

Prüfbericht-Nr.: 50347787 001 <i>Test Report No.:</i>	Auftrags-Nr.: 238134760 <i>Order No.:</i>	Seite 1 von 35 <i>Page 1 of 35</i>																								
Kunden-Referenz-Nr.: N/A <i>Client Reference No.:</i>	Auftragsdatum: 15-Feb-2020 <i>Order date:</i>																									
Auftraggeber: Zeroplus Technology Corporation <i>Client:</i> 3F, No.121, Jian 8th Rd, Chung Ho District New Taipei City, 235, Taiwan																										
Prüfgegenstand: Pocket Auto Watchic <i>Test item:</i>																										
Bezeichnung / Typ-Nr.: ZPP0058 <i>Identification / Type No.:</i>																										
Auftrags-Inhalt: FCC Part 15C <i>Order content:</i>																										
Prüfgrundlage: <i>Test specification:</i> FCC 47CFR Part 15: Subpart C Section 15.247																										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Wareneingangsdatum: 19-Feb-2020 <i>Date of receipt:</i></td> <td rowspan="6" style="width: 50%;"></td> </tr> <tr> <td>Prüfmuster-Nr.: A001065243-001~ <i>Test sample No.:</i> A001065243-002</td> </tr> <tr> <td>Prüfzeitraum: 21-Feb-2020~2-Mar-2020 <i>Testing period:</i></td> </tr> <tr> <td>Ort der Prüfung: EMC/RF Laboratory Taipei <i>Place of testing:</i></td> </tr> <tr> <td>Prüflaboratorium: TÜV Rheinland Taiwan Ltd. <i>Testing laboratory:</i></td> </tr> <tr> <td>Prüfergebnis*: Pass <i>Test result*:</i></td> </tr> </table>			Wareneingangsdatum: 19-Feb-2020 <i>Date of receipt:</i>		Prüfmuster-Nr.: A001065243-001~ <i>Test sample No.:</i> A001065243-002	Prüfzeitraum: 21-Feb-2020~2-Mar-2020 <i>Testing period:</i>	Ort der Prüfung: EMC/RF Laboratory Taipei <i>Place of testing:</i>	Prüflaboratorium: TÜV Rheinland Taiwan Ltd. <i>Testing laboratory:</i>	Prüfergebnis*: Pass <i>Test result*:</i>																	
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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. <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>																										

TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT

RESULT: Passed

5.1.2 MAXIMUM PEAK CONDUCTED 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 MAINS CONDUCTED EMISSIONS

RESULT: Passed

7.1.1 ELECTROMAGNETIC FIELDS

RESULT: Passed

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1. General Remarks

1.1 Complementary Materials

The following attachments are integral parts of this test report:

Appendix P: Photo Documentation

(File Name: 50347787 001 APPENDIXP)

Appendix D: Test Result of Radiated Emissions

(File Name: 50347787 001 APPENDIXD)

Test Specifications

The following standards were applied.

Table 1: Applied Standard and Test Levels

Radio
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 v05 KDB447498 D01 General RF Exposure Guidance v06

2. Test Sites

2.1 Test Laboratory

TUV Rheinland Taiwan Ltd.

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

2.2 Test Facility

TUV Rheinland Taiwan Ltd.

AC Mains Conduction:
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 / Radiated 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: 6th-May-2019 to 05th-May-2022



2.3 List of Test and Measurement Instruments

Table 2: List of Test and Measurement Equipment

Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
EMI Test Receiver	R&S	ESR7	102109	2019/4/17	2020/4/16
Spectrum Analyzer	R&S	FSV40	101509	2019/10/15	2020/10/15
Pre-Amplifier	Agilent	8447D	2727A05146	2020/2/17	2021/2/16
Pre-Amplifier	EMCI	EMC051845SE	980635	2020/2/11	2021/2/10
Pre-Amplifier	EMCI	EMC184045SE	980656	2020/2/11	2021/2/10
Bilog Antenna	SCHWARZBECK	VULB-9168	00950	2020/1/20	2021/1/19
Horn Antenna	ETS-Lindgren	3117	00218929	2019/11/27	2020/11/26
Horn Antenna	SCHWARZBECK	BBHA 9170	00890	2019/4/12	2020/4/11
Loop Antenna	EMCI	LPA600	287	2019/12/20	2020/12/19
Test Software	Audix	e3	Ver. 9	N/A	N/A
Test Cable	HUBER+SUHNER	SUCOFLEX 104EA	800057/4EA	2019/4/11	2020/4/10
Test Cable	HUBER+SUHNER	SUCOFLEX 104	802244/4	2019/4/11	2020/4/10
Test Cable	HUBER+SUHNER	SUCOFLEX 104	MY37203/4	2019/4/11	2020/4/10
Test Cable	HUBER+SUHNER	SUCOFLEX 102EA	800897/2EA	2019/4/11	2020/4/10
Test Cable	HUBER+SUHNER	SUCOFLEX 102EA	800902/2EA	2019/4/11	2020/4/10
Test Cable	HUBER+SUHNER	SUCOFLEX 102EA	801026/2EA	2019/4/11	2020/4/10
Thermo Chamber	Giant Force	GHT-150-40-CP-SD	MAA1902-010	2020/2/1	2021/2/1
Signal Generator	R&S	SMB100A03	181335	2020/1/23	2021/1/23
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 by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.6 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements are $\pm 3\text{dB}$.

Table 3: Emission Measurement Uncertainty

Parameter	Uncertainty
RF power, conducted	$\pm 1.5 \text{ dB}$
Adjacent channel power	$\pm 3 \text{ dB}$
Radiated emission of transmitter, valid up to 26 GHz	$\pm 6 \text{ dB}$
Radiated emission of receiver, valid up to 26 GHz	$\pm 6 \text{ dB}$
Temperature	$\pm 2 \text{ }^{\circ}\text{C}$
Humidity	$\pm 10 \text{ } \%$

3. General Product Information

3.1 Product Function and Intended Use

The EUT is a wearable devices with Bluetooth function. The Module has RF Shield. The Antenna is not part of the module, The RF output of the module is routed to either an SMA connector or a chip antenna located on the host board.

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	Pocket Auto Watchic
Type Designation	ZPP0058
FCC ID	2ADKM0058

Table 5: Technical Specification of EUT

Technical Specification	Value
Operating Frequencies	2402~2480 MHz
Channel Spacing	2MHz
Number of Channels	40
Operation Voltage	3.6~4.2Vdc
Modulation	GFSK
Antenna gain	0.5 dbi

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

- | | |
|-------------------------|-------------------|
| - Photo Document | - Circuit Diagram |
| - Technical Description | - Block Diagram |
| - Rating Label | |

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum power level.

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	Channel Frequency		
	2402 MHz	2440 MHz	2480 MHz
GFSK	Default	Default	Default

4.2 Test Operation and Test Software

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

This software 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: A001065243-002

Radiated: A001065243-001

Test Software	BlueTest3
---------------	-----------

4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

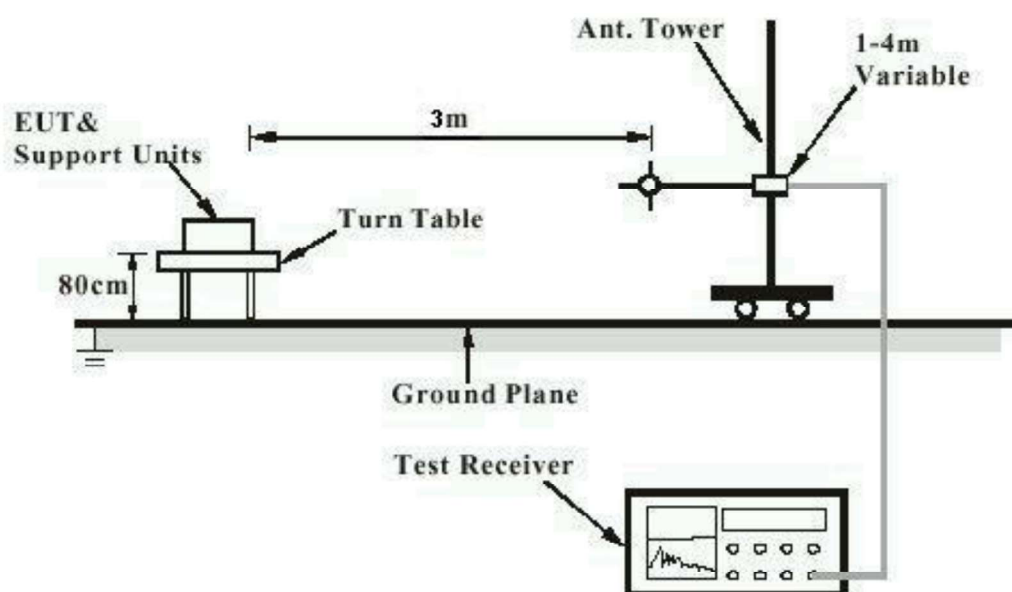
Description	Manufacturer	Model No.	Serial No.
Notebook(EMC-06)	Lenovo	TP00048A	PB-0F8B2

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 Mains Conduction Measurement (if applicable)

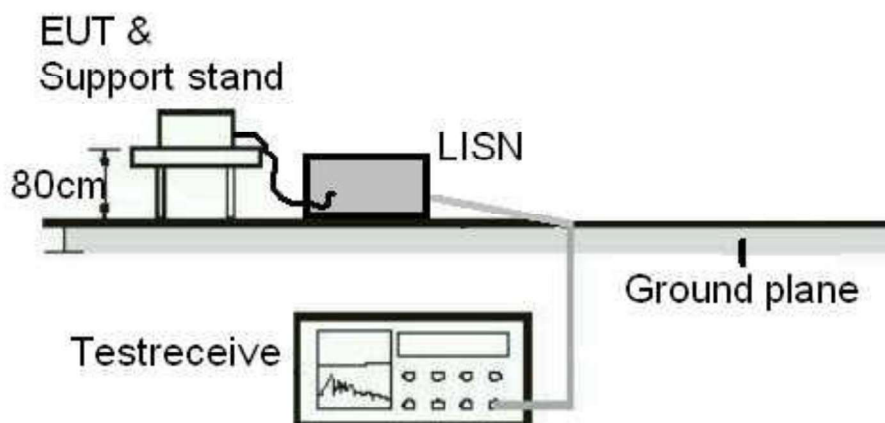
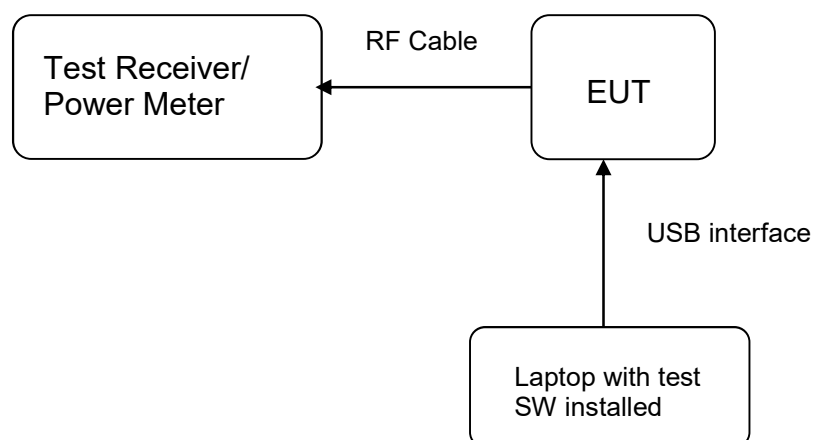


Diagram of Measurement Equipment Configuration for Conducted Transmitter Measurement



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
Limit	:	the use of antennas with directional gains that do not exceed 6dBi

According to the manufacturer declaration, the EUT has an antenna with Max directional gain of 0.5dBi. The antenna is a Chip Antenna soldered to the PCB 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 Maximum peak conducted 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/Conducted room

Test setup

Test Channel : Low/ Middle/ High
 Operation Mode : A

Ambient temperature : 18-25 °C
 Relative humidity : 50-65 %
 Atmospheric pressure : 100-103kPa

Table 7: Test result of Peak Output Power

Channel	Channel Frequency (MHz)	Output Power		Limit
		(dBm)	(W)	(W)
Low Channel	2402	-1.33	0.00074	1
Middle Channel	2440	-2	0.00063	1
High Channel	2480	-2.53	0.00056	1

5.1.3 6dB Bandwidth and 99% Bandwidth**RESULT:****Passed**

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

Test setup

Test Channel : Low/ Middle/ High
Operation Mode : A

Ambient temperature : 18-25°C
Relative humidity : 50-65%
Atmospheric pressure : 100-103kPa

Table 8: Test result of 6dB Bandwidth

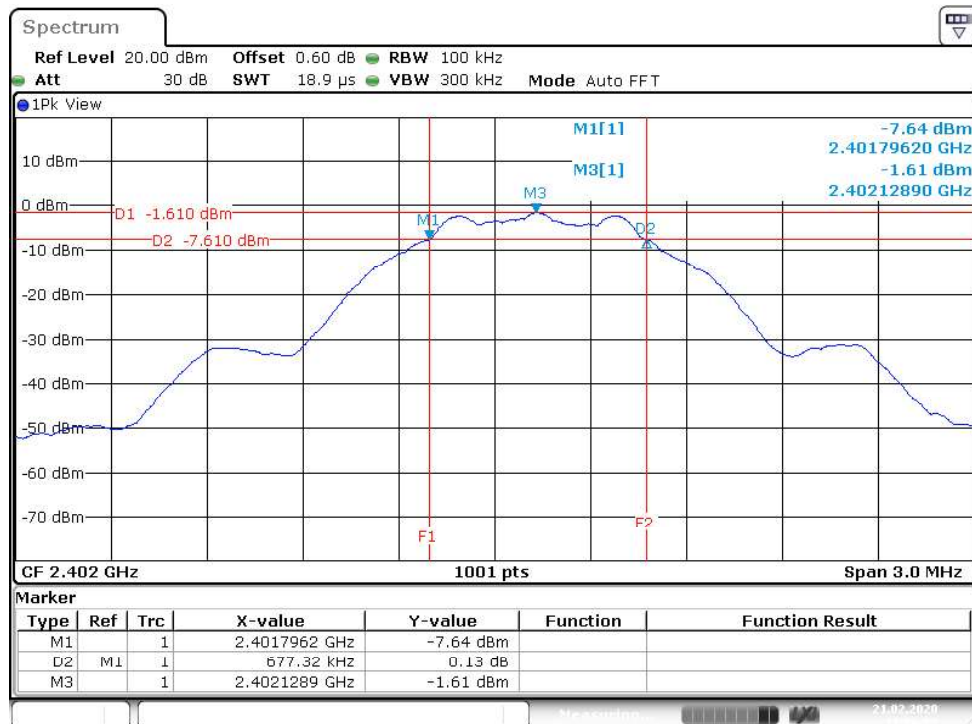
Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Limit (kHz)	Result
Low Channel	2402	677.32	>500	Pass
Mid Channel	2440	683.32	>500	Pass
High Channel	2480	674.33	>500	Pass

Table 9: Test result of 99% Bandwidth

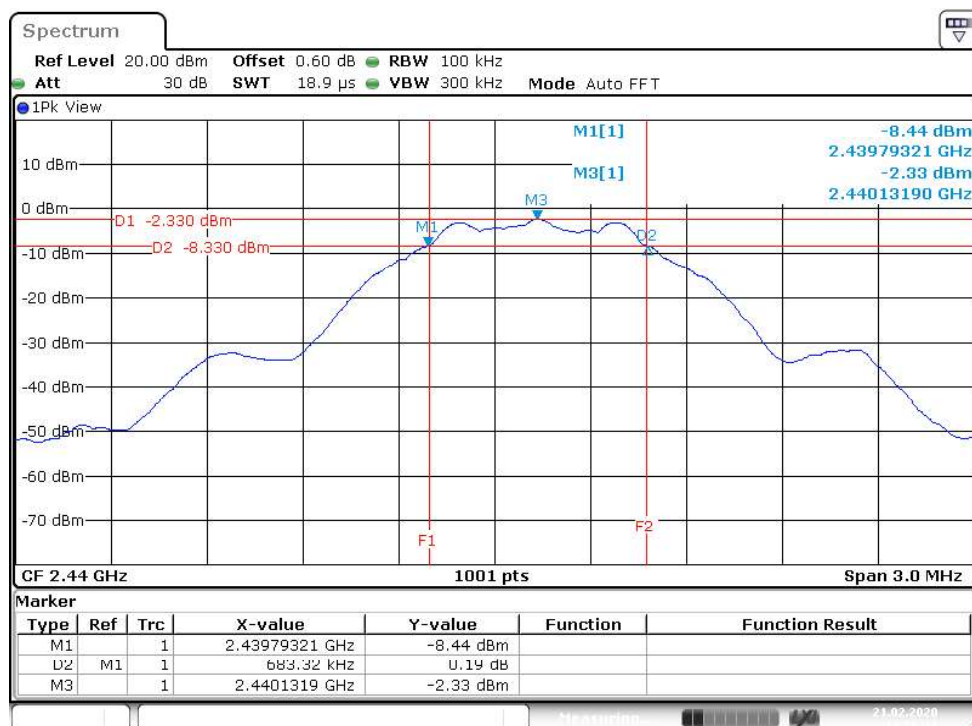
Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)
Low Channel	2402	1.04295
Middle Channel	2440	1.03996
High Channel	2480	1.03996

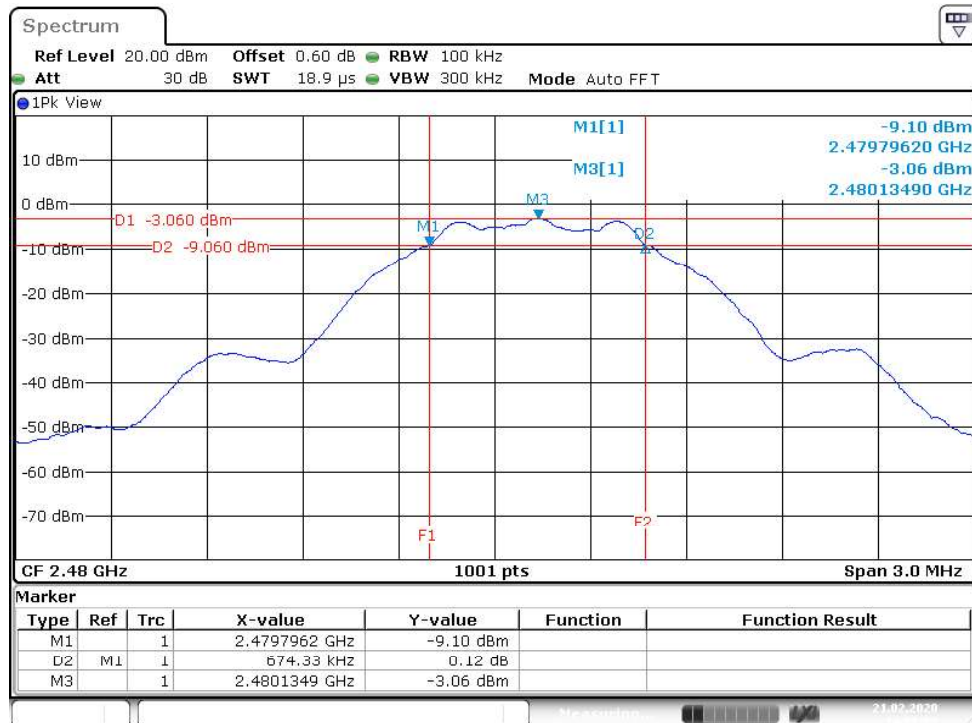
Test Plot of 6dB Bandwidth

Low Channel

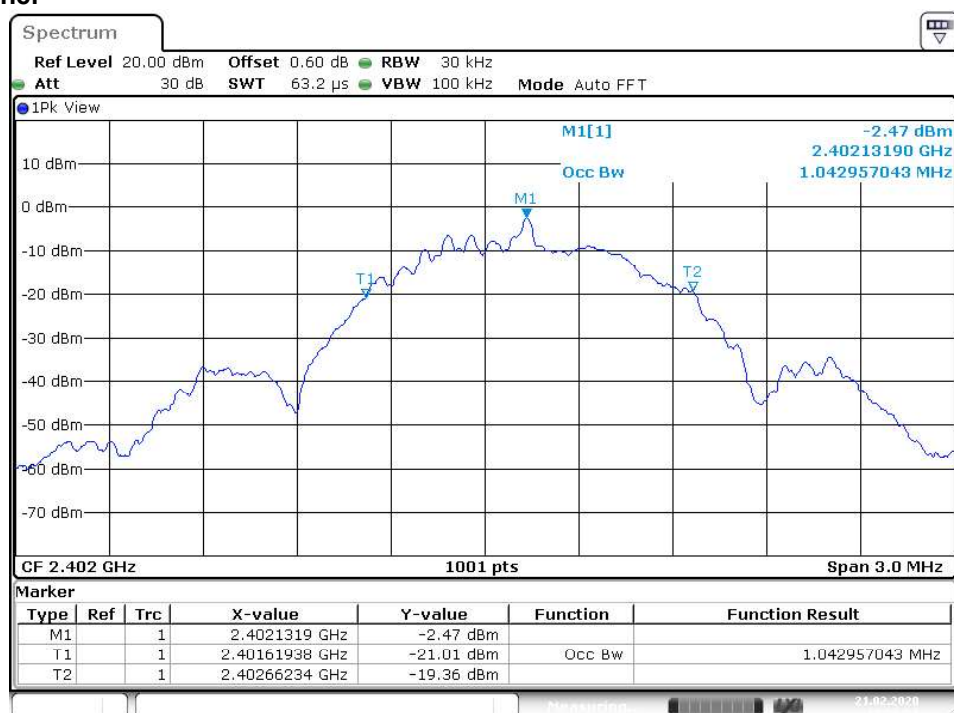


Middle Channel

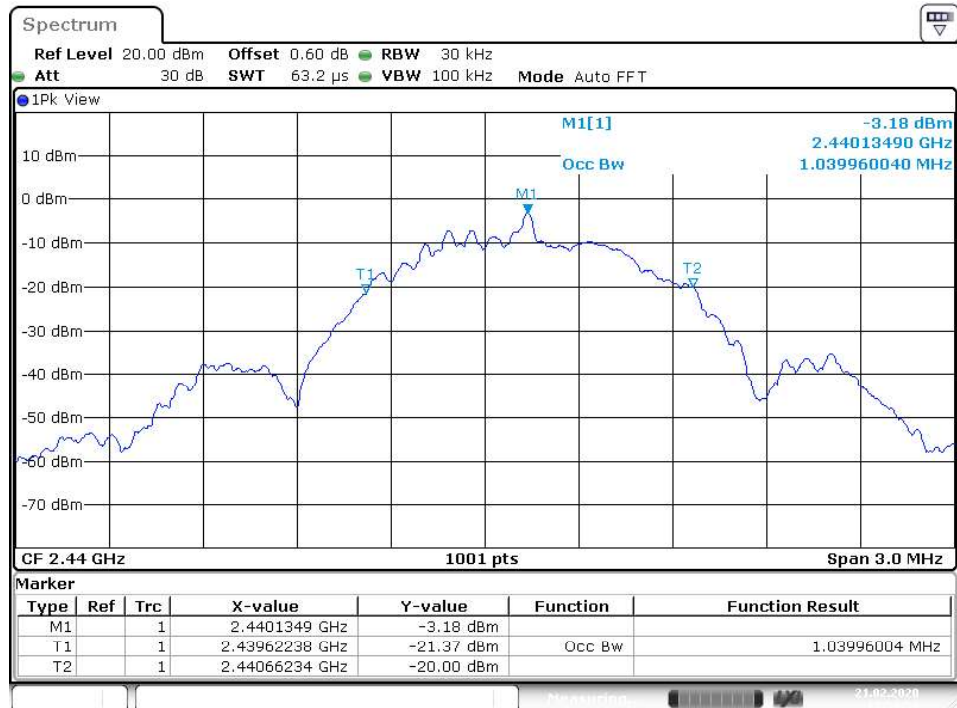


High Channel


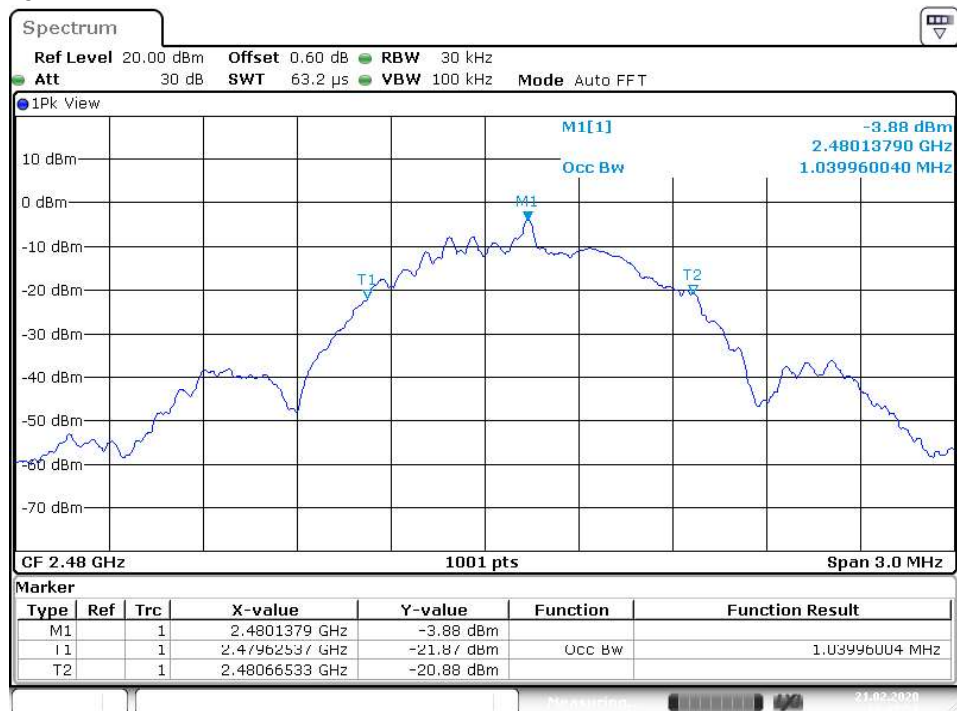
Date: 21.FEB.2020 14:02:23

Test Plot of 99% Bandwidth
Low Channel


Date: 21.FEB.2020 13:56:51

Middle Channel


Date: 21.FEB.2020 13:59:50

High Channel


Date: 21.FEB.2020 14:02:51

5.1.4 Power Density

RESULT:**Passed**

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

Test setup

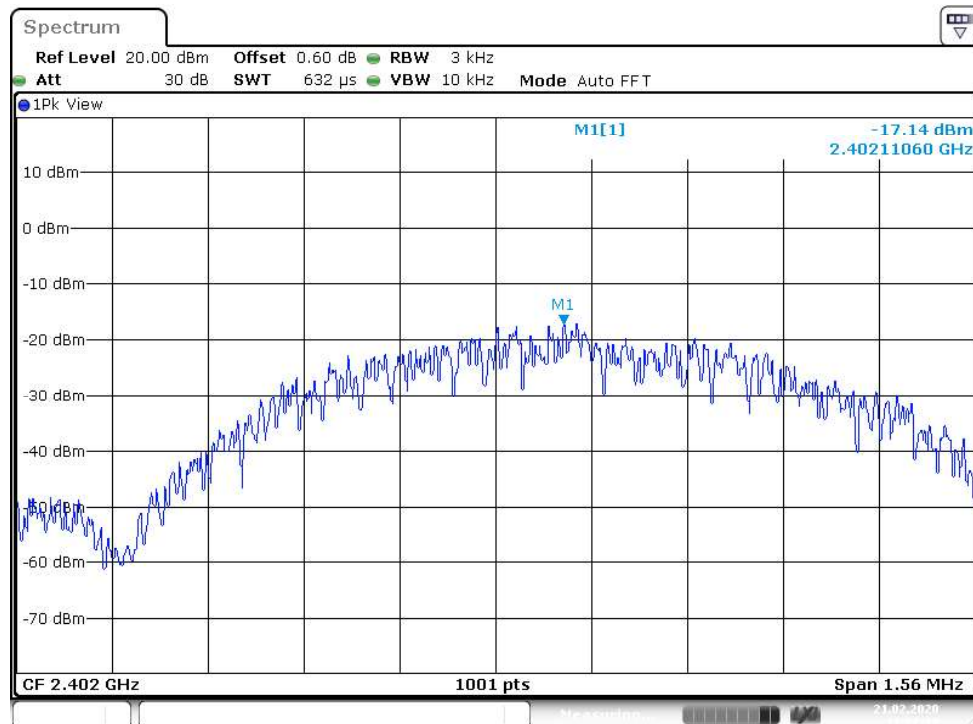
Test Channel : Low/ Middle/ High
Operation Mode : A
Ambient temperature : 18-25°C
Relative humidity : 50-65%
Atmospheric pressure : 100-103kPa

Table 10: Test result of Power Density

Channel	Channel Frequency (MHz)	Power Density	Limit
		(dBm)	(dBm)
Low Channel	2402	-17.14	8
Middle Channel	2440	-17.70	8
High Channel	2480	-18.27	8

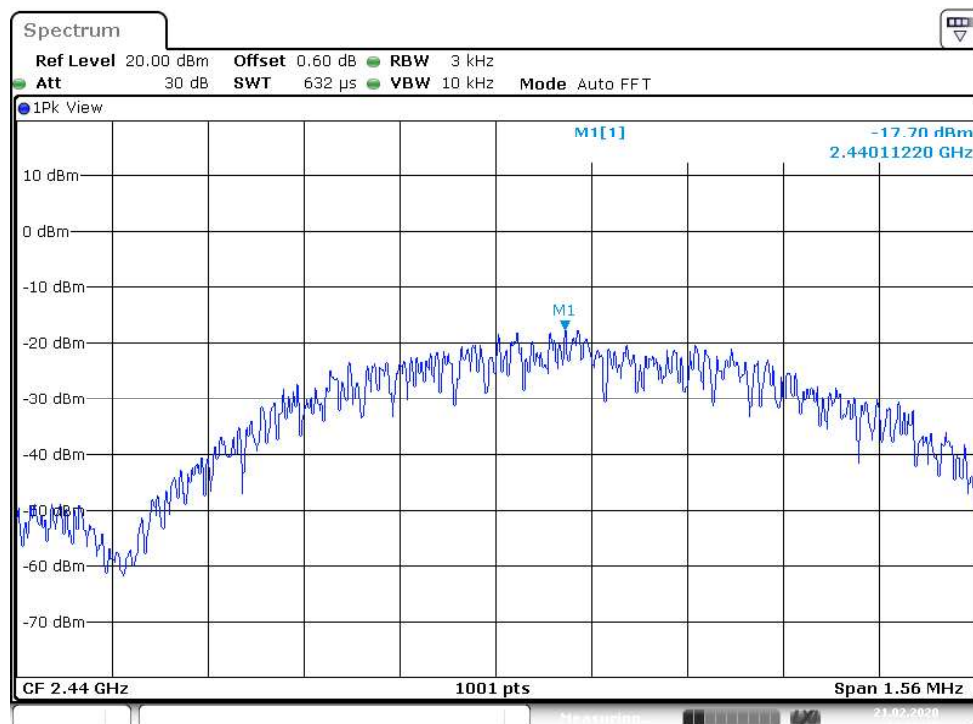
Test Plot of Power Density

Low Channel

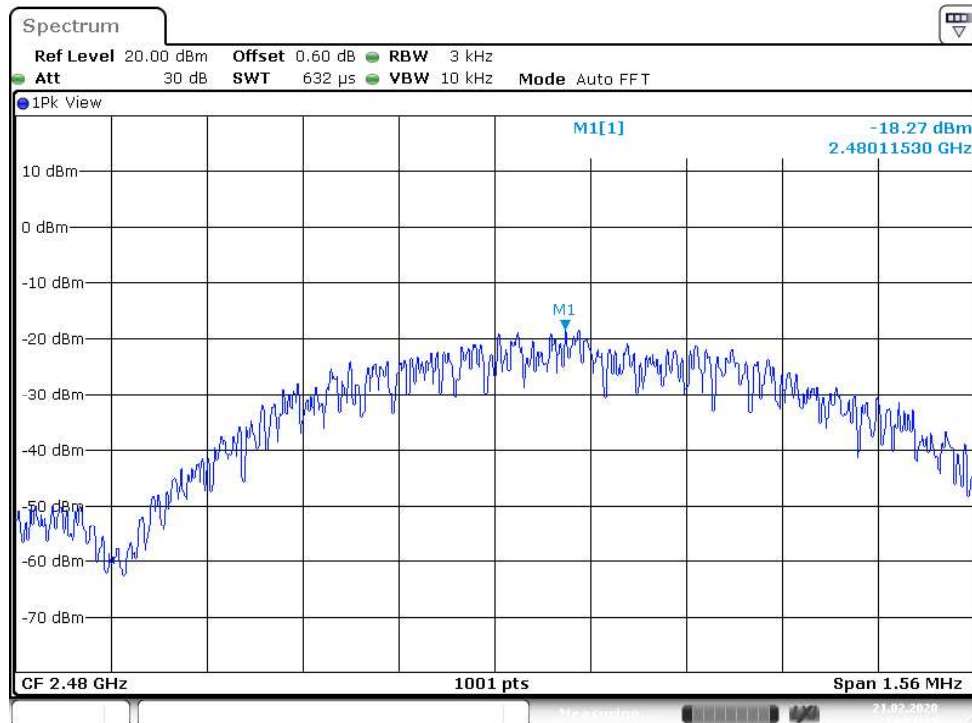


Date: 21.FEB.2020 13:57:31

Middle Channel



Date: 21.FEB.2020 14:00:33

High Channel


Date: 21.FEB.2020 14:03:15

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/Conducted room

Test setup

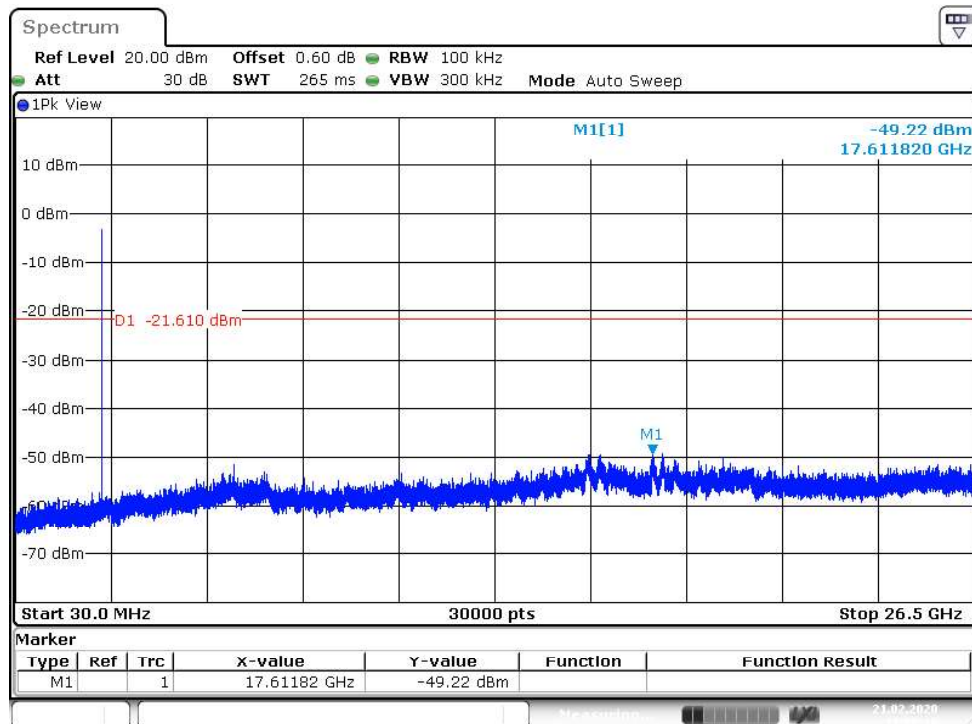
Test Channel	:	Low/ Mid/ High for spurious, Low/ High for Band Edge
Operation mode	:	A
Ambient temperature	:	18-25°C
Relative humidity	:	50-65%
Atmospheric pressure	:	100-103kPa

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 product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

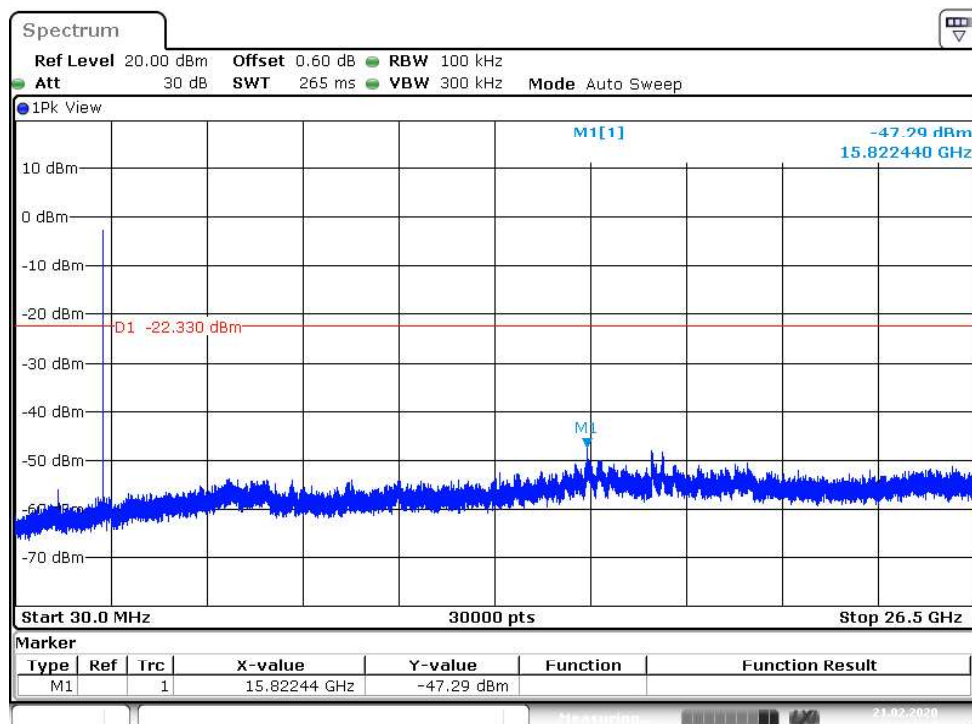
Test Plot 100kHz Conducted Emissions

Low Channel

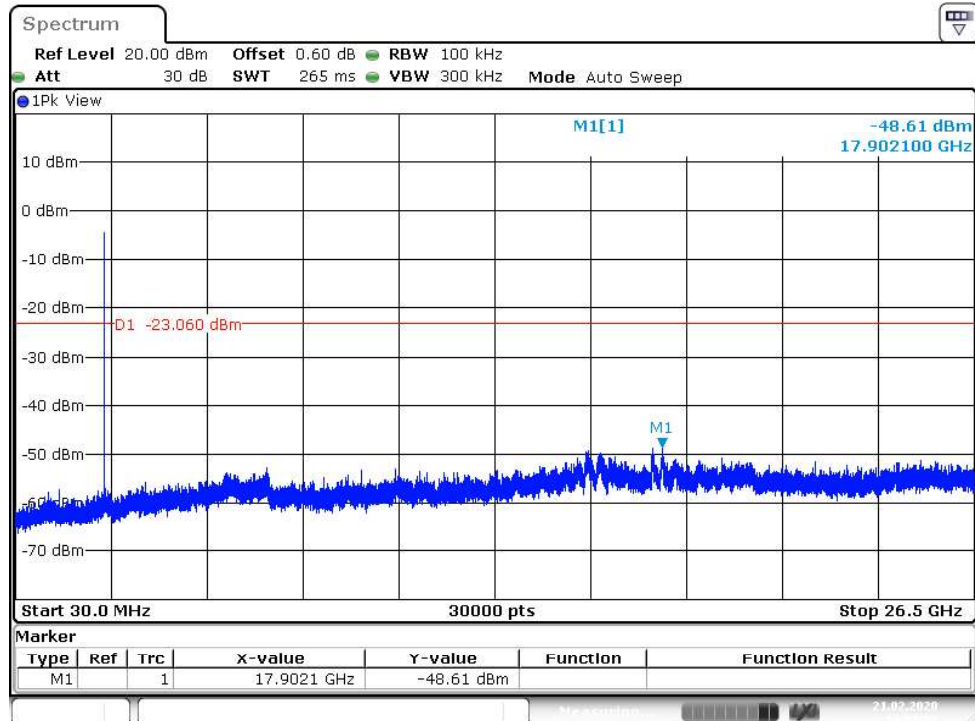


Date: 21.FEB.2020 13:58:16

Middle Channel



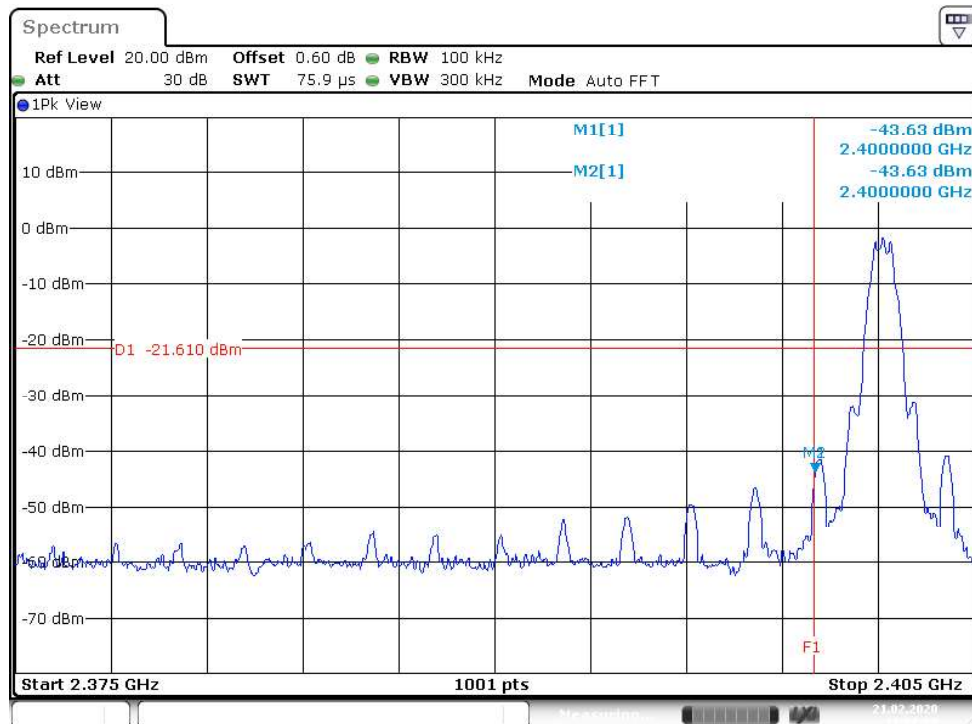
Date: 21.FEB.2020 14:01:08

High Channel


Date: 21.FEB.2020 14:03:53

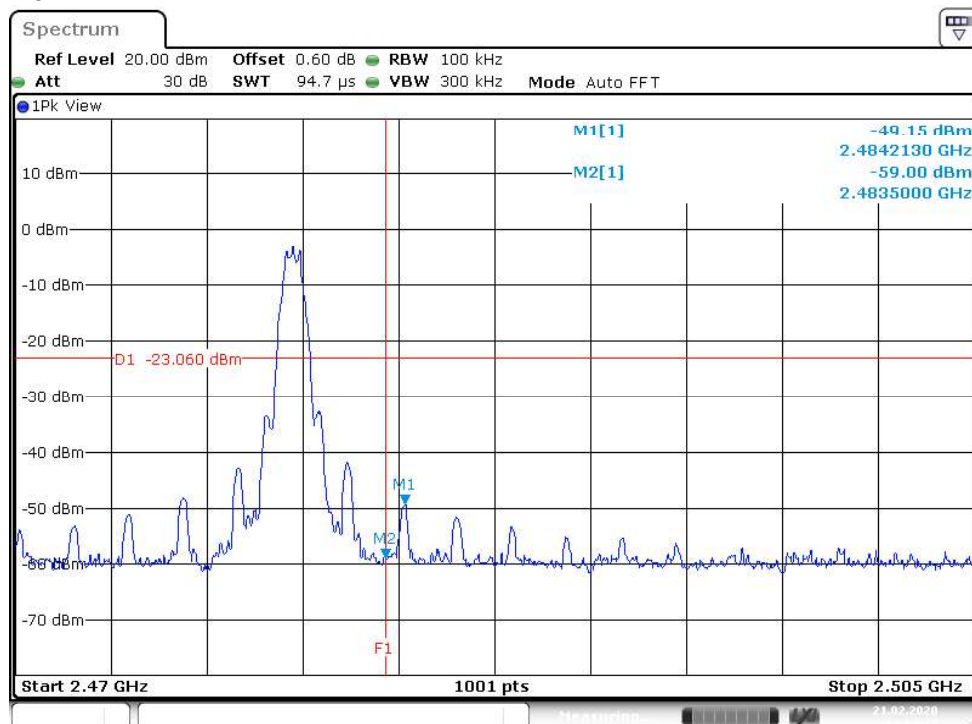
Test Plot 100kHz RBW of Band Edge

Low Channel



Date: 21.FEB.2020 13:57:50

High Channel



Date: 21.FEB.2020 14:03:34

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 ISSED 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 ISSED RSS-247 i2, 5.5

Kind of test site : 3m Semi-Anechoic Chamber

Test setup

Test Channel : Low/ Middle/ High
Operation mode : A, B

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. Mains Emissions

6.1.1 Mains Conducted Emissions

RESULT:**Passed**

Test standard : FCC Part 15.207
FCC Part 15.107
Limits : Mains Conducted emissions as defined in
above standards
Kind of test site : Shielded Room

Test setup

Test Channel : Middle
Operation mode : A

Remark: For details refer to Appendix D.

7. Safety Human exposure

7.1 Radio Frequency Exposure Compliance

7.1.1 Electromagnetic Fields

RESULT:**Passed**

Test standard : FCC KDB Publication 447498 D01 v06
47CFR 1.1310
47CFR 2.1093

FCC:

Therefore the maximum output power of the transmitter is $0.74\text{mW} < 10\text{mW}$ (Distance: 5 mm), hence the EUT is excluded from SAR evaluation according to FCC KDB publication 447498 D01: Mobile Portable RF Exposure.

8. Photographs of the Test Set-Up

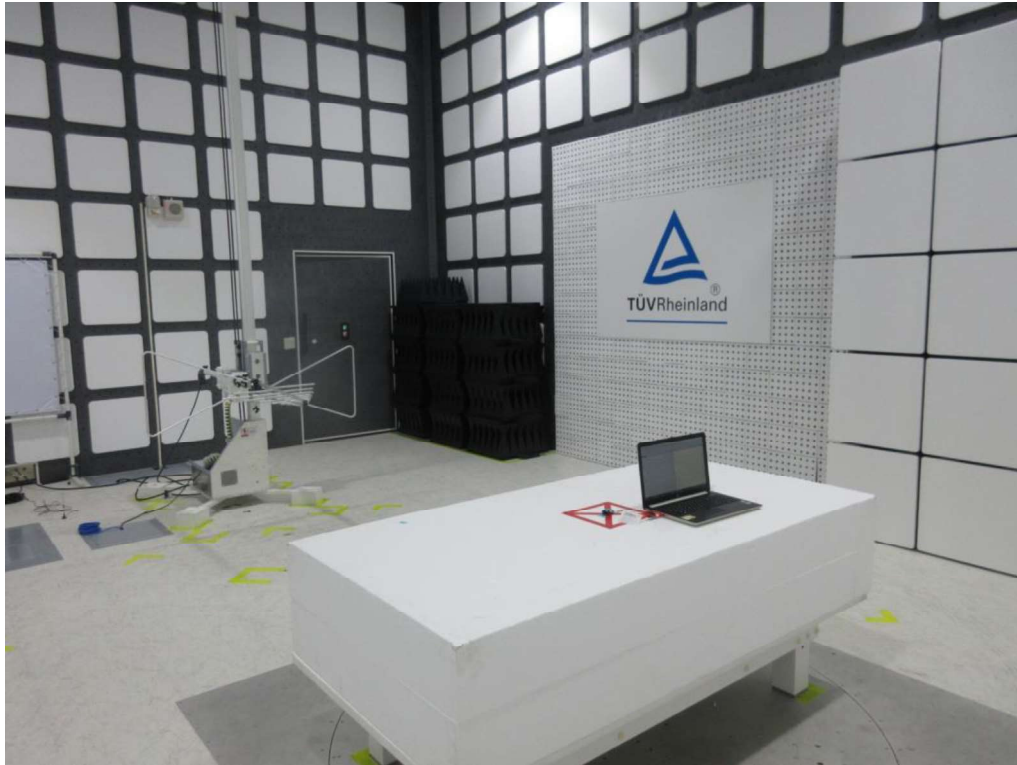
Photograph 1: Set-up for Spurious Emissions (Front View 1)



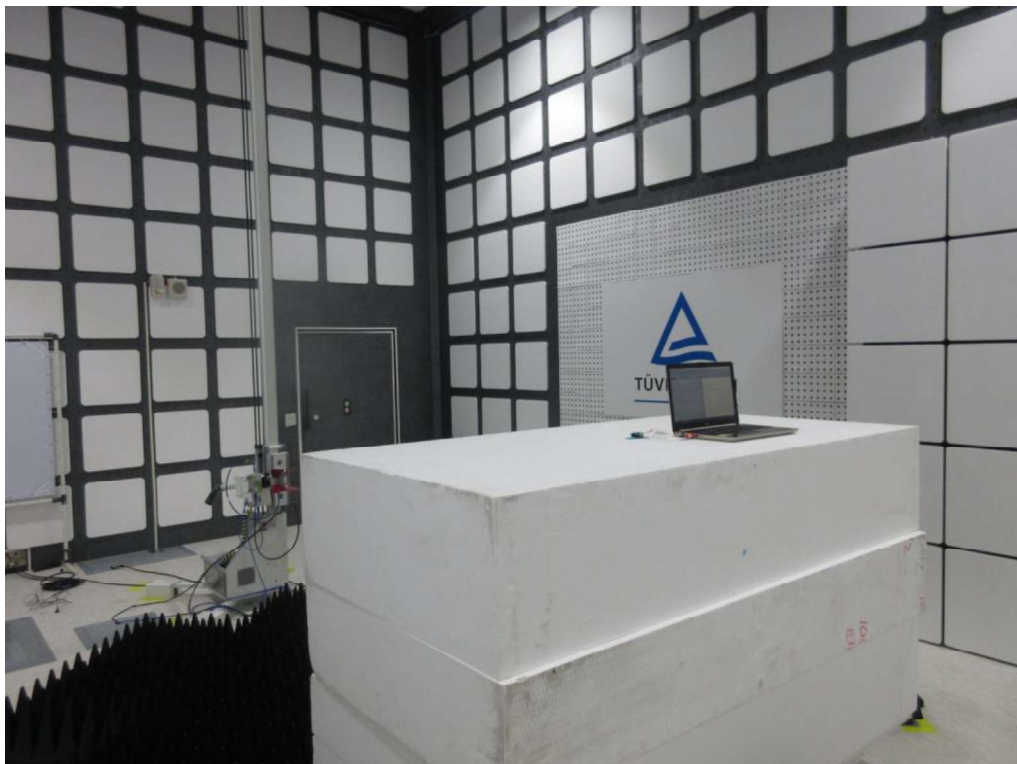
Photograph 2: Set-up for Spurious Emissions (Front View 2)



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



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



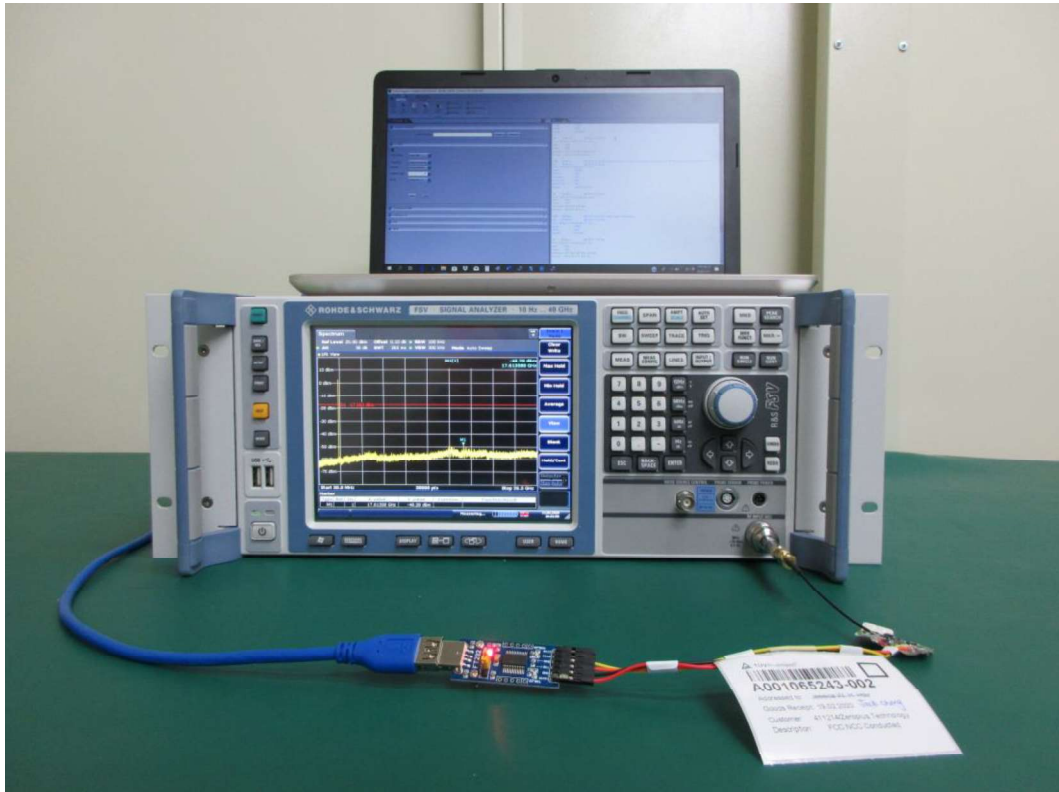
Photograph 5: Set-up for Spurious Emissions (Back View 3)



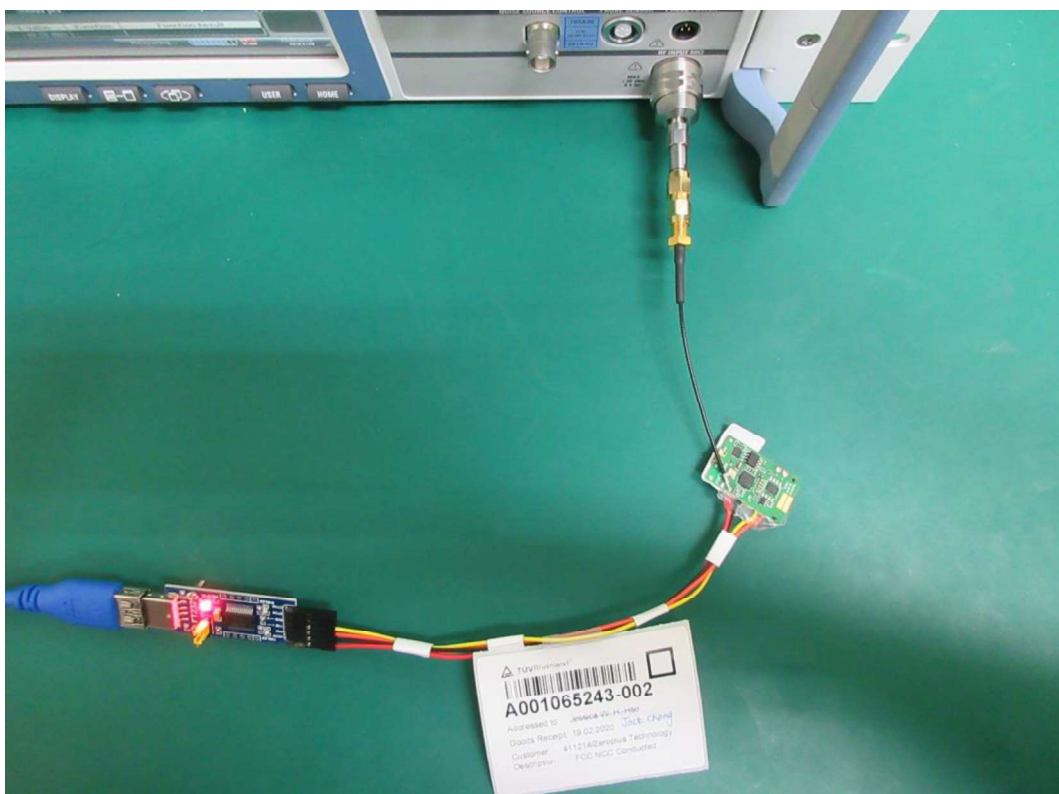
Photograph 6: Set-up for Spurious Emissions (Back View 4)



Photograph 7: Set-up for Conducted testing (View 1)



Photograph 8: Set-up for Conducted testing (View 2)



Photograph 9: Set-up for AC Mains Conducted testing (Front View)



Photograph 10: Set-up for AC Mains Conducted testing (Back View)



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