ISED CABid: ES1909
Lab. Company Number: 4621A

Test Report No:
81532RRF.001

Partial Test Report
USA FCC 15.31(h), 15.209, 15.247, 15.407
CANADA RSS-247, RSS-Gen

(*) Identification of item tested	Radio Navigation Systems (NAV), Display Audio systems (DA)
(*) Trademark	BOSCH
(*) Model and /or type reference	MMCSBXEUR
Other identification of the product	FCC ID: 2AUXS -MMCSBXNAR
(*) Features	AM/FM, DAB, BT, Wi-Fi, GNSS, Highspeed CAN -M-CAN and V-CAN, USB, Ethernet HW version: 001 SW version: 6830_240319
Applicant	Robert Bosch GmbH Robert-Bosch-Platz 1 70839 Gerlingen. GERMANY
Test method requested, standard	USA FCC Part 15.31(h) (10-1-23 Edition): Measurement standard. USA FCC Part 15.209 (10-1-23 Edition): Radiated emission limits; general requirements. USA FCC Part 15.247 (10-1-23 Edition): Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. USA FCC Part 15.407 (10-1-23 Edition): Unlicensed National Information Infrastructure (U-NII) Devices. General technical requirements. Band U-NII-3 (5725 MHz – 5850 MHz). CANADA RSS-247 Issue 3 (August 2023). CANADA RSS-Gen Issue 5 Amendment 2 (February 2021). 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. 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. 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 Firmado digitalmente por 53680346W JOSE MANUEL GOMEZ (C:A29507456)
Date of issue	2025-02-03
Report template No.	FDT08_25 (*) “Data provided by the client”

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Competences and guarantees

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 has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification 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 at the time of performance of the test.

DEKRA Testing and Certification 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.

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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 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 EUT from 1 GHz 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 EUT from 17 GHz to 40 GHz is:
Measurement uncertainty ≤ ± 5,55 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 Radio Navigation Systems (NAV). Display Audio systems (DA) with following features:
   - Units without fascia and keys
   - Linux-based software
   - Key Features:
     - Connectivity (Highspeed CAN -M-CAN and V-CAN bus- 500kbit/s, BT, Wi-Fi SISO, Ethernet)
     - USB
   - 1st port: Connect Molex or Mitsumi USB hub 2port hub. The hub supports connection to MSC or MTP devices containing media playback data or download data. Also supporting connection to devices supporting Apple iPod playback, Apple Carplay and Android Auto
   - 2nd port: Connect TCU box. Using USB subclass CDC-EEM for data transmission (Telematic / eCall box)
     - Smartphone integration
     - GNSS localization (details see GNSS chapter)
     - Audio: Arkamys, ESE
     - Radio: AM/FM, SXM (optional only NAR)
     - Display of vehicle functions HMI
     - LVDS connection to RearViewCamera, RearSeatEntertainment, Media Player and external Display
     - Analogue RearViewCamera
     - LVDS audio connection A2B for external amplifier with digital A2B input

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. The laboratory is not responsible for such information and it is not covered by accreditation.

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	78973_40.1	Radio Navigation Systems (NAV)	MMCSBXEUR	000030725915W009P	2024-12-23	Element Under Test
S/01	78973_1.1	Display	CID UNIT CENTRAL DISPLAY	D000XMI120230922000001	2024-06-24	Element Under Test
S/01	78973_2.1	Harness	--	--	2024-06-24	Auxiliary Element
S/01	78973_9.1	Load box	A-IVI 2	--	2024-07-10	Auxiliary Element
S/01	78973_10.1	Signal distributor smalll box	--	--	2024-07-10	Auxiliary Element
S/01	78973_29.1	Ethernet-USB adapter	--	--	2024-07-10	Auxiliary Element
S/01	78973_30.1	Ethernet-USB adapter	--	--	2024-07-10	Auxiliary Element

Notes referenced to samples during the project:

Id	Type
S/01	Sample used for radiated tests

Test sample description

Ports…… :	Port name and description	Cable			
		Specified max length [m]	Attached during test	Shielded	Coupled to patient(3)
	WiFi connector	2m	[X]	[ ]	[ ]
	FM2 connector	2m	[X]	[ ]	[ ]
	FM1/AM connector	2m	[X]	[ ]	[ ]
	GNSS connector	2m	[X]	[ ]	[ ]
	SBX connector	2m	[X]	[ ]	[ ]
	A2B connector	2m	[X]	[ ]	[ ]
	ETH2/REC connector	2m	[X]	[ ]	[ ]
	ETHA/CGW connector	2m	[X]	[ ]	[ ]
	RVC LVDS connector	2m	[X]	[ ]	[ ]
	TCU/IVCC USB2 connector	2m	[X]	[ ]	[ ]
	LVDS out connector	2m	[X]	[ ]	[ ]
	MCH/USB1 connector	2m	[X]	[ ]	[ ]
	MAIN connector	2m	[X]	[ ]	[ ]
	--		[ ]	[ ]	[ ]
Supplementary information to the ports…… :					

Rated power supply .....:	Voltage and Frequency		Reference poles			
			L1	L2	L3	N	PE
	[ ]	AC:	[ ]	[ ]	[ ]	[ ]	[ ]
	[X]	DC: 12Vdc					

Rated Power .....:	--	
Clock frequencies.....:	--	
Other parameters .....:	--	
Software version .....:	6830_240319	
Hardware version .....:	001	
Dimensions in cm (W x H x D) ....:	--	
Mounting position .....:	[ ]	Table top equipment
	[ ]	Wall/Ceiling mounted equipment
	[ ]	Floor standing equipment
	[ ]	Hand-held equipment
	[X]	Other: Vehicular use equipment

Modules/parts.....:	Module/parts of test item	Type	Manufacturer
	--		
Accessories (not part of the test item) .....:	Description	Type	Manufacturer
	--		
Documents as provided by the applicant.....:	Description	File name	Issue date
	--		

(3) Only for Medical Equipment.

Identification of the client

Robert Bosch GmbH
Robert-Bosch-Platz 1
70839 Gerlingen, GERMANY

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2025-01-13
Date (finish)	2025-01-15

Document history

Report number	Date	Description
81532RRF.001	2025-02-03	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: Sergio Carrasco.

Used instrumentation:

Control No.	Equipment	Model	Manufacturer	Next Calibration
06791	SEMIANECHOIC ABSORBER LINED CHAMBER IV	FACT 3 200 STP	ETS LINDGREN	N/A
06792	SHIELDED ROOM	S101	ETS LINDGREN	N/A
06609	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2025-04-22
06615	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2025-04-04
07817	EMI TEST RECEIVER 2Hz-44GHz	ESW44	ROHDE AND SCHWARZ	2026-07-01
06143	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2027-01-22
06142	PRE-AMPLIFIER G>38dB 30MHz-6GHz	BLNA 0360-01N	BONN ELEKTRONIK	2025-07-25
06496	HORN ANTENNA 1-18GHz	BBHA 9120 D	SCHWARZBECK	2026-12-01
03783	PRE-AMPLIFIER G>30dB 1GHz-18GHz	BLMA 0118-3A	BONN ELEKTRONIK	2025-03-15
06157	SIGNAL AND SPECTRUM ANALYZER 10Hz-40GHz	FSV40	ROHDE AND SCHWARZ	2025-01-18
04657	HORN ANTENNA 18-40GHz	BBHA 9170	SCHWARZBECK	2026-06-12
08856	PRE-AMPLIFIER G>30dB 18-40GHz	BLMA 1840-4A	BONN ELEKTRONIK	2025-02-27
07445	DC POWER SUPPLY 30V/5A	U8002A	KEYSIGHT TECHNOLOGIES	N/A
07760	DIGITAL MULTIMETER	175	FLUKE	2025-11-07
04848	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 / CANADA RSS-247, RSS-Gen PARAGRAPH			
Requirement – Test case		**Verdict**	**Remark**
FCC 15.31 (h), 15.209 (a), 15.247 (d), 15.407 (b), RSS-247 5.5, 6.2.1.2 and 6.2.2.2, RSS-Gen 8.9	Emission limitations radiated (Transmitter)	P	(1)
Supplementary information and remarks: (1) Only simultaneous transmission radiated spurious emission test was requested.			

Appendix A: Test results

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TEST CONDITIONS

(*): Data provided by the Applicant.

POWER SUPPLY (*):

Vnonimal: 12 Vdc.

Type of Power Supply: External DC (vehicle battery).

ANTENNA (*):

Technologies	Antenna Gain (dBi)	Type of Antenna
BT EDR	+1.91	Internal (printed circuit board)
WLAN 2.4 GHz	+2.90	External
WLAN 5 GHz UNII-1	+3.45	External

TEST FREQUENCIES:

Frequency range	Technologies	Modulations	Worst case
2.4 GHz	Bluetooth EDR WLAN 2.4 GHz	Bluetooth EDR (GFSK, Pi/4-DQPSK, 8DPSK) WLAN 2.4 GHz (802.11 bgn20)	Bluetooth EDR (High Channel, GFSK) WLAN 2.4 GHz (High Channel, 802.11 b)
f > 5 GHz	Wi-Fi 5 GHz U-NII-1	WLAN 5 GHz (a, ac, n)	WLAN 5 GHz Band U-NII-1 a20, High Channel

TEST FREQUENCIES FOR SIMULTANEOUS TRANSMISSION MODE RADIATED TESTS:

The EUT was configured to simultaneously transmit the following signals at maximum output power:

1. Simultaneous transmission mode BT EDR, WLAN 2.4 GHz:

BT EDR: High Channel (2480 MHz). GFSK.
WLAN 2.4 GHz: High Channel (2462 MHz). 802.11 b. BW: 20 MHz.

2. Simultaneous transmission mode BT EDR, WLAN 5 GHz U-NII-1:

BT EDR: High Channel (2480 MHz). GFSK.
WLAN 5 GHz U-NII-1: High Channel (5200 MHz). 802.11 a20. BW: 20 MHz.

Test cases

Radiated emissions

Limits:

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
960 - 25000	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 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz (68.23 dBµV/m at 3 m distance) at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

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

Frequency range tested for Radiated emissions:

Start frequency: no radiofrequency signal generated in the device found below 10th sub-harmonic, no further investigation required.
Stop frequency: it has been performed the radiated spurious emissions until 10th harmonic.

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 co-located 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 measuring antenna height and polarization. The maximum meter reading was recorded. Measurements were made in both horizontal and vertical planes of polarization.

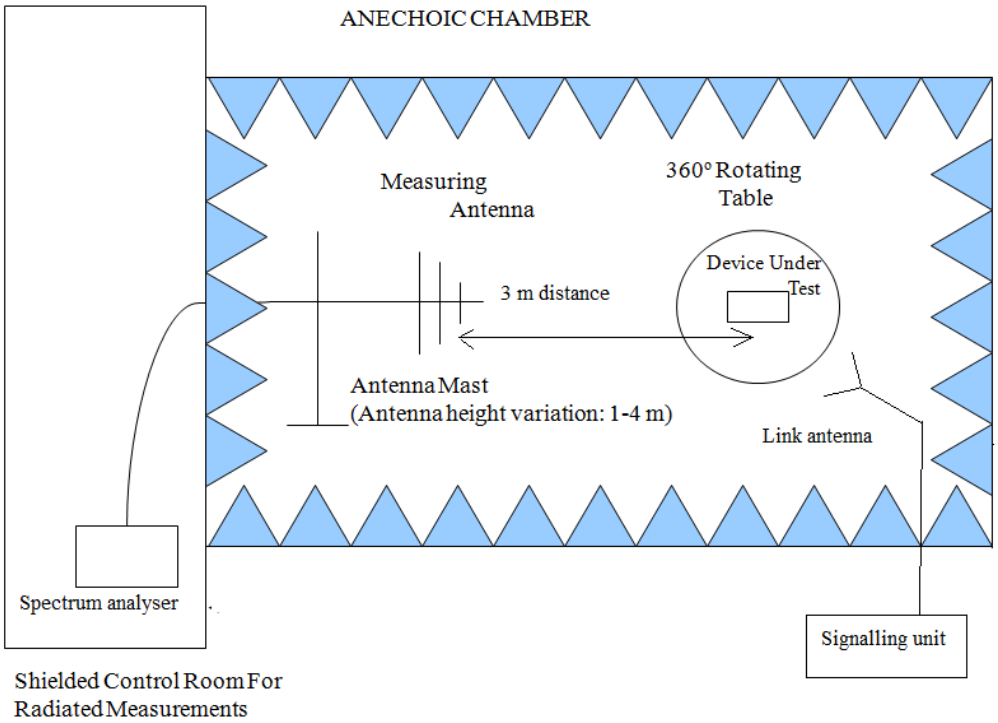
The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

For radiated measurements above 17 GHz 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.

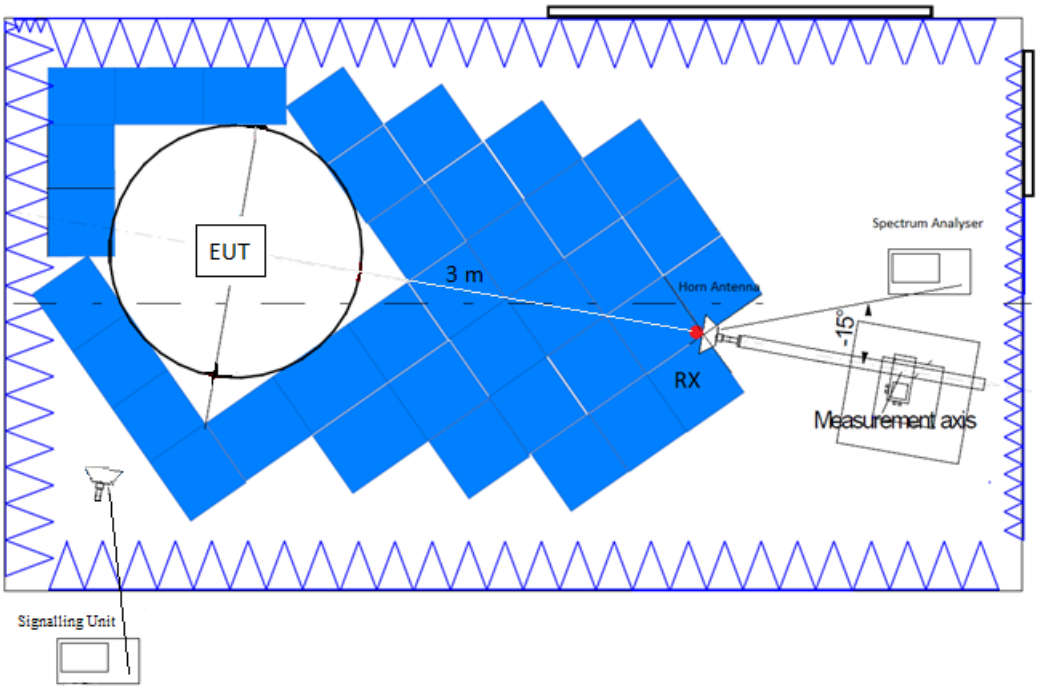
These measurements have been performed in order to check the impact of the Co-Location of all radio interfaces (that can transmit simultaneously).

Test setup:

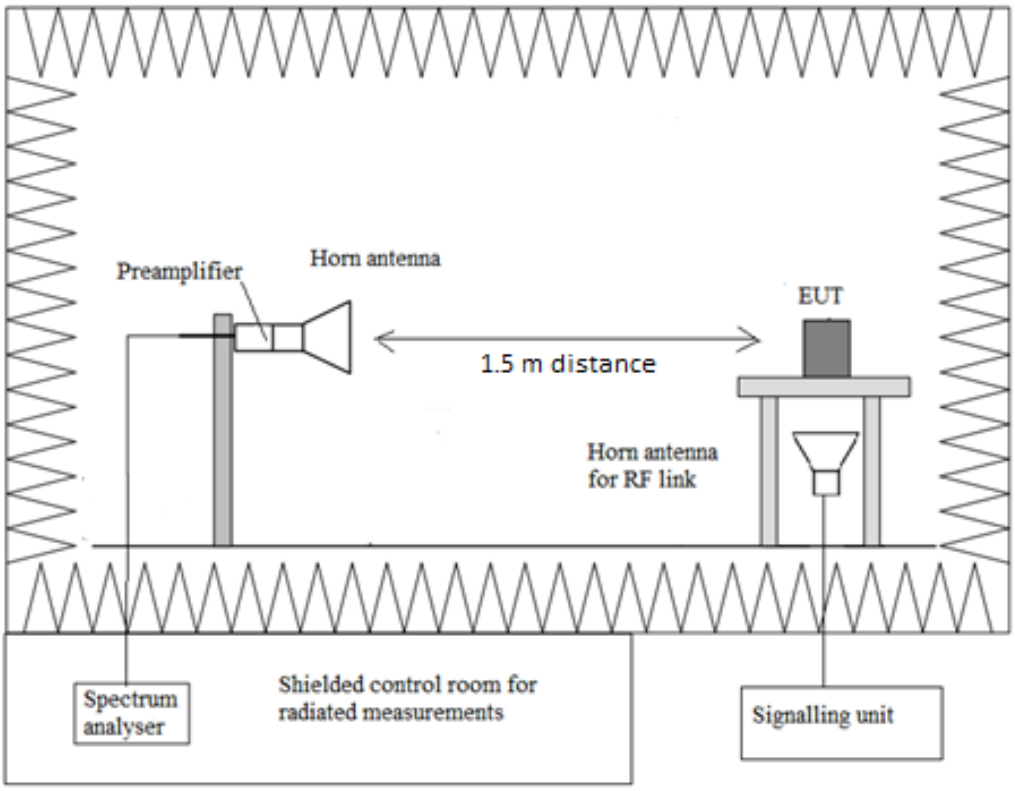
Radiated measurements below 1 GHz.



Radiated measurements between 1 GHz and 17 GHz.



Radiated measurements above 17 GHz.



Results:

- **Operation Mode 1**

Spurious frequencies at less than 20 dB below the limit:

Freq Rng (GHz)	Unwanted Freq (MHz)	Unwanted Lvl (dBµV/m)	Pol	Detector
[0.03, 1]	44.9865	30.00	V	PK
		24.09	V	QP
	183.0660	15.93	V	PK
		9.39	V	QP
	192.9115	19.76	V	PK
		14.25	V	QP
	194.4635	15.52	V	PK
		8.44	V	QP
	620.6815	22.98	V	PK
		16.91	V	QP
	668.7450	23.10	V	PK
		17.40	V	QP
[1, 17]	4977.267	58.23	V	PK
		45.90	V	AVG

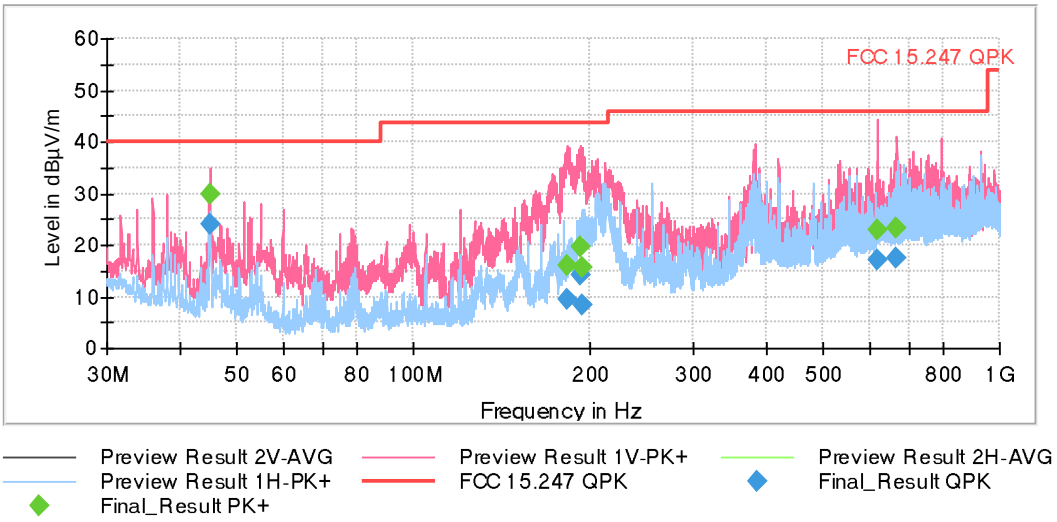
Verdict

Pass

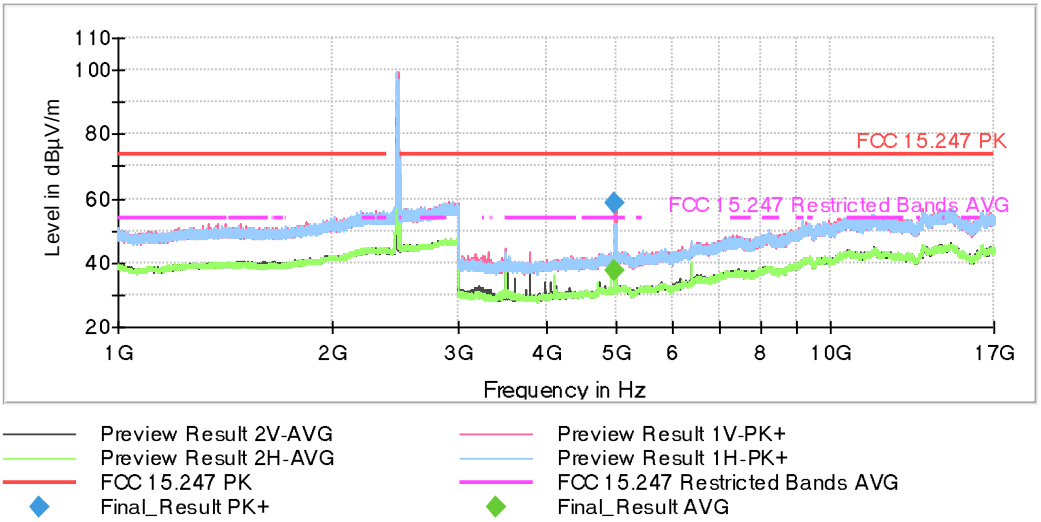
The setting for each range of frequency is indicated in the following tables:

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	48,5 kHz	PK+	100 kHz	1 s	0 dB
1 GHz - 3 GHz	100 kHz	PK+ ; AVG	1 MHz	1 s	0 dB
3 GHz - 17 GHz	466,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB
17 GHz - 26 GHz	281,25 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

FREQUENCY RANGE 30 MHz - 1 GHz

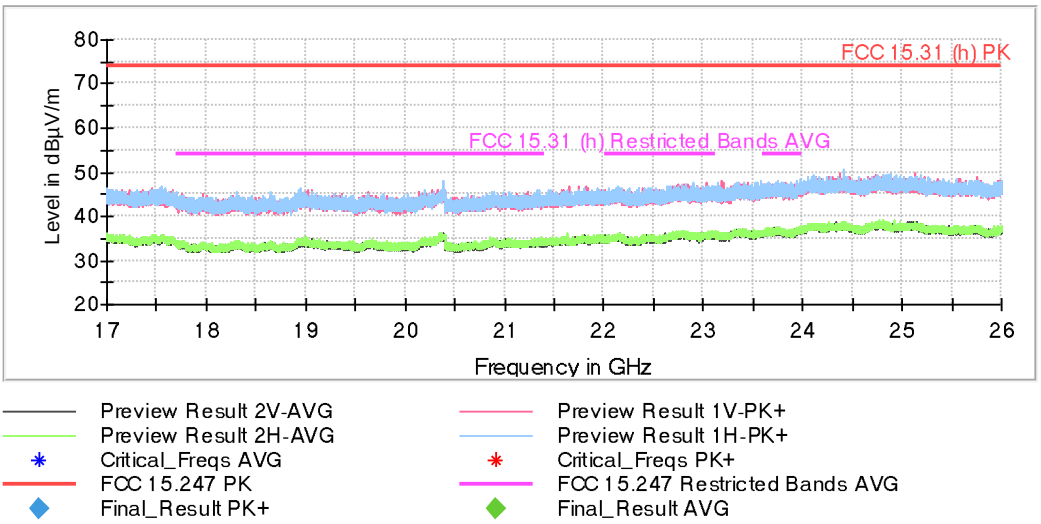


FREQUENCY RANGE 1 - 17 GHz



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

FREQUENCY RANGE 17 - 26 GHz



- **Operation Mode 2**

Spurious frequencies at less than 20 dB below the limit:

Freq Rng (GHz)	Unwanted Freq (MHz)	Unwanted Lvl (dBµV/m)	Pol	Detector
[0.03, 1]	44.9865	31.21	V	PK
		25.17	V	QP
	55.9290	33.59	V	PK
		29.09	V	QP
	151.4925	34.16	V	PK
		32.34	V	QP
	155.5665	35.88	V	PK
		33.88	V	QP
	239.9565	36.82	H	PK
		33.80	H	QP
	874.9670	35.35	H	PK
		33.16	H	QP

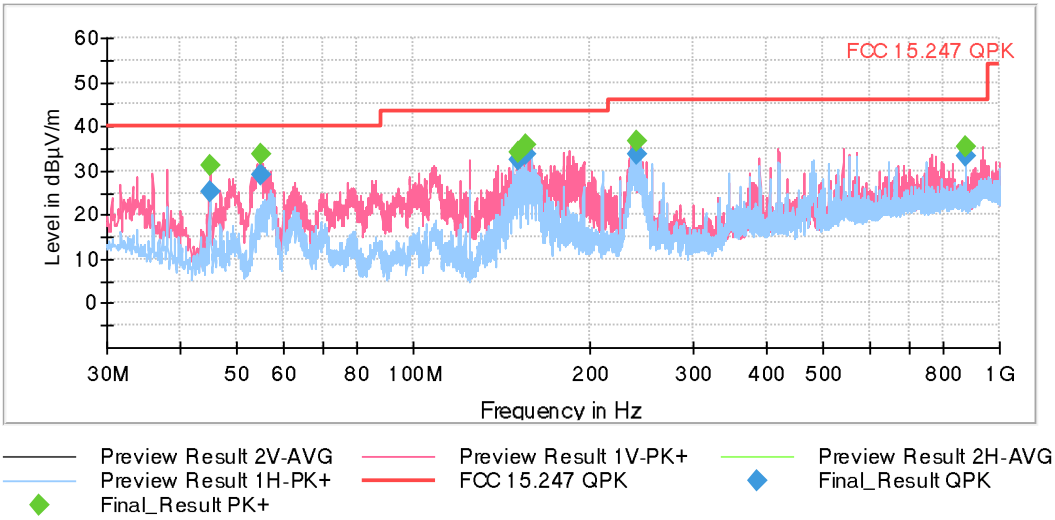
Verdict

Pass

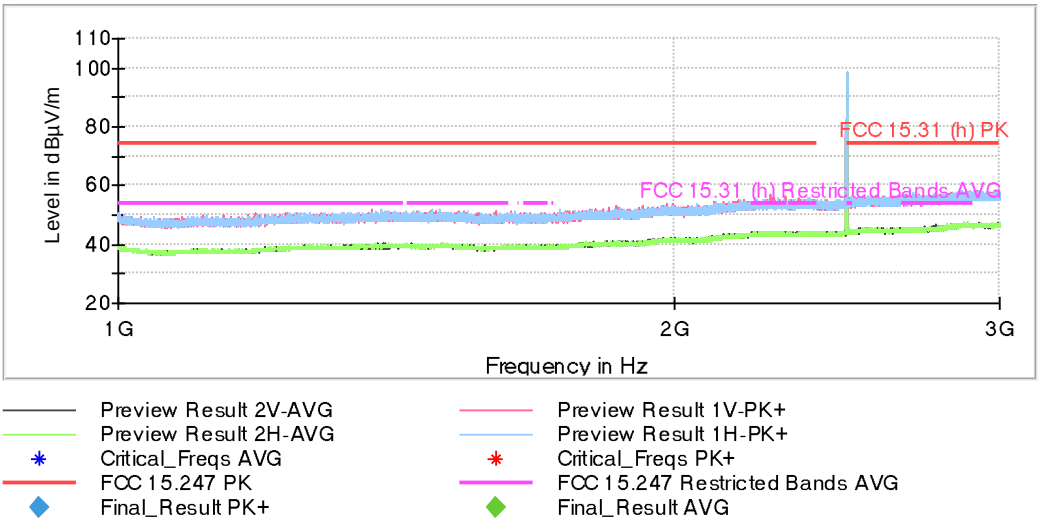
The setting for each range of frequency is indicated in the following tables:

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	48,5 kHz	PK+	100 kHz	1 s	0 dB
1 GHz - 3 GHz	100 kHz	PK+ ; AVG	1 MHz	1 s	0 dB
3 GHz - 17 GHz	466,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB
17 GHz - 40 GHz	766,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

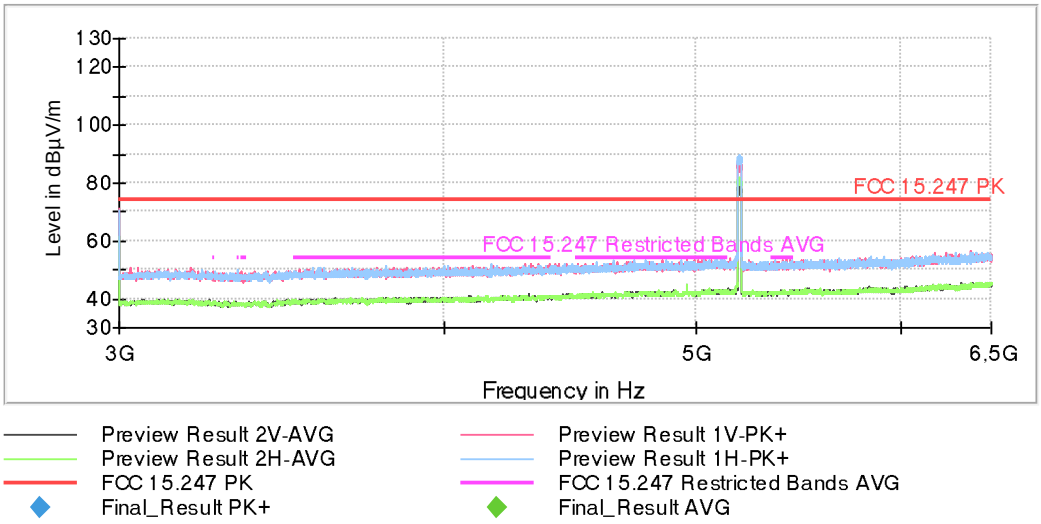
FREQUENCY RANGE 30 MHz - 1 GHz



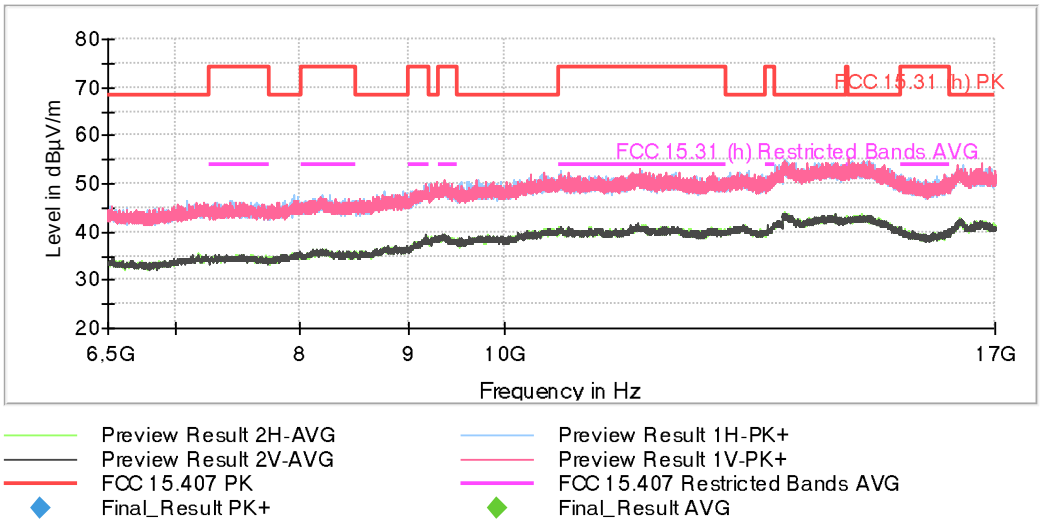
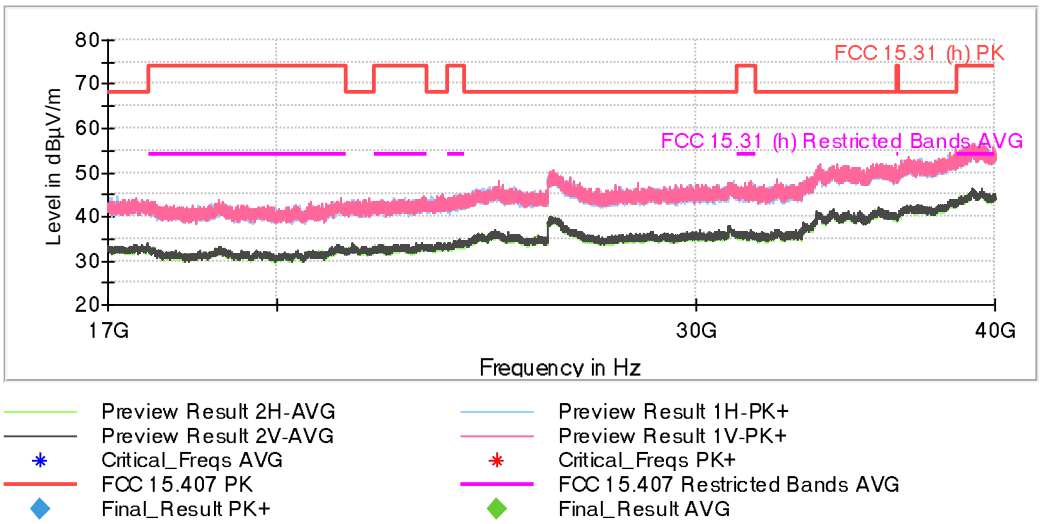
FREQUENCY RANGE 1 - 17 GHz



The peaks above the limit are the BT EDR carrier frequencies.



The peak above the limit is the WLAN 5 GHz carrier frequency.



FREQUENCY RANGE 17 - 40 GHz