

Secondo i seguenti Standard / According to following Standards

Emilab Srl – Amaro (UD) - Italy

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1. Informazioni Generali / *General Information*

1.0 Laboratorio / *Testing Laboratory*

Luogo di Prova e partecipanti/ <i>Testing location and participants:</i>	
Testing Laboratory:	
Testing location/ address.....:	Emilab Srl Via F.lli Solari 5/A – 33020 Amaro (UD) – Italy Tel +39 0433 468625 Fax +39 0433 494739 Email: info@emilab.it
Partecipanti / <i>Participants:</i>	Loris Fruch, Pierluigi Pollano (Eurotech Spa), Pierluigi Driussi (Eurotech Spa)

1.1 Campionamento e Documentazione / *Sampling and Documentation*

I campioni sono stati consegnati dal Cliente. I risultati dei test contenuti in questo documento si riferiscono esclusivamente al modello e numero di serie provato. E' responsabilità del costruttore assicurare che la produzione dei modelli in serie rispetti i requisiti del presente documento. Questo documento non può essere riprodotto in parte senza il consenso scritto del responsabile del laboratorio EMILAB.

EMILAB non si assume nessuna responsabilità per danni derivanti da interpretazioni che esulano dal contesto e dall'applicazione del presente documento.

The samples was delivered by customer. The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report. This report shall not be reproduced, except in full, without the written approval of the Issuing testing Emilab laboratory.

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1.2 Specifiche del test / *Test specifications*

Test performed according to:	
Test plan	TP-13LA00163/01_140108_REGATE-10-10-03 Date: 08/01/2014 Author: Pierluigi Pollano - Eurotech S.p.A.
Test specification	FCC KDB 558074: Guidance for performing compliance measurements on digital transmission systems operating under 15.247 Apr- 2013 ANSI C63.10-2009 - American National Standard for Testing Unlicensed Wireless Devices ANSI C63.4: 2009-09 American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
Basic Specifications	/

1.3 Svolgimento dei test e condizioni generali / *Test scheduling and general condition*

Svolgimento dei test / <i>Scheduling</i>	
Data ricezione EUT	
<i>Date of receipt of EUT</i>	09/01/2014
Data esecuzione test	
<i>Date (s) of performance of tests.....</i>	13/01/2014 – 08/05/2014
Condizioni ambientali / <i>Environment Conditions</i>	Se non diversamente specificato / <i>If not otherwise specified:</i> Temperature: 18-28°C Humidity: 20-90% Pressure: 87-108.56 kPa
Intervallo delle tarature/ <i>Calibration Interval</i>	Minimum 1 year

1.4 Espressione dei risultati finali / *Test case of final verdicts*

I GIUDIZI NON SONO SOGGETTI AD ACCREDITAMENTO / <i>VERDICTS ARE NOT SUBJECT TO ACCREDITATION</i>	
- test case does not apply to the test object.. :	N/A
- test object does meet the requirement	Compliant
- test object does not meet the requirement . :	Not Compliant

1.5 Incertezza / *Uncertainty*

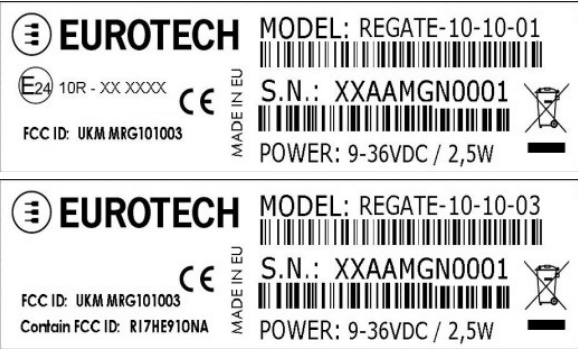
L'incertezza estesa riportata è espressa come l'incertezza tipo moltiplicata per il fattore di copertura $k = 2$, che per una distribuzione normale corrisponde ad una probabilità di copertura di circa il 95 %.	
<i>The reported expanded uncertainty of measurements is stated as the standard uncertainty of measurement, multiplied by the coverage factor $k=2$, which for a normal distribution corresponding to a coverage probability of approximately 95%.</i>	

1.6 Termini, Definizioni e Acronimi/ *Terms, definitions and abbreviations*

With reference to IEC 60050-161

ALSE	absorber-lined shielded enclosure
AV	Average Detector
DTS	Digital Transmission System
DUT	Device Under Test
EMC	electromagnetic compatibility
EMI	electromagnetic interference
EUT	Equipment Under test
OM	Operating Modes
OBW	Occupied Bandwidth
PK	Peak Detector
PSD	Power Spectral Density
QP	Quasi-Peak Detector

2. Apparecchiatura sottoposta a test/ *Device Under Test*

Descrizione / <i>Description</i>:	The REGATE 10-10-XX is a compact size gateway designed to support M2M (Machine to Machine) communication. All antennas are integrated within the module (models where XX=01,03).
Marchio commercial / <i>Trade Mark</i>:	
Produttore / <i>Manufacturer</i>:	Eurotech Spa
Modello / <i>Model/Type reference</i>:	REGATE-10-10-03, REGATE-10-10-01
Voltage/Current.....:	9-36Vdc (nominal 24Vdc) / 0.1A
Frequency.....:	/
Power.....:	2.5W
Numero EUT / <i>EUT Number</i>:	-13LA00163/01 (full option model with integral antennas REGATE 10-10-03), used for radiated emission measurements, conducted emission measurements at power port and for RF exposure evaluation; -13LA00163/02 (same model REGATE10-10-03 as above, where WLAN antenna is replaced by temporary RF 50ohm coaxial connector), used for conducted radio measurem. at the WLAN port; -13LA00163/03 (model REGATE 10-10-01: same model REGATE10-10-03 as above but without GSM module and GSM integral antenna), used for radiated emission measurements and conducted emission measurements at power port.
Serial Number.....:	/
Numero di campioni testati / <i>Number of samples tested</i>:	1+1+1
Hardware stage/level.....:	S01
Software stage/level.....:	1.1
Operating Mode.....:	Mode 1: the DUT executes the test routine through SSH connection with control PC (placed outside the SAC) and the Ethernet Switch (Access Point). WLAN link was set using the Access Point Intellinet 524704. GSM1800 link was active also, where applicable. During all tests the DUT WLAN transmitter, which does not support the 40 MHz channel mode, was set at its maximum Tx-power (20dBm), as per software setting.
Wiring harness.....:	2mt power supply line, 2mt Ethernet line, 3.5mt Digital I/O, CAN and RS232 lines;
Monitoring.....:	/

Info:

Product family description:

The REGATE 10-10-XX product family is available in 2 different optional versions, here submitted to the verification of compliancy to the FCC regulation, where XX= 01 or 03; more details can be found in the operation manual. Both models are equipped with integral antennas only.

Tested models:

- 1) **REGATE 10-10-03**, which is the full optional model, with integral WLAN and GSM antennas: tested for radiated emissions and conducted emission at power port. This model was also used for RF exposure eval. of end user
- 2) modified sample of the same model **REGATE 10-10-03**, where the integral WLAN antenna was replaced with a 50 ohm temporary connector (sample was prepared by the applicant): tested for WLAN RF port radio conducted RF measurements
- 3) **REGATE 10-10-01** (obtained from above model **REGATE 10-10-03** removing the GSM radio module and the respective antenna); tested for radiated emissions and conducted emission at power port.

All models, which do not support the 40MHz channel mode, during tests were operated at the maximum WLAN TX power (20 dBm), as per software setting.

The test results collected in this report are confirmed in all the voltage range of EUT power supply (9÷36V dc).

The “AC Power Line Conducted Emissions, Section 15.207” and “Spurious Radiated Emissions and Restricted Bands of Operation, Section 15.209 and 15.205” tests were executed on EUT n° 13LA00163/01 and 13LA00163/03 , the other tests (conducted at RF WLAN port) were performed on EUT n° 13LA00163/02;

DUT Hardware features

Processor: ARM Cortex A8 Memory SDRAM: 512MB DDR3* Memory FLASH: 512 MB* SD interface: 1 x MicroSD receptacle Real Time Clock: Real-Time Date

Interfaces:

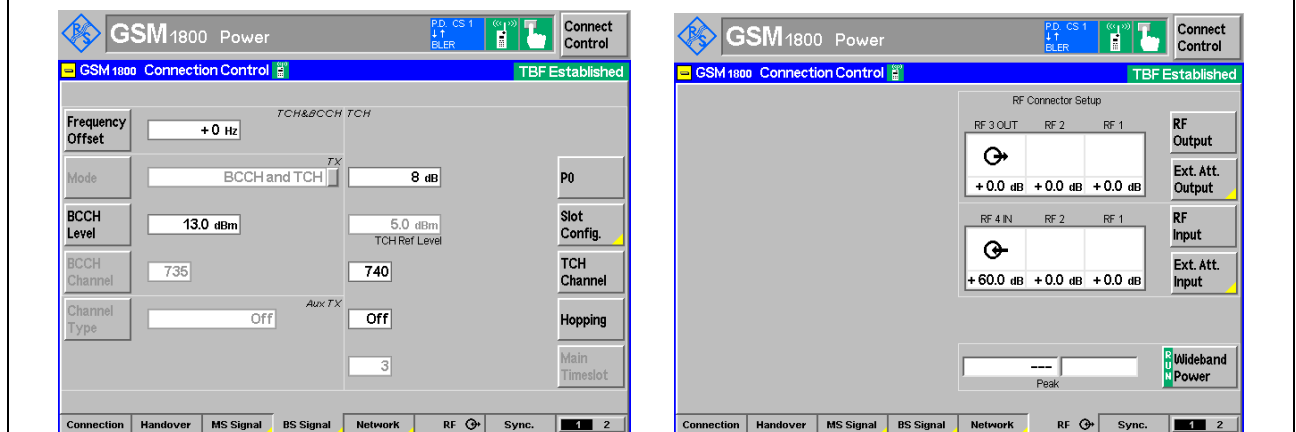
- 2 x Ethernet 10/100, RJ45 connectors
- 2 x CAN BUS, DB9, Supports CAN Version 2 Parts A and B
- 2 x USB 2.0
- 1 x RS 232 (Rx, Tx, Cts, Rts) ; 2 x RS232/RS485 (RX-TX)
- Digital I/O

Communications:

- Modul GPRS, optional 3G HSPA
- Wi-Fi (802.11 b/g/n)

GSM Radio Base Station simulator settings:

During “AC Power Line Conducted Emissions, Section 15.207” and “Spurious Radiated Emissions and Restricted Bands of Operation, Section 15.209 and 15.205” tests, the GSM link was activated (channel 735) using the RBS simulator R&S CMU 200 with the following settings:



3.0 Maximum Peak Conducted Output Power - Condizioni di prova / Test Conditions

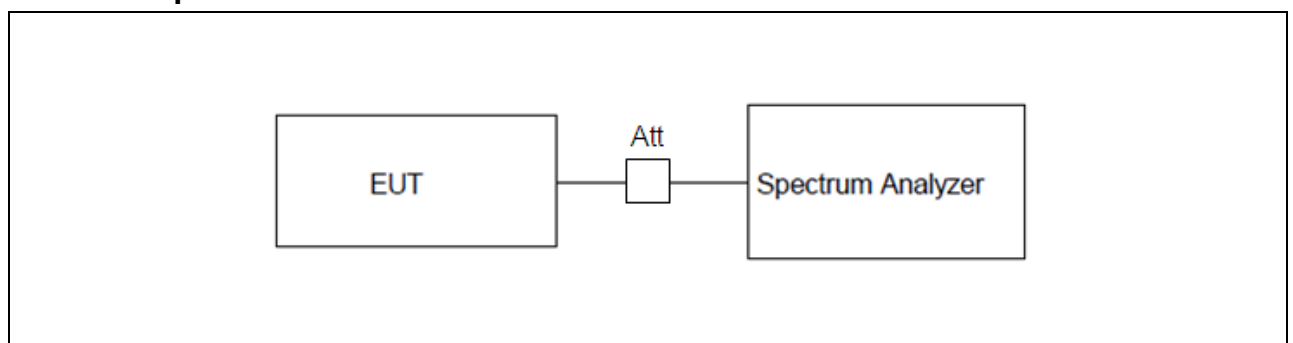
Technician / Tecnico: Loris Fruch		
Table No.	TEST: Maximum Peak Conducted Output Power , Section 15.247 (b) (3)	\
Method	FCC KDB 558074 sect. 9.1.2	\
Parameters required prior to the test	Laboratory Ambient Temperature	18 to 28 °C
	Relative Humidity	20 to 90 %
Parameters recorded during the test	Laboratory Ambient Temperature	20 °C
	Relative Humidity	59 %
Supplementary information:		
- Conducted Test, executed at WLAN temporary antenna output (50ohm, SMA) connected to the Spectrum Analyser through an attenuator (10 dB). - DUT powered at 24Vdc; - Spectrum analyser settings setup according to FCC KDB 558074 sect. 9.1.2 (integrated band power method) Detector: Peak, Trace: max hold (over last 30 sweeps), RBW: 1MHz, VBW=3MHz, instrument mode: 'channel power'. - Test executed with the following WLAN settings: • protocol "b" on channel 1, 6 and 11 with data rate at 1 and 11Mbps • protocol "g" on channel 1, 6 and 11 with data rate at 6, 24 and 54Mbps • protocol "n" on channel 1, 6 and 11 with data rate at 6.5, 39 and 65Mbps		

3.1 Apparecchiature utilizzate / Test Equipment Used – Maximum Peak Conducted Output Power

<i>Apparecchiature usate/Equipment Used</i>	<i>Modello/Model</i>	<i>Costruttore/Manufacturer</i>	<i>Numero di serie/Serial Number</i>
EMI Receiver MXE	N9038A	Agilent Technologies	MY51210230
10dB Attenuator	SA4014	CPE Italia Spa (CPE)	03VCV-5093
Access Point (*)	524704	Intellinet	GAP215N16C1800539

(*) auxiliary equipment

3.2 Fotografie del setup / Photo of the test setup – Maximum Peak Conducted Output Power



3.3 Risultati / Results - Maximum Peak Conducted Output Power

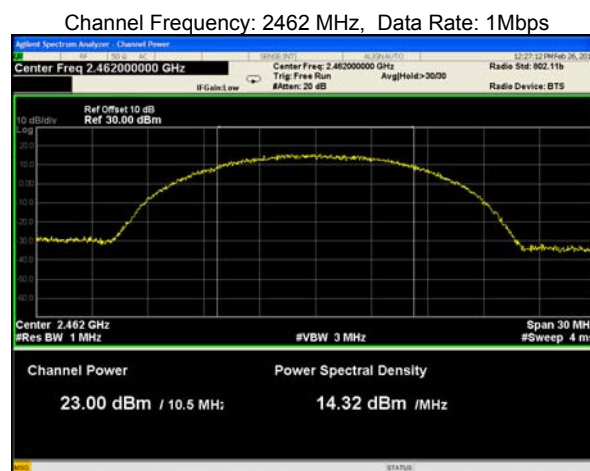
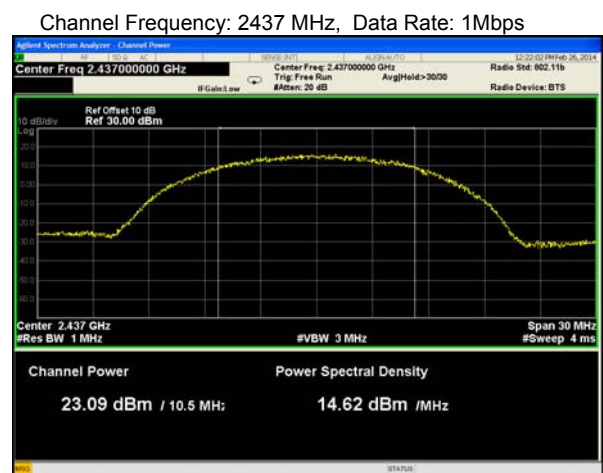
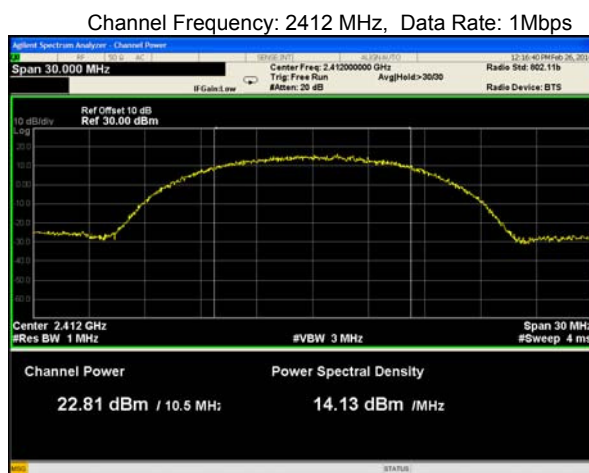
The result of the test is: **PASS**. See the details in the charts/tables of the following paragraphs.

3.3.1 Tabelle e grafici dei risultati / Tables and graphical representation of data – Maximum Peak Conducted Output Power

Note: all the traces reported in this section have been obtained with Peak detector, max hold (over last 30 sweeps), RBW=1MHz.

802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	Total Power (dBm)	Limit (dBm)	Margin (dB)
b	1	2412,0	22,8	30,0	7,2
		2437,0	23,1	30,0	6,9
		2462,0	23,0	30,0	7,0
	11	2412,0	22,8	30,0	7,2
		2437,0	23,1	30,0	6,9
		2462,0	23,2	30,0	6,9

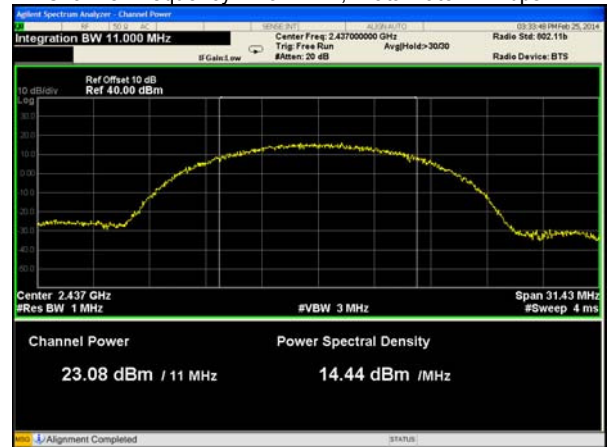
See traces below:



Channel Frequency: 2412 MHz, Data Rate: 11Mbps



Channel Frequency: 2437 MHz, Data Rate: 11Mbps



Channel Frequency: 2462 MHz, Data Rate: 11Mbps



802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	Total Power (dBm)	Limit (dBm)	Margin (dB)
g	6	2412,0	22,9	30,0	7,1
		2437,0	23,1	30,0	6,9
		2462,0	22,8	30,0	7,2
	24	2412,0	22,1	30,0	8,0
		2437,0	22,3	30,0	7,7
		2462,0	22,4	30,0	7,7
	54	2412,0	22,6	30,0	7,4
		2437,0	22,7	30,0	7,3
		2462,0	22,4	30,0	7,7

See traces below:

Channel Frequency: 2412 MHz, Data Rate: 6Mbps



Channel Frequency: 2437 MHz, Data Rate: 6Mbps



Channel Frequency: 2462 MHz, Data Rate: 6Mbps



Channel Frequency: 2412 MHz, Data Rate: 24Mbps



Channel Frequency: 2437 MHz, Data Rate: 24Mbps



Channel Frequency: 2462 MHz, Data Rate: 24Mbps



Channel Frequency: 2412 MHz, Data Rate: 54Mbps



Channel Frequency: 2437 MHz, Data Rate: 54Mbps



Channel Frequency: 2462 MHz, Data Rate: 54Mbps



802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	Total Power (dBm)	Limit (dBm)	Margin (dB)
n	6,5	2412,0	23,3	30,0	6,7
		2437,0	23,9	30,0	6,1
		2462,0	22,8	30,0	7,2
	39	2412,0	23,0	30,0	7,0
		2437,0	23,2	30,0	6,8
		2462,0	22,7	30,0	7,3
	65	2412,0	22,8	30,0	7,2
		2437,0	23,5	30,0	6,5
		2462,0	23,0	30,0	7,0

See traces below:

Channel Frequency: 2412 MHz, Data Rate: 6.5Mbps



Channel Frequency: 2437 MHz, Data Rate: 6.5Mbps



Channel Frequency: 2462 MHz, Data Rate: 6.5Mbps



Channel Frequency: 2412 MHz, Data Rate: 39Mbps



Channel Frequency: 2437 MHz, Data Rate: 39Mbps



Channel Frequency: 2462 MHz, Data Rate: 39Mbps



Channel Frequency: 2412 MHz, Data Rate: 65Mbps



Channel Frequency: 2437 MHz, Data Rate: 65Mbps



Channel Frequency: 2462 MHz, Data Rate: 65Mbps



4.0 Maximum Power Spectral Density- Condizioni di prova / Test Conditions

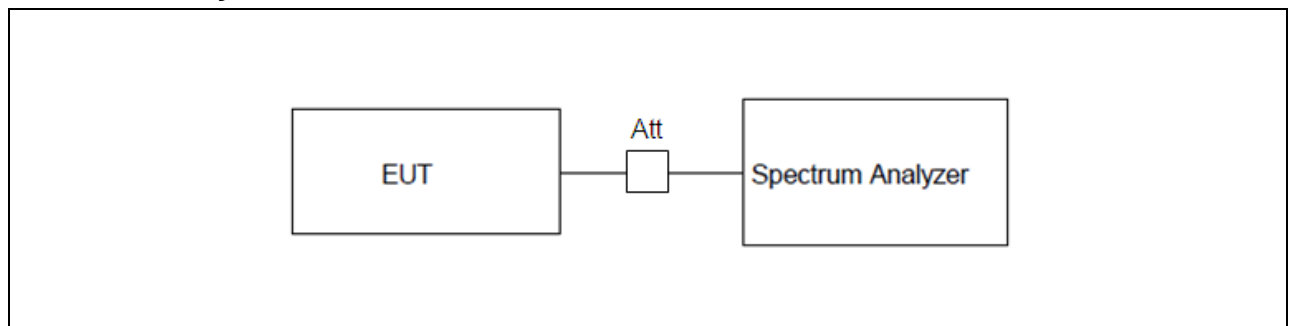
Technician / Tecnico: Loris Fruch		
Table No.	TEST: Maximum Power Spectral Density, Section FCC 15.247(e)	\
Method	FCC KDB 558074 par.10.2 (peak PSD)	\
Parameters required prior to the test	Laboratory Ambient Temperature	18 to 28 °C
	Relative Humidity	20 to 90 %
Parameters recorded during the test	Laboratory Ambient Temperature	21 °C
	Relative Humidity	58 %
Supplementary information: - Conducted Test, executed at WLAN temporary antenna output (50ohm,SMA) connected to the Spectrum Analyser through an attenuator (10 dB). - DUT powered at 24Vdc; - Spectrum analyser settings setup according to FCC KDB 558074 sect. 10.2 (peak PSD) Detector: Peak, Trace: max hold (over last 30 sweeps), RBW: 10 kHz, VBW=30 kHz, Sweep Control: auto couple (SR=stimulus/response). - Test executed with the following Wi-Fi settings: • protocol “b” on channel 1, 6 and 11 with data rate at 1 and 11Mbps • protocol “g” on channel 1, 6 and 11 with data rate at 6, 24 and 54Mbps • protocol “n” on channel 1, 6 and 11 with data rate at 6.5, 39 and 65Mbps		

4.1 Apparecchiature utilizzate / Test Equipment Used – Maximum Power Spectral Density

Apparecchiature usate/Equipment Used	Modello/Model	Costruttore/Manufacturer	Numero di serie/Serial Number
EMI Receiver MXE	N9038A	Agilent Technologies	MY51210230
10dB Attenuator	SA4014	CPE Italia Spa (CPE)	03VCV-5093
Access Point (*)	524704	Intellinet	GAP215N16C1800539

(*) auxiliary equipment

4.2 Fotografie del setup / Photo of the test setup – Maximum Power Spectral Density



4.3 Risultati / Results - Maximum Power Spectral Density

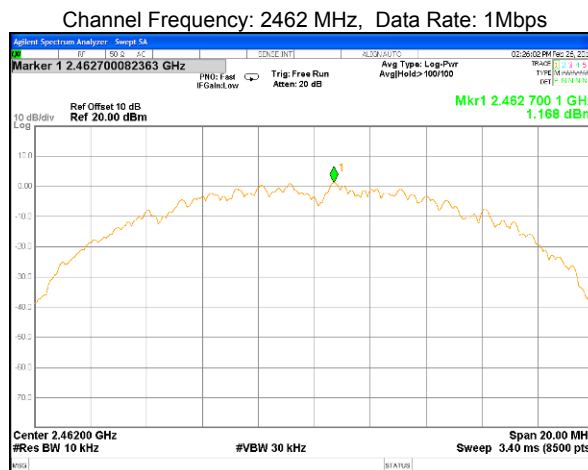
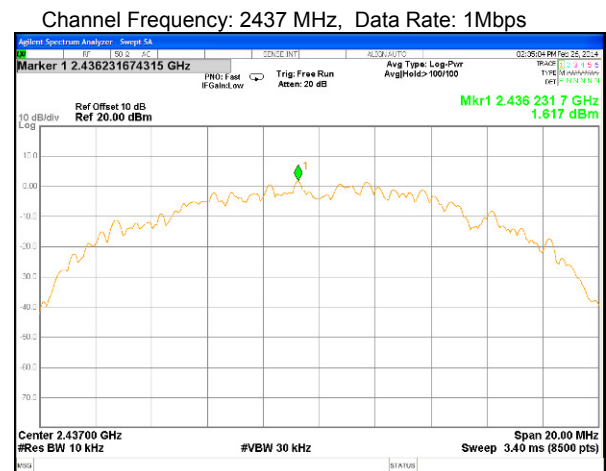
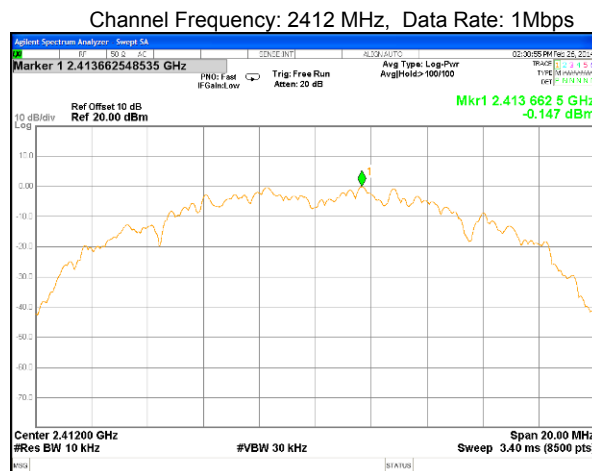
The result of the test is: **PASS**. See the details in the charts/tables of the following paragraphs.

4.3.1 Tabelle e grafici dei risultati / Tables and graphical representation of data – Maximum Power Spectral Density

Note: all the traces reported in this section have been obtained with Peak detector, max hold (over last 100 sweeps); RBW= 10kHz:

802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
b	1	2412,0	-0,15	8,00	8,2
		2437,0	1,62	8,00	6,4
		2462,0	1,17	8,00	6,8
	11	2412,0	0,16	8,00	7,8
		2437,0	0,88	8,00	7,1
		2462,0	1,94	8,00	6,1

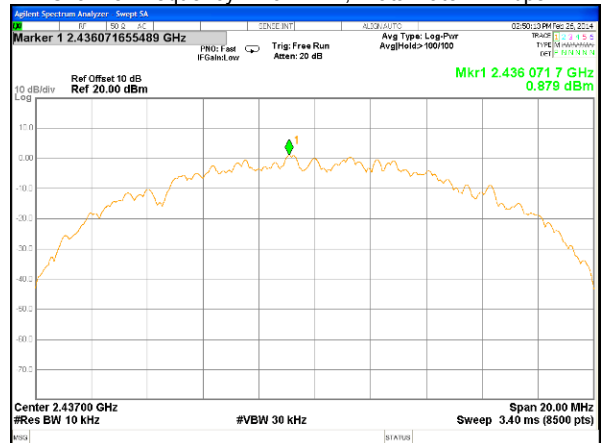
See traces below:



Channel Frequency: 2412 MHz, Data Rate: 11Mbps



Channel Frequency: 2437 MHz, Data Rate: 11Mbps



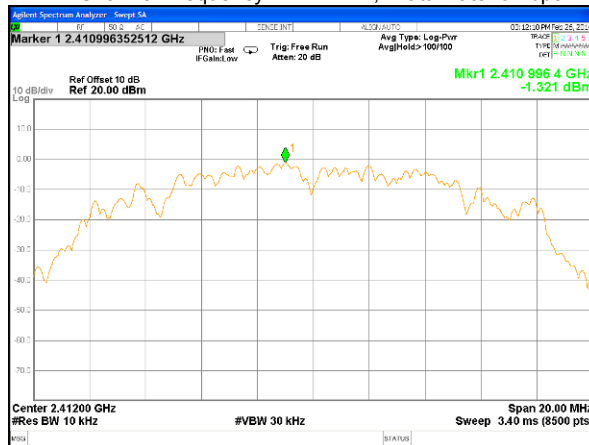
Channel Frequency: 2462 MHz, Data Rate: 11Mbps



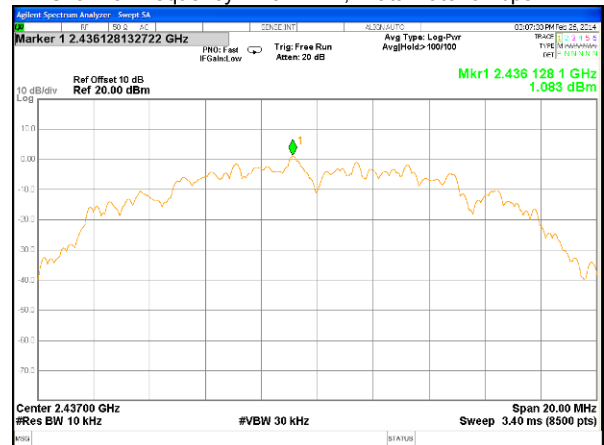
802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
g	6	2412,0	-1,32	8,0	9,3
		2437,0	1,08	8,0	6,9
		2462,0	0,48	8,0	7,5
	24	2412,0	0,21	8,0	7,8
		2437,0	1,15	8,0	6,9
		2462,0	0,98	8,0	7,0
	54	2412,0	-0,03	8,0	8,0
		2437,0	0,46	8,0	7,5
		2462,0	-0,70	8,0	8,7

See traces below:

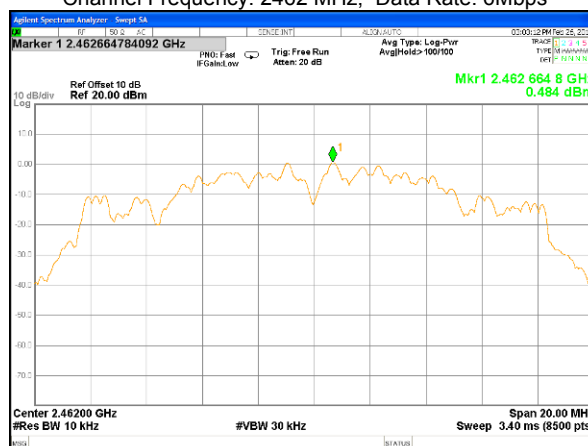
Channel Frequency: 2412 MHz, Data Rate: 6Mbps



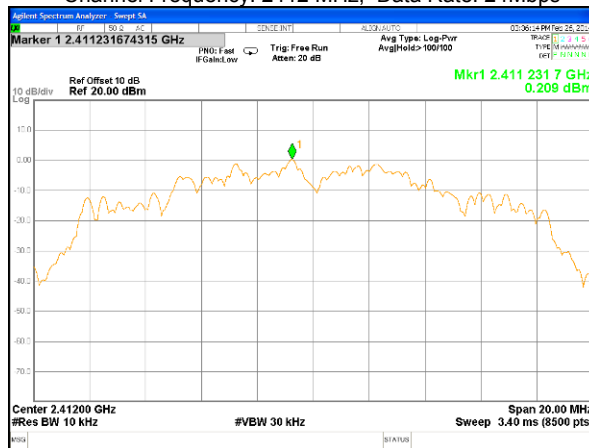
Channel Frequency: 2437 MHz, Data Rate: 6Mbps



Channel Frequency: 2462 MHz, Data Rate: 6Mbps



Channel Frequency: 2412 MHz, Data Rate: 24Mbps



Channel Frequency: 2437 MHz, Data Rate: 24Mbps



Channel Frequency: 2462 MHz, Data Rate: 24Mbps



Channel Frequency: 2412 MHz, Data Rate: 54Mbps



Channel Frequency: 2437 MHz, Data Rate: 54Mbps



Channel Frequency: 2462 MHz, Data Rate: 54Mbps



802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
n	6,5	2412,0	-0,46	8,0	8,5
		2437,0	-0,34	8,0	8,3
		2462,0	-1,10	8,0	9,1
	39	2412,0	-0,82	8,0	8,8
		2437,0	-1,00	8,0	9,0
		2462,0	0,04	8,0	8,0
	65	2412,0	0,30	8,0	7,7
		2437,0	-0,31	8,0	8,3
		2462,0	0,15	8,0	7,9

See traces below:

Channel Frequency: 2412 MHz, Data Rate: 6.5Mbps



Channel Frequency: 2437 MHz, Data Rate: 6.5Mbps



Channel Frequency: 2462 MHz, Data Rate: 6.5Mbps



Channel Frequency: 2412 MHz, Data Rate: 39Mbps



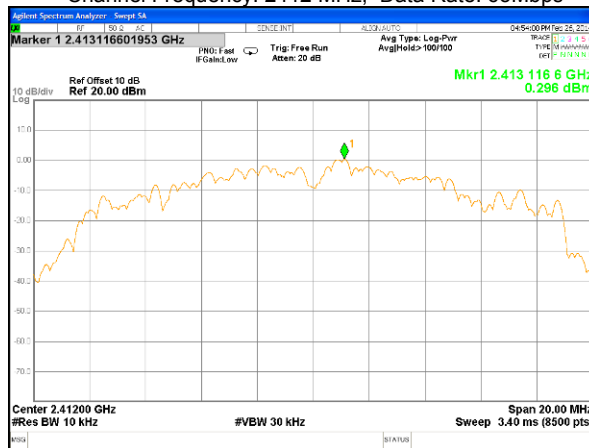
Channel Frequency: 2437 MHz, Data Rate: 39Mbps



Channel Frequency: 2462 MHz, Data Rate: 39Mbps



Channel Frequency: 2412 MHz, Data Rate: 65Mbps



Channel Frequency: 2437 MHz, Data Rate: 65Mbps



Channel Frequency: 2462 MHz, Data Rate: 65Mbps



5.0 6 dB Bandwidth - Condizioni di prova / Test Conditions

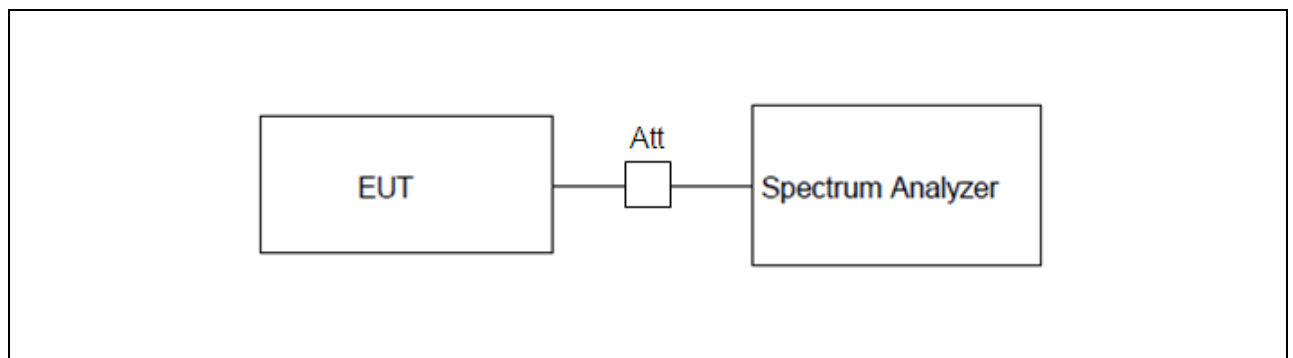
Technician / Tecnico: Loris Fruch		
Table No.	TEST: 6 dB Bandwidth, Section 15.247 (a) (2)	\
Method	FCC KDB 558074, par. 8.2	\
Parameters required prior to the test	Laboratory Ambient Temperature	18 to 28 °C
	Relative Humidity	20 to 90 %
Parameters recorded during the test	Laboratory Ambient Temperature	20 °C
	Relative Humidity	51 %
Supplementary information: - Conducted Test, executed at WLAN temporary antenna output (50ohm, SMA) connected to the Spectrum Analyser through an attenuator (10 dB). - DUT powered at 24Vdc; - Spectrum analyser settings setup according to FCC KDB 558074 sect. 8.2 (automatic bandwidth measurement) Detector: Peak, Trace: max hold (over last 10 sweeps), RBW: 430 kHz, VBW=1.3 MHz, - Test executed with the following WLAN settings: • protocol “b” on channel 1, 6 and 11 with data rate at 1 and 11Mbps • protocol “g” on channel 1, 6 and 11 with data rate at 6, 24 and 54Mbps • protocol “n” on channel 1, 6 and 11 with data rate at 6.5, 39 and 65Mbps		

5.1 Apparecchiature utilizzate / Test Equipment Used – 6 dB Bandwidth

Apparecchiature usate/Equipment Used	Modello/Model	Costruttore/Manufacturer	Numero di serie/Serial Number
EMI Receiver MXE	N9038A	Agilent Technologies	MY51210230
10dB Attenuator	SA4014	CPE Italia Spa (CPE)	03VCV-5093
Access Point (*)	524704	Intellinet	GAP215N16C1800539

(*) auxiliary equipment

5.2 Fotografie del setup / Photo of the test setup – 6 dB Bandwidth



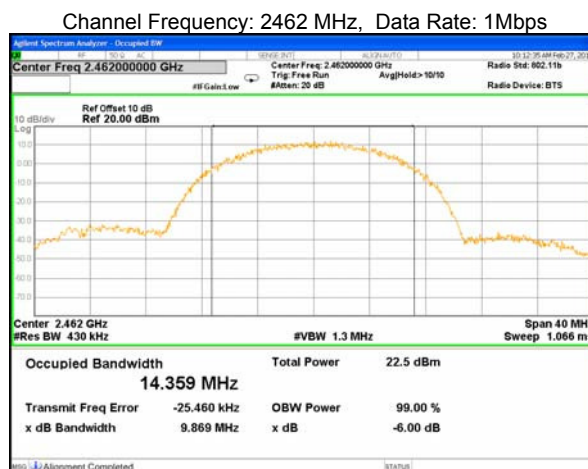
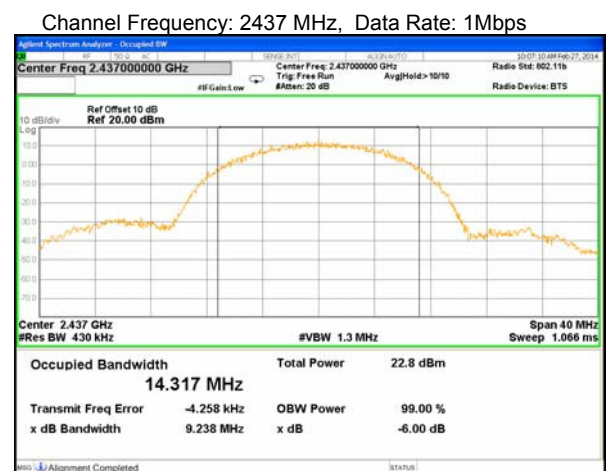
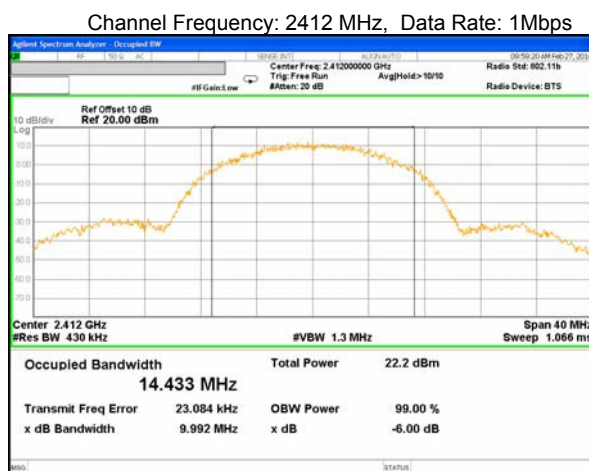
5.3 Risultati / Results - 6 dB Bandwidth

The minimum specified 6dB bandwidth for digital modulated is 500 kHz, thus the result of the test is: **PASS**. See the details in the charts/tables of the following paragraphs.

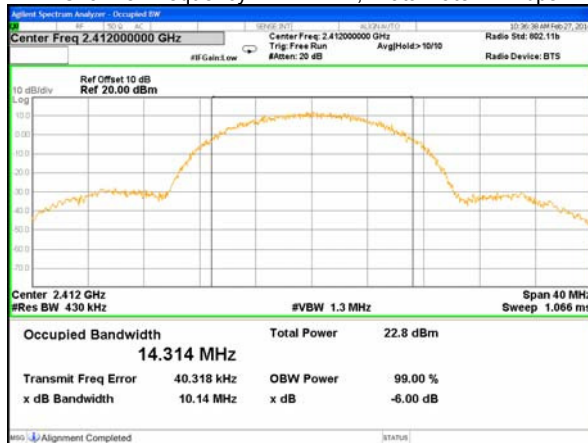
5.3.1 Tabelle e grafici dei risultati / Tables and graphical representation data – 6 dB Bandwidth

802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	6 dB Bandwidth (MHz)	99% OBW (MHz)
b	1	2412,0	10,0	14,4
		2437,0	9,2	14,3
		2462,0	9,9	14,4
	11	2412,0	10,1	14,3
		2437,0	9,7	14,5
		2462,0	9,4	14,3

See traces below:



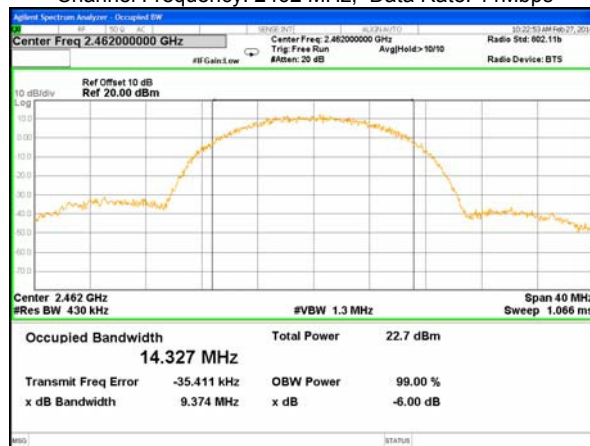
Channel Frequency: 2412 MHz, Data Rate: 11Mbps



Channel Frequency: 2437 MHz, Data Rate: 11Mbps



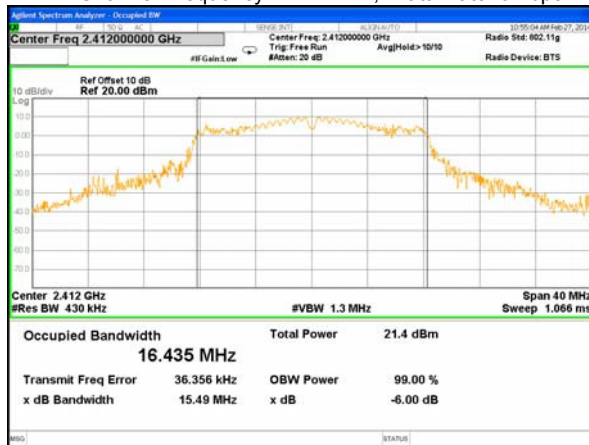
Channel Frequency: 2462 MHz, Data Rate: 11Mbps



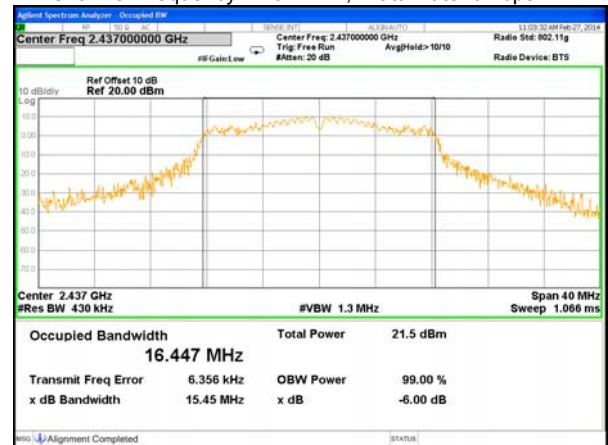
802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	6 dB Bandwidth (MHz)	99% OBW (MHz)
g	6	2412,0	15,5	16,4
		2437,0	15,5	16,5
		2462,0	14,9	16,4
	24	2412,0	15,6	16,3
		2437,0	15,3	16,4
		2462,0	15,6	16,3
	54	2412,0	14,3	16,4
		2437,0	15,7	16,4
		2462,0	15,7	16,4

See traces below:

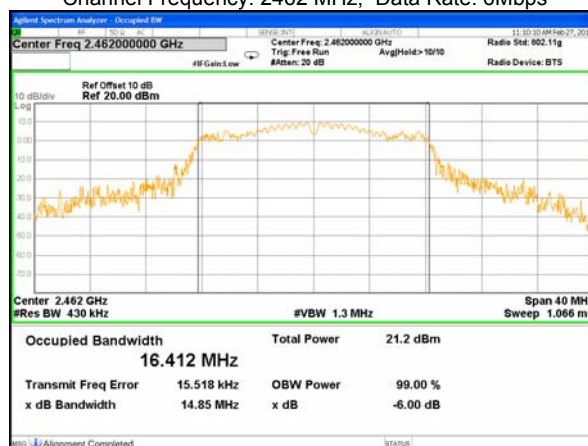
Channel Frequency: 2412 MHz, Data Rate: 6Mbps



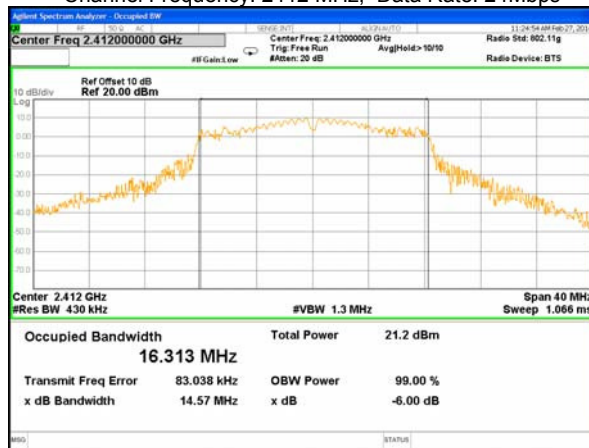
Channel Frequency: 2437 MHz, Data Rate: 6Mbps



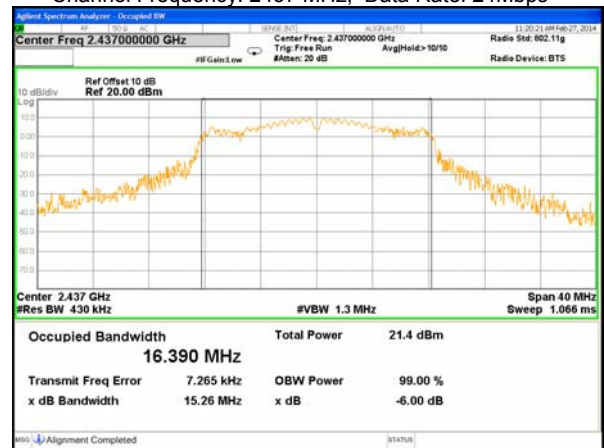
Channel Frequency: 2462 MHz, Data Rate: 6Mbps



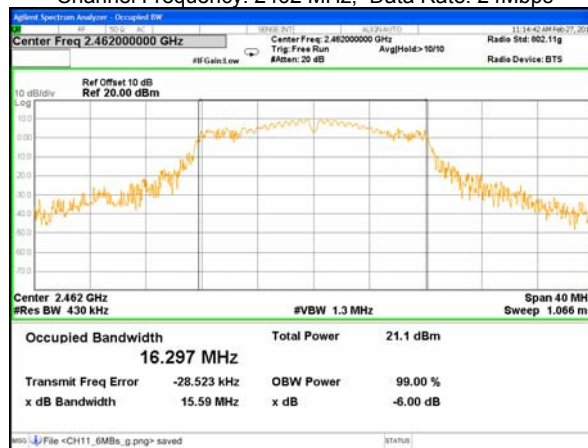
Channel Frequency: 2412 MHz, Data Rate: 24Mbps



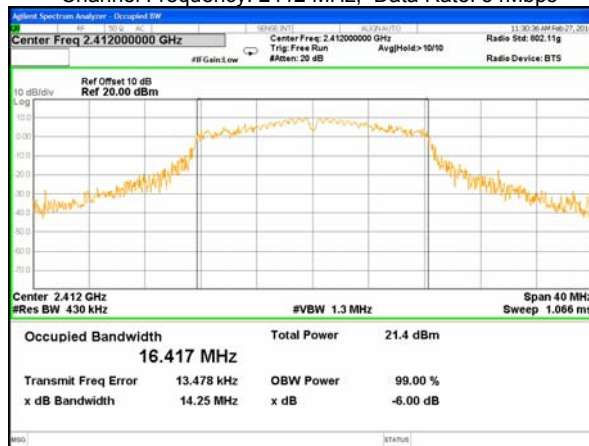
Channel Frequency: 2437 MHz, Data Rate: 24Mbps



Channel Frequency: 2462 MHz, Data Rate: 24Mbps



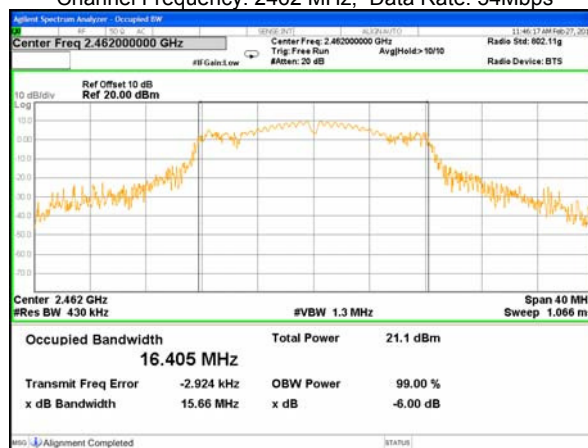
Channel Frequency: 2412 MHz, Data Rate: 54Mbps



Channel Frequency: 2437 MHz, Data Rate: 54Mbps



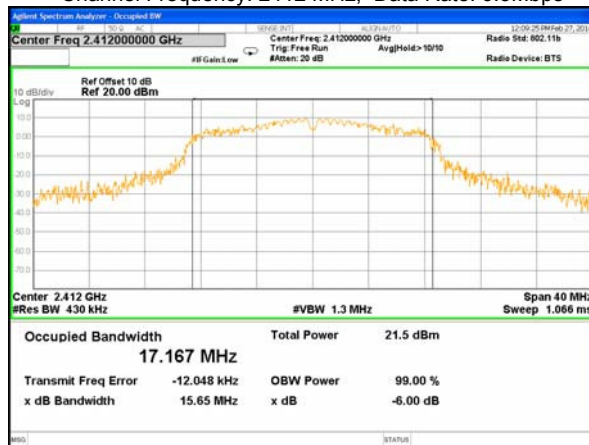
Channel Frequency: 2462 MHz, Data Rate: 54Mbps



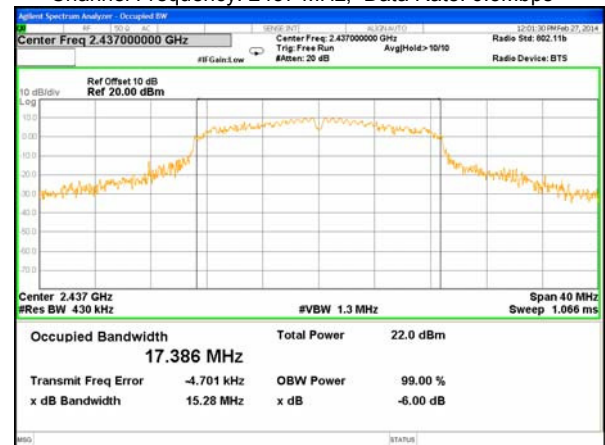
802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	6 dB Bandwidth (MHz)	99% OBW (MHz)
n	6,5	2412,0	15,7	17,2
		2437,0	15,3	17,4
		2462,0	16,2	17,5
	39	2412,0	16,2	17,3
		2437,0	14,8	17,5
		2462,0	16,3	17,5
	65	2412,0	15,8	17,2
		2437,0	15,4	17,3
		2462,0	12,9	17,5

See traces below:

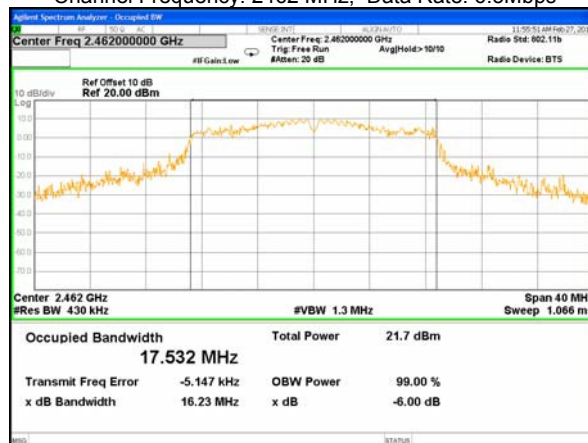
Channel Frequency: 2412 MHz, Data Rate: 6.5Mbps



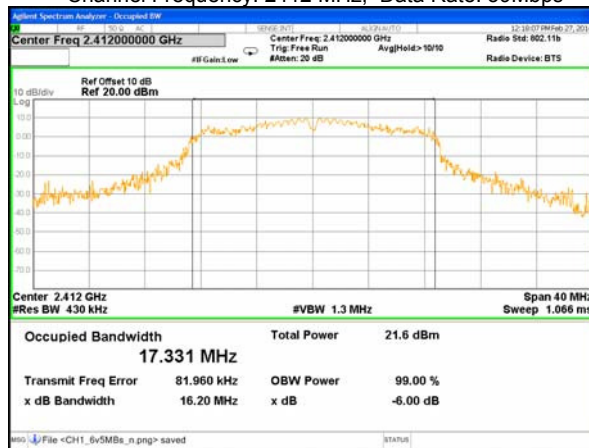
Channel Frequency: 2437 MHz, Data Rate: 6.5Mbps



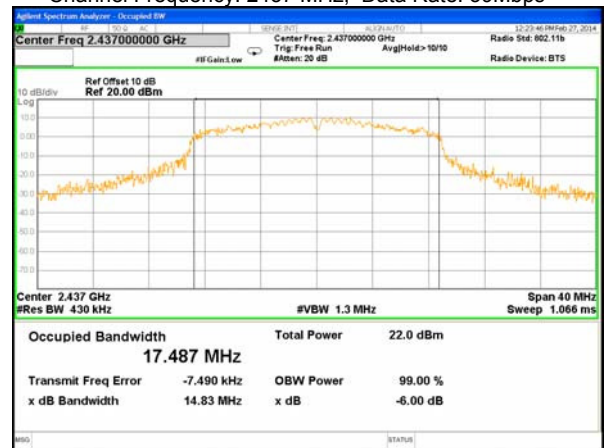
Channel Frequency: 2462 MHz, Data Rate: 6.5Mbps



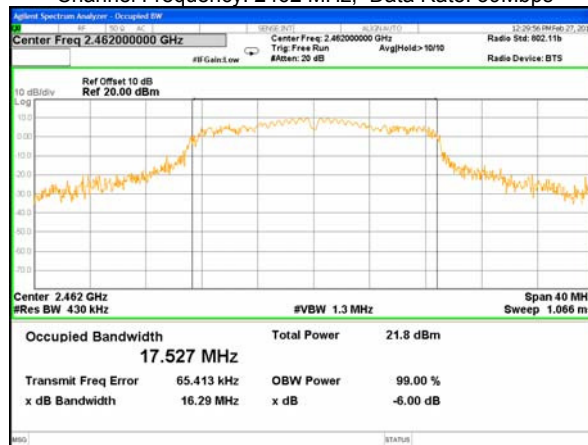
Channel Frequency: 2412 MHz, Data Rate: 39Mbps



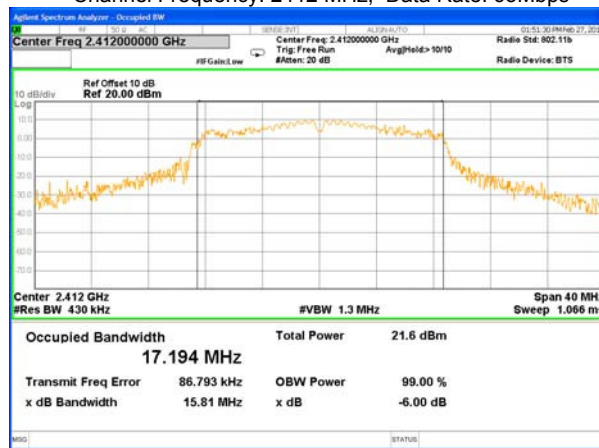
Channel Frequency: 2437 MHz, Data Rate: 39Mbps



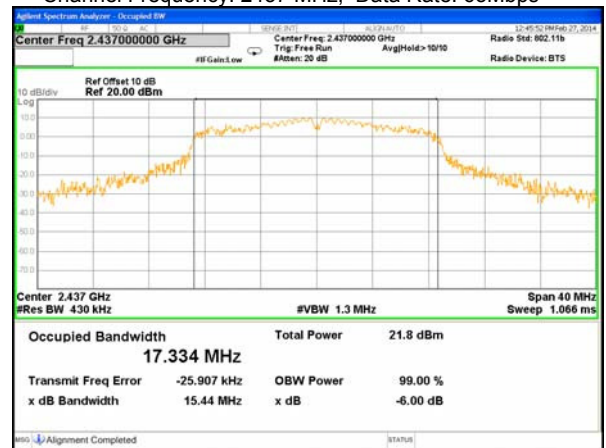
Channel Frequency: 2462 MHz, Data Rate: 39Mbps



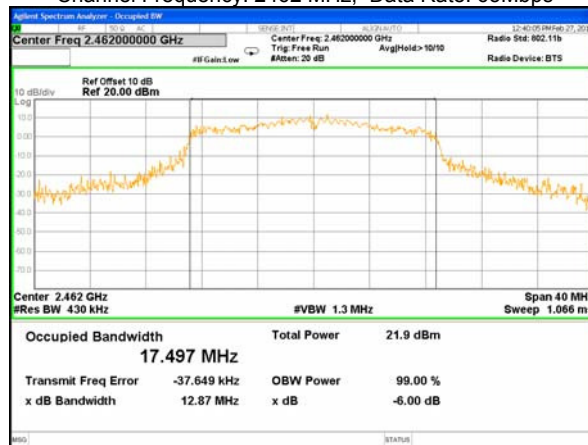
Channel Frequency: 2412 MHz, Data Rate: 65Mbps



Channel Frequency: 2437 MHz, Data Rate: 65Mbps



Channel Frequency: 2462 MHz, Data Rate: 65Mbps



6.0 Band-edge Compliance - Condizioni di prova / Test Conditions

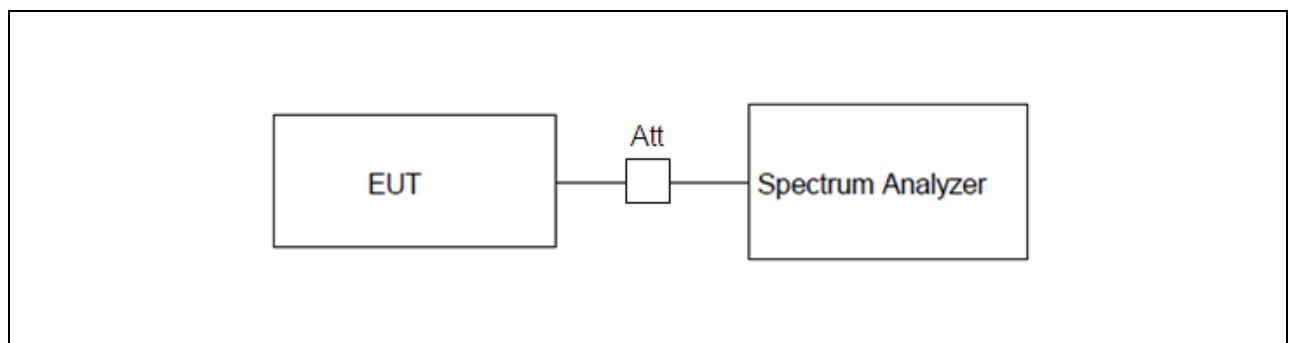
Technician / Tecnico: Loris Fruch		
Table No.	TEST: Band-edge Compliance, Section 15.247(d)	\
Method	FCC KDB 558074 par.13.2 (marker delta method)	\
Parameters required prior to the test	Laboratory Ambient Temperature	18 to 28 °C
	Relative Humidity	20 to 90 %
Parameters recorded during the test	Laboratory Ambient Temperature	19 °C
	Relative Humidity	52 %
Supplementary information: - Conducted Test, executed at WLAN temporary antenna output (50ohm,SMA) connected to the Spectrum Analyser through an attenuator (10 dB). - EUT powered at 24Vdc; - Spectrum analyser settings setup according to FCC KDB 558074 sect. 13.2 (peak detection) Detector: Peak, Trace: max hold (over last 100 sweeps), RBW: 100 kHz, VBW=300 kHz, - Test executed with the following Wi-Fi settings: • protocol "b" on channel 1, 6 and 11 with data rate at 1 and 11Mbps • protocol "g" on channel 1, 6 and 11 with data rate at 6, 24 and 54Mbps • protocol "n" on channel 1, 6 and 11 with data rate at 6.5, 39 and 65Mbps		

6.1 Apparecchiature utilizzate / Test Equipment Used – Band-edge Compliance

Apparecchiature usate/Equipment Used	Modello/Model	Costruttore/Manufacturer	Numero di serie/Serial Number
EMI Receiver MXE	N9038A	Agilent Technologies	MY51210230
10dB Attenuator	SA4014	CPE Italia Spa (CPE)	03VCV-5093
Access Point (*)	524704	Intellinet	GAP215N16C1800539

(*) auxiliary equipment

6.2 Fotografie del setup / Photo of the test setup – Band-edge Compliance



6.3 Risultati / Results - Band-edge Compliance

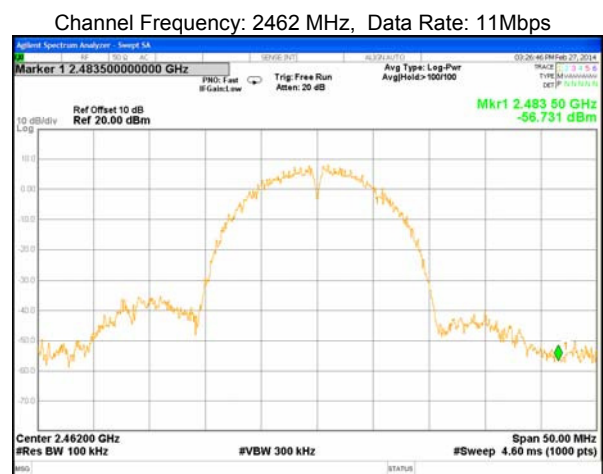
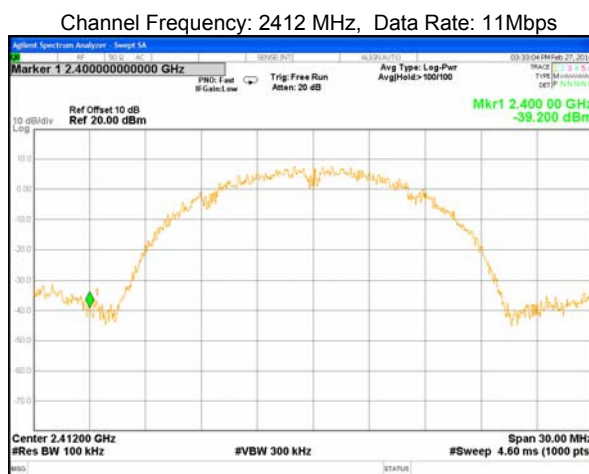
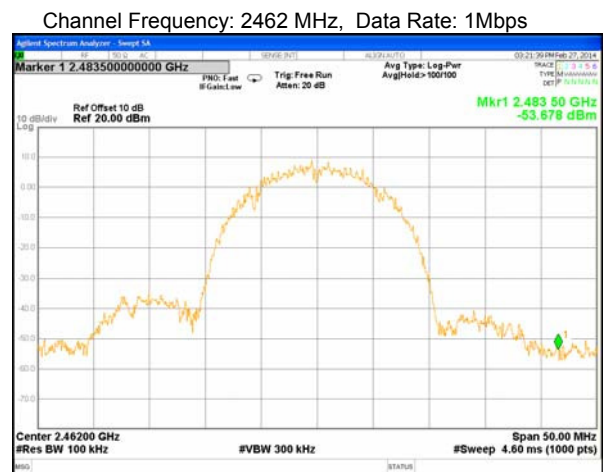
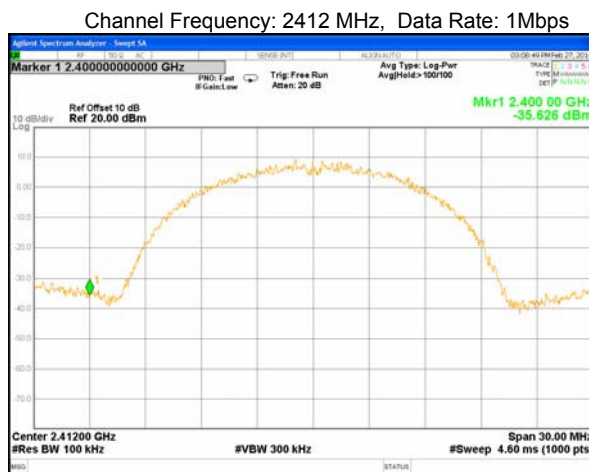
The result of the test is: **PASS**. See the details in the charts/tables of the following paragraphs.

6.3.1 Tabelle e grafici dei risultati / Tables and graphical representation of data – Band-edge Compliance

802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	Total PSD* (dBm)	Frequency (MHz)	Value at Band Edge		Limit (dBc)
					Measured Value ** (dBm)	Value (dBc)	
b	1	2412,0	-0,15	2400,0	-35,60	-35,5	-20,0
		2462,0	1,17	2483,5	-53,70	-54,9	-20,0
	11	2412,0	0,16	2400,0	-39,20	-39,4	-20,0
		2462,0	1,94	2483,5	-56,70	-58,6	-20,0

* See chapt. 4

** See carts below:



802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	Total PSD* (dBm)	Frequency (MHz)	Value at Band Edge		Limit (dBc)
					Measured Value** (dBm)	Value (dBc)	
g	6	2412,0	-1,32	2400,0	-30,3	-29,0	-20,0
		2462,0	0,48	2483,5	-43,2	-43,7	-20,0
	24	2412,0	0,21	2400,0	-29,3	-29,5	-20,0
		2462,0	0,98	2483,5	-41,9	-42,9	-20,0
	54	2412,0	-0,03	2400,0	-28,5	-28,5	-20,0
		2462,0	-0,70	2483,5	-42,6	-41,9	-20,0

* See chapt. 4

** See carts below:

Channel Frequency: 2412 MHz, Data Rate: 6Mbps



Channel Frequency: 2462 MHz, Data Rate: 6Mbps



Channel Frequency: 2412 MHz, Data Rate: 24Mbps



Channel Frequency: 2462 MHz, Data Rate: 24Mbps



Channel Frequency: 2412 MHz, Data Rate: 54Mbps



Channel Frequency: 2462 MHz, Data Rate: 54Mbps



802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	Total PSD* (dBm)	Frequency (MHz)	Value at Band Edge		Limit (dBc)
					Measured Value ** (dBm)	Value (dBc)	
n	6,5	2412,0	-0,46	2400,0	-29	-28,5	-20,0
		2462,0	-1,10	2483,5	-44,3	-43,2	-20,0
	39	2412,0	-0,82	2400,0	-29,4	-28,6	-20,0
		2462,0	0,04	2483,5	-35	-35,0	-20,0
	65	2412,0	0,30	2400,0	-31	-31,3	-20,0
		2462,0	0,15	2483,5	-43,6	-43,8	-20,0

* See chapt. 4

** See carts below:

Channel Frequency: 2412 MHz, Data Rate: 6.5Mbps



Channel Frequency: 2462 MHz, Data Rate: 6.5Mbps



Channel Frequency: 2412 MHz, Data Rate: 39Mbps



Channel Frequency: 2462 MHz, Data Rate: 39Mbps



Channel Frequency: 2412 MHz, Data Rate: 65Mbps



Channel Frequency: 2462 MHz, Data Rate: 65Mbps



7.0 Conducted Spurious Emissions - Condizioni di prova / Test Conditions

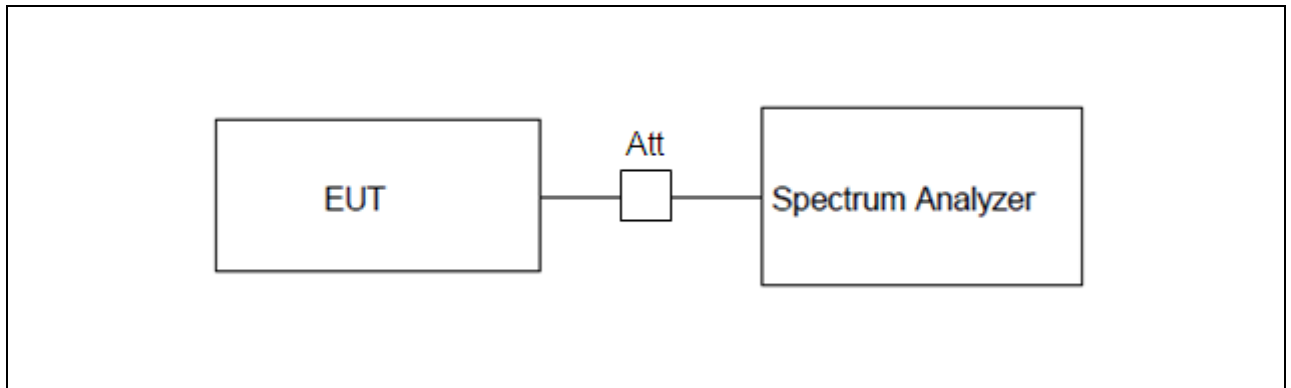
Technician / Tecnico: Loris Fruch			
Table No.	TEST: Conducted Spurious Emissions, Section 15.247 (d)		\
Method	KDB_558074 11.0		\
Parameters required prior to the test		Laboratory Ambient Temperature	18 to 28 °C
		Relative Humidity	20 to 90 %
Parameters recorded during the test		Laboratory Ambient Temperature	20 °C
		Relative Humidity	51 %
Supplementary information:			
- Conducted Test, executed at WLAN temporary antenna output (50ohm,SMA) connected to the Spectrum Analyser through an attenuator (10 dB). - EUT powered at 24Vdc; - Spectrum analyser settings setup according to FCC KDB 558074 sect. 11.0 (peak detection): Detector= Peak, Trace= max hold (over last 20 sweeps), RBW= 100 kHz, VBW=300 kHz, - Test aim is to verify that in any 100 kHz bandwidth outside the frequency band in which the digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator is at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. - Test executed with the following Wi-Fi settings: • protocol “b” on channel 1 and 11 with data rate at 1 and 11Mbps • protocol “g” on channel 1 and 11 with data rate at 6, 24 and 54Mbps • protocol “n” on channel 1 and 11 with data rate at 6.5, 39 and 65Mbps			

7.1 Apparecchiature utilizzate / Test Equipment Used – Conducted Spurious Emissions

<i>Apparecchiature usate/ Equipment Used</i>	<i>Modello/Model</i>	<i>Costruttore/ Manufacturer</i>	<i>Numero di serie/ Serial Number</i>
EMI Receiver MXE	N9038A	Agilent Technologies	MY51210230
10dB Attenuator	SA4014	CPE Italia Spa (CPE)	03VCV-5093
Access Point (*)	524704	Intellinet	GAP215N16C1800539

(*) auxiliary equipment

7.2 Fotografie del setup / *Photo of the test setup* – Conducted Spurious Emissions



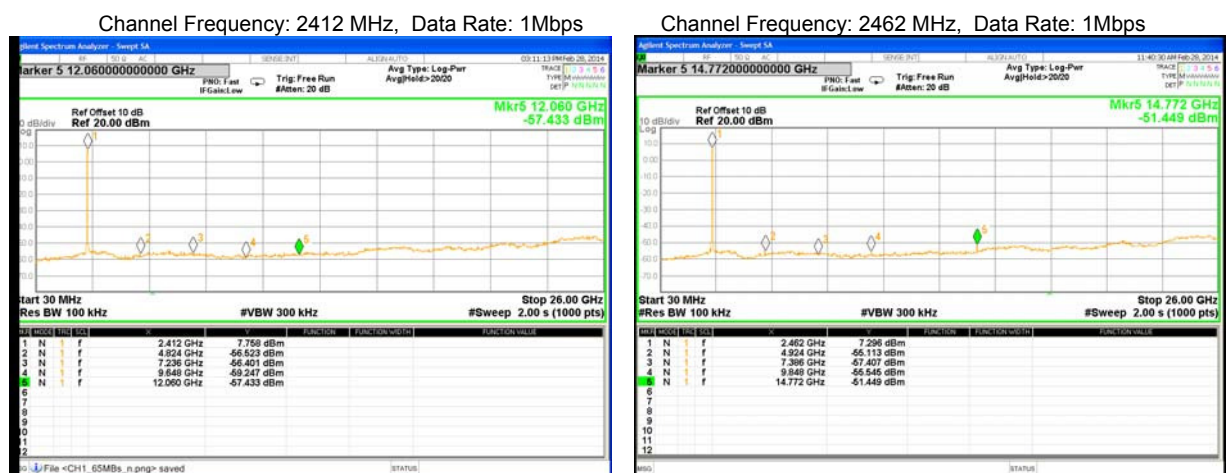
7.3 Risultati / *Results* - Conducted Spurious Emissions

The amplitude of spurious emissions is lower than 20 dBc, thus the result of the test is: **PASS** . See the details in the charts of the following paragraphs.

7.3.1 Grafici dei risultati / *Graphical representation data* – Conducted Spurious Emissions

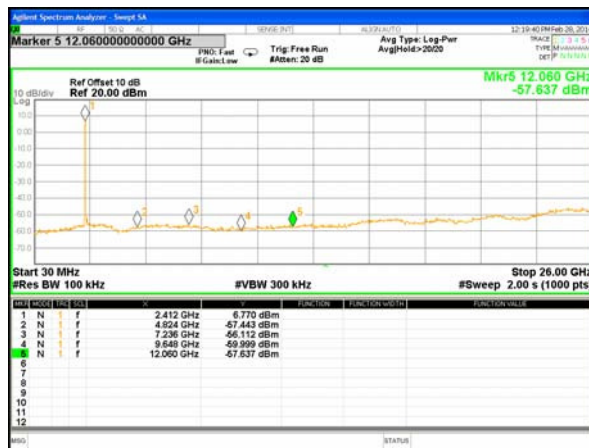
Note: all the traces reported in this section have been obtained with detector Peak, max hold (over last 20 sweeps); RBW: 100kHz, VBW:300kHz

802.11 Protocol b



Channel Frequency: 2412 MHz, Data Rate: 11Mbps

Channel Frequency: 2462 MHz, Data Rate: 11Mbps



802.11 Protocol g

Channel Frequency: 2412 MHz, Data Rate: 6Mbps



Channel Frequency: 2462 MHz, Data Rate: 6Mbps



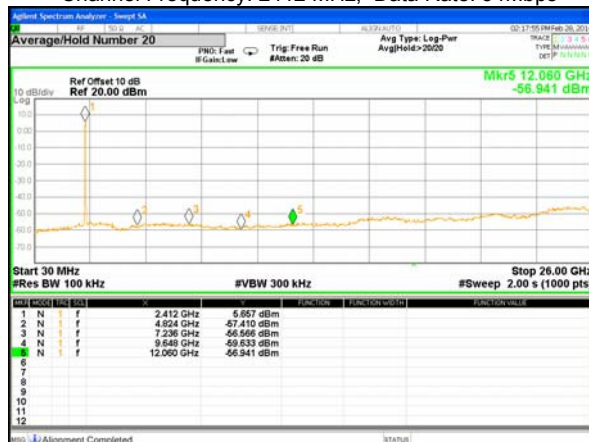
Channel Frequency: 2412 MHz, Data Rate: 24Mbps



Channel Frequency: 2462 MHz, Data Rate: 24Mbps



Channel Frequency: 2412 MHz, Data Rate: 54Mbps



Channel Frequency: 2462 MHz, Data Rate: 54Mbps



802.11 Protocol n

Channel Frequency: 2412 MHz, Data Rate: 6.5Mbps



Channel Frequency: 2462 MHz, Data Rate: 6.5Mbps



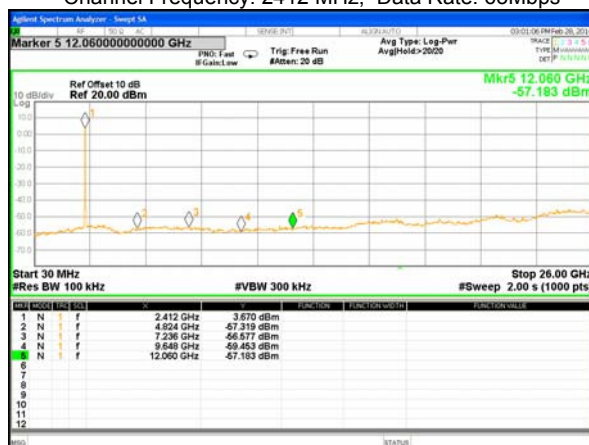
Channel Frequency: 2412 MHz, Data Rate: 39Mbps



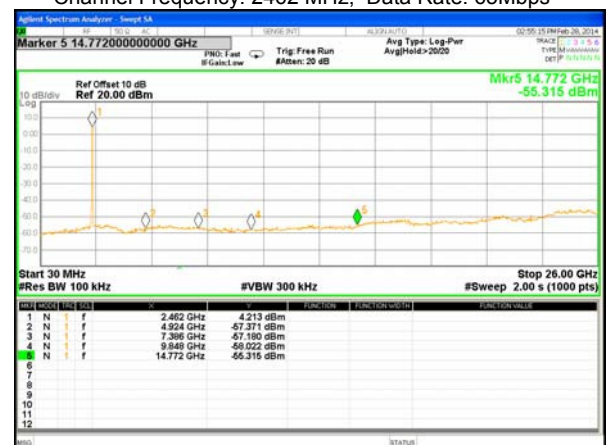
Channel Frequency: 2462 MHz, Data Rate: 39Mbps



Channel Frequency: 2412 MHz, Data Rate: 65Mbps



Channel Frequency: 2462 MHz, Data Rate: 65Mbps



8.0 Conducted emission - Condizioni di prova / Test Conditions

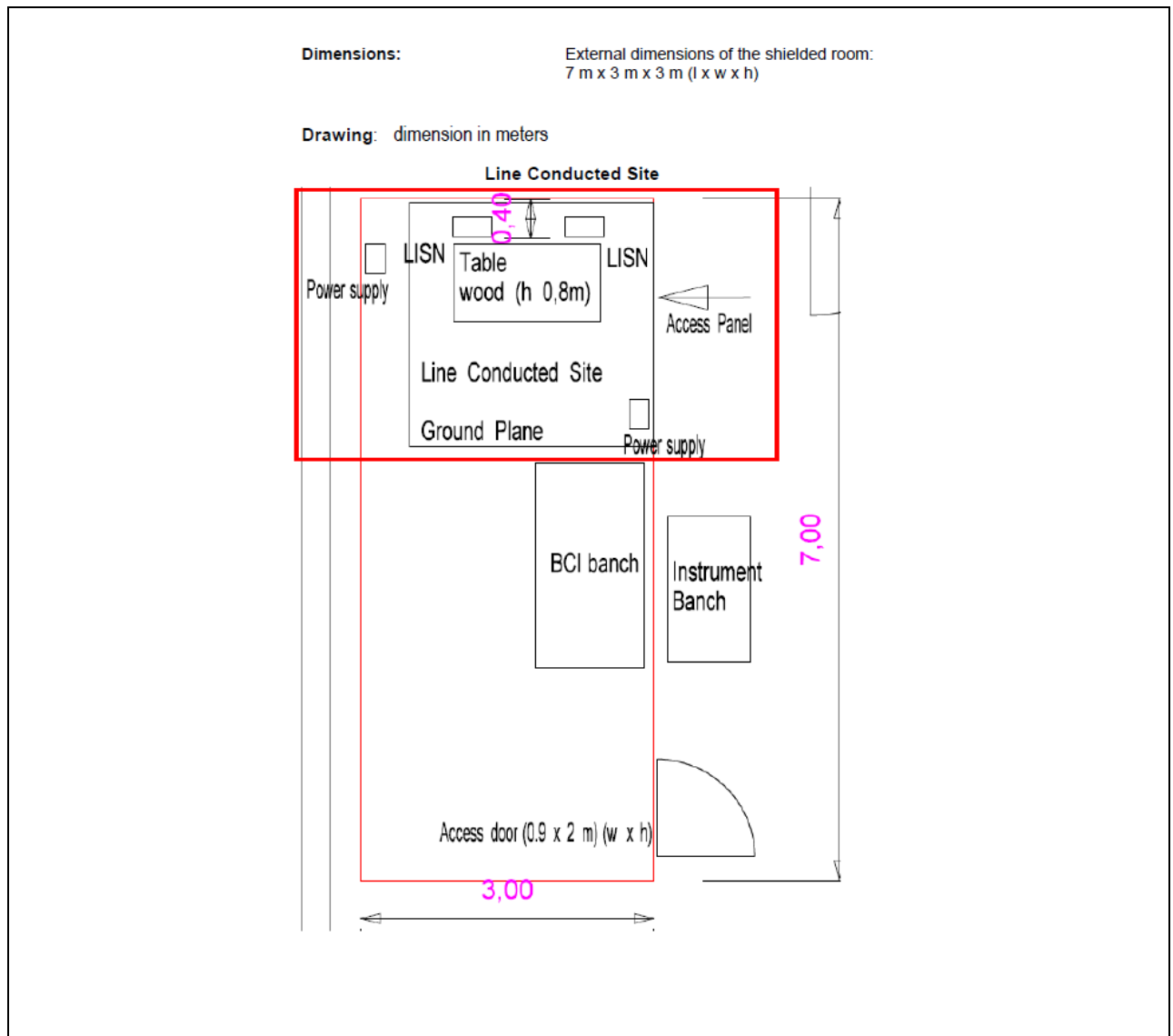
Technician / Tecnico: Loris Fruch		
Table No.	TEST: AC Power Line Conducted Emissions, Section 15.207	\
Method	ANSI C63.4: 2009-09, Par. 7	\
Parameters required prior to the test	Laboratory Ambient Temperature	18 to 28 °C
	Relative Humidity	20 to 90 %
Parameters recorded during the test	Laboratory Ambient Temperature	22 °C
	Relative Humidity	50 %
Fully configured sample scanned over the following frequency range	150kHz to 30MHz	
Supplementary information:		
- EUT operating mode 1 (see the applicable cited test plan); - Test executed on 110V 60Hz power supply line;		

8.1 Apparecchiature utilizzate / Test Equipment Used – Conducted emission

<i>Apparecchiature usate/ Equipment Used</i>	<i>Modello/Model</i>	<i>Costruttore/ Manufacturer</i>	<i>Numero di serie/ Serial Number</i>
EMI Receiver	ESR	Rohde&Schwarz	101069
LISN	3810/2	Emco	9702-1833
ISN	T8CAT6	Teseq	29673
Cable 10m	MIL C-17 OLWG7	CCI/SAXTON	M17/16.4-00001
Cable RF da 6m	PE142LL	Pasternak	EL038210
Shielded Chamber	RFD-100	ETS-Lindgren	2012
Shielded Chamber DC Filter	N5004	ETS-Lindgren (ETSL)	121226
AC Power Supply	KBT-100-C-109-451	BEHLMAN	5896
CMU Universal Radio Communication Tester (*)	CMU200	Rohde&Schwarz	111416
Access Point (*)	524704	Intellinet	GAP215N16C1800539

(*) auxiliary equipment

8.2 Fotografie del setup / *Photo of the test setup* – Conducted emission



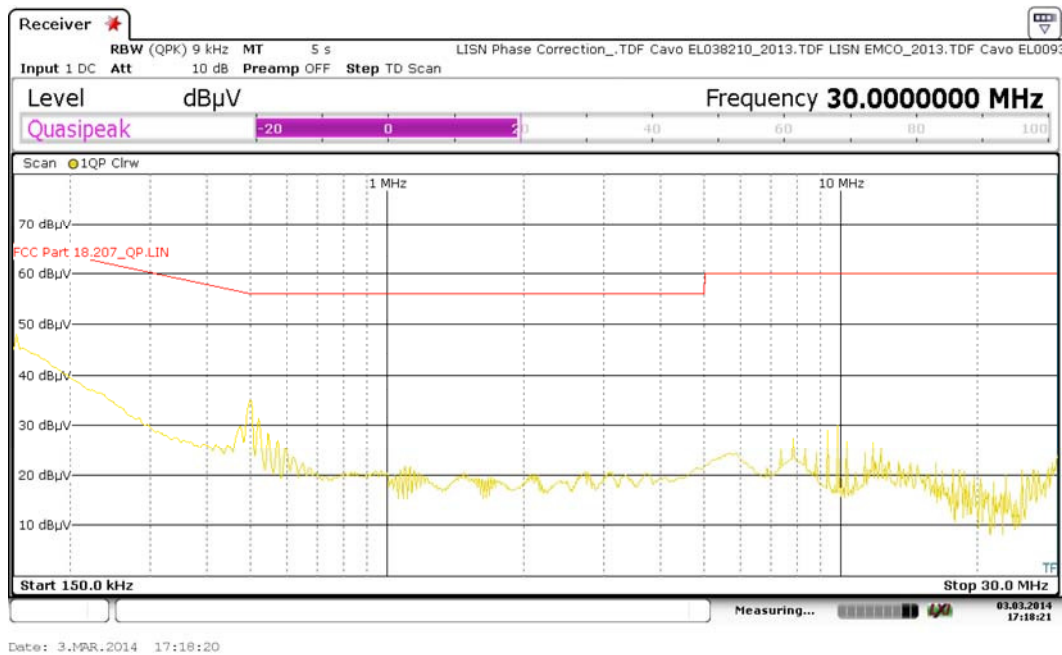
8.3 Risultati / *Results* - Conducted emission

The result of the test is: **PASS**. See the details in the charts of the following paragraphs.

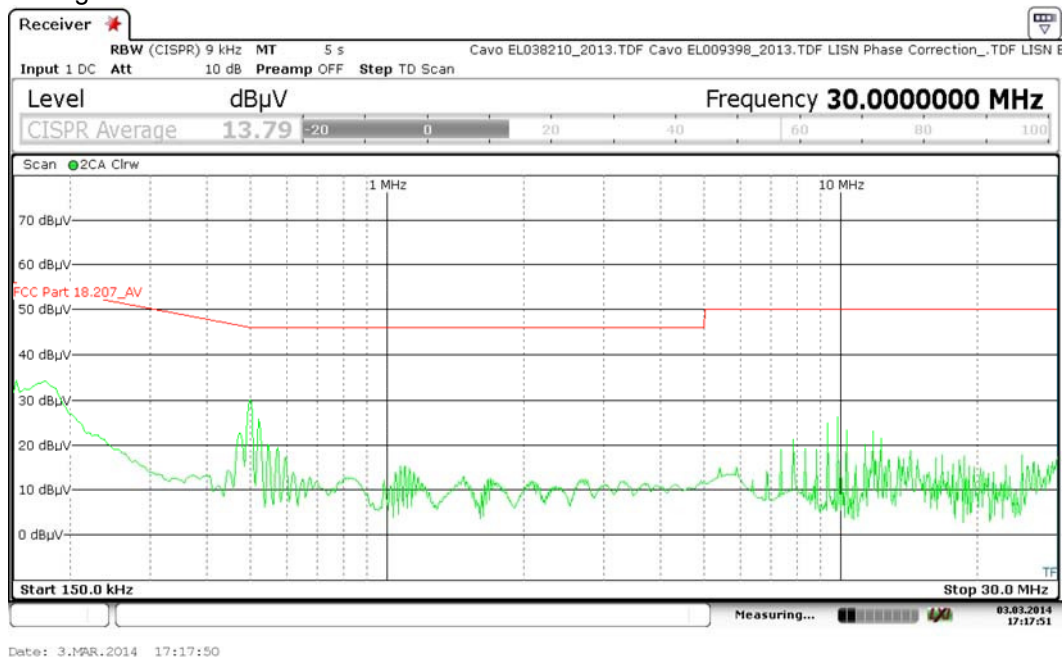
8.3.1 Grafici dei risultati / Graphical representation data – Conducted emission

EUT N° 13LA00163/01

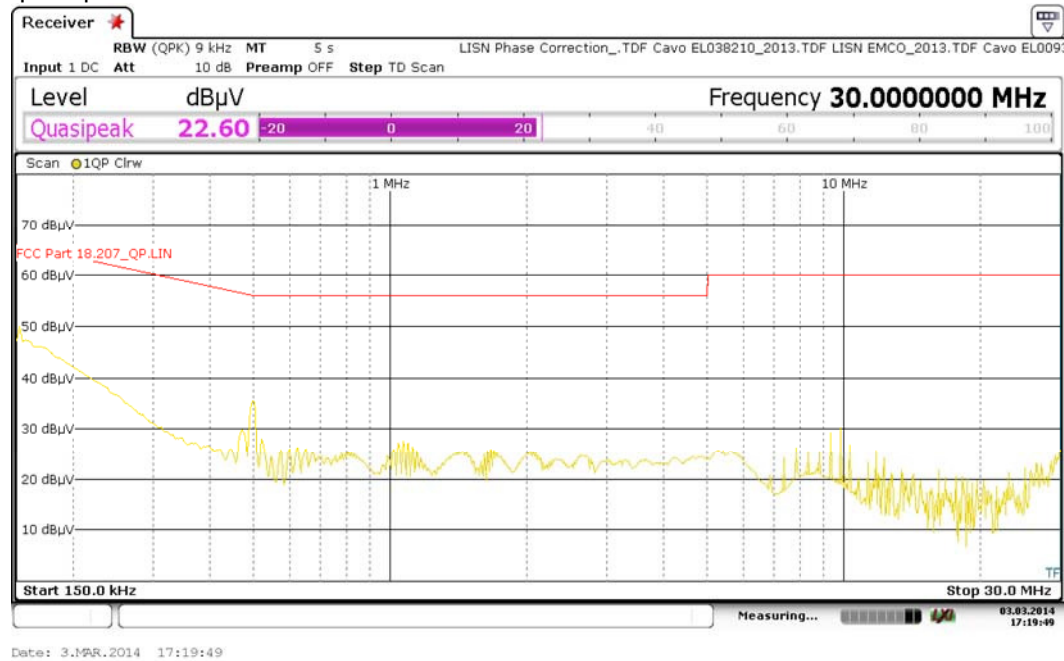
Conducted emission measured on 110V 60Hz Line1 (from 0.15MHz to 30MHz): quasi-peak detector with quasi-peak limit



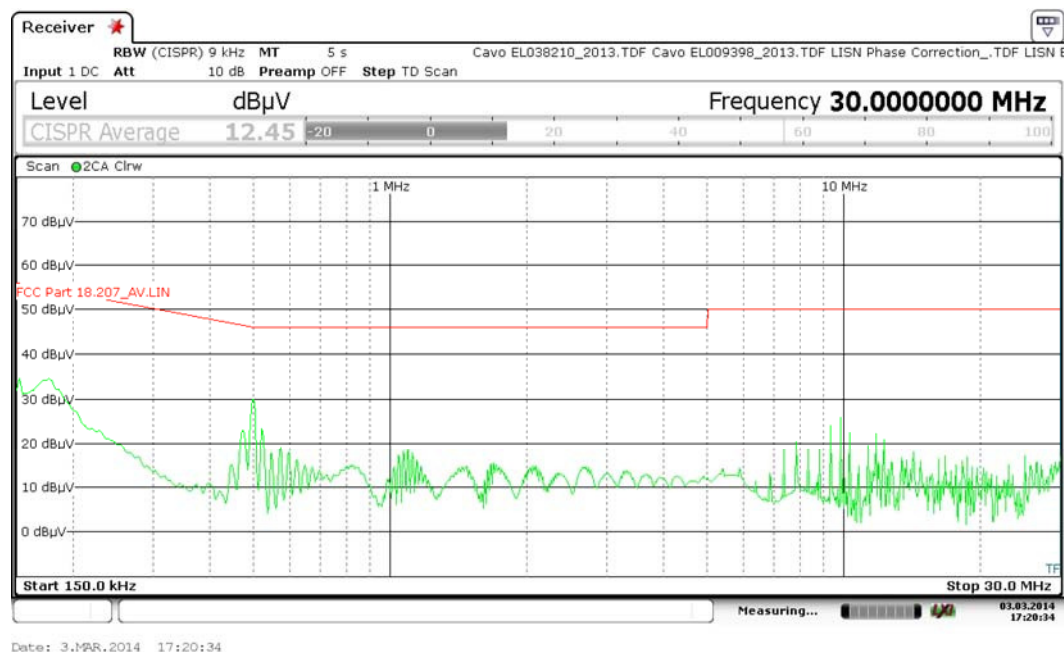
Conducted emission measured on 110V 60Hz Line1 (from 0.15MHz to 30MHz): average detector with average limit



Conducted emission measured on 110V 60Hz Line2 (from 0.15MHz to 30MHz): quasi-peak detector with quasi-peak limit



Conducted emission measured on 110V 60Hz Line2 (from 0.15MHz to 30MHz): average detector with average limit



Note: the charts of the measurements in same conditions of the DUT N° 13LA00163/03 have not been included in the report: they are similar to the above emission measured on EUT N° 13LA00163/01.

9.0 Spurious Radiated Emissions and Restricted Bands of Operation - Condizioni di prova / Test Conditions

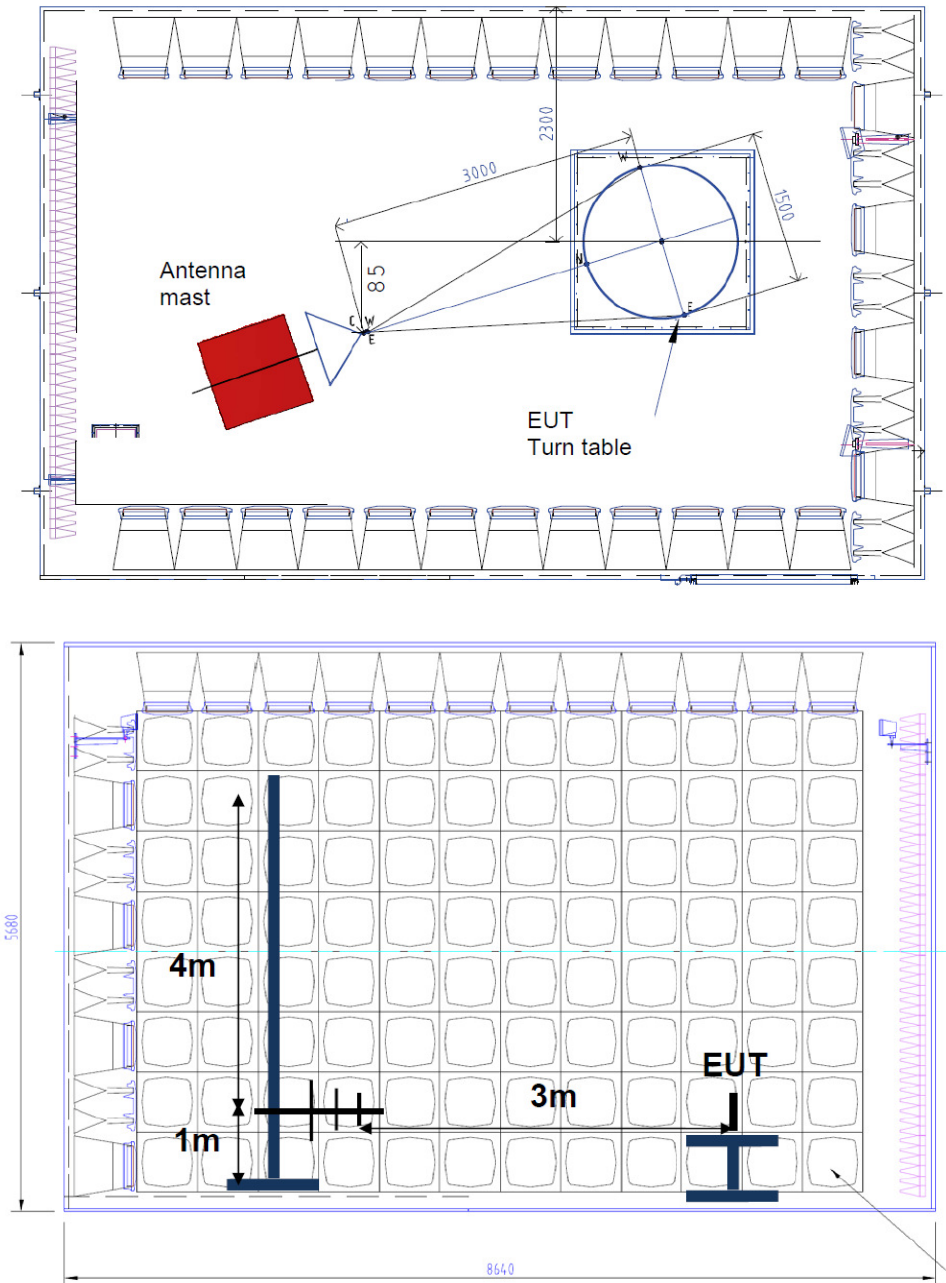
Technician / Tecnico: Loris Fruch		
Table No.	TEST: Spurious Radiated Emissions and Restricted Bands of Operation, Section 15.209 and 15.205	\
Method	ANSI C63.4: 2009-09, Par. 8	\
Parameters required prior to the test	Laboratory Ambient Temperature	18 to 28 °C
	Relative Humidity	20 to 90 %
Parameters recorded during the test	Laboratory Ambient Temperature	20 °C
	Relative Humidity	66 %
Supplementary information: - EUT operating mode 1 (see the applicable cited test plan). Test site: Semi-anechoic chamber; - The EUT was placed on turn-platform on a dielectric table 0.8m above the ground plane . The EUT was placed 3m apart from the receiving antenna - The turn-platform I rotated from 0° to 360° degrees to determine the position of maximum emission level, in the band 30MHz to 1GHz the antenna height was changed from 1m to 4m to find the highest emission; the receiving antenna was positioned in horizontal and vertical polarization (by means of an automatic procedure computer assisted). - For Radiated spurious emissions, the tests were performed for all data rates and only worst-case results are reported in this report (max hold traces). - The measures were made with WLAN on Channel11 and Data Rate set to 54Mbps. Measures of WLAN harmonics were performed also with WLAN on Channel1 and Data Rate set to 1Mbps (see par.9.3.2); - The measures were repeated after rotation of the EUT around the X, Y, and Z Axis and the worst case results are reported in this report; - The measurements were made with the detector set to PEAK within a IF bandwidth of 200Hz from 9KHz to 150KHz, of 120KHz from 30MHz to 1GHz and of 1000KHz from 1GHz to 25GHz; - Antennas used during measurements: Loop antenna from 9KHz to 30MHz, Bilog antenna from 30MHz to 1GHz, Horn BBHA 9120E from 1GHz to 6GHz, Horn VT84HA20+NK antenna from 6GHz to 8.2GHz, Horn WR90 antenna from 8.2GHz to 12.4GHz, Horn WR62 antenna from 12.4GHz to 18GHz, Horn WR42 antenna from 18GHz to 25GHz; - The measurements with Quasi-Peak/AVE detector were performed only for frequencies for which the Peak values was $\geq$ (limit – 4dB); - It was checked that radiated emissions in the restricted bands (2483.5-2500MHz) comply with the radiated emission limits specified in §15.209(a) (=54dBuV/m) as well. - It was checked that the Band Edge in the restricted band (2483.5 - 2500MHz) comply with the radiated emission limits specified in §15.209(a) (=54dBuV/m). The measures were performed with WLAN (see Channel 11 with the following settings: • protocol “b” on channel 1, 6 and 11 with data rate at 1 and 11Mbps • protocol “g” on channel 1, 6 and 11 with data rate at 6, 24 and 54Mbps • protocol “n” on channel 1, 6 and 11 with data rate at 6.5, 39 and 65Mbps The results measured on EUT N° 13LA0016/01 and are collected at par. 9.3.3; the same measurements were checked on the sample 13LA00163/03 as well (mod .REGATE 10-10-01) with similar results.		

9.1 Apparecchiature utilizzate / Test Equipment Used – Spurious Radiated Emissions and Restricted Bands of Operation

<i>Apparecchiature usate/ Equipment Used</i>	<i>Modello/Model</i>	<i>Costruttore/ Manufacturer</i>	<i>Numero di serie/ Serial Number</i>
EMI Receiver MXE	N9038A	Agilent Technologies	MY51210230
EMI Receiver	ESR	Rohde&Schwarz	101069
Loop Antenna	ALR25M	Electro-Metrics	813
Antenna Bilog	Bilog CBL6111C	Chase	2415
Antenna Horn	BBHA 9120E	Schwarzbeck	198
Antenna Horn	VT84HA20+NK	Vector Telecom	111656030001
Antenna Horn WR90	AMTP-90-20_C-SF	Spin electronics	01-165-12
Antenna Horn WR62	AMTP-62-20_C-SF	Spin electronics	01-165-12
Antenna Horn WR42	AMTP-42-20_C-SF	Spin electronics	01-165-12
PreAmplificatore	SPIN WBPR_01-21-20	SPIN Electronics	01-100-09
PreAmplificatore RF	HP8447F, OPT H64	Hewlett/Packard	3113A07568
RF Cable	S5LL-400	Spin electronics	01-053-12
RF Cable	S5LL-900	Spin electronics	02-053-12
Multi-Device Controller	2090	ETS LINDGREN	81311
Palo d'antenna elettrico	2175	ETS LINDGREN	136028
SAC3 – DC Filter	N6006	ETS-Lindgren (ETSL)	202031
Semi-Anechoic Chamber	-	ETS-Lindgren (ETSL)	5207
DC Power Supply	E3634A	Agilent (AGIL)	MY51070028
CMU Universal Radio Communication Tester (*)	CMU200	Rohde&Schwarz	111416
Access Point (*)	524704	Intellinet	GAP215N16C1800539

(*) auxiliary equipment

9.2 Fotografie del setup / *Photo of the test setup* – Spurious Radiated Emissions and Restricted Bands of Operation



Note: for frequencies from 30MHz to 1GHz the height of receiving antenna was changed from 1m to 4m, for frequencies from 1GHz to 25GHz the height of receiving antenna was fixed to 1m;

9.3 Risultati / Results - Spurious Radiated Emissions and Restricted Bands of Operation

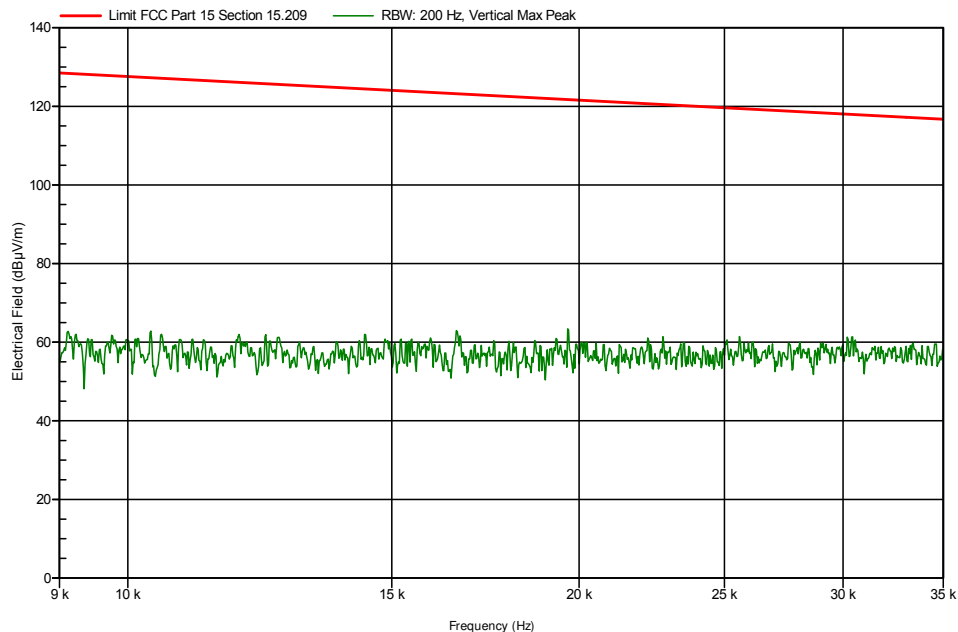
The result of the test is: **PASS**. See the details in the charts/tables of the following paragraphs.

9.3.1 Tabelle e grafici dei risultati / Tables and graphical representation data – Spurious Radiated Emissions and Restricted Bands of Operation

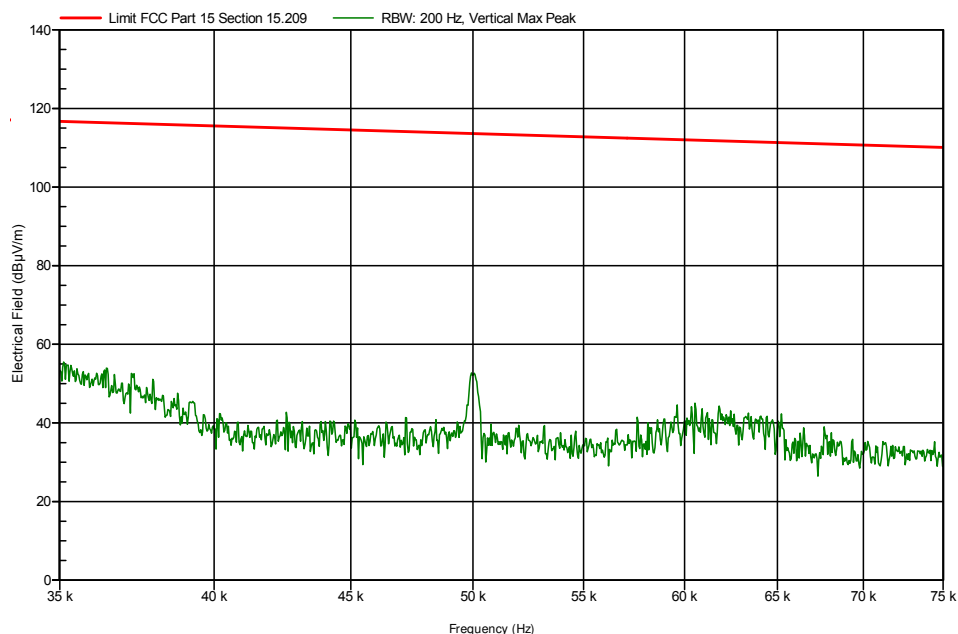
EUT N° 13LA00163/01

(WIFI CH11 at 54Mbps) Y Axis

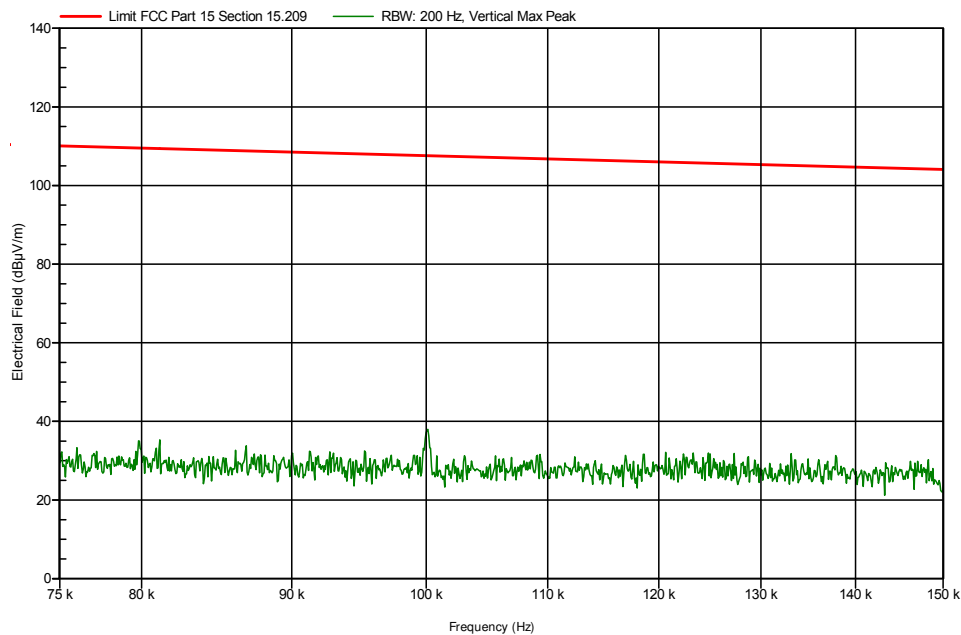
Emissions measured from 9KHz to 35KHz. Peak detector with IF=200Hz.



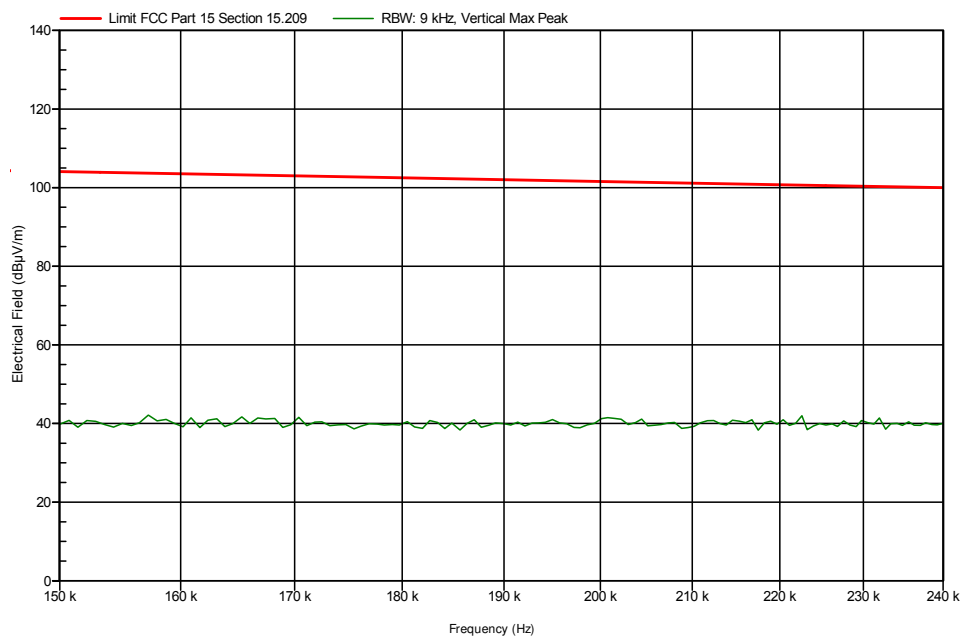
Emissions measured from 35KHz to 75KHz. Peak detector with IF=200Hz.



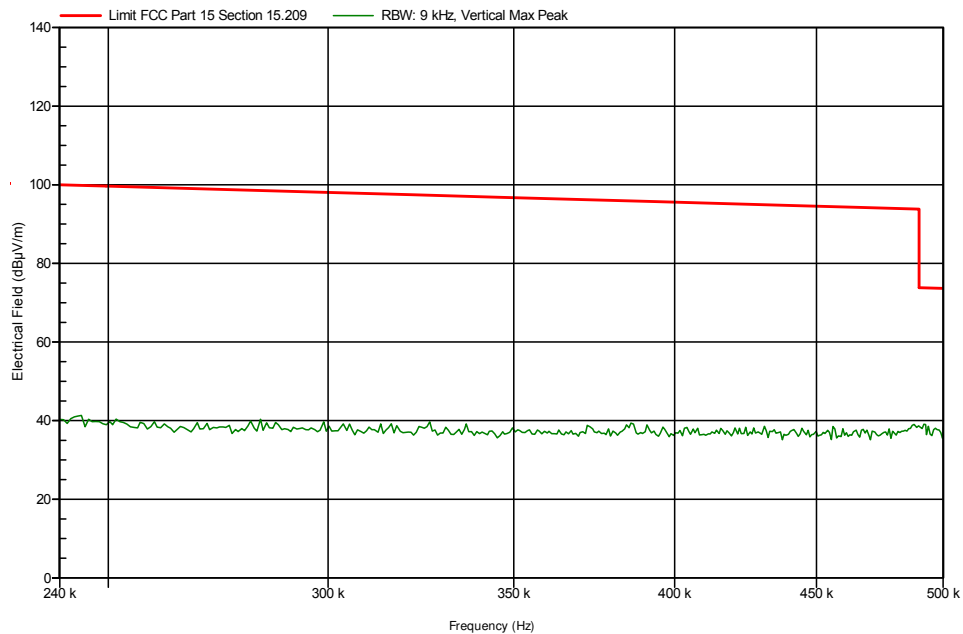
Emissions measured from 75KHz to 150KHz. Peak detector with IF=200Hz.



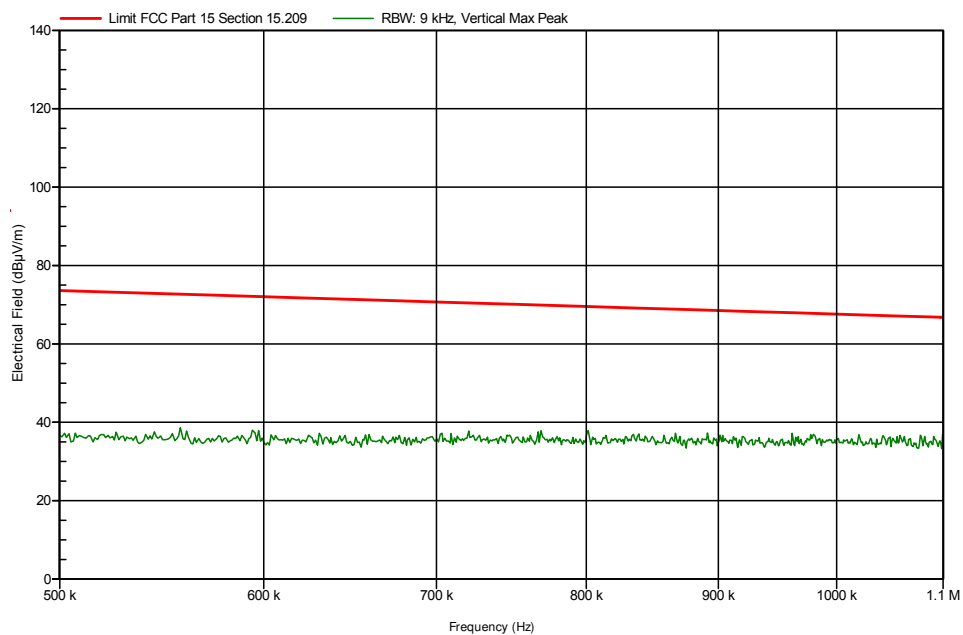
Emissions measured from 150KHz to 240KHz. Peak detector with IF=9KHz.



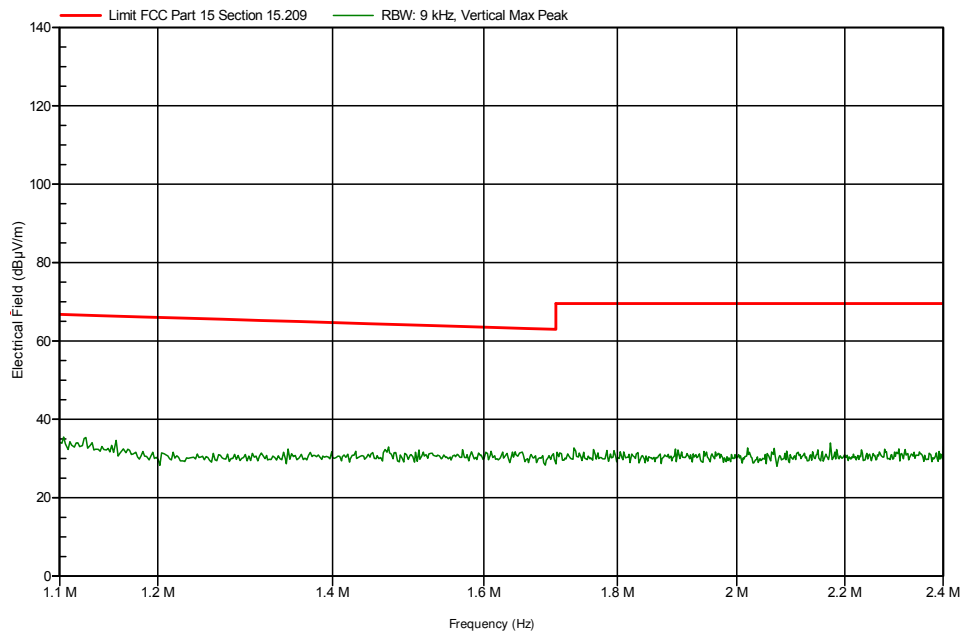
Emissions measured from 240KHz to 500KHz. Peak detector with IF=9KHz.



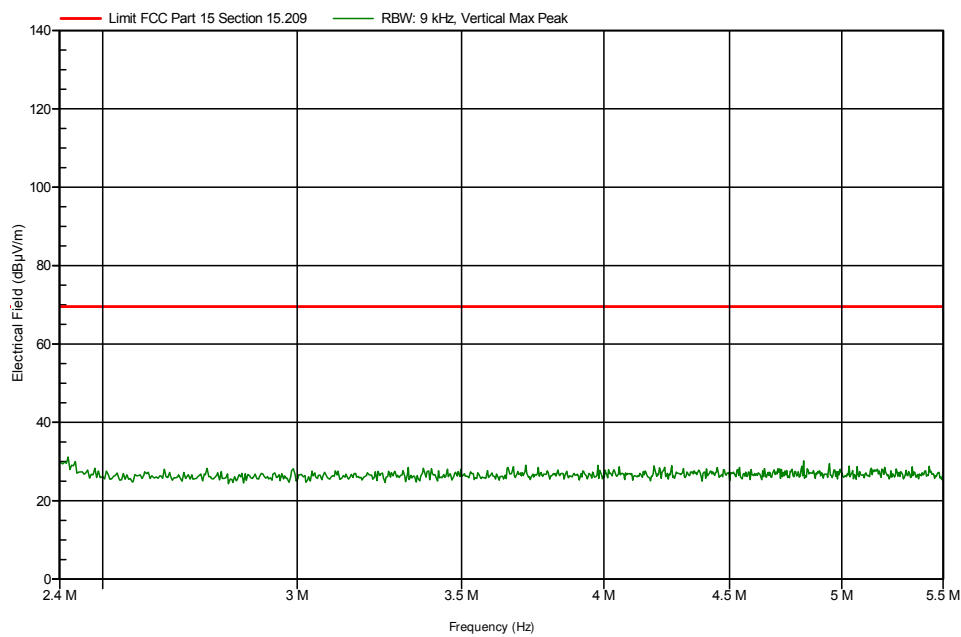
Emissions measured from 500KHz to 1.1MHz. Peak detector with IF=9KHz.



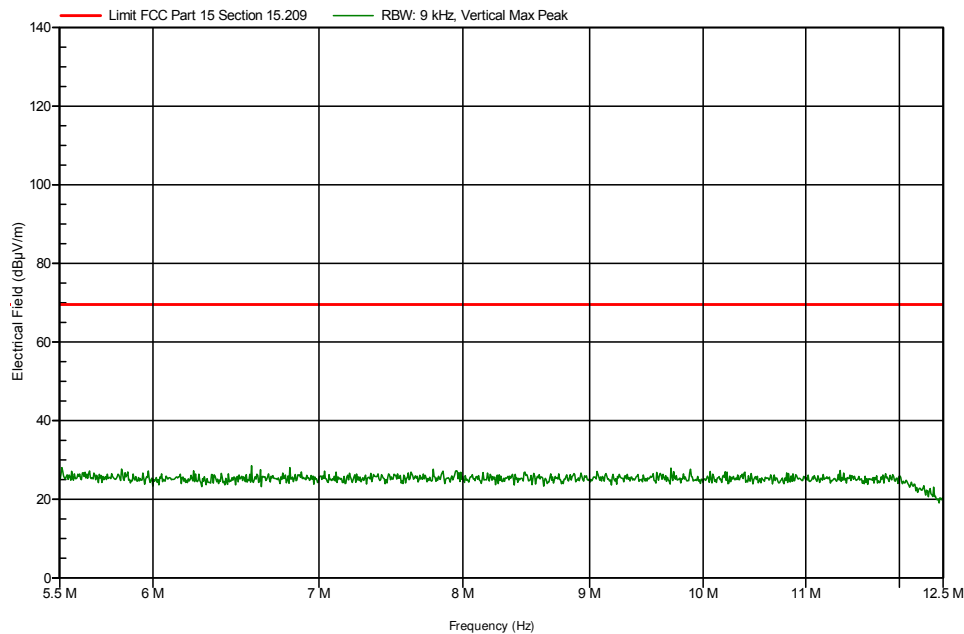
Emissions measured from 1.1MHz to 2.4MHz. Peak detector with IF=9KHz.



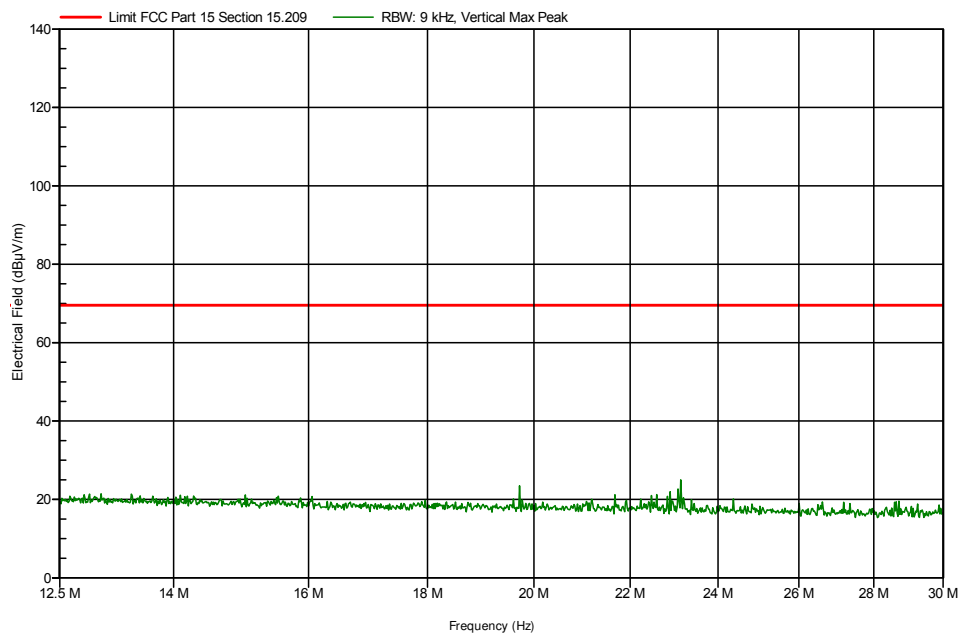
Emissions measured from 2.4MHz to 5.5MHz. Peak detector with IF=9KHz.



Emissions measured from 5.5MHz to 12.5MHz. Peak detector with IF=9KHz.



Emissions measured from 12.5MHz to 30MHz. Peak detector with IF=9KHz.



EUT N° 13LA00163/03:

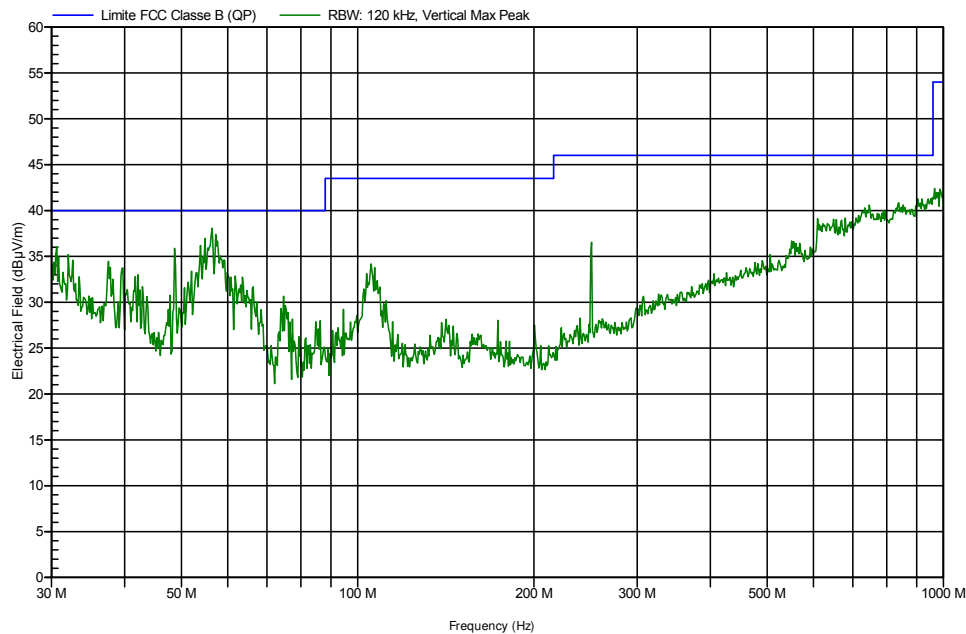
No emissions detected above noise level as per sample N° 13LA00163/01.

Measures from 30MHz to 1GHz

EUT N° 13LA00163/01

(WIFI CH11 at 54Mbps) X Axis

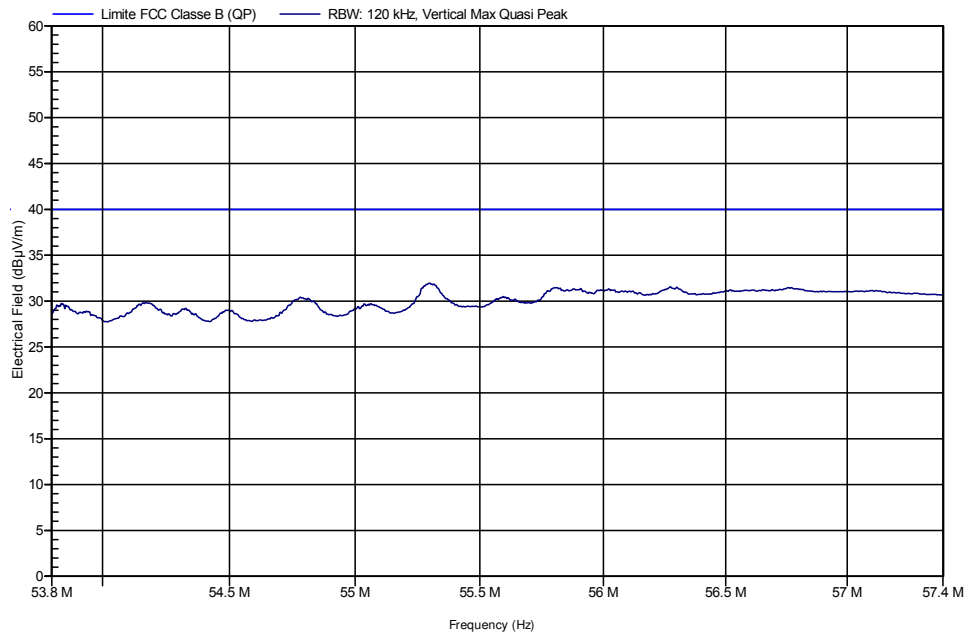
Radiated emissions measured from 30MHz to 1GHz: peak detector (green trace) with Q-Peak limit (blue line). Vertical polarization.



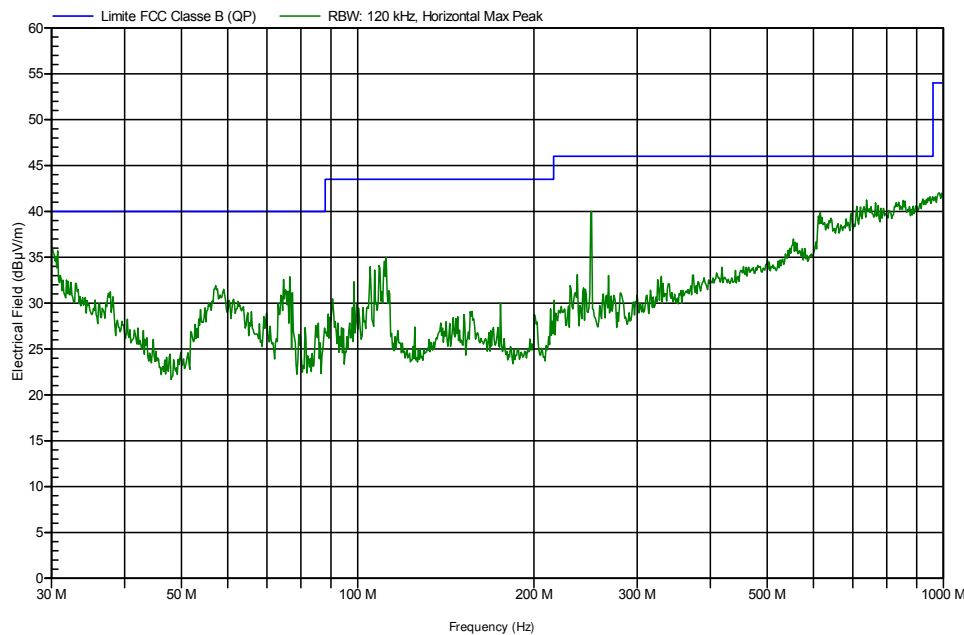
Signals at 4dB from the limit, maximized and re-measured with peak and quasi-peak detector

Frequency	Peak	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Status
30.534 MHz	38.31 dBμV/m	31.74 dBμV/m	40 dBμV/m	-8.26 dB	Pass

Emission measured from 53.8MHz to 57.4MHz with antenna 1m high and EUT at 344 degrees. Quasi-peak detector (blue trace) with Q-Peak limit (blue line).



Radiated emissions measured from 30MHz to 1GHz: peak detector (green trace) with Q-Peak limit (blue line). Horizontal polarization.

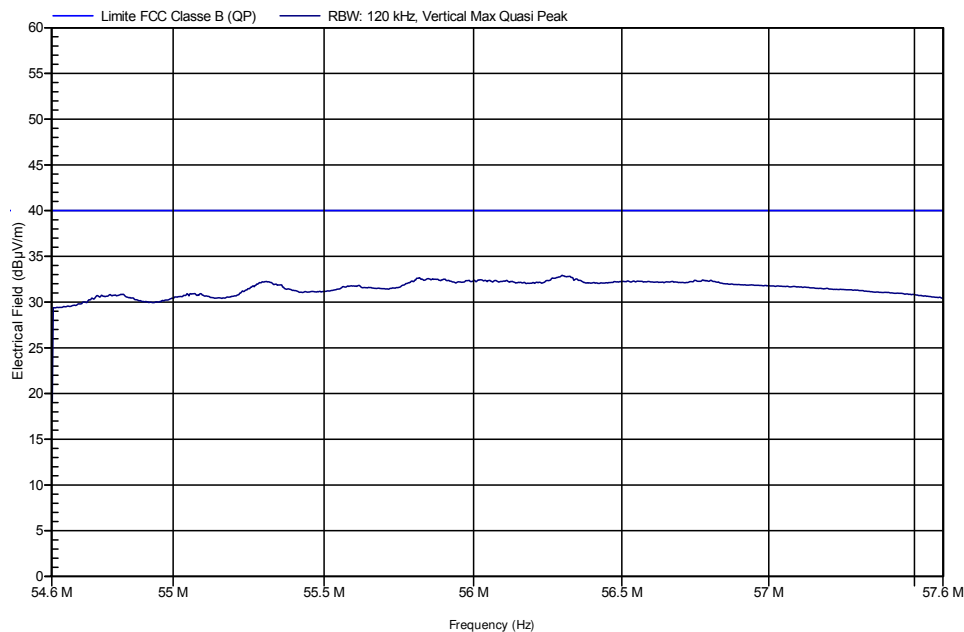


(WIFI CH11 at 54Mps) Y Axis

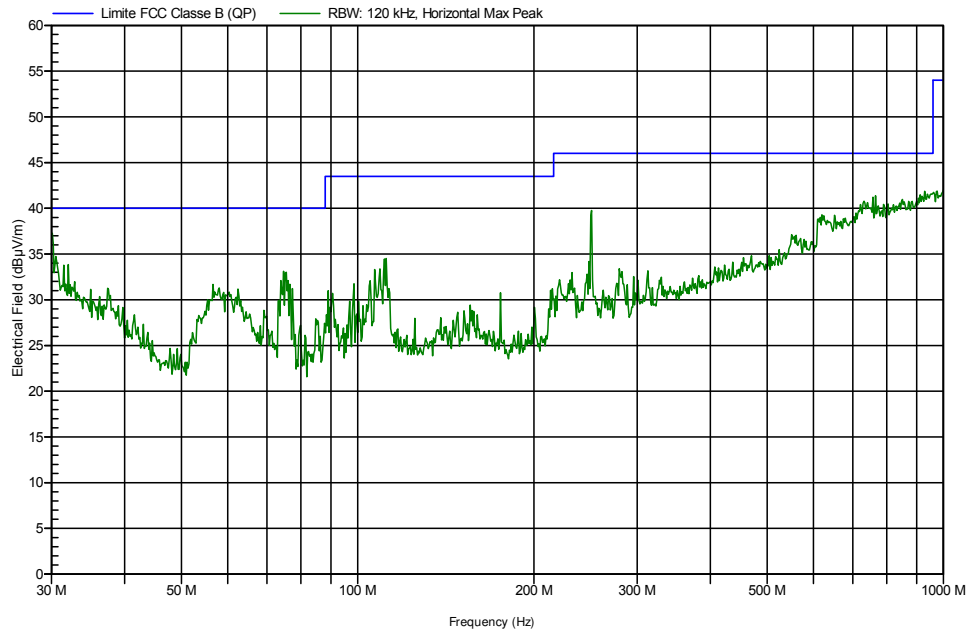
Radiated emissions measured from 30MHz to 1GHz: peak detector (green trace) with Q-Peak limit (blue line). Vertical polarization.



Emission measured from 54.6MHz to 57.6MHz with antenna 1m high and EUT at 144 degrees. Quasi-peak detector (blue trace) with Q-Peak limit (blue line).



Radiated emissions measured from 30MHz to 1GHz: peak detector (green trace) with Q-Peak limit (blue line). Horizontal polarization.

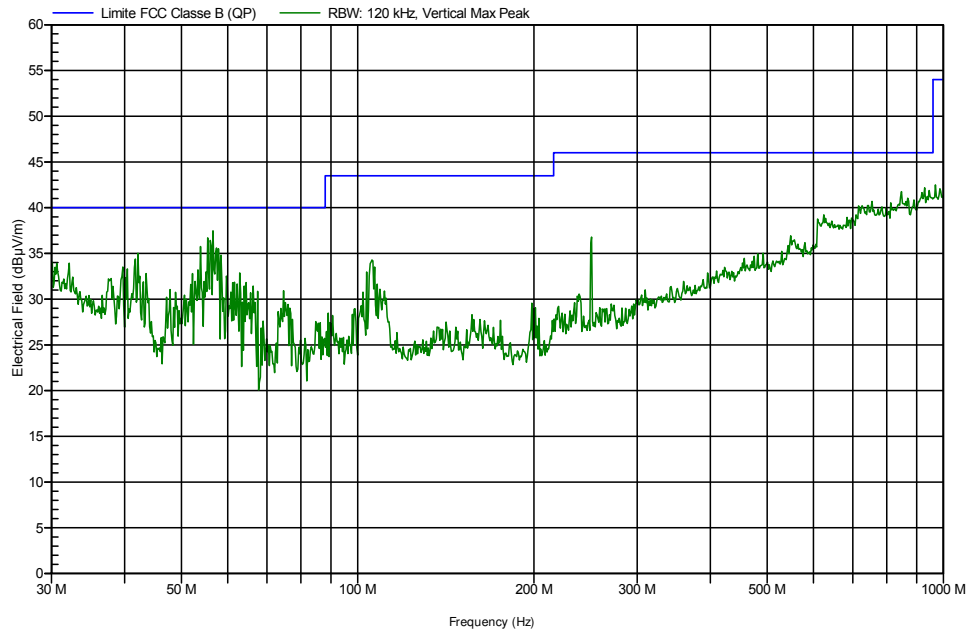


Signals at 4dB from the limit, maximized and re-measured with peak and quasi-peak detector

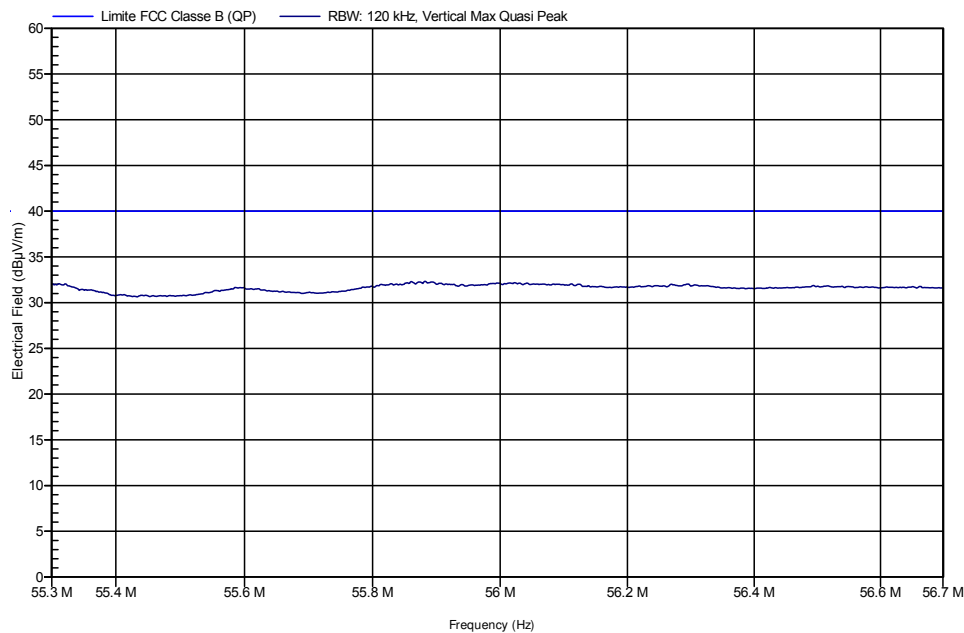
Frequency	Peak	Quasi-Peak	Quasi-PeakLimit	Quasi-Peak Difference	Status
30 MHz	39.75 dBμV/m	33.22 dBμV/m	40 dBμV/m	-6.78 dB	Pass

(WIFI CH11 at 54Mbps) Z Axis

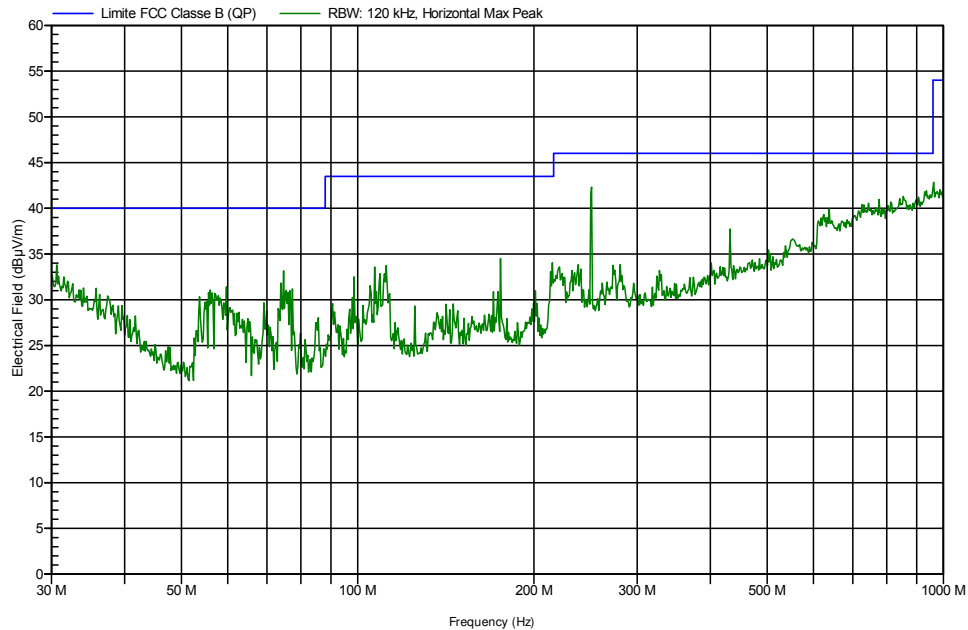
Radiated emissions measured from 30MHz to 1GHz: peak detector (green trace) with Q-Peak limit (blue line). Vertical polarization.



Signals at 4dB from the limit, maximized and re-measured with peak and quasi-peak detector



Radiated emissions measured from 30MHz to 1GHz: peak detector (green trace) with Q-Peak limit (blue line). Horizontal polarization.



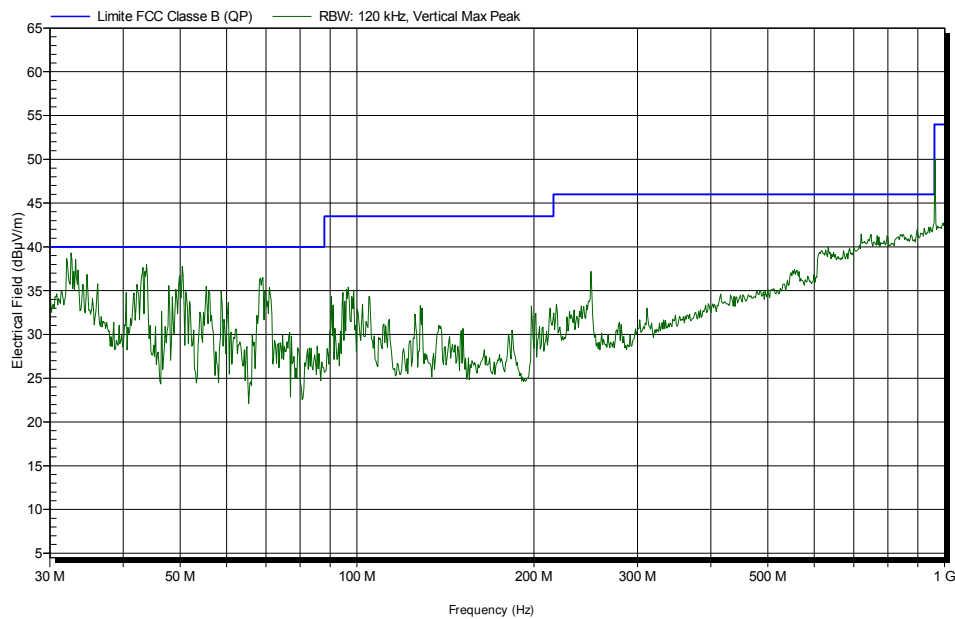
Signals at 4dB from the limit, maximized and re-measured with peak and quasi-peak detector

Frequency	Peak	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Status
250.008 MHz	42.48 dBμV/m	41.6 dBμV/m	46 dBμV/m	-4.4 dB	Pass

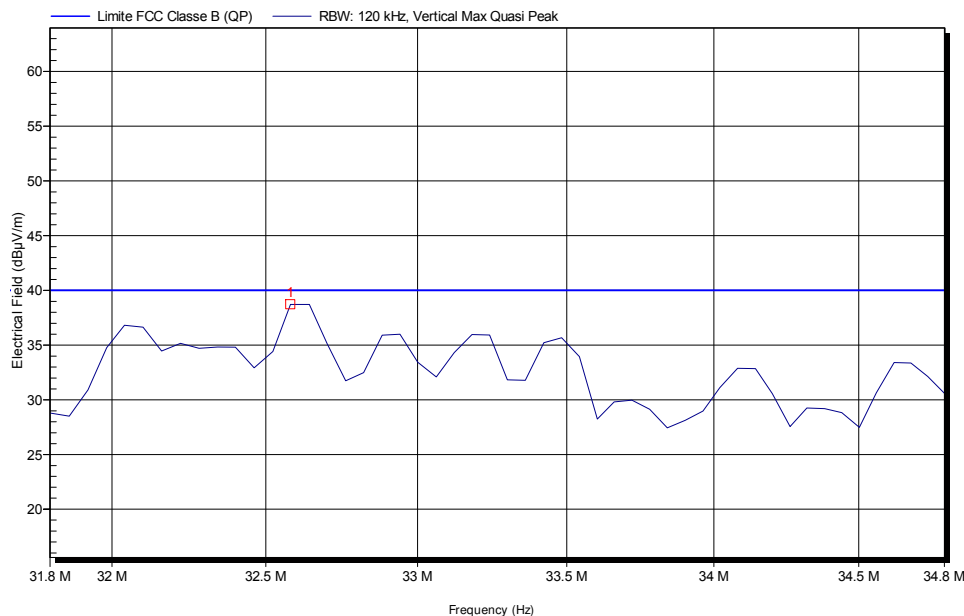
EUT N° 13LA00163/03:

(WIFI CH11 at 54Mbps) Y Axis

Radiated emissions measured from 30MHz to 1GHz: peak detector (green trace) with Q-Peak limit (blue line). Vertical polarization.



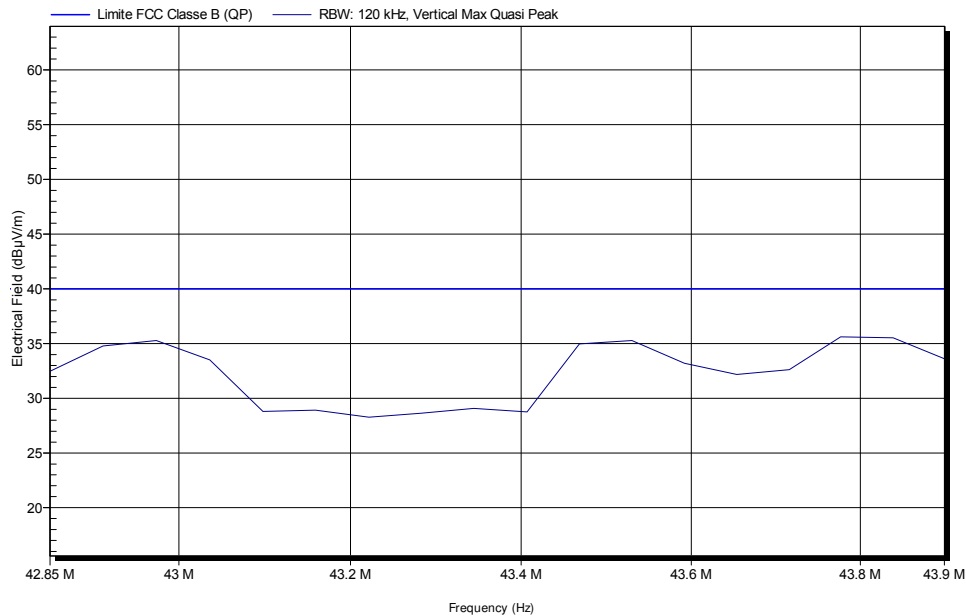
Emission measured from 31.8MHz to 34.8MHz with antenna 1m high and EUT at 144 degrees. Quasi-peak detector (blue trace) with Q-Peak limit (blue line).



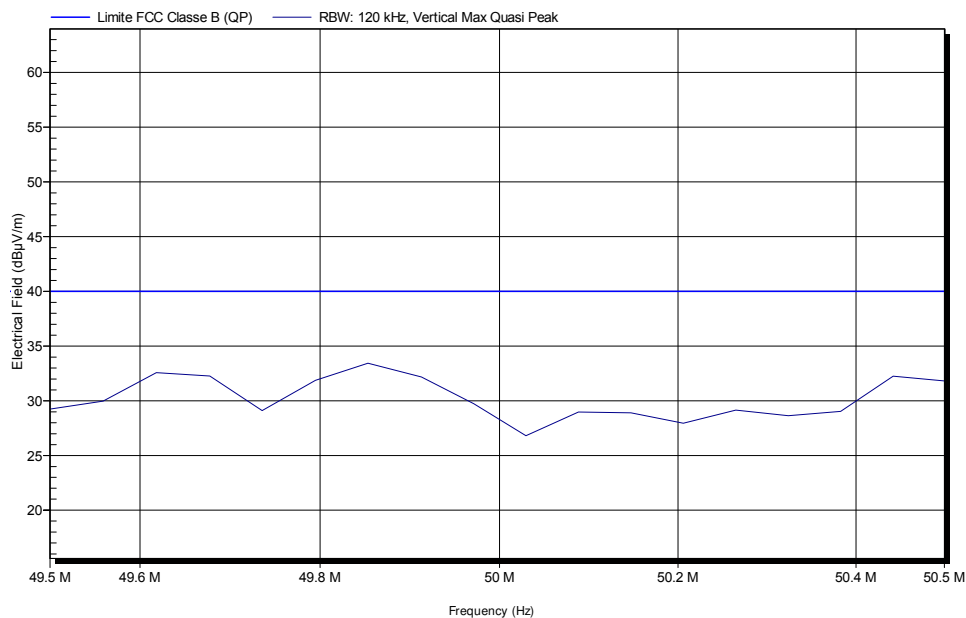
Signal list

Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Status
32.58 MHz	38.73 dBμV/m	40 dBμV/m	-1.27 dB	Pass

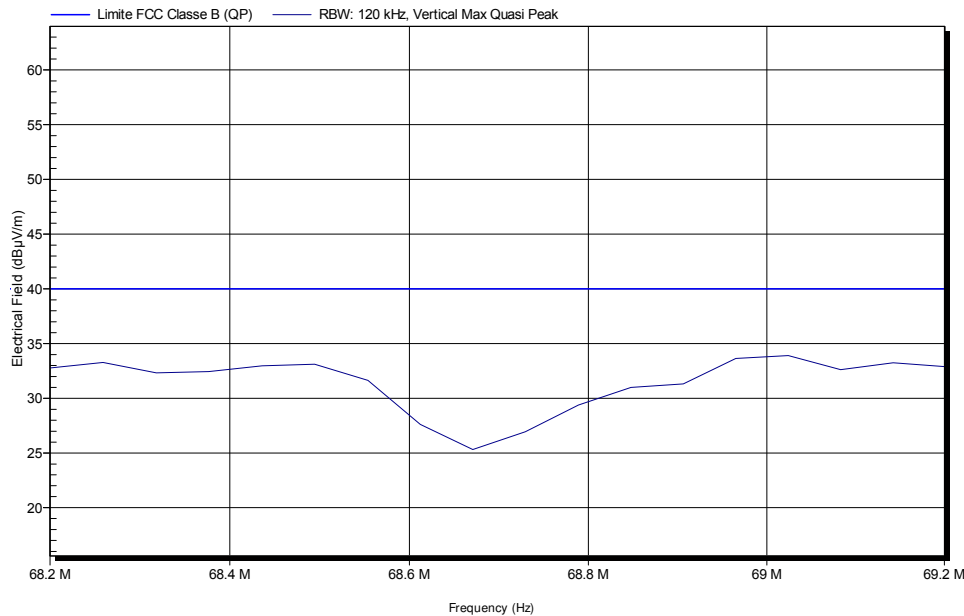
Emission measured from 42.85MHz to 43.9MHz with antenna 1m high and EUT at 216 degrees. Quasi-peak detector (blue trace) with Q-Peak limit (blue line).



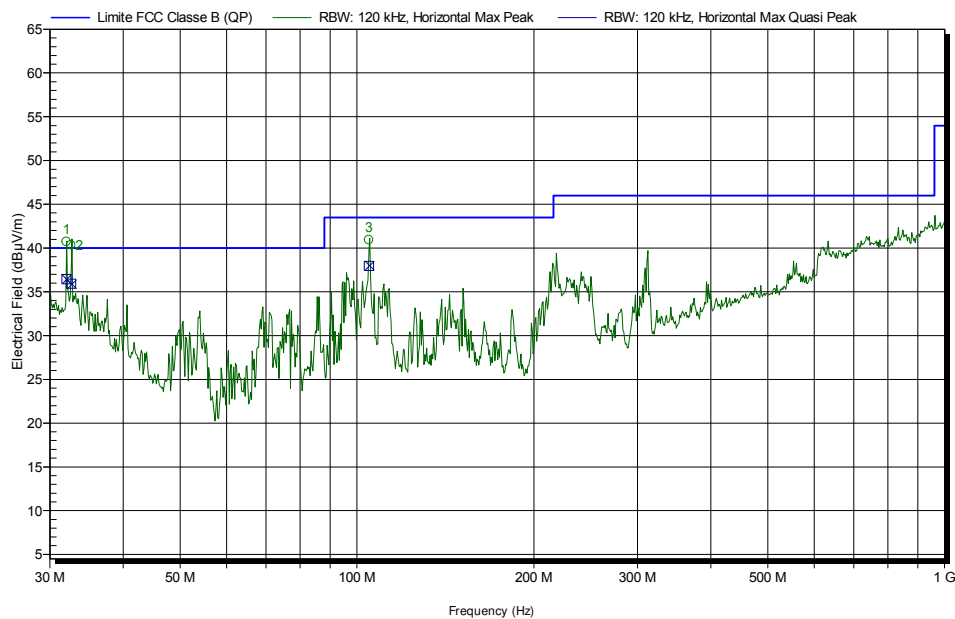
Emission measured from 49.5MHz to 50.5MHz with antenna 1m high and EUT at 288 degrees. Quasi-peak detector (blue trace) with Q-Peak limit (blue line).



Emission measured from 68.2MHz to 69.2MHz with antenna 1.42m high and EUT at 108 degrees. Quasi-peak detector (blue trace) with Q-Peak limit (blue line).



Radiated emissions measured from 30MHz to 1GHz: peak detector (green trace) with Q-Peak limit (blue line). Horizontal polarization.



Signals at 4dB from the limit, maximized and re-measured with peak and quasi-peak detector

Frequency	Peak	Quasi-Peak	Quasi-Peak Limit	Status	Angle	Height
32.016 MHz	40.72 dBμV/m	36.44 dBμV/m	40 dBμV/m	Pass	42 Degree	2.34 m
32.622 MHz	40.34 dBμV/m	35.93 dBμV/m	40 dBμV/m	Pass	318 Degree	1.75 m
104.747 MHz	40.93 dBμV/m	37.96 dBμV/m	43.5 dBμV/m	Pass	52 Degree	3 m

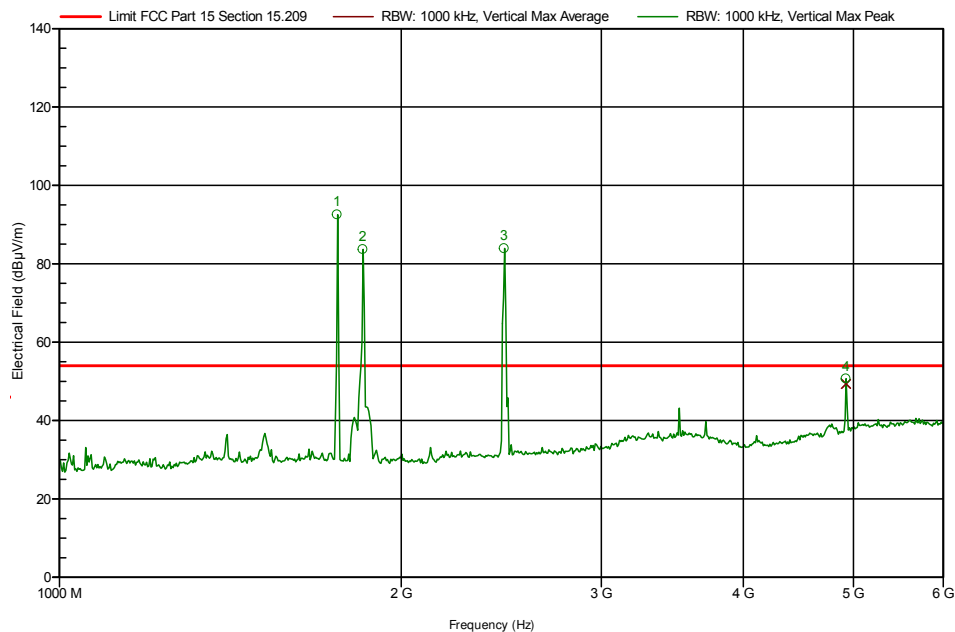
Measures from 1GHz to 6GHz

EUT N° 13LA00163/01:

Note: in the next graphics the signals Nr 1, 2 and 3 are inside of the GSM the exclusion band and respectively for GSM (1.756GHz, 1.85GHz and 2.461GHz)

(WIFI CH11 at 54Mbps) Y Axis

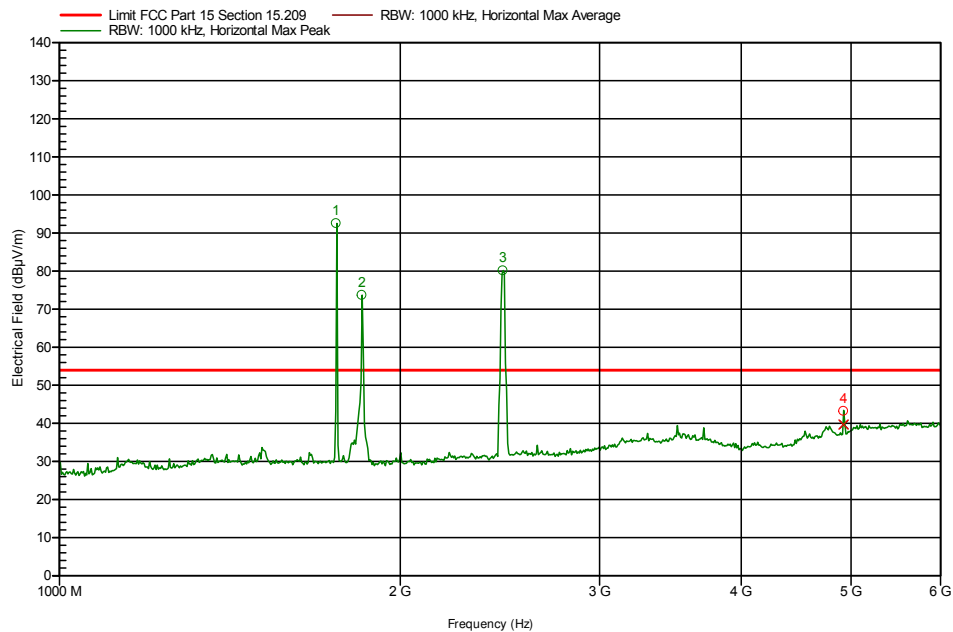
Radiated emissions measured from 1GHz to 6GHz: peak detector (green trace) with Average limit (red line). Vertical polarization.



Signals at 4dB from the limit, maximized and re-measured with peak and average detector

Frequency	Peak	Average Limit	Average	Status	Angle	Height	Polarization
4.924 GHz	50.67 dBμV/m	53.98 dBμV/m	49.34 dBμV/m	Pass	360 Degree	100 cm	Vertical

Radiated emissions measured from 1GHz to 6GHz: peak detector (green trace) with Average limit (red line). Horizontal polarization.



Signals at 4dB from the limit, maximized and re-measured with peak and average detector

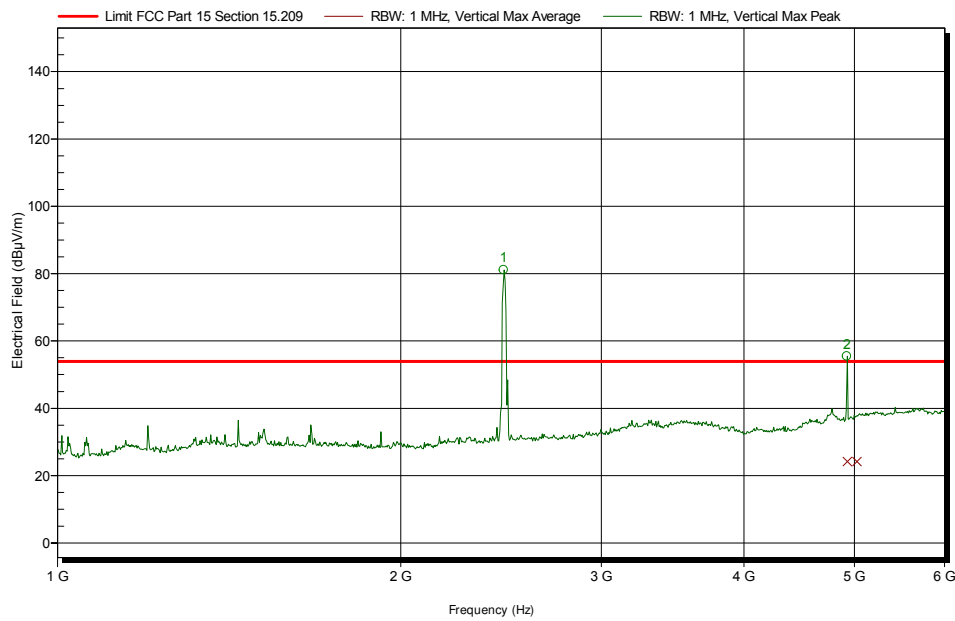
Frequency	Peak	Average	Limit	Average	Status	Angle	Height	Polarization
4.925 GHz	43.23 dBμV/m	53.98 dBμV/m	53.98 dBμV/m	39.69 dBμV/m	Pass	334 Degree	100 cm	Horizontal

EUT N° 13LA00163/03:

Note: in the next graphics the signals on marker Nr 1 is inside of the WLAN exclusion band (2.462GHz)

(WIFI CH11 at 54Mbps) Y Axis

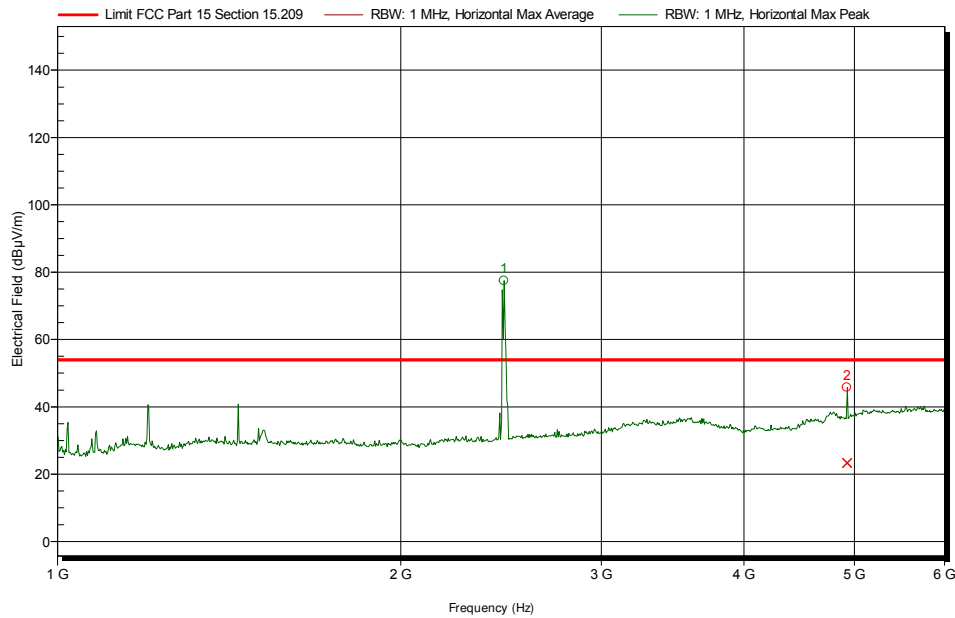
Radiated emissions measured from 1GHz to 6GHz: peak detector (green trace) with Average limit (red line). Vertical polarization.



Signals at 4dB from the limit, maximized and re-measured with peak and average detector

Frequency	Peak	Average	Average Limit	Status	Angle
4.924 GHz	55.45 dBμV/m	24.18 dBμV/m	53.98 dBμV/m	Pass	350 Degree

Radiated emissions measured from 1GHz to 6GHz: peak detector (green trace) with Average limit (red line). Horizontal polarization.



Signals at 4dB from the limit, maximized and re-measured with peak and average detector

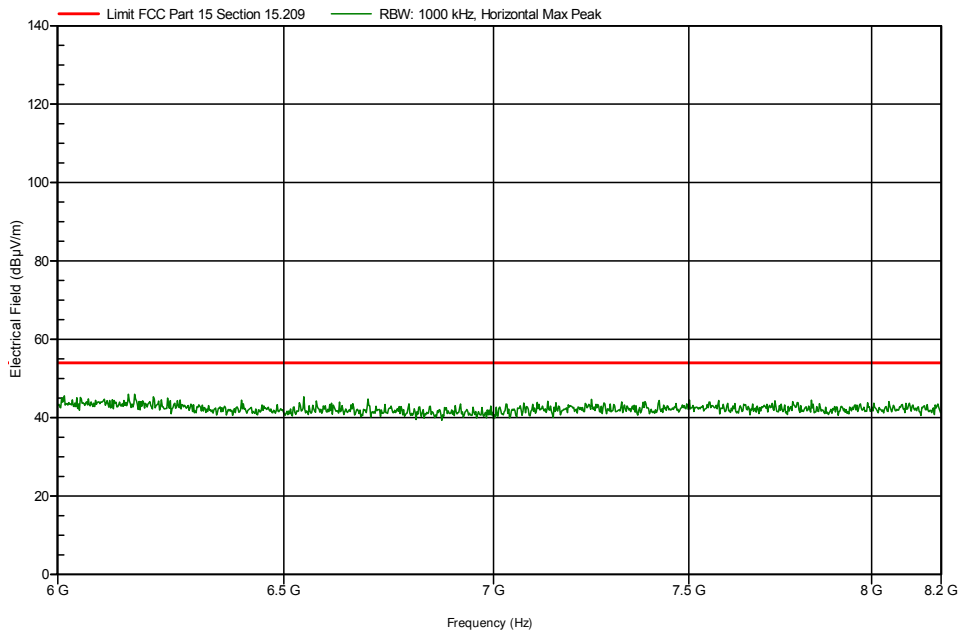
Frequency	Peak	Average	Average Limit	Status	Angle
4.924 GHz	45.82 dBμV/m	23.31 dBμV/m	53.98 dBμV/m	Pass	360 Degree

Measures from 6GHz to 8.2GHz

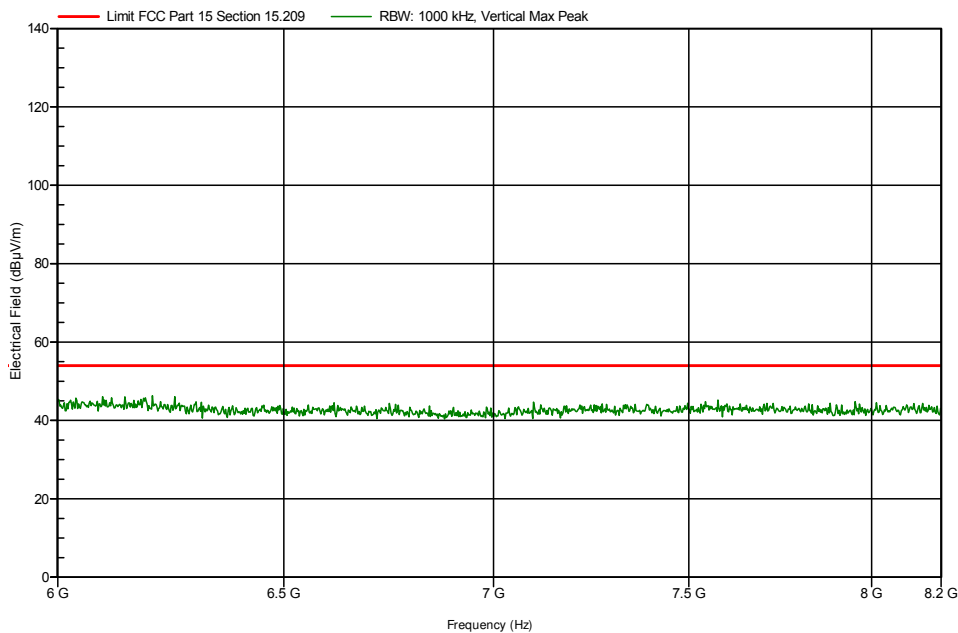
EUT N° 13LA00163/01:

(WIFI CH11 at 54Mps) Z Axis

Radiated emissions measured from 6GHz to 8.2GHz: peak detector (green trace) with Average limit (red line). Vertical polarization.



Radiated emissions measured from 6GHz to 8.2GHz: peak detector (green trace) with Average limit (red line). Horizontal polarization.



EUT N° 13LA00163/03:

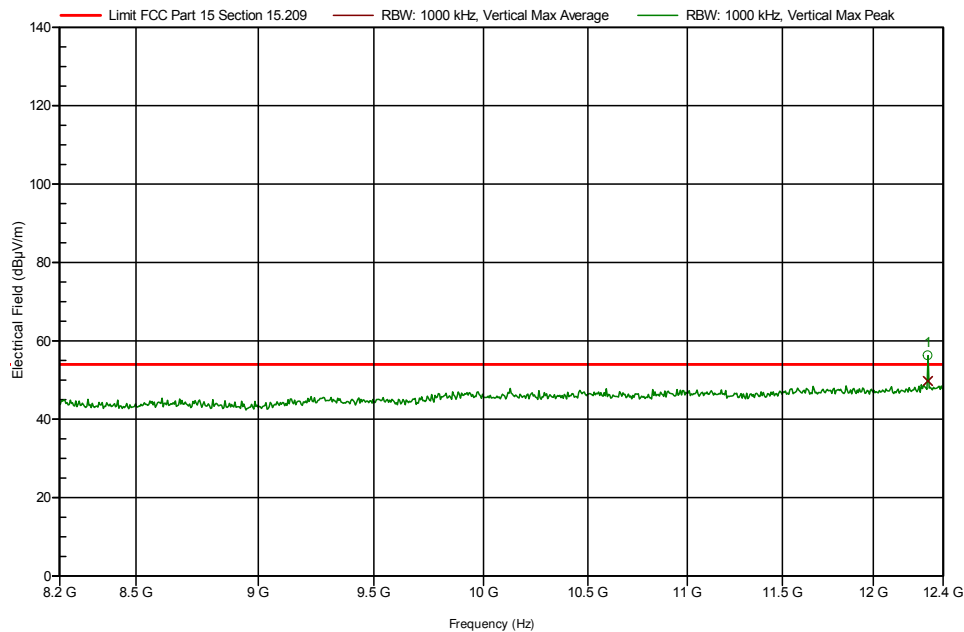
No emissions were detected above the noise level as per EUT N° 13LA00163/01.

Measures from 8.2GHz to 12.4GHz

EUT N° 13LA00163/01:

(WIFI CH11 at 54Mbps) Z Axis

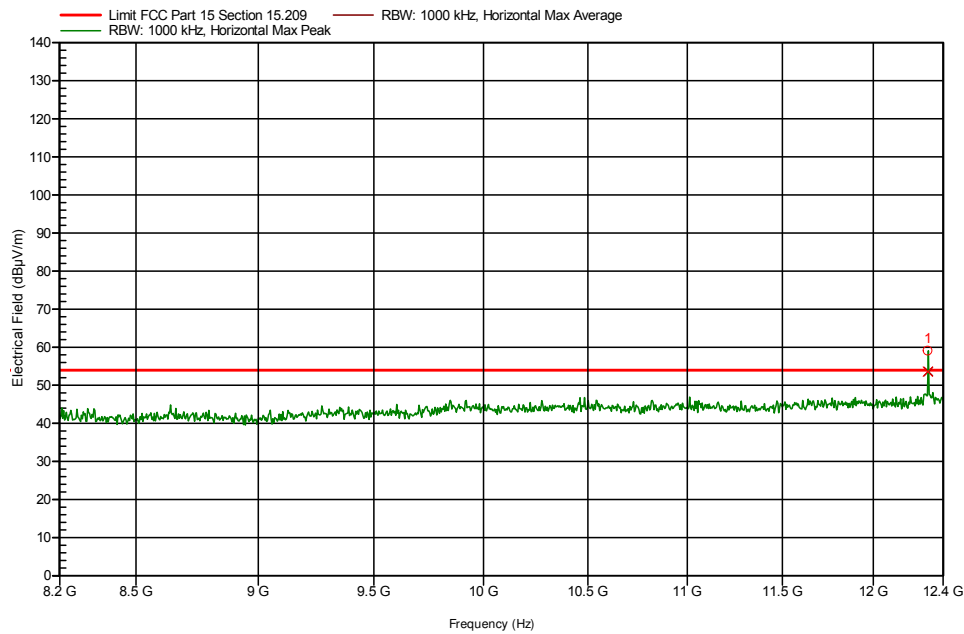
Radiated emissions measured from 8.2GHz to 12.4GHz: peak detector (green trace) with Average limit (red line). Vertical polarization.



Signals at 4dB from the limit, maximized and re-measured with peak and average detector

Frequency	Peak	Average	Limit	Average	Status	Angle	Height	Polarization
12.31 GHz	56.24 dBμV/m	53.98 dBμV/m	49.75 dBμV/m	Pass	360Degree	100 cm	Vertical	

Radiated emissions measured from 8.2GHz to 12.4GHz: peak detector (green trace) with Average limit (red line). Horizontal polarization.



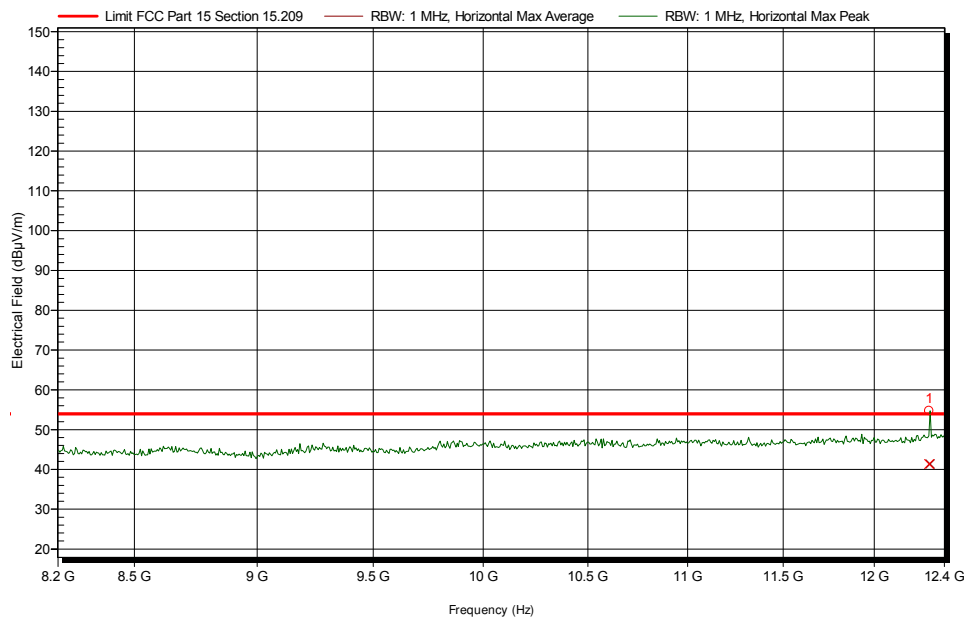
Signals at 4dB from the limit, maximized and re-measured with peak and average detector

Frequency	Peak	Average Limit	Average	Status	Angle	Height	Polarization
12.31 GHz	59.05 dBuV/m	53.98 dBuV/m	53.61 dBuV/m	Pass	360Degree	100 cm	Horizontal

EUT N° 13LA00163/03:

(WIFI CH11 at 54Mbps) Z Axis

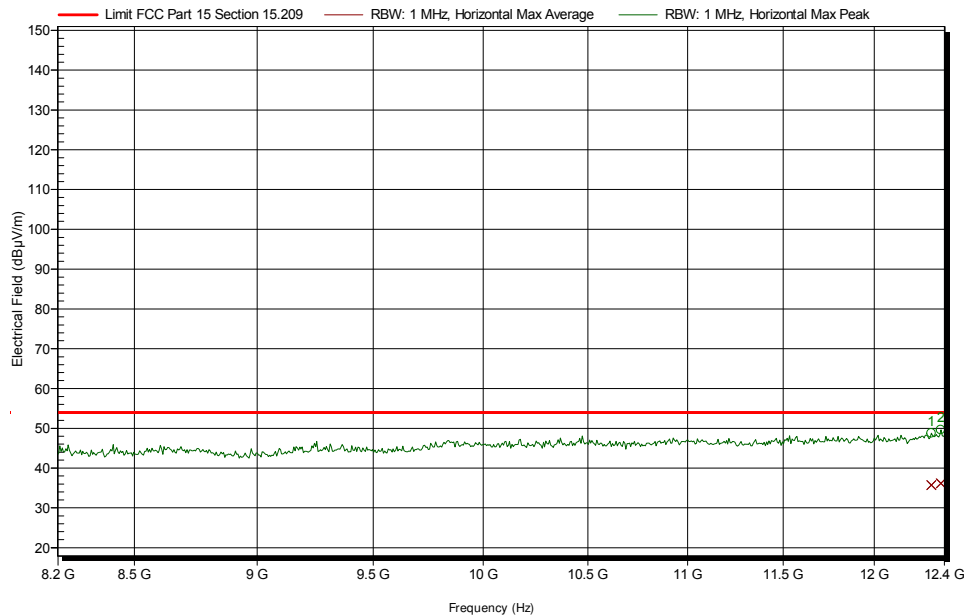
Radiated emissions measured from 8.2GHz to 12.4GHz: peak detector (green trace) with Average limit (red line). Vertical polarization.



Signals at 4dB from the limit, maximized and re-measured with peak and average detector

Frequency	Peak	Average	Average Limit	Status	Angle
12.31 GHz	54.7 dBμV/m	41.35 dBμV/m	53.98 dBμV/m	Pass	324 Degree

Radiated emissions measured from 8.2GHz to 12.4GHz: peak detector (green trace) with Average limit (red line). Horizontal polarization.



Signals at 4dB from the limit, maximized and re-measured with peak and average detector

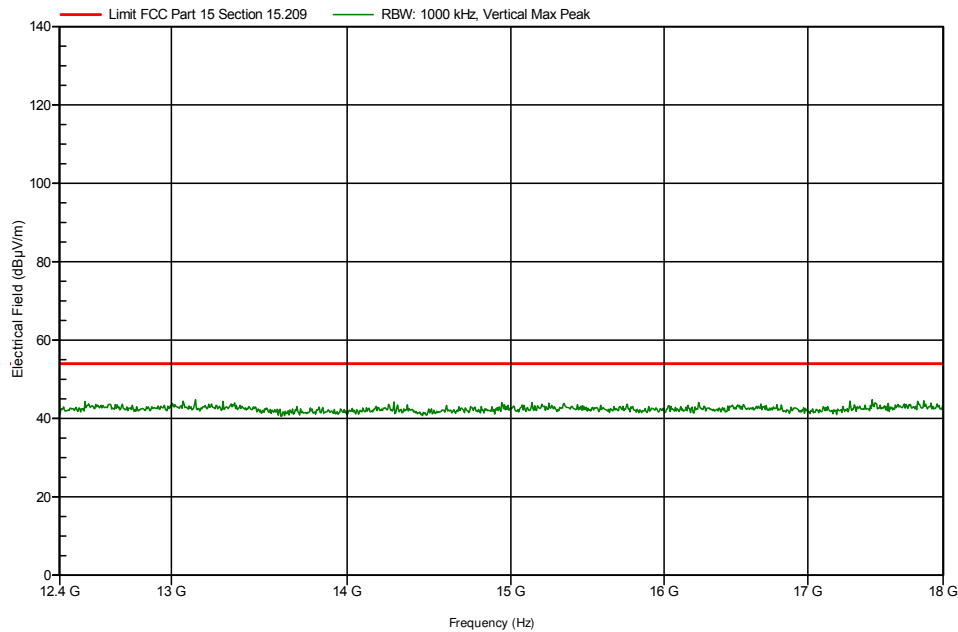
Frequency	Peak	Average	Average Limit	Status	Angle
12.323 GHz	48.8 dBμV/m	35.69 dBμV/m	53.98 dBμV/m	Pass	216 Degree
12.377 GHz	49.59 dBμV/m	36.15 dBμV/m	53.98 dBμV/m	Pass	180 Degree

Measures from 12.4GHz to 18GHz

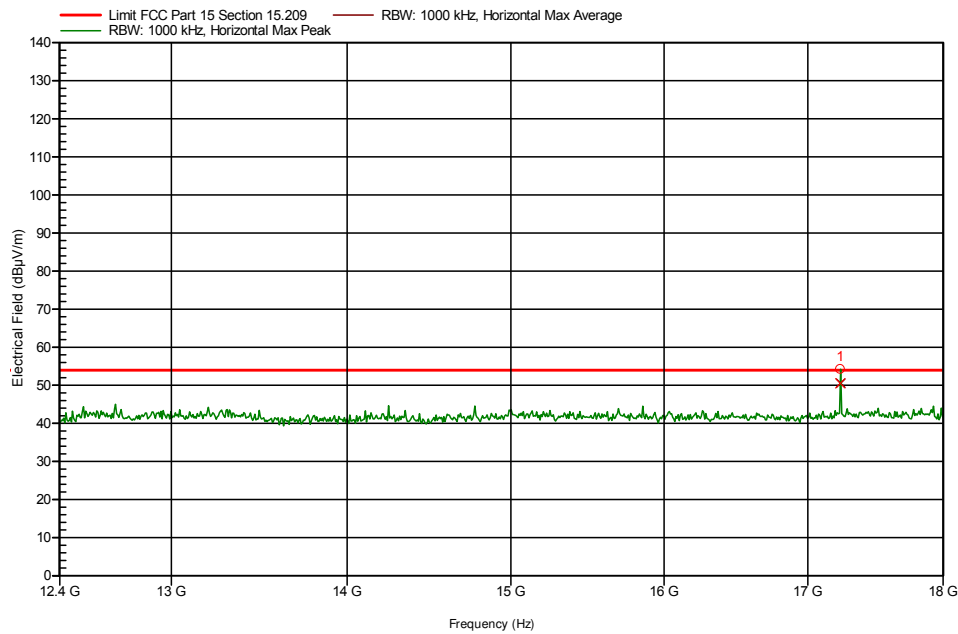
EUT N° 13LA00163/01:

(WIFI CH11 at 54Mbps) Z Axis

Radiated emissions measured from 12.4GHz to 18GHz: peak detector (green trace) with Average limit (red line). Vertical polarization.



Radiated emissions measured from 12.4GHz to 18GHz: peak detector (green trace) with Average limit (red line). Horizontal polarization.



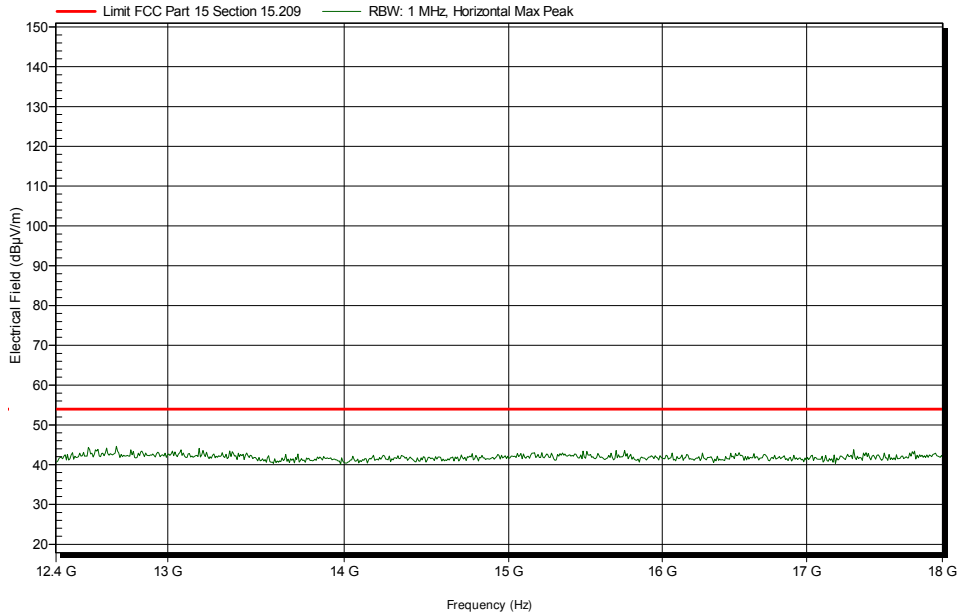
Signals at 4dB from the limit, maximized and re-measured with peak and average detector

Frequency	Peak	Average Limit	Average	Status	Angle	Height	Polarization
17.234 GHz	54.23 dBuV/m	53.98 dBuV/m	50.53 dBuV/m	Pass	360 Degree	100 cm	Horizontal

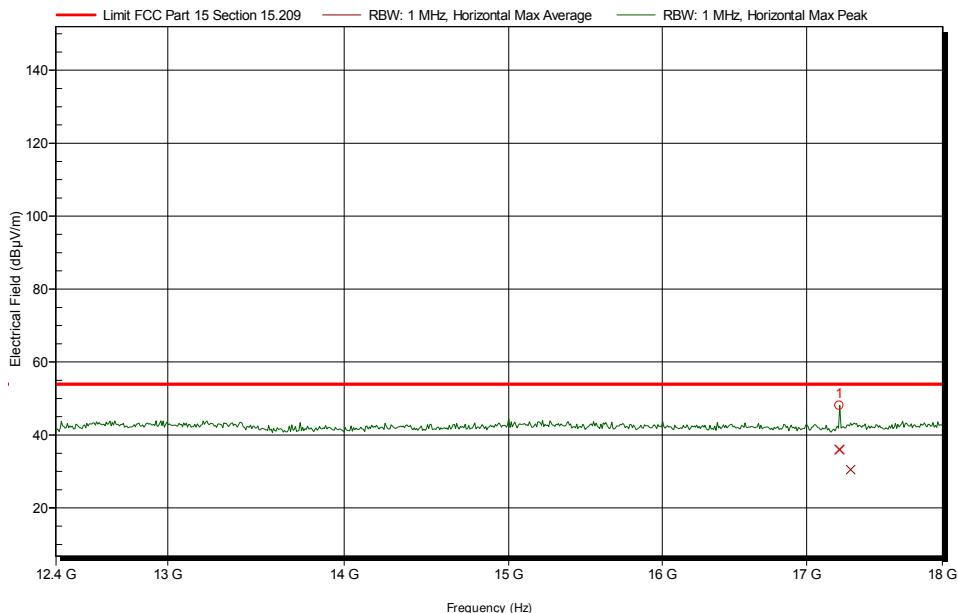
EUT N° 13LA00163/03:

(WIFI CH11 at 54Mbps) Z Axis

Radiated emissions measured from 12.4GHz to 18GHz: peak detector (green trace) with Average limit (red line). Vertical polarization.



Radiated emissions measured from 12.4GHz to 18GHz: peak detector (green trace) with Average limit (red line). Horizontal polarization.



Signals at 4dB from the limit, maximized and re-measured with peak and average detector

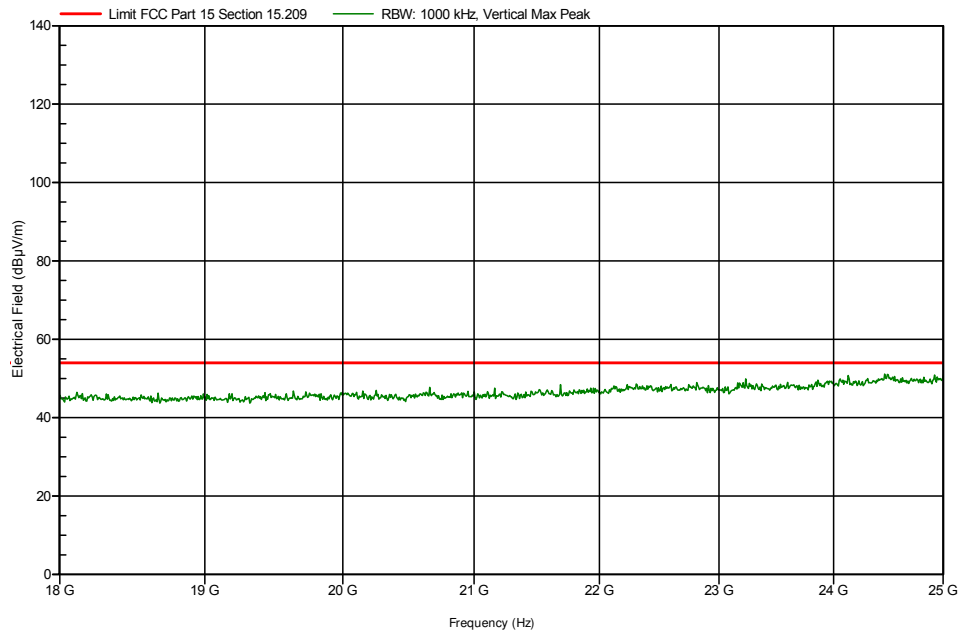
Frequency	Peak	Average	Average Limit	Status	Angle
17.234 GHz	48.07 dBμV/m	36.03 dBμV/m	53.98 dBμV/m	Pass	72 Degree

Measures from 18GHz to 25GHz

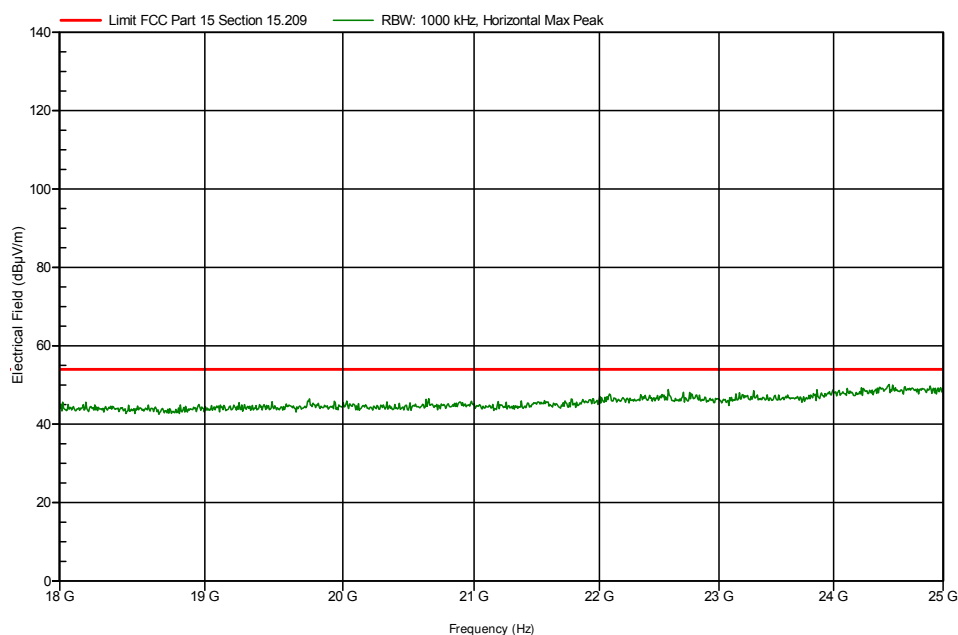
EUT N° 13LA00163/01:

(WIFI CH11 at 54Mbps) Z Axis

Radiated emissions measured from 18GHz to 25GHz: peak detector (green trace) with Average limit (red line). Vertical polarization.



Radiated emissions measured from 18GHz to 25GHz: peak detector (green trace) with Average limit (red line). Horizontal polarization.



EUT N° 13LA00163/03:

No emissions detected above noise level, as per EUT N° 13LA00163/01.

9.3.2 Table of measured WLAN harmonics

Data Rate (Mbps)	Channel	Polarization	Detector	Frequency (MHz)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	1	V	Peak	2412	-	-	-
			Average	2412	-	-	-
			Peak	4824	43.7	-	-
			Average	4824	41.2	54	12.8
			Peak	12060	53.5	-	-
			Average	12060	49.3	54	4.7
			Peak	16884	53.7	-	-
			Average	16884	49.0	54	5.0
		H	Peak	2412	-	-	-
			Average	2412	-	-	-
			Peak	4824	46.2	-	-
			Average	4824	43.5	54	10.6
			Peak	12060	57.1	-	-
			Average	12060	50.8	54	3.2
			Peak	16884	52.4	-	-
			Average	16884	46.4	54	7.6
	6	V	Peak	2437	-	-	-
			Average	2437	-	-	-
			Peak	4874	44.9	-	-
			Average	4874	42.5	54	11.5
			Peak	12185	52.0	-	-
			Average	12185	48.3	54	5.7
			Peak	17059	48.9	-	-
			Average	17059	44.2	54	9.8
		H	Peak	2437	-	-	-
			Average	2437	-	-	-
			Peak	4874	47.0	-	-
			Average	4874	44.3	54	9.7
			Peak	12185	55.1	-	-
			Average	12185	49.2	54	4.8
			Peak	17059	47.6	-	-
			Average	17059	41.3	54	12.7
	11	V	Peak	2462	-	-	-
			Average	2462	-	-	-
			Peak	4924	42.6	-	-
			Average	4924	37.8	54	16.2
			Peak	12310	54.4	-	-
			Average	12310	49.2	54	4.8
			Peak	17234	52.8	-	-
			Average	17234	46.9	54	7.1
		H	Peak	2462	-	-	-
			Average	2462	-	-	-
			Peak	4924	40.5	-	-
			Average	4924	36.7	54	17.3
			Peak	12310	58.8	-	-
			Average	12310	52.8	54	1.2
			Peak	17234	53.6	-	-
			Average	17234	49.0	54	5.0

Data Rate (Mbps)	Channel	Polarization	Detector	Frequency (MHz)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)
54	1	V	Peak	2412	-	-	-
			Average	2412	-	-	-
			Peak	4824	42.5	-	-
			Average	4824	39.3	54	14.7
			Peak	12060	53.7	-	-
			Average	12060	47.7	54	6.4
			Peak	16884	51.4	-	-
			Average	16884	47.4	54	6.6
		H	Peak	2412	-	-	-
			Average	2412	-	-	-
			Peak	4824	44.4	-	-
			Average	4824	41.6	54	12.4
			Peak	12060	56.9	-	-
			Average	12060	53.5	54	0.5
			Peak	16884	52.3	-	-
			Average	16884	45.9	54	8.1
	6	V	Peak	2437	-	-	-
			Average	2437	-	-	-
			Peak	4874	41.3	-	-
			Average	4874	38.1	54	15.9
			Peak	12185	53.2	-	-
			Average	12185	47.2	54	6.8
			Peak	17059	50.2	-	-
			Average	17059	46.1	54	7.9
		H	Peak	2437	-	-	-
			Average	2437	-	-	-
			Peak	4874	43.1	-	-
			Average	4874	40.8	54	13.2
			Peak	12185	56.4	-	-
			Average	12185	52.9	54	1.1
			Peak	17059	51.2	-	-
			Average	17059	44.8	54	9.3
	11	V	Peak	2462	-	-	-
			Average	2462	-	-	-
			Peak	4924	54.0	-	-
			Average	4924	49.3	54	4.7
			Peak	12310	56.2	-	-
			Average	12310	49.8	54	4.3
		H	Peak	17234	55.1	-	-
			Average	17234	50.1	54	3.9
			Peak	2462	-	-	-
			Average	2462	-	-	-
			Peak	4924	43.2	-	-
			Average	4924	39.7	54	14.3
			Peak	12310	59.1	-	-
			Average	12310	53.6	54	0.4
			Peak	17234	54.2	-	-
			Average	17234	50.5	54	3.5

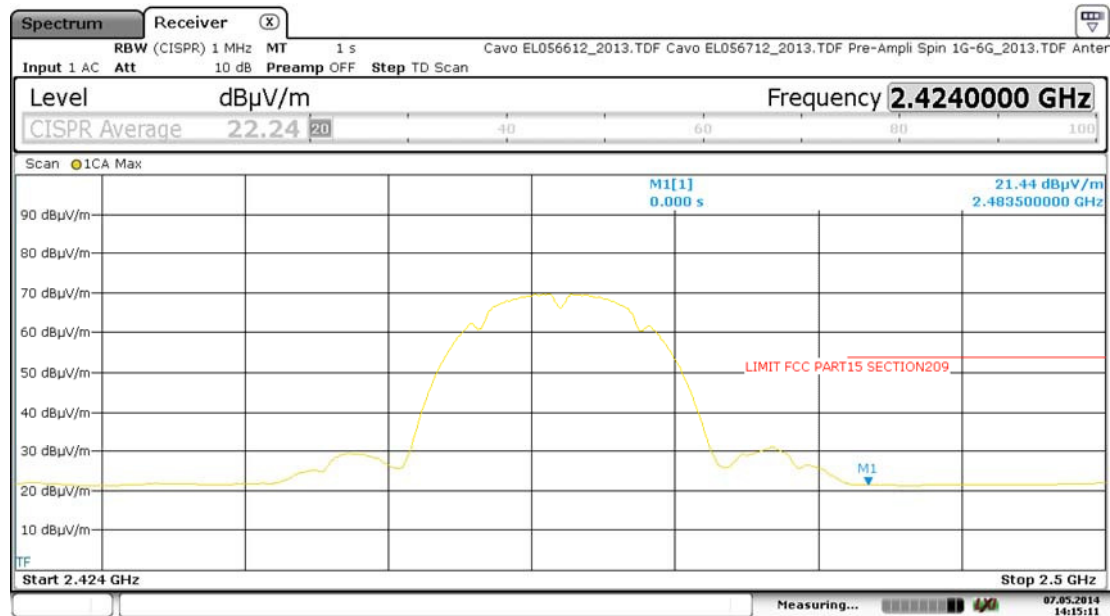
Note: the AVE values reported are the max level registered during tests.

9.3.3 Band Edge measurements - Restricted band of operation

EUT N° 13LA00163/01 (Mod. REGATE 10-10-03):

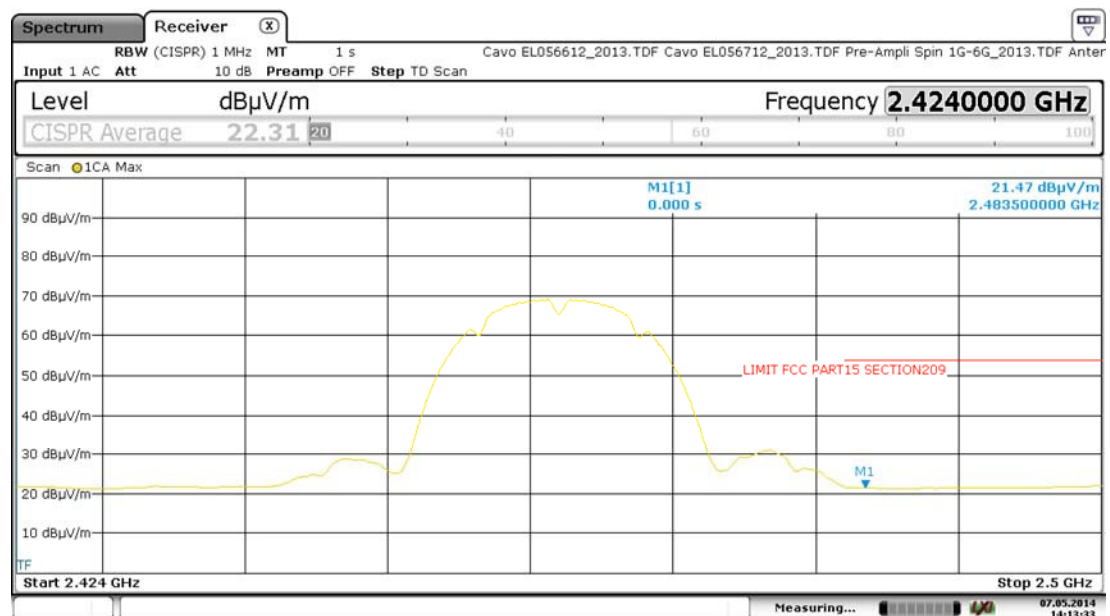
Band Edge measured from 2.424GHz to 2.5GHz: average detector (yellow trace) with average limit (red line). Horizontal polarization.

WIFI channel 11, protocol "b" with data rate at 1Mbps



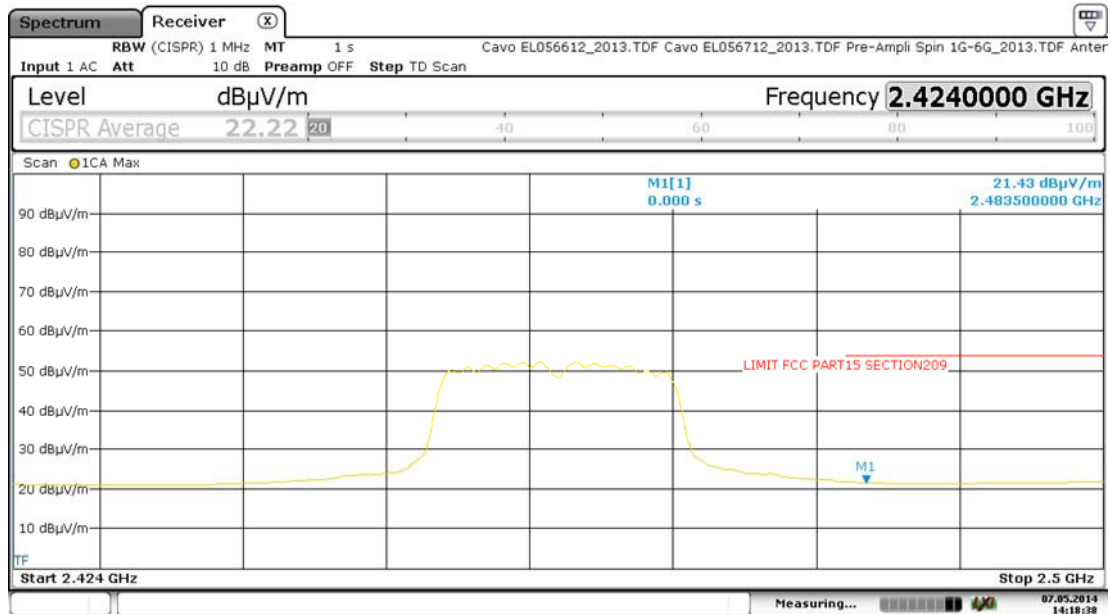
Date: 7.MAY.2014 14:15:11

WIFI channel 11, protocol "b" with data rate at 11Mbps

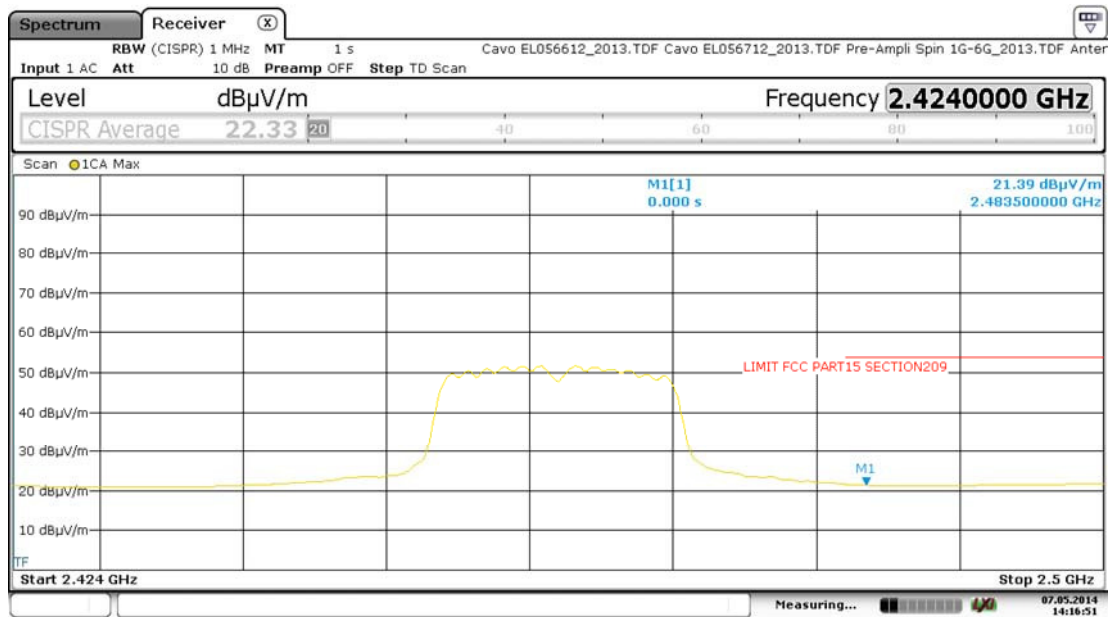


Date: 7.MAY.2014 14:13:33

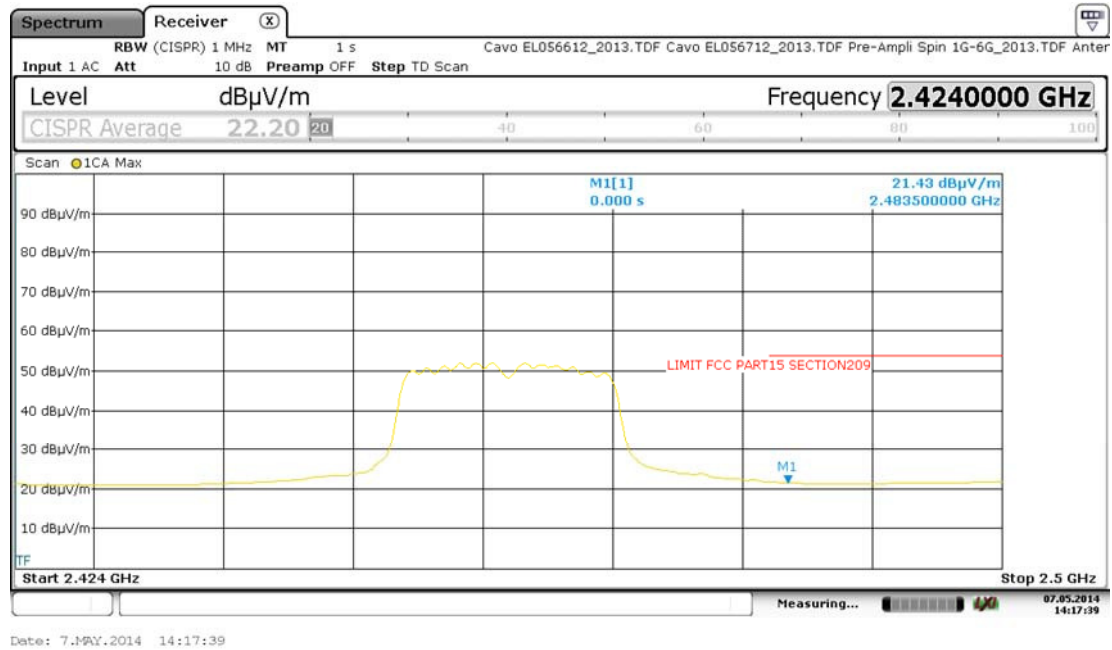
WIFI channel 11, protocol "g" with data rate at 6Mbps



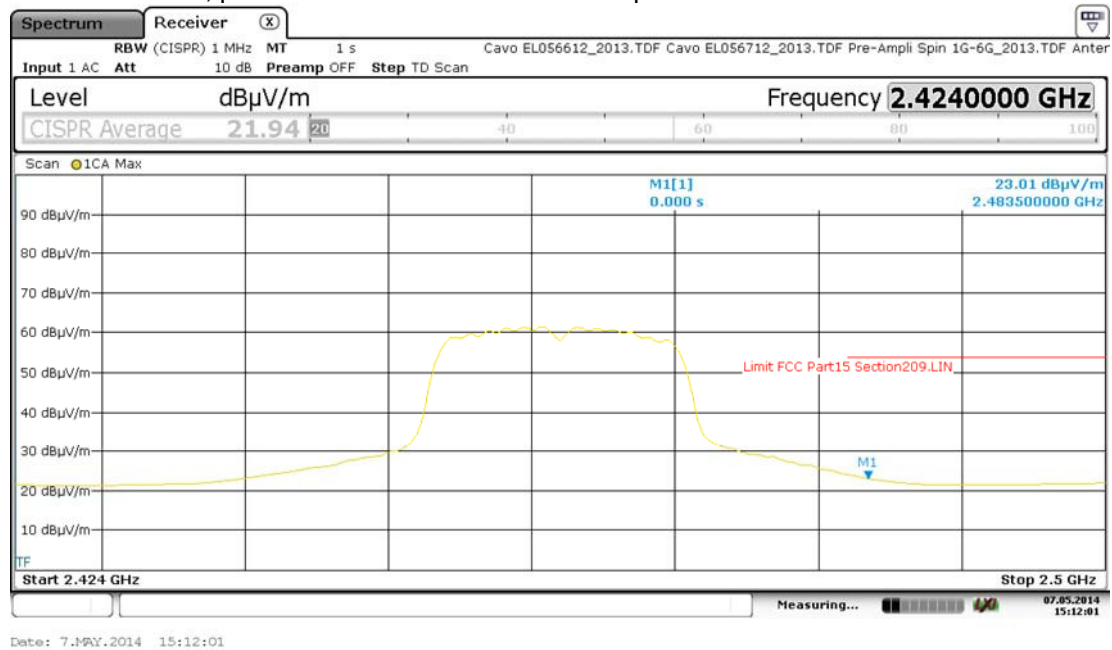
WIFI channel 11, protocol "g" with data rate at 24Mbps



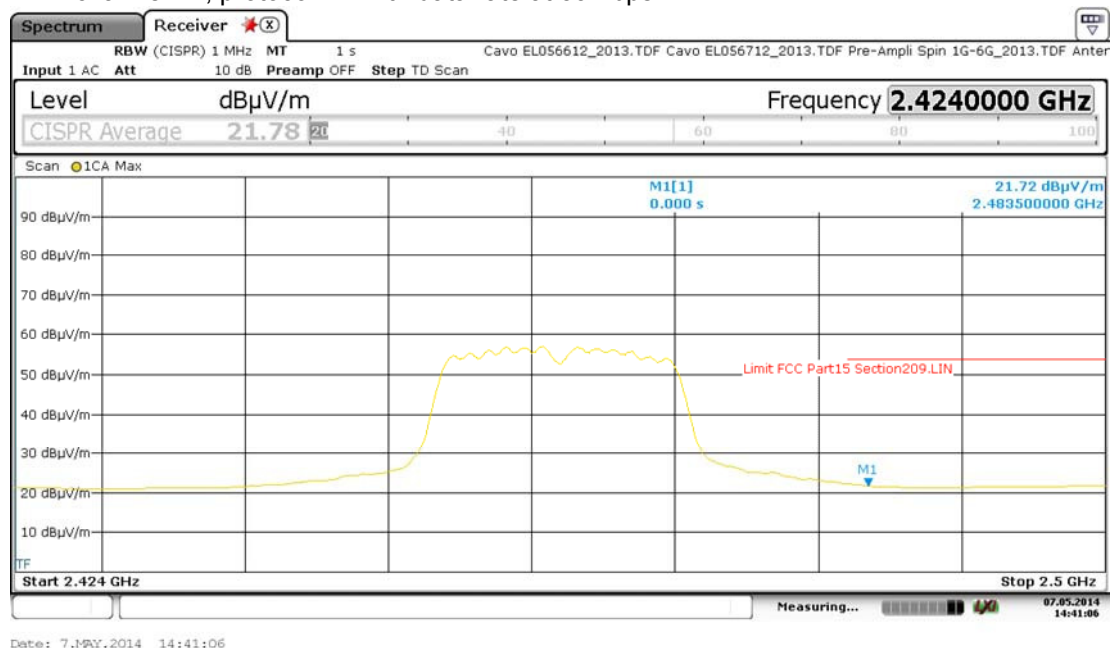
WIFI channel 11, protocol "g" with data rate at 54Mbps



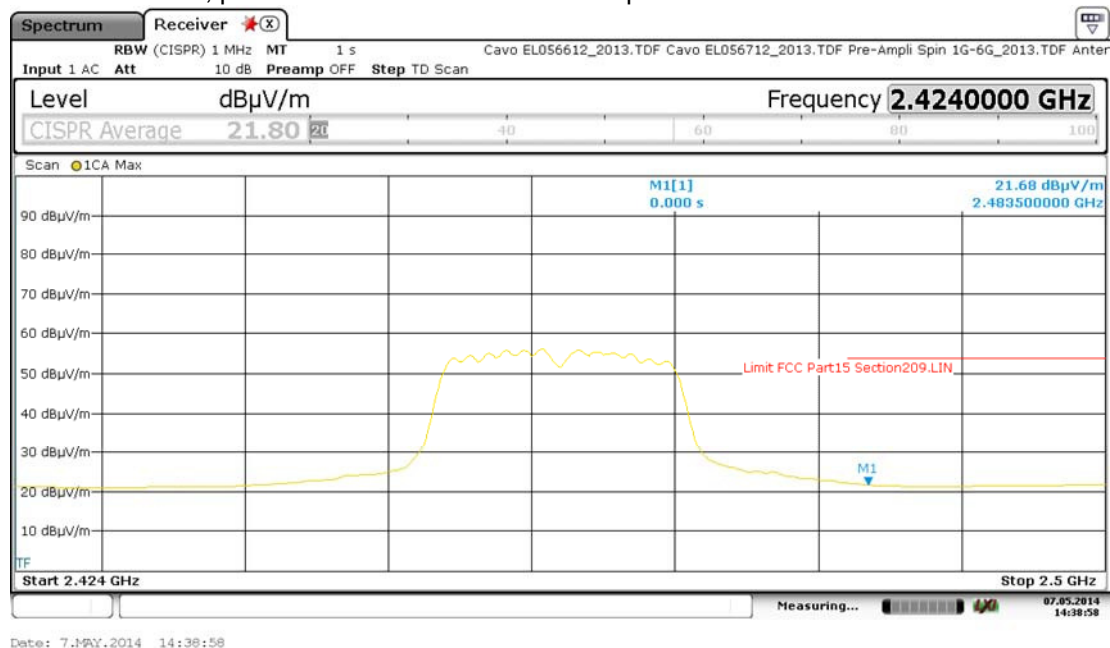
WIFI channel 11, protocol "n" with data rate at 6.5Mbps



WIFI channel 11, protocol "n" with data rate at 39Mbps

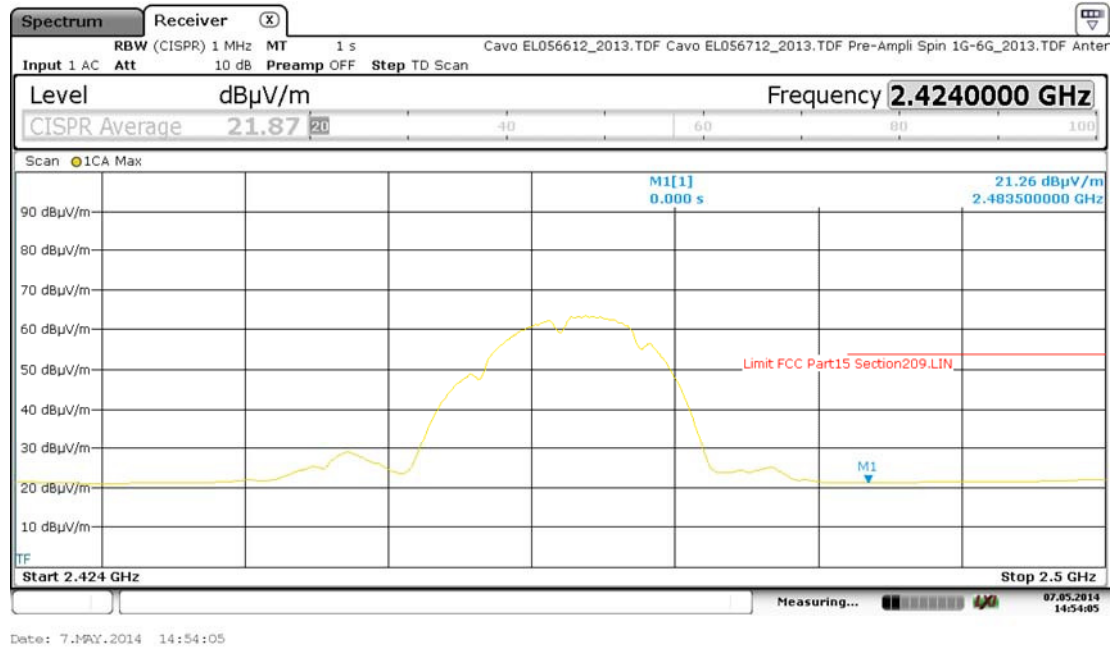


WIFI channel 11, protocol "n" with data rate at 65Mbps

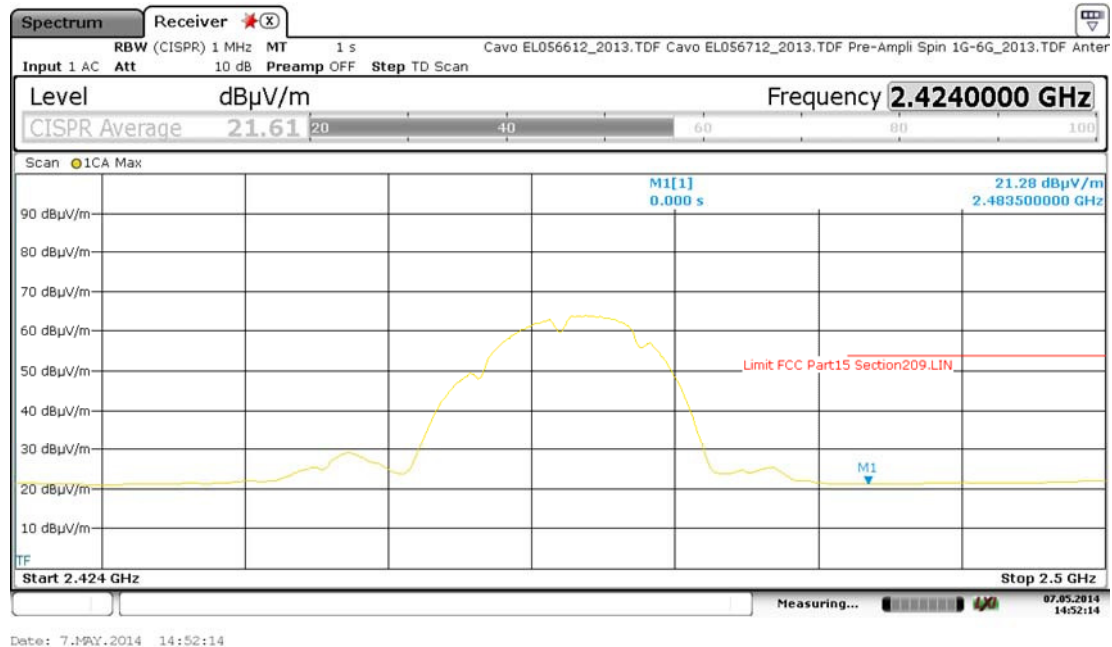


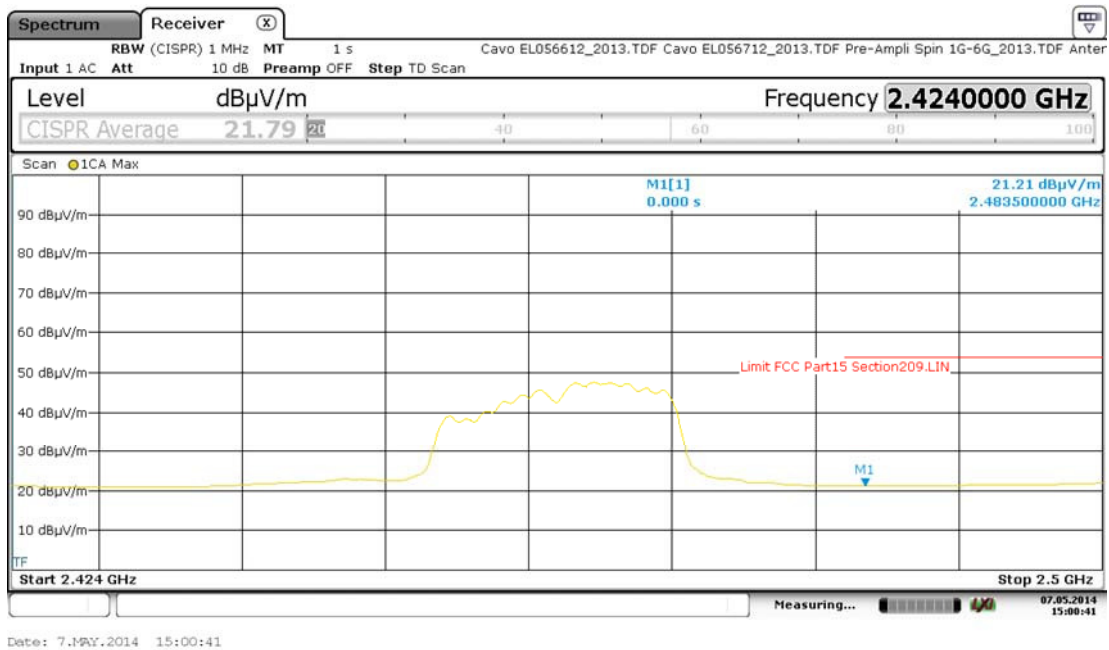
Band Edge measured from 2.424GHz to 2.5GHz: average detector (yellow trace) with average limit (red line). Vertical polarization.

WIFI channel 11, protocol "b" with data rate at 1Mbps

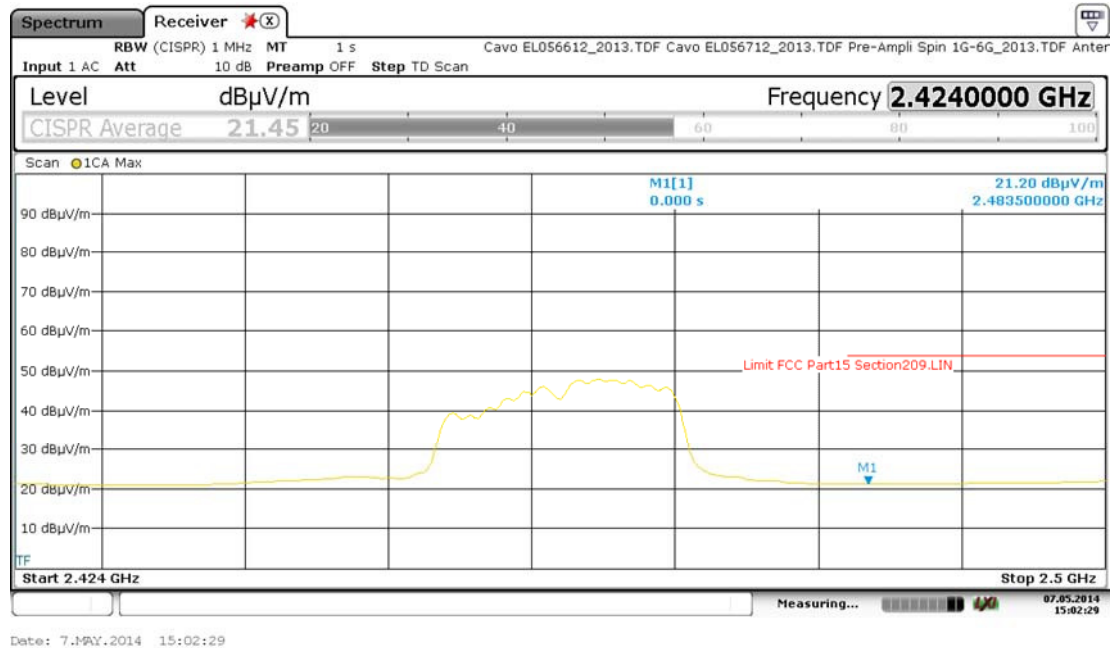


WIFI channel 11, protocol "b" with data rate at 11Mbps

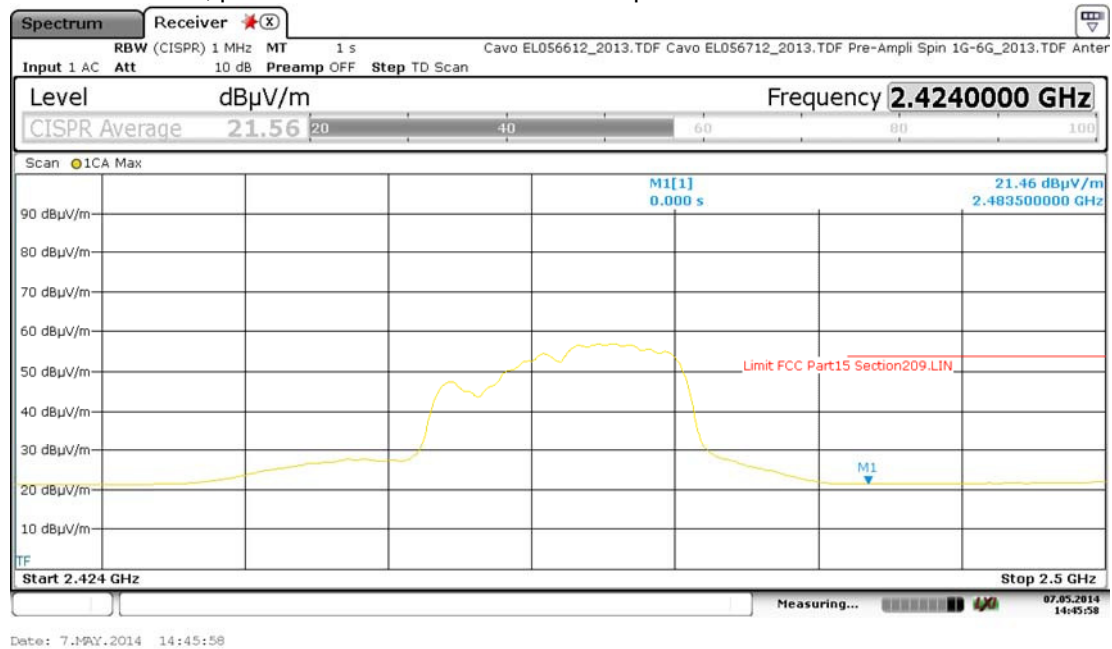




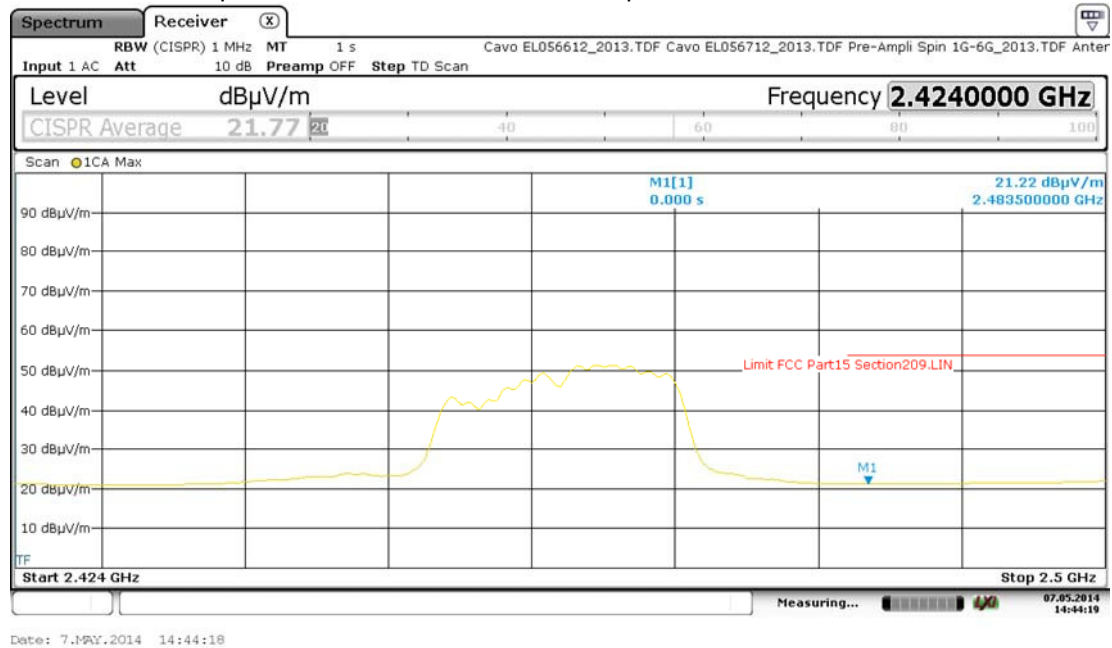
WIFI channel 11, protocol "g" with data rate at 54Mbps



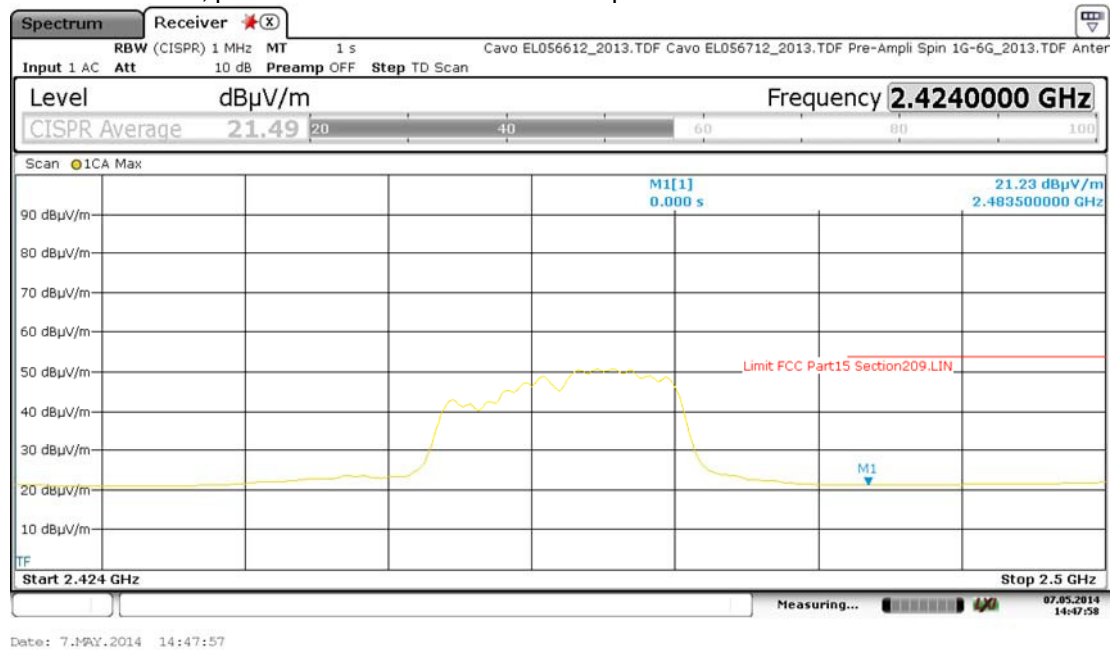
WIFI channel 11, protocol "n" with data rate at 6.5Mbps



WIFI channel 11, protocol "n" with data rate at 39Mbps



WIFI channel 11, protocol "n" with data rate at 65Mbps



Note: the radiated measurements above were checked and gave similar PASS results on the sample 13LA00163/03 (mod .REGATE 10-10-01) = same model as above sample 13LA00163/01 but without GSM radio module and GSM integral antenna.

10.0 Valutazione dell'esposizione dell'operatore/RF exposure evaluation -

Technician	Loris Fruch																														
Table No.	TEST: RF exposure evaluation		\																												
Method	Section 1.1307 (b)(1)		\																												
Parameters required prior to the test	Laboratory Ambient Temperature	18 to 28 °C																													
	Relative Humidity	20 to 90 %																													
Parameters recorded during the test	Laboratory Ambient Temperature	/																													
	Relative Humidity	/																													
Supplementary information: - FCC Requirement: System operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines section 1.1307 (b) (1) of FCC Rules: 47 CFR Part 1 Subpart I; - EUT Classification: mobile device; The antennas of this product, under normal use condition, are at least 20cm away from the body of the user. Warning statement to the user for keeping at least 20cm or more separation distance from the antenna should be included in the User manual. The distance from DUT to evaluation point was selected on the basis of par FCC Rules: 47 CFR Part 2 Subpart J: section 2.1091. - Applicable limit: Maximum Permissible Exposure (MPE) according to section 1.1310 of FCC Rules: 47 CFR Part 1 Subpart I; - Field density at given distance from antenna is evaluated by means of the far field formula: $S = (P G) / 4\pi R^2$ S = Power Density (mW/cm²) P = Power of transmitter (in mW) G = Gain of antenna (linear scale) R = 20cm - Total density of multiple frequency device is calculated adding contributes: (S_{tot}=S₁+S₂): TX power at WLAN integral antenna input: max power measurements at lower, mid and upper channels (see sect.3 of this document); TX power at GSM integral antenna input: based on max power setting. - Gain of integral antennas has been extracted from manufacturers data. Limits for Maximum Permissible Exposure (MPE) <table><tr><th>Frequency Range (MHz)</th><th>Electric Field Strength (V/m)</th><th>Magnetic Field Strength (A/m)</th><th>Power Density (mW/cm²)</th></tr><tr><td colspan="4">Limits for Occupational / controlled Exposures</td></tr><tr><td>300 - 1500</td><td>--</td><td>--</td><td>f/300</td></tr><tr><td>1500 – 100000</td><td>--</td><td>--</td><td>5.0</td></tr><tr><td colspan="4">Limits for General population / Uncontrolled Exposure</td></tr><tr><td>300 - 1500</td><td>--</td><td>--</td><td>f/1500</td></tr><tr><td>1500 – 100000</td><td>--</td><td>--</td><td>1.0</td></tr></table> where f=Frequency in MHz				Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Limits for Occupational / controlled Exposures				300 - 1500	--	--	f/300	1500 – 100000	--	--	5.0	Limits for General population / Uncontrolled Exposure				300 - 1500	--	--	f/1500	1500 – 100000	--	--	1.0
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)																												
Limits for Occupational / controlled Exposures																															
300 - 1500	--	--	f/300																												
1500 – 100000	--	--	5.0																												
Limits for General population / Uncontrolled Exposure																															
300 - 1500	--	--	f/1500																												
1500 – 100000	--	--	1.0																												

10.1 Risultati del test / Test Results - RF exposure evaluation

GSM antenna, power density calculation

Band	Channel Frequency (MHz)	Output Power to Antenna (dBm)	Output Power to Antenna (mW)	Max Antenna Gain (dBi)	distance at evaluation point (cm)	Power Density (mW/cm ²)
DCS1800 / PCS1900	1710-1880 / 1850-1990	30,0	1000,0	5,6	20	0,72

WLAN antenna, power density calculation

802.11 Protocol	Data Rate (Mbps)	Channel Frequency (MHz)	Output Power to Antenna (dBm)	Output Power to Antenna (mW)	Max Antenna Gain (dBi)	distance from DUT at evaluation point (cm)	Power Density (mW/cm²)
b	1	2412,0	22,8	191,0	2	20	0,060
		2437,0	23,1	203,7	2	20	0,064
		2462,0	23,0	199,5	2	20	0,063
	11	2412,0	22,8	191,4	2	20	0,060
		2437,0	23,1	203,2	2	20	0,064
		2462,0	23,2	206,5	2	20	0,065
g	6	2412,0	22,9	196,8	2	20	0,062
		2437,0	23,1	206,1	2	20	0,065
		2462,0	22,8	190,5	2	20	0,060
	24	2412,0	22,1	160,3	2	20	0,051
		2437,0	22,3	170,2	2	20	0,054
		2462,0	22,4	171,8	2	20	0,054
	54	2412,0	22,6	180,7	2	20	0,057
		2437,0	22,7	184,5	2	20	0,058
		2462,0	22,4	171,8	2	20	0,054
n	6,5	2412,0	23,3	211,8	2	20	0,067
		2437,0	23,9	243,2	2	20	0,077
		2462,0	22,8	189,7	2	20	0,060
	39	2412,0	23,0	197,7	2	20	0,062
		2437,0	23,2	207,0	2	20	0,065
		2462,0	22,7	186,6	2	20	0,059
	65	2412,0	22,8	189,2	2	20	0,060
		2437,0	23,5	224,4	2	20	0,071
		2462,0	23,0	199,1	2	20	0,063
						MAX=	0,077

Total power density calculation

GSM power density [mW/cm ²]	WLAN power density [mW/cm ²]	Total power density [mW/cm ²]	Limit [mW/cm ²]	Result
0,72	0,077	0,80	1,0	Pass

Note: General public exposure limit was applied.

Allegato 2 / Annex 2: Incertezza / Uncertainty

A.2.1 Radiated Emissions: CISPR 16

From 30MHz to 200MHz using Bi-log antenna

Field intensity : +/- 5.5 dB

From 200MHz to 1000MHz using Bi-log antenna

Field intensity : +/- 4.4 dB

Above 1GHz using Horn antenna

Field intensity : +/- 5.4 dB

A.2.2 Conducted Emissions CISPR 16

Voltage Method : +/- 4.2 dB