

RAPPORTO DI PROVA

TEST REPORT

Rif. / Ref. n.	FCCTR_175917-2	Data Emissione / Issue Date:	25/07/2019	Pagine / Pages:	31
Scopo delle prove Test object	Prove di tipo in accordo alla Norma Type test according to standard 47 CFR FCC part 15.231				
Richiedente Applicant	GEMINI Technologies S.r.l. Via L. Galvani 12 - 21020 Bodio Lomnago – Varese – Italy Phone: +39 0332-943211; Fax +39 0332-948080				
Marchio commerciale Trade mark					
Fabbricante Manufacturer	GEMINI Technologies S.r.l.				
Prodotto Product	Remote control				
Modello testato Testing model	748USA				
Identificativo FCC FCC ID	2AIA2748USA				
Data ricevimento campioni Date of test samples receipt	16/05/2019				
Campioni verificati No. of tested samples	1 – Sample by the applicant				
Data verifiche Testing date	20-24/05/2019				
Sito di prova Testing site	PRSLAB S.r.l. Unipersonale - Via Campagna 92 - 22020 Faloppio - Como - Italy				
Esito delle valutazioni Assessment results	CONFORME / COMPLIANT				
Verifiche effettuate da Verifications carried out by	Daniele AOSANI Tecnico laboratorio EMC & RADIO EMC & RADIO Test Engineer				
Approvato Approved by	Riccardo PFEIFFER Responsabile laboratori EMC & RADIO EMC & RADIO Laboratory manager				

I risultati delle prove riportati nel presente rapporto di prova si riferiscono solo ai campioni esaminati.

The test results reported in this test report shall refer only to the samples tested.

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0. RELEASE CONTROL RECORD

TEST REPORT NUMBER	REASON OF CHANGE	DATE OF ISSUE
FCCTR_175917-0	Original release	11/06/2019
FCCTR_175917-1	Editorial change	05/07/2019
FCCTR_175917-2	Editorial change	25/07/2019

1. TECHNICAL INFORMATION OF EQUIPMENT UNDER TEST (EUT)

1.1 EUT Identification

DESCRIPTION	Remote control
MODEL NAME	748US
FCC ID	2AIA2748USA
SERIAL NO.	Prototype
TRADEMARK	
MANUFACTURER	GEMINI Technologies S.r.l.
COUNTRY OF MANUFACTURER	Italy
SINGLE UNIT OR SYSTEM	Single
POWER SOURCE	Internal lithium battery (type CR2016 3Vdc x2)
ELECTRICAL SYSTEM RATED VOLTAGE	6Vdc
OPERATING TEMPERATURE	-10°C ÷ +55°C
EUT STANDING	Portable

1.2 Radio module technical data

RADIO TYPE	Intentional radiator
WORKING FREQUENCY	433.92MHz
NUMBER OF CHANNELS	1
CHANNEL BW	150kHz
TYPE OF MODULATION	OOK
ANTENNA	PCB printed

1.3 Ports identification

	PORT	DESCRIPTION	CONNECTION	NOTES
<input checked="" type="checkbox"/>	Enclosure	Plastic	Screw	---
<input type="checkbox"/>	AC Power input	Port not present	---	---
<input type="checkbox"/>	DC Power input	Internal battery	---	---
<input type="checkbox"/>	Signal/Control port	Port not present	---	---
<input type="checkbox"/>	Telecomm. port	Port not present	---	---
<input type="checkbox"/>	Antenna Port	PCB printed	---	---

Note:

During the tests all cables must be what provided the manufacturer or the same that used in the real employment of the EUT.

1.4 Modifications incorporated in E.U.T.

The following items are the modifications introduced in the equipment under test:

- None

1.5 Auxiliary equipment

- None

2. OPERATING MODES AND TEST CONDITIONS

In the following table there are the operating conditions adopted during tests identified by an indicator (#) at which has been referred the item "Operating condition of the equipment under test"

OPERATING CONDITION	DESCRIPTION
#1	Continuous transmission, modulated carrier (see note 1)
#2	Standard operating condition, manually operate (see note 1)

Note:

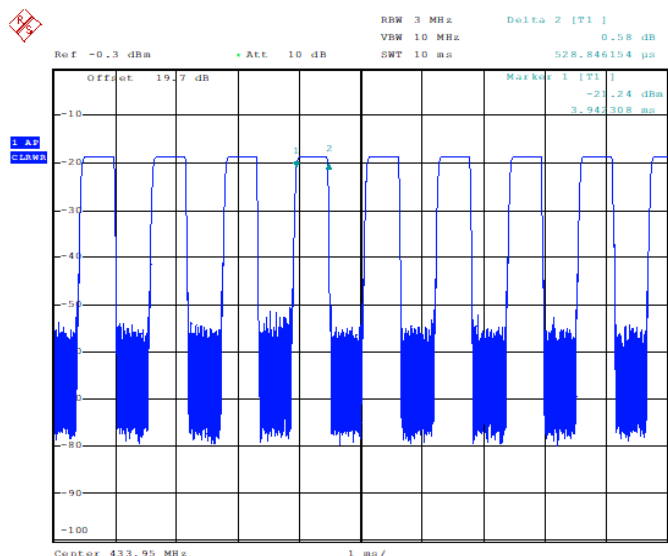
¹ The timing of the continuous transmission and the usual standard operating condition is the same and it is illustrated in the following measurement: According to CFR 47 Part 15.35 c) *Unless otherwise specified, e.g., §§15.255(b), and 15.256(l)(5), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.*

Starting from the measurement below the duty cycle used to calculate the correction factor for field strength measurements results:

DUTY CYCLE (DC): $(528.85\mu s * 8.5) / 10ms = 0.4495 = 44.95\%$

and so the correction factor results:

CORRECTION FACTOR: $20 * \log(1/DC) = 6.95dB$



Special Test Software: Special software by the Applicant to operate the EUT at each channel frequency continuously. For example, the transmitter will be operated at each of the lowest, middle and highest frequencies individually continuously during testing.

Special Hardware Used: None

Transmitter Test Antenna: The EUT has been tested with the antenna fitted in a manner typical of normal intended use as integral antenna equipment as described with the test results.

3. REFERENCE STANDARDS

REFERENCE STANDARD	
CFR 47, Part 15, Subpart C	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 15: General Rules and Regulations, Allocation, Assignment, and Use of Radio Frequencies
ANSI C63.10:2013	American National Standard for Testing Unlicensed Wireless Devices

4. SUMMARY OF TEST RESULTS

EUT PORT	DESCRIPTION OF PHENOMENA	BASIC STANDARD	OPERATING CONDITION	RESULTS
Antenna port	Antenna requirement	FCC Part 15 §15.203	---	Compliant
	Conducted missions	FCC Part 15 §15.207	---	Not applicable The EUT is battery powered
	Periodic operation characteristics	FCC Part 15 §15.231 (a)	#2	Within the limits
	Field strength of fundamental and spurious emissions	FCC Part 15 §15. 231 (b)	#1	Within the limits
	20dB Bandwidth	FCC Part 15 §15. 231 (c)	#1	Within the limits

5. MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
Frequency	±1kHz
All radiated emissions, in radio test area	±1dB
All radiated emissions, in semi anechoic chamber	±5.22dB
Temperature	±1°C
Humidity	±5%
DC Voltage	±3%
Time	±5%

6. LIST OF INSTRUMENTS USED

Instrument	Manufacturer	Model	Serial n°	Last Call	Call Due
Emi Receiver / Analyzer	Rohde & Schwarz	ESU40	100111	05/2019	05/2020
Loop antenna	Rohde & Schwarz	HFH 2-Z2	841801/012	03/2017	03/2020
Bi-Log antenna	Chase	CBL6111A	1533	03/2017	03/2020
Horn antenna	Electro Metrics	EM-6961	100437	06/2017	06/2020
High pass filter	Wainwright	WHK 1,3/15G	9	03/2019	03/2021
Semi-Anechoic Chamber	Siemens	B83117-D6019-T232	003-005-134/94C	02/2019	02/2020

7. TEST RESULTS

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FIELD STRENGTH OF FUNDAMENTAL AND SPURIOUS EMISSIONS	15

TEST 1.	ANTENNA REQUIREMENTS
REFERENCE DOCUMENT	<p>According to §15.203 / 15.204</p> <p>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sec. 15.211, Sec. 15.213, Sec. 15.217, Sec. 15.219, or Sec. 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Sec. 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.</p>

Antenna Requirements
The 748USA has an integral antenna
RESULT: COMPLIANT

TEST 2.

PERIODIC OPERATION CHARACTERISTICS

REFERENCE DOCUMENT

According to §15.231 (a)

The provisions of this section are restricted to periodic operation within the band 40.66-40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted. Data is permitted to be sent with a control signal. The following conditions shall be met to comply with the provisions for this periodic operation: (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released. (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation. (3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour. (4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition. (5) Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

• TEST SETUP	Acc. to reference document
• TEST LOCATION	Radio test area
• TYPE OF MEASUREMENT	Radiated
• TEST METHOD	ANSI C63.10:2013
• TEST EQUIPMENT USED FOR TEST	Spectrum Analyser Rodhe & Schwarz mod. ESU40
• TEST PERFORMED BY	Daniele Aosani

TEST CONDITIONS	REQUIRED	MEASURED
Ambient temperature	23°C ± 5°C	24 °C
Ambient humidity	25 - 75%rH	45%
Pressure	85 - 106kPa (860mbar - 1060mbar)	960 mbar

OPERATING CONDITION: #2

RESULT: **COMPLIANT**

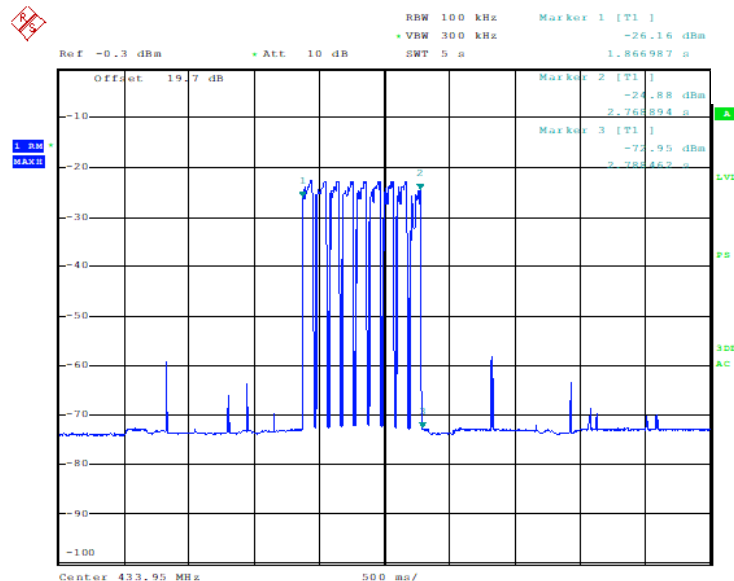
TEST RESULTS

15.231 (a) (1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

COMPLIANT the EUT is immediately deactivated after the release of the push button

Marker 1: push button pressed (start of transmission)

Marker 2: push button released and transmitter deactivation



15.231 (a) (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

NOT APPLICABLE: The EUT is a manually operated transmitter

15.231 (a) (3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

NOT APPLICABLE: The EUT is a manually operated transmitter

15.231 (a) (4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition

NOT APPLICABLE: The EUT is not employed for radio control purposes during emergencies involving fire, security, and safety of life

TEST 3.	20dB BANDWIDTH
REFERENCE DOCUMENT	According to §15.231 (c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

• TEST SETUP	Acc. to reference document
• TEST LOCATION	Radio test area
• TYPE OF MEASUREMENT	Radiated
• TEST METHOD	ANSI C63.10:2013
• TEST EQUIPMENT USED FOR TEST	Spectrum Analyzer R&S mod. ESU40
• TEST PERFORMED BY	Daniele Aosani

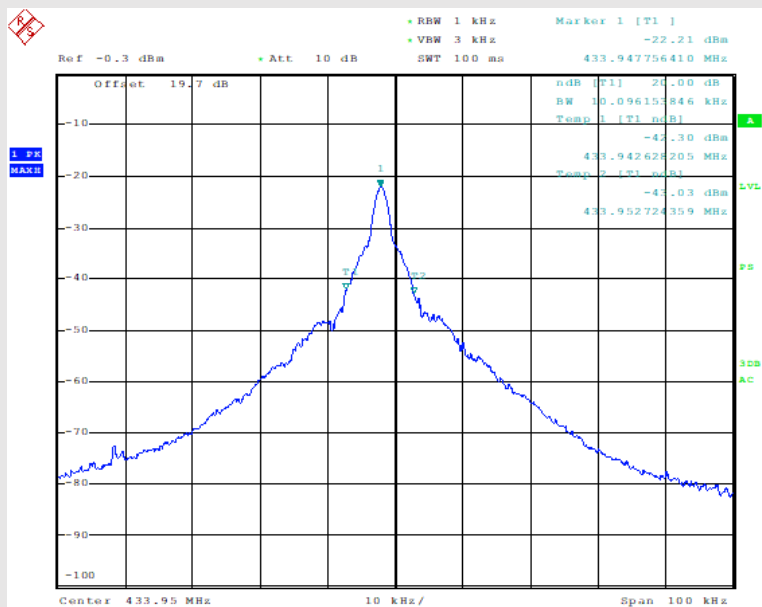
TEST CONDITIONS	REQUIRED	MEASURED
Ambient temperature	23°C ± 5°C	24 °C
Ambient humidity	25 - 75%rH	45%
Pressure	85 - 106kPa (860mbar - 1060mbar)	960 mbar

OPERATING CONDITION: #1

RESULT: WITHIN THE LIMITS

Measurement Result

20dB BANDWIDTH



Channel	Frequency (MHz)	20dB Bandwidth (kHz)	Limit 0.0025*Frequency (kHz)	Results
---	433.92	10.096	1084.8	WITHIN THE LIMITS

Measurement Uncertainty : ±1 KHz

TEST 4.

FIELD STRENGTH OF FUNDAMENTAL AND SPURIOUS EMISSIONS

REFERENCE DOCUMENT

According to §15,231 (b)

In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	¹ 1,250 to 3,750	¹ 125 to 375
174-260	3,750	375
260-470	¹ 3,750 to 12,500	¹ 375 to 1,250
Above 470	12,500	1,250

¹Linear interpolations.

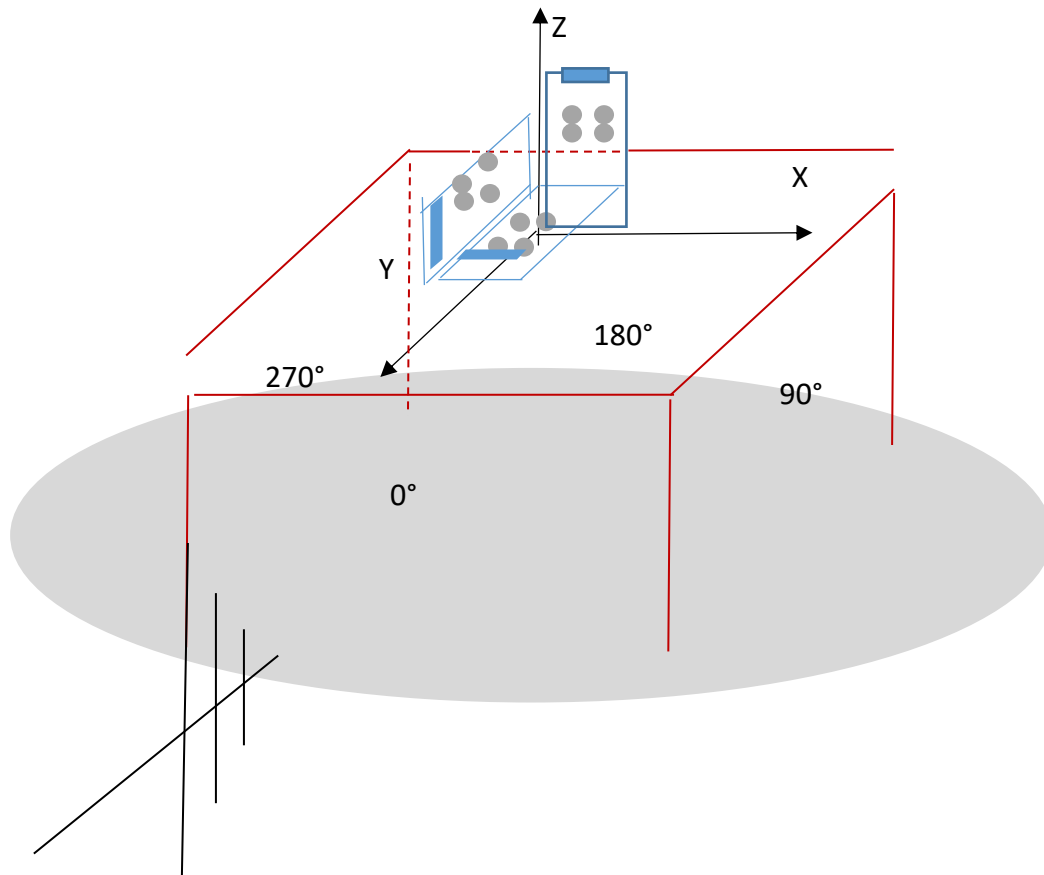
• TEST SETUP	Acc. to reference document
• TEST LOCATION	Semi anechoic chamber
• TYPE OF MEASUREMENT	Radiated
• TEST METHOD	ANSI C63.10:2013
• TEST EQUIPMENT USED FOR TEST	EMI Receiver Rodhe & Schwarz mod. ESU40 Loop Antenna Rohde & Schwarz mod. HFH 2-Z2 Bi-log antenna CHASE mod. CBL6111A Horn antenna Electro Metrics mod. EM-6961 High pass filter Wainwright mod. WHK 1,3/15G
• TEST PERFORMED BY	Daniele Aosani

TEST CONDITIONS	REQUIRED	MEASURED
Ambient temperature	23°C ± 5°C	24 °C
Ambient humidity	25 - 75%rH	45%
Pressure	85 - 106kPa (860mbar - 1060mbar)	960 mbar

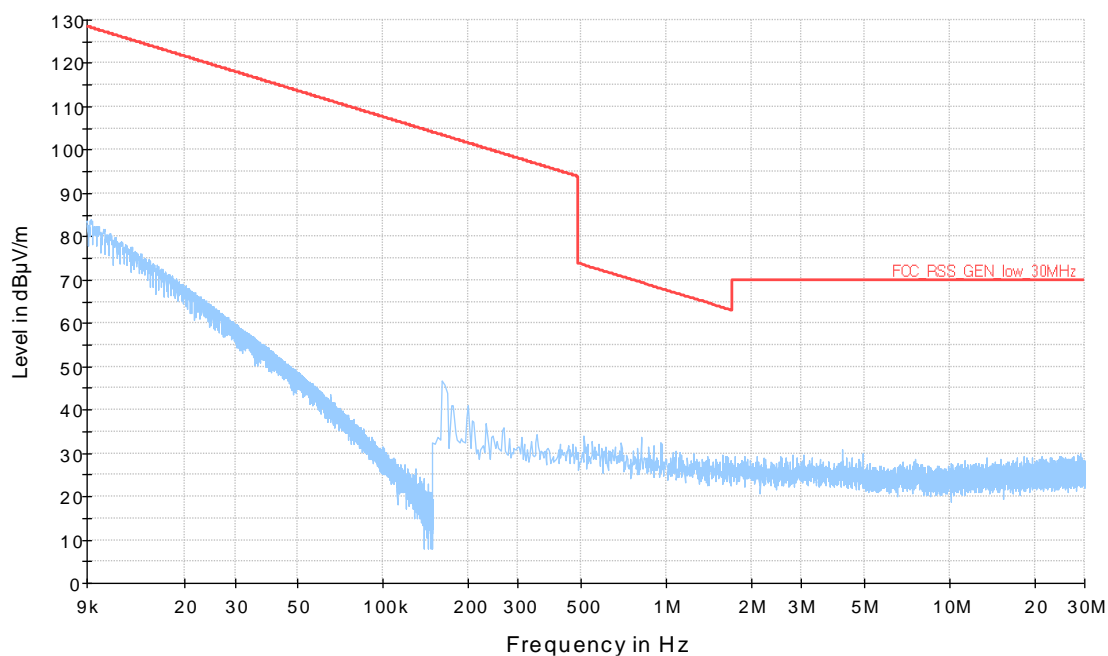
OPERATING CONDITION :#1

RESULT: **WITHIN THE LIMITS**

Field Strength of Fundamental and Spurious Emissions Setup

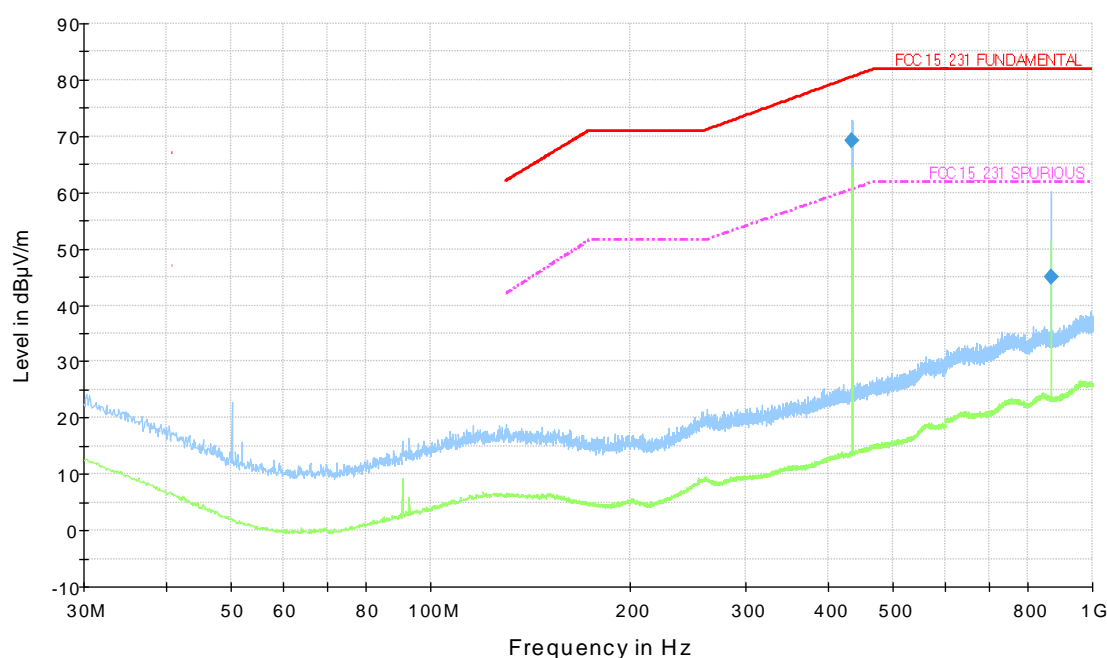


EUT POSITION	ZX plane
FREQUENCY RANGE	9kHz – 30MHz
POLARIZATION	VERTICAL



*Blue line is the peak detector

EUT POSITION	ZX plane
FREQUENCY RANGE	30MHz – 1GHz
POLARIZATION	VERTICAL

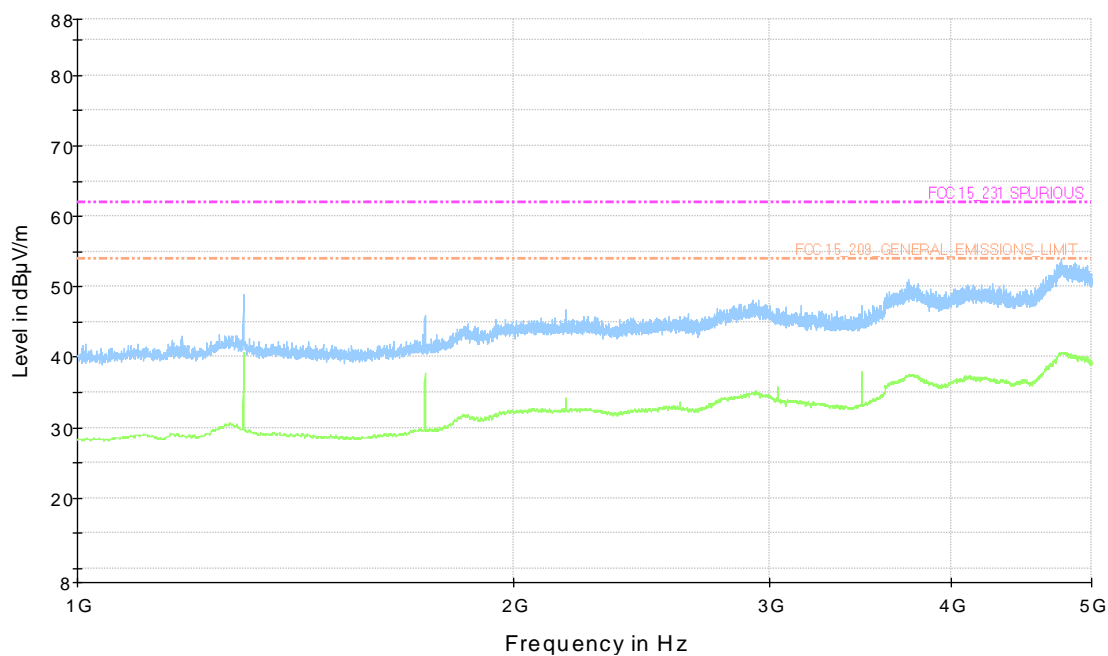


Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Duty Cycle correction (dB)	Value with correction (dBμV/m)	Margin (dB)	Limit (dBμV/m)
433.908000	69.3	104.8	V	90.0	-6.95	62.35	18.23	80.58
867.983000	45.0	104.8	V	90.0	-6.95	38.05	22.53	60.58

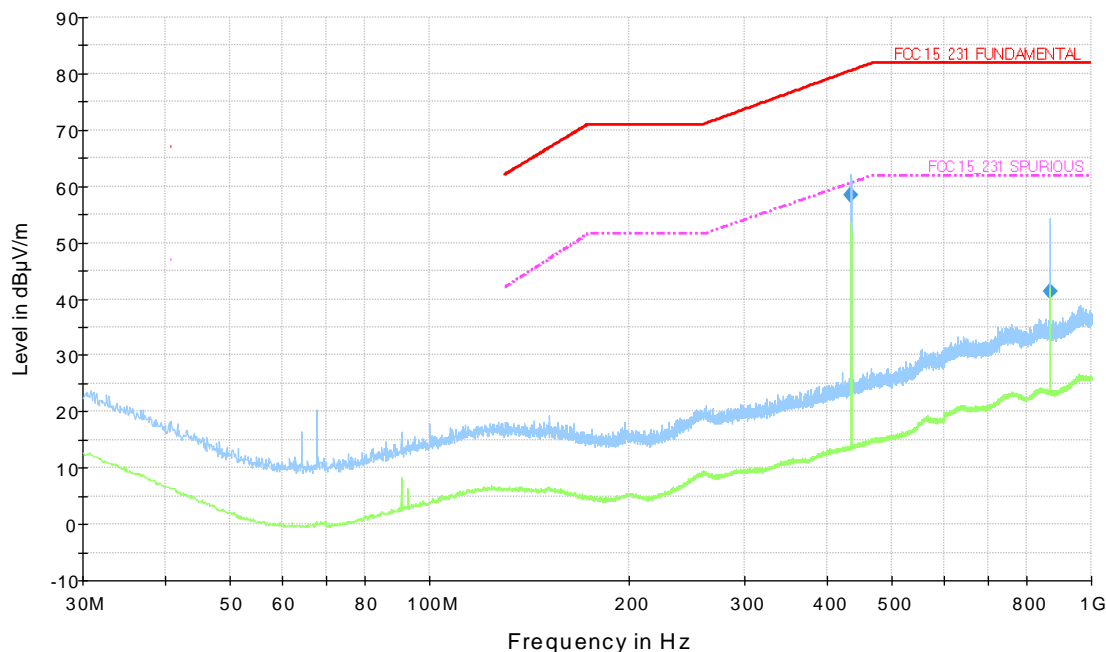
*Blue line is the peak detector, green line is the average detector

EUT POSITION	ZX plane
FREQUENCY RANGE	1GHz – 5GHz
POLARIZATION	VERTICAL



*Blue line is the peak detector, green line is the average detector

EUT POSITION	ZX plane
FREQUENCY RANGE	30MHz – 1GHz
POLARIZATION	HORIZONTAL

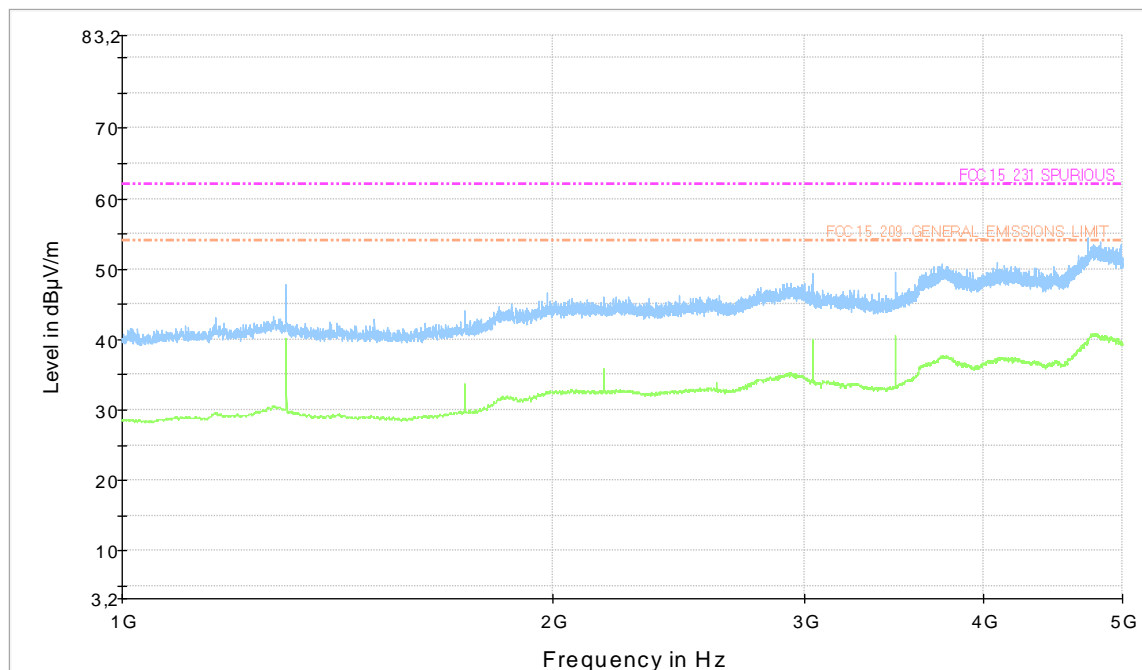


Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Duty Cycle correction (dB)	Value with correction (dBμV/m)	Margin (dB)	Limit (dBμV/m)
433.908000	58.5	104.7	H	0.0	-6.95	51.55	29.03	80.58
867.983000	41.4	104.7	H	180.0	-6.95	34.45	26.13	60.58

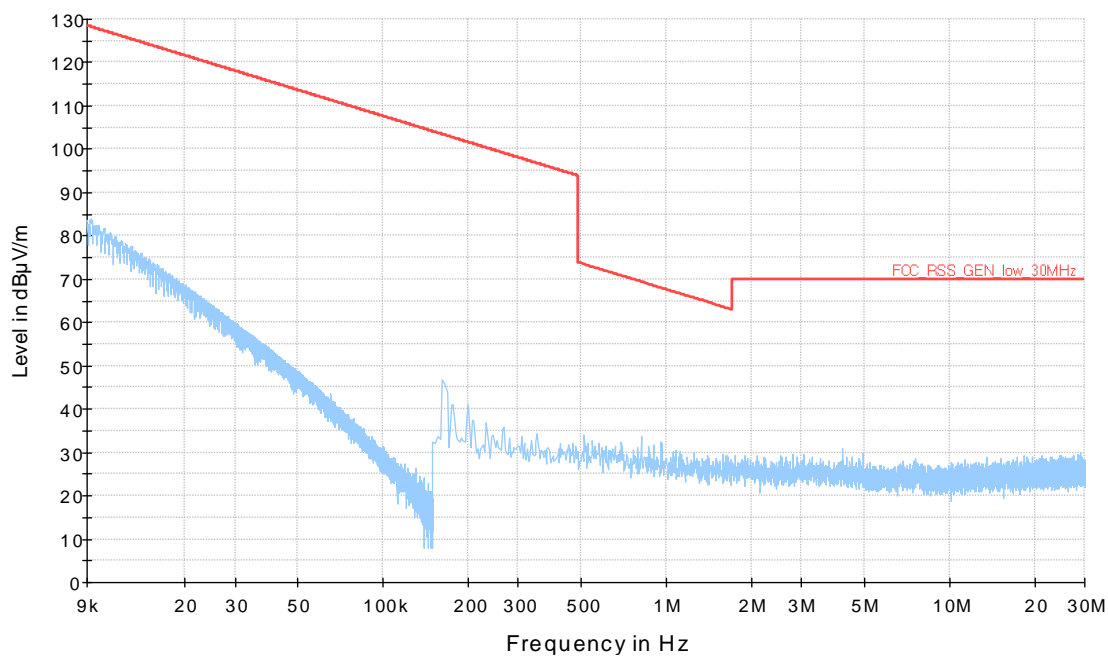
*Blue line is the peak detector, green line is the average detector

EUT POSITION	ZX plane
FREQUENCY RANGE	1GHz – 5GHz
POLARIZATION	HORIZONTAL



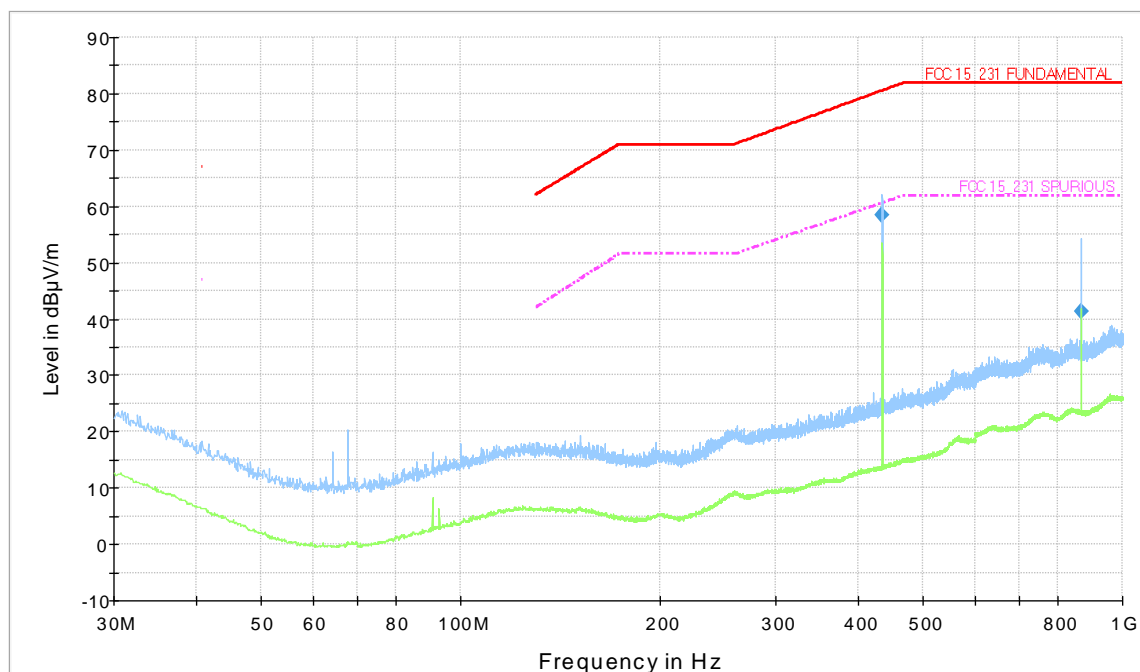
*Blue line is the peak detector, green line is the average detector

EUT POSITION	YZ plane
FREQUENCY RANGE	9kHz – 30MHz
POLARIZATION	VERTICAL



*Blue line is the peak detector

EUT POSITION	YZ plane
FREQUENCY RANGE	30MHz – 1GHz
POLARIZATION	VERTICAL

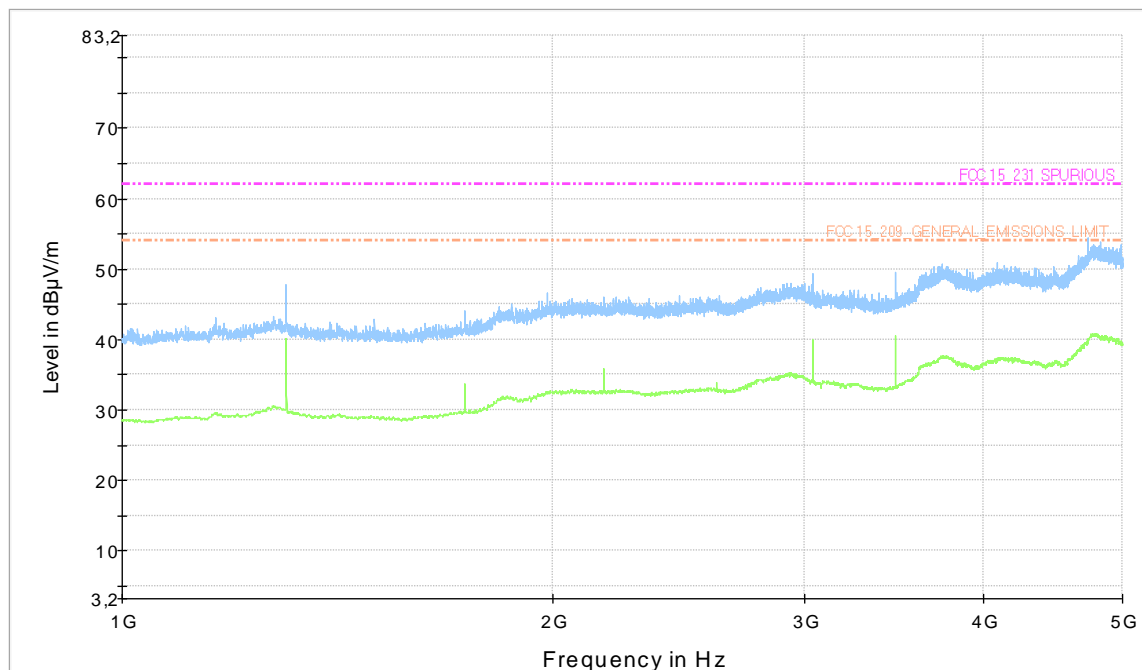


Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Duty Cycle correction (dB)	Value with correction (dBμV/m)	Margin (dB)	Limit (dBμV/m)
433.908000	59.1	104.7	H	0.0	-6.95	52.15	28.43	80.58
867.983000	42.0	104.7	H	180.0	-6.95	35.05	25.53	60.58

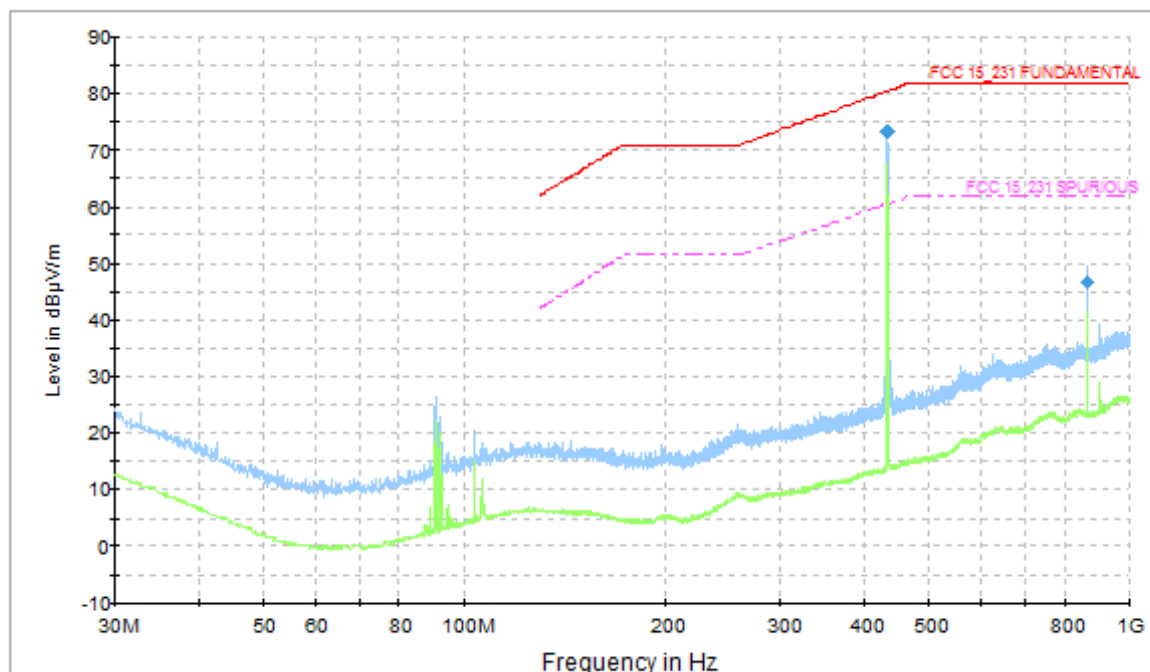
*Blue line is the peak detector, green line is the average detector

EUT POSITION	YZ plane
FREQUENCY RANGE	1GHz – 5GHz
POLARIZATION	VERTICAL



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EUT POSITION	YZ plane
FREQUENCY RANGE	30MHz – 1GHz
POLARIZATION	HORIZONTAL

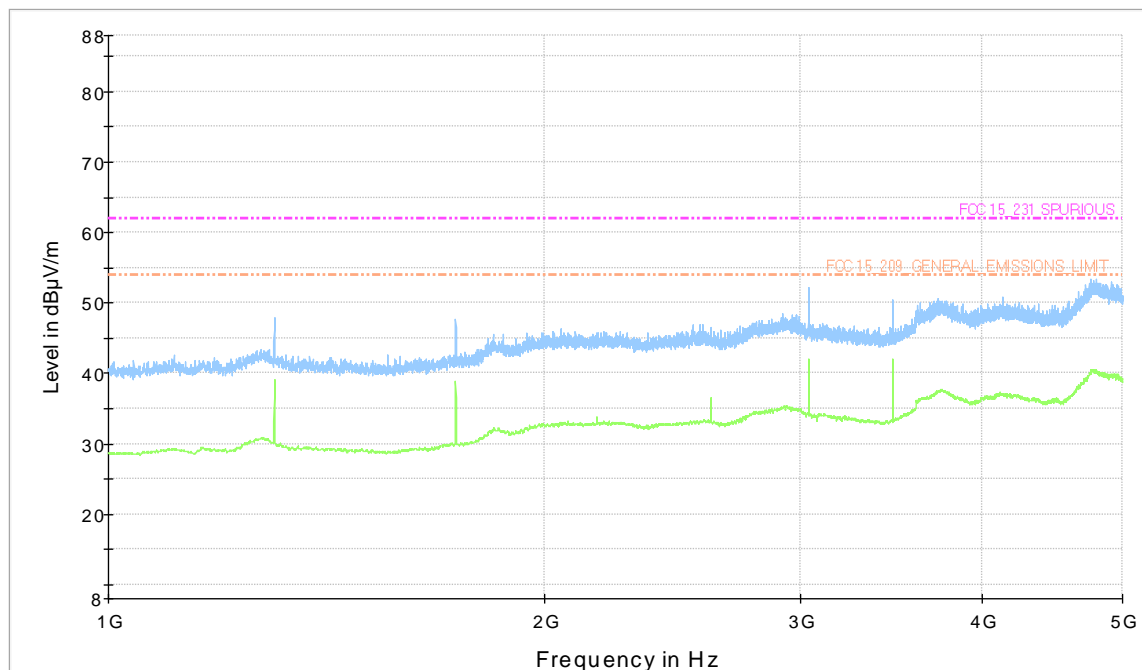


Final Result

Frequency (MHz)	MaxPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Duty Cycle correction (dB)	Value with correction (dBµV/m)	Margin (dB)	Limit (dBµV/m)
433.908000	73.3	254.8	H	90.0	-6.95	66.35	14.23	80.58
867.789000	46.7	104.7	H	180.0	-6.95	39.75	20.83	60.58

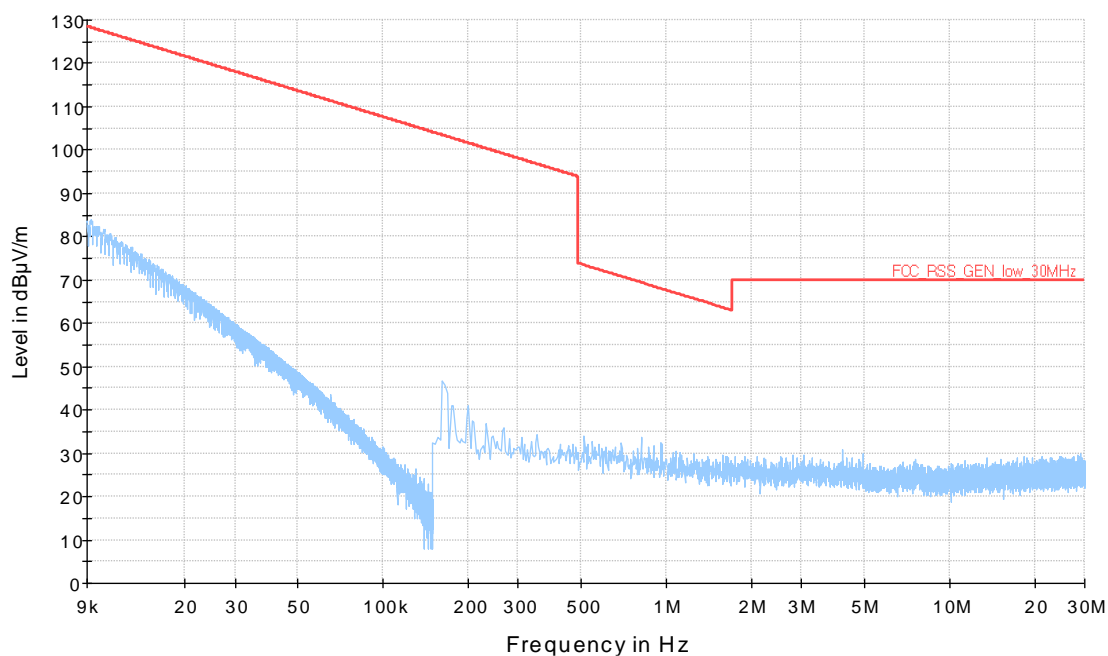
*Blue line is the peak detector, green line is the average detector

EUT POSITION	YZ plane
FREQUENCY RANGE	1GHz – 5GHz
POLARIZATION	HORIZONTAL



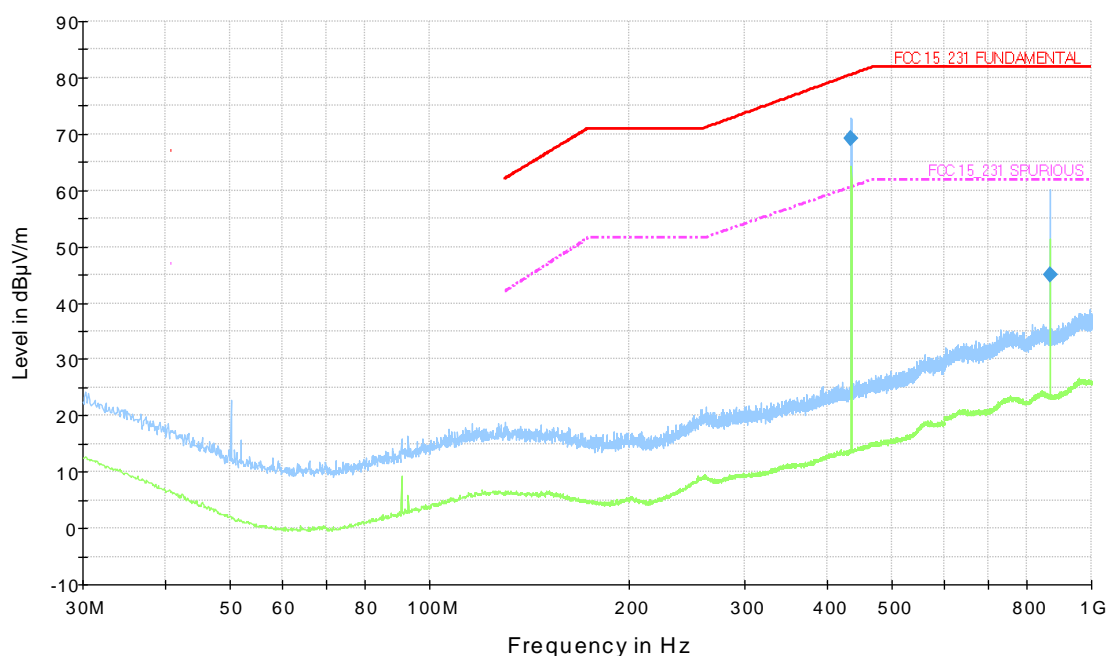
*Blue line is the peak detector, green line is the average detector

EUT POSITION	XY plane
FREQUENCY RANGE	9kHz – 30MHz
POLARIZATION	VERTICAL



*Blue line is the peak detector

EUT POSITION	XY plane
FREQUENCY RANGE	30MHz – 1GHz
POLARIZATION	VERTICAL

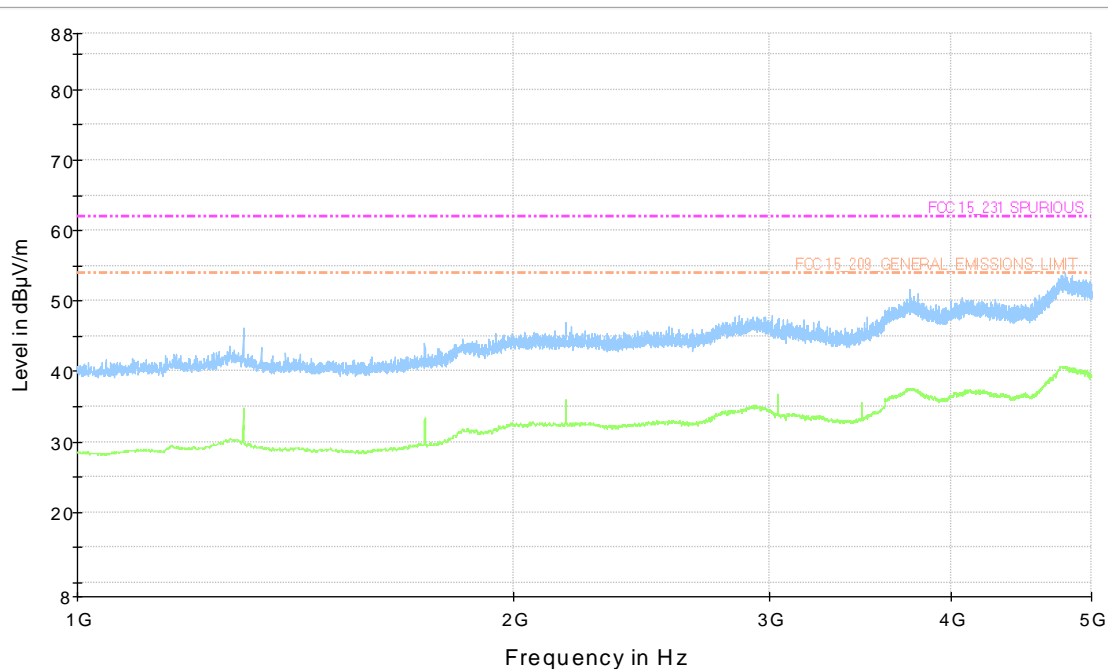


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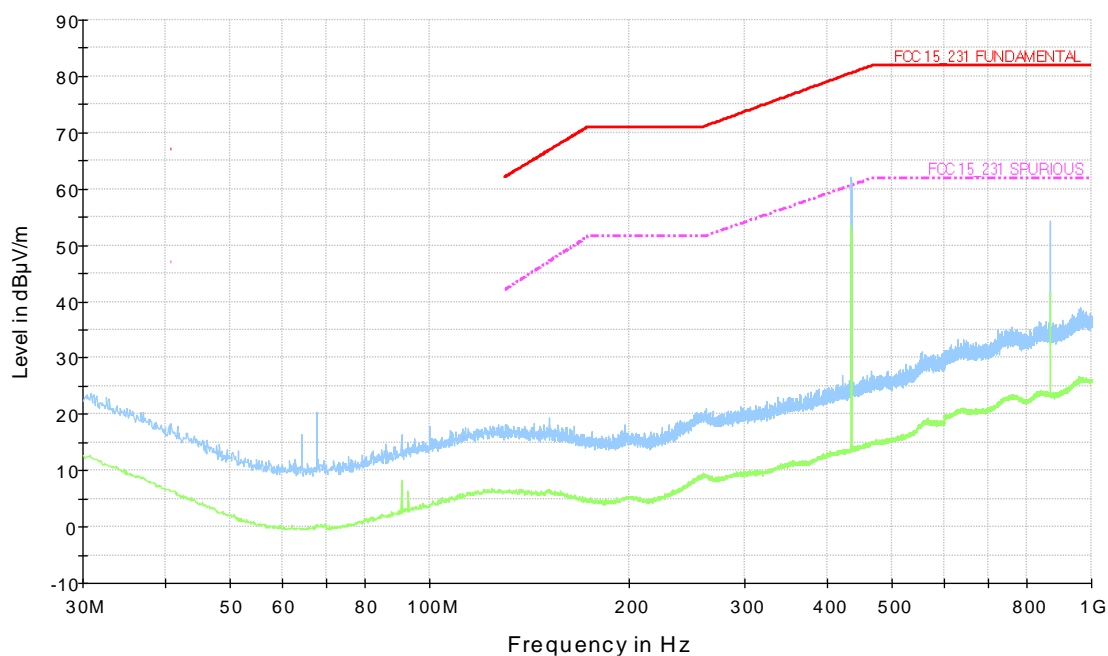
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EUT POSITION	XY plane
FREQUENCY RANGE	1GHz – 5GHz
POLARIZATION	VERTICAL



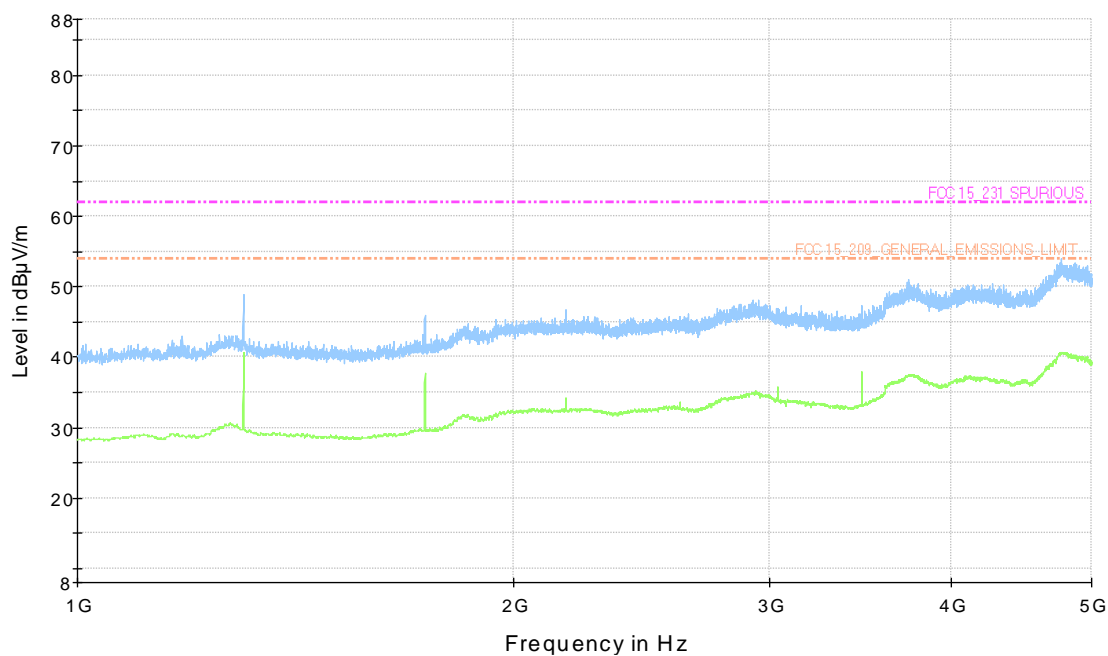
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EUT POSITION	XY plane
FREQUENCY RANGE	30MHz – 1GHz
POLARIZATION	HORIZONTAL



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EUT POSITION	XY plane
FREQUENCY RANGE	1GHz – 5GHz
POLARIZATION	HORIZONTAL



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