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:
78894RRF.001

Test Report

USA FCC Part 15.249, 15.209
CANADA RSS-210, RSS-Gen

(*) Identification of item tested	Safety edge wireless system consisting in a transmitter
(*) Trademark	JCM
(*) Model and /or type reference	RB-TX20C
Other identification of the product	FCC ID: U5Z-RB-TX20C IC: 8572A-RBTX20C
(*) Features	Multifrequency system 916MHz auto-adjustable HW version: S-RB3T-GT3C-EL SW version: RBAND3T_ULMEP_02.04.13.00
Applicant	JCM TECHNOLOGIES, S.A.U. C/Costa d'en Paratge, 6B 08500 VIC, BARCELONA
Test method requested, standard	USA FCC Part 15.249 (10-1-23 Edition): Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, 5725 - 5875 MHz, and 24.0 - 24.25 GHz. USA FCC Part 15.209 (10-1-23 Edition): Radiated emission limits; general requirements. CANADA RSS-210 Issue 10 (December 2019). CANADA RSS-Gen Issue 5 Amendment 2 (February 2021). ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Summary	IN COMPLIANCE
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	2024-06-18
Report template No	FDT08_24 (*) "Data provided by the client"

Index

Acronyms

Acronym ID	Acronym Description
99OBW	99% Occupied Channel Bandwidth
Avg Field	Average Field Strength
Detector	Detector used
Equipment	Equipment Type
Freq	Frequency
Freq Rng	Frequency Range
MP	Measurement Point
Mod	Modulation
Operation Band	Operation Band
Pk Field	Peak Field Strength
Pol	Polarization
Unwanted Freq	Unwanted Emissions Frequency
Unwanted Lvl	Unwanted Emissions Level

Competences and guarantees

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

DEKRA Testing and Certification S.A.U. 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.

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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 10 GHz is: Measurement uncertainty ≤ ± 4,32 dB with factor (k = 2).

The total uncertainty of the measurement system for the conducted testing of EUT is:
Occupied Channel Bandwidth: Measurement uncertainty ≤ ± 1,17 %

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 Safety edge wireless system consisting in a transmitter. 916 MHz multifrequency transmitter for safety edge connection.

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	78894_2.1	Safety edge wireless system	RB-TX20C	RB TX20C -8	2024-04-18	Element Under Test
S/02	78894_3.1	Safety edge wireless system	RB-TX20C	RB TX20C -9	2024-04-18	Element Under Test

Notes referenced to samples during the project:

Id	Type
S/01	Samples used for radiated tests.
S/02	Samples used for conducted tests.

Test sample description

<table>
<tr><td rowspan="3">Ports…… :</td><td rowspan="2" colspan="2">Port name and description</td><td colspan="4">Cable</td></tr>
<tr><td>Specified max length [m]</td><td>Attached during test</td><td>Shielded</td><td>Coupled to patient(3)</td></tr>
<tr><td colspan="2">Safety edge input</td><td>Not specified</td><td>[X]</td><td>[ ]</td><td>[ ]</td></tr>
<tr><td colspan="2">.....</td><td>.....</td><td>[ ]</td><td>[ ]</td><td>[ ]</td></tr>
<tr><td>Supplementary information to the ports…… :</td><td colspan="6">.....</td></tr>
<tr><td rowspan="4">Rated power supply .....:</td><td rowspan="2" colspan="2">Voltage and Frequency</td><td colspan="5">Reference poles</td></tr>
<tr><td>L1</td><td>L2</td><td>L3</td><td>N</td><td>PE</td></tr>
<tr><td>[ ]</td><td>AC: .....</td><td>[ ]</td><td>[ ]</td><td>[ ]</td><td>[ ]</td><td>[ ]</td></tr>
<tr><td>[X]</td><td colspan="5">DC: 3,6V</td></tr>
<tr><td>Rated Power .....:</td><td colspan="6">12mA</td></tr>
<tr><td>Clock frequencies.....:</td><td colspan="6">CLK SOURCE 1: 16MHz ; CLK SOURCE 2: 32,768kHz</td></tr>
<tr><td>Other parameters .....:</td><td colspan="6">---</td></tr>
<tr><td>Software version .....:</td><td colspan="6">RBAND3T_ULMEP_02.04.13.00</td></tr>
<tr><td>Hardware version .....:</td><td colspan="6">S-RB3T-GT3C-EL</td></tr>
<tr><td>Dimensions in cm (W x H x D) ....:</td><td colspan="6">4,572 x 12,141 x 4,445 cm</td></tr>
<tr><td rowspan="5">Mounting position .....:</td><td>[ ]</td><td colspan="5">Table top equipment</td></tr>
<tr><td>[ ]</td><td colspan="5">Wall/Ceiling mounted equipment</td></tr>
<tr><td>[ ]</td><td colspan="5">Floor standing equipment</td></tr>
<tr><td>[ ]</td><td colspan="5">Hand-held equipment</td></tr>
<tr><td>[X]</td><td colspan="5">Other: Garage door mounted equipment</td></tr>
<tr><td rowspan="2">Modules/parts.....:</td><td colspan="3">Module/parts of test item</td><td>Type</td><td colspan="2">Manufacturer</td></tr>
<tr><td colspan="3">.....</td><td>.....</td><td colspan="2">.....</td></tr>
<tr><td rowspan="2">Accessories (not part of the test item) .....:</td><td colspan="3">Description</td><td>Type</td><td colspan="2">Manufacturer</td></tr>
<tr><td colspan="3">.....</td><td>.....</td><td colspan="2">.....</td></tr>
<tr><td rowspan="3">Documents as provided by the applicant .....:</td><td colspan="3">Description</td><td>File name</td><td colspan="2">Issue date</td></tr>
<tr><td colspan="3">Documents attached in TASC4</td><td>.....</td><td colspan="2">.....</td></tr>
<tr><td colspan="3">.....</td><td>.....</td><td colspan="2">.....</td></tr>
</table>

(3) Only for Medical Equipment

Identification of the client

JCM TECHNOLOGIES, S.A.U.
C/Costa d'en Paratge, 6B, 08500, Vic, Barcelona, Spain

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2024-05-09
Date (finish)	2024-05-17

Document history

Report number	Date	Description
78894RRF.001	2024-05-22	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 %

In the chamber for conducted measurements, 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: Alvaro Gutiérrez, Antonio Maireles

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
06143	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2027-01-22
06144	PRE-AMPLIFIER G>40dB 10MHz-6GHz	BLNA 0160-01N	BONN ELEKTRONIK	2024-07-25
02942	EMI TEST RECEIVER 20Hz-40GHz	ESU40	ROHDE AND SCHWARZ	2026-02-22
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
07445	DC POWER SUPPLY 30V/5A	U8002A	KEYSIGHT TECHNOLOGIES	N/A
07760	DIGITAL MULTIMETER	175	FLUKE	2024-11-08
04848	SOFTWARE FOR EMC/RF TESTING	EMC32	ROHDE AND SCHWARZ	N/A
06793	SHIELDED ROOM	S101	ETS LINDGREN	N/A
06611	TEMPERATURE AND HUMIDITY PROBE	HWg-STE	HW GROUP	2025-04-04
06668	SIGNAL AND SPECTRUM ANALYZER 10Hz-40GHz	FSV40	ROHDE AND SCHWARZ	2025-01-18
00922	POWER SUPPLY DC 40 V / 40 A	NGPE 40/40	ROHDE AND SCHWARZ	N/A
05850	DIGITAL MULTIMETER	179	FLUKE	2024-11-02
07798	WMS32	WMS32	ROHDE AND SCHWARZ	N/A

Testing verdicts

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

Summary

LoRa 902-928 MHz:

FCC PART 15 PARAGRAPH/ RSS-249		
Requirement – Test case	**Verdict**	**Remark**
15.249 (b) / RSS-210 B.10 (a) Field strength of fundamental end harmonics emissions	P	
15.249 (d) (e) / RSS-210 B.10 (b) Maximum output power and antenna gain	P	
Supplementary information and remarks: None.		

Appendix A: Test results

INDEX

TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

Vnominal:	3.6 Vdc
Type of Power Supply:	DC (internal battery)

ANTENNA (*):

Type of Antenna:	Printed in circuit.
Maximum Declared Antenna Gain:	0 dBi

TEST FREQUENCIES (*):

Low Channel:	902.30 MHz
Middle Channel:	915.65 MHz
High Channel:	927.70 MHz

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.

CONDUCTED MEASUREMENTS:

The equipment under test was set up in a shielded room and it is connected to the TS8997 using a low loss RF cable. The reading of the spectrum analyser is corrected taking into account the cable loss.

RADIATED MEASUREMENTS:

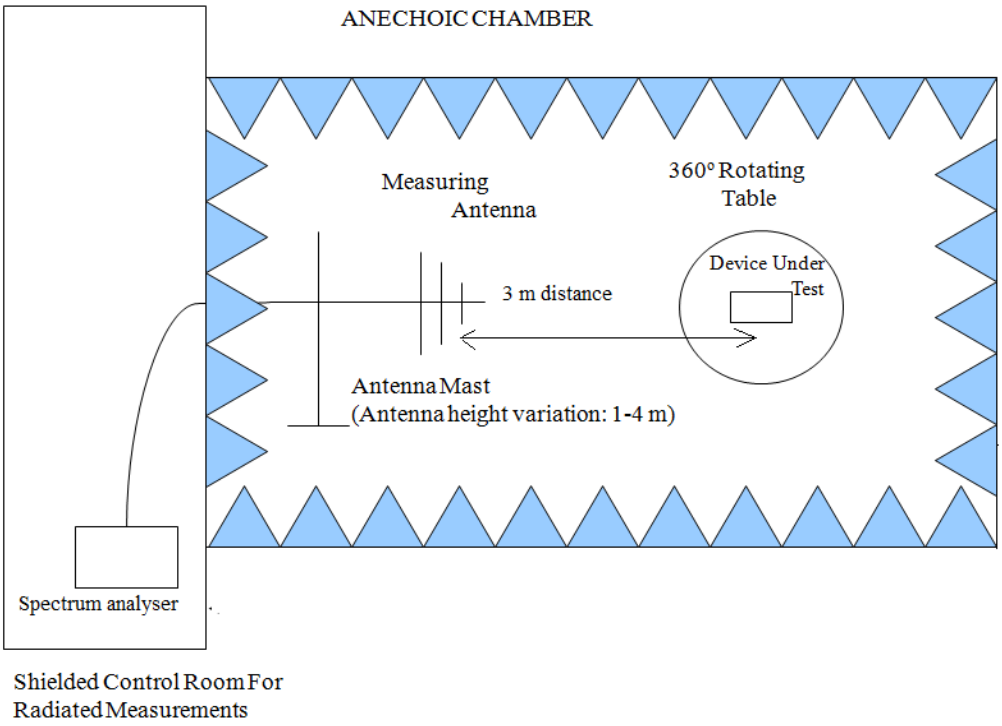
All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Bilog antenna for the range between 30 MHz to 1000 MHz and 1 GHz-10 GHz Double ridge horn antenna) is situated at a distance of 3 m.

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 (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find the maximum radiated emission.

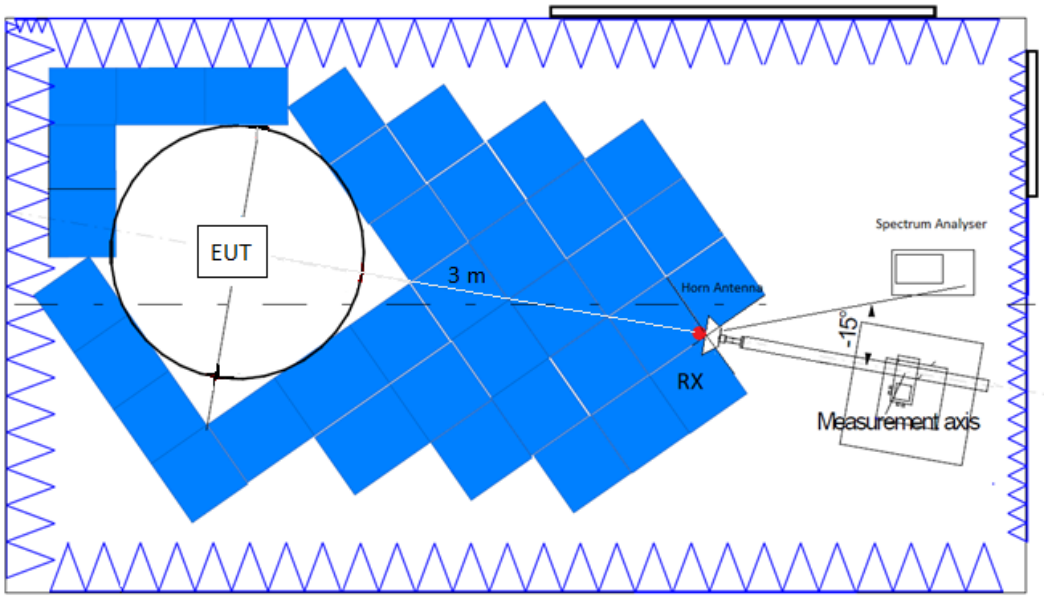
Measurements were made in both horizontal and vertical planes of polarization.

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 10 GHz:



TEST CASES DETAILS

Occupied Channel Bandwidth 99%

Results:

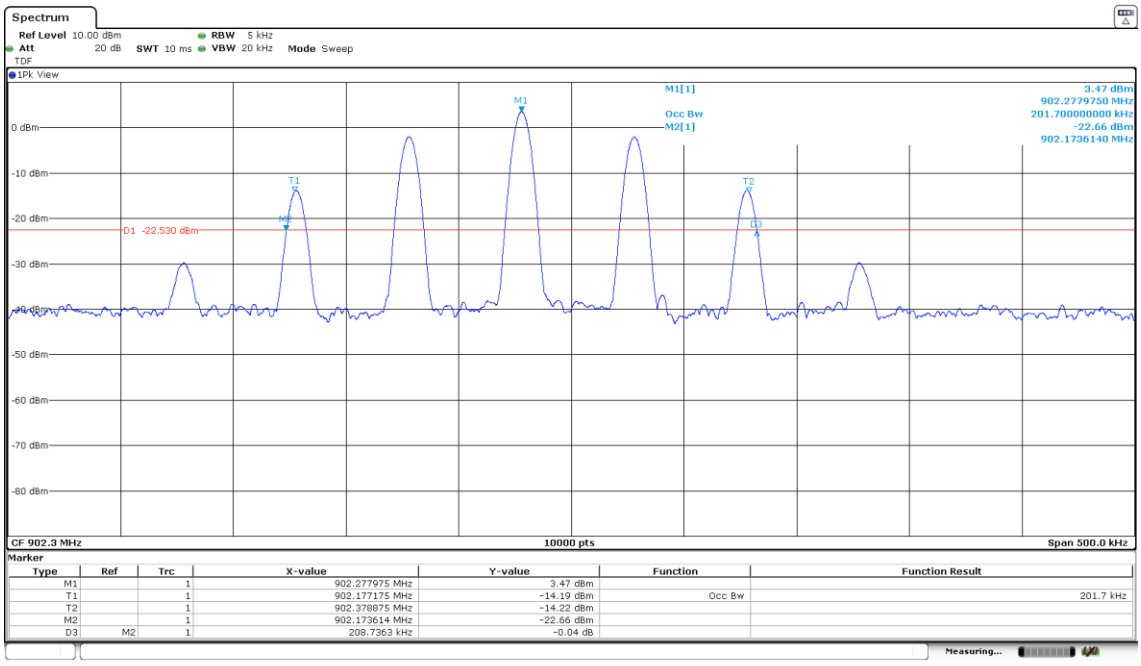
Operation Band (MHz)	Equipment	Freq (MHz)	99OBW (kHz)
[902, 928]	Digital Transmission System (DTS)	902.30	201.70
		915.65	201.80
		927.70	201.65

Attachments

Operation Band MHz = [902, 928] Equipment Type = Digital Transmission System (DTS)

Frequency MHz = 902.30000 Modulation = SRD

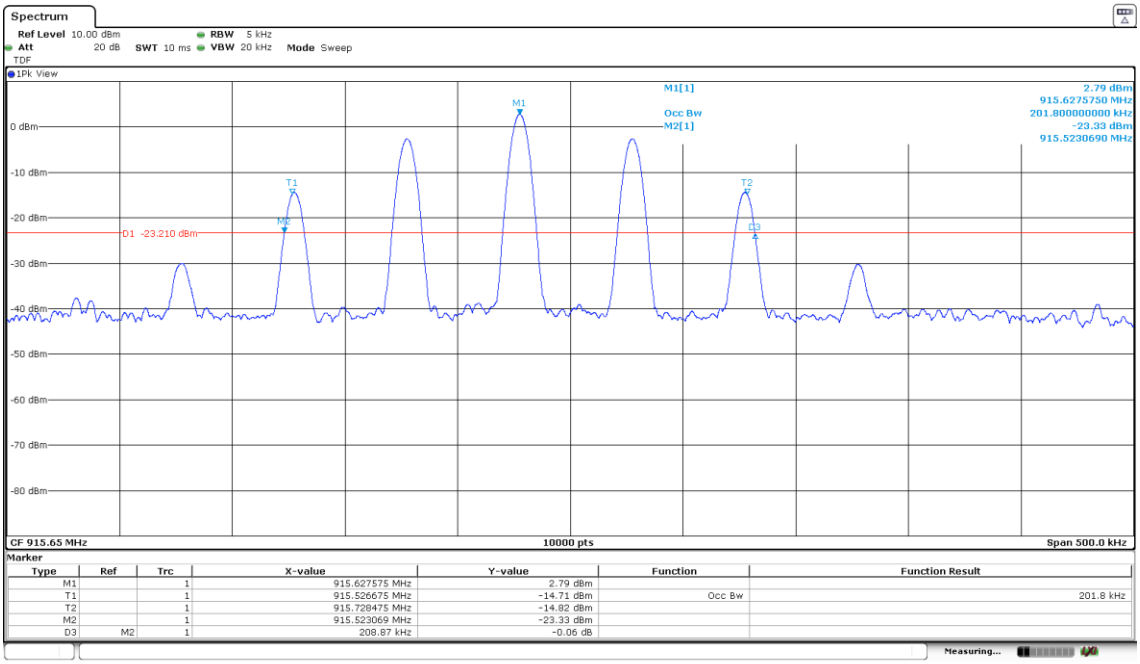
Images:



Operation Band MHz = [902, 928] Equipment Type = Digital Transmission System (DTS)

Frequency MHz = 915.65000 Modulation = SRD

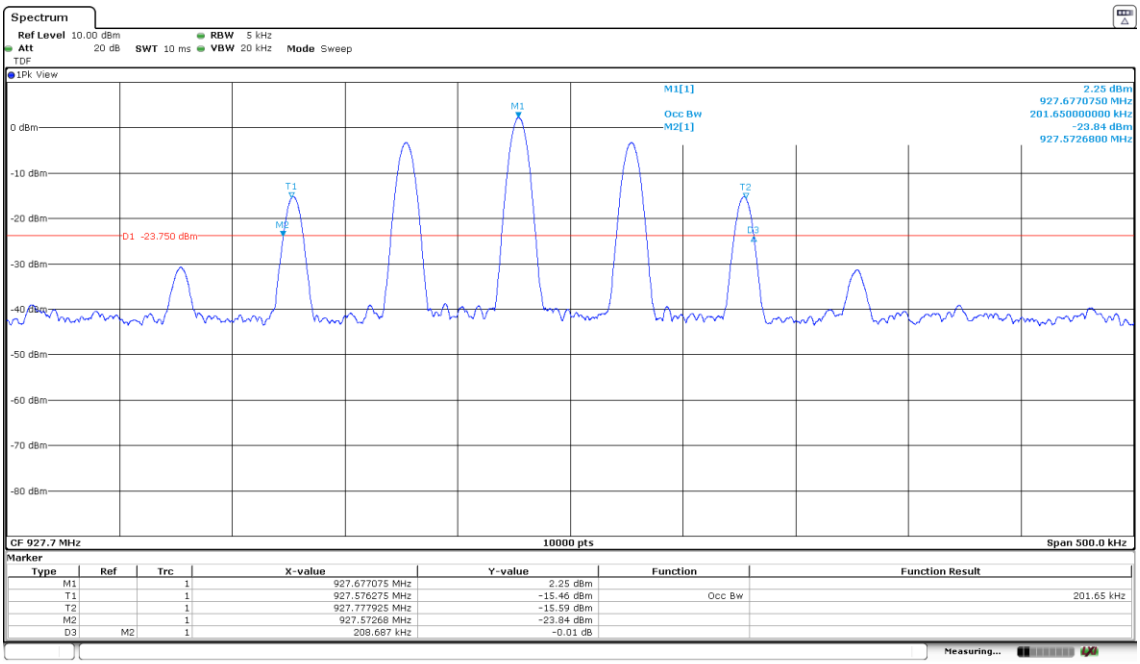
Images:



Operation Band MHz = [902, 928] Equipment Type = Digital Transmission System (DTS)

Frequency MHz = 927.70000 Modulation = SRD

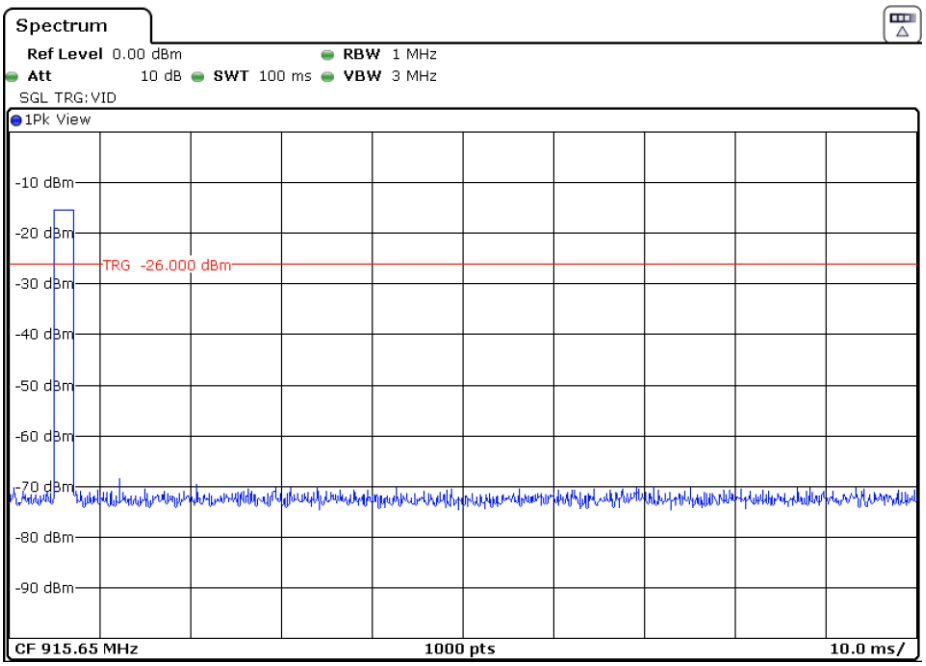
Images:



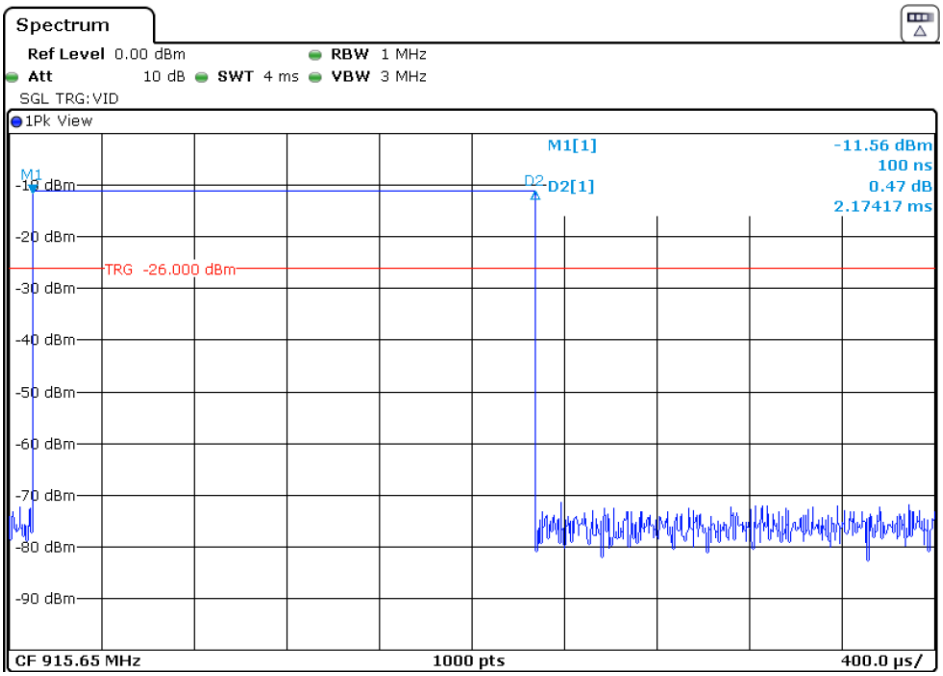
Duty Cycle

Computation of duty-cycle correction factor

Number of pulses within 100 ms: 1



Pulse duration: 2.174 ms.



Duty-cycle correction factor calculation.

Sub-pulse	Duration (ms)	Number of pulses	Sub-pulse "On Time" (ms)
1	2.174	1	2.174
		TOTAL ON TIME	2.174

Duty cycle correction factor δ = 2.094/ 100 = 0.02174

δ = 20 log (0.02094) = -33.25 dB

15.249 (b) / RSS-210 B.10 (a) Field strength of fundamental and harmonics emissions

Limits:

The field strength of emissions from intentional radiators shall comply with the following:

Fundamental frequency (MHz)	Field strength of fundamental (mV/m)	Field strength (dBµV/m)	Measurement distance (m)
902 - 928	50	93.98	3
2400 - 2483.5	50	93.98	3
5725 - 5875	50	93.98	3
24000 - 24250	250	107.96	3

For frequencies above 1000 MHz, the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

Modulation: SRD

Results:

Operation Band (MHz)	Equipment	Freq (MHz)	Pk Field (dBµV/m)	Duty cycle correction factor δ	Avg Field (dBµV/m)
[902, 928]	Digital Transmission System (DTS)	902.30	105.58	-33.25	72.33
		915.65	104.58		71.33
		927.70	102.63		69.38

Verdict:

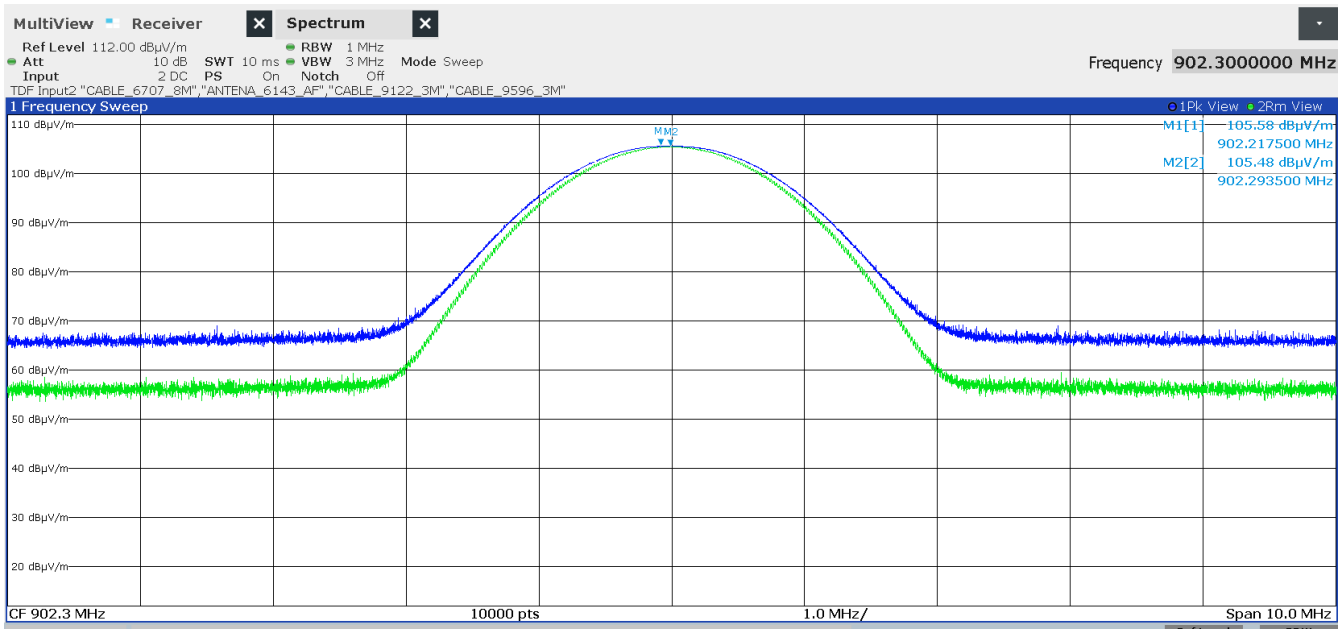
Pass

Attachments:

Operation Band MHz = [902, 928] Equipment Type = Digital Transmission System (DTS)

Frequency MHz = 902.30000 Modulation = SRD

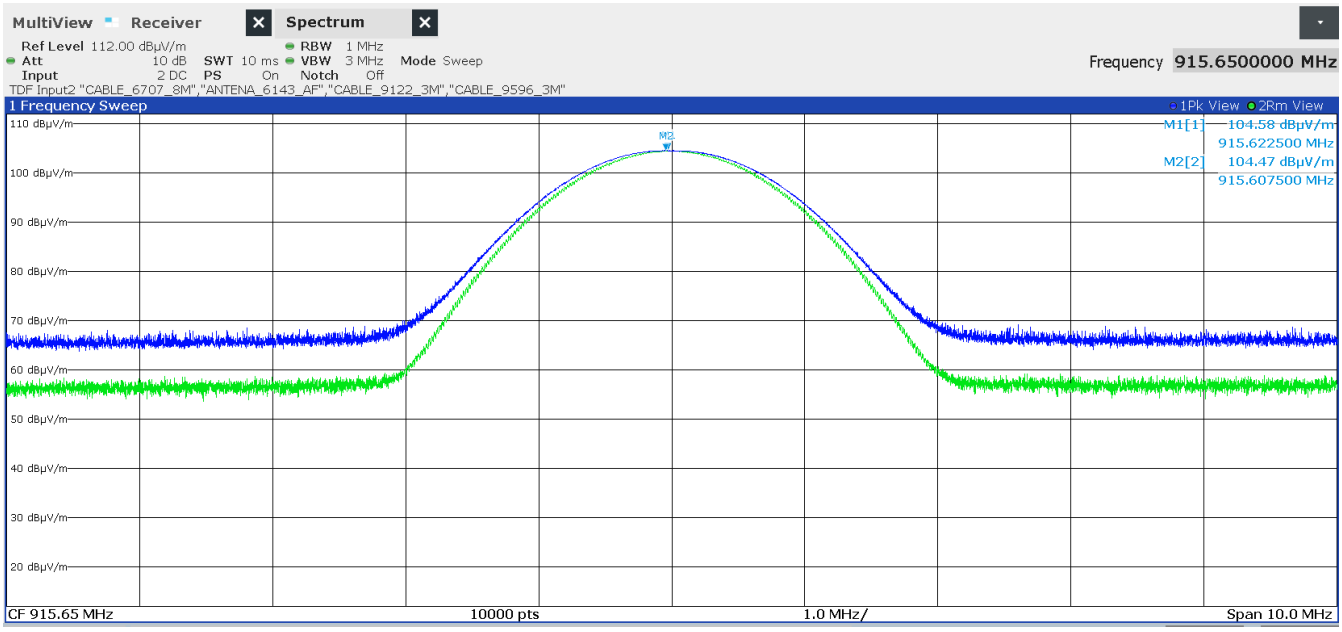
Images:



Operation Band MHz = [902, 928] Equipment Type = Digital Transmission System (DTS)

Frequency MHz = 915.65000 Modulation = SRD

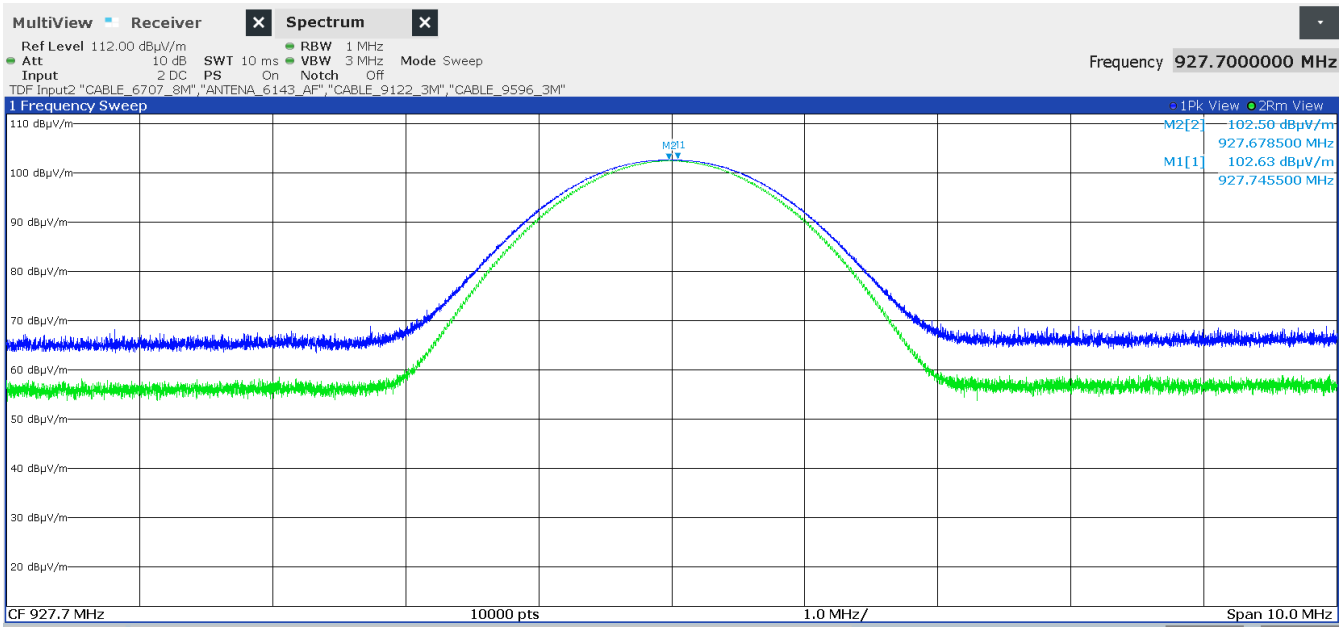
Images:



Operation Band MHz = [902, 928] Equipment Type = Digital Transmission System (DTS)

Frequency MHz = 927.70000 Modulation = SRD

Images:



15.249 (d) (e) / RSS-210 B.10 (b) Emissions radiated outside of the specific frequency bands

Limits:

The field strength of harmonics from intentional radiators shall comply with the following:

Fundamental frequency (MHz)	Field strength of harmonics (µV/m)	Field strength of harmonics (dBµV/m)	Measurement distance (m)
902 - 928	500	54	3
2400 - 2483.5	500	54	3
5725 - 5875	500	54	3
24000 - 24250	2500	67.96	3

Emissions radiated outside of the specific frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of fundamental or to the general radiated emission limits specified in section 15.209:

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

Whichever is the lesser attenuation.

Modulation: GFSK

Results:

Operation Band (MHz)	Equipment	Freq (MHz)	Freq Rng (GHz)	Unwanted Freq (MHz)	Unwanted Lvl (dBµV/m)	Polarizatrion	Detector
[902, 928]	Digital Transmission System (DTS)	902.30	[0.03, 1]	642.282	34.01	V	PK
					30.87		QP
				694.329	35.13	V	PK
					31.52		QP
		915.65		655.650	34.40	V	PK
					31.04		QP
				707.697	33.69	H	PK
					29.64		QP
		927.70		667.714	34.20	V	PK
					31.41		QP
				719.761	33.14	V	PK
					28.52		QP
		902.30	[3, 10]	4511.160	55.63	H	PK
					22.38		AVG
				5413.460	58.72	V	PK
					25.47		AVG
				6315.900	56.72	V	PK
				8121.200	54.90	V	PK
					21.65		AVG
		915.65		4578.220	57.97	H	PK
					24.72		AVG
				5493.400	61.81	V	PK
		927.70		4638.140	57.60	V	PK
					24.35		AVG
				5565.920	60.72	V	PK
				6493.560	61.11	H	PK
				8348.840	53.28	V	PK
					20.03		AVG

Verdict:

Pass

Spectrum Analyzer Parameters:

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 - 10 GHz	140 kHz	PK+ ; AVG	1 MHz	1 s	30 dB

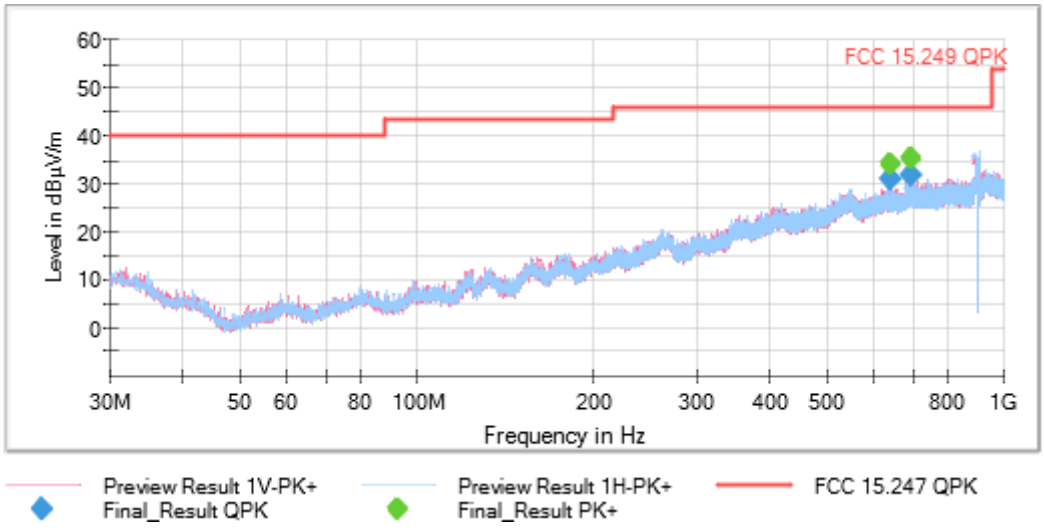
Attachments:

Operation Band MHz = [902, 928] Equipment Type = Digital Transmission System (DTS)

Frequency MHz = 902.30000 Modulation = GFSK

Frequency Range GHz = [0.03, 1]

Images:

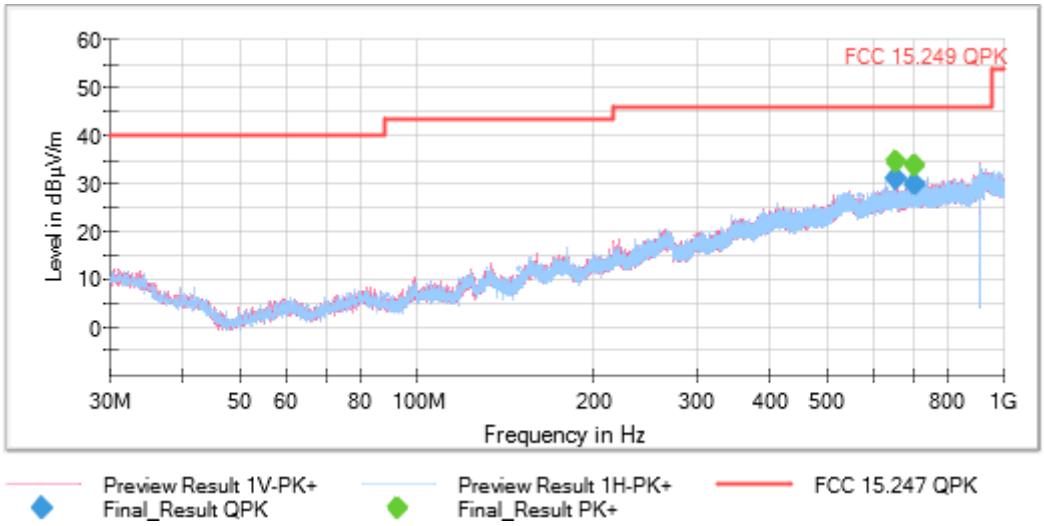


Operation Band MHz = [902, 928] Equipment Type = Digital Transmission System (DTS)

Frequency MHz = 915.65000 Modulation = GFSK

Frequency Range GHz = [0.03, 1]

Images:

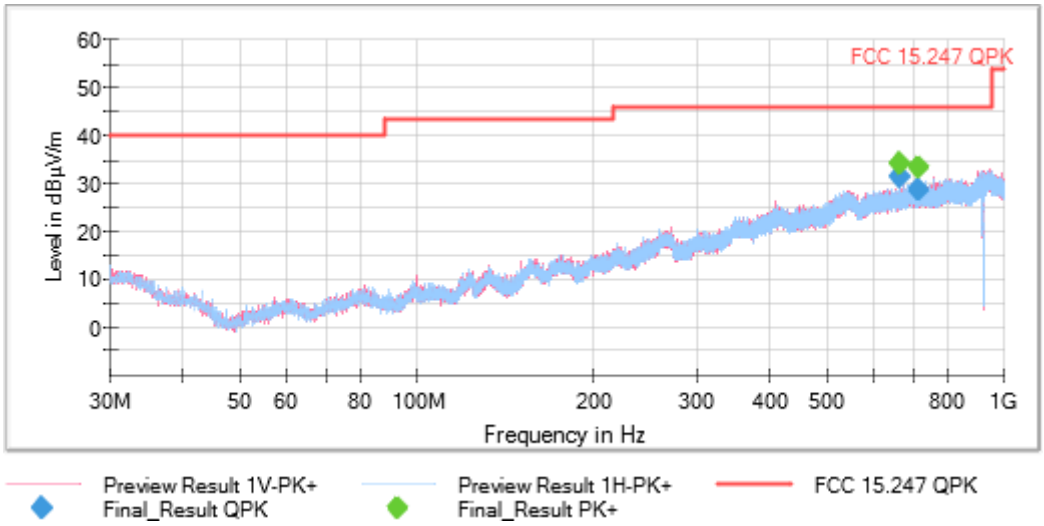


Operation Band MHz = [902, 928] Equipment Type = Digital Transmission System (DTS)

Frequency MHz = 927.70000 Modulation = GFSK

Frequency Range GHz = [0.03, 1]

Images:

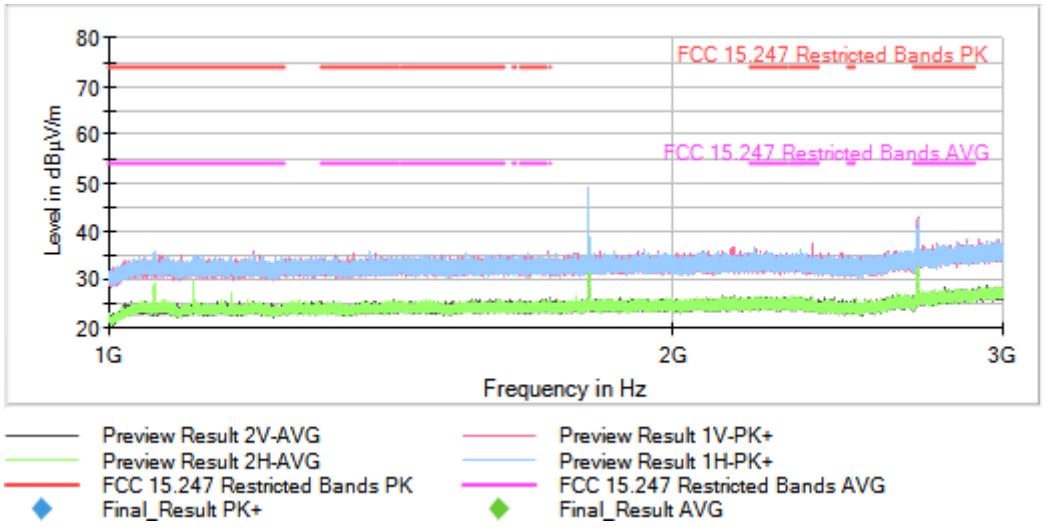


Operation Band MHz = [902, 928] Equipment Type = Digital Transmission System (DTS)

Frequency MHz = 902.30000 Modulation = GFSK

Frequency Range GHz = [1, 3]

Images:

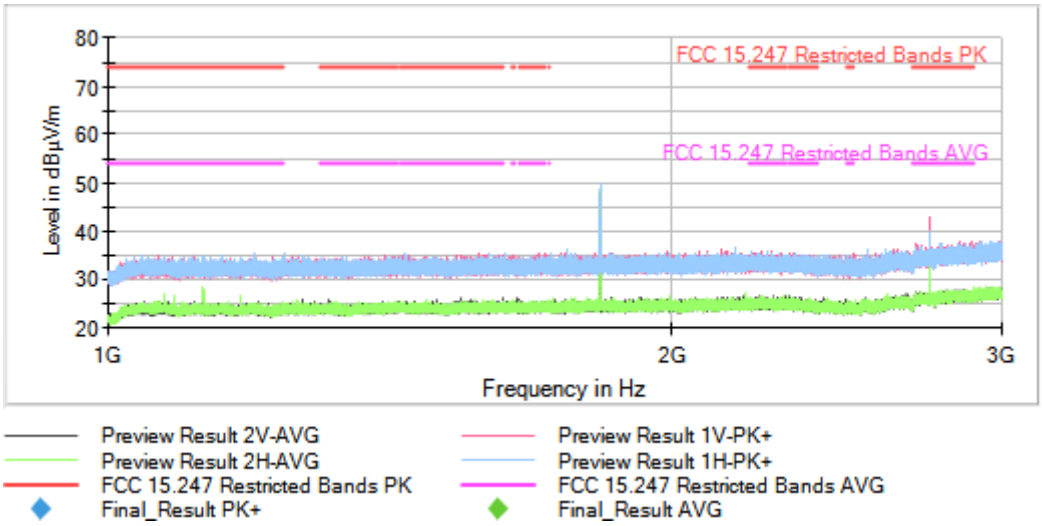


Operation Band MHz = [902, 928] Equipment Type = Digital Transmission System (DTS)

Frequency MHz = 915.65000 Modulation = GFSK

Frequency Range GHz = [1, 3]

Images:

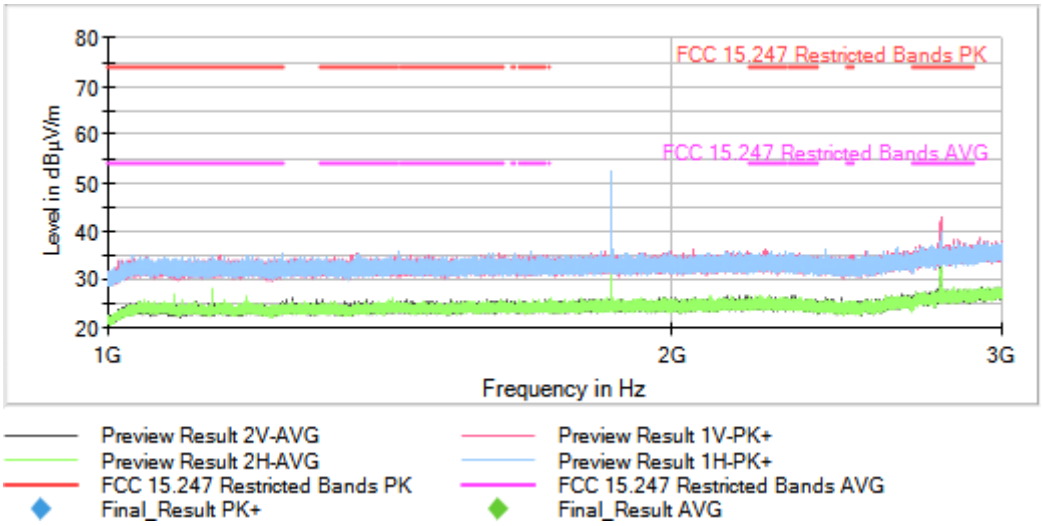


Operation Band MHz = [902, 928] Equipment Type = Digital Transmission System (DTS)

Frequency MHz = 927.70000 Modulation = GFSK

Frequency Range GHz = [1, 3]

Images:

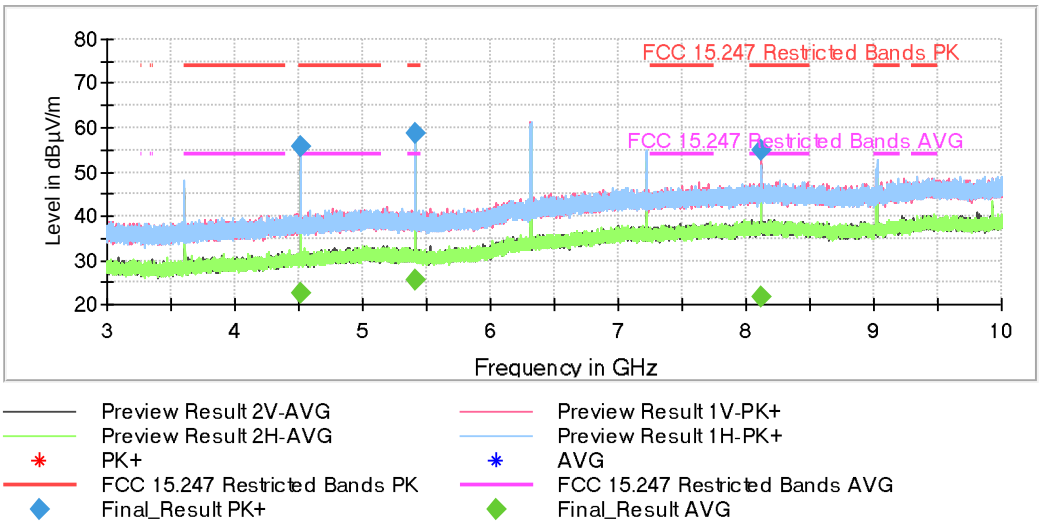


Operation Band MHz = [902, 928] Equipment Type = Digital Transmission System (DTS)

Frequency MHz = 902.30000 Modulation = GFSK

Frequency Range GHz = [3, 10]

Images:

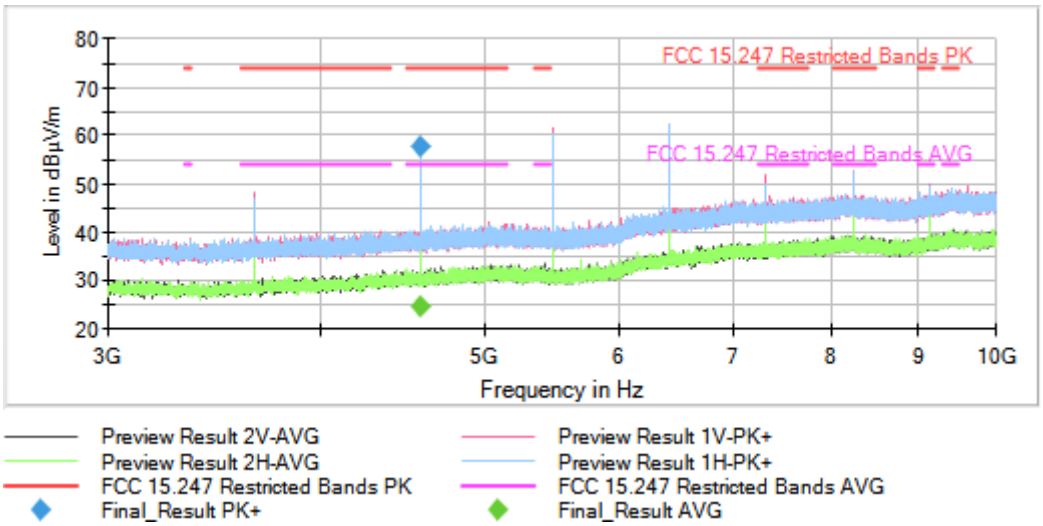


Operation Band MHz = [902, 928] Equipment Type = Digital Transmission System (DTS)

Frequency MHz = 915.65000 Modulation = GFSK

Frequency Range GHz = [3, 10]

Images:



Operation Band MHz = [902, 928] Equipment Type = Digital Transmission System (DTS)

Frequency MHz = 927.70000 Modulation = LoRa

Frequency Range GHz = [3, 10]

Images: