FCC Test Firm Registration Number: 171131
Industry Canada Test Firm Number: Site# 9545A-1

Matériel testé : *Equipment under test*:	**Routeur V3**

Constructeur:
Manufacturer:
Laser Game Equipement
29, rue du Champ Roman
38400 Saint Martin d'Hères - France

Rapport délivré à :
Issued to:
Laser Game Equipement
29, rue du Champ Roman
38400 Saint Martin d'Hères - France

Référence de la proposition :
Proposal number:
082016-22132

Date de l'essai :
Date of test:
Du 14 au 27 septembre 2016
September 14th to 27th, 2016

Objectif des essais :
Test purpose:
EMC qualification accordingly to following standards:
- CFR 47, FCC Part 15, Subpart B & C
(Chapter 15.247 - Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz)
- Industry Canada ICES-003 Issue 6, RSS-Gen Issue 4 & RSS-247, Issue 1
(Digital Transmission Systems)

FCC ID: 2ABZ40003
IC ID : 11833A-0003
Model : Routeur V3

Lieu du test:
Test location:
SMEE CE-Mesures
38 VOIRON - France

Test réalisé par :
Test realized by:
Jérémy BLANCHER

Conclusion :
Conclusion:
L'équipement satisfait aux prescriptions des normes citées en référence.
The appliance complies with requirements of above mentioned standards.

Ed.	Date	Modifications / Pages	Written by:	Approved by: Visa
1	October 12th, 2016	Initial Edition	Jeremy Blancher	Laurent Chapus

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1. Normatives References

FCC qualification following:		
Standards	**Applied**	**Title**
ANSI C63.4 (2014)	X	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
ANSI C63.10 (2013)	X	American National Standard for Testing Unlicensed Wireless Devices
CFR47, Part 15	X	Telecommunication – Federal Communication Commission – Radio frequency devices, Sections 15.107 / 15.109 / 15.207 / 15.209 / 15.247

Industry Canada qualification following:		
Standards	**Applied**	**Title**
ICES-003 (Issue 6/2016)	X	Information Technology Equipment (Including Digital Apparatus) — Limits and Methods of Measurement
RSS-Gen (Issue 4/2014)	X	General Requirements and Information for the Certification of Radio Apparatus
RSS-247 (Issue1/2015)	X	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

Note: Following guidance are used

- DTS Measurement Guidance 558074 D01 v03r04
- Determining ERP and EIRP Guidance 412172 D01 v01r01

2. Test synthesis

TEST	Paragraph number FCC Part 15 / IC RSS-247	Spec. FCC Part 15 / IC RSS-247	RESULTS (comments)
Conducted emissions test	15.107 (a) / 15.207 (a) ICES-003: Issue 6, §6.1 RSS-Gen: Issue 4, §8.8	Table 15.107 (a) / 15.207 (a) Table §6.1 Table §8.8	**PASS**
Radiated emission test	15.109 (a) / 15.209 (a) ICES-003: Issue 6, §6.2 RSS-Gen: Issue 4, §7.1	Table 15.109 (a) Table §6.2 Table §7.1.2	**PASS**
6dB Bandwidth	15.247 (a) (2) RSS-247 §5.2 (1)	At least 500kHz	**PASS**
Maximum Peak Output Power	15.247 (b) (3) RSS-247 §5.4 (4)	1W max / 30dBm (Conducted) 4W max / 36dBm (EIRP)	**PASS**
Maximum Power Spectral Density	15.247 (e) RSS-247 §5.2 (2)	8dBm in a 3kHz band segment	**PASS**
Unwanted emissions into Non Restricted Frequency Bands	15.247 (d) / RSS-247 §5.5	-20dBc in any 100kHz outside frequency band.	**PASS**
Unwanted emissions into Restricted Frequency Bands	15.209 / 15.247 (d) / 15.205 RSS-Gen: Issue 4, §8.9 & §8.10 / RSS-247 §5.5	Measure at 300m 9-490kHz: 2400µV/m/F(kHz) Measure at 30m 0.490-1.705: 24000µV/m/F(kHz) 1.705-30MHz: 30µV/m 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**
Occupied Bandwidwth	RSS-Gen: Issue 4, §6.6	BW at 99%	**PASS**

- **General conclusion:**

Measures and tests performed on the sample of the product *ROUTEUR V3*, in configuration and description presented in this test report, show compliance with standards FCC CFR 47, PART 15, Subpart B & C and Industry Canada ICES-003, RSS-Gen & RSS-247.

3. Equipment Under Test (EUT)

Nom /
Identification

ROUTEUR V3

Sn: N.C

Alimentation /
Power supply

- 24Vdc on RJ45 input port
- AC mains input 100-240V 50-60Hz

Auxiliaires /
Auxiliaries

- ROUTEUR, Laser Game Equipment product
- ADAPTER, Laser Game Equipment product
- Power supply unit FUJIKON SAW12.5-24.0-0520 (for ADAPTER)
- PLASTRON V3, Laser Game Equipment product
- Laptop DELL, model VOSTRO 1710
- 24Ω load

Entrées-Sorties /
Input / Output

	Câbles pour essai / *Cables for test*	Blindé / *Shielded*	Prévu pour >3m / *Intended for >3m*
AC mains	2 lines + PE	No	Mains
RJ45 input (RS422 + DC input) [1]	8 wires, 2m	No	Yes
RJ45 output (x4, RS422 + DC output) [1]	8 wires, 2m	No	Yes
GPIO	10 wires	No	Yes

[1]: Straight RJ45 cables shall be used

Version programme /
Firmware version

N.C

Mode de fonctionnement /
Running mode

EUT is wired to the ADAPTER ancillary with RJ45 cable at its RJ45 input port.
RJ45 output port is wired to ROUTEUR ancillary.
RJ45 ports are composed by two pairs for 24Vdc power and two pairs for RS422 link.
AC mains voltage is converted into 24Vdc to power RJ45 output ports.
A 24Ω load is wired at output port (1A).
The tested sample is able to:

- Transmit a carrier frequency on low, middle and high channels (903.5MHz / 914.5MHz / 926.5MHz)
- Communicate with ancillary equipment (wired link with ADAPTER or RF link with PLASTRON)
- Be in Receiver mode (no transmission)
- Be in Standby mode

Programme de test /
Test program /

"WiredNetworkInterface" for RF configuration
"RadioComTester" for communication configuration

- **<u>Equipment information:</u>**

- Frequency band: 902 to 928 MHz (Tx & Rx, Data Transmission systems)
- Frequency channels used: 903.5MHz / 912.5MHz / 914.5MHz / 926.5MHz
- Modulation: FSK ± 75kHz
- RF chip: HOPERF Electronics, model RFM69HW
- Antenna type: Dipole antenna
- RF Output Power setting: 11dBm
- Maximum antenna gain: -0.6dBi
- Powered by 24V DC from RJ45 input port
- AC Mains to power ancillaries wired at output ports
- Equipment intended for use as a fixed station
- Equipment designed for continuous operation

4. Test conditions

Relative Humidity : 50-55%
Temperature : 20-22°C

Power supply voltage:
Equipment under test : 24V DC
AC Mains : 110V/60Hz

5. Modifications of the EUT

None

6. Special accessory

None

7. Conducted Emission Measurement (150kHz-30MHz)

TEST: Limits for conducted disturbance 150kHz – 30MHz	**Verdict**
Method: The LISN is placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane. This distance was between the closest points of the AMN and the EUT. All other units of the EUT and associated equipment were at least 0,8 m from the AMN. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on lines were made at the output of the LISN. The EUT is 80cm above the ground reference plane and 40cm from the vertical ground plane. The AC power cable is 1m length.	**Pass**

Laboratory Parameters:	Required prior to the test	During the test
Ambient Temperature	10 to 40 °C	20°C
Relative Humidity	10 to 90 %	55%
Fully configured sample scanned over the following frequency range	Frequency range on each side of line	Measurement Point
	150kHz to 30MHz	AC input ports - on ancillary ADAPTER power supply (to DC input of EUT) - on AC Mains input of EUT

Limits – FCC Part 15.107 (a), 15.207 (a) / ICES-003 §6.1, RSS-Gen §8.8

Frequency (MHz)	Limit dB (µV)			
	Quasi-Peak	Result	Average	Result
0.15 – 0.50	66 \ 56	**Pass**	56 \ 46	**Pass**
0.50 – 5	56	**Pass**	46	**Pass**
5 – 30	60	**Pass**	50	**Pass**

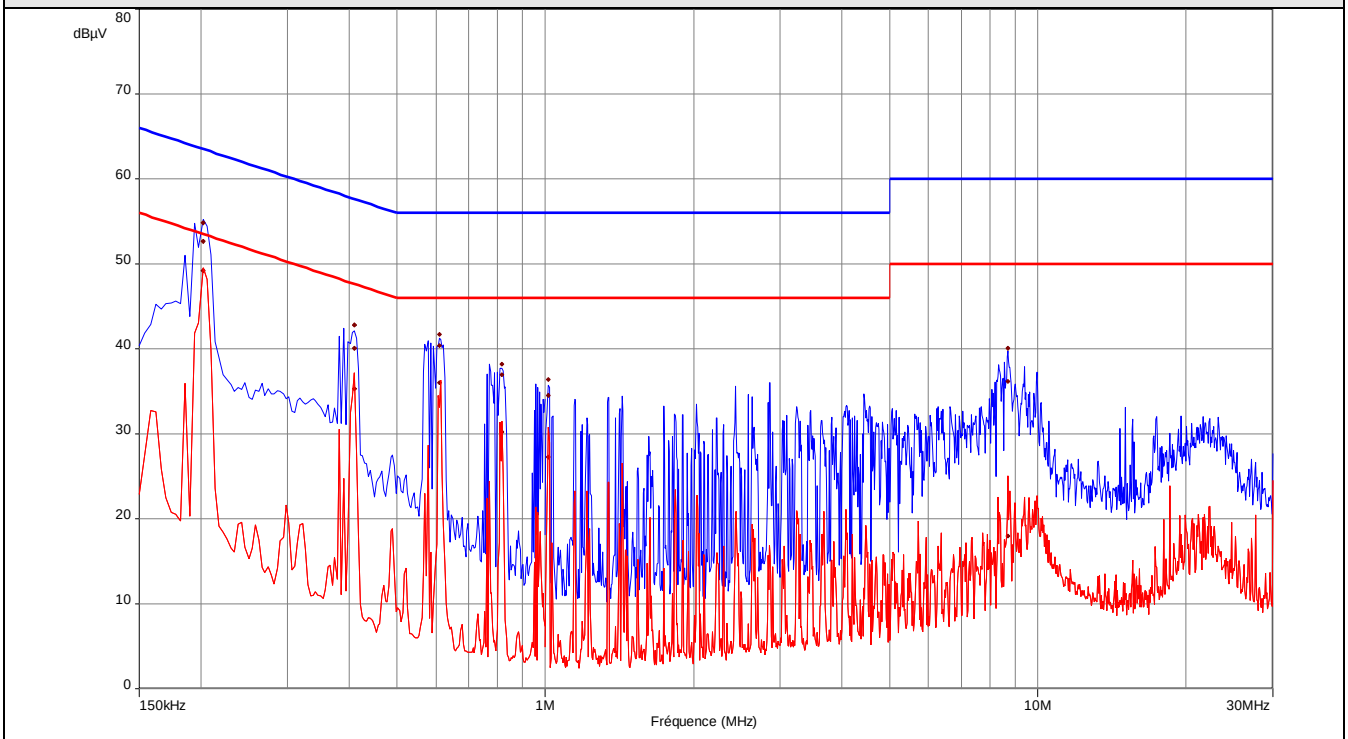
Supplementary information:
Test location: SMEE – CE Mesures
Test date: September 27th, 2016
Power supply voltage: 110V / 60Hz to power adapter

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Attenuator / limiter	SMEE	ATT#1	ATT-101-004	2016/3	2017/3
Cable RF	Div	2m	CAB-101-007	2016/3	2017/3
LISN (50Ω / 50µH)	AFJ	LS16C	RSI-101-001	2016/3	2017/3
LISN (50Ω / 50µH)	AFJ	LS16C	RSI-101-002	2016/3	2017/3
Measuring Rec	Rohde&Schwarz	ESRP	REC-151-021	2015/7	2018/7
Ref. Comb generator	SMEE	EMC-250K	REF-111-001	-	-

Tabulated Results for Mains Terminal Disturbance Voltage on AC port								
"ADAPTER" power supply								
FREQ	**Meas. PK**	**Mes. QP**	**LIMIT QP**	**Margin QP**	**Mes. AV**	**LIMIT AV**	**Margin AV**	Line
(MHz)	(dBµV)	(dBµV)	(dBµV)	(dB)	(dBµV)	(dBµV)	(dB)	
0.202	54.8	52.7	63.5	**-10.8**	49.2	53.5	**-4.3**	Line L1
0.410	42.8	40.0	57.7	**-17.6**	35.3	47.7	**-12.3**	Line L1
0.610	41.7	40.4	56.0	**-15.6**	36.0	46.0	**-10.0**	Line L1
0.818	38.2	36.9	56.0	**-19.1**	30.2	46.0	**-15.8**	Line L1
1.016	36.4	34.5	56.0	**-21.5**	27.3	46.0	**-18.8**	Line L1
8.700	40.1	36.2	60.0	**-23.8**	17.9	50.0	**-32.1**	Line L1
0.206	53.2	51.0	63.4	**-12.4**	47.6	53.4	**-5.8**	Neutral
0.410	39.8	37.4	57.7	**-20.3**	32.4	47.7	**-15.2**	Neutral
0.610	38.4	37.1	56.0	**-19.0**	31.7	46.0	**-14.3**	Neutral
0.814	36.5	35.4	56.0	**-20.6**	29.0	46.0	**-17.0**	Neutral
1.024	36.1	34.1	56.0	**-21.9**	24.3	46.0	**-21.8**	Neutral
9.580	40.7	36.8	60.0	**-23.2**	22.9	50.0	**-27.1**	Neutral
AC Mains of EUT								
FREQ	**Meas. PK**	**Mes. QP**	**LIMIT QP**	**Margin QP**	**Mes. AV**	**LIMIT AV**	**Margin AV**	Line
(MHz)	(dBµV)	(dBµV)	(dBµV)	(dB)	(dBµV)	(dBµV)	(dB)	
0.186	46.8	44.7	64.2	**-19.5**	38.2	54.2	**-16.0**	Line L1
0.438	39.3	38.1	57.1	**-19.0**	31.2	47.1	**-15.9**	Line L1
0.498	40.8	40.0	56.0	**-16.1**	29.3	46.0	**-16.7**	Line L1
0.878	40.7	39.4	56.0	**-16.7**	27.9	46.0	**-18.1**	Line L1
1.128	42.2	40.5	56.0	**-15.5**	30.4	46.0	**-15.7**	Line L1
13.664	33.1	26.7	60.0	**-33.4**	20.0	50.0	**-30.0**	Line L1
0.186	50.9	49.0	64.2	**-15.2**	41.4	54.2	**-12.8**	Neutral
0.238	41.2	38.2	62.2	**-23.9**	36.9	52.2	**-15.2**	Neutral
0.438	40.7	39.6	57.1	**-17.5**	32.1	47.1	**-15.0**	Neutral
0.502	42.8	41.8	56.0	**-14.2**	32.8	46.0	**-13.2**	Neutral
1.060	40.8	39.7	56.0	**-16.3**	29.2	46.0	**-16.8**	Neutral
1.128	41.8	40.1	56.0	**-15.9**	30.8	46.0	**-15.2**	Neutral

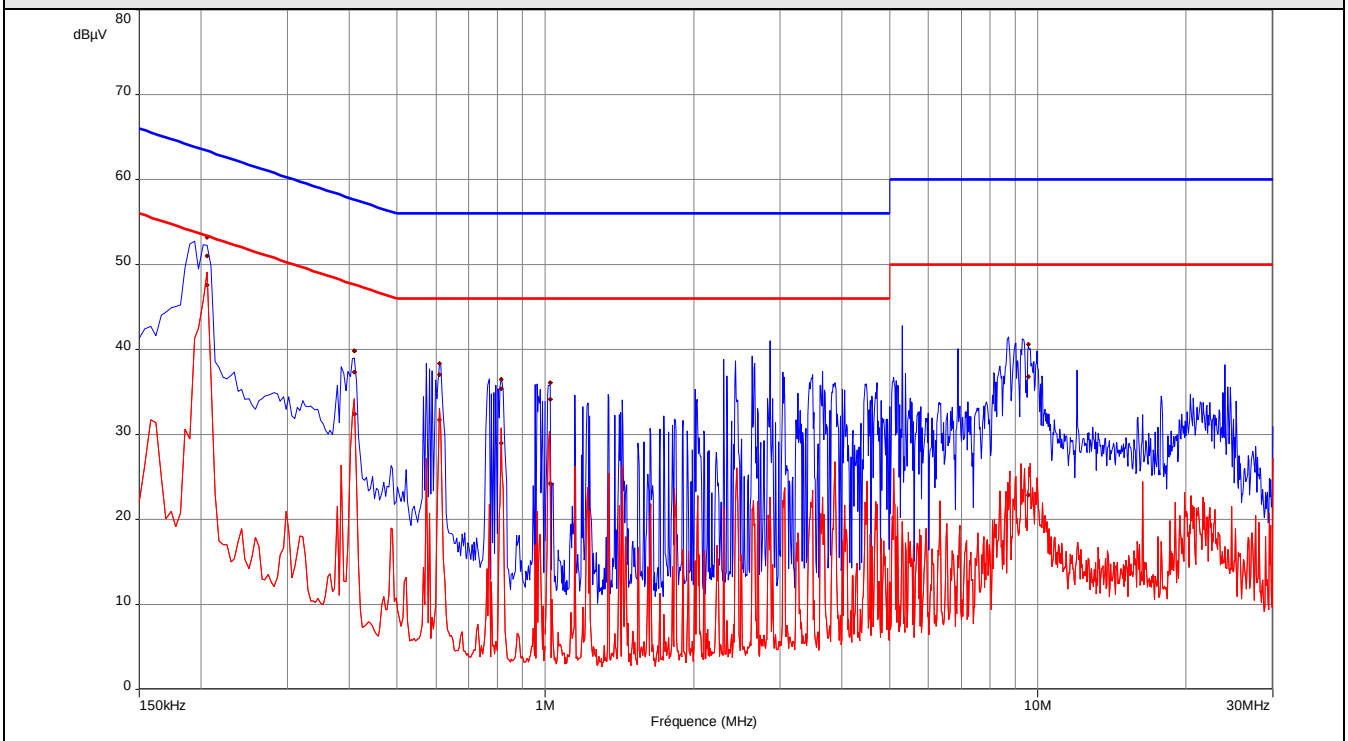
Frequency band investigated:	150kHz-30MHz
RBW:	9kHz
Voltage:	110V / 60Hz
Limit:	FCC Part 15.107, 15.207 / ICES-003, RSS-Gen
Final measurement detector:	Quasi-Peak and Average
Wide Measurement Uncertainty:	± 3.6dB (k=2)
RESULT:	PASS
Measured value calculation:	The measured value (level) is calculated by adding the Cable Factor, the Transient suppressor attenuation and LISN attenuation from the receiver amplitude reading. The basic equation is as follow: Meas. = RA + CF + ATT_{TRAN} + ATT_{LISN} Where Meas. = Level (dBµV) RA = Receiver Amplitude CF = Cable Factor ATT_{TRAN} = Transient suppressor attenuation ATT_{LISN} = LISN attenuation Margin value = Emission level – Limit value

Graphical representation of Conducted Disturbance Measurement (Peak and Average detection)
AC port, Line L1 – "ADAPTER" power supply



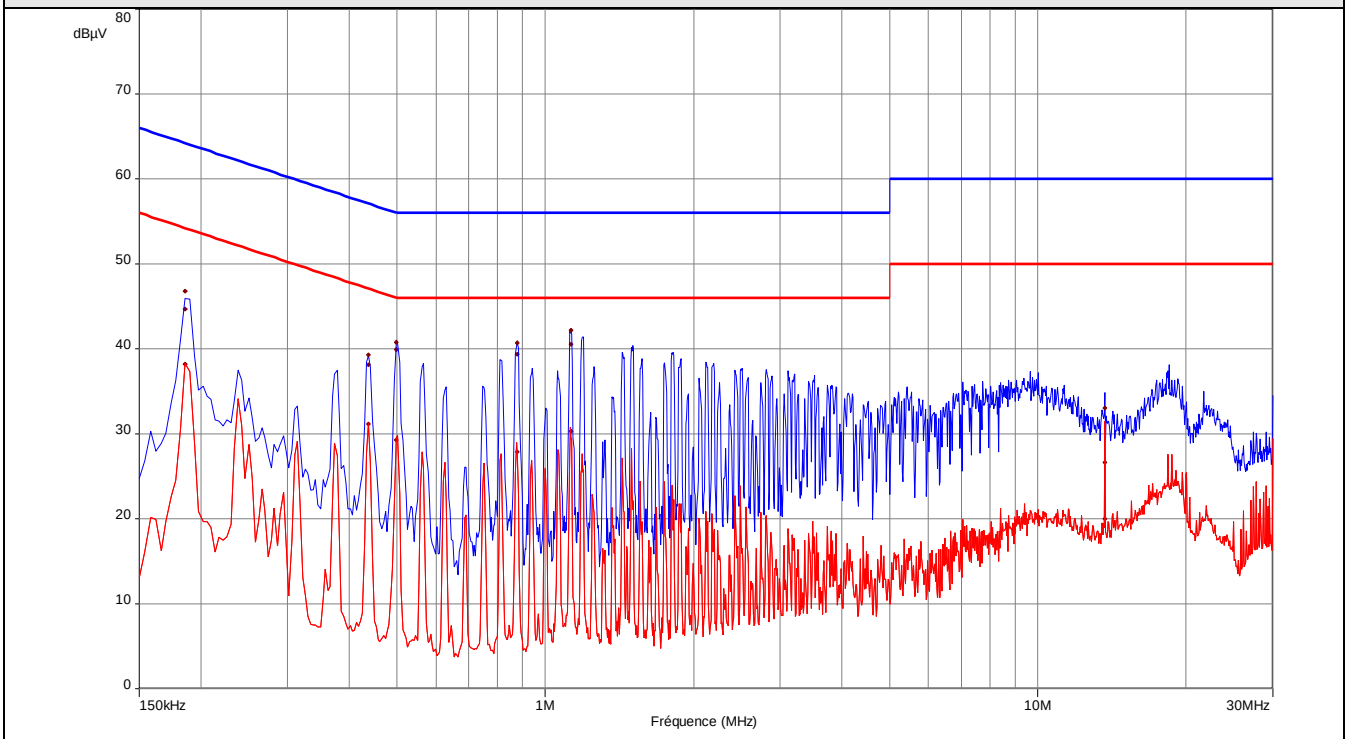
----: Peak | ----: Average

Graphical representation of Conducted Disturbance Measurement (Peak and Average detection)
AC port, Line Neutral – "ADAPTER" power supply



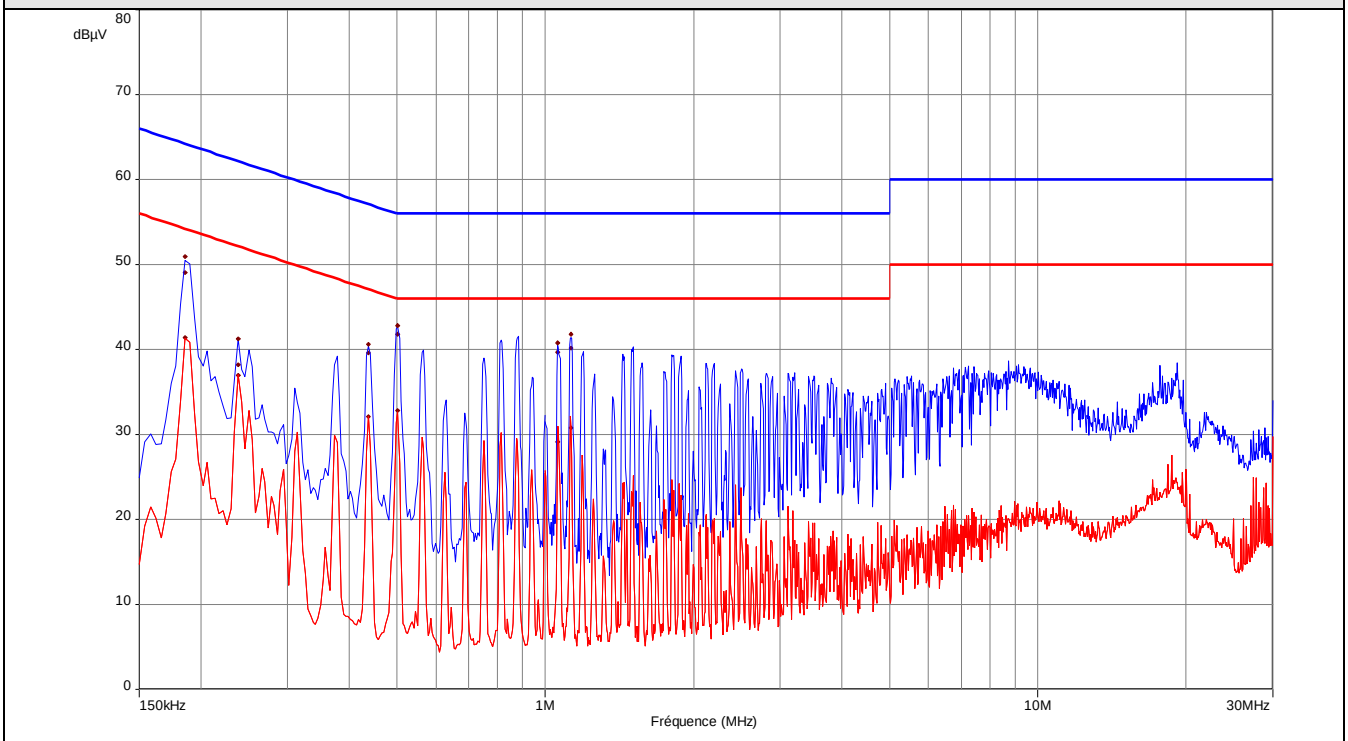
----: Peak | ----: Average

Graphical representation of Conducted Disturbance Measurement (Peak and Average detection)
AC port, Line L1 – AC Mains of EUT



----: Peak | ----: Average

Graphical representation of Conducted Disturbance Measurement (Peak and Average detection)
AC port, Line Neutral – AC Mains of EUT



----: Peak | ----: Average

8. Radiated Emission Measurement (30MHz-9.3GHz)

TEST: Limits for radiated disturbance 30 MHz – 9.3 GHz		**Verdict**
Method: Measurements were made in a 3-meter Open Area Test Site (OATS) that complies to ANSI C63.4. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3 meters. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in horizontal and vertical polarities. Final measurements (Peak, Quasi-peak) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4 m. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable. A pre-scan frequency identification of the EUT has been performed in full anechoic chamber. The measured radiated field of the EUT is realised at 3-meters of distance. Antenna is 1.25-meters high. The pre-characterization graphs are obtained in PEAK detection.		**Pass**
Laboratory Parameters:	Required prior to the test	During the test
Ambient Temperature	10 to 40 °C	25°C
Relative Humidity	10 to 90 %	55%
Fully configured sample scanned over the following frequency range	Frequency range on each side of line	Measurement Point
	30MHz – 9.3GHz	3 m measurement distance
Running mode	RF communication is in Receive / Standby mode A wired communication is activated	

Limits – FCC Part 15.109 (a), 15.209 (a) / ICES-003 §6.2, RSS-Gen §7.1		
Frequency (MHz)	Limit at 3m (dBµV/m)	
	Level (Detector)	Results
30 to 88	40.0 (QP)	**Pass**
88 to 216	43.5 (QP)	**Pass**
216 to 960	46.0 (QP)	**Pass**
960 to 1000	54.0 (QP)	**Pass**
Above 1GHz	54.0 (AV) 74.0 (PK)	**Pass**

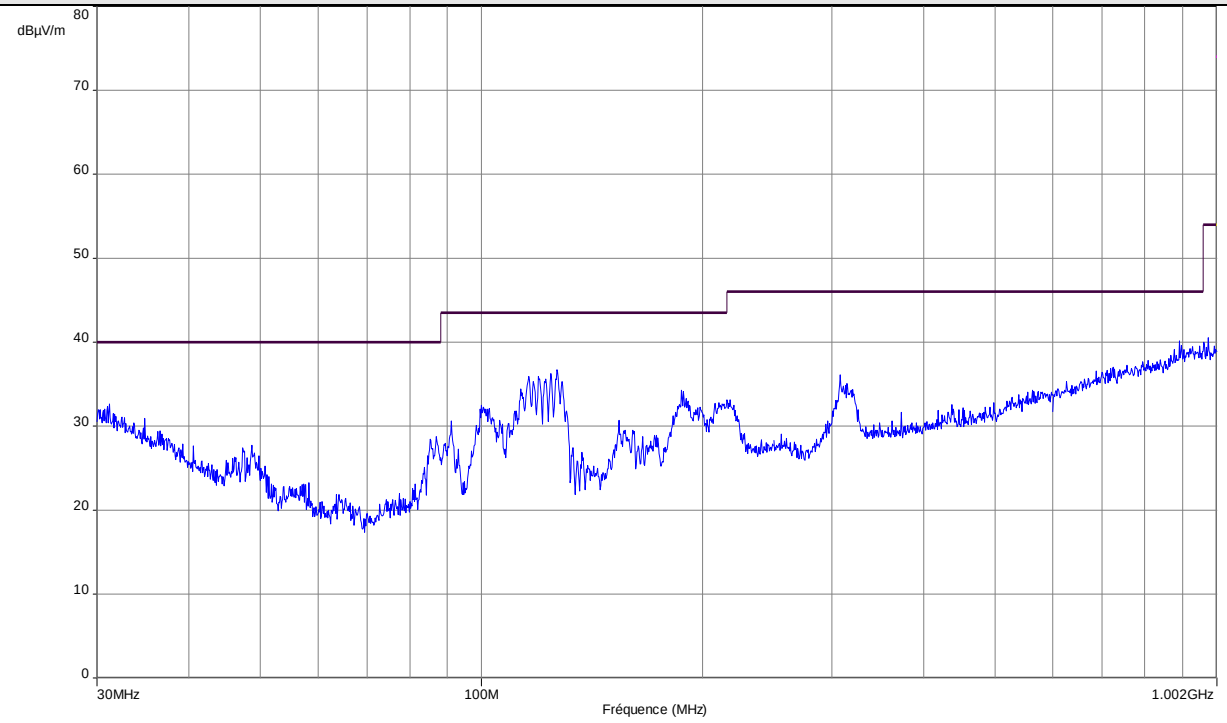
Supplementary information:
Test location: SMEE
Test date: September 20th, 2016 by J. Blancher
Power supply voltage: 24Vdc at RJ45 Input and 230V / 50Hz on AC Mains

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Log-periodic antenna	TDK	PLP3003	ANT-101-001	2016/8	2017/8
Biconnic antenna	COM-POWER	AB- 900	ANT-101-003	2016/8	2017/8
BiConiLog antenna	EMCO	3142B	ANT-101-010	2016/8	2017/8
Horn antenna	ETS-LINDGREN	3115	ANT-141-013	2015/7	2018/7
RF cable	Div	2m	CAB-101-011	2016/3	2017/3
RF cable	Div	OATS/25m	CAB-101-019	2016/3	2017/3
RF cable	Div	OATS/10m	CAB-101-020	2016/3	2017/3
Anechoic chamber	COMTEST	214263	CAG-141-001	-	-
OATS	Div	10m	SIT-101-001	2016/8	2017/8
Antenna mast	Innco- Systems	MA4000EP	MAT-101-001	-	-
Turntable	Innco- Systems	DS1200S	PLA-101-001	-	-
Measuring Rec	Rohde&Schwarz	ESRP	REC-151-002	2015/7	2018/7
Ref. Comb generator	SMEE	EMR-10M	REF-111-002	-	-

Tabulated Results for Radiated Disturbance (3m measurement on Open Area Test Site, 30MHz-1GHz)										
FREQ	**Meter reading**	**Meter reading**	**Total Factor**	**Field level**	**Field level**	**Pol**	**Antenna height**	**Table angle**	**Limit**	**Margin**
MHz	(QP) dBµV	(Pk) dBµV	dB	(QP) dBµV/m	(Pk) dBµV/m		cm	Degré	(QP) dBµV/m	dB
109,378	167,0	21,2	13,6	30,3	34,8	V	100	35	43,5	**-13,2**
115,559	22,8	25,4	14,6	37,4	40,0	H	400	0	43,5	**-6,1**
188,347	17,2	25,7	18,1	35,3	43,8	V	100	190	43,5	**-8,2**
Supplementary information: Frequency list measured on the Open Area Test Site has been created with pre-scan results.										

Frequency band investigated:	30MHz-1GHz
RBW:	120kHz
Measurement distance:	3m
Limit:	FCC Part 15.109, 15.209 / ICES-003, RSS-Gen
Final measurement detector:	Quasi-Peak
Wide Measurement Uncertainty:	± 5.2dB (k=2)
RESULT:	PASS
Field Strength Calculation:	The field strength (level) is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation is as follow: FS = RA + AF + CF – AG Where FS = Field Strength (Level) RA = Receiver Amplitude (Meter reading) AF = Antenna Factor CF = Cable Factor AG = Amplifier Gain Total factor (dB) is AF + CF – AG Margin value = Emission level – Limit value

Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 30MHz-1GHz / 3m / Horizontal)

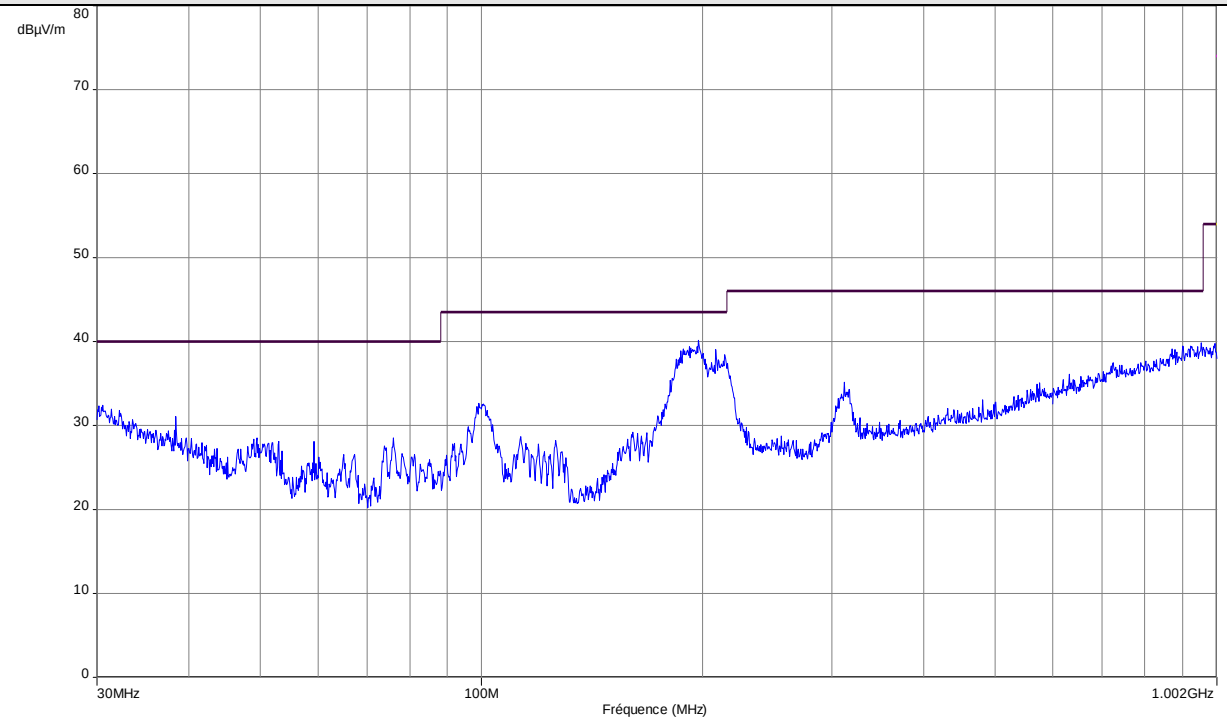


Frequency (MHz)	Peak level (dBµV/m)
116.039	35.9
126.846	36.7
187.294	34.3

Note: Pre-scan graph only for identification purpose.

------ : Peak measure	------ : Class B limit (3m)	
Frequency band investigated:	30MHz-1GHz	
Unit :	dBµV/m	
RBW :	100kHz	
Antenna polarization :	Horizontal	
Limit:	15.109 / ICES-003	
Measurement detector:	Peak	
Wide Measurement Uncertainty:	± 5dB (k=2)	

Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 30MHz-1GHz / 3m / Vertical)



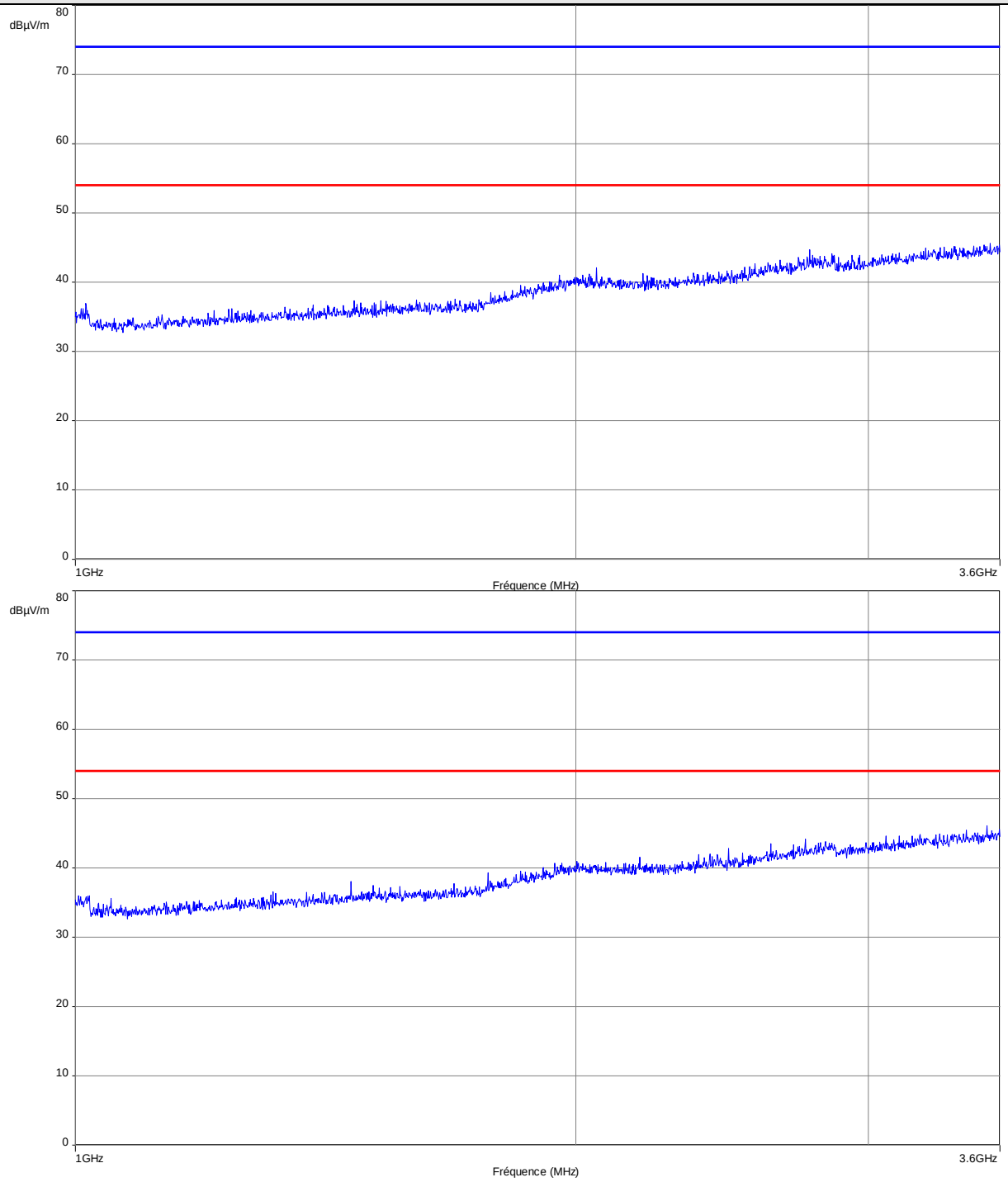
Frequency (MHz)	Peak level (dBµV/m)
100.651	32.6
197.448	40.2
208.241	39.1

Note: Pre-scan graph only for identification purpose.

------ : Peak measure	------ : Class B limit (3m)	

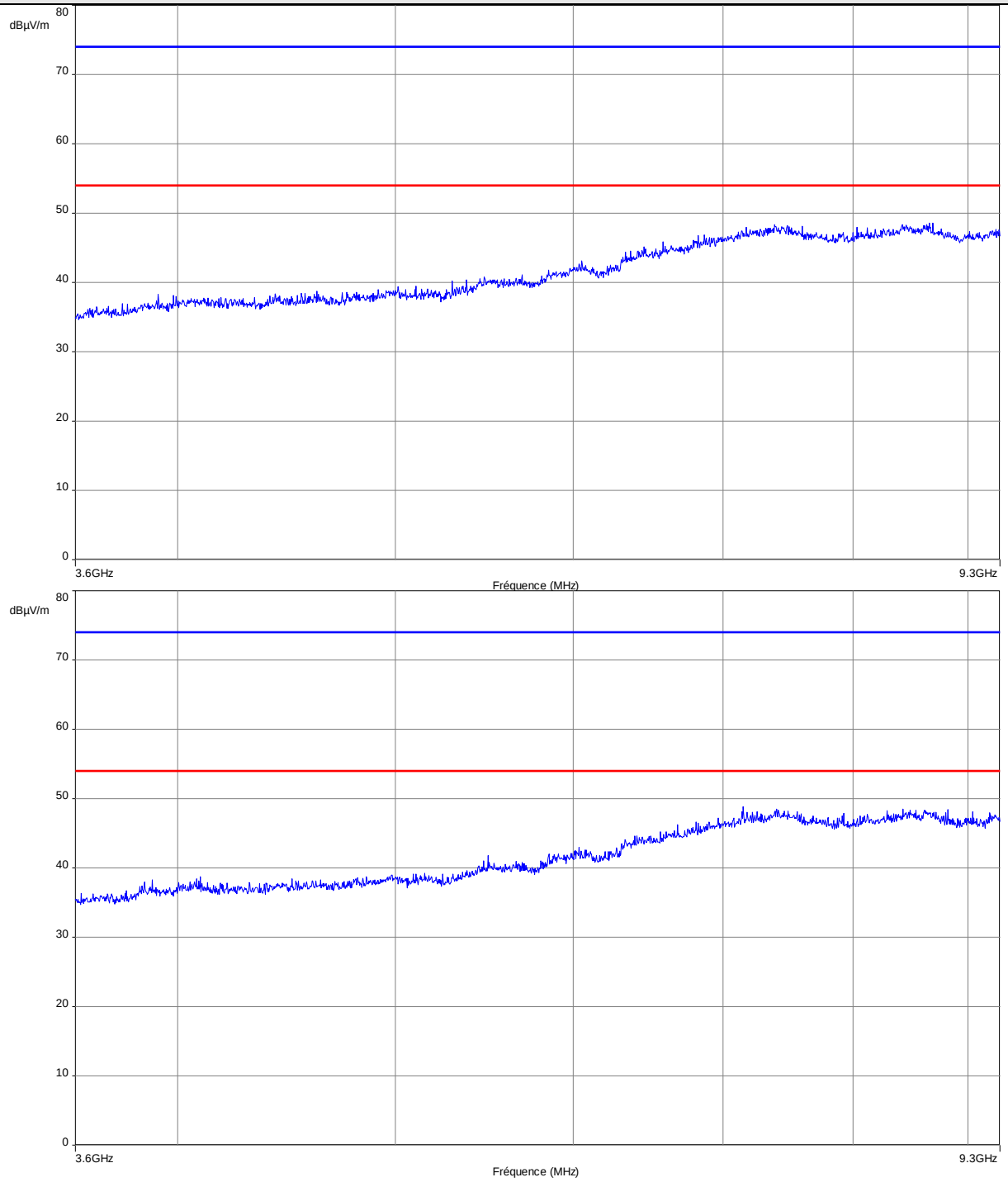
Frequency band investigated:	30MHz-1GHz
Unit :	dBµV/m
RBW :	100kHz
Antenna polarization :	Horizontal
Limit:	15.109 / ICES-003
Measurement detector:	Peak
Wide Measurement Uncertainty:	± 5dB (k=2)

Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 1GHz-3.6GHz / 3m / Horizontal & Vertical



Frequency band investigated:	1GHz-3.6GHz
Unit :	dBµV/m
RBW :	1MHz
Antenna polarization :	Horizontal & Vertical
Limit:	15.109, 15.209 / ICES-003, RSS-Gen
Measurement detector:	Peak
Wide Measurement Uncertainty:	± 5dB (k=2)

Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 3.6GHz-9.3GHz / 3m / Horizontal & Vertical



Frequency band investigated:	3.6GHz-9.3GHz
Unit :	dBµV/m
RBW :	1MHz
Antenna polarization :	Horizontal & Vertical
Limit:	15.109, 15.209 / ICES-003, RSS-Gen
Measurement detector:	Peak
Wide Measurement Uncertainty:	± 5dB (k=2)

9. 6dB Bandwidth

TEST: DTS Bandwidth		**Verdict**
Method: RF Output of EUT is connected directly to a spectrum analyser. A conducted measurement is performed. The RBW is 100kHz, with VBW ≥ 3 x RBW. The SPAN is wide enough to capture all products of the modulation process. A MaxHold Peak detector is used. The tested equipment is set to transmit operation with modulation on lowest, middle and highest channel.		**Pass**
Laboratory Parameters:	Required prior to the test	During the test
Ambient Temperature	10 to 40 °C	20°C
Relative Humidity	10 to 90 %	55%

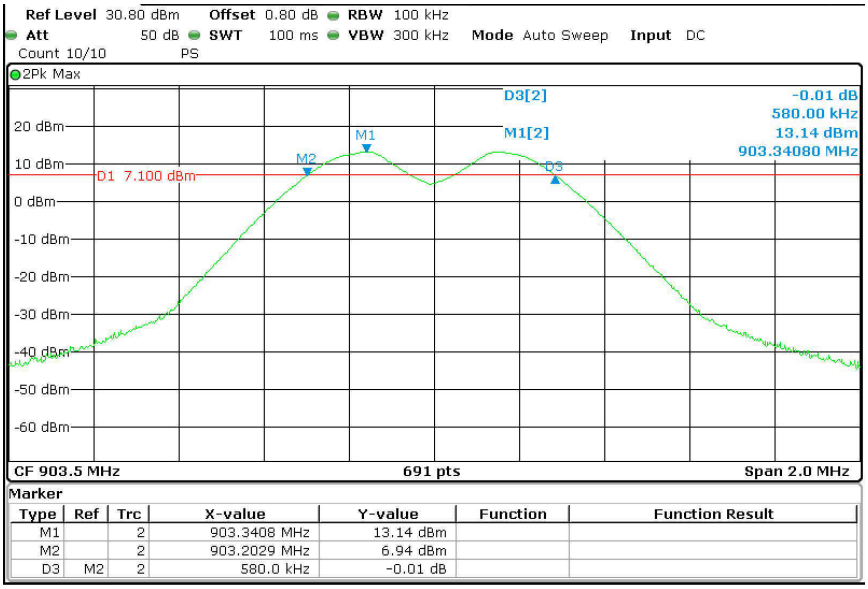
Limits – FCC Part 15.247 (a) / RSS-247 5.2 (1)		
Frequency (MHz)	**Level for Bandwidth**	**Limit**
903.5	6dB below the maximum output power	At least 500kHz
914.5		
926.5		

Supplementary information:
Test location: SMEE
Test date: September 14th, 2016 by J. Blancher
Power supply voltage: 24Vdc at RJ45 Input

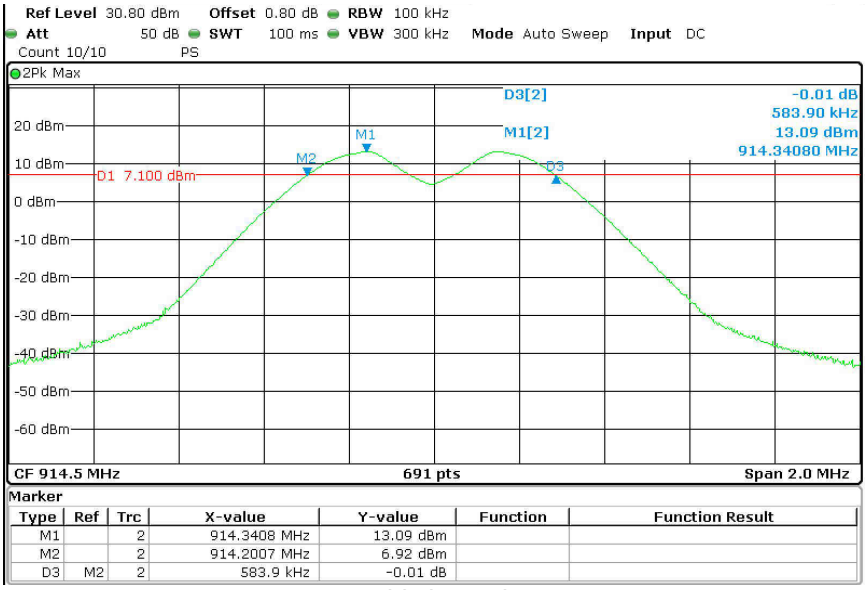
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Measuring Rec.	Rohde&Schwarz	ESRP	REC-151-002	2015/7	2018/7
RF cable	Pasternack	PE354-150	CAB-131-025	2016/3	2017/3

Tabulated Results for Occupied Bandwidth		
Frequency (MHz)	**6dB Bandwidth** (kHz)	**Result**
903.5	580.0 kHz	**Pass**
914.5	583.9 kHz	**Pass**
926.5	578.9 kHz	**Pass**

Graphical representation of 6dB Bandwidth



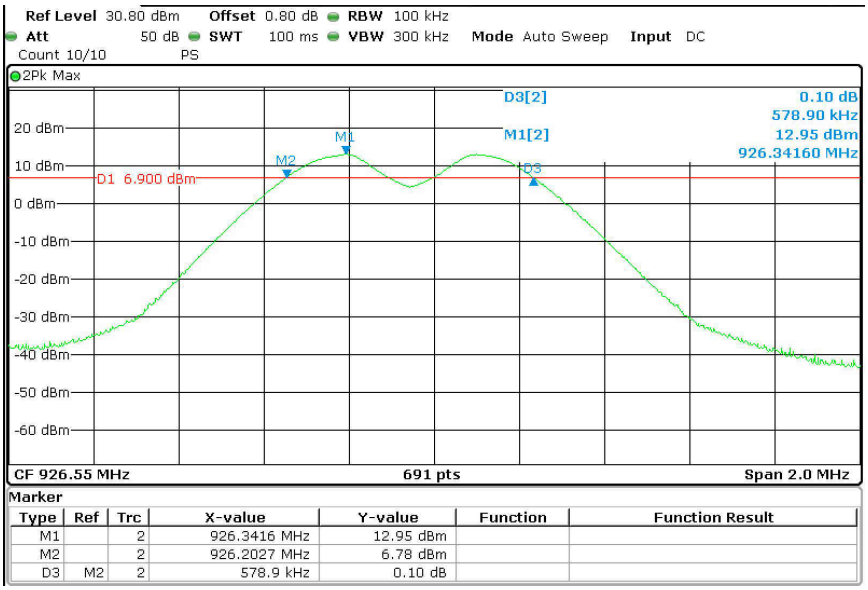
Low channel



Mid channel

Frequency band investigated:	902MHz to 928MHz
RBW :	100kHz
Measurement detector:	Peak

Graphical representation of 6dB Bandwidth



High channel

Frequency band investigated:	902MHz to 928MHz
RBW :	100kHz
Measurement detector:	Peak

10. Maximum Peak Output power

TEST: Maximum peak conducted output power		**Verdict**
Method: RF Output of EUT is wired directly to a spectrum analyser. A conducted measurement is performed. The RBW is 1MHz (> DTS Bandwidth), with VBW ≥ 3 x RBW. The SPAN is wide enough to capture all products of the modulation process. A MaxHold Peak detector is used. Radiated field strength of RF Output Power is measured at 3m on Open Area Test Site The tested equipment is set to transmit operation with modulations on lowest, middle and highest channel		**Pass**
Laboratory Parameters:	Required prior to the test	During the test
Ambient Temperature	10 to 40 °C	25°C
Relative Humidity	10 to 90 %	50%

Limits – FCC Part 15.247 (b) / RSS-247 §5.4 (4)		
Frequency (MHz)	Limits (dBµV/m)	
	Level / Detector / Distance	Results
902 to 928MHz	36 dBm / Pk / 3m (Radiated)	**Pass**
902 to 928MHz	30 dBm / Pk (Conducted)	**Pass**

Supplementary information:
Test location: SMEE
Test date: September 14th, 2016 by J. Blancher
Power supply voltage: 24Vdc at RJ45 Input

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Measuring Rec.	Rohde&Schwarz	ESRP	REC-151-002	2015/7	2018/7
Log-periodic antenna	TDK	PLP3003	ANT-101-001	2016/8	2017/8
RF cable	Div	OATS/25m	CAB-101-017	2016/3	2017/3
RF cable	Pasternack	PE354-150	CAB-131-025	2016/3	2017/3
OATS	Div	3 / 10m	SIT-101-001	2016/8	2017/8
Antenna mast	Innco- Systems	MA4000EP	MAT-101-001	-	-
Turntable	Innco- Systems	DS1200S	PLA-101-001	-	-

Tabulated Results for Maximum peak output power (Radiated measurement)				
FREQ	**Field Strength 3m**	**Calculed EIRP**	**Limit**	**Result**
(MHz)	(dBµV/m)	(dBm)	(dBm)	
903.5	111.7	**11.7**	36.0	**Pass**
914.5	112.0	**12.0**	36.0	**Pass**
926.5	112.4	**12.4**	36.0	**Pass**

RBW:	1MHz
Measurement distance:	3m
Limit:	FCC Part 15.247 / RSS-247
Final measurement detector:	Peak
Wide Measurement Uncertainty:	± 5.2dB (k=2)
RESULT:	PASS
Note:	(1): The field strength (level) is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation is as follow: FS = RA + AF + CF – AG Where FS = Field Strength RA = Receiver Amplitude AF = Antenna Factor CF = Cable Factor AG = Amplifier Gain Total factor (dB) is AF + CF – AG Margin value = Emission level – Limit value (2): EIRP is calculated using the following equation: EIRP = E + 20xlog (D) – 104.8 – GR Where EIRP = Equivalent Isotropic Radiated Power in dBm E = Electric field strength in dBµV/m D = Measuring distance in meter GR = Ground reflection in dB (4.7dB for 30MHz – 1GHz band) (3): Test performed on OATS at 3m distance

Tabulated Results for Maximum peak output power (Conducted)			
FREQ	**Measured conducted power**	**Limit**	**Result**
(MHz)	(dBm)	(dBm)	
903.5	**13.1**	30.0	**Pass**
914.5	**13.1**	30.0	**Pass**
926.5	**13.0**	30.0	**Pass**

RBW:	1MHz
Limit:	FCC Part 15.247 / RSS-247
Final measurement detector:	Peak
RESULT:	PASS

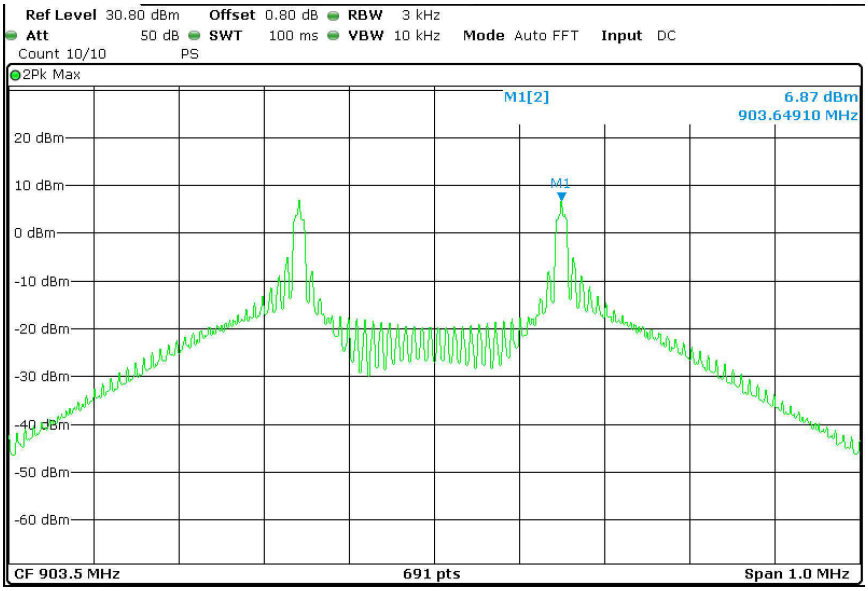
11. Maximum Power Spectral Density

TEST: Maximum Power Spectral Density level in the fundamental emission		**Verdict**
Method: RF Output of EUT is wired directly to a spectrum analyser. A conducted measurement is performed. The RBW is 3kHz. The SPAN is 1MHz. A MaxHold Peak detector is used. The tested equipment is set to transmit operation with modulations on lowest, middle and highest channel.		**Pass**
Laboratory Parameters:	Required prior to the test	During the test
Ambient Temperature	10 to 40 °C	20°C
Relative Humidity	10 to 90 %	55%
Limits – FCC Part 15.247 (e) / RSS-247 §5.2 (2)		
Frequency (MHz)	**Level / Detector**	**Limit**
903.5	8 dBm/3kHz / Pk (Conducted)	**Pass**
914.5		
926.5		
Supplementary information: Test location: SMEE Test date: September 14th, 2016 by J. Blancher Power supply voltage: 24Vdc at RJ45 Input		

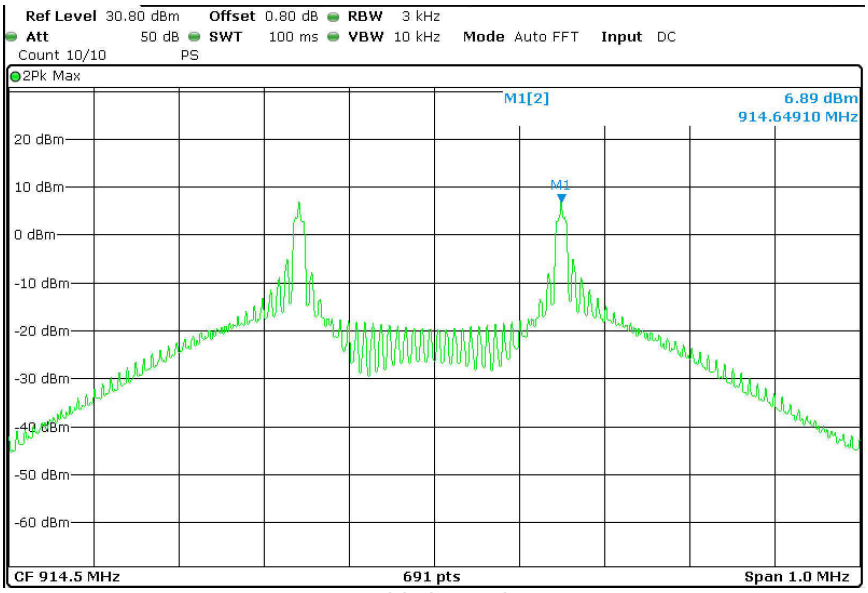
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Measuring Rec.	Rohde&Schwarz	ESRP	REC-151-002	2015/7	2018/7
RF cable	Pasternack	PE354-150	CAB-131-025	2016/3	2017/3

Tabulated Results for Maximum Power Spectral Density		
Frequency (MHz)	**PSD** (dBm/3kHz)	**Result**
903.5	6.9 dBm/3kHz	**Pass**
914.5	6.9 dBm/3kHz	**Pass**
926.5	6.8 dBm/3kHz	**Pass**

Graphical representation of Power Spectral Density



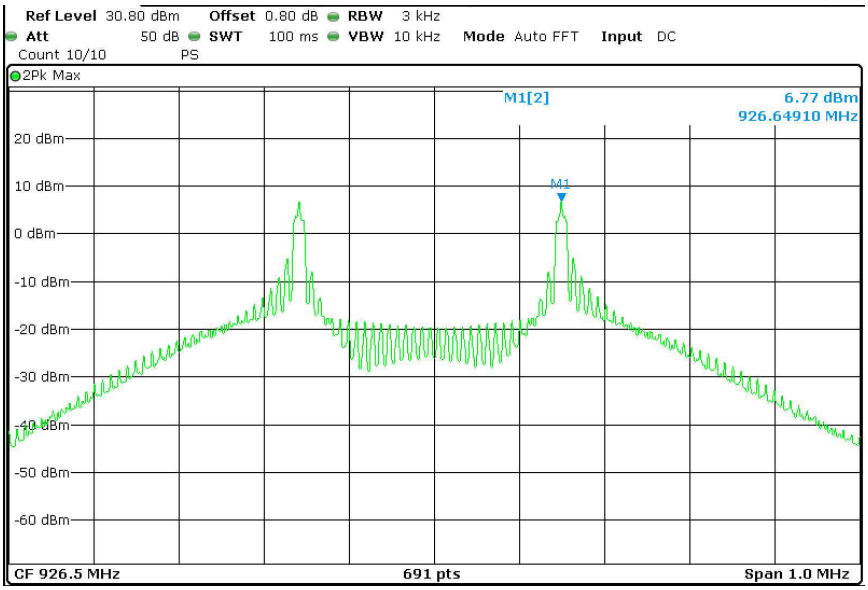
Low channel



Mid channel

Frequency band investigated:	902MHz to 928MHz
RBW :	3kHz
Measurement detector:	Peak

Graphical representation of Power Spectral Density



High channel

Frequency band investigated:	902MHz to 928MHz
RBW :	3kHz
Measurement detector:	Peak

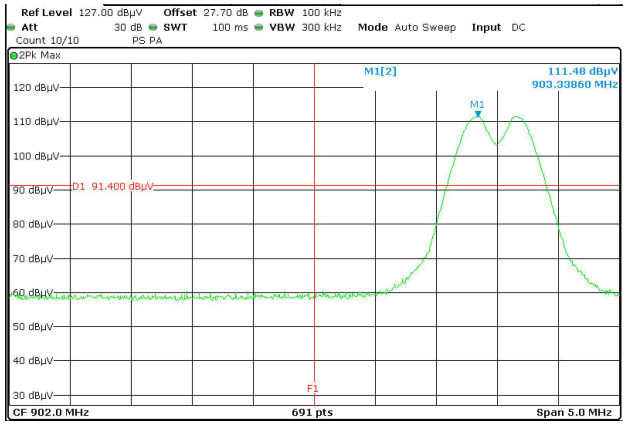
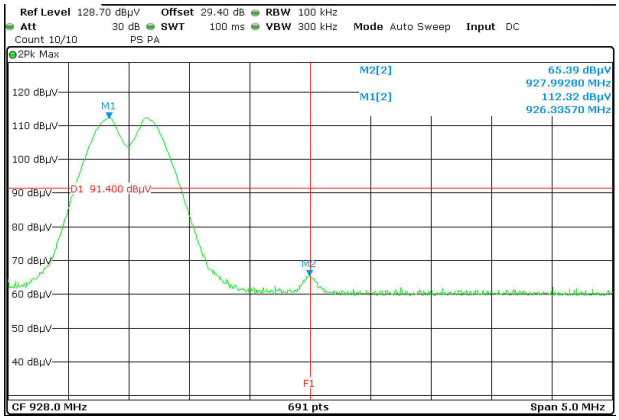
12. Unwanted emissions in Non-Restricted Frequency bands

<table>
<tr><td colspan="3">TEST: Unwanted emissions in Non-Restricted Frequency Bands</td><td>Verdict</td></tr>
<tr><td colspan="3">Method: Measurements were made in a 3-meter Open Area Test Site (OATS) that complies to ANSI C63.4. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3 meter. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in horizontal and vertical polarities. Final measurements (Peak) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4 m. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.
A pre-scan frequency identification of the EUT has been performed in full anechoic chamber. The measured radiated field of the EUT is realised at 3-meters of distance. Antenna is 1.25-meters high.</td><td>Pass</td></tr>
<tr><td>Laboratory Parameters:</td><td>Required prior to the test</td><td colspan="2">During the test</td></tr>
<tr><td>Ambient Temperature</td><td>10 to 40 °C</td><td colspan="2">25°C</td></tr>
<tr><td>Relative Humidity</td><td>10 to 90 %</td><td colspan="2">55%</td></tr>
<tr><td rowspan="2">Fully configured sample scanned over the following frequency range</td><td>Frequency range on each side of line</td><td colspan="2">Measurement Point</td></tr>
<tr><td>30MHz – 9.3GHz</td><td colspan="2">3 m measurement distance</td></tr>
<tr><td colspan="4">Limits – FCC Part 15.247 (d) / RSS-247 §5.5</td></tr>
<tr><td rowspan="2">Frequency (MHz)</td><td colspan="3">Limits (dBµV/m)</td></tr>
<tr><td>Detector / Analyser RBW</td><td>Limit</td><td>Results</td></tr>
<tr><td>30 to 9300</td><td>Pk / 100kHz</td><td>20dB below the maximum Peak level</td><td>Pass</td></tr>
<tr><td colspan="4">Supplementary information:
Test location: SMEE
Test date: September 15th & 20th, 2016 by J. Blancher
Power supply voltage: 24Vdc at RJ45 Input</td></tr>
</table>

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Log-periodic antenna	TDK	PLP3003	ANT-101-001	2016/8	2017/8
Biconnic antenna	COM-POWER	AB- 900	ANT-101-003	2016/8	2017/8
BiConiLog antenna	EMCO	3142B	ANT-101-010	2016/8	2017/8
Horn antenna	ETS-LINDGREN	3115	ANT-141-013	2015/7	2018/7
RF cable	Div	OATS/25m	CAB-101-019	2016/3	2017/3
RF cable	Pasternack	PE302-120	CAB-131-024	2016/3	2017/3
RF cable	HUBER+SUHNER	RG214U	CAB-141-026	2016/3	2017/3
RF cable	HUBER+SUHNER	RG214U	CAB-141-029	2016/3	2017/3
RF cable	HUBER+SUHNER	SF104	CAB-141-030	2016/3	2017/3
High-pass filter	Mini-Circuit	VHF-2700+	FIL-151-005	2016/3	2017/3
Pre-amplifier	PE	PE1524	PRE-101-002	2016/3	2017/3
Anechoic chamber	COMTEST	214263	CAG-141-001	-	-
OATS	Div	10m	SIT-101-001	2016/8	2017/8
Antenna mast	Innco- Systems	MA4000EP	MAT-101-001	-	-
Turntable	Innco- Systems	DS1200S	PLA-101-001	-	-
Turntable	Innco- Systems	CT0800	PLA-141-001	-	-
Measuring Rec	Rohde&Schwarz	ESRP	REC-151-002	2015/7	2018/7
Spectrum analyzer	AGILENT HP	8563E	ASP-111-003	2013/9	2016/9

Tabulated Results for Peak Output Power Reference level	
FREQ	**Field Strength 3m**
(MHz)	(dBµV/m)
903.5	111.4
914.5	111.7
926.5	112.1
RBW:	100kHz
Measurement distance:	3m
Limit:	Ref. level only – For 15.247 / RSS-247
Final measurement detector:	Peak
Wide Measurement Uncertainty:	± 5.2dB (k=2)
Note:	Only for identification of limit in non-restricted band Limit is **91.4 dBµV/m** Peak for out-of-band frequencies in Non-Restricted bands (with a 100kHz RBW on the spectrum analyser)

Tabulated Results for Unwanted emissions in Non-Restricted bands			
FREQ	**Field Strength 3m**	**Limit**	**Result**
(MHz)	(dBµV/m)	(dBµV/m)	(dBµV/m)
1807.0	**44.2**	91.4	**Pass**
1829.0	**45.8**	91.4	**Pass**
1853.0	**47.2**	91.4	**Pass**
5487.0	**45.0**	91.4	**Pass**
5559.0	**45.1**	91.4	**Pass**
6324.5	**55.4**	91.4	**Pass**
6401.5	**55.1**	91.4	**Pass**
6485.5	**55.1**	91.4	**Pass**
7228.0	**59.6**	91.4	**Pass**
RBW:	100kHz		
Measurement distance:	3m		
Limit:	For 15.247 / RSS-247		
Final measurement detector:	Peak		
Wide Measurement Uncertainty:	± 5.2dB (k=2)		
RESULT:	PASS		
Notes:	(1): The field strength (level) is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation is as follow: FS = RA + AF + CF – AG Where FS = Field Strength RA = Receiver Amplitude AF = Antenna Factor CF = Cable Factor AG = Amplifier Gain Total factor (dB) is AF + CF – AG Margin value = Emission level – Limit value (2): Test performed on OATS at 3m distance		

Graphical representation of Band-edge compliance	
	
<u>Low bandedge compliance</u> F1 = 902MHz Peak level at 902MHz is below 60dBµV/m (limit is 91.4dBµV/m) RESULT: PASS Note: Radiated measurement	*<u>High bandedge compliance</u>* F1 = 928MHz Peak level at 928MHz is 65.4dBµV/m (limit is 91.4dBµV/m) RESULT: PASS Note: Radiated measurement

13. Unwanted emissions in Restricted Frequency bands

TEST: Unwanted emissions into Restricted Frequency Bands			**Verdict**
Method: Measurements were made in a 10 or 3-meter Open Area Test Site (OATS) that complies to ANSI C63.4. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3 meter. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in horizontal and vertical polarities. Final measurements (Peak, Quasi-peak, Average) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4 m. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable. A pre-scan frequency identification of the EUT has been performed in full anechoic chamber. The measured radiated field of the EUT is realised at 3-meters of distance. Antenna is 1.25-meters high.			**Pass**
Laboratory Parameters:	Required prior to the test	During the test	
Ambient Temperature	10 to 40 °C	25°C	
Relative Humidity	10 to 90 %	55%	
Fully configured sample scanned over the following frequency range	Frequency range on each side of line	Measurement Point	
	9kHz – 30MHz	10 m measurement distance	
	30MHz – 9.3GHz	3 m measurement distance	
Limits – FCC Part 15.205, 15.209 (a), 15.247 (d) / RSS-GEN §8.9, §8.10, RSS-247 §5.5			
Frequency (MHz)	Limits (dBµV/m)		
	Level / Detector / Distance	Results	
0.009 to 0.490	107.6 to 72.9 / QP / 10m	**Pass**	
0.490 to 1.705	52.9 to 42.1 / QP / 10m	**Pass**	
1.705 to 30	48.6 / QP / 10m	**Pass**	
30 to 88	40.0 / QP / 3m	**Pass**	
88 to 216	43.5 / QP / 3m	**Pass**	
216 to 960	46.0 / QP / 3m	**Pass**	
960-1000	54.0 / QP / 3m	**Pass**	
Above 1GHz	54.0 / AV / 3m 74.0 / PK / 3m	**Pass**	
Supplementary information: Test location: SMEE Test date: September 15th & 20th, 2016 by J. Blancher Power supply voltage: 24Vdc at RJ45 Input			

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Log-periodic antenna	TDK	PLP3003	ANT-101-001	2016/8	2017/8
Biconnic antenna	COM-POWER	AB- 900	ANT-101-003	2016/8	2017/8
BiConiLog antenna	EMCO	3142B	ANT-101-010	2016/8	2017/8
Horn antenna	ETS-LINDGREN	3115	ANT-141-013	2015/7	2018/7
RF cable	Div	OATS/25m	CAB-101-019	2016/3	2017/3
RF cable	Pasternack	PE302-120	CAB-131-024	2016/3	2017/3
RF cable	HUBER+SUHNER	RG214U	CAB-141-026	2016/3	2017/3
RF cable	HUBER+SUHNER	RG214U	CAB-141-029	2016/3	2017/3
RF cable	HUBER+SUHNER	SF104	CAB-141-030	2016/3	2017/3
High-pass filter	Mini-Circuit	VHF-2700+	FIL-151-005	2016/3	2017/3
Pre-amplifier	PE	PE1524	PRE-101-002	2016/3	2017/3
Anechoic chamber	COMTEST	214263	CAG-141-001	-	-
OATS	Div	10m	SIT-101-001	2016/8	2017/8
Antenna mast	Innco- Systems	MA4000EP	MAT-101-001	-	-
Turntable	Innco- Systems	DS1200S	PLA-101-001	-	-
Turntable	Innco- Systems	CT0800	PLA-141-001	-	-
Measuring Rec	Rohde&Schwarz	ESRP	REC-151-002	2015/7	2018/7
Spectrum analyzer	AGILENT HP	8563E	ASP-111-003	2013/9	2016/9

Tabulated Results for Unwanted emissions (9kHz-30MHz)						
FREQ	**RF field @ 30m**	**Limit @ 30m**	**Margin**	**Antenna angle**	**Table angle**	**Correc. Fact. (CF)**
MHz	(QP) dBµV/m	(QP) dBµV/m	dB	Degree	Degree	dB
Margin > 10dB						
Supplementary information: Frequency list measured on the Open Area Test Site has been created with pre-scan results.						

Frequency band investigated:	9kHz-30MHz
RBW:	200Hz (9kHz-150kHz) 9kHz (150kHz-30MHz)
Measurement distance:	10m
Limit:	FCC Part 15.205, 15.209, 15.247 / RSS-Gen, RSS-247
Final measurement detector:	Quasi-Peak
Wide Measurement Uncertainty:	± 5 dB (k=2)
Note:	CF: Correction factor = Antenna factor + Cable loss *[1]: Measure have been done at 10m distance and corrected according to requirements of 15.209.e) (M@30m = M@10m-19.1dB)

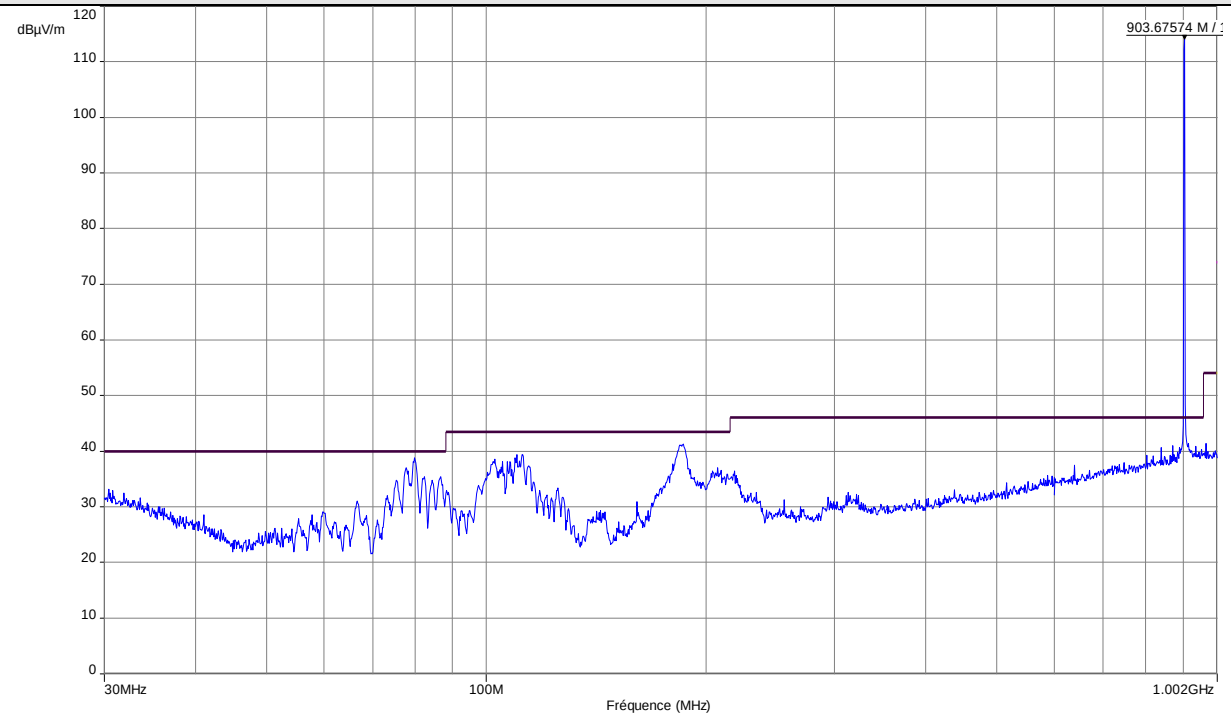
Tabulated Results for Unwanted emissions (30MHz-1GHz)										
FREQ	**Meter reading**	**Meter reading**	**CF total**	**Field level**	**Field level**	**Pol**	**Antenna height**	**Table angle**	**Limit**	**Margin**
MHz	(QP) dBµV	(Pk) dBµV	dB	(QP) dBµV/m	(Pk) dBµV/m		cm	Degré	(QP) dBµV/m	dB
109,378	167,0	21,2	13,6	30,3	34,8	V	100	35	43,5	**-13,2**
115,559	22,8	25,4	14,6	37,4	40,0	H	400	0	43,5	**-6,1**
188,347	17,2	25,7	18,1	35,3	43,8	V	100	190	43,5	**-8,2**
Supplementary information: Frequency list measured on the Open Area Test Site has been created with pre-scan results.										

Frequency band investigated:	30MHz-1GHz
RBW:	120kHz
Measurement distance:	3m
Limit:	FCC Part 15.205, 15.209, 15.247 / RSS-Gen, RSS-247
Final measurement detector:	Quasi-Peak
Wide Measurement Uncertainty:	± 5.2dB (k=2)
RESULT:	PASS
Field Strength Calculation:	The field strength (level) is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation is as follow: FS = RA + AF + CF – AG Where FS = Field Strength RA = Receiver Amplitude AF = Antenna Factor CF = Cable Factor AG = Amplifier Gain Total factor (dB) is AF + CF – AG Margin value = Emission level – Limit value

Tabulated Results for Unwanted emissions (1GHz-9.3GHz)				
FREQ	**Field level**	**Detector**	**Limit**	**Result**
(MHz)	dBµV/m		(dBµV/m)	
2710.5	**49.5**	**Pk**	74 Pk / 54 Av	**Pass**
2743.5	**49.4**	**Pk**	74 Pk / 54 Av	**Pass**
2779.5	**48.7**	**Pk**	74 Pk / 54 Av	**Pass**
3614.0	**39.6**	**Pk**	74 Pk / 54 Av	**Pass**
3658.0	**41.5**	**Pk**	74 Pk / 54 Av	**Pass**
3706.0	**43.8**	**Pk**	74 Pk / 54 Av	**Pass**
4517.5	**57.4**	**Pk**	74	**Pass**
4517.5	**48.4**	**Av**	54	**Pass**
4572.5	**59.0**	**Pk**	74	**Pass**
4572.5	**50.1**	**Av**	54	**Pass**
4632.5	**59.5**	**Pk**	74	**Pass**
4632.5	**50.7**	**Av**	54	**Pass**
5421.0	**45.7**	**Pk**	74 Pk / 54 Av	**Pass**
7316.0	**56.8**	**Pk**	74	**Pass**
7316.0	**48.3**	**Av**	54	**Pass**
7412.0	**51.2**	**Pk**	74 Pk / 54 Av	**Pass**
8131.5	**53.5**	**Pk**	74 Pk / 54 Av	**Pass**
8230.5	**51.2**	**Pk**	74 Pk / 54 Av	**Pass**
8338.5	**50.0**	**Pk**	74 Pk / 54 Av	**Pass**
9035.0	**49.1**	**Pk**	74 Pk / 54 Av	**Pass**
9145.0	**49.5**	**Pk**	74 Pk / 54 Av	**Pass**
9265.0	**50.0**	**Pk**	74 Pk / 54 Av	**Pass**

RBW / VBW	1MHz / 3MHz (Peak) 1MHz / 10Hz (AV)
Measurement distance:	3m
Limit:	FCC Part 15.205, 15.209, 15.247 / RSS-Gen, RSS-247
Final measurement detector:	Peak / Average
Wide Measurement Uncertainty:	± 5.2dB (k=2)
RESULT:	PASS
Notes:	(1): The field strength (level) is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation is as follow: FS = RA + AF + CF – AG Where FS = Field Strength RA = Receiver Amplitude AF = Antenna Factor CF = Cable Factor AG = Amplifier Gain Total factor (dB) is AF + CF – AG Margin value = Emission level – Limit value (2): Test performed on OATS at 3m distance (3): For peak measurement below average limit, no test performed with average detector.

Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 30MHz-1GHz / 3m / Horizontal / Transmit mode at 903.5MHz)

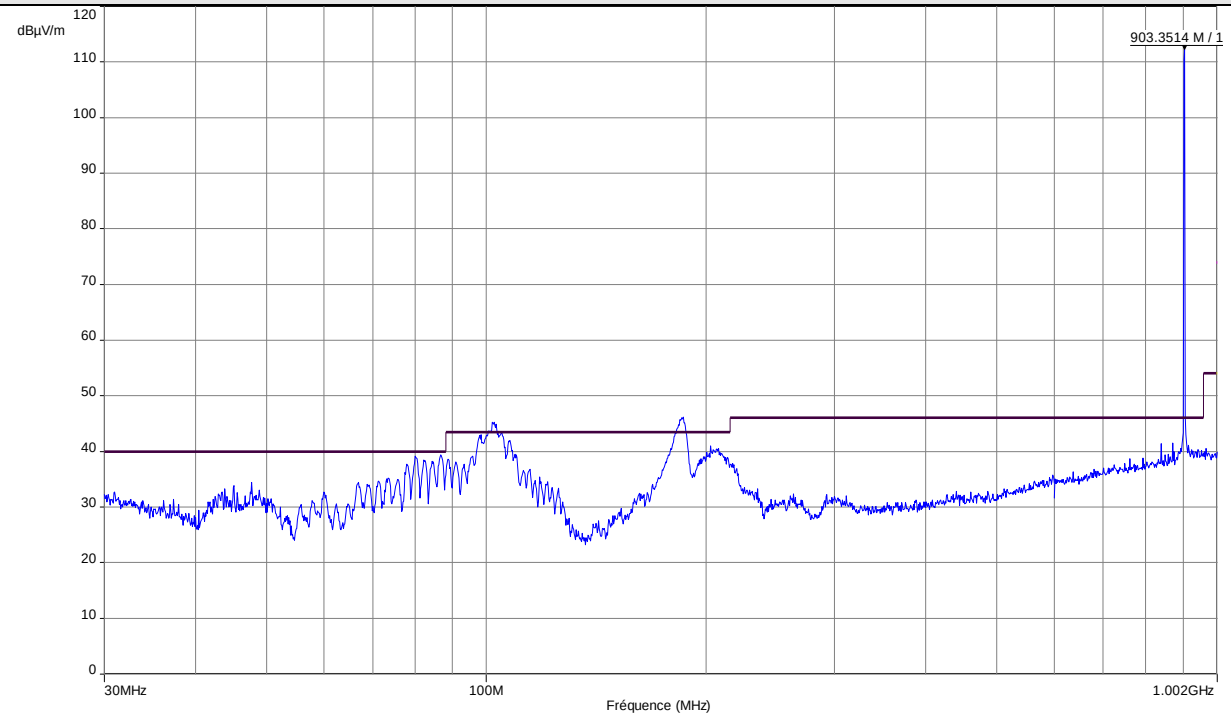


Frequency (MHz)	Peak Level (dBµV/m)
79.882	38.8
110.095	39.4
184.966	41.2
839.347	40.7
871.677	41.0

Note: Pre-scan graph only for identification purpose.

Frequency band investigated:	30MHz-1GHz
Unit :	dBµV/m
RBW :	100kHz
Antenna polarization :	Horizontal
Limit:	15.209 / RSS-Gen
Measurement detector:	Peak
Wide Measurement Uncertainty:	± 5dB (k=2)

Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 30MHz-1GHz / 3m / Vertical / Transmit mode at 903.5MHz)

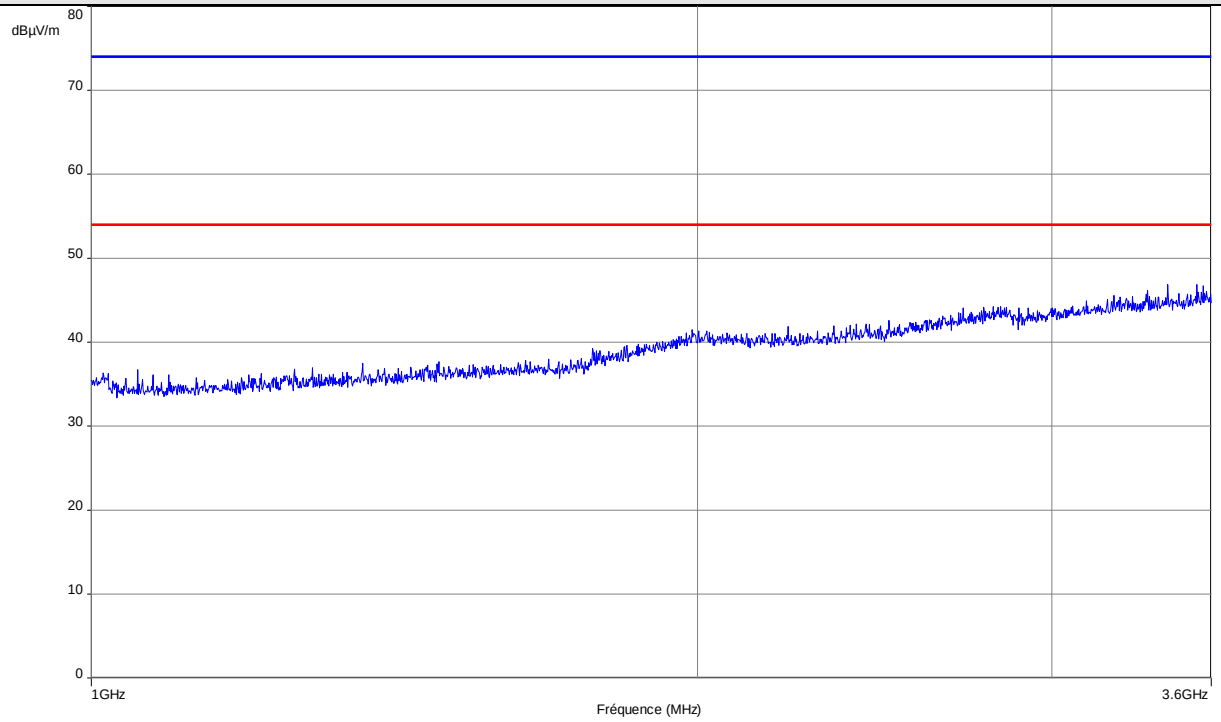


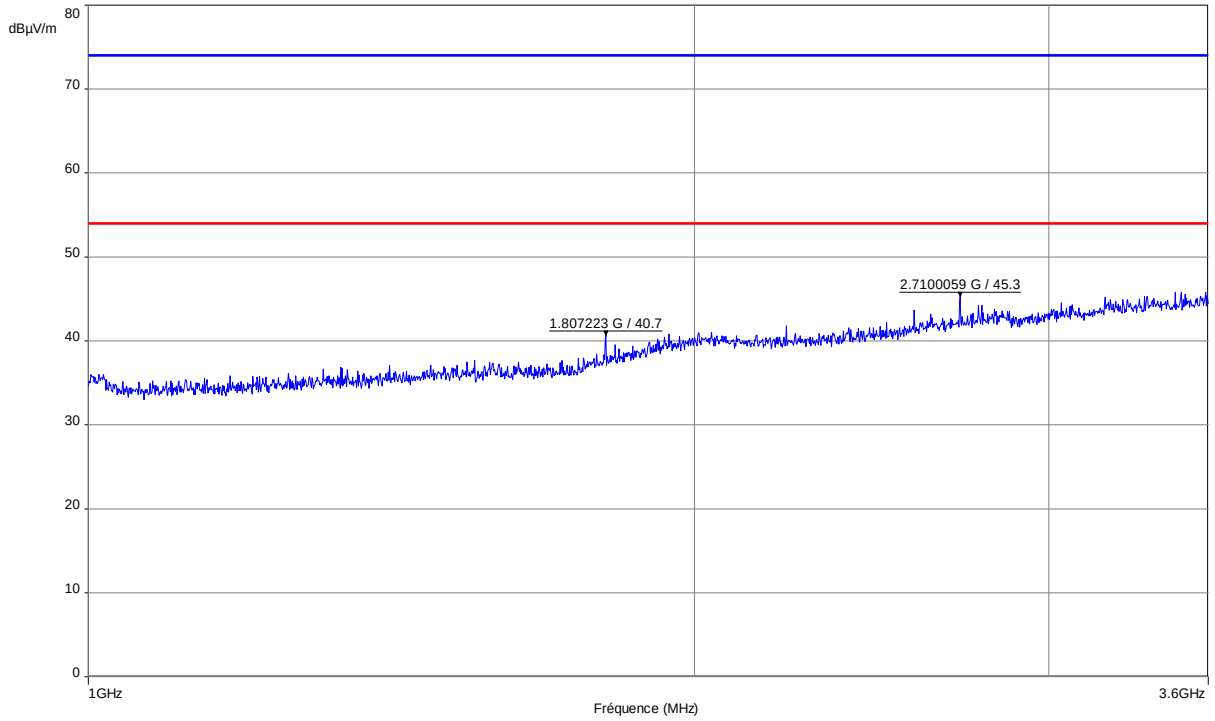
Frequency (MHz)	Peak Level (dBµV/m)
47.729	34.5
80.034	39.1
86.713	39.4
98.081	42.9
101.983	45.2
185.555	45.9
208.064	40.5
839.648	41.4
871.320	41.5

Note: Pre-scan graph only for identification purpose.

Frequency band investigated:	30MHz-1GHz
Unit :	dBµV/m
RBW :	100kHz
Antenna polarization :	Vertical
Limit:	15.209 / RSS-Gen
Measurement detector:	Peak
Wide Measurement Uncertainty:	± 5dB (k=2)

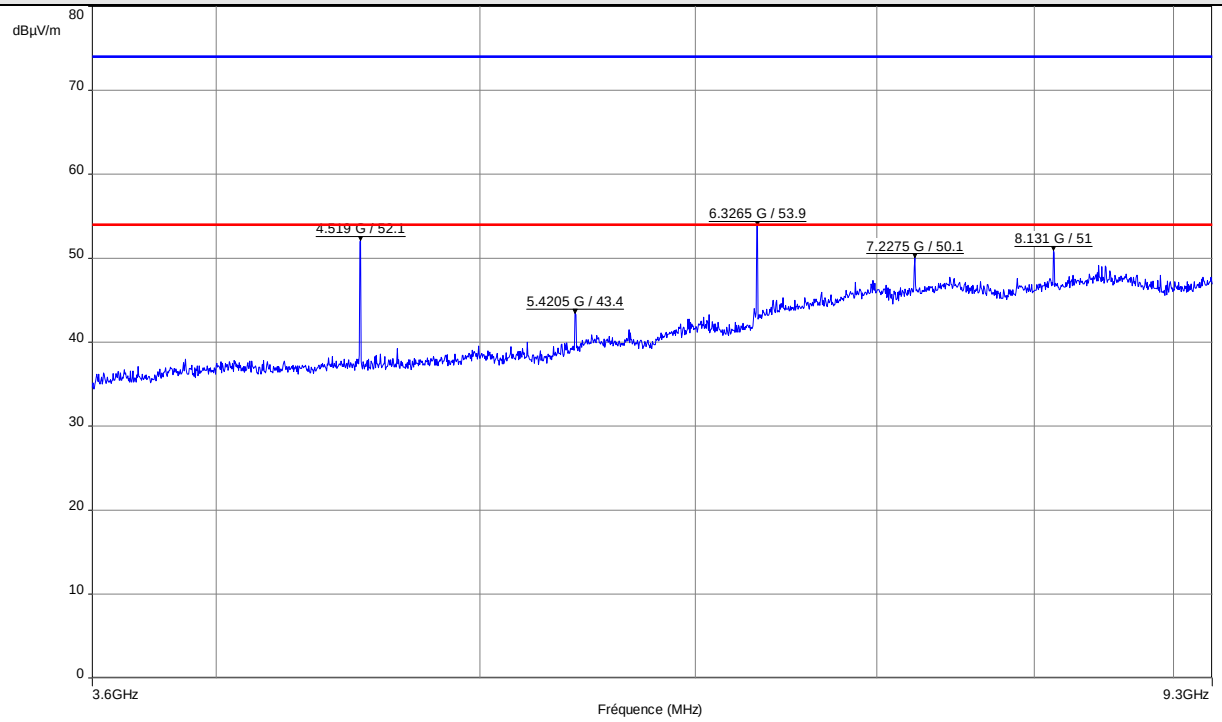
Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 1GHz-3.6GHz / 3m / Horizontal & Vertical / Transmit mode at 903.5MHz)

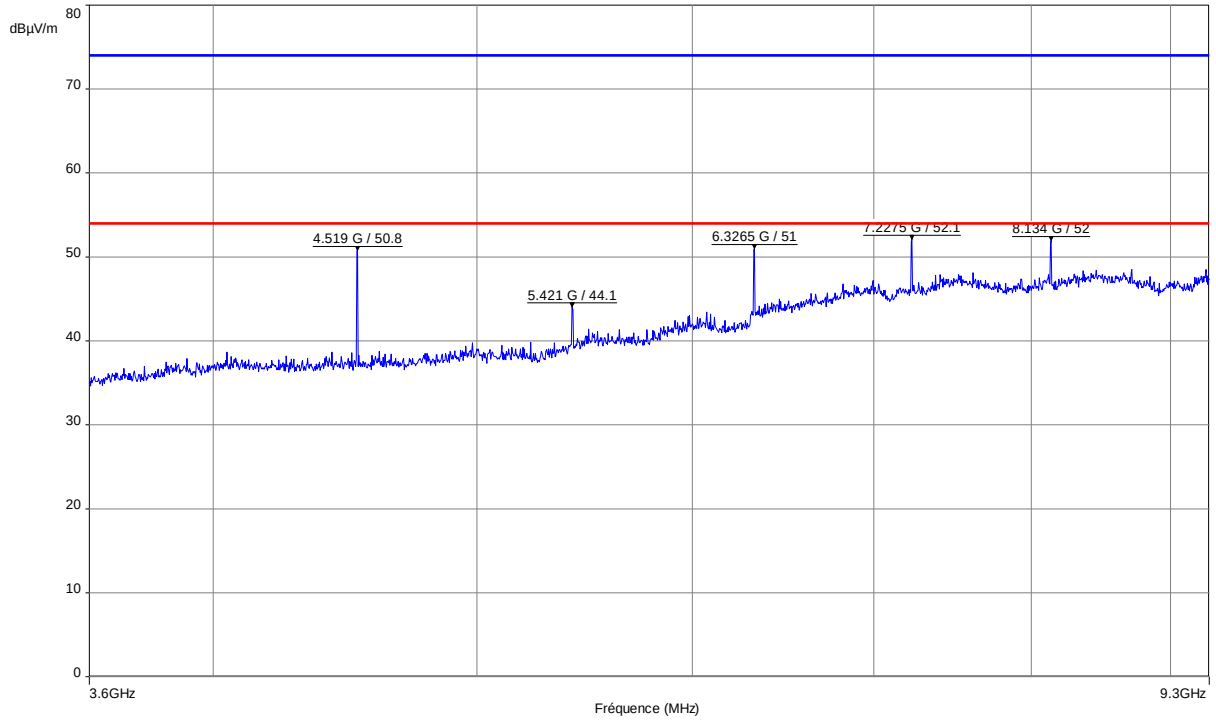




Frequency band investigated:	1GHz-3.6GHz
Unit :	dBµV/m
RBW :	1MHz
Antenna polarization :	Horizontal & Vertical
Limit:	15.209 / RSS-Gen
Measurement detector:	Peak
Wide Measurement Uncertainty:	± 5dB (k=2)

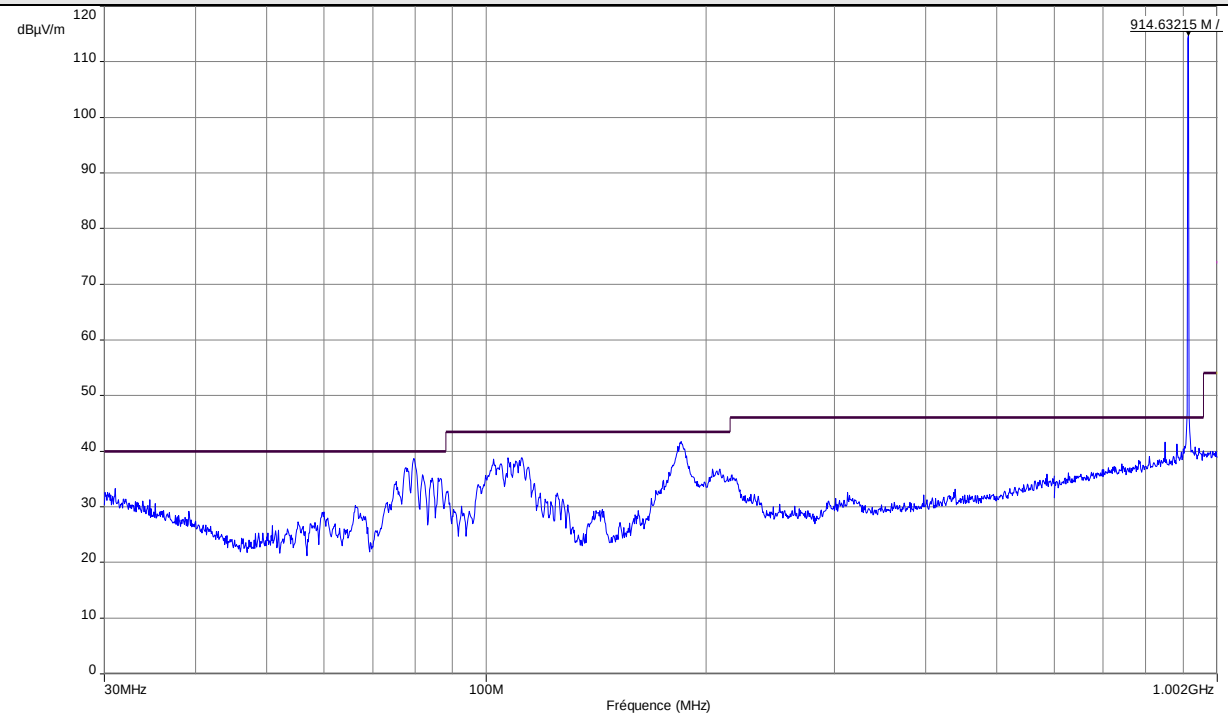
Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 3.6GHz-9.3GHz / 3m / Horizontal & Vertical / Transmit mode at 903.5MHz)





Frequency band investigated:	3.6GHz-9.3GHz
Unit :	dBµV/m
RBW :	1MHz
Antenna polarization :	Horizontal & Vertical
Limit:	15.209 / RSS-Gen
Measurement detector:	Peak
Wide Measurement Uncertainty:	± 5dB (k=2)

Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 30MHz-1GHz / 3m / Horizontal / Transmit mode at 914.5MHz)

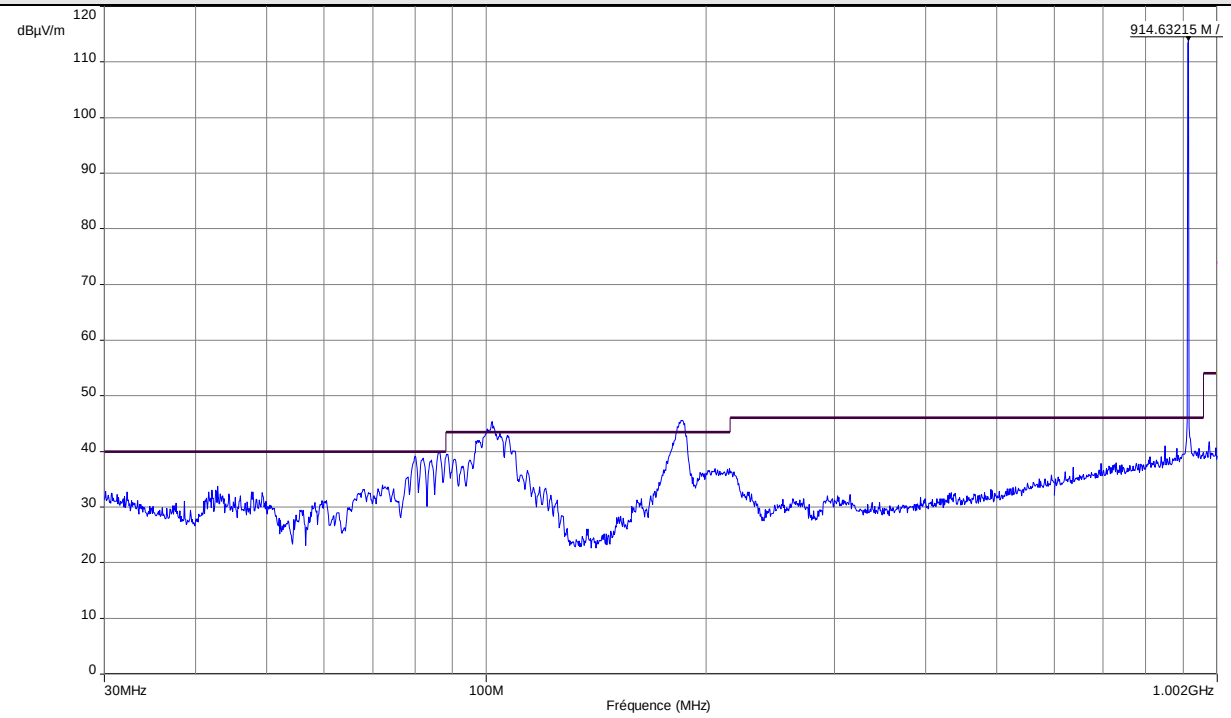


Frequency (MHz)	Peak Level (dBµV/m)
79.594	38.7
107.170	38.8
185.084	41.7
850.351	41.6
882.336	41.3

Note: Pre-scan graph only for identification purpose.

Frequency band investigated:	30MHz-1GHz
Unit :	dBµV/m
RBW :	100kHz
Antenna polarization :	Horizontal
Limit:	15.209 / RSS-Gen
Measurement detector:	Peak
Wide Measurement Uncertainty:	± 5dB (k=2)

Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 30MHz-1GHz / 3m / Vertical / Transmit mode at 914.5MHz)

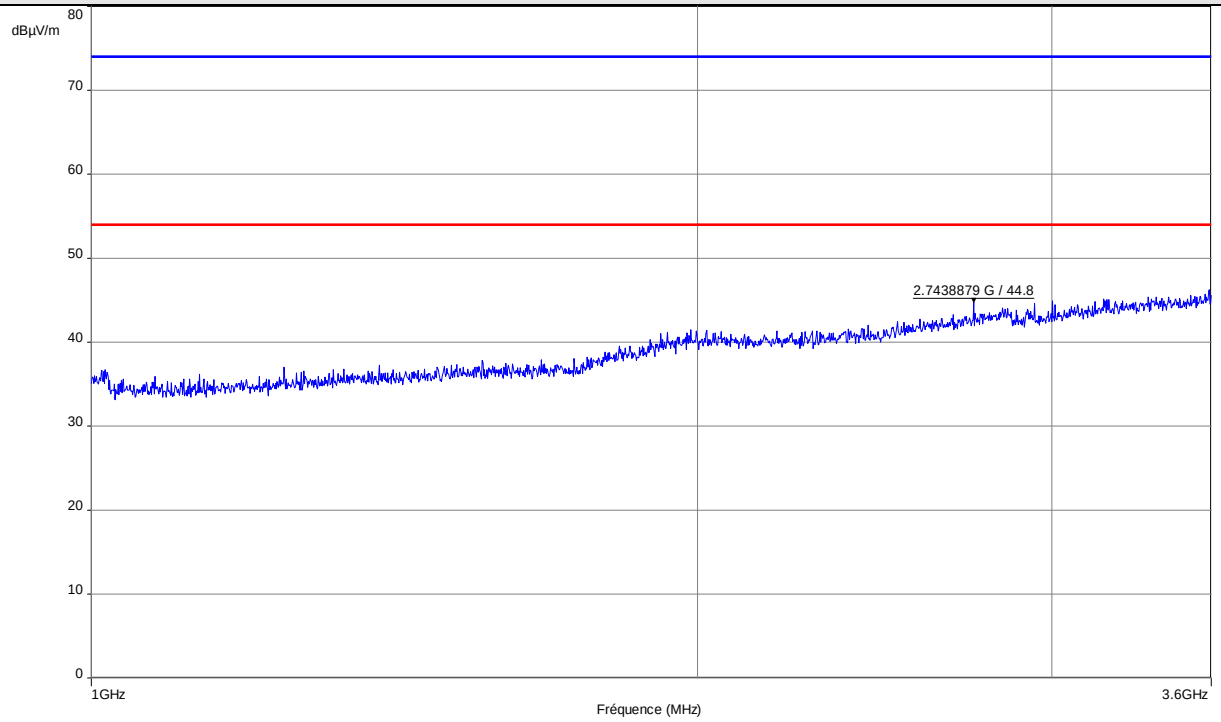


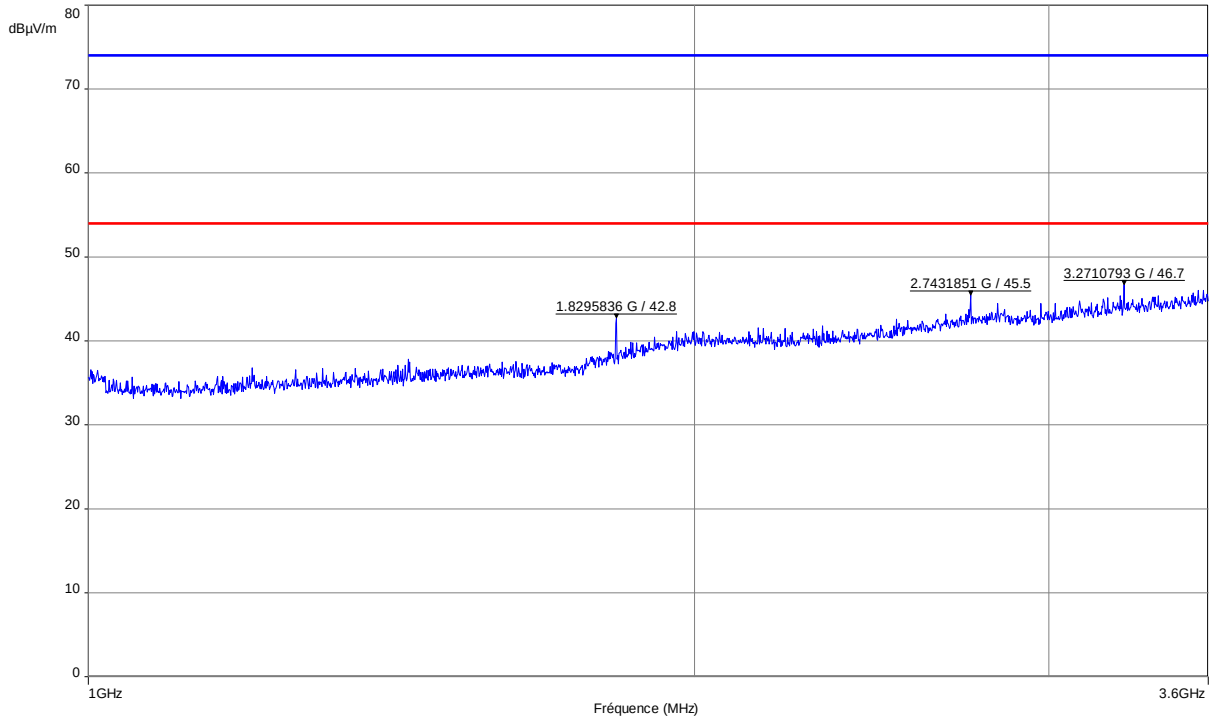
Frequency (MHz)	Peak Level (dBµV/m)
80.068	38.9
86.254	39.9
102.004	45.3
185.476	45.5

Note: Pre-scan graph only for identification purpose.

Frequency band investigated:	30MHz-1GHz
Unit :	dBµV/m
RBW :	100kHz
Antenna polarization :	Vertical
Limit:	15.209 / RSS-Gen
Measurement detector:	Peak
Wide Measurement Uncertainty:	± 5dB (k=2)

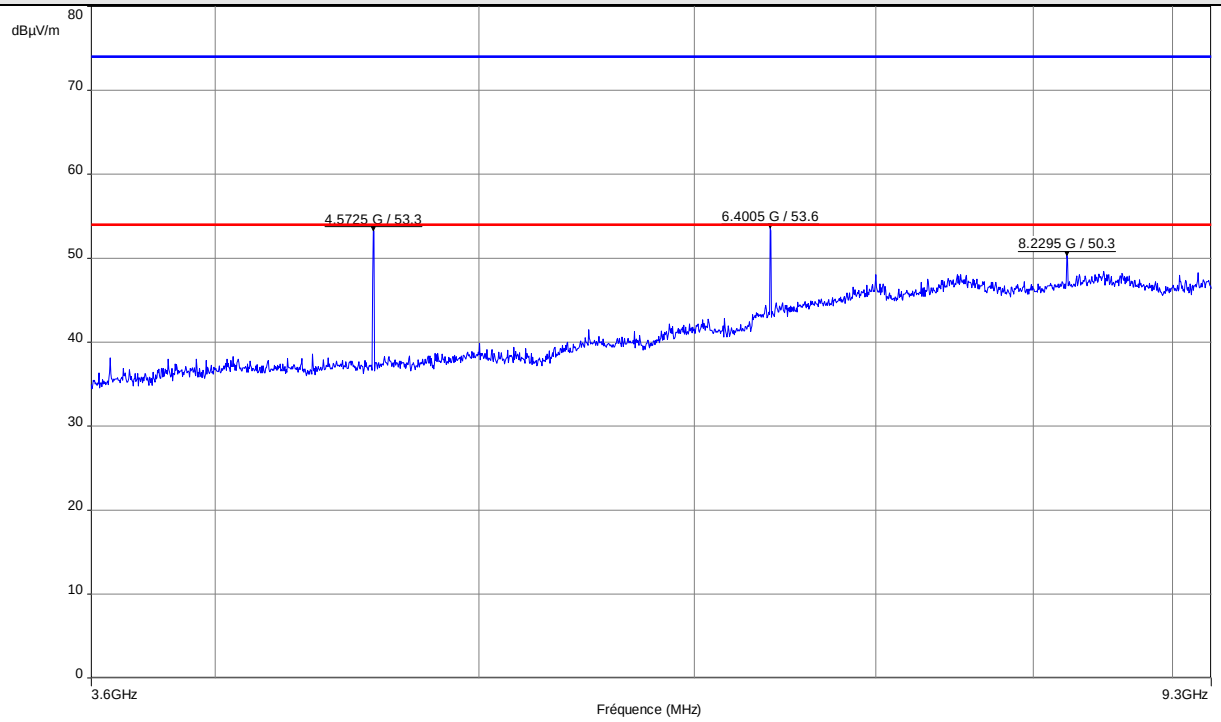
Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 1GHz-3.6GHz / 3m / Horizontal & Vertical / Transmit mode at 914.5Hz)

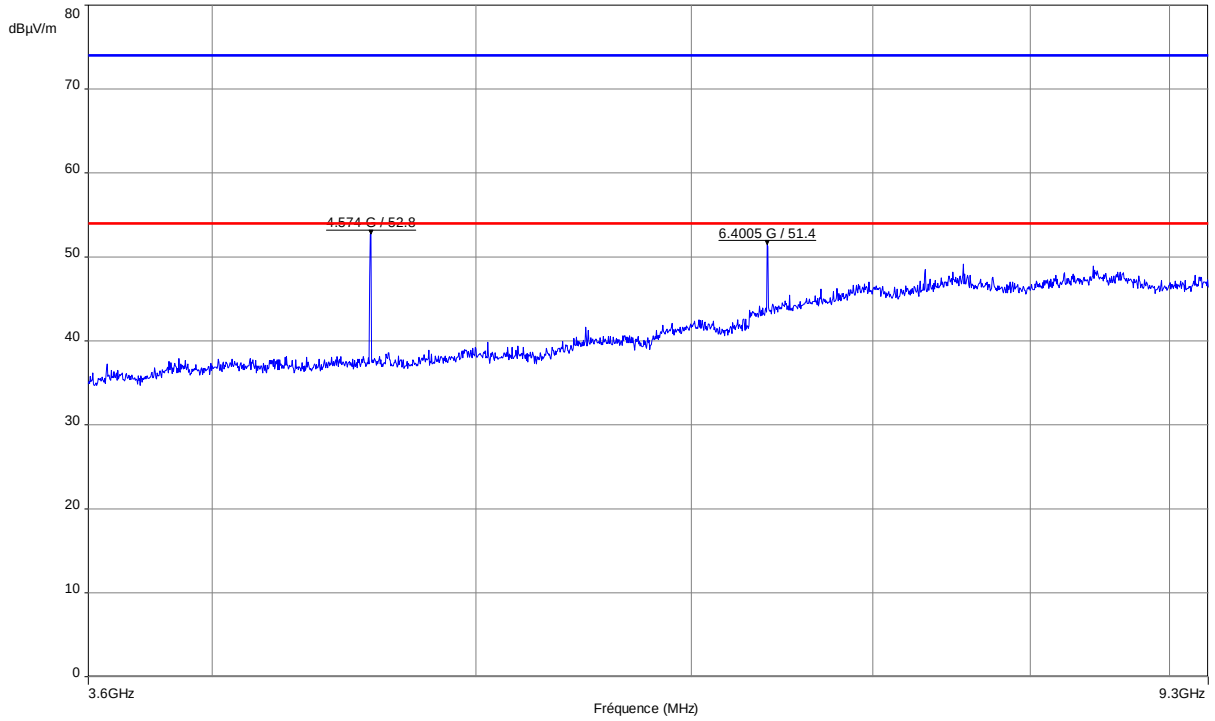




Frequency band investigated:	1GHz-3.6GHz
Unit :	dBµV/m
RBW :	1MHz
Antenna polarization :	Horizontal & Vertical
Limit:	15.209 / RSS-Gen
Measurement detector:	Peak
Wide Measurement Uncertainty:	± 5dB (k=2)

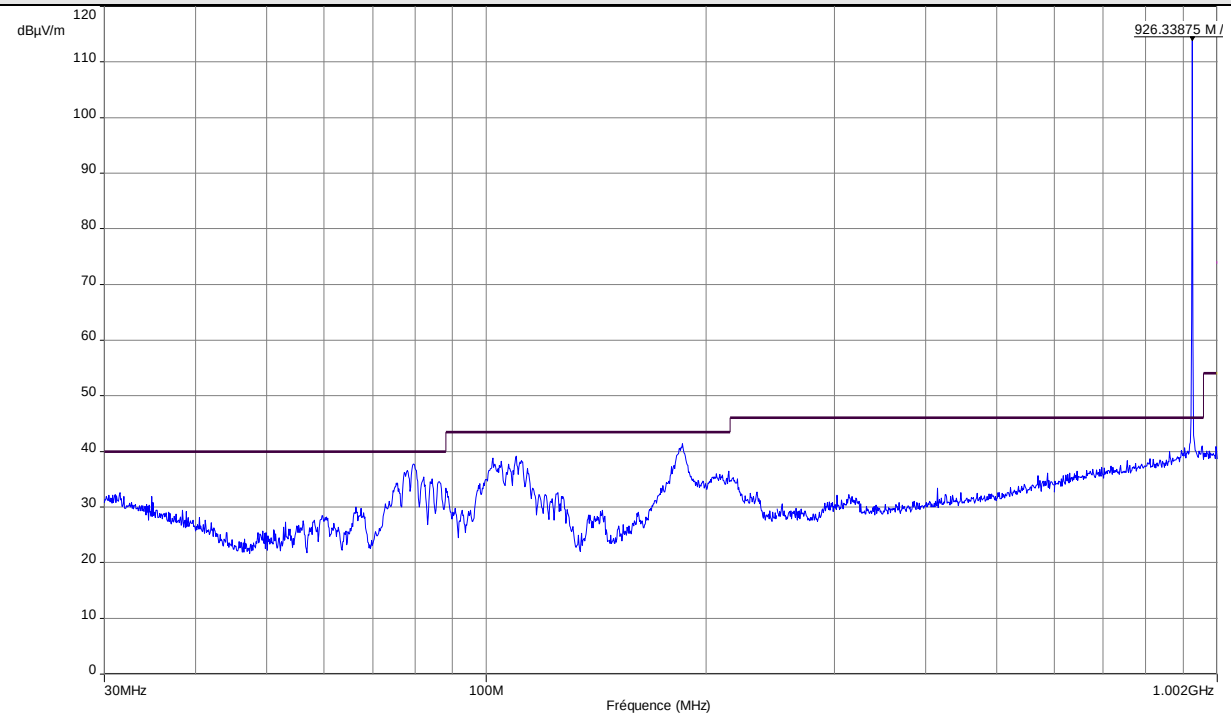
Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 3.6GHz-9.3GHz / 3m / Horizontal & Vertical / Transmit mode at 914.5MHz)





Frequency band investigated:	3.6GHz-9.3GHz
Unit :	dBµV/m
RBW :	1MHz
Antenna polarization :	Horizontal & Vertical
Limit:	15.209 / RSS-Gen
Measurement detector:	Peak
Wide Measurement Uncertainty:	± 5dB (k=2)

Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 30MHz-1GHz / 3m / Horizontal / Transmit mode at 926.5MHz)

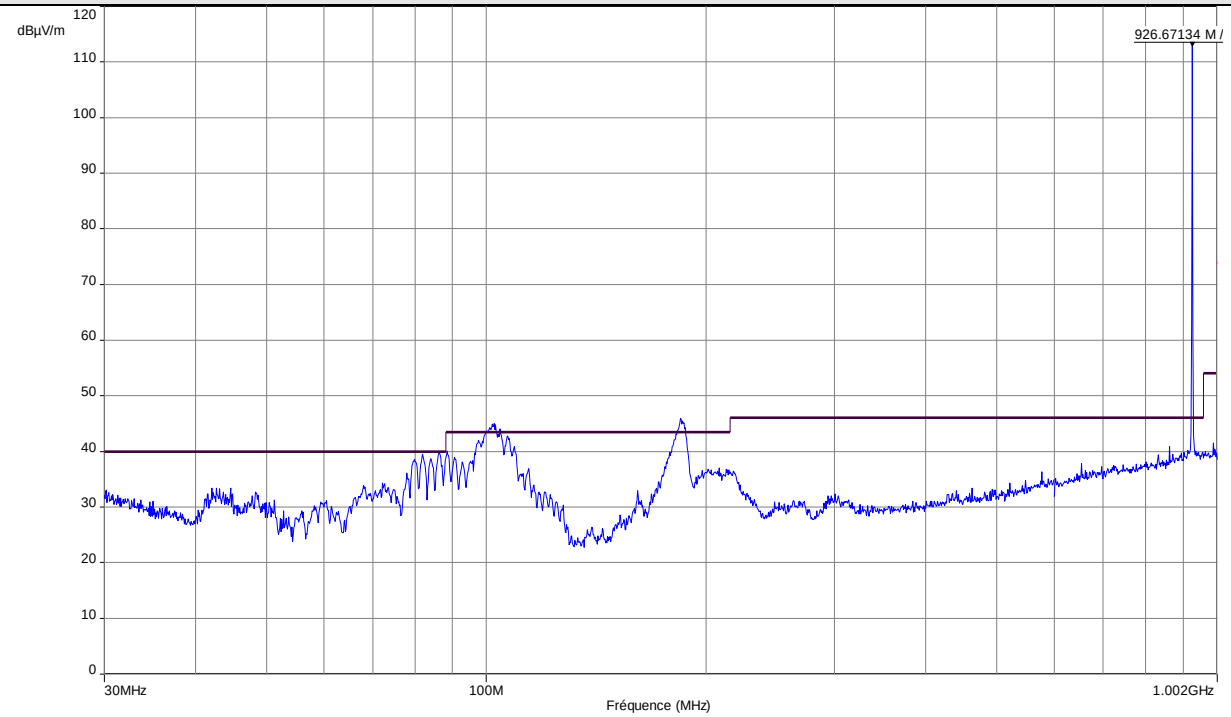


Frequency (MHz)	Peak Level (dBµV/m)
79.611	37.7
109.862	39.0
185.594	41.4

Note: Pre-scan graph only for identification purpose.

Frequency band investigated:	30MHz-1GHz
Unit :	dBµV/m
RBW :	100kHz
Antenna polarization :	Horizontal
Limit:	15.209 / RSS-Gen
Measurement detector:	Peak
Wide Measurement Uncertainty:	± 5dB (k=2)

Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 30MHz-1GHz / 3m / Vertical / Transmit mode at 926.5MHz)

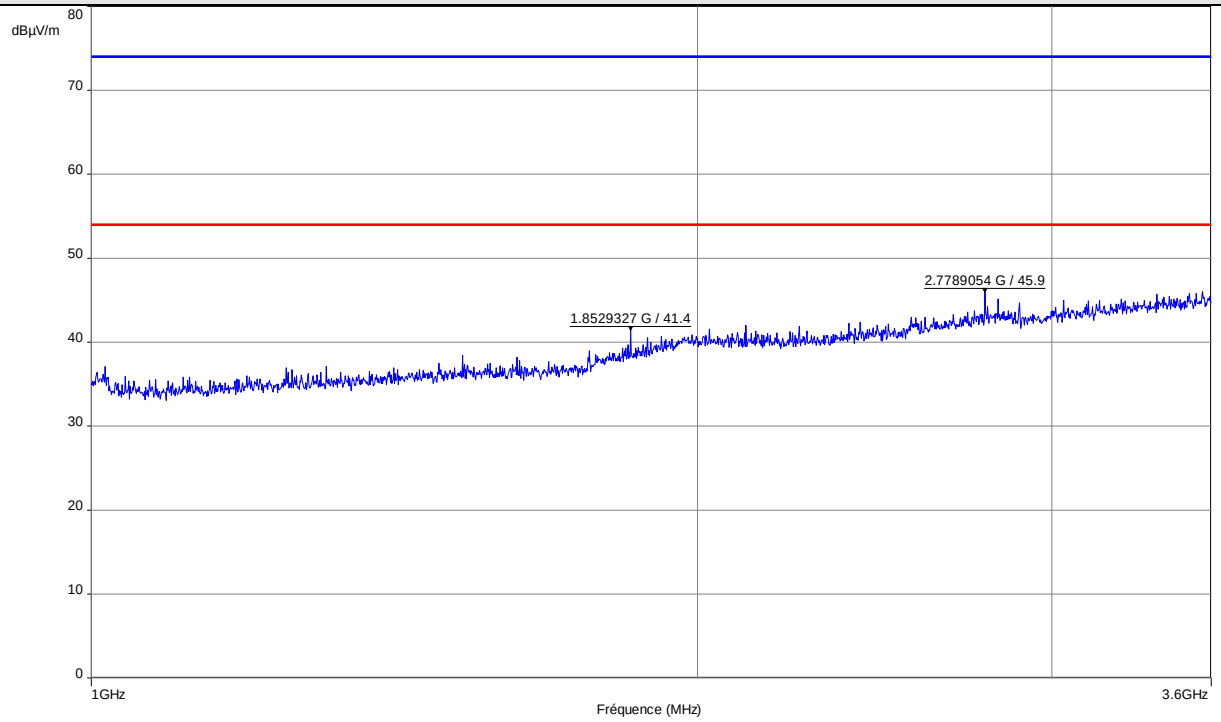


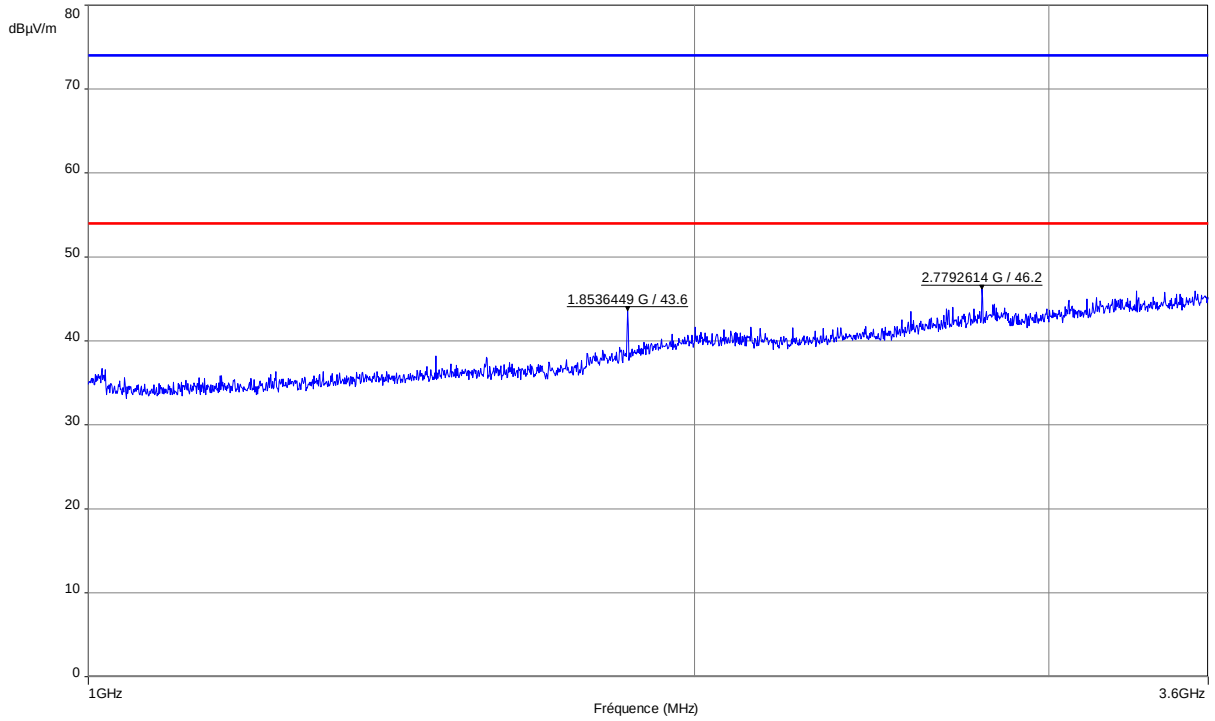
Frequency (MHz)	Peak Level (dBµV/m)
81.732	39.5
86.200	39.8
101.961	44.9
184.692	45.9
862.650	41.0

Note: Pre-scan graph only for identification purpose.

Frequency band investigated:	30MHz-1GHz
Unit :	dBµV/m
RBW :	100kHz
Antenna polarization :	Vertical
Limit:	15.209 / RSS-Gen
Measurement detector:	Peak
Wide Measurement Uncertainty:	± 5dB (k=2)

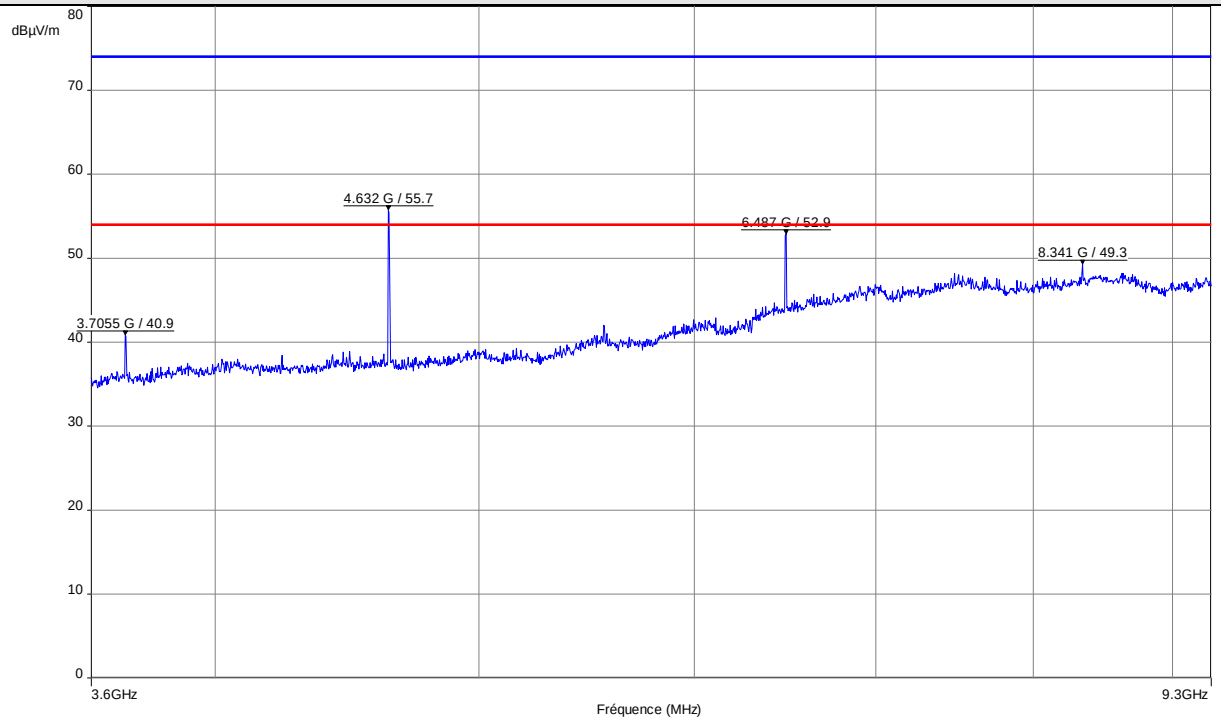
Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 1GHz-3.6GHz / 3m / Horizontal & Vertical / Transmit mode at 926.5MHz)

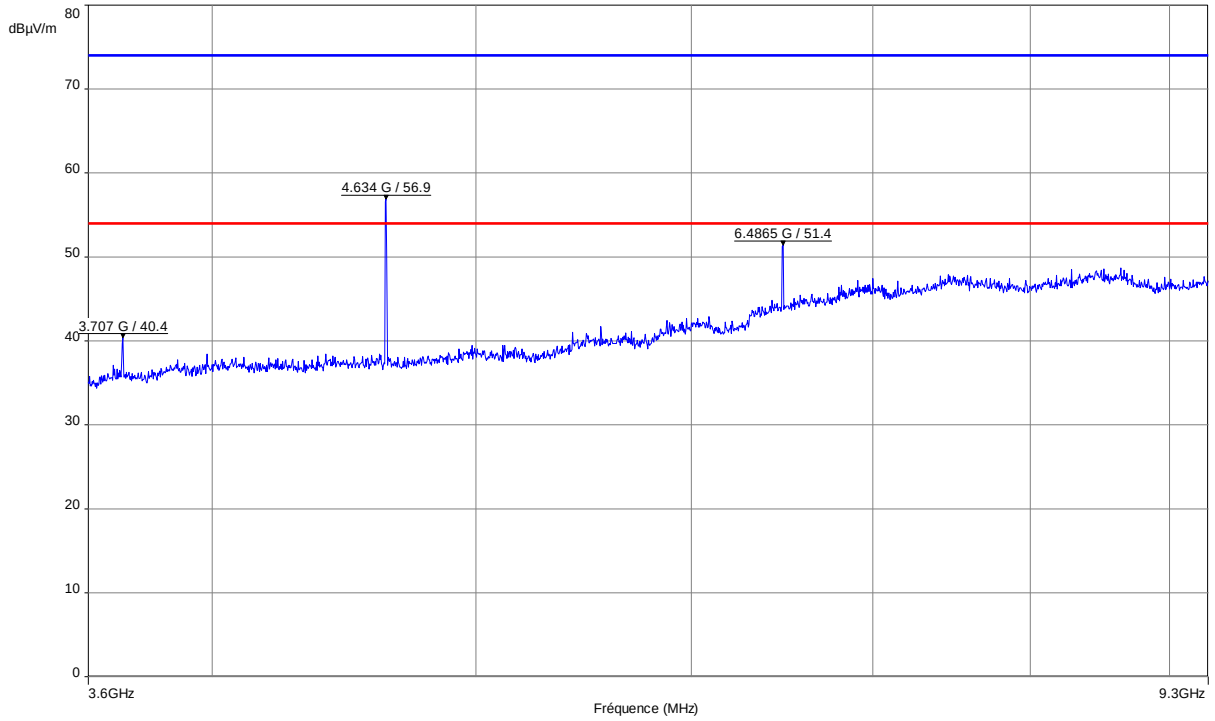




Frequency band investigated:	1GHz-3.6GHz
Unit :	dBµV/m
RBW :	1MHz
Antenna polarization :	Horizontal & Vertical
Limit:	15.209 / RSS-Gen
Measurement detector:	Peak
Wide Measurement Uncertainty:	± 5dB (k=2)

Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 3.6GHz-9.3GHz / 3m / Horizontal & Vertical / Transmit mode at 926.5MHz)





Frequency band investigated:	3.6GHz-9.3GHz
Unit :	dBµV/m
RBW :	1MHz
Antenna polarization :	Horizontal & Vertical
Limit:	15.209 / RSS-Gen
Measurement detector:	Peak
Wide Measurement Uncertainty:	± 5dB (k=2)

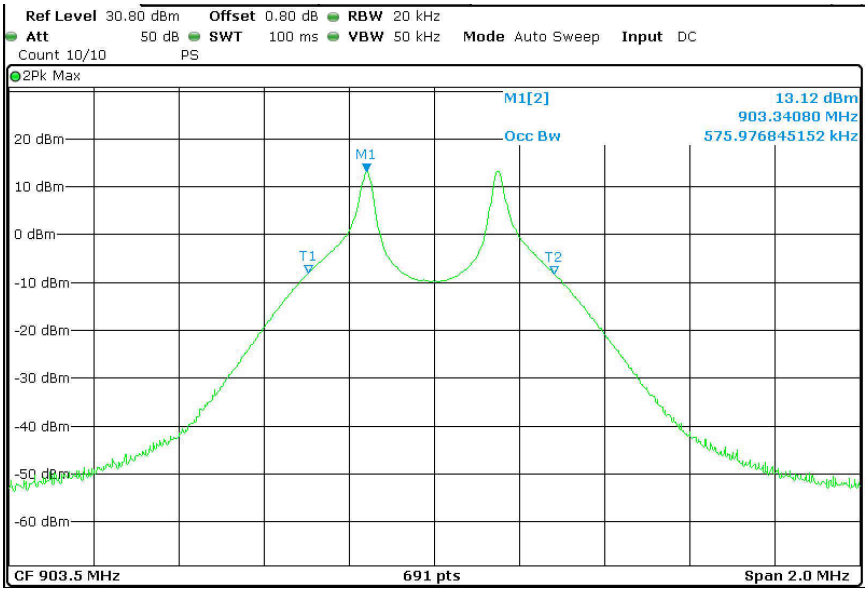
14. Occupied bandwidth (99%)

TEST: Occupied bandwidth (99%) / RSS-GEN		**Verdict**
Method: RF Output of EUT is wired directly to a spectrum analyser. A conducted measurement is performed. The RBW is set in the range of 1% to 5% of the occupied bandwidth, with VBW ≥ 3 x RBW. The SPAN is wide enough to capture all products of the modulation process. A MaxHold Peak detector is used. Measure is performed with OBW 99% function of the spectrum analyser. The tested equipment is set to transmit operation with modulations on lowest, middle and highest channel.		**Pass**
Laboratory Parameters:	Required prior to the test	During the test
Ambient Temperature	10 to 40 °C	20°C
Relative Humidity	10 to 90 %	55%
Supplementary information: Test location: SMEE Test date: September 14th, 2016 by J. Blancher Power supply voltage: 24Vdc at RJ45 Input		

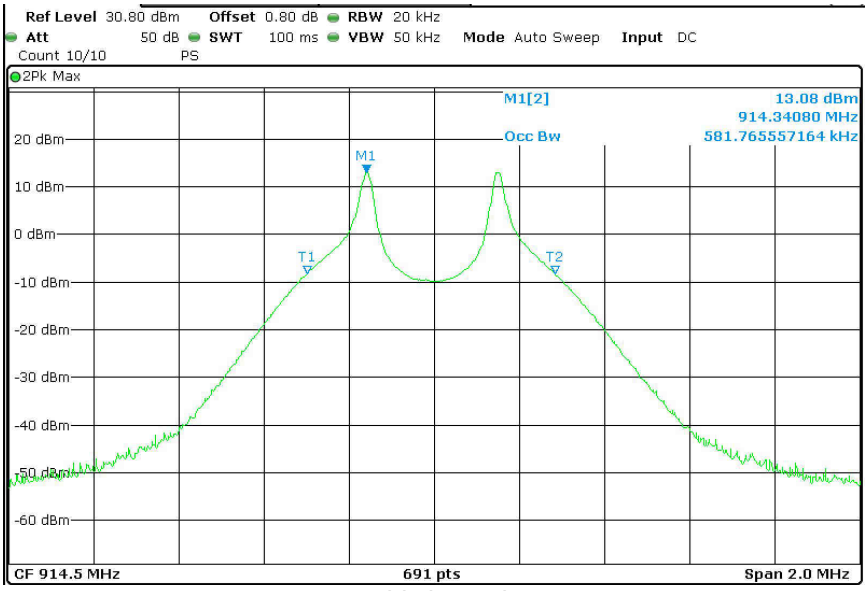
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Measuring Rec.	Rohde&Schwarz	ESRP	REC-151-002	2015/7	2018/7
RF cable	Pasternack	PE354-150	CAB-131-025	2016/3	2017/3

Tabulated Results for Occupied Bandwidth	
Frequency (MHz)	**99% Occupied Bandwidth** (kHz)
903.5	576.0kHz
914.5	581.8kHz
926.5	581.8kHz

Graphical representation of 99% Occupied Bandwidth



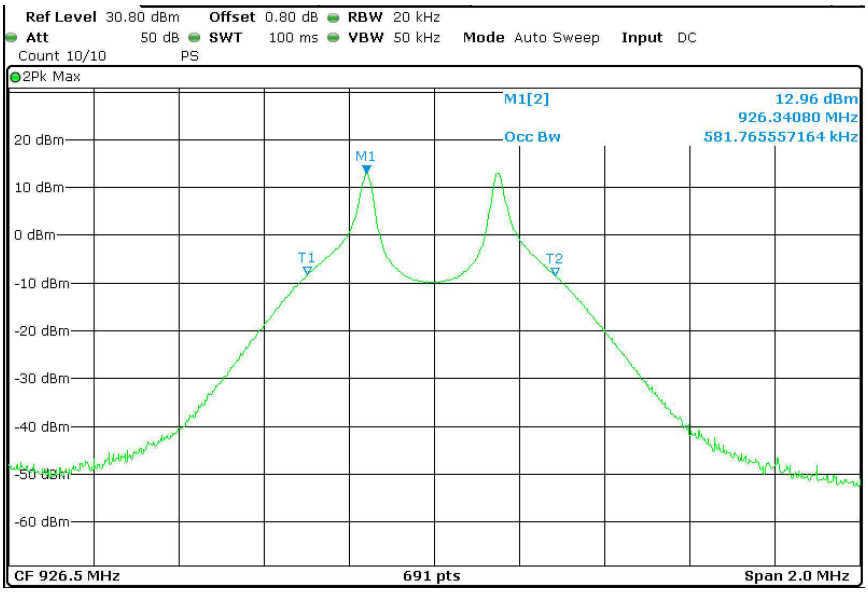
Low channel



Mid channel

Frequency band investigated:	902MHz to 928MHz
RBW :	20kHz
Measurement detector:	Peak

Graphical representation of 99% Occupied Bandwidth



High channel

Frequency band investigated:	902MHz to 928MHz
RBW :	20kHz
Measurement detector:	Peak