



RF – TEST REPORT

- FCC Part 15.247, RSS-247 -

Type / Model Name : PVA-1500HE2

Product Description : Test instrument with WiFi

Applicant : Fluke Corporation

Address : 6920 Seaway Blvd Everett.

Washington 98203, US

Manufacturer : Fluke Corporation

Address : 6920 Seaway Blvd Everett.

Washington 98203, US

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

POSITIVE

Test Report No. : 80195041-04 Rev_0

08. March 2024

Date of issue



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

Contents

1	<u>TEST STANDARDS</u>	<u>3</u>
2	<u>EQUIPMENT UNDER TEST</u>	<u>4</u>
2.1	Information provided by the Client	4
2.2	Sampling	4
2.3	Photo documentation of the EUT – Detailed photos see ATTACHMENT A	4
2.4	General remarks	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	5
2.10	Antenna	5
2.11	Power supply system utilised	5
2.12	Peripheral devices and interface cables	5
2.13	Determination of worst case conditions for final measurement	6
3	<u>TEST RESULT SUMMARY</u>	<u>7</u>
3.1	Revision history of test report	7
3.2	Final assessment	7
4	<u>TEST ENVIRONMENT</u>	<u>8</u>
4.1	Address of the test laboratory	8
4.2	Environmental conditions	8
4.3	Statement of the measurement uncertainty	8
4.4	Conformity Decision Rule	9
4.5	Measurement protocol for FCC and ISED	9
5	<u>TEST CONDITIONS AND RESULTS</u>	<u>12</u>
5.1	AC power line conducted emissions	12
5.2	Maximum peak output power	16
5.3	Unwanted emissions in restricted bands, radiated	18
5.4	Antenna application	31
6	<u>USED TEST EQUIPMENT AND ACCESSORIES</u>	<u>32</u>

ATTACHMENT A as separate supplement

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.

1 TEST STANDARDS

The tests were performed **partly** according to following standards:

FCC Rules and Regulations Part 15, Subpart A - General (March 2024)

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 (March 2024)

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

KDB 558074 D01 v05 Guidance for compliance measurements on DTS; FHSS and hybrid system devices operating under Section 15.247 of the FCC rules, April 2, 2019.

KDB 996369 D04 MODULAR TRANSMITTER INTEGRATION GUIDE—
GUIDANCE FOR HOST PRODUCT MANUFACTURERS

ISED Canada Rules and Regulations

RSS-Gen, Issue 5 + Amendment 1 + 2 General Requirements for Compliance of Radio Apparatus

RSS-247, Issue 3 Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

ANSI C63.10: 2013 Testing Unlicensed Wireless Devices

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 to his/her instructions.

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

2.4 General remarks

This report covers the emissions of the Module “CC3220MODSF12MOB” in combination with the host device PVA-1500HE2.

Performed tests:

- RF output power (radiated)
- Transmitter unwanted emissions, radiated

2.5 Equipment type

WLAN - AP

2.6 Short description of the equipment under test (EUT)

The EUT is a measurement instrument with integrated WiFi module. The PVA1500HE2 measures the I-V (current vs voltage) curve of solar modules.

The EUT supports the 2.4 GHz frequency band. It is compatible with 802.11b, g, n Standard and supports no beam forming.

- The equipment using other types of wide band modulation (e.g. DSSS, OFDM, etc.).
- The EUT is adaptive equipment.

Number of tested samples: 1
Serial number: 7352254
Firmware version: 2.5.402.sli

2.7 Variants of the EUT

There are two variants of the EUT: PVA-1500T2 and PVA-1500HE2. This test reports only covers the measurements with type PVA-1500 HE2.

2.8 Operation frequency and channel plan

The operating frequency is 2400 MHz to 2483.5 MHz.

Channel plan WLAN Standard 802.11b, g, n HT 20:

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

2.9 Transmit operating modes

The EUT use DSSS or OFDM modulation and may operate under operating mode 2 and provide following data rates with auto-fall-back:

- 802.11b mode 11, 5.5, 2, 1 Mbps (Mbps = megabits per second)
- 802.11g mode 54, 48, 36, 24, 18, 12, 9, 6 Mbps (Mbps = megabits per second)
- 802.11n HT20, MCS 0 - 7

2.10 Antenna

The following antenna shall be used with the EUT:

Number	Characteristic	Model number	Plug	Frequency range (GHz)	Gain (dBi)
1	Omni	AH316M245001-T	-	2.4	1.6

The EUT is equipped with 1 internal WLAN antenna for SISO.

2.11 Power supply system utilised

Power supply voltage, V_{nom} : 5 V_{DC} (battery powered), chargeable

2.12 Peripheral devices and interface cables

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

- - Model : -

Model : -

2.13 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.

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

WLAN	Available channel	Tested channels	Power setting	Modulation	Modulation type	Data rate
802.11b	1 to 11	1, 11	$P_{\max}$	DSSS	DBPSK	1 Mbps
802.11n HT20	1 to 11	1, 11	$P_{\max}$	OFDM	BPSK	MCS0

2.13.1 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 (x) from an internal packet generator.

3 TEST RESULT SUMMARY

FCC Rule Part	RSS Rule Part	Description	Result
15.207(a)	RSS-Gen, 8.8	AC power line conducted emissions	P
15.247(a)(2)	RSS-247, 5.2(a)	-6 dB EBW	NT
15.247(b)(3)	RSS-247, 5.4(d)	Maximum peak output power	P
15.247(d)	RSS-247, 5.5	Unwanted emission, radiated	P
15.247(d)	RSS-Gen, 8.10	Emissions in restricted bands	P
15.247(e)	RSS-247, 5.2(b)	PSD	NT
15.35(c)	RSS-Gen, 6.10	Pulsed operation	NT
15.203	-	Antenna requirement	P
	RSS-Gen, 6.11	Transmitter frequency stability	NT
	RSS-Gen, 6.7	99 % Bandwidth	NT

3.1 Revision history of test report

Test report No	Rev.	Issue Date	Changes
80195041-04	0	08 March 2024	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 : 31 January 2024

Testing concluded on : 22 February 2024

Checked by:

Tested by:

Klaus Gegenfurtner
Teamleader Radio

Christopher Thaller
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 power line conducted emissions	0.15 MHz to 30 MHz	95%	$\pm 3.29 \text{ dB}$
EBW and OBW	2400 MHz to 30000 MHz	95%	$\pm 2.5 \times 10^{-7}$
Output power ERP, radiated	1000 MHz to 7000 MHz	95%	$\pm 2.71 \text{ dB}$
Field strength of the fundamental	1000 MHz to 7000 MHz	95%	$\pm 2.71 \text{ dB}$
Power spectral density	2400 MHz to 3000 MHz	95%	$\pm 0.62 \text{ dB}$
Spurious Emissions, conducted	9 kHz to 10000 MHz	95%	$\pm 2.15 \text{ dB}$
Spurious Emissions, conducted	10000 MHz to 40000 MHz	95%	$\pm 3.47 \text{ dB}$
Spurious Emissions, radiated	9 kHz to 30 MHz	95%	$\pm 3.53 \text{ dB}$
Spurious Emissions, radiated	30 MHz to 1000 MHz	95%	$\pm 4.44 \text{ dB}$
Spurious Emissions, radiated	1000 MHz to 30000 MHz	95%	$\pm 2.34 \text{ dB}$
Spurious Emissions, radiated	30000 MHz to 40000 MHz	95%	$\pm 5.13 \text{ dB}$

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 ISED

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".

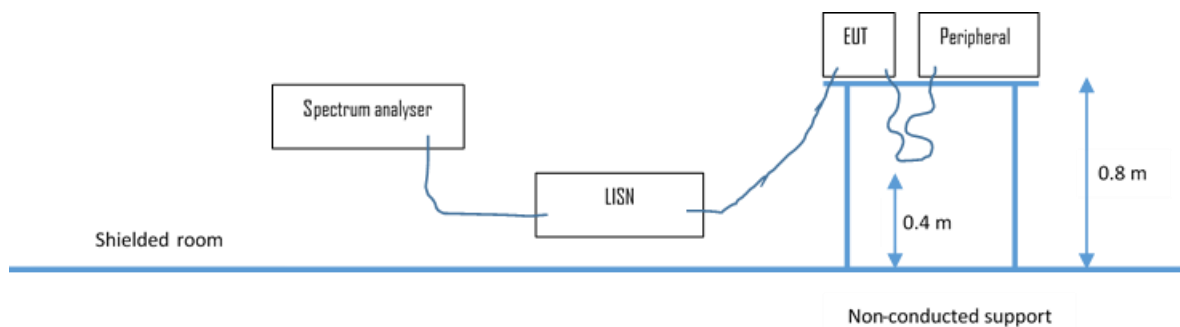
4.5.2.1 Justification

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:

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

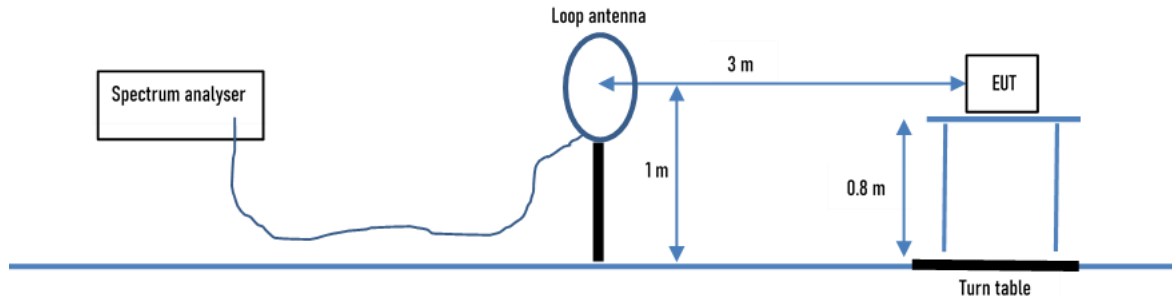
$$\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$$

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):

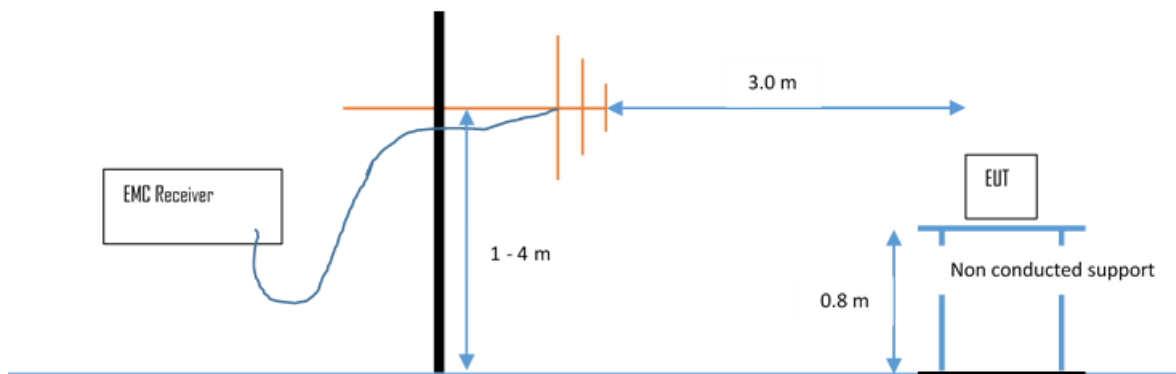
Test setup according ANSI C63.10



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 dB μ V/m is calculated by taking the reading from the EMI receiver (Level dB μ V) 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:

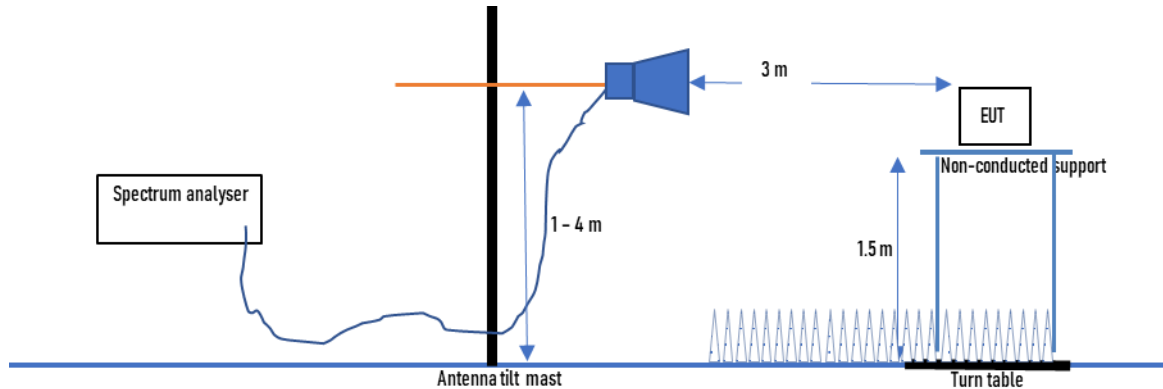
30 MHz – 1000 MHz: RBW: 120 kHz

Example:

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

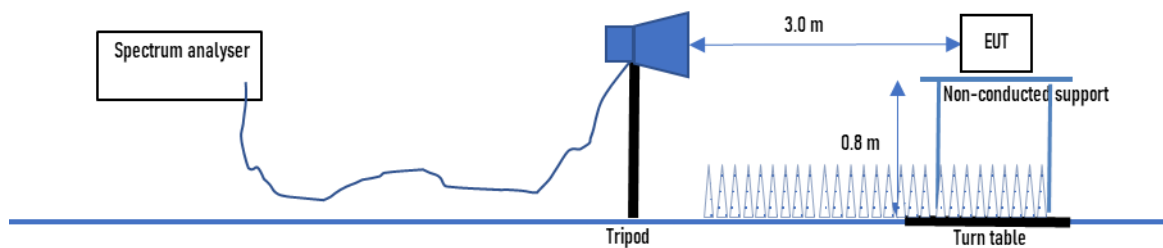
4.5.3.2.3 Anechoic chamber 1 (1000 MHz – 18000 MHz)

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

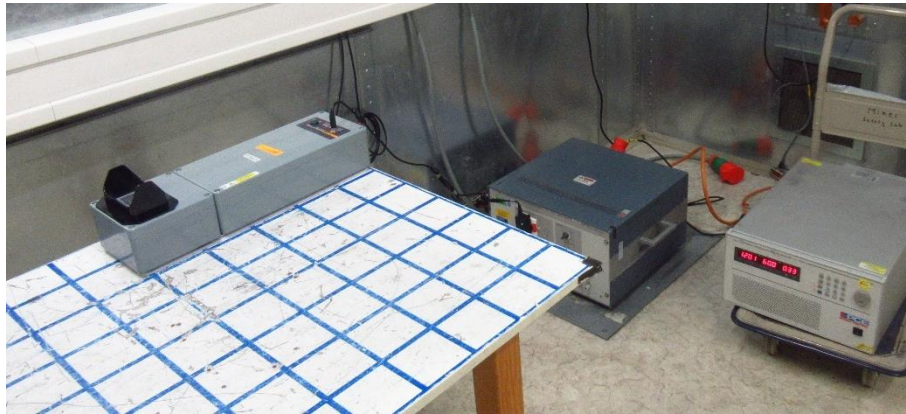
5.1 AC power line conducted emissions

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 limits under FCC 15.207(a).

5.1.4 Description of Measurement

The measurements are performed following the procedures set out in ANSI C63.10 described under item 4.4.3. 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 14.4 dB at 523.5 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

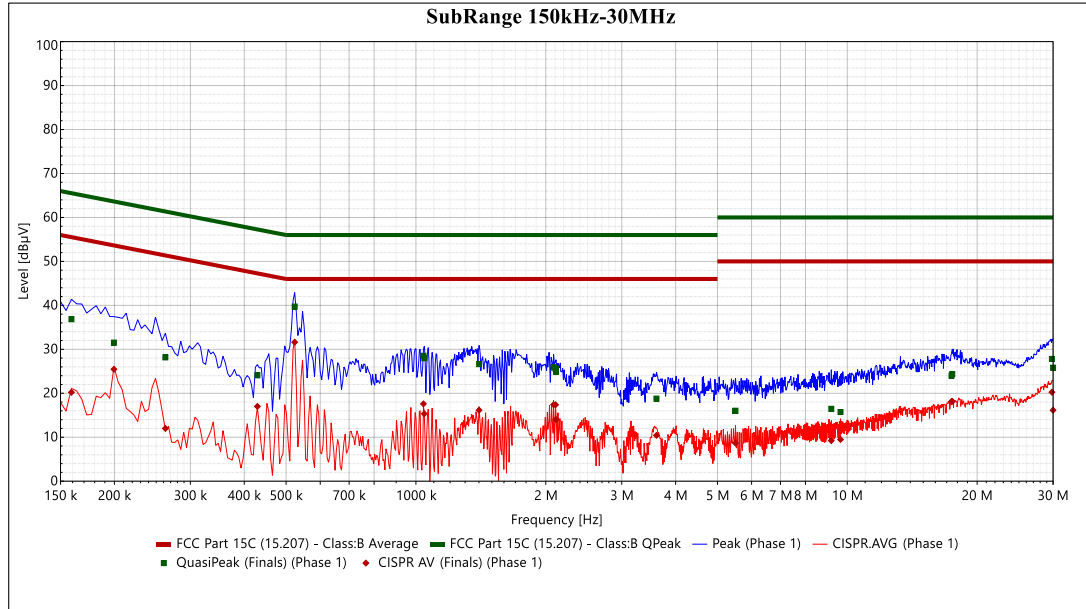
The requirements are **FULFILLED**.

Remarks: For detailed test result please refer to following test protocols

5.1.6 Test protocol

Test point L1
Operation mode: Transmission 2.4 GHz

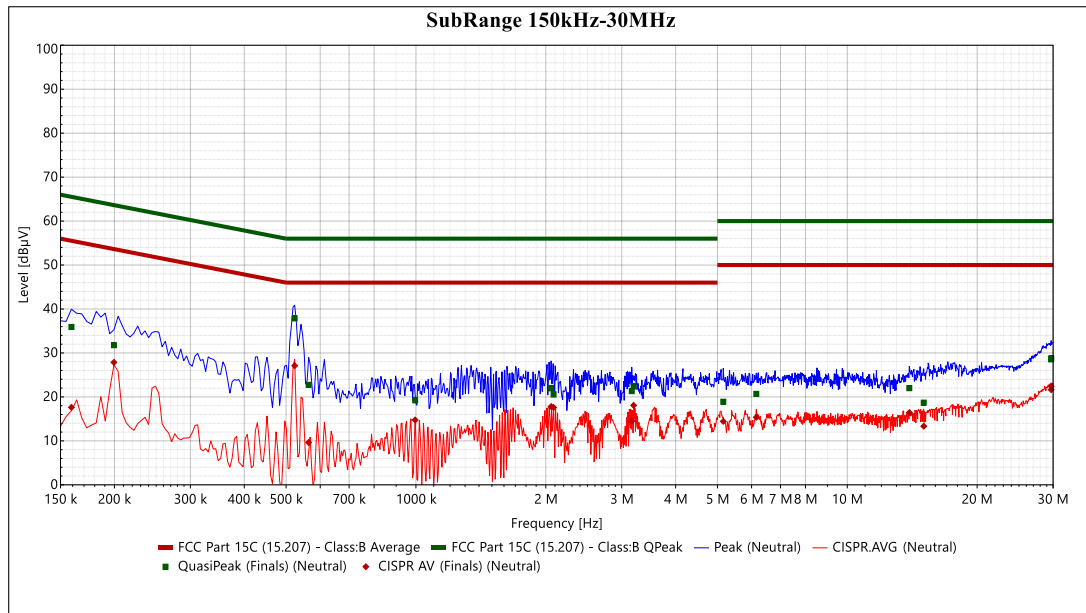
Result: passed



Frequency (Hz)	QuasiPeak (dBμV)	QP Margin	QP Limit (dBμV)	CISPR AV (dBμV)	CISPR AV Margin	AV Limit (dBμV)	Line	RBW (Hz)	Meas.Time (s)	Correction (dB)
159 k	36.847	-28.669	65.516	20.223	-35.293	55.516	Phase 1	9000	1	10.087
199.5 k	31.518	-32.113	63.631	25.456	-28.175	53.631	Phase 1	9000	1	10.099
262.5 k	28.17	-33.182	61.352	11.991	-39.361	51.352	Phase 1	9000	1	10.117
429 k	24.09	-33.182	57.272	17.011	-30.261	47.272	Phase 1	9000	1	10.159
523.5 k	39.72	-16.28	56	31.62	-14.38	46	Phase 1	9000	1	10.17
1.041 M	28.526	-27.474	56	17.592	-28.408	46	Phase 1	9000	1	10.189
1.0455 M	27.976	-28.024	56	15.343	-30.657	46	Phase 1	9000	1	10.19
1.401 M	26.628	-29.372	56	16.153	-29.847	46	Phase 1	9000	1	10.234
2.085 M	25.867	-30.133	56	17.386	-28.614	46	Phase 1	9000	1	10.255
2.1075 M	25.591	-30.409	56	17.377	-28.623	46	Phase 1	9000	1	10.257
2.112 M	24.873	-31.127	56	14.013	-31.987	46	Phase 1	9000	1	10.257
3.6105 M	18.783	-37.217	56	10.422	-35.578	46	Phase 1	9000	1	10.33
5.505 M	16.032	-43.968	60	8.655	-41.345	50	Phase 1	9000	1	10.446
9.1815 M	16.456	-43.544	60	9.231	-40.769	50	Phase 1	9000	1	10.56
9.645 M	15.726	-44.274	60	9.477	-40.523	50	Phase 1	9000	1	10.556
17.4435 M	24.01	-35.99	60	18.128	-31.872	50	Phase 1	9000	1	10.895
17.511 M	24.371	-35.629	60	18.15	-31.85	50	Phase 1	9000	1	10.897
29.8095 M	27.807	-32.193	60	20.24	-29.76	50	Phase 1	9000	1	10.859
29.994 M	25.816	-34.184	60	16.139	-33.861	50	Phase 1	9000	1	10.855

Test point N
Operation mode: Transmission 2.4 GHz

Result: passed



Frequency (Hz)	QuasiPeak (dBμV)	QP Margin	QP Limit (dBμV)	CISPR AV (dBμV)	CISPR AV Margin	AV Limit (dBμV)	Line	RBW (Hz)	Meas.Time (s)	Correction (dB)
159 k	35.909	-29.607	65.516	17.634	-37.882	55.516	Neutral	9000	1	10.136
199.5 k	31.774	-31.857	63.631	27.859	-25.772	53.631	Neutral	9000	1	10.145
523.5 k	37.87	-18.13	56	27.096	-18.904	46	Neutral	9000	1	10.17
564 k	22.746	-33.254	56	9.627	-36.373	46	Neutral	9000	1	10.172
996 k	19.225	-36.775	56	14.751	-31.249	46	Neutral	9000	1	10.233
2.058 M	21.948	-34.052	56	17.812	-28.188	46	Neutral	9000	1	10.287
2.085 M	20.551	-35.449	56	17.592	-28.408	46	Neutral	9000	1	10.289
3.165 M	21.322	-34.678	56	14.507	-31.493	46	Neutral	9000	1	10.341
3.1965 M	22.372	-33.628	56	18.084	-27.916	46	Neutral	9000	1	10.341
5.1585 M	18.9	-41.1	60	14.442	-35.558	50	Neutral	9000	1	10.438
6.153 M	20.691	-39.309	60	15.366	-34.634	50	Neutral	9000	1	10.513
13.9245 M	21.99	-38.01	60	16.418	-33.582	50	Neutral	9000	1	10.9
15.0405 M	18.703	-41.297	60	13.341	-36.659	50	Neutral	9000	1	10.902
29.688 M	28.542	-31.458	60	21.657	-28.343	50	Neutral	9000	1	10.78
29.6925 M	28.774	-31.226	60	22.419	-27.581	50	Neutral	9000	1	10.78

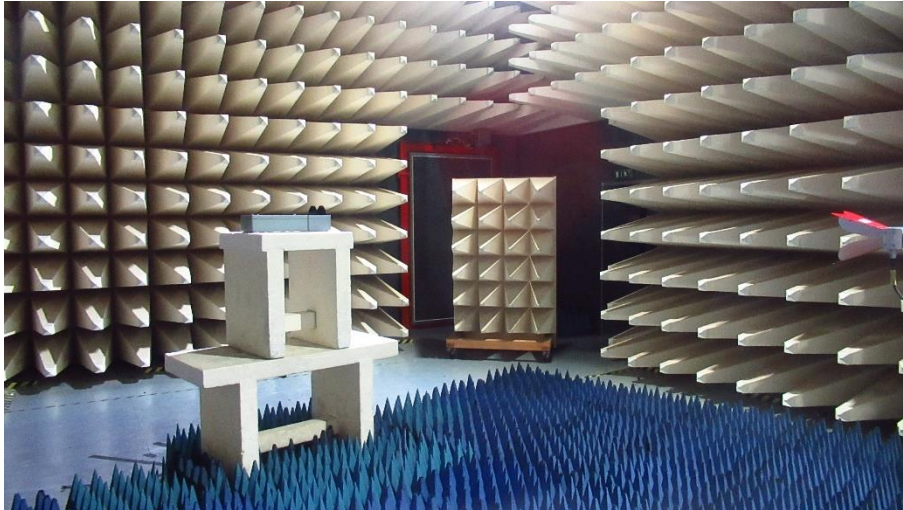
5.2 Maximum peak output power

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

5.2.1 Description of the test location

Test location: Anechoic chamber 1
Test distance: 3 m

5.2.2 Photo documentation of the test set-up



5.2.3 Applicable standard

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

For systems using digital modulation in the 2400 – 2483.5 MHz and 5725 – 5850 MHz bands, the maximum peak output power of the transmitter shall not exceed 1 Watt. The limit is based on transmitting antennas of directional gain that do not exceed 6 dBi.

5.2.4 Description of Measurement

The maximum peak conducted output power is measured using a peak power meter following the procedure set out in ANSI C63-10, item 11.9.1.1. The EUT is set in TX continuous mode while measuring.

5.2.5 Test result

802.11b Mbps, 1 TX	Test results		
Channel	A [Pmax] (dBm)	Limit (dBm)	Margin (dB)
CH1	17.1	30.0	-12.9
CH13	16.3	30.0	-13.7

802.11n HT20 MCS0	Test results		
Channel	A [Pmax] (dBm)	Limit (dBm)	Margin (dB)
CH1	18.4	30.0	-11.6
CH13	16.3	30.0	-13.7

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

Frequency (MHz)	Peak Power Limit	
	(dBm)	(Watt)
2400-2483.5	30	1.0

The requirements are **FULFILLED**.

Remarks: None.

5.3 Unwanted emissions in restricted bands, radiated

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

5.3.1 Description of the test location

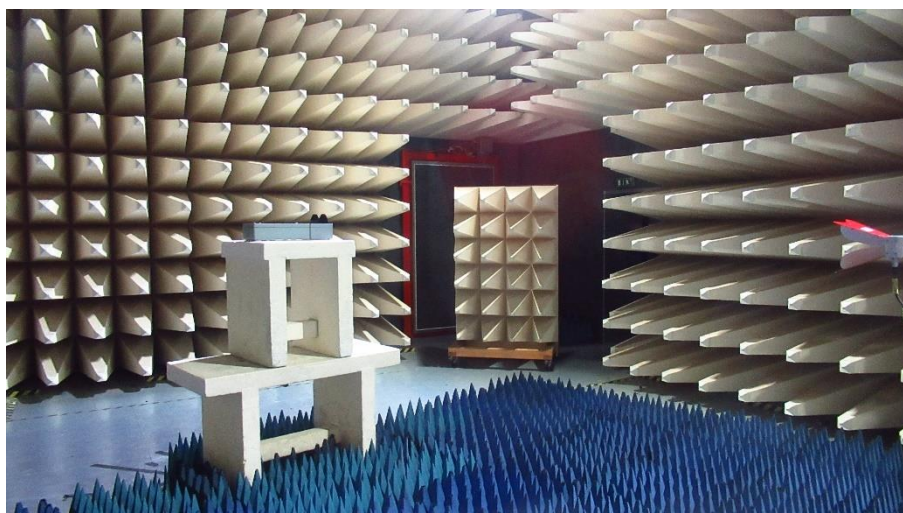
Test location: OATS 1
 Test location: Anechoic chamber 1
 Test distance: 3 m

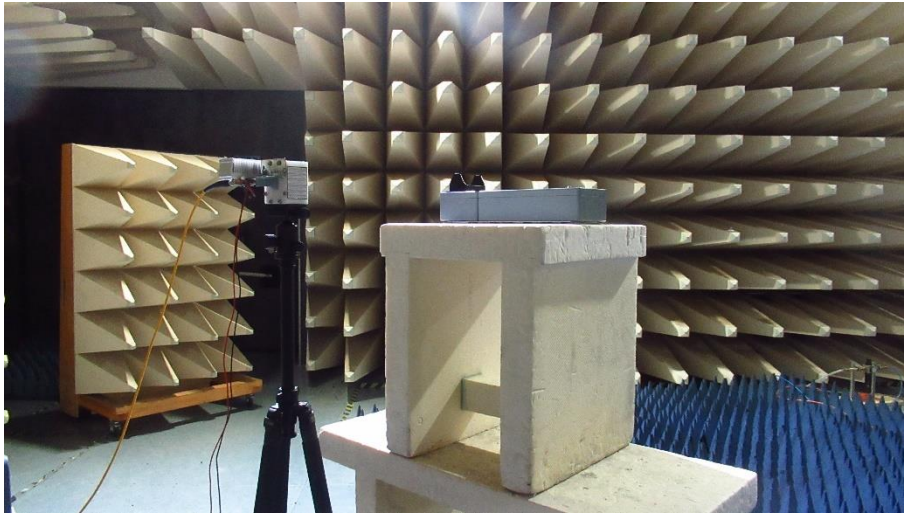
5.3.2 Photo documentation of the test set-up

Open area test site



Anechoic chamber





5.3.3 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).

5.3.4 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.

Spectrum analyser settings:

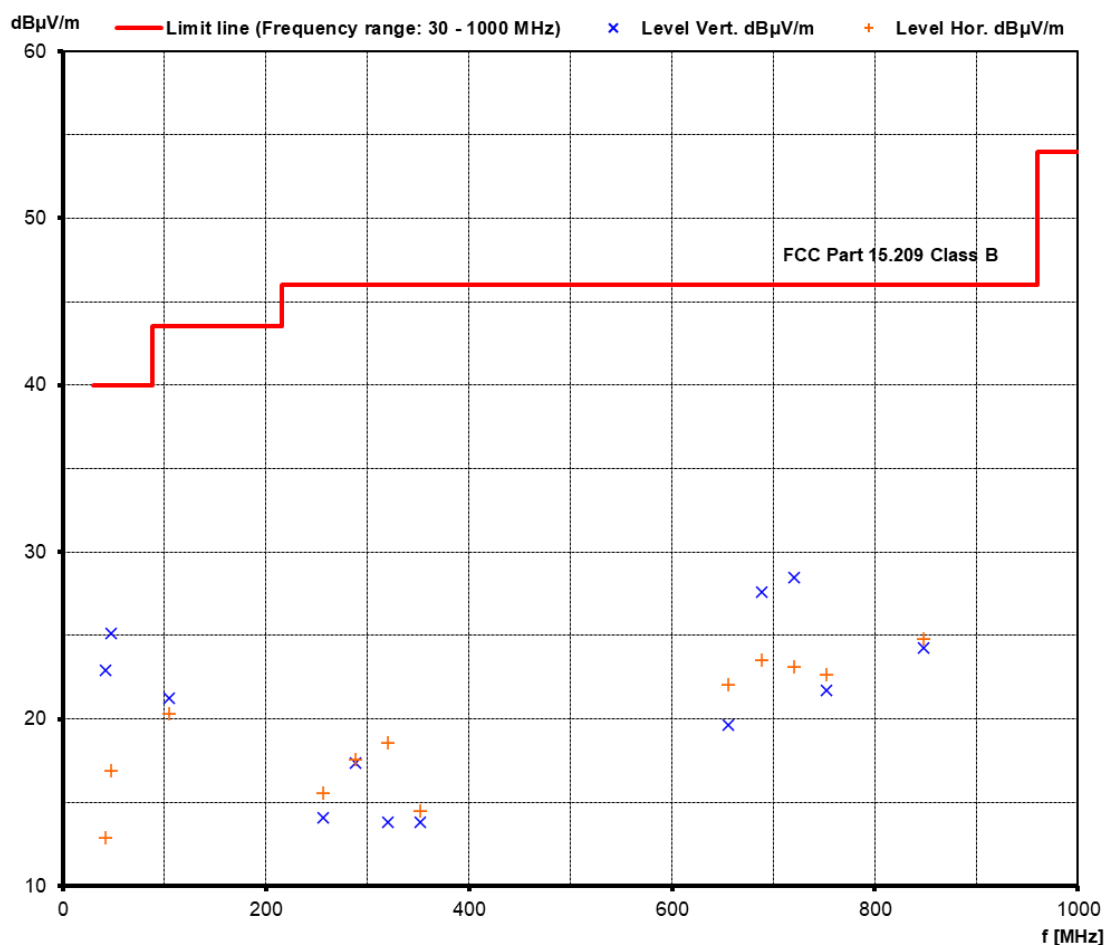
30 MHz – 1000 MHz: RBW: 120 kHz

1000 MHz – 26 GHz: RBW: 1 MHz, VBW: 3 MHz, Sweep: Auto, Detector function: Max Peak

5.3.1 Test result

$f < 1000$ MHz:

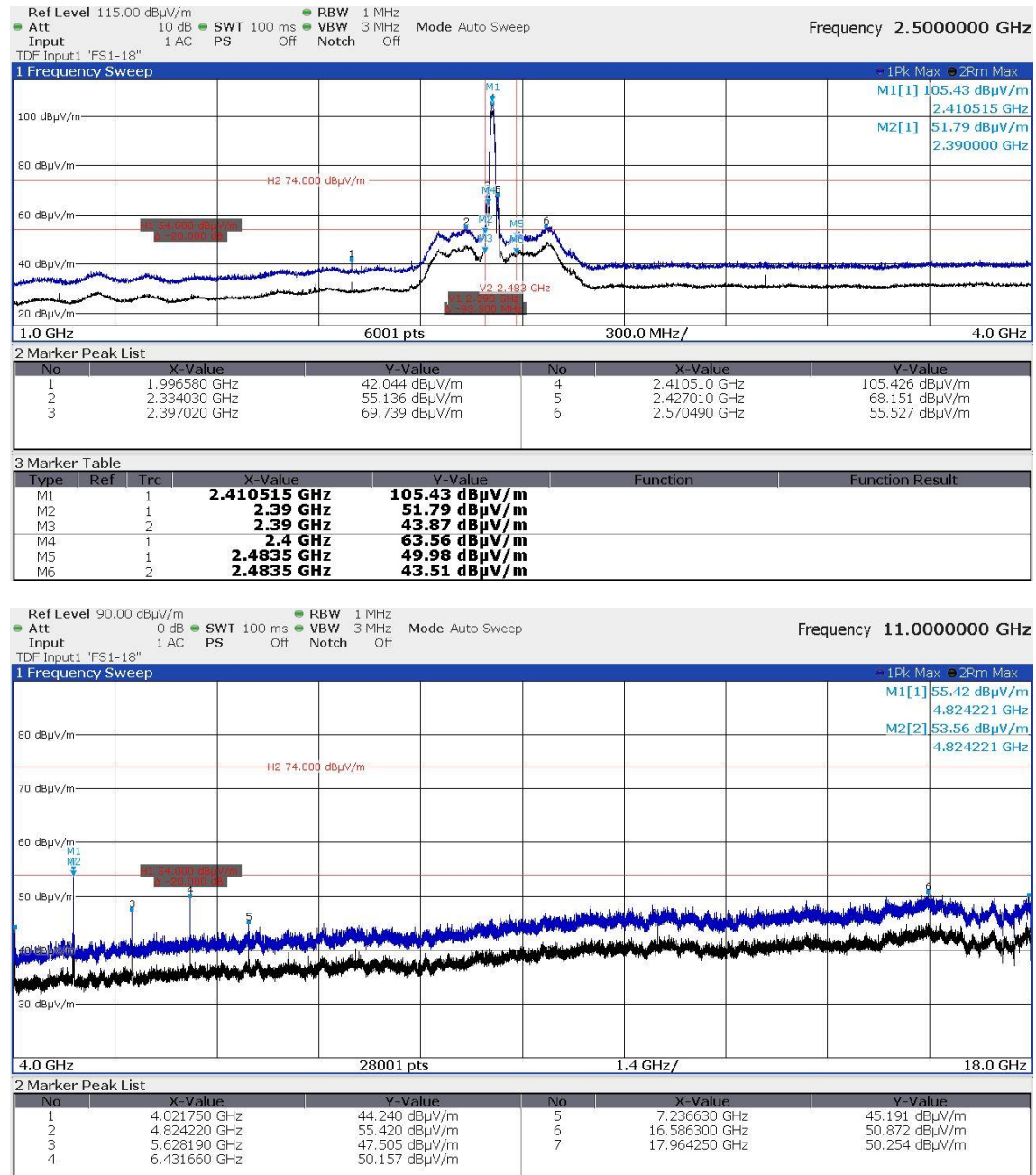
Frequency (MHz)	Reading Vert. (dB μ V)	Reading Hor. (dB μ V)	Correct. Vert. (dB)	Correct. Hor. (dB)	Level Vert. (dB μ V/m)	Level Hor. (dB μ V/m)	Limit (dB μ V/m)	Dlimit (dB)
41.57	5.8	-5.3	17.1	18.2	22.9	12.9	40.0	-17.1
47.05	7.4	-1.7	17.7	18.6	25.1	16.9	40.0	-14.9
104.17	5.6	5.7	15.6	14.6	21.2	20.3	43.5	-22.3
256.00	-4.9	-3.4	19.0	19.0	14.1	15.6	46.0	-30.4
287.96	-2.5	-2.7	19.9	20.3	17.4	17.6	46.0	-28.4
319.96	-7.0	-2.8	20.8	21.4	13.8	18.6	46.0	-27.4
352.00	-8.0	-7.8	21.8	22.3	13.8	14.5	46.0	-31.5
655.99	-9.5	-7.5	29.1	29.6	19.6	22.1	46.0	-23.9
687.99	-2.0	-6.6	29.6	30.1	27.6	23.5	46.0	-18.4
719.99	-1.7	-7.5	30.2	30.6	28.5	23.1	46.0	-17.5
751.99	-9.0	-8.5	30.7	31.1	21.7	22.6	46.0	-23.4
847.98	-8.0	-7.8	32.2	32.6	24.2	24.8	46.0	-21.2

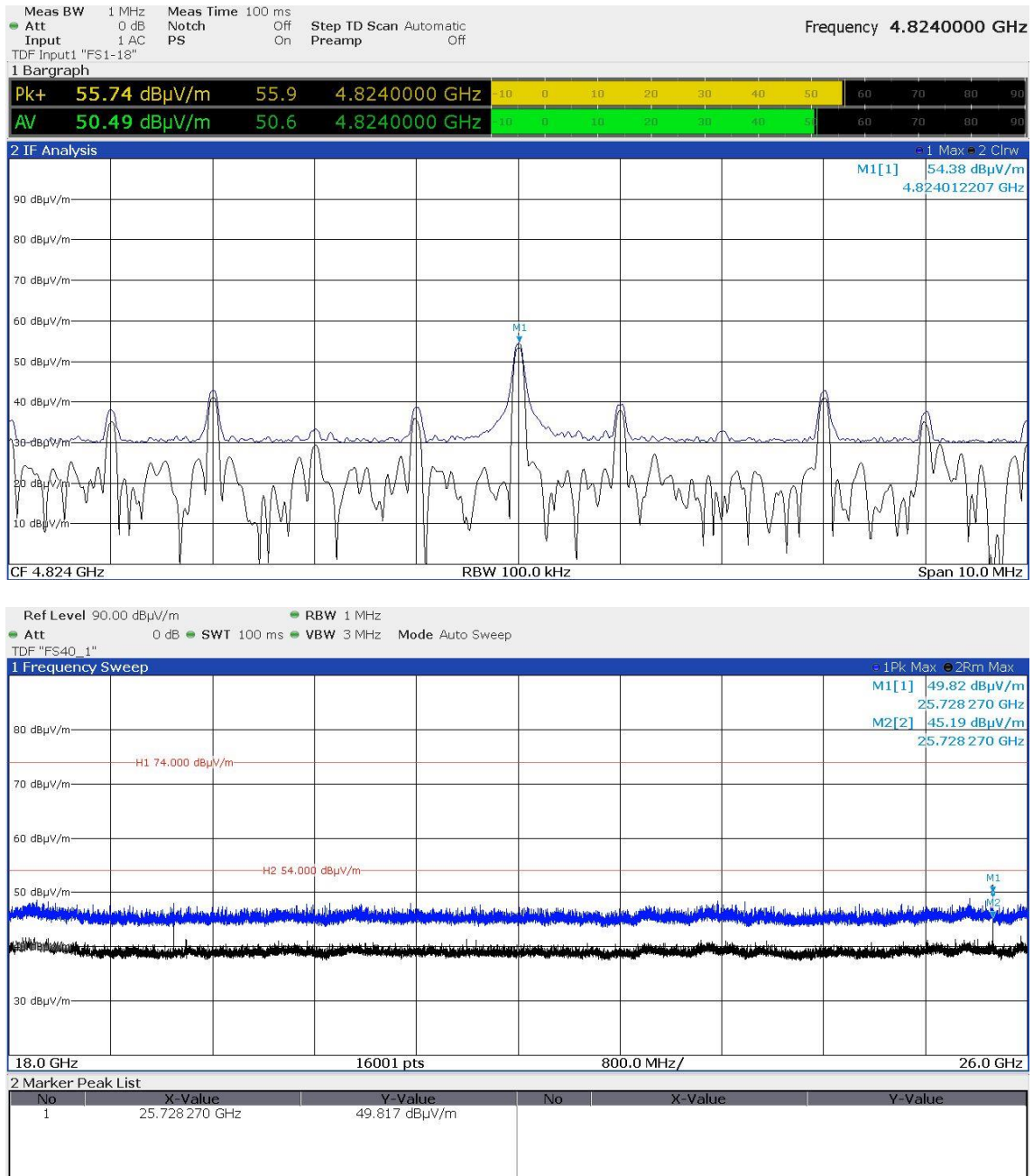


f > 1000 MHz:

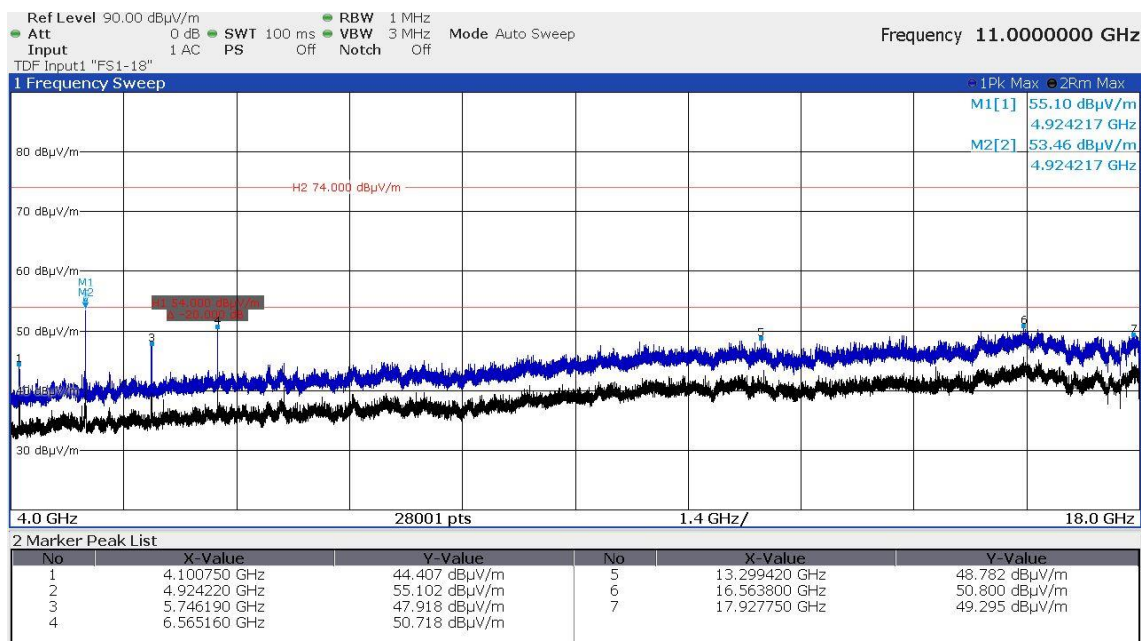
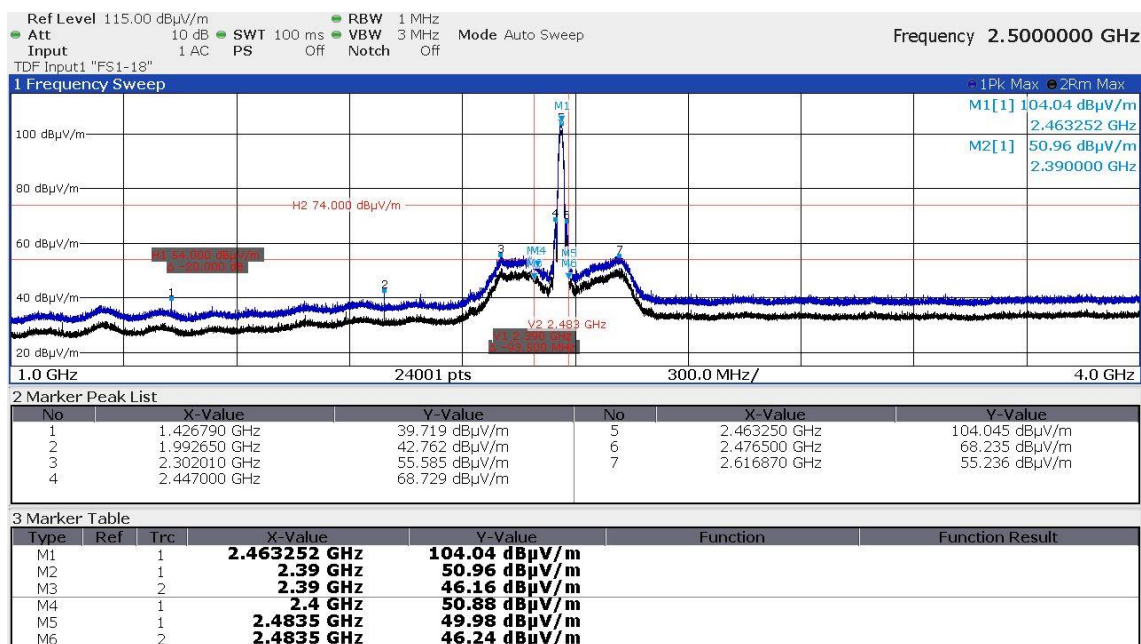
5.3.1.1 WLAN Standard 802.11b, 11 Mbps

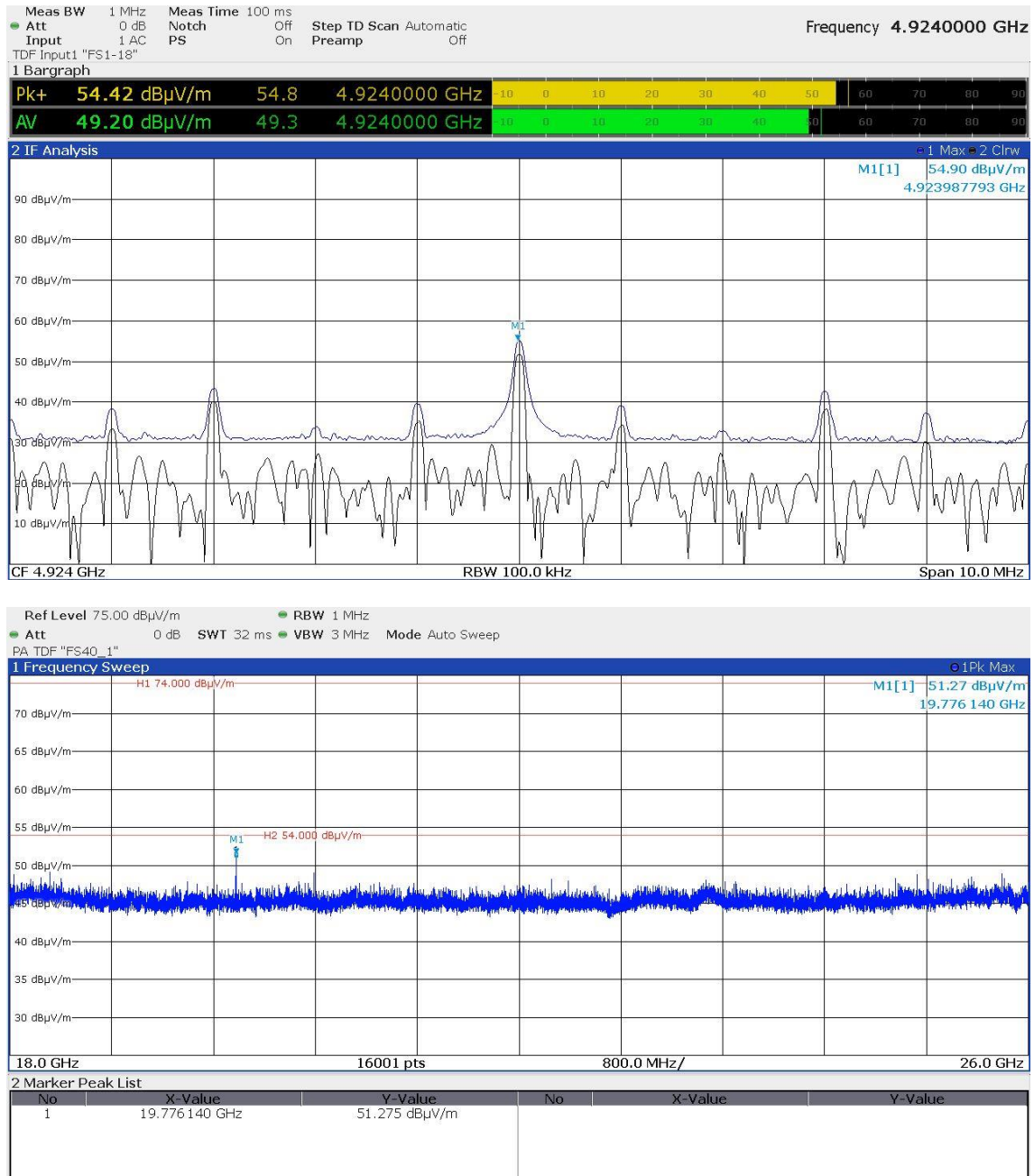
CH1





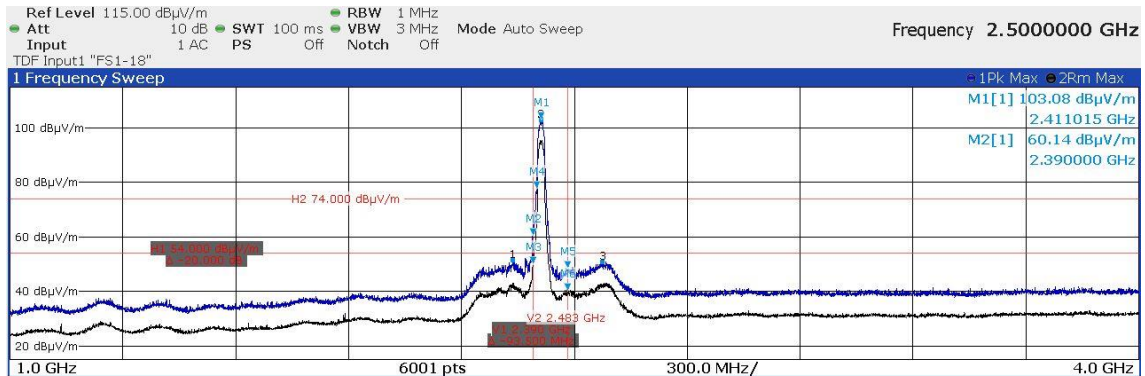
CH11





5.3.1.2 WLAN Standard 802.11n HT20, MCS0

CH1

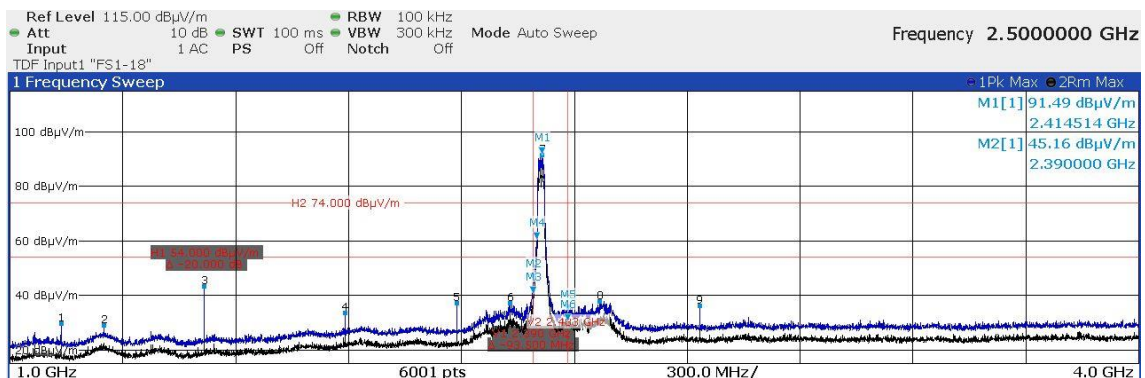


2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	2.337030 GHz	51.498 dBµV/m	3	2.574990 GHz	50.944 dBµV/m
2	2.411010 GHz	103.084 dBµV/m			

3 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	2.411015 GHz	103.08 dBµV/m		
M2		1	2.39 GHz	60.14 dBµV/m		
M3		2	2.39 GHz	49.79 dBµV/m		
M4		1	2.4 GHz	77.65 dBµV/m		
M5		1	2.4835 GHz	48.32 dBµV/m		
M6		2	2.4835 GHz	40.05 dBµV/m		

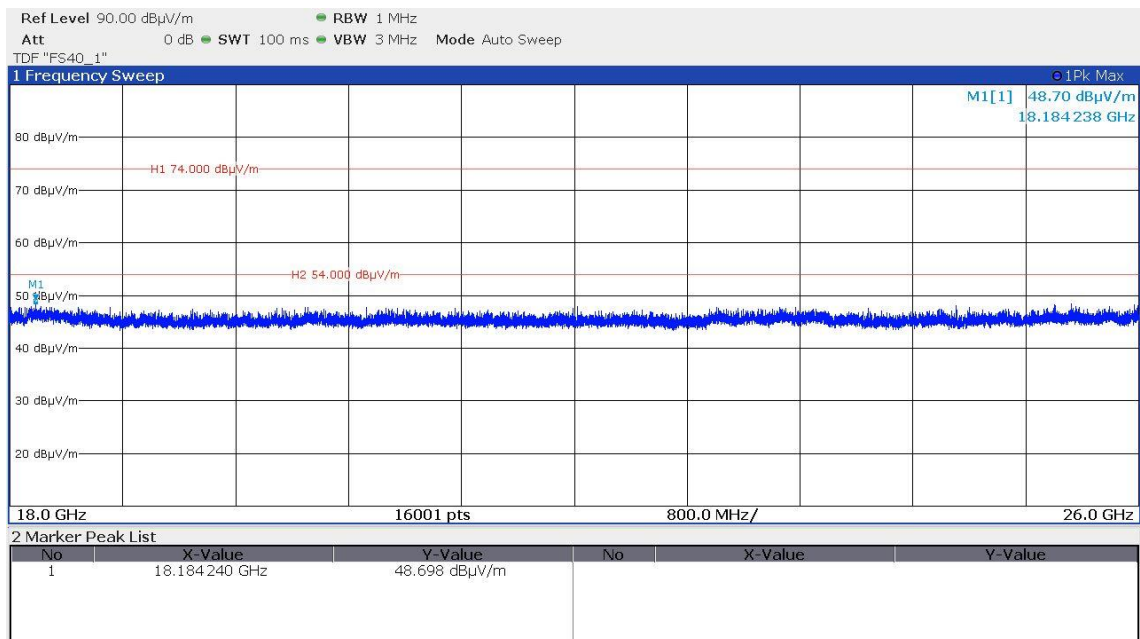
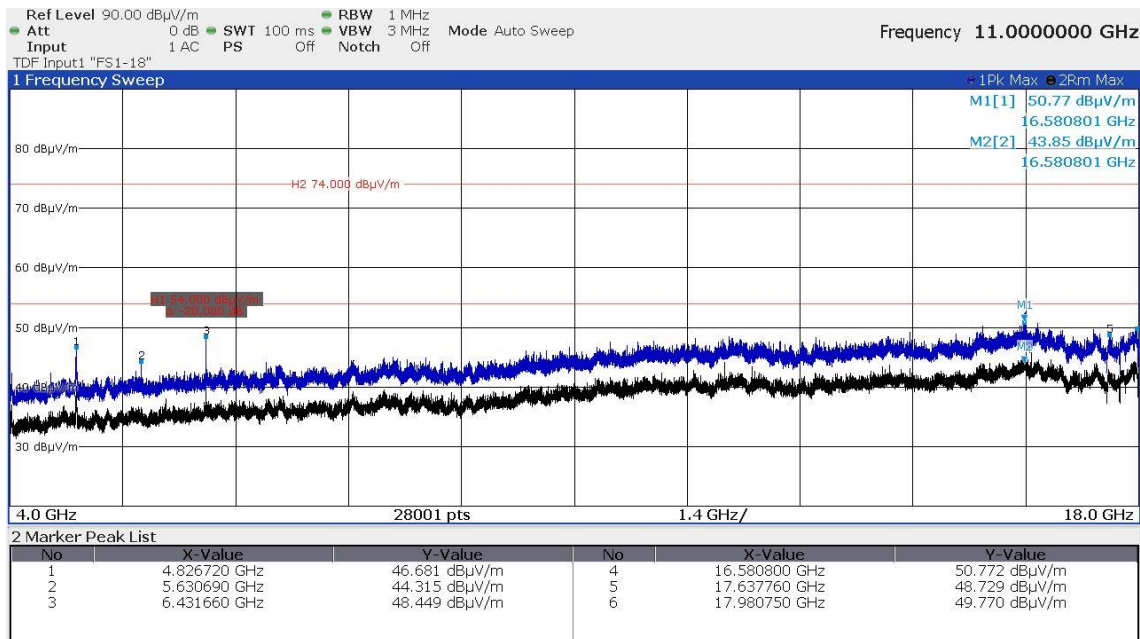


2 Marker Peak List

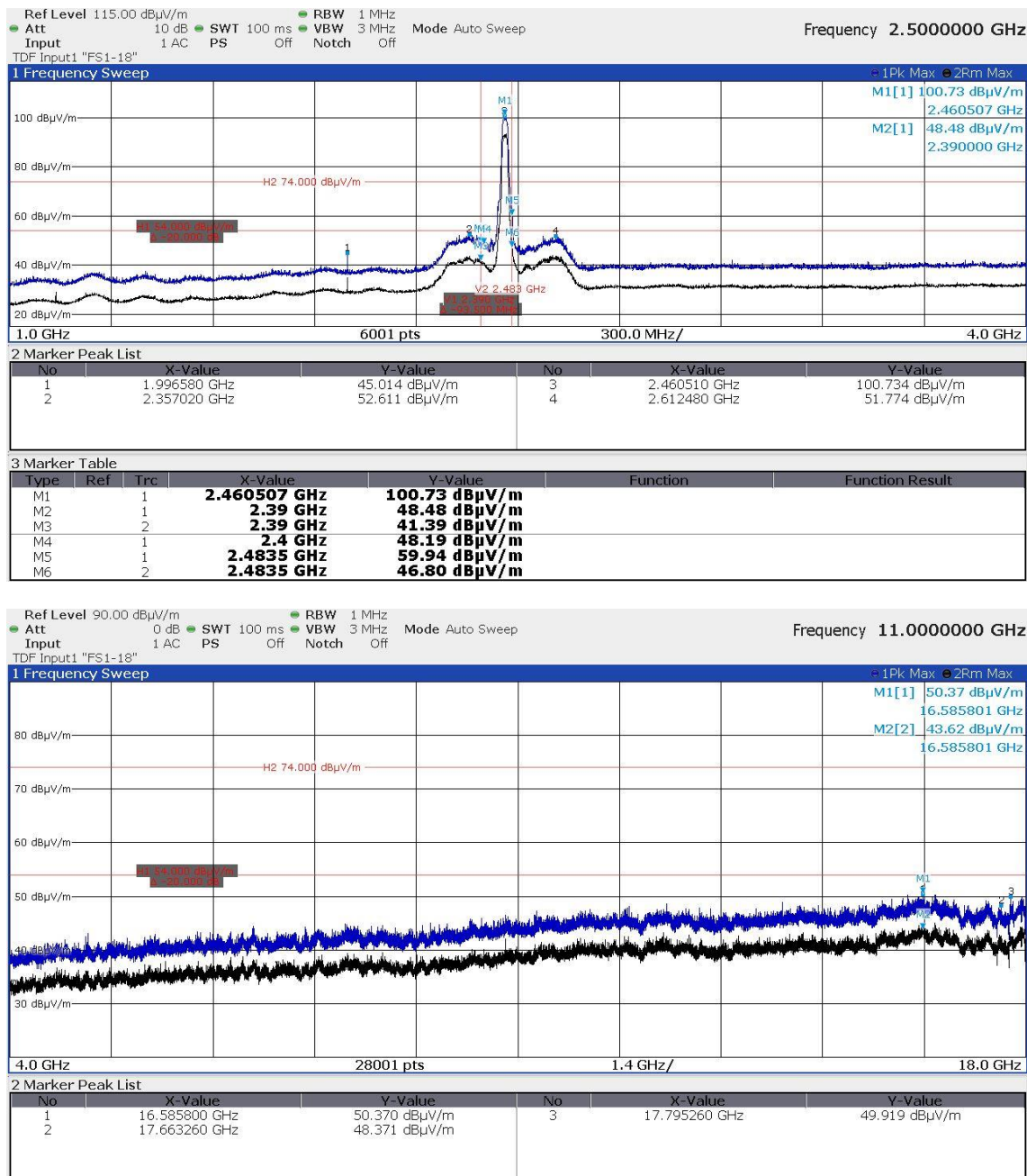
No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.136230 GHz	29.611 dBµV/m	6	2.329530 GHz	36.989 dBµV/m
2	1.250210 GHz	28.920 dBµV/m	7	2.414510 GHz	91.487 dBµV/m
3	1.516660 GHz	43.370 dBµV/m	8	2.567990 GHz	37.960 dBµV/m
4	1.890100 GHz	33.577 dBµV/m	9	2.833440 GHz	36.186 dBµV/m
5	2.187550 GHz	37.130 dBµV/m			

3 Marker Table

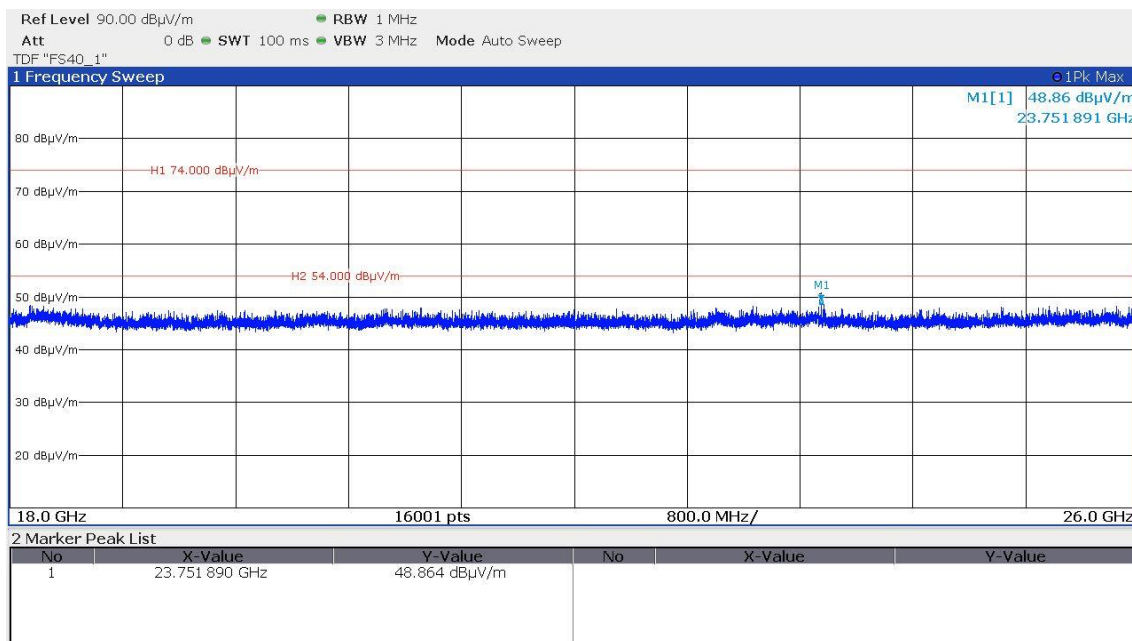
Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	2.414514 GHz	91.49 dBµV/m		
M2		1	2.39 GHz	45.16 dBµV/m		
M3		2	2.39 GHz	40.51 dBµV/m		
M4		1	2.4 GHz	60.38 dBµV/m		
M5		1	2.4835 GHz	34.02 dBµV/m		
M6		2	2.4835 GHz	30.43 dBµV/m		



CH11



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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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

Radiated limits according to RSS-Gen, 8.9 for spurious emissions which fall in restricted bands:

Frequency (MHz)	RSS-Gen Limits ($\mu\text{A/m}$)	Measurement distance (m)
0.009 - -0.49	63.7/f(kHz)	300
0.49 – 1.705	63.7/f(kHz)	30
1.705 – 30.0	0.08	30

Frequency (MHz)	RSS-Gen Limits ($\mu\text{V/m}$)	Measurement distance (m)
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 RSS-247, 5.5 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 RSS-Gen is not required.

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

RSS-Gen, Table 6 – Restricted Frequency Bands

MHz	MHz	MHz	GHz
0.090 - 0.110	12.57675 - 12.57725	399.9 - 410	7.250 - 7.750
0.495 - 0.505	13.36 - 13.41	608 - 614	8.025 – 8.500
2.1735 - 2.1905	16.42 - 16.423	960 - 1427	9.0 - 9.2
3.020 - 3.026	16.69475 - 16.69525	1435 - 1626.5	9.3 - 9.5
4.125 - 4.128	16.80425 - 16.80475	1645.5 - 1646.5	10.6 - 12.7
4.17725 - 4.17775	25.5 - 25.67	1660 - 1710	13.25 - 13.4
4.20725 - 4.20775	37.5 - 38.25	1718.8 - 1722.2	14.47 - 14.5
5.677 - 5.683	73 - 74.6	2200 - 2300	15.35 - 16.2
6.215 - 6.218	74.8 - 75.2	2310 - 2390	17.7 - 21.4
6.26775 - 6.26825	108 – 138	2483.5 - 2500	22.01 - 23.12
6.31175 - 6.31225	149.9 - 150.05	2655 - 2900	23.6 - 24.0
8.291 - 8.294	156.52475 - 156.52525	3260 – 3267	31.2 - 31.8
8.362 - 8.366	156.7 - 156.9	3332 - 3339	36.43 - 36.5
8.37625 - 8.38675	162.0125 - 167.17	3345.8 - 3358	Above 38.6
8.41425 - 8.41475	167.72 - 173.2	3500 - 4400	
12.29 - 12.293	240 – 285	4500 - 5150	
12.51975 - 12.52025	322 - 335.4	5350 - 5460	

The requirements are **FULFILLED**.

Remarks: The measurement was performed up to the 10th harmonic.

5.4 Antenna application

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 an integrated PCB antenna. No other antennas can be used with the device.

All supplied antennas meet the requirements of part 15.203.

Remarks: None.

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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.
CPR 3	FSW43	02-02/11-21-001	22/05/2024	22/05/2023		
	AMF-6D-01002000-22-10P	02-02/17-15-004				
	LNA-40-18004000-33-5P	02-02/17-20-002				
	311702-02/24-05-009	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
	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				
SER 2	KMS116-GL140SE-KMS116-	02-02/50-20-026				
	BAT-EMC 2023.0.8.0	02-02/68-13-001				
	ESVS 30	02-02/03-05-006	27/07/2024	27/07/2023		
	ESR 7	02-02/03-13-001	15/03/2024	15/03/2023		
	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	02-02/11-21-001	22/05/2024	22/05/2023		
	AMF-6D-01002000-22-10P	02-02/17-15-004				
	LNA-40-18004000-33-5P	02-02/17-20-002				
	311702-02/24-05-009	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				
	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-	02-02/50-20-026				
	BAT-EMC 2023.0.8.0	02-02/68-13-001				

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