
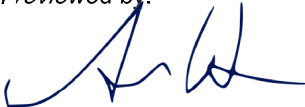


<b>Prüfbericht-Nr.:</b> <i>Test Report No.:</i>	<b>50354460 001</b>	<b>Auftrags-Nr.:</b> <i>Order No.:</i>	238111472	Seite 1 von 32 <i>Page 1 of 32</i>
<b>Kunden-Referenz-Nr.:</b> <i>Client Reference No.:</i>	N/A	<b>Auftragsdatum:</b> <i>Order date:</i>	28-Aug-2019	
<b>Auftraggeber:</b> <i>Client:</i>	WINSCEND TECH LIMITED - Room 8, 5/F, Sunwise Industrial Building, 16-26 Wang Wo Tsai Street, Tsuen Wan, N.T. Hong Kong.			
<b>Prüfgegenstand:</b> <i>Test item:</i>	Bluetooth Dartboard			
<b>Bezeichnung / Typ-Nr.:</b> <i>Identification / Type No.:</i>	SDB A1			
<b>Auftrags-Inhalt:</b> <i>Order content:</i>	FCC Part 15C Test report (BLE)			
<b>Prüfgrundlage:</b> <i>Test specification:</i>	FCC 47CFR Part 15: Subpart C Section 15.247(DTS)			
<b>Wareneingangsdatum:</b> <i>Date of receipt:</i>	26-Apr-2019			
<b>Prüfmuster-Nr.:</b> <i>Test sample No.:</i>	A001041698-001			
<b>Prüfzeitraum:</b> <i>Testing period:</i>	24-Dec-2019~14-Jan-2020			
<b>Ort der Prüfung:</b> <i>Place of testing:</i>	EMC/RF Laboratory Taipei			
<b>Prüflaboratorium:</b> <i>Testing laboratory:</i>	TUV Rheinland Taiwan Ltd.			
<b>Prüfergebnis*:</b> <i>Test result*:</i>	Pass			
<b>geprüft von / tested by:</b>		<b>kontrolliert von / reviewed by:</b>		
				
<b>16-Jan-2020</b>	<b>Jack Chang/Project Manager</b>	<b>16-Jan-2020</b>	<b>Arvin Ho / Vice General Manager</b>	
<b>Datum</b>	<b>Name / Stellung</b>	<b>Unterschrift</b>	<b>Datum</b>	<b>Name / Stellung</b>
<i>Date</i>	<i>Name / Position</i>	<i>Signature</i>	<i>Date</i>	<i>Name / Position</i>
<b>Sonstiges / Other:</b>				
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend
	5 = mangelhaft	P(ass) = entspricht o.g. Prüfgrundlage(n)		
	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar		
Legend:	1 = very good	2 = good	3 = satisfactory	4 = sufficient
	5 = poor	N/A = not applicable		
	P(ass) = passed a.m. test specification(s)	F(ail) = failed a.m. test specification(s)		
	N/T = nicht getestet	N/T = not tested		
<p><b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b></p> <p><i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i></p>				

## TEST SUMMARY

### 5.1.1 ANTENNA REQUIREMENT

RESULT: *Passed*

### 5.1.2 PEAK OUTPUT POWER

RESULT: *Passed*

### 5.1.3 6dB BANDWIDTH

RESULT: *Passed*

### 5.1.4 POWER DENSITY

RESULT: *Passed*

### 5.1.5 CONDUCTED SPURIOUS EMISSIONS AND FREQUENCY BAND EDGE MEASURED IN 100KHZ BANDWIDTH

RESULT: *Passed*

### 5.1.6 SPURIOUS EMISSION

RESULT: *Passed*

### 6.1.1 ELECTROMAGNETIC FIELDS

RESULT: *Passed*

## Contents

<b>1.</b>	<b>GENERAL REMARKS .....</b>	<b>5</b>
<b>1.1</b>	<b>COMPLEMENTARY MATERIALS.....</b>	<b>5</b>
<b>1.2</b>	<b>DECISION RULE OF CONFORMITY.....</b>	<b>5</b>
<b>2.</b>	<b>TEST SITES .....</b>	<b>6</b>
<b>2.1</b>	<b>TEST LABORATORY .....</b>	<b>6</b>
<b>2.2</b>	<b>TEST FACILITY.....</b>	<b>6</b>
<b>2.3</b>	<b>LIST OF TEST AND MEASUREMENT INSTRUMENTS.....</b>	<b>7</b>
<b>2.4</b>	<b>TRACEABILITY .....</b>	<b>8</b>
<b>2.5</b>	<b>CALIBRATION .....</b>	<b>8</b>
<b>2.6</b>	<b>MEASUREMENT UNCERTAINTY.....</b>	<b>8</b>
<b>3.</b>	<b>GENERAL PRODUCT INFORMATION.....</b>	<b>9</b>
<b>3.1</b>	<b>PRODUCT FUNCTION AND INTENDED USE .....</b>	<b>9</b>
<b>3.2</b>	<b>SYSTEM DETAILS AND RATINGS.....</b>	<b>9</b>
<b>3.3</b>	<b>INDEPENDENT OPERATION MODES.....</b>	<b>10</b>
<b>3.4</b>	<b>NOISE GENERATING AND NOISE SUPPRESSING PARTS .....</b>	<b>10</b>
<b>3.5</b>	<b>SUBMITTED DOCUMENTS.....</b>	<b>10</b>
<b>4.</b>	<b>TEST SET-UP AND OPERATION MODES.....</b>	<b>11</b>
<b>4.1</b>	<b>PRINCIPLE OF CONFIGURATION SELECTION .....</b>	<b>11</b>
<b>4.2</b>	<b>TEST OPERATION AND TEST SOFTWARE.....</b>	<b>11</b>
<b>4.3</b>	<b>SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT .....</b>	<b>12</b>
<b>4.4</b>	<b>COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE.....</b>	<b>12</b>
<b>4.5</b>	<b>TEST SETUP DIAGRAM .....</b>	<b>13</b>
<b>5.</b>	<b>TEST RESULTS .....</b>	<b>14</b>
<b>5.1</b>	<b>TRANSMITTER REQUIREMENT &amp; TEST SUITES .....</b>	<b>14</b>
5.1.1	<i>Antenna Requirement .....</i>	<i>14</i>
5.1.2	<i>Peak Output Power .....</i>	<i>15</i>
5.1.3	<i>6dB Bandwidth .....</i>	<i>16</i>
5.1.4	<i>Power Density .....</i>	<i>19</i>
5.1.5	<i>Conducted spurious emissions and Frequency Band Edge measured in 100kHz Bandwidth.....</i>	<i>22</i>
5.1.6	<i>Spurious Emission .....</i>	<i>26</i>
<b>6.</b>	<b>SAFETY HUMAN EXPOSURE .....</b>	<b>27</b>
<b>6.1</b>	<b>RADIO FREQUENCY EXPOSURE COMPLIANCE .....</b>	<b>27</b>
6.1.1	<i>Electromagnetic Fields.....</i>	<i>27</i>

Produkte  
Products

**Prüfbericht - Nr.: 50354460 001**  
*Test Report No.*

**Seite 4 von 32**  
*Page 4 of 32*

<b>7.</b>	<b>PHOTOGRAPHS OF THE TEST SET-UP.....</b>	<b>28</b>
<b>8.</b>	<b>LIST OF TABLES .....</b>	<b>32</b>
<b>9.</b>	<b>LIST OF PHOTOGRAPHS.....</b>	<b>32</b>

## 1. General Remarks

### 1.1 Complementary Materials

The following attachments are integral parts of this test report:

**Appendix P: Photo Documentation internal view**  
(File Name: 50274640 001 Appendix P)

**Appendix D: Test Result of Radiated Emissions**  
(File Name: 50274640 001 Appendix D)

#### Test Specifications

The following standards were applied.

**Table 1: Applied Standard and Test Levels**

<b>Radio</b>
FCC 47CFR Part 15: Subpart C Section 15.247
FCC 47CFR Part 2: Subpart J Section 2.1093
ANSI C63.10:2013
KDB558074 D01 DTS Meas Guidance v05r02
KDB447498 D01 General RF Exposure Guidance v06

### 1.2 Decision Rule of conformity

The decision rule of conformity of this test report is following the requirements of the requested standard in the quotation, and agreed among testing laboratory and manufacturer (applicant) to exclude the consideration of Measurement Uncertainty, unless it is required by the specific standard.

## 2. Test Sites

### 2.1 Test Laboratory

TUV Rheinland Taiwan Ltd.  
Taipei Testing Laboratories

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.  
Taipei City 105  
Taiwan (R.O.C.)

### 2.2 Test Facility

TUV Rheinland Taiwan Ltd.

Radiated Test:  
11F. No.758, Sec. 4, Bade Rd., Songshan Dist.  
Taipei City 105  
Taiwan (R.O.C.)  
FCC Registration No.: 180491  
IC Canada Registration No.: 9465A

Conducted Test:  
No. 458-18, Sec 2, Fenliao., Linkou Dist.  
New Taipei City 244  
Taiwan (R.O.C.)  
FCC Registration No.: 226631  
IC Canada Registration No.: 25563

TAF Accredited NCC Test Lab. No.:3567  
TAF ISO17025 Certification effective period: 6<sup>th</sup>-May-2019 to 05<sup>th</sup>-May-2022



Testing Laboratory  
3567

## 2.3 List of Test and Measurement Instruments

**Table 2: List of Test and Measurement Equipment**

Radiated Test in Songshan:

Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESR 7	101062	2019/10/15	2020/10/15
Spectrum Analyzer	Rohde & Schwarz	FSV-40	100921	2019/04/30	2020/04/30
Pre-Amplifier	Hewlett Packard	8447F	2805A03335	2019/09/11	2020/09/11
Pre-Amplifier	EM Electronics	EM01G18G	060558	2019/12/24	2020/12/24
Pre-Amplifier	EMC Instruments	EMC184045SE	980609(980408)	2019/06/14	2020/06/14
Bilog Antenna	TESEQ	CBL 6111D	29802	2019/09/10	2020/09/10
Horn Antenna	ETS-Lindgren	3117	00138160	2019/06/24	2020/06/24
Horn Antenna	Schwarzbeck	BBHA 9170	00907	2019/04/12	2020/04/12
Loop Antenna	Schwarzbeck	FMZB 1513	1513-076	2019/07/11	2020/07/11
Test Software	Audix	e3	Ver. 9	N/A	N/A

Conducted Test in LinKou:

Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	R&S	FSV40	101513	2019/2/8	2020/2/8
Thermo Chamber	Giant Force	GHT-150-40-CP-SD	MAA1902-010	2019/2/1	2020/2/1
Signal Generator	R&S	SMB100A03	181335	2019/1/23	2020/1/23
Power Meter	Anritsu	ML2495A	1901008	2019/4/29	2020/4/28
Power Sensor	Anritsu	MA2411B	1725269	2019/4/29	2020/4/28

## 2.4 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

## 2.5 Calibration

Equipment requiring calibration is calibrated periodically in a suitably accredited Calibration Lab. Additionally all equipment is verified for proper performance on a regular schedule using in house standards or comparisons.

## 2.6 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements .

**Table 3: Emission Measurement Uncertainty**

Parameter	Uncertainty
Radio Frequency	± 0.1 ppm
RF power/RF Exposure(MPE), conducted	± 1.5 dB
RF power density, conducted	± 3 dB
spurious emissions, conducted	± 3 dB
all emissions, radiated	± 6 dB
Temperature	± 1 °C
Humidity	± 5 %
DC and low frequency voltages	±3 %



### 3. General Product Information

#### 3.1 Product Function and Intended Use

The EUT is a Bluetooth Dartboard . It contains a Bluetooth compatible chip enabling the user to communicate data through a Wireless interface.  
For details refer to the User Guide, Data Sheet and Circuit Diagram.

#### 3.2 System Details and Ratings

**Table 4: Basic Information of EUT**

Item	EUT information
Kind of Equipment/Test Item	Bluetooth Dartboard
Type Identification	SDB A1
FCC ID	2ARFT-SDBA1

**Table 5: Technical Specification of EUT**

Technical Specification	Value
Operating Frequencies	2402~2480MHz
Channel number	40
Operation Voltage	3Vdc
Modulation	GFSK
Antenna gain	-0.36dBi

### **3.3 Independent Operation Modes**

Basic operation modes are:

- A. Transmitting
  - 1. Low channel
  - 2. Middle channel
  - 3. High channel
- B. Receiving
- C. Standby
- D. Off

### **3.4 Noise Generating and Noise Suppressing Parts**

Refer to the Circuit Diagram.

### **3.5 Submitted Documents**

- Circuit Diagram
- Blocking Diagram
- Rating Label
- Technical Description

## 4. Test Set-up and Operation Modes

### 4.1 Principle of Configuration Selection

The test modes were adapted accordingly in reference to the instructions for use.

During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

**Table 6: Table for Parameters of Test Software Setting**

Mode, Data Rate	Channel Frequency		
	2402 MHz	2440 MHz	2480 MHz
BLE	Default	Default	Default

### 4.2 Test Operation and Test Software

Setup for testing: Setup for testing: Test samples are provided with USB interface which makes it possible to control them through a test software installed on a notebook computer.

This software nRF\_DTM was running on the laptop computer connected to the EUT. It was used to enable the operation modes listed in section 3.3 as appropriate.

The samples were used as follows:

Conducted: A000913336-001

Radiation: A000913336-001

Full test was applied on all test modes, but only worst case was shown BLE mode:

Channel Low (2402MHz), Channel Mid (2440MHz) and Channel High (2480MHz) were chosen for full testing.

IOA5	IOA4	IOA3	Test Firmware
0	0	1	A7107Config_RF[0X23] = 0x13; A7107Config_RF[0X27] = 0x37; A7107Config_RF[0X28] = 0x1D;
IOA2	IOA1	IOA0	Test Frequency
0	0	0	Tx 2402MHz Setting
0	1	1	Tx 2440MHz Setting
1	0	0	Tx 2480MHz Setting
1	0	1	Rx 2402MHz Setting
1	1	0	Rx 2440MHz Setting
1	1	1	Rx 2480MHz Setting

### 4.3 Special Accessories and Auxiliary Equipment

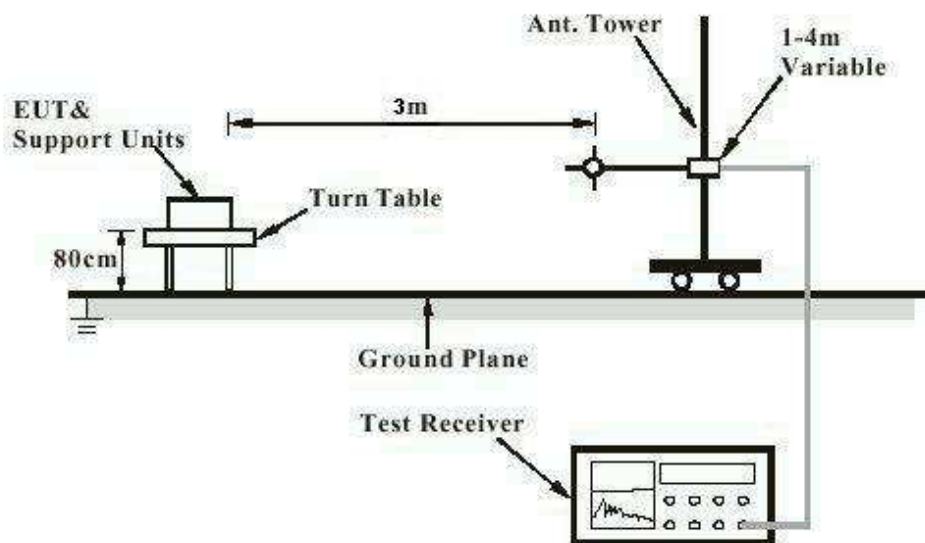
N/A

### 4.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

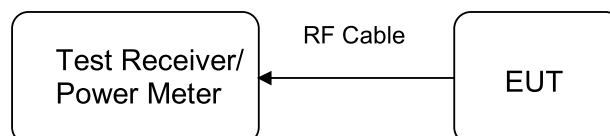
## 4.5 Test Setup Diagram

### Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1 GHz are done with a table height of 1.5m

### Diagram of Measurement Equipment Configuration for Conducted Transmitter Measurement



## 5. Test Results

### 5.1 Transmitter Requirement & Test Suites

#### 5.1.1 Antenna Requirement

**RESULT:** **Passed**

Test standard : FCC Part 15.247(b)(4), Part 15.203

Requirement : use of approved antennas only with directional gains that do not exceed 6 dBi

According to the manufacturer declaration, the EUT has an antenna with a directional gain of -0.36dBi. The antenna is a printed trace with no possibility of replacement with a non-approved antenna by the end-user. Therefore, the EUT is considered to comply with this provision.

Refer to EUT photo for details.

## 5.1.2 Peak Output Power

**RESULT:**
**Passed**

Test standard : FCC Part 15.247(b)(3)  
 Basic standard : ANSI C63.10:2013, KDB558074  
 Limit : 1 Watt  
 Kind of test site : Shielded room

**Test setup**

Test Channel : Low/ Middle/ High  
 Operation Mode : A  
  
 Ambient temperature : 20-24 °C  
 Relative humidity : 50-65 %  
 Atmospheric pressure : 100-103 kPa

**Table 7: Test result of Peak Output Power**

Channel	Channel Frequency (MHz)	Output Power		Limit (W)
		(dBm)	(W)	
Low Channel	2402	-0.85	0.00082	1
Middle Channel	2440	-1.64	0.00069	1
High Channel	2480	-2.37	0.00058	1

Pmax: 0.82mW

### 5.1.3 6dB Bandwidth

**RESULT:**
**Passed**

Test standard : FCC Part 15.247(a)(2)  
 Basic standard : ANSI C63.10:2013, KDB558074  
 Kind of test site : Shielded room

**Test setup**

Test Channel : Low/ Middle/ High  
 Operation Mode : A  
  
 Ambient temperature : 20-24°C  
 Relative humidity : 50-65%  
 Atmospheric pressure : 100-103 kPa

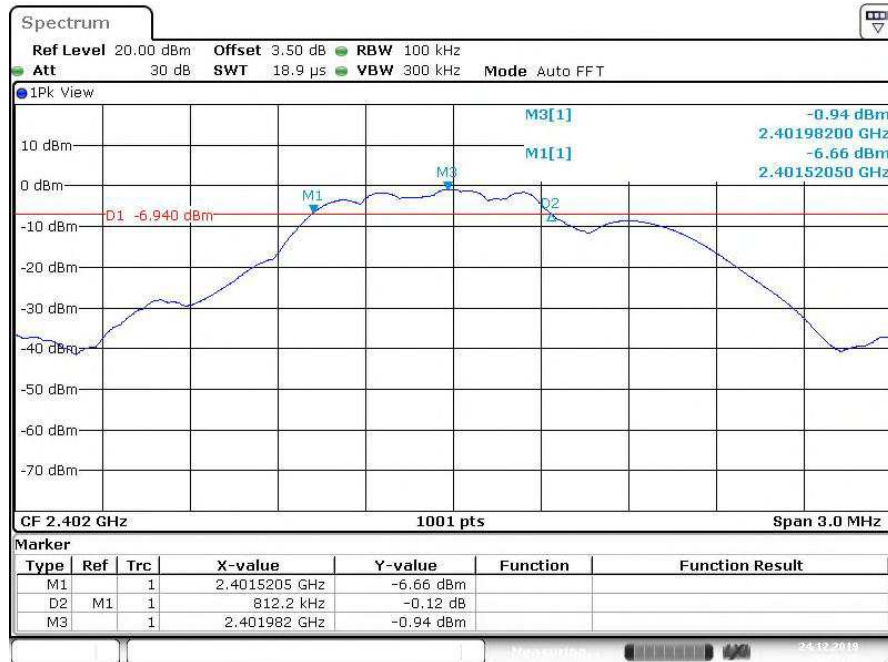
**Table 8: Test result of 6dB Bandwidth**

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Limit (kHz)	Result
Low Channel	2402	812.2	>500	Pass
Mid Channel	2440	875.1	>500	Pass
High Channel	2480	917.1	>500	Pass

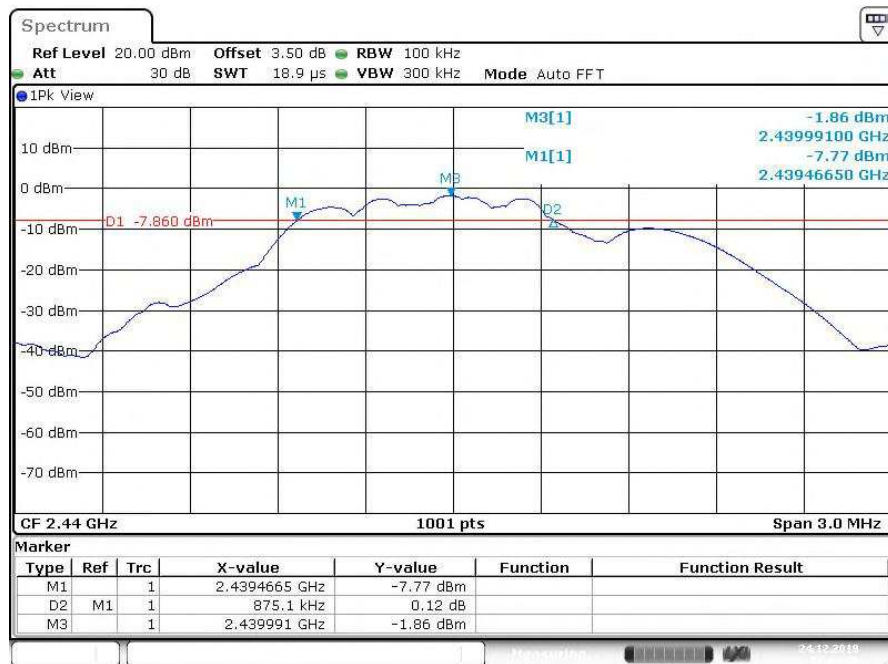


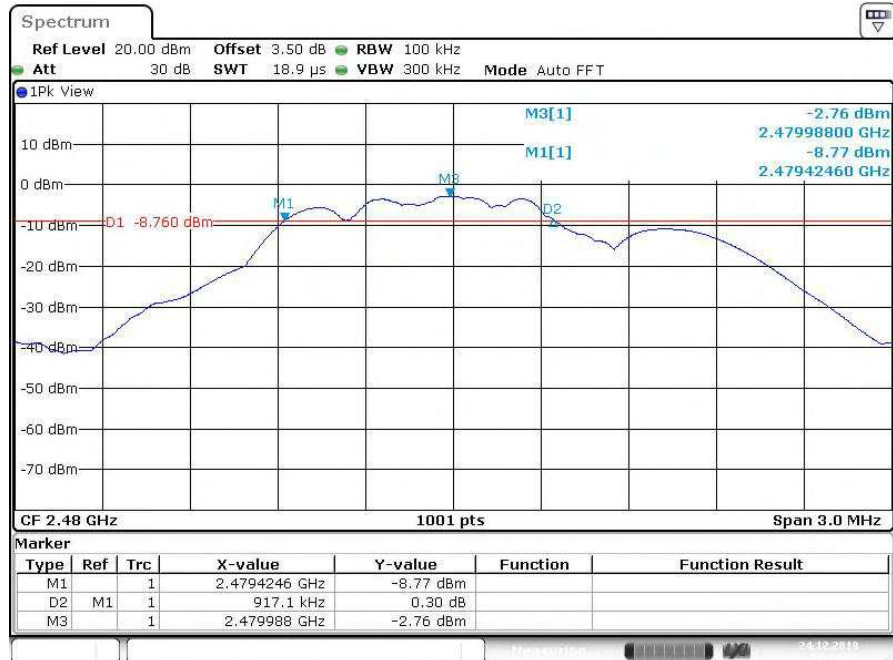
## Test Plot of 6dB Bandwidth

### Low Channel



### Middle Channel



**High Channel**


Date: 24.DEC.2019 17:16:41

### 5.1.4 Power Density

**RESULT:**
**Passed**

Test standard : FCC Part 15.247(e), RSS-247 5.2(b)  
 Basic standard : ANSI C63.10:2013, KDB558074  
 Kind of test site : Shielded room

**Test setup**

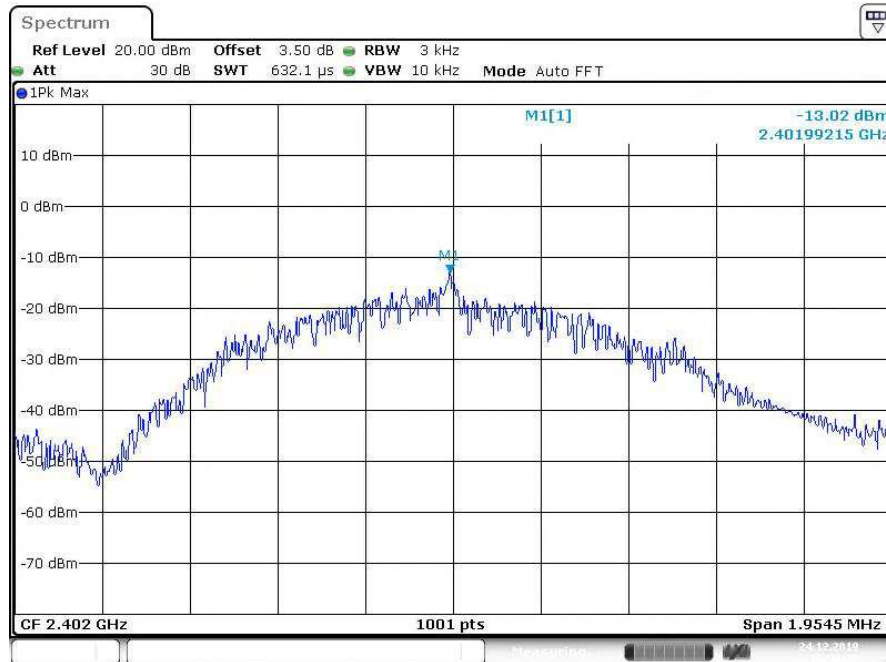
Test Channel : Low/ Middle/ High  
 Operation Mode : A  
 Ambient temperature : 20-24°C  
 Relative humidity : 50-65%  
 Atmospheric pressure : 100-103 kPa

**Table 9: Test result of Power Density**

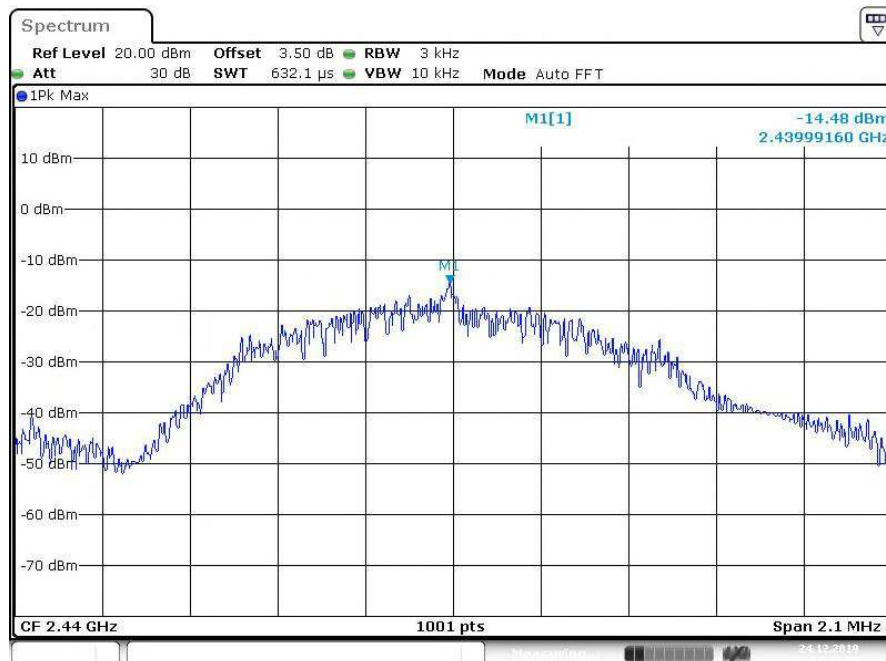
Channel	Channel Frequency (MHz)	Power Density	Limit
		(dBm)	(dBm)
Low Channel	2402	-13.02	8
Middle Channel	2440	-14.48	8
High Channel	2480	-15.6	8

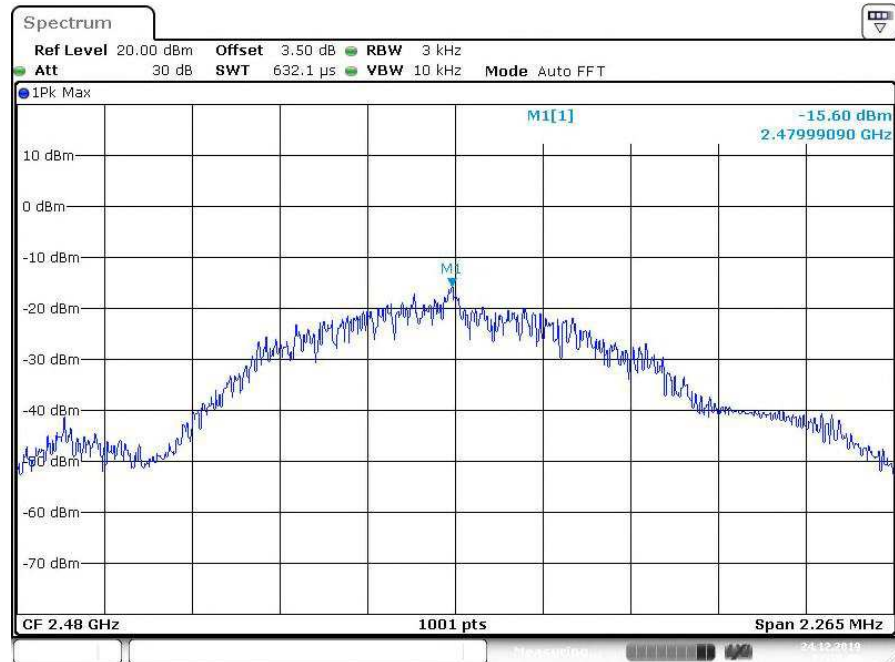
## Test Plot of Power Density

### Low Channel



### Middle Channel



**High Channel**


Date: 24.DEC.2019 17:18:28

### 5.1.5 Conducted spurious emissions and Frequency Band Edge measured in 100kHz Bandwidth

**RESULT:** **Passed**

Test standard	:	FCC part 15.247(d)
Basic standard	:	ANSI C63.10:2013, KDB558074
Limit	:	20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power)
Kind of test site	:	Shielded room

#### Test setup

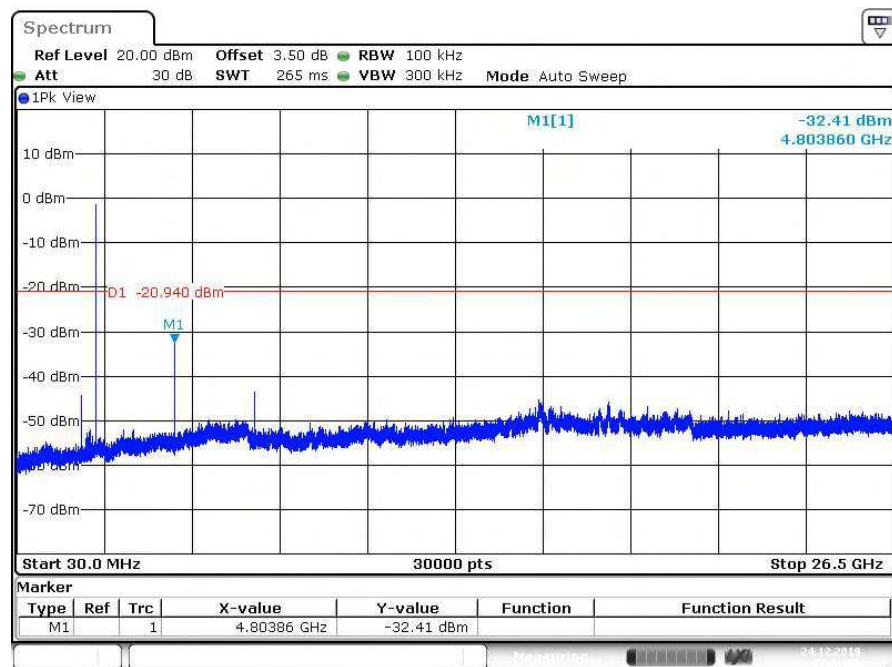
Test Channel	:	Low/ Middle/ High for Conducted Spurious Emissions Low/ High for Frequency Band Edge
Operation Mode	:	A
Ambient temperature	:	°C
Relative humidity	:	50-65%
Atmospheric pressure	:	100-103 kPa

All emissions are more than 20dB below fundamental, details refer to following test plot, and compliance is achieved as well.

Due to the small size of the RF circuit and that there are no inductive components of significant size connected to the antenna port, 9kHz to 30MHz frequency range is not tested based on technical judgment.

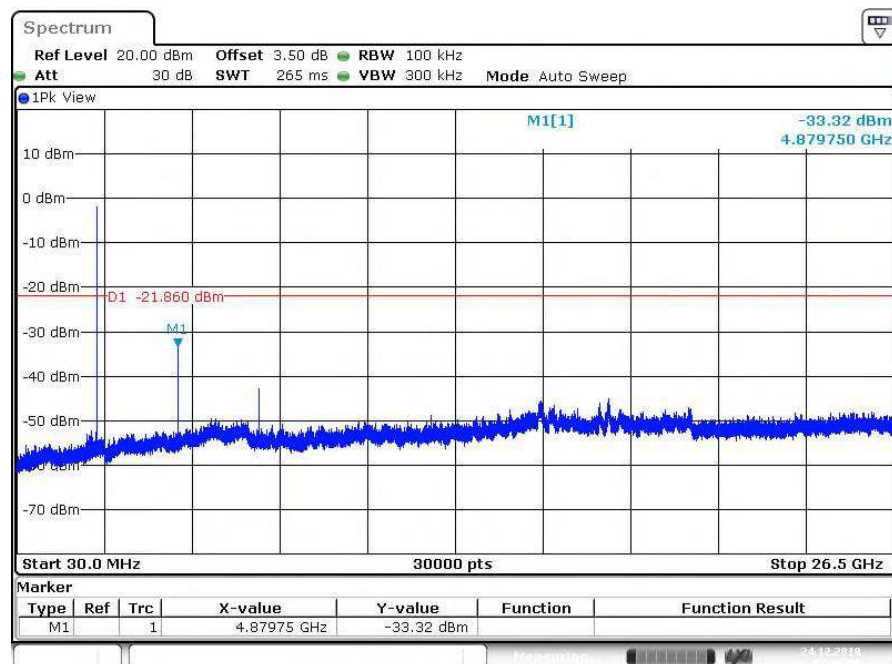
## Test Plot 100kHz Conducted Emissions

### Low Channel

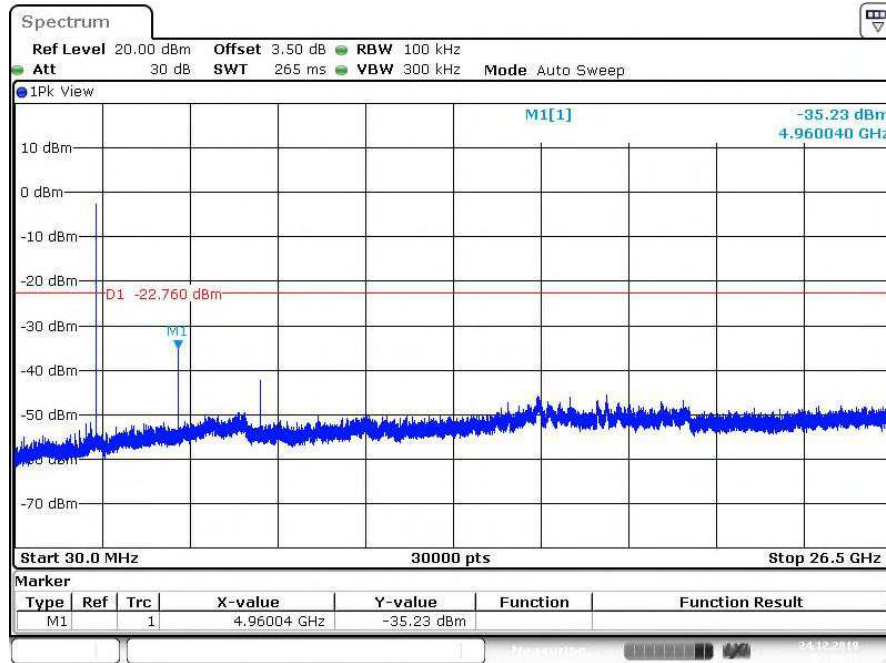


Date: 24.DEC.2019 17:01:06

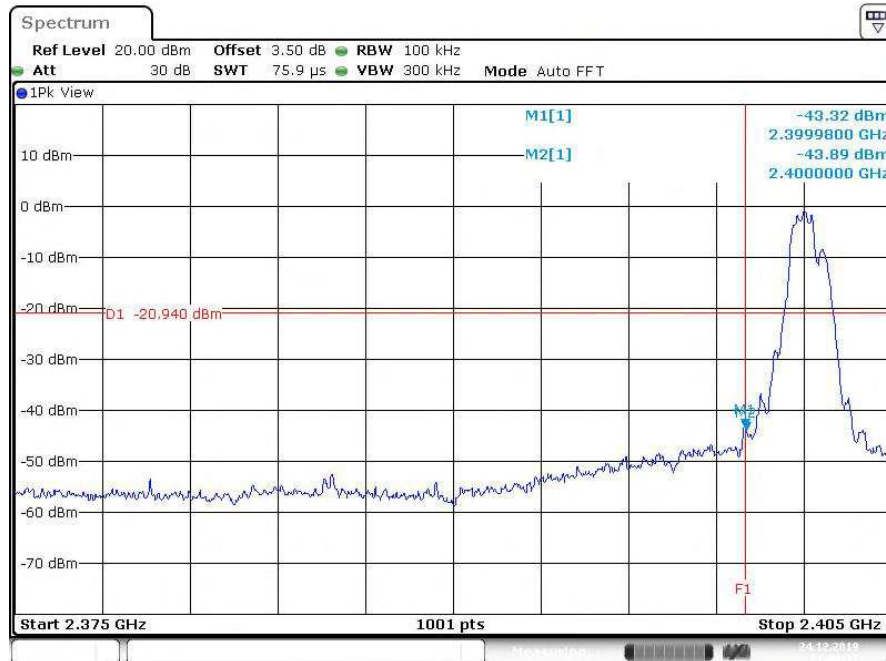
### Middle Channel



Date: 24.DEC.2019 17:36:20

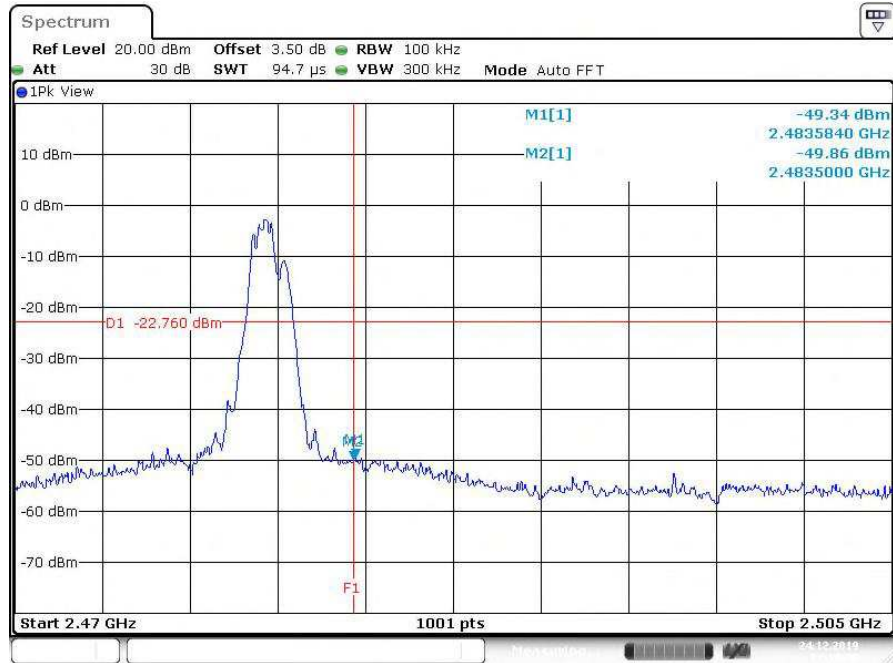
**High Channel**


Date: 24.DEC.2019 17:19:41

**Test Plot 100kHz RBW of Band Edge**
**Low Channel**


Date: 24.DEC.2019 17:00:12



**High Channel**


Date: 24.DEC.2019 17:18:51

### 5.1.6 Spurious Emission

**RESULT:****Passed**

Test standard : FCC part 15.247(d), FCC 15.205, FCC 15.209  
Basic standard : ANSI C63.10: 2013  
Limits : Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a) and RSS-Gen i5, 8.10 (Table 7), must comply with the radiated emission limits specified in FCC 15.209(a) and RSS-Gen i5, 8.9 (Table 5 and 6).

Emission radiated outside the restricted and authorized frequency bands must either comply with the radiated emission limits specified for the restricted bands or in FCC15.247(d) and RSS-247 i2, 5.5

Kind of test site : 3m Semi-Anechoic Chamber

**Test setup**

Test Channel : Refer to Appendix D  
Operation mode : A

Ambient temperature : 20-24 °C  
Relative humidity : 50-65 %  
Atmospheric pressure : 100-103 kPa

Factor (dB/m)=Antenna Factor(dB/m)+Cable loss (dB)

Level(dBuV/m)=Reading(dBuV)+ Factor(dB/m)

Testing was carried out within frequency range 9kHz to the tenth harmonic. For details refer to Appendix D. The Radiated Emissions testing was performed in the X, Y and Z axis orientation. The worst-case Axis orientation is recorded in this test report.

## 6. Safety Human exposure

### 6.1 Radio Frequency Exposure Compliance

#### 6.1.1 Electromagnetic Fields

**RESULT:** **Passed**

Test standard : FCC KDB Publication 447498 D01 v06

Therefore the maximum output power of the transmitter is  $0.82\text{mW} < 10\text{mW}$  (Distance: 5 mm), hence the EUT is excluded from SAR evaluation according to FCC KDB publication 447498 D01: Mobile Portable RF Exposure.

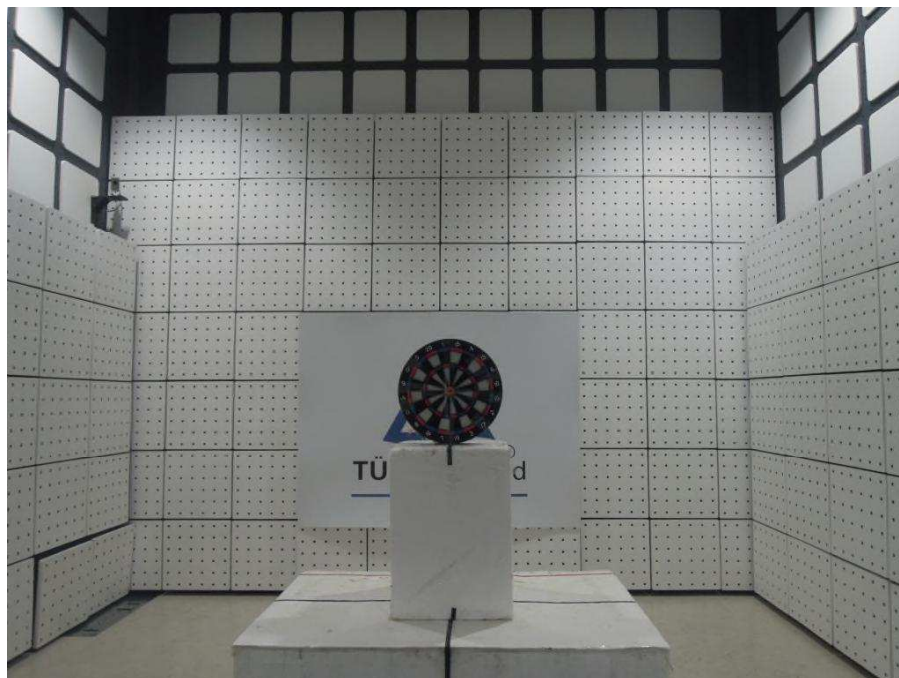
---End---

## 7. Photographs of the Test Set-Up

Photograph 1: Set-up for Spurious Emissions (Front View 1)



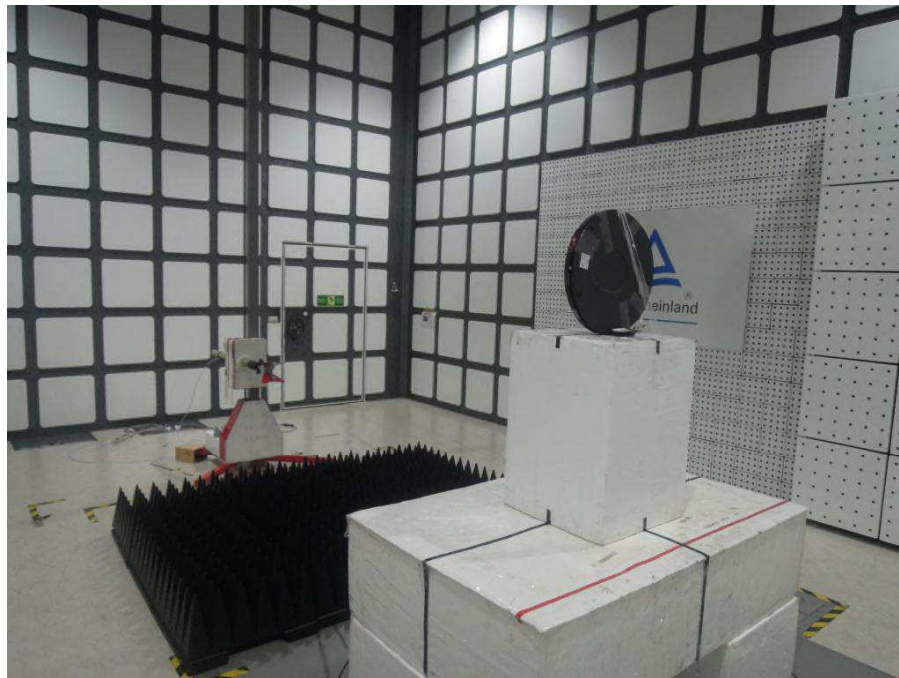
Photograph 2: Set-up for Spurious Emissions (Front View 2)



**Photograph 3: Set-up for Spurious Emissions (Back View 1)**



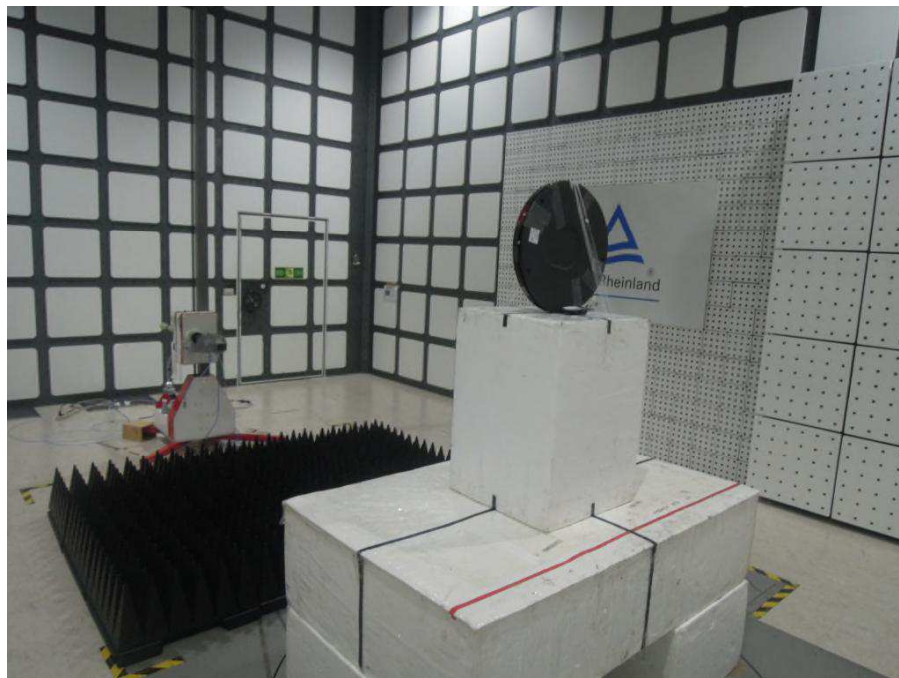
**Photograph 4: Set-up for Spurious Emissions (Back View 2)**



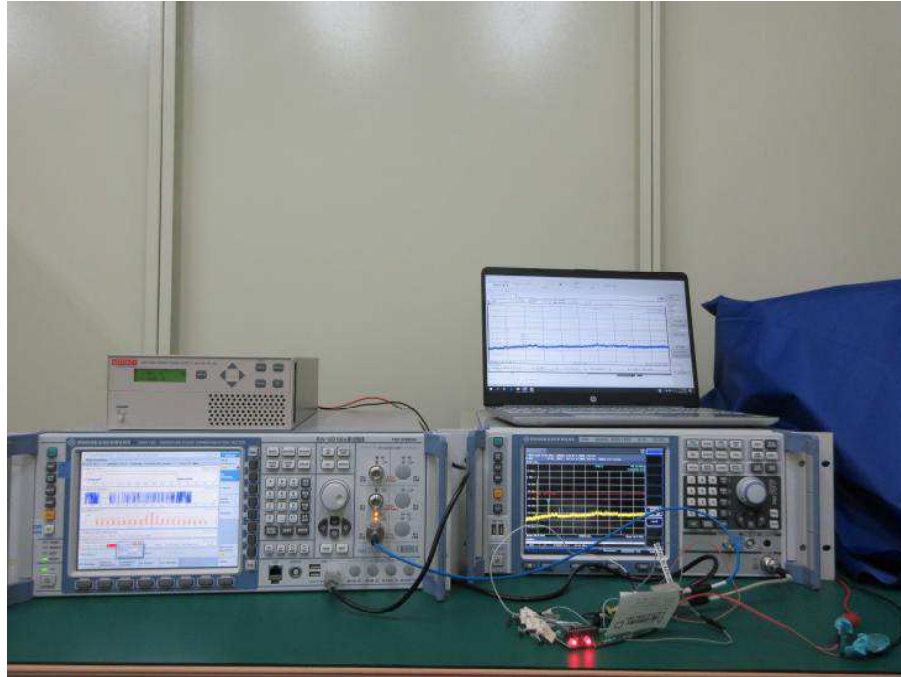
**Photograph 5: Set-up for Spurious Emissions (Back View 3)**



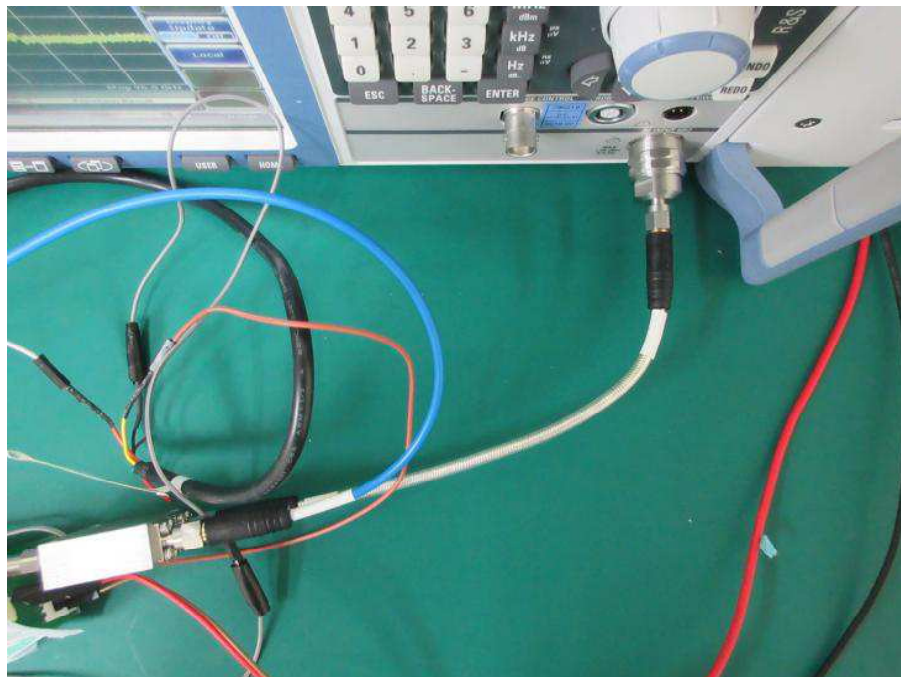
**Photograph 6: Set-up for Spurious Emissions (Back View 4)**



Photograph 7: Set-up for Conducted testing



Photograph 8: Set-up for Conducted testing



## 8. List of Tables

Table 1: Applied Standard and Test Levels .....	5
Table 2: List of Test and Measurement Equipment .....	7
Table 3: Emission Measurement Uncertainty.....	8
Table 4: Basic Information of EUT .....	9
Table 5: Technical Specification of EUT .....	9
Table 6: Table for Parameters of Test Software Setting .....	11
Table 7: Test result of Peak Output Power .....	15
Table 8: Test result of 6dB Bandwidth .....	16
Table 9: Test result of Power Density .....	19

## 9. List of Photographs

Photograph 1: Set-up for Spurious Emissions (Front View 1).....	28
Photograph 2: Set-up for Spurious Emissions (Front View 2).....	28
Photograph 3: Set-up for Spurious Emissions (Back View 1).....	29
Photograph 4: Set-up for Spurious Emissions (Back View 2).....	29
Photograph 5: Set-up for Spurious Emissions (Back View 3).....	30
Photograph 6: Set-up for Spurious Emissions (Back View 4).....	30
Photograph 7: Set-up for Conducted testing .....	31
Photograph 8: Set-up for Conducted testing .....	31