Prüfbericht-Nr.: *Test report no.:*	**60376684 001**	**Auftrags-Nr.:** *Order no.*:	**238486682**	Seite 1 von 40 *Page 1 of 40*
Kunden-Referenz-Nr.: *Client reference no.:*	**N/A**	**Auftragsdatum:** *Order date:*	**2020.05.18**	
Auftraggeber: *Client:*	PAMEX INC. 4680 VINITA CT, CHINO, CA, 91710, UNITED STATES			
Prüfgegenstand: *Test item:*	Kapture Auto Deadbolt			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	KP1-D791, KP1-D7P1			
Auftrags-Inhalt: *Order content*:	FCC Part 15C Test report (BLE)			
Prüfgrundlage: *Test specification:*	FCC 47CFR Part 15: Subpart C Section 15.247			

Wareneingangsdatum: *Date of sample receipt:*	2020.05.19
Prüfmuster-Nr.: *Test sample no:*	A002831089-001, A002831089-003
Prüfzeitraum: *Testing period:*	2020.05.21 - 2020.05.28
Ort der Prüfung: *Place of testing:*	EMC/RF Laboratory Taipei
Prüflaboratorium: *Testing laboratory:*	Taipei Testing laboratories
Prüfergebnis*: *Test result*:*	Pass

überprüft von: reviewed by:		**genehmigt von:** authorized by:	
atum: 2020.06.01 *Date:*	Mars Y.J. Lin	**Datum:** 2020.06.01 *Date:*	Ryan W.T. Chen
Stellung / *Position:*	Project Engineer	**Stellung** / *Position:*	Project Manager

Sonstiges / *Other:* Color differences: KP1-D791 is the mian model with matt black, and the series model, KP1-D7P1, is satin nickel.

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged*

* 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	N/T = nicht getestet
** Legend:*	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT
RESULT: Passed

5.1.2 MAXIMUM CONDUCTED PEAK OUTPUT POWER
RESULT: Passed

5.1.3 6DB BANDWIDTH AND 99% 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

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: 60376684 001 APPENDIX P)

Appendix D: Test Result of Radiated Emissions
(File Name: 60376684 001 APPENDIX D)

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 2.1091
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

Taipei Testing laboratories

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

2.2 Test Facility

Taipei Testing laboratories

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

Testing Laboratory
3567

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	2020/3/30	2021/3/29
Spectrum Analyzer	R&S	FSV40	101508	2020/3/16	2021/3/15
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	00896	2020/1/17	2021/1/16
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	2020/3/25	2021/3/24
Test Cable	HUBER+SUHNER	SUCOFLEX 104	802244/4	2020/3/25	2021/3/24
Test Cable	HUBER+SUHNER	SUCOFLEX 104	MY37203/4	2020/3/25	2021/3/24
Test Cable	HUBER+SUHNER	SUCOFLEX 102EA	800897/2EA	2020/3/25	2021/3/24
Test Cable	HUBER+SUHNER	SUCOFLEX 102EA	800902/2EA	2020/3/25	2021/3/24
Test Cable	HUBER+SUHNER	SUCOFLEX 102EA	801026/2EA	2020/3/25	2021/3/24
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	2020/4/06	2021/4/05
Power Sensor	Anritsu	MA2411B	1725269	2020/4/06	2021/4/05

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	± 1 x 10^{-7}
RF power, conducted	± 1.5 dB
RF power density, conducted	± 3 dB
spurious emissions, conducted	± 3 dB
all emissions, radiated	± 6 dB
Temperature	± 1 ºC
Humidity	± 5 %

3. General Product Information

3.1 Product Function and Intended Use

The EUT is a Kapture Auto Deadbolt. It contains a bluetooth compatible module 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	Kapture Auto Deadbolt
Type Designation	KP1-D791, KP1-D7P1
FCC ID	2AQ8A-KP1D7

Table 5: Technical Specification of EUT

Technical Specification	Value
Operating Frequencies	2402~2480MHz
Channel number	40
Operation Voltage	6Vdc
Modulation	LE 1M:GFSK LE 2M:GFSK
Antenna gain	3.3 dBi

3.3 Independent Operation Modes

Basic operation modes are:

A. Transmitting
B. Receiving
C. Normal

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Circuit Diagram
- Block 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	Channel Frequency		
	2402 MHz	2440 MHz	2480 MHz
BLE 1M	5	5	5
BLE 2M	5	5	5

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: A002831089-003

Radiated: A002831089-001

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

Test Software	smartrftm_studio-2.17.0

4.3 Special Accessories and Auxiliary Equipment

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

Support Unit

Description	Manufacturer	Model No.	Serial No.	Length
Notebook	HP	15s-du0007TX	CND93662VF	-
Adapter	HP	TPN-CA16	N/A	-
Mini USB Cable	-	-	-	1.2m
Adapter Cable	-	-	-	1.8m

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

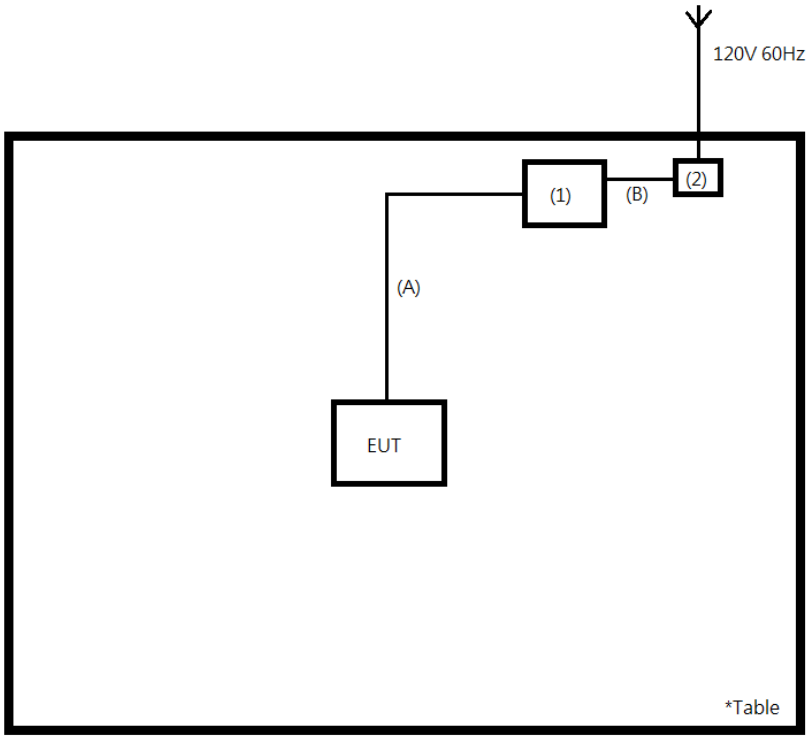


Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)

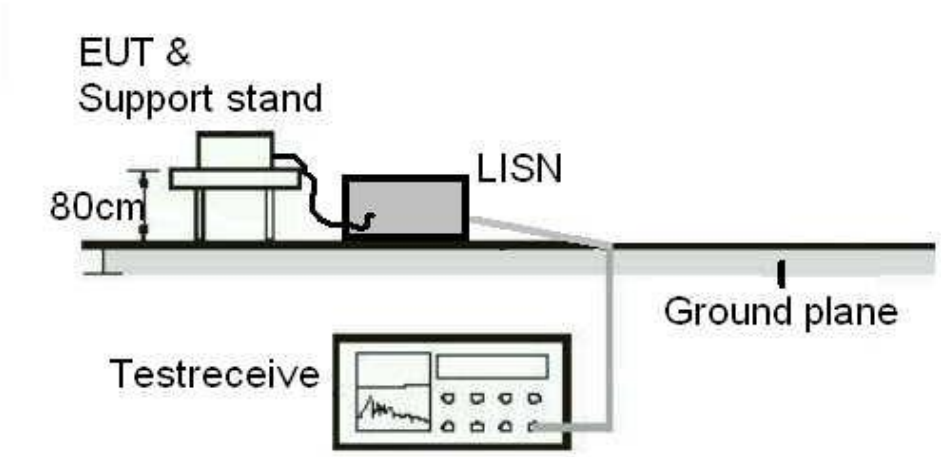
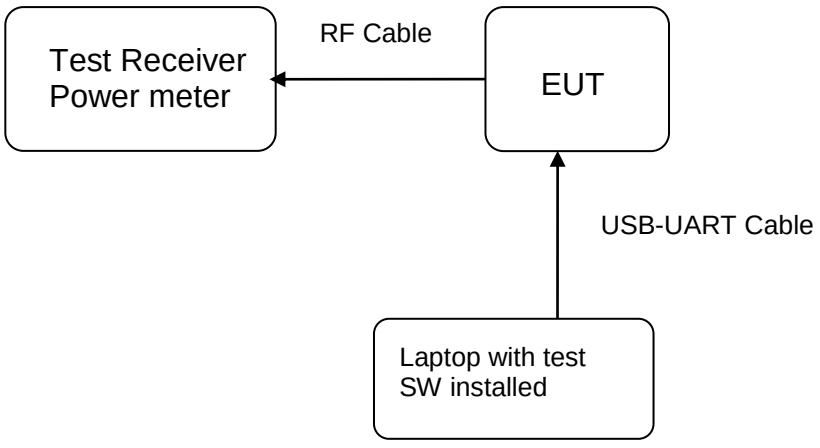


Diagram of Measurement Equipment Configuration for Conducted Transmitter Measurement



Note: The output power is measured by power meter according to 8.3.1.3 KDB558074 D01 Meas Guidance v05r02 8.3.1.3.

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

According to the manufacturer declaration, the EUT has an antenna with maximum directional gain of 3.3 dBi. The antenna is a printed PCB trace antenna 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 conducted Peak output power

RESULT: **Passed**

Test standard	:	FCC Part 15.247(b)(3)
Basic standard	:	ANSI C63.10:2013, KDB558074(8.3.1.3)
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 Maximum conducted Peak output power, BLE 1M

Channel	Channel Frequency (MHz)	Output Power		Limit
		(dBm)	(W)	(W)
Low Channel	2402	5.49	0.00354	1
Middle Channel	2440	5.28	0.00337	1
High Channel	2480	5.19	0.00330	1

Pmax: 3.5400mW

Table 8: Test result of Maximum conducted Peak output power, BLE 2M

Channel	Channel Frequency (MHz)	Output Power		Limit
		(dBm)	(W)	(W)
Low Channel	2402	5.50	0.00355	1
Middle Channel	2440	5.29	0.00338	1
High Channel	2480	5.21	0.00332	1

Pmax: 3.5481mW

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

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 6dB Bandwidth, BLE 1M

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Limit (kHz)	Result
Low Channel	2402	683.320	>500	Pass
Mid Channel	2440	698.300	>500	Pass
High Channel	2480	698.310	>500	Pass

Table 10: Test result of 6dB Bandwidth, BLE 2M

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Limit (kHz)	Result
Low Channel	2402	1418.580	>500	Pass
Mid Channel	2440	1373.630	>500	Pass
High Channel	2480	1298.700	>500	Pass

Table 11: Test result of 99% Bandwidth, BLE 1M

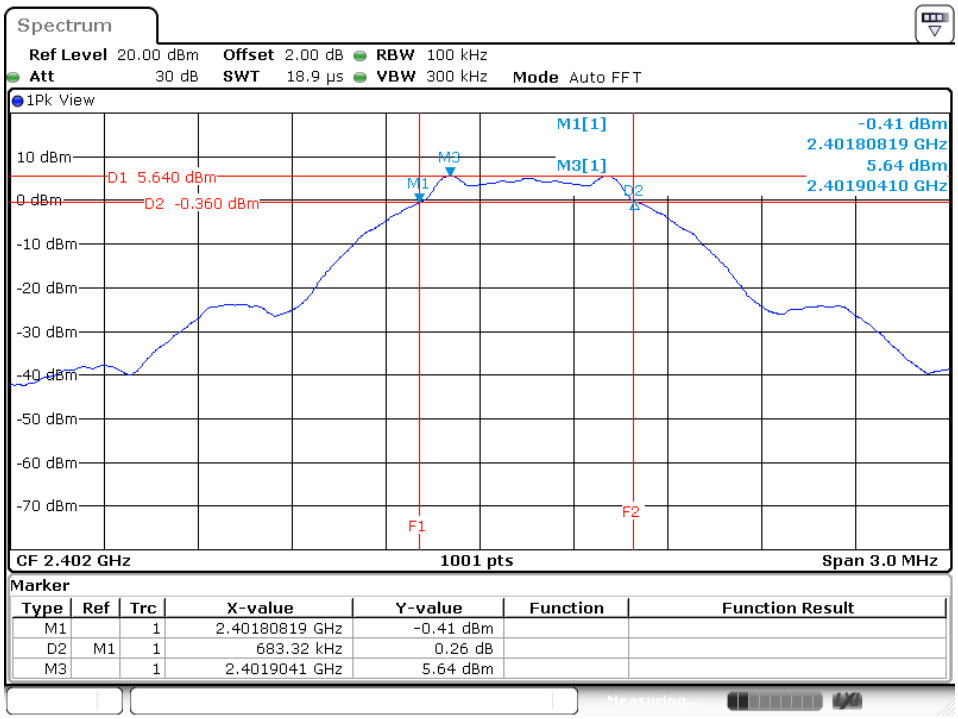
Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)
Low Channel	2402	1.04
Mid Channel	2440	1.04
High Channel	2480	1.05

Table 12: Test result of 99% Bandwidth, BLE 2M

Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)
Low Channel	2402	2.06
Mid Channel	2440	2.08
High Channel	2480	2.09

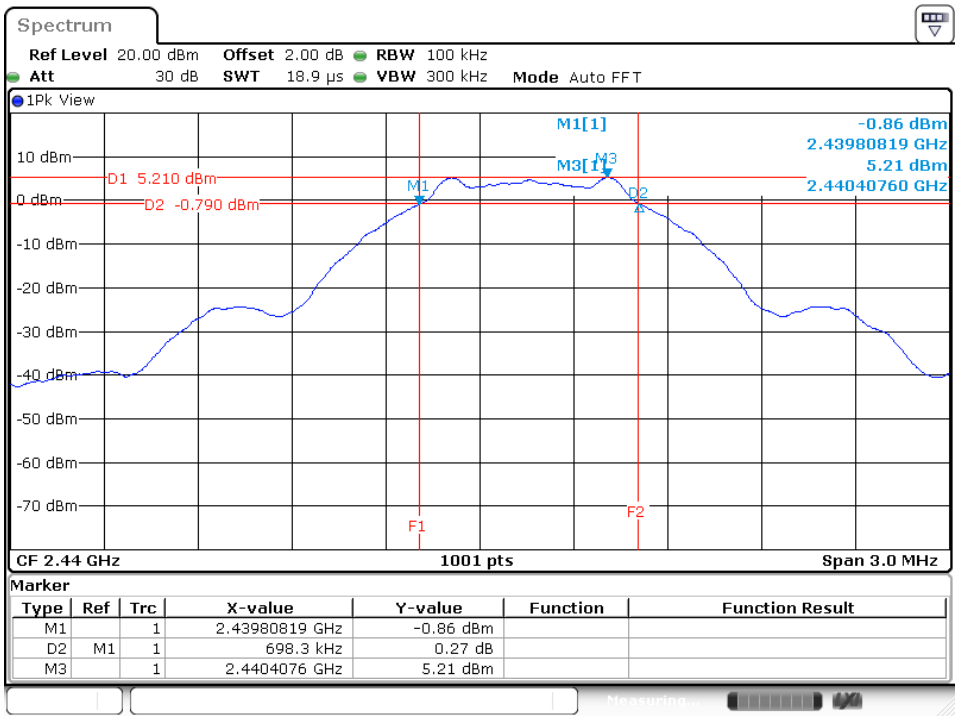
Test Plot of 6dB Bandwidth, BLE 1M

Low Channel



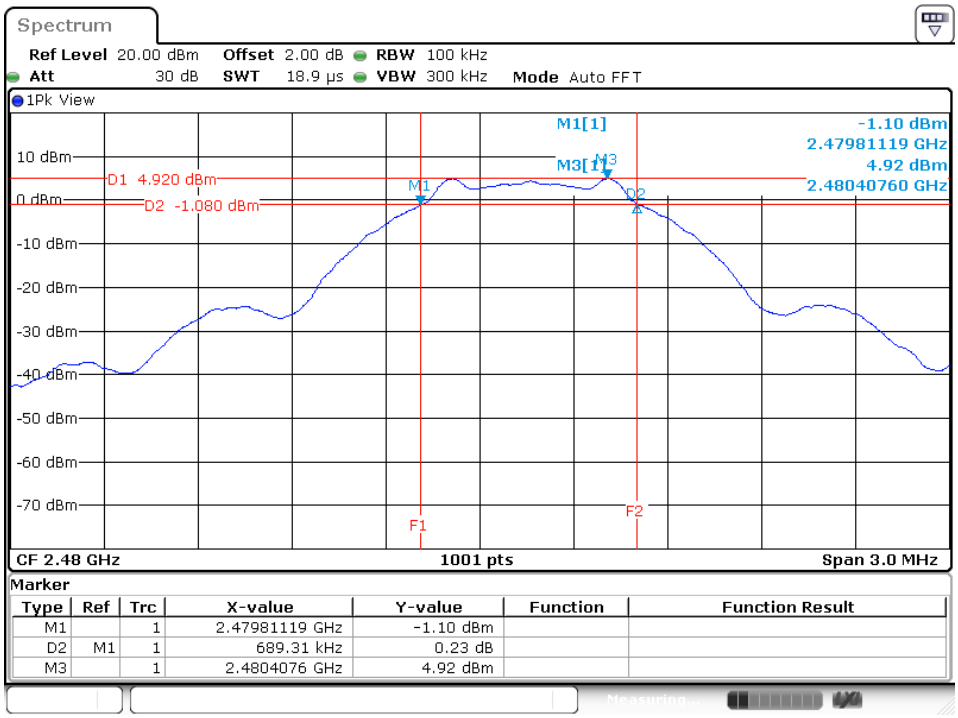
Date: 22.MAY.2020 23:14:11

Middle Channel



Date: 22.MAY.2020 23:15:00

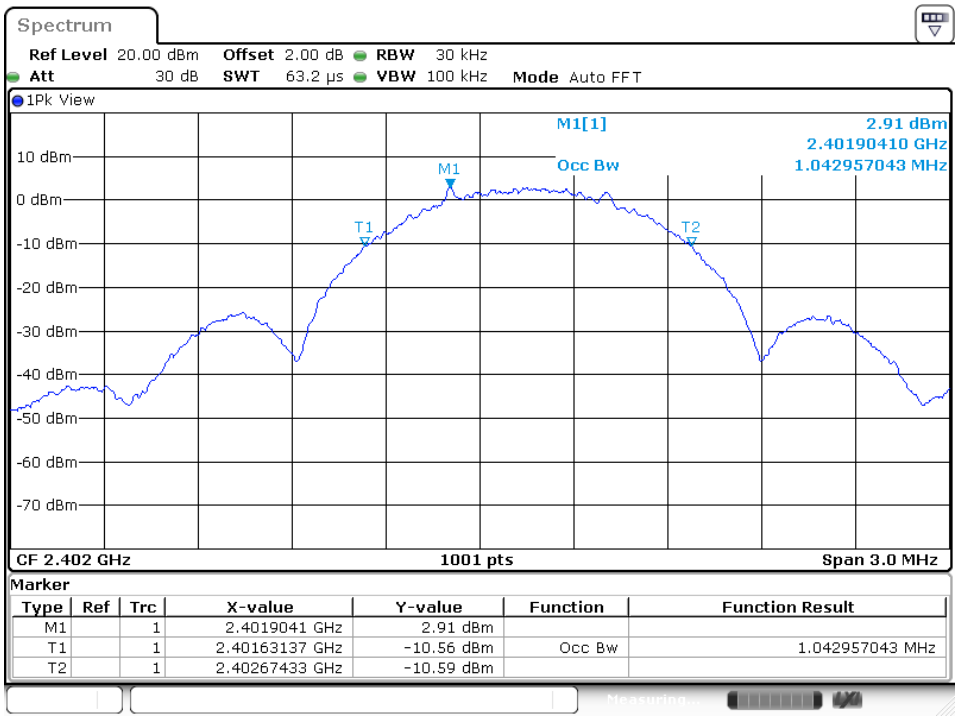
High Channel



Date: 22.MAY.2020 23:17:44

Test Plot of 99% Bandwidth, BLE 1M

Low Channel



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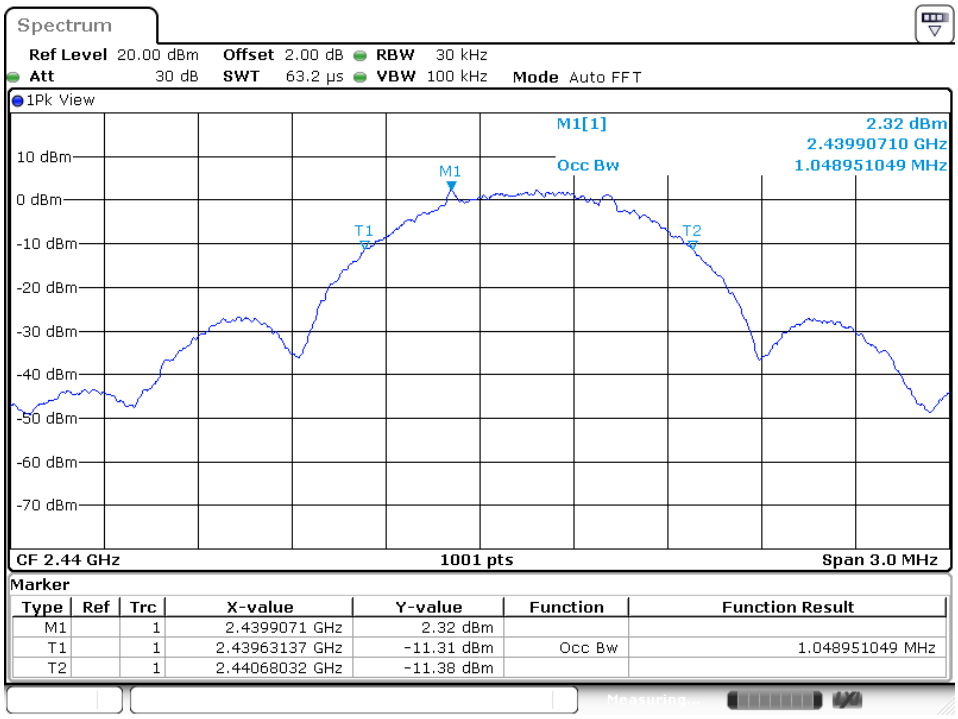
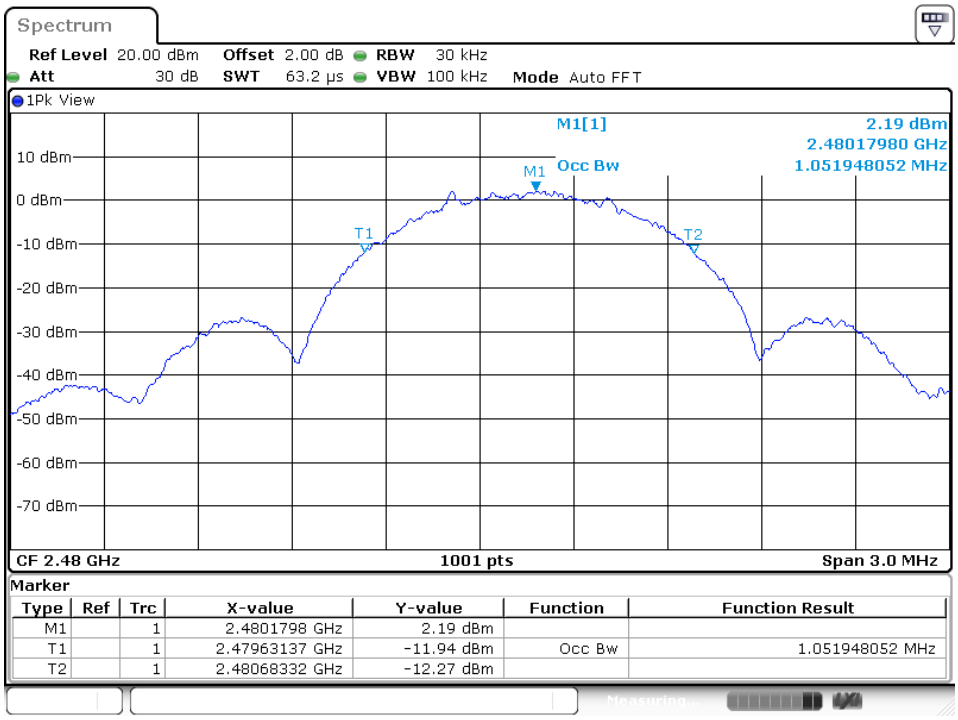
Middle Channel



Date: 22.MAY.2020 23:15:16

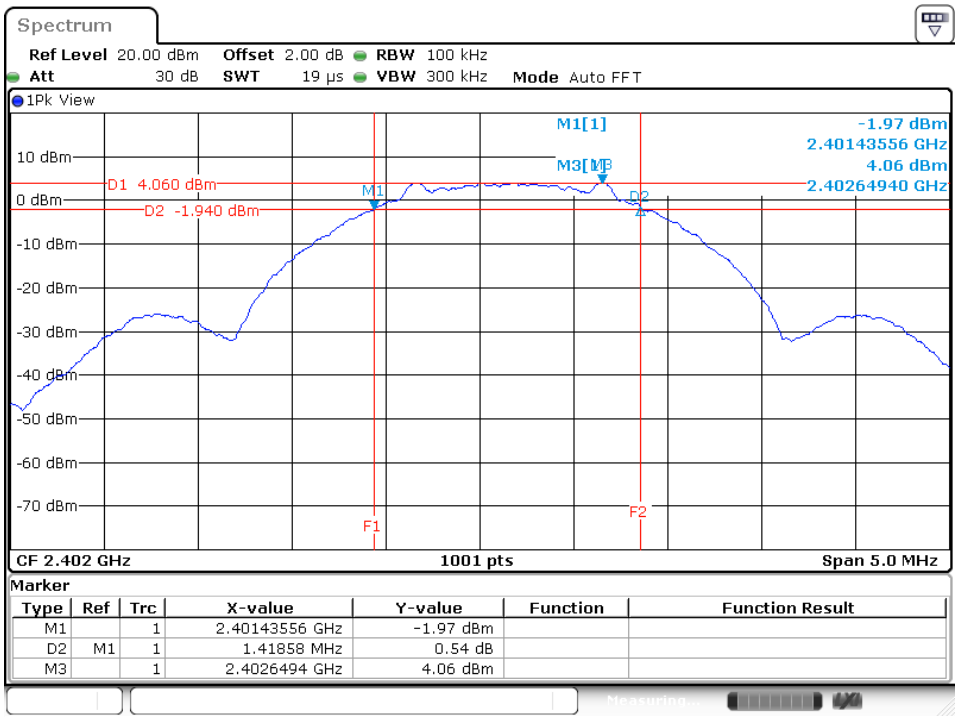
High Channel



Date: 22.MAY.2020 23:17:59

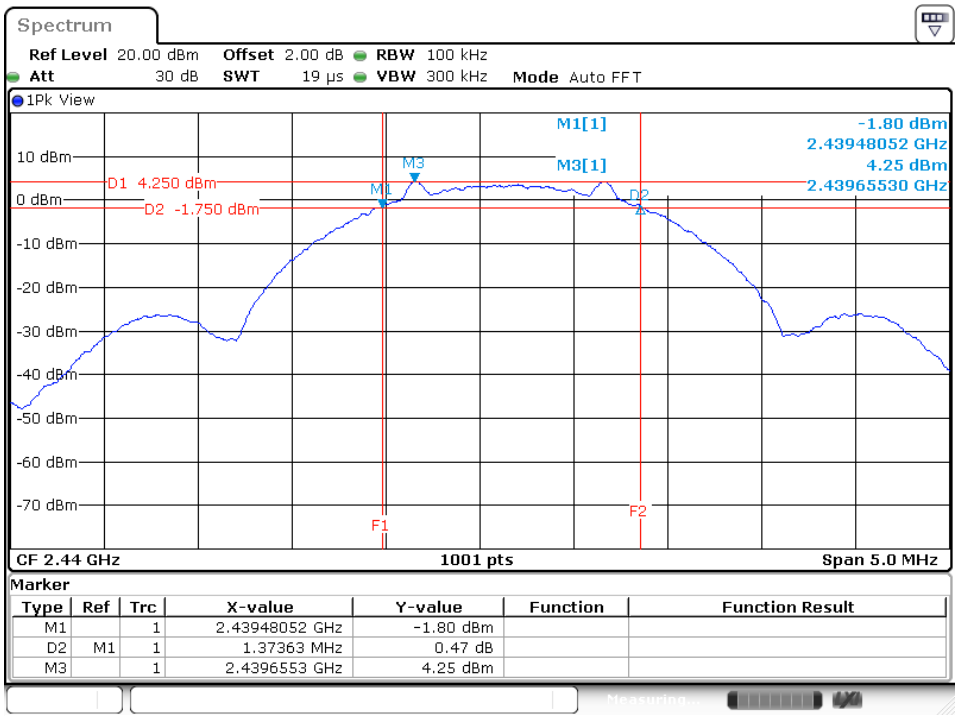
Test Plot of 6dB Bandwidth, BLE 2M

Low Channel



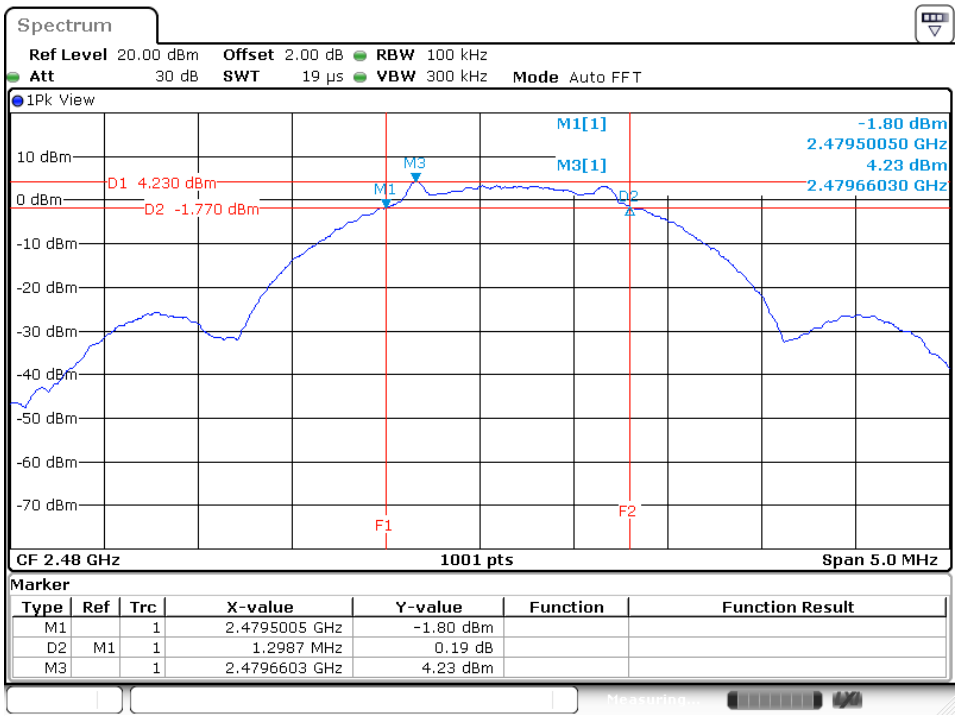
Date: 22.MAY.2020 23:21:04

Middle Channel



Date: 22.MAY.2020 23:23:24

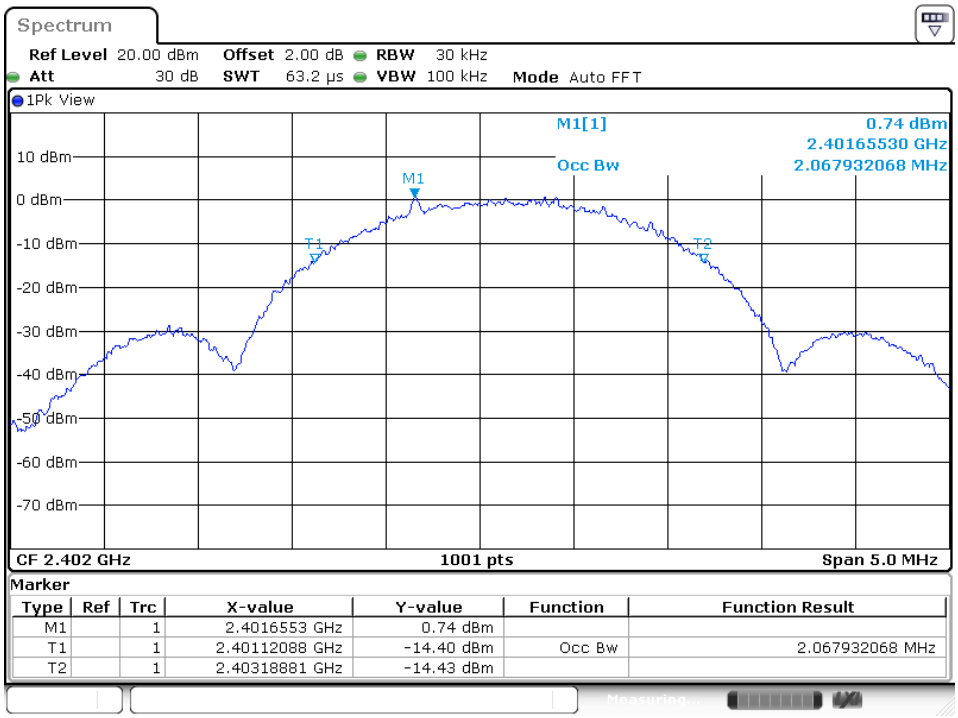
High Channel



Date: 22.MAY.2020 23:25:50

Test Plot of 99% Bandwidth, BLE 2M

Low Channel



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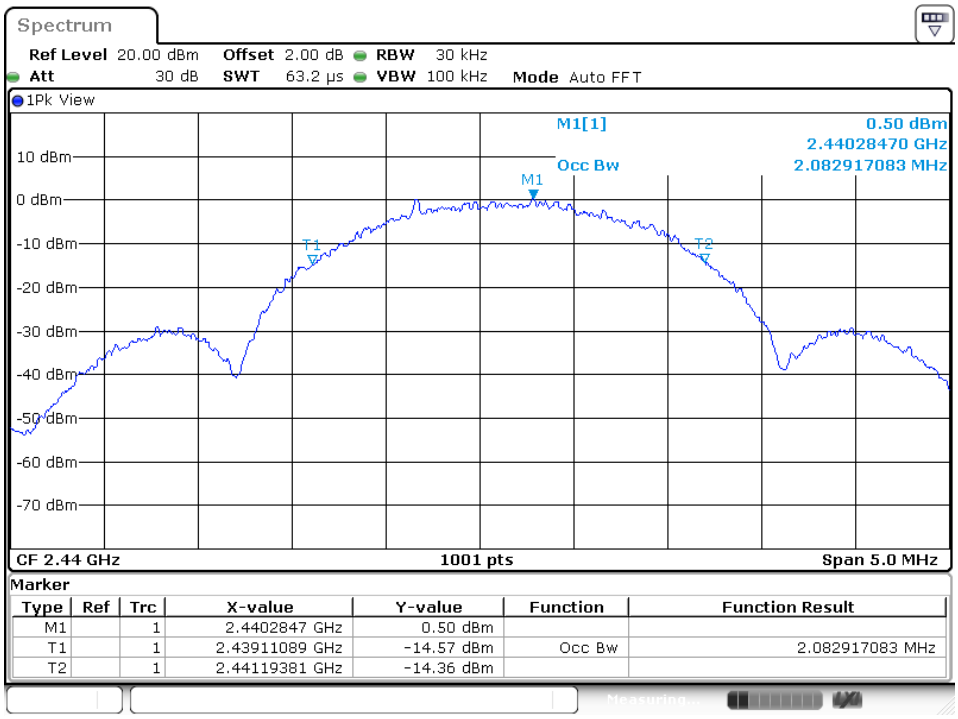
Middle Channel



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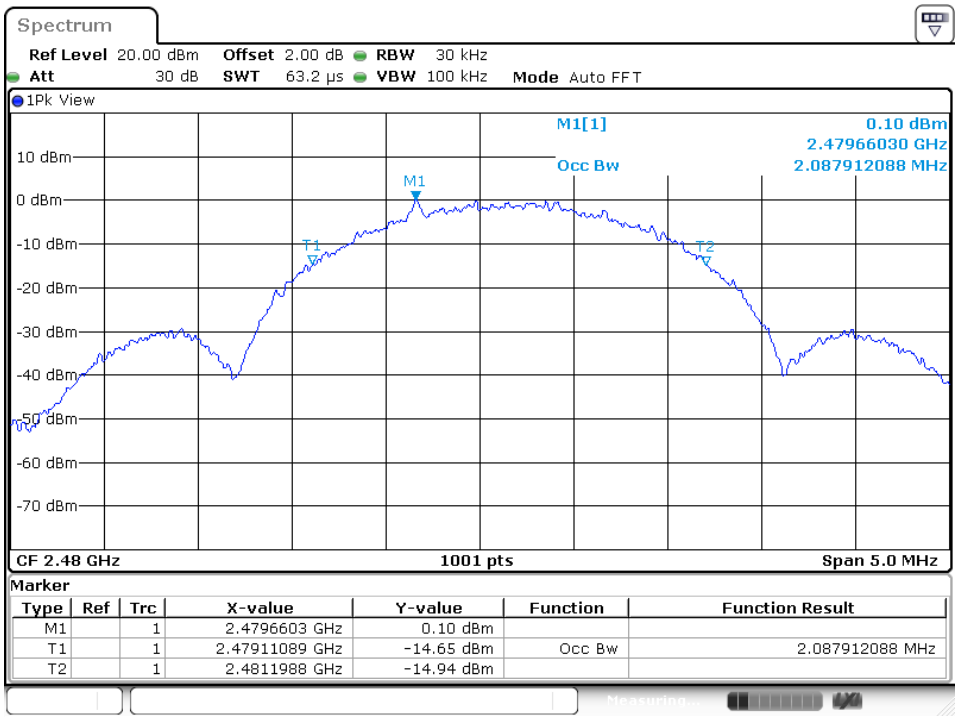
High Channel



Date: 22.MAY.2020 23:26:05

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

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 13: Test result of Power Density, BLE 1M

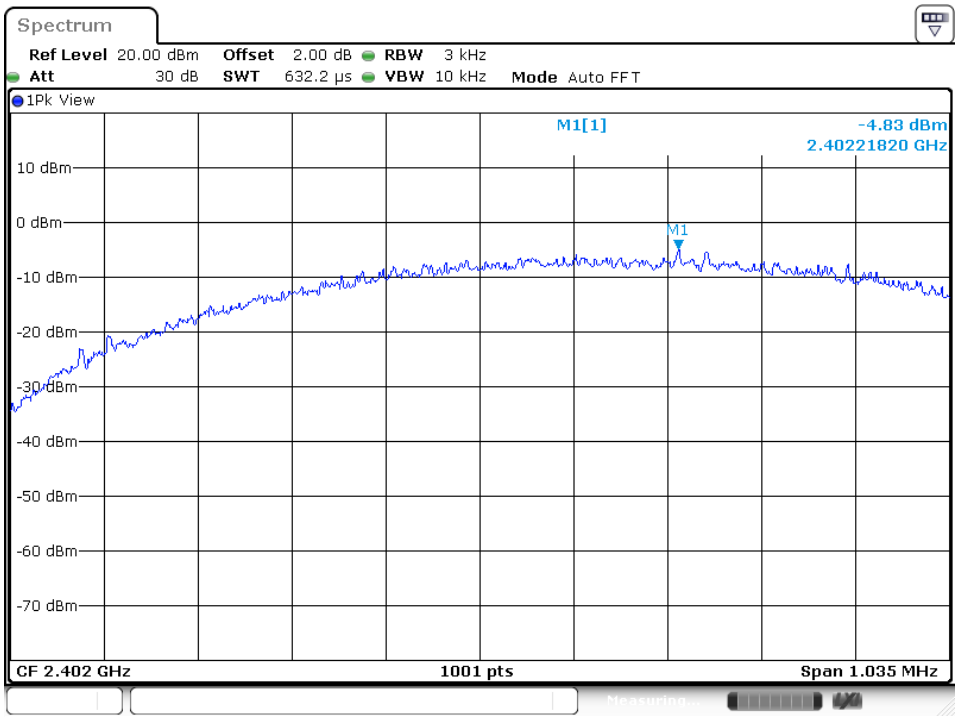
Channel	Channel Frequency (MHz)	Power Density	Limit
		(dBm)	(dBm)
Low Channel	2402	-4.83	8
Middle Channel	2440	-5.51	8
High Channel	2480	-5.45	8

Table 14: Test result of Power Density, BLE 2M

Channel	Channel Frequency (MHz)	Power Density	Limit
		(dBm)	(dBm)
Low Channel	2402	-7.44	8
Middle Channel	2440	-8.07	8
High Channel	2480	-7.87	8

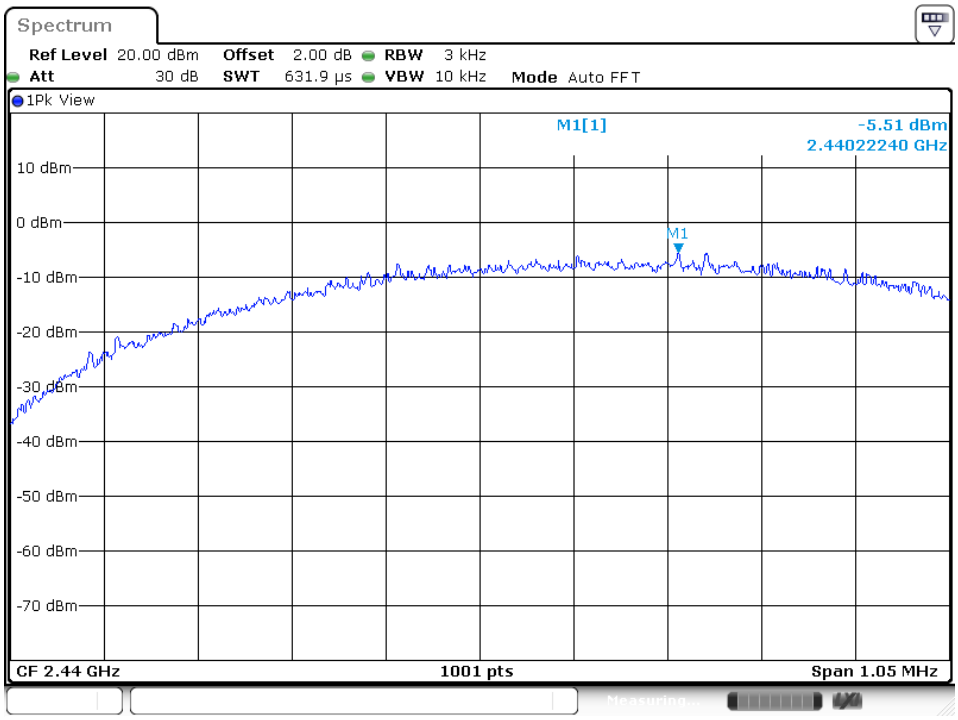
Test Plot of Power Density, BLE 1M

Low Channel



Date: 22.MAY.2020 23:11:22

Middle Channel



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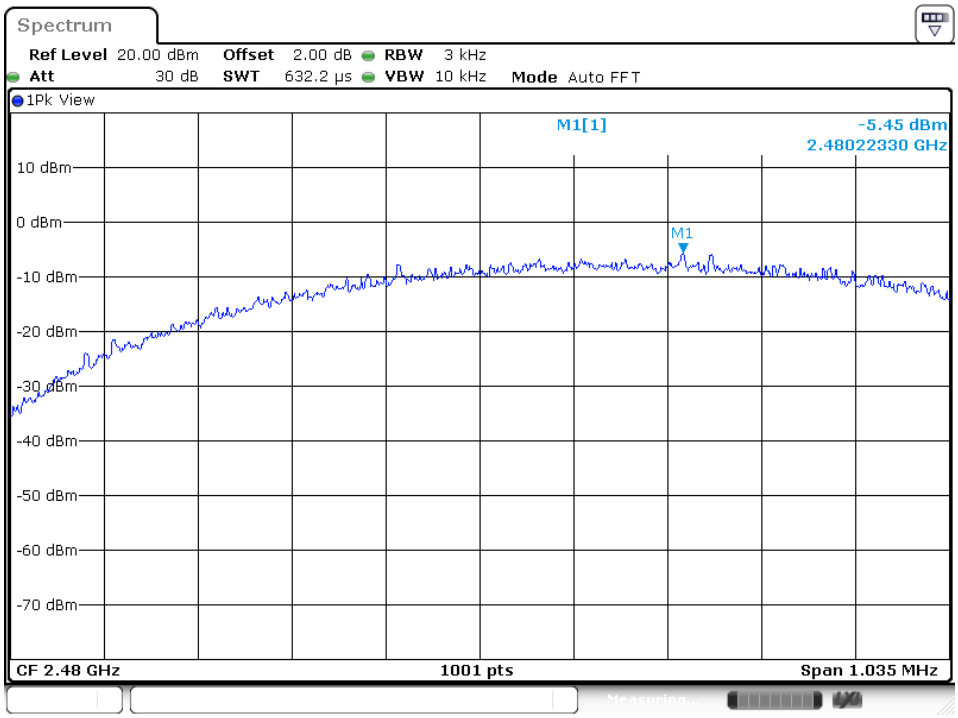
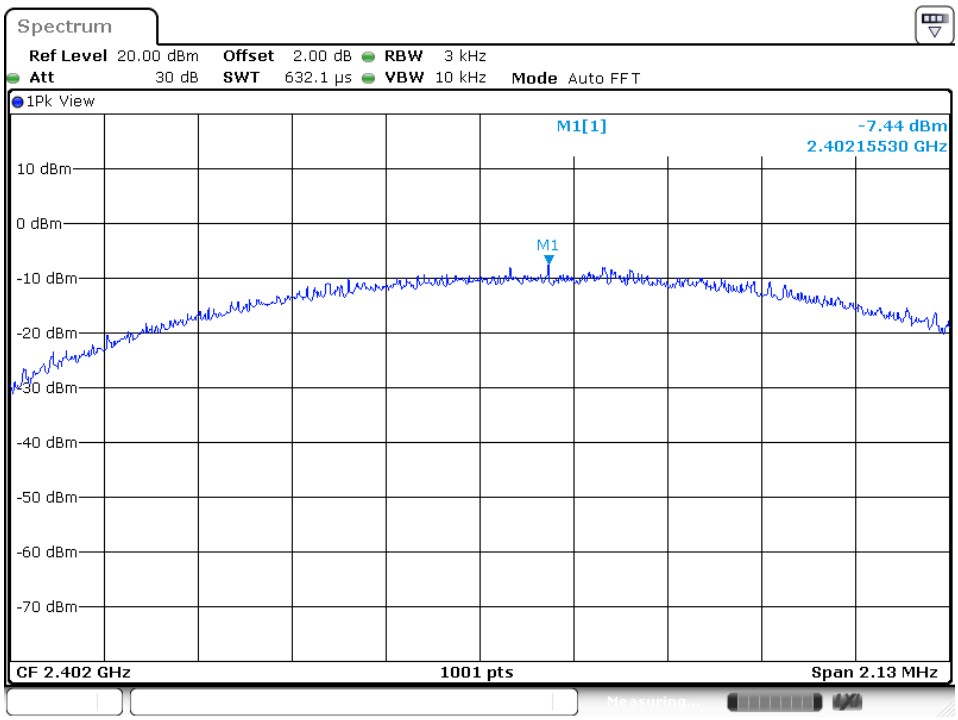
High Channel



Date: 22.MAY.2020 23:19:01

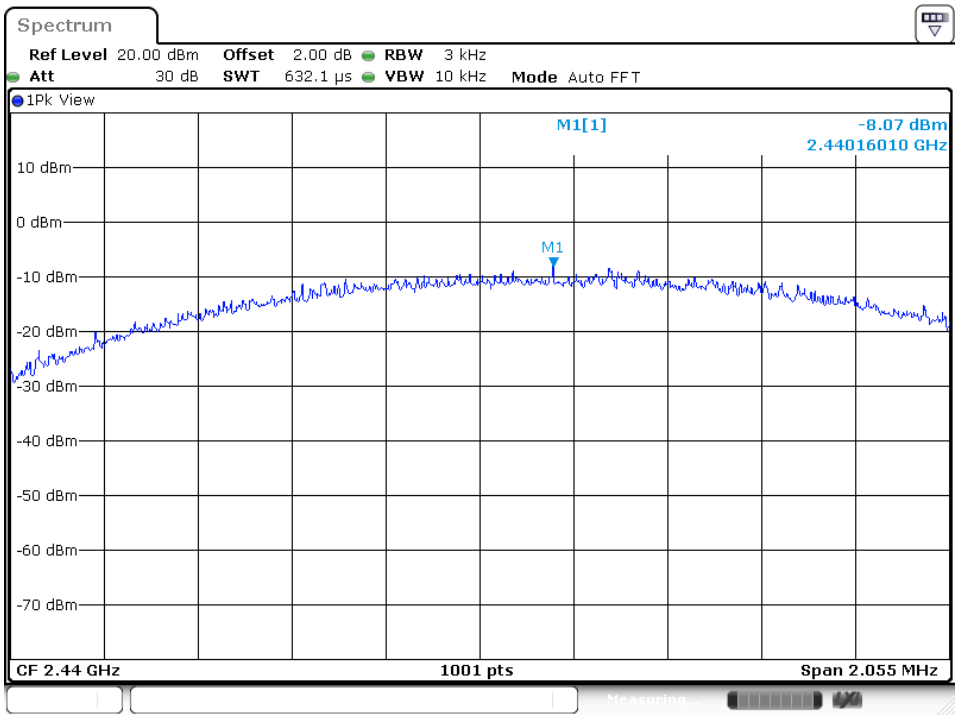
Test Plot of Power Density, BLE 2M

Low Channel



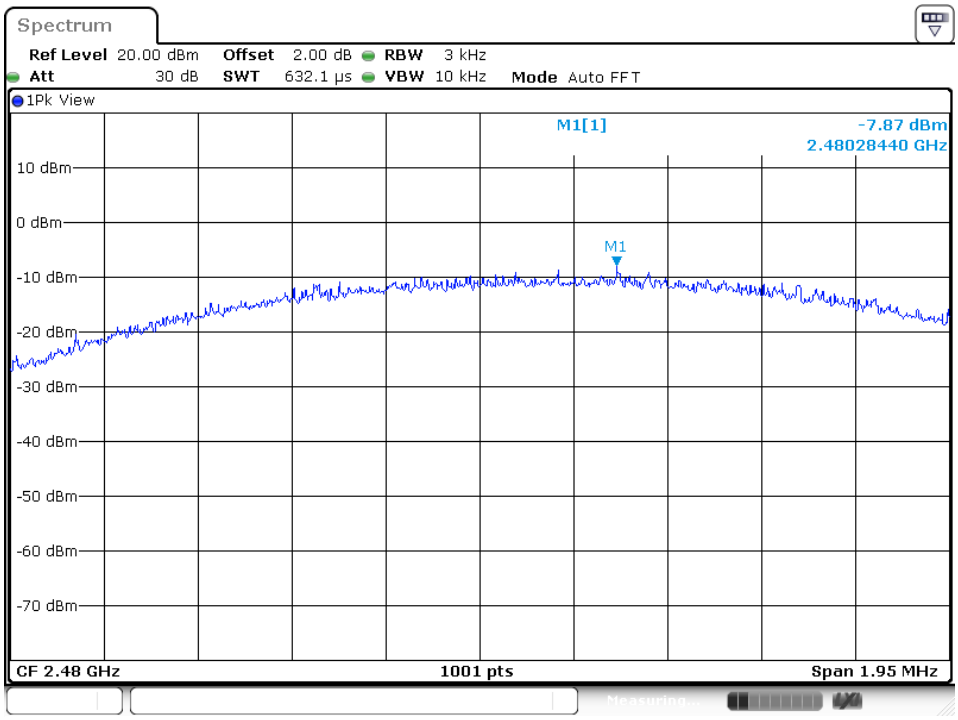
Date: 22.MAY.2020 23:22:20

Middle Channel



Date: 22.MAY.2020 23:24:38

High Channel



Date: 22.MAY.2020 23:27:04

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

RESULT: **Passed**

Test standard	:	FCC part 15.247(d), ISED RSS-247 5.5
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

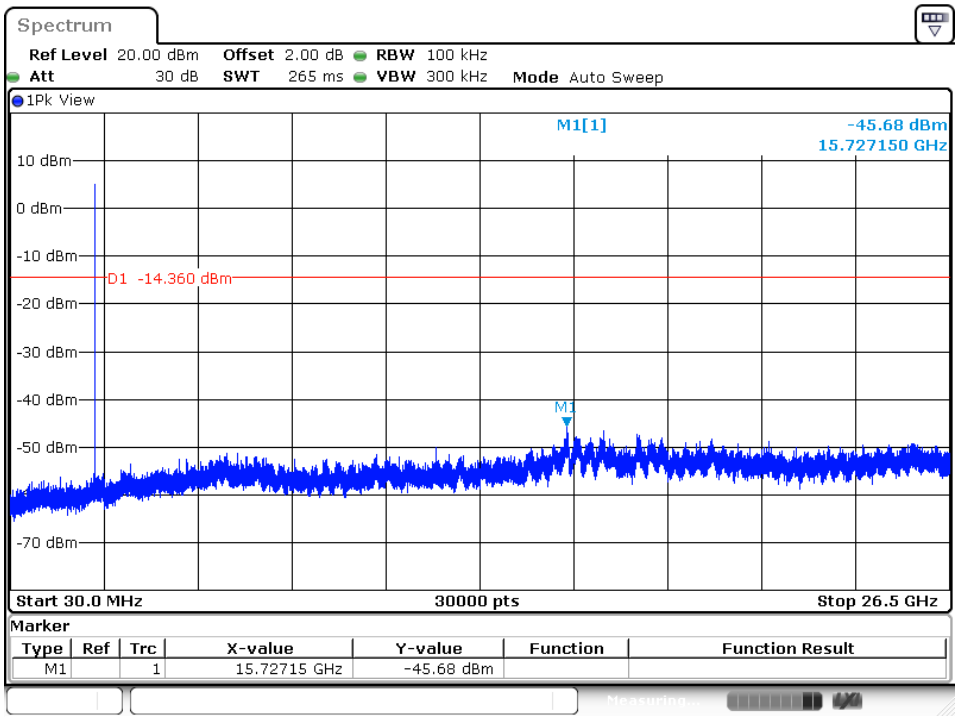
Test setup

Test Channel	:	Low/ Mid/ High for spurious, Low/ High for Band Edge
Operation mode	:	A
Ambient temperature	:	20-24°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 product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

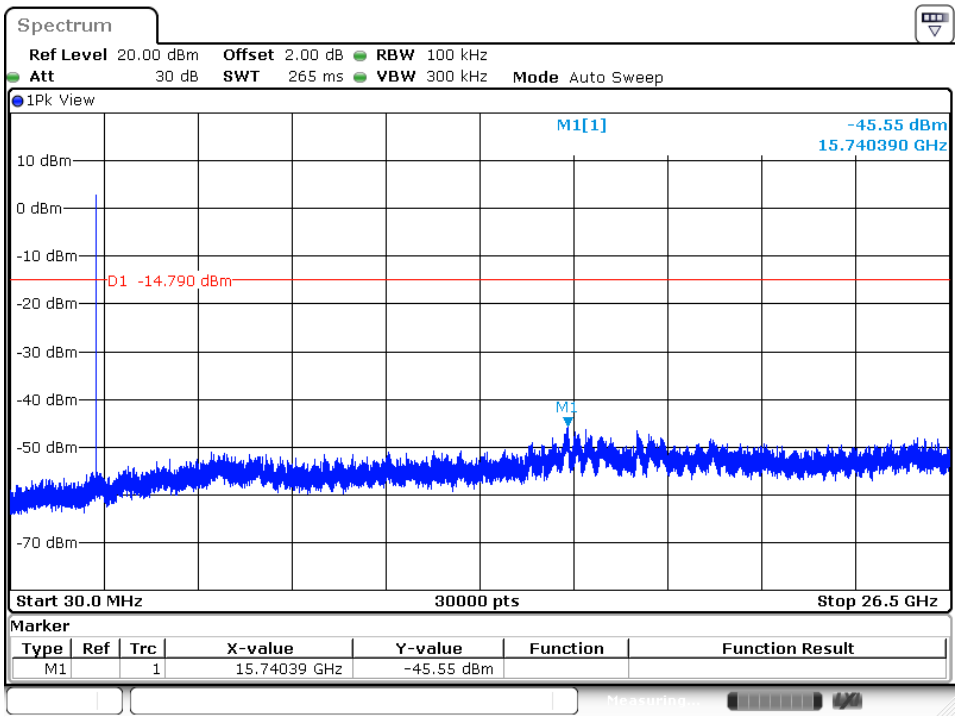
Test Plot 100kHz Conducted Emissions, BLE 1M

Low Channel



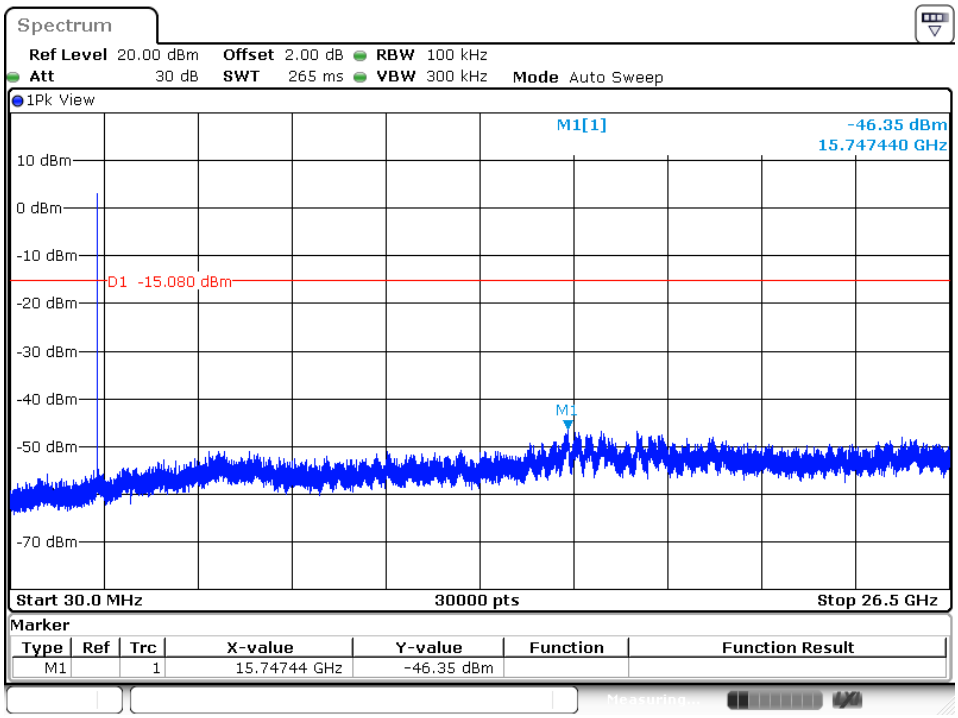
Date: 25.MAY.2020 08:38:07

Middle Channel



Date: 22.MAY.2020 23:15:54

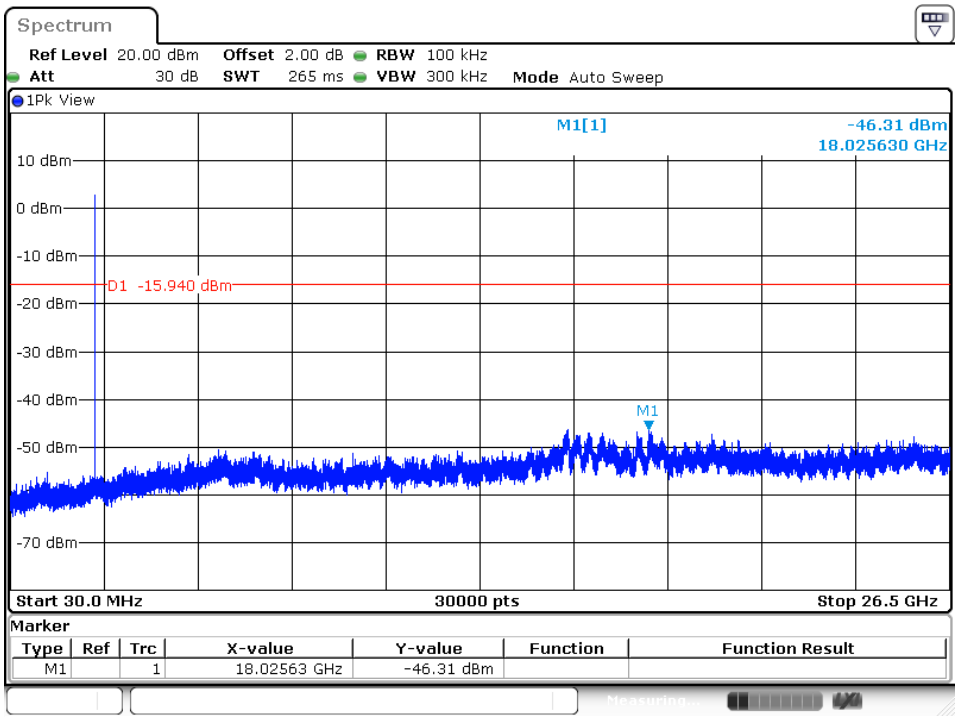
High Channel



Date: 22.MAY.2020 23:18:39

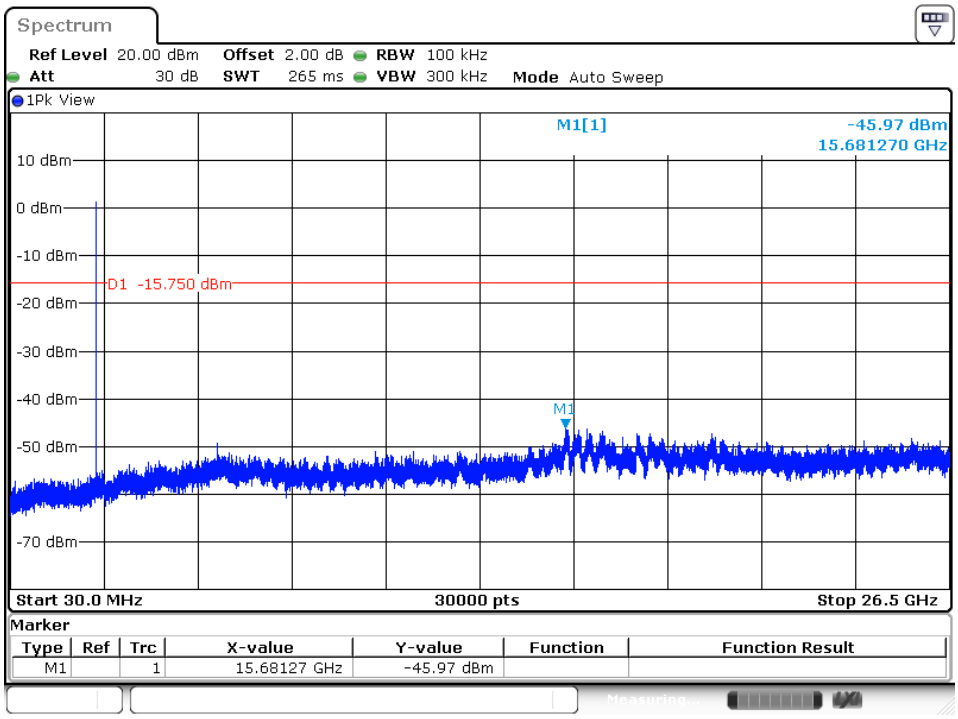
Test Plot 100kHz Conducted Emissions, BLE 2M

Low Channel



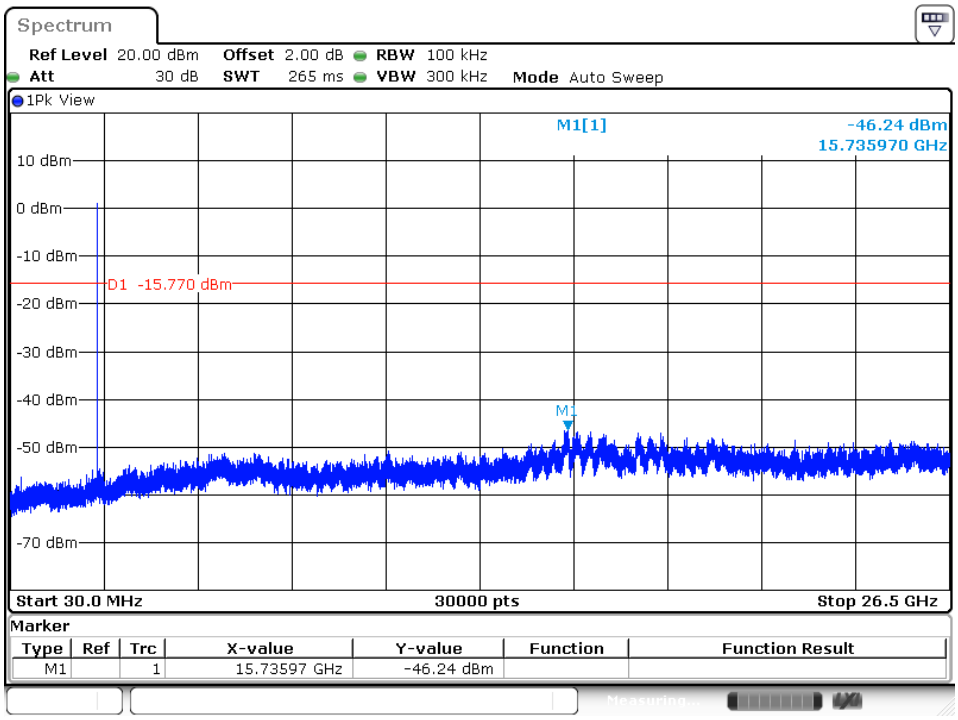
Date: 22.MAY.2020 23:21:59

Middle Channel



Date: 22.MAY.2020 23:24:17

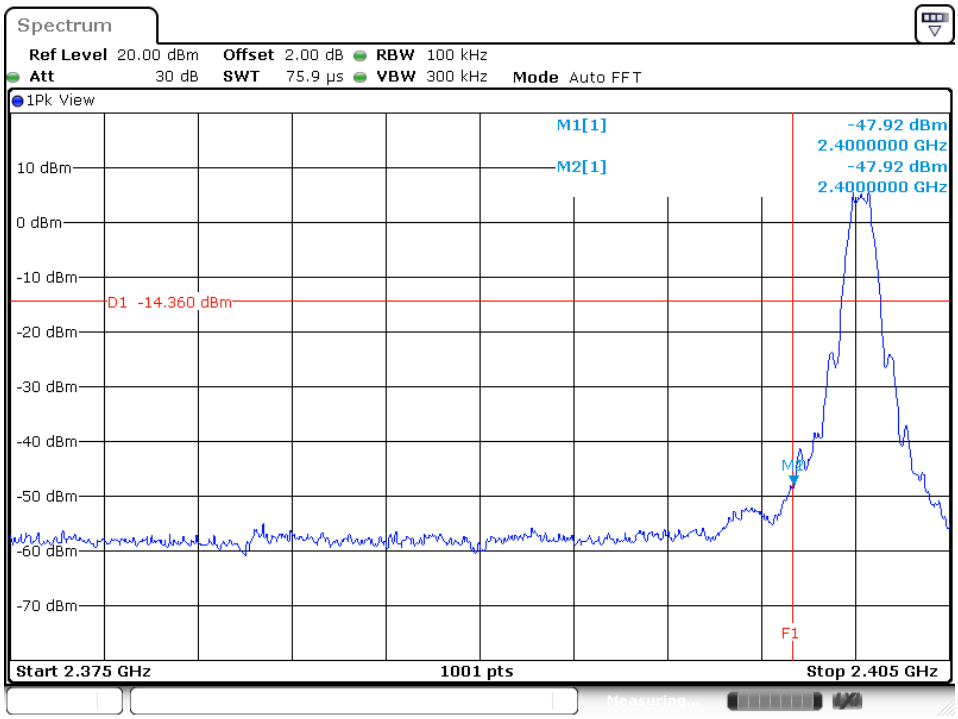
High Channel



Date: 22.MAY.2020 23:26:42

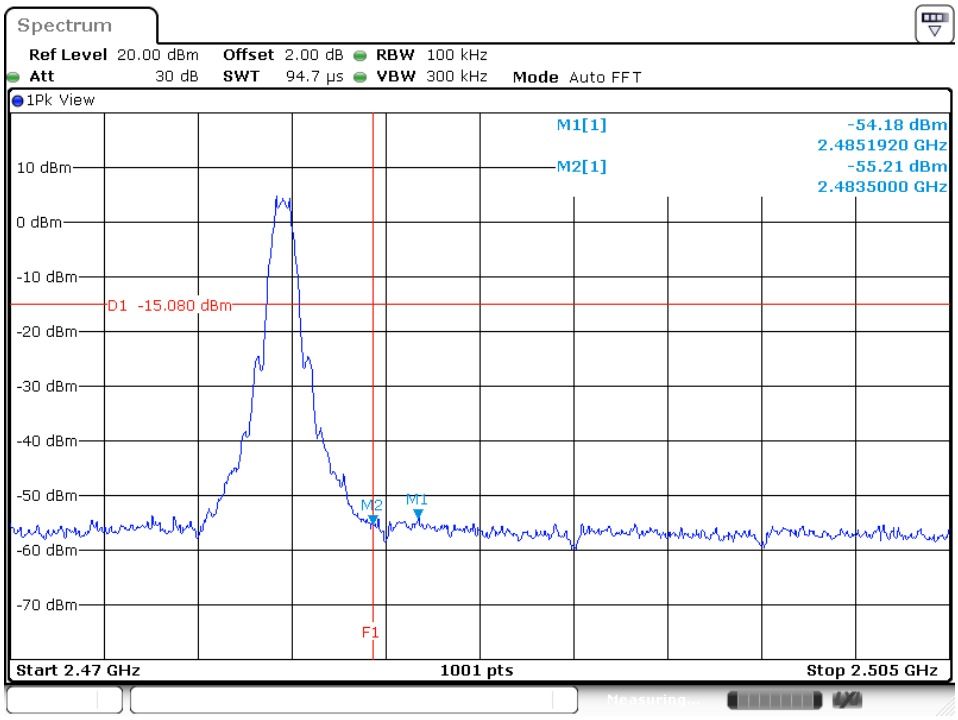
Test Plot 100kHz RBW of Band Edge, BLE 1M

Low Channel



Date: 25.MAY.2020 08:37:29

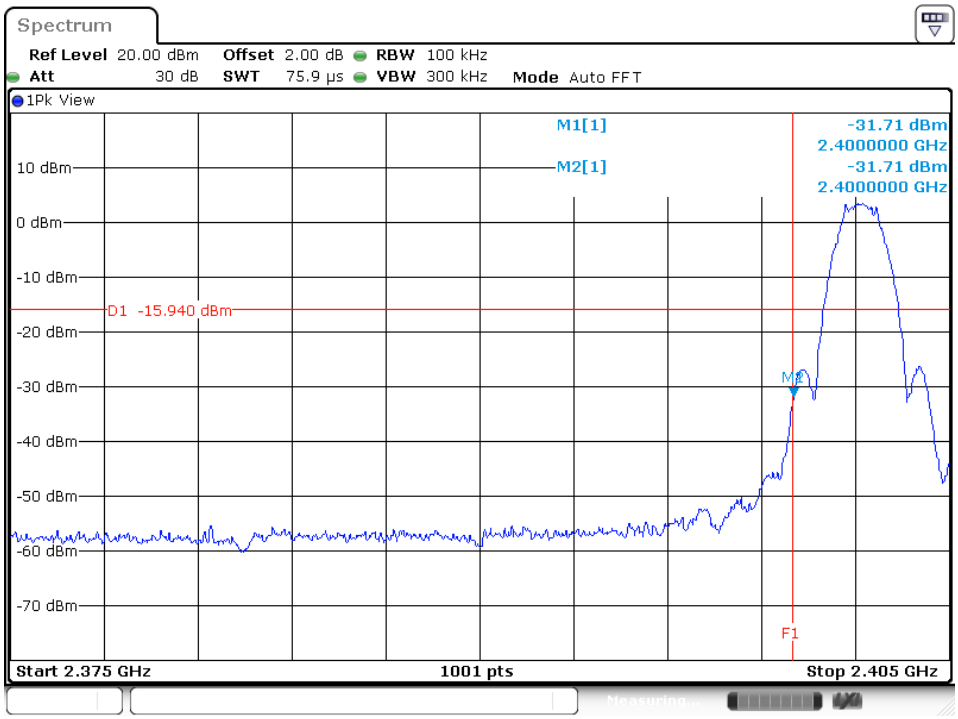
High Channel



Date: 22.MAY.2020 23:18:18

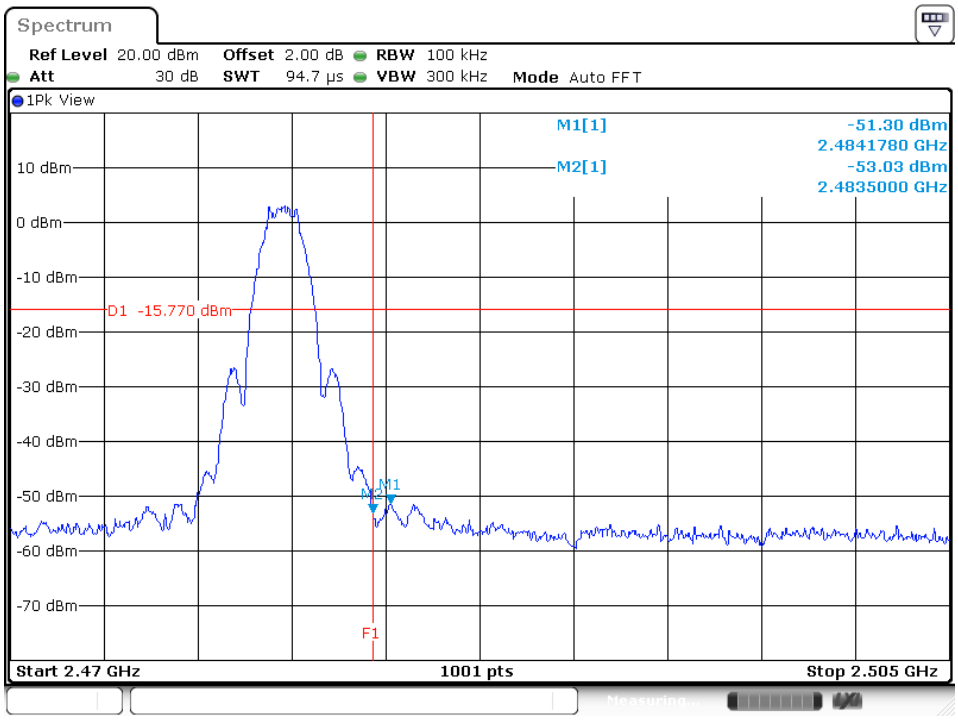
Test Plot 100kHz RBW of Band Edge, BLE 2M

Low Channel



Date: 22.MAY.2020 23:21:39

High Channel



Date: 22.MAY.2020 23:26:24

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), must comply with the radiated emission limits specified in FCC 15.209(a). 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).
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

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

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.

Factor (dB/m)=Antenna Factor(dB/m)+Cable loss (dB)
Level(dBuV/m)=Reading(dBuV)+ Factor(dB/m)

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
FCC CFR 47 Part 2 Subpart J Section 2.1091

Separation distance is more than 20 cm, thus mobile device exposure limits can be applied.

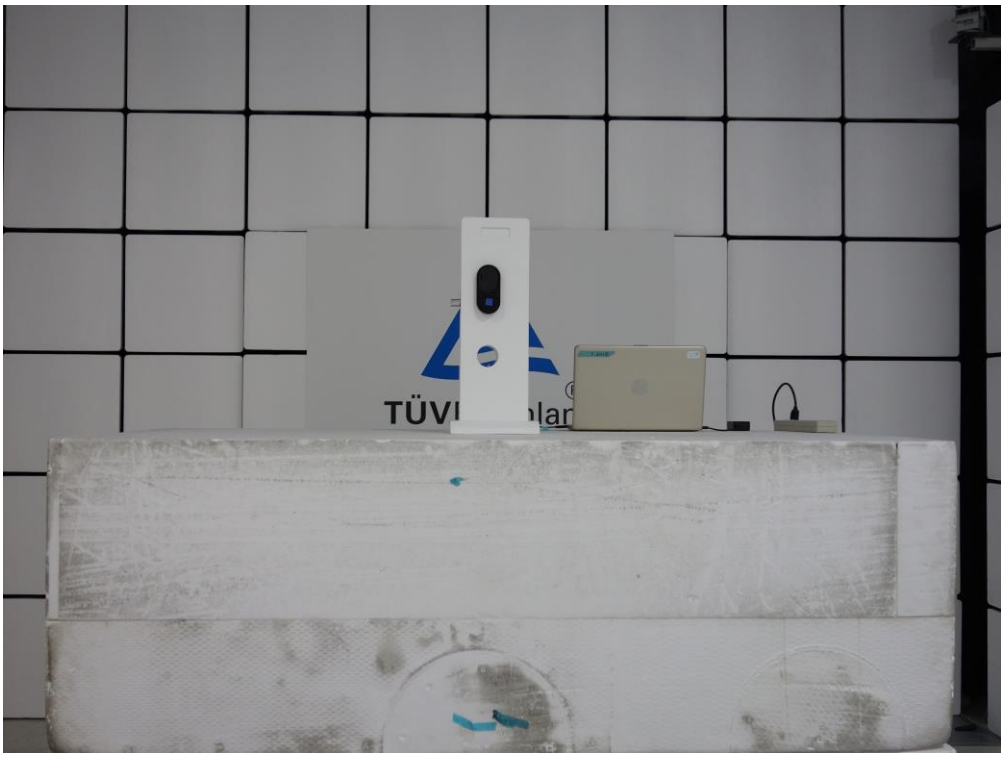
FCC Maximum Exposure:

Mode	Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Maximum Output Power (dBm)	Output Power (mW)	Power Density (S)(mW/cm^2)	Test Result
GFSK 2M	2402	3.3	2.138	5.50	3.5481	0.00151	Pass

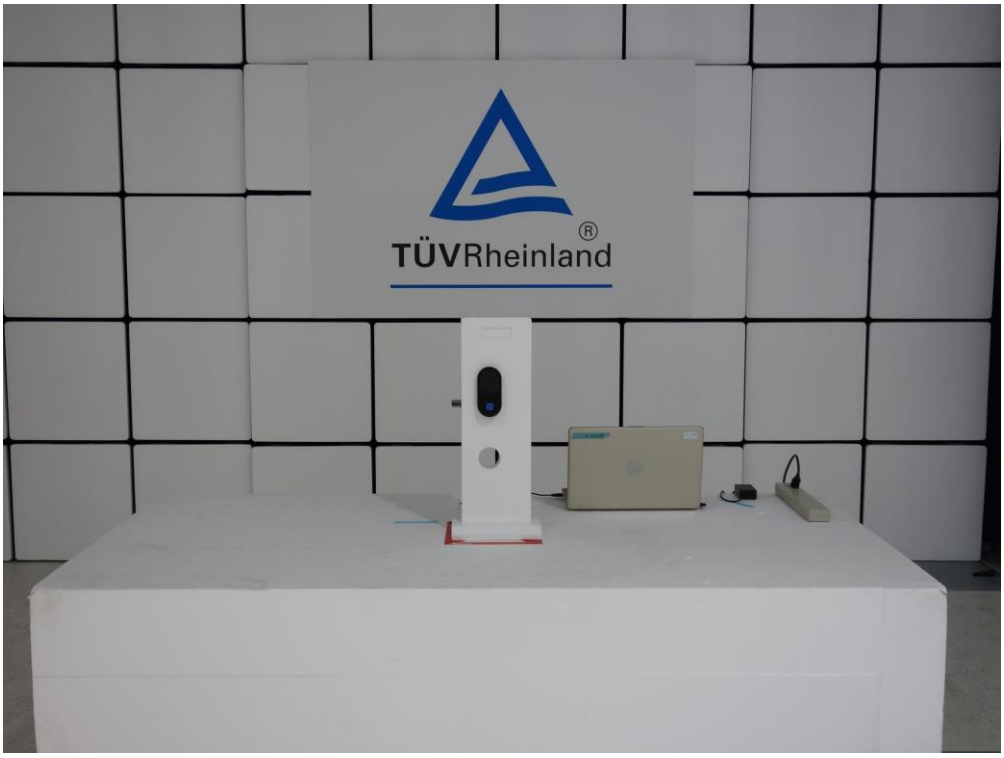
Limit FCC: 1500-100,000 MHz **1.0 mW/cm^2**

7. Photographs of the Test Set-Up

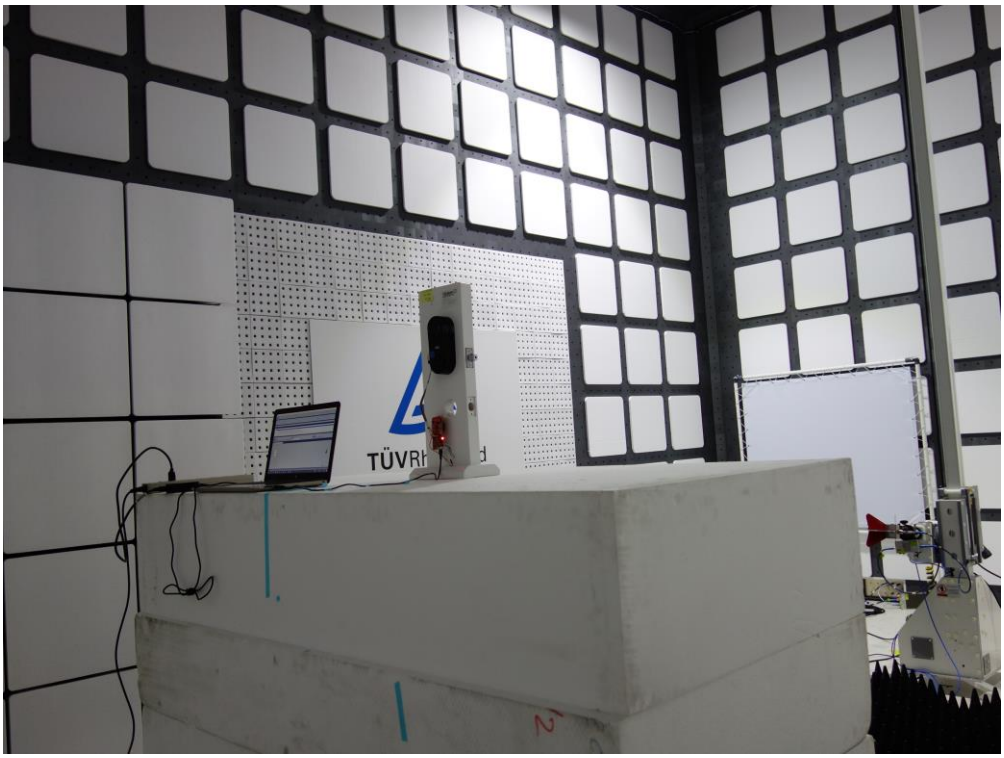
Photograph 1: Set-up for Spurious Emissions (Front View 1)



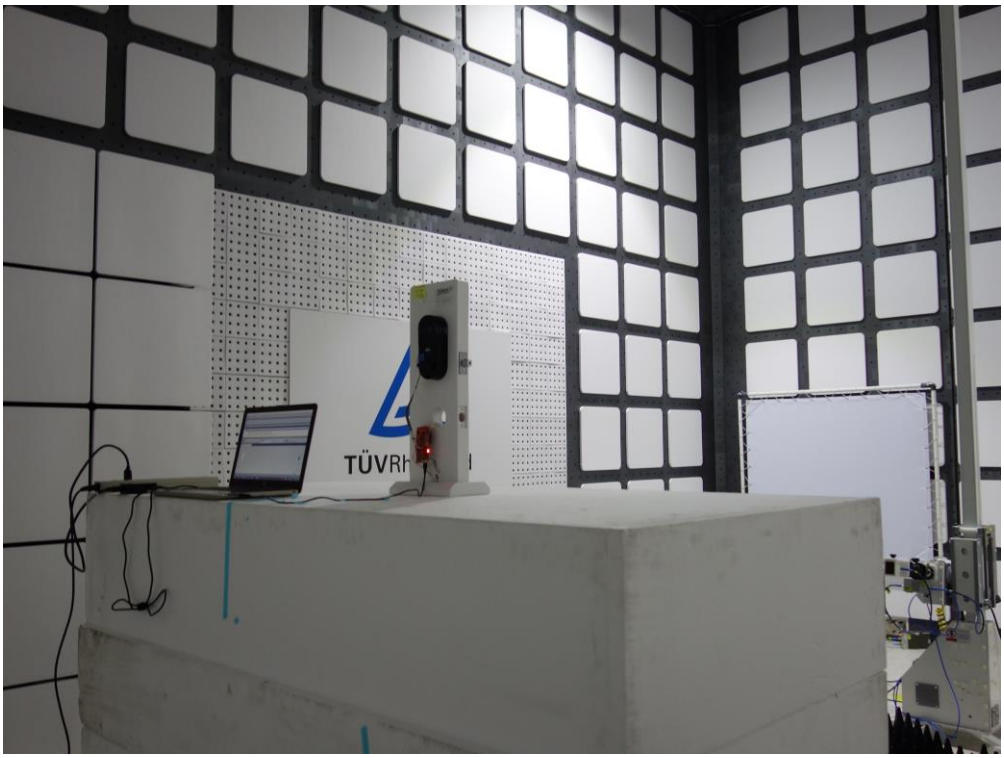
Photograph 2: Set-up for Spurious Emissions (Front View 2)



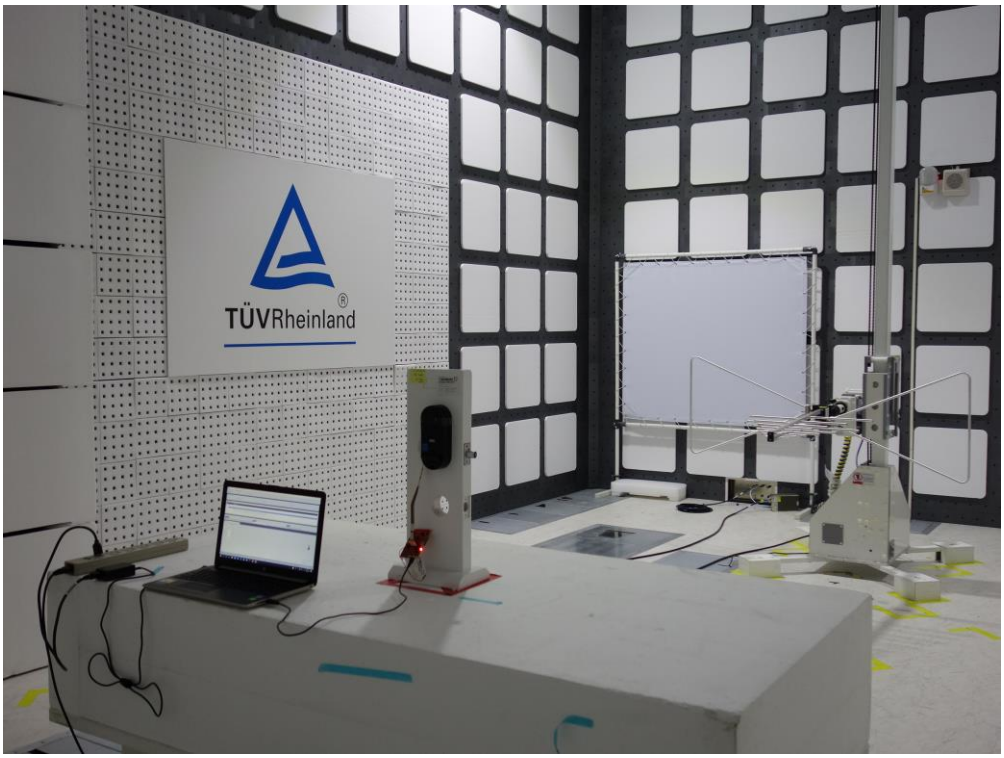
Photograph 3: Set-up for Spurious Emissions (Back View 1)



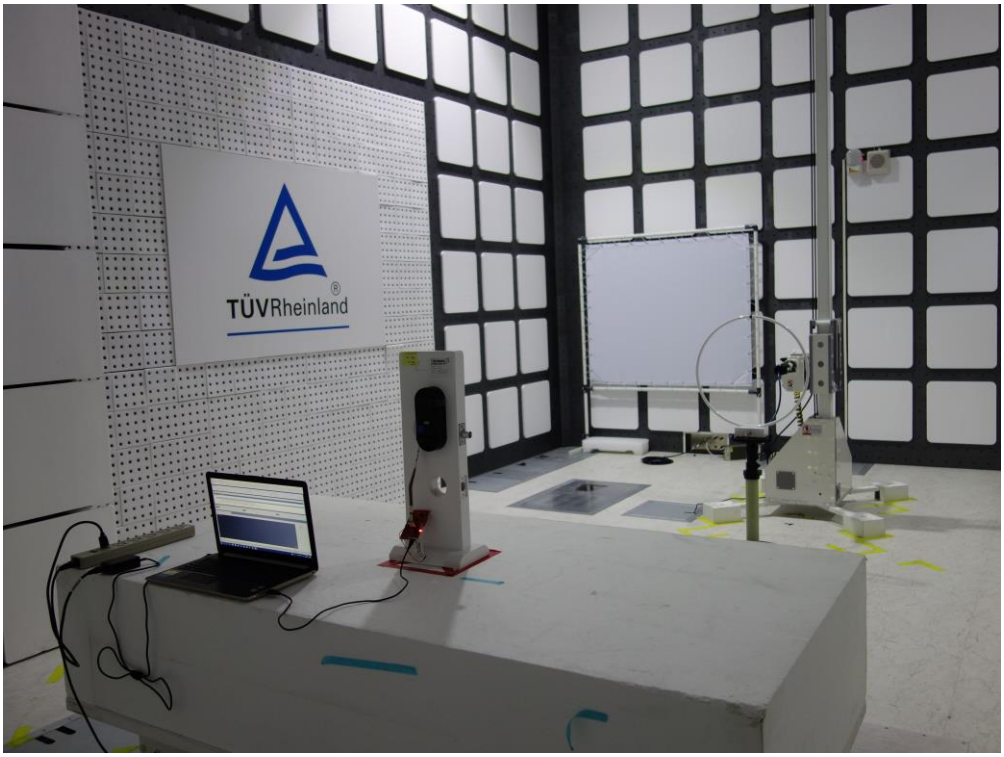
Photograph 4: Set-up for Spurious Emissions (Back View 2)



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



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



8. List of Tables

9. List of Photographs