

## SPECIFICATION FOR APPROVALS

CUSTOMER: \_\_\_\_\_ HKC

CUS PARTNO: \_\_\_\_\_ 260504003720

PARTNAME: \_\_\_\_\_ WIFI antenna

TPTPART NO: \_\_\_\_\_ WWXL6009190

Version: \_\_\_\_\_ 1.0

CUS STAMP:

DATE:

|                 |                  |          |
|-----------------|------------------|----------|
| Purchasing Dept | Engineering Dept | Approval |
|                 |                  |          |

WWXL:

Date: November 03, 2022

|                  |            |              |
|------------------|------------|--------------|
| Engineering Dept | Sales Dept | Approval     |
| Hongbo Dai       |            | Xianyan Tong |

WWXL 万物相连 Shenzhen all things connected Communication Co., Ltd.  
All things connected Communication Co., Ltd.

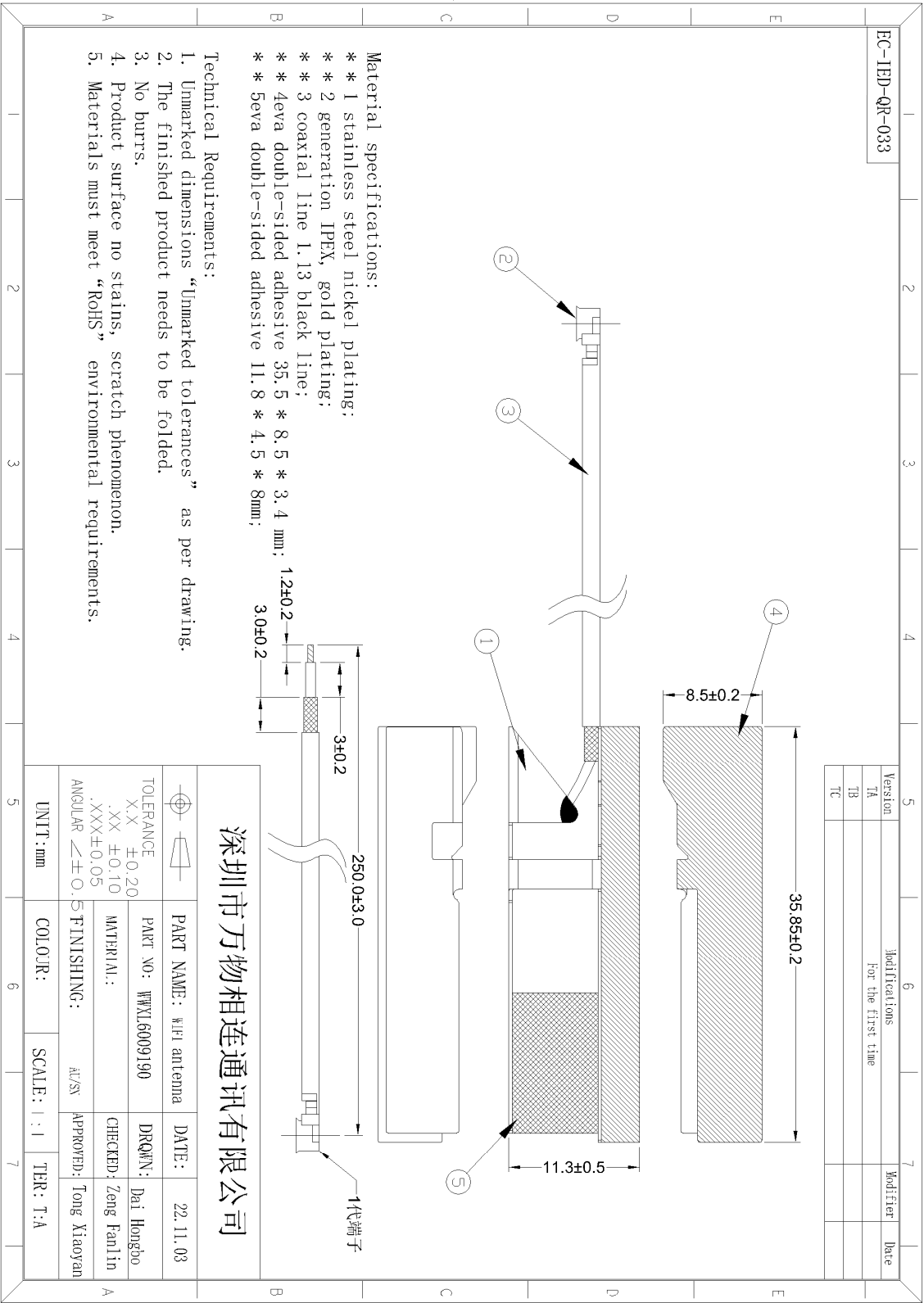
Please return one specification or one copy of it with your chop and signature of approval and retain the others for your record. In the event of an order being placed for this part number before the chop and signed with specification (or copy) is returned and without special explanation, it will be assumed that full approval have been given.

## INDEX

|                                                          |       |
|----------------------------------------------------------|-------|
| cover.....                                               | 1-2   |
| Index.....                                               | 3     |
| Change your resume.....                                  | 4     |
| 1、 Drawing.....                                          | 5     |
| 2、 Product pictures.....                                 | 6     |
| 3、 Parts list.....                                       | 6     |
| 4、 Test parameters.....                                  | 6     |
| 5、 Antenna test environment.....                         | 7     |
| 6、 Active and passive parameters of antenna: .....       | 8     |
| 1、 VSWR.....                                             | 8     |
| 2、 Directional、 Gain and Efficiency.....                 | 8-9   |
| 3、 directional diagram.....                              | 10-12 |
| 4、 Active testing of WIFI antennas.....                  | 13    |
| 5、 Throughput Test.....                                  | 13-14 |
| 7、 Reliability testing.....                              | 15    |
| 1、 Environmental experiment.....                         | 15    |
| 2、 Salt spray test.....                                  | 16    |
| 8、 Packing instructions.....                             | 17    |
| 9、 Material Composition Declaration.....                 | 18    |
| 10、 SVHC substances questionnaire for REACH regulations. | 19    |

1、Drawing

由 Autodesk 教育版产品制作



由 Autodesk 教育版产品制作

由 Autodesk 教育版产品制作

万物相连 深圳 Autodesk 甲

## 2、Product pictures



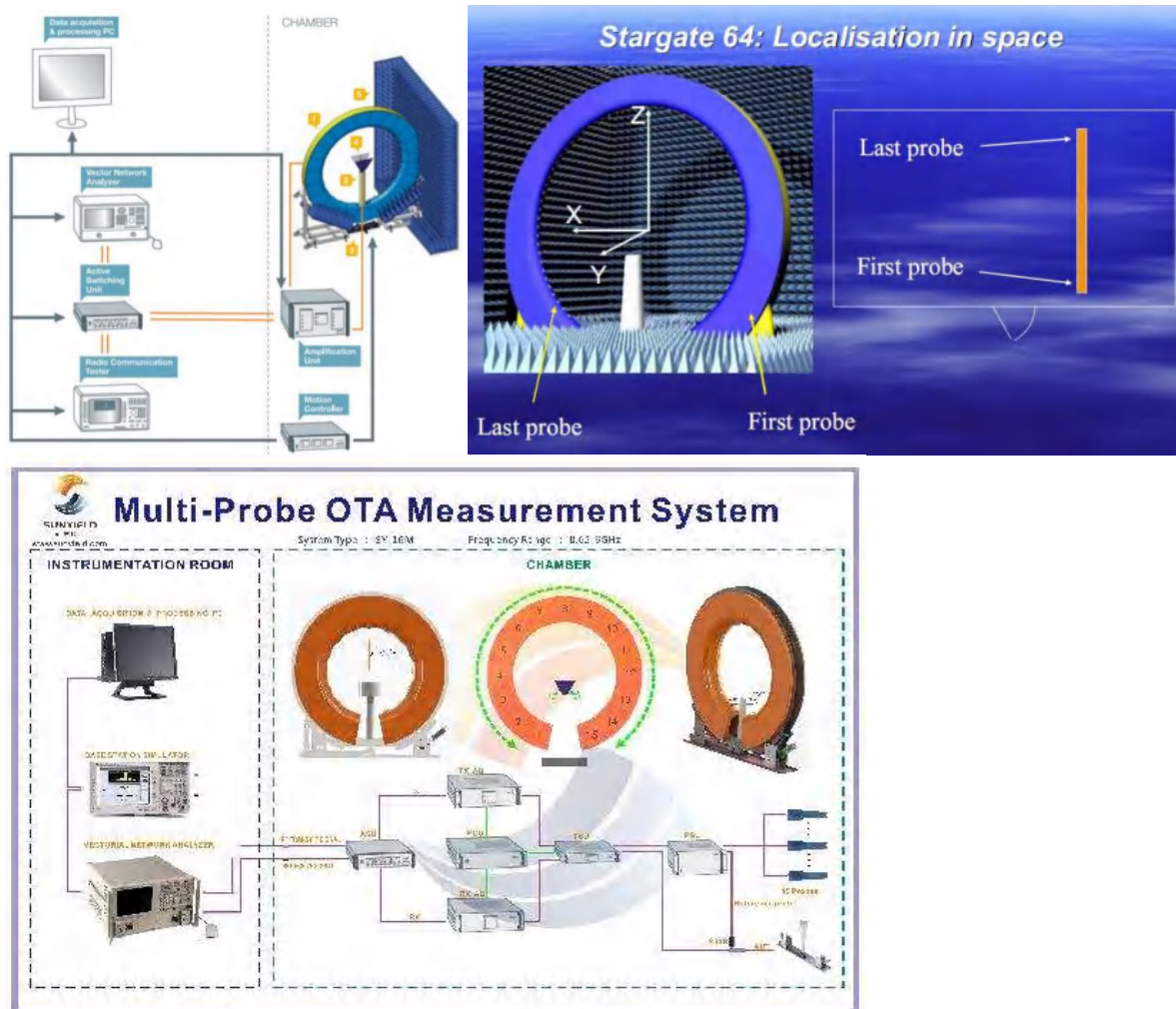
## 3、Parts list

| No. | Name of material      | Material Code  | Name of material    |
|-----|-----------------------|----------------|---------------------|
| 1   | Stainless steel       | WWXLTP168      | 35.85*8.5*8mm       |
| 2   | RF terminal           | WWXL I-PX001-1 | 1.13 terminals      |
| 3   | Coaxial cable         | WWXLGCX024     | 1.13 black, L=250mm |
| 4   | Eva double-sided Glue | WWXLSMJ229     | 35.5*8.5*3.4        |
| 5   | Eva double-sided Glue | WWXLSMJ230     | 11.8*4.5*8          |

## 4、Test parameters

|                                        |                 |                           |                    |
|----------------------------------------|-----------------|---------------------------|--------------------|
| Name WIFI antenna (WWXL6009190)        |                 | ModelType                 |                    |
| ELECTRICAL SPECTFICATIONS              |                 | MECHANICAL SPECTFICATIONS |                    |
| FrenquencyRange 2400-2500/5150-5850MHz |                 | Dimensions                | 35.85*8.5*11.3mm   |
| Bandwidth                              | 100/700MHz      | Connector                 | IPEX               |
| Impedance                              | 50 $\Omega$     | Radome Material           | Stainless steel    |
| VSWR                                   | $\leq 3.5$      | Radome Color              | Nickel plating     |
| Gain                                   | 3.86/4.74dBi    | Coaxial-cable             | 1.13black, L=250mm |
| Polarization                           | linear Vertical | WorkingTemperature        | -45°C-+80°C        |
| Radiation                              | Omnidirectional | Limit Temperature         | -45°C-+80°C        |
| Power                                  | 50W             |                           |                    |

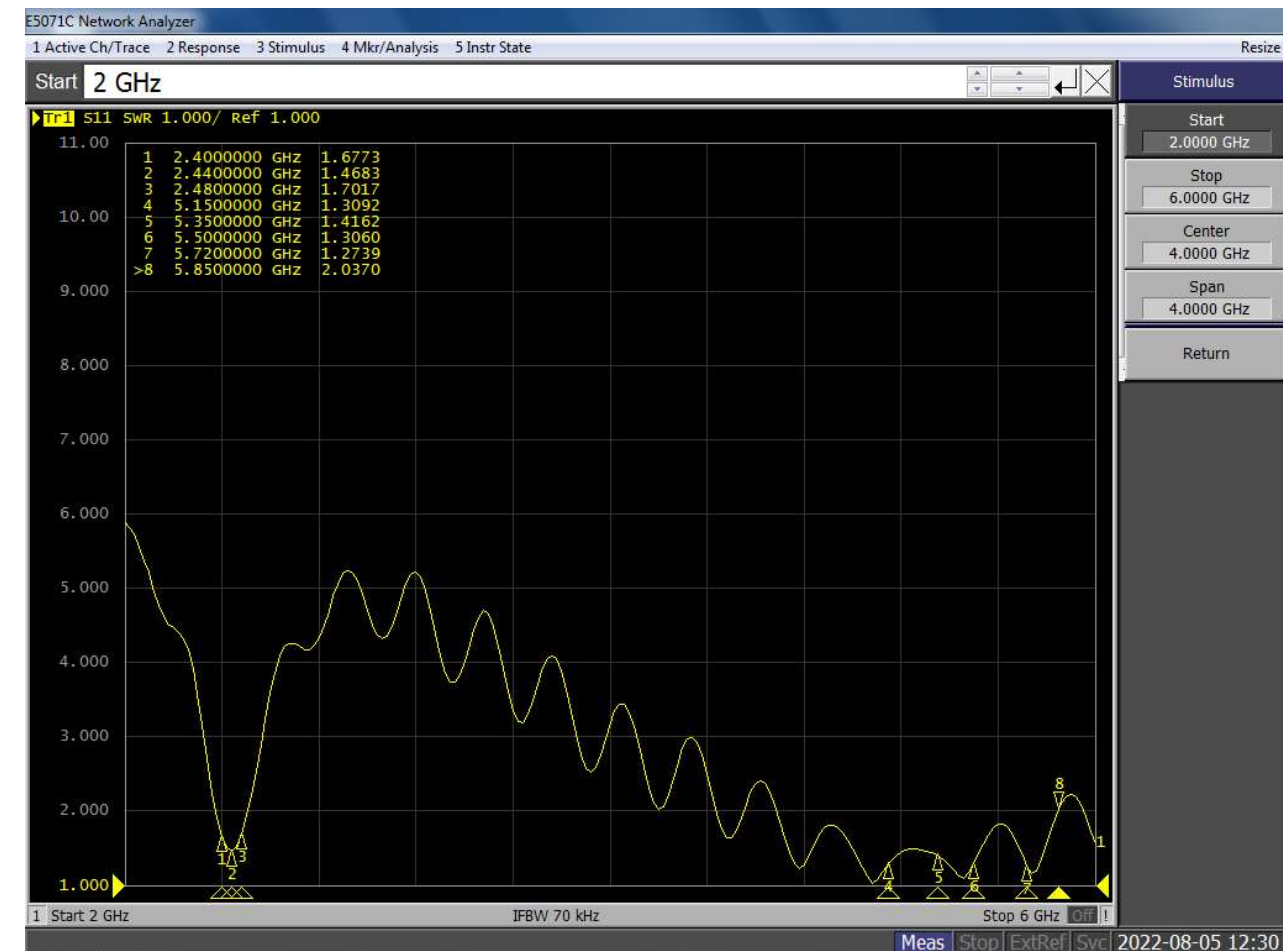
## 5、Antenna test environment



|                      |                                                                                                                          |
|----------------------|--------------------------------------------------------------------------------------------------------------------------|
| test macro:          | SY-16M Antenna measurement system                                                                                        |
| testing environment: | Temperature $22^{\circ}\text{C} \pm 3^{\circ}\text{C}$ , humidity $50\% \pm 15\%$                                        |
| testing equipment:   | Agilent 5071C<br>Agilent 8960 Comprehensive measuring instrument<br>Agilent CMW500 4G Comprehensive measuring instrument |

## 6、Antenna Passive Parameters:

### 1、VSWR:



|                 |      |      |      |      |      |      |      |      |
|-----------------|------|------|------|------|------|------|------|------|
| Frequency (MHz) | 2400 | 2440 | 2480 | 5150 | 5350 | 5500 | 5720 | 5850 |
| VSWR            | 1.67 | 1.46 | 1.70 | 1.30 | 1.41 | 1.30 | 1.27 | 2.03 |

### 2. Gain and Efficiency: (The whole machine tests the antenna)

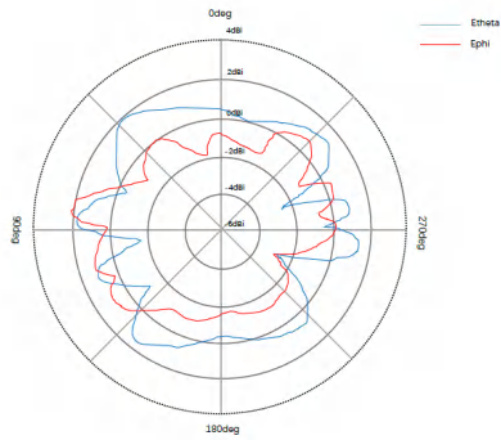
| Gain&Efficiency&PhaseCenter<br>增益、效率和相位中心 |                  |                     |                       |                  |                     |                       |                  |                     |
|-------------------------------------------|------------------|---------------------|-----------------------|------------------|---------------------|-----------------------|------------------|---------------------|
| frequency<br>频率 (MHz)                     | gain<br>增益 (dBi) | efficiency<br>效率(%) | frequency<br>频率 (MHz) | gain<br>增益 (dBi) | efficiency<br>效率(%) | frequency<br>频率 (MHz) | gain<br>增益 (dBi) | efficiency<br>效率(%) |
| 2400                                      | 3.62             | 44.57               | 5150                  | 3                | 30.39               | 5510                  | 4.45             | 30.89               |
| 2410                                      | 3.73             | 43.55               | 5160                  | 3.25             | 31.77               | 5520                  | 4.39             | 30.53               |
| 2420                                      | 3.72             | 45.86               | 5170                  | 3.27             | 31.86               | 5530                  | 4.35             | 30.55               |
| 2430                                      | 3.86             | 44.46               | 5180                  | 3.3              | 32.09               | 5540                  | 4.34             | 31.21               |
| 2440                                      | 3.73             | 45.83               | 5190                  | 3.31             | 32.54               | 5550                  | 4.33             | 31.78               |
| 2450                                      | 3.64             | 47.89               | 5200                  | 3.17             | 31.98               | 5560                  | 4.3              | 31.95               |

|      |      |       |      |      |       |      |      |       |
|------|------|-------|------|------|-------|------|------|-------|
| 2460 | 3.64 | 48.56 | 5210 | 3.1  | 32.02 | 5570 | 4.43 | 33.11 |
| 2470 | 3.5  | 46.23 | 5220 | 2.99 | 31.55 | 5580 | 4.4  | 33.66 |
| 2480 | 3.31 | 48.76 | 5230 | 3.06 | 32.44 | 5590 | 4.49 | 34.06 |
| 2490 | 3.2  | 47.93 | 5240 | 3.07 | 32.2  | 5600 | 4.48 | 34.57 |
| 2500 | 2.93 | 46.88 | 5250 | 3.14 | 32.29 | 5610 | 4.74 | 35.69 |
|      |      |       | 5260 | 3.2  | 31.88 | 5620 | 4.69 | 35.46 |
|      |      |       | 5270 | 3.28 | 31.45 | 5630 | 4.69 | 35.39 |
|      |      |       | 5280 | 3.33 | 30.82 | 5640 | 4.66 | 35.17 |
|      |      |       | 5290 | 3.3  | 29.91 | 5650 | 4.54 | 34.6  |
|      |      |       | 5300 | 3.07 | 28.08 | 5660 | 4.63 | 33.2  |
|      |      |       | 5310 | 3.11 | 28.22 | 5670 | 4.5  | 31.84 |
|      |      |       | 5320 | 3.04 | 27.71 | 5680 | 4.5  | 31.18 |
|      |      |       | 5330 | 2.87 | 26.51 | 5690 | 4.47 | 30.51 |
|      |      |       | 5340 | 2.88 | 26.3  | 5700 | 4.38 | 29.53 |
|      |      |       | 5350 | 2.97 | 26.23 | 5710 | 4.34 | 29.06 |
|      |      |       | 5360 | 3.01 | 25.91 | 5720 | 4.37 | 29.26 |
|      |      |       | 5370 | 3.12 | 26.07 | 5730 | 4.19 | 28.17 |
|      |      |       | 5380 | 3.27 | 26.55 | 5740 | 4    | 27.12 |
|      |      |       | 5390 | 3.39 | 27.28 | 5750 | 3.79 | 25.89 |
|      |      |       | 5400 | 3.64 | 28.92 | 5760 | 3.55 | 24.55 |
|      |      |       | 5410 | 3.75 | 29.86 | 5770 | 3.36 | 23.39 |
|      |      |       | 5420 | 3.88 | 30.96 | 5780 | 3.39 | 23.34 |
|      |      |       | 5430 | 3.97 | 31.79 | 5790 | 3.47 | 23.53 |
|      |      |       | 5440 | 4.09 | 32.48 | 5800 | 3.69 | 24.5  |
|      |      |       | 5450 | 4.04 | 31.88 | 5810 | 3.83 | 24.95 |
|      |      |       | 5460 | 4.15 | 32    | 5820 | 3.97 | 25.5  |
|      |      |       | 5470 | 4.24 | 31.98 | 5830 | 3.94 | 25.2  |
|      |      |       | 5480 | 4.3  | 31.59 | 5840 | 3.82 | 24.36 |
|      |      |       | 5490 | 4.36 | 31.28 | 5850 | 3.57 | 23.07 |
|      |      |       | 5500 | 4.45 | 31.21 |      |      |       |

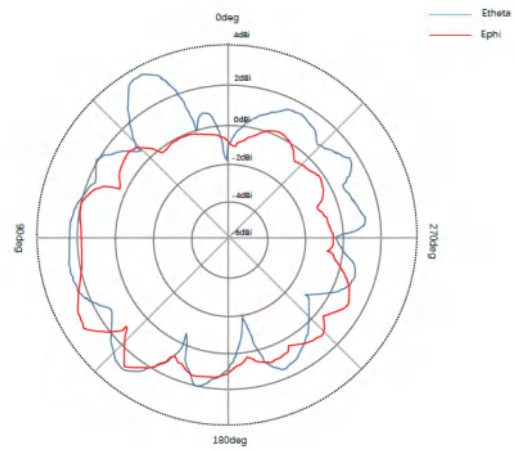


### 3. directional diagram

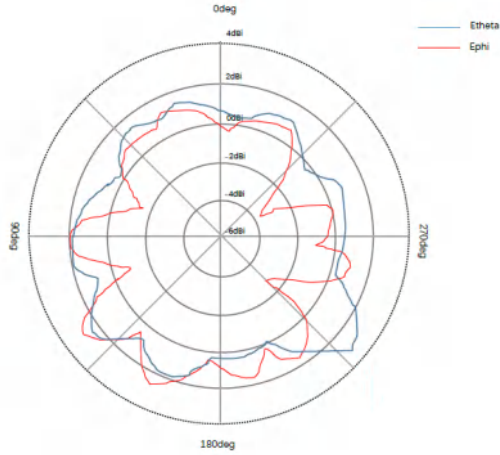
**Theta=90 freq=2400MHz**



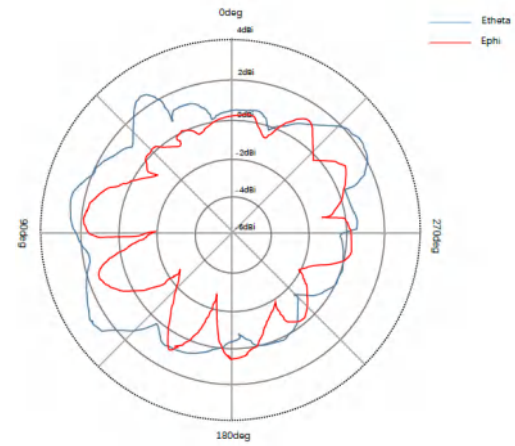
**Phi=90 freq=2400MHz**



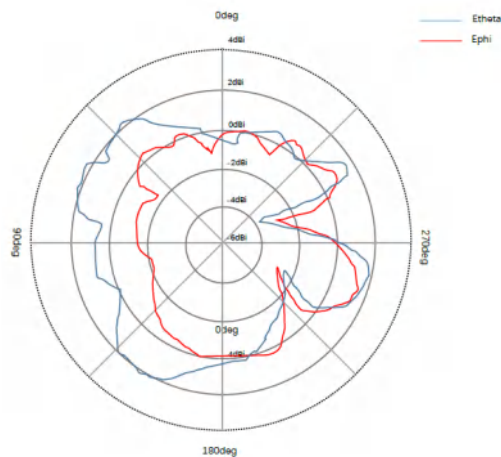
**Theta=90 freq=2450MHz**



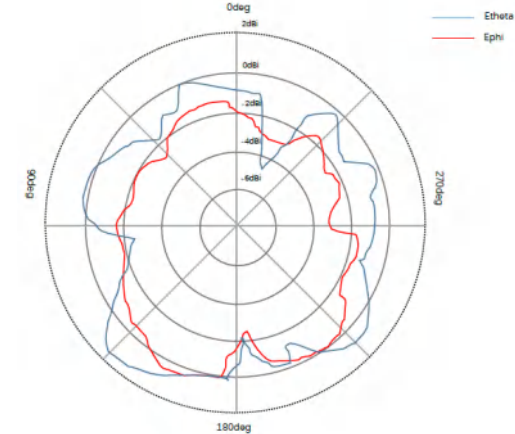
**Phi=90 freq=2450MHz**



**Theta=90 freq=2500MHz**

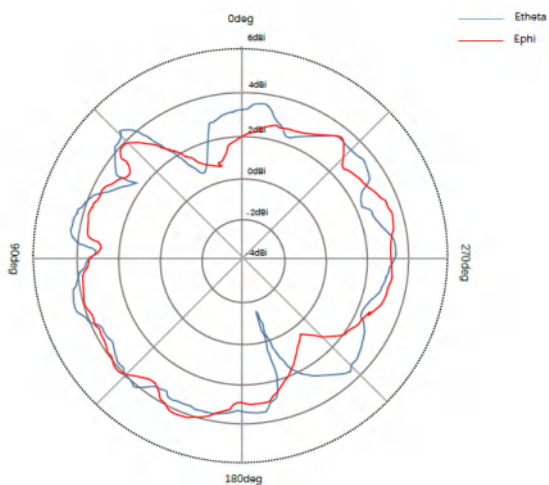


**Phi=90 freq=2500MHz**

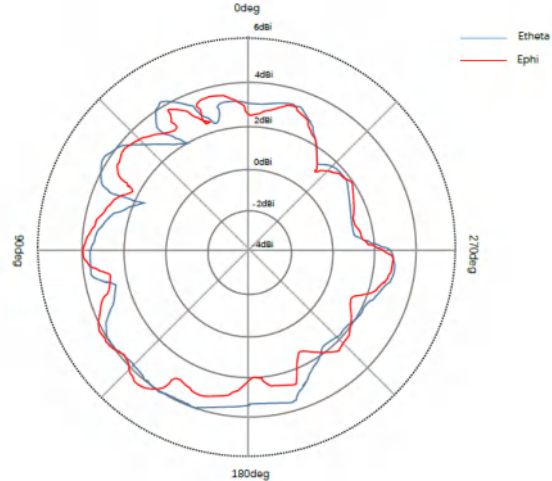




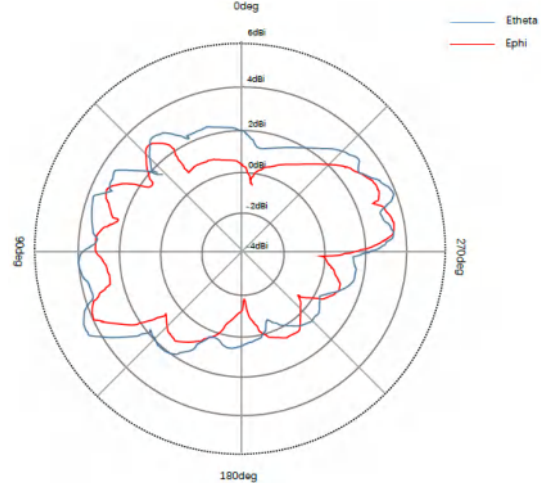
Theta=90 freq=5150MHz



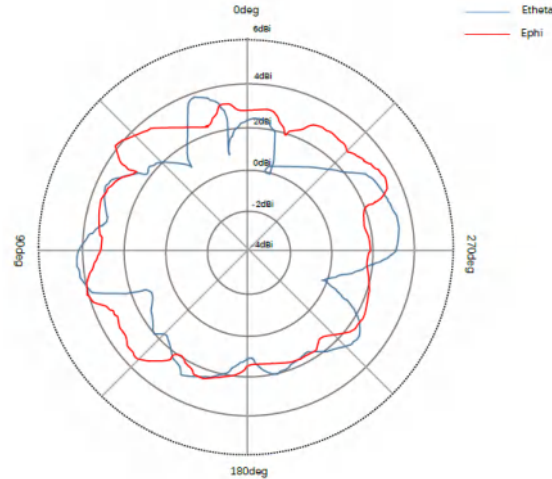
Phi=90 freq=5150MHz



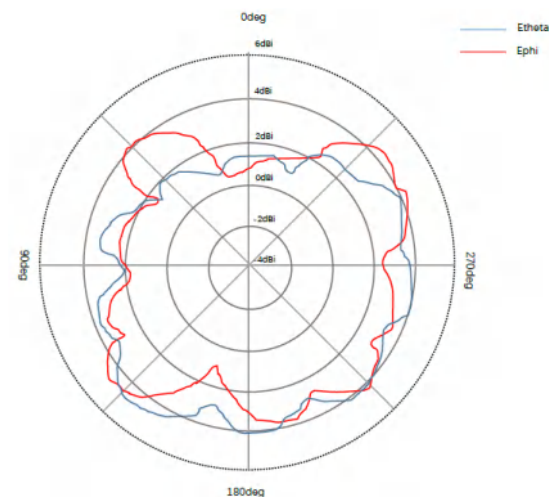
Theta=90 freq=5350MHz



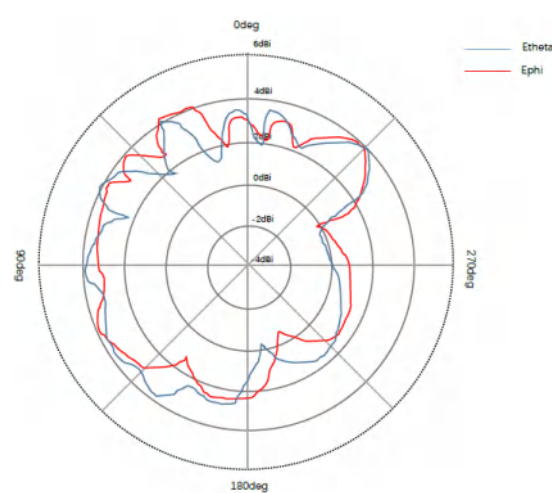
Phi=90 freq=5350MHz



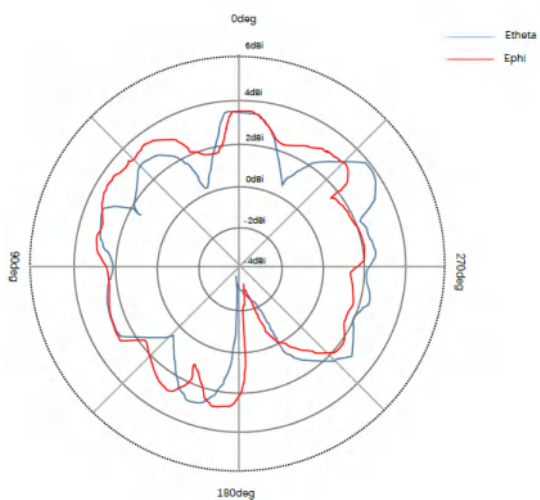
Theta=90 freq=5500MHz



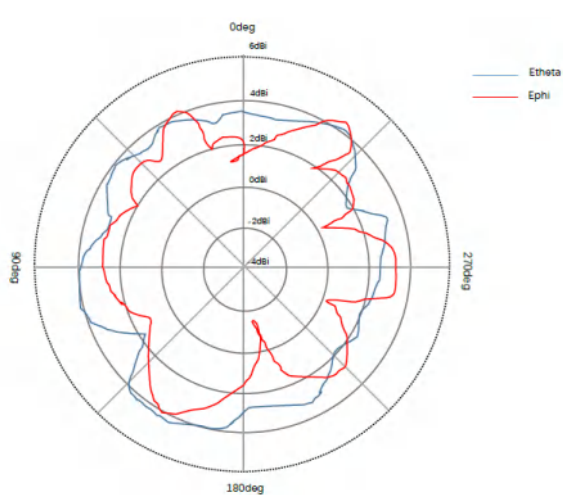
Phi=90 freq=5500MHz



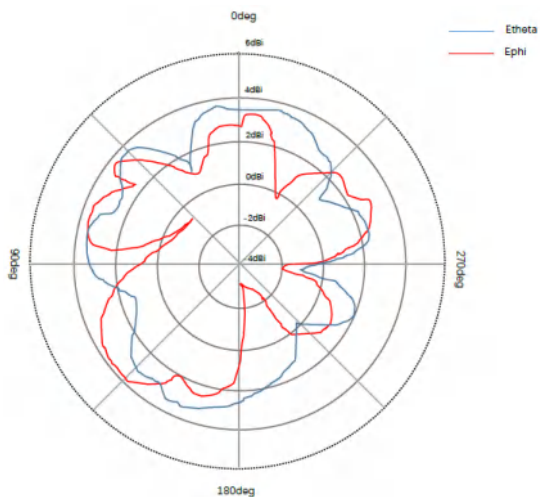
Theta=90 freq=5720MHz



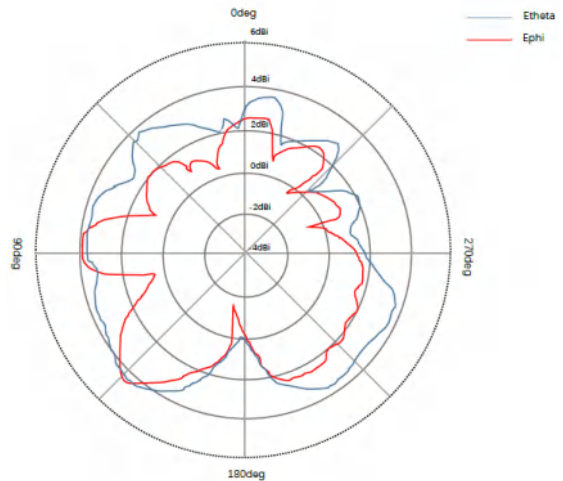
Phi=90 freq=5720MHz



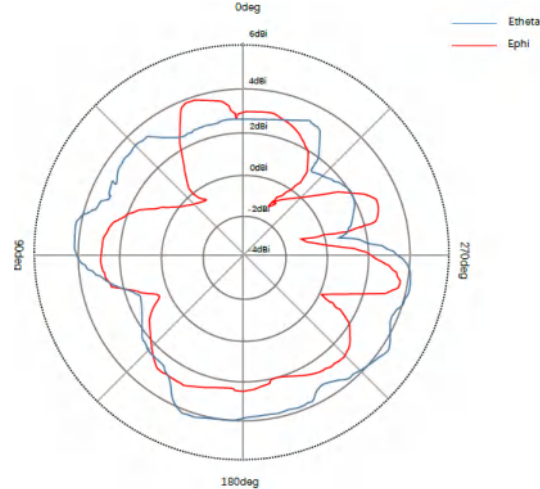
Theta=90 freq=5800MHz



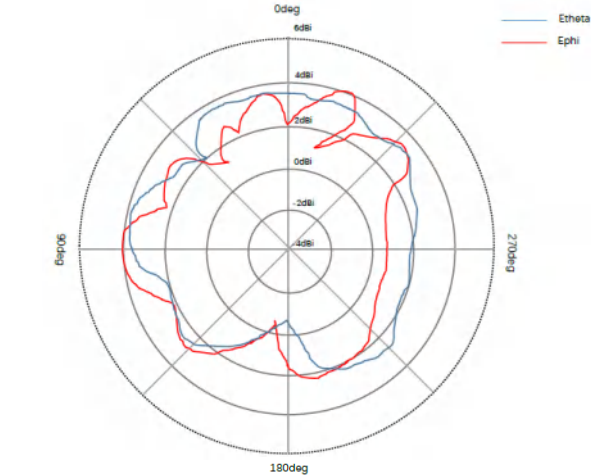
Phi=90 freq=5800MHz



Theta=90 freq=5850MHz



Phi=90 freq=5850MHz



#### 4. Active testing of WIFI antennas

| Active Measurement Report |        |               |          |            |          |       |             |           |          |                        |           |                        |
|---------------------------|--------|---------------|----------|------------|----------|-------|-------------|-----------|----------|------------------------|-----------|------------------------|
| Manufacturer              |        |               |          | Model      | WIFI_G   |       | Export Time |           |          | 2022/3/30 星期三 12:07:35 |           |                        |
| Item                      | Tester | Measurement   | Azimuths | Elevations | Standard | Band  | Channel     | Frequency | MaxValue | Total                  | Test time | End time               |
| 1                         | Cmw500 | TRP           | Every30  | AllProbes  | WIFI_G   | G_6M  | 1           | 2412      | 22.54    | 15.19                  | 3' 20"    | 2022/3/30 星期三 11:46:52 |
| 2                         | Cmw500 | TRP           | Every30  | AllProbes  | WIFI_G   | G_6M  | 6           | 2437      | 22.73    | 15.23                  | 3' 21"    | 2022/3/30 星期三 11:51:50 |
| 3                         | Cmw500 | TRP           | Every30  | AllProbes  | WIFI_G   | G_6M  | 13          | 2472      | 23.47    | 15.1                   | 3' 19"    | 2022/3/30 星期三 11:57:18 |
| 4                         | Cmw500 | TIS with EIRP | Every30  | AllProbes  | WIFI_G   | G_54M | 1           | 2412      | 72.11    | 58.37                  | 2' 13"    | 2022/3/30 星期三 12:00:45 |
| 5                         | Cmw500 | TIS with EIRP | Every30  | AllProbes  | WIFI_G   | G_54M | 6           | 2437      | 71.8     | 60.91                  | 2' 17"    | 2022/3/30 星期三 12:03:51 |
| 6                         | Cmw500 | TIS with EIRP | Every30  | AllProbes  | WIFI_G   | G_54M | 13          | 2472      | 74.91    | 67.58                  | 1' 56"    | 2022/3/30 星期三 12:06:33 |

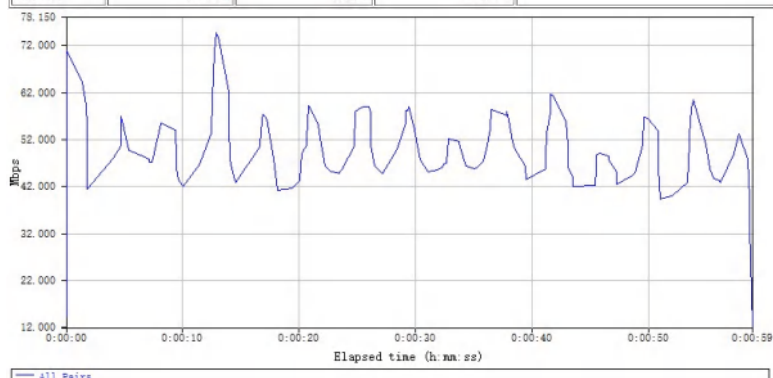
  

| Active Measurement Report |        |               |          |            |          |       |             |           |          |                        |           |                        |
|---------------------------|--------|---------------|----------|------------|----------|-------|-------------|-----------|----------|------------------------|-----------|------------------------|
| Manufacturer              |        |               |          | Model      | WIFI_A   |       | Export Time |           |          | 2022/3/30 星期三 13:51:03 |           |                        |
| Item                      | Tester | Measurement   | Azimuths | Elevations | Standard | Band  | Channel     | Frequency | MaxValue | Total                  | Test time | End time               |
| 1                         | Cmw500 | TRP           | Every30  | AllProbes  | WIFI_A   | A_6M  | 36          | 5180      | 26.99    | 17.36                  | 3' 9"     | 2022/3/30 星期三 12:12:44 |
| 2                         | Cmw500 | TRP           | Every30  | AllProbes  | WIFI_A   | A_6M  | 100         | 5500      | 24.92    | 15.6                   | 41' 6"    | 2022/3/30 星期三 13:07:18 |
| 3                         | Cmw500 | TRP           | Every30  | AllProbes  | WIFI_A   | A_6M  | 165         | 5825      | 22.63    | 13.23                  | 20' 51"   | 2022/3/30 星期三 13:41:37 |
| 4                         | Cmw500 | TIS with EIRP | Every30  | AllProbes  | WIFI_A   | A_54M | 36          | 5180      | 87.65    | 77.65                  | 2' 1"     | 2022/3/30 星期三 13:44:30 |
| 5                         | Cmw500 | TIS with EIRP | Every30  | AllProbes  | WIFI_A   | A_54M | 100         | 5500      | 85.47    | 76.37                  | 2' 1"     | 2022/3/30 星期三 13:47:31 |
| 6                         | Cmw500 | TIS with EIRP | Every30  | AllProbes  | WIFI_A   | A_54M | 165         | 5825      | 84.51    | 74.88                  | 2' 0"     | 2022/3/30 星期三 13:50:23 |

#### 5. Throughput Test

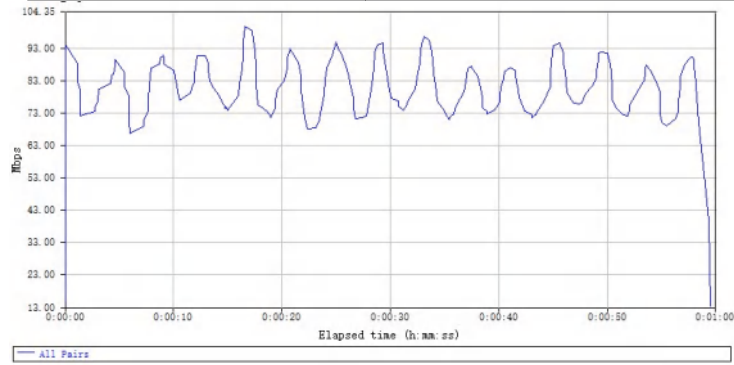
##### 2G frequency 11 channel TX

| Group/ Pair | Average (Mbps) | Minimum (Mbps) | Maximum (Mbps) | Throughput 95% Confidence Interval | Measured Time (secs) | Relative Precision |
|-------------|----------------|----------------|----------------|------------------------------------|----------------------|--------------------|
| All Pairs   | 49.104         | 5.501          | 18.762         |                                    |                      |                    |
| Pair 1      | 8.865          | 6.572          | 18.762         | 0.987                              | 58.656               | 11.128             |
| Pair 2      | 7.157          | 5.811          | 13.550         | 0.613                              | 58.683               | 8.570              |
| Pair 3      | 10.199         | 6.408          | 16.639         | 1.029                              | 58.832               | 10.088             |
| Pair 4      | 7.126          | 5.726          | 13.055         | 0.614                              | 58.938               | 8.619              |
| Pair 5      | 6.492          | 5.501          | 11.261         | 0.460                              | 58.532               | 7.085              |
| Pair 6      | 9.756          | 6.487          | 15.140         | 0.927                              | 59.452               | 9.505              |
| Totals:     | 49.104         | 5.501          | 18.762         |                                    |                      |                    |



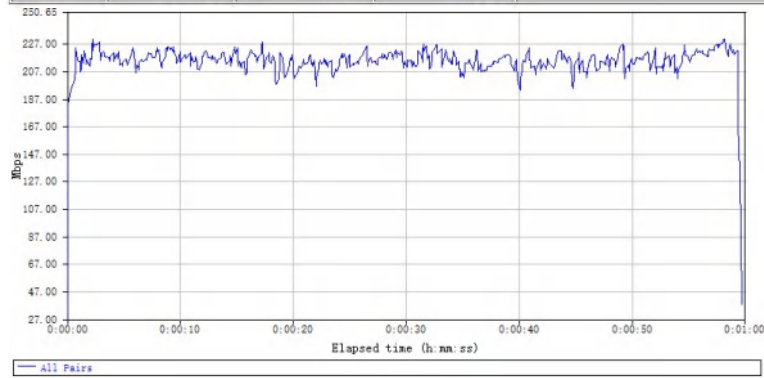
##### 2G frequency 11 channel RX

| Group/ Pair | Average (Mbps) | Minimum (Mbps) | Maximum (Mbps) | Throughput 95% Confidence Interval | Measured Time (secs) | Relative Precision |
|-------------|----------------|----------------|----------------|------------------------------------|----------------------|--------------------|
| All Pairs   | 80.580         | 10.288         | 17.937         |                                    |                      |                    |
| Pair 1      | 13.435         | 10.288         | 16.863         | 0.552                              | 59.546               | 4.111              |
| Pair 2      | 13.817         | 11.474         | 17.937         | 0.499                              | 59.347               | 3.609              |
| Pair 3      | 13.575         | 10.917         | 16.935         | 0.511                              | 58.931               | 3.761              |
| Pair 4      | 13.468         | 11.161         | 17.937         | 0.499                              | 59.402               | 3.702              |
| Pair 5      | 13.435         | 10.805         | 16.639         | 0.524                              | 59.546               | 3.899              |
| Pair 6      | 13.350         | 10.352         | 17.513         | 0.513                              | 58.425               | 3.839              |
| Totals:     | 80.580         | 10.288         | 17.937         |                                    |                      |                    |



### 5G frequency 136 channel TX

| Group/ Pair | Average (Mbps) | Minimum (Mbps) | Maximum (Mbps) | Throughput 95% Confidence Interval | Measured Time (secs) | Relative Precision |
|-------------|----------------|----------------|----------------|------------------------------------|----------------------|--------------------|
| All Pairs   | 214.229        | 13.661         | 80.000         |                                    |                      |                    |
| Pair 1      | 30.304         | 20.387         | 51.813         | 1.025                              | 59.399               | 3.383              |
| Pair 2      | 39.094         | 19.512         | 62.500         | 2.429                              | 59.344               | 6.213              |
| Pair 3      | 32.036         | 13.661         | 70.423         | 2.175                              | 59.932               | 6.788              |
| Pair 4      | 42.535         | 24.155         | 80.000         | 1.749                              | 59.716               | 4.111              |
| Pair 5      | 36.902         | 18.886         | 58.824         | 1.902                              | 59.618               | 5.154              |
| Pair 6      | 34.590         | 18.536         | 53.192         | 1.827                              | 59.554               | 5.282              |
| Totals:     | 214.229        | 13.661         | 80.000         |                                    |                      |                    |



### 5G frequency 136 channel Rx

| Group/ Pair | Average (Mbps) | Minimum (Mbps) | Maximum (Mbps) | Throughput 95% Confidence Interval | Measured Time (secs) | Relative Precision |
|-------------|----------------|----------------|----------------|------------------------------------|----------------------|--------------------|
| All Pairs   | 266.934        | 29.851         | 50.633         |                                    |                      |                    |
| Pair 1      | 45.046         | 31.008         | 47.733         | 0.371                              | 59.495               | 0.823              |
| Pair 2      | 43.361         | 36.630         | 46.083         | 0.239                              | 59.500               | 0.551              |
| Pair 3      | 43.427         | 29.851         | 46.512         | 0.357                              | 59.870               | 0.822              |
| Pair 4      | 44.180         | 32.733         | 48.193         | 0.313                              | 59.755               | 0.708              |
| Pair 5      | 44.430         | 30.960         | 48.309         | 0.364                              | 59.869               | 0.819              |
| Pair 6      | 47.576         | 37.807         | 50.633         | 0.282                              | 59.694               | 0.593              |
| Totals:     | 266.934        | 29.851         | 50.633         |                                    |                      |                    |

