

EMI – TEST REPORT

- FCC Part 15.247, RSS247 -

Type / Model Name : EBI 10-System (IF 100, IF 100-1, IF 150, IF 200)

Product Description : Wireless data logger system

Applicant : Xylem Analytics Germany GmbH

Address : Dr.-Karl-Slevogt-Strasse 1

82362 WEILHEIM, GERMANY

Manufacturer : Xylem Analytics Germany GmbH

Address : Dr.-Karl-Slevogt-Strasse 1

82362 WEILHEIM, GERMANY

Licence holder : Xylem Analytics Germany GmbH

Address : Dr.-Karl-Slevogt-Strasse 1

82362 WEILHEIM, GERMANY

Test Result according to the standards
listed in clause 1 test standards:

POSITIVE

Test Report No. : **T40058-00-10HS**

05. September 2016

Date of issue



Deutsche
Akkreditierungsstelle
D-PL-12030-01-01
D-PL-12030-01-02

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test results
without the written permission of the test laboratory.

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Attachment A as separate supplement

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15, Subpart A - General (September 2015)

Part 15, Subpart A, Section 15.31	Measurement standards
Part 15, Subpart A, Section 15.33	Frequency range of radiated measurements
Part 15, Subpart A, Section 15.35	Measurement detector functions and bandwidths

FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (September 2015)

Part 15, Subpart C, Section 15.203	Antenna requirement
Part 15, Subpart C, Section 15.204	External radio frequency power amplifiers and antenna modifications
Part 15, Subpart C, Section 15.205	Restricted bands of operation
Part 15, Subpart C, Section 15.207	Conducted limits
Part 15, Subpart C, Section 15.209	Radiated emission limits, general requirements
Part 15, Subpart C, Section 15.247	Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz
ANSI C63.10: 2013	Testing Unlicensed Wireless Devices
ETSI TR 100 028 V1.3.1: 2001-03,	Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Uncertainties in the Measurement of Mobile Radio Equipment Characteristics—Part 1 and Part 2
KDB 558074 D01 v03r05	Guidance for performing compliance measurements on DTS operating under §15.247, April 8, 2016.

2 EQUIPMENT UNDER TEST

2.1 Photo documentation of the EUT – Detailed photos see ATTACHMENT A

2.2 Equipment type

ZigBee, fixed station

2.3 Short description of the equipment under test (EUT)

Interface for data logging system. The system consists of a fixed interface and one up to 4 mobile data logger (EBI10 Series, EBI100 Series). The interface identifies a logger in the programming slot via 13.56 MHz RFID-Transceiver. In the mobile data logger is a RFID-Tag only. A 2.4 GHz "ZigBee" port (Chipset according IEEE 802.15.4) is used for data exchange, communication and programming the data logger. The power supply as stand alone system is normally via USB, cascaded up to max. 3 systems the 15 VDC power supply have to be used.

Number of tested samples: 1

Serial number, IF200: 20007277, Firmware number: 2.08

EUT configuration:

(The CDF filled by the applicant can be viewed at the test laboratory.)

2.4 Variants of the EUT

Variant	Device-Name	Comment	Antenna
I01	IF200	Interface	external
I02	IF100	Interface	external
I03	IF100-1	Interface	integrated
I04	IF150	Interface	integrated
I05	IF300	Interface	integrated

Note: The interface IF 200, with external antenna AN2400-1901RS, has the most options and is as worst case selected for test.

2.5 Operation frequency and channel plan

The operating frequency is 2400 MHz to 2483.5 MHz.

Channel plan:

Channel	Frequency	Channel	Frequency
11	2405	19	2445
12	2410	20	2450
13	2415	21	2455
14	2420	22	2460
15	2425	23	2465
16	2430	24	2470
17	2435	25	2475
18	2440	26	2480

Note: the marked frequencies are determined for final testing.

2.6 Transmit operating modes

The EUT allows the user to switch the transmission on or off. There are no further operating modes.

The EUT use O-QPSK modulation and may provide following data rate:

- 250 kbps (kbps = *kilobits per second*)

2.7 Antenna

The following antennas shall be used with the EUT:

Number	Type	Certification name	Plug	Frequency range (GHz)	Gain (dBi)
1	Omni	AN2400-1901RS (Monopole)	SMA-R	2.4	5
2	Omni	AL 112 (Monopole)	SMA-R	2.4	-7.8
3	Omni	rod antenna (Monopole)	SMA-R	2.4	2
4	Omni	PCB meander antenna (Inverted F, Monopole)	none	2.4	5

Note: There are variants with antenna connector. This variants are not able to connect to the PCB meander antenna. Variants without antenna connector are only able to use the integrated PCB meander antenna.

2.8 Power supply system utilised

Power supply voltage, V_{nom} : 15 VDC (external AC mains adapter)

Power supply voltage (alternative) : USB supply voltage 5 VDC

2.9 Peripheral devices and interface cables

The following peripheral devices and interface cables are connected during the measurements:

- USB-Cable (host to client) 1 m Model : As usual in trade
- Notebook for control Model : Toshiba
- Power supply, 100 V-230 VAC, 15 VDC Model : GlobTek, GT-41080-1817-9-2-9

2.10 Determination of worst case conditions for final measurement

Measurements are made in all three orthogonal axes and the settings of the EUT are changed to locate at which position and at what setting of the EUT produce the maximum of the emissions. For the further measurement the EUT is set in X-position. The tests are carried out in the following frequency band:

2400 MHz – 2483.5 MHz

Preliminary tests are performed to find the worst case mode from all possible combinations between available modulations and data rates. The maximum output power depends on used data rate. The output power can not be set.

For the final test the following channels and test modes are selected:

IEEE Standard	Available channel	Tested channels	Power setting	Modulation	Modulation type	Data rate
802.15.4	11 to 26	11, 18, 26	Pmax	DSSS	O-QPSK	250 kbps

- TX continuous mode

2.11 Test jig

No special test jig is used for testing.

2.12 Test software

For testing, the interface is set in TX-continuous mode. The test software is available for testing only.

3 TEST RESULT SUMMARY

Operating in the 2400 MHz – 2483.5 MHz:

FCC Rule Part	RSS Rule Part	Description	Result
15.207(a)	RSS-Gen, 8.8	AC power line conducted emissions	passed
15.247(a)(2)	RSS247, 5.2(1)	-6 dB EBW	passed
15.247(b)(3)	RSS247, 5.4(4)	Maximum peak conducted output power	passed
15.247(b)(4)	RSS247, 5.4(4)	Defacto limit	not applicable
15.247(d)	RSS247, 5.5	Unwanted emissions, conducted	passed
15.247(d)	RSS-Gen, 8.9	Radiated emissions in restricted bands	passed
15.247(e)	RSS247, 5.2(2)	PSD	passed
15.203	-	Antenna requirement	passed
-	RSS-Gen, 6.11	Transmitter frequency stability	Not tested
-	RSS-Gen, 6.6	99 % Bandwidth	passed

The mentioned new RSS Rule Parts in the above table are related to:

RSS Gen, Issue 4, November 2014

RSS 247, Issue 1, May 2015

3.1 Final assessment

The equipment under test fulfills the EMI requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 24 May 2016

Testing concluded on : 15 June 2016

Checked by:

Tested by:

Eduard Stangl
Technical Director

Hermann Smetana
Radio Team

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

**CSA Group Bayern GmbH
Ohmstrasse 1-4
94342 STRASSKIRCHEN
GERMANY**

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: 15-35 °C

Humidity: 30-60 %

Atmospheric pressure: 86-106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor $k = 2$. The true value is located in the corresponding interval with a probability of 95 %. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 / 11.2003 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, CSA Group Bayern GmbH, is below the measurement uncertainty as defined by CISPR. Therefore, no special measures must be taken into consideration with regard to the limits according to CISPR. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Measurement Type	Range	Confidence Level	Calculated Uncertainty
AC power line conducted emissions	0.15 MHz to 30 MHz	95%	± 3.29 dB
EBW and OBW	2400 MHz to 3000 MHz	95%	$\pm 2.5 \times 10^{-7}$
Maximum peak conducted output power	2400 MHz to 3000 MHz	95%	± 0.62 dB
Power spectral density	2400 MHz to 3000 MHz	95%	± 0.62 dB
Conducted Spurious Emissions	9 kHz to 10000 MHz	95%	± 2.15 dB
Conducted Spurious Emissions	10000 MHz to 40000 MHz	95%	± 3.47 dB
Radiated Spurious Emissions	9 kHz to 30 MHz	95%	± 3.53 dB
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	± 3.71 dB
Radiated Spurious Emissions	1000 MHz to 10000 MHz	95%	± 2.34 dB
Field strength of the fundamental	100 kHz to 100 MHz	95%	± 3.53 dB

4.4 Measurement protocol for FCC and ISCED

4.4.1 General information

The Open Area test site is a listed Open Site under the Canadian Test-Sites File-No:

IC 3009A-1

The Anechoic chamber is a listed test site under the Canadian Test-Sites File-No:

IC 3009A-2

In compliance with RSS 247 testing for RSS compliance may be achieved by following the procedures set out in ANSI C63.10 and applying the CISPR 22 limits.

4.4.1.1 Justification

The equipment under test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral using the appropriate impedance characteristic or left unterminated. Where appropriate, cables are manually manipulated with respect to each other thus obtaining maximum disturbances from the unit.

4.4.1.2 Details of test procedures

The test methods used comply with CISPR Publication 22, EN 55022 - "Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement" and with ANSI C63.10 - "Testing Unlicensed Wireless Devices". In compliance with 47 CFR Part 15 Subpart A, Section 15.38 testing for FCC compliance may be achieved by following the procedures set out in ANSI C63.10 and applying the CISPR 22 limits.

5 TEST CONDITIONS AND RESULTS

5.1 AC power line conducted emissions

For test instruments and accessories used see section 6 Part A 4.

5.1.1 Description of the test location

Test location: Shielded Room S2

5.1.2 Photo documentation of the test set-up



5.1.3 Applicable standard

According to FCC Part 15, Section 15.207(a):

Except as shown in paragraphs (b) and (c) of this Section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the given limits.

5.1.4 Description of Measurement

The measurements are performed following the procedures set out in ANSI C63.10 described under item 6.2. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

5.1.5 Test result

Frequency range: 0.15 MHz - 30 MHz

Min. limit margin 12.33 dB at 15.357 MHz

Limit according to FCC Part 15, Section 15.207(a):

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

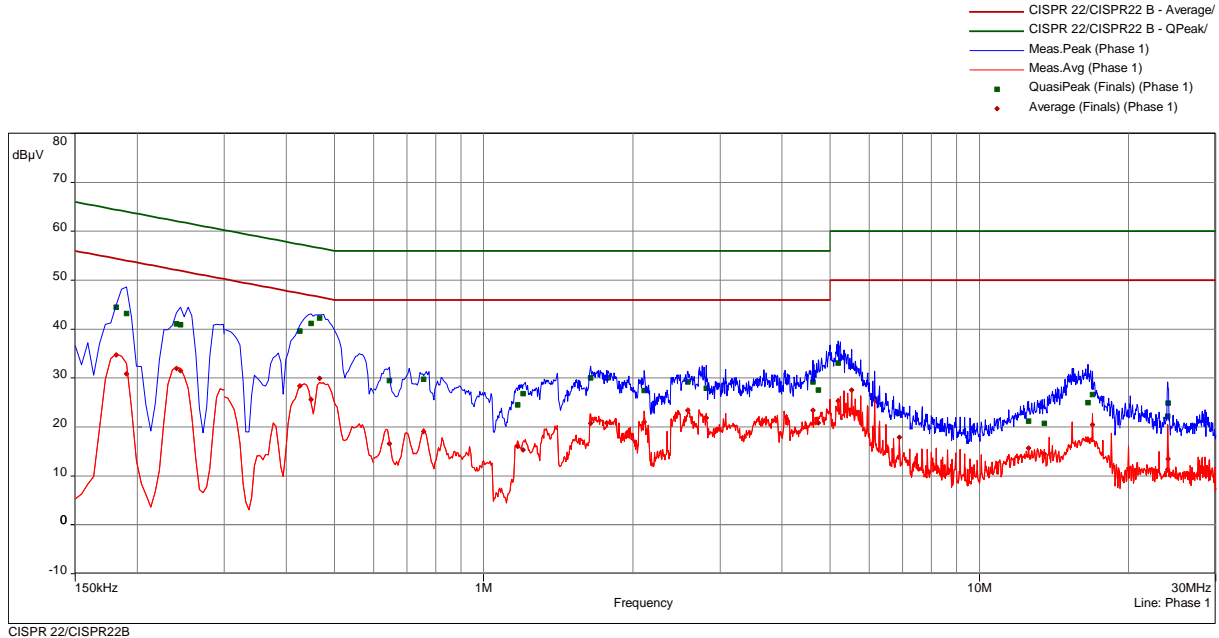
* Decreases with the logarithm of the frequency

The requirements are **FULFILLED**.**Remarks:** For detailed test result please see the following test protocols.

5.1.6 Test protocol

Test point L1
 Operation mode: Cont. Tx at 2.4 GHz
 Remarks: Connection via USB – all ports are free

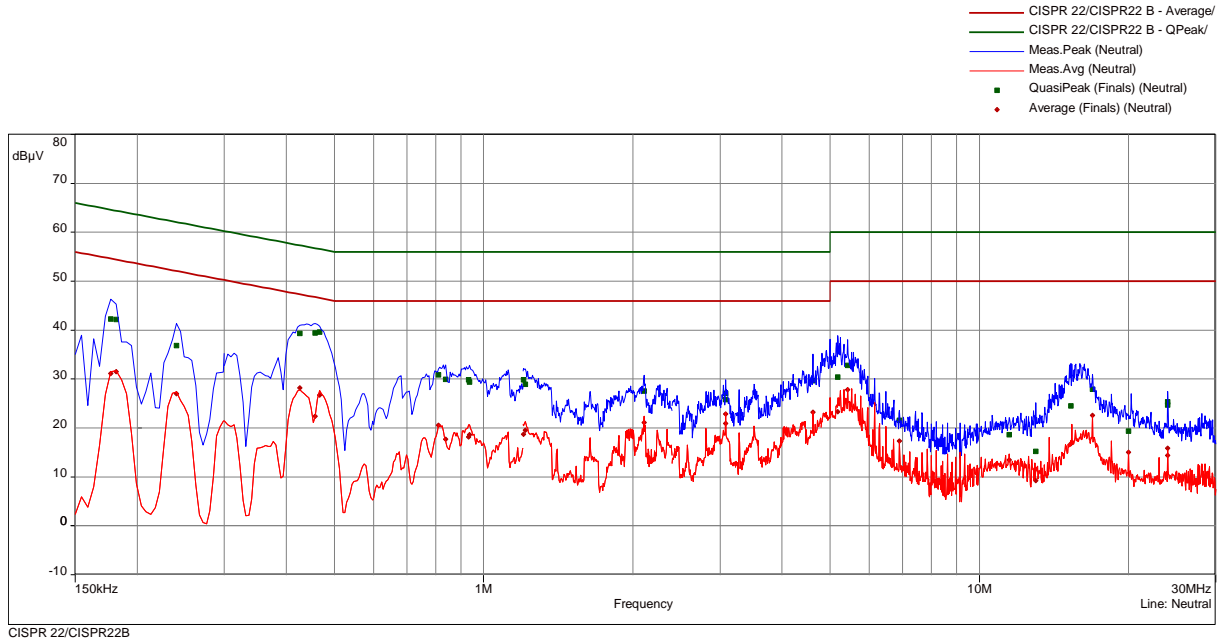
Result: passed



freq	SR	QP	margin	limit	AV	margin	limit	line	corr
MHz		dB(μV)	dB	dB	dB(μV)	dB	dB		dB
0.1815	1	44.49	19.93	64.42	34.75	19.67	54.42	Phase 1	9.84
0.1905	1	43.22	20.80	64.01	30.89	23.13	54.01	Phase 1	9.83
0.24	1	41.05	21.05	62.10	31.96	20.13	52.10	Phase 1	9.83
0.2445	1	40.89	21.05	61.94	31.55	20.40	51.94	Phase 1	9.83
0.426	2	39.56	17.77	57.33	28.42	18.91	47.33	Phase 1	9.81
0.4485	2	41.19	15.71	56.90	25.59	21.31	46.90	Phase 1	9.82
0.4665	2	42.31	14.27	56.58	29.90	16.67	46.58	Phase 1	9.82
0.645	3	29.49	26.51	56.00	16.57	29.43	46.00	Phase 1	9.81
0.7575	3	29.77	26.23	56.00	19.11	26.89	46.00	Phase 1	9.80
1.1715	3	24.49	31.51	56.00	16.05	29.95	46.00	Phase 1	9.80
1.2	3	26.80	29.20	56.00	15.33	30.67	46.00	Phase 1	9.80
1.6455	4	30.04	25.96	56.00	20.73	25.27	46.00	Phase 1	9.79
1.7715	4	30.02	25.98	56.00	20.80	25.20	46.00	Phase 1	9.79
2.109	4	27.43	28.57	56.00	21.01	24.99	46.00	Phase 1	9.80
2.58	5	29.22	26.78	56.00	23.41	22.59	46.00	Phase 1	9.79
2.814	5	27.88	28.12	56.00	21.87	24.13	46.00	Phase 1	9.79
4.614	5	29.23	26.77	56.00	23.39	22.61	46.00	Phase 1	9.81
4.74	5	27.55	28.45	56.00	20.79	25.21	46.00	Phase 1	9.82
5.1915	6	33.08	26.92	60.00	25.34	24.66	50.00	Phase 1	9.83
5.5245	6	32.41	27.59	60.00	27.58	22.42	50.00	Phase 1	9.82
6.906	6	22.78	37.22	60.00	17.85	32.15	50.00	Phase 1	9.84
12.5745	7	21.19	38.81	60.00	15.72	34.28	50.00	Phase 1	10.00
13.5285	7	20.72	39.28	60.00	14.47	35.53	50.00	Phase 1	10.04
16.566	7	24.95	35.05	60.00	17.30	32.70	50.00	Phase 1	10.18
16.926	7	26.63	33.37	60.00	20.48	29.52	50.00	Phase 1	10.19
23.97	8	22.26	37.74	60.00	11.24	38.76	50.00	Phase 1	10.34
24.06	8	24.90	35.10	60.00	13.46	36.54	50.00	Phase 1	10.34

Test point N
 Operation mode: Cont. Tx at 2.4 GHz
 Remarks: Connection via USB – all ports are free

Result: passed



freq	SR	QP	margin	limit	AV	margin	limit	line	corr
MHz		dB(μV)	dB	dB	dB(μV)	dB	dB		dB
0.177	9	42.27	22.35	64.63	31.14	23.49	54.63	Neutral	9.85
0.1815	9	42.22	22.20	64.42	31.53	22.89	54.42	Neutral	9.85
0.24	9	36.85	25.25	62.10	27.01	25.09	52.10	Neutral	9.84
0.426	10	39.38	17.96	57.33	28.18	19.15	47.33	Neutral	9.81
0.4575	10	39.41	17.33	56.74	22.44	24.29	46.74	Neutral	9.82
0.4665	10	39.58	17.00	56.58	26.74	19.83	46.58	Neutral	9.82
0.8115	11	30.90	25.10	56.00	20.57	25.43	46.00	Neutral	9.81
0.8385	11	29.98	26.02	56.00	17.67	28.33	46.00	Neutral	9.81
0.933	11	29.85	26.15	56.00	18.18	27.82	46.00	Neutral	9.82
0.9375	11	29.42	26.58	56.00	18.61	27.39	46.00	Neutral	9.82
1.2045	12	29.90	26.10	56.00	18.73	27.27	46.00	Neutral	9.80
1.2135	12	28.95	27.05	56.00	19.58	26.42	46.00	Neutral	9.80
2.109	12	27.54	28.46	56.00	21.07	24.93	46.00	Neutral	9.80
3.075	13	27.07	28.93	56.00	22.85	23.15	46.00	Neutral	9.79
3.0795	13	25.83	30.17	56.00	20.96	25.04	46.00	Neutral	9.79
4.614	13	29.66	26.34	56.00	23.24	22.76	46.00	Neutral	9.81
5.1825	14	30.36	29.64	60.00	23.35	26.65	50.00	Neutral	9.82
5.43	14	32.83	27.17	60.00	27.80	22.20	50.00	Neutral	9.81
6.906	14	21.56	38.44	60.00	17.37	32.63	50.00	Neutral	9.81
11.481	15	18.65	41.35	60.00	13.49	36.51	50.00	Neutral	9.85
12.993	15	15.24	44.76	60.00	9.26	40.74	50.00	Neutral	9.88
15.3105	15	24.49	35.51	60.00	16.83	33.17	50.00	Neutral	9.95
16.917	15	27.89	32.11	60.00	22.63	27.37	50.00	Neutral	10.00
19.992	16	19.35	40.65	60.00	15.07	34.93	50.00	Neutral	10.13
23.997	16	25.36	34.64	60.00	15.90	34.10	50.00	Neutral	9.96
24.0105	16	24.72	35.28	60.00	14.36	35.64	50.00	Neutral	9.96

FCC ID: VQ5-EBIIFXXX
IC: 7412A-EBIIFXXX

Test point

L1

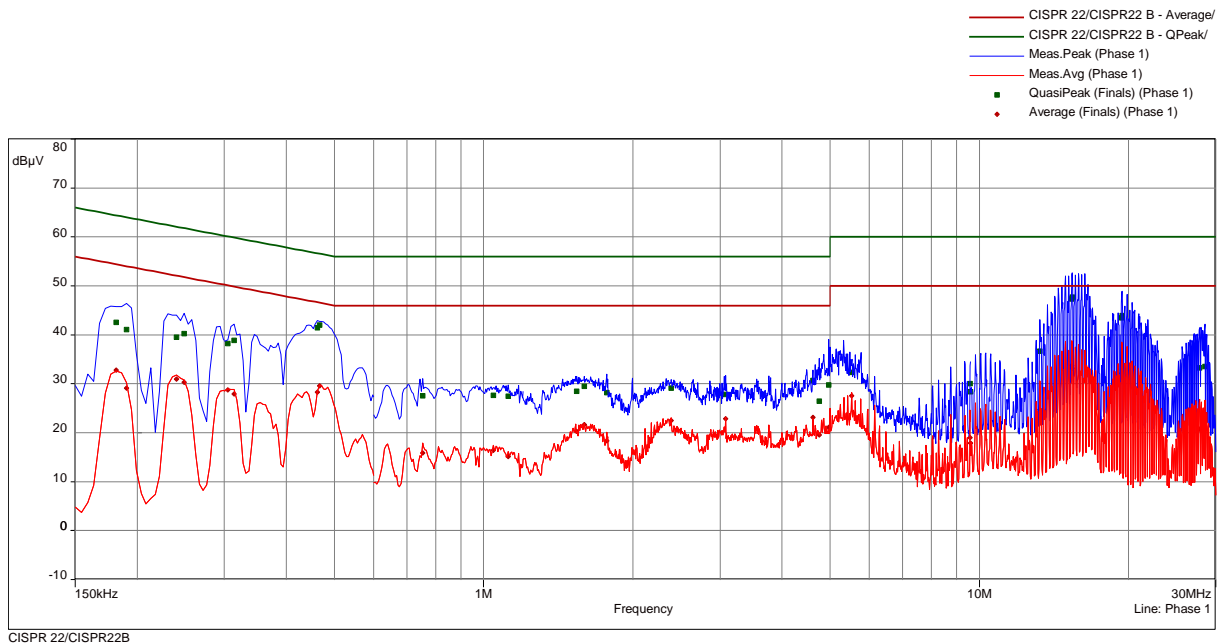
Result: passed

Operation mode:

active Connection at 2.4 GHz with logger in port 3

Remarks:

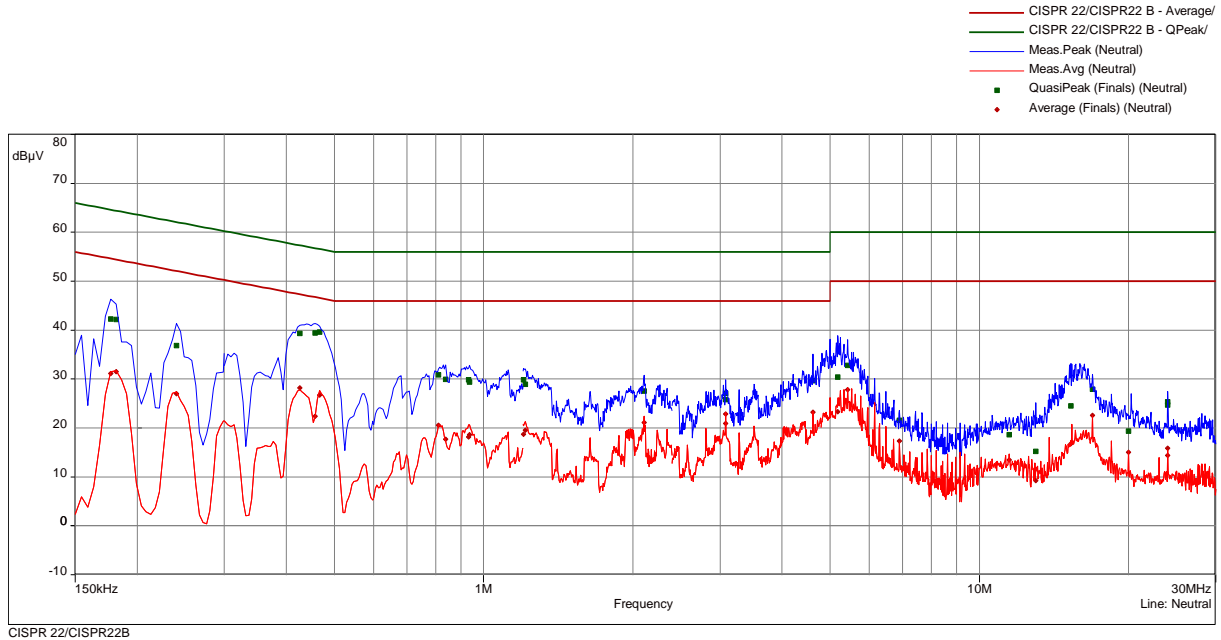
Connection via USB



freq	SR	QP	margin	limit	AV	margin	limit	line	corr
MHz		dB(μV)	dB	dB	dB(μV)	dB	dB		dB
0.1815	1	42.52	21.90	64.42	32.76	21.65	54.42	Phase 1	9.84
0.1905	1	41.06	22.95	64.01	29.10	24.91	54.01	Phase 1	9.83
0.24	1	39.54	22.56	62.10	30.97	21.13	52.10	Phase 1	9.83
0.249	1	40.25	21.54	61.79	30.36	21.44	51.79	Phase 1	9.83
0.3045	2	38.27	21.85	60.12	28.76	21.35	50.12	Phase 1	9.82
0.3135	2	38.90	20.98	59.88	27.94	21.94	49.88	Phase 1	9.82
0.462	2	41.47	15.19	56.66	28.28	18.38	46.66	Phase 1	9.82
0.4665	2	42.00	14.57	56.58	29.55	17.03	46.58	Phase 1	9.82
0.753	3	27.52	28.48	56.00	15.87	30.13	46.00	Phase 1	9.80
1.0455	3	27.63	28.37	56.00	16.41	29.59	46.00	Phase 1	9.81
1.122	3	27.48	28.52	56.00	15.14	30.86	46.00	Phase 1	9.81
1.542	4	28.43	27.57	56.00	20.27	25.73	46.00	Phase 1	9.78
1.596	4	29.52	26.48	56.00	21.65	24.35	46.00	Phase 1	9.79
1.7715	4	28.20	27.80	56.00	18.31	27.69	46.00	Phase 1	9.79
2.3925	4	29.09	26.91	56.00	22.45	23.55	46.00	Phase 1	9.79
3.0795	5	27.79	28.21	56.00	22.87	23.13	46.00	Phase 1	9.80
4.6185	5	30.66	25.34	56.00	23.10	22.90	46.00	Phase 1	9.81
4.758	5	26.43	29.57	56.00	19.57	26.43	46.00	Phase 1	9.82
4.971	6	29.72	26.28	56.00	21.09	24.91	46.00	Phase 1	9.82
5.5245	6	32.33	27.67	60.00	27.57	22.43	50.00	Phase 1	9.82
9.588	6	30.04	29.96	60.00	19.02	30.98	50.00	Phase 1	9.89
9.5925	6	28.43	31.57	60.00	17.86	32.14	50.00	Phase 1	9.89
13.254	7	36.63	23.37	60.00	24.68	25.32	50.00	Phase 1	10.03
15.3825	7	47.35	12.65	60.00	33.75	16.25	50.00	Phase 1	10.13
15.387	7	47.67	12.33	60.00	33.19	16.81	50.00	Phase 1	10.13
19.4025	8	43.49	16.51	60.00	32.18	17.82	50.00	Phase 1	10.30
19.407	8	43.98	16.02	60.00	31.33	18.67	50.00	Phase 1	10.30
27.804	8	33.25	26.75	60.00	20.77	29.23	50.00	Phase 1	10.34
28.524	8	33.53	26.47	60.00	20.77	29.23	50.00	Phase 1	10.34

Test point N
Operation mode: active Connection at 2.4 GHz with logger in port 3
Remarks: Connection via USB

Result: passed



freq	SR	QP	margin	limit	AV	margin	limit	line	corr
MHz		dB(μV)	dB	dB	dB(μV)	dB	dB		dB
0.177	9	42.27	22.35	64.63	31.14	23.49	54.63	Neutral	9.85
0.1815	9	42.22	22.20	64.42	31.53	22.89	54.42	Neutral	9.85
0.24	9	36.85	25.25	62.10	27.01	25.09	52.10	Neutral	9.84
0.426	10	39.38	17.96	57.33	28.18	19.15	47.33	Neutral	9.81
0.4575	10	39.41	17.33	56.74	22.44	24.29	46.74	Neutral	9.82
0.4665	10	39.58	17.00	56.58	26.74	19.83	46.58	Neutral	9.82
0.8115	11	30.90	25.10	56.00	20.57	25.43	46.00	Neutral	9.81
0.8385	11	29.98	26.02	56.00	17.67	28.33	46.00	Neutral	9.81
0.933	11	29.85	26.15	56.00	18.18	27.82	46.00	Neutral	9.82
0.9375	11	29.42	26.58	56.00	18.61	27.39	46.00	Neutral	9.82
1.2045	12	29.90	26.10	56.00	18.73	27.27	46.00	Neutral	9.80
1.2135	12	28.95	27.05	56.00	19.58	26.42	46.00	Neutral	9.80
2.109	12	27.54	28.46	56.00	21.07	24.93	46.00	Neutral	9.80
3.075	13	27.07	28.93	56.00	22.85	23.15	46.00	Neutral	9.79
3.0795	13	25.83	30.17	56.00	20.96	25.04	46.00	Neutral	9.79
4.614	13	29.66	26.34	56.00	23.24	22.76	46.00	Neutral	9.81
5.1825	14	30.36	29.64	60.00	23.35	26.65	50.00	Neutral	9.82
5.43	14	32.83	27.17	60.00	27.80	22.20	50.00	Neutral	9.81
6.906	14	21.56	38.44	60.00	17.37	32.63	50.00	Neutral	9.81
11.481	15	18.65	41.35	60.00	13.49	36.51	50.00	Neutral	9.85
12.993	15	15.24	44.76	60.00	9.26	40.74	50.00	Neutral	9.88
15.3105	15	24.49	35.51	60.00	16.83	33.17	50.00	Neutral	9.95
16.917	15	27.89	32.11	60.00	22.63	27.37	50.00	Neutral	10.00
19.992	16	19.35	40.65	60.00	15.07	34.93	50.00	Neutral	10.13
23.997	16	25.36	34.64	60.00	15.90	34.10	50.00	Neutral	9.96
24.0105	16	24.72	35.28	60.00	14.36	35.64	50.00	Neutral	9.96

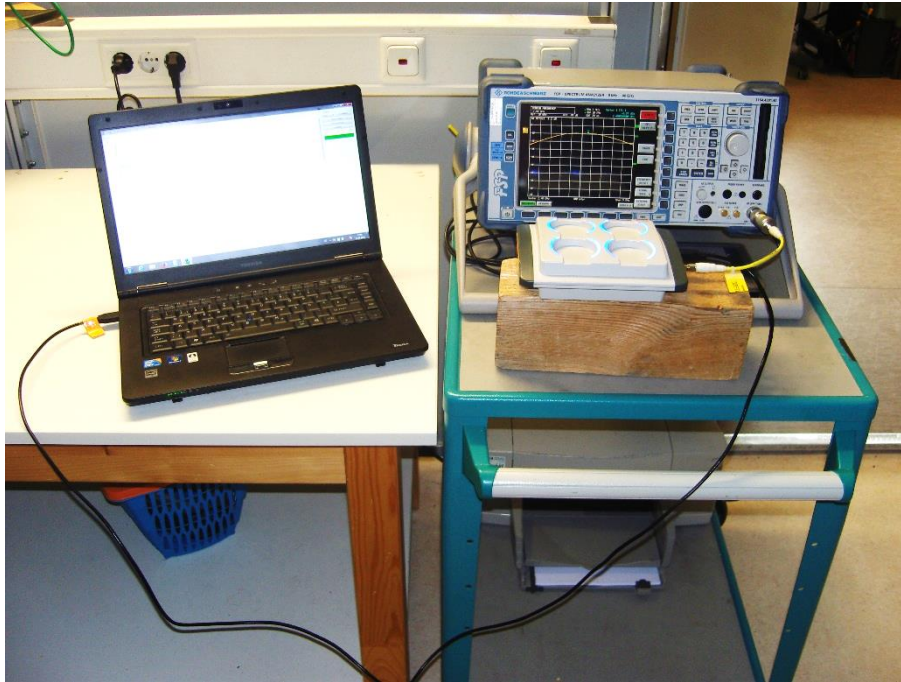
5.2 EBW and OBW

For test instruments and accessories used see section 6 Part **MB**.

5.2.1 Description of the test location

Test location: AREA4

5.2.2 Photo documentation of the test set-up



5.2.3 Applicable standard

According to FCC Part 15, Section 15.247(a)(2):

Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 – 2483.5 MHz and 5725 – 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

5.2.4 Description of Measurement

The bandwidth was measured at an amplitude level reduced from the reference level of a modulated channel by a ratio of -6 dB. The reference level is the level of the highest signal amplitude observed at the transmitted bandwidth at either the fundamental frequency or the first order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical. An alternative is to use the bandwidth measurement of the analyser.

Spectrum analyser settings for EBW 6dB:

RBW: 100 kHz, VBW: 300 kHz, Detector: Max peak, Sweep time: 5 s, Span: 2 EBW;

Spectrum analyser settings for OBW:

RBW: 1-5% OBW, VBW: 3 RBW, Detector: Max peak, Sweep time: 5 s, Span: 2 OBW;

5.2.5 Test result

Channel	Centre frequency (MHz)	6 dB bandwidth (MHz)	Minimum limit (MHz)
11	2405	1.587	0.5
18	2440	1.587	0.5
26	2480	1.582	0.5

Channel	Centre frequency (MHz)	99 % bandwidth (MHz)
11	2405	2.473
18	2440	2.466
26	2480	2.474

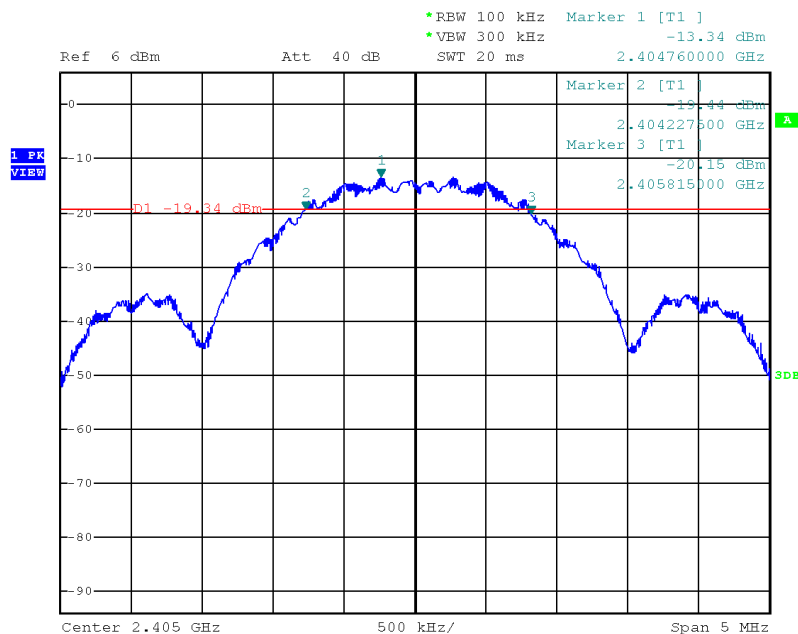
Limit according to FCC Part 15, Section 15.247(b)(2):
The minimum 6 dB bandwidth shall be at least 500 kHz.

The requirements are **FULFILLED**.

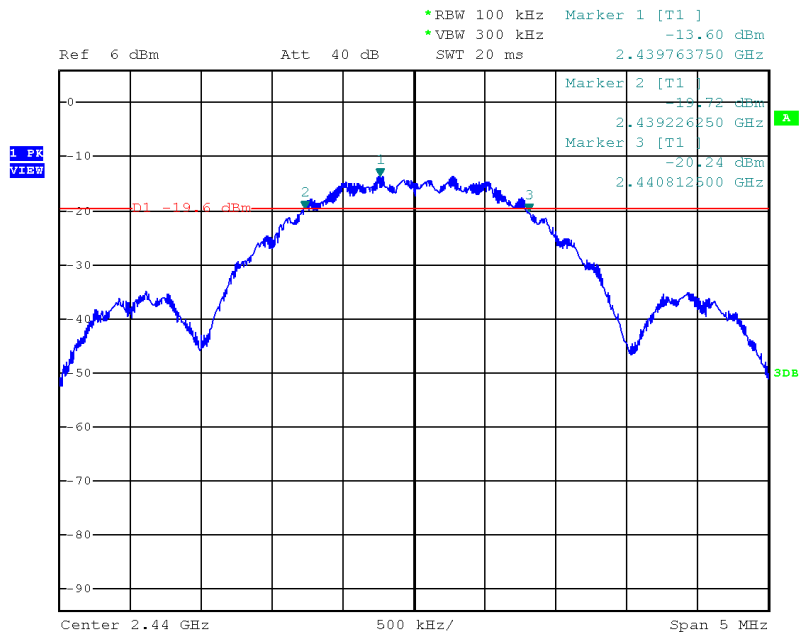
Remarks: For detailed test result please see the following test protocols.

5.2.6 Test protocols EBW 6 dB

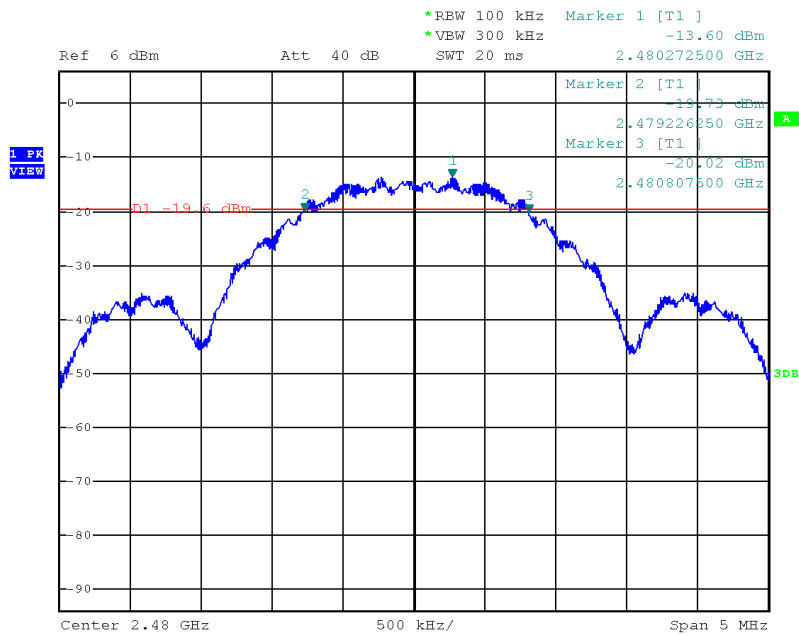
Channel 11 (2405 MHz)



Channel 18 (2440 MHz)

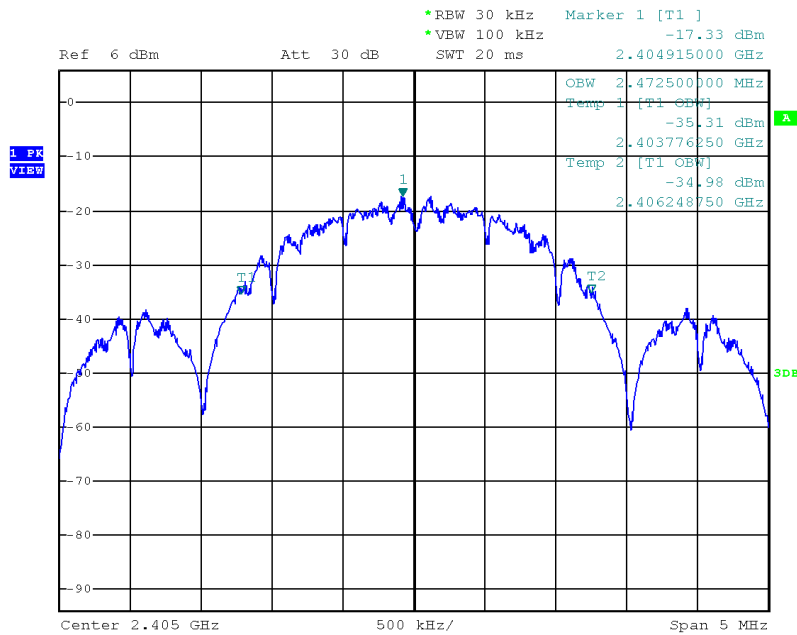


Channel 26 (2480 MHz)

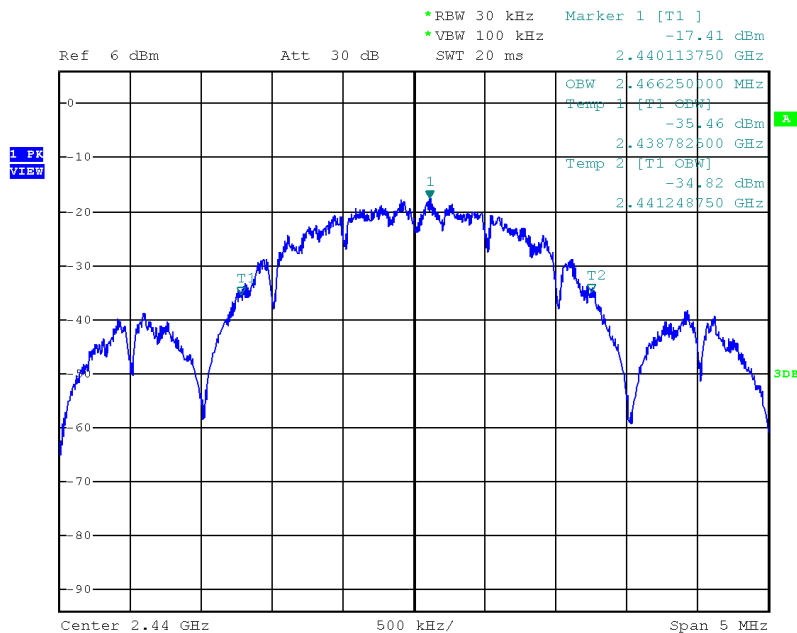


5.2.7 Test protocols OBW

Channel 11 (2405 MHz)



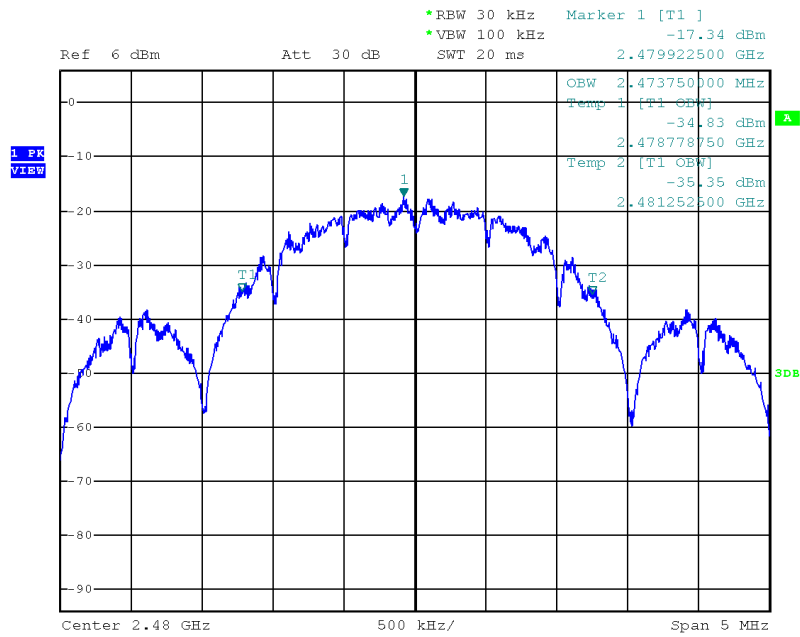
Channel 18 (2440 MHz)



FCC ID: VQ5-EBIIFXXX

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Channel 26 (2480 MHz)



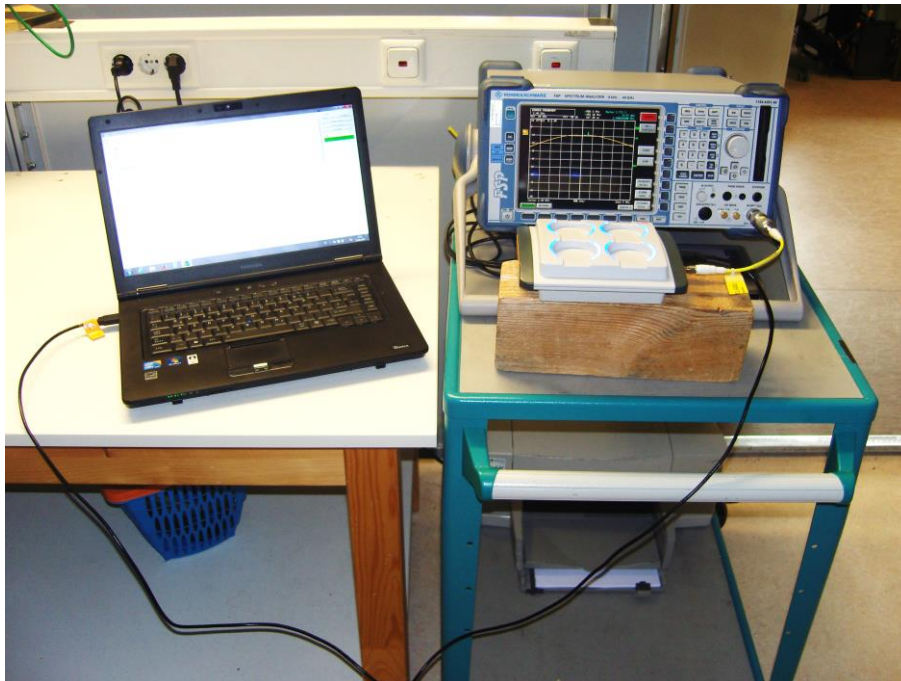
5.3 Maximum peak conducted output power

For test instruments and accessories used see section 6 Part **CPC 3**.

5.3.1 Description of the test location

Test location: AREA4

5.3.2 Photo documentation of the test set-up



5.3.3 Applicable standard

According to FCC Part 15, Section 15.247(b)(3):

For systems using digital modulation in the 2400-2483.5 MHz the maximum peak conducted output power of the transmitter shall not exceed 1 Watt.

5.3.4 Description of Measurement

The maximum peak conducted output power is measured using a spectrum analyser following the procedure set out in KDB 558074, item 9.1.1. The EUT is set in TX continuous mode while measuring.

5.3.5 Test result

802.15.4, 250 kbps, TX		Test results		
		A (dBm)	Peak power limit (dBm)	Margin (dB)
Lowest frequency: CH11				
T_{nom}	V_{nom}	-2.6	30.0	-32.6
Middle frequency: CH18				
T_{nom}	V_{nom}	-2.2	30.0	-32.2
Highest frequency: CH26				
T_{nom}	V_{nom}	-1.4	30.0	-31.4

Peak Power Limit according to FCC Part 15, Section 15.247(b)(3):

Frequency (MHz)	Peak Power Limit	
	(dBm)	(W)
902-928	30	1.0
2400-2483.5	30	1.0
5725-5850	30	1.0

The requirements are **FULFILLED**.

Remarks:

5.4 EIRP, Defacto limit

For test instruments and accessories used see section 6 Part **CPC 3**.

5.4.1 Description of the test location

Test location: NONE

Remarks: Not applicable, the antenna gain is less 6 dBi.

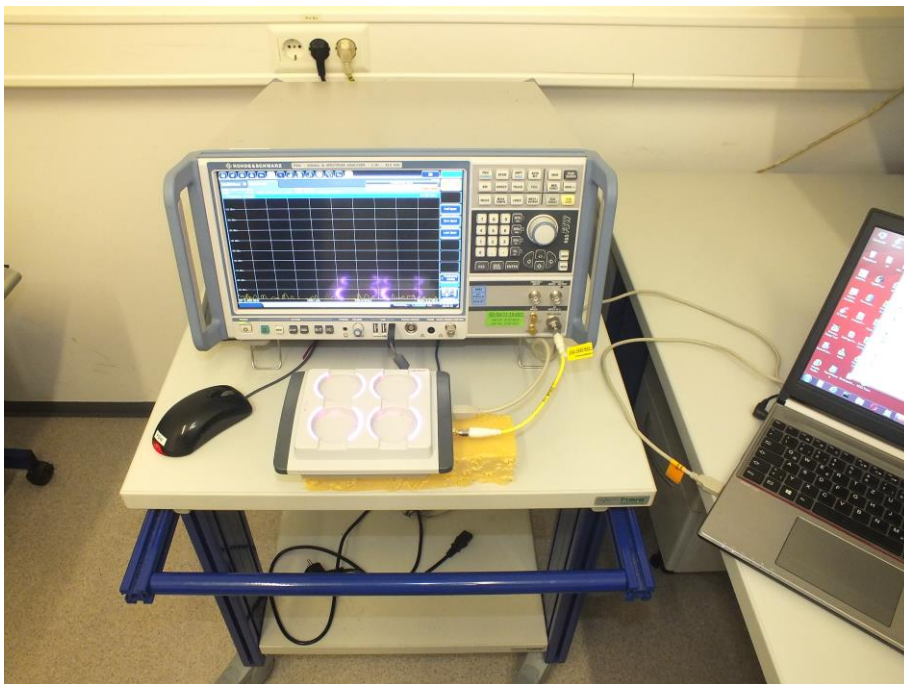
5.5 Power spectral density

For test instruments and accessories used see section 6 Part **MB**.

5.5.1 Description of the test location

Test location: AREA4

5.5.2 Photo documentation of the test set-up



5.5.3 Applicable standard

According to FCC Part 15, Section 15.247(e):

For digitally modulated systems, the power spectral density radiated from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the radiated output power shall be used to determine the power spectral density.

5.5.4 Description of Measurement

The measurement is performed using the procedure 10.2 set out in KDB-558074. Therefore the PKPSD is measured conducted. The max peak is located and measured with the spectrum analyser and the marker set to peak. A transducer is used to compensate the insertion loss of the cable.

Spectrum analyser settings:

RBW: 3 kHz, VBW: 10 kHz, Detector: Peak, Sweep time: Auto

5.5.5 Test result

802.15.4, 250 kbps, 1 TX		Test results conducted				
		PD [Pmax] (dBm/3kHz)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm/3kHz)	Margin (dB)
Lowest frequency: 2405 MHz						
T_{nom}	V_{nom}	-24.6	5.0	-19.6	14.0	-33.6
Middle frequency: 2440 MHz						
T_{nom}	V_{nom}	-24.8	5.0	-19.8	14.0	-33.8
Highest frequency: 2480 MHz						
T_{nom}	V_{nom}	-25.2	5.0	-20.2	14.0	-34.2

Power spectral density limit according to FCC Part 15, Section 15.247(e):

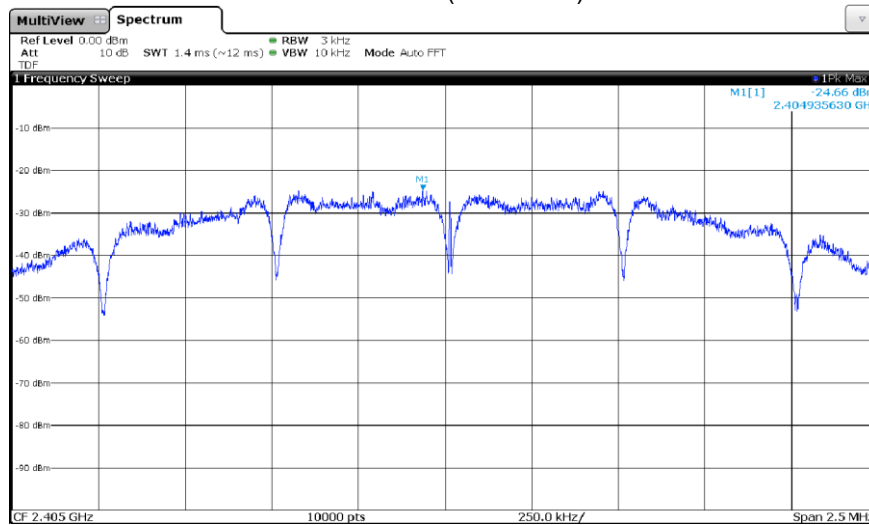
Frequency (MHz)	Power spectral density limit (EIRP)
	(dBm/3 kHz)
2400 - 2483.5	14

The requirements are **FULFILLED**.

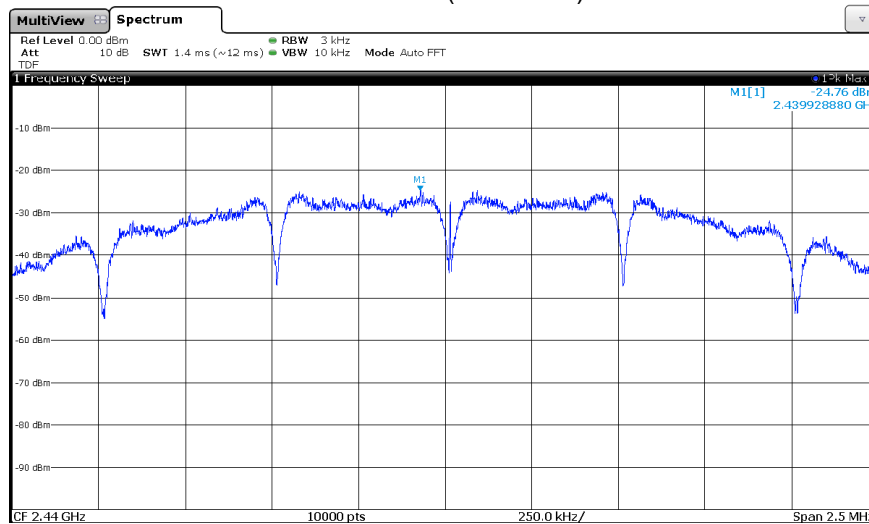
Remarks: For detailed test result please see the following test protocols.

5.5.6 Test protocols

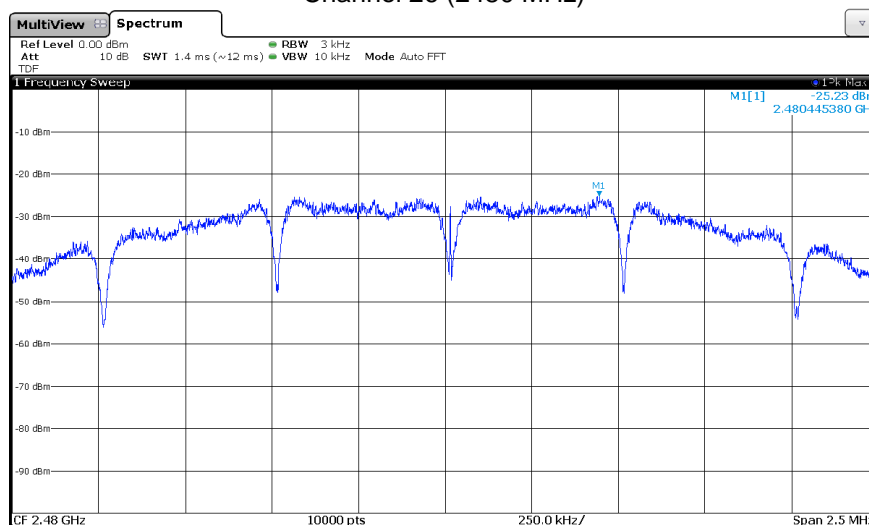
Channel 11 (2405 MHz)



Channel 18 (2440 MHz)



Channel 26 (2480 MHz)



5.6 Radiated emissions in restricted bands

For test instruments and accessories used see section 6 Part **SER 2**, **SER 3**.

5.6.1 Description of the test location

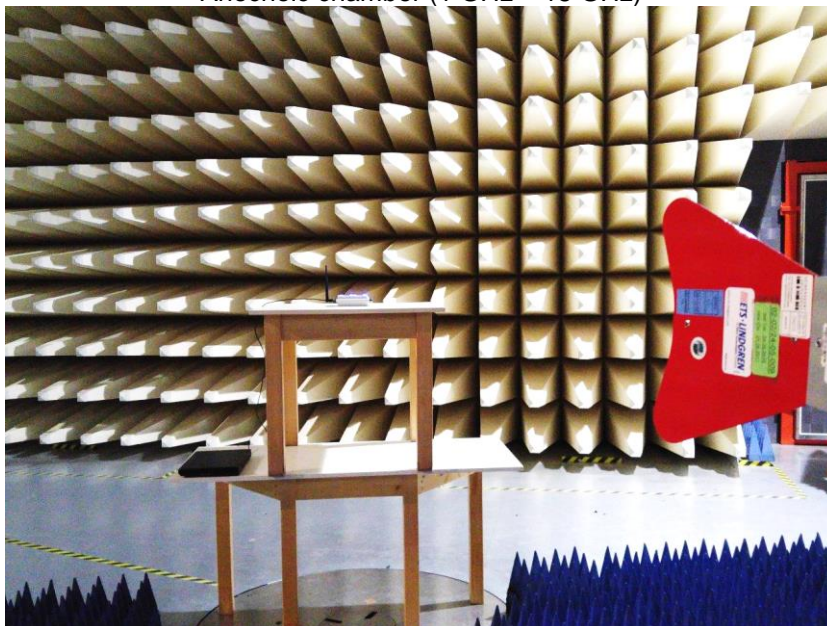
Test location: OATS 1
 Test location: Anechoic Chamber 1
 Test distance: 3 m
 Test distance: 1 m (for frequencies > 18GHz)

5.6.2 Photo documentation of the test set-up

Open area test site (30 MHz – 1000 MHz)



Anechoic chamber (1 GHz – 18 GHz)





Horn Antenna (18 GHz – 25 GHz)



5.6.3 Applicable standard

According to FCC Part 15, Section 15.205(a):

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limit specified in Section 15.209(a).

5.6.4 Description of Measurement

The restricted bands are measured radiated. The span of the spectrum analyser is set wide enough to capture the restricted band and measure the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation. The restricted bands are measured falling emissions into it and the nearest restricted band are checked for emissions also the restricted band for the harmonics of the carrier.

EMC Test receiver settings for SER2:

RBW: 120 MHz, Detector: Quasi peak, Mes. Time: 1 s,

Spectrum analyser settings for SER3:

RBW: 1 MHz, VBW: 3 MHz, Detector: Max. peak, Trace: Max. hold, Sweep: Auto

Due to the small output power the spurious emissions are measured > 1 GHz RBW 1 MHz and against the general limit.

5.6.5 Test result

Emissions 30 MHz – 1000 MHz

Test conditions: TX continuous							
CH11, Pre-scan			Test results				
Start <i>f</i>	Stop <i>f</i>	RBW	Maximum emission		Limit	Margin	Detector
(MHz)	(MHz)	(kHz)	(MHz)	(dB μ V/m)	(dB μ V/m)	(dB)	
30	1000	120	58.00	28.6	40.0	-11.4	QP
30	1000	120	256.00	35.8	46.0	-10.2	QP
30	1000	120	304.00	43.0	46.0	-3.0	QP
30	1000	120	336.00	39.4	46.0	-6.6	QP
30	1000	120	368.00	40.6	46.0	-5.4	QP
30	1000	120	963.00	37.5	54.0	-16.5	QP
Measurement uncertainty				± 6 dB			

Test conditions: TX continuous							
CH18, Pre-scan			Test results				
Start <i>f</i>	Stop <i>f</i>	RBW	Maximum emission		Limit	Margin	Detector
(MHz)	(MHz)	(kHz)	(MHz)	(dB μ V/m)	(dB μ V/m)	(dB)	
30	1000	120	58.00	27.6	40.0	-12.4	QP
30	1000	120	256.00	37.9	46.0	-8.1	QP
30	1000	120	304.00	43.6	46.0	-2.4	QP
30	1000	120	368.00	41.3	46.0	-4.7	QP
30	1000	120	868.00	36.6	46.0	-9.4	QP
30	1000	120	963.00	37.6	54.0	-16.4	QP
Measurement uncertainty				± 6 dB			

Test conditions: TX continuous							
CH26, Peak pre-scan			Test results				
Start <i>f</i>	Stop <i>f</i>	RBW	Maximum emission		Limit	Margin	Detector
(MHz)	(MHz)	(kHz)	(MHz)	(dB μ V/m)	(dB μ V/m)	(dB)	
30	1000	120	58.00	20.9	40.0	-19.1	QP
30	1000	120	256.00	36.8	46.0	-9.2	QP
30	1000	120	272.00	38.6	46.0	-7.4	QP
30	1000	120	304.00	44.4	46.0	-1.6	QP
30	1000	120	368.00	41.3	46.0	-4.7	QP
30	1000	120	868.00	36.6	46.0	-9.4	QP
Measurement uncertainty				± 6 dB			

Emissions 1 GHz – 25 GHz

Test conditions: TX continuous							
CH11, Peak pre-scan			Test results				
Start <i>f</i>	Stop <i>f</i>	RBW	Maximum emission		AVLimit	Margin	Detector
(MHz)	(MHz)	(kHz)	(MHz)	(dBμV/m)	(dBμV/m)	(dB)	
1000	2400	1000	1199.00	47.1	54.0	-6.9	Pk
2483.5	4000	1000	2493.50	46.7	54.0	-7.3	Pk
4000	8000	1000	4810.40	64.6	54.0	10.6	Pk
4000	8000	1000	4810.40	52.4	54.0	-1.6	AV
4000	8000	1000	7213.80	62.7	54.0	8.7	Pk
8000	12000	1000	11961.00	53.9	54.0	-0.1	Pk
12000	18000	1000	17843.75	55.6	54.0	1.6	Pk
12000	18000	1000	17843.75	53.5	54.0	-0.5	AV
18000	25000	1000	19632.63	47.4	54.0	-6.6	Pk
Measurement uncertainty				±6 dB			

Note: Up from 7.5 GHz to 25 GHz only noise could be observed.

Test conditions: TX continuous							
CH18, Peak pre-scan			Test results				
Start <i>f</i>	Stop <i>f</i>	RBW	Maximum emission		AVLimit	Margin	Detector
(MHz)	(MHz)	(kHz)	(MHz)	(dBμV/m)	(dBμV/m)	(dB)	
1000	2400	1000	1598.00	44.7	54.0	-9.3	Pk
2483.5	4000	1000	2496.00	44.3	54.0	-9.7	Pk
4000	8000	1000	4879.00	54.3	54.0	0.3	Pk
4000	8000	1000	4879.00	52.4	54.0	-1.6	AV
8000	12000	1000	11952.00	54.4	54.0	0.4	Pk
8000	12000	1000	11952.00	52.1	54.0	-1.9	AV
12000	18000	1000	17828.00	57.3	54.0	3.3	Pk
12000	18000	1000	17828.00	53.6	54.0	-0.4	AV
18000	25000	1000	18101.25	47.4	54.0	-6.7	Pk
Measurement uncertainty				±6 dB			

Note: Up from 7.5 GHz to 25 GHz only noise could be observed.

Test conditions: TX continuous							
CH26, Peak pre-scan			Test results				
Start <i>f</i>	Stop <i>f</i>	RBW	Maximum emission		AVLimit	Margin	Detector
(MHz)	(MHz)	(kHz)	(MHz)	(dBμV/m)	(dBμV/m)	(dB)	
1000	2400	1000	1597.00	45.8	54.0	-8.2	Pk
2483.5	4000	1000	2631.00	43.0	54.0	-11.0	Pk
4000	8000	1000	4959.00	53.8	54.0	-0.2	Pk
8000	12000	1000	11915.00	54.6	54.0	0.6	Pk
8000	12000	1000	11915.00	50.9	54.0	-3.1	AV
12000	18000	1000	17894.00	58.3	54.0	4.3	Pk
12000	18000	1000	17894.00	53.7	54.0	-0.3	AV
18000	25000	1000	21060.53	47.4	54.0	-6.6	Pk
Measurement uncertainty				±6 dB			

Note: Up from 7.5 GHz to 25 GHz only noise could be observed.

Radiated limits according to FCC Part 15 Section 15.209(a) for spurious emissions which fall in restricted bands:

Frequency (MHz)	Field strength of spurious emissions		Measurement distance (metres)
	($\mu\text{V/m}$)	dB($\mu\text{V/m}$)	
0.009-0.490	2400/F (kHz)		300
0.490-1.705	24000/F (kHz)		30
1.705-30	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Restricted bands of operation:

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209

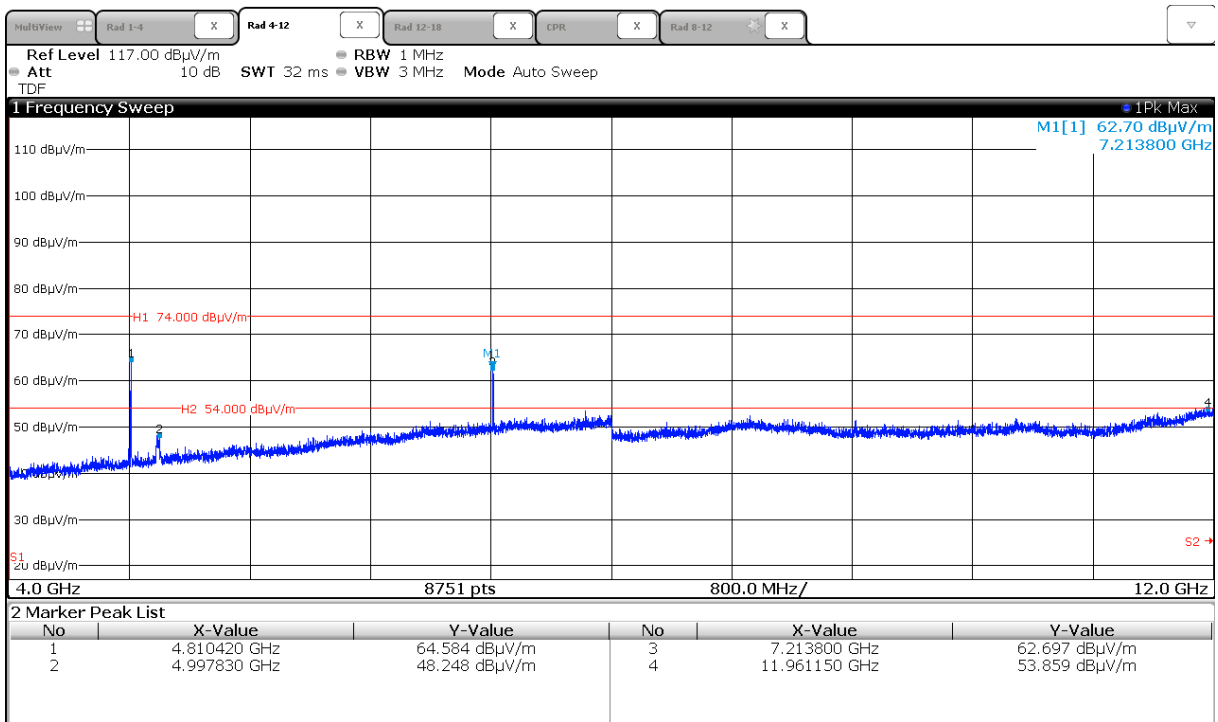
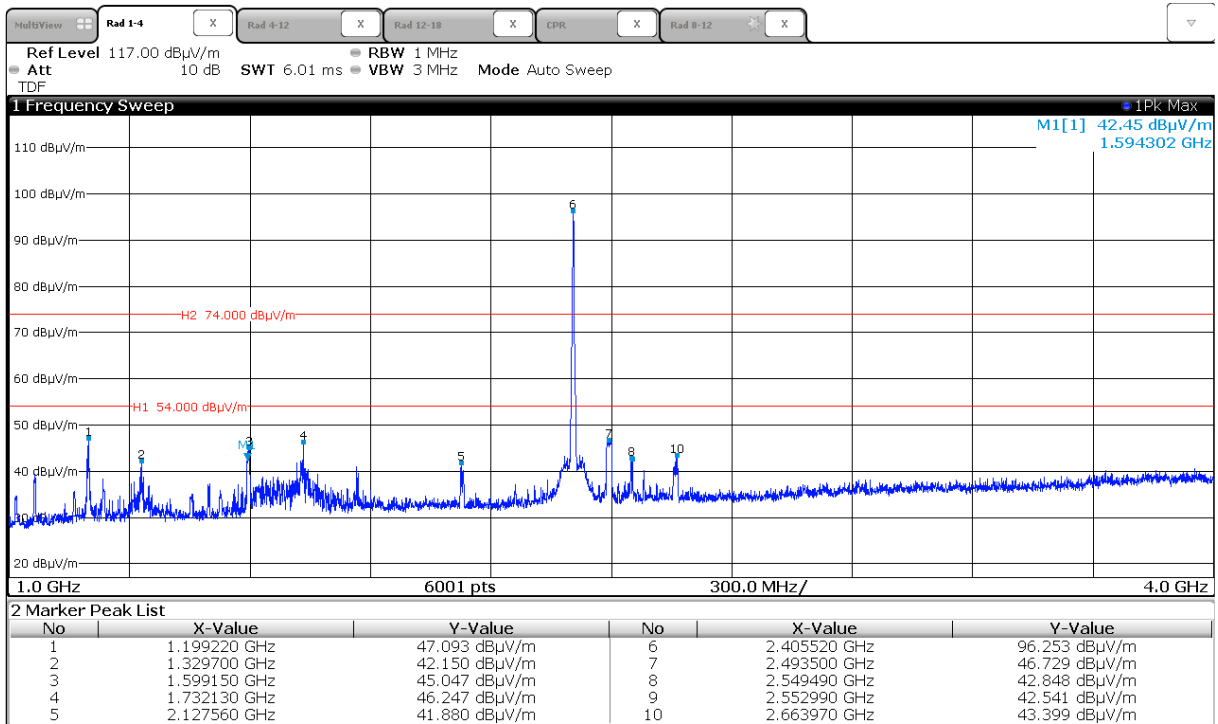
MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	399.9 – 410	4.5 – 5.15
0.495 – 0.505	16.69475 – 16.69525	608 – 614	5.35 – 5.46
2.1735 – 2.1905	16.80425 – 16.80475	960 – 1240	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1300 – 1427	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1645.5 – 1646.5	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1660 – 1710	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	1718.8 – 1722.2	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2200 – 2300	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2310 – 2390	15.35 – 16.2
8.362 – 8.366	156.52475 – 156.52525	2483.5 – 2500	17.7 – 21.4
8.37625 – 8.38675	156.7 – 156.9	2690 – 2900	22.01 – 23.12
8.41425 – 8.41475	162.0125 – 167.17	3260 – 3267	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3332 – 3339	31.2 – 31.8
12.51975 – 12.52025	240 – 285	3345.8 – 3358	36.43 – 36.5
12.57675 – 12.57725	322 – 335.4	3600 – 4400	Above 38.6

The requirements are **FULFILLED**.

Remarks: The measurement was performed up to the 10th harmonic. For detailed test results please see the following test protocols. The worst case plots are shown only.

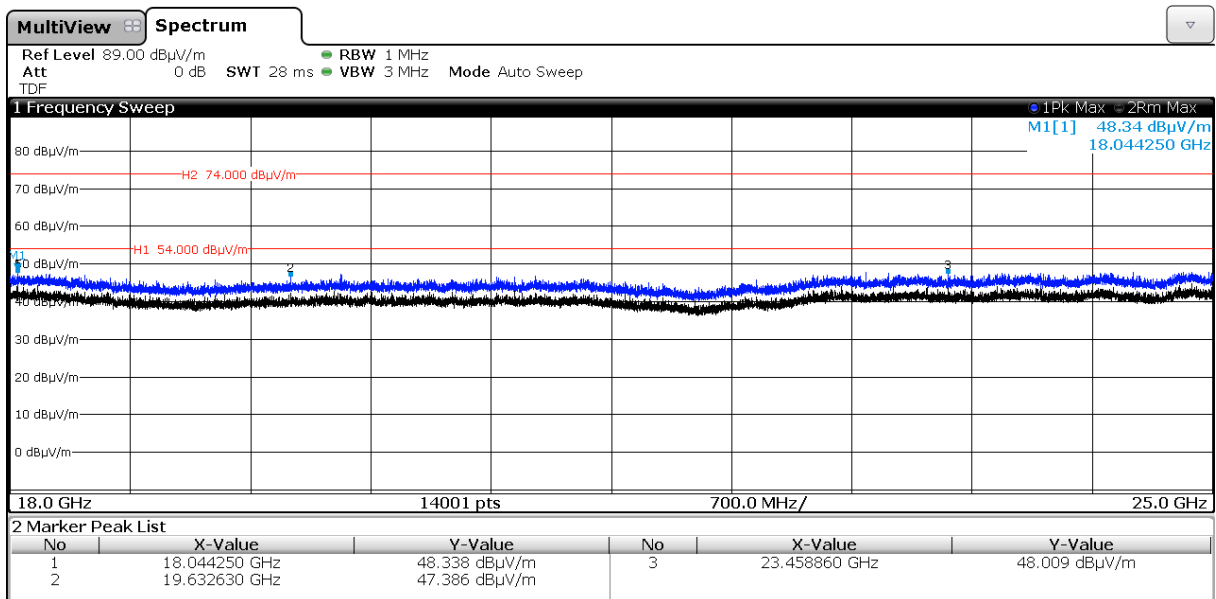
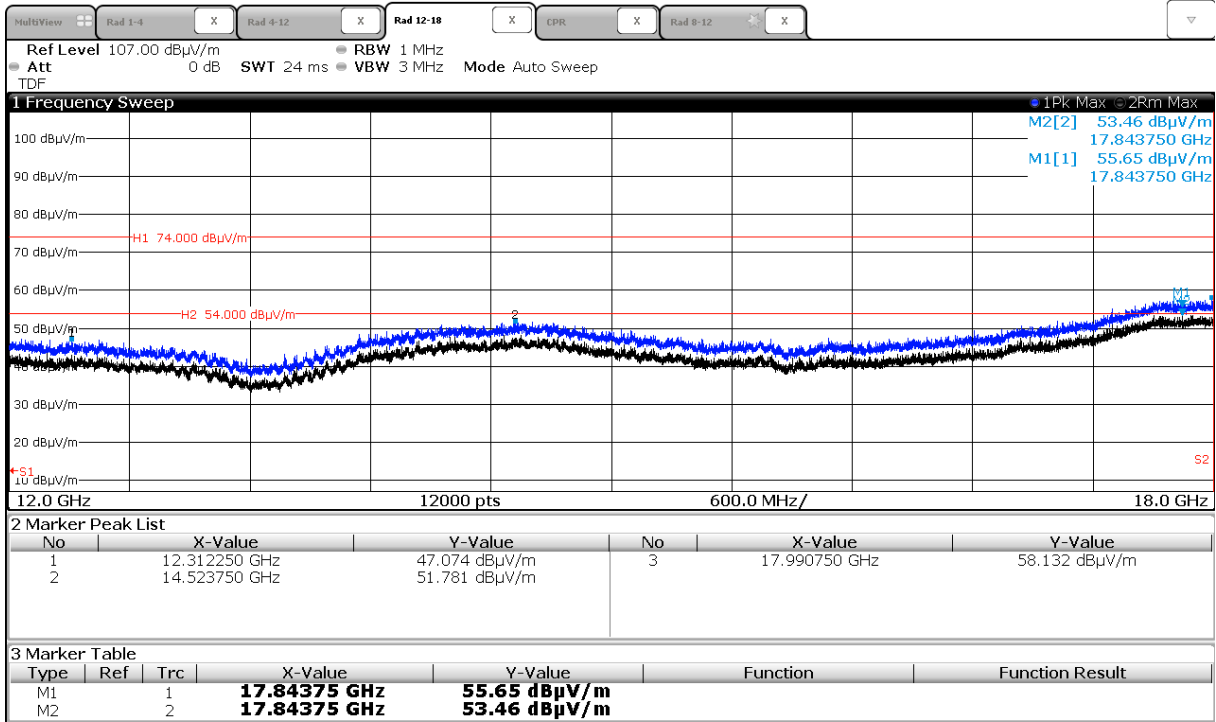
5.6.6 Test protocols radiated emissions SER3

Channel 11



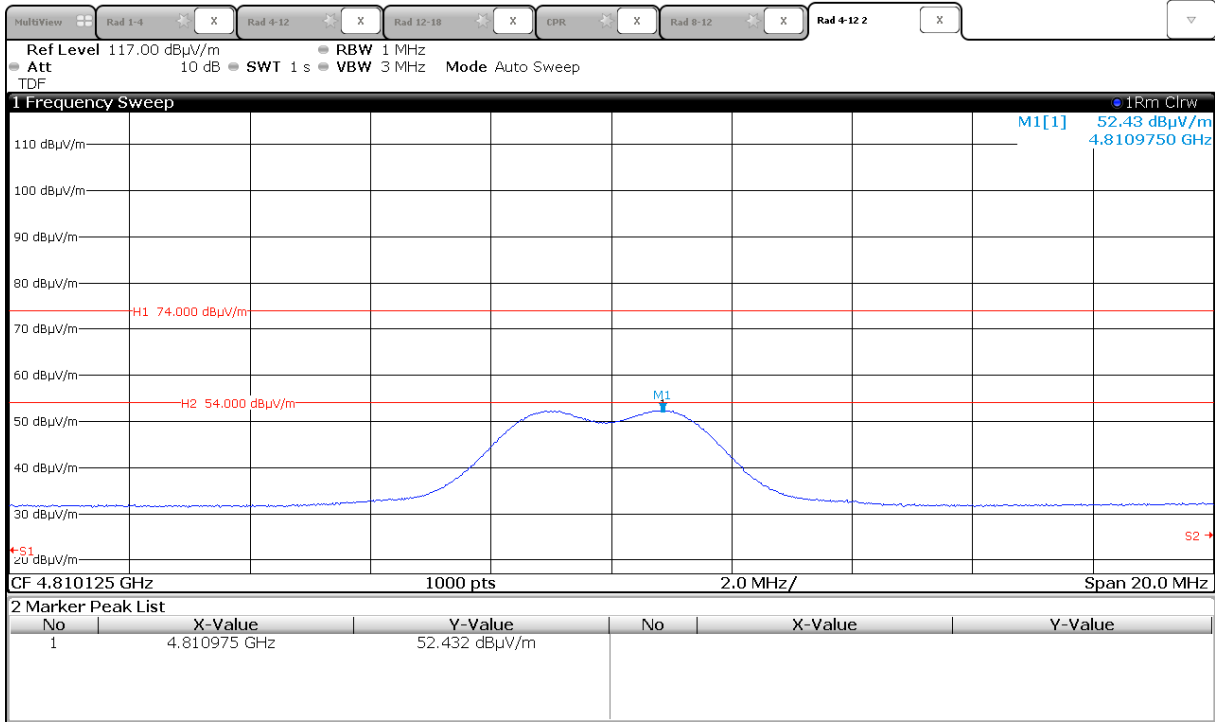
FCC ID: VQ5-EBIIFXXX

IC: 7412A-EBIIFXXX

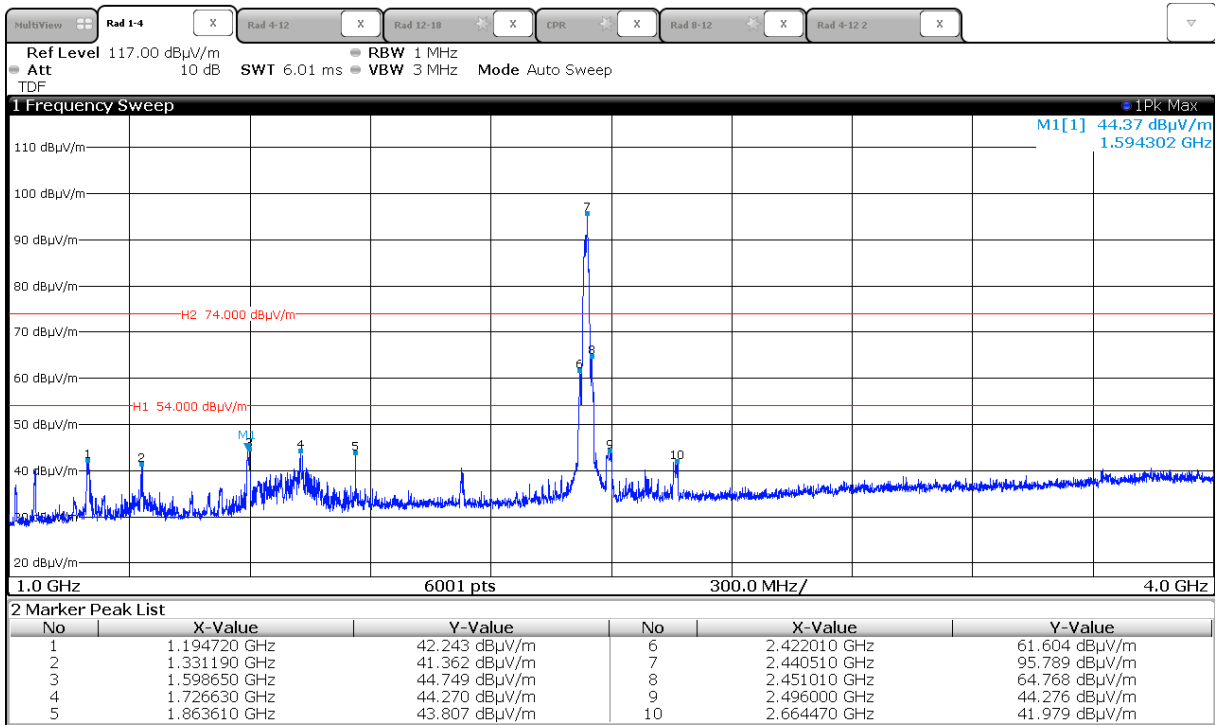


FCC ID: VQ5-EBIIFXXX

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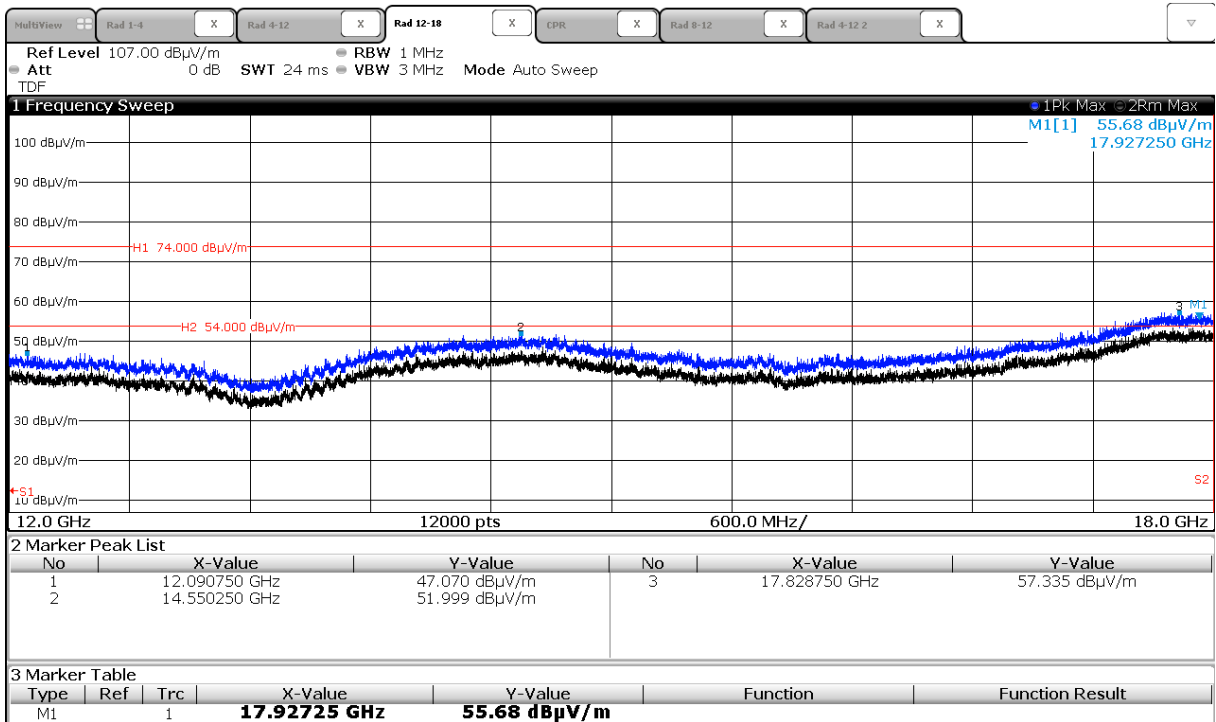
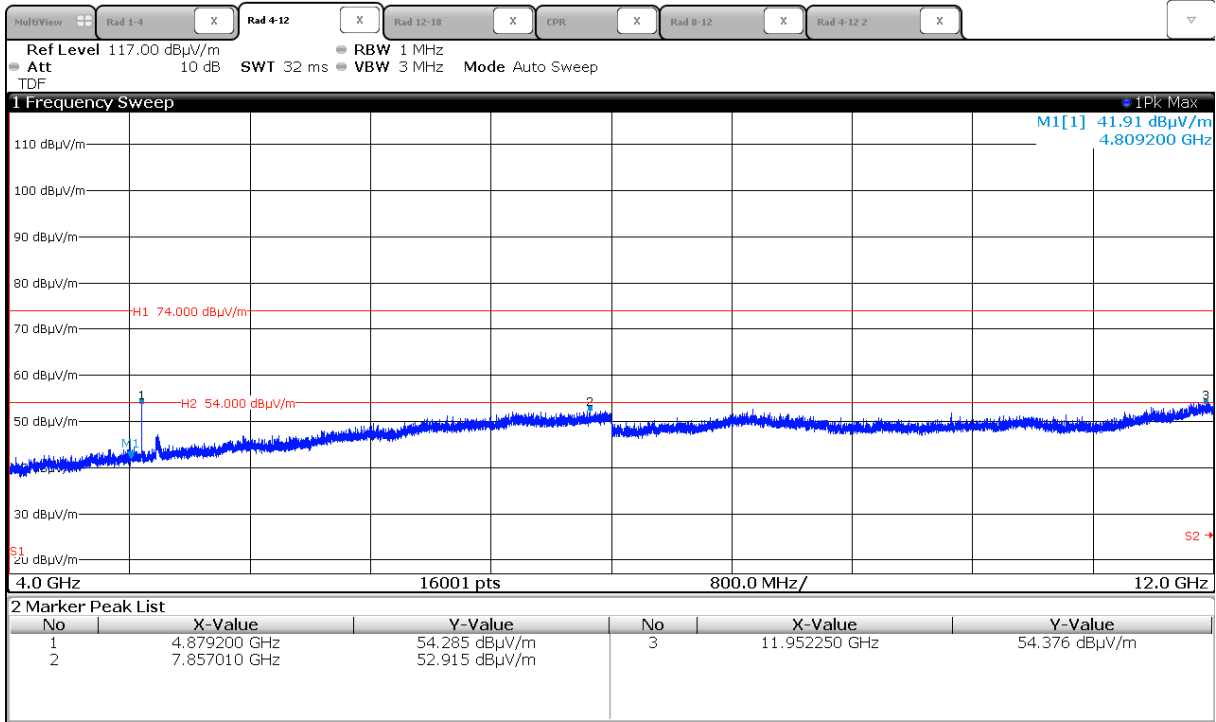


Channel 18



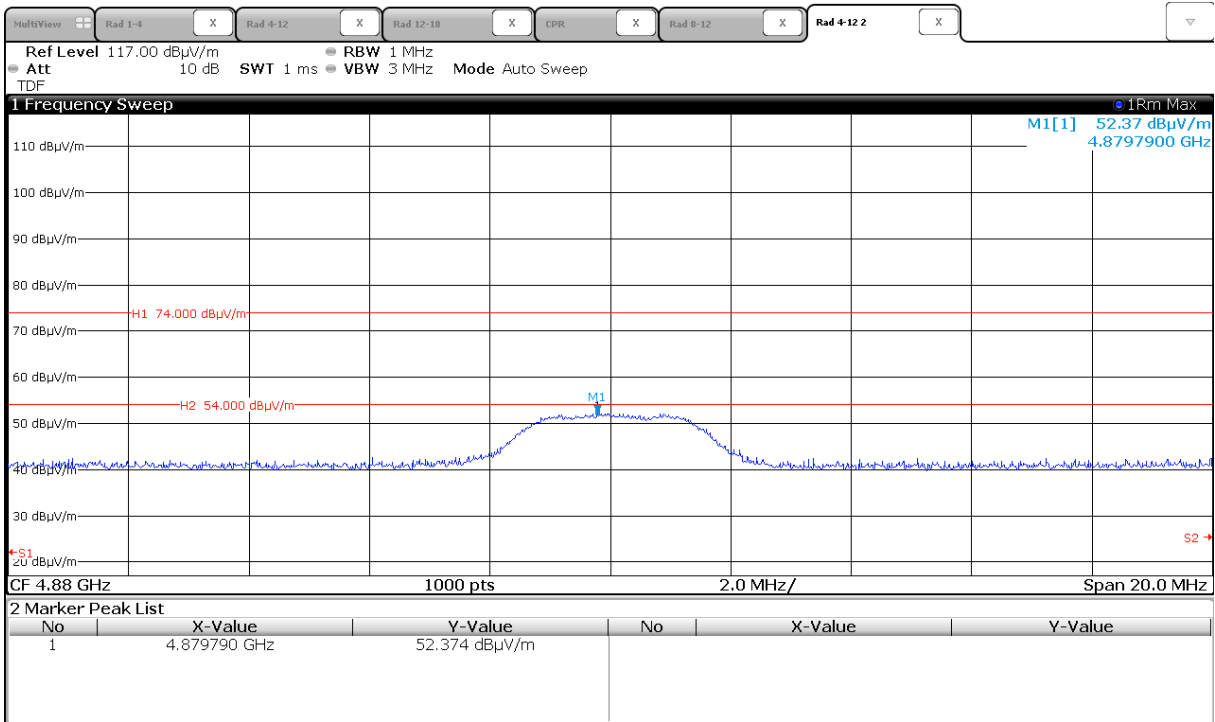
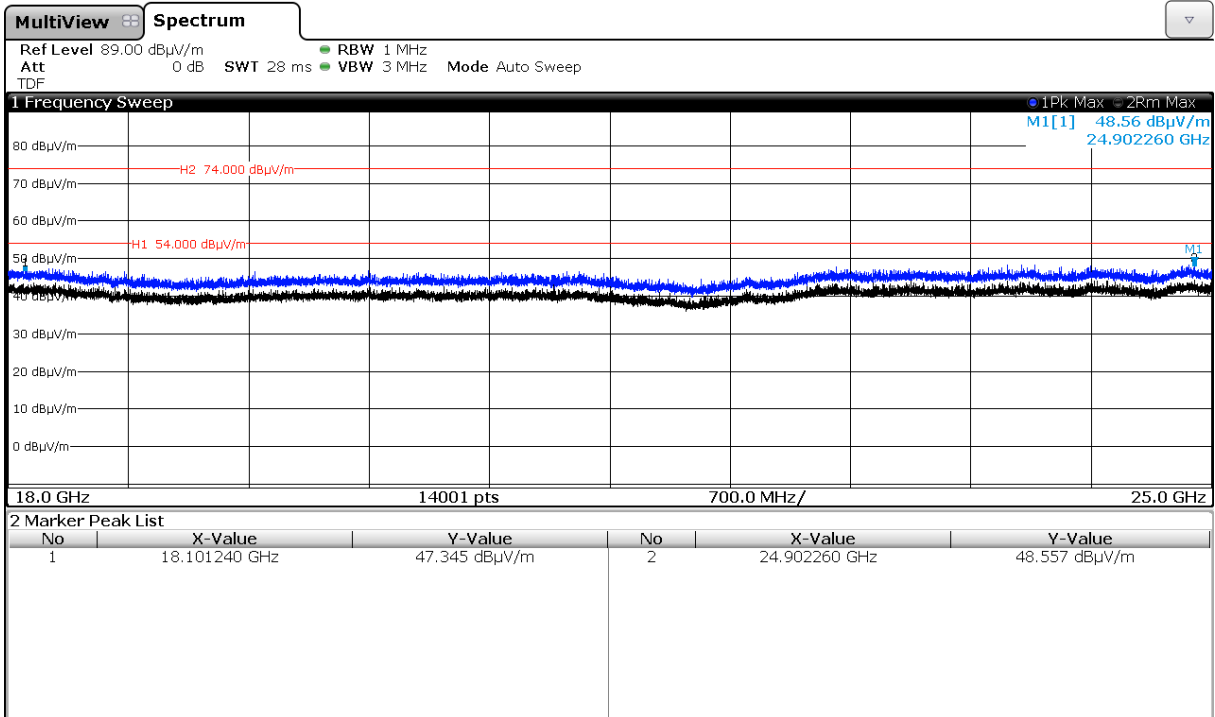
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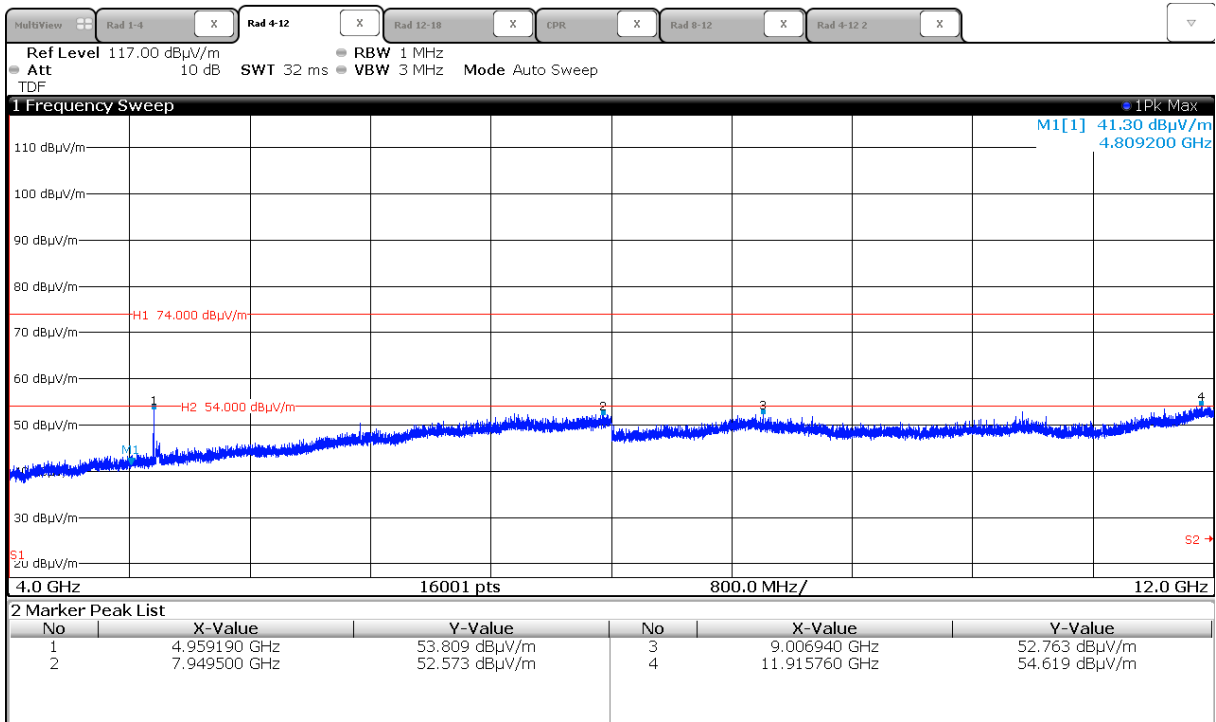
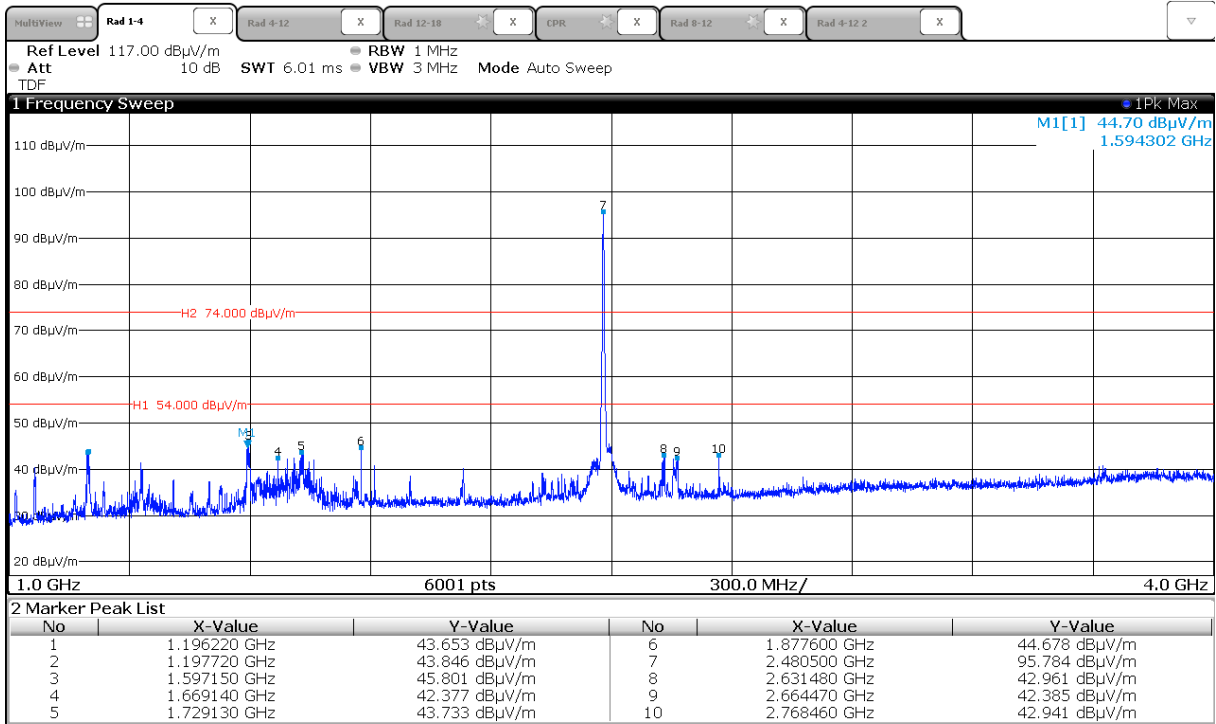


FCC ID: VQ5-EBIIFXXX

IC: 7412A-EBIIFXXX

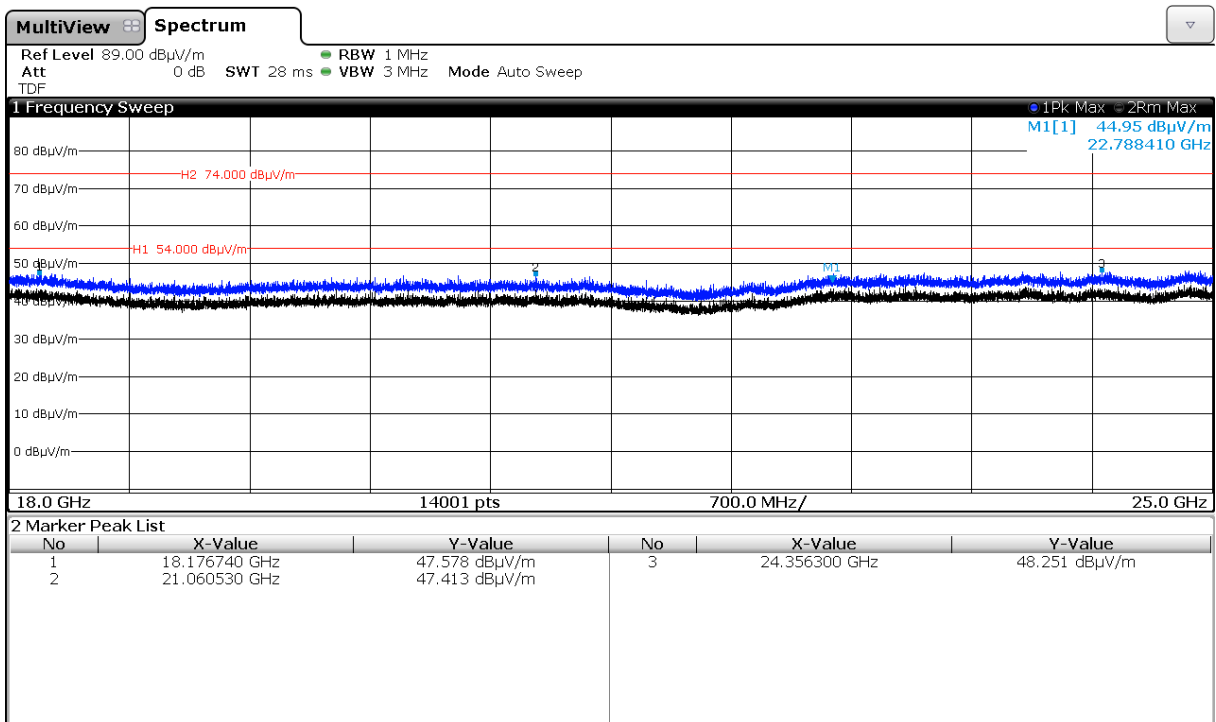
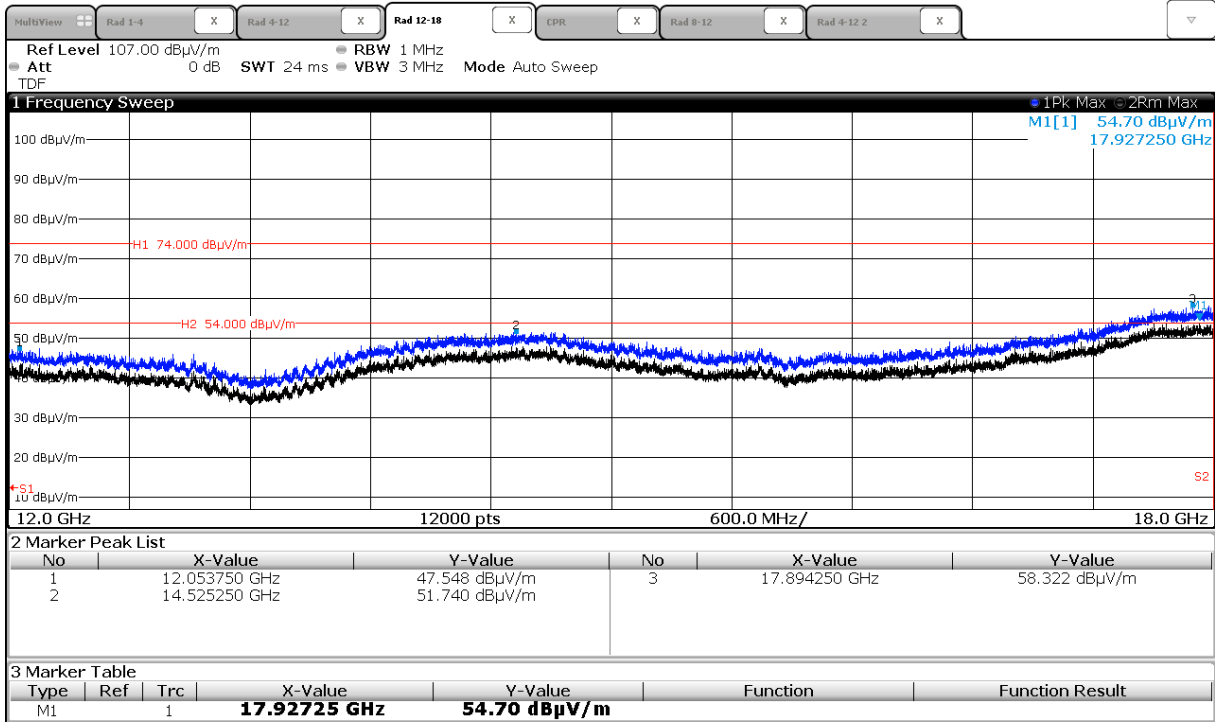


Channel 26



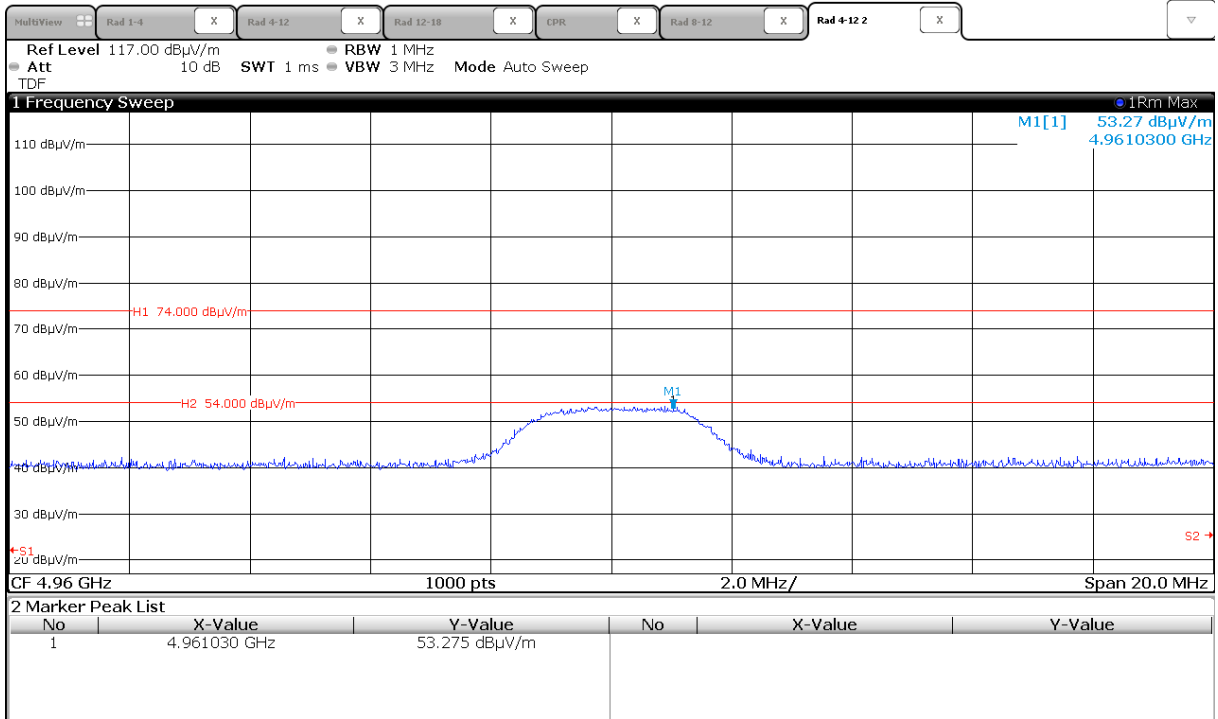
FCC ID: VQ5-EBIIFXXX

IC: 7412A-EBIIFXXX



FCC ID: VQ5-EBIIFXXX

IC: 7412A-EBIIFXXX



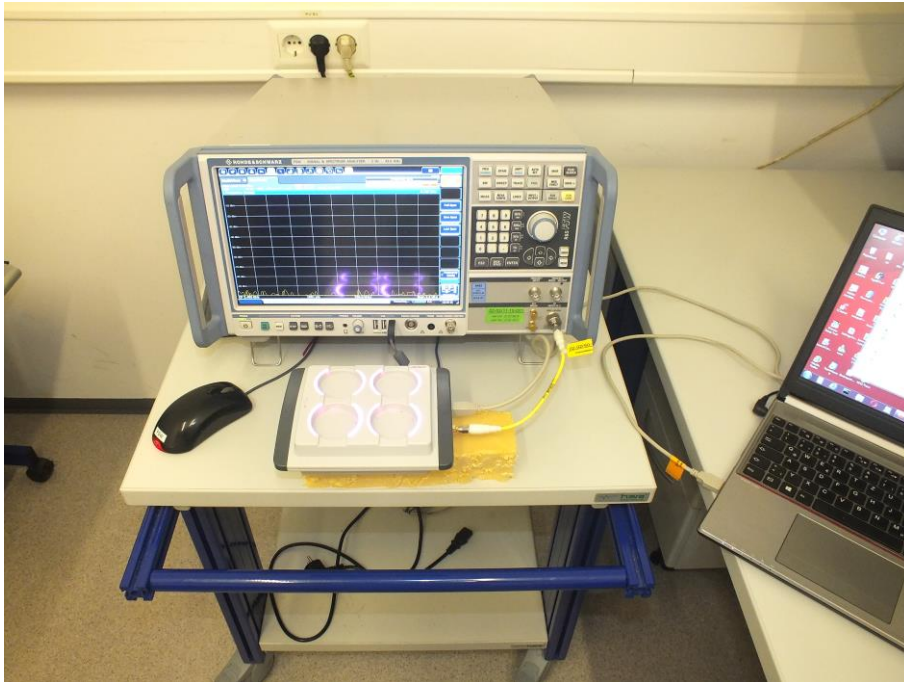
5.7 Unwanted emissions, conducted

For test instruments and accessories used see section 6 Part **SEC 1-3**.

5.7.1 Description of the test location

Test location: AREA4

5.7.2 Photo documentation of the test set-up



5.7.3 Applicable standard

According to FCC Part 15, Section 15.247(d):

In any 100 kHz bandwidth outside the frequency bands 2400 – 2483.50 MHz and 5725 – 5850 MHz, the digitally modulated radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or an radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limit specified in Section 15.209(a) (see Section 15.205(c)).

5.7.4 Description of Measurement

The spurious emissions are measured conducted using a spectrum analyser in a test setup following the procedures set out in KDB 558074 for DTS. The transmitter is set to the lowest operating frequency (CH11), the middle (CH18) and to the highest operating frequency (CH26). The frequency spectrum outside from the operating frequency range (2400 - 2483.5 MHz) is scanned for emissions that exceed the limit. The measurement is performed at normal test conditions in modulated TX continuous mode.

Spectrum analyser settings for SEC 1-3:

RBW: 100 kHz, VBW: 300 kHz, Detector: Max. peak, Trace: Max. hold, Sweep: Auto

5.7.5 Test result

According to FCC Part 15, Section 15.205(a):

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limit specified in Section 15.209(a).

Test conditions: TX continuous							
CH11, Pre-scan			Test results				
Start <i>f</i>	Stop <i>f</i>	RBW	Maximum emission		Limit	Margin	Detector
(MHz)	(MHz)	(kHz)	(MHz)	(dBm)	20dB down	(dB)	
30	1000	100	239.99	-59.7	-34.0	-25.7	Pk
1000	2400	100	2400.00	-57.2	-34.0	-23.2	Pk
2483.5	4000	100	2548.83	-69.8	-34.0	-35.8	Pk
4000	25000	100	4810.08	-45.4	-34.0	-11.4	Pk
4000	25000	100	7215.00	-60.4	-34.0	-26.4	Pk
4000	25000	100	9620.13	-69.4	-34.0	-35.4	Pk
Measurement uncertainty				±3 dB			

Test conditions: TX continuous							
CH18, Pre-scan			Test results				
Start <i>f</i>	Stop <i>f</i>	RBW	Maximum emission		Limit	Margin	Detector
(MHz)	(MHz)	(kHz)	(MHz)	(dBm)	20dB down	(dB)	
30	1000	100	304.00	-61.1	-34.0	-27.1	Pk
1000	2400	100	2400.00	-78.5	-34.0	-44.5	Pk
2483.5	4000	100	2483.50	-79.5	-34.0	-45.5	Pk
4000	25000	100	4880.01	-44.3	-34.0	-10.3	Pk
4000	25000	100	7320.00	-63.0	-34.0	-29.0	Pk
4000	25000	100	9759.99	-75.5	-34.0	-41.5	Pk
Measurement uncertainty				±3 dB			

Test conditions: TX continuous							
CH26, Pre-scan			Test results				
Start <i>f</i>	Stop <i>f</i>	RBW	Maximum emission		Limit	Margin	Detector
(MHz)	(MHz)	(kHz)	(MHz)	(dBm)	20dB down	(dB)	
30	1000	100	303.99	-59.8	-34.0	-25.7	Pk
1000	2400	100	2400.00	-76.2	-34.0	-42.2	Pk
2483.5	4000	100	2483.50	-53.9	-34.0	-19.9	Pk
4000	25000	100	4960.02	-45.3	-34.0	-11.3	Pk
4000	25000	100	7440.12	-63.8	-34.0	-29.8	Pk
4000	25000	100	16828.88	-74.2	-34.0	-40.2	Pk
Measurement uncertainty				±3 dB			

Limit according to FCC Part 15, Section 15.247(d) for emissions falling not in restricted bands:

In any 100 kHz bandwidth outside the frequency bands 2400 – 2483.50 MHz and 5725 – 5850 MHz, the digitally modulated radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or an radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.

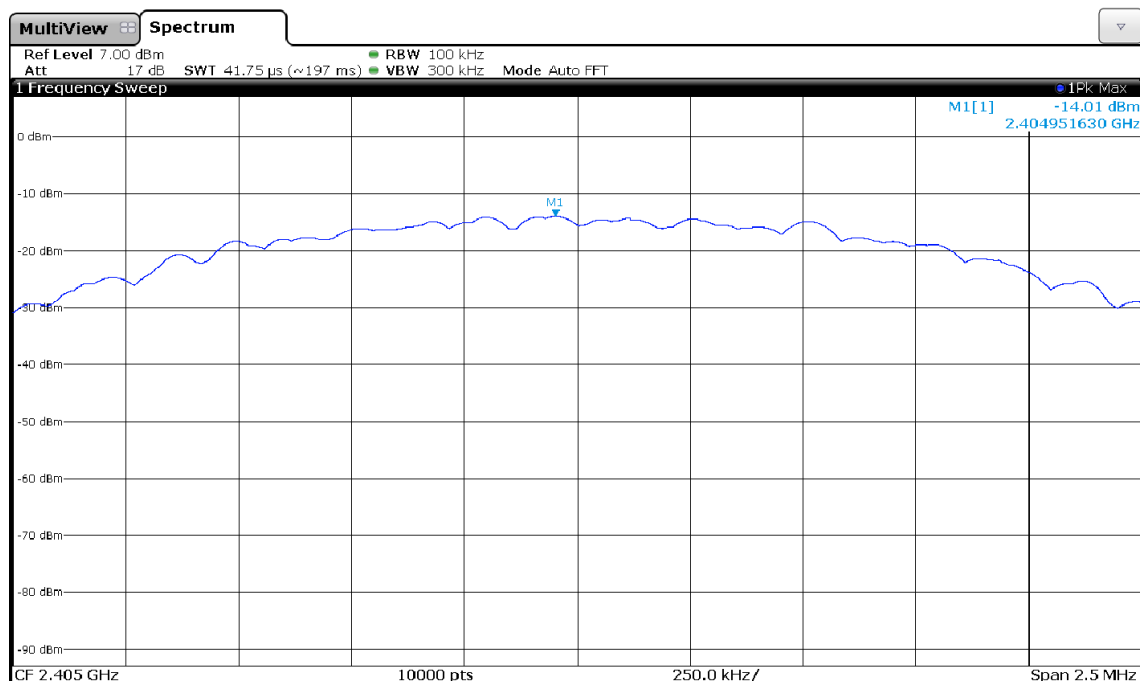
Frequency (MHz)	Spurious emission limit
Below 1000	20 dB below the highest level of the desired power
Above 1000	20 dB below the highest level of the desired power

The requirements are **FULFILLED**.

Remarks: For detailed test result please see the following test protocols.

5.7.6 Test protocols spurious emissions conducted

Determination of the reference level and limit



Determination of the limit:

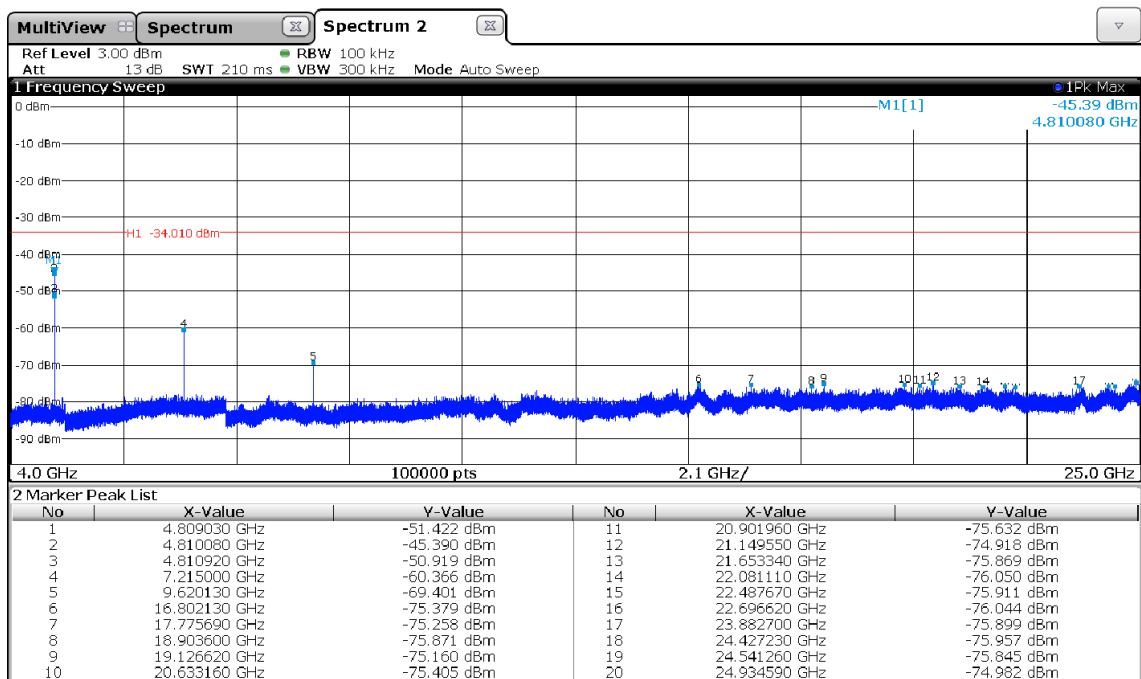
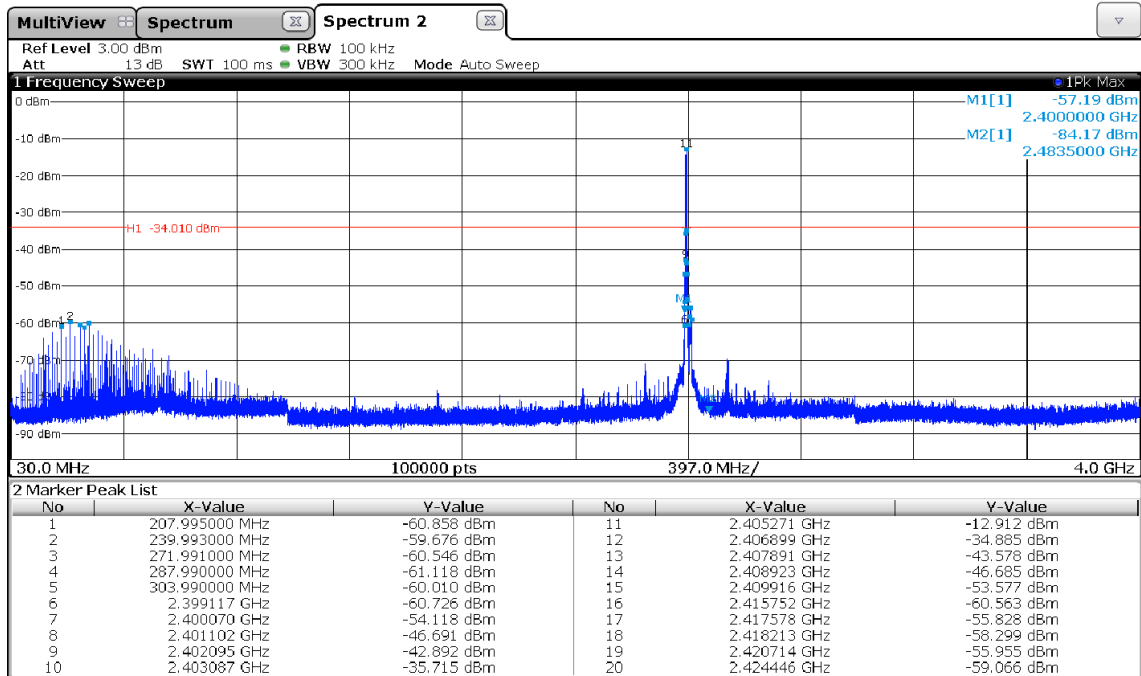
Reference level = -14.01 dBm;

Applicable method is 20 dB down from reference level.

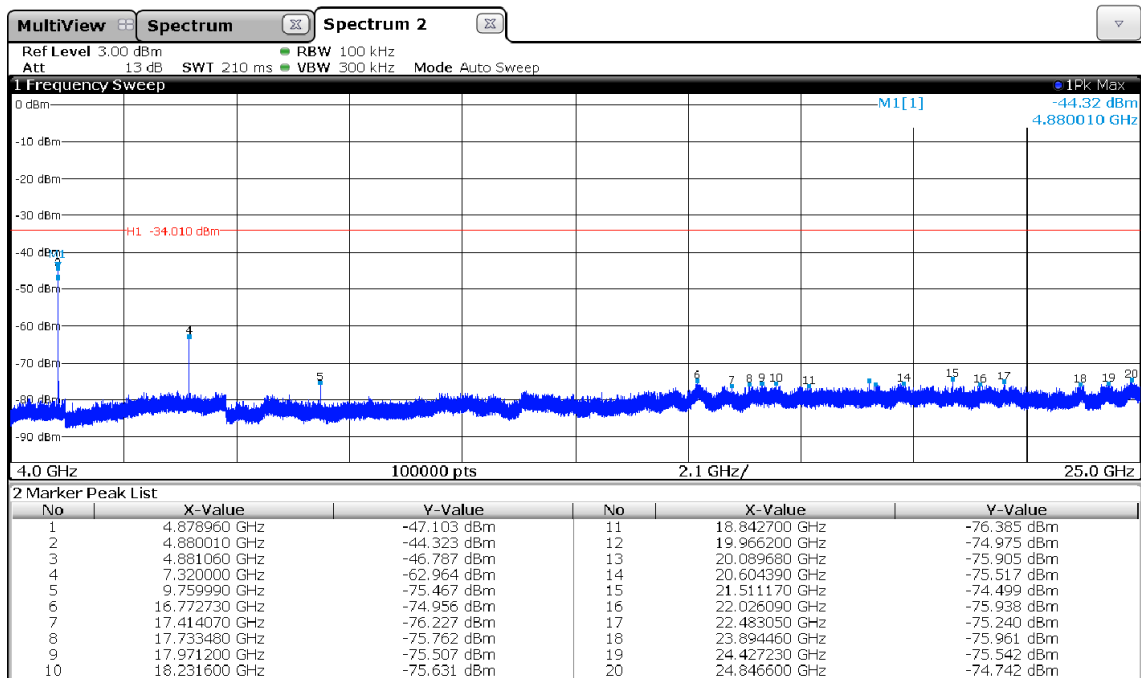
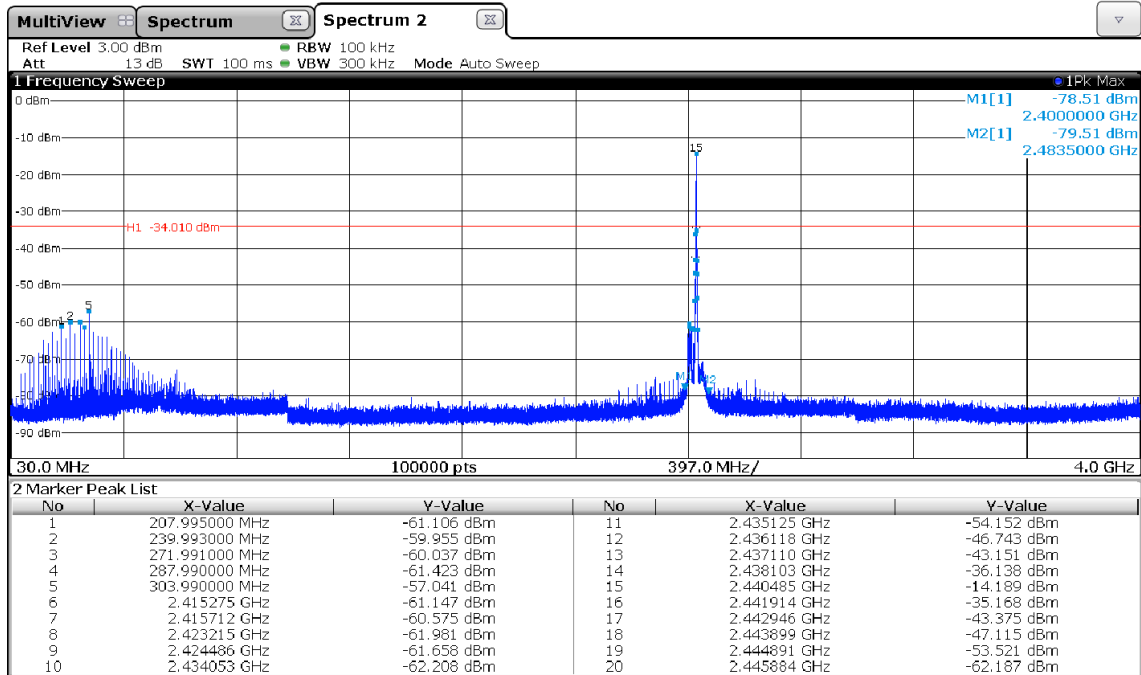
Limit = -14.01 dBm – 20 dB = -34.01 dBm;

Plots of spurious emissions conducted out of operating frequency bands (-20 dBc):

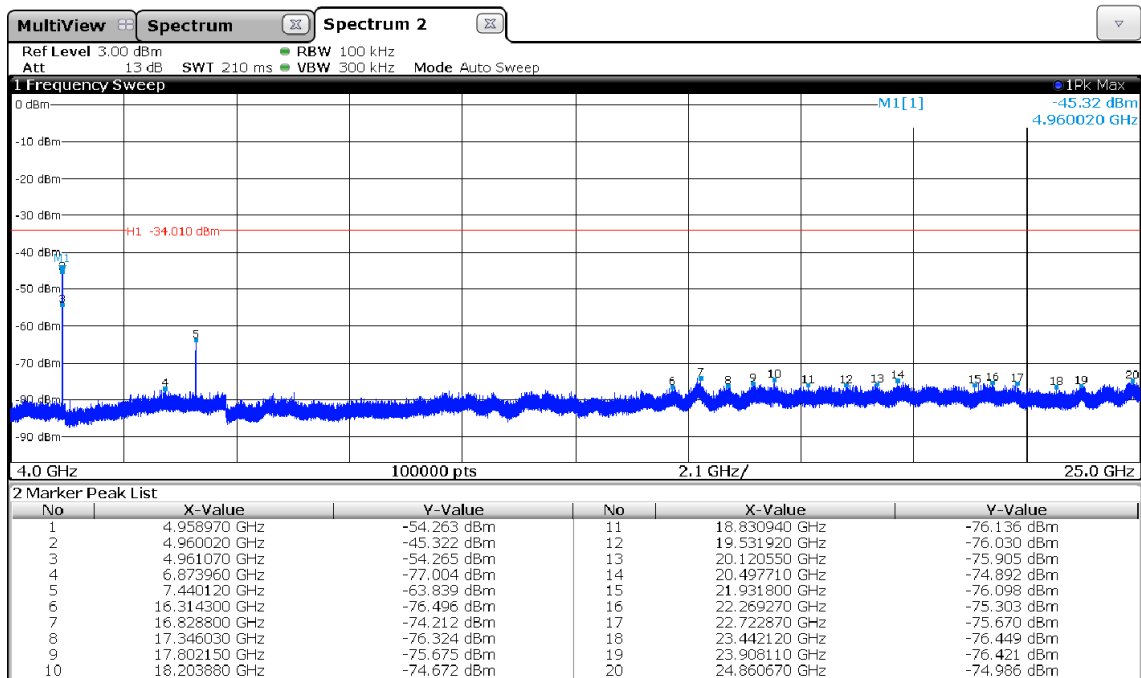
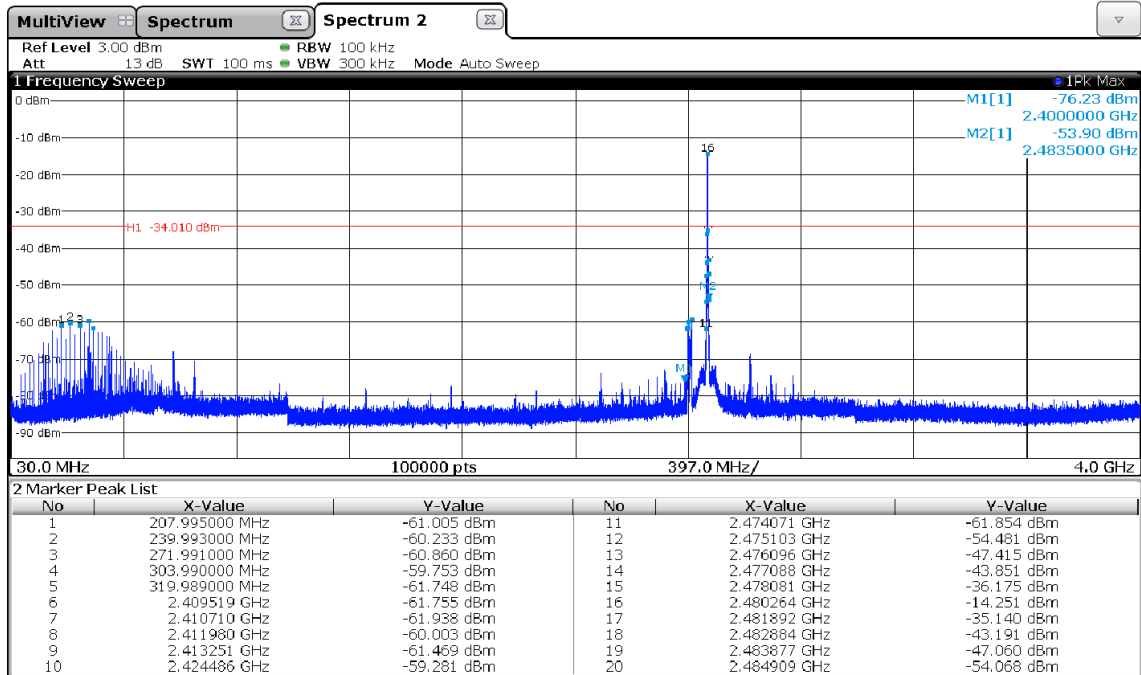
Channel 11:



Channel 18:



Channel 26:



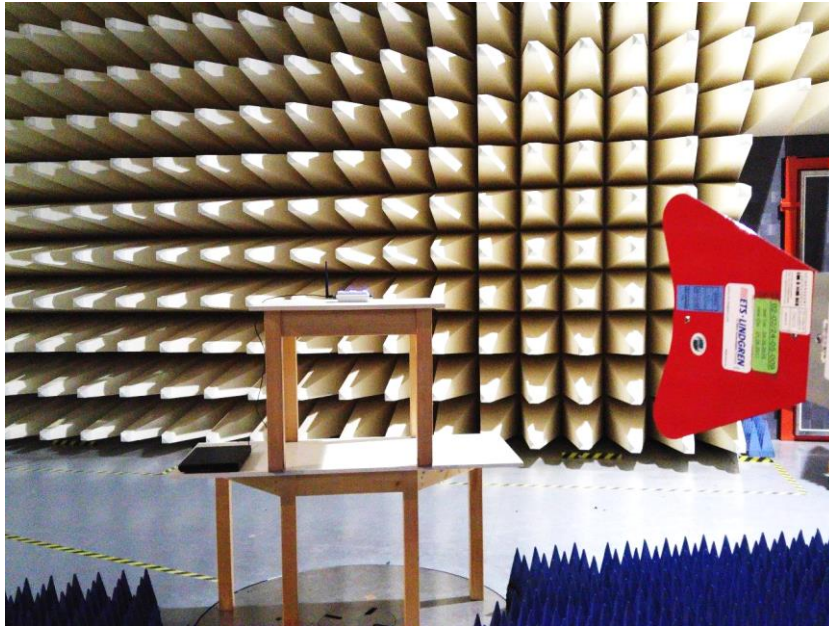
5.8 Band edge compliance

For test instruments and accessories used see section 6 Part **SER 3**.

5.8.1 Description of the test location

Test location: Anechoic chamber 1

5.8.2 Photo documentation of the test set-up



5.8.3 Applicable standard

According to FCC Part 15C, Section 15.247(d):

In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

5.8.4 Description of Measurement

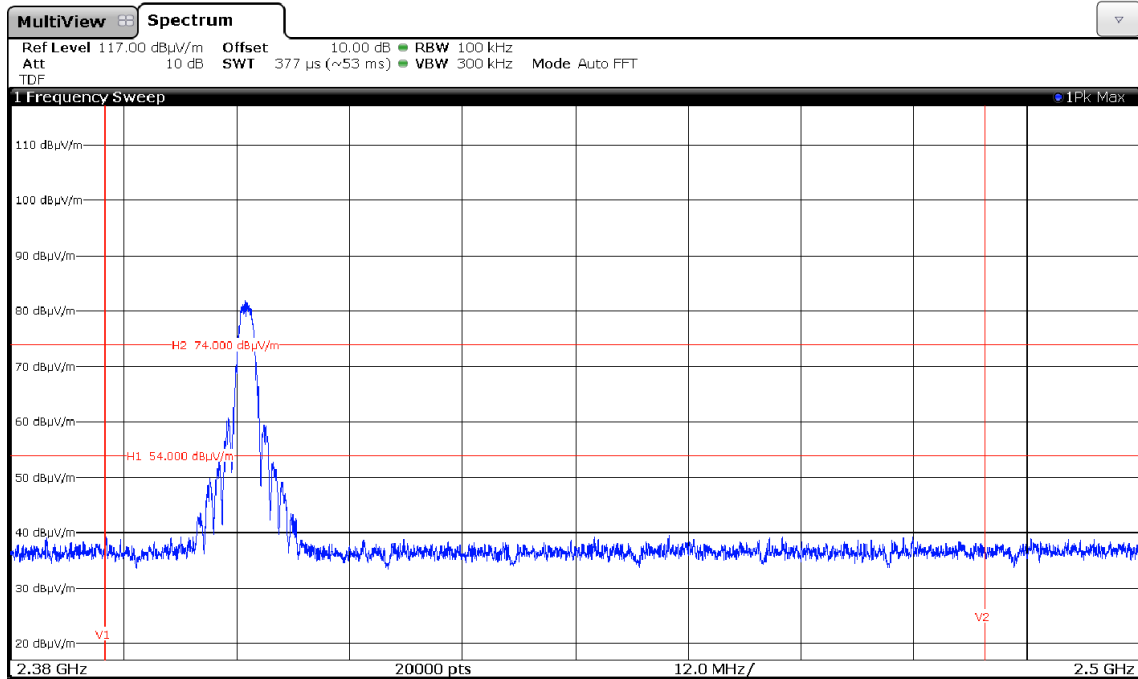
A spectrum analyser is used to measure the field strength of the radiated emissions at the band edges. The EUT was operating in normal transmit mode at the assigned frequency according KDB 558074, 4/8/2016.

Spectrum analyser settings:

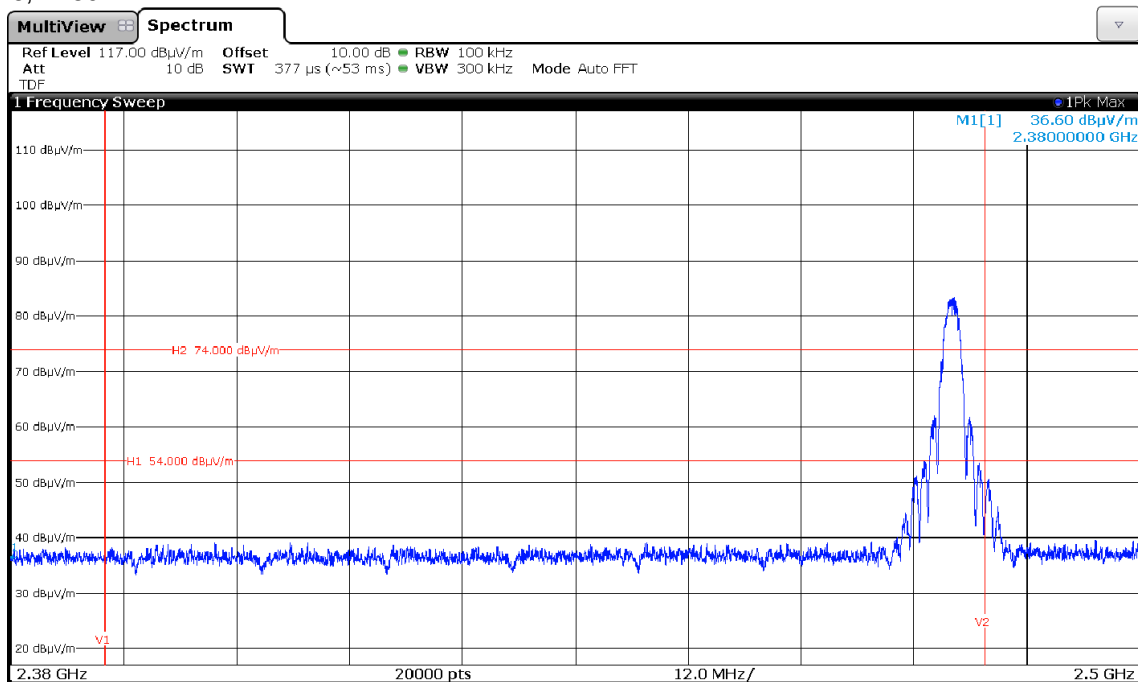
RBW: 100 kHz, VBW: 300 kHz, Detector: Max peak, Trace: Max hold, Sweep: auto

5.8.5 Test result

Channel 11, 2405 MHz:



Channel 26, 2480 MHz



Note:

- Only the results for vertical polarisation are shown, as the higher emission.
- The vertical red line "V1" marks the upper edge of the restricted band from 2310 – 2390 MHz.
- The vertical red line "V2" marks the lower edge of the restricted band from 2483.5 – 2500 MHz.

The requirements are **FULFILLED**.

Remarks:

5.9 Antenna application

For test instruments and accessories used see section 6 Part **CPC3**.

5.9.1 Description of the test location

Test location: NONE

5.9.2 Applicable standard

According to FCC Part 15C, Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit that broken antennas can be replaced by the user, but the use of a standard antenna jack is prohibited.

The EUT has either an integrated antenna or an SMA-R antenna jack. No other antenna can be used with the device.

The supplied antennas meets the requirements of part 15.203 and 15.204.

Remarks:

6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
A 4	ESHS 30	02-02/03-05-002	14/07/2017	14/07/2016		
	ESH 2 - Z 5	02-02/20-05-004	26/10/2017	26/10/2015	09/12/2016	09/06/2016
	N-4000-BNC	02-02/50-05-138				
	N-1500-N	02-02/50-05-140				
	ESH 3 - Z 2	02-02/50-05-155	06/11/2016	06/11/2015	04/02/2017	04/08/2016
CPC 3	FSP 40	02-02/11-11-001	28/10/2016	28/10/2015		
	FSW43	02-02/11-15-001	25/07/2017	25/07/2016		
	KMS102-0.2 m	02-02/50-11-020				
MB	FSP 40	02-02/11-11-001	28/10/2016	28/10/2015		
	FSW43	02-02/11-15-001	25/07/2017	25/07/2016		
	KMS102-0.2 m	02-02/50-11-020				
SEC 1-3	FSW43	02-02/11-15-001	25/07/2017	25/07/2016		
	KMS102-0.2 m	02-02/50-11-020				
SER 2	ESVS 30	02-02/03-05-003	08/07/2017	08/07/2016		
	VULB 9168	02-02/24-05-005	20/04/2017	20/04/2016	20/10/2016	20/04/2016
	NW-2000-NB	02-02/50-05-113				
	KK-EF393/U-16N-21N20 m	02-02/50-12-018				
	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028				
SER 3	FSP 40	02-02/11-11-001	28/10/2016	28/10/2015		
	FSW43	02-02/11-15-001	25/07/2017	25/07/2016		
	JS4-18004000-30-5A	02-02/17-05-017				
	AFS5-12001800-18-10P-6	02-02/17-06-002				
	AFS4-01000400-10-10P-4	02-02/17-13-002				
	AMF-4F-04001200-15-10P	02-02/17-13-003				
	3117	02-02/24-05-009	24/05/2017	24/05/2016		
	BBHA 9170	02-02/24-05-015	24/05/2019	24/05/2016	24/05/2017	24/05/2016
	R1 _ 18 - 40 GHz	02-02/30-09-002	07/06/2017	07/06/2016		
	Sucoflex N-2000-SMA	02-02/50-05-075				
	KMS102-0.2 m	02-02/50-11-016				
	SF104/11N/11N/1500MM	02-02/50-13-015				