Matériel testé : *Equipment under test*:	**DIGITSOLE WARM Series (INWS)**

Constructeur:
Manufacturer:
DIGITSOLE
13 rue Héré
54000 Nancy – France

Rapport délivré à :
Issued to:
DIGITSOLE (Mrs Sandrine Oumnia)
13 rue Héré
54000 Nancy – France

Référence de la proposition :
Proposal number:
082015-21565

Date de l'essai :
Date of test:
Du 2 au 16 septembre 2015
September 2nd to 16th, 2015

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 5 & RSS-247, Issue 1
(Digital Transmission Systems Operating in the Bands 2400-2483.5 MHz

FCC ID:
IC:
2AFVU-INWS
20597-INWS
Model: INWS

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	September 21st, 2015	Initial Edition	Jeremy Blancher	Laurent Chapus

Sommaire / *Contents*

1. Normative references

Standard : FCC CFR 47, PART 15, Subpart B & Subpart C
ANSI C63.4 (2009): 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 (2009): American National Standard for Testing Unlicensed Wireless Devices
DTS Measurement Guidance 558074 D01
Determining ERP and EIRP Guidance 412172 D01

Industry Canada ICES-003 (Issue 5/2012) - Information Technology Equipment (ITE) – Limits and methods of measurement
Industry Canada RSS-GEN (Issue 4/2014) - General Requirements and Information for the Certification of Radio Apparatus
Industry Canada RSS-247 (Issue 1/2015) - Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

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) ICES-003 § 6.1	Table 15.107 (a)	**PASS** (1)
Radiated emission test	15.109 (a) ICES-003 § 6.2	Table 15.109 (a)	**PASS** (1)
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 § A8.4	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 4.10 / 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: 2010 § 4.6	BW at 99%	**PASS**

N/A: Not Applicable
(1): For battery charging mode only

- **General conclusion:**

Measures and tests performed on the sample of the product WARM Series (model: INWS), 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

DIGITSOLE WARM Series (INWS)

Sn: N.C

Alimentation /
Power supply

- 3.7V dc from a Lithium battery (normal used mode)
- 5V DC from standard AC/DC power adapter (charge mode)

Auxiliaires /
Auxiliaries

- Android phone SONY, model XPERIA (for Bluetooth communication)
- Standard power adapter Dong Guan GaoYI Electronic Co. Ldt, model RSS1002-050050-W2E-U (for charge mode)
- USB cable (double connector micro-USB outputs) for DC power only

Entrées-Sorties /
Input / Output

	Câbles pour essai / *Cables for test*	Blindé / *Shielded*	Prévu pour >3m / *Intended for >3m*
Micro-USB input (DC only)	1.0m	Yes	No

Note: Cable for battery charging mode only

Version programme /
Firmware version

N.C

Mode de fonctionnement /
Running mode

The tested sample is able to:

- Transmit a carrier frequency on low, middle and high channels (Bluetooth Low Energy)
- Be in Receiver mode (no transmission)
- Be in standby mode (no transmission)
- Be in charge mode (No possible RF transmission when battery charging)

Programme de test /
Test program /

nRF tool box (ANDROID application, running on smartphone in order to configure tested samples)

Note /
Note

Tested samples are representative of all WARM Series range of products:
- Size 36 to 41 (small size, battery of 1500mAh); Left and right insole
- Size 42 to 47 (large size, battery of 2150mAh); Left and right insole

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

- ISM Frequency band: 2400 to 2483.5 MHz (Transmit and receive, Wideband Data Transmission systems)
- Chip component: nRF51822, Nordic product (Multiprotocol Bluetooth Low Energy System)
- Antenna type: PCB antenna (Max gain 0dBi)
- Non-FHSS equipment
- GFSK modulation
- Equipment intended for use as a mobile station
- Equipment designed for continuous operation
- Normal power source: 3.7V DC from Lithium battery

4. Test conditions

Humidité relative / *Relative Humidity* : 55%
Température / *Temperature* : 20°C

Tension d'alimentation / *Power supply voltage*:
Equipment sous test / *Equipment under test* : 3.7V DC from Li-battery
5V DC from AC/DC power adapter (for charging mode)
Tension secteur / AC mains : 110V/60Hz

5. Modifications of the EUT

None

6. 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 (110V on standard power adapter)
Running mode	Battery charging	

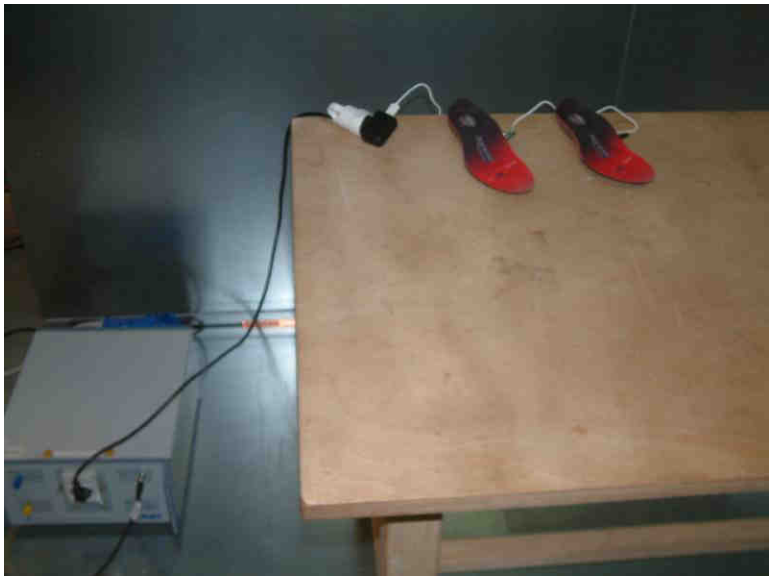
Limits

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**

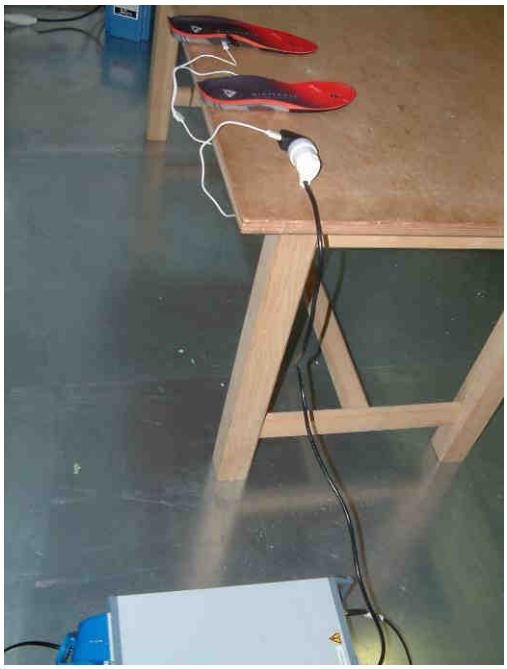
Supplementary information:
Test location: SMEE – CE Mesures
Test date: September 10th, 2015
Power supply voltage: 110V / 60Hz for 5V DC power adapter

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

Photo of test setup for Mains Terminal Disturbance Voltage



Small size



Large size

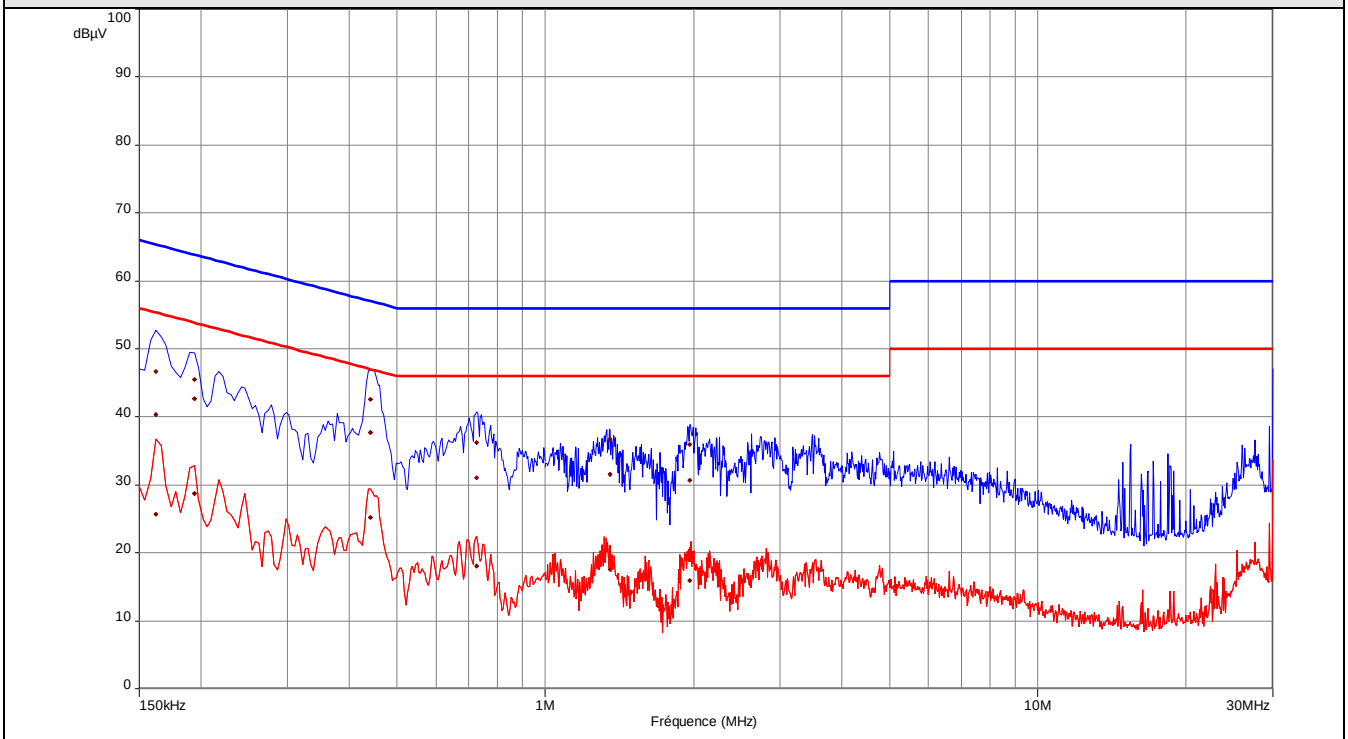
Tabulated Results for Mains Terminal Disturbance Voltage on AC port (Small size)								
FREQ	**Meas. PK**	**Mes. QP**	**LIMIT QP**	**Margin QP**	**Mes. AV**	**LIMIT AV**	**Margin AV**	Line
(MHz)	(dBµV)	(dBµV)	(dBµV)	(dB)	(dBµV)	(dBµV)	(dB)	
0.162	46.7	40.3	65.4	-25.1	25.7	55.4	-29.7	Line L1
0.194	45.5	42.7	63.9	-21.2	28.7	53.9	-25.2	Line L1
0.442	42.6	37.7	57.0	-19.3	25.2	47.0	-21.9	Line L1
0.726	36.2	31.1	56.0	-24.9	18.0	46.0	-28.0	Line L1
1.356	36.7	31.5	56.0	-24.5	17.6	46.0	-28.4	Line L1
1.968	35.9	30.7	56.0	-25.4	16.0	46.0	-30.0	Line L1
0.162	44.6	40.6	65.4	-24.8	25.2	55.4	-30.1	Neutral
0.190	42.8	37.7	64.0	-26.4	22.7	54.0	-31.4	Neutral
0.422	40.0	34.6	57.4	-22.8	26.8	47.4	-20.6	Neutral

Frequency band investigated:	150kHz-30MHz
RBW:	9kHz
Voltage:	110V / 60Hz
Limit:	FCC Part 15.107 / ICES-003
Final measurement detector:	Quasi-Peak and Average
Wide Measurement Uncertainty:	± 3.6dB (k=2)
RESULT:	PASS

Tabulated Results for Mains Terminal Disturbance Voltage on AC port (Large size)								
FREQ	**Meas. PK**	**Mes. QP**	**LIMIT QP**	**Margin QP**	**Mes. AV**	**LIMIT AV**	**Margin AV**	Line
(MHz)	(dBµV)	(dBµV)	(dBµV)	(dB)	(dBµV)	(dBµV)	(dB)	
0.190	50.7	48.0	64.0	-16.0	35.3	54.0	-18.8	Line L1
0.238	46.3	42.8	62.2	-19.4	31.7	52.2	-20.5	Line L1
0.426	47.6	43.4	57.3	-14.0	29.3	47.3	-18.1	Line L1
0.802	48.0	42.5	56.0	-13.5	25.7	46.0	-20.3	Line L1
1.700	49.8	42.7	56.0	-13.3	25.4	46.0	-20.6	Line L1
2.832	47.8	39.6	56.0	-16.4	24.5	46.0	-21.5	Line L1
0.194	47.8	44.5	63.9	-19.4	31.2	53.9	-22.7	Neutral
0.430	42.3	38.7	57.3	-18.6	29.7	47.3	-17.6	Neutral
1.720	42.0	35.0	56.0	-21.0	21.2	46.0	-24.8	Neutral
2.600	41.3	34.8	56.0	-21.2	20.1	46.0	-25.9	Neutral
30.000	44.6	42.6	60.0	-17.5	32.5	50.0	-17.5	Neutral

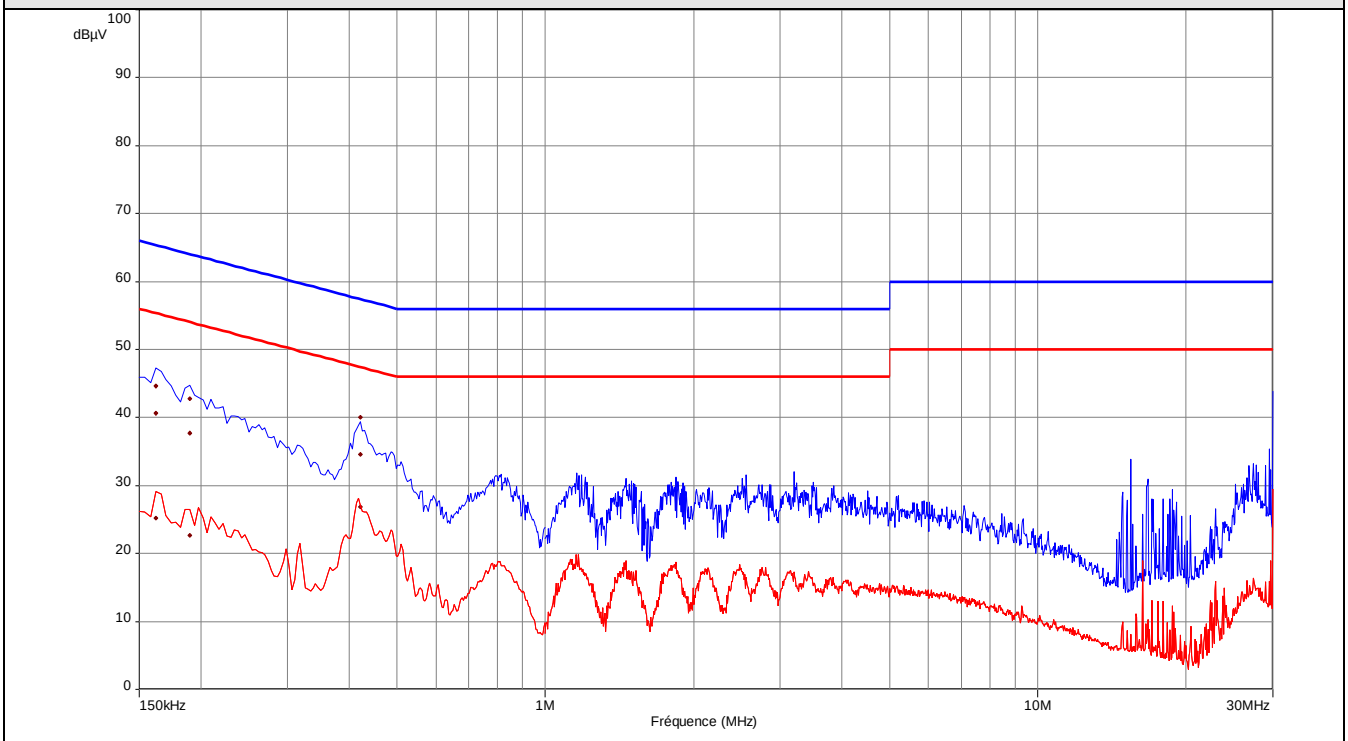
Frequency band investigated:	150kHz-30MHz
RBW:	9kHz
Voltage:	110V / 60Hz
Limit:	FCC Part 15.107 / ICES-003
Final measurement detector:	Quasi-Peak and Average
Wide Measurement Uncertainty:	± 3.6dB (k=2)
RESULT:	PASS

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



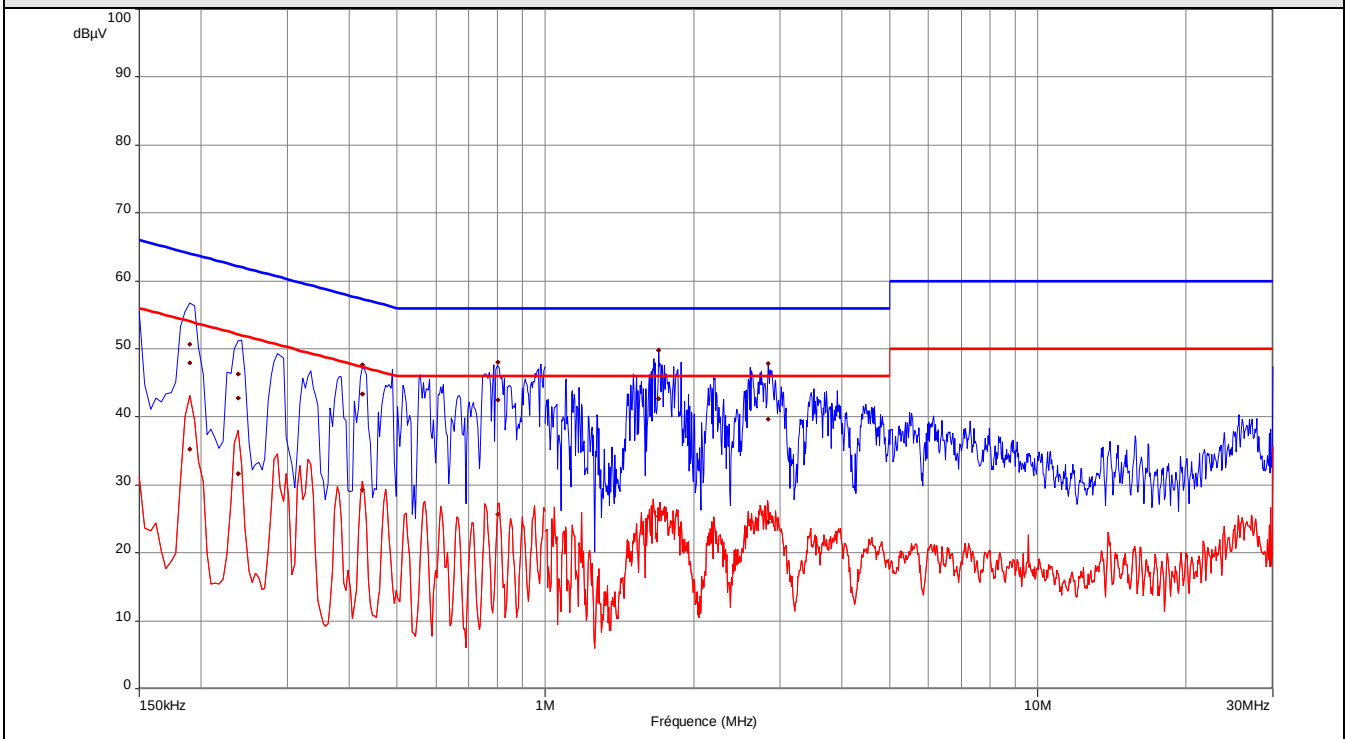
----: Peak | ----: Average

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



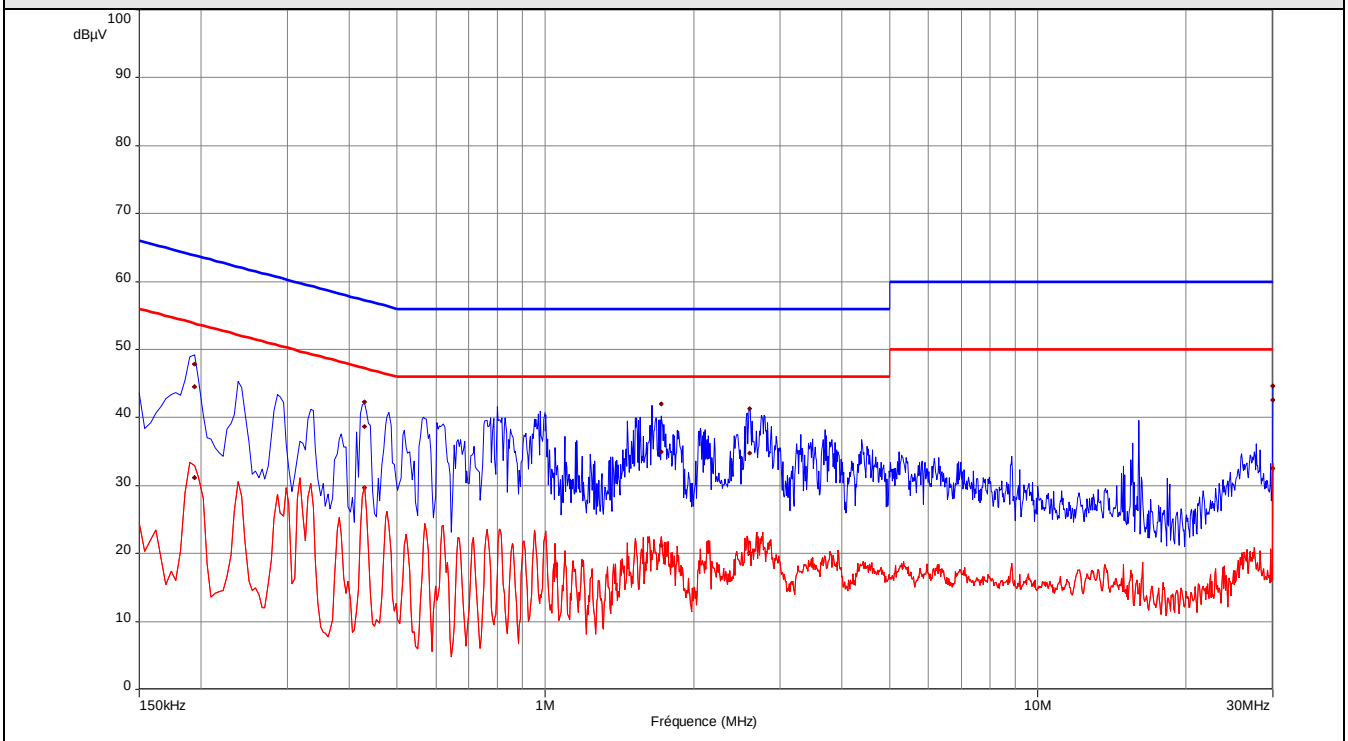
----: Peak | ----: Average

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



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

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



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

7. Radiated Emission Measurement (30MHz-1GHz)

TEST: Limits for radiated disturbance 30 MHz – 1 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		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
	30MHz – 1GHz		3 m measurement distance
Running mode	Battery Charging mode		
Limits			
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 4th, 2015 Power supply voltage: 5V DC from AC/DC power adapter			

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Log-periodic antenna	TDK	PLP3003	ANT-101-001	2015/8	2016/8
Biconnic antenna	COM-POWER	AB- 900	ANT-101-003	2015/8	2016/8
BiConiLog antenna	EMCO	3142B	ANT-101-010	2014/8	2015/8
Horn antenna	ETS-LINDGREN	3115	ANT-141-013	2015/7	2018/7
RF cable	Div	2m	CAB-101-011	2015/3	2016/3
RF cable	Div	OATS/25m	CAB-101-019	2015/3	2016/3
RF cable	Div	OATS/10m	CAB-101-020	2015/3	2016/3
Anechoic chamber	COMTEST	214263	CAG-141-001	-	-
OATS	Div	10m	SIT-101-001	2015/5	2016/5
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	-	-

Photo of test setup for Radiated Disturbance

Small size

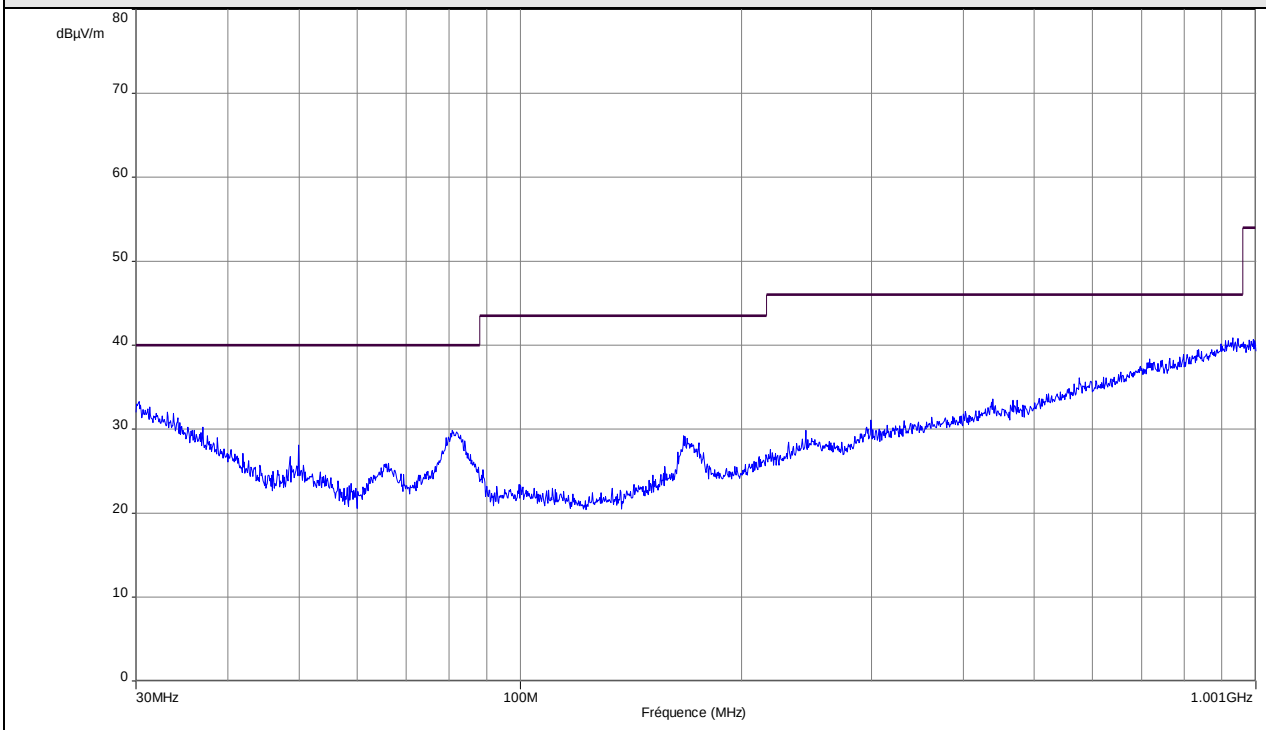
Large size

Tabulated Results for Radiated Disturbance (3m measurement on Open Area Test Site, 30MHz-1GHz)										
Small size										
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
31,693	16,6	29,8	13,3	**29,9**	43,1	V	100	0	40	**-10,1**
64,857	18,5	29,0	9,9	**28,4**	38,9	V	100	110	40	**-11,6**
84,780	17,5	26,8	8,2	**25,7**	35,0	V	100	200	43,5	**-17,8**
159,500	13,1	18,1	14,9	**28,0**	33,0	V	100	90	43,5	**-15,5**
Large size										
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
31,360	20,1	34,1	13,7	**33,8**	47,8	V	100	0	40	**-6,2**
80,350	22,0	35,2	7,3	**29,3**	42,5	V	100	75	40	**-10,7**
158,388	14,9	29,1	14,8	**29,7**	43,9	V	100	135	43,5	**-13,8**
166,710	12,8	17,5	15,7	**28,5**	33,2	V	100	270	43,5	**-15,0**

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 / ICES-003
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

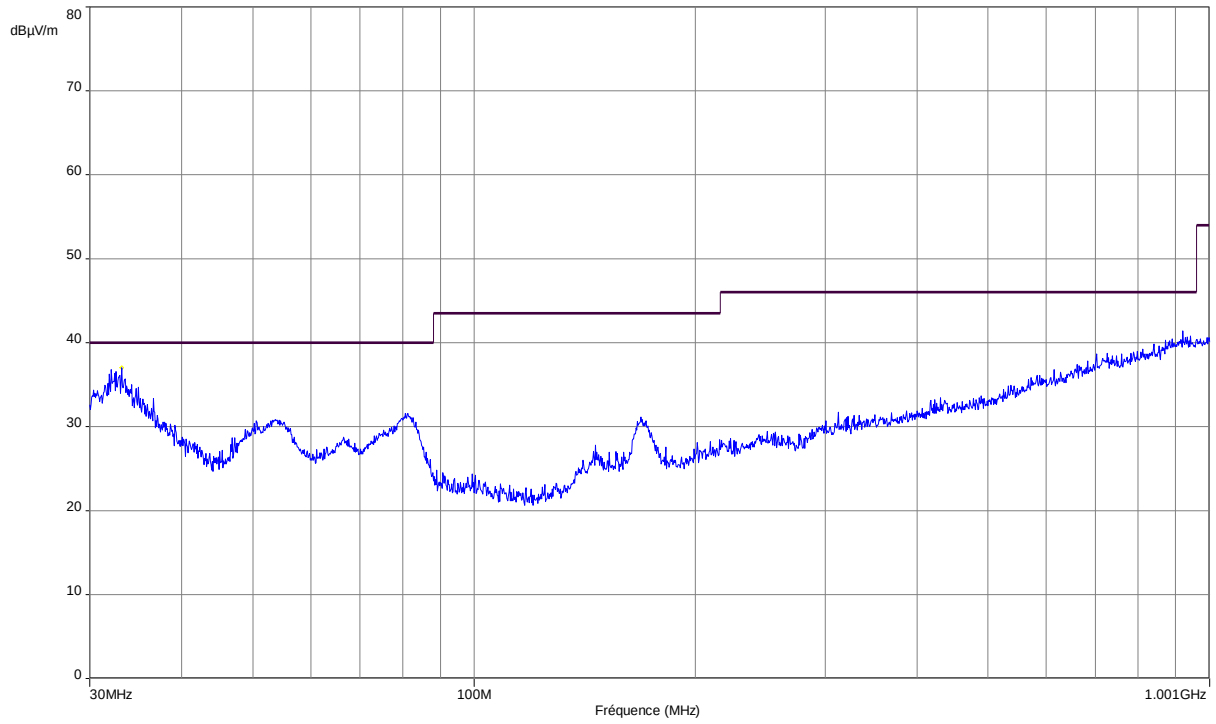
Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 30MHz-1GHz / 3m / Horizontal) – <u>Small size</u>



Note: Pre-scan graph only for identification purpose.

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

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

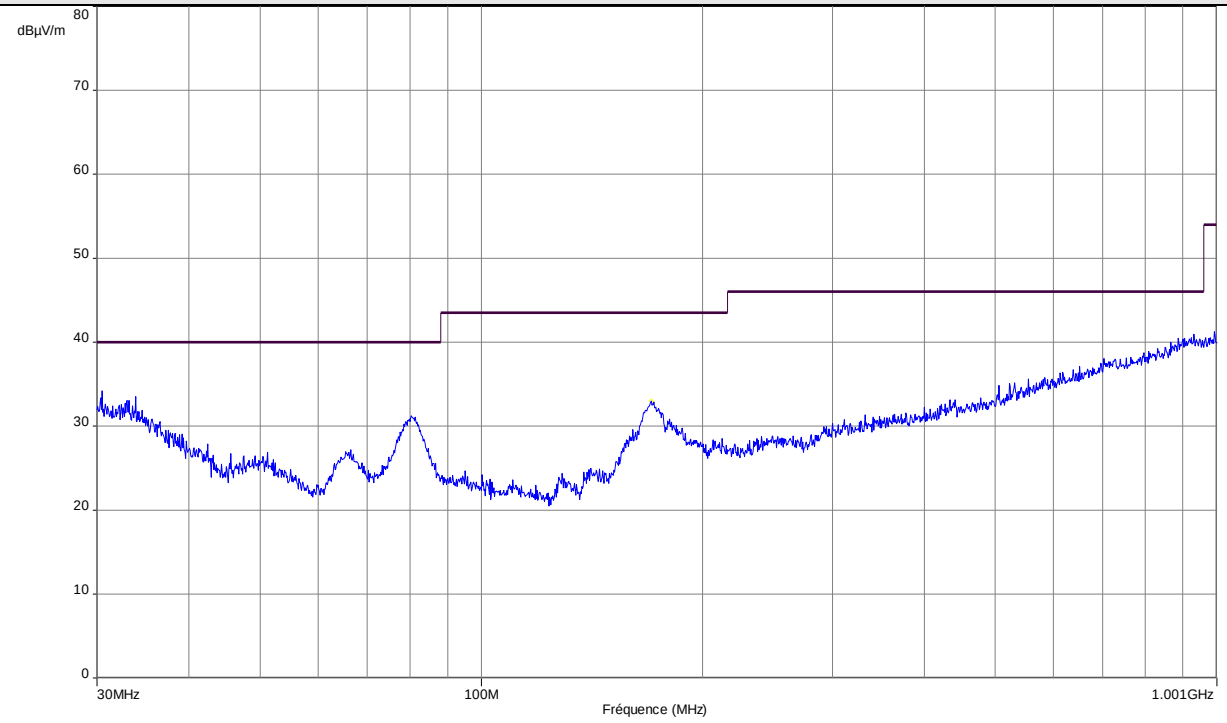


Frequency (MHz)	Peak level (dBµV/m)
33.200	37.0

Note: Pre-scan graph only for identification purpose.

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

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

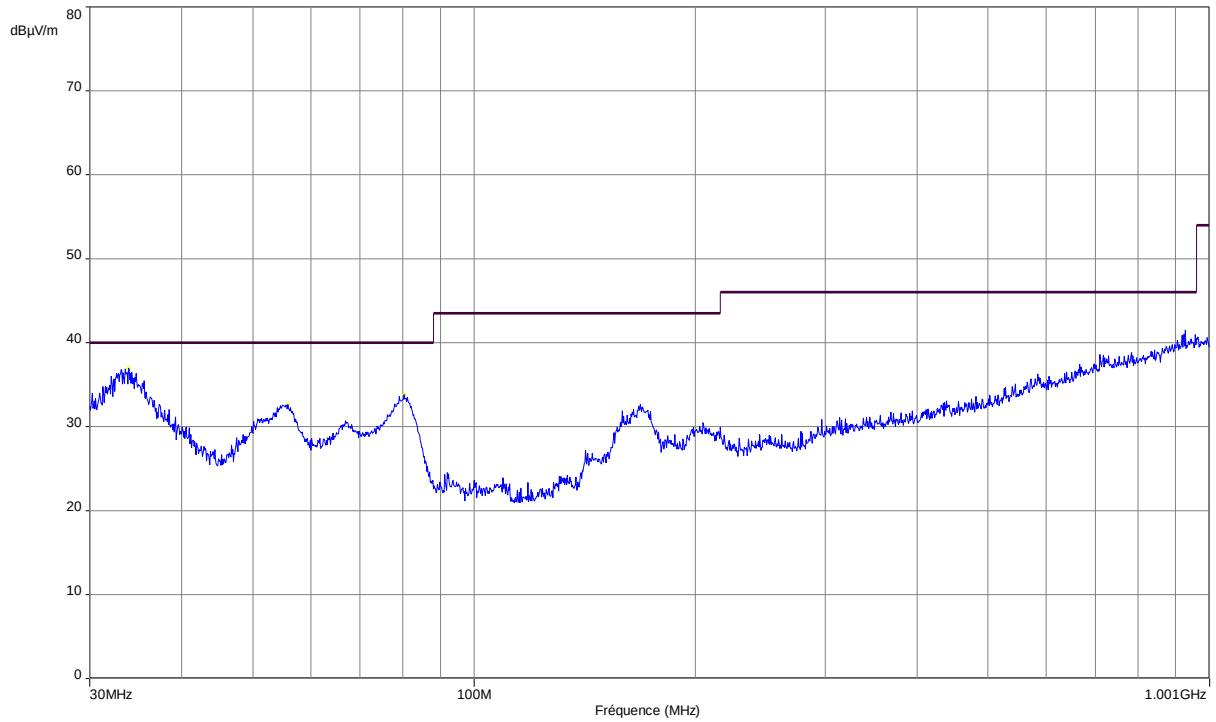


Frequency (MHz)	Peak level (dBµV/m)
170.400	33.0

Note: Pre-scan graph only for identification purpose.

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

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



Frequency (MHz)	Peak level (dBµV/m)
33.850	37.0
55.850	32.7
80.350	33.8

Note: Pre-scan graph only for identification purpose.

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

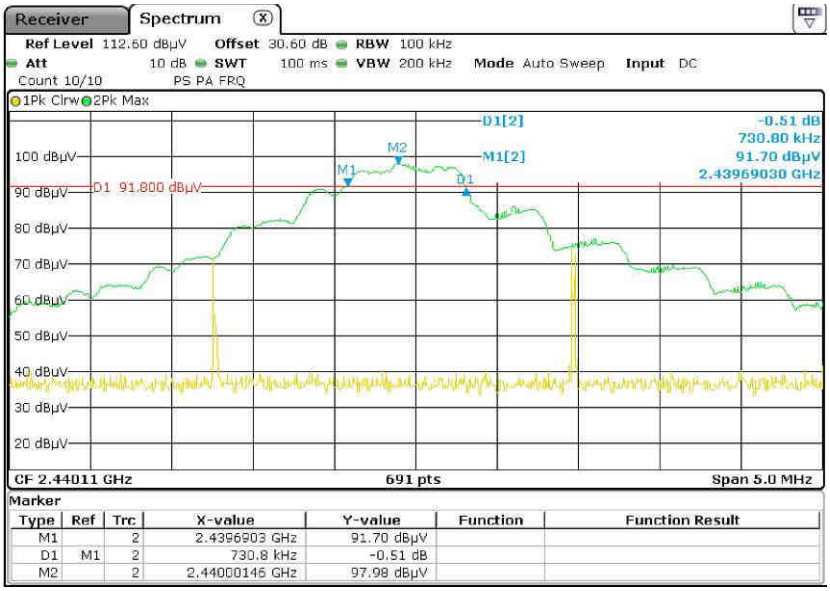
8. 6dB Bandwidth

TEST: 6dB Bandwidth / FCC part 15.247 – RSS-247		**Verdict**
Method: The setup is in an anechoic chamber. The spectrum analyzer is connected to the measuring antenna. Peak value is adjusted to Radiated Maximum Peak Output Power (See §9.). 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 (a) / RSS-247 5.2 (1)		
Frequency (MHz)	**Level for Bandwidth**	**Limit**
2402.0	6dB below the maximum output power	At least 500kHz
2440.0		
2480.0		
Supplementary information: Test location: SMEE – CE Mesures / Test date: September 11th, 2015 Power supply voltage: 3.7V from battery (fully charged)		

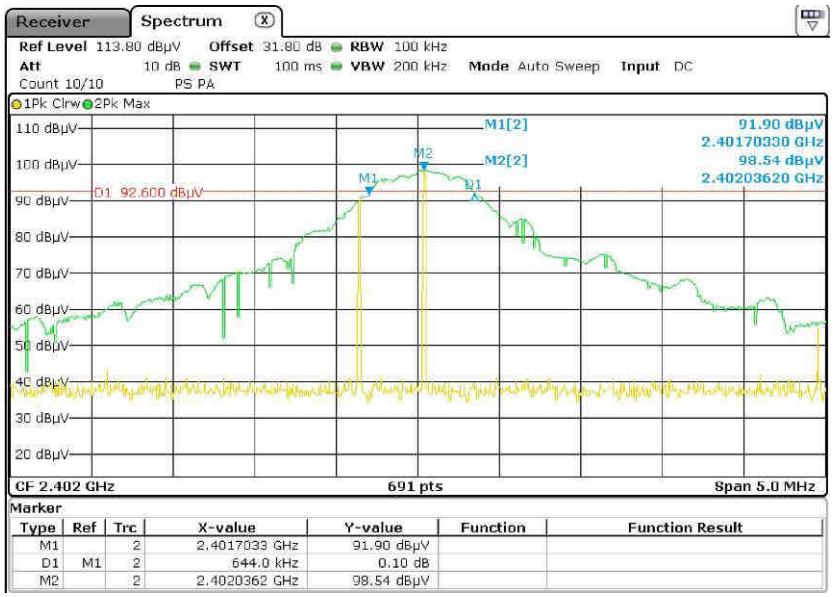
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Measuring Rec.	Rohde&Schwarz	ESRP	REC-151-002	2015/7	2018/7
Horn antenna	ETS-LINDGREN	3115	ANT-141-013	2015/7	2018/7
Anechoic chamber	COMTEST	214263	CAG-141-001	-	-
Turntable	Innco- Systems	CT0800	PLA-141-001	-	-

Tabulated Results for Occupied Bandwidth		
Frequency (MHz)	**6dB Bandwidth** (kHz)	**Result**
2402.0	730.8 kHz	**Pass**
2440.0	644.0 kHz	**Pass**
2480.0	694.6 kHz	**Pass**

Graphical representation of 6dB Bandwidth

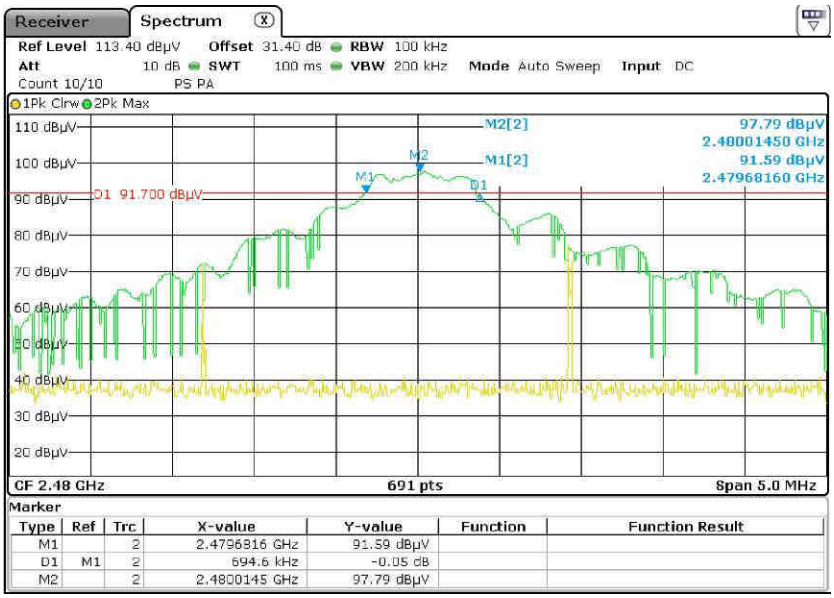


Low channel



Mid channel

Frequency band investigated:	2400MHz to 2483.5MHz
RBW :	100kHz
Measurement detector:	Peak
Wide Measurement Uncertainty:	± 5 dB (k=2)
Note :	Results of this test included Small and Large sizes (Worst case)

Graphical representation of 6dB Bandwidth
 *High channel*

Frequency band investigated:	2400MHz to 2483.5MHz
RBW :	100kHz
Measurement detector:	Peak
Wide Measurement Uncertainty:	± 5 dB (k=2)
Note :	Results of this test included Small and Large size: - same chip in the two cases; - same components in the two cases; - only PCB structure and antenna form changed

9. Maximum Peak Output power

TEST: Maximum peak conducted output power / FCC part 15.247 – RSS-247		**Verdict**
Method: Measurements were performed with peak detector using a 1MHz RBW. The VBW is set to 3MHz. The spectrum analyzer is connected via suitable means to the RF output of the tested equipment. (Conducted measurement). For field strength, the measure is performed on a 3m 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	20°C
Relative Humidity	10 to 90 %	55%
Limits – FCC Part 15.247 (b) / RSS-247 5.4		
Frequency (MHz)	Limits (dBµV/m)	
	Level / Detector / Distance	Results
2400 to 2483.5	36 dBm / Pk / 3m (Radiated)	**Pass**
Supplementary information: Test location: SMEE – CE Mesures / Test date: September 4th, 2015 Power supply voltage: 3.7V from battery (fully charged)		

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Measuring Rec.	Rohde&Schwarz	ESRP	REC-151-002	2015/7	2018/7
Horn antenna	ETS-LINDGREN	3115	ANT-141-013	2015/7	2018/7
RF cable	Div	OATS/25m	CAB-101-017	2014/3	2015/3
OATS	Div	3 / 10m	SIT-101-001	2014/5	2015/5
Antenna mast	Innco- Systems	MA4000EP	MAT-101-001	-	-
Turntable	Innco- Systems	DS1200S	PLA-101-001	-	-

Tabulated Results for Maximum peak output power (Radiated measurement)				
Small size				
FREQ	**Field Strength 3m**	**Calculated EIRP**	**Limit**	**Result**
(MHz)	(dBµV/m)	(dBm)	(dBm)	
2402	98,7	**4,0**	36.0	**Pass**
2440	97,9	**3,2**	36.0	**Pass**
2480	97,8	**3,1**	36.0	**Pass**
Large size				
FREQ	**Field Strength 3m**	**Calculated EIRP**	**Limit**	**Result**
(MHz)	(dBµV/m)	(dBm)	(dBm)	
2402	97,0	**2,3**	36.0	**Pass**
2440	98,0	**3,3**	36.0	**Pass**
2480	97,7	**3,0**	36.0	**Pass**

RBW:	1MHz
Measurement distance:	3m
Limit:	FCC Part 15.247 (b) / RSS-247 5.4
Final measurement detector:	Peak
Wide Measurement Uncertainty:	± 5.2dB (k=2)
RESULT:	PASS
Note:	Field strength is measured on the Open Area Test Site at a distance of 3m. Three orthogonal axis measurements are performed for both horizontal and vertical antenna (measure) polarization in order to obtain the maximum peak field strength. The power (EIRP) was calculated using the following equation: **EIRP = (E x d)²/30** Where D is the distance in meters from which the field strength was measured E is the maximum field strength in V/m

Tabulated Results for Maximum peak output power (Conducted)				
Small size				
FREQ	**Calculated EIRP**	**Calculated conducted power**	**Limit**	**Result**
(MHz)	(dBm)	(dBm)	(dBm)	
2402	**4,0**	**4,0**	30.0	**Pass**
2440	**3,2**	**3,2**	30.0	**Pass**
2480	**3,1**	**3,1**	30.0	**Pass**
Large size				
FREQ	**Calculated EIRP**	**Calculated conducted power**	**Limit**	**Result**
(MHz)	(dBm)	(dBm)	(dBm)	
2402	**2,3**	**2,3**	30.0	**Pass**
2440	**3,3**	**3,3**	30.0	**Pass**
2480	**3,0**	**3,0**	30.0	**Pass**
Note:	Conducted power is calculated from EIRP with antenna gain of 0dBi.			

Photo of test setup for Radiated Disturbance

Small size

Large size

10. Maximum Power Spectral Density

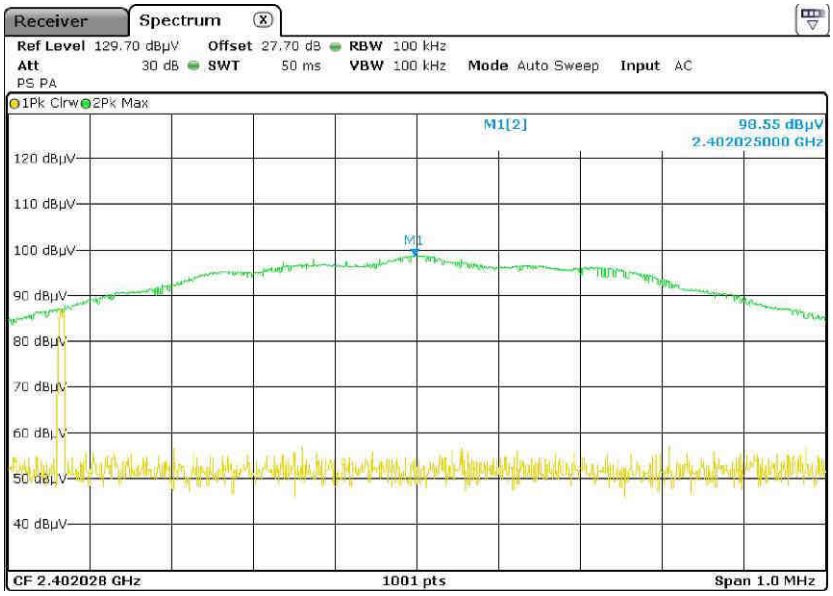
TEST: Power Spectral Density / FCC part 15.247 – RSS-247			**Verdict**
Method: Measurements were performed with peak detector using a 100kHz RBW. The VBW is set to 300kHz The spectrum analyzer is connected to the measuring antenna. EUT is placed in an anechoic chamber at 1-meter distance of the measuring antenna. Peak value is adjusted to Radiated Maximum Peak Output Power (See §9.). 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)	Limits (dBµV/m)		
	Detector / RBW / Limit	Results	
2402	Pk / 3kHz / 8dBm	**Pass**	
2440	Pk / 3kHz / 8dBm	**Pass**	
2480	Pk / 3kHz / 8dBm	**Pass**	
Supplementary information: Test location: SMEE – CE Mesures / Test date: September 11th, 2015 Power supply voltage: 3.7V from battery (fully charged)			

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Measuring Rec.	Rohde&Schwarz	ESRP	REC-151-002	2015/7	2018/7
Horn antenna	ETS-LINDGREN	3115	ANT-141-013	2015/7	2018/7
Anechoic chamber	COMTEST	214263	CAG-141-001	-	-
Turntable	Innco- Systems	CT0800	PLA-141-001	-	-

Tabulated Results for Maximum Power Spectral Density					
FREQ	**Peak Power (100kHz RBW)**		**Calculated PSD**	**Limit**	**Result**
(MHz)	dBµV/m (3m)	dBm	(dBm/3kHz)	(dBm)	
2402	98,6	3,9	**-11,3**	8.0	**Pass**
2440	97,8	3,1	**-12,1**	8.0	**Pass**
2480	97,7	3,0	**-12,2**	8.0	**Pass**

RBW:	100kHz
Measurement distance:	3m
Limit:	FCC Part 15.247 (e) / RSS-247 5.2 (2)
Final measurement detector:	Peak
Wide Measurement Uncertainty:	± 5.2dB (k=2)
RESULT:	PASS
Note:	The Power Spectral Density (PSD) was calculated using the following equation: **$PSD_{3kHz} = P_{100kHz} + BWCF$** Where PSD_{3kHz} is the Power Spectral Density in a 3kHz band segment P_{100kHz} is the maximum power level with a 100kHz RBW, in dBm BWCF is the bandwidth correction factor, with: BWCF = 10log(3 kHz/100 kHz) = -15.2dB

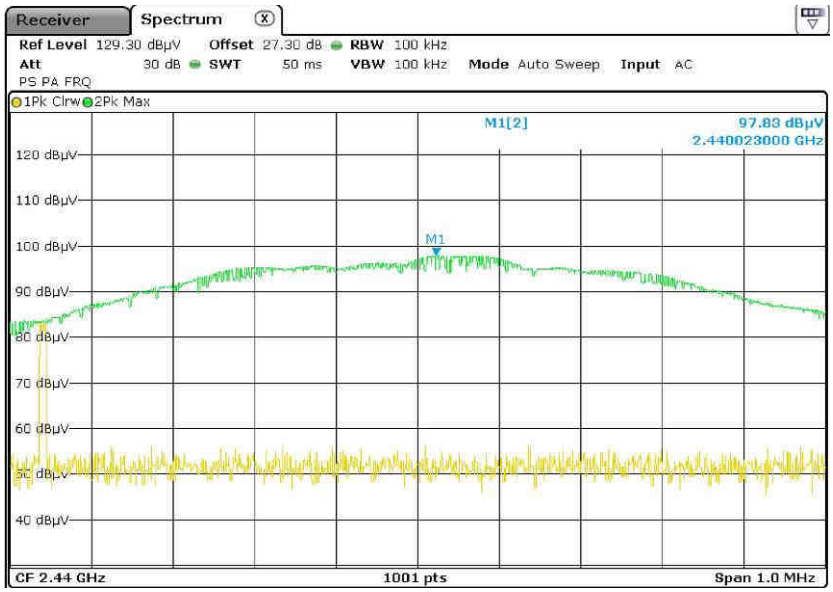
Graphical representation of Maximum Power Level in 100kHz band segment



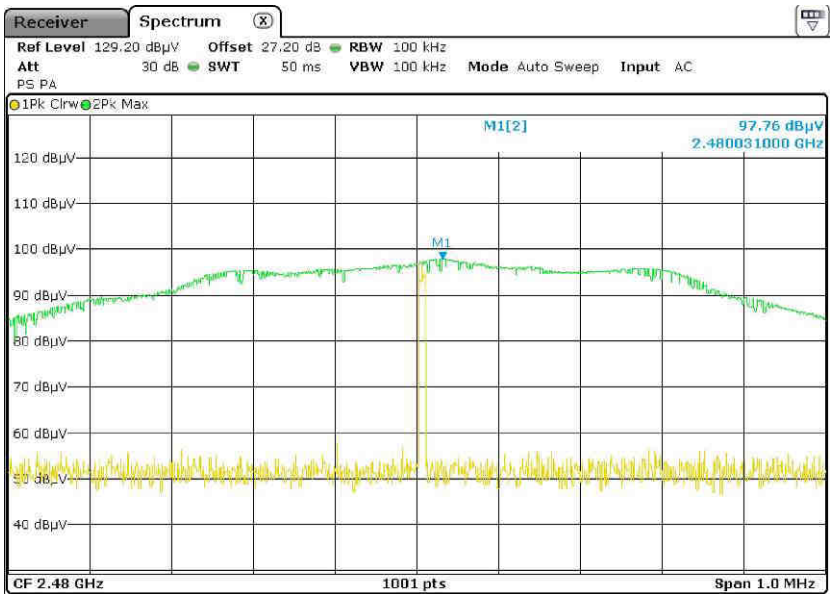
Low channel

Frequency band investigated:	2400MHz to 2483.5MHz
RBW :	100kHz
Measurement detector:	Peak
Note :	Results of this test included Small and Large size (Worst case)

Graphical representation of Maximum Power Level in 100kHz band segment



Mid channel



High channel

Frequency band investigated:	2400MHz to 2483.5MHz
RBW :	100kHz
Measurement detector:	Peak
Note :	Results of this test included Small and Large size (Worst case)

11. Unwanted emissions in Non-Restricted Frequency bands

<table>
<tr><td colspan="3">TEST: Unwanted emissions in Non-Restricted Frequency Bands / FCC part 15.247 – RSS-247</td><td>Verdict</td></tr>
<tr><td colspan="3">Method: Measurements were made in a 10-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 10 meter (Freq < 1GHz) or 3 meter (Freq > 1GHz). 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.</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">20°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 – 25GHz</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 25000</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 – CE Mesures / Test date: September 14th, 2015
Power supply voltage: 3.7V from battery (fully charged)</td></tr>
</table>

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Log-periodic antenna	TDK	PLP3003	ANT-101-001	2015/8	2016/8
Biconnic antenna	COM-POWER	AB- 900	ANT-101-003	2015/8	2016/8
BiConiLog antenna	EMCO	3142B	ANT-101-010	2015/8	2016/8
Horn antenna	ETS-LINDGREN	3115	ANT-141-013	2015/7	2018/7
RF cable	Div	OATS/25m	CAB-101-019	2015/3	2016/3
RF cable	Pasternack	PE302-120	CAB-131-024	2015/3	2016/3
RF cable	HUBER+SUHNER	RG214U	CAB-141-026	2015/3	2016/3
RF cable	HUBER+SUHNER	RG214U	CAB-141-029	2015/3	2016/3
RF cable	HUBER+SUHNER	SF104	CAB-141-030	2015/3	2016/3
High-pass filter	Mini-Circuit	VHF-3100+	FIL-151-006	2015/3	2016/3
Pre-amplifier	PE	PE1524	PRE-101-002	2015/3	2016/3
Anechoic chamber	COMTEST	214263	CAG-141-001	-	-
OATS	Div	10m	SIT-101-001	2015/8	2016/8
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

Photo of test setup for Radiated Disturbance



Little size

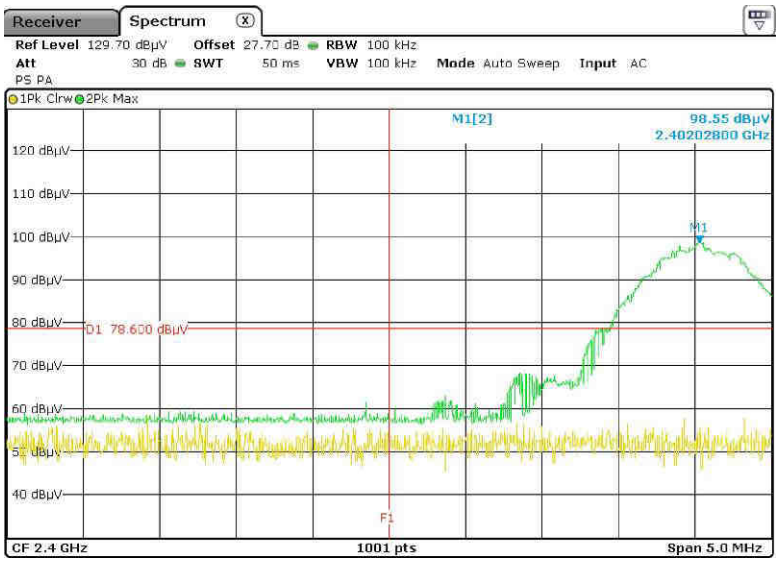


Big size

Tabulated Results for Peak Output Power Reference level	
Small size	
FREQ	**Field Strength 3m**
(MHz)	(dBµV/m)
2402.0	98,6
2440.0	97,8
2480.0	97,7
Large size	
FREQ	**Field Strength 3m**
(MHz)	(dBµV/m)
2402.0	96,7
2440.0	97,7
2480.0	97,3
RBW:	100kHz
Measurement distance:	3m
Limit:	Ref. level only – For 15.247 (d) / RSS-247 5.5
Final measurement detector:	Peak
Wide Measurement Uncertainty:	± 5.2dB (k=2)
Note:	Only for identification of limit in non-restricted band (1): Limit is **77.7 dBµV/m** Peak for out-of-band frequencies in Non-Restricted bands (with a 100kHz RBW on the spectrum analyser) for Small size equipment (2): Limit is **76.7 dBµV/m** Peak for out-of-band frequencies in Non-Restricted bands (with a 100kHz RBW on the spectrum analyser) for Large size equipment

Tabulated Results for Unwanted emissions in Non-Restricted bands			
Small size			
FREQ	**Field Strength 3m**	**Limit**	**Result**
(MHz)	(dBµV/m)	(dBµV/m)	(dBµV/m)
2400.0	**61.3**	77.7	**Pass**
Large size			
FREQ	**Field Strength 3m**	**Limit**	**Result**
(MHz)	(dBµV/m)	(dBµV/m)	(dBµV/m)
2400.0	**60.5**	76.7	**Pass**
RBW:	100kHz		
Measurement distance:	3m		
Limit:	15.247 (d) / RSS-247 5.5		
Final measurement detector:	Peak		
Wide Measurement Uncertainty:	± 5.2dB (k=2)		
RESULT:	PASS		
Note:	(1): All frequencies in non-restricted bands not specified in the tabulated results have margin > 10dB		

Graphical representation of Band-edge compliance



Low bandedge compliance

F1 = 2400MHz
Peak level at 2400MHz is 61.3dBµV/m (limit is 77.7dBµV/m)
RESULT: PASS
Note: Radiated measurement

12. Unwanted emissions in Restricted Frequency bands

TEST: Unwanted emissions into Restricted Frequency Bands / FCC part 15.205, 15.209, 15.247 – RSS-GEN, RSS-247	**Verdict**
Method: Measurements were made in a 10-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 10 meter (Freq < 1GHz) or 3 meter (Freq > 1GHz). 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 (Freq<1GHz) and 1-meter (Freq>1GHz). 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	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
	9kHz – 30MHz	10 m measurement distance
	30MHz – 25GHz	3 m measurement distance

Limits – FCC Part 15.205, 15.209, 15.247 / RSS-GEN, RSS-247

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**
Above 960	54.0 / QP / 3m	**Pass**

Supplementary information:
Test location: SMEE – CE Mesures / Test date: September 16th, 2015
Power supply voltage: 3.7V from battery (fully charged)

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Log-periodic antenna	TDK	PLP3003	ANT-101-001	2015/8	2016/8
Biconnic antenna	COM-POWER	AB- 900	ANT-101-003	2015/8	2016/8
BiConiLog antenna	EMCO	3142B	ANT-101-010	2015/8	2016/8
Horn antenna	ETS-LINDGREN	3115	ANT-141-013	2015/7	2018/7
RF cable	Div	OATS/25m	CAB-101-019	2015/3	2016/3
RF cable	Pasternack	PE302-120	CAB-131-024	2015/3	2016/3
RF cable	HUBER+SUHNER	RG214U	CAB-141-026	2015/3	2016/3
RF cable	HUBER+SUHNER	RG214U	CAB-141-029	2015/3	2016/3
RF cable	HUBER+SUHNER	SF104	CAB-141-030	2015/3	2016/3
High-pass filter	Mini-Circuit	VHF-3100+	FIL-151-006	2015/3	2016/3
Pre-amplifier	PE	PE1524	PRE-101-002	2015/3	2016/3
Anechoic chamber	COMTEST	214263	CAG-141-001	-	-
OATS	Div	10m	SIT-101-001	2015/8	2016/8
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

Photo of test setup for Radiated Disturbance

Small size

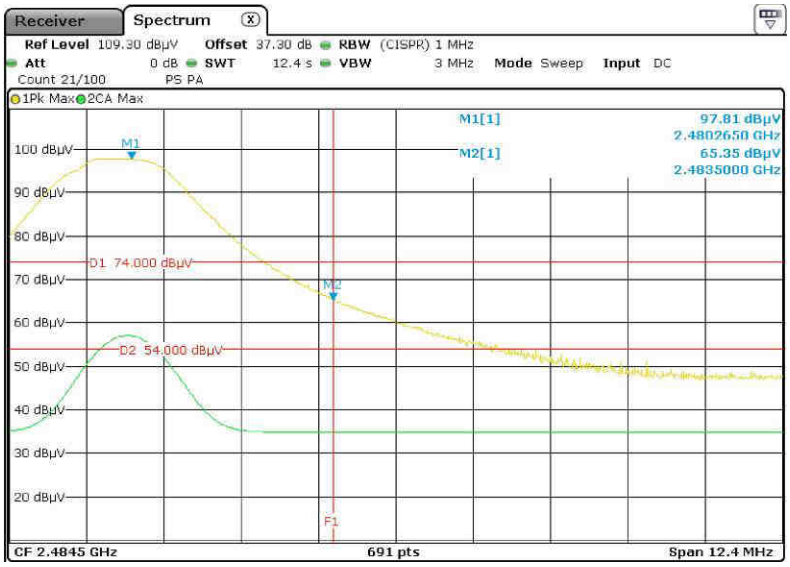
Large size

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
No frequency observed						
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 / RSS-GEN: 2010					
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
No frequency observed										
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 / RSS-GEN: 2010									
Final measurement detector:	Quasi-Peak									
Wide Measurement Uncertainty:	± 5.2dB (k=2)									
RESULT:	PASS									

Tabulated Results for Unwanted emissions (1GHz-25GHz)				
Small size				
FREQ	**Field level**	**Detector**	**Limit**	**Result**
(MHz)	dBµV/m		(dBµV/m)	
2483.5	**66.1**	**Pk**	74	**Pass**
2483.5	**34.0**	**Av**	54	**Pass**
4804,0	**61.3**	**Pk**	74	**Pass**
4804,0	**40.6**	**Av**	54	**Pass**
4880,0	**53.9**	**Pk**	74	**Pass**
4880,0	**33.3**	**Av**	54	**Pass**
4960,0	**57.1**	**Pk**	74	**Pass**
4960,0	**37.3**	**Av**	54	**Pass**
7206,0	**59.8**	**Pk**	74	**Pass**
7206,0	**43.6**	**Av**	54	**Pass**
7320,0	**59.8**	**Pk**	74	**Pass**
7320,0	**44.0**	**Av**	54	**Pass**
7440,0	**58.8**	**Pk**	74	**Pass**
7440,0	**43.2**	**Av**	54	**Pass**
Large size				
FREQ	**Field level**	**Detector**	**Limit**	**Result**
(MHz)	dBµV/m		(dBm)	
2483.5	**66.9**	**Pk**	74	**Pass**
2483.5	**34.5**	**Av**	54	**Pass**
4804,0	**58.2**	**Pk**	74	**Pass**
4804,0	**37.5**	**Av**	54	**Pass**
4880,0	**57.3**	**Pk**	74	**Pass**
4880,0	**38.2**	**Av**	54	**Pass**
4960,0	**57.5**	**Pk**	74	**Pass**
4960,0	**37.7**	**Av**	54	**Pass**
7206,0	**61.7**	**Pk**	74	**Pass**
7206,0	**45.5**	**Av**	54	**Pass**
7320,0	**61.4**	**Pk**	74	**Pass**
7320,0	**45.4**	**Av**	54	**Pass**
7440,0	**61.2**	**Pk**	74	**Pass**
7440,0	**45.6**	**Av**	54	**Pass**

RBW:	1MHz
Measurement distance:	3m
Limit:	FCC Part 15.205 - 15.209 / RSS-GEN: 2010
Final measurement detector:	Peak / Average
Wide Measurement Uncertainty:	± 5.2dB (k=2)
RESULT:	PASS
Note:	(1): Performed on OATS at 3m distance

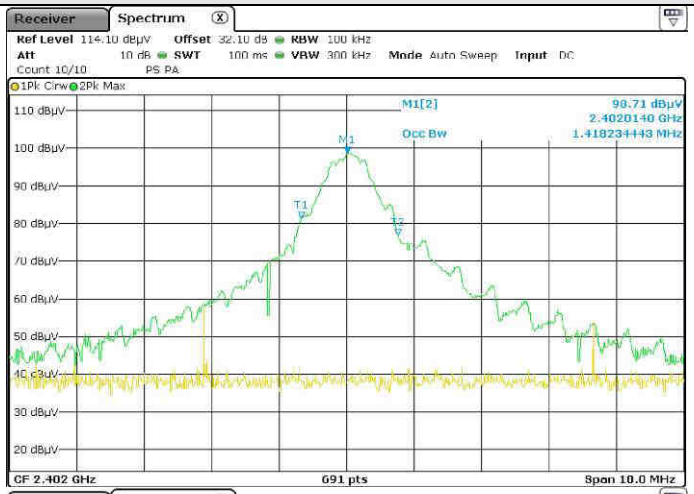
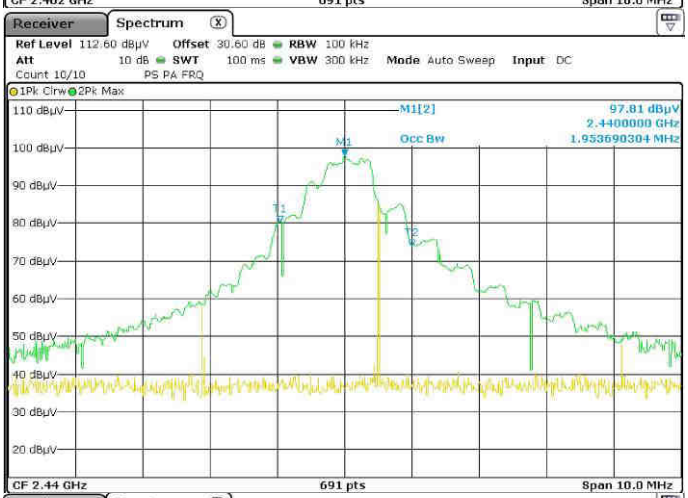
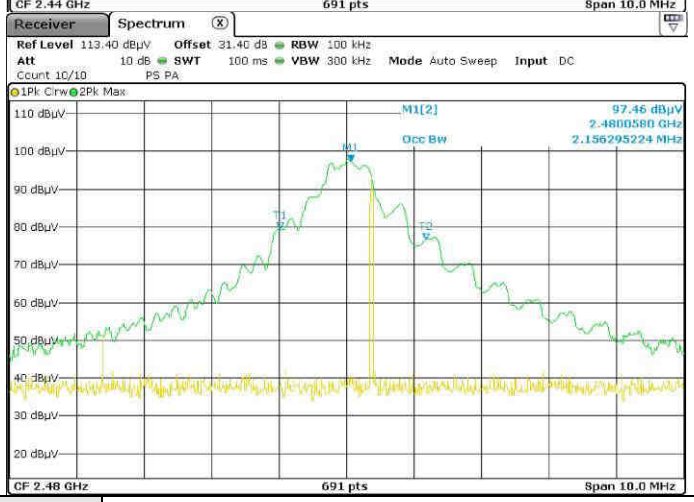
Graphical representation of Band-edge compliance

High bandedge compliance Radiated Peak level is 66.1dBµV/m (limit 74dBµV/m) Radiated Average level is 34.0dBµV/m (limit 54dBµV/m) RESULT: PASS Note: radiated measurement (3m on OATS)

13. Occupied bandwidth (99%)

TEST: Occupied bandwidth (99%) / RSS-GEN		**Verdict**
Method: The setup is in an anechoic chamber. The spectrum analyzer is connected to the measuring antenna. Peak value is adjusted to Radiated Maximum Peak Output Power (See §9.). 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 – CE Mesures / Test date: September 12th, 2015 Power supply voltage: 3.7V from battery (fully charged)		

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Measuring Rec.	Rohde&Schwarz	ESRP	REC-151-002	2015/7	2018/7
Horn antenna	ETS-LINDGREN	3115	ANT-141-013	2015/7	2018/7
Anechoic chamber	COMTEST	214263	CAG-141-001	-	-
Turntable	Innco- Systems	CT0800	PLA-141-001	-	-

Tabulated Results for Occupied Bandwidth	
Frequency (MHz)	**99% Occupied Bandwidth** (MHz)
2402.0	1.418MHz
2440.0	1.954MHz
2480.0	2.156MHz

Graphical representation of Occupied Bandwidth	
	Low channel
	Mid channel
	High channel

Frequency band investigated:	2400MHz to 2483.5MHz
RBW :	100kHz
Measurement detector:	Peak
Note :	Results of this test included Small and Large size (Wort case)