

TEST REPORT
of the accredited test laboratory

TÜV Nr.:INE-AT/FG-18/154

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

Tested Product: STREAM1832 Bluetooth / BLE / WIFI streaming module
Test report for BLE part only

FCC-ID: 2AJYB-S1832

IC-ID: 20504-S1832

Manufacturer: See applicant

Output power / field strength: 13,49 mW cond. **power supply:** 12 VDC

Frequency range: 2402 - 2480 MHz **Channel separation:** 2 MHz

Standard: FCC: 47 CFR Part 15 (October 1, 2017 edition)
RSS-247 Issue 2, February 2017

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Inspection Body,
Certification Body,
Calibration Laboratory,
VerifizierungsstelleNotified Body 0408
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Vienna / FN 288476 fBank Details:
IBAN
AT13120005294900106
BIC BKAUATWWIBAN
AT15310000010409328
BIC RZBAATWWVAT ATU63240488
DVR 3002476**TUV Austria Services GmbH**
Test laboratory for EMC

Supervisor of EMC-laboratory:

Ing. Wilhelm Seier



06.11.2018

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Ing. Michael Emminger

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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: 05.09.2018

Tests were performed on: 05.09. till 05.11.2018

2. Description of EUT

EUT:	Bluetooth / BLE / WIFI module "STREAM1832"
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: 150mA Rated frequency: DC Mains voltage during the tests: 12VDC
Climatic conditions in the emc laboratory:	Relative humidity: 54% Temperature: 23°C

3. Standards / Final result

Name	Title	Deviation	Result
Title 47 CFR Part 15 October 1 st 2017 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 BLE part. See additional test reports:

INE-AT/FG-18/153 for Bluetooth

INE-AT/FG-18/155 for 2,4 GHz WIFI and

INE-AT/FG-18/156 for 5 GHz WIFI measurement results including photodocumentation.

2.1033 (c) Technical description

2.1033 (4) Type of emission: 620KF1D – 1 Mbit/s Mode – Channel spacing 2 MHz
1M30F1D – 2 Mbit/s Mode – Channel spacing 2 MHz

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 13,49 mW and there is no power regulation.

2.1033 (7) Maximum output power rating: 13,49 mW.

2.1033 (8) DC Voltage and Current: 12V DC
maximum current consumption: 150 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: 53,2 dBµV/m Average.

Tests were performed September 5th till November 5th 2018.

4.2. Number of channels and channel spacing

§ 2.1033

Conducted Measurement

Rated output power: 13,49 mW

There are 40 Channels used starting at 2402 till 2480 MHz each separated by 2 MHz channel spacing.

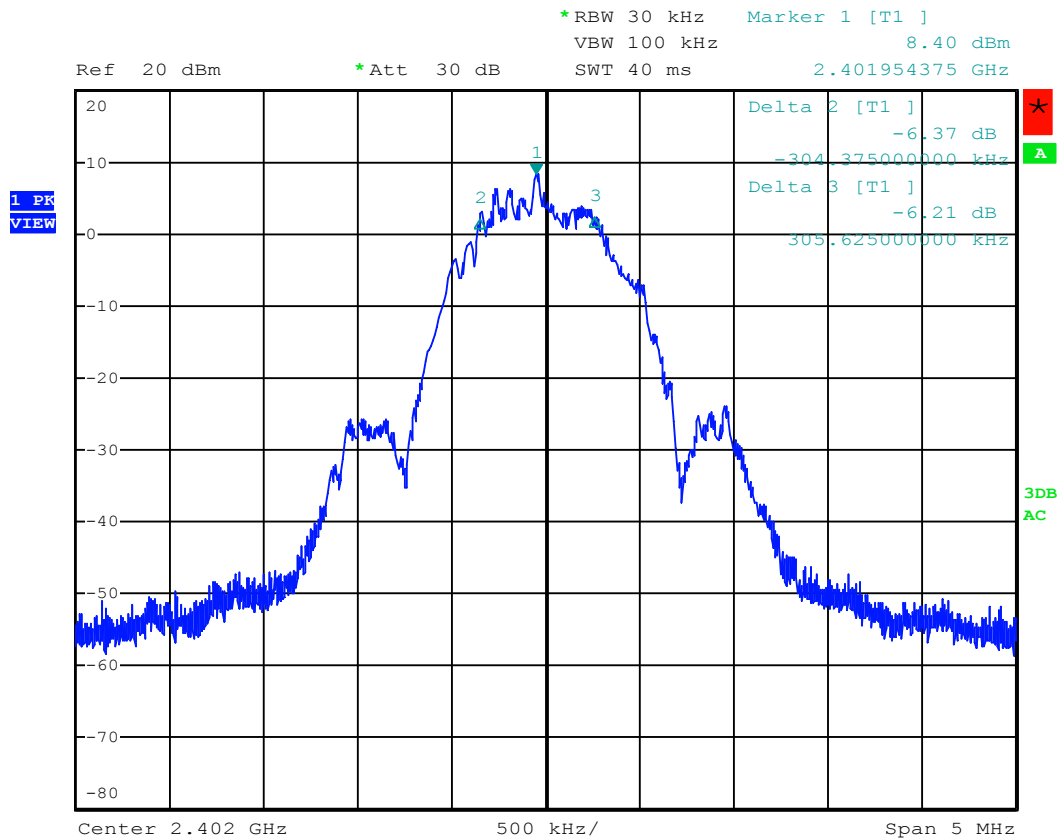
Test Equipment used: N/A

4.3. 6dB Bandwidth

§ 15.247(a)(2)
5.2(1)

Conducted Measurement

Rated output power: 13,49 mW Channel 0 (2402 MHz center frequency) - 1 Mbit/s mode - Antenna 1



Date: 19.SEP.2018 17:07:40

6dB Bandwidth: 610 kHz

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

Under normal test conditons	6 dB Bandwidth at least 500 kHz
-----------------------------	---------------------------------

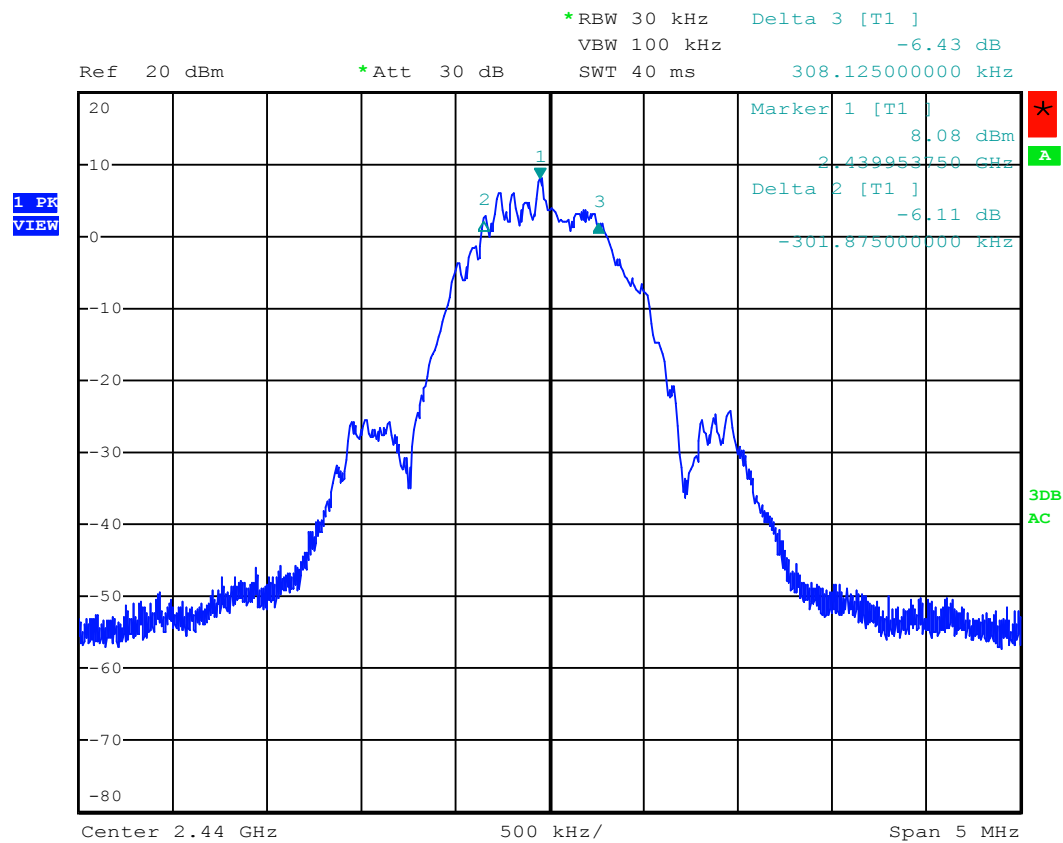
Test Equipment used: NT-203/1

6dB Bandwidth

§ 15.247(a)(2)
5.2(1)

Conducted Measurement

Rated output power: 13,49 mW Channel 19 (2440 MHz center frequency) - 1 Mbit/s mode – Antenna 1



Date: 19.SEP.2018 17:16:24

6dB Bandwidth: 610 kHz

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

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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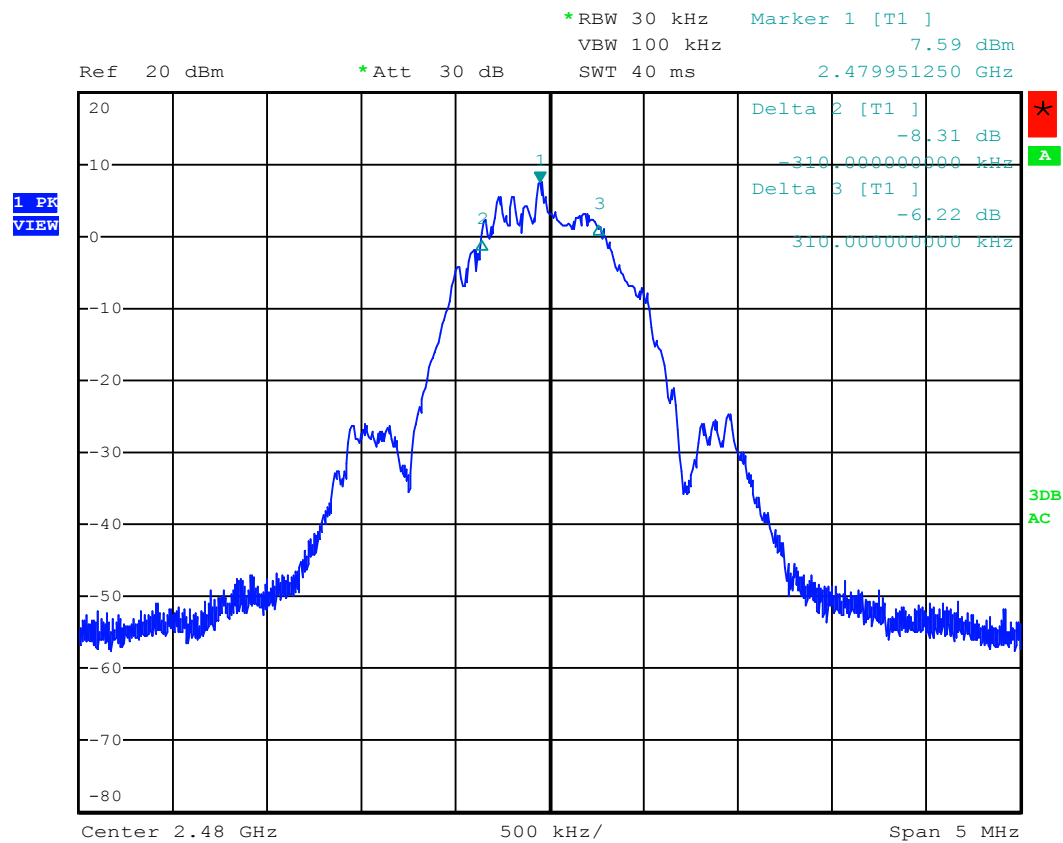
Test Equipment used: NT-203/1

6dB Bandwidth

§ 15.247(a)(2)
5.2(1)

Conducted Measurement

Rated output power: 13,49 mW Channel 39 (2480 MHz center frequency) - 1 Mbit/s mode – Antenna 1



Date: 19.SEP.2018 17:17:38

6dB Bandwidth: 620 kHz

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

Under normal test conditons	6 dB Bandwidth at least 500 kHz
-----------------------------	---------------------------------

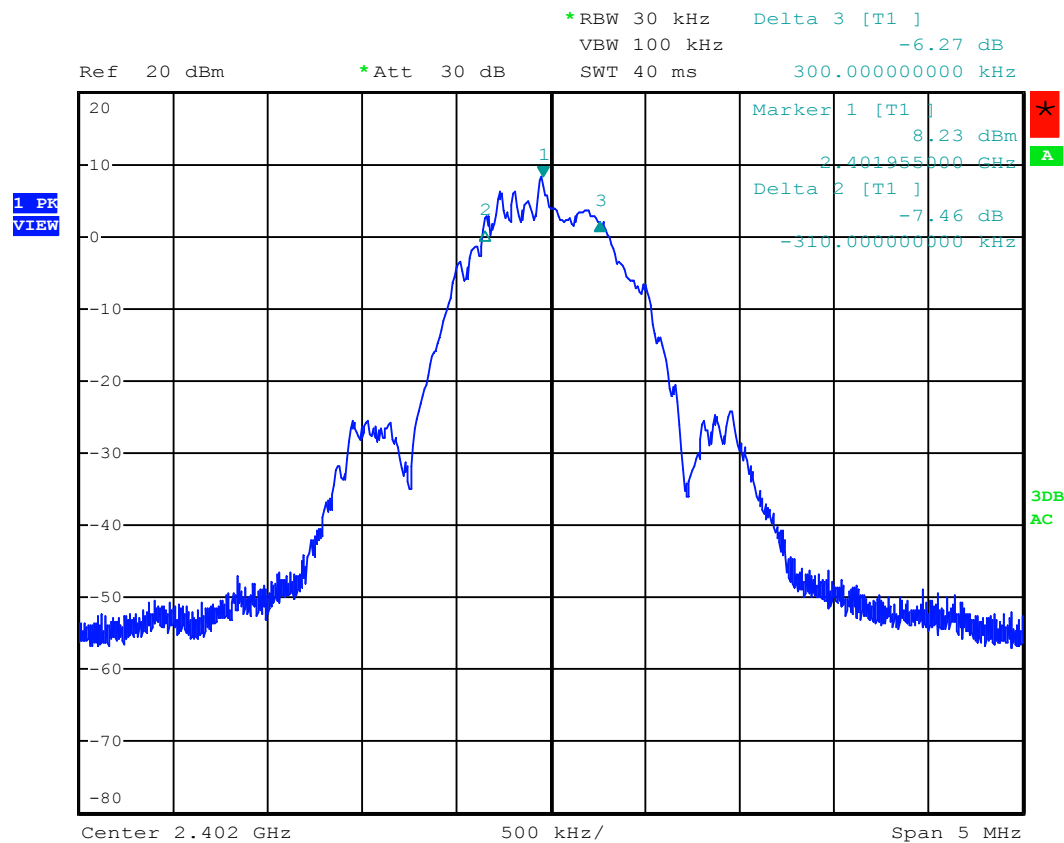
Test Equipment used: NT-203/1

6dB Bandwidth

§ 15.247(a)(2)
5.2(1)

Conducted Measurement

Rated output power: 13,49 mW Channel 0 (2402 MHz center frequency) - 1 Mbit/s mode - Antenna 2



Date: 19.SEP.2018 17:33:20

6dB Bandwidth: 610 kHz

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

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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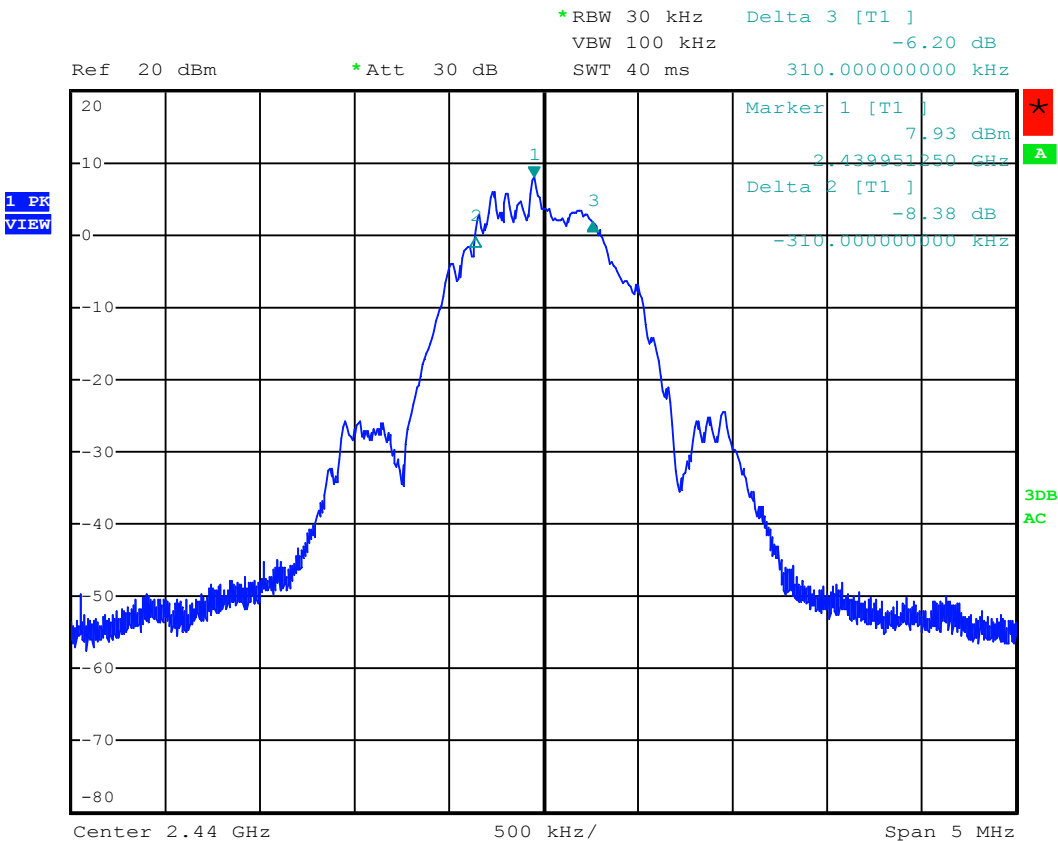
Test Equipment used: NT-203/1

6dB Bandwidth

§ 15.247(a)(2)
5.2(1)

Conducted Measurement

Rated output power: 13,49 mW Channel 19 (2440 MHz center frequency) - 1 Mbit/s mode – Antenna 2



Date: 19.SEP.2018 17:31:16

6dB Bandwidth: 620 kHz

LIMIT SUBCLAUSE 15.247(e) – 5.2(1)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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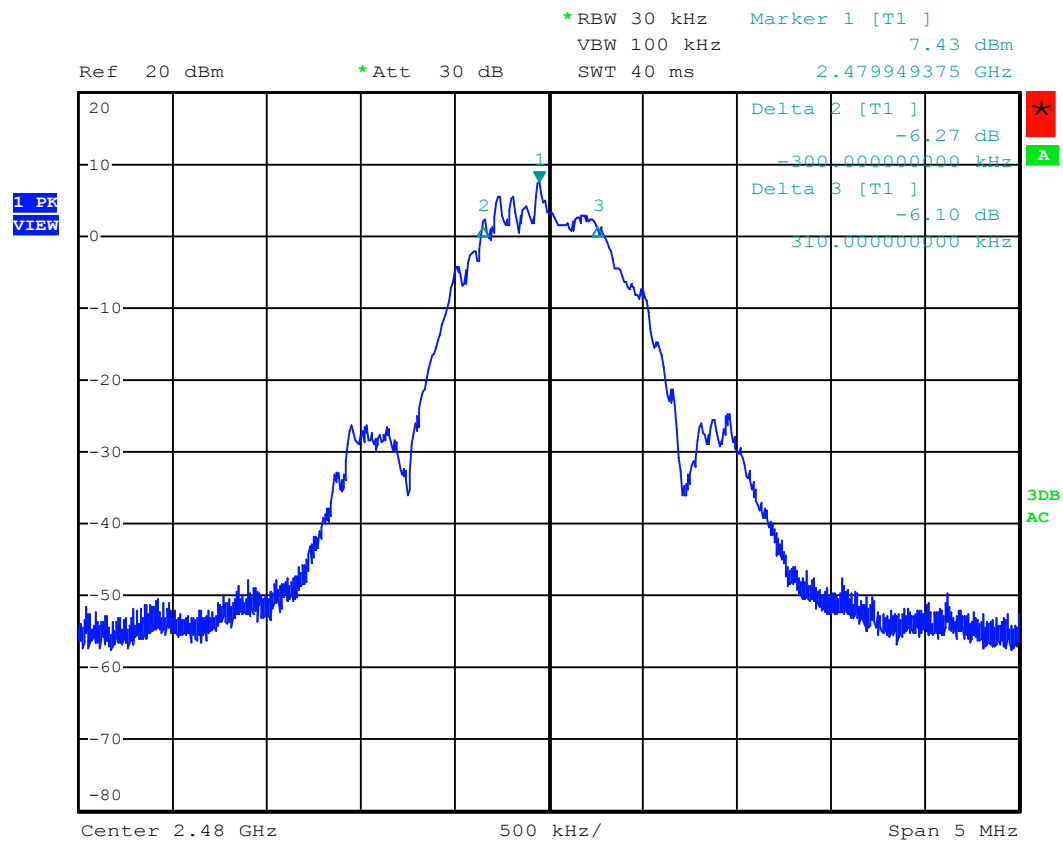
Test Equipment used: NT-203/1

6dB Bandwidth

§ 15.247(a)(2)
5.2(1)

Conducted Measurement

Rated output power: 13,49 mW Channel 39 (2480 MHz center frequency) - 1 Mbit/s mode – Antenna 2



Date: 19.SEP.2018 17:32:15

6dB Bandwidth: 610 kHz

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

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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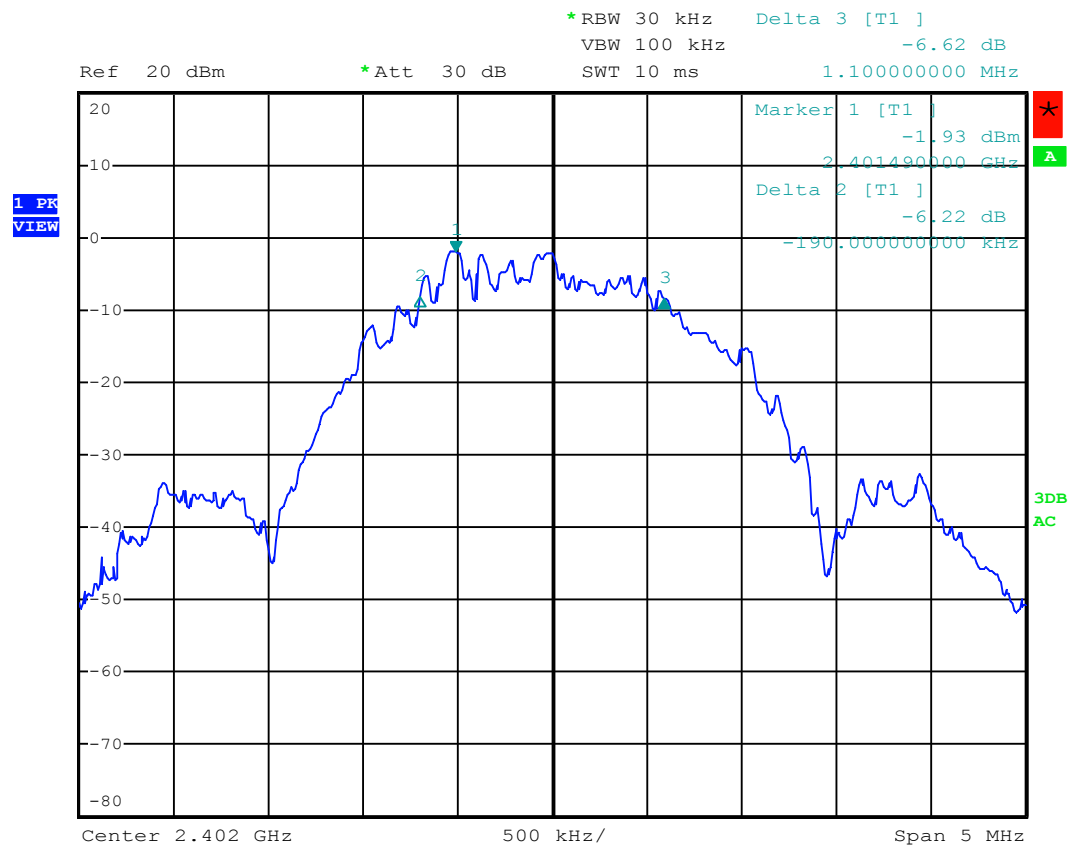
Test Equipment used: NT-203/1

6dB Bandwidth

§ 15.247(a)(2)
5.2(1)

Conducted Measurement

Rated output power: 13,49 mW Channel 0 (2402 MHz center frequency) - 2 Mbit/s mode - Antenna 1



Date: 8.OCT.2018 15:07:00

6dB Bandwidth: 1290 kHz

LIMIT SUBCLAUSE 15.247(e) – 5.2(1)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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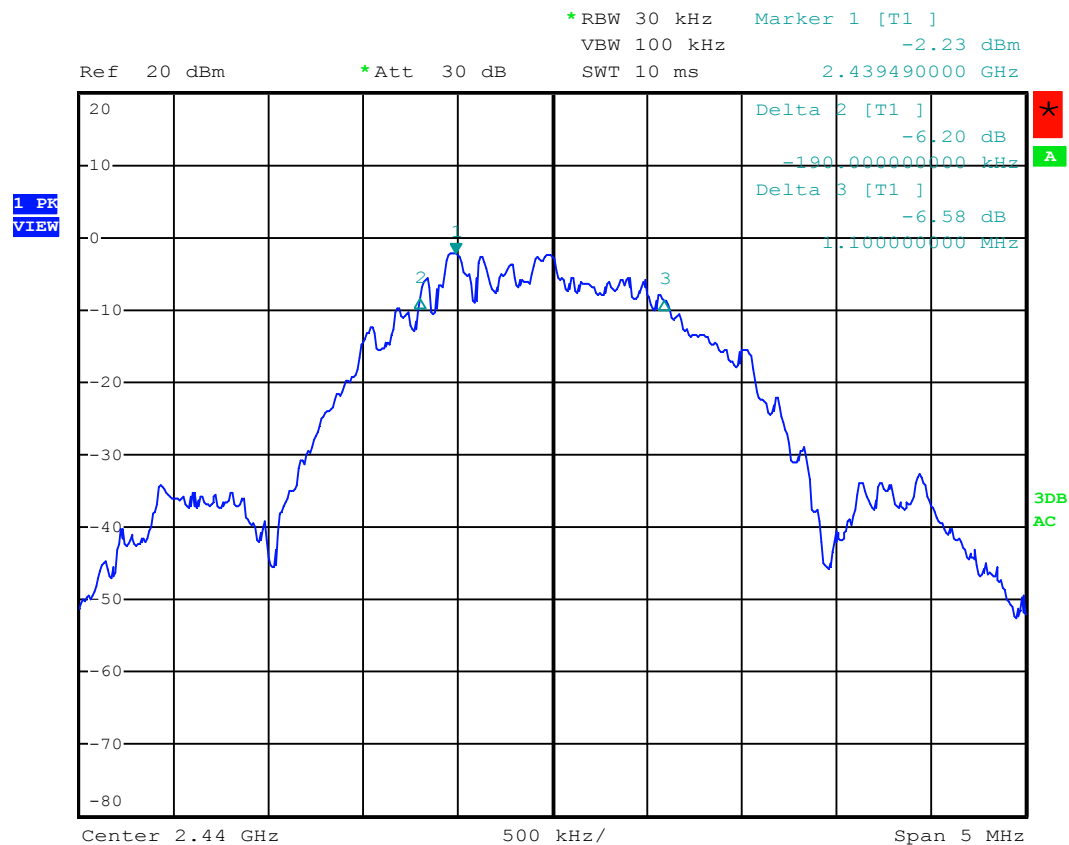
Test Equipment used: NT-203/1

6dB Bandwidth

§ 15.247(a)(2)
5.2(1)

Conducted Measurement

Rated output power: 13,49 mW Channel 19 (2440 MHz center frequency) - 2 Mbit/s mode – Antenna 1



Date: 8.OCT.2018 15:05:56

6dB Bandwidth: 1290 kHz

LIMIT SUBCLAUSE 15.247(e) – 5.2(1)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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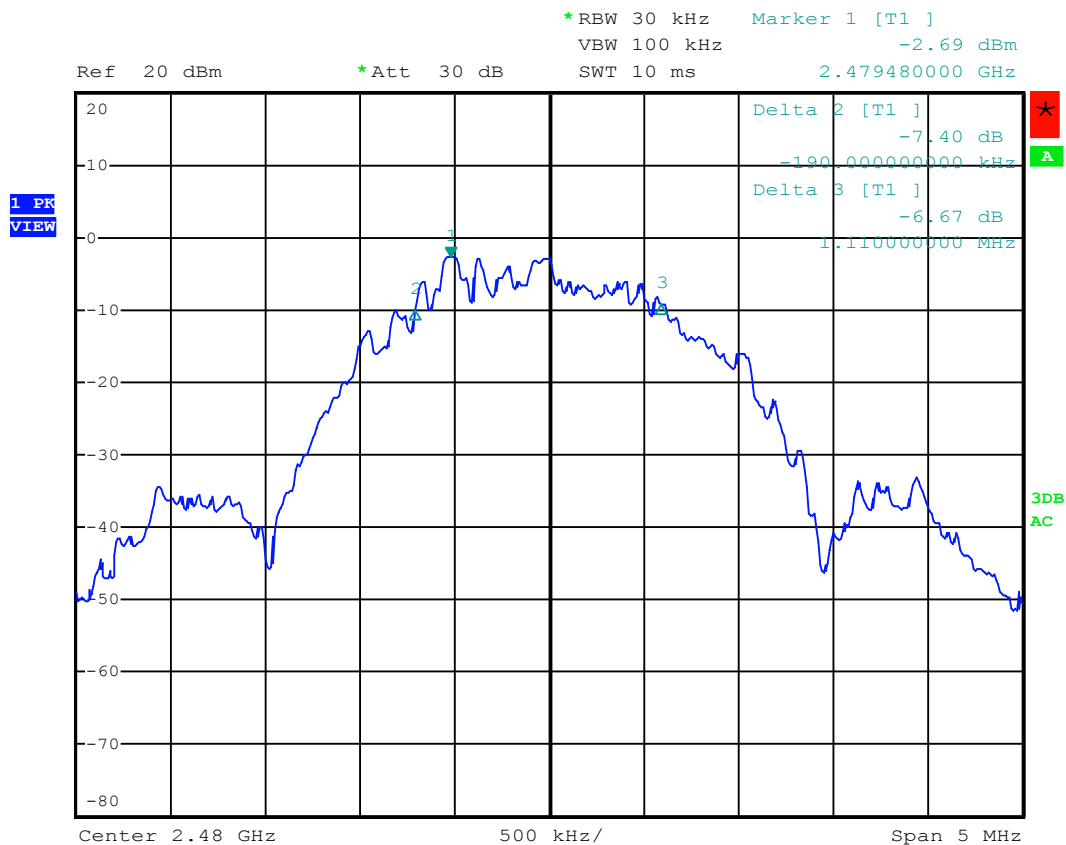
Test Equipment used: NT-203/1

6dB Bandwidth

§ 15.247(a)(2)
5.2(1)

Conducted Measurement

Rated output power: 13,49 mW Channel 39 (2480 MHz center frequency) - 2 Mbit/s mode – Antenna 1



Date: 8.OCT.2018 15:04:26

6dB Bandwidth: 1300 kHz

LIMIT SUBCLAUSE 15.247(e) – 5.2(1)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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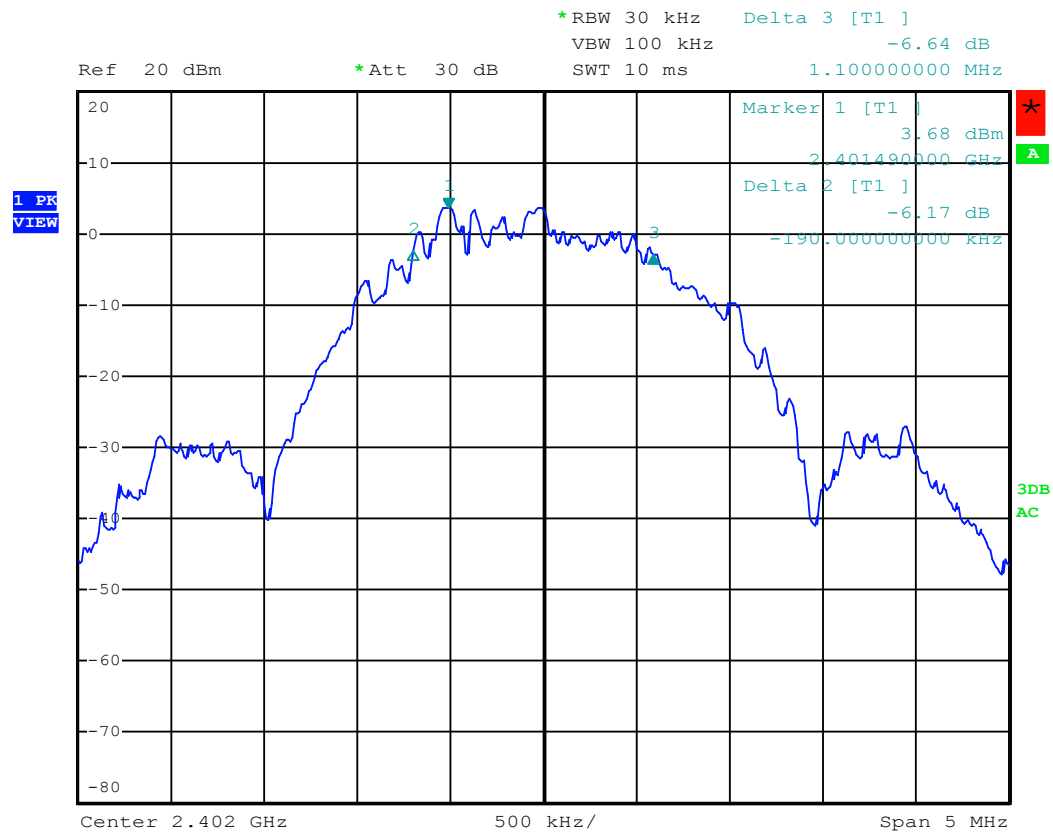
Test Equipment used: NT-203/1

6dB Bandwidth

§ 15.247(a)(2)
5.2(1)

Conducted Measurement

Rated output power: 13,49 mW Channel 0 (2402 MHz center frequency) - 2 Mbit/s mode - Antenna 2



Date: 8.OCT.2018 15:20:15

6dB Bandwidth: 1290 kHz

LIMIT SUBCLAUSE 15.247(e) – 5.2(1)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
-----------------------------	---------------------------------

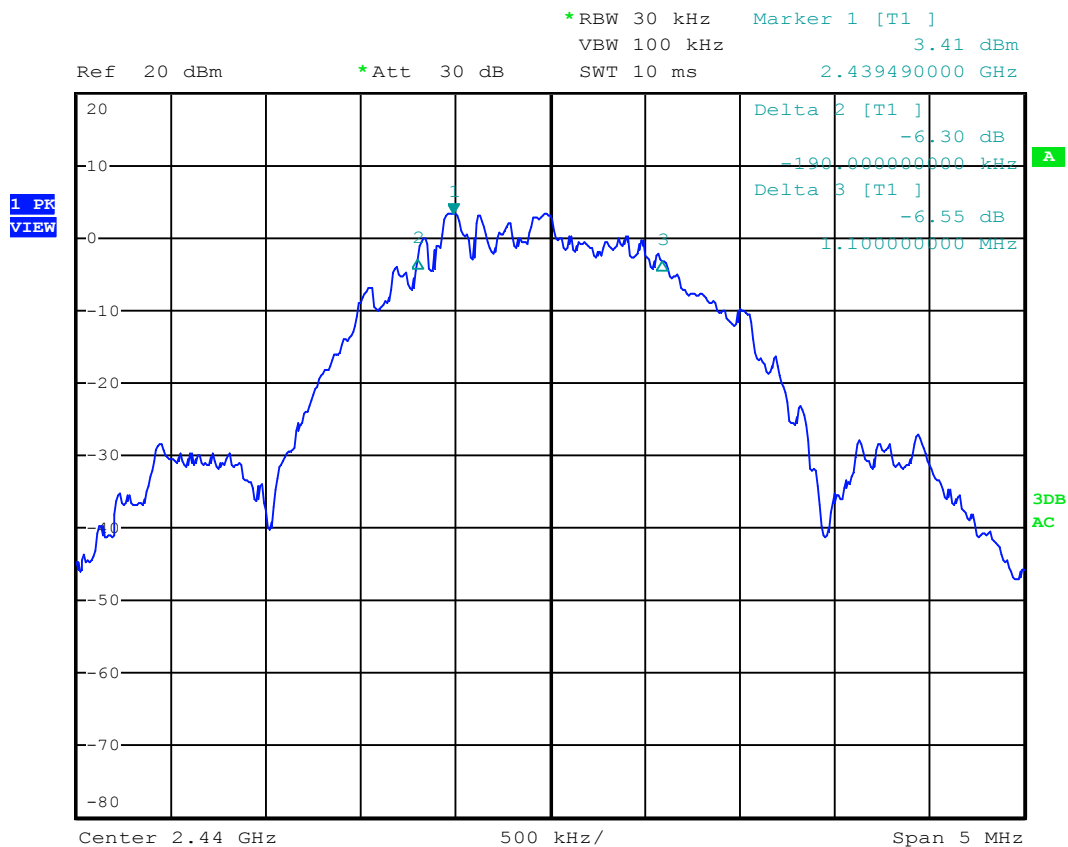
Test Equipment used: NT-203/1

6dB Bandwidth

§ 15.247(a)(2)
5.2(1)

Conducted Measurement

Rated output power: 13,49 mW Channel 19 (2440 MHz center frequency) - 2 Mbit/s mode – Antenna 2



Date: 8.OCT.2018 15:19:11

6dB Bandwidth: 1290 kHz

LIMIT SUBCLAUSE 15.247(e) – 5.2(1)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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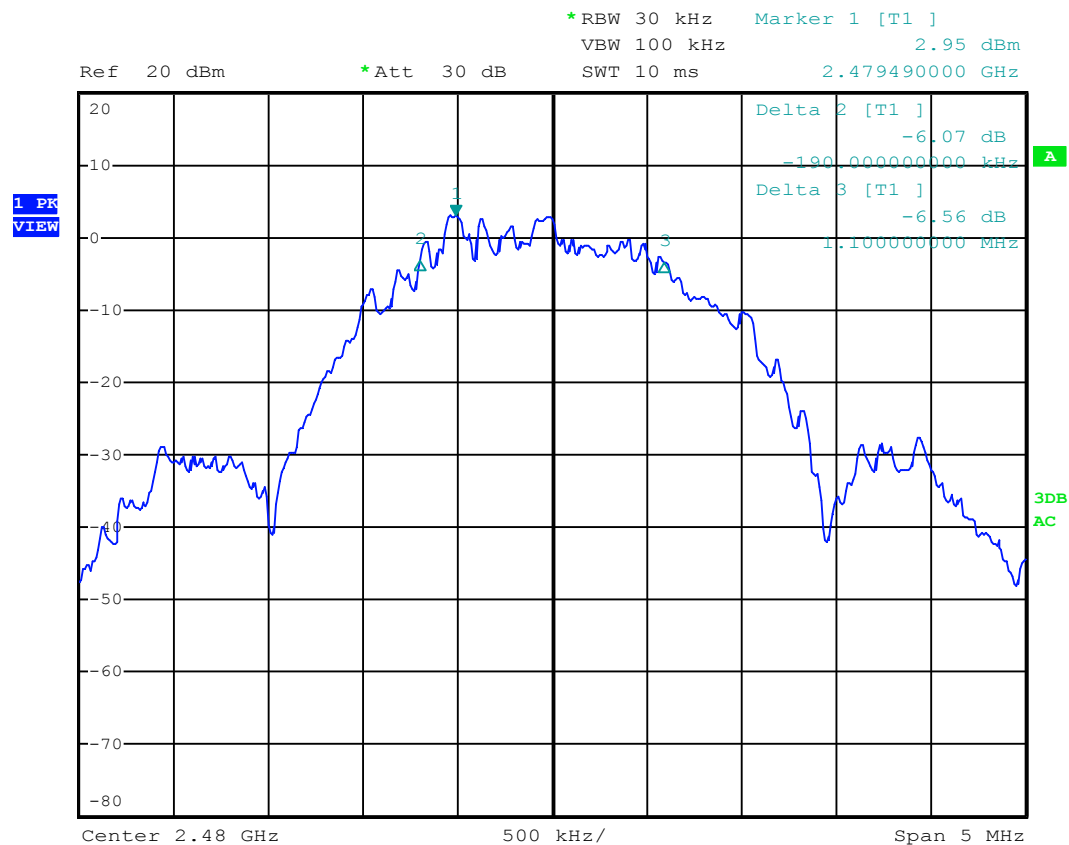
Test Equipment used: NT-203/1

6dB Bandwidth

§ 15.247(a)(2)
5.2(1)

Conducted Measurement

Rated output power: 13,49 mW Channel 39 (2480 MHz center frequency) - 2 Mbit/s mode – Antenna 2



Date: 8.OCT.2018 15:18:14

6dB Bandwidth: 1290 kHz

LIMIT SUBCLAUSE 15.247(e) – 5.2(1)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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Test Equipment used: NT-203/1

4.4. Maximum Peak RF Power Output (conducted)

§ 15.247(b)(3)
5.4(4)

Conducted Measurement – 1 Mbit/s mode – Antenna 1

Rated output power: 13,49 mW

Test conditions		Transmitter power (mW)		
		2402 MHz	2440 MHz	2480 MHz
T _{nom} (23) °C	V _{nom} (5) V	12,88	12,30	11,48
Maximum deviation from rated output power under normal test conditions (dB)		-0,2	-0,4	-0,7
Measurement uncertainty		± 0,75 dB		

LIMIT SUBCLAUSE 15.247(b)(3) – 5.4(4)

Under normal test conditons	1W conducted (4W eirp)
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Test Equipment used: NT-204

Maximum Peak RF Power Output (conducted)

**§ 15.247(b)(3)
5.4(4)**

Conducted Measurement – 1 Mbit/s mode – Antenna 2

Rated output power: 13,49 mW

Test conditions		Transmitter power (mW)		
		2402 MHz	2440 MHz	2480 MHz
T _{nom} (23) °C	V _{nom} (5) V	12,88	12,30	11,48
Maximum deviation from rated output power under normal test conditions (dB)		-0,2	-0,4	-0,7
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 – 2 Mbit/s mode – Antenna 1

Rated output power: 13,49 mW

Test conditions		Transmitter power (mW)		
		2402 MHz	2440 MHz	2480 MHz
T _{nom} (23) °C	V _{nom} (5) V	13,49	12,88	12,02
Maximum deviation from rated output power under normal test conditions (dB)		0	-0,2	-0,5
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 – 2 Mbit/s mode – Antenna 2

Rated output power: 13,49 mW

Test conditions		Transmitter power (mW)		
		2402 MHz	2440 MHz	2480 MHz
T _{nom} (23) °C	V _{nom} (5) V	13,49	12,88	12,02
Maximum deviation from rated output power under normal test conditions (dB)		0	-0,2	-0,5
Measurement uncertainty		± 0,75 dB		

LIMIT SUBCLAUSE 15.247(b)(3) – 5.4(4)

Under normal test conditons	1W conducted (4W eirp)
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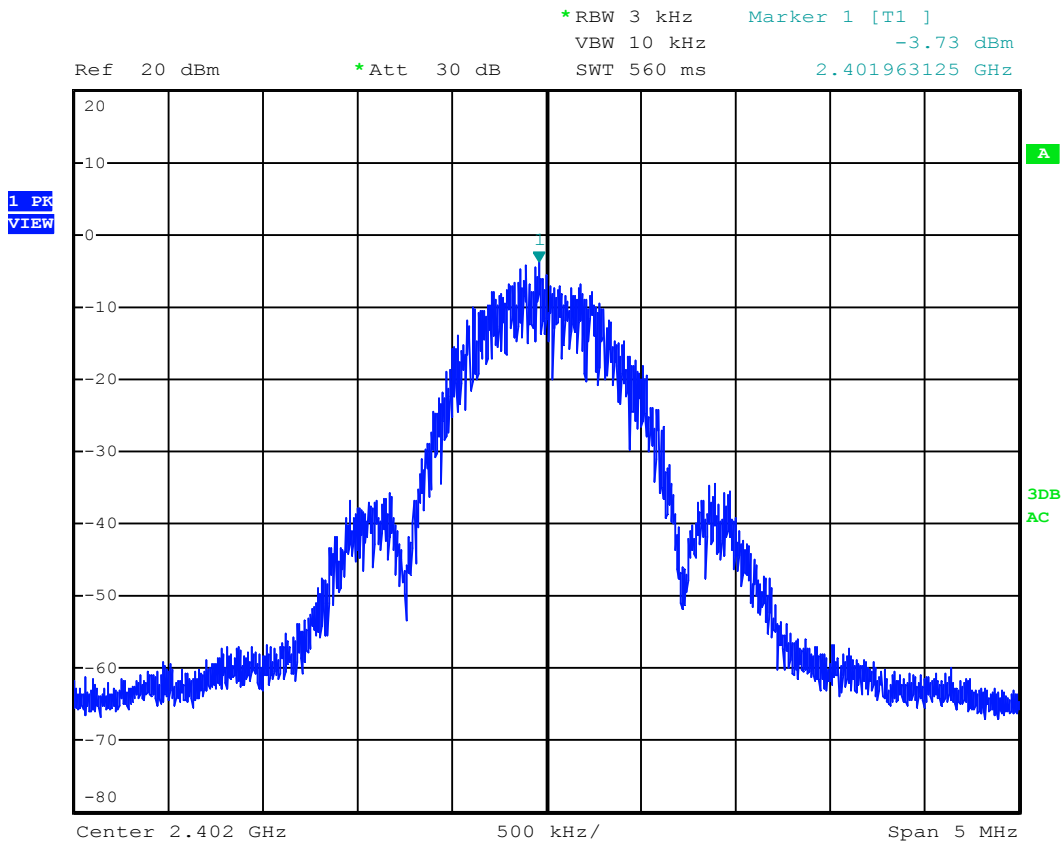
Test Equipment used: NT-204

4.5. Power spectral density (conducted)

§ 15.247(e)
5.2(2)

Conducted Measurement

Rated output power: 13,49 mW Channel 0 (2402 MHz center frequency) – 1 Mbit/s mode – Antenna 1



Date: 19.SEP.2018 17:23:02

Power Spectral density: -3,73 dBm @ 2401,963 MHz

LIMIT SUBCLAUSE 15.247(e) – 5.2(2)

Under normal test conditons	+8dBm in any 3 kHz band
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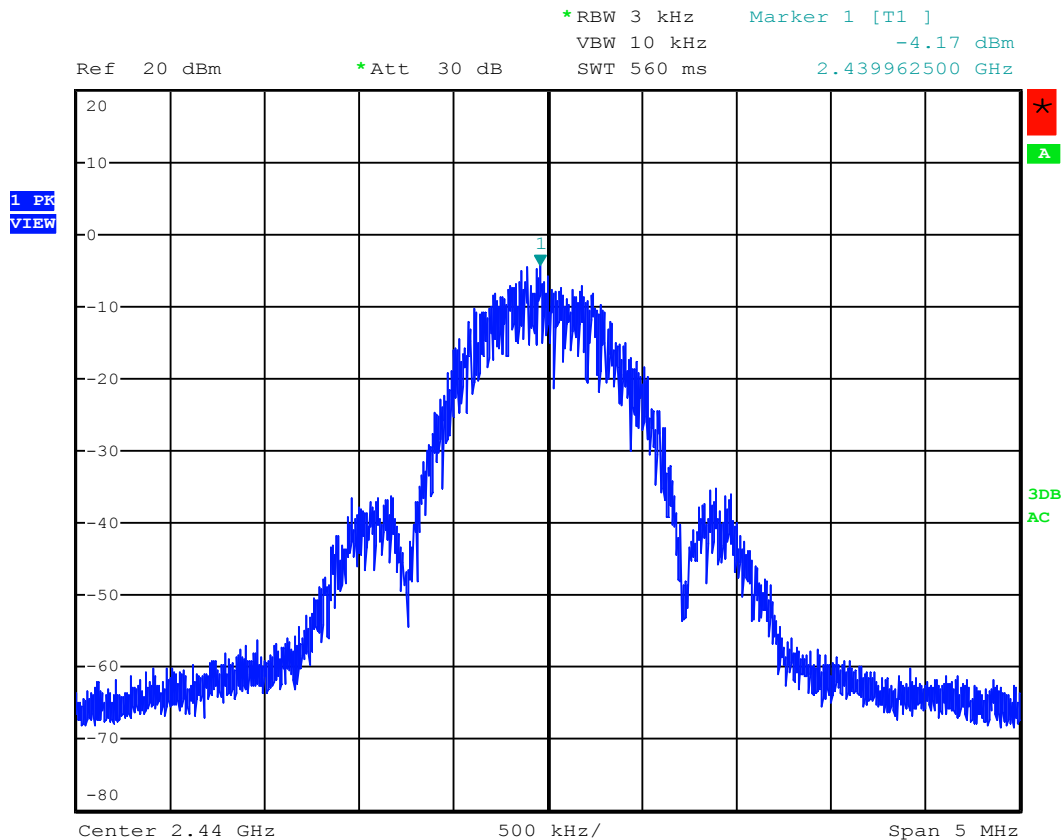
Test Equipment used: NT-203/1

Power spectral density (conducted)

§ 15.247(e)
5.2(2)

Conducted Measurement

Rated output power: 13,49 mW Channel 19 (2440 MHz center frequency) – 1 Mbit/s mode – Antenna 1



Date: 19.SEP.2018 17:20:07

Power Spectral density: -4,17 dBm @ 2439,9625 MHz

LIMIT SUBCLAUSE 15.247(e) – 5.2(2)

Under normal test conditons	+8dBm in any 3 kHz band
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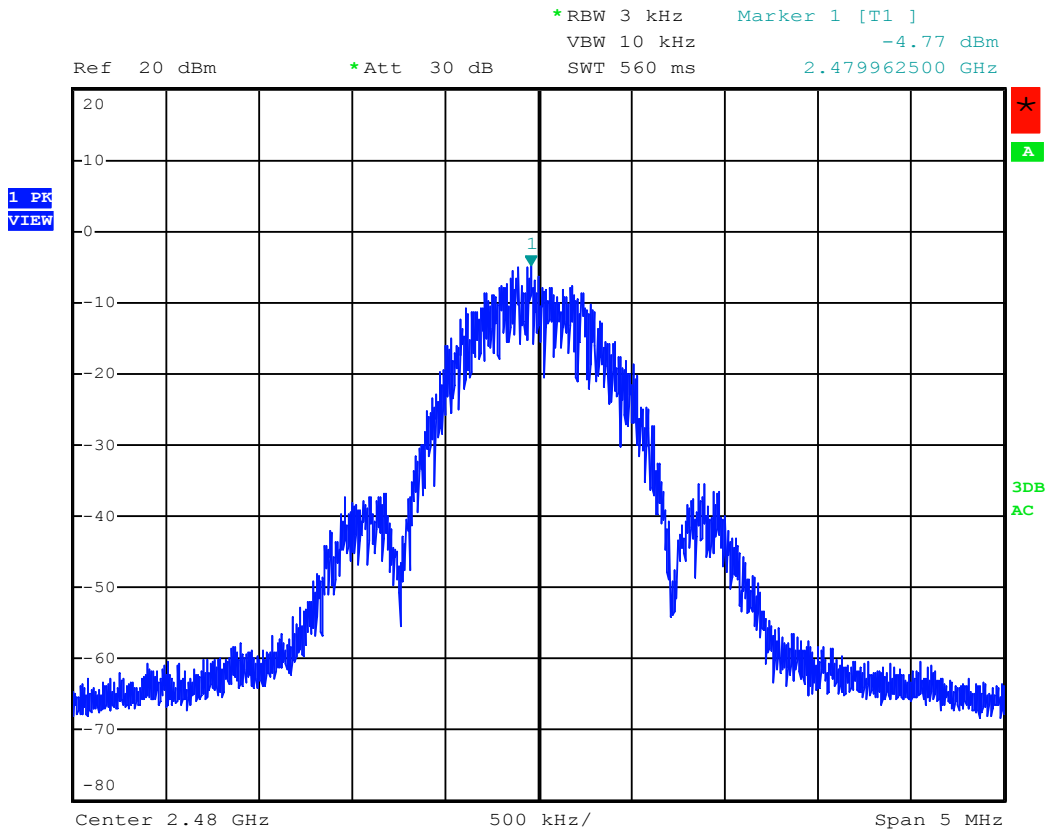
Test Equipment used: NT-203/1

Power spectral density (conducted)

§ 15.247(e)
5.2(2)

Conducted Measurement

Rated output power: 13,49 mW Channel 39 (2480 MHz center frequency) – 1 Mbit/s mode – Antenna 1



Date: 19.SEP.2018 17:18:58

Power Spectral density: -4,77 dBm @ 2479,9625 MHz

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

Under normal test conditons	+8dBm in any 3 kHz band
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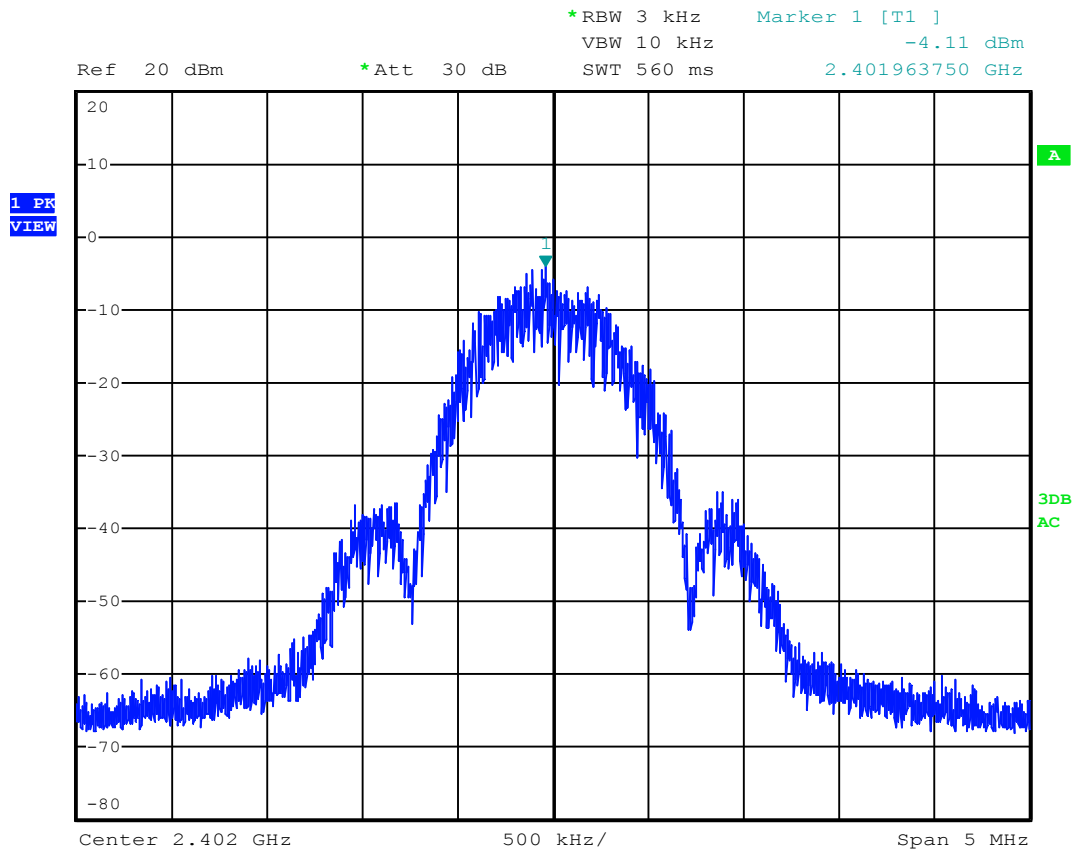
Test Equipment used: NT-203/1

Power spectral density (conducted)

§ 15.247(e)
5.2(2)

Conducted Measurement

Rated output power: 13,49 mW Channel 0 (2402 MHz center frequency) – 1 Mbit/s mode – Antenna 2



Date: 19.SEP.2018 17:27:38

Power Spectral density: -4,11 dBm @ 2401,964 MHz

LIMIT SUBCLAUSE 15.247(e) – 5.2(2)

Under normal test conditons	+8dBm in any 3 kHz band
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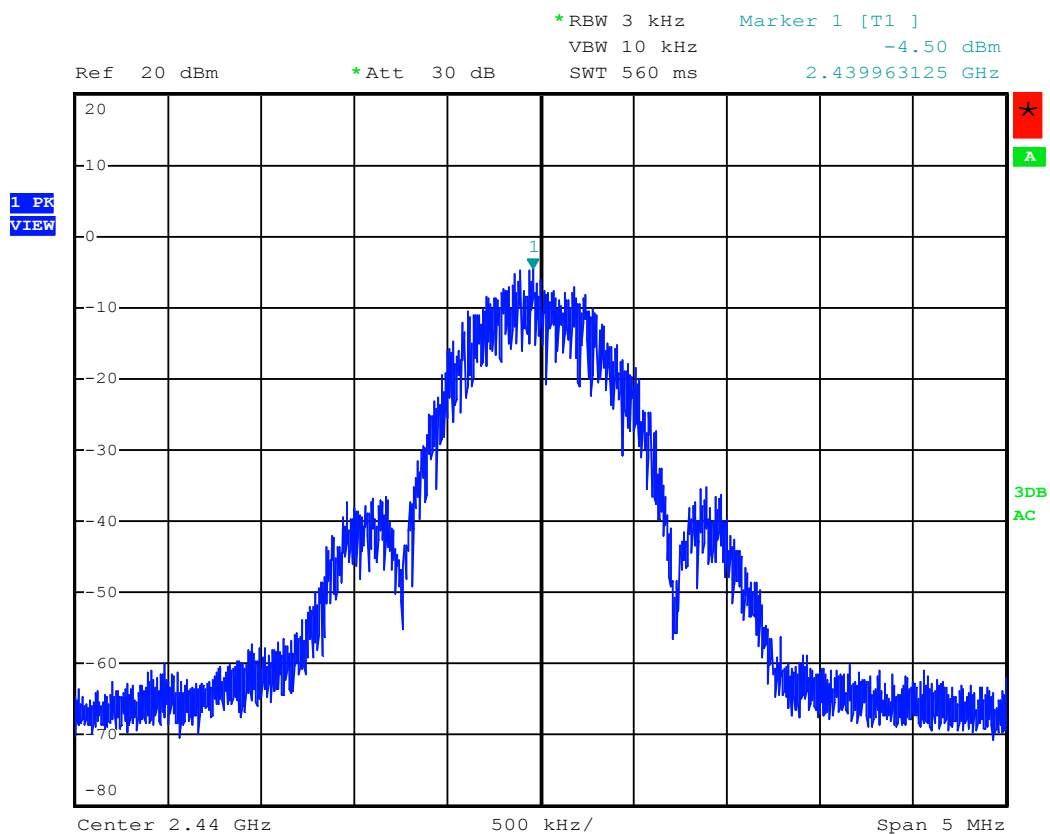
Test Equipment used: NT-203/1

Power spectral density (conducted)

§ 15.247(e)
5.2(2)

Conducted Measurement

Rated output power: 13,49 mW Channel 19 (2440 MHz center frequency) – 1 Mbit/s mode – Antenna 2



Date: 19.SEP.2018 17:29:58

Power Spectral density: -4,50 dBm @ 2439,963 MHz

LIMIT SUBCLAUSE 15.247(e) – 5.2(2)

Under normal test conditons	+8dBm in any 3 kHz band
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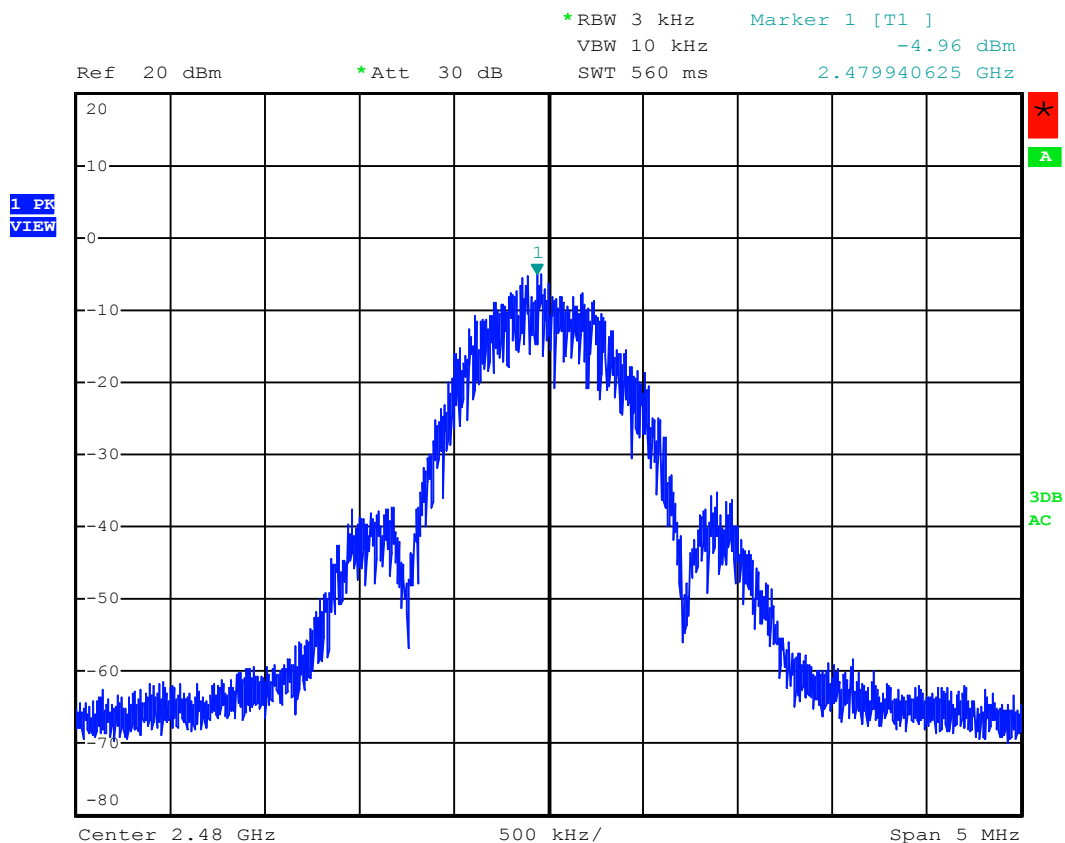
Test Equipment used: NT-203/1

Power spectral density (conducted)

§ 15.247(e)
5.2(2)

Conducted Measurement

Rated output power: 13,49 mW Channel 39 (2480 MHz center frequency) – 1 Mbit/s mode – Antenna 2



Date: 19.SEP.2018 17:29:11

Power Spectral density: -4,96 dBm @ 2479,941 MHz

LIMIT SUBCLAUSE 15.247(e) – 5.2(2)

Under normal test conditons	+8dBm in any 3 kHz band
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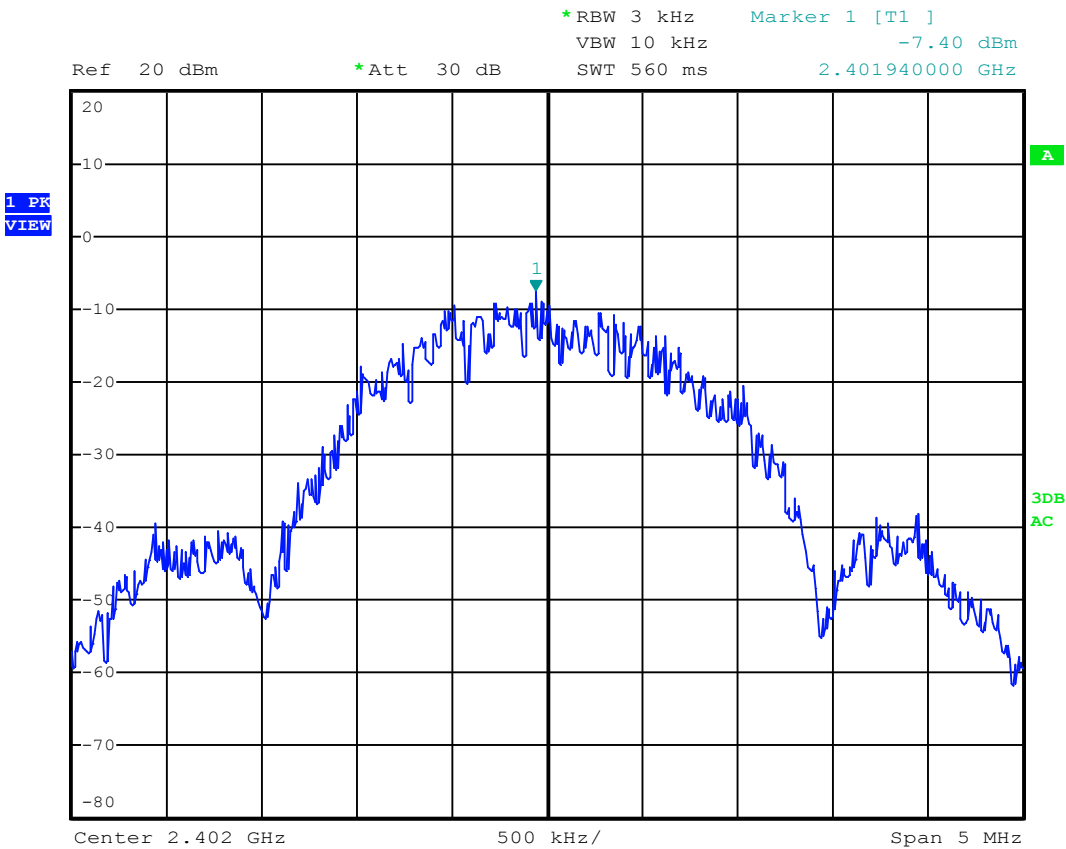
Test Equipment used: NT-203/1

Power spectral density (conducted)

**§ 15.247(e)
5.2(2)**

Conducted Measurement

Rated output power: 13,49 mW Channel 0 (2402 MHz center frequency) – 2 Mbit/s mode – Antenna 1



Date: 8.OCT.2018 15:08:59

Power Spectral density: -7,40 dBm @ 2401,963 MHz

LIMIT SUBCLAUSE 15.247(e) – 5.2(2)

Under normal test conditons	+8dBm in any 3 kHz band
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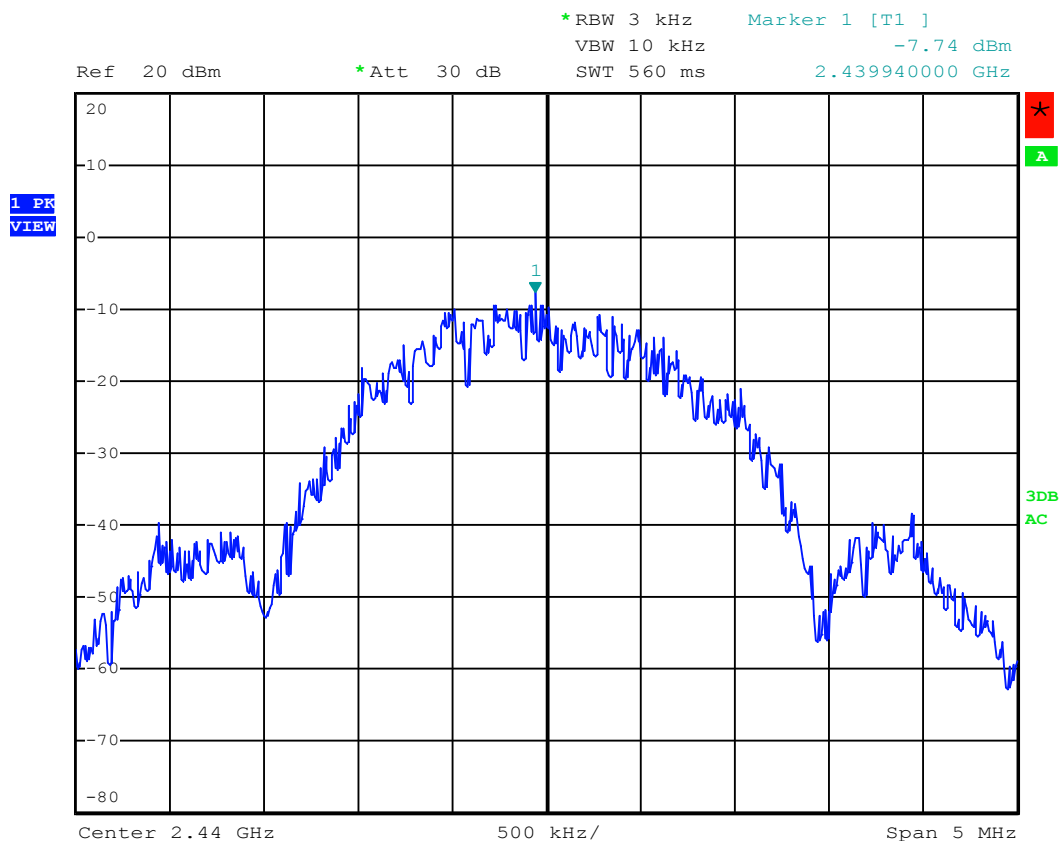
Test Equipment used: NT-203/1

Power spectral density (conducted)

§ 15.247(e)
5.2(2)

Conducted Measurement

Rated output power: 13,49 mW Channel 19 (2440 MHz center frequency) – 2 Mbit/s mode – Antenna 1



Date: 8.OCT.2018 15:09:48

Power Spectral density: -7,74 dBm @ 2439,9625 MHz

LIMIT SUBCLAUSE 15.247(e) – 5.2(2)

Under normal test conditons	+8dBm in any 3 kHz band
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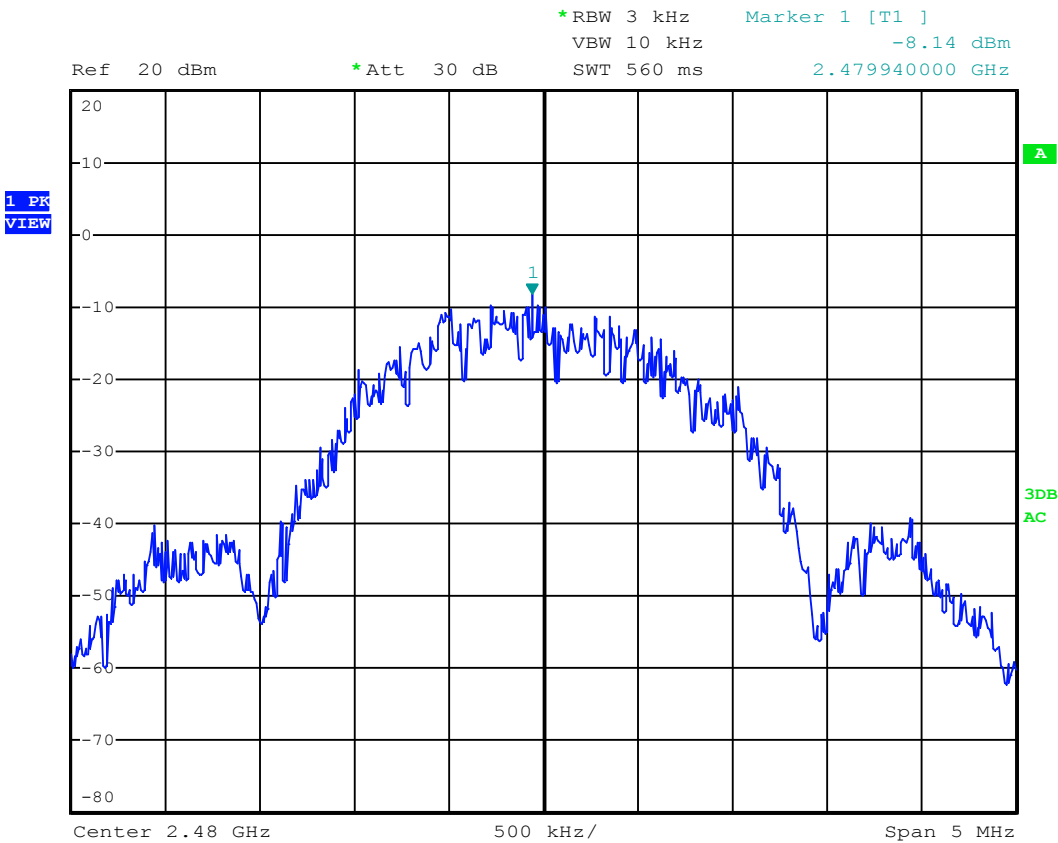
Test Equipment used: NT-203/1

Power spectral density (conducted)

**§ 15.247(e)
5.2(2)**

Conducted Measurement

Rated output power: 13,49 mW Channel 39 (2480 MHz center frequency) – 2 Mbit/s mode – Antenna 1



Date: 8.OCT.2018 15:10:37

Power Spectral density: -8,14 dBm @ 2479,9625 MHz

LIMIT SUBCLAUSE 15.247(e) – 5.2(2)

Under normal test conditons	+8dBm in any 3 kHz band
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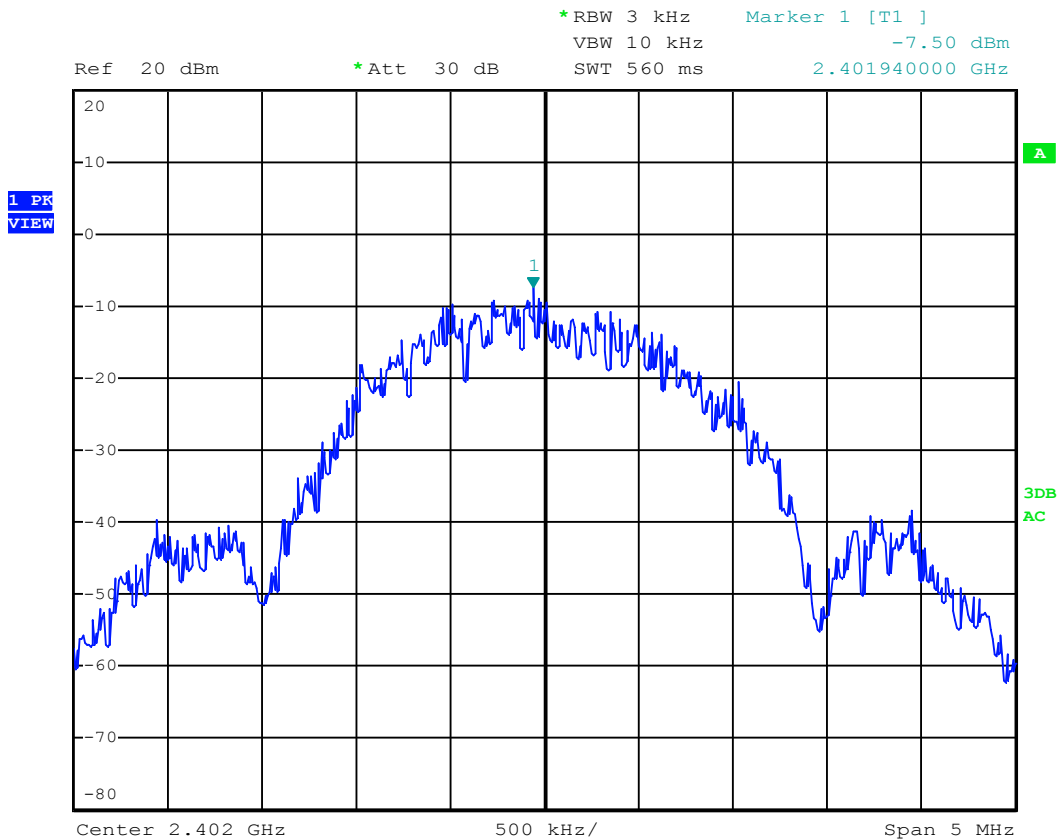
Test Equipment used: NT-203/1

Power spectral density (conducted)

§ 15.247(e)
5.2(2)

Conducted Measurement

Rated output power: 13,49 mW Channel 0 (2402 MHz center frequency) – 2 Mbit/s mode – Antenna 2



Date: 8.OCT.2018 15:15:29

Power Spectral density: -7,50 dBm @ 2401,964 MHz

LIMIT SUBCLAUSE 15.247(e) – 5.2(2)

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

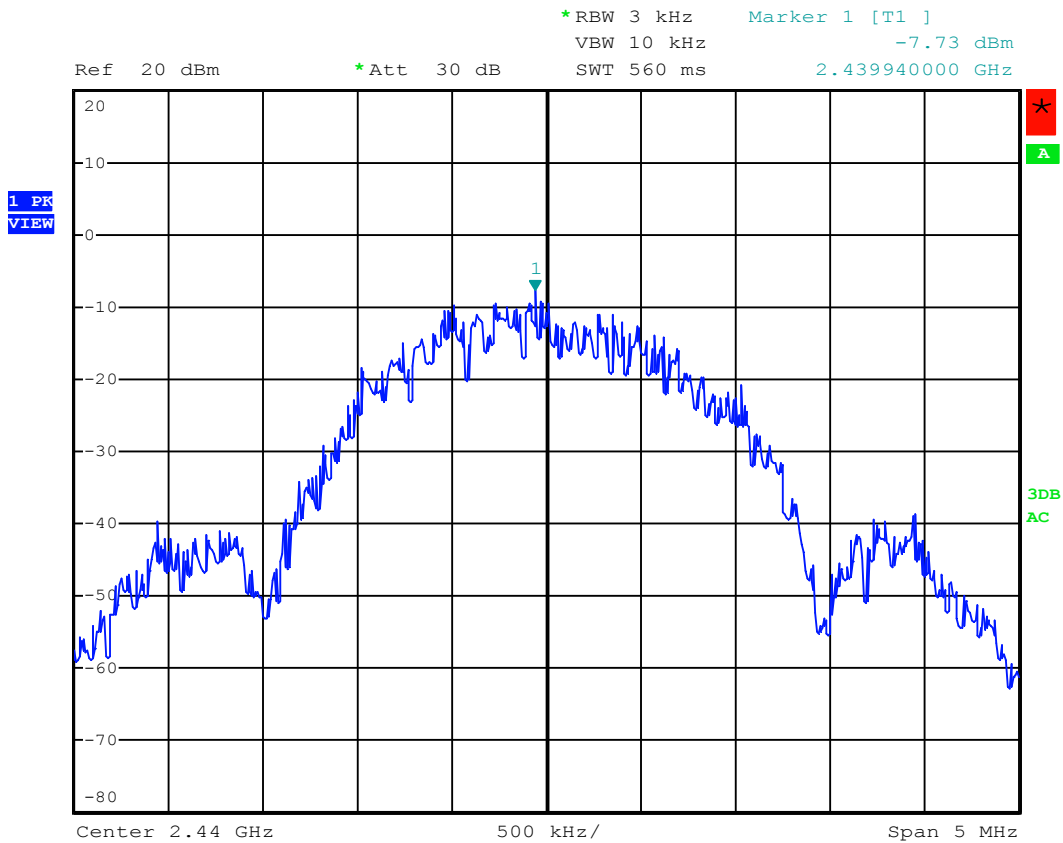
Test Equipment used: NT-203/1

Power spectral density (conducted)

§ 15.247(e)
5.2(2)

Conducted Measurement

Rated output power: 13,49 mW Channel 19 (2440 MHz center frequency) – 2 Mbit/s mode – Antenna 2



Date: 8.OCT.2018 15:16:09

Power Spectral density: -7,73 dBm @ 2439,963 MHz

LIMIT SUBCLAUSE 15.247(e) – 5.2(2)

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

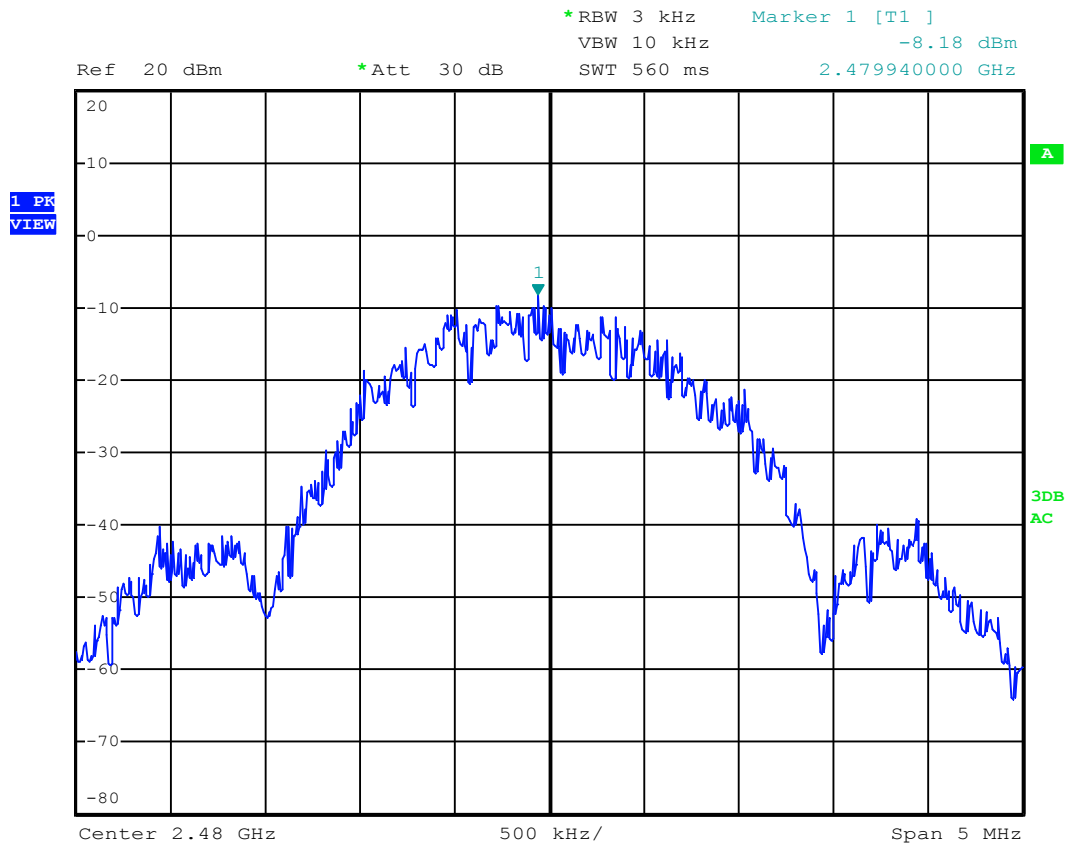
Test Equipment used: NT-203/1

Power spectral density (conducted)

§ 15.247(e)
5.2(2)

Conducted Measurement

Rated output power: 13,49 mW Channel 39 (2480 MHz center frequency) – 2 Mbit/s mode – Antenna 2



Date: 8.OCT.2018 15:16:53

Power Spectral density: -8,18 dBm @ 2479,941 MHz

LIMIT SUBCLAUSE 15.247(e) – 5.2(2)

Under normal test conditons	+8dBm in any 3 kHz band
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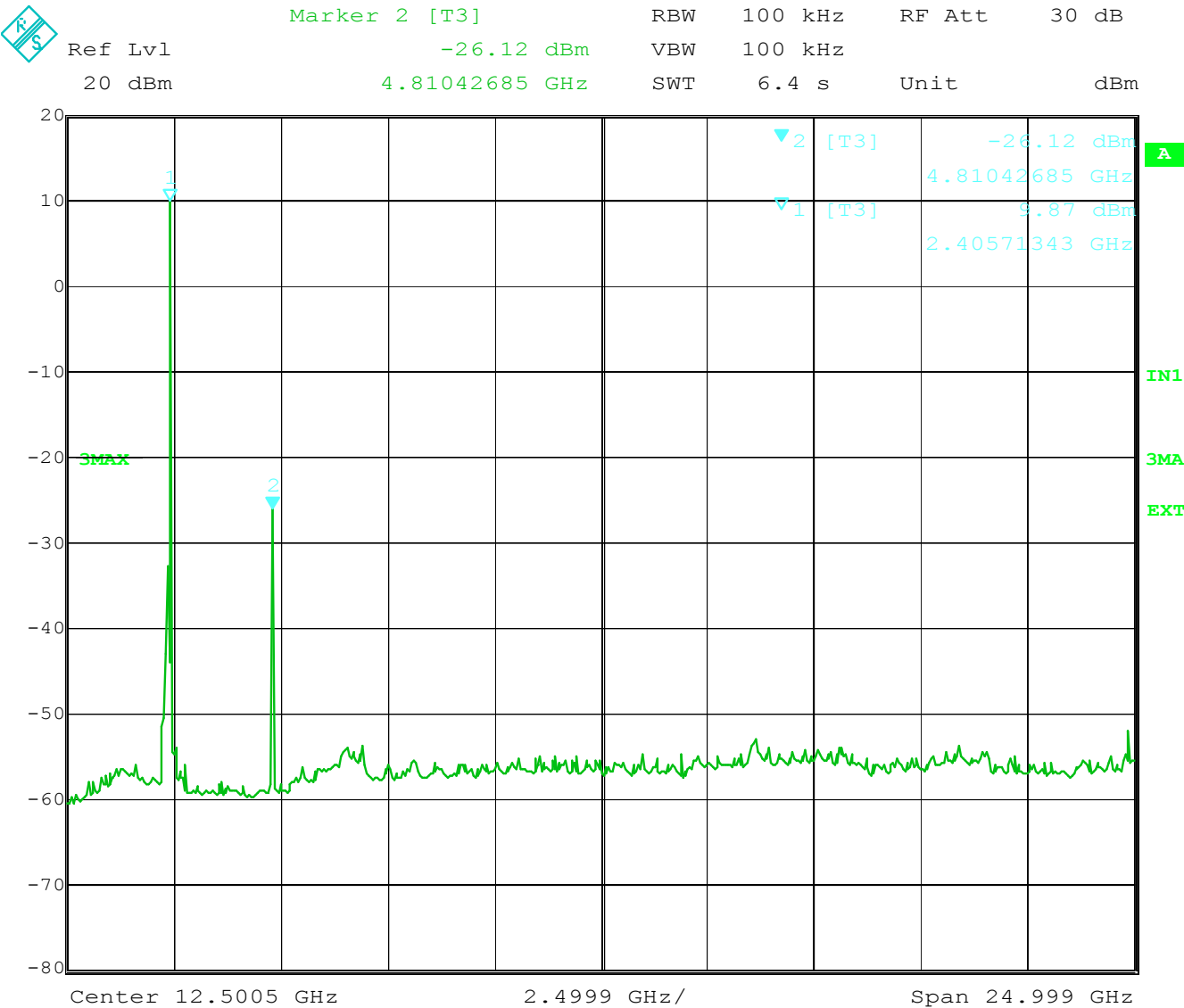
Test Equipment used: NT-203/1

4.6. Out-of-band Emission
Unwanted Emissions

§ 15.247(d)
5.5

Conducted Measurement – 1 Mbit/s mode – Antenna 1

Setup: CH 0: 2402 MHz



Date: 28.SEP.2018 14:37:28

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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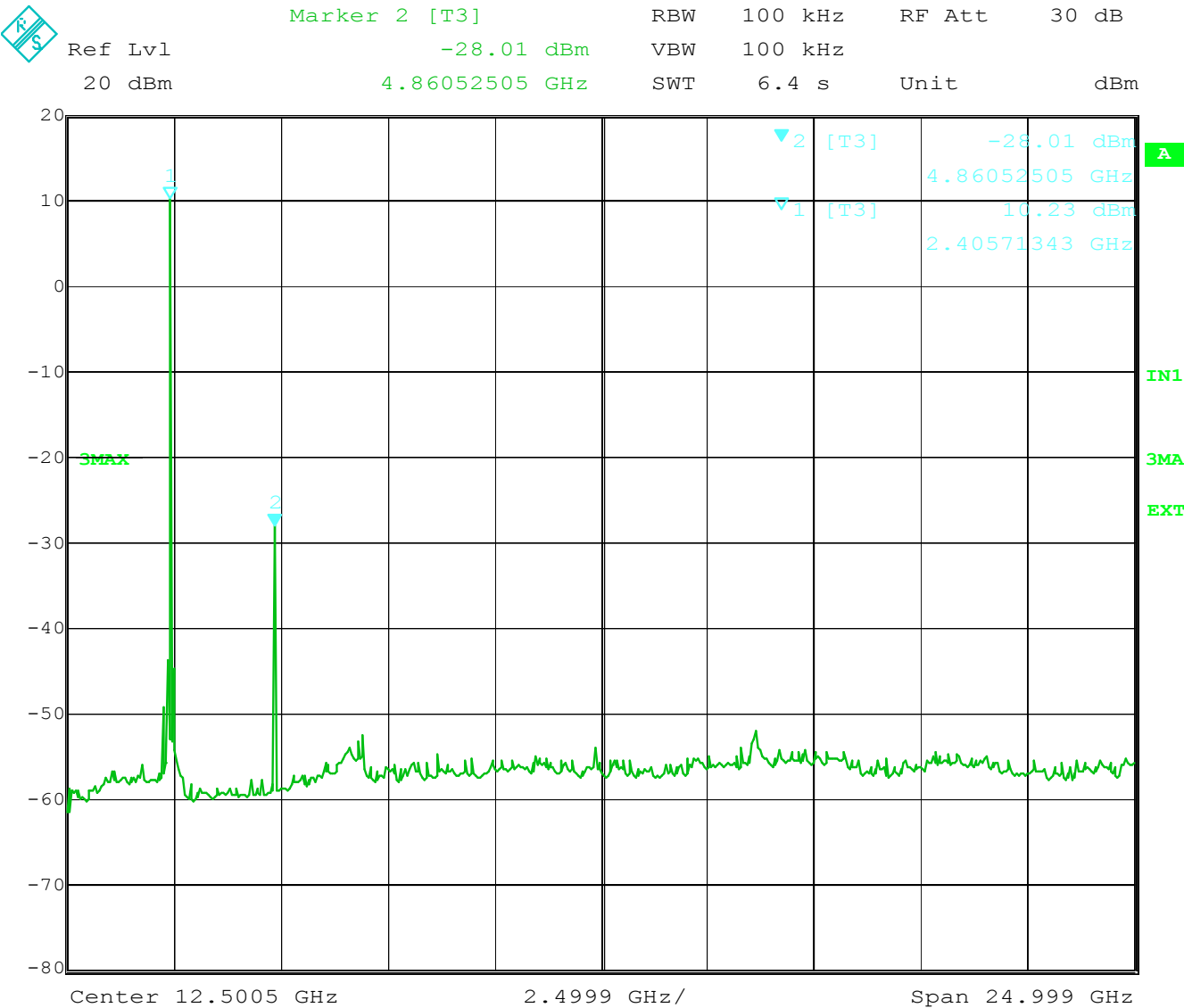
Test Equipment used: NT-207

**Out-of-band Emission
Unwanted Emissions**

**§ 15.247(d)
5.5**

Conducted Measurement – 1 Mbit/s mode – Antenna 1

Setup: CH 19: 2440 MHz



Date: 28.SEP.2018 14:38:15

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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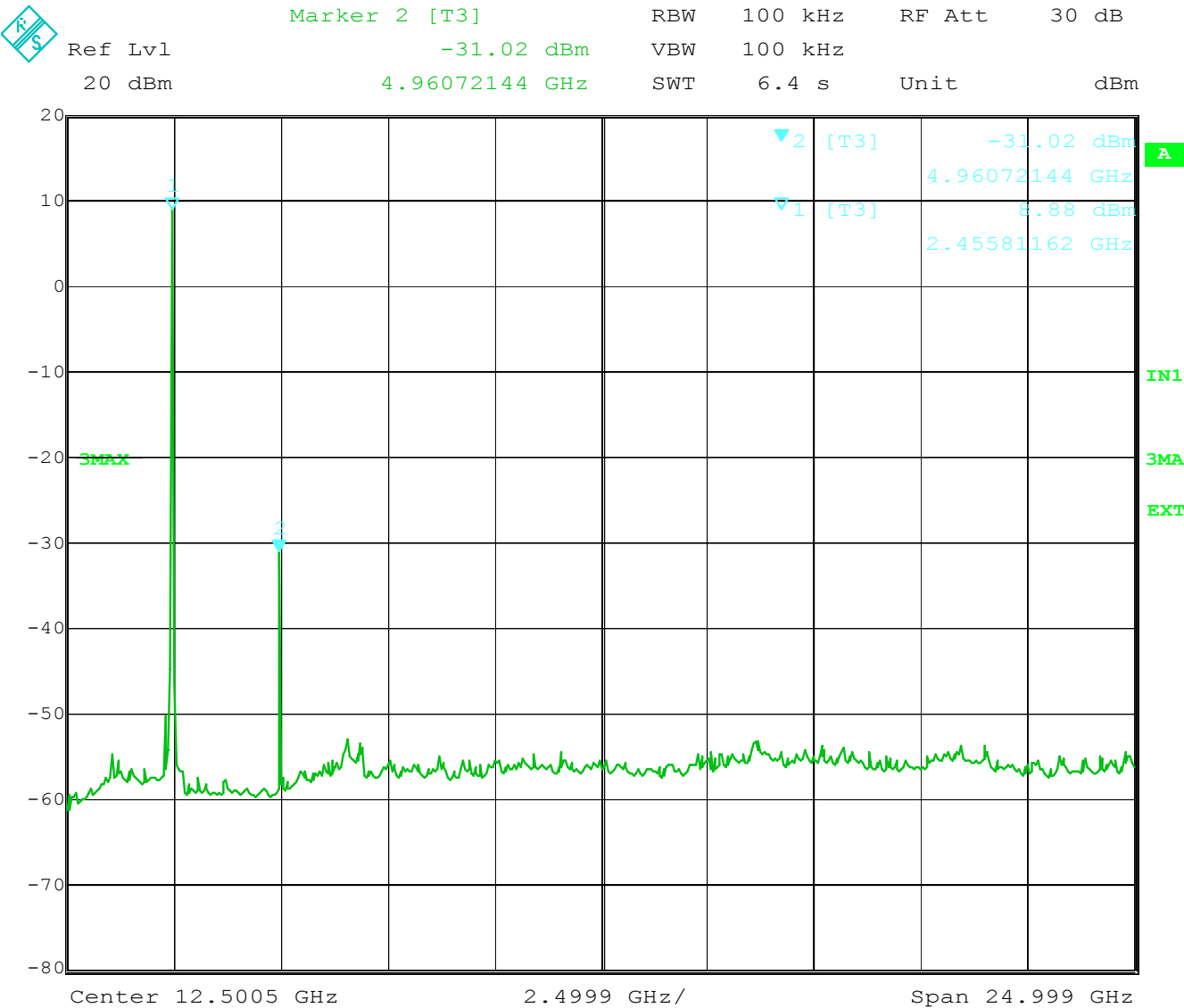
Test Equipment used: NT-207

**Out-of-band Emission
Unwanted Emissions**

**§ 15.247(d)
5.5**

Conducted Measurement – 1 Mbit/s mode – Antenna 1

Setup: CH 39: 2480 MHz



Date: 28.SEP.2018 14:39:23

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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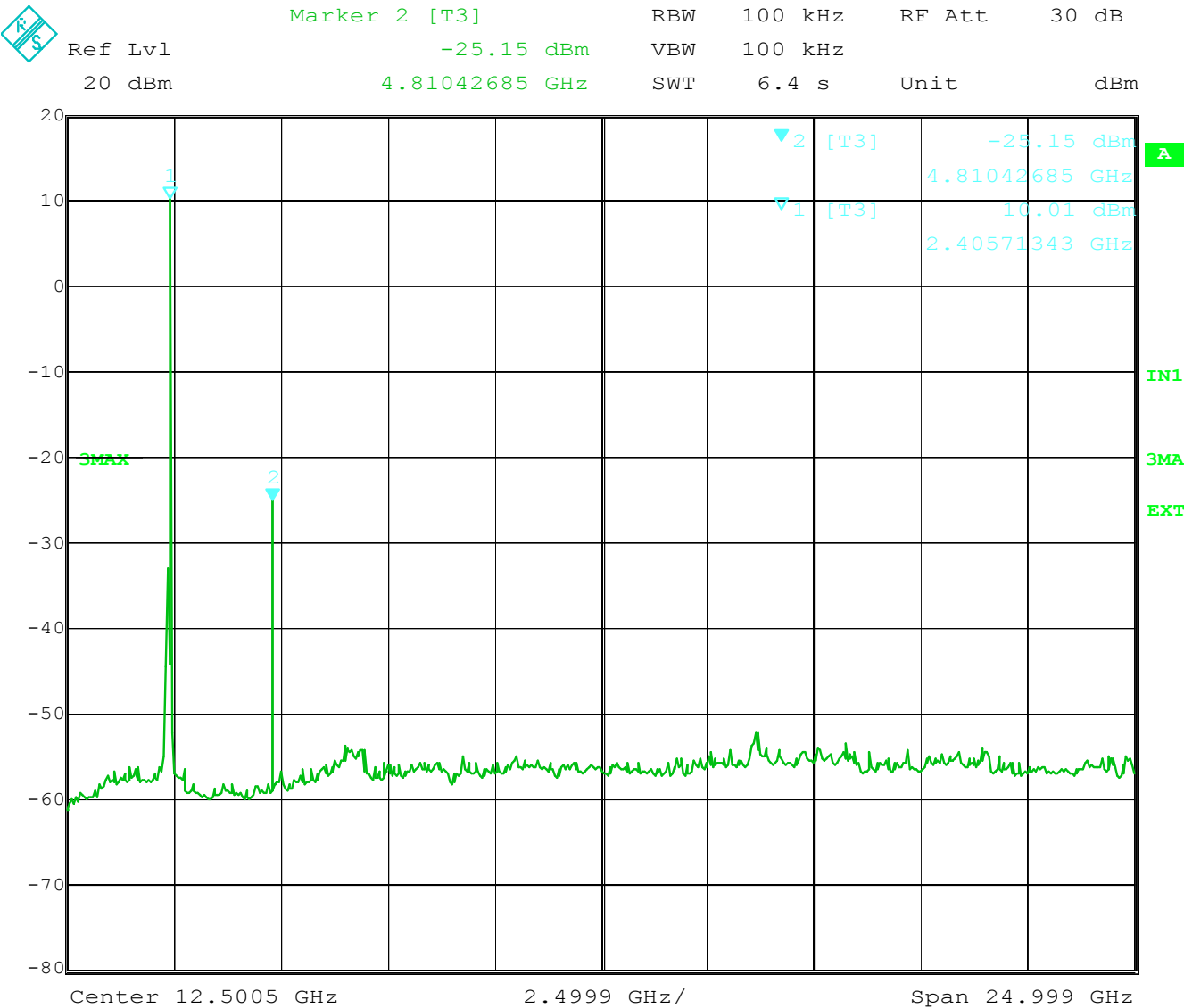
Test Equipment used: NT-207

**Out-of-band Emission
Unwanted Emissions**

**§ 15.247(d)
5.5**

Conducted Measurement – 1 Mbit/s mode – Antenna 2

Setup: CH 0: 2402 MHz



Date: 28.SEP.2018 14:19:25

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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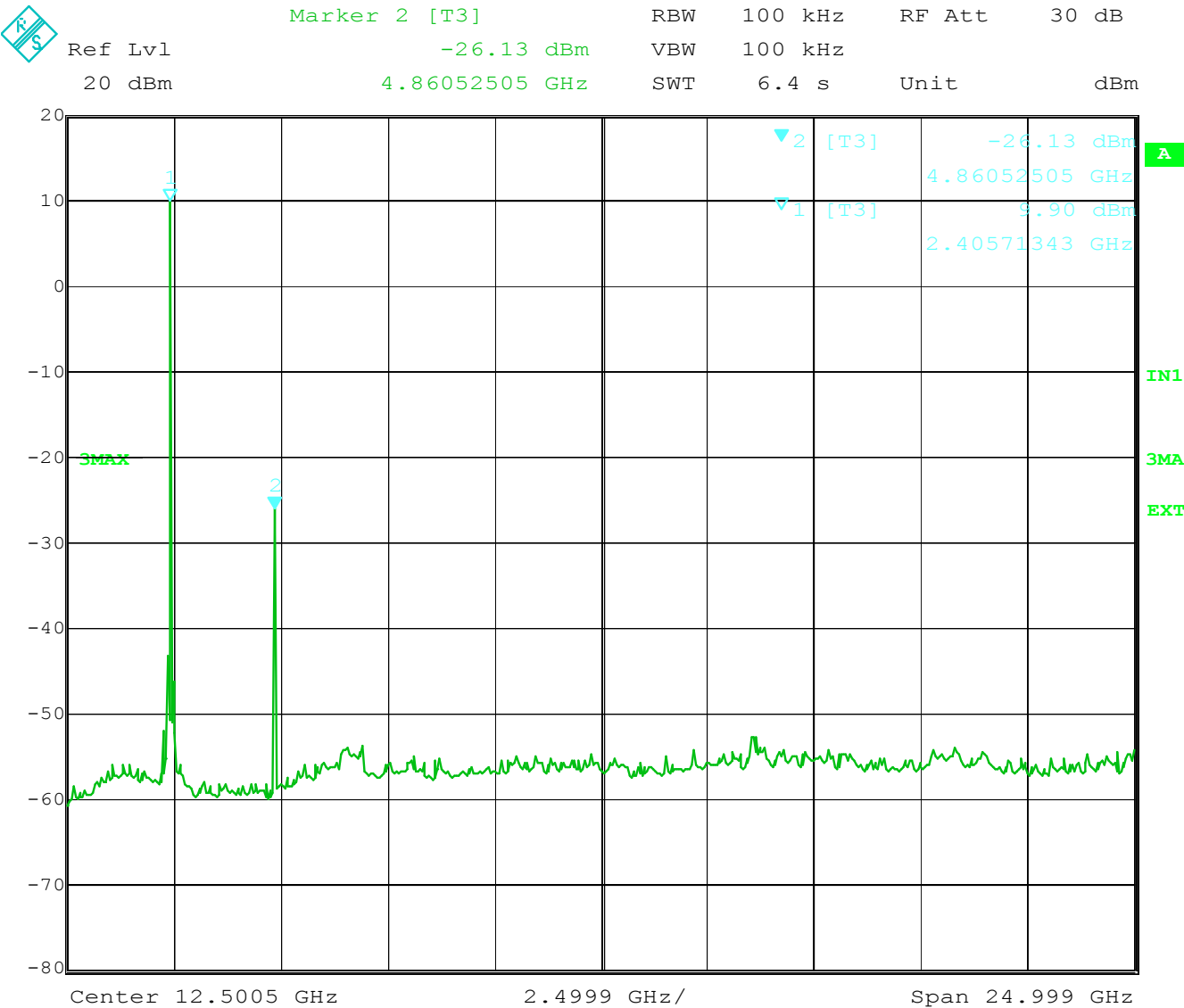
Test Equipment used: NT-207

**Out-of-band Emission
Unwanted Emissions**

**§ 15.247(d)
5.5**

Conducted Measurement – 1 Mbit/s mode – Antenna 2

Setup: CH 19: 2440 MHz



Date: 28.SEP.2018 14:20:39

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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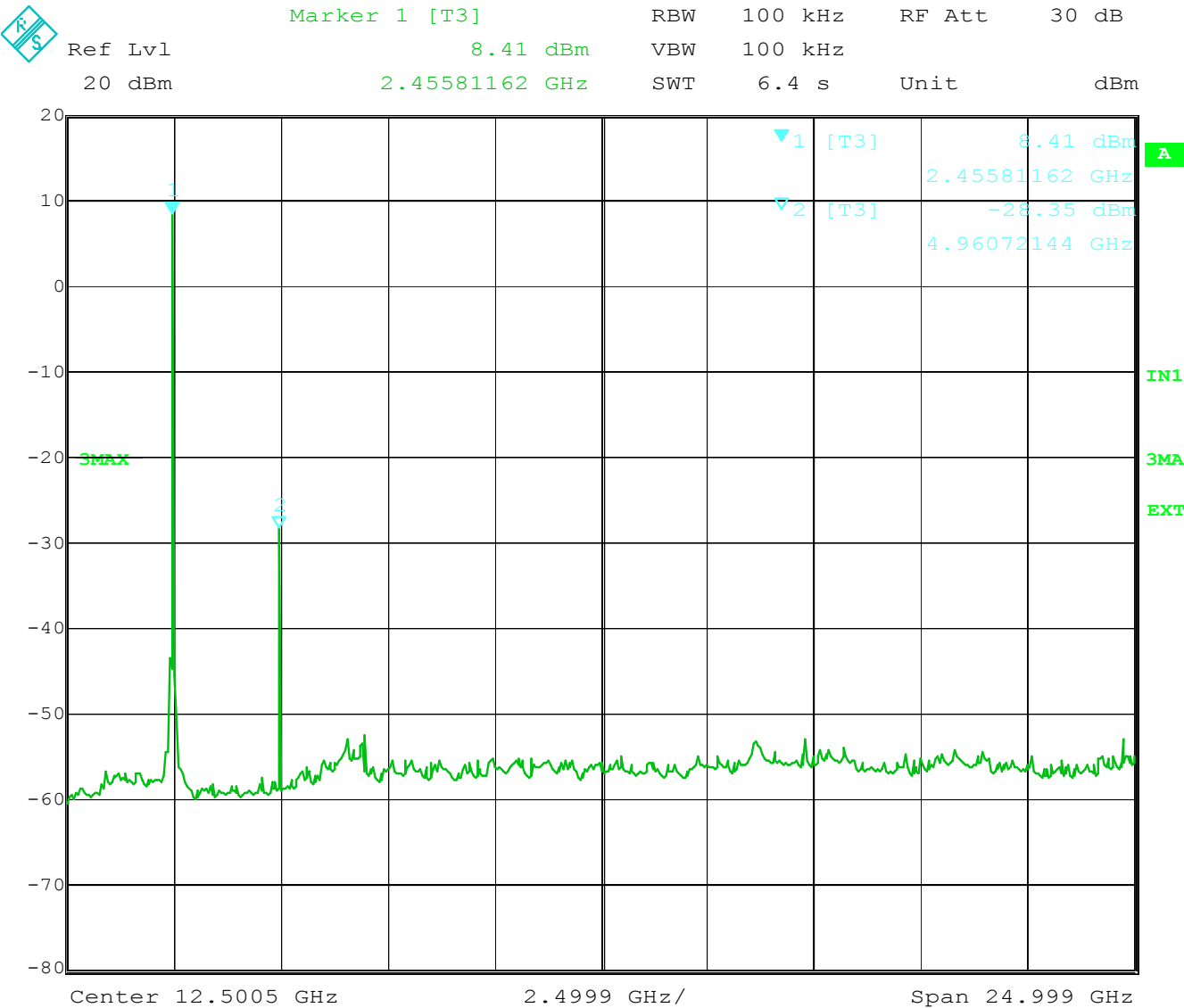
Test Equipment used: NT-207

**Out-of-band Emission
Unwanted Emissions**

**§ 15.247(d)
5.5**

Conducted Measurement – 1 Mbit/s mode – Antenna 2

Setup: CH 39: 2480 MHz



Date: 28.SEP.2018 14:21:23

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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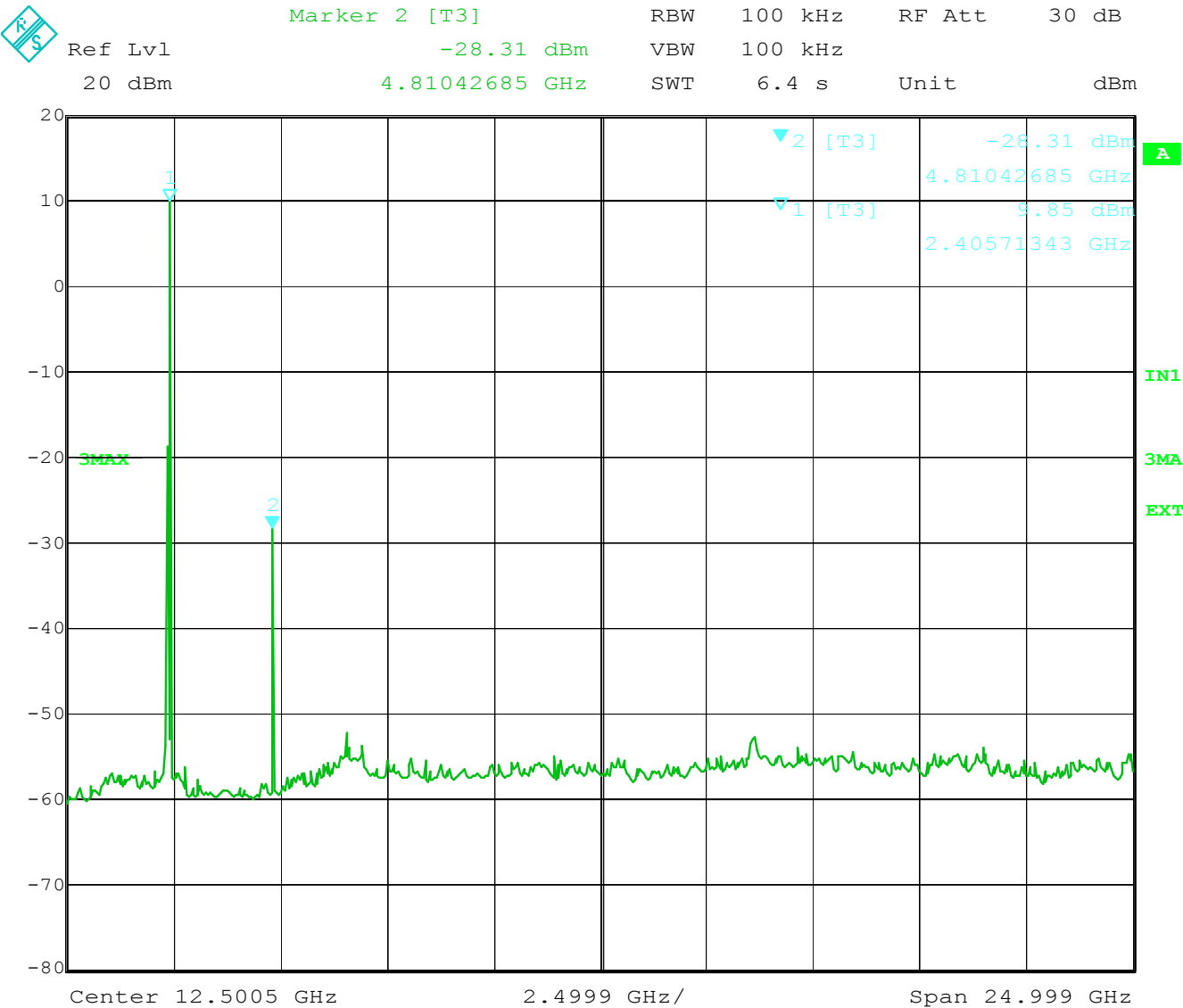
Test Equipment used: NT-207

**Out-of-band Emission
Unwanted Emissions**

**§ 15.247(d)
5.5**

Conducted Measurement – 2 Mbit/s mode – Antenna 1

Setup: CH 0: 2402 MHz



Date: 8.OCT.2018 15:20:23

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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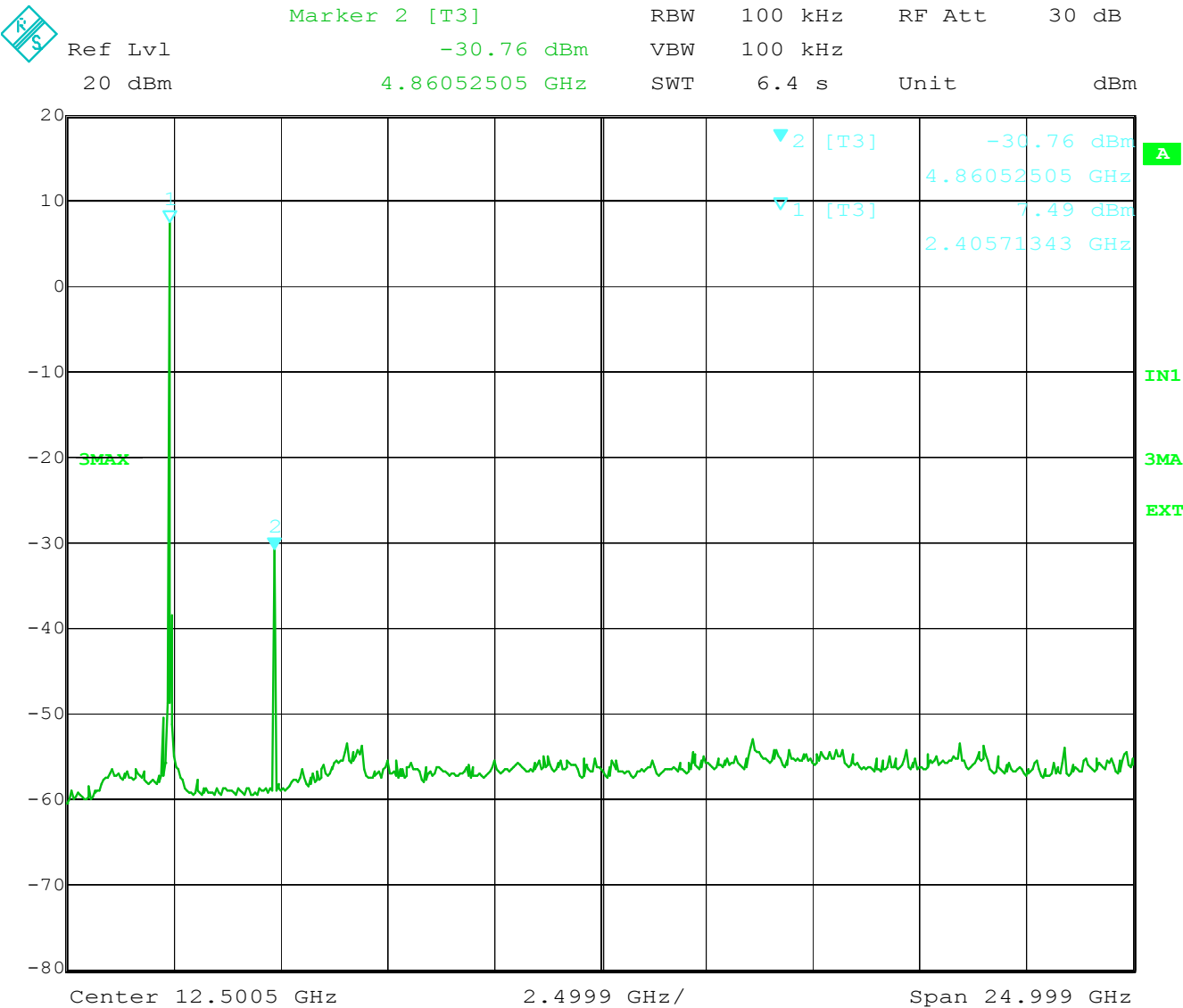
Test Equipment used: NT-207

**Out-of-band Emission
Unwanted Emissions**

**§ 15.247(d)
5.5**

Conducted Measurement – 2 Mbit/s mode – Antenna 1

Setup: CH 19: 2440 MHz



Date: 8.OCT.2018 15:21:24

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.
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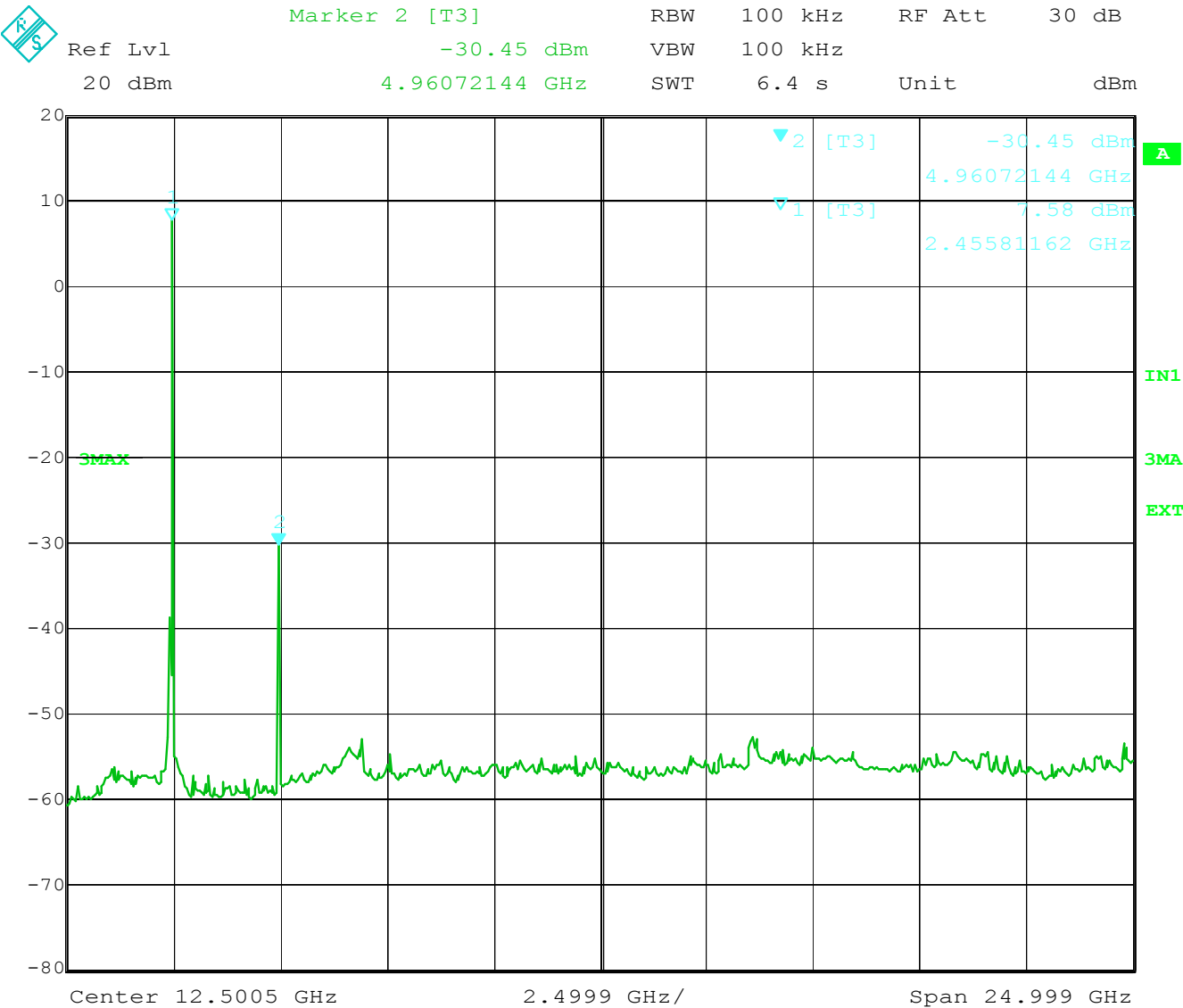
Test Equipment used: NT-207

**Out-of-band Emission
Unwanted Emissions**

**§ 15.247(d)
5.5**

Conducted Measurement – 2 Mbit/s mode – Antenna 1

Setup: CH 39: 2480 MHz



Date: 8.OCT.2018 15:22:16

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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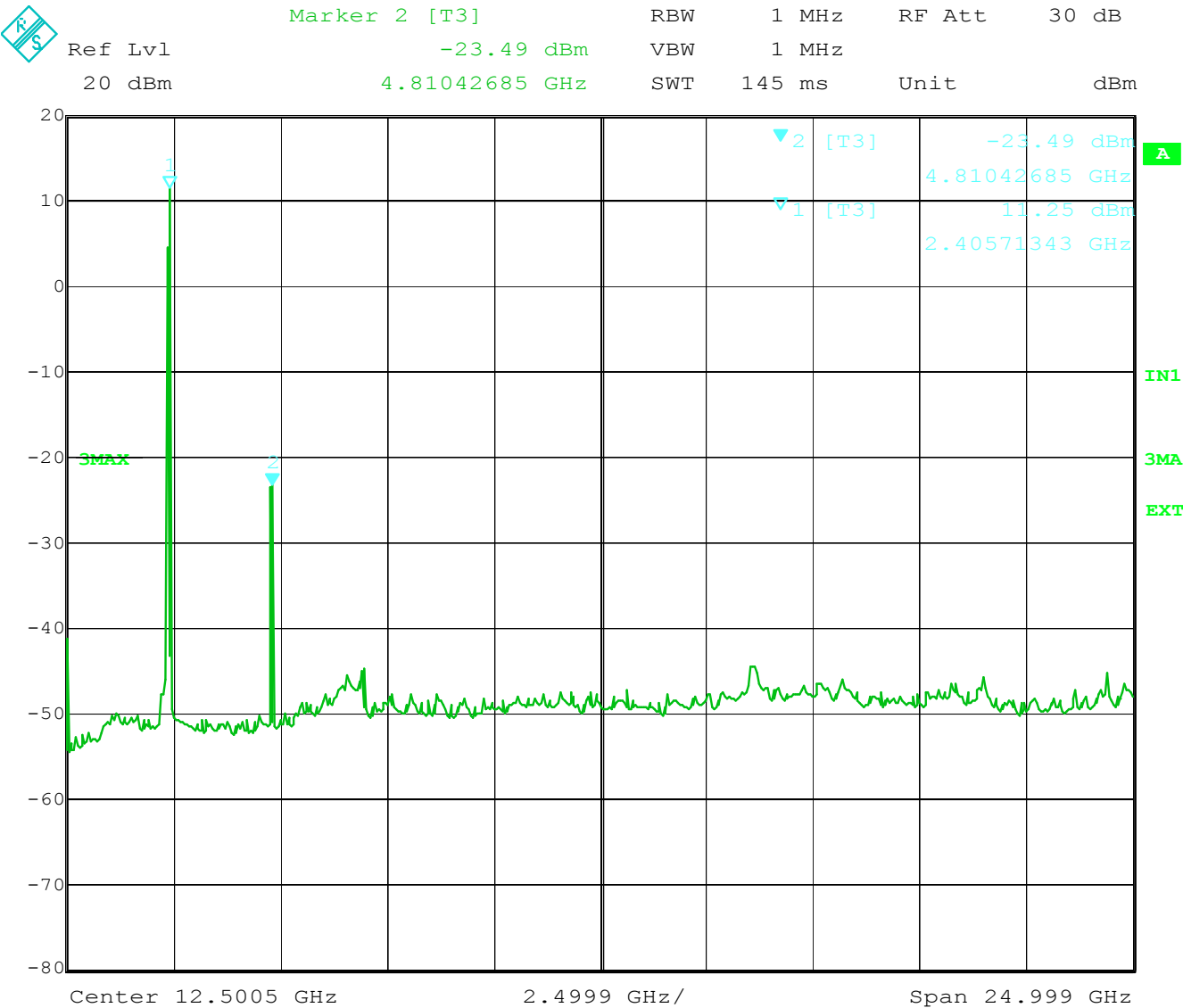
Test Equipment used: NT-207

Out-of-band Emission
Unwanted Emissions

§ 15.247(d)
5.5

Conducted Measurement – 2 Mbit/s mode – Antenna 2

Setup: CH 0: 2402 MHz



Date: 8.OCT.2018 15:18:10

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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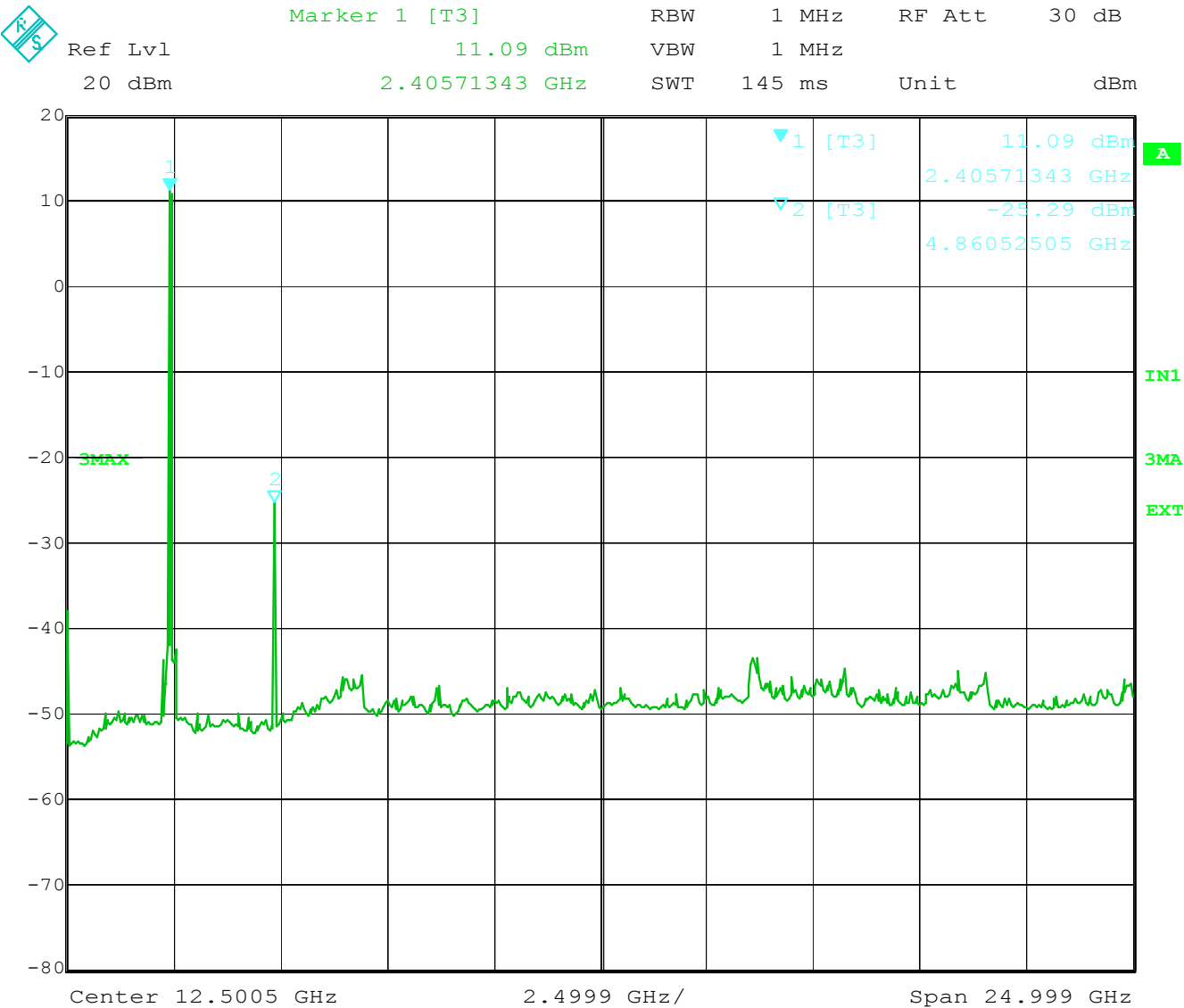
Test Equipment used: NT-207

Out-of-band Emission
Unwanted Emissions

§ 15.247(d)
5.5

Conducted Measurement – 2 Mbit/s mode – Antenna 2

Setup: CH 19: 2440 MHz



Date: 8.OCT.2018 15:17:10

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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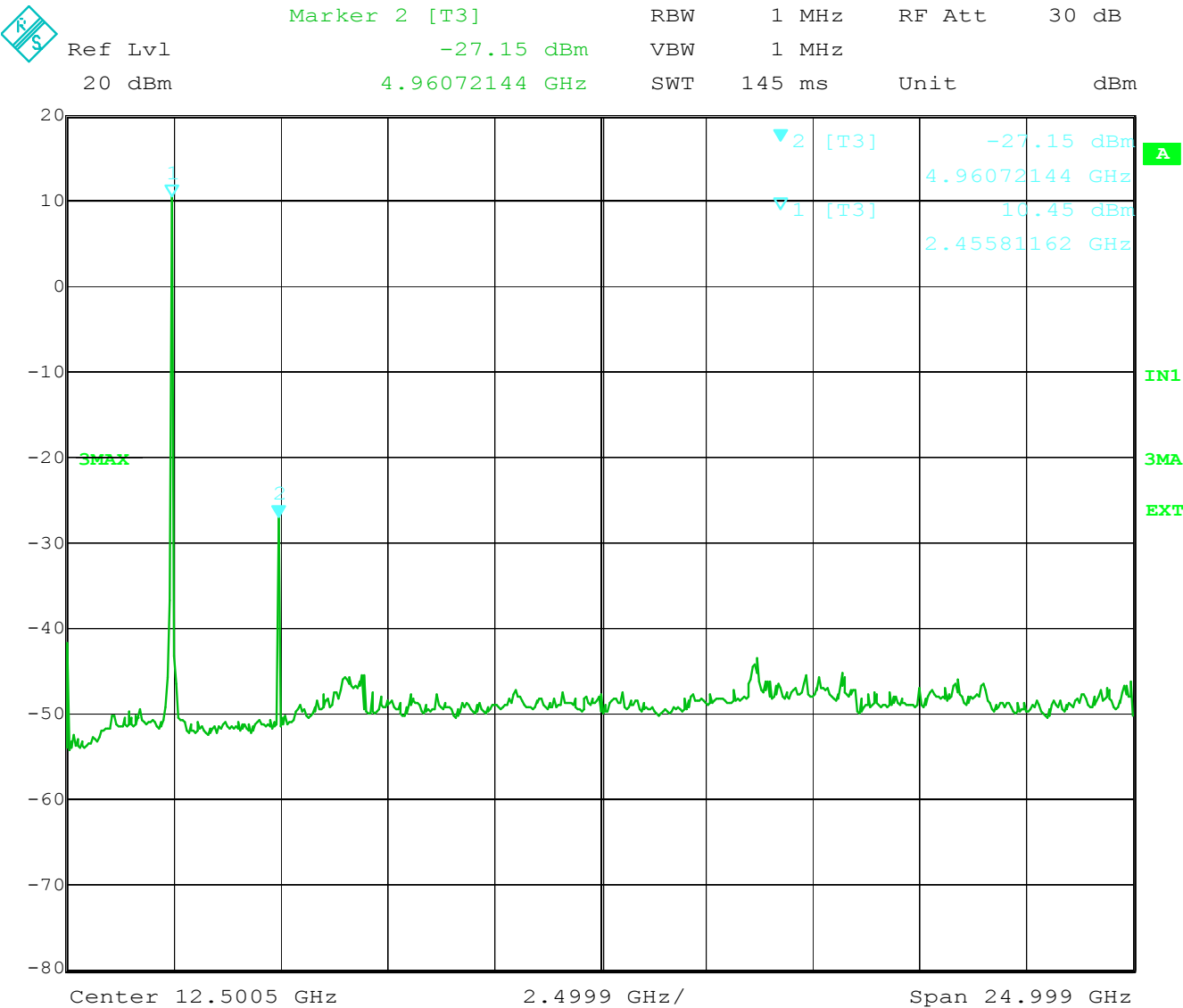
Test Equipment used: NT-207

Out-of-band Emission
Unwanted Emissions

§ 15.247(d)
5.5

Conducted Measurement – 2 Mbit/s mode – Antenna 2

Setup: CH 39: 2480 MHz



Date: 8.OCT.2018 15:17:37

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.
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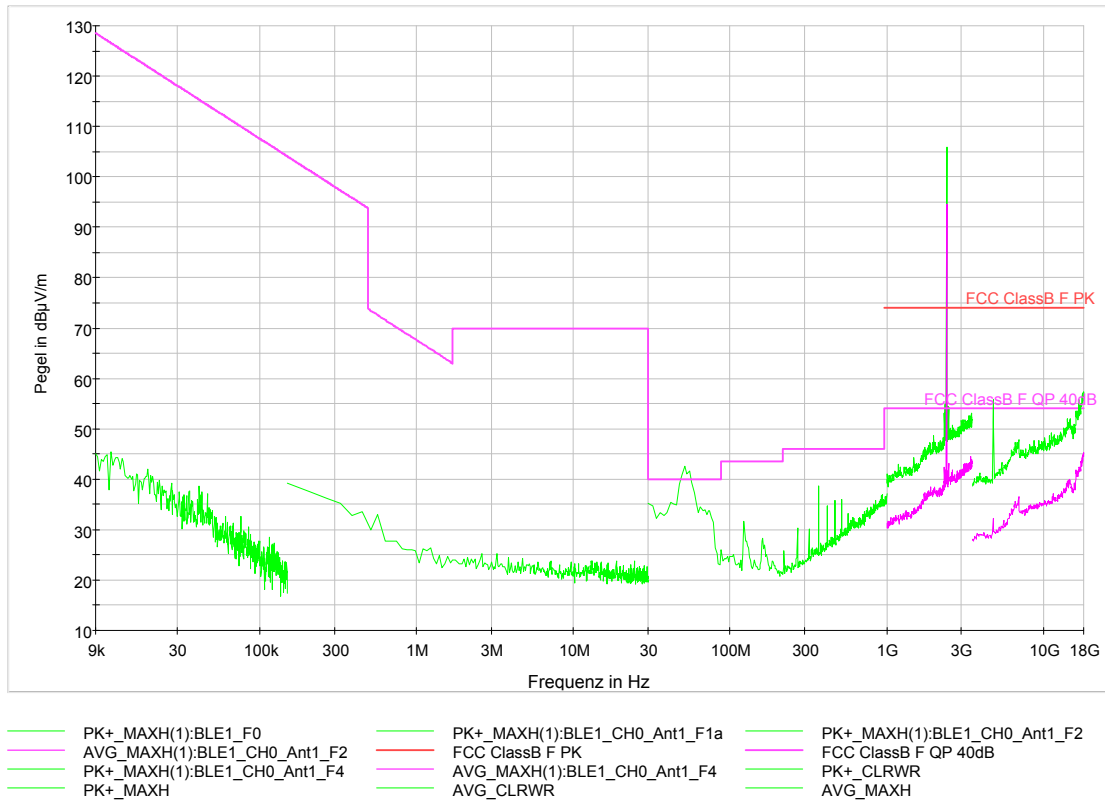
Test Equipment used: NT-207

4.7. 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):

Setup: CH 0: 2402 MHz – 1 Mbit/s mode – Antenna 1



Worst case emission: Quasipeak @ 54,0 MHz 38,5 dBµV/m; 53,2 dBµV/m @ 4804 MHz

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

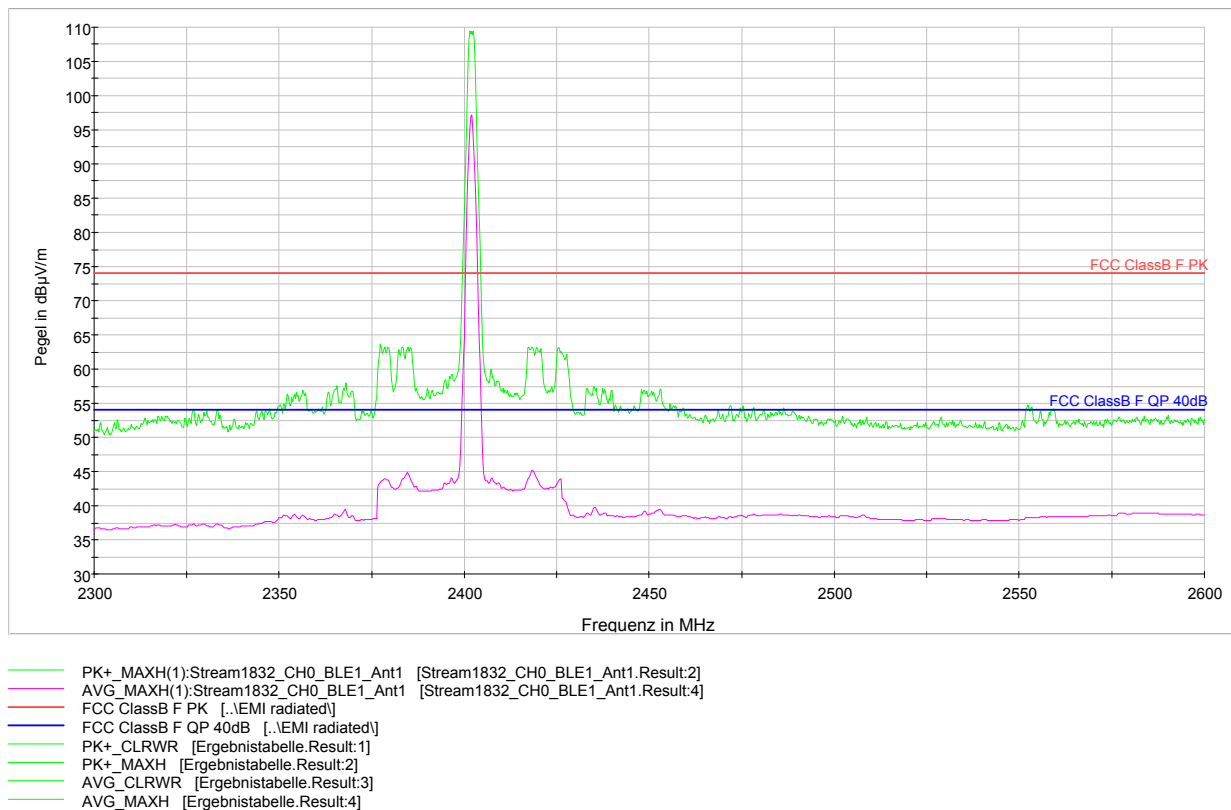
Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-111; EMV-112;
EMV-114; EMV-200; EMV-205; NT-122; NT-126; NT-416

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: CH 0: 2402 MHz – 1 Mbit/s mode – Antenna 1



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.

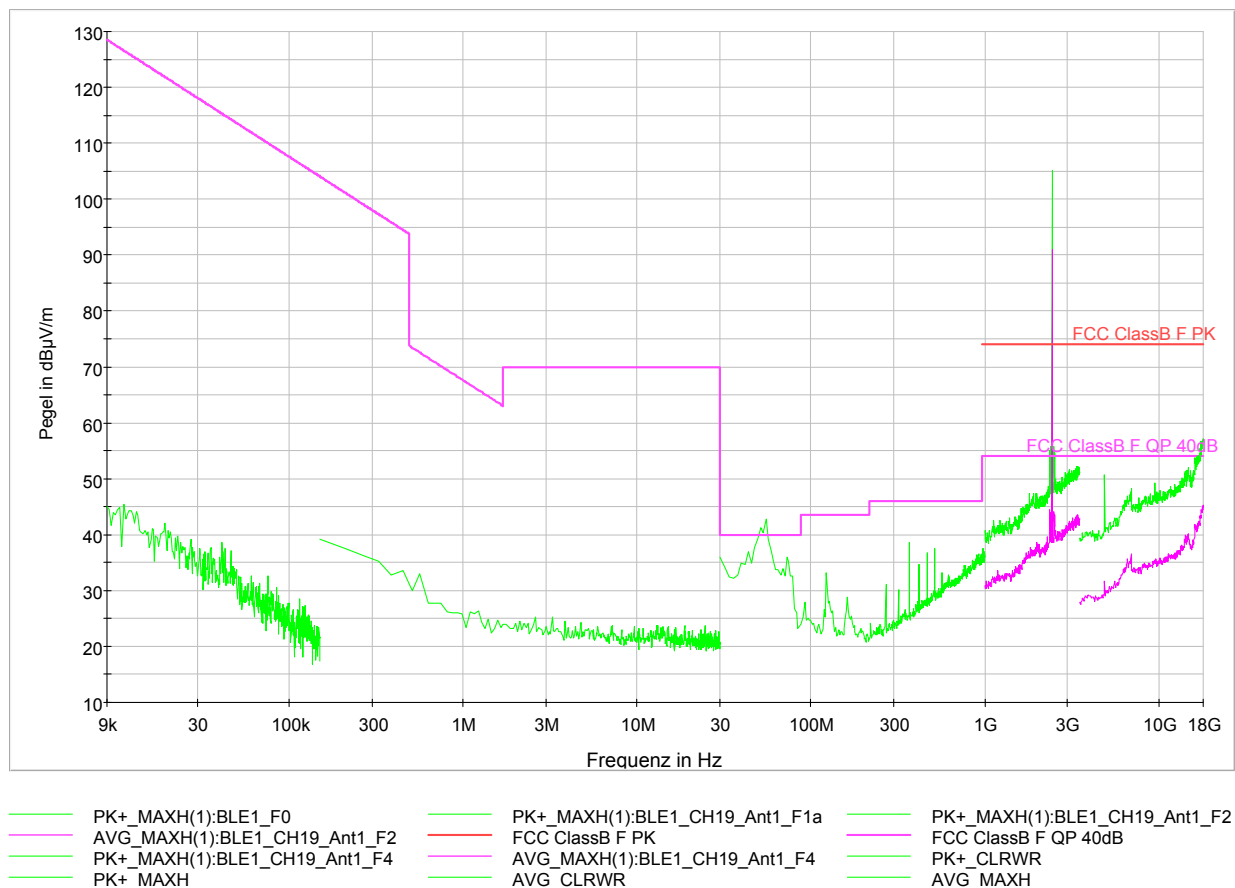
Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-200

Emissions in restricted bands **Emissions falling within restricted frequency bands**

§ 15.209(a)
RSS-Gen

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

Setup: CH 19: 2440 MHz – 1 Mbit/s mode – Antenna 1



Worst case emission: Quasipeak @ 54,0 MHz 38,5 dBµV/m; 49,6 dBµV/m @ 4880 MHz

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

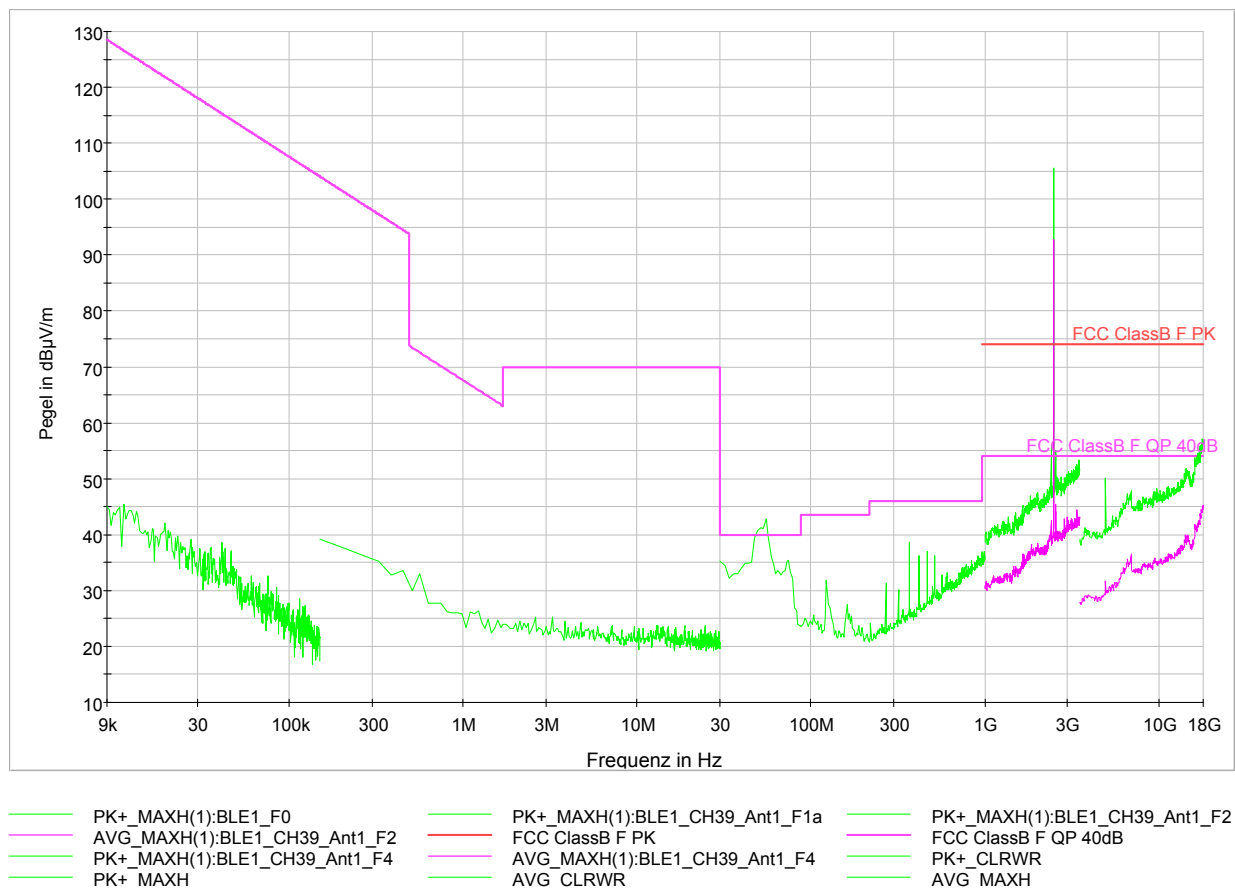
Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-111; EMV-112;
EMV-114; EMV-200; EMV-205; NT-122; NT-126; NT-416

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):

Setup: CH 39: 2480 MHz – 1 Mbit/s mode – Antenna 1



Worst case emission: Quasipeak @ 54,0 MHz 38,5 dBµV/m; 48,4 dBµV/m @ 4960 MHz

LIMIT

SUBCLAUSE 15.209(a) – RSS-Gen

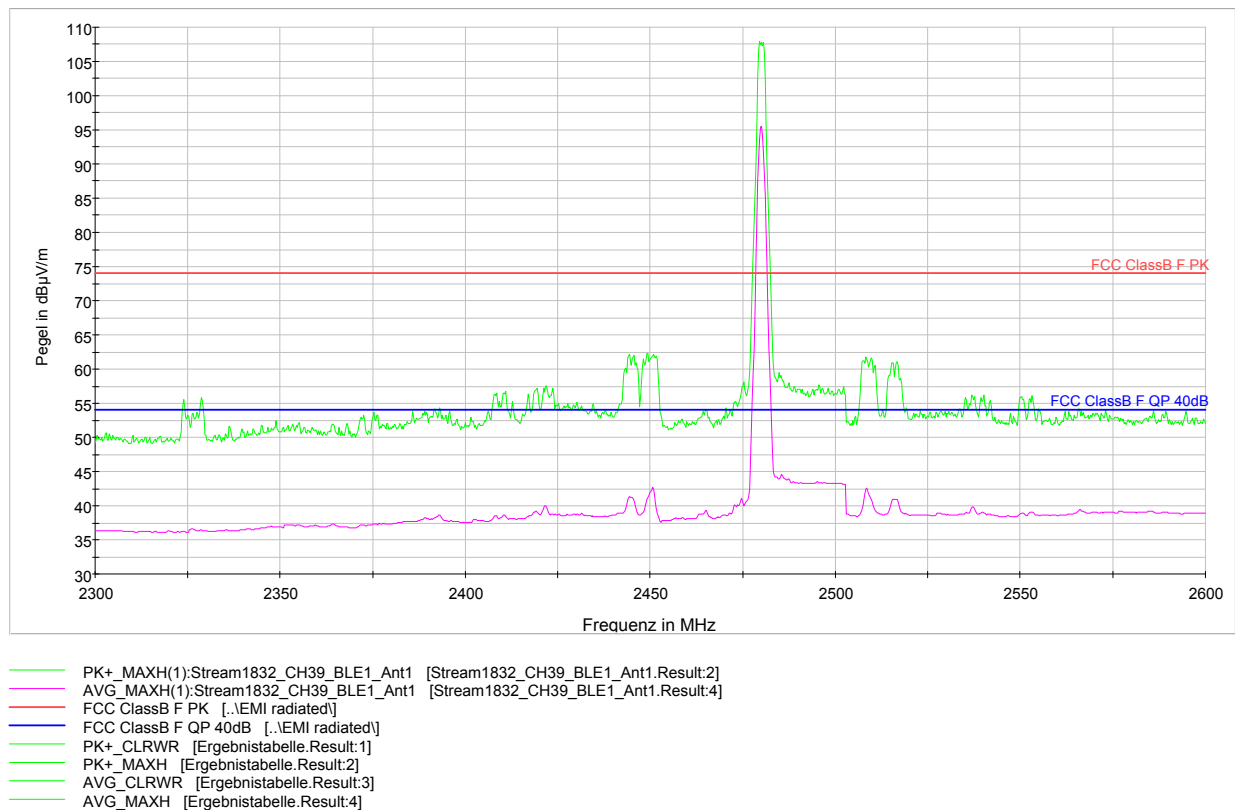
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

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 39: 2480 MHz – 1 Mbit/s mode – Antenna 1



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.

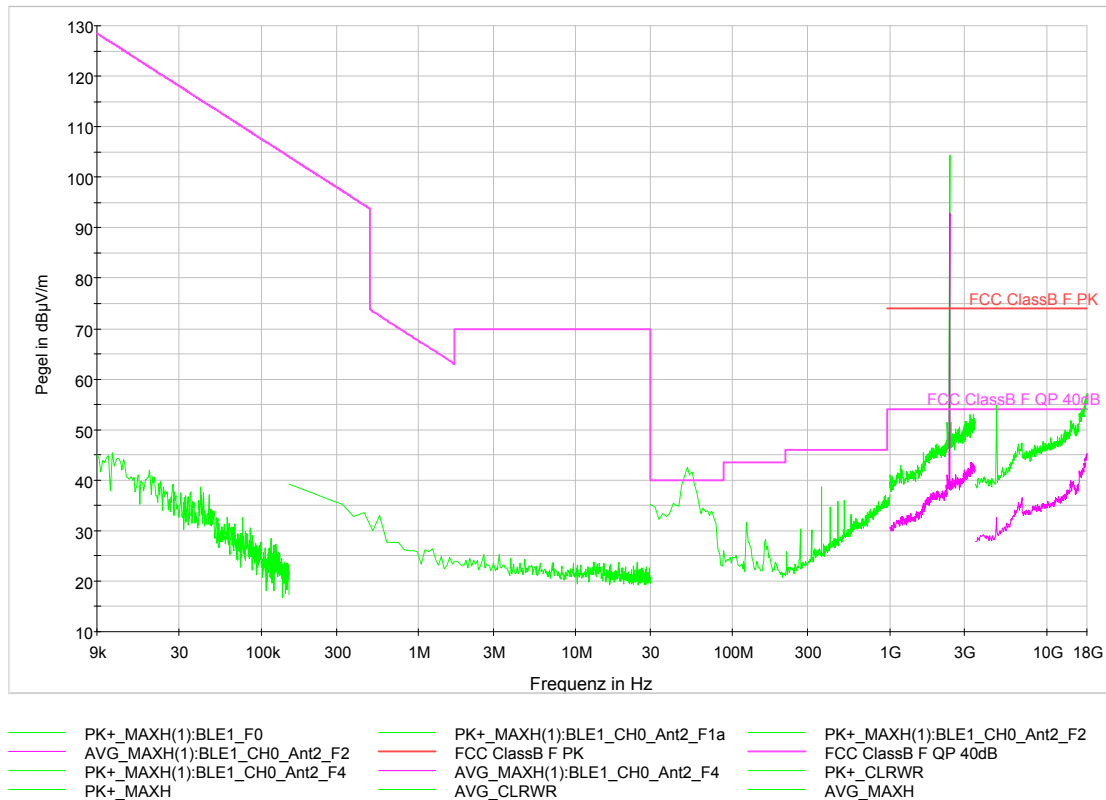
Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-200

Emissions in restricted bands **Emissions falling within restricted frequency bands**

§ 15.209(a) **RSS-Gen**

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

Setup: CH 0: 2402 MHz – 1 Mbit/s mode – Antenna 2



Worst case emission: Quasipeak @ 54,0 MHz 38,5 dBµV/m; 52,7 dBµV/m @ 4804 MHz

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

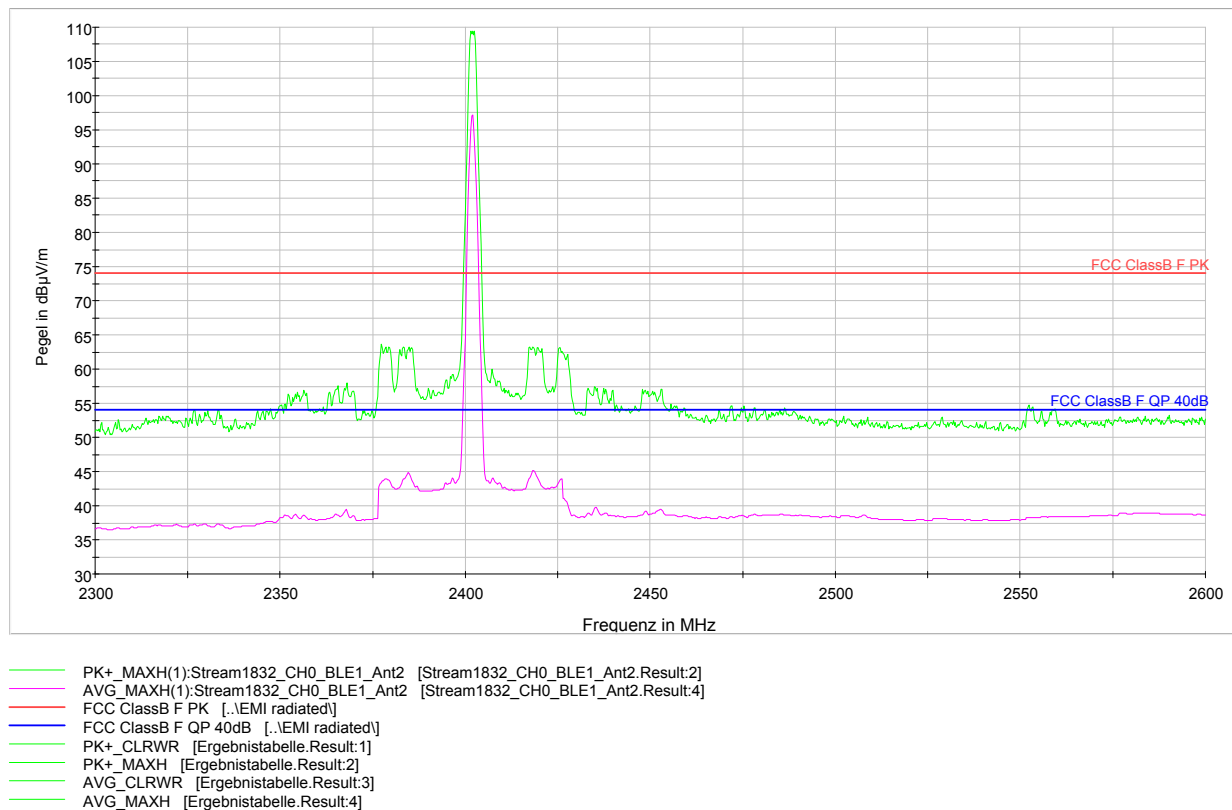
Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-111; EMV-112; EMV-114; EMV-200; EMV-205; NT-122; NT-126; NT-416

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: CH 0: 2402 MHz – 1 Mbit/s mode – Antenna 2



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.

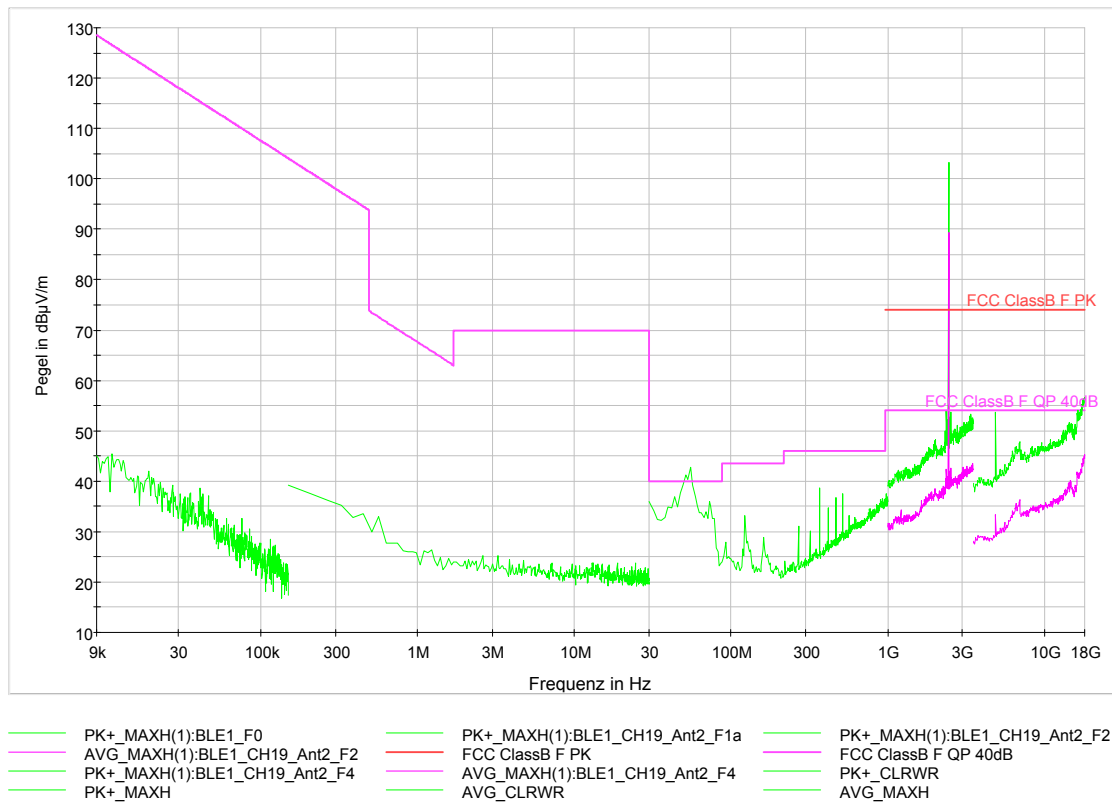
Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-200

Emissions in restricted bands **Emissions falling within restricted frequency bands**

§ 15.209(a) **RSS-Gen**

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

Setup: CH 19: 2440 MHz – 1 Mbit/s mode – Antenna 2



Worst case emission: Quasipeak @ 54,0 MHz 38,5 dBµV/m; 52,8 dBµV/m @ 4880 MHz

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

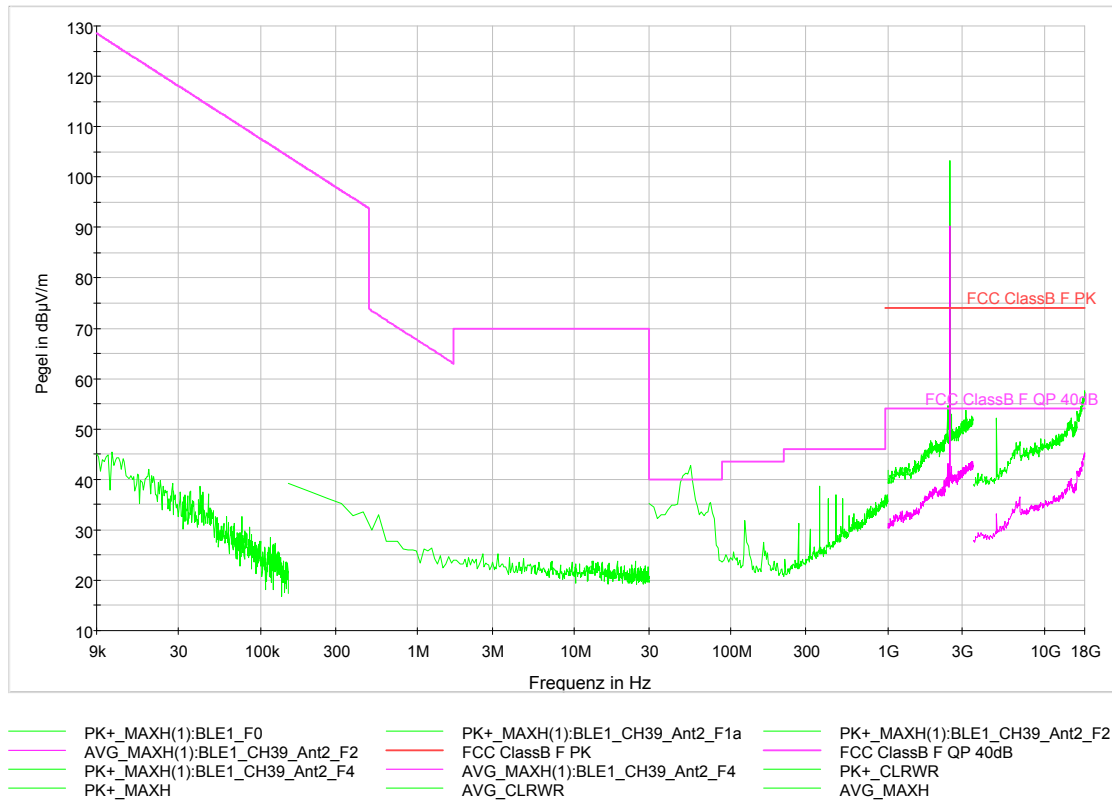
Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-111; EMV-112; EMV-114; EMV-200; EMV-205; NT-122; NT-126; NT-416

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):

Setup: CH 39: 2480 MHz – 1 Mbit/s mode – Antenna 2



Worst case emission: Quasipeak @ 54,0 MHz 38,5 dBµV/m; 51,8 dBµV/m @ 4960 MHz

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

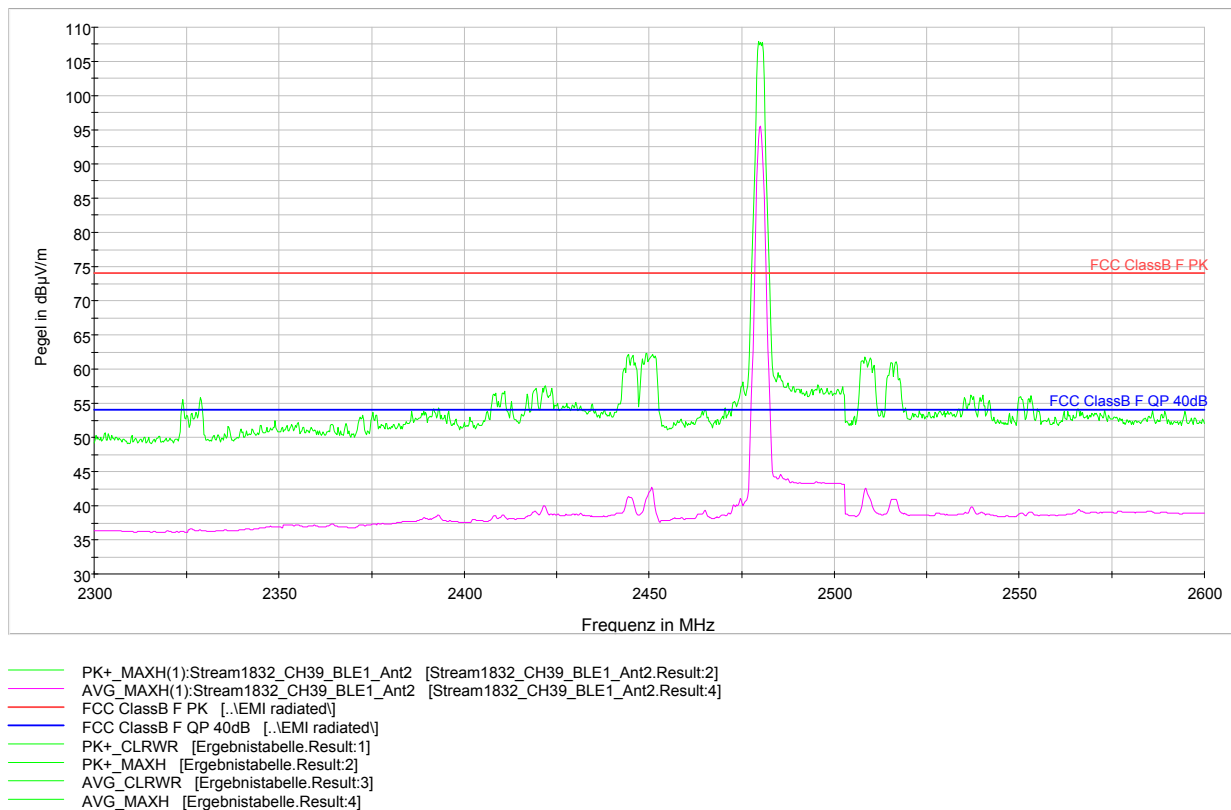
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

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 39: 2480 MHz – 1 Mbit/s mode – Antenna 2



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.

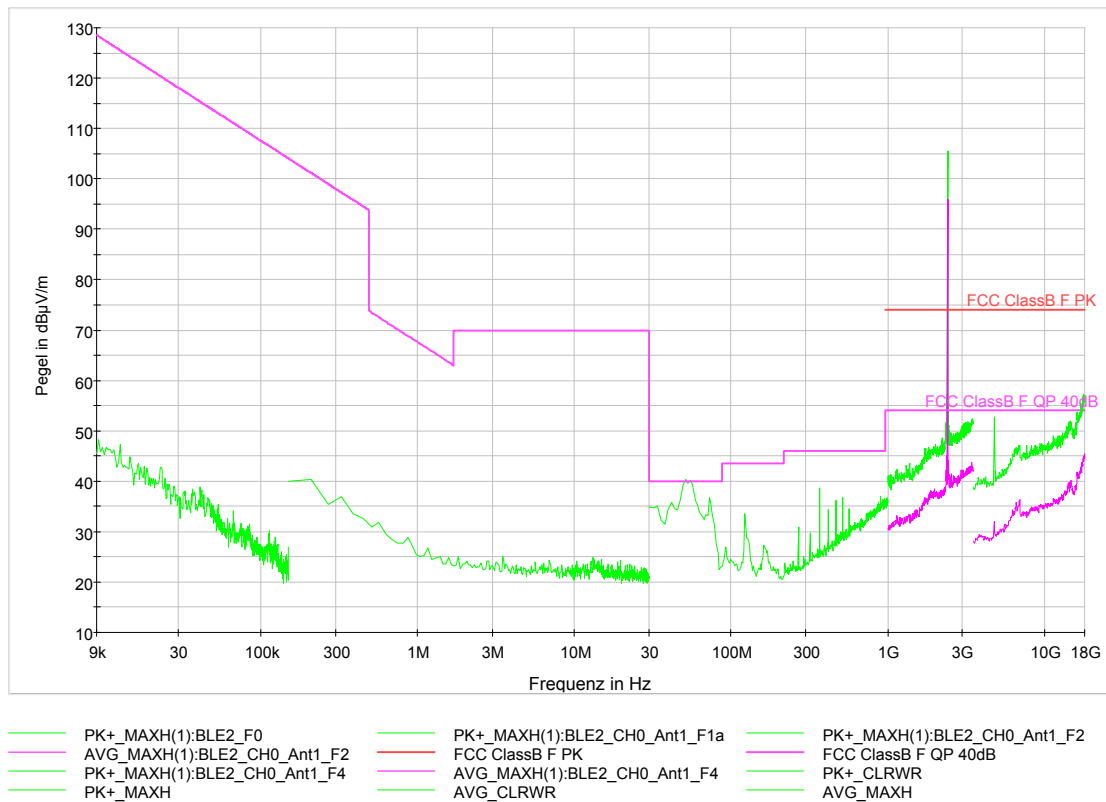
Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-200

Emissions in restricted bands **Emissions falling within restricted frequency bands**

§ 15.209(a) **RSS-Gen**

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

Setup: CH 0: 2402 MHz – 2 Mbit/s mode – Antenna 1



Worst case emission: Quasipeak @ 54,0 MHz 38,5 dBµV/m; 53,1 dBµV/m @ 4804 MHz

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

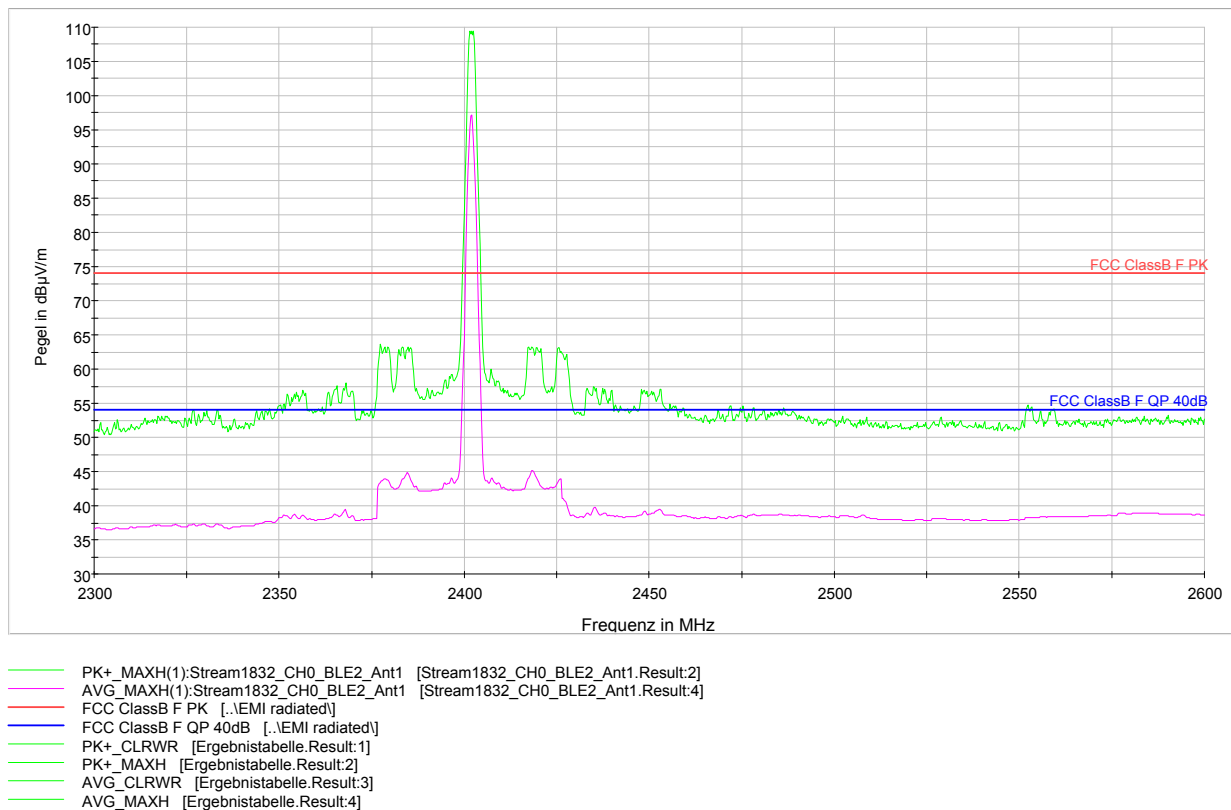
Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-111; EMV-112; EMV-114; EMV-200; EMV-205; NT-122; NT-126; NT-416

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: CH 0: 2402 MHz – 2 Mbit/s mode – Antenna 1



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.

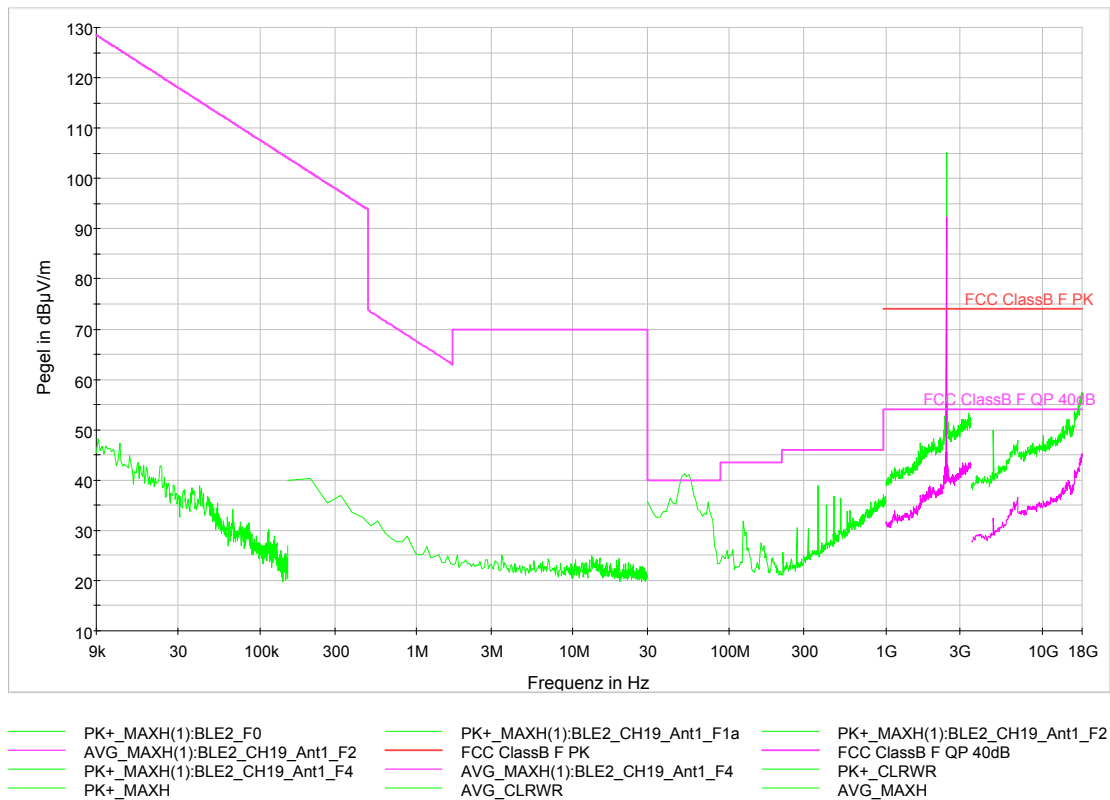
Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-200

Emissions in restricted bands **Emissions falling within restricted frequency bands**

§ 15.209(a) **RSS-Gen**

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

Setup: CH 19: 2440 MHz – 2 Mbit/s mode – Antenna 1



Worst case emission: Quasipeak @ 54,0 MHz 38,5 dBµV/m; 49,2 dBµV/m @ 4880 MHz

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

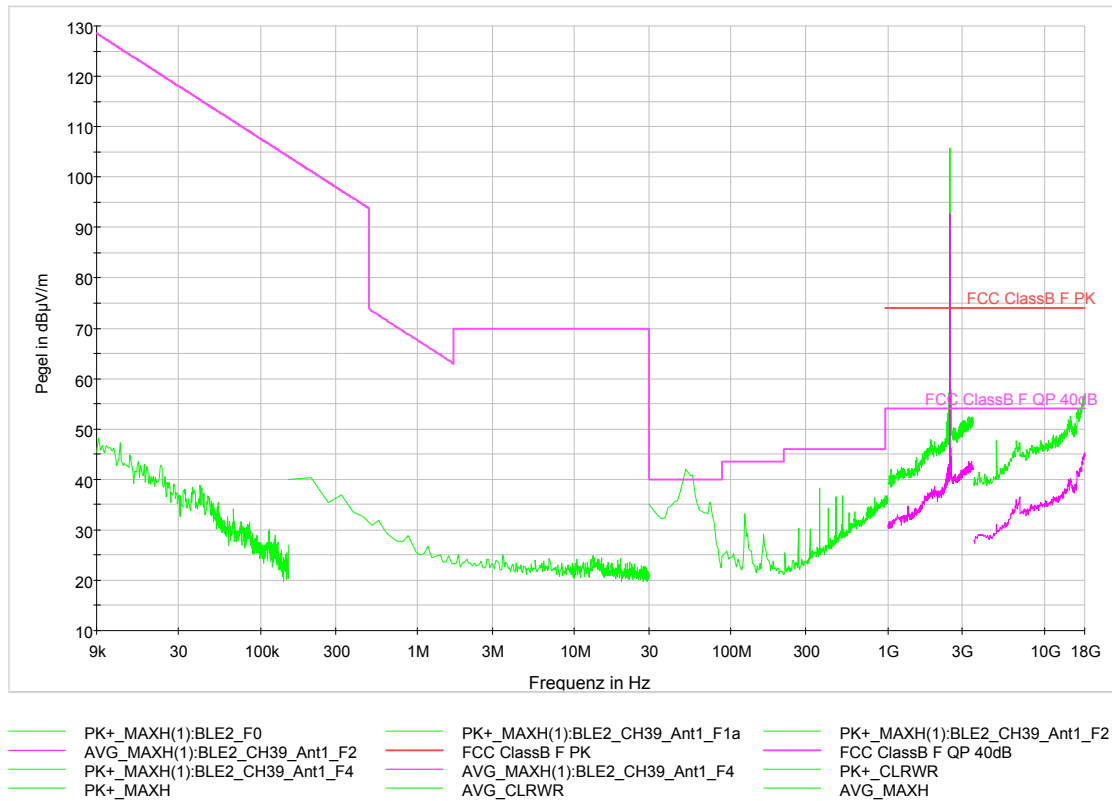
Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-111; EMV-112; EMV-114; EMV-200; EMV-205; NT-122; NT-126; NT-416

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):

Setup: CH 39: 2480 MHz – 2 Mbit/s mode – Antenna 1



Worst case emission: Quasipeak @ 54,0 MHz 38,5 dBµV/m; 46,8 dBµV/m @ 4960 MHz

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

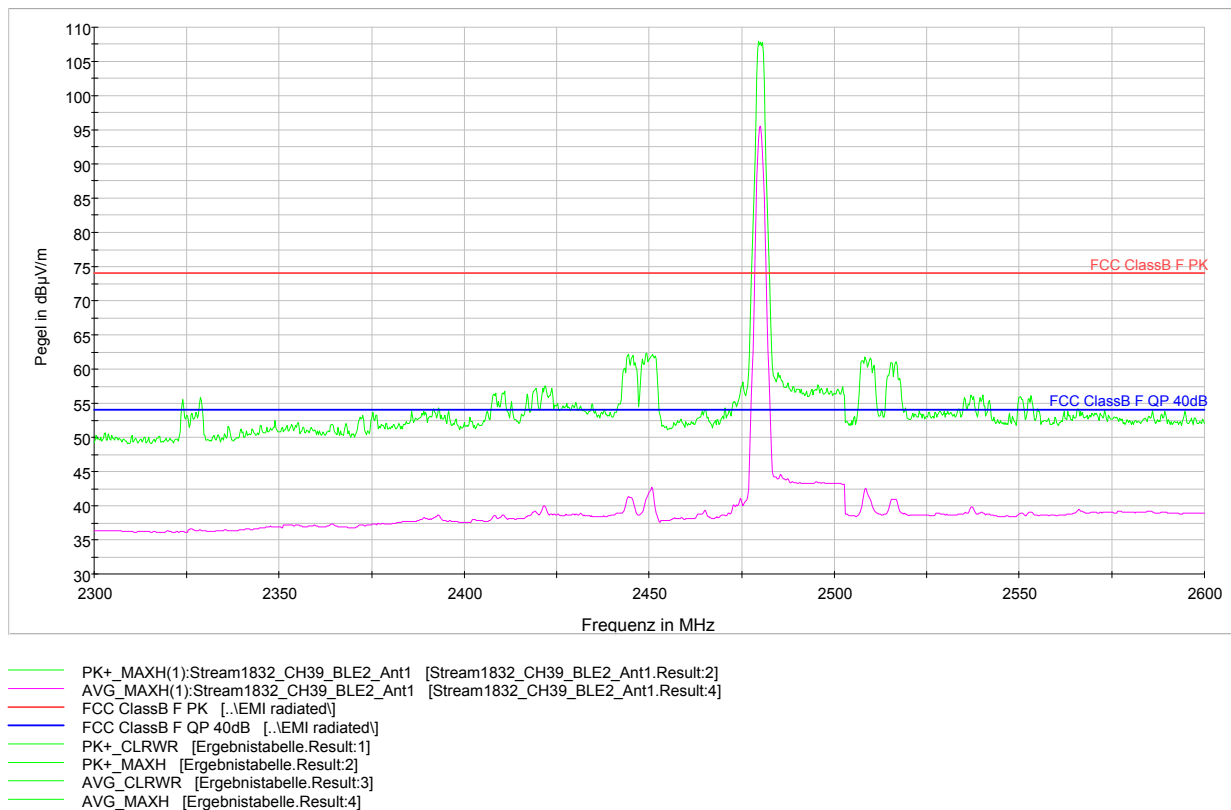
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

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 39: 2480 MHz – 2 Mbit/s mode – Antenna 1



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.

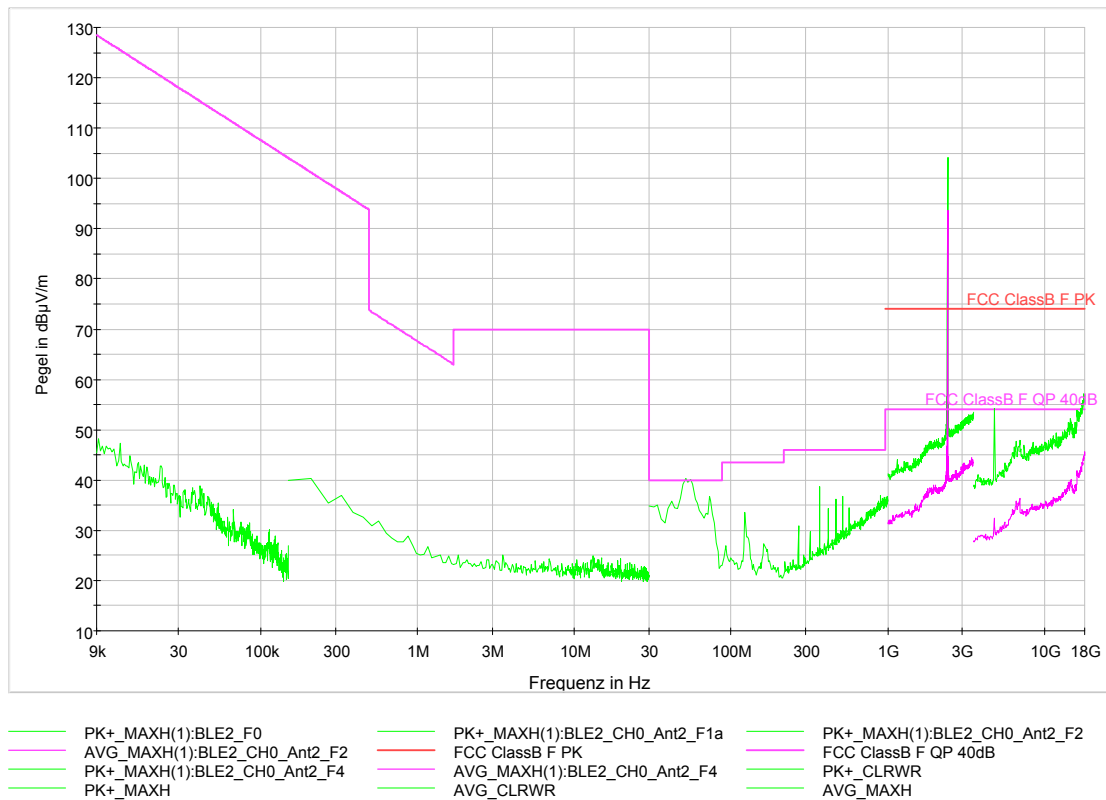
Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-200

Emissions in restricted bands **Emissions falling within restricted frequency bands**

§ 15.209(a) **RSS-Gen**

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

Setup: CH 0: 2402 MHz – 2 Mbit/s mode – Antenna 2



Worst case emission: Quasipeak @ 54,0 MHz 38,5 dBµV/m; 53,0 dBµV/m @ 4804 MHz

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

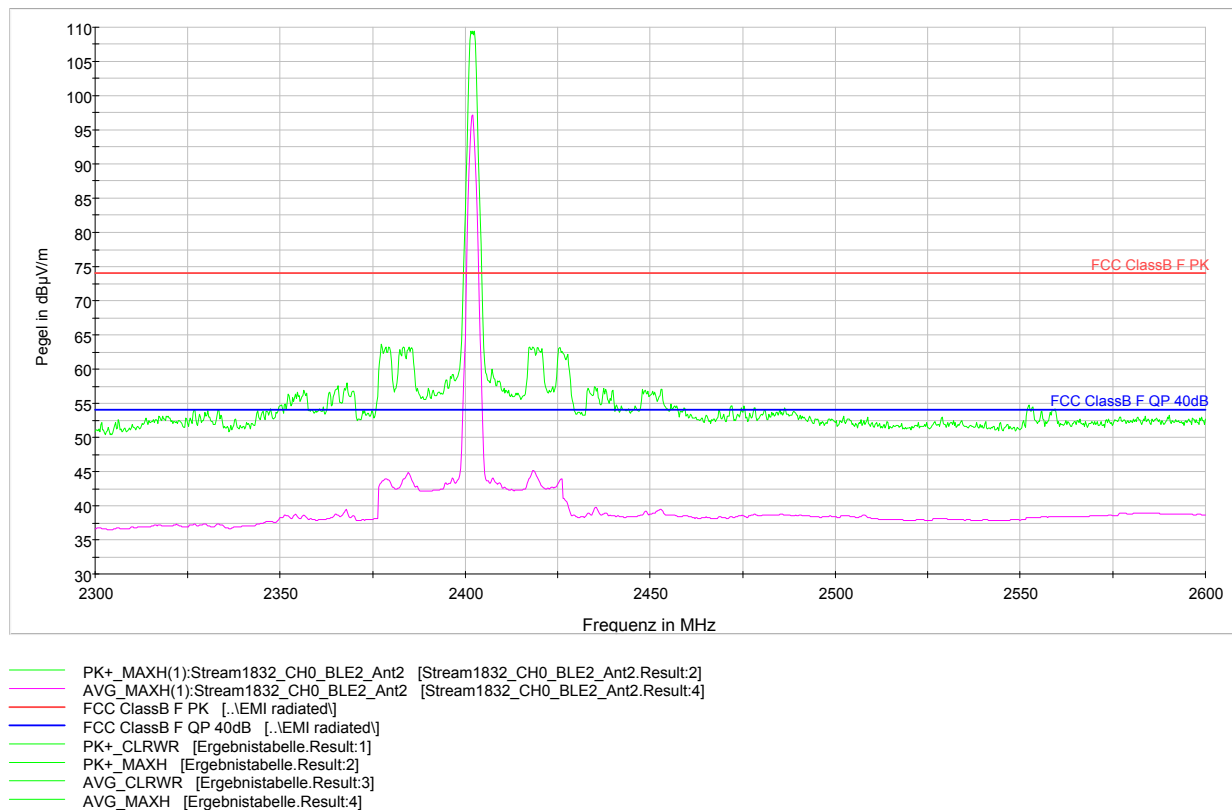
Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-111; EMV-112; EMV-114; EMV-200; EMV-205; NT-122; NT-126; NT-416

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: CH 0: 2402 MHz – 2 Mbit/s mode – Antenna 2



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.

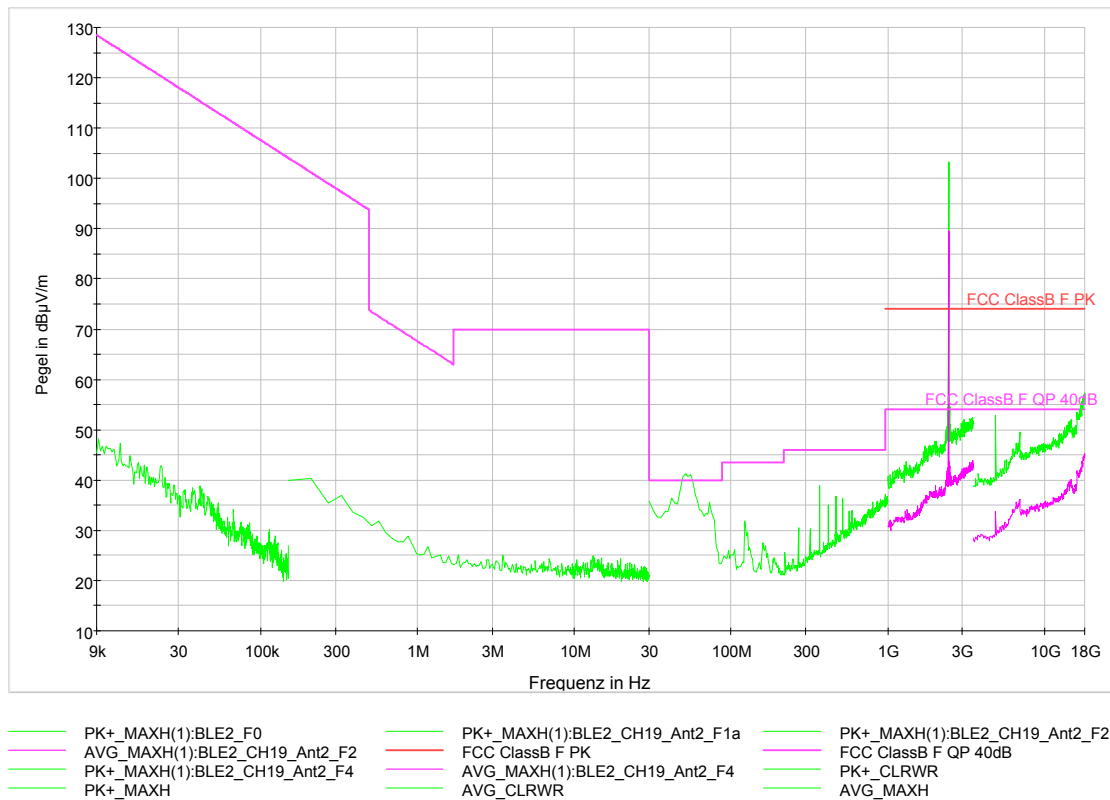
Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-200

Emissions in restricted bands **Emissions falling within restricted frequency bands**

§ 15.209(a) **RSS-Gen**

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

Setup: CH 19: 2440 MHz – 2 Mbit/s mode – Antenna 2



Worst case emission: Quasipeak @ 54,0 MHz 38,5 dBµV/m; 51,9 dBµV/m @ 4880 MHz

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

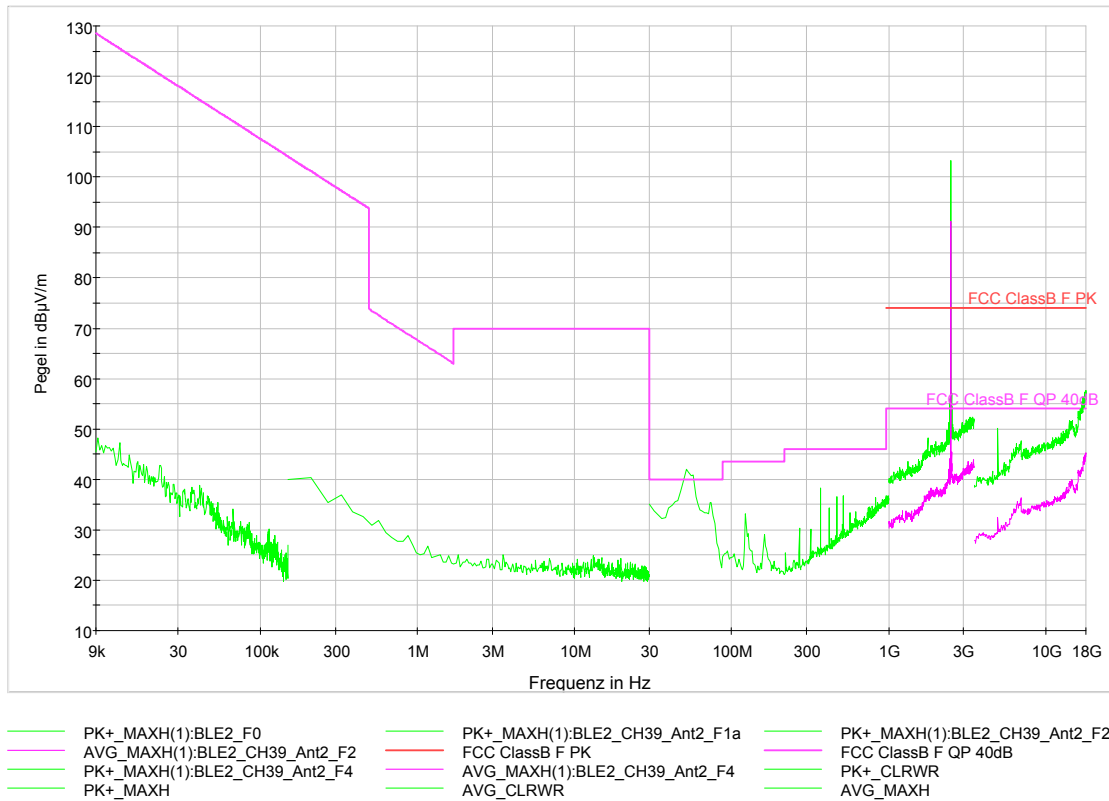
Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-111; EMV-112;
EMV-114; EMV-200; EMV-205; NT-122; NT-126; NT-416

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):

Setup: CH 39: 2480 MHz – 2 Mbit/s mode – Antenna 2



Worst case emission: Quasipeak @ 54,0 MHz 38,5 dBµV/m; 49,4 dBµV/m @ 4960 MHz

LIMIT SUBCLAUSE 15.209(a) – RSS-Gen

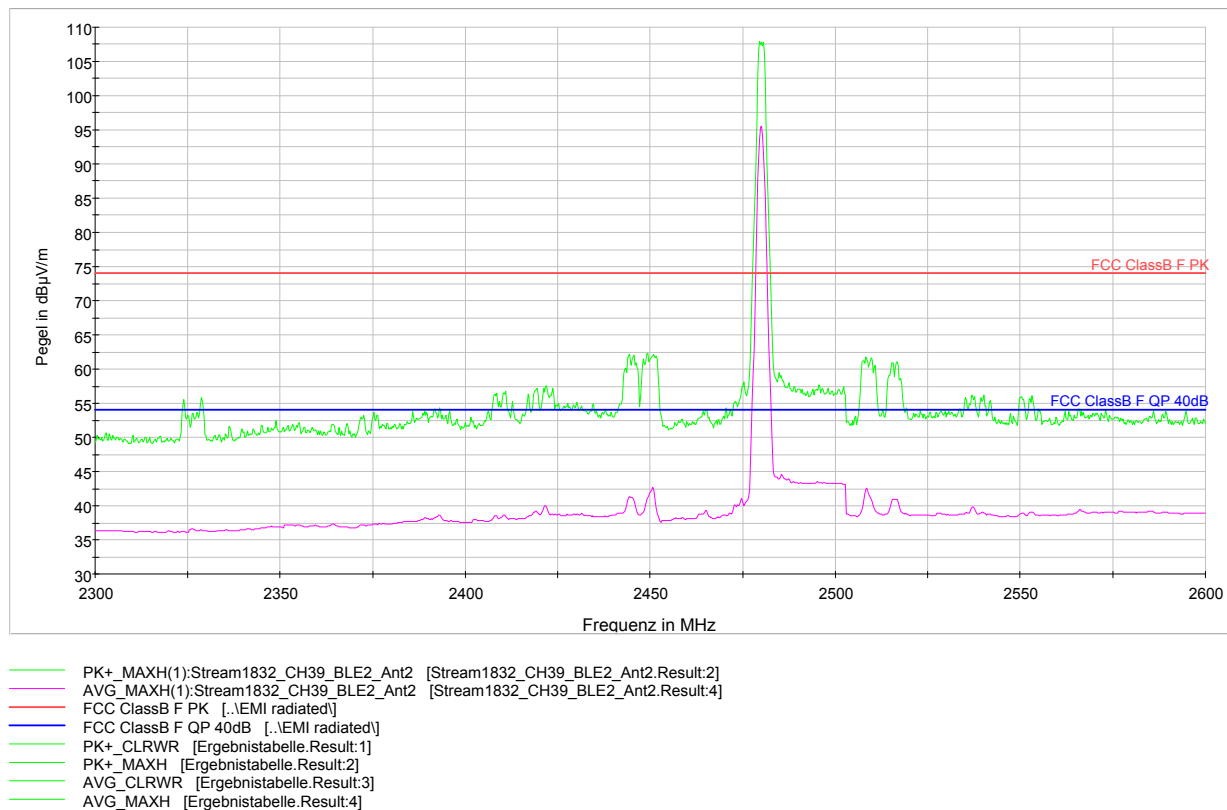
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

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 39: 2480 MHz – 2 Mbit/s mode – Antenna 2



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.

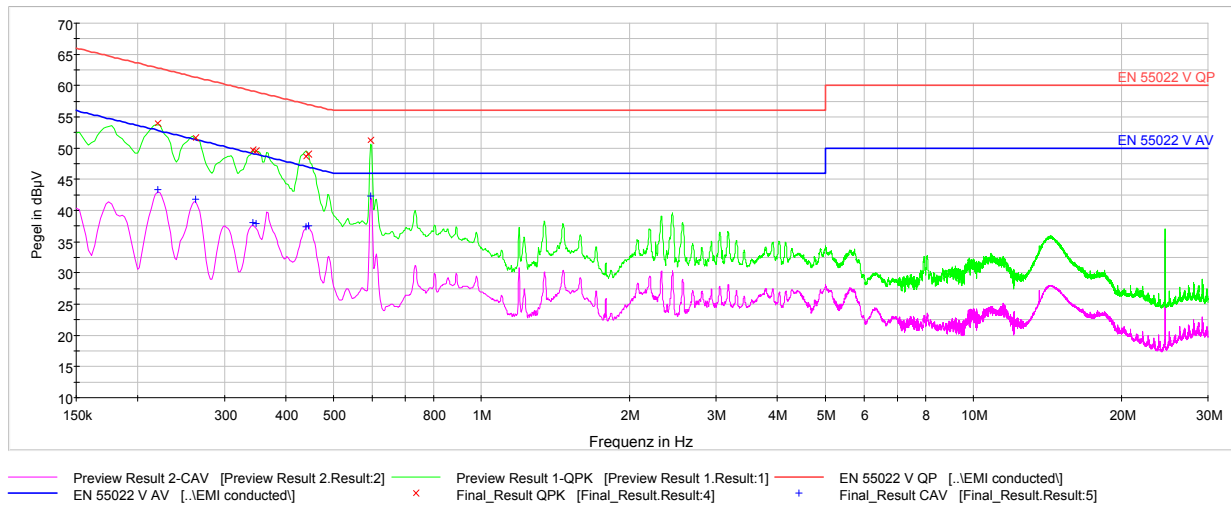
Test Equipment used: EMV-100; EMV-101; EMV-102; EMV-103; EMV-105; EMV-110; EMV-200

4.8. Conducted Limits

§ 15.207 RSS-Gen 8.8

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

Setup: CH 0: 2402 MHz – 1 Mbit/s mode



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.

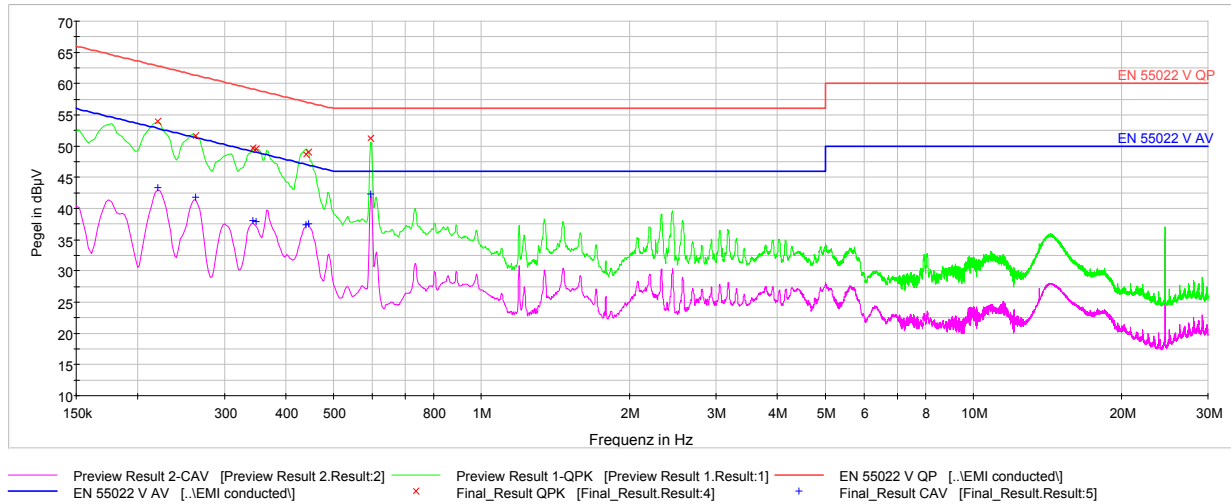
Test Equipment used: EMV-105; EMV-151; EMV-200; EMV-405

Conducted Limits

§ 15.207 RSS-Gen 8.8

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

Setup: CH 0: 2402 MHz – 2 Mbit/s mode



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	☐	Spectrum analyzer – FSP7 9 kHz – 7 GHz	NT-200
☐	Stripline according to ISO 11452-5	NT-108	☐	ESCI - Test receiver 9 kHz – 7 GHz	NT-203/1
☐	MA4000 - Antenna mast 1 - 4 m height	NT-110/1	☐	ESI26 – Test receiver 20 Hz – 26,5 GHz	NT-207
☐	DS - Turntable 0 - 400 ° Azimuth	NT-111/1	☐	Digital Radio Tester CTS55	NT-208
☐	CO3000 Controller Mast+Turntable	NT-112/1	☐	Noise-gen., ITU-R 559-2 20 Hz – 20 kHz	NT-209
☐	HUF-Z3 - Log. Per. Antenna 200 - 1000 MHz	NT-121	☐	CMTA - Radiocommunication analyzer ; 0,1 - 1000 MHz	NT-210
☐	FMZB1513 - Loop Antenna 9 kHz - 30 MHz	NT-122/1	☐	3271 - Spectrum analyzer 100 Hz - 26,5 GHz	NT-211
☐	HFH-Z6 - Rod Antenna 9 kHz - 30 MHz	NT-123	☐	Digital Radio Tester Aeroflex 3920	NT-212/1
☐	3121C - Dipole Antenna 28 - 1000 MHz	NT-124	☐	Mixer M28HW 26,5 GHz - 40 GHz	NT-214
☐	3115 - Horn Antenna 1 - 18 GHz (immunity)	NT-125	☐	RubiSource T&M Timing reference	NT-216
☐	3116 - Horn Antenna 18 - 40 GHz	NT-126	☐	Radiocommunication analyzer SWR 1180 MD	NT-217
☐	SAS-200/543 - Bicon. Antenna 20 MHz - 300 MHz	NT-127	☐	Mixer M19HWD 40 GHz – 60 GHz	NT-218
☐	AT-1080 - Log. Per. Antenna 80 - 1000 MHz	NT-128	☐	Mixer M12HWD 60 GHz – 90 GHz	NT-219
☐	HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-129	☐	DSO9104 Digital scope	NT-220/1
☐	HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-130	☐	TPS 2014 Digital scope	NT-222
☐	3146 - Log. Per. Antenna 200 – 1000 MHz	NT-131	☐	Artificial Ear according to IEC 60318	NT-224
☐	VULB 9163 Trilog Antenna 30 – 3000 MHz	NT-131/1	☐	1 kHz Sound calibrator	NT-225
☐	Loop Antenna H-Field	NT-132	☐	B10 - Harmonics and flicker analyzer	NT-232
☐	Horn Antenna 500 MHz - 2900 MHz	NT-133	☐	SRM-3006 Spectrum analyzer	NT-233/1a
☐	Horn Antenna 500 MHz - 6000 MHz	NT-133/1	☐	E-field probe SRM 75 MHz – 3 GHz	NT-234
☐	Log. per. Antenna 800 MHz - 2500 MHz	NT-134	☐	Field Meter NBM-500 incl. E- and H-Field probes	NT-240a-e
☐	Log. per. Antenna 800 MHz - 2500 MHz	NT-135	☐	Hall-Teslameter ETM-1	NT-241
☐	BiConiLog Antenna 26 MHz – 2000 MHz	NT-137	☐	EFA-3 H-field- / E-field probe	NT-243
☐	Conical Dipol Antenna PCD8250	NT-138	☐	EHP-50F H-field- / E-field probe	NT-243/1
☐	HF 906 - Horn Antenna 1 - 18 GHz (emission)	NT-139	☐	Field Meter EMR-200 100 kHz – 3 GHz	NT-244
☐	HZ-1 Antenna tripod	NT-150	☐	E-field probe 100 kHz – 3 GHz	NT-245
☐	BN 1500 Antenna tripod	NT-151	☐	H-field probe 300 kHz – 30 MHz	NT-246
☐	Ant. tripod for EN61000-4-3 Model TP1000A	NT-156			
☐	Power quality analyzer Fluke 1760 (complete set)	NT-160 - NT-173			

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Appendix 1 (continued)

Test equipment used

☐	E-field probe 3 MHz – 18 GHz	NT-247	☐	500W1000M7 - RF-Amplifier 80 - 1000 MHz / 500 W	NT-332
☐	H-field probe 27 MHz – 1 GHz	NT-248	☐	AS0102-65R - RF-Amplifier 1 GHz - 2 GHz	NT-333
☐	ELT-400 1 Hz – 400 kHz	NT-249	☐	APA01 – RF-Amplifier 0,5 GHz – 2,5 GHz	NT-334
☐	MDS 21 - Absorbing clamp 30 - 1000 MHz	NT-250	☐	Preamplifier 1 GHz - 4 GHz	NT-335
☐	FCC-203I EM Injection clamp	NT-251	☐	Preamplifier for GPS MKU 152 A	NT-336
☐	FCC-203I-DCN Ferrite decoupling network	NT-252	☐	Preamplifier 100 MHz – 23 GHz	NT-337
☐	PR50 Current Probe	NT-253	☐	DC Block 10 MHz – 18 GHz Model 8048	NT-338
☐	i310s Current Probe	NT-254/1	☐	2-97201 Electronic load	NT-341
☐	Fluke 87 V True RMS Multimeter	NT-260	☐	TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-344
☐	Model 2000 Digital Multimeter	NT-261	☐	TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-345
☐	Fluke 87 V Digital Multimeter	NT-262/1	☐	VDS 200 Mobil-impuls-generator	NT-350
☐	ESH2-Z5-U1 Artificial mains network 4x25A	NT-300	☐	LD 200 Mobil-impuls-generator	NT-351
☐	ESH3-Z5-U1 Artificial mains network 2x10A	NT-301	☐	MPG 200 Mobil-Impuls-Generators	NT-352
☐	ESH3-Z6-U1 Artificial mains network 1x100A	NT-302	☐	EFT 200 Mobil-impuls-generator	NT-353
☐	ESH3-Z6-U1 Artificial mains network 1x100A	NT-302a	☐	AN 200 S1 Artificial Network	NT-354
☐	PHE 4500/B Power amplifier	NT-304	☐	FP-EFT 32M 3 ph. Coupling filter (Burst)	NT-400/1
☐	EZ10 T-Artificial Network	NT-305	☐	PHE 4500 - Mains impedance network	NT-401
☐	SMG - Signal generator 0,1 - 1000 MHz	NT-310	☐	IP 6.2 Coupling filter for data lines (Surge)	NT-403
☐	SMA100A - Signal generator 9 kHz - 6 GHz	NT-310/1	☐	TK 9421 High Power Volt. Probe 150 kHz - 30 MHz	NT-409
☐	RefRad Reference generator	NT-312	☐	ESH2-Z3 - Probe 9 kHz - 30 MHz	NT-410
☐	SMP 02 Signal generator 10 MHz - 20 GHz	NT-313	☐	IP 4 - Capacitive clamp (Burst)	NT-411
☐	40 MHz Arbitrary Generator TGA1241	NT-315	☐	Highpass-Filter 100 MHz – 3 GHz	NT-412
☐	Artificial mains network NSLK 8127-PLC	NT-316	☐	Highpass-Filter 600 MHz – 4 GHz	NT-413
☐	ESD 30 System up to 25 kV	NT-321	☐	Highpass-Filter 1250 MHz – 4 GHz	NT-414
☐	PSURGE 4.1 Surge generator	NT-324	☐	Highpass-Filter 1800 MHz – 16 GHz	NT-415
☐	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			

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Appendix 1 (continued)

Test equipment used

☐	Highpass-Filter 3500 MHz – 18 GHz	NT-416	☐	FCC-801-AF10 Coupling decoupling network	NT-461
☐	RF-Attenuator 10 dB DC – 18 GHz / 50 W	NT-417	☐	FCC-801-S25 Coupling decoupling network	NT-462
☐	RF-Attenuator 6 dB DC – 18 GHz / 50 W	NT-418	☐	FCC-801-T4 Coupling decoupling network	NT-463
☐	RF-Attenuator 3 dB DC – 18 GHz / 50 W	NT-419	☐	FCC-801-C1 Coupling decoupling network	NT-464
☐	RF-Attenuator 20 dB DC - 1000 MHz / 25 W	NT-421	☐	SW 9605 - Current probe 150 kHz – 30 MHz	NT-465/1
☐	RF-Attenuator 30 dB DC - 1000 MHz / 1 W	NT-423	☐	95242-1 – Current probe 1 MHz – 400 MHz	NT-468
☐	RF-Attenuator 30 dB	NT-424	☐	94106-1L-1 – Current probe 100 kHz – 450 MHz	NT-471
☐	RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-425	☐	GA 1240 Power amplifier according to EN 61000-4-16	NT-480
☐	RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-426	☐	Coupling networks according to EN 61000-4-16	NT-481 - NT-483
☐	RF-Attenuator 6 dB	NT-428	☐	Van der Hoofden Test Head	NT-484
☐	RF-Attenuator 0 dB - 81 dB	NT-429	☐	EMC Video/Audiosystem	NT-511/1
☐	WRU 27 - Band blocking 27 MHz	NT-430	☐	ES-K1 Version 1.71 SP2 Test software	NT-520
☐	WHJ450C9 AA - High pass 450 MHz	NT-431	☐	EMC32 Version 10.40.00 Test software	NT-520/1
☐	WHJ250C9 AA - High pass 250 MHz	NT-432	☐	SRM-TS Version 1.3 software for SRM-3000	NT-522
☐	RF-Load 150 W	NT-433	☐	SRM-TS Version 1.3.1 software for SRM-3006	NT-522/1
☐	Impedance transducer 1:4 ; 1:9 ; 1:16	NT-435	☐	Spitzenberger und Spies Test software V4.1	NT-525
☐	RF-Attenuator DC – 18 GHz 6 dB	NT-436	☐	Noise power test apparatus according to EN 55014	NT-530
☐	RF-Attenuator DC – 18 GHz 6 dB	NT-437	☐	Vertical coupling plane (ESD)	NT-531
☐	RF-Attenuator DC – 18 GHz 10 dB	NT-438	☐	Test cable #4 for EN 61000-4-6	NT-553
☐	RF-Attenuator DC – 18 GHz 20 dB	NT-439	☐	Test cable #3 for conducted emission	NT-554
☐	I+P 7780 Directional coupler 100 - 2000 MHz	NT-440	☐	Test cable #5+#6 ESD-cable (2x470k)	NT-555 + NT-556
☐	ESH3-Z2 - Pulse limiter 9 kHz - 30 MHz	NT-441	☐	Test cable #8 Sucoflex 104EA	NT-559
☐	Power Divider 6 dB/1 W/50 Ohm	NT-443	☐	Test cable #9 (for outdoor measurements)	NT-580
☐	Directional coupler 0,1 MHz – 70 MHz	NT-444	☐	Test cable #10 (for outdoor measurements)	NT-581
☐	Directional coupler 0,1 MHz – 70 MHz	NT-445	☐	Test cable #13 Sucoflex 104PE	NT-584
☐	Tube imitations according to EN 55015	NT-450	☐	Test cable #21 for SRM-3000	NT-592
☐	FCC-801-M3-16A Coupling decoupling network	NT-458	☐	Shield chamber	NT-600
☐	FCC-801-M2-50A Coupling decoupling network	NT-459	☐	Climatic chamber	M-1200
☐	FCC-801-M5-25 Coupling decoupling network	NT-460			

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☐	Anechoic Chamber 3 m / 5 m measuring distance	EMV-100
☐	Turntabel 6 m diameter	EMV-101
☐	Antenna mast 1 – 4 m	EMV-102
☐	Mast and Turntable controller FC-06	EMV-103
☐	EMC Video/Audiosystem	EMV-104
☐	EMC Software EMC32 Version 10.40.00	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- Amplifier 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 VHBD 9134	EMV-303
☐	Log.per Antenna 80-2700 MHz STLP 9128 E special	EMV-304

☐	Log.per Antenna 0,7 – 9 GHz STLP9149	EMV-305
☐	HF- Amplifier 9 kHz-250 MHz BBA150 (low noise)	EMV-306
☐	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

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