

TEST REPORT

of the accredited test laboratory

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Medical Technology/
Communication
Technology/ EMC

Department:
Testing Body for
Communication
Technology/ EMC

TÜV®

Applicant: Automated Control Technology Partners, Inc
2400 Sandlake Rd Suite 600
32839 Orlando - Florida
USA

Tested Product: Streaming audio device (WIFI part)

FCC-ID: 2AA08-AZSS1

IC-ID: 11338A-AZSS1

Manufacturer: See above

Output power / 42,56 mW eirp **power supply:** 24 VDC
field strength:

Frequency range: 2412 - 2462 MHz **Channel separation:** 5 MHz

Standard: FCC: 47 CFR Part 15 (October 1, 2012 edition)
RSS-210 Issue 8, December 2010



Testing Laboratory,
Inspection Body,
Certification Body,
Calibration Laboratory

Notified Body 0408
IC 2932K-1

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Court / - Number:
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BIC RZBAATWW

UID ATU63240488
DVR 3002476

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Test laboratory for EMC

Supervisor of EMC-laboratory:

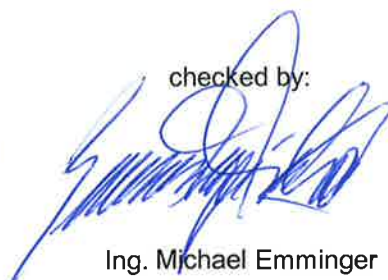

Ing. Wilhelm Sejer



16.09.2013

Copy Nbr.: 01

checked by:


Ing. Michael Emminger

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

LIST OF MEASUREMENTS

The complete list of measurements called for in 47 CFR 15 and RSS-210 is given below.

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TEST OBJECT DATA

General EUT Description

This streaming audio device uses either Ethernet, Bluetooth or WIFI as network/datalink connection. The device contains audio amplifier, so that it can play audio files via loudspeakers that are not part of the device.

This test report refers only to the WIFI capability of this device.

2.1033 (c) Technical description

2.1033 (4) Type of emission:

802.11 standards – Channel bandwidths 10,42 up to 16,933 MHz – Channel spacing 5 MHz.
There are 14 different datarates available, resulting in different bandwidths. On the middle channel (6) the bandwidth was measured at all datarates and a plot is found in this report for all these 14 datarates. At the lowest and the highest channels only the bitrates resulting in the lowest and highest bandwidth were recorded.

2.1033 (5) Frequency range:

2412 till 2462 MHz (channel center frequencies) in 5 MHz steps resulting in 11 Channels

2.1033 (6) Power range and Controls: The maximum peak output power is 42,56 mW and there is no power regulation.

2.1033 (7) Maximum output power rating: 42,56 mW eirp.

2.1033 (8) DC Voltage and Current: 24 V via external power supply
maximum current consumption: 2,04 A)

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

Tests were performed on 29th till 31st July 2013.

Number of channels and channel spacing

§ 2.1033

Radiated Measurement

Rated output power: 42,56 mW

There are 11 Channels used starting at 2412 till 2462 MHz each spaced by 5 MHz channel spacing.

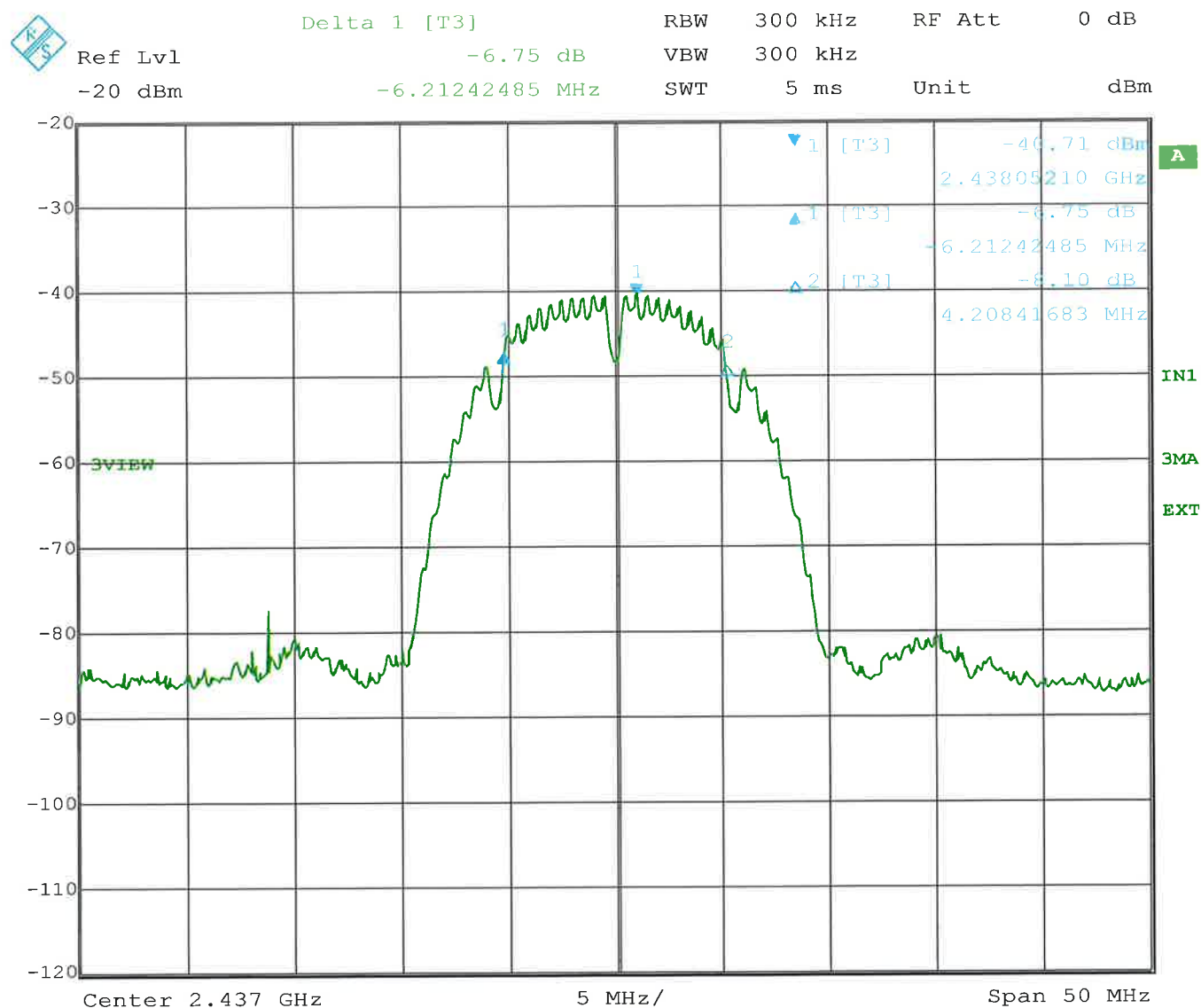
Test Equipment used: N/A

6dB Bandwidth

§ 15.247(a)(2)
A8.2(a)

Radiated Measurement

Rated output power: 42,56 mW Channel 6 (2437 MHz) – Bitrate: 1Mbit/s



Date: 31.JUL.2013 10:00:54

6dB Bandwidth: 10,42 MHz

LIMIT SUBCLAUSE 15.247(e) – A8.2(b)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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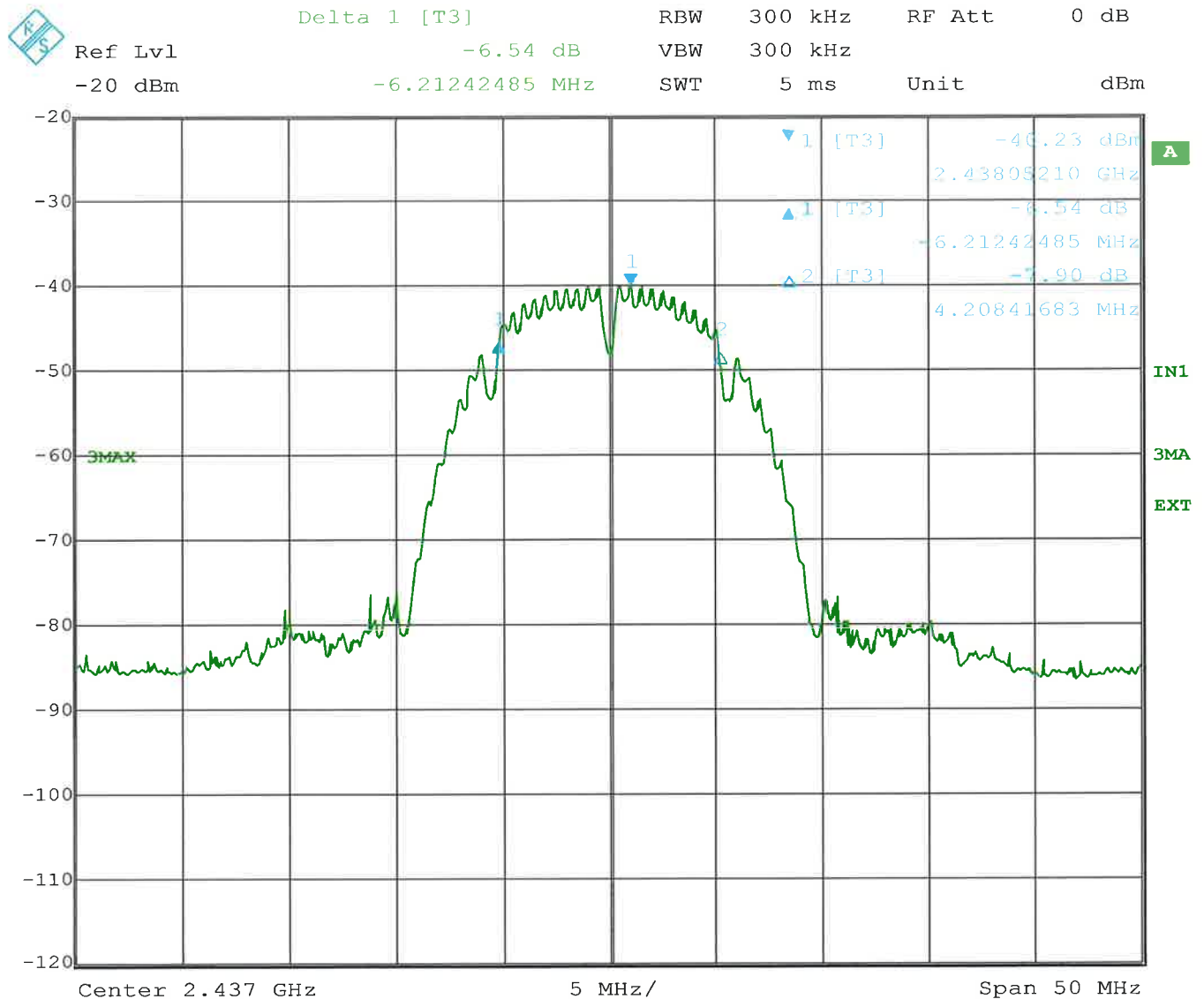
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-125; NT-126; NT-150; NT-207; NT-500; NT-520; NT-550

6dB Bandwidth

§ 15.247(a)(2)
A8.2(a)

Radiated Measurement

Rated output power: 42,56 mW Channel 6 (2437 MHz) – Bitrate: 2Mbit/s



Date: 31.JUL.2013 09:46:02

6dB Bandwidth: 10,42 MHz

LIMIT SUBCLAUSE 15.247(e) – A8.2(b)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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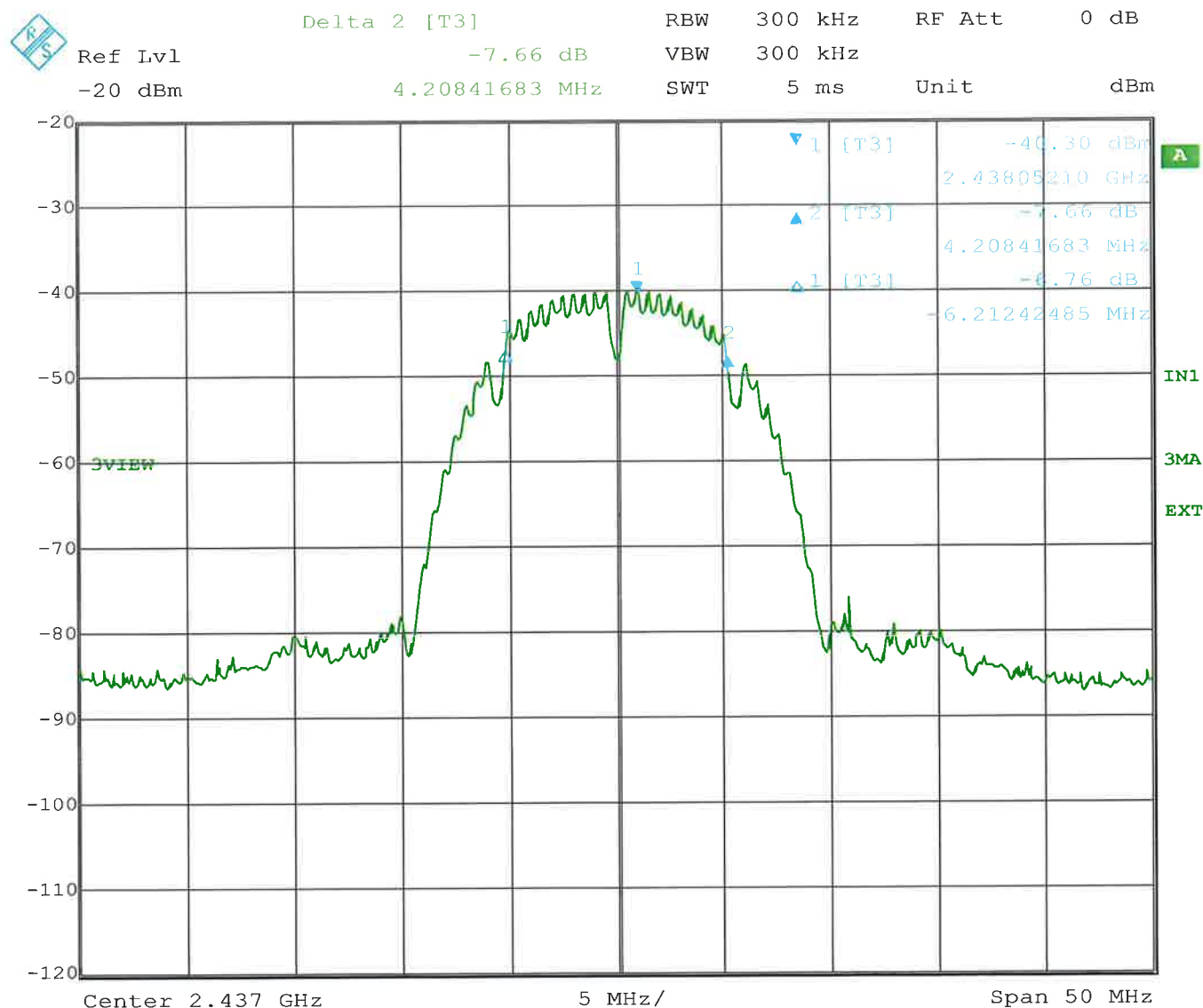
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-125; NT-126; NT-150; NT-207; NT-500; NT-520; NT-550

6dB Bandwidth

§ 15.247(a)(2)
A8.2(a)

Radiated Measurement

Rated output power: 42,56 mW Channel 6 (2437 MHz) – Bitrate: 5,5Mbit/s



Date: 31.JUL.2013 09:49:28

6dB Bandwidth: 10,42 MHz

LIMIT

SUBCLAUSE 15.247(e) – A8.2(b)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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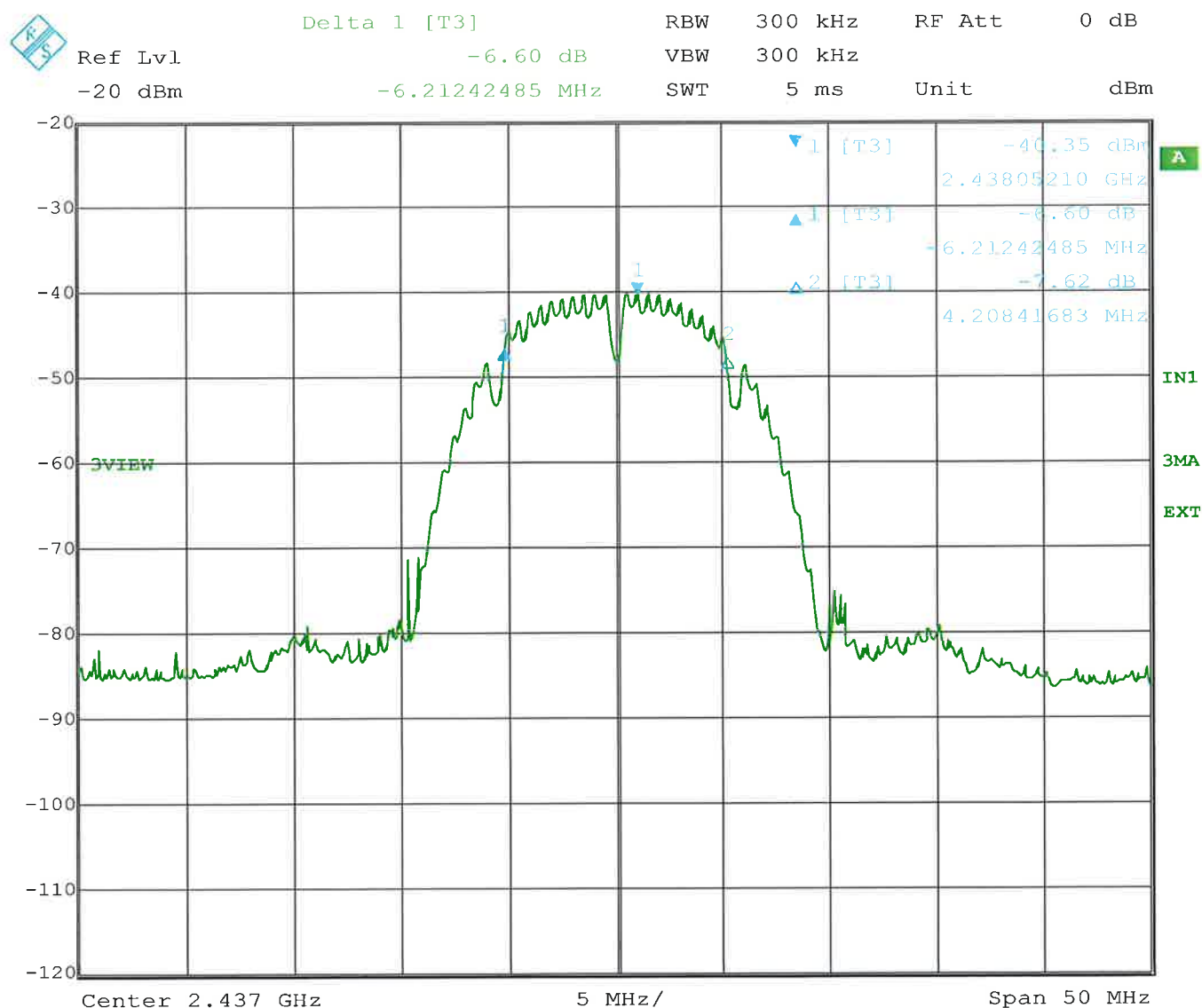
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-125; NT-126; NT-150; NT-207; NT-500; NT-520; NT-550

6dB Bandwidth

§ 15.247(a)(2)
A8.2(a)

Radiated Measurement

Rated output power: 42,56 mW Channel 6 (2437 MHz) – Bitrate: 11Mbit/s



Date: 31.JUL.2013 09:53:10

6dB Bandwidth: 10,42 MHz

LIMIT SUBCLAUSE 15.247(e) – A8.2(b)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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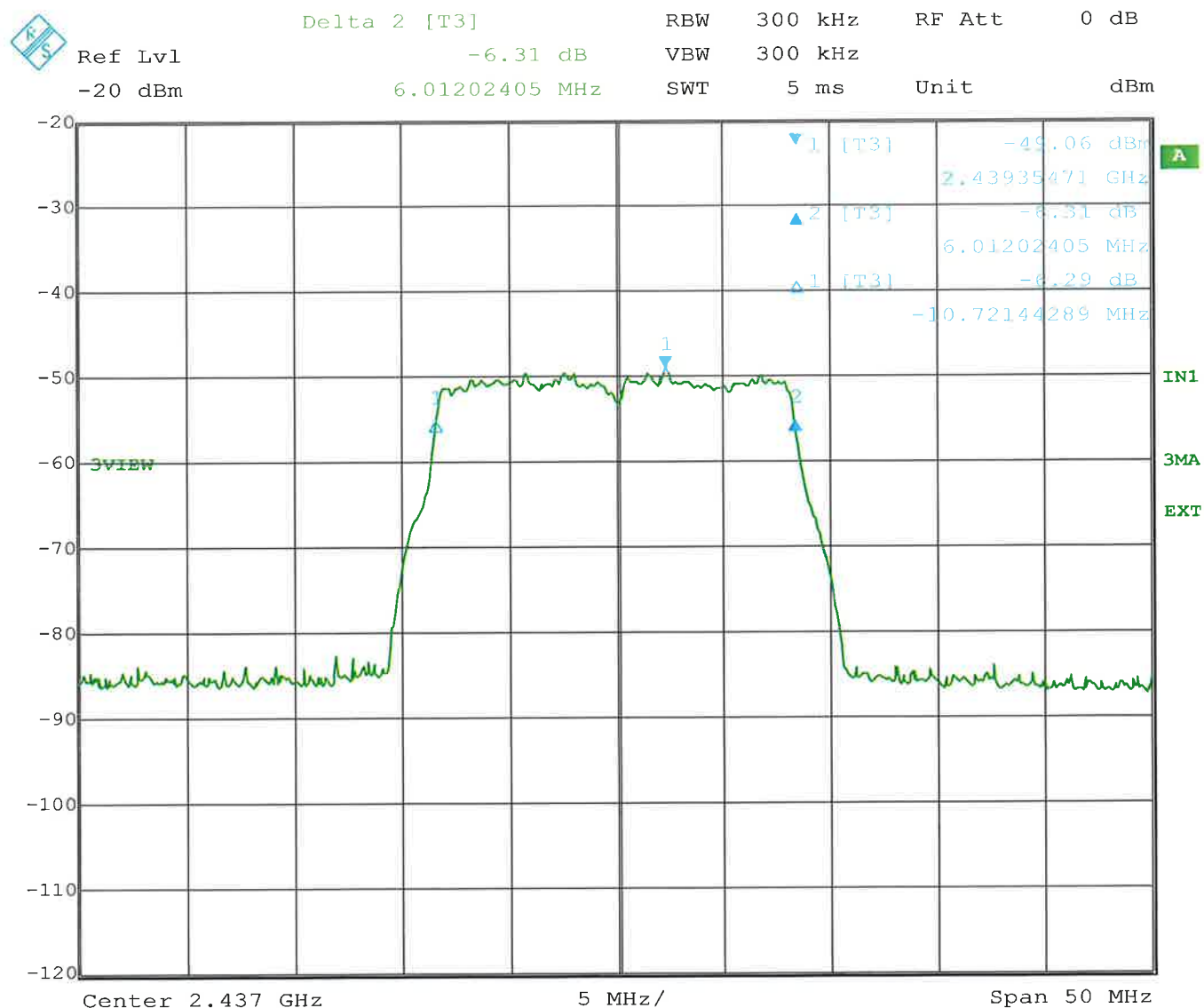
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-125; NT-126; NT-150; NT-207; NT-500; NT-520; NT-550

6dB Bandwidth

§ 15.247(a)(2)
A8.2(a)

Radiated Measurement

Rated output power: 42,56 mW Channel 6 (2437 MHz) – Bitrate: 22Mbit/s



Date: 31.JUL.2013 09:54:56

6dB Bandwidth: 16,733 MHz

LIMIT SUBCLAUSE 15.247(e) – A8.2(b)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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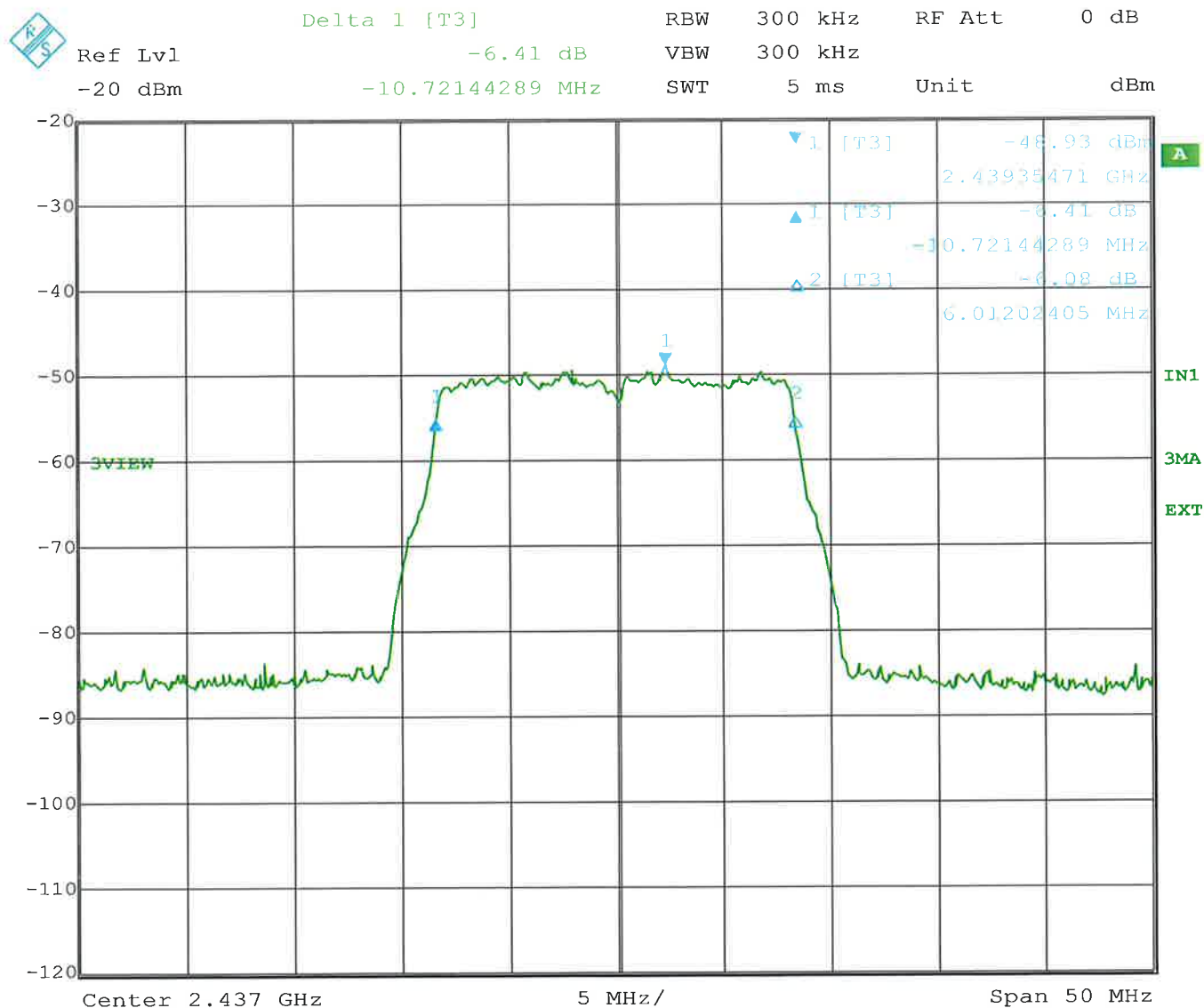
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-125; NT-126; NT-150; NT-207; NT-500; NT-520; NT-550

6dB Bandwidth

§ 15.247(a)(2)
A8.2(a)

Radiated Measurement

Rated output power: 42,56 mW Channel 6 (2437 MHz) – Bitrate: 6Mbit/s



Date: 31.JUL.2013 09:56:23

6dB Bandwidth: 16,733 MHz

LIMIT SUBCLAUSE 15.247(e) – A8.2(b)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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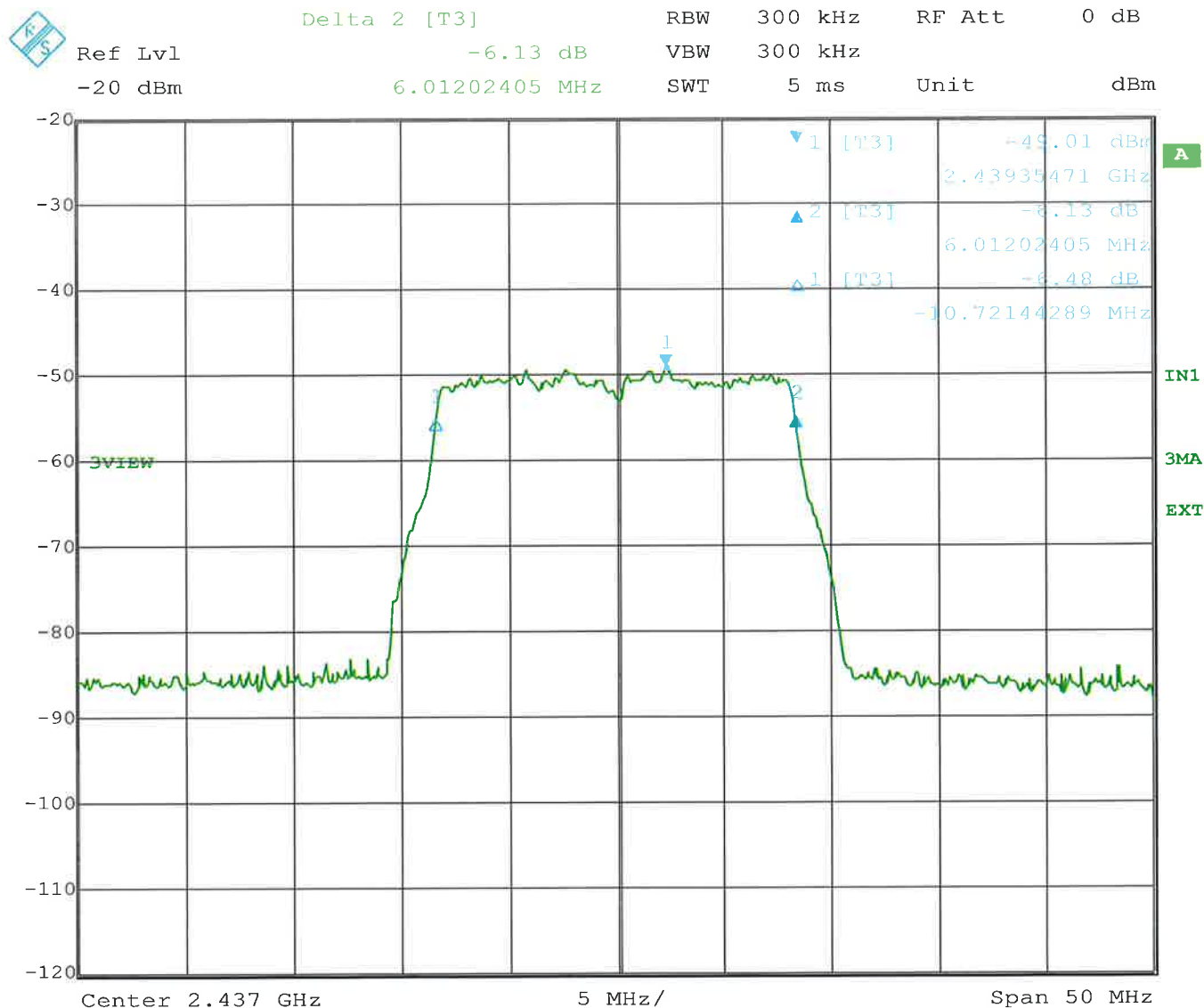
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-125; NT-126; NT-150; NT-207; NT-500; NT-520; NT-550

6dB Bandwidth

§ 15.247(a)(2)
A8.2(a)

Radiated Measurement

Rated output power: 42,56 mW Channel 6 (2437 MHz) – Bitrate: 9Mbit/s



Date: 31.JUL.2013 09:58:13

6dB Bandwidth: 16,733 MHz

LIMIT SUBCLAUSE 15.247(e) – A8.2(b)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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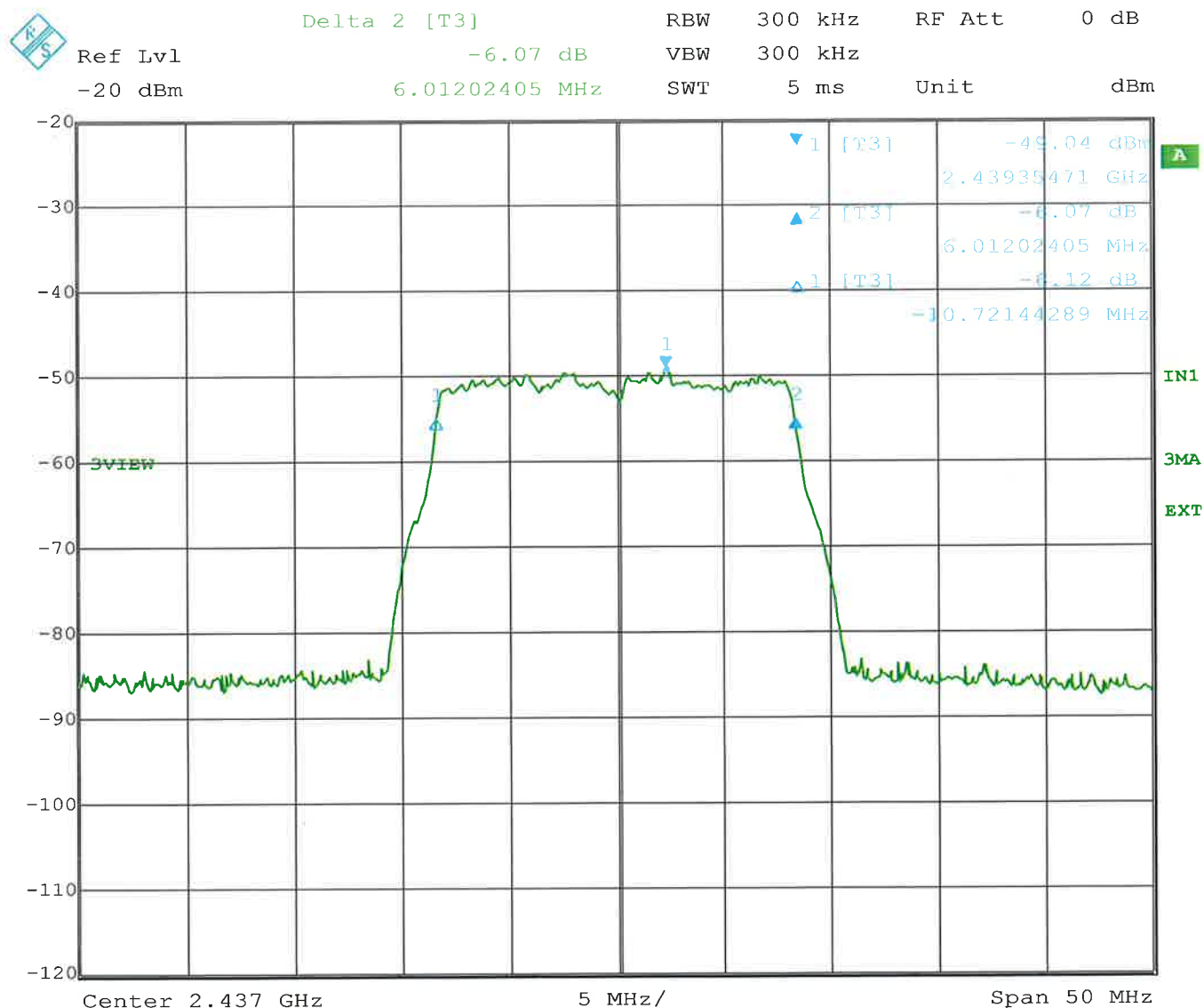
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-125; NT-126; NT-150; NT-207; NT-500; NT-520; NT-550

6dB Bandwidth

§ 15.247(a)(2)
A8.2(a)

Radiated Measurement

Rated output power: 42,56 mW Channel 6 (2437 MHz) – Bitrate: 12Mbit/s



Date: 31.JUL.2013 10:02:33

6dB Bandwidth: 16,733 MHz

LIMIT SUBCLAUSE 15.247(e) – A8.2(b)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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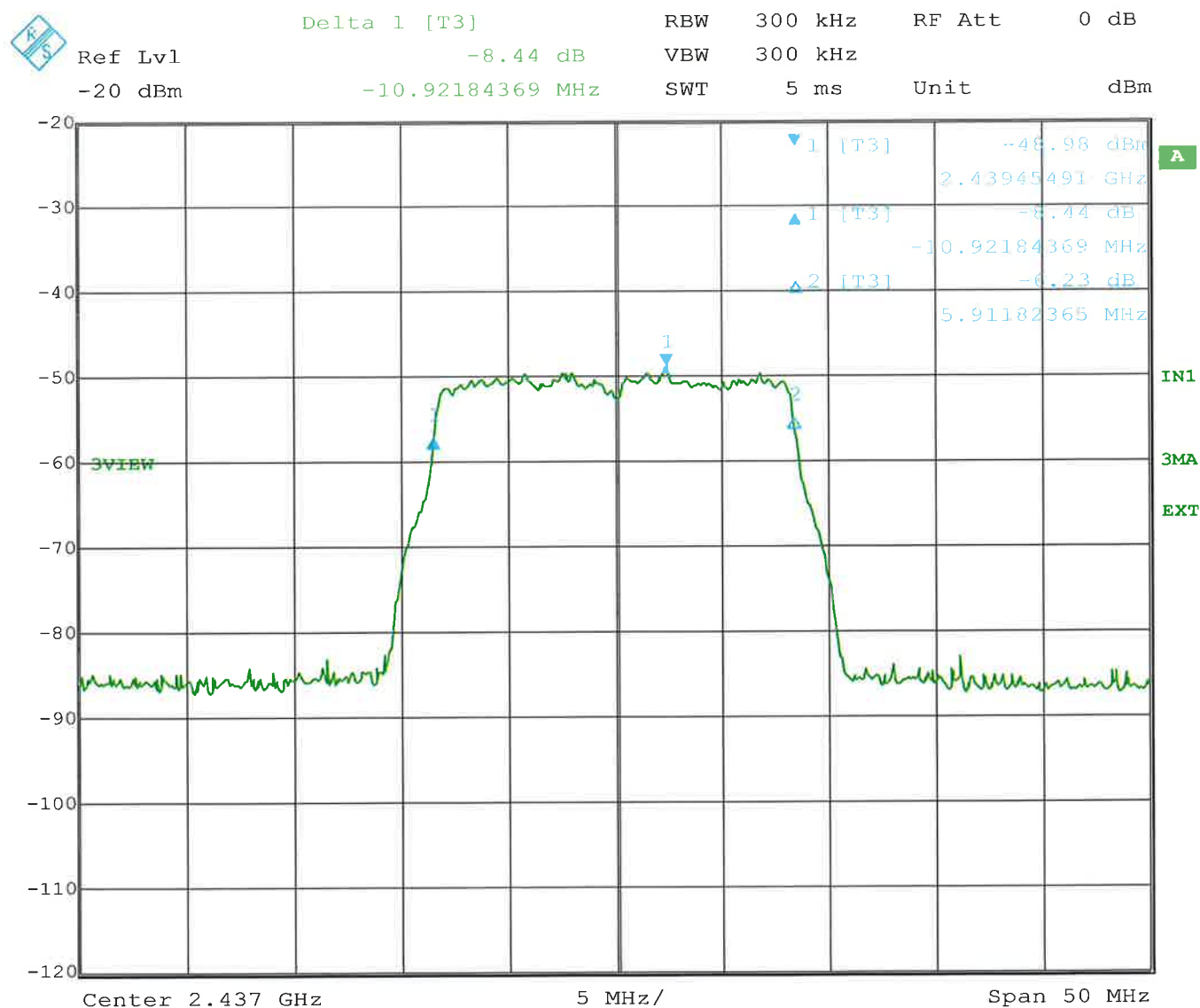
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-125; NT-126; NT-150; NT-207; NT-500; NT-520; NT-550

6dB Bandwidth

§ 15.247(a)(2)
A8.2(a)

Radiated Measurement

Rated output power: 42,56 mW Channel 6 (2437 MHz) – Bitrate: 18Mbit/s



Date: 31.JUL.2013 10:04:11

6dB Bandwidth: 16,833 MHz

LIMIT SUBCLAUSE 15.247(e) – A8.2(b)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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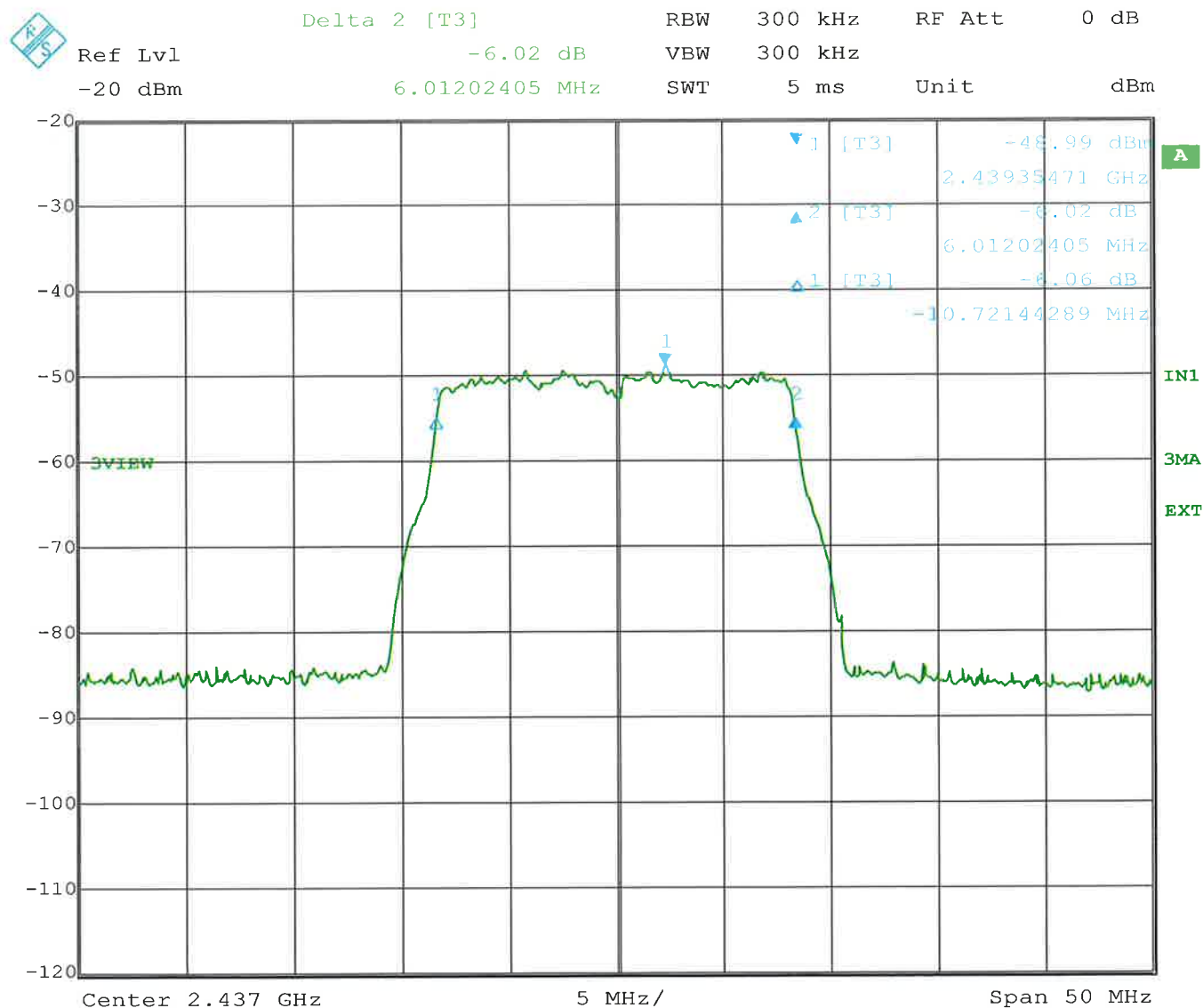
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-125; NT-126; NT-150; NT-207; NT-500; NT-520; NT-550

6dB Bandwidth

§ 15.247(a)(2)
A8.2(a)

Radiated Measurement

Rated output power: 42,56 mW Channel 6 (2437 MHz) – Bitrate: 24Mbit/s



Date: 31.JUL.2013 10:06:06

6dB Bandwidth: 16,733 MHz

LIMIT SUBCLAUSE 15.247(e) – A8.2(b)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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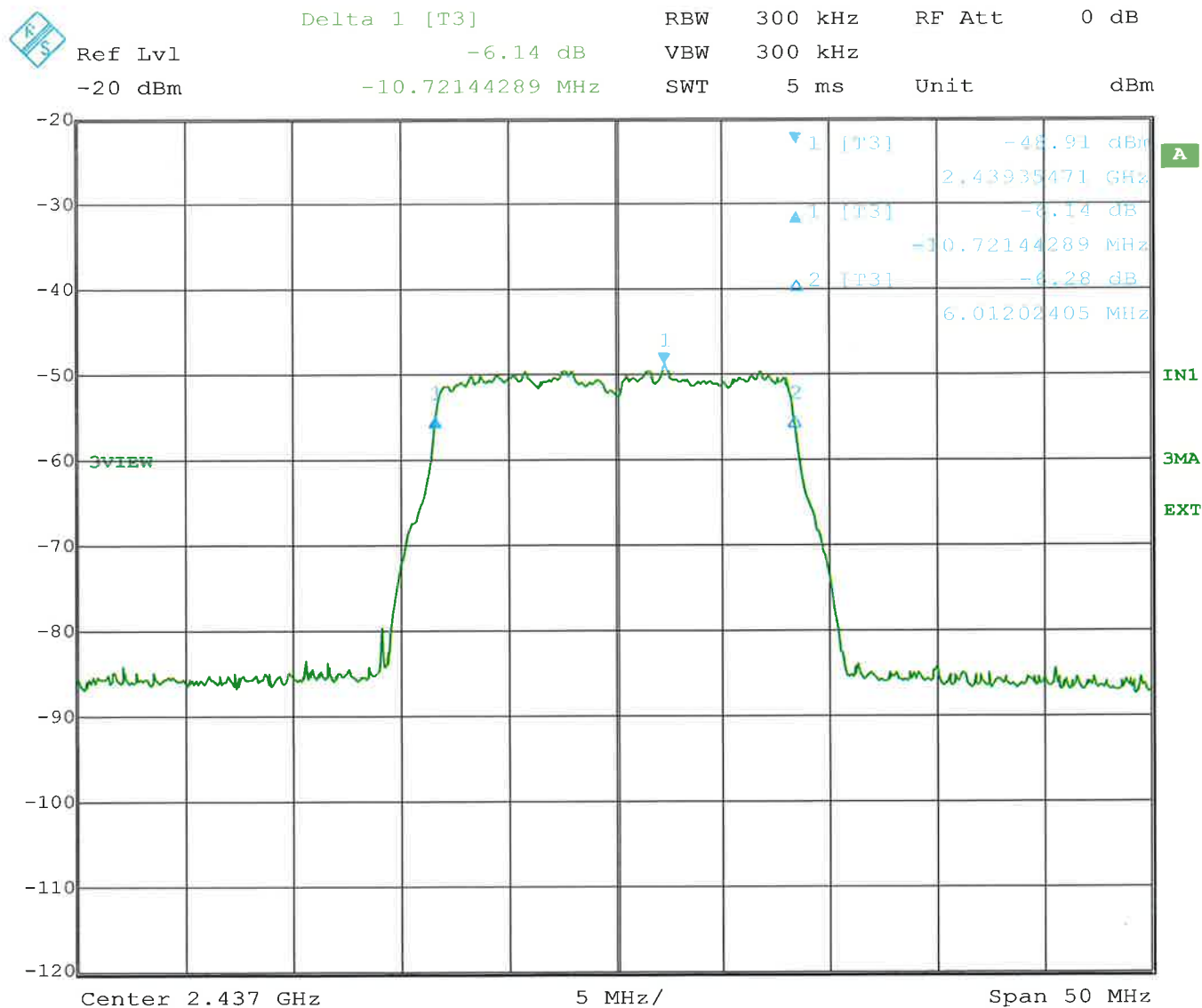
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-125; NT-126; NT-150; NT-207; NT-500; NT-520; NT-550

6dB Bandwidth

§ 15.247(a)(2)
A8.2(a)

Radiated Measurement

Rated output power: 42,56 mW Channel 6 (2437 MHz) – Bitrate: 36Mbit/s



Date: 31.JUL.2013 10:07:38

6dB Bandwidth: 16,733 MHz

LIMIT SUBCLAUSE 15.247(e) – A8.2(b)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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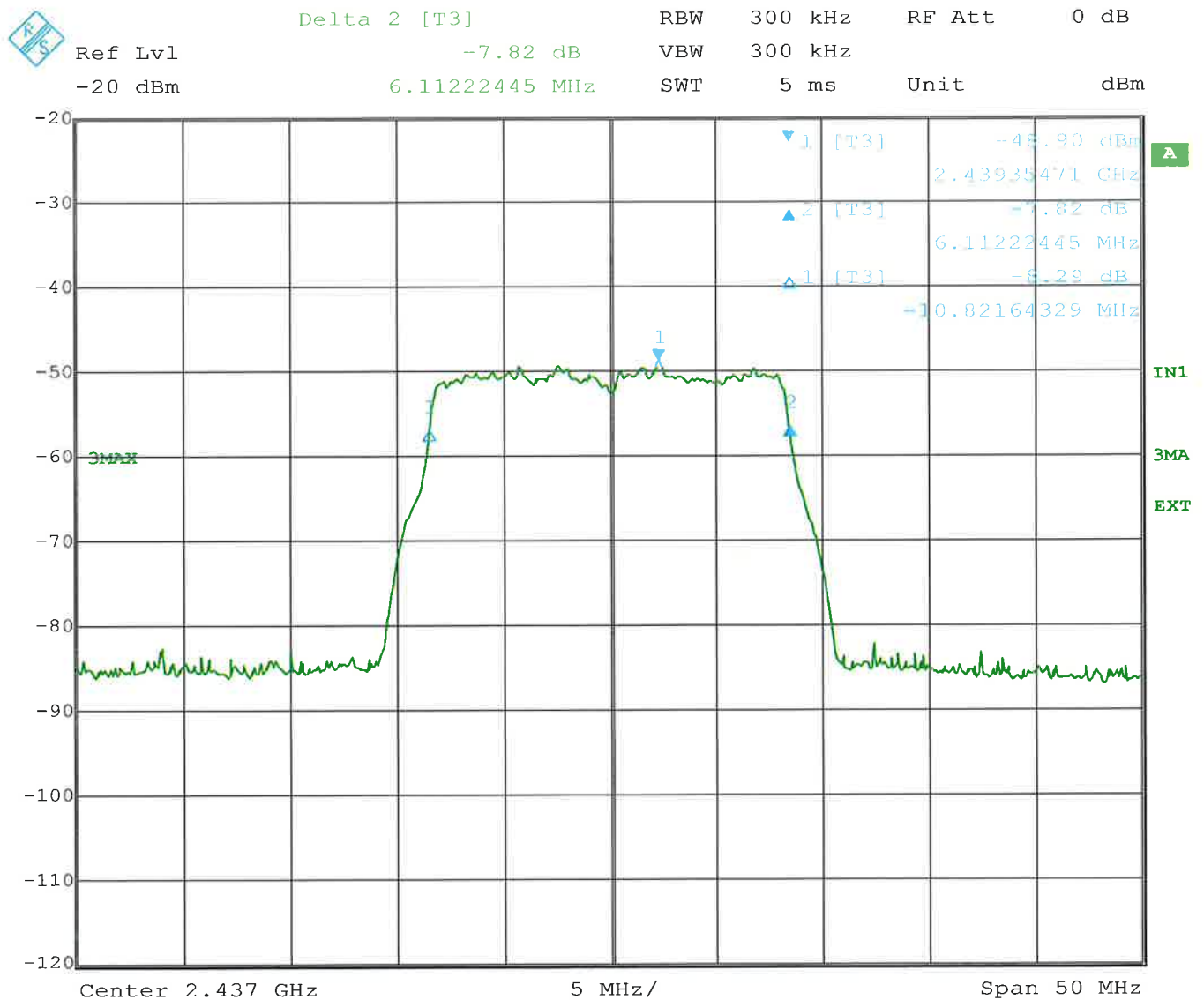
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-125; NT-126; NT-150; NT-207; NT-500; NT-520; NT-550

6dB Bandwidth

§ 15.247(a)(2)
A8.2(a)

Radiated Measurement

Rated output power: 42,56 mW Channel 6 (2437 MHz) – Bitrate: 48Mbit/s



Date: 31.JUL.2013 10:09:51

6dB Bandwidth: 16,933 MHz

LIMIT SUBCLAUSE 15.247(e) – A8.2(b)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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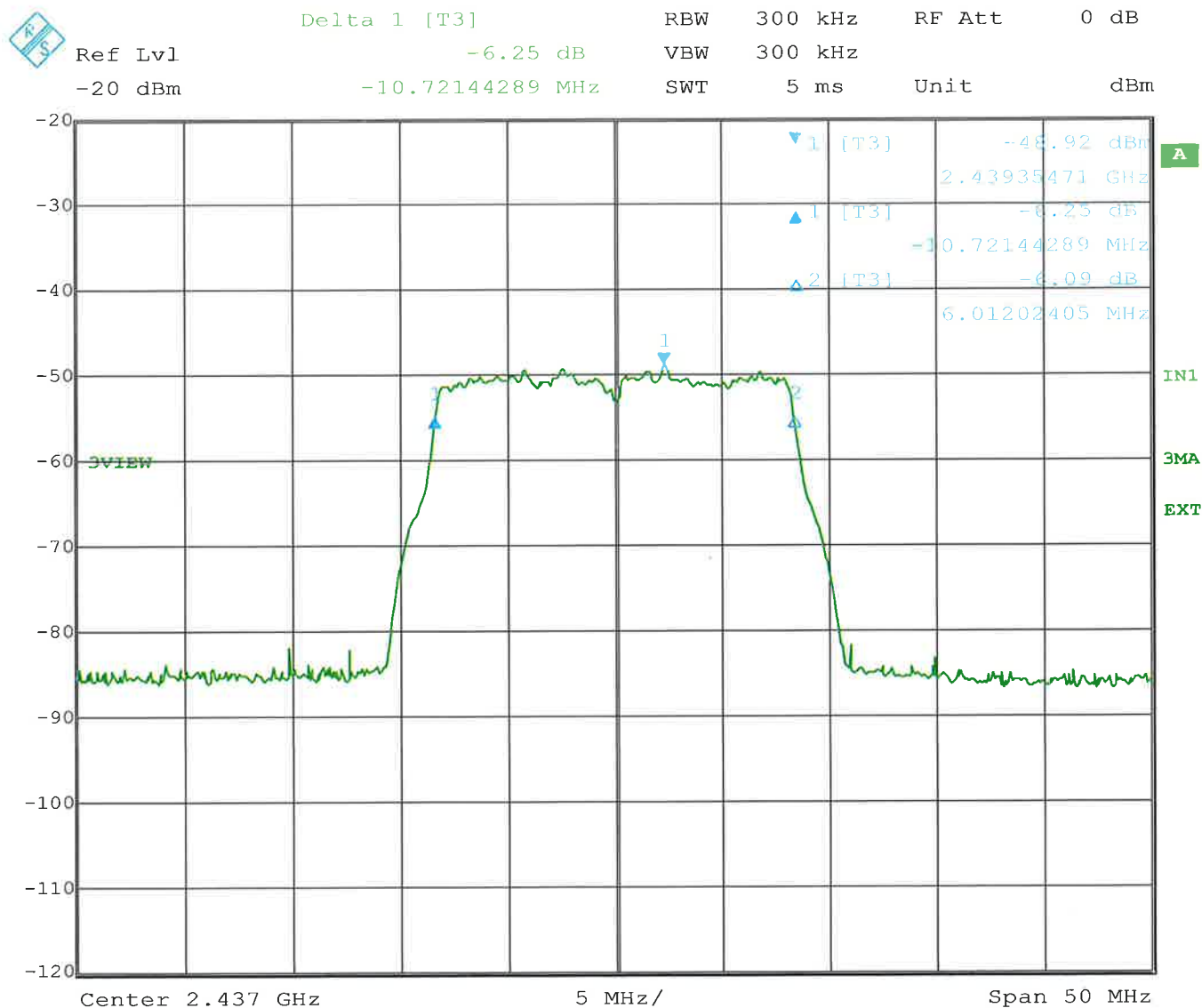
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-125; NT-126; NT-150; NT-207; NT-500; NT-520; NT-550

6dB Bandwidth

§ 15.247(a)(2)
A8.2(a)

Radiated Measurement

Rated output power: 42,56 mW Channel 6 (2437 MHz) – Bitrate: 54Mbit/s



Date: 31.JUL.2013 10:12:46

6dB Bandwidth: 16,733 MHz

LIMIT SUBCLAUSE 15.247(e) – A8.2(b)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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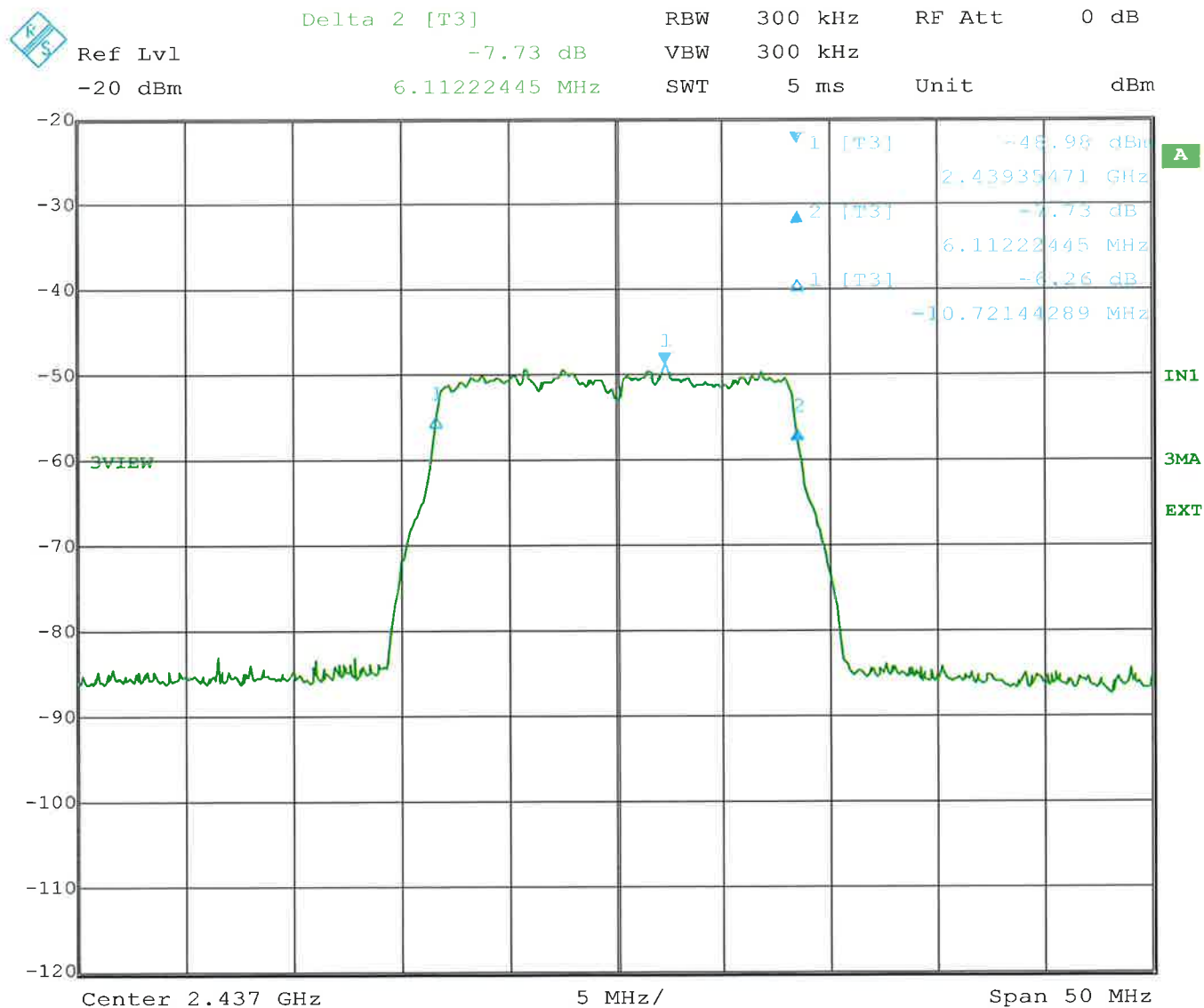
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-125; NT-126; NT-150; NT-207; NT-500; NT-520; NT-550

6dB Bandwidth

§ 15.247(a)(2)
A8.2(a)

Radiated Measurement

Rated output power: 42,56 mW Channel 6 (2437 MHz) – Bitrate: 72Mbit/s



Date: 31.JUL.2013 10:14:34

6dB Bandwidth: 16,833 MHz

LIMIT SUBCLAUSE 15.247(e) – A8.2(b)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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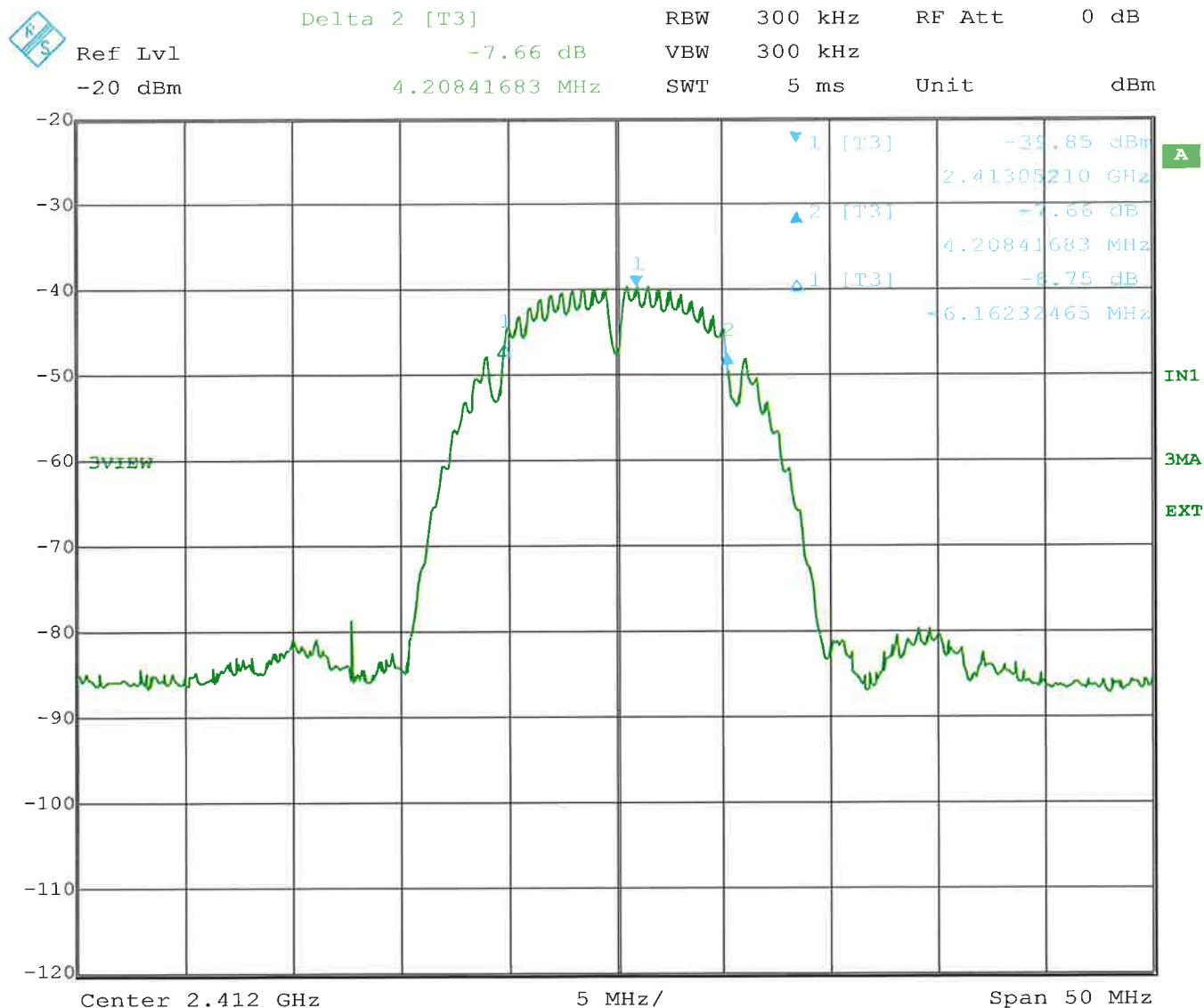
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-125; NT-126; NT-150; NT-207; NT-500; NT-520; NT-550

6dB Bandwidth

§ 15.247(a)(2)
A8.2(a)

Radiated Measurement

Rated output power: 42,56 mW Channel 1 (2412 MHz) – Bitrate: 1Mbit/s



Date: 31.JUL.2013 10:20:23

6dB Bandwidth: 10,37 MHz

LIMIT SUBCLAUSE 15.247(e) – A8.2(b)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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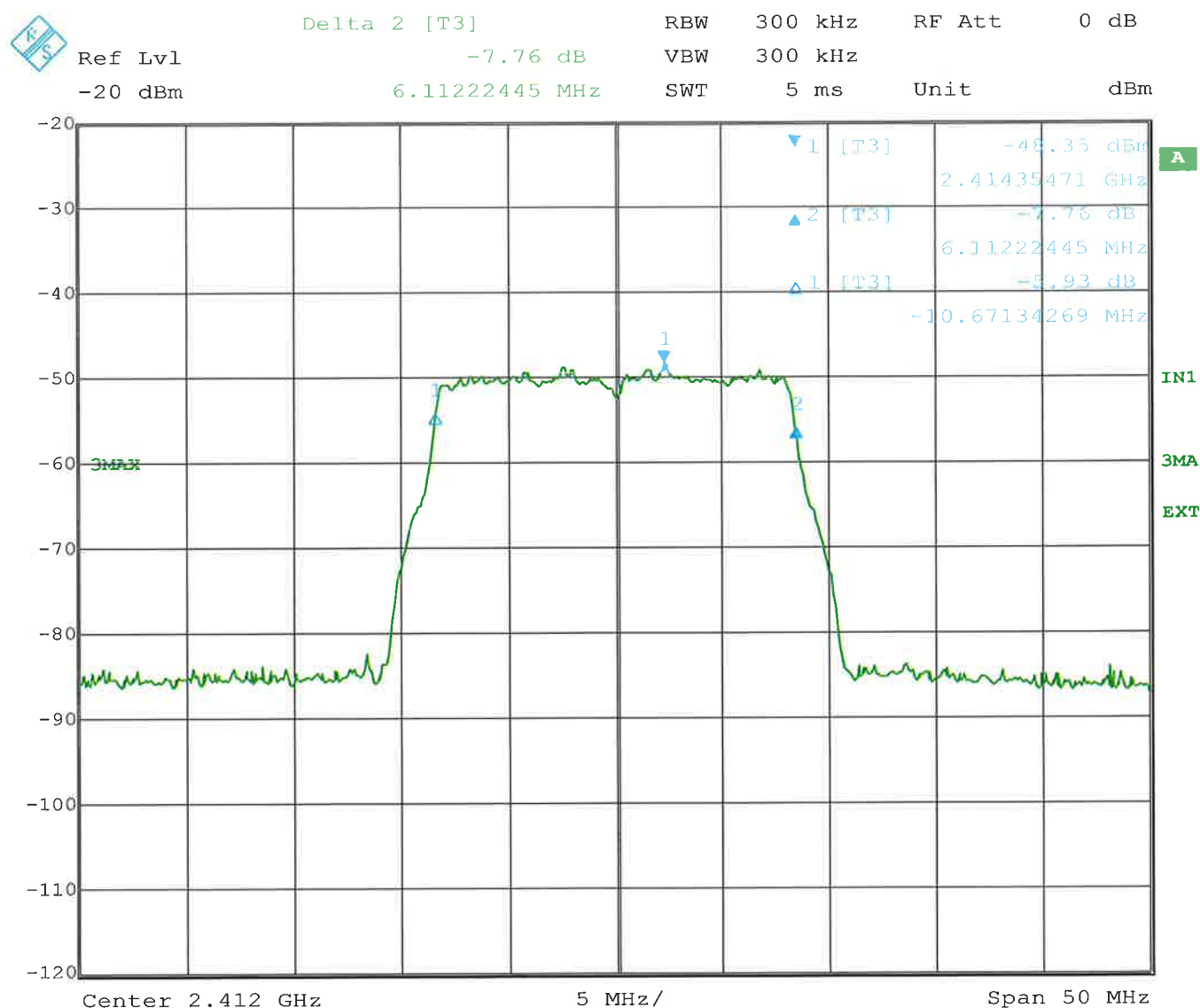
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-125; NT-126; NT-150; NT-207; NT-500; NT-520; NT-550

6dB Bandwidth

§ 15.247(a)(2)
A8.2(a)

Radiated Measurement

Rated output power: 42,56 mW Channel 1 (2412 MHz) – Bitrate: 48Mbit/s



Date: 31.JUL.2013 10:17:20

6dB Bandwidth: 16,783 MHz

LIMIT SUBCLAUSE 15.247(e) – A8.2(b)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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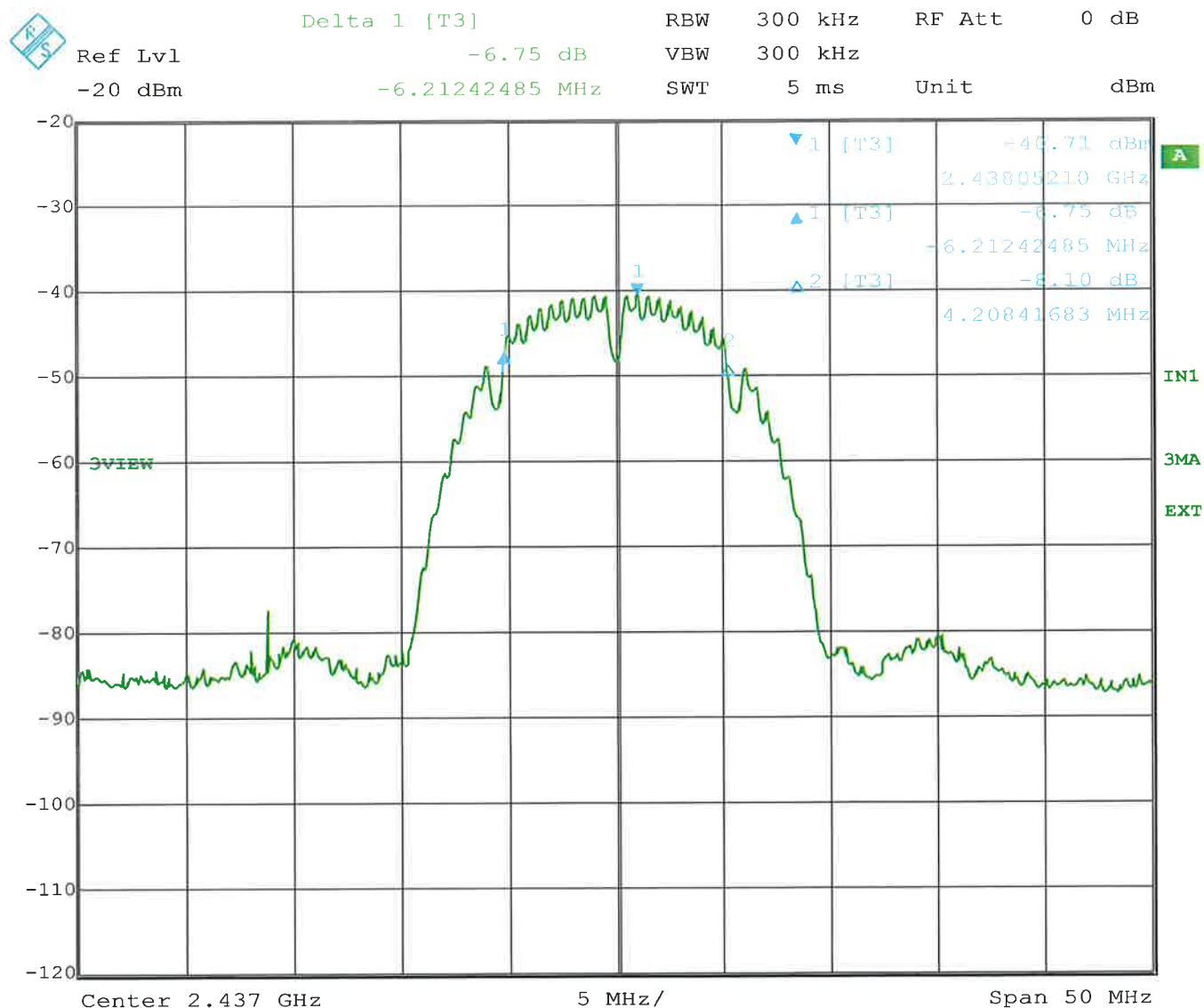
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-125; NT-126; NT-150; NT-207; NT-500; NT-520; NT-550

6dB Bandwidth

§ 15.247(a)(2)
A8.2(a)

Radiated Measurement

Rated output power: 42,56 mW Channel 11 (2462 MHz) – Bitrate: 1Mbit/s



Date: 31.JUL.2013 10:00:54

6dB Bandwidth: 10,42 MHz

LIMIT SUBCLAUSE 15.247(e) – A8.2(b)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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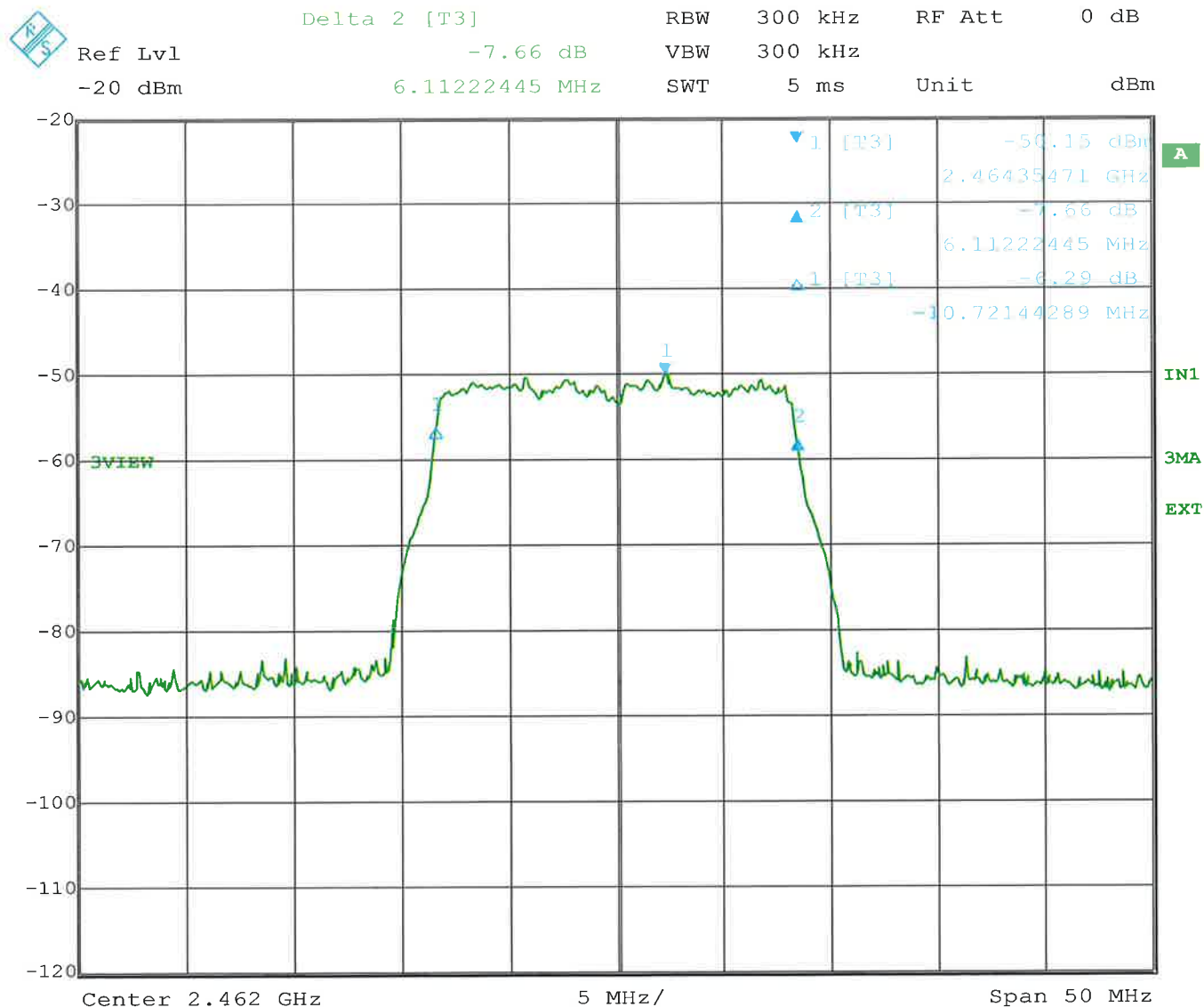
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-125; NT-126; NT-150; NT-207; NT-500; NT-520; NT-550

6dB Bandwidth

§ 15.247(a)(2)
A8.2(a)

Radiated Measurement

Rated output power: 42,56 mW Channel 11 (2462 MHz) – Bitrate: 48Mbit/s



Date: 31.JUL.2013 10:23:02

6dB Bandwidth: 16,833 MHz

LIMIT

SUBCLAUSE 15.247(e) – A8.2(b)

Under normal test conditons	6 dB Bandwidth at least 500 kHz
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Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-125; NT-126; NT-150; NT-207; NT-500; NT-520; NT-550

Maximum Peak RF Power Output (EIRP)

**§ 15.247(b)(3)
A8.4(4)**

Radiated Measurement

Rated output power: 42,56 mW

Test conditions		Transmitter power (mW) (eirp)		
		2412 MHz	2437 MHz	2462 MHz
T _{nom} (27)°C	1 MBit/s Data rate	42,56	39,45	33,42
	48 MBit/s Data rate	35,08	34,20	28,18
Maximum deviation from rated output power under normal test conditions (dB)		-0,84	-0,95	-1,79
Measurement uncertainty		± 0,75 dB		

LIMIT

SUBCLAUSE 15.247(b)(3) – A8.4(4)

Under normal test conditons	1W conducted (4W eirp)
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Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-125; NT-126; NT-150; NT-207; NT-500; NT-520; NT-550

Power spectral density (EIRP)

**§ 15.247(e)
A8.2(b)**

Radiated Measurement

Rated output power: 42,56 mW

Test conditions		Power spectral density (dBm) (eirp)		
		2412 MHz	2437 MHz	2462 MHz
T _{nom} (27)°C	1 MBit/s Data rate	-16,4	-16,9	-17,4
	48 MBit/s Data rate	-25,2	-25,3	-26,3
Measurement uncertainty		± 0,75 dB		

LIMIT SUBCLAUSE 15.247(e) – A8.2(b)

Under normal test conditons	+8dBm in any 3 kHz band
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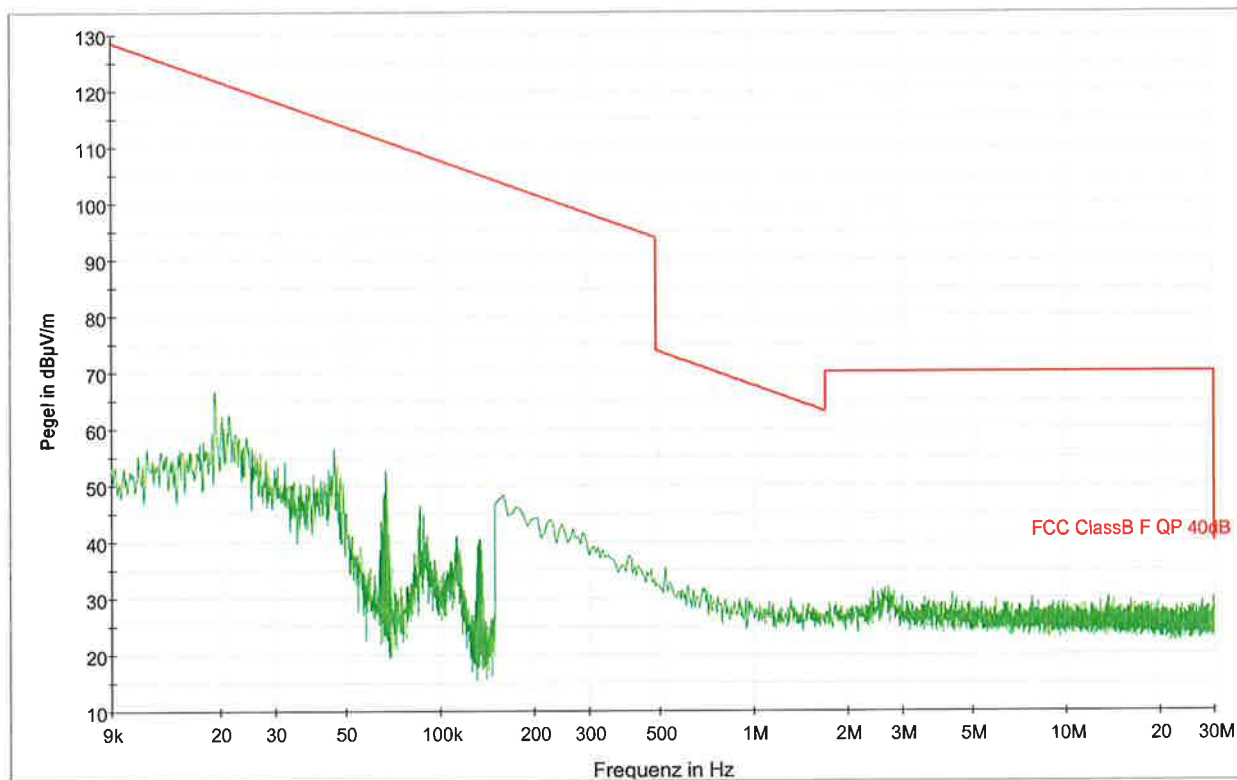
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-125; NT-126; NT-150; NT-207; NT-500; NT-520; NT-550

Out-of-band Emission

§ 15.247(d)
A8.5

Measurement with Peak-Detector:

Setup: CH 1: 2412 MHz – Datarate 1MBit/s



— Preview Result 1-PK+ — FCC ClassB F QP 40dB

Worst case emission: 66,9 dBµV/m @ 19,2 kHz

LIMIT

SUBCLAUSE 15.247(d) – A8.5

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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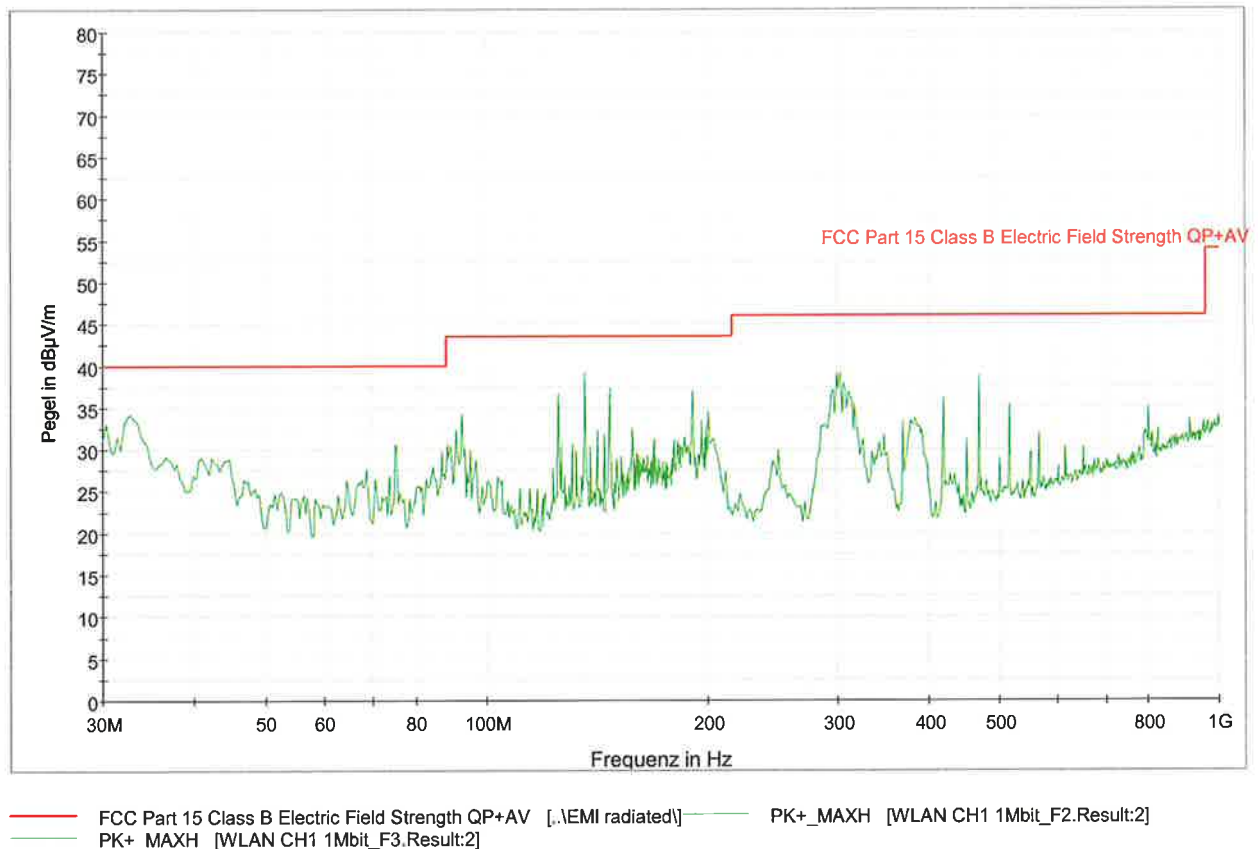
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-122; NT-207

Out-of-band Emission

§ 15.247(d)
A8.5

Measurement with Peak-Detector:

Setup: CH 1: 2412 MHz – Datarate 1MBit/s



Worst case emission: 39,4 dBµV/m @ 300 MHz

LIMIT SUBCLAUSE 15.247(d) – A8.5

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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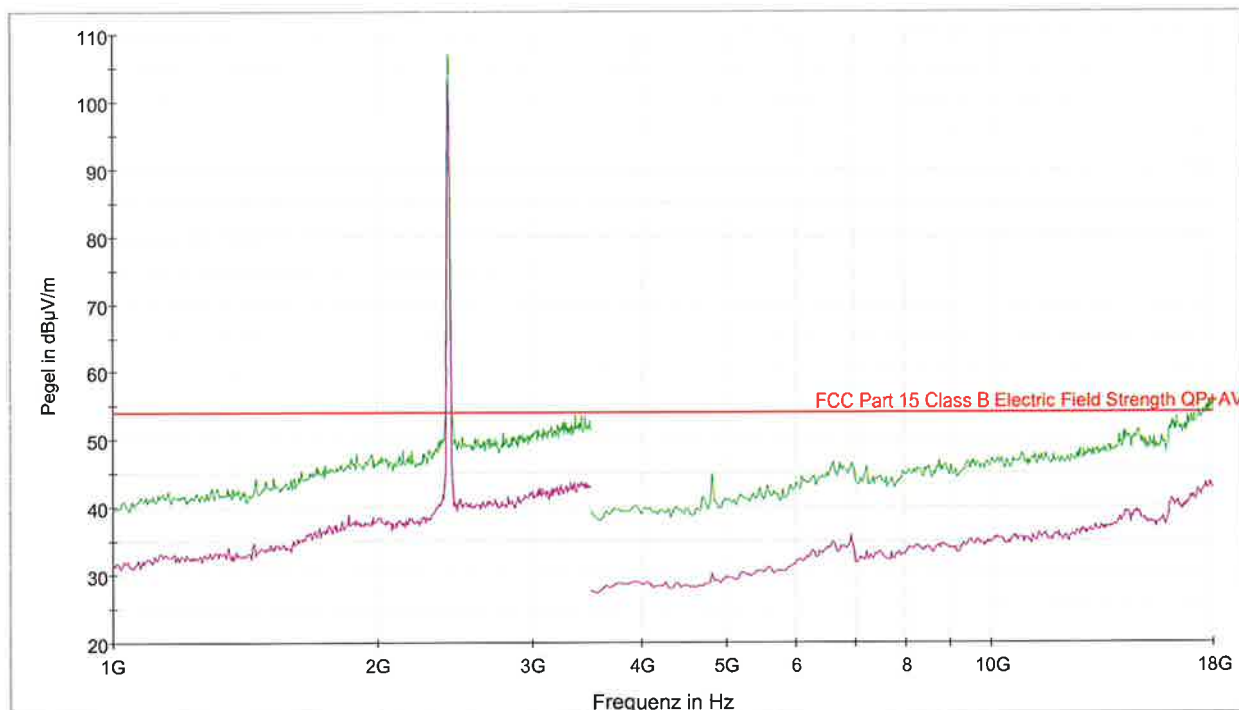
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-129; NT-131; NT-207

Out-of-band Emission

§ 15.247(d)
A8.5

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

Setup: CH 1: 2412 MHz – Datarate 1MBit/s



— FCC Part 15 Class B Electric Field Strength QP+AV [FCC Part 15 Class B Electric Field Strength QP+AV.LimitLine:1]
 — PK+_MAXH [WLAN CH1 1MBit F4.Result:2]
 — AVG_MAXH [WLAN CH1 1MBit F4.Result:4]
 — PK+_MAXH [WLAN CH1 1MBit F5.Result:2]
 — AVG_MAXH [WLAN CH1 1MBit F5.Result:4]

LIMIT

SUBCLAUSE 15.247(d) – A8.5

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: NT-100; NT-110; NT-111; NT-112; NT-139; NT-207; NT-337; NT-416

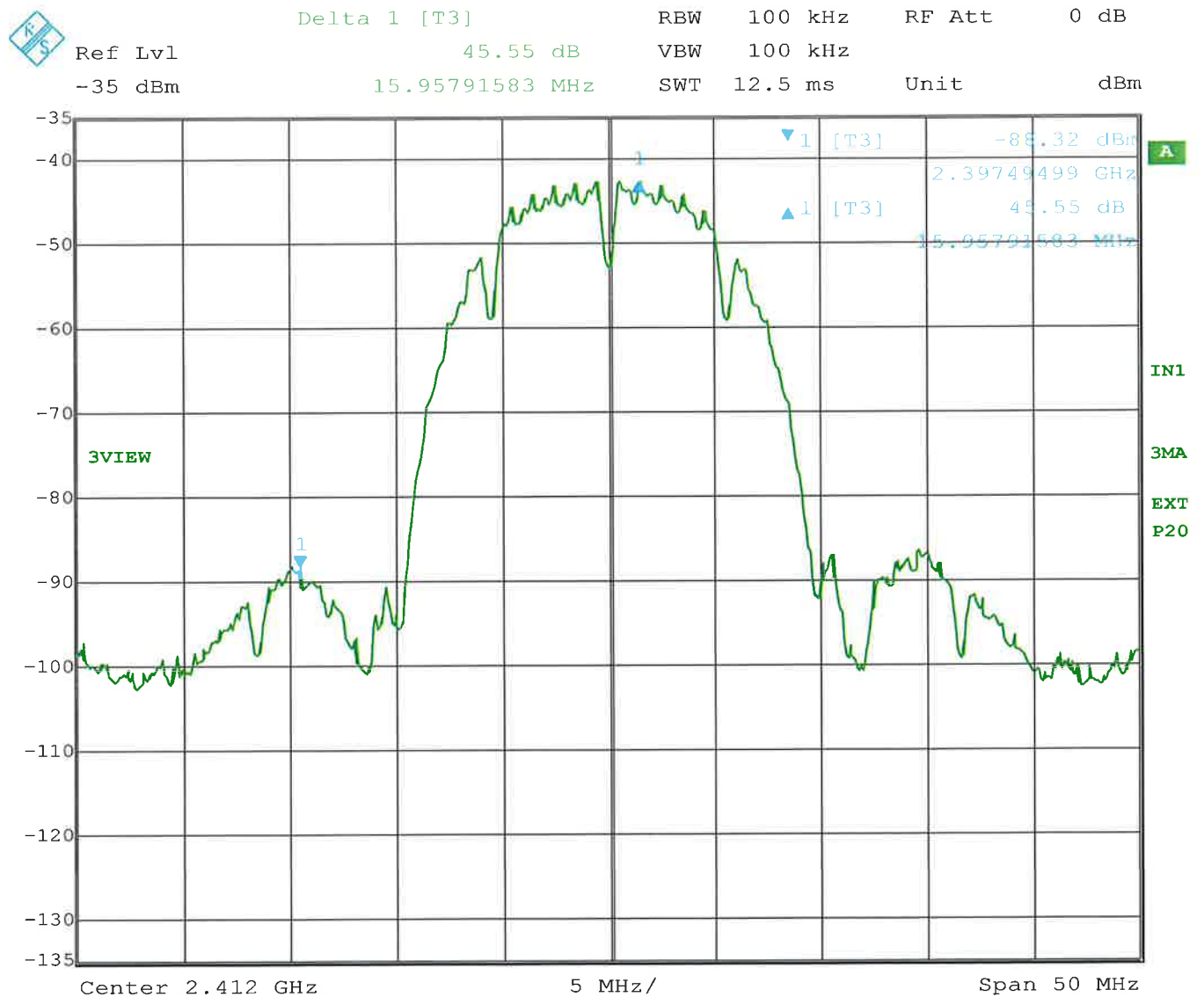
Although the measurements were made up to the tenth harmonic, the curve above is ending at 18 GHz. The tests above 18 GHz are not automatized and therefore we were not able to plot the spectrum analyzer display. Above 18 GHz no emissions above noise level were found.

Out-of-band Emission

§ 15.247(d)
A8.5

Measurement with Peak-Detector: Band Edge requirement

CH 1: 2412 MHz – Datarate 1MBit/s



Date: 31.JUL.2013 10:33:02

LIMIT **SUBCLAUSE 15.247(d) – A8.5**

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.

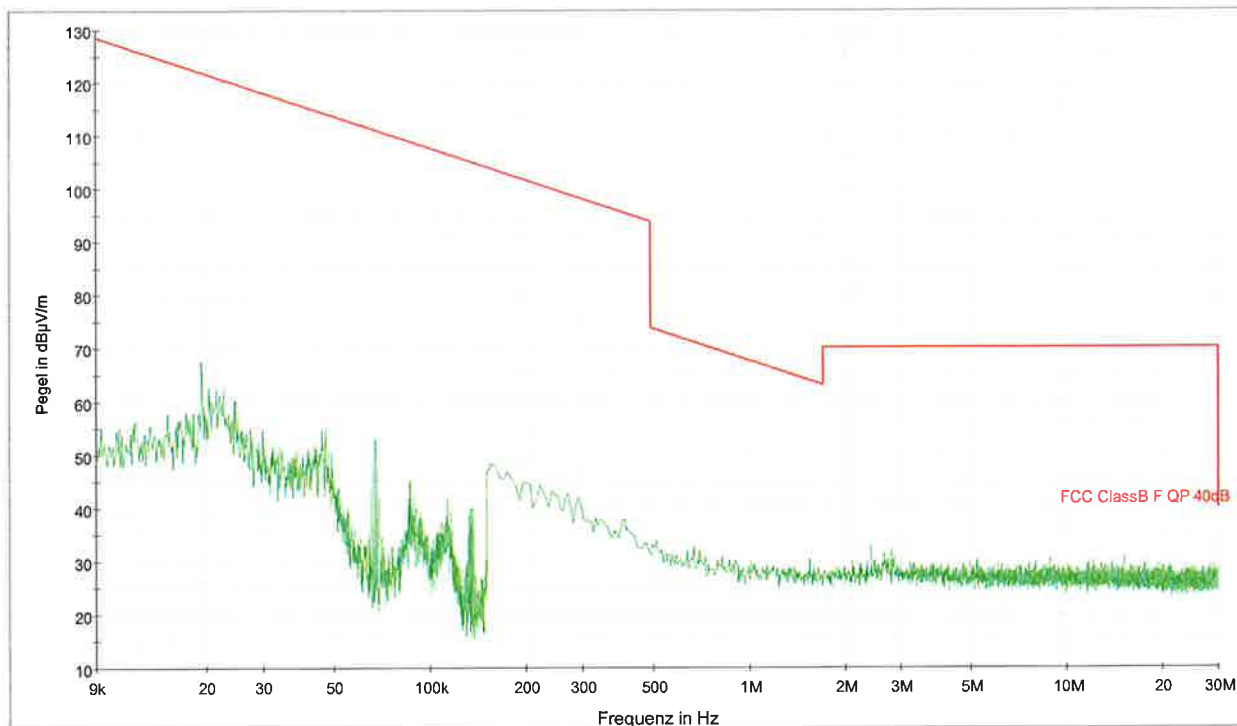
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-139; NT-207

Out-of-band Emission

§ 15.247(d)
A8.5

Measurement with Peak-Detector:

Setup: CH 1: 2412 MHz – Datarate 48MBit/s



— Preview Result 1-PK+ — FCC ClassB F QP 40dB

Worst case emission: 67,4 dBµV/m @ 19,2 kHz

LIMIT

SUBCLAUSE 15.247(d) – A8.5

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.

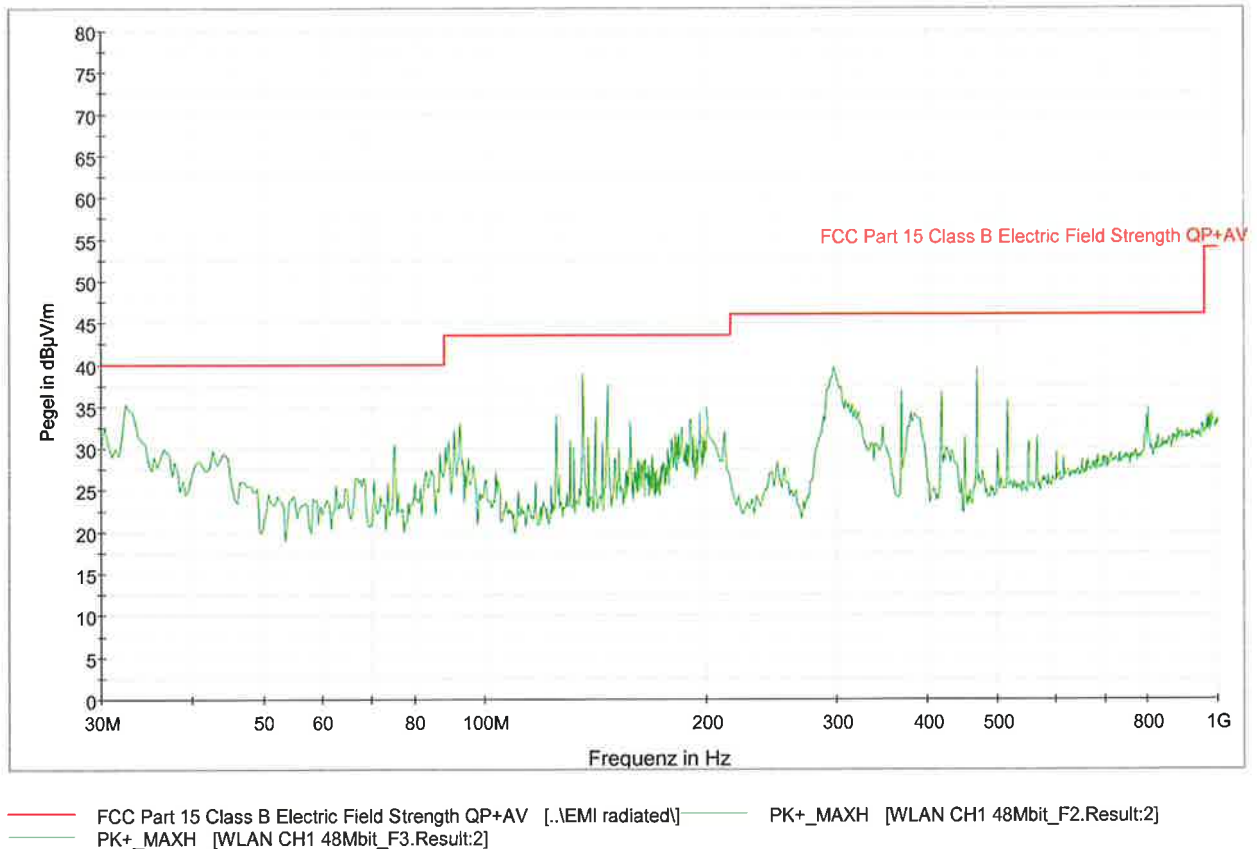
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-122; NT-207

Out-of-band Emission

§ 15.247(d)
A8.5

Measurement with Peak-Detector:

Setup: CH 1: 2412 MHz – Datarate 48MBit/s



Worst case emission: 39,6 dBµV/m @ 466,95 MHz

LIMIT SUBCLAUSE 15.247(d) – A8.5

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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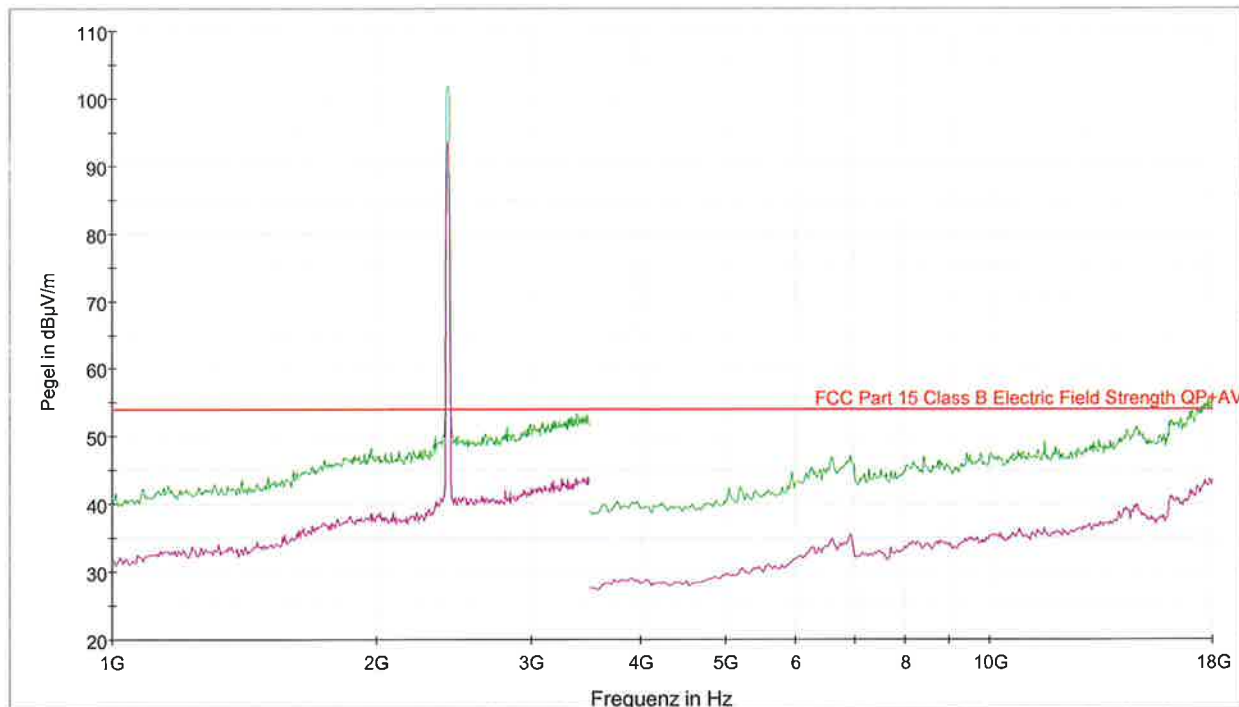
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-129; NT-131; NT-207

Out-of-band Emission

§ 15.247(d)
A8.5

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

Setup: CH 1: 2412 MHz – Datarate 48MBit/s



- FCC Part 15 Class B Electric Field Strength QP+AV [FCC Part 15 Class B Electric Field Strength QP+AV.LimitLine:1]
- PK+_MAXH [WLAN CH1 48MBit F4.Result:2]
- AVG+_MAXH [WLAN CH1 48MBit F4.Result:4]
- PK+_MAXH [WLAN CH1 48MBit F5.Result:2]
- AVG+_MAXH [WLAN CH1 48MBit F5.Result:4]

LIMIT

SUBCLAUSE 15.247(d) – A8.5

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-100; NT-110; NT-111; NT-112; NT-139; NT-207; NT-337; NT-416

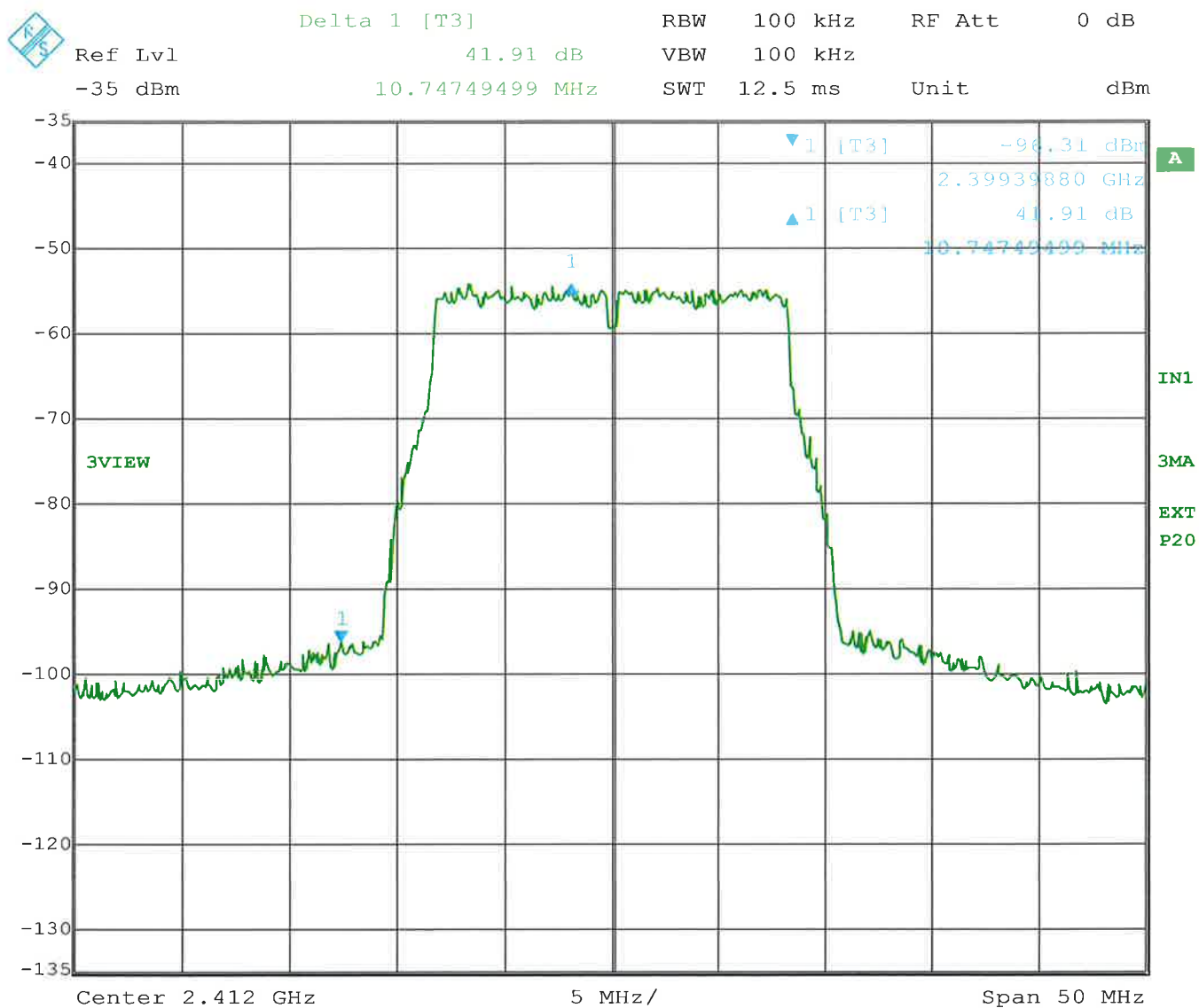
Although the measurements were made up to the tenth harmonic, the curve above is ending at 18 GHz. The tests above 18 GHz are not automatized and therefore we were not able to plot the spectrum analyzer display. Above 18 GHz no emissions above noise level were found.

Out-of-band Emission

§ 15.247(d)
A8.5

Measurement with Peak-Detector: Band Edge requirement

CH 1: 2412 MHz – Datarate 48MBit/s



Date: 31.JUL.2013 10:34:36

LIMIT **SUBCLAUSE 15.247(d) – A8.5**

In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.

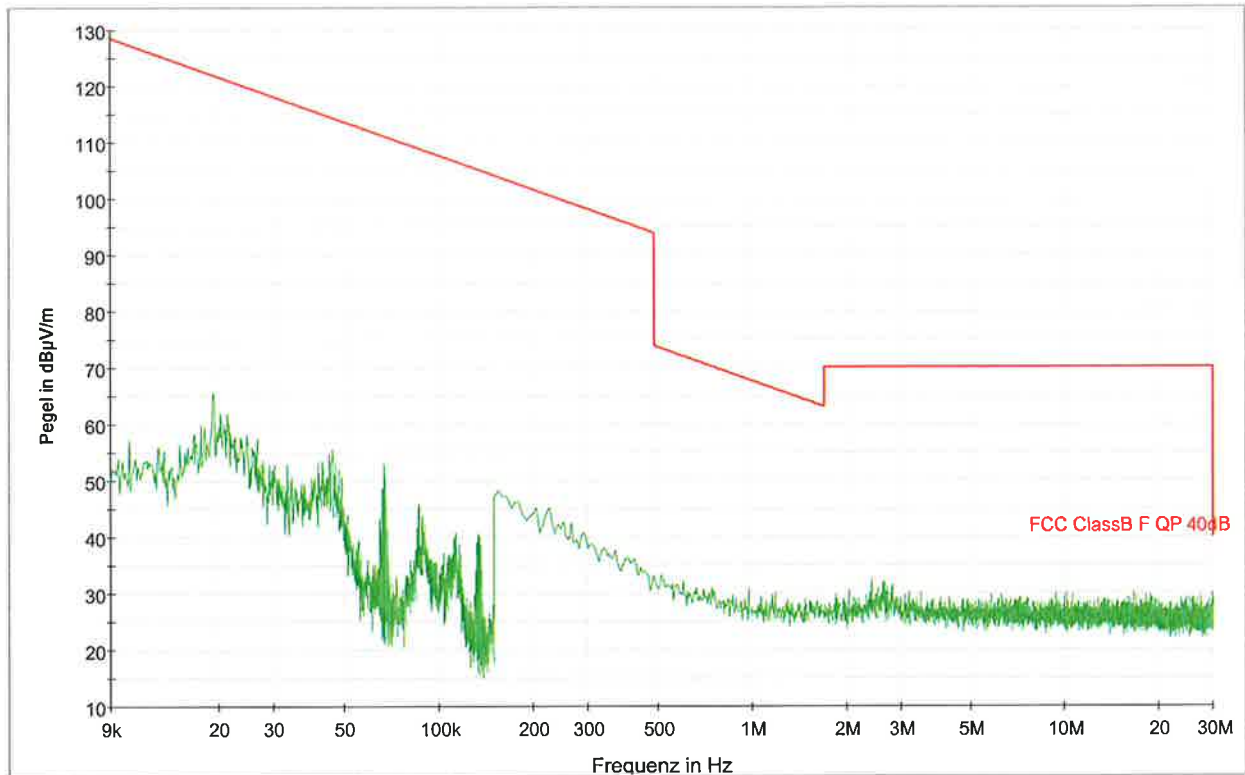
At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Out-of-band Emission

§ 15.247(d)
A8.5

Measurement with Peak-Detector:

Setup: CH 6: 2437 MHz – Datarate 1MBit/s



Preview Result 1-PK+ FCC ClassB F QP 40dB

Worst case emission: 65,9 dBµV/m @ 19,2 kHz

LIMIT SUBCLAUSE 15.247(d) – A8.5

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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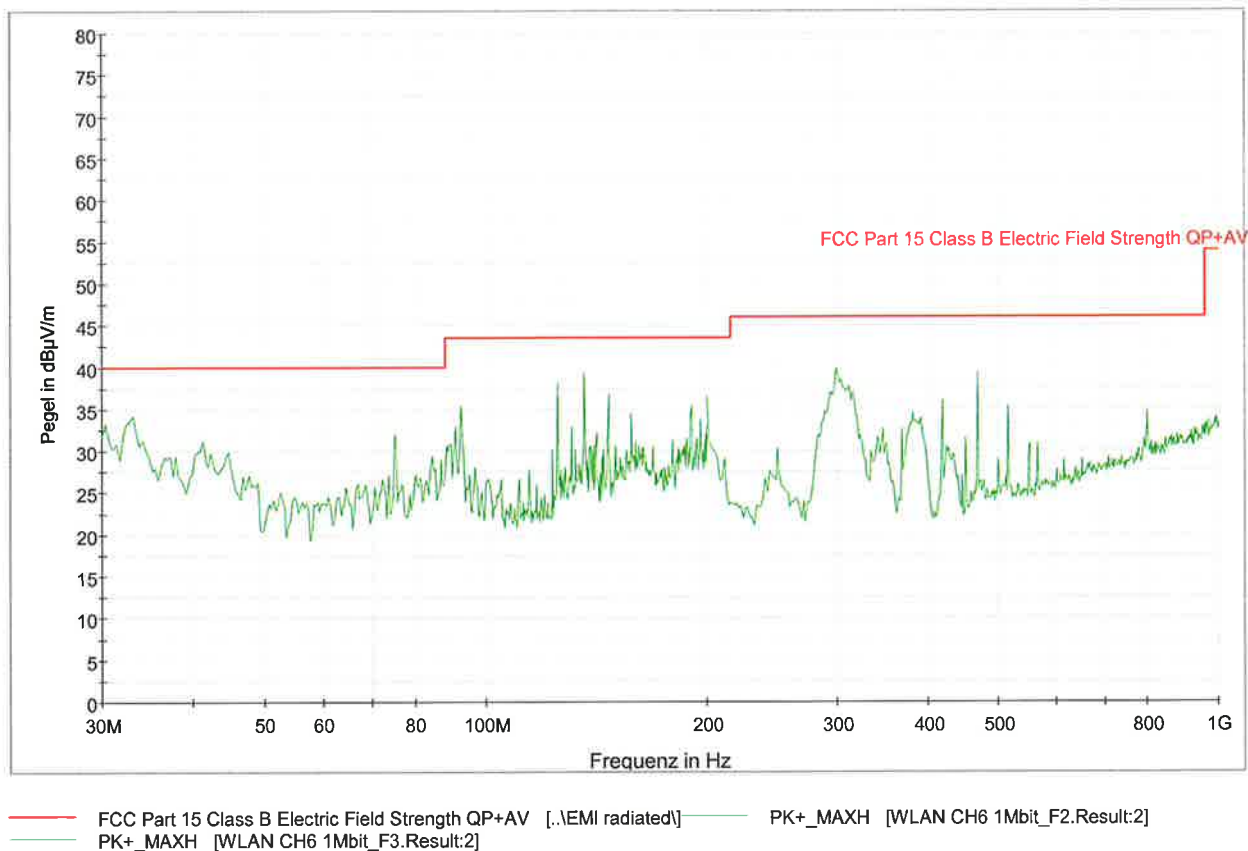
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-122; NT-207

Out-of-band Emission

§ 15.247(d)
A8.5

Measurement with Peak-Detector:

Setup: CH 6: 2437 MHz – Datarate 1MBit/s



Worst case emission: 39,8 dBµV/m @ 300 MHz

LIMIT SUBCLAUSE 15.247(d) – A8.5

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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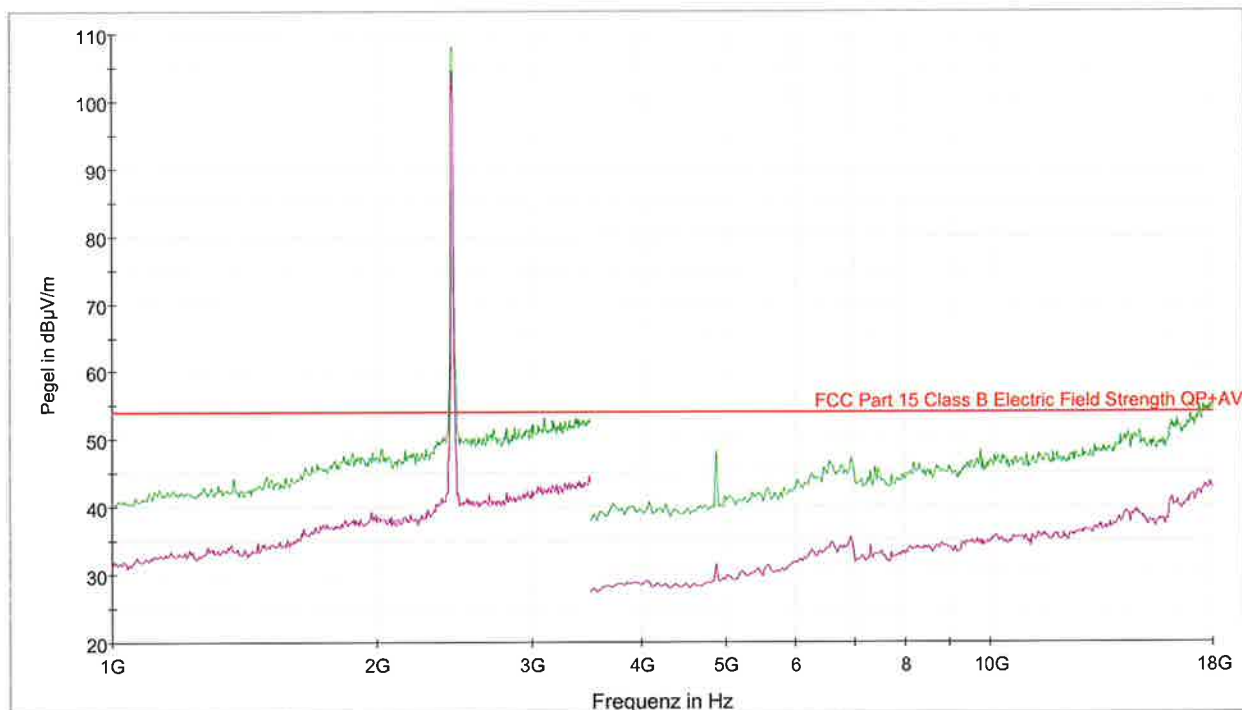
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-129; NT-131; NT-207

Out-of-band Emission

§ 15.247(d)
A8.5

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

Setup: CH 6: 2437 MHz – Datarate 1MBit/s



— FCC Part 15 Class B Electric Field Strength QP+AV [FCC Part 15 Class B Electric Field Strength QP+AV.LimitLine:1]
— PK+_MAXH [WLAN CH6 1MBit F4.Result:2]
— AVG+_MAXH [WLAN CH6 1MBit F4.Result:4]
— PK+_MAXH [WLAN CH6 1MBit F5.Result:2]
— AVG+_MAXH [WLAN CH6 1MBit F5.Result:4]

LIMIT

SUBCLAUSE 15.247(d) – A8.5

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: NT-100; NT-110; NT-111; NT-112; NT-139; NT-207; NT-337; NT-416

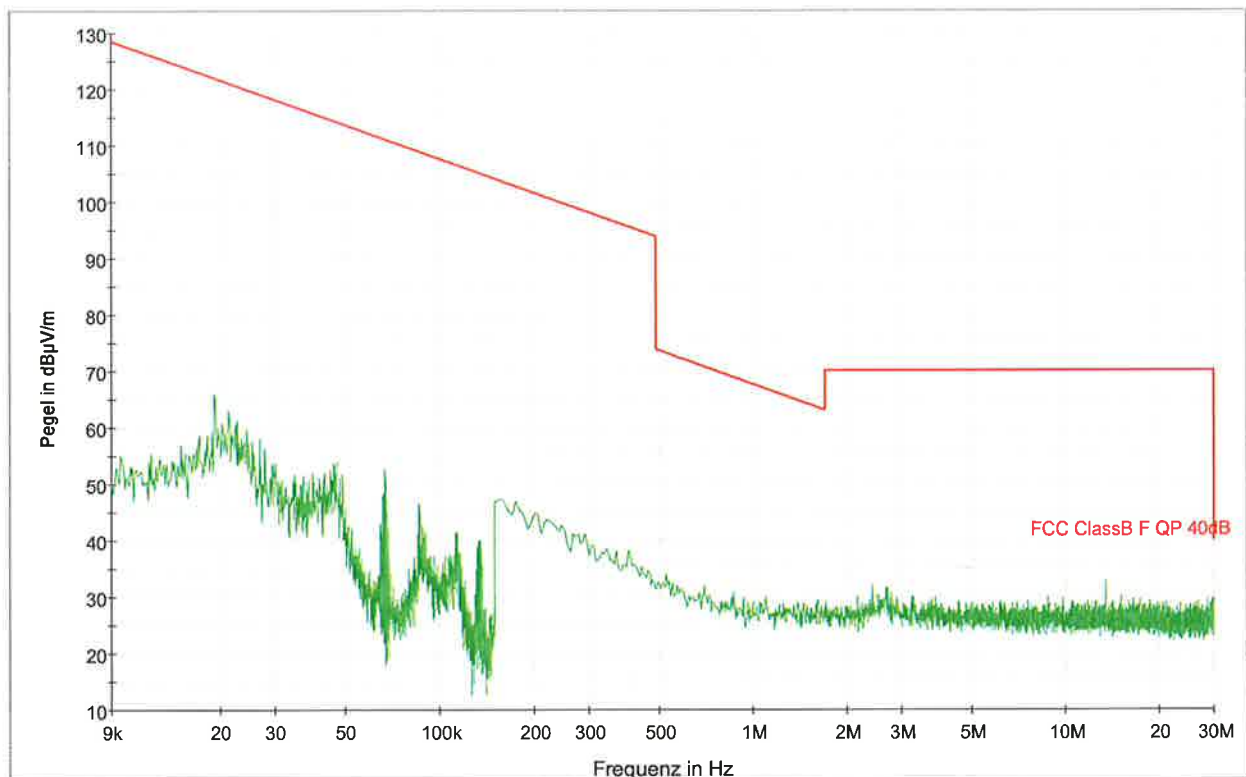
Although the measurements were made up to the tenth harmonic, the curve above is ending at 18 GHz. The tests above 18 GHz are not automatized and therefore we were not able to plot the spectrum analyzer display. Above 18 GHz no emissions above noise level were found.

Out-of-band Emission

§ 15.247(d)
A8.5

Measurement with Peak-Detector:

Setup: CH 6: 2437 MHz – Datarate 48MBit/s



Preview Result 1-PK+

FCC ClassB F QP 40dB

Worst case emission: 66,3 dBµV/m @ 19,2 kHz

LIMIT

SUBCLAUSE 15.247(d) – A8.5

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.

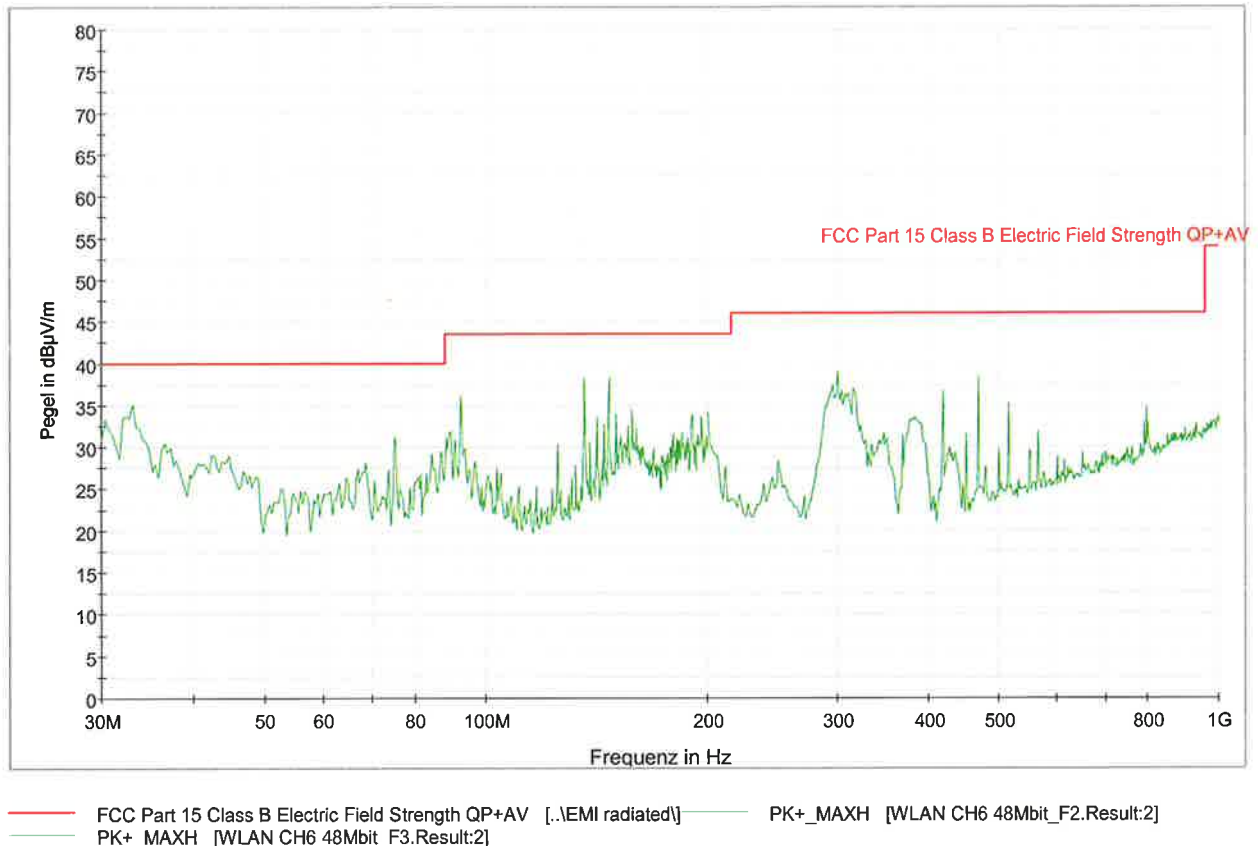
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-122; NT-207

Out-of-band Emission

§ 15.247(d)
A8.5

Measurement with Peak-Detector:

Setup: CH 6: 2437 MHz – Datarate 48MBit/s



Worst case emission: 39,2 dBµV/m @ 300 MHz

LIMIT SUBCLAUSE 15.247(d) – A8.5

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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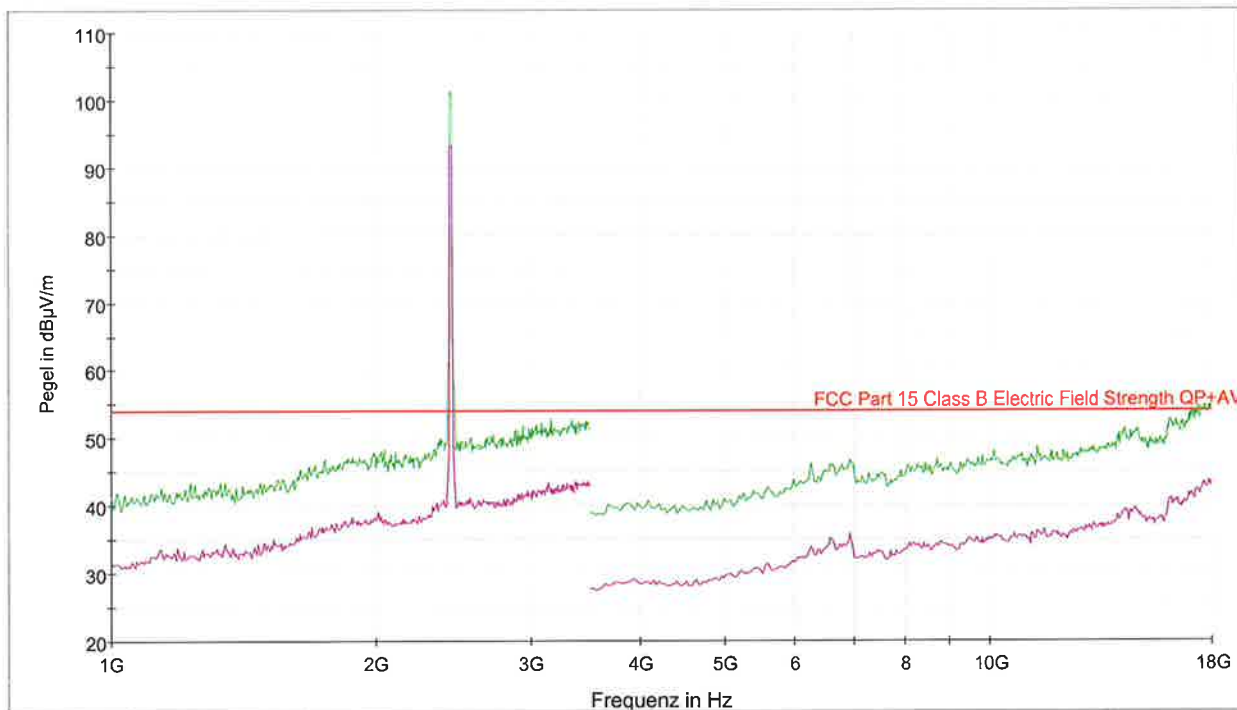
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-129; NT-131; NT-207

Out-of-band Emission

§ 15.247(d)
A8.5

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

Setup: CH 6: 2437 MHz – Datarate 48MBit/s



— FCC Part 15 Class B Electric Field Strength QP+AV [FCC Part 15 Class B Electric Field Strength QP+AV.LimitLine:1]
 — PK+_MAXH [WLAN CH6 48MBit F4.Result:2]
 — AVG_MAXH [WLAN CH6 48MBit F4.Result:4]
 — PK+_MAXH [WLAN CH6 48MBit F5.Result:2]
 — AVG_MAXH [WLAN CH6 48MBit F5.Result:4]

LIMIT

SUBCLAUSE 15.247(d) – A8.5

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: NT-100; NT-110; NT-111; NT-112; NT-139; NT-207; NT-337; NT-416

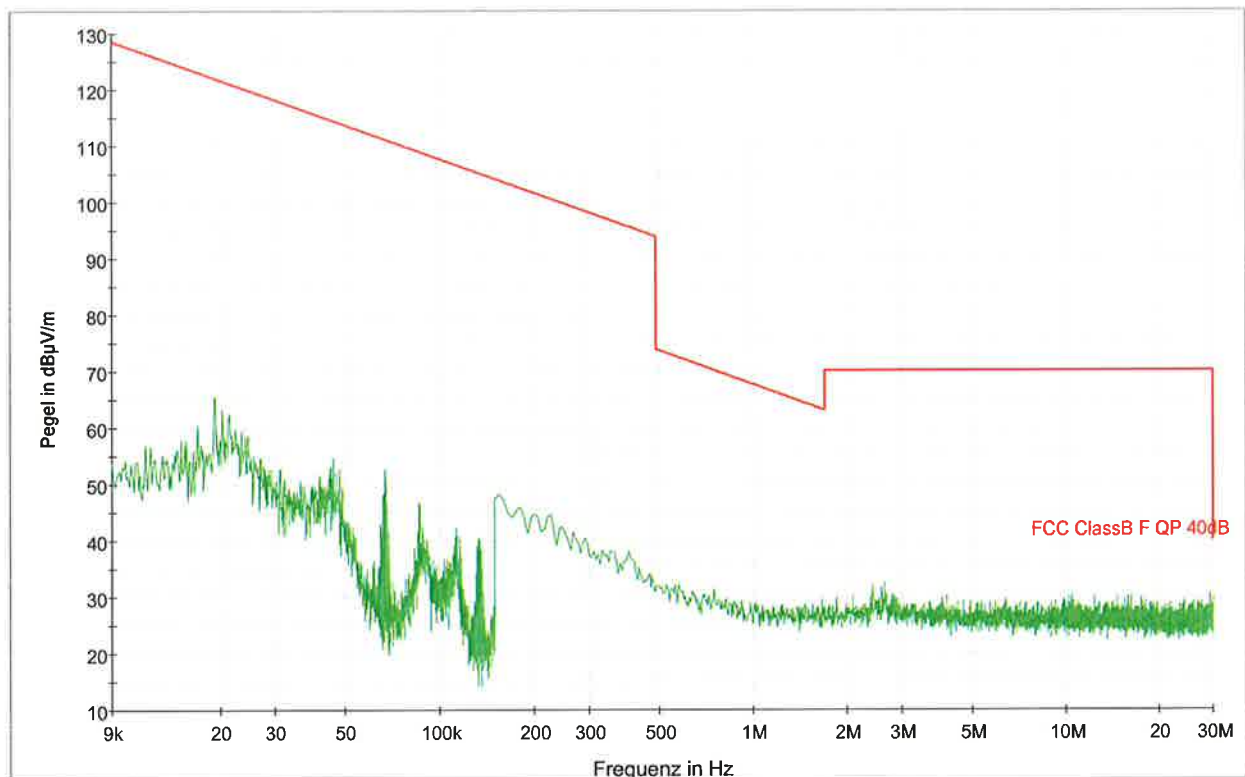
Although the measurements were made up to the tenth harmonic, the curve above is ending at 18 GHz. The tests above 18 GHz are not automatized and therefore we were not able to plot the spectrum analyzer display. Above 18 GHz no emissions above noise level were found.

Out-of-band Emission

§ 15.247(d)
A8.5

Measurement with Peak-Detector:

Setup: CH 11: 2462 MHz – Datarate 1MBit/s



— Preview Result 1-PK+ — FCC ClassB F QP 40dB

Worst case emission: 65,5 dBµV/m @ 19,2 kHz

LIMIT SUBCLAUSE 15.247(d) – A8.5

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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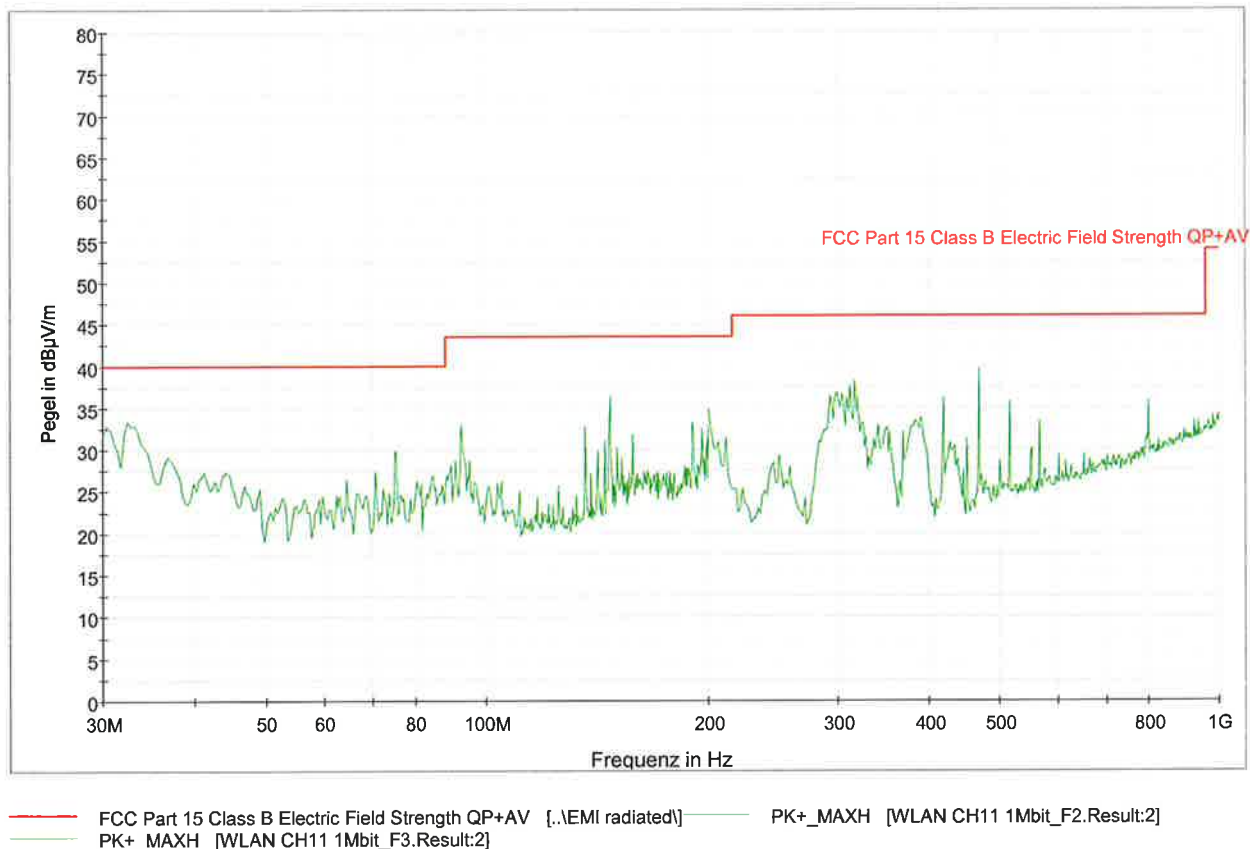
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-122; NT-207

Out-of-band Emission

§ 15.247(d)
A8.5

Measurement with Peak-Detector:

Setup: CH 11: 2462 MHz – Datarate 1Mbit/s



Worst case emission: 39,1 dBµV/m @ 466,95 MHz

LIMIT

SUBCLAUSE 15.247(d) – A8.5

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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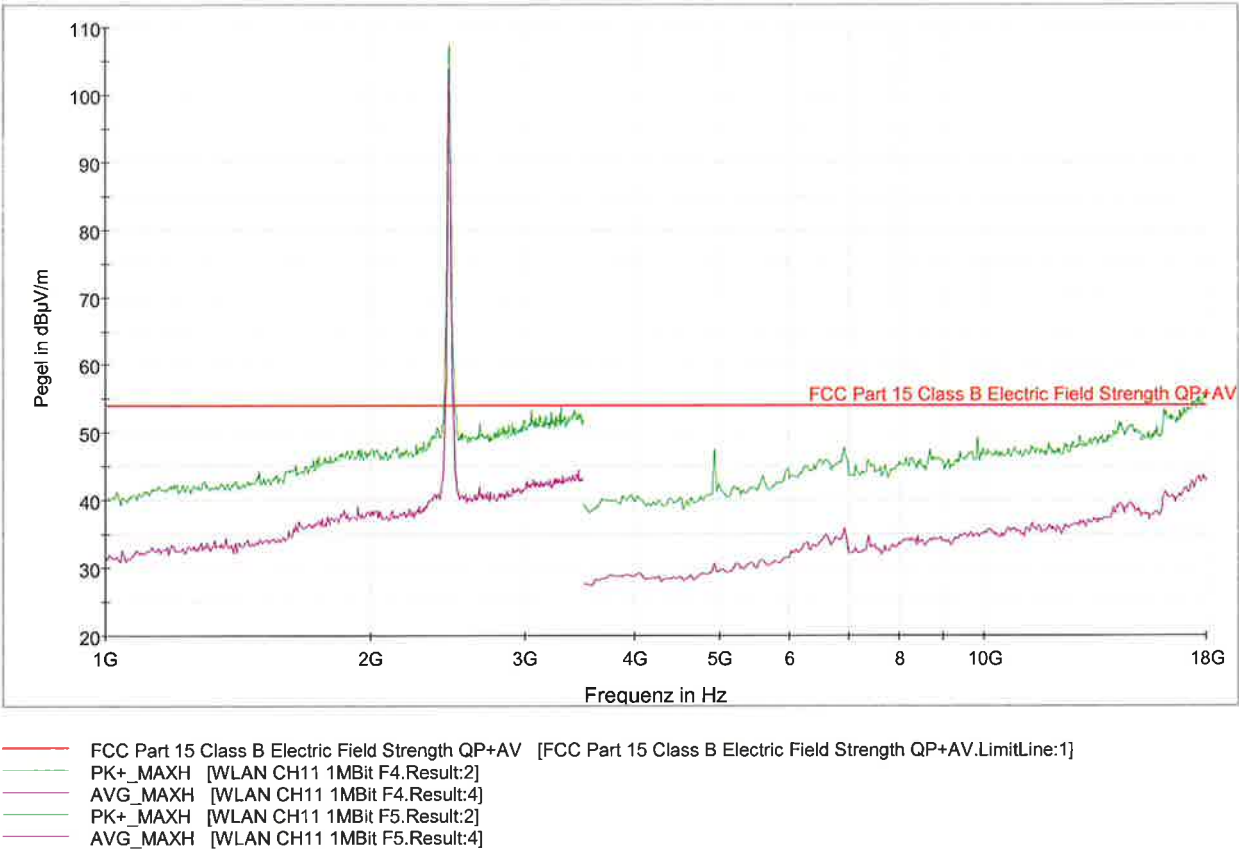
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-129; NT-131; NT-207

Out-of-band Emission

**§ 15.247(d)
A8.5**

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

Setup: CH 11: 2462 MHz – Datarate 1MBit/s



LIMIT

SUBCLAUSE 15.247(d) – A8.5

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: NT-100; NT-110; NT-111; NT-112; NT-139; NT-207; NT-337; NT-416

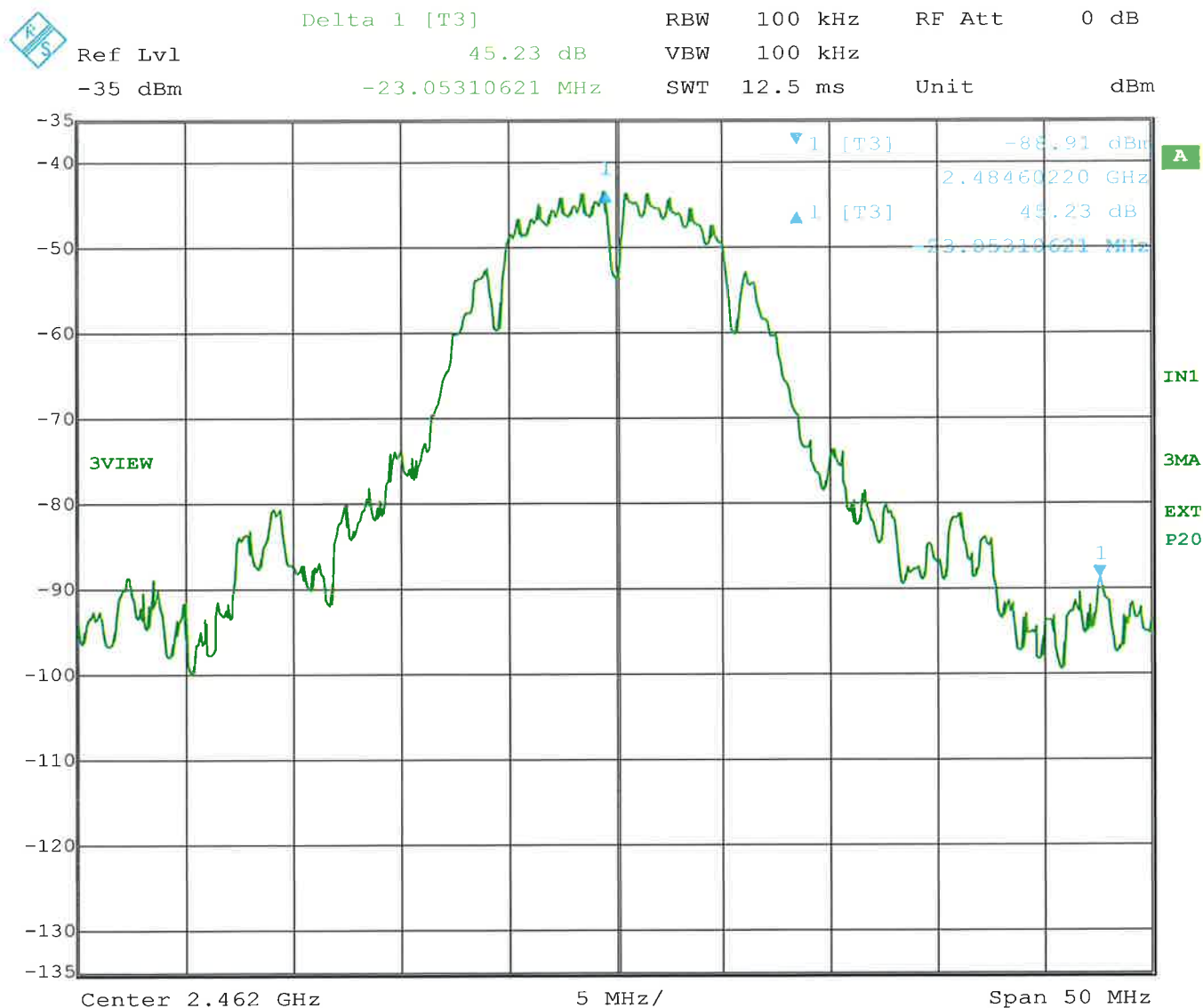
Although the measurements were made up to the tenth harmonic, the curve above is ending at 18 GHz. The tests above 18 GHz are not automatized and therefore we were not able to plot the spectrum analyzer display. Above 18 GHz no emissions above noise level were found.

Out-of-band Emission

§ 15.247(d)
A8.5

Measurement with Peak-Detector: Band Edge requirement

CH 11: 2462 MHz – Datarate 1MBit/s



Date: 31.JUL.2013 10:31:32

LIMIT **SUBCLAUSE 15.247(d) – A8.5**

In any 100 kHz bandwidth outside the frequency band in which the radio device is operating.

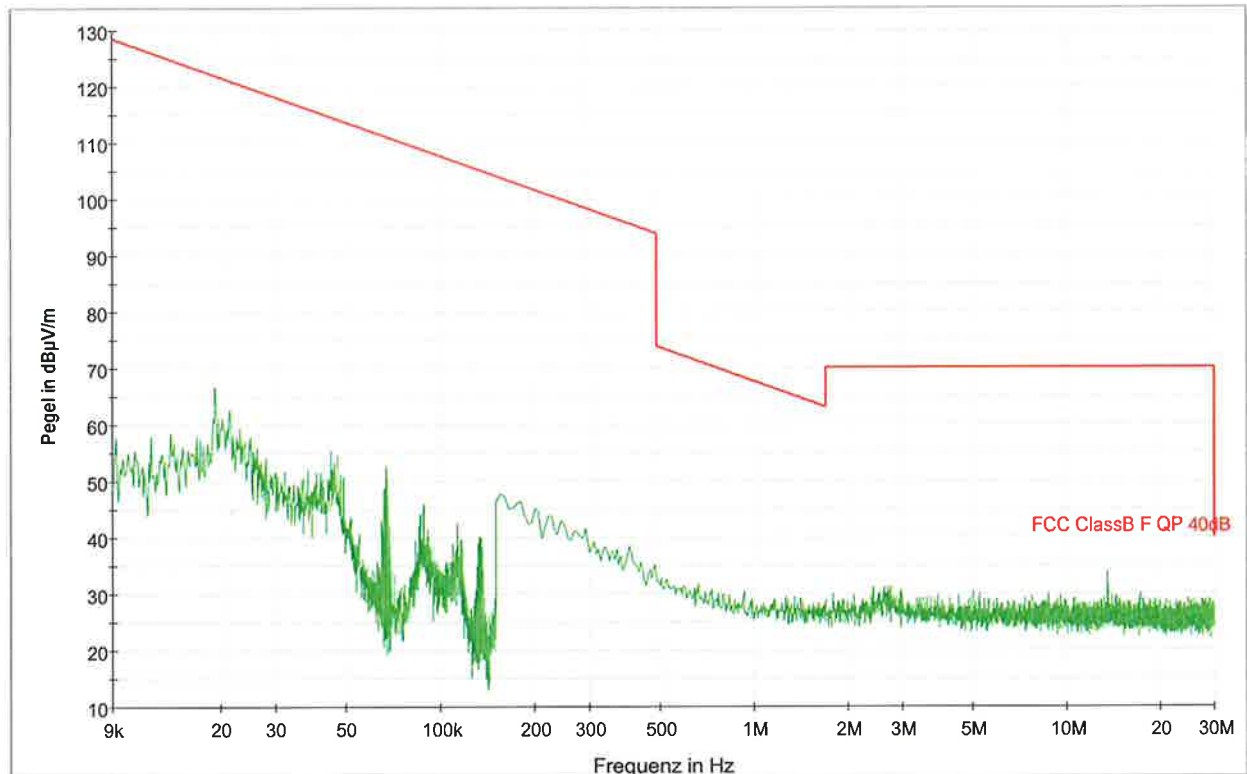
At least 20dB below the power in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Out-of-band Emission

§ 15.247(d)
A8.5

Measurement with Peak-Detector:

Setup: CH 11: 2462 MHz – Datarate 48MBit/s



Worst case emission: 66,7 dBµV/m @ 19,2 kHz

LIMIT SUBCLAUSE 15.247(d) – A8.5

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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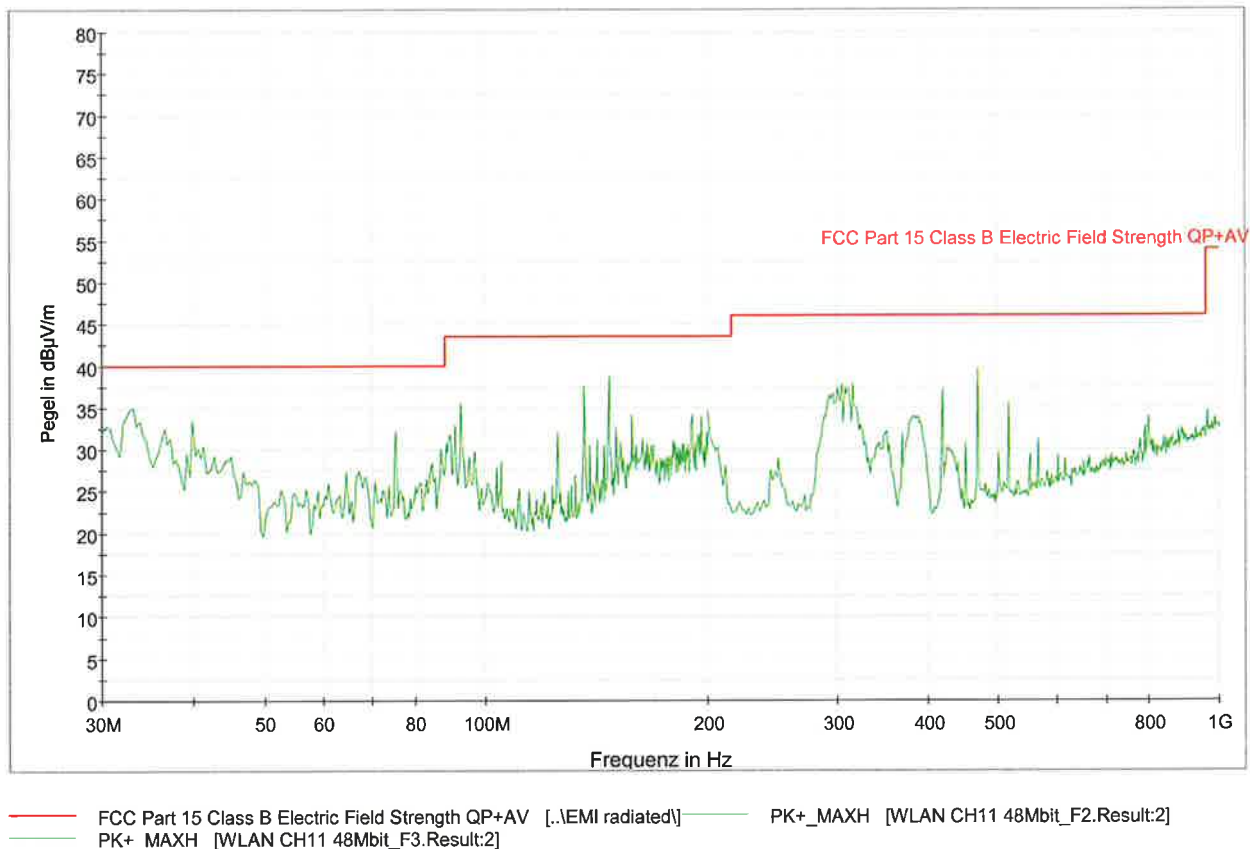
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-122; NT-207

Out-of-band Emission

§ 15.247(d)
A8.5

Measurement with Peak-Detector:

Setup: CH 11: 2462 MHz – Datarate 48MBit/s



Worst case emission: 39,2 dBµV/m @ 466,95 MHz

LIMIT SUBCLAUSE 15.247(d) – A8.5

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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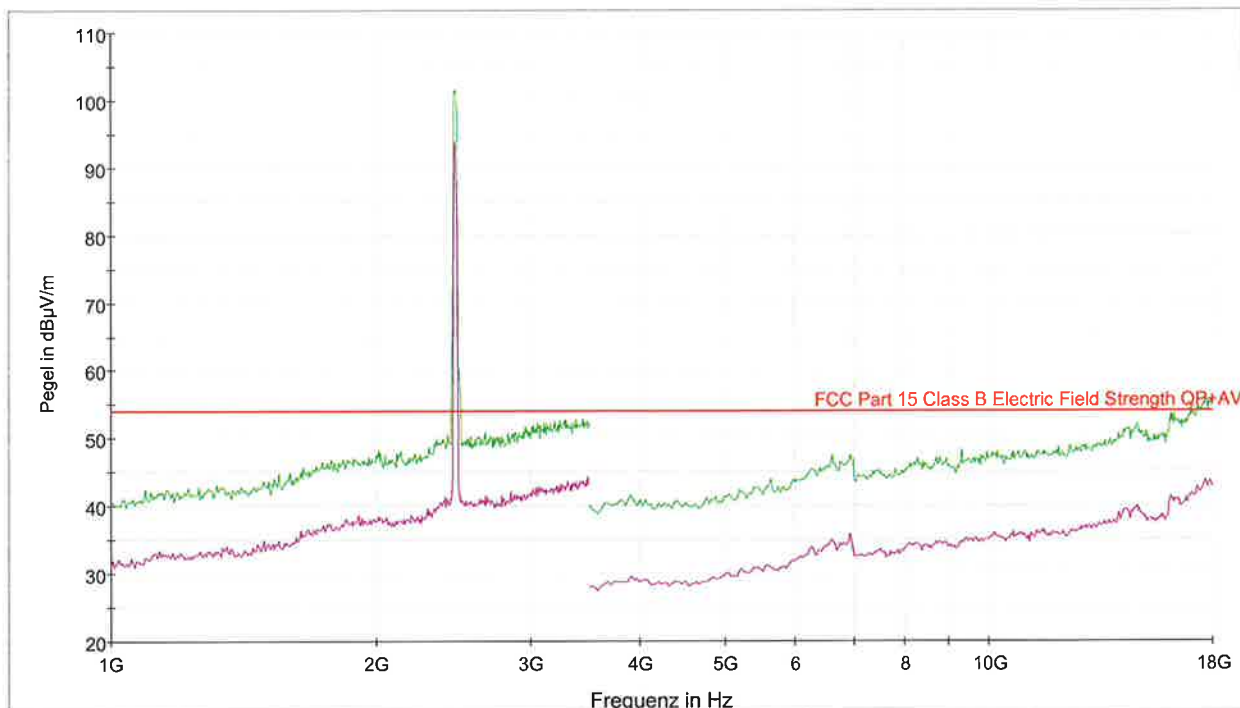
Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-129; NT-131; NT-207

Out-of-band Emission

§ 15.247(d)
A8.5

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

Setup: CH 11: 2462 MHz – Datarate 48MBit/s



— FCC Part 15 Class B Electric Field Strength QP+AV [FCC Part 15 Class B Electric Field Strength QP+AV.LimitLine:1]
— PK+_MAXH [WLAN CH11 48MBit F4.Result:2]
— AVG_MAXH [WLAN CH11 48MBit F4.Result:4]
— PK+_MAXH [WLAN CH11 48MBit F5.Result:2]
— AVG_MAXH [WLAN CH11 48MBit F5.Result:4]

LIMIT

SUBCLAUSE 15.247(d) – A8.5

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: NT-100; NT-110; NT-111; NT-112; NT-139; NT-207; NT-337; NT-416

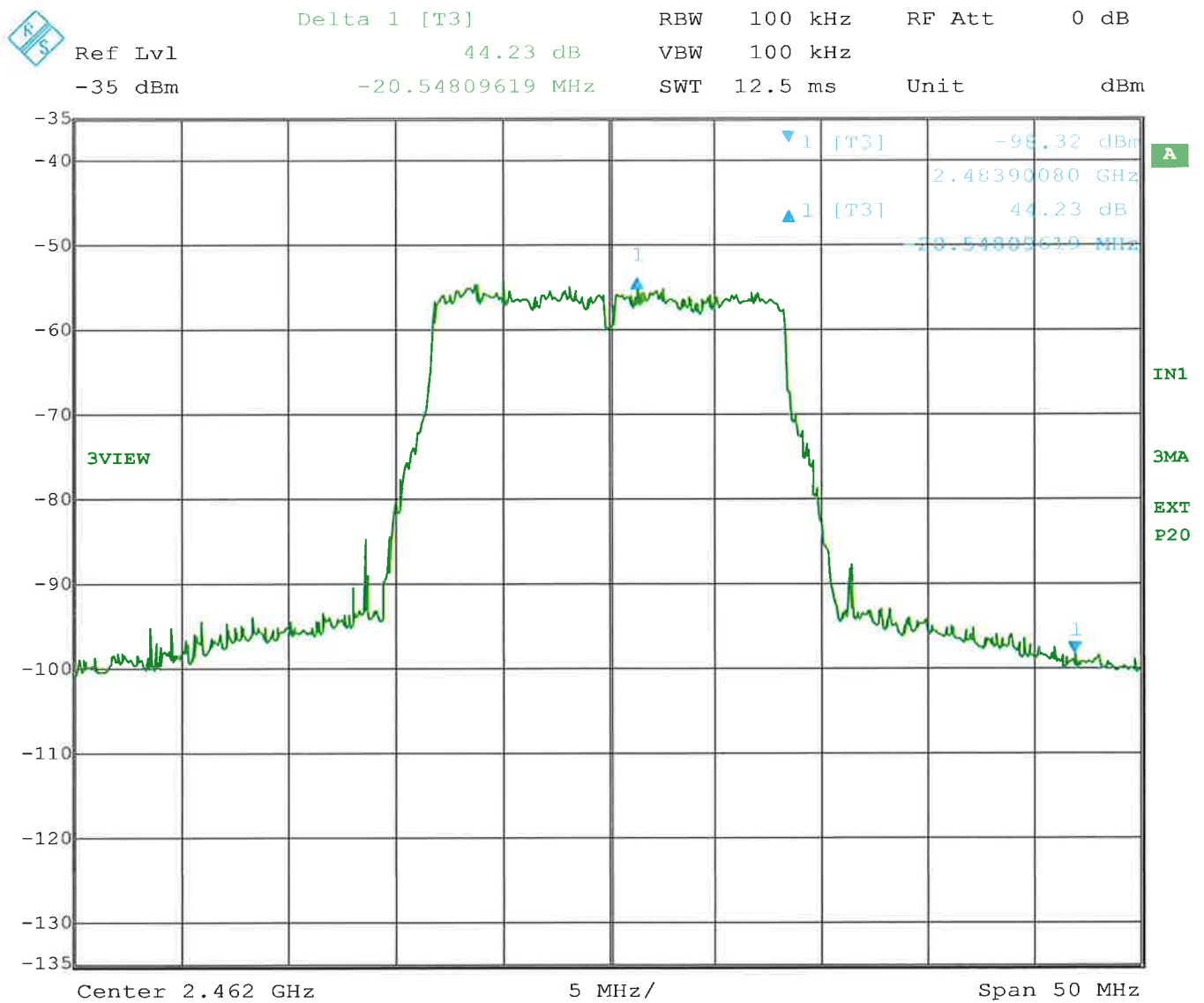
Although the measurements were made up to the tenth harmonic, the curve above is ending at 18 GHz. The tests above 18 GHz are not automatized and therefore we were not able to plot the spectrum analyzer display. Above 18 GHz no emissions above noise level were found.

Out-of-band Emission

§ 15.247(d)
A8.5

Measurement with Peak-Detector: Band Edge requirement

CH 11: 2462 MHz – Datarate 48MBit/s



Date: 31.JUL.2013 10:27:28

LIMIT SUBCLAUSE 15.247(d) – A8.5

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: NT-100; NT-110; NT-111; NT-112; NT-139; NT-207

Emissions in restricted bands

§ 15.209(a)

As the limit 15.209 was checked during "Out-of-band Emission" measurements, no additional measurements were performed.

Maximum permissible Exposure

§ 15.247(i)

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

Appendix 1

Test equipment used

<input type="checkbox"/>	Anechoic Chamber with 3m measurement distance	NT-100	<input type="checkbox"/>	Spectrumanalyzer – FSP7 9 kHz – 7 GHz	NT-200
<input type="checkbox"/>	Stripline according to ISO 11452-5	NT-108	<input type="checkbox"/>	ESCI - Test receiver 9 kHz - 7 GHz	NT-203/1
<input type="checkbox"/>	MA4000 - Antenna mast 1 - 4 m height	NT-110/1	<input type="checkbox"/>	ESI26 – Test receiver 20 Hz – 26,5 GHz	NT-207
<input type="checkbox"/>	DS - Turntable 0 - 400 ° Azimuth	NT-111/1	<input type="checkbox"/>	Digital Radio Tester CTS55	NT-208
<input type="checkbox"/>	CO3000 Controller Mast+Turntable	NT-112/1	<input type="checkbox"/>	Noise-gen., ITU-R 559-2 20 Hz – 20 kHz	NT-209
<input type="checkbox"/>	HUF-Z3 - Log. Per. Antenna 200 - 1000 MHz	NT-121	<input type="checkbox"/>	CMTA - Radiocommunication analyzer ; 0,1 - 1000 MHz	NT-210
<input type="checkbox"/>	HFH-Z2 - Loop Antenna 9 kHz - 30 MHz	NT-122	<input type="checkbox"/>	3271 - Spectrum analyzer 100 Hz - 26,5 GHz	NT-211
<input type="checkbox"/>	HFH-Z6 - Rod Antenna 9 kHz - 30 MHz	NT-123	<input type="checkbox"/>	Digital Radio Tester Aeroflex 3920	NT-212/1
<input type="checkbox"/>	3121C - Dipole Antenna 28 - 1000 MHz	NT-124	<input type="checkbox"/>	Mixer M28HW 26,5 GHz - 40 GHz	NT-214
<input type="checkbox"/>	3115 - Horn Antenna 1 - 18 GHz (immunity)	NT-125	<input type="checkbox"/>	RubiSource T&M Timing reference	NT-216
<input type="checkbox"/>	3116 - Horn Antenna 18 - 40 GHz	NT-126	<input type="checkbox"/>	Radiocommunicationanalyzer SWR 1180 MD	NT-217
<input type="checkbox"/>	SAS-200/543 - Bicon. Antenna 20 MHz - 300 MHz	NT-127	<input type="checkbox"/>	Mixer M19HWD 40 GHz – 60 GHz	NT-218
<input type="checkbox"/>	AT-1080 - Log. Per. Antenna 80 - 1000 MHz	NT-128	<input type="checkbox"/>	Mixer M12HWD 60 GHz – 90 GHz	NT-219
<input type="checkbox"/>	HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-129	<input type="checkbox"/>	DSO9104 Digital scope	NT-220/1
<input type="checkbox"/>	HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-130	<input type="checkbox"/>	TPS 2014 Digital scope	NT-222
<input type="checkbox"/>	3146 - Log. Per. Antenna 200 – 1000 MHz	NT-131	<input type="checkbox"/>	Artificial Ear according to IEC 60318	NT-224
<input type="checkbox"/>	Loop Antenna H-Field	NT-132	<input type="checkbox"/>	1 kHz Sound calibrator	NT-225
<input type="checkbox"/>	Horn Antenna 500 MHz - 2900 MHz	NT-133	<input type="checkbox"/>	B10 - Harmonics and flicker analyzer	NT-232
<input type="checkbox"/>	Horn Antenna 500 MHz - 6000 MHz	NT-133/1	<input type="checkbox"/>	ARS 16/3 – Harmonics- flicker analyzer	NT-232/1
<input type="checkbox"/>	Log. per. Antenna 800 MHz - 2500 MHz	NT-134	<input type="checkbox"/>	SRM-3000 Spectrumanalyzer	NT-233
<input type="checkbox"/>	Log. per. Antenna 800 MHz - 2500 MHz	NT-135	<input type="checkbox"/>	SRM-3006 Spectrumanalyzer	NT-233/1a
<input type="checkbox"/>	BiConiLog Antenna 26 MHz – 2000 MHz	NT-137	<input type="checkbox"/>	E-field probe SRM 75 MHz – 3 GHz	NT-234
<input type="checkbox"/>	Conical Dipol Antenna PCD8250	NT-138	<input type="checkbox"/>	Field Meter NBM-500 incl. E- and H-Field probes	NT-240a-d
<input type="checkbox"/>	HF 906 - Horn Antenna 1 - 18 GHz (emission)	NT-139	<input type="checkbox"/>	Hall-Teslameter ETM-1	NT-241
<input type="checkbox"/>	HZ-1 Antenna tripod	NT-150	<input type="checkbox"/>	EFA-3 H-field- / E-field probe	NT-243
<input type="checkbox"/>	BN 1500 Antenna tripod	NT-151	<input type="checkbox"/>	Field Meter EMR-200 100 kHz – 3 GHz	NT-244
<input type="checkbox"/>	Ant. tripod for EN61000-4-3 Model TP1000A	NT-156	<input type="checkbox"/>	E-field probe 100 kHz – 3 GHz	NT-245
<input type="checkbox"/>	Power quality analyzer Fluke 1760 (complete set)	NT-160 - NT-173	<input type="checkbox"/>	H-field probe 300 kHz – 30 MHz	NT-246


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Technology/ EMC

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Appendix 1 (continued)

Test equipment used

<input type="checkbox"/>	E-field probe 3 MHz – 18 GHz	NT-247	<input type="checkbox"/>	VCS 500-M6 Surge-Generator	NT-326
<input type="checkbox"/>	H-field probe 27 MHz – 1 GHz	NT-248	<input type="checkbox"/>	Oscillatory Wave Simulator incl. Coupling networks	NT-328a+b+c
<input type="checkbox"/>	ELT-400 1 Hz – 400 kHz	NT-249	<input type="checkbox"/>	BTA-250 - RF-Amplifier 9 kHz - 220 MHz / 250 W	NT-330
<input type="checkbox"/>	MDS 21 - Absorbing clamp 30 - 1000 MHz	NT-250	<input type="checkbox"/>	T82-50 RF-Amplifier 2 GHz - 8 GHz	NT-331
<input type="checkbox"/>	FCC-203I EM Injection clamp	NT-251	<input type="checkbox"/>	500W1000M7 - RF-Amplifier 80 - 1000 MHz / 500 W	NT-332
<input type="checkbox"/>	FCC-203I-DCN Ferrite decoupling network	NT-252	<input type="checkbox"/>	AS0102-65R - RF-Amplifier 1 GHz - 2 GHz	NT-333
<input type="checkbox"/>	PR50 Current Probe	NT-253	<input type="checkbox"/>	APA01 – RF-Amplifier 0,5 GHz – 2,5 GHz	NT-334
<input type="checkbox"/>	PR630 Current Probe	NT-254	<input type="checkbox"/>	Preamplifier 1 GHz - 4 GHz	NT-335
<input type="checkbox"/>	Fluke 87 V True RMS Multimeter	NT-260	<input type="checkbox"/>	Preamplifier for GPS MKU 152 A	NT-336
<input type="checkbox"/>	Model 2000 Digital Multimeter	NT-261	<input type="checkbox"/>	Preamplifier 100 MHz – 23 GHz	NT-337
<input type="checkbox"/>	Fluke 87 V Digital Multimeter	NT-262/1	<input type="checkbox"/>	DC Block 10 MHz – 18 GHz Model 8048	NT-338
<input type="checkbox"/>	ESH2-Z5-U1 Artificial mains network 4x25A	NT-300	<input type="checkbox"/>	2-97201 Electronic load	NT-341
<input type="checkbox"/>	ESH3-Z5-U1 Artificial mains network 2x10A	NT-301	<input type="checkbox"/>	TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-344
<input type="checkbox"/>	ESH3-Z6-U1 Artificial mains network 1x100A	NT-302	<input type="checkbox"/>	TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-345
<input type="checkbox"/>	ESH3-Z6-U1 Artificial mains network 1x100A	NT-302a	<input type="checkbox"/>	VDS 200 Mobil-impuls-generator	NT-350
<input type="checkbox"/>	PHE 4500/B Power amplifier	NT-304	<input type="checkbox"/>	LD 200 Mobil-impuls-generator	NT-351
<input type="checkbox"/>	PAS 5000 Power amplifier	NT-304/1a	<input type="checkbox"/>	MPG 200 Mobil-Impuls-Generators	NT-352
<input type="checkbox"/>	EZ10 T-Artificial Network	NT-305	<input type="checkbox"/>	EFT 200 Mobil-impuls-generator	NT-353
<input type="checkbox"/>	SMG - Signal generator 0,1 - 1000 MHz	NT-310	<input type="checkbox"/>	AN 200 S1 Artificial Network	NT-354
<input type="checkbox"/>	SMA100A - Signal generator 9 kHz - 6 GHz	NT-310/1	<input type="checkbox"/>	FP-EFT 32M 3 ph. Coupling filter (Burst)	NT-400/1
<input type="checkbox"/>	RefRad Reference generator	NT-312	<input type="checkbox"/>	PHE 4500 - Mains impedance network	NT-401
<input type="checkbox"/>	SMP 02 Signal generator 10 MHz - 20 GHz	NT-313	<input type="checkbox"/>	IP 6.2 Coupling filter for data lines (Surge)	NT-403
<input type="checkbox"/>	40 MHz Arbitrary Generator TGA1241	NT-315	<input type="checkbox"/>	TK 9421 High Power Volt. Probe 150 kHz - 30 MHz	NT-409
<input type="checkbox"/>	Artificial mains network NSLK 8127-PLC	NT-316	<input type="checkbox"/>	ESH2-Z3 - Probe 9 kHz - 30 MHz	NT-410
<input type="checkbox"/>	Inrush Current Source for PAS 5000	NT-317a	<input type="checkbox"/>	IP 4 - Capacitive clamp (Burst)	NT-411
<input type="checkbox"/>	Control and measurement device Sycore	NT-318	<input type="checkbox"/>	Highpass-Filter 100 MHz – 3 GHz	NT-412
<input type="checkbox"/>	PEFT - Burst generator up to 4 kV	NT-320	<input type="checkbox"/>	Highpass-Filter 600 MHz – 4 GHz	NT-413
<input type="checkbox"/>	ESD 30 System up to 25 kV	NT-321	<input type="checkbox"/>	Highpass-Filter 1250 MHz – 4 GHz	NT-414
<input type="checkbox"/>	PSURGE 4.1 Surge generator	NT-324	<input type="checkbox"/>	Highpass-Filter 1800 MHz – 16 GHz	NT-415
<input type="checkbox"/>	TRANSIENT 1000 Immunity test system	NT-325			


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Appendix 1 (continued)

Test equipment used

<input type="checkbox"/> Highpass-Filter 3500 MHz – 18 GHz	NT-416	<input type="checkbox"/> FCC-801-S25 Coupling decoupling network	NT-462
<input type="checkbox"/> RF-Attenuator 10 dB DC – 18 GHz / 50 W	NT-417	<input type="checkbox"/> FCC-801-T4 Coupling decoupling network	NT-463
<input type="checkbox"/> RF-Attenuator 6 dB DC – 18 GHz / 50 W	NT-418	<input type="checkbox"/> FCC-801-C1 Coupling decoupling network	NT-464
<input type="checkbox"/> RF-Attenuator 3 dB DC – 18 GHz / 50 W	NT-419	<input type="checkbox"/> F-16A - Current probe 1kHz - 70MHz	NT-465
<input type="checkbox"/> RF-Attenuator 20 dB DC - 1000 MHz / 25 W	NT-421	<input type="checkbox"/> 95242-1 – Current probe 1 MHz – 400 MHz	NT-468
<input type="checkbox"/> RF-Attenuator 30 dB DC - 1000 MHz / 1 W	NT-423	<input type="checkbox"/> 94106-1L-1 – Current probe 100 kHz – 450 MHz	NT-471
<input type="checkbox"/> RF-Attenuator 30 dB	NT-424	<input type="checkbox"/> GA 1240 Power amplifier according to EN 61000-4-16	NT-480
<input type="checkbox"/> RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-425	<input type="checkbox"/> Coupling networks according to EN 61000-4-16	NT-481 - NT-483
<input type="checkbox"/> RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-426	<input type="checkbox"/> Van der Hoofden Test Head	NT-484
<input type="checkbox"/> RF-Attenuator 6 dB	NT-428	<input type="checkbox"/> PC P4 3 GHz Test computer	NT-500
<input type="checkbox"/> RF-Attenuator 0 dB - 81 dB	NT-429	<input type="checkbox"/> PC P4 1700 MHz Notebook	NT-505
<input type="checkbox"/> WRU 27 - Band blocking 27 MHz	NT-430	<input type="checkbox"/> Monitoring camera with Monitor	NT-511
<input type="checkbox"/> WHJ450C9 AA - High pass 450 MHz	NT-431	<input type="checkbox"/> ES-K1 Version 1.71 SP2 Test software	NT-520
<input type="checkbox"/> WHJ250C9 AA - High pass 250 MHz	NT-432	<input type="checkbox"/> EMC32 Version 9.01 Test software	NT-520/1
<input type="checkbox"/> RF-Load 150 W	NT-433	<input type="checkbox"/> SRM-TS Version 1.3 software for SRM-3000	NT-522
<input type="checkbox"/> Impedance transducer 1:4 ; 1:9 ; 1:16	NT-435	<input type="checkbox"/> SRM-TS Version 1.3.1 software for SRM-3006	NT-522/1
<input type="checkbox"/> RF-Attenuator DC – 18 GHz 6 dB	NT-436	<input type="checkbox"/> Spitzenberger und Spies Test software V3.4	NT-525
<input type="checkbox"/> RF-Attenuator DC – 18 GHz 6 dB	NT-437	<input type="checkbox"/> Noise power test apparatus according to EN 55014	NT-530
<input type="checkbox"/> RF-Attenuator DC – 18 GHz 10 dB	NT-438	<input type="checkbox"/> Vertical coupling plane (ESD)	NT-531
<input type="checkbox"/> RF-Attenuator DC – 18 GHz 20 dB	NT-439	<input type="checkbox"/> Test cable #4 for EN 61000-4-6	NT-553
<input type="checkbox"/> I+P 7780 Directional coupler 100 - 2000 MHz	NT-440	<input type="checkbox"/> Test cable #3 for conducted emission	NT-554
<input type="checkbox"/> ESH3-Z2 - Pulse limiter 9 kHz - 30 MHz	NT-441	<input type="checkbox"/> Test cable #5+#6 ESD-cable (2x470k)	NT-555 + NT-556
<input type="checkbox"/> Power Divider 6 dB/1 W/50 Ohm	NT-443	<input type="checkbox"/> Test cable #8 Sucoflex 104EA	NT-559
<input type="checkbox"/> Directional coupler 0,1 MHz – 70 MHz	NT-444	<input type="checkbox"/> Test cable #9 (for outdoor measurements)	NT-580
<input type="checkbox"/> Directional coupler 0,1 MHz – 70 MHz	NT-445	<input type="checkbox"/> Test cable #10 (for outdoor measurements)	NT-581
<input type="checkbox"/> Tube imitations according to EN 55015	NT-450	<input type="checkbox"/> Test cable #13 Sucoflex 104PE	NT-584
<input type="checkbox"/> FCC-801-M3-16A Coupling decoupling network	NT-458	<input type="checkbox"/> Test cable #21 for SRM-3000	NT-592
<input type="checkbox"/> FCC-801-M2-50A Coupling decoupling network	NT-459	<input type="checkbox"/> Shield chamber	NT-600
<input type="checkbox"/> FCC-801-M5-25 Coupling decoupling network	NT-460	<input type="checkbox"/> Climatic chamber	M-1200
<input type="checkbox"/> FCC-801-AF10 Coupling decoupling network	NT-461		

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