

Antenna Test Report

Report No.: E4/2018/50029
Test Plan: Non-compliance with ISO17025

Applicant Name: Raytac Corporation
Manufacturer Name: Raytac Corporation

Product Name: Bluetooth Low Energy Module
Model Number: MDBT50Q (CHIP antenna)

Measurements performed at
SGS Taiwan Ltd.
Hwaya District, Taiwan

Issued Date: July 10, 2018

| | Name | Date & Signature | Distribution |
|--------------|-------------------------------|-----------------------------------|--------------|
| Prepared by: | Shawn Yen Asst. Supervisor | <i>Shawn Yen</i> July 10, 2018 | |
| Approved by: | Dragon Wu Asst. Manager | <i>Dragon Wu</i> July 10, 2018 | |

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Measurement System Information

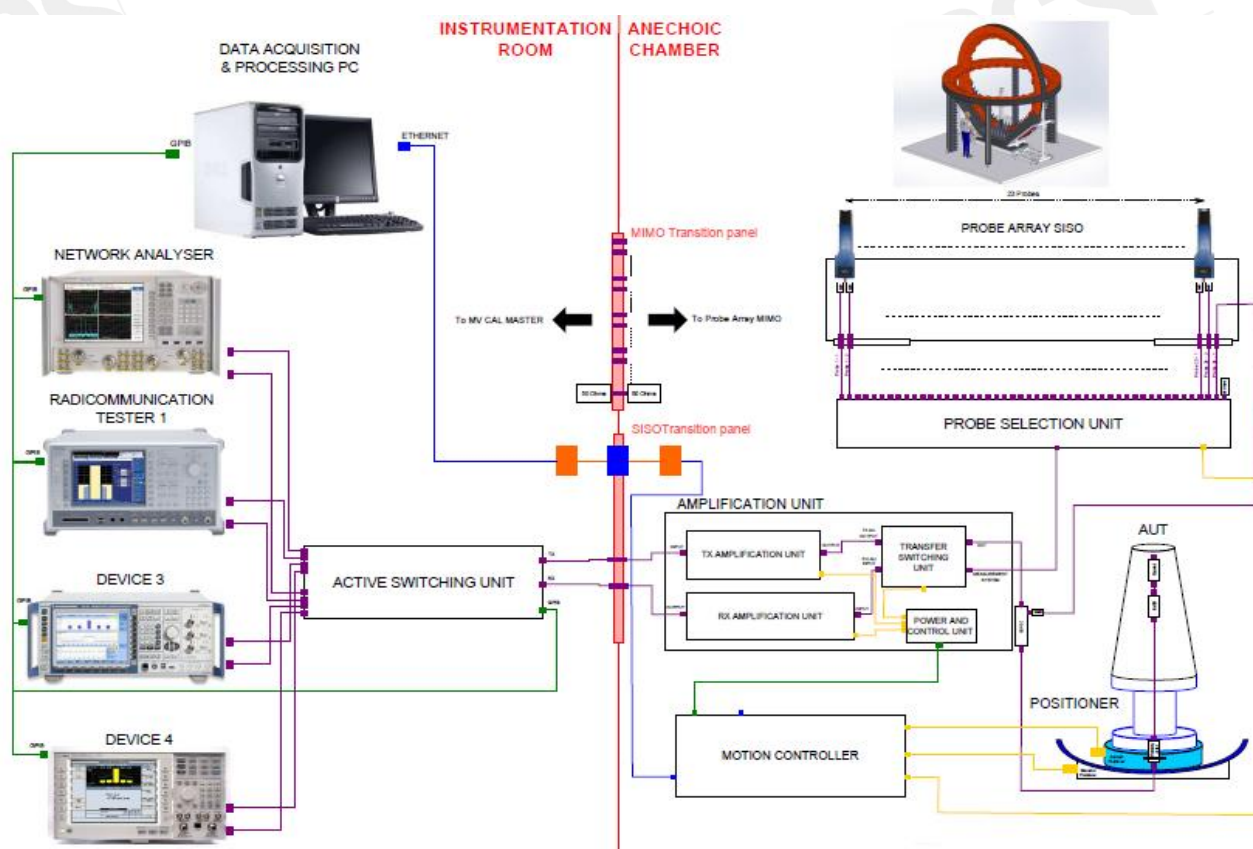
General Information

Testing Condition:

- Temperature: $22 \pm 3^{\circ}\text{C}$
- Humidity: $< 80\%$

Measurement Facility:

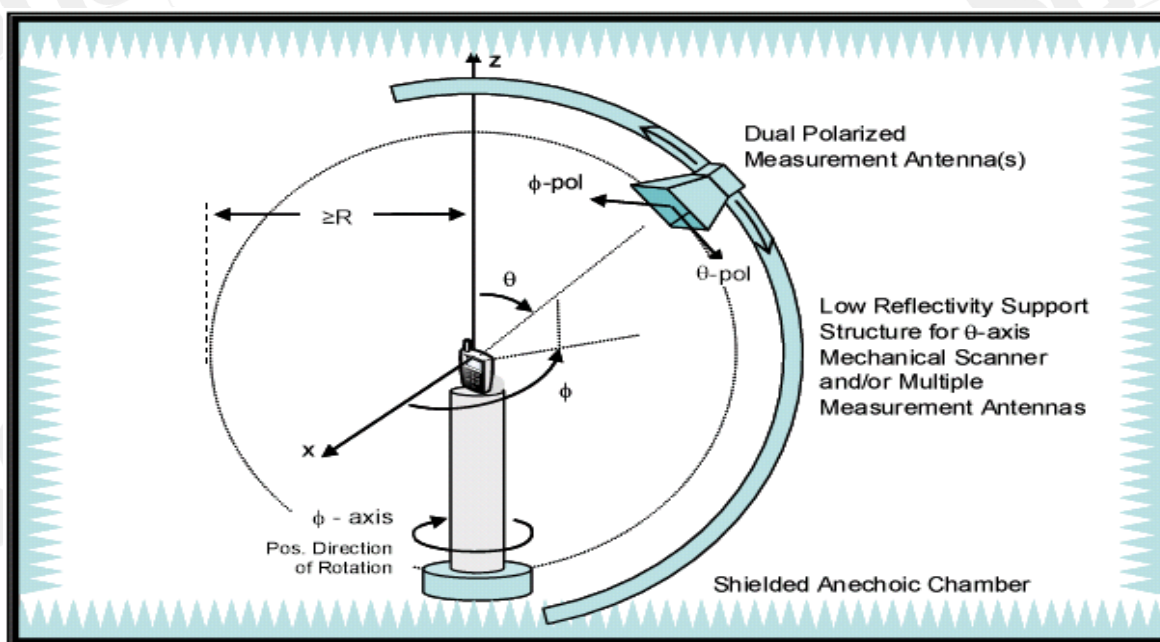
- Measurement Chamber: Satimo 3D fully anechoic chamber and its measuring system (Stargate-24-L)
- Base Station Simulator: Anritsu MT8820C (or R&S CMU200)
- Network Analyzer: Agilent E5071C



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Measurements are performed in a Satimo **Stargate-24-L** with the StarAct interface for a base station simulator. The **Stargate-24-L** has 23 probe antennas mounted with equal spacing on a circular arch. Electronic switching of the probe antennas provides outstanding measurement speed. The geometry of the setup, with only a Styrofoam column within 1.6 meters of the EUT, ensures minimum interference and low ripple on the measured radiation patterns. The DUT is placed on top of the pedestal, in the center of the system.

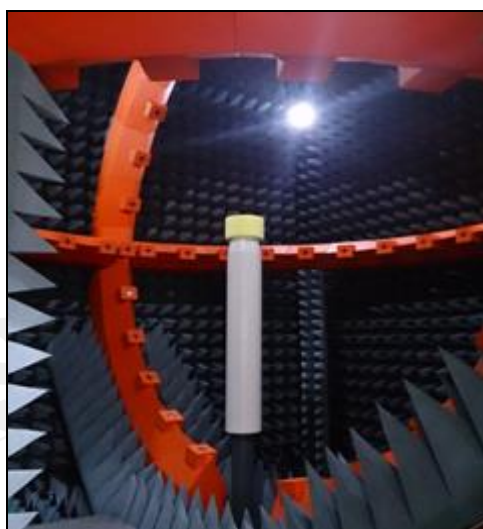
Typical Setup for Satimo Stargate-24-L:



Instruments View



Inside View



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Testing Laboratory: Identification of the Responsible Test Laboratory.● **OTA Laboratory:****SGS Taiwan Ltd. Electronics & Communication Laboratory**

No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803.

Telephone: +886 2 2299 3279

Fax: +886 2 2298 0488

Internet: <http://www.tw.sgs.com>

● **Testing Location:**

No. 2, Keji 1st Rd., Hwaya Technology Park, Guishan District, Taoyuan City, Taiwan 33383.

Details of Applicant:

| | |
|-----------------------------|--|
| Applicant's name: | Raytac Corporation |
| Applicant's address: | 5F, No.3, Jiankang Rd., Zhonghe Dist., New Taipei City, 235, Taiwan |
| Contact person: | Mr. Lyon Liu |
| Telephone: | 886.2.3234.0208 |
| Fax: | 886.2.3234.0547 |
| E-mail: | lyon@raytac.com |

Details of Manufacturer:

| | |
|--------------------------------|--|
| Manufacturer's name: | Raytac Corporation |
| Manufacturer's address: | 5F, No.3, Jiankang Rd., Zhonghe Dist., New Taipei City, 235, Taiwan |
| Contact person: | Mr. Lyon Liu |
| Telephone: | 886.2.3234.0208 |
| Fax: | 886.2.3234.0547 |
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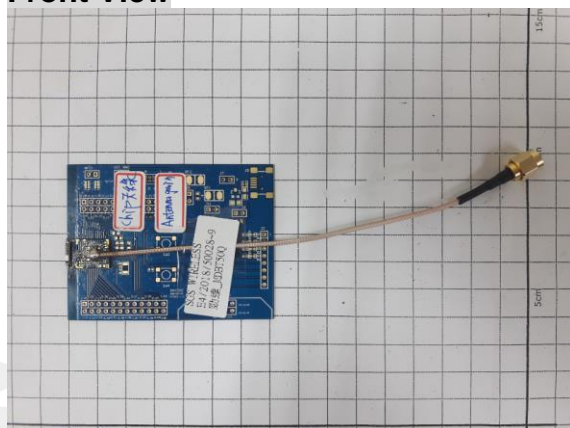
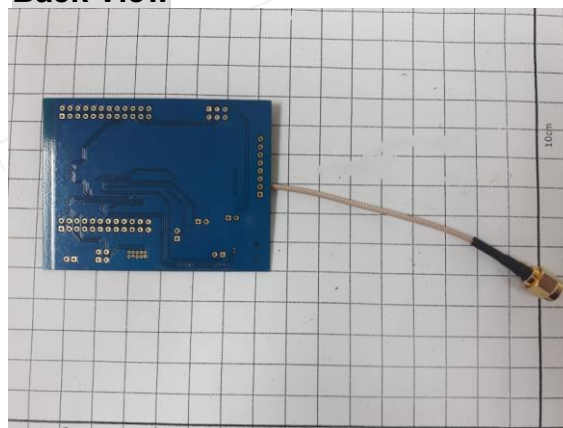
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Details of EUT:

| | |
|-----------------------------|---|
| Device Description: | Bluetooth Low Energy Module |
| Device Manufacturer: | Raytac Corporation |
| Device Model: | MDBT50Q (CHIP antenna) |
| Hardware Version: | N/A |
| Software Version: | N/A |
| FCC ID: | SH6MDBT50Q |
| Frequency Range: | 2400MHz ~ 2500MHz Step size: 10MHz |
| Antenna Type: | Internal antenna |

Duration of Tests:

| | |
|-----------------------------|-------------------|
| Sample Receive Date: | 2018-06-01 |
| Test Starting Date: | 2018-06-01 |
| Test Ending Date: | 2018-06-01 |
| Report Issued Date: | 2018-07-10 |

Photographs of EUT:**Front View****Back View**

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List of Equipment

Equipment Summary Sheet

| Equipment Description | Manufacturer | Identification no. | Current calibration date | Next calibration date |
|--------------------------------------|--------------|--------------------|--------------------------|-----------------------|
| Universal Radio Communication tester | Anritsu | MT8820C | 2017/10/16 | 2018/10/15 |
| Network Analyzer | Agilent | E5071C | 2017/10/16 | 2018/10/15 |
| Sleeve Dipole | Satimo | SD740 | 2017/11/09 | 2018/11/08 |
| Dual Ridge Horn | Satimo | SH800 | 2017/08/02 | 2018/08/01 |
| Stargate-24-L probe array | Satimo | Stargate-24-L | 2017/11/24 | 2018/11/23 |
| Measurement software | Satimo | SPM V1.9 | N/A | N/A |

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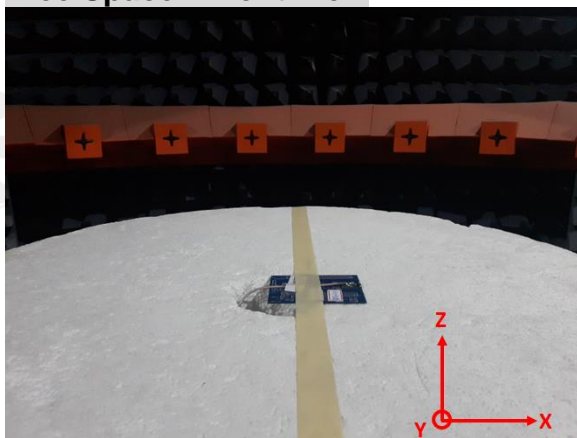
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Antenna Gain and Efficiency

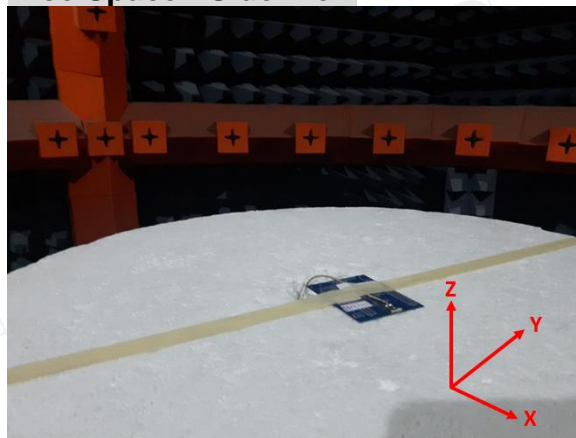
| MDBT50Q (CHIP antenna) | | | |
|------------------------|-----------|------------|---------------|
| Freq(MHz) | Peak. dBi | Efficiency | Average . dBi |
| 2400.00 | -1.47 | 25.18% | -5.99 |
| 2410.00 | -1.27 | 26.07% | -5.84 |
| 2420.00 | -1.32 | 27.15% | -5.66 |
| 2430.00 | -1.12 | 28.51% | -5.45 |
| 2440.00 | -0.80 | 29.41% | -5.32 |
| 2450.00 | -0.65 | 29.59% | -5.29 |
| 2460.00 | -0.82 | 28.98% | -5.38 |
| 2470.00 | -0.94 | 29.31% | -5.33 |
| 2480.00 | -0.88 | 29.12% | -5.36 |
| 2490.00 | -0.98 | 27.60% | -5.59 |
| 2500.00 | -1.49 | 24.96% | -6.03 |

Test Setup

Free Space - Front View



Free Space - Side View

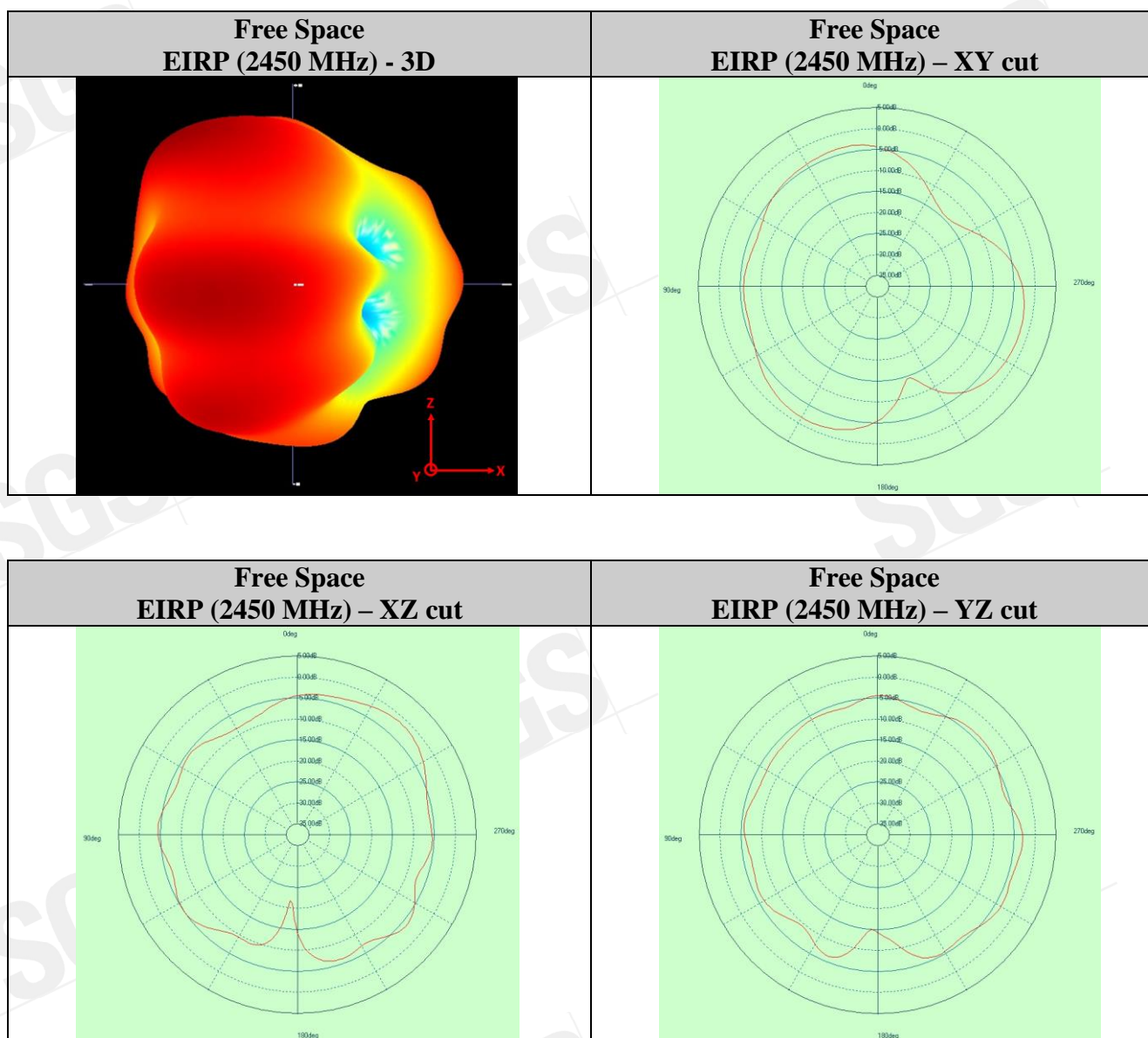


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Antenna 3D Plot Matrix

All plots in this section show the total EIRP ($EIRP_{\theta} + EIRP_{\phi}$) with the +x-axis pointing out of the page, +y-axis pointing right, and +z-axis pointing up.



End of Report

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