DEKRA Testing and Certification, S.A.U.
Parque Tecnológico de Andalucía
c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España
C.I.F. A29507456

ISED CABid: ES1909
Lab. Company Number: 4621A

Test Report No:
76930RRF.002

Partial Test Report

USA FCC 15.31(h), 22, 24, 27, 15.209, 15.247, 15.407
CANADA RSS-132, RSS-133, RSS-199, RSS-247, RSS-Gen

(*) Identification of item tested	Telematic control unit with wireless technologies, used in automotive industry
(*) Trademark	VW AG
(*) Model and /or type reference	ConBox-High
(*) Derived model not tested	ConBox High RD
Other identification of the product	FCC ID: T8GP114 IC: 6434A-P114
(*) Features	GSM, UMTS, LTE, GNSS, Wi-Fi, BTLE, BT_EDR HW version: 043 SW version: 0595
Manufacturer	HARMAN BECKER AUTOMOTIVE SYSTEMS GMBH BECKER-GOERING-STR. 16 76307, KARLSBAD, GERMANY
Test method requested, standard	USA FCC Part 15.31(h) (10-1-21 Edition): Measurement standard. USA FCC Part 15.209 (10-1-21 Edition): Radiated emission limits; general requirements. 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 15.407 (10-1-21 Edition): Unlicensed National Information Infrastructure (U-NII) Devices. General technical requirements. Band U-NII-3 (5725 MHz – 5850 MHz). USA FCC Part 22 (10-1-21 Edition). Public Mobile Services. USA FCC Part 24 (10-1-21 Edition): Personal Communications Services. USA FCC Part 27 (10-1-21 Edition). Miscellaneous Wireless Communications Services. CANADA RSS-247 Issue 2 (Feb. 2017). CANADA RSS-Gen. Issue 5, Amendment 1 (Mar. 2019) + Amendment 2 (Feb. 2021). CANADA RSS-132 Issue 3, Jan. 2013.

Test method requested, standard	CANADA RSS-133 Issue 6, Amendment (Jan. 2018). CANADA RSS-199 Issue 3 (Dec. 2016). • Emission limitations radiated with simultaneous transmissions. 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 Apr. 2, 2019. Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices 789033 D02 General U-NII Test Procedures New Rules v02r01 dated Dec. 14, 2017. Measurement Guidance for Certification of Licensed Digital Transmitters. 971168 D01 Power Meas License Digital Systems v03r01 dated April 9, 2018. ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices. ANSI C63.26-2015. IEEE/ANSI Standard for Testing of Transmitters Used in Licensed Radio Services.
Approved by (name / position & signature)	José Manuel Gómez Galván EMC Consumer & RF Lab. Manager  Firmado digitalmente por 53680346W JOSE MANUEL GOMEZ (C:A29507456)
Date of issue	2023-12-19
Report template No.	FDT08_24 (*) “Data provided by the client”

Index

Acronyms

Acronym ID	Acronym Description
# of Tx Chains	Number of Transmission Chains
Detector	Detector used
Equipment	Equipment Type
Freq	Frequency
Freq Rng	Frequency Range
MP	Measurement Point
Mod	Modulation
Pol	Polarization
Unwanted Freq	Unwanted Emissions Frequency
Unwanted Lvl	Unwanted Emissions Level

Competences and guarantees

DEKRA Testing and Certification is a testing laboratory accredited by the National Accreditation Body (ENAC - Entidad Nacional de Acreditación) to perform the tests indicated in the Certificate No. 51/LE 147.

DEKRA Testing and Certification is an FCC-recognized accredited testing laboratory with appropriate scope of accreditation that covers the performed tests in this report.

DEKRA Testing and Certification is an ISED-recognized accredited testing laboratory, CABid: ES1909, Company Number: 4621A, with the appropriate scope of accreditation that covers the performed tests in this report.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification S.A.U. has a calibration and maintenance program for its measurement equipment.

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.

DEKRA Testing and Certification S.A.U. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Testing and Certification S.A.U.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification S.A.U. and the Accreditation Bodies.

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 from 30 MHz to 1 GHz is: Measurement uncertainty ≤ ±5.35 dB (with factor k=2).

The total uncertainty of the measurement system for the radiated emissions of the EUT from 1 to 17 GHz is: Measurement uncertainty ≤ ±4.32 dB (with factor k=2).

The total uncertainty of the measurement system for the radiated emissions of the EUT from 17 to 40 GHz is: Measurement uncertainty ≤ ±5.51 dB (with factor k=2).

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 a Telematics control unit with wireless technologies, used in automotive, equipped with one modem, OEM. This unit was designed for automotive usage and contains the following features: GSM, UMTS, LTE, GNSS, Wifi (a, b, g, n, ac), Bluetooth Low Energy (BTLE) and Bluetooth EDR.

3. Declaration of Comparability:

HARMAN Becker Automotive Systems GmbH
Becker-Goering-Str. 16
76307 Karlsbad, Germany

Declaration of Comparability

HARMAN BECKER
Automotive Systems GmbH

Becker-Göring-Str. 16
D-76307 Karlsbad, Germany

To whom it may concern:

We, Harman Becker Automotive Systems GmbH, hereby declares that our products:
ConBox-High and **ConBox High RD** are equipped with the same NAD module (for each variant listed below) and the cellular part is identical between these TCU's.
Also, the test results are valid and representative for both projects as long as there are no modifications which may request additional tests.

ConBox Variant: A970, A971, A973, A974, A975, A976, A977, A978, A979, A980, A981, A982, A983, A984, P114, P115, P119

Sincerely,

i.V.

i.V.

By: Iulian-George Stoica
Title: Principal Engineer, Quality Engineering
e-mail: iulian.stoica@harman.com
Telephone: +40799 306 699
Company: Harman Becker Automotive Systems GmbH

By: Olteanu Marius
Title: Regulatory Product Compliance Expert
e-mail: marius.olteanu@harman.com

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 results.

Usage of samples

Samples undergoing test have been selected by: The client.

Id	Control Number	Description	Model	Serial No.	Date of Reception	Application
S/01	76930B_76.1	Telematic control unit	ConBox-High	--	2023-12-04	Element Under Test
	76930B_7.1	Harness	--	--	2023-09-26	Auxiliary Element
	76930B_18.1	Antenna	95C.035.503	--	2023-09-26	Auxiliary Element
	76930B_24.1	Fakra Cable - 4 SMA	--	--	2023-09-26	Auxiliary Element
	76930B_37.1	Antenna	4M0.035.504.A	--	2023-09-26	Auxiliary Element
	76930B_38.1	Antenna	4M0.035.504.A	--	2023-09-26	Auxiliary Element
	76930B_41.1	Antenna	95C.051.502	00053	2023-09-26	Auxiliary Element

Notes referenced to samples during the project:

Id	Type
S/01	This setup uses the cellular harness worst case regarding Radiated Spurious Emission testing.

Test sample description

Ports……..:	Port name and description	Cable					
		Specified max length [m]	Attached during test	Shielded	Coupled to patient(3)		
	RF connector – code		☐	☒	☐		
	RF connector – code		☒	☒	☐		
	RF connector – code		☒	☐	☐		
Supplementary information to the ports……..:							
Rated power supply ..... :	Voltage and Frequency			Reference poles			
				L1	L2	L3	N	PE
	☐	AC:		☐	☐	☐	☐	☐
	☒	DC: 12V car battery (4.8 VDC inside of TCU)						
Rated Power..... :	12V DC							
Clock frequencies..... :	25MHz; 26MHz; 32,768kHz; 49,58MHz;							
Other parameters ..... :	See Technical description							
Software version..... :	0595							
Hardware version ..... :	043							
Dimensions in cm (W x H x D) ... :	--							
Mounting position ..... :	☐	Table top equipment						
	☐	Wall/Ceiling mounted equipment						
	☐	Floor standing equipment						
	☐	Hand-held equipment						
	☒	Other: automotive telematics control unit						
Modules/parts..... :	Module/parts of test item			Type		Manufacturer	
	--			-		-	
Accessories (not part of the test item) ..... :	Description			Type		Manufacturer	
	Cable Harness			-		-	
	2G/3G/4G/5G Antenna			-		Hirschmann/ Molex	
	eCall button/LED			-		-	
	SOS Loudspeaker			-		-	
	Wake-up unit Box			-		-	
Documents as provided by the applicant..... :	Description			File name		Issue date	
	Technical Description			-		-	

(3) Only for Medical Equipment

Identification of the client

HARMAN BECKER AUTOMOTIVE SYSTEMS GMBH
BECKER-GOERING-STR. 16
76307 KARLSBAD GERMANY

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2023-12-07
Date (finish)	2023-12-14

Document history

Report number	Date	Description
76930RRF.002	2023-12-12	First release.

Environmental conditions

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

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

In the semi-anechoic chamber, the following limits were not exceeded during the test:

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

Remarks and comments

The tests have been performed by the technical personnel: José Manuel Jiménez and Valentín Andarias.

Used instrumentation:

Control No.	Equipment	Model	Manufacturer	Next Calibration
4825	SEMIANECHOIC ABSORBER LINED CHAMBER	FACT 3 200 STP	ETS LINDGREN	N/A
4826	SHIELDED ROOM	S101	ETS LINDGREN	N/A
4578	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2026-06-01
6142	PRE-AMPLIFIER G>38dB 30MHz-6GHz	BLNA 0360-01N	BONN ELEKTRONIK	2024-06-28
5862	EMI TEST RECEIVER 9kHz-7GHz	ESR7	ROHDE AND SCHWARZ	2025-02-15
4611	HORN ANTENNA 1-18GHz	BBHA 9120 D	SCHWARZBECK MESS-ELEKTRONIK	2026-01-16
5705	PRE-AMPLIFIER G>40dB 1-18 GHz	BLMA 0118-1M	BONN ELEKTRONIK	2024-07-26
4657	HORN ANTENNA 18-40GHz	BBHA 9170	SCHWARZBECK	2026-06-12
4729	PRE-AMPLIFIER G>30dB 18-40GHz	BLMA 1840-1M	BONN ELEKTRONIK	2024-03-14
4716	SIGNAL AND SPECTRUM ANALYZER 2Hz-50GHz	FSW50	ROHDE AND SCHWARZ	2024-08-12
6092	DC POWER SUPPLY 30V/5A	KEYSIGHT TECHNOLOGIES	U8002A	N/A
7758	DIGITAL MULTIMETER	FLUKE	175	2024-11-08
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 15, 22, 24, 27 / CANADA RSS-132, RSS-133, RSS-199, RSS-247, RSS-Gen			
Requirement – Test case		**Verdict**	**Remark**
FCC 15.31 (h), 15.209 (a), 15.247 (d), 15.407 (b), FCC 22.917, FCC 24.238, FCC 27.53 / RSS-Gen 8.9, RSS-247 5.5, 6.2.1.2, 6.2.2.2, 6.2.3.2 & 6.2.4.2, RSS-132 5.5, RSS-133 6.5, RSS-199 4.5	Emission limitations radiated (Transmitter)	P	(1), (2)
Supplementary information and remarks: (1) Only radiated simultaneous transmission spurious emission test was requested. (2) Radiated measurements were performed in the worst-case of combination between different capabilities of the equipment.			

Appendix A: Test results.

INDEX

TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

Vnominal:	12 Vdc
Type of Power Supply:	External DC (vehicle battery)

ANTENNA (*):

Type of Antennas:	External antennas
Maximum Declared Gain for BT EDR:	+0.11 dBi
Maximum Declared Gain for 2.4 GHz WLAN:	+0.11 dBi
Maximum Declared Gain for 5 GHz WLAN:	+2.38 dBi
Maximum Declared Gain for Cellular:	+2.80 dBi

TEST FREQUENCIES (*):

	CELLULAR	
Band:	2G 850	
Frequency Range:	824 – 849 MHz	
Transmit Channel:	Channel	Channel Frequency (MHz)
	Low: 128	824.2
Band:	2G 1900	
Frequency Range:	1850 – 1910 MHz	
Transmit Channel:	Channel	Channel Frequency (MHz)
	High: 810	1909.8
Band:	LTE Band 7	
Frequency Range:	2500 – 2570 MHz	
Transmit Channel:	Channel	Channel Frequency (MHz)
	Low: 20850	2510 MHz (BW 20 MHz, RB Size 1, RB Offset 0, QPSK)

	WLAN 2.4 GHz (IEEE 802.11 b/g/n20) / DTS	
Mode:	802.11 n20: index MCS0 (SISO)	
Channel Bandwidth:	20 MHz	
Frequency Range:	2400 MHz to 2483.5 MHz	
Transmit Channel:	Channel	Channel Frequency (MHz)
	CH11	2462

	WLAN 5 GHz (IEEE 802.11 a/n/ac 20/40/80) / U-NII	
Mode:	802.11 ac20: index MCS0 (SISO)	
Channel Bandwidth:	20 MHz	
Frequency Range:	5150 MHz to 5250 MHz (U-NII-1)	
Transmit Channel:	Channel	Channel Frequency (MHz)
	CH48	5240

	Bluetooth EDR / FHSS	
Mode:	Basic Data Rate (GFSK – 1-DH5)	
Channel Bandwidth:	1 MHz	
Frequency Range:	2402 MHz to 2480 MHz	
Transmit Channels	Channel	Channel Frequency (MHz)
	CH78	2480

The test set-up was made according to the general provisions of FCC 558074 D01 15.247 Meas Guidance v05r02 dated April 2, 2019.

The EUT was tested in the following operating modes during the transmitter tests:

For cellular technologies, the EUT was controlled by a communication tester to transmit at maximum power on the test channels and modes as required.

For WLAN and Bluetooth, the EUT was configured to transmit continuously on the test channels and modes as required.

Selected Transmission Mode for each Radio:

The following configurations were selected based on preliminary testing that identified these modes as the worst cases:

* Cellular 2G 850:	Cellular 2G 850 / Low Channel, GPRS mode configuration.
* Cellular 2G 1900:	Cellular 2G 1900 / High Channel, GPRS mode configuration.
* Cellular LTE 7:	LTE Band 7 / Low Channel, QPSK mode configuration.
* Bluetooth BR/EDR:	GFSK (DH-5) / CH78 (2480 MHz) configuration.
* WLAN 2.4 GHz:	802.11 n20 (HT20 MCS0 index) / CH11 (2462 MHz) configuration.
* WLAN 5 GHz U-NII-1:	802.11 ac20 (VT20 MCS0 index) / CH48 (5240 MHz) configuration.

TESTED SIMULTANEOUS TRANSMISSION MODES (worst-case):

*** Operation Mode 1: BT EDR GFSK (DH5) Channel 78 (2480 MHz) + Wi-Fi 2.4GHz 802.11n20 Channel 11 (2462 MHz) + Wi-Fi 5GHz 802.11ac20 U-NII-1 Channel 48 (5240 MHz) + 2G 850 GPRS Low Channel (824.2 MHz)**, with the EUT configured to simultaneously transmit all these signals at maximum output power.

*** Operation Mode 2: BT EDR GFSK (DH5) Channel 78 (2480 MHz) + Wi-Fi 2.4GHz 802.11n20 Channel 11 (2462 MHz) + Wi-Fi 5GHz 802.11ac20 U-NII-1 Channel 48 (5240 MHz) + 2G 1900 GPRS High Channel (1909.8 MHz)**, with the EUT configured to simultaneously transmit all these signals at maximum output power.

*** Operation Mode 3: BT EDR GFSK (DH5) Channel 78 (2480 MHz) + Wi-Fi 2.4GHz 802.11n20 Channel 11 (2462 MHz) + Wi-Fi 5GHz 802.11ac20 U-NII-1 Channel 48 (5240 MHz) + LTE Band 7 QPSK Low Channel (2510 MHz)**, with the EUT configured to simultaneously transmit all these signals at maximum output power.

*** Operation Mode 4: BT EDR GFSK (DH5) Channel 78 (2480 MHz) + Wi-Fi 2.4GHz 802.11n20 Channel 11 (2462 MHz) + Wi-Fi 5GHz 802.11ac20 U-NII-1 Channel 48 (5240 MHz)**, with the EUT configured to simultaneously transmit all these signals at maximum output power.

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TEST CASES DETAILS

FCC 15.209 (a), 15.247 (d), 15.407 (b), 22.917, 24.238, 27.53
RSS-Gen 8.9, RSS-247 5.5 & 6.2.1.2, RSS-132 5.5, RSS-133 6.5, RSS-199 4.5

Emission limitations radiated (Transmitter)

Limits

BT EDR, WLAN 2.4 GHz, WLAN 5 GHz:

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

Frequency Range (MHz)	Field strength (µV/m)	Field strength (dBµV/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
Above 960	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 specified when measuring with peak detector function corresponding to 20 dB above the indicated values in the table above.

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

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

Cellular:

2G 850. FCC §2.1053 & §22.917 / RSS-132 Issue 3 Clause 5.5:

FCC §22.917:

> (a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

RSS-132 Clause 5.5:

> ii. After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 p (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

2G 1900. FCC §2.1053 & §24.238 / RSS-133 Clause 6.5:

FCC §24.238:

> (a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

RSS-133 Clause 6.5:

> ii. After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10 p (watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

LTE Band 7. FCC §2.1053 & §27.53 / RSS-199 Clause 4.5:

FCC §27.53 (m):

> (4) For mobile digital stations, the attenuation factor shall be not less than 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz.

RSS-199 Clause 4.5:

> (b) for mobile subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least:
>
> iii. 55 + 10 log10 p at X MHz and beyond from the channel edges
>
> In addition, the attenuation shall not be less than 43 + 10 log10 p on all frequencies between 2490.5 MHz and 2496 MHz, and 55 + 10 log10 p at or below 2490.5 MHz.
>
> In (b), p is the transmitter power measured in watts and X is 6 MHz or the equipment occupied bandwidth, whichever is greater.

Method

The measurement was performed with the EUT inside a semi-anechoic chamber.

The spectrum was scanned from 30 MHz to at least the 10th harmonic of the highest frequency of the combined radios up to 40 GHz.

The EUT was placed on a non-conductive stand at a 3-meter distance from the measuring antenna for measurements up to 17 GHz and at 1.5-meter distance for measurements above 17 GHz.

Detected emissions were maximized at each frequency by rotating the EUT and adjusting the height of the measuring antenna. The maximum meter reading was recorded. Measurements were made in both horizontal and vertical planes of polarization.

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

For radiated measurements above 17GHz performed at a distance closer than the distance specified in standard, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

These measurements have been performed in order to check the impact of the simultaneous transmission of all radio interfaces (that can transmit simultaneously).

Measurement Limit:

At Po transmitting power, the specified minimum attenuation 43+10log (Po) becomes:

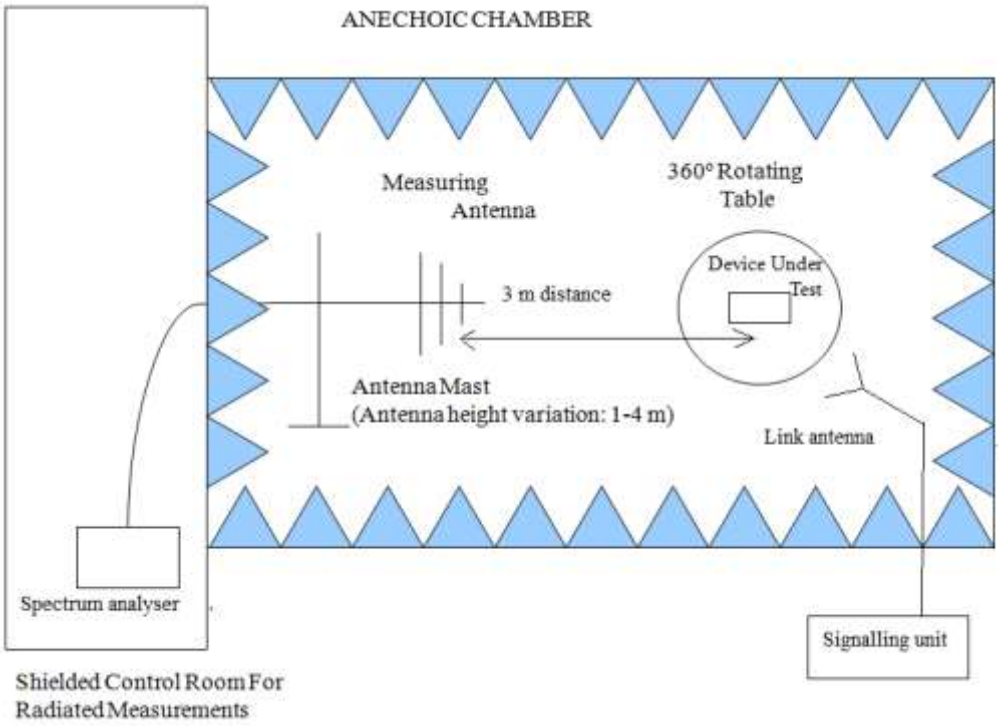
Po (dBm) – [43 + 10 log (Po in mWatts) - 30] = - 13 dBm

At Po transmitting power, the specified minimum attenuation 55+10log (Po) becomes:

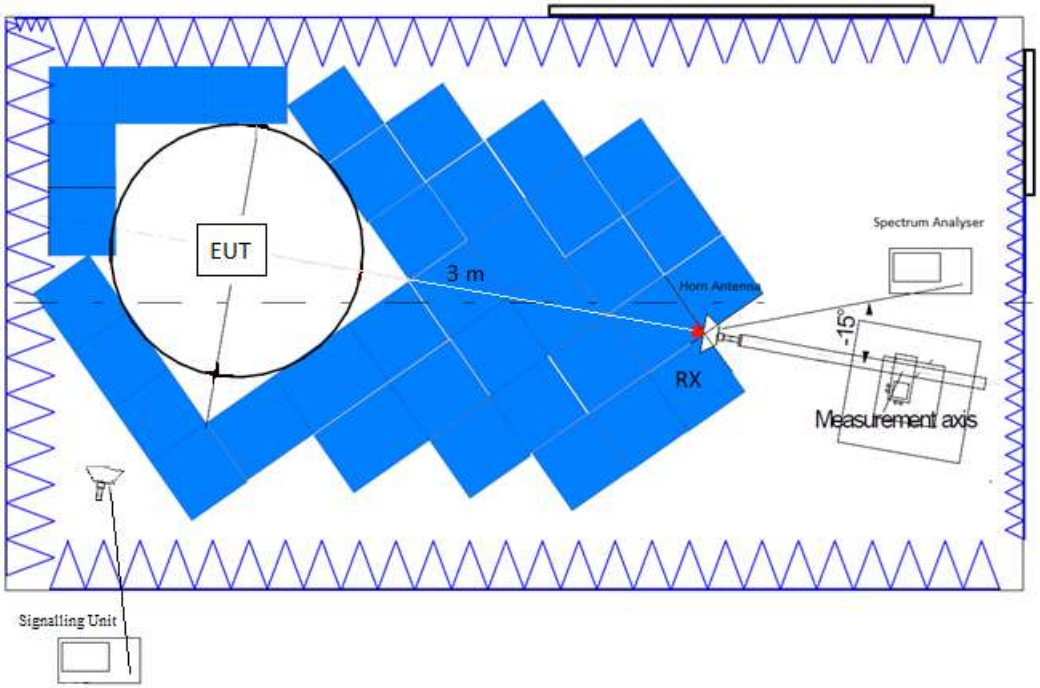
Po (dBm) – [55 + 10 log (Po in mW) - 30] = -25 dBm

Test setup

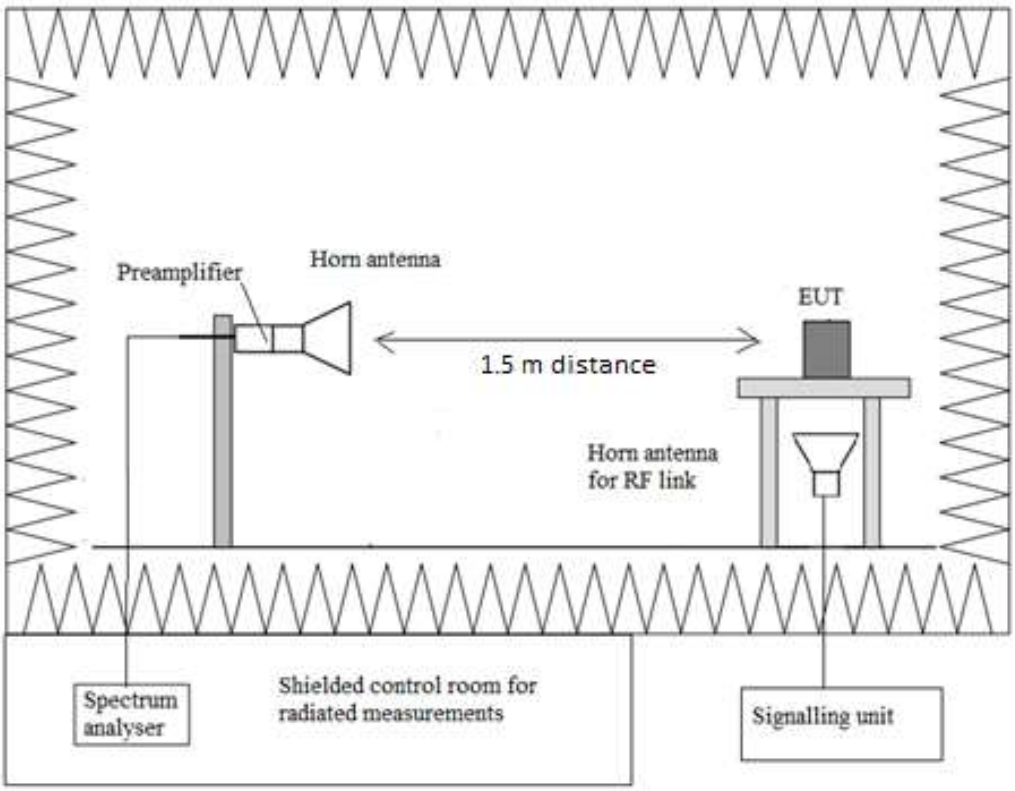
Radiated measurements below 1 GHz.



Radiated measurements between 1 GHz and 17 GHz.



Radiated measurements above 17 GHz.



Operation Mode 1:

BT EDR:	CH80 (2480 MHz), GFSK
WLAN 2.4 GHz:	CH11 (2462 MHz), 802.11 n20.
WLAN 5 GHz:	CH48 (5240 MHz), 802.11 ac20.
2G 850:	Low Channel (824.2 MHz), GPRS.

The limit of the test is determined by:

Frequency Range	Detector	Limit at 3m (dBµV/m)
30 MHz to 8.49 GHz	Peak	43 + 10 log (P) dB = -13 dBm → 82.23 dBµV/m
8.49 GHz to 40 GHz	Peak	68.23 dBµV/m (*) or 74 dBµV/m (**)
8.49 GHz to 40 GHz	Average	54 dBµV/m (**)

(*) Radiated emissions which fall in the non-restricted bands.
(**) Radiated emissions which fall in the restricted bands, as defined in §15.205(a).

Results

Frequency range 30 MHz – 1 GHz

No spurious frequencies at less than 20 dB below the limit.

Frequency range 1 GHz – 40 GHz

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

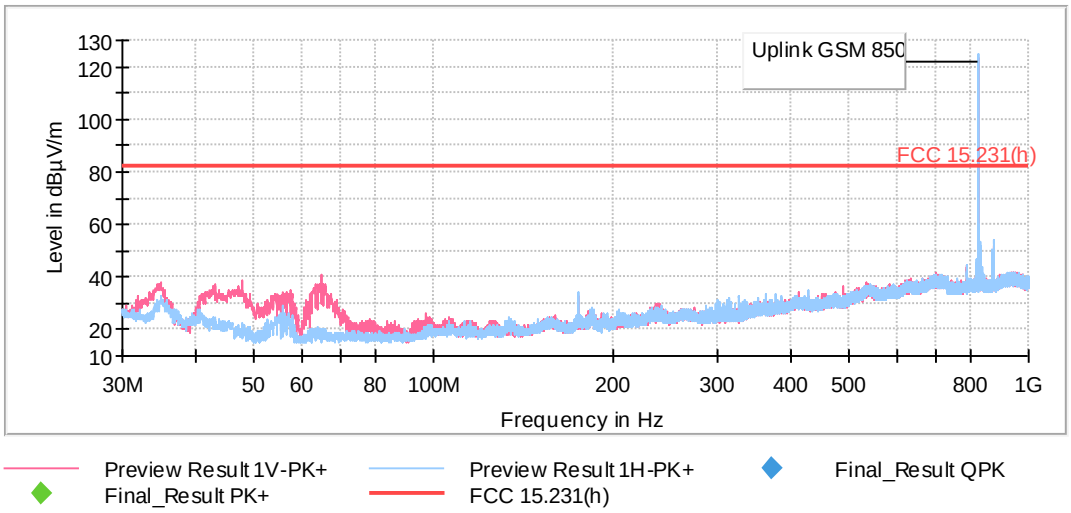
Unwanted Freq (MHz)	Unwanted Lvl (dBµV/m)	Pol	Detector
10482.72	65.16	V	PK

Verdict

Pass

Attachments

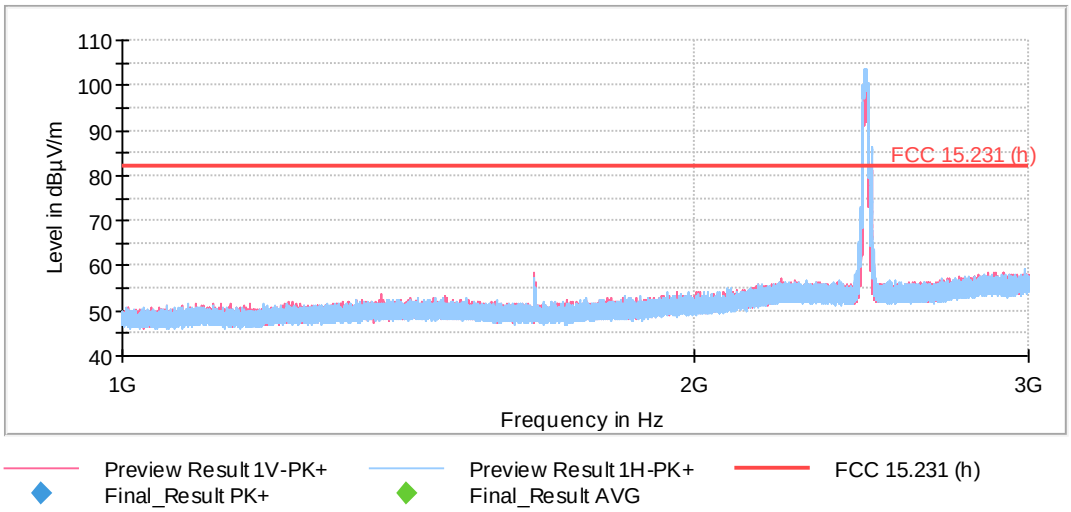
Frequency range 30 MHz – 1 GHz



The peak above the limit is the 2G 850 carrier frequency.

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [ESR 7]					
30 MHz - 1 GHz	30,312 kHz	PK+	100 kHz	1 s	0 dB

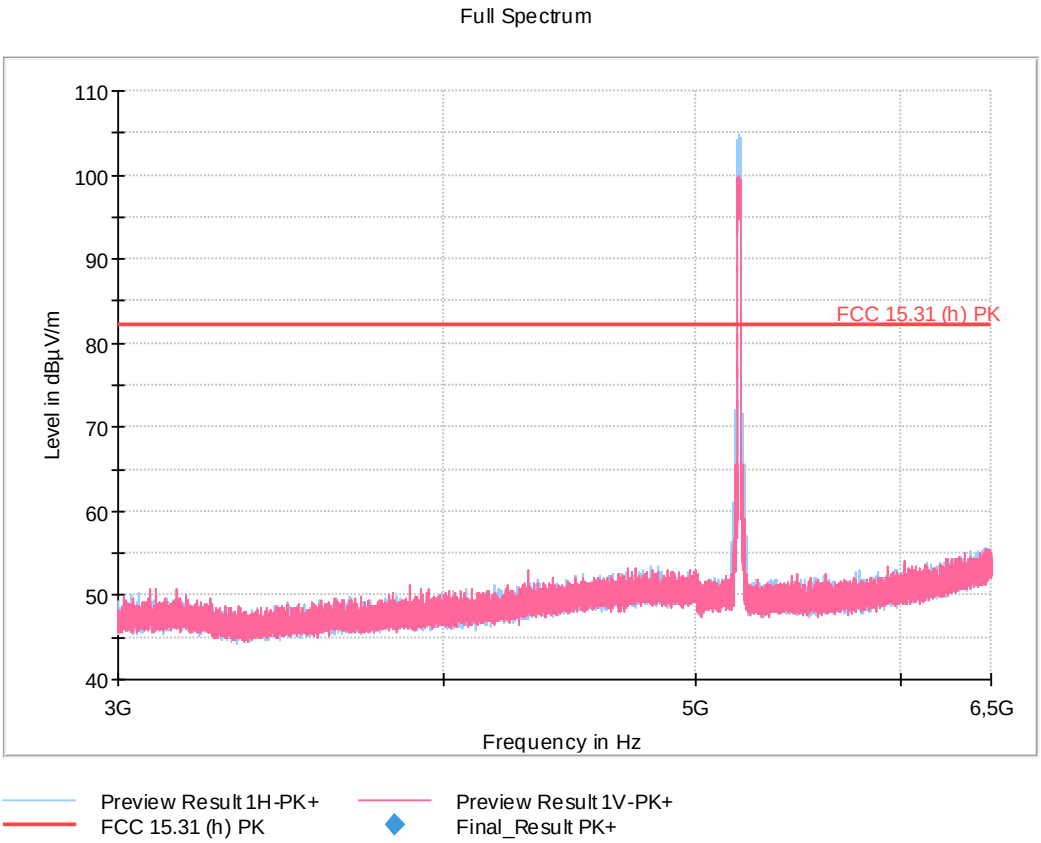
Frequency range 1 GHz – 3 GHz



The peaks above the limit are the BT EDR and WLAN 2.4 GHz carrier frequencies.

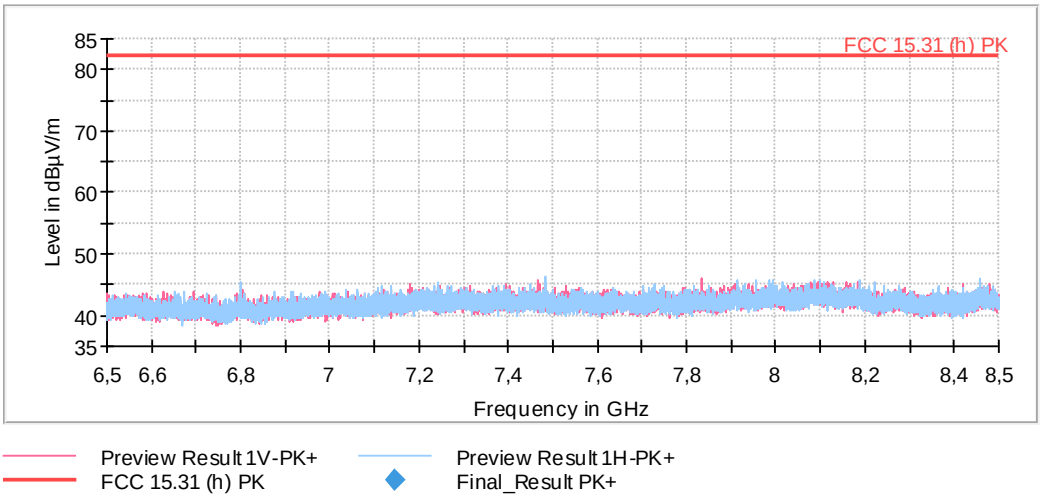
Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [FSW 50]					
1 GHz - 3 GHz	30,769 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Frequency range 3 GHz – 8.5 GHz



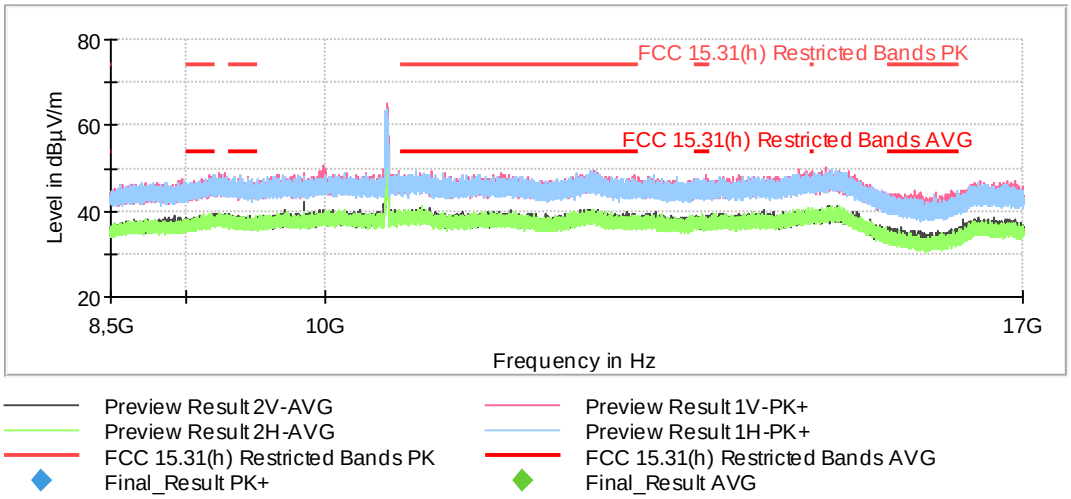
The peak above the limit is the WLAN 5 GHz U-NII-1 carrier frequency.

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [FSW 50]					
3 GHz - 6,5 GHz	100 kHz	PK+ ; AVG	1 MHz	1 s	0 dB



Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [FSW 50]					
6,5 GHz – 8,5 GHz	140 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

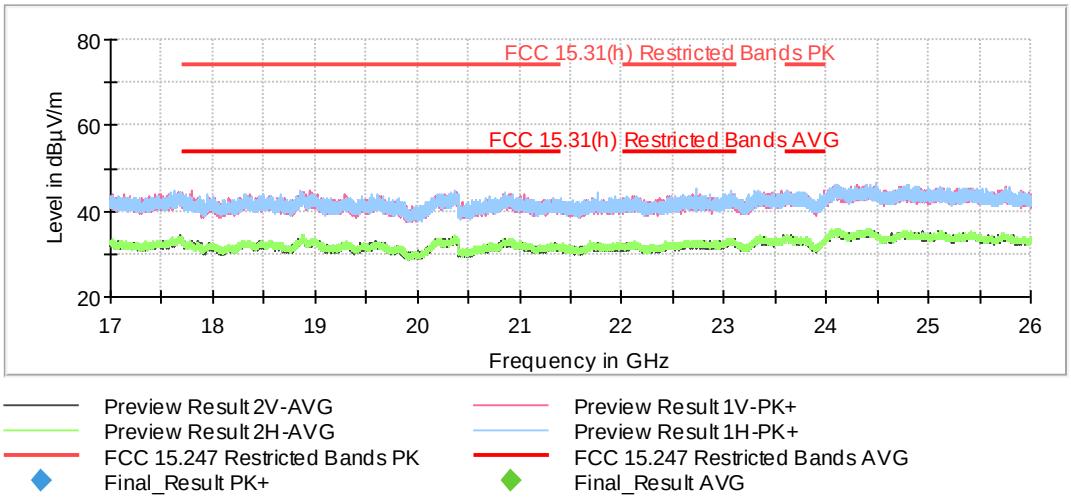
Frequency range 8.5 GHz – 17 GHz



Preview Result 2V-AVG
Preview Result 2H-AVG
FCC 15.31(h) Restricted Bands PK
Final_Result PK+
Preview Result 1V-PK+
Preview Result 1H-PK+
FCC 15.31(h) Restricted Bands AVG
Final_Result AVG

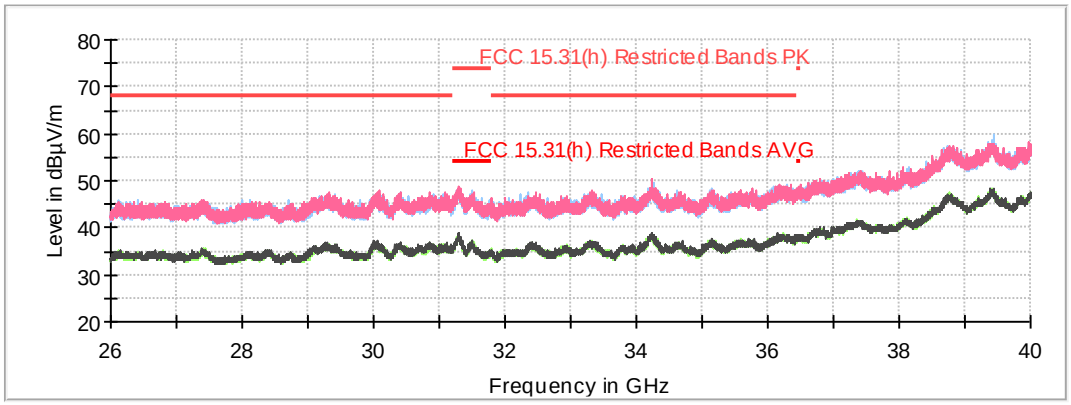
Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [FSW 50]					
3 GHz - 17 GHz	140 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Frequency range 17 GHz – 40 GHz



Preview Result 2V-AVG
Preview Result 2H-AVG
FCC 15.247 Restricted Bands PK
Final_Result PK+
Preview Result 1V-PK+
Preview Result 1H-PK+
FCC 15.247 Restricted Bands AVG
Final_Result AVG

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [FSV 40]					
17 GHz - 26 GHz	300 kHz	PK+ ; AVG	1 MHz	1 s	0 dB



Preview Result 2H-AVG
Preview Result 2V-AVG
FCC 15.407 Restricted Bands PK UNII-3
Final_Result PK+
Preview Result 1H-PK+
Preview Result 1V-PK+
FCC 15.407 Restricted Bands AVG
Final_Result AVG

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [FSV 40]					
26 GHz - 40 GHz	766,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Mode 2:

BT EDR:	CH80 (2480 MHz), GFSK
WLAN 2.4 GHz:	CH11 (2462 MHz), 802.11 n20.
WLAN 5 GHz:	CH48 (5240 MHz), 802.11 ac20.
2G 1900:	High Channel (1909.8 MHz), GPRS.

The limit of the test is determined by:

Frequency Range	Detector	Limit at 3m (dBµV/m)
30 MHz to 19.1 GHz	Peak	43 + 10 log (P) dB = -13 dBm → 82.23 dBµV/m
19.1 GHz to 40 GHz	Peak	68.23 dBµV/m (*) or 74 dBµV/m (**)
19.1 GHz to 40 GHz	Average	54 dBµV/m (**)

(*) Radiated emissions which fall in the non-restricted bands.

(**) Radiated emissions which fall in the restricted bands, as defined in §15.205(a).

Results

Frequency range 30 MHz – 1 GHz

No spurious frequencies at less than 20 dB below the limit.

Frequency range 1 GHz – 40 GHz

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

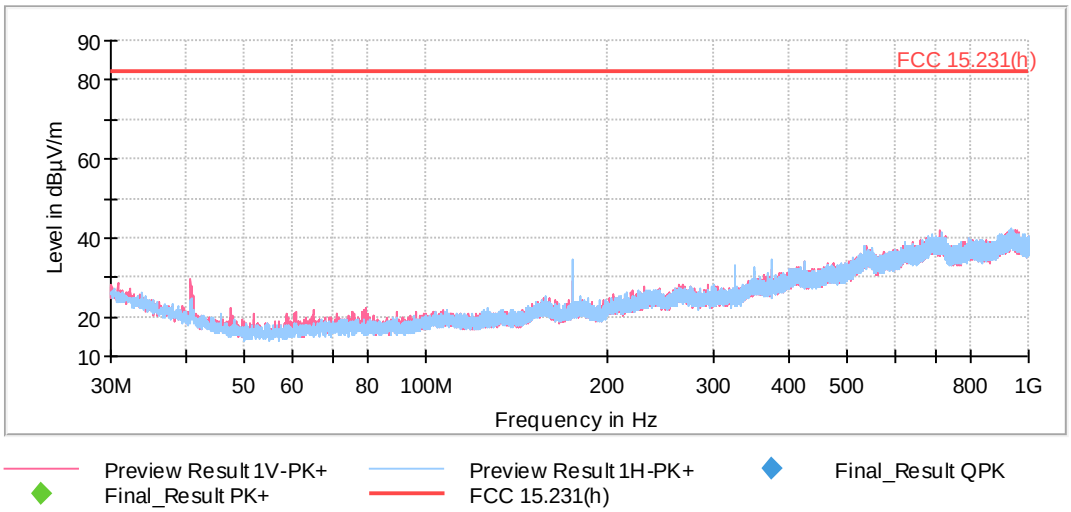
Unwanted Freq (MHz)	Unwanted Lvl (dBµV/m)	Pol	Detector
10462.30	65.07	V	PK

Verdict

Pass

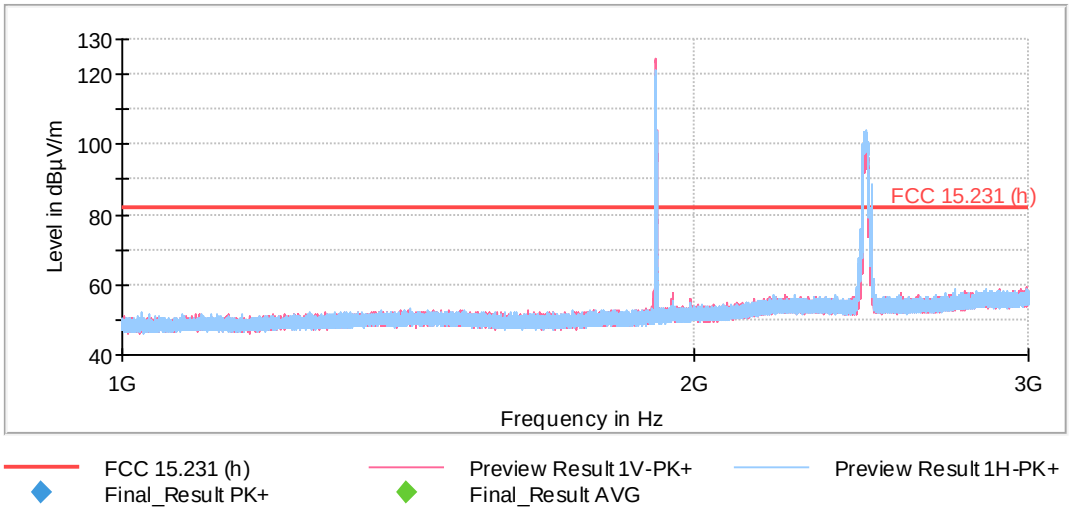
Attachments

Frequency range 30 MHz – 1 GHz



Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [ESR 7]					
30 MHz - 1 GHz	30,312 kHz	PK+	100 kHz	1 s	0 dB

Frequency range 1 GHz – 3 GHz

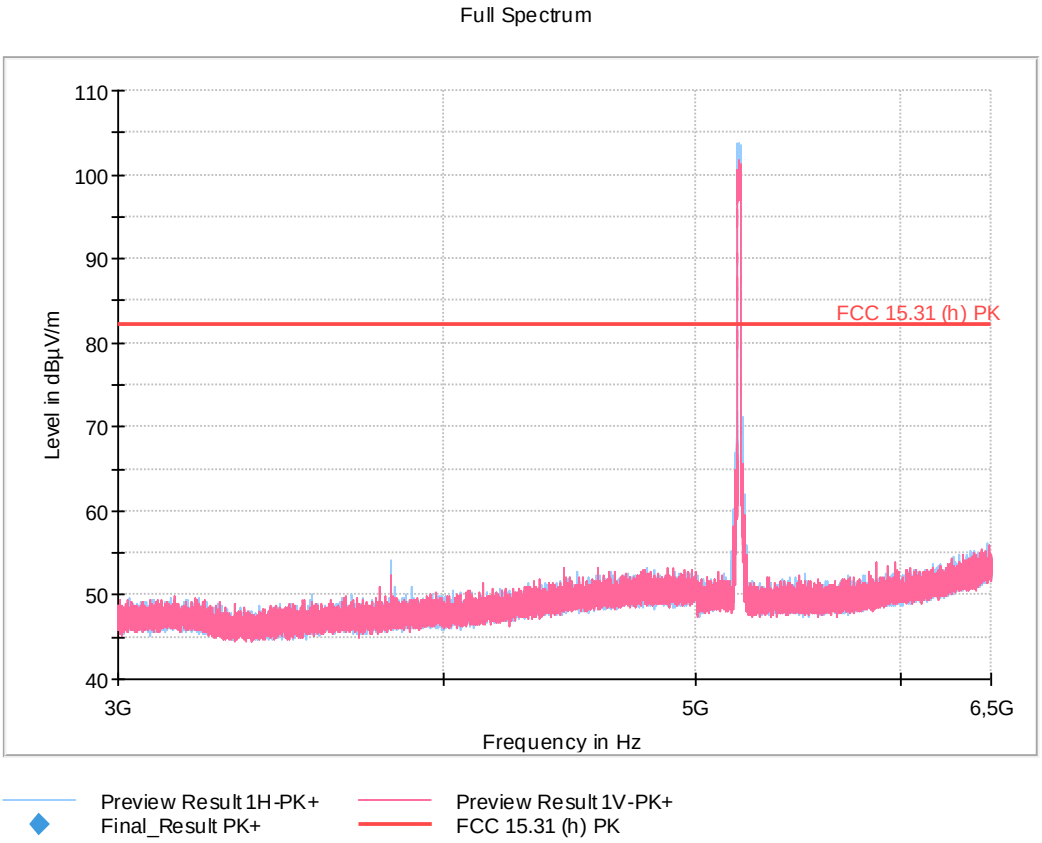


The peak on the left above the limit is the 2G 1900 carrier frequency.

The peaks on the right above the limit are the BT EDR and WLAN 2.4 GHz carrier frequencies.

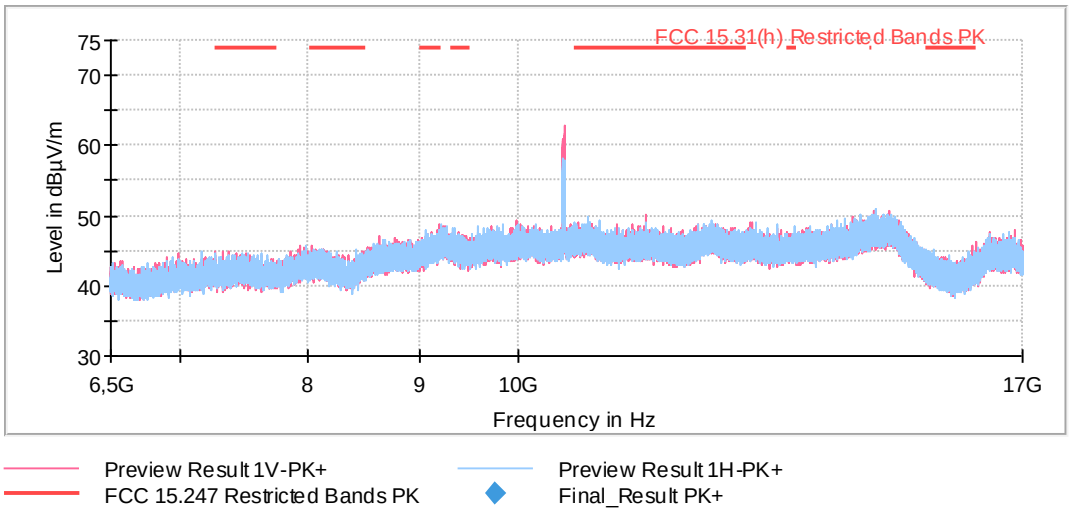
Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [FSW 50]					
1 GHz - 3 GHz	30,769 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Frequency range 3 GHz – 17 GHz



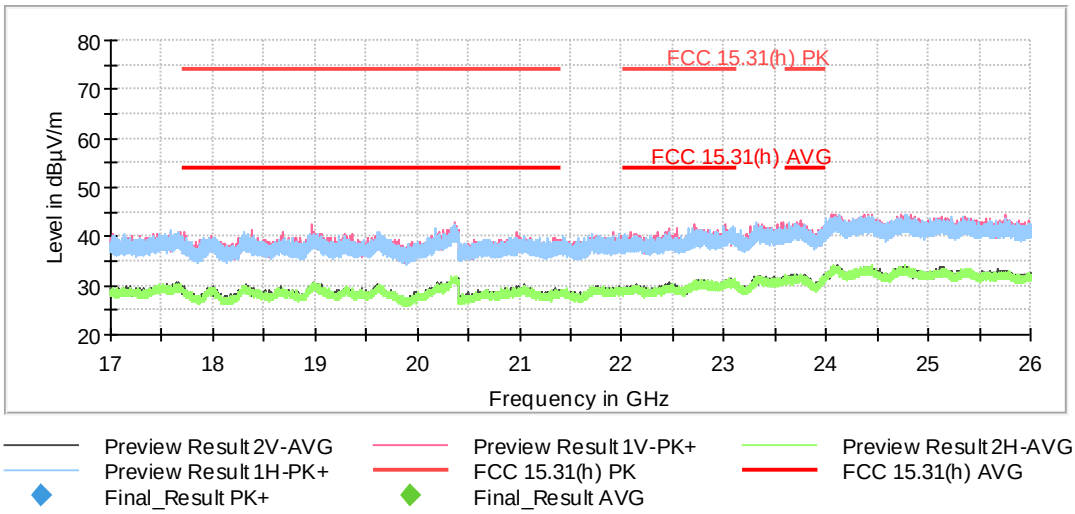
The peak above the limit is the WLAN 5 GHz U-NII-1 carrier frequency.

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [FSW 50]					
3 GHz - 6,5 GHz	100 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

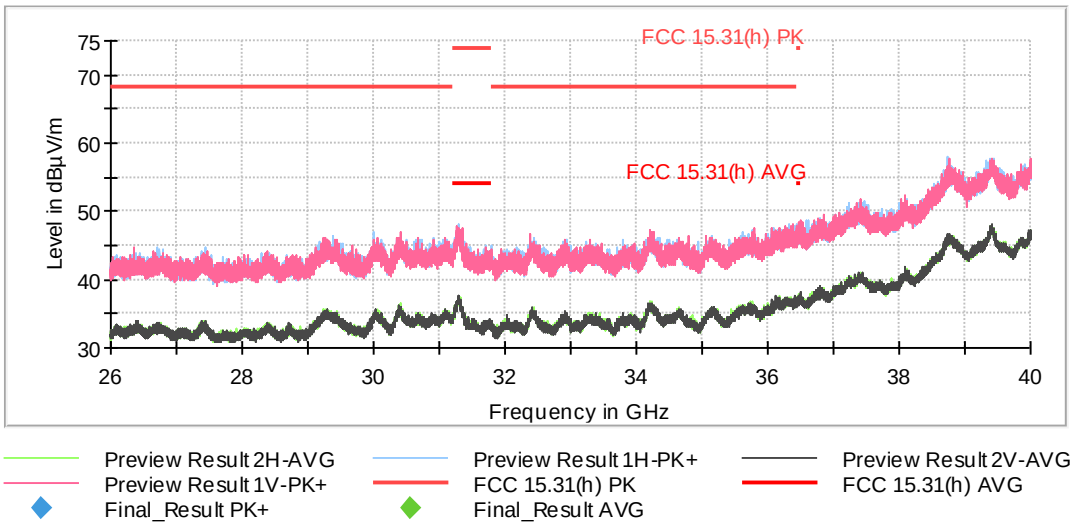


Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [FSW 50]					
6,5 GHz - 17 GHz	140 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Frequency range 17 GHz – 40 GHz



Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [FSV 40]					
17 GHz - 26 GHz	300 kHz	PK+ ; AVG	1 MHz	1 s	0 dB



Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [FSV 40]					
26 GHz - 40 GHz	766,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Mode 3:

BT EDR:	CH80 (2480 MHz), GFSK
WLAN 2.4 GHz:	CH11 (2462 MHz), 802.11 n20.
WLAN 5 GHz:	CH48 (5240 MHz), 802.11 ac20.
LTE Band 7:	Low Channel (2510 MHz), QPSK. BW 20 MHz, RB Size: 1, RB Offset: 0.

The limit of the test is determined by:

Frequency Range	Detector	Limit at 3m (dBµV/m)
30 MHz to 1 GHz	Peak	55 + 10 log (P) dB = -25 dBm → 70.23 dBµV/m
1 GHz to 25.1 GHz	Peak	70.23 dBµV/m (*) or 74 dBµV/m (**)
	Average	54 dBµV/m (**)
25.1 GHz to 40 GHz	Peak	68.23 dBµV/m (*) or 74 dBµV/m (**)
	Average	54 dBµV/m (**)

(*) Radiated emissions which fall in the non-restricted bands.
(**) Radiated emissions which fall in the restricted bands, as defined in §15.205(a).

Results

Frequency range 30 MHz – 1 GHz

No spurious frequencies at less than 20 dB below the limit.

Frequency range 1 GHz – 40 GHz

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

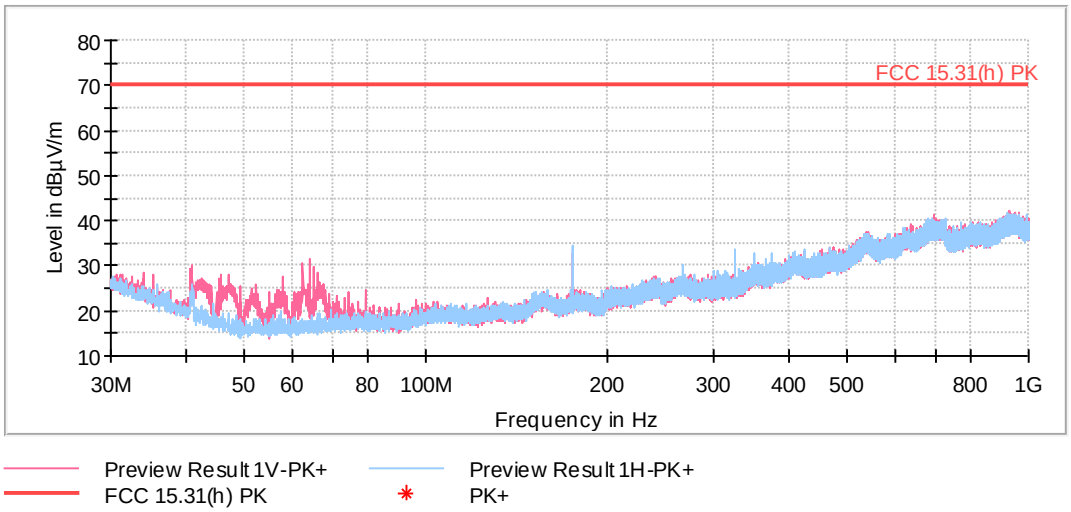
Unwanted Freq (MHz)	Unwanted Lvl (dBµV/m)	Pol	Detector
10432.88	62.80	V	PK

Verdict

Pass

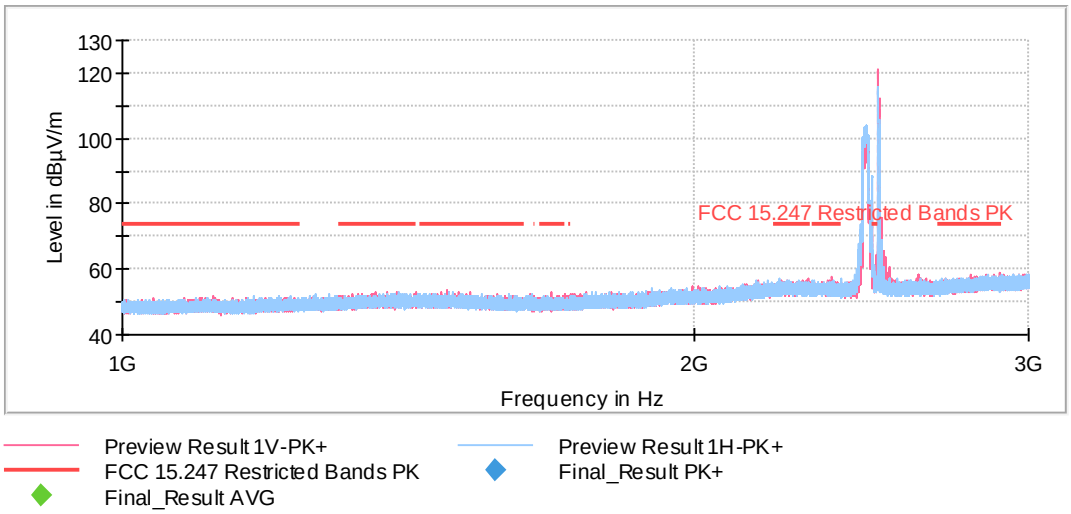
Attachments

Frequency range 30 MHz – 1 GHz



Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [ESR 7]					
30 MHz - 1 GHz	30,312 kHz	PK+	100 kHz	1 s	0 dB

Frequency range 1 GHz – 3 GHz

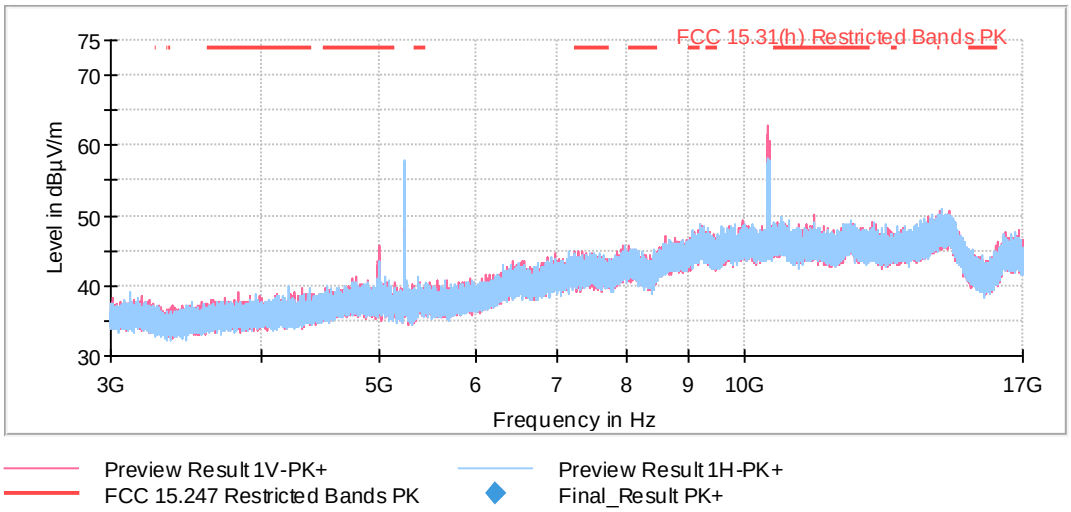


The peaks on the left above the limit are the BTEDR and WLAN 2.4 GHz carrier frequencies.

The peak on the right above the limit is the LTE Band 7 carrier frequency.

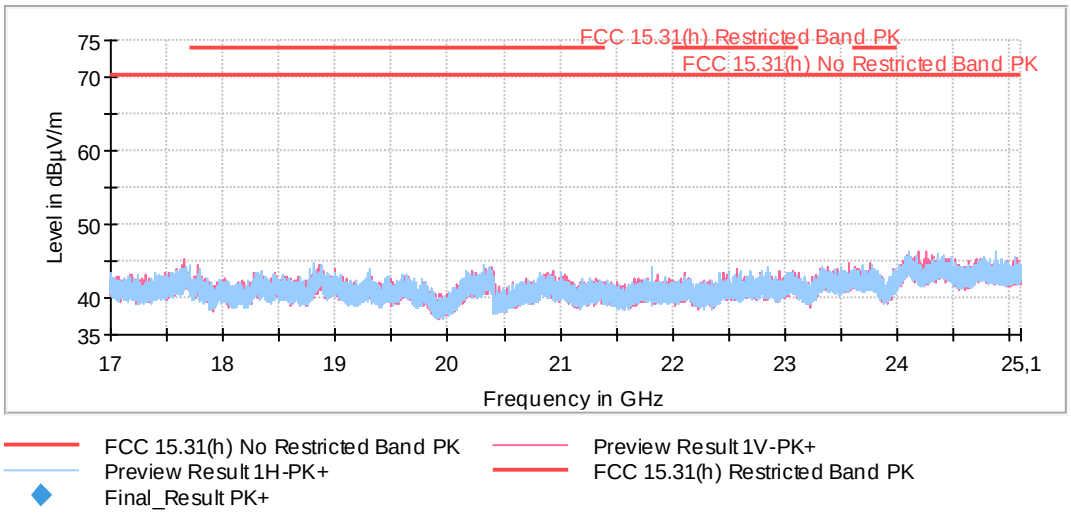
Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [FSW 50]					
1 GHz - 3 GHz	30,769 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Frequency range 3 GHz – 17 GHz



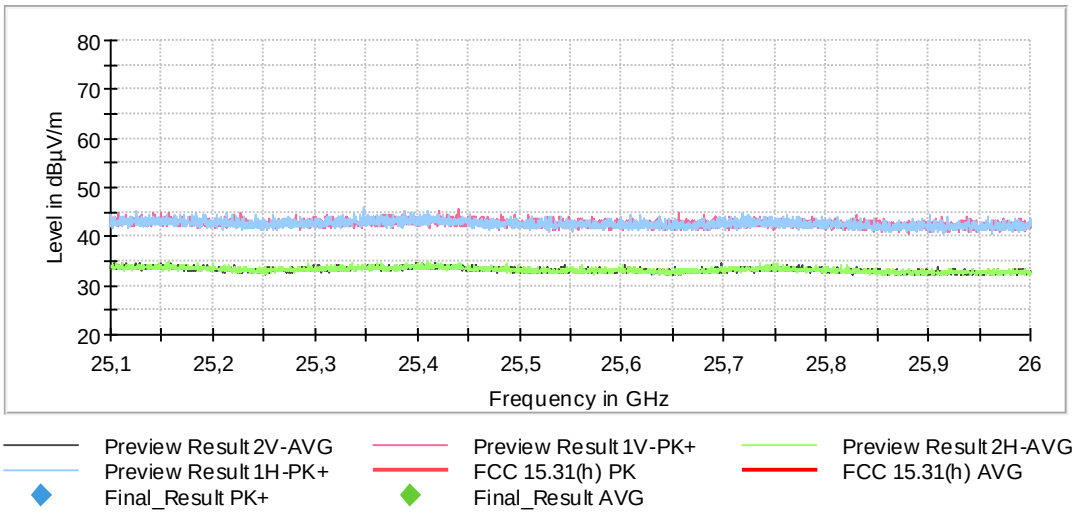
Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [FSW 50]					
3 GHz - 17 GHz	140 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

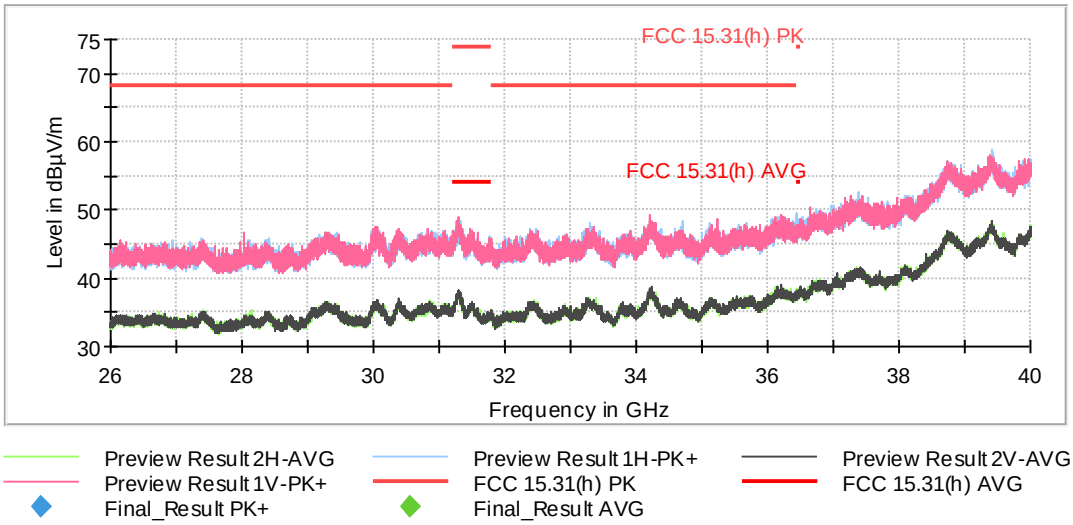
Frequency range 17 GHz – 25.1 GHz



Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [FSV 40]					
17 GHz – 25.1 GHz	300 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Frequency range 25.1 GHz – 40 GHz





Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [FSW 50]					
25.1 GHz - 40 GHz	766,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Mode 4:

BT EDR:	CH80 (2480 MHz), GFSK
WLAN 2.4 GHz:	CH11 (2462 MHz), 802.11 n20.
WLAN 5 GHz:	CH48 (5240 MHz), 802.11 ac20.

The limit of the test is determined by:

Frequency Range	Detector	Limit at 3m (dBµV/m)
30 MHz to 88 MHz	Quasi-PK	40 dBµV/m
88 MHz to 216 MHz	Quasi -PK	43.5 dBµV/m
216 MHz to 960 MHz	Quasi -PK	46 dBµV/m
1 GHz to 26 GHz	PK	68.23 dBµV/m (*) or 74 dBµV/m (**)
1 GHz to 26 GHz	AVG	54 dBµV/m (**)

(*) Radiated emissions which fall in the non-restricted bands.
(**) Radiated emissions which fall in the restricted bands, as defined in §15.205(a).

Results

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
34.759063	7.33	V	Quasi -PK
42.973750	12.55	V	Quasi -PK
47.732813	16.96	V	Quasi -PK
64.684380	24.20	V	Quasi -PK
174.984688	28.66	H	Quasi -PK
451.889375	9.01	V	Quasi -PK
534.127188	13.31	V	Quasi -PK
541.220313	13.33	V	Quasi -PK

Frequency range 1 GHz – 40 GHz

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

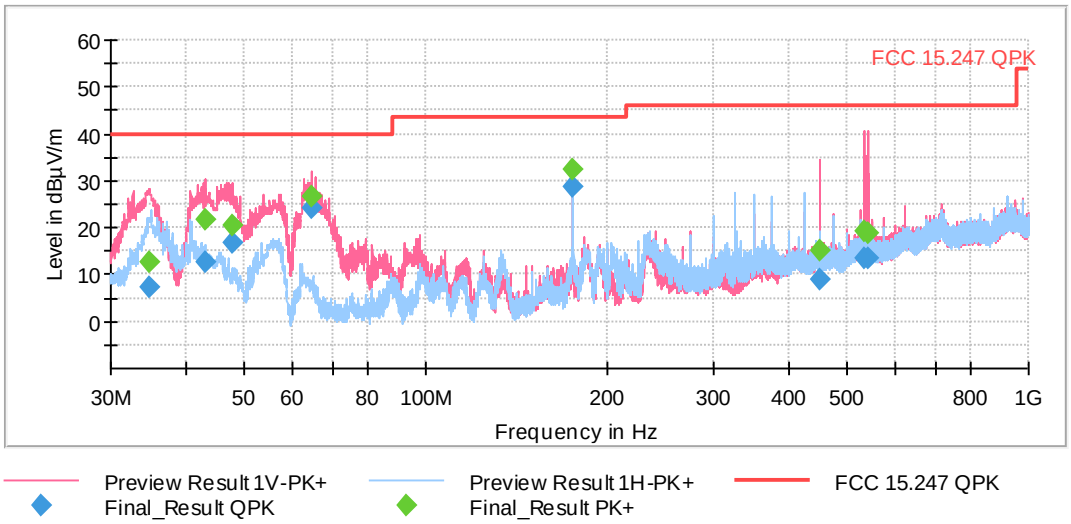
Unwanted Freq (MHz)	Unwanted Lvl (dBµV/m)	Pol	Detector
10480.48	60.79	V	PK

Verdict

Pass

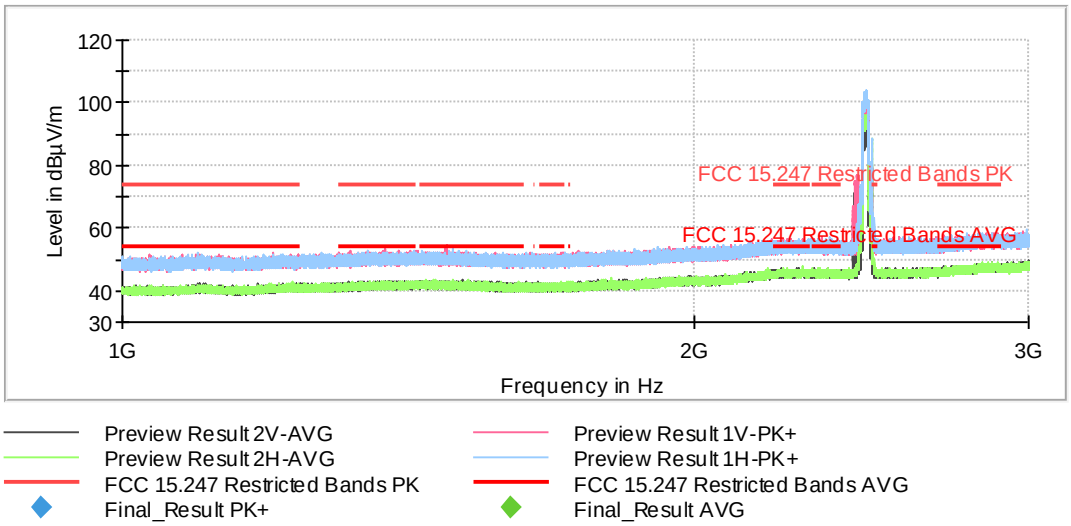
Attachments

Frequency range 30 MHz – 1 GHz



Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [ESR 7]					
30 MHz - 1 GHz	30,312 kHz	PK+	100 kHz	1 s	0 dB

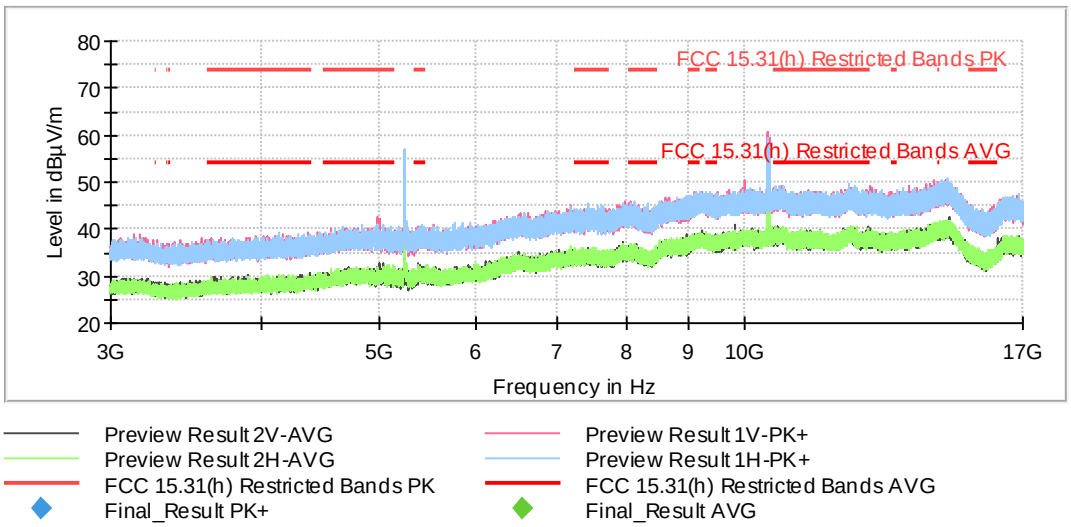
Frequency range 1 GHz – 3 GHz



The peaks above the limit are the BTEDR and WLAN 2.4 GHz carrier frequencies..

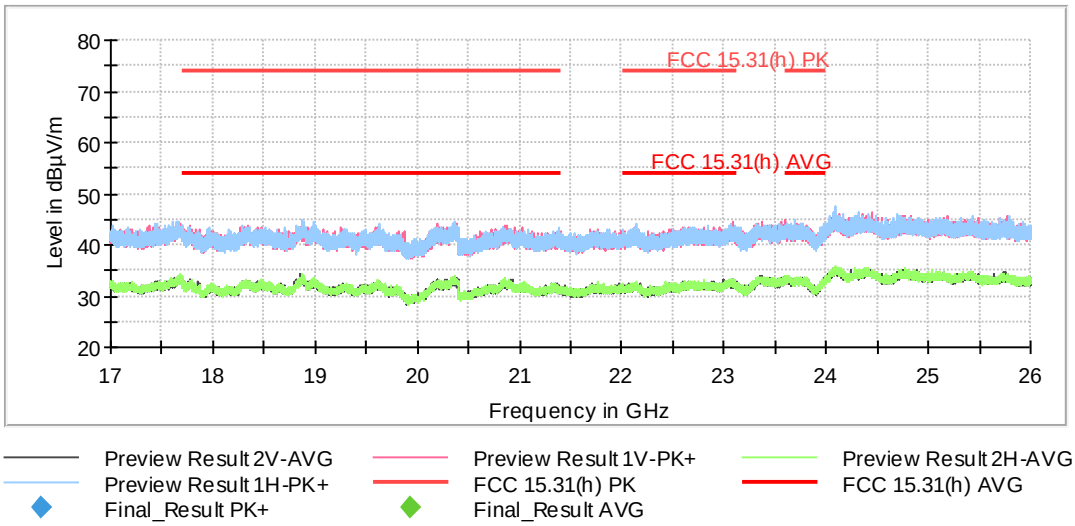
Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [FSW 50]					
1 GHz - 3 GHz	30,769 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Frequency range 3 GHz – 17 GHz

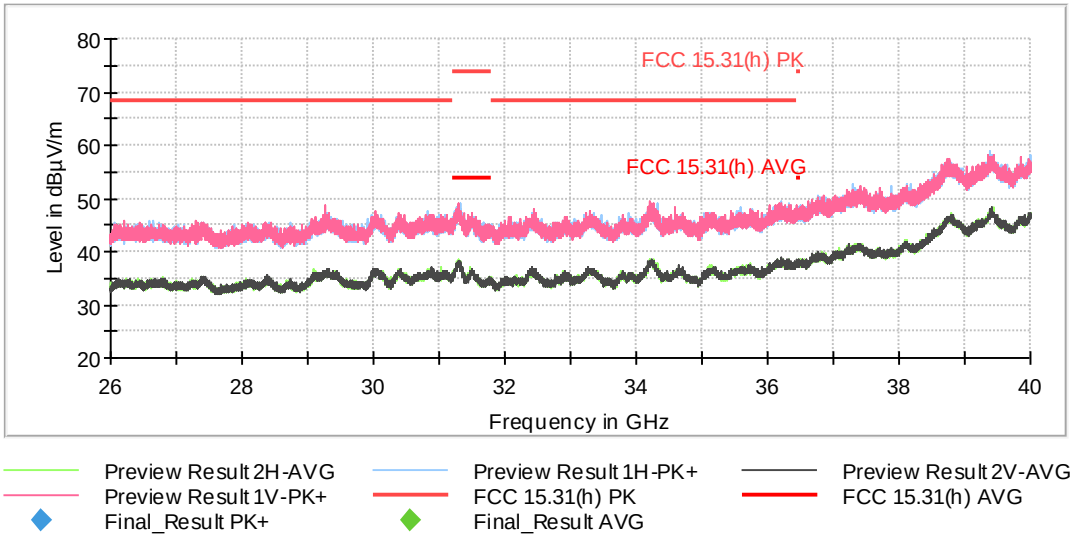


Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [FSW 50]					
3 GHz - 17 GHz	140 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Frequency range 17 GHz – 40 GHz



Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [FSV 40]					
17 GHz - 26 GHz	300 kHz	PK+ ; AVG	1 MHz	1 s	0 dB



Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [FSW 50]					
26 GHz - 40 GHz	766,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB