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:
78973RRF.003

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	MMCSBXNAR
Other identification of the product	FCC ID: 2AUXS -MMCSBXNAR IC: 25847 - MMCSBXNAR
(*) Features	AM/FM, 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, Aug. 2023. CANADA RSS-Gen Issue 5, Amendment 2, Feb. 2021. - 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 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.

	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	2024-11-21
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.

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 following data has been provided by the client:

   Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").

   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.

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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_5.1	Radio Navigation Systems (NAV), Display Audio systems (DA)	MMCSBXNAR	000732525915W016P	2024-06-24	Element Under Test
S/01	78973_1.1	Display	CID UNIT CENTRAL DISPLAY	D000XMI120230922000001	2024-06-24	Auxiliary Element
S/01	78973_10.1	Signal distributor smalll box	-	-	2024-07-10	Auxiliary Element
S/01	78973_2.1	Harness small	LVDS CABLE	-	2024-06-24	Auxiliary Element
S/01	78973_27.1	Ethernet cable	-	-	2024-07-10	Auxiliary Element
S/01	78973_28.1	USB A female-mini B Cable	-	-	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	Samples 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					
	[ ]	Other:					

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)	2024-09-17
Date (finish)	2024-10-09

Document history

Report number	Date	Description
78973RRF.003	2024-11-21	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: Valentín Andarias, Rafael Fernández.

Used instrumentation:

Control No.	Equipment	Model	Manufacturer	Next Calibration
09762	DC POWER SUPPLY 200V/25A	EA-PSI-9200-25-DT	ELEKTRO-AUTOMATIC	N/A
07760	DIGITAL MULTIMETER	175	FLUKE	2024-11-08
06791	SEMIANECHOIC ABSORBER LINED CHAMBER	FACT 3 200 STP	ETS LINDGREN	N/A
06792	SHIELDED ROOM	S101	ETS LINDGREN	N/A
07817	EMI TEST RECEIVER 2 Hz - 44 GHz	ESW44	ROHDE AND SCHWARZ	2026-07-01
06142	PRE-AMPLIFIER, G>38 dB, 30 MHz - 6 GHz	BLNA 0360-01N	BONN ELEKTRONIK	2025-07-25
06143	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2027-01-22
06021	ATTENUATOR 3 dB, 2 W, DC-6 GHz	50HN-03	JFW	2025-02-07
06158	SIGNAL AND SPECTRUM ANALYZER 10 Hz - 40 GHz ROHDE AND SCHWARZ	FSV40	ROHDE AND SCHWARZ	2026-02-05
08856	PRE-AMPLIFIER G>30dB 18-40GHz	BLMA 1840-4A	BONN ELEKTRONIK	2025-02-27
3783	PRE-AMPLIFIER G>30dB 1GHz-18GHz	BLMA 0118-3A	BONN ELEKTRONIK	2025-02-07
6496	HORN ANTENNA 1-18 GHz	BBHA 9120 D	SCHWARZBECK MESS-ELEKTRONIK	2026-12-01
04657	HORN ANTENNA 18-40GHz	BBHA 9170	SCHWARZBECK	2026-06-12
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	+2.9	External
WLAN 5 GHz	+3.45	External

TEST FREQUENCIES:

Frequency range	Technologies	Modulations	Worst case
2.4 GHz	Bluetooth EDR	Bluetooth EDR (GFSK, Pi/4-DQPSK, 8DPSK)	Bluetooth EDR (High Channel, GFSK)
	WLAN 2.4 GHz	WLAN 2.4 GHz (802.11 bgn20)	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

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 mode 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.

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.

FCC 15.31 (h), 15.209 (a), 15.247 (d), 15.407 (b), 22.917 (a), 24.238 (a), 27.53 (m) (4) RSS-132 5.5, RSS-133 6.5, RSS-199 5.6, RSS-247 5.5, 6.2.1.2 and 6.2.2.2, RSS-Gen 8.9 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
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.

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.

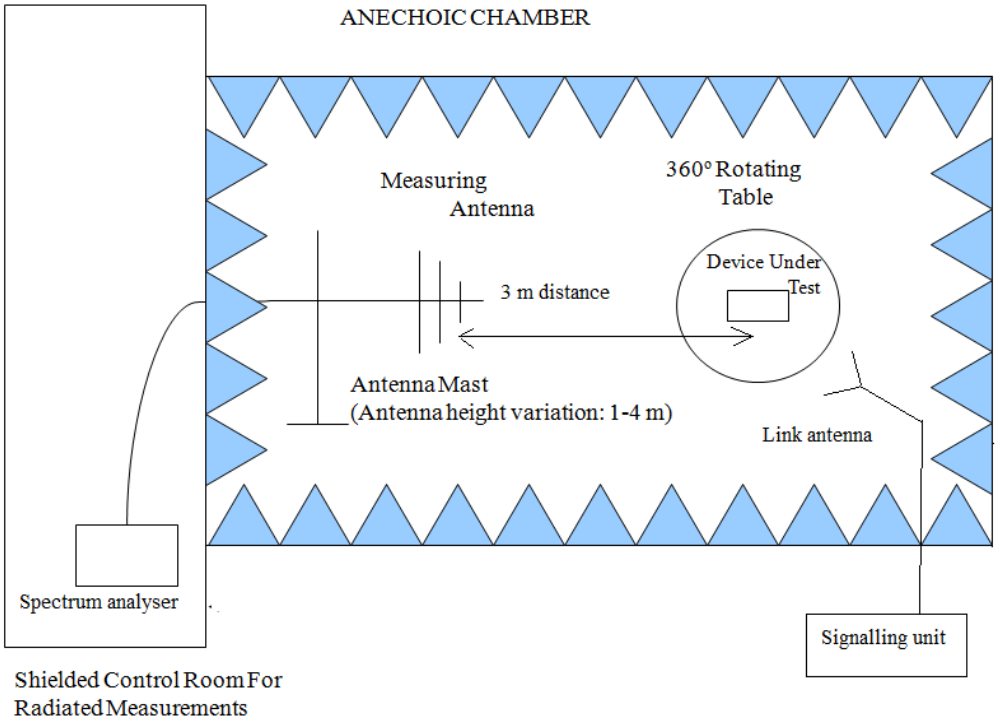
The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

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.

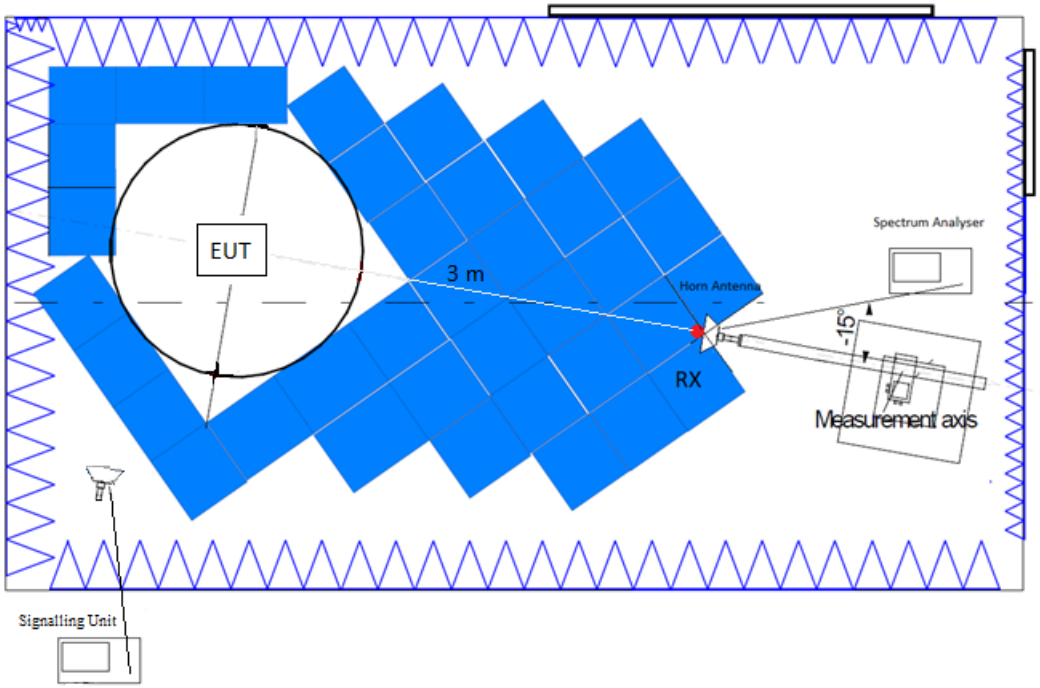
These measurements have been performed in order to check the impact of the Co-Location of all radio interfaces (that can transmit simultaneously).

Test setup:

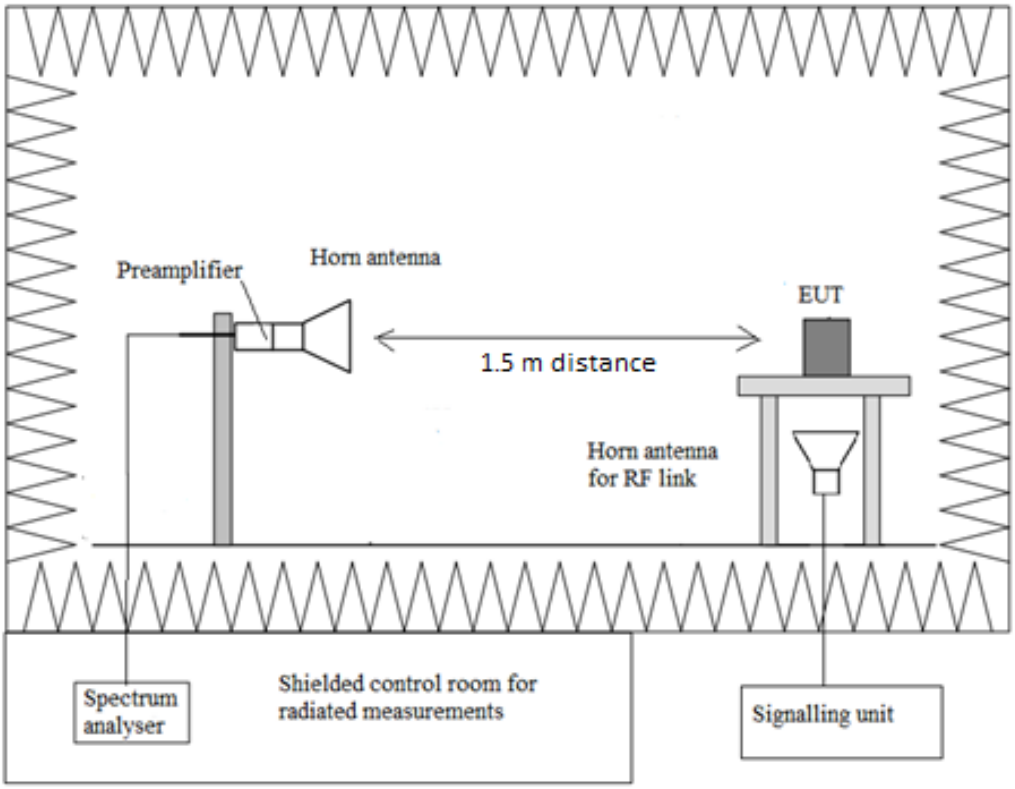
Radiated measurements below 1 GHz.



Radiated measurements between 1 GHz and 17 GHz.



Radiated measurements above 17 GHz.



Results:

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.

Frequency range 30 MHz - 1 GHz:

Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (MHz)	E.I.R.P (dBm)	Polarization	Detector
39.166500	32.80	H	QuasiPeak
66.229500	27.67	V	QuasiPeak
95.960000	25.01	V	QuasiPeak
339.139000	28.74	H	QuasiPeak
855.615500	30.41	V	QuasiPeak
998.254000	40.98	V	QuasiPeak

Frequency range 1 - 26 GHz:

Spurious frequencies at less than 20 dB below the limit:

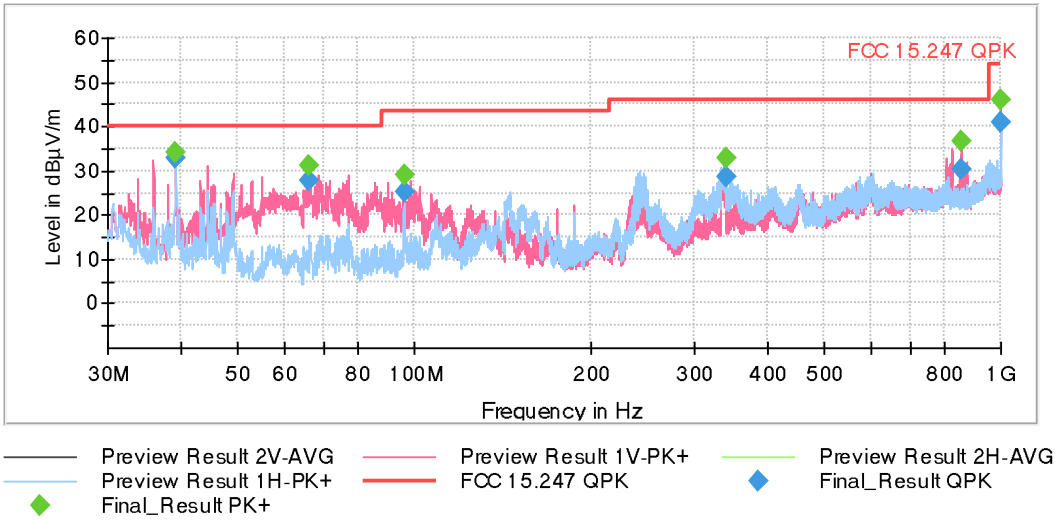
Spurious frequency (MHz)	E.I.R.P (dBµV/m)	Corrected Level with Duty Cycle (dBµV/m)	Polarization	Detector
1000.360000	54.56	-	H	Peak
	-	40.85	H	Average

Verdict

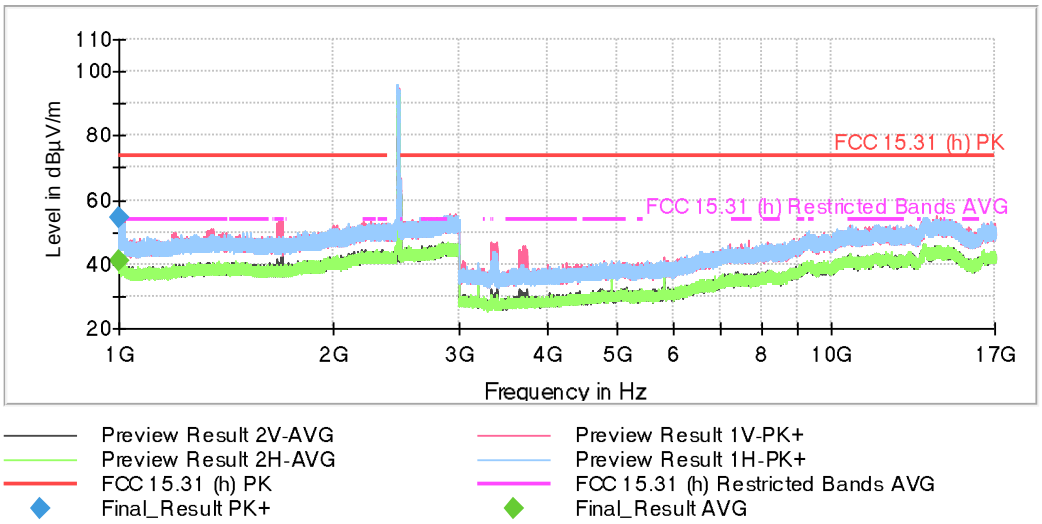
Pass

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	30.312 kHz	PK+	100 kHz	1 s	0 dB
1 GHz - 3 GHz	30.769 kHz	PK+ ; AVG	1 MHz	1 s	0 dB
3 GHz - 17 GHz	140 kHz	PK+ ; AVG	1 MHz	1 s	30 dB
17 GHz - 26 GHz	300 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

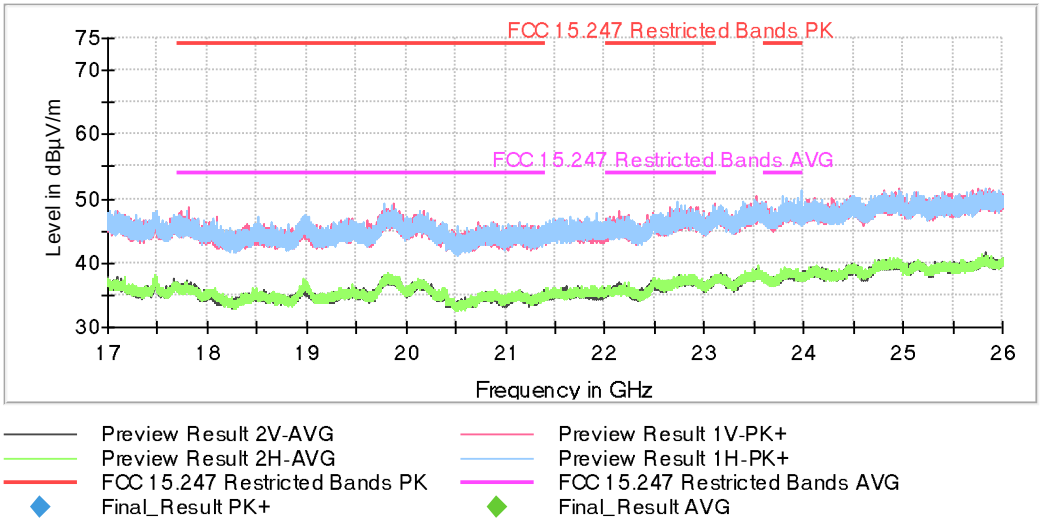
FREQUENCY RANGE 30 MHz - 1 GHz:



FREQUENCY RANGE 1 - 26 GHz:



The peaks above the limit are the WLAN 2.4 GHz carrier frequency (2462 MHz) and the BT EDR carrier frequency (2480 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.

Frequency range 30 MHz - 1 GHz:

Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (MHz)	E.I.R.P (dBm)	Polarization	Detector
33.789063	34.27	V	QuasiPeak
38.002500	32.55	V	QuasiPeak
52.795000	31.58	V	QuasiPeak
187.503750	26.85	H	QuasiPeak
339.157188	34.60	H	QuasiPeak
998.090313	39.51	V	QuasiPeak

Frequency range 1 - 40 GHz:

Spurious frequencies at less than 20 dB below the limit:

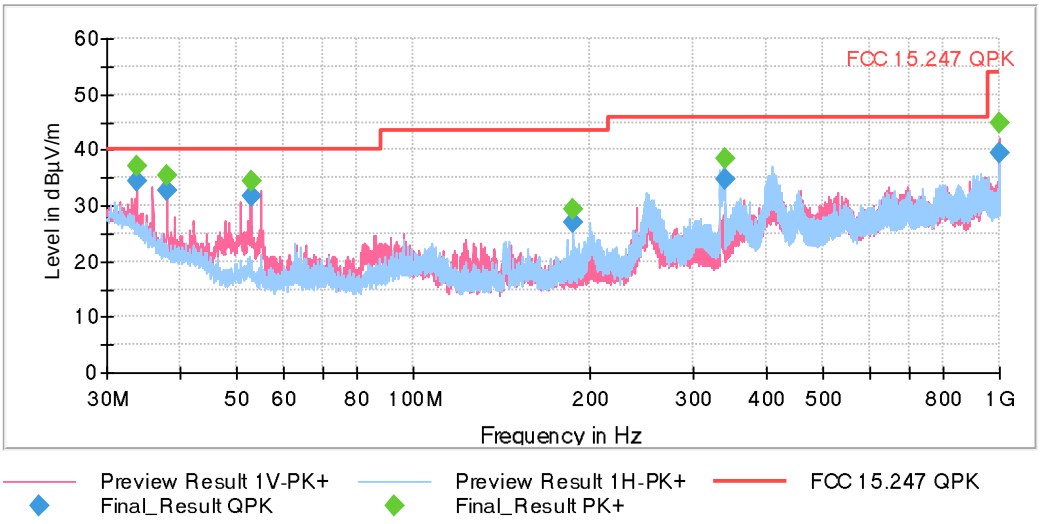
Spurious frequency (MHz)	E.I.R.P (dBm)	Polarization	Detector
1000.16	55.88	V	Peak
3680.96	61.79	H	Peak
	39.23		Average

Verdict

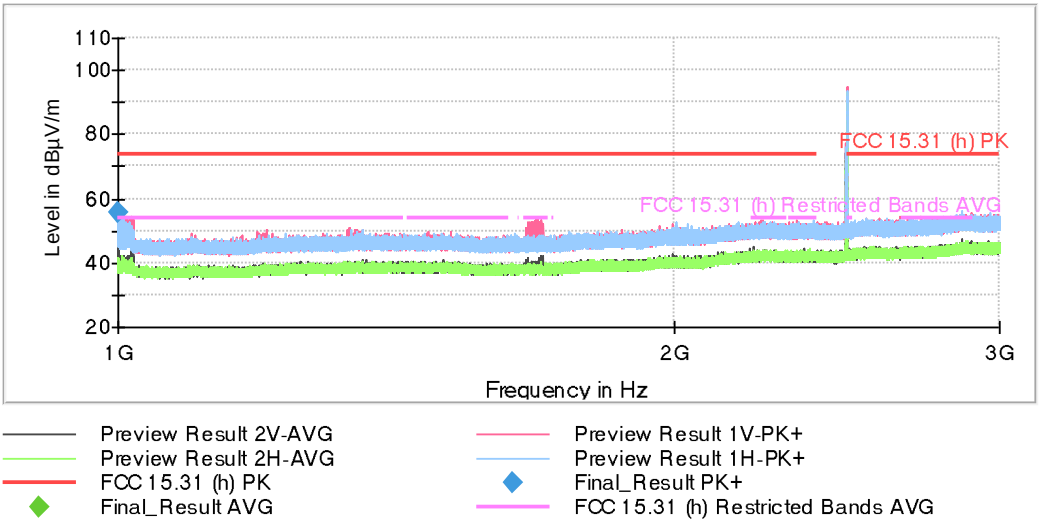
Pass

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	30,312 kHz	PK+	100 kHz	1 s	0 dB
1 GHz - 3 GHz	30,769 kHz	PK+ ; AVG	1 MHz	1 s	0 dB
3 GHz - 17 GHz	140 kHz	PK+ ; AVG	1 MHz	1 s	30 dB
17 GHz - 26 GHz	300 kHz	PK+ ; AVG	1 MHz	1 s	0 dB
26 GHz - 40 GHz	766,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

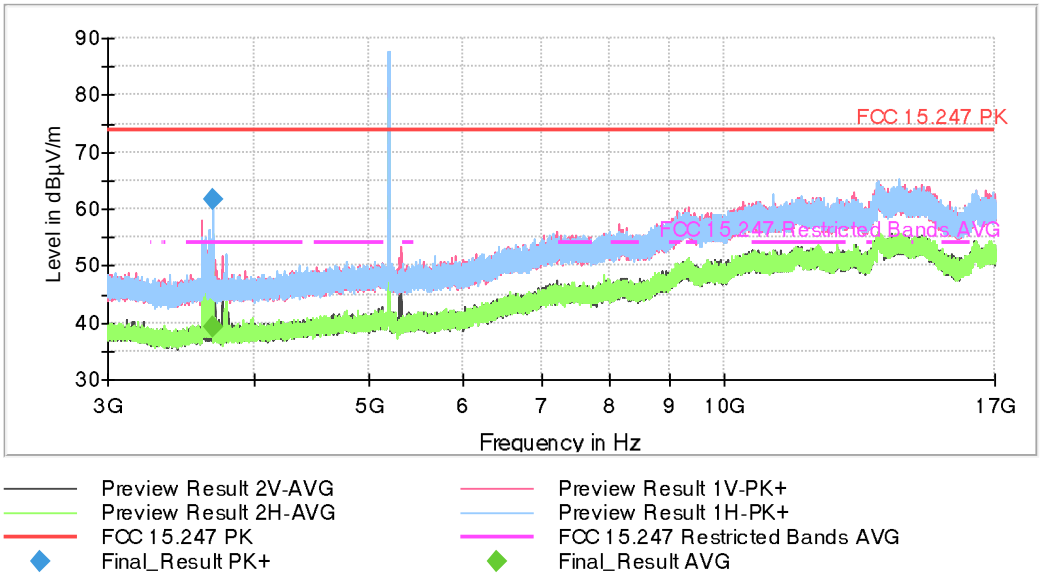
FREQUENCY RANGE 30 MHz - 1 GHz:



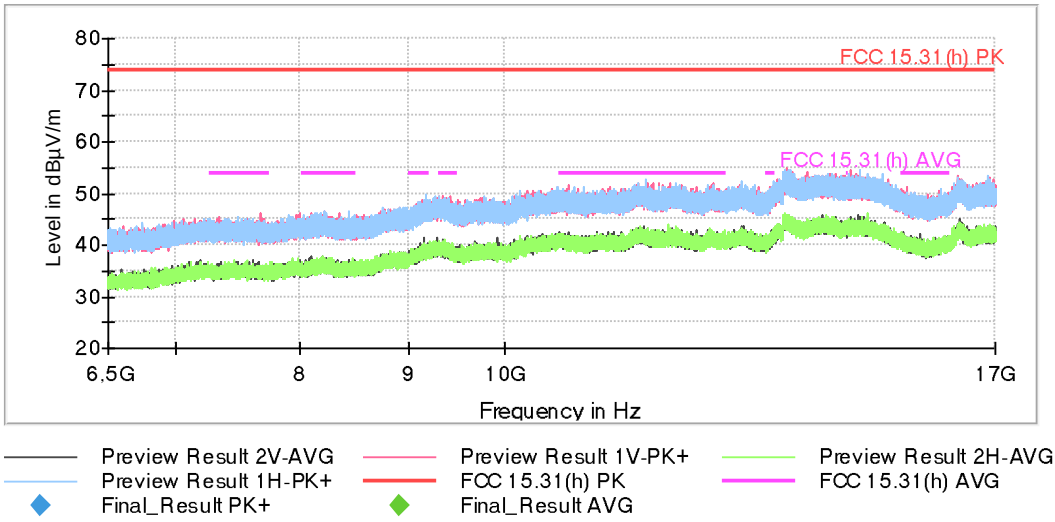
FREQUENCY RANGE 1 - 40 GHz:

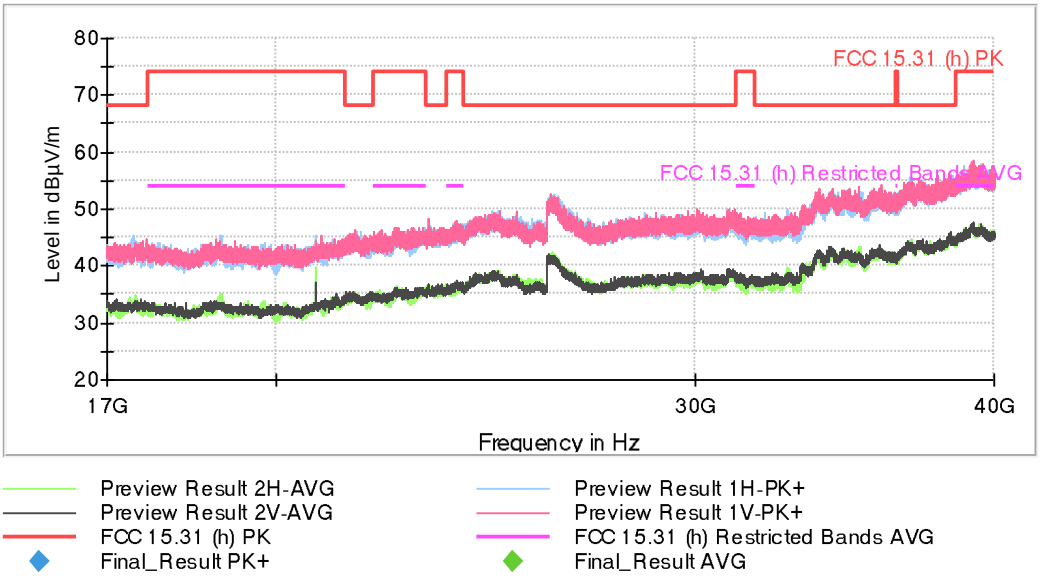


The peak above the limit is the BT EDR carrier frequency (2480 MHz).



The peak above the limit is the WLAN 5 GHz carrier frequency (5200 MHz).





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