

Report:	Electromagnetic compatibility and Radio spectrum Matters		Report no:	20CH-01574.R04
Product name:	Electronic Tap IWT-07-A EXX		Brand name:	Chicago Faucets
Serial no:	224 and 222	Model number:	IWT-07-A ELR	
Applicant and Manufacturer:	The Chicago Faucet Company 2100 S. Clearwater Drive IL-60018 Des Plaines USA	Date of tests:	2022-06-06 to 2022-09-29	

Standards		Result
47 CFR, Part 15	Subpart C, Intentional radiators: §§ 15.109/209/247	Pass
	Subpart B, Class B digital devices: § 15.107/109	Pass

These results were achieved without modifications of EUT

Test performed by

B. Itzcovich
EMC Test Engineer



Report prepared by

B. Itzcovich
EMC Test Engineer



Report controlled and approved by

C. Mauron
EMC Test Engineer



Rossens, 2023-05-22

(Issue Date)

Main language : English

The present document results from tests on one specimen and does not prejudice to the conformity of all the manufactured products.

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

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1. Summary of test results

§	Test Type	Result
7	Emission	47 CFR Part 15
7.1	Minimum 6 dB bandwidth CFR 47 § 15.247 (a)(2)	Pass
7.2	Antenna gain CFR 47 § 15.247 (b)(4)	Pass
7.3	Maximum output power (conducted) CFR 47 § 15.247 (b)(1) (3)	Pass
7.4	Band-edge emission (conducted) CFR 47 § 15.247 (d)	Pass
7.5	Band-edge emission (radiated) CFR 47 § 15.247 (d) CFR 47 § 15.205	Pass
7.6	Maximum power spectral density CFR 47 § 15.247 (e) and (f)	Pass
7.7	Spurious emissions – conducted (transmitter) CFR 47 § 15.247 (d)	Pass
7.8	Spurious emissions – radiated (transmitter) CFR 47 § 15.247 (d) CFR 47 § 15.209 (a) CFR 47 § 15.205	Pass
7.9	Radiated emission – receiver CFR 47 § 15.109 (Class B)	Pass
7.10	Conducted emission CFR 47 § 15.207/107 (Class B)	Pass
7	Emission	47 CFR Part 2
7.11	Designation of emission FCC 47 §2.201 FCC 47 §2.202	2M06FXD

2. Applied standards

47 CFR Part 15 Subpart C	Code of Federal Regulations - Title 47 - Telecommunication, Part 15, Subpart C: "Intentional Radiators"
47 CFR Part 15 Subpart B	Code of Federal Regulations - Title 47 - Telecommunication, Part 15, Subpart B: "Unintentional Radiators"

3. Abbreviations

AC	Alternating current
AFA	Adaptive Frequency Agility
AM	Amplitude Modulation
AN	Artificial Network
AV	Average
BB	Broad Band
BW	Bandwidth
CDN	Coupling Decoupling Network
CW	Continuous Wave
DAA	Detect And Avoid spectrum access technique
dB	Decibel
dBi	Gain in decibels relative to an isotropic antenna
DC	Direct current
DL	Downlink
dmax	Maximum relative voltage change
DS	Defined State
DSSS	Direct Sequence Spread Spectrum
e.i.r.p.	equivalent isotropic radiated power
EMC	ElectroMagnetic Compatibility
ESA	Electrical/electronic sub-assembly
ESD	Electro Static Discharge
EUT	Equipment under Test
FHSS	Frequency Hopping Spread Spectrum
GRP	Ground reference plane
ISM	Industrial Scientific Medical (frequency band)
ITU	International Telecommunications Union
ITU-R	International Telecommunications Union, Radio Sector
ITU-T	International Telecommunications Union, Telecommunications Sector
L1,L2,L3	Phase
LBT	Listen Before Talk
LISN	Line impedance stabilization network
MDS	Absorbing measuring clamp
MU	Master Unit
N	Neutral
NB	Narrow Band
NRI	National Radio Interfaces
N/A	Not Applicable
PE	Protective earth
PK	Peak
PM	Pulse Modulation
QFE	Local atmospheric pressure (Field Elevation)
QP	Quasi-Peak
RF	Radio Frequency
RFID	Radio Frequency Identification
RU	Remote Unit
Rx	Receiver
SAC	Semi-Anechoic chamber
SCU	System Control Unit
SF-CW	Step Frequency Continuous Wave (spread spectrum)
SRD	Short Range Device
THD	Total Harmonic Distortion
Tx	Transmitter
UL	Uplink
UWB	Ultra Wide Band
VSWR	Voltage Standing Wave Ratio

Date & Time Format: yyyy-MM-dd, HH:mm

General vocabulary: <http://www.electropedia.org>

4. Applicant

Applicant name and address	The Chicago Faucet Company 2100 S. Clearwater Drive IL-60018 Des Plaines USA
Contact Person	Mr Johannes Rüegg
Telephone	+41 55 221 61 20
E-mail	johannes.rueegg@geberit.com

5. Equipment under test

5.1 Identification

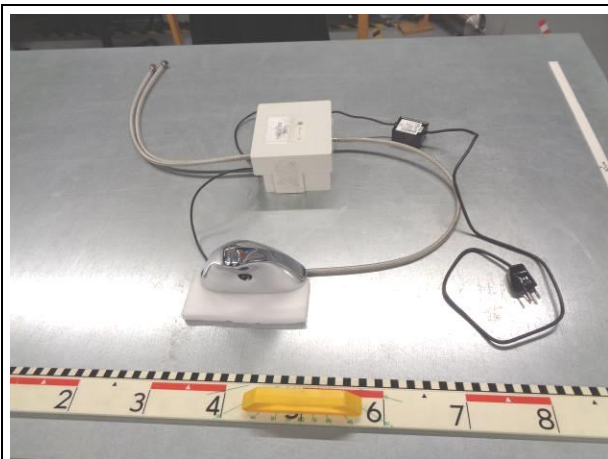
Manufacturer name and address	The Chicago Faucet Company 2100 S. Clearwater Drive IL-60018 Des Plaines USA
Production country	USA (RF module) China (AC adaptor)
Brand name	Chicago Faucets
Product name	Electronic Tap IWT-07-A EXX
Product description	Electronic Tap with BLE
Model number	IWT-07-A ELR
Serial no	224 and 222
FCC ID	2APTX-CFC03
Software version	RS00 TS21
Lowest Frequency	4 Hz (sensor sampling rate)
Highest frequency	32 MHz (processor clock) / 2.48 GHz (RF Transmitter carrier)
Supply	100 - 240 V~, 50/60 Hz, 0.3 A
Dimension	Approx. 10 in x 10 in x 13 in (l x w x h) (or 25 x 25 x 33 cm)
Weight	Approx. 3.75 lb (or 1.4 kg)
Technical	None. The equipment is completely identified by the above-mentioned information. The Chicago Faucet Company assures the traceability of the documentation and is responsible for the product identification.

5.2 Product family

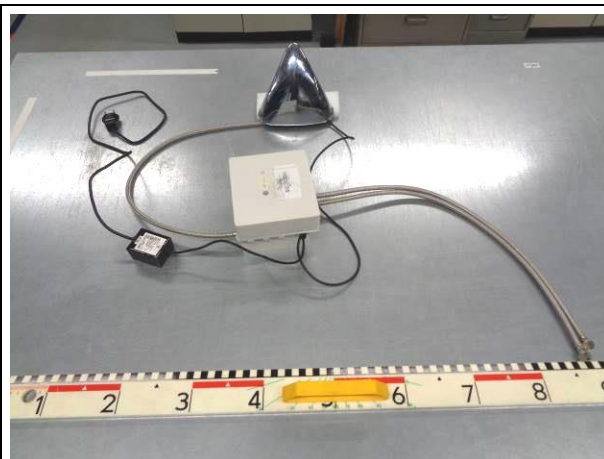
Tested equip.	Covered versions	Explanation*
IWT-07-A ELR	IWT-07-A EVR	- Same schematics, same layout - Same sensor, valve and power supply - Only different shape of tap

* According to information provided by the Applicant and not verified by Eurofins Electric & Electronic Product Testing AG

5.3 Pictures of the EUT



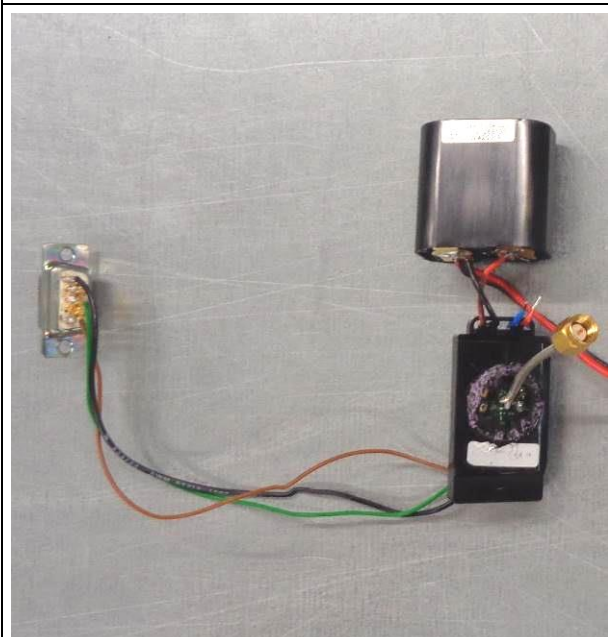
Complete EUT (S/N 224, front-top view)



Complete EUT (S/N 224, rear-top view)



EUT marking (example)



RF module (S/N 222) with temporary antenna connector



AC adaptor marking example

5.4 Classification

CFR 47 Part 15	☒ Unintentional radiator (Subpart B), Receive mode ☐ Class A digital device ☒ Class B digital device ☐ The highest frequency of the internal sources of the EUT is less than 108 MHz (measurement shall be made up to 1 GHz). ☐ The highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz (measurement shall be made up to 2 GHz). ☐ The highest frequency of the internal sources of the EUT is between 500 MHz and 1 GHz (measurement shall be made up to 5 GHz). ☒ The highest frequency of the internal sources of the EUT is above 1 GHz (measurement shall be made up to 5 times the highest frequency or 40 GHz, whichever is lower). ☒ Intentional radiator (Subpart C), Transmit mode ☐ frequency hopping intentional radiator ☒ digitally modulated intentional radiator ☐ hybrid system that employs a combination of both frequency hopping and digital modulation techniques ☐ other type of intentional radiator: ☒ The highest fundamental frequency of the EUT is less than 10 GHz (measurement shall be made up to the tenth harmonic or 40 GHz, whichever is lower). ☐ The highest fundamental frequency of the EUT is between 10 GHz and 30 GHz (measurement shall be made up to the fifth harmonic or 100 GHz, whichever is lower). ☐ The highest fundamental frequency of the EUT is above 30 GHz (measurement shall be made up to the fifth harmonic or 200 GHz, whichever is lower).
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5.5 Transmitter characteristics (according to The Chicago Faucet Company)

RF technology	BLE transceiver based on STM32WB55
Transmitter operating frequency range (OFR) The OFR is the total range of frequencies covered by one type, or by a family of equipment. It is noted that a family of equipment may be capable of covering a wider frequency range than the alignment frequency range of one type of equipment.	2.402 GHz to 2.480 GHz.
Channel separation (if applicable)	2 MHz
Number of channels (if applicable)	40
Maximum rated output power	-6.2 dBm (at transmitter RF output connector)
Variable carrier output	☒ Transmitter carrier output is not variable. RF output: $P_{OUT} = 0.24 \text{ mW}$ ☐ Transmitter carrier output is variable. Max. RF output: $P_{OUT \text{ MAX}} =$ Min. RF output: $P_{OUT \text{ MIN}} =$ ☐ RF output continuously variable ☐ RF output stepped: dB per step
Modulation	☐ Amplitude ☐ Frequency: Deviation kHz ☐ Phase ☐ Pulse Pulse repetition frequency Duty cycle ☒ Other DTS, GFSK (Bluetooth Low Energy)
	☒ Transmitter can be operated without modulation (only for EMC tests) ☐ Transmitter can only be operated with modulation

5.6 Receiver characteristics (according to The Chicago Faucet Company)

Receiver operating frequency range	2.402 GHz to 2.480 GHz
Channel separation (if applicable)	2 MHz
Number of channels (if applicable)	40

5.7 Ports

Port	Cable			Remark
	Max. length	Type	Screen	
AC Mains	Not specified	L, N	None	- - -
USB	3 m	USB	Yes	Not for user, for service only

6. Test conditions

6.1 Climatic conditions, location and date

Location	Date	Temp.	Pressure [QFE]	Rel. humidity
Eurofins Electric & Electronic Product Testing AG 1728 Rossens SWITZERLAND	2022-06-06 to 2022-09-29	20 – 26 °C	920 – 950 hPa	40 – 60 %

6.2 Test facility and methodology

The test site is accepted by FCC:
 - Test Firm Registration Number: 683197
 - Designation Number: CH5001

Conducted and radiated measurements are performed according to the ANSI C63.4-2014 and C63.10-2013 procedures.

6.3 Attendant persons

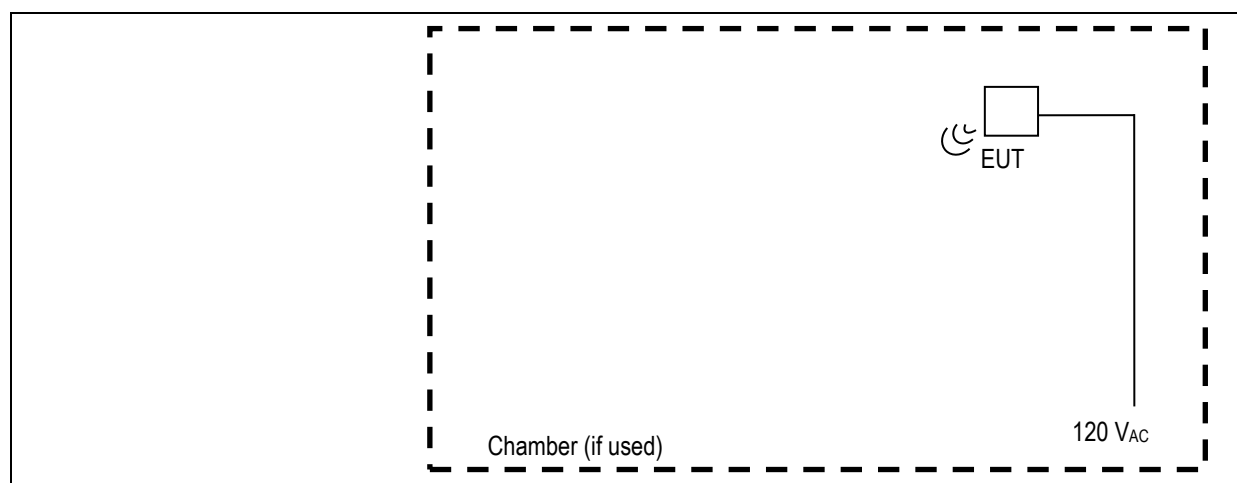
Test Engineer(s):

B. Itzcovich
 EMC Test Engineer

Other(s):

Name	Company
Mr Johannes Rüegg (partially)	Geberit International AG Schachenstrasse 77 8645 Jona SWITZERLAND
Mr Jan Kohli (partially)	
Mr Žiga Kovacic (partially)	

6.4 Test configuration



6.5 Operating conditions

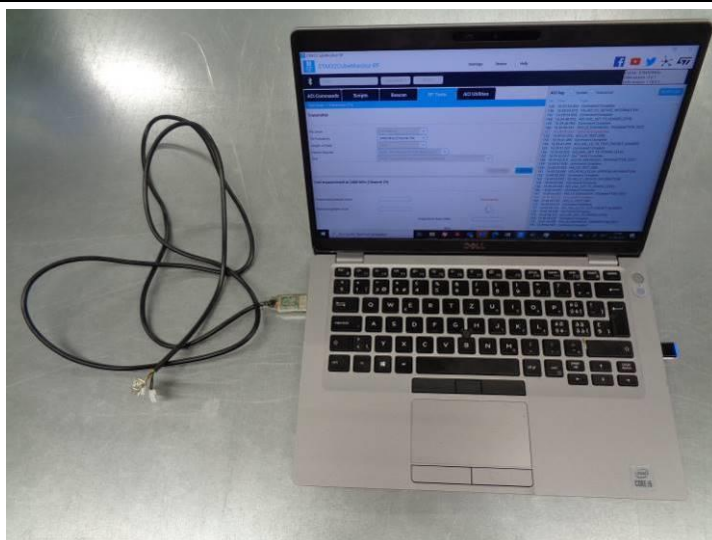
Power supply during tests if not stated otherwise in §7 : 120 VAC / 60 Hz. Special modes for EMC testing:

- Switching valve every 3 second through wireless control from Smartphone (BLE), with wireless communication active (hopping TX and RX), BLE paired with Smartphone
- Continuous transmission of random data on single frequency (2.402 or 2.440 or 2.480 GHz)
- Continuous reception on single frequency (2.440 GHz)

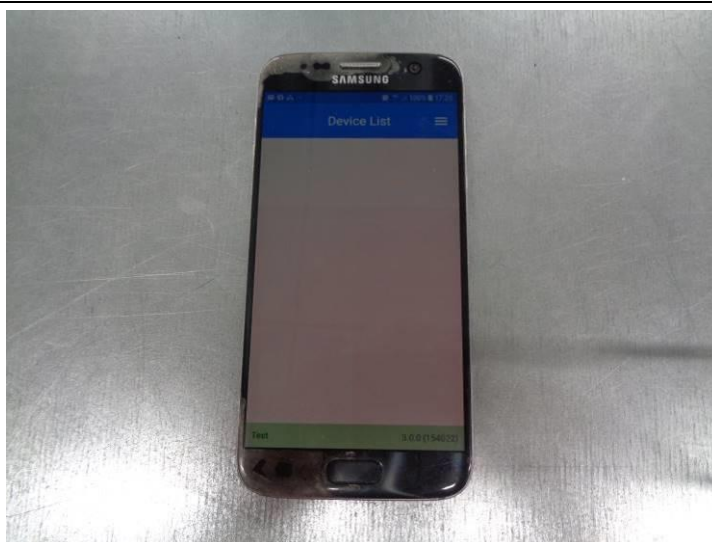
6.6 Auxiliary equipment

The following equipment is used for the monitoring of the EUT or is necessary for the EUT but is not part of the EUT

Product	Brand	Model No.	ID	Remark
Laptop	Dell	Latitude 5410	NCHR A03129	with Software STM32CubeMonitor –RF, Version 2.8.0 from STMicroelectronics
USB Converter	--	TTL-232RG	--	--
Smartphone with Geberit App	Samsung	Galaxy S7	--	Geberit



Laptop and USB converter



Smartphone

7. Test results

7.1 Minimum 6 dB bandwidth

Introduction: Channel-bandwidth measured at -6 dBc.

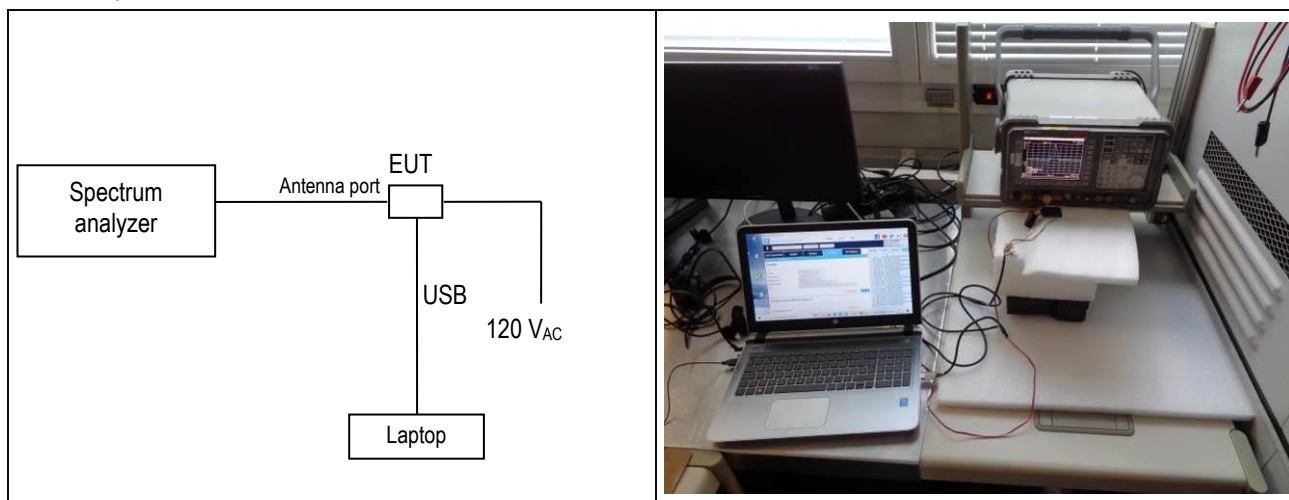
Test site: ☐ SAC3 ☐ open test site
☐ SAC10 ☒ laboratory

Meas. uncertainty: 9kHz – 3GHz: ± 1 dB
 3GHz – 6.7GHz: ± 2.1 dB
 6.7GHz – 13.2GHz: ± 2.6 dB
 13.2GHz – 19GHz: ± 2.8 dB
 19GHz – 26.5GHz: ± 3 dB

Method: Measurement of the conducted power on the antenna connector or a test fixture, according to KDB 558074 §8.2

Limit: For systems using digital modulation techniques, the minimum 6 dB bandwidth shall be at least 500 kHz.

Test set-up:



Remarks: - - -

Test equipment:

Spectrum analyzer	☐ 88-14	☐ 94-24	☒ 02-06	☐ 03-45	☐ 05-39	☐ 07-53
Power supply	☐ 99-07	☐ 04-31				
Multimeter	☐ 09-11					
Cables	☐ 11-13					

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Results of the test

Applicant: The Chicago Faucet Company

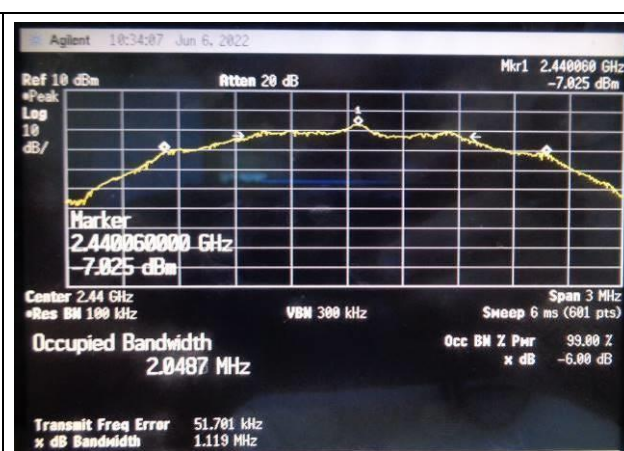
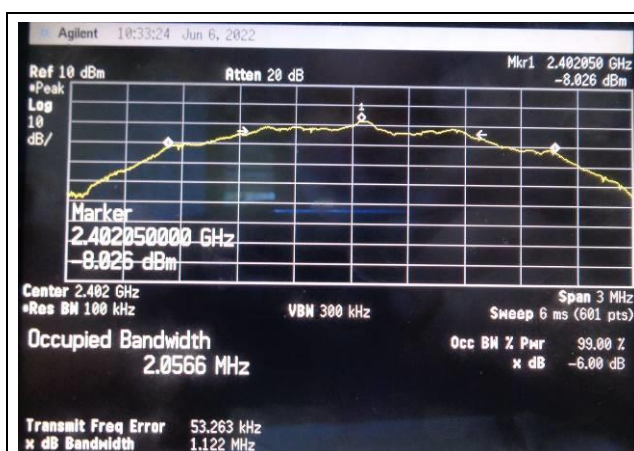
Apparatus: IWT-07-A ELR, S/N 222

Operating mode: TX (f = 2.402 / 2.440 / 2.480 GHz), modulated, PA Level 25 (0 dBm)

Remarks: Measured on temporary antenna connector

Modifications: ☒ None ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

frequency [GHz]	6 dB bandwidth [kHz]	Remarks
2.402	1122	---
2.440	1119	---
2.480	1085	Minimum 6 dB bandwidth

Place and date of test:
Operator:Rossens, 2022-06-06
B. Itzcovich

7.2 Antenna gain

Introduction: The effective radiated power is the power radiated by the antenna of an interrogator in its direction of maximum gain under specified conditions of measurement.

Limit: Antenna gain 6 dBi (for a maximum conducted power 1 Watt = 30 dBm for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands). If antennas with directional gains exceeding 6 dBi are used, the maximum peak output power shall be reduced as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to antenna manufacturer (Johanson Technology, Inc. document "2.45 GHz Antenna P/N 2450AT42A100 Detail Specification: 01/25/2012")

Maximum (Peak) Antenna Gain = 0 dBi (< 6 dBi)

Result:	☒ pass	☐ fail	☐ not applicable	☐ not tested
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7.3 Maximum output power (conducted)

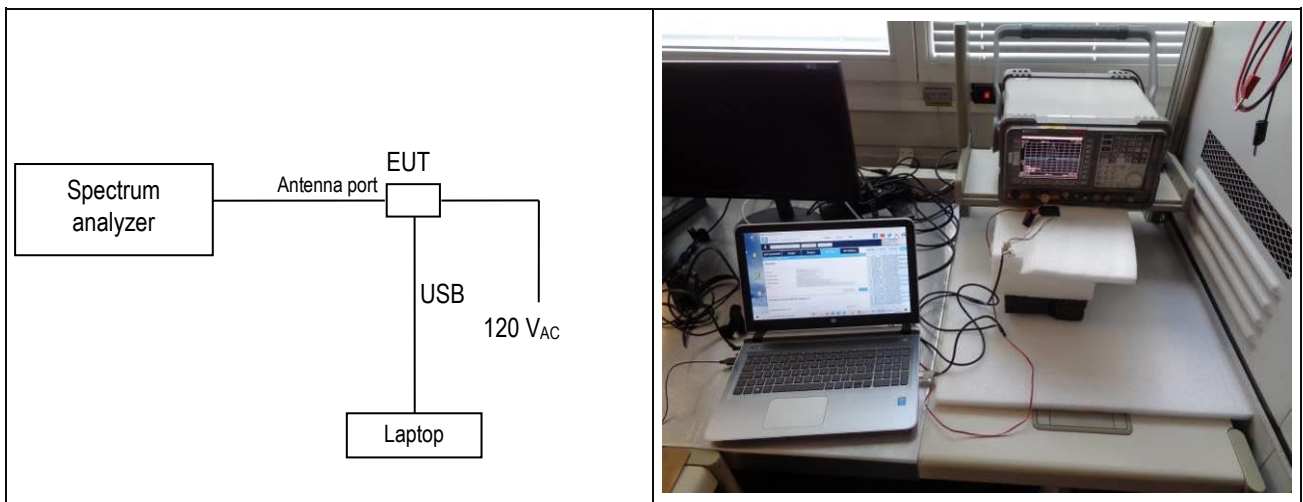
Test site: ☐ SAC3 ☐ open test site
☐ SAC10 ☒ laboratory

Meas. uncertainty: 9kHz – 3GHz: ± 1 dB
 3GHz – 6.7GHz: ± 2.1 dB
 6.7GHz – 13.2GHz: ± 2.6 dB
 13.2GHz – 19GHz: ± 2.8 dB
 19GHz – 26.5GHz: ± 3 dB

Test method: Measurement of the conducted power on the antenna connector or a test fixture.

Limit: Maximum 1 Watt (=30 dBm) for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands using antennas with directional gains that do not exceed 6 dBi. If antennas with directional gains exceeding 6 dBi are used, the maximum peak output power shall be reduced as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test set-up:



Remarks: - - -

Test equipment:

Spectrum analyzer	☐ 88-14	☐ 94-24	☒ 02-06	☐ 03-45	☐ 05-39	☐ 07-53
Power supply	☐ 99-07	☐ 04-31				
Multimeter	☐ 09-11					
Cables	☐ 11-13					

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Results of the test

Applicant: The Chicago Faucet Company

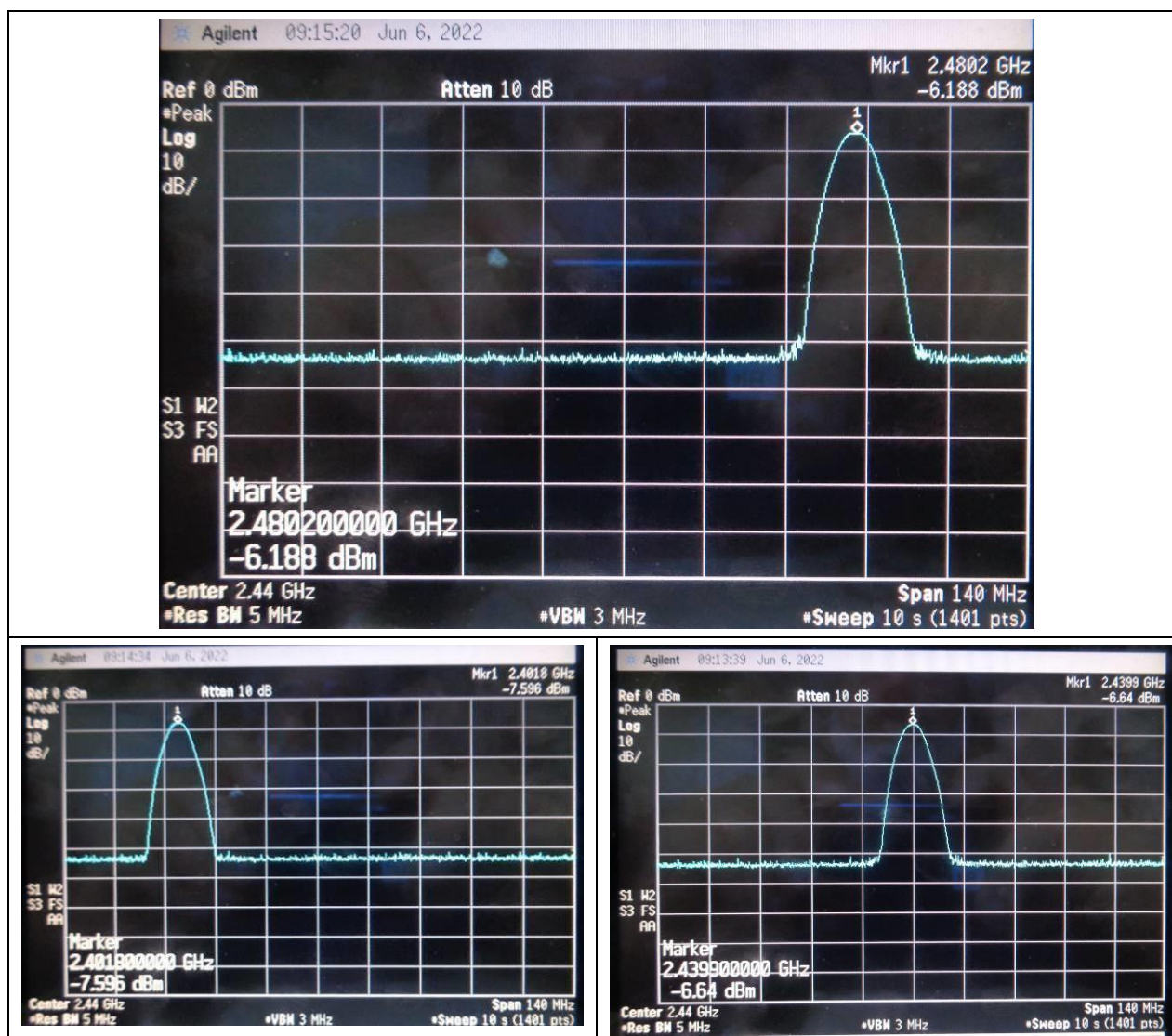
Apparatus: IWT-07-A ELR, S/N 222

Operating mode: TX (f = 2.402 / 2.440 / 2.480 GHz), modulated, PA Level 25 (0 dBm)

Remarks: Measured on temporary antenna connector

Modifications: ☒ None ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

f normal [GHz]	Temp [°C]	P [dBm]	Limit [dBm]	Remarks	Pass Yes	No
2.402	24	-7.60	30	---	☒	☐
2.440	24	-6.64	30	---	☒	☐
2.480	24	-6.19	30	Maximum conducted emission	☒	☐

Place and date of test:
Operator:Rossens, 2022-06-06
B. Itzcovich

7.4 Band-edge emission (conducted)

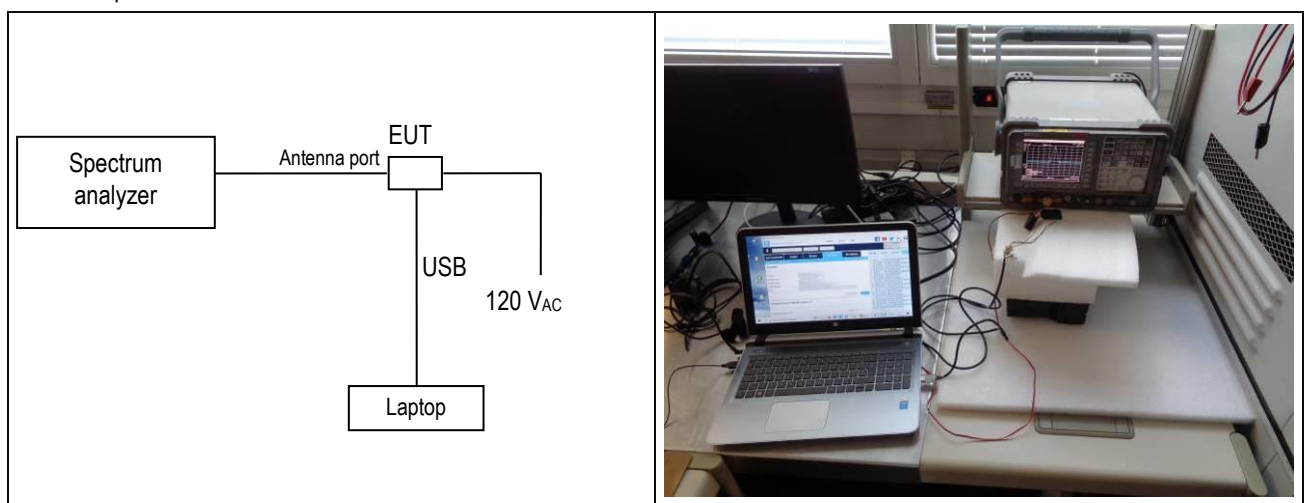
Test site: ☐ SAC3 ☐ open test site
☐ SAC10 ☒ laboratory

Meas. uncertainty: 9kHz – 3GHz: ± 1 dB
 3GHz – 6.7GHz: ± 2.1 dB
 6.7GHz – 13.2GHz: ± 2.6 dB
 13.2GHz – 19GHz: ± 2.8 dB
 19GHz – 26.5GHz: ± 3 dB

Test method: Measurement of the conducted power on the antenna connector or a test fixture.

Limit: In any 100 kHz bandwidth outside the frequency band in which the intentional radiator is operating, the radio frequency power 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.

Test set-up:



Remarks: - - -

Test equipment:

Spectrum analyzer	☐ 88-14	☐ 94-24	☒ 02-06	☐ 03-45	☐ 05-39	☐ 07-53
Power supply	☐ 99-07	☐ 04-31				
Multimeter	☐ 09-11					
Cables	☐ 11-13					

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Results of the test

Applicant: The Chicago Faucet Company

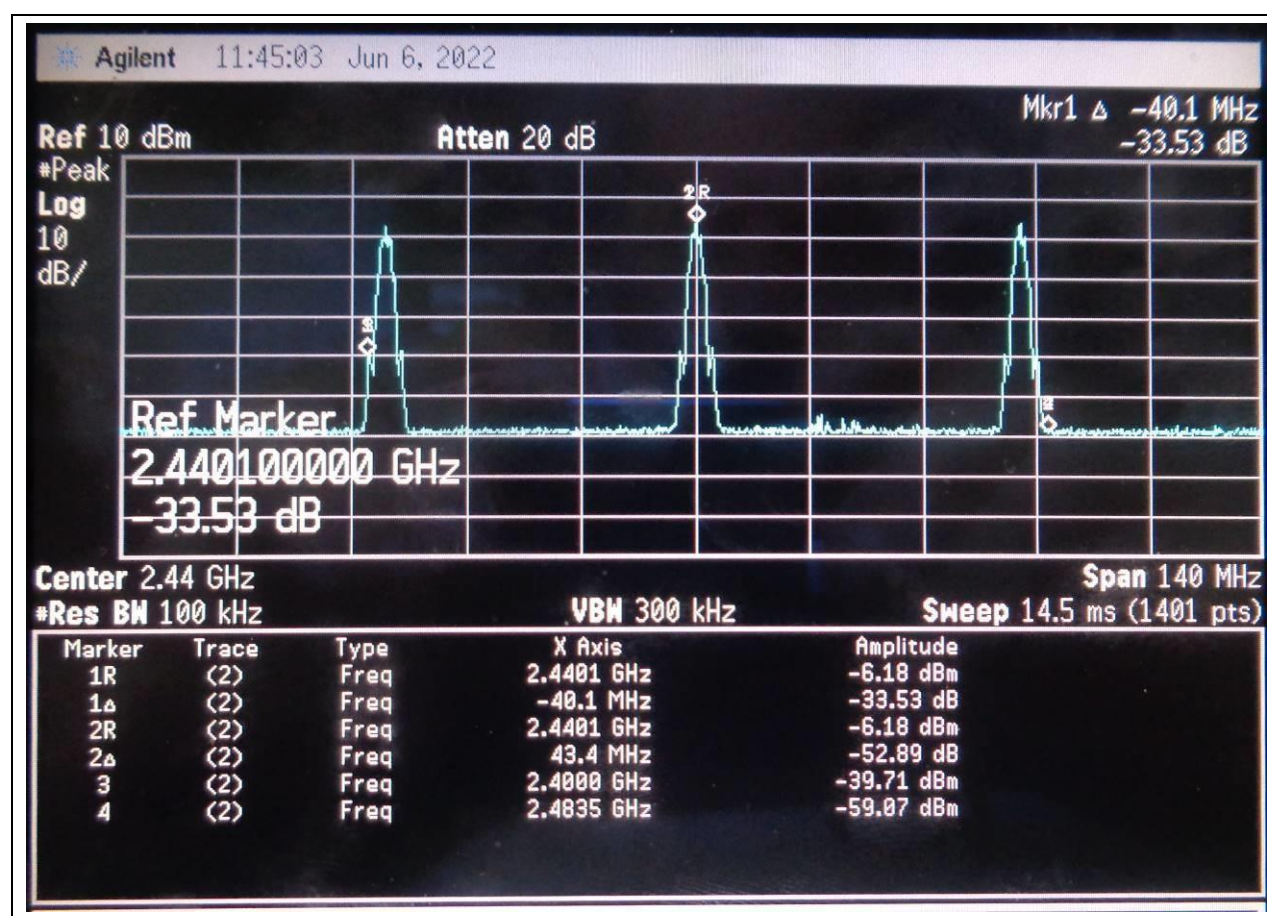
Apparatus: IWT-07-A ELR, S/N 222

Operating mode: TX (f = 2.402 / 2.440 / 2.480 GHz), modulated, PA Level 25 (0 dBm)

Remarks: Measured on temporary antenna connector

Modifications: ☒ None ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

	Measured RF power [dBm]		Highest level [dBm]	Limit [dBm]	Margin [dB]		Pass	
	≤2400.0 MHz	≥2483.5 MHz			≤2400.0 MHz	≥2483.5 MHz	Yes	No
PK detector (RBW 100 kHz)	-39.71	-59.07	-6.18	-26.18	13.53	32.89	☒	☐



Place and date of test:
Operator:

Rossens, 2022-06-06
B. Itzcovich

7.5 Band-edge emission (radiated)Test site: ☐ SAC10 ☒ SAC3Distance: ☐ 1 m ☒ 3 m ☐ 10 m ☐ 30 m

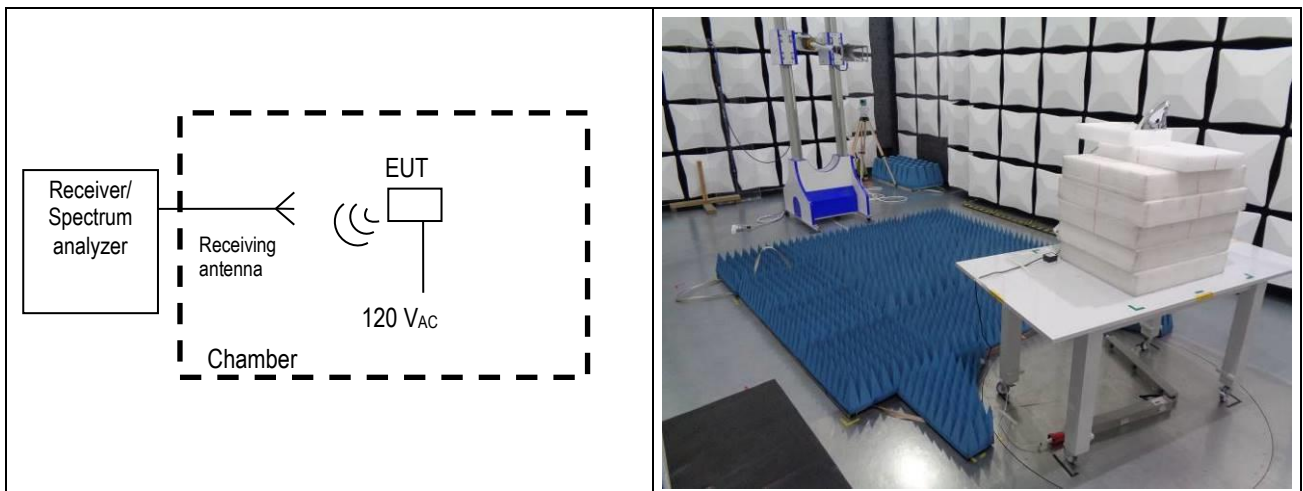
Position of EUT: 1.5 m (height of the equipment under test above floor)

Meas. uncertainty: ± 4.7 dB

Test method: The electromagnetic disturbance radiated by the equipment is measured using a spectrum analyzer and a wide band antenna. The antenna is placed at the same height as the EUT successively with horizontal and vertical polarizations, and aimed at the source by tilting. The turning table is operated through 360° during the measurements. The recordings are carried out taking into account the maximum value of all the disturbances appearing while the EUT is under test.

Limit: 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)

Test set-up:



Remarks: Limit values expressed in dB μ V/m and transformed to a measuring distance of 3 m (factor used = 20 dB/decade) if necessary
e.g.: for f = 40 MHz the limit is 500 μ V/m at 3 m;

$$20 \log \left(\frac{500 \frac{\mu V}{m}}{1 \frac{\mu V}{m}} \right) = 54 \frac{dB\mu V}{m} \text{ at } 3m$$

Test equipment:

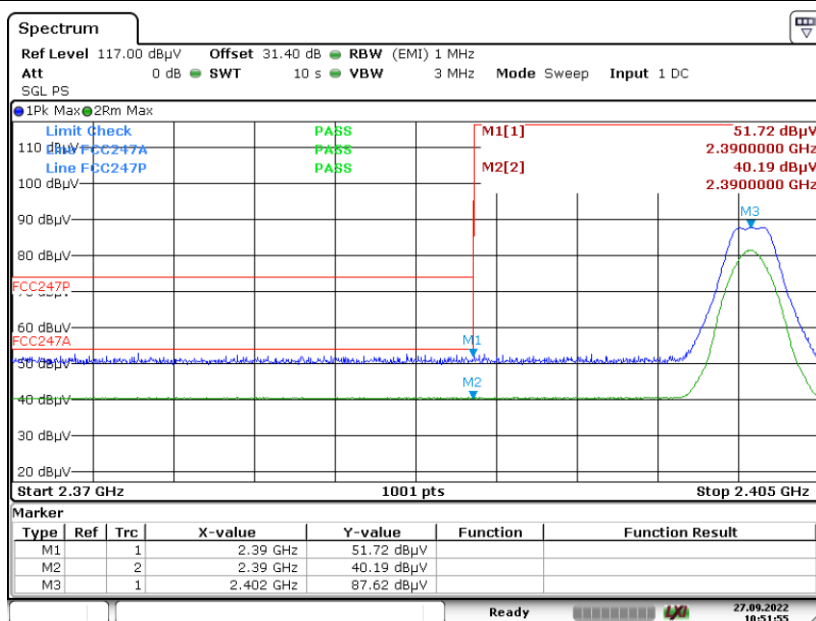
Spectrum analyzer	☐ 21-07	☐ 94-24	☐ 02-06	☐ 03-45	☒ 16-03	☐ 07-53
Preamplifier	☐ 05-56	☐ 05-87	☐ 14-27			
Antenna (horn)	☐ 90-24	☒ 22-07				
Cable set	☒ SAC3_RE_1.0/2.0/3.0		☐ 06-00C			
Software and Revision	☐ Vitam, Rev. 2.4.13		☐ RadiMation 2020.1.8			

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

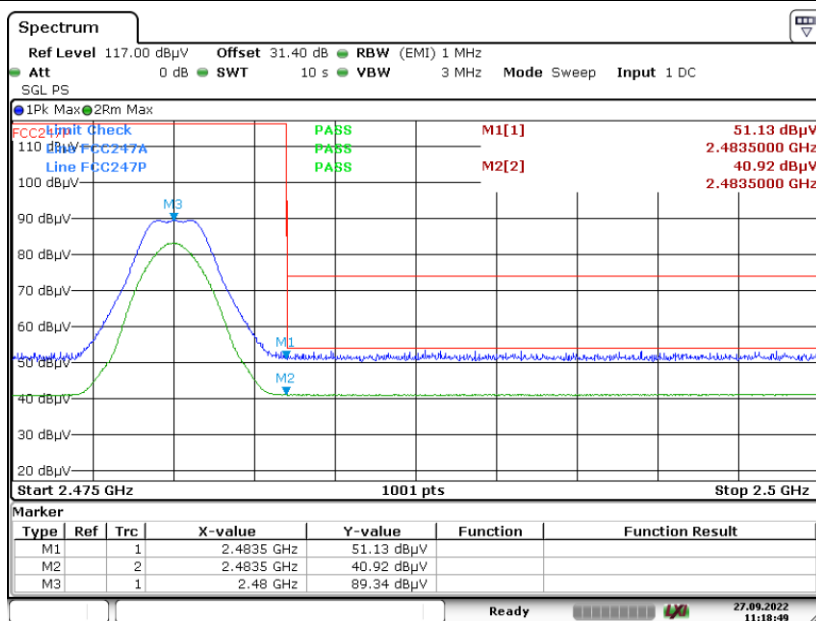
Results of the test

Applicant: The Chicago Faucet Company
 EUT: IWT-07-A ELR, S/N 224
 Operating mode: TX (f = 2.402 / 2.440 / 2.480 GHz), modulated, PA Level 25 (0 dBm)
 Remarks: RefLev Offset is the sum of cable attenuation and antenna factor : $4.0 + 27.4 = 31.4$ dB
 to convert voltage measurement [in dBμV] to E-Field value [in dBμV/m]. 1001 Points
 Modifications: ☒ None ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

	Measured field strength [dBμV/m]		Limit [dBμV/m]	Margin [dB]		Pass	
	≤2390.0 MHz	≥2483.5 MHz		≤2390.0 MHz	≥2483.5 MHz	Yes	No
Peak detector	51.72	51.13	74	22.28	22.87	☒	☐
Average RMS detector	40.19	40.92	54	13.81	13.08	☒	☐



Date: 27.SEP.2022 10:51:54



Date: 27.SEP.2022 11:18:48

Place and date of test:
 Operator:

Rossens, 2022-09-27
 B. Itzcovich

7.6 Maximum power spectral density

Introduction: The maximum power spectral density is defined as the highest power level in Watts per Hertz generated by the transmitter within the power envelope.

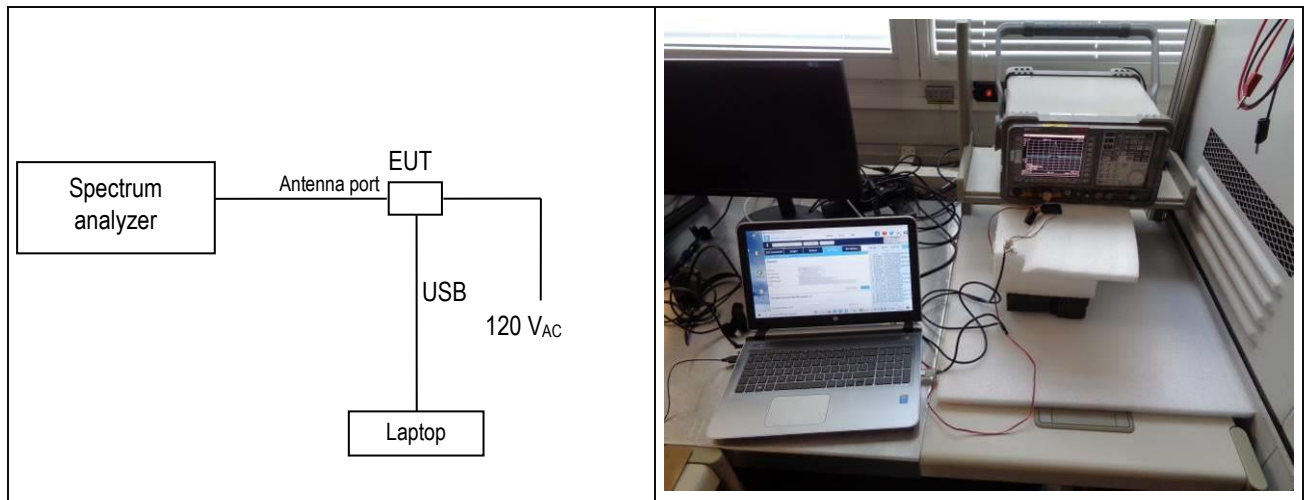
Test site: ☐ anechoic chamber (foam) ☐ open test site
☐ anechoic chamber (ferrites) ☒ laboratory

Meas. uncertainty: $\pm 1.3 \text{ dB}$ ($f < 300 \text{ MHz}$) / $\pm 1.6 \text{ dB}$ ($f > 300 \text{ MHz}$)

Test method: Measurement at the antenna connector or a test fixture, according to KDB 558074 §8.4

Limit: The power spectral density conducted from the intentional radiator to the antenna due to the digital modulation operation of the hybrid system, with the frequency hopping operation turned off, shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission

Test set-up:



Remarks: ---

Test equipment:

Spectrum analyzer	☐ 88-14	☐ 94-24	☒ 02-06	☐ 03-45	☐ 05-39	☐ 07-53
Power supply	☐ 99-07	☐ 04-31				
Multimeter	☐ 09-11					
Cables	☐ 11-13					

Result: ☒ pass ☐ fail ☐ not applicable ☐ partly tested

Results of the test

Applicant: The Chicago Faucet Company

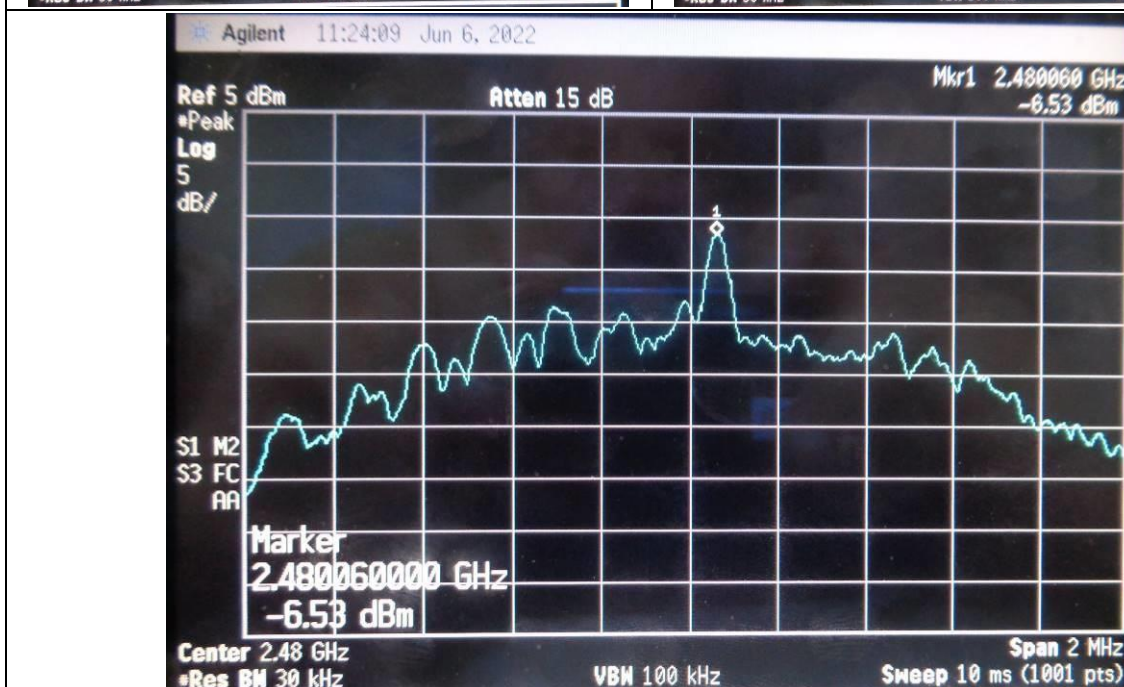
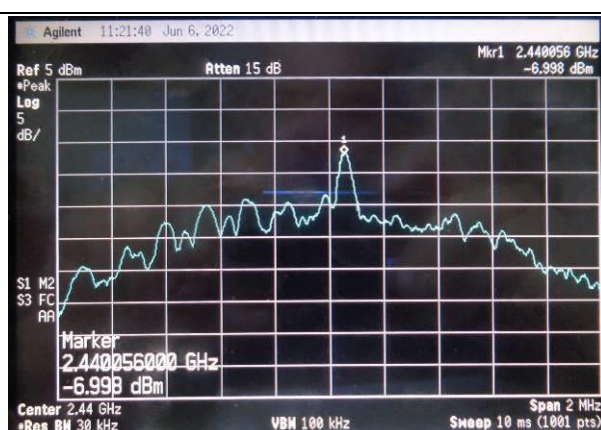
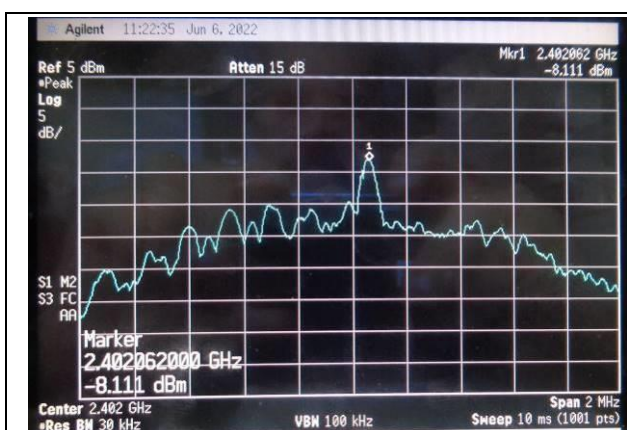
Apparatus: IWT-07-A ELR, S/N 222

Operating mode: TX (f = 2.402 / 2.440 / 2.480 GHz), modulated, PA Level 25 (0 dBm)

Remarks: Measured on temporary antenna connector

Modifications: ☒ None ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

f [GHz]	Peak power [dBm]	Limit [dBm/3kHz]	Pass	
			Yes	No
2.402	-8.11	8	☒	☐
2.440	-7.00	8	☒	☐
2.480	-6.53	8	☒	☐

Place and date of test:
Operator:Rossens, 2022-06-06
B. Itzcovich

7.7 Spurious emission – conducted (transmitter – 9 kHz to 26 GHz)

Test site: ☐ SAC3 ☐ open test site
☐ SAC10 ☒ laboratory

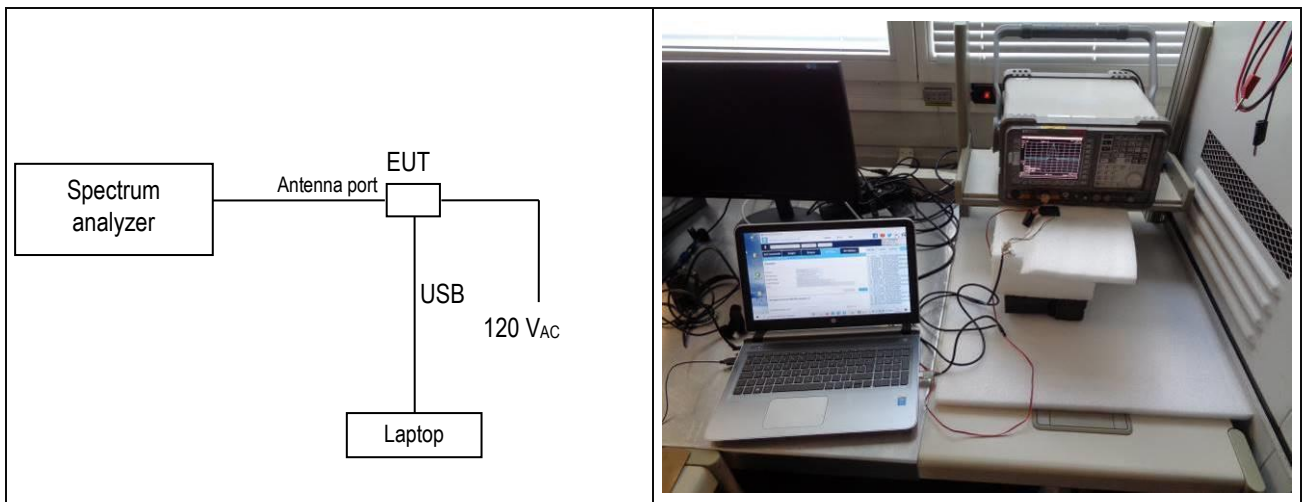
Meas. uncertainty: 9kHz – 3GHz: ± 1 dB
 3GHz – 6.7GHz: ± 2.1 dB
 6.7GHz – 13.2GHz: ± 2.6 dB
 13.2GHz – 19GHz: ± 2.8 dB
 19GHz – 26.5GHz: ± 3 dB

Test method: Measurement of the conducted power on the antenna connector or a test fixture.

Limit: In any 100 kHz bandwidth outside the frequency band, the radio frequency power 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

Modifications: ☒ None ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Test set-up:



Remarks: Emissions near band-edges are checked under § 7.4

Range	RBW
9 KHz - 150 KHz	200 Hz
150 KHz - 30 MHz	9 KHz
30 MHz - 26 GHz	100 KHz

Test equipment:

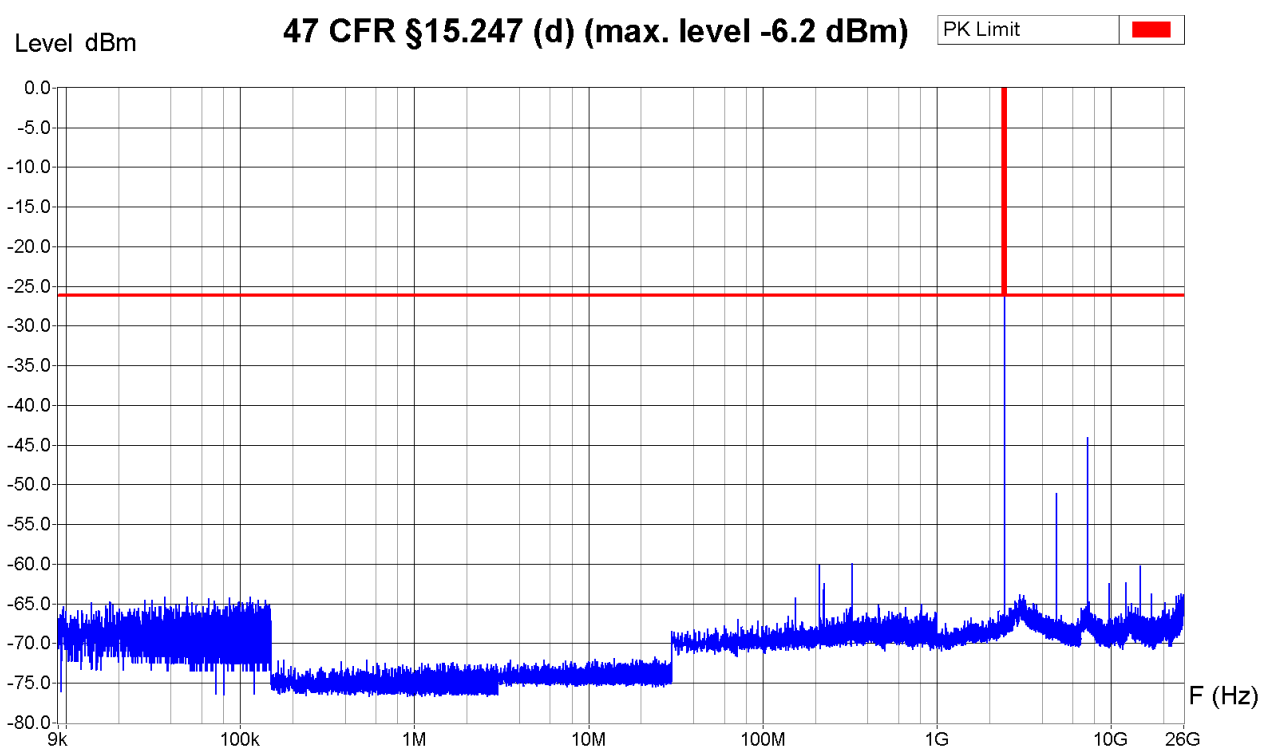
Spectrum analyzer	☐ 88-14	☐ 94-24	☒ 02-06	☐ 03-45	☐ 05-39	☐ 07-53
Power supply	☐ 99-07	☐ 04-31				
Multimeter	☐ 09-11					
Cables	☐ 11-13					
Software and Revision	☒ Vitam, Rev. 2.4.13	☐ RadiMation 2020.1.8				

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Measurement Type : Power Interference
Port : Temporary antenna connector
Clamp position : -



Equipment Under Test : Electronic Tap IWT-07-A ELR
Set-Up : See photos
Operating Conditions : TX (f = 2.440 GHz), PA Level 25 (0.0 dBm), Modulated
Remarks : RBW = 100 kHz (for f >= 30 MHz), VBW = 300 kHz
Peak detector sweep, 8001 pts / zone

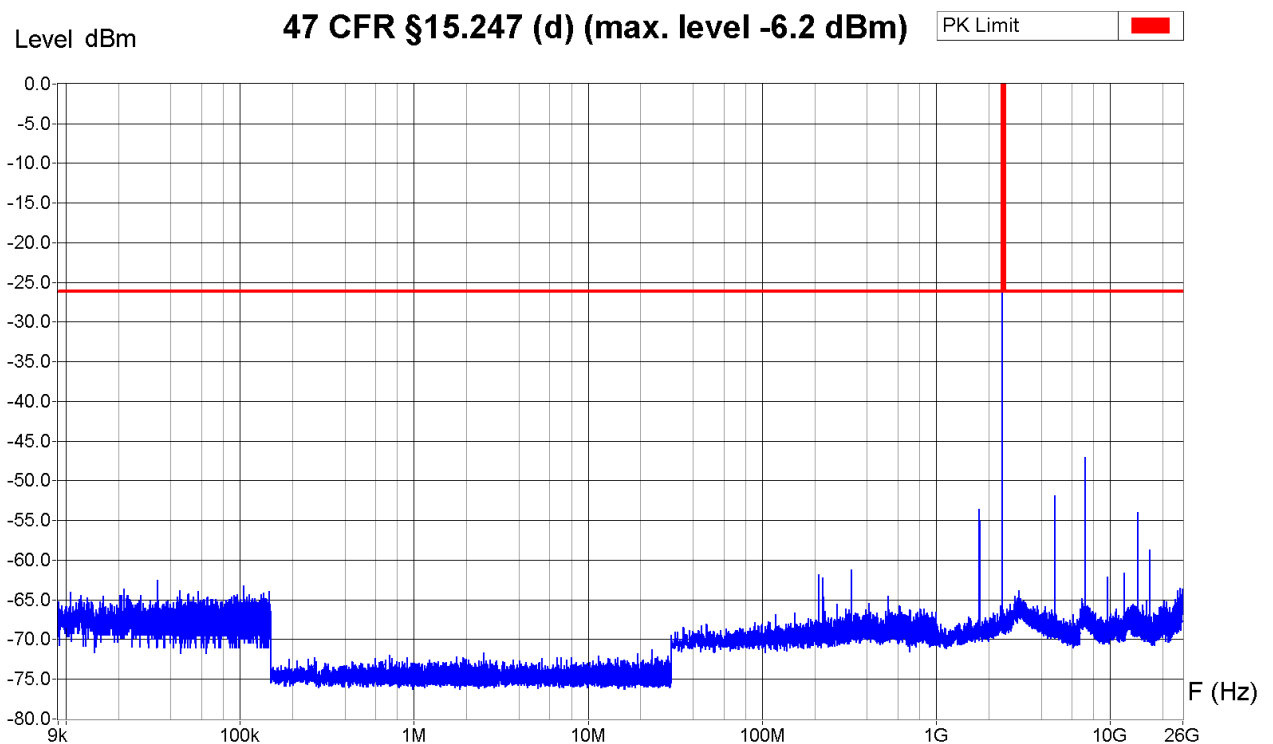


Operator: B. Itzcovich
Date/Time: 06.06.2022 15:34
Filename:
51_CP_9k-26G_TX2440M_-
6dBm2.png/.txt

Measurement Type : Power Interference
Port : Temporary antenna connector
Clamp position : -



Equipment Under Test : Electronic Tap IWT-07-A ELR
Set-Up : See photos
Operating Conditions : TX (f = 2.402 GHz), PA Level 25 (0.0 dBm), Modulated
Remarks : RBW = 100 kHz (for f >= 30 MHz), VBW = 300 kHz
Peak detector sweep, 8001 pts / zone

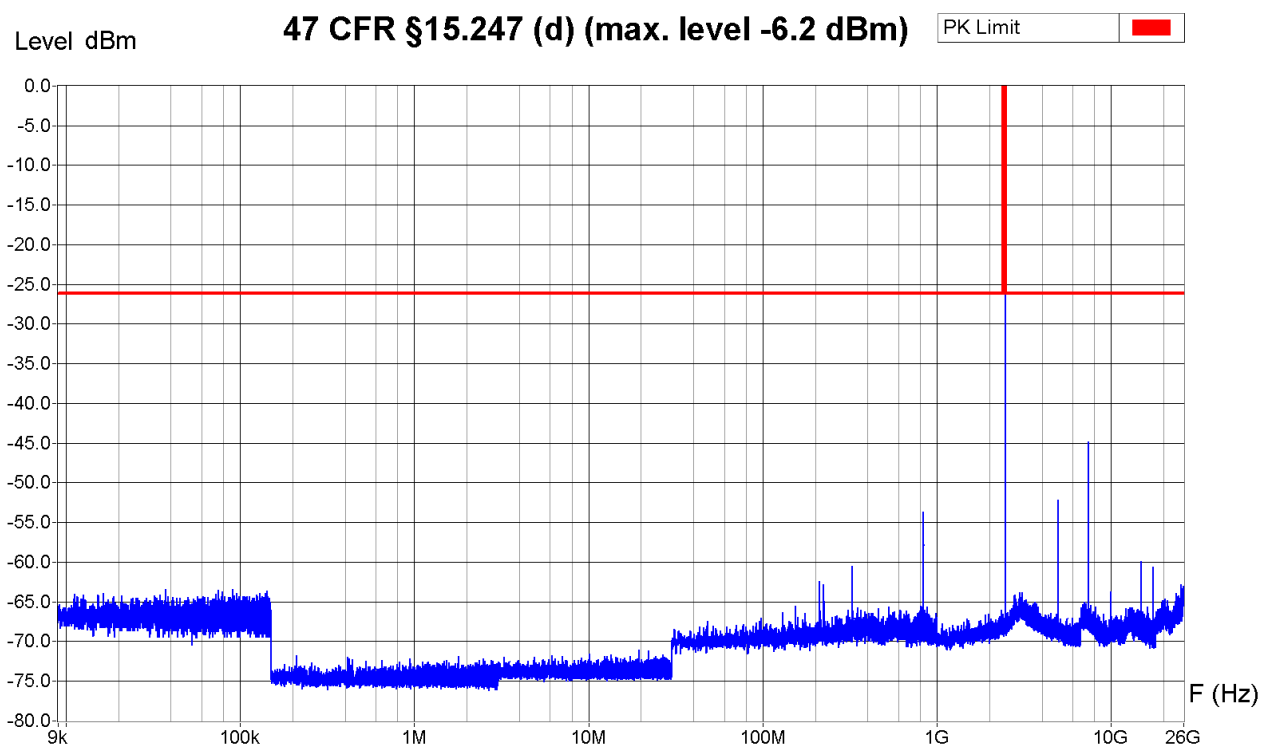


Operator: B. Itzcovich
Date/Time: 06.06.2022 15:41
Filename:
52_CP_9k-26G_TX2402M_-
6dBm2.png/.txt

Measurement Type : Power Interference
Port : Temporary antenna connector
Clamp position : -



Equipment Under Test : Electronic Tap IWT-07-A ELR
Set-Up : See photos
Operating Conditions : TX (f = 2.480 GHz), PA Level 25 (0.0 dBm), Modulated
Remarks : RBW = 100 kHz (for f >= 30 MHz), VBW = 300 kHz
Peak detector sweep, 8001 pts / zone



Operator: B. Itzcovich
Date/Time: 06.06.2022 16:00
Filename:
53_CP_9k-26G_TX2480M_-
6dBm2.png/.txt

7.8 Spurious emission transmit mode – radiated**7.8.1 9 kHz to 30 MHz**

Test site: ☒ SAC3 ☐ open test site

☐ SAC10

Distance: ☒ 3 m ☐ 10 m ☐ 30 m

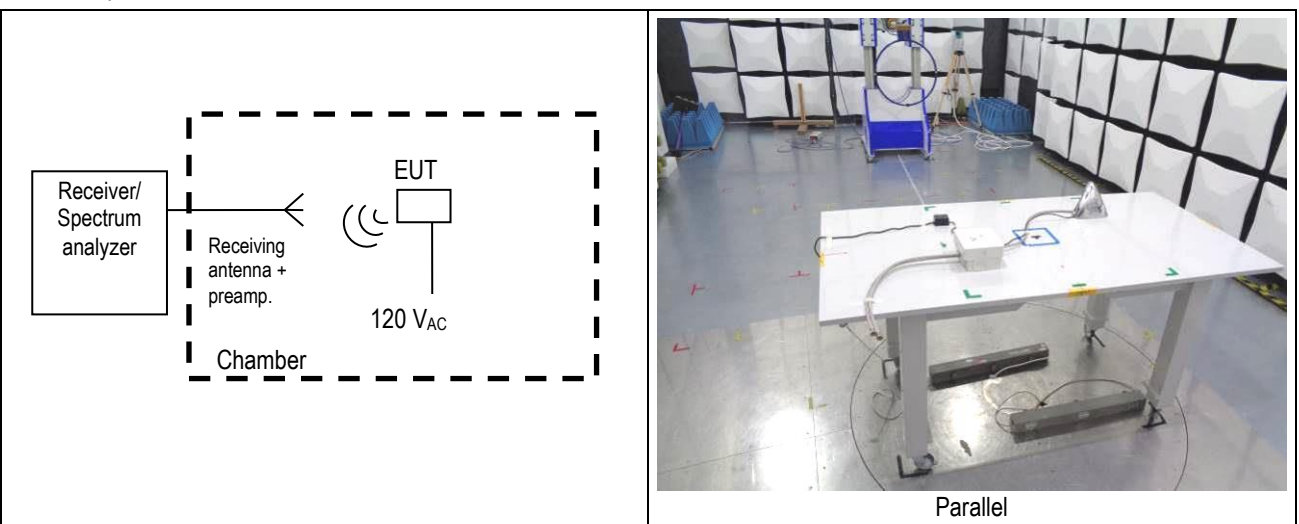
Position of EUT: 0.8 m (height of the equipment under test above floor)

Meas. uncertainty: ± 2.8 dB

Test method: The magnetic disturbance radiated by the equipment under test is measured using a spectrum analyzer and a wide band magnetic antenna. The antenna is placed at 1 m height, first in the direction of the apparatus under test, then at 90° to the apparatus and if required also horizontally. If possible the turning table is operated through 360° during the measurement. The recording is carried out taking into account the maximum value of the disturbance appearing during the functioning of the apparatus under test. The peak values are recorded continuously on a graph. The values exceeding the limits are re-measured using a measuring receiver.

Modifications: ☒ None ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Test set-up:



Remarks: Limit values expressed in dB μ V/m and transformed to a measuring distance of 3 m (factor used = 40 dB/decade) if necessary
e.g.: for f = 10 MHz the limit is 30 μ V/m at 30 m;

$$20 \log \left(\frac{30 \frac{\mu V}{m}}{1 \frac{\mu V}{m}} \right) + 40 \log \left(\frac{30 m}{3 m} \right) = 69.5 \frac{dB\mu V}{m} \text{ at } 3m$$

“Parallel” means measurement antenna axis towards EUT

Test equipment:

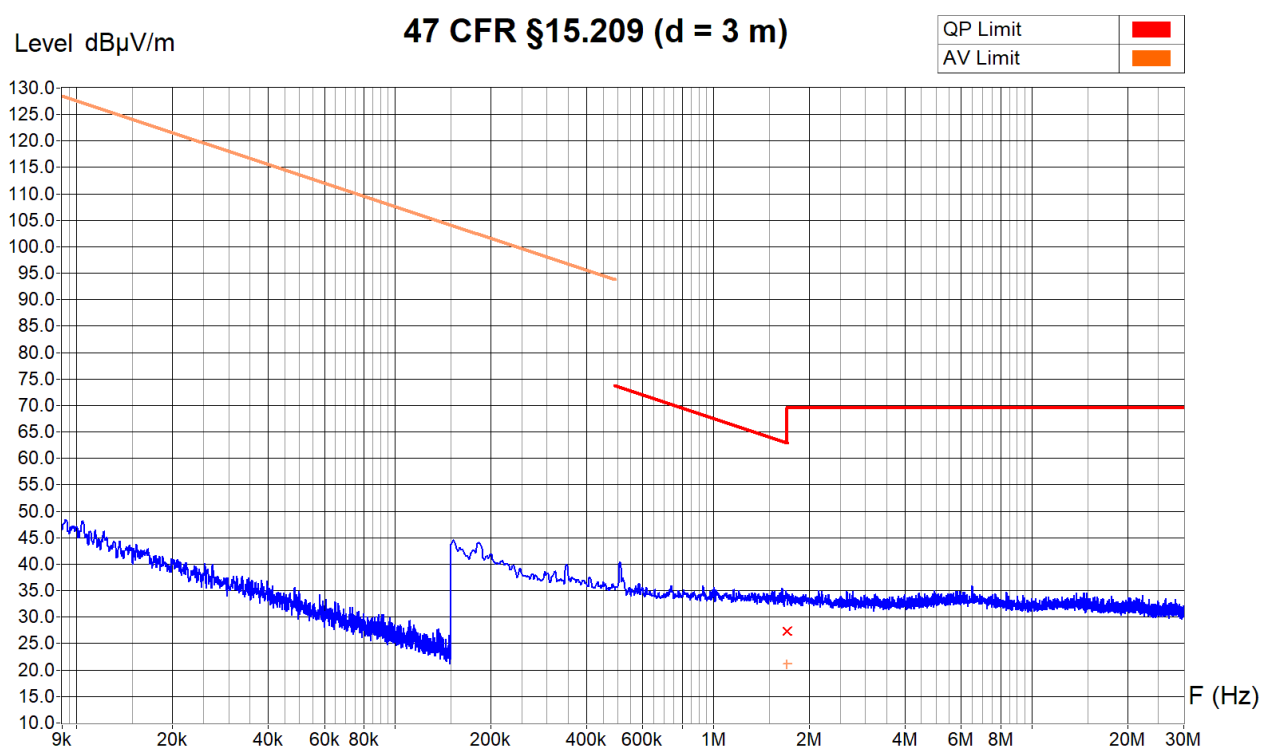
Spectrum analyzer	☒ 21-07	☐ 94-24	☐ 02-06	☐ 03-45	☐ 05-39	☐ 16-03
Receiver	☒ 21-07	☐ 90-43	☐ 94-35	☐ 16-03		
Preamplifier	☐ 90-01	☐ 95-86	☐ 05-56	☐ 05-59	☐ 05-62	
Antenna (type: magnetic)	☒ 90-25	☐ 90-28	☐ 99-32	☐ 04-79		
Cable set	☒ SAC3_RE_1.0/2.0/3.0		☐ 06-00C			
Software and Revision	☒ Vitam, Rev. 2.4.13		☐ RadiMation 2020.1.8			
Power supply	☒ 11-50					

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Measurement Type : Radiated Field
 Polarisation : Parallel
 Table Angle : 0 - 360°
 Antenna Height : 1 m



Equipment Under Test : Electronic Tap IWT-07-A ELR
 Set-Up : Chamber SAC3, see photos
 Operating Conditions : Switching valve every 3 second through wireless control from Smartphone (BLE)
 Remarks : Wireless communication active, TX and RX (BLE paired with Smartphone)
 Powered with 120 V / 60 Hz



Zone	9 KHz - 150 KHz	150 KHz - 6 MHz	6 MHz - 30 MHz
Video Bandwidth	30 KHz	30 KHz	30 KHz
Resol Bandwidth	200 Hz	9 KHz	9 KHz

Receiver Measures

Frequency	Peak	QuasiPeak (x)	Average (+)	QP Margin
1.70 MHz	35.1 dBμV/m	27.3 dBμV/m	21.2 dBμV/m	35.7 dB

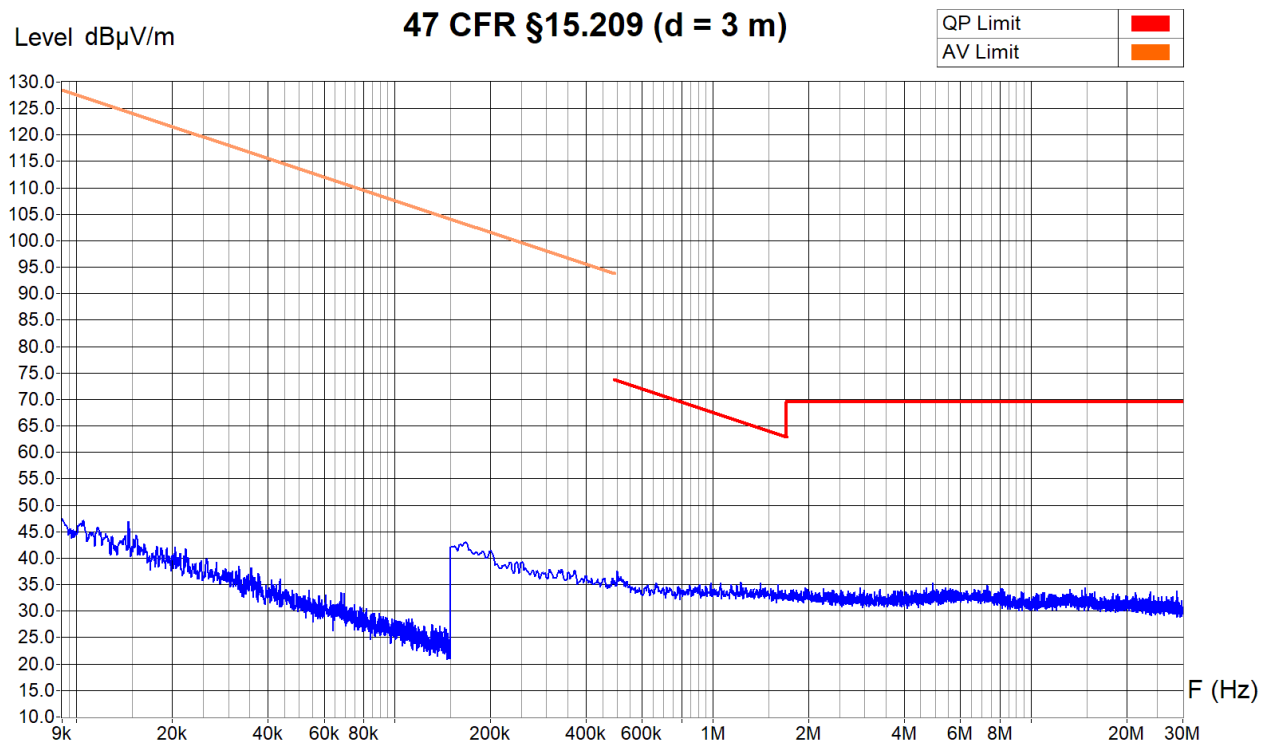
Sample calculation with all conversion and correction factors used					
Frequency [MHz]	Receiver QPK value [dBμV]	Cable att. corr. [dB]	Preamp. gain corr. [dB]	Antenna factor corr. [dB]	QPK field [dBμV/m]
1.70	6.8	+0.2	0.0	+20.3	= 27.3

Operator: B. Itzcovich
 Date/Time: 2022-09-06 09:28
 Filename:
 01_RE_9k-
 30M_Switching_Par.png/.txt

Measurement Type : Radiated Field
Polarisation : Perpendicular
Table Angle : 0 - 360°
Antenna Height : 1 m



Equipment Under Test : Electronic Tap IWT-07-A ELR
Set-Up : Chamber SAC3, see photos
Operating Conditions : Switching valve every 3 second through wireless control from Smartphone (BLE)
Remarks : Wireless communication active, TX and RX (BLE paired with Smartphone)
Powered with 120 V / 60 Hz



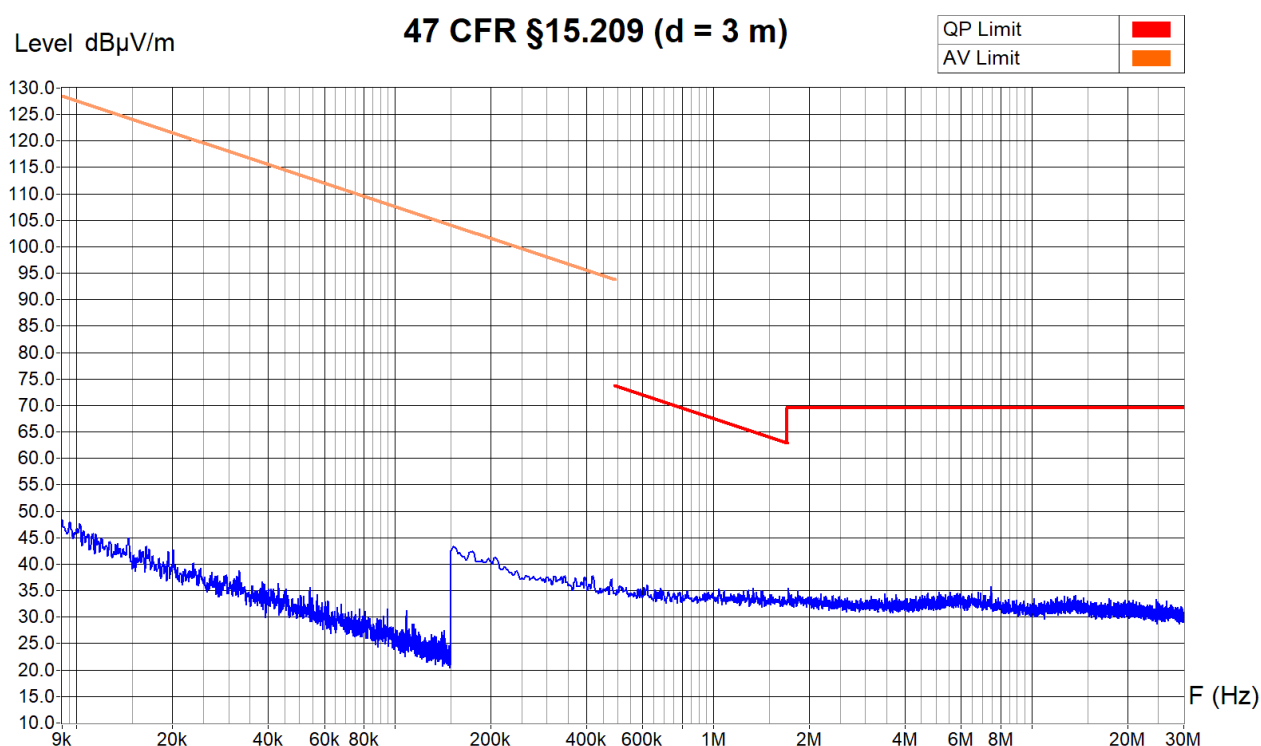
Zone	9 KHz - 150 KHz	150 KHz - 6 MHz	6 MHz - 30 MHz
Video Bandwidth	30 KHz	30 KHz	30 KHz
Resol Bandwidth	200 Hz	9 KHz	9 KHz

Operator: B. Itzcovich
Date/Time: 2022-09-06 09:18
Filename:
02_RE_9k-
30M_Switching_Per.png/.txt

Measurement Type : Radiated Field
 Polarisation : Horizontal
 Table Angle : 0 - 360°
 Antenna Height : 1 m



Equipment Under Test : Electronic Tap IWT-07-A ELR
 Set-Up : Chamber SAC3, see photos
 Operating Conditions : Switching valve every 3 second through wireless control from Smartphone (BLE)
 Remarks : Wireless communication active, TX and RX (BLE paired with Smartphone)
 Powered with 120 V / 60 Hz



Zone	9 KHz - 150 KHz	150 KHz - 6 MHz	6 MHz - 30 MHz
Video Bandwidth	30 KHz	30 KHz	30 KHz
Resol Bandwidth	200 Hz	9 KHz	9 KHz

Operator: B. Itzcovich
 Date/Time: 2022-09-06 09:09
 Filename:
 03_RE_9k-
 30M_Switching_Hor.png/.txt

7.8.2 30 MHz to 1 GHzTest site: ☒ SAC3 ☐ open test site☐ SAC10Distance: ☒ 3 m ☐ 10 m ☐ 30 m

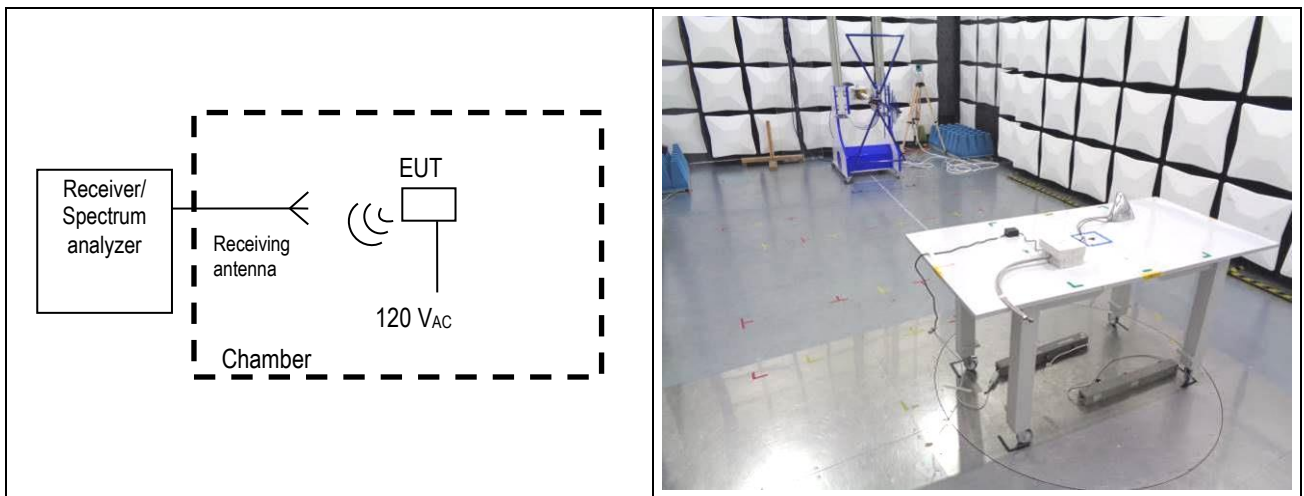
Position of EUT: 0.8 m (height of the equipment under test above floor)

Meas. uncertainty: ± 4.6 dB (30 - 300 MHz) / ± 3.7 dB (300 - 1000 MHz)

Test method: The electromagnetic disturbance radiated by the equipment is measured using a spectrum analyzer and a wide band antenna. The antenna is moved from 1 to 4 m in height successively with horizontal and vertical polarizations. The turning table is operated through 360° during the measurements. The recordings are carried out taking into account the maximum value of all the disturbances appearing while the apparatus is under test. The peak values are recorded continuously on the graph. The values exceeding a limit are re-measured manually using a receiver.

Modifications: ☒ None ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Test set-up:



Remarks: Limit values expressed in dB μ V/m and transformed to a measuring distance of 3m (factor used = 20 dB/decade) if necessary
e.g.: for f = 40 MHz the limit is 100 μ V/m at 3 m;

$$20 \log \left(\frac{100 \frac{\mu V}{m}}{1 \frac{\mu V}{m}} \right) = 40 \frac{dB \mu V}{m} \text{ at } 3m$$

Test equipment:

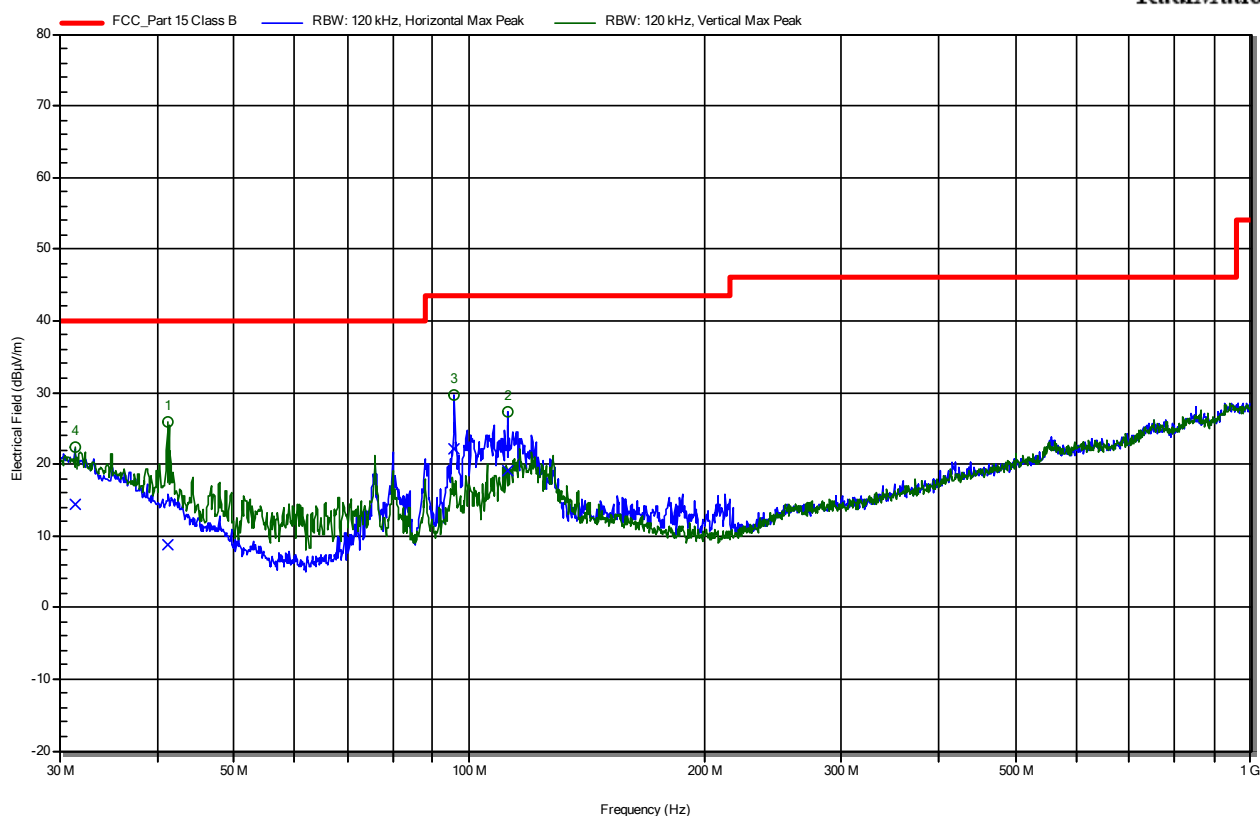
Spectrum analyzer	☒ 21-07	☐ 94-24	☐ 02-06	☐ 03-45	☐ 05-39	☒ 16-03
Receiver	☒ 21-07	☐ 90-43	☐ 94-35	☐ 04-29	☐ 16-03	
Preamplifier	☐ 90-01	☐ 95-86	☐ 05-56	☐ 05-59	☒ 21-07 internal	
Antenna (bilog)	☐ 94-03	☒ 05-38				
Cable set	☒ SAC3_RE_1.0/2.0/3.0		☐ 06-00C			
Software and Revision	☐ Vitam, Rev. 2.4.13		☒ RadiMation 2020.1.8			
Power supply	☒ 11-50					

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Measurement	RE 30 MHz to 1 GHz		Test ID	#1	Date and time	2022-09-06 10:41:22	Operator	B. Itzcovich	
EUT	Electronic Tap IWT-07-A ELR				Order	20CH-01574OR10		Verdict	Pass
Notes	Operating mode: Switching valve every 3 second through wireless control from Smartphone (BLE) Modifications: None Remarks: Wireless communication active, TX and RX (BLE paired with Smartphone)								
Antenna Height	1 m to 4 m, 4 step(s)	Polarization	Both		Table Angle	0 ° to 360 °, 16 step(s)		Distance	3 m
Test Place	ROS-SAC3		Software		Radimation 2020.1.8 (RE 30M-1G ESW26 CBL SAC3)				
Equipment	Device Type	ID	Settings		Band(s): 30 MHz - 1 GHz, Reference Level: 70 dBµV RBW: 120 kHz, VBW: 300 kHz, Sweeptime: Auto [0 ms], Number of Sweeps: 100 Step freq: Fixed step count: 9701 steps per Band, Attenuator: 0.0 dB, Internal preamp: 20 dB, Measure time: 200 ms Final Measurement/Observation Time: PK 1 s / 5 s, QP 1 s / 5 s, AVG 0 s / 0 s				
	Turn table	17-02							
	Cable antenna -> preamp	15-16							
	Spectrum analyzer	21-07							
	Antenna tower	17-02							
	Cable antenna -> preamp	15-15							
	Cable antenna -> preamp	11-61							
	Antenna	05-38							

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Detected peaks

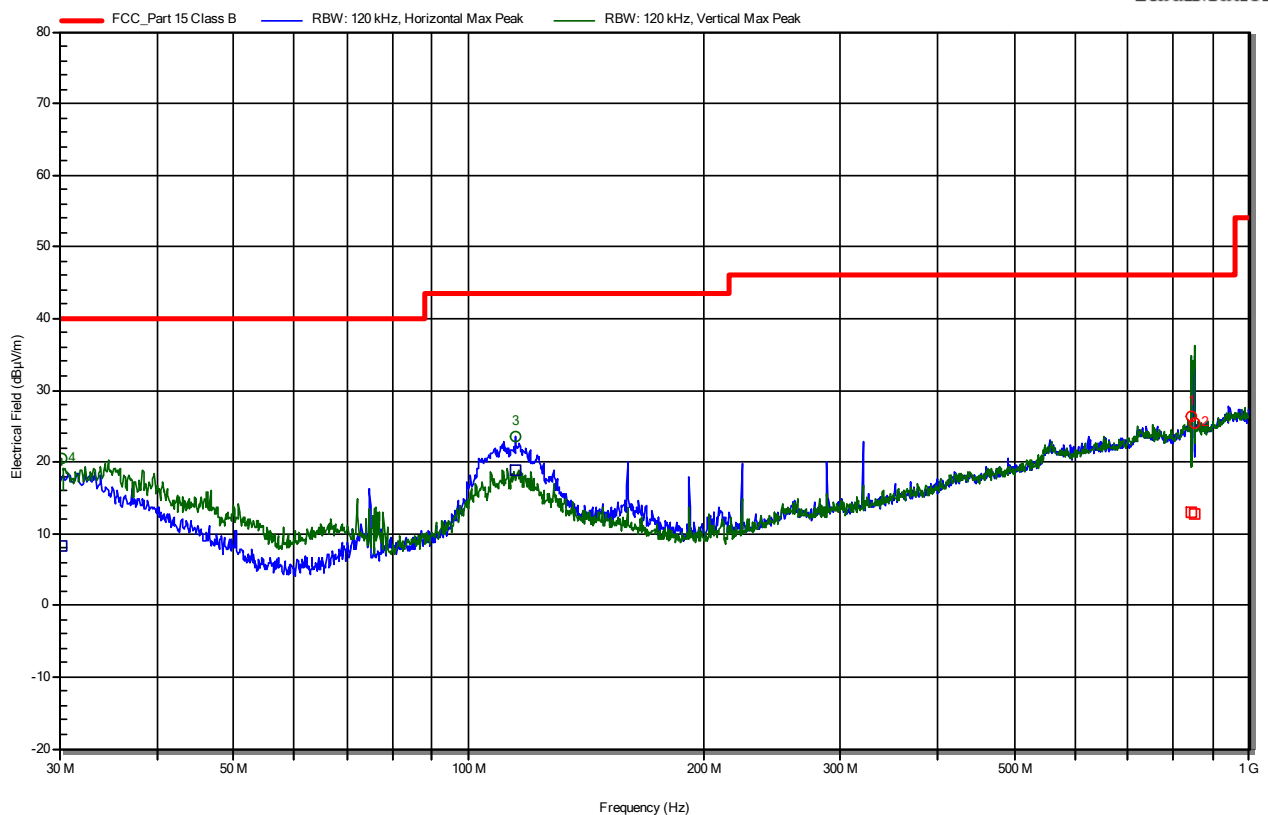
Peak Number	Frequency	Peak	Quasi-Peak	Quasi-Peak Difference	Angle	Height	Polarization	Status
4	31.5 MHz	22.4 dBµV/m	14.4 dBµV/m	-25.6 dB	90 °	2 m	Vertical	Pass
1	41.3 MHz	25.8 dBµV/m	8.8 dBµV/m	-31.2 dB	292 °	4 m	Vertical	Pass
3	96 MHz	29.7 dBµV/m	22.1 dBµV/m	-21.4 dB	0 °	4 m	Horizontal	Pass
2	112.3 MHz	27.3 dBµV/m	19 dBµV/m	-24.5 dB	180 °	3 m	Horizontal	Pass

Sample calculation with all conversion and correction factors used					
Frequency [MHz]	Receiver QP value [dBµV]	Cable att. corr. [dB]	Preamp. gain corr. [dB]	Antenna factor corr. [dB]	QP field [dBµV/m]
96.0	10.8	+0.7	0.0	+10.6	= 22.1

Measurement	RE 30 MHz to 1 GHz		Test ID	#6	Date and time	2022-09-27 14:31:56	Operator	B. Itzcovich
EUT	Electronic Tap IWT-07-A ELR				Order	20CH-01574OR10	Verdict	Pass
Notes	Operating mode: TX (f = 2.440 GHz), PA Level 25 (0.0 dBm), Modulated Modifications: None Remarks: Powered with 120 V / 60 Hz							
Antenna Height	1 m to 4 m, 4 step(s)	Polarization	Both		Table Angle	0 degrees to 360 degrees, 16 step(s)	Distance	3 m
Test Place	ROS-SAC3		Software		Radimation 2020.1.8 (RE 30M-1G ESR7 CBL SAC3)			
Equipment	Device Type	ID	Settings		Band(s): 30 MHz - 1 GHz, Reference Level: 70 dBμV RBW: 120 kHz, VBW: 500 kHz, Sweep time: Auto [0 ms], Number of Sweeps: 40 Step freq: Fixed step count: 9701 steps per Band, Attenuator: 0.0 dB, Internal preamp: 20 dB, Measure time: 100 ms Final Measurement/Observation Time: PK 1 s / 5 s, QP 1 s / 5 s, AVG 0 s / 0 s			
	Turn table	17-02						
	Cable antenna -> preamp	15-16						
	Spectrum analyzer	16-03						
	Antenna tower	17-02						
	Cable antenna -> preamp	15-15						
	Cable antenna -> preamp	11-61						
	Antenna	05-38						

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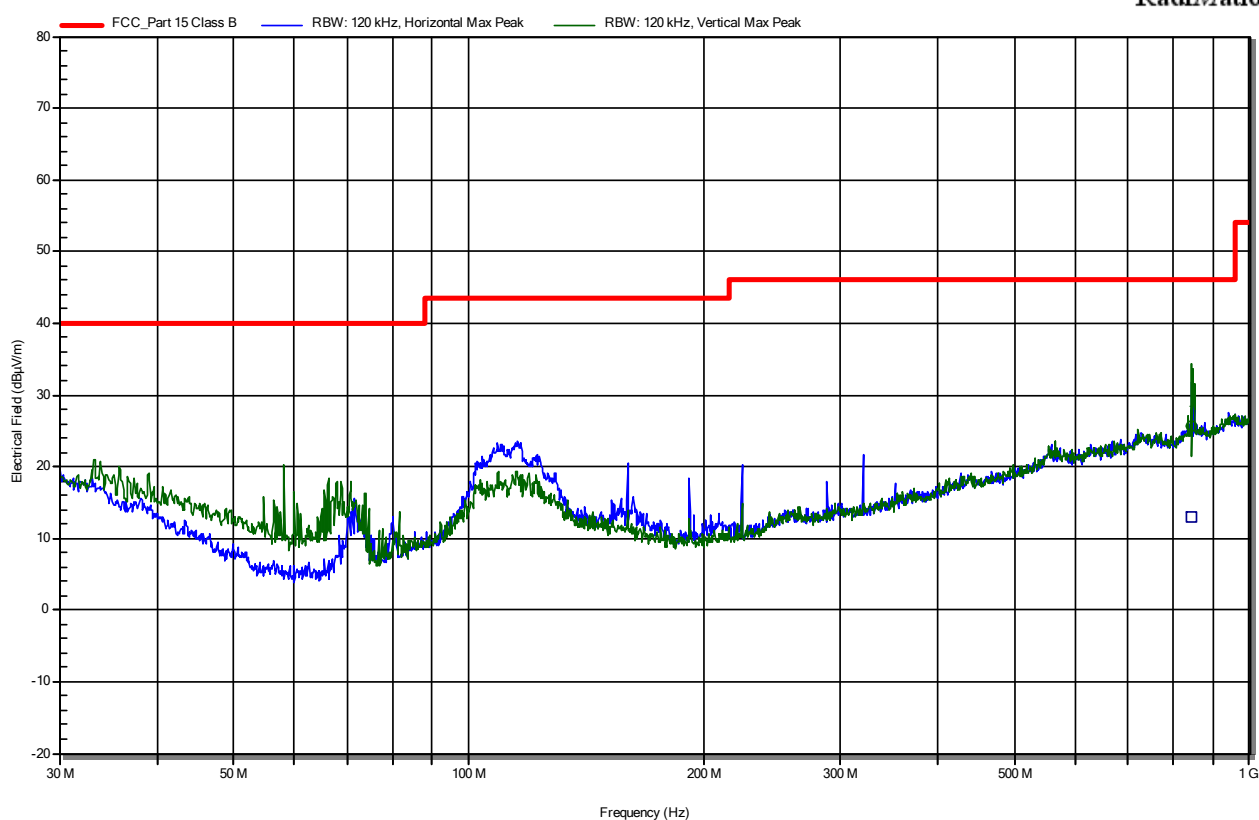
Detected peaks

Peak Number	Frequency	Peak	Quasi-Peak	Quasi-Peak Difference	Angle	Height	Polarization	Status
4	30.2 MHz	20.4 dBμV/m	8.4 dBμV/m	-31.6 dB	315 degrees	2 m	Vertical	Pass
3	115 MHz	23.4 dBμV/m	18.8 dBμV/m	-24.7 dB	202 degrees	3 m	Horizontal	Pass
1	843.7 MHz	26.4 dBμV/m	12.9 dBμV/m	-33.1 dB	202 degrees	3 m	Vertical	Pass
2	850.5 MHz	25.4 dBμV/m	12.8 dBμV/m	-33.2 dB	22 degrees	3 m	Horizontal	Pass

Measurement	RE 30 MHz to 1 GHz		Test ID	#7	Date and time	2022-09-27 15:41:24		Operator	B. Itzcovich	
EUT	Electronic Tap IWT-07-A ELR				Order	20CH-01574OR10		Verdict	Pass	
Notes	Operating mode: TX (f = 2.402 GHz), PA Level 25 (0.0 dBm), Modulated Modifications: None Remarks: Powered with 120 V / 60 Hz									
Antenna Height	1 m to 4 m, 4 step(s)	Polarization	Both		Table Angle	0 degrees to 360 degrees, 16 step(s)		Distance	3 m	
Test Place	ROS-SAC3		Software		Radimation 2020.1.8 (RE 30M-1G ESR7 CBL SAC3)					
Equipment	Device Type	ID	Settings		Band(s): 30 MHz - 1 GHz, Reference Level: 70 dBuV RBW: 120 kHz, VBW: 500 kHz, Sweep time: Auto [0 ms], Number of Sweeps: 40 Step freq: Fixed step count: 9701 steps per Band, Attenuator: 0.0 dB, Internal preamp: 20 dB, Measure time: 100 ms Final Measurement/Observation Time: PK 1 s / 5 s, QP 1 s / 5 s, AVG 0 s / 0 s					
	Turn table	17-02								
	Cable antenna -> preamp	15-16								
	Spectrum analyzer	16-03								
	Antenna tower	17-02								
	Cable antenna -> preamp	15-15								
	Cable antenna -> preamp	11-61								
	Antenna	05-38								

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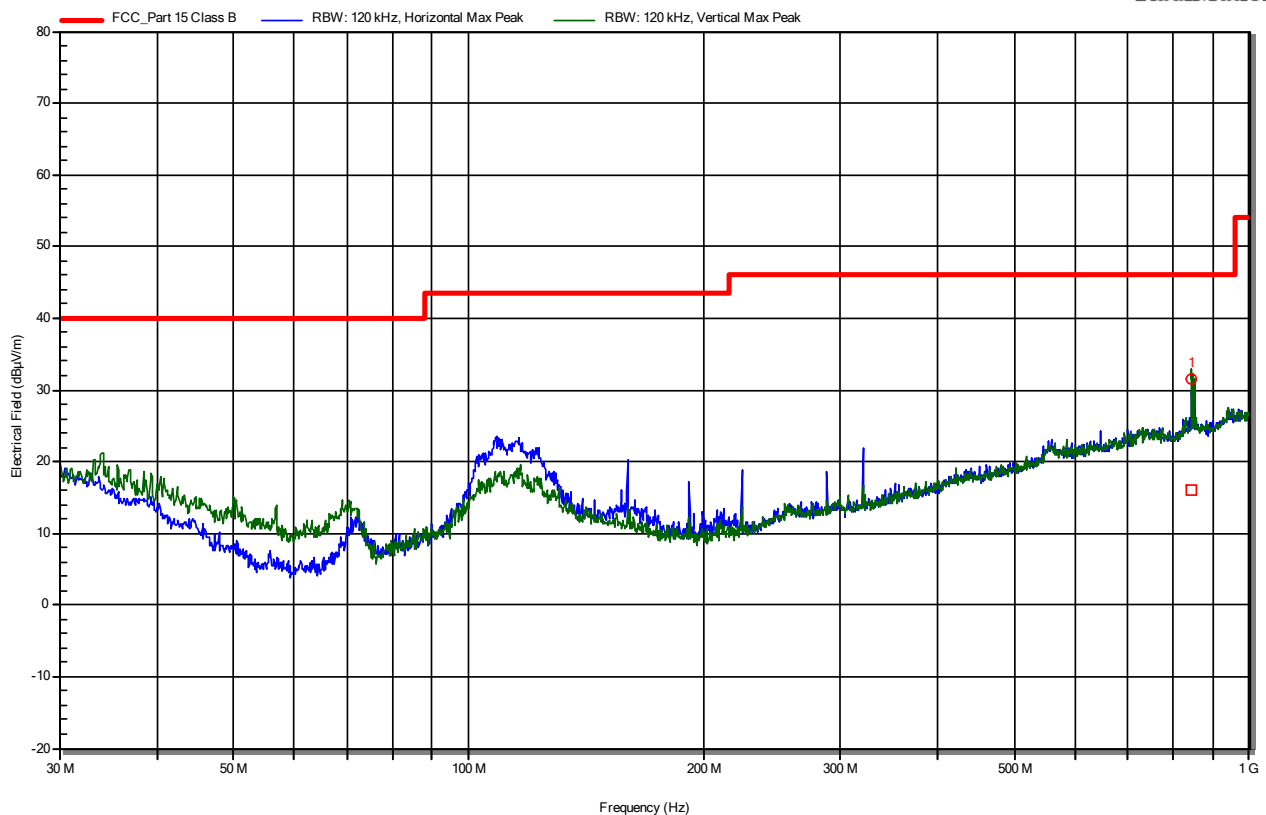
Detected peaks

Peak Number	Frequency	Peak	Quasi-Peak	Quasi-Peak Difference	Angle	Height	Polarization	Status
1	843.8 MHz	25.6 dBμV/m	13 dBμV/m	-33.0 dB	67 degrees	3 m	Vertical	Pass

Measurement	RE 30 MHz to 1 GHz		Test ID	#8	Date and time	2022-09-27 16:27:15	Operator	B. Itzcovich
EUT	Electronic Tap IWT-07-A ELR				Order	20CH-01574OR10	Verdict	Pass
Notes	Operating mode: TX (f = 2.480 GHz), PA Level 25 (0.0 dBm), Modulated Modifications: None Remarks: Powered with 120 V / 60 Hz							
Antenna Height	1 m to 4 m, 4 step(s)	Polarization	Both	Table Angle	0 degrees to 360 degrees, 16 step(s)	Distance	3 m	
Test Place	ROS-SAC3		Software	Radimation 2020.1.8 (RE 30M-1G ESR7 CBL SAC3)				
Equipment	Device Type	ID	Settings	Band(s): 30 MHz - 1 GHz, Reference Level: 70 dBμV RBW: 120 kHz, VBW: 500 kHz, Sweep time: Auto [0 ms], Number of Sweeps: 40 Step freq: Fixed step count: 9701 steps per Band, Attenuator: 0.0 dB, Internal preamp: 20 dB, Measure time: 100 ms Final Measurement/Observation Time: PK 1 s / 5 s, QP 1 s / 5 s, AVG 0 s / 0 s				
	Turn table	17-02						
	Cable antenna -> preamp	15-16						
	Spectrum analyzer	16-03						
	Antenna tower	17-02						
	Cable antenna -> preamp	15-15						
	Cable antenna -> preamp	11-61						
	Antenna	05-38						

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Detected peaks

Peak Number	Frequency	Peak	Quasi-Peak	Quasi-Peak Difference	Angle	Height	Polarization	Status
1	844.1 MHz	31.5 dB μ V/m	16 dB μ V/m	-30.0 dB	112 degrees	2 m	Vertical	Pass

7.8.3 1 GHz to 18 GHz

Test site: ☐ SAC10 ☒ SAC3

Distance: ☒ 1 m ☐ 3 m ☐ 10 m ☐ 30 m

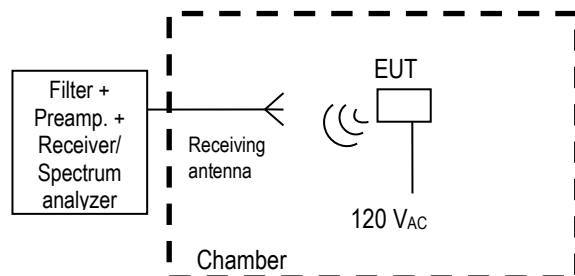
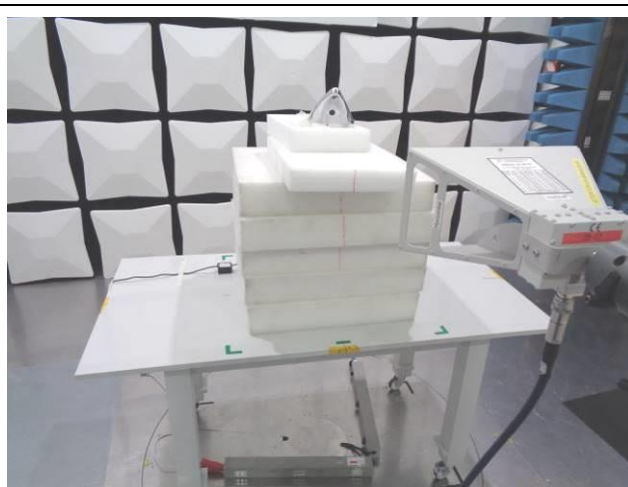
Position of EUT: 1.5 m (height of the equipment under test above floor)

Meas. uncertainty: ± 4.7 dB

Test method: The electromagnetic disturbance radiated by the equipment is measured using a spectrum analyzer and a wide band antenna. The antenna is moved from 1 to 4 m in height successively with horizontal and vertical polarizations, and aimed at the source by tilting. The turning table is operated through 360° during the measurements. The recordings are carried out taking into account the maximum value (peak) of all the disturbances appearing while the apparatus is under test.

Modifications: ☒ None ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Test set-up:



Remarks: - Limit values expressed in dB μ V/m and transformed to a measuring distance of 1m (factor used = 20 dB/decade) if necessary. E.g.: for f = 1 GHz the limit is 500 μ V/m at 3 m;

$$20 \log \left(\frac{500 \frac{\mu V}{m}}{1 \frac{\mu V}{m}} \right) + 20 \log \left(\frac{3m}{1m} \right) = 63.5 \frac{dB\mu V}{m} \text{ at } 1m$$

- Emissions near band-edges are checked under §§ 7.4 and 7.5
- Average measurements determined from the peak field strength after correcting for the worst-case duty cycle according to § 4.1.4.2.4 of ANSI C63.10:2013. Correction factor: $\delta(\text{dB}) = 20\log(\Delta) = 20 \log(0.57) = -4.88$ dB

Test equipment:

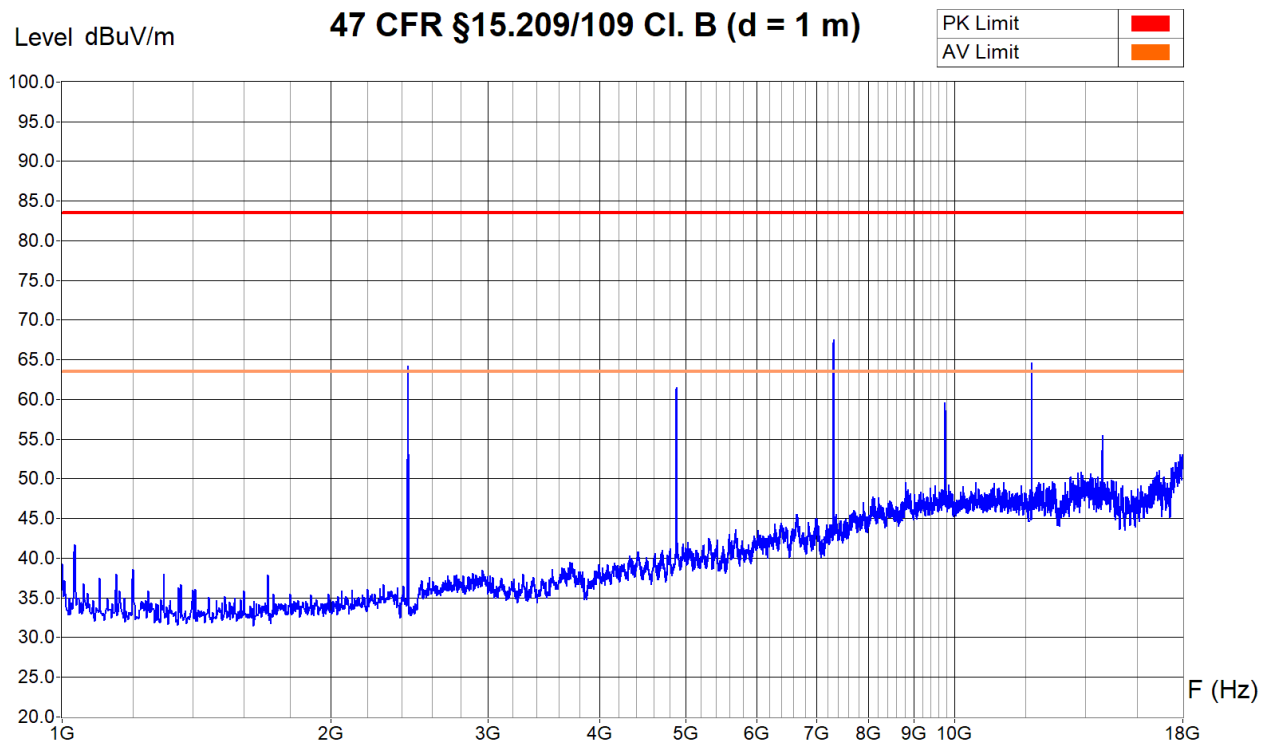
Spectrum analyzer	☐ 88-14	☐ 94-24	☐ 02-06	☐ 03-45	☐ 05-39	☒ 07-53
Preamplifier	☐ 05-56	☐ 05-87	☒ 14-27			
Antenna (horn)	☐ 90-24	☒ 22-07				
Cables	☒ 11-30	☒ 06-00C				
Filters	☒ 13-14	☒ 12-06	☐ 13-05			
Software and Revision	☒ Vitam, Rev. 2.4.13	☐ RadiMation 2020.1.8				

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Measurement Type : Radiated Field
Polarisation : Vertical
Table Angle : 0 - 360°
Antenna Height : 1 - 4m (tilted)



Equipment Under Test : Electronic Tap IWT-07-A ELR
Set-Up : Chamber SAC3, see photos
Operating Conditions : TX (f = 2.440 GHz), PA Level 25 (0.0 dBm), Modulated
Remarks : Powered with 120 V / 60 Hz
Zone 1 - 7 GHz with BR filter 13-14
Zone 7 - 18 GHz with HP filter 12-06



Zone	1 GHz - 7 GHz	7 GHz - 13 GHz	13 GHz - 18 GHz
Video Bandwidth	3 MHz	3 MHz	3 MHz
Resol Bandwidth	1 MHz	1 MHz	1 MHz

Sample calculation with all conversion and correction factors used						
Frequency [GHz]	Analyzer Peak value [dBuV]	Cable att. corr. [dB]	Preamp. gain corr. [dB]	Antenna factor corr. [dB]	Attenuator corr. [dB]	Peak field [dBuV/m]
4.880	67.8	+1.0	-39.4	+32.6	0.0	= 62.0

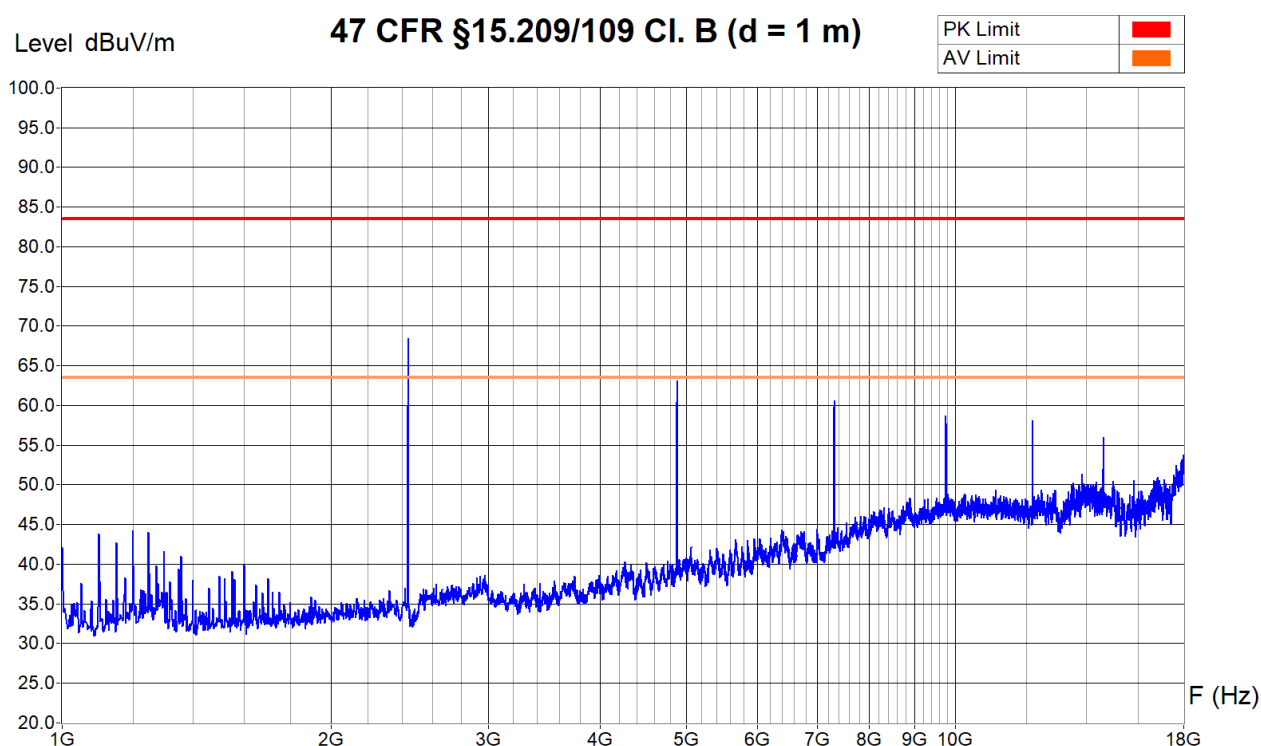
Final Result					
Frequency [GHz]	Peak field [dBuV/m]	Correction for Average [dB]	Calculated Average field [dBuV/m]	Average Limit [dBuV/m]	Conclusion
7.320	67.5	-4.9	62.6	63.5	Pass
12.20	64.6	-4.9	59.7	63.5	Pass

Operator: B. Itzcovich
Date/Time: 2022-09-26 11:03
Filename:
21_RE_1-
18G_TX2440M_0dBm_V.png/.txt

Measurement Type : Radiated Field
 Polarisation : Horizontal
 Table Angle : 0 - 360°
 Antenna Height : 1 - 4m (tilted)



Equipment Under Test : Electronic Tap IWT-07-A ELR
 Set-Up : Chamber SAC3, see photos
 Operating Conditions : TX (f = 2.440 GHz), PA Level 25 (0.0 dBm), Modulated
 Remarks : Powered with 120 V / 60 Hz
 Zone 1 - 7 GHz with BR filter 13-14
 Zone 7 - 18 GHz with HP filter 12-06



Zone	1 GHz - 7 GHz	7 GHz - 13 GHz	13 GHz - 18 GHz
Video Bandwidth	3 MHz	3 MHz	3 MHz
Resol Bandwidth	1 MHz	1 MHz	1 MHz

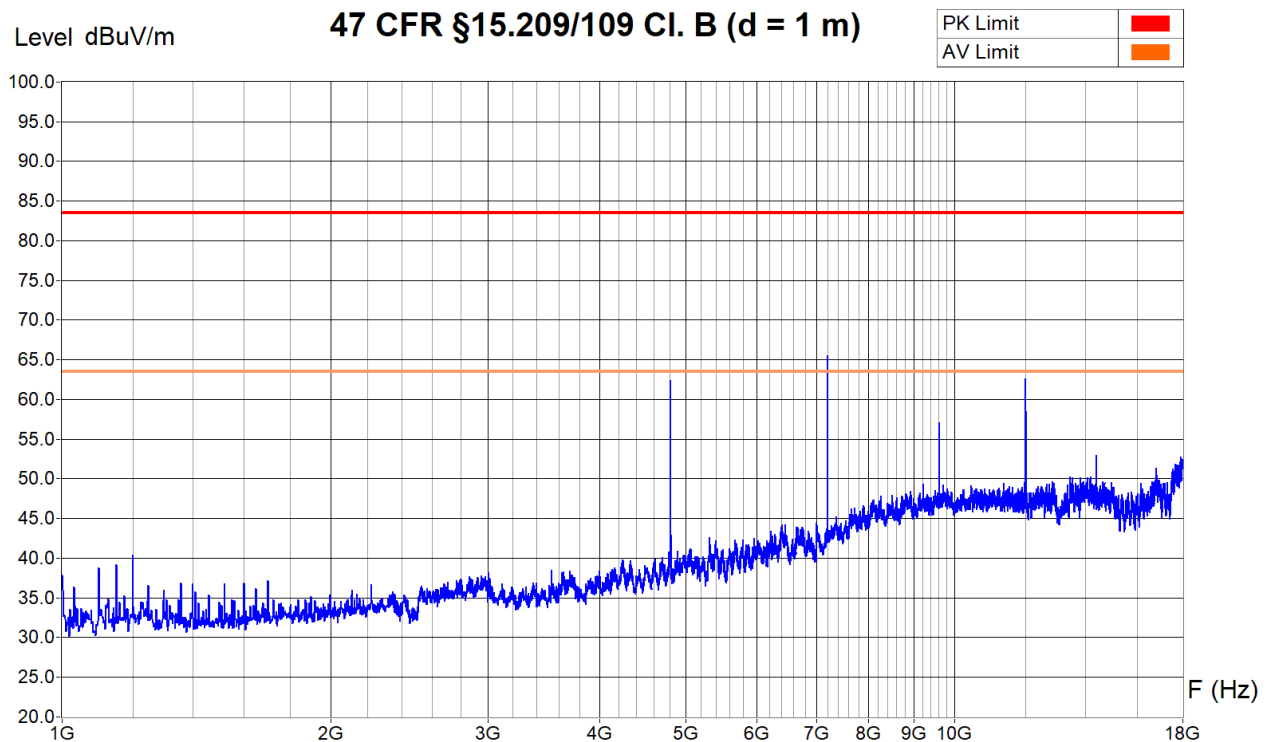
Final Result					
Frequency [GHz]	Peak field [dBuV/m]	Correction for Average [dB]	Calculated Average field [dBuV/m]	Average Limit [dBuV/m]	Conclusion
4.880	63.2	-4.9	58.3	63.5	Pass

Operator: B. Itzcovich
 Date/Time: 2022-09-26 11:40
 Filename:
 22_RE_1-
 18G_TX2440M_0dBm_H.png/.txt

Measurement Type : Radiated Field
Polarisation : Vertical
Table Angle : 0 - 360°
Antenna Height : 1 - 4m (tilted)



Equipment Under Test : Electronic Tap IWT-07-A ELR
Set-Up : Chamber SAC3, see photos
Operating Conditions : TX (f = 2.402 GHz), PA Level 25 (0.0 dBm), Modulated
Remarks : Powered with 120 V / 60 Hz
Zone 1 - 7 GHz with BR filter 13-14
Zone 7 - 18 GHz with HP filter 12-06



Zone	1 GHz - 7 GHz	7 GHz - 13 GHz	13 GHz - 18 GHz
Video Bandwidth	3 MHz	3 MHz	3 MHz
Resol Bandwidth	1 MHz	1 MHz	1 MHz

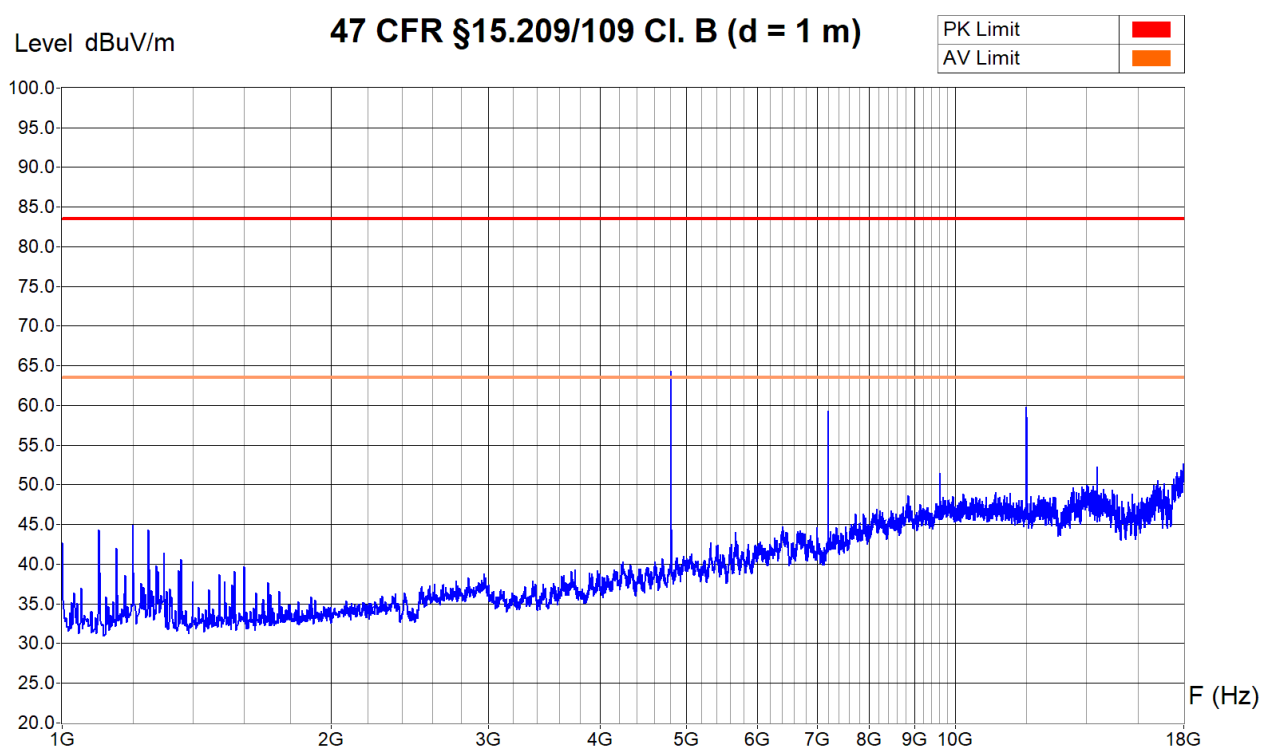
Final Result					
Frequency [GHz]	Peak field [dBuV/m]	Correction for Average [dB]	Calculated Average field [dBuV/m]	Average Limit [dBuV/m]	Conclusion
7.206	65.5	-4.9	60.6	63.5	Pass

Operator: B. Itzcovich
Date/Time: 2022-09-26 12:40
Filename:
23_RE_1-
18G_TX2402M_0dBm_V.png/.txt

Measurement Type : Radiated Field
 Polarisation : Horizontal
 Table Angle : 0 - 360°
 Antenna Height : 1 - 4m (tilted)



Equipment Under Test : Electronic Tap IWT-07-A ELR
 Set-Up : Chamber SAC3, see photos
 Operating Conditions : TX (f = 2.402 GHz), PA Level 25 (0.0 dBm), Modulated
 Remarks : Powered with 120 V / 60 Hz
 Zone 1 - 7 GHz with BR filter 13-14
 Zone 7 - 18 GHz with HP filter 12-06



Zone	1 GHz - 7 GHz	7 GHz - 13 GHz	13 GHz - 18 GHz
Video Bandwidth	3 MHz	3 MHz	3 MHz
Resol Bandwidth	1 MHz	1 MHz	1 MHz

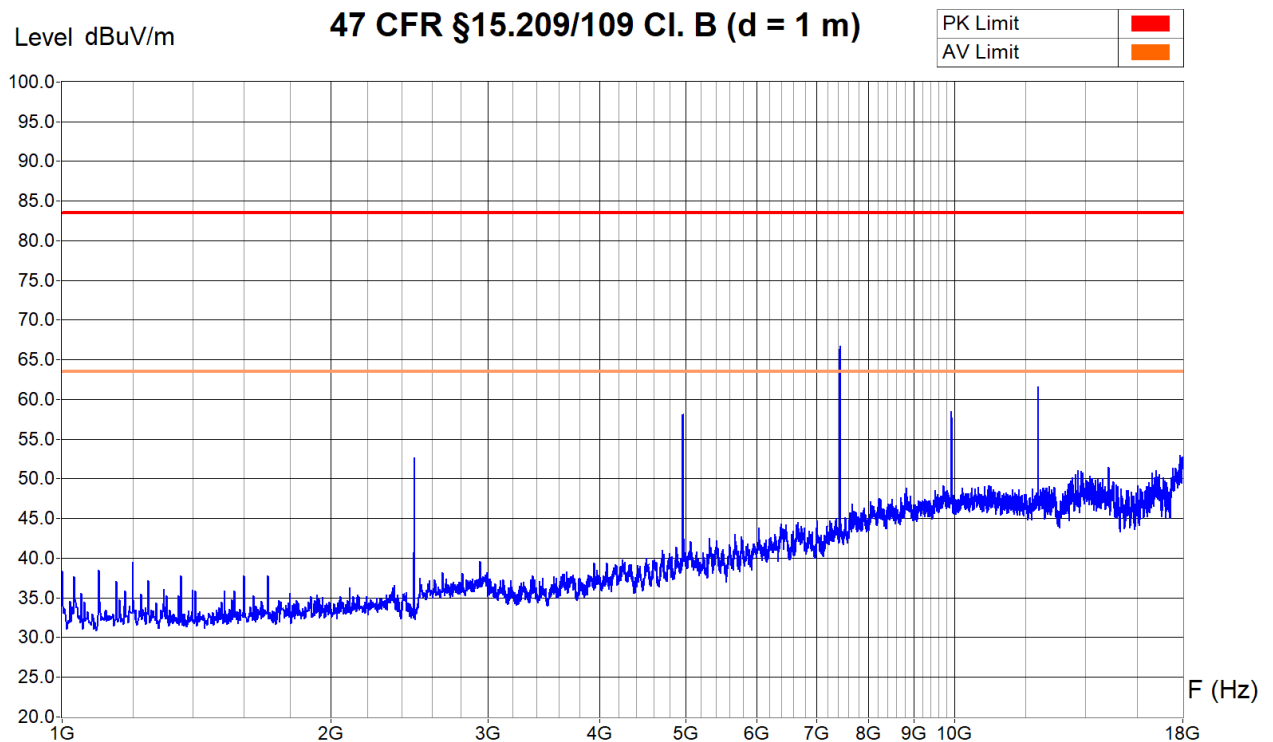
Final Result					
Frequency [GHz]	Peak field [dBuV/m]	Correction for Average [dB]	Calculated Average field [dBuV/m]	Average Limit [dBuV/m]	Conclusion
4.804	64.3	-4.9	59.4	63.5	Pass

Operator: B. Itzcovich
 Date/Time: 2022-09-26 12:56
 Filename:
 24_RE_1-
 18G_TX2402M_0dBm_H.png/.txt

Measurement Type : Radiated Field
Polarisation : Vertical
Table Angle : 0 - 360°
Antenna Height : 1 - 4m (tilted)



Equipment Under Test : Electronic Tap IWT-07-A ELR
Set-Up : Chamber SAC3, see photos
Operating Conditions : TX (f = 2.480 GHz), PA Level 25 (0.0 dBm), Modulated
Remarks : Powered with 120 V / 60 Hz
Zone 1 - 7 GHz with BR filter 13-14
Zone 7 - 18 GHz with HP filter 12-06



Zone	1 GHz - 7 GHz	7 GHz - 13 GHz	13 GHz - 18 GHz
Video Bandwidth	3 MHz	3 MHz	3 MHz
Resol Bandwidth	1 MHz	1 MHz	1 MHz

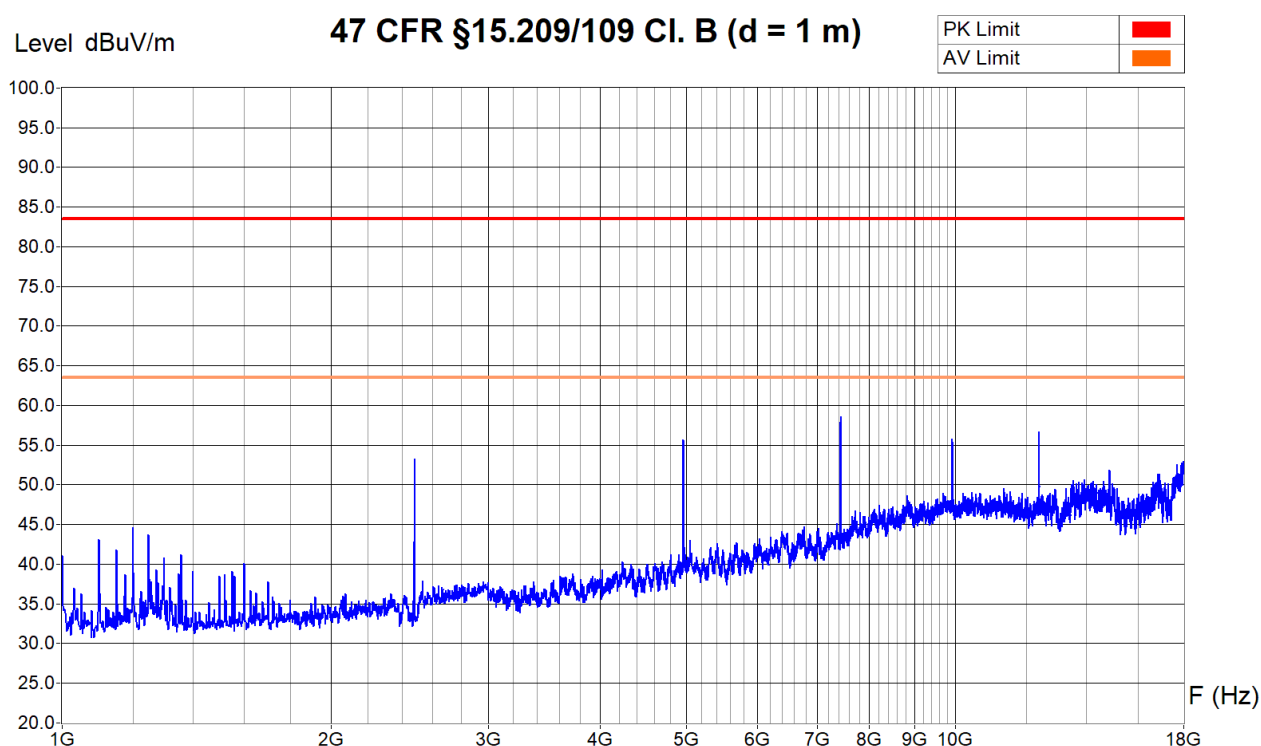
Final Result					
Frequency [GHz]	Peak field [dBuV/m]	Correction for Average [dB]	Calculated Average field [dBuV/m]	Average Limit [dBuV/m]	Conclusion
7.440	66.8	-4.9	61.9	63.5	Pass

Operator: B. Itzcovich
Date/Time: 2022-09-26 13:58
Filename:
25_RE_1-
18G_TX2480M_0dBm_V.png/.txt

Measurement Type : Radiated Field
 Polarisation : Horizontal
 Table Angle : 0 - 360°
 Antenna Height : 1 - 4m (tilted)



Equipment Under Test : Electronic Tap IWT-07-A ELR
 Set-Up : Chamber SAC3, see photos
 Operating Conditions : TX (f = 2.480 GHz), PA Level 25 (0.0 dBm), Modulated
 Remarks : Powered with 120 V / 60 Hz
 Zone 1 - 7 GHz with BR filter 13-14
 Zone 7 - 18 GHz with HP filter 12-06



Zone	1 GHz - 7 GHz	7 GHz - 13 GHz	13 GHz - 18 GHz
Video Bandwidth	3 MHz	3 MHz	3 MHz
Resol Bandwidth	1 MHz	1 MHz	1 MHz

Operator: B. Itzcovich
 Date/Time: 2022-09-26 14:08
 Filename:
 26_RE_1-
 18G_TX2480M_0dBm_H.png/.txt

7.8.4 18 GHz to 26 GHzTest site: ☒ SAC3☐ SAC10Distance: ☒ 1 m☐ 3 m☐ 10 m☐ 30 m

Position of EUT: 1.5 m (height of the equipment under test above floor)

Meas. uncertainty: ± 4.7 dB

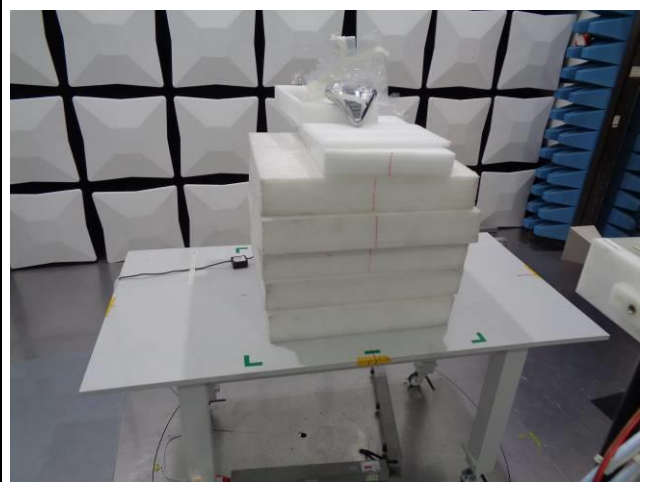
Test method: The electromagnetic disturbance radiated by the equipment is measured using a spectrum analyzer and a wide band antenna. The antenna is placed at the same height as the EUT successively with horizontal and vertical polarizations. The EUT is placed successively in lying and standing positions. The turning table is operated through 360° during the measurements. The recordings are carried out taking into account the maximum value (peak) of all the disturbances appearing while the apparatus is under test.

Modifications: ☒ None☐ 1☐ 2☐ 3☐ 4☐ 5

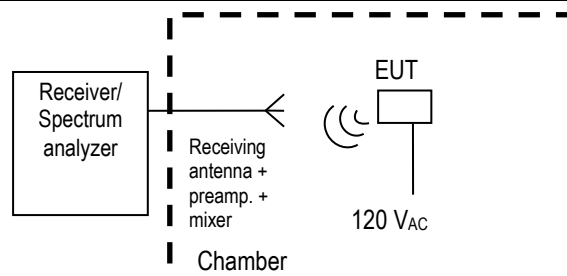
Test set-up:



EUT standing



EUT lying



Remarks: Limit values expressed in dB μ V/m and transformed to a measuring distance of 1m (factor used = 20 dB/decade) if necessary
e.g.: for f = 18 GHz the limit is 500 μ V/m at 3 m;

$$20 \log \left(\frac{500 \frac{\mu V}{m}}{1 \frac{\mu V}{m}} \right) + 20 \log \left(\frac{3m}{1m} \right) = 63.5 \frac{dB\mu V}{m} \text{ at } 1m$$

Test equipment:

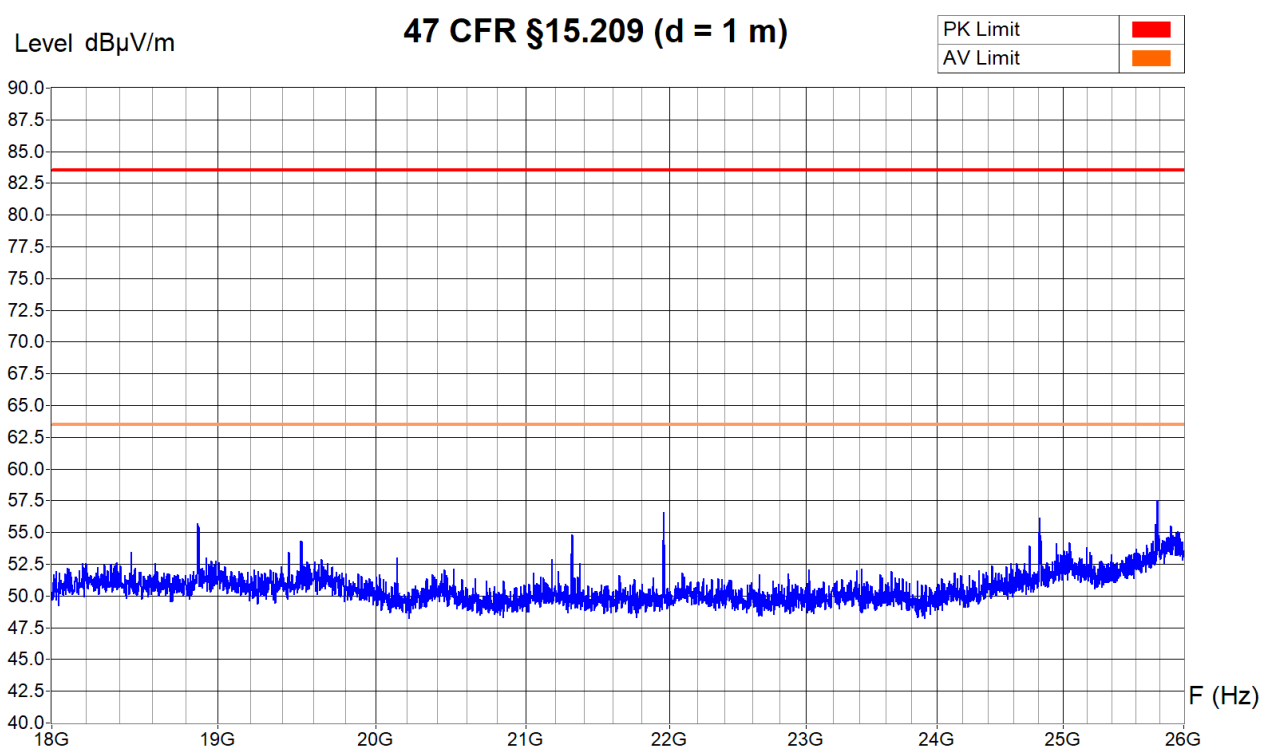
Spectrum analyzer	☐ 88-14	☐ 94-24	☐ 02-06	☐ 03-45	☐ 05-39	☒ 07-53
Antenna with mixer & preamp.	☒ 98-12					
Cables	☒ 11-62	☒ 10-81				
Power supply	☒ 06-62					
Software and Revision	☒ Vitam, Rev. 2.4.13		☐ RadiMation 2020.1.8			

Result: ☒ pass☐ fail☐ not applicable☐ not tested

Measurement Type : Radiated Field
 Polarisation : Vertical
 Table Angle : 0 - 360°
 Antenna Height : 1.5 m



Equipment Under Test : Electronic Tap IWT-07-A ELR
 Set-Up : EUT standing. Chamber SAC3, see photos
 Operating Conditions : TX (f = 2.440 GHz), PA Level 25 (0.0 dBm), Modulated
 Remarks : Powered with 120 V / 60 Hz
 Peak detector sweep



Zone	18 GHz - 26 GHz
Video Bandwidth	3 MHz
Resol Bandwidth	1 MHz

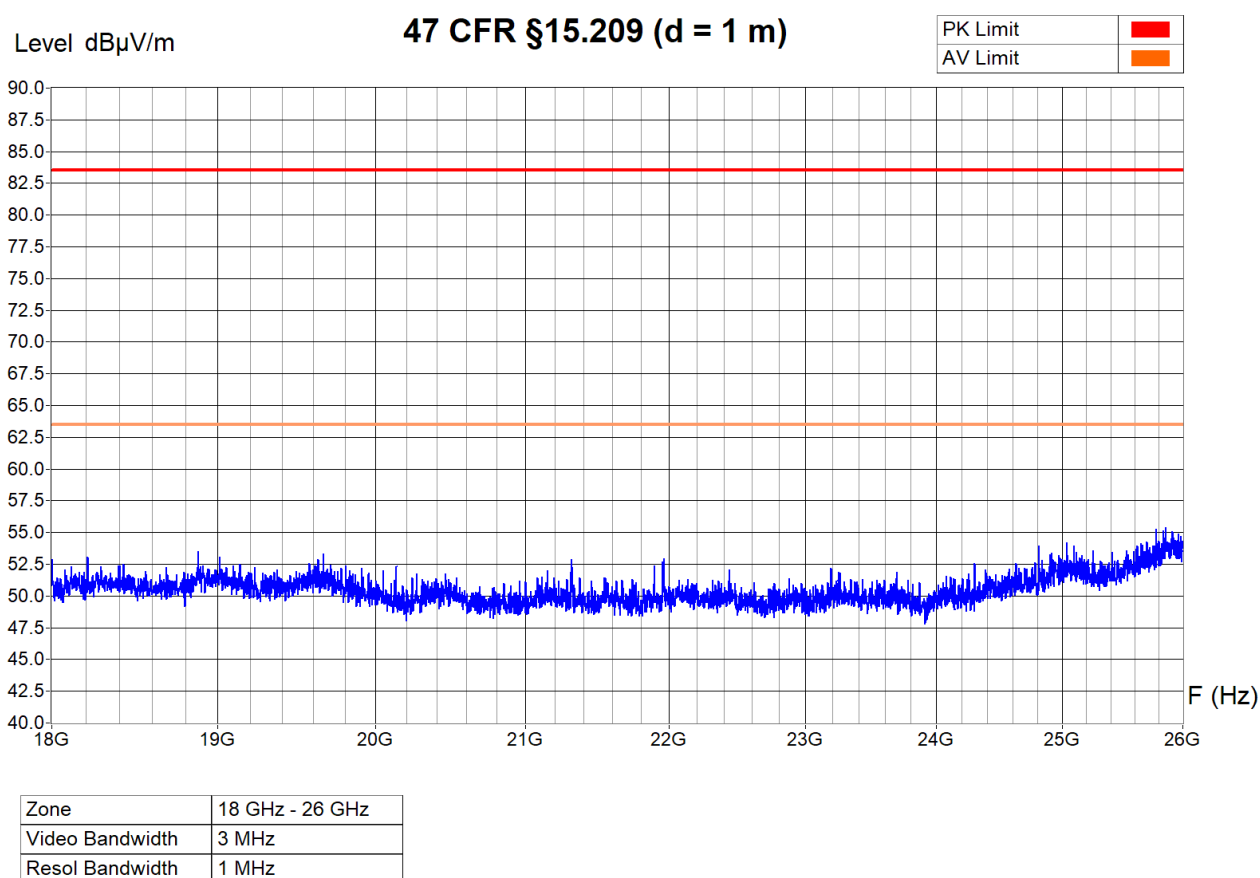
Sample calculation with all conversion and correction factors used				
Frequency [GHz]	Analyzer Peak value [dBμV]	Combined Cable att. + Preamp. gain + Antenna factor corr [dB]	Attenuator corr. [dB]	Peak field [dBμV/m]
21.960	32.5	+24.1	0.0	= 56.6

Operator: B. Itzcovich
 Date/Time: 2022-09-26 16:20
 Filename:
 31_RE_18-
 26G_TX2440M_0dBm_Standing_

Measurement Type : Radiated Field
 Polarisation : Horizontal
 Table Angle : 0 - 360°
 Antenna Height : 1.5 m



Equipment Under Test : Electronic Tap IWT-07-A ELR
 Set-Up : EUT standing. Chamber SAC3, see photos
 Operating Conditions : TX (f = 2.440 GHz), PA Level 25 (0.0 dBm), Modulated
 Remarks : Powered with 120 V / 60 Hz
 Peak detector sweep

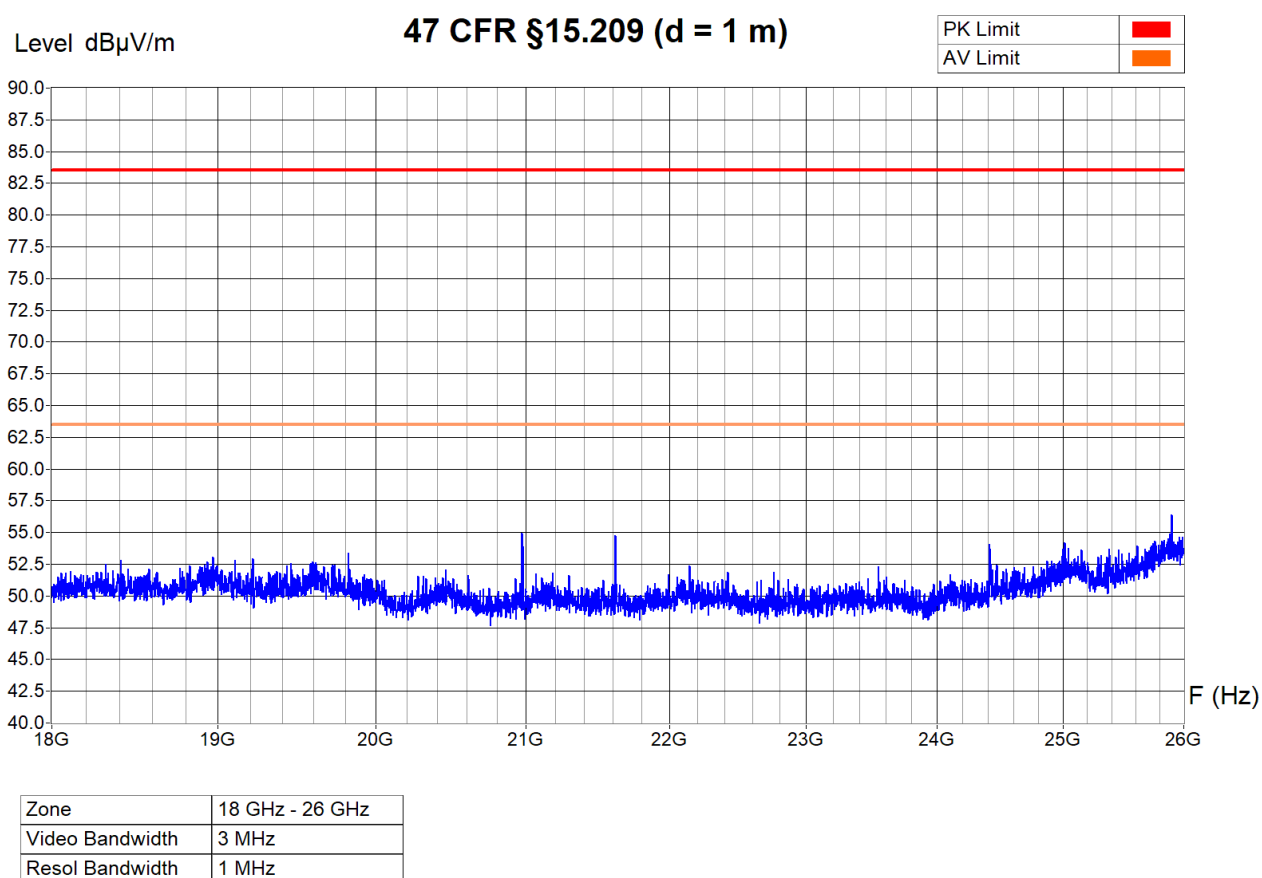


Operator: B. Itzcovich
 Date/Time: 2022-09-26 16:51
 Filename:
 32_RE_18-
 26G_TX2440M_0dBm_Standing_

Measurement Type : Radiated Field
 Polarisation : Vertical
 Table Angle : 0 - 360°
 Antenna Height : 1.5 m



Equipment Under Test : Electronic Tap IWT-07-A ELR
 Set-Up : EUT standing. Chamber SAC3, see photos
 Operating Conditions : TX (f = 2.402 GHz), PA Level 25 (0.0 dBm), Modulated
 Remarks : Powered with 120 V / 60 Hz
 Peak detector sweep

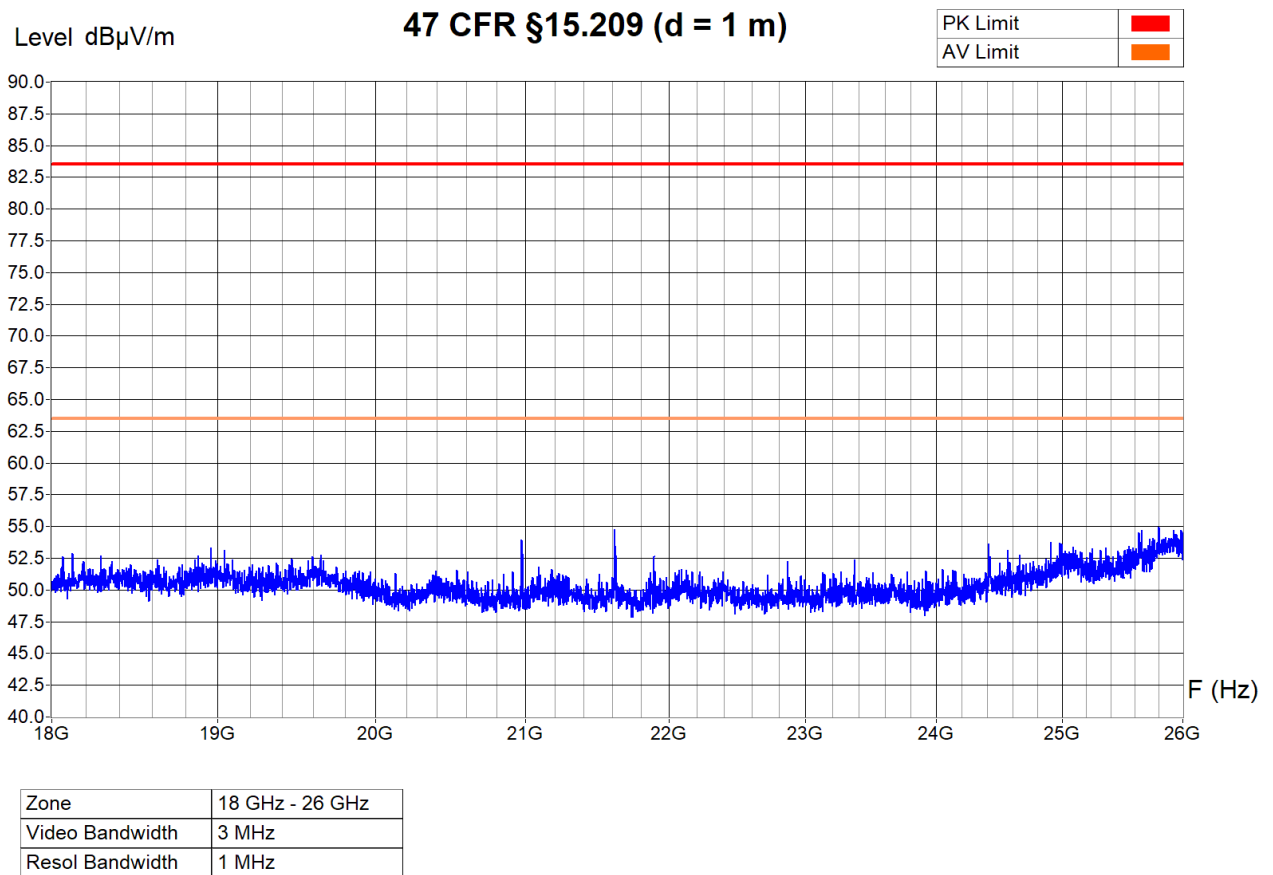


Operator: B. Itzcovich
 Date/Time: 2022-09-26 16:33
 Filename:
 33_RE_18-
 26G_TX2402M_0dBm_Standing_

Measurement Type : Radiated Field
Polarisation : Horizontal
Table Angle : 0 - 360°
Antenna Height : 1.5 m



Equipment Under Test : Electronic Tap IWT-07-A ELR
Set-Up : EUT standing. Chamber SAC3, see photos
Operating Conditions : TX (f = 2.402 GHz), PA Level 25 (0.0 dBm), Modulated
Remarks : Powered with 120 V / 60 Hz
Peak detector sweep

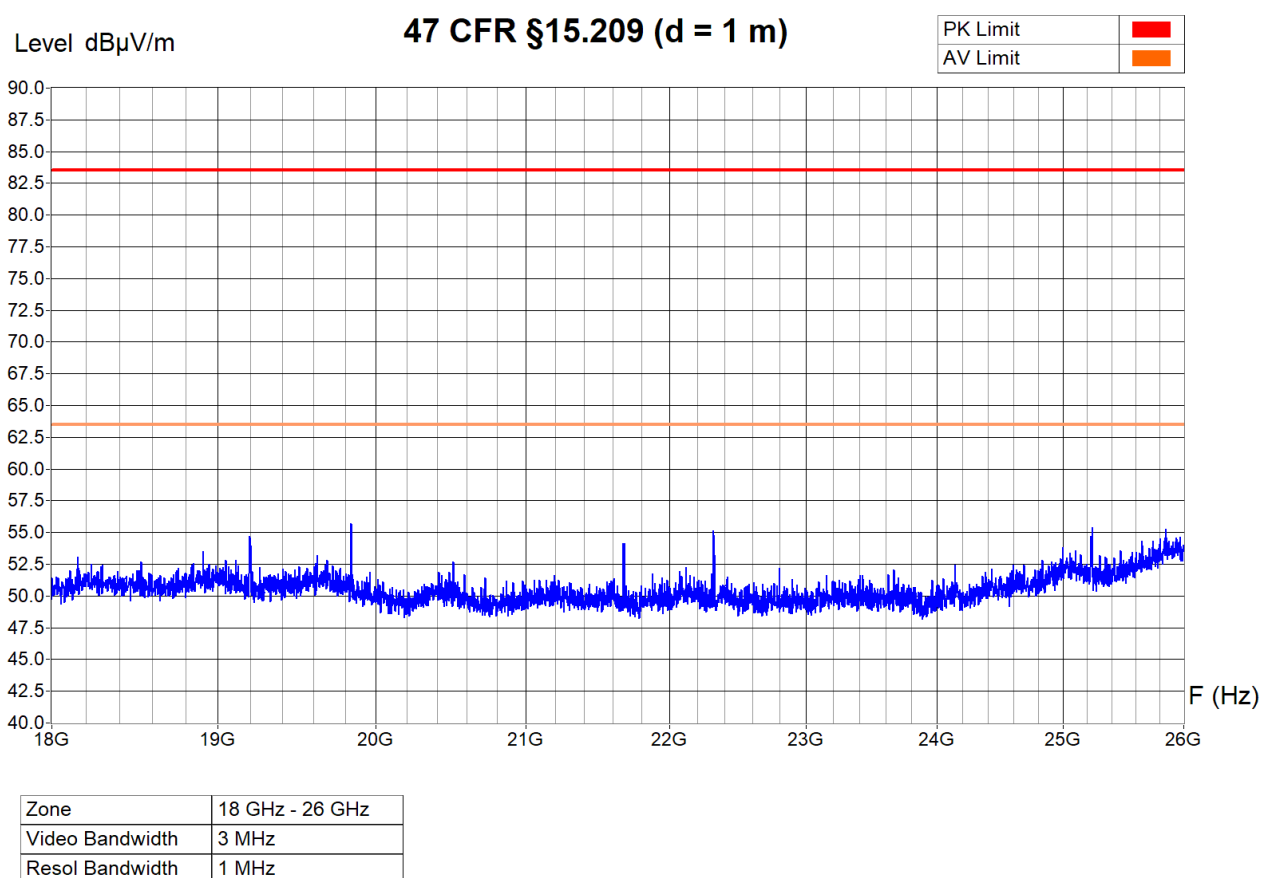


Operator: B. Itzcovich
Date/Time: 2022-09-26 16:46
Filename:
34_RE_18-
26G_TX2402M_0dBm_Standing_

Measurement Type : Radiated Field
 Polarisation : Vertical
 Table Angle : 0 - 360°
 Antenna Height : 1.5 m



Equipment Under Test : Electronic Tap IWT-07-A ELR
 Set-Up : EUT standing. Chamber SAC3, see photos
 Operating Conditions : TX (f = 2.480 GHz), PA Level 25 (0.0 dBm), Modulated
 Remarks : Powered with 120 V / 60 Hz
 Peak detector sweep

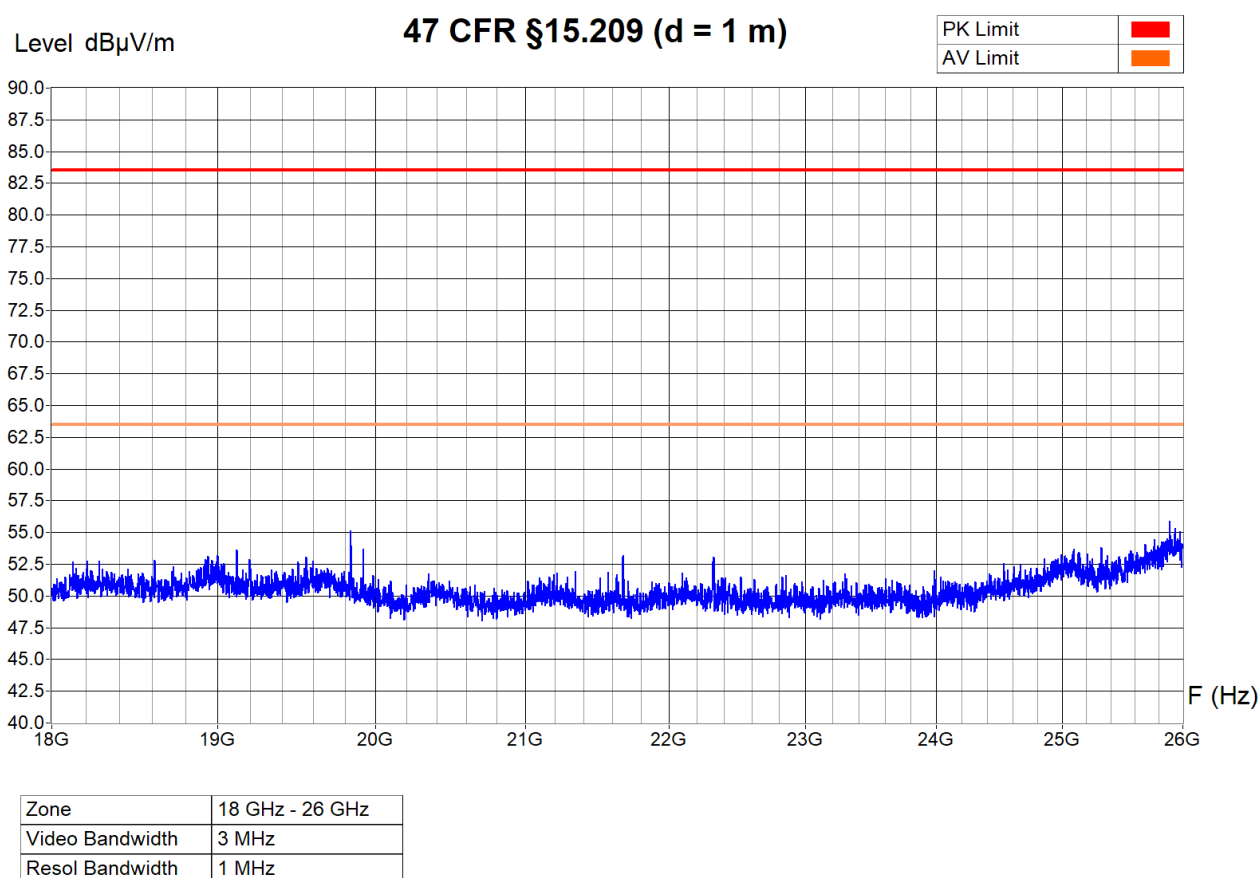


Operator: B. Itzcovich
 Date/Time: 2022-09-26 16:37
 Filename:
 35_RE_18-
 26G_TX2480M_0dBm_Standing_

Measurement Type : Radiated Field
Polarisation : Horizontal
Table Angle : 0 - 360°
Antenna Height : 1.5 m



Equipment Under Test : Electronic Tap IWT-07-A ELR
Set-Up : EUT standing. Chamber SAC3, see photos
Operating Conditions : TX (f = 2.480 GHz), PA Level 25 (0.0 dBm), Modulated
Remarks : Powered with 120 V / 60 Hz
Peak detector sweep

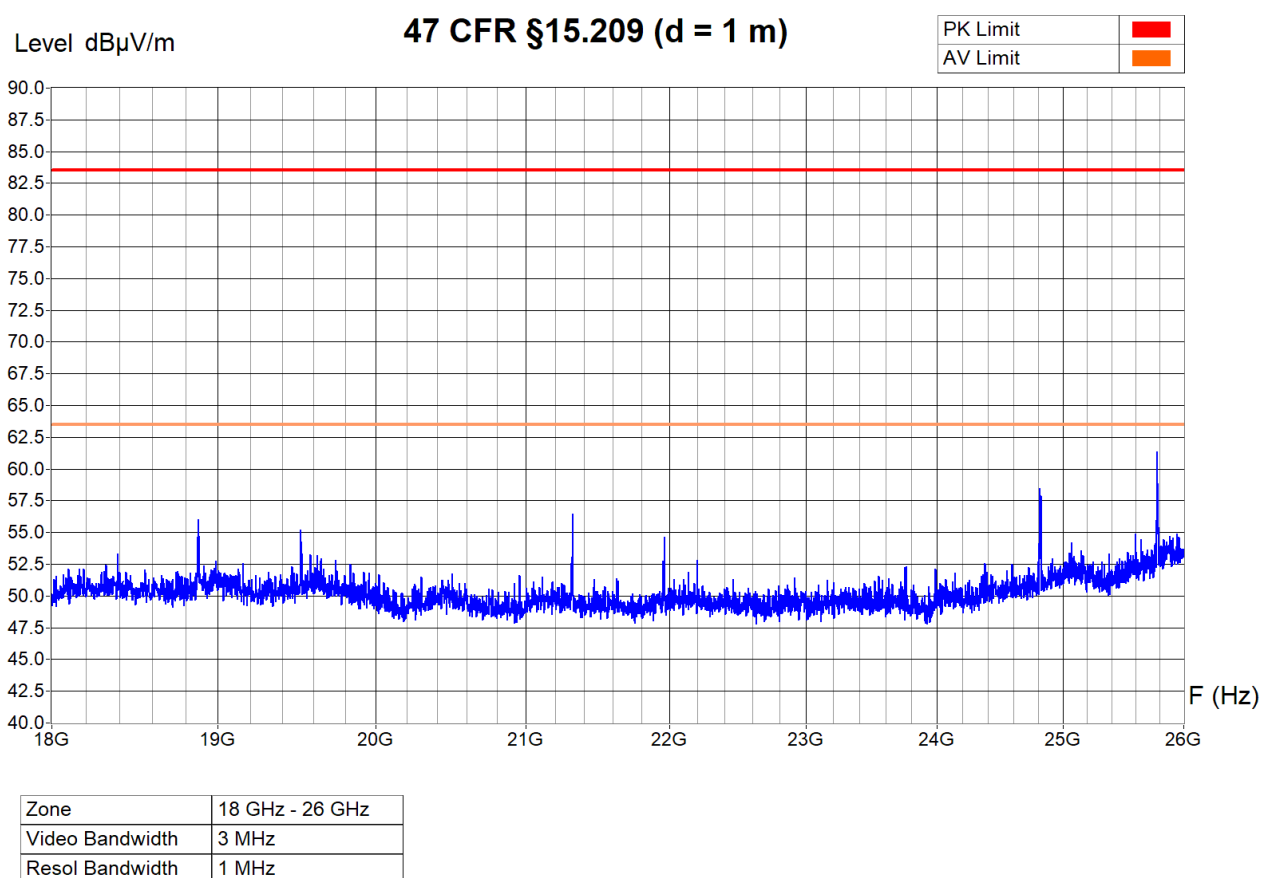


Operator: B. Itzcovich
Date/Time: 2022-09-26 16:41
Filename:
36_RE_18-
26G_TX2480M_0dBm_Standing_

Measurement Type : Radiated Field
 Polarisation : Vertical
 Table Angle : 0 - 360°
 Antenna Height : 1.5 m



Equipment Under Test : Electronic Tap IWT-07-A ELR
 Set-Up : EUT lying. Chamber SAC3, see photos
 Operating Conditions : TX (f = 2.440 GHz), PA Level 25 (0.0 dBm), Modulated
 Remarks : Powered with 120 V / 60 Hz
 Peak detector sweep

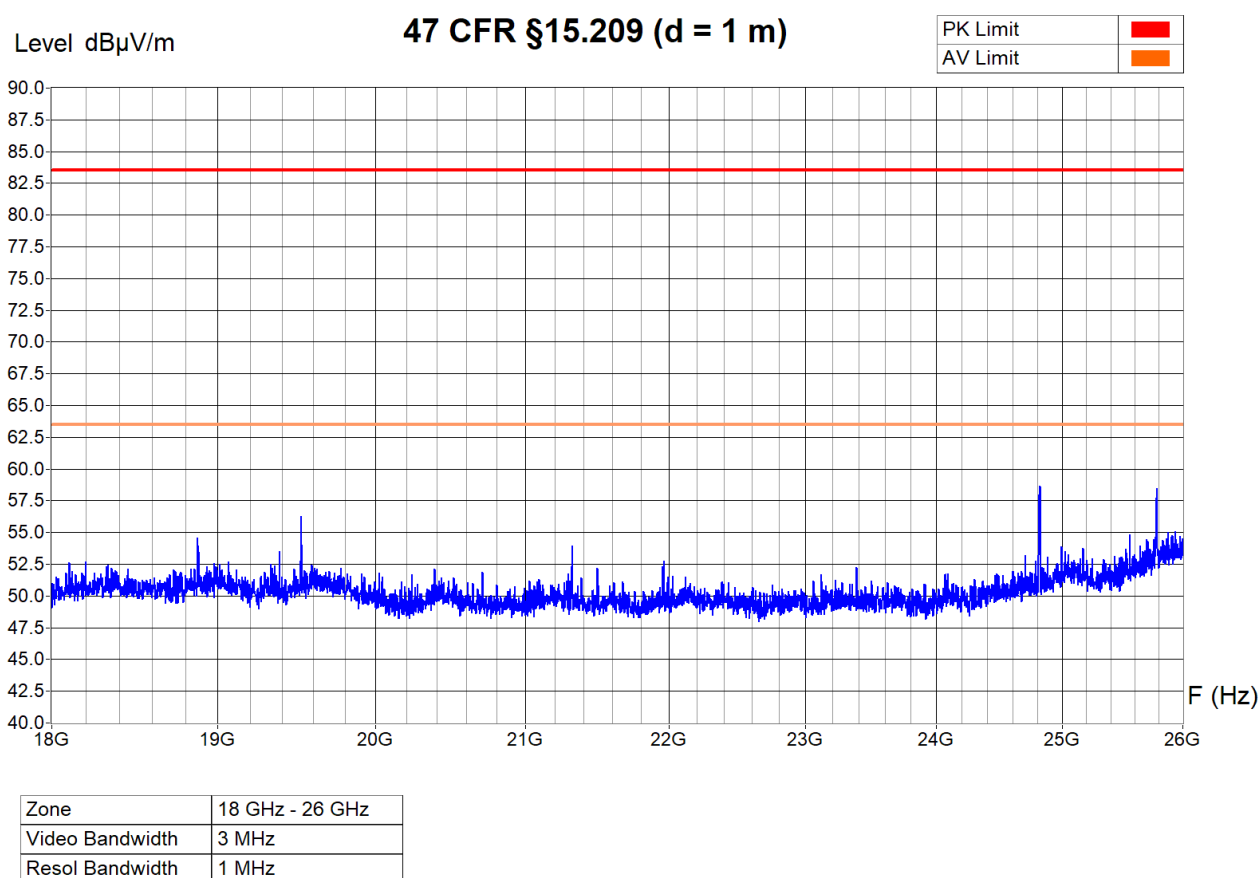


Operator: B. Itzcovich
 Date/Time: 2022-09-27 09:25
 Filename:
 41_RE_18-
 26G_TX2440M_0dBm_Lying_V.p

Measurement Type : Radiated Field
Polarisation : Horizontal
Table Angle : 0 - 360°
Antenna Height : 1.5 m



Equipment Under Test : Electronic Tap IWT-07-A ELR
Set-Up : EUT lying. Chamber SAC3, see photos
Operating Conditions : TX (f = 2.440 GHz), PA Level 25 (0.0 dBm), Modulated
Remarks : Powered with 120 V / 60 Hz
Peak detector sweep

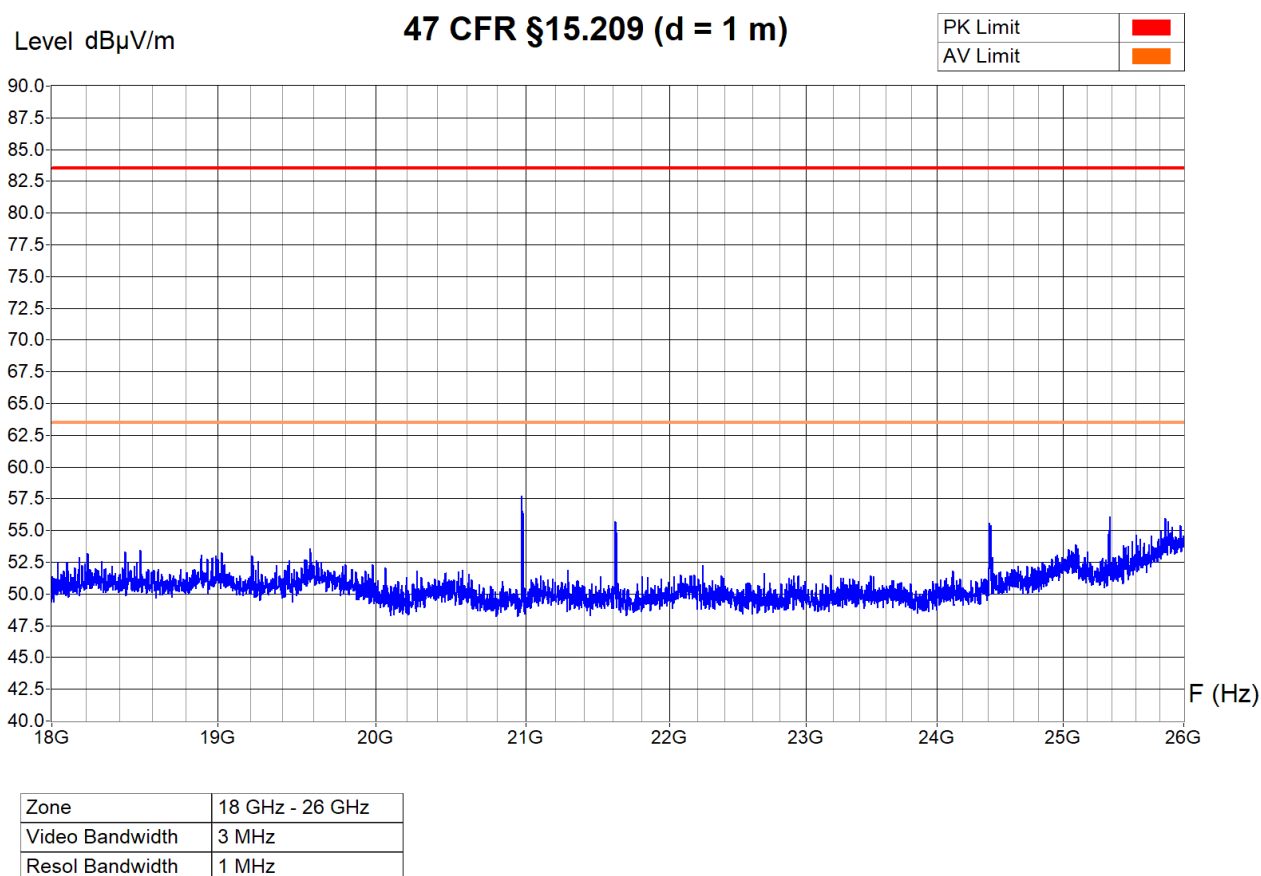


Operator: B. Itzcovich
Date/Time: 2022-09-27 08:54
Filename:
42_RE_18-
26G_TX2440M_0dBm_Lying_H.p

Measurement Type : Radiated Field
 Polarisation : Vertical
 Table Angle : 0 - 360°
 Antenna Height : 1.5 m



Equipment Under Test : Electronic Tap IWT-07-A ELR
 Set-Up : EUT lying. Chamber SAC3, see photos
 Operating Conditions : TX (f = 2.402 GHz), PA Level 25 (0.0 dBm), Modulated
 Remarks : Powered with 120 V / 60 Hz
 Peak detector sweep

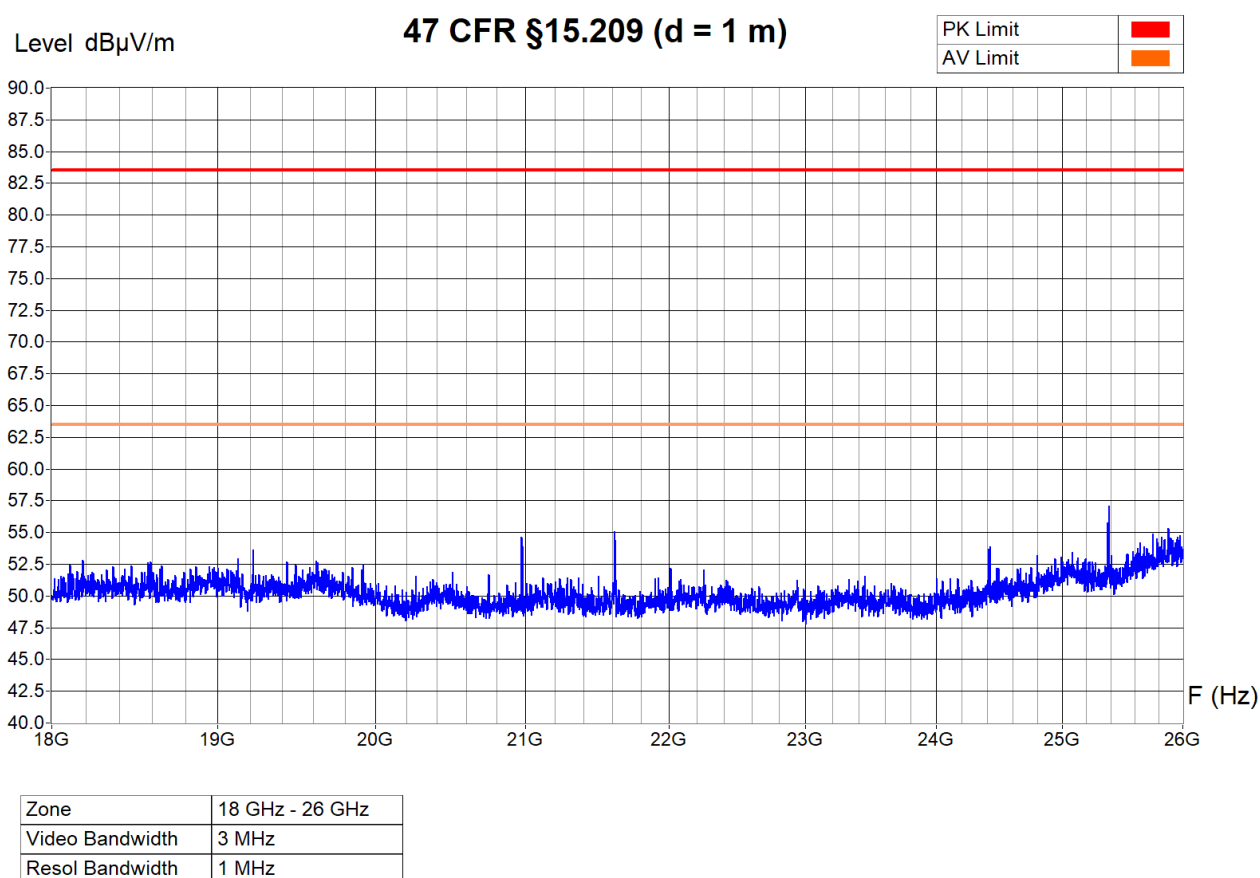


Operator: B. Itzcovich
 Date/Time: 2022-09-27 09:21
 Filename:
 43_RE_18-
 26G_TX2402M_0dBm_Lying_V.p

Measurement Type : Radiated Field
Polarisation : Horizontal
Table Angle : 0 - 360°
Antenna Height : 1.5 m



Equipment Under Test : Electronic Tap IWT-07-A ELR
Set-Up : EUT lying. Chamber SAC3, see photos
Operating Conditions : TX (f = 2.402 GHz), PA Level 25 (0.0 dBm), Modulated
Remarks : Powered with 120 V / 60 Hz
Peak detector sweep

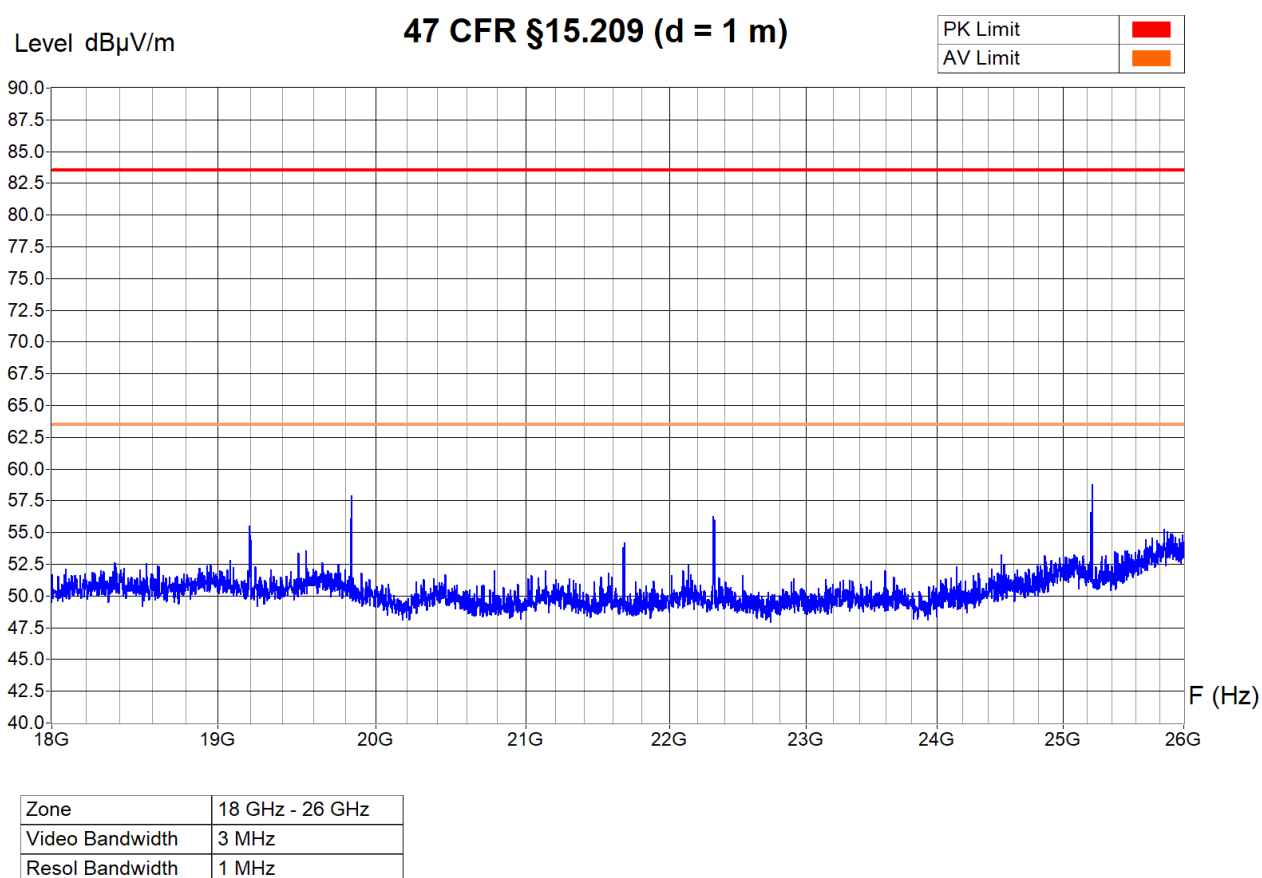


Operator: B. Itzcovich
Date/Time: 2022-09-27 09:02
Filename:
44_RE_18-
26G_TX2402M_0dBm_Lying_H.p

Measurement Type : Radiated Field
 Polarisation : Vertical
 Table Angle : 0 - 360°
 Antenna Height : 1.5 m



Equipment Under Test : Electronic Tap IWT-07-A ELR
 Set-Up : EUT lying. Chamber SAC3, see photos
 Operating Conditions : TX (f = 2.480 GHz), PA Level 25 (0.0 dBm), Modulated
 Remarks : Powered with 120 V / 60 Hz
 Peak detector sweep

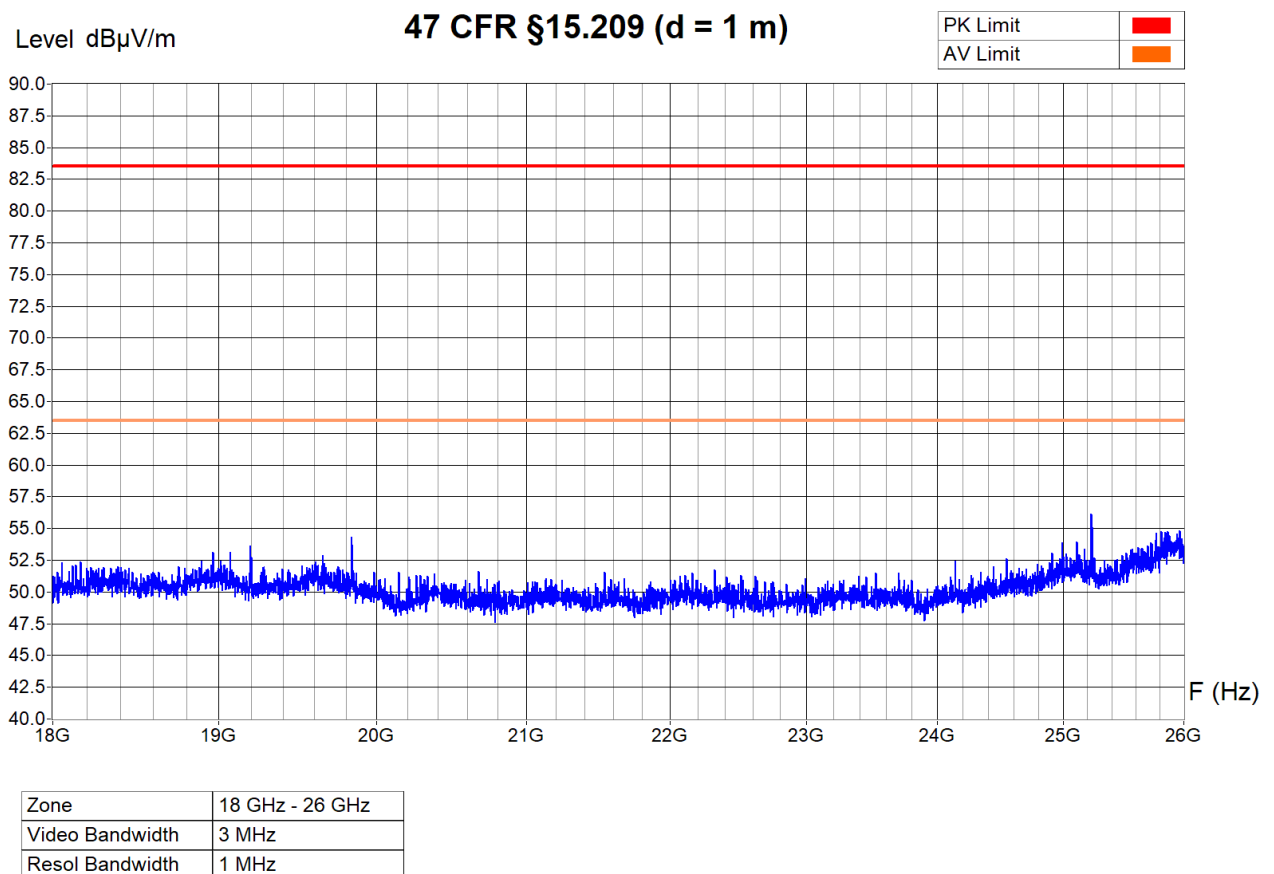


Operator: B. Itzcovich
 Date/Time: 2022-09-27 09:16
 Filename:
 45_RE_18-
 26G_TX2480M_0dBm_Lying_V.p

Measurement Type : Radiated Field
 Polarisation : Horizontal
 Table Angle : 0 - 360°
 Antenna Height : 1.5 m



Equipment Under Test : Electronic Tap IWT-07-A ELR
 Set-Up : EUT lying. Chamber SAC3, see photos
 Operating Conditions : TX (f = 2.480 GHz), PA Level 25 (0.0 dBm), Modulated
 Remarks : Powered with 120 V / 60 Hz
 Peak detector sweep



Operator: B. Itzcovich
 Date/Time: 2022-09-27 09:07
 Filename:
 46_RE_18-
 26G_TX2480M_0dBm_Lying_H.p

7.9 Spurious emission receive mode - radiated

7.9.1 30 MHz to 1 GHz

Test site: ☒ SAC3 ☐ open test site

☐ SAC10

Distance: ☒ 3 m ☐ 10 m ☐ 30 m

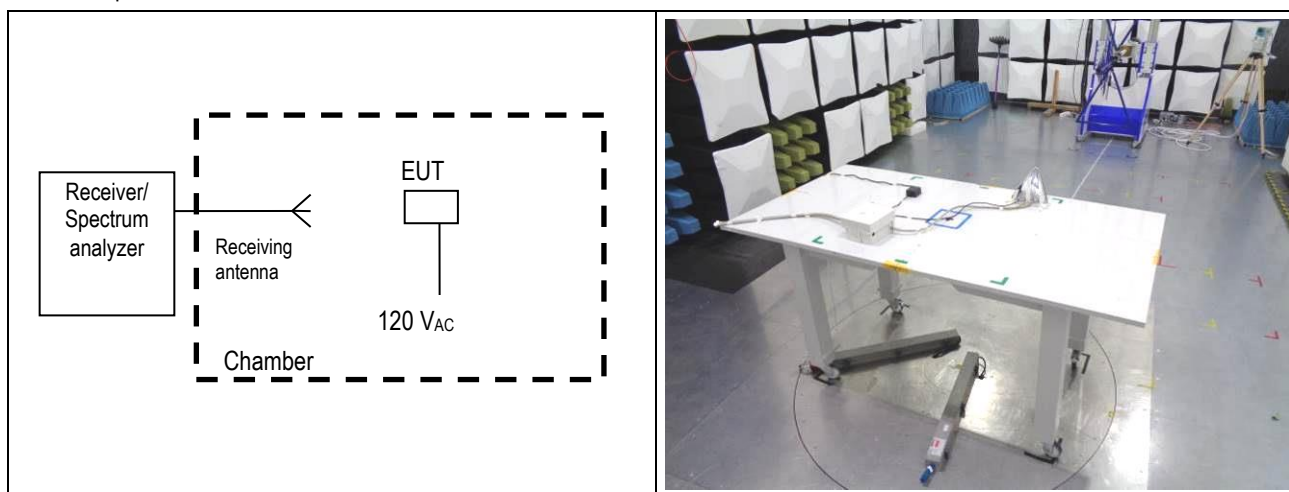
Position of EUT: 0.8 m (height of the equipment under test above floor)

Meas. uncertainty: ± 4.6 dB (30 - 300 MHz) / ± 3.7 dB (300 - 1000 MHz)

Test method: The electromagnetic disturbance radiated by the equipment is measured using a spectrum analyzer and a wide band antenna. The antenna is moved from 1 to 4 m in height successively with horizontal and vertical polarizations. The turning table is operated through 360° during the measurements. The recordings are carried out taking into account the maximum value of all the disturbances appearing while the apparatus is under test. The peak values are recorded continuously on the graph. The values exceeding a limit are re-measured manually using a receiver.

Modifications: ☒ None ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Test set-up:



Remarks: - Limit values expressed in dB μ V/m and transformed to a measuring distance of 3m (factor used = 20 dB/decade) if necessary
e.g.: for f = 40 MHz the limit is 100 μ V/m at 3 m;

$$20 \log \left(\frac{100 \frac{\mu V}{m}}{1 \frac{\mu V}{m}} \right) = 40 \frac{dB \mu V}{m} \text{ at } 3m$$

Test equipment:

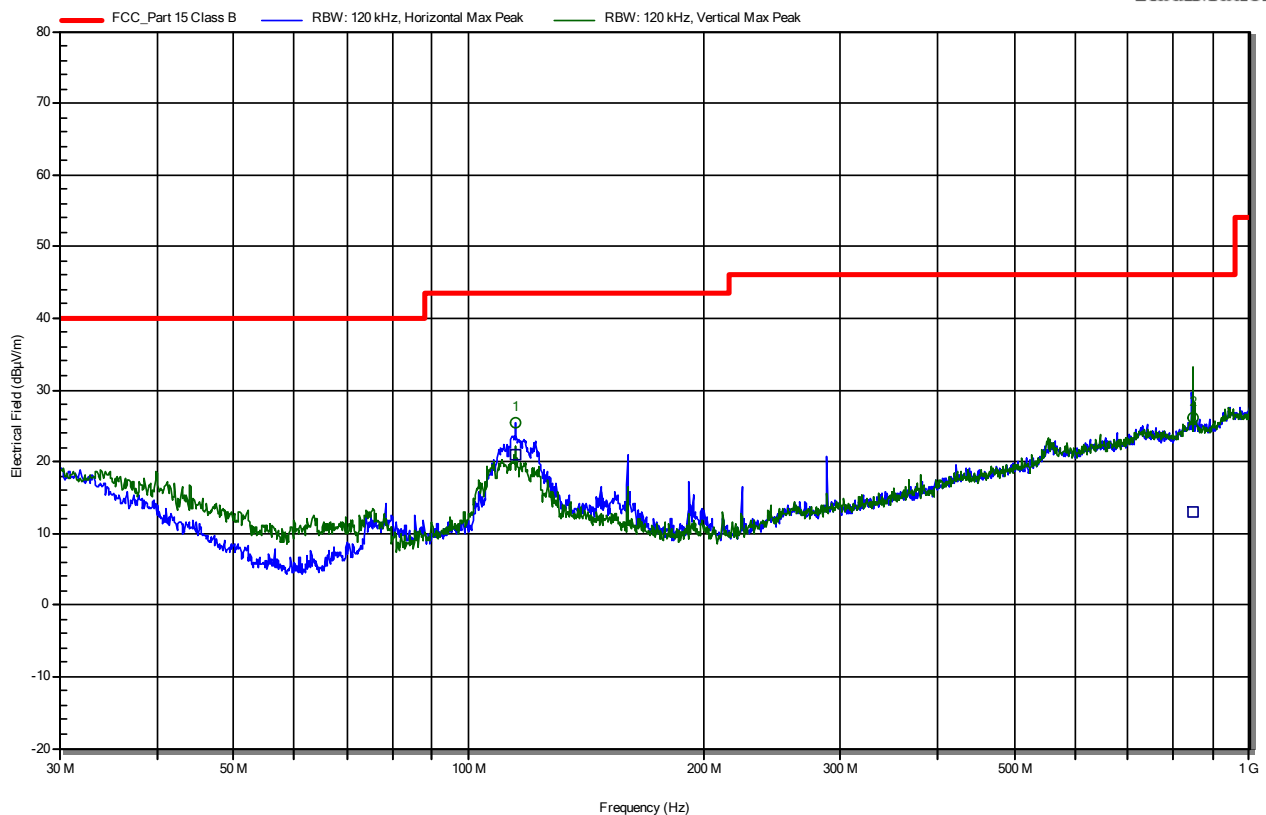
Spectrum analyzer	☒ 21-07	☐ 94-24	☐ 02-06	☐ 03-45	☐ 05-39	☒ 16-03
Receiver	☒ 21-07	☐ 90-43	☐ 94-35	☐ 04-29	☐ 16-03	
Preamplifier	☐ 90-01	☐ 95-86	☐ 05-56	☐ 05-59	☒ 21-07 internal	
Antenna (bilog)	☐ 94-03	☒ 05-38				
Cable set	☒ SAC3_RE_1.0/2.0/3.0		☐ 06-00C			
Software and Revision	☐ Vitam, Rev. 2.4.13		☒ RadiMation 2020.1.8			
Power supply	☒ 11-50					

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Measurement	RE 30 MHz to 1 GHz		Test ID	#12	Date and time	2022-09-29 10:51:50		Operator	B. Itzcovich
EUT	Electronic Tap IWT-07-A ELR				Order	20CH-01574OR10		Verdict	Pass
Notes	Operating mode: RX (f = 2.440 GHz) Modifications: None Remarks: Powered with 120 V / 60 Hz								
Antenna Height	1 m to 4 m, 4 step(s)	Polarization	Both		Table Angle	0 degrees to 360 degrees, 16 step(s)		Distance	3 m
Test Place	ROS-SAC3		Software		Radimation 2020.1.8 (RE 30M-1G ESR7 CBL SAC3)				
Equipment	Device Type ID Turn table 17-02 Cable antenna -> preamp 15-16 Spectrum analyzer 16-03 Antenna tower 17-02 Cable antenna -> preamp 15-15 Cable antenna -> preamp 11-61 Antenna 05-38		Settings		Band(s): 30 MHz - 1 GHz, Reference Level: 70 dBµV RBW: 120 kHz, VBW: 500 kHz, Sweep time: Auto [0 ms], Number of Sweeps: 40 Step freq: Fixed step count: 9701 steps per Band, Attenuator: 0.0 dB, Internal preamp: 20 dB, Measure time: 100 ms Final Measurement/Observation Time: PK 1 s / 5 s, QP 1 s / 5 s, AVG 0 s / 0 s				

47 CFR §15.209/109 Cl. B

RadiMation



Detected peaks

Peak Number	Frequency	Peak	Quasi-Peak	Quasi-Peak Difference	Angle	Height	Polarization	Status
1	115.2 MHz	25.3 dBµV/m	21 dBµV/m	-22.5 dB	180 degrees	3 m	Horizontal	Pass
2	849 MHz	26 dBµV/m	12.9 dBµV/m	-33.1 dB	0 degrees	2 m	Vertical	Pass

Sample calculation with all conversion and correction factors used					
Frequency [MHz]	Receiver QP value [dBµV]	Cable att. corr. [dB]	Preamp. gain corr. [dB]	Antenna factor corr. [dB]	QP field [dBµV/m]
115.2	8.3	+0.7	0.0	+12.0	= 21.0

7.9.2 1 GHz to 13 GHz

Test site: ☐ SAC10 ☒ SAC3

Distance: ☒ 1 m ☐ 3 m ☐ 10 m ☐ 30 m

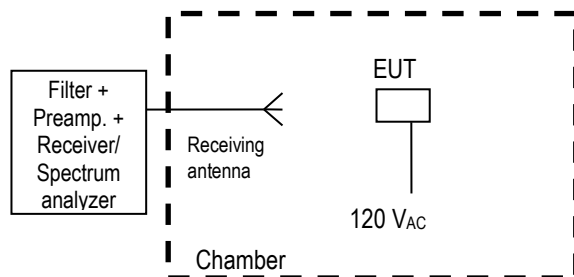
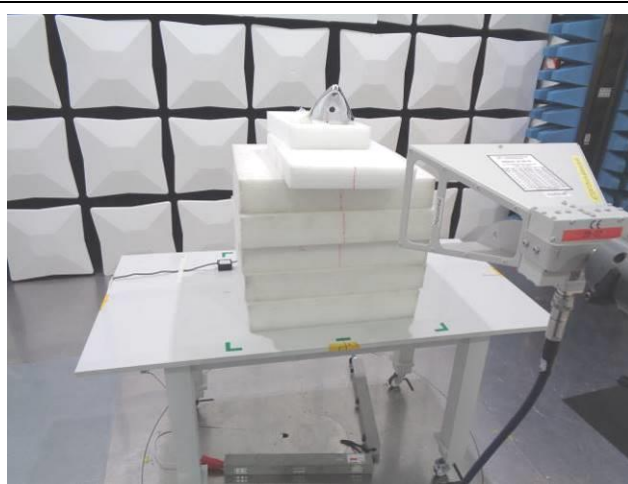
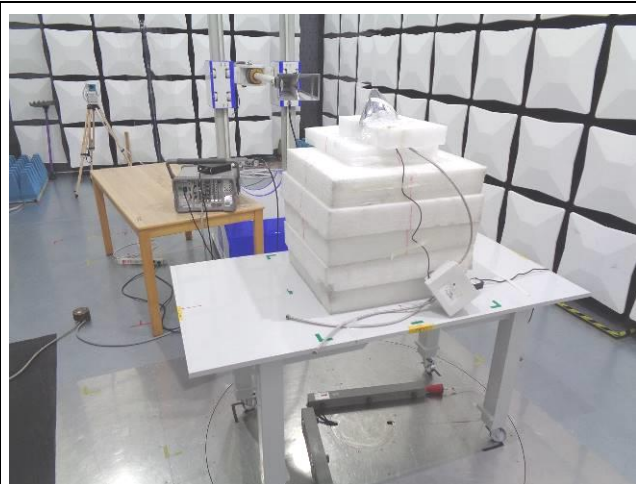
Position of EUT: 1.5 m (height of the equipment under test above floor)

Meas. uncertainty: ± 4.7 dB

Test method: The electromagnetic disturbance radiated by the equipment is measured using a spectrum analyzer and a wide band antenna. The antenna is moved from 1 to 4 m in height successively with horizontal and vertical polarizations, and aimed at the source by tilting. The turning table is operated through 360° during the measurements. The recordings are carried out taking into account the maximum value (peak) of all the disturbances appearing while the apparatus is under test.

Modifications: ☒ None ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Test set-up:



Remarks: Limit values expressed in dB μ V/m and transformed to a measuring distance of 1 m (factor used = 20 dB/decade) if necessary
e.g.: for f = 1 GHz the limit is 500 μ V/m at 3 m;

$$20 \log \left(\frac{500 \frac{\mu V}{m}}{1 \frac{\mu V}{m}} \right) + 20 \log \left(\frac{3m}{1m} \right) = 63.5 \frac{dB\mu V}{m} \text{ at } 1m$$

Test equipment:

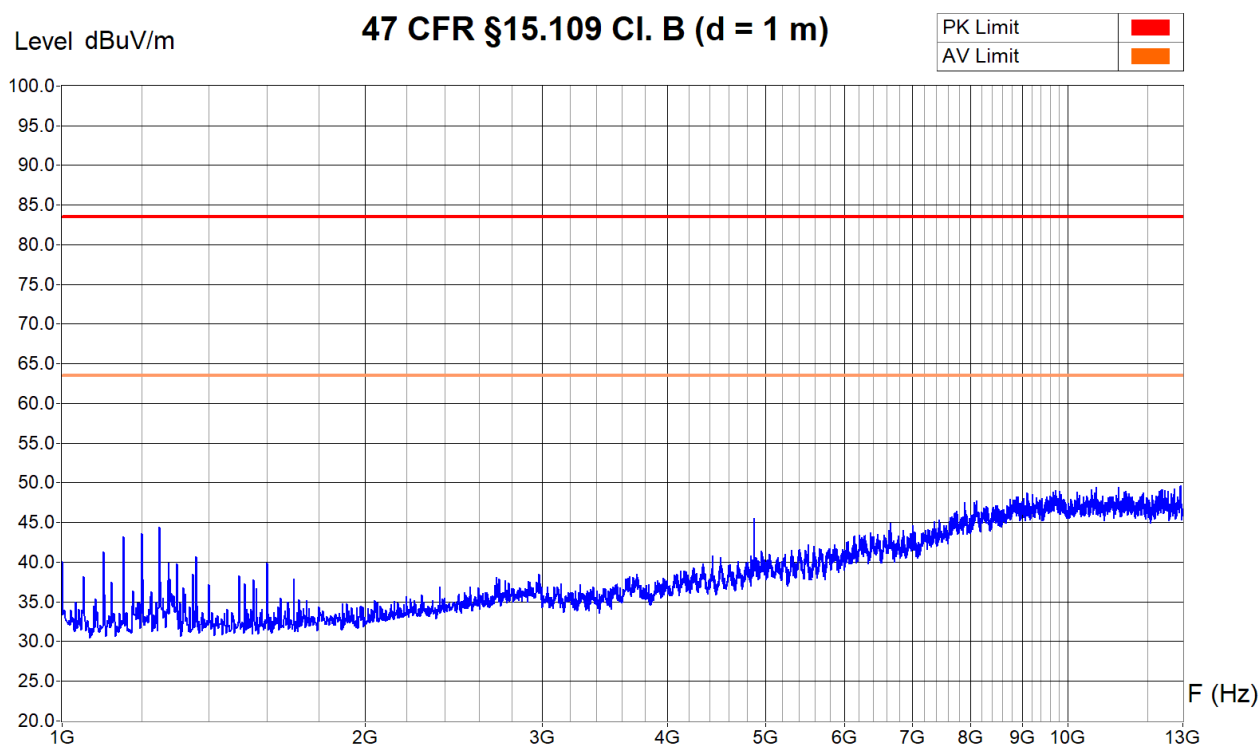
Spectrum analyzer	☐ 88-14	☐ 94-24	☐ 02-06	☐ 03-45	☐ 05-39	☒ 07-53
Preamplifier	☐ 05-56	☐ 05-87	☒ 14-27			
Antenna (horn)	☐ 90-24	☒ 22-07				
Cables	☒ 11-30	☒ 06-00C				
Software and Revision	☒ Vitam, Rev. 2.4.13	☐ RadiMation 2020.1.8				

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Measurement Type : Radiated Field
Polarisation : Vertical
Table Angle : 0 - 360°
Antenna Height : 1 - 4m (tilted)



Equipment Under Test : Electronic Tap IWT-07-A ELR
Set-Up : Chamber SAC3, see photos
Operating Conditions : RX (f = 2.440 GHz)
Remarks : Powered with 120 V / 60 Hz



Zone	1 GHz - 7 GHz	7 GHz - 13 GHz
Video Bandwidth	3 MHz	3 MHz
Resol Bandwidth	1 MHz	1 MHz

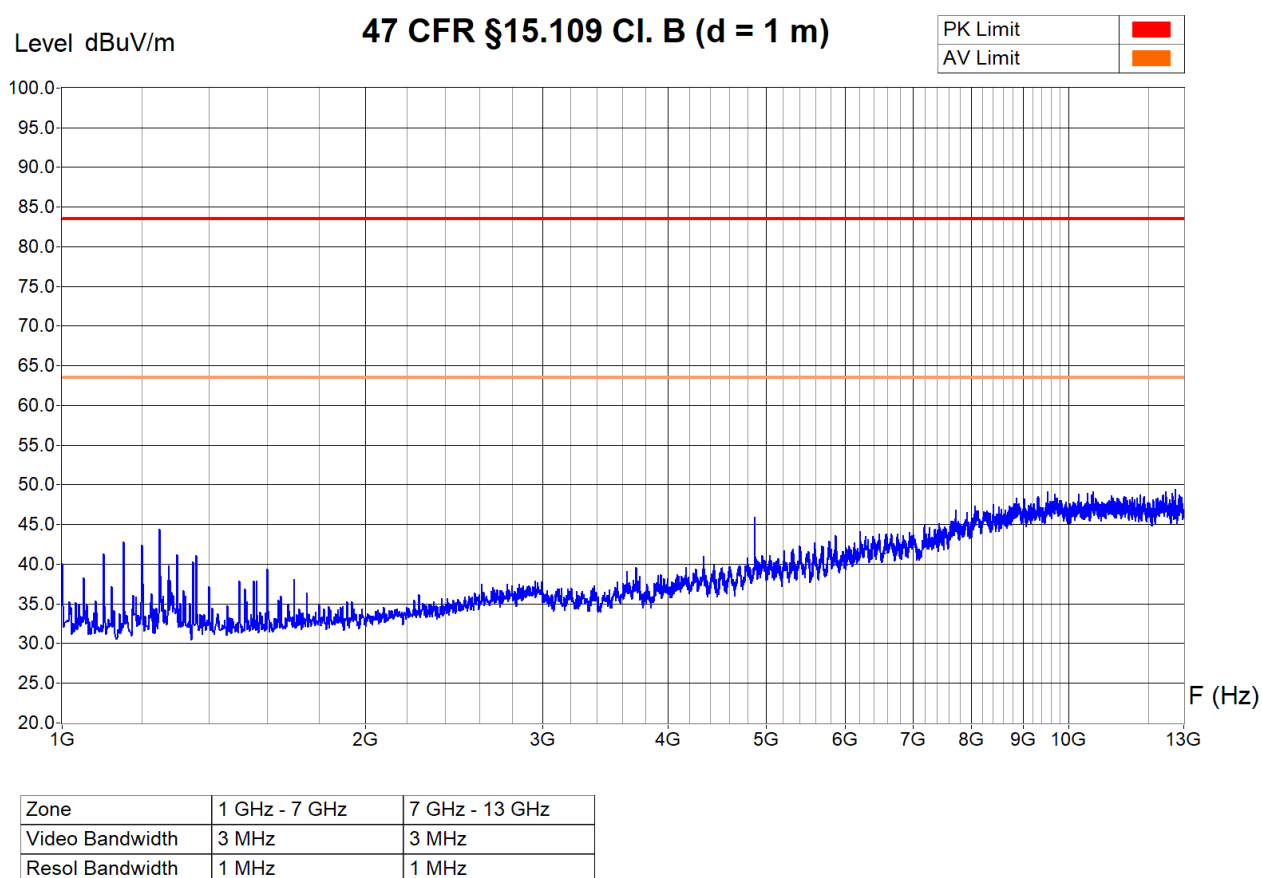
Sample calculation with all conversion and correction factors used						
Frequency [GHz]	Analyzer Peak value [dBuV]	Cable att. corr. [dB]	Preamp. gain corr. [dB]	Antenna factor corr. [dB]	Attenuator corr. [dB]	Peak field [dBuV/m]
4.880	51.3	+1.0	-39.4	+32.6	0.0	= 45.5

Operator: B. Itzcovich
Date/Time: 2022-09-26 15:32
Filename:
27_RE_1-13G_RX_V.png/.txt

Measurement Type : Radiated Field
Polarisation : Horizontal
Table Angle : 0 - 360°
Antenna Height : 1 - 4m (tilted)



Equipment Under Test : Electronic Tap IWT-07-A ELR
Set-Up : Chamber SAC3, see photos
Operating Conditions : RX (f = 2.440 GHz)
Remarks : Powered with 120 V / 60 Hz



Operator: B. Itzcovich
Date/Time: 2022-09-26 15:50
Filename:
28_RE_1-13G_RX_H.png/.txt

7.10 Conducted emission – Interference voltage

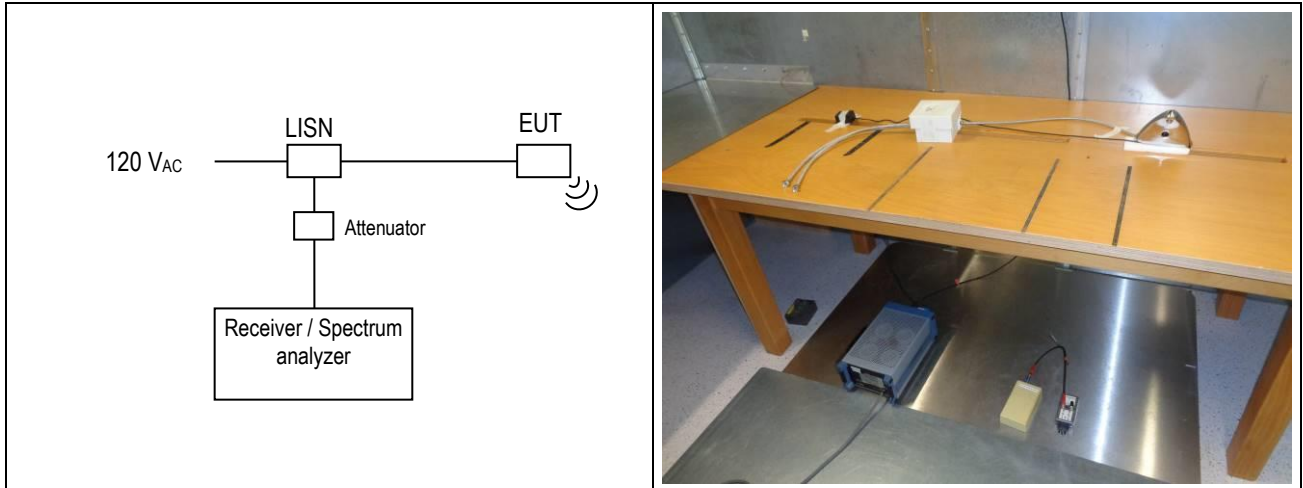
Test site: ☐ semi-anechoic chamber (SAC3) ☒ shielded room
☐ Semi-anechoic chamber (Sac10) ☐ laboratory

Meas. Uncertainty: ± 3.6 dB

Measuring method: The conducted disturbance is measured using a spectrum analyzer and a line impedance substitution network (LISN). The measurement of the voltage against the earth is carried out successively. The peak values are recorded continuously on the graph. The values that exceed the limit are re-measured with a measuring receiver.

Modifications: ☒ None ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Test set-up:



Remarks: - - -

Test equipment:

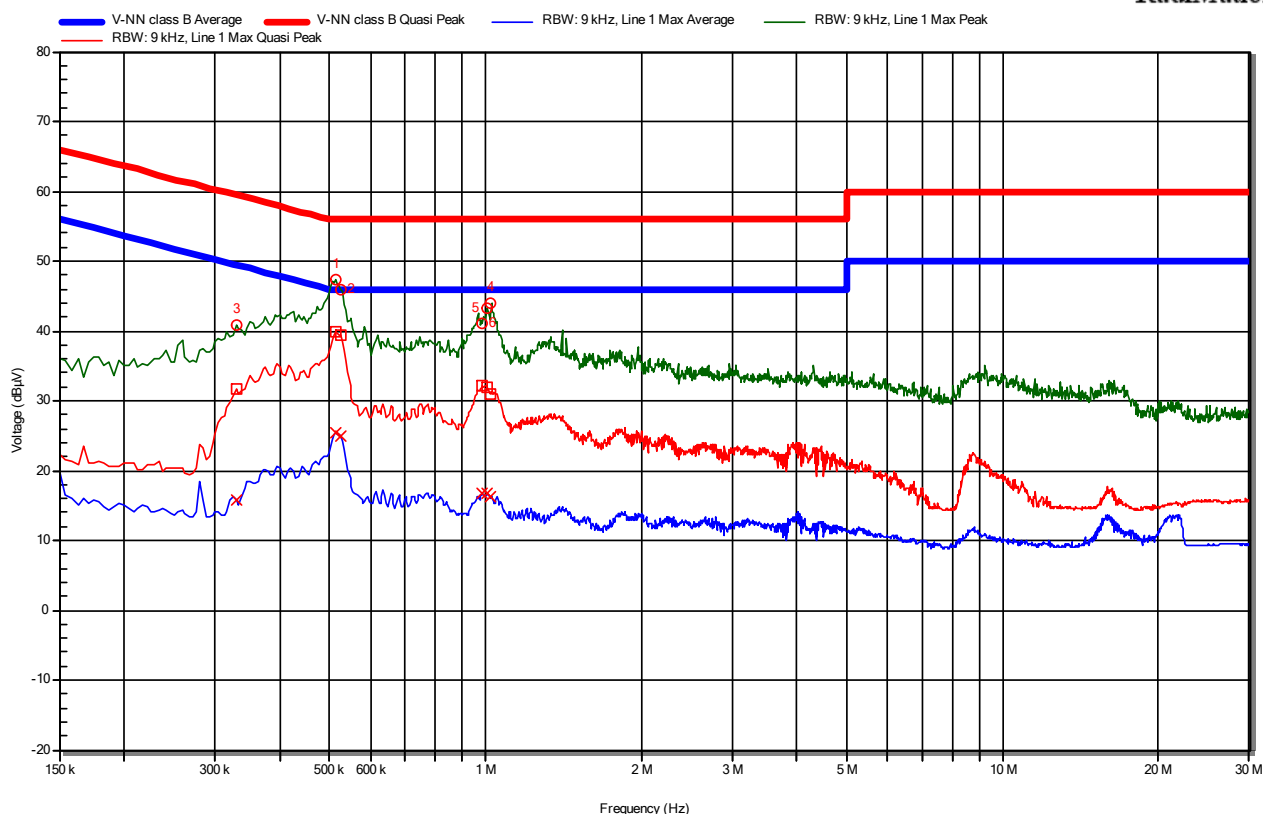
Spectrum analyzer	☐ 21-07	☒ 19-09	☐ 02-06	☐ 03-45	☐ 05-39	☐ 10-70
Receiver	☐ 21-07	☐ 90-11	☐ 10-70	☐ 04-28	☐ 06-29	
LISN	☒ 10540	☐ 90-08	☐ 94-36	☐ 94-40	☐ 95-12	☐ 00-43
Protection 10 dB	☒ 20-05B	☐ 95-35	☐ 95-30	☐ 96-38	☐ included in LISN	
Protection 20 dB	☐ 91-46	☐ 95-33	☐ 95-38	☐ included in LISN		
Cable set	☐ SAC3_CE_1.0/2.0/3.0		☐ 06-00C	☒ FAR_CE_1.0/2.0		
Software and Revision	☐ Vitam, Rev. 2.4.13		☒ RadiMation 2020.1.8			
Power supply	☒ 11-50					

Result: ☒ pass ☐ fail ☐ not applicable ☐ not tested

Measurement	CE 150 kHz to 30 MHz	Test ID	#10	Date and time	2022-09-29 12:59:10	Operator	B. Itzcovich
EUT	Electronic Tap IWT-07-A ELR			Order	20CH-01574OR10	Verdict	Pass
Notes	Operating mode: Switching valve every 3 second through wireless control from Smartphone (BLE) Measurement on: Mains 120 V / 60 Hz Modifications: None Remarks: Wireless communication active, TX and RX (BLE paired with Smartphone)						
Test Place	ROS-SAC5		Software	Radimation 2020.1.8 (CE 150k-30M Std Class B V-AMN TDEMIX)			
Equipment	Device Type Cable antenna -> preamp Cable preamp -> analyser Spectrum analyser LISN	ID 20-05B FAR_CE 19-09 10540	Settings	Band(s): 150 kHz - 30 MHz, Reference Level: 90 dBµV RBW: 9 kHz, VBW: Auto [120 kHz], Sweep time: Auto [120 ms], Number of Sweeps: 1 Step freq: Linear: 4.5 kHz steps, Attenuator: 10 dB, Internal preamp: 0 dB, Measure time: 20 s Final Measurement/Observation Time: PK 1 s / 5 s, QP 0 s / 0 s, AVG 0 s / 0 s			

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Detected peaks

Nr	Frequency	Peak	Quasi-Peak	Quasi-Peak Difference	Average	Average Difference	Status
3	329.391 kHz	40.8 dBµV	31.6 dBµV	-27.86 dB	15.7 dBµV	-33.72 dB	Pass
1	512.953 kHz	47.4 dBµV	39.9 dBµV	-16.06 dB	25.4 dBµV	-20.61 dB	Pass
2	525.469 kHz	45.9 dBµV	39.5 dBµV	-16.53 dB	24.9 dBµV	-21.09 dB	Pass
6	988.547 kHz	41.2 dBµV	32.2 dBµV	-23.76 dB	16.7 dBµV	-29.33 dB	Pass
5	1.009 MHz	43.2 dBµV	31.9 dBµV	-24.06 dB	16.9 dBµV	-29.15 dB	Pass
4	1.026 MHz	43.9 dBµV	31.1 dBµV	-24.93 dB	16.2 dBµV	-29.76 dB	Pass

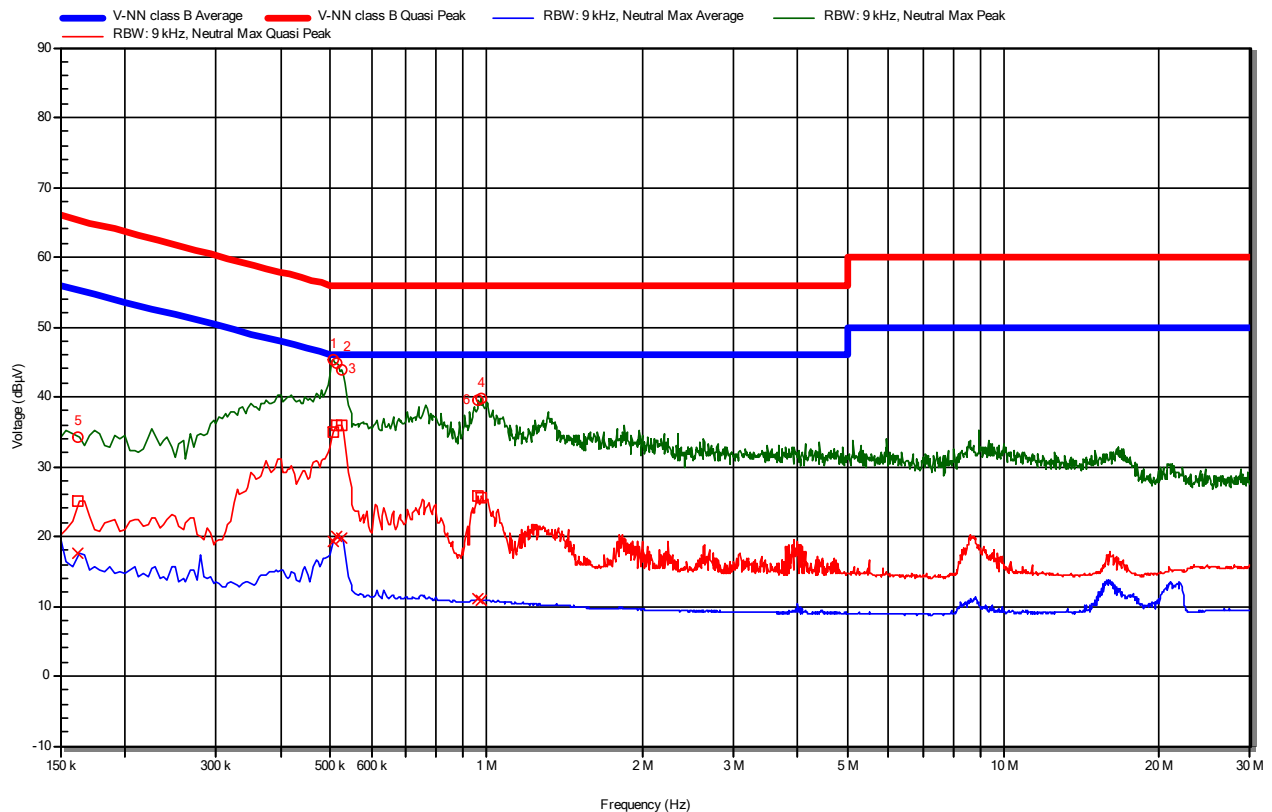
Sample calculation with all conversion and correction factors used

Frequency [MHz]	Receiver QP value [dBµV]	Cable att. corr. [dB]	Attenuator corr. [dB]	QP voltage [dBµV]
1.009 MHz	21.9	+0.0	+ 10.0	= 31.9

Measurement	CE 150 kHz to 30 MHz	Test ID	#11	Date and time	2022-09-29 13:01:28	Operator	B. Itzcovich
EUT	Electronic Tap IWT-07-A ELR			Order	20CH-01574OR10	Verdict	Pass
Notes	Operating mode: Switching valve every 3 second through wireless control from Smartphone (BLE) Measurement on: Mains 120 V / 60 Hz Modifications: None Remarks: Wireless communication active, TX and RX (BLE paired with Smartphone)						
Test Place	ROS-SAC5		Software	Radimation 2020.1.8 (CE 150k-30M Std Class B V-AMN TDEMIX)			
Equipment	Device Type Cable antenna -> preamp Cable preamp -> analyser Spectrum analyser LISN	ID 20-05B FAR_CE 19-09 10540	Settings	Band(s): 150 kHz - 30 MHz, Reference Level: 90 dBµV RBW: 9 kHz, VBW: Auto [120 kHz], Sweeptime: Auto [120 ms], Number of Sweeps: 1 Step freq: Linear: 4.5 kHz steps, Attenuator: 10 dB, Internal preamp: 0 dB, Measure time: 20 s Final Measurement/Observation Time: PK 1 s / 5 s, QP 0 s / 0 s, AVG 0 s / 0 s			

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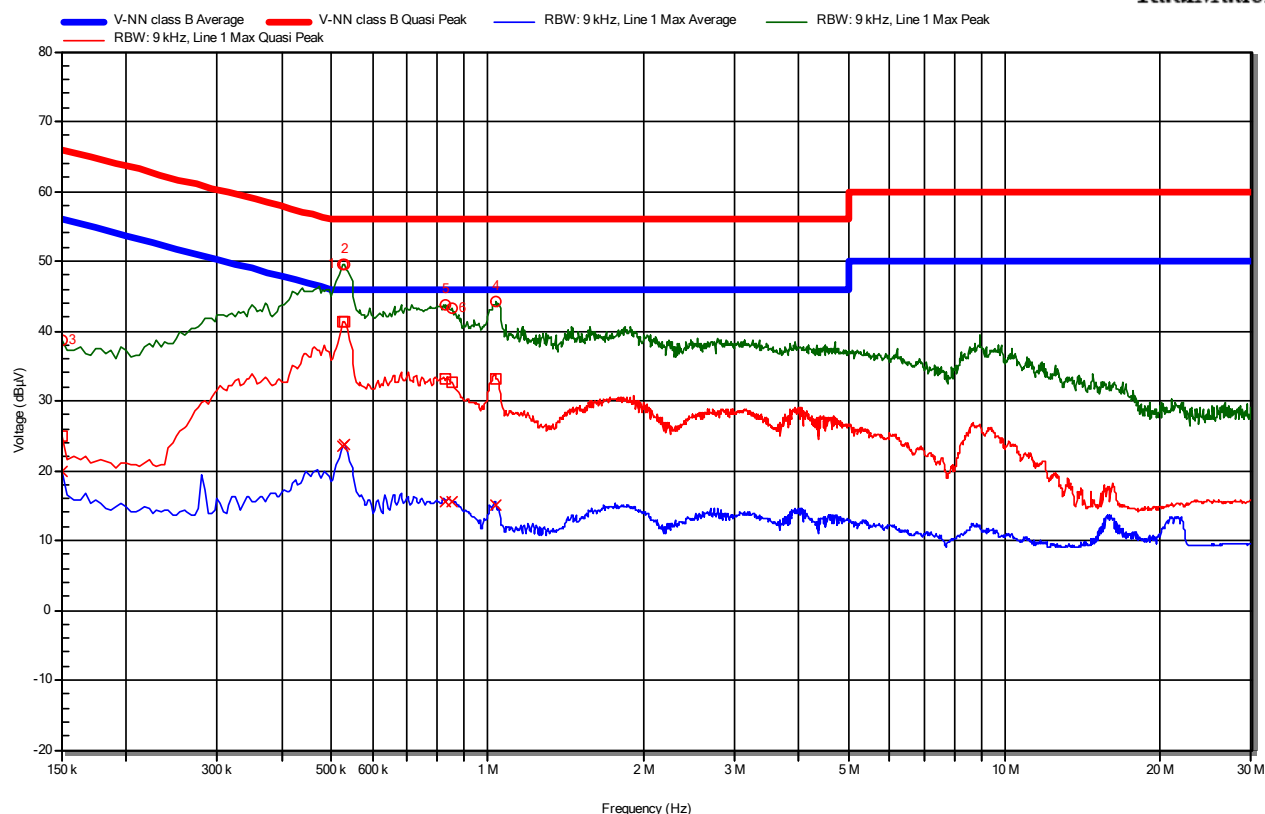
Detected peaks

Nr	Frequency	Peak	Quasi-Peak	Quasi-Peak Difference	Average	Average Difference	Status
5	162.516 kHz	34.3 dBµV	25 dBµV	-40.31 dB	17.6 dBµV	-37.74 dB	Pass
1	504.609 kHz	45.4 dBµV	34.9 dBµV	-21.13 dB	19.4 dBµV	-26.63 dB	Pass
2	512.953 kHz	44.9 dBµV	35.9 dBµV	-20.09 dB	19.9 dBµV	-26.06 dB	Pass
3	525.469 kHz	43.9 dBµV	35.8 dBµV	-20.21 dB	19.9 dBµV	-26.15 dB	Pass
6	963.516 kHz	39.4 dBµV	25.7 dBµV	-30.34 dB	11 dBµV	-35.01 dB	Pass
4	976.031 kHz	39.8 dBµV	25.5 dBµV	-30.54 dB	10.9 dBµV	-35.11 dB	Pass

Measurement	CE 150 kHz to 30 MHz	Test ID	#12	Date and time	2022-09-29 13:09:11	Operator	B. Itzcovich
EUT	Electronic Tap IWT-07-A ELR	Order	20CH-01574OR10	Verdict	Pass		
Notes	Operating mode: Switching valve every 3 second through wireless control from Smartphone (BLE) Measurement on: Mains 230 V / 50 Hz Modifications: None Remarks: Wireless communication active, TX and RX (BLE paired with Smartphone)						
Test Place	ROS-SAC5	Software	Radimation 2020.1.8 (CE 150k-30M Std Class B V-AMN TDEMIX)				
Equipment	Device Type ID Cable antenna -> preamp 20-05B Cable preamp -> analyser FAR_CE Spectrum analyser 19-09 LISN 10540	Settings	Band(s): 150 kHz - 30 MHz, Reference Level: 90 dBµV RBW: 9 kHz, VBW: Auto [120 kHz], Sweep time: Auto [120 ms], Number of Sweeps: 1 Step freq: Linear: 4.5 kHz steps, Attenuator: 10 dB, Internal preamp: 0 dB, Measure time: 20 s Final Measurement/Observation Time: PK 1 s / 5 s, QP 0 s / 0 s, AVG 0 s / 0 s				

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RadiMation



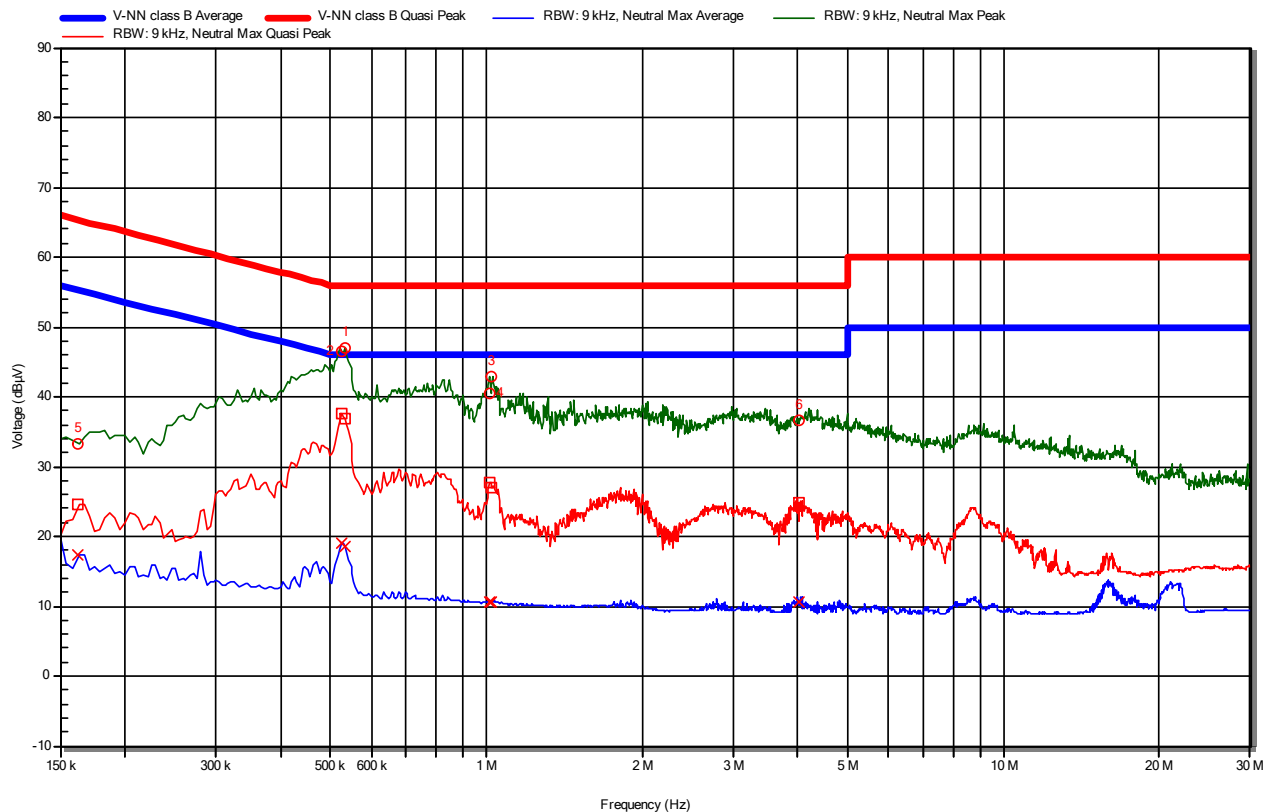
Detected peaks

Nr	Frequency	Peak	Quasi-Peak	Quasi-Peak Difference	Average	Average Difference	Status
3	150 kHz	38.7 dBµV	24.9 dBµV	-41.08 dB	19.9 dBµV	-36.11 dB	Pass
1	525.469 kHz	49.4 dBµV	41.3 dBµV	-14.75 dB	23.4 dBµV	-22.57 dB	Pass
2	529.641 kHz	49.6 dBµV	41.3 dBµV	-14.69 dB	23.7 dBµV	-22.31 dB	Pass
5	830.016 kHz	43.7 dBµV	33.2 dBµV	-22.75 dB	15.6 dBµV	-30.42 dB	Pass
6	855.047 kHz	43.3 dBµV	32.6 dBµV	-23.36 dB	15.5 dBµV	-30.48 dB	Pass
4	1.039 MHz	44.2 dBµV	33.1 dBµV	-22.86 dB	15 dBµV	-31.01 dB	Pass

Measurement	CE 150 kHz to 30 MHz	Test ID	#13	Date and time	2022-09-29 13:11:24	Operator	B. Itzcovich
EUT	Electronic Tap IWT-07-A ELR			Order	20CH-01574OR10	Verdict	Pass
Notes	Operating mode: Switching valve every 3 second through wireless control from Smartphone (BLE) Measurement on: Mains 230 V / 50 Hz Modifications: None Remarks: Wireless communication active, TX and RX (BLE paired with Smartphone)						
Test Place	ROS-SAC5		Software	Radimation 2020.1.8 (CE 150k-30M Std Class B V-AMN TDEMIX)			
Equipment	Device Type Cable antenna -> preamp Cable preamp -> analyser Spectrum analyser LISN	ID 20-05B FAR_CE 19-09 10540	Settings	Band(s): 150 kHz - 30 MHz, Reference Level: 90 dBµV RBW: 9 kHz, VBW: Auto [120 kHz], Sweep time: Auto [120 ms], Number of Sweeps: 1 Step freq: Linear: 4.5 kHz steps, Attenuator: 10 dB, Internal preamp: 0 dB, Measure time: 20 s Final Measurement/Observation Time: PK 1 s / 5 s, QP 0 s / 0 s, AVG 0 s / 0 s			

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RadiMation



Detected peaks

Nr	Frequency	Peak	Quasi-Peak	Quasi-Peak Difference	Average	Average Difference	Status
5	162.516 kHz	33.2 dBµV	24.6 dBµV	-40.76 dB	17.4 dBµV	-37.96 dB	Pass
2	525.469 kHz	46.6 dBµV	37.6 dBµV	-18.42 dB	19.1 dBµV	-26.92 dB	Pass
1	533.813 kHz	47.1 dBµV	36.9 dBµV	-19.08 dB	18.4 dBµV	-27.56 dB	Pass
4	1.018 MHz	40.5 dBµV	27.7 dBµV	-28.32 dB	10.7 dBµV	-35.3 dB	Pass
3	1.026 MHz	42.8 dBµV	27 dBµV	-28.96 dB	10.7 dBµV	-35.35 dB	Pass
6	4.034 MHz	36.7 dBµV	24.9 dBµV	-31.14 dB	10.5 dBµV	-35.48 dB	Pass

7.11 Designation of emission

Standard: United States: 47 CFR "Code of Federal Regulations" – Telecommunication
☒ FCC Part 2, Subpart C: Emission: §2.201 and §2.202

Introduction: A system of designating emission, modulation and transmission characteristics shall be employed.

(a) Emissions are designated according to their classification and their necessary bandwidth.

(b) A minimum of three symbols are used to describe the basic characteristics of radio waves.

(c) Four symbols are used to describe the necessary bandwidth.

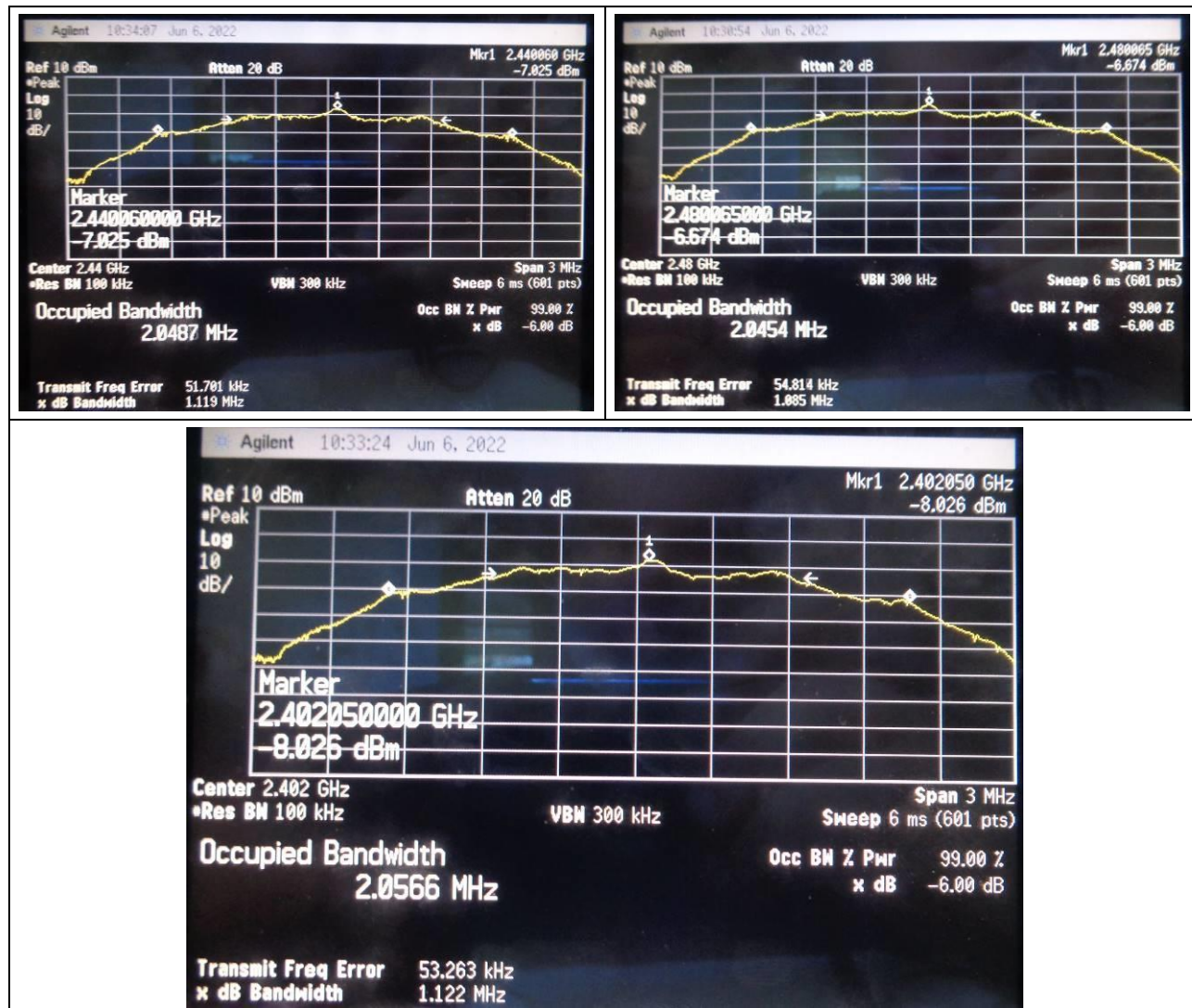
Modifications: ☒ None ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Necessary bandwidth: For a given class of emission, the minimum value of the occupied bandwidth sufficient to ensure the transmission of information at the rate and with the quality required for the system employed, under specified conditions.

$B_n = 2.057$ MHz (occupied bandwidth)

Basic characteristics: FXD F : frequency modulation
 X : Cases not otherwise covered
 D : data transmission

Designation of emission: 2M06FXD



Place and date of test:
 Operator:

Rossens, 2022-06-06
 B. Itzcovich

8. Appendix

8.1 Test equipment

Inventory No.	Designation	Manufacturer	Type	Cal. date	Next calibr.	Cal. period [year]
90-25	Active loop antenna	Chase	HLA6120	2021-02-15	2023-02-15	2
05-38	Bi-Log antenna	Chase	CBL6111C	2018-11-01	2022-11-01	4
22-07	Horn antenna	Schwarzbeck	BBHA 9120 D	2022-02-09	2024-02-09	2
98-12	Horn Antenna + Preamp + Mixer	Emco + Miteq + Hewlett Packard	3160-09 + JDM2W-18002650- 27-10P-R + 11970K	2021-02-12	2023-02-12	3
00-52	Dipole antenna	Schwarzbeck	UHA 9125 D	2022-08-12	2025-08-12	3
10540	LISN	Rohde & Schwarz	ESH3-Z5	2021-05-19	2023-05-19	2
12-06	HP Filter	BSC	SH 6472	2022-05-18	2024-05-18	2
13-14	BR Filter	A-INFOMW	Cavity Band Reject Filter	2022-05-18	2024-05-18	2
20-05B	Attenuator 10 dB	Huber+Suhner	6920.01.A	2020-09-17	2023-09-17	2
14-27	Preamplifier	Montena EMC	AFS42-00101800-25-S-42	2021-05-28	2023-05-28	2
13-16	Signal Generator	AnaPico AG	APSIN20G-HC	2022-05-20	2023-05-20	1
SAC3_RE_1.0/2.0/3.0	Cable set	Huber&Suhner	SF104A	2021-10-14	2023-04-14	2.5
FAR_CE_1.0/2.0	Cable set	Huber&Suhner	RG 58 C/U	2021-10-14	2023-04-14	2.5
06-00C	Cable	Huber&Suhner	SF106PA	2020-09-25	2022-09-25	2
11-30	Cable	Huber&Suhner	ST18A	2021-10-13	2023-10-13	2
10-51	Cable	Huber&Suhner	SF104	2021-10-14	2024-10-14	3
10-81	Cable	Huber&Suhner	SF104P	2020-09-25	2023-09-25	3
11-62	Cable	Huber&Suhner	SF104P	2020-09-25	2023-09-25	3
07-53	Spectr. Analyzer	Hewlett Packard	E4407B	2022-07-27	2024-07-27	2
02-06	Spectr. Analyzer	Hewlett Packard	E4407B	2019-01-22	2023-01-22	4
16-03	Receiver + Spectr. Analyzer	Rohde&Schwarz	ESR7 1316.3003K07	2022-01-17	2023-01-17	1
21-07	Receiver + Spectr. Analyzer	Rohde & Schwarz	ESW26 1328.4100K26	2021-05-10	2023-05-10	2
19-09	Time Domain analyzer	Gauss	TDEMI X	2022-01-07	2023-01-07	2
09-04	Power sensor	Agilent	E9304A H19	2022-05-23	2023-05-23	1
05-73	Wattmeter	HP	E4418B	2022-05-19	2023-05-19	1
09-06	Multimeter	Fluke	87 V	2022-03-03	2024-03-03	2
06-62	Power supply	Elektro-Automatik	EA-PS 2016-050	NO CAL	NO CAL	-
11-50	Power supply	Chroma	61511	2022-02-08	2023-08-08	2

Remark: The test equipment for which no calibration date is defined, is controlled during the test by another calibrated equipment.
E.g. the output of a power supply with variable transformer is verified by a calibrated multimeter.