

RR051-13-102084-3-A Ed. 0

<h2 style="margin: 0;">Certification test report</h2> <p style="margin: 10px 0;"><b>According to the standards:</b> CFR47 FCC part 15.247</p> <p style="margin: 10px 0;"><b>Equipment under test:</b> Base ZARB18W</p> <p style="margin: 10px 0;"><b>FCC ID:</b> Y7HZARB</p> <p style="margin: 10px 0;"><b>Company:</b> SCHNEIDER ELECTRIC INDUSTRIES</p>
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**DISTRIBUTION: Mr CHERBONNIER**

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Ed.	Date	Modified pages	Written by		Technical Verification and Quality Approval	
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0	27-JAN-2014	Creation	T. LEDRESSEUR	T.L		

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 This document is the result of testing a specimen or a sample of the product submitted. It does not imply an assessment of the conformity of the whole manufactured products of the tested sample.



**DESIGNATION OF PRODUCT:** Base ZARB 18 W

**Serial number (S/N):** 500 / 701

**Reference / model (P/N):** ZARB 18 W

**Software version:** Not communicated

**MANUFACTURER:** SCHNEIDER ELECTRIC INDUSTRIES

**COMPANY SUBMITTING THE PRODUCT:**

**Company:** SCHNEIDER ELECTRIC INDUSTRIES

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**DATES OF TEST:** between 18-NOV-2013 and 24-JAN-2014

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**TESTED BY:** T. LEDRESSEUR

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## **1. INTRODUCTION**

This document presents the result of RADIO test carried out on the following equipment: Base ZARB 18W, in accordance with normative reference.

## **2. PRODUCT DESCRIPTION**

Class:	Class B (Residential environment)
Antenna type and gain:	Internal antenna PIFA type (mechanical) area=25mmx25mm or external antenna wire type (about 7cm) with a 2m shielded cable and MCX internal connector (Gain: 4dBi)
Operating frequency range:	2400-2483.5 MHz
Number of channels:	37 during normal utilization mode +3 for pairing phase
Channel spacing:	2 MHz
Modulation:	D.S.S.S.
Power source:	24 Vdc to 240 Vdc or 24 Vac to 240 Vac

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 (2013)	Radio Frequency Devices
ANSI C63.4 (2003)	Methods of Measurement of Radio-Noise Emissions from Low- voltage Electrical and Electronics Equipment in the range of 9 kHz to 40 GHz.
KDB 558074 D01 DTS Meas Guidance v03r01.	Guidance for Performing Compliance on Digital Transmission Systems Operating under §15.247

#### **4. TEST METHODOLOGY**

Radio performance tests procedures given in CFR 47 part 15:

Subpart B –Unintentional Radiators

Paragraph 107: Conducted limits

Paragraph 109: Radiated emission limits

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 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 verification	Next verification	Validity
0	BAT-EMC	Software	/	/	/
1922	Microwave DB C020180F-4B1	Low-noise amplifier 1 to 18 GHz	12/09/2013	12/09/2014	12/11/2014
1939	IMC WR42	Horn antenna	20/04/2012	20/04/2016	20/06/2016
1940	IMC WR42	Horn antenna	20/04/2012	20/04/2016	20/06/2016
3036	ALC Microwave ALN02-0102	Low-noise amplifier	04/04/2013	04/04/2014	04/06/2014
4087	Filtek LP03/1000-7GH	Low-pass filter	24/01/2012	24/01/2014	24/03/2014
7299	Microtronics BRM50702	reject band filter	25/10/2013	25/10/2015	25/12/2015
8262	Filtek HP12/3200-5AA	High pass filter	31/07/2013	31/07/2015	30/09/2015
8508	California instruments 1251RP	Power source	29/08/2013	29/08/2014	29/10/2014
8511	HP 8447D	Low noise preamplifier	22/08/2013	22/08/2014	22/10/2014
8523	R&S FSEM30	Spectrum analyzer	07/09/2012	07/09/2014	07/11/2014
8524	HP 8591EM	Test receiver	30/07/2013	30/07/2015	30/09/2015
8526	Schwarzbeck VHBB 9124	Biconical antenna	12/06/2012	12/06/2016	12/08/2016
8528	Schwarzbeck VHA 9103	Biconical antenna	24/09/2013	24/09/2017	24/11/2017
8533	R&S HFH2-Z2	Loop antenna	01/05/2012	01/05/2014	01/07/2014
8535	Emco 3115	Horn antenna	29/10/2012	29/10/2016	29/12/2016
8543	Schwarzbeck UHALP 9108A	Log periodic antenna	12/06/2012	12/06/2016	12/08/2016
8593	SIDT Cage 2	Full anechoic room	/	/	/
8635	R&S EZ-25	High-pass filter	24/05/2012	24/05/2014	24/07/2014
8641	SECRE ETP232	High-pass filter	12/03/2013	12/03/2015	12/05/2015
8671	HUGER	Meteo station	20/07/2012	20/07/2014	20/09/2014
8675	AOIP MN5102B	Multimeter	15/01/2013	15/01/2015	15/03/2015
8707	R&S ESI7	Test receiver	03/10/2012	03/10/2014	03/12/2014
8719	Thurbly Thandar Instruments 1600	LISN	28/05/2012	28/05/2014	28/07/2014
8732	Emitech	OATS	23/08/2013	23/08/2016	23/10/2016
8750	La Crosse Technology WS-9232	Meteo station	20/07/2012	20/07/2014	20/09/2014
8893	Emitech	Outside room	/	/	/
8896	ACQUISYS GPS8	Satellite synchronized frequency standard	/	/	/
9489	Absorber sheath current	Emitech	14/09/2012	14/09/2014	14/11/2014

## 6. TESTS AND CONCLUSIONS

### 6.1 unintentional radiator (subpart B)

Test procedure	Description of test	Respected criteria?				Comment
		Yes	No	NAp	NAs	
FCC Part 15.107	CONDUCTED LIMITS	X				
FCC Part 15.109	RADIATED EMISSION LIMITS	X				

NAp: Not Applicable    NAs: Not Asked

### 6.2 intentional radiator (subpart C)

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 15.215	ADDITIONAL PROVISIONS TO THE GENERAL RADIATED EMISSION LIMITATIONS					
	(a) <i>Alternative to general radiated emission limits</i>	X				
	(b) <i>Unwanted emissions outside of §15.247 frequency bands</i>	X				Note 3
	(c) <i>20 dB bandwidth and band-edge compliance</i>	X				
FCC Part 15.247	OPERATION WITHIN THE BANDS 902-928 MHZ, 2400-2483.5 MHz and 5725-5850 MHz					
	(a) (1) <i>Hopping systems</i>			X		
	(a) (2) <i>Digital modulation techniques</i>	X				
	(b) <i>Maximum peak output power</i>	X				Note 4
	(c) <i>Operation with directional antenna gains &gt; 6 dBi</i>			X		
	(d) <i>Intentional radiator</i>	X				
	(e) <i>Peak power spectral density</i>	X				
	(f) <i>Hybrid system</i>			X		
	(g) <i>Frequency hopping requirements</i>			X		
	(h) <i>Frequency hopping intelligence</i>			X		
	(i) <i>RF exposure compliance</i>	X				Note 5

NAp: Not Applicable    NAs: Not Asked

Note 1: Integral and dedicated antenna (internal MCX connector). Professionally installed equipment.

Note 2: See FCC part 15.247 (d).

Note 3: See FCC part 15.209. Unwanted emissions levels are all below the fundamental emission field strength level.

Note 4: Conducted measurement is not possible (integral antenna), so we used the radiated method in open field.

Note 5:  $PSD = EIRP / (4 * \pi * R^2) = 9.48 / (4 * \pi * (20 \text{ cm})^2) = 0.0018 \text{ mW/cm}^2$  (limit =  $1 \text{ mW/cm}^2$ ).

The equipment fulfils the requirements on power density for general population/uncontrolled exposure and therefore fulfils the requirements of 47 CFR §1.1310.

« To declare, or not, the compliance with the specifications, it was not explicitly taken into account of uncertainty associated with the results »



## **7. MEASUREMENT OF THE CONDUCTED DISTURBANCES**

**Standard:** FCC Part 15

**Test procedure:** Paragraph 15.107

**Limits:** Class B

**Software used:** BAT-EMC V3.6.0.32

**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.

See photos in appendix 2

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

**Detection mode:** Peak / Average

**Bandwidth:** 10 kHz / 9kHz

**Equipment under test operating condition:**

The equipment is blocked in reception mode.  
The measure is realized with internal antenna, the most critical powerful configuration.

**Results:**

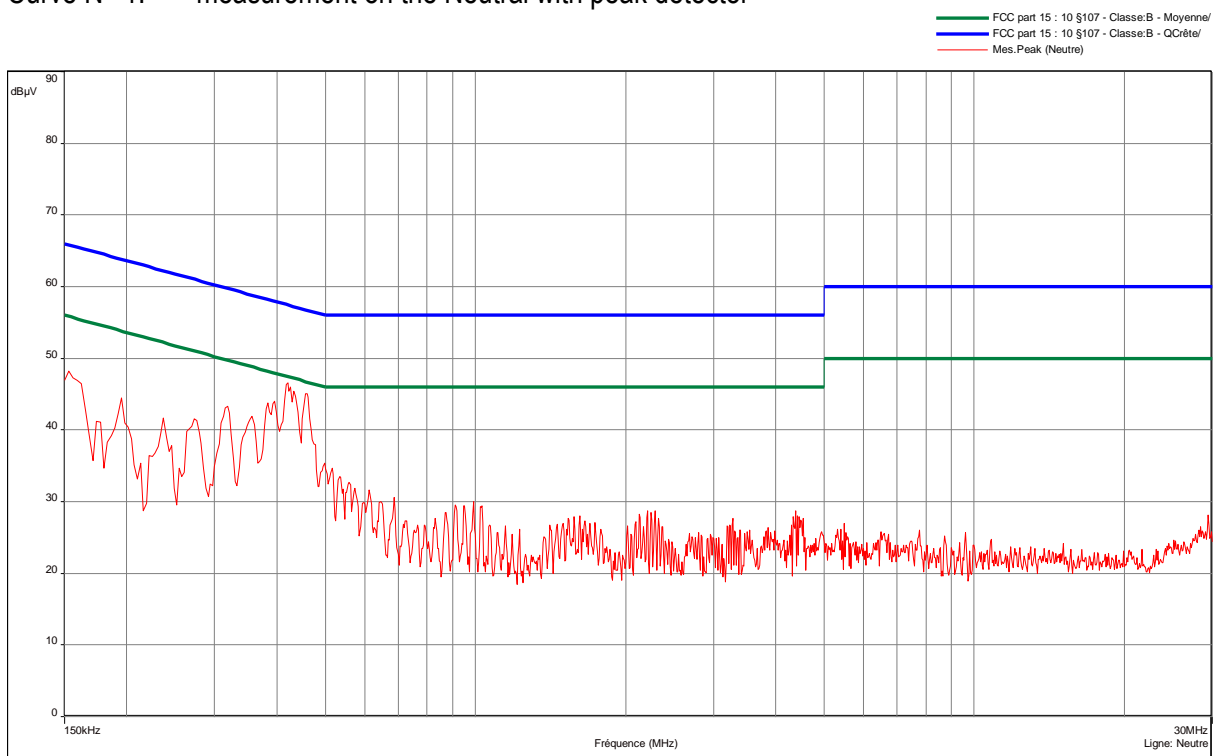
Ambient temperature (°C): 20.6  
 Relative humidity (%): 44

Sample N° 1:

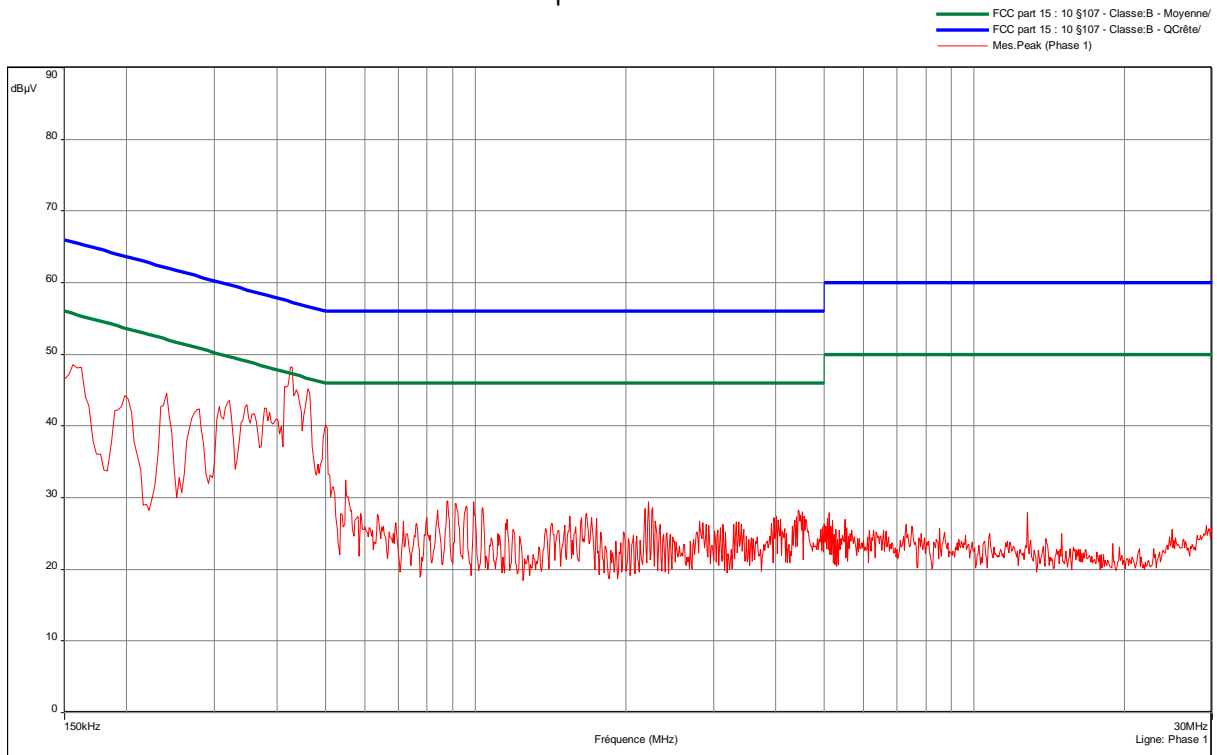
**Measurement on the mains power supply:**

The measurement is first realized with Peak detector.

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

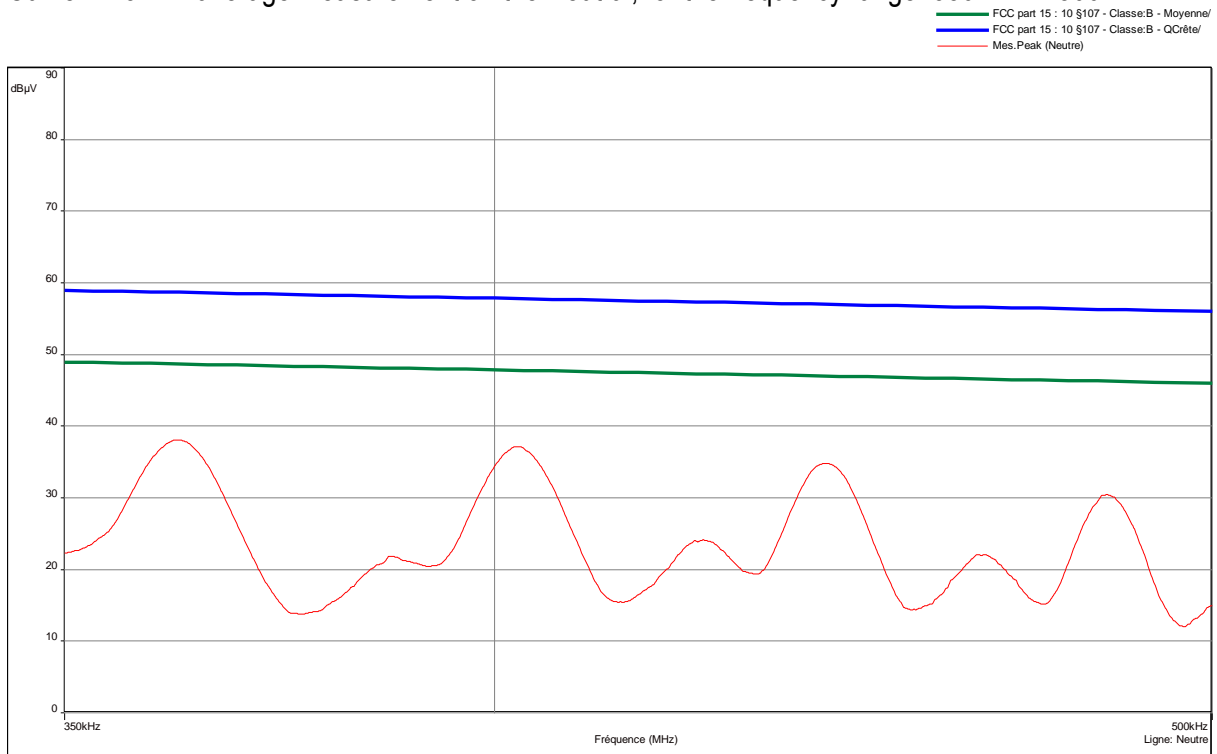


Curve N° 2: measurement on the Line with peak detector



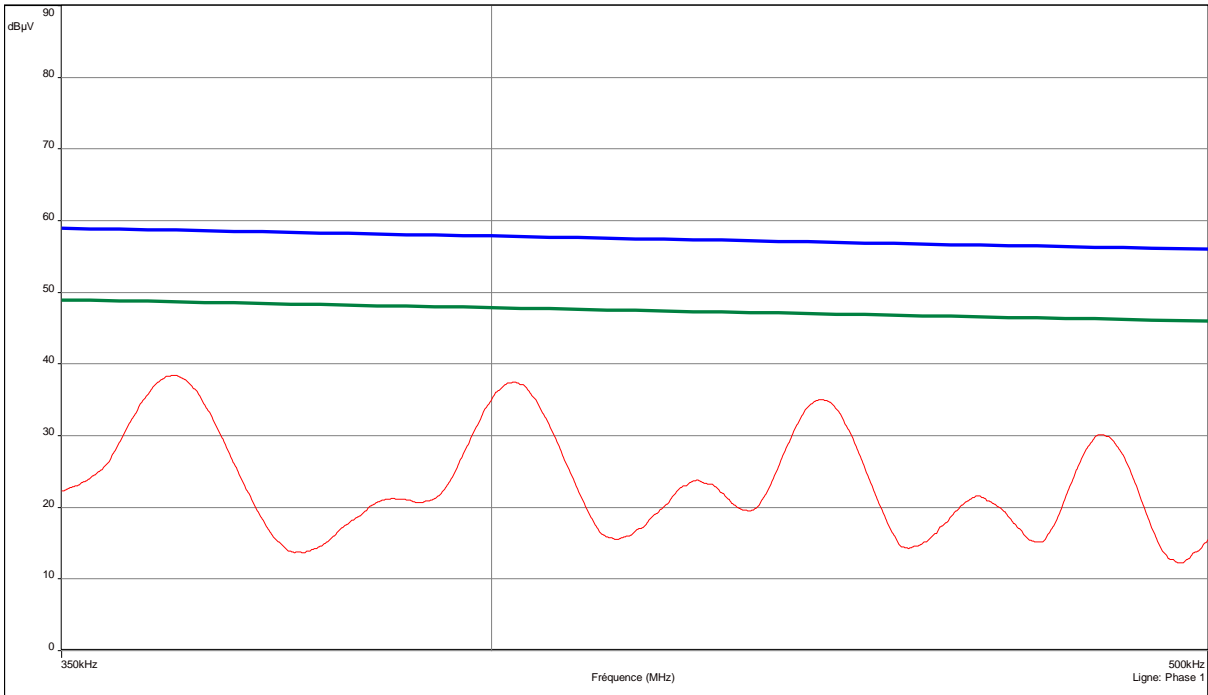
The frequencies which are not 6 dB under the Average limit are then analyzed with Average detector.

Curve N° 3: average measurement on the Neutral, for the frequency range: 350 kHz – 500 kHz



Curve N° 4: average measurement on the Line, for the frequency range: 350 kHz – 500 kHz

— FCC part 15 : 10 §107 - Classe:B - Moyenne/  
— FCC part 15 : 10 §107 - Classe:B - QCrête/  
— Mes.Peak (Phase 1)



**Test conclusion:**

RESPECTED STANDARD

## **8. RADIATED EMISSION LIMITS**

**Standard:** FCC Part 15

**Test procedure:** paragraph 109

**Limit class:** Class B

### **Test set up:**

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, 1.5m from a ground plane.

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

See photos in appendix 2.

**Frequency range:** From 30 MHz to 12.4GHz (5<sup>th</sup> harmonic of the highest frequency used)

**Detection mode:** Quasi-peak (F < 1 GHz)                      Average (F > 1 GHz)

**Bandwidth:** 120 kHz (F < 1 GHz)                              1 MHz (F > 1 GHz)

**Distance of antenna:** 3 meters

**Antenna height:** 1 to 4 meters

**Antenna polarization:** vertical and horizontal (only the highest level is recorded)

### **Equipment under test operating condition:**

The equipment is blocked in reception mode.

The measure is realized with internal antenna and repeated with external antenna

**Results:**

Ambient temperature (°C): 21.5  
Relative humidity (%): 32

Power source: 120Vac – 60 Hz

**Sample N° 1** Low channel

Not any spurious has been detected.

Applicable limits: for 30 MHz ≤ F ≤ 88 MHz:	40 dB $\mu$ V/m at 3 meters
for 88 MHz < F ≤ 216 MHz:	43.5 dB $\mu$ V/m at 3 meters
for 216 MHz < F ≤ 960 MHz:	46 dB $\mu$ V/m at 3 meters
Above 960 MHz:	54 dB $\mu$ V/m at 3 meters

**Sample N° 1** central channel

Not any spurious has been detected.

Applicable limits: for 30 MHz ≤ F ≤ 88 MHz:	40 dB $\mu$ V/m at 3 meters
for 88 MHz < F ≤ 216 MHz:	43.5 dB $\mu$ V/m at 3 meters
for 216 MHz < F ≤ 960 MHz:	46 dB $\mu$ V/m at 3 meters
Above 960 MHz:	54 dB $\mu$ V/m at 3 meters

**Sample N° 1** High channel

Applicable limits: for 30 MHz ≤ F ≤ 88 MHz:	40 dB $\mu$ V/m at 3 meters
for 88 MHz < F ≤ 216 MHz:	43.5 dB $\mu$ V/m at 3 meters
for 216 MHz < F ≤ 960 MHz:	46 dB $\mu$ V/m at 3 meters
Above 960 MHz:	54 dB $\mu$ V/m at 3 meters

Note: any spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported.

**Test conclusion:**

RESPECTED STANDARD

## **9. MEASUREMENT OF THE CONDUCTED DISTURBANCES**

**Standard:** FCC Part 15

**Test procedure:** Paragraph 15.207

**Software used:** BAT-EMC V3.6.0.32

### **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.

See photos in appendix 2

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

**Detection mode:** 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 internal antenna, the most critical powerful configuration.

**Results:**

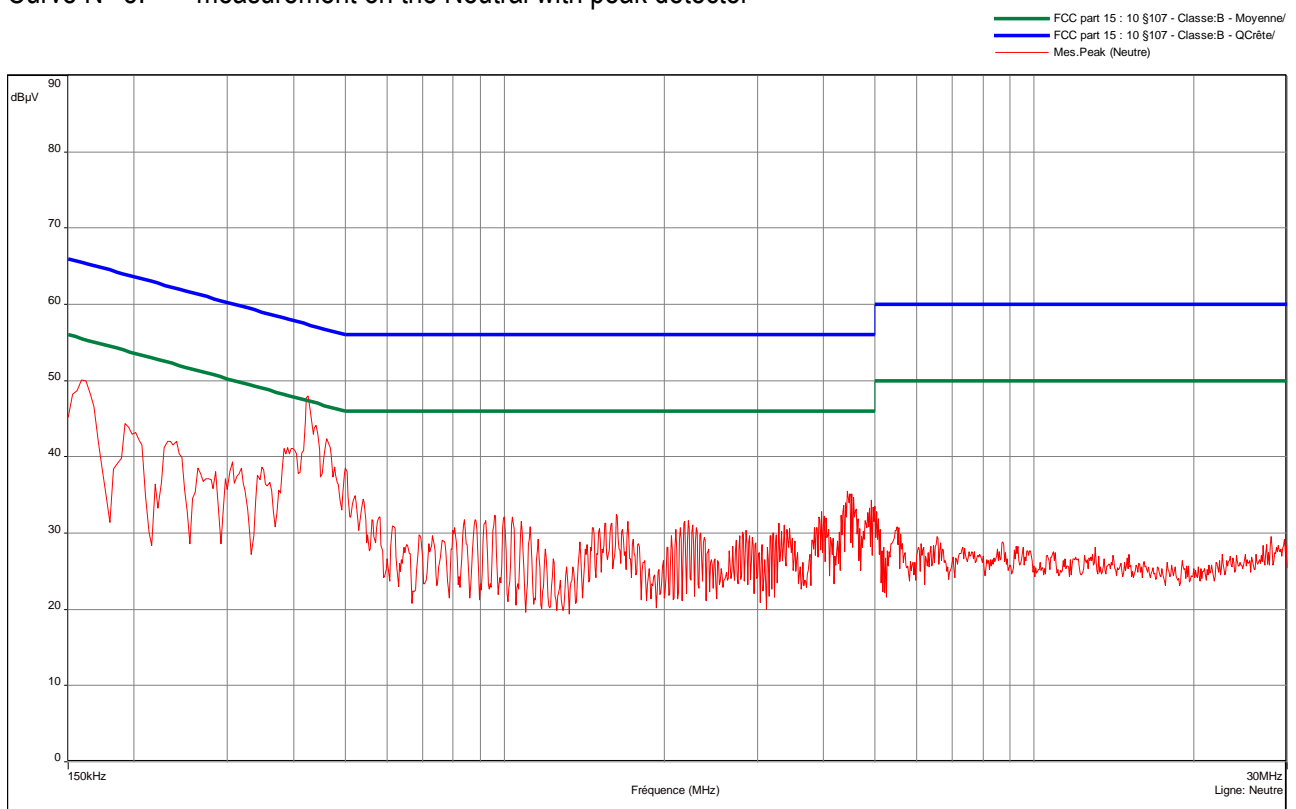
Ambient temperature (°C): 20.6  
 Relative humidity (%): 44

Sample N° 1: central channel

**Measurement on the mains power supply:**

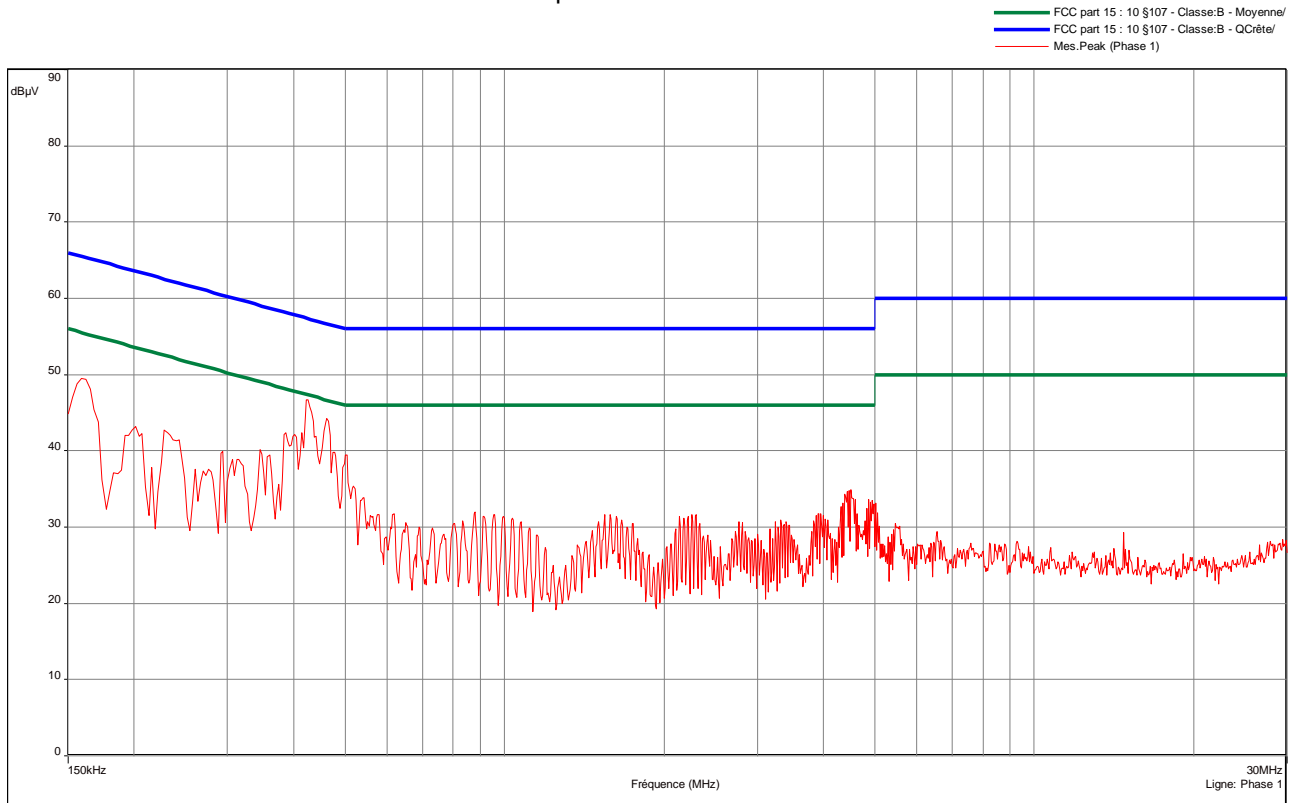
The measurement is first realized with Peak detector.

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



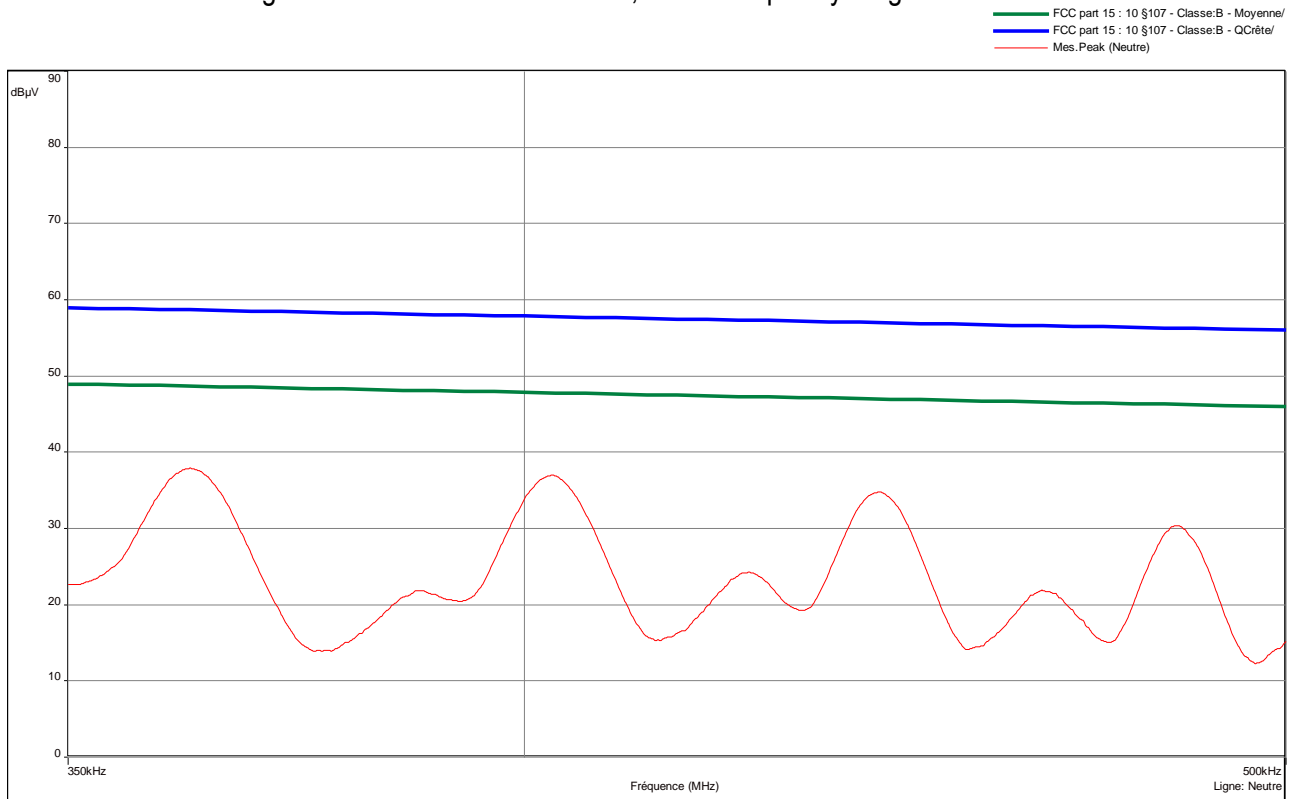


Curve N° 6: measurement on the Line with peak detector



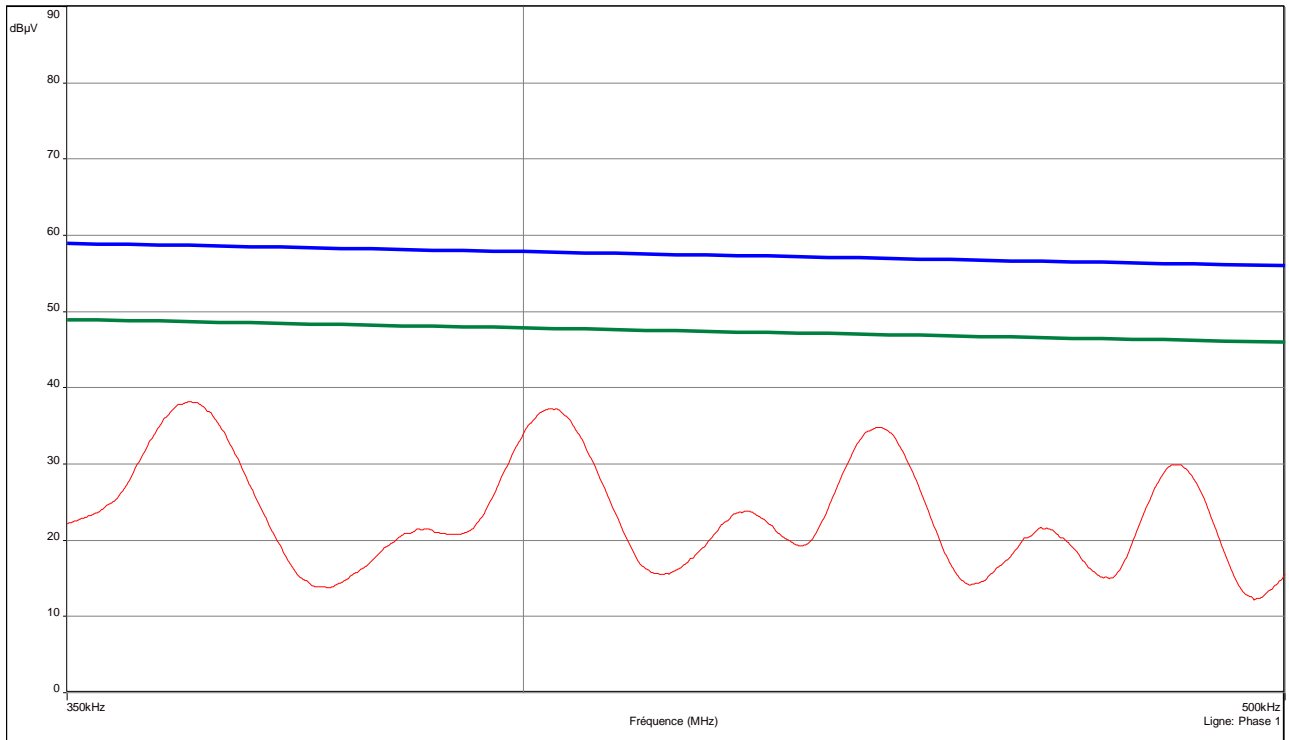
The frequencies which are not 6 dB under the Average limit are then analyzed with Average detector.

Curve N° 7: average measurement on the Neutral, for the frequency range: 350 kHz – 500 kHz



Curve N° 8: average measurement on the Line, for the frequency range: 350 kHz – 500 kHz

— FCC part 15 : 10 §107 - Classe:B - Moyenne/  
— FCC part 15 : 10 §107 - Classe:B - QCrête/  
— Mes.Peak (Phase 1)



**Test conclusion:**  
RESPECTED STANDARD

## 10. ADDITIONAL PROVISIONS TO THE GENERAL RADIATED EMISSION LIMITATIONS

**Standard:** FCC Part 15

**Test procedure:** Paragraph 15.215

### **Test set up:**

Test realized in near field. All field strength measurements are correlated with the radiated maximum peak output power

### **Test operating condition of the equipment:**

The equipment under test is blocked in continuous transmission mode, modulated by internal data signal, at the highest output power level which the transmitter is intended to operate (with internal antenna, the most critical powerful configuration).

### **Results:**

Ambient temperature (°C): 20  
Relative humidity (%): 45

Power source: 120Vac – 60 Hz

Lower Band Edge: from 2398 MHz to 2400 MHz  
Upper Band Edge: from 2483.5 MHz to 2485.5 MHz

Sample N° 1:

<u>FUNDAMENTAL FREQUENCY (MHZ)</u>	<u>FIELD STRENGTH LEVEL OF FUNDAMENTAL (DBµV/M)</u>	<u>DETECTOR (PEAK OR AVERAGE)</u>	<u>FREQUENCY OF MAXIMUM BAND- EDGES EMISSION (MHZ)</u>	<u>DELTA MARKER (DB)*</u>	<u>CALCULATED MAX OUT-OF- BAND EMISSION LEVEL (DBµV/M)</u>	<u>LIMIT (DBµV/M)</u>	<u>MARGIN (DB)</u>
2404	102	PEAK	2399.88125	-31.45	70.55	82	11.45
2478	104.7	PEAK	2483.626	-41.74	62.96	74	11.04
2478	104.7	AVERAGE	2483.554	-63.65	41.05	54	12.95

\* Marker-Delta method

20 dB bandwidth curves are given in appendix 5; band-edge curves are given in appendix 6.

### **Test conclusion:**

RESPECTED STANDARD

**11. MAXIMUM PEAK OUTPUT POWER**

**Standard:** FCC Part 15

**Test procedure:** paragraph 15.247 (b)

**Test set up:**

The system is tested in anechoic chamber. The EUT is placed on a rotating table, 1.5m from a ground plane. Zero degree azimuth corresponds to the front of the device under test.

The measurement of the electro-magnetic field is realized, with a resolution bandwidth adjusted at 3 MHz and video bandwidth at 10 MHz.

**Distance of antenna:** 3 meters

**Antenna height:** 1 to 4 meters

**Antenna polarization:** vertical and horizontal

**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 internal antenna and repeated with external antenna

**Results:**

Ambient temperature (°C): 21.3  
 Relative humidity (%): 40

Power source: 120Vac- 60Hz

Sample N° 1 Low Channel (internal antenna)

	Level (dBμV)	Cable loss (dB)	Antenna factor (dB)	Electro-magnetic field (dBμV/m):	Conducted power * (W)	Limit (W)
<b>Nominal supply voltage:</b>	73.32	3.48	28.2	105	0.00948	0.125

Polarization of test antenna: Horizontal (height: 150 cm)

Position of equipment: See photo in appendix 2 (azimuth: 145 degrees)

Sample N° 1 Central Channel (internal antenna)

	Level (dBμV)	Cable loss (dB)	Antenna factor (dB)	Electro-magnetic field (dBμV/m):	Conducted power * (W)	Limit (W)
<b>Nominal supply voltage:</b>	73.59	3.11	28.3	105	0.00948	0.125

Polarization of test antenna: Horizontal (height: 150 cm)

Position of equipment: See photo in appendix 2 (azimuth: 155 degrees)

Sample N° 1 High Channel (internal antenna)

	Level (dBμV)	Cable loss (dB)	Antenna factor (dB)	Electro-magnetic field (dBμV/m):	Conducted power * (W)	Limit (W)
<b>Nominal supply voltage:</b>	73.66	3.14	28.2	105	0.00948	0.125

Polarization of test antenna: Horizontal (height: 150 cm)

Position of equipment: See photo in appendix 2 (azimuth: 157 degrees)

\*  $P = (E \times d)^2 / (30 \times G_p)$  with  $d = 3 \text{ m}$  and  $G_p = 1$

Sample N° 1 Low Channel (external antenna)

	Level (dBμV)	Cable loss (dB)	Antenna factor (dB)	Electro-magnetic field (dBμV/m):	Conducted power * (W)	Limit (W)
<b>Nominal supply voltage:</b>	71.32	3.48	28.2	103	0.001496	0.125

Polarization of test antenna: Vertical (height: 150 cm)

Position of equipment: See photo in appendix 2 (azimuth: 350 degrees)

Sample N° 1 Central Channel (external antenna)

	Level (dBμV)	Cable loss (dB)	Antenna factor (dB)	Electro-magnetic field (dBμV/m):	Conducted power * (W)	Limit (W)
<b>Nominal supply voltage:</b>	71.59	3.11	28.3	103	0.001496	0.125

Polarization of test antenna: Vertical (height: 150 cm)

Position of equipment: See photo in appendix 2 (azimuth: 14 degrees)

Sample N° 1 High Channel (external antenna)

	Level (dBμV)	Cable loss (dB)	Antenna factor (dB)	Electro-magnetic field (dBμV/m):	Conducted power * (W)	Limit (W)
<b>Nominal supply voltage:</b>	69.66	3.14	28.2	101	0.00094	0.125

Polarization of test antenna: Vertical (height: 150 cm)

Position of equipment: See photo in appendix 2 (azimuth: 152 degrees)

$$* P = (E \times d)^2 / (30 \times G_p) \text{ with } d = 3 \text{ m and } G_p = 4$$

**Test conclusion:**

RESPECTED STANDARD

## **12. INTENTIONAL RADIATOR**

**Standard:** FCC Part 15

**Test procedure:** paragraph 15.205, paragraph 15.209, paragraph 15.247 (d)

### **Test set up:**

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, 1.5m from a ground plane.

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

See photos in appendix 2.

**Frequency range:** From 9 kHz to 25GHz (10<sup>th</sup> harmonic of the highest fundamental frequency)

**Detection mode:** Quasi-peak (F < 1 GHz)

Peak / Average (F > 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:** 3 meters

**Antenna height:** 1 to 4 meters

**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.

The measure is realized with internal antenna and repeated with external antenna

**Results:**

Ambient temperature (°C): 21.5  
 Relative humidity (%): 32

Power source: 120Vac- 60Hz

Sample N° 1 Low Channel (internal antenna)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBμV/m)	Limits (dBμV/m)	Margin (dB)
4808 <sup>(2)</sup>	P	1000	H	57.02	74	16.98
4808 <sup>(2)</sup>	Corrected with "duty cycle correction factor" <sup>(1)</sup>	1000	H	7.02	54	46.98
7212	P	1000	V	61.70	82	20.30

Sample N° 1 Central Channel (internal antenna)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBμV/m)	Limits (dBμV/m)	Margin (dB)
4880 <sup>(2)</sup>	P	1000	H	53.20	74	20.80
4880 <sup>(2)</sup>	Corrected with "duty cycle correction factor" <sup>(1)</sup>	1000	H	3.20	54	50.80
7320 <sup>(2)</sup>	P	1000	H	56	74	18
7320 <sup>(2)</sup>	Corrected with "duty cycle correction factor" <sup>(1)</sup>	1000	H	6	54	48

Sample N° 1 High Channel (internal antenna)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dBμV/m)	Limits (dBμV/m)	Margin (dB)
4956 <sup>(2)</sup>	P	1000	V	50.58	74	23.42
4956 <sup>(2)</sup>	Corrected with "duty cycle correction factor" <sup>(1)</sup>	1000	V	0.58	54	53.42
7434 <sup>(2)</sup>	P	1000	V	52.36	74	21.64
7434 <sup>(2)</sup>	Corrected with "duty cycle correction factor" <sup>(1)</sup>	1000	V	2.36	54	51.64

<sup>(1)</sup> "Duty cycle correction factor":  $20\log(\text{dwell time}/100\text{ms}) \Rightarrow 20\log(0.316/100) = -50\text{dB}$

<sup>(2)</sup> restricted bands of operation in 15.205



Sample N° 1 Low Channel (external antenna)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)
4808 <sup>(2)</sup>	P	1000	V	54	74	20
4808 <sup>(2)</sup>	Corrected with "duty cycle correction factor" <sup>(1)</sup>	1000	V	4	54	50
7212	P	1000	V	59	80	21

Sample N° 1 Central Channel (external antenna)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)
4880 <sup>(2)</sup>	P	1000	V	54.60	74	19.60
4880 <sup>(2)</sup>	Corrected with "duty cycle correction factor" <sup>(1)</sup>	1000	V	4.60	54	49.60
7320 <sup>(2)</sup>	P	1000	V	58.70	74	25.30
7320 <sup>(2)</sup>	Corrected with "duty cycle correction factor" <sup>(1)</sup>	1000	V	8.70	54	45.30

Sample N° 1 High Channel (external antenna)

FREQUENCIES (MHz)	Detector P: Peak QP: Quasi-Peak Av: Average	resolution bandwidth (kHz)	Polarization H: Horizontal V: Vertical	Field strength (dB $\mu$ V/m)	Limits (dB $\mu$ V/m)	Margin (dB)
4956 <sup>(2)</sup>	P	1000	V	50.80	74	23.20
4956 <sup>(2)</sup>	Corrected with "duty cycle correction factor" <sup>(1)</sup>	1000	V	0.80	54	53.20
7434 <sup>(2)</sup>	P	1000	V	54.56	74	19.44
7434 <sup>(2)</sup>	Corrected with "duty cycle correction factor" <sup>(1)</sup>	1000	V	4.56	54	49.44

<sup>(1)</sup> "Duty cycle correction factor":  $20\log(\text{dwell time}/100\text{ms}) \Rightarrow 20\log(0.316/100) = -50\text{dB}$

<sup>(2)</sup> restricted bands of operation in 15.205

Note: any spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported.

**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 20 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 102 dB $\mu$ V/m on channel 1 with internal antenna.

So the applicable limit is 82 dB $\mu$ V/m.

The highest level recorded in a 100 kHz bandwidth is 100 dB $\mu$ V/m on channel 1 with external antenna.

So the applicable limit is 80 dB $\mu$ V/m.

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

**13. PEAK POWER DENSITY**

**Standard:** FCC Part 15

**Test procedure:** paragraph 15.247 (e)

**Test set up:**

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. Zero degree azimuth corresponds to the front of the device under test.

The system is tested in anechoic chamber. The EUT is placed on a rotating table, 1.5m from a ground plane. Zero degree azimuth corresponds to the front of the device under test.

The measuring distance between the equipment and the test antenna is 3 m. The test antenna has been oriented in two polarizations (Vertical and Horizontal) and raised and lowered from 1m to 4m above the ground level. Only the highest level of each measurement is reported.

We used the same method of the peak output power measurement, but the equipment under test power level is recorded with the spectrum analyzer.

Resolution bandwidth: 100 kHz

Video bandwidth: 1 MHz

**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.

**Results:**

Ambient temperature (°C): 21.3  
 Relative humidity (%): 40

Power source: 120Vac- 60Hz

Sample N° 1 Low channel (internal antenna)

	Peak power density at frequency: MHz
<b>Normal test conditions</b>	6.77
<b>Limits</b>	+8 dBm

Sample N° 1 Central channel (internal antenna)

	Peak power density at frequency: MHz
<b>Normal test conditions</b>	6.77
<b>Limits</b>	+8 dBm

Sample N° 1 High channel (internal antenna)

	Peak power density at frequency: MHz
<b>Normal test conditions</b>	6.77
<b>Limits</b>	+8 dBm

Sample N° 1    Low channel (external antenna)

	Peak power density at frequency: MHz
<b>Normal test conditions</b>	4.77
<b>Limits</b>	+8 dBm

Sample N° 1    Central channel (external antenna)

	Peak power density at frequency: MHz
<b>Normal test conditions</b>	4.77
<b>Limits</b>	+8 dBm

Sample N° 1    High channel (external antenna)

	Peak power density at frequency: MHz
<b>Normal test conditions</b>	2.77
<b>Limits</b>	+8 dBm

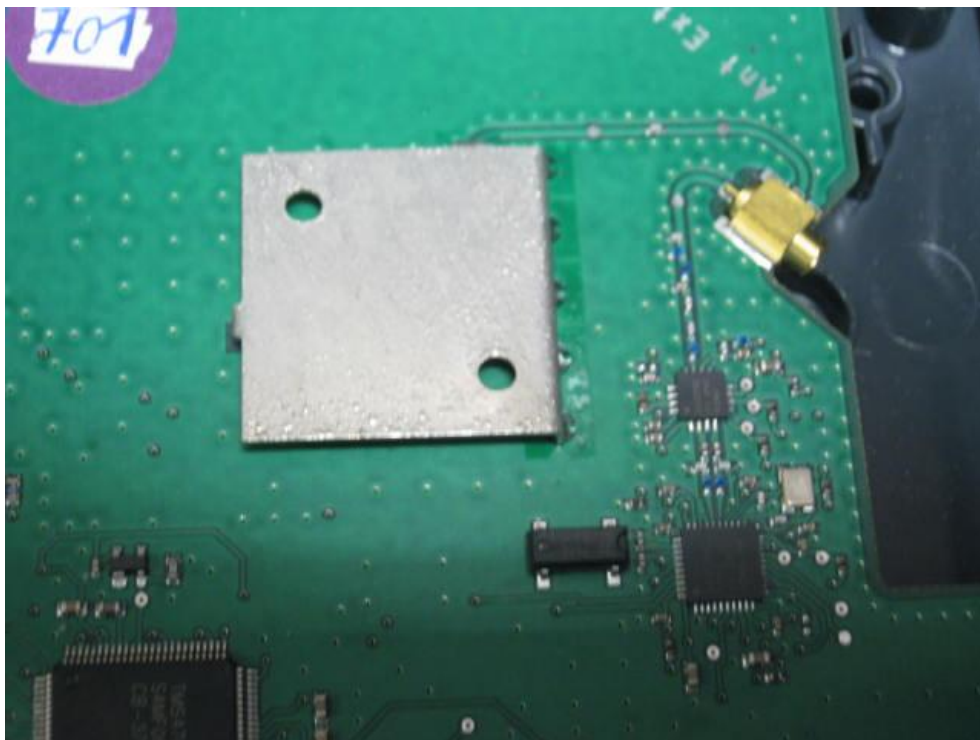
**Test conclusion:**

RESPECTED STANDARD

**□□□ End of report, 6 appendixes to be forwarded □□□**

## APPENDIX 1: Photos of the equipment under test





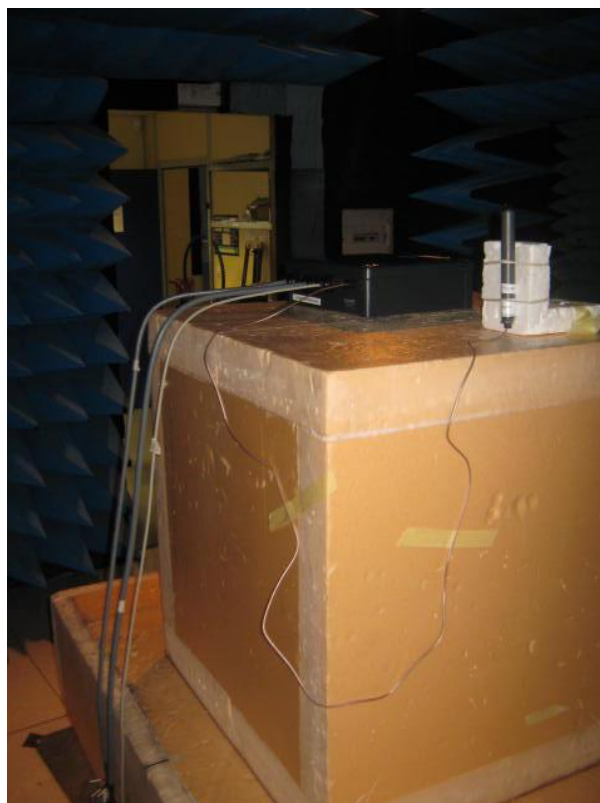






## APPENDIX 2: Test set up

External antenna



Internal antenna



Conducted emission



## APPENDIX 3: Test equipment list

### Measurement of the conducted disturbances

TYPE	MANUFACTURER	EMITECH NUMBER
Outside room Hors cage	Emitech	8893
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver HP 8591EM	Hewlett Packard	8524
LISN 1600	Thurbly Thandar Instruments 1600	8719
High-pass filter EZ-25	Rohde & Schwarz	8635
High-pass filter ETP232	SECRE	8641
Absorber sheath current	Emitech	9489
Power source 1251RP	California instruments	8508
Multimeter MN5102B	AOIP	8675
Meteo station	HUGER	8671
Software	BAT-EMC	0000

### Radiated emission limits

TYPE	MANUFACTURER	EMITECH NUMBER
Open test site	EMITECH	8732
Anechoic Chamber	EMITECH	8593
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver ESI7	Rohde & Schwarz	8707
Spectrum Analyzer FSEM30	Rohde & Schwarz	8523
Biconical antenna VHBB 9124	Schwarzbeck	8526
Biconical antenna VHA 9103	Schwarzbeck	8528
Log periodic antenna UHALP 9108A	Schwarzbeck	8543
Antenna 3115	Electrometrics	8535
Low-noise amplifier 8447D	Hewlett Packard	8511
Low-noise amplifier C020180F-4B1	Microwave DB	1922
Power source 1251RP	California instruments	8508
Multimeter MN5102B	AOIP	8675
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC	0000

**Additional provisions to the general radiated emission limitations**

TYPE	MANUFACTURER	EMITECH NUMBER
Anechoic Chamber	EMITECH	8593
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSEM30	Rohde & Schwarz	8523
Antenna 3115	Electrometrics	8535
Power source 1251RP	California instruments	8508
Multimeter MN5102B	AOIP	8675
Meteo station WS-9232	La Crosse Technology	8750

**Maximum peak output power**

TYPE	MANUFACTURER	EMITECH NUMBER
Anechoic Chamber	EMITECH	8593
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSEM30	Rohde & Schwarz	8523
Antenna 3115	Electrometrics	8535
Power source 1251RP	California instruments	8508
Multimeter MN5102B	AOIP	8675
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC	0000



**Intentional radiator**

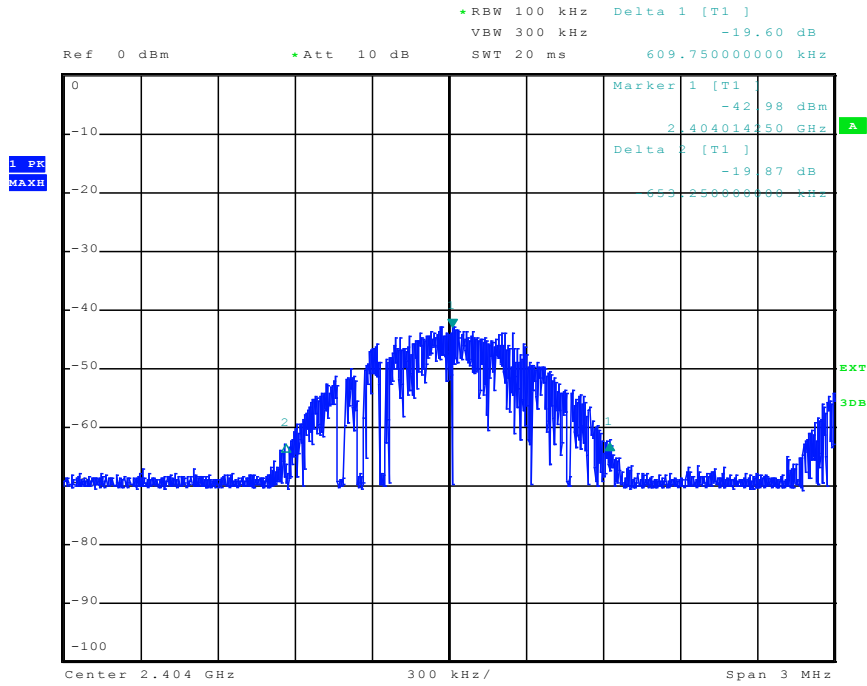
TYPE	MANUFACTURER	EMITECH NUMBER
Open test site	EMITECH	8732
Anechoic Chamber	EMITECH	8593
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver ESI7	Rohde & Schwarz	8707
Spectrum Analyzer FSEM30	Rohde & Schwarz	8523
Loop antenna HFH2-Z2	Rohde & Schwarz	8533
Biconical antenna VHBB 9124	Schwarzbeck	8526
Biconical antenna VHA 9103	Schwarzbeck	8528
Log periodic antenna UHALP 9108A	Schwarzbeck	8543
Antenna 3115	Electrometrics	8535
Antenna WR42	IMC	1939
Antenna WR42	IMC	1940
Low-noise amplifier 8447D	Hewlett Packard	8511
Low-noise amplifier C020180F-4B1	Microwave DB	1922
Low-noise amplifier ALN02-0102	ALC Microwave	3036
Low pass filter LP03/1000-7GH	Filtek	4087
Reject band filter BRM50702	Microtronics	7299
High pass filter HP12/3200-5AA	Filtek	8262
Power source 1251RP	California instruments	8508
Multimeter MN5102B	AOIP	8675
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC	0000

**Peak power density**

TYPE	MANUFACTURER	EMITECH NUMBER
Open test site	EMITECH	8732
Anechoic Chamber	EMITECH	8593
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Test receiver ESI7	Rohde & Schwarz	8707
Spectrum Analyzer FSEM30	Rohde & Schwarz	8523
Biconical antenna VHBB 9124	Schwarzbeck	8526
Biconical antenna VHA 9103	Schwarzbeck	8528
Log periodic antenna UHALP 9108A	Schwarzbeck	8543
Antenna 3115	Electrometrics	8535
Low-noise amplifier 8447D	Hewlett Packard	8511
Low-noise amplifier C020180F-4B1	Microwave DB	1922
Power source 1251RP	California instruments	8508
Multimeter MN5102B	AOIP	8675
Meteo station WS-9232	La Crosse Technology	8750
Software	BAT-EMC	0000

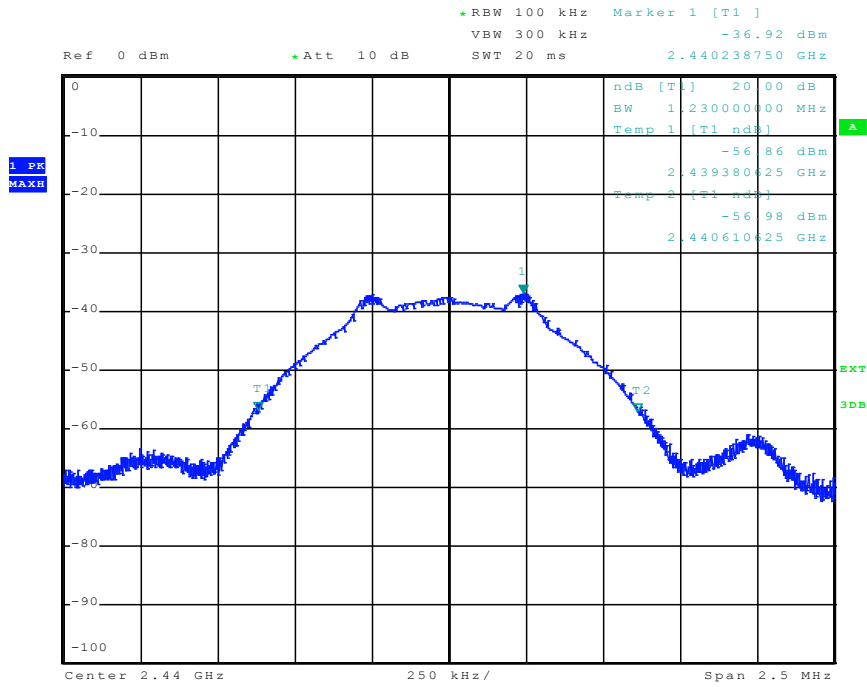
## APPENDIX 4: 20 dB bandwidth

Low channel



Date: 24.JAN.2014 10:40:10

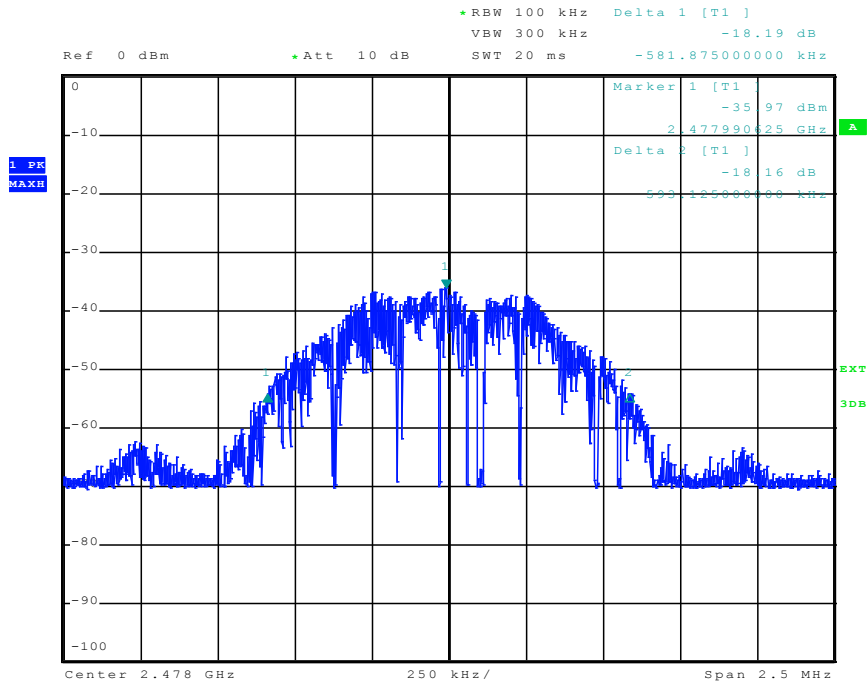
## Central channel



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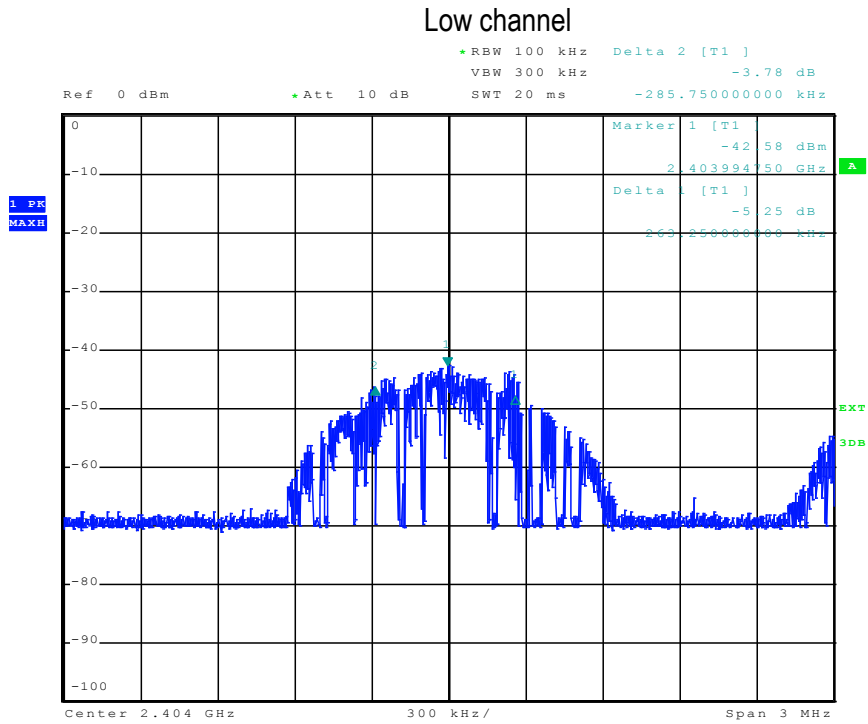


### High channel



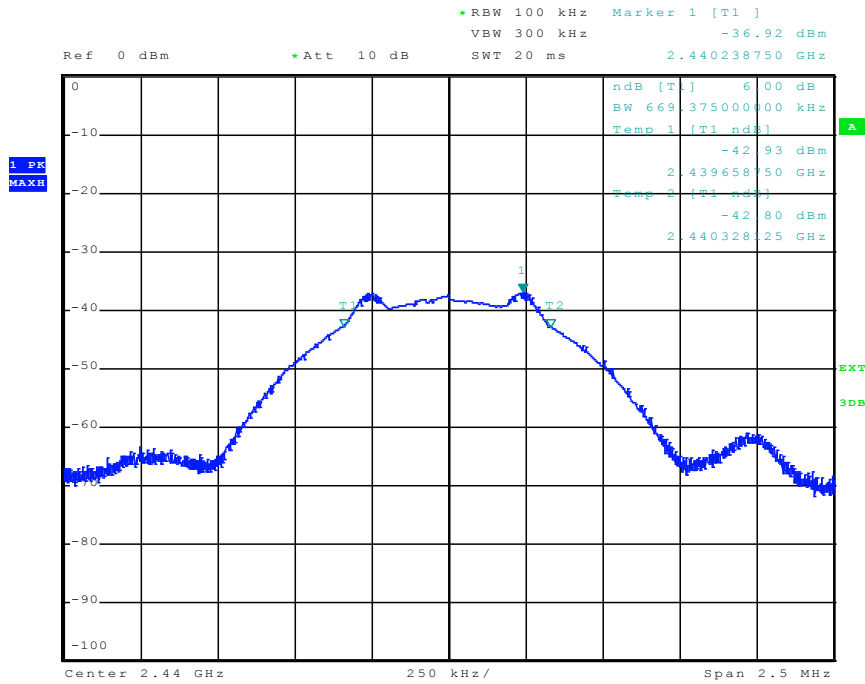
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## APPENDIX 5: 6dB bandwidth



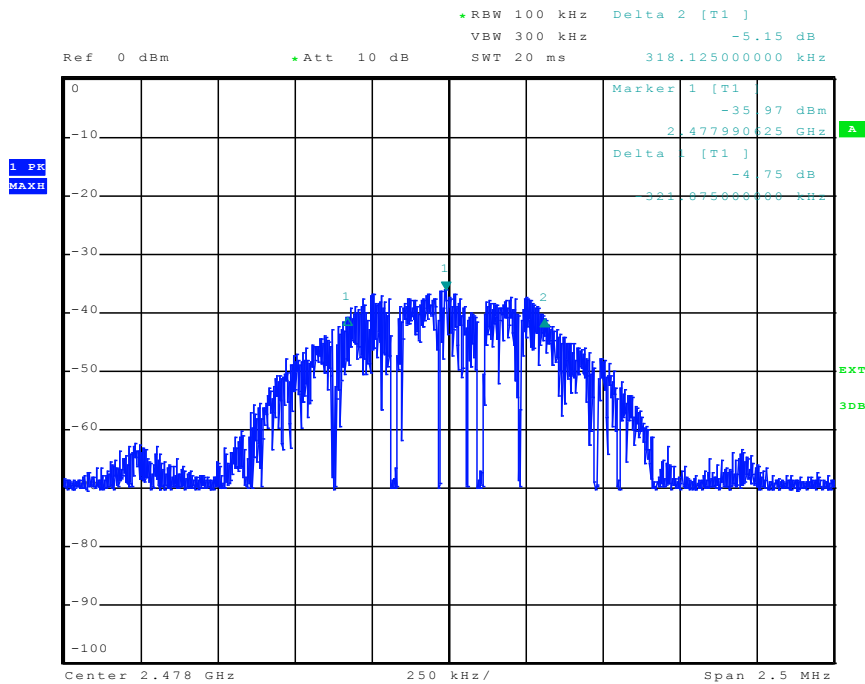
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### Central channel



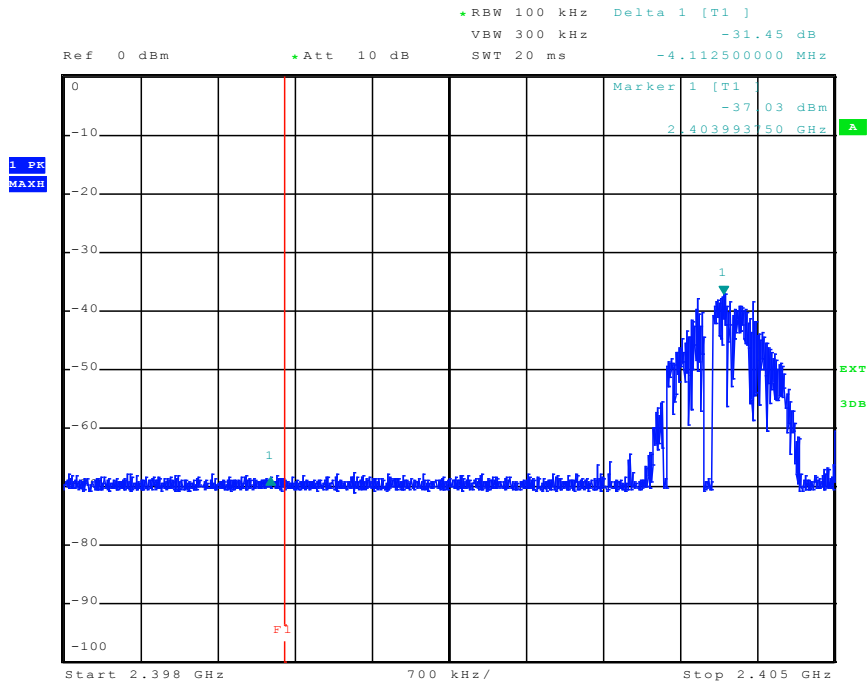
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### High channel

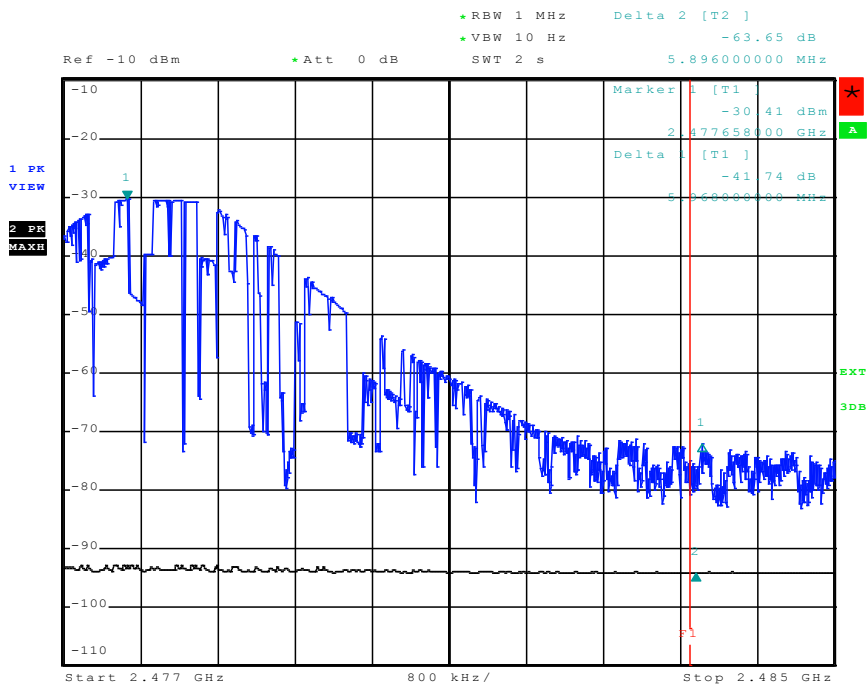


Date: 24.JAN.2014 11:49:42

## APPENDIX 6: Band edge



Date: 24.JAN.2014 12:01:06



Date: 27.JAN.2014 11:08:00