

RR051-19-105023-1-A Ed. 0

**Certification Radio test report**

**According to the standard:  
CFR 47 FCC PART 15**

**Equipment under test:  
Wirnet iStation 915**

**FCC ID: 2AFYS-KLKWIS915**

**Company:  
KERLINK**

**Distribution:** Mr LOUVEAU

**(Company:** KERLINK)

**Number of pages:** 67 with 5 annexes

Ed.	Date	Modified Page(s)	Technical Verification and Quality Approval	
			Name and Function	Visa
0	24-Jan-20	Creation	T. LEDRESSEUR, Radio Technician	

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**DESIGNATION OF PRODUCT:** Wirnet iStation 915

**Serial number (S/N):** 1980018353

**Reference / model (P/N):** Wirnet iStation 915

**Software version:** V4.2.1  
Test software: libloragw-utils\_5.0.1-klk10

**MANUFACTURER:** KERLINK

**COMPANY SUBMITTING THE PRODUCT:**

**Company:** KERLINK

**Address:** 1 Rue Jacqueline Auriol  
35235 THORIGNE-FOUILLARD  
FRANCE

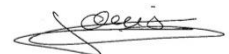
**Responsible:** Mr LOUVEAU

**DATES OF TEST:** From 15-Jan-20 to 24-Jan-20

**TESTING LOCATION:** EMITECH ANGERS laboratory at JUIGNE SUR LOIRE (49) FRANCE  
FCC Accredited under US-EU MRA Designation Number: FR0009  
Test Firm Registration Number: 873677

**TESTED BY:** S. LOUIS

**VISA:**



**WRITTEN BY:** S. LOUIS

## CONTENTS

<i>TITLE</i>	<i>PAGE</i>
<b>1. INTRODUCTION.....</b>	<b>4</b>
<b>2. PRODUCT DESCRIPTION.....</b>	<b>4</b>
<b>3. NORMATIVE REFERENCE.....</b>	<b>5</b>
<b>4. TEST METHODOLOGY.....</b>	<b>5</b>
<b>5. TEST EQUIPMENT CALIBRATION DATES.....</b>	<b>6</b>
<b>6. TESTS RESULTS SUMMARY.....</b>	<b>7</b>
<b>7. MEASUREMENT UNCERTAINTY.....</b>	<b>8</b>
<b>8. CONDUCTED LIMITS.....</b>	<b>9</b>
<b>9. ADDITIONAL PROVISIONS TO THE GENERAL RADIATED EMISSION LIMITATIONS.....</b>	<b>22</b>
<b>10. MAXIMUM CONDUCTED (AVERAGE) OUTPUT POWER.....</b>	<b>24</b>
<b>11. INTENTIONAL RADIATOR.....</b>	<b>27</b>
<b>12. MAXIMUM CONDUCTED POWER DENSITY.....</b>	<b>41</b>
APPENDIX 1: TEST EQUIPMENT LIST.....	44
APPENDIX 2: 6 DB BANDWIDTH.....	46
APPENDIX 3: 99% BANDWIDTH.....	52
APPENDIX 4: BAND EDGE.....	58
APPENDIX 5: SPECTRAL DENSITY.....	62

## 1. INTRODUCTION

This report presents the results of radio test carried out on the following radio equipment: Wirnet iStation 915, in accordance with normative reference.

The device under test integrates the followings radio function:

- GPS receiver
- 3G/LTE module already certified (FCC ID: XMR201903EG25G)
- LoRa function

This radio test report concerns only the measure realized on the emission of the LoRa transmitter.

## 2. PRODUCT DESCRIPTION

Frequency band used 902MHz to 928 MHz

### Frequencies plan detailed (LoRaWAN standard)

#### Transmitter

Channel frequencies	LoRa bandwidth (kHz)	Number of channel	Channel width (kHz)	SPREAD FACTOR
923,3+i*0.6MHz (i=0 à 7)	500	8	600	7 to 12

#### Receiver

Channel frequencies	LoRa bandwidth (kHz)	Number of channel	Channel width (kHz)	SPREAD FACTOR
902,3+i*0,2MHz (i= 0 à 63)	125	64	200	7 to 10
903,0+i*1.6MHz (i=0 à 7)	500	8	600	7 to 12

Class:	B
Utilization:	Residential use
Antenna type and gain:	Internal antenna: 2.6 dBi External antennas: 3 dBi or 6dBi
Power source:	AC/DC PoE

Power level, frequency range and channels characteristics are not user adjustable.  
The details pictures of the product and the circuit boards are joined with this file.

### 3. **NORMATIVE REFERENCE**

The standards and testing methods related throughout this report are those listed below.

They are applied on the whole test report even though the extensions (version, date and amendment) are not repeated.

CFR 47 FCC Part 15 (2020)      Radio Frequency Devices

ANSI C63.10                      2013  
Procedures for Compliance Testing of Unlicensed Wireless Devices.

558074 D01 DTS v05 r02      Guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices operating under section 15.247 of the FCC rules.

447498 D01 General RF      RF Exposure procedures and equipment authorization policies for mobile and  
Exposure Guidance v06      portable equipment

### 4. **TEST METHODOLOGY**

Radio performance tests procedures given in CFR 47 part 15:

Subpart C – Intentional Radiators

Paragraph 203: Antenna requirement

Paragraph 205: Restricted bands of operation

Paragraph 207: Conducted limits

Paragraph 209: Radiated emission limits; general requirements

Paragraph 212: Modular transmitter

Paragraph 215: Additional provisions to the general radiated emission limitations

Paragraph 247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz

**5. TEST EQUIPMENT CALIBRATION DATES**

Emitech Number	Model	Type	Last calibration	Calibration interval (years)	Next calibration due
0	BAT-EMC V3.17.0.25	Software	/	/	/
4088	R&S FSP40	Spectrum Analyzer	21/02/2018	2	21/02/2020
4393	Wainwright WLJS800-C11/60EE	Low Pass Filter	30/03/2018	2	29/03/2020
5275	R&S ESPC	Test receiver	10/01/2019	2	09/01/2021
6884	Suhner 1.5m	Cable	30/03/2018	2	29/03/2020
7011	California instruments 1251RP	Power source	23/01/2019	1	23/01/2020
7310	Filtek HP12/1200-5AA	High-pass filter	30/03/2018	2	29/03/2020
8508	California instruments 1251RP	Power source	23/01/2019	1	23/01/2020
8511	HP 8447D	Low-noise amplifier	15/03/2019	1	14/03/2020
8526	Schwarzbeck VHBB 9124	Biconical antenna	17/08/2018	3	16/08/2021
8535	EMCO 3115	Antenna	10/02/2017	3	10/02/2020
8543	Schwarzbeck UHALP 9108A	Log periodic antenna	17/08/2018	3	16/08/2021
8552	Aéroflex 30dB 25W	Attenuator	04/09/2019	2	03/09/2021
8590	RG214 N-5m	Cable	30/03/2018	2	29/03/2020
8593	SIDT Cage 2	Anechoic chamber	/	/	/
8635	R&S EZ-25	High-pass filter	02/08/2018	2	01/08/2020
8719	Thurbly Thandar Instruments 1600	LISN	14/02/2018	2	14/02/2020
8750	La Crosse Technology WS-9232	Meteo station	25/09/2018	2	24/09/2020
8896	ACQUISYS GPS8	Satellite synchronized frequency standard	/	/	/
8972	K&L Microwave 500-1000MHz	Notch filter	/	/	/
9489	Absorber sheath current	Emitech	31/03/2018	2	30/03/2020
10788	Emitech	Outside room Hors cage	/	/	/
11592	R&S NRV-Z86	Power Sensor	27/08/2019	1	26/08/2020
12911	Huber + Suhner N-2m	cable	30/03/2018	2	29/03/2020
14736	MATURO	Turntable and mat controller MCU	/	/	/
14831	Fluke 177	Multimeter	12/02/2018	2	12/02/2020
14903	Fluke 177	Multimeter	28/02/2018	2	28/02/2020
15812	COMP-POWER PAM-118A	Low-noise amplifier 18GHz	04/09/2019	1	03/09/2020
15882	SUCOFLEX	cable N 5m	28/11/2018	2	27/11/2020

**6. TESTS RESULTS SUMMARY**

Test procedure	Description of test	Respected criteria?				Comment
		Yes	No	NAp	NAs	
FCC Part 15.203	ANTENNA REQUIREMENT	X				Note 1
FCC Part 15.205	RESTRICTED BANDS OF OPERATION	X				
FCC Part 15.207	CONDUCTED LIMITS	X				
FCC Part 15.209	RADIATED EMISSION LIMITS; general requirements	X				Note 2
FCC Part 15.212	MODULAR TRANSMITTERS	X				Note 3
FCC part 15.215	ADDITIONAL PROVISIONS TO THE GENERAL RADIATED EMISSION LIMITATIONS					
	(a) Alternative to general radiated emission limits	X				
	(b) Unwanted emissions outside of §15.247 frequency bands	X				Note 4
	(c) 20 dB bandwidth and band-edge compliance	X				
FCC Part 15.247	OPERATION WITHIN THE BANDS 902-928 MHZ, 2400-2483.5 MHZ and 5725-5850 MHz					
	(a) (1) Hopping systems			X		
	(a) (2) Digital modulation techniques	X				Note 5
	(b) Maximum peak output power	X				
	(c) Operation with directional antenna gains > 6 dBi			X		
	(d) Intentional radiator	X				
	(e) Peak power spectral density	X				
	(f) Hybrid system			X		
	(g) Frequency hopping requirements			X		
	(h) Frequency hopping intelligence			X		
	(i) RF exposure compliance	X				

NAp: Not Applicable

NAs: Not Asked

Note 1: Professionally installed equipment

Note 2: See FCC part 15.247 (d).

Note 3: See certification document

Note 4: See FCC part 15.209. Unwanted emissions levels are all below the fundamental emission field strength level.

Note 5: The maximum 6 dB bandwidth of the equipment is 620 kHz (see appendix 2).

**7. MEASUREMENT UNCERTAINTY**

To declare, or not, the compliance with the specifications, it was not explicitly taken into account of uncertainty associated with the result(s)

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k=2$ , which for normal distribution corresponds to a coverage probability of approximately 95%.

<b>Parameter</b>	<b>Emitech Uncertainty</b>
RF power, conducted	$\pm 0.75\text{dB}$
Radiated emission valid to 26 GHz	
F < 62.5 MHz:	$\pm 5.14\text{ dB}$
62.5 MHz < F < 1 GHz:	$\pm 5.13\text{ dB}$
1 GHz < F < 26 GHz:	$\pm 5.16\text{ dB}$
AC Power Lines conducted emissions	$\pm 3.38\text{ dB}$
Temperature	$\pm 1\text{ }^\circ\text{C}$
Humidity	$\pm 5\%$



<b>8. CONDUCTED LIMITS</b>
----------------------------

Temperature (°C) : 22

Humidity (%HR): 30

Date : January 22, 2020

Technician : S. LOUIS

**Standard:** FCC Part 15

**Test procedure:** Paragraph 15.207

**Software used:** BAT-EMC V3.17.0.25

**Test set up:**

The EUT is isolated and placed on a wooden table, 0.8 m over an horizontal reference plane and 0.4 m from a vertical reference plane. It is powered by an artificial main network placed on the ground reference plane. The equipment is powered with the AC power operating voltage of 120 V / 60 Hz.

**Frequency range:** 150 kHz - 30 MHz

**Detection mode:** Peak / Quasi-peak / Average

**Bandwidth:** 10 kHz / 9 kHz

**Equipment under test operating condition:**

The equipment under test is blocked in continuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

The measure is realized with the followings configuration of the product.

<b>Software Power</b>	<b>SPREAD FACTOR</b>	<b>Antenna (dBi)</b>	<b>N° configuration</b>
PA3 MIX 15	7	Internal – 2.6	1
PA3 MIX 15	12	Internal – 2.6	2
PA3 MIX 15	7	External – 3	3
PA3 MIX 15	12	External – 3	4
PA3 MIX 15	7	External – 6	5
PA3 MIX 15	12	External – 6	6

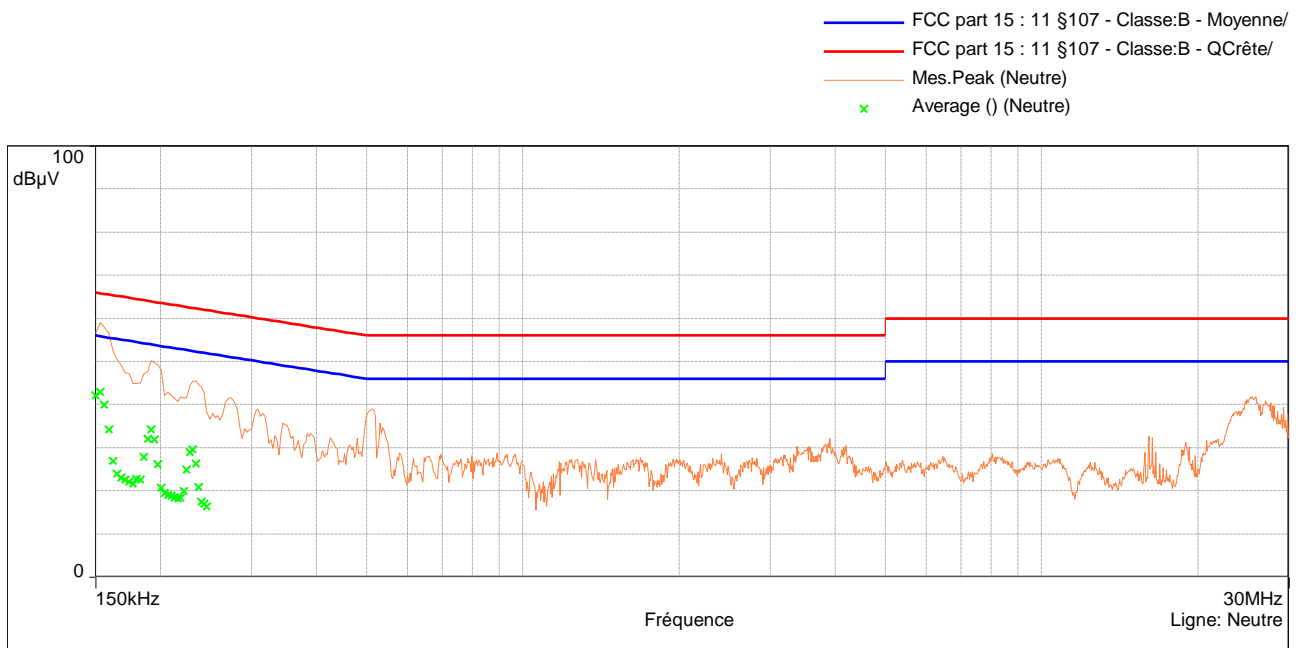
Results:

**Configuration 1**

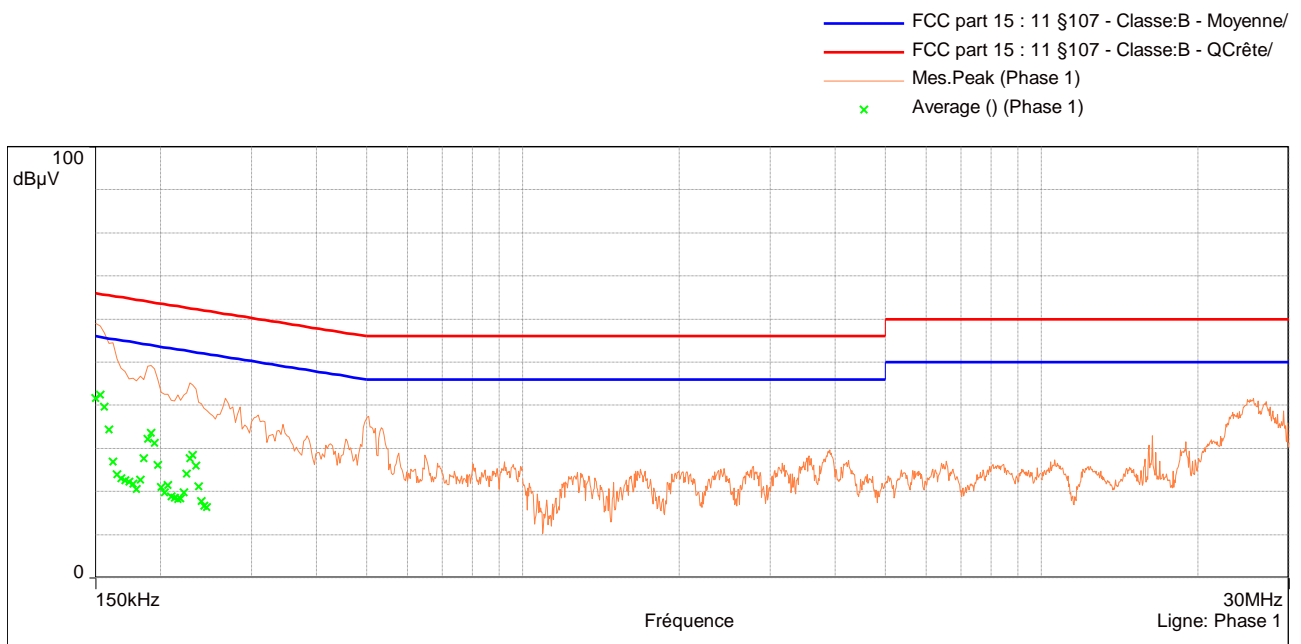
**Measurement on the mains power supply:**

The measurement is first realized with peak detector.

Curve N° 1: measurement on the Neutral with peak detector



Curve N° 2: measurement on the Line with peak detector



The frequencies which are not 6 dB under the Average limit are then analyzed with Quasi-peak detector and Average detector

Table N° 1: measurement on the Neutral, for the frequency range:

Frequency	Quasi-peak	QP Limit	QP margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.150	57.3	66.0	8.70
0.153	58.04	65.8	7.80
0.159	49.35	65.5	16.17
0.192	49.42	63.9	14.53
0.198	41.29	63.7	22.40
0.234	41.45	62.3	20.86

Frequency	Average	Average Limit	Average margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.15	42.07	56.0	13.93
0.153	42.81	55.8	13.03
0.159	34.12	55.5	21.40
0.192	34.19	53.9	19.76
0.198	26.06	53.7	27.63
0.234	26.22	52.3	26.09

Table N° 2: measurement on the Line, for the frequency range:

Frequency	Quasi-peak	QP Limit	QP margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.150	56.84	66.0	9.16
0.153	57.67	65.8	8.17
0.159	49.6	65.5	15.92
0.192	48.8	63.9	15.15
0.198	41.29	63.7	22.40
0.234	41.19	62.3	21.12

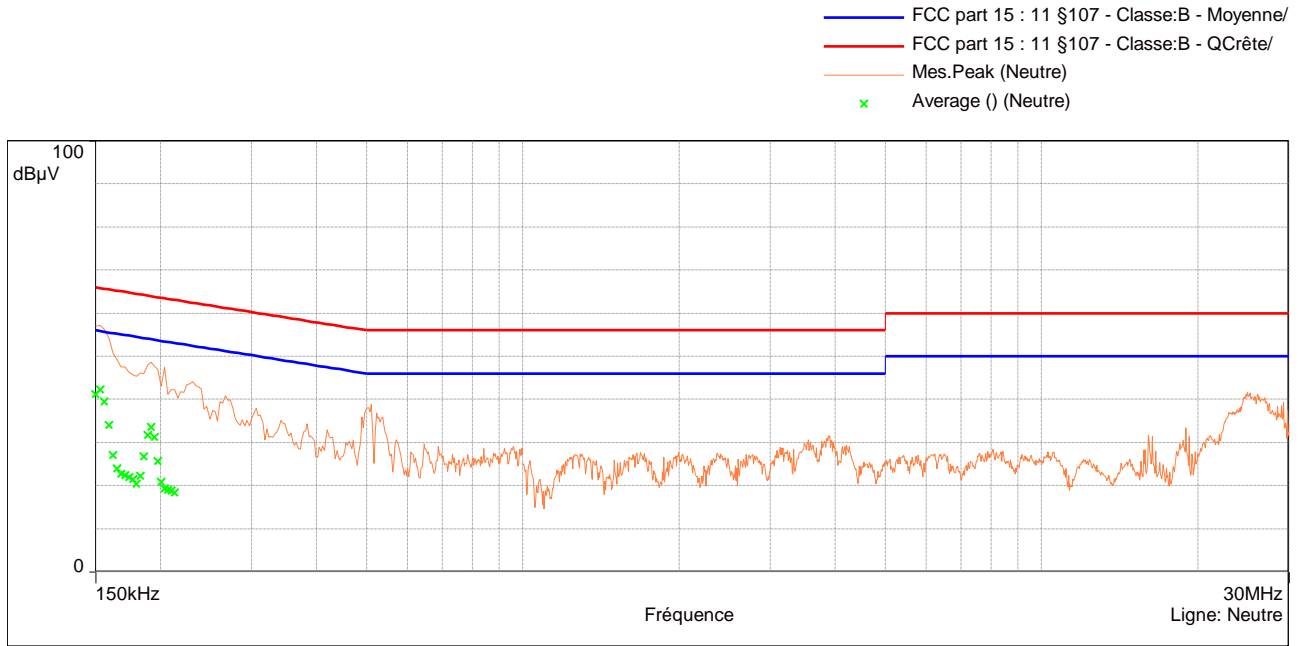
Frequency	Average	Average Limit	Average margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.15	41.61	56.0	14.39
0.153	42.44	55.8	13.40
0.159	34.37	55.5	21.15
0.192	33.57	53.9	20.38
0.198	26.06	53.7	27.63
0.234	25.96	52.3	26.35

**Configuration 2**

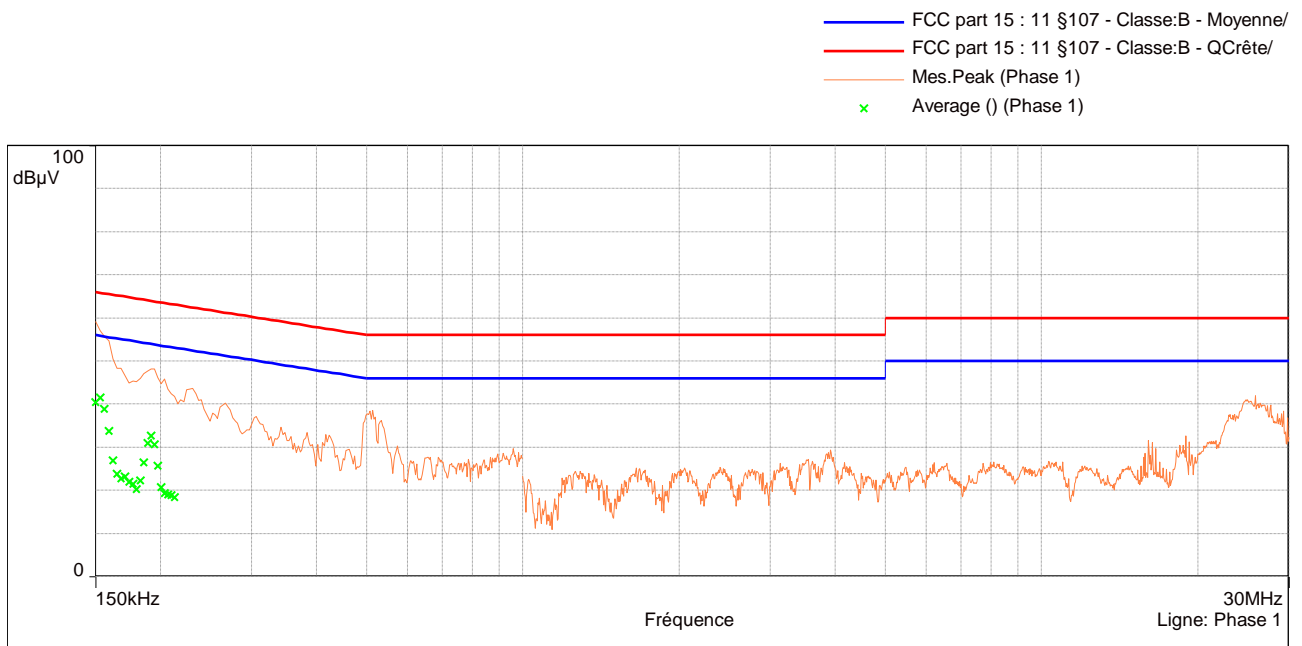
**Measurement on the mains power supply:**

The measurement is first realized with peak detector.

Curve N° 3: measurement on the Neutral with peak detector



Curve N° 4: measurement on the Line with peak detector



The frequencies which are not 6 dB under the Average limit are then analyzed with Quasi-peak detector and Average detector

Table N° 3: measurement on the Neutral, for the frequency range:

Frequency	Quasi-peak	QP Limit	QP margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.150	56.44	66.0	9.56
0.153	57.42	65.8	8.42
0.156	54.69	65.7	10.98
0.192	48.72	63.9	15.23
0.204	34.47	63.4	28.98
0.213	33.49	63.1	29.60

Frequency	Average	Average Limit	Average margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.150	41.21	56.0	14.79
0.153	42.19	55.8	13.65
0.156	39.46	55.7	16.21
0.192	33.49	53.9	20.46
0.204	19.24	53.4	34.21
0.213	18.26	53.1	34.83

Table N° 4: measurement on the Line, for the frequency range:

Frequency	Quasi-peak	QP Limit	QP margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.150	55.62	66.0	10.38
0.153	56.71	65.8	9.13
0.156	54.12	65.7	11.55
0.192	47.81	63.9	16.14
0.204	34.56	63.4	28.89
0.213	33.54	63.1	29.55

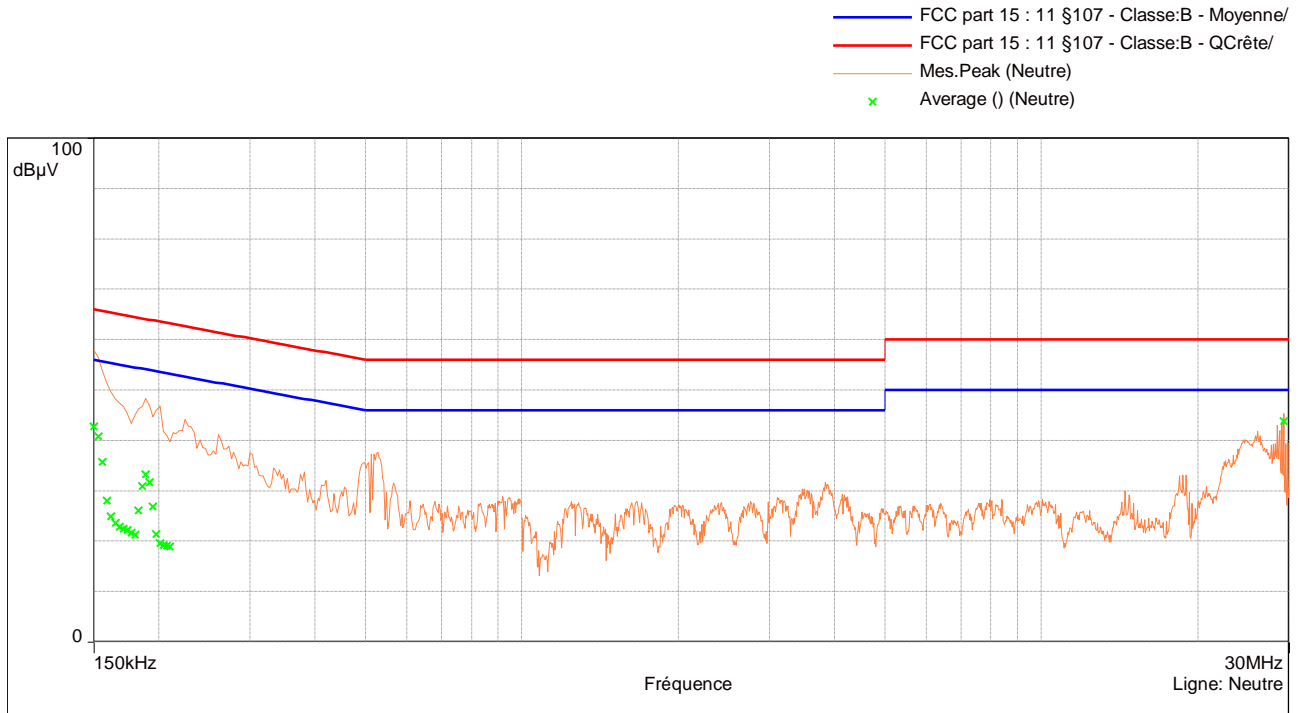
Frequency	Average	Average Limit	Average margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.150	40.39	56.0	15.61
0.153	41.48	55.8	14.36
0.156	38.89	55.7	16.78
0.192	32.58	53.9	21.37
0.204	19.33	53.4	34.12
0.213	18.31	53.1	34.78

**Configuration 3**

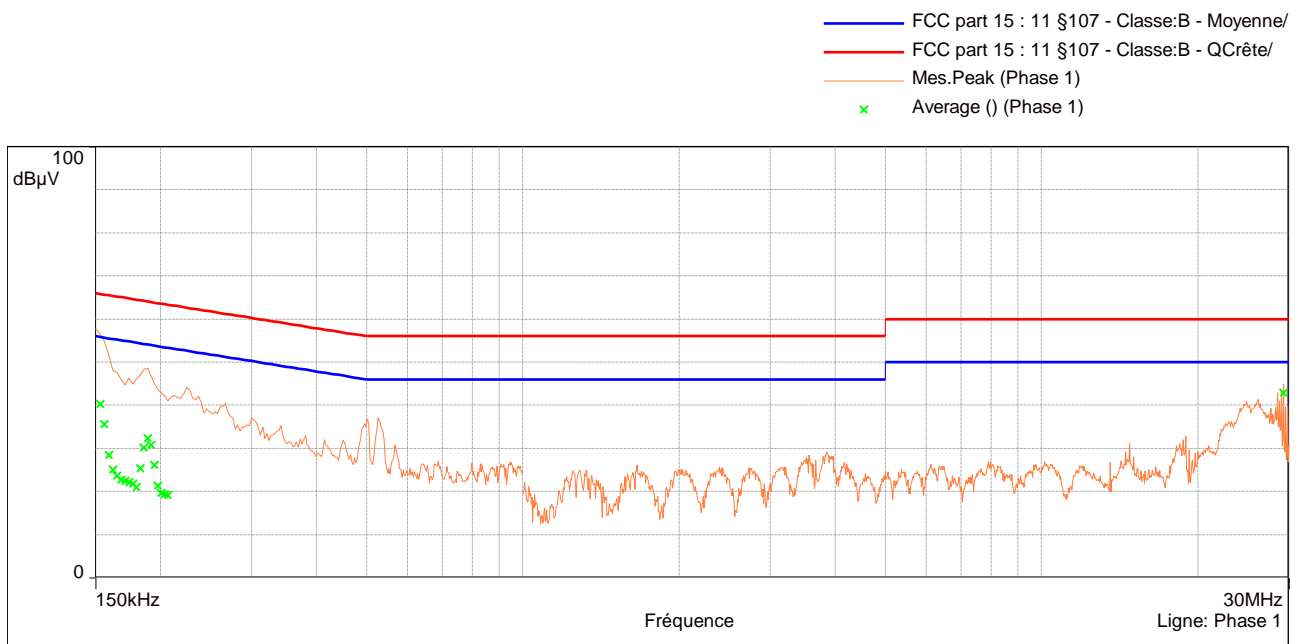
**Measurement on the mains power supply:**

The measurement is first realized with peak detector.

Curve N° 5: measurement on the Neutral with peak detector



Curve N° 6: measurement on the Line with peak detector



The frequencies which are not 6 dB under the Average limit are then analyzed with Quasi-peak detector and Average detector

Table N° 5: measurement on the Neutral, for the frequency range:

Frequency	Quasi-peak	QP Limit	QP margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.150	57.92	66.0	8.08
0.153	56.06	65.8	9.78
0.189	48.48	64.1	15.60
0.201	34.82	63.6	28.75
0.207	34.27	63.3	29.05
29.293	46.93	60.0	13.07

Frequency	Average	Average Limit	Average margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.150	42.69	56.0	13.31
0.153	40.83	55.8	15.01
0.189	33.25	54.1	20.83
0.201	19.59	53.6	33.98
0.207	19.04	53.3	34.28
29.293	43.7	50.0	6.30

Table N° 6: measurement on the Line, for the frequency range:

Frequency	Quasi-peak	QP Limit	QP margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.150	57.81	66.0	8.19
0.153	55.54	65.8	10.30
0.189	47.55	64.1	16.53
0.201	34.78	63.6	28.79
0.207	34.4	63.3	28.92
29.293	46.17	60.0	13.83

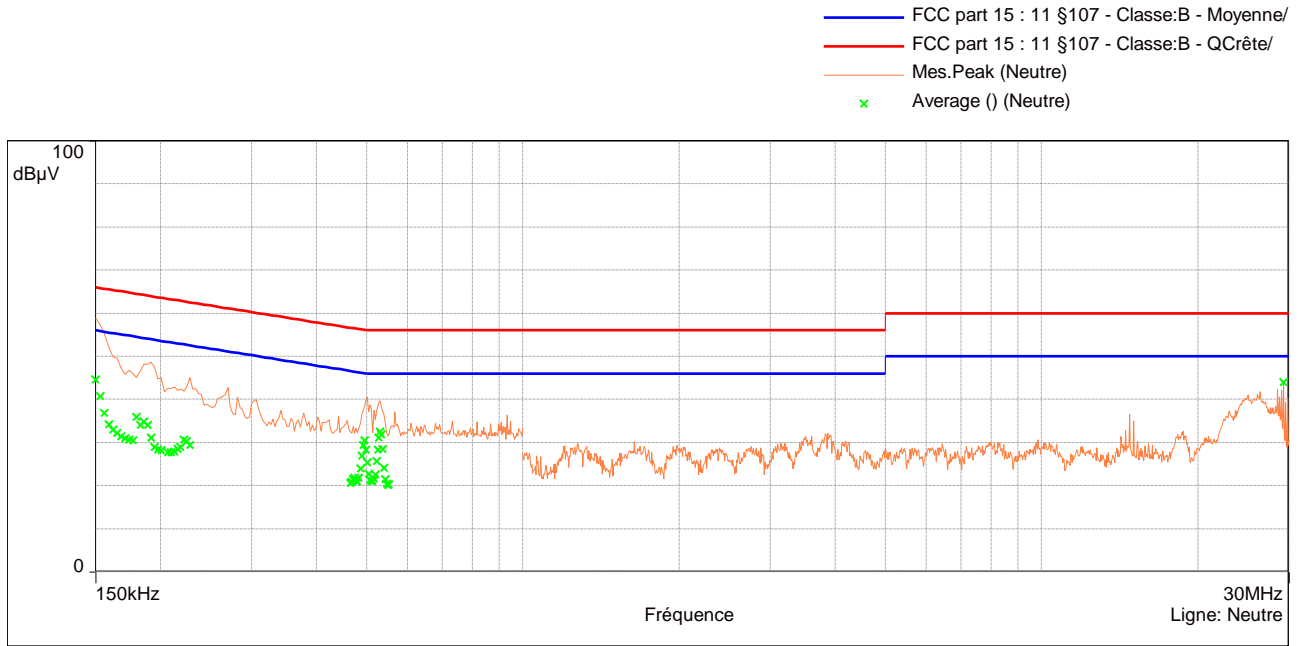
Frequency	Average	Average Limit	Average margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.150	42.58	56.0	13.42
0.153	40.31	55.8	15.53
0.189	32.32	54.1	21.76
0.201	19.55	53.6	34.02
0.207	19.17	53.3	34.15
29.293	42.94	50.0	7.06

**Configuration 4**

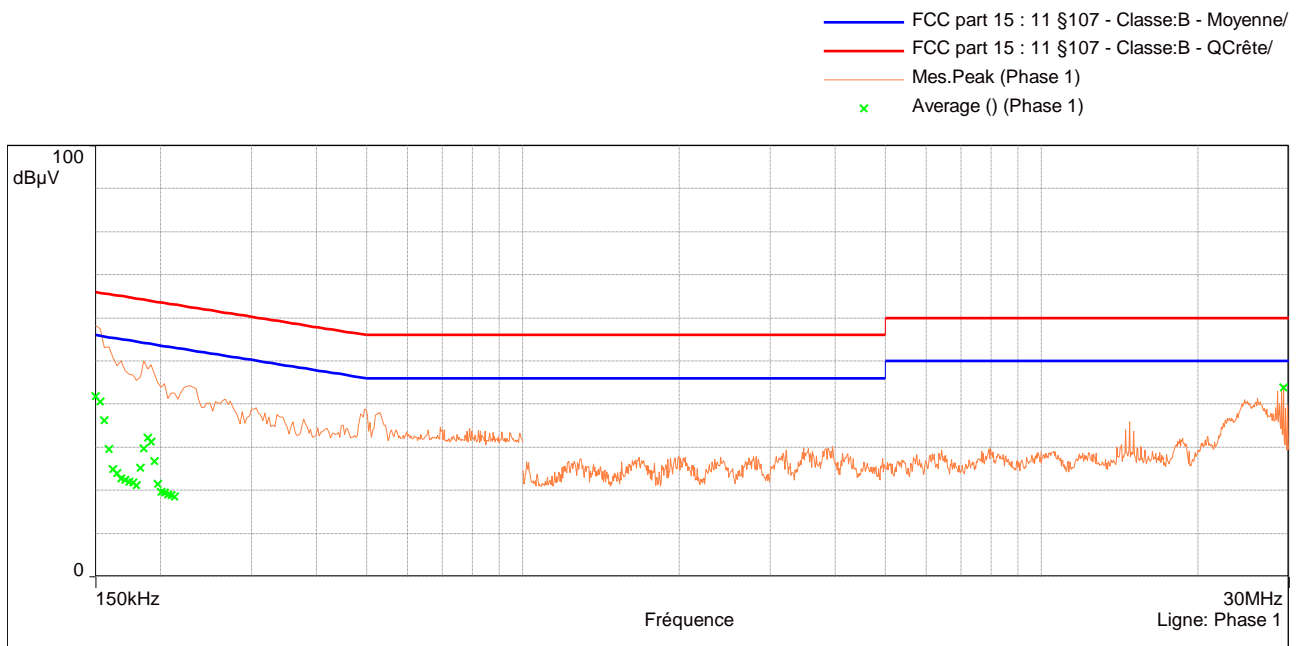
**Measurement on the mains power supply:**

The measurement is first realized with peak detector.

Curve N° 7: measurement on the Neutral with peak detector



Curve N° 8: measurement on the Line with peak detector





The frequencies which are not 6 dB under the Average limit are then analyzed with Quasi-peak detector and Average detector

Table N° 7: measurement on the Neutral, for the frequency range:

Frequency	Quasi-peak	QP Limit	QP margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.150	59.8	66.0	6.20
0.153	55.79	65.8	10.05
0.156	52.07	65.7	13.60
0.186	50.06	64.2	14.15
0.222	45.84	62.7	16.90
29.296	49.11	60.0	10.89

Frequency	Average	Average Limit	Average margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.150	44.57	56.0	11.43
0.153	40.56	55.8	15.28
0.156	36.84	55.7	18.83
0.186	34.83	54.2	19.38
0.222	30.61	52.7	22.13
29.296	43.88	50.0	6.12

Table N° 8: measurement on the Line, for the frequency range:

Frequency	Quasi-peak	QP Limit	QP margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.150	56.98	66.0	9.02
0.153	55.86	65.8	9.98
0.156	51.35	65.7	14.32
0.186	44.94	64.2	19.27
0.222	45.53	62.7	17.21
29.296	49.06	60.0	10.94

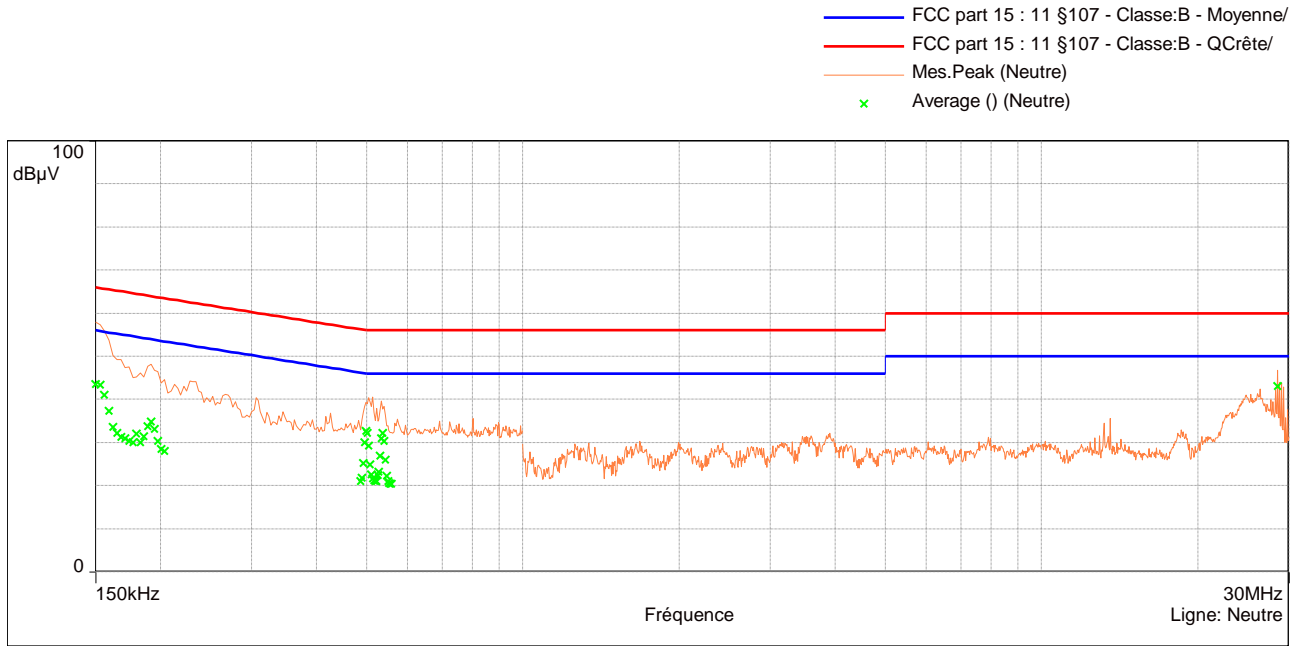
Frequency	Average	Average Limit	Average margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.150	41.75	56.0	14.25
0.153	40.63	55.8	15.21
0.156	36.12	55.7	19.55
0.186	29.71	54.2	24.50
0.222	30.3	52.7	22.44
29.296	43.83	50.0	6.17

**Configuration 5**

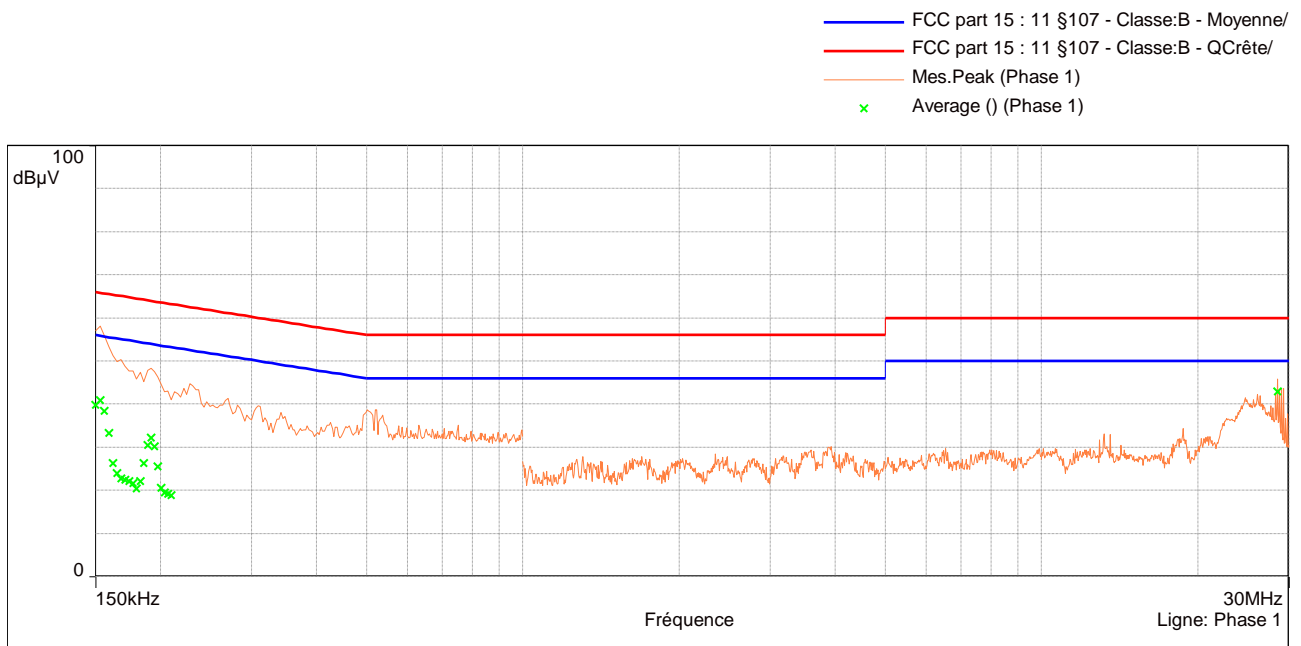
**Measurement on the mains power supply:**

The measurement is first realized with peak detector.

Curve N° 9: measurement on the Neutral with peak detector



Curve N° 10: measurement on the Line with peak detector



The frequencies which are not 6 dB under the Average limit are then analyzed with Quasi-peak detector and Average detector

Table N° 9: measurement on the Neutral, for the frequency range:

Frequency	Quasi-peak	QP Limit	QP margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.150	58.72	66.0	7.28
0.153	58.58	65.8	7.26
0.156	56.28	65.7	9.39
0.189	48.91	64.1	15.17
0.501	47.38	56.0	8.62
28.501	48.31	60.0	11.69

Frequency	Average	Average Limit	Average margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.150	43.49	56.0	12.51
0.153	43.35	55.8	12.49
0.156	41.05	55.7	14.62
0.189	33.68	54.1	20.40
0.501	32.15	46.0	13.85
28.501	43.08	50.0	6.92

Table N° 10: measurement on the Line, for the frequency range:

Frequency	Quasi-peak	QP Limit	QP margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.150	54.99	66.0	11.01
0.153	56.12	65.8	9.72
0.156	53.57	65.7	12.10
0.189	45.72	64.1	18.36
0.204	43.26	63.4	20.19
28.504	48.03	60.0	11.97

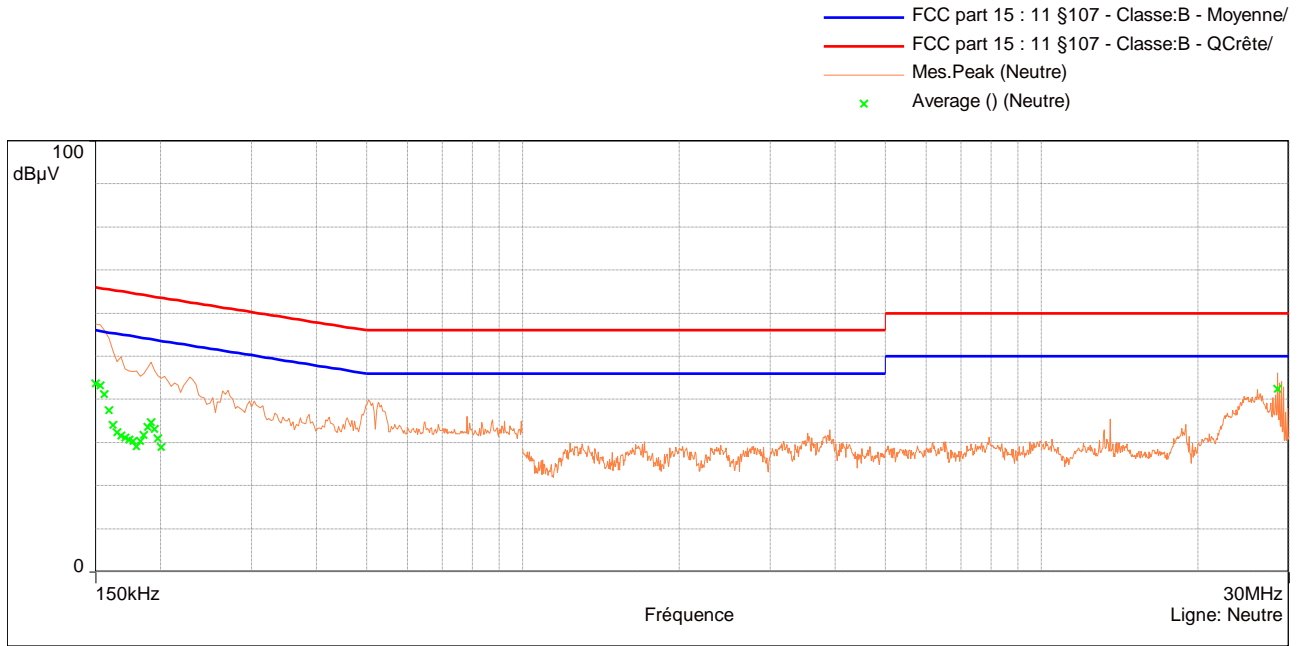
Frequency	Average	Average Limit	Average margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.150	39.76	56.0	16.24
0.153	40.89	55.8	14.95
0.156	38.34	55.7	17.33
0.189	30.49	54.1	23.59
0.204	28.03	53.4	25.42
28.504	42.8	50.0	7.20

**Configuration 6**

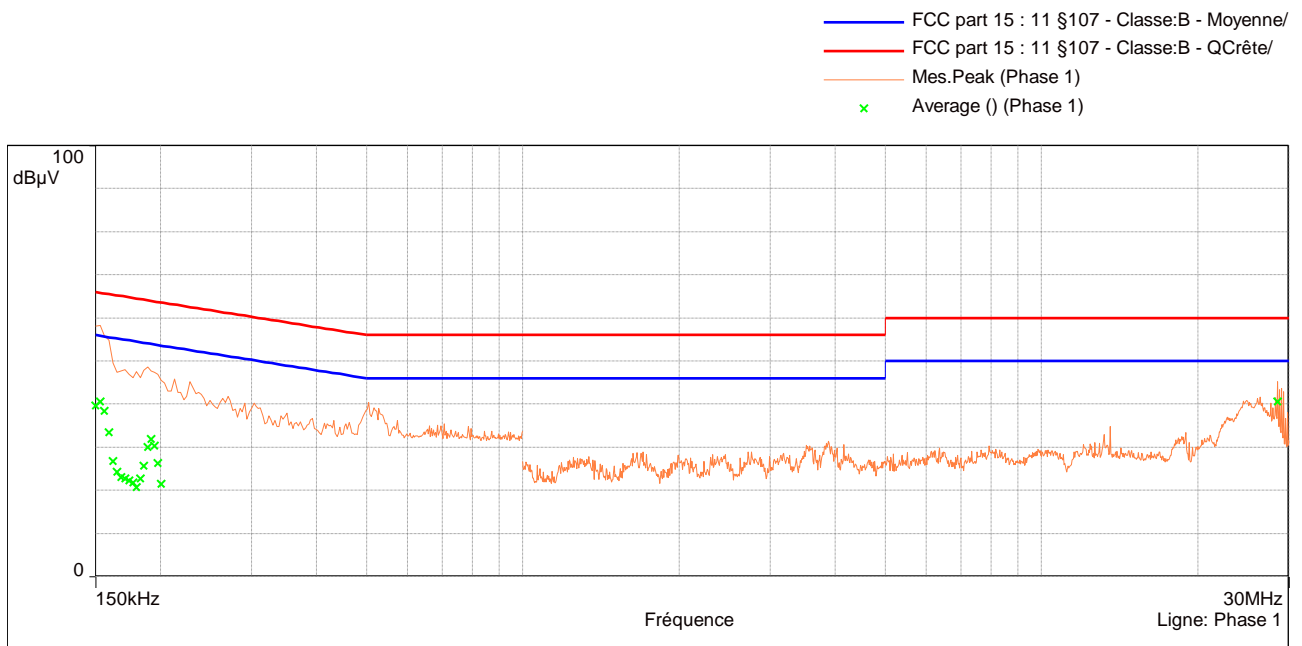
**Measurement on the mains power supply:**

The measurement is first realized with peak detector.

Curve N° 11: measurement on the Neutral with peak detector



Curve N° 12: measurement on the Line with peak detector



The frequencies which are not 6 dB under the Average limit are then analyzed with Quasi-peak detector and Average detector

Table N° 11: measurement on the Neutral, for the frequency range:

Frequency	Quasi-peak	QP Limit	QP margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.150	58.8	66.0	7.20
0.153	58.37	65.8	7.47
0.156	56.44	65.7	9.23
0.192	49.83	63.9	14.12
0.501	47.38	56.0	8.62
28.504	47.63	60.0	12.37

Frequency	Average	Average Limit	Average margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.150	43.57	56.0	12.43
0.153	43.14	55.8	12.70
0.156	41.21	55.7	14.46
0.192	34.6	53.9	19.35
0.501	32.15	46.0	13.85
28.504	42.4	50.0	7.60

Table N° 12: measurement on the Line, for the frequency range:

Frequency	Quasi-peak	QP Limit	QP margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.150	54.9	66.0	11.10
0.153	55.79	65.8	10.05
0.156	53.64	65.7	12.03
0.192	47.02	63.9	16.93
0.204	43.26	63.4	20.19
28.504	45.82	60.0	14.18

Frequency	Average	Average Limit	Average margin
(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)
0.150	39.67	56.0	16.33
0.153	40.56	55.8	15.28
0.156	38.41	55.7	17.26
0.192	31.79	53.9	22.16
0.204	28.03	53.4	25.42
28.504	40.59	50.0	9.41

**Test conclusion:**

RESPECTED STANDARD

**9. ADDITIONAL PROVISIONS TO THE GENERAL RADIATED EMISSION LIMITATIONS****Temperature (°C) :** 20.8**Humidity (%HR):** 44**Date :** January 15, 2020**Technician :** S. LOUIS**Standard:** FCC Part 15**Test procedure:** Paragraph 15.215**Test set up:**

The measure is realized in conducted mode with an analyser.

**Test operating condition of the equipment:**

The equipment under test is blocked in continuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate. The measure is repeated for Spread Factor 7 and 12

Power source: 120 Vac through a variac

Percentage of voltage variation during the test (%):

± 1

**Results:**

Lower Band Edge: From 900 MHz to 902 MHz

Upper Band Edge: From 928 MHz to 930 MHz

Sample N°1: Software Output power PA3 MIX15

## SPREAD FACTOR 7

Fundamental frequency (MHz)	RBW (kHz)	Detector (Peak or Average)	Frequency of maximum Band-edges Emission (MHz)	Delta Marker (dB) (1)	Limit (dBc)	Margin (dB)
923.3	100	Peak	901.921	-54.96	-30	24.96
927.5	100	Peak	928.008	-35.58	-30	5.58

(1) Marker-Delta method

band-edge curves are given in appendix 4.

## SPREAD FACTOR 12

Fundamental frequency (MHz)	RBW (kHz)	Detector (Peak or Average)	Frequency of maximum Band-edges Emission (MHz)	Delta Marker (dB) (1)	Limit (dBc)	Margin (dB)
923.3	100	Peak	900.966	-55.82	30	25.82
927.5	100	Peak	928.008	-35.15	30	5.15

(1) Marker-Delta method

band-edge curves are given in appendix 4.

**Test conclusion:**

RESPECTED STANDARD

**10. MAXIMUM CONDUCTED (AVERAGE) OUTPUT POWER**

Temperature (°C) : 20.8

Humidity (%HR): 44

Date : January 15, 2020

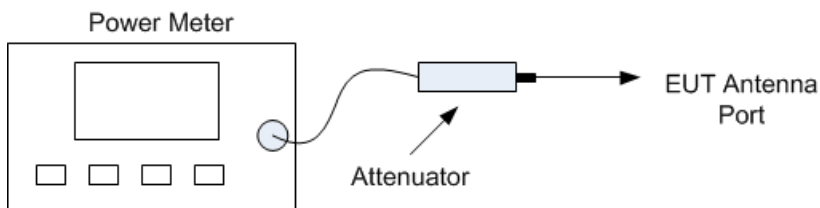
Technician : S. LOUIS

**Standard:** FCC Part 15**Test procedure:** paragraph 15.247 (b)

AVGPM-G method (using a gated RF average-reading power meter) of paragraph 11.9.2.3.2 of ANSI C63.10

**Test set up:**

The measure is realized in conducted mode with a calibrated gated RF average power meter.

**Equipment under test operating condition:**

The equipment under test is blocked in continuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate. The measure is repeated for each Spread Factor.

Power Software adjusted to: PA3 MIX 15

Power source: 120 Vac through a variac

Percentage of voltage variation during the test (%):

 $\pm 1$



**Results:****Power Software:** PA3 MIX 15Sample N° 1

SPREAD FACTOR 7

Frequency 923.3 MHz

Maximum conducted output power		Limit
(dBm)	(W)	(W)
27.41	0.551	1

*Declared maximum antenna gain: 6 dBi*

Frequency 925.7 MHz

Maximum conducted output power		Limit
(dBm)	(W)	(W)
27.01	0.502	1

*Declared maximum antenna gain: 6 dBi*

Frequency 927.5 MHz

Maximum conducted output power		Limit
(dBm)	(W)	(W)
27.23	0.528	1

*Declared maximum antenna gain: 6 dBi*

SPREAD FACTOR 12

Frequency 923.3 MHz

Maximum conducted output power		Limit
(dBm)	(W)	(W)
27.46	0.557	1

*Declared maximum antenna gain: 6 dBi*

Frequency 925.7 MHz

Maximum conducted output power		Limit
(dBm)	(W)	(W)
27.03	0.505	1

*Declared maximum antenna gain: 6 dBi*

Frequency 927.5 MHz

Maximum conducted output power		Limit
(dBm)	(W)	(W)
27.29	0.536	1

*Declared maximum antenna gain: 6 dBi***Test conclusion:**

RESPECTED STANDARD

**11. INTENTIONAL RADIATOR****Temperature (°C) :** 19 to 23**Humidity (%HR):** 44 to 46**Date :** January 15, 2020 to  
January 17, 2020**Technician :** S. LOUIS**Standard:** FCC Part 15**Test procedure:** paragraph 15.205, paragraph 15.209, paragraph 15.247 (d)

Emissions in non-restricted frequency bands method of paragraph 11.11 of ANSI C63.10

Emissions in restricted frequency bands method of paragraph 11.12 of ANSI C63.10

**Test set up:**

First an exploratory radiated measurement was performed.

During this phase the product is oriented in two orthogonal positions

Then the final measurement is realized with the product on the most critical orientation.

The measure is realized on open area test site under 1 GHz and in anechoic chamber above 1 GHz.

When the system is tested in an open area test site (OATS), the EUT is placed on a rotating table, 0.8m from a ground plane.

When the system is tested in anechoic chamber, the EUT is placed on a rotating table, 1.5 m from a ground plane.

Zero degree azimuths correspond to the front of the device under test.

**Frequency range:** From 9 kHz to 10<sup>th</sup> harmonic of the highest fundamental frequency 10 GHz**Detection mode:** Quasi-peak (F < 1 GHz)

Peak / Average (F &gt; 1 GHz)

**Bandwidth:** 200Hz (9 kHz < F < 150kHz)  
9 kHz (150 kHz < F < 30MHz)  
120 kHz (30 MHz < F < 1 GHz)  
100 kHz / 1 MHz (F > 1 GHz)**Distance of antenna:** 10 meters (in open area test site) / 3 meters (in anechoic room)**Antenna height:** 1 to 4 meters (in open area test site) / 1.5 meter (in anechoic room)**Antenna polarization:** vertical and horizontal (only the highest level is recorded)

**Equipment under test operating condition:**

The equipment under test is blocked in continuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

Measures are repeated for each Spread Factor with the 3 antennas.

Power source: 120 Vac through a variac

Percentage of voltage variation during the test (%):  $\pm 1$

**Results:**

Sample N° 1: Internal antenna

SPREAD FACTOR 7

Frequency 923.3 MHz

Frequencies (MHz)	Detector P QP Av	RBW (kHz)	Polarization H: Horizontal V: Vertical	Position of product	Field strength Measured at 3 m (dB $\mu$ V/m)	Limits (dBm)	Margin (dB)
1846.6	P	100	V	1	45.0	90.8	45.8
8311.6 (1)	P	1000	H	1	53.4 (2)	74	20.6

P= Peak, QP=Quasi-peak, Av=Average

(1) Restricted bands of operation in 15.205

(2) The peak level is lower than the average limit (54 dB $\mu$ V/m)

Frequency 925.7 MHz

Frequencies (MHz)	Detector P QP Av	RBW (kHz)	Polarization H: Horizontal V: Vertical	Position of product	Field strength Measured at 3 m (dB $\mu$ V/m)	Limits (dBm)	Margin (dB)
1851.6	P	100	V	1	44.3	90.8	46.5
8333.5 (1)	P	1000	H	1	53.7 (2)	74	20.3

P= Peak, QP=Quasi-peak, Av=Average

(1) Restricted bands of operation in 15.205

(2) The peak level is lower than the average limit (54 dB $\mu$ V/m)

Frequency 927.5 MHz

Frequencies (MHz)	Detector P QP Av	RBW (kHz)	Polarization H: Horizontal V: Vertical	Position of product	Field strength Measured at 3 m (dB $\mu$ V/m)	Limits (dBm)	Margin (dB)
1854.8	P	100	V	1	44.0	90.8	46.8
7419 (1)	P	1000	H	1	49.9 (2)	74	24.1
8345.5 (1)	P	1000	H	1	53.9 (2)	74	24.1

P= Peak, QP=Quasi-peak, Av=Average

(1) Restricted bands of operation in 15.205

(2) The peak level is lower than the average limit (54 dB $\mu$ V/m)

**Applicable limits:** In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

The highest level recorded in a 100 kHz bandwidth is 120.8 dB $\mu$ V/m at 3 meters.  
So the applicable limit is 90.8 dB $\mu$ V/m at 3 meters.

In addition, radiated emissions which fall in the restricted band, 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)).

## SPREAD FACTOR 12

## Frequency 923.3 MHz

Frequencies (MHz)	Detector P QP Av	RBW (kHz)	Polarization H: Horizontal V: Vertical	Position of product	Field strength Measured at 3 m (dB $\mu$ V/m)	Limits (dBm)	Margin (dB)
1846.8	P	100	V	1	45.5	90.7	45.2
7388 (1)	P	1000	H	1	53.1 (2)	74	20.9
8312 (1)	P	1000	H	1	57.4	74	16.6
8312 (1)	Av	1000	H	1	47.2	54	6.8

P= Peak, QP=Quasi-peak, Av=Average

(1) Restricted bands of operation in 15.205

(2) The peak level is lower than the average limit (54 dB $\mu$ V/m)

## Frequency 925.7 MHz

Frequencies (MHz)	Detector P QP Av	RBW (kHz)	Polarization H: Horizontal V: Vertical	Position of product	Field strength Measured at 3 m (dB $\mu$ V/m)	Limits (dBm)	Margin (dB)
1851.6	P	100	V	1	44.6	90.7	46.1
7406.5 (1)	P	1000	H	1	53.7 (2)	74	20.3
8329.5 (1)	P	1000	H	1	55.9	74	18.1
8329.5 (1)	Av	1000	H	1	45.7	54	8.3

P= Peak, QP=Quasi-peak, Av=Average

(1) Restricted bands of operation in 15.205

(2) The peak level is lower than the average limit (54 dB $\mu$ V/m)

## Frequency 927.5 MHz

Frequencies (MHz)	Detector P QP Av	RBW (kHz)	Polarization H: Horizontal V: Vertical	Position of product	Field strength Measured at 3 m (dB $\mu$ V/m)	Limits (dBm)	Margin (dB)
1855.2	P	100	V	1	44.7	90.7	46
7418.5 (1)	P	1000	H	1	53.0 (2)	74	21
8345.5 (1)	P	1000	H	1	55.4	74	18.6
8345.5 (1)	Av	1000	H	1	45.2	54	8.8

P= Peak, QP=Quasi-peak, Av=Average

(1) Restricted bands of operation in 15.205

(2) The peak level is lower than the average limit (54 dB $\mu$ V/m)

**Applicable limits:** In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

The highest level recorded in a 100 kHz bandwidth is 120.7 dB $\mu$ V/m at 3 meters.  
So the applicable limit is 90.7 dB $\mu$ V/m at 3 meters.

In addition, radiated emissions which fall in the restricted band, 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)).



Sample N° 1: External antenna 3 dBi

SPREAD FACTOR 7

Frequency 923.3 MHz

Frequencies (MHz)	Detector P QP Av	RBW (kHz)	Polarization H: Horizontal V: Vertical	Position of product	Field strength Measured at 3 m (dB $\mu$ V/m)	Limits (dBm)	Margin (dB)
1846.8	P	100	H	2	39.9	95	55.1
2770 (1)	P	1000	V	1	45.1 (2)	74	28.9
8311 (1)	P	1000	V	2	55.6	74	18.4
8311 (1)	Av	1000	V	2	45.4	54	8.6

P= Peak, QP=Quasi-peak, Av=Average

(1) Restricted bands of operation in 15.205

(2) The peak level is lower than the average limit (54 dB $\mu$ V/m)

Frequency 925.7 MHz

Frequencies (MHz)	Detector P QP Av	RBW (kHz)	Polarization H: Horizontal V: Vertical	Position of product	Field strength Measured at 3 m (dB $\mu$ V/m)	Limits (dBm)	Margin (dB)
1851.6	P	100	H	2	41.0	95	54
2777.6 (1)	P	1000	V	1	45.0 (2)	74	29
8331.0 (1)	P	1000	V	2	54.8	74	19.2
8331.0 (1)	Av	1000	V	2	44.6	54	9.4

P= Peak, QP=Quasi-peak, Av=Average

(1) Restricted bands of operation in 15.205

(2) The peak level is lower than the average limit (54 dB $\mu$ V/m)

Frequency 927.5 MHz

Frequencies (MHz)	Detector P QP Av	RBW (kHz)	Polarization H: Horizontal V: Vertical	Position of product	Field strength Measured at 3 m (dB $\mu$ V/m)	Limits (dBm)	Margin (dB)
1855.2	P	100	H	2	42.6	95	52.4
2782.0 (1)	P	1000	V	1	42.8 (2)	74	31.2
8346.0 (1)	P	1000	H	1	54.7	74	19.3
8346.0 (1)	Av	1000	H	1	44.5	54	9.5

P= Peak, QP=Quasi-peak, Av=Average

(1) Restricted bands of operation in 15.205

(2) The peak level is lower than the average limit (54 dB $\mu$ V/m)

**Applicable limits:** In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

The highest level recorded in a 100 kHz bandwidth is 125 dB $\mu$ V/m at 3 meters.  
So the applicable limit is 95 dB $\mu$ V/m at 3 meters.

In addition, radiated emissions which fall in the restricted band, 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)).

## SPREAD FACTOR 12

## Frequency 923.3 MHz

Frequencies (MHz)	Detector P QP Av	RBW (kHz)	Polarization H: Horizontal V: Vertical	Position of product	Field strength Measured at 3 m (dB $\mu$ V/m)	Limits (dBm)	Margin (dB)
1846.8	P	100	H	2	41.6	95	53.4
2770 (1)	P	1000	H	2	42.8 (2)	74	31.2
8308 (1)	P	1000	V	2	55.4	74	18.6
8308 (1)	Av	1000	V	2	45.2	54	8.8

P= Peak, QP=Quasi-peak, Av=Average

(1) Restricted bands of operation in 15.205

(2) The peak level is lower than the average limit (54 dB $\mu$ V/m)

## Frequency 925.7 MHz

Frequencies (MHz)	Detector P QP Av	RBW (kHz)	Polarization H: Horizontal V: Vertical	Position of product	Field strength Measured at 3 m (dB $\mu$ V/m)	Limits (dBm)	Margin (dB)
1851.6	P	100	H	2	41	95	54.0
2777.6 (1)	P	1000	H	2	41.2 (2)	74	32.8
8330.5 (1)	P	1000	V	2	54.3	74	19.7
8330.5 (1)	Av	1000	V	2	44.1	54	9.9

P= Peak, QP=Quasi-peak, Av=Average

(1) Restricted bands of operation in 15.205

(2) The peak level is lower than the average limit (54 dB $\mu$ V/m)

## Frequency 927.5 MHz

Frequencies (MHz)	Detector P QP Av	RBW (kHz)	Polarization H: Horizontal V: Vertical	Position of product	Field strength Measured at 3 m (dB $\mu$ V/m)	Limits (dBm)	Margin (dB)
1854.8	P	100	H	2	42.1	95	52.9
2782.8 (1)	P	1000	H	1	41.4 (2)	74	32.6
8346.5 (1)	P	1000	H	1	54.8	74	19.2
8346.5 (1)	Av	1000	H	1	44.6	54	9.4

P= Peak, QP=Quasi-peak, Av=Average

(1) Restricted bands of operation in 15.205

(2) The peak level is lower than the average limit (54 dB $\mu$ V/m)

**Applicable limits:** In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

The highest level recorded in a 100 kHz bandwidth is 125 dB $\mu$ V/m at 3 meters.  
So the applicable limit is 95 dB $\mu$ V/m at 3 meters.

In addition, radiated emissions which fall in the restricted band, 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)).

Sample N° 1: External antenna 6 dBi

SPREAD FACTOR 7

Frequency 923.3 MHz

Frequencies (MHz)	Detector P QP Av	RBW (kHz)	Polarization H: Horizontal V: Vertical	Position of product	Field strength Measured at 3 m (dB $\mu$ V/m)	Limits (dBm)	Margin (dB)
1846.8	P	100	H	2	41.7	96.2	54.5
2770 (1)	P	1000	V	1	51.3 (2)	74	22.7
8308 (1)	P	1000	V	2	55.2	74	18.8
8308 (1)	Av	1000	V	2	45.2	54	8.8

P= Peak, QP=Quasi-peak, Av=Average

(1) Restricted bands of operation in 15.205

(2) The peak level is lower than the average limit (54 dB $\mu$ V/m)

Frequency 925.7 MHz

Frequencies (MHz)	Detector P QP Av	RBW (kHz)	Polarization H: Horizontal V: Vertical	Position of product	Field strength Measured at 3 m (dB $\mu$ V/m)	Limits (dBm)	Margin (dB)
1851.6	P	100	H	2	42.7	96.2	53.5
2777.2 (1)	P	1000	V	1	49.1 (2)	74	24.9
8331.5 (1)	P	1000	H	1	53.7 (2)	74	20.3

P= Peak, QP=Quasi-peak, Av=Average

(1) Restricted bands of operation in 15.205

(2) The peak level is lower than the average limit (54 dB $\mu$ V/m)

Frequency 927.5 MHz

Frequencies (MHz)	Detector P QP Av	RBW (kHz)	Polarization H: Horizontal V: Vertical	Position of product	Field strength Measured at 3 m (dB $\mu$ V/m)	Limits (dBm)	Margin (dB)
1855.2	P	100	H	2	44.0	96.2	52.2
2782 (1)	P	1000	V	1	47.4 (2)	74	26.6
8346.5 (1)	P	1000	H	1	53.6 (2)	74	20.4

P= Peak, QP=Quasi-peak, Av=Average

(1) Restricted bands of operation in 15.205

(2) The peak level is lower than the average limit (54 dB $\mu$ V/m)

**Applicable limits:** In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 k.Hz bandwidth within the band that contains the highest level of the desired power.

The highest level recorded in a 100 kHz bandwidth is 126.2 dB $\mu$ V/m at 3 meters.  
So the applicable limit is 96.2 dB $\mu$ V/m at 3 meters.

In addition, radiated emissions which fall in the restricted band, 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)).

## SPREAD FACTOR 12

## Frequency 923.3 MHz

Frequencies (MHz)	Detector P QP Av	RBW (kHz)	Polarization H: Horizontal V: Vertical	Position of product	Field strength Measured at 3 m (dB $\mu$ V/m)	Limits (dBm)	Margin (dB)
1846.8	P	100	H	2	42.9	96.2	53.3
2770.8 (1)	P	1000	V	1	49.7 (2)	74	24.3
8308.5 (1)	P	1000	V	2	55.6	74	18.4
8308.5 (1)	Av	1000	V	2	45.4	54	9.6

P= Peak, QP=Quasi-peak, Av=Average

(1) Restricted bands of operation in 15.205

(2) The peak level is lower than the average limit (54 dB $\mu$ V/m)

## Frequency 925.7 MHz

Frequencies (MHz)	Detector P QP Av	RBW (kHz)	Polarization H: Horizontal V: Vertical	Position of product	Field strength Measured at 3 m (dB $\mu$ V/m)	Limits (dBm)	Margin (dB)
1851.2	P	100	H	2	43.0	96.2	53.2
2776.8 (1)	P	1000	V	1	46.3 (2)	74	27.7
8330.5 (1)	P	1000	H	1	54.4	74	22.67
8330.5 (1)	P	1000	H	1	44.2	54	9.8

P= Peak, QP=Quasi-peak, Av=Average

(1) Restricted bands of operation in 15.205

(2) The peak level is lower than the average limit (54 dB $\mu$ V/m)

## Frequency 927.5 MHz

Frequencies (MHz)	Detector P QP Av	RBW (kHz)	Polarization H: Horizontal V: Vertical	Position of product	Field strength Measured at 3 m (dB $\mu$ V/m)	Limits (dBm)	Margin (dB)
1855.2	P	100	H	2	44.7	96.2	51.5
2782.4 (1)	P	1000	V	1	47.4 (2)	74	26.6
8346 (1)	P	1000	H	1	53.1 (2)	74	20.9

P= Peak, QP=Quasi-peak, Av=Average

(1) Restricted bands of operation in 15.205

(2) The peak level is lower than the average limit (54 dB $\mu$ V/m)

**Applicable limits:** In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.  
The highest level recorded in a 100 kHz bandwidth is 126.2 dB $\mu$ V/m at 3 meters.  
So the applicable limit is 96.2 dB $\mu$ V/m at 3 meters.  
In addition, radiated emissions which fall in the restricted band, 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)).

**Test conclusion:**

RESPECTED STANDARD



**12. MAXIMUM CONDUCTED POWER DENSITY**

Temperature (°C) : 20.8

Humidity (%HR): 44

Date : January 15, 2020

Technician : S. LOUIS

**Standard:** FCC Part 15**Test procedure:** paragraph 15.247 (e)

AVGPSD-1 of paragraph 11.10.3 of ANSI C63.10

**Test set up:**

The measure is realized in conducted mode with an analyser.

Span: 2 MHz

Resolution bandwidth: 3kHz

Video bandwidth: 10 kHz

Detector: RMS

Number of points: 8001

Sweep time: 225ms

Trace mode: Avg (Power)

Then the peak marker function is used.

**Equipment under test operating condition:**

The equipment under test is blocked in continuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate. The measure is repeated for Spread Factor 7 and 12

Power source: 120 Vac through a variac

Percentage of voltage variation during the test (%):

± 1

**Results:****Power Software:** PA3 MIX 15Sample N° 1

SPREAD FACTOR 7

Frequency 923.3 MHz

Maximum conducted power density (dBm / 3 kHz)	Limit (dBm / 3 kHz)
7.09	8

*Declared maximum antenna gain: 6 dBi*

See curve in appendix 5

Frequency 925.7 MHz

Maximum conducted power density (dBm / 3 kHz)	Limit (dBm / 3 kHz)
6.75	8

*Declared maximum antenna gain: 6 dBi*

See curve in appendix 5

Frequency 927.5 MHz

Maximum conducted power density (dBm / 3 kHz)	Limit (dBm / 3 kHz)
6.91	8

*Declared maximum antenna gain: 6 dBi*

See curve in appendix 5

SPREAD FACTOR 12

Frequency 923.3 MHz

Maximum conducted power density (dBm / 3 kHz)	Limit (dBm / 3 kHz)
7.53	8

*Declared maximum antenna gain: 6 dBi*

See curve in appendix 5

Frequency 925.7 MHz

Maximum conducted power density (dBm / 3 kHz)	Limit (dBm / 3 kHz)
7.76	8

*Declared maximum antenna gain: 6 dBi*

See curve in appendix 5

Frequency 927.5 MHz

Maximum conducted power density (dBm / 3 kHz)	Limit (dBm / 3 kHz)
7.90	8

*Declared maximum antenna gain: 6 dBi*

See curve in appendix 5

**Test conclusion:**

RESPECTED STANDARD

**□□□ End of report, 5 annexes to be forwarded □□□**

## APPENDIX 1: Test equipment list

### Conducted limits

TYPE	MANUFACTURER	EMITECH NUMBER
Outside room Site	EMITECH	10788
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
ESPC	Rohde & Schwarz	5275
Cable RG214 N	EMITECH	8590
High-pass filter EZ-25	Rohde & Schwarz	8635
LISN 1600	Thurbly Thandar Instruments	8719
Absorber sheath current	EMITECH	9489
Power source 1251RP	California instruments	7011
Multimeter 177	Fluke	14903
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC V3.17.0.25	0000

### Additional provisions to the general radiated emission limitations

TYPE	MANUFACTURER	EMITECH NUMBER
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Attenuator 30dB 25W	Aéroflex	8552
Power source 1251RP	California instruments	7011
Multimeter 177	Fluke	14903
Meteo station WS-9232	La Crosse Technology	8750

### Maximum conducted (average) output power

TYPE	MANUFACTURER	EMITECH NUMBER
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Wideband sensor Z86	Rohde & Schwarz	11592
Attenuator 30dB 25W	Aéroflex	8552
Multimeter 177	Fluke	14831
Power source 1251RP	California instruments	8508
Meteo station WS-9232	La Crosse Technology	8750

**Intentional radiator**

TYPE	MANUFACTURER	EMITECH NUMBER
Anechoic Chamber	EMITECH	8593
Turntable controller MCU	MATURO	14736
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Cable N-5m	Huber + Suhner	12911
Cable N-1m	Huber + Suhner	15882
Cable N-1.5m	Suhner	6884
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Biconical antenna VHBB 9124	Schwarzbeck	8526
Log periodic antenna UHALP 9108A	Schwarzbeck	8543
Antenna 3115	EMCO	8535
Low-noise amplifier 8447D	Hewlett Packard	8511
Low-noise amplifier PAM-118A	COM-POWER	15812
Low pass filter HP12/1200-5AA	Filtek	7310
Low pass filter WLJS800-C11/60EE	Wainwright	4393
Notch filter 500-1000MHz	K&L Microwave	8972
Multimeter 177	Fluke	14903
Meteo station WS-9232	La Crosse Technology	8750
Power source 1251RP	California instruments	7011
Software	BAT-EMC V3.17.0.25	0000

**Maximum conducted power density**

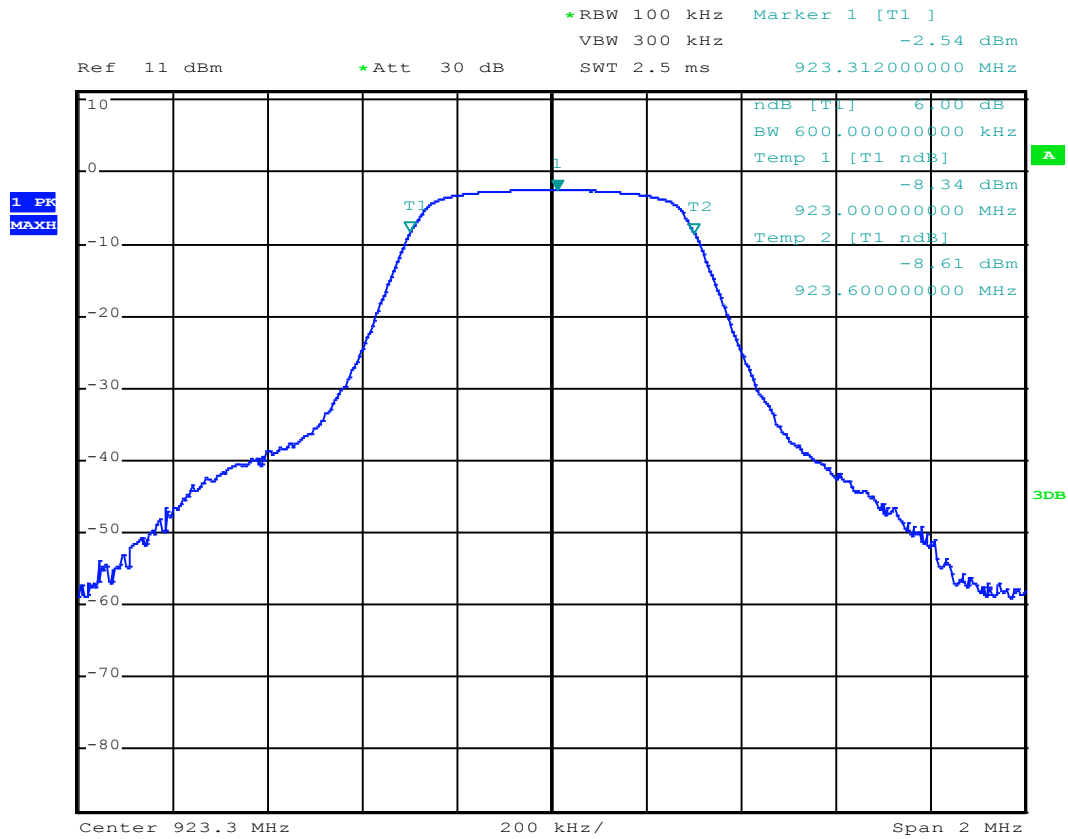
TYPE	MANUFACTURER	EMITECH NUMBER
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Attenuator 30dB 25W	Aéroflex	8552
Power source 1251RP	California instruments	7011
Multimeter 177	Fluke	14903
Meteo station WS-9232	La Crosse Technology	8750

### APPENDIX 2: 6 dB bandwidth

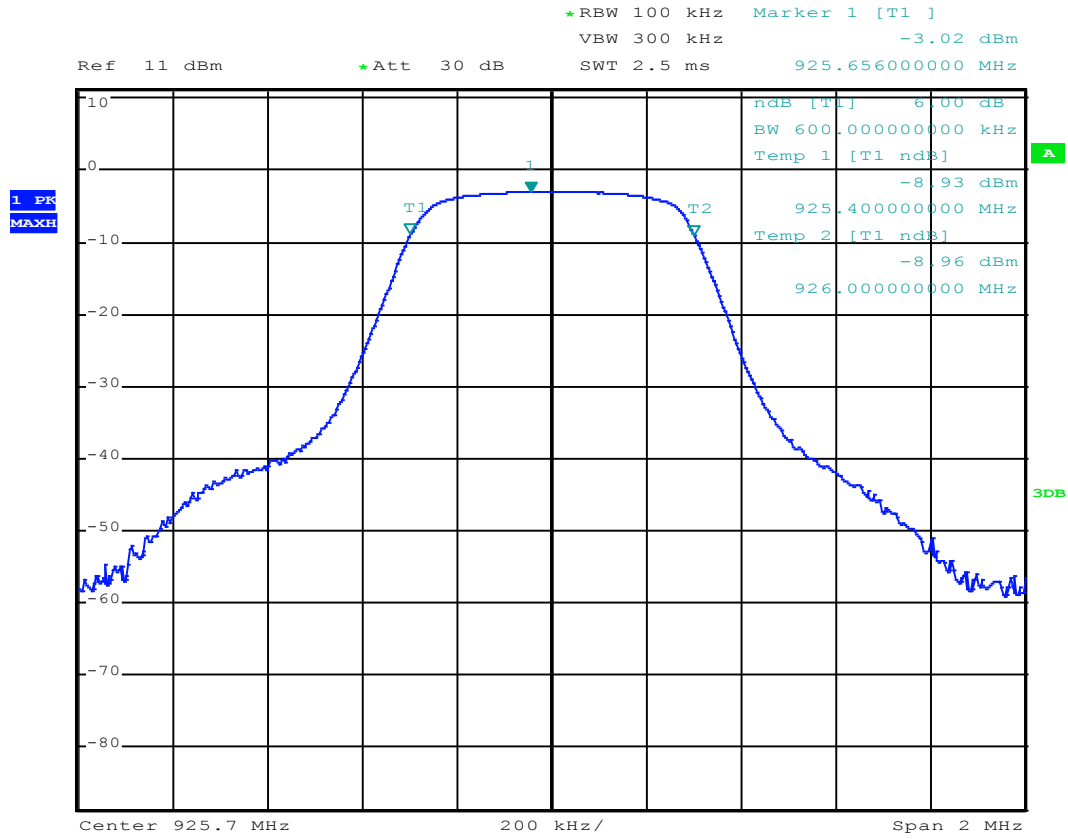
All measurement are realized with P Soft = PA3 MIX 15

SPREAD FACTOR 7

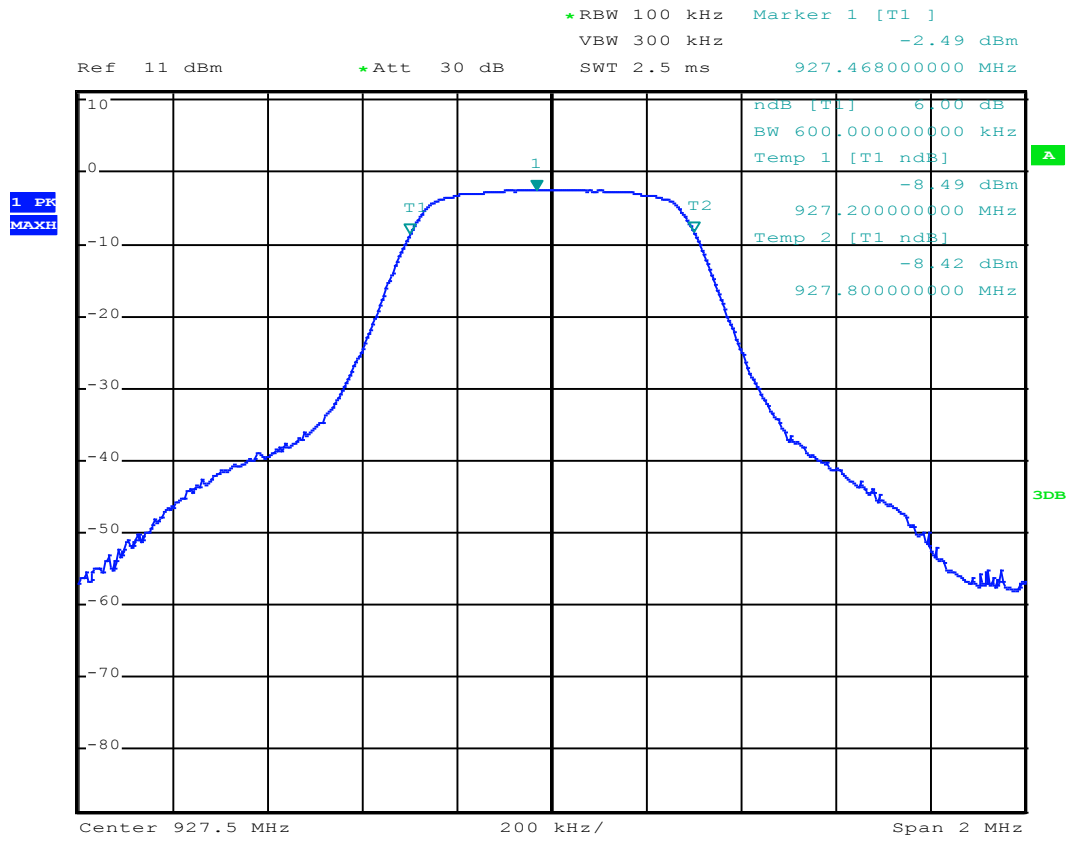
Frequency 923.3 MHz



Frequency 925.7 MHz



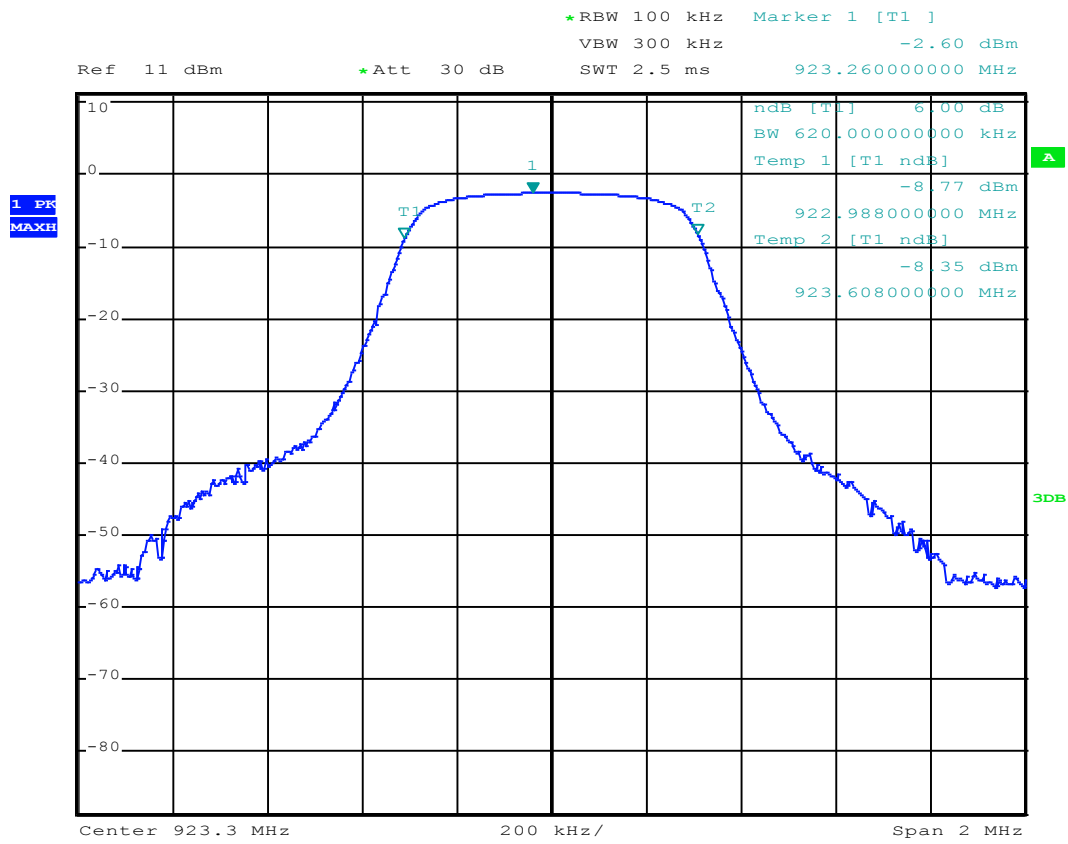
Frequency 927.5 MHz



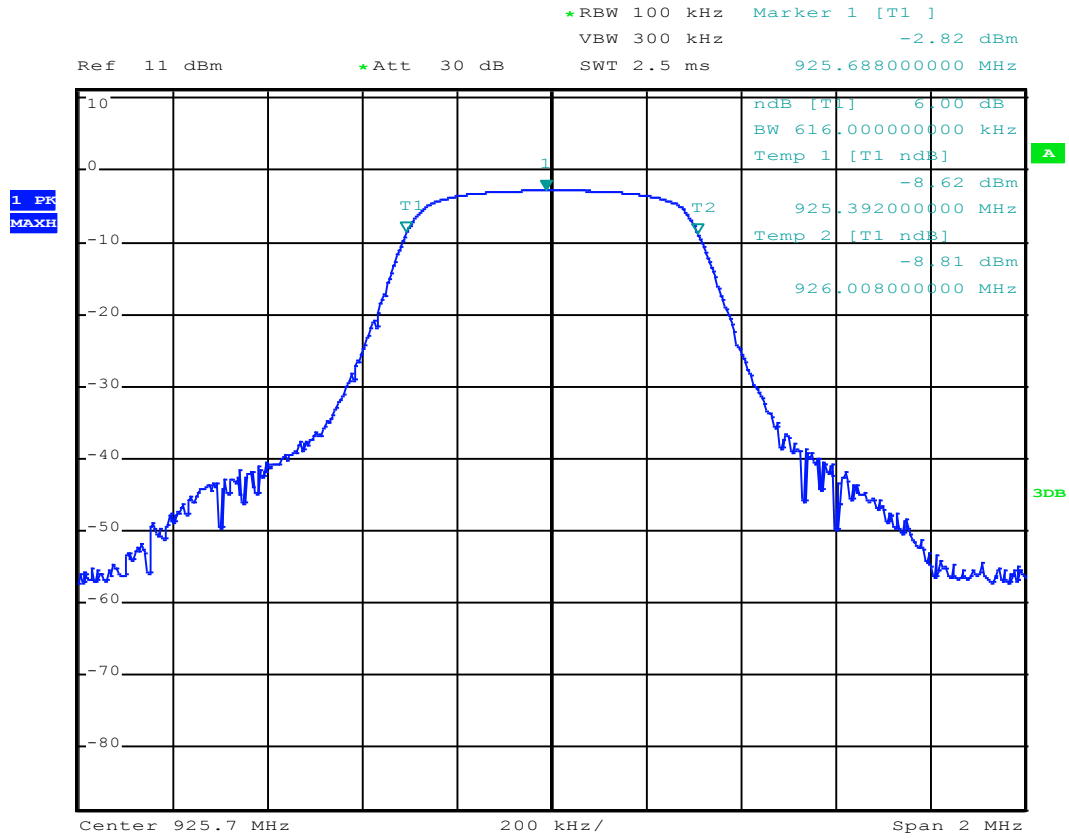


SPREAD FACTOR 12

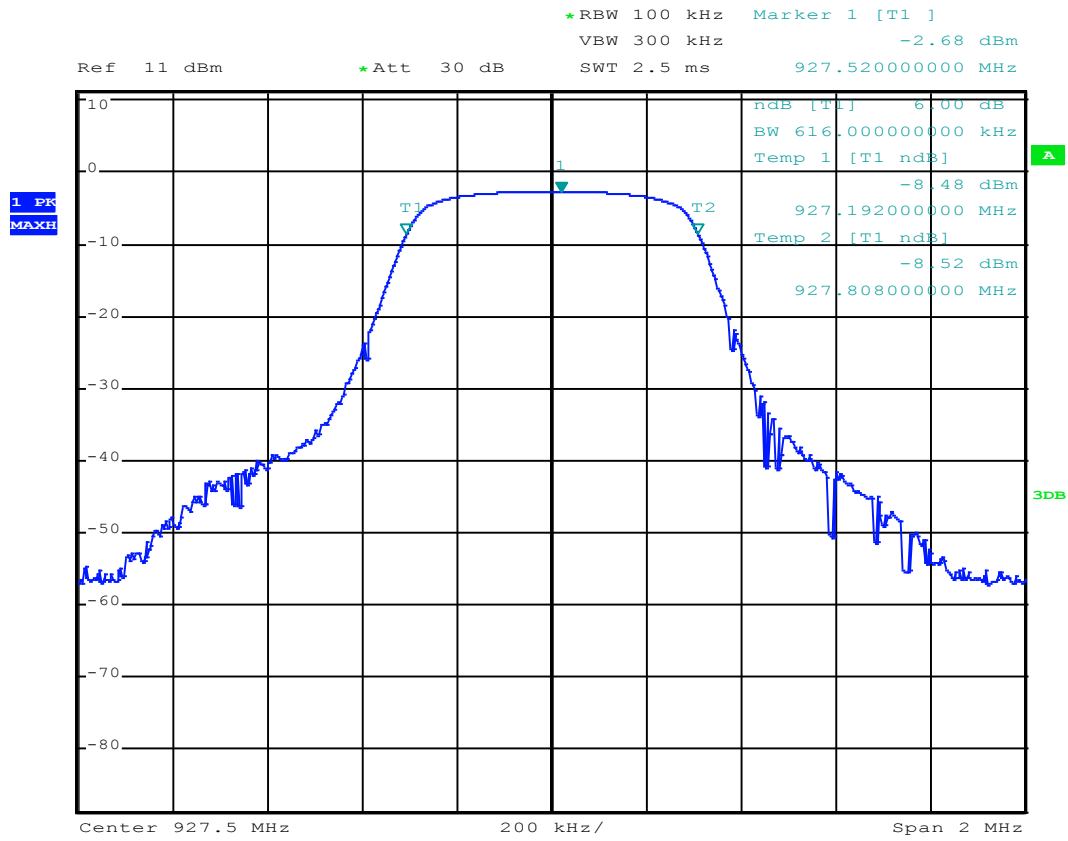
Frequency 923.3 MHz



Frequency 925.7 MHz



Frequency 927.5 MHz

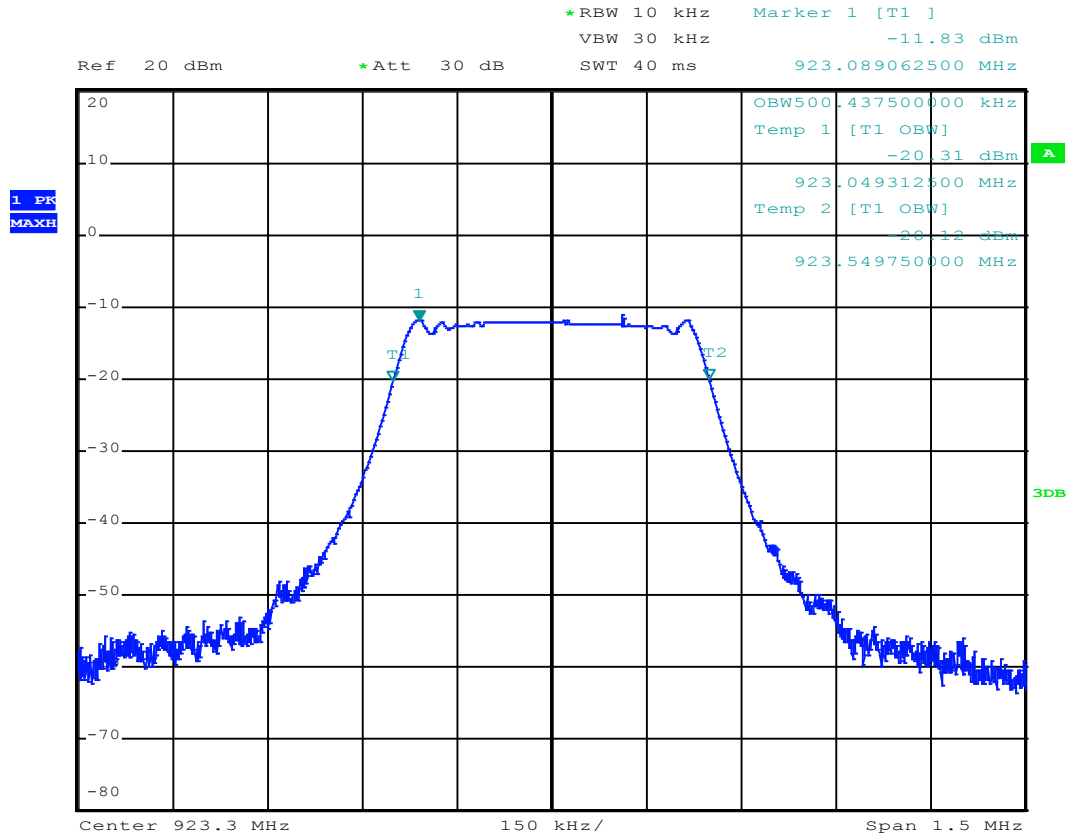


### APPENDIX 3: 99% bandwidth

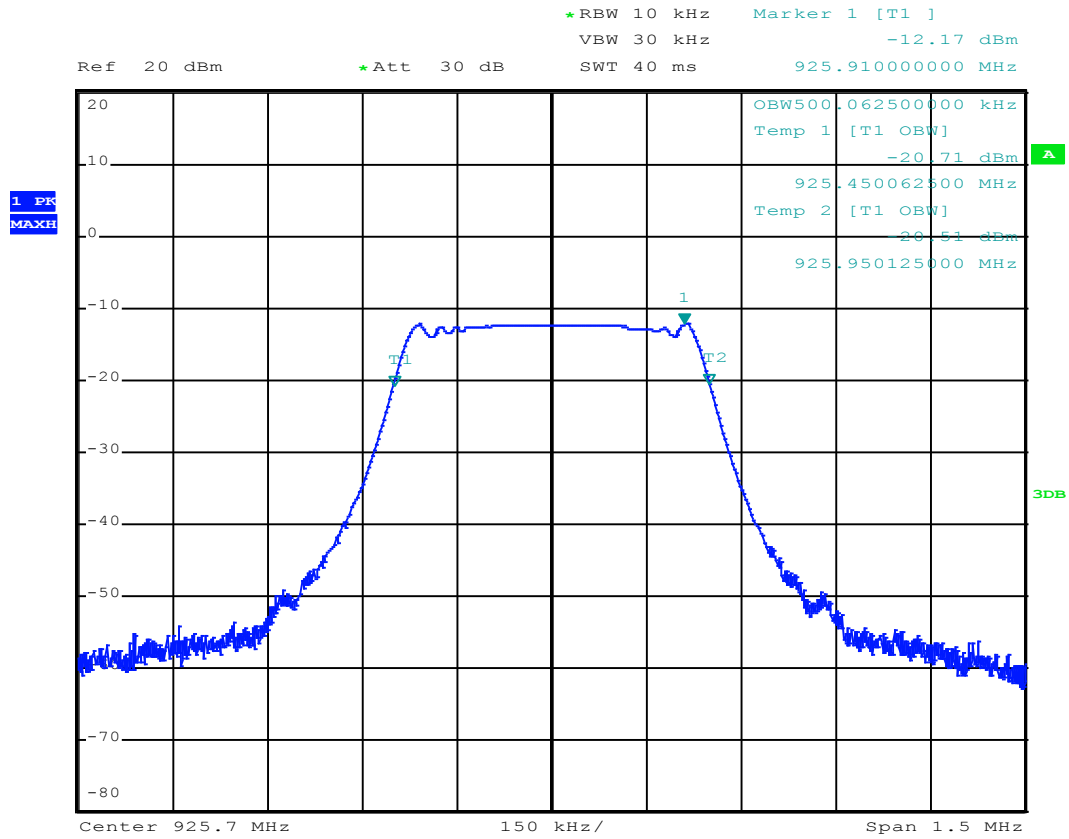
All measurement are realized with P Soft = PA3 MIX 15

SPREAD FACTOR 7

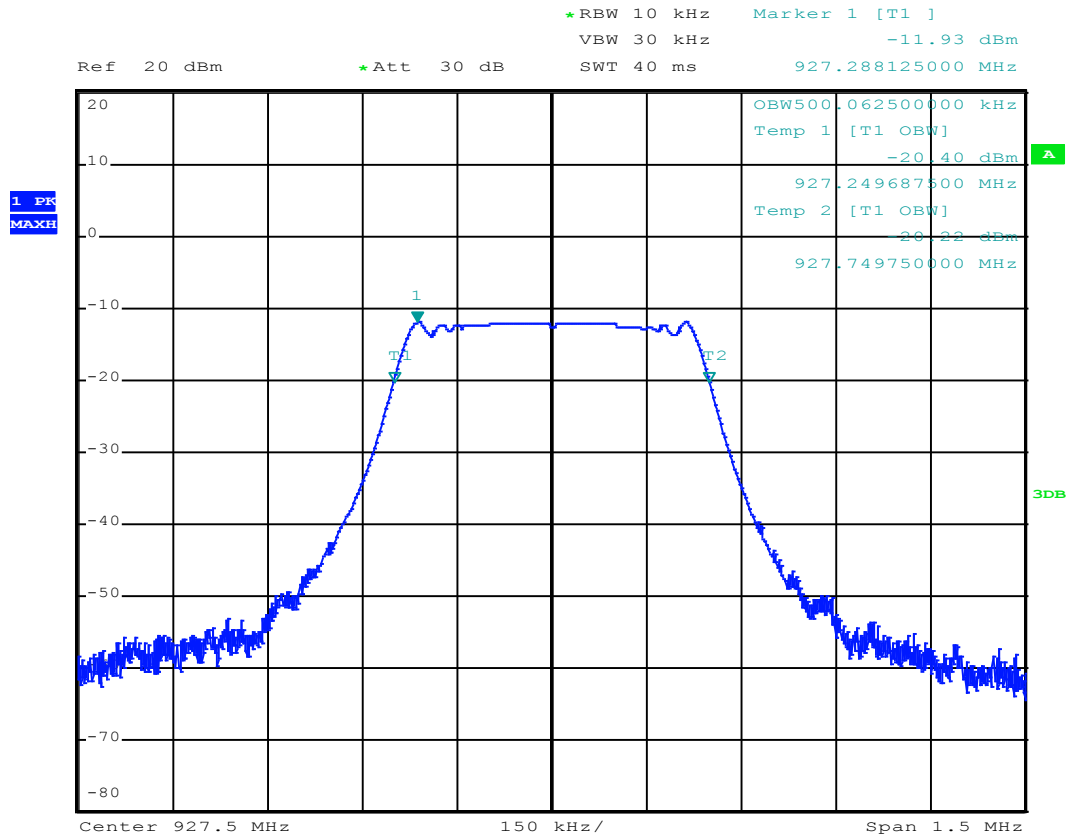
Frequency 923.3 MHz



Frequency 925.7 MHz

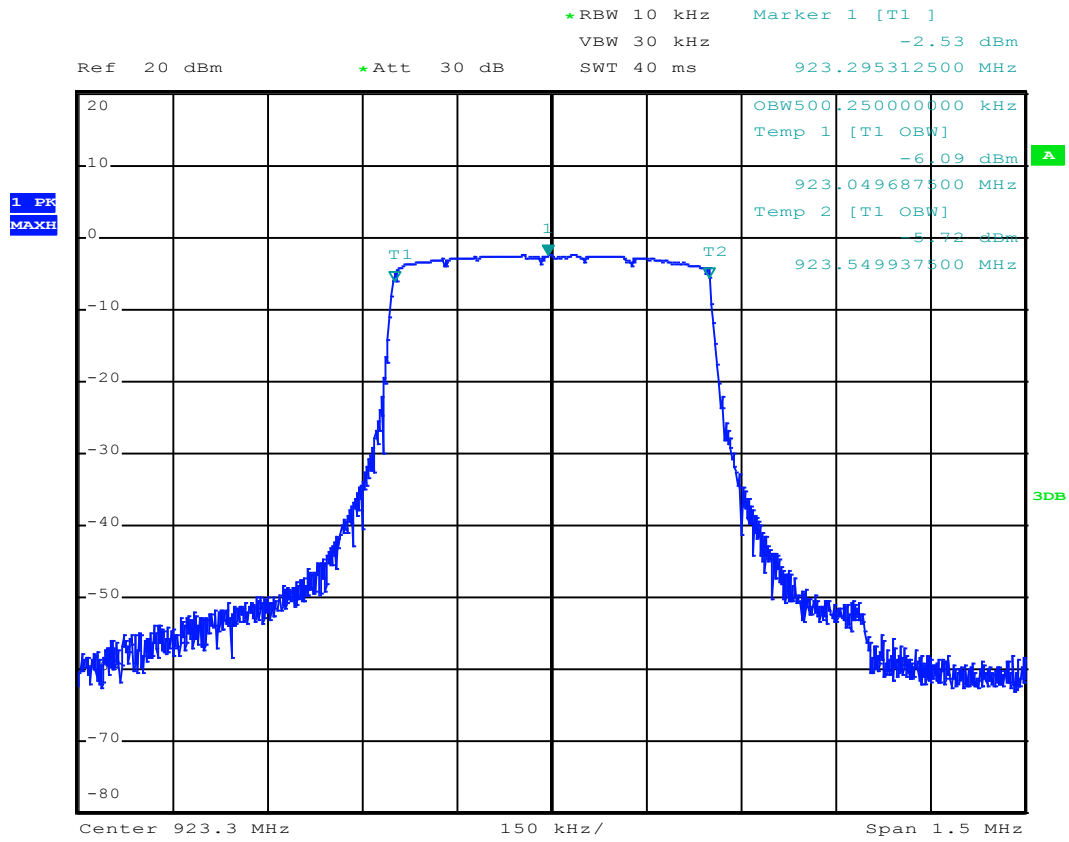


Frequency 927.5 MHz

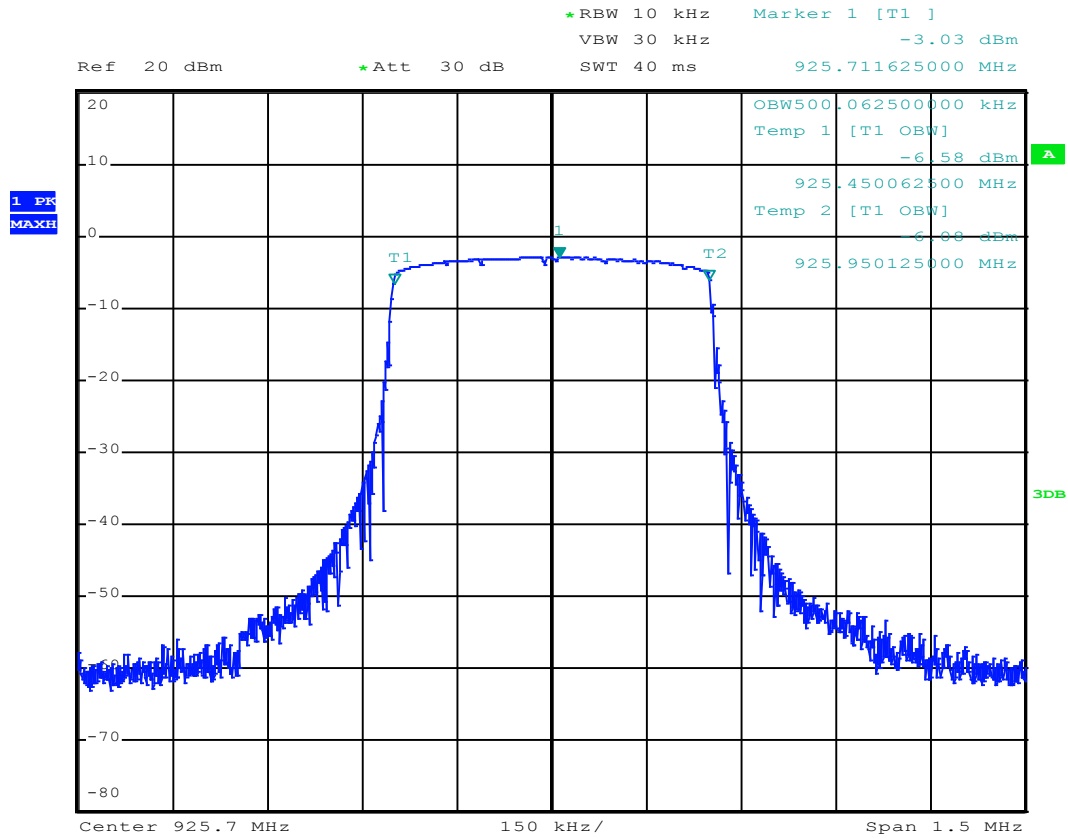


SPREAD FACTOR 12

Frequency 923.3 MHz

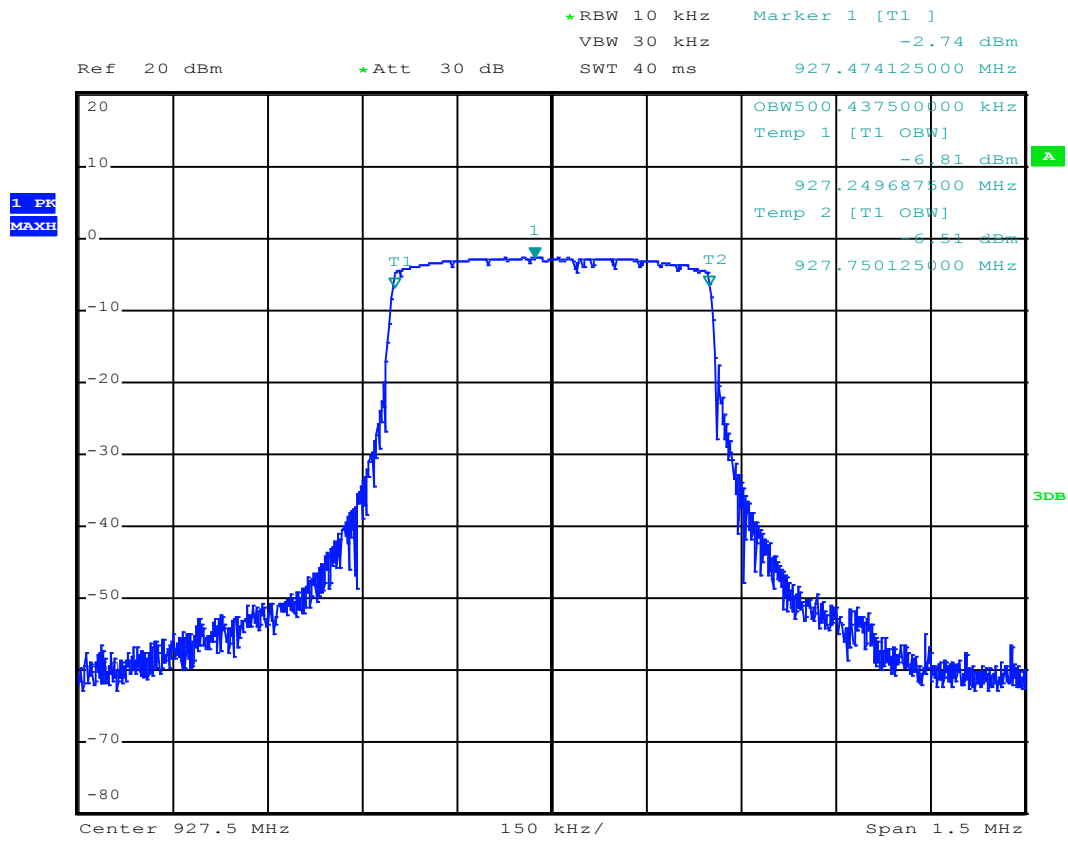


Frequency 925.7 MHz





Frequency 927.5 MHz

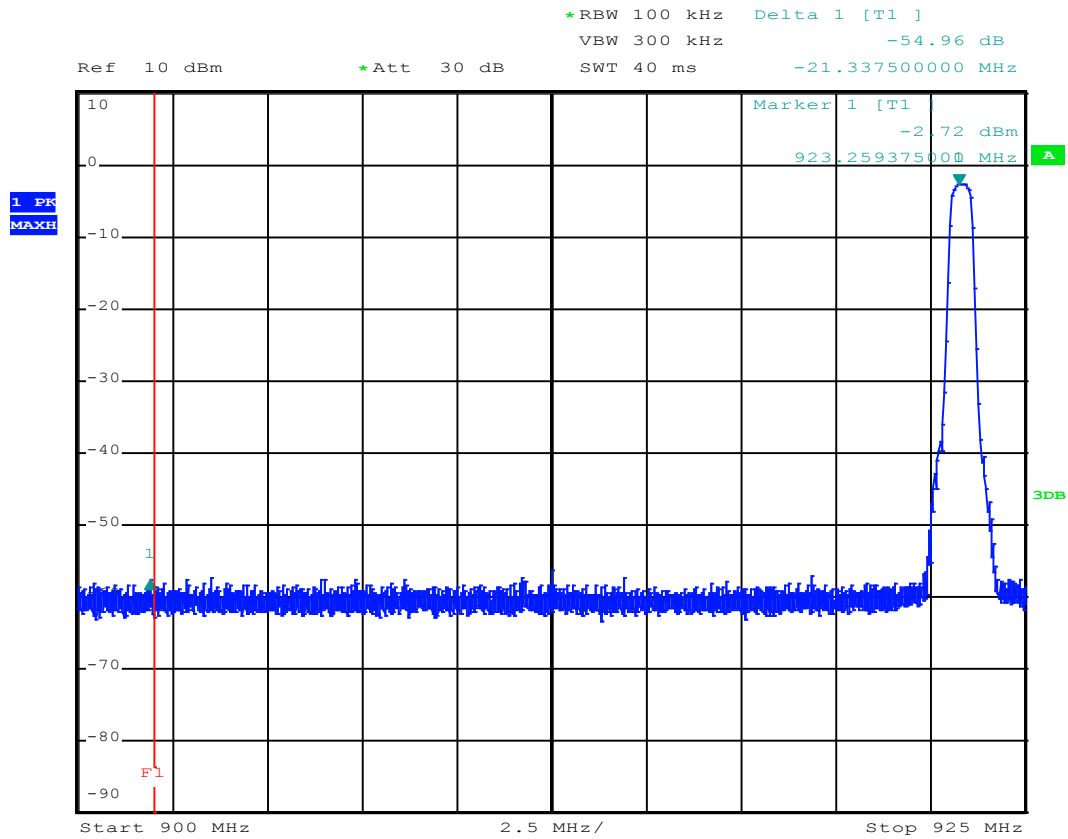


### APPENDIX 4: Band edge

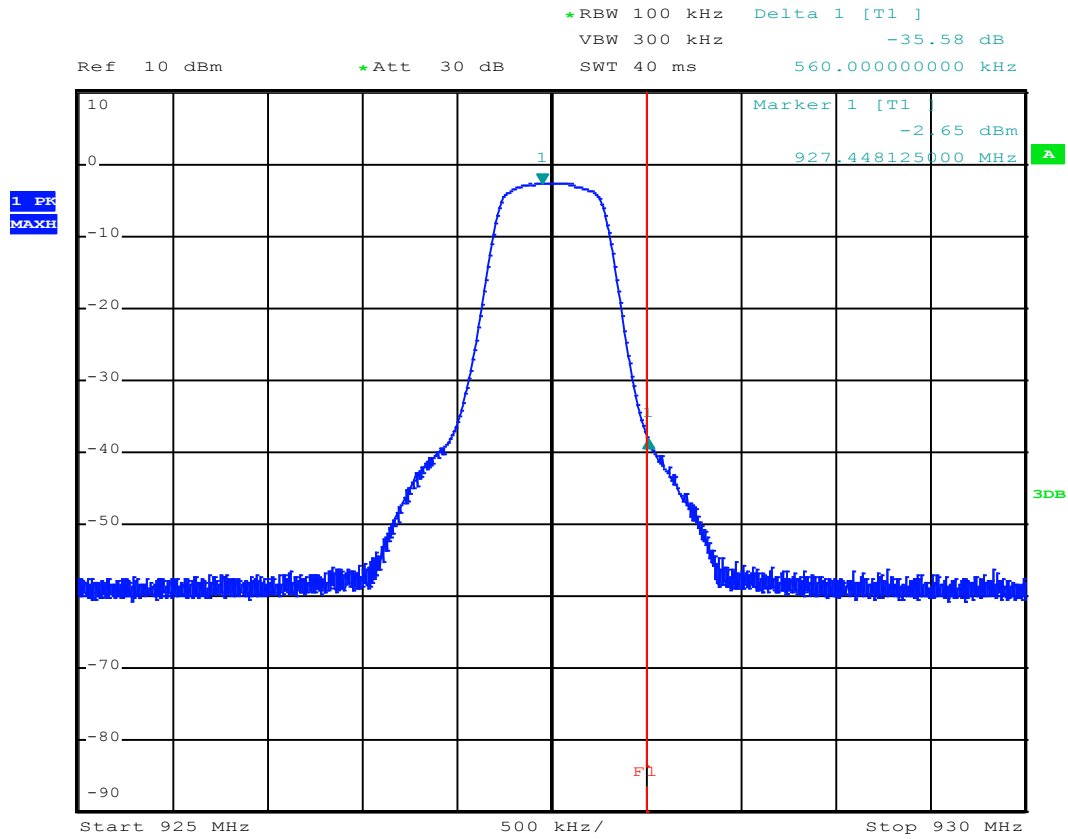
All measurement are realized with P Soft = PA3 MIX 15

SPREAD FACTOR 7

Frequency 923.3 MHz

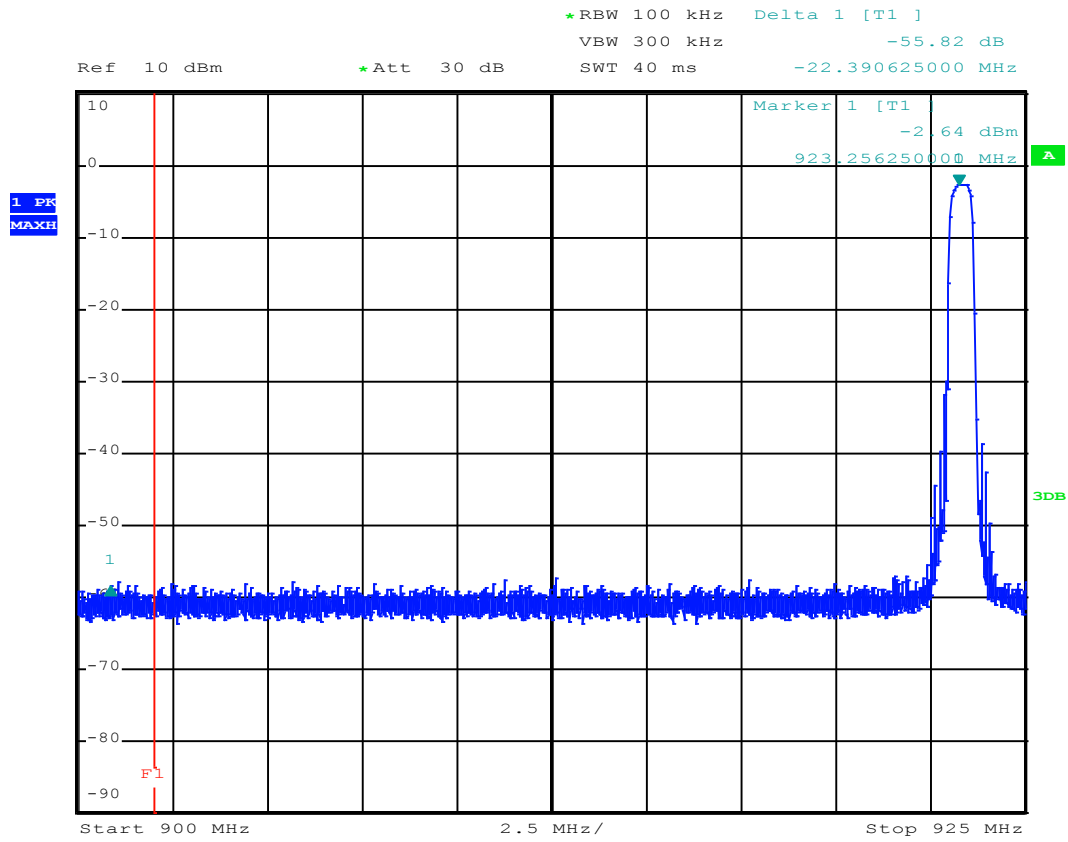


Frequency 927.5 MHz

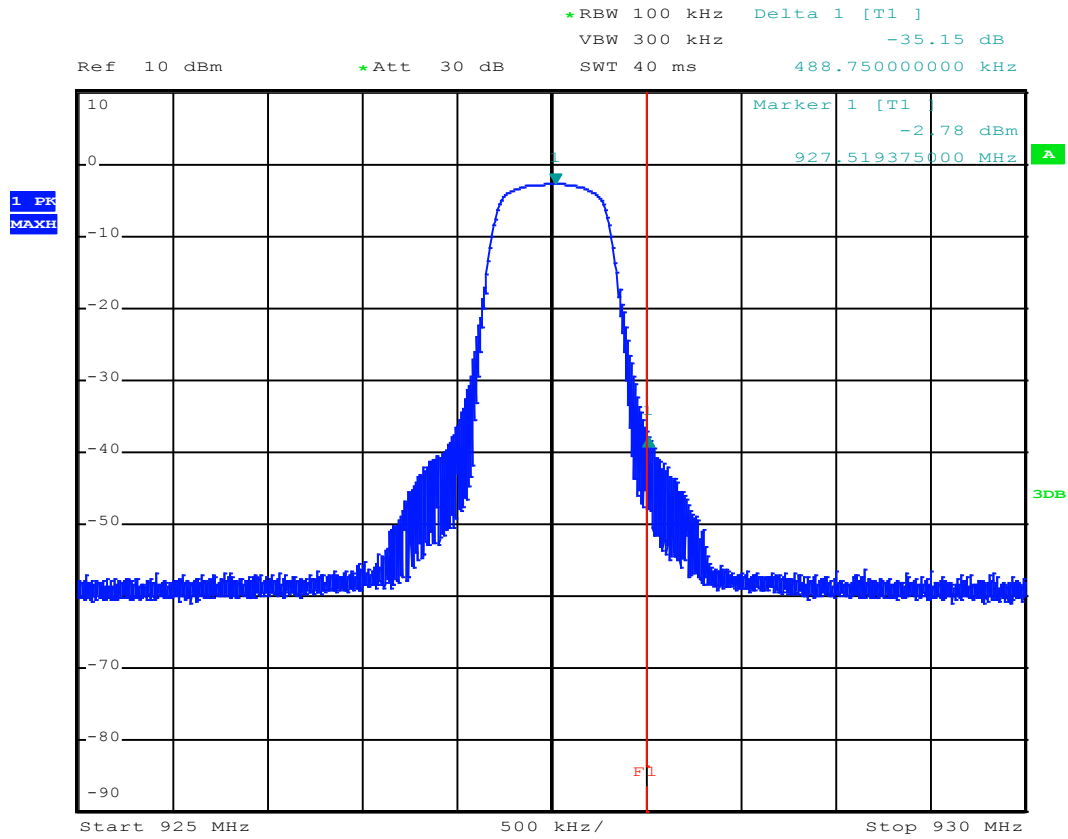


SPREAD FACTOR 12

Frequency 923.3 MHz



Frequency 927.5 MHz

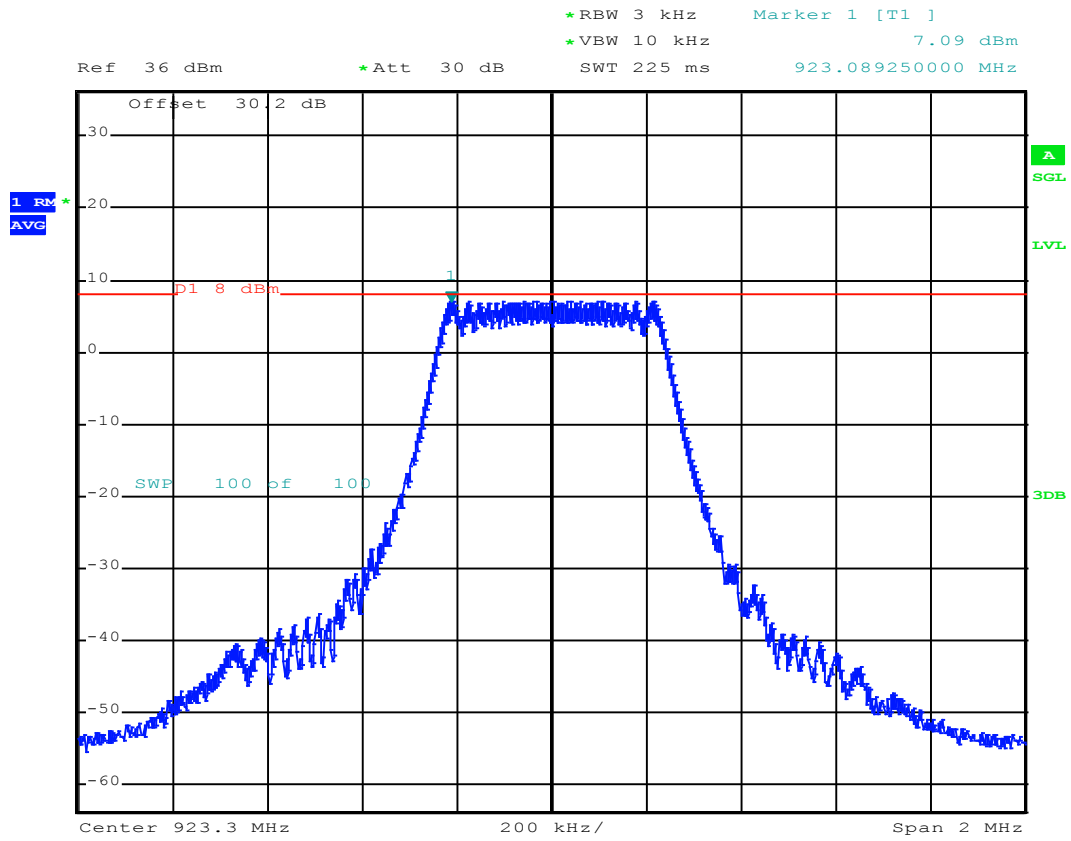


### APPENDIX 5: Spectral density

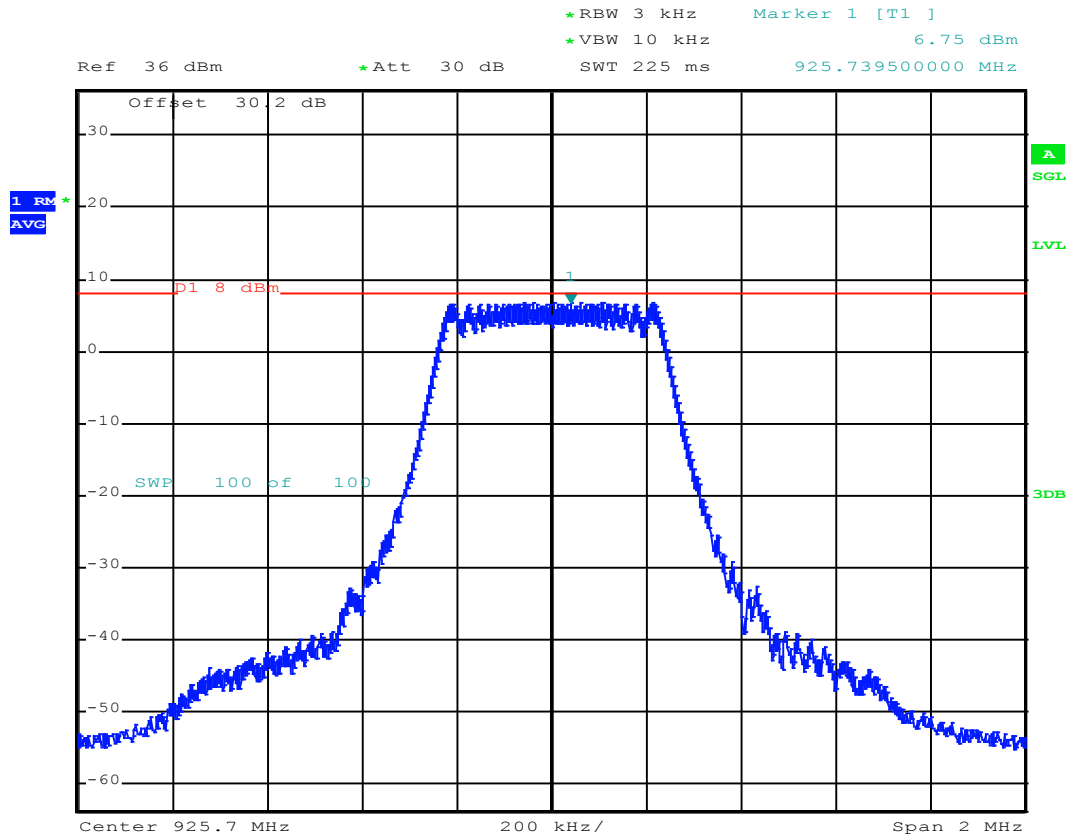
Measure realized with P Soft = PA3 MIX 15

SPREAD FACTOR 7

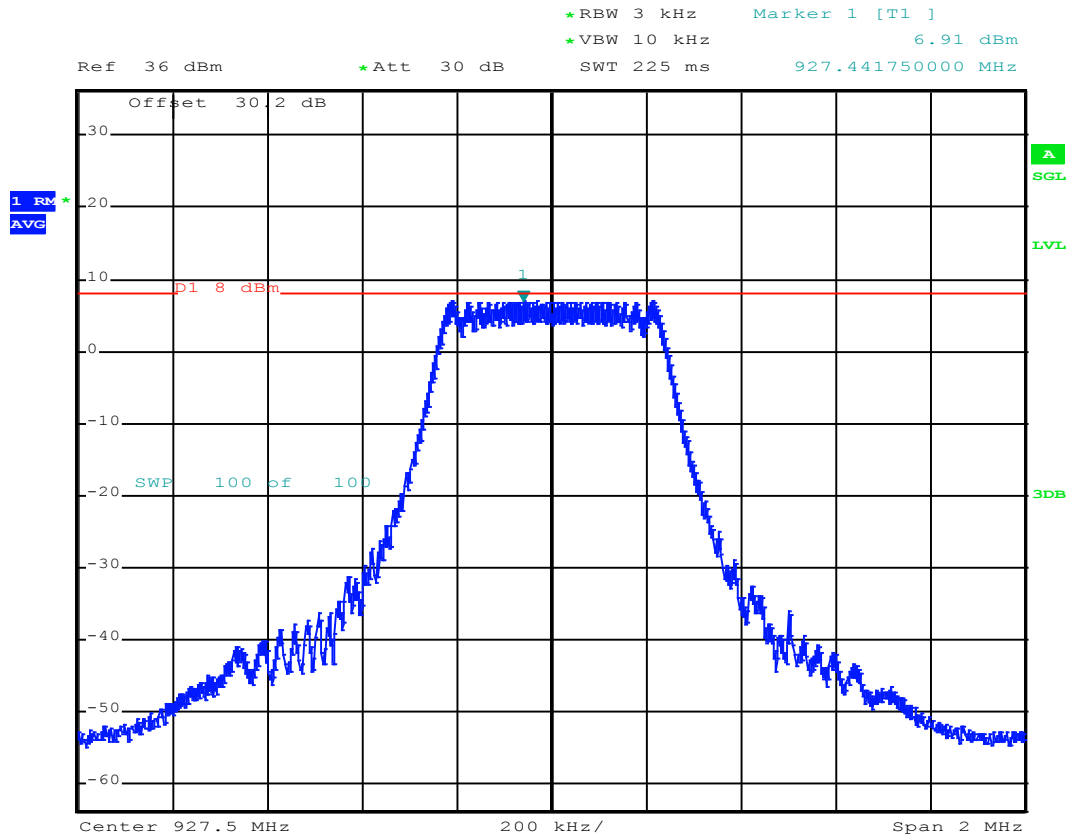
Frequency 923.3 MHz



Frequency 925.7 MHz



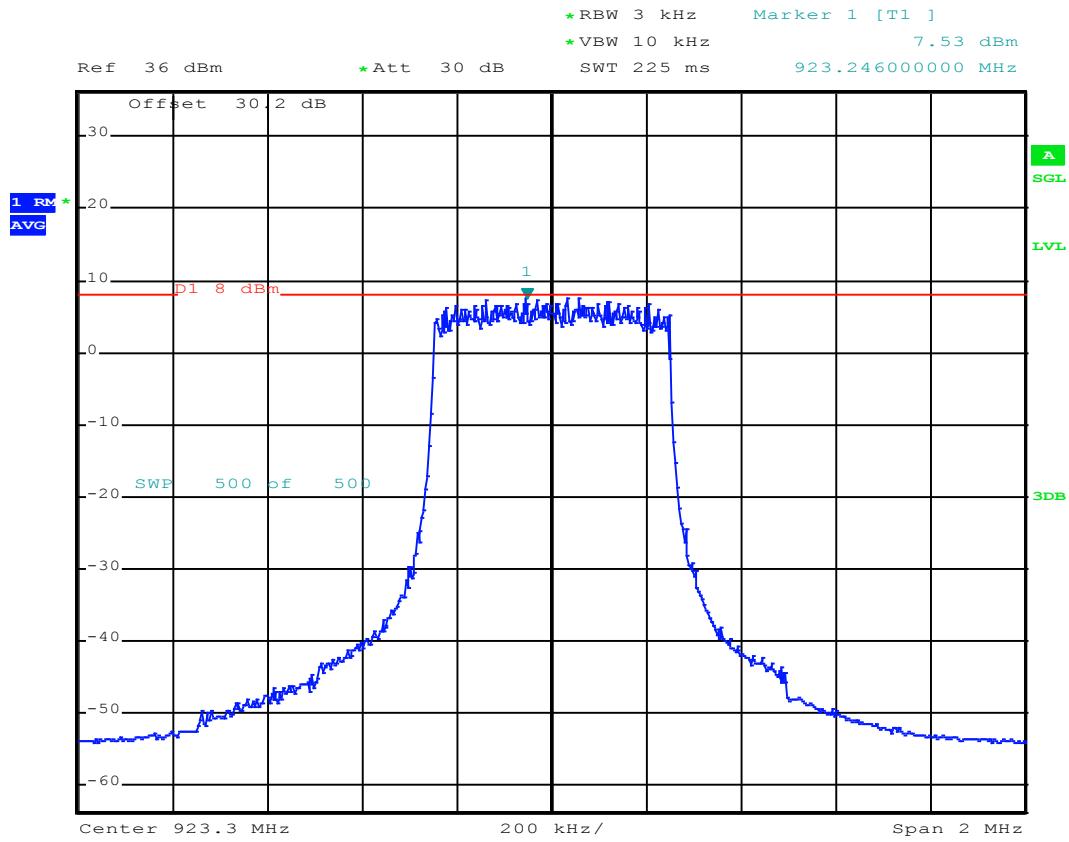
Frequency 927.5 MHz



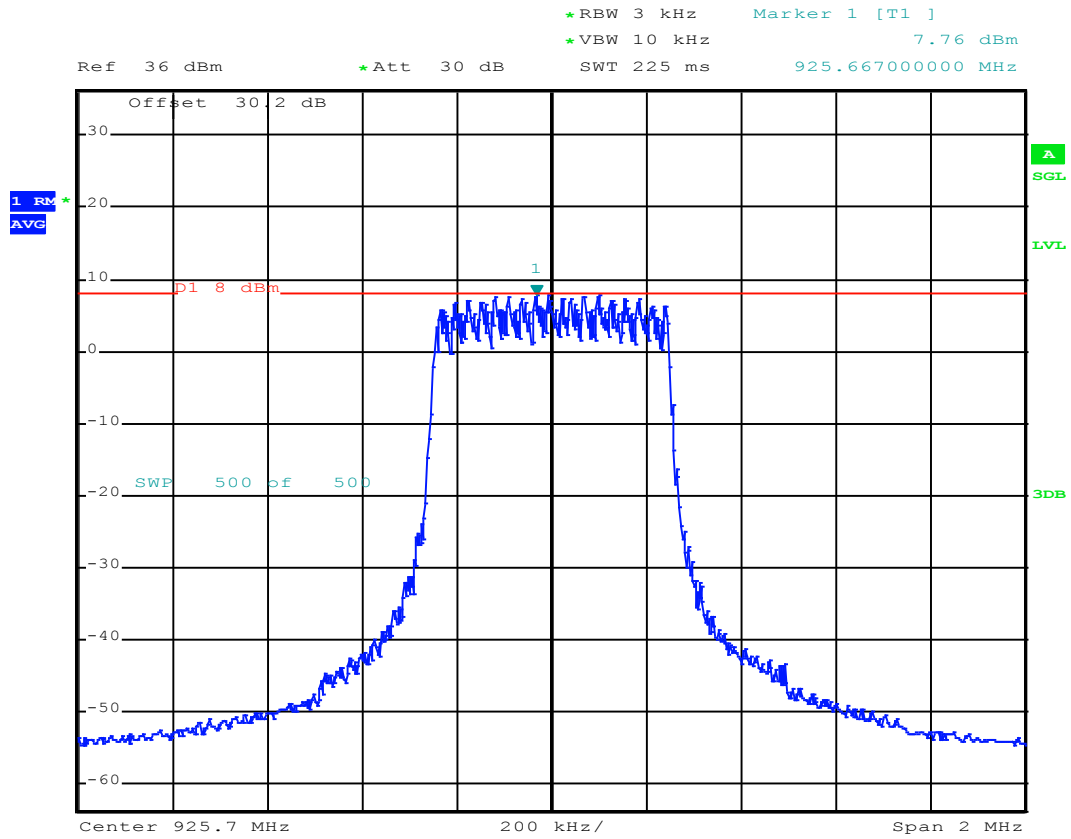


SPREAD FACTOR 12

Frequency 923.3 MHz



Frequency 925.7 MHz



Frequency 927.5 MHz

