DEKRA Testing and Certification, S.A.U.
Parque Tecnológico de Andalucía,
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C.I.F. A29507456

ISED CABid: ES1909

Test report No:
NIE: 64614RRF.007

Partial Test Report

USA FCC Part 15.247,15.209, 15.407
CANADA RSS-247, RSS-Gen

Radio Frequency Devices.
Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz.
Radiated emission limits; general requirements.
Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.
General Requirements and Information for the Certification of Radio Apparatus.

(*) Identification of item tested	Infotainment Head Unit
(*) Trademark	Marelli
(*) Model and /or type reference	HUAIDP10BY
Other identification of the product	HW version: PRS4 SW version: PI14 FCC ID: RX2HUAIDP10BY IC: 4983A-HUAIDP10BY
(*) Features	Bluetooth, WLAN 5GHz Channel #149
Applicant	Marelli Europe S.p.A. Viale A. Borletti 61/63 – Corbetta (MI) - 20011 Italy
Test method requested, standard	USA FCC Part 15.247 (10-1-20) Edition: Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. USA FCC Part 15.407 (10-1-20 Edition): General technical requirements. USA FCC Part 15.209 (10-1-20) Edition: Radiated emission limits; general requirements. CANADA RSS-247 Issue 2 (February 2017). CANADA RSS-Gen Issue 5. Amendment 2 (February 2021) -Transmitter out of band radiated emissions 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. ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Approved by (name / position & signature)	Rafael López EMC Consumer & RF Lab. Manager  2021.11.08 18:03:22 +01'00'
Date of issue	2021-11-08
Report template No	FDT08_23 (*) "Data provided by the client"

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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 a FCC-recognized accredited testing laboratory with appropriate scope of accreditation that include testing performed in this test report.

DEKRA Testing and Certification S.A.U. is an ISED-recognized accredited testing laboratory, CABid: ES1909, 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.

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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.
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Uncertainty

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

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 of the model HUAIDP10BY is an Infotainment Head Unit, with Bluetooth and Wi-Fi.

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 under test have been selected by: The client.

- Sample S/01 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
64614/277	Infotainment Head Unit	HUAIDP10BY	--	2021/03/04
64614/005	Harness	--	--	2020/10/23

Auxiliary elements used with the Sample S/01:

Control Nº	Description	Model	Serial Nº	Date of reception
64614/004	PCB (AIDA TLS_10)	--	--	2020/10/23
64614/006	H-MTD Cable	--	--	2020/10/23
64614/007	H-MTD Cable	--	--	2020/10/23
64614/009	FAKRA Cable	--	--	2020/10/23
64614/010	FAKRA Cable	--	--	2020/10/23
64614/011	Connecting Cable	--	--	2020/10/23
64614/012	Connecting Cable	--	--	2020/10/23
64614/014	Connecting Cable	--	--	2020/10/23
64614/015	Connecting Cable	--	--	2020/10/23
64614/016	USB Cable	--	--	2020/10/23
64614/019	Ethernet Cable	--	--	2020/10/23
64614/021	Ethernet USB Adapter	--	--	2020/10/23

Sample S/01 has undergone the following test(s): The Radiated tests indicated in the Appendix B

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				
	☒	DC: 13.5Vdc			
Rated Power..... :	-				
Clock frequencies..... :	-				
Other parameters ..... :	-				
Software version..... :	-				
Hardware version ..... :	-				
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	
	-				
	-				
	-				

Identification of the client

Marelli Europe S.p.A.

Viale A. Borletti 61/63 – Corbetta (MI) - 20011 Italy

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2021-07-23
Date (finish)	2021-07-26

Document history

Report number	Date	Description
64614RRF.007	2021-11-08	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 semianechoic 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: Alfonso Gutiérrez.

Used instrumentation:

Radiated Measurements:

		Last Calibration	Due Calibration
1.	Semianechoic Absorber Lined Chamber ETS LINDGREN FACT 3 200 STP	N/A	N/A
2.	Shielded Room ETS LINDGREN S101	N/A	N/A
3.	Biconical/Log Antenna 30MHz - 6 GHz ETS LINDGREN 3142E	2020/10	2023/10
4.	RF Preamplifier 40 dB, 10 MHz - 6 GHz BONN ELEKTRONIK BLNA 0160-01N	2021/03	2022/03
5.	EMI Test Receiver 7 GHz ROHDE AND SCHWARZ ESR7	2019/10	2021/10
6.	Horn Antenna 1-18 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9120 D	2020/08	2023/08
7.	Horn Antenna 18-40 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9170	2020/05	2023/05
8.	RF Preamplifier G>30dB, 1-18GHz BONN ELEKTRONIK BLMA 0118-3A	2020/10	2021/10
9.	Pre-amplifier G>30dB 18-40 GHz BONN ELEKTRONIK BLMA 1840-3G	2019/11	2021/11
10.	Signal and Spectrum Analyzer 10 Hz - 40 GHz ROHDE AND SCHWARZ FSV40	2019/10	2021/10
11.	DC Power Supply 30V/5A KEYSIGHT TECHNOLOGIES U8002A	N/A	N/A
12.	Digital Multimeter, FLUKE 175	2020/11	2021/11

Testing verdicts

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

Summary

FCC PART 15 PARAGRAPH / RSS-247		
Requirement – Test case	**Verdict**	**Remark**
FCC 15.209 (a), 15.247 (d), FCC 15.407 / RSS-Gen 8.9, RSS-247 5.5: - Emission limitations radiated (Transmitter)	P	(1)
Supplementary information and remarks: (1) Only co-location radiated spurious emission test was requested.		

Appendix A: Test results.

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TEST CONDITIONS

POWER SUPPLY:

V nonimal:	13.5 Vdc
Type of Power Supply:	DC External (Car Battery).

ANTENNAS:

Type of Antenna:	Integral.
Maximum Declared Antenna Gain:	0 dBi

RADIOS AND CHANNELS TESTED:

- Co-Location mode Bluetooth EDR, WLAN 2.4 GHz: (Worst case)

	Bluetooth EDR / FHSS	
Mode:	Basic Rate (Pi/4-DQPSK - 2DH5)	
Channel Spacing:	1 MHz	
Frequency Range:	2402 MHz to 2480 MHz	
Transmit Channels	Channel	Channel Frequency (MHz)
	Low: 0	2402

	WLAN (IEEE 802.11 a/n/ac): U-NII-3 Band	
Mode:	802.11 a20: 6, 9, 12, 18, 24, 36, 48 & 54 Mbps	
	802.11 n HT20: MCS0 to MCS7	
	802.11 ac VHT20: MCS0 to MCS8	
Setting of cores / ports:	1.	
Beamforming:	No	
Channel Spacing:	20 MHz	
Frequency Range:	5725 MHz to 5850 MHz	
Transmit Channels	Channel	Channel Frequency (MHz)
	Low: 149	5745

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 Mode for each Radio:

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

* Bluetooth Enhanced Data Rate: Transmitter radiated spurious emissions tests were performed with the EUT transmitting in Bluetooth EDR / Low Channel in GFKS (DH-5) mode configuration as this mode was found as the worst case for spurious emissions than all the other Bluetooth EDR modes.

* WLAN 5 GHz: Transmitter radiated spurious emissions tests were performed with the EUT transmitting in 802.11 a20 / Low Channel in MCS0 mode configuration as this mode was found as the worst case for spurious emissions than all the other 5 GHz WLAN SISO modes.

TESTED SIMULTANEOUS TRANSMISSION MODES:

*** Co-Location mode Bluetooth Enhanced Data Rate, WLAN 5 GHz,** with the EUT configured to simultaneously at maximum output power:
Bluetooth EDR / Low Channel in GFKS (DH-5), WLAN 5GHz in 802.11 a20 / Low Channel in MCS0.

RADIATED MEASUREMENTS:

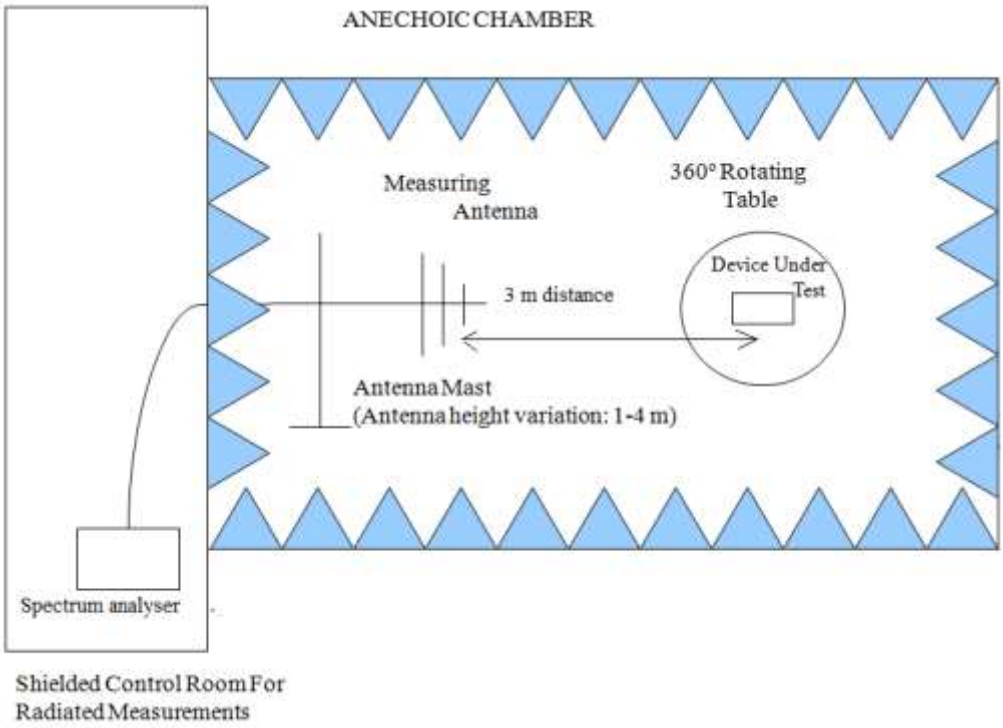
All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m for the range between 30 MHz to 1000 MHz (Bilog antenna for 30 MHz to 1000 MHz), at distance of 3 m for the frequency range 1 GHz-17 GHz (1 GHz-18 GHz Double ridge horn antenna) and at distance of 1 m for the frequency range 17 GHz-40 GHz (18 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 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

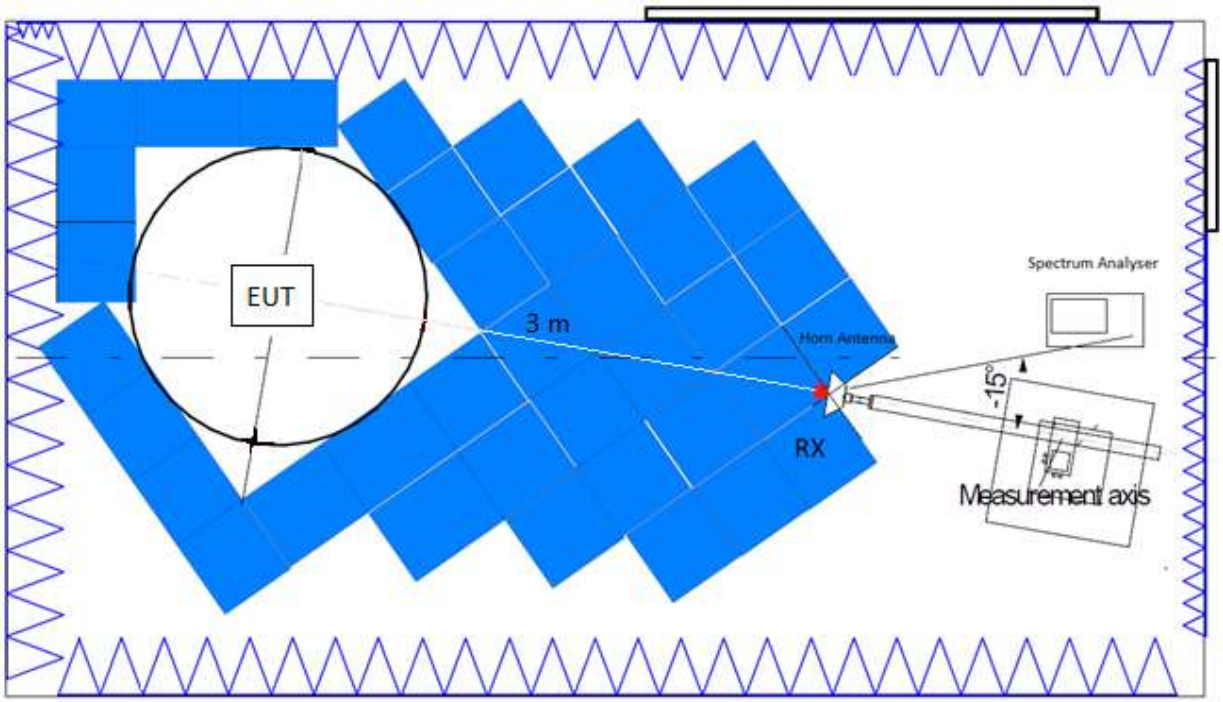
Measurements were made in both horizontal and vertical planes of polarization.

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

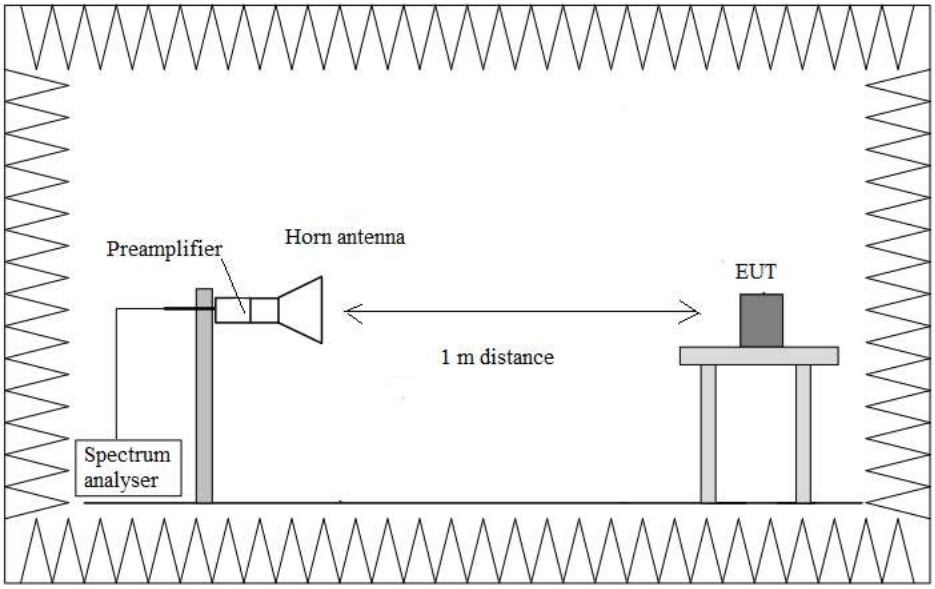
Radiated measurements setup 30 MHz < f < 1 GHz:



Radiated measurements setup f > 1 GHz up to 17 GHz:



Radiated measurements setup f > 17 GHz up to 40 GHz:



15.209 (a), 15.247 (d), FCC 15.407 / RSS-Gen 8.9, RSS-247 5.5 Emission limitations radiated (Transmitter)

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 (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	29.54	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 360º 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 30 MHz-17 GHz and at distance of 1m for the frequency range 17 GHz-40 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.

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

- **Co-Location mode Bluetooth EDR, 802.11 a20.**

Bluetooth EDR:	Low Channel (2402 MHz). GFSK (DH-5)
802.11 a20:	High Channel (5745 MHz). BW 20 MHz. MCS0.

Frequency range 30 MHz - 1 GHz:

The spurious emissions below 1 GHz do not depend on either the operating channel or the modulation mode.

Spurious frequencies detected closest to the limit:

Spurious frequency (MHz)	Emission Level (dBµV/m)	Polarization	Detector
333.61	33.26	V	Quasi-Peak
731.601	31.60		
777.6275	38.92		
825.594	37.82		

Measurement uncertainty (dB): **<±** 5.1

Frequency range 1 - 40 GHz:

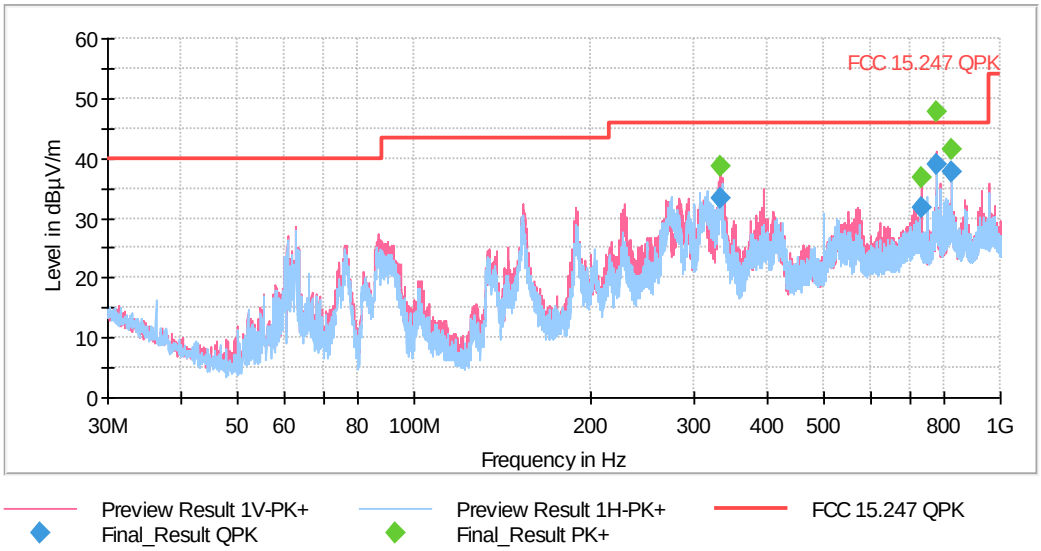
Spurious frequencies detected closest to the limit:

Spurious frequency (GHz)	Emission Level (dBµV/m)	Polarization	Detector
11.4906	59.91	V	Peak
	46.81		AVG
34.2392	52.12	H	Peak

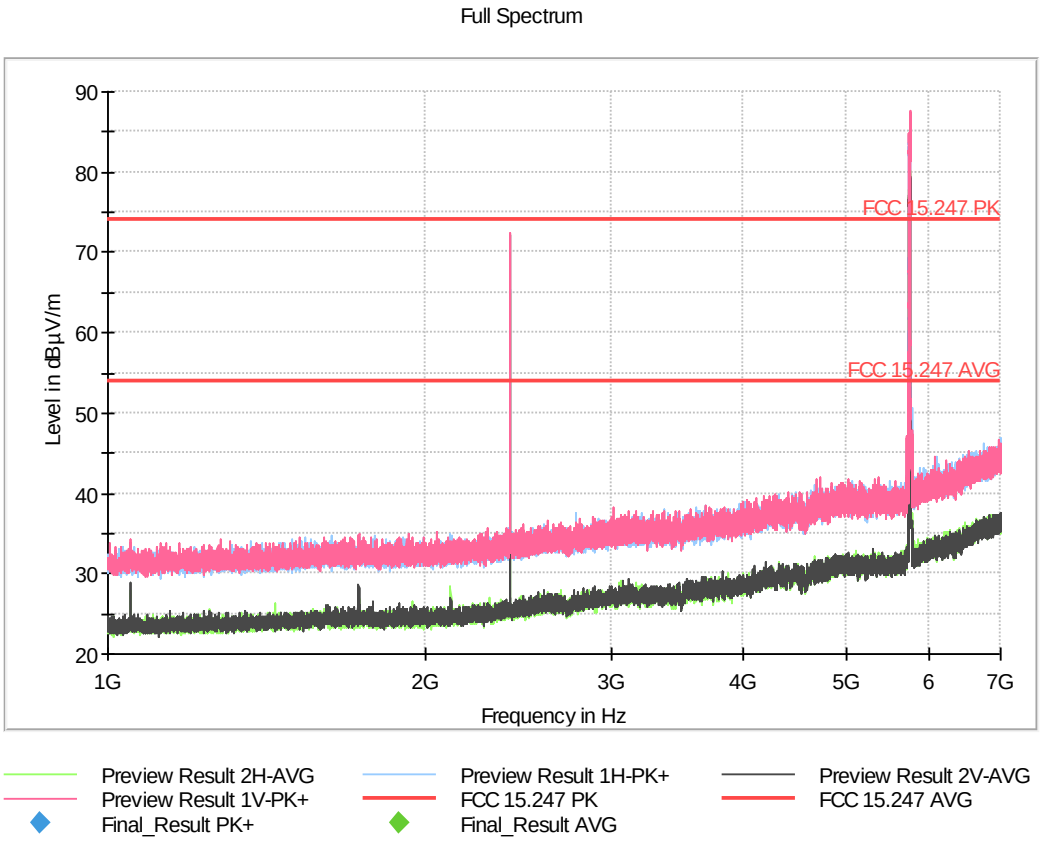
Measurement Uncertainty (dB): 1 GHz to 17 GHz <± 4.60
17 GHz to 40 GHz <± 4.89

Verdict: PASS

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

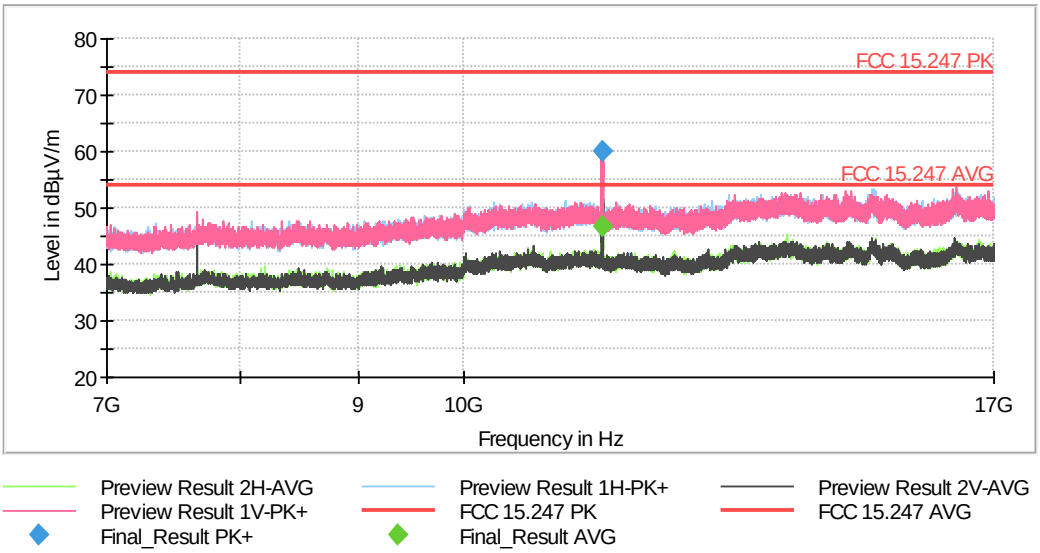


FREQUENCY RANGE 1 - 7 GHz (worst case):



The peaks above the highest limit are the Bluetooth EDR and Wifi 5GHz carrier frequencies.

FREQUENCY RANGE 7 - 17 GHz (worst case):



FREQUENCY RANGE 17 - 40 GHz (worst case):