LCIE
Etablissement de Moirans
ZI Centr'alp
170, rue de Chatagnon
38430 Moirans
RCS Grenoble 408 363 174
Tél. : +33 4 76 07 36 36
Fax : +33 4 76 55 90 88

Rapport d'essai / *Test report*

N° 600435-A3-R3-E **JDE :** 121072

DELIVRE A / *ISSUED TO*	:	**INGENICO** Rovaltain TGV – Gare 26300 ALIXAN - FRANCE
Objet / *Subject*	:	Essais de compatibilité électromagnétique conformément aux normes **FCC CFR 47 Part 15, Subpart B et C** **RSS-210 Issue 8** *Electromagnetic compatibility tests according to the standards* ***FCC CFR 47 Part 15, Subpart B and C*** ***RSS-210 Issue 8***
Matériel testé / *Apparatus under test*	:	
• Produit / *Product*	:	**Terminal de paiement / *Payment terminal***
• Marque / *Trade mark*	:	**INGENICO**
• Constructeur / *Manufacturer*	:	**INGENICO**
• Type / *Model*	:	**ICM122-11T2265A**
• N° de série / *serial number*	:	**13079PP00004795**
• FCC ID	:	**XKB-ICM122BTCL**
• IC	:	**2586D-ICM122BTCL**
Date des essais / *Test date*	:	Du 13 au 30 Mai 2013 / *From May 13th to 30th, 2013*
Lieu d'essai / *Test location*	:	**LCIE SUD-EST** ZI Centr'Alp – 170 rue de Chatagnon 38430 MOIRANS - FRANCE
Test réalisé par / *Test performed by*	:	Anthony MERLIN

Ce document comporte /*Composition of document :* 55 pages.

MOIRANS, LE 26 JUIN 2013 / *JUNE 26TH, 2013*

Ecrit par / *Written by,*
Anthony MERLIN

Approuvé par / *Approved by,*
Jacques LEBRUN

LABORATOIRE CENTRAL DES INDUSTRIES ELECTRIQUES
LCIE SUD-EST
ZI Centr'Alp
170, Rue de Chatagnon
38430 MOIRANS
Tél. 04 76 07 36 36

SUMMARY

1. TEST PROGRAM

Standard:
- **FCC Part 15, Subpart C 15.247**
- **ANSI C63.4 (2003)**
- **RSS-210 Issue 8 – Dec 2010**
- **RSS-Gen Issue 3 – Dec 2010**

EMISSION Test	LIMITS			RESULTS (Comments)
Limits for conducted disturbance at mains ports 150kHz-30MHz *CFR 47 §15.207*	**Frequency**	**Quasi-peak value (dBµV)**	**Average value (dBµV)**	**PASS**
	150-500kHz	66 to 56	56 to 46	
	0.5-5MHz	56	46	
	5-30MHz	60	50	
Radiated emissions 9kHz-30MHz *CFR 47 §15.209 (a) / CFR 47 §15.247 (d) / CFR 47 §15.225* *RSS-Gen §4.9 / RSS-210 §A8.5*	**Measure at 300m** 9kHz-490kHz : 67.6dBµV/m /F(kHz) **Measure at 30m** 490kHz-1.705MHz : 87.6dBµV/m /F(kHz) 1.705MHz-30MHz : 29.5 dBµV/m			**PASS**
Radiated emissions 30MHz-25GHz* *CFR 47 §15.209 (a) / CFR 47 §15.247 (d) / CFR 47 §15.225* *RSS-Gen §4.9 / RSS-210 §A8.5*	**Measure at 3m** 30MHz-88MHz : 40 dBµV/m 88MHz-216MHz : 43.5 dBµV/m 216MHz-960MHz : 46.0 dBµV/m Above 960MHz : 54.0 dBµV/m			**PASS**
Maximum Peak Output Power *CFR 47 §15.247 (b)* *RSS-210 §A8.4(1)*	**Limit: 21dBm** Conducted or Radiated measurement			**PASS**
Hopping Channel Separation *CFR 47 §15.247 (a) (1)* *RSS-210 §A8.1(b)*	**Minimum between:** Two-third 20dB Bandwidth or 25kHz Whichever is greater			**PASS**
Number of Hopping Frequencies *CFR 47 §15.247 (a) (1) (iii)* *RSS-210 §A8.1(d)*	**At least 15 channels used**			**PASS**
Time of Occupancy (Dwell Time) *CFR 47 §15.247 (a) (1) (iii)* *RSS-210 §A8.1(d)*	**Maximum 0.4 sec within 31.6sec**			**PASS**
Band Edge Measurement *CFR 47 §15.209 (a) / CFR 47 §15.247 (d)* *RSS-210 §A8.5*	**Limit: -20dBc**			**PASS**
Fundamental field strength limit *CFR 47 §15.225* *RSS-210 §A2.6*	**Operation within the band 13.110-14.010 MHz**			**PASS**
Fundamental frequency tolerance *CFR 47 §15.225* *RSS-210 §A2.6 / RSS-Gen §4.7*	**Operation within the band 13.110-14.010 MHz**			**PASS**
Occupied bandwidth *RSS-Gen §4.6.1*	**No limit**			**See results**
Receiver Spurious Emission** *RSS-Gen §4.10*	**See RSS-Gen §4.10**			**NA**

***§15.33:** The highest internal source of a testing device is defined like more the highest frequency generated or used in the testing device or on which the testing device works or agrees.
- If the highest frequency of the internal sources of the testing device is lower than 108 MHz, measurement must be only performed until 1GHz.
- If the highest frequency of the internal sources of the testing device ranges between 108 MHz and 500 MHz, measurement must be only performed until 2GHz.
- If the highest frequency of the internal sources of the testing device ranges between 500 MHz and 1 GHz, measurement must be only performed until 5GHz.

If the highest frequency of the internal sources of the testing device is above 1 GHz, measurement must be only performed until 5 times the highest frequency or 40 GHz, while taking smallest of both.

****Testing covered the receive mode, and receiver spurious emissions are considered to be the same as transmitter.

2. SYSTEM TEST CONFIGURATION

2.1. JUSTIFICATION

ICM122-11T2265A is payment terminal with Bluetooth + RFID like RF communications, powered by battery and loaded by MicroUSB, both configuration s are tested and worst case is presented in this test report.

Configuration n°1: Alone, battery
Configuration n°2: Loaded

2.2. HARDWARE IDENTIFICATION

- **Equipment under test (EUT):**

ICM122-11T2265A Serial number: 13079PP00004795

- Internal max frequencies: 387MHz

- **Power supply:**

- Battery lithium-ion 3.7VDC
- Loaded by MicroUSB

During all the tests, EUT is supplied by battery with or without load, worst case presented.

- **Input/output:**

- Micro USB, load only, not used with PC

- **Auxiliaries used for testing:**

- USB power adapter A1205 Apple
- Contact card
- Contactless card
- CMU200 for Bluetooth communication
- Laptop

- **I/O cables used for testing:**

- 1 x MicroUSB cable, shielded, length: 1.5m

Equipment information:

RFID

- Frequency band:	[13.553 -13.567] MHz		
- Modulation type:	ASK		
- RF mode:	☒TX/RX	☒Standby	
- Antenna type:	Internal		
- Antenna connector:	☐Permanent external	☐Permanent internal	
	☒None	☐Temporary (only for tests)	

Bluetooth

- Frequency band:	[2400.0-2483.5] MHz		
- Standard:	☐Wifi	☒Bluetooth v3.0	☐Zigbee
- Spectrum Modulation:	☒FHSS		☐DSSS
- Modulation type:	☒GFSK	☒ Pi/4 DQPSK	☒8DPSK
Packet type:	DH1, DH3, DH5		
Transfert data rate:	1Mbps, 2Mbps, 3Mbps		
- Number of channel:	78		
- Channel separation:	☐5MHz	☐2MHz	☒1MHz
- Channel bandwidth:	☐10MHz	☐20MHz	☒1MHz
- Channel tested:	Full test on 2402MHz, 2480MHz and 2441MHz with DH5 packet type		
- RF mode:	☒TX/RX	☐RX	☐Standby
- Antenna type:	Internal		
- Antenna connector:	☐Permanent external	☐Permanent internal	
	☒None	☐Temporary (only for tests)	

2.3. EUT CONFIGURATION

Configuration n°1:

- CAM0, reading in loop of contact card
- RFID, reading in loop of contactless card
- Bluetooth, hopping mode or permanent channel 0, 39 or 78

Configuration n°2:

- CAM0, reading in loop of contact card
- RFID, reading in loop of contactless card
- Bluetooth, hopping mode or permanent channel 0, 39 or 78
- Loade by MicroUSB with adapter

Terminal firmware : SDK 9.10

CSR8811A08 (Bluetooth chipset) :

- Pre-qualified chipset : B017701
- Pre-qualified stack : B013295

2.4. EQUIPMENT MODIFICATIONS

None

2.5. SPECIAL ACCESSORIES

None

3. CONDUCTED EMISSION DATA

3.1. TEST CONDITIONS

Date of test : May 15th, 2013
Test performed by : A.MERLIN
Atmospheric pressure : 981hPa
Relative humidity : 43%
Ambient temperature : 20°C

3.2. SETUP FOR CONDUCTED EMISSIONS MEASUREMENT

The product has been tested according to ANSI C63.4-(2003) and FCC Part 15 subpart B and C.

The product has been tested with 120V/60Hz power line voltage and compared to the FCC Part 15 subpart B §15.107 and C §15.207 limits. Measurement bandwidth was 9kHz from 150 kHz to 30 MHz.

Measurement is made with a Rohde & Schwarz ESU8 receiver in peak mode. This was followed by a Quasi-Peak, i.e. CISPR measurement for any strong signal. If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary. The LISN (measure) is 50Ω / 50µH.

The Peak data are shown on plots in annex 1. Quasi-Peak and Average measurements are detailed in a table with frequencies and levels measured.

Interconnecting cables and equipment's were moved to position that maximized emission. A summary of the worst case emissions found in all test configurations and modes is shown on the following page.

3.3. TEST SETUP

The EUT is placed on the ground reference plane, at 80cm from the LISN. The distance between the EUT and the vertical ground plane is 40cm.
Auxiliaries are powered by another LISN.
The cable has been shorted to 1meter length. The EUT is powered trough the LISN (measure).

Conducted emission test setup

3.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE
Cable	-	-	A5329578
Conducted emission comb generator	BARDET	-	A3169049
LISN tri-phase ESH2-Z5	RHODE & SCHWARZ	33852.19.53	C2320062
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011
Transient limiter	RHODE & SCHWARZ	ESH3-Z2	A7122204

3.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

3.6. TEST SEQUENCE AND RESULTS

Measurements are performed on the phase (L1) and neutral (N) of power line voltage.
Graphs are obtained in PEAK detection.
Measures are also performed in Quasi-Peak and Average for any strong signal.

Measure on L1:	graph Emc#1	(Worst case)	(see annex 1)
Measure on N:	graph Emc#2	(Worst case)	(see annex 1)

RESULT: PASS

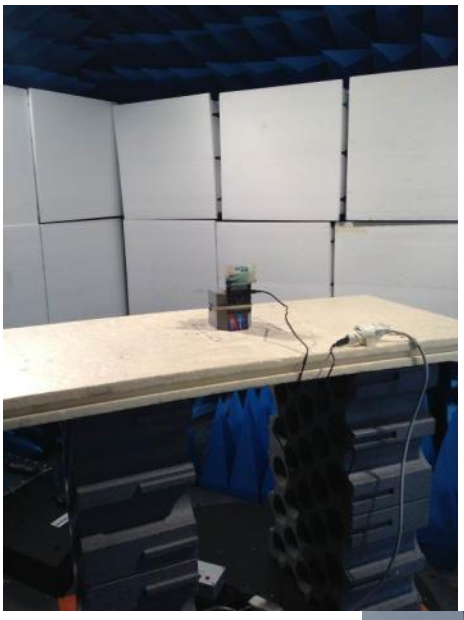
4. RADIATED EMISSION DATA

4.1. TEST CONDITIONS

Date of test : May 14th, 2013
Test performed by : A.MERLIN
Atmospheric pressure : 990hPa
Relative humidity : 31%
Ambient temperature : 24°C

4.2. TEST SETUP

The installation of EUT is identical for pre-characterization measurement in a 3 meters semi anechoic chamber and for measures on a 10 meters Open site.




RDo


RDo

Radiated emission test setup

4.3. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE
Amplifier 1-13GHz	LCIE SUD EST	-	A7102067
Antenna Bi-log	CHASE	CBL6111A	C2040051
Antenna Loop	ELECTRO-METRICS	EM-6879	C2040052
Antenna Bi-log	CHASE	CBL6111A	C2040172
Antenna horn	EMCO	3115	C2042027
Cable N/N	-	-	A5329038
Cable	SUCOFLEX	106G	A5329061
Cable	-	-	A5329183
Cable OATS (Mast at 10m)	UTIFLEX	-	A5329188
Cable	-	-	A5329191
Cable	UTIFLEX	-	A5329192
Cable OATS (Mast at 10m)	UTIFLEX	-	A5329199
Cable N/N	-	-	A5329206
Cable	-	-	A5329590
Semi-Anechoic chamber #1	SIEPEL	-	D3044016
Semi-Anechoic chamber #3	SIEPEL	-	D3044017
Radiated emission comb generator	BARDET	-	A3169050
OATS	-	-	F2000409
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019
Receiver 20Hz-26.5GHz	ROHDE & SCHWARZ	ESIB26	A2642021
Receiver 9kHz - 6GHz	ROHDE & SCHWARZ	FSL6	A2642020
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078
Turntable chamber (Cage#3)	ETS Lingren	Model 2165	F2000371
Turntable / Mast controller (OATS)	ETS Lindgren	Model 2066	F2000372
Antenna mast (OATS)	ETS Lindgren	2071-2	F2000392
Turntable (OATS)	ETS Lindgren	Model 2187	F2000403
Turntable chamber (Cage#1)	MATURO Gmbh	TT 2.0 SI	F2000406
Antenna mast (Cage#1)	MATURO Gmbh	AM 4.0	F2000407
Turntable controller (Cage#1)	MATURO Gmbh	Control Unit	F2000408
Table	MATURO Gmbh	-	F2000437
Turntable controller (Cage#3)	ETS Lingren	Model 2090	F2000444

4.1. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

4.2. TEST SEQUENCE AND RESULTS

4.2.1. Pre-characterization at 3 meters [9kHz-30MHz]

A pre-scan of all the setup has been performed in a 3 meters semi anechoic chamber.
The distance between EUT and antenna is 3 meters. For Pre-characterization, the loop antenna was rotated during the test for maximized the emission measurement. Measurement performed on 3 axis of EUT.
Frequency band investigated is 9kHz to 30MHz.

The pre-characterization graphs are obtained in PEAK detection.

See graph for 9kHz-30MHz band:

0° Polarization	**Emr#1**	*Alone*	(See annex 1)
0° Polarization	**Emr#6**	*Load*	(See annex 1)
0° Polarization	**Emr#11**	*Laptop*	(See annex 1)

4.2.2. Pre-characterization [30MHz-25GHz]

For frequency band 30MHz to 1GHz, a pre-scan of all the setup has been performed in a 3 meters semi anechoic chamber.
The distance between EUT and antenna is 3 meters. Test is performed in horizontal (H) and vertical (V) polarization with a log-periodic antenna. The EUT is being rotated on 360° and on 3 axis during the measurement. The pre-characterization graphs are obtained in PEAK detection.
For frequency band 1GHz to 25GHz, a search is performed in the semi-anechoic chamber in order to determine frequencies radiated by the EUT (Measuring distance reduced to 1m and 20cm for frequencies from 12GHz to 25GHz).

See graphs for 30MHz-1GHz:

H polarization	**Emr#2**	*Alone-Axis XY*	(See annex 1)
V polarization	**Emr#3**	*Alone-Axis XY*	(See annex 1)
H polarization	**Emr#4**	*Alone-Axis Z*	(See annex 1)
V polarization	**Emr#5**	*Alone-Axis Z*	(See annex 1)
H polarization	**Emr#7**	*Load-Axis XY*	(See annex 1)
V polarization	**Emr#8**	*Load -Axis XY*	(See annex 1)
H polarization	**Emr#9**	*Load -Axis Z*	(See annex 1)
V polarization	**Emr#10**	*Load -Axis Z*	(See annex 1)
H polarization	**Emr#12**	*Laptop-Axis XY*	(See annex 1)
V polarization	**Emr#13**	*Laptop-Axis XY*	(See annex 1)
H polarization	**Emr#14**	*Laptop-Axis Z*	(See annex 1)
V polarization	**Emr#15**	*Laptop-Axis Z*	(See annex 1)

4.2.3. Characterization on 10 meters open site below 30 MHz

The product has been tested according to ANSI C63.4 (2003), FCC part 15 subpart C. Radiated Emissions were measured on an open area test site. A description of the facility is on file with the FCC. The product has been tested at a distance of **10 meters** from the antenna and compared to the FCC part 15 subpart C §15.225 limits in the frequency range 13.553MHz 13.567MHz. Measurement bandwidth was 9kHz. Antenna height was 1m for both horizontal and vertical polarization. Antenna was rotated around its vertical axis. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on 3 axis of EUT. A summary of the worst case emissions found in all test configurations and modes is shown on clauses 3.2.

Frequency (MHz)	QPeak Limit (dBµV/m) @ 30m	Qpeak (dBµV/m)	Qpeak-Limit (Margin dB)	Turntable Angle (deg)	Ant. Pol./ Angle (deg)	Tot Corr (dB)
13.56*[1]	84.0	30.0	**-54.0**	90	0	35.3
27.12*[1]	29.5	23.2	**-6.3**	90	0	42.4

*[1]: Measure have been done at 10m distance and corrected according to requirements of 15.209.e) (M@30m = M@10m-19.1dB)

Limits Sub clause §15.225

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
13.553-13.567	15 848 84 dBµV/m	30
13.410-13.553 13.567-13.710	334 50.5 dBµV/m	30
13.110-13.410 13.710-14.010	106 40.5 dBµV/m	30

See chapter 5 of this test report for band edge measurements.

4.2.4. Characterization on 10 meters open site from 30MHz to 1GHz

The product has been tested at a distance of **10 meters** from the antenna and compared to the FCC part 15 subpart B §15.109 limits and C §15.209 limits. Measurement bandwidth was 120kHz from 30 MHz to 1GHz. Antenna height search was performed from 1m to 4m for both horizontal and vertical polarization. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on 3 axis of EUT. A summary of the worst case emissions found in all test configurations and modes is shown on following tables.

Worst case final data result (Alone/Load configuration):

No	Frequency (MHz)	QPeak Limit (dBµV/m)	Qpeak * (dBµV/m)	Qpeak-Limit (Margin, dB)	Angle (deg)	Pol	Hgt (cm)	Tot Corr (dB)	Comments
1	37.038	40.0	38.2	**-1.8**	30	V	100	16.6	Load configuration
2	40.680	40.0	37.0	**-3.0**	270	V	100	14.5	Load configuration
3	54.240	40.0	35.9	**-4.1**	55	V	100	8.8	Load configuration
4	81.360	40.0	33.3	**-6.7**	90	V	100	9.8	Load configuration
5	162.720	43.5	29.7	**-13.8**	45	V	150	12.9	Load configuration
6	194.251	43.5	27.8	**-15.7**	35	H	200	11.4	Load configuration
7	209.160	43.5	23.4	**-20.1**	185	H	330	11.7	Load configuration
8	212.680	43.5	23.3	**-20.2**	235	H	400	11.8	Load configuration

*: Measure have been done at 10m distance and corrected according to requirements of 15.209.e)
(M@3m = M@10m+10.5dB)

4.2.5. Characterization on 3 meters anechoic chamber from 1GHz to 25GHz

The product has been tested at a distance of **3 meters** from the antenna and compared to the FCC part 15 subpart B §15.109 limits and C §15.209 limits. Measurement bandwidth was 1MHz from 1GHz to 25GHz. Antenna height search was performed from 1m to 4m for both horizontal and vertical polarization. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on 3 axis of EUT. A summary of the worst case emissions found in all test configurations and modes is shown on following tables.

Frequency band 1GHz to 25GHz

Worst case final data result (Alone/Load configuration):

Measurements are performed using a PEAK and Average detection. (RBW = 1MHz)

No	Frequency (GHz)	Limit Average (dBµV/m)	Measure Average (dBµV/m)	Margin (Mes-Lim) (dB)	Angle Table (deg)	Pol Ant.	Ht Ant. (cm)	Correc. factor (dB)	Comments
1	4804	54.0	31.3	-22.7	10	H	110	36.4	
2	7206	54.0	29.6	-24.4	55	H	110	39.6	
3	9608	54.0	28.6	-25.4	0	H	110	41.9	
4	4882	54.0	39.8	-14.2	10	H	110	36.5	
5	7323	54.0	35.6	-18.4	285	H	110	39.9	
6	9764	54.0	34.1	-19.9	310	H	110	42.0	
7	4960	54.0	37.4	-16.6	10	H	110	36.6	
8	7440	54.0	32.9	-21.1	300	H	110	40.1	
9	9920	54.0	31.3	-22.7	45	H	110	42.1	
10	2390	54.0	24.6	-29.4	15	H	110	31.3	
11	2483.5	54.0	24.8	-29.2	20	H	110	31.4	

Note: Measures have been done at 3m distance.

No	Frequency (GHz)	Limit Peak (dBµV/m)	Measure Peak (dBµV/m)	Margin (Mes-Lim) (dB)	Angle Table (deg)	Pol Ant.	Ht Ant. (cm)	Correc. factor (dB)	Comments
1	4804	74.0	40.9	-33.1	10	H	110	36.4	
2	7206	74.0	36.5	-37.5	55	H	110	39.6	
3	9608	74.0	30.0	-44.0	0	H	110	41.9	
4	4882	74.0	48.9	-25.1	10	H	110	36.5	
5	7323	74.0	43.7	-30.3	285	H	110	39.9	
6	9764	74.0	37.9	-36.1	310	H	110	42.0	
7	4960	74.0	46.6	-27.4	10	H	110	36.6	
8	7440	74.0	40.9	-33.1	300	H	110	40.1	
9	9920	74.0	34.8	-39.2	45	H	110	42.1	
10	2390	74.0	38.7	-35.3	15	H	110	31.3	
11	2483.5	74.0	39.9	-34.1	20	H	110	31.4	

RESULTS: PASS

4.3. FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follow:

FS = RA + AF + CF – AG

Where FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Factor
AG = Amplifier Gain

Assume a receiver reading of 52.5dBµV is obtained. The antenna factor of 7.4 and a cable factor of 1.1 are added. The amplifier gain of 29dB is subtracted, giving a field strength of 32 dBµV/m.
FS = 52.5 + 7.4 + 1.1 – 29 = 32 dBµV/m
The 32 dBµV/m value can be mathematically converted to its corresponding level in µV/m.
Level in µV/m = Common Antilogarithm [(32dBµV/m)/20] = 39.8 µV/m.

5. MAXIMUM PEAK OUTPUT POWER (15.247)

5.1. TEST CONDITIONS

Date of test : May 14th, 2013
Test performed by : A.MERLIN
Atmospheric pressure : 981hPa
Relative humidity : 35%
Ambient temperature : 24°C

5.2. EQUIPMENT CONFIGURATION

Modulation: GFSK, worst case
Packet Type: 1-DH5, worst case
Hopping sequence: OFF, worst case

5.3. SETUP

Radiated measurement:
The product has been tested at a distance of 3 meters from the antenna and using 3MHz RBW and 10MHz VBW.
Antenna height search was performed from 1m to 4m for both horizontal and vertical polarization. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on 3 axis of EUT.
A summary of the worst case emissions found in all test configurations and modes is shown on following table.
The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.
To demonstrate compliance with peak output power requirement of section 15.247 (b), the transmitter's peak output power is calculated using the following equation:

$$E = \frac{\sqrt{30PG}}{d}$$

Where:
- E is the measured maximum fundamental field strength in V/m, utilizing a RBW ≥ the 20 dB bandwidth of the emission, VBW > RBW, peak detector function. Follow the procedures in C63.4-1992 with respect to maximizing the emission.
- G is the numeric gain of the transmitting antenna with reference to an isotropic radiator.
- d is the distance in meters from which the field strength was measured.
- P is the power in watts for which you are solving:

$$P = \frac{(Ed)^2}{30G}$$

5.4. TEST EQUIPMENT LIST

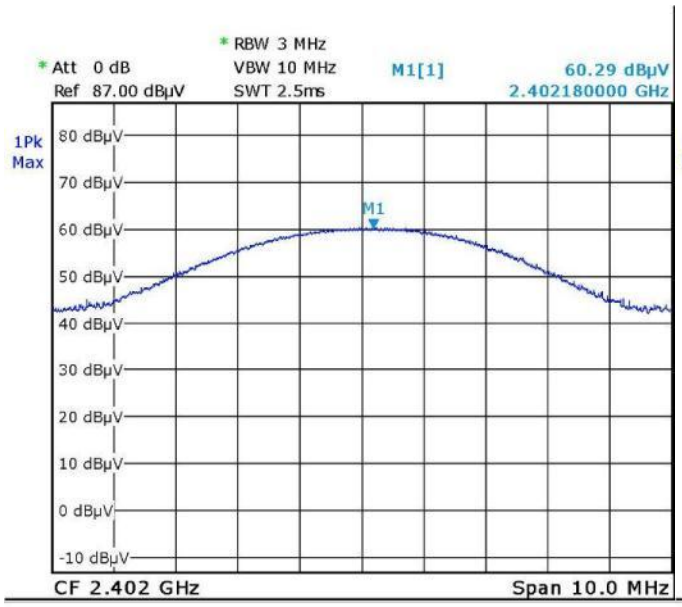
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE
Antenna horn	EMCO	3115	C2042027
Cable N/N	-	-	A5329038
Cable	UTIFLEX	-	A5329192
Cable N/N	-	-	A5329206
Semi-Anechoic chamber #3	SIEPEL	-	D3044017
Receiver 9kHz - 6GHz	ROHDE & SCHWARZ	FSL6	A2642020
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011

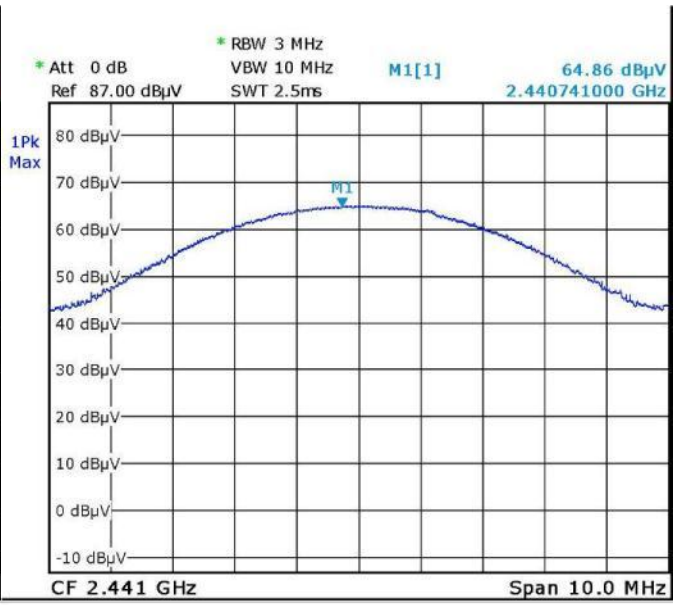
5.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

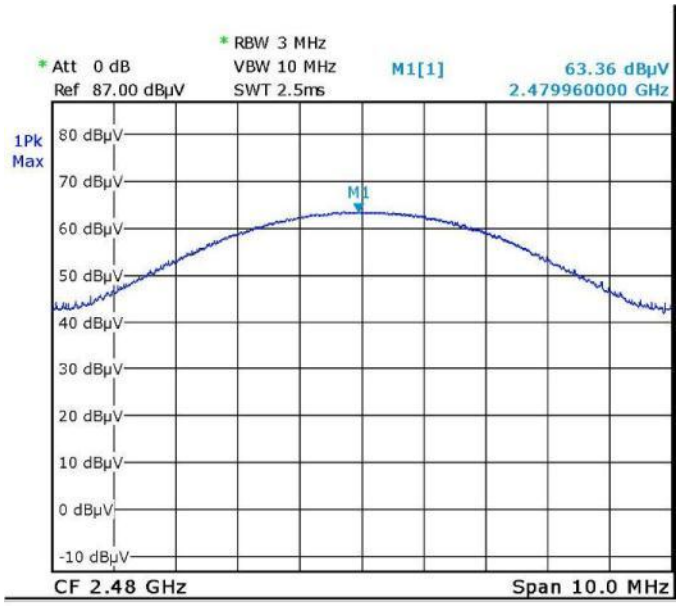
None

5.6. TEST SEQUENCE AND RESULTS

Channel	Channel Frequency (MHz)	Maximum Field (dBµV/m)	E.I.R.P (dBm)	FC (dB)	Antenna Gain (dBi)	Peak Conducted Output Power (dBm)	Power Limit (dBm)	PASS / FAIL
0	**2402**	**90.7**	**-4.5**	30.4	-0.5	-4.0	**30.0**	**PASS**
39	**2441**	**95.5**	**0.3**	30.6	-0.5	0.8	**30.0**	**PASS**
78	**2480**	**94.2**	**-1.0**	30.8	-0.5	-0.5	**30.0**	**PASS**







6. HOPPING CHANNEL SEPARATION (15.247)

6.1. TEST CONDITIONS

Date of test : May 28th, 2013
Test performed by : A.MERLIN
Atmospheric pressure : 990hPa
Relative humidity : 40%
Ambient temperature : 22°C

6.2. LIMIT

For frequency hopping system, hopping channel carrier frequencies must be separated by a minimum of 25kHz or the 20dB bandwidth of hopping channel, whichever is greater.

6.3. EQUIPMENT CONFIGURATION

Modulation type:	☒GFSK	☒Pi/4 DQPSK	☒8DPSK
Packet type:	1-DH5	2-DH5	3-DH5
Hopping sequence:	ON	ON	ON

6.4. SETUP – 20DB BANDWIDTH

The EUT is placed in an anechoic chamber; levels have been corrected to be in compliant with the Peak Output Power measured. The EUT is turn ON and using the MaxHold function, the frequency separation of two frequencies that were attenuated 20dB from the Peak Output Power level. A delta marker is used to measure the frequency difference as the emission bandwidth.

6.5. SETUP – ADJACENT CHANNEL SEPARATION

The EUT is placed in an anechoic chamber; levels have been corrected to be in compliant with the Peak Output Power measured. The EUT is turn ON and using the MaxHold function, the separation of two adjacent channels is recorded. A delta marker is used to measure the frequency difference.

6.6. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE
Antenna horn	EMCO	3115	C2042027
Cable N/N	-	-	A5329038
Cable	UTIFLEX	-	A5329192
Semi-Anechoic chamber #3	SIEPEL	-	D3044017
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019

6.7. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

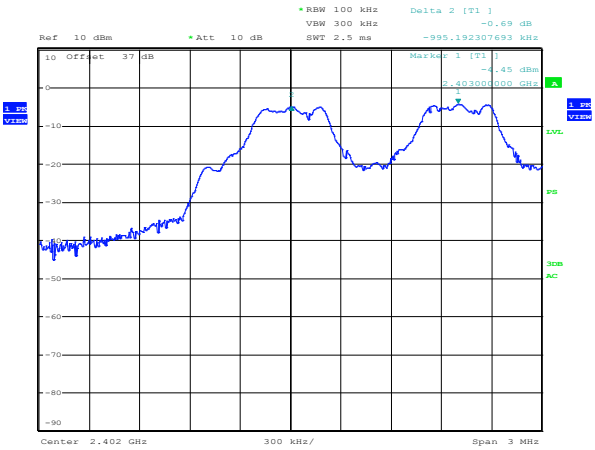
None

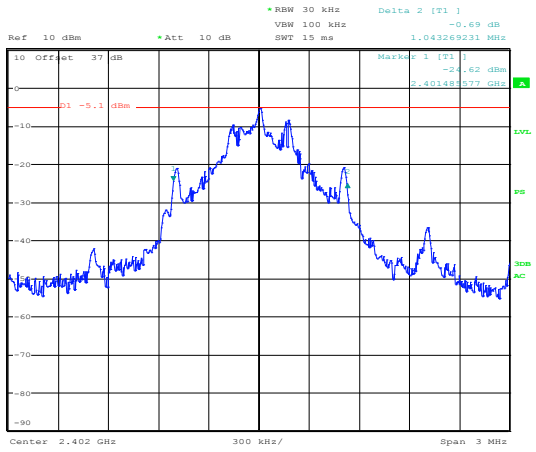
6.8. TEST SEQUENCE AND RESULTS

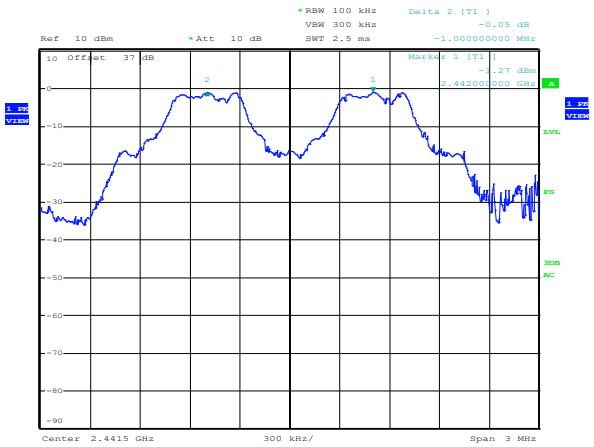
GFSK – 1-DH5 – 1Mbps

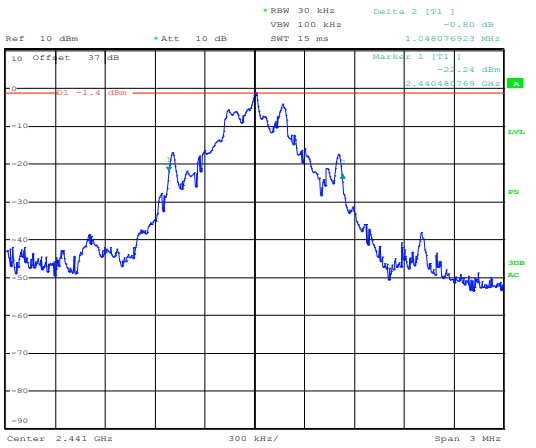
Channel	Channel Frequency (MHz)	Adjacent Channel Separation (MHz)	20dB Bandwidth (MHz)	Minimum Limit (MHz)	PASS / FAIL
0	2402	0.995	1.043	0.695	PASS
39	2441	1.000	1.048	0.698	PASS
78	2480	1.000	1.048	0.698	PASS

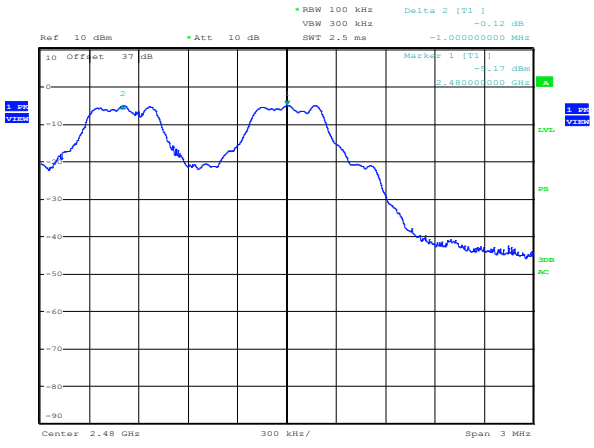
Limit used: Two-third 20dB Bandwidth

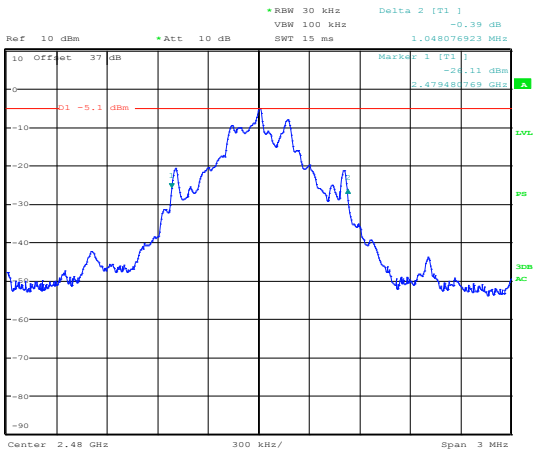








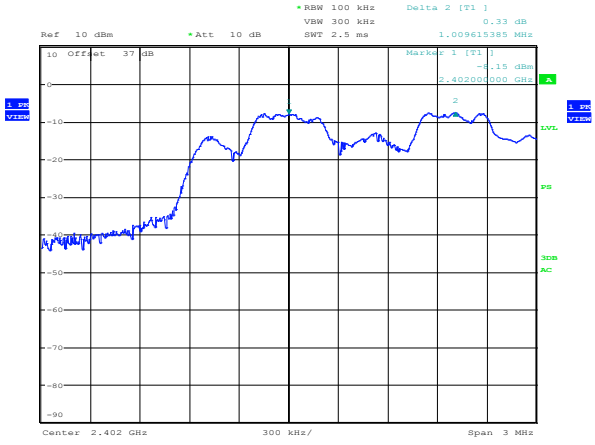


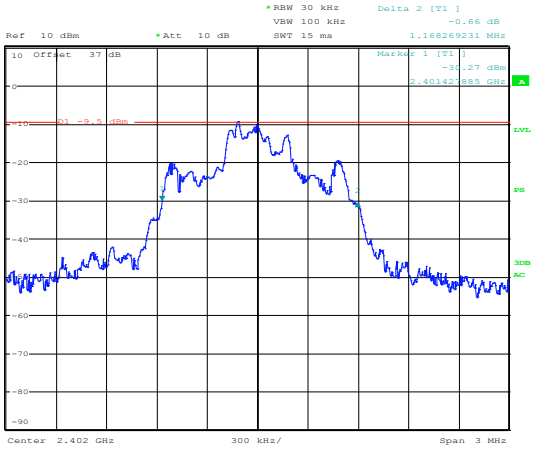


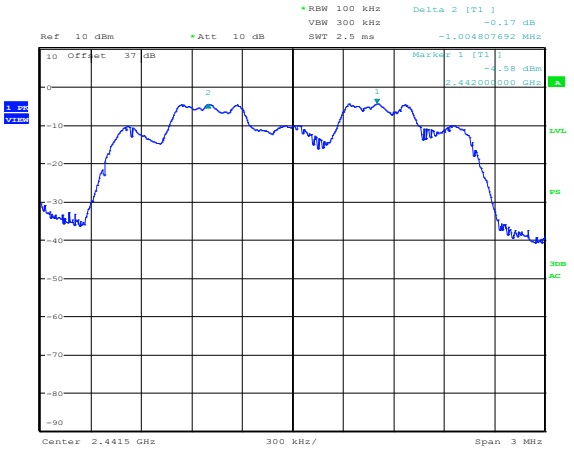
Pi/4 DQPSK – 2-DH5 – 2Mbps

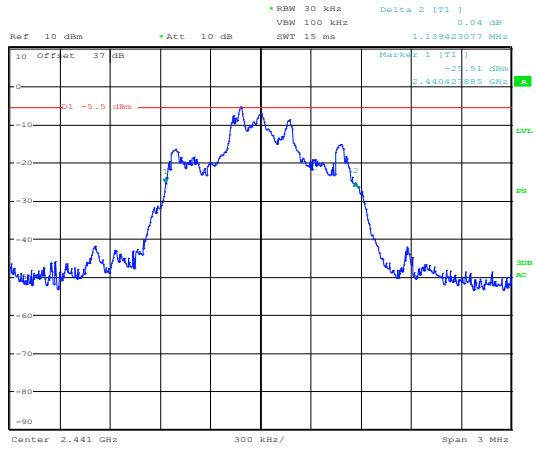
Channel	Channel Frequency (MHz)	Adjacent Channel Separation (MHz)	20dB Bandwidth (MHz)	Minimum Limit (MHz)	PASS / FAIL
0	2402	1.009	1.168	0.778	PASS
39	2441	1.004	1.139	0.759	PASS
78	2480	0.995	1.139	0.759	PASS

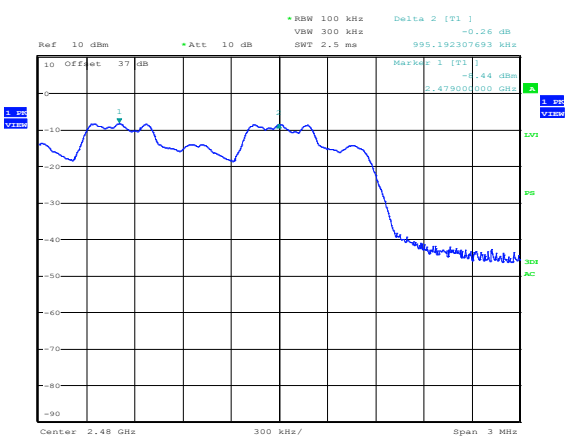
Limit used: Two-third 20dB Bandwidth

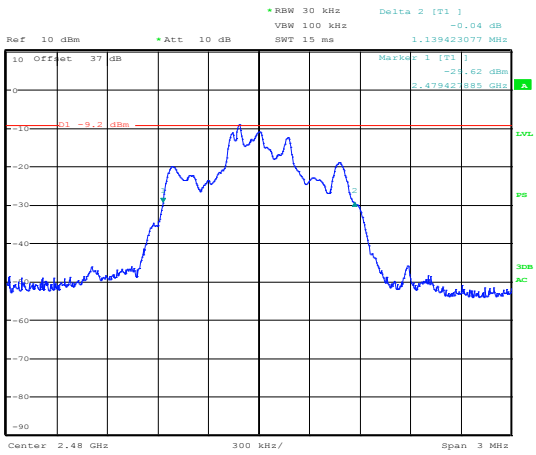








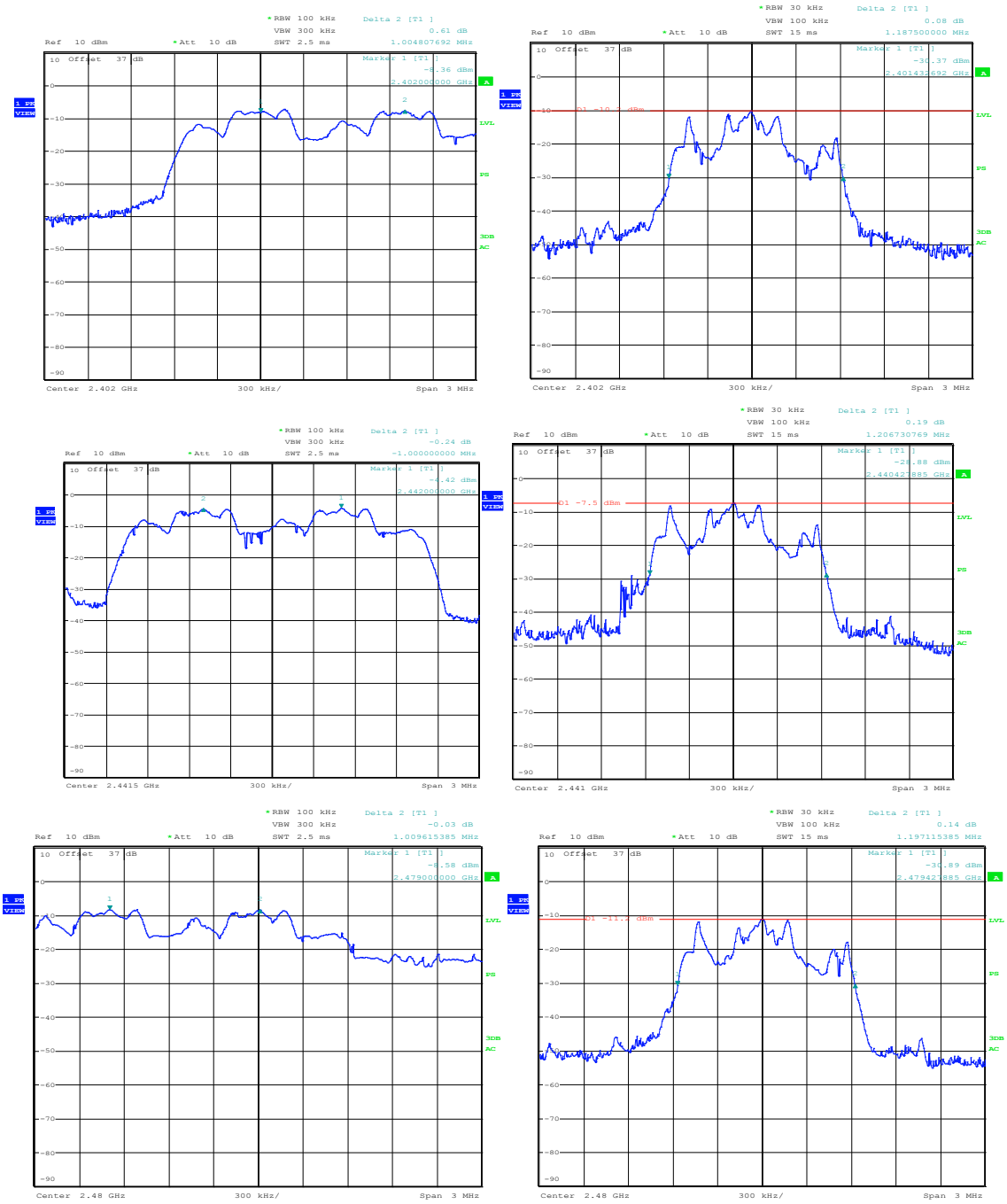




8DPSK – 3-DH5 – 3Mbps

Channel	Channel Frequency (MHz)	Adjacent Channel Separation (MHz)	20dB Bandwidth (MHz)	Minimum Limit (MHz)	PASS / FAIL
0	2402	1.004	1.187	0791	PASS
39	2441	1.000	1.206	0.804	PASS
78	2480	1.009	1.197	0.798	PASS

Limit used: Two-third 20dB Bandwidth



7. NUMBER OF HOPPING FREQUENCIES (15.247)

7.1. TEST CONDITIONS

Test performed by : A.MERLIN
Date of test : May 14th, 2013
Atmospheric pressure : 991hPa
Ambient temperature : 21°C
Relative humidity : 37%

7.1. LIMIT

For frequency hopping system operating in the 2400-2483.5MHz, at least 15 channels frequencies must be used and should be equally spaced.

7.2. EQUIPMENT CONFIGURATION

Modulation: GFSK, same results
Packet Type: 1-DH5, same results
Hopping sequence: ON

7.3. SETUP

The EUT is placed in an anechoic chamber. The EUT is turn ON and using the MaxHold function and a delta marker the number of frequencies used for this FHSS system is recorded, see following graphs.
RBW: 100kHz
VBW: 300kHz

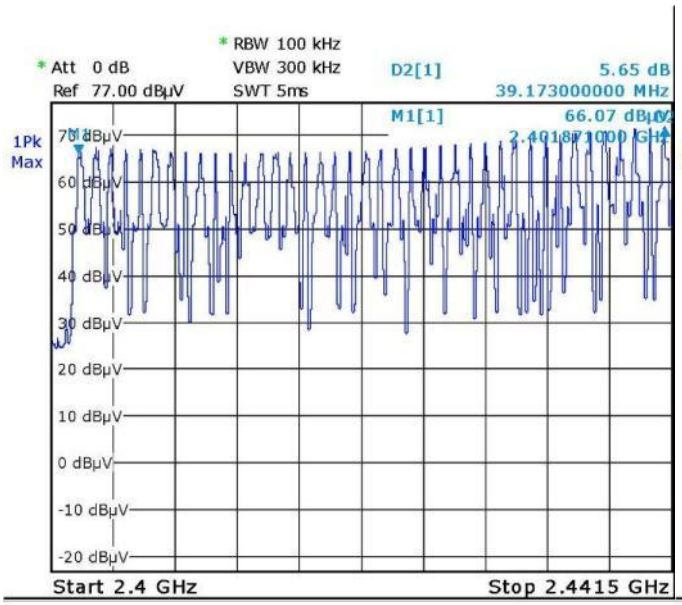
7.4. TEST EQUIPMENT LIST

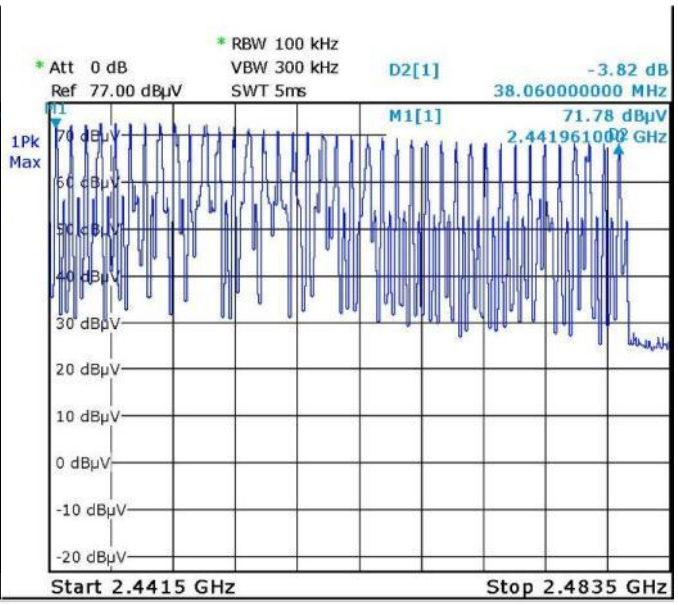
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE
Antenna horn	EMCO	3115	C2042027
Cable N/N	-	-	A5329038
Cable	UTIFLEX	-	A5329192
Cable N/N	-	-	A5329206
Semi-Anechoic chamber #3	SIEPEL	-	D3044017
Receiver 9kHz - 6GHz	ROHDE & SCHWARZ	FSL6	A2642020
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011

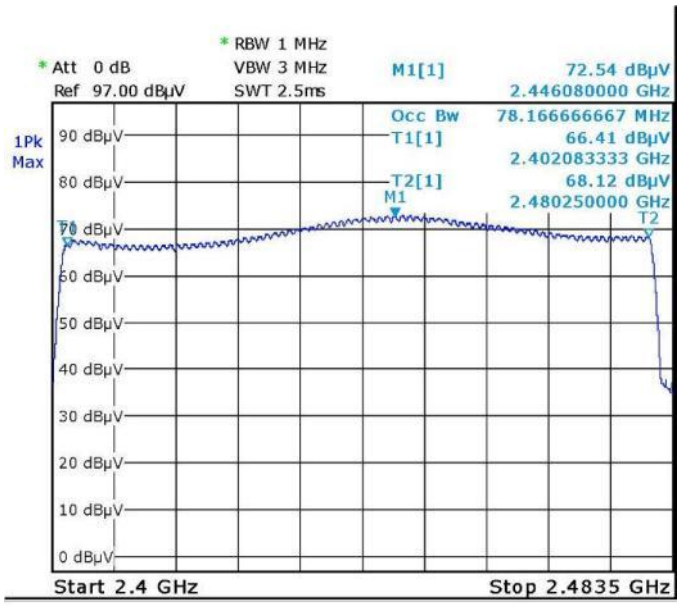
7.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

7.6. TEST SEQUENCE AND RESULTS







Number of frequency used in the hopping sequence: 79 channels / 78.2MHz (99% OBW)

8. TIME OF OCCUPANCY (DWELL TIME) (15.247)

8.1. TEST CONDITIONS

Date of test : May 28th, 2013
Test performed by : A.MERLIN
Atmospheric pressure : 990hPa
Relative humidity : 39%
Ambient temperature : 22°C

8.2. LIMIT

The average time of occupancy on any channel shall not be greater than 0.4 seconds within period of 0.4 seconds multiplied by the number of hopping channels employed.

8.3. EQUIPMENT CONFIGURATION

Modulation: 8DPSK, worst case
Packet Type: 3-DH5, worst case
Hopping sequence: ON

8.4. SETUP

The EUT is placed in an anechoic chamber. The EUT is turn ON; the Dwell Time is measured and calculated using the zero SPAN mode on a channel frequency and a SWEEP with an adapter value to measure the number of transmission within a period and the time of transmission
RBW: 100kHz
VBW: 300kHz

8.5. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE
Antenna horn	EMCO	3115	C2042027
Cable N/N	-	-	A5329038
Cable	UTIFLEX	-	A5329192
Cable N/N	-	-	A5329206
Semi-Anechoic chamber #3	SIEPEL	-	D3044017
Receiver 9kHz - 6GHz	ROHDE & SCHWARZ	FSL6	A2642020
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078
Thermo-hygrometer (PM2)	OREGON	BAR916HG-G	B4206011

8.1. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

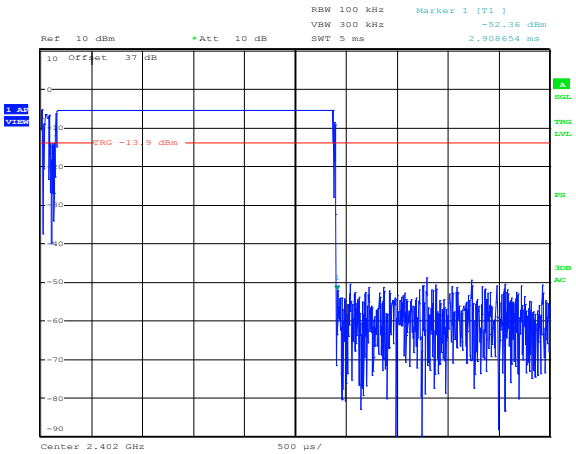
None

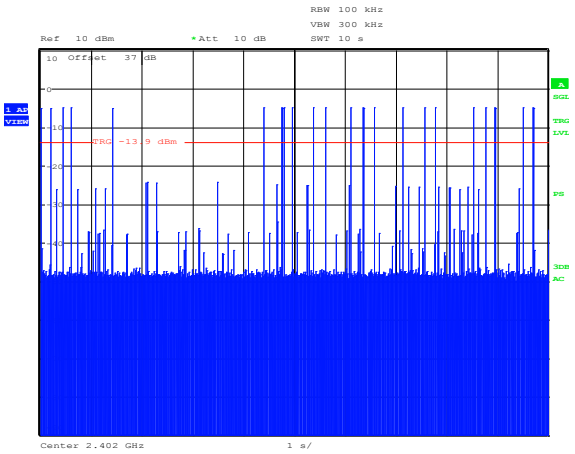
8.2. TEST SEQUENCE AND RESULTS

8DPSK – 3-DH5 – 3Mbps

Packet Mode	Number of transmission in the period	Length of transmission time (ms)	Result (ms)	Limit (ms)	PASS / FAIL
3-DH5	**26 times / 10s**	**2.909**	**239.0**	**400**	**PASS**

Note: Period of 31.6 seconds (79 channels x 0.4)





9. BAND EDGE MEASUREMENT (15.247)

9.1. TEST CONDITIONS

Date of test : May 29th, 2013
Test performed by : A.MERLIN
Atmospheric pressure : 990hPa
Relative humidity : 42%
Ambient temperature : 22°C°C

9.1. LIMIT

In Bandedge, the limit of spurious emissions are below -20dB of the highest emission level of operating band (in 100kHz RBW).
In the restrict band (2310-2390MHz) and (2483.5-2500MHz) including bandedge, the limit of spurious emissions are 15.209. (RBW:1MHz / VBW:1MHz)

9.2. EQUIPMENT CONFIGURATION

Modulation: 1-DH5 (Worst case)
Hopping sequence: ON

9.3. SETUP

The EUT is placed in an anechoic chamber; levels have been corrected to be in compliant with Peak Output Power measurement. The EUT is turn ON; the graphs of the restrict frequency band are recorded with a display line indicating the highest level and other the 20dB offset below to show compliance with 15.247 (d) and 15.205. The emissions in restricted bands are compared to 15.209 limits.
RBW: 100kHz
VBW: 300kHz

9.4. TEST EQUIPMENT LIST

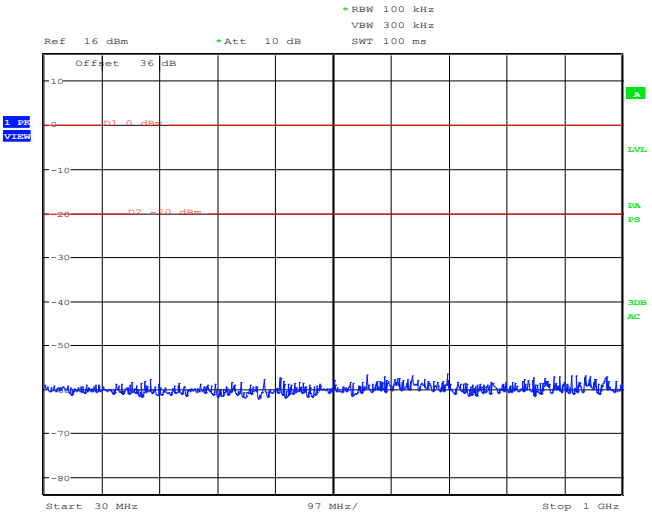
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE
Amplifier 8-26GHz	ALDETEC	ALS01452	A7102026
Amplifier 1-13GHz	LCIE SUD EST	-	A7102067
Attenuator 10dB	JFW	-	A7122166
Cable SMA	-	-	A5329580
Semi-Anechoic chamber #3	SIEPEL	-	D3044017
High Pass (4.8-18GHz)	BL Microwave	SH4800-1800	A7484034
Receiver 9kHz - 6GHz	ROHDE & SCHWARZ	FSL6	A2642020
Spectrum Analyzer 9KHz – 26.5GHz	HEWLETT PACKARD	8593E	A4060018

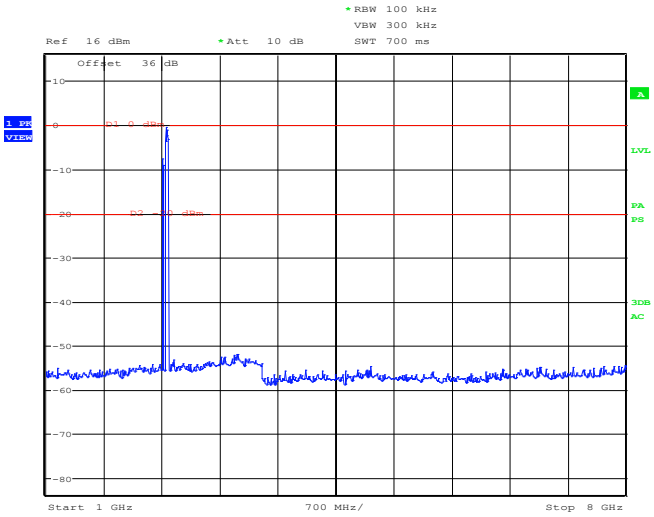
9.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

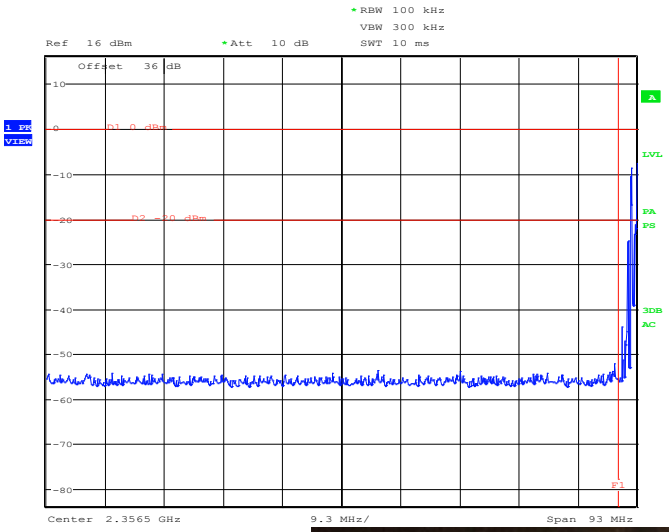
None

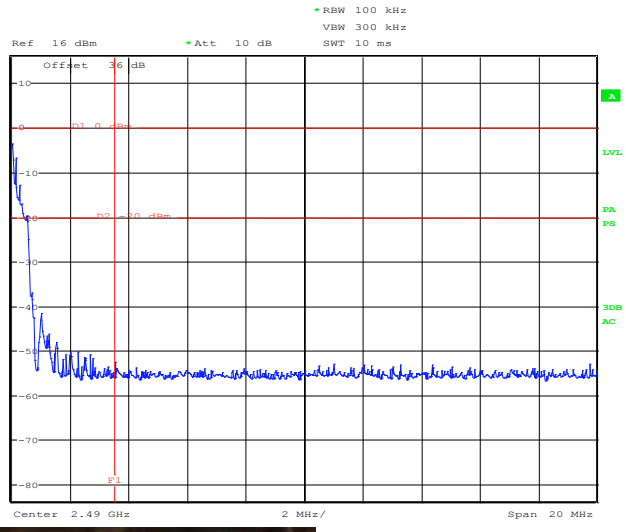
9.6. TEST SEQUENCE AND RESULTS

For spurious in restricted frequency band, see Radiated emission data paragraph.









Measurement from 6GHz to 26GHz: No frequency observed

10. FUNDAMENTAL FREQUENCY TOLERANCE (15.225E)

10.1. TEST CONDITIONS

Date of test : May 30th, 2013
Test performed by : A.MERLIN

The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency when the temperature is varied from -20°C to +50°C at the nominal power voltage and the primary power voltage is varied from 85% to 115% of the rated supply voltage at 20°C.

10.2. TEMPERATURE AND VOLTAGE FLUCTUATION

Temperature has been set at +20°C, –20°C and +50°C.
Voltage is varied from 3.3VDC to 4.2VDC, worst case, supply of battery.
Frequency of carrier: 13.56 MHz
Upper limit: 13.561356 MHz
Lower limit: 13.558644 MHz
The equipment (RF box) is set in a climatic chamber. Measure is performed on one channel of RF module.

Temperature **Voltage**	**-30°C**	**-20°C**	**20°C**	**+50°C**
Mains voltage: 3.7VDC				
Frequency Drift (MHz)	- 0.000004	- 0.000004	**REF**	- 0.000032
Carrier level (dBc)	- 2.70	- 2.70	**REF**	+ 0.00
Mains voltage: 4.2VDC				
Frequency Drift (MHz)	- 0.000004	- 0.000004	+ 0.000000	- 0.000032
Carrier level (dBc)	- 2.70	- 2.70	+ 0.00	+ 0.00
Mains voltage: 3.3VDC				
Frequency Drift (MHz)	- 0.000004	- 0.000004	+ 0.000000	- 0.000032
Carrier level (dBc)	- 6.10	- 5.20	- 0.20	+ 0.00

Frequency drift measured is **32Hz.**

10.3. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE
Antenna Loop	ELECTRO-METRICS	EM-6879	C2040052
Cable N/N	-	-	A5329206
Climatic chamber	BIA CLIMATIC	CL 6-25	D1022117
Data Logger	AGILENT	34970A	A6440083
Data Logger card	AGILENT	34970A	A6449036
Multimeter	FLUKE	289	A1240238
Power supply DC	TDK	-	A7044055
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019

10.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

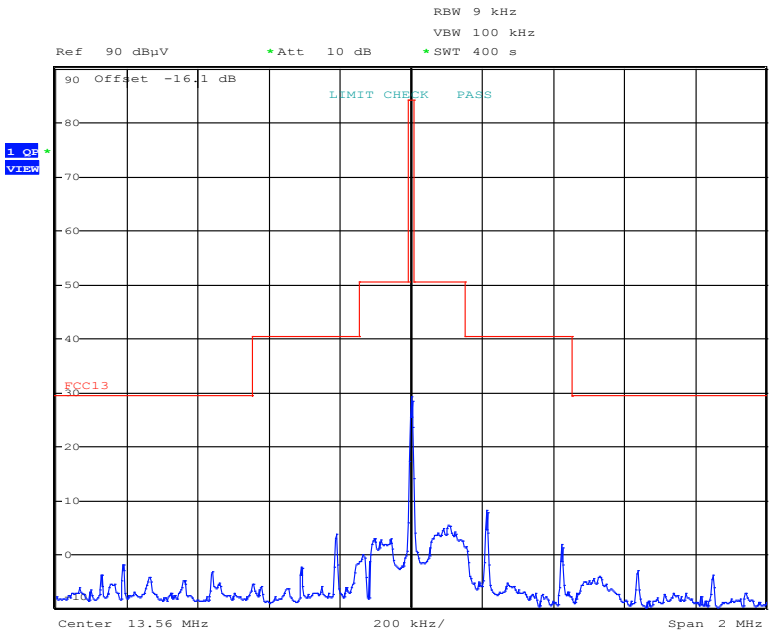
11. BAND-EDGE COMPLIANCE §15.209

11.1. TEST CONDITIONS

Date of test : May 15th, 2013
Test performed by : A.MERLIN
Atmospheric pressure : 981hPa
Relative humidity : 43%
Ambient temperature : 21°C

11.1. FREQUENCY BAND 13.110-14.010MHZ

Following plots show radiated emission level in the frequency band 13.110-14.010MHz with a RBW of 9kHz and a quasi-peak detector. The graphs are obtained with a measuring receiver ESU8.



11.2. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE
Antenna Loop	ELECTRO-METRICS	EM-6879	C2040052
Cable N/N	-	-	A5329038
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019

11.3. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

12. OCCUPIED BANDWIDTH

12.1. CLIMATIC CONDITIONS

Date of test : May 15th, 2013
Test performed by : A.MERLIN
Atmospheric pressure : 981hPa
Relative humidity : 43%
Ambient temperature : 21°C

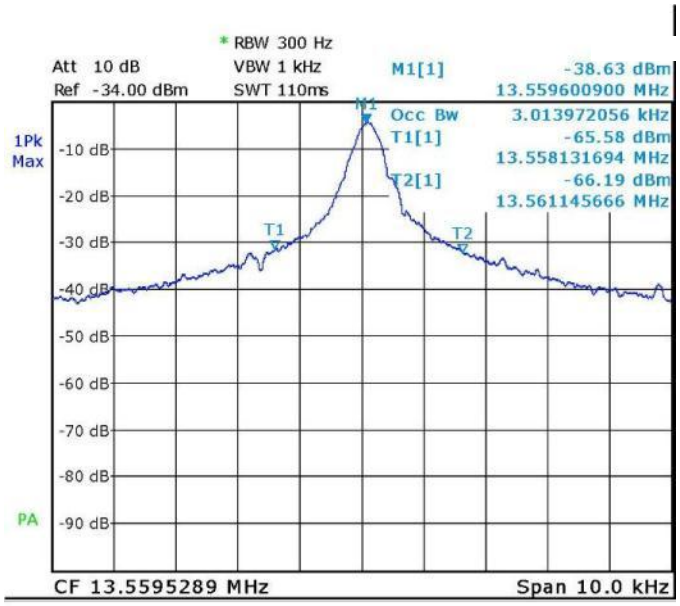
12.1. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE
Antenna horn	EMCO	3115	C2042027
Cable N/N	-	-	A5329038
Cable	UTIFLEX	-	A5329192
Semi-Anechoic chamber #3	SIEPEL	-	D3044017
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019

12.1. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

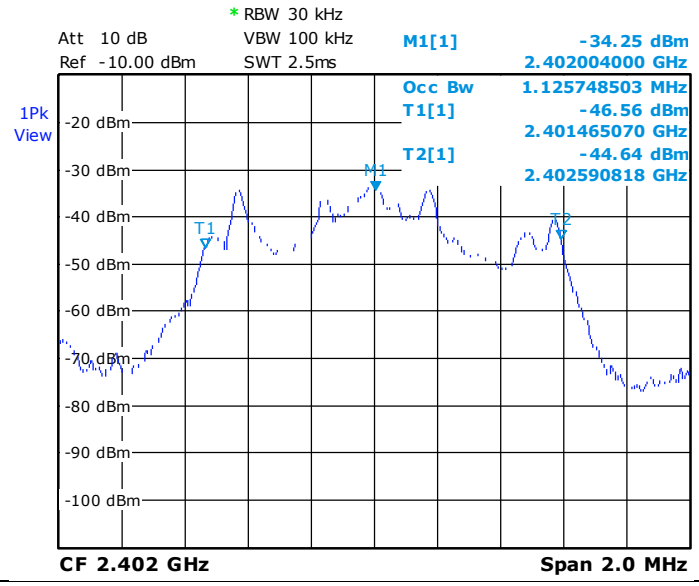
12.2. TEST RESULTS



Measured occupied bandwidth is **3.0 kHz**

Measurement settings:
RBW = 300Hz / Video BW = 1kHz
SPAN = 10kHz
The occupied bandwidth is measured where 99% of the power envelop is above the displayed line.

8DPSK / 3-DH5 (Worst case)



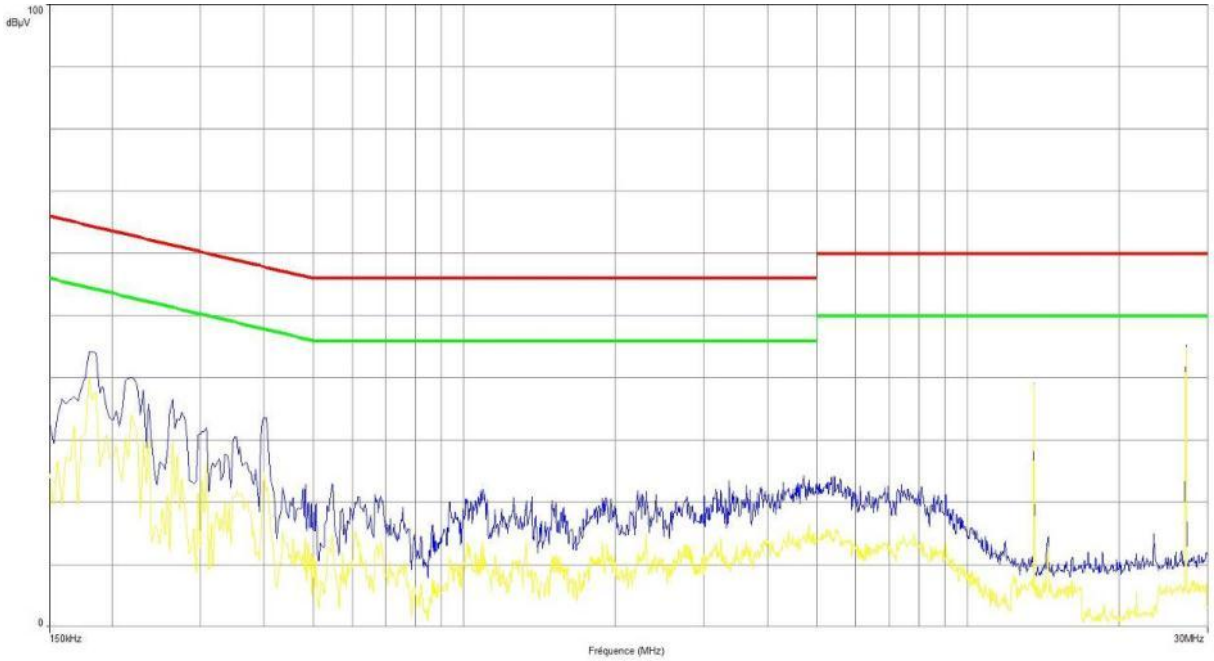
Measured occupied bandwidth is **1.126MHz**, same results following channel.

Measurement settings:
RBW = 30kHz / Video BW = 100kHz / SPAN = 2MHz
The occupied bandwidth is measured with OBW 99% function of spectrum analyzer.

13. ANNEX 1 (GRAPHS)

CONDUCTED EMISSIONS		
Graph name :	Emc#1	**Test configuration:**
Limit :	EN 55022	CAM0 + RFID + Bluetooth (Hopping mode)
Class :	B	

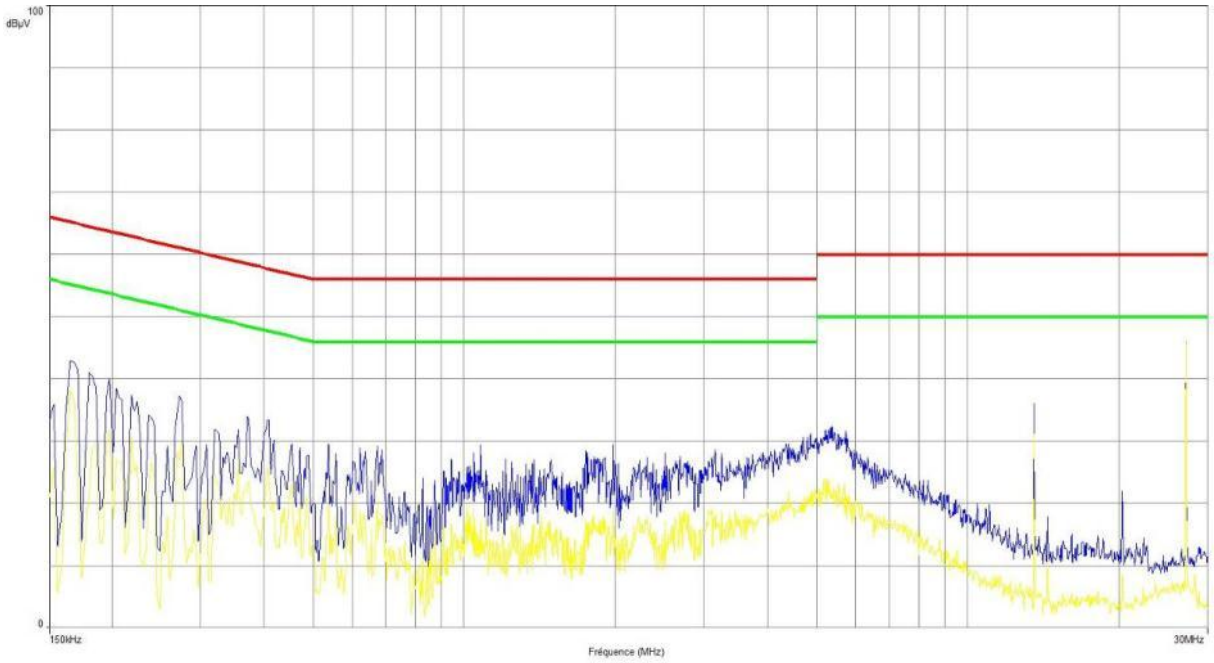
PARAMETERS					
Voltage / Frequency :	110VAC / 60Hz	**Legend:**			
Line :	Phase 1		**Peak Measure**		**Average Measure**
RBW :	9kHz				
VBW :	30kHz		**QPeak Limit**		**Average Limit**
Frequency :	150kHz- 30MHz				



Frequency (MHz)	Avg (dBµV)	Lim Avg (dBµV)	MesAvg - LimAvg (dBµV)	QPeak (dBµV)	Lim QPeak (dBµV)	MesQP - LimQP (dBµV)
13.55862	37.98	50	-12.02	39.26	60	-20.74
27.119475	34.19	50	-15.81	39.68	60	-20.32

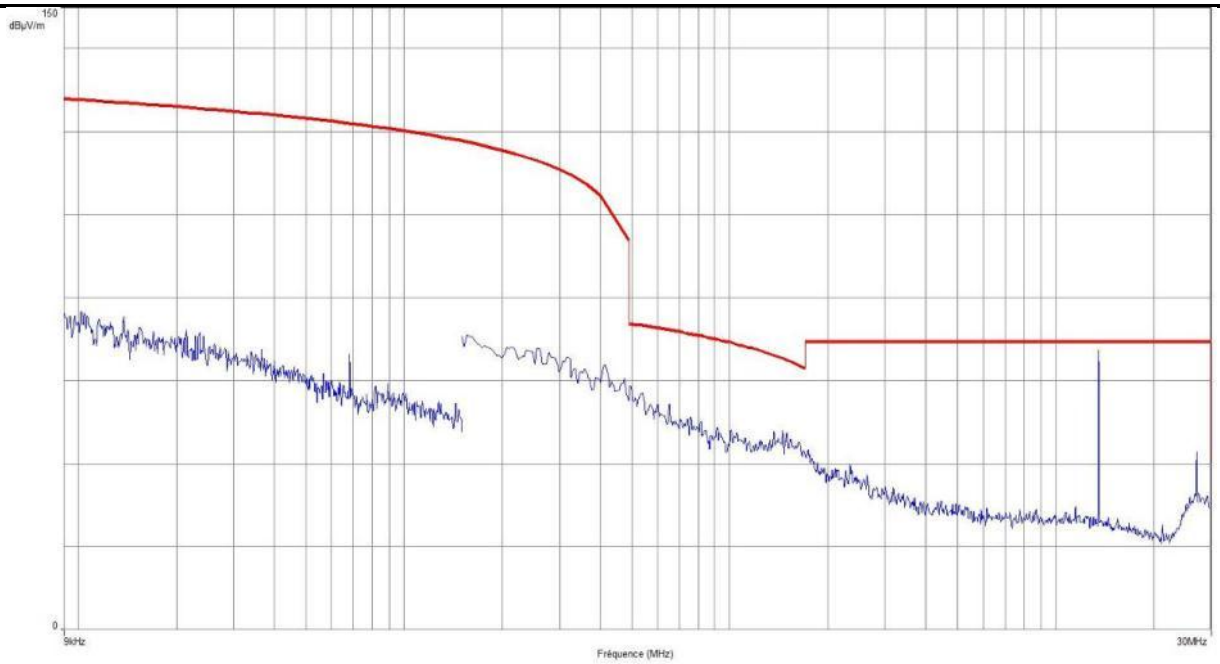
CONDUCTED EMISSIONS		
Graph name :	Emc#2	**Test configuration:**
Limit :	EN 55022	CAM0 + RFID + Bluetooth (Hopping mode)
Class :	B	

PARAMETERS					
Voltage / Frequency :	110VAC / 60Hz	**Legend:**			
Line :	Neutral		**Peak Measure**		**Average Measure**
RBW :	9kHz				
VBW :	30kHz		**QPeak Limit**		**Average Limit**
Frequency :	150kHz- 30MHz				



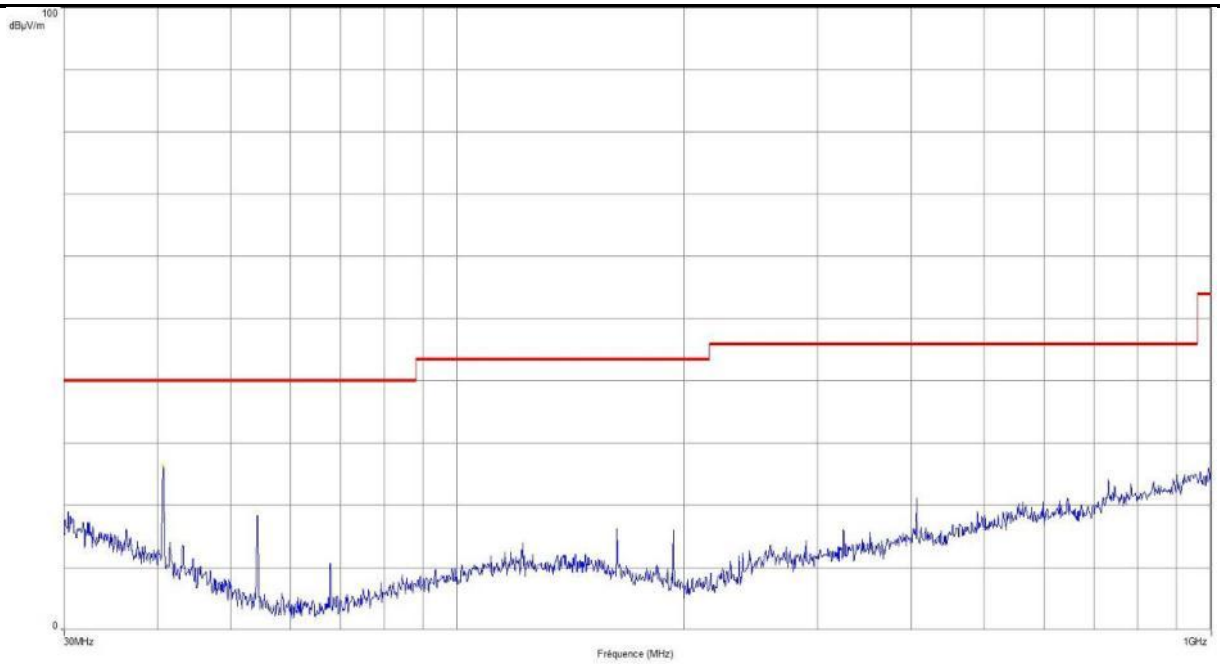
Frequency (MHz)	Avg (dBµV)	Lim Avg (dBµV)	MesAvg - LimAvg (dBµV)	QPeak (dBµV)	Lim QPeak (dBµV)	MesQP - LimQP (dBµV)
13.55862	39.42	50	-10.58	39.65	60	-20.35
27.119475	35.85	50	-14.15	40.51	60	-19.49

RADIATED EMISSIONS			
Graph name :	Emr#1	**Test configuration:**	
Limit :	FCC Part15C	RFID + Bluetooth - CAM0 – Alone	
Class :	-	Axis Z - (0°) Worst case	
PARAMETERS			
Antenna polarization:	0°	**Legend:**	
Azimuth :	0° - 360°		**Peak Measure**
RBW :	100kHz		
VBW :	300kHz		**QPeak Limit@3m**
Frequency :	9kHz - 30MHz		



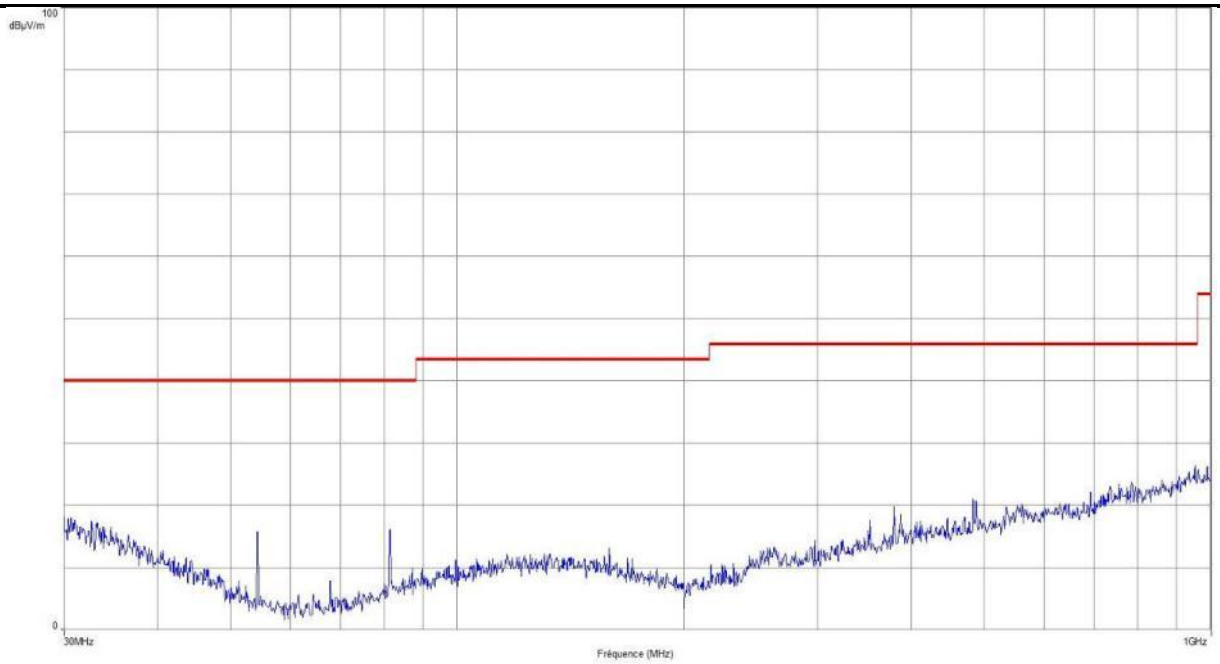
Frequency (MHz)	Peak Level (dBµV/m)
13.561605	67.4

RADIATED EMISSIONS			
Graph name :	Emr#2	**Test configuration:**	
Limit :	FCC Part15C	RFID + Bluetooth - CAM0 - Axis XY - Alone	
Class :	-		
PARAMETERS			
Antenna polarization:	Horizontal	**Legend:**	
Azimuth :	0° - 360°		**Peak Measure**
RBW :	100kHz		
VBW :	300kHz		**QPeak Limit@3m**
Frequency :	30MHz - 1GHz		



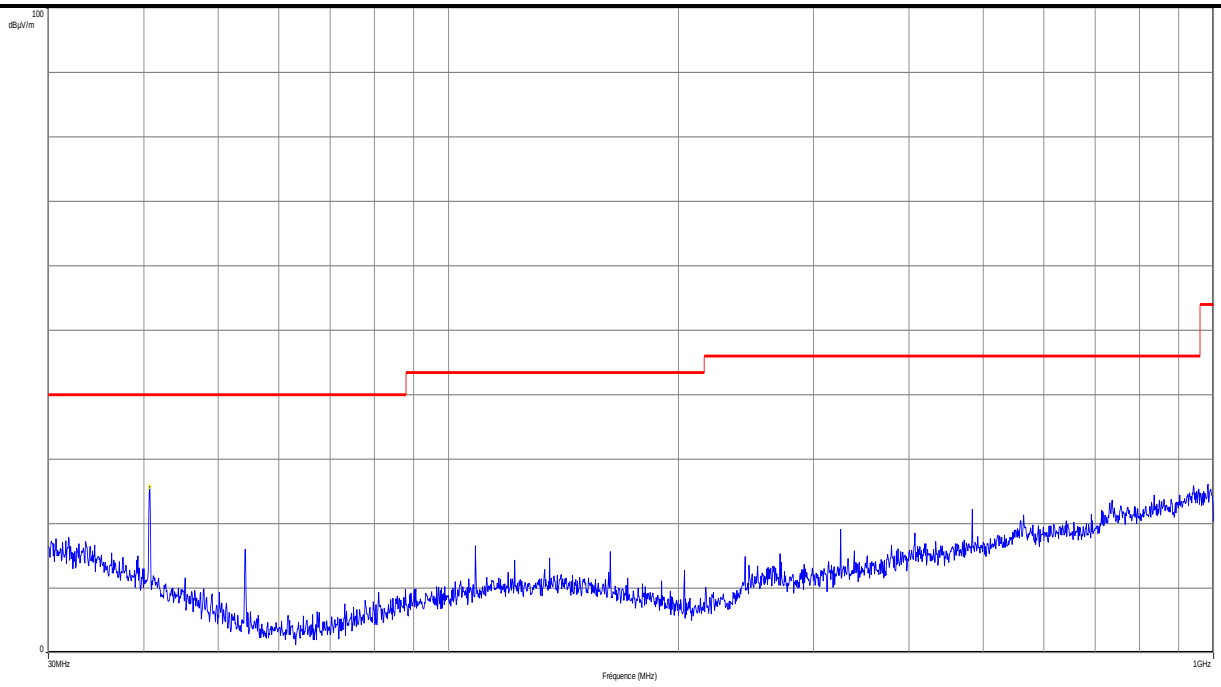
Frequency (MHz)	Peak Level (dBµV/m)
40.693	26.3

RADIATED EMISSIONS			
Graph name :	Emr#3	**Test configuration:**	
Limit :	FCC Part15C	RFID + Bluetooth - CAM0 - Axis XY- Alone	
Class :	-		
PARAMETERS			
Antenna polarization:	Vertical	**Legend:**	
Azimuth :	0° - 360°		**Peak Measure**
RBW :	100kHz		
VBW :	300kHz		**QPeak Limit@3m**
Frequency :	30MHz - 1GHz		



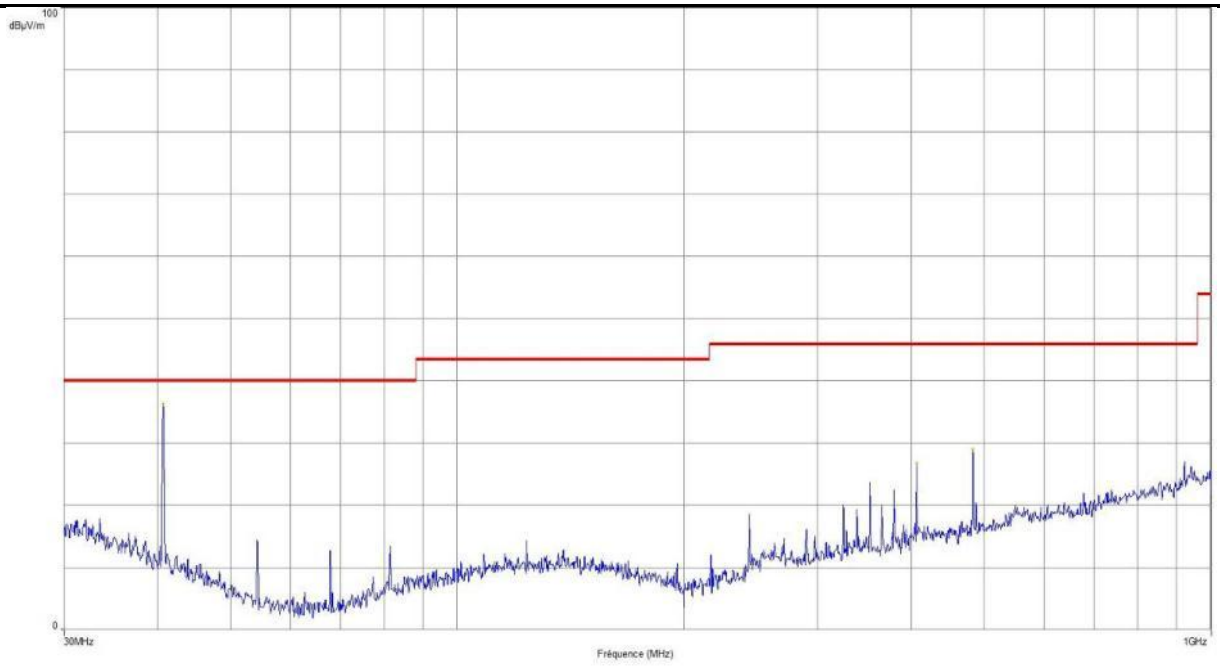
Frequency (MHz)	Peak Level (dBµV/m)
No significant frequency observed	

RADIATED EMISSIONS			
Graph name :	Emr#4	**Test configuration:**	
Limit :	FCC Part15C	RFID + Bluetooth - CAM0 - Axis Z - Alone	
Class :	-		
PARAMETERS			
Antenna polarization:	Horizontal	**Legend:**	
Azimuth :	0° - 360°		**Peak Measure**
RBW :	100kHz		
VBW :	300kHz		**QPeak Limit@3m**
Frequency :	30MHz - 1GHz		



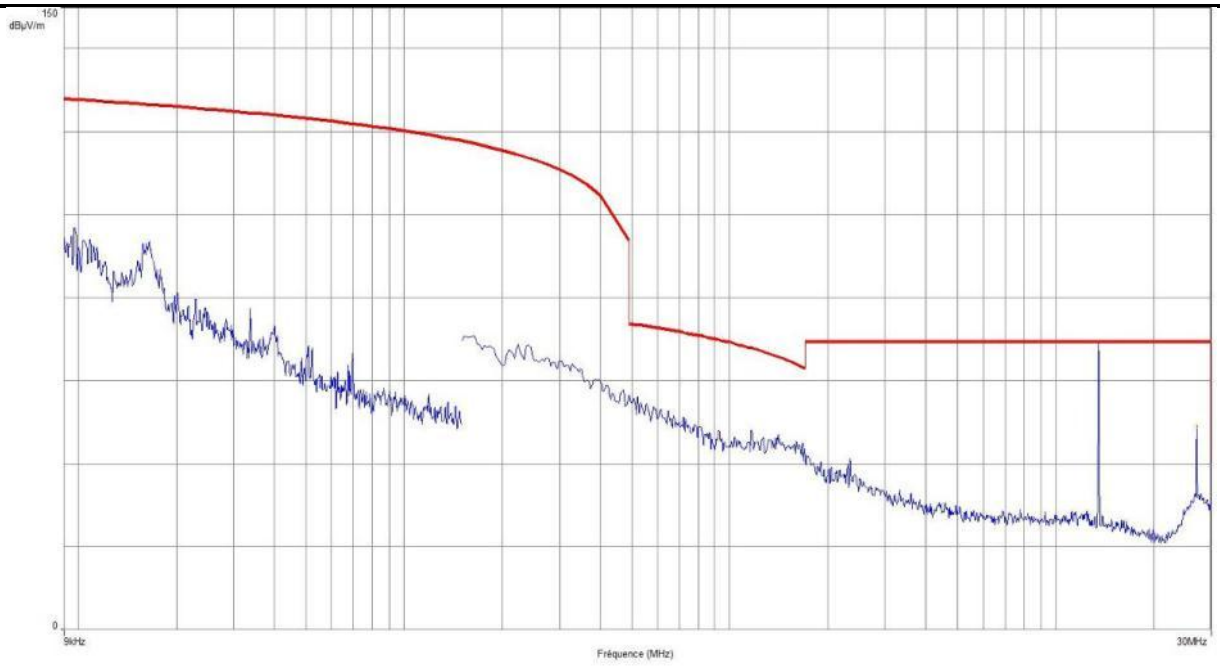
Frequency (MHz)	Peak Level (dBµV/m)
40.676	25.73

RADIATED EMISSIONS			
Graph name :	Emr#5	**Test configuration:**	
Limit :	FCC Part15C	RFID + Bluetooth - CAM0 - Axis Z - Alone	
Class :	-		
PARAMETERS			
Antenna polarization:	Vertical	**Legend:**	
Azimuth :	0° - 360°		**Peak Measure**
RBW :	100kHz		
VBW :	300kHz		**QPeak Limit@3m**
Frequency :	30MHz - 1GHz		



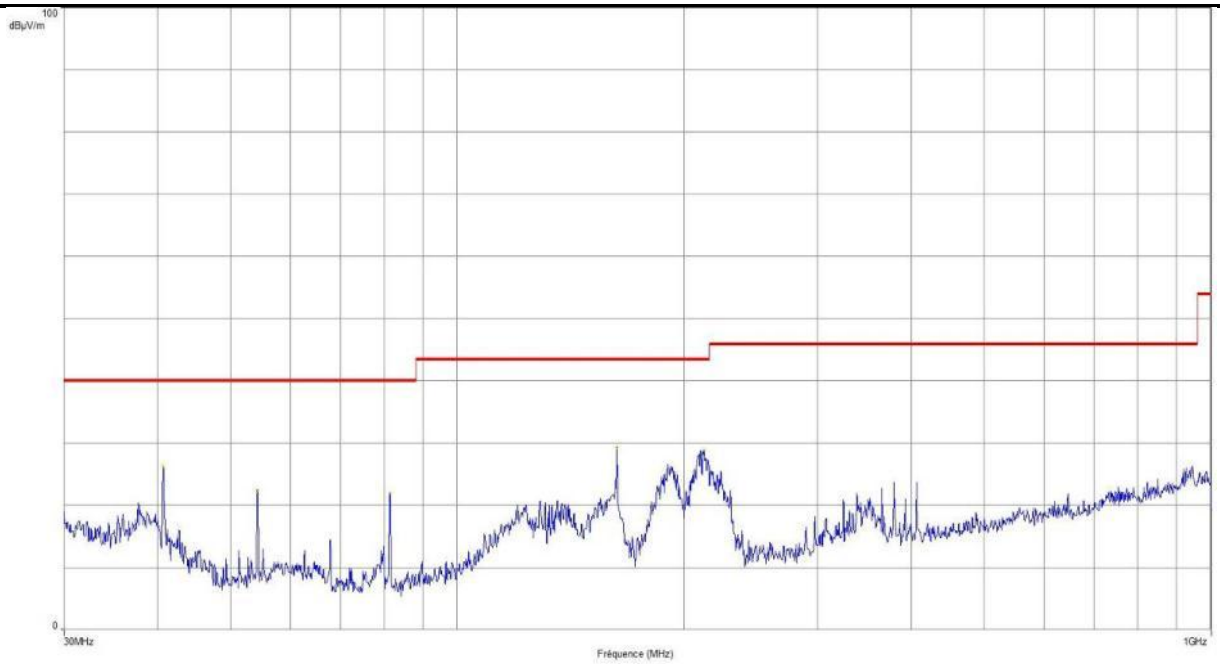
Frequency (MHz)	Peak Level (dBµV/m)
40.676	36.42
406.8	26.93
483.8	29.16

RADIATED EMISSIONS			
Graph name :	Emr#6	**Test configuration:**	
Limit :	FCC Part15C	RFID + Bluetooth - CAM0 - USB (Load)	
Class :	-	Axis Z - (0°) Worst case	
PARAMETERS			
Antenna polarization:	0°	**Legend:**	
Azimuth :	0° - 360°		**Peak Measure**
RBW :	100kHz		
VBW :	300kHz		**QPeak Limit@3m**
Frequency :	9kHz - 30MHz		



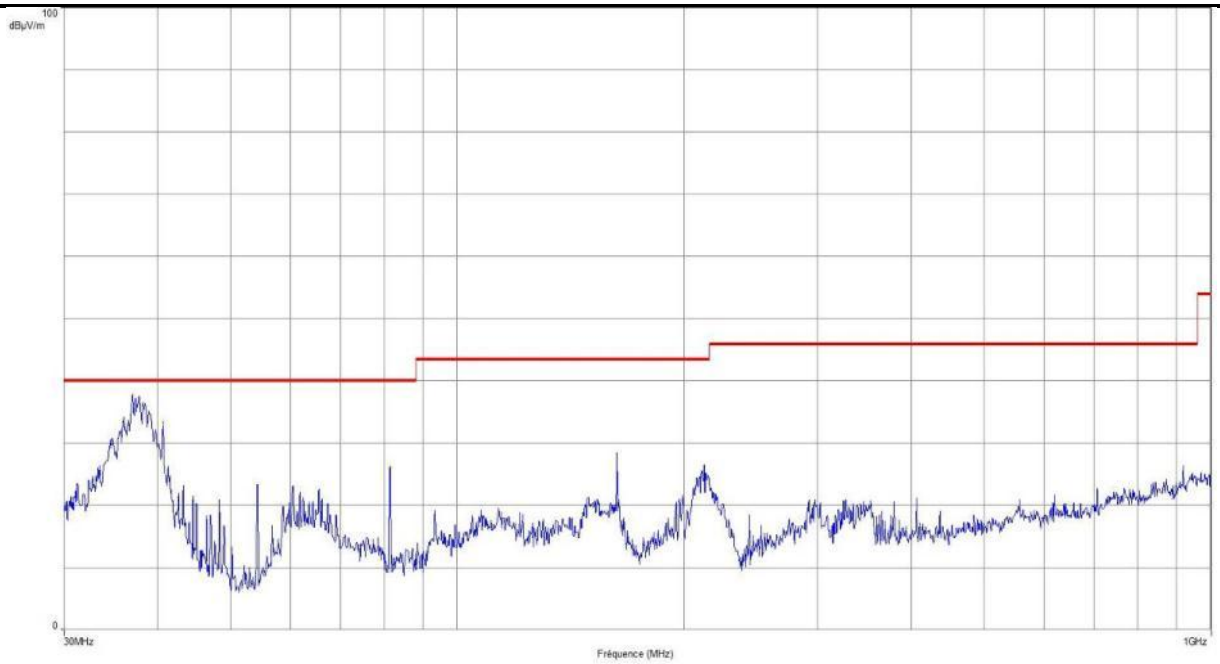
Frequency (MHz)	Peak Level (dBµV/m)
13.561605	69.41
27.119475	49.27

RADIATED EMISSIONS			
Graph name :	Emr#7	**Test configuration:**	
Limit :	FCC Part15C	RFID + Bluetooth - CAM0 - Axis XY - USB (Load)	
Class :	-		
PARAMETERS			
Antenna polarization:	Horizontal	**Legend:**	
Azimuth :	0° - 360°		**Peak Measure**
RBW :	100kHz		
VBW :	300kHz		**QPeak Limit@3m**
Frequency :	30MHz - 1GHz		



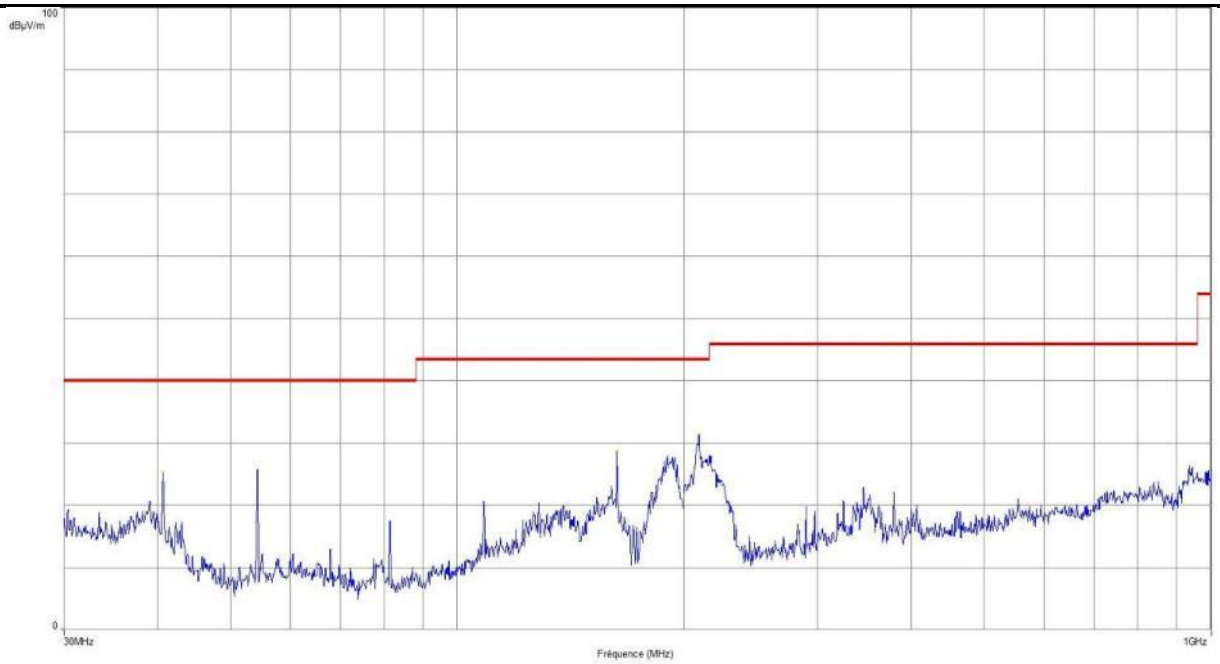
Frequency (MHz)	Peak Level (dBµV/m)
40.693	26.31
54.225	22.54
81.357	22.02
162.736	29.37
212.68	28.97

RADIATED EMISSIONS			
Graph name :	Emr#8	**Test configuration:**	
Limit :	FCC Part15C	RFID + Bluetooth - CAM0 - Axis XY - USB (Load)	
Class :	-		
PARAMETERS			
Antenna polarization:	Vertical	**Legend:**	
Azimuth :	0° - 360°		**Peak Measure**
RBW :	100kHz		
VBW :	300kHz		**QPeak Limit@3m**
Frequency :	30MHz - 1GHz		



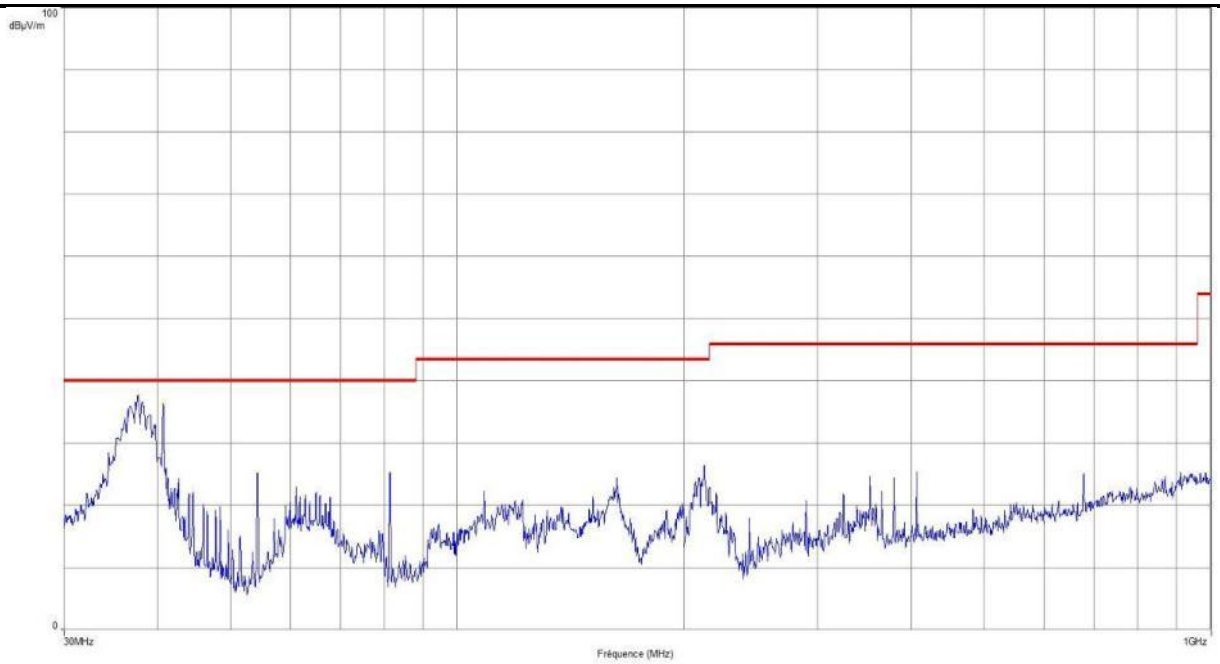
Frequency (MHz)	Peak Level (dBµV/m)
37.038	37.84
40.659	33.39
81.357	26.16

RADIATED EMISSIONS			
Graph name :	Emr#9	**Test configuration:**	
Limit :	FCC Part15C	RFID + Bluetooth - CAM0 - Axis Z – USB (Load)	
Class :	-		
PARAMETERS			
Antenna polarization:	Horizontal	**Legend:**	
Azimuth :	0° - 360°		**Peak Measure**
RBW :	100kHz		
VBW :	300kHz		**QPeak Limit@3m**
Frequency :	30MHz - 1GHz		



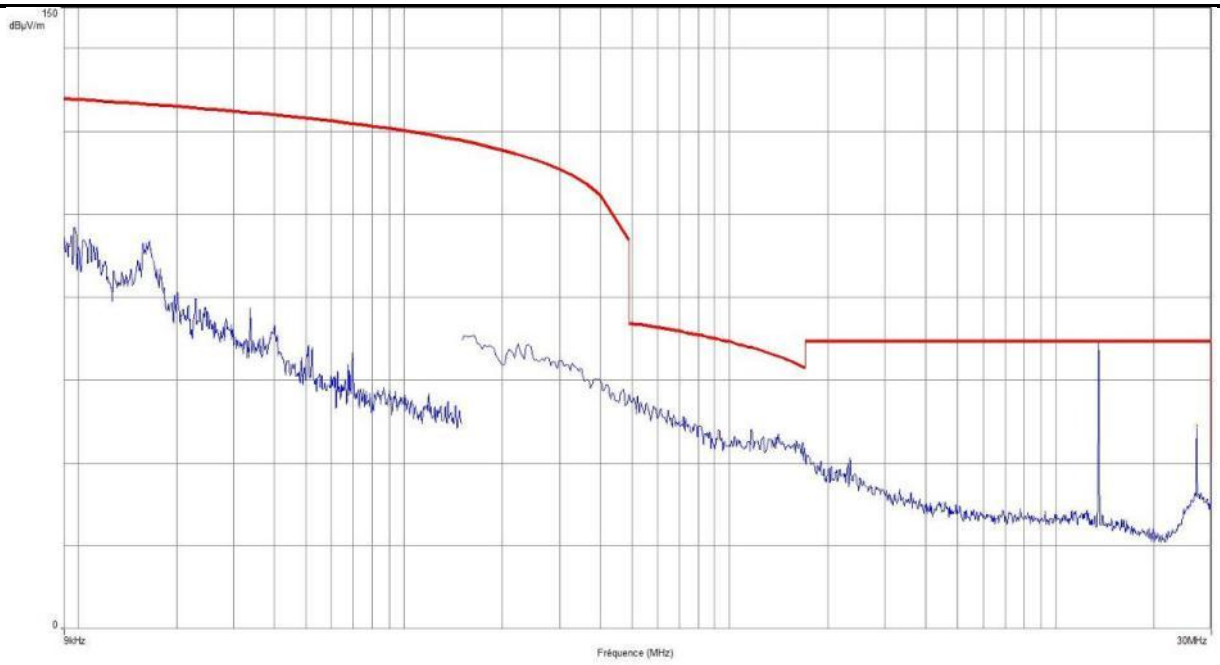
Frequency (MHz)	Peak Level (dBµV/m)
40.642	25.32
54.242	25.71
162.736	28.68
209.16	31.45

RADIATED EMISSIONS			
Graph name :	Emr#10	**Test configuration:**	
Limit :	FCC Part15C	RFID + Bluetooth - CAM0 - Axis Z - USB (Load)	
Class :	-		
PARAMETERS			
Antenna polarization:	Vertical	**Legend:**	
Azimuth :	0° - 360°		**Peak Measure**
RBW :	100kHz		
VBW :	300kHz		**QPeak Limit@3m**
Frequency :	30MHz - 1GHz		



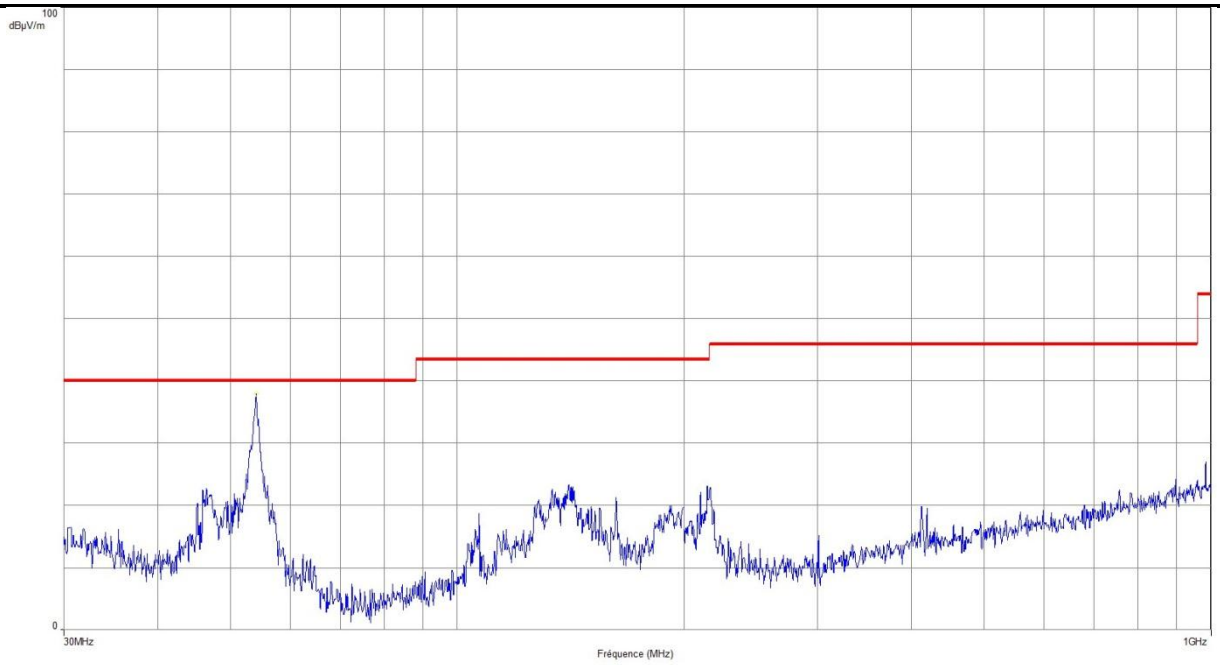
Frequency (MHz)	Peak Level (dBµV/m)
37.65	37.62
40.693	36.4
54.242	25.14
81.357	25.27

RADIATED EMISSIONS			
Graph name :	Emr#11	**Test configuration:**	
Limit :	FCC Part15C	RFID + Bluetooth - CAM0 - USB (Laptop)	
Class :	-	Axis Z - (0°) Worst case	
PARAMETERS			
Antenna polarization:	0°	**Legend:**	
Azimuth :	0° - 360°		**Peak Measure**
RBW :	100kHz		
VBW :	300kHz		**QPeak Limit@3m**
Frequency :	9kHz - 30MHz		



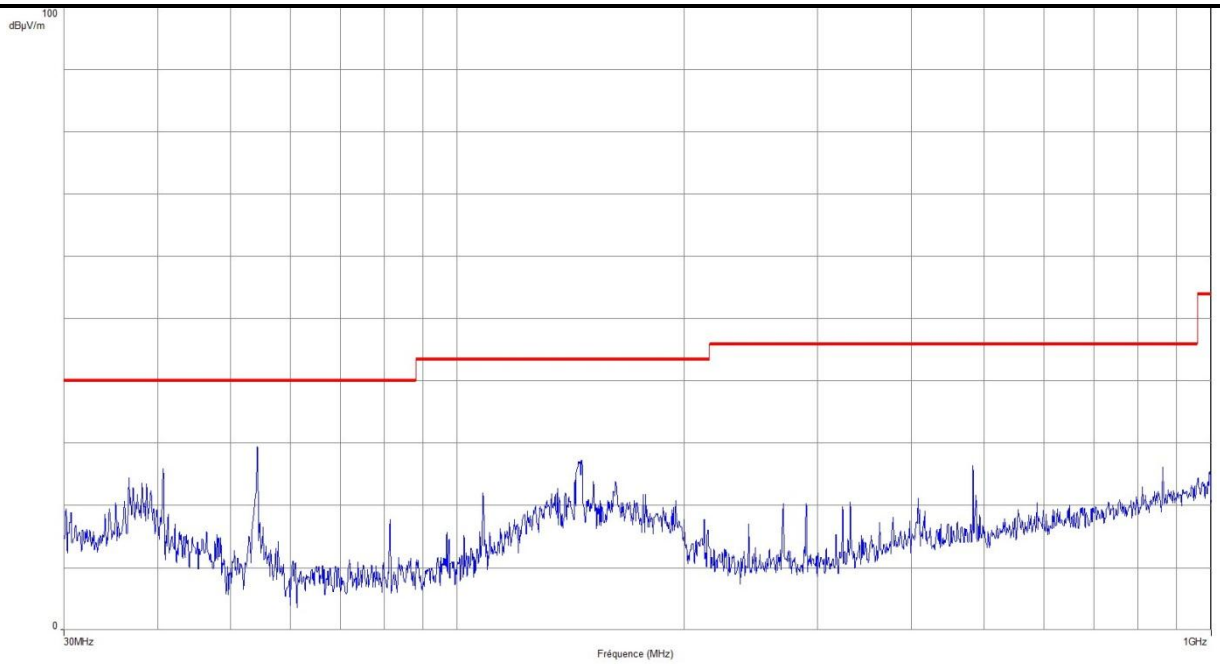
Frequency (MHz)	Peak Level (dBµV/m)
13.561	68.1
27.11	45.9

RADIATED EMISSIONS			
Graph name :	Emr#12	**Test configuration:**	
Limit :	FCC Part15C	RFID + Bluetooth - CAM0 - Axis XY - USB (Laptop)	
Class :	-		
PARAMETERS			
Antenna polarization:	Horizontal	**Legend:**	
Azimuth :	0° - 360°		**Peak Measure**
RBW :	100kHz		
VBW :	300kHz		**QPeak Limit@3m**
Frequency :	30MHz - 1GHz		

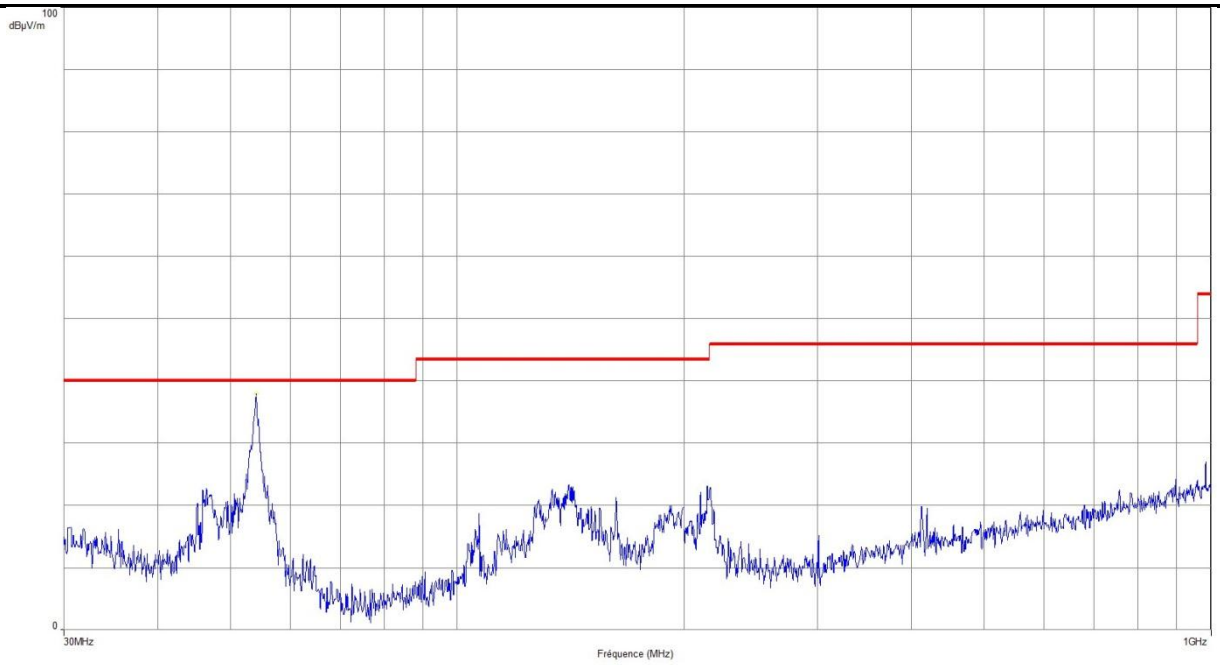


Frequency (MHz)	Peak Level (dBµV/m)
54.242	37.91

RADIATED EMISSIONS			
Graph name :	Emr#13	**Test configuration:**	
Limit :	FCC Part15C	RFID + Bluetooth - CAM0 - Axis XY - USB (Laptop)	
Class :	-		
PARAMETERS			
Antenna polarization:	Vertical	**Legend:**	
Azimuth :	0° - 360°		**Peak Measure**
RBW :	100kHz		
VBW :	300kHz		**QPeak Limit@3m**
Frequency :	30MHz - 1GHz		

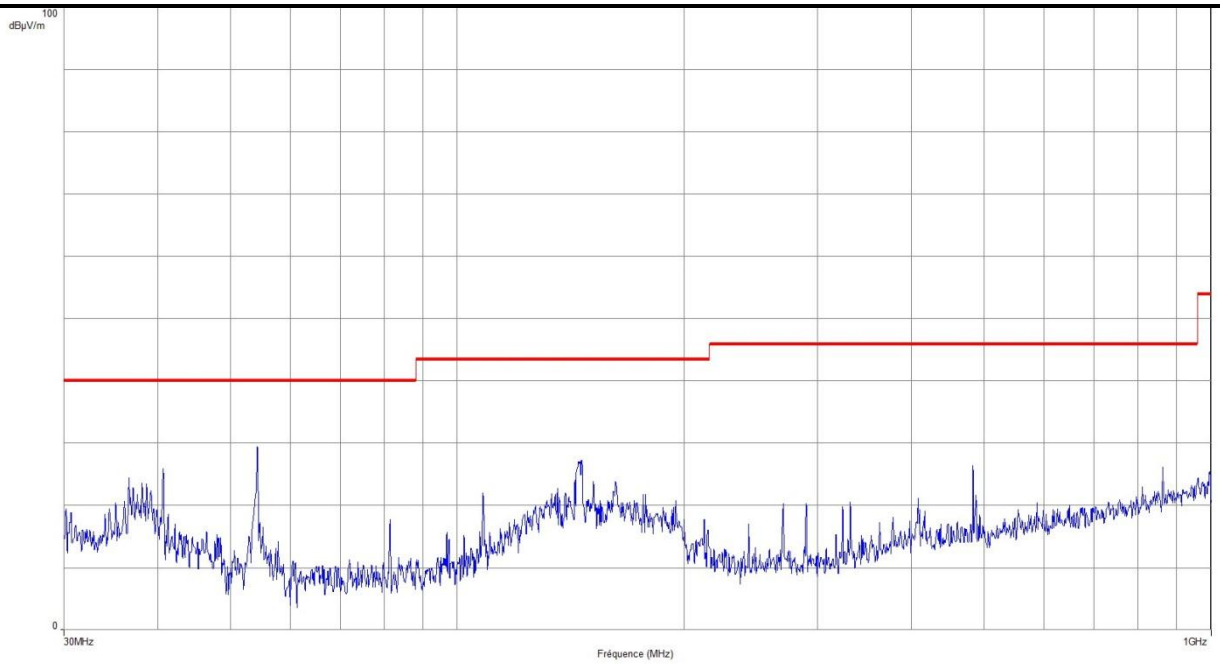


RADIATED EMISSIONS			
Graph name :	Emr#14	**Test configuration:**	
Limit :	FCC Part15C	RFID + Bluetooth - CAM0 - Axis Z - USB (Laptop)	
Class :	-		
PARAMETERS			
Antenna polarization:	Horizontal	**Legend:**	
Azimuth :	0° - 360°		**Peak Measure**
RBW :	100kHz		
VBW :	300kHz		**QPeak Limit@3m**
Frequency :	30MHz - 1GHz		



Frequency (MHz)	Peak Level (dBµV/m)
54.242	37.91

RADIATED EMISSIONS			
Graph name :	Emr#15	**Test configuration:**	
Limit :	FCC Part15C	RFID + Bluetooth - CAM0 - Axis Z - USB (Laptop)	
Class :	-		
PARAMETERS			
Antenna polarization:	Vertical	**Legend:**	
Azimuth :	0° - 360°		**Peak Measure**
RBW :	100kHz		
VBW :	300kHz		**QPeak Limit@3m**
Frequency :	30MHz - 1GHz		



14. UNCERTAINTIES CHART

Type de mesure / *Kind of measurement*	**Incertitude élargie laboratoire / *Wide uncertainty laboratory* (k=2) ± x**	**Incertitude limite du CISPR / *CISPR uncertainty limit* ± y**
Mesure des perturbations conduites en tension sur le réseau d'énergie *Measurement of conducted disturbances in voltage on the power port*	3.57 dB	3.6 dB
Mesure des perturbations conduites en tension sur le réseau de télécommunication *Measurement of conducted disturbances in voltage on the telecommunication port.*	3.28 dB	A l'étude / Under consid.
Mesure des perturbations discontinues conduites en tension *Measurement of discontinuous conducted disturbances in voltage*	3.47 dB	3.6 dB
Mesure des perturbations conduites en courant *Measurement of conducted disturbances in current*	2.90 dB	A l'étude / Under consid.
Mesure du champ électrique rayonné sur le site en espace libre de Moirans *Measurement of radiated electric field on the Moirans open area test site*	5.07 dB	5.2 dB

Les valeurs d'incertitudes calculées du laboratoire étant inférieures aux valeurs d'incertitudes limites établies par la norme, la conformité de l'échantillon est établie directement par les niveaux limites applicables. / *The uncertainty values calculated by the laboratory are lower than limit uncertainty values defined by the standard. The conformity of the sample is directly established by the applicable limits values.*