FCC Measurement/Technical Report on

Multimedia Equipment with WLAN and Bluetooth

BCI3L4PTN1(Star 3.5 / Star 3.0)

FCC ID: 2AUXS- BCI3L4PTN1
IC: 25847-BCI3L4PTN1

Test Report Reference: MDE_BOSCH_2411_FCC_05_rev01

Test Laboratory:
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Borsigstrasse 11
40880 Ratingen
Germany

Deutsche Akkreditierungsstelle D-PL-12140-01-00

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1 APPLIED STANDARDS AND TEST SUMMARY

1.1 APPLIED STANDARDS

Type of Authorization
Certification for an Intentional Radiator.

Applicable FCC Rules

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 Parts 2 and 15 (10-1-23 Edition). The following subparts are applicable to the results in this test report.

Part 2, Subpart J - Equipment Authorization Procedures, Certification

Part 15, Subpart C – Intentional Radiators

§ 15.201 Equipment authorization requirement

§ 15.207 Conducted limits (only in case of direct or indirect connection to AC main)

§ 15.209 Radiated emission limits; general requirements

§ 15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz

Note:
The tests were selected and performed with reference to the FCC Public Notice "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, 558074 D01 15.247 Meas Guidance v05r02, 2019-04-02".
ANSI C63.10–2013 is applied.

1.2 FCC-IC CORRELATION TABLE

Correlation of measurement requirements for FHSS (e.g. Bluetooth®) equipment from FCC and IC

FHSS equipment

Measurement	FCC reference	IC reference
Conducted emissions on AC Mains	§ 15.207	RSS-Gen Issue 5 & AMD 1 & AMD 2: 8.8
Occupied bandwidth	§ 15.247 (a) (1)	RSS-247 Issue 3: 5.1 (b)
Peak conducted output power	§ 15.247 (b) (1), (4)	RSS-247 Issue 3: 5.4 (b)
Transmitter spurious RF conducted emissions	§ 15.247 (d)	RSS-Gen Issue 5 & AMD 1 & AMD 2: 6.13/8.9/8.10; RSS-247 Issue 3: 5.5
Transmitter spurious radiated emissions	§ 15.247 (d); § 15.209 (a)	RSS-Gen Issue 5 & AMD 1 & AMD 2: 6.13 / 8.9/8.10; RSS-247 Issue 3: 5.5
Band edge compliance	§ 15.247 (d)	RSS-247 Issue 3: 5.5
Dwell time	§ 15.247 (a) (1) (iii)	RSS-247 Issue 3: 5.1 (d)
Channel separation	§ 15.247 (a) (1)	RSS-247 Issue 3: 5.1 (b)
No. of hopping frequencies	§ 15.247 (a) (1) (iii)	RSS-247 Issue 3: 5.1 (d)
Hybrid systems (only)	§ 15.247 (f); § 15.247 (e)	RSS-247 Issue 3: 5.3
Antenna requirement	§ 15.203 / 15.204	RSS-Gen Issue 5 & AMD 1 & AMD 2: 8.3
Receiver spurious emissions	–	-

1.3 MEASUREMENT SUMMARY

47 CFR CHAPTER I FCC PART 15 Subpart C §15.247 **§ 15.247 (a) (1)**

Occupied Bandwidth (20 dB)

The measurement was performed according to ANSI C63.10, chapter 6.9.2 **Final Result**

OP-Mode Chip, Radio Technology, Operating Frequency, Measurement method	Setup	Date	FCC	IC
Chip01, Bluetooth BR, high, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth BR, low, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth BR, mid, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth EDR 2, high, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth EDR 2, low, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth EDR 2, mid, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth EDR 3, high, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth EDR 3, low, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth EDR 3, mid, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth BR, high, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth BR, low, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth BR, mid, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth EDR 2, high, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth EDR 2, low, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth EDR 2, mid, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth EDR 3, high, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth EDR 3, low, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth EDR 3, mid, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed

47 CFR CHAPTER I FCC PART 15 Subpart C §15.247 **IC RSS-Gen; Ch. 6.7 & Ch. 8**

Occupied Bandwidth (99%)

The measurement was performed according to ANSI C63.10, chapter 6.9.3 **Final Result**

OP-Mode Chip, Radio Technology, Operating Frequency	Setup	Date	FCC	IC
Chip01, Bluetooth BR, high, conducted	S01_AA01#S3.5	2024-12-09	N/A	Performed
Chip01, Bluetooth BR, low, conducted	S01_AA01#S3.5	2024-12-09	N/A	Performed
Chip01, Bluetooth BR, mid, conducted	S01_AA01#S3.5	2024-12-09	N/A	Performed
Chip01, Bluetooth EDR 2, high, conducted	S01_AA01#S3.5	2024-12-09	N/A	Performed
Chip01, Bluetooth EDR 2, low, conducted	S01_AA01#S3.5	2024-12-09	N/A	Performed
Chip01, Bluetooth EDR 2, mid, conducted	S01_AA01#S3.5	2024-12-09	N/A	Performed
Chip01, Bluetooth EDR 3, high, conducted	S01_AA01#S3.5	2024-12-09	N/A	Performed
Chip01, Bluetooth EDR 3, low, conducted	S01_AA01#S3.5	2024-12-09	N/A	Performed
Chip01, Bluetooth EDR 3, mid, conducted	S01_AA01#S3.5	2024-12-09	N/A	Performed
Chip02, Bluetooth BR, high, conducted	S01_AA01#S3.5	2024-12-09	N/A	Performed
Chip02, Bluetooth BR, low, conducted	S01_AA01#S3.5	2024-12-09	N/A	Performed
Chip02, Bluetooth BR, mid, conducted	S01_AA01#S3.5	2024-12-09	N/A	Performed
Chip02, Bluetooth EDR 2, high, conducted	S01_AA01#S3.5	2024-12-09	N/A	Performed
Chip02, Bluetooth EDR 2, low, conducted	S01_AA01#S3.5	2024-12-09	N/A	Performed

47 CFR CHAPTER I FCC PART 15 Subpart C §15.247	**IC RSS-Gen; Ch. 6.7 & Ch. 8**
Occupied Bandwidth (99%) The measurement was performed according to ANSI C63.10, chapter 6.9.3	**Final Result**

OP-Mode Chip, Radio Technology, Operating Frequency	**Setup**	**Date**	**FCC**	**IC**
Chip02, Bluetooth EDR 2, mid, conducted	S01_AA01#S3.5	2024-12-09	N/A	Performed
Chip02, Bluetooth EDR 3, high, conducted	S01_AA01#S3.5	2024-12-09	N/A	Performed
Chip02, Bluetooth EDR 3, low, conducted	S01_AA01#S3.5	2024-12-09	N/A	Performed
Chip02, Bluetooth EDR 3, mid, conducted	S01_AA01#S3.5	2024-12-09	N/A	Performed

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Peak Power Output The measurement was performed according to ANSI C63.10, chapter 7.8.5	**Final Result**

OP-Mode Chip, Radio Technology, Operating Frequency, Measurement method	**Setup**	**Date**	**FCC**	**IC**
Chip01, Bluetooth BR, high, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth BR, low, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth BR, mid, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth EDR 2, high, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth EDR 2, low, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth EDR 2, mid, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth EDR 3, high, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth EDR 3, low, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth EDR 3, mid, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth BR, high, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth BR, low, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth BR, mid, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth EDR 2, high, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth EDR 2, low, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth EDR 2, mid, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth EDR 3, high, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth EDR 3, low, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth EDR 3, mid, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed

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Spurious RF Conducted Emissions

The measurement was performed according to ANSI C63.10, chapter 11.11 **Final Result**

OP-Mode Chip, Radio Technology, Operating Frequency	Setup	Date	FCC	IC
Chip01, Bluetooth BR, high	S01_AA01#S3.5	2025-01-16	Passed	Passed
Chip01, Bluetooth BR, low	S01_AA01#S3.5	2025-01-16	Passed	Passed
Chip01, Bluetooth BR, mid	S01_AA01#S3.5	2025-01-16	Passed	Passed
Chip01, Bluetooth EDR 2, high	S01_AA01#S3.5	2025-01-16	Passed	Passed
Chip01, Bluetooth EDR 2, low	S01_AA01#S3.5	2025-01-16	Passed	Passed
Chip01, Bluetooth EDR 2, mid	S01_AA01#S3.5	2025-01-16	Passed	Passed
Chip01, Bluetooth EDR 3, high	S01_AA01#S3.5	2025-01-16	Passed	Passed
Chip01, Bluetooth EDR 3, low	S01_AA01#S3.5	2025-01-16	Passed	Passed
Chip01, Bluetooth EDR 3, mid	S01_AA01#S3.5	2025-01-16	Passed	Passed
Chip02, Bluetooth BR, high	S01_AA01#S3.5	2025-01-16	Passed	Passed
Chip02, Bluetooth BR, low	S01_AA01#S3.5	2025-01-16	Passed	Passed
Chip02, Bluetooth BR, mid	S01_AA01#S3.5	2025-01-16	Passed	Passed
Chip02, Bluetooth EDR 2, high	S01_AA01#S3.5	2025-01-16	Passed	Passed
Chip02, Bluetooth EDR 2, low	S01_AA01#S3.5	2025-01-16	Passed	Passed
Chip02, Bluetooth EDR 2, mid	S01_AA01#S3.5	2025-01-16	Passed	Passed
Chip02, Bluetooth EDR 3, high	S01_AA01#S3.5	2025-01-16	Passed	Passed
Chip02, Bluetooth EDR 3, low	S01_AA01#S3.5	2025-01-16	Passed	Passed
Chip02, Bluetooth EDR 3, mid	S01_AA01#S3.5	2025-01-16	Passed	Passed
Chip01, Simultaneous Transmission, -	S01_AA01#S3.5	2025-04-23	Passed	Passed

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Transmitter Spurious Radiated Emissions

The measurement was performed according to ANSI C63.10, chapter 6.4, 6.5, 6.6.5 **Final Result**

OP-Mode Chip, Radio Technology, Operating Frequency, Measurement range	Setup	Date	FCC	IC
Chip01, Bluetooth EDR 2, high, 1 GHz - 8 GHz	S01_AB01#S3.5	2024-12-22	Passed	Passed
Chip01, Bluetooth EDR 2, low, 1 GHz - 8 GHz	S01_AB01#S3.5	2024-12-23	Passed	Passed
Chip01, Bluetooth EDR 2, mid, 1 GHz - 8 GHz	S01_AB01#S3.5	2024-12-23	Passed	Passed
Chip01, Bluetooth EDR 3, high, 1 GHz - 26 GHz	S01_AB01#S3.5	2024-12-24	Passed	Passed
Chip01, Bluetooth EDR 3, high, 30 MHz - 1 GHz	S01_AB01#S3.5	2024-12-14	Passed	Passed
Chip01, Bluetooth EDR 3, low, 1 GHz - 26 GHz	S01_AB01#S3.5	2024-12-23	Passed	Passed
Chip01, Bluetooth EDR 3, low, 30 MHz - 1 GHz	S01_AB01#S3.5	2024-12-14	Passed	Passed
Chip01, Bluetooth EDR 3, mid, 1 GHz - 26 GHz	S01_AB01#S3.5	2024-12-23	Passed	Passed
Chip01, Bluetooth EDR 3, mid, 30 MHz - 1 GHz	S01_AB01#S3.5	2024-12-14	Passed	Passed
Chip01, Bluetooth EDR 3, mid, 9 kHz - 30 MHz	S01_AB01#S3.5	2024-12-15	Passed	Passed
Chip02, Bluetooth EDR 2, high, 1 GHz - 8 GHz	S01_AB01#S3.5	2024-12-22	Passed	Passed
Chip02, Bluetooth EDR 2, low, 1 GHz - 8 GHz	S01_AB01#S3.5	2024-12-22	Passed	Passed
Chip02, Bluetooth EDR 2, mid, 1 GHz - 8 GHz	S01_AB01#S3.5	2024-12-22	Passed	Passed
Chip02, Bluetooth EDR 3, high, 1 GHz - 26 GHz	S01_AB01#S3.5	2024-12-22	Passed	Passed
Chip02, Bluetooth EDR 3, high, 30 MHz - 1 GHz	S01_AB01#S3.5	2024-12-15	Passed	Passed
Chip02, Bluetooth EDR 3, low, 1 GHz - 26 GHz	S01_AB01#S3.5	2024-12-24	Passed	Passed
Chip02, Bluetooth EDR 3, low, 30 MHz - 1 GHz	S01_AB01#S3.5	2024-12-15	Passed	Passed

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Transmitter Spurious Radiated Emissions

The measurement was performed according to ANSI C63.10, chapter 6.4, 6.5, 6.6.5 **Final Result**

OP-Mode Chip, Radio Technology, Operating Frequency, Measurement range	Setup	Date	FCC	IC
Chip02, Bluetooth EDR 3, mid, 1 GHz - 26 GHz	S01_AB01#S3.5	2024-12-24	Passed	Passed
Chip02, Bluetooth EDR 3, mid, 30 MHz - 1 GHz	S01_AB01#S3.5	2024-12-15	Passed	Passed
Chip02, Bluetooth EDR 3, mid, 9 kHz - 30 MHz	S01_AB01#S3.5	2024-12-15	Passed	Passed
Chip01, Bluetooth EDR 3, high, 1 GHz - 26 GHz	S01_AA01#S3.0	2025-01-20	Passed	Passed
Chip02, Bluetooth EDR 3, low, 1 GHz - 26 GHz	S01_AA01#S3.0	2025-01-20	Passed	Passed
Chip02, Bluetooth EDR 3, low, 30 MHz - 1 GHz	S01_AA01#S3.0	2025-01-30	Passed	Passed
Chip02, Bluetooth EDR 3, mid, 9 kHz - 30 MHz	S01_AA01#S3.0	2025-01-30	Passed	Passed

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Band Edge Compliance Conducted

The measurement was performed according to ANSI C63.10, chapter 11.11 **Final Result**

OP-Mode Chip, Radio Technology, Operating Frequency, Band Edge	Setup	Date	FCC	IC
Chip01, Bluetooth BR, high, high	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth BR, hopping, high	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth BR, hopping, low	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth BR, low, low	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth EDR 2, high, high	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth EDR 2, hopping, high	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth EDR 2, hopping, low	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth EDR 2, low, low	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth EDR 3, high, high	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth EDR 3, hopping, high	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth EDR 3, hopping, low	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip01, Bluetooth EDR 3, low, low	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth BR, high, high	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth BR, hopping, high	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth BR, hopping, low	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth BR, low, low	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth EDR 2, high, high	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth EDR 2, hopping, high	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth EDR 2, hopping, low	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth EDR 2, low, low	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth EDR 3, high, high	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth EDR 3, hopping, high	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth EDR 3, hopping, low	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth EDR 3, low, low	S01_AA01#S3.5	2024-12-09	Passed	Passed

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Band Edge Compliance Radiated

The measurement was performed according to ANSI C63.10, chapter 6.6.5 **Final Result**

OP-Mode Chip, Radio Technology, Operating Frequency, Band Edge	Setup	Date	FCC	IC
Chip01, Bluetooth EDR 3, low, low	S01_AB01#S3.5	2025-07-14	Passed	Passed
Chip01, Bluetooth BR, high, high	S01_AB01#S3.5	2024-12-20	Passed	Passed
Chip01, Bluetooth EDR 2, high, high	S01_AB01#S3.5	2024-12-22	Passed	Passed
Chip01, Bluetooth EDR 3, high, high	S01_AB01#S3.5	2024-12-23	Passed	Passed
Chip02, Bluetooth EDR 3, low, low	S01_AB01#S3.5	2025-07-14	Passed	Passed
Chip02, Bluetooth BR, high, high	S01_AB01#S3.5	2024-12-20	Passed	Passed
Chip02, Bluetooth EDR 2, high, high	S01_AB01#S3.5	2024-12-22	Passed	Passed
Chip02, Bluetooth EDR 3, high, high	S01_AB01#S3.5	2024-12-23	Passed	Passed
Chip01, Bluetooth BR, high, high	S01_AA01#S3.0	2025-01-20	Passed	Passed
Chip01, Bluetooth EDR 3, high, high	S01_AA01#S3.0	2025-01-20	Passed	Passed
Chip02, Bluetooth BR, high, high	S01_AA01#S3.0	2025-01-20	Passed	Passed
Chip02, Bluetooth EDR 3, high, high	S01_AA01#S3.0	2025-01-20	Passed	Passed

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Channel Separation

The measurement was performed according to ANSI C63.10, chapter 7.8.2 **Final Result**

OP-Mode Chip, Radio Technology, Measurement method	Setup	Date	FCC	IC
Chip01, Bluetooth BR, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth BR, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed

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Dwell Time

The measurement was performed according to ANSI C63.10, chapter 7.8.4 **Final Result**

OP-Mode Chip, Radio Technology, Measurement method	Setup	Date	FCC	IC
Chip01, Bluetooth BR, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth BR, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed

47 CFR CHAPTER I FCC PART 15 Subpart C §15.247 **§ 15.247 (a) (1) (i) (ii) (iii)**

Number of Hopping Frequencies

The measurement was performed according to ANSI C63.10, chapter 7.8.3 **Final Result**

OP-Mode	Setup	Date	FCC	IC
Chip, Radio Technology, Measurement method				
Chip01, Bluetooth BR, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed
Chip02, Bluetooth BR, conducted	S01_AA01#S3.5	2024-12-09	Passed	Passed

N/A: Not applicable
N/P: Not performed

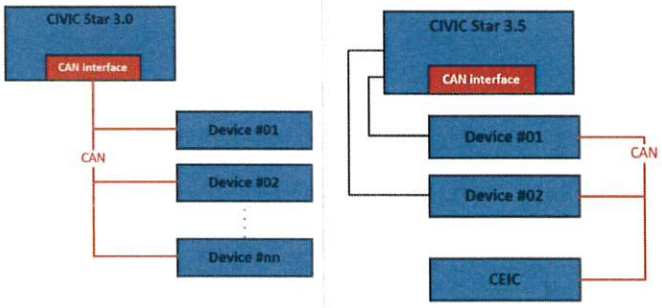
2 REVISION HISTORY / SIGNATURES

Report version control			
Version	**Release date**	**Change Description**	**Version validity**
initial	2025-04-25	--	invalid
rev01	2025-08-04	- changed the values in test case output power. - changed the AV values in test case radiated Band-Edge. - Low Band-Edge radiated measurements have been added.	valid

COMMENT: -

The EUT (Multimedia Equipment with WLAN and Bluetooth) supports two different software variants. The differences between these variants are explained in the following table:

Parameter	LS4T	LS4+T
SW-SKU	ABBC	AABC
GPU frequency	635 MHz	731 MHz
Software variant	Star 3.0	Star 3.5
Blockdiagram Star Architectures	The following block diagram shows the fundamental Star 3.0 architecture that uses the CAN interface.	The following block diagram shows the fundamental Star 3.5 architecture that does not use the CAN interface, but it is assembled on the CIVIC device.



The CAN interface is always built on both Star architectures, but only Star 3.0 uses the CAN interface.

Based on the previous table and the applicant's suggested test plan, the measurements were conducted as follows:

- Variant "Star 3.5": Full testing
- Variant "Star 3.0": Spot checks only

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(responsible for accreditation scope)	(responsible for testing and report)
Dipl.-Ing. Daniel Gall	BSc. Mhd Mouaz Saad

3 ADMINISTRATIVE DATA

3.1 TESTING LABORATORY

Company Name:	7layers GmbH
Address:	Borsigstr. 11 40880 Ratingen Germany

The test facility is accredited by the following accreditation organisation:

Laboratory accreditation no:	DAkkS D-PL-12140-01-00
FCC Designation Number:	DE0015
FCC Test Firm Registration:	929146
ISED CAB Identifier	DE0007; ISED#: 3699A
Responsible for accreditation scope:	Dipl.-Ing. Daniel Gall
Report Template Version:	2024-11-06

3.2 PROJECT DATA

Responsible for testing and report:	BSc. Mhd Mouaz Saad
Employees who performed the tests:	documented internally at 7Layers
Date of Report:	2025-08-04
Testing Period:	2024-12-09 to 2025-07-14

3.3 APPLICANT DATA

Company Name:	Robert Bosch GmbH
Address:	Robert-Bosch-Platz 1, 70839 Gerlingen Germany
Contact Person:	Karin Silberhorn

3.4 MANUFACTURER DATA

Manufacturer 1

Company Name:	Bosch Car Multimedia Portugal
Address:	S.A. Rua Max Grundig 35-Lomar, 4705-820 Braga

Manufacturer 2

Company Name:	Bosch Automotive Products (Suzhou) Co., Ltd.
Address:	Changzhou Branch No. 17, Long Men Road, Wujin Hi-tech Industrial Zone Changzhou, Jiangsu, P.R. China

4 TEST OBJECT DATA

4.1 GENERAL EUT DESCRIPTION

Kind of Device product description	Central In-Vehicle Infotainment Computer	
Product name	Multimedia Device with WLAN and Bluetooth	
Model name	BCI3L4PTN1(Star 3.5 / Star 3.0)	
Declared EUT data by the supplier		
Voltage Type	DC	
Voltage Level	12 VDC	
Antenna / Gain	External	
	Antenna 3 (Chip01, BT)	**Antenna 2** (Chip02, BT)
	0.1 dB	0.1 dB
Tested Modulation Type and Tested datarates	GFSK Modulation, 1-DHx packets, 1 Mbit π/4 DQPSK Modulation, 2-DHx packets, 2 Mbit 8-DPSK Modulation, 3-DHx packets, 3 Mbit	
General product description	Central In-Vehicle Infotainment Computer Gen20x.i3 infotainment system is the main unit in the vehicle, which combines the instrument cluster and infotainment functionality. It supports Bluetooth classic (BT), Bluetooth Low Energy (BTLE) and Wi-Fi (2.4GHz and 5GHz).	
Specific product description for the EUT	The EUT has the following modules for Bluetooth and WLAN:	
	ATC6QPL002(**Chip02**): Only BT and BTLE	ATC6QPL004(**Chip01**): BT, BTLE, Wi-Fi (2.4GHz and 5GHz).
EUT ports (connected cables during testing):	Main Connector A (incl. DC Power) (unshielded, 1m)	GNSS antenna (shielded, 1.5m)
	Main Connector B (unshielded, 1m)	BT/WLAN Antenna (shielded, 1.5m)
	Ethernet (shielded, 1.5m)	HD-BaseT (shielded, 1.5m)
	FM/AM/SDARS/Ref.-Antennas	USB 2.0 – TGS (shielded, 1.5m)
	Video-Out Displays (shielded, 1.5m)	USB 2.0 - MM-Box (shielded, 1.5m)
	CamsControl(shielded, 1.5m)	Video-in Cameras (shielded, 1.5m)
	USB 3.0 High Speed Flashing/CAM Logging (shielded, 1.5m)	
Special software used for testing	ADB shell.exe	
Connection to AC main is supported	No (no direct or indirect connection)	

4.2 EUT MAIN COMPONENTS

Sample Name	Sample Code	Description
EUT A	DE1050025aa01	Conducted Sample
Sample Parameter	**Value**	
Serial No.	0015674	
HW Version	D5	
SW Version	E064.4	
Comment	BCI3L4PTN1 - Star 3.5	

Sample Name	Sample Code	Description
EUT B	DE1050025ab01	Radiated Sample
Sample Parameter	**Value**	
Serial No.	0015673	
HW Version	D5	
SW Version	E064.4	
Comment	BCI3L4PTN1 - Star 3.5	

Sample Name	Sample Code	Description
EUT C	DE1050026aa01	Radiated Sample
Sample Parameter	**Value**	
Serial No.	0018792	
HW Version	D5	
SW Version	E064.4	
Comment	BCI3L4PTN1 - Star 3.0	

NOTE:The short description is used to simplify the identification of the EUT in this test report.

4.3 ANCILLARY EQUIPMENT

For the purposes of this test report, ancillary equipment is defined as equipment which is used in conjunction with the EUT to provide operational and control features to the EUT. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless Ancillary Equipment can influence the test results.

Device	Details(Manufacturer, Type Model, OUT Code)	Description
ANC 1	Continental, RKE223E1GNS, DE1050025/026AUX01	GNSS Antenna + Antenna Cable (1.5m)
ANC 2	Mercedes-Benz, A1779052902, DE1050025/026AUX45	4x WIFI/BT Antenna + 4x Antenna Cable (1.5m)

4.4 AUXILIARY EQUIPMENT

For the purposes of this test report, auxiliary equipment is defined as equipment which is used temporarily to enable operational and control features especially used for the tests of the EUT which is not used during normal operation or equipment that is used during the tests in combination with the EUT but is not subject of this test report. It is necessary to configure the system in a typical fashion, as a customer would normally use it.
But nevertheless Auxiliary Equipment can influence the test results.

Device	Details(Manufacturer, Type Model, HW, SW, S/N)	Description
AUX A	Bosch, -, -, -, -	2x Cable Harness

4.5 EUT SETUPS

This chapter describes the combination of EUTs and equipment used for testing. The rationale for selecting the EUTs, ancillary and auxiliary equipment and interconnecting cables, is to test a representative configuration meeting the requirements of the referenced standards.

Setup	Combination of EUTs	Description and Rationale
S01_AA01#S3.5	EUT A, AUX A	Conducted Setup
S01_AB01#S3.5	EUT B, ANC 1, ANC 2, AUX A	Radiated Setup
S01_AA01#S3.0	EUT C, ANC 1, ANC 2, AUX A	Radiated Setup

4.6 OPERATING MODES / TEST CHANNELS

This chapter describes the operating modes of the EUTs used for testing.

	2.4 GHz ISM 2400 - 2483.5 MHz		
BT Test Channels:	**low**	**mid**	**high**
Channel:	0	39	78
Frequency [MHz]	2402	2441	2480

Operating Modes:

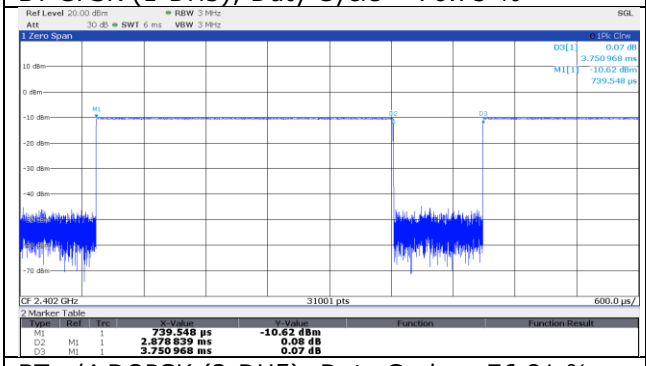
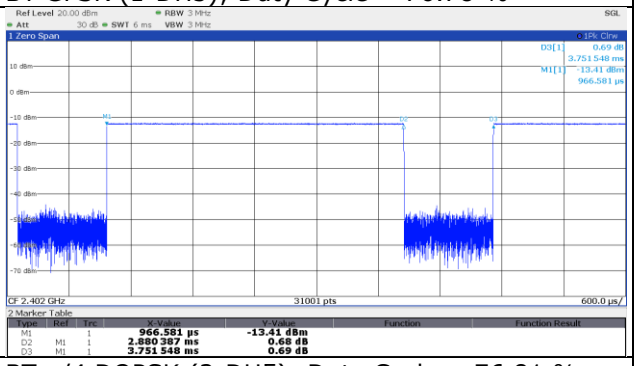
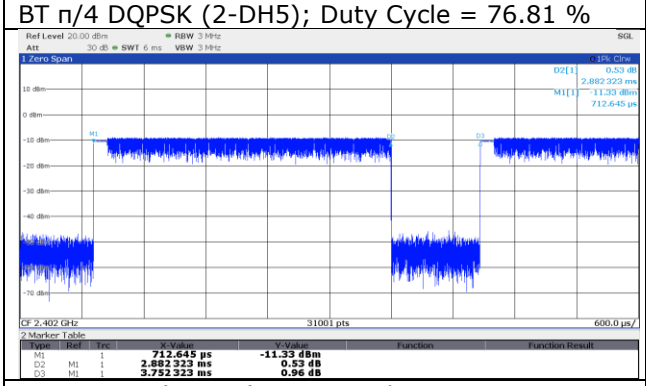
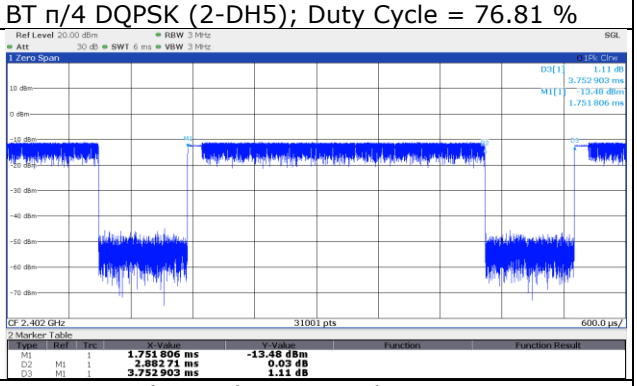
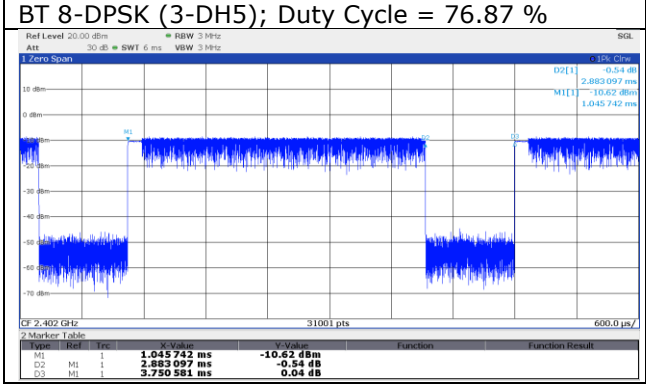
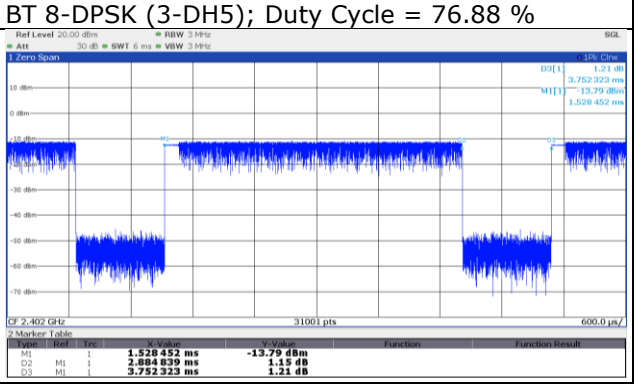
- Bluetooth BR: GFSK Modulation, 1-DHx packets, 1 Mbit
- Bluetooth EDR 2: π/4 DQPSK Modulation, 2-DHx packets, 2 Mbit
- Bluetooth EDR 3: 8-DPSK Modulation, 3-DHx packets, 3 Mbit
- Simultaneous Transmission[1)]: Bluetooth EDR 3 high + WLAN 5GHz n40-mode Ch46 MSC0

The testing was conducted at the maximum output power setting specified by the manufacturer.

1) the wanted signals in "simultaneous transmission" mode have been chosen to represent the worst-case-scenario of the spurious Emission measurements, because they have the highest output power.

4.7 DUTY CYCLE

The test was performed according to:
ANSI C63.10, chapter 7.5

Chip01	Chip02
BT GFSK (1-DH5); Duty Cycle = 76.75 %	BT GFSK (1-DH5); Duty Cycle = 76.78 %
	
BT π/4 DQPSK (2-DH5); Duty Cycle = 76.81 %	BT π/4 DQPSK (2-DH5); Duty Cycle = 76.81 %
	
BT 8-DPSK (3-DH5); Duty Cycle = 76.87 %	BT 8-DPSK (3-DH5); Duty Cycle = 76.88 %
	

4.8 PRODUCT LABELLING

4.8.1 FCC ID LABEL

Please refer to the documentation of the applicant.

4.8.2 LOCATION OF THE LABEL ON THE EUT

Please refer to the documentation of the applicant.

5 TEST RESULTS

5.1 OCCUPIED BANDWIDTH (20 DB)

Standard **FCC Part 15 Subpart C**

The test was performed according to:
ANSI C63.10, chapter 6.9.2

5.1.1 TEST DESCRIPTION

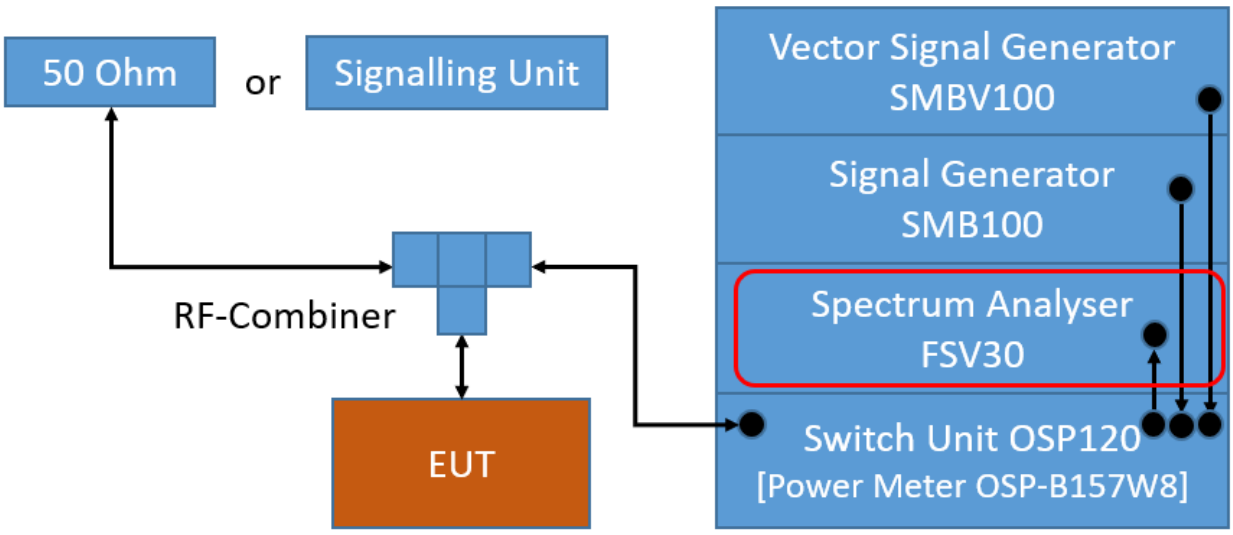
The Equipment Under Test (EUT) was set up to perform the occupied bandwidth measurements.
The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or first-order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical.
The results recorded were measured with the modulation which produce the worst-case (widest) emission bandwidth.

The EUT was connected to the test system as described in the block diagram below. The complete attenuation of the measurement path is known and considered.

Analyser settings:

- Resolution Bandwidth (RBW): 1% to 5 % of the OBW
- Video Bandwidth (VBW): ≥ 3 x RBW
- Span: 2 to 5 times the OBW
- Trace: Maxhold
- Sweeps: Till stable (min. 1000, max. 30000)
- Sweeptime: Auto
- Detector: Peak

The technology depending measurement parameters can be found in the measurement plot.



TS8997; Channel Bandwidth

5.1.2 TEST REQUIREMENTS / LIMITS

FCC Part 15, Subpart C, §15.247 (a) (2)

For the frequency band 2400 – 2483.5 MHz:
FCC Part 15, Subpart C, §15.247 (a) (1) (iii)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Used conversion factor: Output power (dBm) = 10 log (Output power (W) / 1mW)

The measured output power of the system is below 125 mW (21.0 dBm). For the results, please refer to the related chapter of this report.
Therefore the limit is determined as 1.5 MHz.

5.1.3 TEST PROTOCOL

Ambient temperature: 23 °C
Air Pressure: 998 hPa
Humidity: 38 %

Chip01

BT GFSK (1-DH5)

Band	Channel No.	Frequency [MHz]	20 dB Bandwidth [MHz]
2.4 GHz ISM	0	2402	0.837
	39	2441	0.837
	78	2480	0.877

BT π/4 DQPSK (2-DH5)

Band	Channel No.	Frequency [MHz]	20 dB Bandwidth [MHz]
2.4 GHz ISM	0	2402	1.306
	39	2441	1.296
	78	2480	1.296

BT 8-DPSK (3-DH5)

Band	Channel No.	Frequency [MHz]	20 dB Bandwidth [MHz]
2.4 GHz ISM	0	2402	1.246
	39	2441	1.246
	78	2480	1.246

Chip02

BT GFSK (1-DH5)

Band	Channel No.	Frequency [MHz]	20 dB Bandwidth [MHz]
2.4 GHz ISM	0	2402	0.877
	39	2441	0.877
	78	2480	0.877

BT π/4 DQPSK (2-DH5)

Band	Channel No.	Frequency [MHz]	20 dB Bandwidth [MHz]
2.4 GHz ISM	0	2402	1.306
	39	2441	1.306
	78	2480	1.306

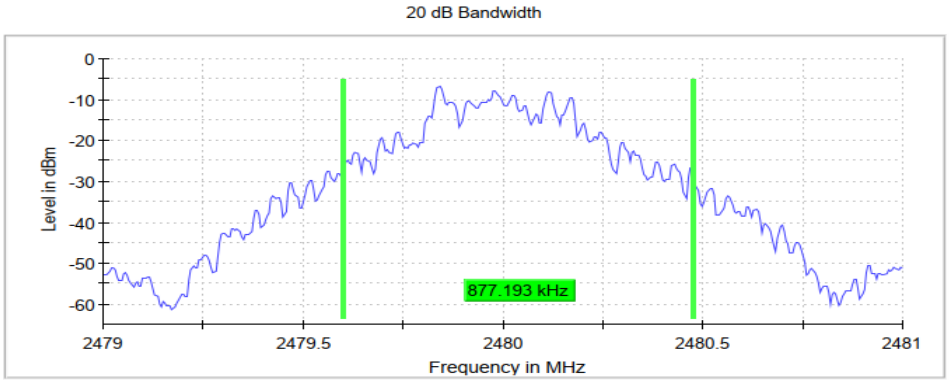
BT 8-DPSK (3-DH5)

Band	Channel No.	Frequency [MHz]	20 dB Bandwidth [MHz]
2.4 GHz ISM	0	2402	1.336
	39	2441	1.326
	78	2480	1.316

Remark: Please see next sub-clause for the measurement plot.

5.1.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

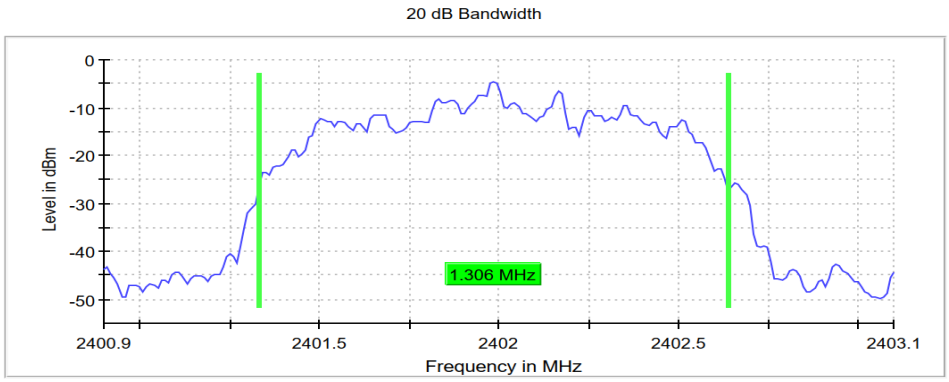
Chip01, Modulation= Bluetooth BR, Operating Channel = 78
(S01_AA01#S3.5)



Measurement

Setting	Instrument Value
Start Frequency	2.47900 GHz
Stop Frequency	2.48100 GHz
Span	2.000 MHz
RBW	10.000 kHz
VBW	30.000 kHz
SweepPoints	400
Sweeptime	419.000 µs
Reference Level	0.000 dBm
Attenuation	10.000 dB
Detector	MaxPeak
SweepCount	200
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.50 dB
Run	6 / max. 150
Stable	5 / 5
Max Stable Difference	0.06 dB

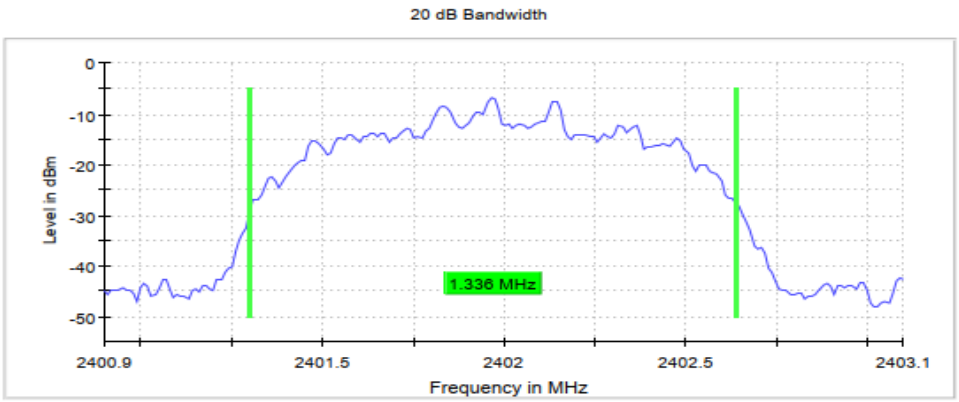
Chip01, Modulation= Bluetooth EDR 2, Operating Channel = 0
(S01_AA01#S3.5)



Measurement

Setting	Instrument Value
Start Frequency	2.40090 GHz
Stop Frequency	2.40310 GHz
Span	2.200 MHz
RBW	20.000 kHz
VBW	100.000 kHz
SweepPoints	220
Sweeptime	210.000 µs
Reference Level	0.000 dBm
Attenuation	10.000 dB
Detector	MaxPeak
SweepCount	200
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.50 dB
Run	8 / max. 150
Stable	5 / 5
Max Stable Difference	0.07 dB

Chip02, Modulation= Bluetooth EDR 3, Operating Channel = 0
(S01_AA01#S3.5)



Measurement

Setting	Instrument Value
Start Frequency	2.40090 GHz
Stop Frequency	2.40310 GHz
Span	2.200 MHz
RBW	20.000 kHz
VBW	100.000 kHz
SweepPoints	220
Sweeptime	210.000 µs
Reference Level	0.000 dBm
Attenuation	10.000 dB
Detector	MaxPeak
SweepCount	200
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.50 dB
Run	14 / max. 150
Stable	5 / 5
Max Stable Difference	0.05 dB

5.1.5 TEST EQUIPMENT USED

- R&S TS8997

5.2 OCCUPIED BANDWIDTH (99%)

Standard **FCC Part 15 Subpart C**

The test was performed according to:
ANSI C63.10, chapter 6.9.3

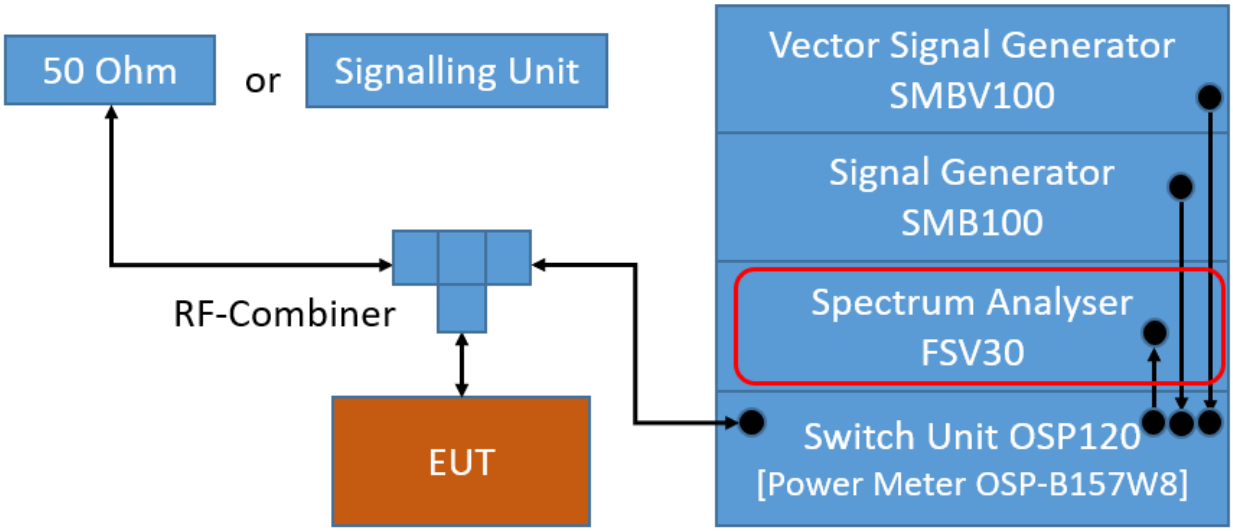
5.2.1 TEST DESCRIPTION

The Equipment Under Test (EUT) was set up to perform the occupied bandwidth measurements.
The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or first-order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical.

The EUT was connected to the test system as described in the block diagram below. The complete attenuation of the measurement path is known and considered.

Analyser settings:

- Resolution Bandwidth (RBW): 1 to 5 % of the OBW
- Video Bandwidth (VBW): ≥ 3 times the RBW
- Span: 1.5 to 5 times the OBW
- Trace: Maxhold
- Sweeps: Till stable (min. 500, max. 75000)
- Sweeptime: Auto
- Detector: Peak



TS8997; Channel Bandwidth

5.2.2 TEST REQUIREMENTS / LIMITS

No applicable limit:

5.2.3 TEST PROTOCOL

Ambient temperature: 23 °C
Air Pressure: 998 hPa
Humidity: 38 %

Chip01

BT GFSK (1-DH5)

Band	Channel No.	Frequency [MHz]	99 % Bandwidth [MHz]
2.4 GHz ISM	0	2402	0.802
	39	2441	0.802
	78	2480	0.802

BT π/4 DQPSK (2-DH5)

Band	Channel No.	Frequency [MHz]	99 % Bandwidth [MHz]
2.4 GHz ISM	0	2402	1.165
	39	2441	1.185
	78	2480	1.185

BT 8-DPSK (3-DH5)

Band	Channel No.	Frequency [MHz]	99 % Bandwidth [MHz]
2.4 GHz ISM	0	2402	1.165
	39	2441	1.165
	78	2480	1.165

Chip02

BT GFSK (1-DH5)

Band	Channel No.	Frequency [MHz]	99 % Bandwidth [MHz]
2.4 GHz ISM	0	2402	0.797
	39	2441	0.794
	78	2480	0.802

BT π/4 DQPSK (2-DH5)

Band	Channel No.	Frequency [MHz]	99 % Bandwidth [MHz]
2.4 GHz ISM	0	2402	1.185
	39	2441	1.175
	78	2480	1.185

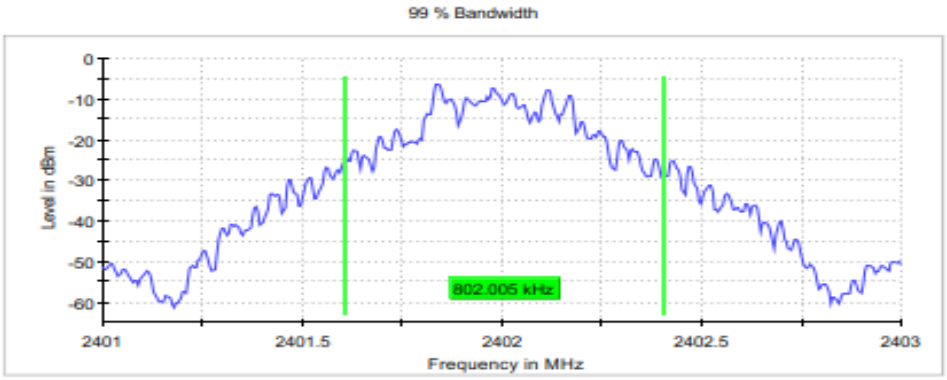
BT 8-DPSK (3-DH5)

Band	Channel No.	Frequency [MHz]	99 % Bandwidth [MHz]
2.4 GHz ISM	0	2402	1.205
	39	2441	1.205
	78	2480	1.205

Remark: Please see next sub-clause for the measurement plot.

5.2.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

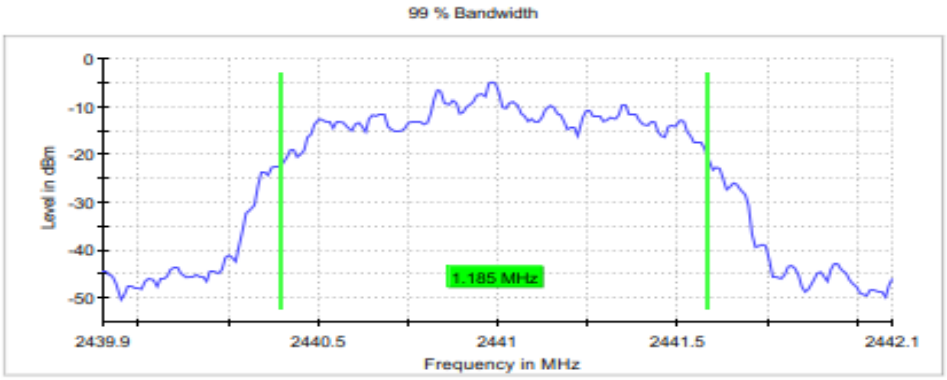
Chip01, Modulation= Bluetooth BR, Operating Channel = 0
(S01_AA01#S3.5)



Measurement

Setting	Instrument Value
Start Frequency	2.40100 GHz
Stop Frequency	2.40300 GHz
Span	2.000 MHz
RBW	10.000 kHz
VBW	30.000 kHz
SweepPoints	400
Sweeptime	419.000 µs
Reference Level	0.000 dBm
Attenuation	10.000 dB
Detector	MaxPeak
SweepCount	500
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.30 dB
Run	5 / max. 150
Stable	3 / 3
Max Stable Difference	0.07 dB

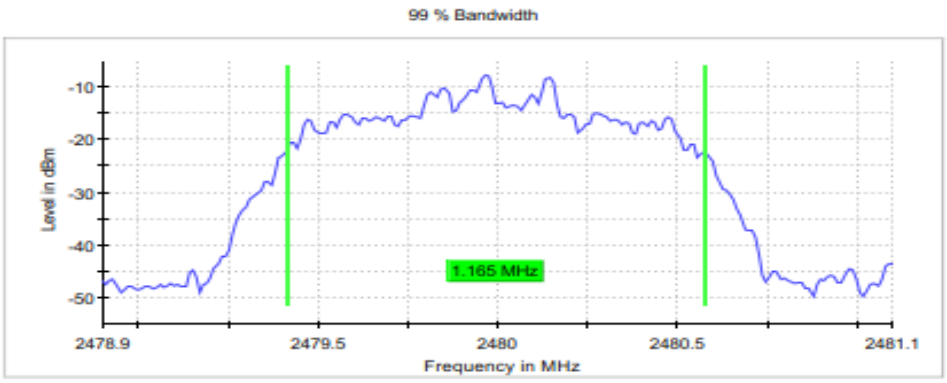
Chip01, Modulation= Bluetooth EDR 2, Operating Channel = 39
(S01_AA01#S3.5)



Measurement

Setting	Instrument Value
Start Frequency	2.43990 GHz
Stop Frequency	2.44210 GHz
Span	2.200 MHz
RBW	20.000 kHz
VBW	100.000 kHz
SweepPoints	220
Sweeptime	210.000 µs
Reference Level	0.000 dBm
Attenuation	10.000 dB
Detector	MaxPeak
SweepCount	500
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.30 dB
Run	6 / max. 150
Stable	3 / 3
Max Stable Difference	0.07 dB

Chip02, Modulation= Bluetooth EDR 3, Operating Channel = 78
(S01_AA01#S3.5)



Measurement

Setting	Instrument Value
Start Frequency	2.47890 GHz
Stop Frequency	2.48110 GHz
Span	2.200 MHz
RBW	20.000 kHz
VBW	100.000 kHz
SweepPoints	220
Sweeptime	210.000 µs
Reference Level	0.000 dBm
Attenuation	10.000 dB
Detector	MaxPeak
SweepCount	500
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.30 dB
Run	6 / max. 150
Stable	3 / 3
Max Stable Difference	0.07 dB

5.2.5 TEST EQUIPMENT USED

- R&S TS8997

5.3 PEAK POWER OUTPUT

Standard **FCC Part 15 Subpart C**

The test was performed according to:
ANSI C63.10, chapter 7.8.5

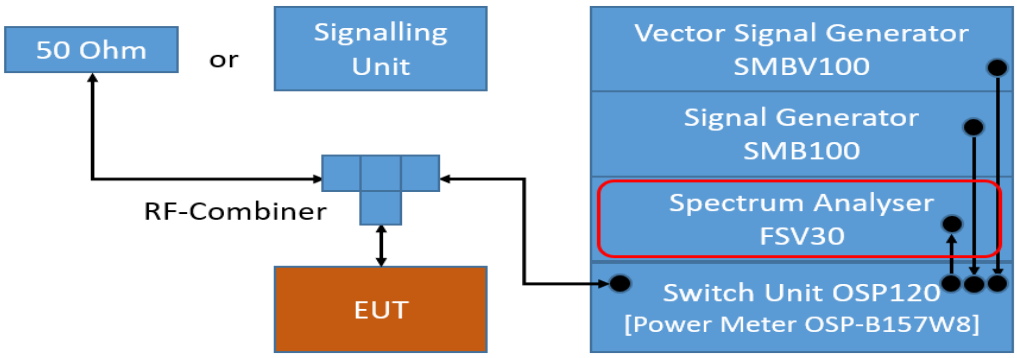
5.3.1 TEST DESCRIPTION

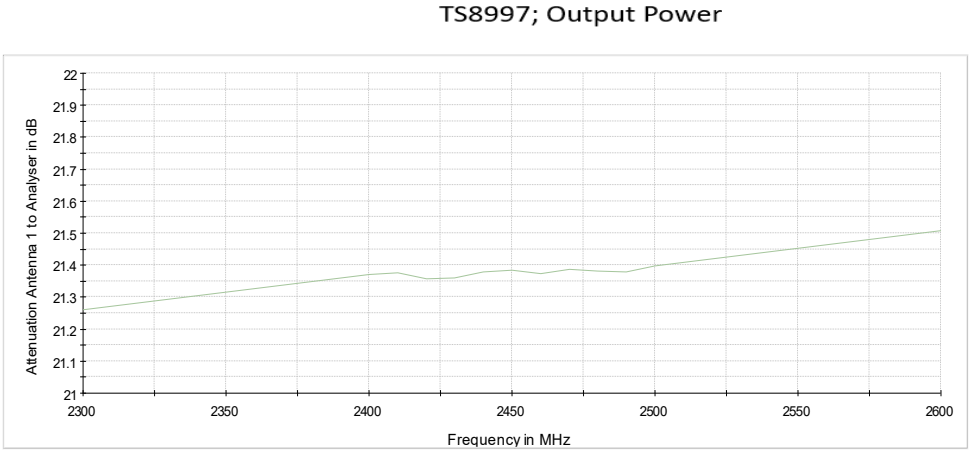
FHSS EQUIPMENT:
The Equipment Under Test (EUT) was set up to perform the output power measurements. The results recorded were measured with the modulation which produces the worst-case (highest) output power. The reference level of the spectrum analyser was set higher than the output power of the EUT.

The EUT was connected to the test system as described in the block diagram below. The complete attenuation of the measurement path is known and considered.

Analyser settings:

- Resolution Bandwidth (RBW): ≥ 20 dB BW
- Video Bandwidth (VBW): ≥ 3 times RBW
- Trace: Maxhold
- Sweeps: Till stable (min. 300, max. 15000)
- Sweeptime: Auto
- Detector: Peak





Attenuation Output power

5.3.2 TEST REQUIREMENTS / LIMITS

Frequency Hopping Systems:
FCC Part 15, Subpart C, §15.247 (b) (1)
For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

FCC Part 15, Subpart C, §15.247 (b) (2)
For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

Used conversion factor: Limit (dBm) = 10 log (Limit (W)/1mW)

5.3.3 TEST PROTOCOL

Ambient temperature:	23 °C
Air Pressure:	998 hPa
Humidity:	38 %

Chip01
BT GFSK (1-DH5)

Band	Channel No.	Frequency [MHz]	Peak Power@ EUT[dBm]	Cable + Insertion Loss[dB]	Peak Power [dBm]	Limit [dBm]	Margin to Limit [dB]	E.I.R.P [dBm]
2.4 GHz ISM	0	2402	-0.1	-1.1	-1.2	21.0	22.2	-1.1
	39	2441	-0.3	-1.1	-1.4	21.0	22.4	-1.3
	78	2480	-0.5	-1.1	-1.6	21.0	22.6	-1.5

BT π/4 DQPSK (2-DH5)

Band	Channel No.	Frequency [MHz]	Peak Power@ EUT[dBm]	Cable + Insertion Loss[dB]	Peak Power [dBm]	Limit [dBm]	Margin to Limit [dB]	E.I.R.P [dBm]
2.4 GHz ISM	0	2402	1.3	-1.1	0.2	21.0	20.8	0.3
	39	2441	1.1	-1.1	0.0	21.0	21.0	0.1
	78	2480	0.9	-1.1	-0.2	21.0	21.2	-0.1

BT 8-DPSK (3-DH5)

Band	Channel No.	Frequency [MHz]	Peak Power@ EUT[dBm]	Cable + Insertion Loss[dB]	Peak Power [dBm]	Limit [dBm]	Margin to Limit [dB]	E.I.R.P [dBm]
2.4 GHz ISM	0	2402	1.6	-1.1	0.5	21.0	20.5	0.6
	39	2441	1.5	-1.1	0.4	21.0	20.6	0.5
	78	2480	1.3	-1.1	0.2	21.0	20.8	0.3

Chip02

BT GFSK (1-DH5)

Band	Channel No.	Frequency [MHz]	Peak Power@ EUT[dBm]	Cable + Insertion Loss[dB]	Peak Power [dBm]	Limit [dBm]	Margin to Limit [dB]	E.I.R.P [dBm]
2.4 GHz ISM	0	2402	-2.3	-1.2	-3.5	21.0	24.5	-3.4
	39	2441	-2.9	-1.2	-4.1	21.0	25.1	-4.0
	78	2480	-2.8	-1.2	-4.0	21.0	25.0	-3.9

BT π/4 DQPSK (2-DH5)

Band	Channel No.	Frequency [MHz]	Peak Power@ EUT[dBm]	Cable + Insertion Loss[dB]	Peak Power [dBm]	Limit [dBm]	Margin to Limit [dB]	E.I.R.P [dBm]
2.4 GHz ISM	0	2402	-1.1	-1.2	-2.3	21.0	23.3	-2.2
	39	2441	-1.7	-1.2	-2.9	21.0	23.9	-2.8
	78	2480	-1.6	-1.2	-2.8	21.0	23.8	-2.7

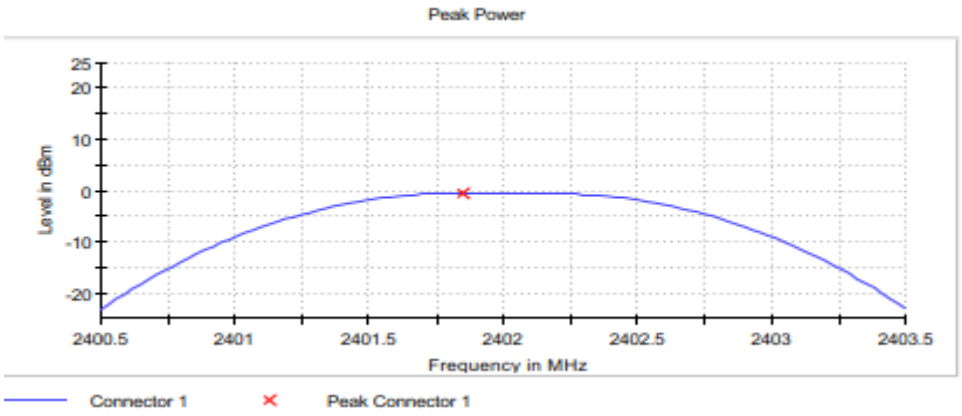
BT 8-DPSK (3-DH5)

Band	Channel No.	Frequency [MHz]	Peak Power@ EUT[dBm]	Cable + Insertion Loss[dB]	Peak Power [dBm]	Limit [dBm]	Margin to Limit [dB]	E.I.R.P [dBm]
2.4 GHz ISM	0	2402	-0.8	-1.2	-2.0	21.0	23.0	-1.9
	39	2441	-1.4	-1.2	-2.6	21.0	23.6	-2.5
	78	2480	-1.4	-1.2	-2.6	21.0	23.6	-2.5

Remark: - Please see next sub-clause for the measurement plot.
- The Results in the following plots are before implementing the cable attenuation correction, the corrected Results are defined in the previous tables.

5.3.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

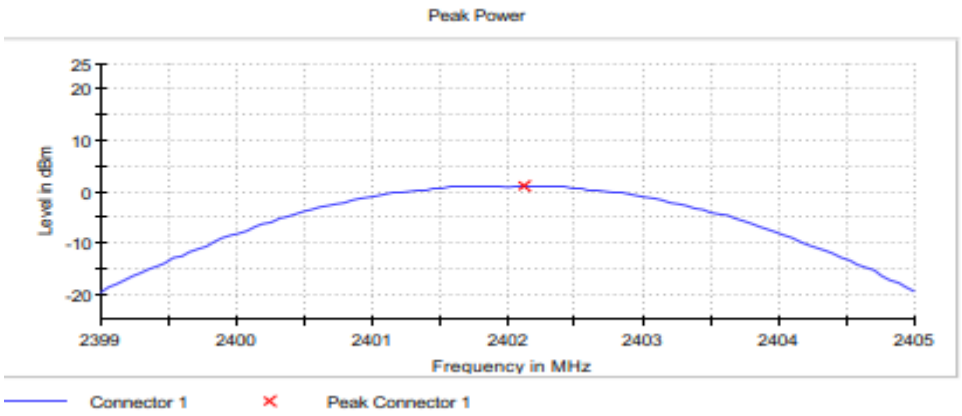
Chip01, Modulation= Bluetooth BR, Operating Channel = 0
(S01_AA01#S3.5)



Measurement

Setting	Instrument Value
Start Frequency	2.40050 GHz
Stop Frequency	2.40350 GHz
Span	3.000 MHz
RBW	1.000 MHz
VBW	3.000 MHz
SweepPoints	101
Sweeptime	4.210 µs
Reference Level	10.000 dBm
Attenuation	20.000 dB
Detector	MaxPeak
SweepCount	100
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.50 dB
Run	4 / max. 150
Stable	3 / 3
Max Stable Difference	0.02 dB

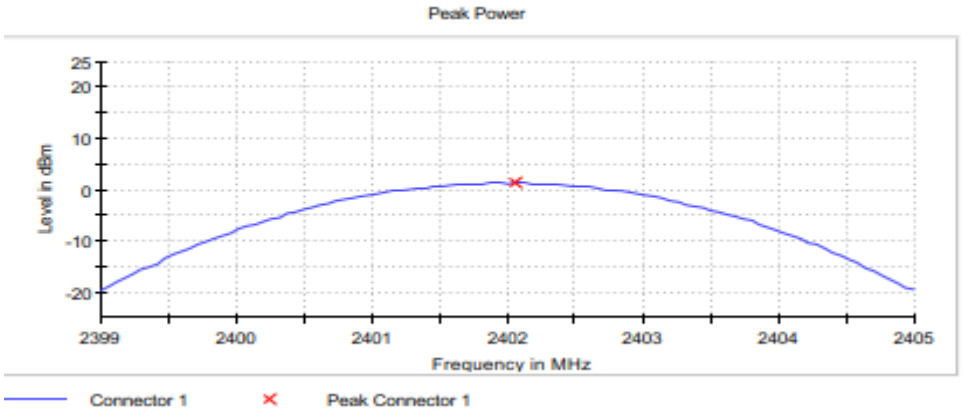
Chip01, Modulation= Bluetooth EDR 2, Operating Channel = 0
(S01_AA01#S3.5)



Measurement

Setting	Instrument Value
Start Frequency	2.39900 GHz
Stop Frequency	2.40500 GHz
Span	6.000 MHz
RBW	2.000 MHz
VBW	10.000 MHz
SweepPoints	101
Sweeptime	1.000 ms
Reference Level	10.000 dBm
Attenuation	20.000 dB
Detector	MaxPeak
SweepCount	100
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	Sweep
Preamp	off
Stablemode	Trace
Stablevalue	0.50 dB
Run	4 / max. 150
Stable	3 / 3
Max Stable Difference	0.12 dB

Chip01, Modulation= Bluetooth EDR 3, Operating Channel = 0
(S01_AA01#S3.5)



Measurement

Setting	Instrument Value
Start Frequency	2.39900 GHz
Stop Frequency	2.40500 GHz
Span	6.000 MHz
RBW	2.000 MHz
VBW	10.000 MHz
SweepPoints	101
Sweeptime	1.000 ms
Reference Level	10.000 dBm
Attenuation	20.000 dB
Detector	MaxPeak
SweepCount	100
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	Sweep
Preamp	off
Stablemode	Trace
Stablevalue	0.50 dB
Run	4 / max. 150
Stable	3 / 3
Max Stable Difference	0.22 dB

5.3.5 TEST EQUIPMENT USED

- R&S TS8997

5.4 SPURIOUS RF CONDUCTED EMISSIONS

Standard **FCC Part 15 Subpart C**

The test was performed according to:
ANSI C63.10, chapter 7.8.8

5.4.1 TEST DESCRIPTION

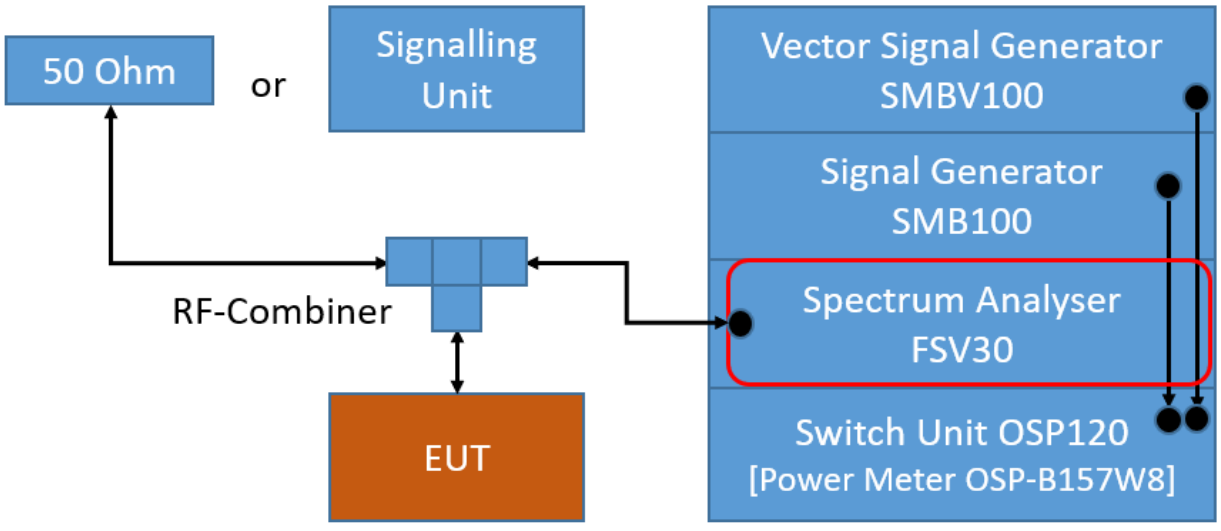
The Equipment Under Test (EUT) was set up to perform the spurious emissions measurements.

The EUT was connected to the test system as described in the block diagram below. The complete attenuation of the measurement path is known and considered.

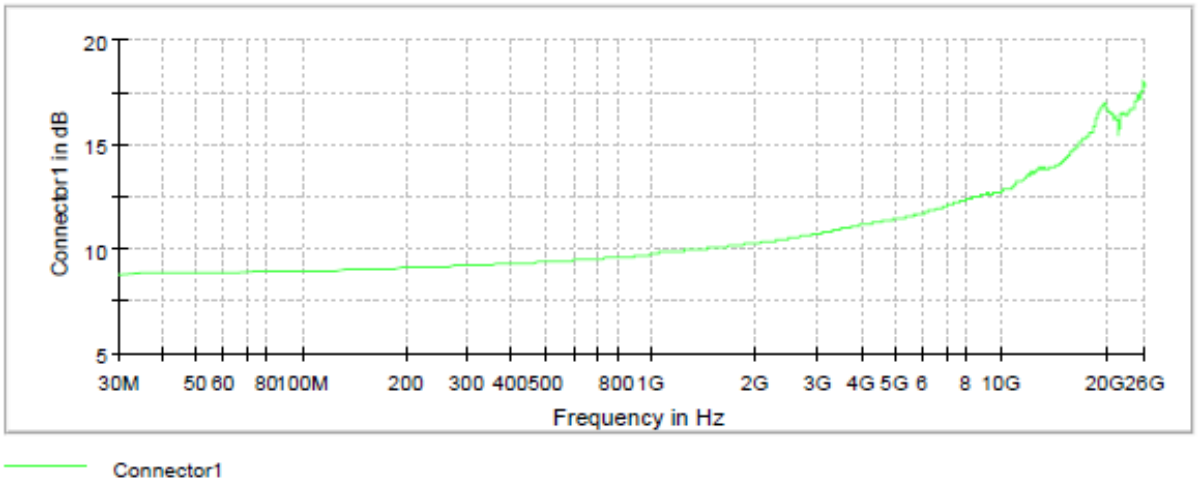
Analyser settings:

- Frequency range: 30 – 26000 MHz
- Resolution Bandwidth (RBW): 100 kHz
- Video Bandwidth (VBW): 300 kHz
- Trace: Maxhold
- Sweeps: Till Stable (max. 120)
- Sweep Time: Auto
- Detector: Peak

The reference value for the measurement of the spurious RF conducted emissions is determined during the test "band edge compliance conducted". This value is used to calculate the 20 dBc or 30 dBc limit.



TS8997; Spurious RF Conducted Emissions



Attenuation of the measurement part

5.4.2 TEST REQUIREMENTS / LIMITS

FCC Part 15, Subpart C, §15.247 (c)
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz 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 30 dB instead of 20 dB.

5.4.3 TEST PROTOCOL

Ambient temperature:	23 °C
Air Pressure:	1030.5 hPa
Humidity:	33%

Chip01

BT GFSK (1-DH5)

Channel No	Channel Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Ref. Level [dBm]	Limit [dBm]	Margin to Limit [dB]
0	2402	2493.5	-55.5	PEAK	100	-1.5	-21.5	34.0
39	2441	2623.5	-55.9	PEAK	100	-1.6	-21.6	34.3
78	2480	2663.5	-57.0	PEAK	100	-1.3	-21.3	35.7

BT π/4 DQPSK (2-DH5)

Channel No	Channel Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Ref. Level [dBm]	Limit [dBm]	Margin to Limit [dB]
0	2402	2493.5	-56.0	PEAK	100	-0.3	-20.3	35.7
39	2441	5203.1	-37.0	PEAK	100	-0.2	-20.2	16.8
78	2480	2663.5	-56.9	PEAK	100	-3.6	-23.6	33.3

BT 8-DPSK (3-DH5)

Channel No	Channel Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Ref. Level [dBm]	Limit [dBm]	Margin to Limit [dB]
0	2402	5203.1	-36.0	PEAK	100	-0.3	-20.3	15.7
39	2441	2533.5	-56.4	PEAK	100	-3.0	-23.0	33.4
78	2480	2663.5	-56.6	PEAK	100	-0.2	-20.2	36.4

Chip02

BT GFSK (1-DH5)

Channel No	Channel Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Ref. Level [dBm]	Limit [dBm]	Margin to Limit [dB]
0	2402	5173.1	-43.6	PEAK	100	-2.1	-22.1	21.5
39	2441	2583.5	-60.4	PEAK	100	-3.6	-23.6	36.8
78	2480	22310.5	-60.5	PEAK	100	-3.3	-23.3	37.2

BT π/4 DQPSK (2-DH5)

Channel No	Channel Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Ref. Level [dBm]	Limit [dBm]	Margin to Limit [dB]
0	2402	5173.1	-44.3	PEAK	100	-3.0	-23.0	21.3
39	2441	2583.5	-60.4	PEAK	100	-7.1	-27.1	33.3
78	2480	5173.1	-43.6	PEAK	100	-2.9	-22.9	20.7

BT 8-DPSK (3-DH5)

Channel No	Channel Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Ref. Level [dBm]	Limit [dBm]	Margin to Limit [dB]
0	2402	2593.5	-60.2	PEAK	100	-2.9	-22.9	37.3
39	2441	2623.5	-60.2	PEAK	100	-3.8	-23.8	36.4
78	2480	2623.5	-60.3	PEAK	100	-3.5	-23.5	36.8

Ambient temperature: 24 °C
Air Pressure: 1015 hPa
Humidity: 39%

Chip01

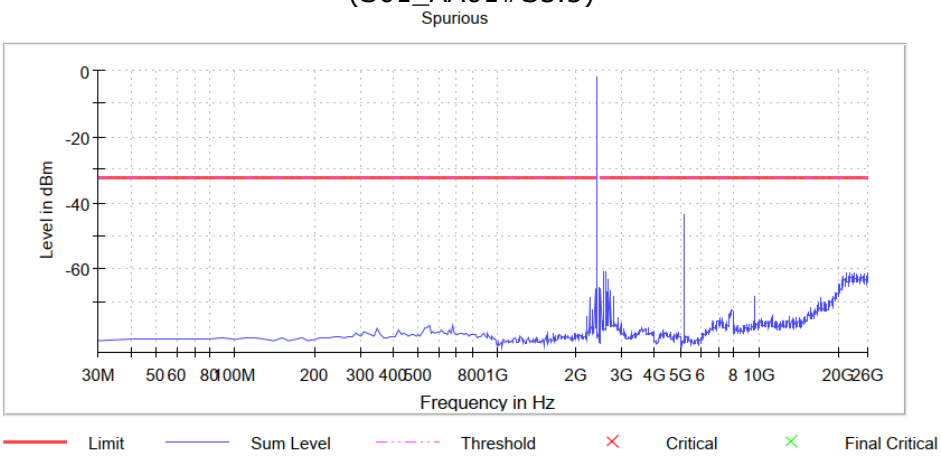
Simultaneous Transmission (Ref. BT 8-DPSK (3-DH5)):

Channel No	Channel Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Ref. Level [dBm]	Limit [dBm]	Margin to Limit [dB]
78	2480	6973.0	-53.6	PEAK	100	-3.0	-23.0	30.6

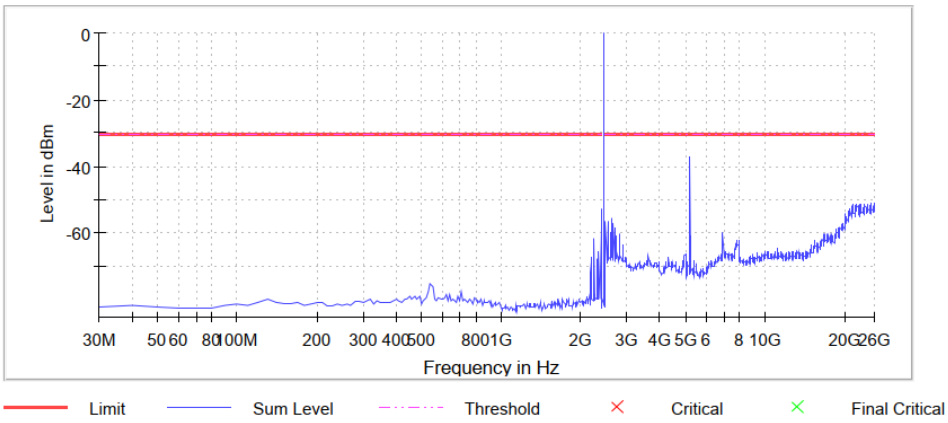
Remark: Please see next sub-clause for the measurement plot.
The used limits in the following plots are not correct, the correct limits are defined in the previous tables.

5.4.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

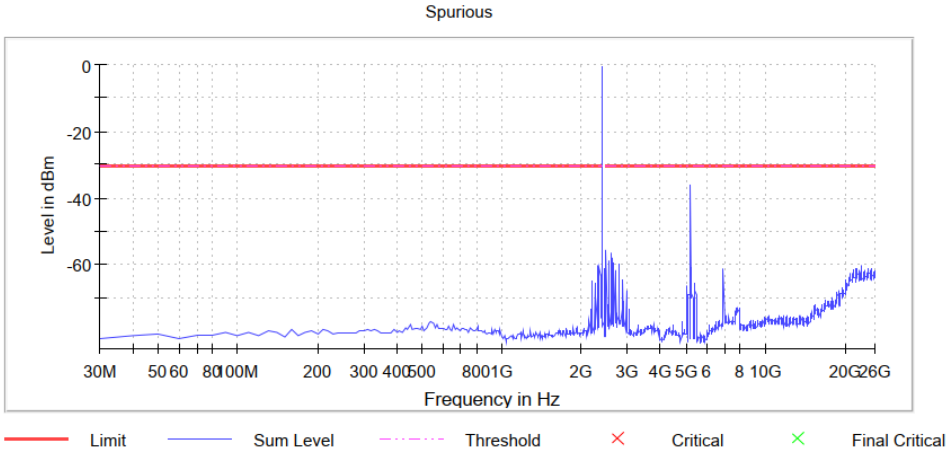
Chip02, Modulation= Bluetooth BR, Operating Channel = 0
(S01_AA01#S3.5)



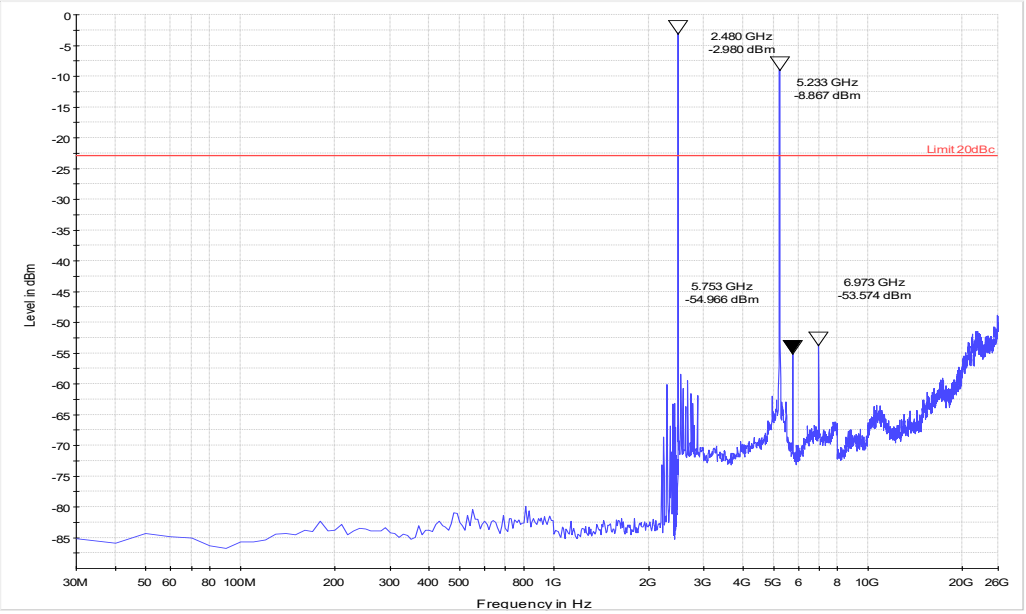
Chip01, Modulation= Bluetooth EDR 2, Operating Channel = 39
(S01_AA01#S3.5)



Chip01, Modulation= Bluetooth EDR 3, Operating Channel = 0
(S01_AA01#S3.5)



Radio Technology = Simultaneous Transmission
(S01_AA01#S3.5)



5.4.5 TEST EQUIPMENT USED

- R&S TS8997

5.5 TRANSMITTER SPURIOUS RADIATED EMISSIONS

Standard **FCC Part 15 Subpart C**

The test was performed according to:
ANSI C63.10, chapter 6.4, 6.5, 6.6.5

5.5.1 TEST DESCRIPTION

The test set-up was made in accordance to the general provisions of ANSI C63.10 in a typical installation configuration. The measurements were performed according the following sub-chapters of ANSI C63.10:

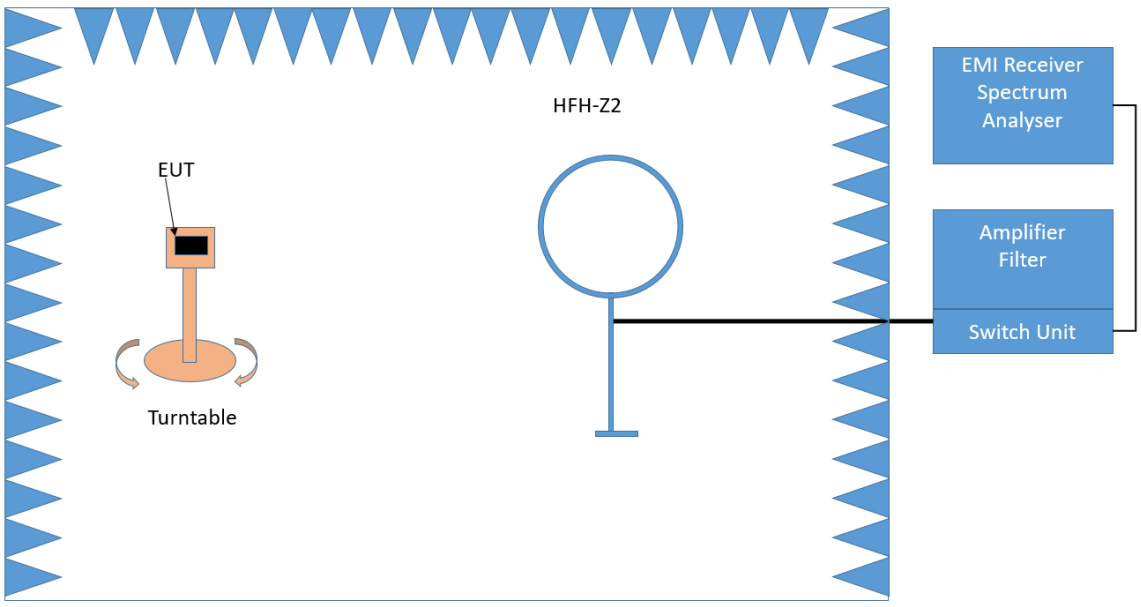
- < 30 MHz: Chapter 6.4
- 30 MHz – 1 GHz: Chapter 6.5
- > 1 GHZ: Chapter 6.6 (procedure according 6.6.5 used)

The measurement procedure is implemented into the EMI test software EMC32 from R&S. Exploratory tests are performed at 3 orthogonal axes to determine the worst-case orientation of a body-worn or handheld EUT. The final test on all kind of EUTs is also performed at 3 axes. A pre-check is performed while the EUT is powered.

Below 1 GHz:

The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The influence of the EUT support table that is used between 30–1000 MHz was evaluated.

1. Measurement up to 30 MHz



Test Setup; Spurious Emission Radiated (SAC), 9 kHz – 30 MHz

The Loop antenna HFH2-Z2 is used.

Step 1: pre measurement

- Anechoic chamber
- Antenna distance: 3 m
- Antenna height: 1 m
- Detector: Peak-Maxhold
- Frequency range: 0.009 - 0.15 MHz and 0.15 – 30 MHz
- Frequency steps: 0.05 kHz and 2.25 kHz
- IF–Bandwidth: 0.2 kHz and 9 kHz
- Measuring time / Frequency step: 100 ms (FFT-based)

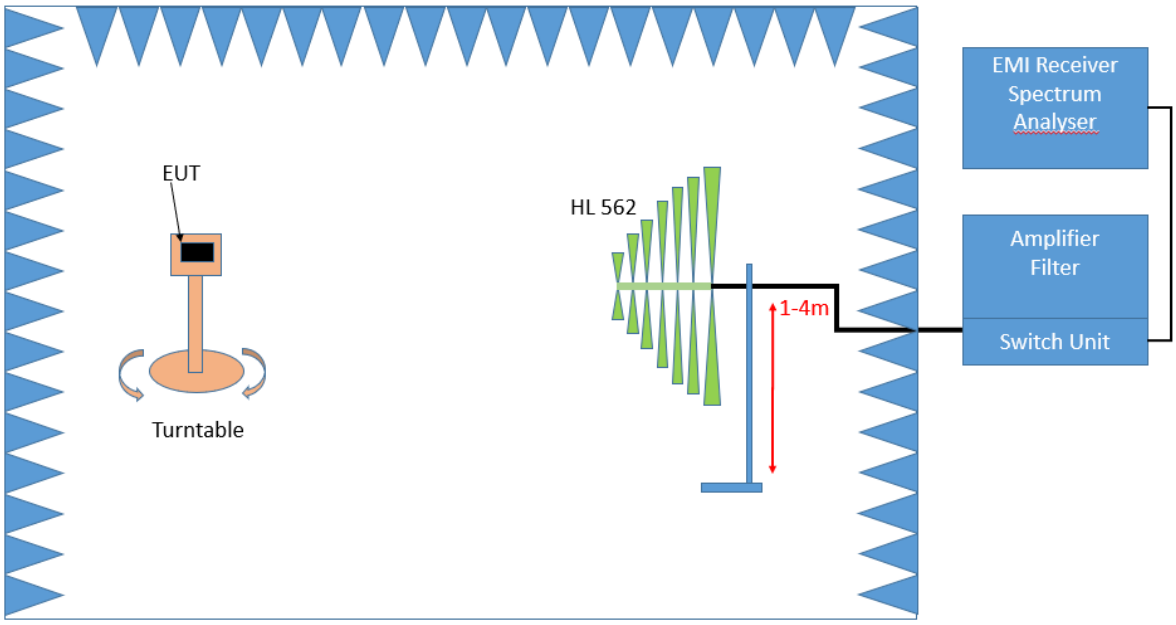
Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

Step 2: final measurement

For the relevant emissions determined in step 1, an additional measurement with the following settings will be performed. Intention of this step is to find the maximum emission level.

- Detector: Quasi-Peak (9 kHz – 150 kHz, Peak / Average 150 kHz- 30 MHz)
- Frequency range: 0.009 – 30 MHz
- Frequency steps: measurement at frequencies detected in step 1
- IF–Bandwidth: 0.2 - 10 kHz
- Measuring time / Frequency step: 1 s

2. Measurement above 30 MHz and up to 1 GHz



Test Setup; Spurious Emission Radiated (SAC), 30 MHz- 1GHz

Step 1: Preliminary scan
This is a preliminary test to identify the highest amplitudes relative to the limit.
Settings for step 1:
- Antenna distance: 3 m
- Detector: Peak-Maxhold / Quasipeak (FFT-based)
- Frequency range: 30 – 1000 MHz
- Frequency steps: 30 kHz
- IF–Bandwidth: 120 kHz
- Measuring time / Frequency step: 100 ms
- Turntable angle range: –180° to 90°
- Turntable step size: 90°
- Height variation range: 1 – 4 m
- Height variation step size: 1.5 m
- Polarisation: Horizontal + Vertical

Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

Step 2: Adjustment measurement
In this step the accuracy of the turntable azimuth and antenna height will be improved. This is necessary to find out the maximum value of every frequency.
For each frequency, which was determined the turntable azimuth and antenna height will be adjusted. The turntable azimuth will slowly vary by 360°. During this action, the value of emission is continuously measured. The turntable azimuth at the highest emission will be recorded and adjusted. In this position, the antenna height will also slowly vary between 1 – 4 meter. During this action, the value of emission is also continuously measured. The antenna height of the highest emission will also be recorded and adjusted.
- Detector: Peak – Maxhold
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 100 ms
- Turntable angle range: 360 °
- Height variation range:1 – 4 m
- Antenna Polarisation: max. value determined in step 1

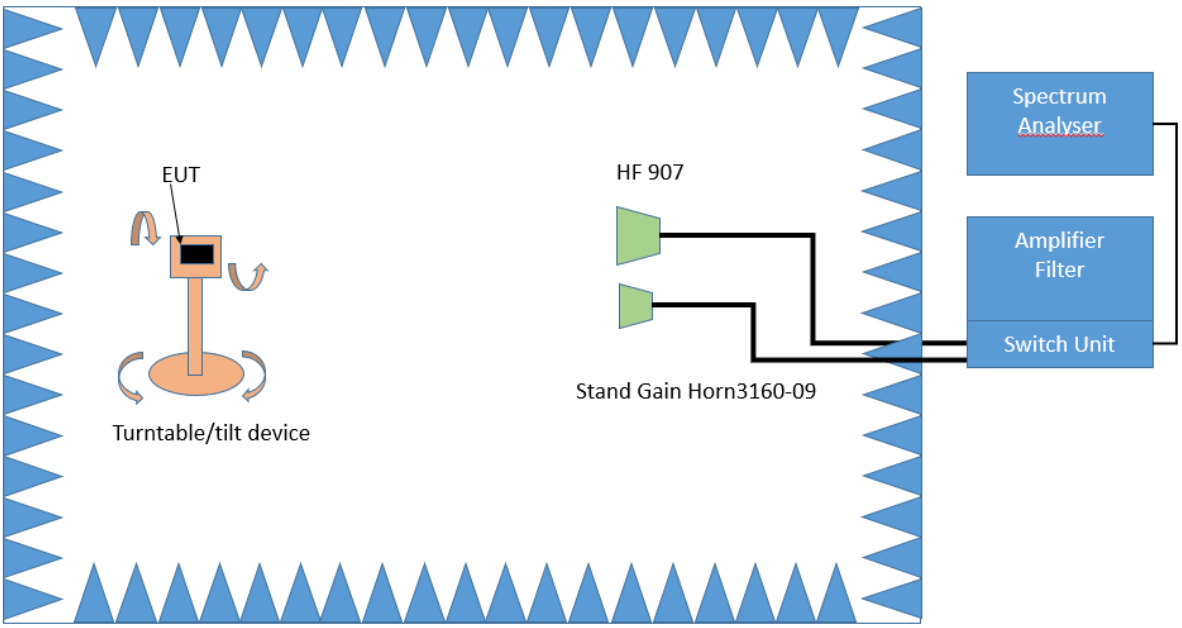
Step 3: Final measurement with QP detector
With the settings determined in step 2, the final measurement will be performed:
EMI receiver settings for step 3:
- Detector: Quasi-Peak (< 1 GHz)
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 1 s

After the measurement a plot will be generated which contains a diagram with the results of the preliminary scan and a chart with the frequencies and values of the results of the final measurement.

Above 1 GHz:

The Equipment Under Test (EUT) was set up on a non-conductive support (tilt device) at 1.5 m height in the fully-anechoic chamber.
All steps were performed with one height (1.5 m) of the receiving antenna only.

3. Measurement above 1 GHz



Test Setup; Spurious Emission Radiated (FAC), 1 GHz-26.5 GHz

Step 1:
The EUT is turned during the preliminary measurement across the elevation axis, with a step size of 90 °.
The turn table step size (azimuth angle) for the preliminary measurement is 45 °.
Spectrum analyser settings:
- Detector: Peak, Average
- RBW = 1 MHz
- VBW = 3 MHz

Step 2:
The turn table azimuth will slowly vary by ± 22.5°.
The elevation angle will slowly vary by ± 45°
Spectrum analyser settings:
- Detector: Peak

Step 3:
Spectrum analyser settings for step 3:
- Detector: Peak / CISPR Average
- Measured frequencies: in step 1 determined frequencies
- RBW = 1 MHz
- VBW = 3 MHz
- Measuring time: 1 s

5.5.2 TEST REQUIREMENTS / LIMITS

FCC Part 15, Subpart C, §15.247 (d)
... In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

FCC Part 15, Subpart C, §15.209, Radiated Emission Limits

Frequency in MHz	Limit (µV/m)	Measurement distance (m)	Limits (dBµV/m)
0.009 – 0.49	2400/F(kHz)@300m	3	(48.5 – 13.8)@300m
0.49 – 1.705	24000/F(kHz)@30m	3	(33.8 – 23.0)@30m
1.705 – 30	30@30m	3	29.5@30m

The measured values are corrected with an inverse linear distance extrapolation factor (40 dB/decade) according FCC 15.31 (2).

Frequency in MHz	Limit (µV/m)	Measurement distance (m)	Limits (dBµV/m)
30 – 88	100@3m	3	40.0@3m
88 – 216	150@3m	3	43.5@3m
216 – 960	200@3m	3	46.0@3m
960 - 26000	500@3m	3	54.0@3m
26000 - 40000	500@3m	1	54.0@3m

The measured values above 26 GHz are corrected with an inverse linear distance extrapolation factor (20 dB/decade).

§15.35(b) ..., there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit....

Used conversion factor: Limit (dBµV/m) = 20 log (Limit (µV/m)/1µV/m)

5.5.3 TEST PROTOCOL

Ambient temperature:	20–22 °C
Air Pressure:	999–1010 hPa
Humidity:	38–45 %

Chip01(S01_AB01#S3.5)
BT π/4 DQPSK (2-DH5)

Ch. No.	Ch. Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin to Limit [dB]	Limit Type
0	2402*	- - -	- - -	- - -	- - -	- - -	- - -	RB
39	2441*	- - -	- - -	- - -	- - -	- - -	- - -	RB
78	2480*	- - -	- - -	- - -	- - -	- - -	- - -	RB

Chip01(S01_AB01#S3.5)

BT 8-DPSK (3-DH5)

Ch. No.	Ch. Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin to Limit [dB]	Limit Type
0	2402	150.0	29.1	QP	120	43.5	14.4	RB
0	2402	162.5	29.2	QP	120	43.5	14.3	RB
0	2402	168.1	35.9	QP	120	43.5	7.6	RB
0	2402	404.2	39.7	QP	120	46.0	6.3	RB
0	2402	407.6	40.9	QP	120	46.0	5.1	RB
0	2402	410.0	43.2	QP	120	46.0	2.8	RB
0	2402	608.2	37.6	QP	120	46.0	8.5	RB
0	2402	5136.8	48.6	PEAK	1000	74.0	25.4	RB
39	2441	150.1	28.5	QP	120	43.5	15.0	RB
39	2441	162.5	29.7	QP	120	43.5	13.8	RB
39	2441	168.1	36.1	QP	120	43.5	7.4	RB
39	2441	404.2	39.8	QP	120	46.0	6.2	RB
39	2441	410.0	42.4	QP	120	46.0	3.6	RB
39	2441	608.3	39.7	QP	120	46.0	6.3	RB
39	2441	1198.2	46.6	PEAK	1000	74.0	27.4	RB
39	2441	2489.3	50.9	PEAK	1000	74.0	23.1	RB
78	2480	150.1	28.0	QP	120	43.5	15.5	RB
78	2480	165.1	33.0	QP	120	43.5	10.5	RB
78	2480	168.1	37.0	QP	120	43.5	6.5	RB
78	2480	404.2	39.9	QP	120	46.0	6.1	RB
78	2480	410.0	43.2	QP	120	46.0	2.8	RB
78	2480	608.2	37.7	QP	120	46.0	8.3	RB

Chip02(S01_AB01#S3.5)

BT π/4 DQPSK (2-DH5)

Ch. No.	Ch. Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin to Limit [dB]	Limit Type
0	2402*	- - -	- - -	- - -	- - -	- - -	- - -	RB
39	2441*	- - -	- - -	- - -	- - -	- - -	- - -	RB
78	2480*	- - -	- - -	- - -	- - -	- - -	- - -	RB

Chip02 (S01_AB01#S3.5)
BT 8-DPSK (3-DH5)

Ch. No.	Ch. Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin to Limit [dB]	Limit Type
0	2402	150.0	27.3	QP	120	43.5	16.2	RB
0	2402	165.2	34.0	QP	120	43.5	9.5	RB
0	2402	404.1	41.2	QP	120	46.0	4.8	RB
0	2402	410.0	42.3	QP	120	46.0	3.7	RB
0	2402	608.3	32.3	QP	120	46.0	13.7	RB
39	2441	165.2	35.4	QP	120	43.5	8.1	RB
39	2441	404.2	41.4	QP	120	46.0	4.7	RB
39	2441	410.0	42.0	QP	120	46.0	4.1	RB
39	2441	608.3	37.6	QP	120	46.0	8.4	RB
39	2441	2800.5	51.7	PEAK	1000	74.0	22.3	RB
78	2480	165.1	33.4	QP	120	43.5	10.1	RB
78	2480	327.9	20.5	QP	120	46.0	25.5	RB
78	2480	404.2	39.2	QP	120	46.0	6.9	RB
78	2480	410.0	43.0	QP	120	46.0	3.0	RB
78	2480	611.1	36.1	QP	120	46.0	9.9	RB

==========

Chip01(S01_AA01#S3.0)
BT 8-DPSK (3-DH5)

Ch. No.	Ch. Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin to Limit [dB]	Limit Type
78	2480*	- - -	- - -	- - -	- - -	- - -	- - -	RB

Chip02(S01_AA01#S3.0)
BT 8-DPSK (3-DH5)

Ch. No.	Ch. Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin to Limit [dB]	Limit Type
0	2402	150.0	32.5	QP	120	43.5	11.0	RB
0	2402	165.1	26.8	QP	120	43.5	16.7	RB
0	2402	283.8	20.4	QP	120	46.0	25.6	RB
0	2402	334.4	27.9	QP	120	46.0	18.2	RB
0	2402	410.0	37.3	QP	120	46.0	8.7	RB
0	2402	611.8	20.8	QP	120	46.0	25.2	RB
39	2441*	- - -	- - -	- - -	- - -	- - -	- - -	RB
78	2480	5079.0	48.0	PEAK	1000	74.0	26.0	RB

Remark: - Please see next sub-clause for the measurement plot.
- The measurements have been performed only on worst-case modes" BT 8-DPSK (3-DH5) and BT π/4 DQPSK (2-DH5)", which they have the widest bandwidth and highest output power.

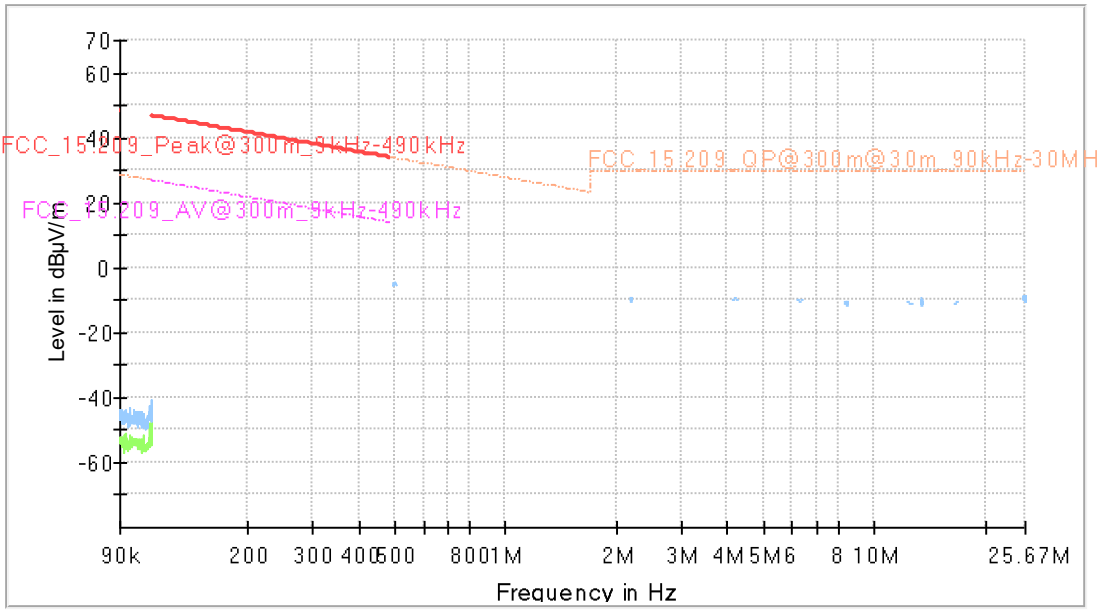
***) no peaks have been found for these operating channels /operating modes**

5.5.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

Trace:
blue = Peak (9 kHz - 40 GHz)
green = AV (9 kHz – 30 MHz and 1 - 26 GHz), QP (30 MHz - 1 GHz)

Marker:
Star = critical frequency, Rhombus = final Results

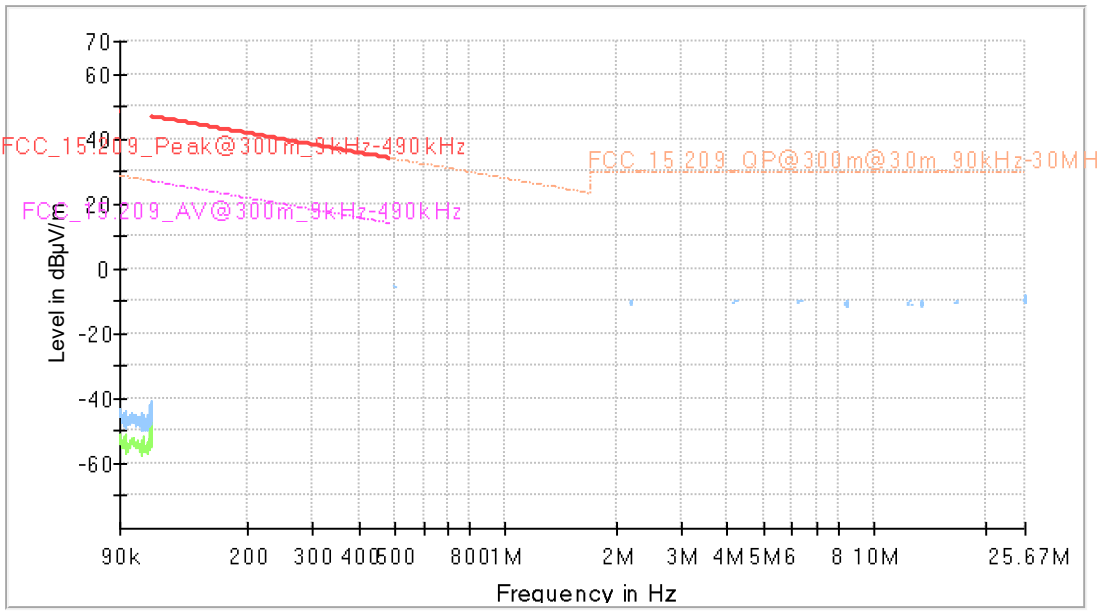
Chip01, Modulation= Bluetooth EDR 3, Operating Channel = 39
Measurements range = 9 kHz – 30 MHz
(S01_AB01#S3.5)



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---	---	---	---	---	---

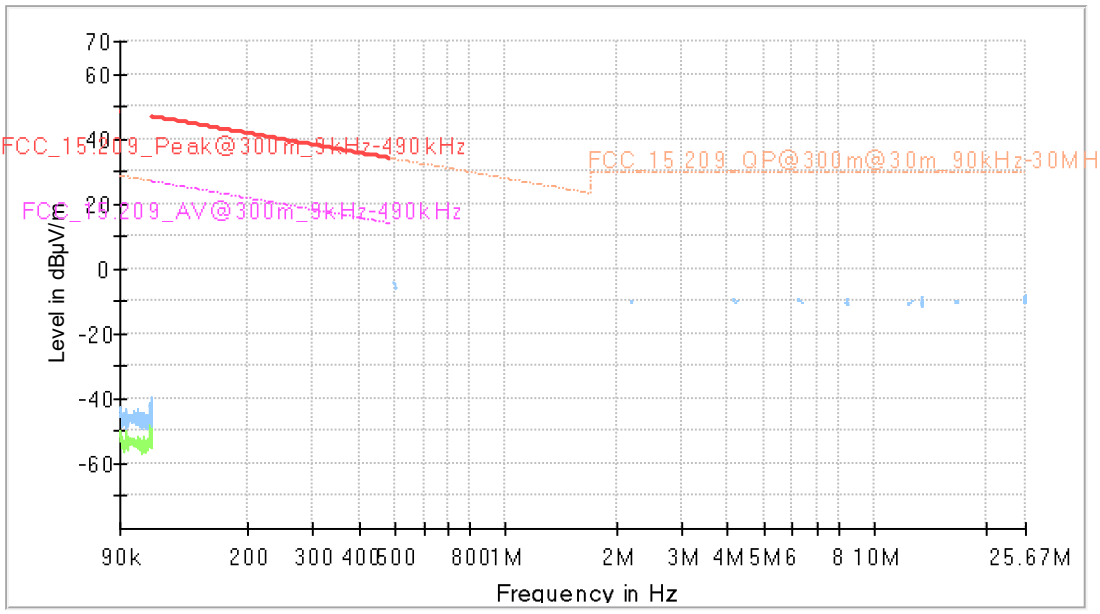
Chip02, Modulation= Bluetooth EDR 3, Operating Channel = 39
Measurements range = 9 kHz – 30 MHz
(S01_AB01#S3.5)



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---	---	---	---	---	---

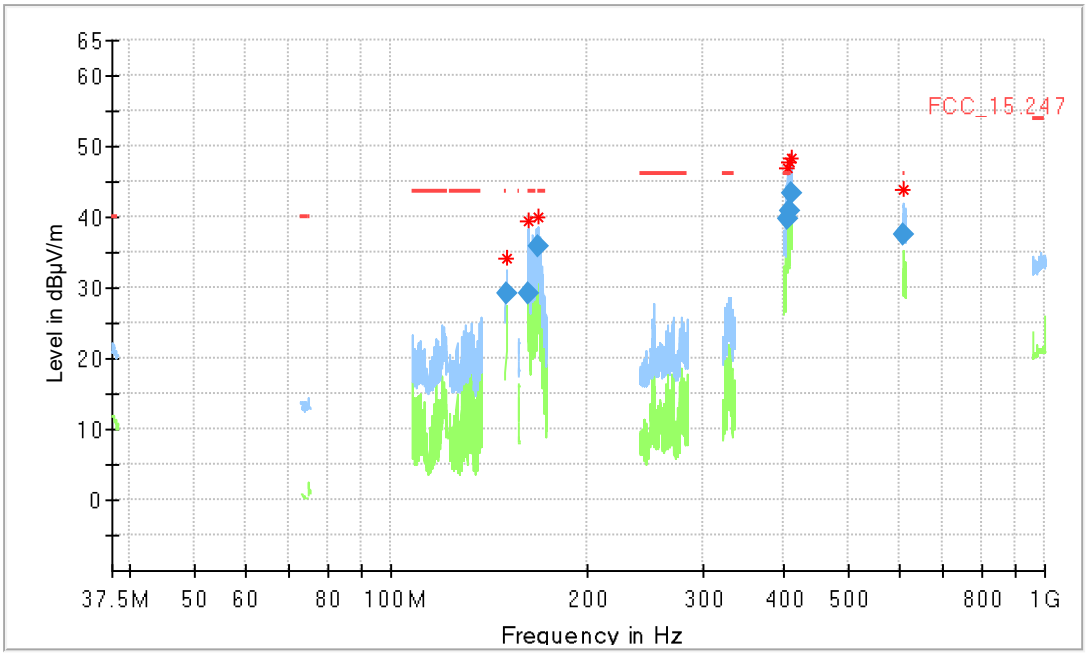
Chip02, Modulation= Bluetooth EDR 3, Operating Channel = 39
Measurements range = 9 kHz – 30 MHz
(S01_AA01#S3.0)



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Azimuth (deg)	Corr. (dB/m)
---	---	---	---	---	---	---	---	---	---

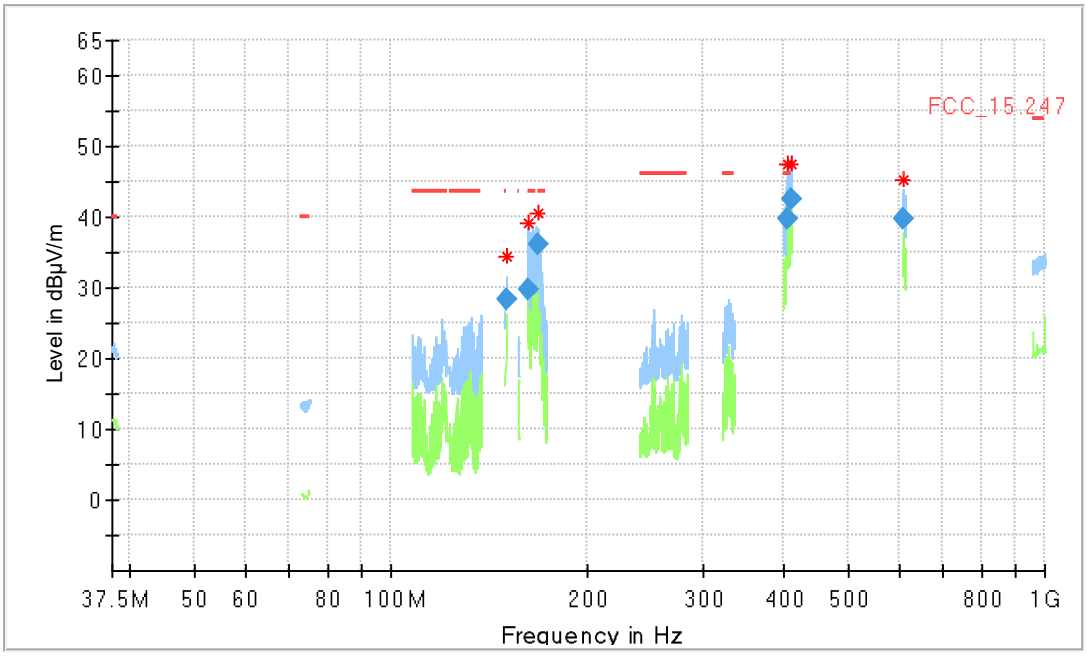
Chip01, Modulation= Bluetooth EDR 3, Operating Channel = 0
Measurements range = 30 MHz – 1 GHz
(S01_AB01#S3.5)



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
150.020000	29.10	43.50	14.40	1000.0	120.000	219.0	H	154.0	9.9
162.522500	29.18	43.50	14.32	1000.0	120.000	150.0	H	149.0	9.9
168.050000	35.88	43.50	7.62	1000.0	120.000	116.0	V	38.0	10.2
404.160000	39.68	46.00	6.32	1000.0	120.000	104.0	H	278.0	18.2
407.610000	40.93	46.00	5.07	1000.0	120.000	107.0	H	281.0	18.3
409.980000	43.22	46.00	2.78	1000.0	120.000	106.0	H	282.0	18.4
608.240000	37.55	46.00	8.45	1000.0	120.000	113.0	V	130.0	23.0

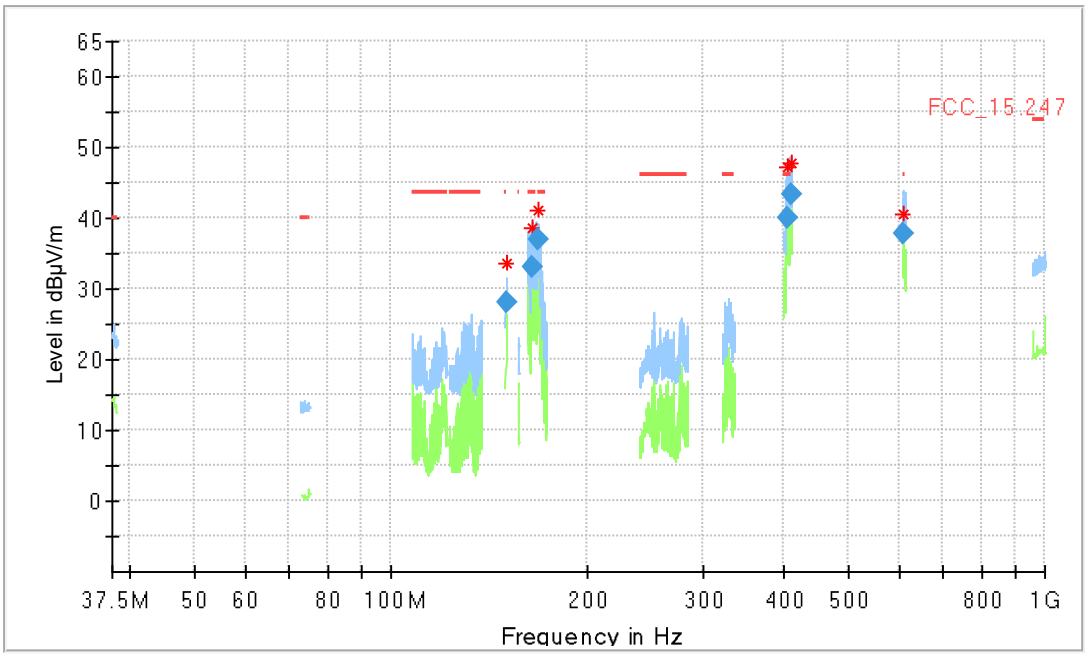
Chip01, Modulation= Bluetooth EDR 3, Operating Channel = 39
Measurements range = 30 MHz – 1 GHz
(S01_AB01#S3.5)



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
150.050000	28.47	43.50	15.03	1000.0	120.000	176.0	H	154.0	9.9
162.522500	29.68	43.50	13.82	1000.0	120.000	112.0	V	315.0	9.9
168.050000	36.13	43.50	7.37	1000.0	120.000	104.0	V	36.0	10.2
404.190000	39.84	46.00	6.16	1000.0	120.000	104.0	H	276.0	18.2
409.950000	42.42	46.00	3.58	1000.0	120.000	111.0	H	285.0	18.4
608.270000	39.66	46.00	6.34	1000.0	120.000	100.0	H	265.0	23.0

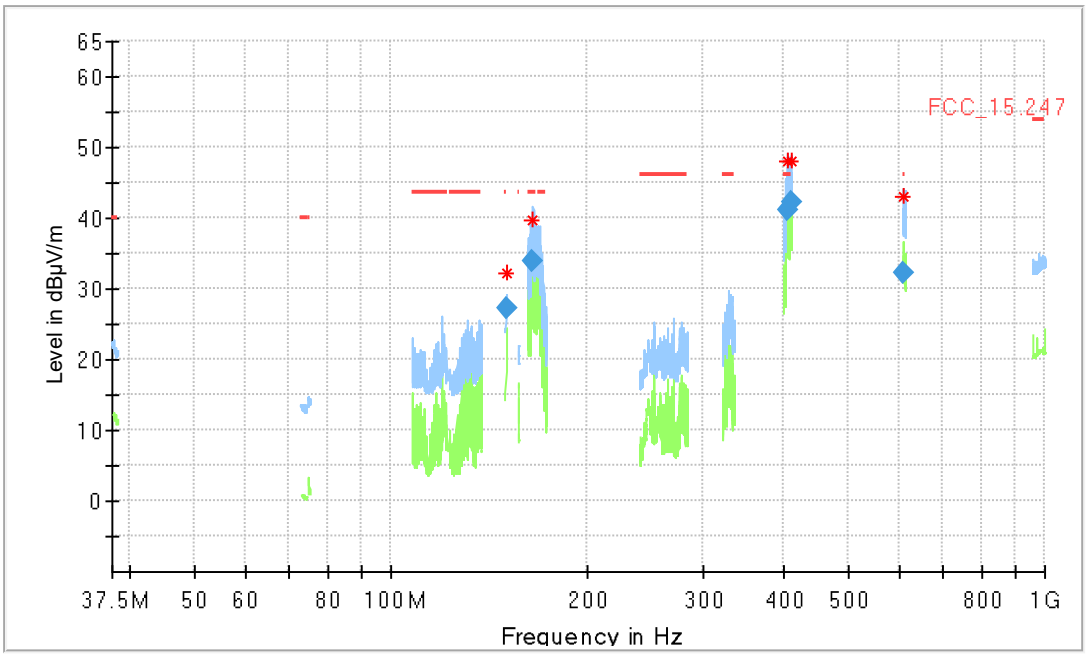
Chip01, Modulation= Bluetooth EDR 3, Operating Channel = 78
Measurements range = 30 MHz – 1 GHz
(S01_AB01#S3.5)



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
150.050000	27.96	43.50	15.54	1000.0	120.000	214.0	H	144.0	9.9
165.132500	32.98	43.50	10.52	1000.0	120.000	104.0	V	48.0	10.0
168.050000	36.96	43.50	6.54	1000.0	120.000	106.0	V	32.0	10.2
404.160000	39.89	46.00	6.11	1000.0	120.000	113.0	H	287.0	18.2
409.980000	43.20	46.00	2.80	1000.0	120.000	104.0	H	286.0	18.4
608.210000	37.71	46.00	8.29	1000.0	120.000	110.0	H	258.0	23.0

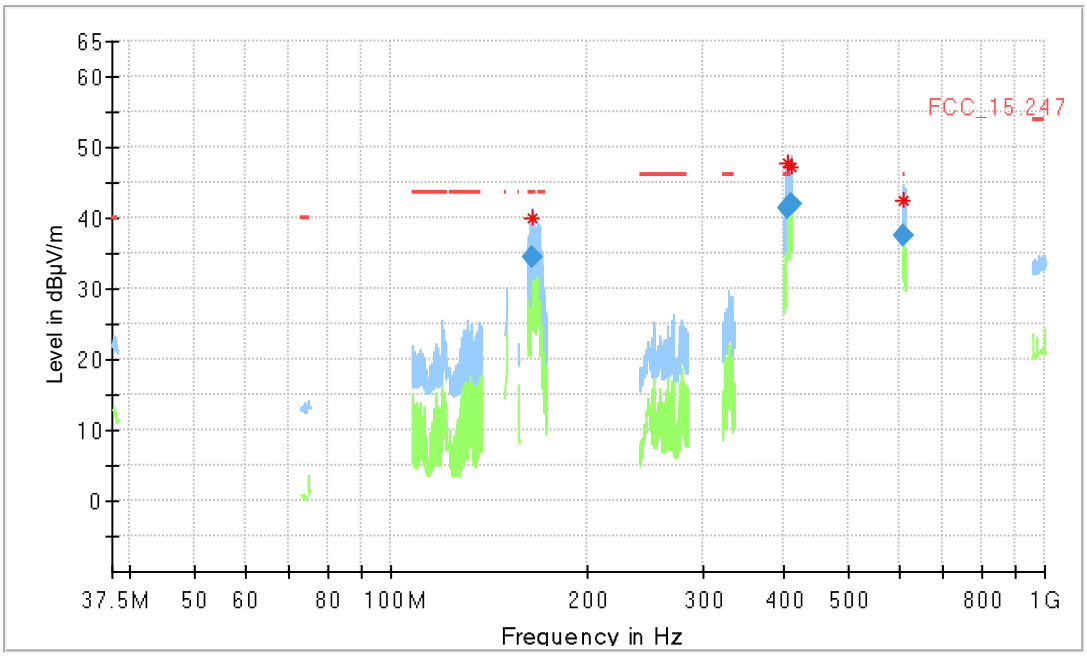
Chip02, Modulation= Bluetooth EDR 3, Operating Channel = 0
Measurements range = 30 MHz – 1 GHz
(S01_AB01#S3.5)



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
150.020000	27.28	43.50	16.22	1000.0	120.000	206.0	H	138.0	9.9
165.162500	34.01	43.50	9.49	1000.0	120.000	105.0	V	66.0	10.0
404.130000	41.19	46.00	4.81	1000.0	120.000	105.0	H	273.0	18.2
409.950000	42.26	46.00	3.74	1000.0	120.000	104.0	H	282.0	18.4
608.330000	32.31	46.00	13.69	1000.0	120.000	100.0	H	252.0	23.0

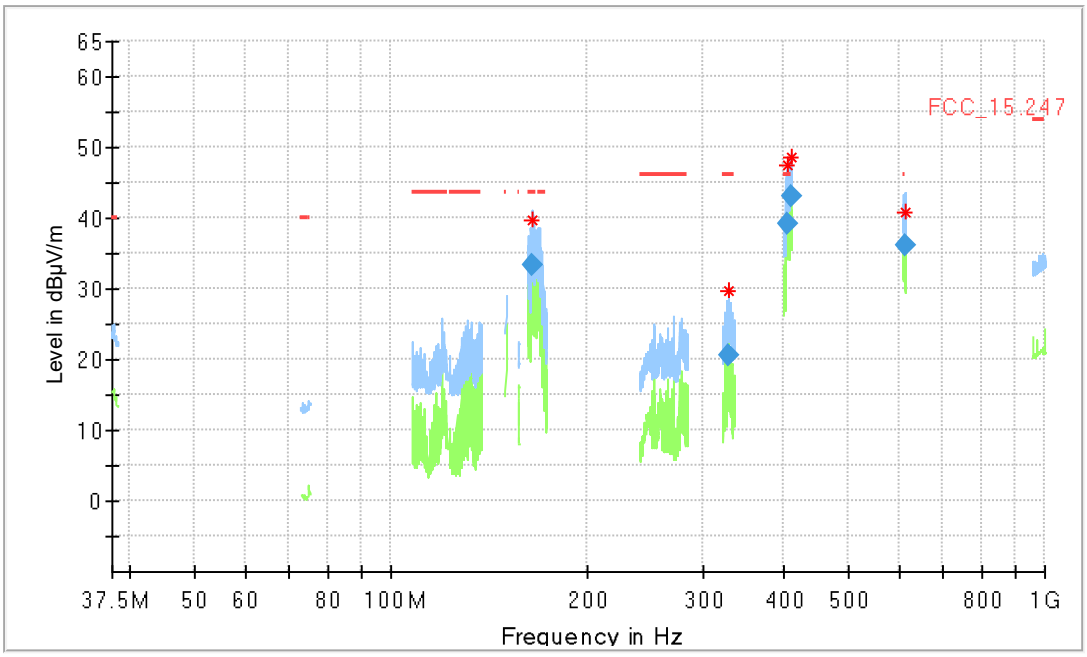
Chip02, Modulation= Bluetooth EDR 3, Operating Channel = 39
Measurements range = 30 MHz – 1 GHz
(S01_AB01#S3.5)



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
165.162500	34.39	43.50	9.11	1000.0	120.000	100.0	V	75.0	10.0
404.160000	41.35	46.00	4.65	1000.0	120.000	104.0	H	285.0	18.2
409.950000	41.95	46.00	4.05	1000.0	120.000	107.0	H	286.0	18.4
608.330000	37.60	46.00	8.40	1000.0	120.000	105.0	H	256.0	23.0

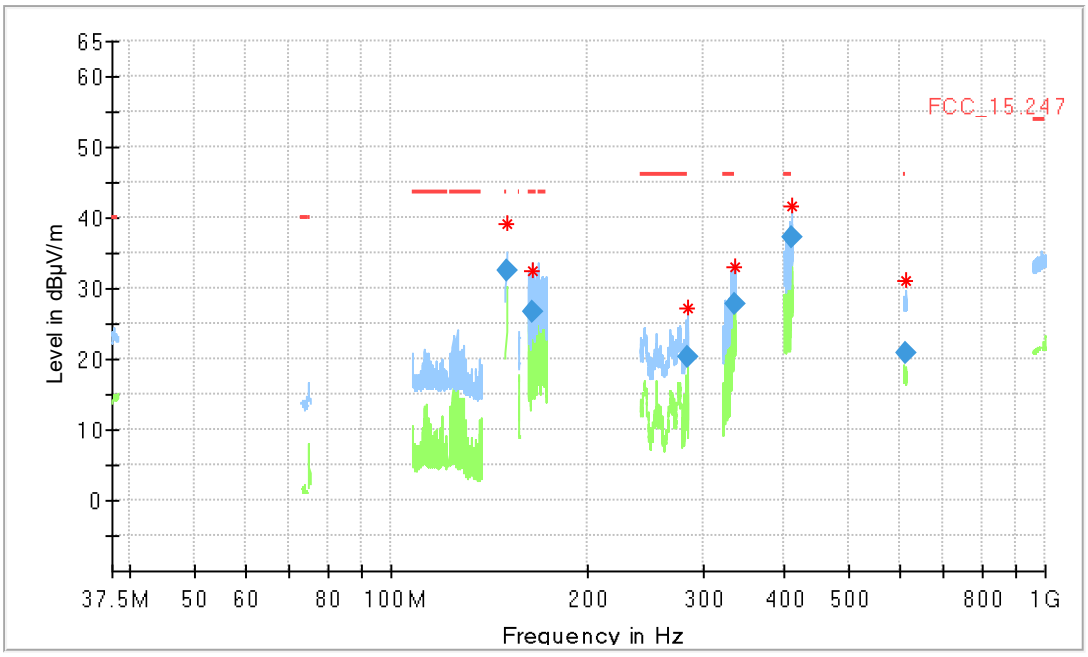
Chip02, Modulation= Bluetooth EDR 3, Operating Channel = 78
Measurements range = 30 MHz – 1 GHz
(S01_AB01#S3.5)



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
165.132500	33.40	43.50	10.10	1000.0	120.000	107.0	V	209.0	10.0
327.940000	20.54	46.00	25.46	1000.0	120.000	112.0	V	168.0	15.6
404.220000	39.15	46.00	6.85	1000.0	120.000	106.0	H	284.0	18.2
409.950000	42.97	46.00	3.03	1000.0	120.000	100.0	H	292.0	18.4
611.120000	36.14	46.00	9.86	1000.0	120.000	109.0	H	257.0	23.1

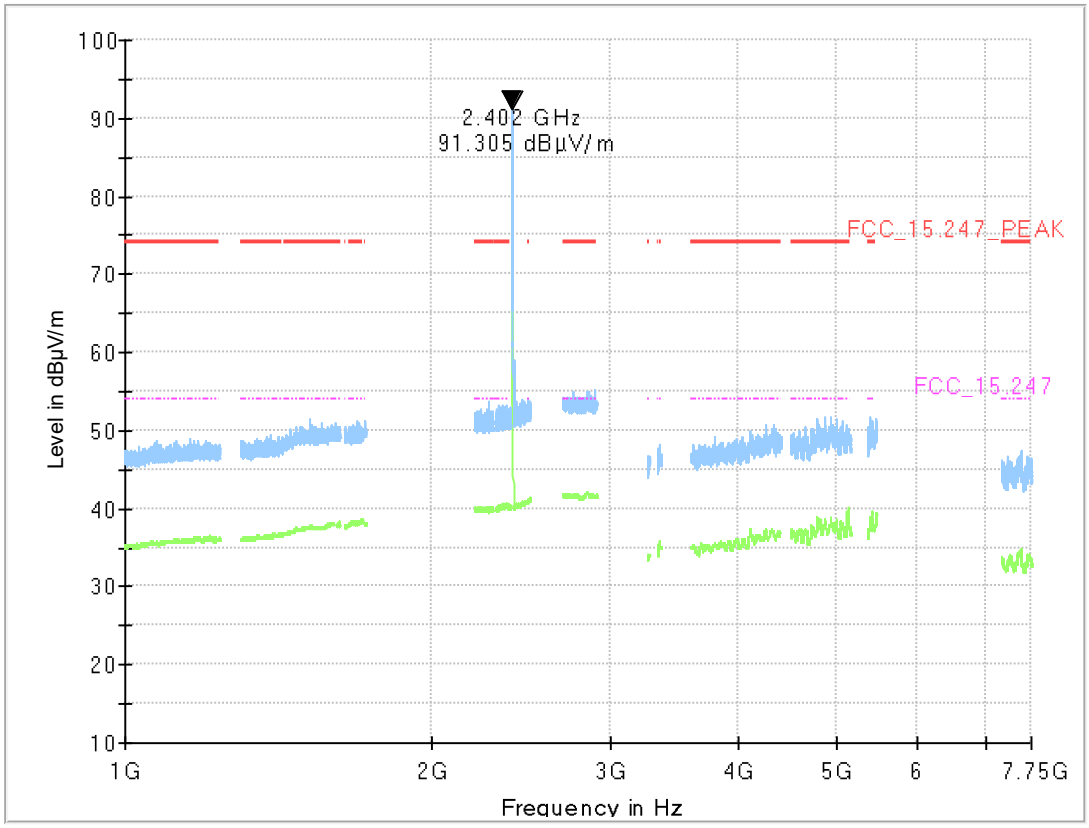
Chip02, Modulation= Bluetooth EDR 3, Operating Channel = 0
Measurements range = 30 MHz – 1 GHz
(S01_AA01#S3.0)



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
150.020000	32.50	43.50	11.00	1000.0	120.000	199.0	H	230.0	9.9
165.132500	26.79	43.50	16.71	1000.0	120.000	104.0	V	340.0	10.0
283.800000	20.37	46.00	25.63	1000.0	120.000	116.0	H	109.0	14.0
334.390000	27.85	46.00	18.15	1000.0	120.000	118.0	H	319.0	15.9
409.950000	37.34	46.00	8.66	1000.0	120.000	100.0	H	24.0	18.4
611.780000	20.77	46.00	25.23	1000.0	120.000	115.0	H	153.0	23.1

Chip01, Modulation= Bluetooth EDR 2, Operating Channel = 0
Measurements range = 1 GHz – 8 GHz
(S01_AB01#S3.5)



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
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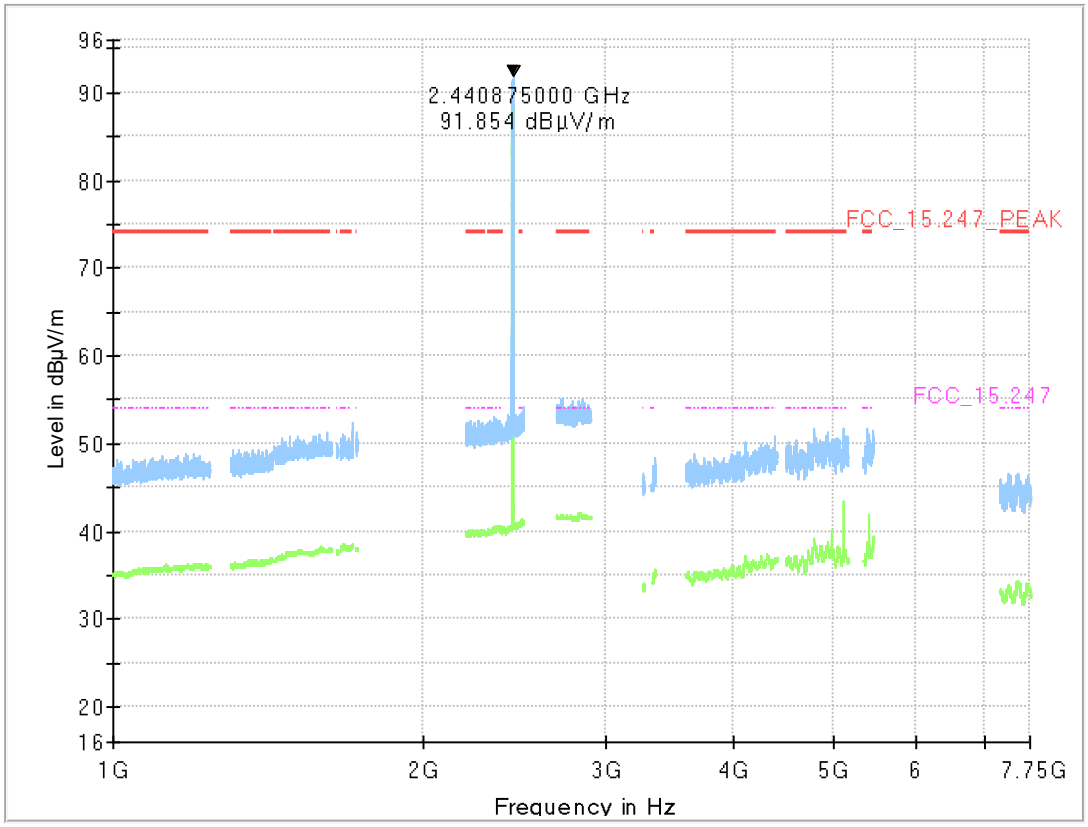
(Note: the peak at 2402 MHz is the wanted signal)

Chip01, Modulation= Bluetooth EDR 2, Operating Channel = 39
Measurements range = 1 GHz – 8 GHz
(S01_AB01#S3.5)

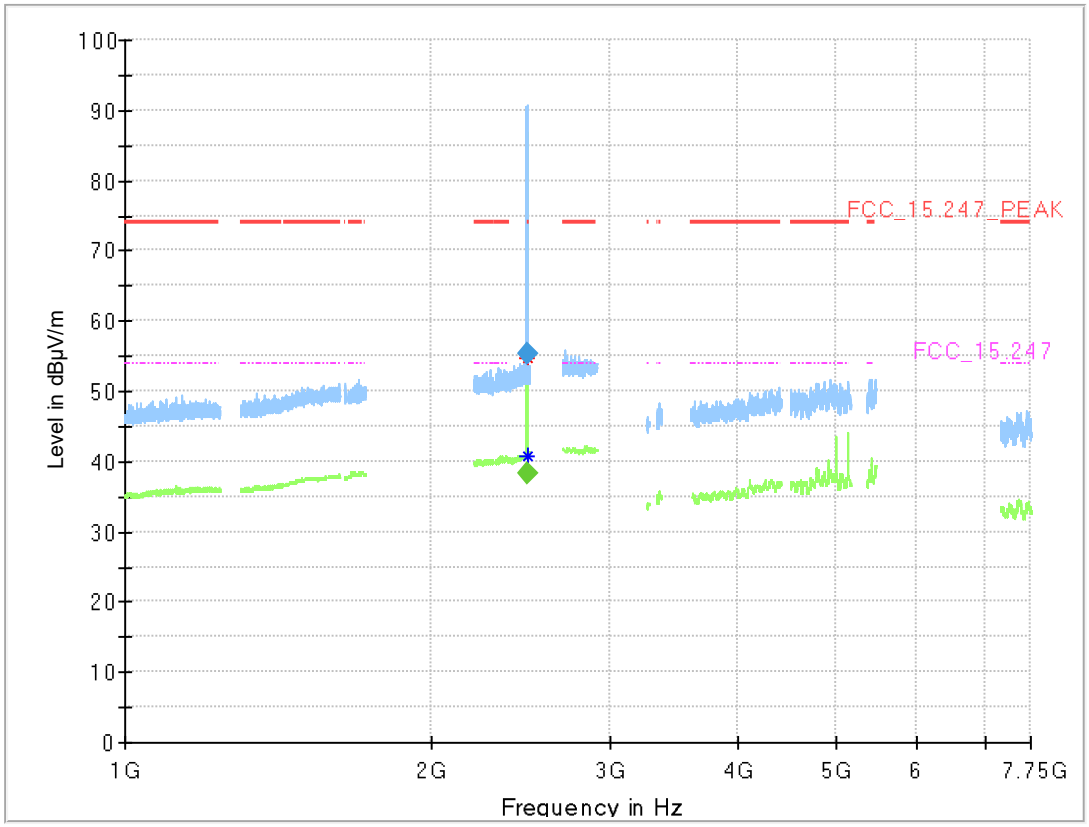


Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
---	---	---	---	---	---	---	---		---	---	---

(Note: the peak at 2440 MHz is the wanted signal)

Chip01, Modulation= Bluetooth EDR 2, Operating Channel = 78
Measurements range = 1 GHz – 8 GHz
(S01_AB01#S3.5)

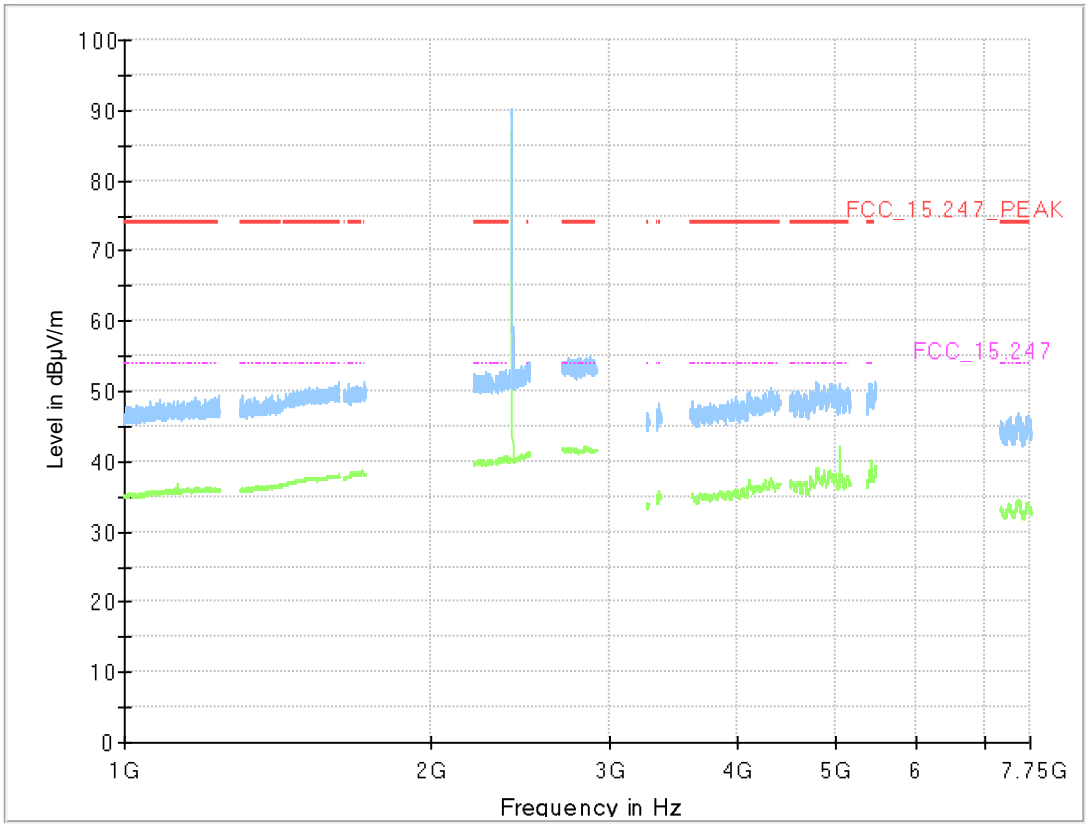


Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
2483.625	---	38.2	54.00	15.78	1000.0	1000.000	150.0	H	-23.0	100.0	8.0
2483.625	55.4	---	74.00	18.61	1000.0	1000.000	150.0	H	-23.0	100.0	8.0

(Note: the peak at 2480 MHz is the wanted signal)

Chip02, Modulation= Bluetooth EDR 2, Operating Channel = 0
Measurements range = 1 GHz – 8 GHz
(S01_AB01#S3.5)



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
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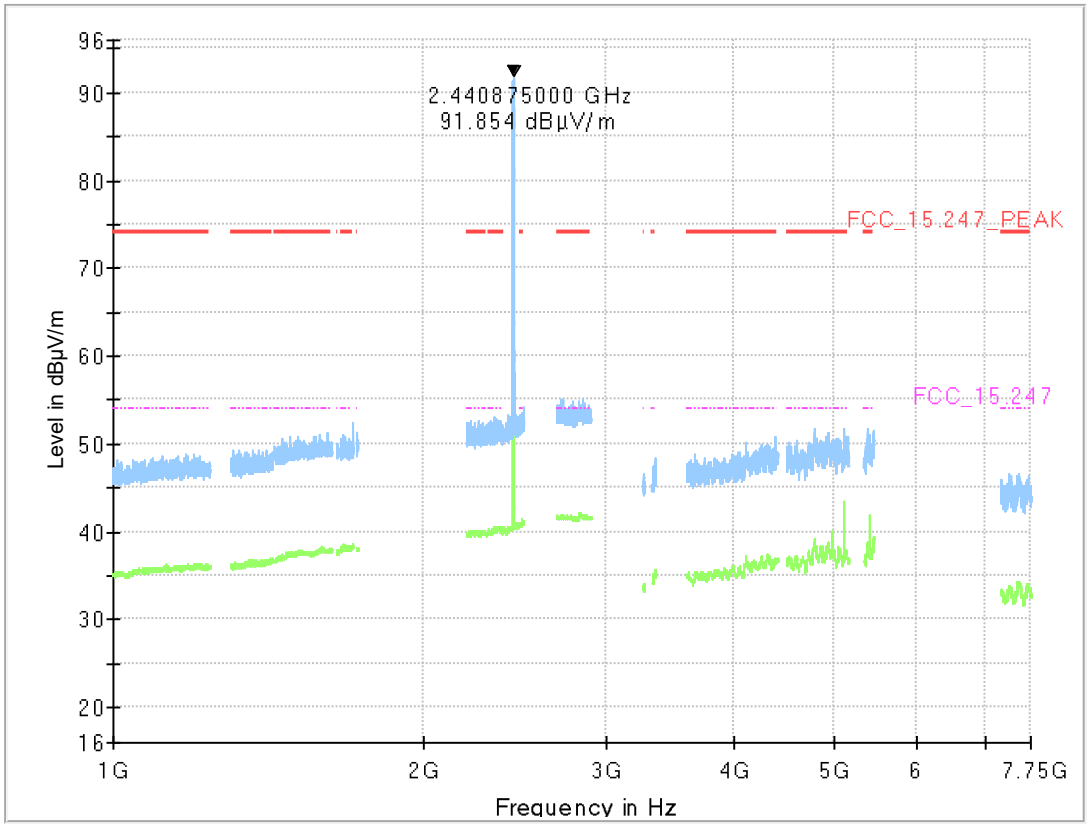
(Note: the peak at 2402 MHz is the wanted signal)

Chip02, Modulation= Bluetooth EDR 2, Operating Channel = 39
Measurements range = 1 GHz – 8 GHz
(S01_AB01#S3.5)

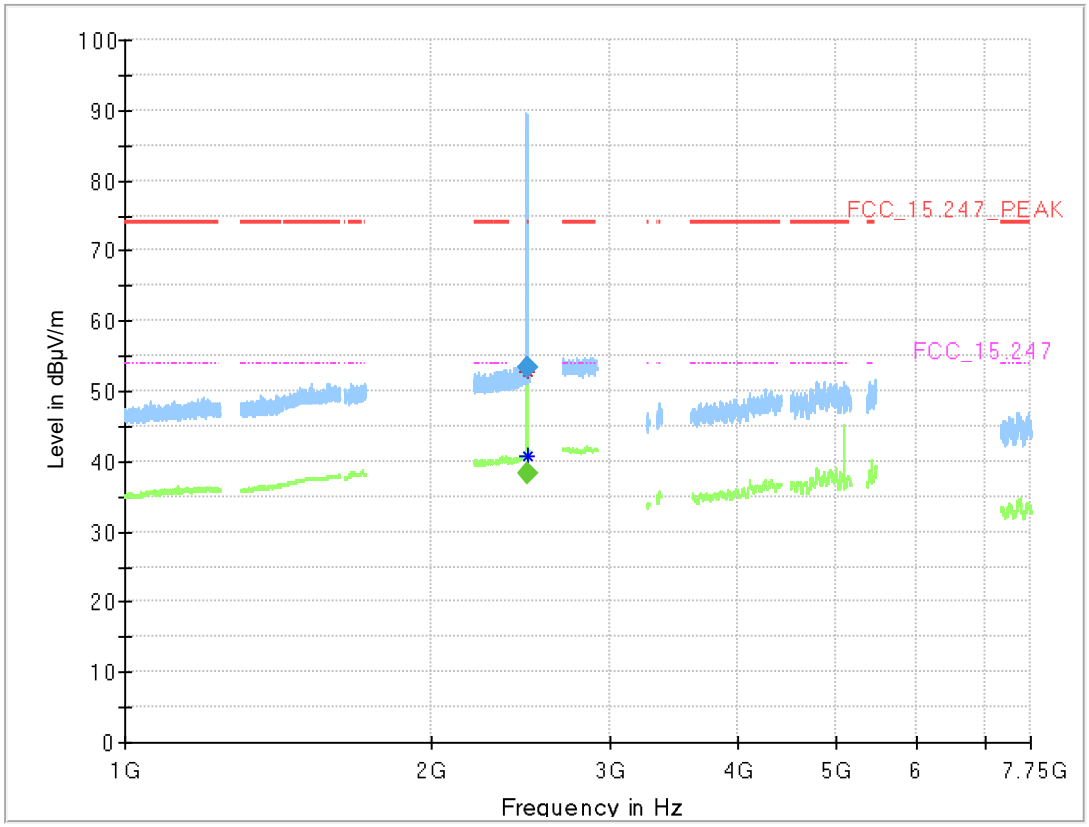


Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
---	---	---	---	---	---	---	---		---	---	---

(Note: the peak at 2440.8 MHz is the wanted signal)

Chip02, Modulation= Bluetooth EDR 2, Operating Channel = 78
Measurements range = 1 GHz – 8 GHz
(S01_AB01#S3.5)

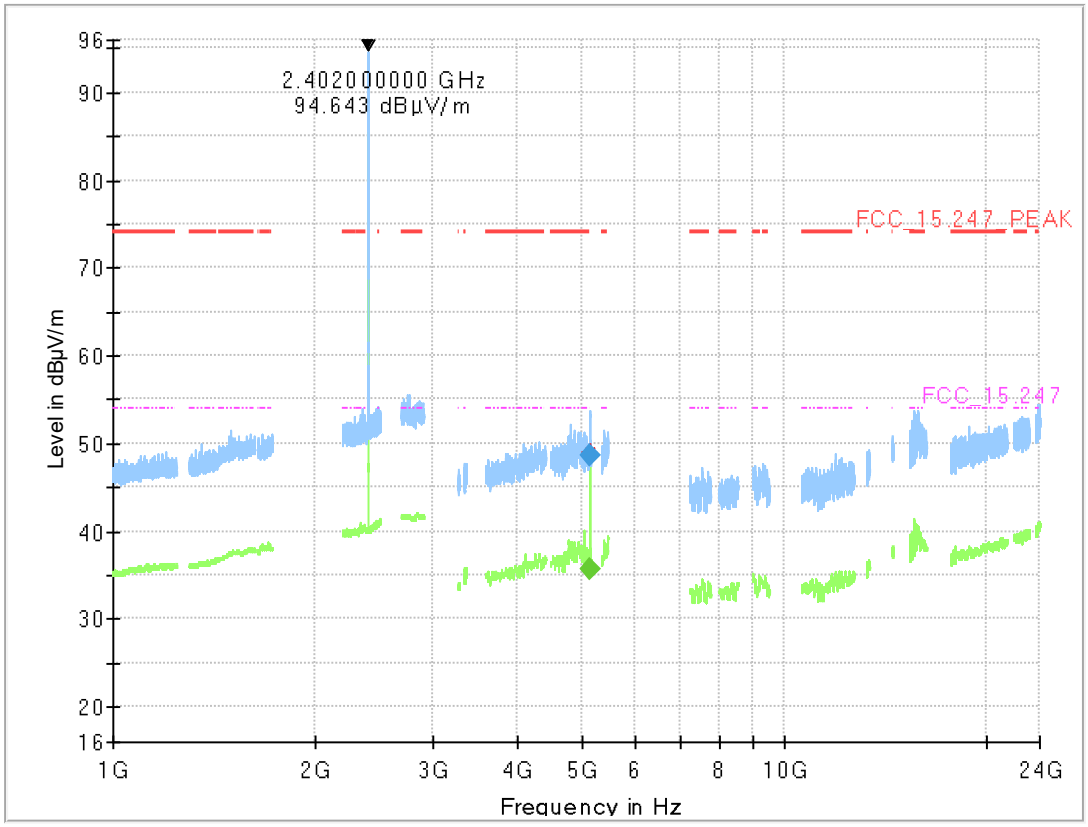


Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
2484.063	---	38.2	54.00	15.80	1000.0	1000.000	150.0	H	162.0	91.0	8.0
2484.063	53.4	---	74.00	20.61	1000.0	1000.000	150.0	H	162.0	91.0	8.0

(Note: the peak at 2480 MHz is the wanted signal)

Chip01, Modulation= Bluetooth EDR 3, Operating Channel = 0
Measurements range = 1 GHz – 24 GHz
(S01_AB01#S3.5)

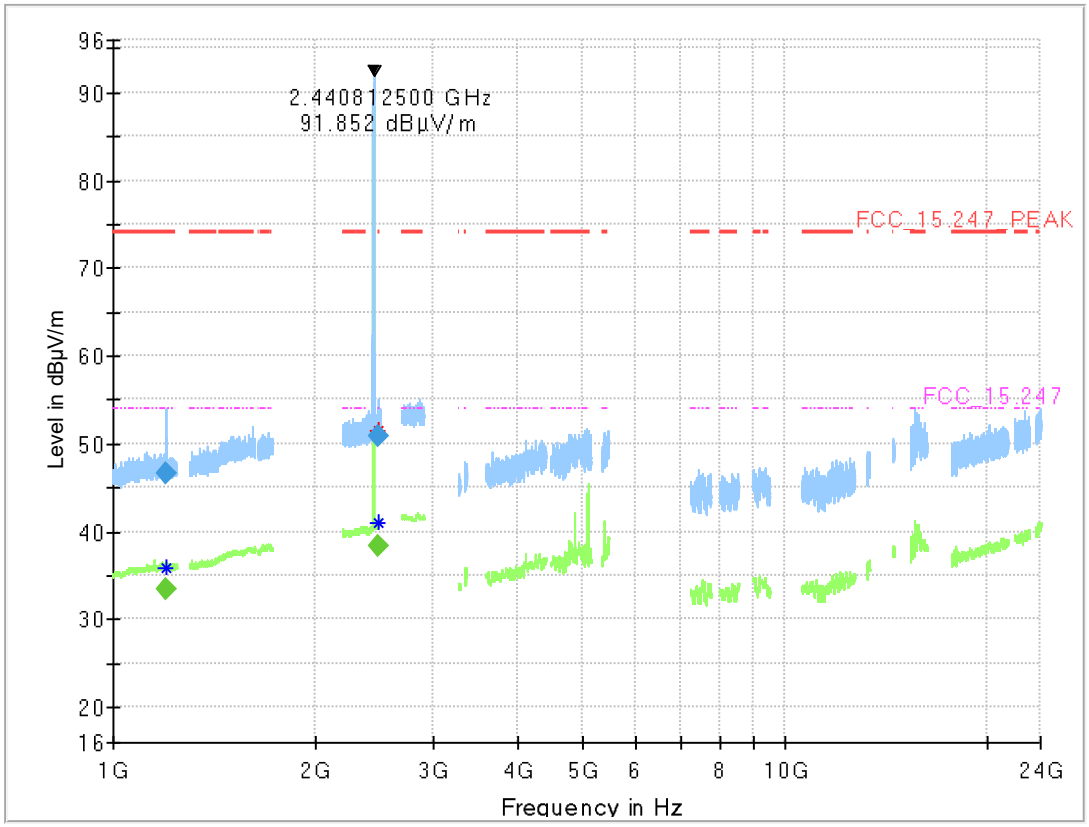


Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5136.838	---	35.7	54.00	18.29	1000.0	1000.000	150.0	H	-142.0	-7.0	6.4
5136.838	48.6	---	74.00	25.42	1000.0	1000.000	150.0	H	-142.0	-7.0	6.4

(Note: the peak at 2402 MHz is the wanted signal)

Chip01, Modulation= Bluetooth EDR 3, Operating Channel = 39
Measurements range = 1 GHz – 24 GHz
(S01_AB01#S3.5)

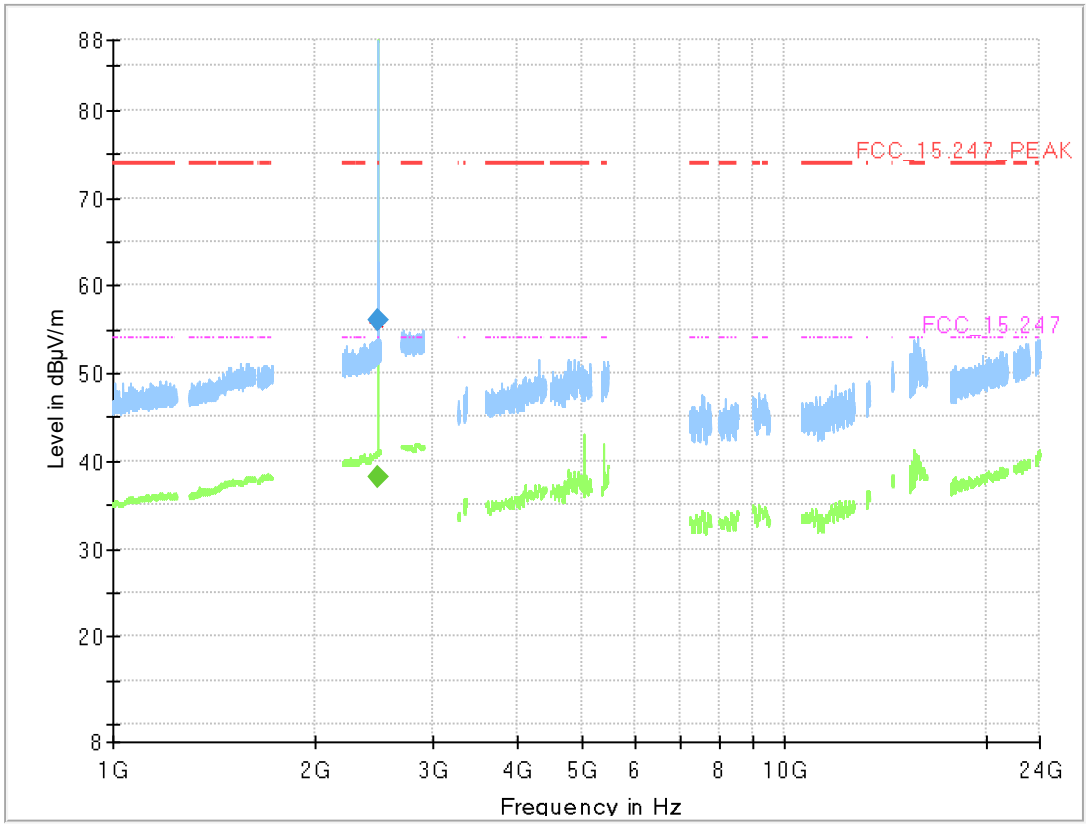


Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
1198.240	---	33.5	54.00	20.51	1000.0	1000.000	150.0	V	-4.0	8.0	3.2
1198.240	46.6	---	74.00	27.38	1000.0	1000.000	150.0	V	-4.0	8.0	3.2
2489.250	---	38.3	54.00	15.70	1000.0	1000.000	150.0	V	152.0	6.0	8.1
2489.250	50.9	---	74.00	23.09	1000.0	1000.000	150.0	V	152.0	6.0	8.1

(Note: the peak at 2440.8 MHz is the wanted signal)

Chip01, Modulation= Bluetooth EDR 3, Operating Channel = 78
Measurements range = 1 GHz – 24 GHz
(S01_AB01#S3.5)

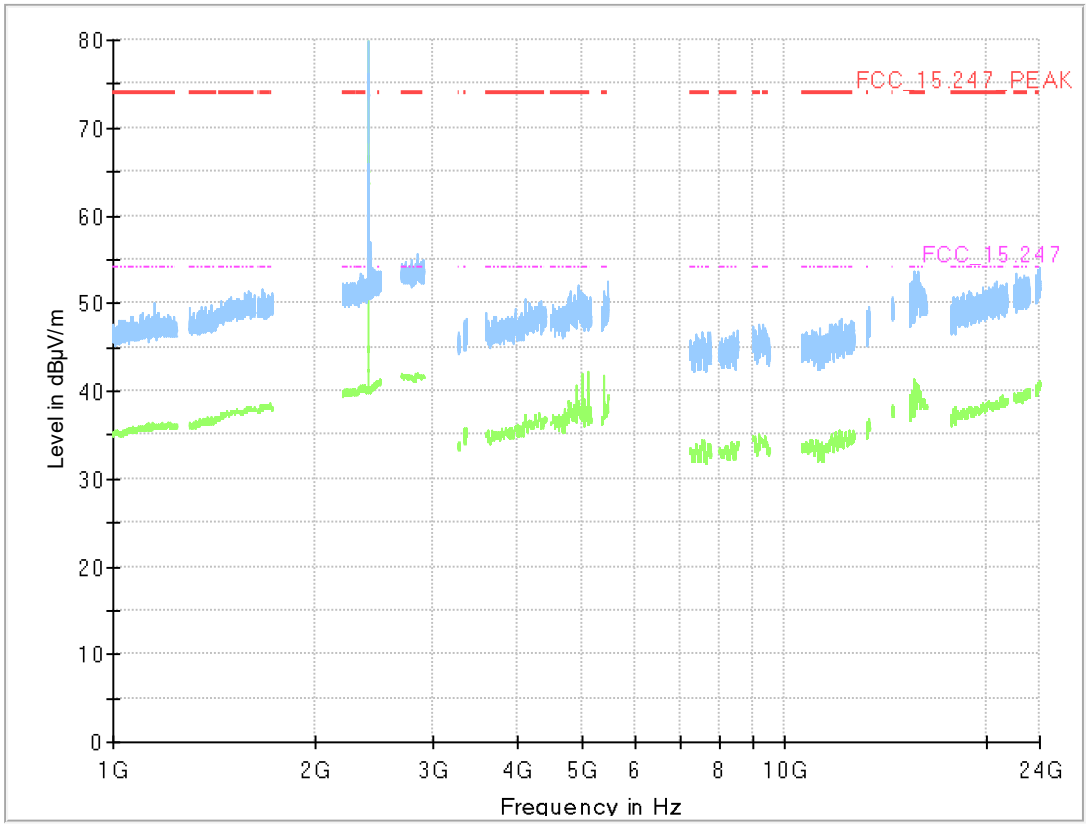


Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
2483.688	---	38.2	54.00	15.82	1000.0	1000.000	150.0	V	-92.0	-15.0	8.0
2483.688	56.0	---	74.00	18.00	1000.0	1000.000	150.0	V	-92.0	-15.0	8.0

(Note: the peak at 2480 MHz is the wanted signal)

Chip02, Modulation= Bluetooth EDR 3, Operating Channel = 0
Measurements range = 1 GHz – 24 GHz
(S01_AB01#S3.5)

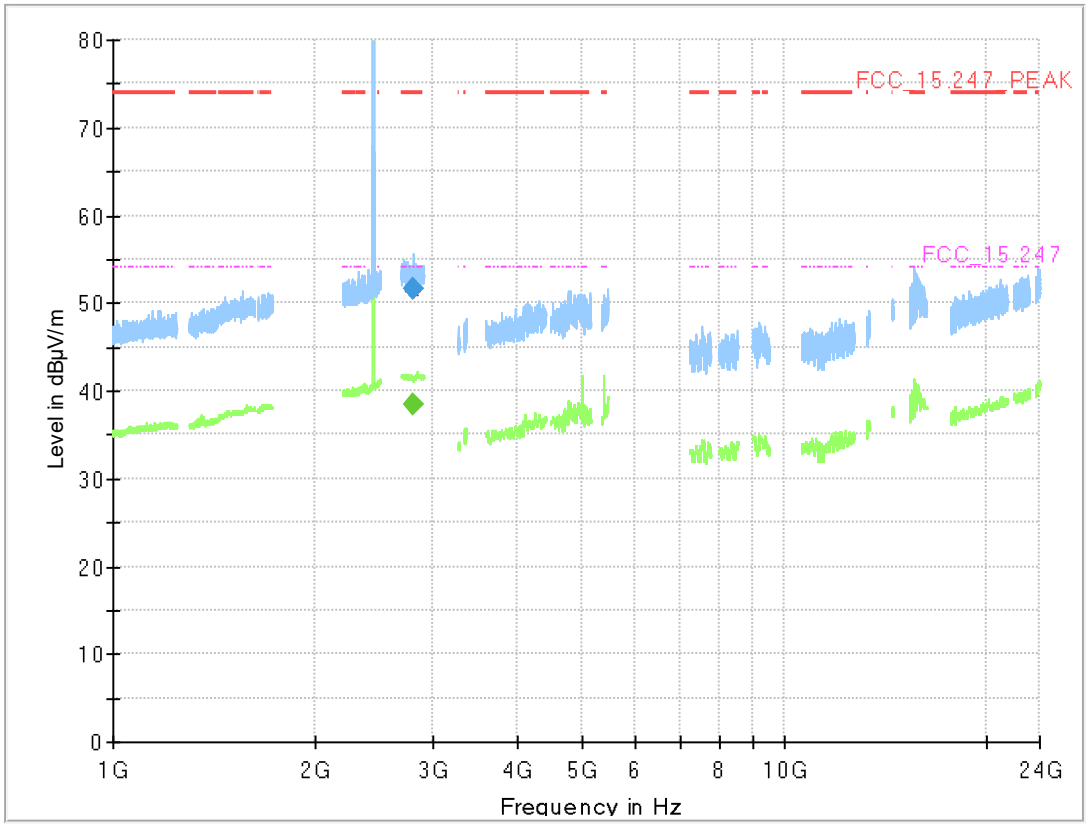


Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
---	---	---	---	---	---	---	---		---	---	---

(Note: the peak at 2402 MHz is the wanted signal)

Chip02, Modulation= Bluetooth EDR 3, Operating Channel = 39
Measurements range = 1 GHz – 24 GHz
(S01_AB01#S3.5)

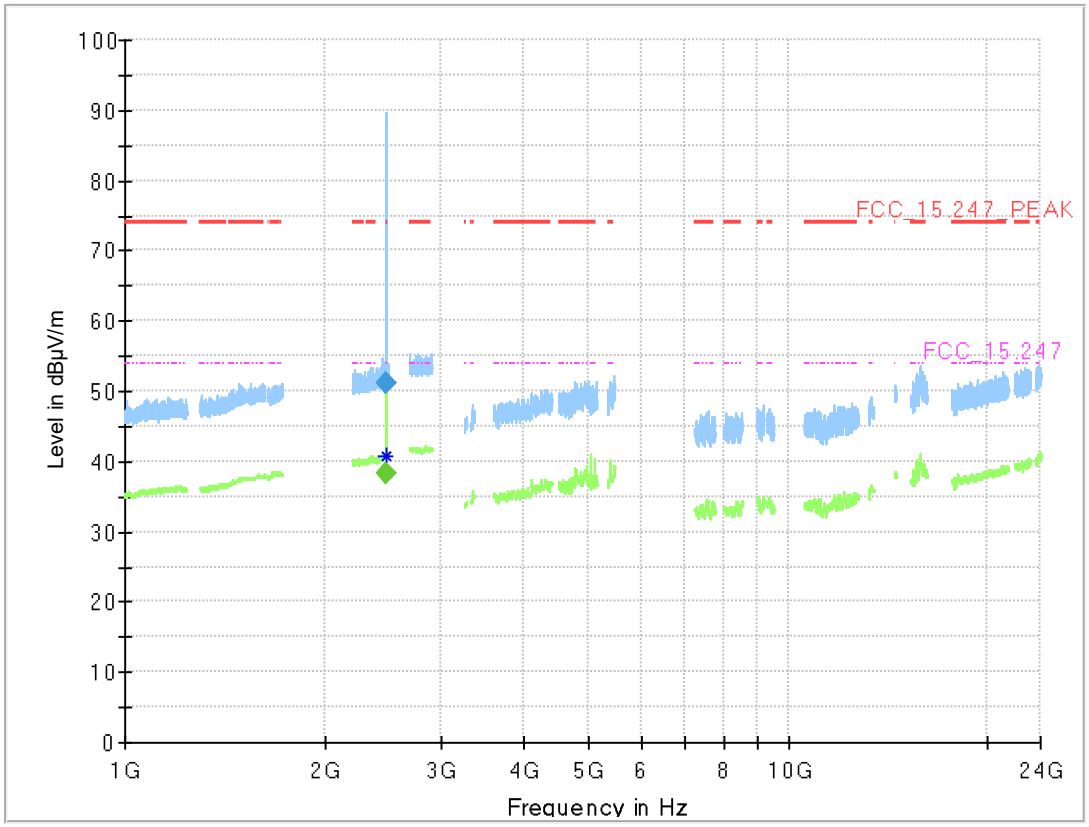


Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
2800.460	---	38.5	54.00	15.45	1000.0	1000.000	150.0	V	109.0	8.0	8.5
2800.460	51.7	---	74.00	22.34	1000.0	1000.000	150.0	V	109.0	8.0	8.5

(Note: the peak at 2440 MHz is the wanted signal)

Chip02, Modulation= Bluetooth EDR 3, Operating Channel = 78
Measurements range = 1 GHz – 24 GHz
(S01_AB01#S3.5)

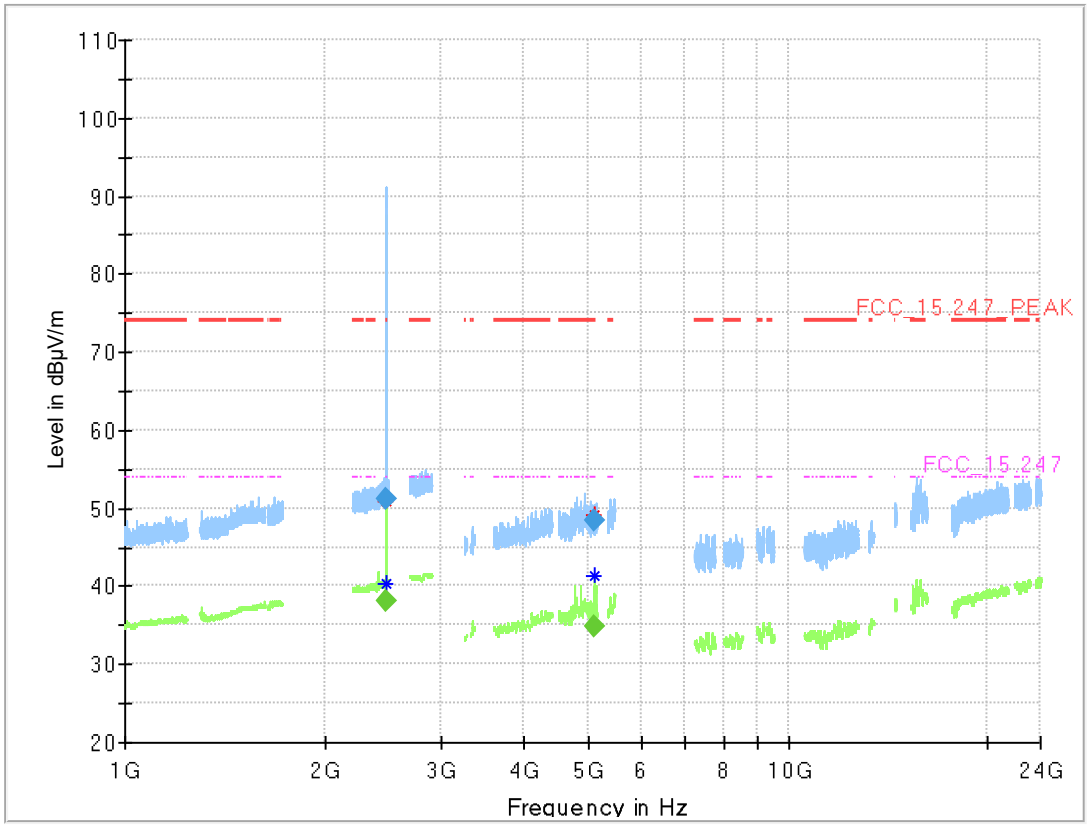


Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
2483.563	---	38.2	54.00	15.76	1000.0	1000.000	150.0	V	-124.0	100.0	8.0
2483.563	51.0	---	74.00	23.00	1000.0	1000.000	150.0	V	-124.0	100.0	8.0

(Note: the peak at 2480 MHz is the wanted signal)

Chip01, Modulation= Bluetooth EDR 3, Operating Channel = 78
Measurements range = 1 GHz – 24 GHz
(S01_AA01#S3.0)

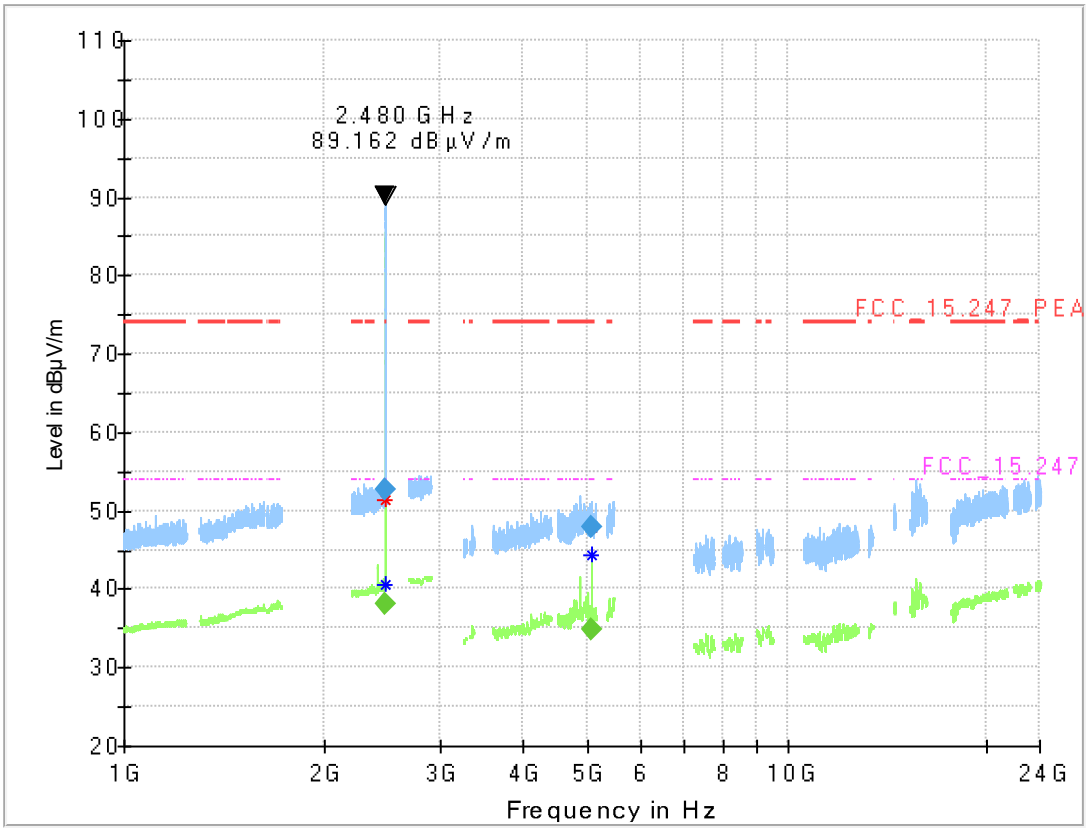


Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
2484.500	---	38.0	54.00	16.00	1000.0	1000.000	150.0	H	118.0	15.0	8.0
2484.500	51.1	---	74.00	22.92	1000.0	1000.000	150.0	H	118.0	15.0	8.0
5107.750	---	34.7	54.00	19.29	1000.0	1000.000	150.0	H	66.0	1.0	5.2
5107.750	48.3	---	74.00	25.70	1000.0	1000.000	150.0	H	66.0	1.0	5.2

(Note: the peak at 2480 MHz is the wanted signal)

Chip02, Modulation= Bluetooth EDR 3, Operating Channel = 78
Measurements range = 1 GHz – 24 GHz
(S01_AA01#S3.0)



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
2483.875	---	38.0	54.00	16.03	1000.0	1000.000	150.0	H	-53.0	15.0	8.0
2483.875	52.8	---	74.00	21.20	1000.0	1000.000	150.0	H	-53.0	15.0	8.0
5078.988	---	34.8	54.00	19.20	1000.0	1000.000	150.0	H	-79.0	105.0	6.0
5078.988	48.0	---	74.00	26.03	1000.0	1000.000	150.0	H	-79.0	105.0	6.0

(Note: the peak at 2480 MHz is the wanted signal)

5.5.5 TEST EQUIPMENT USED

- Radiated Emissions FAR 2.4 GHz FCC
- Radiated Emissions SAC H-Field
- Radiated Emissions SAC up to 1 GHz

5.6 BAND EDGE COMPLIANCE CONDUCTED

Standard **FCC Part 15 Subpart C**

The test was performed according to:
ANSI C63.10, chapter 7.8.6

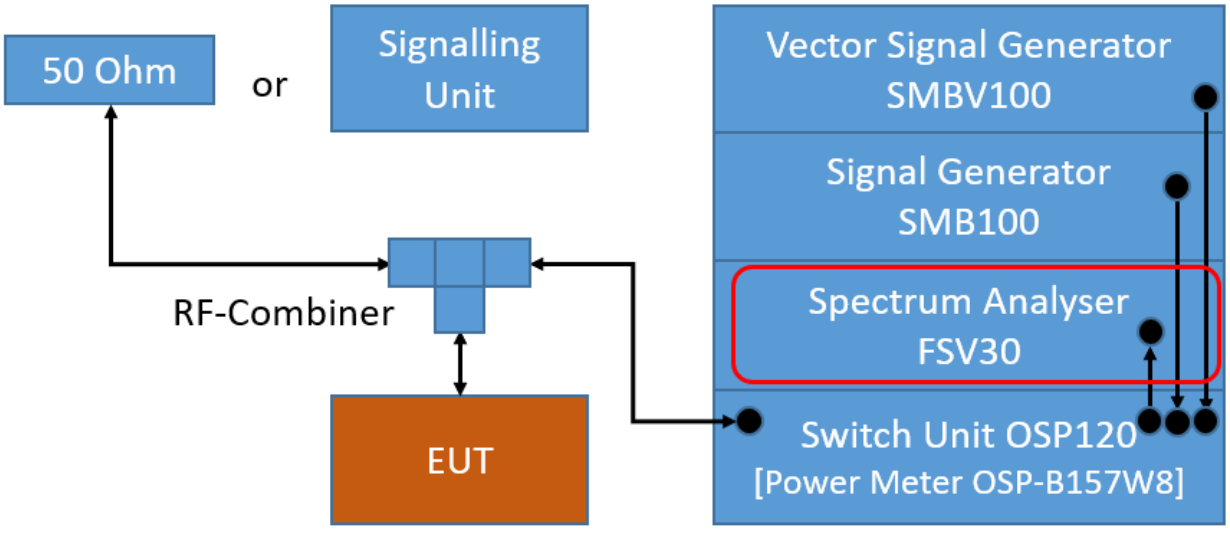
5.6.1 TEST DESCRIPTION

For the conducted measurement, the Equipment Under Test (EUT) is placed in a shielded room. The reference power was measured in the test case "Spurious RF Conducted Emissions".

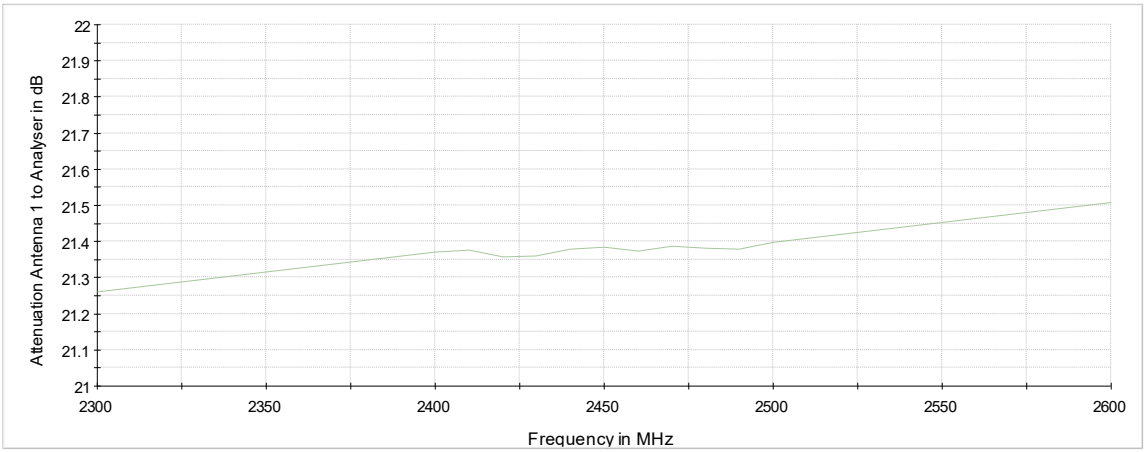
The EUT was connected to the test system as described in the block diagram below. The complete attenuation of the measurement path is known and considered.

Analyser settings:

- Lower Band Edge:
  Measured range: 2310.0 MHz to 2483.5 MHz
  Upper Band Edge
  Measured range: 2400.0 MHz to 2500 MHz
- Detector: Peak
- Resolution Bandwidth (RBW): 100 kHz
- Video Bandwidth (VBW): 300 kHz
- Sweeptime: Auto
- Sweeps: Till stable (min. 300, max. 15000)
- Trace: Maxhold



TS8997; Band Edge Conducted



Attenuation of the measurement path

5.6.2 TEST REQUIREMENTS / LIMITS

FCC Part 15.247 (d)

"In any 100 kHz 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 20 dB below that in the 100 kHz 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 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c))."

For the conducted measurement the RF power at the band edge shall be "at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power..."

5.6.3 TEST PROTOCOL

Ambient temperature:	23 °C
Air Pressure:	998 hPa
Humidity:	38 %

Chip01

BT GFSK (1-DH5)

Channel No.	Channel Center Frequency [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Ref. Level [dBm]	Limit [dBm]	Margin to Limit [dB]
0	2402	2400.0	-56.3	PEAK	100	-0.4	-20.4	35.9
78	2480	2483.5	-58.1	PEAK	100	-0.9	-20.9	37.2
hopping	hopping	2400.0	-55.3	PEAK	100	-0.3	-20.3	35.0
hopping	hopping	2483.5	-54.1	PEAK	100	-0.3	-20.3	33.8

BT π/4 DQPSK (2-DH5)

Channel No.	Channel Center Frequency [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Ref. Level [dBm]	Limit [dBm]	Margin to Limit [dB]
0	2402	2400.0	-55.9	PEAK	100	-0.4	-20.4	35.5
78	2480	2483.5	-58.3	PEAK	100	-0.9	-20.9	37.4
hopping	hopping	2400.0	-55.2	PEAK	100	-0.2	-20.2	35.0
hopping	hopping	2483.5	-56.0	PEAK	100	-0.3	-20.3	35.7

BT 8-DPSK (3-DH5)

Channel No.	Channel Center Frequency [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Ref. Level [dBm]	Limit [dBm]	Margin to Limit [dB]
0	2402	2400.0	-57.3	PEAK	100	-0.4	-20.4	36.9
78	2480	2483.5	-58.7	PEAK	100	-1.0	-21.0	37.7
hopping	hopping	2400.0	-55.0	PEAK	100	-0.3	-20.3	34.7
hopping	hopping	2483.5	-55.8	PEAK	100	-0.3	-20.3	35.5

Chip02

BT GFSK (1-DH5)

Channel No.	Channel Center Frequency [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Ref. Level [dBm]	Limit [dBm]	Margin to Limit [dB]
0	2402	2400.0	-58.6	PEAK	100	-2.6	-22.6	36.0
78	2480	2483.5	-58.6	PEAK	100	-3.3	-23.3	35.3
hopping	hopping	2400.0	-59.6	PEAK	100	-2.6	-22.6	37.0
hopping	hopping	2483.5	-58.0	PEAK	100	-2.6	-22.6	35.4

BT π/4 DQPSK (2-DH5)

Channel No.	Channel Center Frequency [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Ref. Level [dBm]	Limit [dBm]	Margin to Limit [dB]
0	2402	2400.0	-57.2	PEAK	100	-2.8	-22.8	34.4
78	2480	2483.5	-58.3	PEAK	100	-3.4	-23.4	34.9
hopping	hopping	2400.0	-59.3	PEAK	100	-2.7	-22.7	36.6
hopping	hopping	2483.5	-58.9	PEAK	100	-2.8	-22.8	36.1

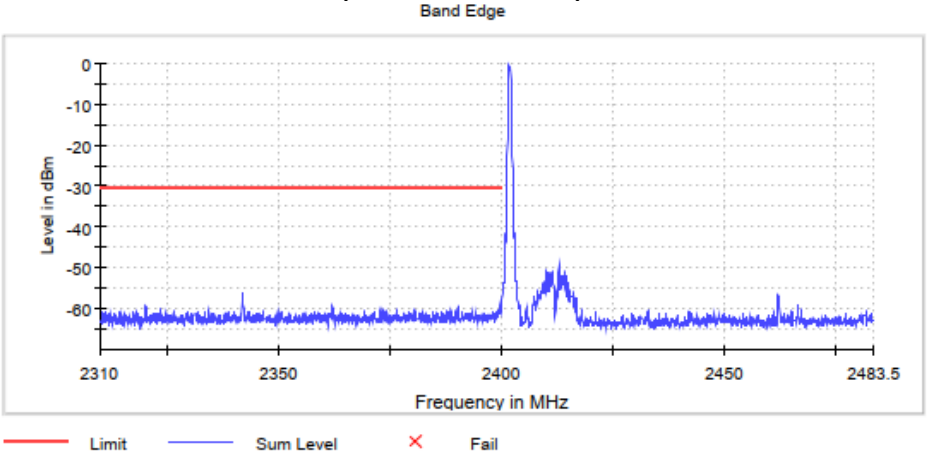
BT 8-DPSK (3-DH5)

Channel No.	Channel Center Frequency [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBm]	Detector	RBW [kHz]	Ref. Level [dBm]	Limit [dBm]	Margin to Limit [dB]
0	2402	2400.0	-58.0	PEAK	100	-2.7	-22.7	35.3
78	2480	2483.5	-57.2	PEAK	100	-3.3	-23.3	33.9
hopping	hopping	2400.0	-59.2	PEAK	100	-2.7	-22.7	36.5
hopping	hopping	2483.5	-58.6	PEAK	100	-2.7	-22.7	35.9

Remark: Please see next sub-clause for the measurement plot.
The used limits in the following plots are not correct, the correct limits are defined in the previous tables.

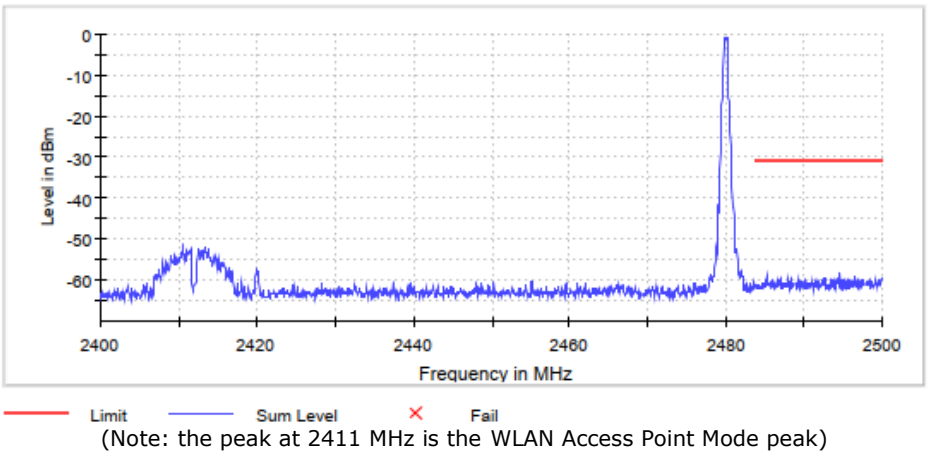
5.6.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

Chip01, Modulation= Bluetooth BR, Operating Channel = 0, Band Edge = low (S01_AA01#S3.5)



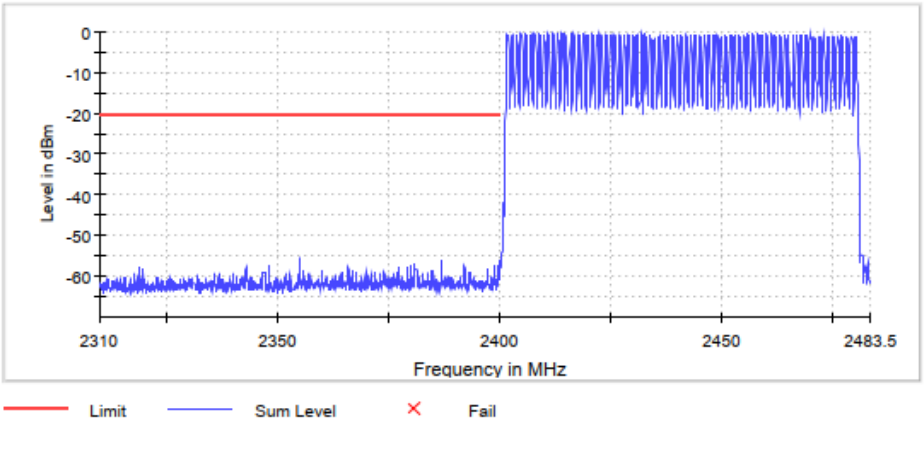
(Note: the peak at 2411 MHz is the WLAN Access Point Mode peak)

Chip01, Modulation= Bluetooth BR, Operating Channel = 78, Band Edge = high (S01_AA01#S3.5)

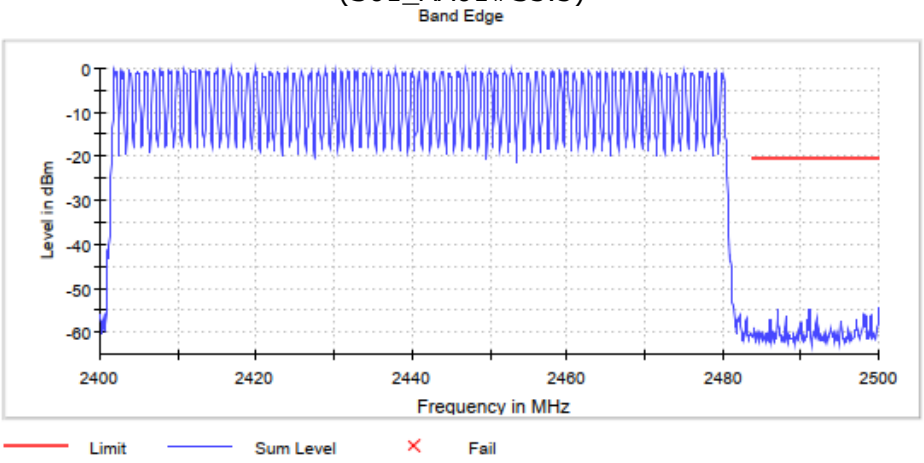


(Note: the peak at 2411 MHz is the WLAN Access Point Mode peak)

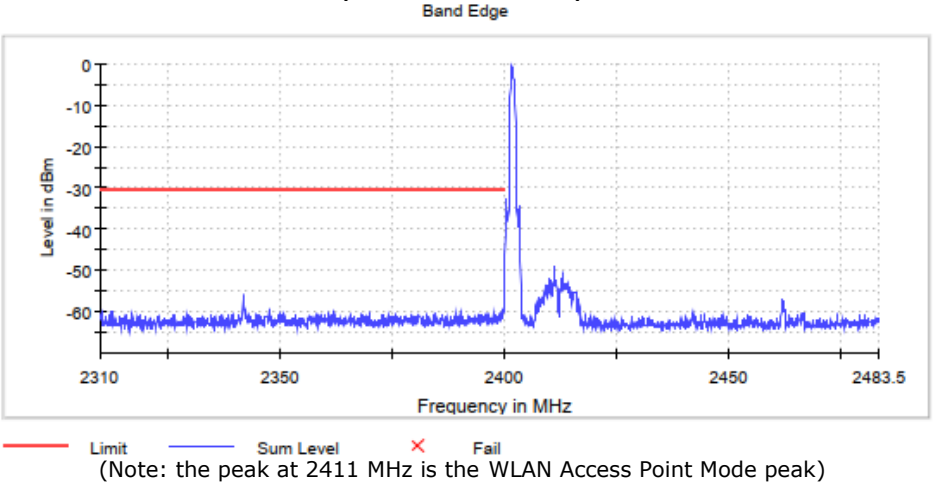
Chip01, Modulation= Bluetooth BR, Operating Channel = hopping, Band Edge = low (S01_AA01#S3.5)



Chip01, Modulation= Bluetooth BR, Operating Channel = hopping, Band Edge = high (S01_AA01#S3.5)

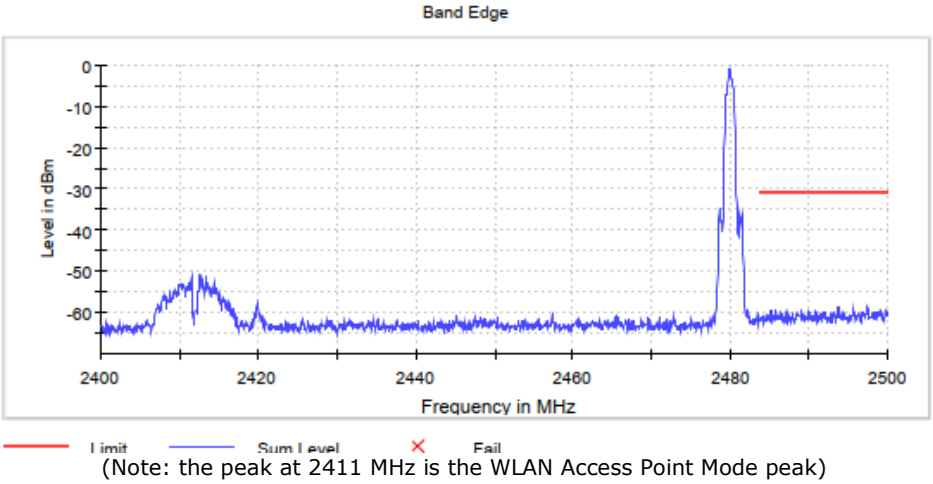


Chip01, Modulation= Bluetooth EDR 2, Operating Channel = 0, Band Edge = low (S01_AA01#S3.5)



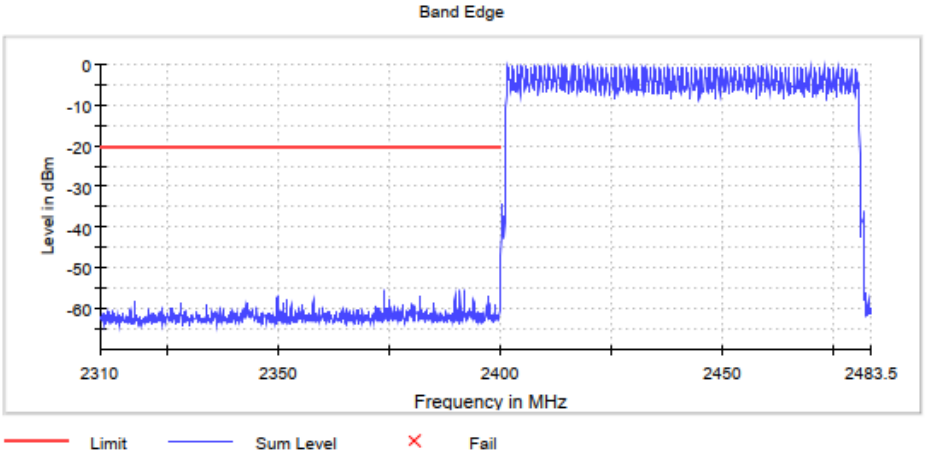
(Note: the peak at 2411 MHz is the WLAN Access Point Mode peak)

Chip01, Modulation= Bluetooth EDR 2, Operating Channel = 78, Band Edge = high (S01_AA01#S3.5)

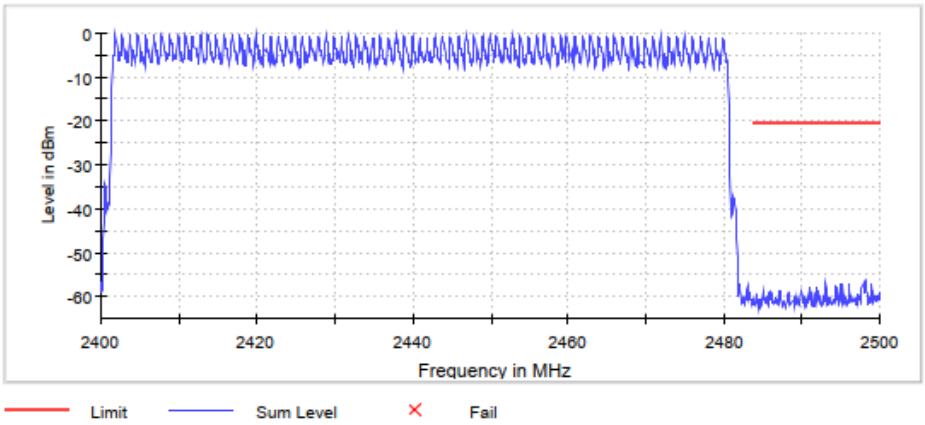


(Note: the peak at 2411 MHz is the WLAN Access Point Mode peak)

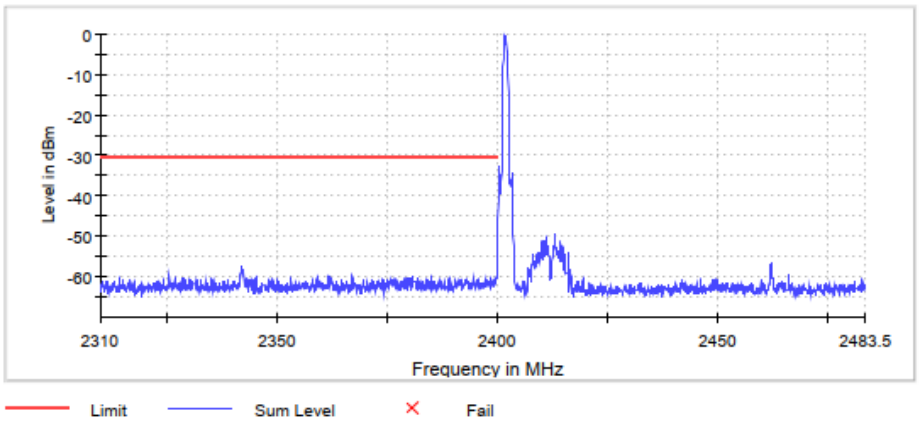
Chip01, Modulation= Bluetooth EDR 2, Operating Channel = hopping, Band Edge = low (S01_AA01#S3.5)



Chip01, Modulation= Bluetooth EDR 2, Operating Channel = hopping, Band Edge = high (S01_AA01#S3.5)

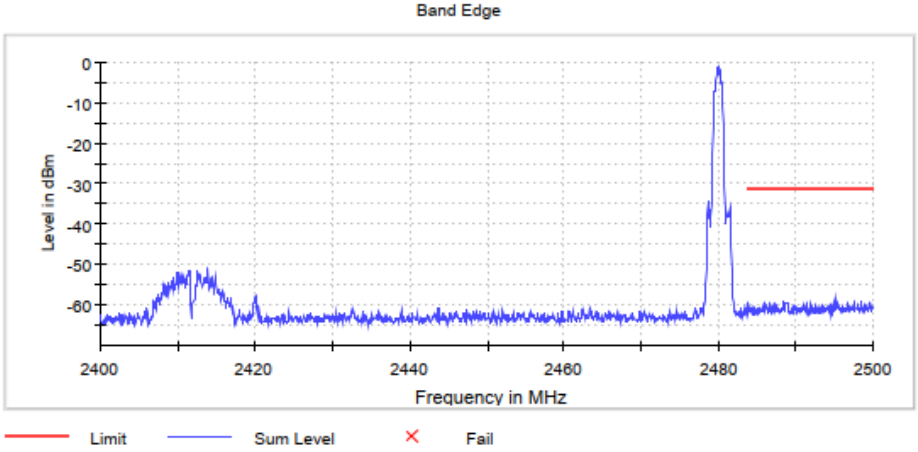


Chip01, Modulation= Bluetooth EDR 3, Operating Channel = 0, Band Edge = low (S01_AA01#S3.5)



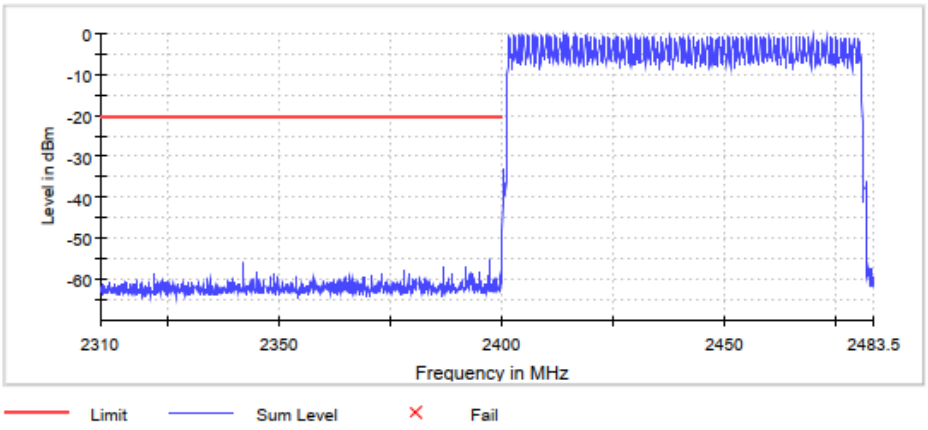
(Note: the peak at 2411 MHz is the WLAN Access Point Mode peak)

Chip01, Modulation= Bluetooth EDR 3, Operating Channel = 78, Band Edge = high (S01_AA01#S3.5)

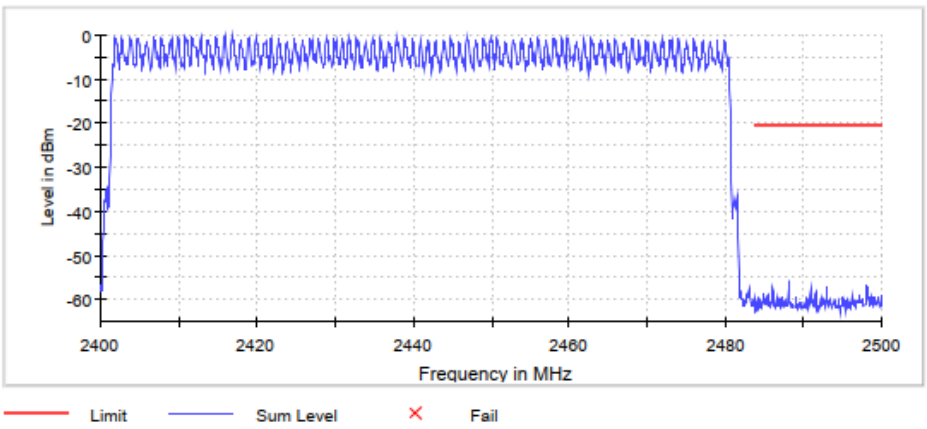


(Note: the peak at 2411 MHz is the WLAN Access Point Mode peak)

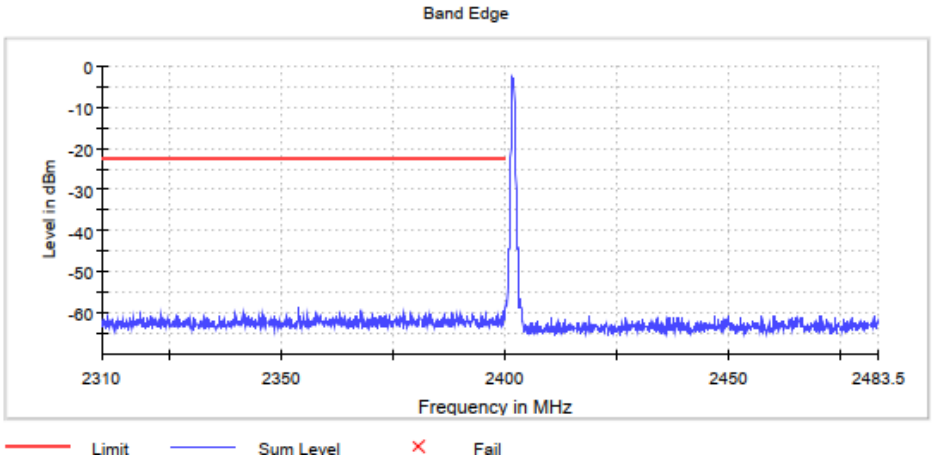
Chip01, Modulation= Bluetooth EDR 3, Operating Channel = hopping, Band Edge = low (S01_AA01#S3.5)



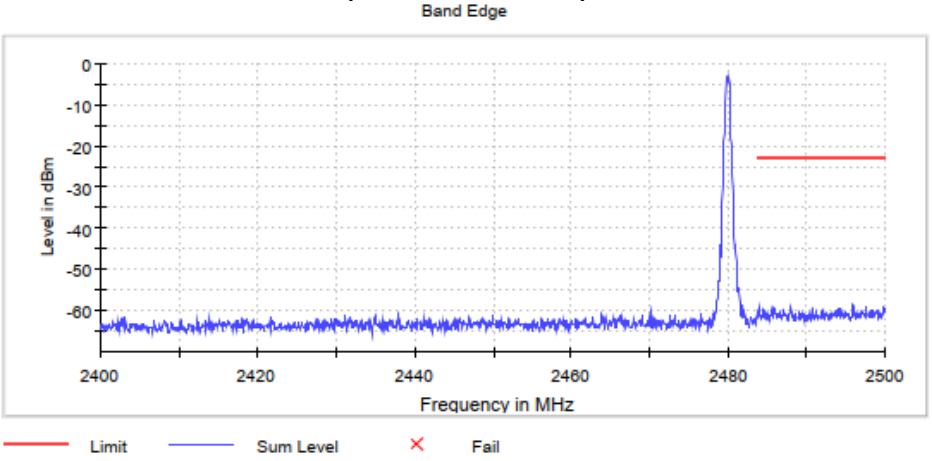
Chip01, Modulation= Bluetooth EDR 3, Operating Channel = hopping, Band Edge = high (S01_AA01#S3.5)



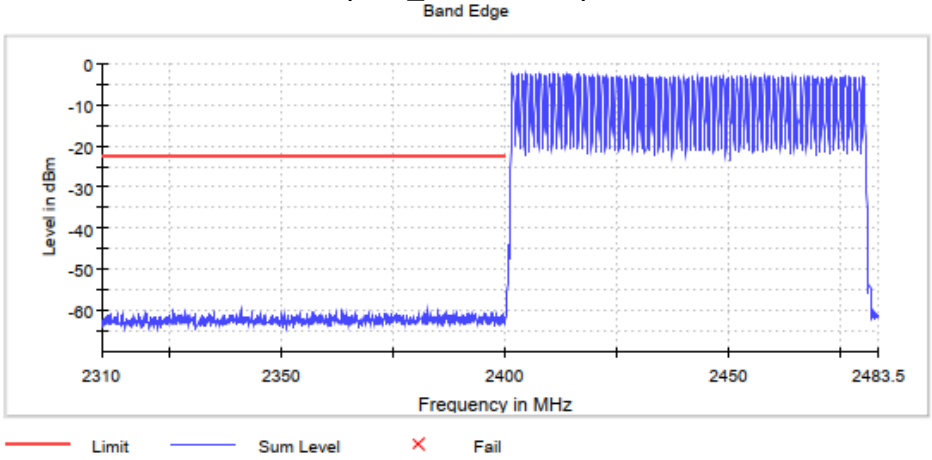
Chip02, Modulation= Bluetooth BR, Operating Channel = 0, Band Edge = low (S01_AA01#S3.5)



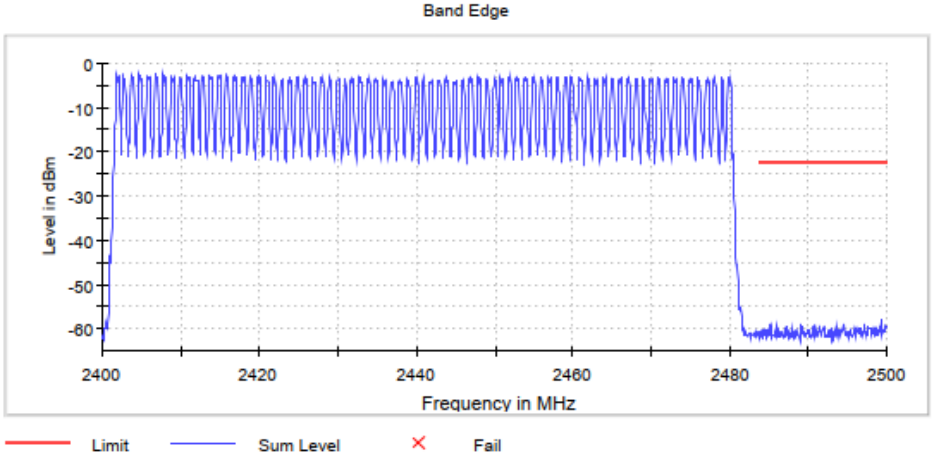
Chip02, Modulation= Bluetooth BR, Operating Channel = 78, Band Edge = high (S01_AA01#S3.5)



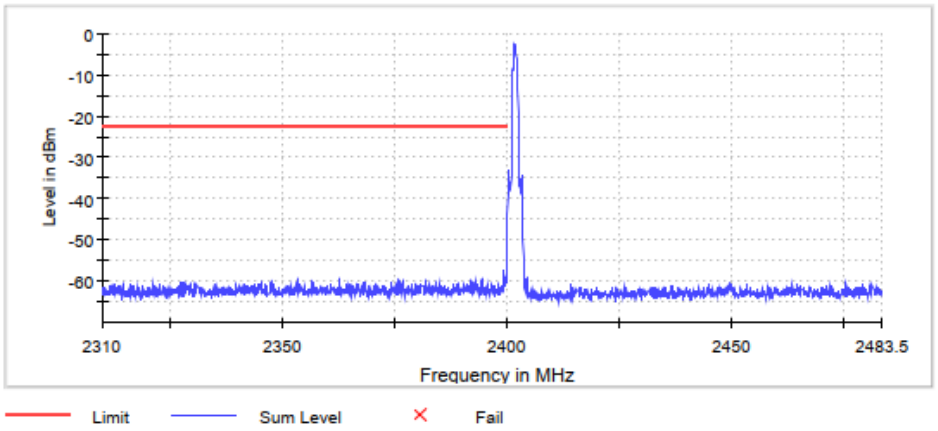
Chip02, Modulation= Bluetooth BR, Operating Channel = hopping, Band Edge = low (S01_AA01#S3.5)



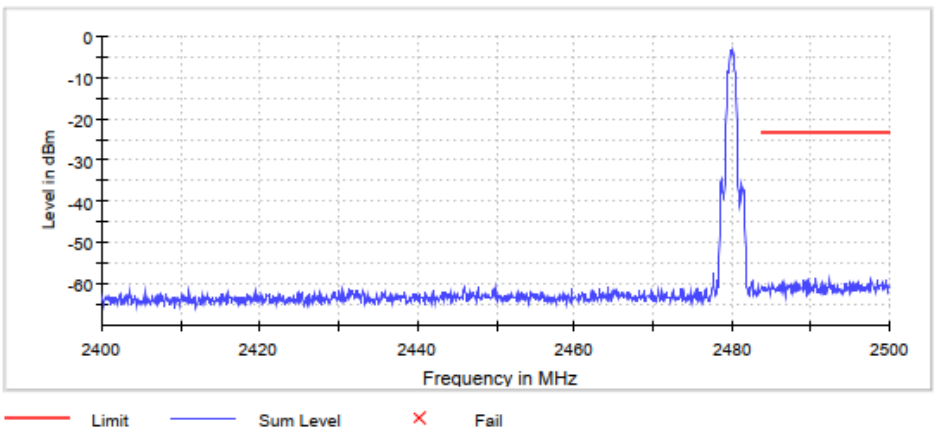
Chip02, Modulation= Bluetooth BR, Operating Channel = hopping, Band Edge = high (S01_AA01#S3.5)



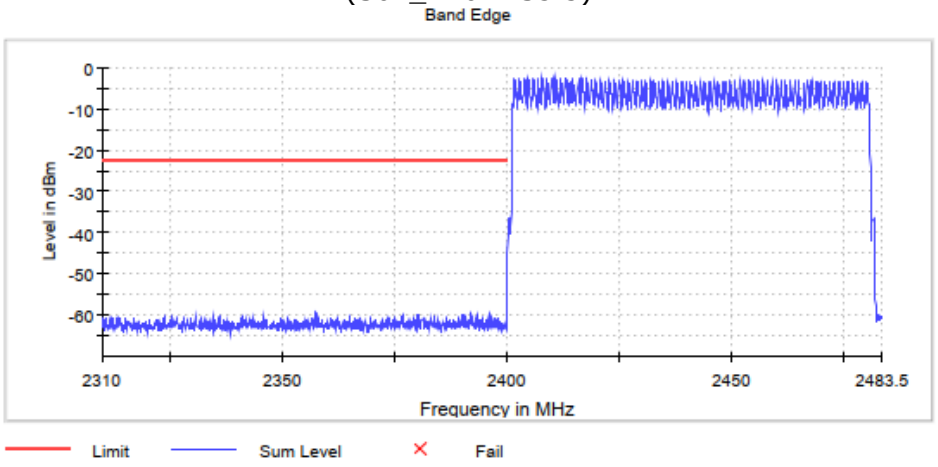
Chip02, Modulation= Bluetooth EDR 2, Operating Channel = 0, Band Edge = low (S01_AA01#S3.5)



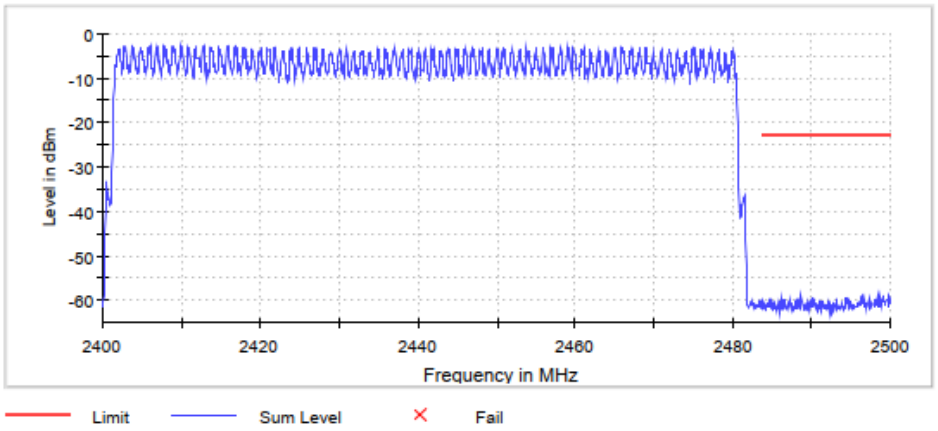
Chip02, Modulation= Bluetooth EDR 2, Operating Channel = 78, Band Edge = high (S01_AA01#S3.5)



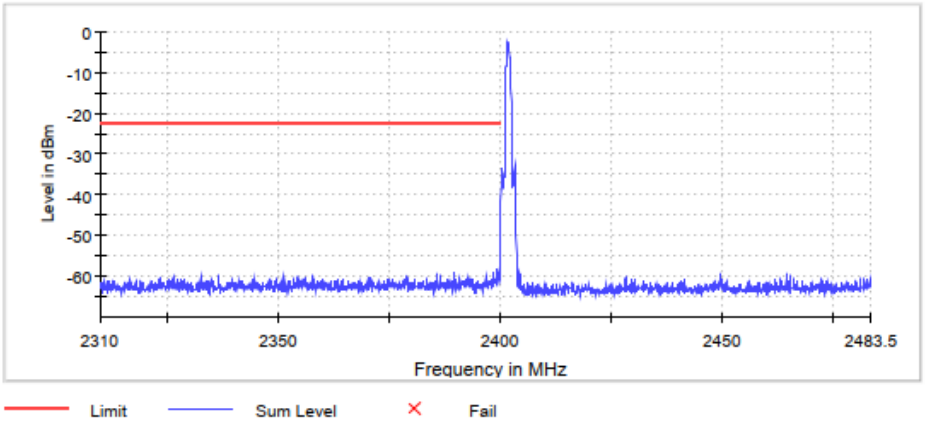
Chip02, Modulation= Bluetooth EDR 2, Operating Channel = hopping, Band Edge = low (S01_AA01#S3.5)



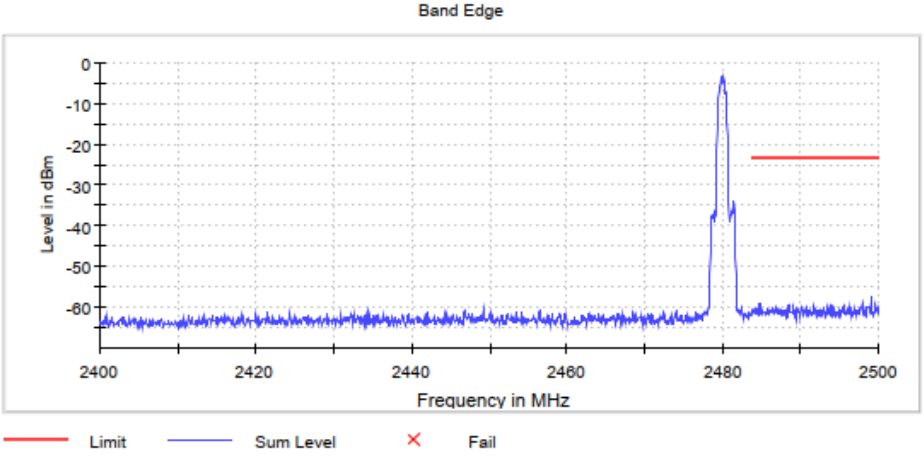
Chip02, Modulation= Bluetooth EDR 2, Operating Channel = hopping, Band Edge = high (S01_AA01#S3.5)



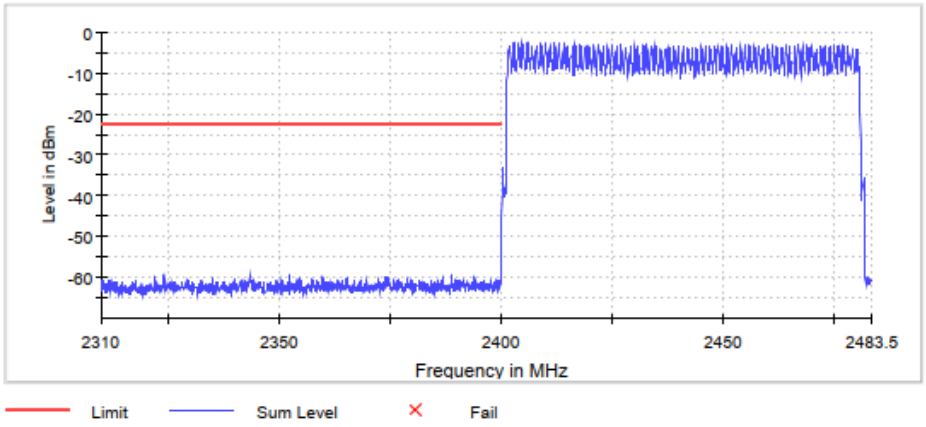
Chip02, Modulation= Bluetooth EDR 3, Operating Channel = 0, Band Edge = low (S01_AA01#S3.5)



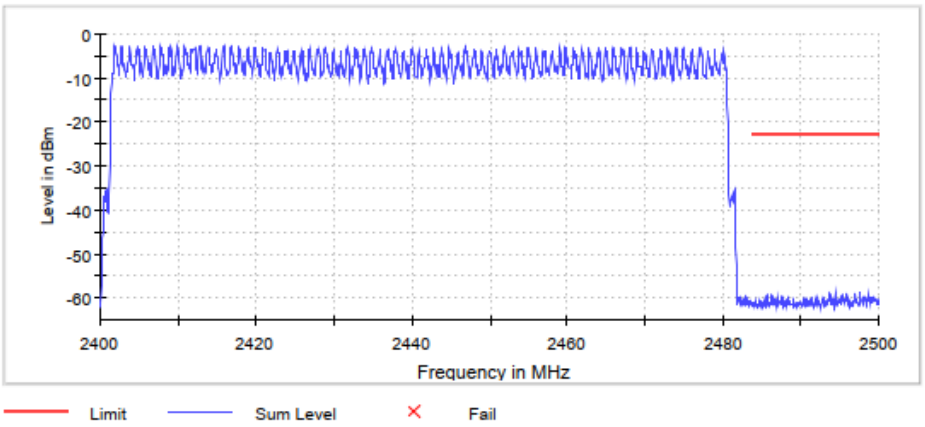
Chip02, Modulation= Bluetooth EDR 3, Operating Channel = 78, Band Edge = high (S01_AA01#S3.5)



Chip02, Modulation= Bluetooth EDR 3, Operating Channel = hopping, Band Edge = low (S01_AA01#S3.5)



Chip02, Modulation= Bluetooth EDR 3, Operating Channel = hopping, Band Edge = high (S01_AA01#S3.5)



5.6.5 TEST EQUIPMENT USED

- R&S TS8997

5.7 BAND EDGE COMPLIANCE RADIATED

Standard **FCC Part 15 Subpart C**

The test was performed according to:
ANSI C63.10, chapter 7.8.6

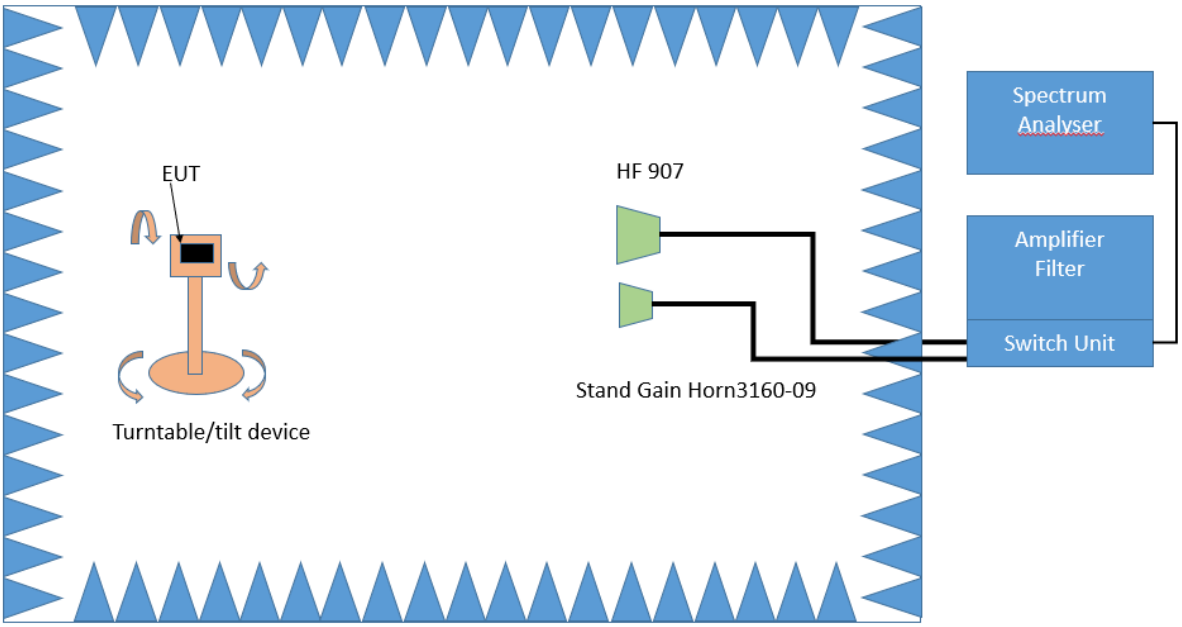
5.7.1 TEST DESCRIPTION

The test set-up was made in accordance to the general provisions of ANSI C63.10 in a typical installation configuration. The measurements were performed according the following sub-chapter of ANSI C63.10:

- Chapter 6.10.5

The Equipment Under Test (EUT) was set up on a non-conductive support (tilt device) at 1.5 m height in the fully-anechoic chamber.
All steps were performed with one height (1.5 m) of the receiving antenna only (procedure according ANSI C63.10, chapter 6.6.5.

3. Measurement above 1 GHz



Test Setup; Spurious Emission Radiated (FAC), 1 GHz-26.5 GHz

Step 1:
The EUT is turned during the preliminary measurement across the elevation axis, with a step size of 90 °.
The turn table step size (azimuth angle) for the preliminary measurement is 45 °.
Spectrum analyser settings:
- Detector: Peak, Average
- RBW = 1 MHz
- VBW = 3 MHz

Step 2:
The turn table azimuth will slowly vary by ± 22.5°.
The elevation angle will slowly vary by ± 45°
Spectrum analyser settings:
- Detector: Peak

Step 3:
Spectrum analyser settings for step 3:
- Detector: Peak / CISPR Average
- Measured frequencies: in step 1 determined frequencies
- RBW = 1 MHz
- VBW = 3 MHz
- Measuring time: 1 s

5.7.2 TEST REQUIREMENTS / LIMITS

For band edges connected to a restricted band, the limits are specified in Section 15.209(a)

FCC Part 15, Subpart C, §15.209, Radiated Emission Limits

Frequency in MHz	Limit (µV/m)	Measurement distance (m)	Limits (dBµV/m)
0.009 – 0.49	2400/F(kHz)@300m	3	(48.5 – 13.8)@300m
0.49 – 1.705	24000/F(kHz)@30m	3	(33.8 – 23.0)@30m
1.705 – 30	30@30m	3	29.5@30m

The measured values are corrected with an inverse linear distance extrapolation factor (40 dB/decade) according FCC 15.31 (2).

Frequency in MHz	Limit (µV/m)	Measurement distance (m)	Limits (dBµV/m)
30 – 88	100@3m	3	40.0@3m
88 – 216	150@3m	3	43.5@3m
216 – 960	200@3m	3	46.0@3m
960 - 26000	500@3m	3	54.0@3m
26000 - 40000	500@3m	1	54.0@3m

The measured values above 26 GHz are corrected with an inverse linear distance extrapolation factor (20 dB/decade).

§15.35(b) ..., there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit....

Used conversion factor: Limit (dBµV/m) = 20 log (Limit (µV/m)/1µV/m)

The average values have been calculated from the Peak measurements based on "duty cycles correction" method in ANSI C63.10, chapter 7.5.

The Duty Cycle Measurements are listed in Chapter 4.7 of this Report.

5.7.3 TEST PROTOCOL

Ambient temperature: 20–22 °C
Air Pressure: 999–1010 hPa
Humidity: 38–45 %

Chip01(S01_AB01#S3.5)

BT GFSK (1-DH5)
Applied duty cycle correction (AV): 2.3 dB

Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin to Limit [dB]
78	2480	2483.5	53.2	PEAK	1000	74.0	20.8
78	2480	2483.5	50.9	AV	1000	54.0	3.1

BT DQPSK (2-DH5)
Applied duty cycle correction (AV): 2.3 dB

Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin to Limit [dB]
78	2480	2483.5	55.4	PEAK	1000	74.0	18.6
78	2480	2483.5	53.1	AV	1000	54.0	0.9

BT 8-DPSK (3-DH5)
Applied duty cycle correction (AV): 2.3 dB

Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin to Limit [dB]
0	2402	2390.0	50.2	PEAK	1000	74.0	23.8
0	2402	2390.0	47.9	AV	1000	54.0	6.1
78	2480	2483.5	56.0	PEAK	1000	74.0	18.0
78	2480	2483.5	53.7	AV	1000	54.0	0.3

Chip02(S01_AB01#S3.5)

BT GFSK (1-DH5)
Applied duty cycle correction (AV): 2.3 dB

Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin to Limit [dB]
78	2480	2483.5	53.8	PEAK	1000	74.0	20.2
78	2480	2483.5	51.5	AV	1000	54.0	2.5

BT DQPSK (2-DH5)
Applied duty cycle correction (AV): 2.3 dB

Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin to Limit [dB]
78	2480	2483.5	53.4	PEAK	1000	74.0	20.6
78	2480	2483.5	51.1	AV	1000	54.0	2.9

BT 8-DPSK (3-DH5)
Applied duty cycle correction (AV): 2.3 dB

Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin to Limit [dB]
0	2402	2390.0	49.2	PEAK	1000	74.0	24.8
0	2402	2390.0	46.9	AV	1000	54.0	7.1
78	2480	2483.5	51.0	PEAK	1000	74.0	23.0
78	2480	2483.5	48.7	AV	1000	54.0	5.3

==========

Chip01(S01_AA01#S3.0)

BT GFSK (1-DH5)

Applied duty cycle correction (AV): 2.3 dB

Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin to Limit [dB]
78	2480	2483.5	52.2	PEAK	1000	74.0	21.8
78	2480	2483.5	49.9	AV	1000	54.0	4.1

BT 8-DPSK (3-DH5)

Applied duty cycle correction (AV): 2.3 dB

Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin to Limit [dB]
78	2480	2483.5	51.1	PEAK	1000	74.0	22.9
78	2480	2483.5	48.8	AV	1000	54.0	5.2

Chip02(S01_AA01#S3.0)

BT GFSK (1-DH5)

Applied duty cycle correction (AV): 2.3 dB

Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin to Limit [dB]
78	2480	2483.5	53.0	PEAK	1000	74.0	21.0
78	2480	2483.5	50.7	AV	1000	54.0	3.3

BT 8-DPSK (3-DH5)

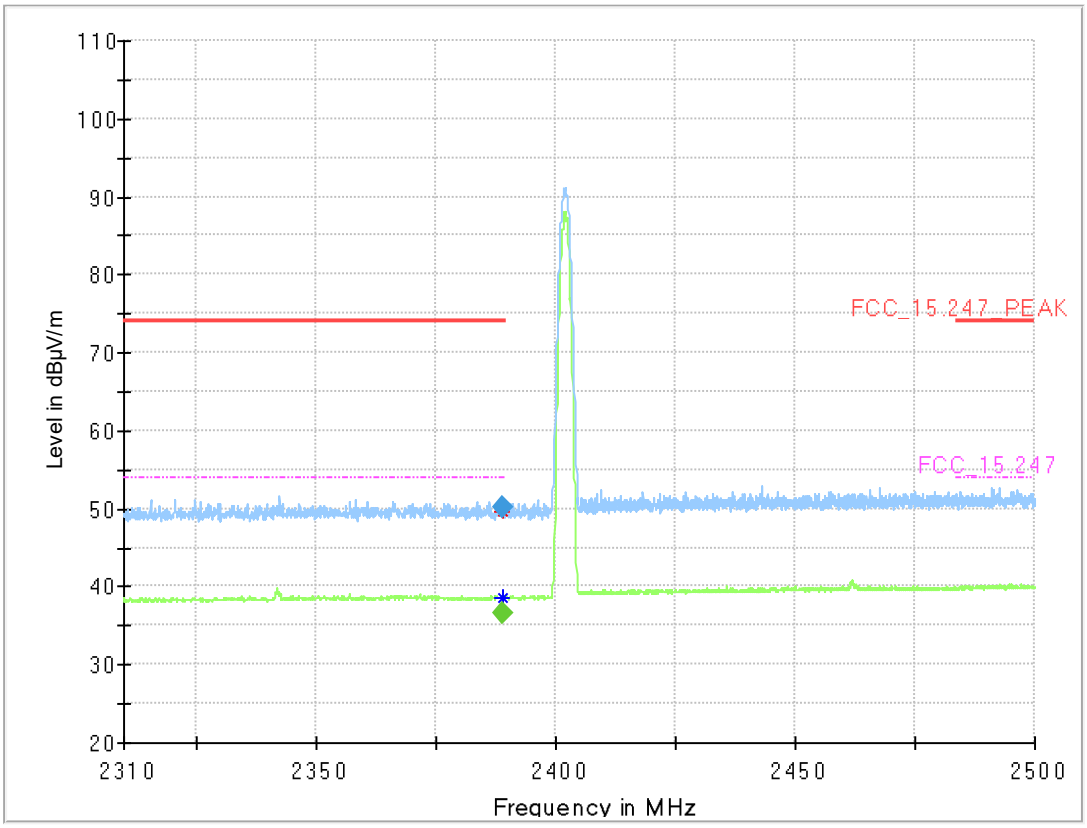
Applied duty cycle correction (AV): 2.3 dB

Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin to Limit [dB]
78	2480	2483.5	52.8	PEAK	1000	74.0	21.2
78	2480	2483.5	50.5	AV	1000	54.0	3.5

Remark: - Please see next sub-clause for the measurement plot.
- the Low Band-Edge measurements have been performed only on worst-case mode" BT 8-DPSK (3-DH5)", which has the widest bandwidth and highest output power.

5.7.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

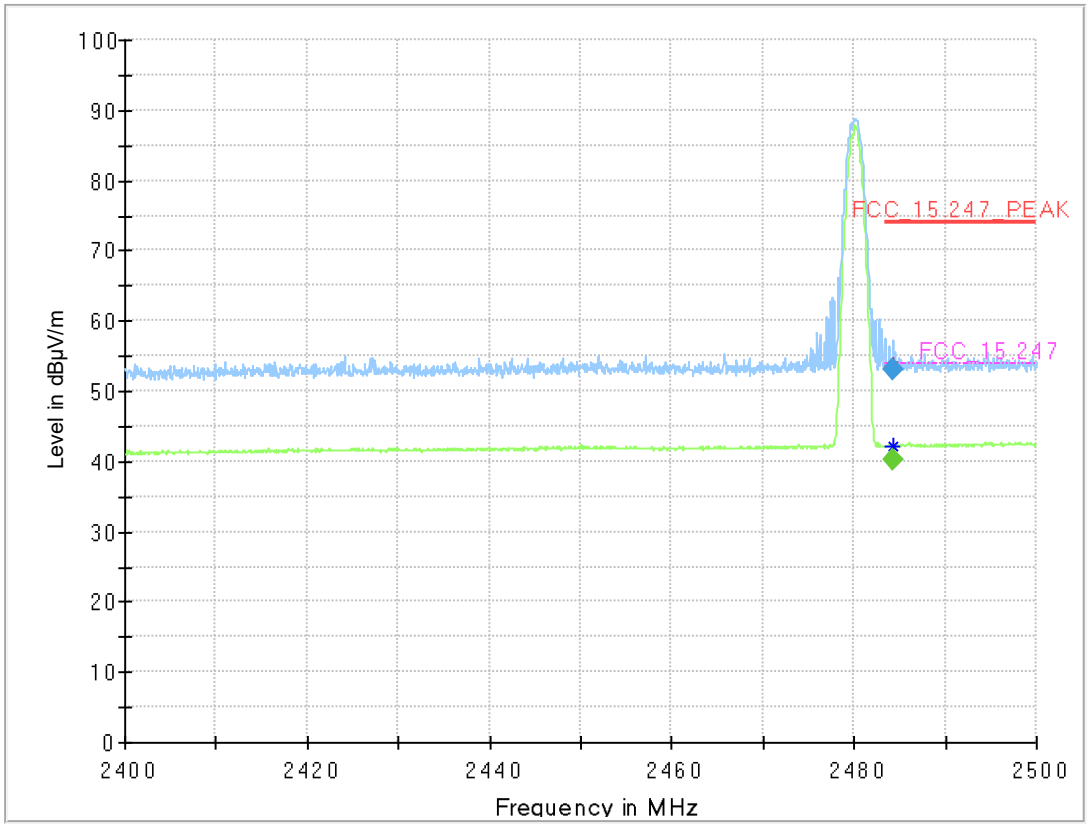
Chip01, Modulation= Bluetooth EDR 3, Operating Channel = 0, Band Edge = low
(S01_AB01#S3.5)



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
2389.200	50.2	---	74.00	23.77	1000.0	1000.000	150.0	H	144.0	105.0	7.0
2389.200	---	36.6	54.00	17.44	1000.0	1000.000	150.0	H	144.0	105.0	7.0

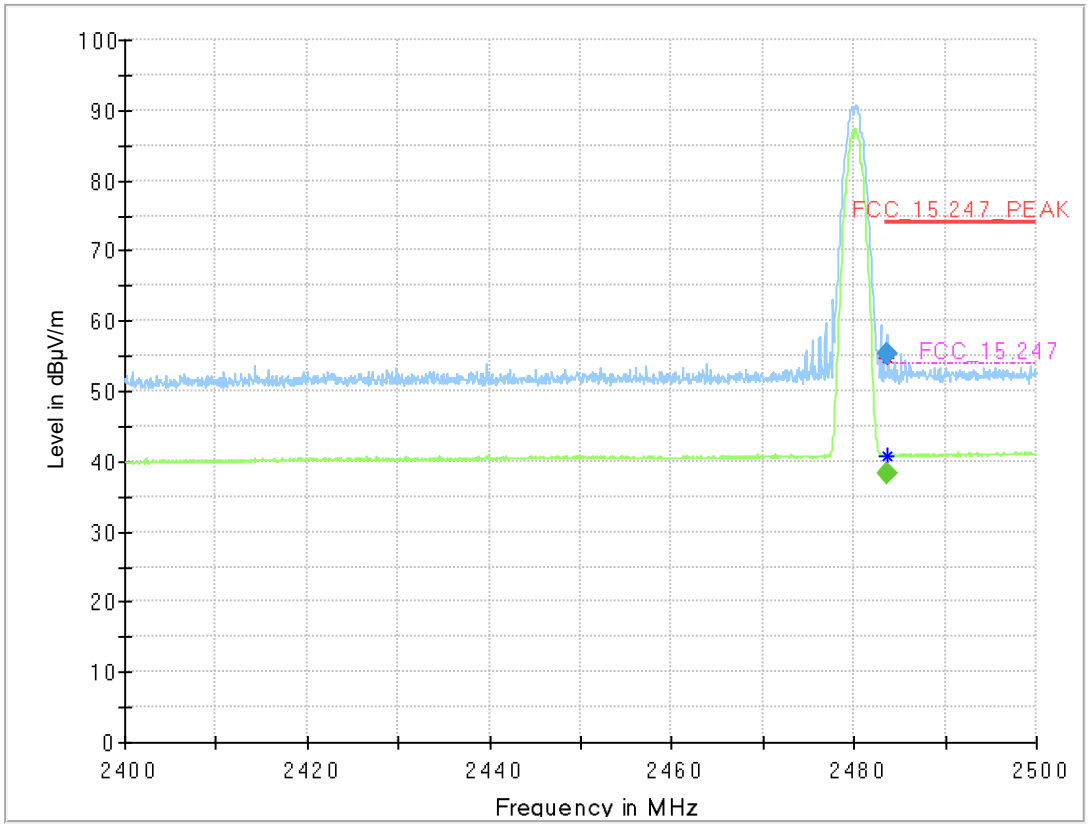
Chip01, Modulation= Bluetooth BR, Operating Channel = 78, Band Edge = high
(S01_AB01#S3.5)



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
2484.250	---	40.3	54.00	13.72	1000.0	1000.000	150.0	H	-185.0	15.0	8.0
2484.250	53.2	---	74.00	20.80	1000.0	1000.000	150.0	H	-185.0	15.0	8.0

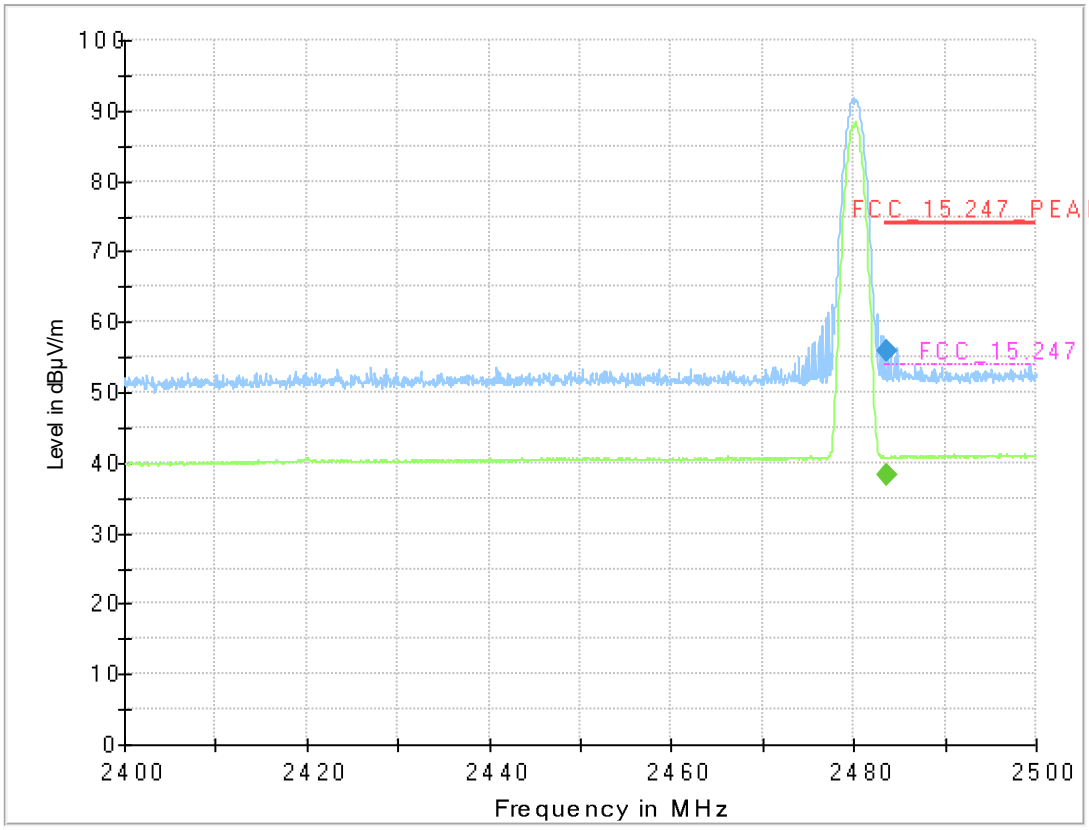
Chip01, Modulation= Bluetooth EDR 2, Operating Channel = 78, Band Edge = high (S01_AB01#S3.5)



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
2483.625	---	38.2	54.00	15.78	1000.0	1000.000	150.0	H	-23.0	100.0	8.0
2483.625	55.4	---	74.00	18.61	1000.0	1000.000	150.0	H	-23.0	100.0	8.0

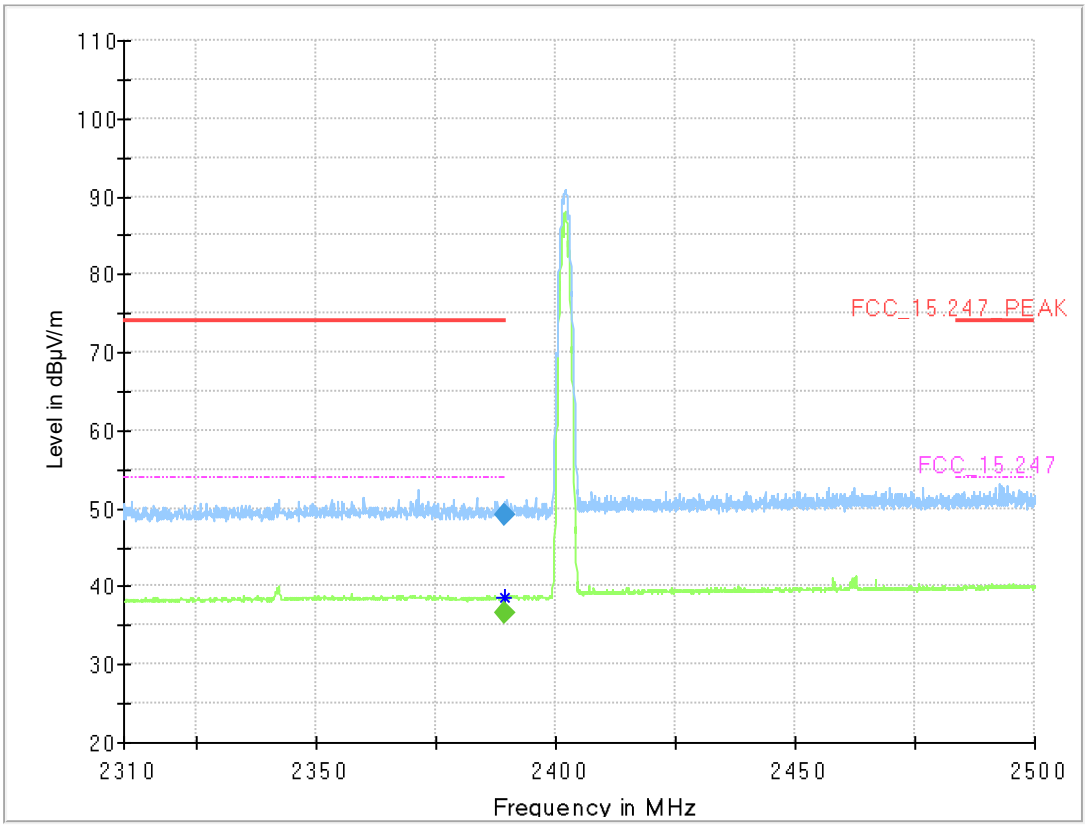
Chip01, Modulation= Bluetooth EDR 3, Operating Channel = 78, Band Edge = high (S01_AB01#S3.5)



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
2483.688	---	38.2	54.00	15.82	1000.0	1000.000	150.0	V	-92.0	-15.0	8.0
2483.688	56.0	---	74.00	18.00	1000.0	1000.000	150.0	V	-92.0	-15.0	8.0

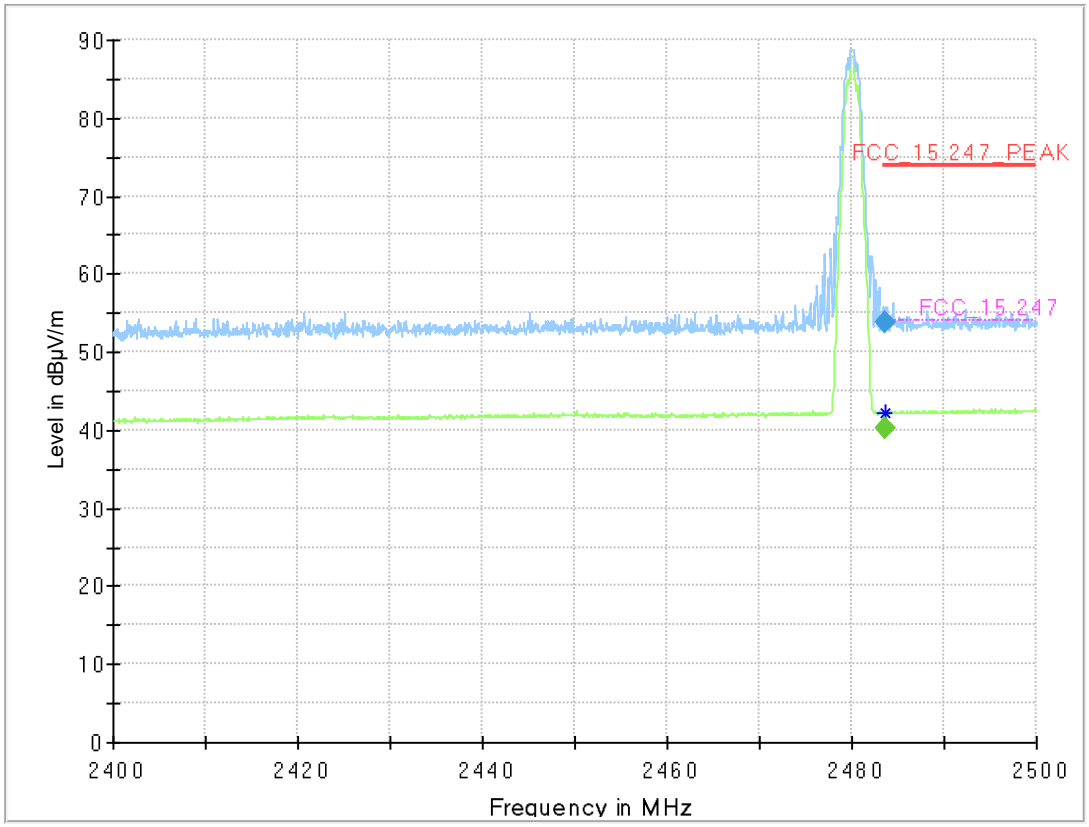
Chip02, Modulation= Bluetooth EDR 3, Operating Channel = 0, Band Edge = low
(S01_AB01#S3.5)



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
2389.380	---	36.5	54.00	17.46	1000.0	1000.000	150.0	V	-118.0	92.0	7.0
2389.380	49.2	---	74.00	24.82	1000.0	1000.000	150.0	V	-118.0	92.0	7.0

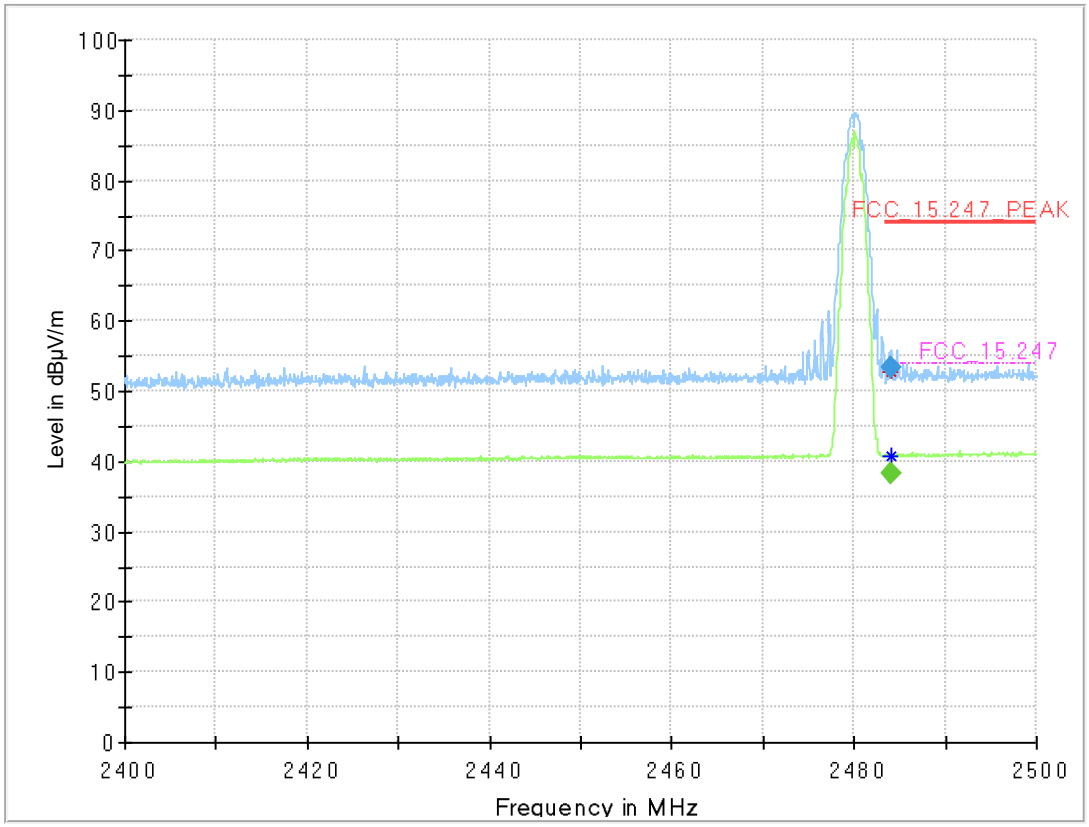
Chip02, Modulation= Bluetooth BR, Operating Channel = 78, Band Edge = high (S01_AB01#S3.5)



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
2483.563	---	40.2	54.00	13.75	1000.0	1000.000	150.0	V	-114.0	15.0	8.0
2483.563	53.8	---	74.00	20.22	1000.0	1000.000	150.0	V	-114.0	15.0	8.0

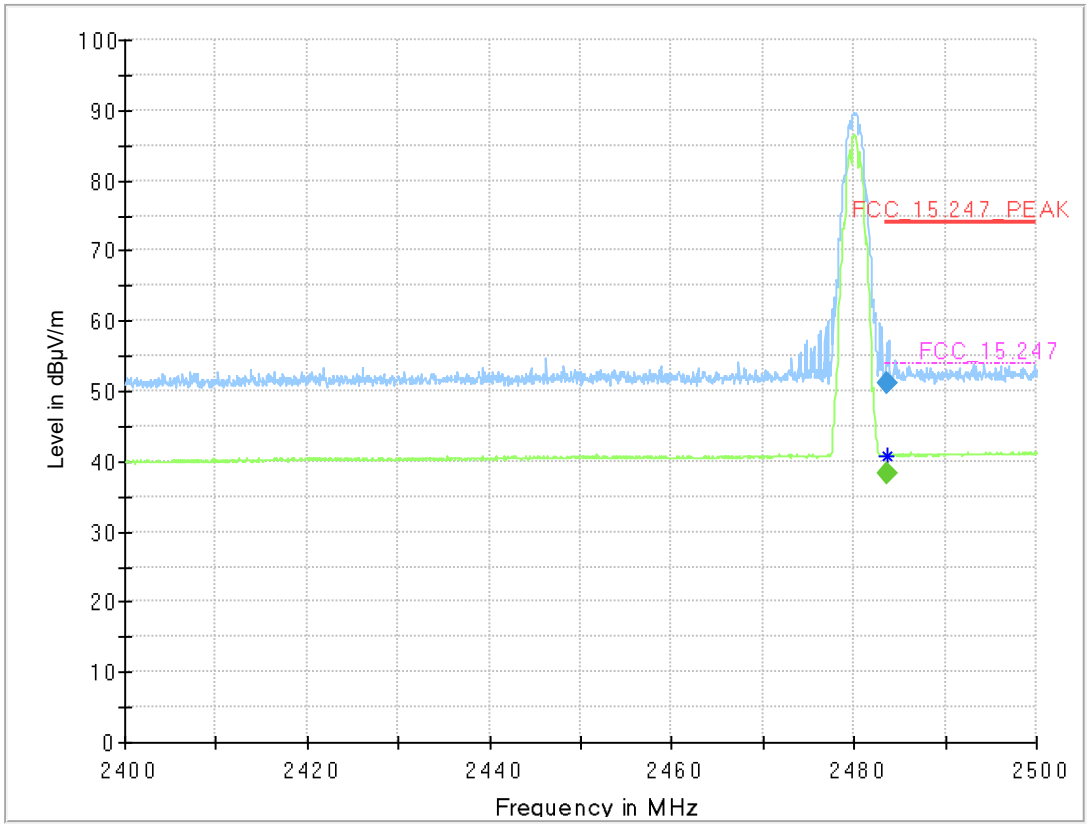
Chip02, Modulation= Bluetooth EDR 2, Operating Channel = 78, Band Edge = high (S01_AB01#S3.5)



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
2484.063	---	38.2	54.00	15.80	1000.0	1000.000	150.0	H	162.0	91.0	8.0
2484.063	53.4	---	74.00	20.61	1000.0	1000.000	150.0	H	162.0	91.0	8.0

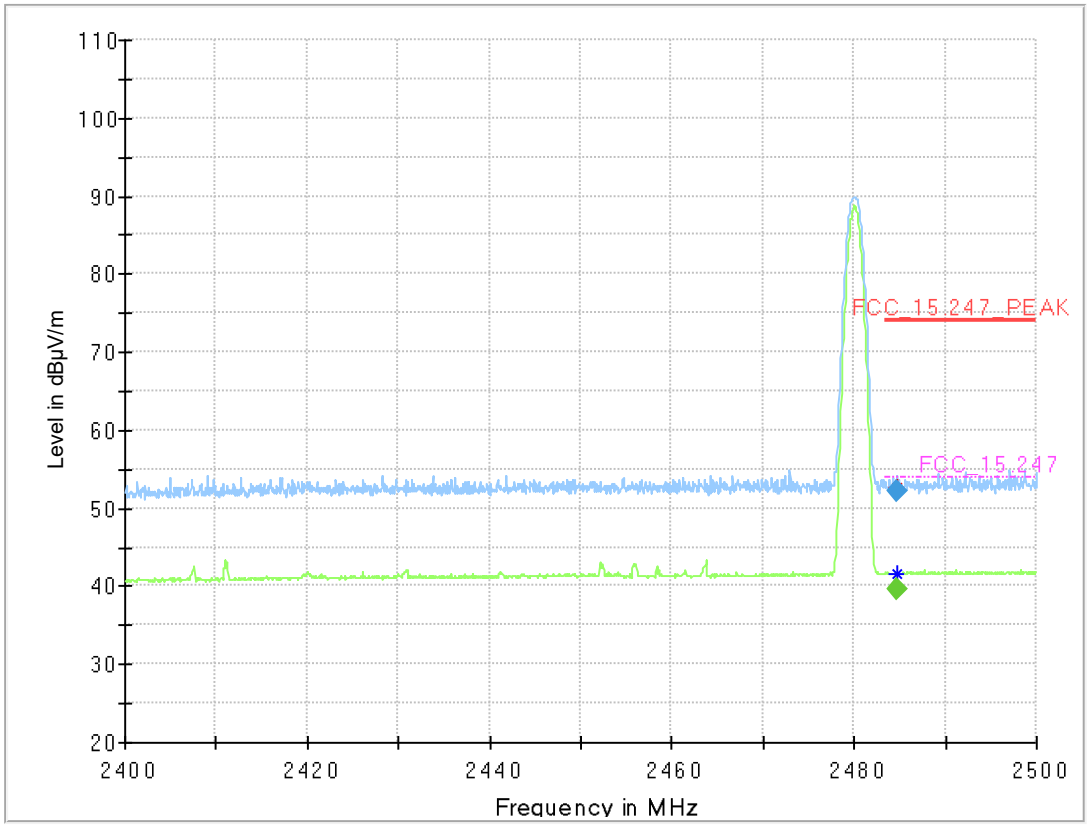
Chip02, Modulation= Bluetooth EDR 3, Operating Channel = 78, Band Edge = high (S01_AB01#S3.5)



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
2483.563	---	38.2	54.00	15.76	1000.0	1000.000	150.0	V	-124.0	100.0	8.0
2483.563	51.0	---	74.00	23.00	1000.0	1000.000	150.0	V	-124.0	100.0	8.0

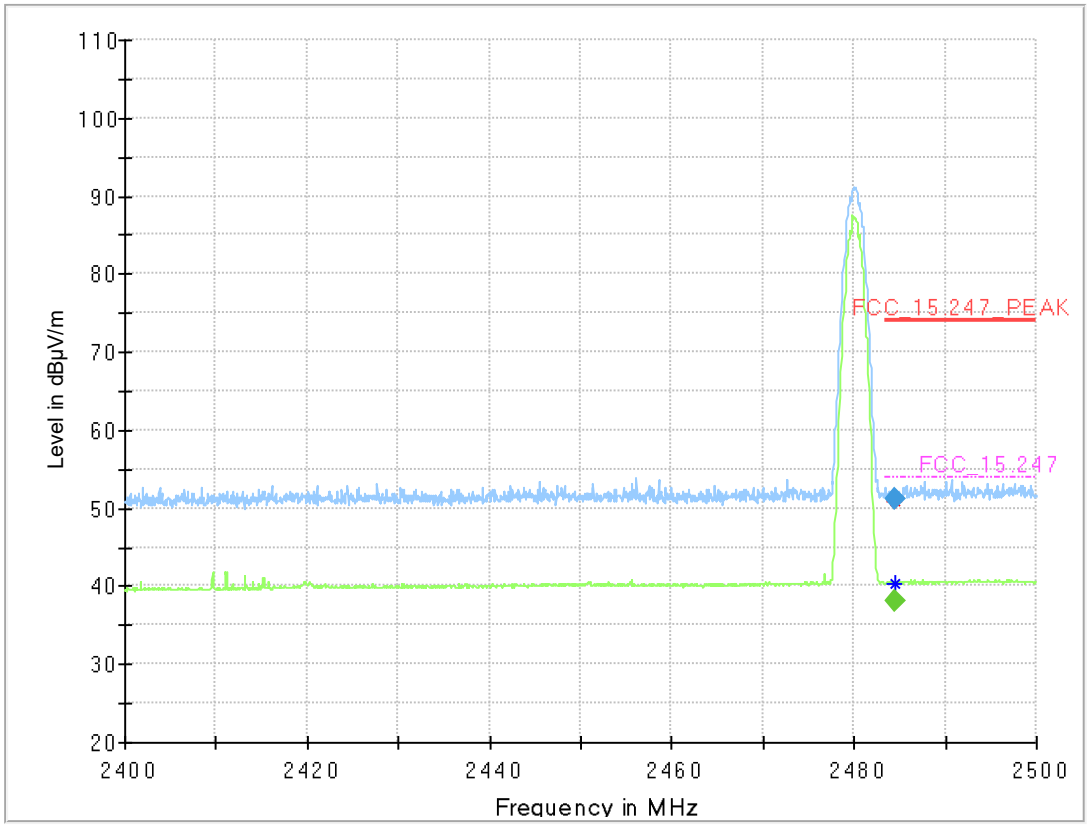
Chip01, Modulation= Bluetooth BR, Operating Channel = 78, Band Edge = high
(S01_AA01#S3.0)



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
2484.688	---	39.7	54.00	14.29	1000.0	1000.000	150.0	H	54.0	105.0	8.0
2484.688	52.2	---	74.00	21.83	1000.0	1000.000	150.0	H	54.0	105.0	8.0

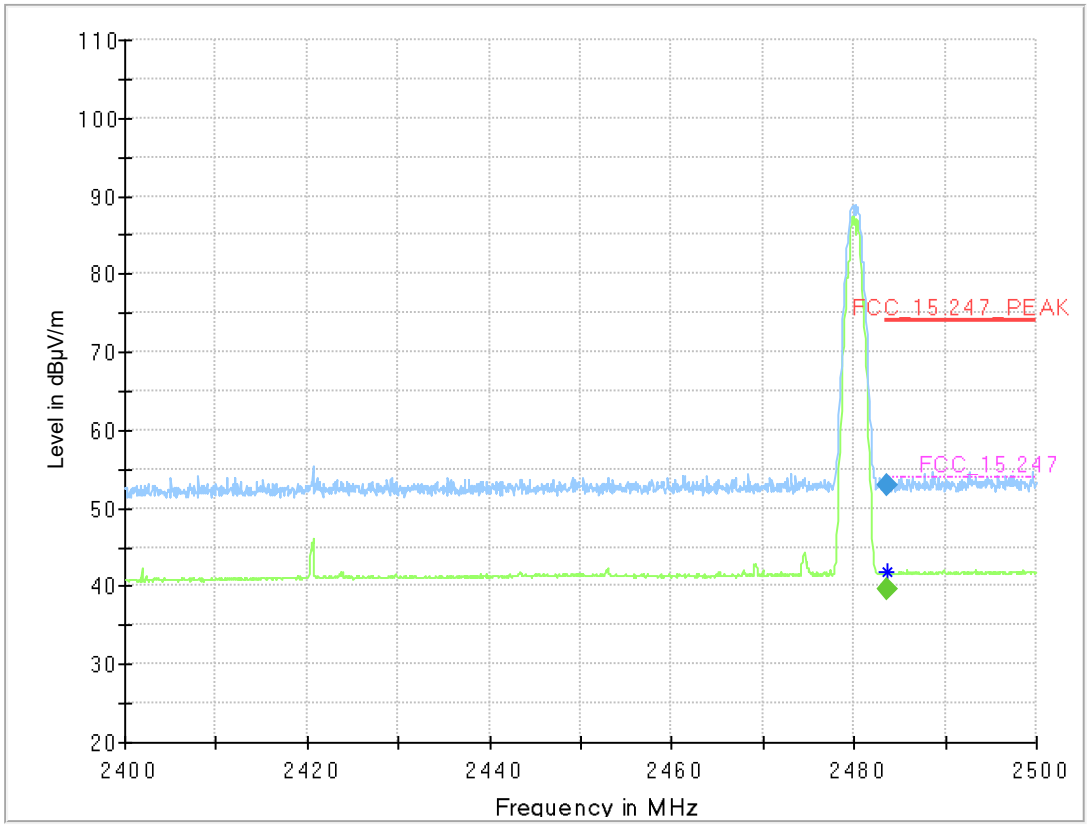
Chip01, Modulation= Bluetooth EDR 3, Operating Channel = 78, Band Edge = high (S01_AA01#S3.0)



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
2484.500	---	38.0	54.00	16.00	1000.0	1000.000	150.0	H	118.0	15.0	8.0
2484.500	51.1	---	74.00	22.92	1000.0	1000.000	150.0	H	118.0	15.0	8.0

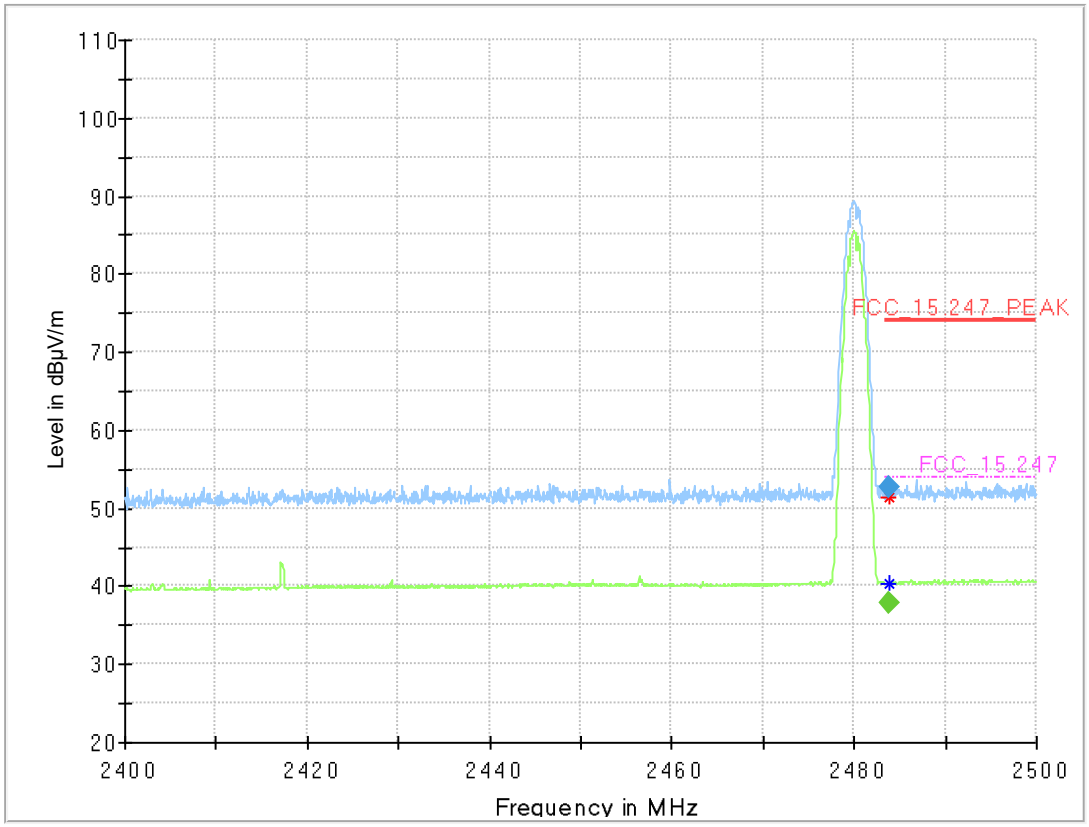
Chip02, Modulation= Bluetooth BR, Operating Channel = 78, Band Edge = high
(S01_AA01#S3.0)



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
2483.625	---	39.7	54.00	14.32	1000.0	1000.000	150.0	H	49.0	81.0	8.0
2483.625	53.0	---	74.00	20.98	1000.0	1000.000	150.0	H	49.0	81.0	8.0

Chip02, Modulation= Bluetooth EDR 3, Operating Channel = 78, Band Edge = high (S01_AA01#S3.0)



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
2483.875	---	38.0	54.00	16.03	1000.0	1000.000	150.0	H	-53.0	15.0	8.0
2483.875	52.8	---	74.00	21.20	1000.0	1000.000	150.0	H	-53.0	15.0	8.0

5.7.5 TEST EQUIPMENT USED

- Radiated Emissions FAR 2.4 GHz FCC

5.8 CHANNEL SEPARATION

Standard **FCC Part 15 Subpart C**

The test was performed according to:
ANSI C63.10, chapter 7.8.2

5.8.1 TEST DESCRIPTION

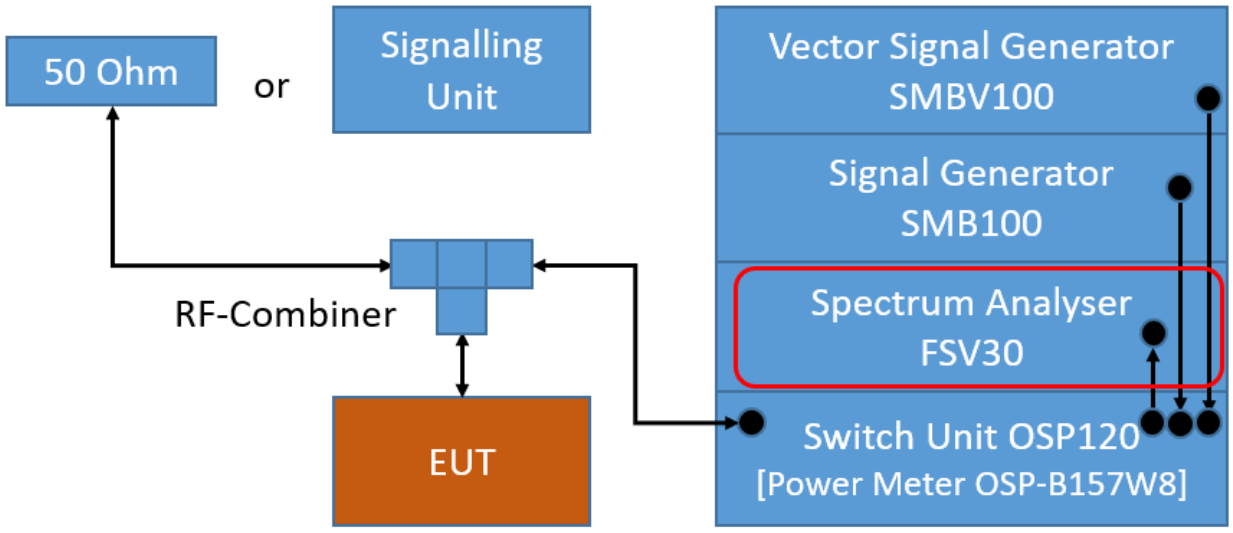
The Equipment Under Test (EUT) was set up to perform the channel separation measurement. The channel separation is independent of the modulation pattern.

The EUT was connected to the test system as described in the block diagram below. The complete attenuation of the measurement path is known and considered.

Analyser settings:

- Detector: Peak
- Trace: Maxhold
- Span: appr. 3 x OBW
- Centre Frequency: approximate mid of two channels
- Resolution Bandwidth (RBW): appr. 30 % of channel spacing
- Video Bandwidth (VBW): ≥ RBW
- Sweep Time: Auto
- Sweeps: Till stable (min. 2000, max. 30000)

The technology depending measurement parameters can be found in the measurement plot.



TS8997; Channel Separation

5.8.2 TEST REQUIREMENTS / LIMITS

FCC Part 15, Subpart C, §15.247 (a) (1)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

5.8.3 TEST PROTOCOL

Ambient temperature:	23 °C
Air Pressure:	998 hPa
Humidity:	38 %

Chip01

Radio Technology	Channel Separation [MHz]	Limit [MHz]	Margin to Limit [MHz]
BT GFSK (1-DH5)	1.020	0.888	0.132

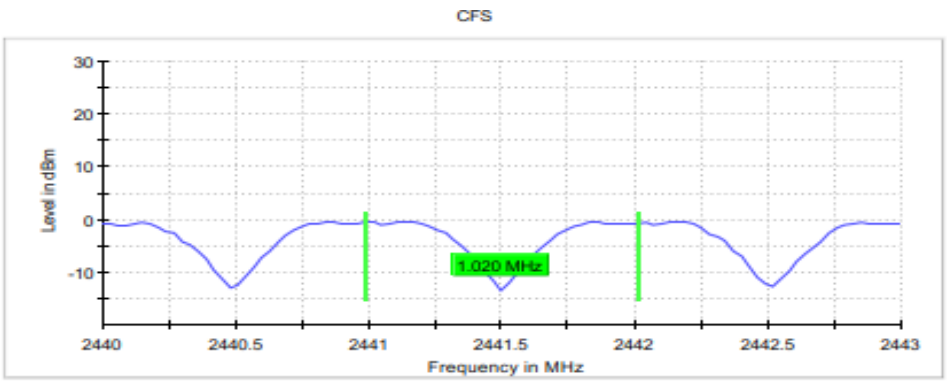
Chip02

Radio Technology	Channel Separation [MHz]	Limit [MHz]	Margin to Limit [MHz]
BT GFSK (1-DH5)	1.020	0.877	0.143

Remark: Please see next sub-clause for the measurement plot.

5.8.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

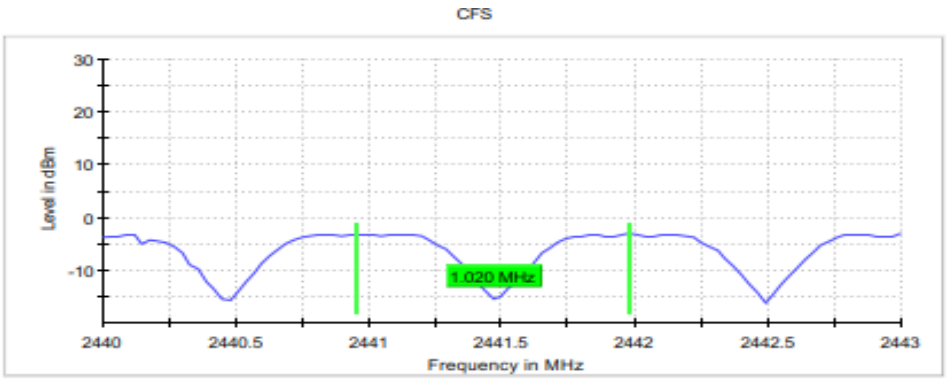
Chip01, Modulation= Bluetooth BR
(S01_AA01#S3.5)



Measurement

Setting	Instrument Value
Start Frequency	2.44000 GHz
Stop Frequency	2.44300 GHz
Span	3.000 MHz
RBW	300.000 kHz
VBW	300.000 kHz
SweepPoints	101
Sweeptime	1.000 ms
Reference Level	0.000 dBm
Attenuation	10.000 dB
Detector	MaxPeak
SweepCount	200
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	Sweep
Preamp	off
Stablemode	Trace
Stablevalue	0.50 dB
Run	14 / max. 150
Stable	10 / 10
Max Stable Difference	0.00 dB

Chip02, Modulation= Bluetooth BR
(S01_AA01#S3.5)



Measurement

Setting	Instrument Value
Start Frequency	2.44000 GHz
Stop Frequency	2.44300 GHz
Span	3.000 MHz
RBW	300.000 kHz
VBW	300.000 kHz
SweepPoints	101
Sweeptime	1.000 ms
Reference Level	0.000 dBm
Attenuation	10.000 dB
Detector	MaxPeak
SweepCount	200
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	Sweep
Preamp	off
Stablemode	Trace
Stablevalue	0.50 dB
Run	14 / max. 150
Stable	10 / 10
Max Stable Difference	0.00 dB

5.8.5 TEST EQUIPMENT USED

- R&S TS8997

5.9 DWELL TIME

Standard **FCC Part 15 Subpart C**

The test was performed according to:
ANSI C63.10, chapter 7.8.4

5.9.1 TEST DESCRIPTION

The Equipment Under Test (EUT) was set up to perform the dwell time measurement.
The dwell time is independent of the modulation pattern.
The EUT is set to its maximum dwell time.

The dwell time is measured by spectrum analyser and power meter in parallel. The spectrum analyser video output is connected to the power meter allowing the power meter to measure transmission time only when the EUT is actively transmitting on the measured channel. The power meter is using a time resolution of 1 µs resulting in a more accurate measurement then possible using the spectrum analyser. In addition, measurement of burst length on more than one transmission is performed this way.
In addition to the calculated dwell time from single burst length, measured dwell time summing up all measured bursts lengths as measured by the power meter is given in the result table.

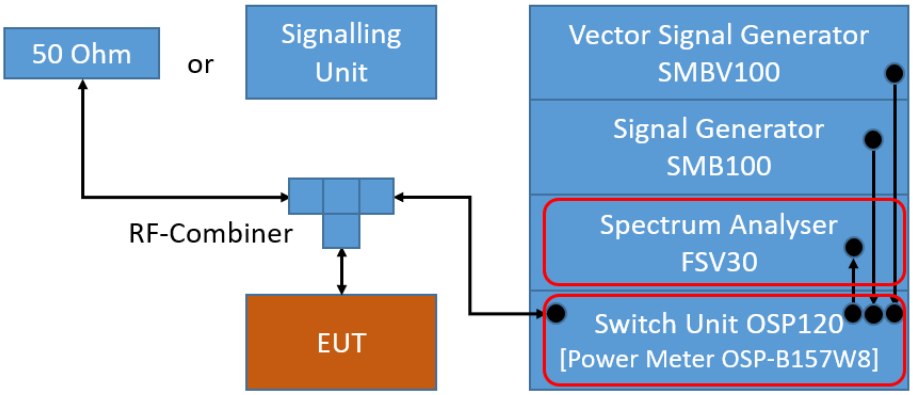
Calculation for Bluetooth Classic:
Maximum Duty Cycle is given for DH5 packets, resulting in 5 time slots transmission, 1 time slots reception. Each time slot lasts 625 µs.

Dwell time is calculated as: measured length of a single 5 time slot transmission multiplied by the number of bursts measured by the power meter.

Analyser Settings single 5 slot burst:
- Centre Frequency: mid channel frequency
- Span: Zero span
- Detector: Peak
- Resolution Bandwidth (RBW): ≤ Channel separation
- Trigger: Video
- Sweep Time: 3 ms
- Sweep Points: 30001
- Single Sweep

Analyser setting full sweep:
- Centre Frequency: mid channel frequency
- Span: Zero span
- Detector: Peak
- Resolution Bandwidth (RBW): ≤ Channel separation
- Trigger: External
- Sweep Time: 31.6 s
- Sweep Points: 30001
- Single Sweep

Time resolution of power meter: 1 µs



TS8997; Dwell Time

5.9.2 TEST REQUIREMENTS / LIMITS

For the frequency band 2400 – 2483.5 MHz:
FCC Part 15, Subpart C, §15.247 (a) (1) (iii)

…The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Since the Bluetooth technology uses 79 channels this period is calculated to be 31.6 seconds.

FCC Part 15, Subpart C, §15.247 (f)

(f) For the purposes of this section, hybrid systems are those that employ a combination of both frequency hopping and digital modulation techniques. The frequency hopping operation of the hybrid system, with the direct sequence or digital modulation operation turned-off, shall have an average time of occupancy on any frequency not to exceed 0.4 seconds within a time period in seconds equal to the number of hopping frequencies employed multiplied by 0.4.
…

5.9.3 TEST PROTOCOL

Ambient temperature:	23 °C
Air Pressure:	998 hPa
Humidity:	38 %

Chip01

Radio Technology	Measured Slot Length [ms]	Measured Number of Slots	Calculated Dwell Time [ms]	Limit [ms]	Margin to Limit [ms]
BT GFSK (1-DH5)	2.882	95	273.759	400.0	126.241

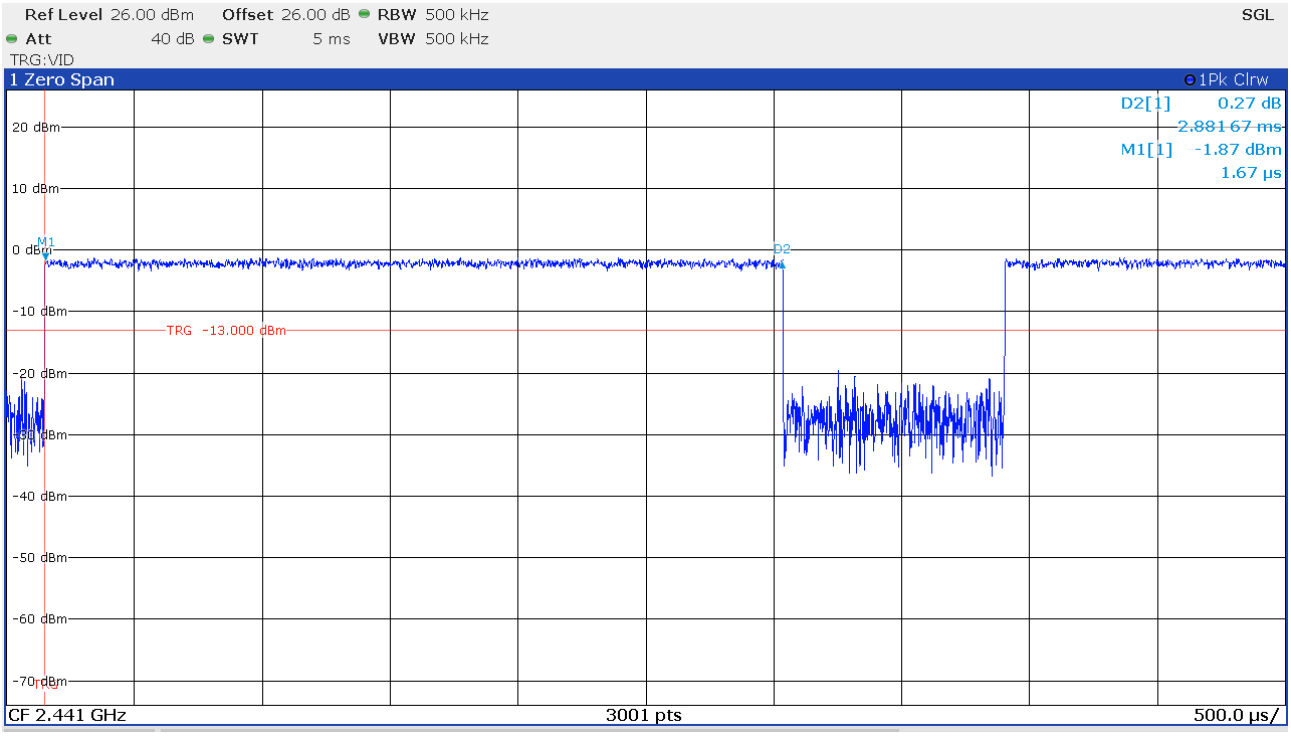
Chip02

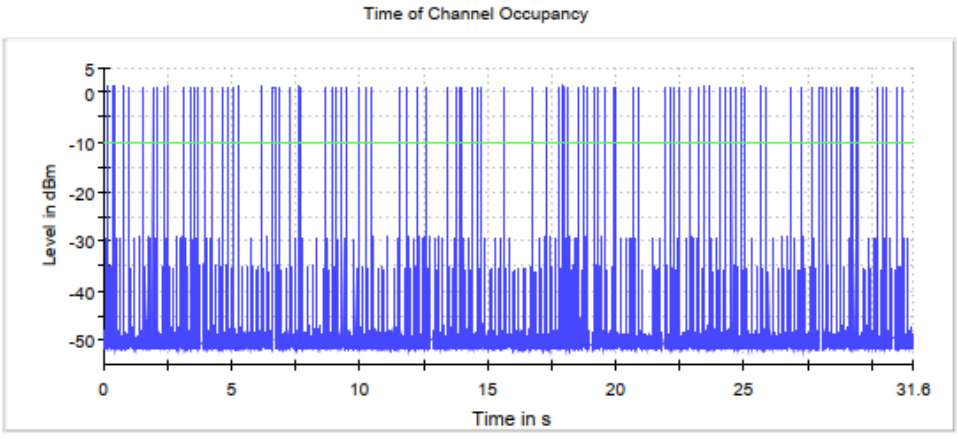
Radio Technology	Measured Slot Length [ms]	Measured Number of Slots	Calculated Dwell Time [ms]	Limit [ms]	Margin to Limit [ms]
BT GFSK (1-DH5)	2.883	107	308.516	400.0	91.484

Remark: Please see next sub-clause for the measurement plot.

5.9.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

Chip01, Modulation= Bluetooth BR
(S01_AA01#S3.5)

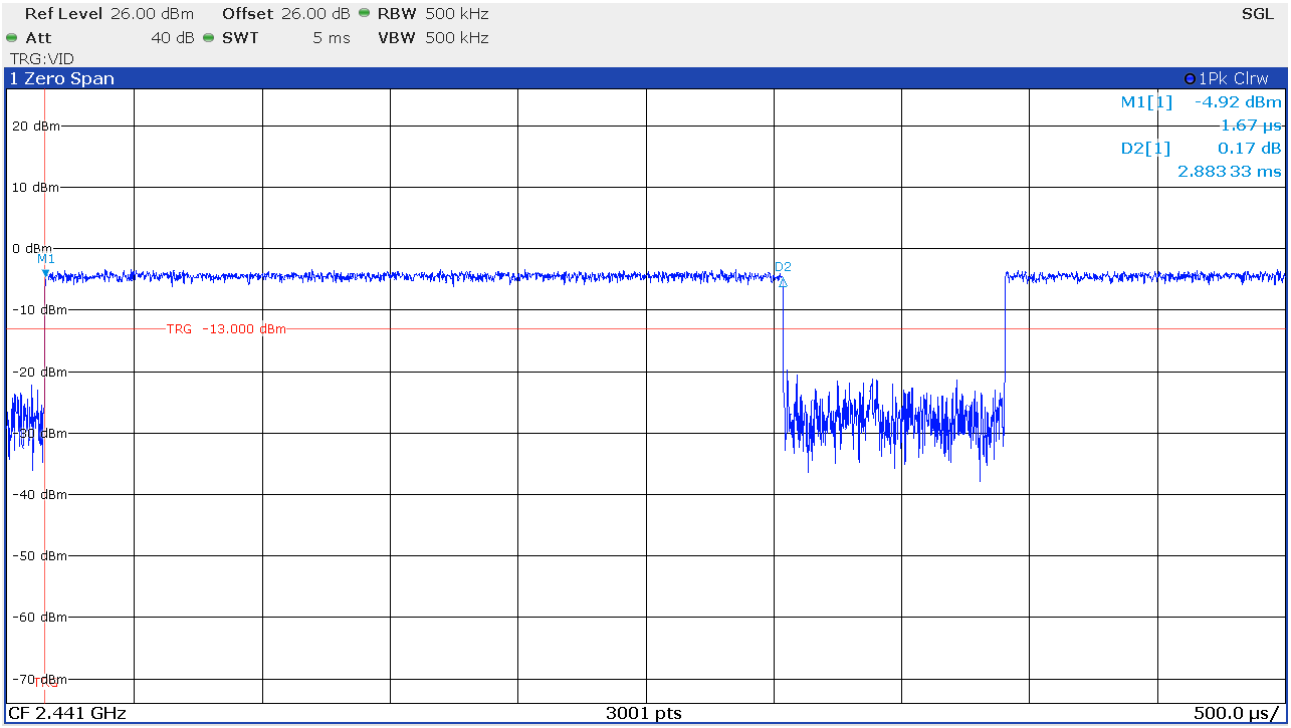


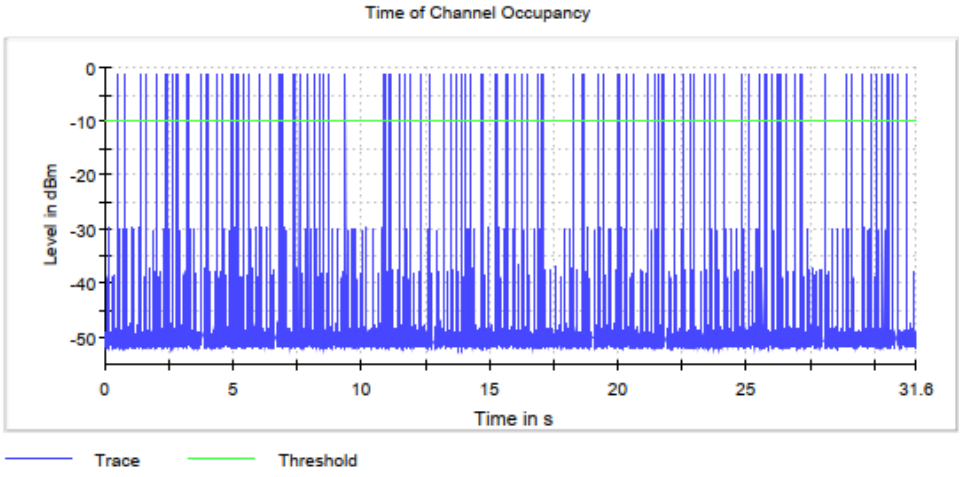


Measurement

Setting	Instrument Value
Center Frequency	2.44100 GHz
Span	ZeroSpan
RBW	500.000 kHz
VBW	1.000 MHz
SweepPoints	30001
Sweeptime	31.600 s
Reference Level	-20.000 dBm
Attenuation	0.000 dB
Detector	MaxPeak
SweepCount	1
Filter	Channel
Trace Mode	Clear Write
Sweeptype	Sweep
Preamp	off
Trigger	External
Trigger Offset	0.000 s

Chip02, Modulation= Bluetooth BR
(S01_AA01#S3.5)





Measurement

Setting	Instrument Value
Center Frequency	2.44100 GHz
Span	ZeroSpan
RBW	500.000 kHz
VBW	1.000 MHz
SweepPoints	30001
Sweeptime	31.600 s
Reference Level	-20.000 dBm
Attenuation	0.000 dB
Detector	MaxPeak
SweepCount	1
Filter	Channel
Trace Mode	Clear Write
Sweeptype	Sweep
Preamp	off
Trigger	External
Trigger Offset	0.000 s

5.9.5 TEST EQUIPMENT USED

- R&S TS8997

5.10 NUMBER OF HOPPING FREQUENCIES

Standard **FCC Part 15 Subpart C**

The test was performed according to:
ANSI C63.10, chapter 7.8.3

5.10.1 TEST DESCRIPTION

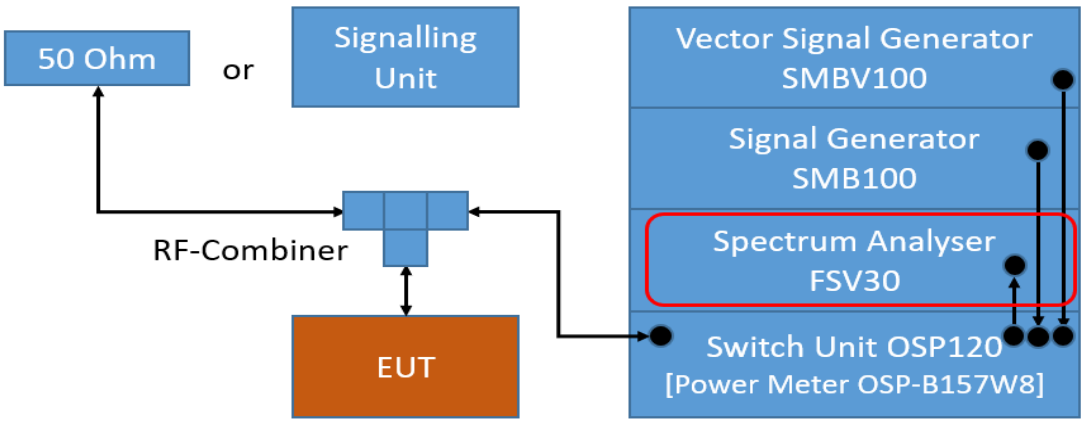
The Equipment Under Test (EUT) was set up to perform the number of hopping frequencies measurement. The number of hopping frequencies is independent of the modulation pattern.

The EUT was connected to the test system as described in the block diagram below. The complete attenuation of the measurement path is known and considered.

Analyser settings:

- Detector: Peak
- Trace: Maxhold
- Frequency span: Frequency band of operation
- Resolution Bandwidth (RBW): < 30 % of channel spacing or 20 dB bandwidth (whichever is smaller)
- Video Bandwidth (VBW): 3 x RBW
- Sweep Time: Auto
- Sweeps: Till stable (min. 300, max. 15000)

The technology depending measurement parameters can be found in the measurement plot.



TS8997; Number of Hopping Frequencies

5.10.2 TEST REQUIREMENTS / LIMITS

For the band: 2400 – 2483.5 MHz
FCC Part 15, Subpart C, §15.247 (a) (1) (iii)

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

5.10.3 TEST PROTOCOL

Ambient temperature:	23 °C
Air Pressure:	998 hPa
Humidity:	38 %

Chip01

Radio Technology	Number of Hopping Frequencies	Limit	Margin to Limit
BT GFSK (1-DH5)	79	15	64

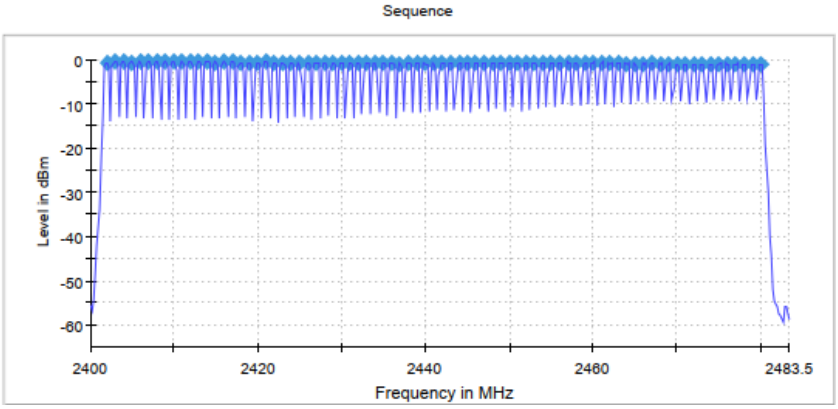
Chip02

Radio Technology	Number of Hopping Frequencies	Limit	Margin to Limit
BT GFSK (1-DH5)	79	15	64

Remark:Please see next sub-clause for the measurement plot.

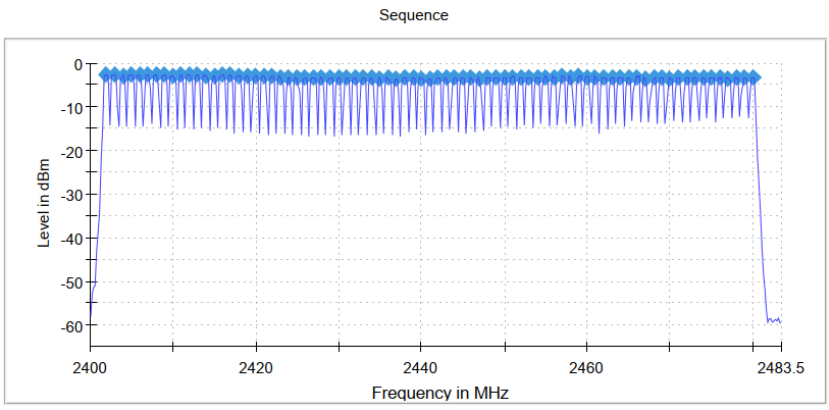
5.10.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

Chip01, Modulation= Bluetooth BR
(S01_AA01#S3.5)



Setting	Instrument Value
Start Frequency	2.40000 GHz
Stop Frequency	2.48350 GHz
Span	83.500 MHz
RBW	200.000 kHz
VBW	200.000 kHz
SweepPoints	418
Sweeptime	1.060 ms
Reference Level	0.000 dBm
Attenuation	10.000 dB
Detector	MaxPeak
SweepCount	100
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	Sweep
Preamp	off
Stablemode	Trace
Stablevalue	0.50 dB
Run	75 / max. 150
Stable	3 / 3
Max Stable Difference	0.11 dB

Chip02, Modulation= Bluetooth BR
(S01_AA01#S3.5)



Setting	Instrument Value
Start Frequency	2.40000 GHz
Stop Frequency	2.48350 GHz
Span	83.500 MHz
RBW	200.000 kHz
VBW	200.000 kHz
SweepPoints	418
Sweeptime	1.060 ms
Reference Level	0.000 dBm
Attenuation	10.000 dB
Detector	MaxPeak
SweepCount	100
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	Sweep
Preamp	off
Stablemode	Trace
Stablevalue	0.50 dB
Run	54 / max. 150
Stable	3 / 3
Max Stable Difference	0.04 dB

5.10.5 TEST EQUIPMENT USED

- R&S TS8997

6 TEST EQUIPMENT

6.1 TEST EQUIPMENT HARDWARE

1 R&S TS8997
2.4 and 5 GHz Bands Conducted Test Lab

Ref.No.	Device Name	Description	Manufacturer	Serial Number	Last Calibration	Calibration Due
1.1	Opus10 TPR (8253.00)	T/P Logger 13	Lufft Mess- und Regeltechnik GmbH	13936	2023-12	2025-12
1.2	SMB100A	Signal Generator 9 kHz - 6 GHz	Rohde & Schwarz	107695	2024-07	2027-07
1.3	EX520	Digital Multimeter 12	Extech Instruments Corp	05157876	2024-12	2026-12
1.4	FSV30	Signal Analyzer 10 Hz - 30 GHz	Rohde & Schwarz	103005	2023-08	2025-08
1.5	Opus10 THI (8152.00N)	T/H Logger 01	Lufft Mess- und Regeltechnik GmbH	5809	2023-12	2025-12
1.6	Temperature Chamber VT 4002	Temperature Chamber Vötsch 03	Vötsch	58566002150010	2024-07	2026-07
1.7	FSW43	Signal Analyser	Rohde & Schwarz GmbH & Co. KG	102013	2023-07	2025-07
1.8	Opus10 THI (8152.00)	T/H Logger 14	Lufft Mess- und Regeltechnik GmbH	13993	2023-12	2025-12
1.9	HMP2020	Programmable Power Supply	Rohde & Schwarz GmbH & Co. KG	101992	N/A	N/A
1.10	SMBV100A	Vector Signal Generator 9 kHz - 6 GHz	Rohde & Schwarz	259291	2023-01	2026-01
1.11	OSP120	Contains Power Meter and Switching Unit OSP-B157W8 PLUS	Rohde & Schwarz	101158	2024-08	2027-08
1.12	CS-RUB6	Rubidium Frequency Standard	Rohde & Schwarz GmbH & Co. KG	100321	2023-10	2025-10
1.13	CBT	Bluetooth Tester	Rohde & Schwarz	100302	2024-09	2027-09

2 Radiated Emissions FAR 2.4 GHz FCC

Radiated emission tests for 2.4 GHz ISM devices in a fully anechoic room

Ref.No.	Device Name	Description	Manufacturer	Serial Number	Last Calibration	Calibration Due
2.1	Opus10 TPR (8253.00)	T/P Logger 13	Lufft Mess- und Regeltechnik GmbH	13936	2023-12	2025-12
2.2	Innco Systems CO3000	Controller for bore sight mast FAC	innco systems GmbH	CO3000/1460/54740522/P	N/A	N/A
2.3	AMF-7D00101800-30-10P-R	Broadband Amplifier 100 MHz - 18 GHz	Miteq		N/A	N/A
2.4	Anechoic Chamber 03	FAR, 8.80m x 4.60m x 4.05m (l x w x h)	Albatross Projects	P26971-647-001-PRB	N/A	N/A
2.5	Fluke 177	Digital Multimeter 03 (Multimeter)	Fluke Europe B.V.	86670383	2023-08	2025-08
2.6	HF 906	Double-ridged horn	Rohde & Schwarz	357357/002	2022-07	2025-07
2.7	JS4-18002600-32-5P	Broadband Amplifier 18 GHz - 26 GHz	Miteq	849785	N/A	N/A
2.8	FSW43	Spectrum Analyzer	Rohde & Schwarz GmbH & Co. KG	103779	2024-12	2026-12
2.9	EP 1200/B, NA/B1	AC Source, Amplifier with integrated variable Oscillator	Spitzenberger & Spies GmbH & Co. KG	B6278	N/A	N/A
2.10	3160-09	Standard Gain / Pyramidal Horn Antenna 26.5 GHz	EMCO Elektronic GmbH	00083069	N/A	N/A
2.11	WHKX 7.0/18G-8SS	High Pass Filter	Wainwright Instruments GmbH	09	N/A	N/A
2.12	MA3000/0800-XP-ET-compact	Bore Sight Antenna Mast	innco systems GmbH	9210522	N/A	N/A
2.13	TT 1.5 WI	Turn Table	Maturo GmbH	-	N/A	N/A
2.14	5HC3500/18000-1.2-KK	High Pass Filter	Trilithic	200035008	N/A	N/A
2.15	Opus 20 THI (8120.00)	ThermoHygro Datalogger	Lufft Mess- und Regeltechnik GmbH	115.0318.0802.033	2023-08	2025-08
2.16	TD1.5-10kg	EUT Tilt Device (Rohacell)	Maturo GmbH	TD1.5-10kg/024/3790709	N/A	N/A
2.17	AFS42-00101800-25-S-42	Broadband Amplifier 25 MHz - 18 GHz	Miteq	2035324	N/A	N/A
2.18	HF 907	Double-ridged horn	Rohde & Schwarz	102444	2024-10	2027-10
2.19	CBT	Bluetooth Tester	Rohde & Schwarz	100302	2024-09	2027-09

3 Radiated Emissions SAC H-Field

Radiated emission tests in the H-Field in a semi anechoic room

Ref.No.	Device Name	Description	Manufacturer	Serial Number	Last Calibration	Calibration Due
3.1	N5000/NP	Filter for EUT, 2 Lines, 250 V, 16 A	ETS-LINDGREN	241515	N/A	N/A
3.2	Opus10 TPR (8253.00)	T/P Logger 13	Lufft Mess- und Regeltechnik GmbH	13936	2023-12	2025-12
3.3	ESW44	EMI Receiver / Spectrum Analyzer	Rohde & Schwarz GmbH & Co. KG	101603	2024-03	2026-03
3.4	Anechoic Chamber 01	SAC/FAR, 10.58 m x 6.38 m x 6.00 m	Frankonia Germany EMC Solution GmbH	none	N/A	N/A
3.5	Fluke 177	Digital Multimeter 03 (Multimeter)	Fluke Europe B.V.	86670383	2023-08	2025-08
3.6	Opus10 THI (8152.00)	T/H Logger 10	Lufft Mess- und Regeltechnik GmbH	12488	2023-12	2025-12
3.7	EP 1200/B, NA/B1	AC Source, Amplifier with integrated variable Oscillator	Spitzenberger & Spies GmbH & Co. KG	B6278	N/A	N/A
3.8	DS 420S	Turn Table 2 m diameter	HD GmbH	420/573/99	N/A	N/A
3.9	HFH2-Z2	Loop Antenna + 3 Axis Tripod	Rohde & Schwarz GmbH & Co. KG	829324/006	2024-04	2027-04
3.10	CS-RUB6	Rubidium Frequency Standard	Rohde & Schwarz GmbH & Co. KG	100321	2023-10	2025-10
3.11	CBT	Bluetooth Tester	Rohde & Schwarz	100302	2024-09	2027-09

4 Radiated Emissions SAC up to 1 GHz

Radiated emission tests up to 1 GHz in a semi anechoic room

Ref.No.	Device Name	Description	Manufacturer	Serial Number	Last Calibration	Calibration Due
4.1	N5000/NP	Filter for EUT, 2 Lines, 250 V, 16 A	ETS-LINDGREN	241515	N/A	N/A
4.2	Opus10 TPR (8253.00)	T/P Logger 13	Lufft Mess- und Regeltechnik GmbH	13936	2023-12	2025-12
4.3	ESW44	EMI Receiver / Spectrum Analyzer	Rohde & Schwarz GmbH & Co. KG	101603	2024-03	2026-03
4.4	Anechoic Chamber 01	SAC/FAR, 10.58 m x 6.38 m x 6.00 m	Frankonia Germany EMC Solution GmbH	none	N/A	N/A
4.5	HL 562 ULTRALOG	Biconical-log-per antenna (30 MHz - 3 GHz) with HL 562E biconicals	Rohde & Schwarz GmbH & Co. KG	830547/003		
4.6	Fluke 177	Digital Multimeter 03 (Multimeter)	Fluke Europe B.V.	86670383	2023-08	2025-08
4.7	Opus10 THI (8152.00)	T/H Logger 10	Lufft Mess- und Regeltechnik GmbH	12488	2023-12	2025-12
4.8	EP 1200/B, NA/B1	AC Source, Amplifier with integrated variable Oscillator	Spitzenberger & Spies GmbH & Co. KG	B6278	N/A	N/A
4.9	DS 420S	Turn Table 2 m diameter	HD GmbH	420/573/99	N/A	N/A
4.10	HL562E ULTRALOG	Biconical-log-per Antenna (30 MHz - 6 GHz)	Rohde & Schwarz GmbH & Co. KG	102299	2024-07	2027-07
4.11	Chase CBL6111C + INMET 64671 18N-6dB	Hybrid Antenna with 6dB Attenuator		2624 | Kartei-Nr E-003226/K1026	2023-03	2026-03
4.12	CS-RUB6	Rubidium Frequency Standard	Rohde & Schwarz GmbH & Co. KG	100321	2023-10	2025-10
4.13	AM 4.0	Antenna Mast 4 m	Maturo GmbH	AM4.0/180/11920513	N/A	N/A
4.14	CBT	Bluetooth Tester	Rohde & Schwarz	100302	2024-09	2027-09

The calibration interval is the time interval between “Last Calibration” and “Calibration Due”

6.2 TEST EQUIPMENT SOFTWARE

Semi-Anechoic Chamber:	
Software	Version
EMC32 Measurement Software	10.60.10
INNCO Mast Controller	1.02.62
INNCO Mast Height	34.10
INNCO Mast Elevation	36.11
MATURO Controller	1.24
MATURO Mast	12.19
MATURO Turn-Table	30.10
Fully-Anechoic Chamber:	
Software	Version
EMC32 Measurement Software	10.60.10
MATURO Controller	1.30
MATURO Turn-Unit	11.10
MATURO Mast	12.10
MATURO Turntable	12.11
INNCO Controller	1.03.02
INNCO Mast Height	34.10
INNCO Mast Elevation	36.11
TS 8997	
WMS32 Measurement Software	11.60.00 (till 2024-03-19), 11.70.00 + Hotfix 01
Conducted AC Emissions:	
Software	Version
EMC32 Measurement Software	10.60.20

7 ANTENNA FACTORS, CABLE LOSS AND SAMPLE CALCULATIONS

This chapter contains the antenna factors with their corresponding path loss of the used measurement path for all antennas as well as the insertion loss of the LISN.

7.1 ANTENNA R&S HFH2-Z2 (9 KHZ – 30 MHZ)

Frequency	AF HFH-Z2)	Corr.	cable loss 1 (inside chamber)	cable loss 2 (outside chamber)	cable loss 3 (switch unit)	cable loss 4 (to receiver)	distance corr. (-40 dB/ decade)	d_{Limit} (meas. distance (limit)	d_{used} (meas. distance (used)
MHz	dB (1/m)	dB	dB	dB	dB	dB	dB	m	m
0.009	20.50	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.01	20.45	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.015	20.37	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.02	20.36	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.025	20.38	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.03	20.32	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.05	20.35	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.08	20.30	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.1	20.20	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.2	20.17	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.3	20.14	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.49	20.12	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.490001	20.12	-39.6	0.1	0.1	0.1	0.1	-40	30	3
0.5	20.11	-39.6	0.1	0.1	0.1	0.1	-40	30	3
0.8	20.10	-39.6	0.1	0.1	0.1	0.1	-40	30	3
1	20.09	-39.6	0.1	0.1	0.1	0.1	-40	30	3
2	20.08	-39.6	0.1	0.1	0.1	0.1	-40	30	3
3	20.06	-39.6	0.1	0.1	0.1	0.1	-40	30	3
4	20.05	-39.5	0.2	0.1	0.1	0.1	-40	30	3
5	20.05	-39.5	0.2	0.1	0.1	0.1	-40	30	3
6	20.02	-39.5	0.2	0.1	0.1	0.1	-40	30	3
8	19.95	-39.5	0.2	0.1	0.1	0.1	-40	30	3
10	19.83	-39.4	0.2	0.1	0.2	0.1	-40	30	3
12	19.71	-39.4	0.2	0.1	0.2	0.1	-40	30	3
14	19.54	-39.4	0.2	0.1	0.2	0.1	-40	30	3
16	19.53	-39.3	0.3	0.1	0.2	0.1	-40	30	3
18	19.50	-39.3	0.3	0.1	0.2	0.1	-40	30	3
20	19.57	-39.3	0.3	0.1	0.2	0.1	-40	30	3
22	19.61	-39.3	0.3	0.1	0.2	0.1	-40	30	3
24	19.61	-39.3	0.3	0.1	0.2	0.1	-40	30	3
26	19.54	-39.3	0.3	0.1	0.2	0.1	-40	30	3
28	19.46	-39.2	0.3	0.1	0.3	0.1	-40	30	3
30	19.73	-39.1	0.4	0.1	0.3	0.1	-40	30	3

Sample calculation

E (dB µV/m) = U (dB µV) + AF (dB 1/m) + Corr. (dB)
U = Receiver reading
AF = Antenna factor
Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)
distance correction = -40 * LOG (d_{Limit}/ d_{used})
Linear interpolation will be used for frequencies in between the values in the table.
Table shows an extract of values

7.2 ANTENNA R&S HL562 (30 MHZ – 1 GHZ)

(d_{Limit} = 3 m)

Frequency	AF R&S HL562	Corr.	cable loss 1 (inside chamber)	cable loss 2 (outside chamber)	cable loss 3 (switch unit)	cable loss 4 (to receiver)	distance corr. (-20 dB/ decade)	d_{Limit} (meas. distance (limit)	d_{used} (meas. distance (used)
MHz	dB (1/m)	dB	dB	dB	dB	dB	dB	m	m
30	18.6	0.6	0.29	0.04	0.23	0.02	0.0	3	3
50	6.0	0.9	0.39	0.09	0.32	0.08	0.0	3	3
100	9.7	1.2	0.56	0.14	0.47	0.08	0.0	3	3
150	7.9	1.6	0.73	0.20	0.59	0.12	0.0	3	3
200	7.6	1.9	0.84	0.21	0.70	0.11	0.0	3	3
250	9.5	2.1	0.98	0.24	0.80	0.13	0.0	3	3
300	11.0	2.3	1.04	0.26	0.89	0.15	0.0	3	3
350	12.4	2.6	1.18	0.31	0.96	0.13	0.0	3	3
400	13.6	2.9	1.28	0.35	1.03	0.19	0.0	3	3
450	14.7	3.1	1.39	0.38	1.11	0.22	0.0	3	3
500	15.6	3.2	1.44	0.39	1.20	0.19	0.0	3	3
550	16.3	3.5	1.55	0.46	1.24	0.23	0.0	3	3
600	17.2	3.5	1.59	0.43	1.29	0.23	0.0	3	3
650	18.1	3.6	1.67	0.34	1.35	0.22	0.0	3	3
700	18.5	3.6	1.67	0.42	1.41	0.15	0.0	3	3
750	19.1	4.1	1.87	0.54	1.46	0.25	0.0	3	3
800	19.6	4.1	1.90	0.46	1.51	0.25	0.0	3	3
850	20.1	4.4	1.99	0.60	1.56	0.27	0.0	3	3
900	20.8	4.7	2.14	0.60	1.63	0.29	0.0	3	3
950	21.1	4.8	2.22	0.60	1.66	0.33	0.0	3	3
1000	21.6	4.9	2.23	0.61	1.71	0.30	0.0	3	3

(d_{Limit} = 10 m)

30	18.6	-9.9	0.29	0.04	0.23	0.02	-10.5	10	3
50	6.0	-9.6	0.39	0.09	0.32	0.08	-10.5	10	3
100	9.7	-9.2	0.56	0.14	0.47	0.08	-10.5	10	3
150	7.9	-8.8	0.73	0.20	0.59	0.12	-10.5	10	3
200	7.6	-8.6	0.84	0.21	0.70	0.11	-10.5	10	3
250	9.5	-8.3	0.98	0.24	0.80	0.13	-10.5	10	3
300	11.0	-8.1	1.04	0.26	0.89	0.15	-10.5	10	3
350	12.4	-7.9	1.18	0.31	0.96	0.13	-10.5	10	3
400	13.6	-7.6	1.28	0.35	1.03	0.19	-10.5	10	3
450	14.7	-7.4	1.39	0.38	1.11	0.22	-10.5	10	3
500	15.6	-7.2	1.44	0.39	1.20	0.19	-10.5	10	3
550	16.3	-7.0	1.55	0.46	1.24	0.23	-10.5	10	3
600	17.2	-6.9	1.59	0.43	1.29	0.23	-10.5	10	3
650	18.1	-6.9	1.67	0.34	1.35	0.22	-10.5	10	3
700	18.5	-6.8	1.67	0.42	1.41	0.15	-10.5	10	3
750	19.1	-6.3	1.87	0.54	1.46	0.25	-10.5	10	3
800	19.6	-6.3	1.90	0.46	1.51	0.25	-10.5	10	3
850	20.1	-6.0	1.99	0.60	1.56	0.27	-10.5	10	3
900	20.8	-5.8	2.14	0.60	1.63	0.29	-10.5	10	3
950	21.1	-5.6	2.22	0.60	1.66	0.33	-10.5	10	3
1000	21.6	-5.6	2.23	0.61	1.71	0.30	-10.5	10	3

Sample calculation

E (dB µV/m) = U (dB µV) + AF (dB 1/m) + Corr. (dB)
U = Receiver reading
AF = Antenna factor
Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)
distance correction = -20 * LOG (d_{Limit}/ d_{used})
Linear interpolation will be used for frequencies in between the values in the table.
Tables show an extract of values.

7.3 ANTENNA R&S HF907 (1 GHZ – 18 GHZ)

Frequency	AF R&S HF907	Corr.	cable loss 1 (relay + cable inside chamber)	cable loss 2 (outside chamber)	cable loss 3 (switch unit, atten-uator & pre-amp)	cable loss 4 (to receiver)		
MHz	dB (1/m)	dB	dB	dB	dB	dB		
1000	24.4	-19.4	0.99	0.31	-21.51	0.79		
2000	28.5	-17.4	1.44	0.44	-20.63	1.38		
3000	31.0	-16.1	1.87	0.53	-19.85	1.33		
4000	33.1	-14.7	2.41	0.67	-19.13	1.31		
5000	34.4	-13.7	2.78	0.86	-18.71	1.40		
6000	34.7	-12.7	2.74	0.90	-17.83	1.47		
7000	35.6	-11.0	2.82	0.86	-16.19	1.46		

Frequency	AF R&S HF907	Corr.	cable loss 1 (relay inside chamber)	cable loss 2 (inside chamber)	cable loss 3 (outside chamber)	cable loss 4 (switch unit, atten-uator & pre-amp)	cable loss 5 (to receiver)	used for FCC 15.247
MHz	dB (1/m)	dB	dB	dB	dB	dB	dB	
3000	31.0	-23.4	0.47	1.87	0.53	-27.58	1.33	
4000	33.1	-23.3	0.56	2.41	0.67	-28.23	1.31	
5000	34.4	-21.7	0.61	2.78	0.86	-27.35	1.40	
6000	34.7	-21.2	0.58	2.74	0.90	-26.89	1.47	
7000	35.6	-19.8	0.66	2.82	0.86	-25.58	1.46	

Frequency	AF R&S HF907	Corr.	cable loss 1 (relay inside chamber)	cable loss 2 (High Pass)	cable loss 3 (pre-amp)	cable loss 4 (inside chamber)	cable loss 5 (outside chamber)	cable loss 6 (to receiver)
MHz	dB (1/m)	dB	dB	dB	dB	dB	dB	dB
7000	35.6	-57.3	0.56	1.28	-62.72	2.66	0.94	1.46
8000	36.3	-56.3	0.69	0.71	-61.49	2.84	1.00	1.53
9000	37.1	-55.3	0.68	0.65	-60.80	3.06	1.09	1.60
10000	37.5	-56.2	0.70	0.54	-61.91	3.28	1.20	1.67
11000	37.5	-55.3	0.80	0.61	-61.40	3.43	1.27	1.70
12000	37.6	-53.7	0.84	0.42	-59.70	3.53	1.26	1.73
13000	38.2	-53.5	0.83	0.44	-59.81	3.75	1.32	1.83
14000	39.9	-56.3	0.91	0.53	-63.03	3.91	1.40	1.77
15000	40.9	-54.1	0.98	0.54	-61.05	4.02	1.44	1.83
16000	41.3	-54.1	1.23	0.49	-61.51	4.17	1.51	1.85
17000	42.8	-54.4	1.36	0.76	-62.36	4.34	1.53	2.00
18000	44.2	-54.7	1.70	0.53	-62.88	4.41	1.55	1.91

Sample calculation

E (dB µV/m) = U (dB µV) + AF (dB 1/m) + Corr. (dB)
U = Receiver reading
AF = Antenna factor
Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)
Linear interpolation will be used for frequencies in between the values in the table.
Tables show an extract of values.

7.4 ANTENNA EMCO 3160-09 (18 GHZ – 26.5 GHZ)

Frequency	AF EMCO 3160-09	Corr.	cable loss 1 (inside chamber)	cable loss 2 (pre-amp)	cable loss 3 (inside chamber)	cable loss 4 (switch unit)	cable loss 5 (to receiver)
MHz	dB (1/m)	dB	dB	dB	dB	dB	dB
18000	40.2	-23.5	0.72	-35.85	6.20	2.81	2.65
18500	40.2	-23.2	0.69	-35.71	6.46	2.76	2.59
19000	40.2	-22.0	0.76	-35.44	6.69	3.15	2.79
19500	40.3	-21.3	0.74	-35.07	7.04	3.11	2.91
20000	40.3	-20.3	0.72	-34.49	7.30	3.07	3.05
20500	40.3	-19.9	0.78	-34.46	7.48	3.12	3.15
21000	40.3	-19.1	0.87	-34.07	7.61	3.20	3.33
21500	40.3	-19.1	0.90	-33.96	7.47	3.28	3.19
22000	40.3	-18.7	0.89	-33.57	7.34	3.35	3.28
22500	40.4	-19.0	0.87	-33.66	7.06	3.75	2.94
23000	40.4	-19.5	0.88	-33.75	6.92	3.77	2.70
23500	40.4	-19.3	0.90	-33.35	6.99	3.52	2.66
24000	40.4	-19.8	0.88	-33.99	6.88	3.88	2.58
24500	40.4	-19.5	0.91	-33.89	7.01	3.93	2.51
25000	40.4	-19.3	0.88	-33.00	6.72	3.96	2.14
25500	40.5	-20.4	0.89	-34.07	6.90	3.66	2.22
26000	40.5	-21.3	0.86	-35.11	7.02	3.69	2.28
26500	40.5	-21.1	0.90	-35.20	7.15	3.91	2.36

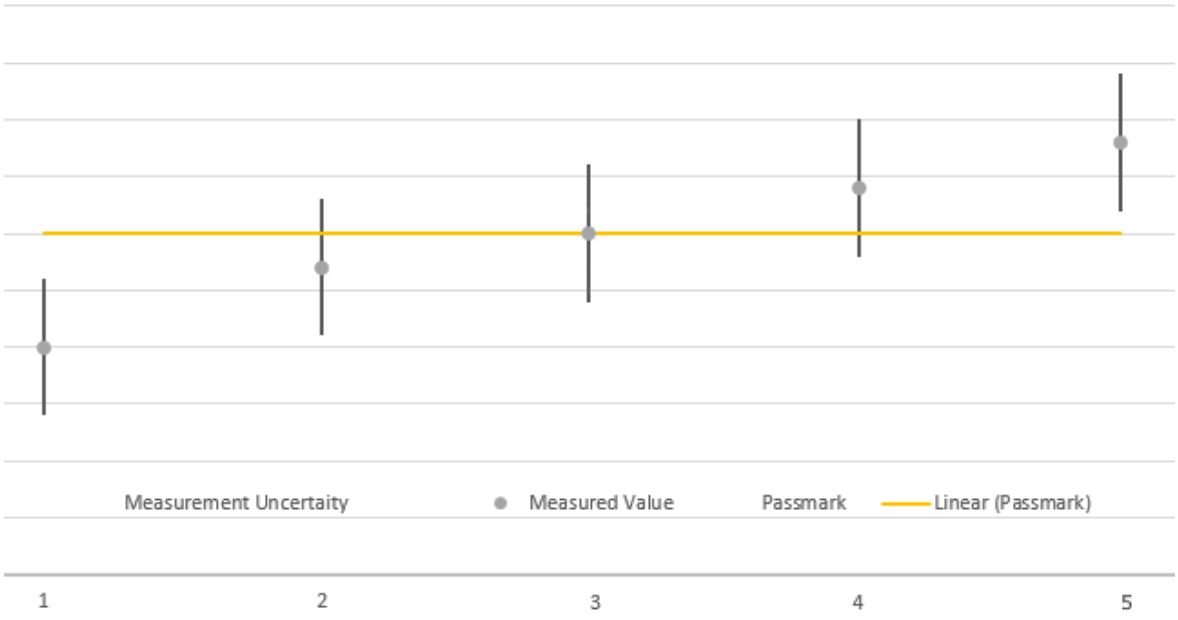
Sample calculation

E (dB µV/m) = U (dB µV) + AF (dB 1/m) + Corr. (dB)
U = Receiver reading
AF = Antenna factor
Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)
Linear interpolation will be used for frequencies in between the values in the table.
Table shows an extract of values.

8 MEASUREMENT UNCERTAINTIES

Test Case	Parameter	Uncertainty
AC Power Line	Power	± 3.4 dB
Field Strength of spurious radiation	Power	± 5.5 dB
6 dB / 26 dB / 99% Bandwidth	Power Frequency	± 2.9 dB ± 11.2 kHz
Conducted Output Power	Power	± 2.2 dB
Band Edge Compliance	Power Frequency	± 2.2 dB ± 11.2 kHz
Frequency Stability	Frequency	± 25 Hz
Power Spectral Density	Power	± 2.2 dB

The measurement uncertainties for all parameters are calculated with an expansion factor (coverage factor) k = 1.96. This means, that the true value is in the corresponding interval with a probability of 95 %.



The verdicts in this test report are given according the above diagram:

Case	Measured Value	Uncertainty Range	Verdict
1	below pass mark	below pass mark	Passed
2	below pass mark	within pass mark	Passed
3	on pass mark	within pass mark	Passed
4	above pass mark	within pass mark	Failed
5	above pass mark	above pass mark	Failed

That means, the laboratory applies, as decision rule (see ISO/IEC 17025:2017), the so-called shared risk principle

9 PHOTO REPORT

Please see separate photo report.

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