TEST REPORT

Reference No......	:	WTX25X05117815W002
FCC ID.....	:	2BNRF-BTM30
Applicant.....	:	SUNTEK ELECTRONICS CO., LTD
Address.....	:	Floor 2, Building A5, No.8 Minkang West Road,Torch Development Zone, Zhongshan City, Guangdong Province, China
Manufacturer.....	:	The same as Applicant
Address.....	:	The same as Applicant
Product Name.....	:	BT Module
Model No......	:	BTM30
Standards.....	:	FCC Part 15.247
Date of Receipt sample.....	:	2025-05-09
Date of Test.....	:	2025-05-09 to 2025-05-26
Date of Issue.....	:	2025-05-26
Test Report Form No......	:	WTX_Part 15_247W
Test Result.....	:	**Pass**

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of approver.

Prepared By:

Waltek Testing Group (Shenzhen) Co., Ltd.

Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road,
Block 70 Bao'an District, Shenzhen, Guangdong, China
Tel.: +86-755-33663308 Fax.: +86-755-33663309 Email: sem@waltek.com.cn

Tested by:

Gala Wang/Project Engineer

Approved by:

Jason Su/Manager

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Report version

Version No.	Date of issue	Description
Rev.00	2025-05-26	Original
/	/	/

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

General Description of EUT	
Product Name:	BT Module
Trade Name	/
Model No.:	BTM30
Adding Model(s):	/
Rated Voltage:	DC 3.3V
Power Adapter:	/
Note: The test data is gathered from a production sample, provided by the manufacturer.	

Technical Characteristics of EUT	
Bluetooth Version:	V5.0 (BLE mode)
Frequency Range:	2402-2480MHz
RF Output Power:	1Mbps: 3.20dBm (Conducted) 2Mbps: 3.52dBm (Conducted)
Data Rate:	1Mbps, 2Mbps
Modulation:	GFSK
Quantity of Channels:	40
Channel Separation:	2MHz
Type of Antenna:	PCB Antenna
Antenna Gain:	-0.58dBi
Note The Antenna Gain is provided by the customer and can affect the validity of results.	

1.2 Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz.
558074 D01 15.247 Meas Guidance v05r02: Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating under section 15.247 of the Fcc rules.
ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02.
The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted accordingly in reference to the Operating Instructions.

1.4 Test Facility

Address of the test laboratory
Laboratory: Waltek Testing Group (Shenzhen) Co., Ltd.
Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road, Block 70 Bao'an District, Shenzhen, Guangdong, China

FCC – Registration No.: 125990
Waltek Testing Group (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is mai ntained in our files. The Designation Number is CN5010, and Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A
The 3m Semi-anechoic chamber of Waltek Testing Group (Shenzhen) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A and the CAB identifier is CN0057.

1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, with a duty cycle equal to 100%, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	Low	2402MHz
TM2	Middle	2440MHz
TM3	High	2480MHz

Test Conditions	
Temperature:	22~25 °C
Relative Humidity:	45~75 %
ATM Pressure:	1019 mbar

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Notebook	Lenovo	100-14IBD	PF0F4ABV

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	0.57dB
Occupied Bandwidth	Conducted	0.015MHz
Power Spectral Density	Conducted	1.8dB
Conducted Spurious Emission	Conducted	2.17dB
Conducted Emissions	Conducted	9-150kHz, 3.74dB
		0.15-30MHz, 3.34dB
Transmitter Spurious Emissions	Radiated	30-200MHz, 4.52dB
		0.2-1GHz 5.56dB
		1-6GHz, 3.84dB
		6-18GHz, 3.92dB

1.7 Test Equipment List and Details

Fixed asset Number	Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
WTXE1041A 1001	Communication Tester	Rohde & Schwarz	CMW500	148650	2025-02-23	2026-02-22
WTXE1005A 1005	Spectrum Analyzer	Agilent	N9020A	US47140102	2025-02-23	2026-02-22
WTXE1084A 1001	Spectrum Analyzer	Agilent	N9020A	MY54320548	2025-02-23	2026-02-22
WTXE1004A 1-001	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2025-02-23	2026-02-22
WTXE1103A 1003	Attenuator	Pasternack	PE4007-4	/	2025-02-23	2026-02-22
WTXE1003A 1-005	Coaxial Cable	/	0M4RFC	/	2025-02-23	2026-02-22
☐ Chamber A: Below 1GHz						
WTXE1005A 1003	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2025-02-23	2026-02-22
WTXE1001A 1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2025-02-23	2026-02-22
WTXE1007A 1001	Amplifier	HP	8447F	2805A03475	2025-02-23	2026-02-22
WTXE1010A 1007	Loop Antenna	Schwarz beck	FMZB 1516	9773	2024-02-26	2026-02-25
WTXE1010A 1006	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2025-02-23	2026-02-22
WTXE1104A 1032-1	Coaxial Cable	/	RC_6G-N-M	/	2025-02-23	2026-02-22
WTXE1104A 1032-2	Coaxial Cable	/	RC_6G-N-M	/	2025-02-23	2026-02-22
WTXE1104A 1032-3	Coaxial Cable	/	RC_6G-N-M	/	2025-02-23	2026-02-22
☐ Chamber A: Above 1GHz						
WTXE1005A 1003	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2025-02-23	2026-02-22
WTXE1001A 1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2025-02-23	2026-02-22
WTXE1065A 1001	Amplifier	C&D	PAP-1G18	2002	2025-02-23	2026-02-22
WTXE1010A 1005	Horn Antenna	ETS	3117	00086197	2025-02-23	2026-02-22

WTXE1010A 1010	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2024-03-17	2026-03-16
WTXE1003A 1001	Pre-amplifier	Schwarzbeck	BBV 9721	9721-031	2025-02-23	2026-02-22
WTXE1104A 1033-1	Coaxial Cable	/	C16-07-07	/	2025-02-23	2026-02-22
WTXE1104A 1033-2	Coaxial Cable	/	C16-07-07	/	2025-02-23	2026-02-22
WTXE1104A 1033-3	Coaxial Cable	/	C16-07-07	/	2025-02-23	2026-02-22
☐ Chamber B:Below 1GHz						
WTXE1010A 1006	Trilog Broadband Antenna	Schwarz beck	VULB9163(B)	9163-635	2024-03-17	2027-03-16
WTXE1038A 1001	Amplifier	Agilent	8447D	2944A104 57	2025-02-23	2026-02-22
WTXE1001A 1002	EMI Test Receiver	Rohde & Schwarz	ESPI	101391	2025-02-23	2026-02-22
WTXE1104A 1031-1	Coaxial Cable	/	1.5MRFC-LWB3	/	2025-02-23	2026-02-22
WTXE1104A 1031-2	Coaxial Cable	/	RG 316	/	2025-02-23	2026-02-22
WTXE1104A 1031-3	Coaxial Cable	/	RG 316	/	2025-02-23	2026-02-22
☒ Chamber C:Below 1GHz						
WTXE1093A 1001	EMI Test Receiver	Rohde & Schwarz	ESIB 26	100401	2025-02-23	2026-02-22
WTXE1010A 1013-1	Trilog Broadband Antenna	Schwarz beck	VULB 9168	1194	2024-04-18	2027-04-17
WTXE1010A 1007	Loop Antenna	Schwarz beck	FMZB 1516	9773	2024-02-26	2026-02-25
WTXE1007A 1002	Amplifier	HP	8447F	2944A038 69	2025-02-23	2026-02-22
WTXE1104A 1034-1	Coaxial Cable	/	RC_6G-N-M	/	2025-02-23	2026-02-22
WTXE1104A 1034-2	Coaxial Cable	/	RC_6G-N-M	/	2025-02-23	2026-02-22
WTXE1104A 1034-3	Coaxial Cable	/	RC_6G-N-M	/	2025-02-23	2026-02-22
☒ Chamber C: Above 1GHz						
WTXE1093A	EMI Test	Rohde &	ESIB 26	100401	2025-02-23	2026-02-22

1001	Receiver	Schwarz				
WTXE1103A 1005	Horn Antenna	POAM	RTF-118A	1820	2023-03-10	2026-03-09
WTXE1103A 1006	Amplifier	Tonscend	TAP01018050	AP22E806 235	2025-02-23	2026-02-22
WTXE1010A 1010	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2024-03-17	2026-03-16
WTXE1003A 1001	Pre-amplifier	Schwarzbeck	BBV 9721	9721-031	2025-02-23	2026-02-22
WTXE1104A 1035-1	Coaxial Cable	/	RC-18G-N-M	/	2025-02-23	2026-02-22
WTXE1104A 1035-2	Coaxial Cable	/	RC-18G-N-M	/	2025-02-23	2026-02-22
WTXE1104A 1035-3	Coaxial Cable	/	RC-18G-N-M	/	2025-02-23	2026-02-22
☐ Conducted Room 1#						
WTXE1104A 1029	EMI Test Receiver	Rohde & Schwarz	ESCI	100525	2024-12-08	2025-12-07
WTXE1002A 1001	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2025-02-23	2026-02-22
WTXE1003A 1001	AC LISN	Schwarz beck	NSLK8126	8126-279	2025-02-23	2026-02-22
WTXE1104A 1036	Coaxial Cable	/	RG 316	/	2025-02-23	2026-02-22
WTXE1104A 1038	Coaxial Cable	/	6MRFC-DP	/	2025-02-23	2026-02-22
☒ Conducted Room 2#						
WTXE1001A 1004	EMI Test Receiver	Rohde & Schwarz	ESPI	101259	2025-02-23	2026-02-22
WTXE1003A 1003	LISN	Rohde & Schwarz	ENV 216	100097	2025-02-23	2026-02-22
WTXE1104A 1037	Coaxial Cable	/	RG 316	/	2025-02-23	2026-02-22

Software List			
Description	**Manufacturer**	**Model**	**Version**
EMI Test Software (Radiated Emission A)	Farad	EZ-EMC	RA-03A1 (1.1.4.2)
EMI Test Software (Radiated Emission B)	Farad	EZ-EMC	RA-03A1 (1.1.4.2)
EMI Test Software (Radiated Emission C)	Farad	EZ-EMC	RA-03A1-2 (1.1.4.2)
EMI Test Software (Conducted Emission Room 1#)	Farad	EZ-EMC	3A1*CE-RE 1.1.4.3
EMI Test Software (Conducted Emission Room 2#)	Farad	EZ-EMC	3A1*CE-RE 1.1.4.3

*Remark: indicates software version used in the compliance certification testing.

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§15.203; §15.247(b)(4)(i)	Antenna Requirement	Compliant
§15.205	Restricted Band of Operation	Compliant
§15.207(a)	Conducted Emission	Compliant
§15.247(e)	Power Spectral Density	Compliant
§15.247(a)(2)	DTS Bandwidth	Compliant
§15.247(b)(3)	RF Output Power	Compliant
§15.209(a)	Radiated Emission	Compliant
§15.247(d)	Band Edge (Out of Band Emissions)	Compliant

N/A: Not applicable.

3. Antenna Requirement

3.1 Standard Applicable

According to FCC Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

3.2 Evaluation Information

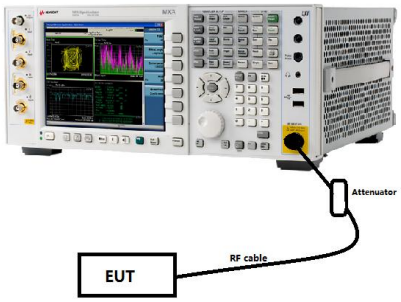
This product has a PCB antenna, fulfill the requirement of this section.

4. Power Spectral Density

4.1 Standard Applicable

According to 15.247(a)(1)(iii), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

4.2 Test Setup Block Diagram



4.3 Test Procedure

According to the KDB 558074 D01 v05r02 Subclause 8.4 and ANSI C63.10-2013 Subclause 11.10.2, the test method of power spectral density as below:

a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3kHz ≤ RBW ≤ 100kHz.
d) Set the VBW ≥ 3 × RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3kHz) and repeat.

4.4 Summary of Test Results/Plots

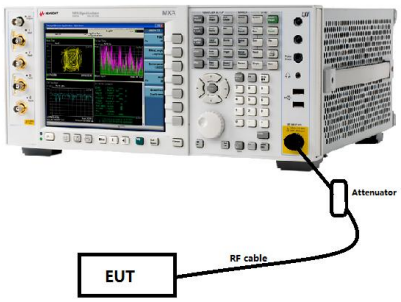
Please refer to Appendix A

5. DTS Bandwidth

5.1 Standard Applicable

According to 15.247(a)(2), systems using digital modulation techniques may operate in the 902–928MHz, 2400–2483.5MHz, and 5725–5850 MHz bands. The minimum 6dB bandwidth shall be at least 500kHz.

5.2 Test Setup Block Diagram



5.3 Test Procedure

According to the KDB 558074 D01 v05r02 Subclause 8.2 and ANSI C63.10-2013 Subclause 11.8.1, the test method of DTS Bandwidth as below:

a) Set RBW = 100kHz.
b) Set the video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6dB relative to the maximum level measured in the fundamental emission.

5.4 Summary of Test Results/Plots

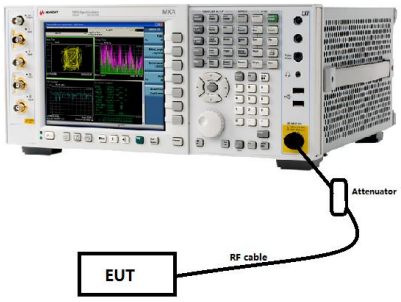
Please refer to Appendix B

6. RF Output Power

6.1 Standard Applicable

According to 15.247(b)(3), for systems using digital modulation in the 902–928MHz, 2400–2483.5MHz, and 5725–5850MHz bands: 1 Watt.

6.2 Test Setup Block Diagram



6.3 Test Procedure

According to the KDB-558074 D01 v05r02 Subclause 8.3.1.1 and ANSI C63.10-2013 Subclause 11.9.1.1, this procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

a) Set the RBW ≥ DTS bandwidth.
b) Set VBW ≥ 3 × RBW.
c) Set span ≥ 3 x RBW
d) Sweep time = auto couple.
e) Detector = peak.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use peak marker function to determine the peak amplitude level.

6.4 Summary of Test Results/Plots

Please refer to Appendix C

7. Field Strength of Spurious Emissions

7.1 Standard Applicable

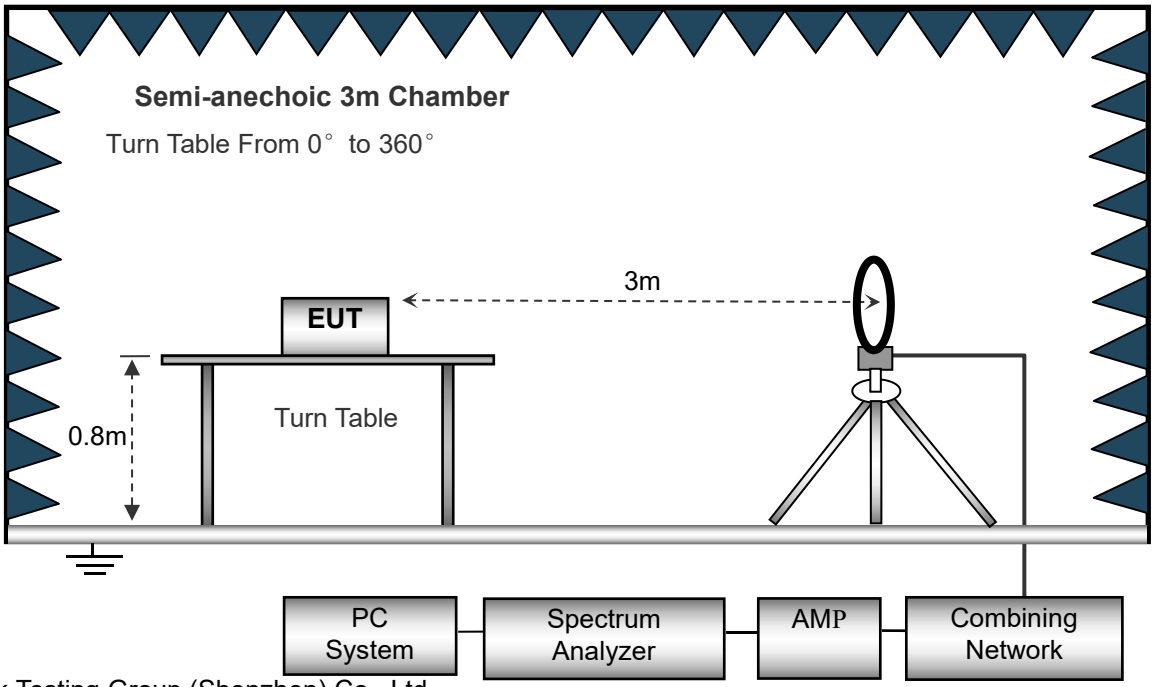
According to §15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30dB instead of 20dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

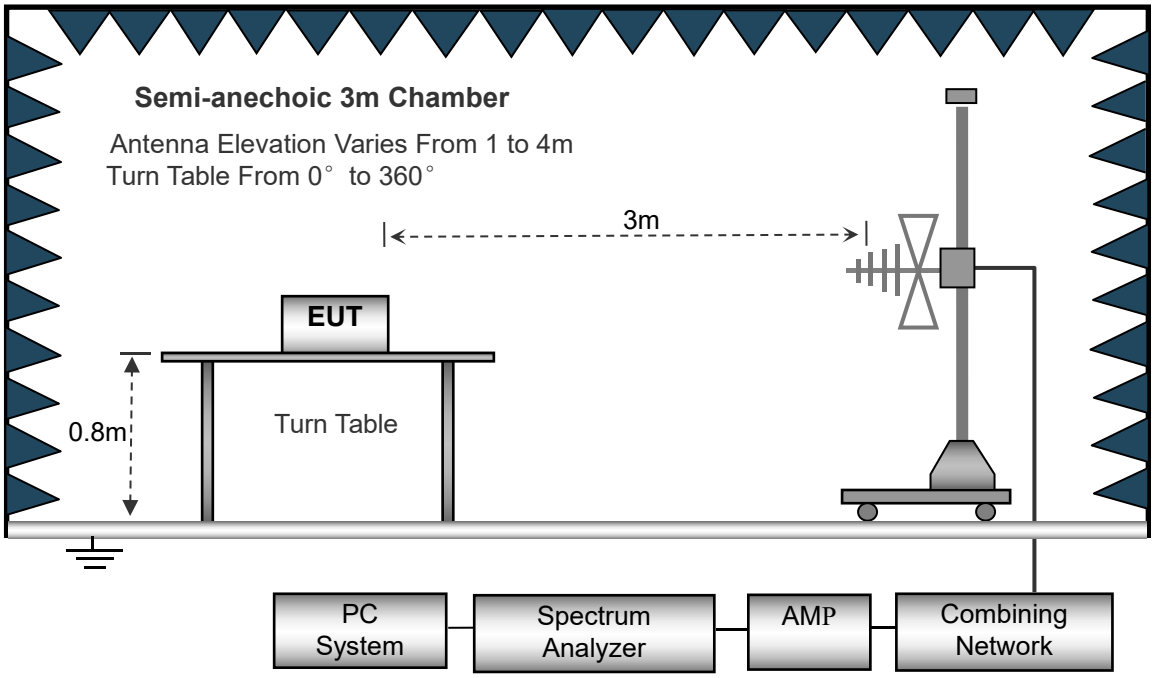
7.2 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.247(a) and FCC Part 15.209 Limit.
The external I/O cables were draped along the test table and formed a bundle 30 to 40cm long in the middle. The spacing between the peripherals was 10cm.

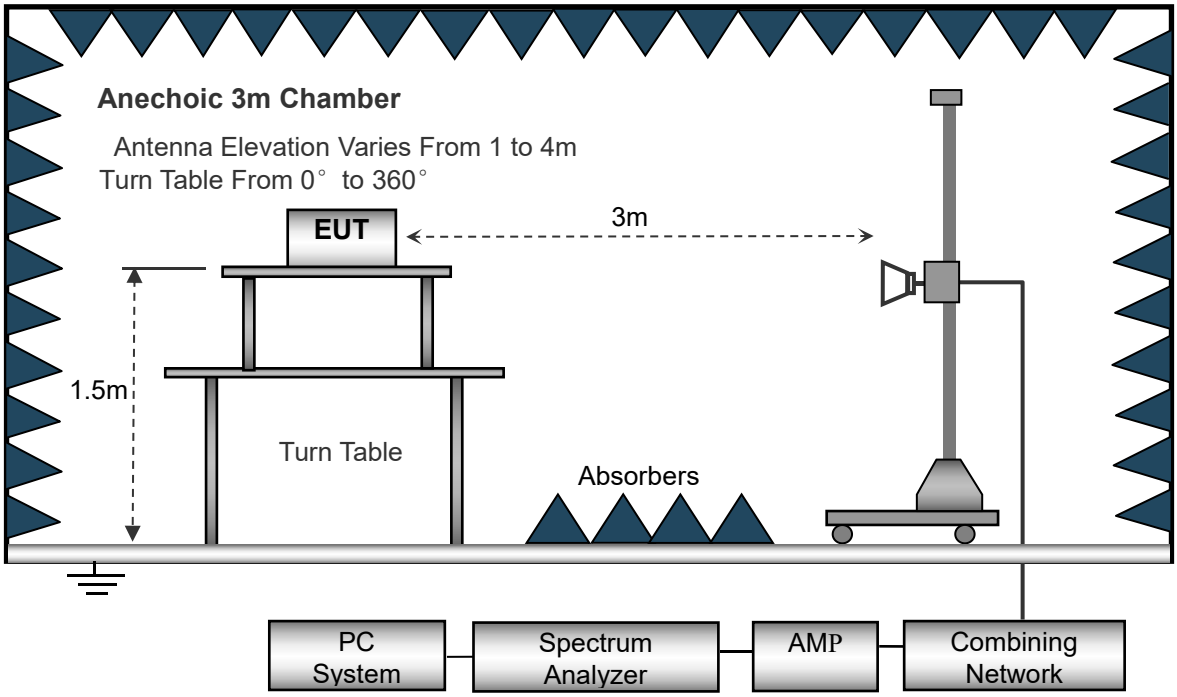
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30MHz to 1GHz.



The test setup for emission measurement above 1GHz.



Frequency :9kHz-30MHz	Frequency :30MHz-1GHz	Frequency :Above 1GHz
RBW=10kHz,	RBW=120kHz,	RBW=1MHz,
VBW =30kHz	VBW=300kHz	VBW=3MHz(Peak), 10Hz(AV)
Sweep time= Auto	Sweep time= Auto	Sweep time= Auto
Trace = max hold	Trace = max hold	Trace = max hold

Detector function = peak Detector function = peak, QP Detector function = peak, AV

7.3 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Ant. Factor + Cable Loss – Ampl. Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit. The equation for margin calculation is as follows:

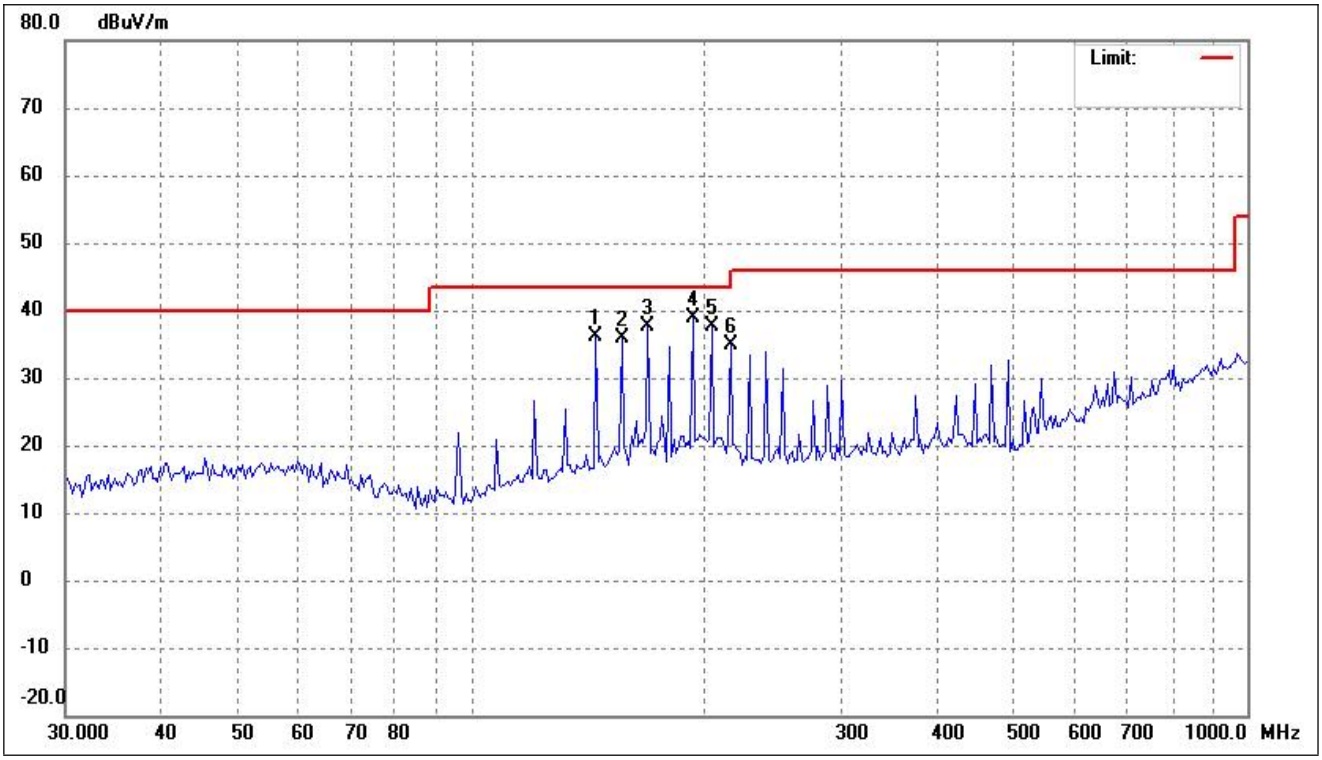
Margin = Corr. Ampl. – FCC Part 15 Limit

7.4 Summary of Test Results/Plots

Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

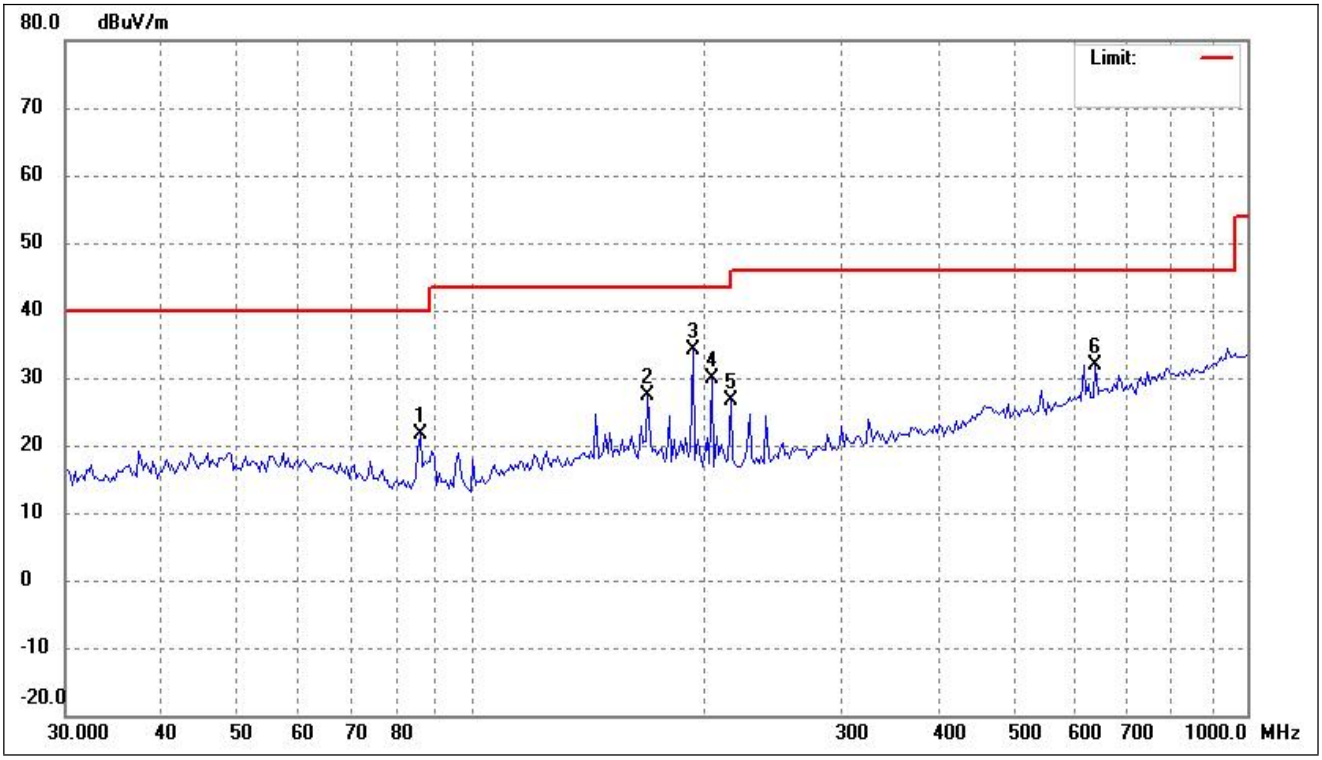
- Spurious Emissions Below 1GHz
- BLE 1Mbps

Test Channel	Low(worst case)	Polarity:	Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	144.7899	45.25	-9.14	36.11	43.50	-7.39	-	-	peak
2	156.4259	44.54	-8.58	35.96	43.50	-7.54	-	-	peak
3	168.9970	46.49	-8.80	37.69	43.50	-5.81	-	-	peak
4	193.1366	50.21	-11.40	38.81	43.50	-4.69	-	-	peak
5	204.3052	49.31	-11.68	37.63	43.50	-5.87	-	-	peak
6	216.1197	46.64	-11.66	34.98	46.00	-11.02	-	-	peak

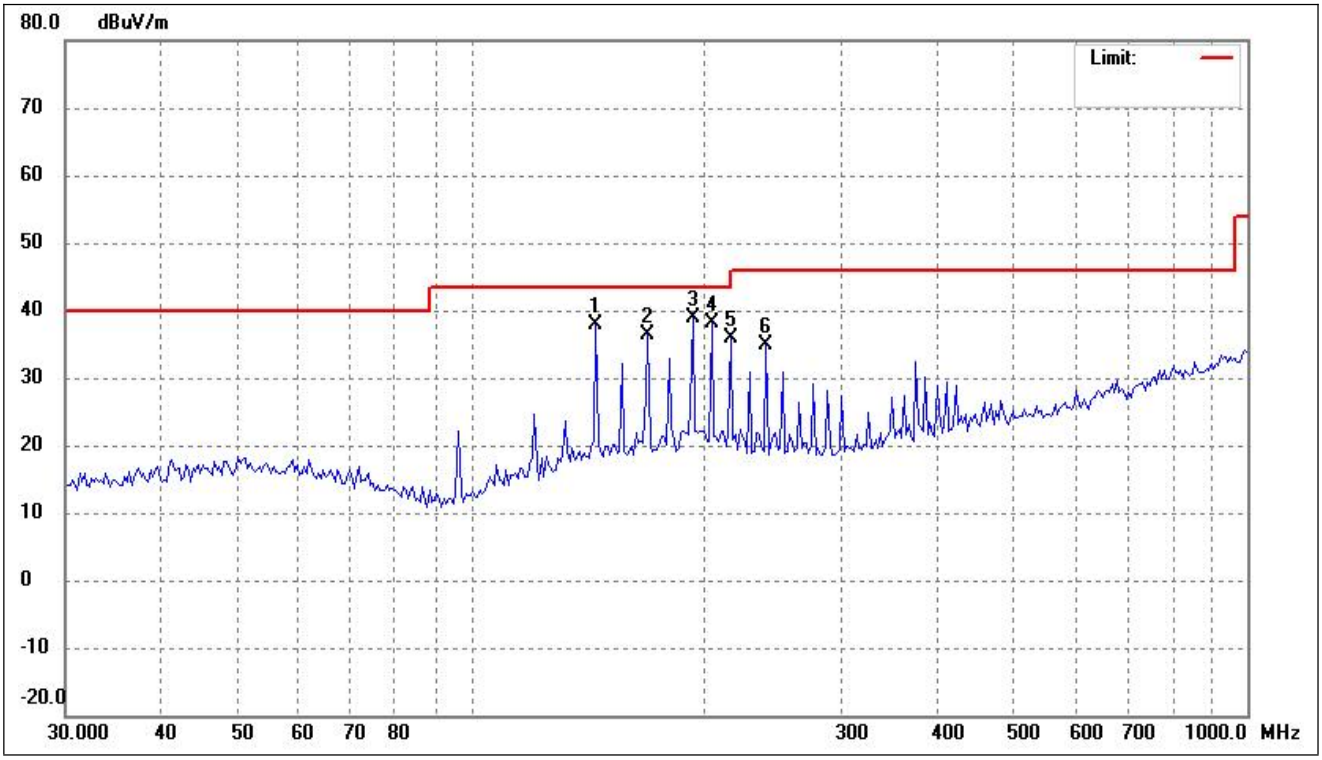
Test Channel	Low(worst case)	Polarity:	Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	86.0796	35.82	-14.07	21.75	40.00	-18.25	-	-	peak
2	168.9970	36.14	-8.80	27.34	43.50	-16.16	-	-	peak
3	193.1366	45.42	-11.40	34.02	43.50	-9.48	-	-	peak
4	204.3052	41.56	-11.68	29.88	43.50	-13.62	-	-	peak
5	216.1197	38.37	-11.66	26.71	46.00	-19.29	-	-	peak
6	637.7947	33.71	-1.74	31.97	46.00	-14.03	-	-	peak

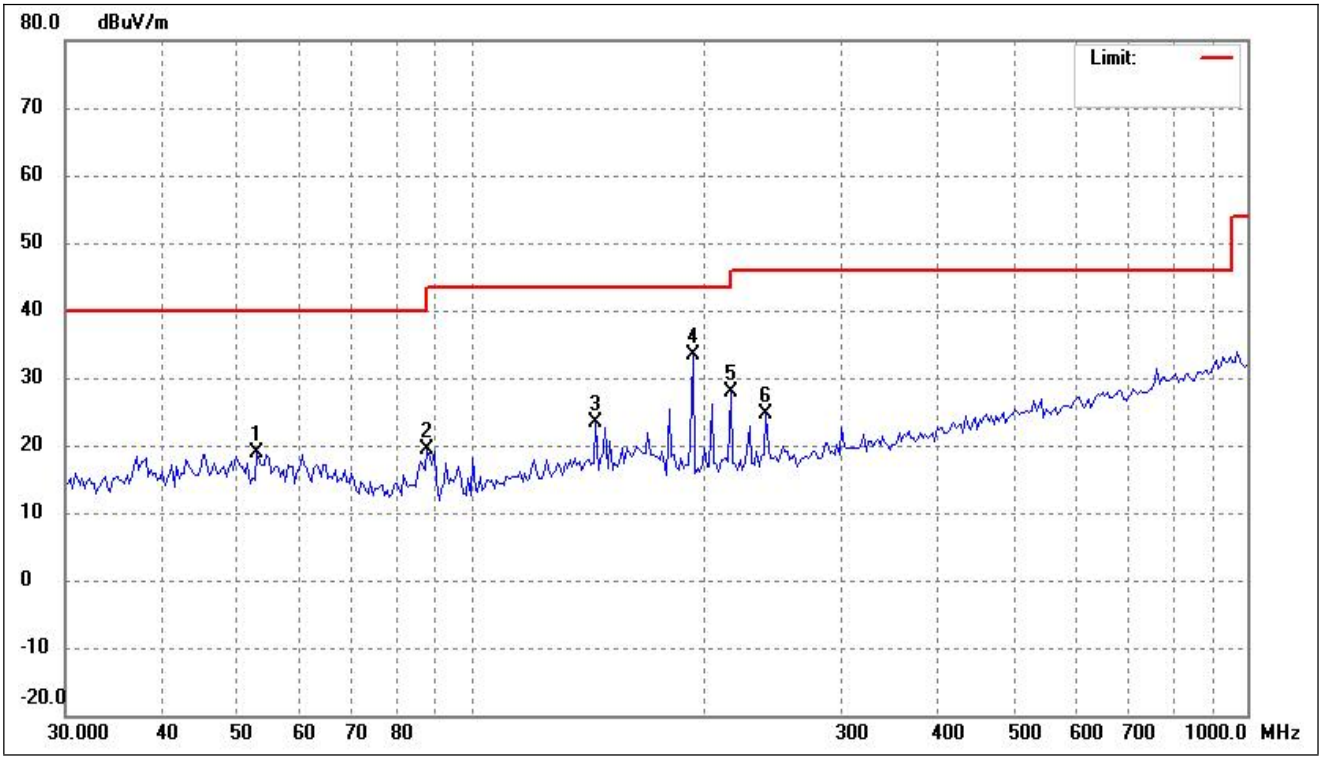
➢ BLE 2Mbps

Test Channel	Low(worst case)	Polarity:	Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	144.7899	47.01	-9.14	37.87	43.50	-5.63	-	-	peak
2	168.9970	45.24	-8.80	36.44	43.50	-7.06	-	-	peak
3	193.1366	50.18	-11.40	38.78	43.50	-4.72	-	-	peak
4	204.3052	49.83	-11.68	38.15	43.50	-5.35	-	-	peak
5	216.1197	47.63	-11.66	35.97	46.00	-10.03	-	-	peak
6	240.1442	44.97	-9.98	34.99	46.00	-11.01	-	-	peak

Test Channel	Low(worst case)	Polarity:	Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	53.0056	27.82	-9.06	18.76	40.00	-21.24	-	-	peak
2	87.9136	33.75	-14.28	19.47	40.00	-20.53	-	-	peak
3	144.7899	32.60	-9.14	23.46	43.50	-20.04	-	-	peak
4	193.1366	44.82	-11.40	33.42	43.50	-10.08	-	-	peak
5	216.1197	39.50	-11.66	27.84	46.00	-18.16	-	-	peak
6	240.1442	34.56	-9.98	24.58	46.00	-21.42	-	-	peak

Remark: '-'Means' the test Degree and Height are not recorded by the test software and only show the worst case in the test report.

➢ Spurious Emissions Above 1GHz

BLE 1Mbps

Frequency (MHz)	Reading (dBuV/m)	Correct dB	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar H/V	Detector
Low Channel-2402MHz							
4795.868	60.36	-13.23	47.13	74.00	-26.87	H	PK
7206.000	55.00	-6.85	48.15	74.00	-25.85	H	PK
4795.868	58.06	-13.23	44.83	74.00	-29.17	V	PK
7206.000	53.98	-6.85	47.13	74.00	-26.87	V	PK
Middle Channel-2440MHz							
4870.395	62.83	-13.15	49.68	74.00	-24.32	H	PK
7320.000	54.25	-7.18	47.07	74.00	-26.93	H	PK
4870.396	59.08	-13.15	45.93	74.00	-28.07	V	PK
7320.000	53.59	-7.18	46.41	74.00	-27.59	V	PK
High Channel-2480MHz							
4946.082	63.86	-13.06	50.80	74.00	-23.20	H	PK
7440.000	54.15	-7.52	46.63	74.00	-27.37	H	PK
4960.000	57.58	-13.03	44.55	74.00	-29.45	V	PK
7440.000	54.40	-7.52	46.88	74.00	-27.12	V	PK

BLE 2Mbps

Frequency (MHz)	Reading (dBuV/m)	Correct dB	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar H/V	Detector
Low Channel-2402MHz							
4795.868	59.50	-13.23	46.27	74.00	-27.73	H	PK
7206.000	54.01	-6.85	47.16	74.00	-26.84	H	PK
4795.868	59.42	-13.23	46.19	74.00	-27.81	V	PK
7198.184	56.50	-6.82	49.68	74.00	-24.32	V	PK
Middle Channel-2440MHz							
4870.396	58.93	-13.15	45.78	74.00	-28.22	H	PK
7320.000	54.15	-7.18	46.97	74.00	-27.03	H	PK
4870.395	58.79	-13.15	45.64	74.00	-28.36	V	PK
7320.000	54.04	-7.18	46.86	74.00	-27.14	V	PK
High Channel-2480MHz							
4960.000	57.47	-13.03	44.44	74.00	-29.56	H	PK
7440.000	54.14	-7.52	46.62	74.00	-27.38	H	PK
4920.723	57.14	-13.09	44.05	74.00	-29.95	V	PK
7440.000	53.67	-7.52	46.15	74.00	-27.85	V	PK

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

8. Out of Band Emissions

8.1 Standard Applicable

According to §15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30dB instead of 20dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

8.2 Test Procedure

According to the KDB 558074 D01 v05r02 Subclause 8.4 and ANSI C63.10-2013 Subclause 11.11, the Emissions in nonrestricted frequency bands test method as follows:

a) Set the center frequency and span to encompass frequency range to be measured.
b) Set the RBW = 100kHz.
c) Set the VBW ≥ [3 × RBW].
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the peak marker function to determine the maximum amplitude level.

According to the KDB 558074 D01 v05r02 Subclause 8.5 and ANSI C63.10-2013 Subclause 11.12, the Emissions in restricted frequency bands test method as follows:

A. Radiated emission measurements:
Set span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation (2310MHz to 2420MHz for low bandedge, 2460MHz to 2500MHz for the high bandedge)
RBW = 1MHz, VBW = 1MHz for peak value measured
RBW = 1MHz, VBW = 10Hz for average value measured
Sweep = auto; Detector function = peak/average; Trace = max hold
All the trace to stabilize, set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. Those emission

must comply with the 15.209 limit for fall in the restricted bands listed in section 15.205. Note that the method of measurement KDB publication number: 913591 may be used for the radiated bandedge measurements.

B. Antenna-port conducted measurements

Peak emission levels are measured by setting the instrument as follows:

a) RBW = as specified in Table 9.

b) VBW ≥ [3 × RBW].

c) Detector = peak.

d) Sweep time = auto.

e) Trace mode = max hold.

f) Allow sweeps to continue until the trace stabilizes. (Note that the required measurement time may be lengthened for low-duty-cycle applications.)

RBW as a function of frequency

Frequency	RBW
9kHz to 150kHz	200Hz to 300Hz
0.15MHz to 30MHz	9kHz to 10kHz
30MHz to 1000MHz	100kHz to 120kHz
>1000MHz	1MHz

If the peak-detected amplitude can be shown to comply with the average limit, then it is not necessary to perform a separate average measurement.

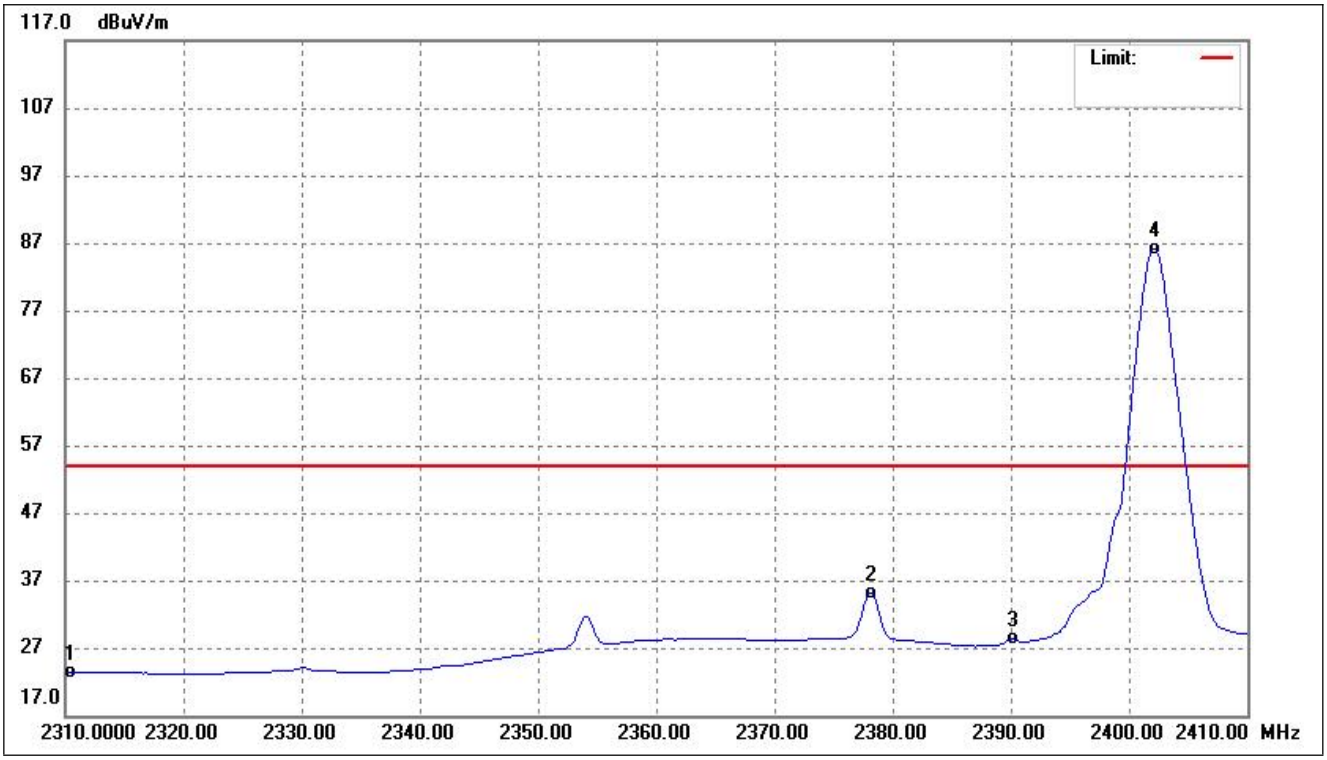
Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in section 8.1. Report the three highest emissions relative to the limit.

8.3 Summary of Test Results/Plots

➢ Radiated test

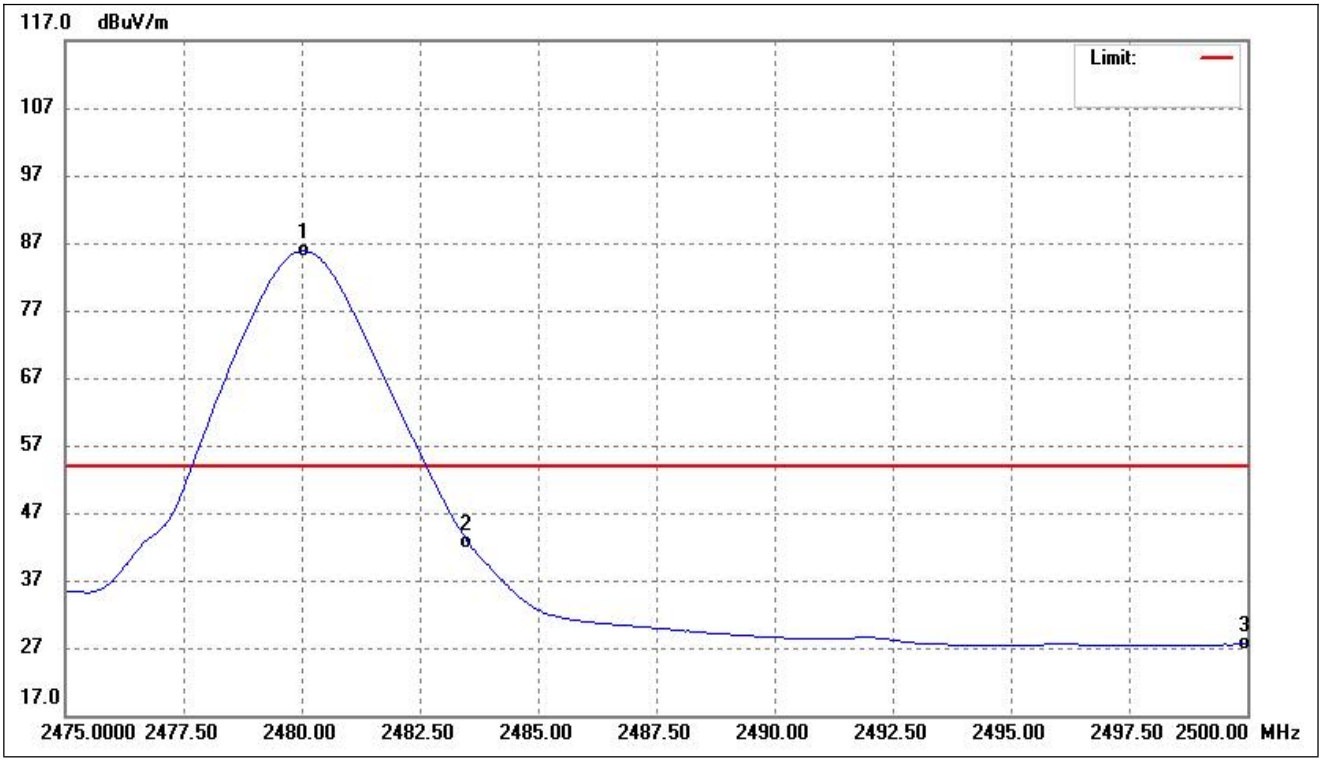
BLE 1Mbps

Test Channel	Low	Polarity:	Horizontal(worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	42.90	-19.50	23.40	54.00	-30.60	Average Detector
	2310.000	55.63	-19.50	36.13	74.00	-37.87	Peak Detector
2	2378.136	54.54	-19.34	35.20	54.00	-18.80	Average Detector
3	2390.000	47.59	-19.31	28.28	54.00	-25.72	Average Detector
	2390.000	61.73	-19.31	42.42	74.00	-31.58	Peak Detector
4	2402.184	105.41	-19.29	86.12	/	/	Average Detector
	2401.784	116.13	-19.29	96.84	/	/	Peak Detector

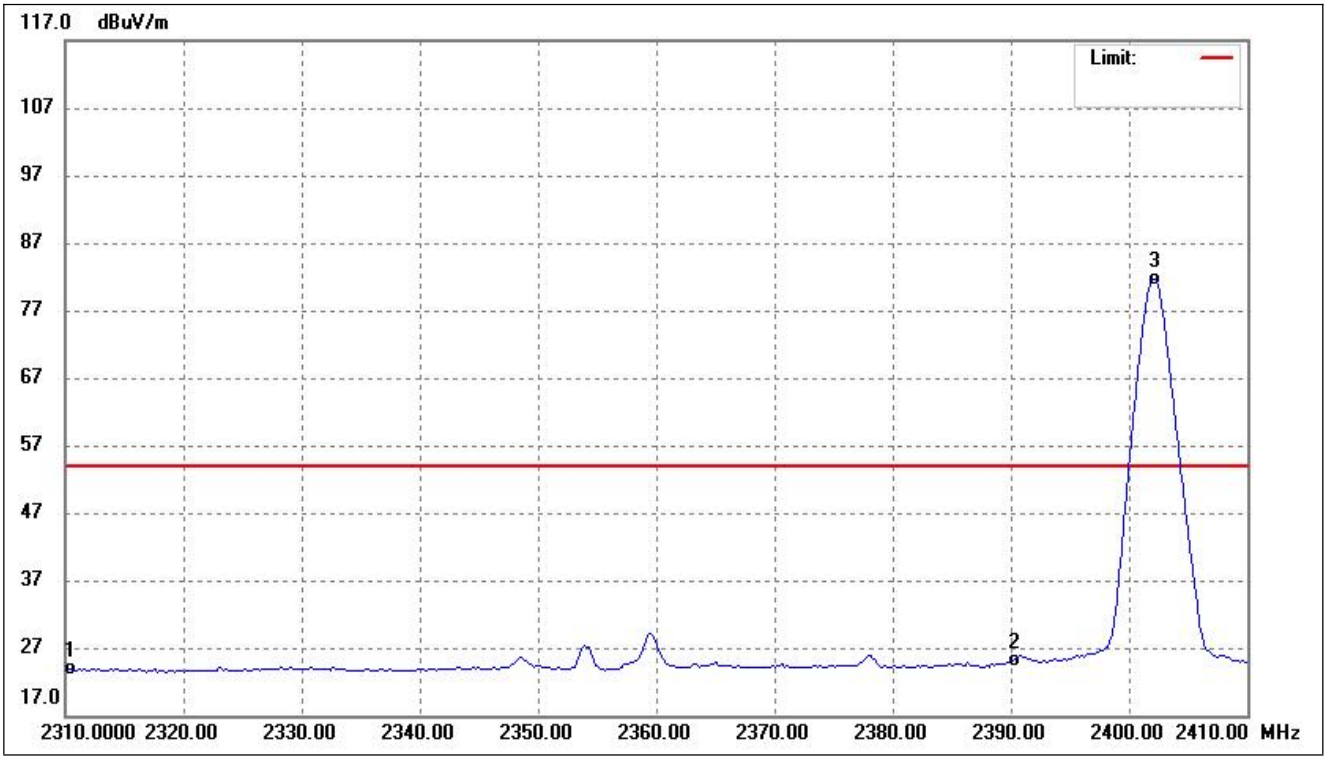
Test Channel	High	Polarity:	Horizontal(worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2480.060	104.93	-19.09	85.84	/	/	Average Detector
	2479.709	115.63	-19.09	96.54	/	/	Peak Detector
2	2483.500	61.84	-19.09	42.75	54.00	-11.25	Average Detector
	2483.500	74.71	-19.09	55.62	74.00	-18.38	Peak Detector
3	2500.000	46.62	-19.05	27.57	54.00	-26.43	Average Detector
	2500.000	61.17	-19.05	42.12	74.00	-31.88	Peak Detector

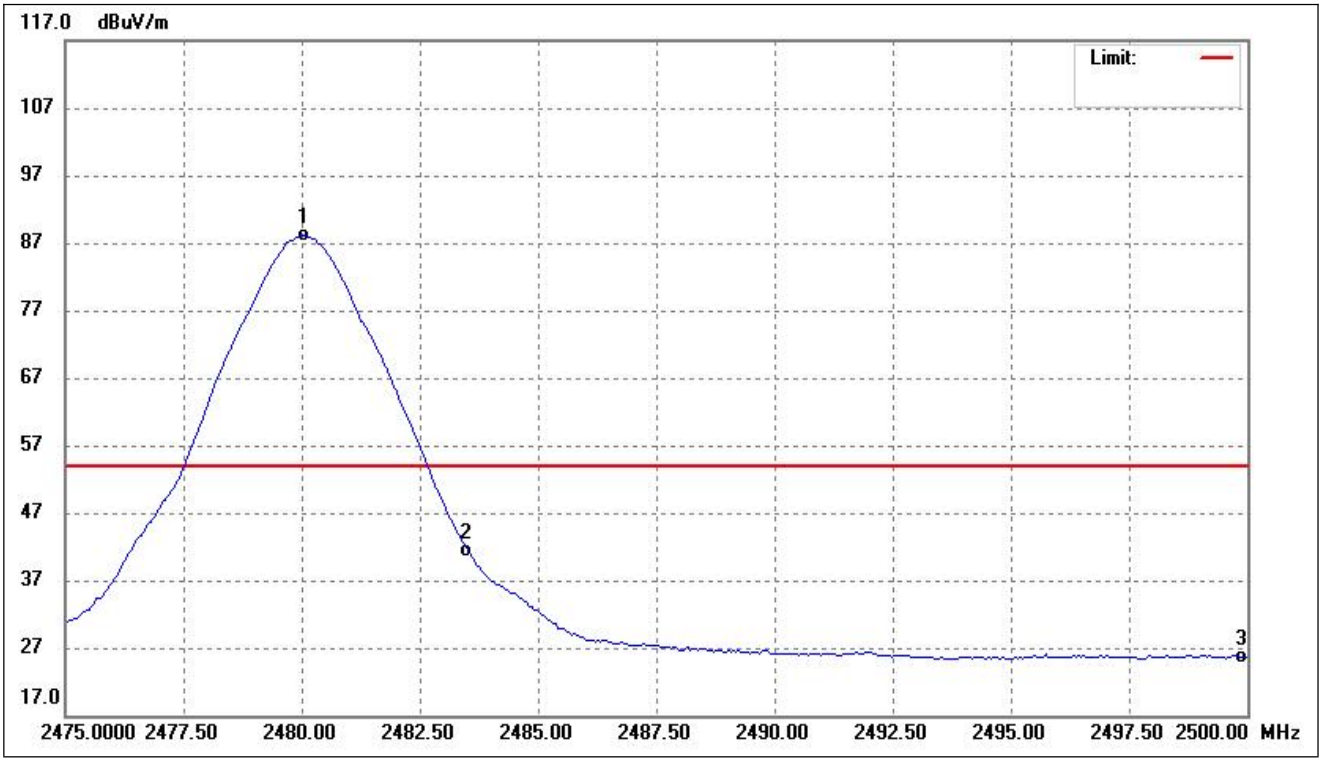
BLE 2Mbps

Test Channel	Low	Polarity:	Horizontal(worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	43.34	-19.50	23.84	54.00	-30.16	Average Detector
	2310.000	59.45	-19.50	39.95	74.00	-34.05	Peak Detector
2	2390.000	44.49	-19.31	25.18	54.00	-28.82	Average Detector
	2390.000	74.20	-19.31	54.89	74.00	-19.11	Peak Detector
3	2402.184	100.94	-19.29	81.65	/	/	Average Detector
	2401.583	108.61	-19.29	89.32	/	/	Peak Detector

Test Channel	High	Polarity:	Horizontal(worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2480.060	107.14	-19.09	88.05	/	/	Average Detector
	2479.459	109.21	-19.10	90.11	/	/	Peak Detector
2	2483.500	60.48	-19.09	41.39	54.00	-12.61	Average Detector
	2483.500	70.26	-19.09	51.17	74.00	-22.83	Peak Detector
3	2500.000	44.72	-19.05	25.67	54.00	-28.33	Average Detector
	2500.000	57.54	-19.05	38.49	74.00	-35.51	Peak Detector

- Conducted test

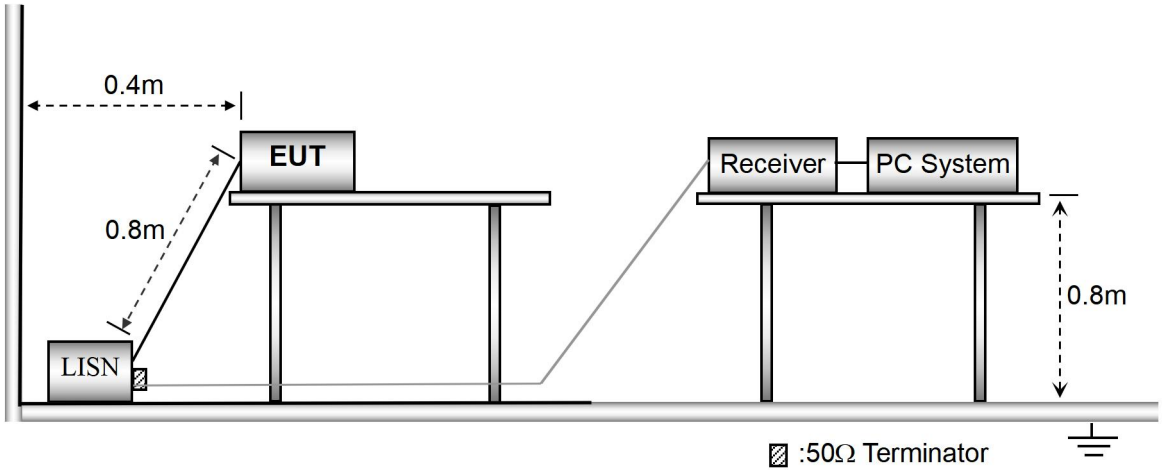
Please refer to Appendix D

9. Conducted Emissions

9.1 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 Limit.
The external I/O cables were draped along the test table and formed a bundle 30 to 40cm long in the middle. The spacing between the peripherals was 10cm.

9.2 Basic Test Setup Block Diagram



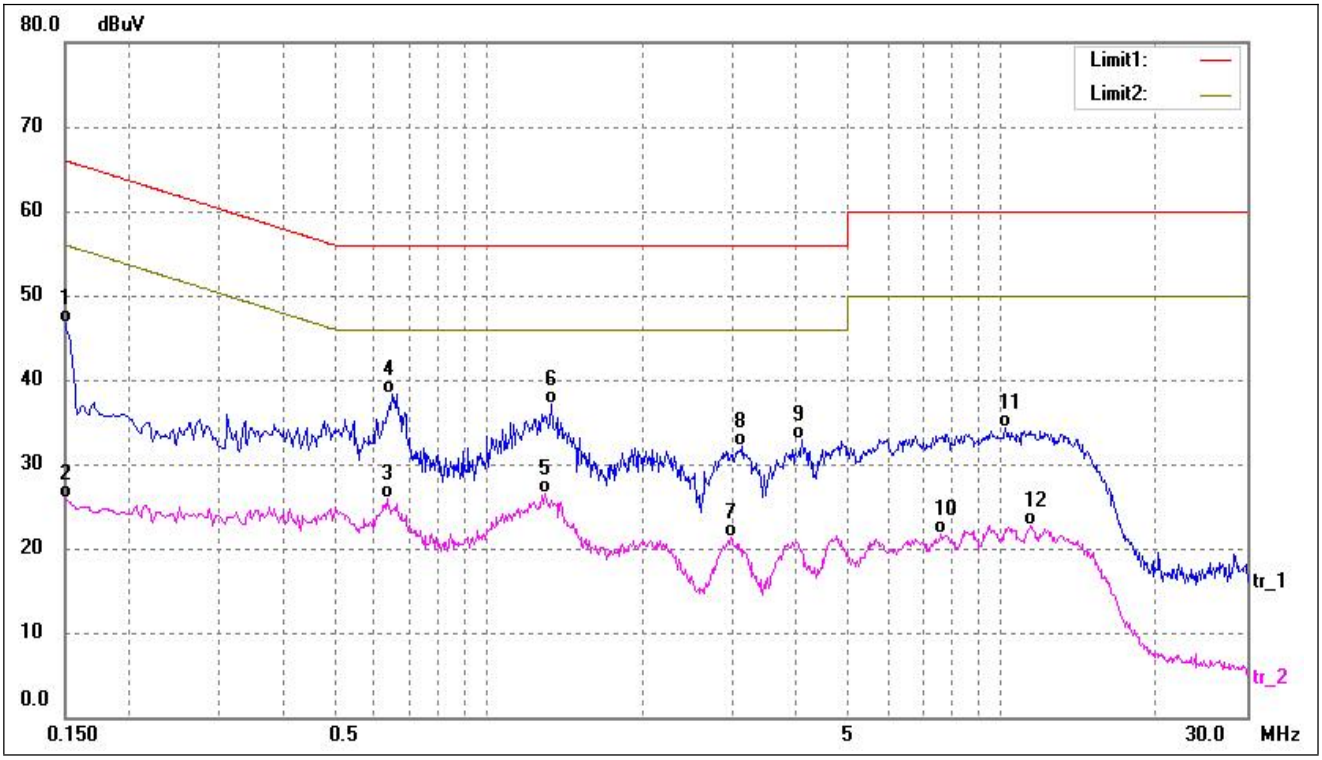
9.3 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

Start Frequency..... 150kHz
Stop Frequency..... 30MHz
Sweep Speed.....Auto
IF Bandwidth..... 10kHz
Quasi-Peak Adapter Bandwidth.....9kHz
Quasi-Peak Adapter Mode.....Normal

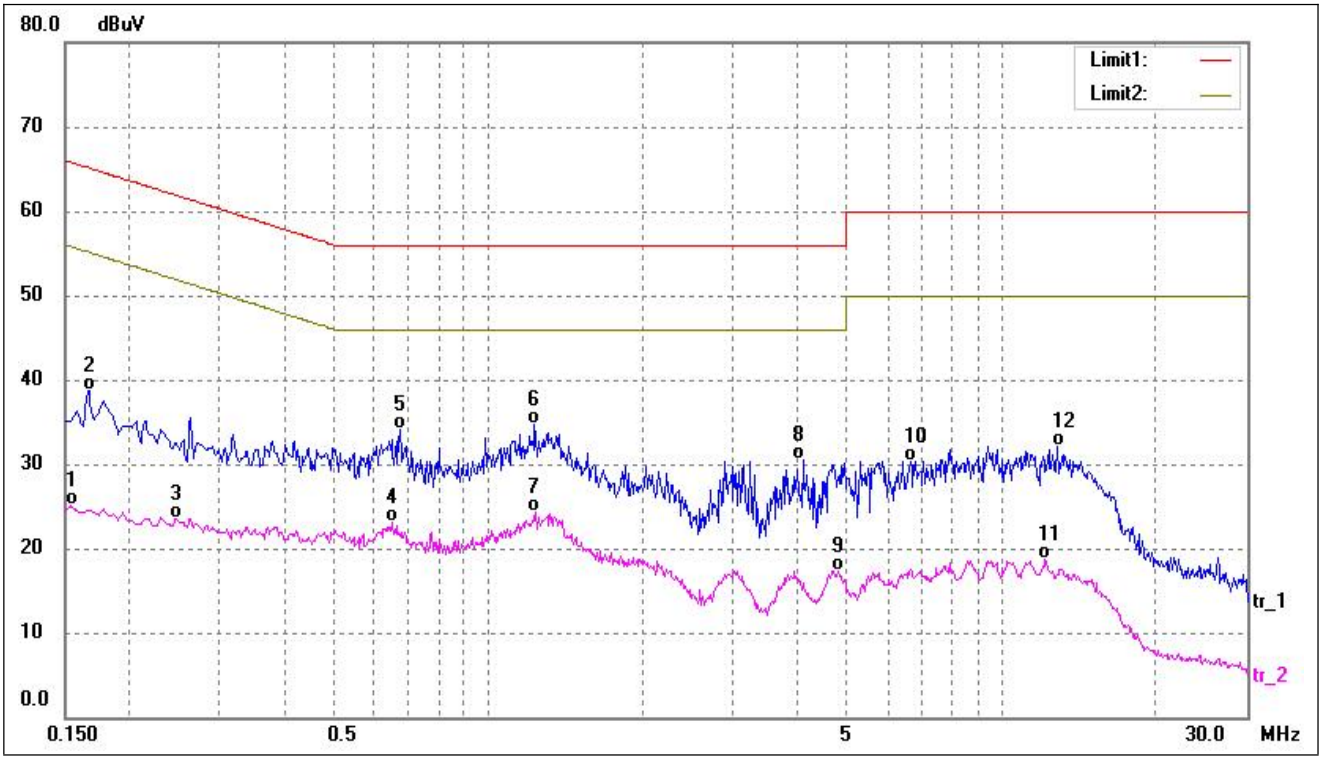
9.4 Summary of Test Results/Plots

Test Mode	Communication	AC120V 60Hz	Polarity:	Line



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)	
1	0.1500	37.01	9.76	46.77	65.99	-19.22	QP
2	0.1500	16.14	9.76	25.90	55.99	-30.09	AVG
3	0.6340	16.16	9.70	25.86	46.00	-20.14	AVG
4*	0.6500	28.59	9.70	38.29	56.00	-17.71	QP
5	1.2940	16.77	9.66	26.43	46.00	-19.57	AVG
6	1.3300	27.49	9.65	37.14	56.00	-18.86	QP
7	2.9620	11.74	9.62	21.36	46.00	-24.64	AVG
8	3.1340	22.54	9.62	32.16	56.00	-23.84	QP
9	4.0900	23.24	9.67	32.91	56.00	-23.09	QP
10	7.6340	11.84	9.80	21.64	50.00	-28.36	AVG
11	10.1580	24.45	9.87	34.32	60.00	-25.68	QP
12	11.4020	12.74	9.89	22.63	50.00	-27.37	AVG

Test Mode	Communication	AC120V 60Hz	Polarity:	Neutral



No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)	
1	0.1539	15.29	9.75	25.04	55.78	-30.74	AVG
2	0.1660	29.07	9.70	38.77	65.15	-26.38	QP
3	0.2460	13.95	9.60	23.55	51.89	-28.34	AVG
4	0.6500	13.43	9.70	23.13	46.00	-22.87	AVG
5	0.6740	24.36	9.70	34.06	56.00	-21.94	QP
6*	1.2300	24.97	9.66	34.63	56.00	-21.37	QP
7	1.2380	14.66	9.66	24.32	46.00	-21.68	AVG
8	4.0939	20.88	9.67	30.55	56.00	-25.45	QP
9	4.8060	7.59	9.70	17.29	46.00	-28.71	AVG
10	6.6340	20.58	9.78	30.36	60.00	-29.64	QP
11	12.1300	8.71	9.90	18.61	50.00	-31.39	AVG
12	12.7860	22.17	9.91	32.08	60.00	-27.92	QP

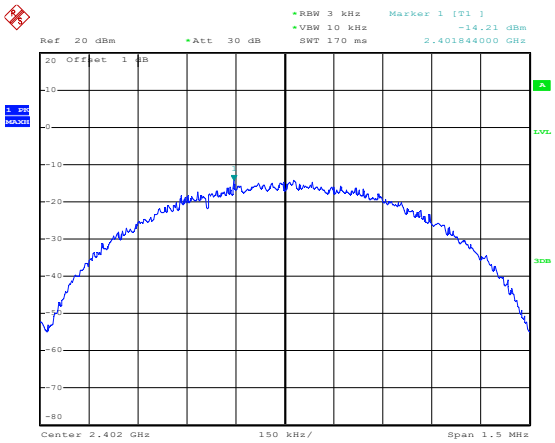
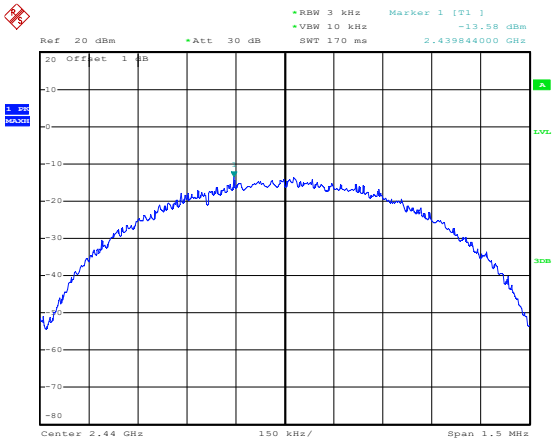
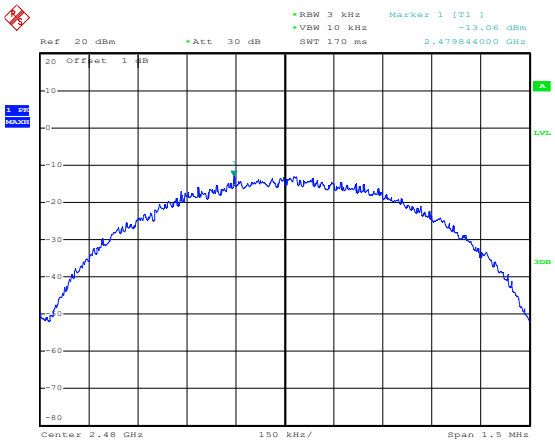
APPENDIX SUMMARY

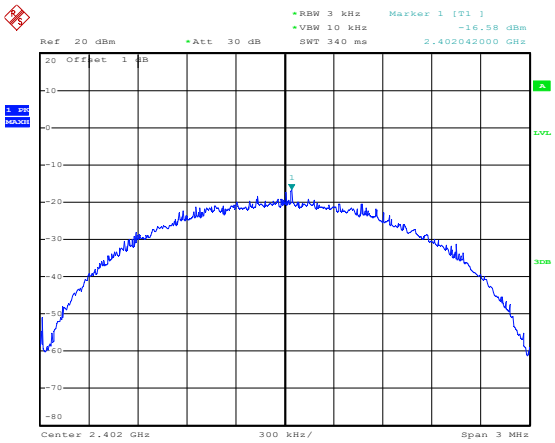
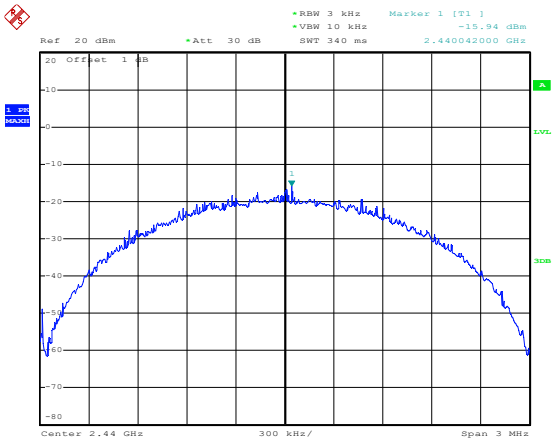
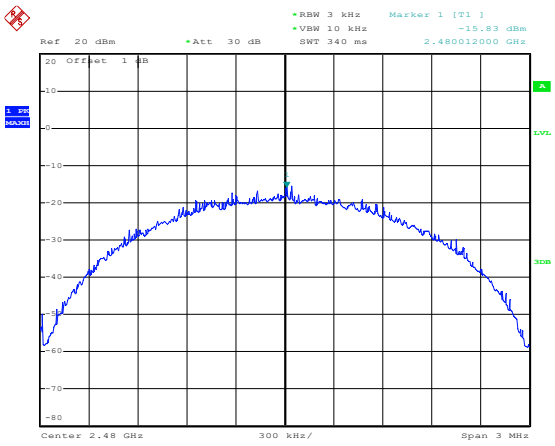
Project No.	WTX25X05117815W	Test Engineer	Timi Huang
Start date	2025/5/19	Finish date	2025/5/23
Temperature	22.2℃	Humidity	65%
RF specifications	BT-BLE		

APPENDIX	Description of Test Item	Result
A	Power Spectral Density	Compliant
B	DTS Bandwidth	Compliant
C	RF Output Power	Compliant
D	Conducted Out of Band Emissions	Compliant

APPENDIX A

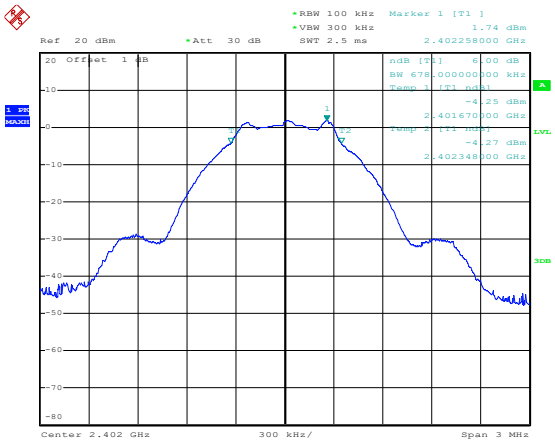
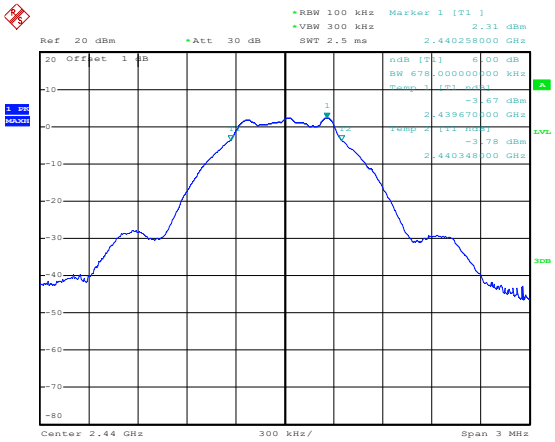
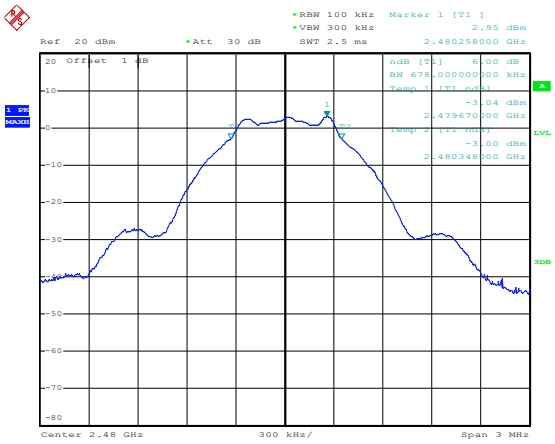
Power Spectral Density			
Test Mode	Test Channel	Power Spectral Density dBm/3kHz	Limit dBm/3kHz
BLE-GFSK-1Mbps	Low	-14.21	8
	Middle	-13.58	8
	High	-13.06	8
BLE-GFSK-2Mbps	Low	-16.58	8
	Middle	-15.94	8
	High	-15.83	8

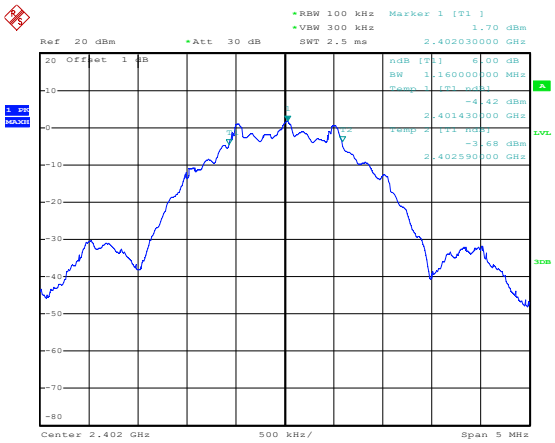
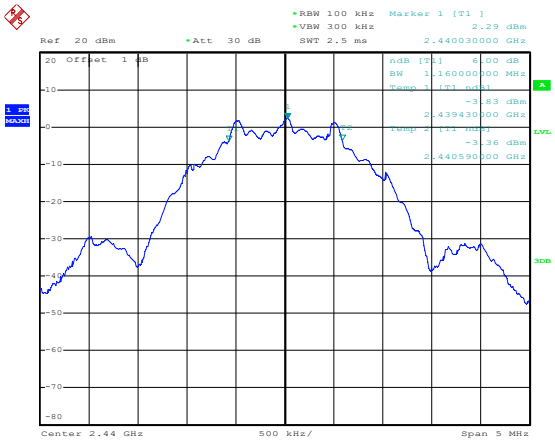
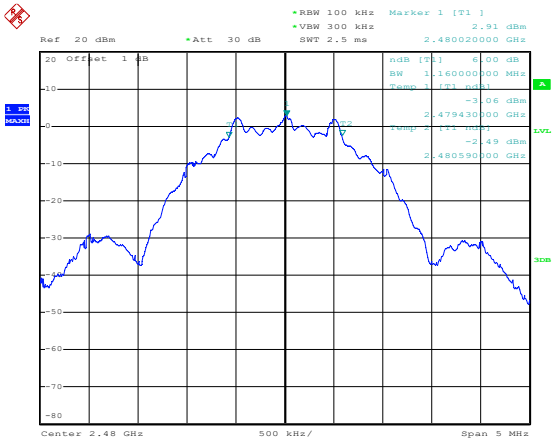
Low-1Mbps	 Date: 19.MAY.2025 14:44:05
Middle-1Mbps	 Date: 19.MAY.2025 14:42:53
High-1Mbps	 Date: 19.MAY.2025 14:42:12

Low-2Mbps	
Middle-2Mbps	
High-2Mbps	

APPENDIX B

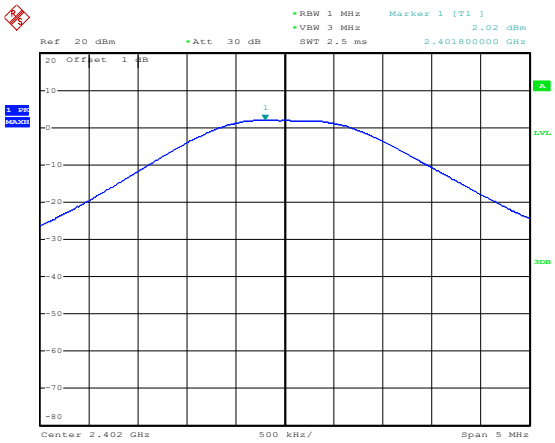
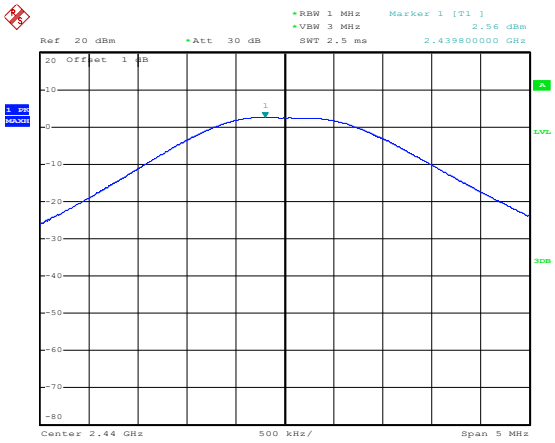
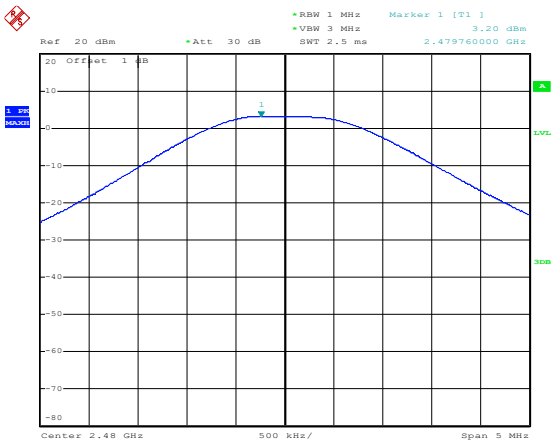
Test Mode	Test Channel	6 dB Bandwidth kHz	Limit kHz
BLE-GFSK-1Mbps	Low	678	≥500
	Middle	678	≥500
	High	678	≥500
BLE-GFSK-2Mbps	Low	1160	≥500
	Middle	1160	≥500
	High	1160	≥500

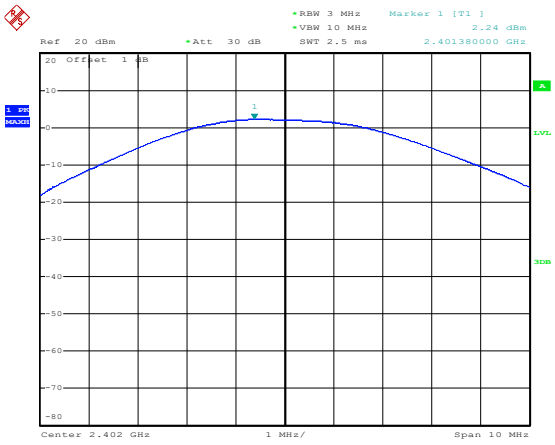
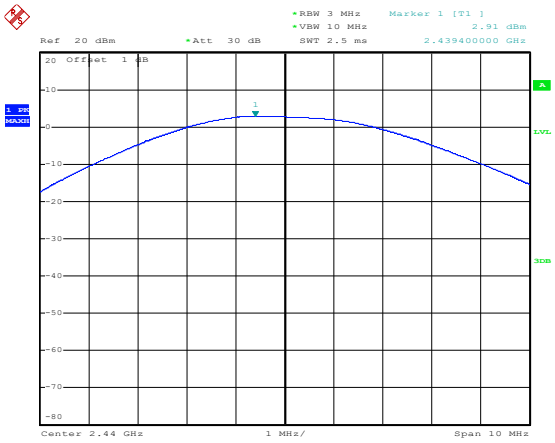
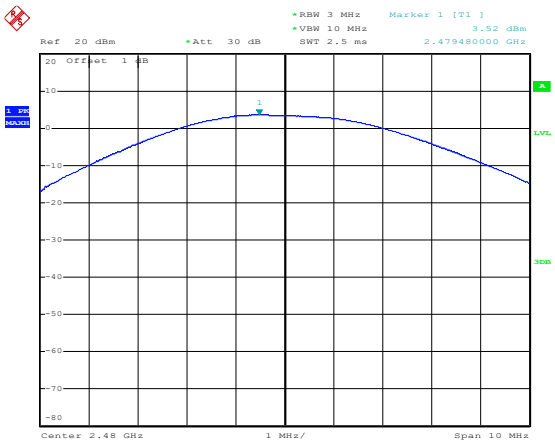
Low-1Mbps	 Date: 19.MAY.2025 14:44:46
Middle-1Mbps	 Date: 19.MAY.2025 14:47:18
High-1Mbps	 Date: 19.MAY.2025 14:55:22

Low-2Mbps	
Middle-2Mbps	
High-2Mbps	

APPENDIX C

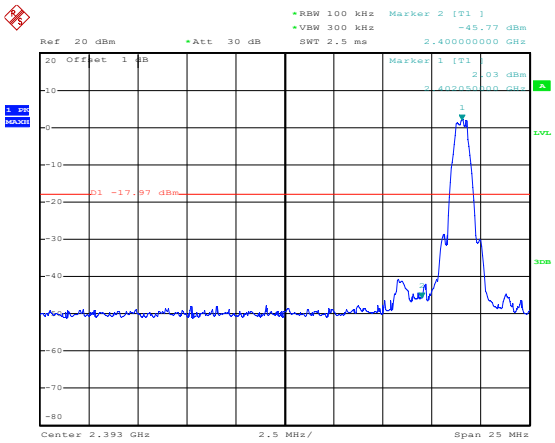
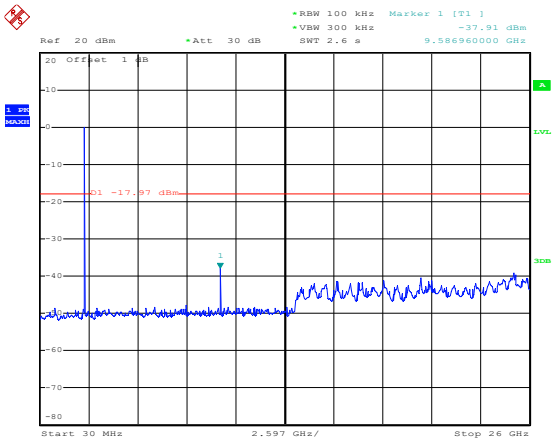
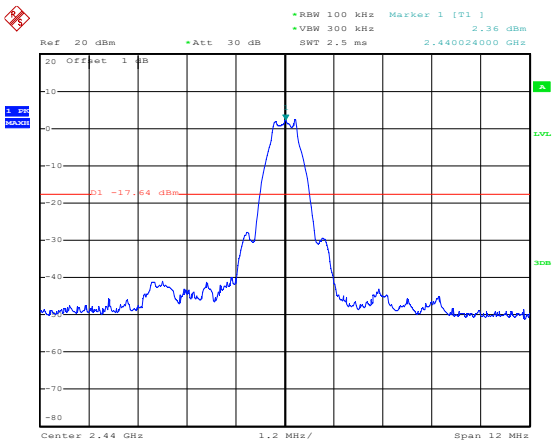
RF Output Power			
Test Mode	Test Channel	Reading dBm	Limit dBm
BLE-GFSK-1Mbps	Low	2.02	30.00
	Middle	2.56	30.00
	High	3.20	30.00
BLE-GFSK-2Mbps	Low	2.24	30.00
	Middle	2.91	30.00
	High	3.52	30.00

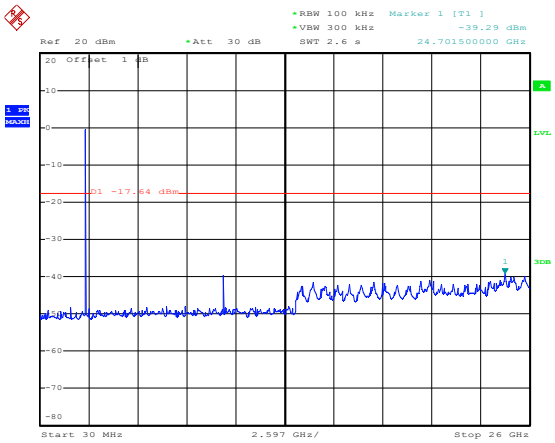
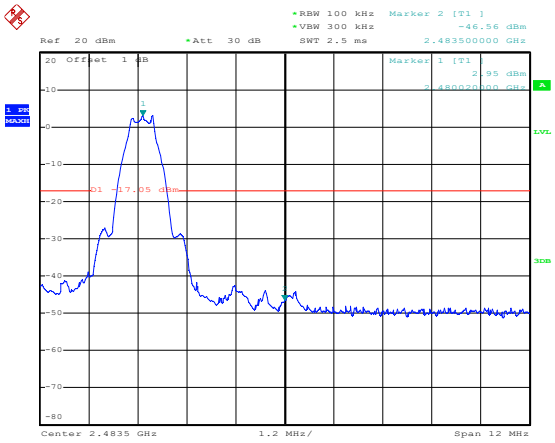
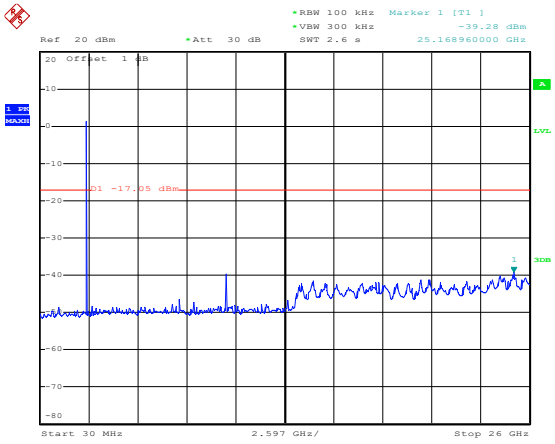
Low-1Mbps	 Date: 19.MAY.2025 14:40:34
Middle-1Mbps	 Date: 19.MAY.2025 14:40:53
High-1Mbps	 Date: 19.MAY.2025 14:41:09

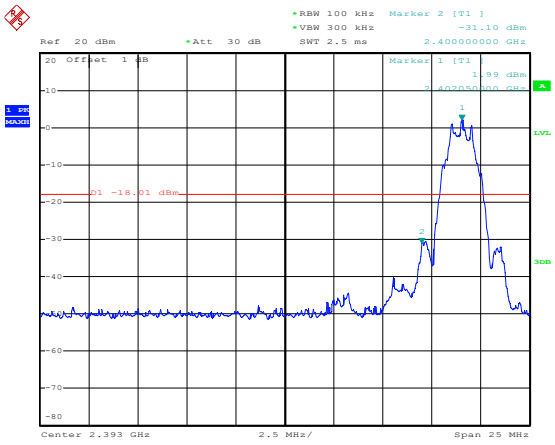
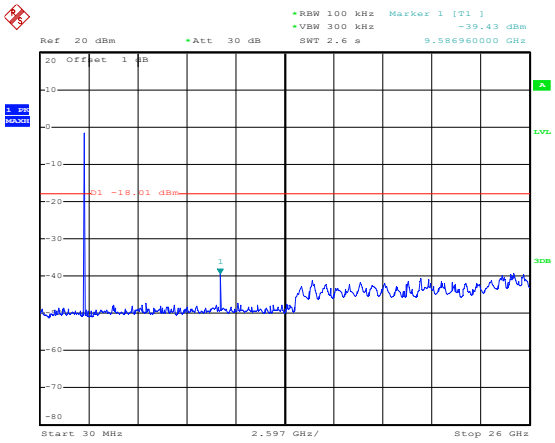
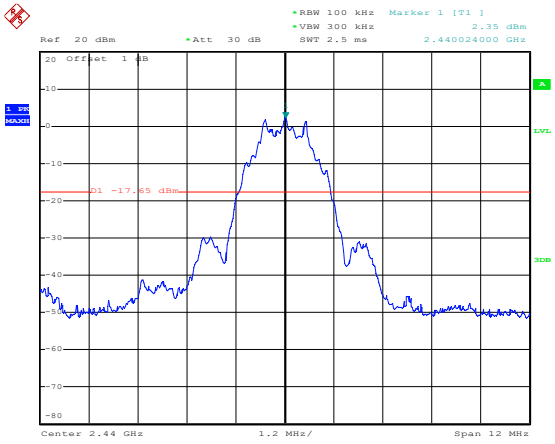
Low-2Mbps	 Date: 23.MAY.2025 09:13:25
Middle-2Mbps	 Date: 23.MAY.2025 09:13:39
High-2Mbps	 Date: 23.MAY.2025 09:13:52

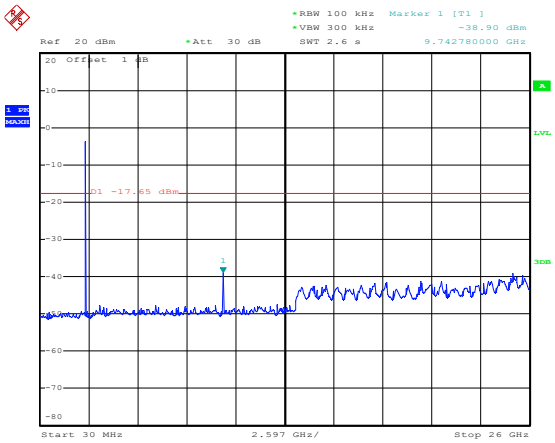
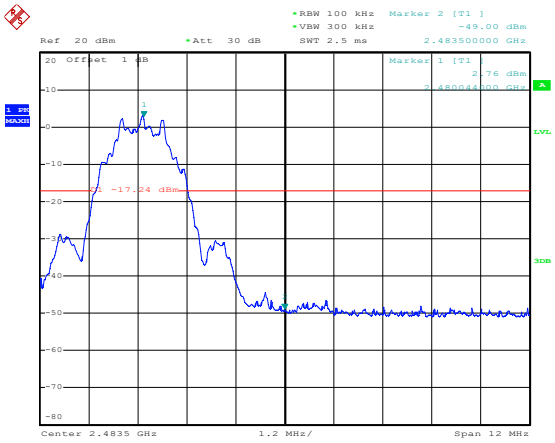
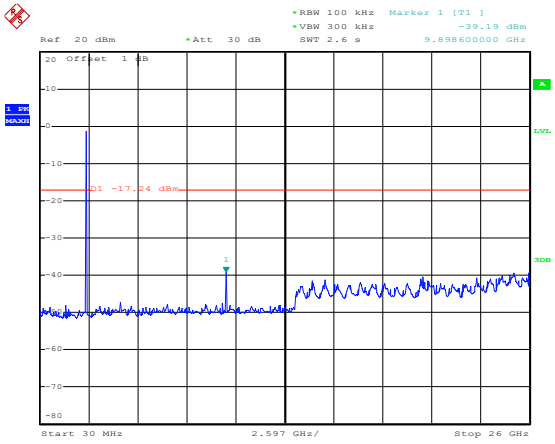
APPENDIX D

Conducted Out of Band Emissions

Low-1Mbps	 Date: 19.MAY.2025 15:02:01
	 Date: 19.MAY.2025 15:02:42
Middle-1Mbps	 Date: 19.MAY.2025 15:00:17

	 Date: 19.MAY.2025 15:00:41
High-1Mbps	 Date: 19.MAY.2025 14:58:03
	 Date: 19.MAY.2025 14:59:17

Low-2Mbps	 Date: 23.MAY.2025 09:19:15
	 Date: 23.MAY.2025 09:19:50
Middle-2Mbps	 Date: 23.MAY.2025 09:18:04

	 Date: 23.MAY.2025 09:18:23
High-2Mbps	 Date: 23.MAY.2025 09:17:07
	 Date: 23.MAY.2025 09:17:26

APPENDIX PHOTOGRAPHS

Please refer to “ANNEX”

******* END OF REPORT *******