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DEKRA

ENAC ENSAYOS Nº 51/LE147

FCC LISTED,
REGISTRATION NUMBER:
720267

ISED LISTED
REGISTRATION NUMBER
ISED 4621A-3

Test report No:
NIE: 55746RRF.001

Test report

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

Radio Frequency Devices. Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, 5725 - 5875 MHz, and 24.0 – 24.25 GHz.

Identification of item tested	Transceiver
Trademark	JCM
Model and /or type reference	RBAND-PROX T
Other identification of the product	FCC ID: U5Z-RBPROX-T IC: 8572A-RBPROX-T
Features	Power supply: 3,6Vdc (2x3,6Vdc ER14505 AA) Frequency: Multifrequency system 916MHz auto-adjustable Operating consumption: 12mA Radiated power < 25mW Range (in open field): 50m Battery life (approximately): 2 years
Applicant	JCM TECHNOLOGIES, S.A. C/Morgades, 46 Bajos, 08500, Vic, Barcelona (SPAIN)
Test method requested, standard	USA FCC Part 15.249 10-1-17 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 10-1-17 Edition: Radiated emission limits; general requirements. CANADA RSS-210 Issue 9 (August 2016). CANADA RSS-Gen Issue 4 (November 2014). ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	A. Llamas RF Lab. Manager Firmado digitalmente por ALEJANDRO LLAMAS RODRIGUEZ Fecha: 2018.09.19 12:32:26 +02'00'

Date of issue	2018-09-19
Report template No	FDT08_21

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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 laboratory with a measurement facility in compliance with the requirements of Section 2.948 of the FCC rules and has been added to the list of facilities whose measurements data will be accepted in conjuction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Registration Number: 720267.

DEKRA Testing and Certification is a laboratory with a measurement site in compliance with the requirements of RSS 212, Issue 1 (Provisional) and has been added to the list of filed sites of the Canadian Certification and Engineering Bureau. Reference File Number: ISED 4621A-3.

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.
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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 and the Accreditation Bodies.

Uncertainty

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

Usage of samples

Samples undergoing 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
55746/001	Transceiver	RBAND-PROX T	---	2018-06-01

1. Sample S/01 has undergone the following test(s):

All radiated tests indicated in Appendix A.

Sample S/02 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
55746/002	Transceiver with antenna connector	RBAND-PROX T	---	2018-06-01

1. Sample S/02 has undergone the following test(s):

All conducted tests indicated in Appendix A.

Test sample description

Description of product.....:	916MHz multifrequency transceiver for safety edge connection		
Rated power supply.....:	Voltage and Frequency		
	☐	AC:	
	☒	DC: 3.6 Vdc.	
Software version.....:	CAPTME2_UL_02.07.27.00		
Hardware version.....:	S-RBAND-PROX-T		
Mounting position.....:	☐	Table top equipment	
	☐	Wall/Ceiling mounted equipment	
	☐	Floor standing equipment	
	☐	Hand-held equipment	
	☒	Other: Door installation	
Accessories (not part of the test item).....:	Description	Type	Manufacturer

Identification of the client

JCM TECHNOLOGIES, S.A.
C/Morgades, 46 Bajos, 08500, Vic, Barcelona (SPAIN).

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2018-06-04
Date (finish)	2018-06-11

Document history

Report number	Date	Description
55746RRF.001	2018-09-19	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 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 1 Ω

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 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 1 Ω
Normal site attenuation (NSA)	< ±4 dB at 10 m distance between item under test and receiver antenna, (30 MHz to 1000 MHz)
Field homogeneity	More than 75% of illuminated surface is between 0 and 6 dB (26 MHz to 1000 MHz).

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. = 35 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 1 Ω

Remarks and comments

The tests have been performed by the technical personnel: Carlos Alberto Contreras.

Used instrumentation:

Conducted Measurements

		Last Cal. date	Cal. due date
1.	Spectrum analyser Agilent E4440A	2017/10	2018/10

Radiated Measurements

		Last Cal. date	Cal. due date
1.	Semianechoic Absorber Lined Chamber FRANKONIA SAC-3	N.A.	N.A.
2.	BiconicalLog antenna ETS LINDGREN 3142E	2017/09	2020/09
3.	Position Controller FRANKONIA FC-06	N.A.	N.A.
4.	Double-ridge Guide Horn antenna 1-18 GHz SCHWARZBECK BBHA 9120 D	2016/11	2019/11
5.	Spectrum analyser Rohde & Schwarz FSV40	2017/07	2019/07
6.	EMI Test Receiver R&S ESR7	2016/07	2018/07
7.	RF pre-amplifier 30 MHz-6 GHz Bonn Elektronik BLNA 0360-01N	2018/07	2019/07
8.	RF pre-amplifier 1-18 GHz Bonn Elektronik BLMA 0118-1M	2018/03	2019/03

Testing verdicts

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

Summary

FCC PART 15 / RSS-210 PARAGRAPH Requirement – Test case		Verdict	Remark
FCC 15.249 Subclause (a) / RSS-210 B.10. (a)	Field strength of fundamental and harmonics emissions	P	
FCC 15.249 Subclause (d) / RSS-210 B.10. (b)	Emissions radiated outside of the specific frequency bands	P	
Supplementary information and remarks: None.			

Appendix A: Test results

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TEST CONDITIONS

Power supply (V):

Vnominal = 3.6 Vdc

Type of power supply = DC voltage from internal battery.

Type of antenna = Pluggable antenna.

Declared Gain for antenna = 0 dBi

TEST FREQUENCIES:

Lowest channel: 902.30 MHz

Middle channel: 915.65 MHz

Highest channel: 927.70 MHz

CONDUCTED MEASUREMENTS

The equipment under test was set up inside a climatic chamber and it is connected to the spectrum analyzer using low loss RF cable.

The measurements are corrected taking into account the cable loss.

RADIATED MEASUREMENTS

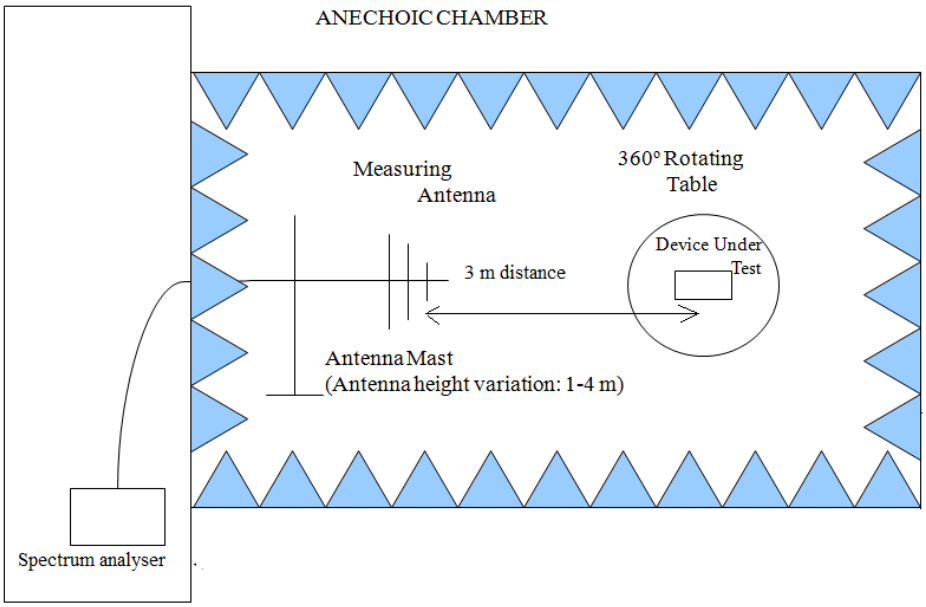
All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m for the frequency range 30 MHz-1000 MHz (30 MHz-1000 MHz Bilog antenna) and at a distance of 1m for the frequency range 1 GHz-10 GHz (1 GHz-18 GHz Double ridge horn antenna).

For radiated emissions in the range 1 GHz-10 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.

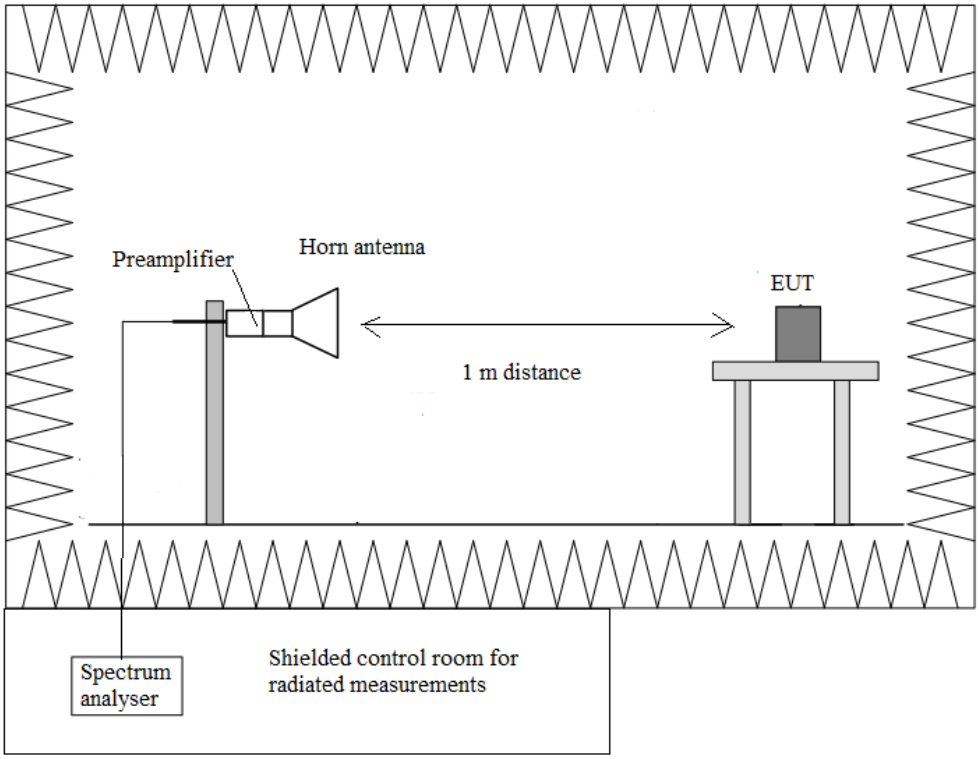
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

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

Radiated measurements setup f < 1 GHz



Radiated measurements setup f > 1 GHz



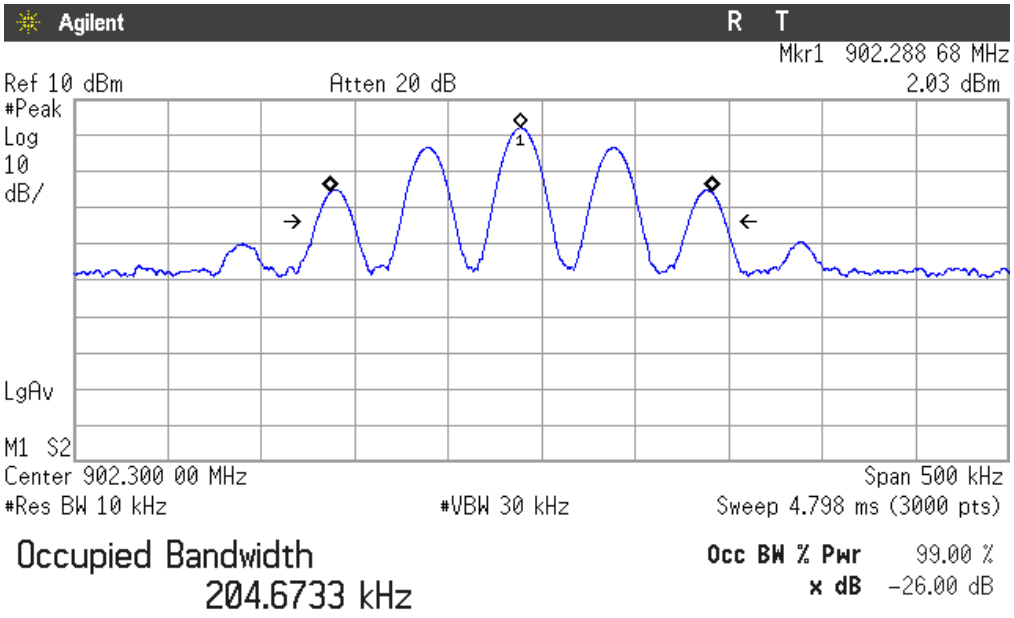
Occupied Bandwidth

RESULTS

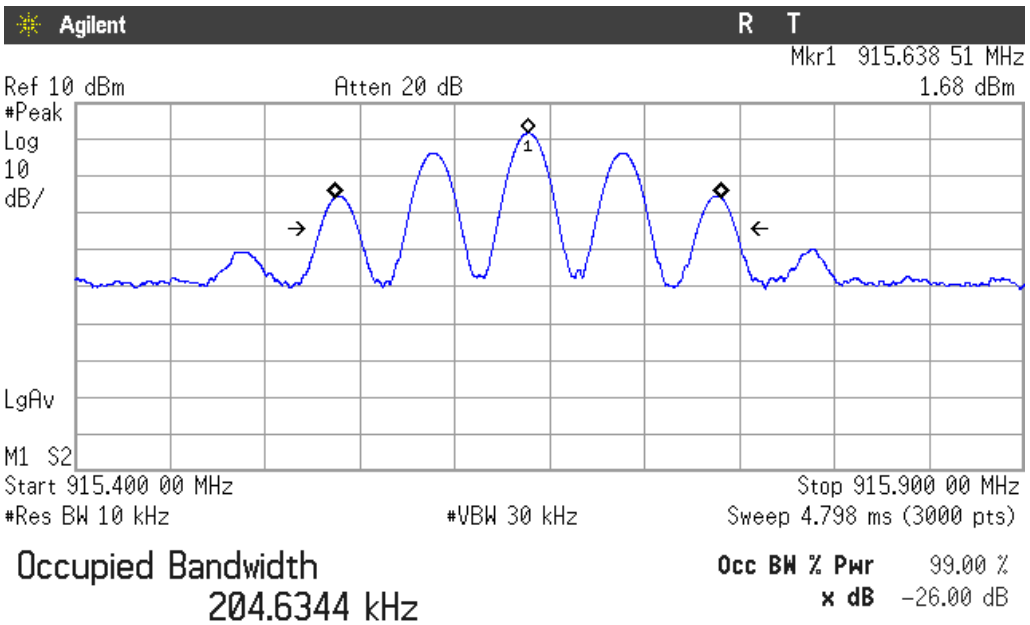
(see next plots).

	Lowest frequency 902.30 MHz	Middle frequency 915.65 MHz	Highest frequency 927.70 MHz
99% bandwidth (kHz)	204.673	204.634	204.948
-26 dBc bandwidth (kHz)	220.138	220.132	220.225
Measurement uncertainty (kHz)	<±0.83		

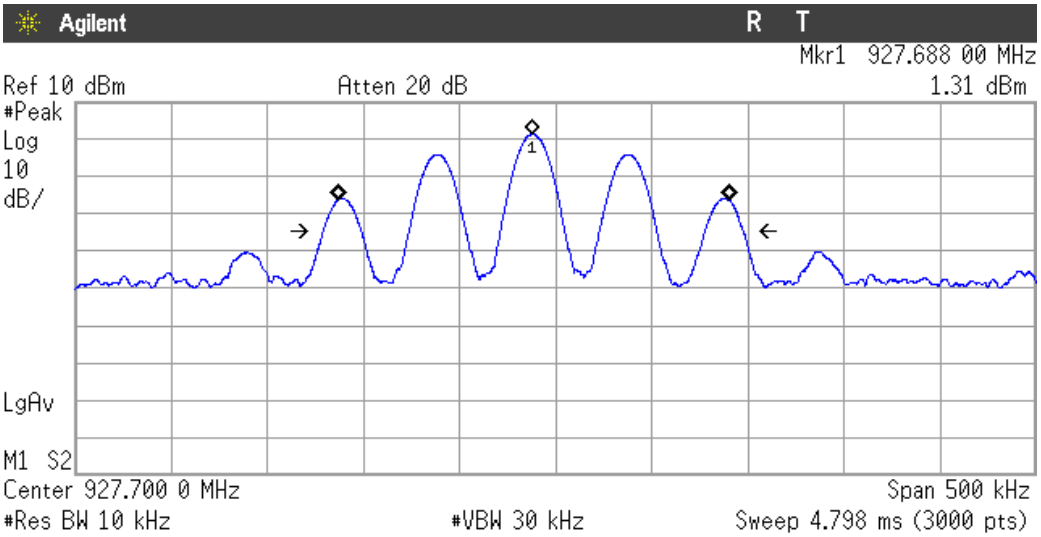
Lowest Channel



Middle Channel



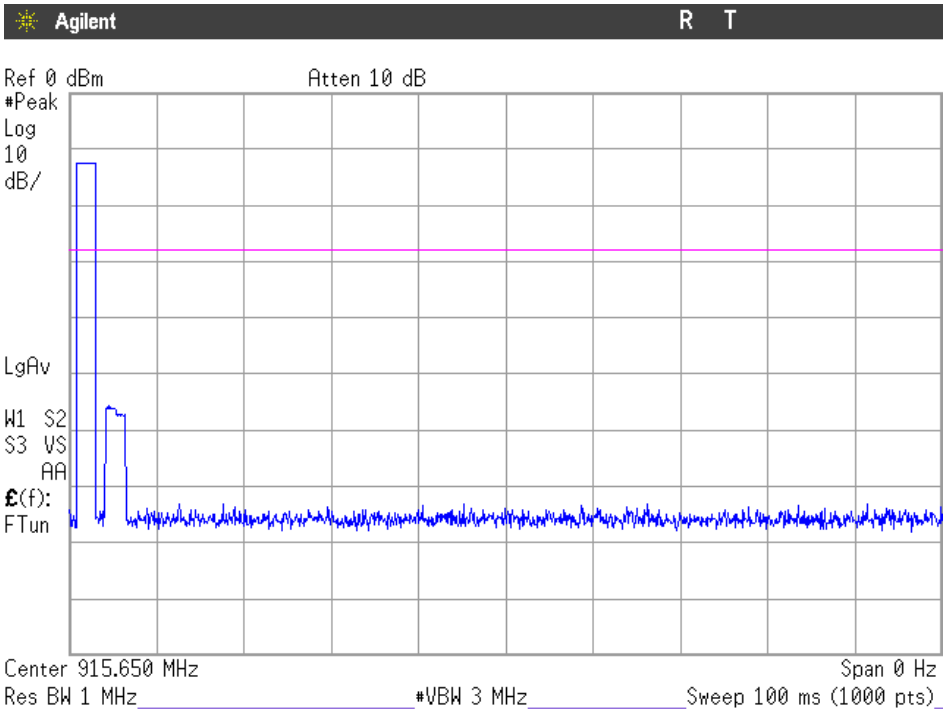
Highest channel



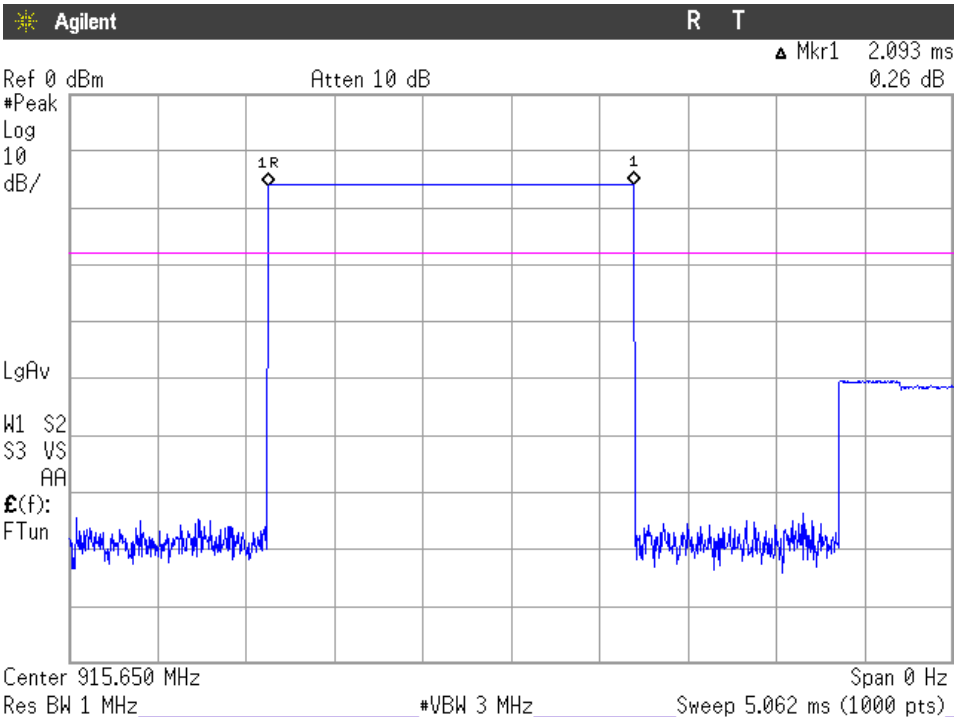
Duty cycle

Computation of duty-cycle correction factor

Number of pulses within 100 ms: 1



Pulse duration: 2.093 ms.



Duty-cycle correction factor calculation.

Sub-pulse	Duration (ms)	Number of pulses	Sub-pulse "On Time" (ms)
1	2.093	1	2.093
		TOTAL ON TIME	2.093

Duty cycle correction factor δ = 2.093/ 100 = 0.02093

δ = 20 log (0.02093) = -33.58 dB

Section 15.249 Subclause (a) / RSS-210 B.10. (a) Field strength of Fundamental.

SPECIFICATION

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.

RESULTS

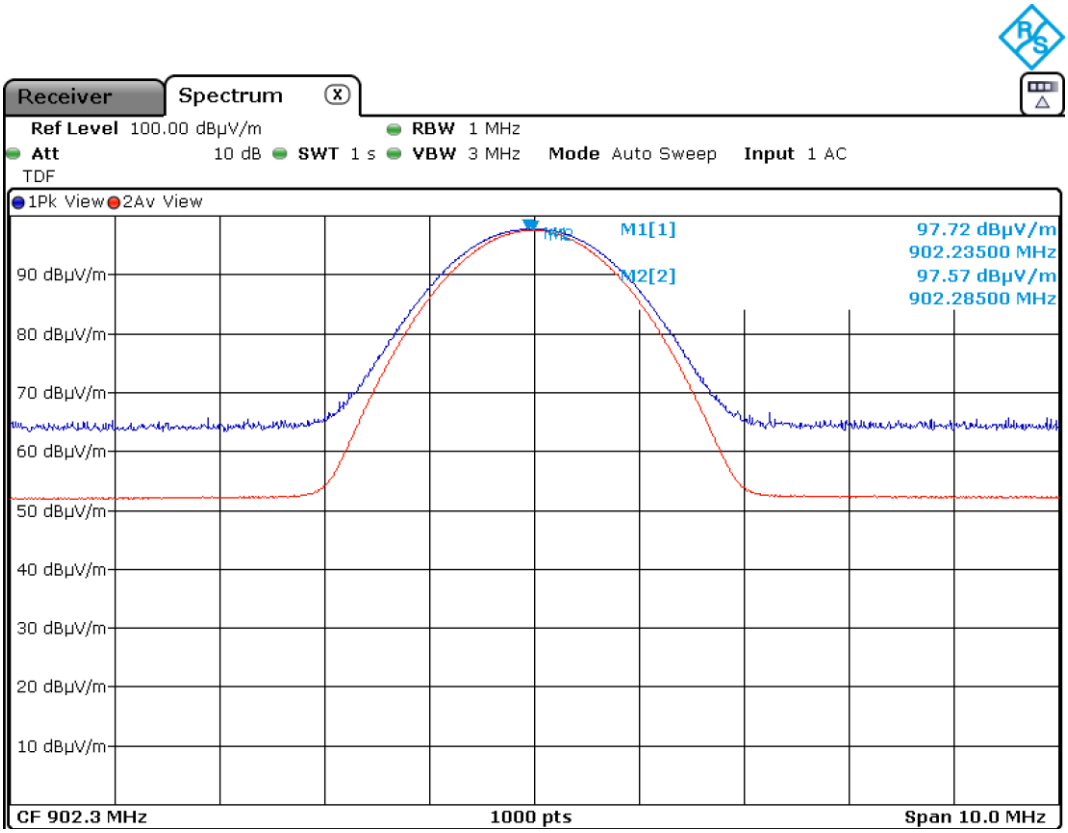
The transmission is pulsed so the average values of transmitter fundamental emissions are calculated from the measured peak values using the duty cycle correction factor δ as indicated in standard ANSI C63.10-2013.

	Lowest frequency 902.30 MHz	Middle frequency 915.65 MHz	Highest frequency 927.70 MHz
Field strength (dBµV/m) peak	97.72	97.70	96.63
Duty cycle correction factor δ	-33.58	-33.58	-33.58
Field strength (dBµV/m) average	64.14	64.12	63.05
Measurement uncertainty (dB)	<±3.88		

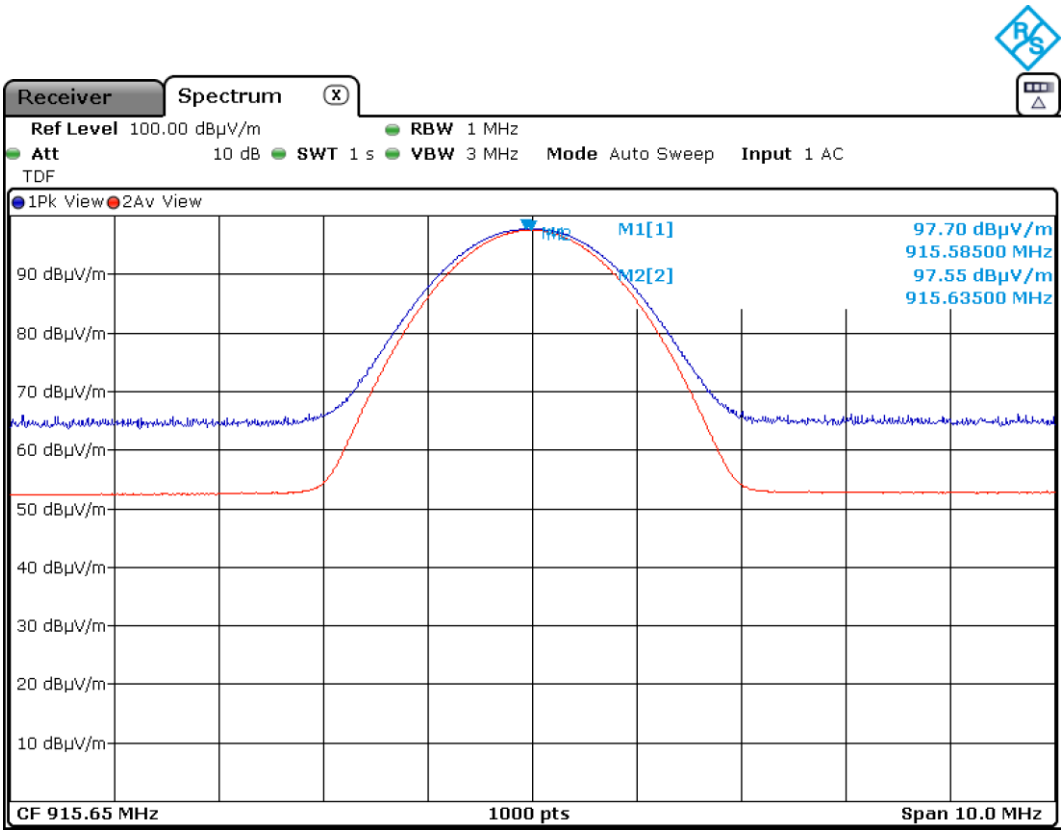
Verdict: PASS

FIELD STRENGTH

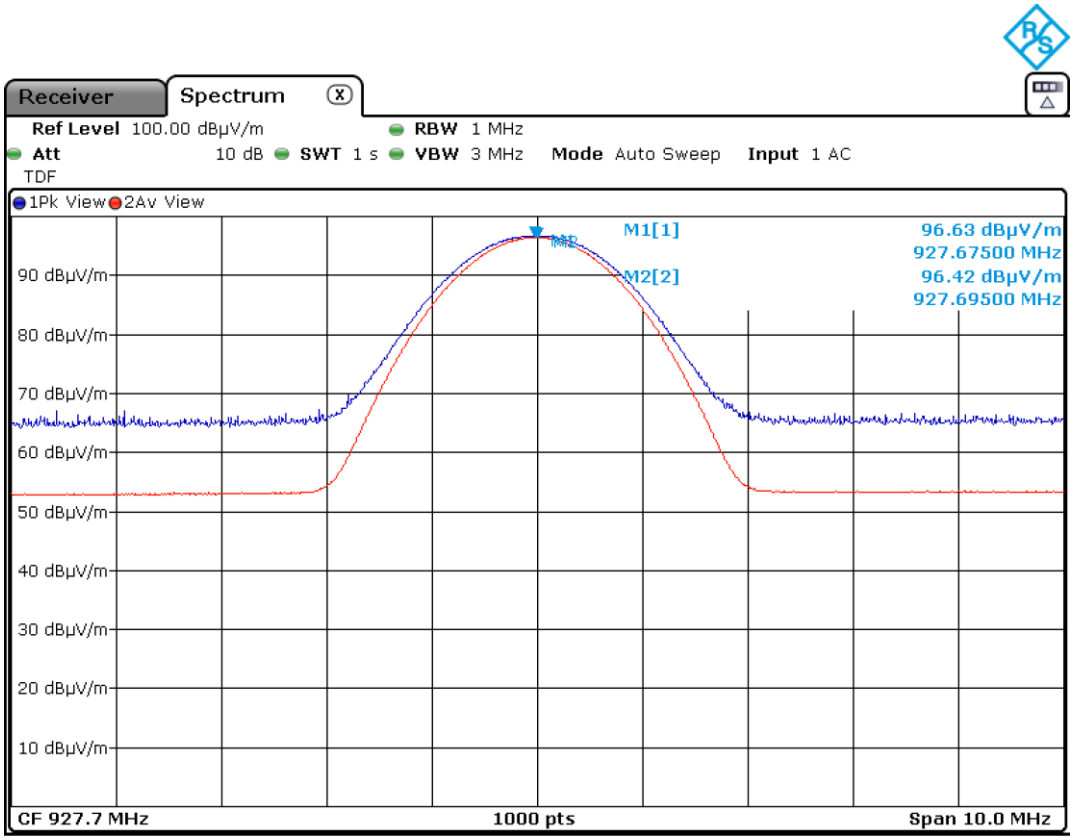
Lowest Channel



Middle Channel



Highest Channel



Section 15.249 Subclause (a) and (d) / RSS-210 B.10 (b) Emissions limitations radiated (Transmitter).

SPECIFICATION

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.

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-1000 MHz and at distance of 1m for the frequency range 1 GHz-10 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.

The transmission is pulsed so the average values of spurious emissions are calculated from the measured peak values using the duty cycle correction factor δ as indicated in standard ANSI C63.10-2013.

Frequency range 30 MHz-1000 MHz.

All detected signals are more than 20 dB below the limit for the three channels.

Frequency range 1 GHz-10 GHz

All detected signals are harmonics of the fundamental emission.

1. CHANNEL: LOWEST (902.30 MHz).

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
5.41345	H	Peak	62.83	<±4.87
		Average (*)	29.25	<±4.87
6,31615	H	Peak	55.39	<±4.87
		Average (*)	21.81	<±4.87
7.21855	V	Peak	53.13	<±4.87

(*): The average values are calculated from the measured peak values using the duty cycle correction factor δ.
All other peaks are more than 20 dB below the limit.

2. CHANNEL: MIDDLE (915.65 MHz).

Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
5.49355	H	Peak	62.32	<±4.87
		Average (*)	28.74	<±4.87
7.32535	V	Peak	54.18	<±4.87
		Average (*)	20.60	<±4.87

(*): The average values are calculated from the measured peak values using the duty cycle correction factor δ.
All other peaks are more than 20 dB below the limit.

3. CHANNEL: HIGHEST (927.70 MHz).

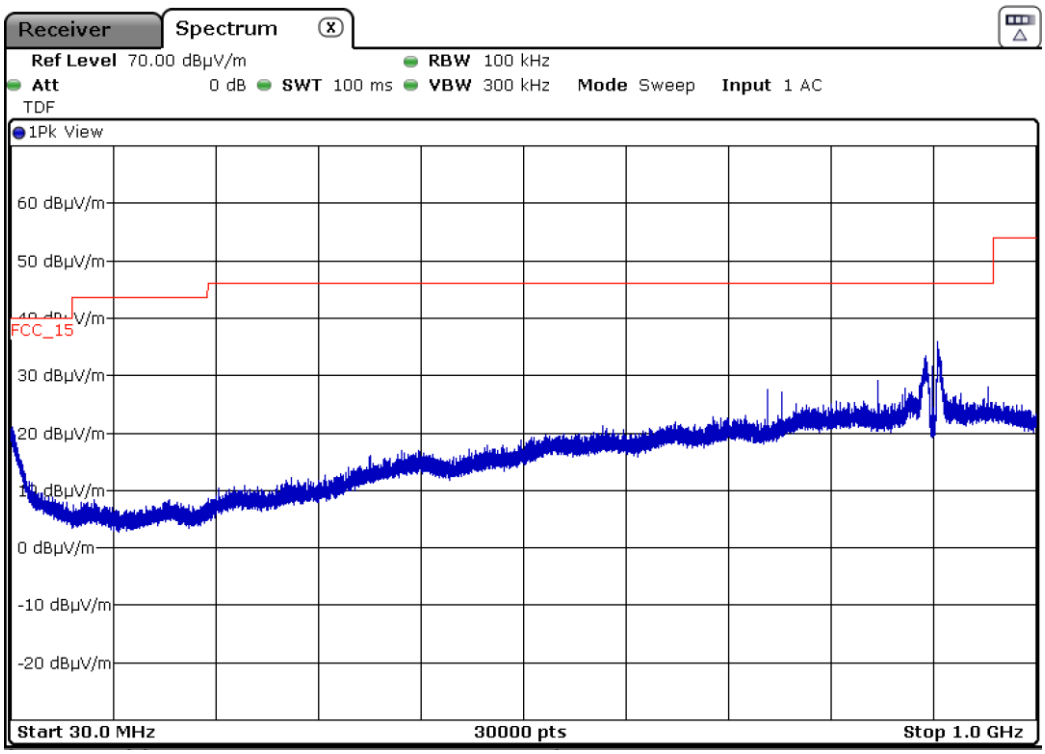
Spurious frequency (GHz)	Polarization	Detector	Emission Level (dBµV/m)	Measurement Uncertainty (dB)
5.56585	H	Peak	60.19	<±4.87
		Average (*)	26.61	<±4.87

(*): The average values are calculated from the measured peak values using the duty cycle correction factor δ.
All other peaks are more than 20 dB below the limit.

Verdict: PASS

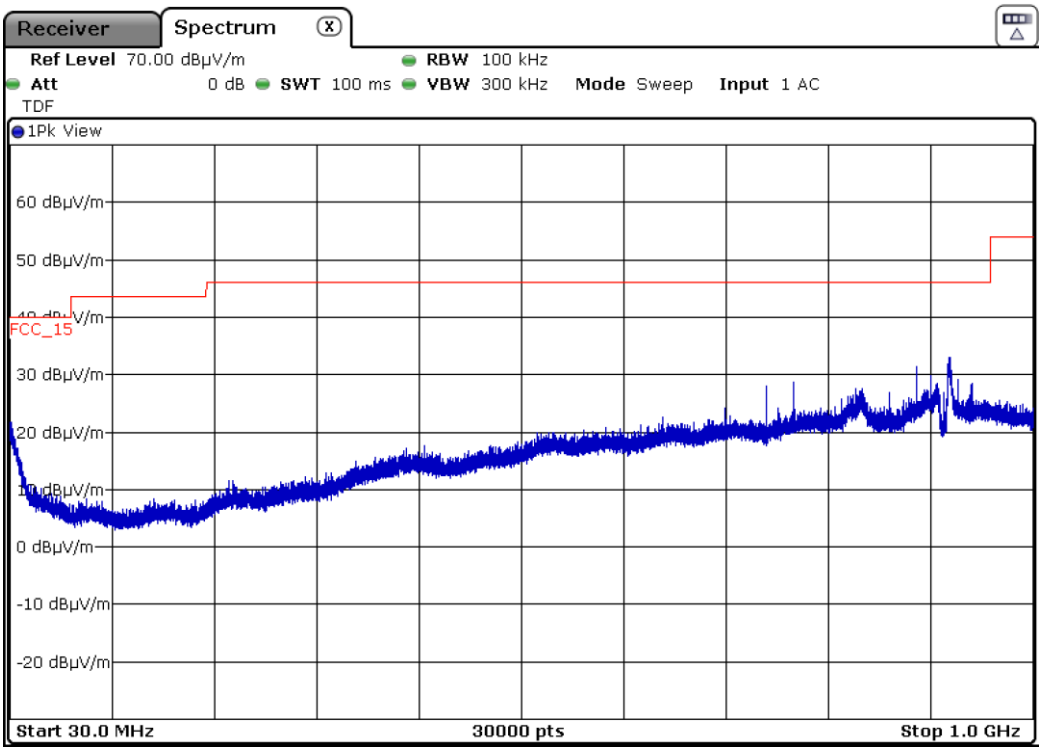
FREQUENCY RANGE 30 MHz-1000 MHz.

CHANNEL: Lowest (902.30 MHz).



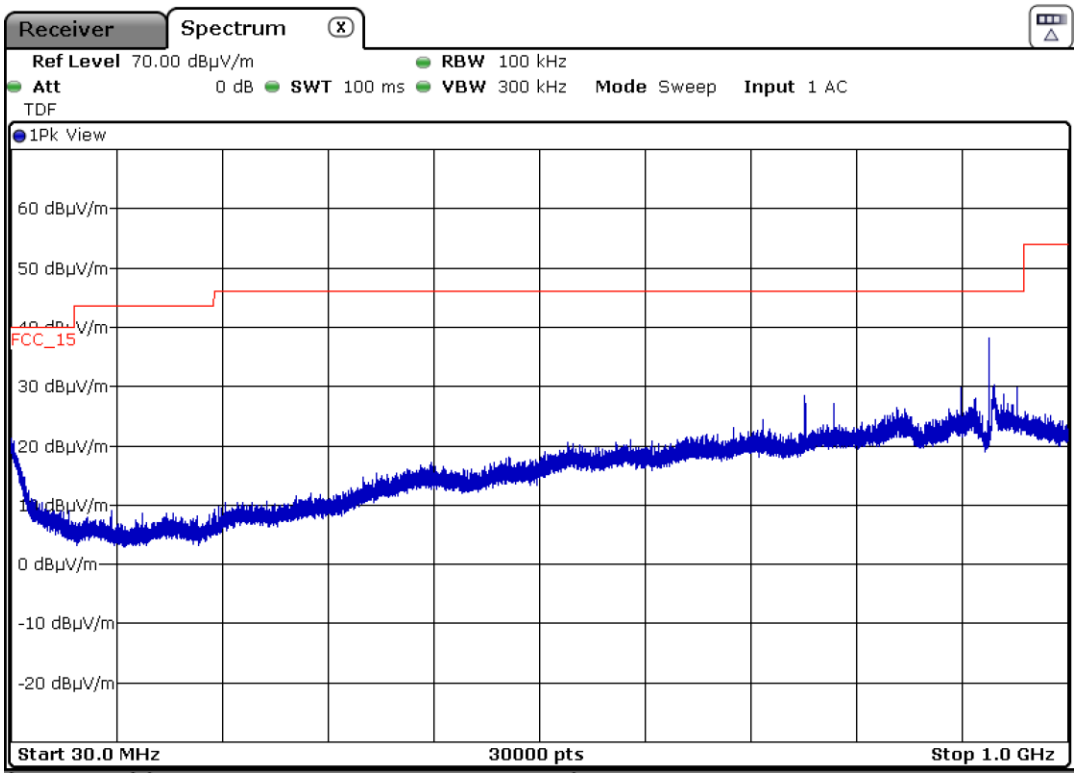
Note: The carrier was attenuated using a notch filter.

CHANNEL: Middle (915.65 MHz).



Note: The carrier was attenuated using a notch filter.

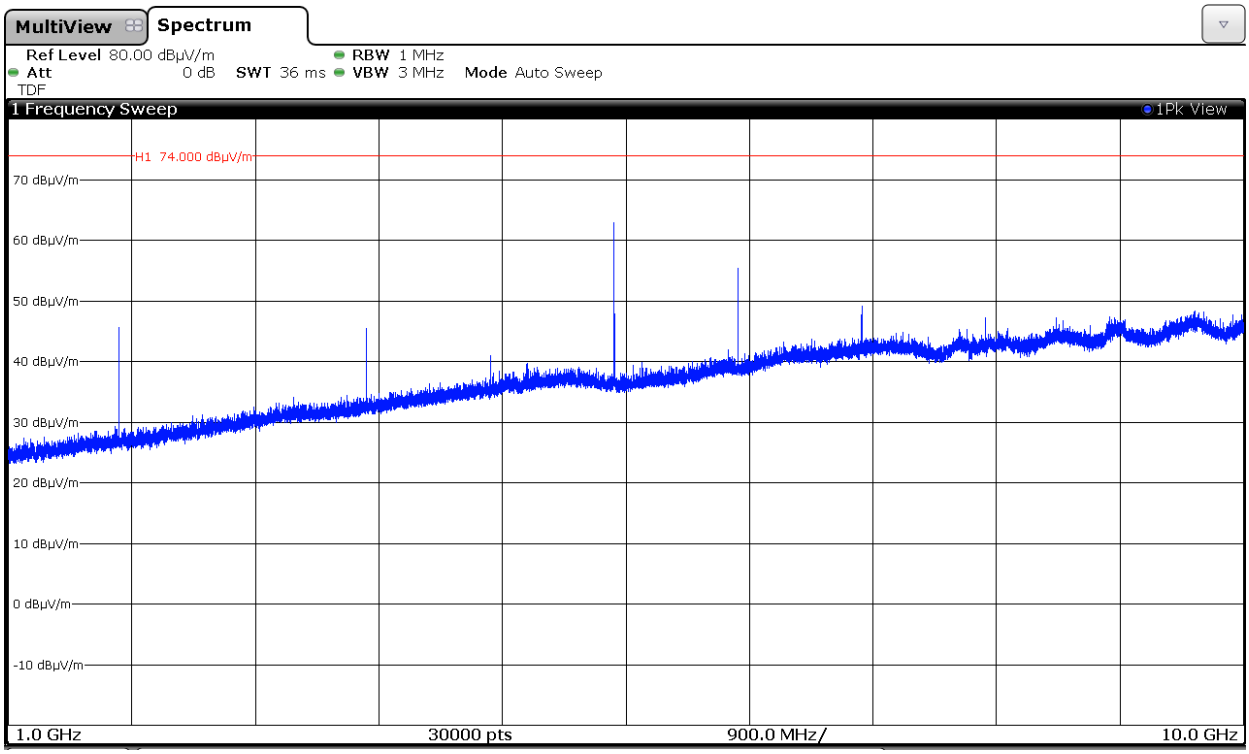
CHANNEL: Highest (927.70 MHz).



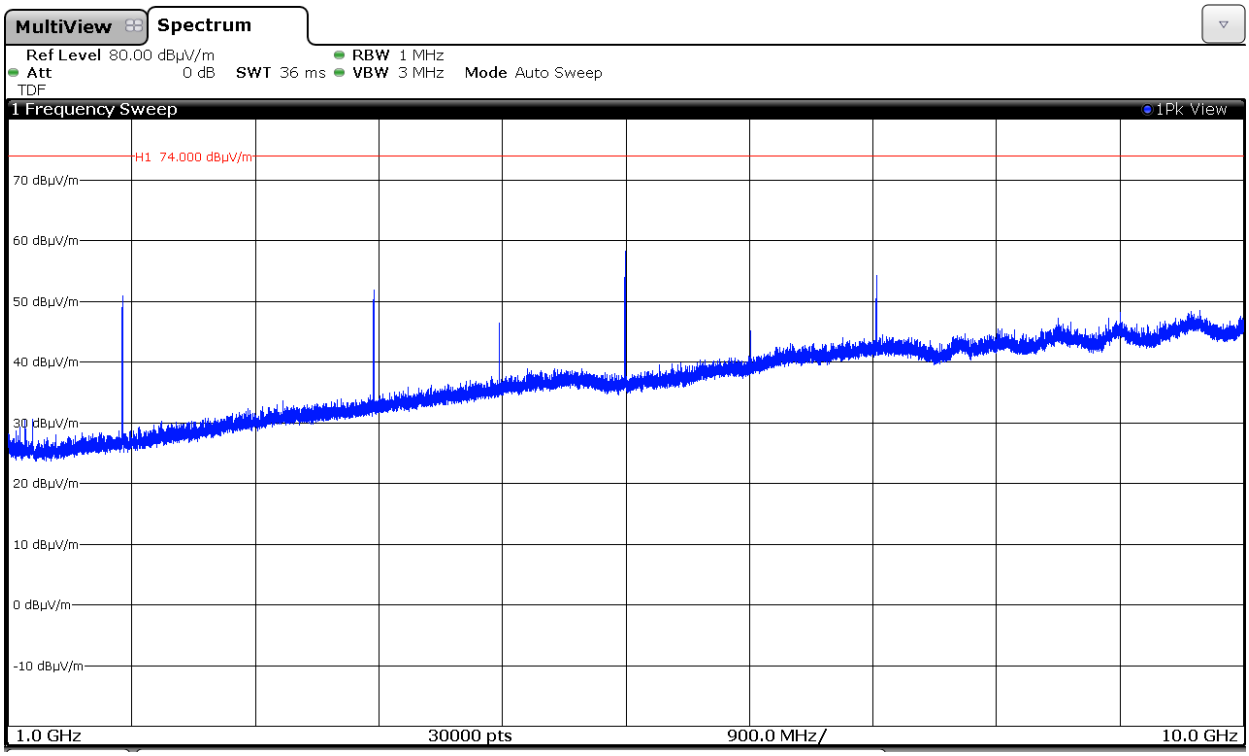
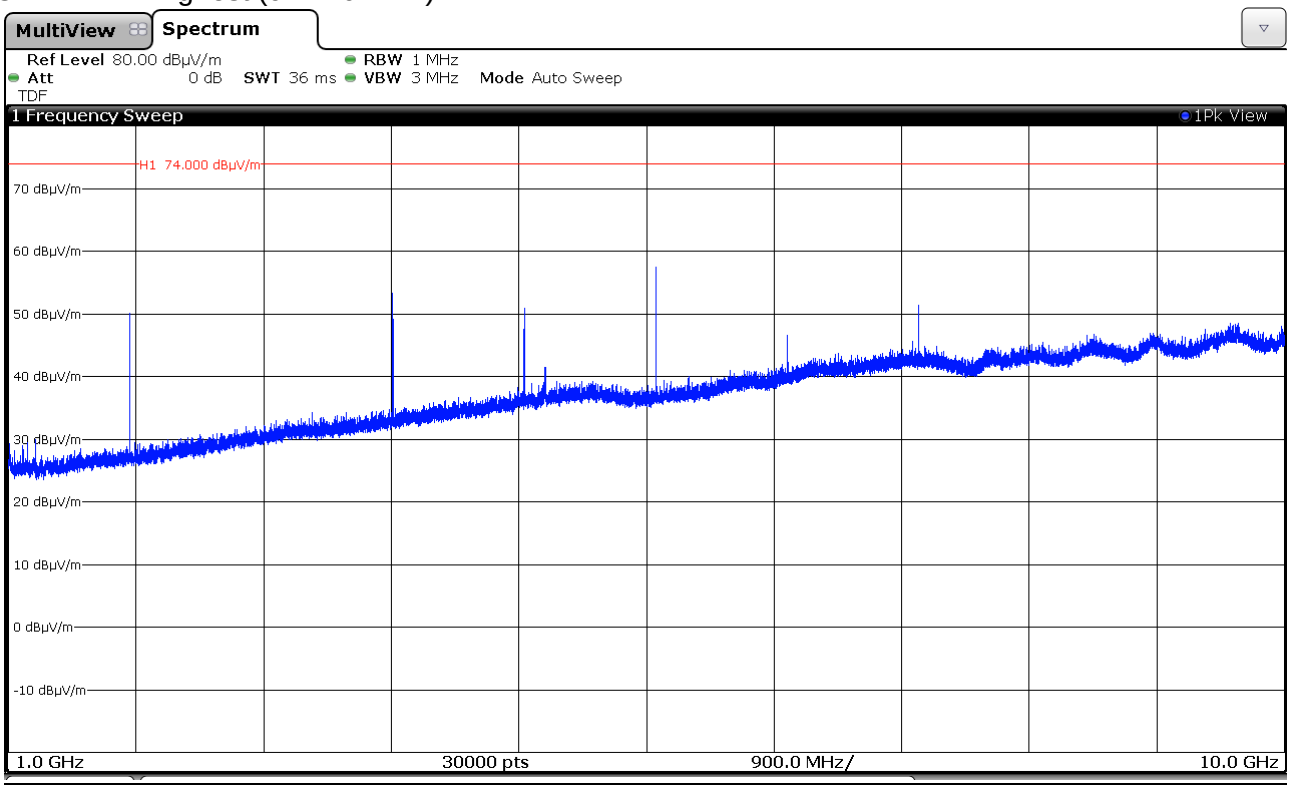
Note: The carrier was attenuated using a notch filter.

FREQUENCY RANGE 1 GHz to 10 GHz.

CHANNEL: Lowest (902.30 MHz).



CHANNEL: Middle (915.65 MHz).



CHANNEL: Highest (927.70 MHz).