

TEST REPORT

of the accredited test laboratory

TÜV Nr.:INE-AT/FG-21/144**TÜV AUSTRIA
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Industry & Energy Austria

Technik

TÜV®

Applicant: StreamUnlimited Engineering GmbH
High Tech Campus Vienna
Gutheil-Schoder-Gasse 10
A-1100 Vienna

Tested Product: STREAM1955 Bluetooth / BLE / WIFI streaming module
Test report for Bluetooth part only

FCC ID 2AJYB-ST1955

IC ID 20504-ST1955

Manufacturer: See applicant

Output power 3,98 mW cond. **power supply:** 12 VDC

Frequency range: 2402 - 2480 MHz **Channel separation:** 1 MHz

Accredited Standards: FCC: 47 CFR Part 15 (eCFR 28.06.2021)
RSS-247 Issue 2, February 2017
ANSI C63.10-2013

Testing Laboratory,
Inspection Body,
Certification Body,
Calibration Laboratory,
Verifizierungsstelle**Notified Body 0408****Non-executive
Board of Directors:**
KR DI Johann
Marihart**Management:**
DI Dr. Stefan Haas
Mag. Christoph
Wenninger**Registered Office:**
Deutschstrasse 10
1230 Vienna/Austria**Branch Offices:**
www.tuv.at/standorte**Company Register
Court / - Number:**
Vienna / FN 288476 f**Bank Details:**
IBAN
AT131200052949001066
BIC BKAUATWWVAT ATU63240488
DVR 3002476**TÜV AUSTRIA SERVICES GMBH**
Test laboratory for EMC

Wolfram Topka, BSc.

**examined by / Testing
Laboratory**
**TÜV AUSTRIA SERVICES
GMBH**

29.07.2021

Ing. Wilhelm Seier

**approved by / Testing
Laboratory**
**TÜV AUSTRIA SERVICES
GMBH**

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The results of this test report only refer to the provided equipment.

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1. Applicant

Company: StreamUnlimited Engineering GmbH

Department: Director Systems

Address: High Tech Campus Vienna
Gutheil-Schoder-Gasse 10
A-1100 Vienna

Contact person: Mr. DI Christoph Apel

EUT received on: 29.04.2021

Tests were performed on: 04.05.2021 till 11.06.2021

2. Description of EUT

EUT: Bluetooth / BLE / WIFI module "STREAM1955"

Serial Number: Prototype mounted on evaluation board

Manufacturer: StreamUnlimited Engineering GmbH
High Tech Campus Vienna
Gutheil-Schoder-Gasse 10
A-1100 Vienna

Description: StreamUnlimited Engineering GmbH provided the following configuration for the measurements:

Prototype mounted on evaluation board with direct connection for conducted measurements and with antenna type of highest gain for radiated measurements

Operating mode: The measurements were carried out at the following running states:
test-firmware running, transmitting continuously

Technical data EUT: Rated voltage: 12VDC
Rated current: 450mA
Rated frequency: DC

Mains voltage during the tests: 12VDC

Climatic conditions in the emc laboratory: Relative humidity: 25%
Temperature: 25°C

3. Standards / Final result

Name	Title	Deviation	Result
FCC: 47 CFR Part 15 (eCFR 28.06.2021)	RADIO FREQUENCY DEVICES	none	OK
RSS-247 Issue 2, February 2017	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices	none	OK
ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	none	OK
<p>Result: Opinions and interpretation of testing laboratory OK: EUT passed NOK: EUT failed</p>			

4. TEST RESULTS

4.1. TEST OBJECT DATA

General EUT Description

This Bluetooth / BLE / WIFI module is using either 2.4 GHz frequencies or 5 GHz (WIFI only). This test report is only for the Bluetooth part. See additional test reports:

INE-AT/FG-21/145 for BLE

INE-AT/FG-21/146 for 2,4 GHz WIFI and

INE-AT/FG-21/147 for 5 GHz WIFI measurement results including photodocumentation.

2.1033 (c) Technical description

2.1033 (4) Type of emission: Basic datarate: 927KF1D – Channel spacing 1 MHz
Enhanced datarate: 1M23F1D – Channel spacing 1 MHz > 2/3 of channel bandwidth - > maximum power should be 125 mW.

2.1033 (5) Frequency range: 2402 to 2480 MHz (channel center frequencies).

2.1033 (6) Power range and Controls: The maximum peak output power is 4,27 mW and there is no power regulation.

2.1033 (7) Maximum output power rating: 3,98 mW.

2.1033 (8) DC Voltage and Current: 12V DC
maximum current consumption: 450 mA

RSS-135 This standard does not apply to:

- 1.1.(a) a receiver that scans radio frequencies for the purpose of enabling its associated transmitter to avoid transmitting in an occupied frequency but which does not have the capability of decoding the message (e.g. converting it to audio voice) contained in the radio signal

Antennas used for all radiated measurements: Molex '146153' 3,5 dBi

Worst case Spurious Emissions: 49,9 dB μ V/m Average at 4GHz.

Tests were performed May 4th till June 11th 2021.

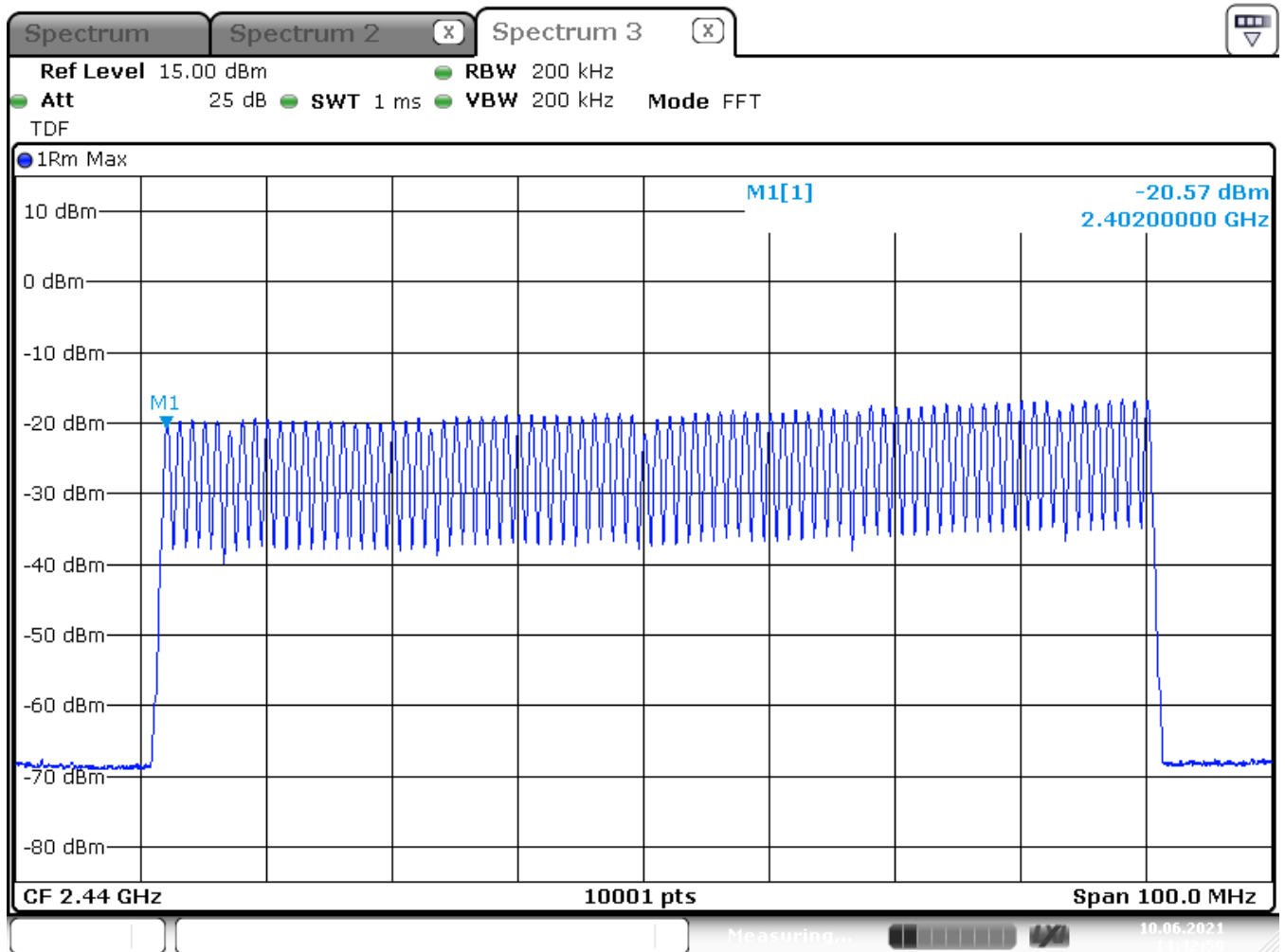
4.2. Number of channels and channel spacing

§ 15.247 (a) (1)
5.1

Mode: Bluetooth

Conducted Measurement

Rated output power: 3,98 mW



Date: 10 JUN 2021 14:42:59

There are 79 Channels used, starting at 2402 till 2480 each spaced by 1 MHz channel spacing.

LIMIT SUBCLAUSE 15.247(a) (1) – 5.1

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.

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

Test Equipment used: EMV-205

4.3. 20dB Bandwidth

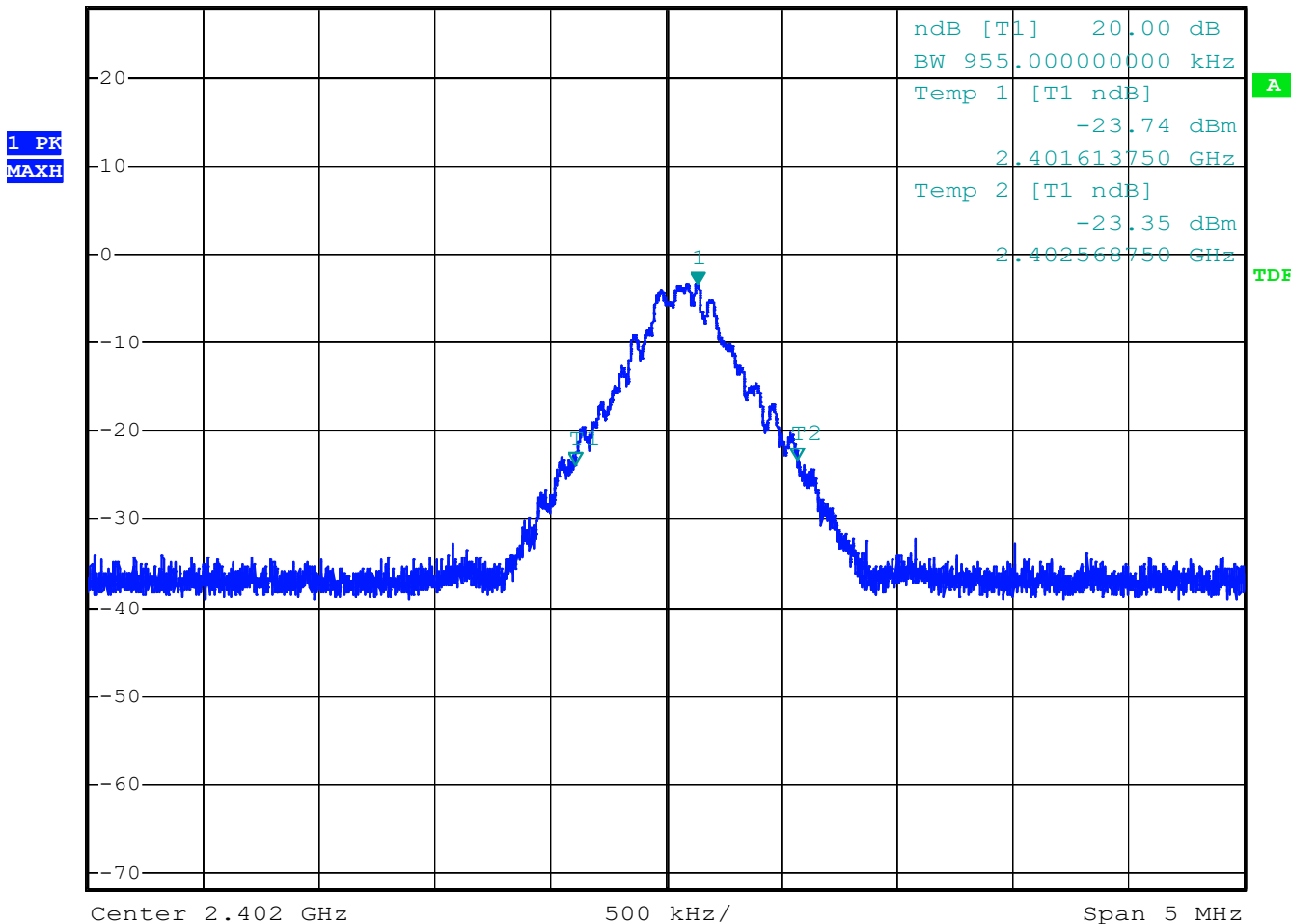
§ 15.247 (a) (1) 5.1

Conducted Measurement - Mode: Bluetooth BDR

Rated output power: 3,98 mW 2402 MHz



Ref	28 dBm	Att	60 dB	*RBW 30 kHz	Marker 1 [T1]
				*VBW 100 kHz	-3.36 dBm
				*SWT 40 ms	2.402138125 GHz



Date: 2.JUN.2021 16:41:55

20dB Bandwidth: 955 kHz

LIMIT SUBCLAUSE 15.247(a) (1) – 5.1(2)

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.

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

Test Equipment used: NT-200

20dB Bandwidth

§ 15.247 (a) (1)
5.1 (2)

Conducted Measurement - Mode: Bluetooth EDR

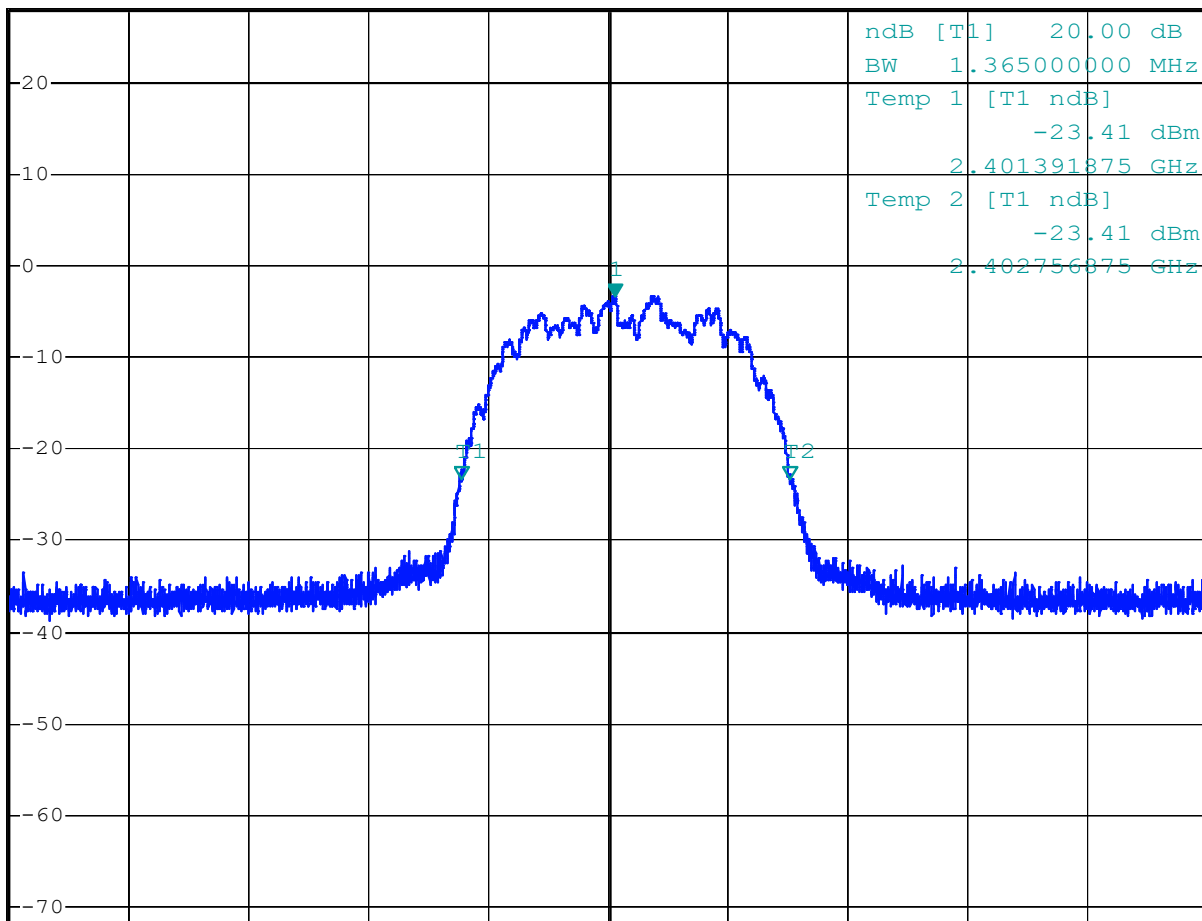
Rated output power: 3,98 mW 2402 MHz



*RBW 30 kHz Marker 1 [T1]
*VBW 100 kHz -3.40 dBm
*SWT 40 ms 2.402026250 GHz

Ref 28 dBm Att 60 dB

1 PK
MAXH



Center 2.402 GHz 500 kHz/ Span 5 MHz

Date: 2.JUN.2021 16:52:59

20dB Bandwidth: 1365 kHz

LIMIT SUBCLAUSE 15.247(a) (1) – 5.1(2)

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.

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

Test Equipment used: NT-200

20dB Bandwidth

**§ 15.247 (a) (1)
5.1 (2)**

Conducted Measurement - Mode: Bluetooth BDR

Rated output power: 3,98 mW 2441 MHz

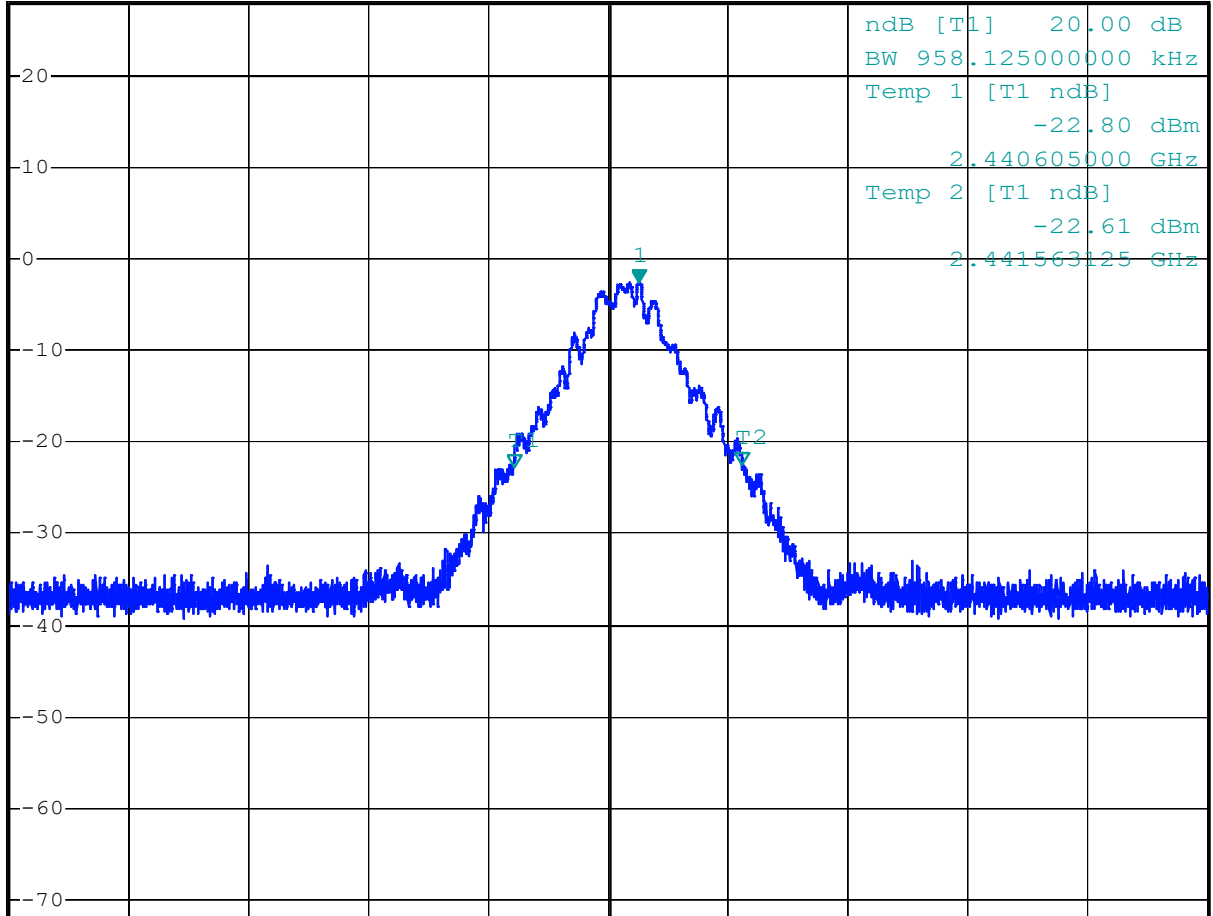


*RBW 30 kHz Marker 1 [T1]
*VBW 100 kHz -2.56 dBm
*SWT 40 ms 2.441131875 GHz

Ref 28 dBm

Att 60 dB

1 PK
MAXH



Center 2.441 GHz

500 kHz/

Span 5 MHz

Date: 2.JUN.2021 16:45:37

20dB Bandwidth: 958,125 kHz

LIMIT SUBCLAUSE 15.247(a) (1) – 5.1(2)

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.

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

Test Equipment used: NT-200

20dB Bandwidth

**§ 15.247 (a) (1)
5.1 (2)**

Conducted Measurement - Mode: Bluetooth EDR

Rated output power: 3,98 mW 2441 MHz

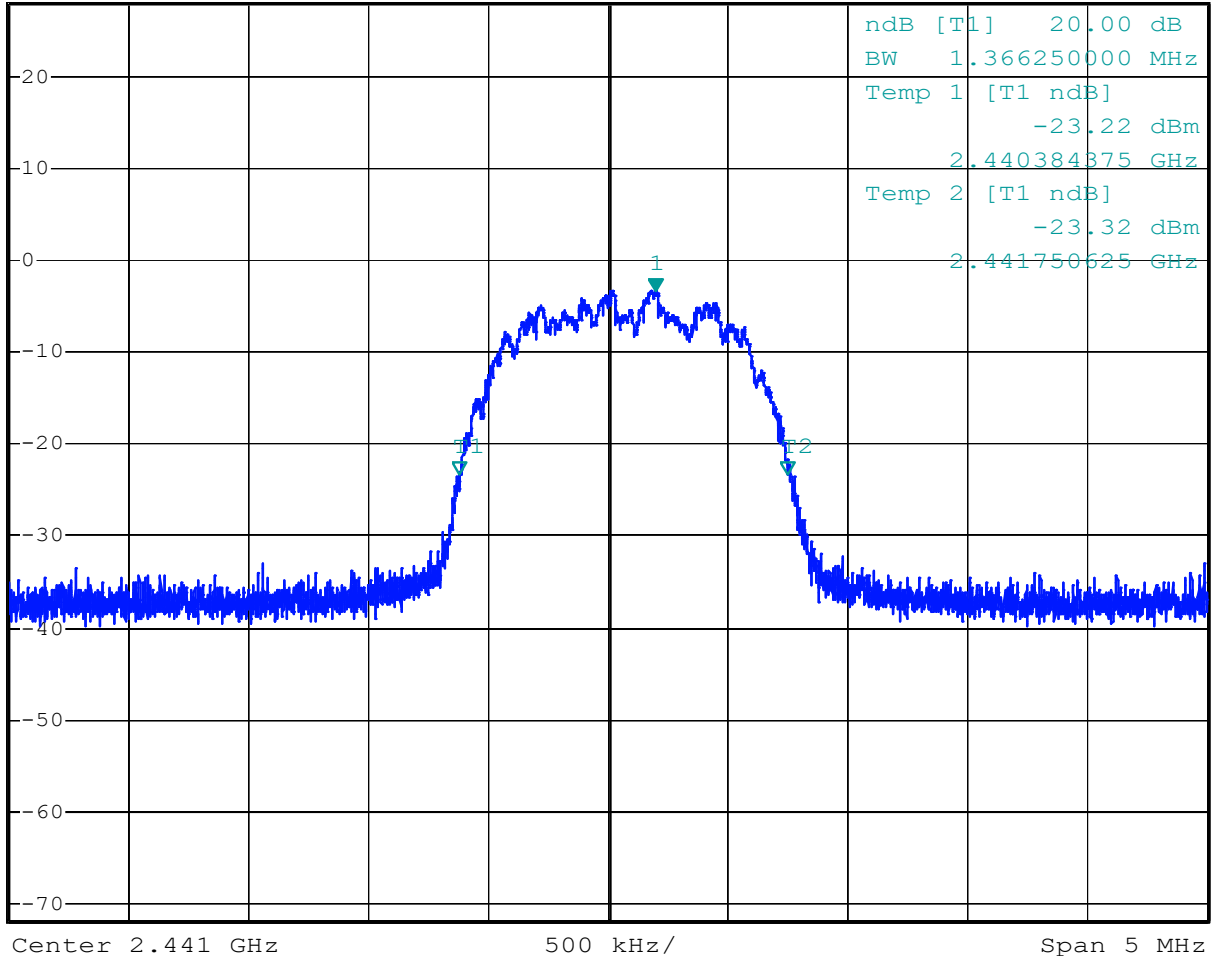


*RBW 30 kHz Marker 1 [T1]
*VBW 100 kHz -3.34 dBm
*SWT 40 ms 2.441198750 GHz

Ref 28 dBm

Att 60 dB

1 PK
MAXH



Date: 2.JUN.2021 16:54:05

20dB Bandwidth: 1366,35 kHz

LIMIT SUBCLAUSE 15.247(a) (1) – 5.1(2)

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.

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

Test Equipment used: NT-200

20dB Bandwidth

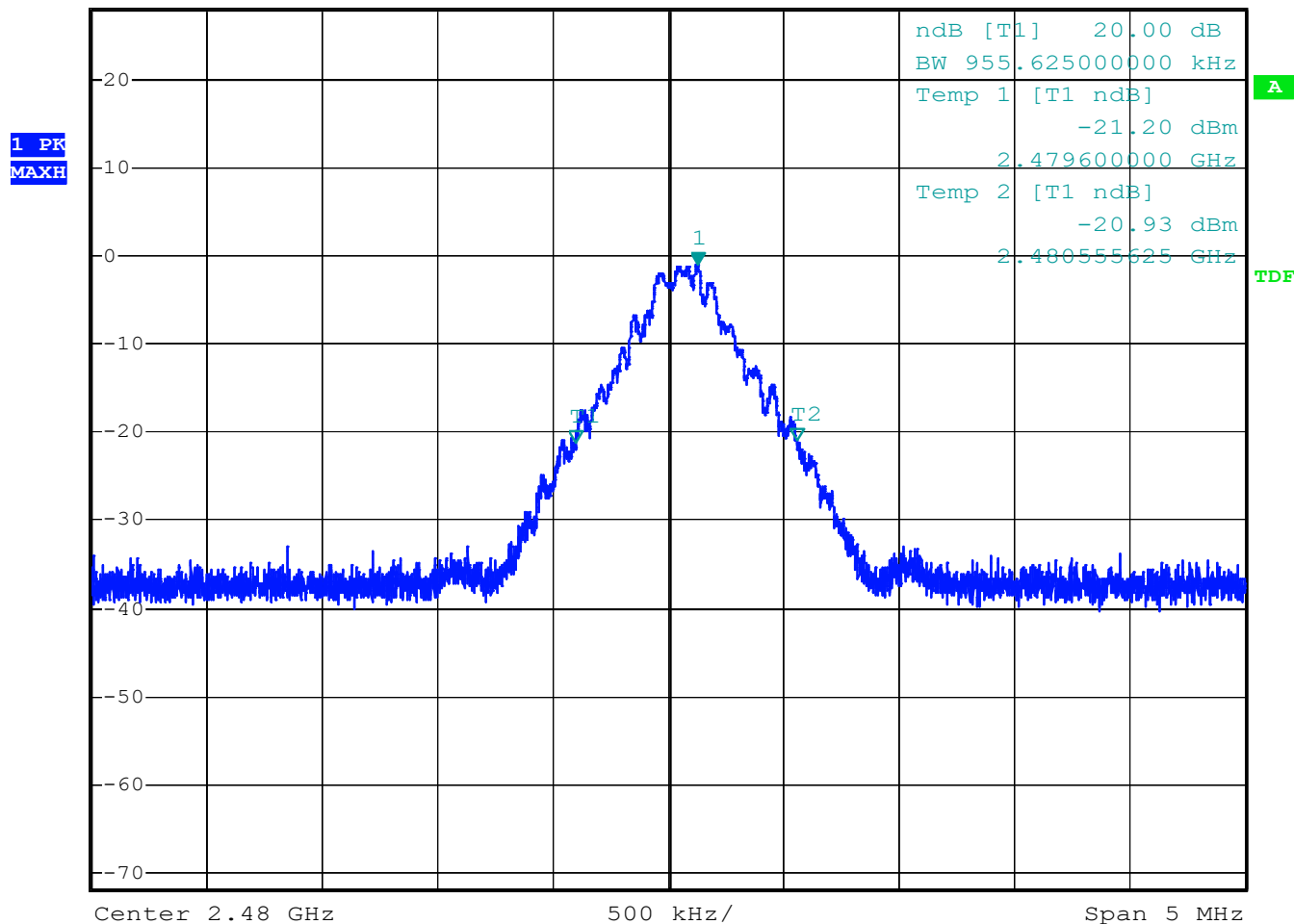
§ 15.247 (a) (1)
5.1 (2)

Conducted Measurement - Mode: Bluetooth BDR

Rated output power: 3,98 mW 2480 MHz



Ref 28 dBm Att 60 dB *RBW 30 kHz Marker 1 [T1]
*VBW 100 kHz -1.04 dBm
*SWT 40 ms 2.480128125 GHz



Date: 2.JUN.2021 16:47:08

20dB Bandwidth: 955,625 kHz

LIMIT SUBCLAUSE 15.247(a) (1) – 5.1(2)

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.

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

Test Equipment used: NT-200

20dB Bandwidth

**§ 15.247 (a) (1)
5.1 (2)**

Conducted Measurement - Mode: Bluetooth EDR

Rated output power: 3,98 mW 2480 MHz

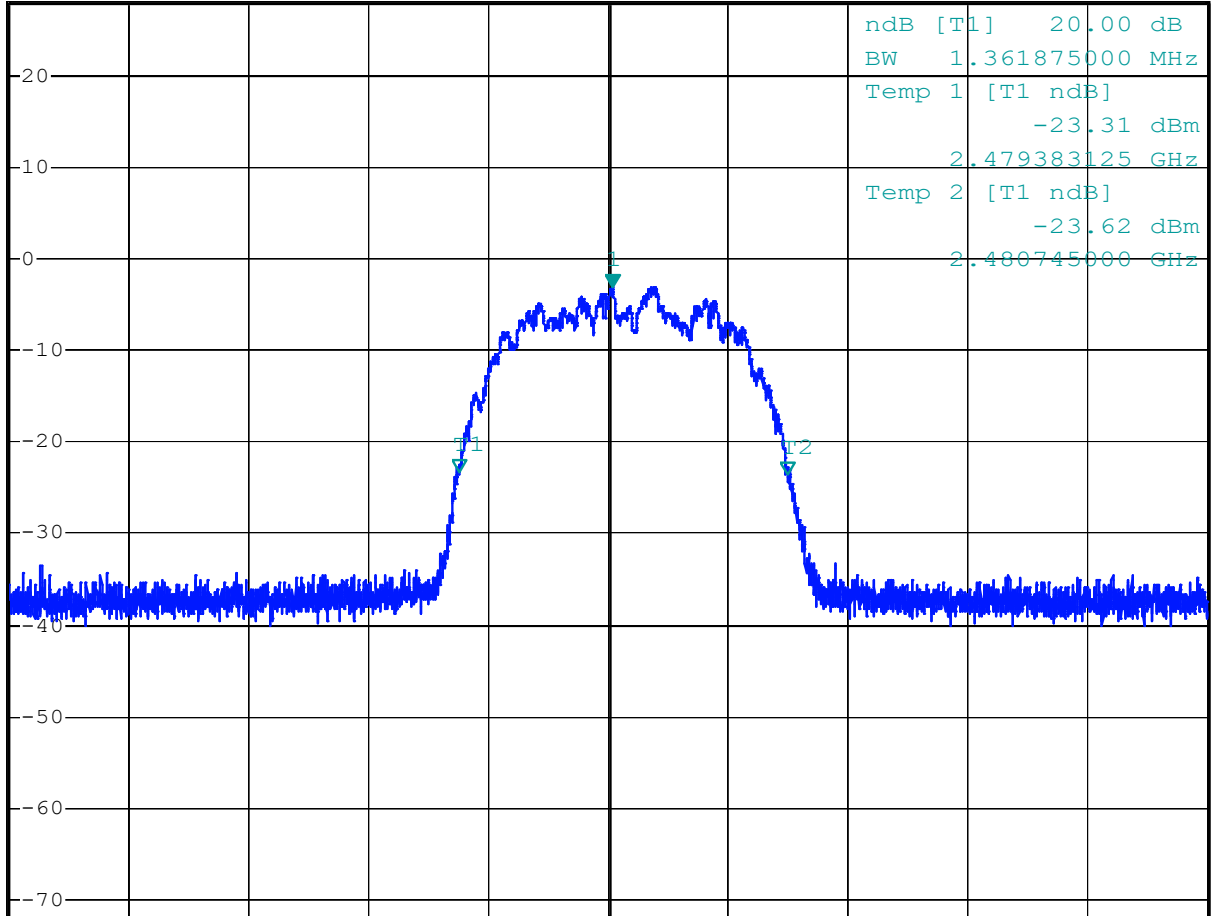


*RBW 30 kHz Marker 1 [T1]
*VBW 100 kHz -3.20 dBm
*SWT 40 ms 2.480015625 GHz

Ref 28 dBm

Att 60 dB

1 PK
MAXH



Center 2.48 GHz

500 kHz/

Span 5 MHz

Date: 2.JUN.2021 17:08:07

20dB Bandwidth: 1361,8 kHz

LIMIT SUBCLAUSE 15.247(a) (1) – 5.1(2)

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.

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

Test Equipment used: NT-200

Test report number:
INE-AT/FG-21/146
Date: 29.07.2021
Ambient temperature: 25°C

Relative humidity: 25%

4.4. 99%dB Bandwidth

RSS 247

Conducted Measurement - Mode: Bluetooth BDR

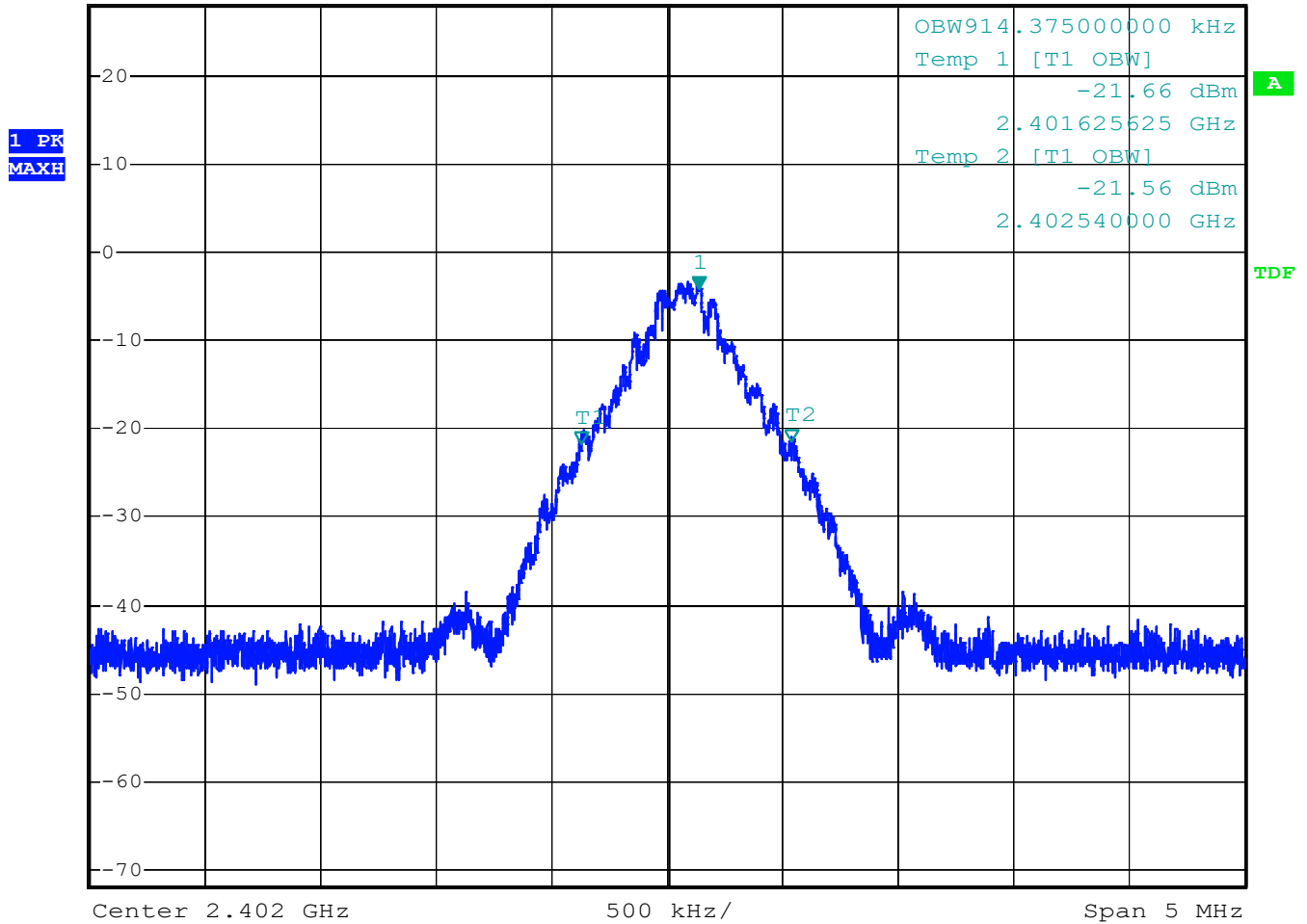
Rated output power: 3,98 mW 2402 MHz



*RBW 30 kHz Marker 1 [T1]
*VBW 100 kHz -4.06 dBm
*SWT 40 ms 2.402138750 GHz

Ref 28 dBm

Att 50 dB



Date: 2.JUN.2021 16:43:10

99% Bandwidth: 914,375 kHz

LIMIT RSS 247

None; for IC reporting purposes only

Test Equipment used: NT-200

99% Bandwidth

RSS 247

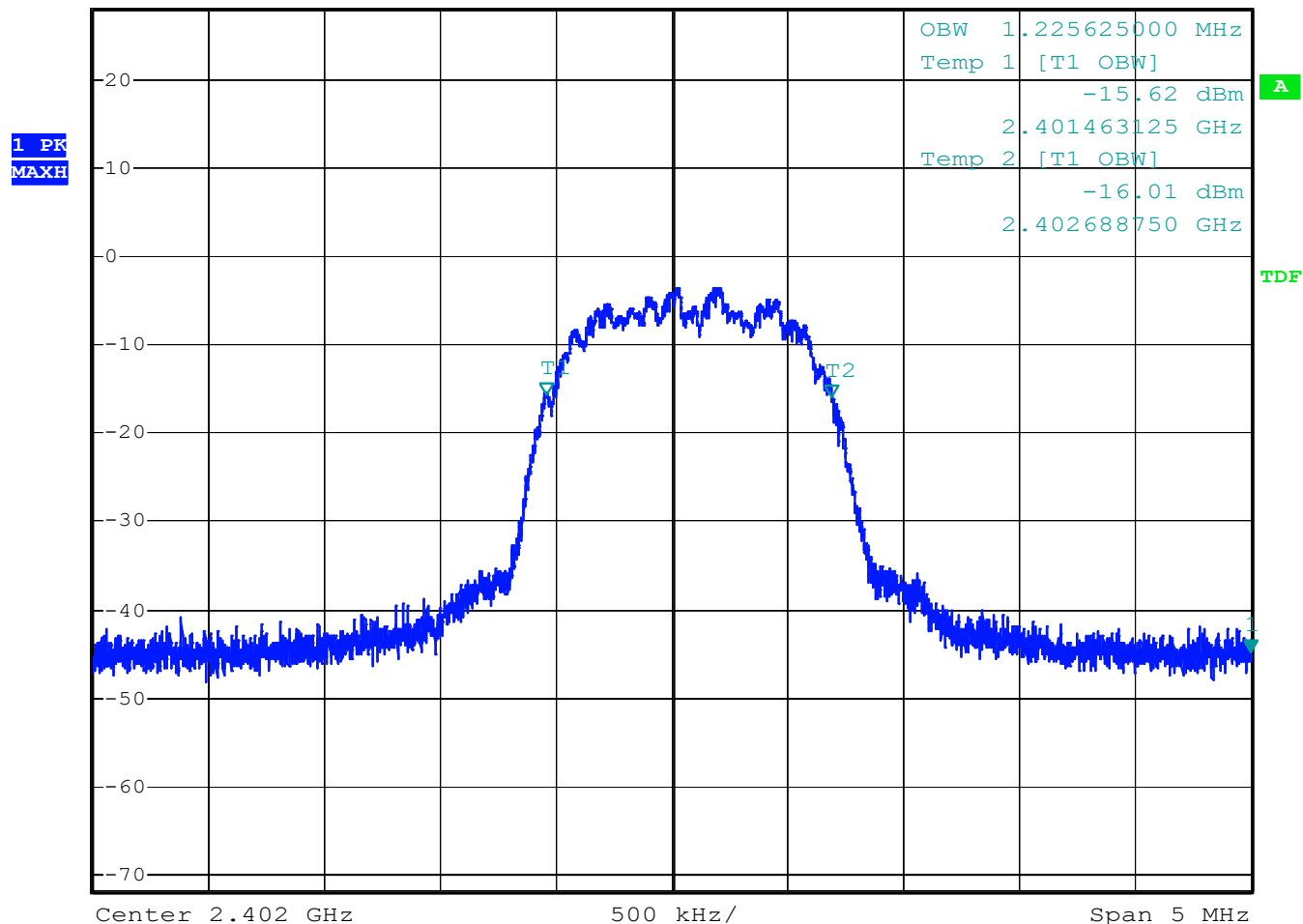
Conducted Measurement - Mode: Bluetooth EDR

Rated output power: 3,98 mW 2402 MHz



Ref 28 dBm Att 50 dB

*RBW 30 kHz Marker 1 [T1]
 *VBW 100 kHz -44.83 dBm
 *SWT 40 ms 2.404500000 GHz



Date: 2.JUN.2021 16:51:00

99% Bandwidth: 1225,625 kHz

LIMIT RSS 247

None; for IC reporting purposes only

Test Equipment used: NT-200

99% Bandwidth

RSS 247

Conducted Measurement - Mode: Bluetooth BDR

Rated output power: 3,98 mW 2441 MHz

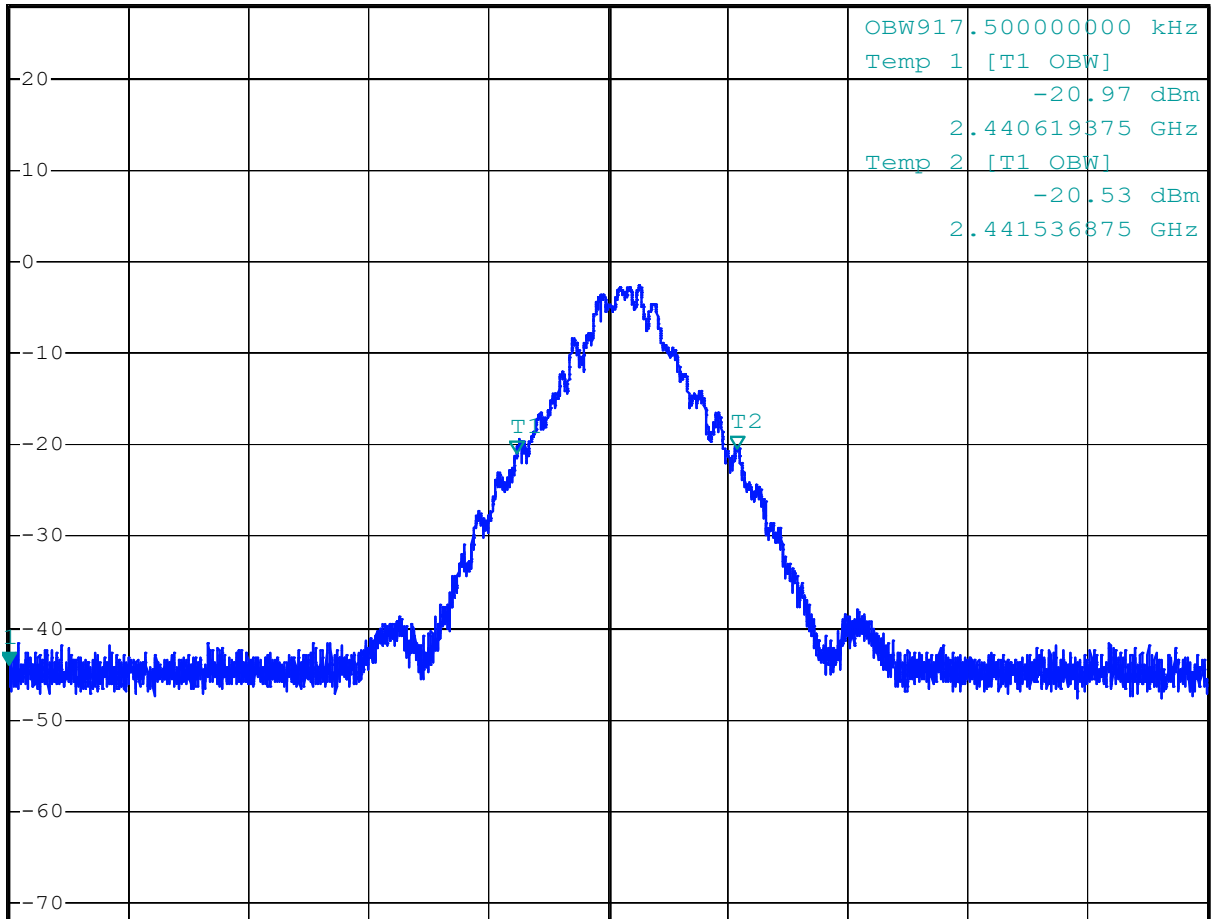


*RBW 30 kHz Marker 1 [T1]
 *VBW 100 kHz -44.17 dBm
 *SWT 40 ms 2.438500000 GHz

Ref 28 dBm

Att 50 dB

1 PK
 MAXH



Center 2.441 GHz

500 kHz/

Span 5 MHz

Date: 2.JUN.2021 16:44:17

99% Bandwidth: 927,5 kHz

LIMIT RSS 247

None; for IC reporting purposes only

Test Equipment used: NT-200

99% Bandwidth

RSS 247

Conducted Measurement - Mode: Bluetooth EDR

Rated output power: 3,98 mW 2441 MHz

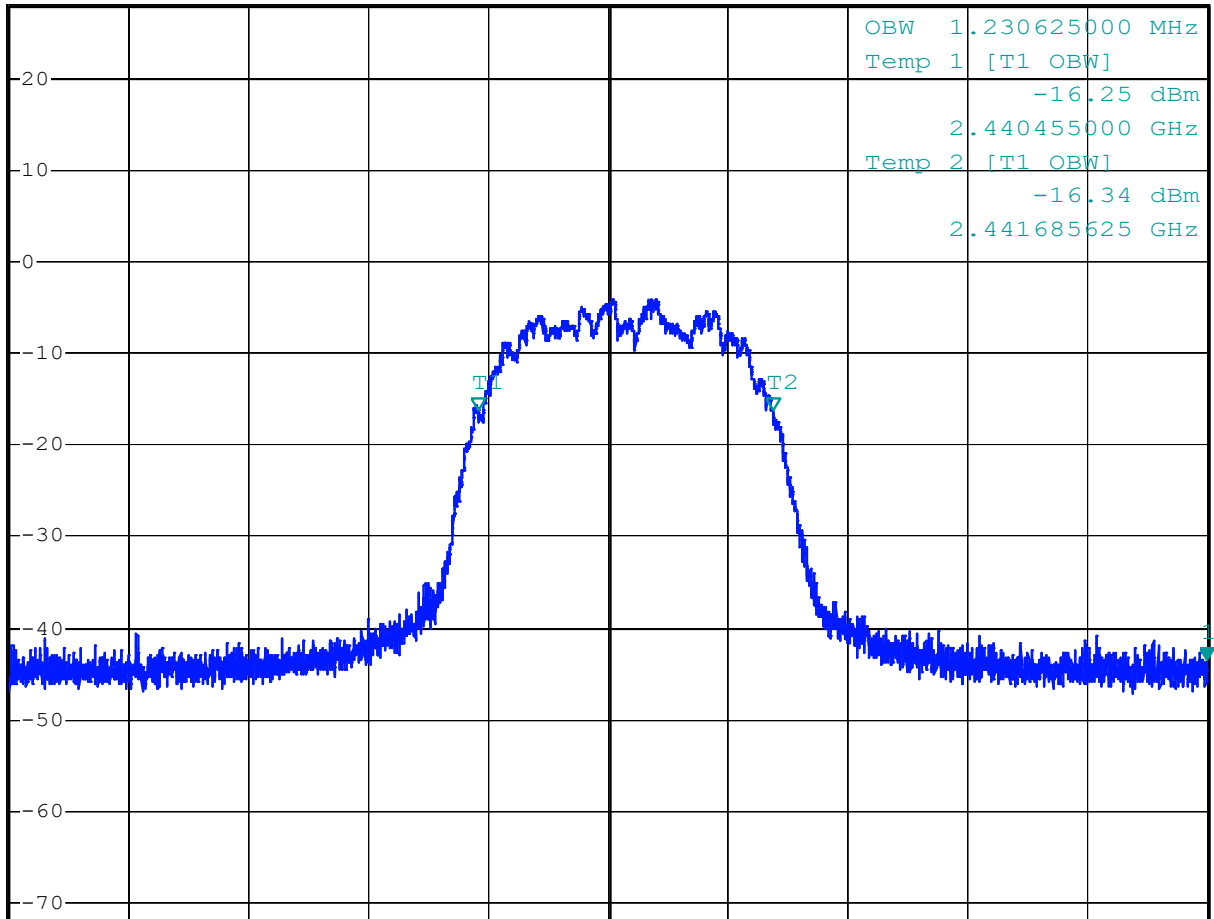


*RBW 30 kHz Marker 1 [T1]
*VBW 100 kHz -43.47 dBm
*SWT 40 ms 2.443500000 GHz

Ref 28 dBm

Att 50 dB

1 PK
MAXH



Center 2.441 GHz

500 kHz/

Span 5 MHz

Date: 2.JUN.2021 17:05:20

99% Bandwidth: 1230,625 kHz

LIMIT RSS 247

None; for IC reporting purposes only

Test Equipment used: NT-200

99% Bandwidth

RSS 247

Conducted Measurement - Mode: Bluetooth BDR

Rated output power: 3,98 mW 2480 MHz

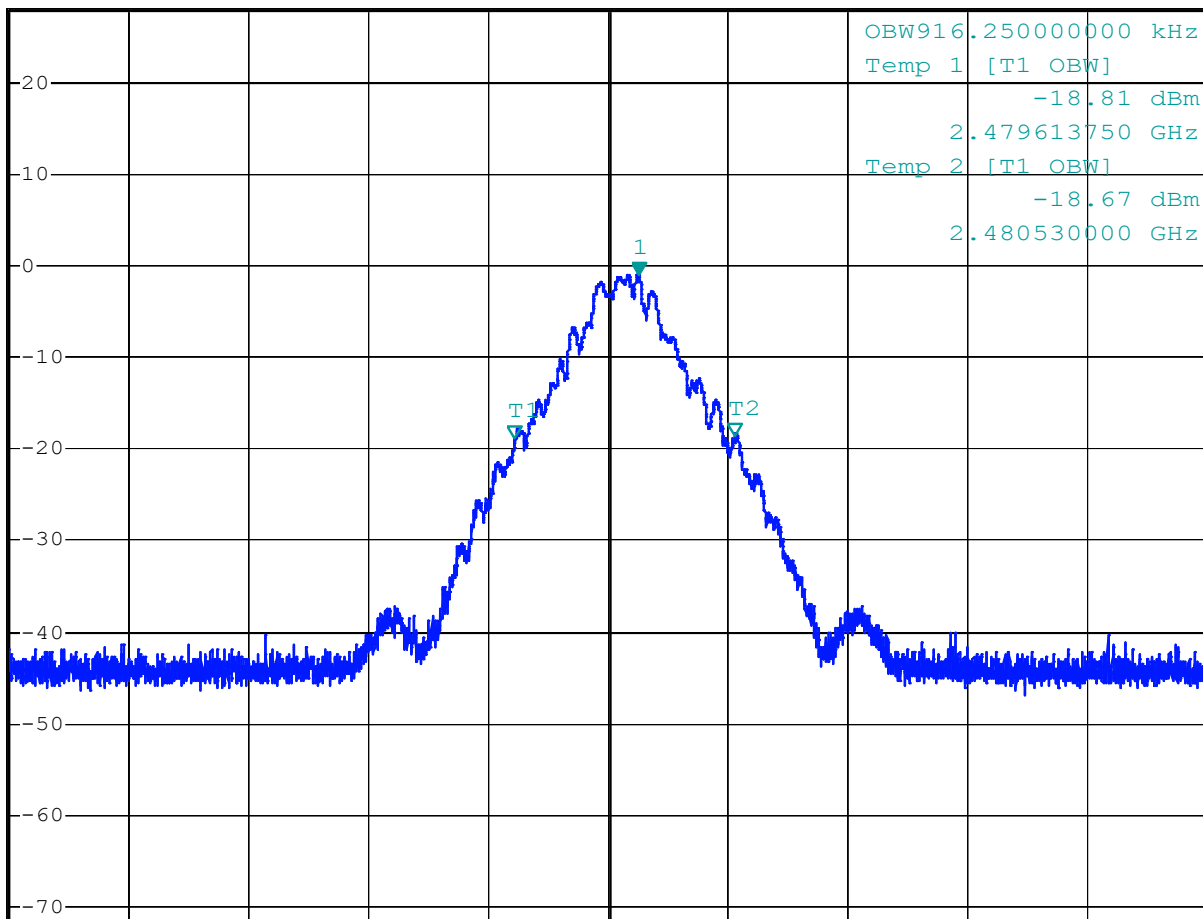


*RBW 30 kHz Marker 1 [T1]
 *VBW 100 kHz -1.00 dBm
 *SWT 40 ms 2.480126875 GHz

Ref 28 dBm

Att 50 dB

1 PK
 MAXH



Center 2.48 GHz

500 kHz/

Span 5 MHz

Date: 2.JUN.2021 16:49:17

99% Bandwidth: 916,25 kHz

LIMIT RSS 247

None; for IC reporting purposes only

Test Equipment used: NT-200

99% Bandwidth

RSS 247

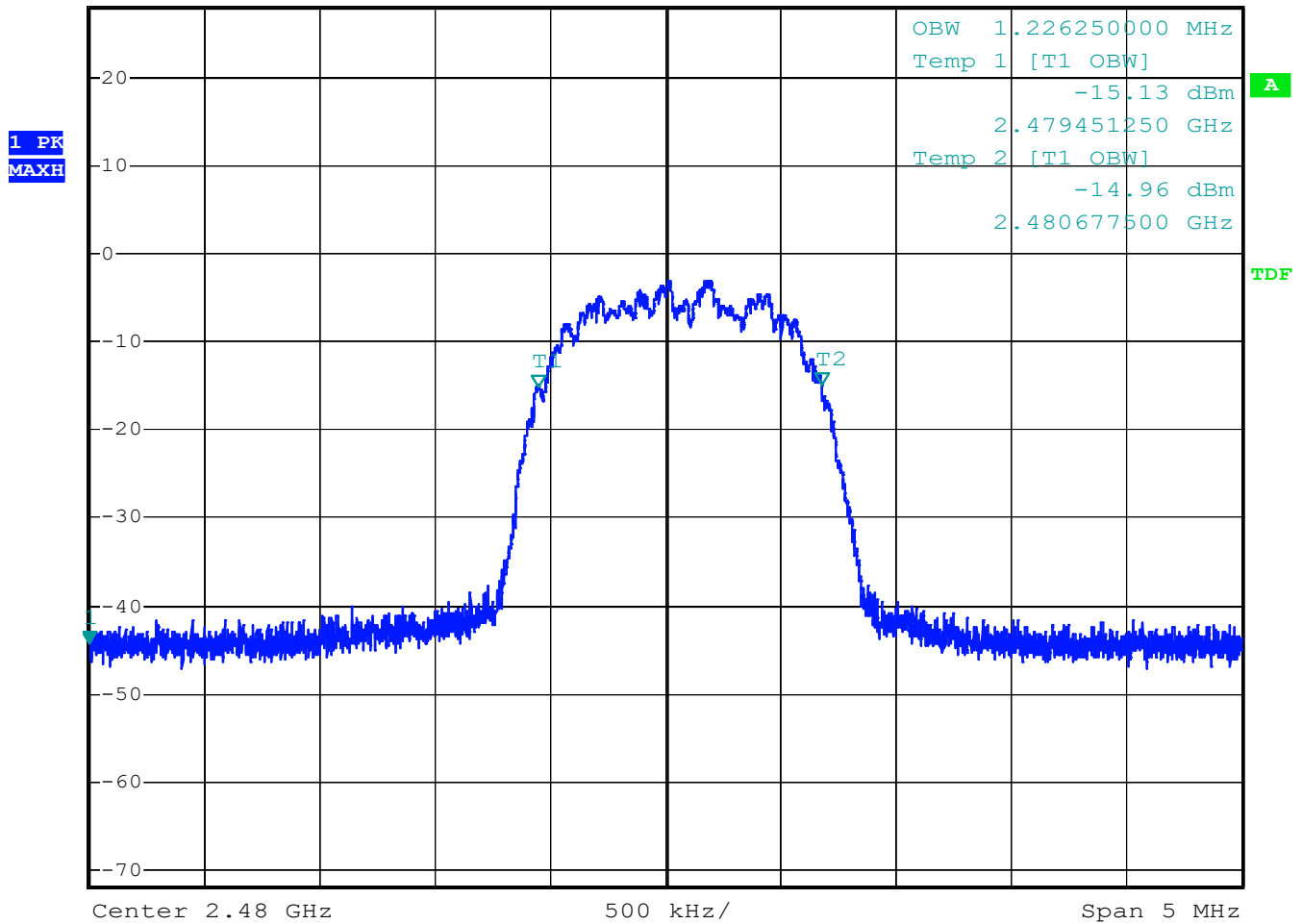
Conducted Measurement - Mode: Bluetooth EDR

Rated output power: 3,98 mW 2480 MHz



Ref 28 dBm Att 50 dB

*RBW 30 kHz Marker 1 [T1] -44.43 dBm
 *VBW 100 kHz
 *SWT 40 ms 2.477500000 GHz



Date: 2.JUN.2021 17:07:22

99% Bandwidth: 1226,25 kHz

LIMIT RSS 247

None; for IC reporting purposes only

Test Equipment used: NT-200

4.5. Maximum Peak RF Power Output (EIRP)

**§ 15.247(b)(1)
 5.4(2)**

Conducted Measurement – Mode: Bluetooth BDR

Rated output power: 3,98 mW

Test conditions		Transmitter power (mW)		
		2402 MHz	2441 MHz	2480 MHz
T _{nom} (23)°C	V _{nom} (12) V	1,81	2,08	2,88
Maximum deviation from rated output power under normal test conditions (dB)		-3,6	-2,8	-1,4
Measurement uncertainty		± 0,75 dB		

LIMIT SUBCLAUSE 15.247(b)(1) – 5.4(2)

Under normal test conditons	1W conducted (4W eirp)
-----------------------------	------------------------

Maximum Antenna Gain: 6dBi, eirp can be calculated by multiplying conducted value with factor 4.

Test Equipment used: EMV-205

Maximum Peak RF Power Output (EIRP)

**§ 15.247(b)(1)
 5.4(2)**

Conducted Measurement – Mode: Bluetooth EDR

Rated output power: 3,98 mW

Test conditions		Transmitter power (mW)		
		2402 MHz	2441 MHz	2480 MHz
T _{nom} (23)°C	V _{nom} (12) V	3,73	3,74	3,98
Maximum deviation from rated output power under normal test conditions (dB)		-0,73	-0,26	0
Measurement uncertainty		± 0,75 dB		

LIMIT SUBCLAUSE 15.247(b)(1) – 5.4(2)

Under normal test conditons	1W conducted (4W eirp)
-----------------------------	------------------------

Maximum Antenna Gain: 6dBi, eirp can be calculated by multiplying conducted value with factor 4.

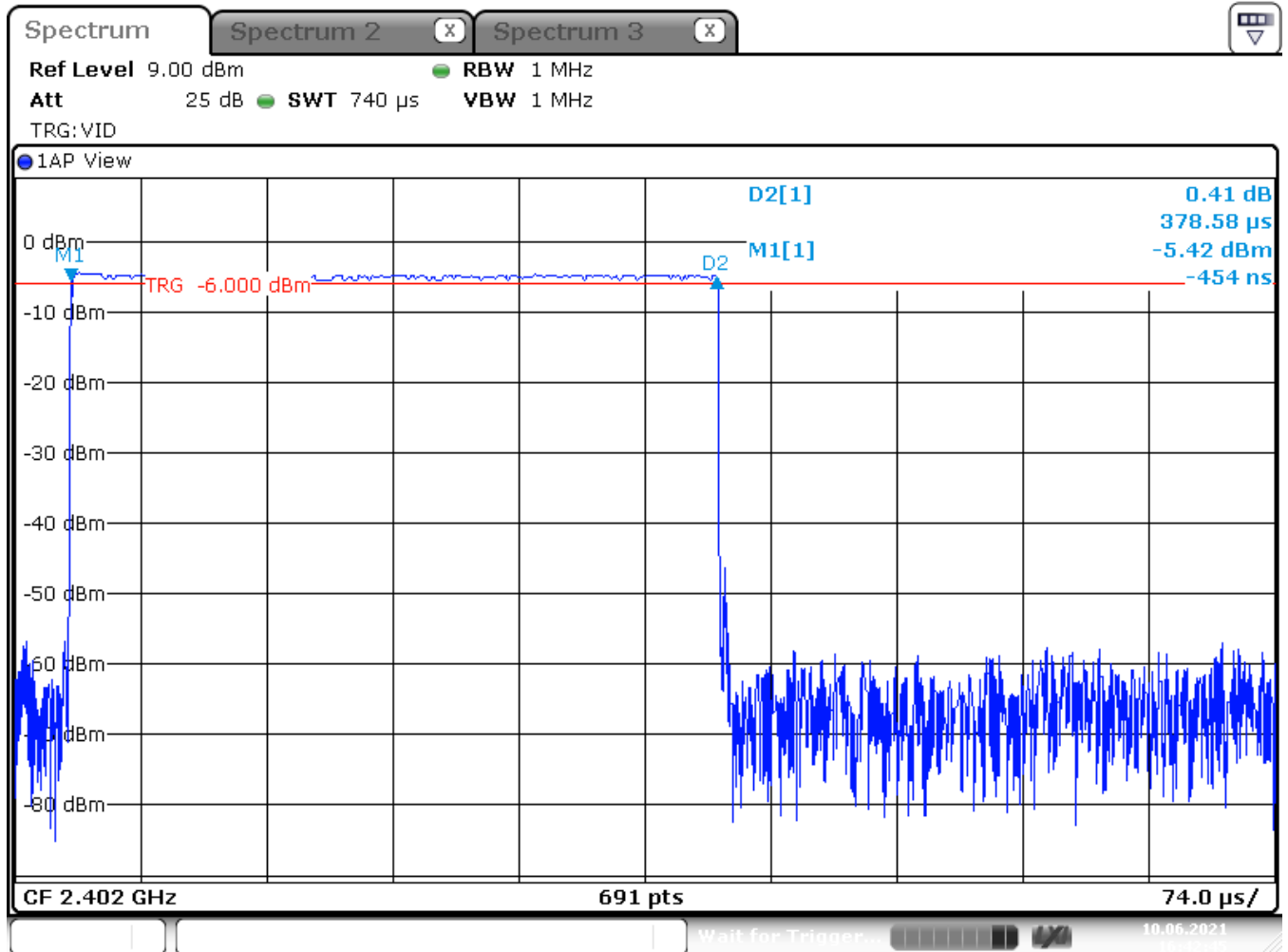
Test Equipment used: EMV-205

4.6. Average Time of Occupancy

§ 15.247(a)(1)(iii)
5.1(4)

Conducted Measurement - Mode: Bluetooth BDR

Rated output power: 3,98 mW 2402 MHz



Date: 10 JUN 2021 16:42:46

The dwell time is constant 378,58 µs.

LIMIT SUBCLAUSE 15.247(a)(1)(iii) – 5.1(4)

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.

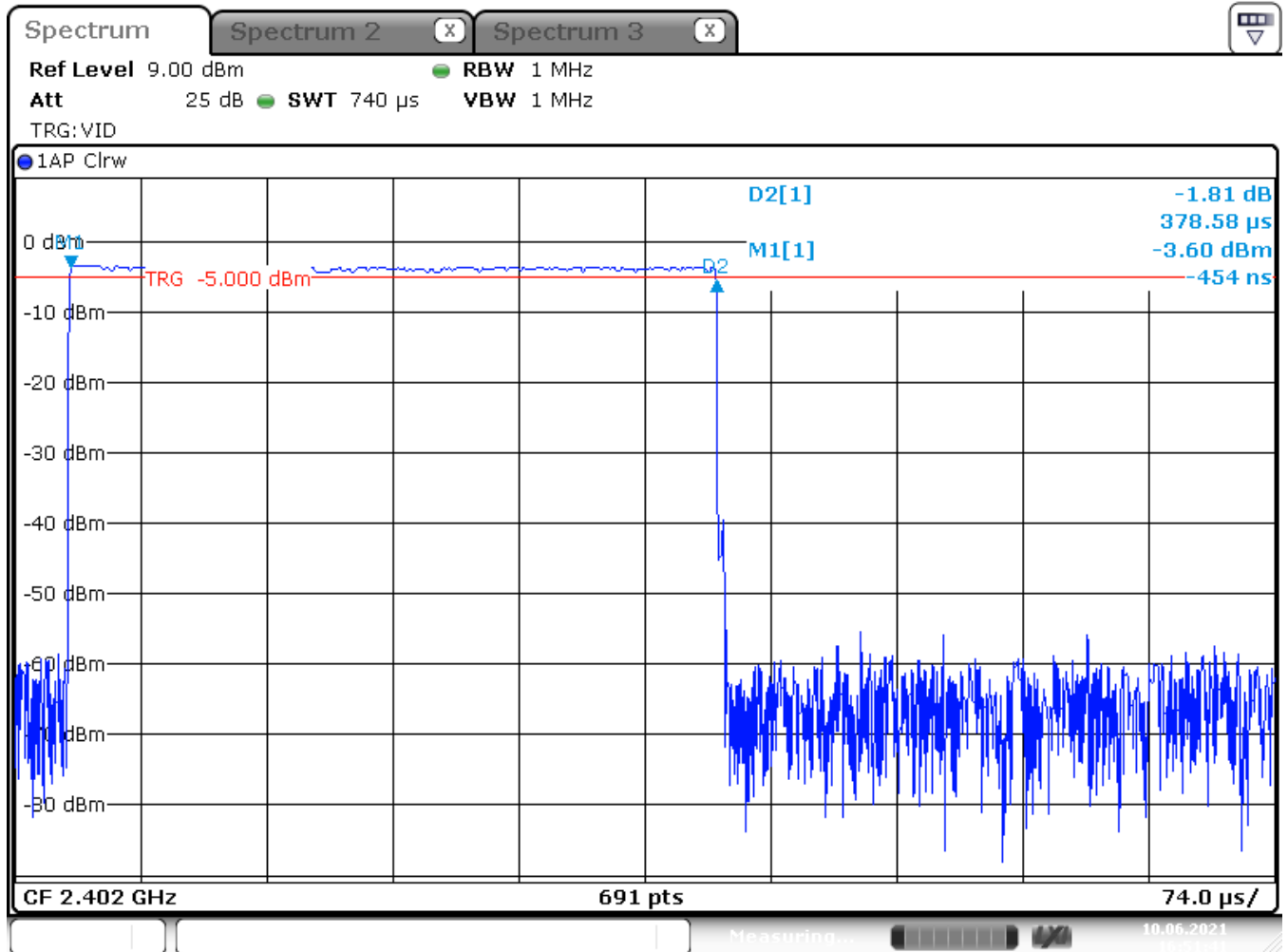
Test Equipment used: EMV-205

Average Time of Occupancy

§ 15.247(a)(1)(iii)
5.1(4)

Conducted Measurement - Mode: Bluetooth BDR

Rated output power: 3,98 mW 2441 MHz



Date: 10 JUN 2021 16:51:41

The dwell time is constant 378,58 µs.

LIMIT SUBCLAUSE 15.247(a)(1)(iii) – 5.1(4)

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.

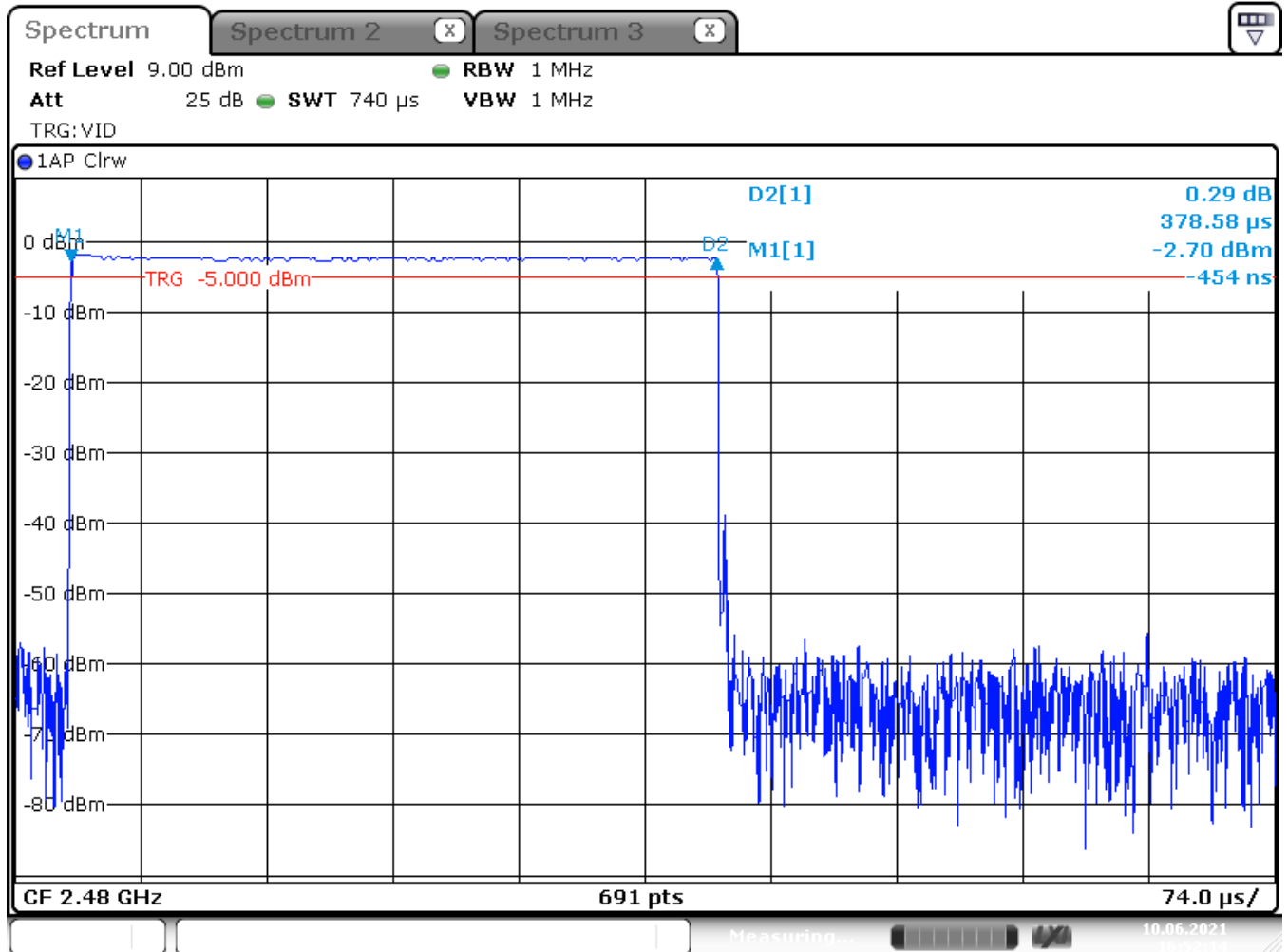
Test Equipment used: EMV-205

Average Time of Occupancy

§ 15.247(a)(1)(iii)
5.1(4)

Conducted Measurement - Mode: Bluetooth BDR

Rated output power: 3,98 mW 2480 MHz



Date: 10 JUN 2021 16:52:14

The dwell time is constant 378,58 ms.

LIMIT SUBCLAUSE 15.247(a)(1)(iii) – 5.1(4)

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.

Test Equipment used: EMV-205

Average Time of Occupancy

**§ 15.247(a)(1)(iii)
5.1(4)**

Conducted Measurement - Mode: Bluetooth BDR

Rated output power: 3,98 mW

	Channel 0 (2402 MHz)	Channel 39 (2441 MHz)	Channel 78 (2480 MHz)
Observed time period	79 times 0,4 Seconds = 31,6 seconds		
Time of each individual transmission	0,378 ms	0,378 ms	0,378 ms
Observed number of transmissions	313	317	320
Average time of occupancy	0,118 seconds	0,119 seconds	0,121 seconds

LIMIT SUBCLAUSE 15.247(a)(1)(iii) – 5.1(4)

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.

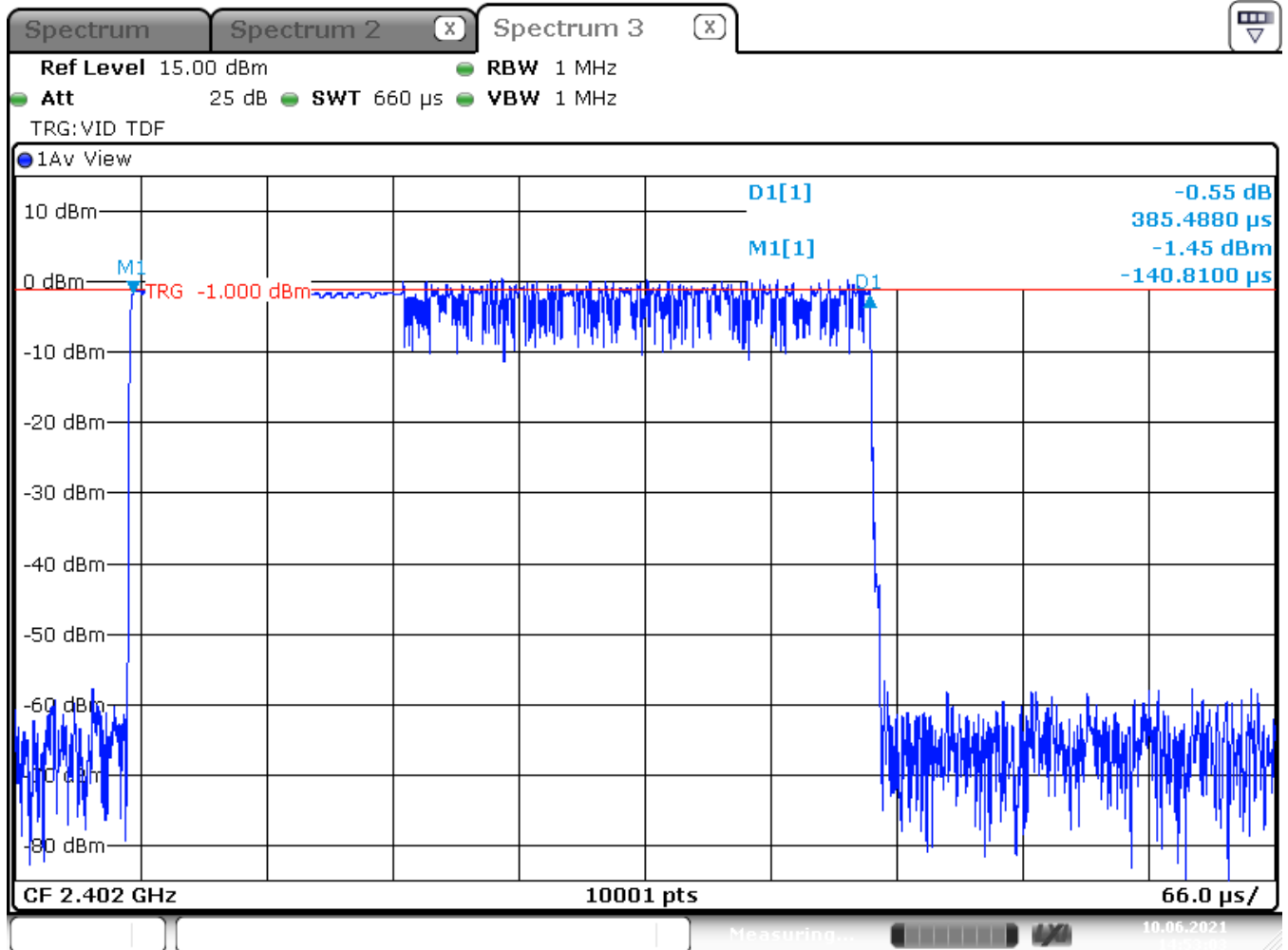
Test Equipment used: EMV-205

Average Time of Occupancy

§ 15.247(a)(1)(iii)
5.1(4)

Conducted Measurement - Mode: Bluetooth EDR

Rated output power: 3,98 mW 2402 MHz



Date: 10 JUN 2021 14:53:03

The dwell time is constant 385,48 µs.

LIMIT SUBCLAUSE 15.247(a)(1)(iii) – 5.1(4)

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.

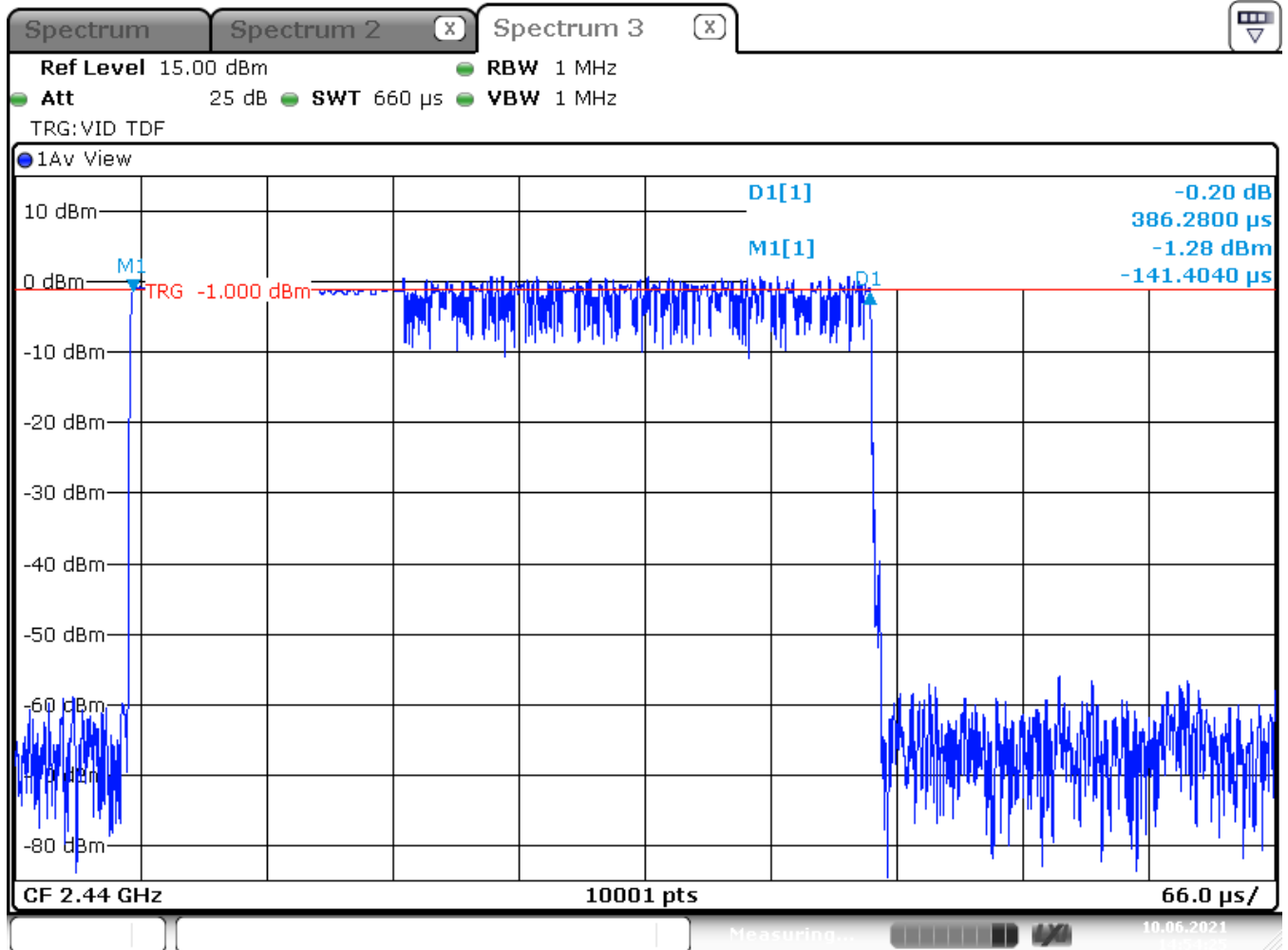
Test Equipment used: EMV-205

Average Time of Occupancy

§ 15.247(a)(1)(iii)
5.1(4)

Conducted Measurement - Mode: Bluetooth EDR

Rated output power: 3,98 mW 2441 MHz



Date: 10 JUN 2021 14:54:26

The dwell time is constant 386,28 µs.

LIMIT SUBCLAUSE 15.247(a)(1)(iii) – 5.1(4)

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.

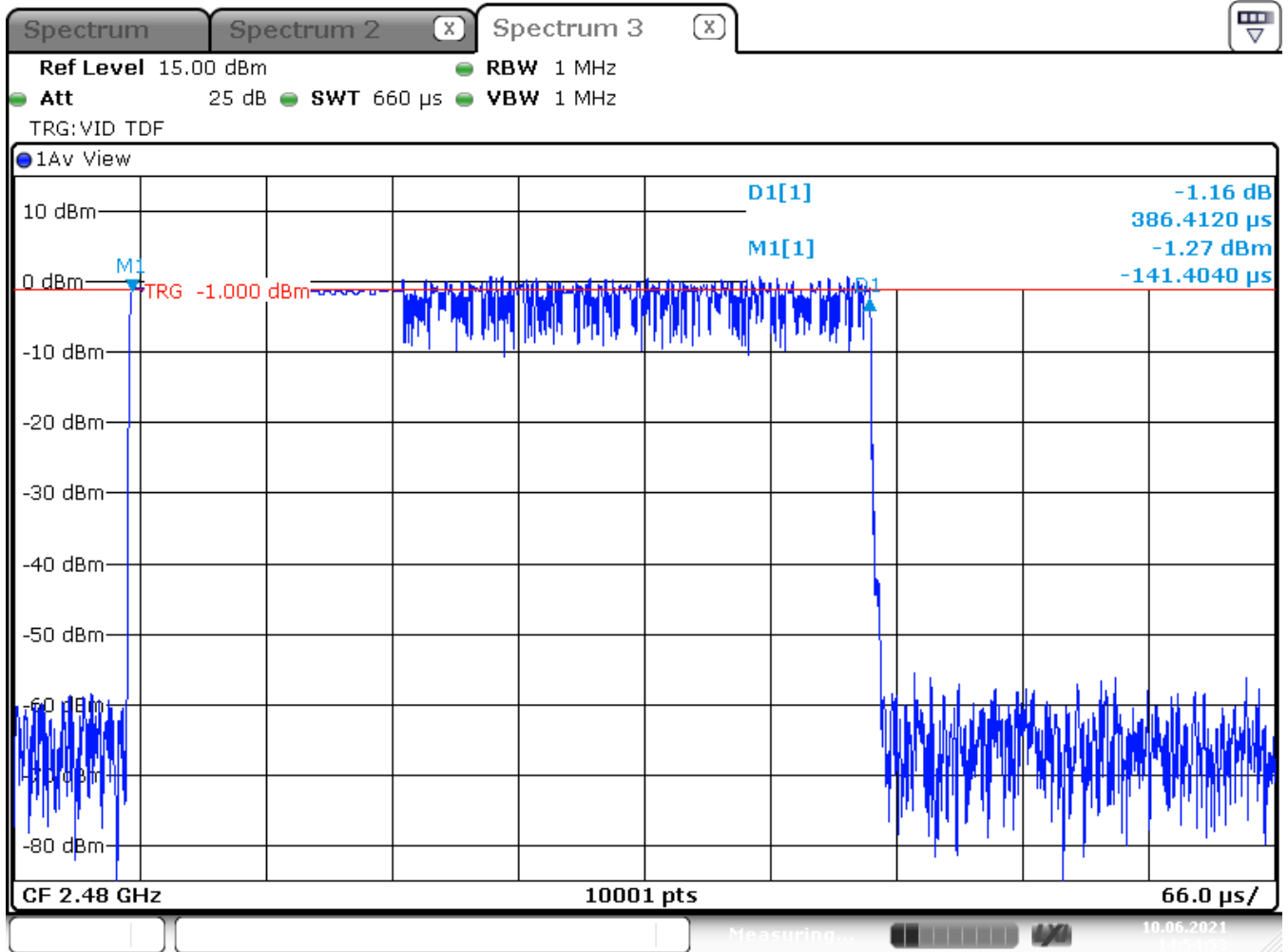
Test Equipment used: EMV-205

Average Time of Occupancy

§ 15.247(a)(1)(iii)
5.1(4)

Conducted Measurement - Mode: Bluetooth EDR

Rated output power: 3,98 mW 2480 MHz



Date: 10 JUN 2021 14:54:54

The dwell time is constant 386,41 μs.

LIMIT SUBCLAUSE 15.247(a)(1)(iii) – 5.1(4)

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.

Test Equipment used: EMV-205

Average Time of Occupancy

§ 15.247(a)(1)(iii)
5.1(4)

Conducted Measurement - Mode: Bluetooth EDR

Rated output power: 3,98 mW

	Channel 0 (2402 MHz)	Channel 39 (2441 MHz)	Channel 78 (2480 MHz)
Observed time period	79 times 0,4 Seconds = 31,6 seconds		
Time of each individual transmission	0,385 ms	0,386 ms	0,386 ms
Observed number of transmissions	315	321	319
Average time of occupancy	0,121 seconds	0,124 seconds	0,123 seconds

5,51 5,50 5,74

LIMIT SUBCLAUSE 15.247(a)(1)(iii) – 5.1(4)

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.

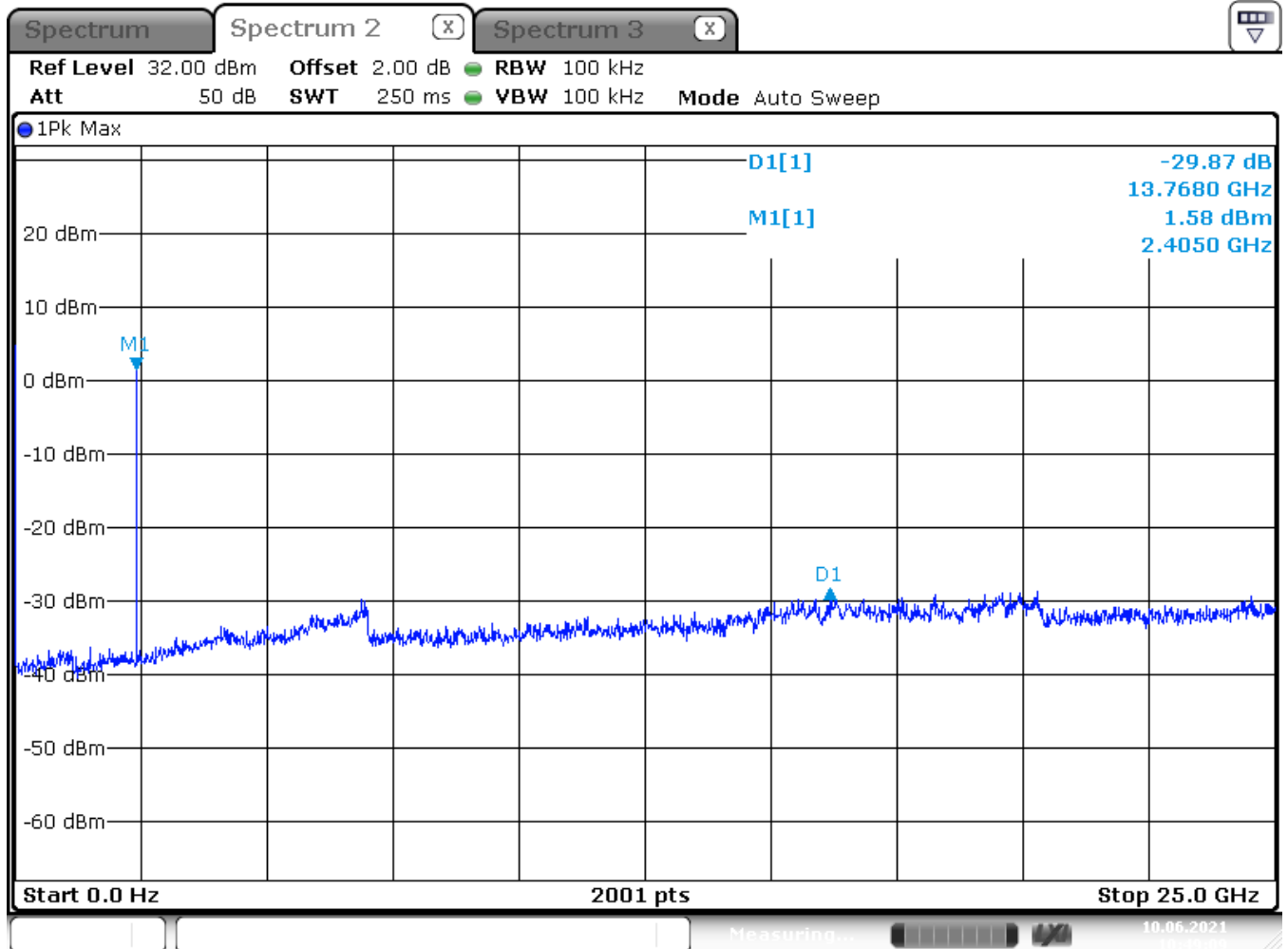
Test Equipment used: EMV-205

4.7. Out-of-band Emission

§ 15.247(d)
 5.5

Measurement conducted with Peak-Detector:

Mode: Bluetooth BDR – Channel 0 – 2402 MHz



Date: 10 JUN 2021 10:49:09

LIMIT SUBCLAUSE 15.247(d) – 5.5

<p>In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.</p>	<p>At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.</p>
--	---

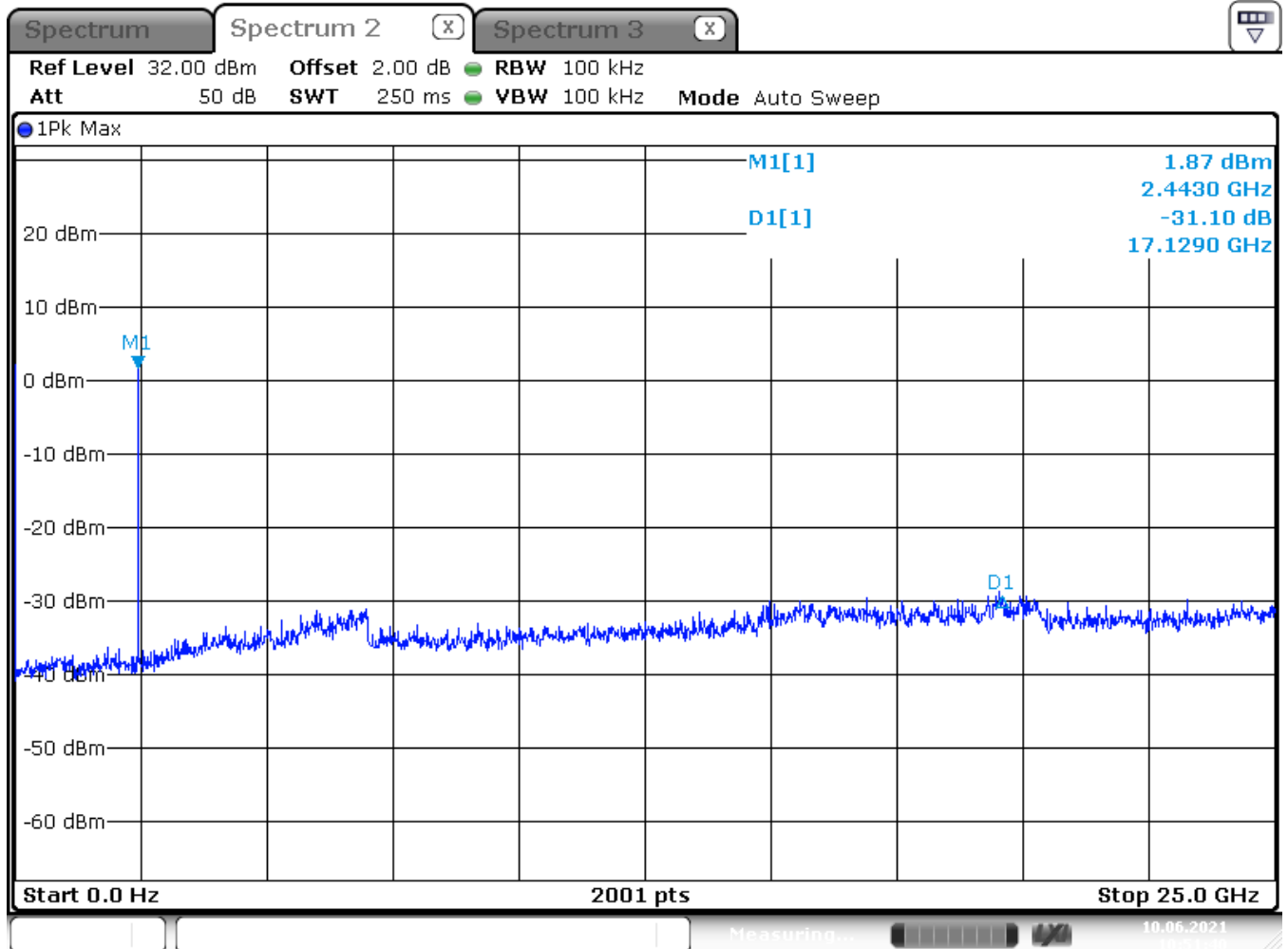
Test Equipment used: EMV-205

Out-of-band Emission

§ 15.247(d)
 5.5

Measurement conducted with Peak-Detector:

Mode: Bluetooth BDR – Channel 39 – 2441 MHz



Date: 10 JUN 2021 10:51:40

LIMIT SUBCLAUSE 15.247(d) – 5.5

<p>In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.</p>	<p>At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.</p>
--	---

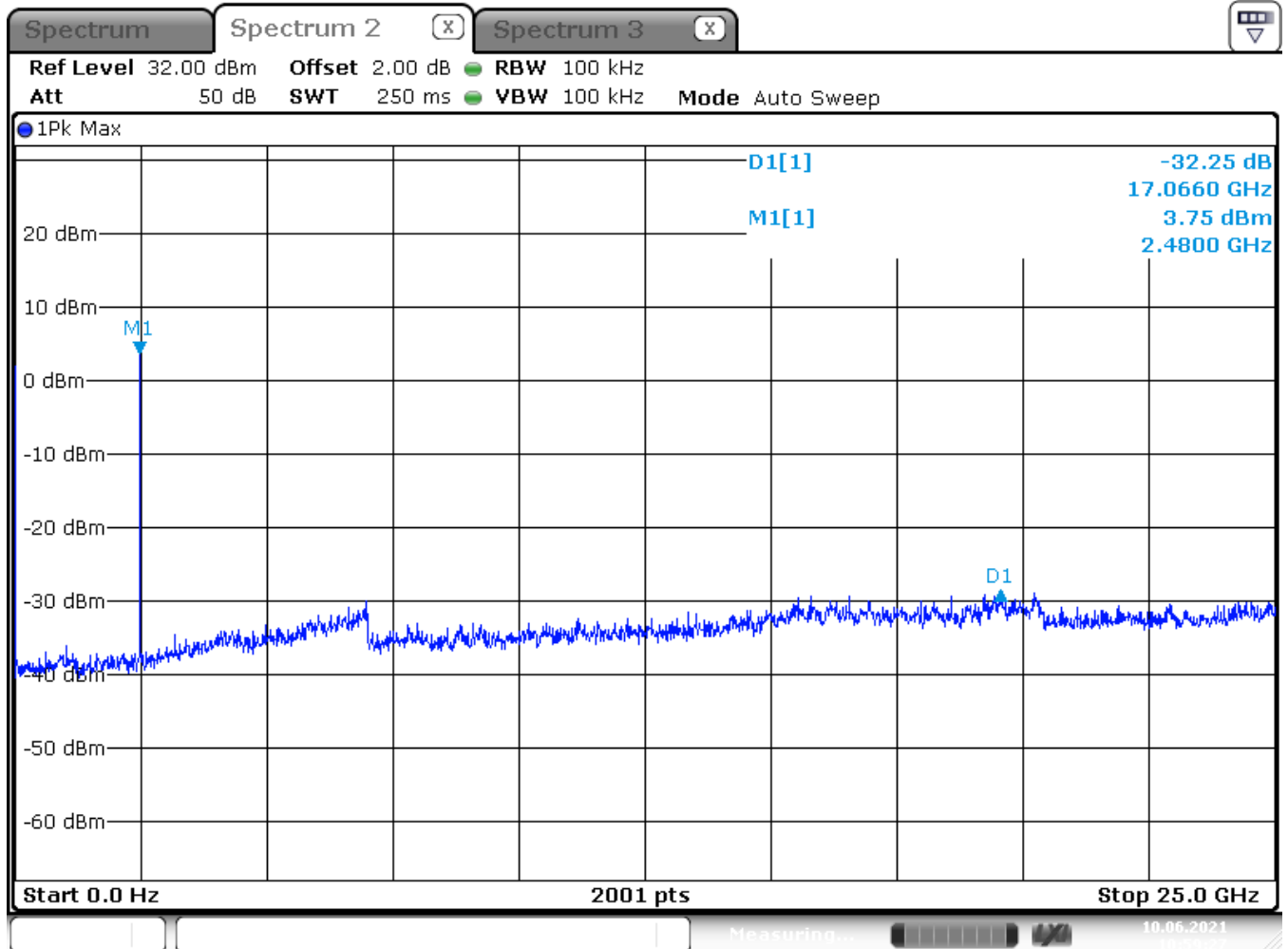
Test Equipment used: EMV-205

Out-of-band Emission

§ 15.247(d)
 5.5

Measurement conducted with Peak-Detector:

Mode: Bluetooth BDR – Channel 78 – 2480 MHz



Date: 10 JUN 2021 10:59:27

LIMIT SUBCLAUSE 15.247(d) – 5.5

<p>In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.</p>	<p>At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.</p>
--	---

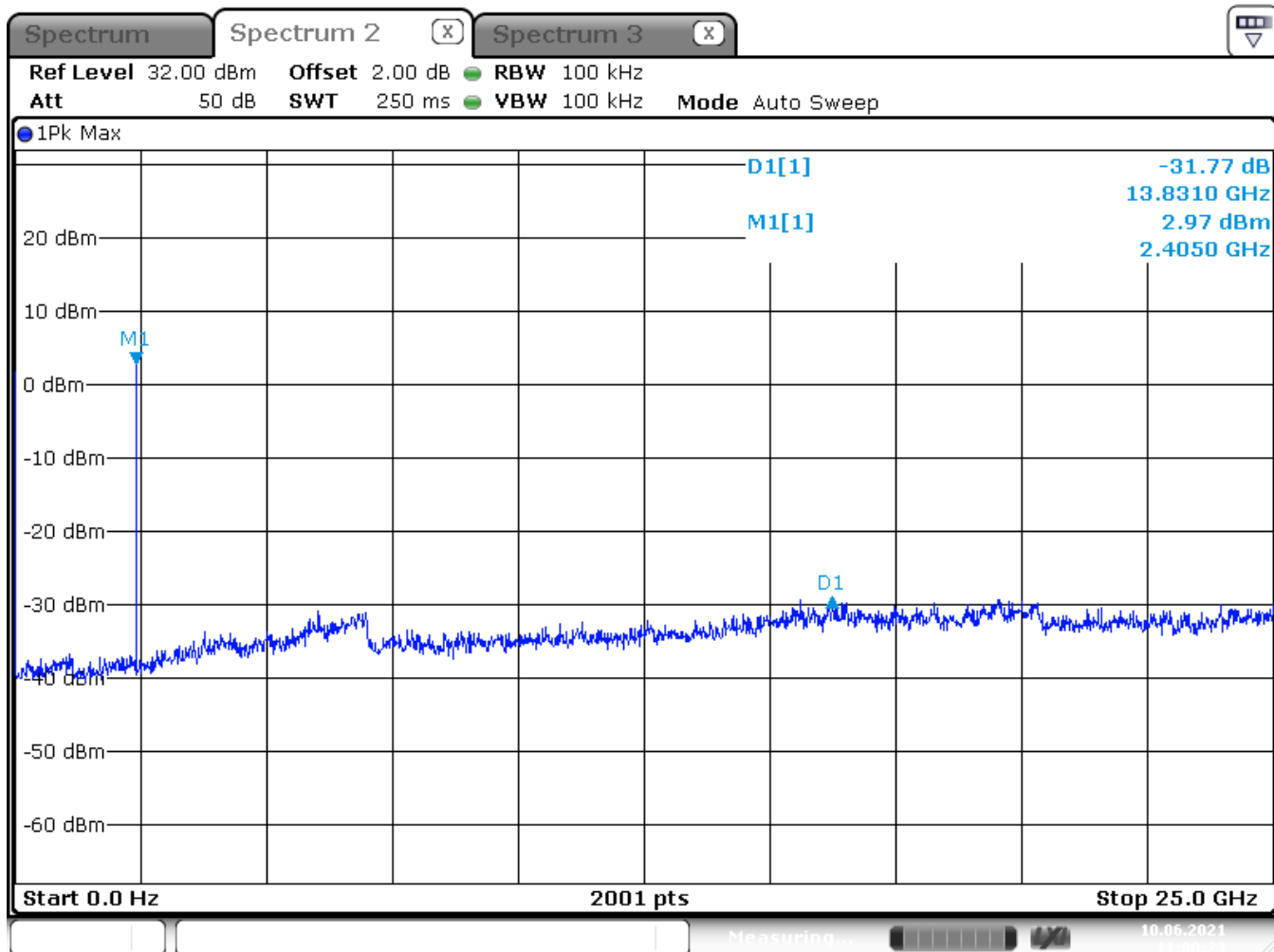
Test Equipment used: EMV-205

Out-of-band Emission

§ 15.247(d)
5.5

Measurement conducted with Peak-Detector:

Mode: Bluetooth EDR – Channel 0 – 2402 MHz



Date: 10 JUN 2021 11:00:23

LIMIT SUBCLAUSE 15.247(d) – 5.5

In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.	At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.
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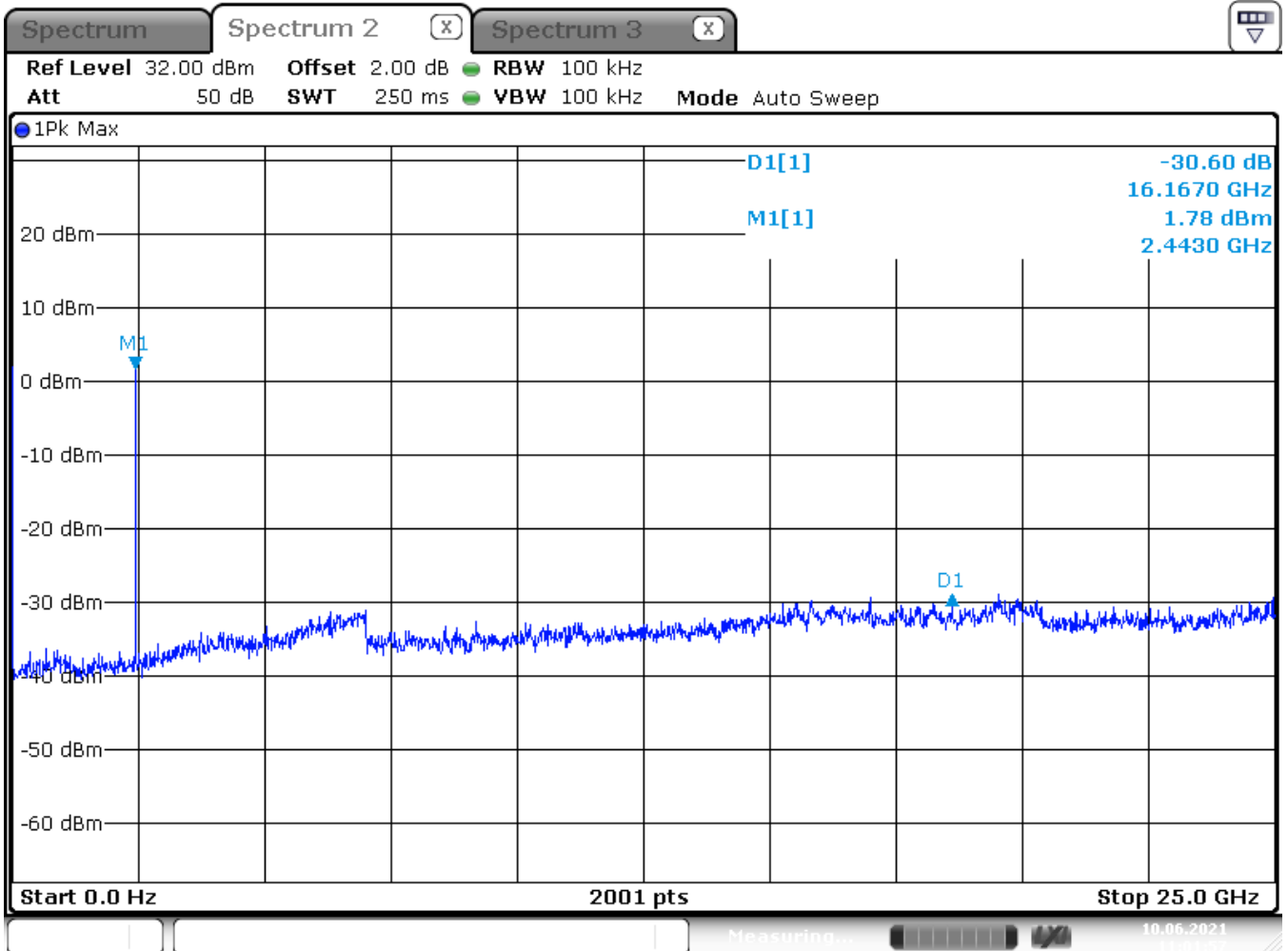
Test Equipment used: EMV-205

Out-of-band Emission

§ 15.247(d)
 5.5

Measurement conducted with Peak-Detector:

Mode: Bluetooth EDR – Channel 39 – 2441 MHz



Date: 10 JUN 2021 11:01:58

LIMIT SUBCLAUSE 15.247(d) – 5.5

<p>In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.</p>	<p>At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.</p>
--	---

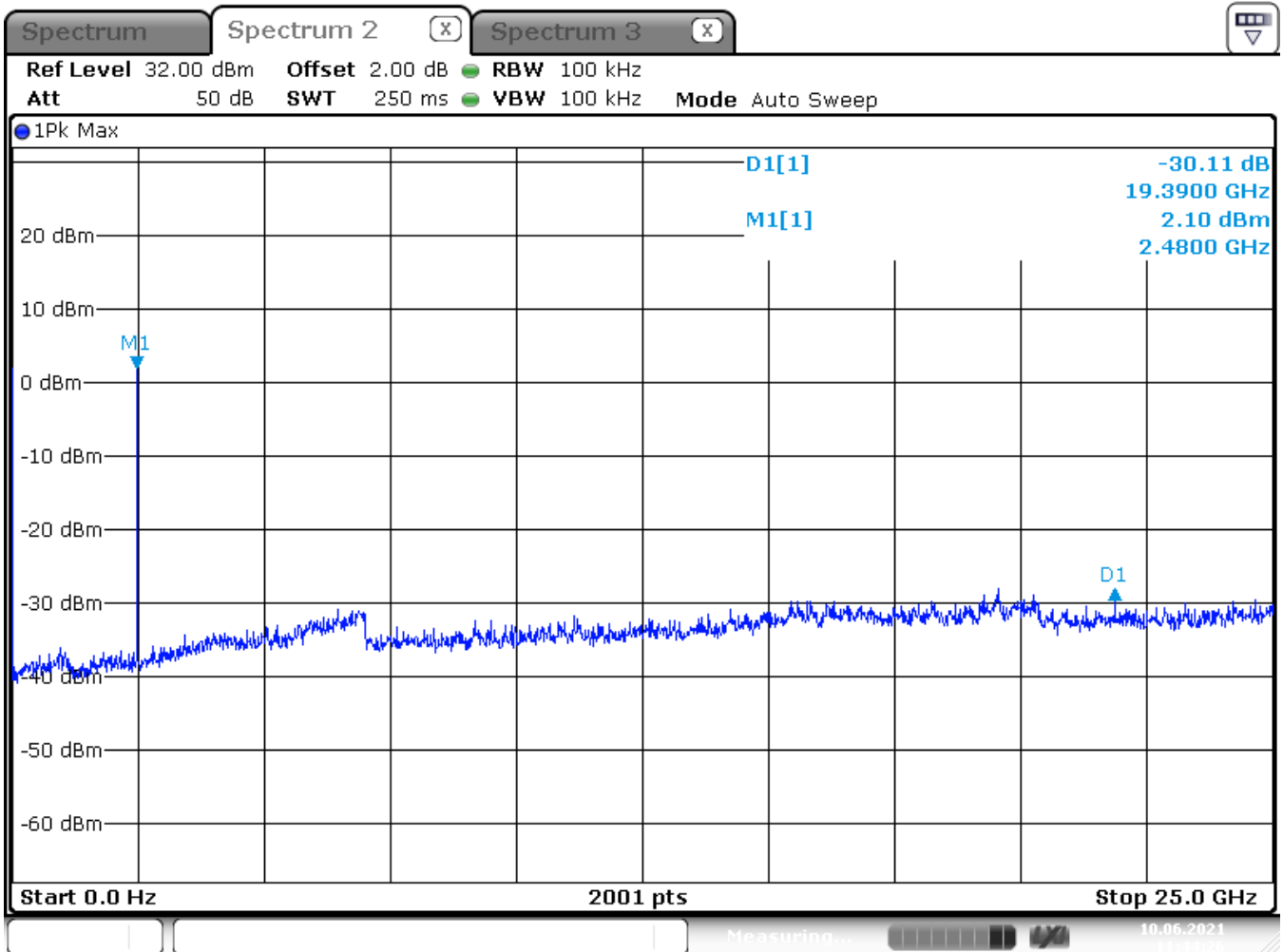
Test Equipment used: EMV-205

Out-of-band Emission

§ 15.247(d)
 5.5

Measurement conducted with Peak-Detector:

Mode: Bluetooth EDR – Channel 78 – 2480 MHz



Date: 10 JUN 2021 11:44:26

LIMIT SUBCLAUSE 15.247(d) – 5.5

<p>In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.</p>	<p>At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.</p>
--	---

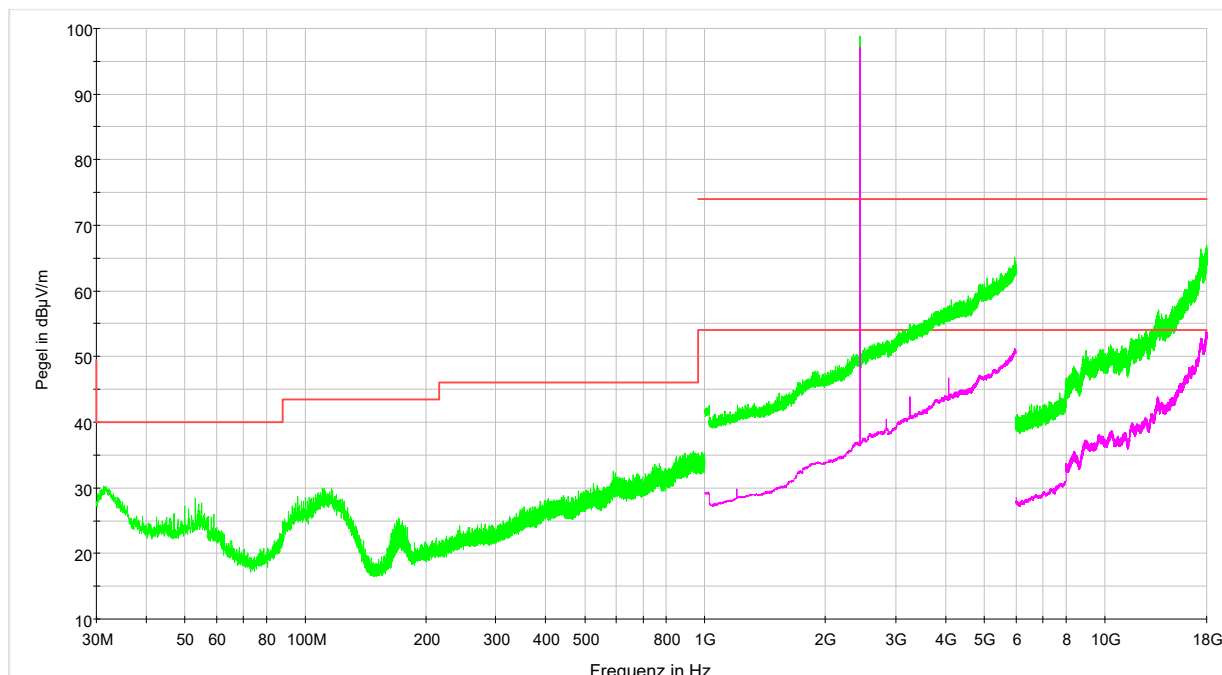
Test Equipment used: EMV-205

4.8. Emissions in restricted bands
Emissions falling within restricted frequency bands

§ 15.209(a)
RSS-Gen

Measurement radiated with Peak-Detector (green line) and Average detector (magenta line):

Mode: Bluetooth BDR – Channel 0 – 2402 MHz



- PK+_MAXH(1)@fcc [BDR_CH1_F1.Result:2]
- PK+_CLRWR [Ergebnistabelle.Result:1]
- FCC ClassB F QP [..EMI radiated]
- AVG_CLRWR [Ergebnistabelle.Result:3]
- FCC ClassB F PK [..EMI radiated]
- AVG_MAXH(2):BDR_CH39_F2 [BDR_CH39_F2.Result:4]
- PK+_MAXH(1) [BDR_CH39_F3.Result:2]
- PK+_MAXH [Ergebnistabelle.Result:2]
- AVG_MAXH(1) [BDR_CH39_F3.Result:4]
- AVG_MAXH [Ergebnistabelle.Result:4]
- PK+_MAXH(2):BDR_CH39_F2 [BDR_CH39_F2.Result:2]

Worst case emission: Average @ 4000,0 MHz: 47,4 dBµV/m

Remark: Although the measurement above ends at 18 GHz, all measurements were performed up to the tenth harmonics of the transmitter frequency.

LIMIT SUBCLAUSE 15.209(a) – RSS-Gen

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

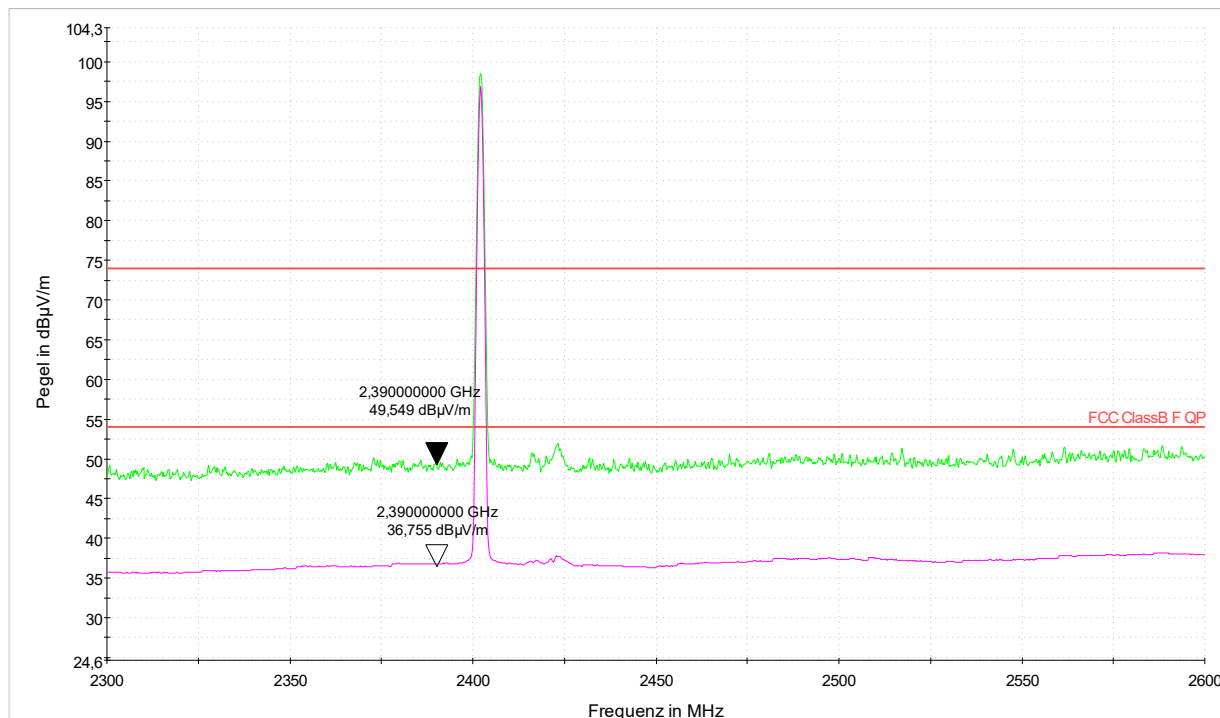
Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-111; EMV-112; EMV-114; EMV-200; EMV-205; NT-122; NT-126; NT-416

Emissions in restricted bands
Emissions falling within restricted frequency bands

§ 15.209(a)
RSS-Gen

Measurement with Peak-Detector (green line) and Average detector (magenta line): Band Edge requirement

Setup: Bluetooth BDR – CH 0: 2402 MHz



- FCC ClassB F QP [..\EMI radiated\]
- PK+ _MAXH(1)@fcc [BDR_CH0_F2.Result:2]
- PK+ _CLRWR [Ergebnistabelle.Result:1]
- PK+ _MAXH [Ergebnistabelle.Result:2]
- FCC ClassB F PK [..\EMI radiated\]
- AVG_MAXH(1)@fcc [BDR_CH0_F2.Result:4]
- AVG_CLRWR [Ergebnistabelle.Result:3]
- AVG_MAXH [Ergebnistabelle.Result:4]

LIMIT SUBCLAUSE 15.209(a) – RSS-Gen

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

Band edges of the nearest restricted bands: 2390 MHz and 2483,5 MHz.

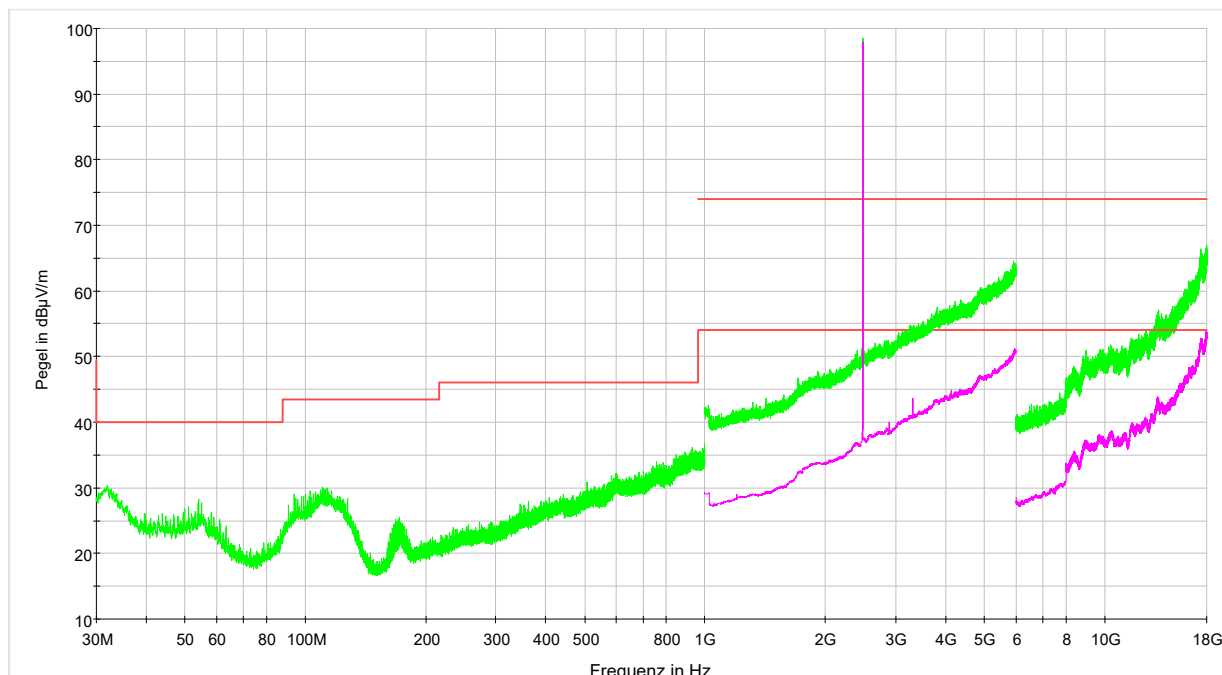
Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-200

Emissions in restricted bands
Emissions falling within restricted frequency bands

§ 15.209(a)
RSS-Gen

Measurement radiated with Peak-Detector (green line) and Average detector (magenta line):

Mode: Bluetooth BDR – Channel 39 – 2441 MHz



- PK+_MAXH(1)@fcc [BDR_CH3_F1.Result:2]
- PK+_CLRWR [Ergebnistabelle.Result:1]
- FCC ClassB F QP [..EMI radiated]
- AVG_CLRWR [Ergebnistabelle.Result:3]
- FCC ClassB F PK [..EMI radiated]
- AVG_MAXH(2):BDR_CH79_F2 [BDR_CH79_F2.Result:4]
- PK+_MAXH(1) [BDR_CH39_F3.Result:2]
- PK+_MAXH [Ergebnistabelle.Result:2]
- AVG_MAXH(1) [BDR_CH39_F3.Result:4]
- AVG_MAXH [Ergebnistabelle.Result:4]
- PK+_MAXH(2):BDR_CH79_F2 [BDR_CH79_F2.Result:2]

Worst case emission: Average @ 3450,0 MHz: 43,2 dBµV/m

Remark: Although the measurement above ends at 18 GHz, all measurements were performed up to the tenth harmonics of the transmitter frequency.

LIMIT SUBCLAUSE 15.209(a) – RSS-Gen

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

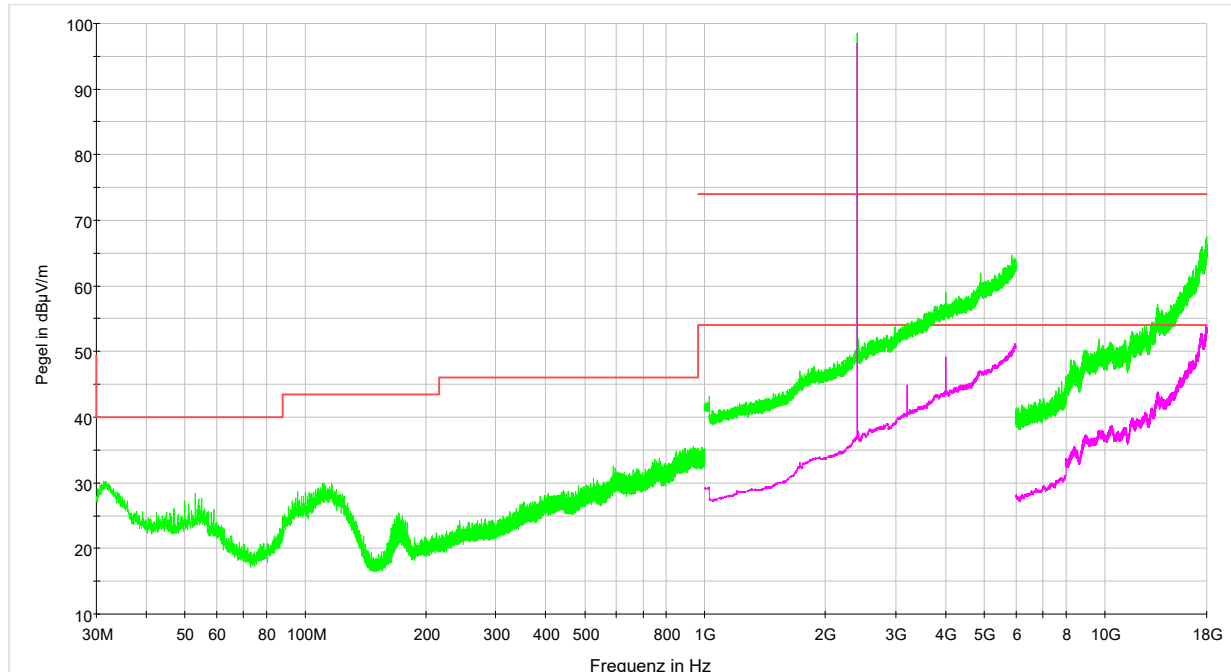
Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-111; EMV-112; EMV-114; EMV-200; EMV-205; NT-122; NT-126; NT-416

Emissions in restricted bands
Emissions falling within restricted frequency bands

§ 15.209(a)
RSS-Gen

Measurement radiated with Peak-Detector (green line) and Average detector (magenta line):

Mode: Bluetooth BDR – Channel 78 – 2480 MHz



- PK+_MAXH(1)@fcc [BDR_CH0_F3.Result:2]
- PK+_CLRWR [Ergebnistabelle.Result:1]
- FCC ClassB F QP [..EMI radiated]
- AVG_CLRWR [Ergebnistabelle.Result:3]
- FCC ClassB F PK [..EMI radiated]
- AVG_MAXH(1):BDR_CH0_F2 [BDR_CH0_F2.Result:4]
- AVG_MAXH(1)@fcc [BDR_CH0_F3.Result:4]
- PK+_MAXH [Ergebnistabelle.Result:2]
- PK+_MAXH(1):BDR_CH1_F1 [BDR_CH1_F1.Result:2]
- AVG_MAXH [Ergebnistabelle.Result:4]
- PK+_MAXH(1):BDR_CH0_F2 [BDR_CH0_F2.Result:2]

Worst case emission: Average @ 4000,0 MHz: 49,9 dBµV/m

Remark: Although the measurement above ends at 18 GHz, all measurements were performed up to the tenth harmonics of the transmitter frequency.

LIMIT SUBCLAUSE 15.209(a) – RSS-Gen

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

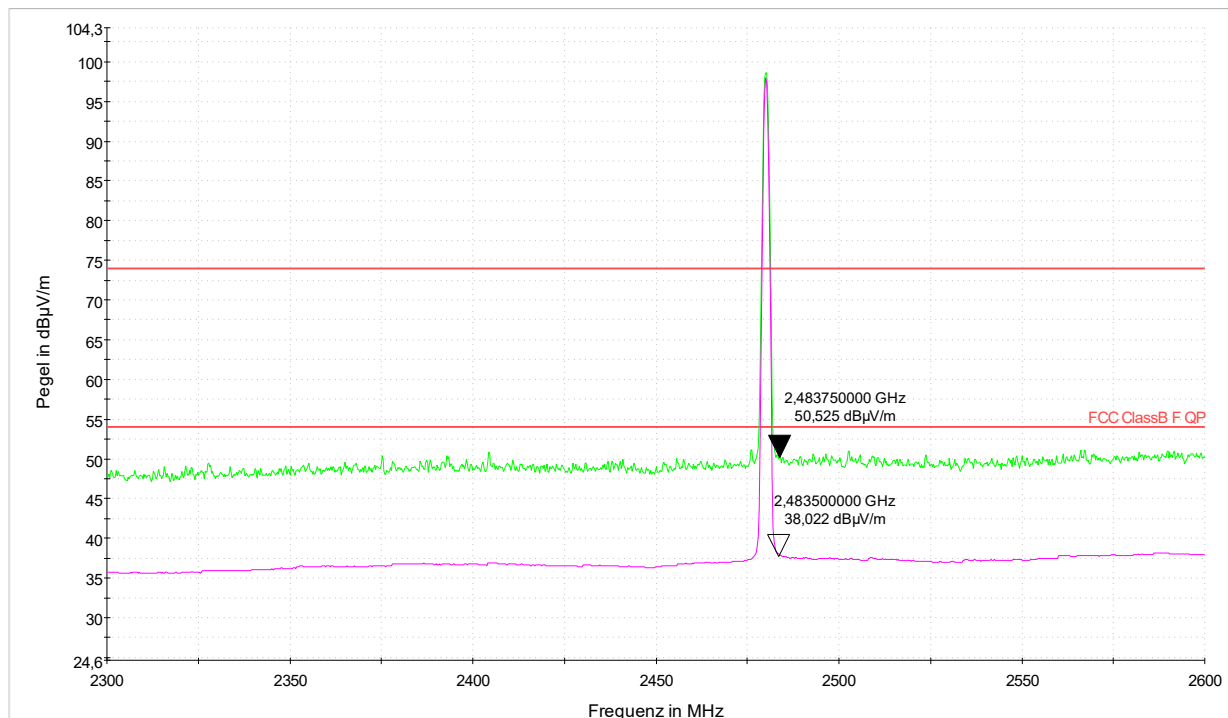
Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-111; EMV-112; EMV-114; EMV-200; EMV-205; NT-122; NT-126; NT-416

Emissions in restricted bands
Emissions falling within restricted frequency bands

§ 15.209(a)
RSS-Gen

Measurement with Peak-Detector (green line) and Average detector (magenta line): Band Edge requirement

Setup: Bluetooth BDR – CH 78: 2480 MHz



- FCC ClassB F QP [.\EMI radiated]
- PK+ _MAXH [Ergebnistabelle.Result:2]
- AVG_CLRWR [Ergebnistabelle.Result:3]
- PK+ _MAXH(1)@fcc [BDR_CH79_F2.Result:2]
- FCC ClassB F PK [.\EMI radiated]
- AVG_MAXH [Ergebnistabelle.Result:4]
- PK+ _CLRWR [Ergebnistabelle.Result:1]
- AVG_MAXH(1)@fcc [BDR_CH79_F2.Result:4]

LIMIT SUBCLAUSE 15.209(a) – RSS-Gen

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

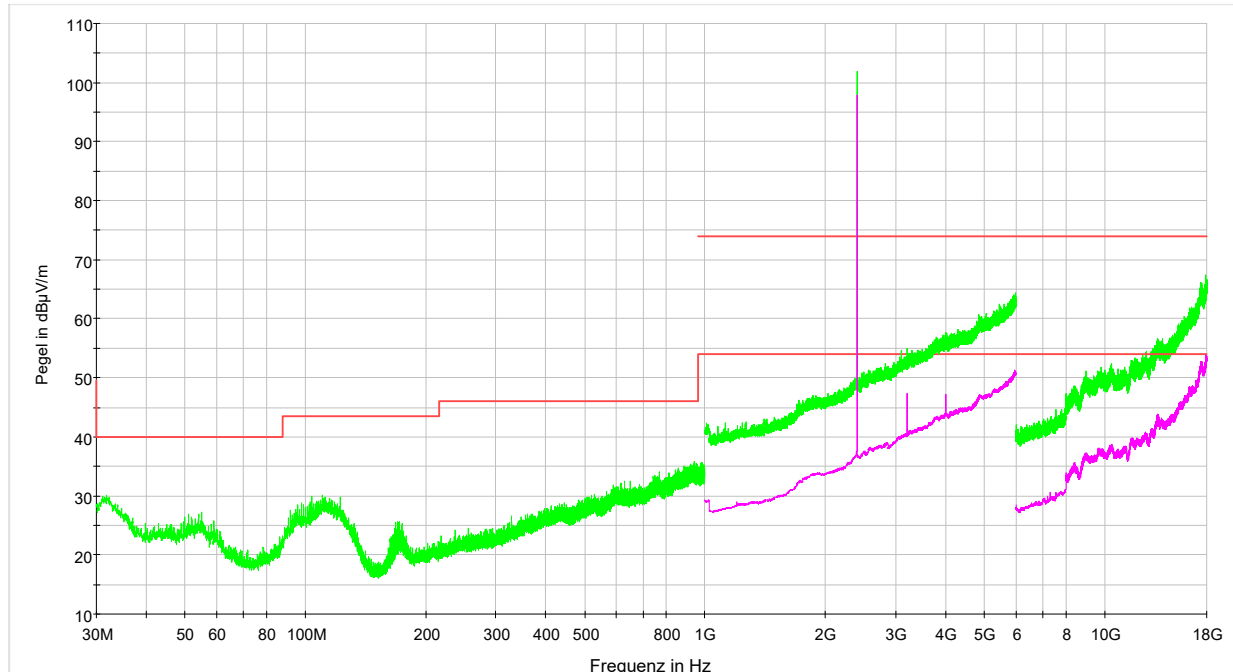
Band edges of the nearest restricted bands: 2390 MHz and 2483,5 MHz.

Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-200

Emissions in restricted bands § 15.209(a)
Emissions falling within restricted frequency bands RSS-Gen

Measurement radiated with Peak-Detector (green line) and Average detector (magenta line):

Mode: Bluetooth EDR – Channel 0 – 2402 MHz



- PK+_MAXH(1)@fcc [EDR_CH1_F1.Result:2]
- PK+_CLRWR [Ergebnistabelle.Result:1]
- FCC ClassB F QP [..EMI radiated]
- AVG_CLRWR [Ergebnistabelle.Result:3]
- FCC ClassB F PK [..EMI radiated]
- AVG_MAXH(1):EDR_CH1_F2 [EDR_CH1_F2.Result:4]
- PK+_MAXH(1):EDR_CH0_F3 [EDR_CH0_F3.Result:2]
- PK+_MAXH [Ergebnistabelle.Result:2]
- AVG_MAXH(1):EDR_CH0_F3 [EDR_CH0_F3.Result:4]
- AVG_MAXH [Ergebnistabelle.Result:4]
- PK+_MAXH(1):EDR_CH1_F2 [EDR_CH1_F2.Result:2]

Worst case emission: Average @ 4000,0 MHz: 47,0 dBµV/m

Remark: Although the measurement above ends at 18 GHz, all measurements were performed up to the tenth harmonics of the transmitter frequency.

LIMIT SUBCLAUSE 15.209(a) – RSS-Gen

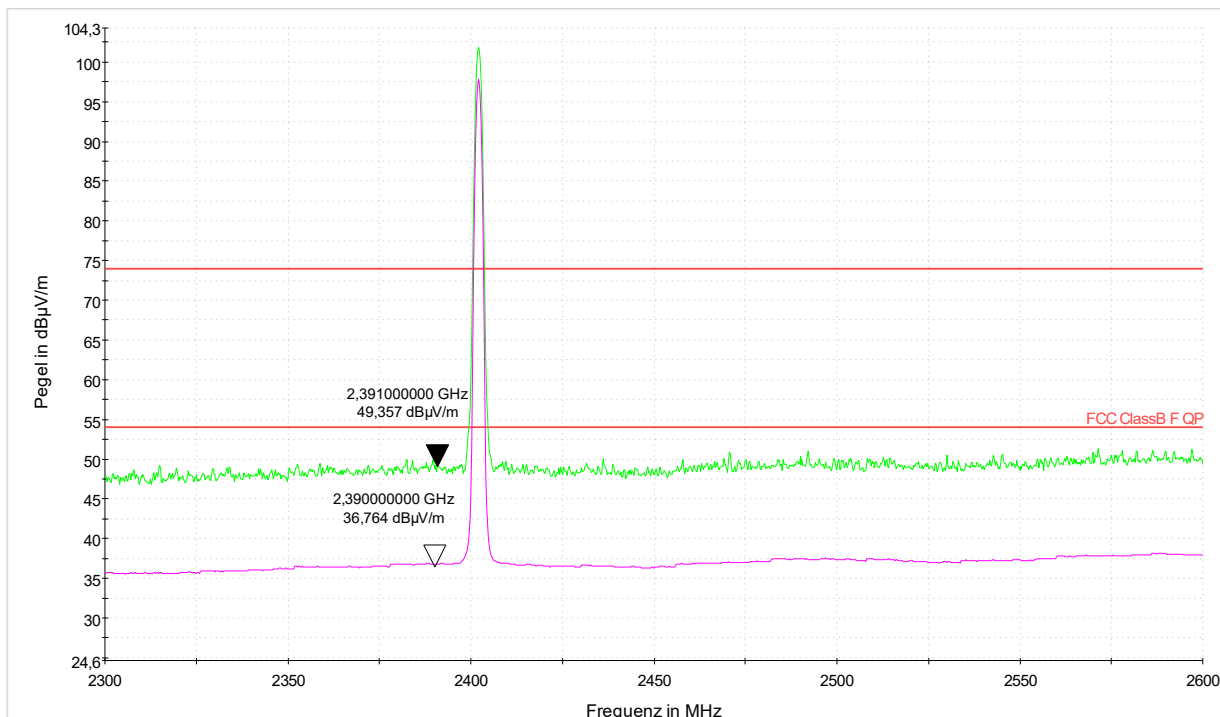
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-111; EMV-112;
 EMV-114; EMV-200; EMV-205; NT-122; NT-126; NT-416

Emissions in restricted bands § 15.209(a)
Emissions falling within restricted frequency bands RSS-Gen

Measurement with Peak-Detector (green line) and Average detector (magenta line): Band Edge requirement

Setup: Bluetooth EDR – CH 0: 2402 MHz



- FCC ClassB F QP [..EMI radiated]
- PK+ _MAXH [Ergebnistabelle.Result:2]
- AVG_CLRWR [Ergebnistabelle.Result:3]
- PK+ _MAXH(1)@fcc [EDR_CH1_F2.Result:2]
- FCC ClassB F PK [..EMI radiated]
- AVG_MAXH [Ergebnistabelle.Result:4]
- PK+ CLRWR [Ergebnistabelle.Result:1]
- AVG_MAXH(1)@fcc [EDR_CH1_F2.Result:4]

LIMIT SUBCLAUSE 15.209(a) – RSS-Gen

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

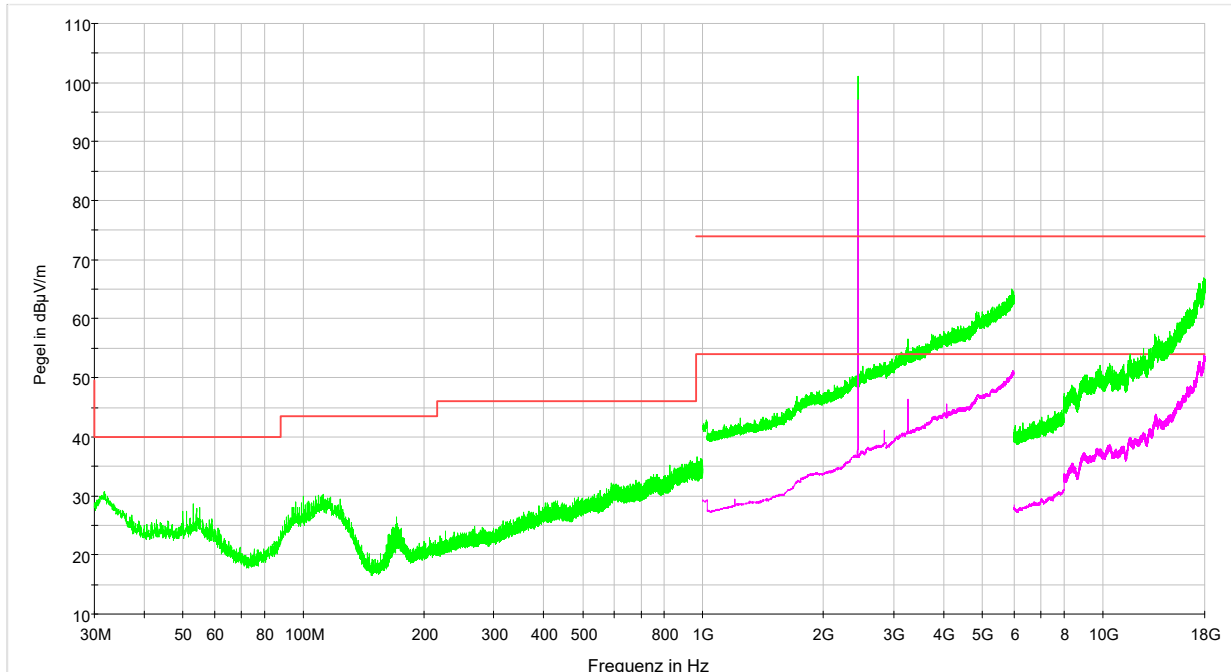
Band edges of the nearest restricted bands: 2390 MHz and 2483,5 MHz.

Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-200

Emissions in restricted bands § 15.209(a)
Emissions falling within restricted frequency bands RSS-Gen

Measurement radiated with Peak-Detector (green line) and Average detector (magenta line):

Mode: Bluetooth EDR – Channel 39 – 2441 MHz



- PK+ _MAXH(1):EDR_CH39_F2 [EDR_CH39_F2.Result:2]
- PK+ _CLRWR [Ergebnistabelle.Result:1]
- FCC ClassB F QP [..EMI radiated]
- AVG _CLRWR [Ergebnistabelle.Result:3]
- FCC ClassB F PK [..EMI radiated]
- PK+ _MAXH(1) [BLE_CH1_F1.Result:2]
- AVG _MAXH(1):EDR_CH39_F2 [EDR_CH39_F2.Result:4]
- PK+ _MAXH [Ergebnistabelle.Result:2]
- PK+ _MAXH(1)@fcc [EDR_CH39_F3.Result:2]
- AVG _MAXH [Ergebnistabelle.Result:4]
- AVG _MAXH(1)@fcc [EDR_CH39_F3.Result:4]

Worst case emission: Average @ 4000,0 MHz: 43,4 dBµV/m

Remark: Although the measurement above ends at 18 GHz, all measurements were performed up to the tenth harmonics of the transmitter frequency.

LIMIT SUBCLAUSE 15.209(a) – RSS-Gen

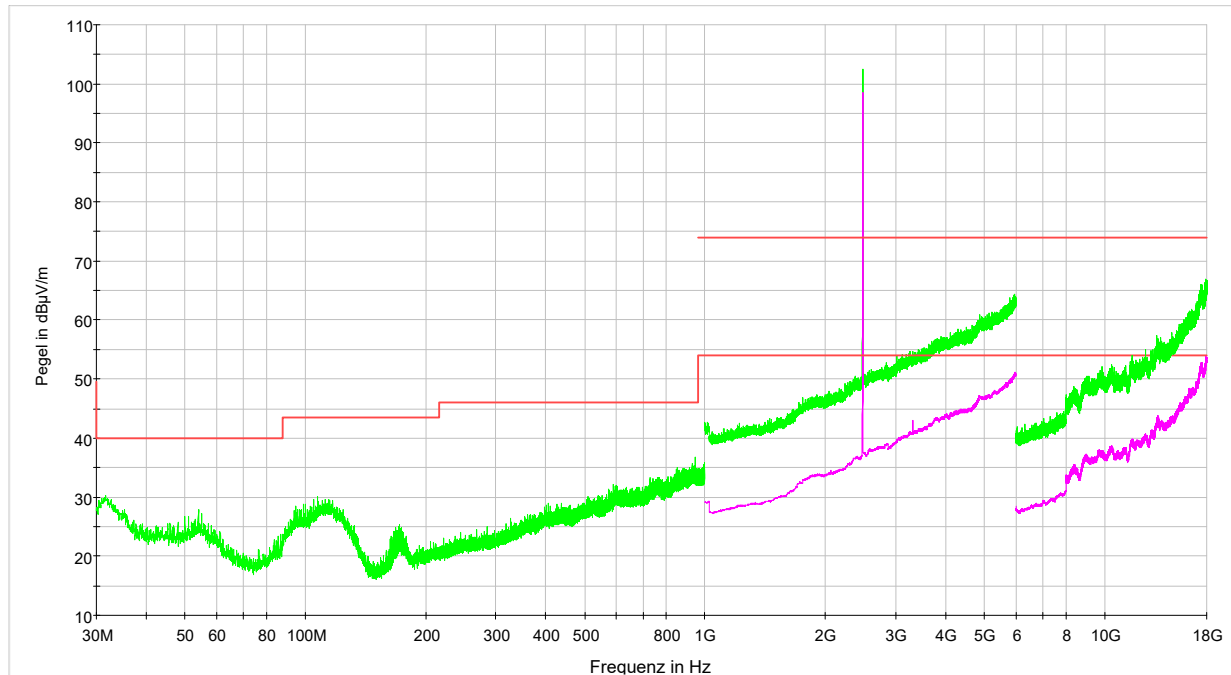
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-111; EMV-112;
 EMV-114; EMV-200; EMV-205; NT-122; NT-126; NT-416

Emissions in restricted bands § 15.209(a)
Emissions falling within restricted frequency bands RSS-Gen

Measurement radiated with Peak-Detector (green line) and Average detector (magenta line):

Mode: Bluetooth EDR – Channel 78 – 2480 MHz



- PK+ _MAXH(1);EDR_CH79_F2 [EDR_CH79_F2.Result:2]
- PK+ _CLRWR [Ergebnistabelle.Result:1]
- FCC ClassB F QP [..EMI radiated]
- AVG _CLRWR [Ergebnistabelle.Result:3]
- FCC ClassB F PK [..EMI radiated]
- AVG _MAXH(1) [EDR_CH39_F3.Result:4]
- AVG _MAXH(1);EDR_CH79_F2 [EDR_CH79_F2.Result:4]
- PK+ _MAXH [Ergebnistabelle.Result:2]
- PK+ _MAXH(1)@fcc [EDR_CH3_F1.Result:2]
- AVG _MAXH [Ergebnistabelle.Result:4]
- PK+ _MAXH(1) [EDR_CH39_F3.Result:2]

Worst case emission: Average @ 4000,0 MHz: 44,4 dBµV/m

Remark: Although the measurement above ends at 18 GHz, all measurements were performed up to the tenth harmonics of the transmitter frequency.

LIMIT SUBCLAUSE 15.209(a) – RSS-Gen

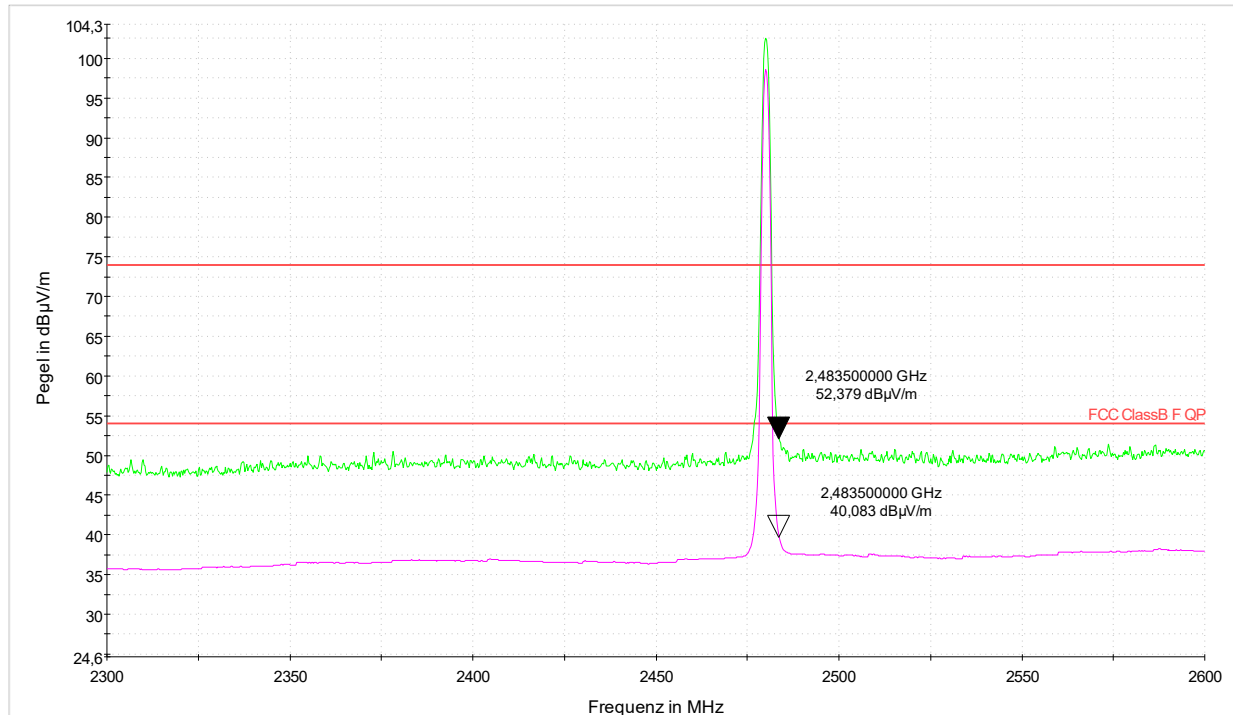
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-111; EMV-112; EMV-114; EMV-200; EMV-205; NT-122; NT-126; NT-416

Emissions in restricted bands § 15.209(a)
Emissions falling within restricted frequency bands RSS-Gen

Measurement with Peak-Detector (green line) and Average detector (magenta line): Band Edge requirement

Setup: Bluetooth EDR – CH 78: 2480 MHz



- FCC ClassB F QP [.\EMI radiated]
- PK+ _MAXH(1)@fcc [EDR_CH79_F2.Result:2]
- PK+ _CLRWR [Ergebnistabelle.Result:1]
- PK+ _MAXH [Ergebnistabelle.Result:2]
- FCC ClassB F PK [.\EMI radiated]
- AVG_ _MAXH(1)@fcc [EDR_CH79_F2.Result:4]
- AVG_ _CLRWR [Ergebnistabelle.Result:3]
- AVG_ _MAXH [Ergebnistabelle.Result:4]

LIMIT SUBCLAUSE 15.209(a) – RSS-Gen

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

Band edges of the nearest restricted bands: 2390 MHz and 2483,5 MHz.

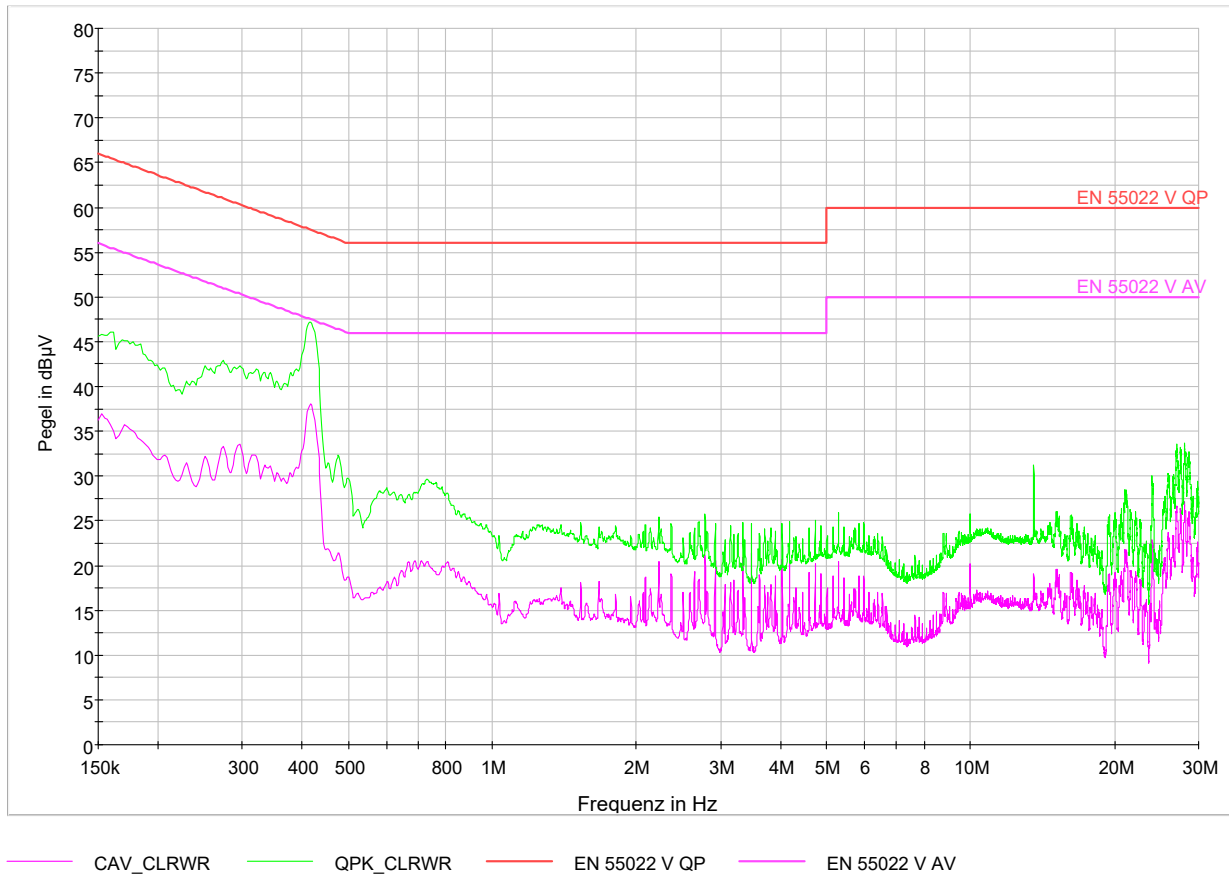
Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-200

4.9. Conducted Limits

§ 15.207
 RSS-Gen 8.8

Measurement with Peak-Detector (green line) and Average detector (magenta line):

Setup: Bluetooth BDR, Frequency hopping active



LIMIT SUBCLAUSE 15.207(a) – RSS-Gen 8.8

Frequency of emission (MHz)	Conducted limit (dBµV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

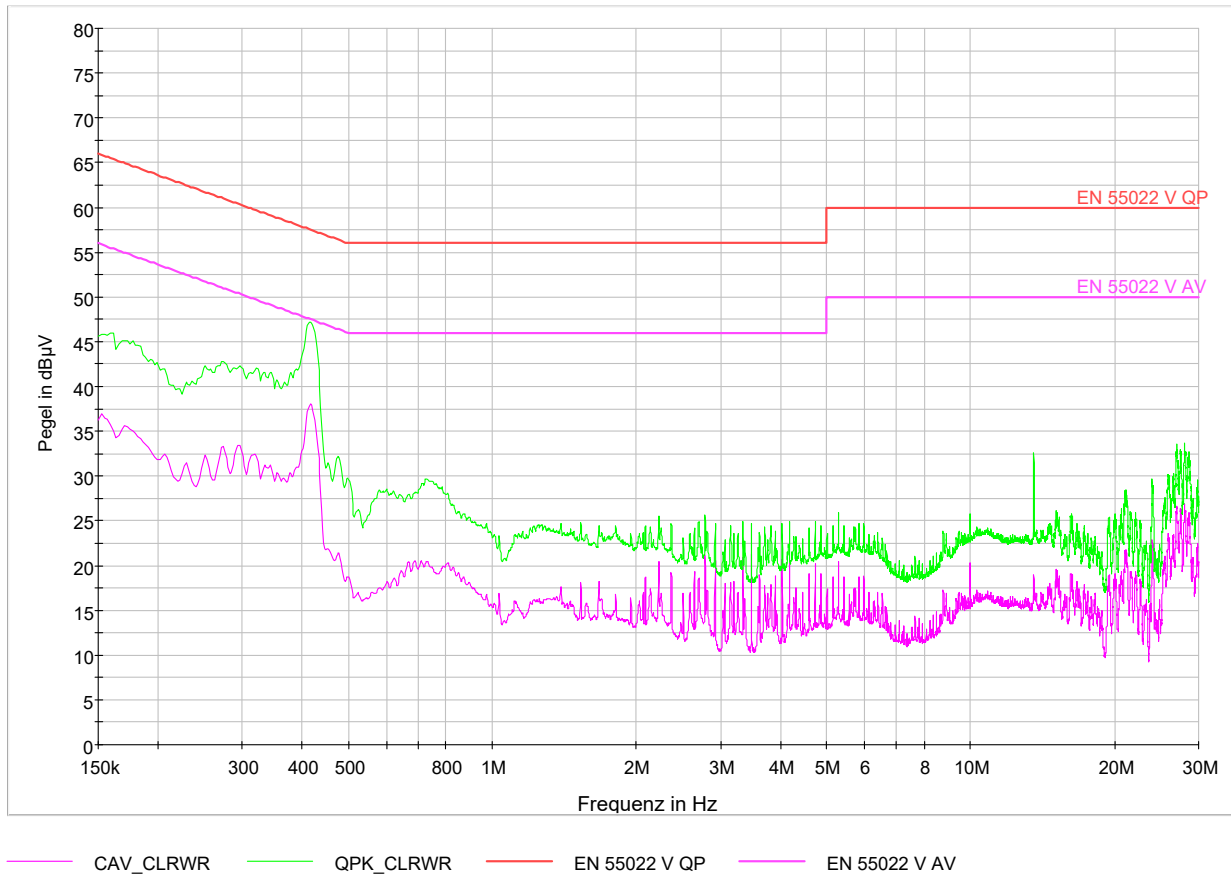
Test Equipment used: EMV-105; EMV-151; EMV-200; EMV-405

Conducted Limits

**§ 15.207
 RSS-Gen 8.8**

Measurement with Peak-Detector (green line) and Average detector (magenta line):

Setup: Bluetooth EDR, Frequency hopping active



LIMIT SUBCLAUSE 15.207(a) – RSS-Gen 8.8

Frequency of emission (MHz)	Conducted limit (dBµV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

Test Equipment used: EMV-105; EMV-151; EMV-200; EMV-405

Appendix 1

Test equipment used

<input type="checkbox"/>	Anechoic Chamber with 3m measurement distance	NT-100	<input type="checkbox"/>	Power quality analyzer Fluke 1760 (complete set)	NT-160 - NT-173
<input type="checkbox"/>	Stripline according to ISO 11452-5	NT-108	<input type="checkbox"/>	Spectrumalyzer – FSP7 9 kHz – 7 GHz	NT-200
<input type="checkbox"/>	MA4000 - Antenna mast 1 - 4 m height	NT-110/1	<input type="checkbox"/>	ESCI - Test receiver 9 kHz - 7 GHz	NT-203/1
<input type="checkbox"/>	DS - Turntable 0 - 400 ° Azimuth	NT-111/1	<input type="checkbox"/>	ESR – Test receiver 20 Hz – 26,5 GHz	NT-207/1
<input type="checkbox"/>	CO3000 Controller Mast+Turntable	NT-112/1	<input type="checkbox"/>	Digital Radio Tester CMW500	NT-208/1
<input type="checkbox"/>	HUF-Z3 - Log. Per. Antenna 200 - 1000 MHz	NT-121	<input type="checkbox"/>	Noise-gen., ITU-R 559-2 20 Hz – 20 kHz	NT-209
<input type="checkbox"/>	FMZB1513 - Loop Antenna 9 kHz - 30 MHz	NT-122/1	<input type="checkbox"/>	CMTA - Radiocommunication analyzer ; 0,1 - 1000 MHz	NT-210
<input type="checkbox"/>	HFH-Z6 - Rod Antenna 9 kHz - 30 MHz	NT-123	<input type="checkbox"/>	3271 - Spectrum analyzer 100 Hz - 26,5 GHz	NT-211
<input type="checkbox"/>	3121C - Dipole Antenna 28 - 1000 MHz	NT-124	<input type="checkbox"/>	Digital Radio Tester Aeroflex 3920	NT-212/1
<input type="checkbox"/>	3115 - Horn Antenna 1 - 18 GHz (immunity)	NT-125	<input type="checkbox"/>	Mixer M28HW 26,5 GHz - 40 GHz	NT-214
<input type="checkbox"/>	3116 - Horn Antenna 18 - 40 GHz	NT-126	<input type="checkbox"/>	RubiSource T&M Timing reference	NT-216
<input type="checkbox"/>	SAS-200/543 - Bicon. Antenna 20 MHz - 300 MHz	NT-127	<input type="checkbox"/>	Radiocommunicationanalyzer SWR 1180 MD	NT-217
<input type="checkbox"/>	AT-1080 - Log. Per. Antenna 80 - 1000 MHz	NT-128	<input type="checkbox"/>	Mixer M19HWD 40 GHz – 60 GHz	NT-218
<input type="checkbox"/>	HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-129	<input type="checkbox"/>	Mixer M12HWD 60 GHz – 90 GHz	NT-219
<input type="checkbox"/>	HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-130	<input type="checkbox"/>	DSO9104 Digital scope	NT-220/1
<input type="checkbox"/>	3146 - Log. Per. Antenna 200 – 1000 MHz	NT-131	<input type="checkbox"/>	TPS 2014 Digital scope	NT-222
<input type="checkbox"/>	VULB 9163 Trilog Antenna 30 – 3000 MHz	NT-131/1	<input type="checkbox"/>	Artificial Ear according to IEC 60318	NT-224
<input type="checkbox"/>	Loop Antenna H-Field	NT-132	<input type="checkbox"/>	1 kHz Sound calibrator	NT-225
<input type="checkbox"/>	Horn Antenna 500 MHz - 2900 MHz	NT-133	<input type="checkbox"/>	B10 - Harmonics and flicker analyzer	NT-232
<input type="checkbox"/>	Horn Antenna 500 MHz - 6000 MHz	NT-133/1	<input type="checkbox"/>	SRM-3006 Spectrumalyzer	NT-233/1a
<input type="checkbox"/>	Log. per. Antenna 800 MHz - 2500 MHz	NT-134	<input type="checkbox"/>	E-field probe SRM 75 MHz – 3 GHz	NT-234
<input type="checkbox"/>	Log. per. Antenna 800 MHz - 2500 MHz	NT-135	<input type="checkbox"/>	Field Meter NBM-500 incl. E- and H-Field probes	NT-240a-e
<input type="checkbox"/>	BiConiLog Antenna 26 MHz – 2000 MHz	NT-137	<input type="checkbox"/>	Hall-Teslameter ETM-1	NT-241
<input type="checkbox"/>	Conical Dipol Antenna PCD8250	NT-138	<input type="checkbox"/>	EFA-3 H-field- / E-field probe	NT-243
<input type="checkbox"/>	HF 906 - Horn Antenna 1 - 18 GHz (emission)	NT-139	<input type="checkbox"/>	EHP-50F H-field- / E-field probe	NT-243/1
<input type="checkbox"/>	HZ-1 Antenna tripod	NT-150	<input type="checkbox"/>	Field Meter EMR-200 100 kHz – 3 GHz	NT-244
<input type="checkbox"/>	BN 1500 Antenna tripod	NT-151	<input type="checkbox"/>	E-field probe 100 kHz – 3 GHz	NT-245
<input type="checkbox"/>	Ant. tripod for EN61000-4-3 Model TP1000A	NT-156	<input type="checkbox"/>	H-field probe 300 kHz – 30 MHz	NT-246

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<input type="checkbox"/>	E-field probe 3 MHz – 18 GHz	NT-247	<input type="checkbox"/>	500W1000M7 - RF-Amplifier 80 - 1000 MHz / 500 W	NT-332
<input type="checkbox"/>	H-field probe 27 MHz – 1 GHz	NT-248	<input type="checkbox"/>	AS0102-65R - RF-Amplifier 1 GHz - 2 GHz	NT-333
<input type="checkbox"/>	ELT-400 1 Hz – 400 kHz	NT-249	<input type="checkbox"/>	APA01 – RF-Amplifier 0,5 GHz – 2,5 GHz	NT-334
<input type="checkbox"/>	MDS 21 - Absorbing clamp 30 - 1000 MHz	NT-250	<input type="checkbox"/>	Preamplifier 1 GHz - 4 GHz	NT-335
<input type="checkbox"/>	FCC-203I EM Injection clamp	NT-251	<input type="checkbox"/>	Preamplifier for GPS MKU 152 A	NT-336
<input type="checkbox"/>	FCC-203I-DCN Ferrite decoupling network	NT-252	<input type="checkbox"/>	Preamplifier 1 GHz – 18 GHz	NT-337/1
<input type="checkbox"/>	PR50 Current Probe	NT-253	<input type="checkbox"/>	DC Block 10 MHz – 18 GHz Model 8048	NT-338
<input type="checkbox"/>	i310s Current Probe	NT-254/1	<input type="checkbox"/>	2-97201 Electronic load	NT-341
<input type="checkbox"/>	Fluke 87 V True RMS Multimeter	NT-260	<input type="checkbox"/>	TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-344
<input type="checkbox"/>	Model 2000 Digital Multimeter	NT-261	<input type="checkbox"/>	TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-345
<input type="checkbox"/>	Fluke 87 V Digital Multimeter	NT-262/1	<input type="checkbox"/>	VDS 200 Mobil-impuls-generator	NT-350
<input type="checkbox"/>	ESH2-Z5-U1 Artificial mains network 4x25A	NT-300	<input type="checkbox"/>	LD 200 Mobil-impuls-generator	NT-351
<input type="checkbox"/>	ESH3-Z5-U1 Artificial mains network 2x10A	NT-301	<input type="checkbox"/>	MPG 200 Mobil-Impuls-Generators	NT-352
<input type="checkbox"/>	ESH3-Z6-U1 Artificial mains network 1x100A	NT-302	<input type="checkbox"/>	EFT 200 Mobil-impuls-generator	NT-353
<input type="checkbox"/>	ESH3-Z6-U1 Artificial mains network 1x100A	NT-302a	<input type="checkbox"/>	AN 200 S1 Artificial Network	NT-354
<input type="checkbox"/>	PHE 4500/B Power amplifier	NT-304	<input type="checkbox"/>	FP-EFT 32M 3 ph. Coupling filter (Burst)	NT-400/1
<input type="checkbox"/>	EZ10 T-Artificial Network	NT-305	<input type="checkbox"/>	PHE 4500 - Mains impedance network	NT-401
<input type="checkbox"/>	SMG - Signal generator 0,1 - 1000 MHz	NT-310	<input type="checkbox"/>	IP 6.2 Coupling filter for data lines (Surge)	NT-403
<input type="checkbox"/>	SMA100A - Signal generator 9 kHz - 6 GHz	NT-310/1	<input type="checkbox"/>	TK 9421 High Power Volt. Probe 150 kHz - 30 MHz	NT-409
<input type="checkbox"/>	RefRad Reference generator	NT-312	<input type="checkbox"/>	ESH2-Z3 - Probe 9 kHz - 30 MHz	NT-410
<input type="checkbox"/>	SMP 02 Signal generator 10 MHz - 20 GHz	NT-313	<input type="checkbox"/>	IP 4 - Capacitive clamp (Burst)	NT-411
<input type="checkbox"/>	40 MHz Arbitrary Generator TGA1241	NT-315	<input type="checkbox"/>	Highpass-Filter 100 MHz – 3 GHz	NT-412
<input type="checkbox"/>	Artificial mains network NSLK 8127-PLC	NT-316	<input type="checkbox"/>	Highpass-Filter 600 MHz – 4 GHz	NT-413
<input type="checkbox"/>	PSURGE 4.1 Surge generator	NT-324	<input type="checkbox"/>	Highpass-Filter 1250 MHz – 4 GHz	NT-414
<input type="checkbox"/>	IMU4000 Immunity test system	NT-325/1	<input type="checkbox"/>	Highpass-Filter 1800 MHz – 16 GHz	NT-415
<input type="checkbox"/>	VCS 500-M6 Surge-Generator	NT-326			
<input type="checkbox"/>	Oscillatory Wave Simulator incl. Coupling networks	NT-328a+b+c			
<input type="checkbox"/>	BTA-250 - RF-Amplifier 9 kHz - 220 MHz / 250 W	NT-330			
<input type="checkbox"/>	T82-50 RF-Amplifier 2 GHz – 8 GHz	NT-331			

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<input type="checkbox"/>	Highpass-Filter 3500 MHz – 18 GHz	NT-416	NT-461
<input type="checkbox"/>	RF-Attenuator 10 dB DC – 18 GHz / 50 W	NT-417/1	NT-462
<input type="checkbox"/>	RF-Attenuator 6 dB DC – 18 GHz / 50 W	NT-418	NT-463
<input type="checkbox"/>	RF-Attenuator 3 dB DC – 18 GHz / 50 W	NT-419	NT-464
<input type="checkbox"/>	RF-Attenuator 20 dB DC - 1000 MHz / 25 W	NT-421	NT-465/1
<input type="checkbox"/>	RF-Attenuator 30 dB DC - 1000 MHz / 1 W	NT-423	NT-468
<input type="checkbox"/>	RF-Attenuator 30 dB	NT-424	NT-471
<input type="checkbox"/>	RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-425	NT-480
<input type="checkbox"/>	RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-426	NT-481 - NT-483
<input type="checkbox"/>	RF-Attenuator 6 dB	NT-428	NT-484
<input type="checkbox"/>	RF-Attenuator 0 dB - 81 dB	NT-429	NT-511/1
<input type="checkbox"/>	WRU 27 - Band blocking 27 MHz	NT-430	NT-520
<input type="checkbox"/>	WHJ450C9 AA - High pass 450 MHz	NT-431	NT-520/1
<input type="checkbox"/>	WHJ250C9 AA - High pass 250 MHz	NT-432	NT-522
<input type="checkbox"/>	RF-Load 150 W	NT-433	NT-522/1
<input type="checkbox"/>	Impedance transducer 1:4 ; 1:9 ; 1:16	NT-435	NT-525
<input type="checkbox"/>	RF-Attenuator DC – 18 GHz 6 dB	NT-436	NT-530
<input type="checkbox"/>	RF-Attenuator DC – 18 GHz 6 dB	NT-437	NT-531
<input type="checkbox"/>	RF-Attenuator DC – 18 GHz 10 dB	NT-438	NT-553
<input type="checkbox"/>	RF-Attenuator DC – 18 GHz 20 dB	NT-439	NT-554
<input type="checkbox"/>	I+P 7780 Directional coupler 100 - 2000 MHz	NT-440	NT-555 + NT-556
<input type="checkbox"/>	ESH3-Z2 - Pulse limiter 9 kHz - 30 MHz	NT-441	NT-559
<input type="checkbox"/>	Power Divider 6 dB/1 W/50 Ohm	NT-443	NT-580
<input type="checkbox"/>	Directional coupler 0,1 MHz – 70 MHz	NT-444	NT-581
<input type="checkbox"/>	Directional coupler 0,1 MHz – 70 MHz	NT-445	NT-584
<input type="checkbox"/>	Tube imitations according to EN 55015	NT-450	NT-592
<input type="checkbox"/>	FCC-801-M3-16A Coupling decoupling network	NT-458	NT-600
<input type="checkbox"/>	FCC-801-M2-50A Coupling decoupling network	NT-459	
<input type="checkbox"/>	FCC-801-M5-25 Coupling decoupling network	NT-460	M-1200
<input type="checkbox"/>	FCC-801-AF10 Coupling decoupling network		NT-461
<input type="checkbox"/>	FCC-801-S25 Coupling decoupling network		NT-462
<input type="checkbox"/>	FCC-801-T4 Coupling decoupling network		NT-463
<input type="checkbox"/>	FCC-801-C1 Coupling decoupling network		NT-464
<input type="checkbox"/>	SW 9605 - Current probe 150 kHz – 30 MHz		NT-465/1
<input type="checkbox"/>	95242-1 – Current probe 1 MHz – 400 MHz		NT-468
<input type="checkbox"/>	94106-1L-1 – Current probe 100 kHz – 450 MHz		NT-471
<input type="checkbox"/>	GA 1240 Power amplifier according to EN 61000-4-16		NT-480
<input type="checkbox"/>	Coupling networks according to EN 61000-4-16		NT-481 - NT-483
<input type="checkbox"/>	Van der Hoofden Test Head		NT-484
<input type="checkbox"/>	EMC Video/Audiosystem		NT-511/1
<input type="checkbox"/>	ES-K1 Version 1.71 SP2 Test software		NT-520
<input type="checkbox"/>	EMC32 Version 10.60.20 Test software		NT-520/1
<input type="checkbox"/>	SRM-TS Version 1.3 software for SRM-3000		NT-522
<input type="checkbox"/>	SRM-TS Version 1.3.1 software for SRM-3006		NT-522/1
<input type="checkbox"/>	Spitzenberger und Spies Test software V4.1		NT-525
<input type="checkbox"/>	Noise power test apparatus according to EN 55014		NT-530
<input type="checkbox"/>	Vertical coupling plane (ESD)		NT-531
<input type="checkbox"/>	Test cable #4 for EN 61000-4-6		NT-553
<input type="checkbox"/>	Test cable #3 for conducted emission		NT-554
<input type="checkbox"/>	Test cable #5+#6 ESD-cable (2x470k)		NT-555 + NT-556
<input type="checkbox"/>	Test cable #8 Sucoflex 104EA		NT-559
<input type="checkbox"/>	Test cable #9 (for outdoor measurements)		NT-580
<input type="checkbox"/>	Test cable #10 (for outdoor measurements)		NT-581
<input type="checkbox"/>	Test cable #13 Sucoflex 104PE		NT-584
<input type="checkbox"/>	Test cable #21 for SRM-3000		NT-592
<input type="checkbox"/>	Shield chamber		NT-600
<input type="checkbox"/>	Climatic chamber		M-1200

Appendix 1 (continued)

Test equipment used

<input type="checkbox"/>	Anechoic Chamber 3 m / 5 m measuring distance	EMV-100	<input type="checkbox"/>	Log.per Antenna 0,7 – 9 GHz STLP9149	EMV-305
<input type="checkbox"/>	Turntabel 6 m diameter	EMV-101	<input type="checkbox"/>	HF- Amplifier 9 kHz-250 MHz BBA150 (low noise)	EMV-306
<input type="checkbox"/>	Antenna mast + controller	EMV-102+ EMV-103	<input type="checkbox"/>	ISO11451-2 TLS 10 kHz – 30 MHz	EMV-307
<input type="checkbox"/>	EMC Video/Audiosystem	EMV-104	<input type="checkbox"/>	Load Dump Generator LD 200N	EMV-350
<input type="checkbox"/>	EMC Software EMC32 Version 10.60.20	EMV-105	<input type="checkbox"/>	Ultra Compact Symulator UCS 200N100	EMV-351
<input type="checkbox"/>	Hornantenna 1 – 18 GHz HF 907	EMV-110	<input type="checkbox"/>	Automotive Power fail module PFM 200N100.1	EMV-352
<input type="checkbox"/>	Antennapre.amp. 1 – 18 GHz ERZ-LNA0200-1800-30-2	EMV-111	<input type="checkbox"/>	Voltage Drop Symulator VDS 200Q100	EMV-353
<input type="checkbox"/>	Trilog Antenna 30-3000 MHz VULB9163	EMV-112	<input type="checkbox"/>	Arb. Generator AutoWave	EMV-354
<input type="checkbox"/>	Monopol 9 kHz – 30 MHz VAMP 9243	EMV-113	<input type="checkbox"/>	Ultra Compact Symulator UCS 500N7	EMV-355
<input type="checkbox"/>	Antennapre.amp 18 – 40 GHz BBV 9721	EMV-114	<input type="checkbox"/>	Coupling decoupling network CNI 503B7 / 32 A	EMV-356
<input type="checkbox"/>	Hornantenna 200 – 2000 MHz AH-220	EMV-115	<input type="checkbox"/>	Coupling decoupling network CNI 503B7 / 63 A	EMV-357
<input type="checkbox"/>	DC Artificial Network PVDC 8300	EMV-150	<input type="checkbox"/>	Telecom Surge Generator TSurge 7	EMV-358
<input type="checkbox"/>	AC Artificial Network NNLK 8121 RC	EMV-151	<input type="checkbox"/>	Coupling decoupling network CNI 508N2	EMV-359
<input type="checkbox"/>	EMI Receiver ESW44	EMV-200/1	<input type="checkbox"/>	Coupling decoupling network CNV 504N2.2	EMV-360
<input type="checkbox"/>	Signalgenerator 9 kHz – 40 GHz N5173B	EMV-201	<input type="checkbox"/>	Immunity generator NSG4060/NSG4060-1	EMV-361
<input type="checkbox"/>	GPS Frequency normal B-88	EMV-202	<input type="checkbox"/>	Coupling network CDND M316-2	EMV-362
<input type="checkbox"/>	DC Power supply N5745A	EMV-203	<input type="checkbox"/>	Coupling network CT419-5	EMV-363
<input type="checkbox"/>	Spektrum Analyzator FSV40	EMV-205	<input type="checkbox"/>	ESD Generator NSG 437	EMV-364
<input type="checkbox"/>	Thd Multimeter Model 2015	EMV-206	<input type="checkbox"/>	Pulse Limiter VTSD 9561-F BNC	EMV-405
<input type="checkbox"/>	Poweramplifier PAS15000	EMV- 207/abc	<input type="checkbox"/>	Transient emission BSM200N40+BS200N100	EMV- 450+451
<input type="checkbox"/>	Inrush Current Source	EMV- 208/abc	<input type="checkbox"/>	Cap. Coupling Clamp HFK	EMV-455
<input type="checkbox"/>	Arb.-generator Sycore	EMV-209	<input type="checkbox"/>	Mag. Field System MS100N+MC26100+MC2630	EMV- 456-458
<input type="checkbox"/>	Harmonics/Flicker analyzer ARS 16/3	EMV-210	<input type="checkbox"/>	Coupling network CDN M2-100A	EMV-459
<input type="checkbox"/>	HF- Amplifier 9 kHz-250 MHz BBA150	EMV-300	<input type="checkbox"/>	Coupling network CDN M3-32A	EMV-460
<input type="checkbox"/>	HF- Amplifier 80 -1000 MHz BBA150	EMV-301	<input type="checkbox"/>	Coupling network CDN M5-100A	EMV-461
<input type="checkbox"/>	HF- Amplifier 0,8 - 6 GHz BBA150	EMV-302	<input type="checkbox"/>	Current Clamp CIP 9136A	EMV-462
<input type="checkbox"/>	High Power Ant. 20-200 MHz HPBA-2510	EMV-303/1	<input type="checkbox"/>	DC Artificial Network HV-AN 150	EMV- 464+465
<input type="checkbox"/>	Log.per Antenna 80-2700 MHz STLP 9128 E special	EMV-304	<input type="checkbox"/>	Coupling Clamp EM 101	EMV-466
			<input type="checkbox"/>	Decoupling Clamp FTC 101	EMV-467
			<input type="checkbox"/>	Power attenuator 10 dB / 250 Watt	EMV-469/2

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Appendix 2 Photodocumentation

Description: Front view

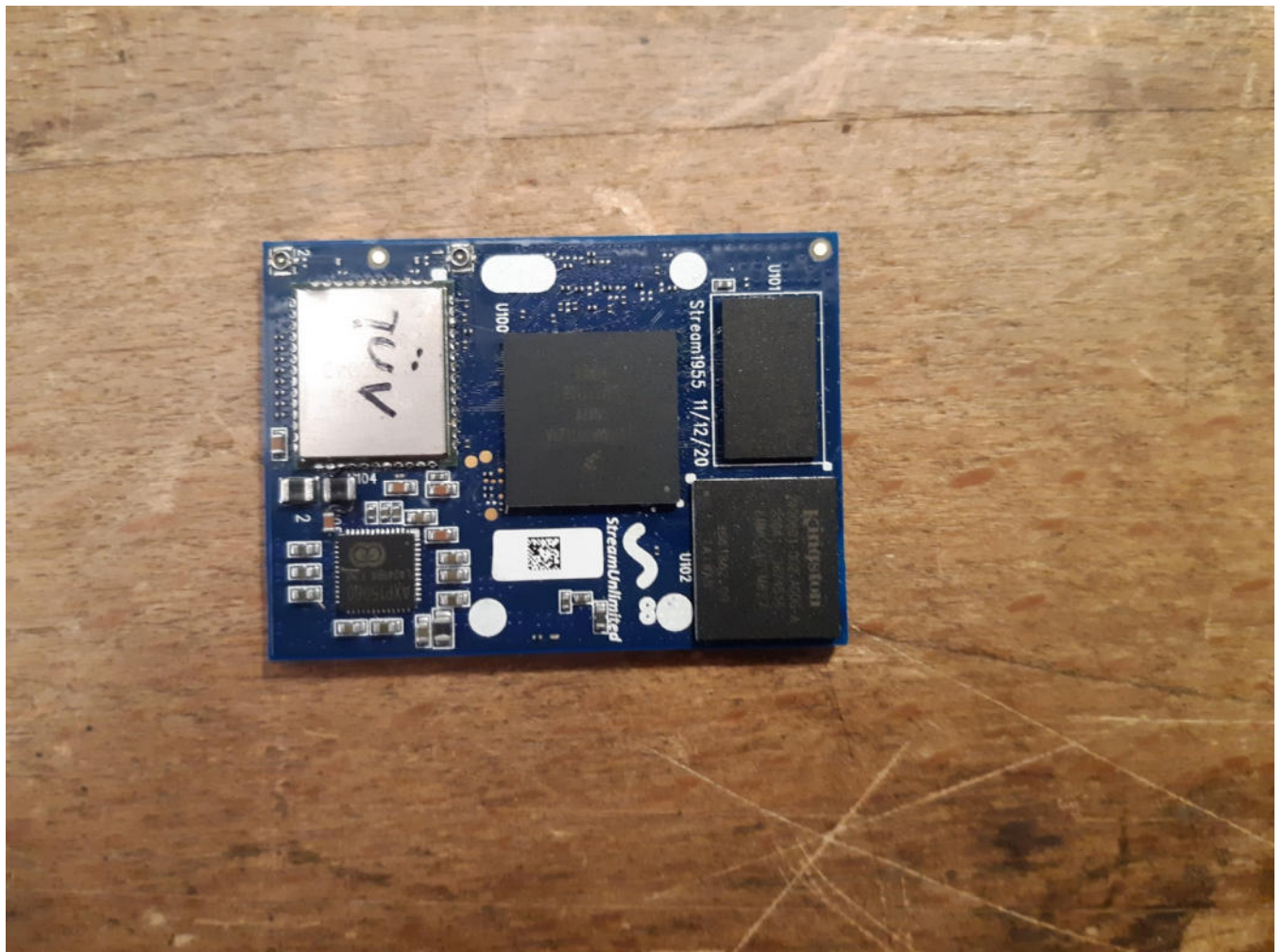
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Appendix 2 Photodocumentation

Description: Backside view

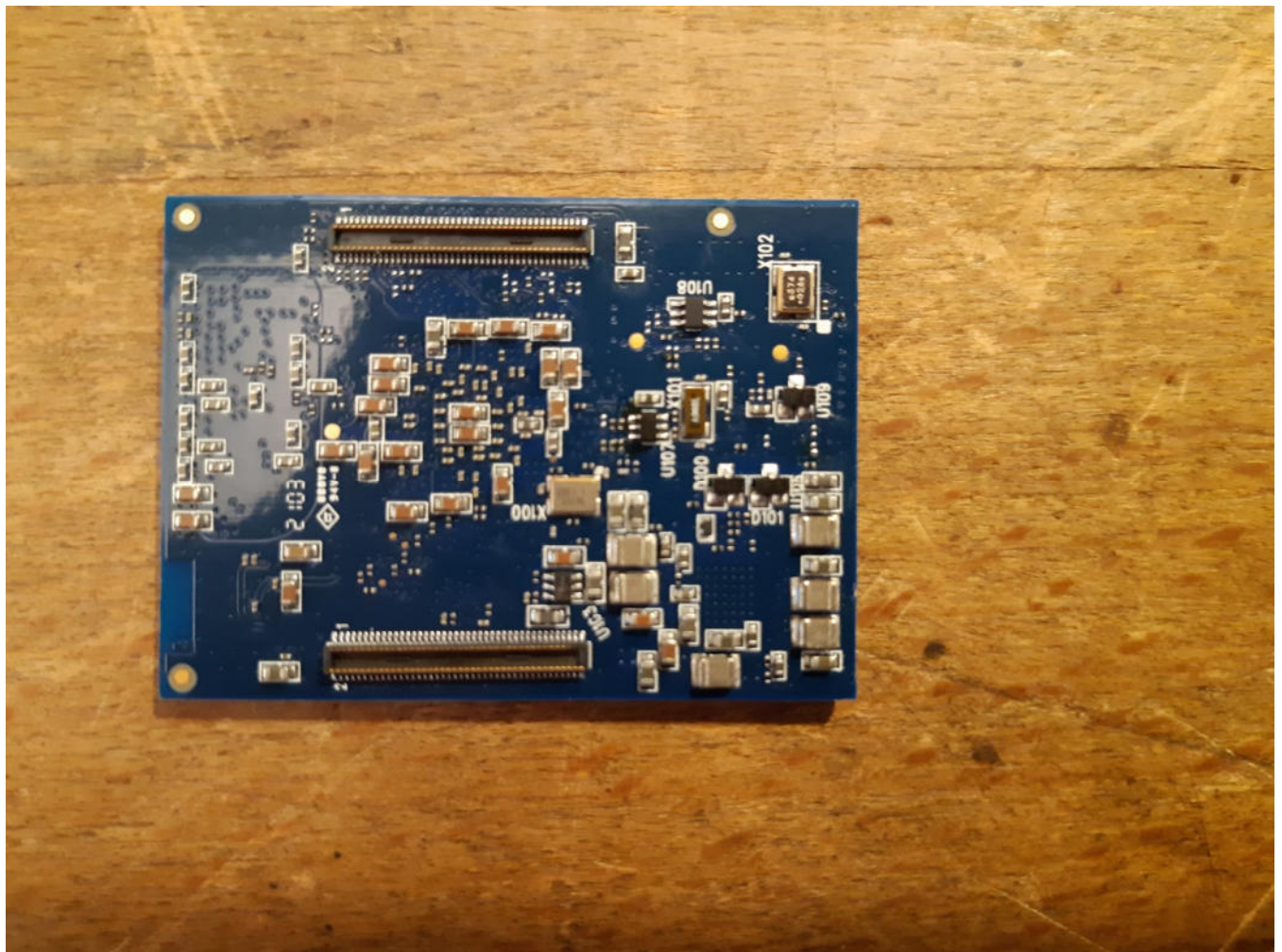
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Description: Evaluation Board front view

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Appendix 2 Photodocumentation

Description: Evaluation Board back view

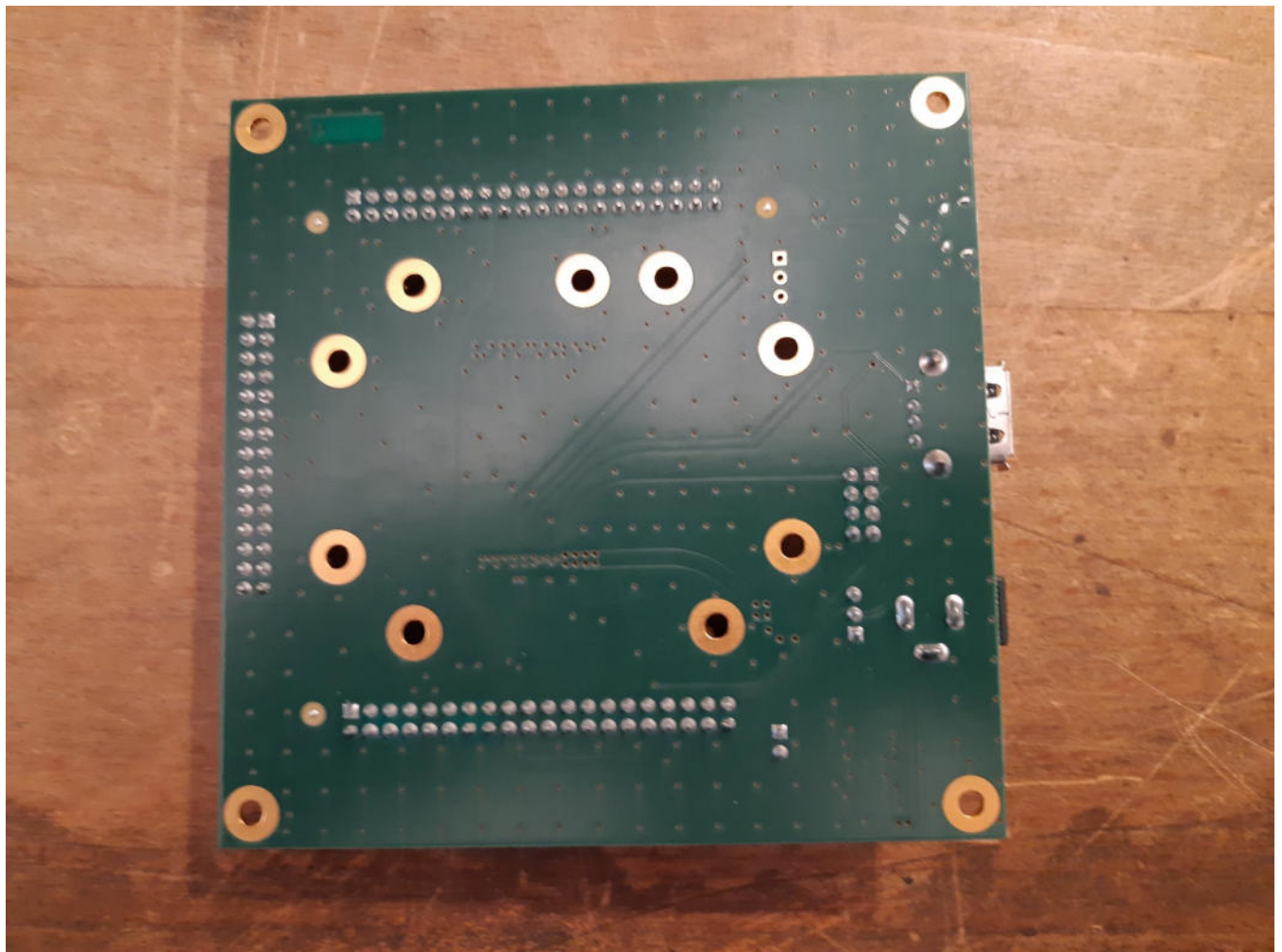
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Appendix 2 Photodocumentation

Description: Test setup absorber chamber #1

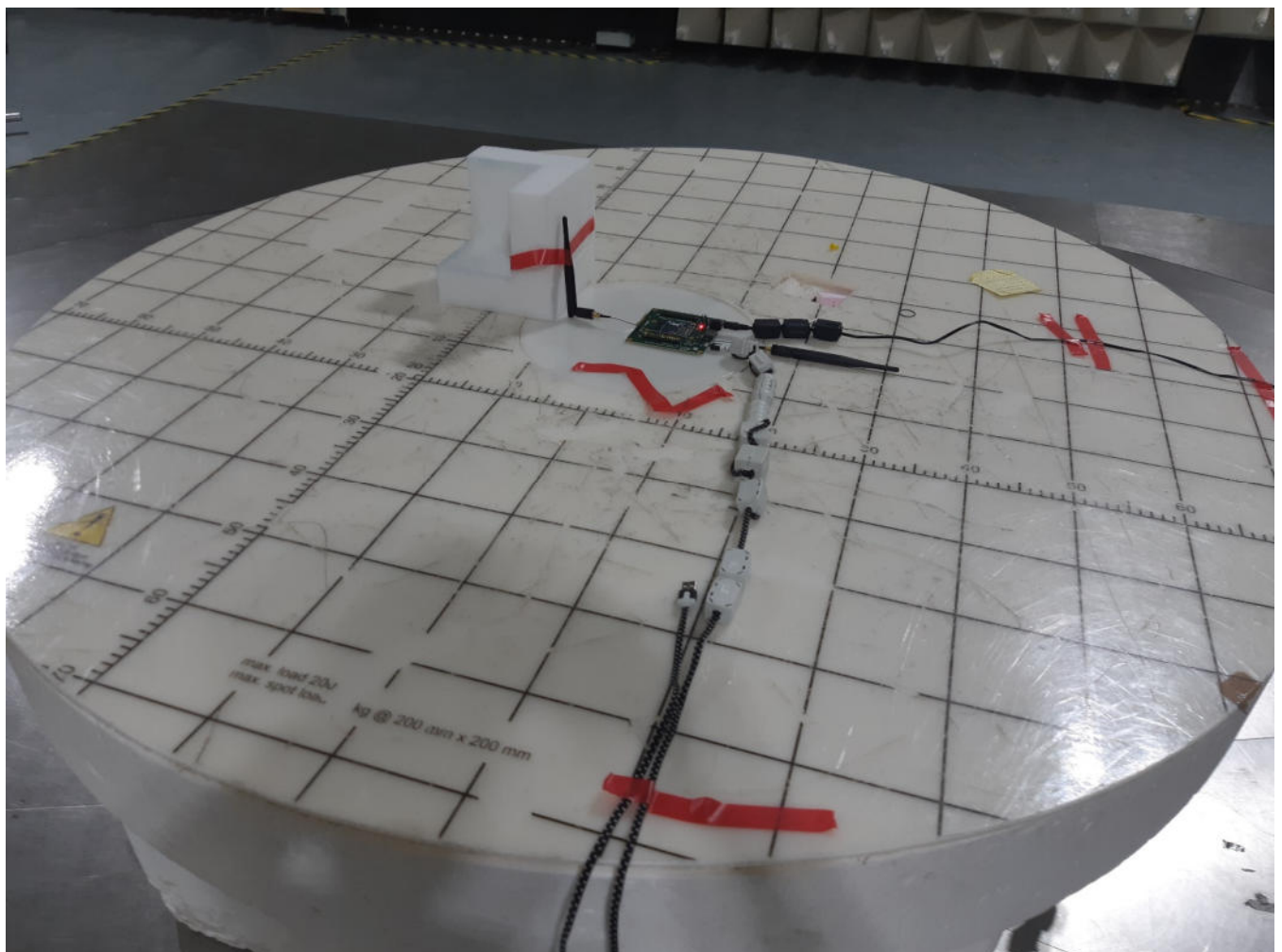
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Description: Test setup absorber chamber #2

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