

TEST REPORT

of the accredited test laboratory

TÜV Nr.:INE-AT/FG-21/197

Applicant: SES-imagotag GmbH
Kalsdorfer Strasse 12
A – 8072 Fernitz-Mellach

Tested Product: Electronic shelf labelling system

Product Name: VUSION Gate E1-B incorporating radio module

Model: APB1-VGE1-A (Module: APG3-BLUE-A)

FCC ID: 2ACQM-APG3-BLUE-A (radio module)

IC ID: 12154A-APG3BLUEA (radio module)

Manufacturer: SES-imagotag GmbH
Kalsdorfer Strasse 12
A – 8072 Fernitz-Mellach

Output power 3,38 mW eirp **power supply:** 5V DC
via external power supply

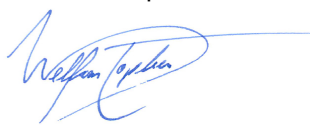
Frequency range: 2402 - 2480 MHz **Channel separation:** 2 MHz

Accredited Standards: FCC: 47 CFR Part 15 (eCFR 07.12.2021)
RSS-247 Issue 2, February 2017
ANSI C63.10-2013

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Test laboratory for EMC

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BIC BKAUATWWVAT ATU63240488
DVR 3002476

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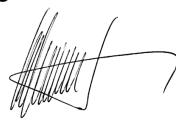


**examined by / Testing
Laboratory**
**TÜV AUSTRIA SERVICES
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14.01.2022

Ing. Wilhelm Seier



**approved by / Testing
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The results of this test report only refer to the provided equipment.

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1. Applicant

Company: SES-imagotag GmbH
Department: Product & Project Manager
Address: A – 8072 Fernitz-Mellach; Kalsdorfer Strasse 12
Contact person: Mr. Phillip Jauck

EUT received on: 07.12.2021

Tests were performed on: 07.12. and 09.12.2021 and 23.12.2021

2. Description of EUT

EUT:	Electronic shelf labelling system
Product Name:	VUSION Gate E1-B incorporating radio module
Model:	APB1-VGE1-A (Module: APG3-BLUE-A)
Serial Number:	Prototype
Manufacturer:	SES-imagotag GmbH
Description:	SES-imagotag GmbH provided the following configuration for the measurements: Prototype with special firmware for continuous transmission
Operating mode:	The measurements were carried out at the following running states: test-firmware running, transmitting continuously
Technical data EUT:	Rated voltage: 5VDC Rated current: <1A Rated frequency: DC Mains voltage during the tests: 5VDC via external power supply
Climatic conditions in the emc laboratory:	Relative humidity: 30% Temperature: 23°C

3. Standards / Final result

Name	Title	Deviation	Result
FCC: 47 CFR Part 15 (eCFR 07.12.2021)	RADIO FREQUENCY DEVICES	none	OK
RSS-247 Issue 2, February 2017	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices	none	OK
ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	none	OK
Result: Opinions and interpretation of testing laboratory OK: EUT passed NOK: EUT failed			

4. TEST RESULTS

4.1. TEST OBJECT DATA

General EUT Description

2.1033 (c) Technical description

2.1033 (4) Type of emission: 1M03F1D – 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 3,38 mW and there is no power regulation.

2.1033 (7) Maximum output power rating: 3,38 mW EIRP.

2.1033 (8) DC Voltage and Current: 5 VDC via external power supply
maximum current consumption: < 1A during continuous transmission

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

Worst case Spurious Emissions: 38,84 dBµV/m Average at 66,66 MHz.

Tests were performed on: December 7th and 9th 2021.

4.2. Number of channels and channel spacing

§ 2.1033

Conducted Measurement

Rated output power: 3,38 mW

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

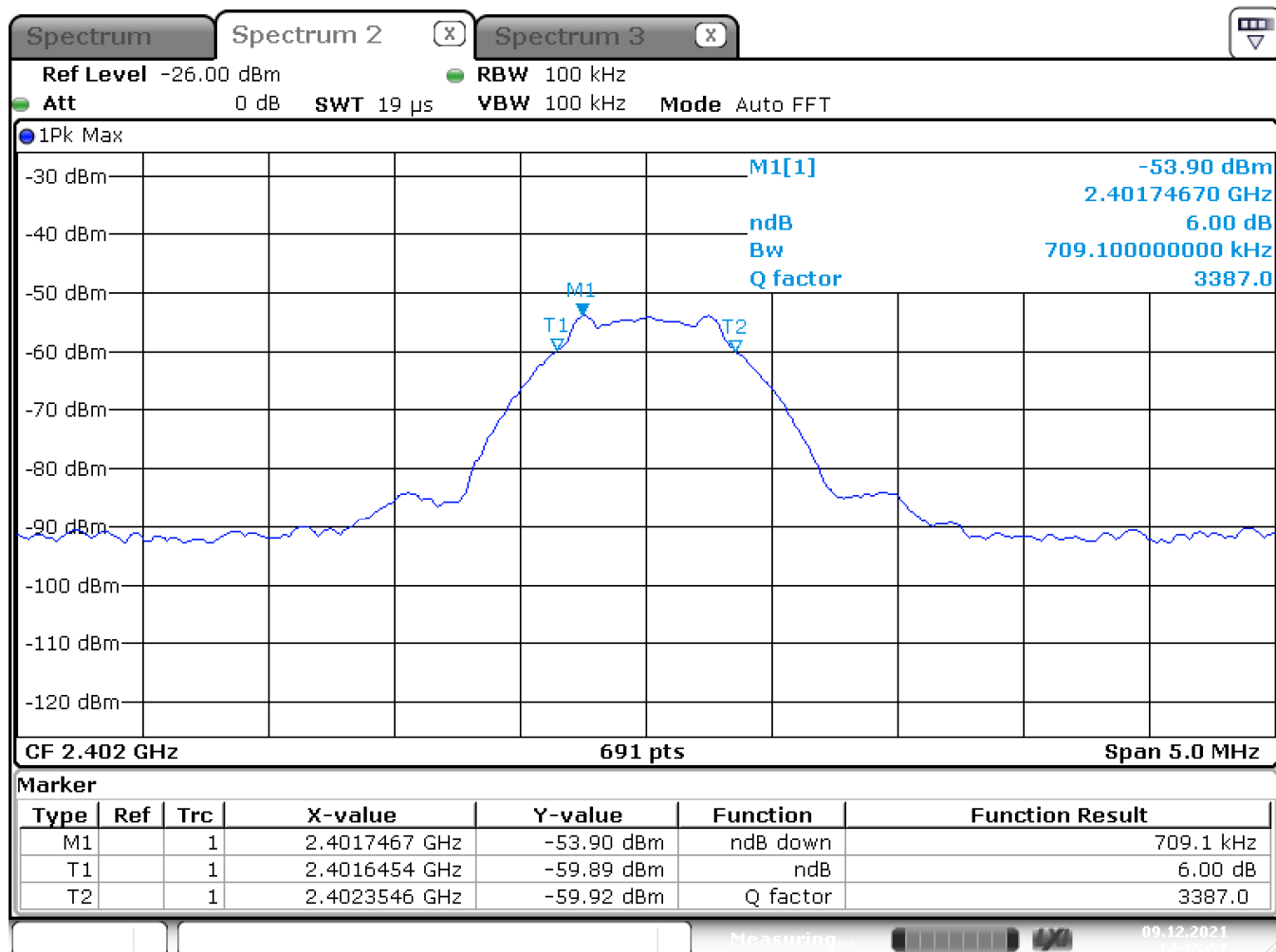
Test Equipment used: N/A

4.3. 6 dB Bandwidth

§ 15.247(a)(2)
5.2.a)

Radiated Measurement

Rated output power: 3,38 mW Channel 0 (2402 MHz center frequency)



Date: 9.DEC.2021 14:15:58

6dB Bandwidth: 709,1 kHz

LIMIT SUBCLAUSE 15.247(e) – 5.2.a)

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

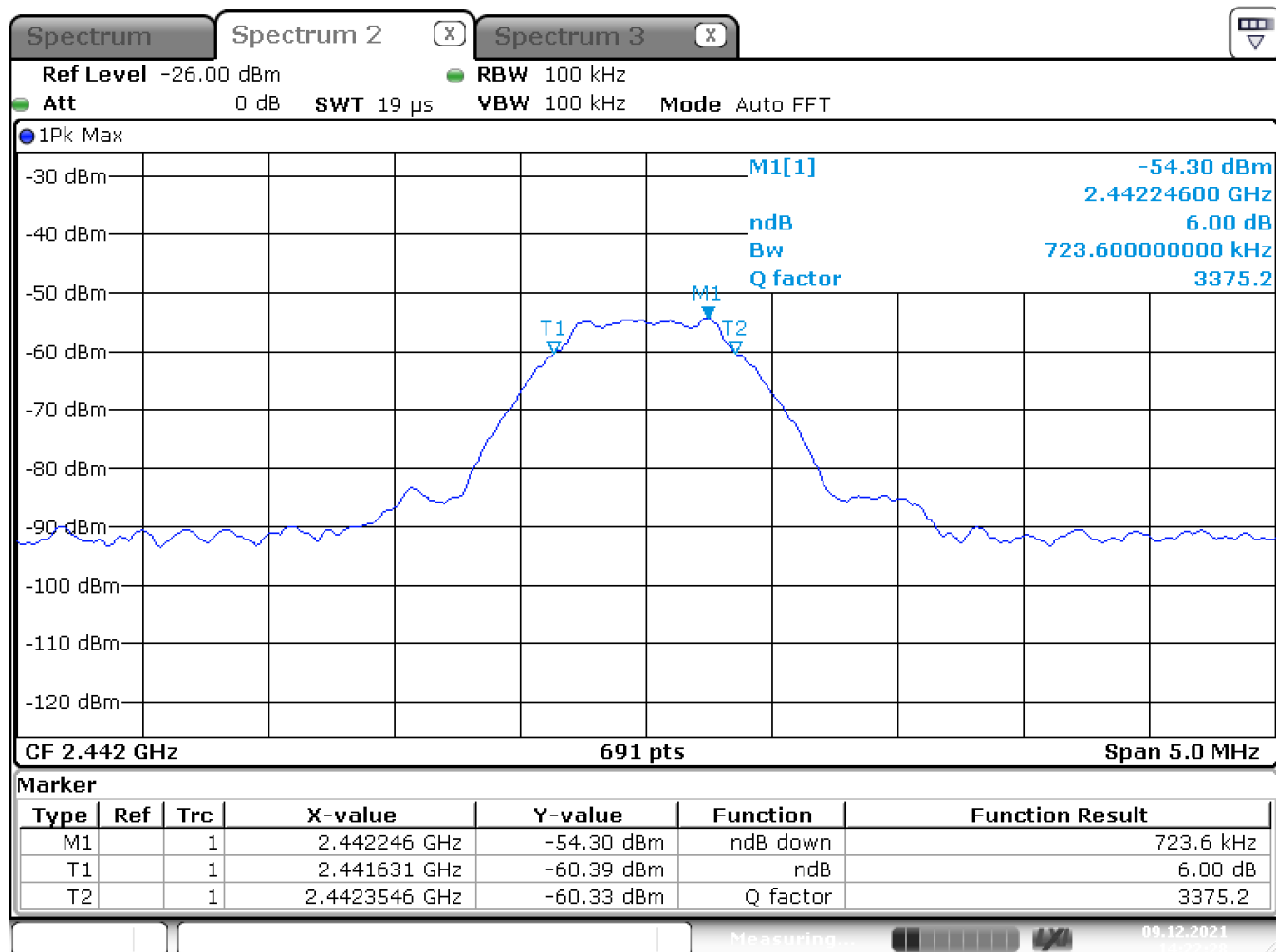
Test Equipment used: NT-100; NT-110/1; NT-111/1; NT-139; NT-207/1;

6 dB Bandwidth

§ 15.247(a)(2)
5.2.a)

Radiated Measurement

Rated output power: 3,38 mW Channel 20 (2442 MHz center frequency)



Date: 9.DEC.2021 14:22:29

6dB Bandwidth: 723,6 kHz

LIMIT SUBCLAUSE 15.247(e) – 5.2.a)

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

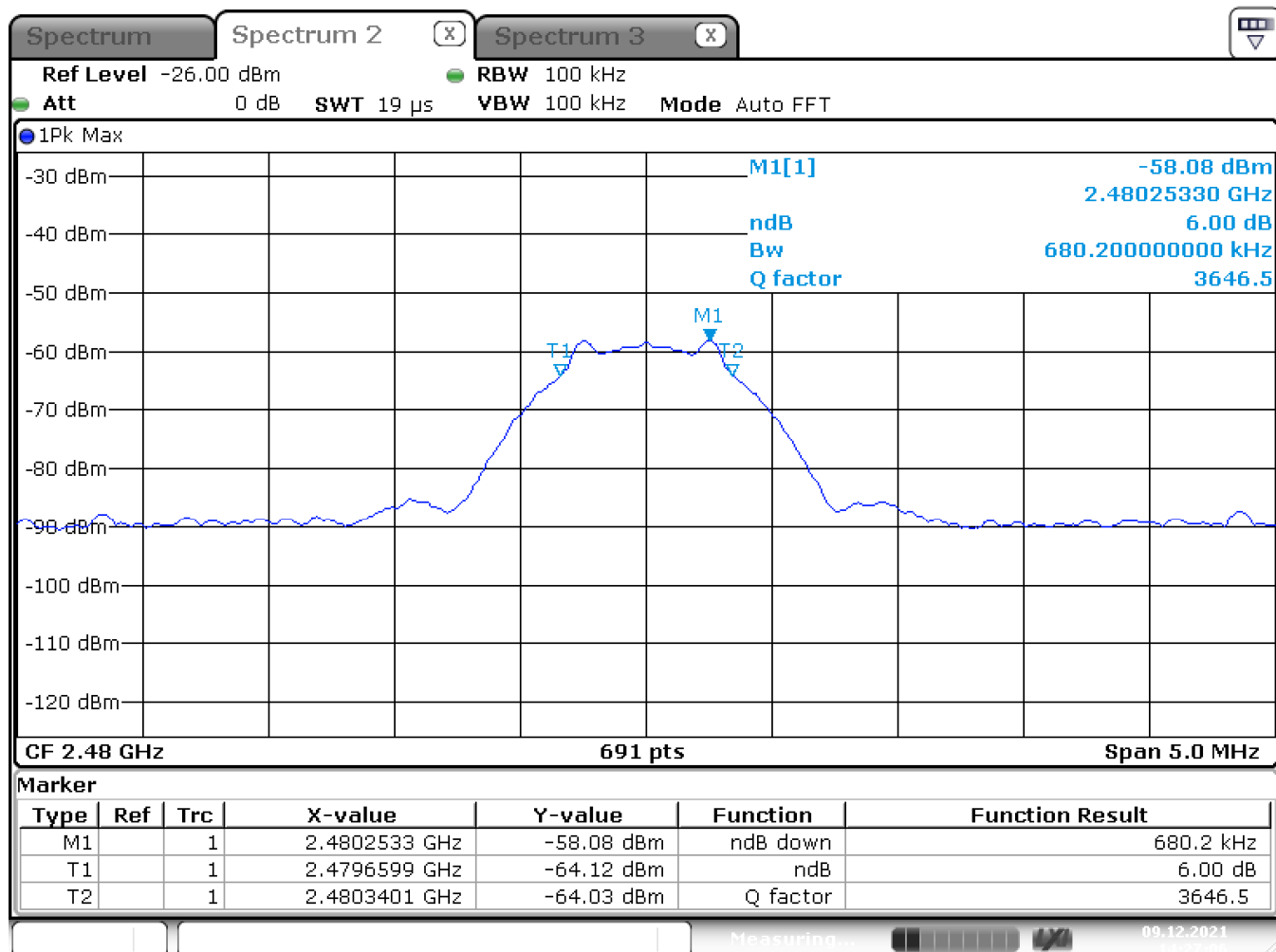
Test Equipment used: NT-100; NT-110/1; NT-111/1; NT-139; NT-207/1;

6 dB Bandwidth

§ 15.247(a)(2)
5.2.a)

Radiated Measurement

Rated output power: 3,38 mW Channel 39 (2480 MHz center frequency)



Date: 9.DEC.2021 14:27:07

6dB Bandwidth: 680,2 kHz

LIMIT SUBCLAUSE 15.247(e) – 5.2.a)

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

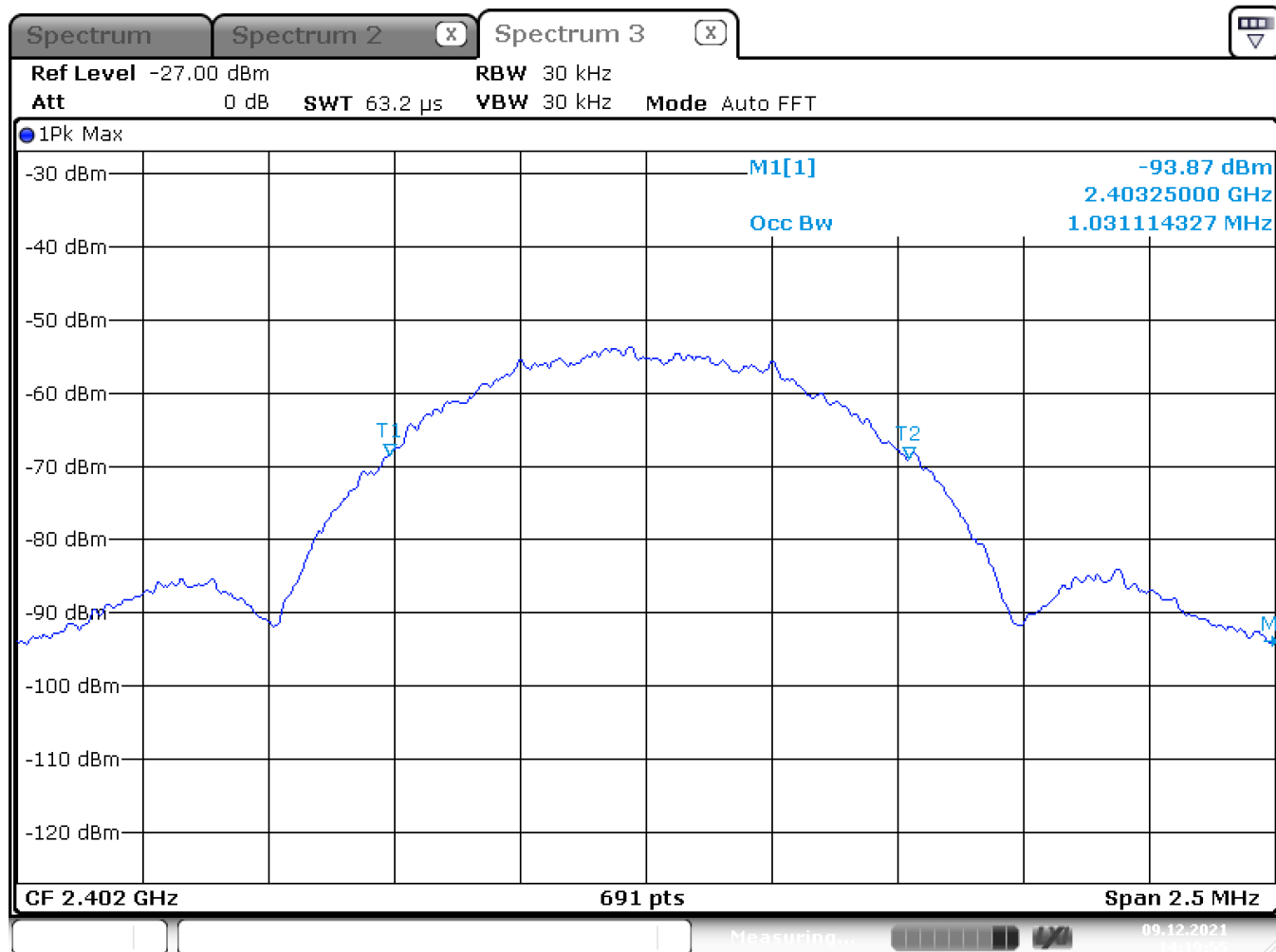
Test Equipment used: NT-100; NT-110/1; NT-111/1; NT-139; NT-207/1;

4.4. 99% Bandwidth

RSS 247

Radiated Measurement

Rated output power: 3,38 mW Channel 0 (2402 MHz center frequency)



Date: 9.DEC.2021 14:19:56

99% Bandwidth: 1031 kHz

LIMIT **RSS 247**

None; for IC reporting purposes only

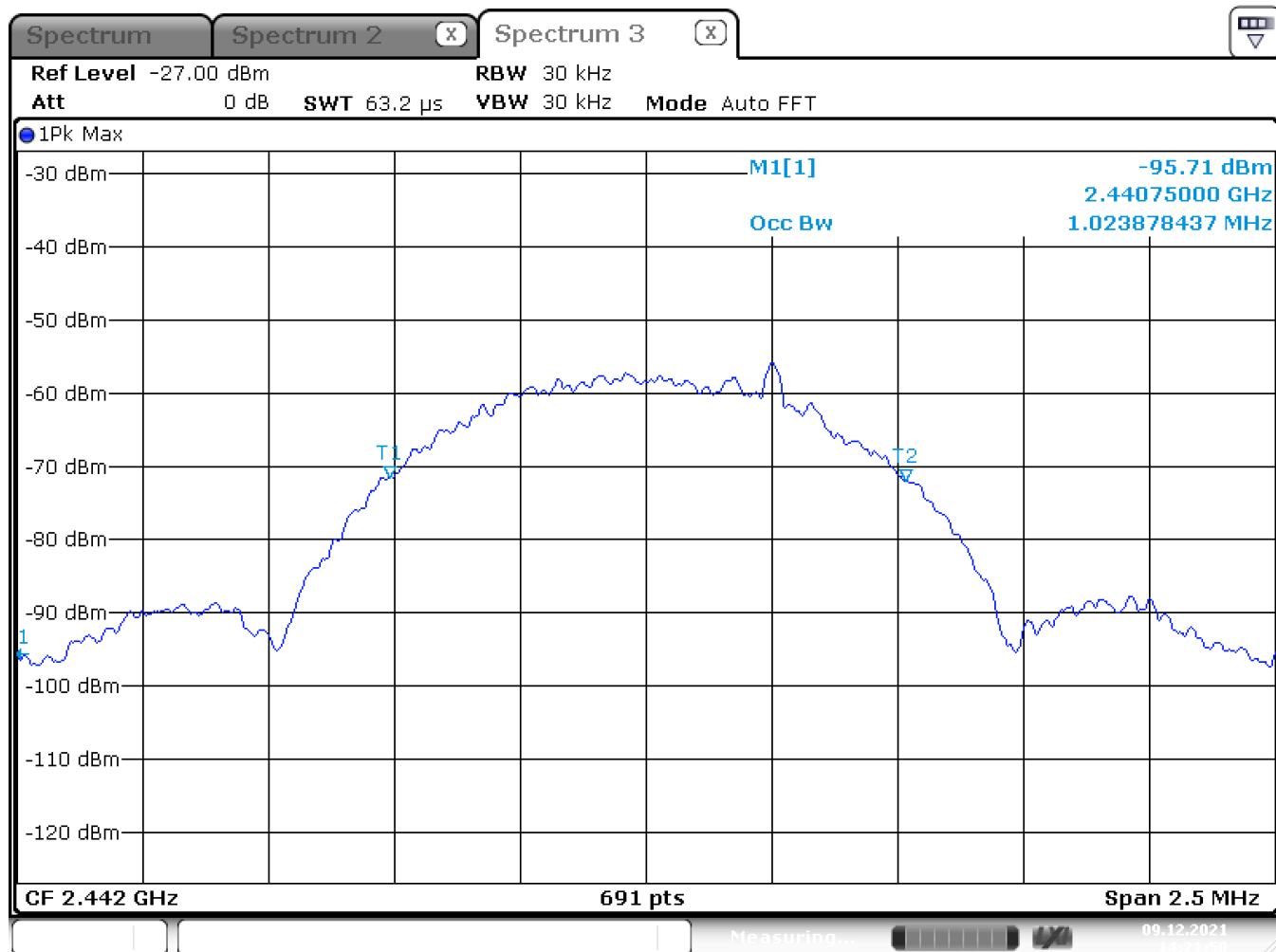
Test Equipment used: NT-100; NT-110/1; NT-111/1; NT-139; NT-207/1;

99% Bandwidth

RSS 247

Radiated Measurement

Rated output power: 3,38 mW Channel 20 (2442 MHz center frequency)



Date: 9.DEC.2021 14:21:50

99% Bandwidth: 1024 kHz

LIMIT **RSS 247**

None; for IC reporting purposes only

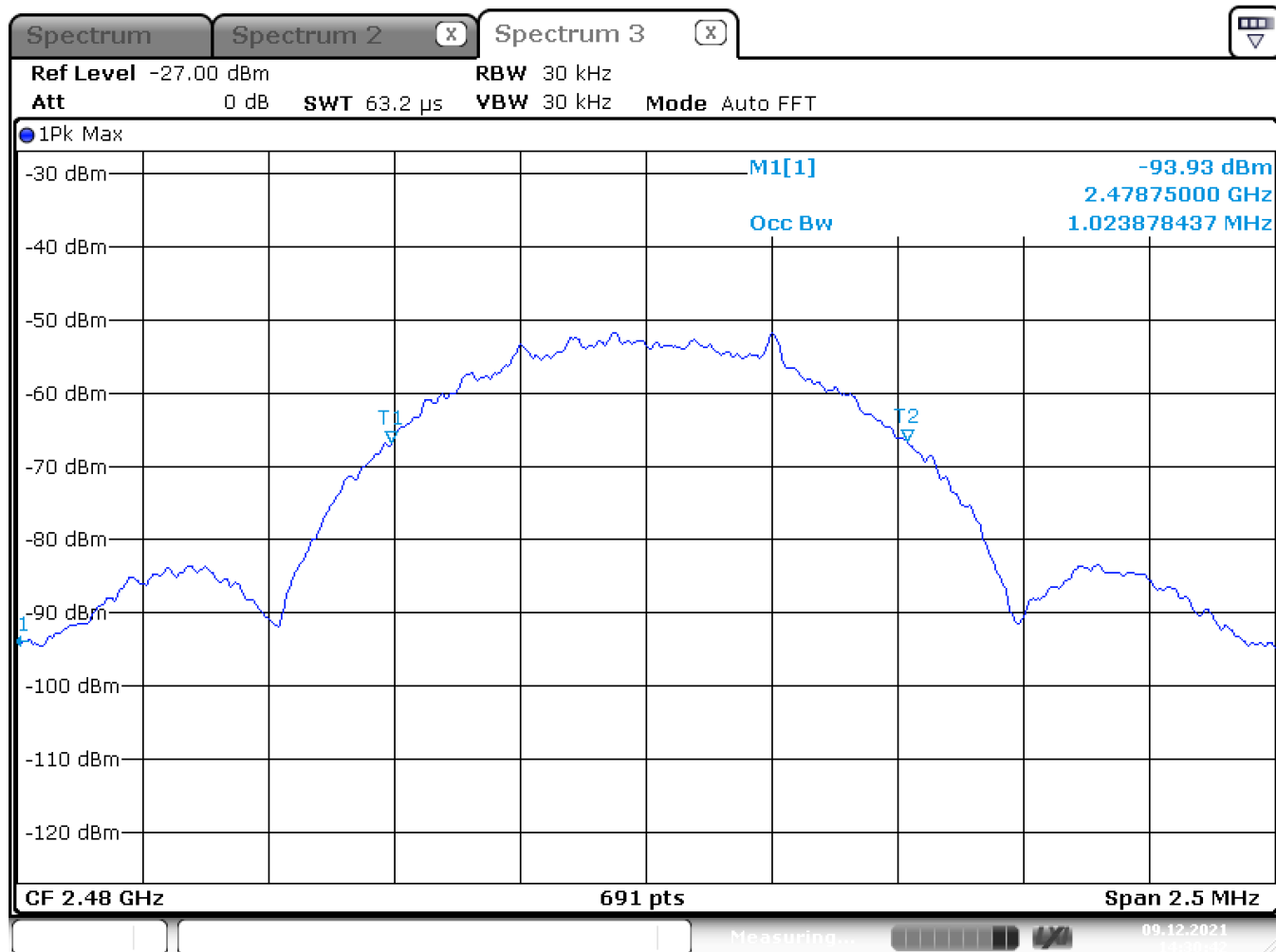
Test Equipment used: NT-100; NT-110/1; NT-111/1; NT-139; NT-207/1;

99% Bandwidth

RSS 247

Radiated Measurement

Rated output power: 3,38 mW Channel 39 (2480 MHz center frequency)



Date: 9.DEC.2021 14:30:42

99% Bandwidth: 1024 kHz

LIMIT RSS 247

None; for IC reporting purposes only

Test Equipment used: NT-100; NT-110/1; NT-111/1; NT-139; NT-207/1;

4.5. Maximum Peak RF Power Output (radiated)

§ 15.247(b)(3)
5.4.4

Radiated Measurement

Rated output power: 3,38 mW

Test conditions		Transmitter power (mW)		
		2402 MHz	2442 MHz	2480 MHz
T _{nom} (23)°C	V _{nom} (5) V	3,23	3,09	3,38
Maximum deviation from rated output power under normal test conditions (dB)		-0,2	-0,4	0
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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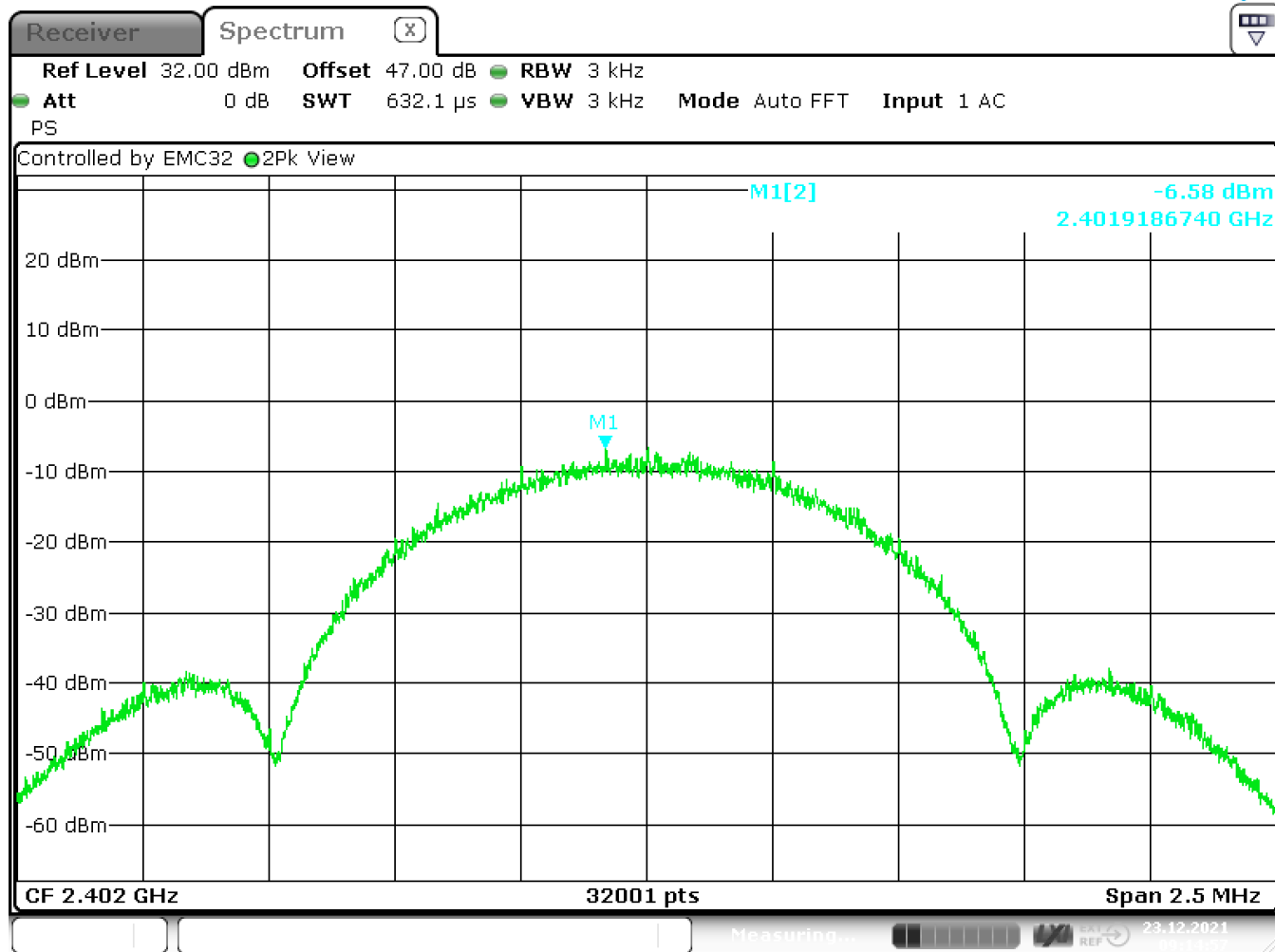
Test Equipment used: NT-100; NT-110/1; NT-111/1; NT-139; NT-207/1;

4.6. Power spectral density (radiated)

§ 15.247(e)
5.2.2

Radiated Measurement

Rated output power: 3,38 mW Channel 0 (2402 MHz center frequency)



Date: 23.DEC.2021 09:14:57

Power Spectral density: -6,58 dBm @ 2401,19 MHz

LIMIT SUBCLAUSE 15.247(e) – 5.2 b)

Under normal test conditons	+8dBm in any 3 kHz band
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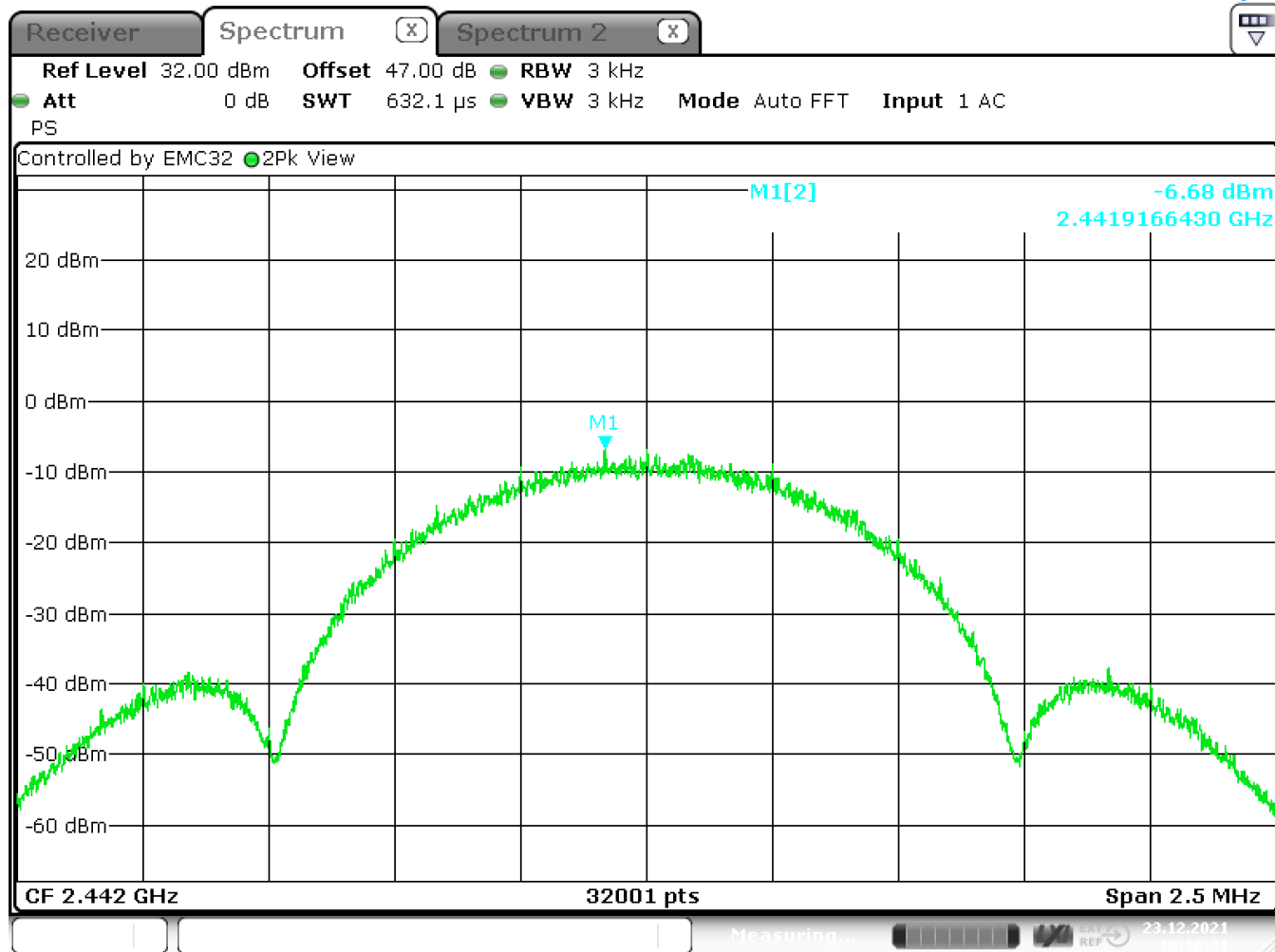
Test Equipment used: NT-100; NT-110/1; NT-111/1; NT-139; NT-207/1;

Power spectral density (radiated)

§ 15.247(e)
5.2 b)

Radiated Measurement

Rated output power: 3,38 mW Channel 20 (2442 MHz center frequency)



Date: 23.DEC.2021 10:16:41

Power Spectral density: -6,68 dBm @ 2439,96 MHz

LIMIT SUBCLAUSE 15.247(e) – 5.2 b)

Under normal test conditons	+8dBm in any 3 kHz band
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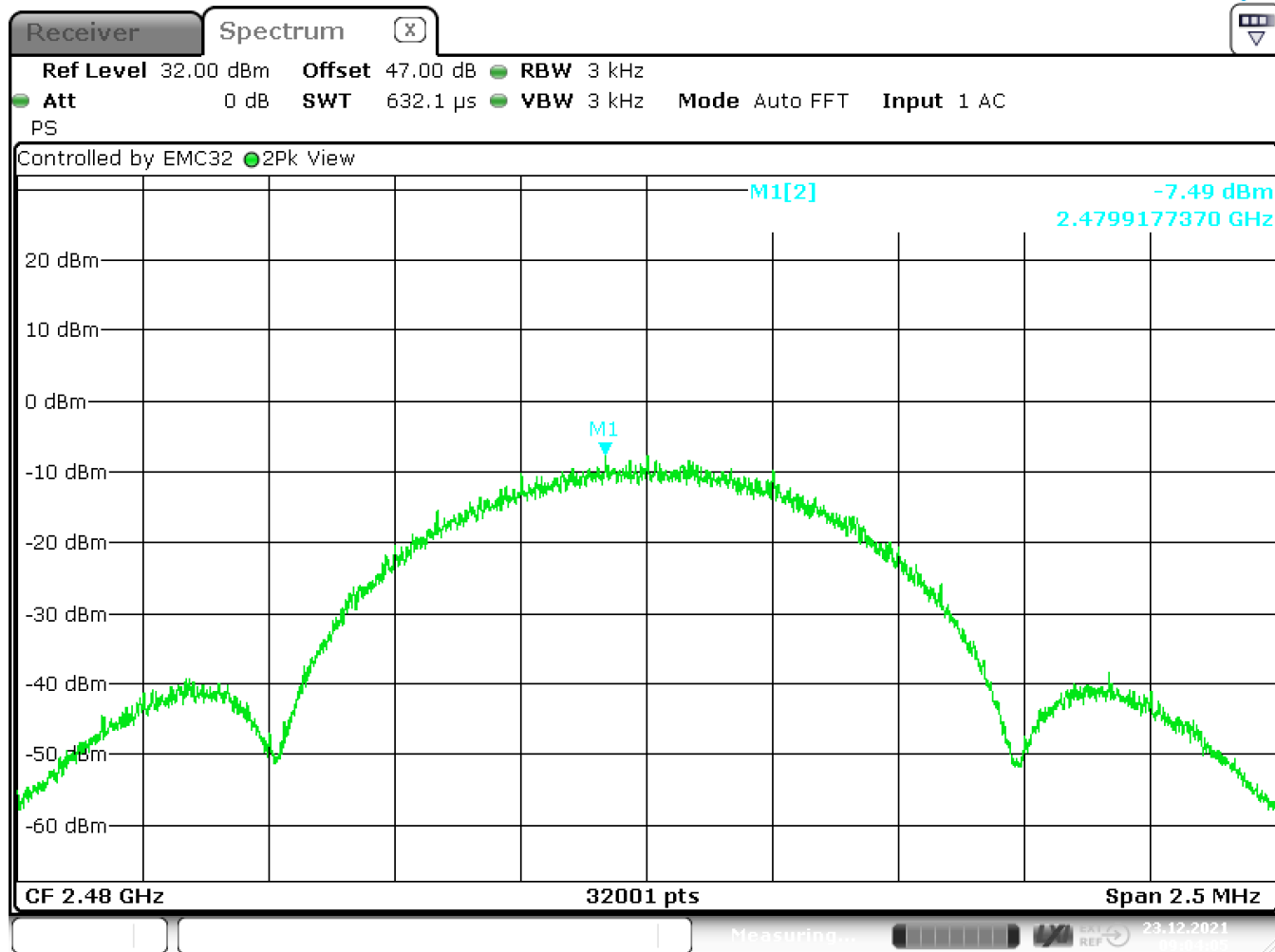
Test Equipment used: NT-100; NT-110/1; NT-111/1; NT-139; NT-207/1;

Power spectral density (radiated)

§ 15.247(e)
5.2 b)

Radiated Measurement

Rated output power: 3,38 mW Channel 39 (2480 MHz center frequency)



Date: 23.DEC.2021 09:04:05

Power Spectral density: -7,49 dBm @ 2479,17 MHz

LIMIT SUBCLAUSE 15.247(e) – 5.2 b)

Under normal test conditons	+8dBm in any 3 kHz band
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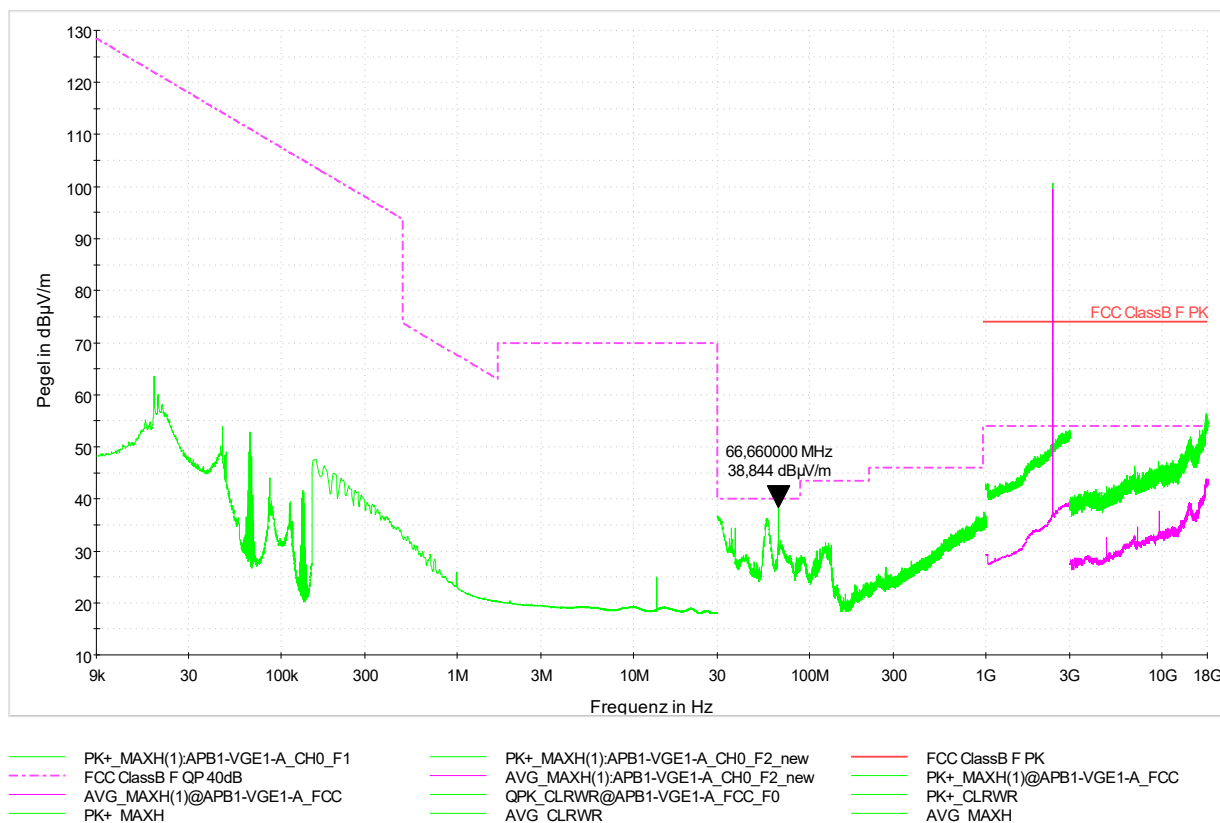
Test Equipment used: NT-100; NT-110/1; NT-111/1; NT-139; NT-207/1;

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): Band Edge requirement

Setup: CH 0: 2402 MHz



Worst case Emissions: 38,84 dBµV/m Quasipeak at 66,66 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

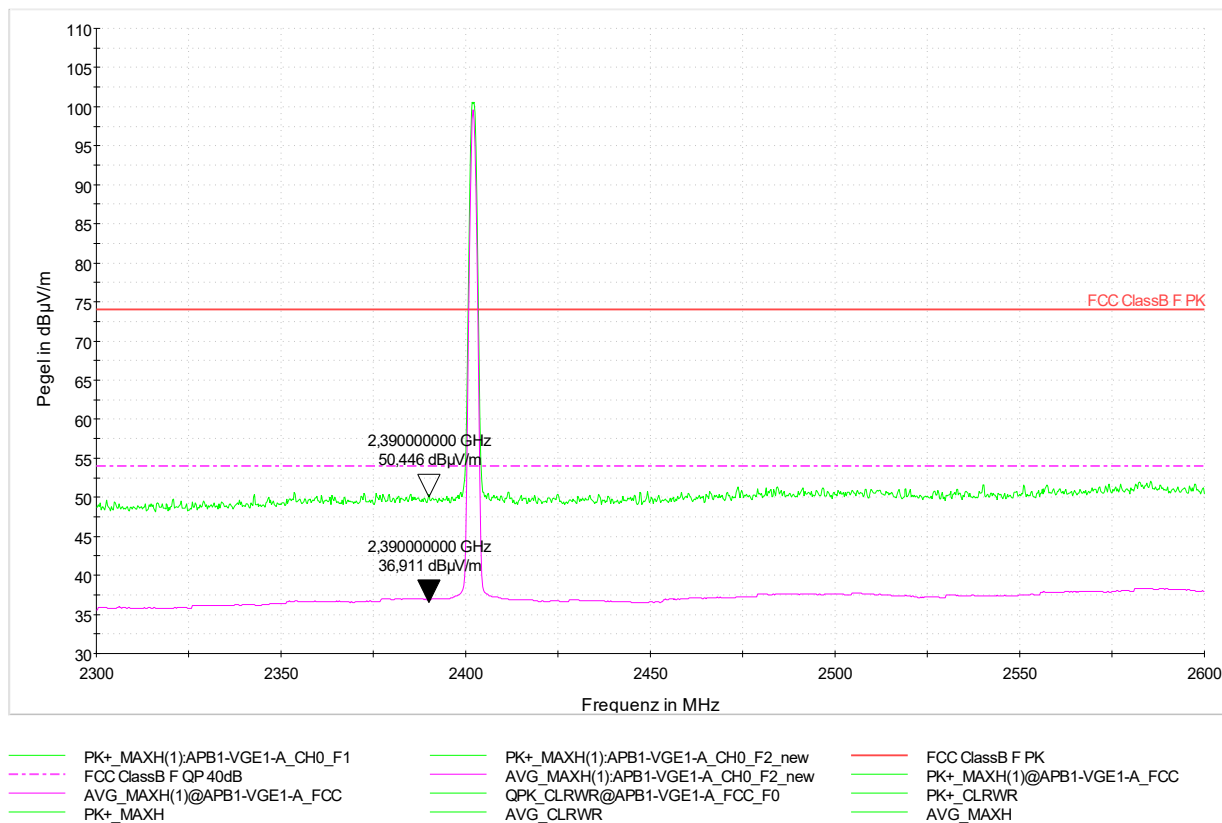
Test Equipment used: NT-100; NT-110/1; NT-111/1; NT-132; NT-207/1;

Remark: Although the measurements were made up to the 10th harmonic (25 GHz) the frequency range above 18 GHz is not automatized, so no graphs are available. Nevertheless no emissions above noise level were found in the frequency range above 18 GHz.

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 0: 2402 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

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

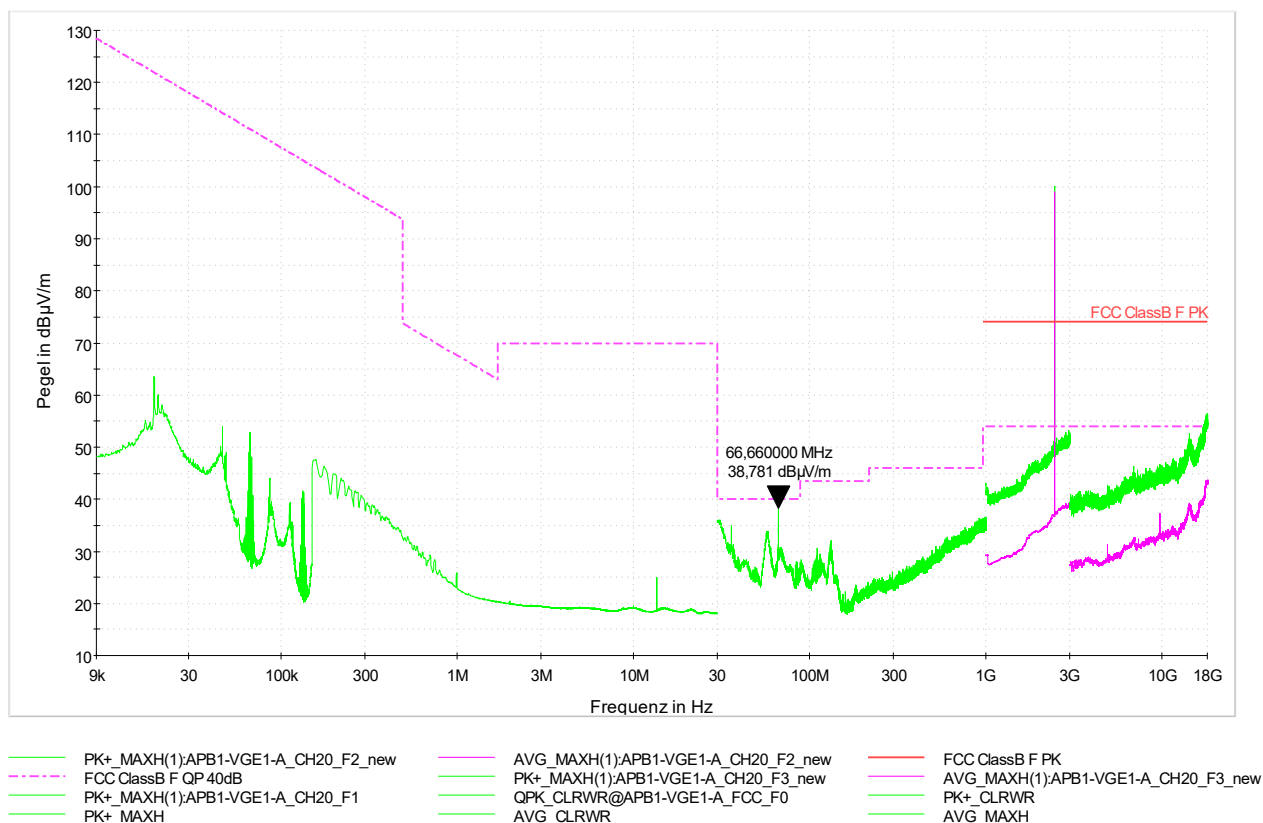
Test Equipment used: NT-100; NT-110/1; NT-111/1; NT-131/1; NT-139; NT-207/1;

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 20: 2442 MHz



Worst case Emissions: 36,78 dBµV/m Quasipeak at 66,66 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: NT-100; NT-110/1; NT-111/1; NT-131/1; NT-139; NT-207/1;

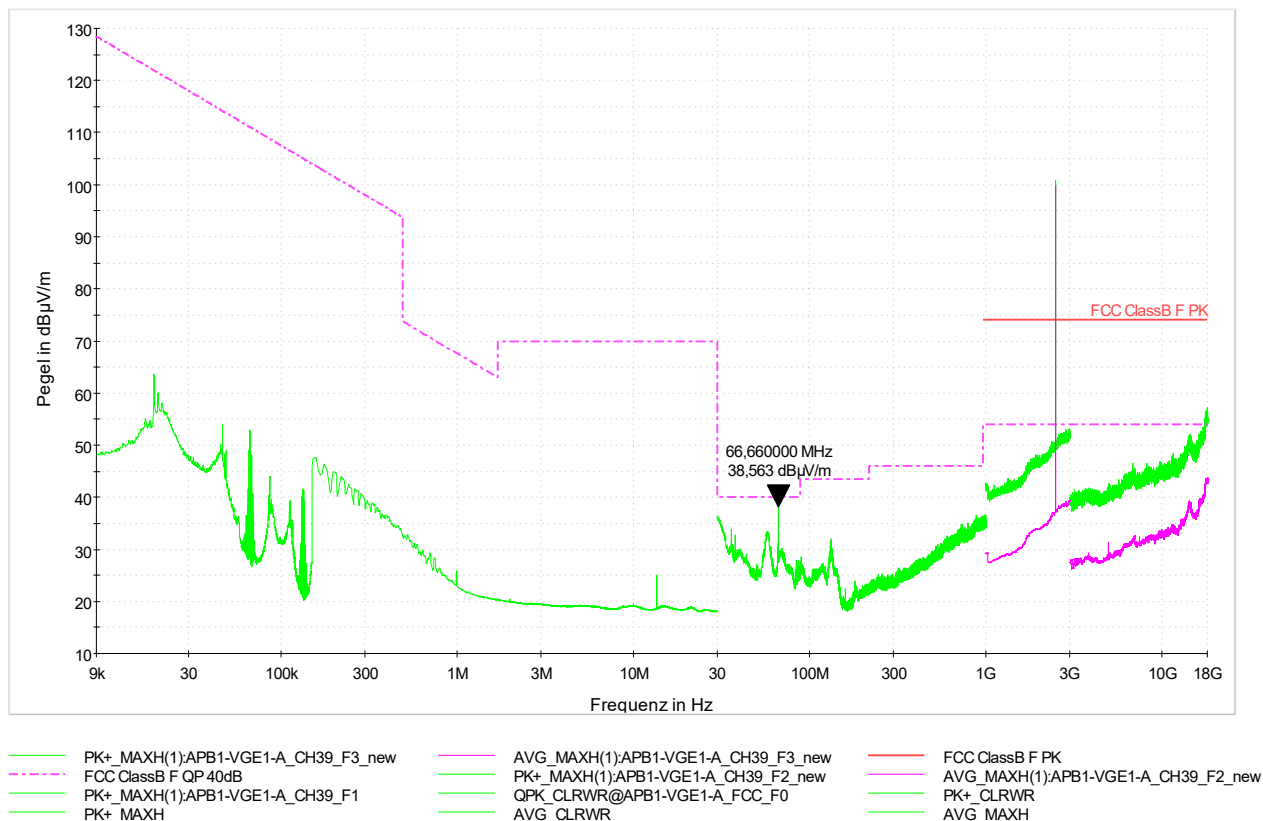
Remark: Although the measurements were made up to the 10th harmonic (25 GHz) the frequency range above 18 GHz is not automatized, so no graphs are available. Nevertheless no emissions above noise level were found in the frequency range above 18 GHz.

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



Worst case Emissions: 38,563 dBμV/m Quasipeak at 66,66 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: NT-100; NT-110/1; NT-111/1; NT-131/1; NT-139; NT-207/1;

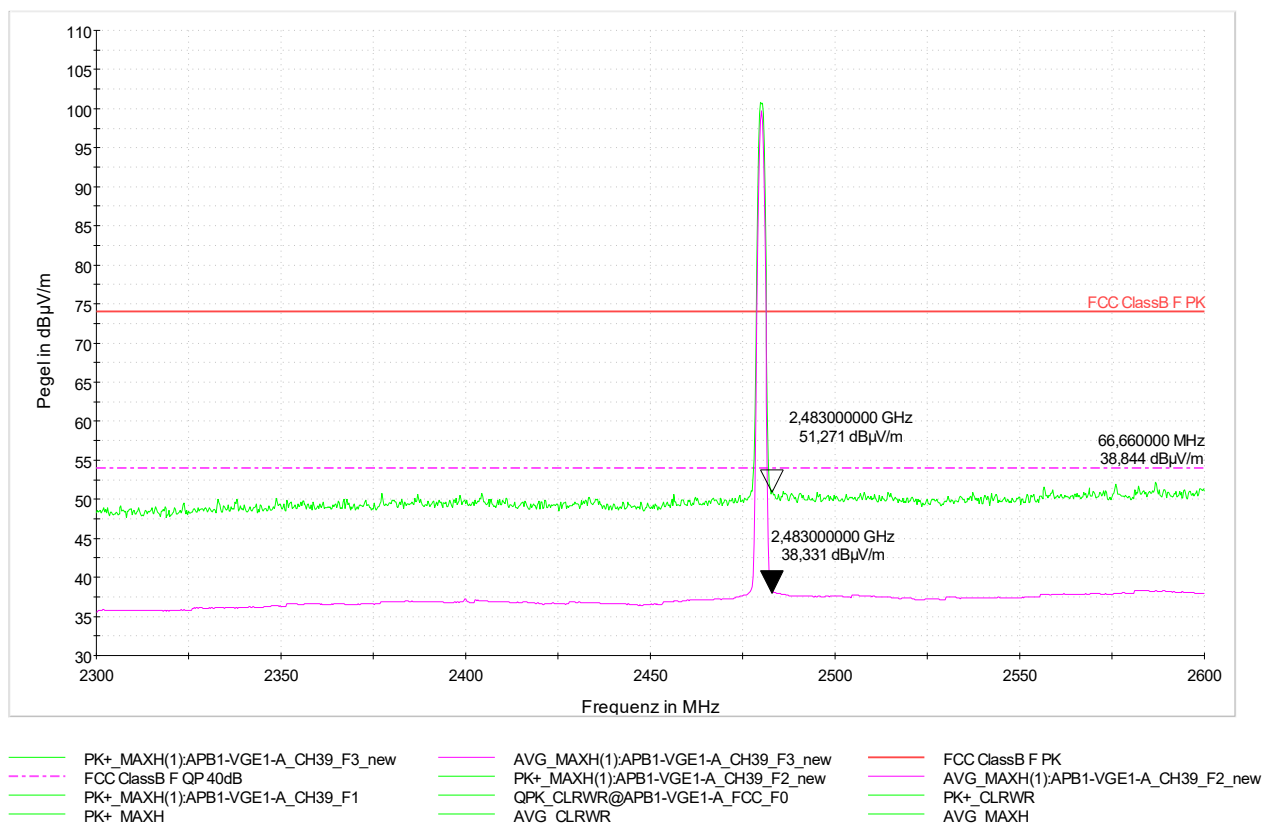
Remark: Although the measurements were made up to the 10th harmonic (25 GHz) the frequency range above 18 GHz is not automatized, so no graphs are available. Nevertheless no emissions above noise level were found in the frequency range above 18 GHz.

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 39: 2480 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

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

Test Equipment used: NT-100; NT-110/1; NT-111/1; NT-131/1; NT-139; NT-207/1;

4.8 RF Exposure

KDB 447498 D04 v01

according to KDB 447498 D04 Interim General RF Exposure Guidance v01 "RF EXPOSURE PROCEDURES AND EQUIPMENT AUTHORIZATION POLICIES FOR MOBILE AND PORTABLE DEVICES".

The device has only one antenna and simultaneous transmission does not apply.
The evaluation followed the flowchart in Figure A.1.

Title 47 §1.1307(b)(3)(i):

(3) Determination of exemption. (i) For single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if:

(B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by:

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

d = the separation distance (cm);

Maximum transmit power values are taken from Section 4.5.
Calculations are done for a minimum separation distance of 0.5 cm.

Title 47 §1.1307(b)(3)(i)(B) exemption calculation:

Frequency range (see 4.1 and 4.2)	max. EIRP [mW]	Duty cycle (not measured)	max. time-averaged power ERP [mW]	§1.1307(b)(3)(i)(B) limit (P_{th}) [mW]
2402 - 2480 MHz	3.38	100 %	2.06	2.72

The available maximum time-averaged ERP is below P_{th} for separation distances of 0.5 cm and above.

The device is a *SAR exempt RF device* as per Title 47 §1.1307(b)(3)(i)(B).

RF Exposure

RSS-102, Issue 5

2.5.1 Exemption Limits for Routine Evaluation – SAR Evaluation

SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1.

Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥50 mm
≤300	223 mW	254 mW	284 mW	315 mW	345 mW
450	141 mW	159 mW	177 mW	195 mW	213 mW
835	80 mW	92 mW	105 mW	117 mW	130 mW
1900	99 mW	153 mW	225 mW	316 mW	431 mW
2450	83 mW	123 mW	173 mW	235 mW	309 mW
3500	86 mW	124 mW	170 mW	225 mW	290 mW
5800	56 mW	71 mW	85 mW	97 mW	106 mW

Output power level shall be the higher of the maximum conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power. For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 5. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 2.5. If the operating frequency of the device is between two frequencies located in Table 1, linear interpolation shall be applied for the applicable separation distance. For test separation distance less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required.

For medical implants devices, the exemption limit for routine evaluation is set at 1 mW. The output power of a medical implants device is defined as the higher of the conducted or e.i.r.p to determine whether the device is exempt from the SAR evaluation.

RSS-210 2.5.1 Exemption calculation

Frequency (MHz)	max. EIRP (mW)	Duty Cycle (1)	Avg. EIRP (mW)	separation distance (mm)	Limit (mW)
2402	3.23	1	3.23	5	4.26
2442	3.09	1	3.09	5	4.04
2480	3.38	1	3.38	5	3.94

The time-averaged output power is below the exemption limit for routine evaluation.

Appendix 1

Test equipment used

☐	Anechoic Chamber with 3m measurement distance	NT-100	☐	Power quality analyzer Fluke 1760 (complete set)	NT-160 - NT-173
☐	Stripline according to ISO 11452-5	NT-108	☐	Spectrumanalyzer – FSP7 9 kHz – 7 GHz	NT-200
☐	MA4000 - Antenna mast 1 - 4 m height	NT-110/1	☐	ESCI - Test receiver 9 kHz - 7 GHz	NT-203/1
☐	DS - Turntable 0 - 400 ° Azimuth	NT-111/1	☐	ESR – Test receiver 20 Hz – 26,5 GHz	NT-207/1
☐	CO3000 Controller Mast+Turntable	NT-112/1	☐	Digital Radio Tester CMW500	NT-208/1
☐	HUF-Z3 - Log. Per. Antenna 200 - 1000 MHz	NT-121	☐	Noise-gen., ITU-R 559-2 20 Hz – 20 kHz	NT-209
☐	FMZB1513 - Loop Antenna 9 kHz - 30 MHz	NT-122/1	☐	CMTA - Radiocommunication analyzer ; 0,1 - 1000 MHz	NT-210
☐	HFH-Z6 - Rod Antenna 9 kHz - 30 MHz	NT-123	☐	3271 - Spectrum analyzer 100 Hz - 26,5 GHz	NT-211
☐	3121C - Dipole Antenna 28 - 1000 MHz	NT-124	☐	Digital Radio Tester Aeroflex 3920	NT-212/1
☐	3115 - Horn Antenna 1 - 18 GHz (immunity)	NT-125	☐	Mixer M28HW 26,5 GHz - 40 GHz	NT-214
☐	3116 - Horn Antenna 18 - 40 GHz	NT-126	☐	RubiSource T&M Timing reference	NT-216
☐	SAS-200/543 - Bicon. Antenna 20 MHz - 300 MHz	NT-127	☐	Radiocommunicationanalyzer SWR 1180 MD	NT-217
☐	AT-1080 - Log. Per. Antenna 80 - 1000 MHz	NT-128	☐	Mixer M19HWD 40 GHz – 60 GHz	NT-218
☐	HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-129	☐	Mixer M12HWD 60 GHz – 90 GHz	NT-219
☐	HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-130	☐	DSO9104 Digital scope	NT-220/1
☐	3146 - Log. Per. Antenna 200 – 1000 MHz	NT-131	☐	TPS 2014 Digital scope	NT-222
☐	VULB 9163 Trilog Antenna 30 – 3000 MHz	NT-131/1	☐	Artificial Ear according to IEC 60318	NT-224
☐	Loop Antenna H-Field	NT-132	☐	1 kHz Sound calibrator	NT-225
☐	Horn Antenna 500 MHz - 2900 MHz	NT-133	☐	SRM-3006 Spectrumanalyzer	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	☐	Magnetometer HP-01	NT-241/1
☐	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			

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☐ 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 1 GHz – 18 GHz	NT-337/1
☐ 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
☐ EZ10 T-Artificial Network	NT-305	☐ FP-EFT 32M 3 ph. Coupling filter (Burst)	NT-400/1
☐ SMG - Signal generator 0,1 - 1000 MHz	NT-310	☐ PHE 4500 - Mains impedance network	NT-401
☐ SMA100A - Signal generator 9 kHz - 6 GHz	NT-310/1	☐ IP 6.2 Coupling filter for data lines (Surge)	NT-403
☐ RefRad Reference generator	NT-312	☐ TK 9421 High Power Volt. Probe 150 kHz - 30 MHz	NT-409
☐ SMP 02 Signal generator 10 MHz - 20 GHz	NT-313	☐ ESH2-Z3 - Probe 9 kHz - 30 MHz	NT-410
☐ 40 MHz Arbitrary Generator TGA1241	NT-315	☐ IP 4 - Capacitive clamp (Burst)	NT-411
☐ Artificial mains network NSLK 8127-PLC	NT-316	☐ Highpass-Filter 100 MHz – 3 GHz	NT-412
☐ PSURGE 4.1 Surge generator	NT-324	☐ Highpass-Filter 600 MHz – 4 GHz	NT-413
☐ IMU4000 Immunity test system	NT-325/1	☐ Highpass-Filter 1250 MHz – 4 GHz	NT-414
☐ VCS 500-M6 Surge-Generator	NT-326	☐ Highpass-Filter 1800 MHz – 16 GHz	NT-415
☐ 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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☐	RF-Attenuator 10 dB DC – 18 GHz / 50 W	NT-417/1	☐	FCC-801-T4 Coupling decoupling network	NT-463
☐	RF-Attenuator 6 dB DC – 18 GHz / 50 W	NT-418	☐	FCC-801-C1 Coupling decoupling network	NT-464
☐	RF-Attenuator 3 dB DC – 18 GHz / 50 W	NT-419	☐	SW 9605 - Current probe 150 kHz – 30 MHz	NT-465/1
☐	RF-Attenuator 20 dB DC - 1000 MHz / 25 W	NT-421	☐	95242-1 – Current probe 1 MHz – 400 MHz	NT-468
☐	RF-Attenuator 30 dB DC - 1000 MHz / 1 W	NT-423	☐	94106-1L-1 – Current probe 100 kHz – 450 MHz	NT-471
☐	RF-Attenuator 30 dB	NT-424	☐	WHKX12-2700-3000-18000 3 GHz Highpass filter	NT-472
☐	RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-425	☐	WHKX10-3870-4500-18000 4,5 GHz Highpass filter	NT-473
☐	RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-426	☐	GA 1240 Power amplifier according to EN 61000-4-16	NT-480
☐	RF-Attenuator 6 dB	NT-428	☐	Coupling networks according to EN 61000-4-16	NT-481 - NT-483
☐	RF-Attenuator 0 dB - 81 dB	NT-429	☐	Van der Hoofden Test Head	NT-484
☐	WRU 27 - Band blocking 27 MHz	NT-430	☐	WRCJV12-5820-5850-5950-5980 5,9 GHz Band Reject Filter	NT-490
☐	WHJ450C9 AA - High pass 450 MHz	NT-431	☐	WHKX10-5670-6300-18000 6 GHz Highpass filter	NT-491
☐	WHJ250C9 AA - High pass 250 MHz	NT-432	☐	WHK12-935-1000-7000 1 GHz Highpass filter	NT-492
☐	RF-Load 150 W	NT-433	☐	EMC Video/Audiosystem	NT-511/1
☐	Impedance transducer 1:4 ; 1:9 ; 1:16	NT-435	☐	ES-K1 Version 1.71 SP2 Test software	NT-520
☐	RF-Attenuator DC – 18 GHz 6 dB	NT-436	☐	EMC32 Version 10.60.20 Test software	NT-520/1
☐	RF-Attenuator DC – 18 GHz 6 dB	NT-437	☐	SRM-TS Version 1.3 software for SRM-3000	NT-522
☐	RF-Attenuator DC – 18 GHz 10 dB	NT-438	☐	SRM-TS Version 1.3.1 software for SRM-3006	NT-522/1
☐	RF-Attenuator DC – 18 GHz 20 dB	NT-439	☐	Spitzenberger und Spies Test software V4.1	NT-525
☐	I+P 7780 Directional coupler 100 - 2000 MHz	NT-440	☐	Vertical coupling plane (ESD)	NT-531
☐	ESH3-Z2 - Pulse limiter 9 kHz - 30 MHz	NT-441	☐	Test cable #4 for EN 61000-4-6	NT-553
☐	Power Divider 6 dB/1 W/50 Ohm	NT-443	☐	Test cable #3 for conducted emission	NT-554
☐	Directional coupler 0,1 MHz – 70 MHz	NT-444	☐	Test cable #5+#6 ESD-cable (2x470k)	NT-555 + NT-556
☐	Directional coupler 0,1 MHz – 70 MHz	NT-445	☐	Test cable #8 Sucoflex 104EA	NT-559
☐	Tube imitations according to EN 55015	NT-450	☐	Test cable #9 (for outdoor measurements)	NT-580
☐	FCC-801-M3-16A Coupling decoupling network	NT-458	☐	Test cable #10 (for outdoor measurements)	NT-581
☐	FCC-801-M2-50A Coupling decoupling network	NT-459	☐	Test cable #13 Sucoflex 104PE	NT-584
☐	FCC-801-M5-25 Coupling decoupling network	NT-460	☐	Test cable #21 for SRM-3000	NT-592
☐	FCC-801-AF10 Coupling decoupling network	NT-461	☐	Shield chamber	NT-600
☐	FCC-801-S25 Coupling decoupling network	NT-462	☐	Climatic chamber	M-1200

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☐	Anechoic Chamber 3 m / 5 m measuring distance	EMV-100	☐	HF- Amplifier 9 kHz-225 MHz BBL200	EMV-300/1	Division: Industry & Energy
☐	Turntable 6 m diameter	EMV-101	☐	HF- Amplifier 80 -1000 MHz BBA150	EMV-301	Department: FG
☐	Antenna mast + controller	EMV-102+ EMV-103	☐	HF- Amplifier 0,8 - 6 GHz BBA150	EMV-302	Test report number: INE-AT/FG-21/197
☐	EMC Video/Audiosystem	EMV-104	☐	High Power Ant. 20-200 MHz HPBA-2510	EMV-303/1	Page: 4 of 5
☐	EMC Software EMC32 Version 10.60.20	EMV-105	☐	High Power Ant. 20-200 MHz S12018-21	EMV-303/2	Date: 14.01.2022
☐	Hornantenna 1 – 18 GHz HF 907	EMV-110	☐	Log.per Antenna 80-2700 MHz STLP 9128 E special	EMV-304	
☐	Antennapre.amp. 1 – 18 GHz ERZ-LNA0200-1800-30-2	EMV-111	☐	Log.per Antenna 0,7 – 9 GHz STLP9149	EMV-305	
☐	Trilog Antenna 30-3000 MHz VULB9163	EMV-112	☐	HF- Amplifier 9 kHz-250 MHz BBA150 (low noise)	EMV-306	
☐	Monopol 9 kHz – 30 MHz VAMP 9243	EMV-113	☐	ISO11451-2 TLS 10 kHz – 30 MHz	EMV-307	
☐	Antennapre.amp 18 – 40 GHz BBV 9721	EMV-114	☐	Load Dump Generator LD 200N	EMV-350	
☐	Hornantenna 200 – 2000 MHz AH-220	EMV-115	☐	Ultra Compact Symulator UCS 200N100	EMV-351	
☐	DC Artificial Network PVDC 8300	EMV-150	☐	Automotive Power fail module PFM 200N100.1	EMV-352	
☐	AC Artificial Network NNLK 8121 RC	EMV-151	☐	Voltage Drop Symulator VDS 200Q100	EMV-353	
☐	EMI Receiver ESW44	EMV-200/1	☐	Arb. Generator AutoWave	EMV-354	
☐	Signalgenerator 9 kHz – 40 GHz N5173B	EMV-201	☐	Ultra Compact Symulator UCS 500N7	EMV-355	
☐	GPS Frequency normal B-88	EMV-202	☐	Coupling decoupling network CNI 503B7 / 32 A	EMV-356	
☐	DC Power supply N5745A	EMV-203	☐	Coupling decoupling network CNI 503B7 / 63 A	EMV-357	
☐	Spektrum Analyzator FSV40	EMV-205	☐	Telecom Surge Generator TSurge 7	EMV-358	
☐	Thd Multimeter Model 2015	EMV-206	☐	Coupling decoupling network CNI 508N2	EMV-359	
☐	Poweramplifier PAS15000	EMV- 207/abc	☐	Coupling decoupling network CNV 504N2.2	EMV-360	
☐	Inrush Current Source	EMV- 208/abc	☐	Immunity generator NSG4060/NSG4060-1	EMV-361	
☐	Arb.-generator Sycore	EMV-209	☐	Coupling network CDND M316-2	EMV-362	
☐	Harmonics/Flicker analyzer ARS 16/3	EMV-210	☐	Coupling network CT419-5	EMV-363	
☐	Power Supply Regatron AC	EMV-214	☐	ESD Generator NSG 437	EMV-364	
☐	Power Supply Regatron DC	EMV-215	☐	Pulse Limiter VTSD 9561-F BNC	EMV-405	
☐	Harmonics/Flicker analyser Zimmer	EMV-216	☐	Transient emission BSM200N40+BS200N100	EMV- 450+451	
☐	Flicker Impedanz Newtons4th 753	EMV-218	☐	Cap. Coupling Clamp HFK	EMV-455	
☐	Comemso	EMV-219	☐	Mag. Field System MS100N+MC26100+MC2630	EMV- 456-458	

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☐	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
☐	HV AMN NNHV 8123 800A	EMV-472
☐	HV AMN NNHV 8123 800A	EMV-473

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