# Testing Report

Customer Name: Steelwrist AB

Product Name: Quantum Connectivity Gateway

Sample Model: QCG

Reference Standard: *GB/T 9410-2008; ANSI/IEEE Std149-1979*

Issue Date: 2025.3.7

| | | | |
|---|---|---|---|
| Engineer: | Zkris | Date: | 2025.03.06 |
| Auditor: | Eason | Date: | 2025.03.07 |
| Approver: | Aaron | Date: | 2025.03.07 |

Shenzhen RFI-LAB Communication Technology Co.,Ltd. RFI-LAB

QP030-E41

# Version

| Version No. | Date | Description | Formulate | Approval |
|---|---|---|---|---|
| A0 | 2025.3.7 | For the first time, formulate | Zkris | Eason |
| | | | | |
| | | | | |

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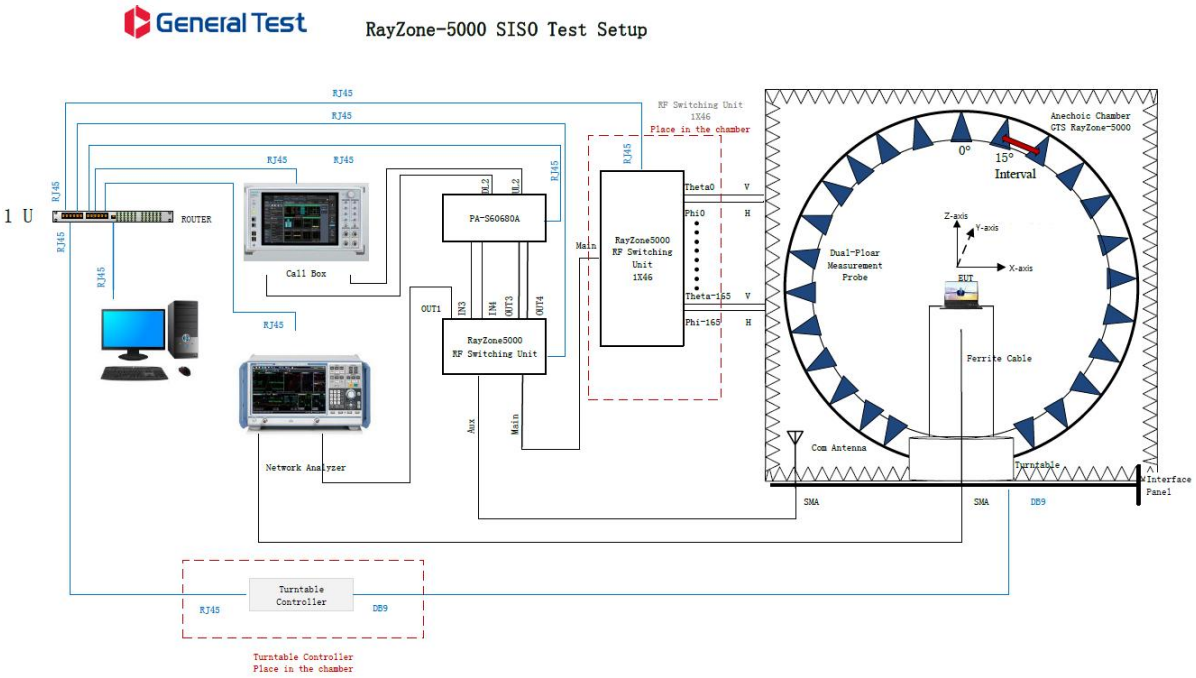
# 1.General Information

## 1.1 General information of testing institutions

| | |
|---|---|
| **Name** | Shenzhen RFI-LAB Communication Technology Co., Ltd. |
| **Address** | 103 Building 1 Tingwei lndustrial Park,No.6, Liufang Road, Zone 67Xingdong,Xin'an Subdistrict,Bao'an District, Shenzhen, Guangdong, China |
| **Tel** | 13682621346 |
| **E-mail** | rfi-lab_cs@tech-now.com |
| **Equipment** | All the equipment used in the report is fixed in 103 Building 1 Tingwei lndustrial Park,No.6, Liufang Road, Zone 67Xingdong,Xin'an Subdistrict,Bao'an District, Shenzhen, Guangdong, China |

## 1.2 Testing principle



## 1.3 Test equipment

| Equipment | Model No. | Serial No. | Manufacturer | Calibration date | Next calibration date |
|---|---|---|---|---|---|
| OTA Test System | RayZone-5000 | RFI-LAB-RF-D00 | GTS | 2023.3.14 | 2025.3.13 |
| Network Analyzer | E5071C | RFI-LAB-RF-D01 | KEYSIGHT | 2024.5.6 | 2025.5.5 |
| Network Analyzer | E5071C | RFI-LAB-RF-C02 | KEYSIGHT | 2024.5.6 | 2025.5.5 |

## 1.4 Test environment

| | |
|---|---|
| **Temperature** | 23.7℃ |
| **Humidity** | 59%RH |
| **Pressure** | 100.21kPa |

## 1.5 Statement

(1) The test results in the report are only applicable to the tested samples and the tested samples work under the environment described in the report.
(2) Only Shenzhen RFI-LAB Communication Technology Co., Ltd. have the right to modify the report, and the modification information shall be annotated in the revision form.
(3) Any objection to this report shall be raised within 30 days after formal confirmation of the report.
(4) This report is invalid if there is any evidence that the sample information provided is falsified.
(5) The report is invalid without the signature of the auditor and approver.

# 2.Sample Information

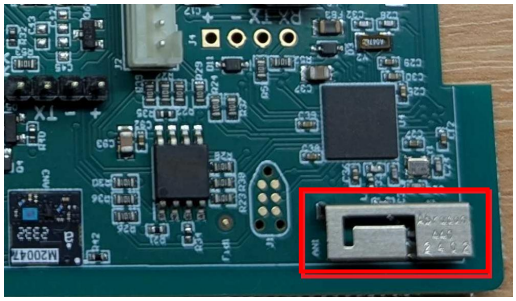
## 2.1 Client information

| | |
|---|---|
| **Name** | Steelwrist AB |
| **Address** | Titangatan 9, 17592 Rosersberg, Sweden |
| **Contacts** | Gustav Andersson |
| **Tel** | 08 626 07 12 |
| **E-mail** | support@steelwrist.com |
| **Manufacturer** | Steelwrist AB |

## 2.2 Description of EUT(S)

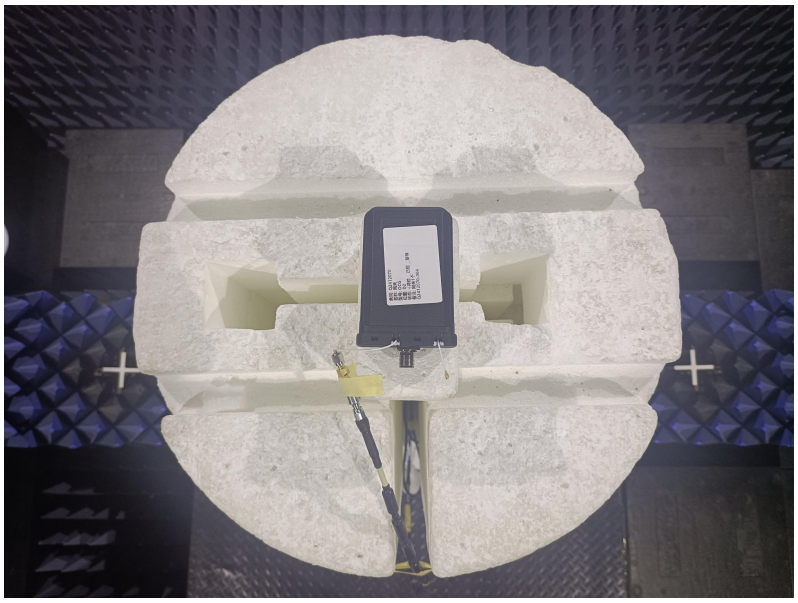
| | |
|---|---|
| **Product Name** | Quantum Connectivity Gateway |
| **Sample Model** | QCG |
| **Serial No.** | / |
| **Antenna Type** | PRO-0B-440, surface mount |
| **Test Item** | VSWR;Antenna gain; Efficiency; Radiation pattern |
| **Frequency Range** | 2400-2500MHz |
| **Received Date** | 2025.3.6 |
| **Test Date** | 2025.3.6 |
| **Remark** | Bluetooth version: V5.1 |

## 2.3 EUT appearance

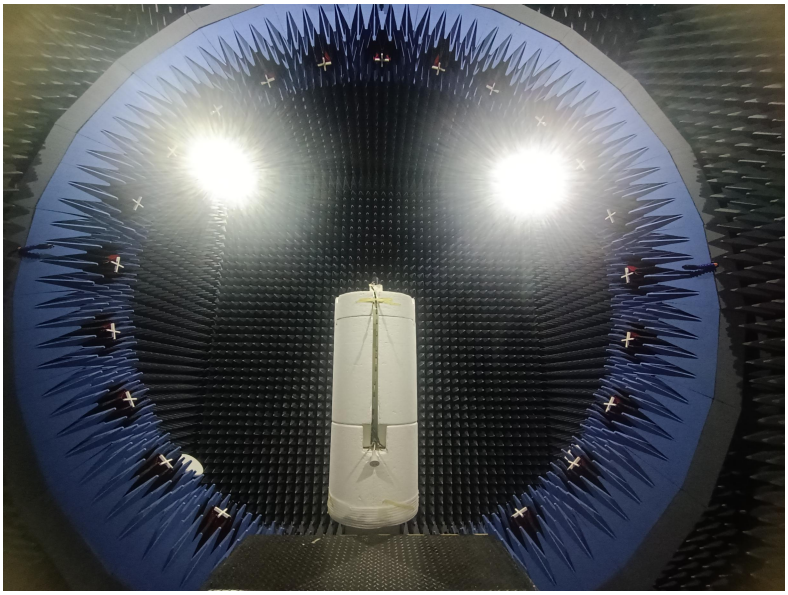


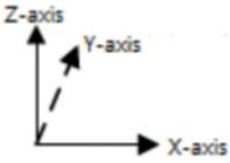
## 2.4 EUT setup photo of free space OTA testing

Planform



Front view





# 3.Test Results

## 3.1 Test standard

| Name | Parameter | Method | Standard no. |
|---|---|---|---|
| Mobile communication antenna | Antenna gain | Generic specification for antennas used in the mobile communications | GB/T 9410-2008 |
| | Radiation pattern | | |
| | VSWR | | |
| Antenna | Radiation efficiency | IEEE Standard Test Procedures for Antennas | ANSI/IEEE Std 149-1979 |
| | Gain and directivity | | |

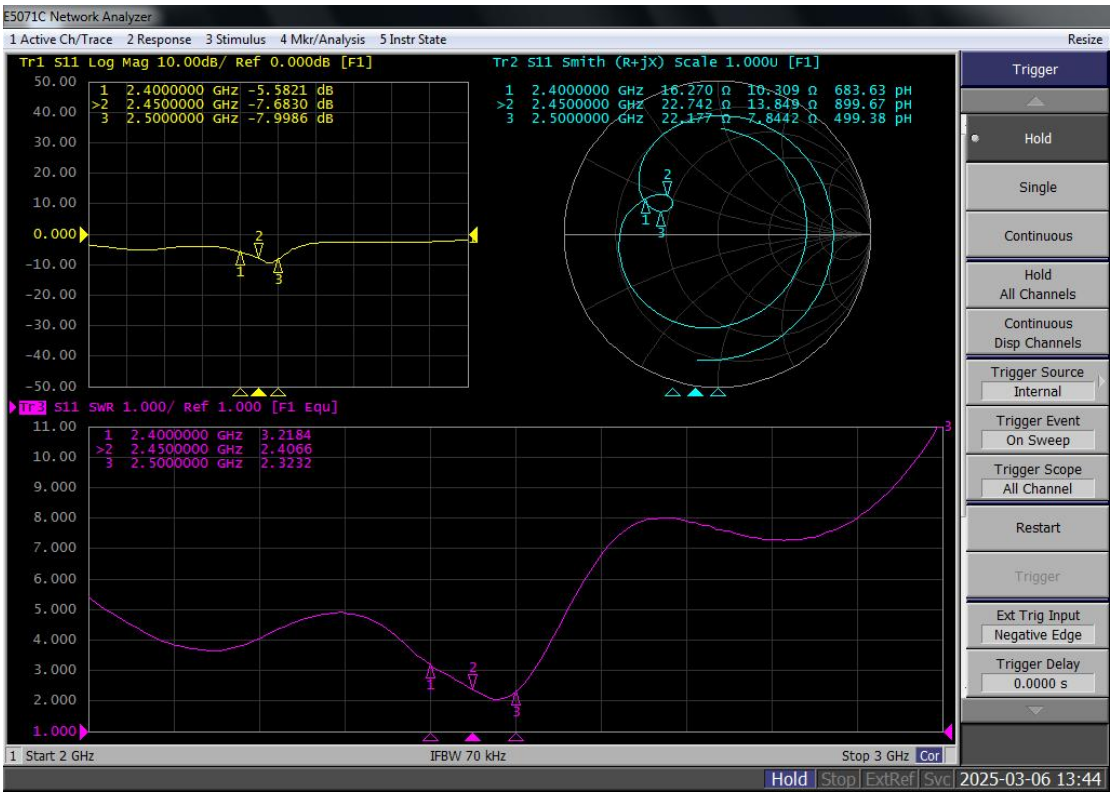
## 3.2 Test uncertainty

The uncertainty was calculated on the basis of the GUM published by ISO, using the inclusion factor of K=2 and the 95% confidence level to express the extended uncertainty.

| Item | Uncertainty |
|---|---|
| VSWR | ±0.3 |
| Antenna gain | ±0.72dB |
| Radiation efficiency | ±0.72dB |

## 3.3 Test data

### 3.3.1 S11 parameters




### 3.3.2 S11 data

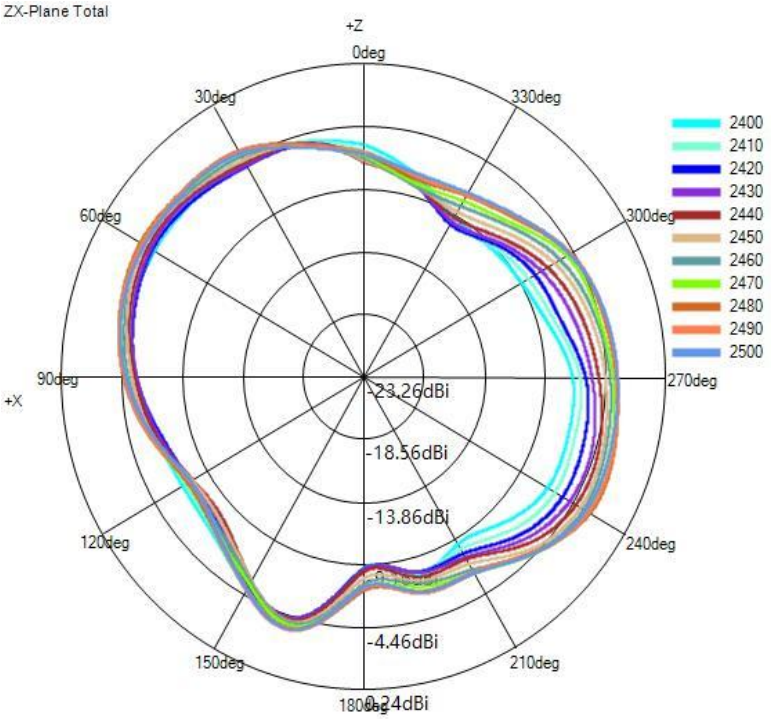
| Frequency/MHz | 2400 | 2450 | 2500 |
|---|---|---|---|
| VSWR | 3.2184 | 2.4066 | 2.3232 |

### 3.3.3 Typical free space efficiency and gain

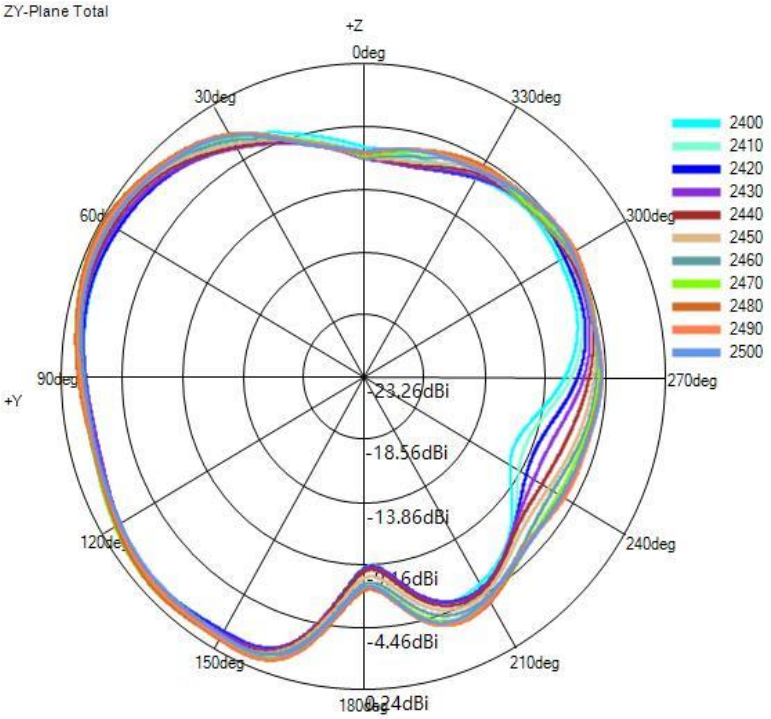
| Frequency/MHz | 2400 | 2410 | 2420 | 2430 | 2440 | 2450 | 2460 | 2470 | 2480 | 2490 | 2500 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Peak Gain/dBi | -0.61 | -0.52 | -0.65 | -0.52 | -0.46 | -0.29 | -0.06 | 0.11 | 0.22 | 0.00 | -0.29 |
| Efficiency/% | 31.35 | 31.40 | 30.99 | 31.87 | 33.21 | 34.88 | 36.08 | 37.34 | 38.29 | 37.52 | 36.20 |

## 3.3.4 Typical free space radiation pattern

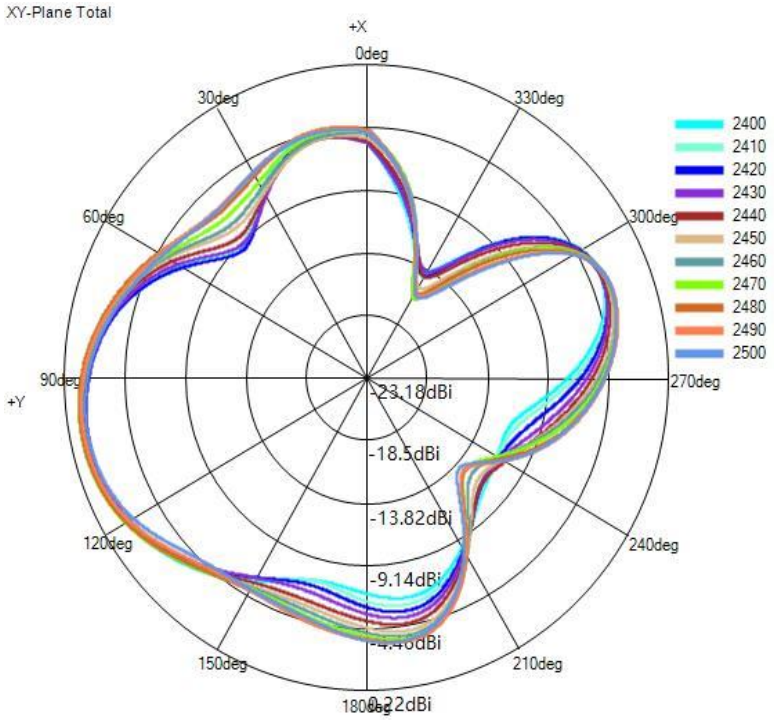
(1) X-Z Plane(unit:dBi):



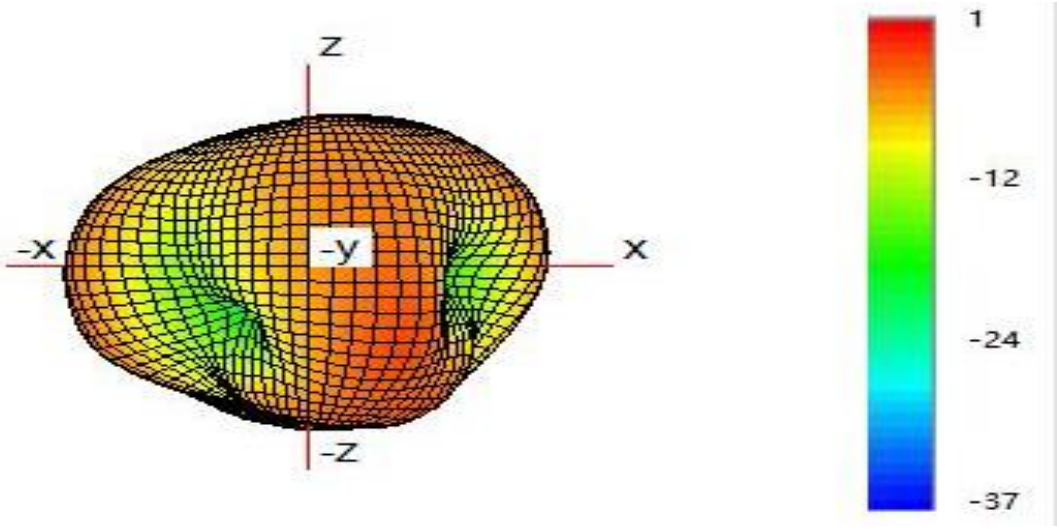

(2) Y-Z Plane(unit:dBi):



(3) X-Y Plane(unit:dBi):




(4) Typical Free Space 3D Radiation Pattern at 2480MHz(unit:dBi):

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