

ISED CABid: ES1909

Test Report No:

Lab. Company Number: 4621A

74675RRF.004

Partial Test Report

USA FCC Part 15.31, 15.247, 15.209

CANADA RSS-210, RSS-247, RSS-Gen

(*) Identification of item tested	IQ3 Mini
(*) Trademark	SALTO
(*) Model and /or type reference	IQ3M0B1 (Type reference: P2336)
Other identification of the product	UKCIQ3M0B1, Contains: FCC ID: XPYNINAW106 10088A-IQ3M0B1, Contains: IC: 8595A-NINAW106
(*) Features	Features: Wi-Fi and Bluetooth LE HW version: 1.0 SW version: 0210 (Control FW), 0211 (Wi-Fi FW) 0186 (FUS FW), 0187 (BLE FW)
Applicant	SALTO SYSTEMS, S.L. Arkotz 9, Polígono Lanbarren 20180, Oiartzun, Gipuzkoa, SPAIN
Test method requested, standard	USA FCC Part 15.31 (10-1-21 Edition): Measurement standard. USA FCC Part 15.247 (10-1-21) Edition: Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. USA FCC Part 15.209 (10-1-21) Edition: Radiated emission limits; general requirements. CANADA RSS-210 Issue 10 (December 2019). CANADA RSS-247 Issue 2 (February 2017). CANADA RSS-Gen Issue 5 (March 2019). Guidance for Performing Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid Systems Devices Operating Under Section 15.247 of the FCC Rules. 558074 D01 Meas Guidance v05r02 dated April 2, 2019. ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Approved by (name / position & signature)	José Manuel Gómez Galván EMC Consumer & RF Lab. Manager 
Date of issue	2023-06-19
Report template No	FDT08_24 (*) "Data provided by the client"

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Competences and guarantees

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DEKRA Testing and Certification S.A.U. is an FCC-recognized accredited testing laboratory with appropriate scope of accreditation that include testing performed in this test report.

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DEKRA Testing and Certification S.A.U. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification S.A.U. at the time of performance of the test.

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Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

The total uncertainty of the measurement system for the radiated emissions of the EUT is:

From 30 MHz to 1 GHz:	Measurement uncertainty $\leq \pm 5.03$ dB.
From 1 to 3 GHz:	Measurement uncertainty $\leq \pm 4.11$ dB.
From 3 to 17 GHz:	Measurement uncertainty $\leq \pm 4.32$ dB.
From 17 to 26 GHz:	Measurement uncertainty $\leq \pm 4.58$ dB.

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").
2. The sample consists of an IQ3 Mini with Bluetooth LE and Wi-Fi technology.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of result.

Usage of samples

Samples undergoing test have been selected by: The client.

Id	Control Number	Description	Model	Serial N°	Date of Reception	Application
S/01	74675_1.1	IQ3 Mini	IQ3M0B1	--	2023-03-22	Element Under Test
S/01	74675_3.1	AC/DC adapter	SYM-303A	--	2023-04-26	Element Under Test

Notes referenced to samples during the project:

Id	Type
S/01	Sample used for radiated test

Test sample description

Ports..... :	Port name and description	Cable					
		Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾		
	--		[]	[]	[]		
Supplementary information to the ports..... :	--						
Rated power supply :	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	[X]	AC: 115Vac, 60Hz	[]	[]	[]	[]	[]
	[]	DC:					
Rated Power :	--						
Clock frequencies :	32 MHz, 32.768 KHz						
Other parameters..... :	N/A						
Software version :	0210 (Control FW) + 0211 (Wi-Fi FW) + 0186 (FUS FW) + 0187 (BLE FW)						
Hardware version..... :	1.0						
Dimensions in cm (W x H x D) :	Ø 5.3 cm, D=3.2 cm						
Mounting position..... :	[X]	Table top equipment					
	[X]	Wall/Ceiling mounted equipment					
	[]	Floor standing equipment					
	[]	Hand-held equipment					
	[]	Other: Door mounting					
Modules/parts :	Module/parts of test item		Type		Manufacturer		
	SoC + Antenna		BLE		ST + JOHANSON		
	Wi-Fi module		Wi-Fi Module		u-blox		
	--						
Accessories (not part of the test item) :	Description		Type		Manufacturer		
	--						
Documents as provided by the applicant :	Description		File name		Issue date		
	User manual						
	FW Explanation Document						
	--						

⁽³⁾ Only for Medical Equipment

Identification of the client

SALTO SYSTEMS, S.L.
Arkotz 9, Polígono Lanbarren
20180, Oiartzun, Gipuzkoa, SPAIN

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2023-03-22
Date (finish)	2023-05-04

Document history

Report number	Date	Description
74675RRF.004	2023-06-19	First release.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

Remarks and comments

The tests have been performed by the technical personnel: Miguel Manuel Lopez and Rafael Fernandez.

Used instrumentation:

Control No.	Equipment	Model	Manufacturer	Next Calibration
6791	SEMIANECHOIC ABSORBER LINED CHAMBER	FACT 3 200 STP	ETS LINDGREN	N/A
6792	SHIELDED ROOM	S101	ETS LINDGREN	N/A
6143	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2023-10-29
6142	PRE-AMPLIFIER G>38dB 30MHz-6GHz	BLNA 0360-01N	BONN ELEKTRONIK	2023-06-16
6496	HORN ANTENNA 1-18GHz	BBHA 9120 D	SCHWARZBECK	2023-08-24
3783	PRE-AMPLIFIER G>30dB 1GHz-18GHz	BLMA 0118-3A	BONN ELEKTRONIK	2023-12-29
4657	HORN ANTENNA 18-40GHz	BBHA 9170	SCHWARZBECK	2023-05-05
8856	PRE-AMPLIFIER G>30dB 17-40GHz	BLMA 1840-4A	BONN ELEKTRONIK	2023-11-02
7817	EMI TEST RECEIVER 2Hz-44GHz	ESW44	ROHDE AND SCHWARZ	2023-12-30
4848	SOFTWARE FOR EMC/RF TESTING	EMC32	ROHDE AND SCHWARZ	N/A

Testing verdicts

Not applicable:	N/A
Pass:	P
Fail:	F
Not measured:	N/M

Summary

FCC PART 15 PARAGRAPH / RSS-Gen/ RSS-210/ RSS-247		
Requirement – Test case	Verdict	Remark
FCC 15.31 (h), FCC 15.209 (a), 15.247 (d) / RSS-Gen 8.9, RSS-210 B.6 (a)(iv), RSS-247 5.5: - Emission limitations radiated (Transmitter)	P	(1)
<u>Supplementary information and remarks:</u> (1) Only simultaneous mode radiated spurious emission test was requested.		

Appendix A: Test results.

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TEST CONDITIONS

(*) Declared by the Applicant

POWER SUPPLY (*):

Vnominal: 115Vac

ANTENNA (*):

Type of Antenna for Bluetooth Low Energy: Integral (Chip).

Maximum Declared Antenna Gain for Bluetooth Low Energy: +1.5 dBi

Type of Antenna for WLAN 2.4GHz b/g/n: Integral (Chip).

Maximum Declared Antenna Gain for WLAN 2.4GHz b/g/n: +3.0 dBi

RADIOS AND CHANNELS TESTED:

	Bluetooth Low Energy / DTS	
Mode:	1M (GFSK - 1DH5)	
Channel Spacing:	2 MHz	
Frequency Range:	2402 MHz to 2480 MHz	
Transmit Channel:	Channel	Channel Frequency (MHz)
	38	2440

	WLAN 2.4GHz (IEEE 802.11 b/g/n20) / DTS	
Mode:	802.11 g: 6 Mbps	
Channel Spacing:	20 MHz	
Frequency Range:	2412 MHz to 2472 MHz	
Transmit Channel:	Channel	Channel Frequency (MHz)
	11	2462

The EUT was tested in the following operating mode:

- Continuous transmission with a modulated carrier at maximum power in all required channels selecting the supported data rates/modulations types.

During transmitter test the EUT was being controlled by the SW tool to operate in a continuous transmit mode on the test channel as required and in each of the different modulation modes.

Selected Transmission Modes for each Radio:

The following configurations were selected based on preliminary testing that identified those corresponding to the worst-cases:

* Bluetooth Low Energy: Transmitter radiated spurious emissions tests were performed with the EUT transmitting 1 Mbps in the Middle Channel (2440 MHz).

* WLAN 2.4GHz: Transmitter radiated spurious emissions tests were performed with the EUT transmitting in 802.11 g / 6 Mbps mode in the High Channel (2462 MHz).

TESTED SIMULTANEOUS TRANSMISSION MODES:

* **Simultaneous transmission mode Bluetooth and WLAN 2.4GHz** with the EUT configured to simultaneously transmit two signals at maximum output power:

Bluetooth Low Energy in the Middle Channel (2440 MHz) and WLAN 2.4GHz Mode g in the High Channel (2462 MHz),

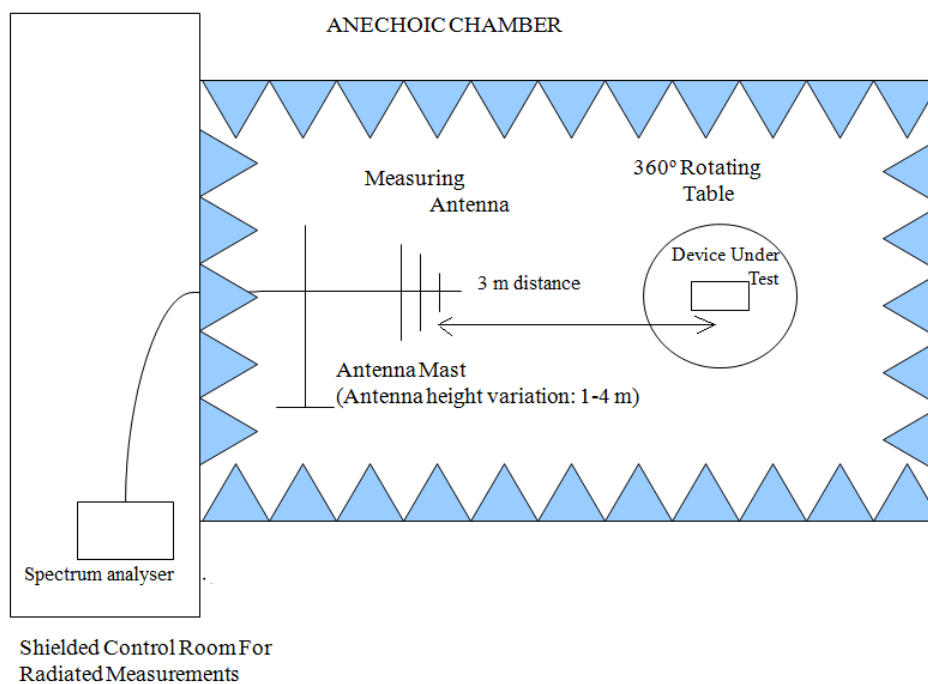
RADIATED MEASUREMENTS:

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Bilog antenna for the range between 30 MHz to 1 GHz and 1 GHz-17 GHz Double ridge horn antenna) is situated at a distance of 3 m and at a distance of 1m for the frequency range 17 GHz-26 GHz (17 GHz-26 GHz horn antenna).

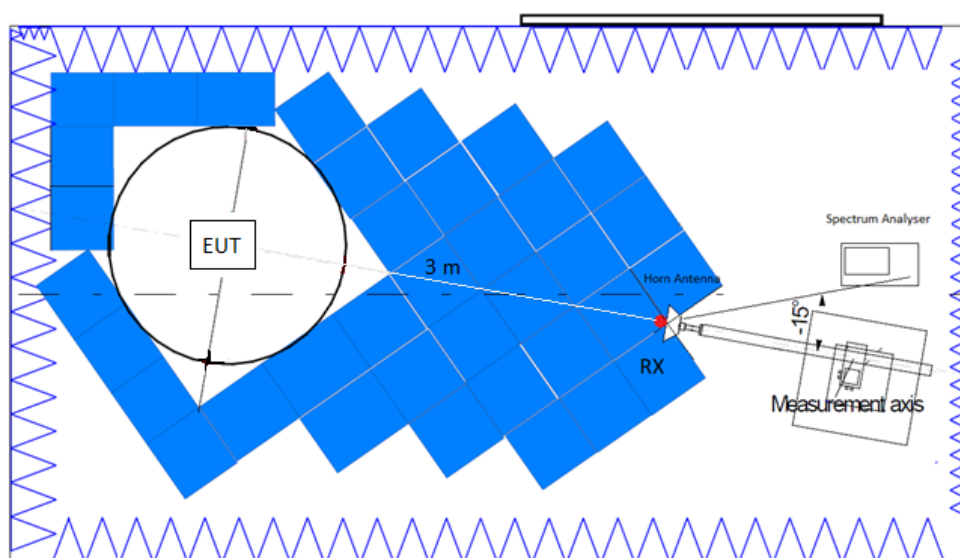
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

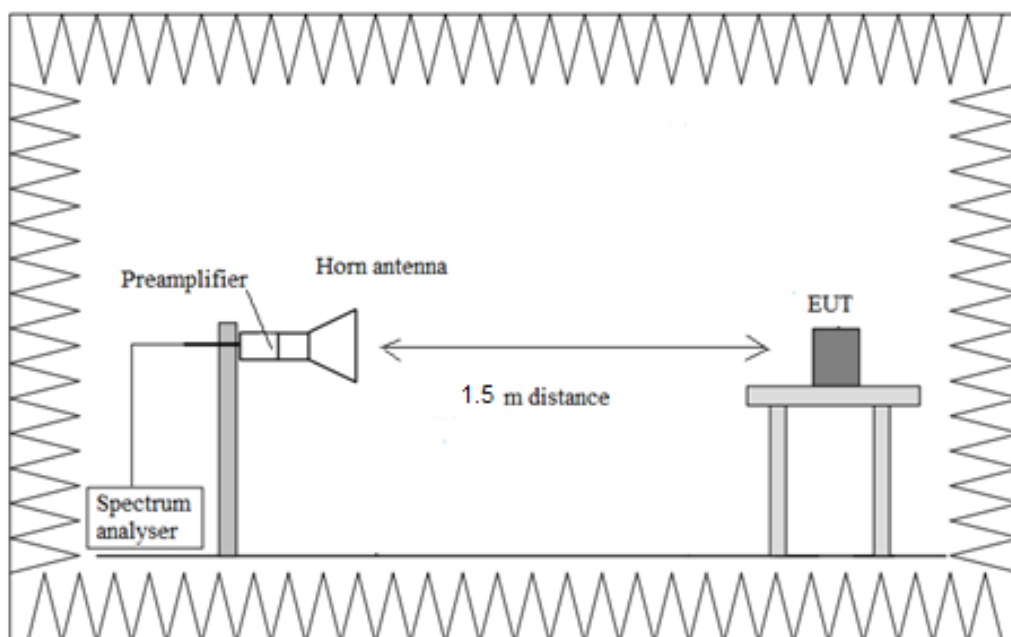
Radiated measurements setup $30 \text{ MHz} < f < 1 \text{ GHz}$:



Radiated measurements setup $f > 1 \text{ GHz}$ up to 17 GHz:



Radiated measurements setup $f > 17$ GHz:



Radiated emissions

SPECIFICATION:

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), appearing outside of the band 13.110 MHz - 14.010 MHz band must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c) / RSS-Gen):

Frequency Range (MHz)	Field strength ($\mu\text{V/m}$)	Field strength ($\text{dB}\mu\text{V/m}$)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705 - 30.0	30		30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 40000	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RSS-247. Attenuation below the general field strength limits specified in RSS-Gen is not required.

RESULTS:

The situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

All tests were performed in a semi-anechoic chamber at a distance of 3 m for the frequency range 30MHz-17 GHz and at distance of 1.5 m for the frequency range 17 GHz-26 GHz.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

A resolution bandwidth / video bandwidth of 100 kHz / 300 kHz was used for frequencies between 30 MHz up to 1 GHz and 1 MHz / 3 MHz for frequencies above 1 GHz.

Test performed on the following worst-cases in all relevant tests channels.

• **Simultaneous transmission mode Bluetooth Low Energy, WLAN 2.4GHz:**

Bluetooth Low Energy:
WLAN 2.4GHz Mode g:

Middle Channel (2440 MHz)
High Channel (2462 MHz)

Frequency range 30 MHz - 1 GHz

Spurious frequencies detected at less than 20 dB below the limit:

Unwanted Freq (MHz)	Unwanted Lvl (dBµV/m)	Pol	Detector
65.2534	23.77	V	Quasi-Peak
100.8100	29.52	V	Quasi-Peak
152.0078	25.55	H	Quasi-Peak

Frequency range 1 - 26 GHz

Spurious frequencies with peak levels above the average limit (54 dBµV/m at 3 m) are measured with average detector for checking compliance with the average limit.

Spurious frequencies detected at less than 20 dB below the limit:

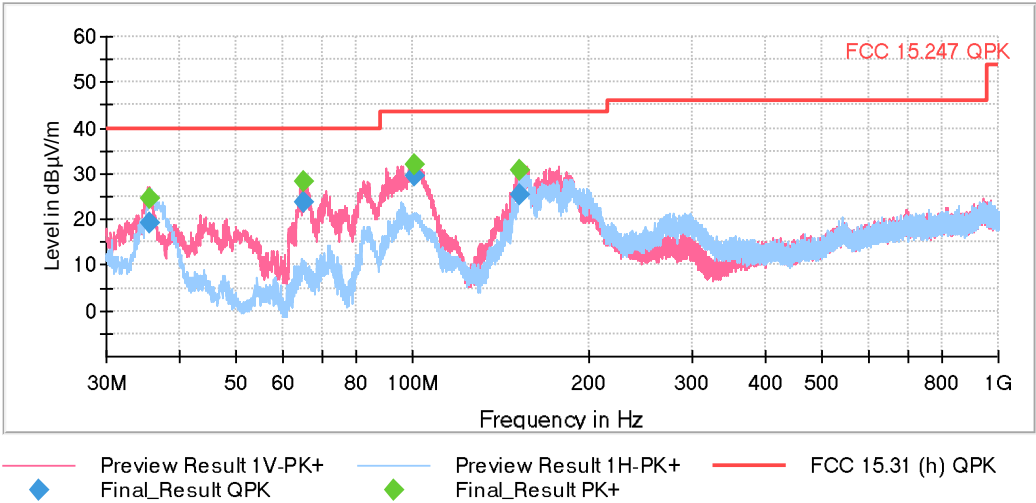
Unwanted Freq (MHz)	Unwanted Lvl (dBµV/m)	Pol	Detector
2389.2615	60.05	H	PK
	48.29		AVG
2483.8154	61.52	H	PK
	49.26		AVG
4879.6400	43.92	V	PK
7319.2800	52.69	V	PK
9847.6800	55.51	V	PK

Verdict: PASS

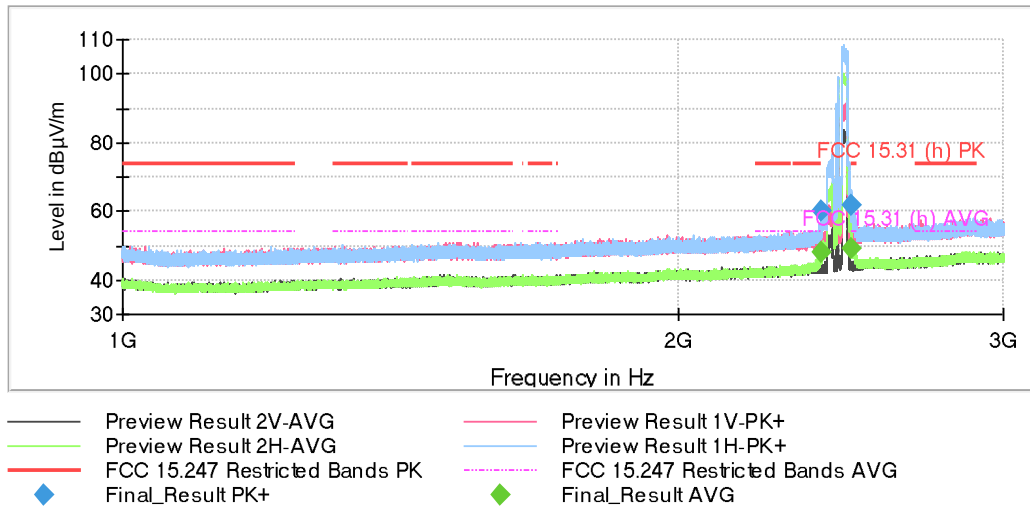
Spectrum Analyzer Parameters:

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [ESW 44] 30 MHz - 1 GHz	30,312 kHz	PK+	100 kHz	1 s	0 dB
Receiver: [ESW 44] 1 GHz - 3 GHz	30,769 kHz	PK+ ; AVG	1 MHz	1 s	0 dB
Receiver: [ESW 44] 3 GHz - 17 GHz	140 kHz	PK+ ; AVG	1 MHz	1 s	30 dB
Receiver: [ESW 44] 17 GHz - 26 GHz	300 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

FREQUENCY RANGE 30 MHz - 1 GHz (worst-case):

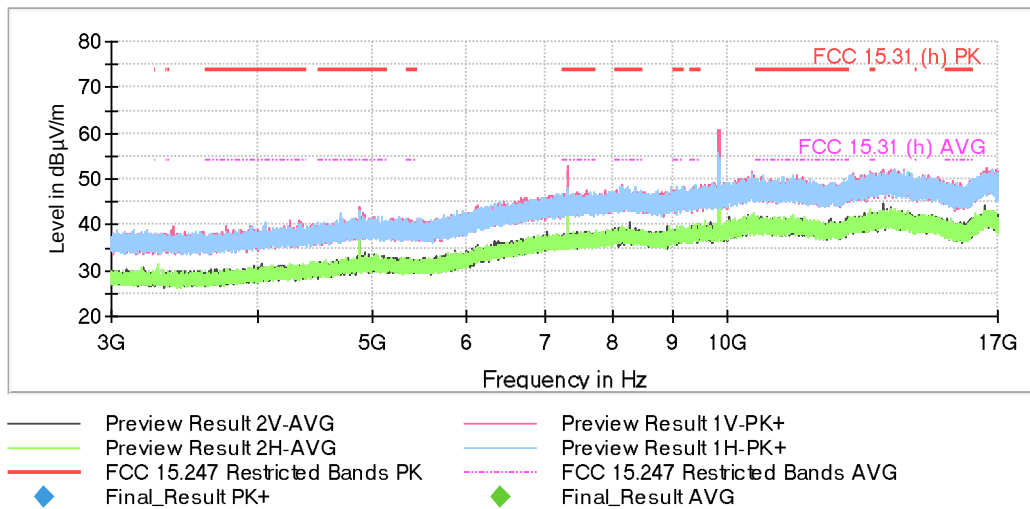


FREQUENCY RANGE 1 - 3 GHz (worst-case):



The peak above the limit are the Bluetooth LE and WiFi 2.4GHz carrier frequencies.

FREQUENCY RANGE 3 - 17 GHz (worst-case):



FREQUENCY RANGE 17 - 26 GHz (worst-case):

