -100.8 |
| TIS     |        |      | -93.8   |         |      | -100.1 |

| BAND    | W1    |       |        | W8   |      |        |
|---------|-------|-------|--------|------|------|--------|
| CHANNEL | 10562 | 10700 | 10838  | 2937 | 3012 | 3088   |
| TRP     | 16.5  | 17.1  | 17.4   | 17.9 | 17.7 | 17.7   |
| TIS     |       |       | -104.1 |      |      | -101.5 |
| TIS     |       |       | -104   |      |      | -100.1 |
| BAND    | W2    |       |        | W5   |      |        |
| CHANNEL | 9662  | 9800  | 9938   | 4357 | 4408 | 4458   |
| TRP     | 17.6  | 17.7  | 17.3   | 17.1 | 16.9 | 17.2   |
| TIS     |       |       | -103.8 |      |      | -104.4 |
| TIS     |       |       | -103.2 |      |      | -100.1 |

| BAND    | TD-A  |       |        | TD-F |      |        |
|---------|-------|-------|--------|------|------|--------|
| CHANNEL | 10054 | 10087 | 10121  | 9404 | 9500 | 9596   |
| TRP     | 16.6  | 16.8  | 16.9   | 17.8 | 18.1 | 18.2   |
| TIS     |       |       | -104.1 |      |      | -104.7 |
| TIS     |       |       | -103.8 |      |      | -104.2 |

| BAND    | FDD-B1 |       |       | FDD-B2 |       |       |
|---------|--------|-------|-------|--------|-------|-------|
| CHANNEL | 18050  | 18300 | 18550 | 18650  | 18900 | 19150 |
| TRP     | 16.2   | 16.1  | 16.2  | 17.6   | 17.6  | 17.2  |
| TIS     |        |       | -90.9 |        |       | -90.4 |
| TIS     |        |       | -90.4 |        |       | -90.1 |
| BAND    | FDD-B3 |       |       | FDD-B4 |       |       |
| CHANNEL | 19250  | 19575 | 19900 | 20000  | 20175 | 20350 |
| TRP     | 17.8   | 18.1  | 18.2  | 17.8   | 18.1  | 18.2  |
| TIS     |        |       | -87.6 |        |       | -89.1 |
| TIS     |        |       | -87.1 |        |       | -88.1 |

| BAND    | FDD-B5 |       |       | FDD-B7  |       |       |
|---------|--------|-------|-------|---------|-------|-------|
| CHANNEL | 20450  | 20525 | 20600 | 20800   | 21100 | 21400 |
| TRP     | 16.1   | 16.7  | 17.0  | 18.4    | 18.1  | 17.3  |
| TIS     |        |       | -90.2 |         |       | -88.4 |
| TIS     |        |       | -84.4 |         |       | -87.3 |
| BAND    | FDD-B8 |       |       | FDD-B13 |       |       |
| CHANNEL | 21500  | 21625 | 21750 |         | 28230 |       |
| TRP     | 18.2   | 17.7  | 17.3  |         | 14.3  |       |
| TIS     |        |       | -87.5 |         | -90.1 |       |
| TIS     |        |       | -86.1 |         | -85.6 |       |

| BAND    | FDD-B17 |       |       | FDD-B20 |       |       |
|---------|---------|-------|-------|---------|-------|-------|
| CHANNEL | 23780   | 23790 | 23800 | 24200   | 24300 | 24400 |
| TRP     | 11.4    | 11.5  | 11.7  | 16.3    | 17.1  | 17.4  |
| TIS     |         |       | -89.5 |         |       | -89.3 |
| TIS     |         |       | -87.2 |         |       | -85.4 |
| BAND    | TDD-B28 |       |       |         |       |       |
| CHANNEL | 27260   | 27435 | 27610 |         |       |       |
| TRP     | 11.4    | 11.6  | 11.6  |         |       |       |
| TIS     |         |       | -89.1 |         |       |       |
| TIS     |         |       | -88.2 |         |       |       |

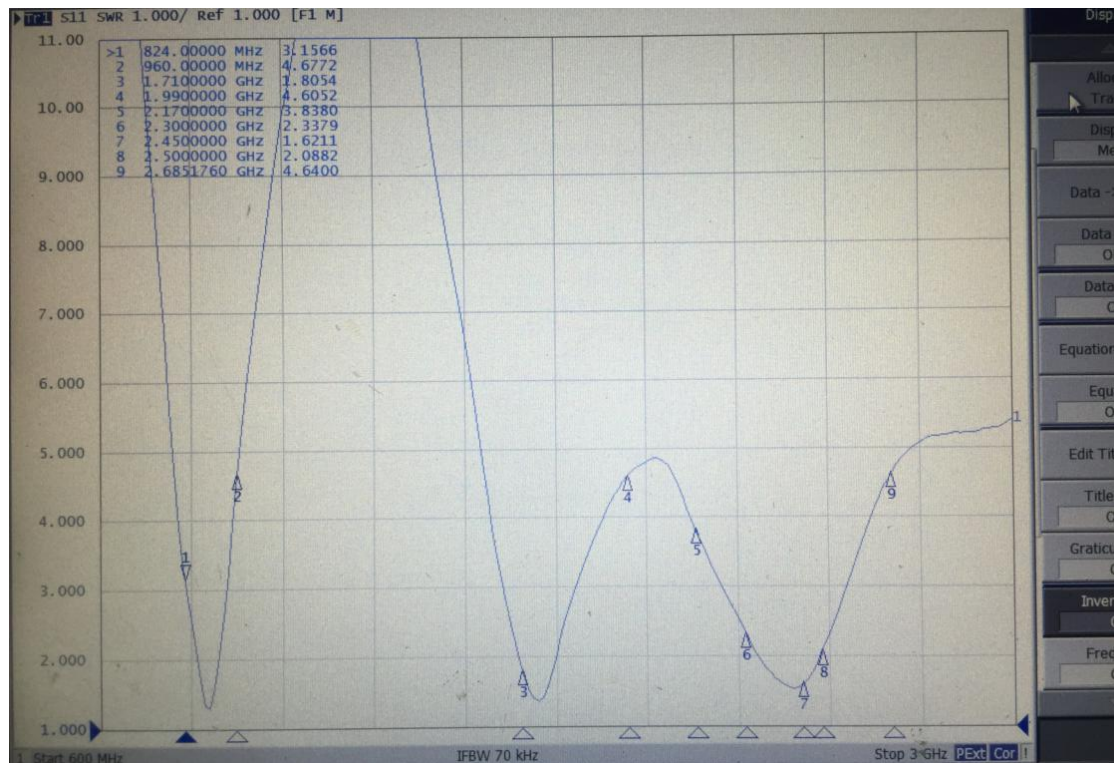
| BAND    | TDD-B38 |       |       | TDD-B39 |       |       |
|---------|---------|-------|-------|---------|-------|-------|
| CHANNAL | 37850   | 38000 | 38150 | 38350   | 38450 | 38550 |
| TRP     | 17.2    | 16.7  | 16.6  | 17.6    | 17.4  | 17.1  |
| TIS     |         |       | -87.3 |         |       | -92.3 |
| TIS     |         |       | -87   |         |       | -91.9 |
| BAND    | TDD-B40 |       |       | TDD-B41 |       |       |
| CHANNAL | 38750   | 39150 | 39550 | 40540   | 40620 | 40940 |
| TRP     | 16.8    | 17.4  | 18.1  | 17.1    | 16.9  | 16.4  |
| TIS     |         |       | -87.2 |         |       | -86.7 |
| TIS     |         |       | -86.7 |         |       | -86.2 |

| Frequency(Hz) | Gain(dBi)    |
|---------------|--------------|
| 1710000000    | -0.155839975 |
| 1759500000    | 1.96522758   |
| 1809000000    | 3.421337013  |
| 1858500000    | 3.006790678  |
| 1908000000    | 1.350903629  |
| 1957500000    | -0.384775819 |
| 2007000000    | -1.958935603 |
| 2056500000    | -3.124263689 |
| 2106000000    | -4.44111812  |
| 2155500000    | -4.773636952 |
| 2205000000    | -3.837852494 |
| 2254500000    | -2.218452428 |
| 2304000000    | -0.890343319 |
| 2353500000    | 0.01346919   |
| 2403000000    | 0.28649313   |
| 2452500000    | 0.976547589  |
| 2502000000    | 1.90167515   |
| 2551500000    | 1.884605008  |
| 2601000000    | 1.36422374   |
| 2650500000    | 1.195267504  |
| 2700000000    | 0.688432236  |

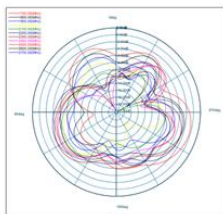
| Frequency(Hz) | Gain(dBi)    |
|---------------|--------------|
| 824000000     | -0.542519688 |
| 837600000     | 0.908545431  |
| 851200000     | 0.905102832  |
| 864800000     | 0.950396263  |
| 878400000     | -0.250074968 |
| 892000000     | -1.657050501 |
| 905600000     | -1.600386526 |
| 919200000     | -1.091816563 |
| 932800000     | -0.660957417 |
| 946400000     | -2.657758773 |
| 960000000     | -3.252068113 |
|               |              |
|               |              |
|               |              |
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|               |              |

## 3.5 Passive Test

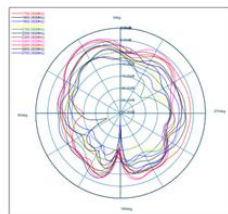
|                   |             |        |        |        |        |        |
|-------------------|-------------|--------|--------|--------|--------|--------|
| Diversity antenna | band(Mhz)   | 704    | 791    | 824    | 960    | 1710   |
|                   | Performance | >12%   | >12%   | >12%   | >12%   | >15%   |
|                   | Measured    | 22. 0% | 23. 0% | 24. 0% | 25. 0% | 24. 0% |
|                   | Determine   | pass   | pass   | pass   | pass   | pass   |
| Diversity antenna | band((Mhz)  | 1880   | 1990   | 2170   | 2300   | 2690   |
|                   | Performance | >15%   | >15%   | >15%   | >15%   | >15%   |
|                   | Measured    | 23. 0% | 22. 0% | 20. 0% | 18. 0% | 16. 0% |
|                   | Determine   | pass   | pass   | pass   | pass   | pass   |



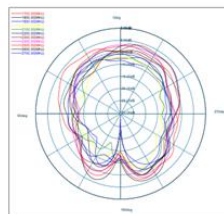
Azimuth 0°



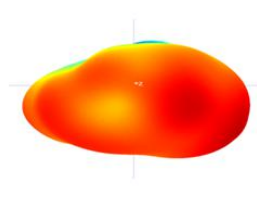
Azimuth 90°



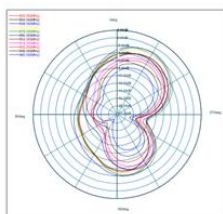
H-Plane (Elevation 90° )



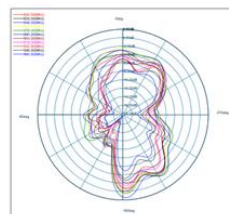
3D view Frequency  
2200MHz



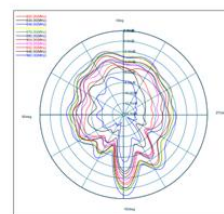
Azimuth 0°



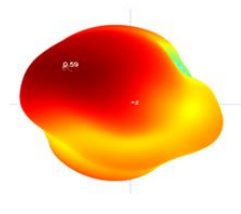
Azimuth 90°

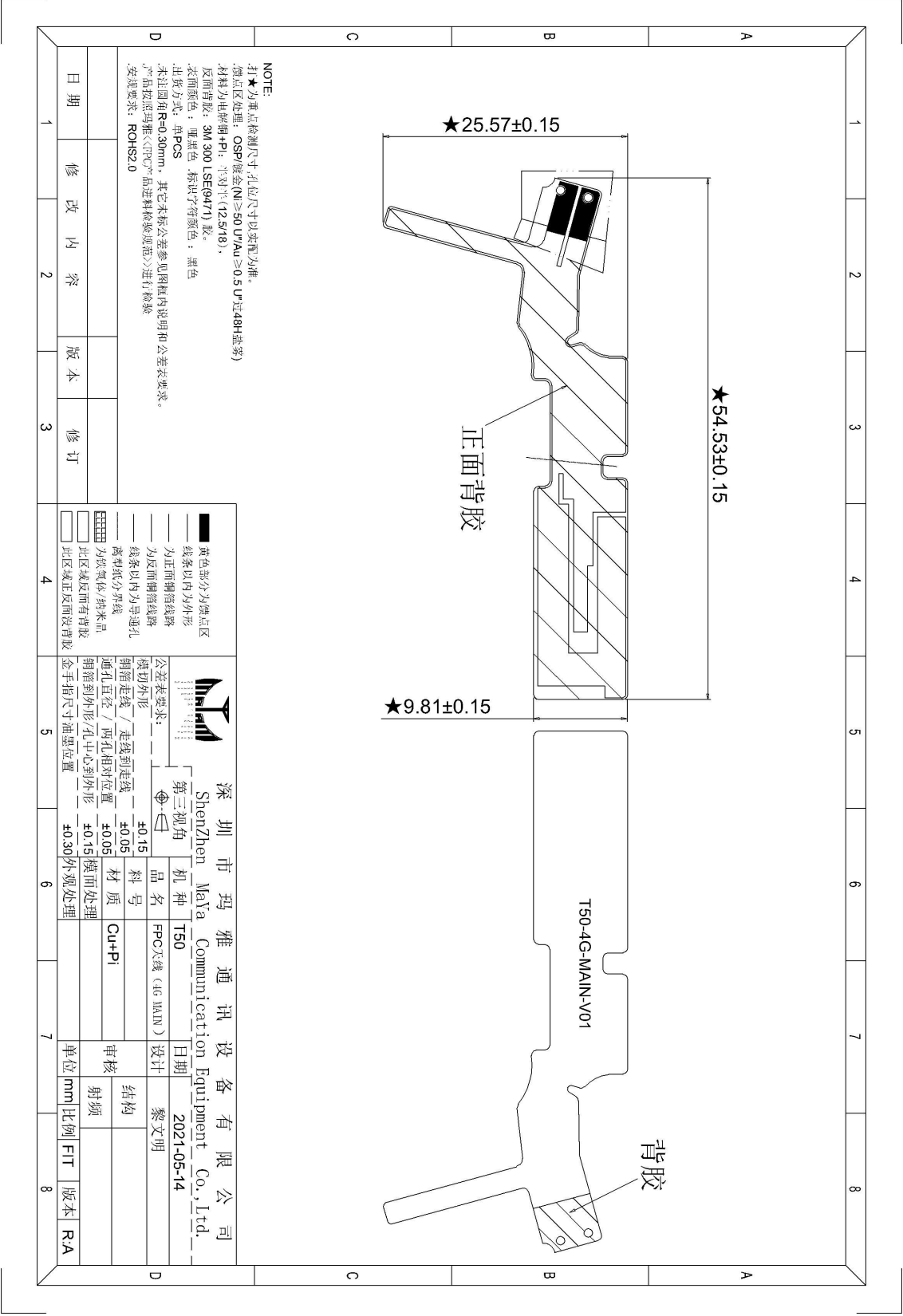


H-Plane (Elevation 90° )



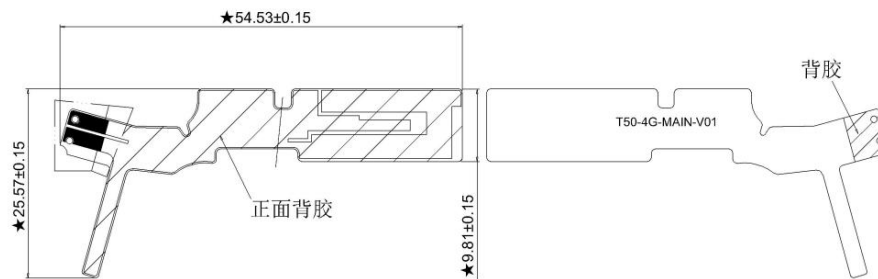
3D view Frequency  
2200MHz





## 5. Dimensional inspection report

|              |     |
|--------------|-----|
| material     | FPC |
| Project name | T50 |



|    | Base value<br>(mm) | public errand<br>+ (mm) | public errand<br>- (mm) | II    | 2     | 3     | 4     | 5     |    |
|----|--------------------|-------------------------|-------------------------|-------|-------|-------|-------|-------|----|
| 1  | 54.53              | 0.15                    | 0.15                    | 54.63 | 54.65 | 54.45 | 54.53 | 54.50 | OK |
| 2  | 25.57              | 0.15                    | 0.15                    | 25.66 | 25.68 | 25.57 | 25.47 | 25.50 | OK |
| 3  | 9.81               | 0.15                    | 0.15                    | 9.90  | 9.92  | 9.82  | 9.71  | 9.75  | OK |
| 4  |                    |                         |                         |       |       |       |       |       |    |
| 5  |                    |                         |                         |       |       |       |       |       |    |
| 6  |                    |                         |                         |       |       |       |       |       |    |
| 7  |                    |                         |                         |       |       |       |       |       |    |
| 8  |                    |                         |                         |       |       |       |       |       |    |
| 9  |                    |                         |                         |       |       |       |       |       |    |
| 10 |                    |                         |                         |       |       |       |       |       |    |