

ISED CABid: ES1909

Lab. Company Number: 4621A

Test Report No:

77830RRF.002A1

Partial Test Report

USA FCC Part 15.247, 15.209

CANADA RSS-247, RSS-Gen

(*) Identification of item tested	e-bike user interface controller
(*) Trademark	Bosch
(*) Model and /or type reference	BRC3600 / LED Remote
(*) Other identification of the product	FCC ID: 2AWRC-BRC3600 IC: 26294-BRC3600
(*) Features	Bluetooth Low Energy HW version: 8.0.2 SW version: BRC3600_EM_C_1.0.0
Applicant	Robert Bosch GmbH Markwiesenstraße 58 72770 Reutlingen
Test method requested, standard	USA FCC Part 15.247 (10-1-21 Edition): Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. USA FCC Part 15.209 (10-1-21 Edition): Radiated emission limits; general requirements. CANADA RSS-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. 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 (CA29507456)
Date of issue	2024-08-13
Report template No	FDT08_24 (*) "Data provided by the client"

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Acronyms

Acronym ID	Acronym Description
Detector	Detector used
Equipment	Equipment Type
Freq	Frequency
Freq Rng	Frequency Range
MP	Measurement Point
Mod	Modulation
Mode	MIMO Mode
Pol	Polarization
Port	Active Port
Unwanted Freq	Unwanted Emissions Frequency
Unwanted Lvl	Unwanted Emissions Level

Competences and guarantees

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Uncertainty

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

The total uncertainty of the measurement system for the radiated emissions of EUT from 30 MHz to 1 GHz is:
Measurement uncertainty $\leq \pm 5,35$ 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 $\leq \pm 4,32$ dB with factor ($k = 2$).

The total uncertainty of the measurement system for the radiated emissions of EUT from 17 GHz to 26 GHz is:
Measurement uncertainty $\leq \pm 5,51$ 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 e-bike user interface controller with BLE.

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	77830C_54.1	eBike Display RADIATED	BCR3600	43829-0026	2024-03-22	Element Under Test
S/01	77830C_9.1	Power Cable			2024-03-19	Element Under Test

Notes referenced to samples during the project:

Id	Type
S/01	Radiated

Test sample description

Ports..... :	Port name and description	Cable						
		Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾			
	USB service port (USB-C interface for service)	<3m	[]	[]	[]			
	System cable connector (Supply+CAN FD) connected to ebike	<3m	[X]	[]	[]			
			[]	[]	[]			
			[]	[]	[]			
			[]	[]	[]			
			[]	[]	[]			
Supplementary information to the ports..... :								
Rated power supply	Voltage and Frequency		Reference poles					
			L1	L2	L3	N	PE	
	[]	AC:	[]	[]	[]	[]	[]	
	[]	AC:	[]	[]	[]	[]	[]	
	[X]	DC: USB port, nom. 5VDC						
	[X]	DC: System cable, nom. 13,5VDC						
Rated Power	System cable: max. 2,7W (13,5V/0,2A) / USB port: max. 2,5W (5V/0,5A)							
Clock frequencies.....	110MHz, 55MHz, 48MHz, 2MHz, 1.1MHz							
Other parameters								
Software version	BRC3600_EMC_1.0.0							
Hardware version	8.0.2							
Dimensions in cm (W x H x D)	72,8 x 53,2 x 34,3 mm							
Mounting position	[]	Table top equipment						
	[]	Wall/Ceiling mounted equipment						
	[]	Floor standing equipment						

	[]	Hand-held equipment		
	[X]	Other: Bicycle handlebar		
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
Markwiesenstraße 58. 72770 Reutlingen, Germany

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2024-03-22
Date (finish)	2024-03-23

Document history

Report number	Date	Description
77830RRF.002	2024-05-15	First release.
77830RRF.002A1	2024-08-13	First modification. - Additional information on the non-applicability of some test cases is included on page 9. - Antenna gain on page 12 has been corrected from 3.6dBm to 3.7dBm. - On page 12, it is specified that the worst case has been selected after performing a spot check. This report cancels and replaces 77830RRF.002

Environmental conditions

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

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

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

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

In the chamber for conducted measurements, the following limits were not exceeded during the test:

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

Remarks and comments

The tests have been performed by the technical personnel: Daniel Mejías Herrera and Jia Hao Luo Chen.
Used instrumentation:

Control No.	Equipment	Model	Manufacturer	Next Calibration
10304	EMI TEST RECEIVER 2Hz-44GHz	ESW44	ROHDE AND SCHWARZ	2026-02-19
05862	EMI TEST RECEIVER 9kHz-7GHz	ESR7	ROHDE AND SCHWARZ	2025-02-15
07763	HORN ANTENNA 1-18GHz	BBHA 9120D	SCHWARZBECK MESS-ELEKTRONIK	2026-01-16
06495	HORN ANTENNA 18-40GHz	BBHA 9170	SCHWARZBECK	2024-03-19
09968	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2026-09-22
07862	PRE-AMPLIFIER G>30dB 18-40GHz	BLMA 1840-3G	BONN ELEKTRONIK	2025-04-02
07769	PREAMPLIFIER 30dB 500MHz-18GHz	BBV 9718 C	SCHWARZBECK	2025-03-13
08130	SEMIANECHOIC ABSORBER LINED CHAMBER	P29419	ALBATROSS	--
08134	SHIELDED ROOM	P29419	ALBATROSS PROJECTS GMBH	--
04848	SOFTWARE FOR EMC/RF TESTING	EMC32	ROHDE AND SCHWARZ	--
07550	TEMPERATURE AND HUMIDITY PROBE	HWg-STE	HW GROUP	2025-04-24
07549	TEMPERATURE AND HUMIDITY PROBE	HWg-STE	HW GROUP	2025-04-24

Testing verdicts

Fail	F
Inconclusive	I
Not applicable	N/A
Not measured	N/M
Pass	P

Summary

Bluetooth Low Energy 5.0 (1Mbps)

FCC PART 15 PARAGRAPH/ RSS-247			
Requirement – Test case		Verdict	Remark
FCC 15.247 (a)(2) / RSS-247 5.2. (a)	6 dB Bandwidth	N/A	(1)
FCC 15.247 (b) / RSS-247 5.4. (d)	Maximum output power and antenna gain	N/A	(1)
FCC 15.247 (d) / RSS-247 5.5.	Band-edge emissions compliance (Transmitter)	N/A	(1)
FCC 15.247 (e) / RSS-247 5.2. (b)	Power spectral density	N/A	(1)
FCC 15.247 (d) / RSS-247 5.5.	Emission limitations radiated (Transmitter)	P	--
<u>Supplementary information and remarks:</u>			
1. Test not requested due to C2PC partial testing			

Appendix A: Test results. Bluetooth Low Energy (1Mbps)

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TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

Vnominal: 13.5V DC
Type of Power Supply: DC

ANTENNA (*):

Type of Antenna: Integral Antenna
Maximum Declared Antenna Gain: 3.7 dBi

TEST FREQUENCIES (*):

Modulation	Data rates	Middle Channel
BTLE GFSK	1 Mbit/s	2440 MHz (*)

(*) Middle Channel has been selected as worst case. After performing a spot check, it was concluded that the worst case is the Middle Channel.

During transmitter test the EUT was controlled by a SW tool provided by the client to operate in a continuous transmit mode on the modulation schemes and test channels as required.

RADIATED MEASUREMENTS:

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Bilog antenna for the range between 30 MHz to 1000 MHz and 1 GHz-17 GHz Double ridge horn antenna) is situated at a distance of 3 m and at a distance of 1.5 m for the frequency range 17 GHz-26 GHz (17 GHz-40 GHz horn antenna).

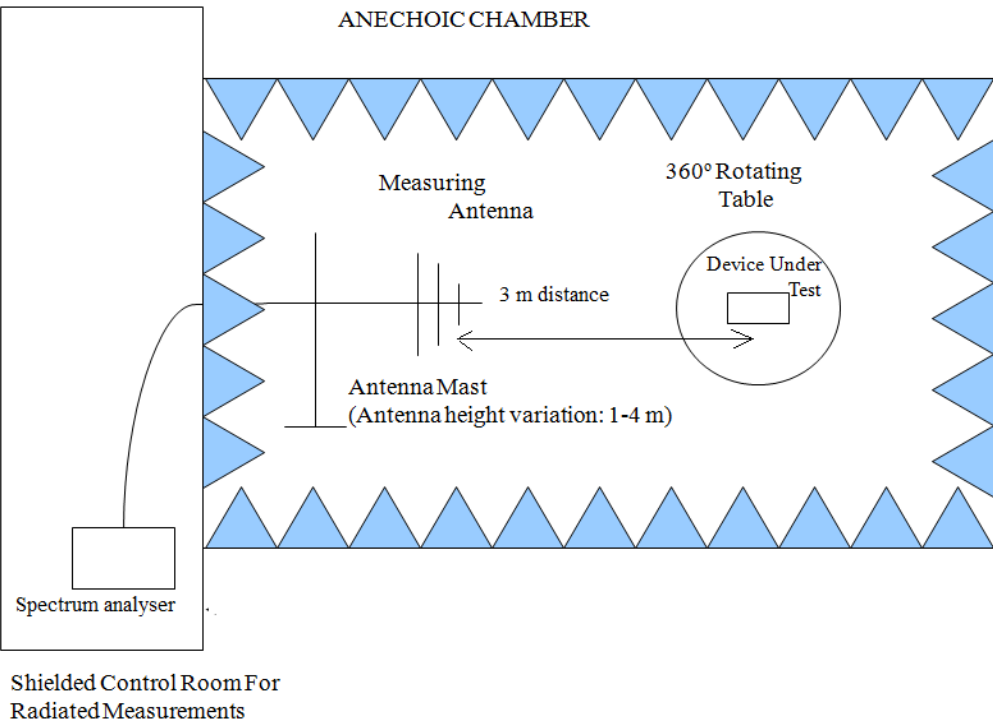
For radiated emissions in the range 17 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

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

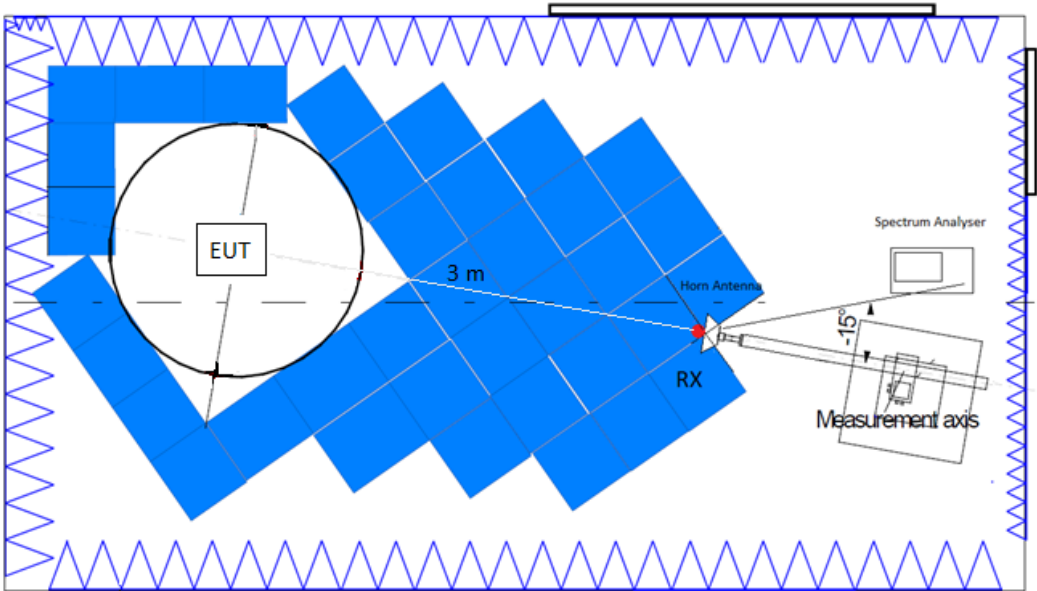
Measurements were made in both horizontal and vertical planes of polarization.

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

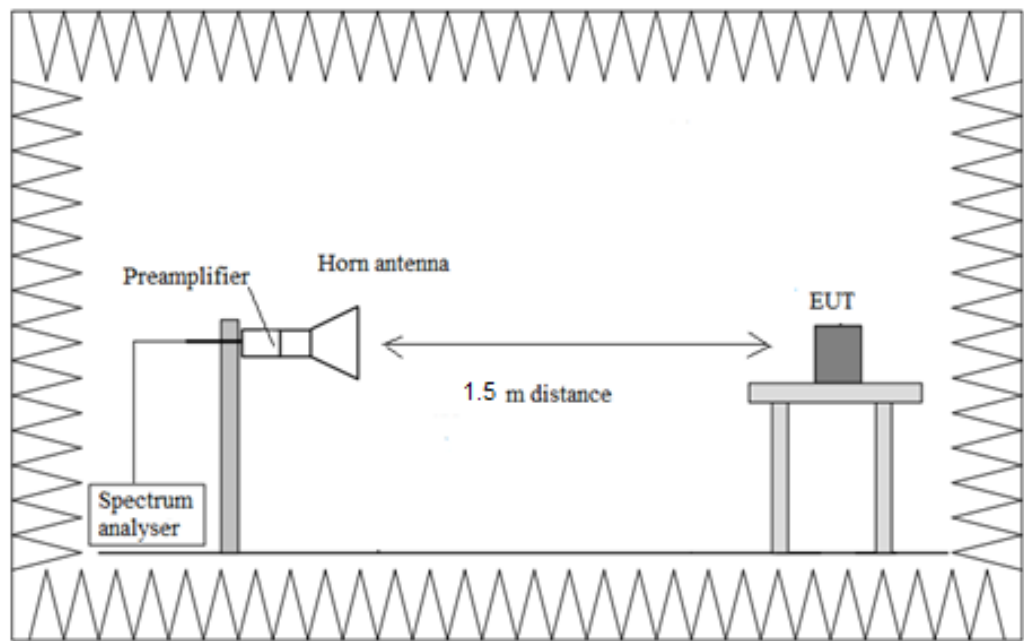
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



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



TEST CASES DETAILS

FCC 47 CFR Part 15.247 / RSS-247

RSS-247 5.5 / FCC 15.247 (d) [RSE] Emission limitations radiated (Transmitter)

Limits

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 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 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.

Modulation: BTLE (GFSK 1 Mbit/s)

MIMO Mode: SISO

Results

Freq Rng (GHz)	Equipment	Freq (MHz)	Port	Unwanted Freq (MHz)	Unwanted Lvl (dBµV/m)	Pol	Detector
[0.03, 1]	Digital Transmission System (DTS)	2440.00000	1	34.656	21.30	V	PK
				34.656	8.73	V	QP
				37.130	22.22	V	PK
				37.130	9.86	V	QP
				38.536	22.01	V	PK
				38.536	10.38	V	QP
				631.109	31.69	H	PK
				631.109	24.17	H	QP
				924.534	31.31	V	PK
				924.534	20.00	V	QP
[3, 17]	Digital Transmission System (DTS)	2440.00000	1	4879.500	46.14	H	PK
				4879.500	39.80	H	AVG

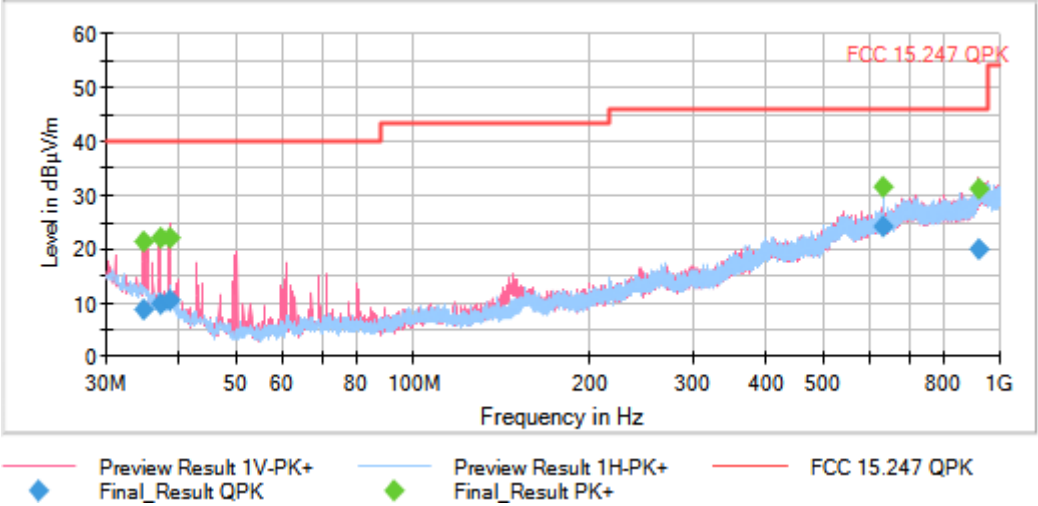
Verdict

Pass

Attachments

Frequency Range GHz = [0.03, 1] Equipment Type = Digital Transmission System (DTS)
Modulation = BTLE (GFSK 1 Mbit/s) Frequency MHz = 2440.00000
MIMO Mode = SISO Active Port = 1

Images:



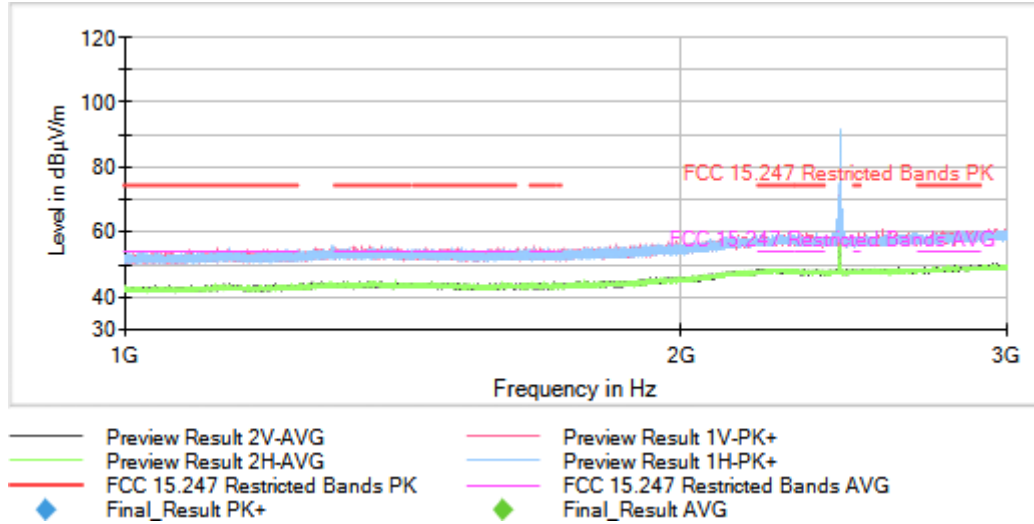
Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESR 7]					
	30 MHz - 1 GHz	48,5 kHz	PK+	100 kHz	1 s	20 dB

Frequency Range GHz = [1, 3] Equipment Type = Digital Transmission System (DTS)
Modulation = BTLE (GFSK 1 Mbit/s) Frequency MHz = 2440.00000
MIMO Mode = SISO Active Port = 1

Images:



Full Spectrum



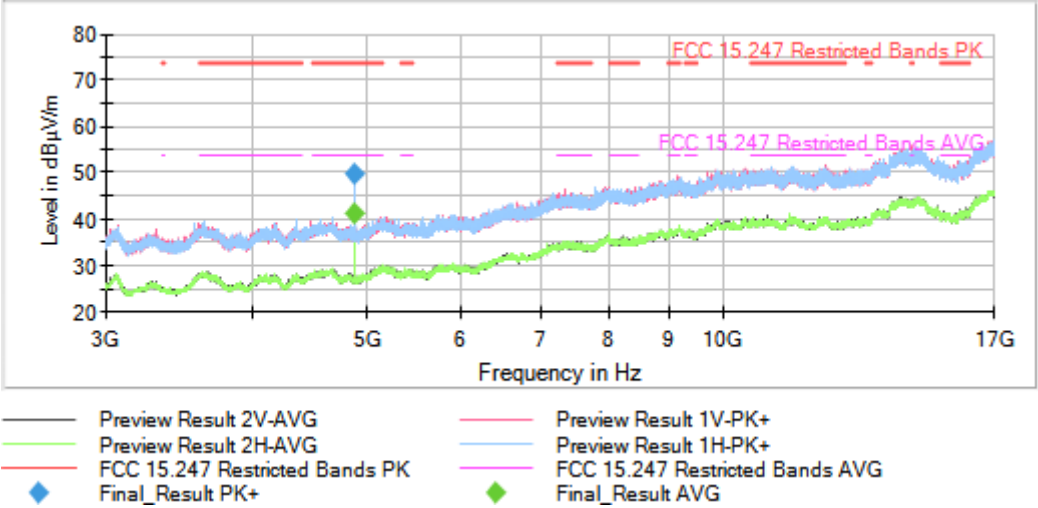


Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	1 GHz - 3 GHz	66,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Frequency Range GHz = [3, 17] Equipment Type = Digital Transmission System (DTS)
Modulation = BTLE (GFSK 1 Mbit/s) Frequency MHz = 2440.00000
MIMO Mode = SISO Active Port = 1

Images:



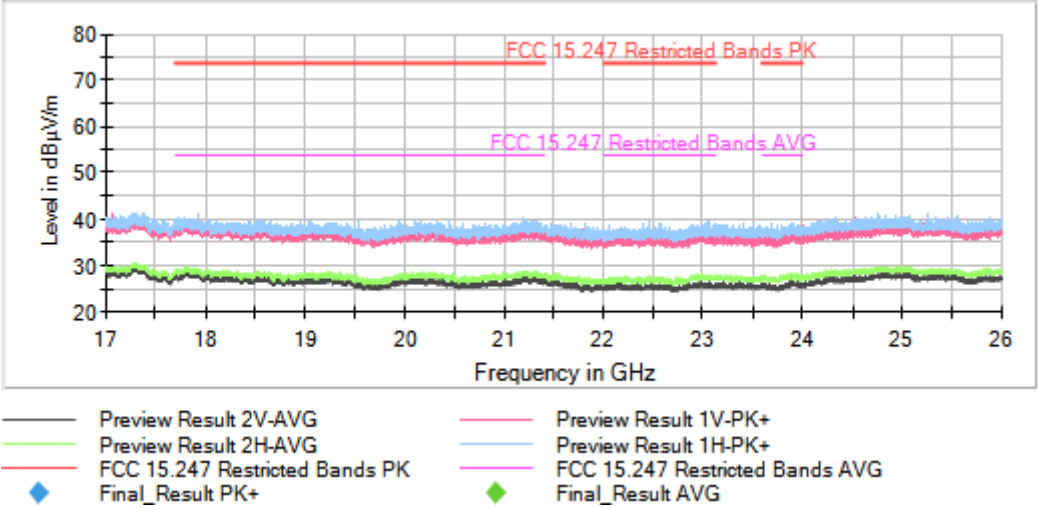
Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	3 GHz - 17 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Frequency Range GHz = [17, 26] Equipment Type = Digital Transmission System (DTS)
Modulation = BTLE (GFSK 1 Mbit/s) Frequency MHz = 2440.00000
MIMO Mode = SISO Active Port = 1

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	17 GHz - 26 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s	0 dB