TEST REPORT

of the accredited test laboratory

TÜV Nr.:INE-AT/FG-19/197

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 2,4 GHz WIFI part only
FCC-ID:	2AJYB-S1955
IC-ID:	20504-S1955
Manufacturer:	See applicant
Output power / field strength:	173,78 mW cond. **power supply:** 12 VDC
Frequency range:	2412 - 2462 MHz **Channel separation:** 5 MHz
Standard:	FCC: 47 CFR Part 15 (October 1, 2018 edition) RSS-247 Issue 2, February 2017

TUV Austria Services GmbH
Test laboratory for EMC

Supervisor of EMC-laboratory:

Ing. Wilhelm Seier

02.12.2019

checked by:

Ing. Michael Emminger

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Business Area
Industry & Energy
Austria

Technik

Testing Laboratory,
Inspection Body,
Certification Body,
Calibration Laboratory,
Verifizierungsstelle

Notified Body 0408
IC 2932K-1

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:
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AT131200052949001066
BIC BKAUATWW

IBAN
AT153100000104093282
BIC RZBAATWW

VAT ATU63240488
DVR 3002476

Contents

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:	20.05.2019
Tests were performed on:	27.05. till 17.09.2019

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: 5VDC Rated current: 450mA Rated frequency: DC Mains voltage during the tests: 5VDC
Climatic conditions in the emc laboratory:	Relative humidity: 39% Temperature: 23°C

3. Standards / Final result

Name	Title	Deviation	Result
Title 47 CFR Part 15 October 1st 2018 edition	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

Result: Opinions and interpretation of testing laboratory
OK: EUT passed
NOK: EUT failed

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 2,4 GHz WIFI part. See additional test reports:
INE-AT/FG-19/195 for Bluetooth
INE-AT/FG-19/196 for BLE and
INE-AT/FG-19/198 for 5 GHz WIFI measurement results including photodocumentation.

2.1033 (c) Technical description

2.1033 (4) Type of emission:
802.11 standards – Channel bandwidths 9,2 MHz (DSSS), 16,8 MHz (20 MHz OFDM) and 36,7 MHz (40 M - aggregation of 2 non-overlapping 20 M OFDM channels) - Channel spacing 5 MHz.

2.1033 (5) Frequency range:
2412 till 2462 MHz (channel center frequencies) in 5 MHz steps resulting in 11 Channels (DSSS and 20 MHz channels)
2422 till 2452 MHz (channel center frequencies) in 5 MHz steps resulting in 7 Channels of 40 MHz bandwidth

2.1033 (6) Power range and Controls: The maximum peak output power is 173,78 mW and there is no power regulation.

2.1033 (7) Maximum output power rating: 173,78 mW.

2.1033 (8) DC Voltage and Current: 5V 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 ‘1461531100’

Worst case Spurious Emissions: 49,1 dBµV/m Average at the 3rd harmonics.

Tests were performed May 27th till September 17th 2019.

4.2. Number of channels and channel spacing § 2.1033

Conducted Measurement

Rated output power: 173,78 mW

There are 11 Channels used starting at 2412 till 2462 MHz each separated by 5 MHz channel spacing with a maximum bandwidth of 20 MHz.
Two channels spaced by 20 MHz can be used simultaneously to give a RF-Bandwidth of 40 MHz, resulting in 7 different channels with 40 MHz bandwidth and center frequencies of 2422 till 2452 MHz each separated by 5 MHz channel spacing.

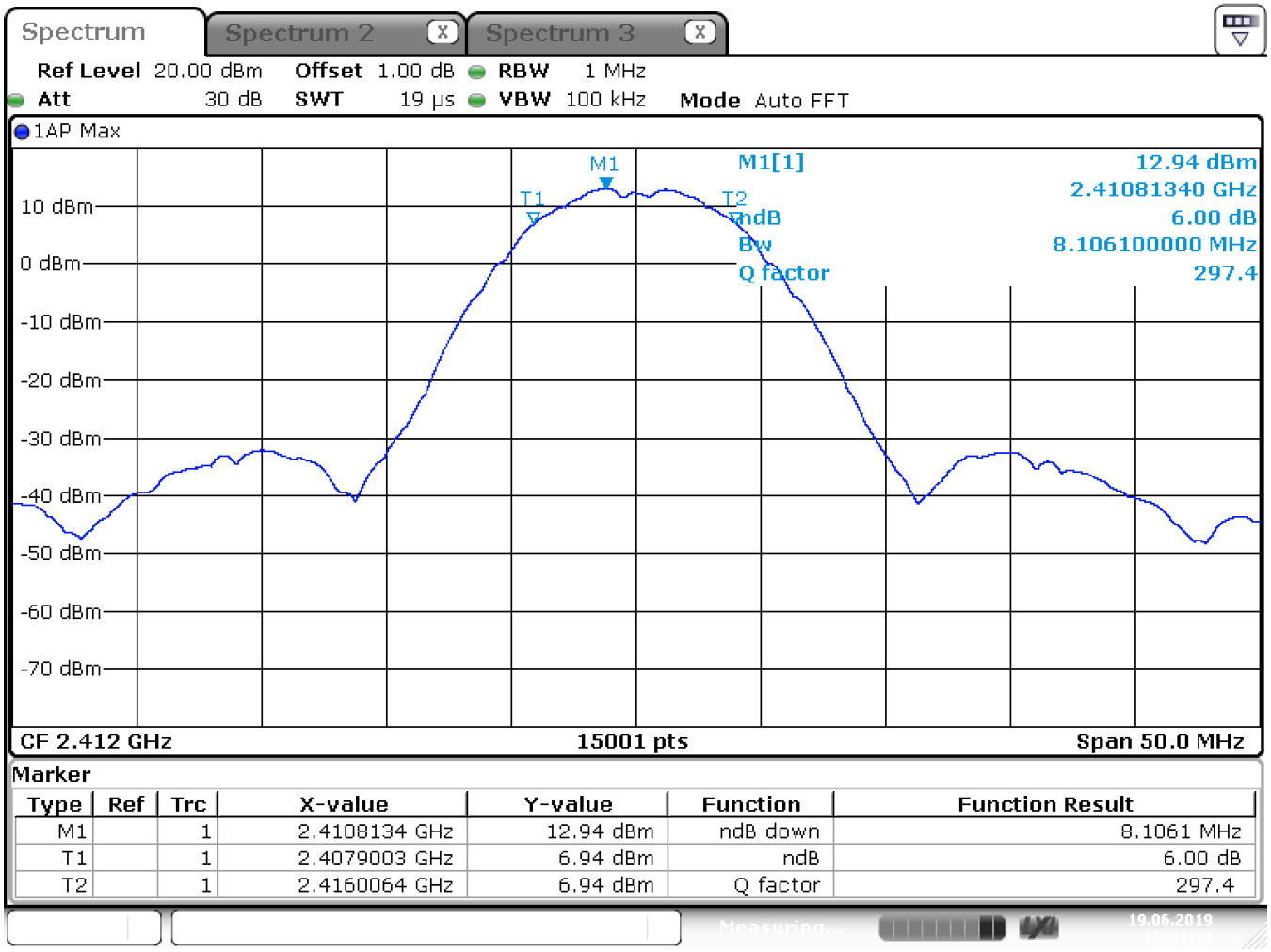
Test Equipment used: N/A

4.3. 6dB Bandwidth

§ 15.247(a)(2)
5.2(1)

Conducted Measurement – Antenna 1

Rated output power: 173,78 mW Channel 1 (2412 MHz center frequency) – DSSS



Date: 19.JUN.2019 15:31:19

6dB Bandwidth: 8,1 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(1)**

Under normal test conditons	6 dB Bandwidth at least 500 kHz

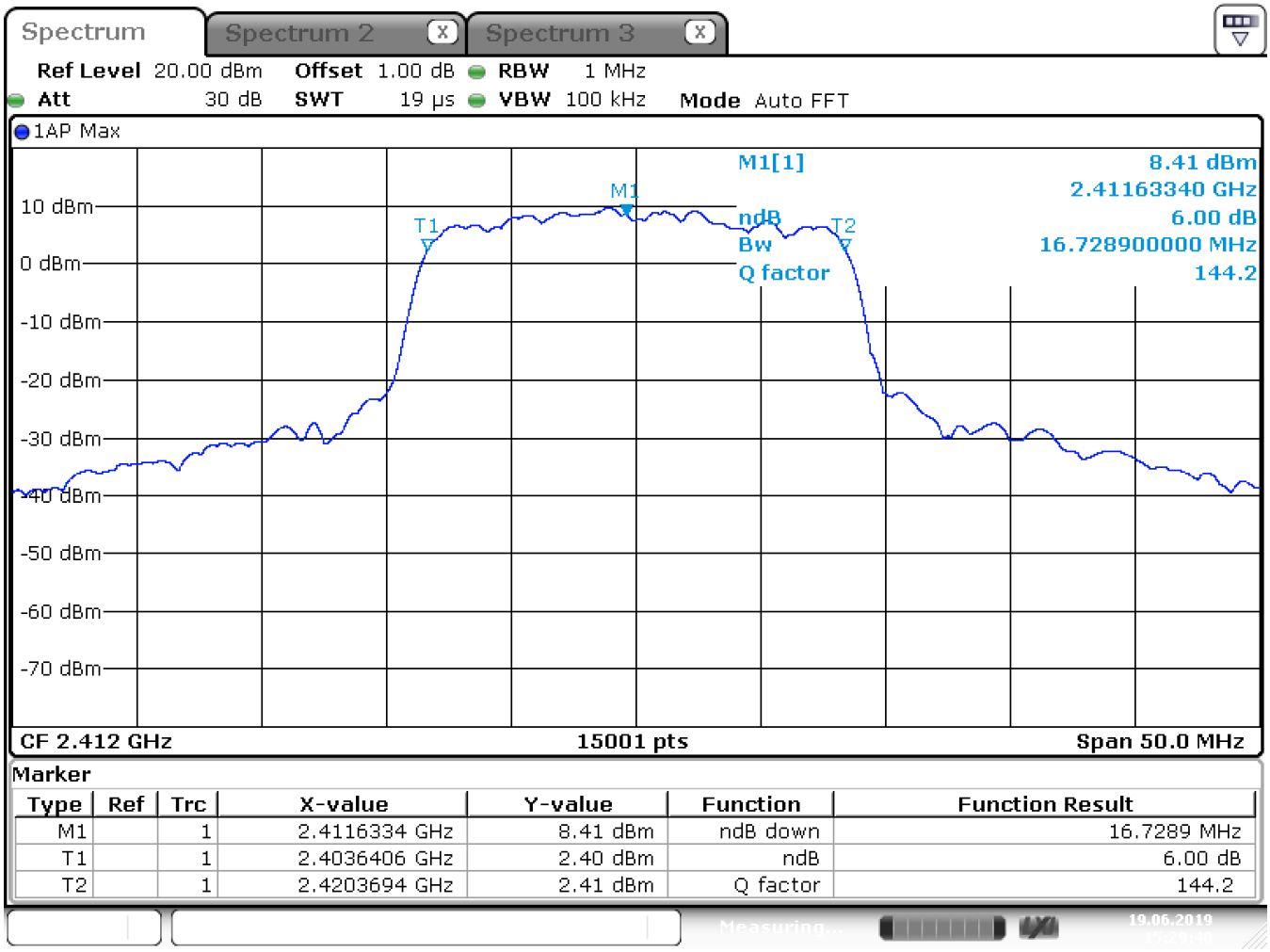
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

6dB Bandwidth **§ 15.247(a)(2)**
5.2(1)

Conducted Measurement – Antenna 1

Rated output power: 173,78 mW Channel 1 (2412 MHz center frequency) – OFDM



Date: 19.JUN.2019 15:29:40

6dB Bandwidth: 16,8 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(1)**

Under normal test conditons	6 dB Bandwidth at least 500 kHz

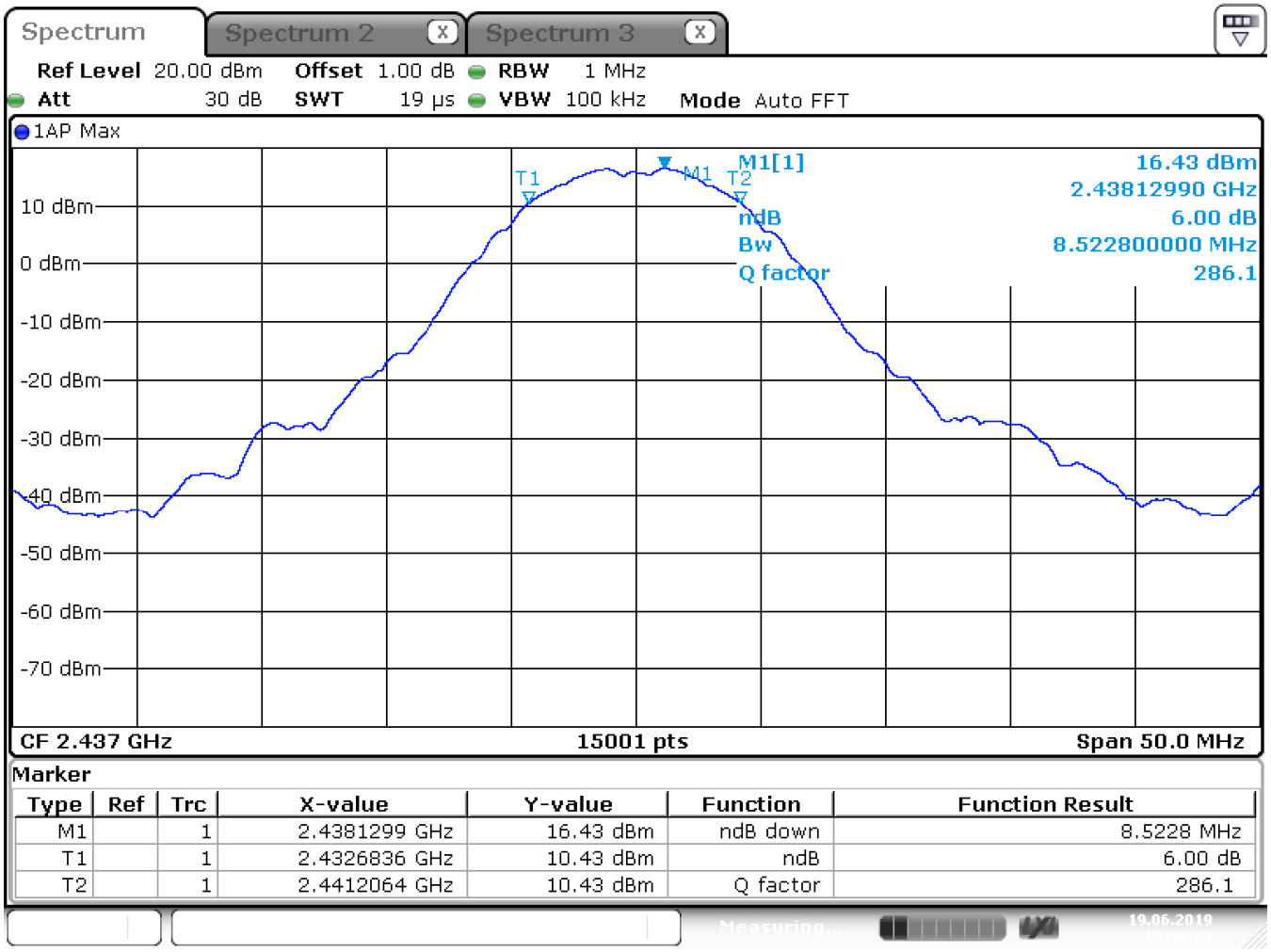
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

6dB Bandwidth **§ 15.247(a)(2)**
5.2(1)

Conducted Measurement – Antenna 1

Rated output power: 173,78 mW Channel 6 (2437 MHz center frequency) – DSSS



Date: 19.JUN.2019 15:38:21

6dB Bandwidth: 8,5 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(1)**

Under normal test conditons	6 dB Bandwidth at least 500 kHz

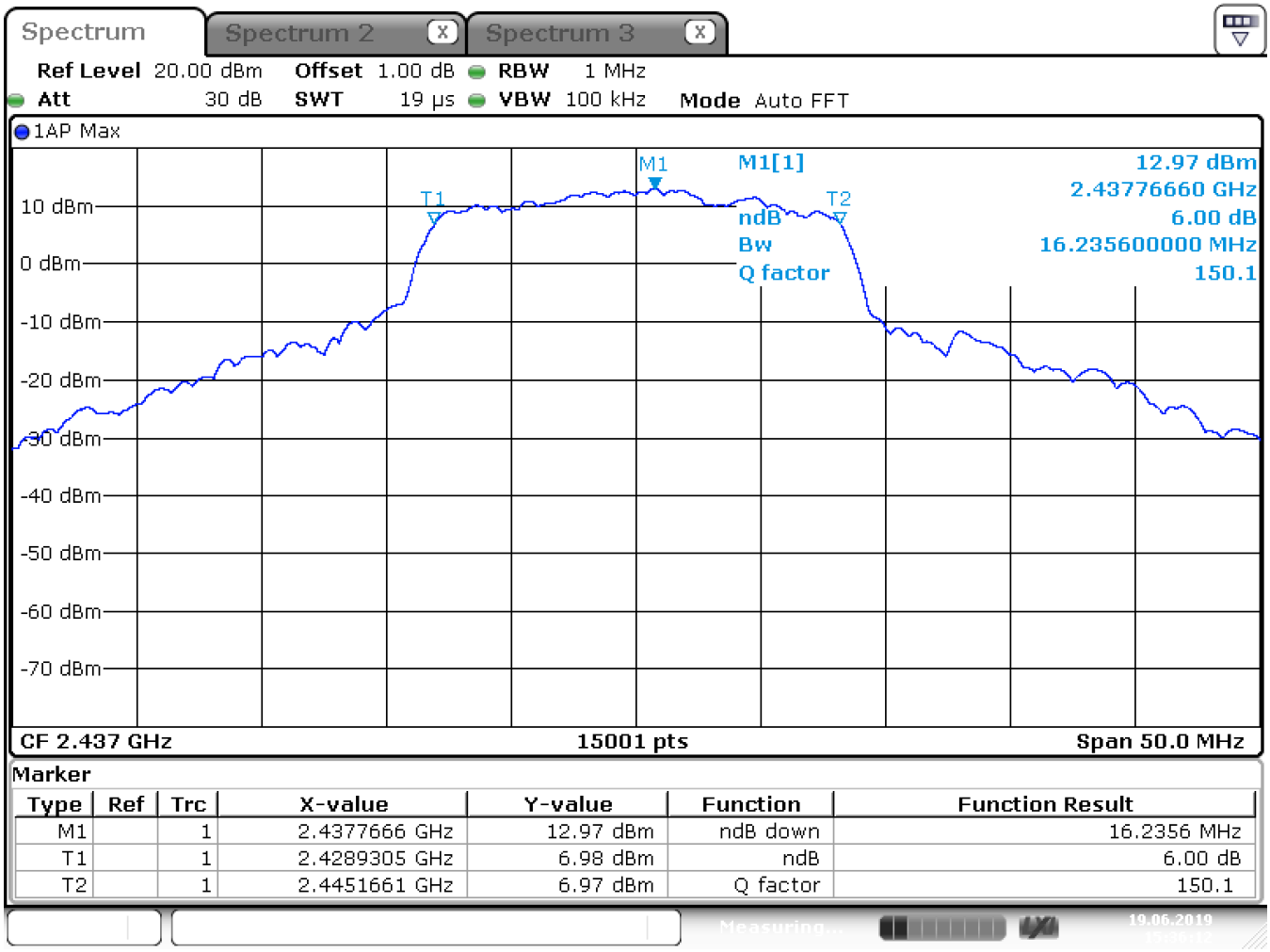
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

6dB Bandwidth **§ 15.247(a)(2)**
5.2(1)

Conducted Measurement – Antenna 1

Rated output power: 173,78 mW Channel 6 (2437 MHz center frequency) – OFDM



Date: 19.JUN.2019 15:36:13

6dB Bandwidth: 16,3 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(1)**

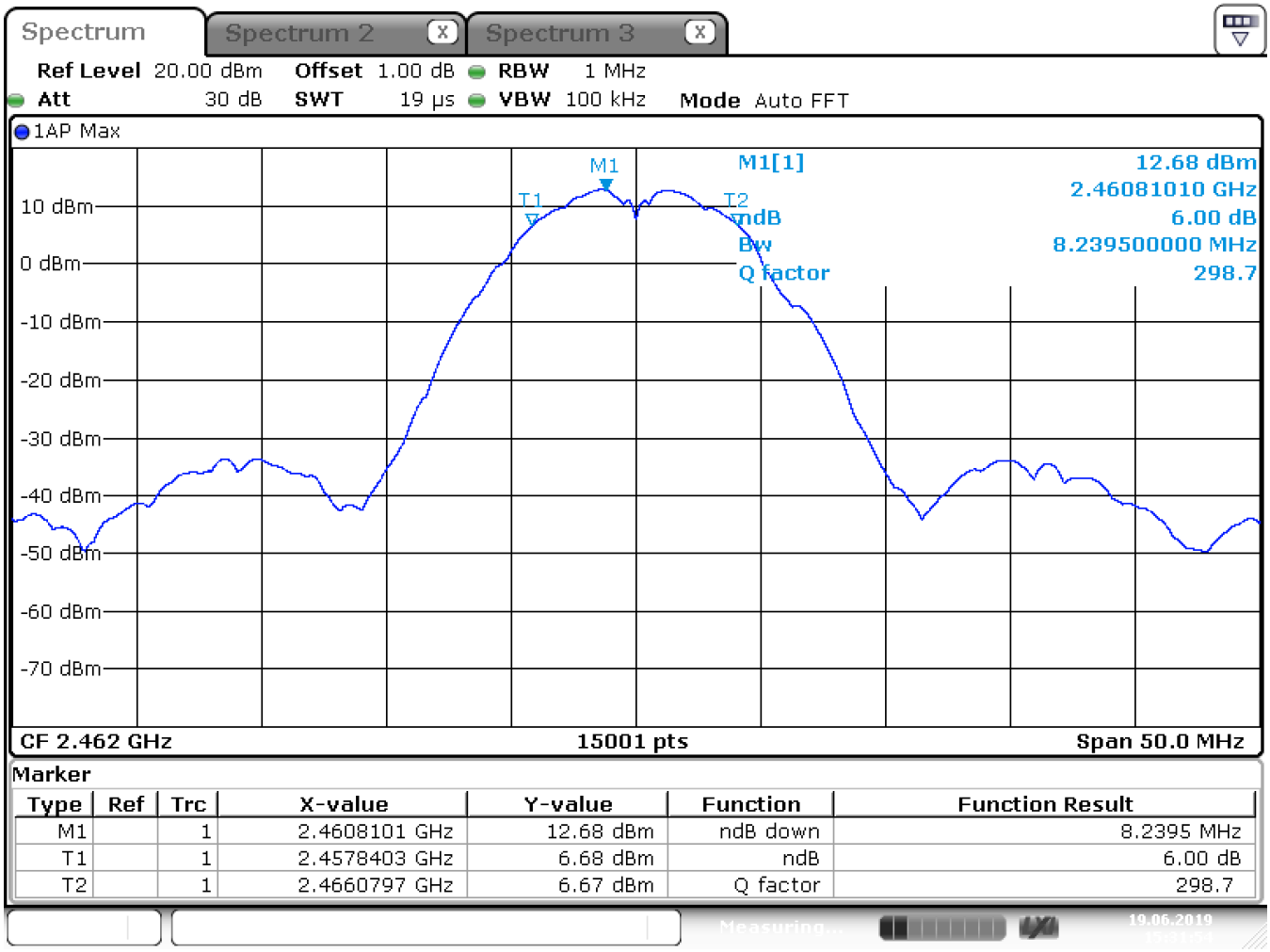
Under normal test conditons	6 dB Bandwidth at least 500 kHz

Test Equipment used: EMV-205

6dB Bandwidth **§ 15.247(a)(2)**
5.2(1)

Conducted Measurement – Antenna 1

Rated output power: 173,78 mW Channel 11 (2462 MHz center frequency) – DSSS



Date: 19.JUN.2019 15:31:53

6dB Bandwidth: 8,3 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(1)**

Under normal test conditons	6 dB Bandwidth at least 500 kHz

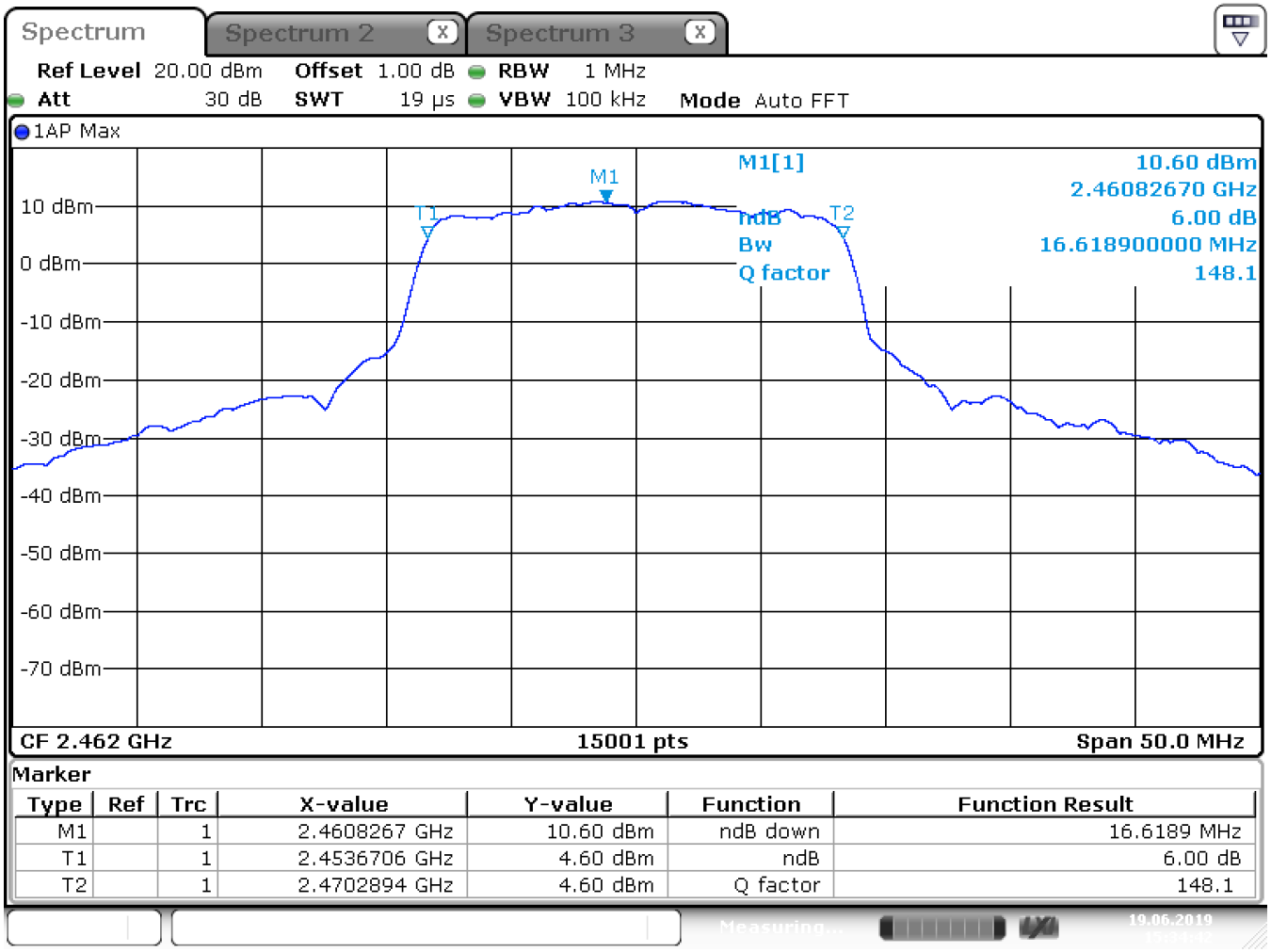
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

6dB Bandwidth **§ 15.247(a)(2)**
5.2(1)

Conducted Measurement – Antenna 1

Rated output power: 173,78 mW Channel 11 (2462 MHz center frequency) – OFDM



Date: 19.JUN.2019 15:34:42

6dB Bandwidth: 16,6 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(1)**

Under normal test conditons	6 dB Bandwidth at least 500 kHz

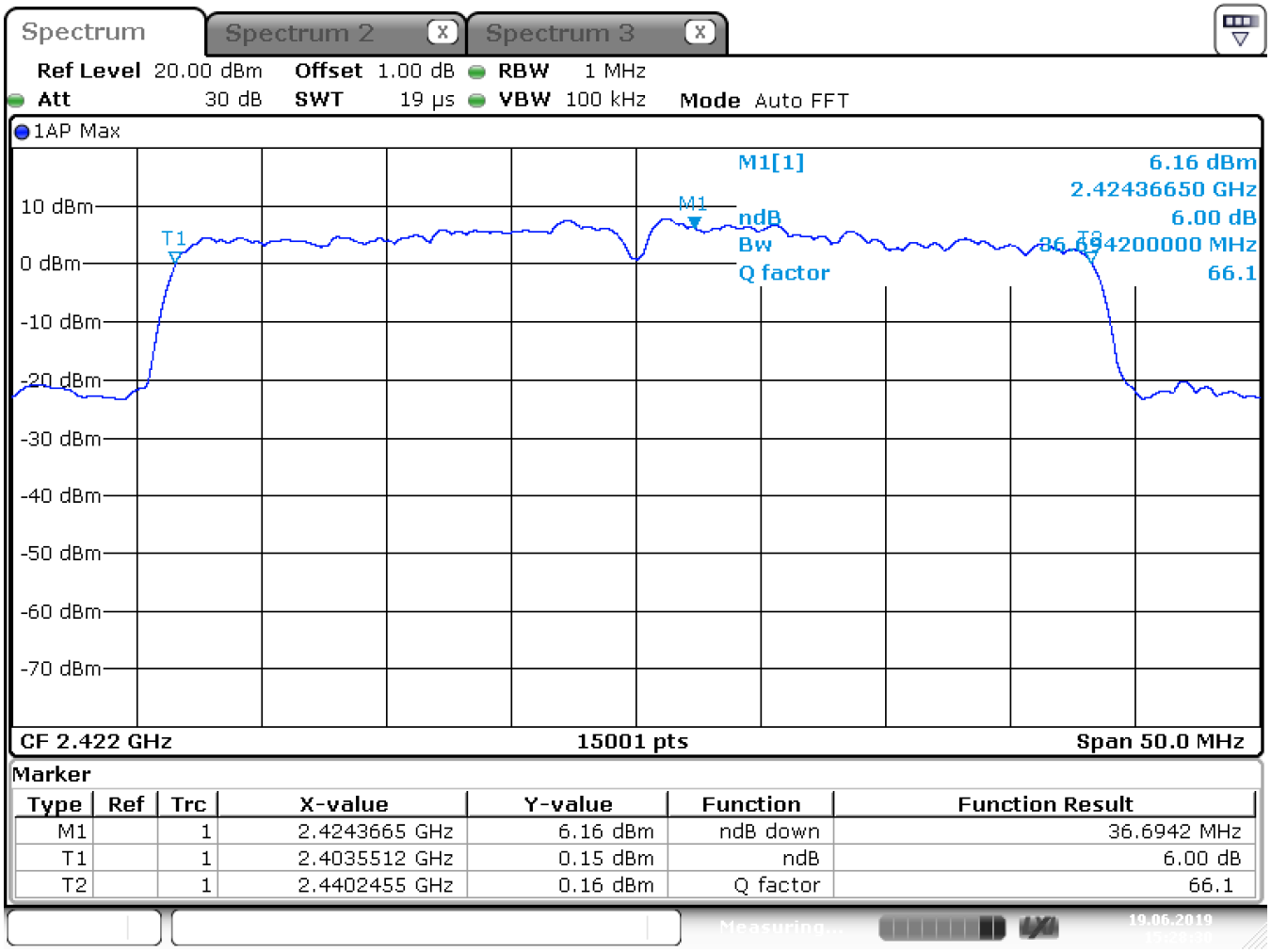
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

6dB Bandwidth **§ 15.247(a)(2)**
5.2(1)

Conducted Measurement – Antenna 1

Rated output power: 173,78 mW Channels 1+5 (2422 MHz center frequency)



Date: 19.JUN.2019 15:28:30

6dB Bandwidth: 36,7 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(1)**

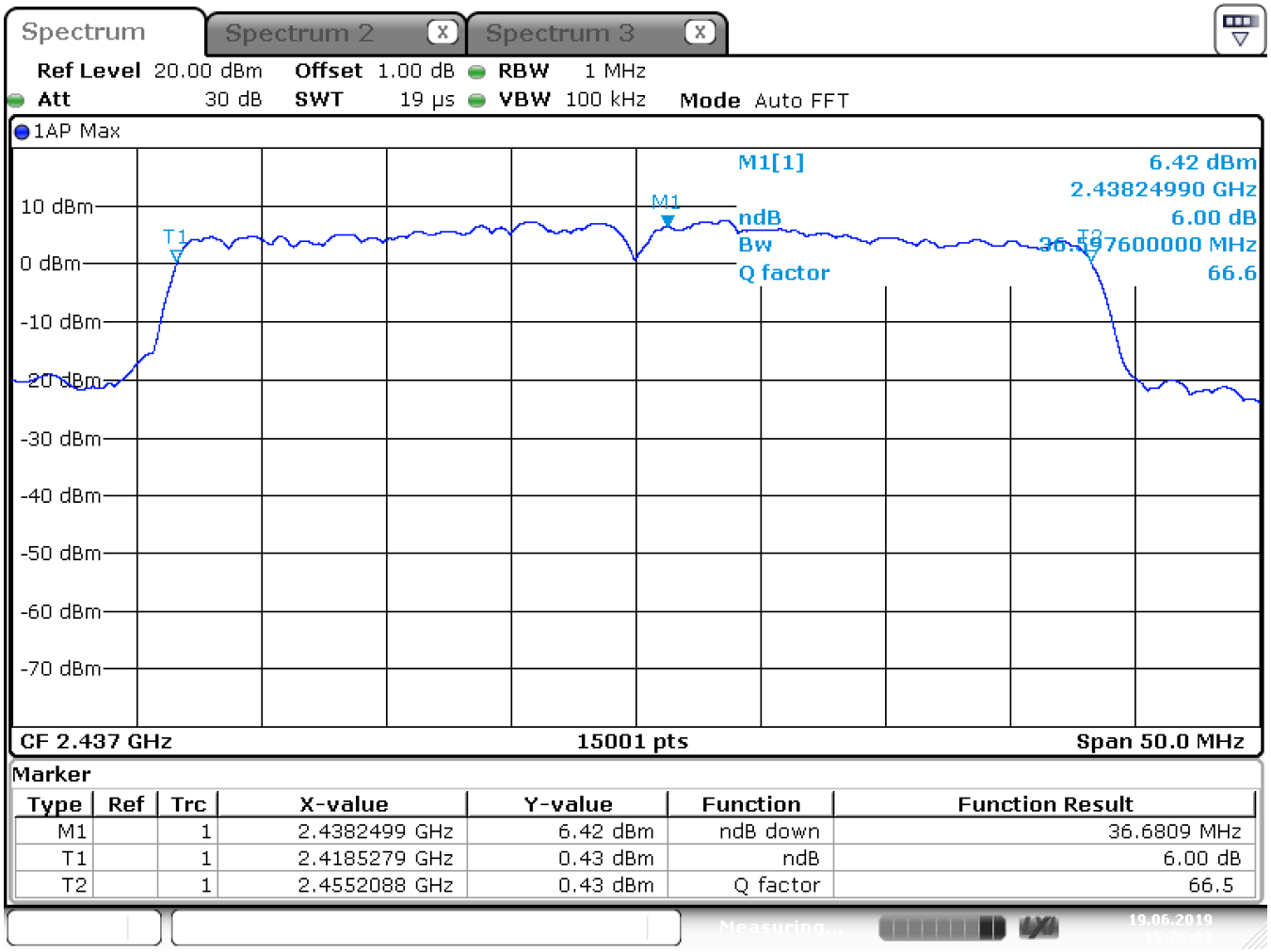
Under normal test conditons	6 dB Bandwidth at least 500 kHz

Test Equipment used: EMV-205

6dB Bandwidth **§ 15.247(a)(2)**
5.2(1)

Conducted Measurement – Antenna 1

Rated output power: 173,78 mW Channels 4 + 8 (2437 MHz center frequency)



Date: 19.JUN.2019 15:25:03

6dB Bandwidth: 36,7 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(1)**

Under normal test conditons	6 dB Bandwidth at least 500 kHz

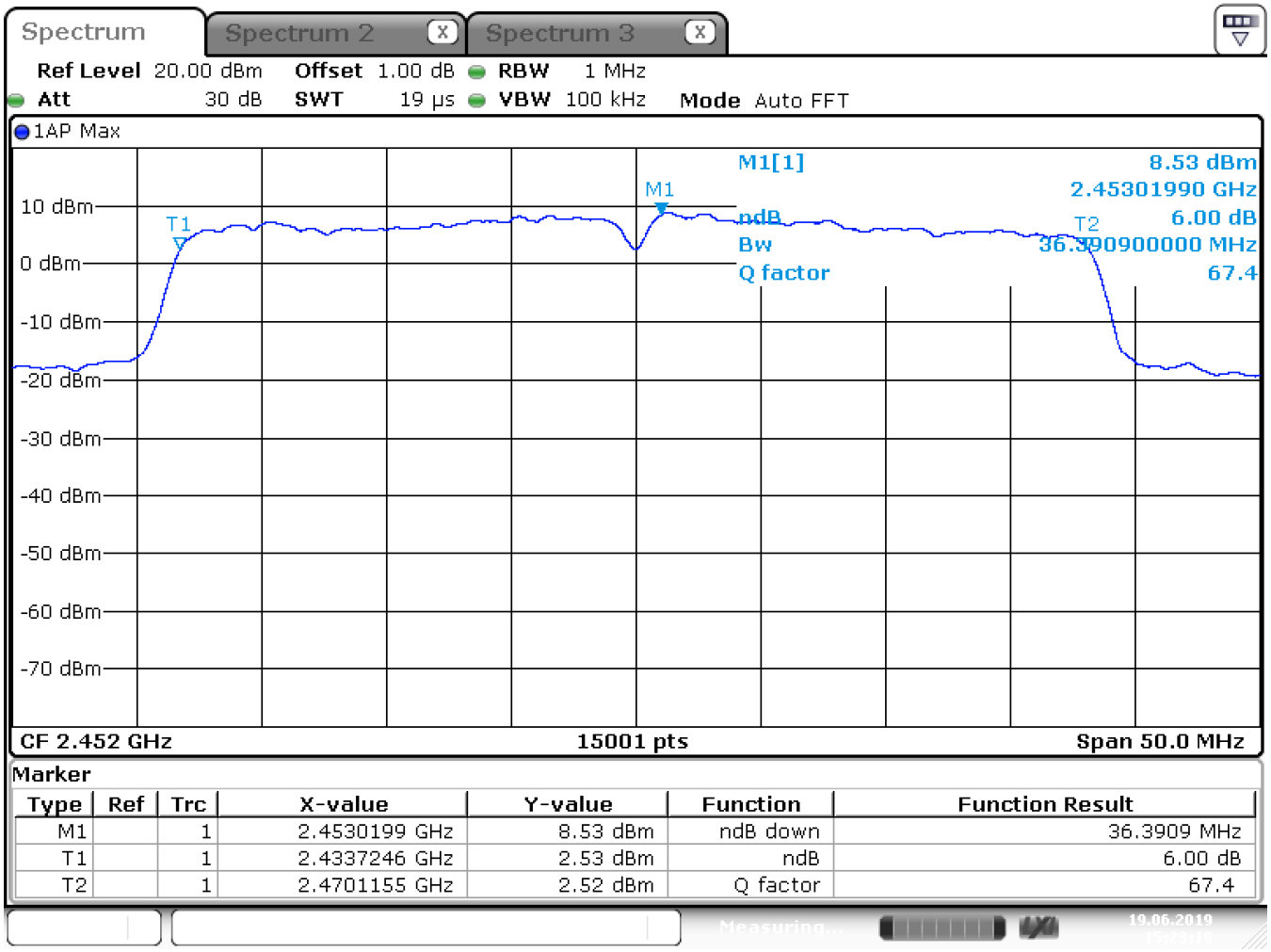
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

6dB Bandwidth **§ 15.247(a)(2)**
5.2(1)

Conducted Measurement – Antenna 1

Rated output power: 173,78 mW Channel 7 + 11 (2452 MHz center frequency)



Date: 19.JUN.2019 15:23:19

6dB Bandwidth: 36,4 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(1)**

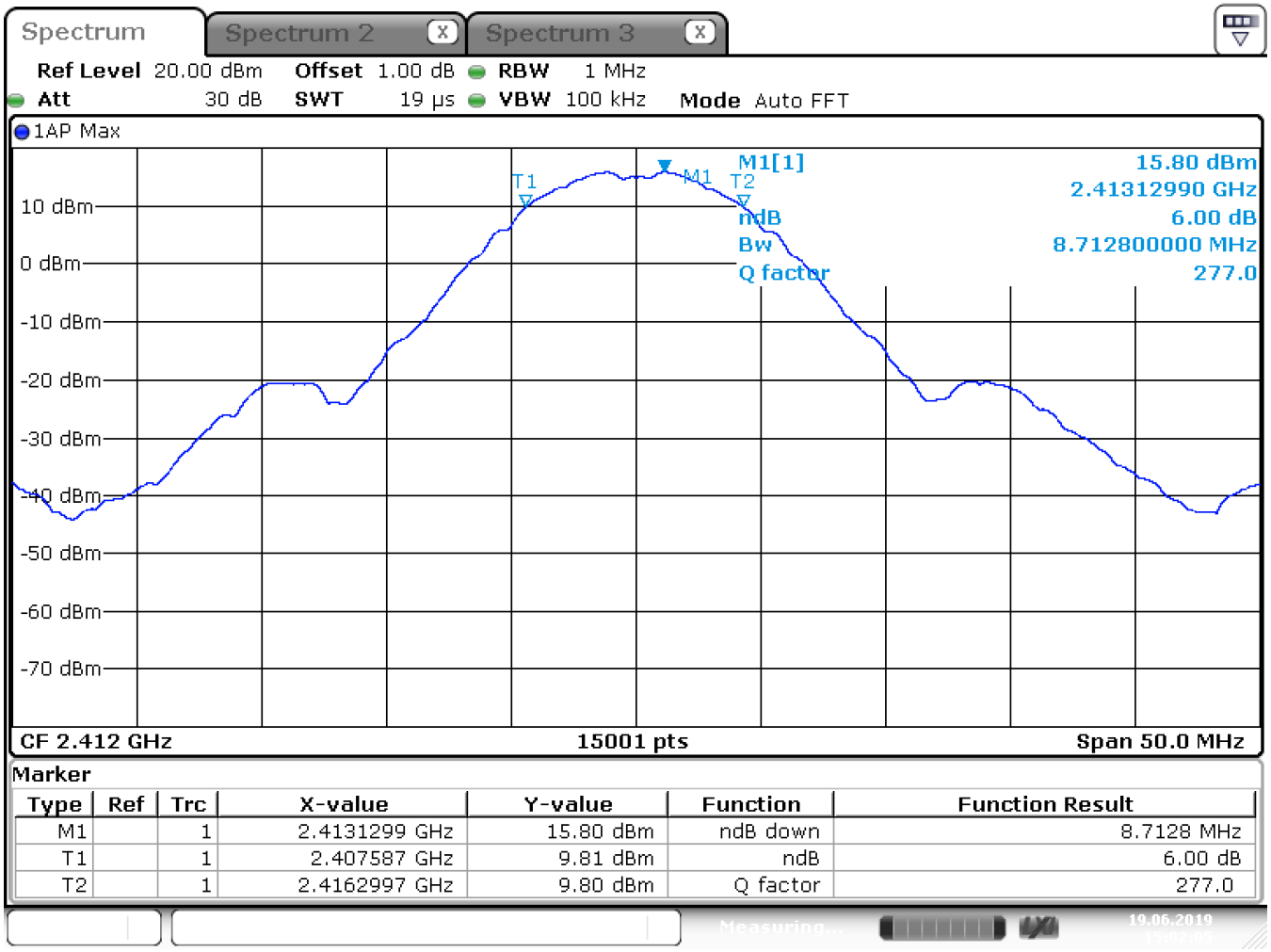
Under normal test conditons	6 dB Bandwidth at least 500 kHz

Test Equipment used: EMV-205

6dB Bandwidth **§ 15.247(a)(2)**
5.2(1)

Conducted Measurement – Antenna 2

Rated output power: 173,78 mW Channel 1 (2412 MHz center frequency) – DSSS



Date: 19.JUN.2019 15:02:05

6dB Bandwidth: 8,7 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(1)**

Under normal test conditons	6 dB Bandwidth at least 500 kHz

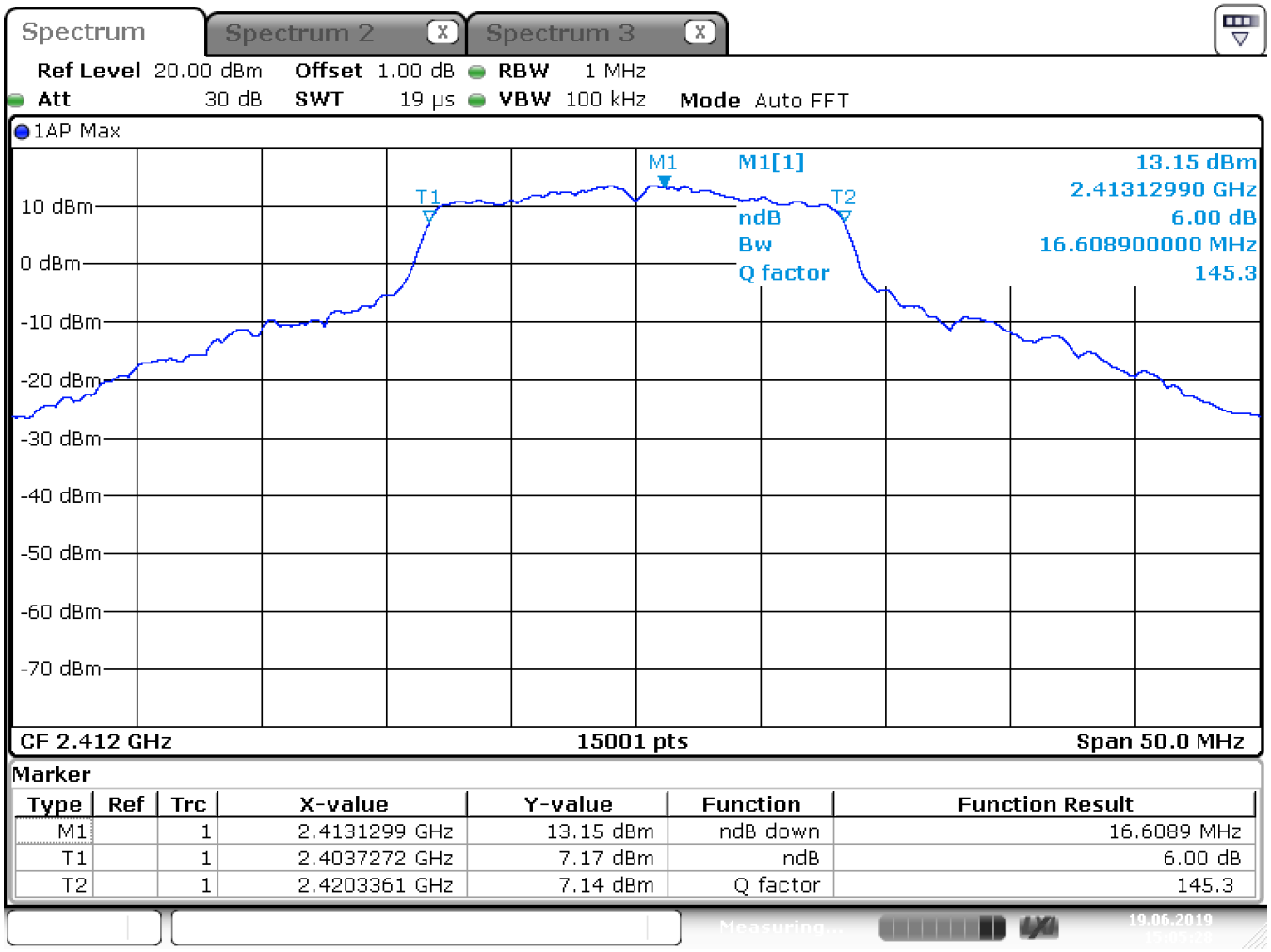
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

6dB Bandwidth **§ 15.247(a)(2)**
5.2(1)

Conducted Measurement – Antenna 2

Rated output power: 173,78 mW Channel 1 (2412 MHz center frequency) – OFDM



Date: 19.JUN.2019 15:05:28

6dB Bandwidth: 16,6 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(1)**

Under normal test conditons	6 dB Bandwidth at least 500 kHz

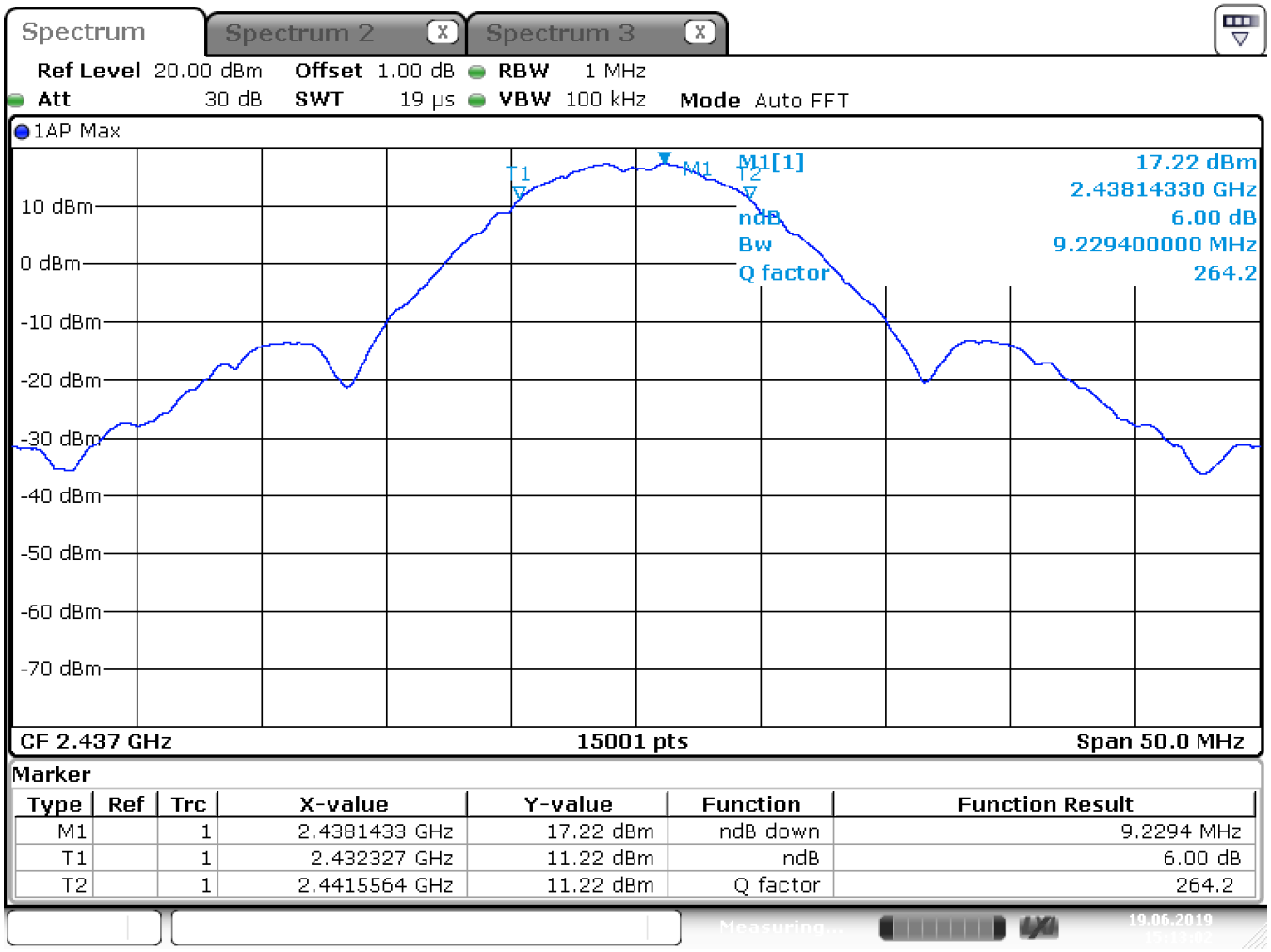
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

6dB Bandwidth **§ 15.247(a)(2)**
5.2(1)

Conducted Measurement – Antenna 2

Rated output power: 173,78 mW Channel 6 (2437 MHz center frequency) – DSSS



Date: 19.JUN.2019 15:13:03

6dB Bandwidth: 9,2 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(1)**

Under normal test conditons	6 dB Bandwidth at least 500 kHz

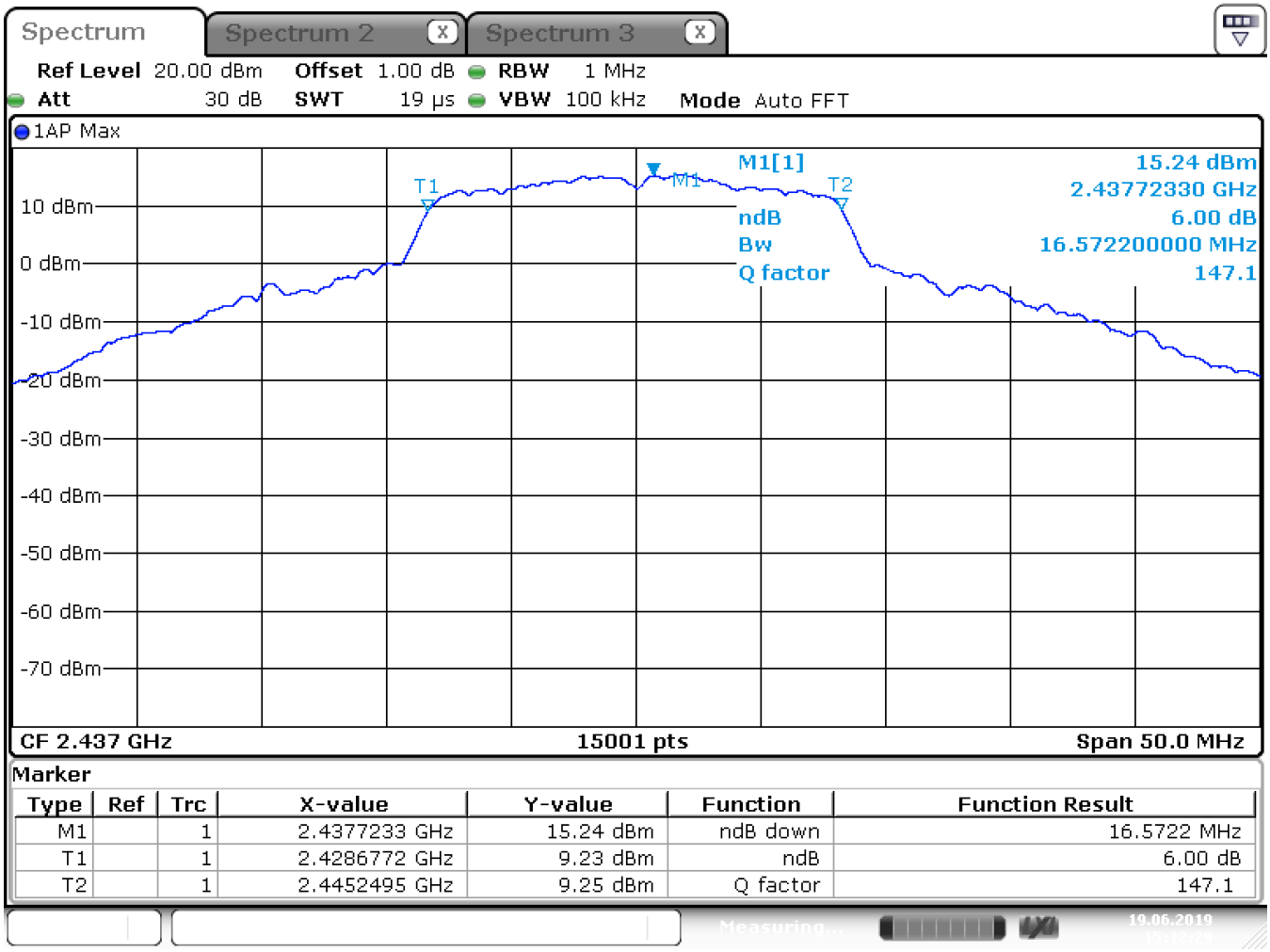
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

6dB Bandwidth **§ 15.247(a)(2)**
5.2(1)

Conducted Measurement – Antenna 2

Rated output power: 173,78 mW Channel 6 (2437 MHz center frequency) – OFDM



Date: 19.JUN.2019 15:12:29

6dB Bandwidth: 16,6 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(1)**

Under normal test conditons	6 dB Bandwidth at least 500 kHz

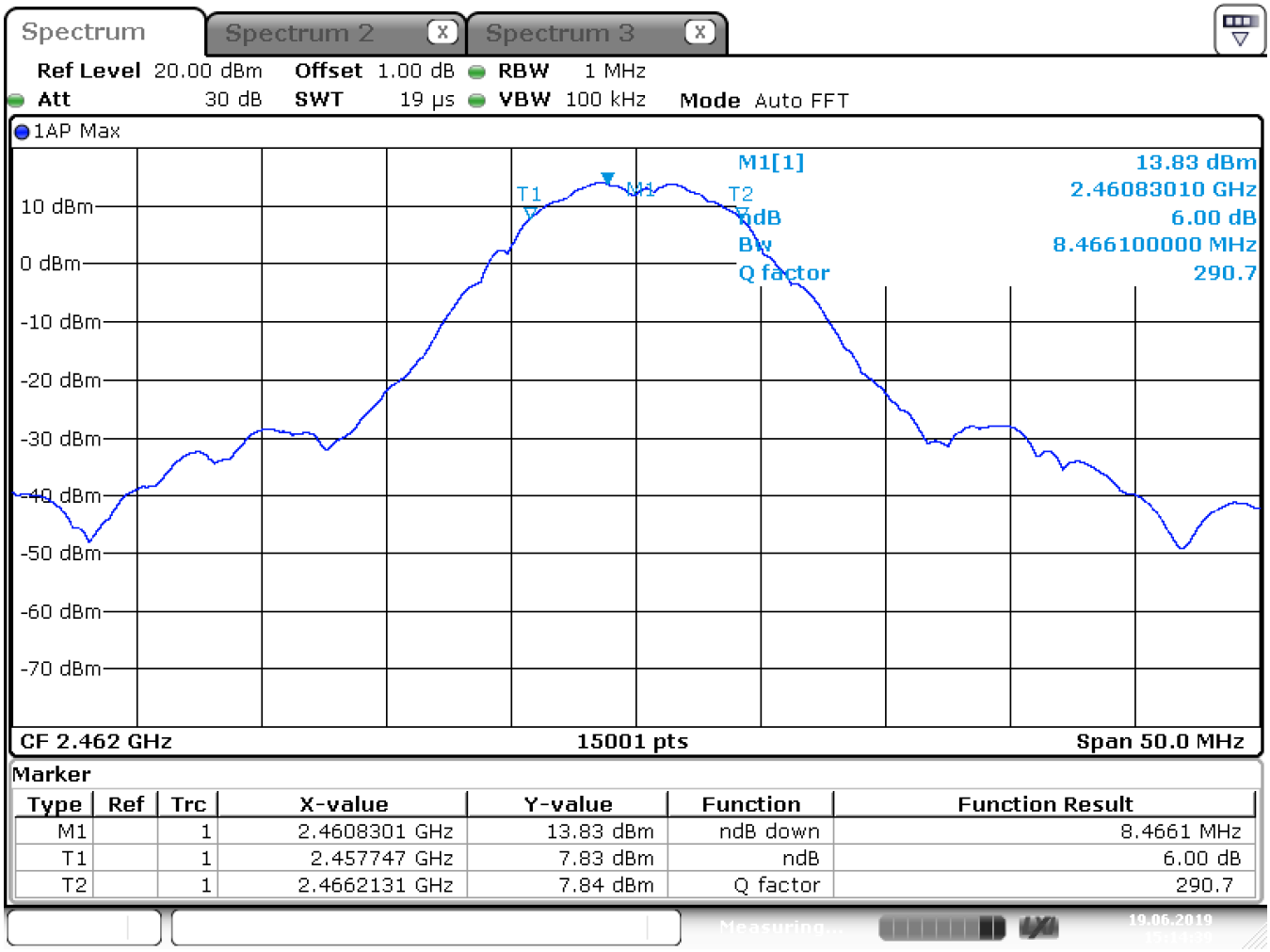
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

6dB Bandwidth **§ 15.247(a)(2)**
5.2(1)

Conducted Measurement – Antenna 2

Rated output power: 173,78 mW Channel 11 (2462 MHz center frequency) – DSSS



Date: 19.JUN.2019 15:14:40

6dB Bandwidth: 8,5 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(1)**

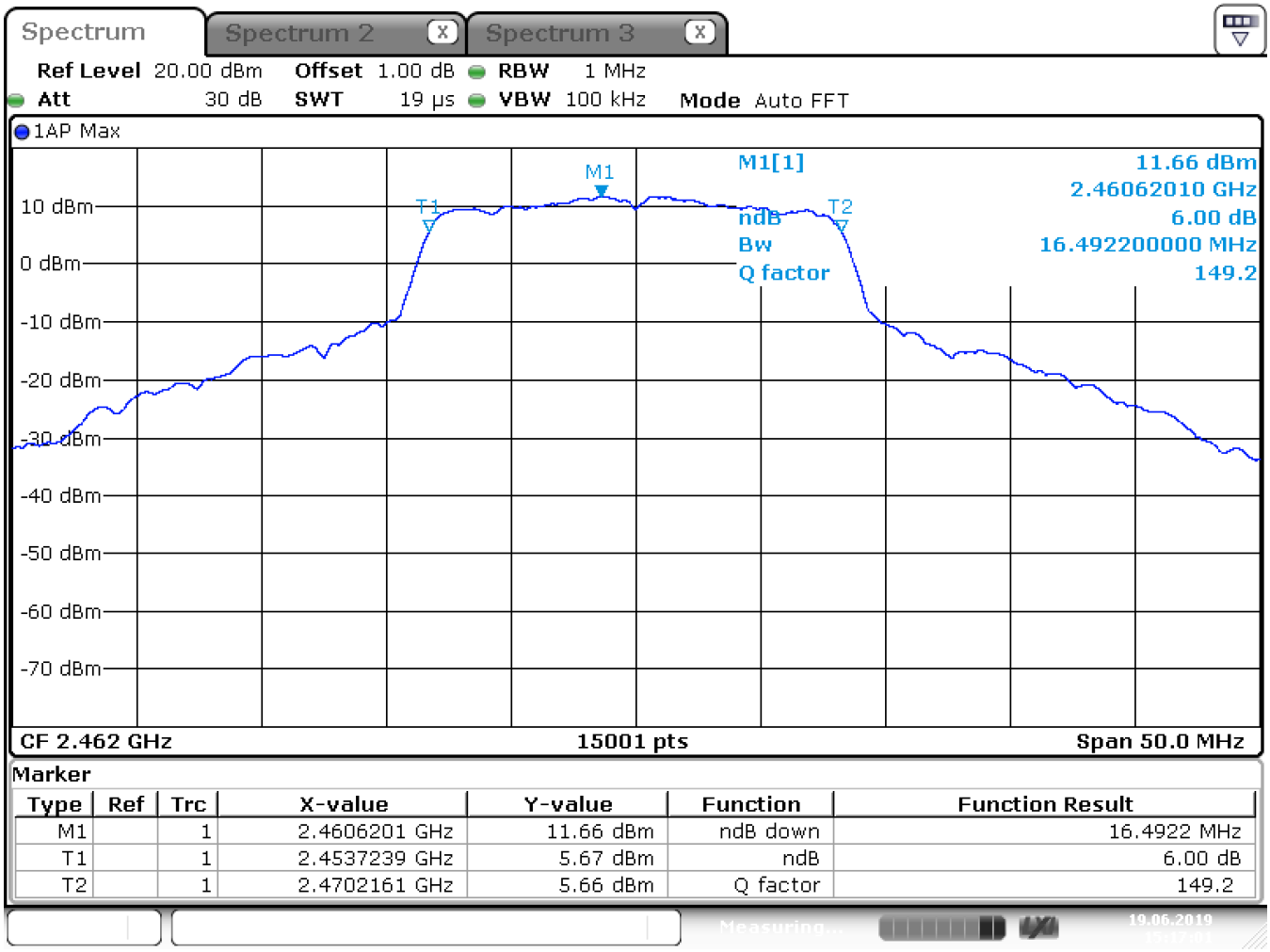
Under normal test conditons	6 dB Bandwidth at least 500 kHz

Test Equipment used: EMV-205

6dB Bandwidth **§ 15.247(a)(2)**
5.2(1)

Conducted Measurement – Antenna 2

Rated output power: 173,78 mW Channel 11 (2462 MHz center frequency) – OFDM



Date: 19.JUN.2019 15:17:02

6dB Bandwidth: 16,5 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(1)**

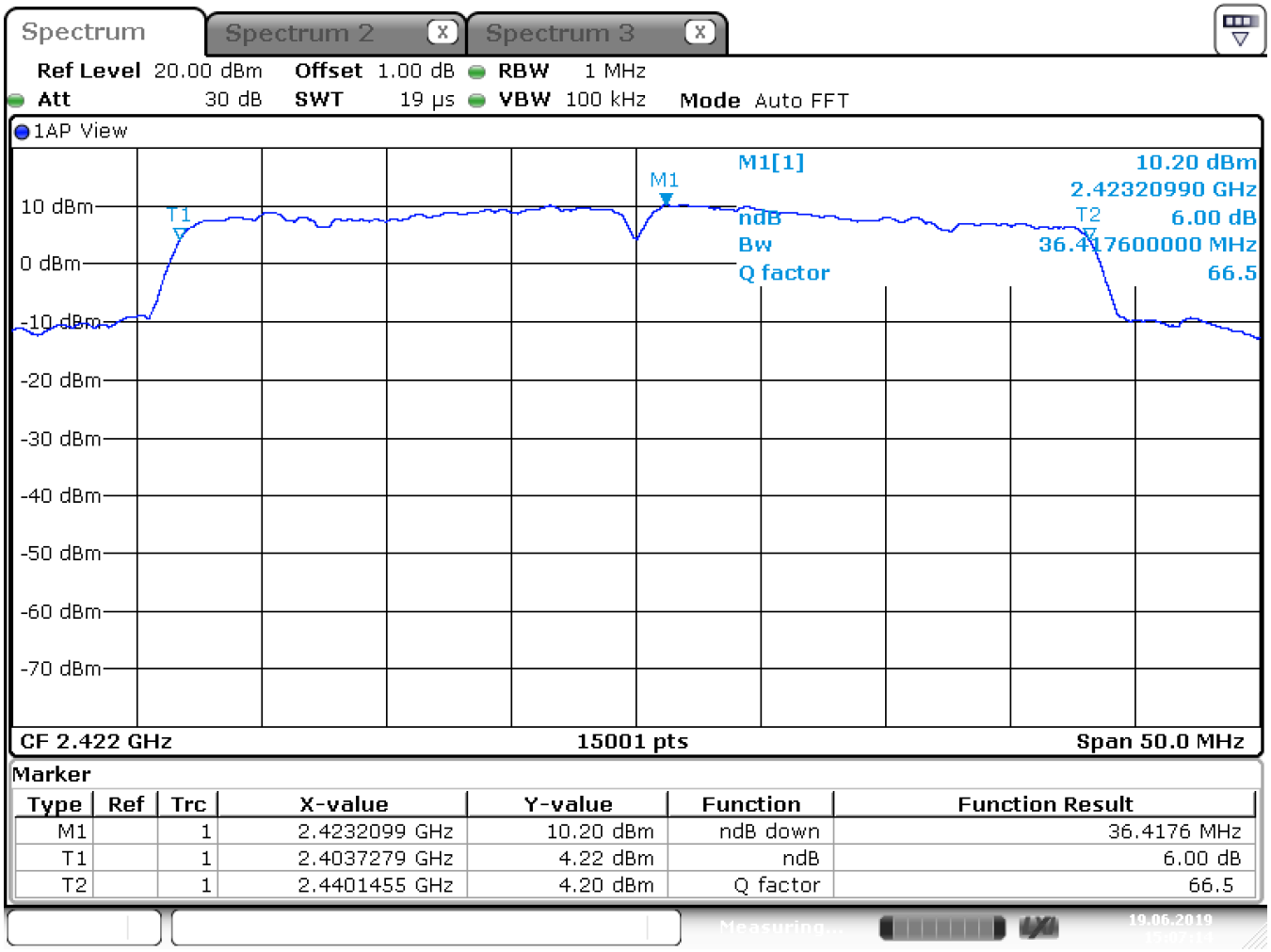
Under normal test conditons	6 dB Bandwidth at least 500 kHz

Test Equipment used: EMV-205

6dB Bandwidth **§ 15.247(a)(2)**
5.2(1)

Conducted Measurement – Antenna 2

Rated output power: 173,78 mW Channels 1+5 (2422 MHz center frequency)



Date: 19.JUN.2019 15:07:15

6dB Bandwidth: 36,4 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(1)**

Under normal test conditons	6 dB Bandwidth at least 500 kHz

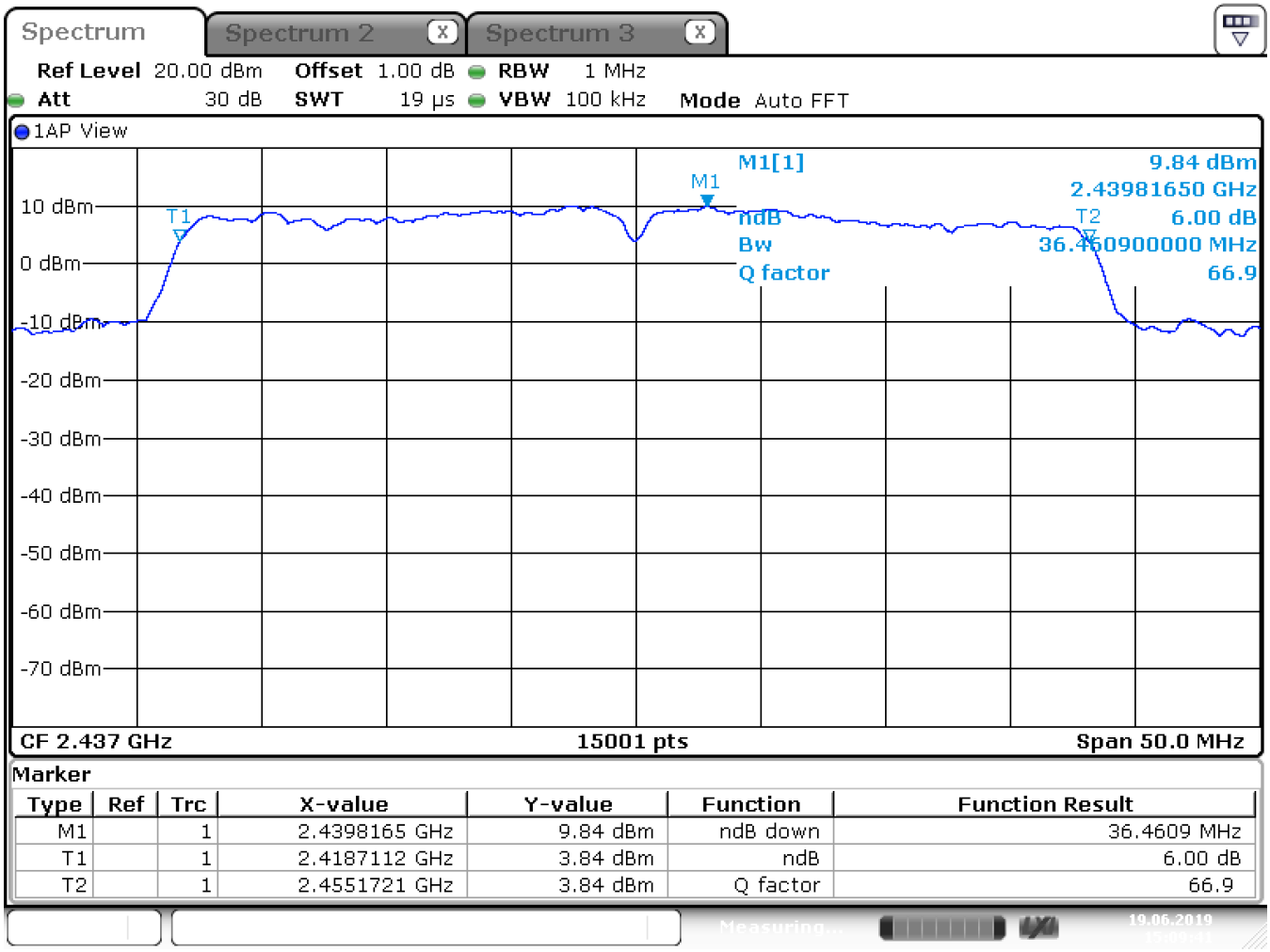
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

6dB Bandwidth **§ 15.247(a)(2)**
5.2(1)

Conducted Measurement – Antenna 2

Rated output power: 173,78 mW Channels 4 + 8 (2437 MHz center frequency)



Date: 19.JUN.2019 15:09:41

6dB Bandwidth: 36,5 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(1)**

Under normal test conditons	6 dB Bandwidth at least 500 kHz

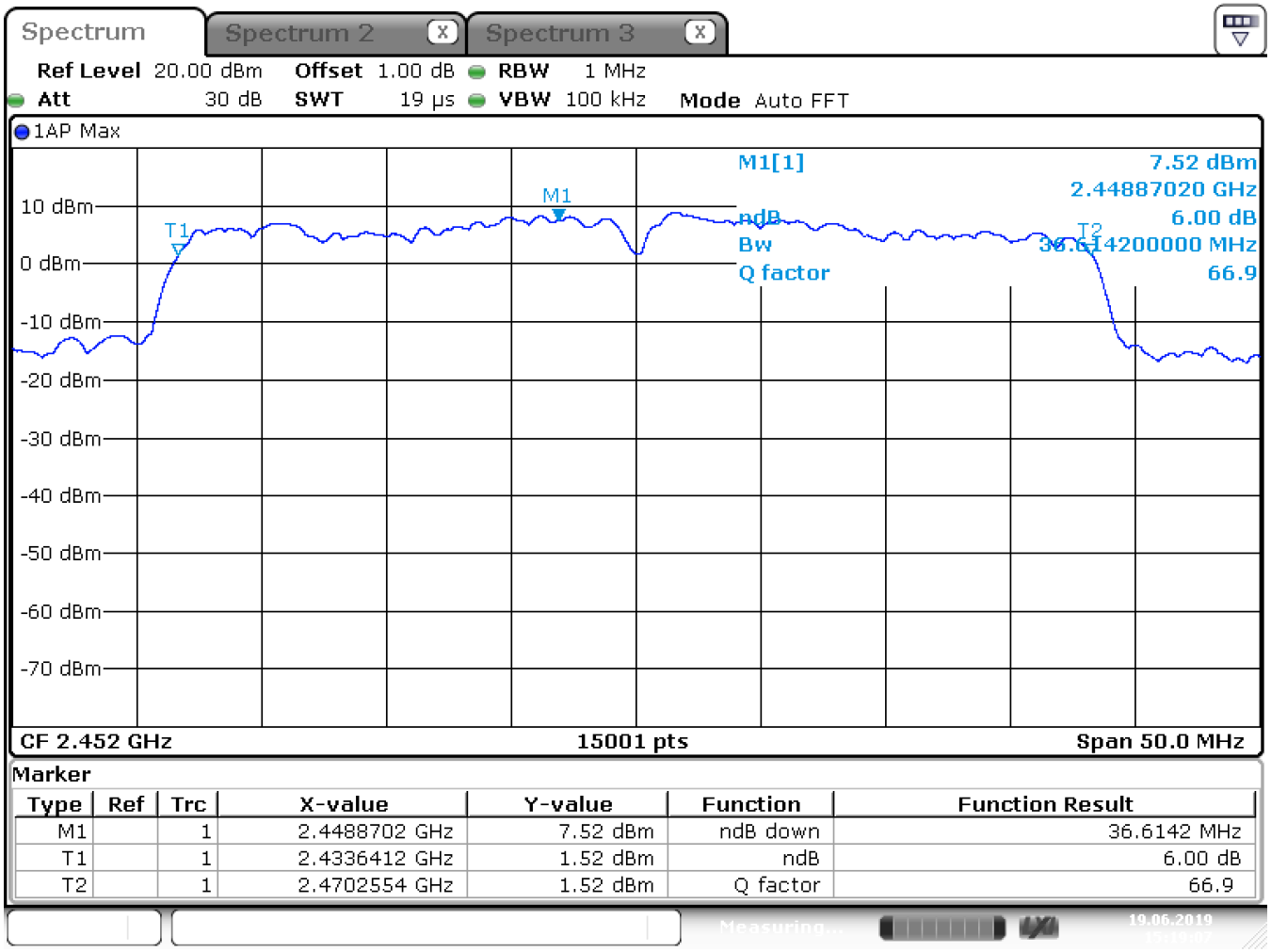
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

6dB Bandwidth **§ 15.247(a)(2)**
5.2(1)

Conducted Measurement – Antenna 2

Rated output power: 173,78 mW Channel 7 + 11 (2452 MHz center frequency)



Date: 19.JUN.2019 15:19:07

6dB Bandwidth: 36,6 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(1)**

Under normal test conditons	6 dB Bandwidth at least 500 kHz

Test Equipment used: EMV-205

4.4. Maximum Peak RF Power Output (conducted)

§ 15.247(b)(3)
5.4(4)

Firmware power settings during all tests

Antenna 1

Mode of operation	Firmware power setting		
	Channel and center frequency (MHz)		
DSSS	Setting 71 at CH 1 (2412)	Setting 80 at CH 6 (2437)	Setting 71 at CH 11 (2462)
OFDM – 20 MHz	Setting 65 at CH 1 (2412)	Setting 80 at CH 6 (2437)	Setting 65 at CH 11 (2462)
OFDM – 40 MHz	Setting 62 at CH 3 (2422)	Setting 72 at CH 6 (2437)	Setting 62 at CH 11 (2462)

Antenna 2

Mode of operation	Firmware power setting		
	Channel and center frequency (MHz)		
DSSS	Setting 77 at CH 1 (2412)	Setting 84 at CH 6 (2437)	Setting 74 at CH 11 (2462)
OFDM – 20 MHz	Setting 65 at CH 1 (2412)	Setting 84 at CH 6 (2437)	Setting 65 at CH 11 (2462)
OFDM – 40 MHz	Setting 62 at CH 3 (2422)	Setting 72 at CH 6 (2437)	Setting 62 at CH 11 (2462)

LIMIT **N/A**

Measuring equipment used: N/A

Maximum Peak RF Power Output (conducted) **§ 15.247(b)(3) 5.4(4)**

Conducted Measurement with thermal power sensor (RMS) – Antenna 1

Rated output power: 173,78 mW

Test conditions		Transmitter power (mW)		
		2412 (2422) MHz	2437 MHz	2462 (2452) MHz
T_{nom} (23)°C	DSSS	58,88	138,04	60,26
	OFDM – 20 MHz	45,71	125,89	45,71
	OFDM – 40 MHz	45,19	50,12	43,15
Measurement uncertainty		± 0,75 dB		

LIMIT **SUBCLAUSE 15.247(b)(3) – 5.4(4)**

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

Test Equipment used: NT-204

Maximum Peak RF Power Output (conducted) **§ 15.247(b)(3) 5.4(4)**

Conducted Measurement with thermal power sensor (RMS) – Antenna 2

Rated output power: 173,78 mW

Test conditions		Transmitter power (mW)		
		2412 (2422) MHz	2437 MHz	2462 (2452) MHz
T_{nom} (23)°C	DSSS	120,23	173,78	80,35
	OFDM – 20 MHz	56,23	173,78	48,42
	OFDM – 40 MHz	45,19	56,23	50,12
Measurement uncertainty		± 0,75 dB		

LIMIT **SUBCLAUSE 15.247(b)(3) – 5.4(4)**

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

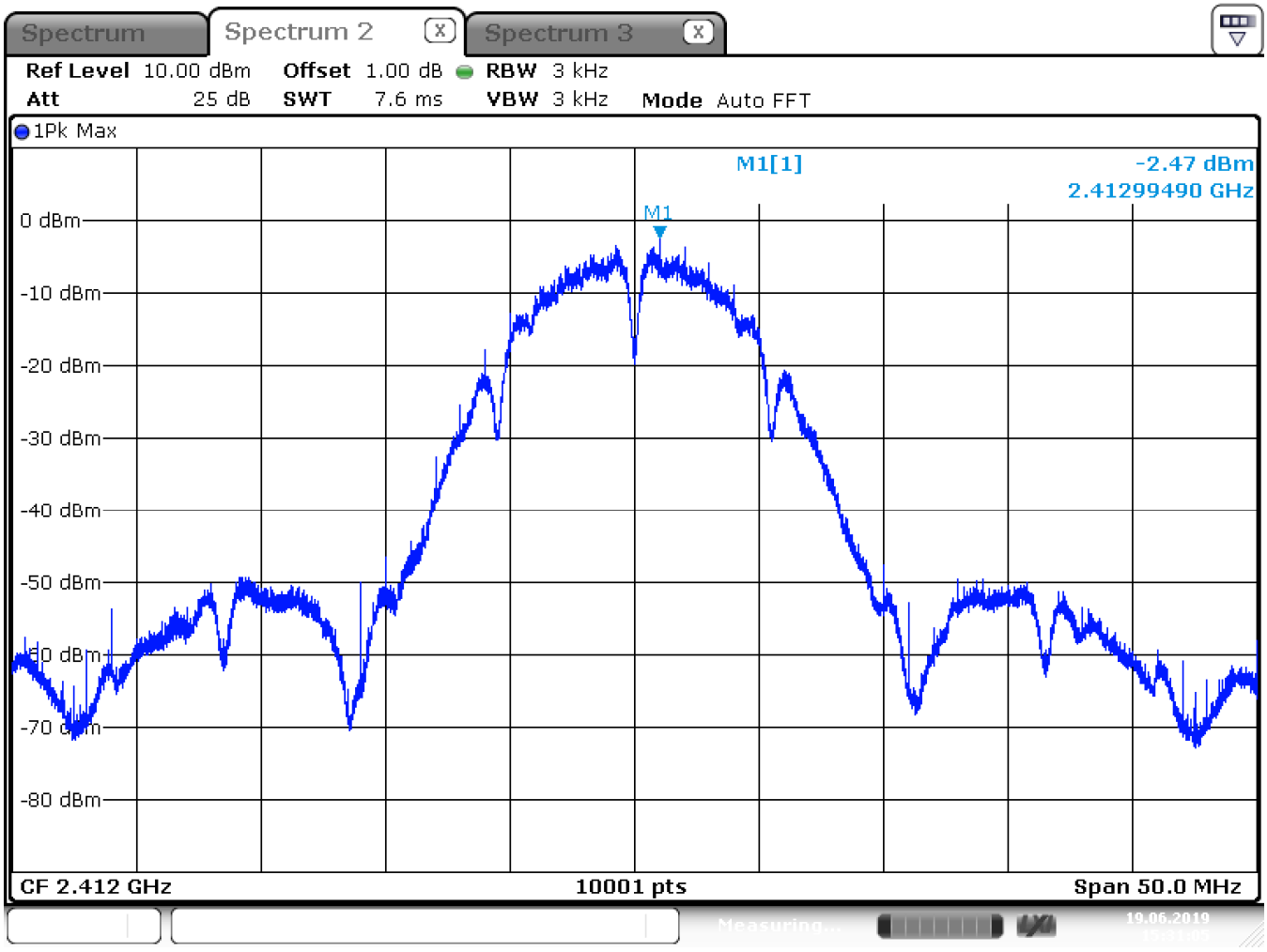
Test Equipment used: NT-204

4.5. Power spectral density (conducted)

§ 15.247(e)
5.2(2)

Conducted Measurement – Antenna 1

Rated output power: 173,78 mW Channel 1 (2412 MHz center frequency) – DSSS



Date: 19.JUN.2019 15:31:05

Power Spectral density: -2,47 dBm @ 2412,995 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(2)**

Under normal test conditons	+8dBm in any 3 kHz band

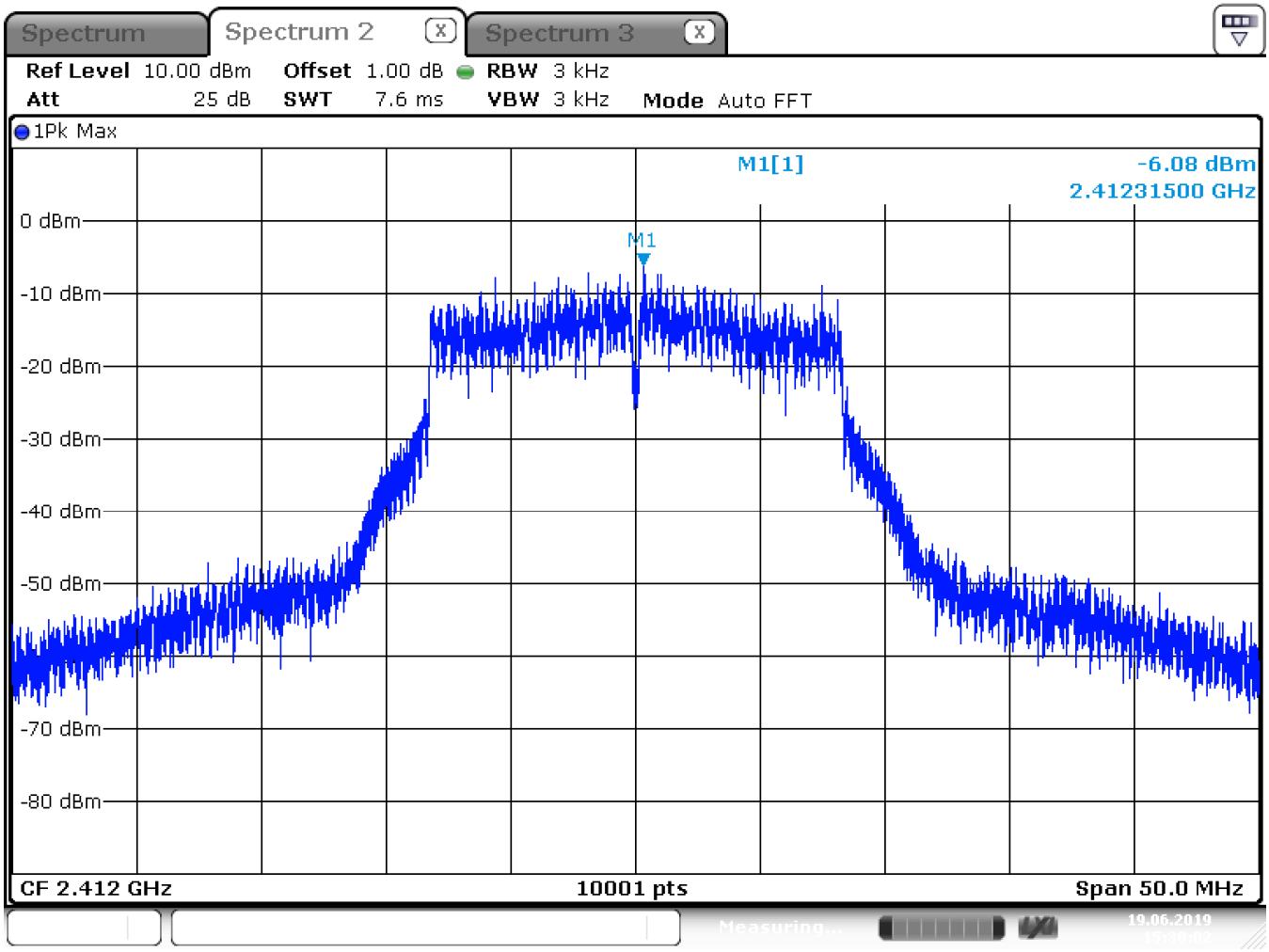
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

Power spectral density (conducted) **§ 15.247(e)**
5.2(2)

Conducted Measurement – Antenna 1

Rated output power: 173,78 mW Channel 1 (2412 MHz center frequency) – OFDM



Date: 19.JUN.2019 15:30:02

Power Spectral density: -6,08 dBm @ 2412,315 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(2)**

Under normal test conditons	+8dBm in any 3 kHz band

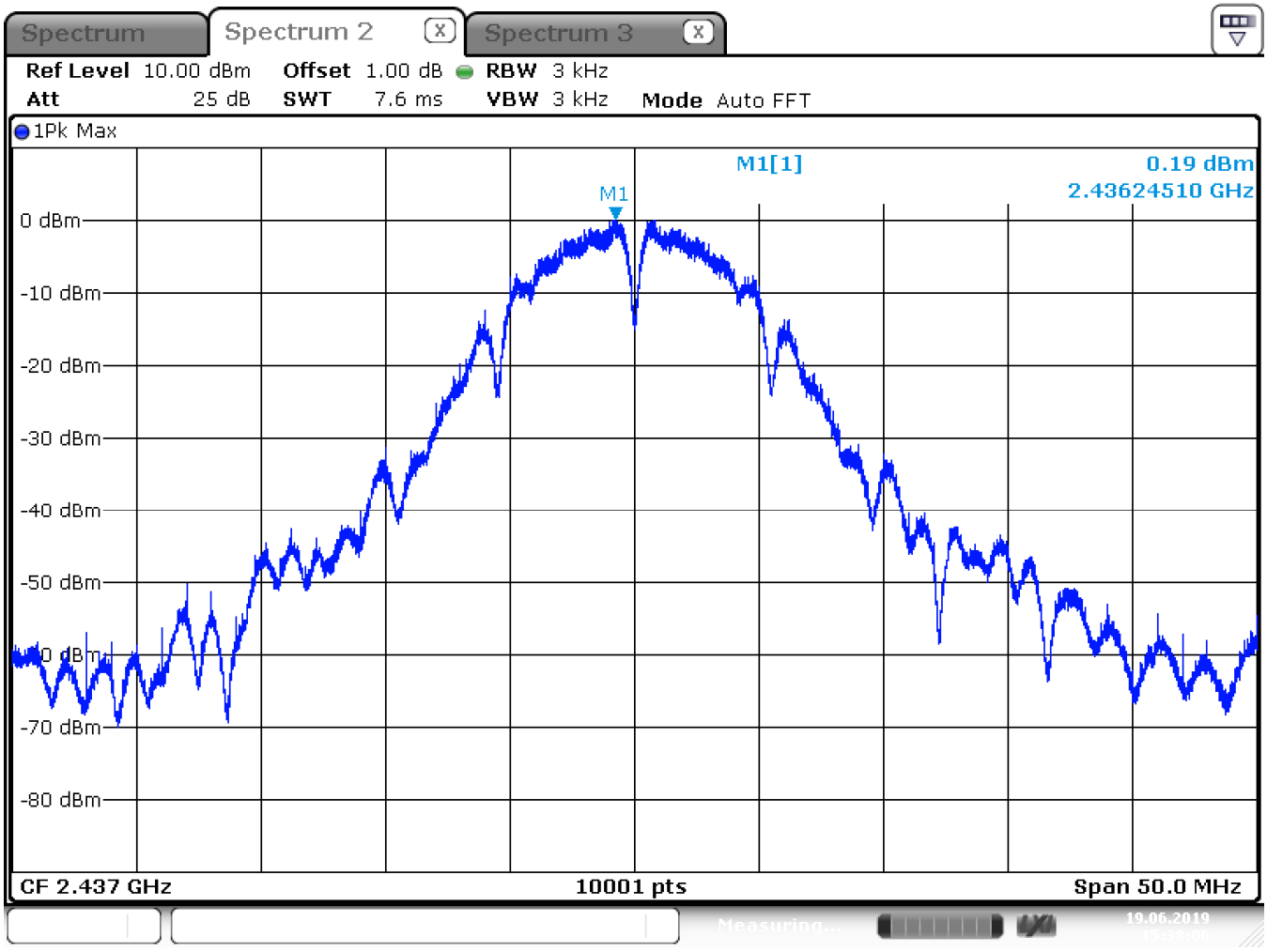
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

Power spectral density (conducted) **§ 15.247(e)**
5.2(2)

Conducted Measurement – Antenna 1

Rated output power: 173,78 mW Channel 6 (2437 MHz center frequency) – DSSS



Date: 19.JUN.2019 15:38:06

Power Spectral density: 0,19 dBm @ 2436,245 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(2)**

Under normal test conditons	+8dBm in any 3 kHz band

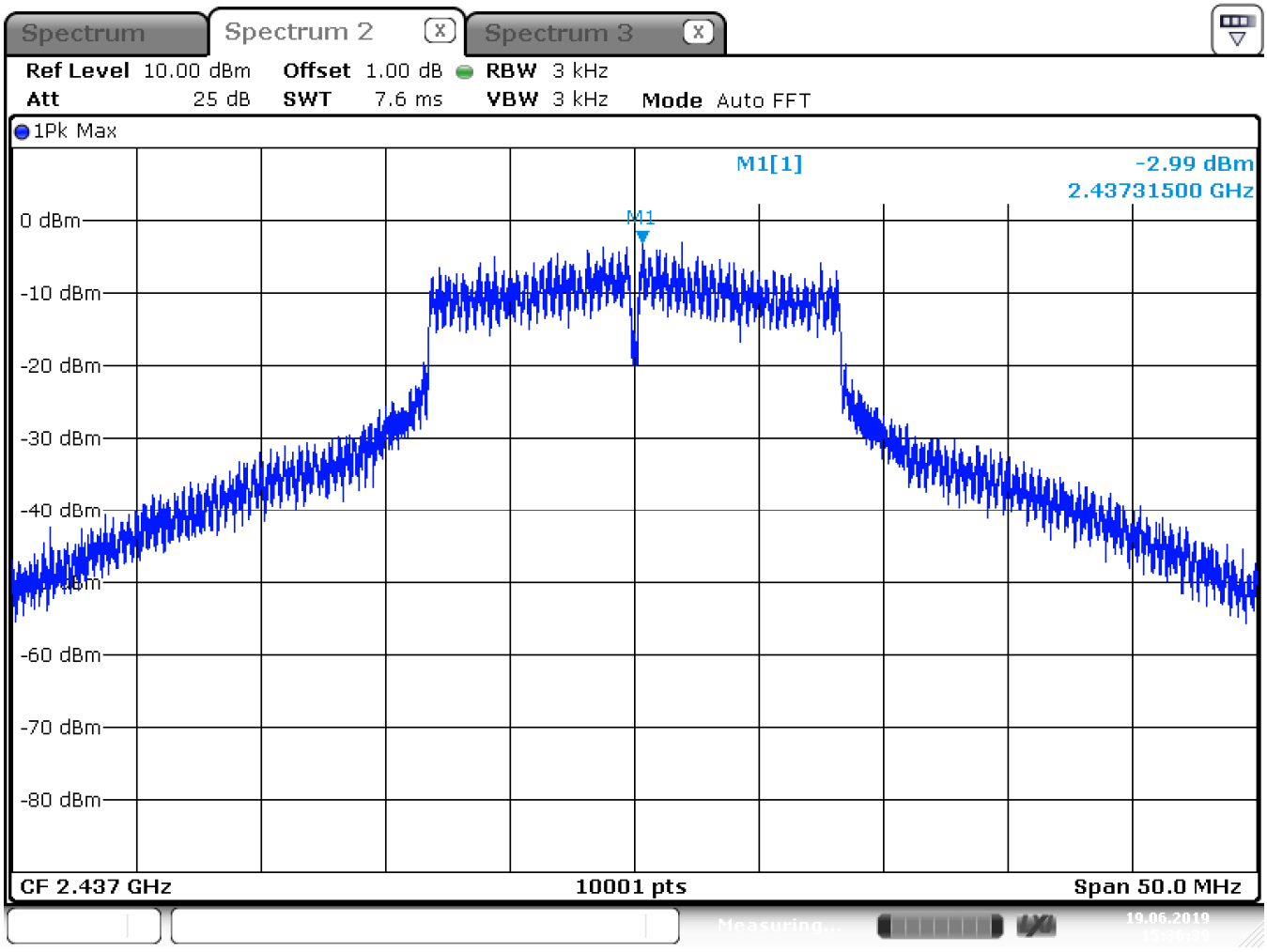
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

Power spectral density (conducted) **§ 15.247(e)**
5.2(2)

Conducted Measurement – Antenna 1

Rated output power: 173,78 mW Channel 6 (2437 MHz center frequency) – OFDM



Date: 19.JUN.2019 15:36:39

Power Spectral density: -2,99 dBm @ 2437,315 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(2)**

Under normal test conditons	+8dBm in any 3 kHz band

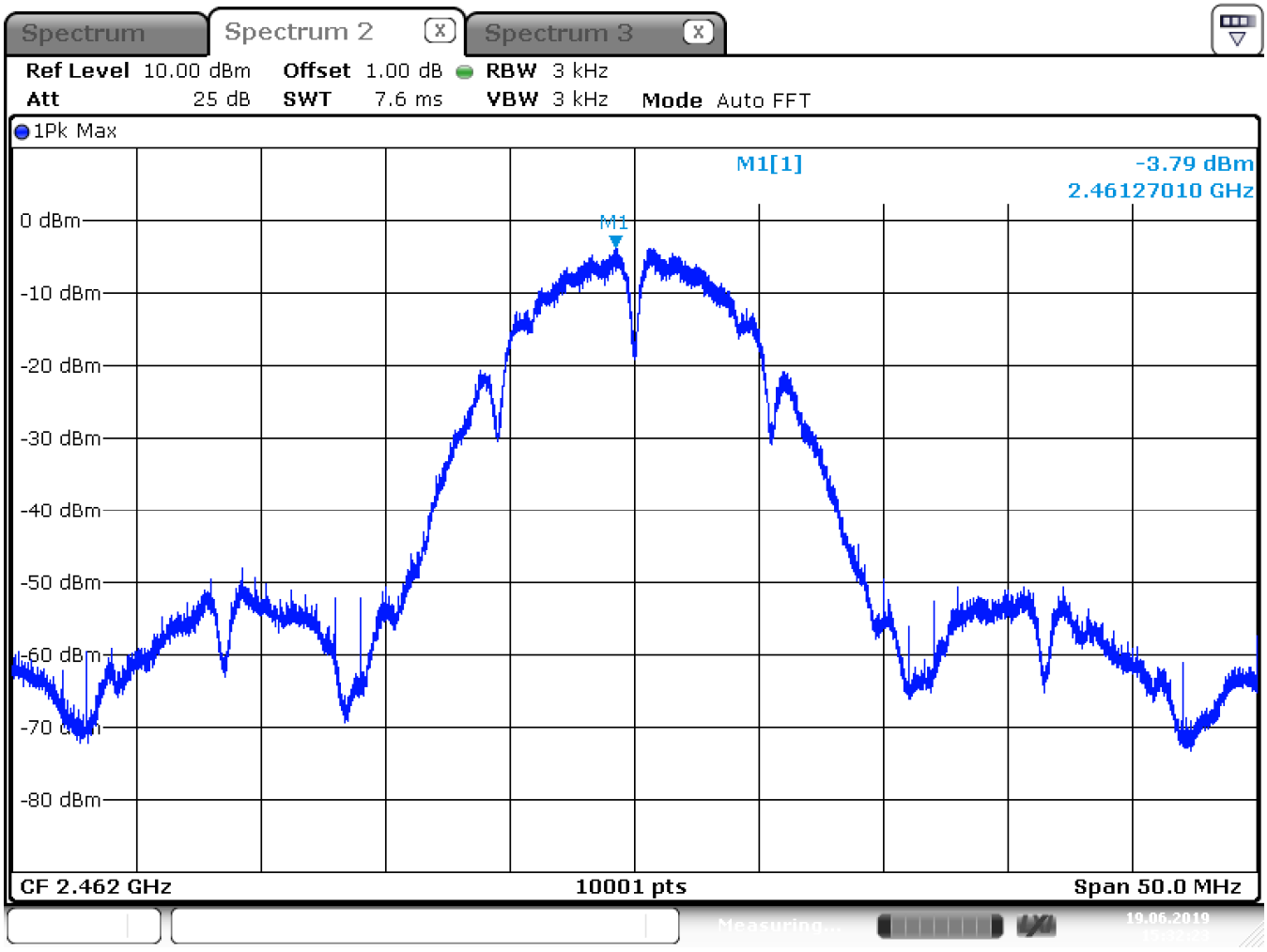
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

Power spectral density (conducted) **§ 15.247(e)**
5.2(2)

Conducted Measurement – Antenna 1

Rated output power: 173,78 mW Channel 11 (2462 MHz center frequency) – DSSS



Date: 19.JUN.2019 15:32:24

Power Spectral density: -3,79 dBm @ 2461,270 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(2)**

Under normal test conditons	+8dBm in any 3 kHz band

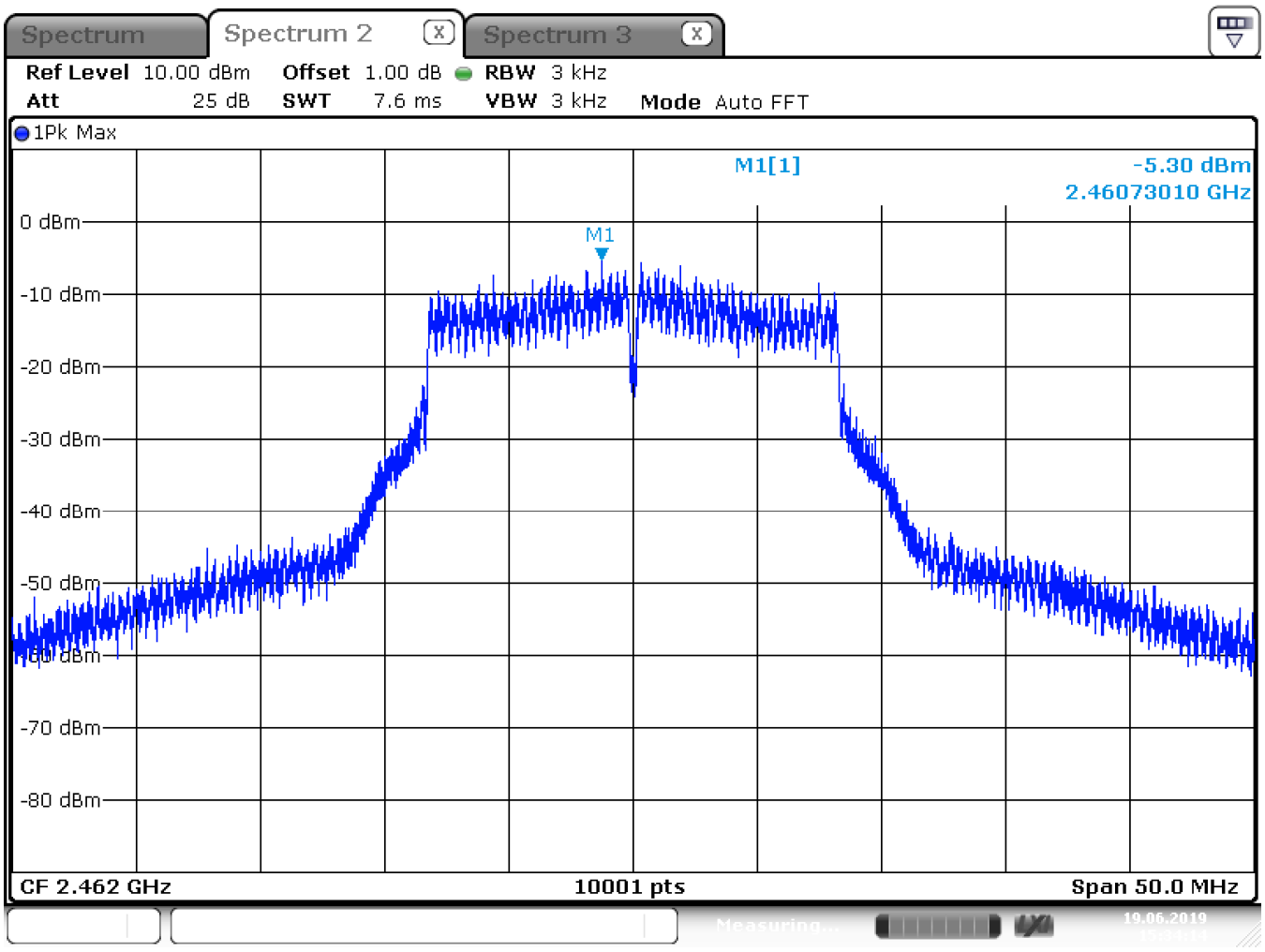
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

Power spectral density (conducted) **§ 15.247(e) 5.2(2)**

Conducted Measurement – Antenna 1

Rated output power: 173,78 mW Channel 11 (2462 MHz center frequency) – OFDM



Date: 19.JUN.2019 15:34:14

Power Spectral density: -5,30 dBm @ 2460,730 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(2)**

Under normal test conditons	+8dBm in any 3 kHz band

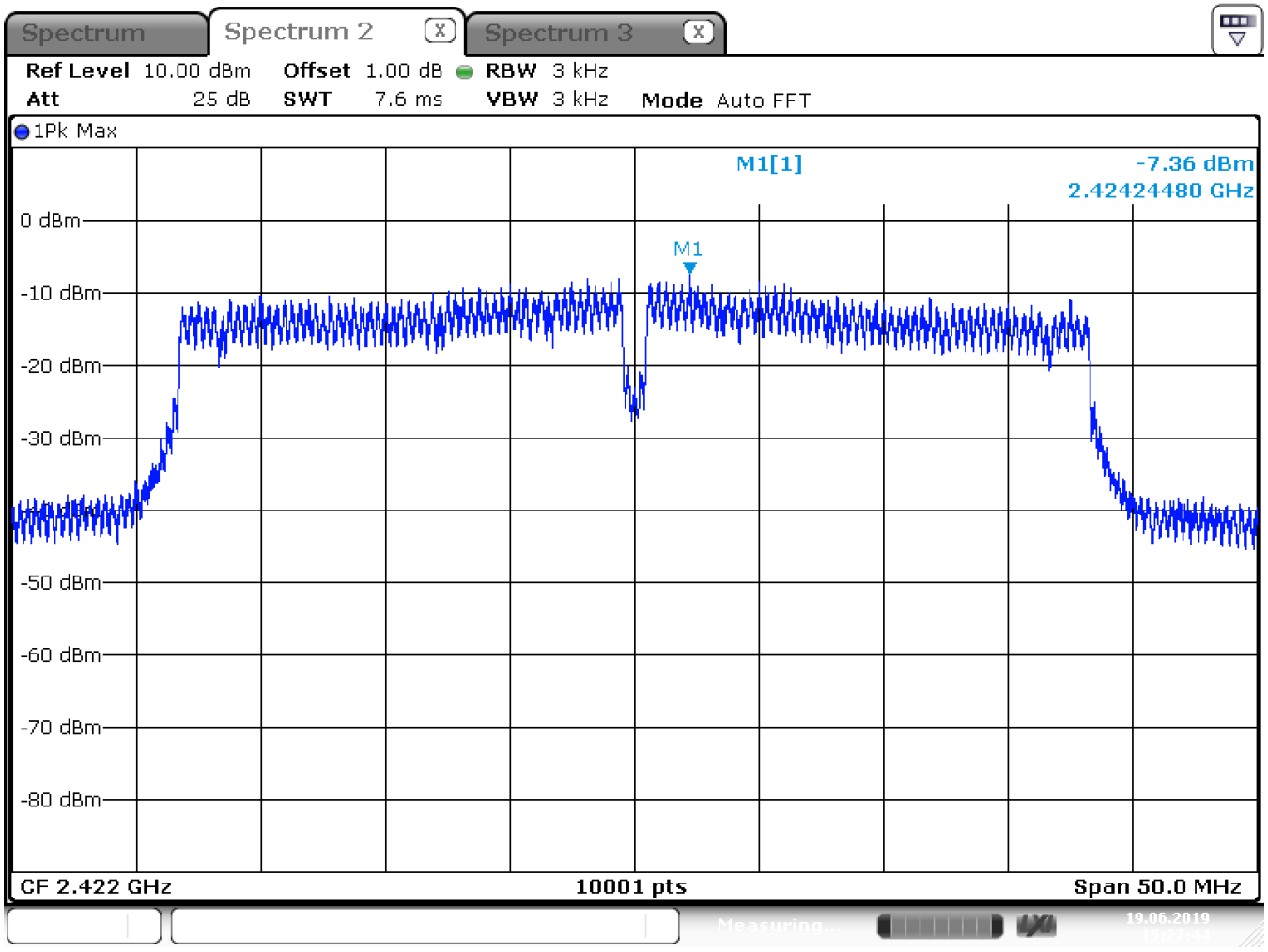
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

Power spectral density (conducted) **§ 15.247(e)**
5.2(2)

Conducted Measurement – Antenna 1

Rated output power: 173,78 mW Channel 1 + 5 (2422 MHz center frequency)



Date: 19.JUN.2019 15:27:44

Power Spectral density: -7,36 dBm @ 2424,245 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(2)**

Under normal test conditons	+8dBm in any 3 kHz band

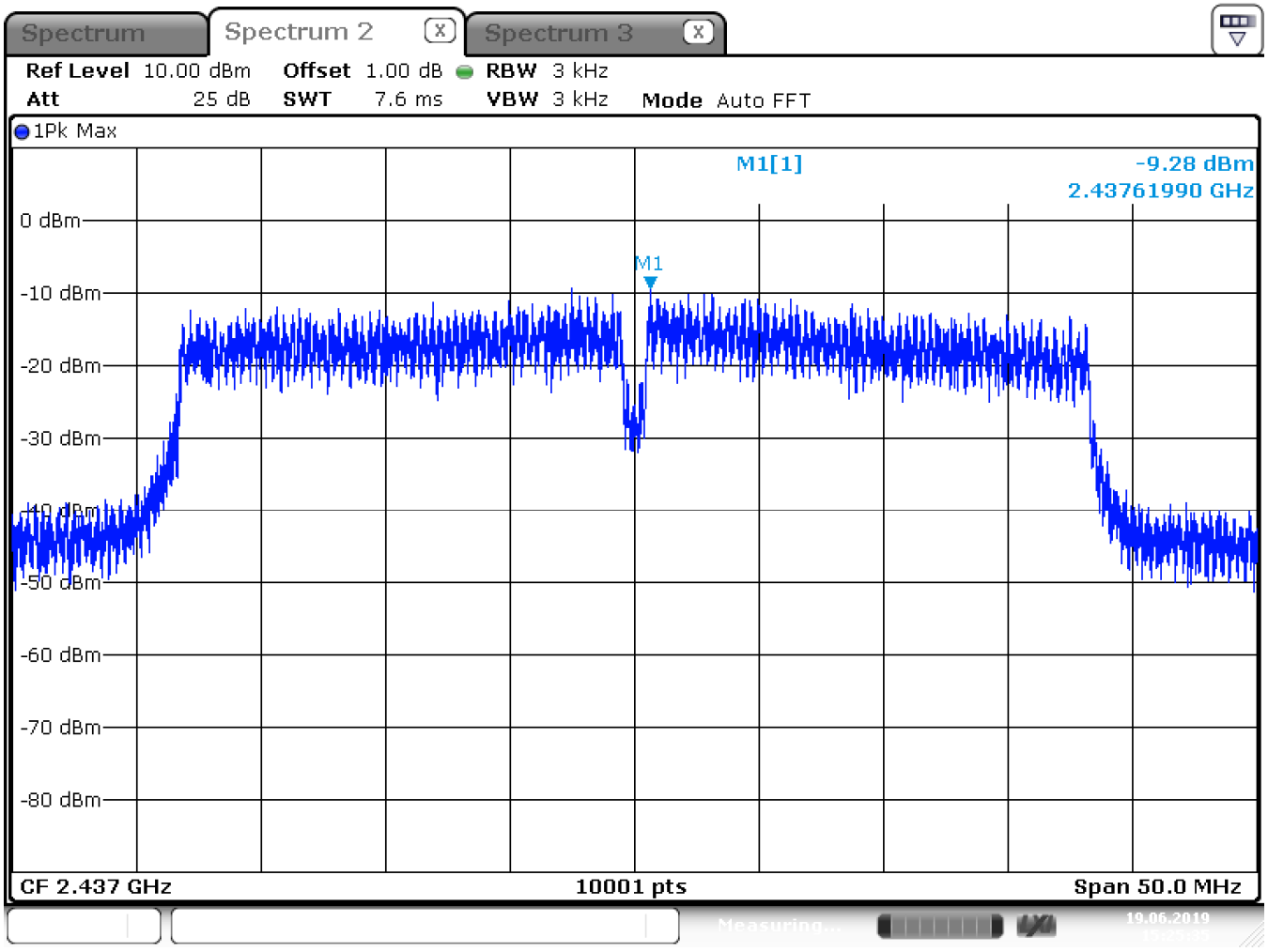
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

Power spectral density (conducted) **§ 15.247(e)**
5.2(2)

Conducted Measurement – Antenna 1

Rated output power: 173,78 mW Channel 4 + 8 (2437 MHz center frequency)



Date: 19.JUN.2019 15:25:36

Power Spectral density: -9,28 dBm @ 2437,620 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(2)**

Under normal test conditons	+8dBm in any 3 kHz band

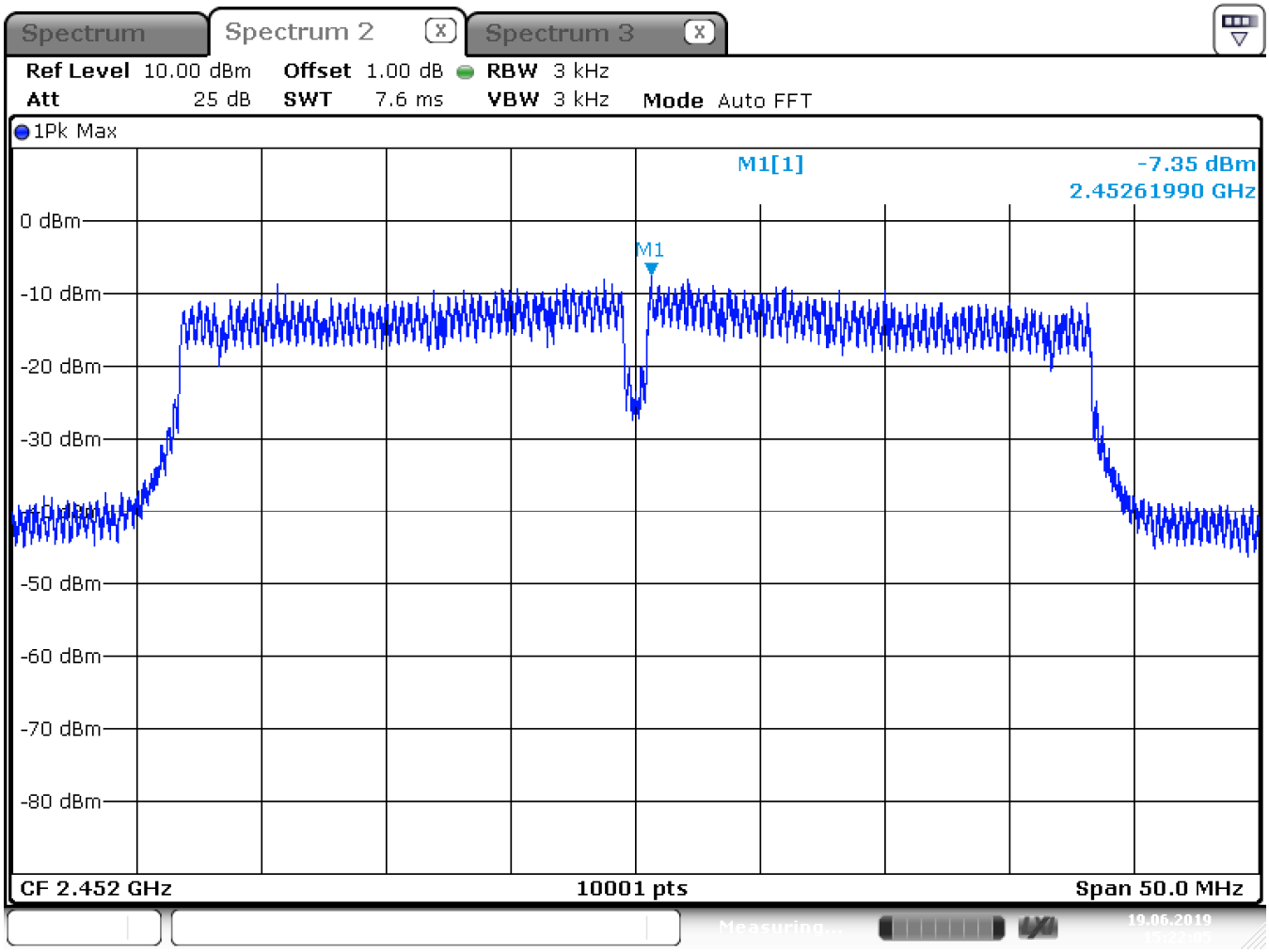
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

Power spectral density (conducted) **§ 15.247(e)**
5.2(2)

Conducted Measurement – Antenna 1

Rated output power: 173,78 mW Channel 7 + 11 (2452 MHz center frequency)



Date: 19.JUN.2019 15:22:05

Power Spectral density: -7,35 dBm @ 2452,620 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(2)**

Under normal test conditons	+8dBm in any 3 kHz band

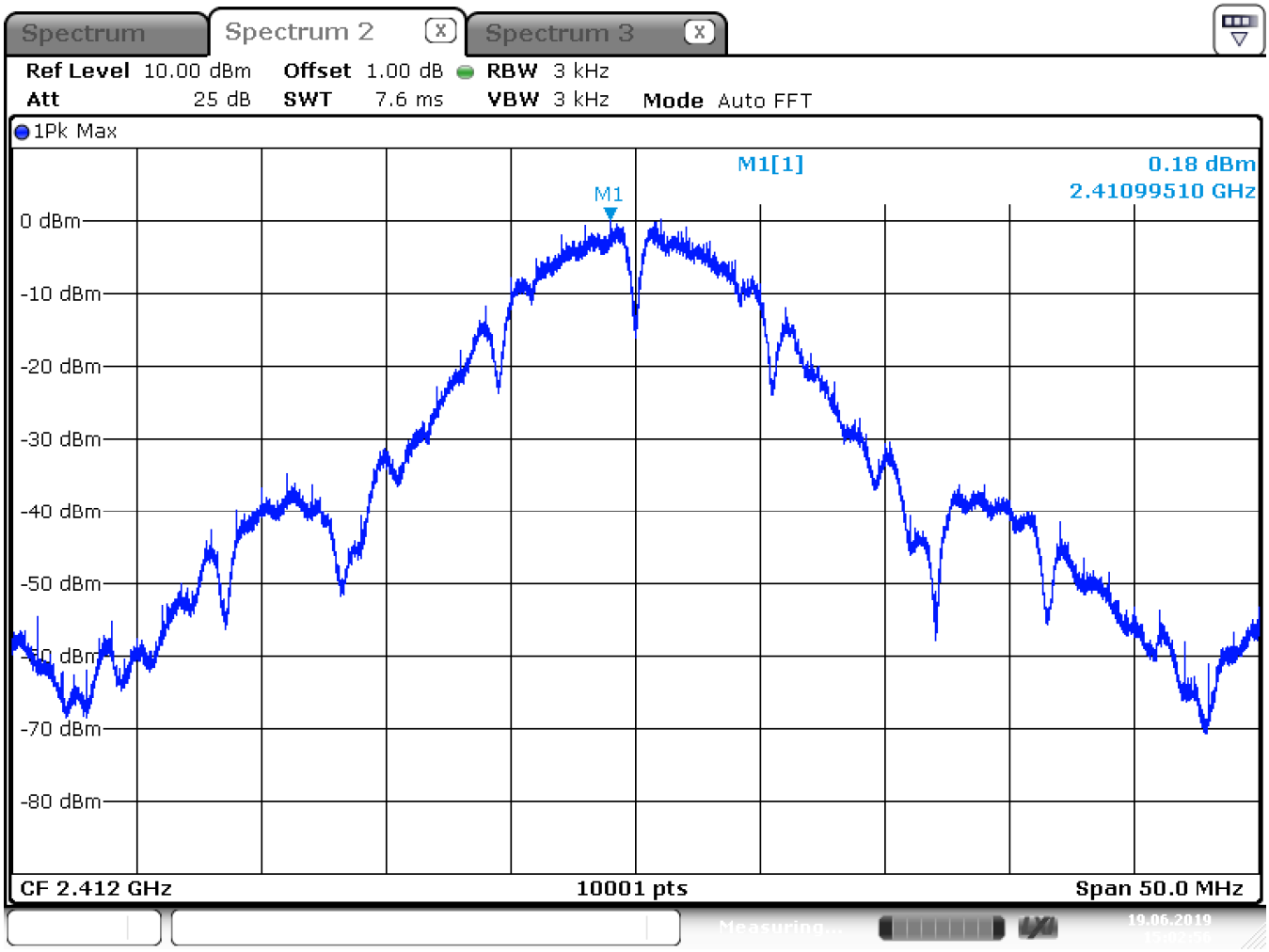
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

Power spectral density (conducted) **§ 15.247(e)**
5.2(2)

Conducted Measurement – Antenna 2

Rated output power: 173,78 mW Channel 1 (2412 MHz center frequency) – DSSS



Date: 19.JUN.2019 15:02:56

Power Spectral density: 0,18 dBm @ 2410,995 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(2)**

Under normal test conditons	+8dBm in any 3 kHz band

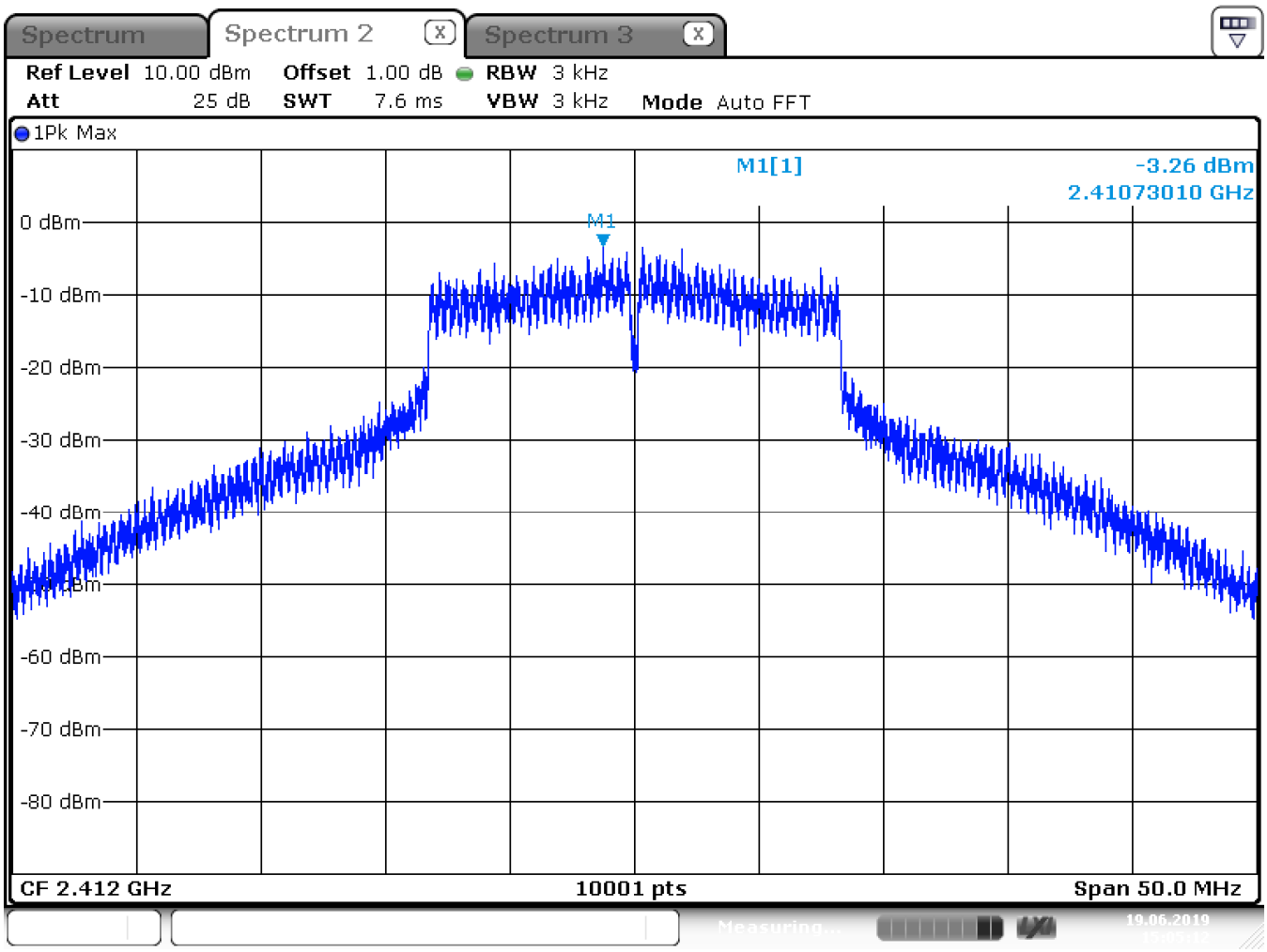
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

Power spectral density (conducted) **§ 15.247(e)**
5.2(2)

Conducted Measurement – Antenna 2

Rated output power: 173,78 mW Channel 1 (2412 MHz center frequency) – OFDM



Date: 19.JUN.2019 15:05:12

Power Spectral density: -3,26 dBm @ 2410,730 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(2)**

Under normal test conditons	+8dBm in any 3 kHz band

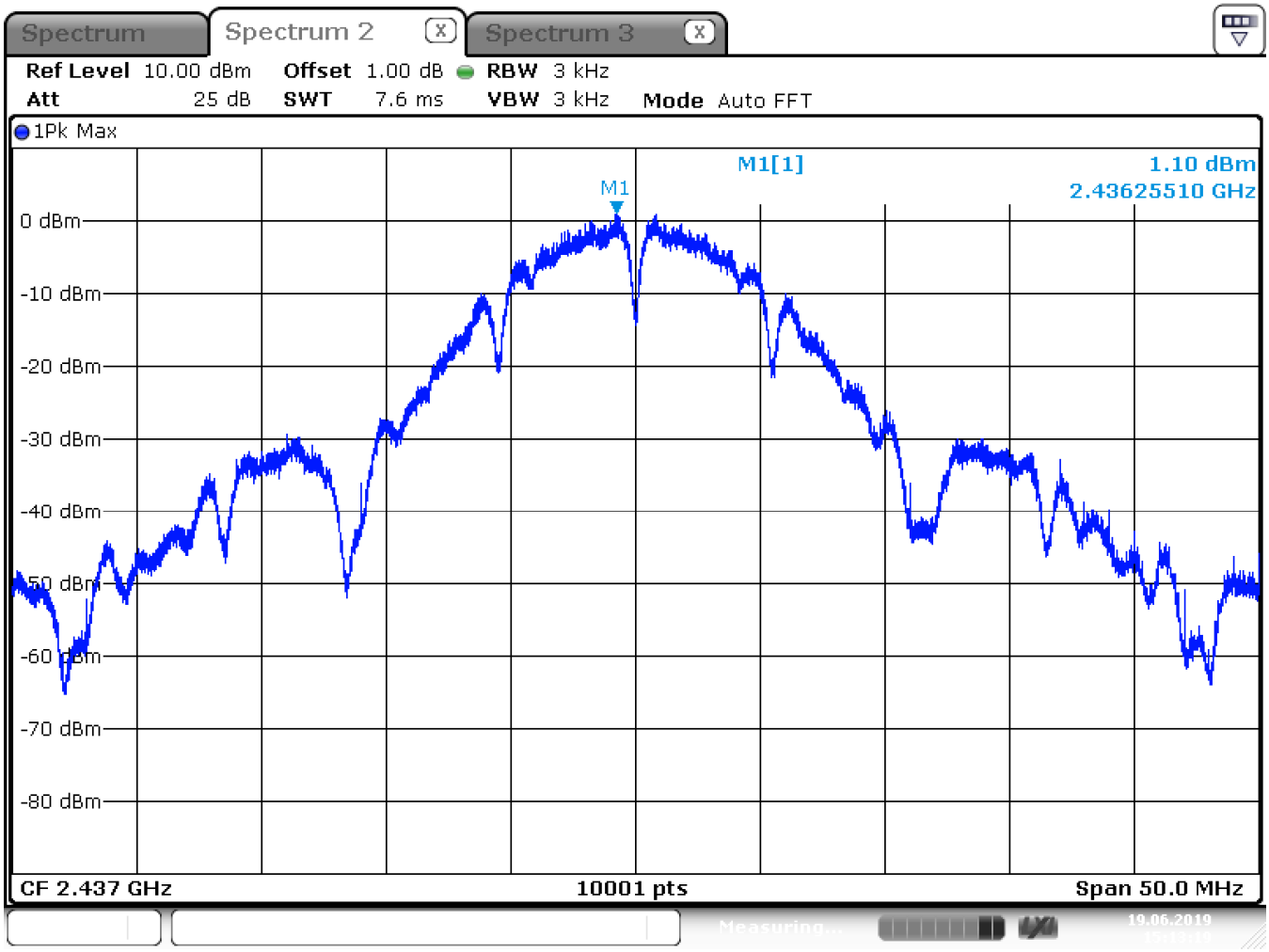
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

Power spectral density (conducted) **§ 15.247(e)**
5.2(2)

Conducted Measurement – Antenna 2

Rated output power: 173,78 mW Channel 6 (2437 MHz center frequency) – DSSS



Date: 19.JUN.2019 15:13:19

Power Spectral density: 1,10 dBm @ 2436,255 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(2)**

Under normal test conditons	+8dBm in any 3 kHz band

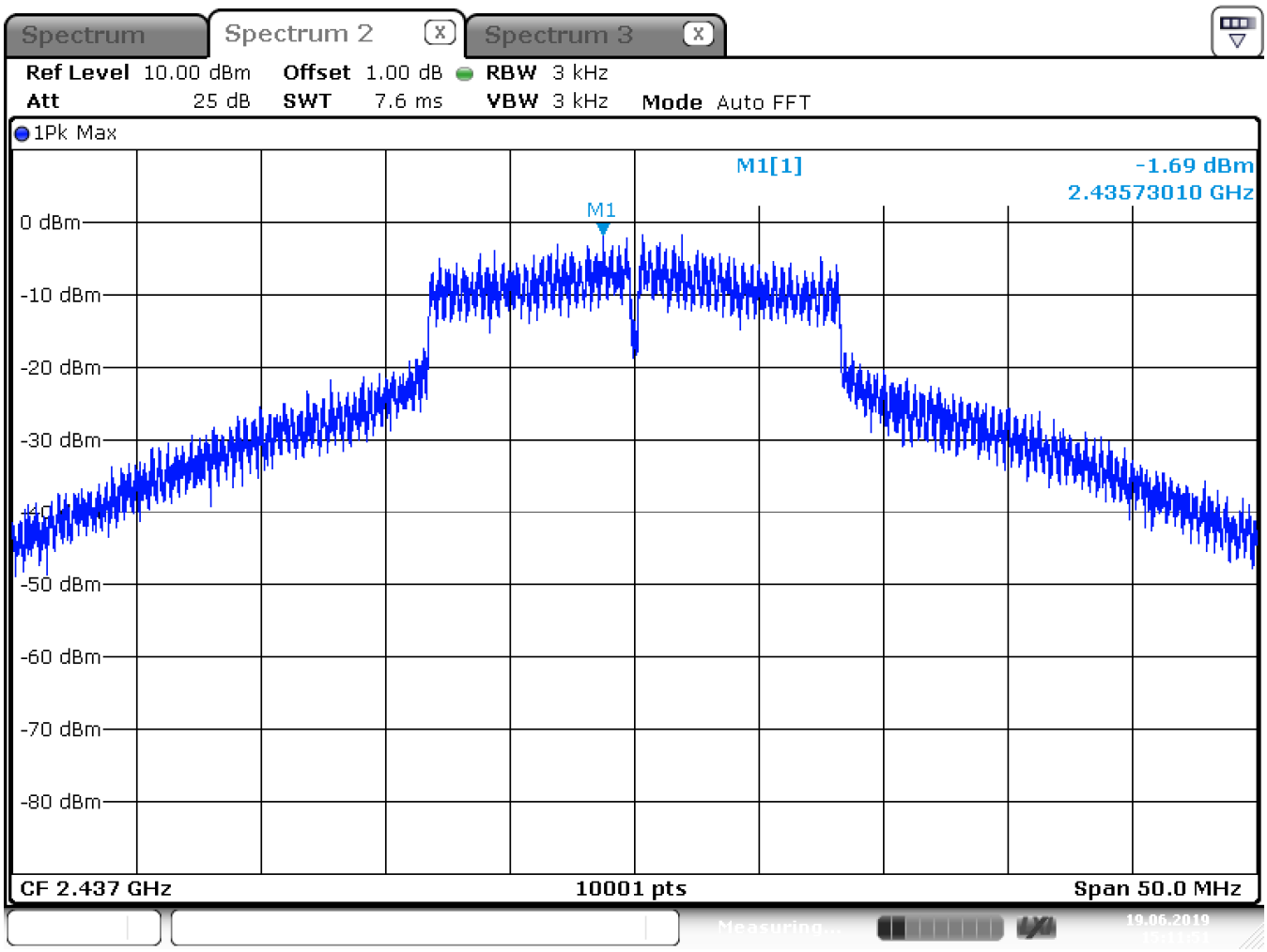
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

Power spectral density (conducted) **§ 15.247(e)**
5.2(2)

Conducted Measurement – Antenna 2

Rated output power: 173,78 mW Channel 6 (2437 MHz center frequency) – OFDM



Date: 19.JUN.2019 15:11:52

Power Spectral density: -1,69 dBm @ 2435,730 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(2)**

Under normal test conditons	+8dBm in any 3 kHz band

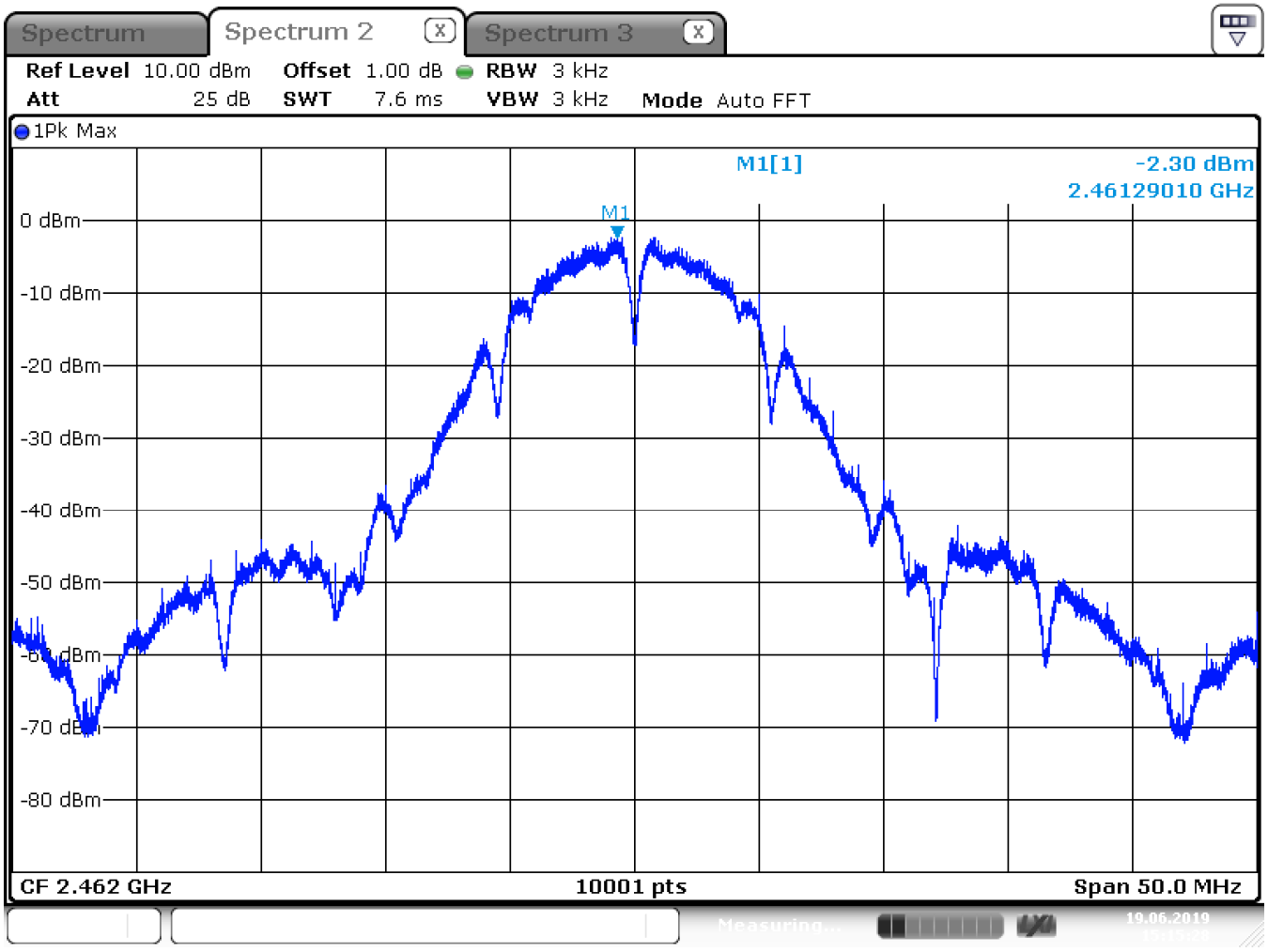
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

Power spectral density (conducted) **§ 15.247(e)**
5.2(2)

Conducted Measurement – Antenna 2

Rated output power: 173,78 mW Channel 11 (2462 MHz center frequency) – DSSS



Date: 19.JUN.2019 15:15:29

Power Spectral density: -2,30 dBm @ 2461,290 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(2)**

Under normal test conditons	+8dBm in any 3 kHz band

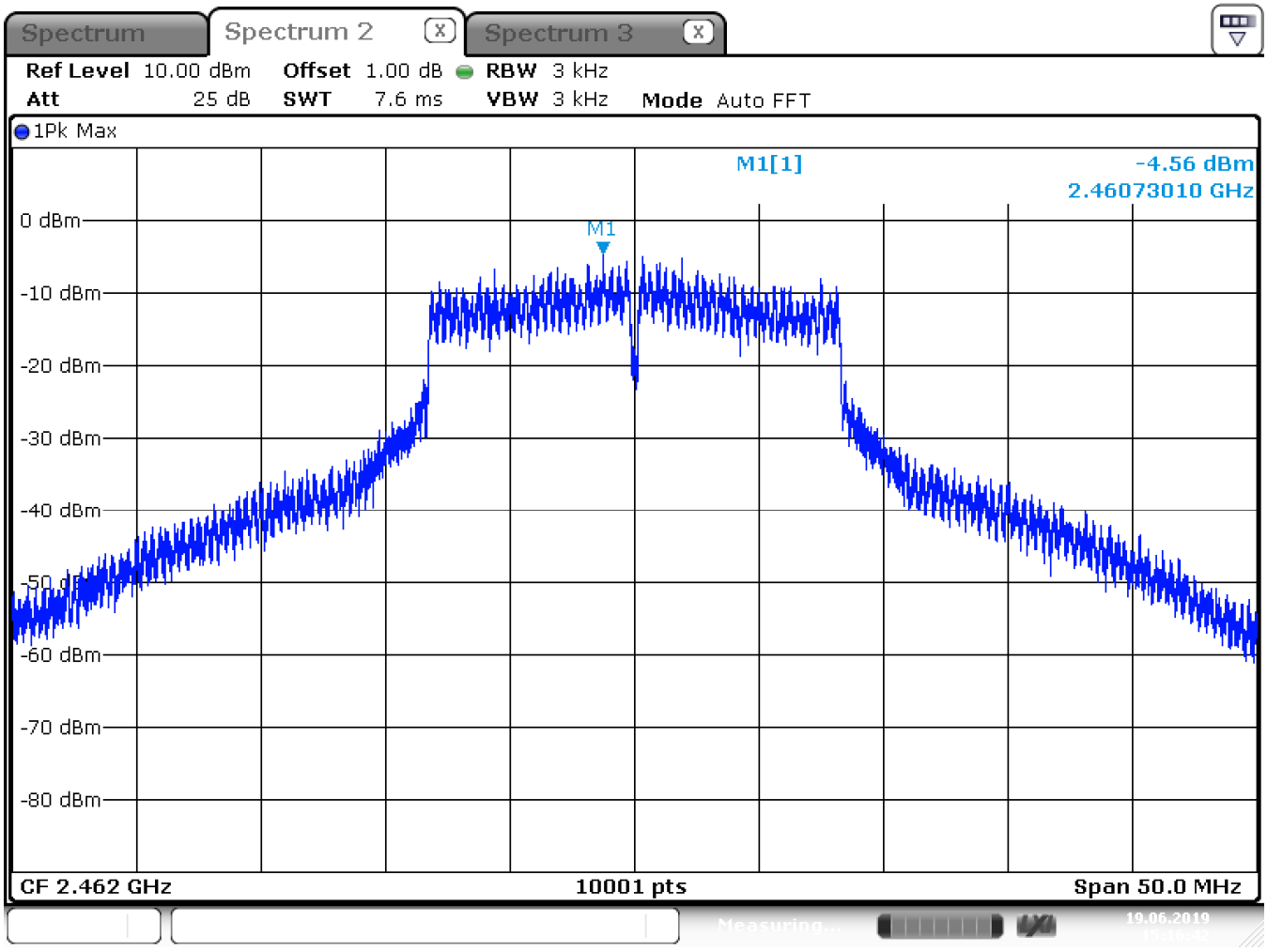
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

Power spectral density (conducted) **§ 15.247(e) 5.2(2)**

Conducted Measurement – Antenna 2

Rated output power: 173,78 mW Channel 11 (2462 MHz center frequency) – OFDM



Date: 19.JUN.2019 15:16:42

Power Spectral density: -4,56 dBm @ 2460,730 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(2)**

Under normal test conditons	+8dBm in any 3 kHz band

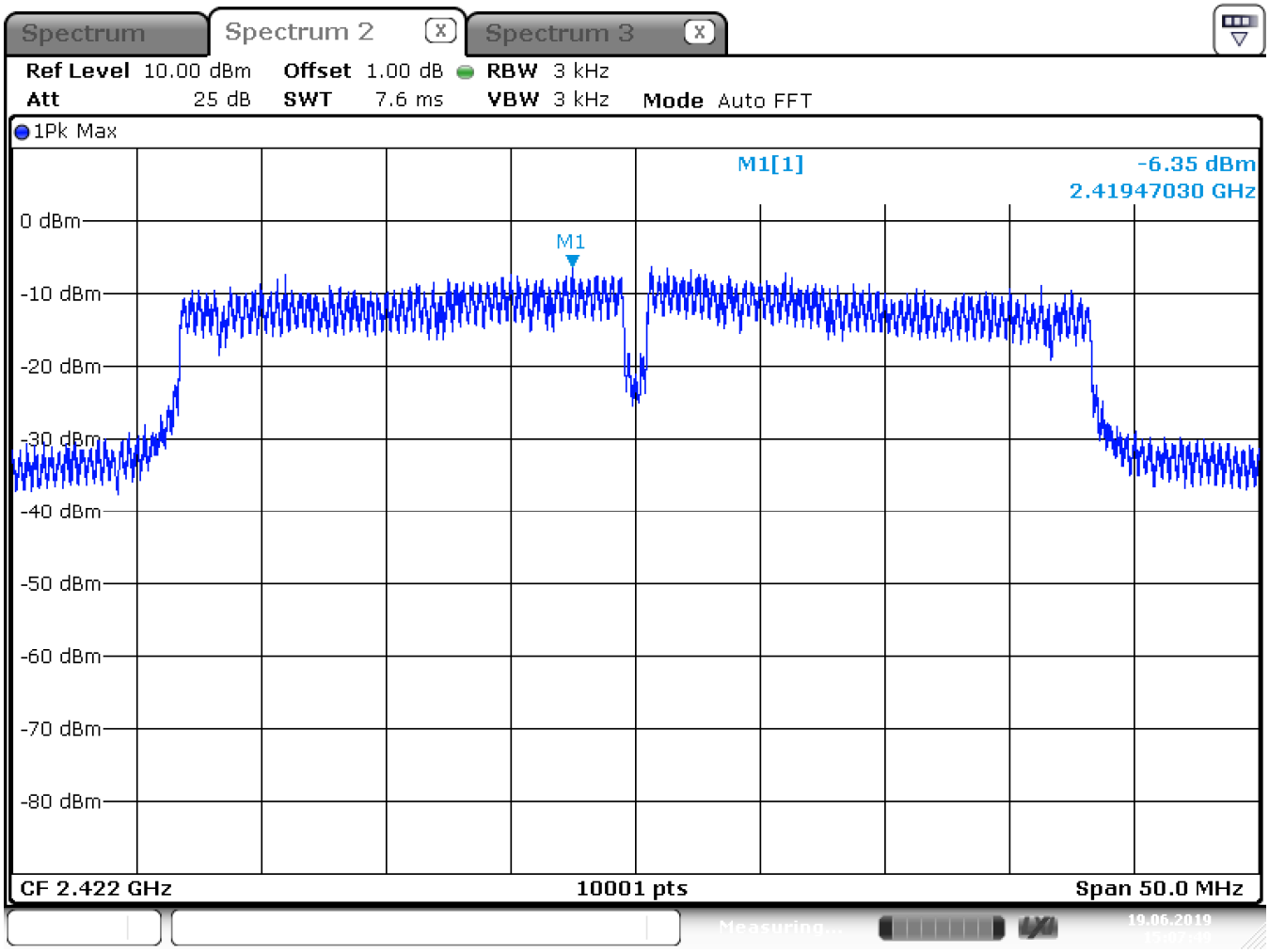
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

Power spectral density (conducted) **§ 15.247(e)**
5.2(2)

Conducted Measurement – Antenna 2

Rated output power: 173,78 mW Channel 1 + 5 (2422 MHz center frequency)



Date: 19.JUN.2019 15:07:49

Power Spectral density: -6,35 dBm @ 2419,470 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(2)**

Under normal test conditons	+8dBm in any 3 kHz band

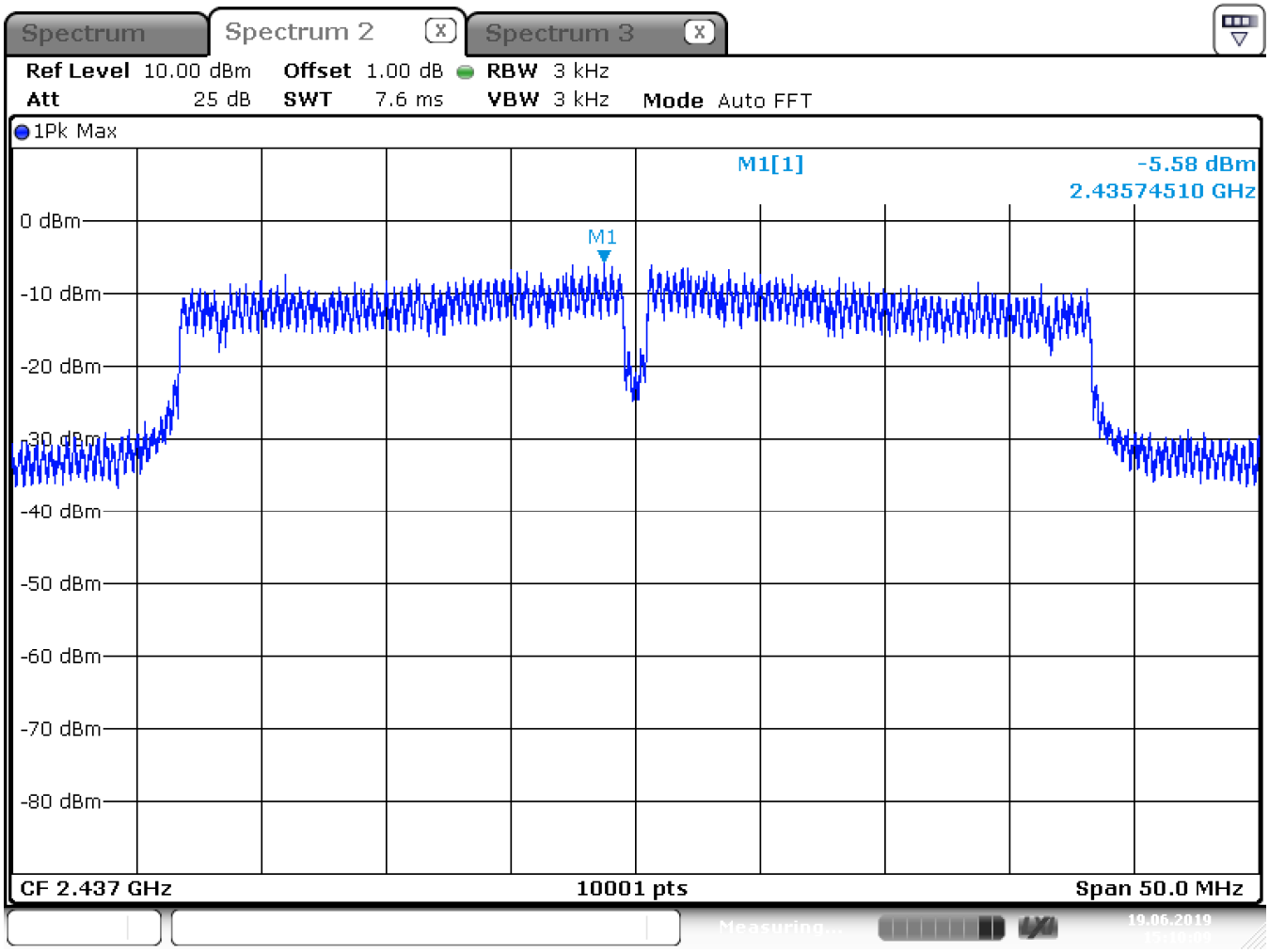
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

Power spectral density (conducted) **§ 15.247(e)**
5.2(2)

Conducted Measurement – Antenna 2

Rated output power: 173,78 mW Channel 4 + 8 (2437 MHz center frequency)



Date: 19.JUN.2019 15:10:09

Power Spectral density: -5,58 dBm @ 2435,745 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(2)**

Under normal test conditons	+8dBm in any 3 kHz band

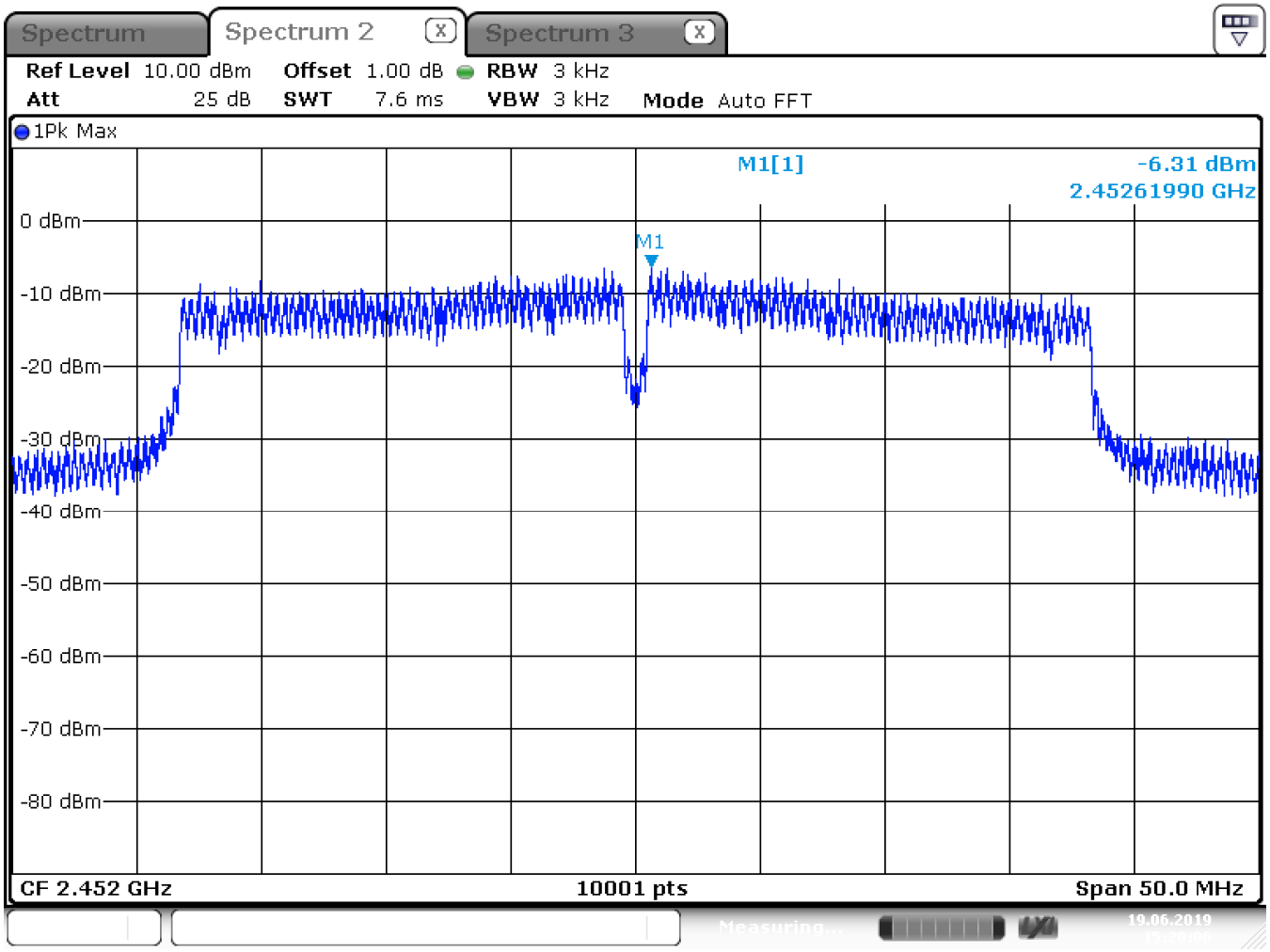
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

Power spectral density (conducted) **§ 15.247(e)**
5.2(2)

Conducted Measurement – Antenna 2

Rated output power: 173,78 mW Channel 7 + 11 (2452 MHz center frequency)



Date: 19.JUN.2019 15:20:06

Power Spectral density: -6,31 dBm @ 2452,620 MHz

LIMIT **SUBCLAUSE 15.247(e) – 5.2(2)**

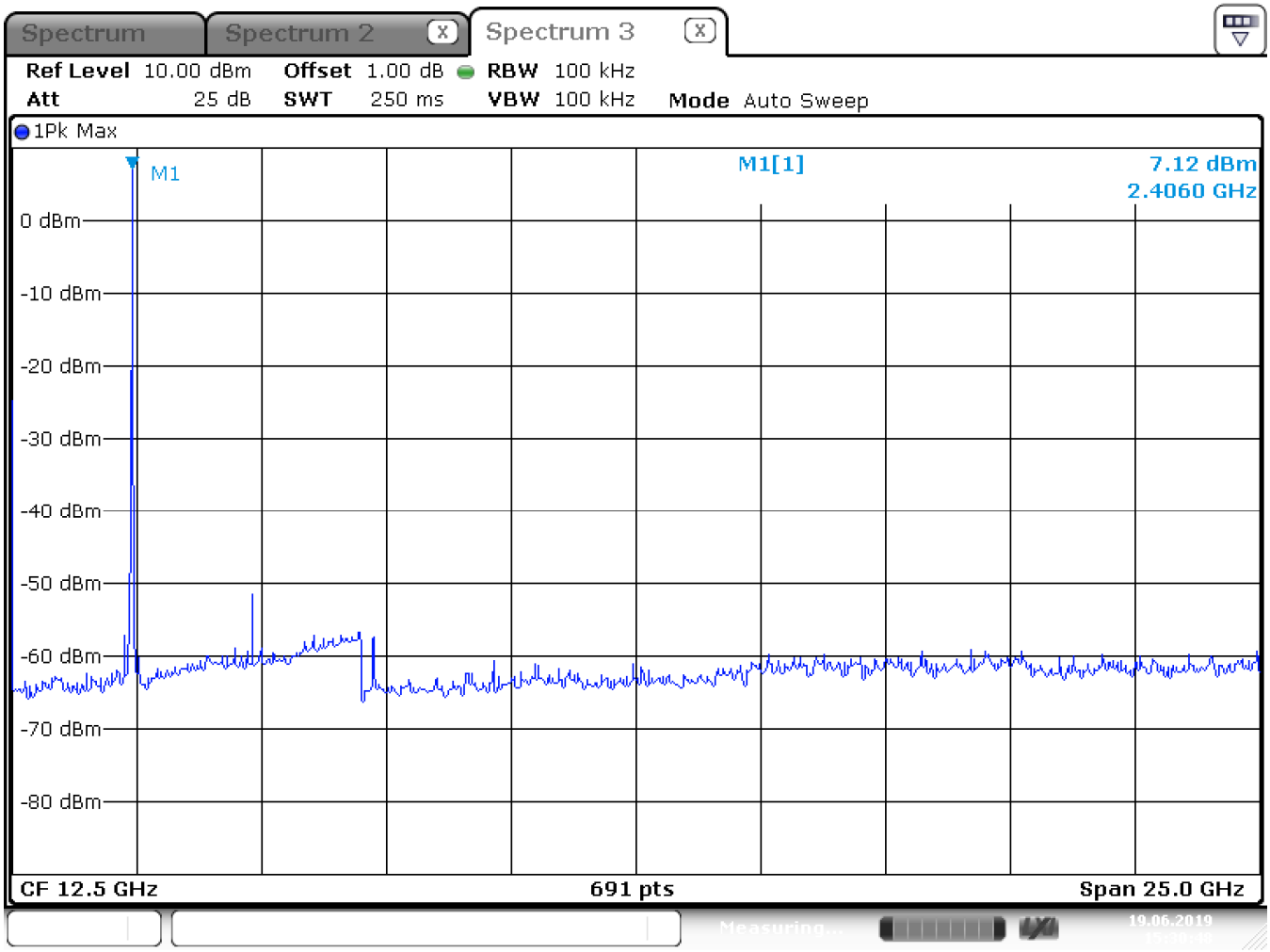
Under normal test conditons	+8dBm in any 3 kHz band

Test Equipment used: EMV-205

4.6. Out-of-band Emission **§ 15.247(d)**
Unwanted Emissions **5.5**

Conducted Measurement – Antenna 1

Setup: CH 1: 2412 MHz – DSSS



Date: 19.JUN.2019 15:30:48

LIMIT **SUBCLAUSE 15.247(d) – 5.5**

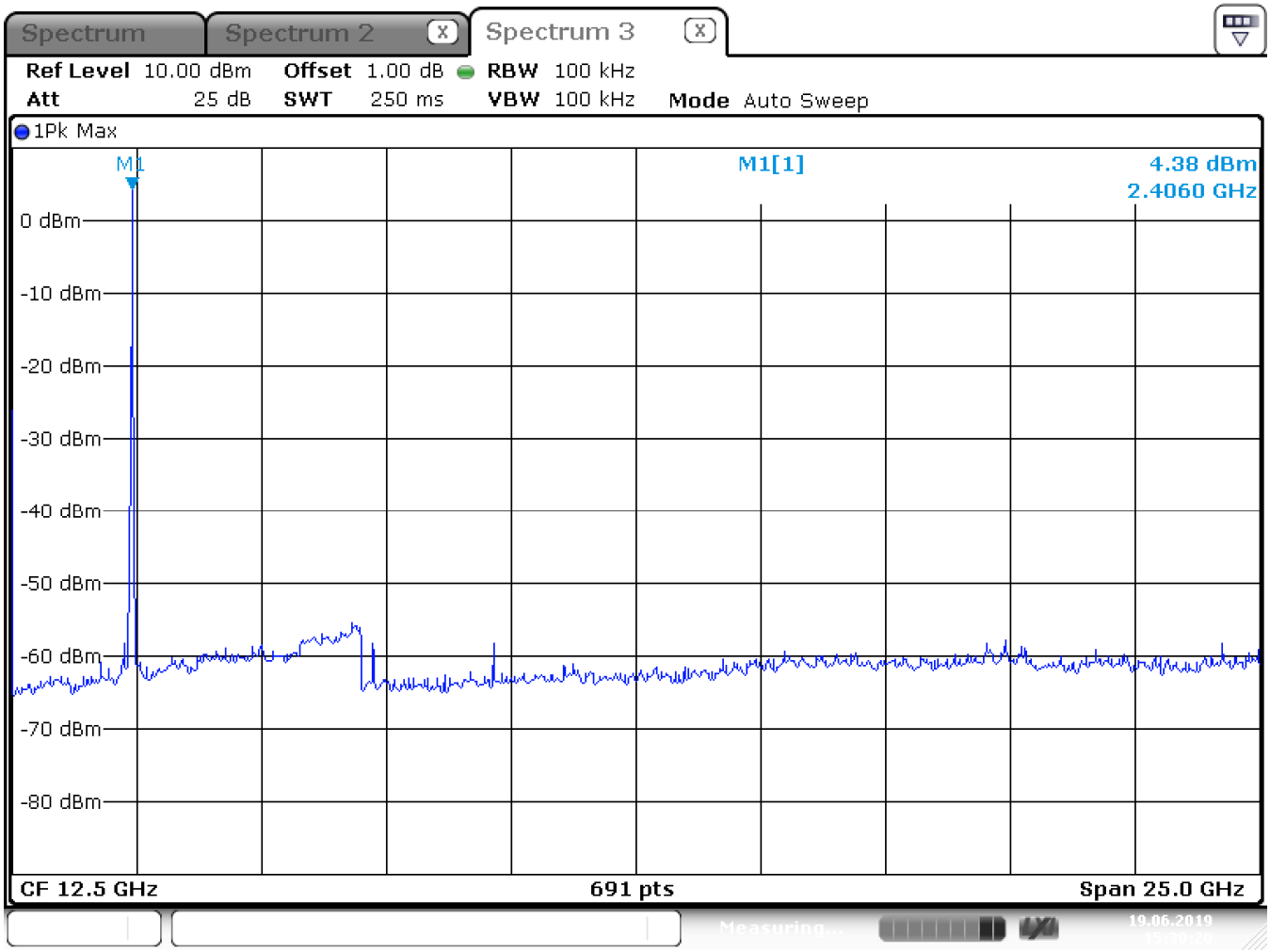
In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.	At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Test Equipment used: EMV-205

Out-of-band Emission **§ 15.247(d)**
Unwanted Emissions **5.5**

Conducted Measurement – Antenna 1

Setup: CH 1: 2412 MHz – OFDM



Date: 19.JUN.2019 15:30:21

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.

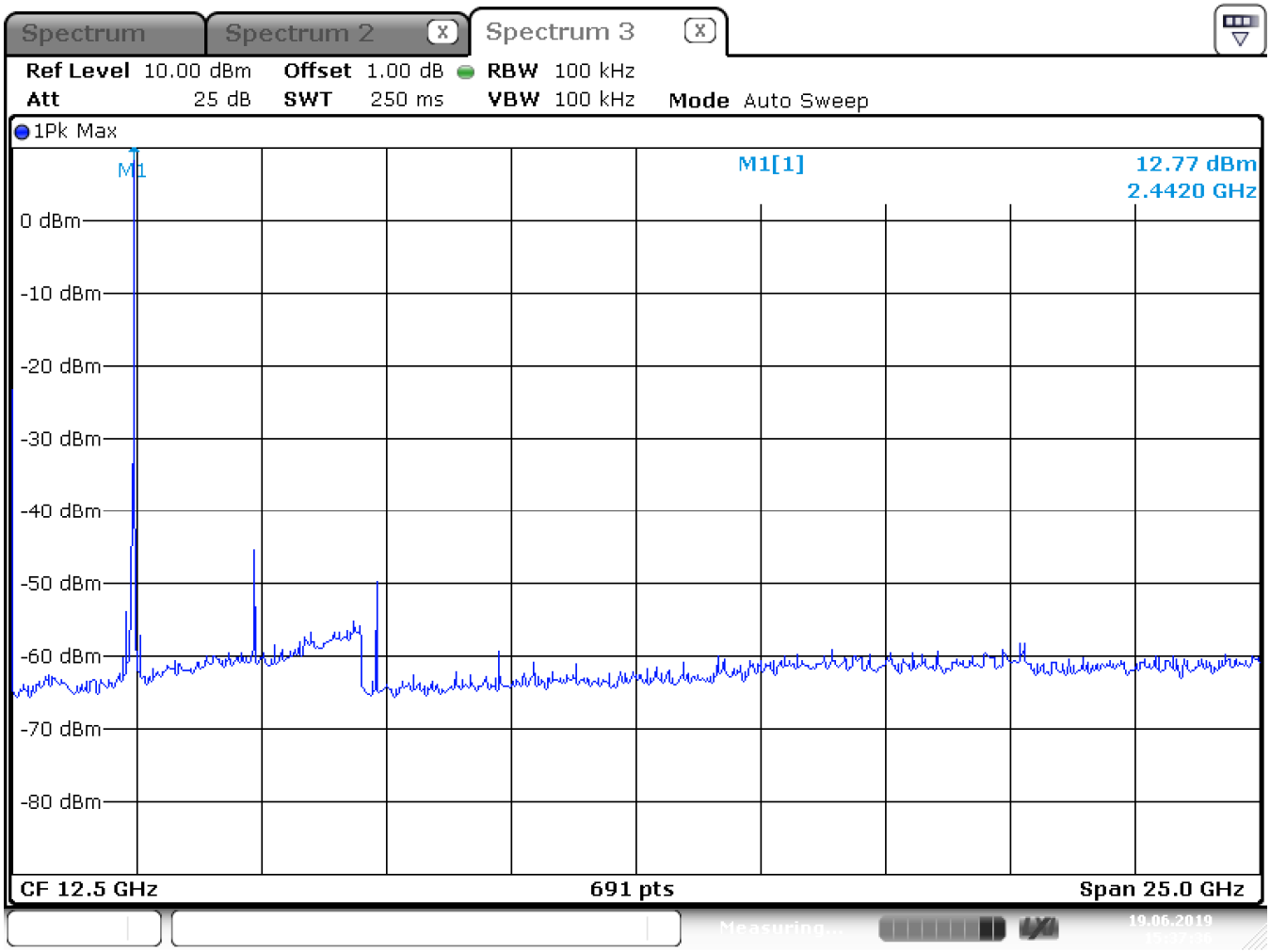
Test Equipment used: EMV-205

Ambient temperature: 23°C Relative humidity: 39%

Out-of-band Emission **§ 15.247(d)**
Unwanted Emissions **5.5**

Conducted Measurement – Antenna 1

Setup: CH 6: 2437 MHz – DSSS



Date: 19.JUN.2019 15:37:37

LIMIT **SUBCLAUSE 15.247(d) – 5.5**

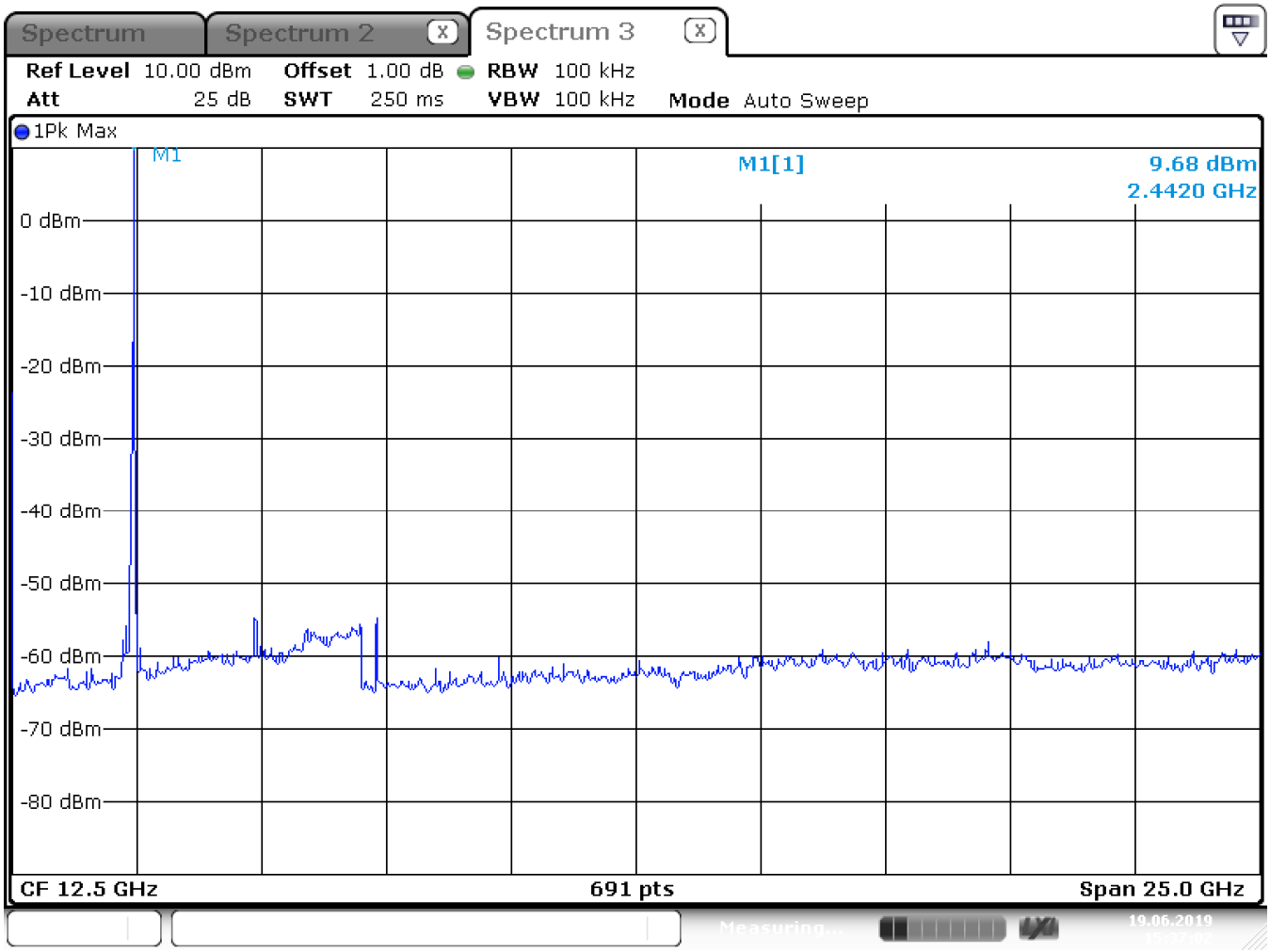
In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.	At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Test Equipment used: EMV-205

Out-of-band Emission **§ 15.247(d)**
Unwanted Emissions **5.5**

Conducted Measurement – Antenna 1

Setup: CH 6: 2437 MHz – OFDM



Date: 19.JUN.2019 15:37:02

LIMIT **SUBCLAUSE 15.247(d) – 5.5**

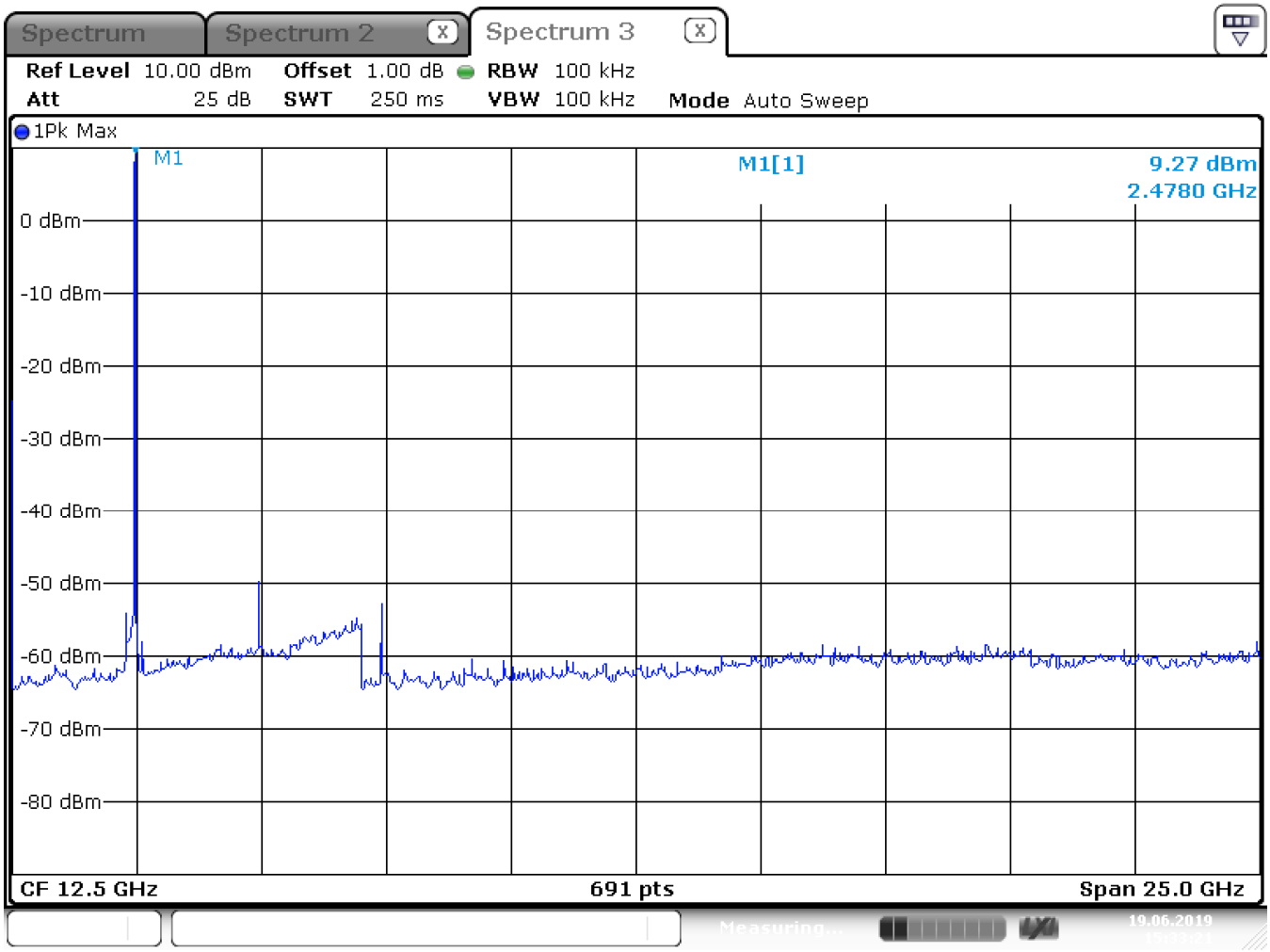
In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.	At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Test Equipment used: EMV-205

Out-of-band Emission **§ 15.247(d)**
Unwanted Emissions **5.5**

Conducted Measurement – Antenna 1

Setup: CH 11: 2462 MHz – DSSS



Date: 19.JUN.2019 15:33:21

LIMIT **SUBCLAUSE 15.247(d) – 5.5**

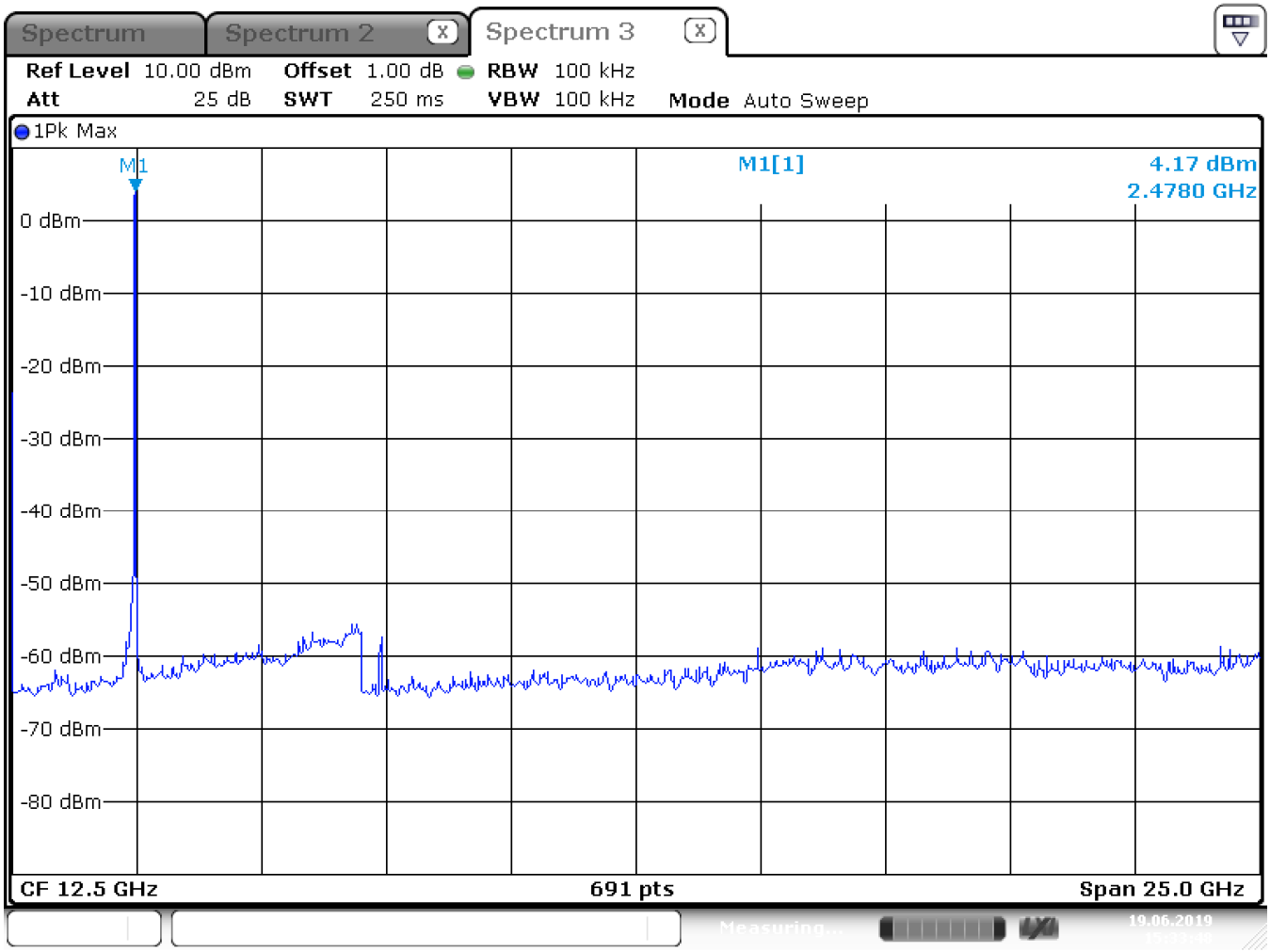
In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.	At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Test Equipment used: EMV-205

Out-of-band Emission **§ 15.247(d)**
Unwanted Emissions **5.5**

Conducted Measurement – Antenna 1

Setup: CH 11: 2462 MHz – OFDM



Date: 19.JUN.2019 15:33:48

LIMIT **SUBCLAUSE 15.247(d) – 5.5**

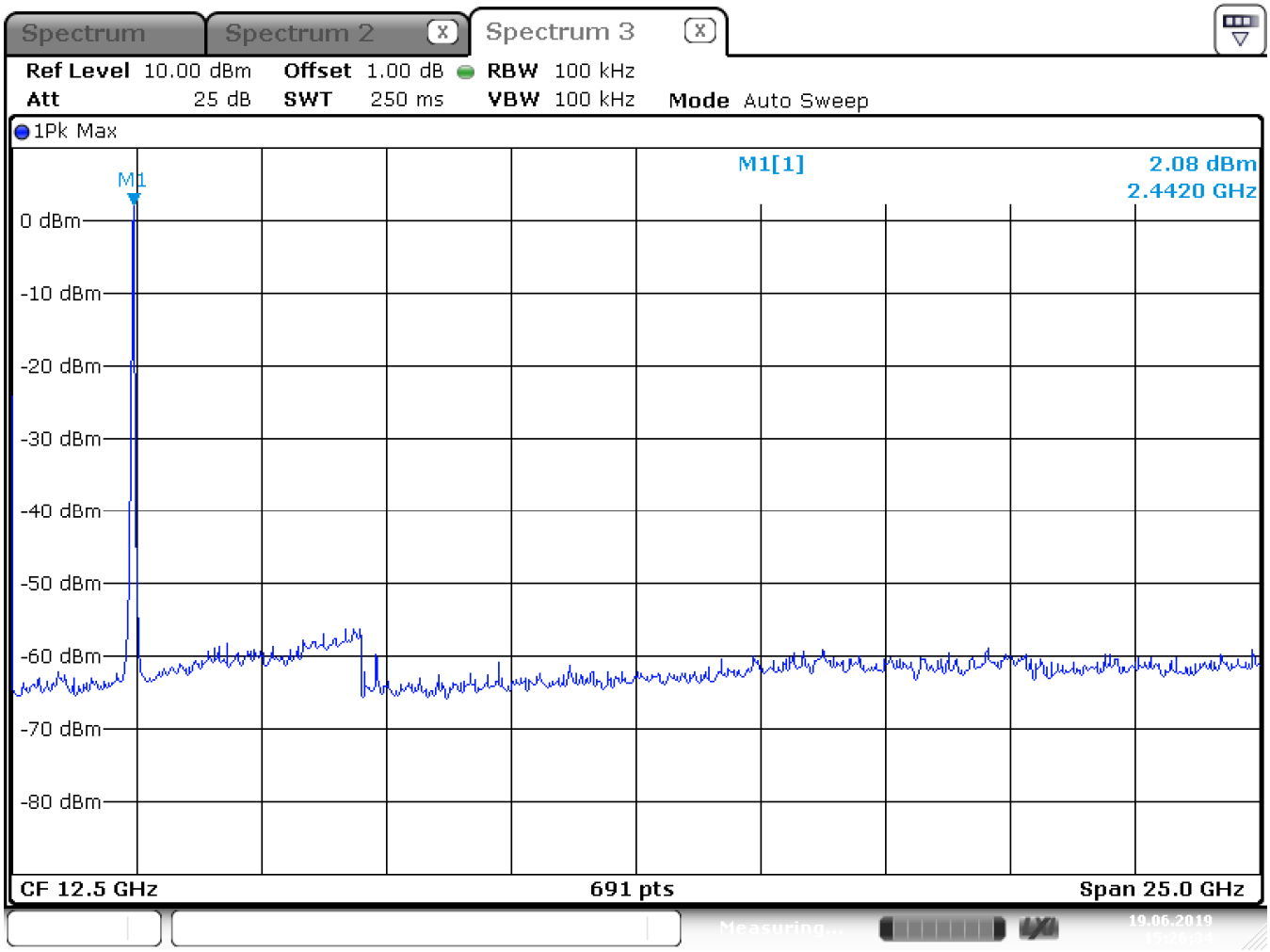
In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.	At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Test Equipment used: EMV-205

Out-of-band Emission **§ 15.247(d)**
Unwanted Emissions **5.5**

Conducted Measurement – Antenna 1

Setup: CH 1 + 5: 2422 MHz



Date: 19.JUN.2019 15:26:35

LIMIT **SUBCLAUSE 15.247(d) – 5.5**

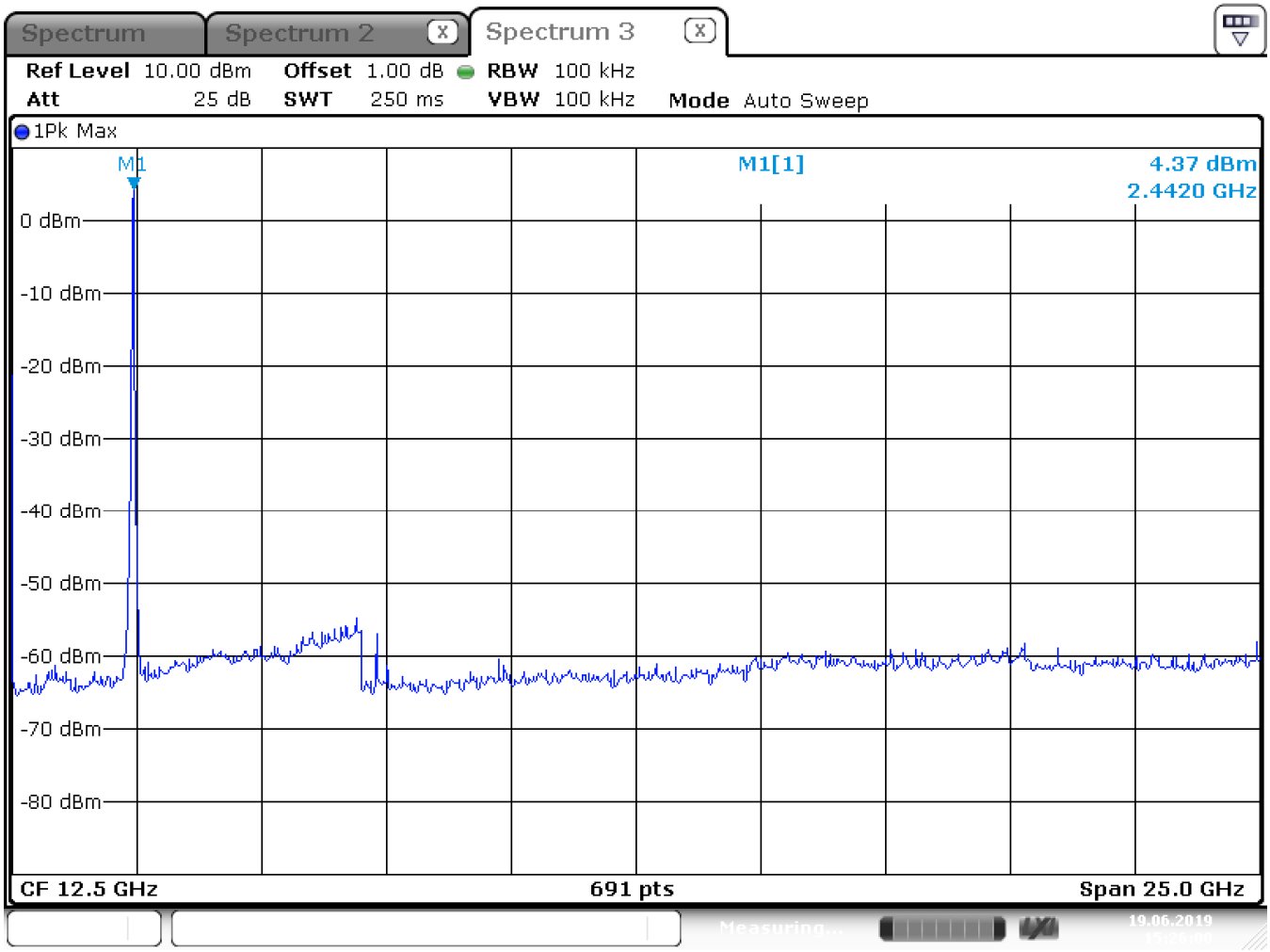
In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.	At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Test Equipment used: EMV-205

Out-of-band Emission **§ 15.247(d)**
Unwanted Emissions **5.5**

Conducted Measurement – Antenna 1

Setup: CH 4 + 8: 2437 MHz



Date: 19.JUN.2019 15:26:00

LIMIT **SUBCLAUSE 15.247(d) – 5.5**

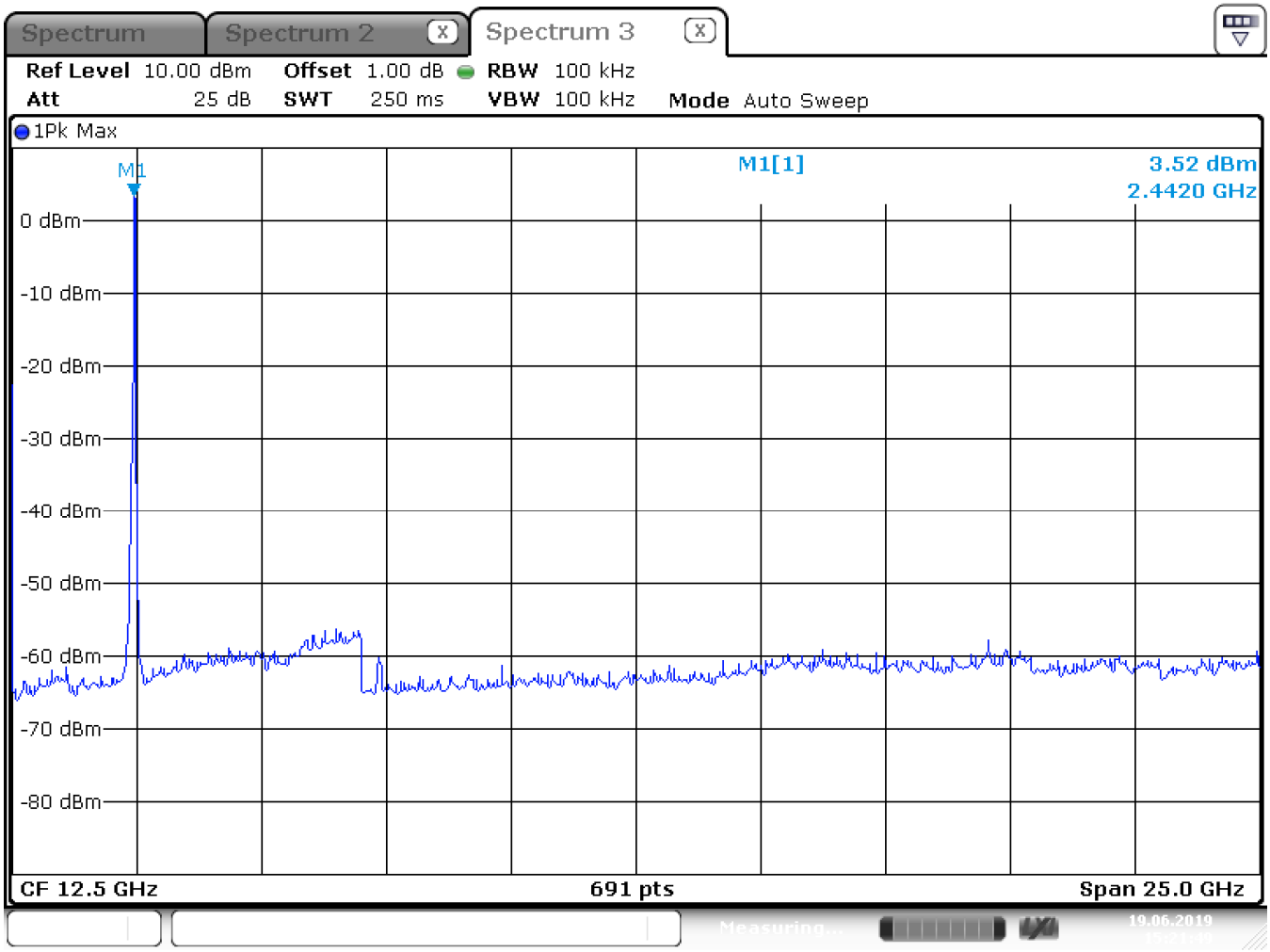
In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.	At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Test Equipment used: EMV-205

Out-of-band Emission **§ 15.247(d)**
Unwanted Emissions **5.5**

Conducted Measurement – Antenna 1

Setup: CH 7 + 11: 2452 MHz



Date: 19.JUN.2019 15:21:49

LIMIT **SUBCLAUSE 15.247(d) – 5.5**

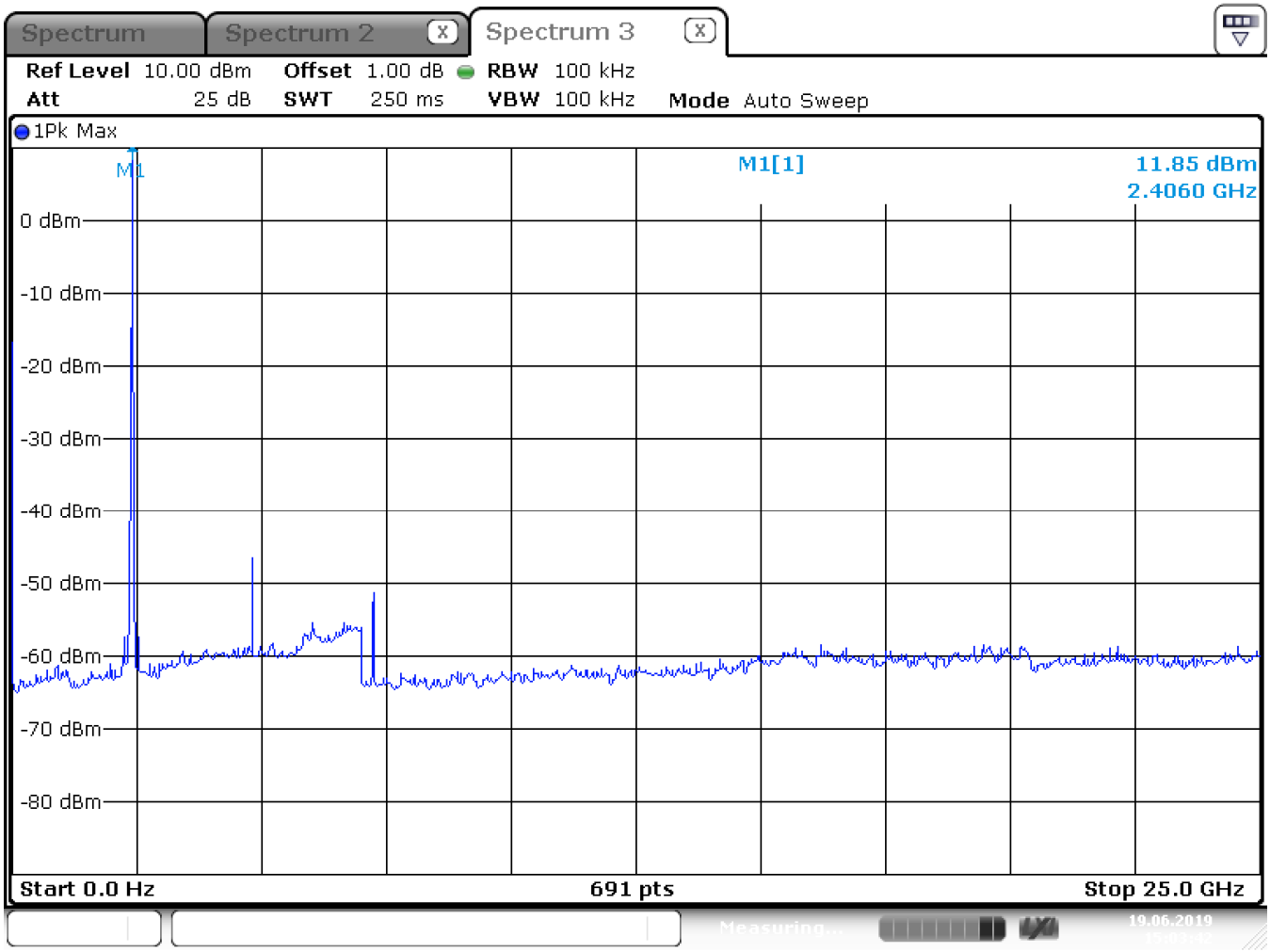
In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.	At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Test Equipment used: EMV-205

Out-of-band Emission **§ 15.247(d)**
Unwanted Emissions **5.5**

Conducted Measurement – Antenna 2

Setup: CH 1: 2412 MHz – DSSS



Date: 19.JUN.2019 15:03:42

LIMIT **SUBCLAUSE 15.247(d) – 5.5**

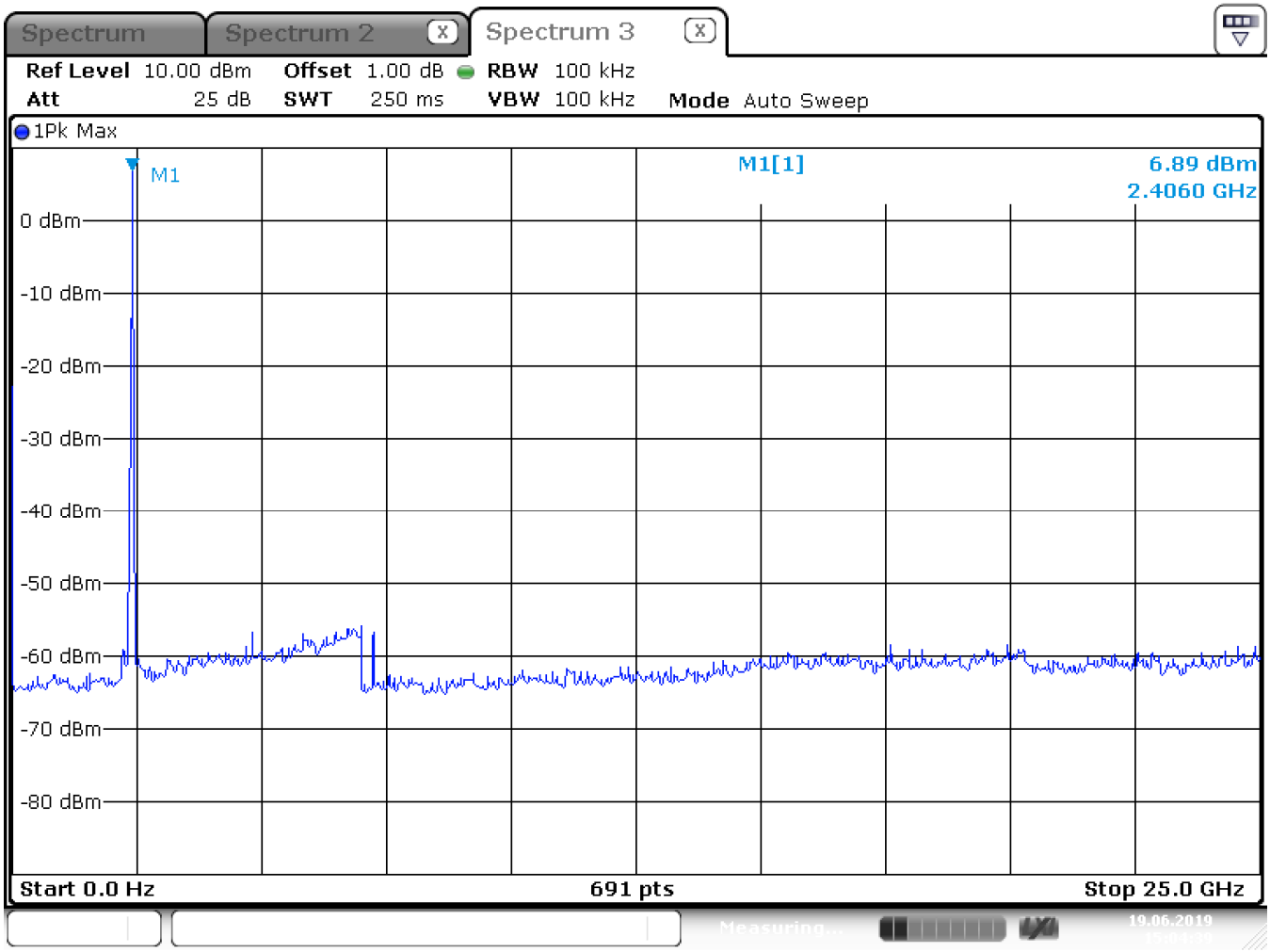
In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.	At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Test Equipment used: EMV-205

Out-of-band Emission **§ 15.247(d)**
Unwanted Emissions **5.5**

Conducted Measurement – Antenna 2

Setup: CH 1: 2412 MHz – OFDM



Date: 19.JUN.2019 15:04:40

LIMIT **SUBCLAUSE 15.247(d) – 5.5**

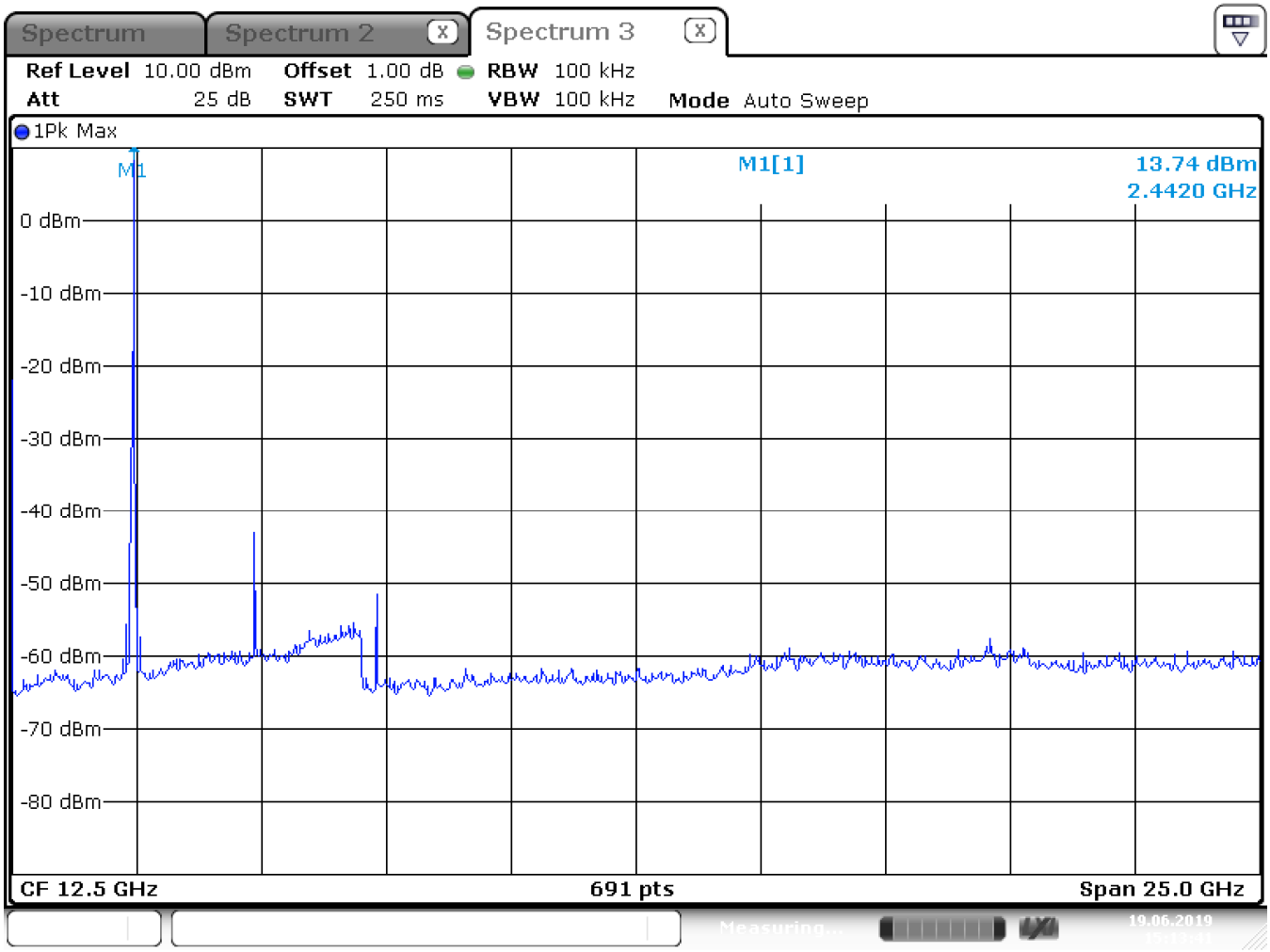
In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.	At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Test Equipment used: EMV-205

Out-of-band Emission **§ 15.247(d)**
Unwanted Emissions **5.5**

Conducted Measurement – Antenna 2

Setup: CH 6: 2437 MHz – DSSS



Date: 19.JUN.2019 15:13:41

LIMIT **SUBCLAUSE 15.247(d) – 5.5**

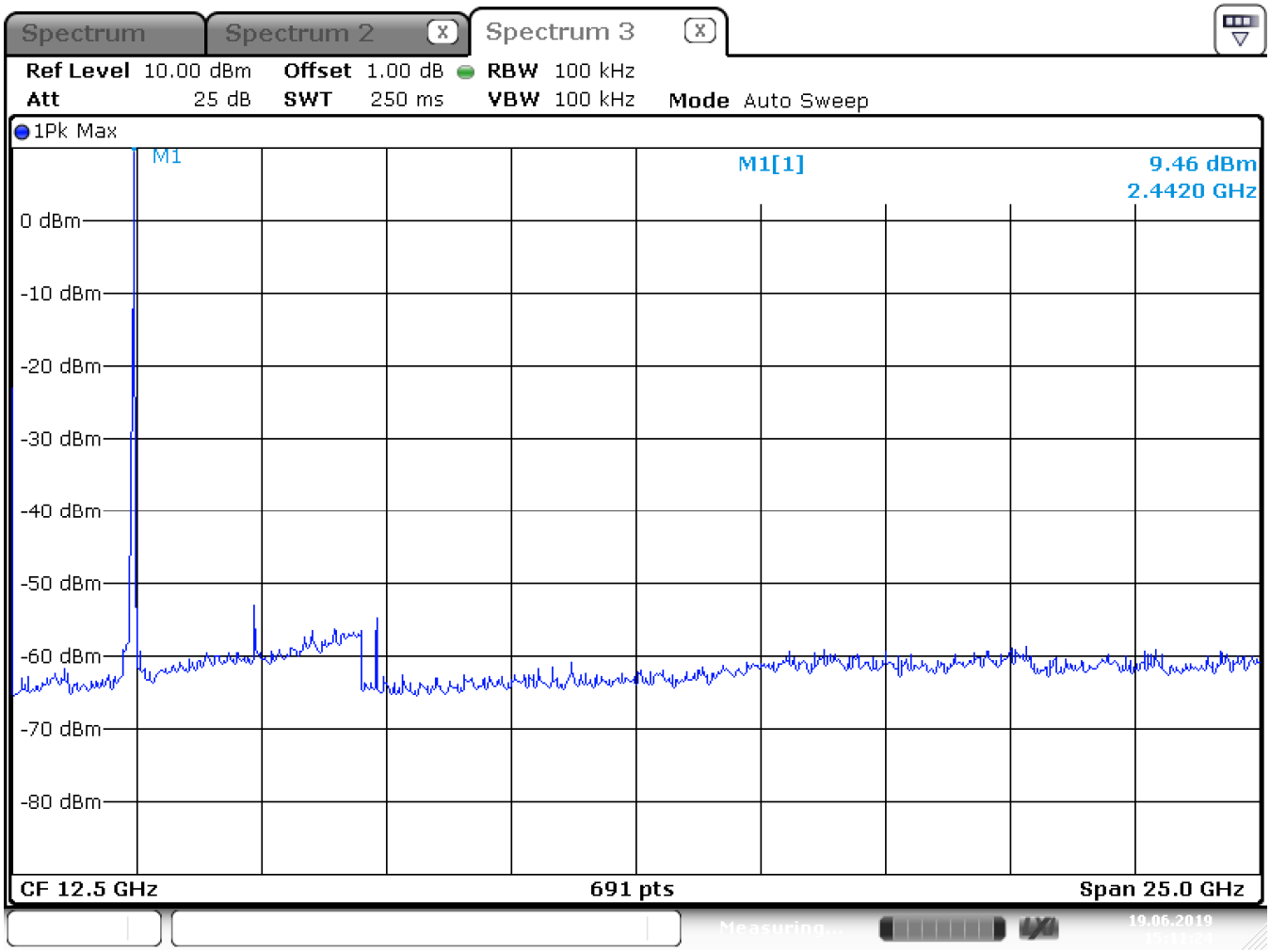
In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.	At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Test Equipment used: EMV-205

Out-of-band Emission **§ 15.247(d)**
Unwanted Emissions **5.5**

Conducted Measurement – Antenna 2

Setup: CH 6: 2437 MHz – OFDM



Date: 19.JUN.2019 15:11:24

LIMIT **SUBCLAUSE 15.247(d) – 5.5**

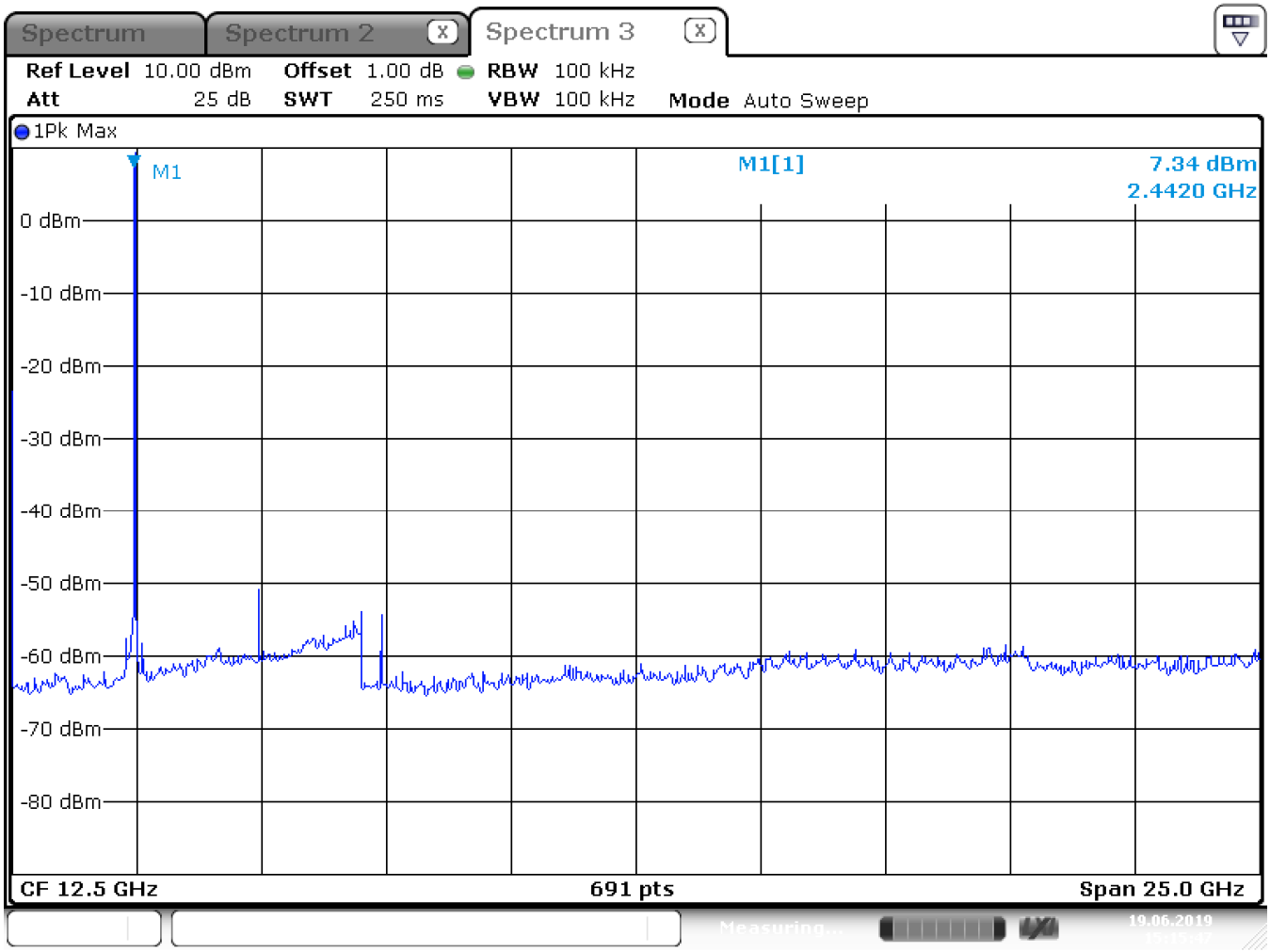
In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.	At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Test Equipment used: EMV-205

Out-of-band Emission **§ 15.247(d)**
Unwanted Emissions **5.5**

Conducted Measurement – Antenna 2

Setup: CH 11: 2462 MHz – DSSS



Date: 19.JUN.2019 15:15:48

LIMIT **SUBCLAUSE 15.247(d) – 5.5**

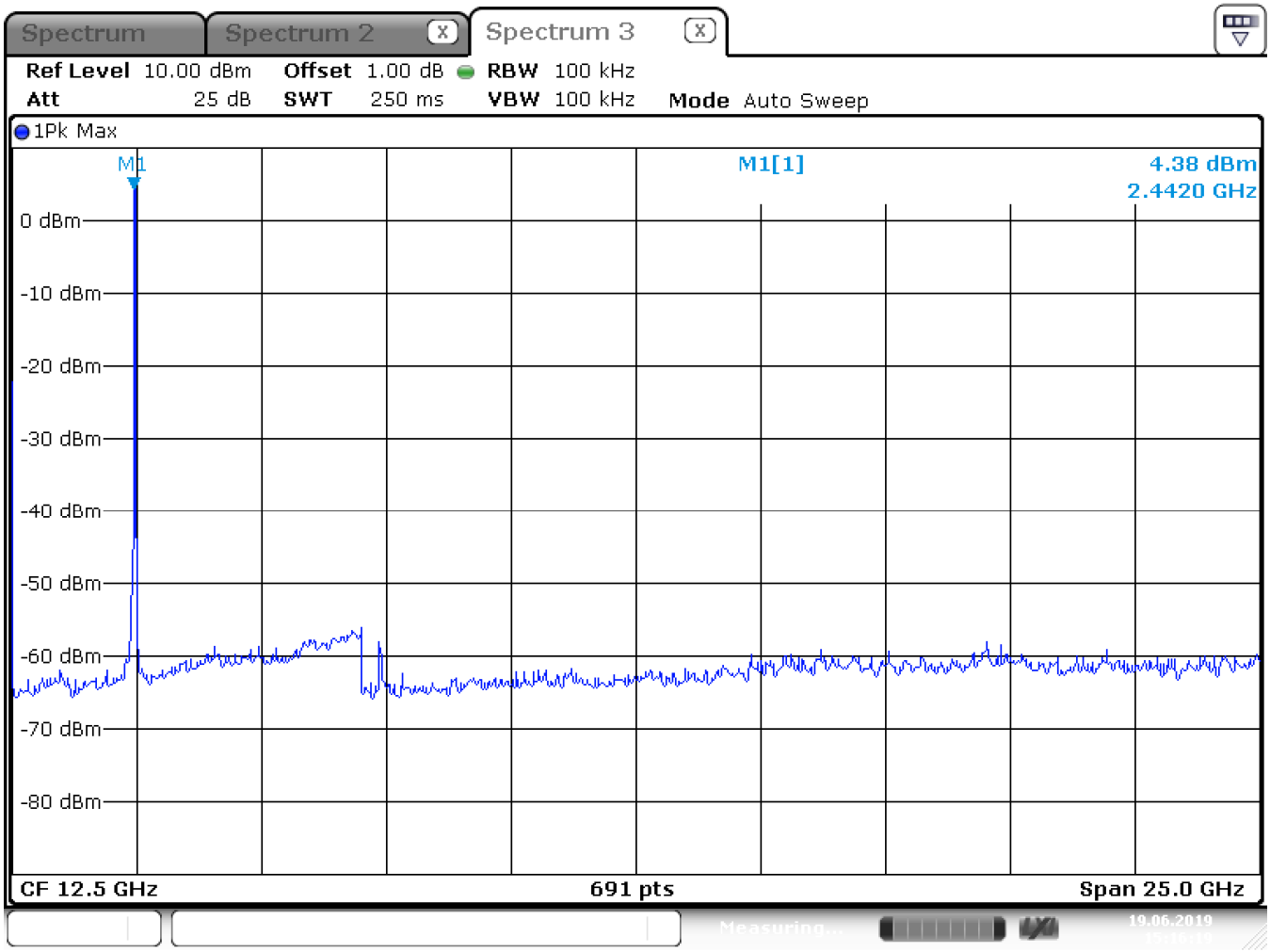
In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.	At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Test Equipment used: EMV-205

Out-of-band Emission **§ 15.247(d)**
Unwanted Emissions **5.5**

Conducted Measurement – Antenna 2

Setup: CH 11: 2462 MHz – OFDM



Date: 19.JUN.2019 15:16:19

LIMIT **SUBCLAUSE 15.247(d) – 5.5**

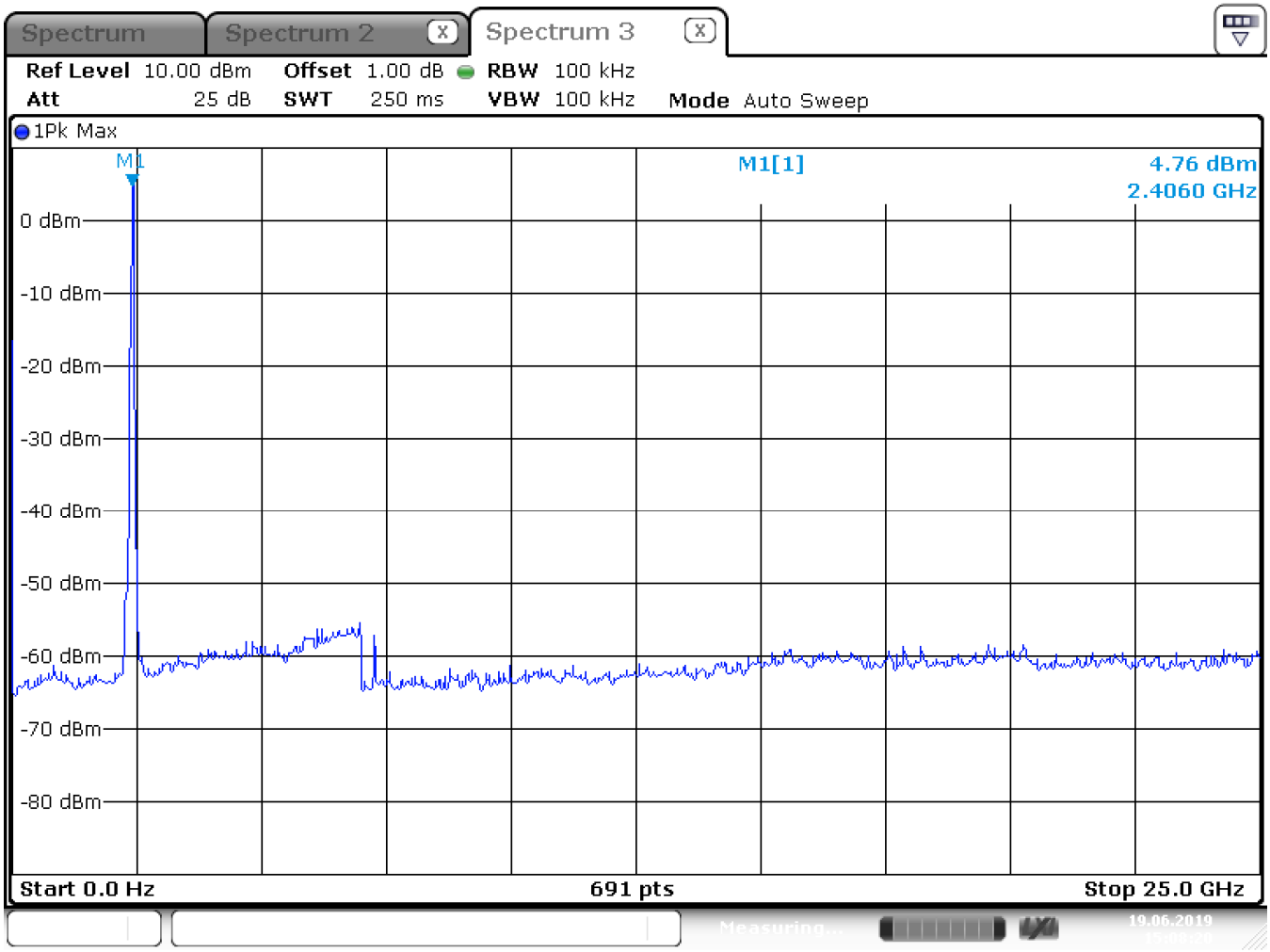
In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.	At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Test Equipment used: EMV-205

Out-of-band Emission **§ 15.247(d)**
Unwanted Emissions **5.5**

Conducted Measurement – Antenna 2

Setup: CH 1 + 5: 2422 MHz



Date: 19.JUN.2019 15:08:21

LIMIT **SUBCLAUSE 15.247(d) – 5.5**

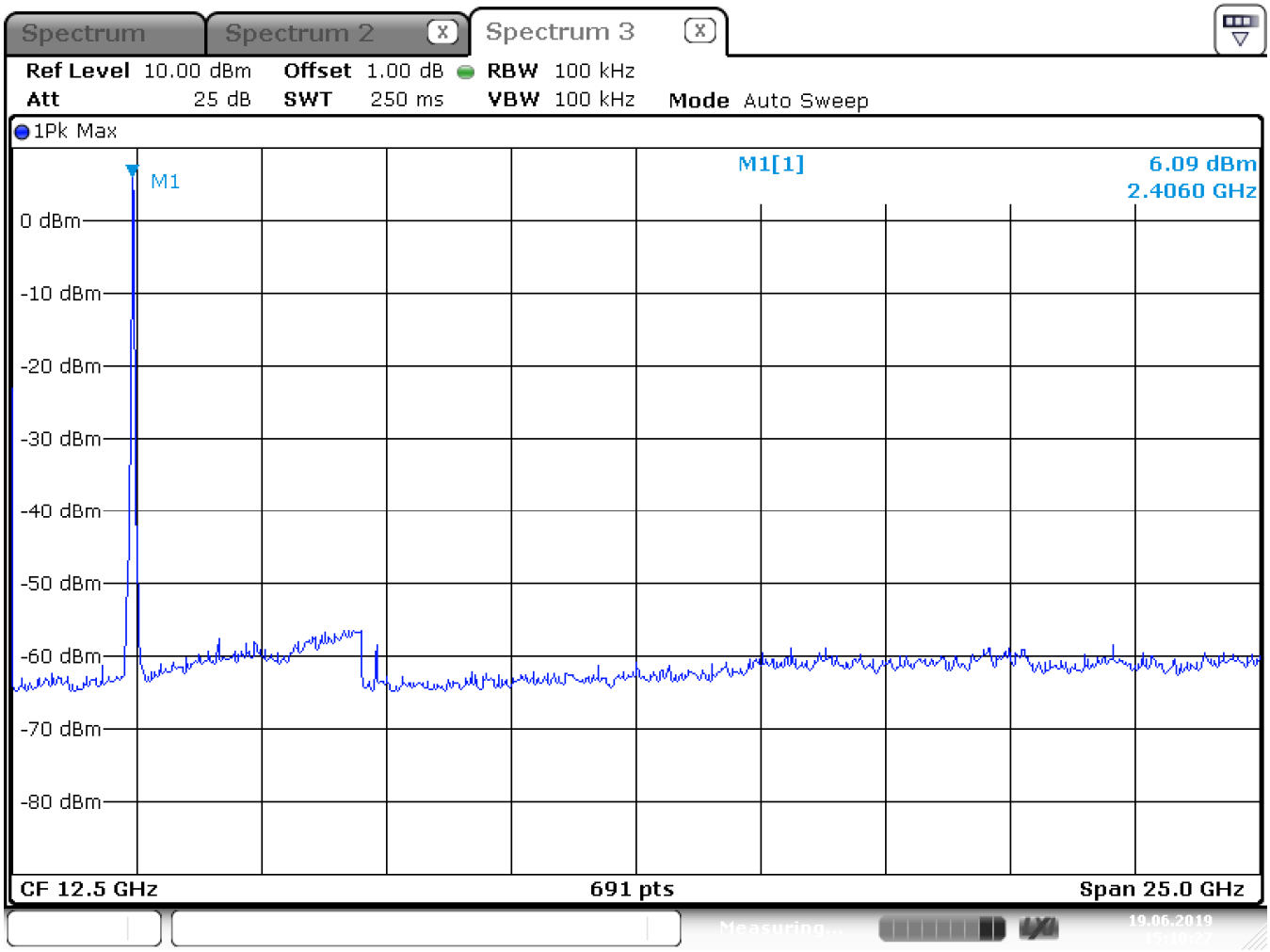
In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.	At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Test Equipment used: EMV-205

Out-of-band Emission **§ 15.247(d)**
Unwanted Emissions **5.5**

Conducted Measurement – Antenna 2

Setup: CH 4 + 8: 2437 MHz



Date: 19.JUN.2019 15:10:27

LIMIT **SUBCLAUSE 15.247(d) – 5.5**

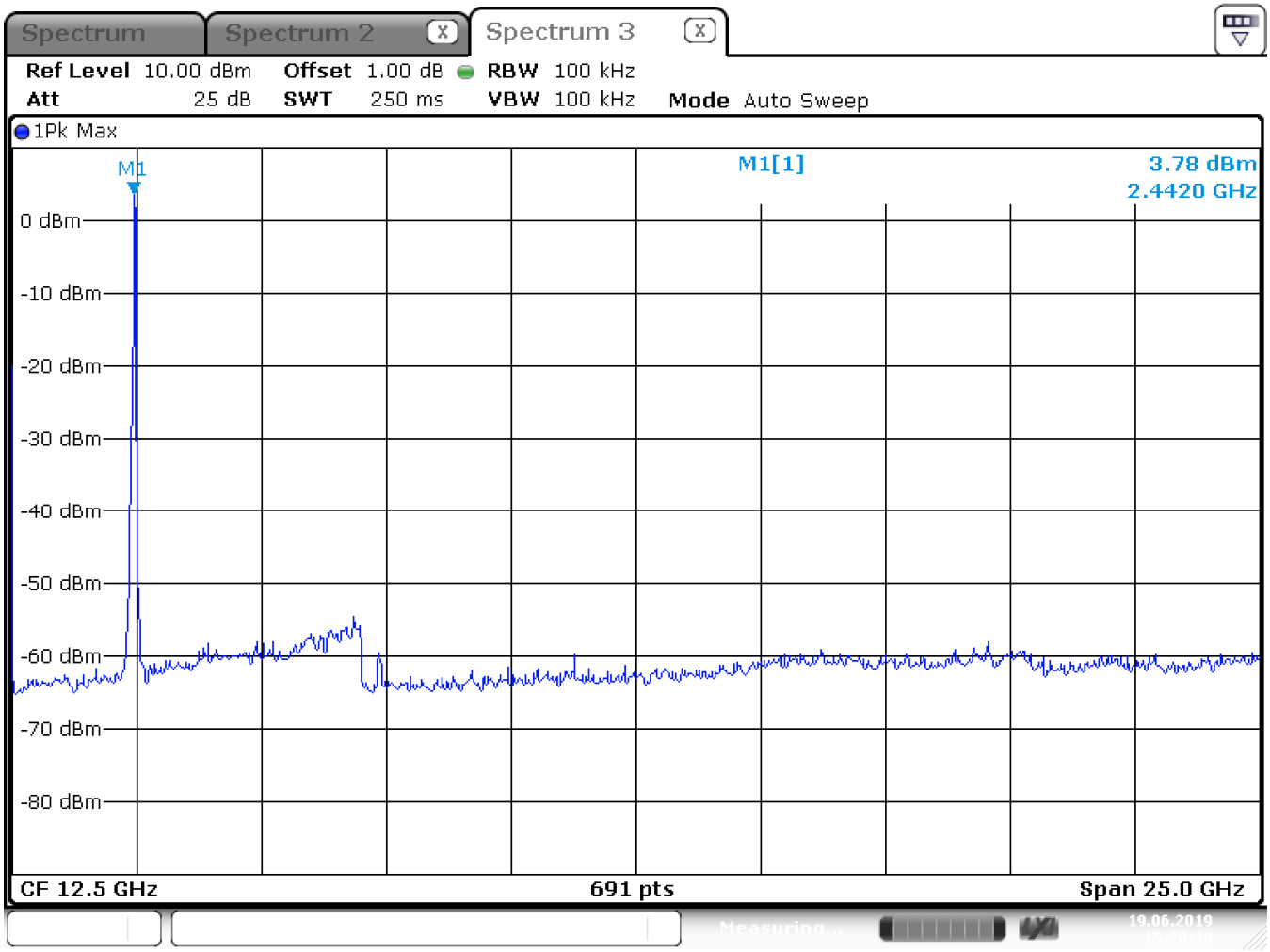
In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.	At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Test Equipment used: EMV-205

Out-of-band Emission **§ 15.247(d)**
Unwanted Emissions **5.5**

Conducted Measurement – Antenna 2

Setup: CH 7 + 11: 2452 MHz



Date: 19.JUN.2019 15:20:31

LIMIT **SUBCLAUSE 15.247(d) – 5.5**

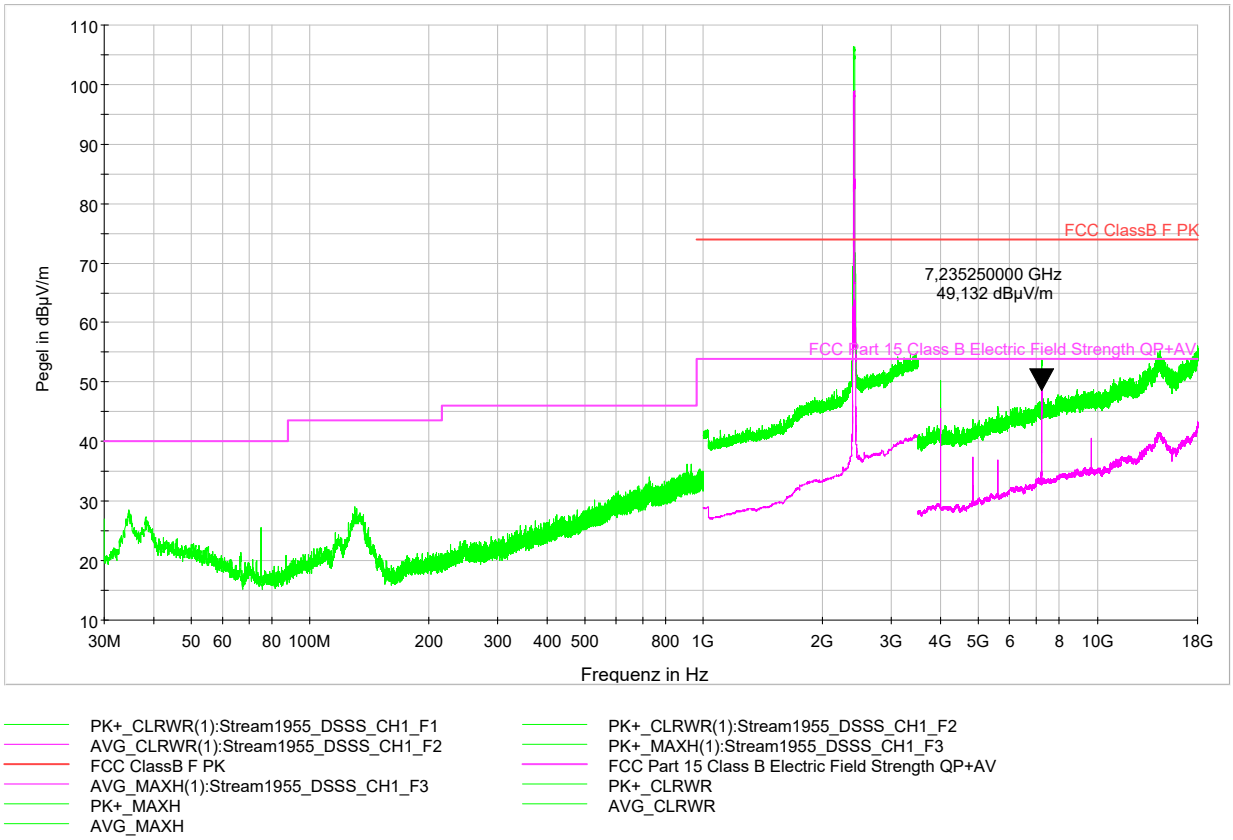
In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.	At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Test Equipment used: EMV-205

4.7. 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):

Setup: CH 1: 2412 MHz – DSSS – Both antennas



Worst case emission: Average @ 7235,25 MHz: 49,1 dBµV/m
Remark: Although the measurement above ends at 18 GHz, all measurements were performed up to the thenth harmonics of the transmitter frequency.

LIMIT **SUBCLAUSE 15.209(a) – RSS-Gen**

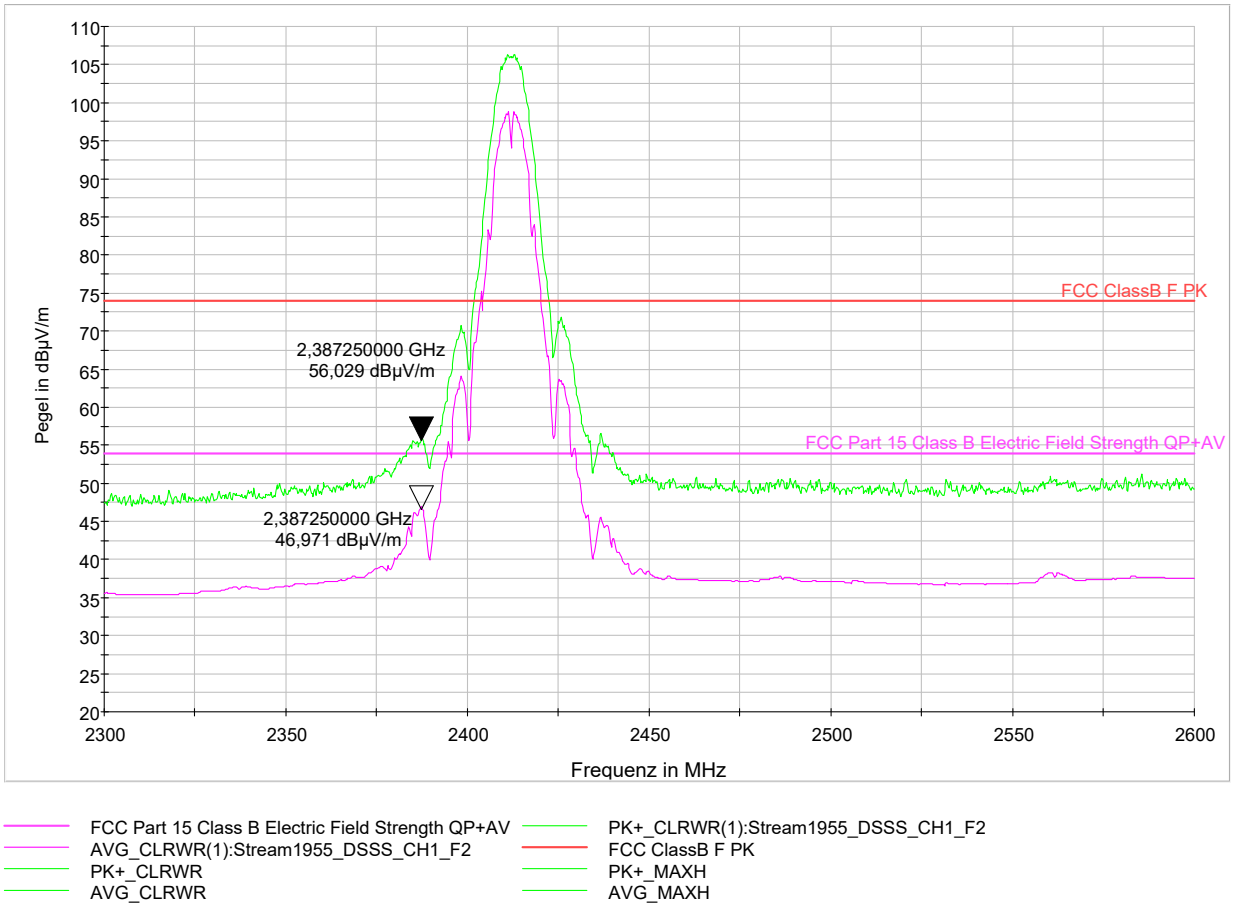
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

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: CH 1: 2412 MHz – DSSS – both Antennas



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

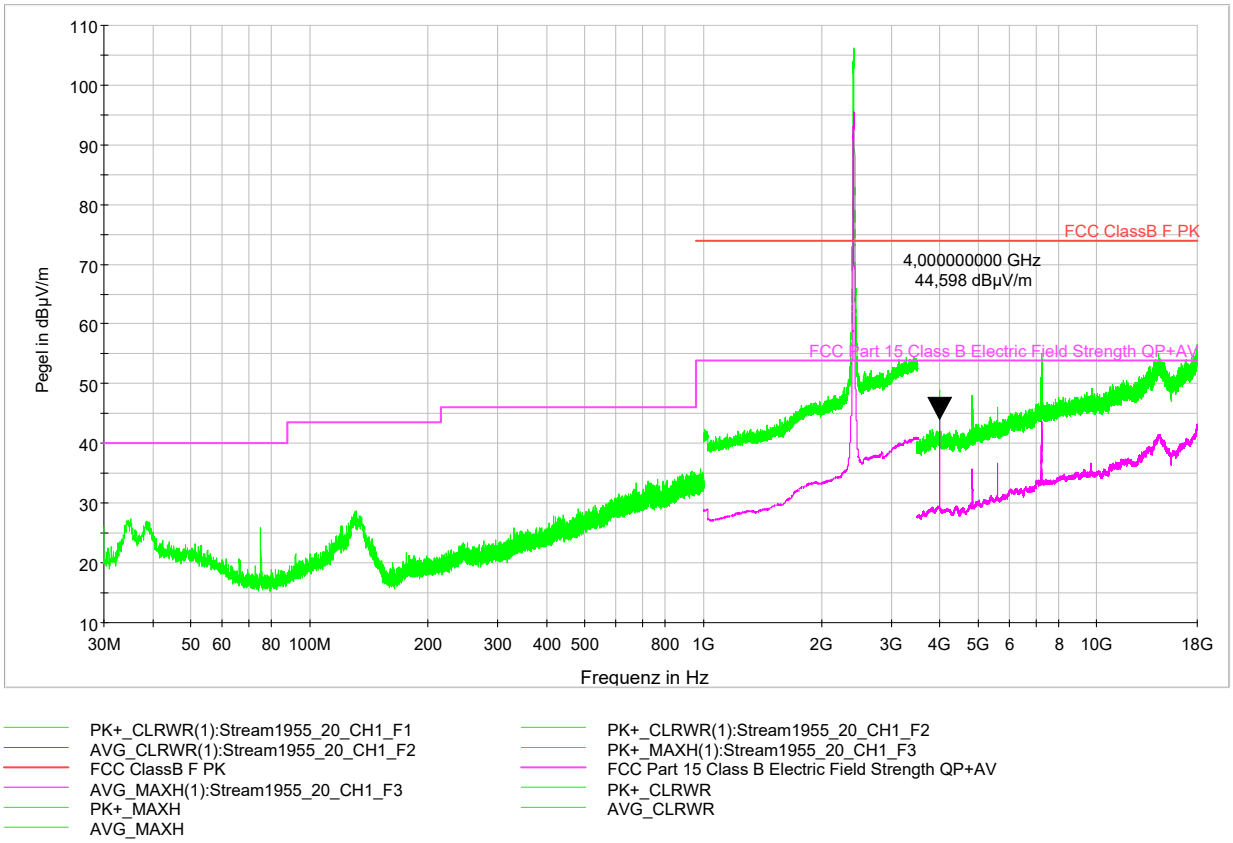
Band edges of the nearest restricted bands: 2390 MHz and 2483,5 MHz.

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

Setup: CH 1: 2412 MHz – OFDM – both Antennas



Worst case emission: Average @ 4000,0 MHz: 44,6 dBµV/m
Remark: Although the measurement above ends at 18 GHz, all measurements were performed up to the thenth harmonics of the transmitter frequency.

LIMIT **SUBCLAUSE 15.209(a) – RSS-Gen**

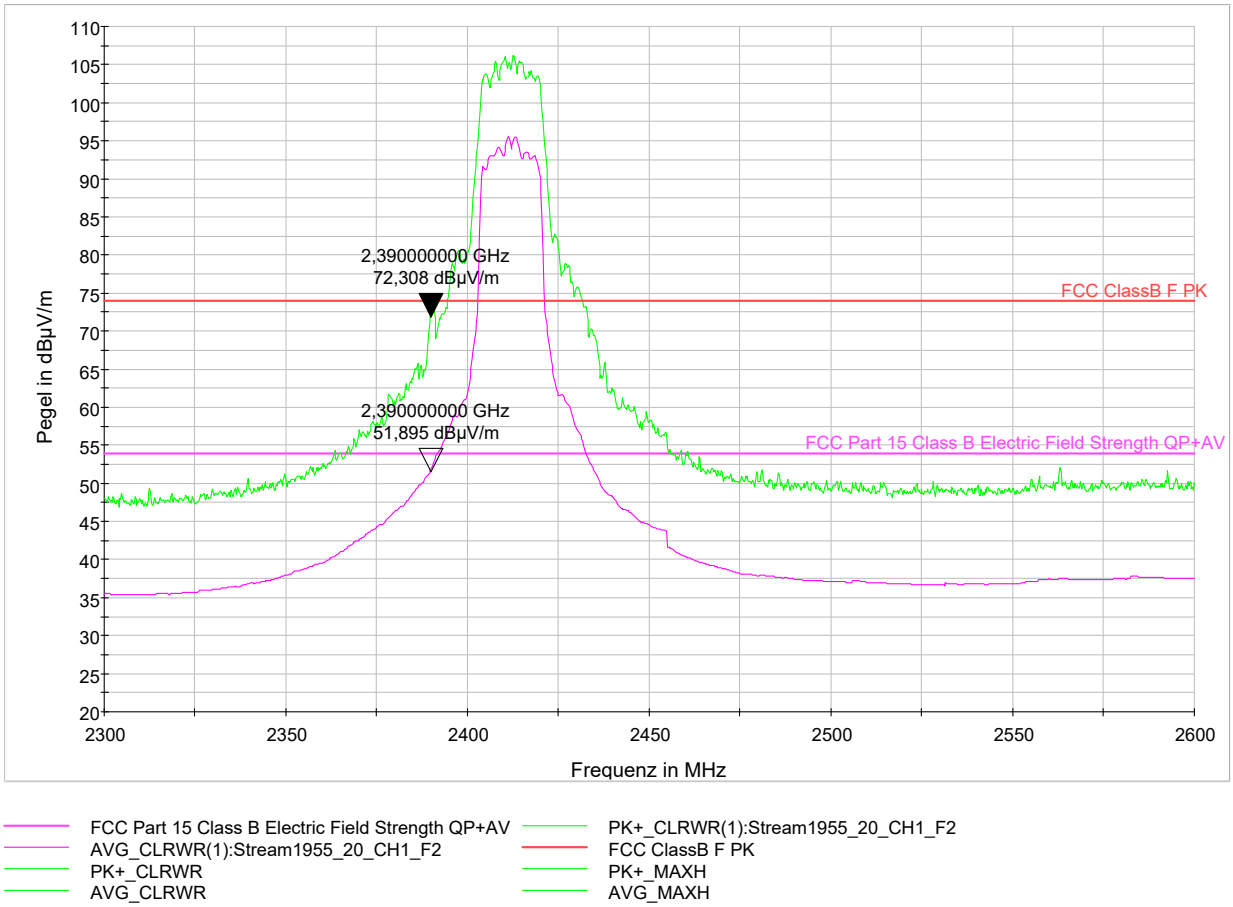
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

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: CH 1: 2412 MHz – OFDM – both Antennas



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

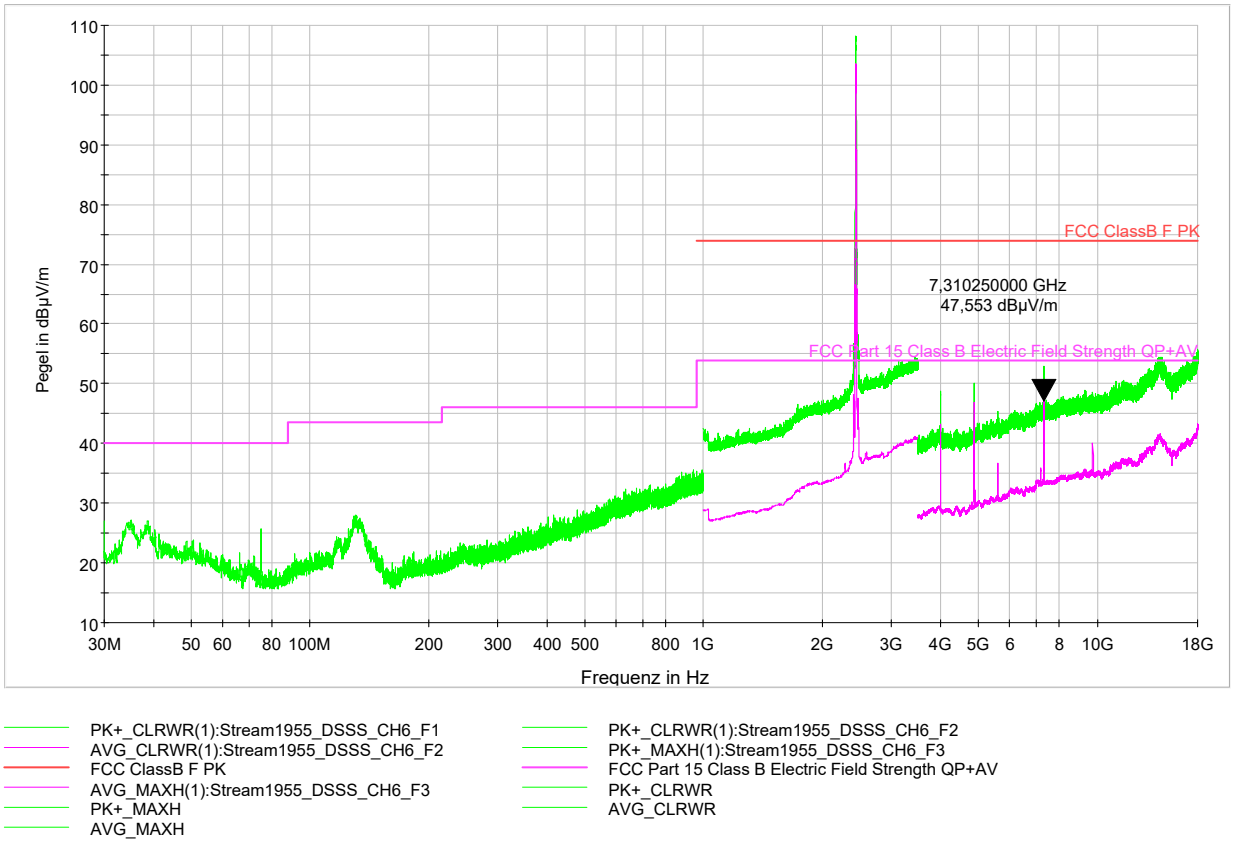
Band edges of the nearest restricted bands: 2390 MHz and 2483,5 MHz.

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

Setup: CH 6: 2437 MHz – DSSS – both Antennas



Worst case emission: Average @ 7310,250 MHz: 47,5 dBµV/m
Remark: Although the measurement above ends at 18 GHz, all measurements were performed up to the thenth harmonics of the transmitter frequency.

LIMIT **SUBCLAUSE 15.209(a) – RSS-Gen**

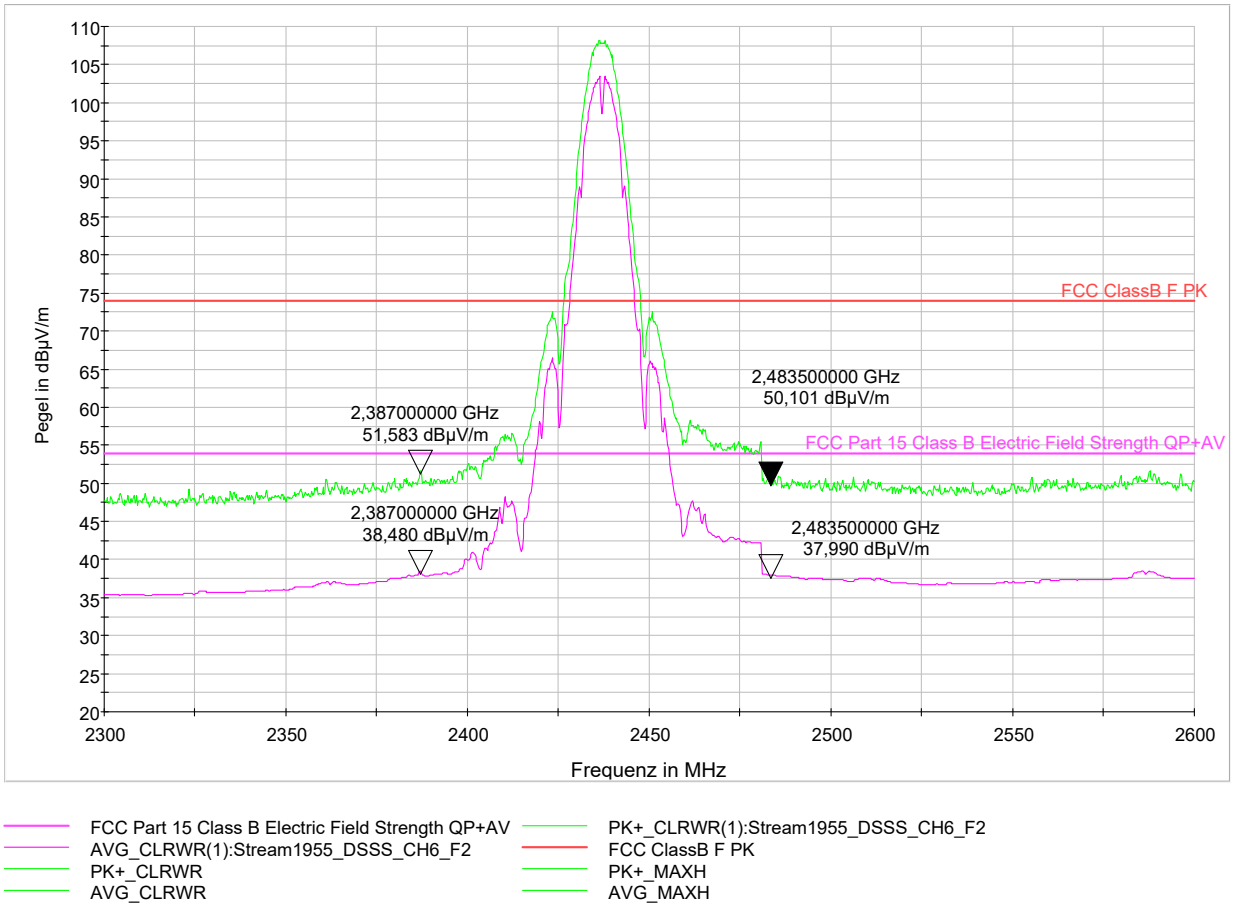
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

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: CH 6: 2437 MHz – DSSS – both Antennas



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

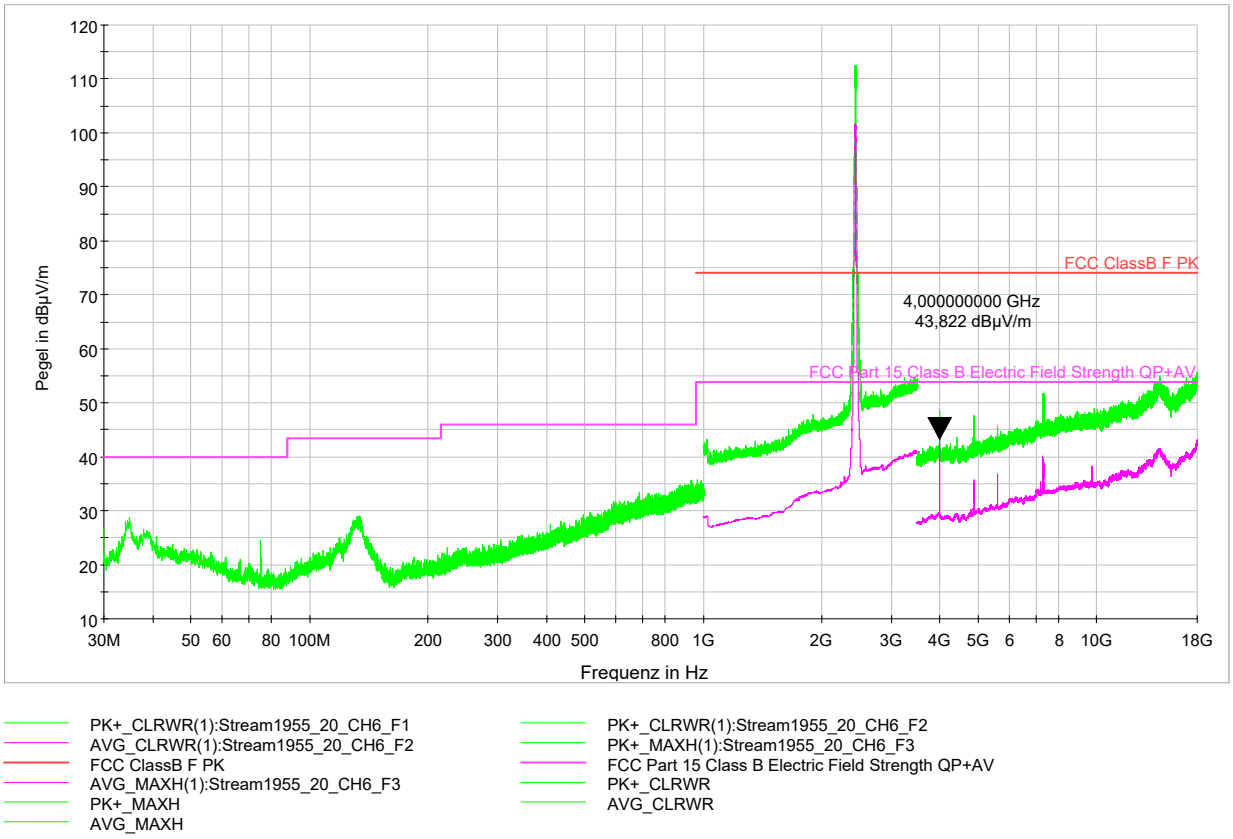
Band edges of the nearest restricted bands: 2390 MHz and 2483,5 MHz.

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

Setup: CH 6: 2437 MHz – OFDM – both Antennas



Worst case emission: Average @ 4000,0 MHz: 43,8 dBµV/m
Remark: Although the measurement above ends at 18 GHz, all measurements were performed up to the thenth harmonics of the transmitter frequency.

LIMIT **SUBCLAUSE 15.209(a) – RSS-Gen**

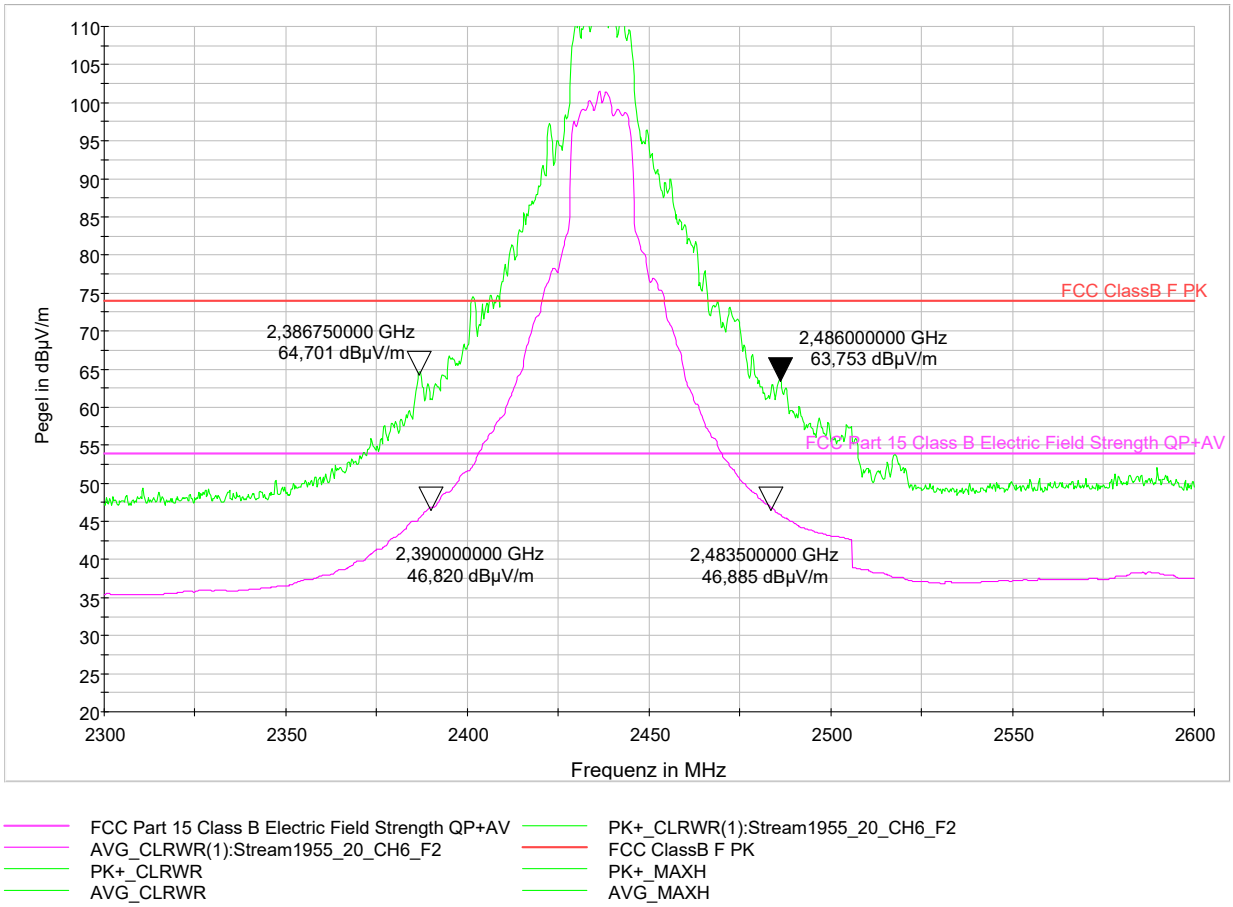
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

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: CH 6: 2437 MHz – OFDM – both Antennas



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

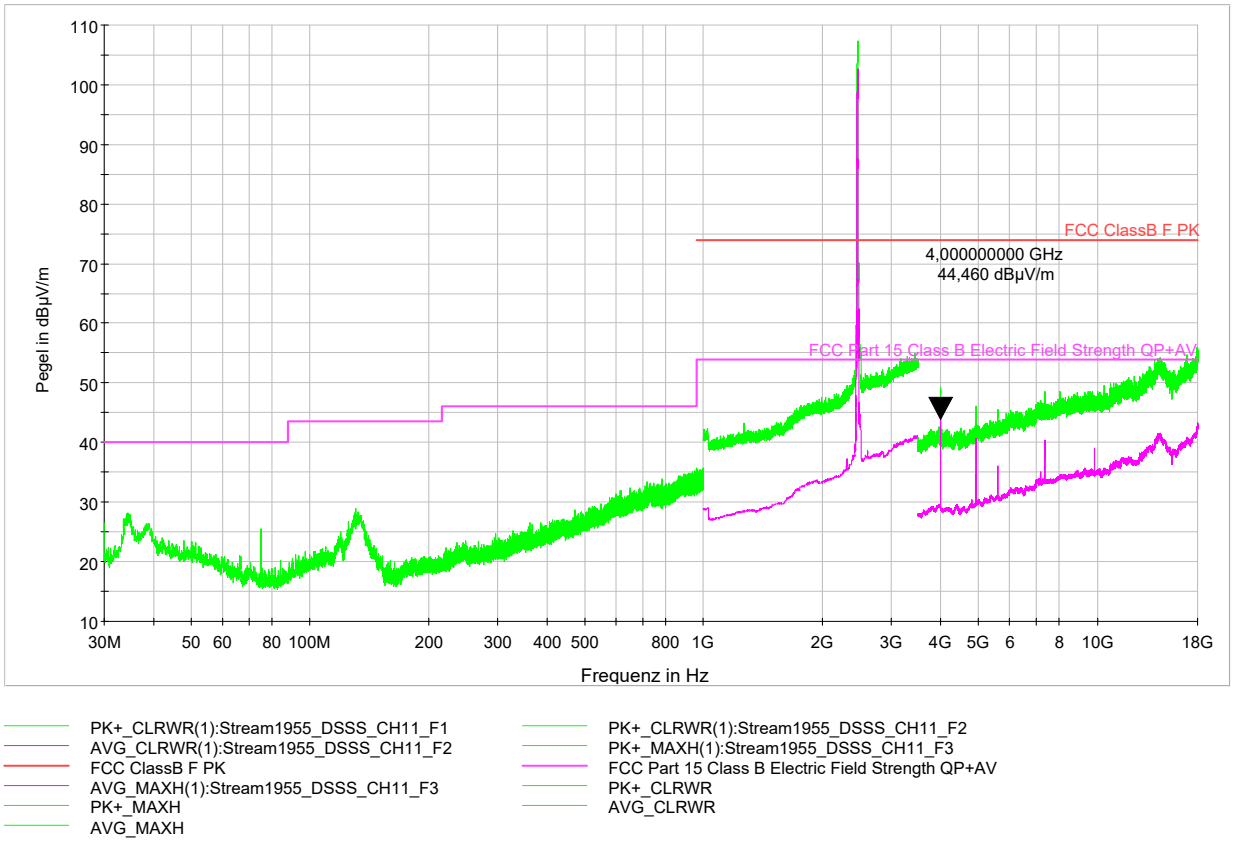
Band edges of the nearest restricted bands: 2390 MHz and 2483,5 MHz.

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

Setup: CH 11: 2462 MHz – DSSS – both Antennas



Worst case emission: Average @ 4000,0 MHz: 44,5 dBµV/m
Remark: Although the measurement above ends at 18 GHz, all measurements were performed up to the thenth harmonics of the transmitter frequency.

LIMIT **SUBCLAUSE 15.209(a) – RSS-Gen**

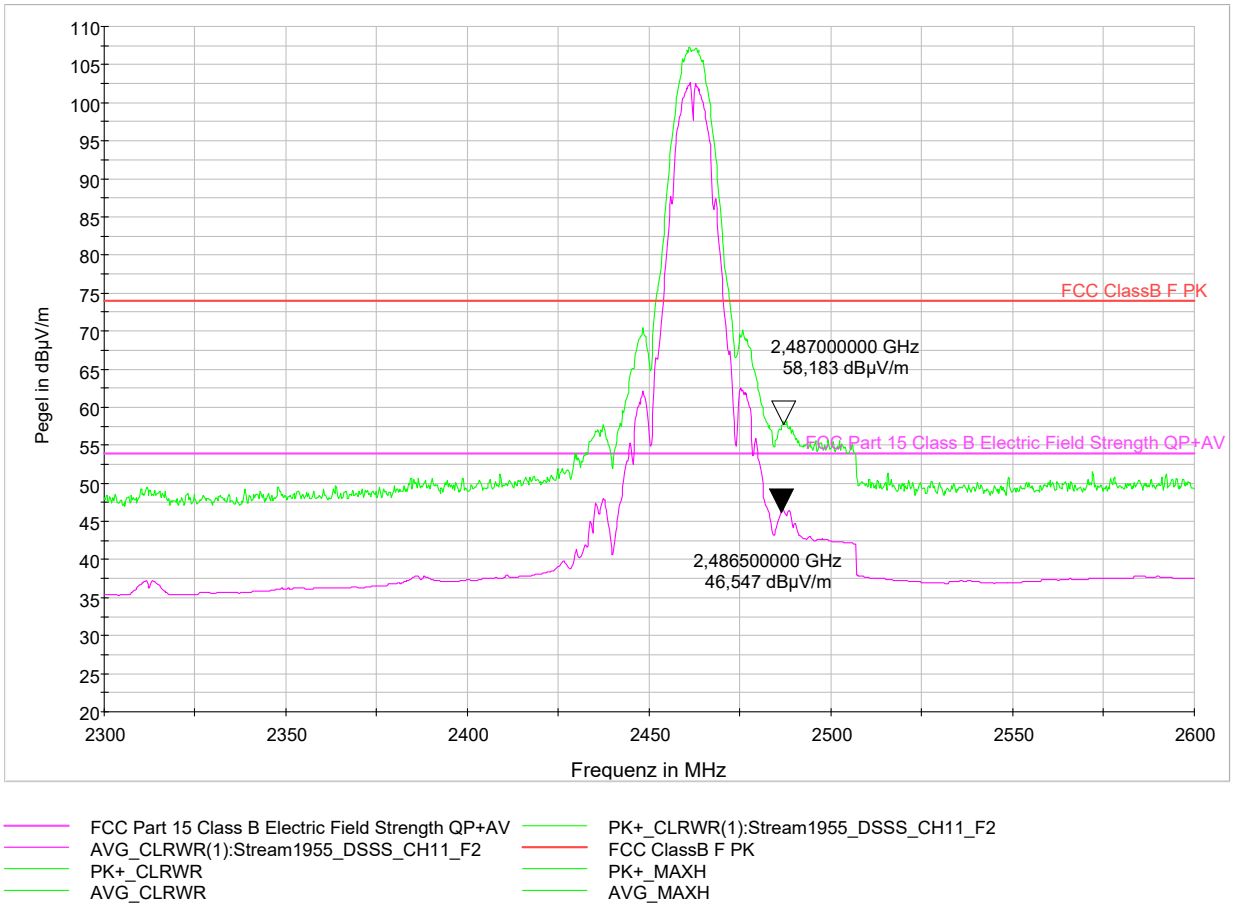
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

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: CH 11: 2462 MHz – DSSS – both Antennas



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

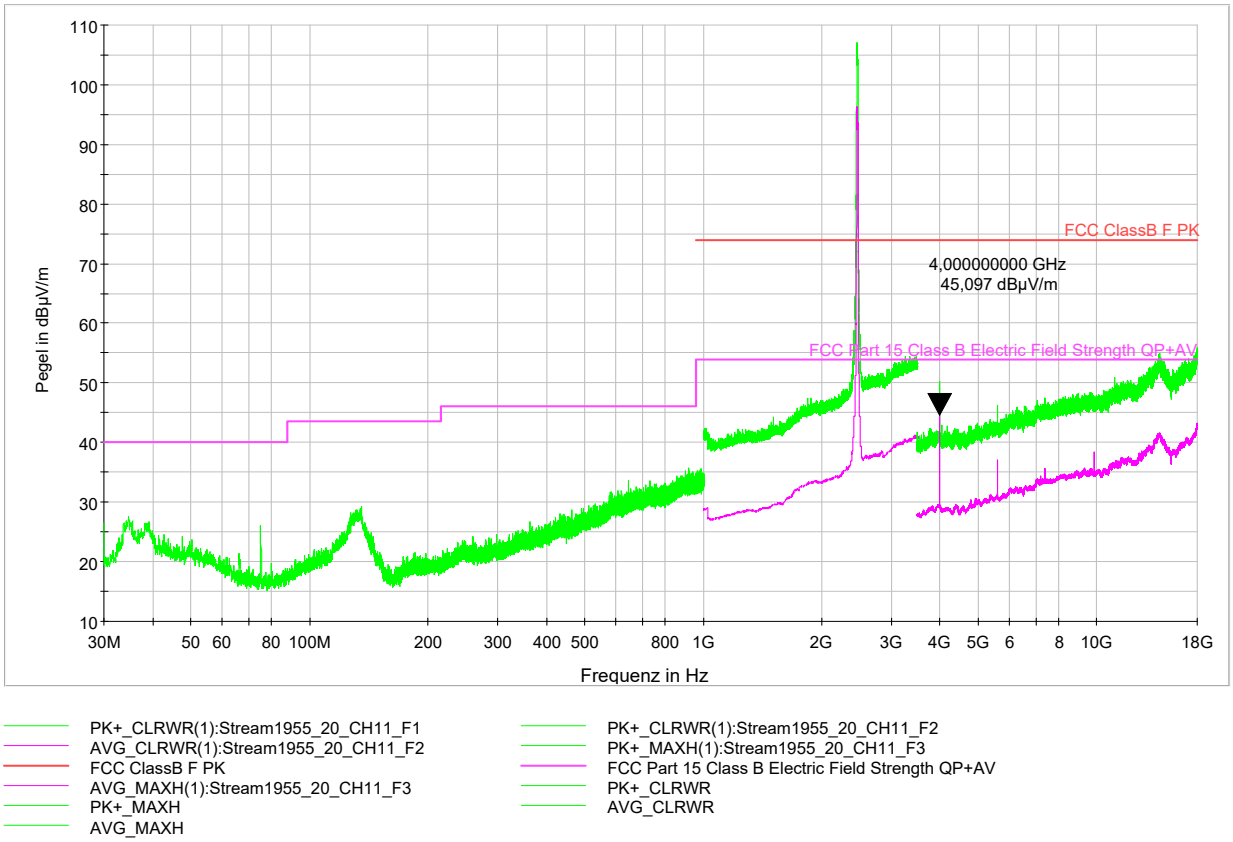
Band edges of the nearest restricted bands: 2390 MHz and 2483,5 MHz.

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

Setup: CH 11: 2462 MHz – OFDM – both Antennas



Worst case emission: Average @ 4000,0 MHz: 45,1 dBµV/m
Remark: Although the measurement above ends at 18 GHz, all measurements were performed up to the thenth harmonics of the transmitter frequency.

LIMIT **SUBCLAUSE 15.209(a) – RSS-Gen**

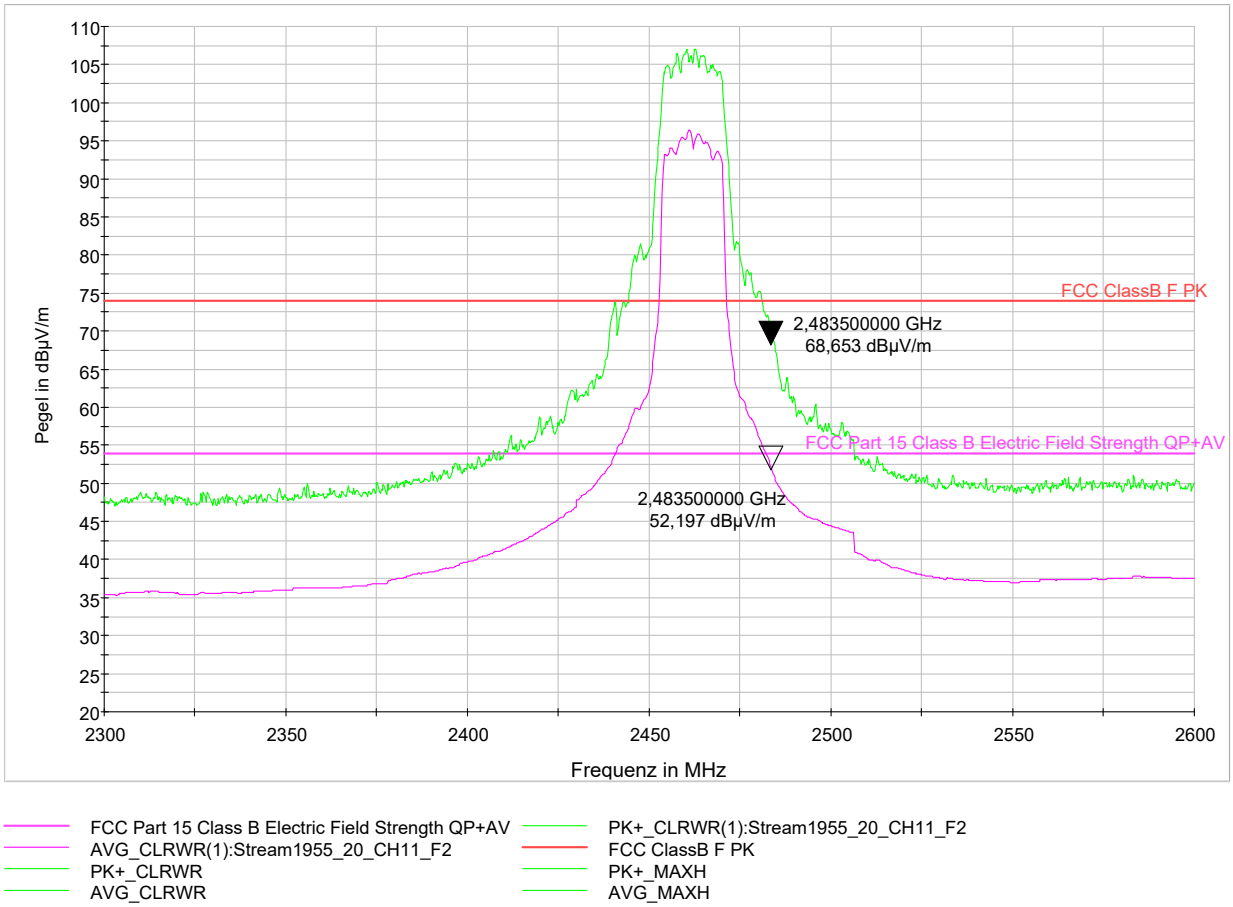
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

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: CH 11: 2462 MHz – OFDM – both Antennas



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

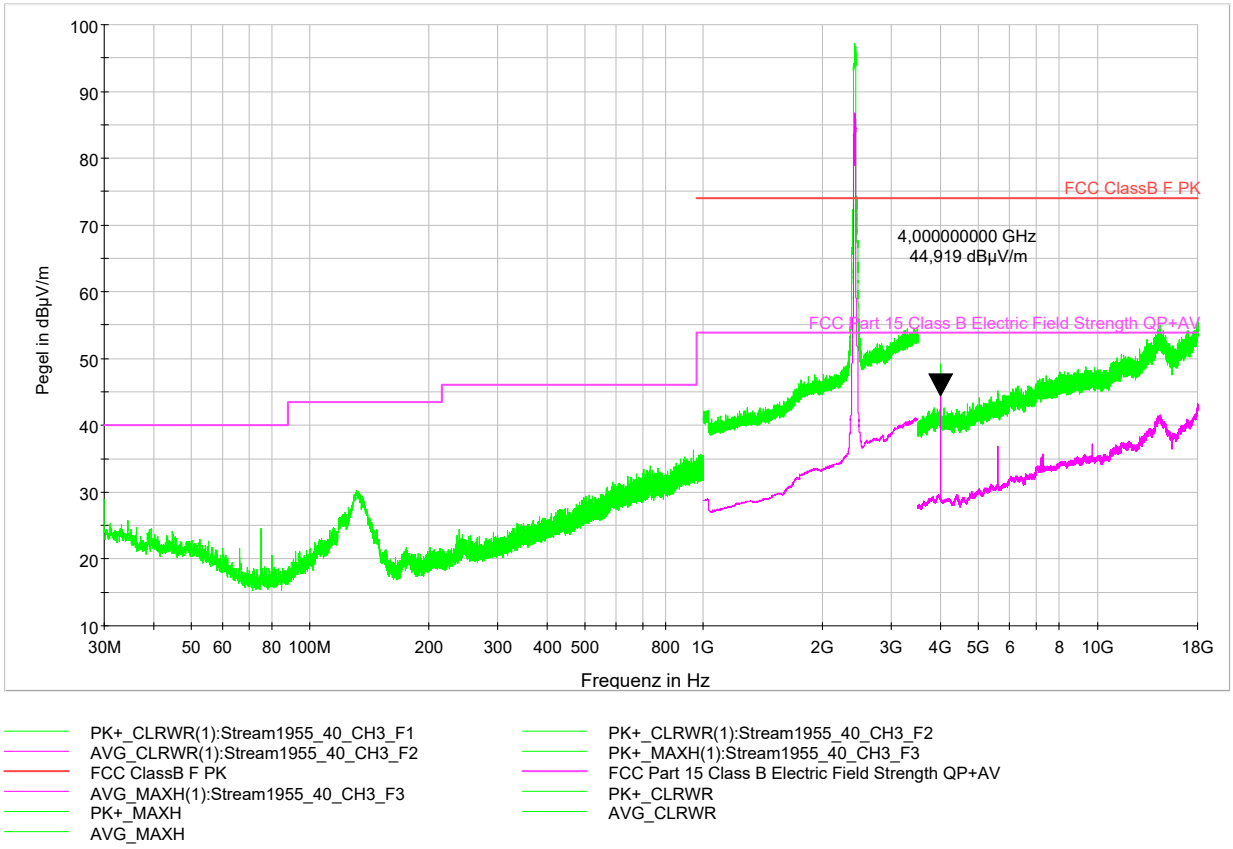
Band edges of the nearest restricted bands: 2390 MHz and 2483,5 MHz.

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

Setup: CH 3 (40 MHz): 2422 MHz – both Antennas



Worst case emission: Average @ 4000,0 MHz: 44,9 dBµV/m
Remark: Although the measurement above ends at 18 GHz, all measurements were performed up to the thenth harmonics of the transmitter frequency.

LIMIT **SUBCLAUSE 15.209(a) – RSS-Gen**

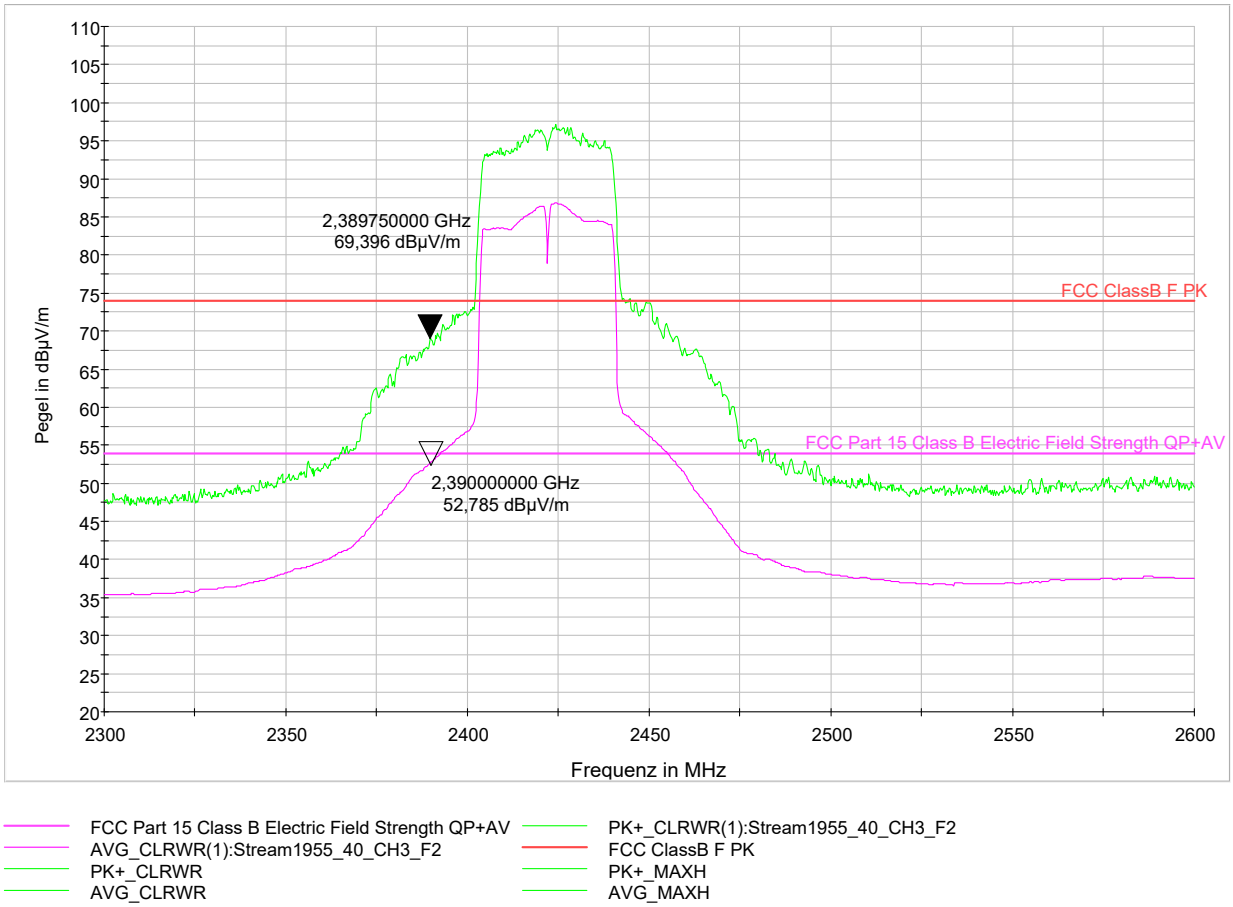
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

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: CH 3 (40MHz): 2422 MHz – both Antennas



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

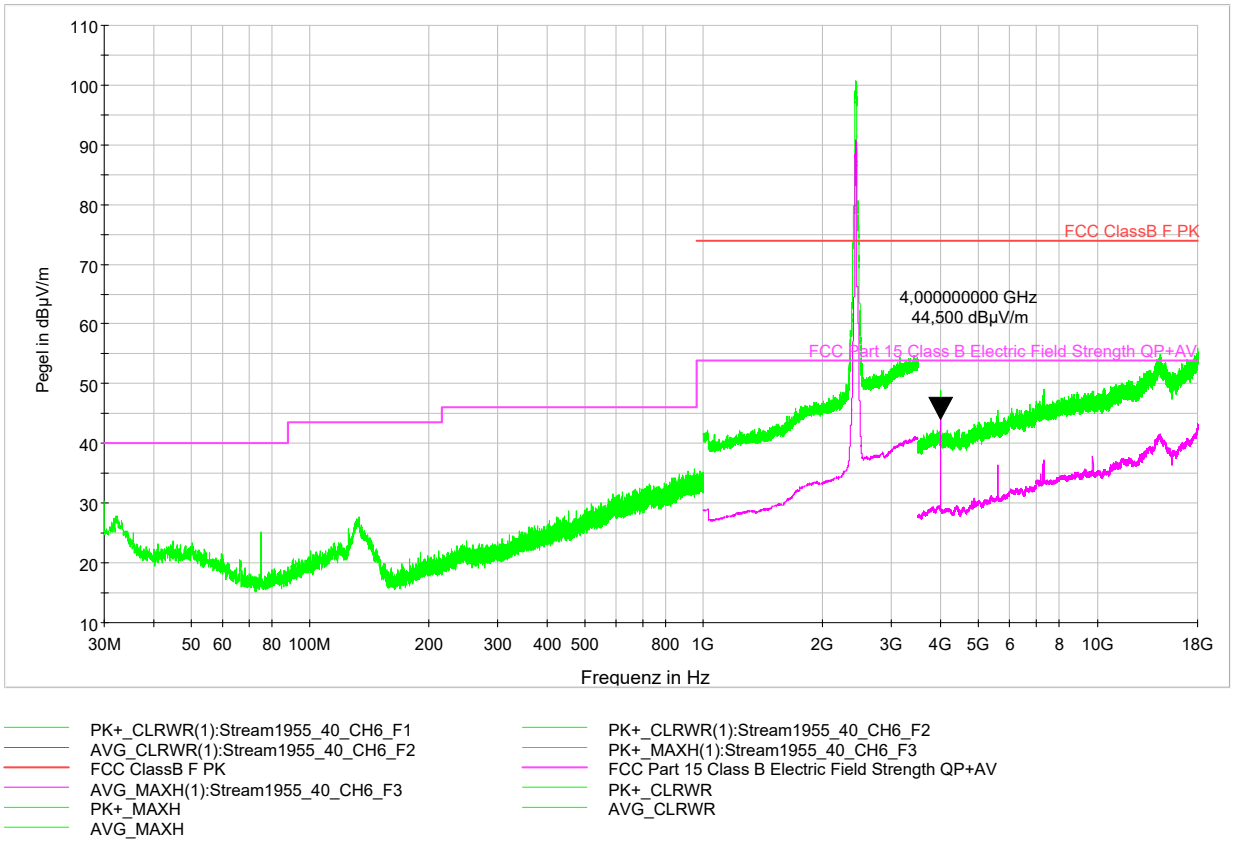
Band edges of the nearest restricted bands: 2390 MHz and 2483,5 MHz.

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

Setup: CH 6 (40 MHz): 2437 MHz – both Antennas



Worst case emission: Average @ 4000,0 MHz: 44,5 dBµV/m
Remark: Although the measurement above ends at 18 GHz, all measurements were performed up to the thenth harmonics of the transmitter frequency.

LIMIT **SUBCLAUSE 15.209(a) – RSS-Gen**

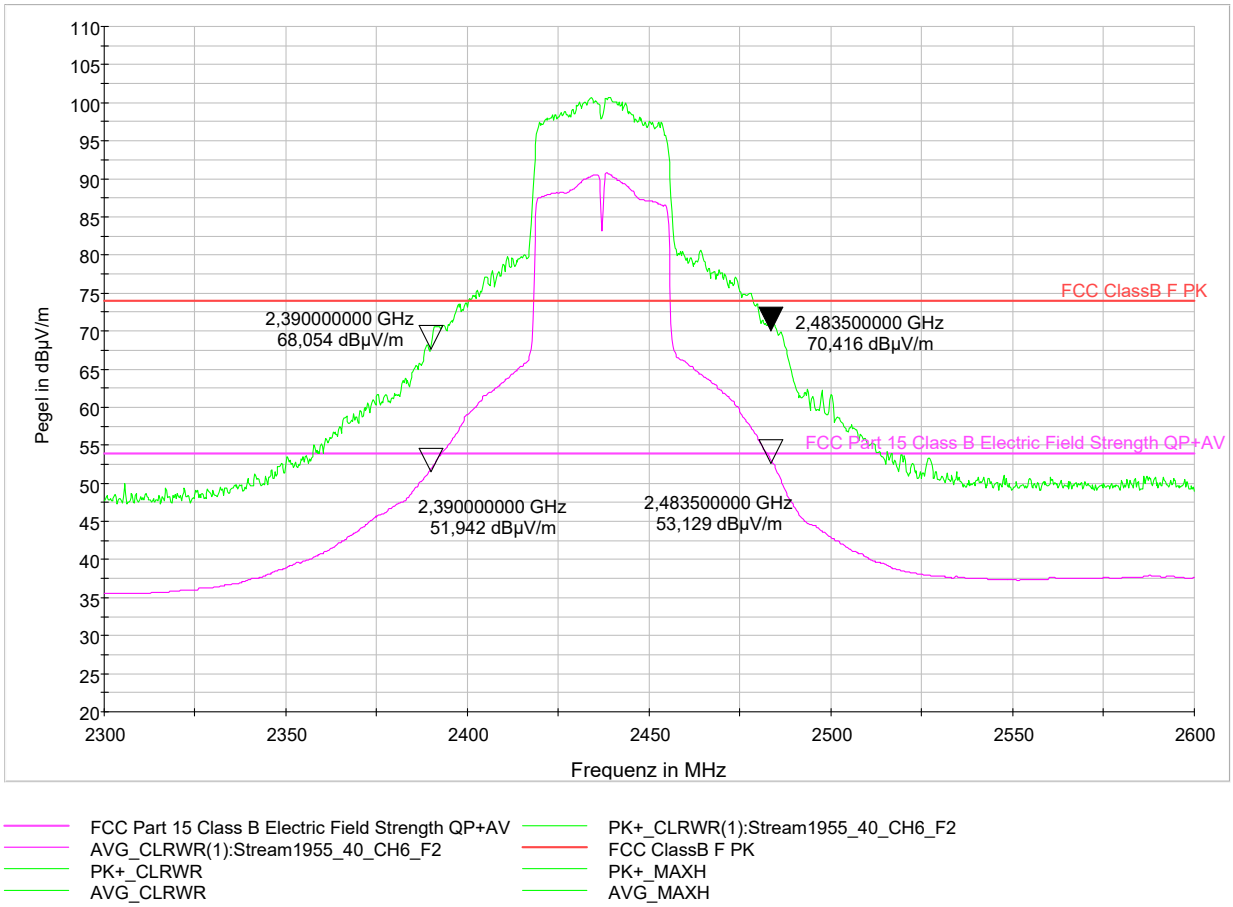
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

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: CH 6 (40MHz): 2437 MHz – both Antennas



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

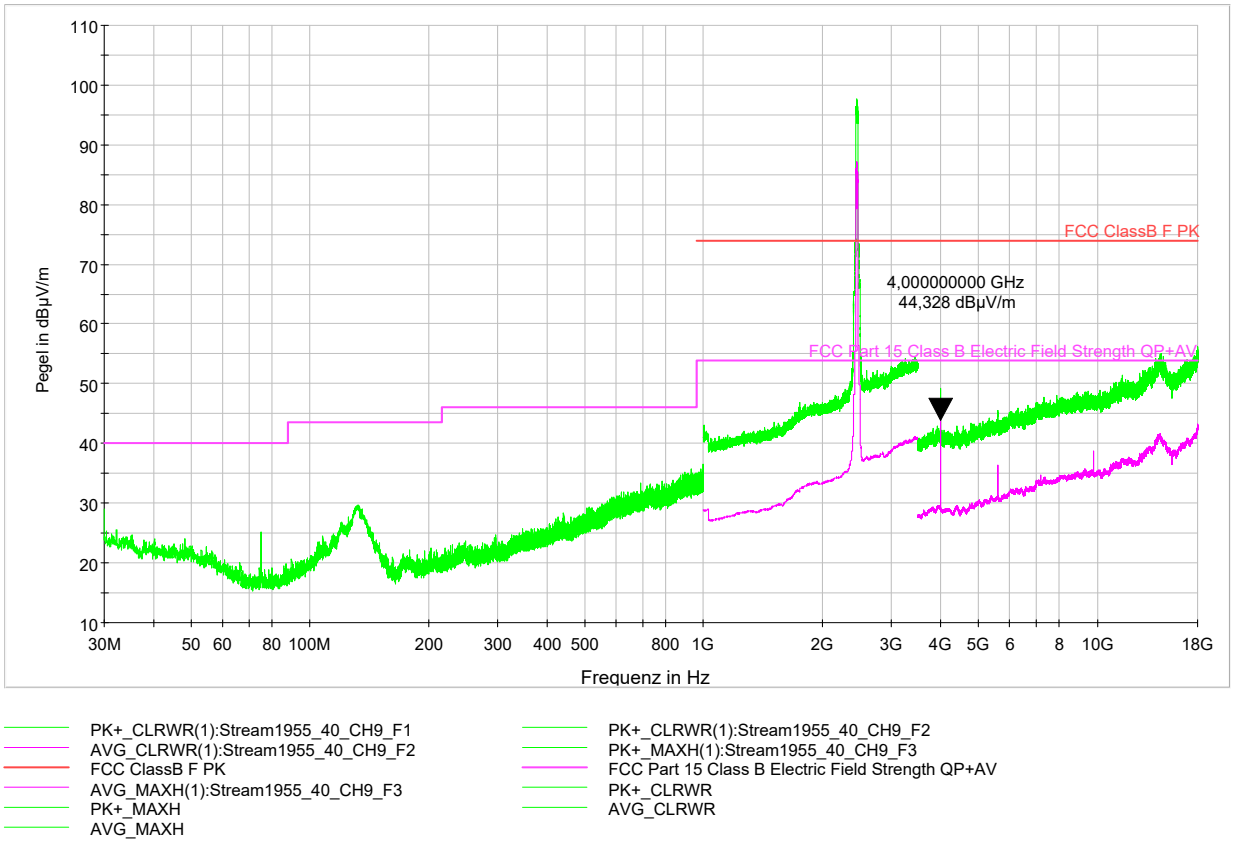
Band edges of the nearest restricted bands: 2390 MHz and 2483,5 MHz.

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

Setup: CH 9 (40 MHz): 2452 MHz – both Antennas



Worst case emission: Average @ 4000,0 MHz: 44,3 dBµV/m
Remark: Although the measurement above ends at 18 GHz, all measurements were performed up to the thenth harmonics of the transmitter frequency.

LIMIT **SUBCLAUSE 15.209(a) – RSS-Gen**

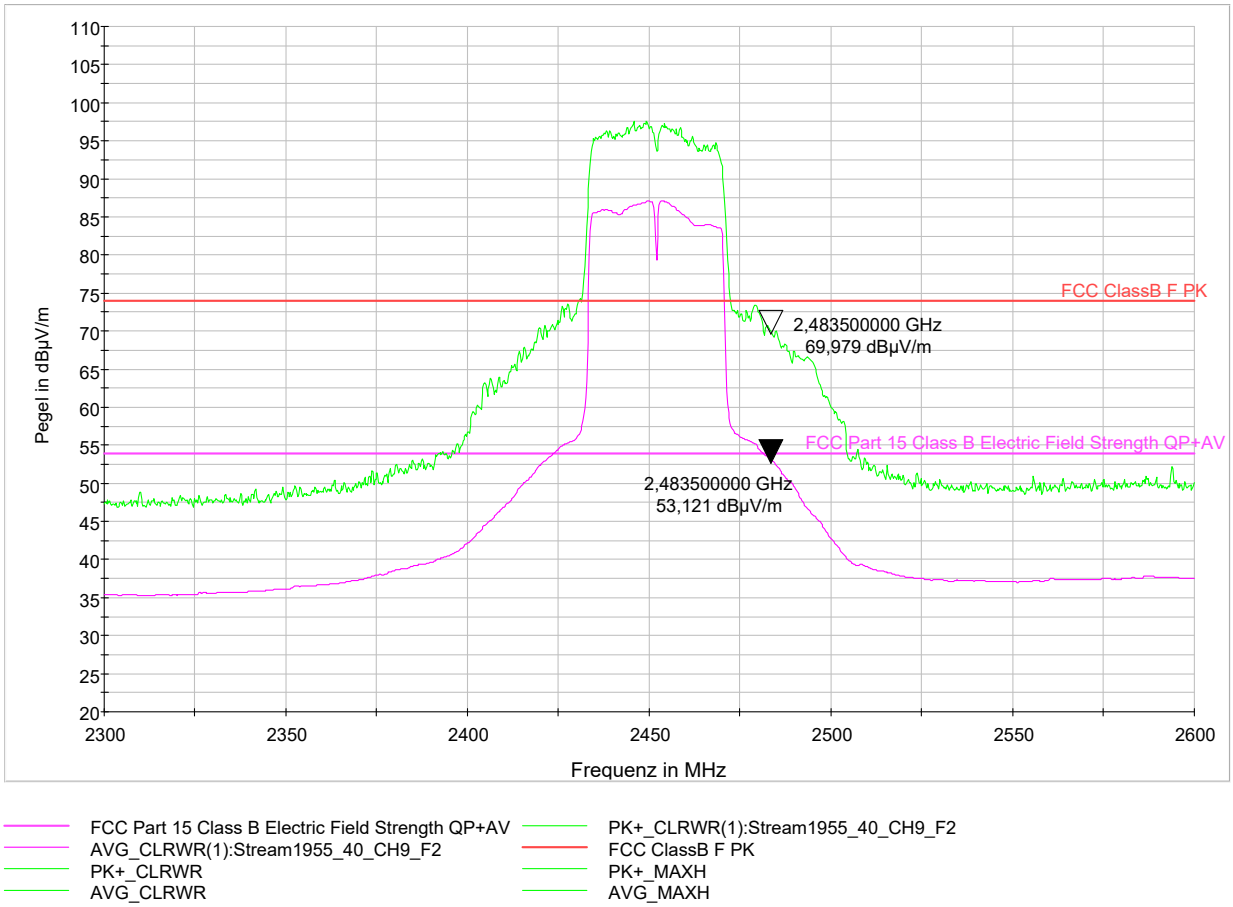
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

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: CH 9 (40 MHz): 2452 MHz – both Antennas



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.

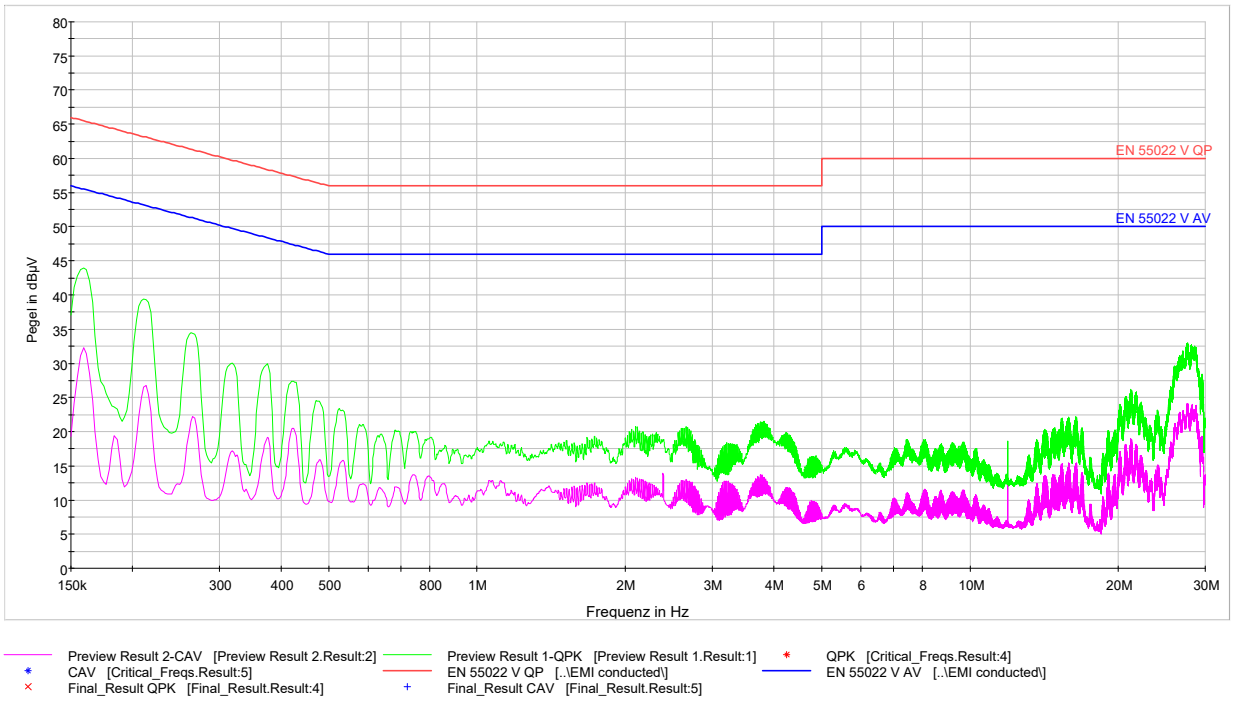
Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-200

4.8. Conducted Limits

§ 15.207
RSS-Gen 8.8

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

Setup: CH 1: 2412 MHz – DSSS



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

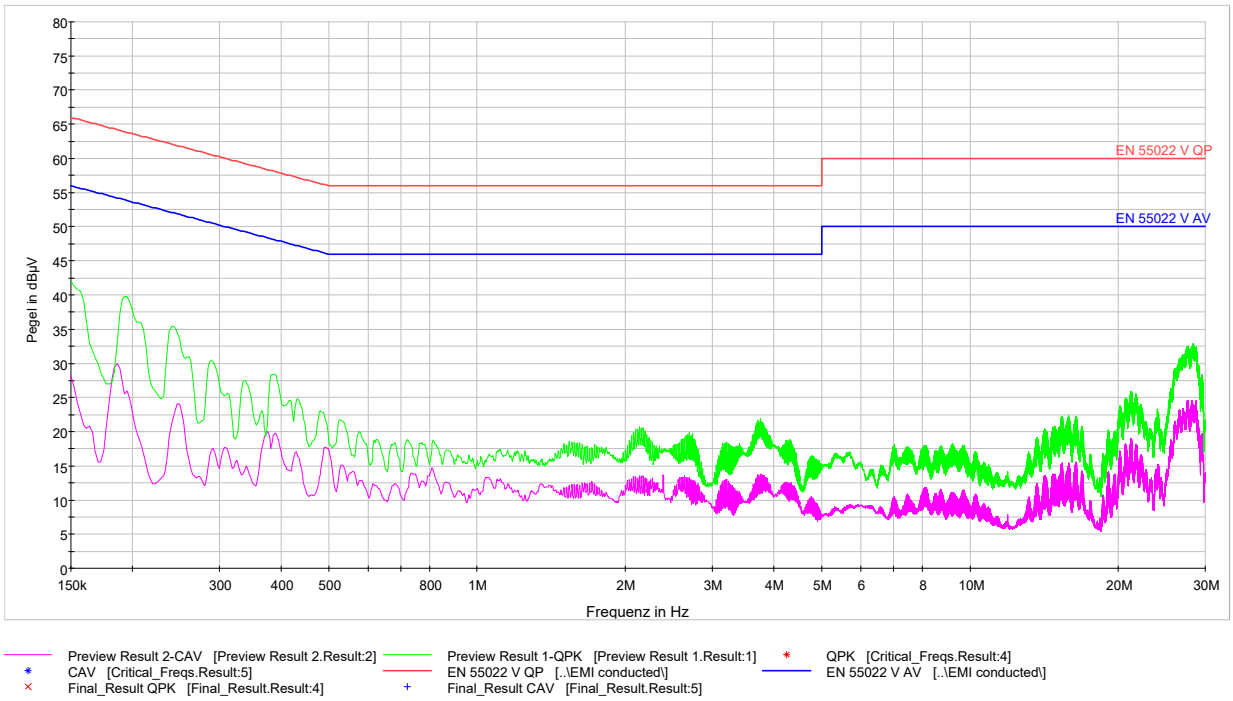
*Decreases with the logarithm of the frequency.

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: CH 1: 2412 MHz – OFDM



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

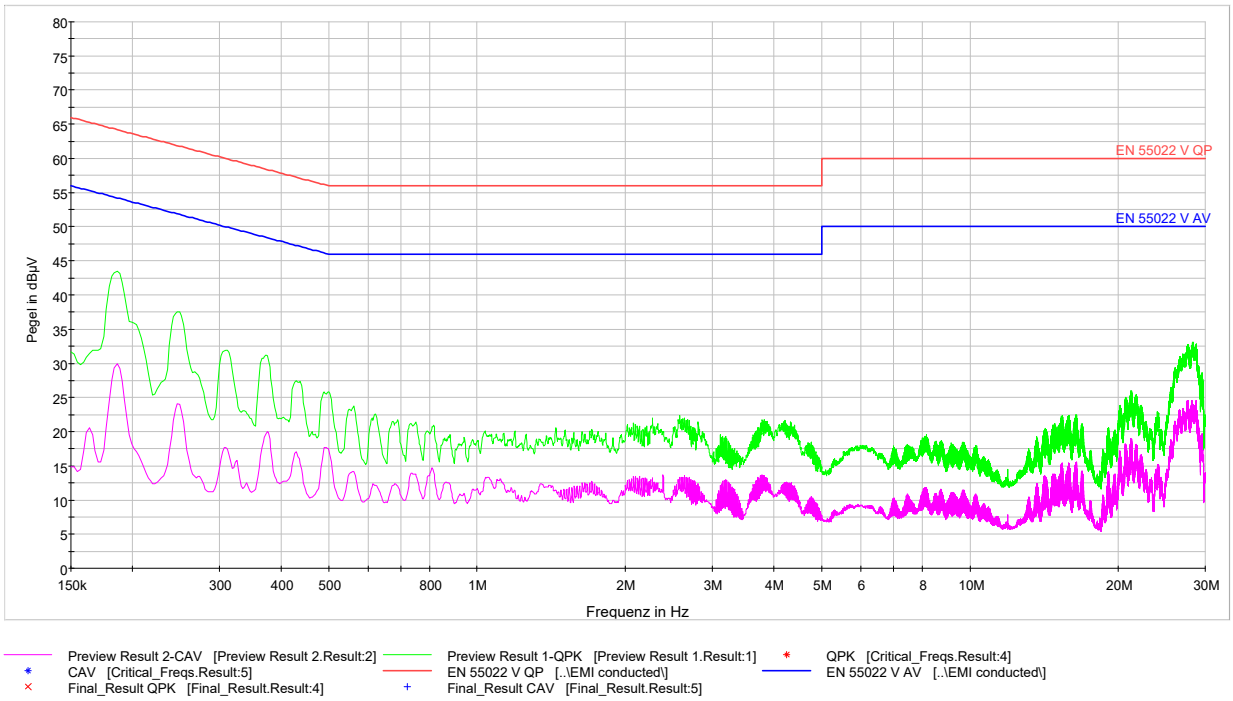
*Decreases with the logarithm of the frequency.

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: CH 1 + 5: 2422 MHz – OFDM



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

4.9. Maximum permissible Exposure § 15.247(i)

This kind of radio equipment is categorically excluded from routine environmental evaluation.

Appendix 1
Test equipment used

☐	Anechoic Chamber with 3m measurement distance	NT-100	☐	Power quality analyzer Fluke 1760 (complete set)	NT-160 - NT-173
☐	Stripline according to ISO 11452-5	NT-108	☐	Spectrumanalyzer – FSP7 9 kHz – 7 GHz	NT-200
☐	MA4000 - Antenna mast 1 - 4 m height	NT-110/1	☐	ESCI - Test receiver 9 kHz - 7 GHz	NT-203/1
☐	DS - Turntable 0 - 400 ° Azimuth	NT-111/1	☐	ESI26 – Test receiver 20 Hz – 26,5 GHz	NT-207
☐	CO3000 Controller Mast+Turntable	NT-112/1	☐	Digital Radio Tester CMW500	NT-208/1
☐	HUF-Z3 - Log. Per. Antenna 200 - 1000 MHz	NT-121	☐	Noise-gen., ITU-R 559-2 20 Hz – 20 kHz	NT-209
☐	FMZB1513 - Loop Antenna 9 kHz - 30 MHz	NT-122/1	☐	CMTA - Radiocommunication analyzer ; 0,1 - 1000 MHz	NT-210
☐	HFH-Z6 - Rod Antenna 9 kHz - 30 MHz	NT-123	☐	3271 - Spectrum analyzer 100 Hz - 26,5 GHz	NT-211
☐	3121C - Dipole Antenna 28 - 1000 MHz	NT-124	☐	Digital Radio Tester Aeroflex 3920	NT-212/1
☐	3115 - Horn Antenna 1 - 18 GHz (immunity)	NT-125	☐	Mixer M28HW 26,5 GHz - 40 GHz	NT-214
☐	3116 - Horn Antenna 18 - 40 GHz	NT-126	☐	RubiSource T&M Timing reference	NT-216
☐	SAS-200/543 - Bicon. Antenna 20 MHz - 300 MHz	NT-127	☐	Radiocommunicationanalyzer SWR 1180 MD	NT-217
☐	AT-1080 - Log. Per. Antenna 80 - 1000 MHz	NT-128	☐	Mixer M19HWD 40 GHz – 60 GHz	NT-218
☐	HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-129	☐	Mixer M12HWD 60 GHz – 90 GHz	NT-219
☐	HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-130	☐	DSO9104 Digital scope	NT-220/1
☐	3146 - Log. Per. Antenna 200 – 1000 MHz	NT-131	☐	TPS 2014 Digital scope	NT-222
☐	VULB 9163 Trilog Antenna 30 – 3000 MHz	NT-131/1	☐	Artificial Ear according to IEC 60318	NT-224
☐	Loop Antenna H-Field	NT-132	☐	1 kHz Sound calibrator	NT-225
☐	Horn Antenna 500 MHz - 2900 MHz	NT-133	☐	B10 - Harmonics and flicker analyzer	NT-232
☐	Horn Antenna 500 MHz - 6000 MHz	NT-133/1	☐	SRM-3006 Spectrumanalyzer	NT-233/1a
☐	Log. per. Antenna 800 MHz - 2500 MHz	NT-134	☐	E-field probe SRM 75 MHz – 3 GHz	NT-234
☐	Log. per. Antenna 800 MHz - 2500 MHz	NT-135	☐	Field Meter NBM-500 incl. E- and H-Field probes	NT-240a-e
☐	BiConiLog Antenna 26 MHz – 2000 MHz	NT-137	☐	Hall-Teslameter ETM-1	NT-241
☐	Conical Dipol Antenna PCD8250	NT-138	☐	EFA-3 H-field- / E-field probe	NT-243
☐	HF 906 - Horn Antenna 1 - 18 GHz (emission)	NT-139	☐	EHP-50F H-field- / E-field probe	NT-243/1
☐	HZ-1 Antenna tripod	NT-150	☐	Field Meter EMR-200 100 kHz – 3 GHz	NT-244
☐	BN 1500 Antenna tripod	NT-151	☐	E-field probe 100 kHz – 3 GHz	NT-245
☐	Ant. tripod for EN61000-4-3 Model TP1000A	NT-156	☐	H-field probe 300 kHz – 30 MHz	NT-246

Appendix 1 (continued)
Test equipment used

☐	E-field probe 3 MHz – 18 GHz	NT-247
☐	H-field probe 27 MHz – 1 GHz	NT-248
☐	ELT-400 1 Hz – 400 kHz	NT-249
☐	MDS 21 - Absorbing clamp 30 - 1000 MHz	NT-250
☐	FCC-203I EM Injection clamp	NT-251
☐	FCC-203I-DCN Ferrite decoupling network	NT-252
☐	PR50 Current Probe	NT-253
☐	i310s Current Probe	NT-254/1
☐	Fluke 87 V True RMS Multimeter	NT-260
☐	Model 2000 Digital Multimeter	NT-261
☐	Fluke 87 V Digital Multimeter	NT-262/1
☐	ESH2-Z5-U1 Artificial mains network 4x25A	NT-300
☐	ESH3-Z5-U1 Artificial mains network 2x10A	NT-301
☐	ESH3-Z6-U1 Artificial mains network 1x100A	NT-302
☐	ESH3-Z6-U1 Artificial mains network 1x100A	NT-302a
☐	PHE 4500/B Power amplifier	NT-304
☐	EZ10 T-Artificial Network	NT-305
☐	SMG - Signal generator 0,1 - 1000 MHz	NT-310
☐	SMA100A - Signal generator 9 kHz - 6 GHz	NT-310/1
☐	RefRad Reference generator	NT-312
☐	SMP 02 Signal generator 10 MHz - 20 GHz	NT-313
☐	40 MHz Arbitrary Generator TGA1241	NT-315
☐	Artificial mains network NSLK 8127-PLC	NT-316
☐		
☐	PSURGE 4.1 Surge generator	NT-324
☐	IMU4000 Immunity test system	NT-325/1
☐	VCS 500-M6 Surge-Generator	NT-326
☐	Oscillatory Wave Simulator incl. Coupling networks	NT-328a+b+c
☐	BTA-250 - RF-Amplifier 9 kHz - 220 MHz / 250 W	NT-330
☐	T82-50 RF-Amplifier 2 GHz – 8 GHz	NT-331
☐	500W1000M7 - RF-Amplifier 80 - 1000 MHz / 500 W	NT-332
☐	AS0102-65R - RF-Amplifier 1 GHz - 2 GHz	NT-333
☐	APA01 – RF-Amplifier 0,5 GHz – 2,5 GHz	NT-334
☐	Preamplifier 1 GHz - 4 GHz	NT-335
☐	Preamplifier for GPS MKU 152 A	NT-336
☐	Preamplifier 100 MHz – 23 GHz	NT-337
☐	DC Block 10 MHz – 18 GHz Model 8048	NT-338
☐	2-97201 Electronic load	NT-341
☐	TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-344
☐	TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-345
☐	VDS 200 Mobil-impuls-generator	NT-350
☐	LD 200 Mobil-impuls-generator	NT-351
☐	MPG 200 Mobil-Impuls-Generators	NT-352
☐	EFT 200 Mobil-impuls-generator	NT-353
☐	AN 200 S1 Artificial Network	NT-354
☐	FP-EFT 32M 3 ph. Coupling filter (Burst)	NT-400/1
☐	PHE 4500 - Mains impedance network	NT-401
☐	IP 6.2 Coupling filter for data lines (Surge)	NT-403
☐	TK 9421 High Power Volt. Probe 150 kHz - 30 MHz	NT-409
☐	ESH2-Z3 - Probe 9 kHz - 30 MHz	NT-410
☐	IP 4 - Capacitive clamp (Burst)	NT-411
☐	Highpass-Filter 100 MHz – 3 GHz	NT-412
☐	Highpass-Filter 600 MHz – 4 GHz	NT-413
☐	Highpass-Filter 1250 MHz – 4 GHz	NT-414
☐	Highpass-Filter 1800 MHz – 16 GHz	NT-415

Appendix 1 (continued)
Test equipment used

☐	Highpass-Filter 3500 MHz – 18 GHz	NT-416
☐	RF-Attenuator 10 dB DC – 18 GHz / 50 W	NT-417
☐	RF-Attenuator 6 dB DC – 18 GHz / 50 W	NT-418
☐	RF-Attenuator 3 dB DC – 18 GHz / 50 W	NT-419
☐	RF-Attenuator 20 dB DC - 1000 MHz / 25 W	NT-421
☐	RF-Attenuator 30 dB DC - 1000 MHz / 1 W	NT-423
☐	RF-Attenuator 30 dB	NT-424
☐	RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-425
☐	RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-426
☐	RF-Attenuator 6 dB	NT-428
☐	RF-Attenuator 0 dB - 81 dB	NT-429
☐	WRU 27 - Band blocking 27 MHz	NT-430
☐	WHJ450C9 AA - High pass 450 MHz	NT-431
☐	WHJ250C9 AA - High pass 250 MHz	NT-432
☐	RF-Load 150 W	NT-433
☐	Impedance transducer 1:4 ; 1:9 ; 1:16	NT-435
☐	RF-Attenuator DC – 18 GHz 6 dB	NT-436
☐	RF-Attenuator DC – 18 GHz 6 dB	NT-437
☐	RF-Attenuator DC – 18 GHz 10 dB	NT-438
☐	RF-Attenuator DC – 18 GHz 20 dB	NT-439
☐	I+P 7780 Directional coupler 100 - 2000 MHz	NT-440
☐	ESH3-Z2 - Pulse limiter 9 kHz - 30 MHz	NT-441
☐	Power Divider 6 dB/1 W/50 Ohm	NT-443
☐	Directional coupler 0,1 MHz – 70 MHz	NT-444
☐	Directional coupler 0,1 MHz – 70 MHz	NT-445
☐	Tube imitations according to EN 55015	NT-450
☐	FCC-801-M3-16A Coupling decoupling network	NT-458
☐	FCC-801-M2-50A Coupling decoupling network	NT-459
☐	FCC-801-M5-25 Coupling decoupling network	NT-460
☐	FCC-801-AF10 Coupling decoupling network	NT-461
☐	FCC-801-S25 Coupling decoupling network	NT-462
☐	FCC-801-T4 Coupling decoupling network	NT-463
☐	FCC-801-C1 Coupling decoupling network	NT-464
☐	SW 9605 - Current probe 150 kHz – 30 MHz	NT-465/1
☐	95242-1 – Current probe 1 MHz – 400 MHz	NT-468
☐	94106-1L-1 – Current probe 100 kHz – 450 MHz	NT-471
☐	GA 1240 Power amplifier according to EN 61000-4-16	NT-480
☐	Coupling networks according to EN 61000-4-16	NT-481 - NT-483
☐	Van der Hoofden Test Head	NT-484
☐	EMC Video/Audiosystem	NT-511/1
☐	ES-K1 Version 1.71 SP2 Test software	NT-520
☐	EMC32 Version 10.50.40 Test software	NT-520/1
☐	SRM-TS Version 1.3 software for SRM-3000	NT-522
☐	SRM-TS Version 1.3.1 software for SRM-3006	NT-522/1
☐	Spitzenberger und Spies Test software V4.1	NT-525
☐	Noise power test apparatus according to EN 55014	NT-530
☐	Vertical coupling plane (ESD)	NT-531
☐	Test cable #4 for EN 61000-4-6	NT-553
☐	Test cable #3 for conducted emission	NT-554
☐	Test cable #5+#6 ESD-cable (2x470k)	NT-555 + NT-556
☐	Test cable #8 Sucoflex 104EA	NT-559
☐	Test cable #9 (for outdoor measurements)	NT-580
☐	Test cable #10 (for outdoor measurements)	NT-581
☐	Test cable #13 Sucoflex 104PE	NT-584
☐	Test cable #21 for SRM-3000	NT-592
☐	Shield chamber	NT-600
☐	Climatic chamber	M-1200

Appendix 1 (continued)
Test equipment used

☐	Anechoic Chamber 3 m / 5 m measuring distance	EMV-100
☐	Turntabel 6 m diameter	EMV-101
☐	Antenna mast + controller	EMV-102+ EMV-103
☐	EMC Video/Audiosystem	EMV-104
☐	EMC Software EMC32 Version 10.50.40	EMV-105
☐	Hornantenna 1 – 18 GHz HF 907	EMV-110
☐	Antennapre.amp. 1 – 18 GHz ERZ-LNA0200-1800-30-2	EMV-111
☐	Trilog Antenna 30-3000 MHz VULB9163	EMV-112
☐	Monopol 9 kHz – 30 MHz VAMP 9243	EMV-113
☐	Antennapre.amp 18 – 40 GHz BBV 9721	EMV-114
☐	Hornantenna 200 – 2000 MHz AH-220	EMV-115
☐	DC Artificial Network PVDC 8300	EMV-150
☐	AC Artificial Network NNLK 8121 RC	EMV-151
☐	EMI Receiver ESR26	EMV-200
☐	Signalgenerator 9 kHz – 40 GHz N5173B	EMV-201
☐	GPS Frequency normal B-88	EMV-202
☐	DC Power supply N5745A	EMV-203
☐	Spektrum Analyzator FSV40	EMV-205
☐	Thd Multimeter Model 2015	EMV-206
☐	Poweramplifier PAS15000	EMV- 207/abc
☐	Inrush Current Source	EMV- 208/abc
☐	Arb.-generator Sycore	EMV-209
☐	Harmonics/Flicker analyzer ARS 16/3	EMV-210
☐	HF- Ampflifier 9 kHz-250 MHz BBA150	EMV-300
☐	HF- Amplifier 80 -1000 MHz BBA150	EMV-301
☐	HF- Amplifier 0,8 - 6 GHz BBA150	EMV-302
☐	High Power Ant. 20-200 MHz HPBA-2510	EMV-303/1
☐	Log.per Antenna 80-2700 MHz STLP 9128 E special	EMV-304
☐	Log.per Antenna 0,7 – 9 GHz STLP9149	EMV-305
☐	HF- Ampflifier 9 kHz-250 MHz BBA150 (low noise)	EMV-306
☐	ISO11451-2 TLS 10 kHz – 30 MHz	EMV-307
☐	Load Dump Generator LD 200N	EMV-350
☐	Ultra Compact Symulator UCS 200N100	EMV-351
☐	Automotive Power fail module PFM 200N100.1	EMV-352
☐	Voltage Drop Symulator VDS 200Q100	EMV-353
☐	Arb. Generator AutoWave	EMV-354
☐	Ultra Compact Symulator UCS 500N7	EMV-355
☐	Coupling decoupling network CNI 503B7 / 32 A	EMV-356
☐	Coupling decoupling network CNI 503B7 / 63 A	EMV-357
☐	Telecom Surge Generator TSurge 7	EMV-358
☐	Coupling decoupling network CNI 508N2	EMV-359
☐	Coupling decoupling network CNV 504N2.2	EMV-360
☐	Immunity generator NSG4060/NSG4060-1	EMV-361
☐	Coupling network CDND M316-2	EMV-362
☐	Coupling network CT419-5	EMV-363
☐	ESD Generator NSG 437	EMV-364
☐	Pulse Limiter VTSD 9561-F BNC	EMV-405
☐	Transient emission BSM200N40+BS200N100	EMV- 450+451
☐	Cap. Coupling Clamp HFK	EMV-455
☐	Mag. Field System MS100N+MC26100+MC2630	EMV- 456-458
☐	Coupling network CDN M2-100A	EMV-459
☐	Coupling network CDN M3-32A	EMV-460
☐	Coupling network CDN M5-100A	EMV-461
☐	Current Clamp CIP 9136A	EMV-462
☐	DC Artificial Network HV-AN 150	EMV- 464+465
☐	Coupling Clamp EM 101	EMV-466
☐	Decoupling Clamp FTC 101	EMV-467
☐	Power attenuator 10 dB / 250 Watt	EMV-469/2