



RF - TEST REPORT

- FCC Part 15.225, 15.247, 15.407 -

Type / Model Name : Voxter

Product Description : Voice Terminal

Applicant : ACD Elektronik GmbH

Address : Engelberg 2

88480 ACHSTETTEN, GERMANY

Manufacturer : ACD Elektronik GmbH

Address : Engelberg 2

88480 ACHSTETTEN, GERMANY

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

POSITIVE

Test Report No. : **80179841-00 Rev_0**

27. October 2023

Date of issue



Deutsche
Akkreditierungsstelle
D-PL-12030-01-03
D-PL-12030-01-04

Contents

1	TEST STANDARDS	3
2	EQUIPMENT UNDER TEST	4
2.1	Information provided by the Client	4
2.2	Sampling	4
2.3	General remarks	4
2.4	Photo documentation of the EUT – Detailed photos see ATTACHMENT A	4
2.5	Equipment type	4
2.6	Short description of the equipment under test (EUT)	4
2.7	Variants of the EUT	4
2.8	Operation frequency and channel plan	5
2.9	Transmit operating modes	8
2.10	Antenna	8
2.11	Power supply system utilised	8
2.12	Peripheral devices and interface cables	8
2.13	Determination of worst-case conditions for final measurement	8
3	TEST RESULT SUMMARY	11
3.1	Revision history of test report	11
3.2	Final assessment	11
4	TEST ENVIRONMENT	12
4.1	Address of the test laboratory	12
4.2	Environmental conditions	12
4.3	Statement of the measurement uncertainty	12
4.4	Conformity Decision Rule	13
4.5	Measurement protocol for FCC and ISED	13
5	TEST CONDITIONS AND RESULTS	16
5.1	Spurious emissions radiated	16
6	USED TEST EQUIPMENT AND ACCESSORIES	28

ATTACHMENTS A, B as separate supplements

1 TEST STANDARDS

The tests were performed partly according to following standards:

FCC Rules and Regulations Part 15, Subpart A - General (September 2023)

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 2023)

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 15.225	Operation within the band 13.110 - 14.010 MHz
Part 15, Subpart C, Section 15.247	Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz

FCC Rules and Regulations Part 15, Subpart E – Unlicensed National Information Infrastructure Devices (September 2023)

Part 15, Subpart E, Section 15.407	Operation within the bands 5.15 - 5.25 GHz, 5.25 - 5.35 GHz, 5.47 - 5.725 GHz and 5.725 - 5.85 GHz
ANSI C63.10: 2013	Testing Unlicensed Wireless Devices
KDB 558074 D01 v05r02	Guidance for compliance measurements on DTS; FHSS and hybrid system devices operating under Section 15.247 of the FCC rules, April 2, 2019.
KDB 789033 D02 v02r01	Guidelines for compliance testing of UNII-Devices Part 15, Subpart E, December 14, 2017.

2 EQUIPMENT UNDER TEST

2.1 Information provided by the Client

Please note, we do not take any responsibility for information provided by the client or his representative which may have an influence on the validity of the test results.

2.2 Sampling

The customer is responsible for the choice of sample. Sample configuration, start-up and operation is carried out by the customer or according his/her instructions.

2.3 General remarks

This test report only covers the spurious emissions of the EUT with DC power supply for vehicular use while simultaneous transmission of RFID with WLAN/BT/BLE.

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

2.5 Equipment type

RFID device, WLAN client, BLE device, BT device

2.6 Short description of the equipment under test (EUT)

The EUT is a voice terminal equipped with a combi-module (FCC ID: XO2-SPB228D) for WLAN, Bluetooth and BLE as well as an RFID module. The EUT can be used as body worn voice terminal or can be built in a vehicle (fork lift), depending on which battery pack is used.

In this test report only the dummy battery pack for DC connection to the vehicle on-board voltage is used and evaluated.

Number of tested samples : 1 (radiated sample)
Serial number : 23VT51200619
Firmware number : v1.18.4

2.7 Variants of the EUT

There is no variant.

2.8 Operation frequency and channel plan

BLE:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
37	2402	18	2442
0	2404	19	2444
1	2406	20	2446
2	2408	21	2448
3	2410	22	2450
4	2412	23	2452
5	2414	24	2454
6	2416	25	2456
7	2418	26	2458
8	2420	27	2460
9	2422	28	2462
10	2424	29	2464
38	2426	30	2466
11	2428	31	2468
12	2430	32	2470
13	2432	34	2472
14	2434	35	2474
15	2436	36	2476
16	2438	37	2478
17	2440	39	2480

Note: the marked frequencies are determined for final testing.

BT:

Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402	28	2429	55	2456
2	2403	29	2430	56	2457
3	2404	30	2431	57	2458
4	2405	31	2432	58	2459
5	2406	32	2433	59	2460
6	2407	33	2434	60	2461
7	2408	34	2435	61	2462
8	2409	35	2436	62	2463
9	2410	36	2437	63	2464
10	2411	37	2438	64	2465
11	2412	38	2439	65	2466
12	2413	39	2440	66	2467
13	2414	40	2441	67	2468
14	2415	41	2442	68	2469
15	2416	42	2443	69	2470
16	2417	43	2444	70	2471
17	2418	44	2445	71	2472
18	2419	45	2446	72	2473
19	2420	46	2447	73	2474
20	2421	47	2448	74	2475
21	2422	48	2449	75	2476
22	2423	49	2450	76	2477
23	2424	50	2451	77	2478
24	2425	51	2452	78	2479
25	2426	52	2453	79	2480
26	2427	53	2454		
27	2428	54	2455		

FCC-ID: O2FVOXTER

WLAN 2.4 GHz:

Channel	Frequency (MHz)
1	2412
2	2417
3	2422
4	2427
5	2432
6	2437
7	2442
8	2447
9	2452
10	2457
11	2462

WLAN 5 GHz:

Channel	Frequency (MHz)
36	5180
40	5200
44	5220
48	5240

Channel	Frequency (MHz)
52	5260
56	5280
60	5300
64	5320

Channel	Frequency (MHz)
100	5500
104	5520
108	5540
112	5560
116	5580
120	5600
124	5620
128	5640
132	5660
136	5680
140	5700
144	5720

Channel	Frequency (MHz)
149	5745
153	5765
157	5785
161	5805
165	5825

FCC-ID: O2FVOXTER

Channel plan WLAN Standard 802.11n HT 40, ac VT40:

Channel, HT40 up	Channel, HT40 down	Frequency (MHz)
1 up	5 down	2422
2 up	6 down	2427
3 up	7 down	2432
4 up	8 down	2437
5 up	9 down	2442
6 up	10 down	2447
7 up	11 down	2452

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36up	5190	40down	5190
44up	5230	48down	5230

Channel	Frequency (MHz)	Channel	Frequency (MHz)
52up	5270	56down	5270
60up	5310	64down	5310

Channel	Frequency (MHz)	Channel	Frequency (MHz)
100up	5510	104down	5510
116up	5580	120down	5580
132up	5670	136down	5670
140up	5710	142down	5710

Channel	Frequency (MHz)	Channel	Frequency (MHz)
149up	5755	153down	5755
161up	5815	165down	5815

Channel plan WLAN Standard 802.11ac VT80:

Channel	Frequency (MHz)
42	5210

Channel	Frequency (MHz)
56	5210

Channel	Frequency (MHz)
106	5530
122	5610
138	5690

Channel	Frequency (MHz)
155	5775

RFID:

Only one channel at 13.56 MHz is used

2.9 Transmit operating modes

- RFID 13.56 MHz TX
- BLE TX
- BT Classic TX
- WLAN 2.4 GHz TX
- WLAN 5 GHz TX

2.10 Antenna

The following antennas shall be used with the EUT:

Number	Characteristic	Name	Connector	Frequency band (MHz)	Gain (dBi)
1	omnidirectional	Ethertronics 1001932PT	U.FI	2400 - 2.500 5150 - 5850	2.5 4.4
2	omnidirectional	Ethertronics 1001932PT	U.FI	2400 - 2.500 5150 - 5850	2.5 4.4
3	NFC antenna	Coil, Molex 1462360001	-	13.56	45*55 mm

The EUT is equipped with 2 internal WLAN antennas for MIMO.

2.11 Power supply system utilised

Power supply voltage, V_{nom} : 5.0 V/DC

2.12 Peripheral devices and interface cables

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

- Notebook Model : Dell, Latitude E6400
- Laboratory DC power supply Model : Hameg, HM 8143
- - Model : -

2.13 Determination of worst-case conditions for final measurement

Preliminary tests are performed in all three orthogonal axes of the EUT to locate at which position and at what setting of the EUT produces the maximum of the emissions.

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

- 1) RFID TX + WLAN 2.4GHz n HT20 MCS-0 Channel 1 TX
- 2) RFID TX + BLE 1 Mbps Channel 39 TX
- 3) RFID TX + WLAN 5GHz n HT20 MCS-7 Channel 36 TX + BLE 1 Mbps Channel 34 TX
- 4) RFID TX + WLAN 5GHz n HT20 MCS-7 Channel 100 TX + BT DH5 Channel 79 TX

2.13.1 Test jig

No test jig is used.

2.13.2 Test software

The test software for the EUT provides free power setting, the special test mode TX continuous mode, modulated. The EUT was set with test modulation to transmit data during the tests with a maximum duty cycle from an internal packet generator.

Test software commands:

BTLE Tx ch 34

80
225 0
234
116 1
114 1
16 6.5
125 34 37 0

BTLE Tx ch 39

80
225 0
234
116 1
114 1
16 6.5
125 39 37 0

BT Tx 1Mbps, DH5, ch 78

80
225 0
234
116 1
114 1
16 6.5
12 78
225 1 15 2 -1 0

2G4 802.11n, ch1, MCS0, HT20, 16dBm Path A only

25 0
10 1 1
30 0
112 0
22 0 1 16 2 0
25 1 15

802.11n, ch36, MCS7, HT20, 14dBm Path A only

25 0
10 1 1
30 1
112 0
22 0 36 14 2 0
25 1 22

FCC-ID: O2FVOXTER

802.11n, ch100, MCS7, HT20, 14dBm Path A only

25 0

10 1 1

30 1

112 0

22 0 100 14 2 0

25 1 22

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.

3 TEST RESULT SUMMARY

FCC Rule Part	Description	Result
15.207(a)	AC power line conducted emissions	not applicable*
15.209 15.247(d) 15.407(b)	Spurious emissions	passed

*EUT is intended for vehicular use

3.1 Revision history of test report

Test report No	Rev.	Issue Date	Changes
80179841-00	0	27 October 2023	Initial test report

The test report with the highest revision number replaces the previous test reports.

3.2 Final assessment

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

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

Testing commenced on : 05 October 2023

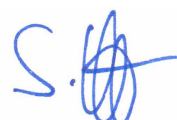
Testing concluded on : 19 October 2023

Checked by:

Tested by:


Klaus
Gegenfurtner
2023.10.27
10:18:46 +02'00'

Klaus Gegenfurtner
Teamleader Radio


Sabine Kugler
2023.10.27
09:42:48 +02'00'

Sabine Kugler
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 on basis of the ETSI Technical Report TR 100 028 Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1 and Part 2. The results are documented in the quality system acc. to DIN EN ISO/IEC 17025. 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 Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	$\pm 3.29 \text{ dB}$
20 dB Bandwidth	Center frequency of EUT	95%	$\pm 2.5 \times 10^{-7}$
99% Occupied Bandwidth	Center frequency of EUT	95%	$\pm 2.5 \times 10^{-7}$
Radiated Spurious Emissions	9 kHz to 30 MHz	95%	$\pm 3.53 \text{ dB}$
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	$\pm 3.71 \text{ dB}$
Radiated Spurious Emissions	1000 MHz to 10000 MHz	95%	$\pm 2.34 \text{ dB}$
Peak conducted output power	902 MHz to 928 MHz	95%	$\pm 0.35 \text{ dB}$
Conducted Spurious Emissions	9 kHz to 10000 MHz	95%	$\pm 2.15 \text{ dB}$

4.4 Conformity Decision Rule

The applied conformity decision rule is based on ILAC G8:09/2019 clause 4.2.1 Binary Statement for Simple Acceptance Rule ($w = 0$).

Details can be found in the procedure CSA_B_V50_29.

4.5 Measurement protocol for FCC and ISCED

4.5.1 General information

CSA Group Bayern GmbH is recognized as wireless testing laboratory under the CAB identifier:

FCC: DE 0011

ISED: DE0009

4.5.2 General Standard information

The test methods used comply with ANSI C63.10 - "Testing Unlicensed Wireless Devices".

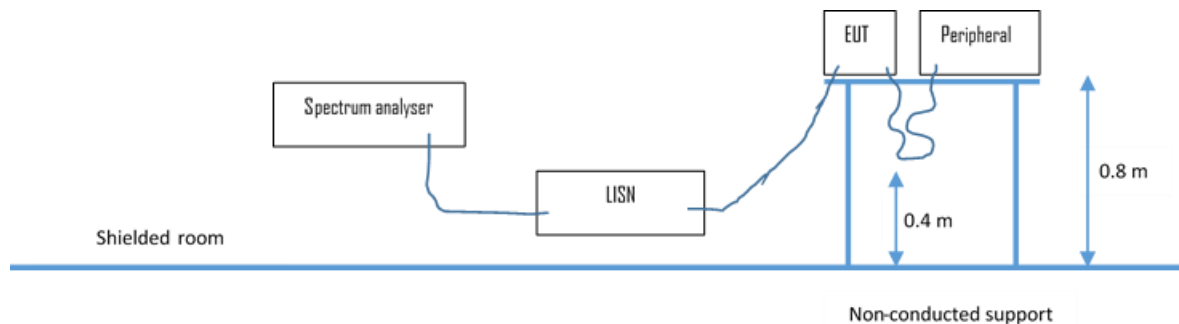
4.5.2.1 Justification

The equipment under test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions.

4.5.3 Details of test procedures

4.5.3.1 Conducted emission

Test setup according ANSI C63.10



The final level, expressed in dB μ V, is arrived at by taking the reading directly from the Spectrum analyser. This level is compared to the limit.

To convert between dB μ V and μ V, the following conversions apply:

$$\text{dB}\mu\text{V} = 20(\log \mu\text{V})$$

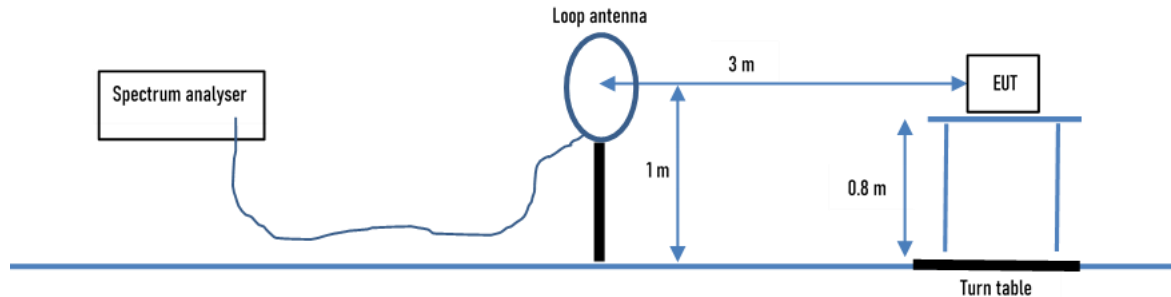
$$\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$$

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a Line Impedance Stabilization Network (LISN) with 50 Ω / 50 μ H (CISPR 16) characteristics. The receiver is protected by means of an impedance matched pulse limiter connected directly to the RF input. Table top equipment is placed on a non-conducting table 80 centimetres above the floor and is positioned 40 centimetres from the vertical ground plane (wall) of the screen room. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emission is re-measured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

4.5.3.2 Radiated emission

4.5.3.2.1 OATS1 test site (9 kHz - 30 MHz):

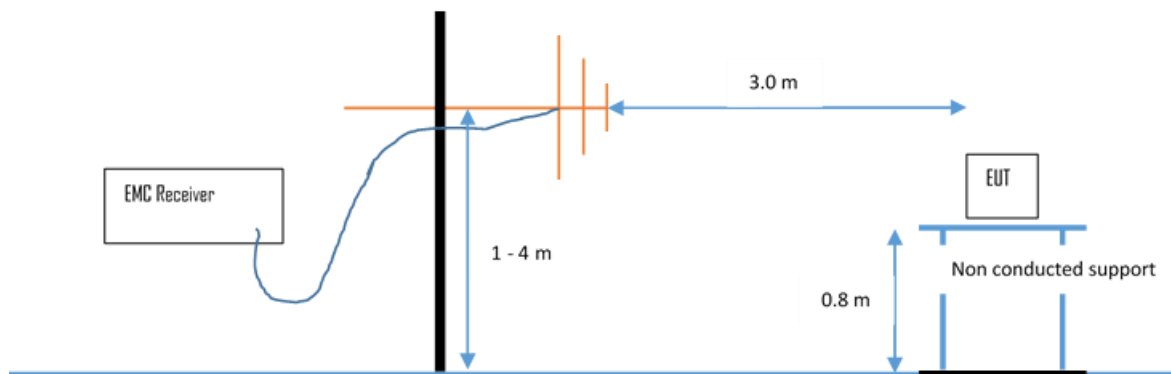
Test setup according ANSI C63.10



Emissions from the EUT are measured in the frequency range of 9 MHz to 30 MHz using a tuned receiver and a calibrated loop antenna. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Cables to simulators/testers (if used in this test) are routed through the centre of the table and to a screened room located outside the test area. The antenna is positioned 3, 10 or 30 metres horizontally from the EUT and is repeated vertically. To locate maximum emissions from the test sample the antenna is varied along the site axis and the EUT is rotated 360 degrees.

4.5.3.2.2 OATS1 test site (30 MHz - 1 GHz):

Test setup according ANSI C63.10.



Spurious emissions from the EUT are measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarised antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Cables to simulators/testers (if used in this test) are routed through the centre of the table and to a screened room located outside the test area. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres and the EUT is rotated 360 degrees. The final level in dBμV/m is calculated by taking the reading from the EMI receiver (Level dBμV) and adding the correction factors and cable loss factor (dB). The FCC limit is subtracted from this result in order to provide the limit margin listed in the measurement protocol.

The resolution bandwidth setting:

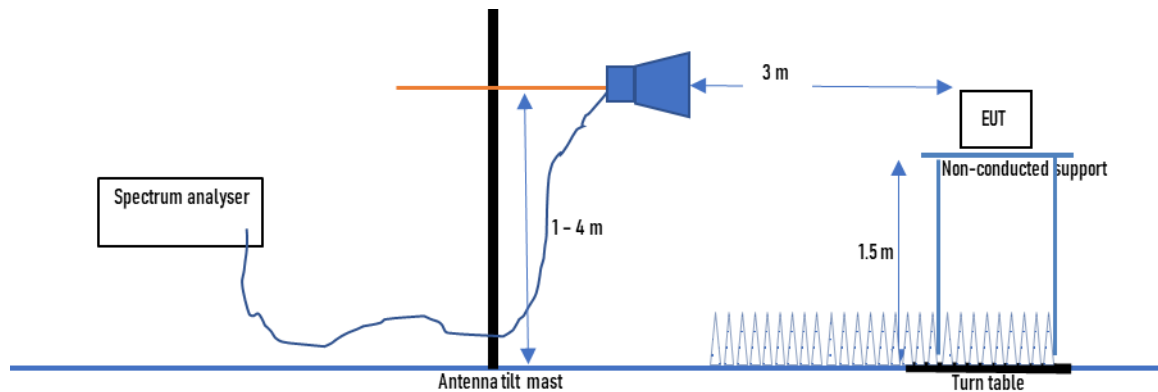
30 MHz – 1000 MHz: RBW: 120 kHz

Example:

Frequency (MHz)	Level (dBμV)	+	Factor (dB)	=	Level (dBμV/m)	-	Limit (dBμV/m)	=	Delta (dB)
719.0	75.0	+	32.6	=	107.6	-	110.0	=	-2.4

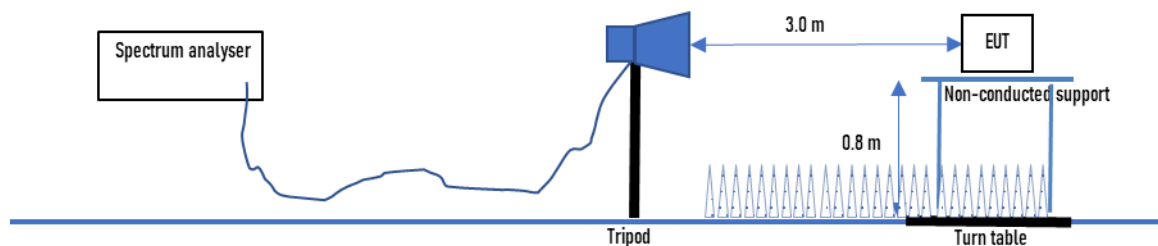
4.5.3.2.3 Anechoic chamber 1 (1000 MHz – 18000 MHz)

Test setup according ANSI C63.10.



Radiated emissions from the EUT are measured in the frequency range 1 GHz up to 18 GHz as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and appropriate linearly polarized antennas. Table top equipment is placed on a non-conducting table, 1.5 metre above the ground plane. The turntable is fully covered with the appropriate absorber (Type VHP-12). Any controlling device is positioned such that it does not significantly influence the measurement results. Interconnecting cables that hang closer than 40 cm to the ground plane are folded back and forth in the centre, forming a bundle 30 cm to 40 cm long. Measurements are made in three orientations of the EUT and the horizontal and vertical polarization planes of measurement antenna in a fully anechoic room. The measurement antenna is adjusted and the EUT orientated to permit the measurement of the maximum emission from the EUT. The conditions determined as worst-case will then be used for the final measurements.

4.5.3.2.4 Anechoic chamber 1 (18 GHz – 40 GHz)



Emissions from the EUT are measured in the frequency range 18 GHz up to 40 GHz as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and appropriate linearly polarized antennas. Table top equipment is placed on a non-conducting table, 0.8 metre above the ground plane. The turntable is fully covered with the appropriate absorber (Type VHP-12). Any controlling device is positioned such that it does not significantly influence the measurement results. Interconnecting cables that hang closer than 40 cm to the ground plane are folded back and forth in the centre, forming a bundle 30 cm to 40 cm long. Measurements are made in three orientations of the EUT and the horizontal and vertical polarization planes of measurement antenna in a fully anechoic room. The measurement antenna is adjusted and the EUT orientated to permit the measurement of the maximum emission from the EUT. The conditions determined as worst-case will then be used for the final measurements. Where appropriate, the test distance may be reduced in order to detect emissions under better uncertainty. The limit is adopted.

5 TEST CONDITIONS AND RESULTS

5.1 Spurious emissions radiated

For test instruments and accessories used see section 6 Part **SER1, SER 2, SER 3**.

5.1.1 Description of the test location

Test location: OATS 1
Test location: Anechoic chamber 1
Test distance: 3 m

5.1.2 Photo documentation of the test set-up

See Attachment B for detailed photo documentation of the test set-up.

5.1.3 Applicable standard

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

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the 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 a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

Attenuation below the general limits specified in § 15.209(a) is not required. 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)).

5.1.4 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.

The radiated power of the spurious emission from the EUT is measured in a test setup following the procedures set out in ANSI C63.10. If the emission level of the EUT in peak mode complies with the average limit is 20 dB lower, then testing will be stopped and peak values of the EUT will be reported, otherwise the emission will be measured in average mode again and reported.

FCC-ID: O2FVOXTER

Measurements are performed in following order:

A) For RFID + BLE/ BT/ WLAN 2.4 GHz:

1) Measurement of emissions according to General Limit specified in section 15.209(a):

Test receiver settings for SER1, SER2:

9kHz-150kHz	RBW: 200 Hz	Detector: Quasi peak*	Meas. Time: 1 s,
150kHz-30MHz	RBW: 9 kHz	Detector: Quasi peak*	Meas. Time: 1 s,
30MHz-1GHz	RBW: 120 MHz	Detector: Quasi peak	Meas. Time: 1 s,

*AV Detector in the ranges 9-90kHz and 110-490kHz

Spectrum analyser settings for SER3:

1GHz-40GHz	RBW: 1 MHz	Detector: PK/ RMS	Trace: Max. hold	Sweep: Auto
------------	------------	-------------------	------------------	-------------

2) If emissions outside the Restricted Bands are above General Limit additional measurements of emissions according to Spurious Emissions Limit specified in section 15.247(d) are performed:

Spectrum analyser settings:

RBW: 100 kHz	VBW: 300 kHz	Detector: PK	Trace: Max. hold	Sweep: Auto
--------------	--------------	--------------	------------------	-------------

B) For RFID + WLAN 5 GHz:

1) Measurement of emissions according to General Limit specified in section 15.209(a):

Test receiver settings for SER1, SER2:

9kHz-150kHz	RBW: 200 Hz	Detector: Quasi peak*	Meas. Time: 1 s,
150kHz-30MHz	RBW: 9 kHz	Detector: Quasi peak*	Meas. Time: 1 s,
30MHz-1GHz	RBW: 120 MHz	Detector: Quasi peak	Meas. Time: 1 s,

*AV Detector in the ranges 9-90kHz and 110-490kHz

Spectrum analyser settings for SER3:

1GHz-40GHz	RBW: 1 MHz	Detector: PK/ RMS	Trace: Max. hold	Sweep: Auto
------------	------------	-------------------	------------------	-------------

2) Measurement of emissions according to Spurious Emissions Limit specified in section 15.407(b):

Spectrum analyser settings:

RBW: 1 MHz	VBW: 3 MHz	Detector: PK	Trace: Max. hold	Sweep: Auto
------------	------------	--------------	------------------	-------------

FCC-ID: O2FVOXTER

5.1.5 Test result

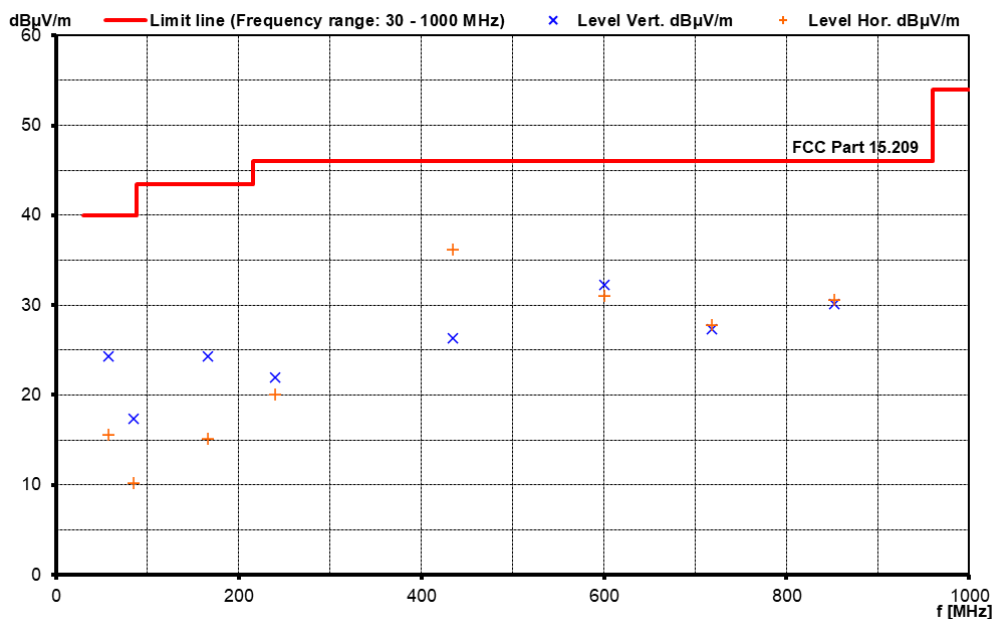
$f < 30$ MHz:

FCC Part 15.209 Radiated emission limits; general requirements (< 30 MHz)									
Frequency (kHz)	PK reading (dBμV)	QP reading (dBμV)	AV reading (dBμV)	Ant. factor (dB)	Distance corr. (dB)	AV level (dBμV/m)	QP level (dBμV/m)	Limit (dBμV/m)	Dlimit (dB)
21.5	36.6	14.2	13.4	20.0	-80.0	-46.6	-45.8	41.0	-87.6
51.5	19.4	15.9	16.1	20.0	-80.0	-43.9	-44.1	33.4	-77.3
75.0	18.2	0.0	-5.8	20.0	-80.0	-65.8	-60.0	30.1	-95.9
500.0	17.1	7.3	-1.7	20.0	-40.0	-21.7	-12.7	33.6	-46.3
3390.0	13.7	-1.2	-9.9	20.0	-40.0	-29.9	-21.2	29.5	-50.7
6780.0	6.3	-7.9	-13.4	20.0	-40.0	-13.7	-27.9	29.5	-57.4
13560.0	19.4	11.5	-1.0	20.0	-40.0	-0.6	-8.5	29.5	-38.0
27120.0	-3.5	-12.8	-18.9	20.0	-40.0	-23.5	-32.8	29.5	-62.3

Note: frequencies in bold characters fall into AV ranges.

30 MHz < f < 1000 MHz:

Frequency (MHz)	Reading Vert. (dBμV)	Reading Hor. (dBμV)	Correct. Vert. (dB)	Correct. Hor. (dB)	Level Vert. (dBμV/m)	Level Hor. (dBμV/m)	Limit (dBμV/m)	Dlimit (dB)
56.77	7.0	-2.8	17.3	18.3	24.3	15.5	40.0	-15.7
84.57	3.6	-3.4	13.7	13.6	17.3	10.2	40.0	-22.7
165.91	5.0	-3.7	19.3	18.9	24.3	15.2	43.5	-19.2
239.96	3.5	1.8	18.4	18.3	21.9	20.1	46.0	-24.1
434.45	2.2	11.7	24.2	24.5	26.4	36.2	46.0	-9.8
599.99	4.0	2.4	28.3	28.6	32.3	31.0	46.0	-13.7
718.34	-2.8	-2.8	30.1	30.6	27.3	27.8	46.0	-18.2
852.73	-2.2	-2.1	32.3	32.7	30.1	30.6	46.0	-15.4

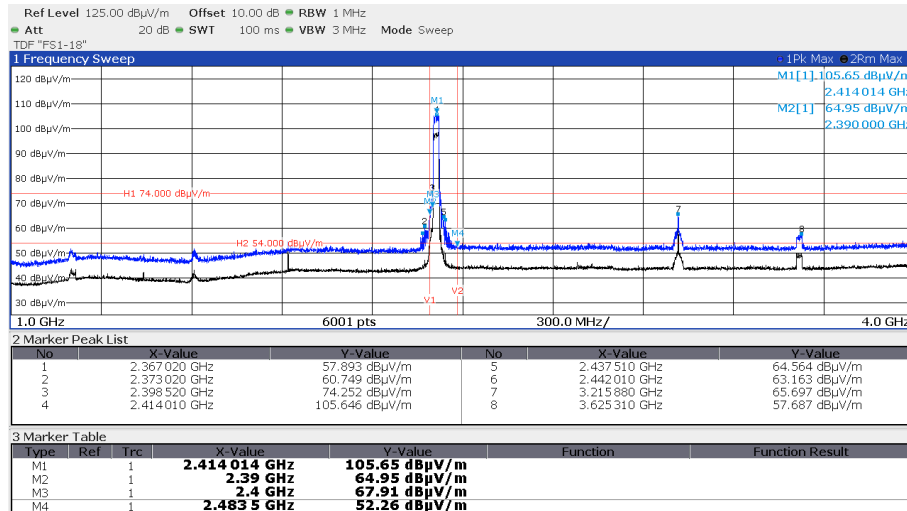


FCC-ID: O2FVOXTER

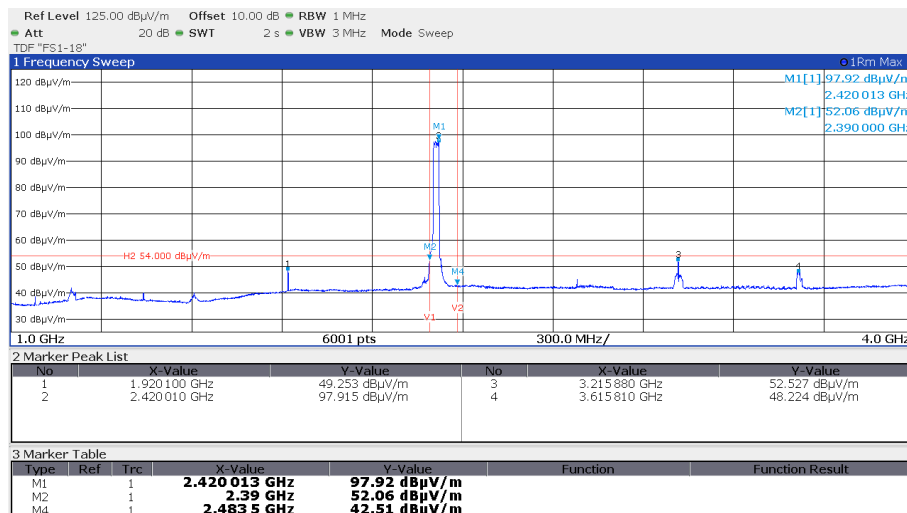
f > 1000 MHz:

Test scenario 1: RFID TX + WLAN 2.4 GHz n HT20 MCS-0 CH1

1-4 GHz



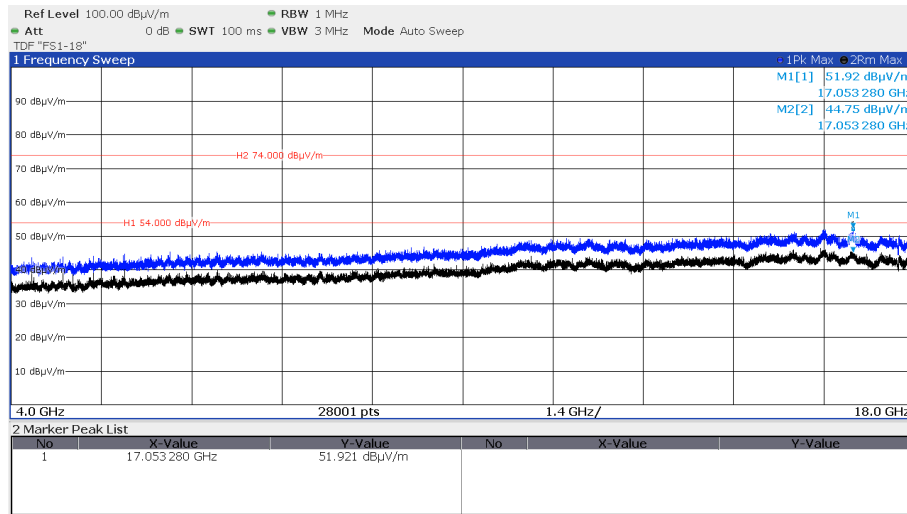
Note: PK measurement



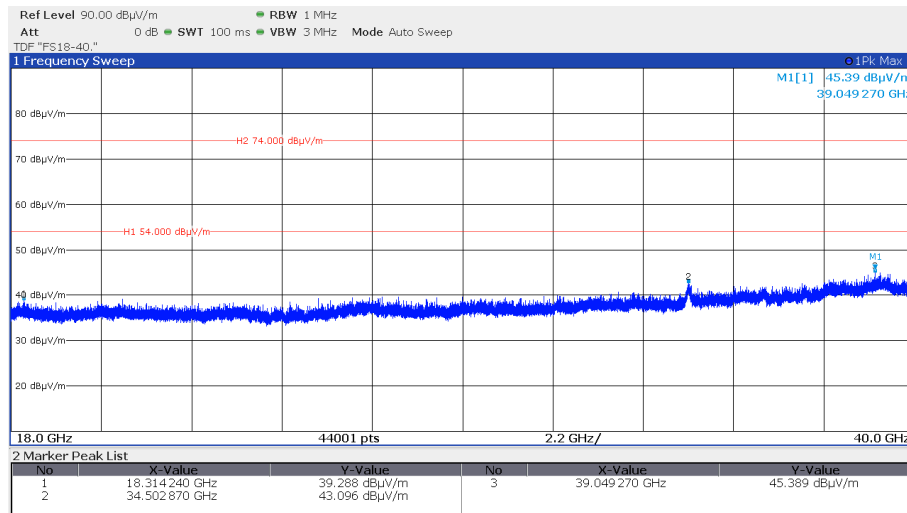
Note: AV measurement

FCC-ID: O2FVOXTER

4-18GHz



18-40GHz

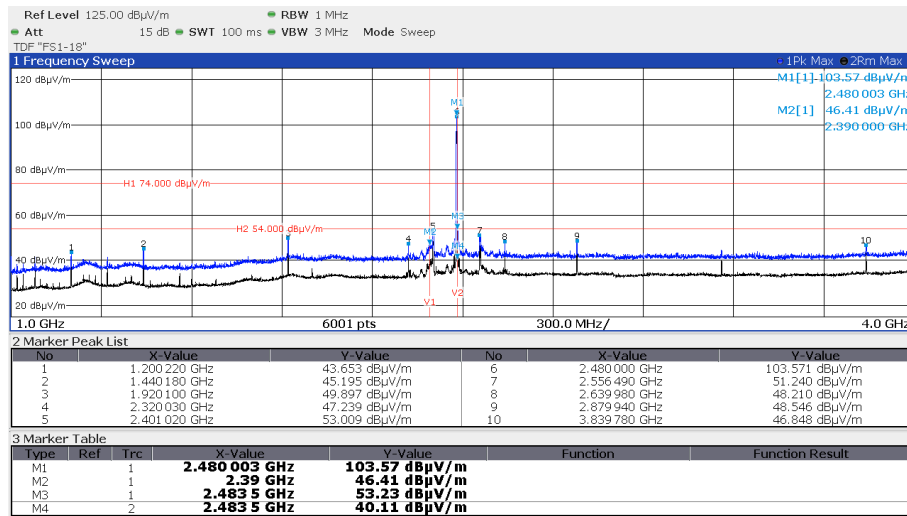


Note: PK results below AV limit, no AV measurement necessary.

FCC-ID: O2FVOXTER

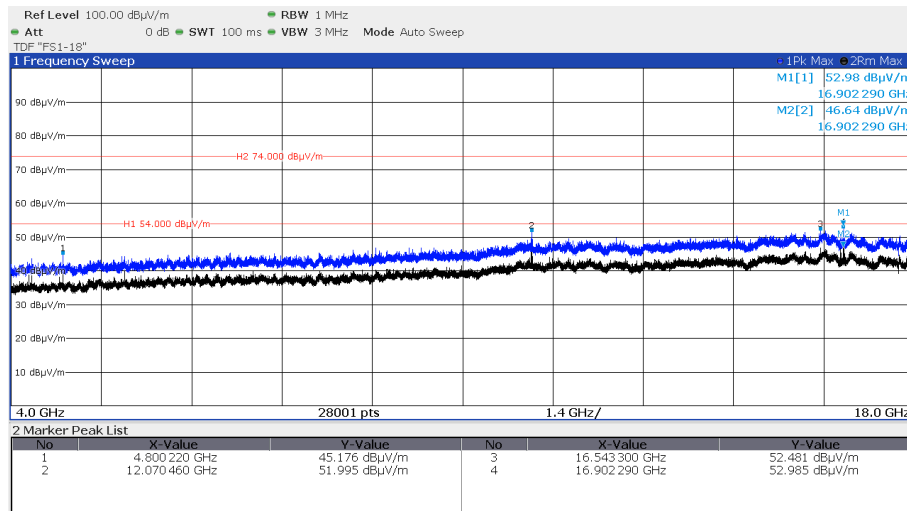
Test scenario 2: RFID TX + BLE 1 Mbps CH39

1-4 GHz

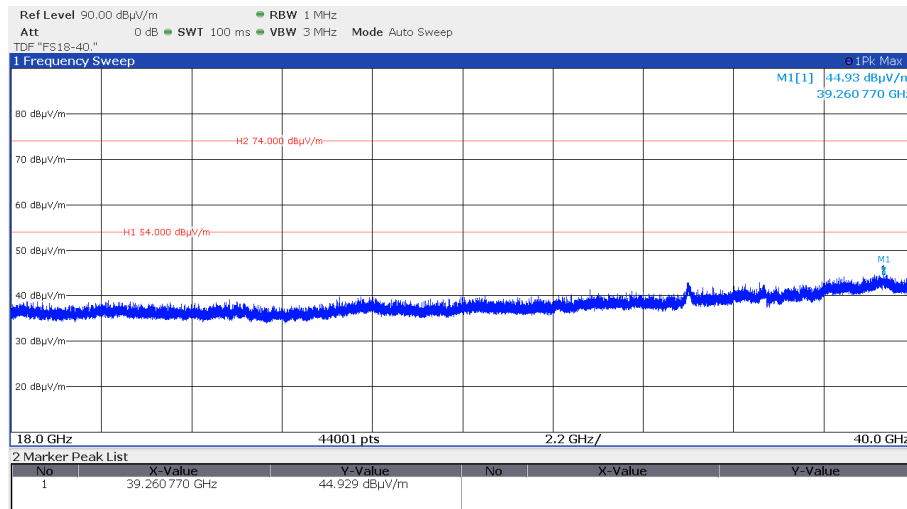


Note: PK results below AV limit, no AV measurement necessary

4-18GHz



18-40GHz

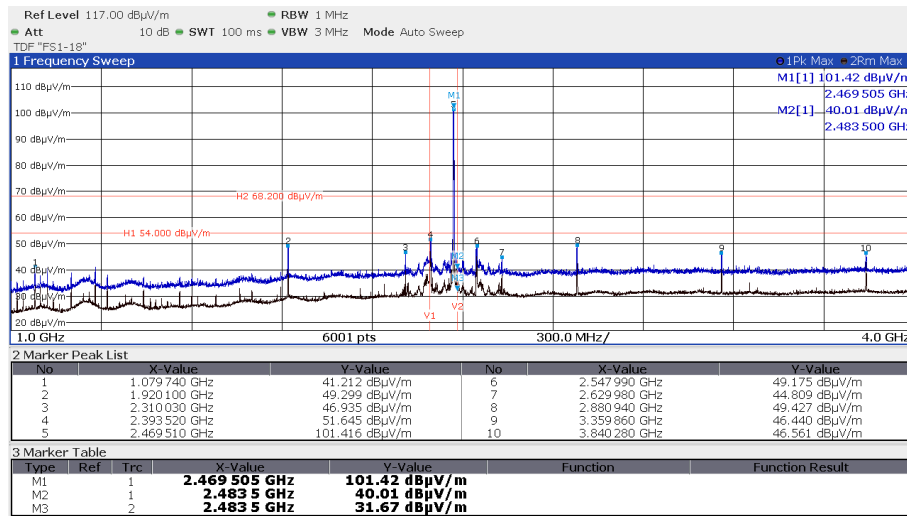


Note: PK results below AV limit, no AV measurement necessary.

FCC-ID: O2FVOXTER

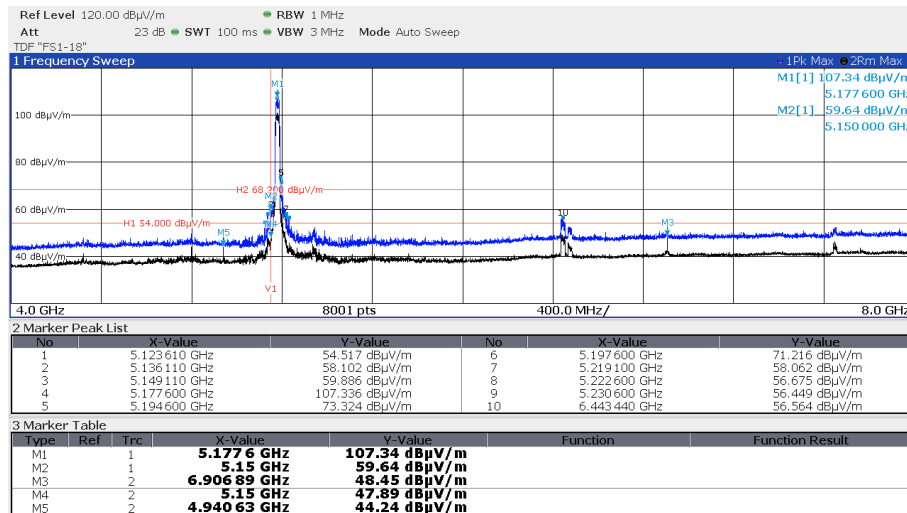
Test scenario 3: RFID TX + WLAN 5GHz n HT20 MCS-7 Channel 36 TX + BLE 1 Mbps Channel 34 TX

1-4 GHz

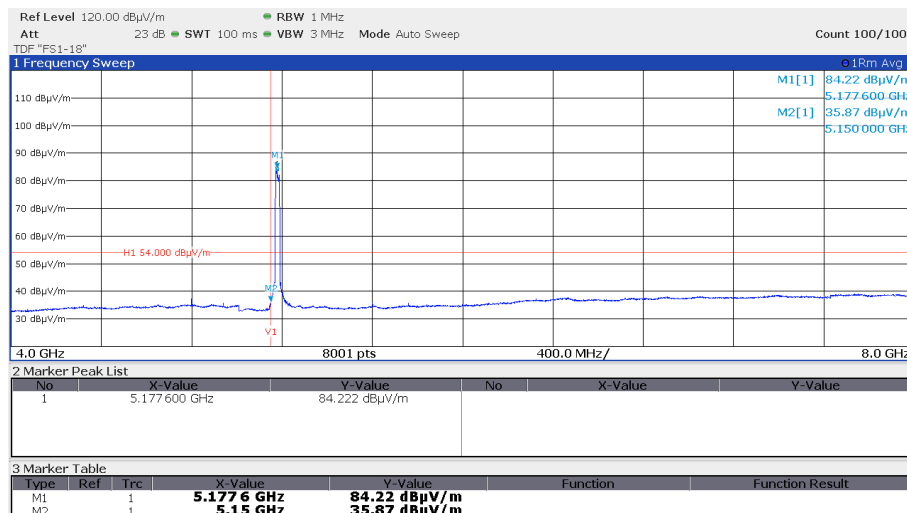


Note: PK results below AV limit, no AV measurement necessary.

4-8GHz



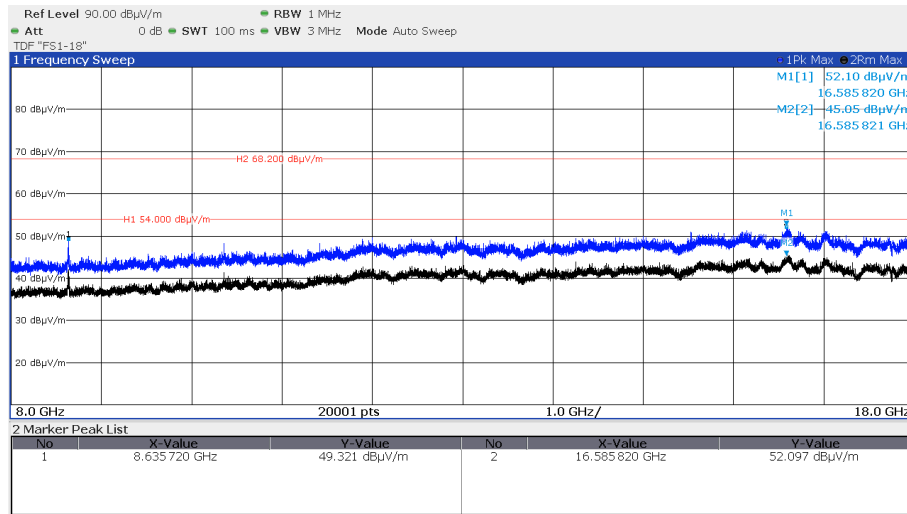
Note: PK measurement



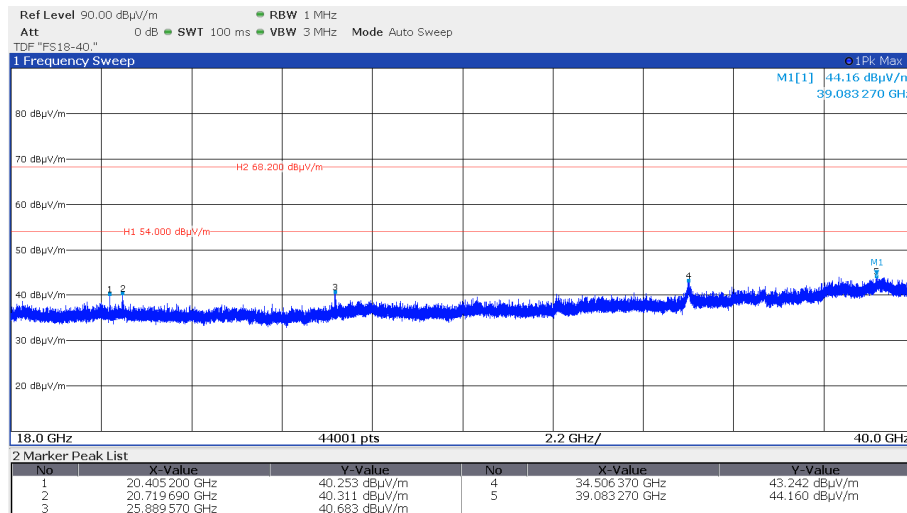
Note: AV measurement

FCC-ID: O2FVOXTER

8-18GHz



18-40GHz

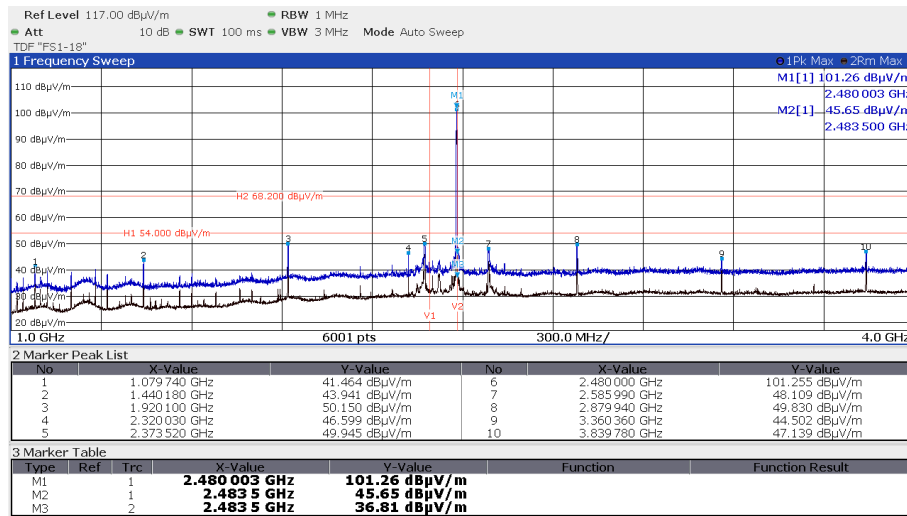


Note: PK results below AV limit, no AV measurement necessary.

FCC-ID: O2FVOXTER

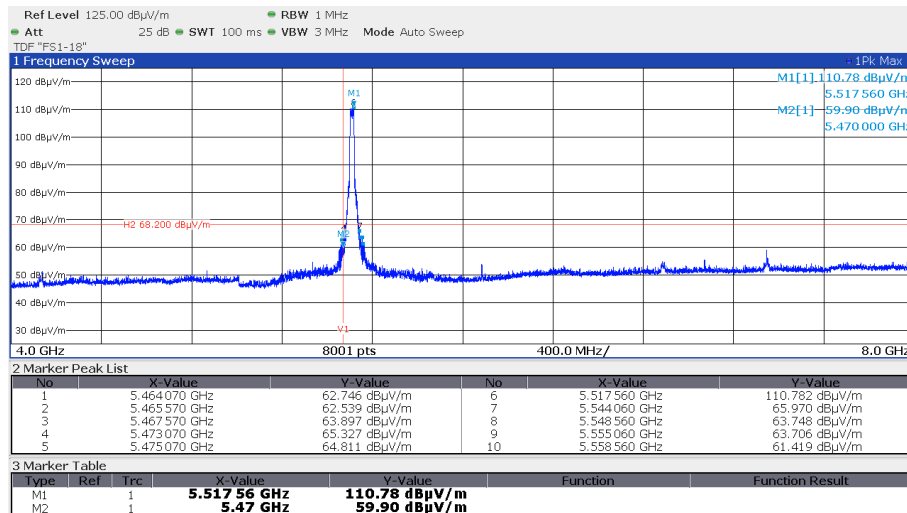
Test scenario 4: RFID TX + WLAN 5GHz n HT20 MCS-7 Channel 100 TX + BT DH5 Channel 79 TX

1-4 GHz

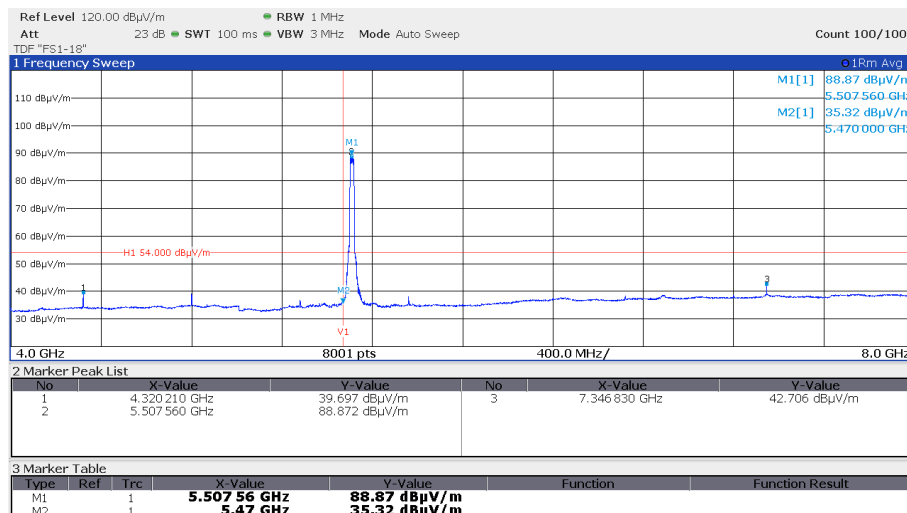


Note: PK results below AV limit, no AV measurement necessary.

4-8GHz



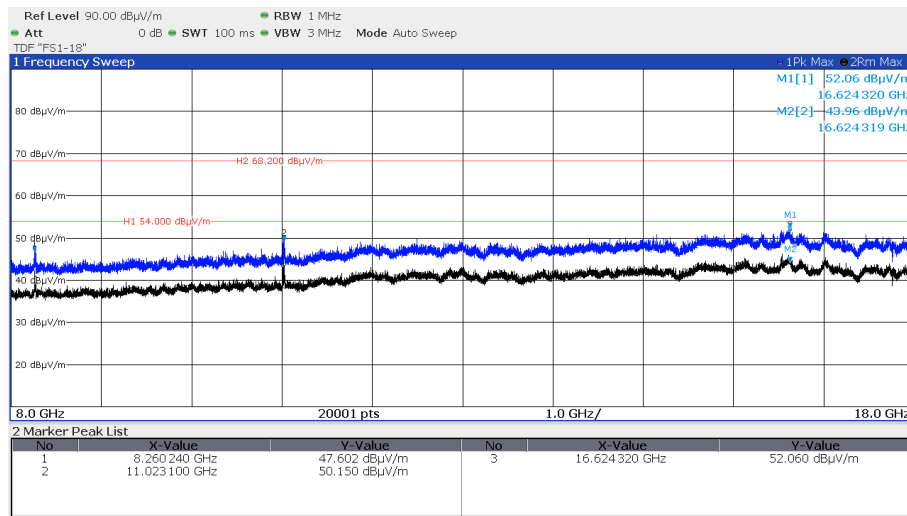
Note: PK measurement



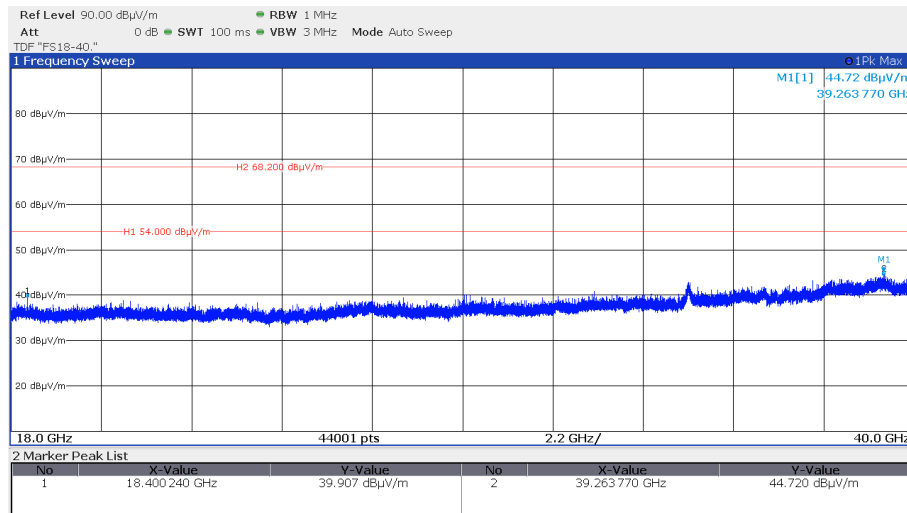
Note: AV measurement

FCC-ID: O2FVOXTER

8-18GHz



18-40GHz



Note: PK results below AV limit, no AV measurement necessary.

FCC-ID: O2FVOXTER

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

Frequency (MHz)	15.209 Limits (μV/m)	Measurement distance (m)
0.009 - 0.49	2400/f(kHz)	300
0.49 - 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

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

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

Attenuation below the general limits specified in Section 15.209(a) is not required.

Limit according to FCC Part 15E, Section 15.407(b):

Operating Frequency range (MHz)	Frequency ranges from band edge (MHz)	Undesirable emission limit, EIRP (dBm / MHz)	Undesirable emission limit, EIRP (dBμV/m / MHz)
5150 - 5250	-	-27.0	68.2
5250 - 5350	-	-27.0	68.2
5470 - 5725	-	-27.0	68.2
5725 - 5850	± 5	27.0 decreasing linearly to 15.6	122.2 decreasing linearly to 110.8
	± 5 - ± 25	15.6 decreasing linearly to 10.0	110.8 decreasing linearly to 105.2
	± 25 - ± 75	10.0 decreasing linearly to -27.0	105.2 decreasing linearly to 68.2
	± 75	-27.0	68.2

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

FCC-ID: O2FVOXTER

The requirements are **FULFILLED**.

Remarks: The measurement was performed up to the 10th harmonic. Only the worst-case plots are listed.

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.

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.
SER 1	ESR 7	02-02/03-17-001	01/08/2024	01/08/2023		
	HFH 2 - Z 2	02-02/24-05-020	01/06/2025	01/06/2022	05/09/2024	05/09/2023
	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 2	ESVS 30	02-02/03-05-006	27/07/2024	27/07/2023		
	VULB 9168	02-02/24-05-005	20/04/2024	20/04/2023	03/05/2024	03/05/2023
	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	50F-003 N 3 dB	02-02/50-21-010				
	FSW43	02-02/11-15-001	04/05/2024	04/05/2023		
	AMF-6D-01002000-22-10P	02-02/17-15-004				
	LNA-40-18004000-33-5P	02-02/17-20-002				
	3117	02-02/24-05-009	12/07/2024	12/07/2023		
	BBHA 9170	02-02/24-05-013	21/03/2026	21/03/2023	21/03/2024	21/03/2023
	WHK 3.0/18G-10EF	02-02/50-05-180				
	WHKX 7.5/18G-8SS	02-02/50-07-010				
	BAM 4.5-P	02-02/50-17-024				
	NCD	02-02/50-17-025				
	KK-SF106-2X11N-6,5M	02-02/50-18-016				
	KMS116-GL140SE-KMS116-6810.17.A 12,4GHz	02-02/50-20-026				
		02-02/50-23-007			28/12/2023	28/06/2023

- End of test report -

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.