

SMEE

SOCIÉTÉ MODERNE D'ÉTUDES ÉLECTRONIQUES

Rapport d'essais / Test Report

N° : 12920-FCC-IC-1

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FCC Test Firm Designation Number: FR0014
ISED Wireless Device Testing Laboratory CAB Number: FR0004

Matériel testé :
Equipment under test:

In&Motion / In&Box
(Trademark / Marketing name or product reference)

Client / Demandeur:
Customer / Applicant:

IN&MOTION
Parc Altaïs - 178, rue de Cran Gevrier
74650 CHAVANOD – France

Rapport délivré à :
Issued to:

IN&MOTION
Mr. Vincent BANNELIER
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74650 CHAVANOD – France

Numéro d'affaire :
Work number:

12920

Référence de la proposition : 122018-23351
Proposal number:

Date de l'essai : 23 et 24 avril 2019
Date of test:
April 23rd and 24th, 2019

Objectif des essais :
Test purpose:

EMC qualification according 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*)
- ISED ICES-003 Issue 6 & RSS-247, Issue 2 (*Digital Transmission Systems Operating in the Bands 2400-2483.5 MHz*)

Lieu du test:
Test location:

SMEE, Rue de Taille

38500 VOIRON - France

Test réalisé par : Laurent CHAPUS
Test realized by:

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

Ed.	Date	Modifications / Pages	Written by : Visa	Approved by: Visa
1	July 19 th , 2019	Initial Edition	Laurent Chapus	Régis ANCEL

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COORDONNEES

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Rue de Taille – ZI Des Blanchisseries
38500 VOIRON - France

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1. Normatives References

FCC qualification according to:		
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 15.109 / 15.209 / 15.247

ISED qualification according to:		
Standards	Applied	Title
ICES-003 (Issue 6/2019)	X	Information Technology Equipment (ITE) – Limits and methods of measurement
RSS-Gen (Issue 5/2018)	X	General Requirements and Information for the Certification of Radio Apparatus
RSS-247 (Issue 2/2017)	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 v05
- Determining ERP and EIRP Guidance 412172 D01 v01r01

Deviation from standard: None

2. Test synthesis

TEST	Paragraph number FCC Part 15 / ISED ICES & RSS	Spec. FCC Part 15 / ISED ICES & RSS	RESULTS (comments)
Conducted emissions test	15.107 (a) / 207 (a) RSS-Gen § 8.8 ICES-003 § 6.1	Table 15.107 (a) / 15.207 (A) Table 4 / RSS-Gen Table 2 / ICES-003	PASS
Radiated emission test	15.109 (a) / 15.209 (a) RSS-Gen § 8.9 ICES-003 § 6.2	Table 15.109 (a) / 15.209 (a) Table 5 & 6 / RSS-Gen Table 5 & 7 / ICES-003	PASS
6dB Bandwidth	15.247 (a) (2) RSS-247 § 5.2 (a)	At least 500kHz	PASS
Maximum Peak Output Power	15.247 (b) (3) & (4) RSS-247 § 5.4 (d)	1W max / 30dBm (Conducted) 4W max / 36dBm (EIRP)	PASS
Maximum Power Spectral Density	15.247 (e) RSS-247 § 5.2 (b)	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 (a) / 15.247 (d) / 15.205 (a) RSS-GEN §8.9, § 8.10 / RSS-247 § 5.5	<u>Measure at 300m</u> 9-490kHz: 2400µV/m/F(kHz) <u>Measure at 30m</u> 0.490-1.705: 24000µV/m/F(kHz) 1.705-30MHz: 30µV/m <u>Measure at 3m</u> 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 Bandwidth	RSS-GEN § 6.7	BW at 99%	PASS

- General conclusion:**

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

3. Equipment Under Test (EUT)

Nom / Identification	In&Motion / In&Box (Trademark / Marketing name or product reference)	Sn: 5406902
---------------------------------	--	-------------

FCC ID: FCC ID: 2AS9Y-INEBOX544
IC: IC: 25034-INEBOX544
Model: IN&BOX V5.4.4

**Alimentation /
Power supply** 5V DC from external power supply for battery charging
AC/DC power adapter used for test: XP power
 Model: VEU 10US050-EU
 Input: 100-240V 50/60Hz
 Output : 5V/2.1A

**Auxiliaires /
Auxiliaries** - Laptop PC ASUS with its power supply unit
 - Plastic shell

Entrées-Sorties / Input / Output	Câbles pour essai / Cables for test	Blindé / Shielded	Prévu pour >3m / Intended for >3m
μUSB connector (DC + Data)	USB 2.0 / 1m	Yes	No
Ignition contacts (2x pins)	0.15m inside shell	-	-

**Version programme /
Firmware version** NC

**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 battery charging mode with external power supply
- Be connected to a PC with USB port

 The device can be used with BLE when it is placed into the shell or when it is used outside the shell for battery charging.

**Programme de test /
Test program /** Windows Serial terminal for BLE settings

**Fréquence max interne EST /
Max internal EUT frequency** 48MHz (Except intentional RF)

**Information sur l'équipement /
Equipment information** - Frequency band: 2400 to 2483.5 MHz (Tx & Rx, Wideband Data Transmission systems)
 - BLE Power Setting: Power is set at 0dBm
 - Modulation: Bluetooth Low Energy (2Mbps)
 - Antenna type: Integral (PCB trace, peak gain 0dBi)
 - Powered by 5V DC from external power supply for battery charging
 - Internal battery is 3.7V DC LIPO
 - Equipment intended for use as a portable station (BLE mode)
 - Equipment designed for continuous operation

4. Test conditions

Power supply voltage:
Equipment under test: 5V DC for battery charging
Auxiliaries: 230V/50Hz (Radiated emission)
 110V/60Hz (Conducted emission)

5. Modifications of the EUT

None

6. Special accessory

None

7. Measurement Uncertainty

Test Description	Expanded uncertainty
Conducted emissions test (150k-30MHz, AC mains)	± 3.5dB
Radiated emission test (9kHz-30MHz, electric field)	± 4.0dB
Radiated emission test (30-300MHz, OATS)	± 5.6dB
Radiated emission test (300-1000MHz, OATS)	± 5.3dB
Radiated emission test (1-40GHz, OATS / FAC)	± 5.6dB
Conducted RF output power at antenna port	± 1.6dB
Radiated RF output power (Peak, Power density)	± 5.6dB
DTS Bandwidth, 99% OBW	±4%
Temperature	± 1°C
Time and duty cycle calculation	±1%
AC and DC voltage	±1%

Note: Expended uncertainty at 95% confidence (k=2)

8. 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

Margin value = Emission level – Limit value

Example:

RA: 14.0dB μ V / AF: 16.5 dBm $^{-1}$ / CF: 3.5dB / AG: 15dB

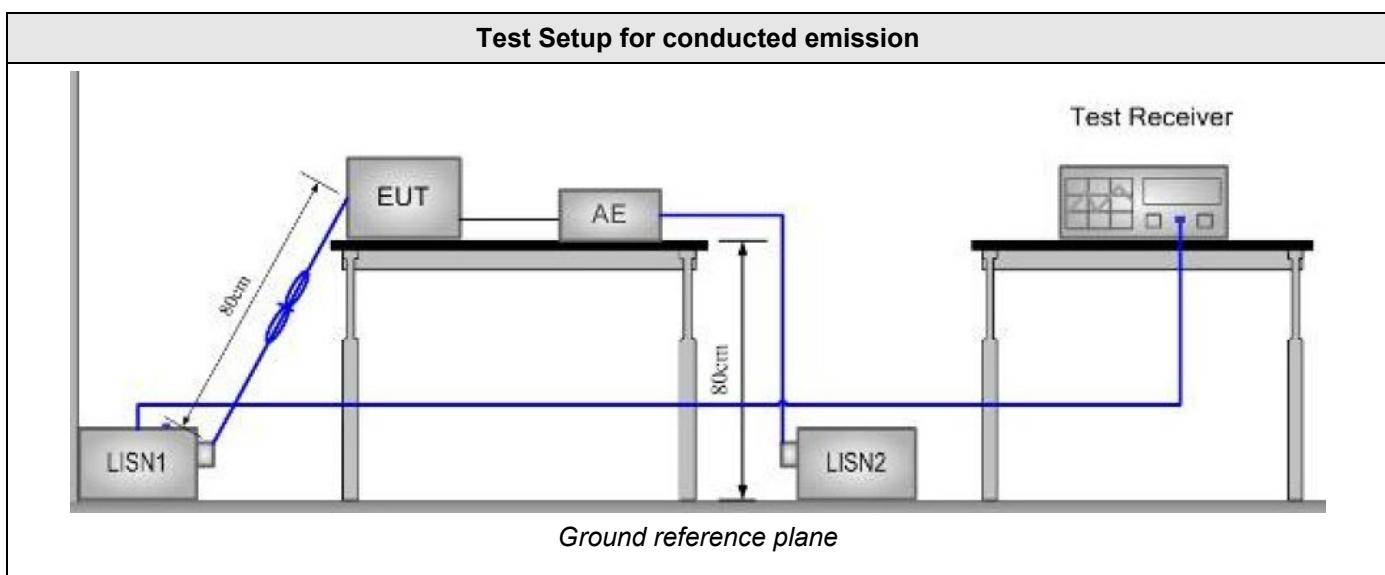
→ Total factor: 5dBm $^{-1}$

→ Field level: 19.0dB μ V/m (-21.0dB for margin if limit is 40dB μ V/m)

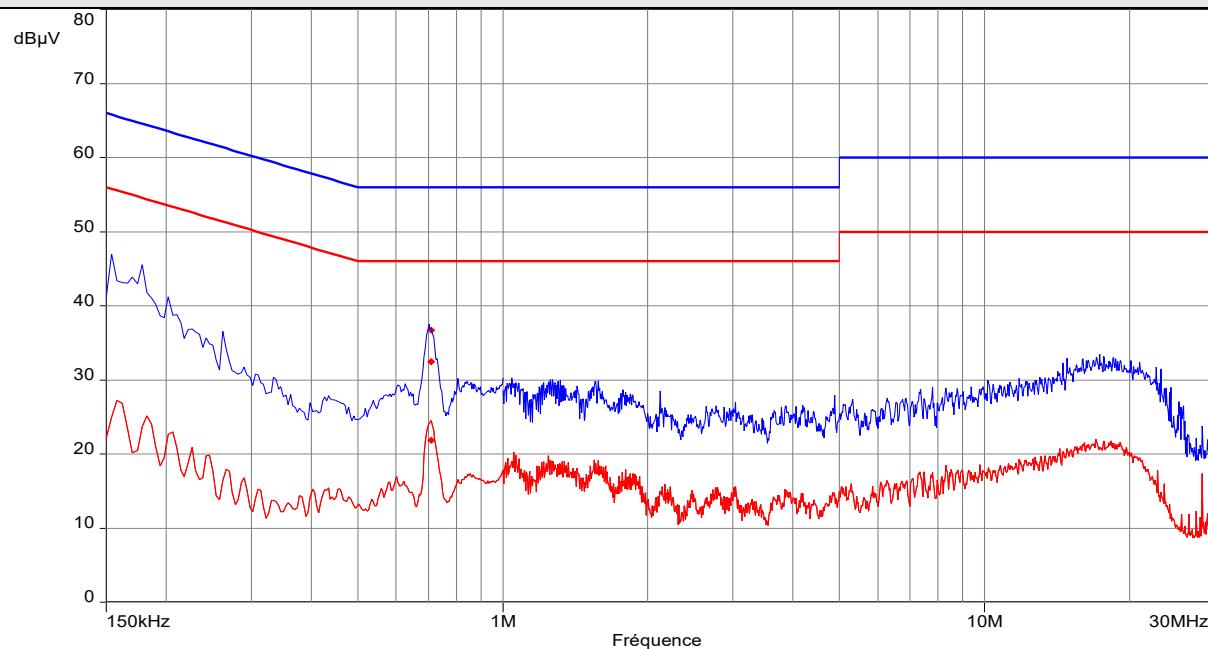
9. Conducted Emission Measurement (150kHz-30MHz)

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		20 to 30 °C	22°C ± 2		
Relative Humidity		25 to 70 %	45% ± 5		
Fully configured sample scanned over the following frequency range		Frequency range on each side of line	Measurement Point		
		150kHz to 30MHz	AC input port (110V) Power adapter		
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 Test date: April 24th, 2019. Tested by L. CHAPUS Power supply voltage: 5V from external power adapter (AC mains 110V/60Hz)					

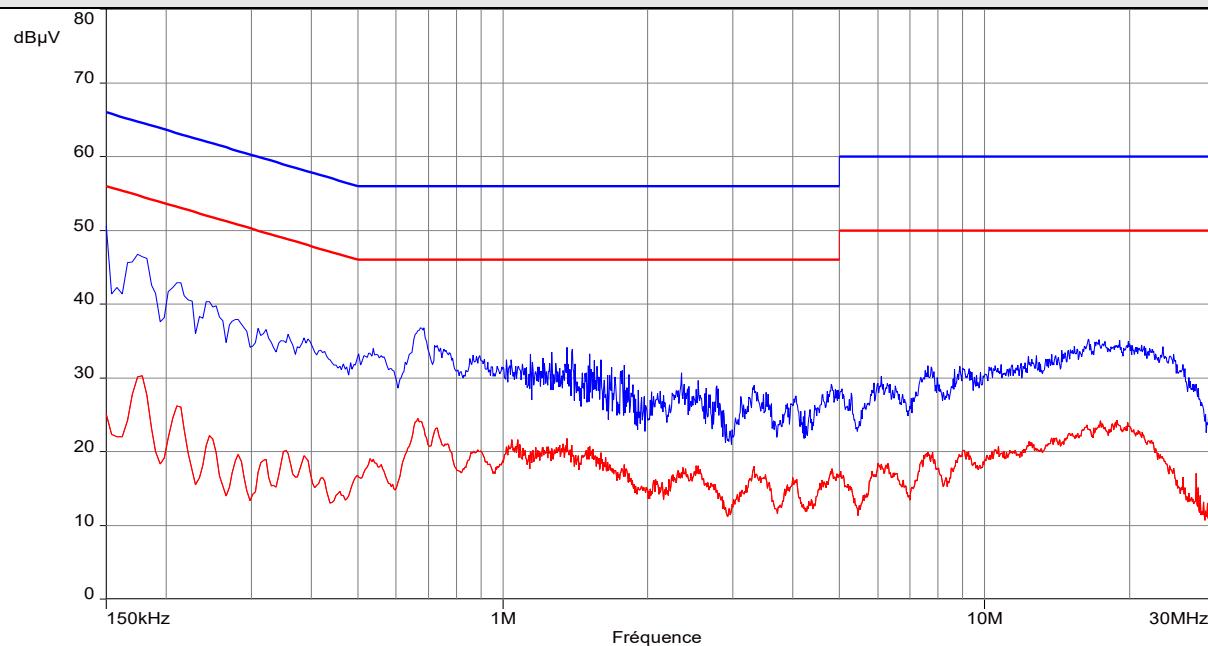
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Attenuator / limiter	SMEE	ATT#2	ATT-171-010	2018/6	2019/6
Cable RF	Div	1m	CAB-101-021	2018/4	2019/4
LISN (50Ω / 50µH) (Meas.)	AFJ	LS16C	RSI-101-001	2017/6	2019/6
Measuring receiver	Rohde&Schwarz	ESRP	REC-151-002	2017/5	2019/5
EMC Software	NEXIO	BAT EMC V3.8	SOF-101-001	-	-
AC power supply	PACIFIC POWER	AMX-125	ALI-101-002	-	-



Tabulated Results for Mains Terminal Disturbance Voltage on AC port								
FREQ (MHz)	Meas. PK (dB μ V)	Mes. QP (dB μ V)	LIMIT QP (dB μ V)	Margin QP (dB)	Mes. AV (dB μ V)	LIMIT AV (dB μ V)	Margin AV (dB)	Line
0.7102	36.75	32.49	56	-23.51	21.87	46	-24.13	L1
Frequency band investigated:	150kHz-30MHz							
RBW:	9kHz							
Voltage:	110V/60Hz							
Limit:	FCC Part 15B & C / ISED ICES-003 & RSS-Gen							
Final measurement detector:	Quasi-Peak and CISPR Average (AV)							
RESULT:	PASS							
Measured value calculation:	<p>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:</p> <p>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 (A negative margin shows compliance to limit)</p>							

**Graphical representation of Conducted Disturbance Measurement (Peak and Average detection)
AC port, Line L1 – Power adapter (Charge mode)**


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

**Graphical representation of Conducted Disturbance Measurement (Peak and Average detection)
AC port, Line Neutral – Power adapter**


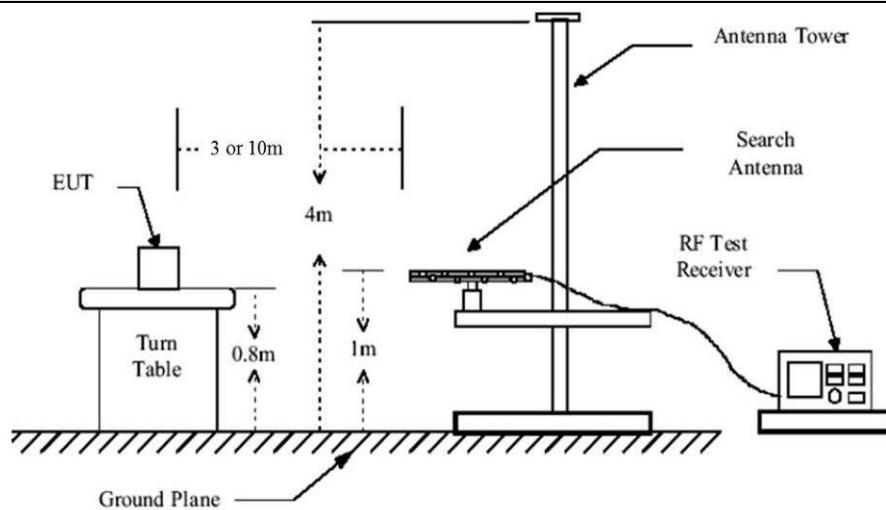
----: Peak ----: Average

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

TEST: Limits for radiated disturbance 30 MHz – 1 GHz			Verdict																
<p>Method: Measurements were performed on a 3-meter Open Area Test Site (OATS) for frequency below 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) were then performed by rotating the EUT on 360° and adjusting the receive antenna height from 1 to 4 m</p> <p>For frequency above 1GHz, final measurements were made at 3m in a Full Anechoic Chamber (FAC) that complies with ANSI C63.10. 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 in horizontal and vertical polarities.</p> <p>Three orthogonal axis measurements on EUT are performed to obtain the maximum peak field strength, with 60° rotation on each axis.(Clause 6.6.5 of ANSI C63.10).</p> <p>A pre-scan frequency identification of the EUT has been performed in full anechoic chamber. The measured radiated field of the EUT is performed (or corrected) at 3-meters of distance. Antenna is 1.25-meters high. The pre-characterization graphs are obtained in PEAK detection with 360° continuous rotation of the device under test.</p>			Pass																
<p>Laboratory Parameters:</p> <table> <tr> <td>Ambient Temperature</td> <td>Required prior to the test</td> <td>During the test</td> </tr> <tr> <td>20 to 30 °C</td> <td>22°C ± 2</td> <td></td> </tr> <tr> <td>Relative Humidity</td> <td>25 to 70 %</td> <td>45% ± 5</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>Measurement Point</td> </tr> <tr> <td>30MHz – 1GHz</td> <td>3 m measurement distance</td> </tr> <tr> <td>Running mode</td> <td colspan="2" rowspan="2">Battery Charging / PC mode</td></tr> </table>			Ambient Temperature	Required prior to the test	During the test	20 to 30 °C	22°C ± 2		Relative Humidity	25 to 70 %	45% ± 5	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 / PC mode	
Ambient Temperature	Required prior to the test	During the test																	
20 to 30 °C	22°C ± 2																		
Relative Humidity	25 to 70 %	45% ± 5																	
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 / PC mode																		
Limits																			
Frequency (MHz)	Limit at 3m (dB μ V/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																
<p>Supplementary information:</p> <p>Test location: SMEE</p> <p>Test date: April 24th, 2019. Tested by L. CHAPUS</p>																			

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Log-periodic antenna	TDK	PLP3003	ANT-101-001	2017/5	2019/5
Biconic antenna	COM-POWER	AB- 900	ANT-101-003	2017/5	2019/5
Loop antenna	EMCO	6502	ANT-101-009	2017/8	2019/8
BiConiLog antenna	EMCO	3142B	ANT-101-010	2017/7	2019/7
Horn antenna	ETS-LINDGREN	3115	ANT-141-013	2014/3	2019/3
Spectrum analyzer	Rohde&Schwarz	FSV40	ASP-171-004	2017/5	2019/5
RF cable	Div	OATS/25m	CAB-101-017	2018/4	2019/4
RF cable	Pasternack RF	PE302-120	CAB-131-024	2018/4	2019/4
RF cable	HUBER+SUHNER	RG214U	CAB-141-026	2018/4	2019/4
RF cable	HUBER+SUHNER	RG214U	CAB-141-029	2018/4	2019/4
RF cable	HUBER+SUHNER	SF104	CAB-141-030	2018/4	2019/4
Anechoic chamber	COMTEST	214263	CAG-141-001	2017/6	2020/6
Antenna mast	Innco- Systems	MA4000EP	MAT-101-001	-	-
Turntable	Innco- Systems	DS1200S	PLA-101-001	-	-
Turntable	Innco- Systems	CT0800	PLA-141-001		
Pre-amplifier	PE	1524	PRE-101-002	2017/6	2018/6
Pre-amplifier	SMEE	18-40GHz	PRE-171-004	2017/12	2018/12
Measuring receiver	Rohde&Schwarz	ESRP	REC-151-003	2017/3	2019/3
OATS	Div	10m	SIT-101-001	2017/7	2020/7
EMC Software	NEXIO	BAT EMC V3.8	SOF-101-001	-	-

Test Setup for radiated emission



Test setup for 30-1000MHz

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) dB μ V	(Pk) dB μ V	dB	(QP) dB μ V/m	(Pk) dB μ V/m		cm	Degré	(QP) dB μ V/m	dB
183.46	21.2	22.5	18.5	39.7	41.0	H	145	15	43.5	-3.8
186.35	23.2	23.1	18.8	42.0	41.9	H	140	45	43.5	-1.5
189.35	23.0	23.1	19.0	42.0	42.1	H	145	30	43.5	-1.5

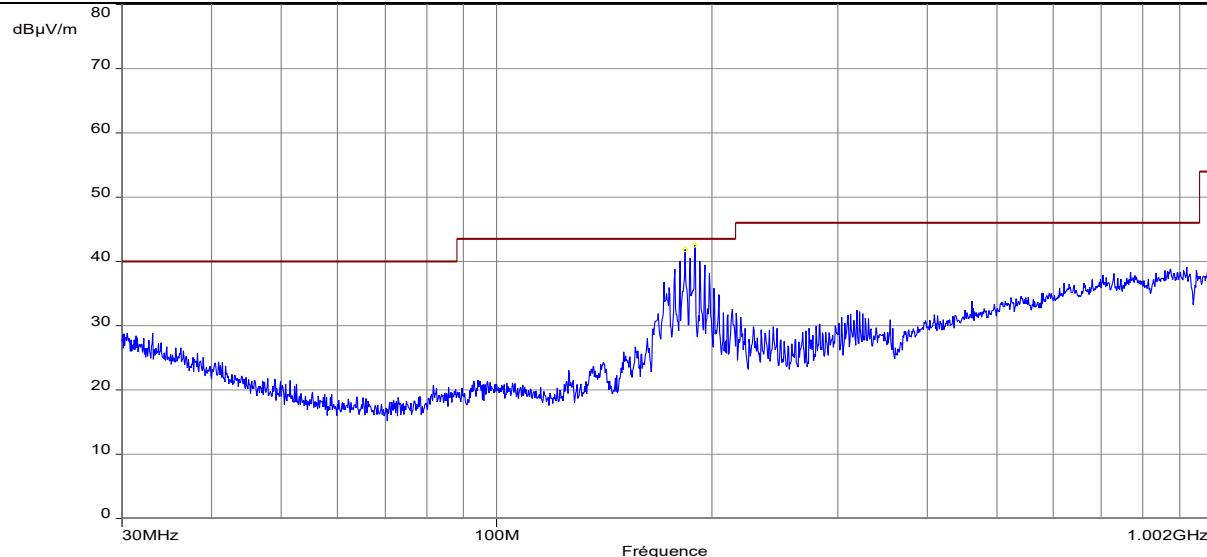
Supplementary information:
Frequency list measured on the Open Area Test Site is created with pre-scan results.

Frequency band investigated:	30MHz-1GHz
RBW:	120kHz
Measurement distance:	3m
Limit:	FCC Part 15B & C / ISED ICES-003 & RSS-Gen
Final measurement detector:	Quasi-Peak
Wide Measurement Uncertainty:	± 5.6 dB (k=2)
RESULT:	PASS
Field Strength Calculation:	<p>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:</p> $FS = RA + AF + CF - AG$ <p>Where FS = Field Strength (Level) RA = Receiver Amplitude (Meter reading) AF = Antenna Factor CF = Cable Factor AG = Amplifier Gain</p> <p>Total factor (dB) is AF + CF – AG Margin value = Emission level – Limit value</p>

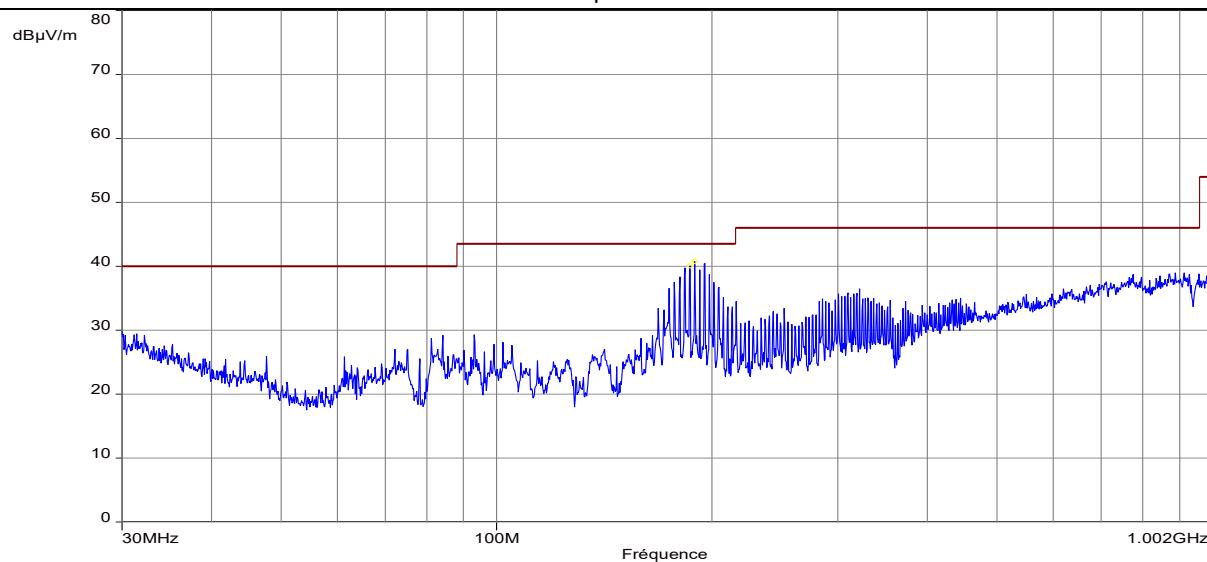
Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 30MHz-1GHz / 3m)

Battery charging

Horizontal polarization



Vertical polarization



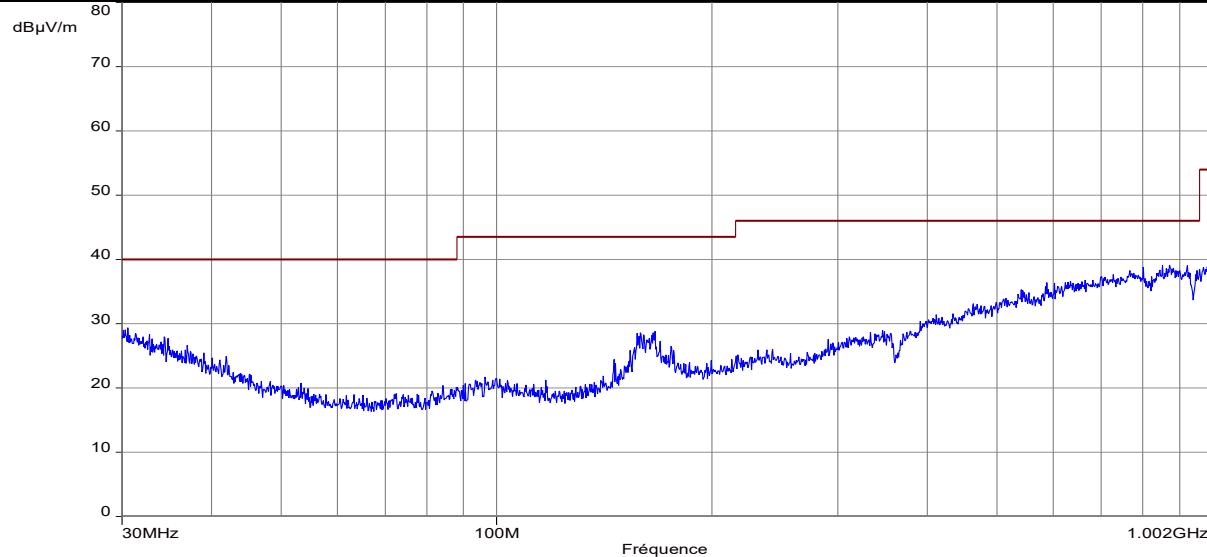
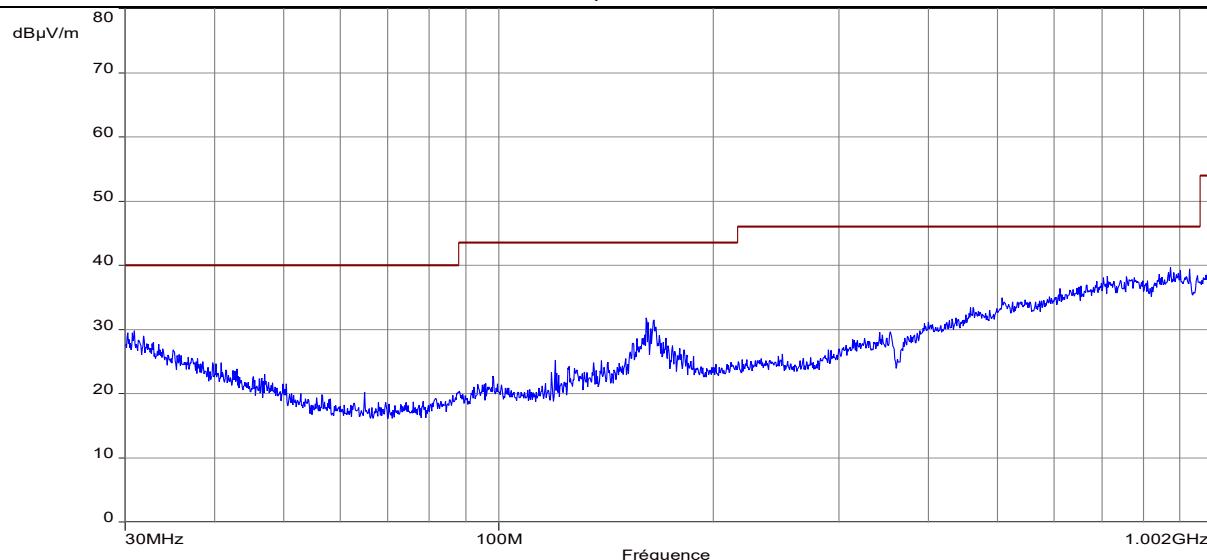
----- : Peak measure

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

Note: Pre-scan graph only for identification purpose.

Marker List :

Frequency (MHz)	Peak Level (dBμV/m)	Limit (dBμV/m)	Polarization
183.459296	41.91	43.5	H
189.35223	42.61	43.5	H
186.345011	40.07	43.5	V
189.35223	40.8	43.5	V

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

Vertical polarization


----- : Peak measure

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

Note: Pre-scan graph only for identification purpose.

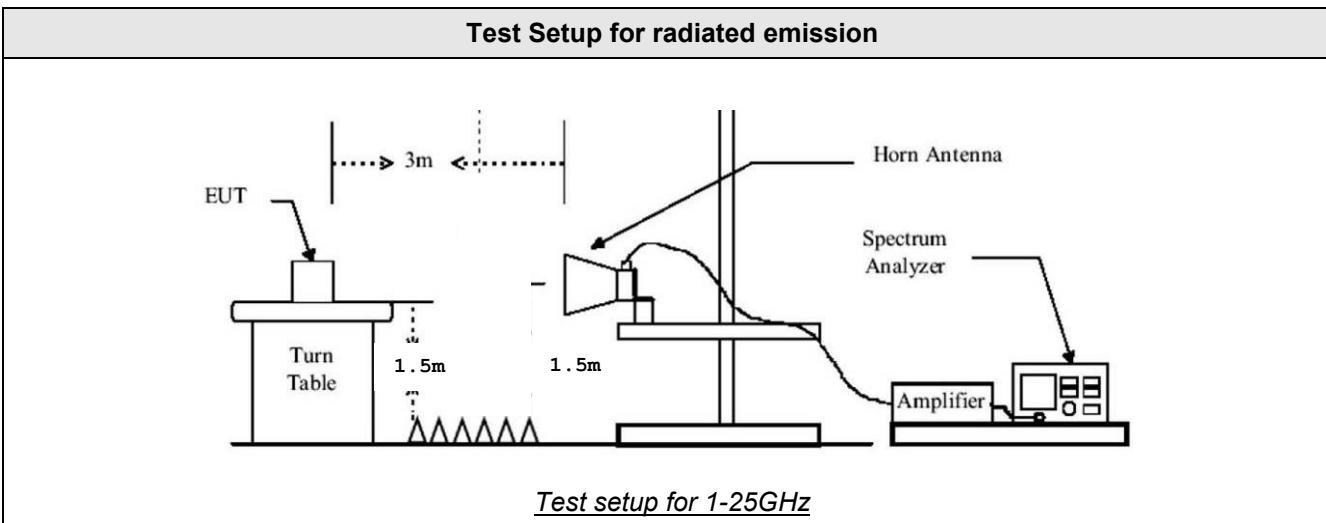
Marker List :

Frequency (MHz)	Peak Level (dB μ V/m)	Limit (dB μ V/m)	Polarization
Levels are at least 10dB below limits			

11. 6dB Bandwidth

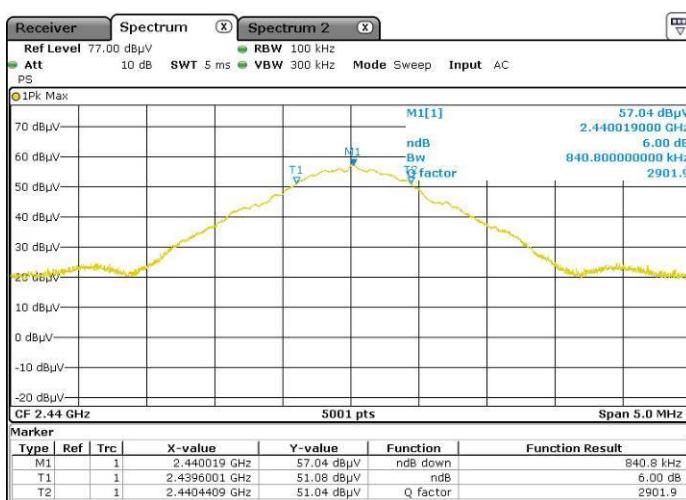
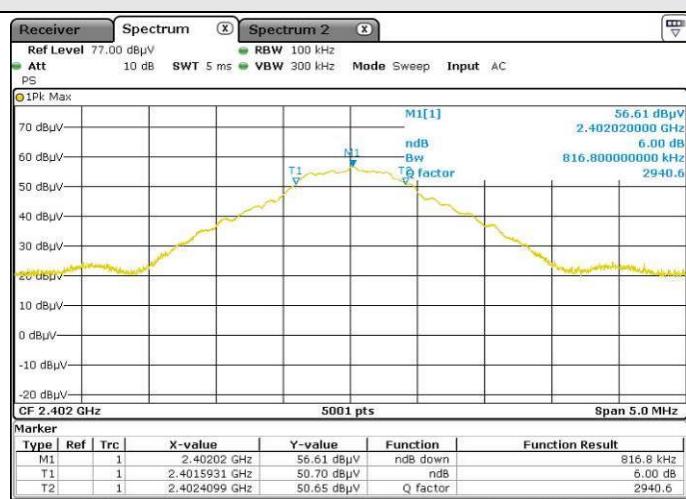
TEST: 6dB Bandwidth		Verdict
Method: The setup is in an anechoic chamber. The spectrum analyzer is connected to the measuring antenna. A radiated measurement is performed. The RBW is 100kHz, with $VBW \geq 3 \times RBW$. The SPAN is wide enough to capture all products of the modulation process. A MaxHold Peak detector is used. Automatic function of the spectrum analyser is used. The tested equipment is set to transmit operation with modulation on low, mid and high channels.		Pass
Laboratory Parameters:	Required prior to the test	During the test
Ambient Temperature	20 to 30 °C	22°C ± 2
Relative Humidity	25 to 70 %	45% ± 5
Limits – FCC Part 15.247 (a) / RSS-247 §5.2 (a)		
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: SMEC Test date: April 23th, 2019. Tested by L. CHAPUS		

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Horn antenna	ETS-LINDGREN	3115	ANT-141-013	2018/10	2021/10
RF cable	Pasternack RF	PE302-120	CAB-131-024	2018/4	2019/4
RF cable	HUBER+SUHNER	SF104	CAB-141-030	2018/4	2019/4
Anechoic chamber	COMTEST	214263	CAG-141-001	2017/6	2020/6
Turntable	Innco- Systems	CT0800	PLA-141-001	-	-
Measuring receiver	Rohde&Schwarz	ESRP	REC-151-002	2017/5	2019/5

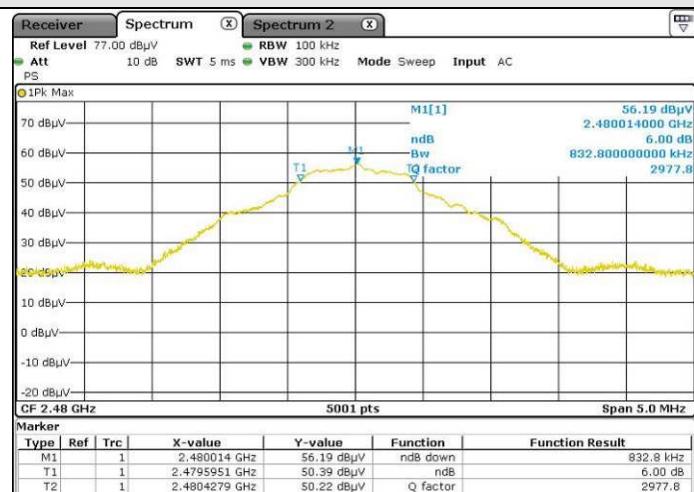


Tabulated Results for Occupied Bandwidth

Frequency (MHz)	6dB Bandwidth (kHz)	Result
2402.0	816.8	Pass
2440.0	840.8	Pass
2480.0	832.8	Pass

Graphical representation of 6dB Bandwidth


Graphical representation of 6dB Bandwidth



High channel

Frequency band investigated:

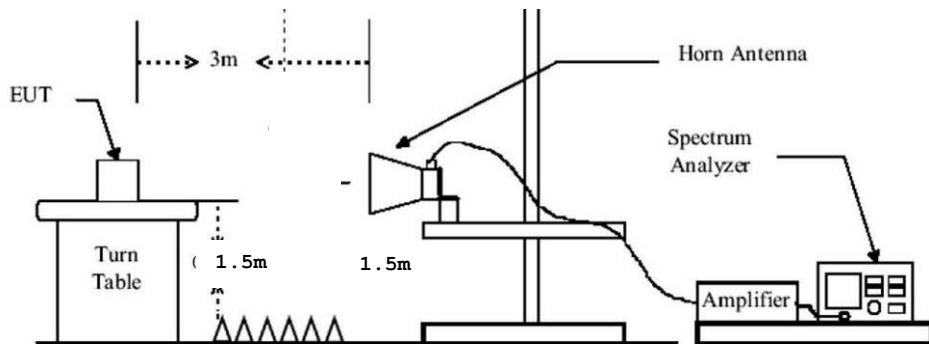
RBW : 100kHz

Measurement detector :

12. Maximum Peak Output power

TEST: Maximum peak conducted output power			Verdict
Method: A radiated measurement is performed. The RBW is wide enough to capture the maximum amplitude level (1MHz). 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 in a Full Anechoic Chamber (FAC) that complies with ANSI C63.10. Maximum field strength (Peak) is performed by rotating the EUT 360°. All frequencies were investigated in both horizontal and vertical antenna polarity. Three orthogonal axis measurements on EUT are performed to obtain the maximum peak field strength, with a 60° rotation on each axis. (Clause 6.6.5 of ANSI C63.10). The tested equipment is set to transmit operation with modulation on low, mid and high channels.			
Laboratory Parameters:			Pass
Ambient Temperature	Required prior to the test		22°C ± 2
Relative Humidity	During the test		45% ± 5
Limits – FCC Part 15.247 (b) / RSS-247 §5.4 (d)			
Frequency (MHz)	Limits (dB μ V/m)		
	Level / Detector	Results	
2400 to 2483.5	36 dBm / Pk / 3m (Radiated)	Pass	
2400 to 2483.5	30 dBm / Pk (Conducted)	Pass	
Supplementary information: Test location: SMEET Test date: April 23th, 2019. Tested by L. CHAPUS			

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Horn antenna	ETS-LINDGREN	3115	ANT-141-013	2018/10	2021/10
RF cable	Pasternack RF	PE302-120	CAB-131-024	2018/4	2019/4
RF cable	HUBER+SUHNER	SF104	CAB-141-030	2018/4	2019/4
Anechoic chamber	COMTEST	214263	CAG-141-001	2017/6	2020/6
Turntable	Innco- Systems	CT0800	PLA-141-001	-	-
Measuring receiver	Rohde&Schwarz	ESRP	REC-151-002	2017/5	2019/5

Test Setup for radiated emission

Test setup for 1-25GHz
Tabulated Results for Maximum peak output power (Radiated measurement)

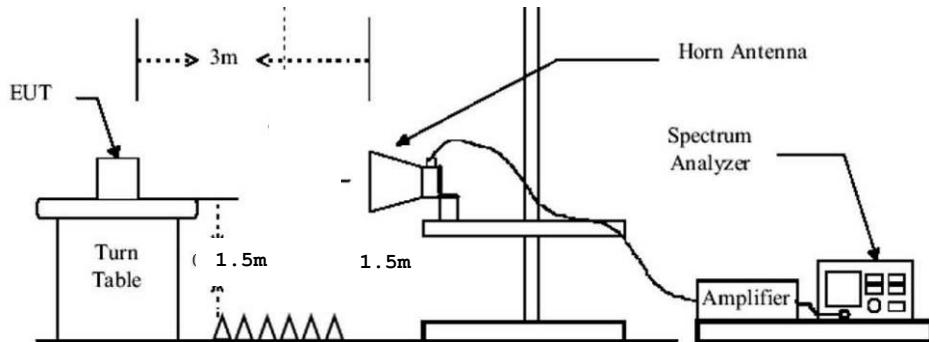
FREQ (MHz)	Field Strength 3m (dB μ V/m)	Calculated EIRP (dBm)	Limit (dBm)	Result
2402	91.1	-4.1	36.0	Pass
2441	93.2	-2.0	36.0	Pass
2480	93.1	-2.1	36.0	Pass
RBW:	1MHz			
Measurement distance:	3m			
Limit:	FCC Part 15.247 / RSS-247			
Final measurement detector:	Peak			
RESULT:	PASS			
Note:	<p>(1): The 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:</p> $FS = RA + AF + CF - AG$ <p>Where FS = Field Strength RA = Receiver Amplitude AF = Antenna Factor CF = Cable Factor AG = Amplifier Gain</p> <p>Total factor (dB) is AF + CF - AG</p> <p>Margin value = Emission level - Limit value</p> <p>(2): EIRP is calculated using the following equation:</p> $EIRP = E + 20 \log(D) - 104.8 - GR$ <p>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 (0dB above 1GHz)</p>			

Tabulated Results for Maximum peak output power (Conducted)			
FREQ (MHz)	Conducted power (dBm)	Limit (dBm)	Result
2402	-4.1	30.0	Pass
2440	-2.0	30.0	Pass
2480	-2.1	30.0	Pass
RBW:	1MHz		
Limit:	FCC Part 15.247 / IC RSS-247		
Final measurement detector:	Peak		
RESULT:	PASS		
Note:	(1): Maximum conducted Peak output power is calculated as follow: $P_c = EIRP - G$ Where P_c = Conducted power dBm $EIRP$ = Equivalent Isotropic Radiated Power in dBm G = Antenna gain in dBi (0dBi, as declared by the manufacturer)		

13. Maximum Power Spectral Density Level in the fundamental emission

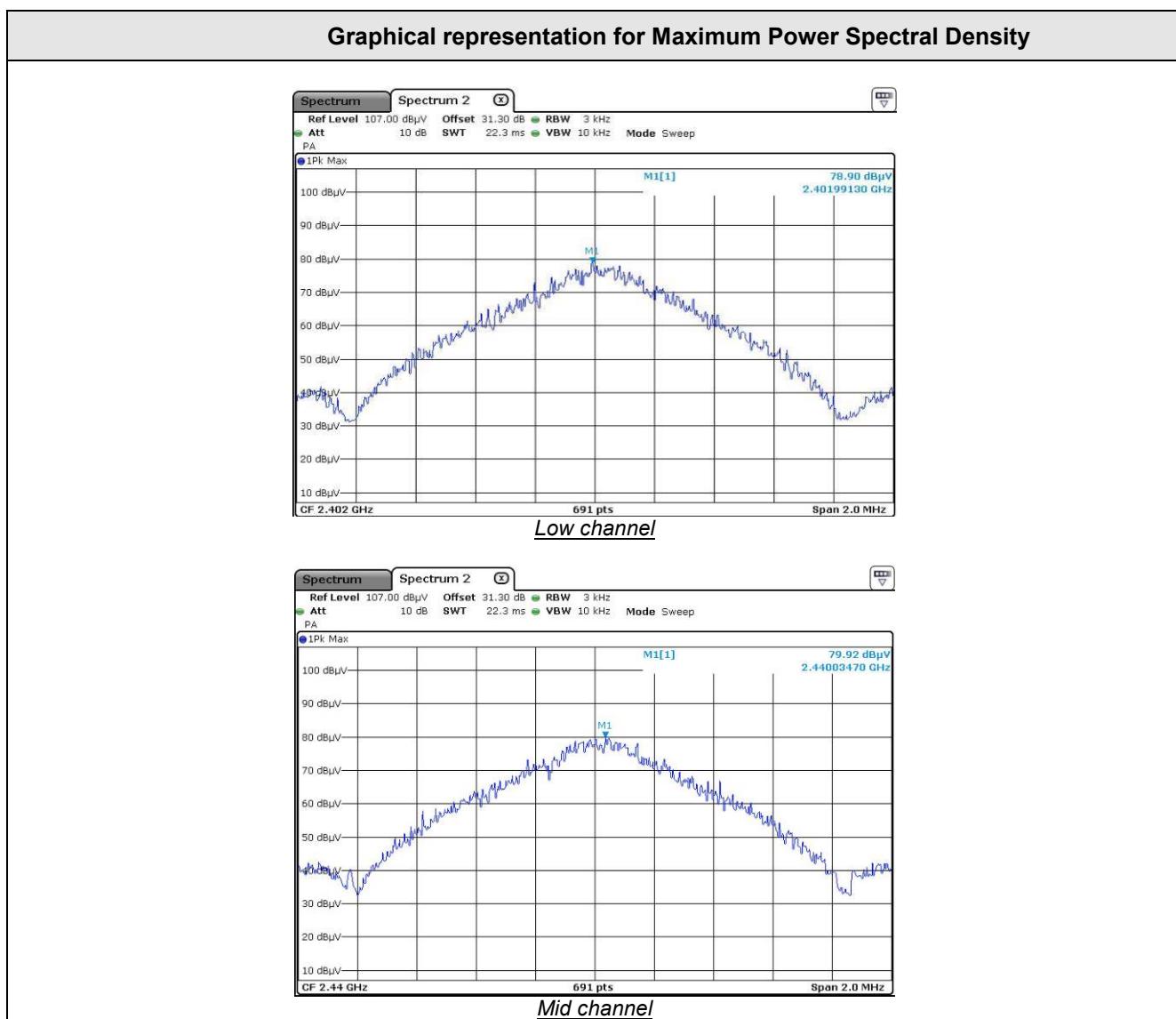
TEST: Maximum Peak Power Spectral Density			Verdict
Method: A radiated measurement is performed. The SPAN is wide enough to capture all products of the modulation process. Radiated field strength of RF Output Power is measured at 3m in a Full Anechoic Chamber (FAC) that complies with ANSI C63.10. Maximum field strength is performed by rotating the EUT 360°. All frequencies were investigated in both horizontal and vertical antenna polarity. Three orthogonal axis measurements on EUT are performed to obtain the maximum peak field strength, with a 60° rotation on each axis. (Clause 6.6.5 of ANSI C63.10). The tested equipment is set to transmit operation with modulation on low, mid and high channels.			
Laboratory Parameters:			Pass
Ambient Temperature	Required prior to the test		During the test
Ambient Temperature	20 to 30 °C		22°C ± 2
Relative Humidity	25 to 70 %		45% ± 5
Limits – FCC Part 15.247 (e) / RSS-247 §5.2 (b)			
Frequency (MHz)	Level (Detector)	Limit	
2441.75	8 dBm/3kHz (Pk)	Pass	
Supplementary information: Test location: SMEC Test date: April 23th, 2019. Tested by L. CHAPUS			

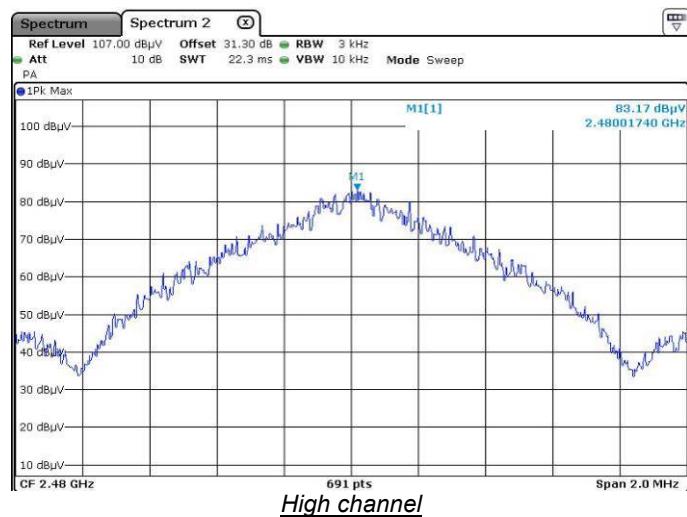
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Horn antenna	ETS-LINDGREN	3115	ANT-141-013	2018/10	2021/10
RF cable	Pasternack RF	PE302-120	CAB-131-024	2018/4	2019/4
RF cable	HUBER+SUHNER	SF104	CAB-141-030	2018/4	2019/4
Anechoic chamber	COMTEST	214263	CAG-141-001	2017/6	2020/6
Turntable	Innco- Systems	CT0800	PLA-141-001	-	-
Measuring receiver	Rohde&Schwarz	ESRP	REC-151-002	2017/5	2019/5

Test Setup for radiated emission

Test setup for 1-25GHz
Tabulated Results for Maximum Spectral Density (Radiated measurement)

FREQ (MHz)	Field Strength 3m (dB μ V/m)	Calculated Radiated PSD (EIRP) (dBm)	Limit (dBm)	Result
2402	78.9	-16.3	-	-
2440	79.9	-15.3	-	-
2480	83.2	-12.0	-	-
RBW:	3kHz			
Measurement distance:	3m			
Limit:	FCC Part 15.247 / RSS-247			
Final measurement detector:	Peak			
Note:	<p>(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:</p> $FS = RA + AF + CF - AG$ <p>Where FS = Field Strength RA = Receiver Amplitude AF = Antenna Factor CF = Cable Factor AG = Amplifier Gain</p> <p>Total factor (dB) is AF + CF - AG</p> <p>Margin value = Emission level - Limit value</p> <p>(2): EIRP/PSD is calculated using the following equation:</p> $EIRP = E + 20\log(D) - 104.8 - GR$ <p>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 (0dB above 1GHz)</p>			

Tabulated Results for Maximum Conducted Power Spectral Density			
Frequency (MHz)	PSD (dBm/3kHz)	Limit	Result
2402.0	-16.3	8dBm/3kHz	Pass
2441.0	-15.3	8dBm/3kHz	Pass
2480.0	-12.0	8dBm/3kHz	Pass
RBW:	3kHz		
Limit:	FCC Part 15.247 / RSS-247		
Final measurement detector:	Peak		
RESULT:	PASS		
Note:	(1): Maximum conducted power spectral density is calculated as follow: $P_{SD} = P_{SD-EIRP} - G$ Where P_{SD} = Conducted power spectral density $P_{SD-EIRP}$ = Equivalent Isotropic Radiated PSD in dBm G = Antenna gain in dBi (0dBi, as declared by the manufacturer)		



Graphical representation for Maximum Power Spectral Density


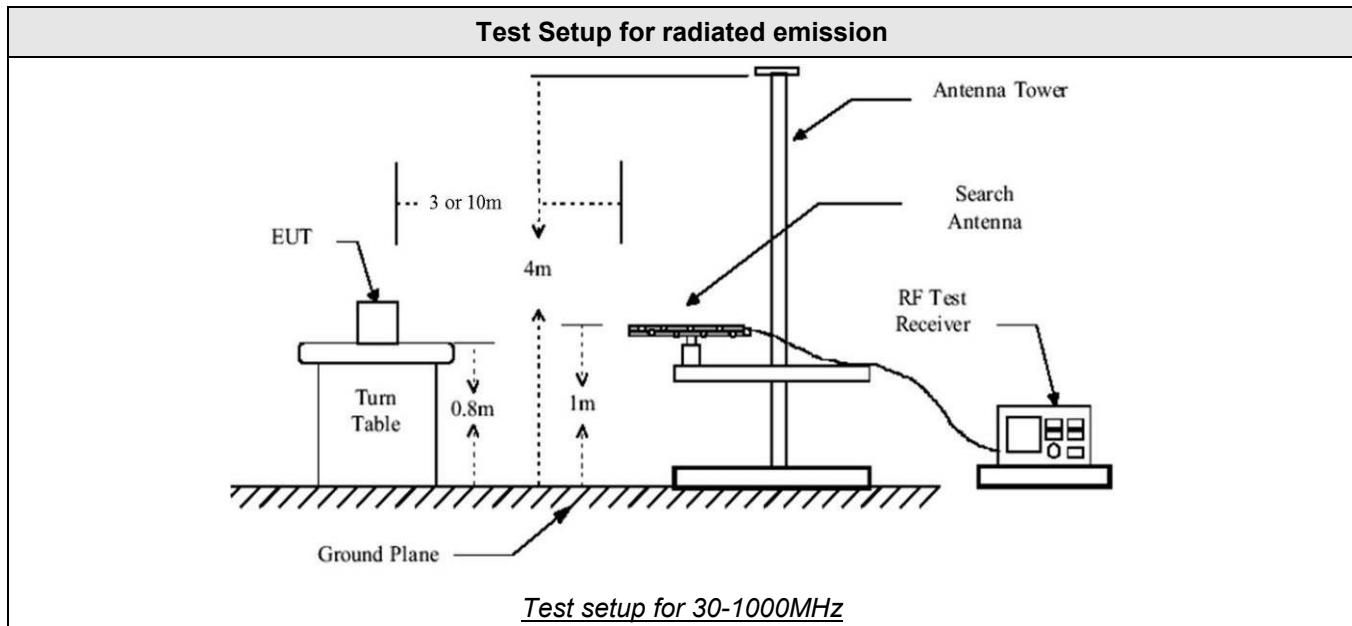
RBW:	3kHz
Limit:	FCC Part 15.247 / RSS-247
RESULT:	PASS

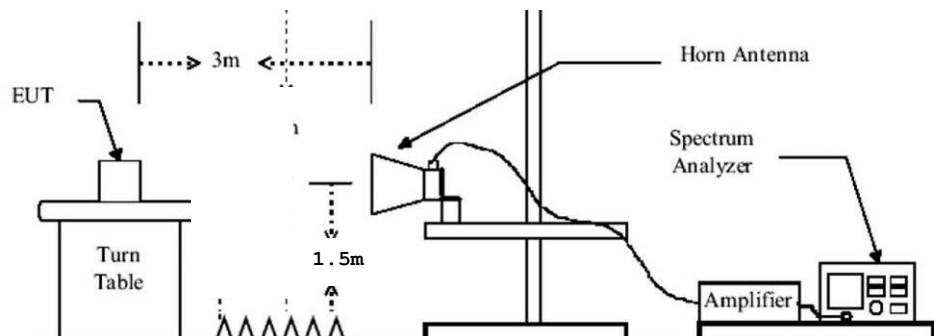
14. Unwanted emissions in Non-Restricted Frequency bands

TEST: Unwanted emissions in Non-Restricted Frequency Bands			Verdict
<p>Method: Measurements were performed on a 3-meter Open Area Test Site (OATS) for frequency below 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) were then performed by rotating the EUT on 360° and adjusting the receive antenna height from 1 to 4 m</p> <p>For frequency above 1GHz, final measurements were made at 3m in a Full Anechoic Chamber (FAC) that complies with ANSI C63.10. 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 in horizontal and vertical polarities.</p> <p>Three orthogonal axis measurements on EUT are performed to obtain the maximum peak field strength, with 60° rotation on each axis. (Clause 6.6.5 of ANSI C63.10).</p> <p>A pre-scan frequency identification of the EUT has been performed in full anechoic chamber. The measured radiated field of the EUT is performed (or corrected) at 3-meters of distance. Antenna is 1.25-meters high. The pre-characterization graphs are obtained in PEAK detection with 360° continuous rotation of the device under test.</p>			Pass
Laboratory Parameters:		Required prior to the test	During the test
Ambient Temperature		20 to 30 °C	22°C ± 2
Relative Humidity		25 to 70 %	45% ± 5
Fully configured sample scanned over the following frequency range	Frequency range on each side of line		Measurement Point
	30MHz – 25GHz		3 m measurement distance
Limits – FCC Part 15.247 (d) / RSS-247 § 5.5			
Frequency (MHz)	Limits (dB μ V/m)		
	Detector / Analyser RBW	Limit	Results
30 to 25000	Pk / 100kHz	20dB below the maximum Peak level	Pass
Supplementary information:			
Test location: SMEET			
Test date: April 23th, 2019. Tested by L. CHAPUS			

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Log-periodic antenna	TDK	PLP3003	ANT-101-001	2017/5	2019/5
Biconic antenna	COM-POWER	AB- 900	ANT-101-003	2017/5	2019/5
Loop antenna	EMCO	6502	ANT-101-009	2017/8	2019/8
BiConiLog antenna	EMCO	3142B	ANT-101-010	2017/7	2019/7
Horn antenna	ETS-LINDGREN	3115	ANT-141-013	2018/10	2021/10
Horn antenna	ETS-LINDGREN	3116	ANT-161-014	2017/12	2022/12
Spectrum analyzer	Rohde&Schwarz	FSV40	ASP-171-004	2017/5	2019/5
RF cable	Div	OATS/25m	CAB-101-017	2018/4	2019/4
RF cable	Pasternack RF	PE302-120	CAB-131-024	2018/4	2019/4
RF cable	HUBER+SUHNER	RG214U	CAB-141-026	2018/4	2019/4
RF cable	HUBER+SUHNER	RG214U	CAB-141-029	2018/4	2019/4

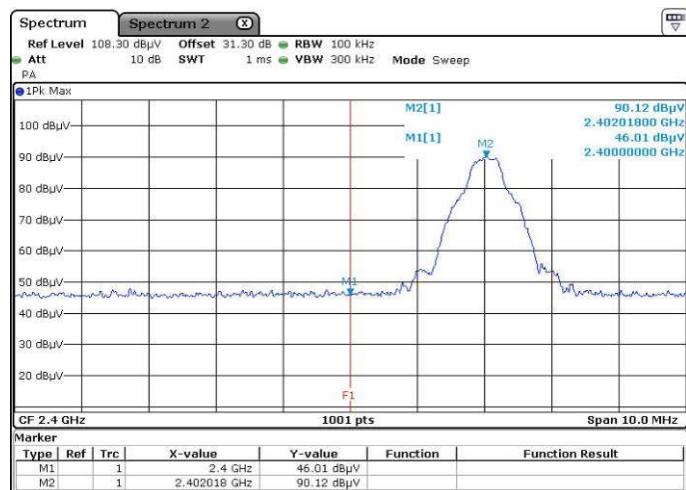
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
RF cable	HUBER+SUHNER	SF104	CAB-141-030	2018/4	2019/4
RF cable	HUBER+SUHNER	SF102 (K/2m)	CAB-171-034	2017/5	2019/5
RF cable	HUBER+SUHNER	SF102 (K/3m)	CAB-171-035	2017/5	2019/5
Anechoic chamber	COMTEST	214263	CAG-141-001	2017/6	2020/6
Antenna mast	Innco- Systems	MA4000EP	MAT-101-001	-	-
Turntable	Innco- Systems	DS1200S	PLA-101-001	-	-
Turntable	Innco- Systems	CT0800	PLA-141-001		
Pre-amplifier	PE	1524	PRE-101-002	2018/4	2019/4
Pre-amplifier	SMEC	18-40GHz	PRE-171-004	2017/12	2019/12
Measuring receiver	Rohde&Schwarz	ESRP	REC-151-003	2017/5	2019/5
OATS	Div	10m	SIT-101-001	2017/7	2020/7
EMC Software	NEXIO	BAT EMC V3.8	SOF-101-001	-	-



Test Setup for radiated emission

Test setup for 1-25GHz
Tabulated Results for Peak Output Power Reference level

FREQ (MHz)	Field Strength 3m (dB μ V/m)
2402.0	91.0 (1)
2440.0	92.8 (1)
2480.0	92.9 (1)
RBW:	100kHz
Measurement distance:	3m
Limit:	Ref. level only – For 15.247 (d) / RSS-247 § 5.5
Final measurement detector:	Peak
Note:	(1): Only for identification of limit in non-restricted band Limit is 71.0 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 (MHz)	Field Strength 3m (dBμV/m)	Limit (dBμV/m)	Margin (dBμV/m)	Result (dBμV/m)
2400.0	46.0	71.0	-25.0	Pass
7206.000	61.0	71.0	-10.0	Pass
RBW:	100kHz			
Measurement distance:	3m			
Limit:	FCC 15.247 / RSS-247			
Final measurement detector:	Peak			
RESULT:	PASS			
Note:	<p>(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</p> <p>Total factor (dB) is AF + CF – AG Margin value = Emission level – Limit value</p> <p>(2): Peak pre-scans not performed at 3-meters distance are corrected as follow: $M@3m = M@D_m + 20 \times \log(D_m / 3m)$ Where D is the measurement distance in meter</p> <p>(3): All frequencies not specified have margin < -10dB</p> <p>(4): Worst case between charge mode and normal used mode</p> <p>(5): 3-axis measurement performed for device under test.</p>			

Graphical representation of Band-edge compliance (LOW)


Low bandedge compliance

Radiated Peak level is 46dB μ V/m (limit 71dB μ V/m)

F1 = 2400MHz

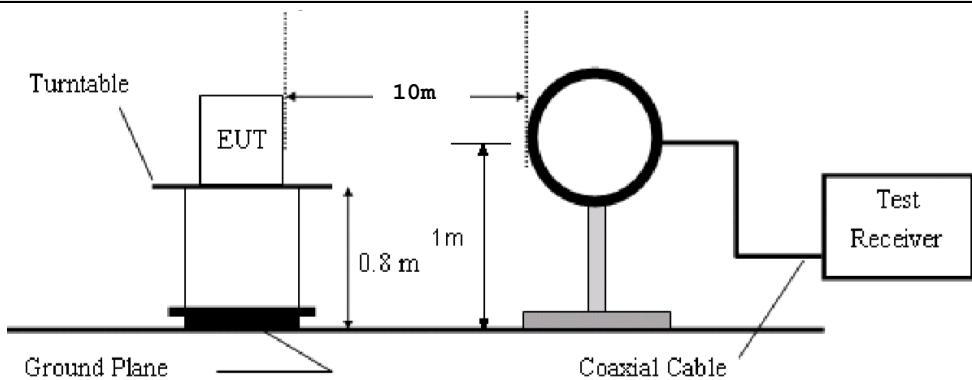
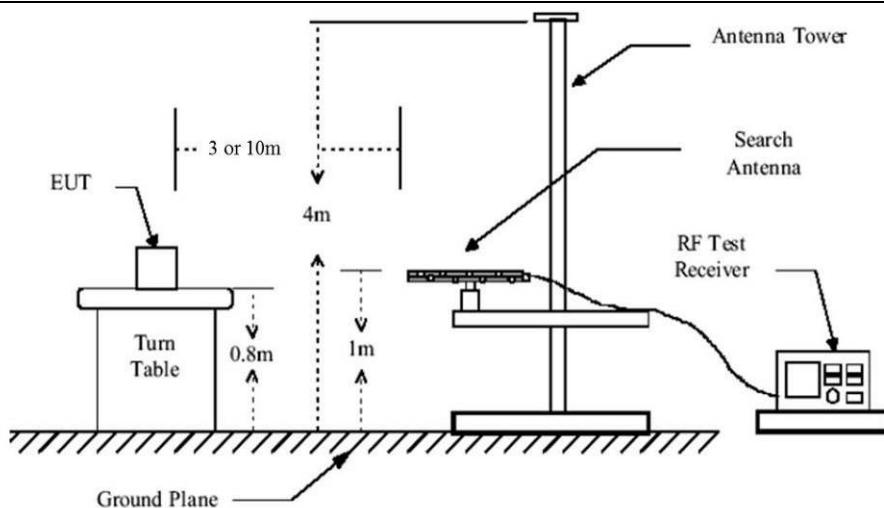
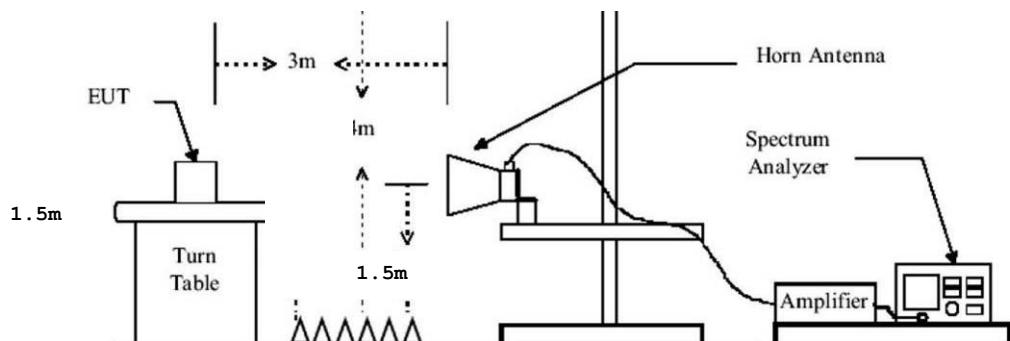
RESULT: PASS

Note: radiated measurement (3m in FAC)

15. Unwanted emissions in Restricted Frequency bands

TEST: Unwanted emissions into Restricted Frequency Bands		Verdict																		
<p><u>Method:</u> Measurements were performed on a 3-meter Open Area Test Site (OATS) for frequency below 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) were then performed by rotating the EUT on 360° and adjusting the receive antenna height from 1 to 4 m</p> <p>For frequency above 1GHz, final measurements were made at 3m in a Full Anechoic Chamber (FAC) that complies with ANSI C63.10. 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 in horizontal and vertical polarities.</p> <p>Three orthogonal axis measurements on EUT are performed to obtain the maximum peak field strength, with 60° rotation on each axis.(Clause 6.6.5 of ANSI C63.10).</p> <p>A pre-scan frequency identification of the EUT has been performed in full anechoic chamber. The measured radiated field of the EUT is performed (or corrected) at 3-meters of distance. Antenna is 1.25-meters high. The pre-characterization graphs are obtained in PEAK detection with 360° continuous rotation of the device under test.</p>		Pass																		
<p>Laboratory Parameters:</p> <table border="1"> <tr> <td>Ambient Temperature</td> <td>Required prior to the test</td> <td>During the test</td> </tr> <tr> <td>Relative Humidity</td> <td>20 to 30 °C</td> <td>22°C ± 2</td> </tr> <tr> <td>Fully configured sample scanned over the following frequency range</td> <td>25 to 70 %</td> <td>45% ± 5</td> </tr> <tr> <td></td> <td>Frequency range on each side of line</td> <td>Measurement Point</td> </tr> <tr> <td></td> <td>9kHz – 30MHz</td> <td>10 m measurement distance</td> </tr> <tr> <td></td> <td>30MHz – 25GHz</td> <td>3 m measurement distance</td> </tr> </table>		Ambient Temperature	Required prior to the test	During the test	Relative Humidity	20 to 30 °C	22°C ± 2	Fully configured sample scanned over the following frequency range	25 to 70 %	45% ± 5		Frequency range on each side of line	Measurement Point		9kHz – 30MHz	10 m measurement distance		30MHz – 25GHz	3 m measurement distance	
Ambient Temperature	Required prior to the test	During the test																		
Relative Humidity	20 to 30 °C	22°C ± 2																		
Fully configured sample scanned over the following frequency range	25 to 70 %	45% ± 5																		
	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 (a), 15.247 (d) / RSS-GEN §8.9, §8.10, RSS-247 §5.5																				
Frequency (MHz)	Limits (dB μ V/m)																			
	Level / Detector / Distance	Results																		
0.009 to 0.090	107.6 – 87.6 / AV / 10m 127.6 – 107.6 / PK / 10m	Pass																		
0.090 to 0.110	87.6 – 85.9 / QP / 10m	Pass																		
0.110 to 0.490	85.7 – 72.9 / AV / 10m 105.7 – 92.9 / PK / 10m	Pass																		
0.490 to 1.705	52.9 – 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																		
<p>Supplementary information: Test location: SMEC Test date: April 23th, 2019. Tested by L. CHAPUS</p>																				

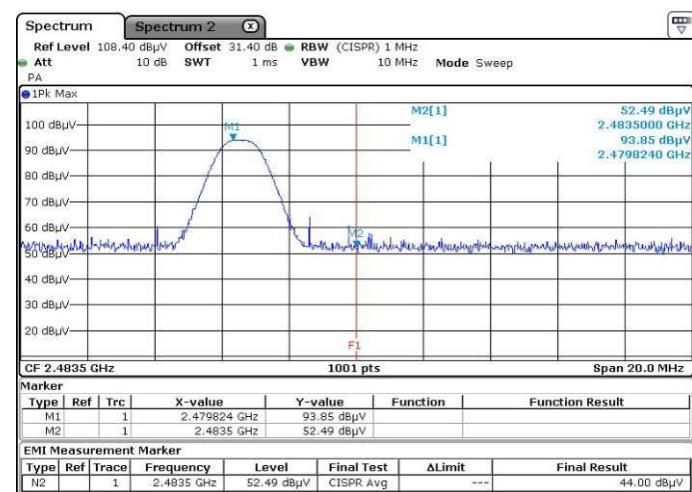
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Log-periodic antenna	TDK	PLP3003	ANT-101-001	2017/5	2019/5
Biconic antenna	COM-POWER	AB- 900	ANT-101-003	2017/5	2019/5
Loop antenna	EMCO	6502	ANT-101-009	2017/8	2019/8
BiConiLog antenna	EMCO	3142B	ANT-101-010	2017/7	2019/7
Horn antenna	ETS-LINDGREN	3115	ANT-141-013	2018/10	2021/10
Horn antenna	ETS-LINDGREN	3116	ANT-161-014	2017/12	2022/12
Spectrum analyzer	Rohde&Schwarz	FSV40	ASP-171-004	2017/5	2019/5
RF cable	Div	OATS/25m	CAB-101-017	2018/4	2019/4
RF cable	Pasternack RF	PE302-120	CAB-131-024	2018/4	2019/4
RF cable	HUBER+SUHNER	RG214U	CAB-141-026	2018/4	2019/4
RF cable	HUBER+SUHNER	RG214U	CAB-141-029	2018/4	2019/4
RF cable	HUBER+SUHNER	SF104	CAB-141-030	2018/4	2019/4
RF cable	HUBER+SUHNER	SF102 (K/2m)	CAB-171-034	2017/5	2019/5
RF cable	HUBER+SUHNER	SF102 (K/3m)	CAB-171-034	2017/5	2019/5
Anechoic chamber	COMTEST	214263	CAG-141-001	2017/6	2020/6
Antenna mast	Innco- Systems	MA4000EP	MAT-101-001	-	-
Turntable	Innco- Systems	DS1200S	PLA-101-001	-	-
Turntable	Innco- Systems	CT0800	PLA-141-001		
Pre-amplifier	PE	1524	PRE-101-002	2018/4	2019/4
Pre-amplifier	SMEE	18-40GHz	PRE-171-004	2017/12	2018/12
Measuring receiver	Rohde&Schwarz	ESRP	REC-151-003	2017/5	2019/5
OATS	Div	10m	SIT-101-001	2017/7	2020/7
EMC Software	NEXIO	BAT EMC V3.8	SOF-101-001	-	-

Test Setup for radiated emission

Test setup for 9k-30MHz

Test setup for 30-1000MHz

Test setup for 1-25GHz

Tabulated Results for Unwanted emissions (9kHz-30MHz)						
FREQ	RF field @ 30m	Limit @ 30m	Margin	Antenna angle	Table angle	Correc. Fact. (CF)
MHz	(QP) dB μ V/m	(QP) dB μ V/m	dB	Degree	Degree	dB
Levels are at least 10dB below limits						
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				
Final measurement detector:		Peak / Quasi-Peak / Average				
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	Total factor	Field level	Field level	Pol	Antenna height	Table angle	Limit	Margin
MHz	(QP) dB μ V	(Pk) dB μ V	dB	(QP) dB μ V/m	(Pk) dB μ V/m		cm	Degré	(QP) dB μ V/m	dB
Levels are at least 10dB below limits										
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								
Final measurement detector:		Quasi-Peak								
RESULT:		PASS								
Field Strength Calculation:		<p>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</p> <p>Total factor (dB) is $AF + CF - AG$ Margin value = Emission level – Limit value</p>								

Tabulated Results for Unwanted emissions (1GHz-25GHz)					
FREQ (MHz)	Field Strength 3m (dB μ V/m)	Detector	Limit (dB μ V/m)	Margin (dB μ V/m)	Result
2483.5	52.5	Pk	74	-21.5	Pass
2483.5	44.0	Avg	54	-10.0	Pass
4804.0	61.7	Pk	74	-12.3	Pass
4804.0	52.8	Avg	54	-1.2	Pass
4882.0	61.5	Pk	74	-12.5	Pass
4882.0	53.4	Avg	54	-0.6	Pass
4960.0	60.3	Pk	74	-13.7	Pass
4960.0	52.6	Avg	54	-1.4	Pass
7320.0	60.5	Pk	74	-13.5	Pass
7320.0	52.7	Avg	54	-1.3	Pass
7440.0	60.8	Pk	74	-13.2	Pass
7440.0	53.0	Avg	54	-1.0	Pass
RBW:	1MHz				
Measurement distance:	3m				
Limit:	FCC Part 15.205, 15.209, 15.247 / RSS-Gen, RSS-247				
Final measurement detector:	Peak / CISPR Average				
RESULT:	PASS				
Notes:	<p>(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</p> <p>Total factor (dB) is $AF + CF - AG$ Margin value = Emission level – Limit value</p> <p>(2): Peak pre-scans not performed at 3-meters distance are corrected as follow: $M@3m = M@Dm + 20 \times \log(Dm / 3m)$ Where D is the measurement distance in meter</p> <p>(3): All frequencies not specified have margin < -10dB (for peak and average detector)</p>				

Graphical representation of Band-edge compliance (HIGH)


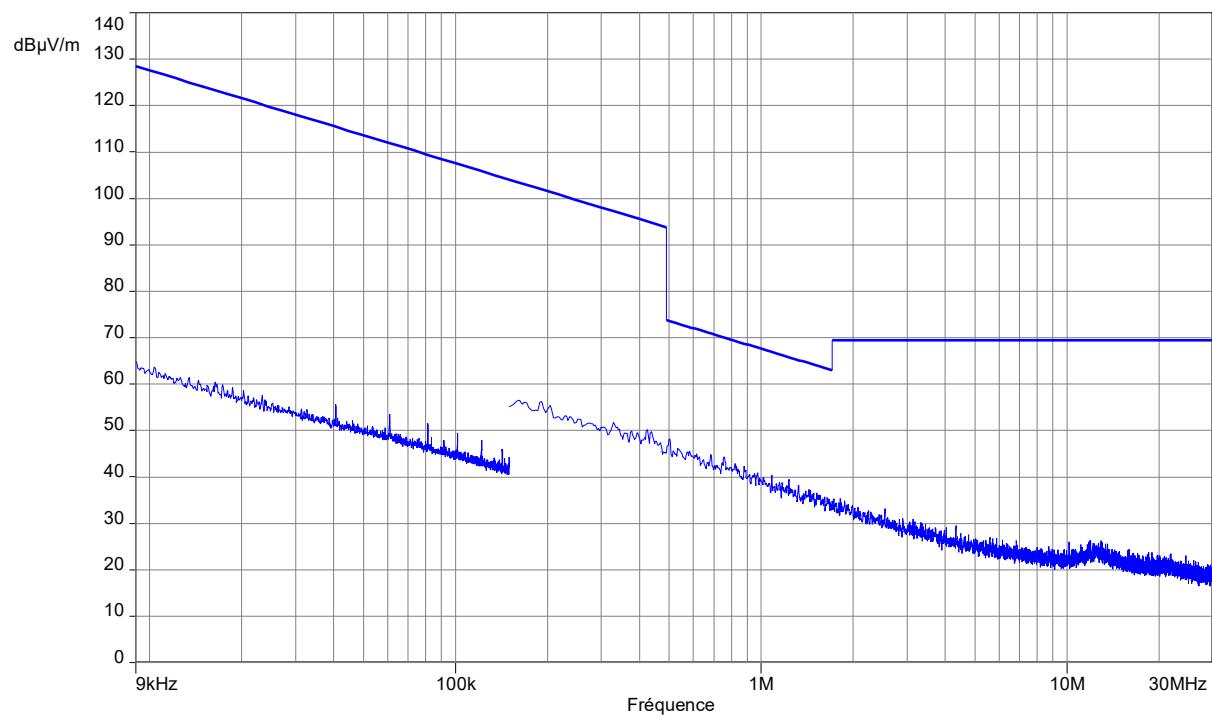
High bandedge compliance

Radiated Peak level is 52.5dB μ V/m (limit 74dB μ V/m)

Radiated Average level is 44.0dB μ V/m (limit 54dB μ V/m, CISPR Average detector measurement)

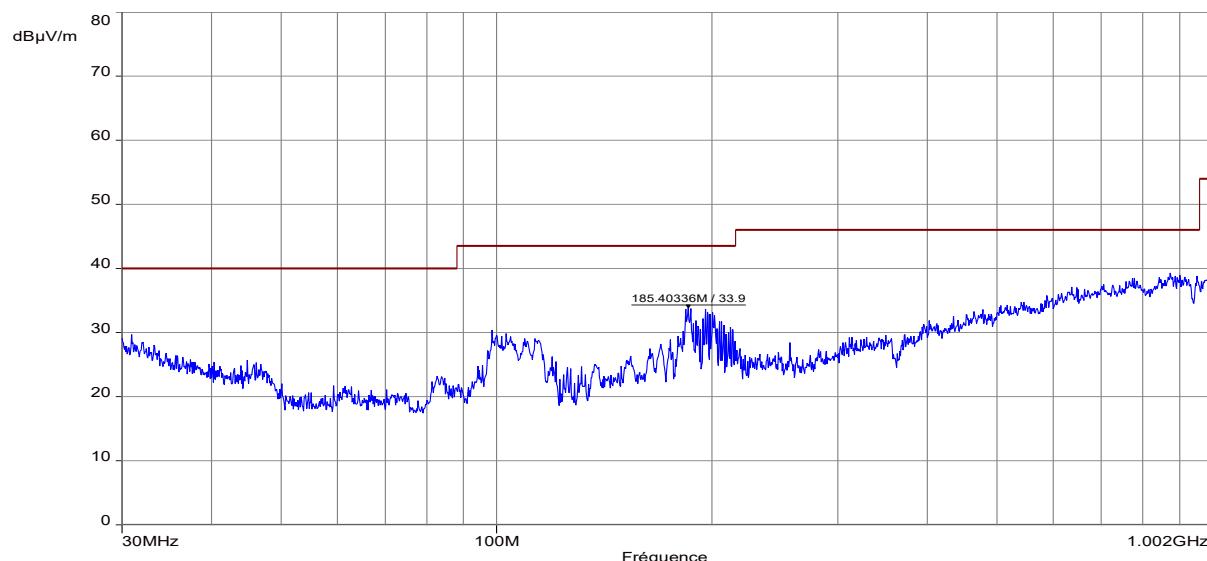
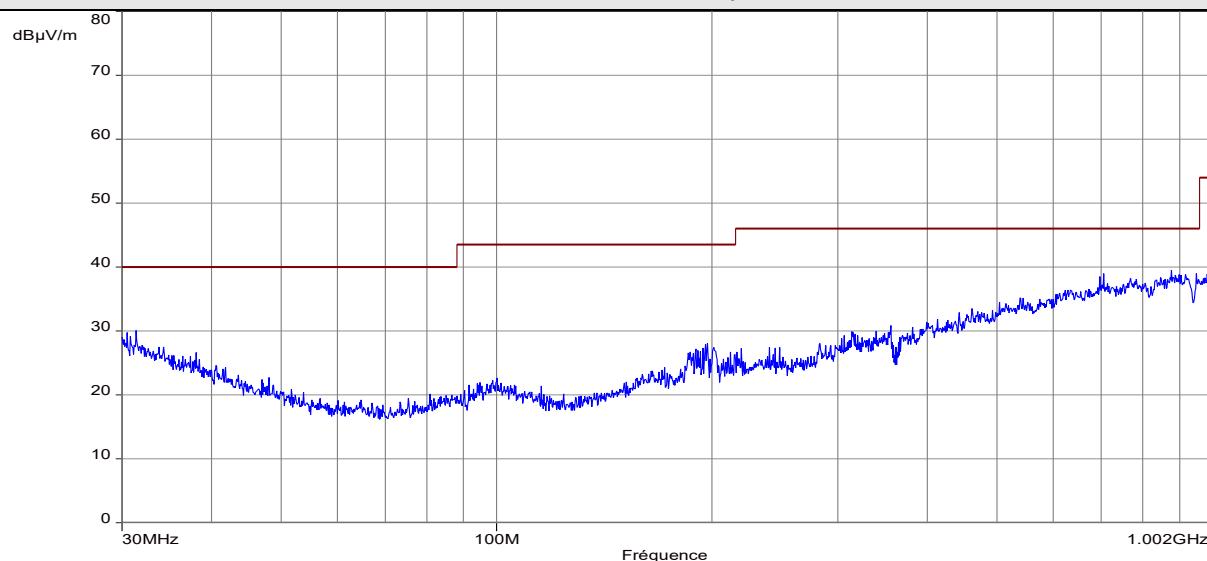
RESULT: PASS

Note: Radiated measurement (FAC/3m)

Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 9kHz-30MHz / 3m / Parallel & Perpendicular antenna position / Transmit mode)


Notes: Pre-scan graph only for identification purpose.
 Same result for transmit mode on all channels.

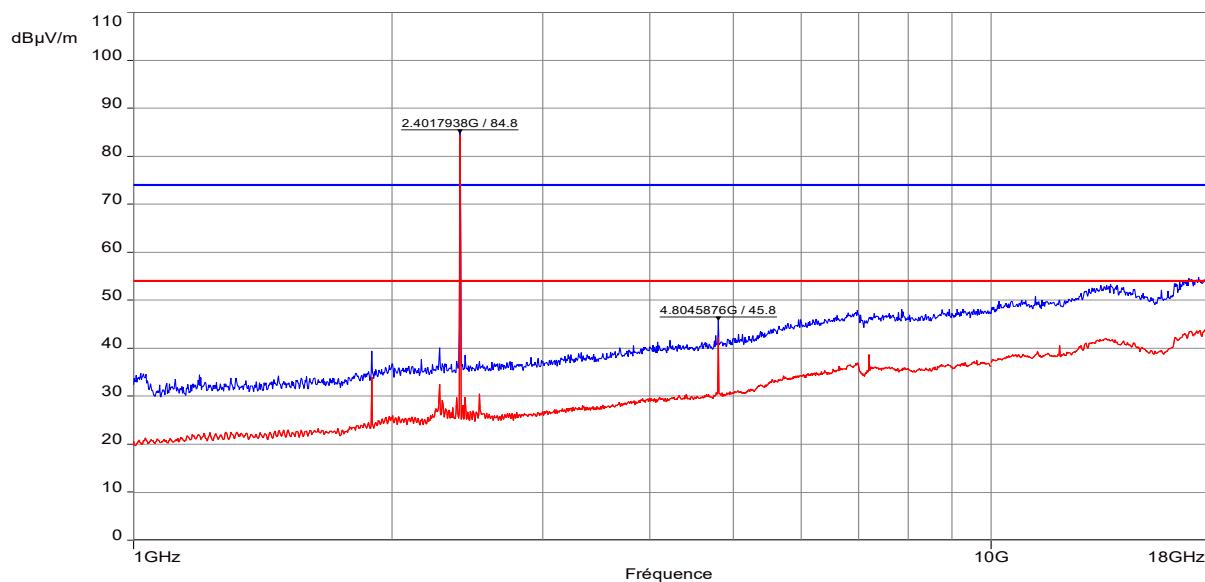
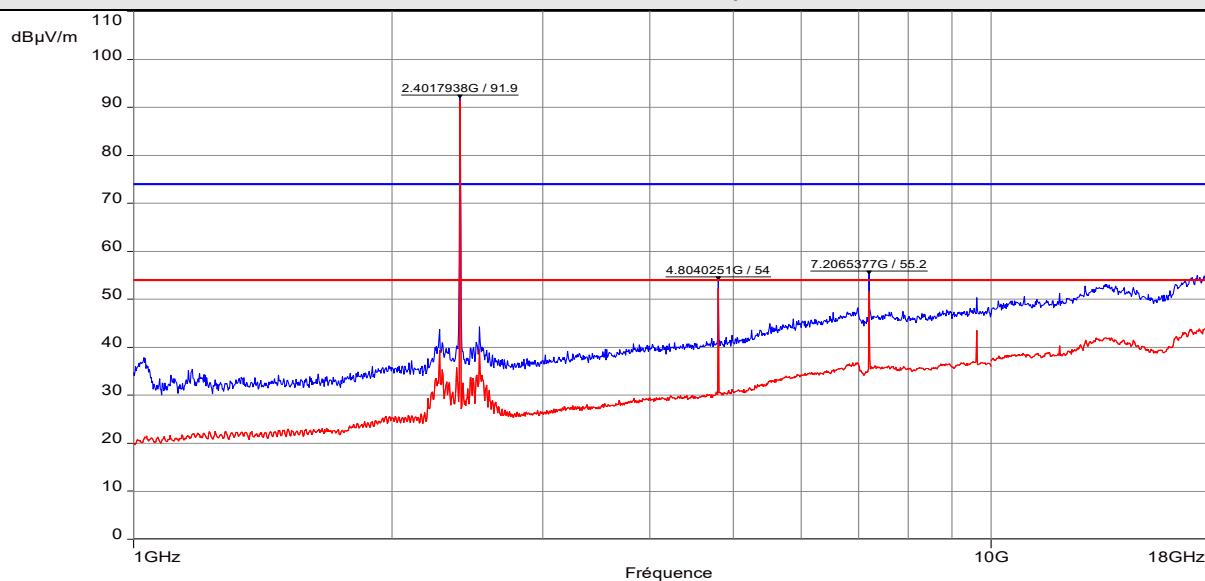
Frequency band investigated:	9kHz-30MHz
Unit :	dB μ V/m
RBW :	200Hz (9kHz-150kHz) 9kHz (150kHz-30MHz)
Antenna polarization :	Parallel & Perpendicular to measurement axis
Measurement detector:	Peak

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


Note: Pre-scan graph only for identification purpose.

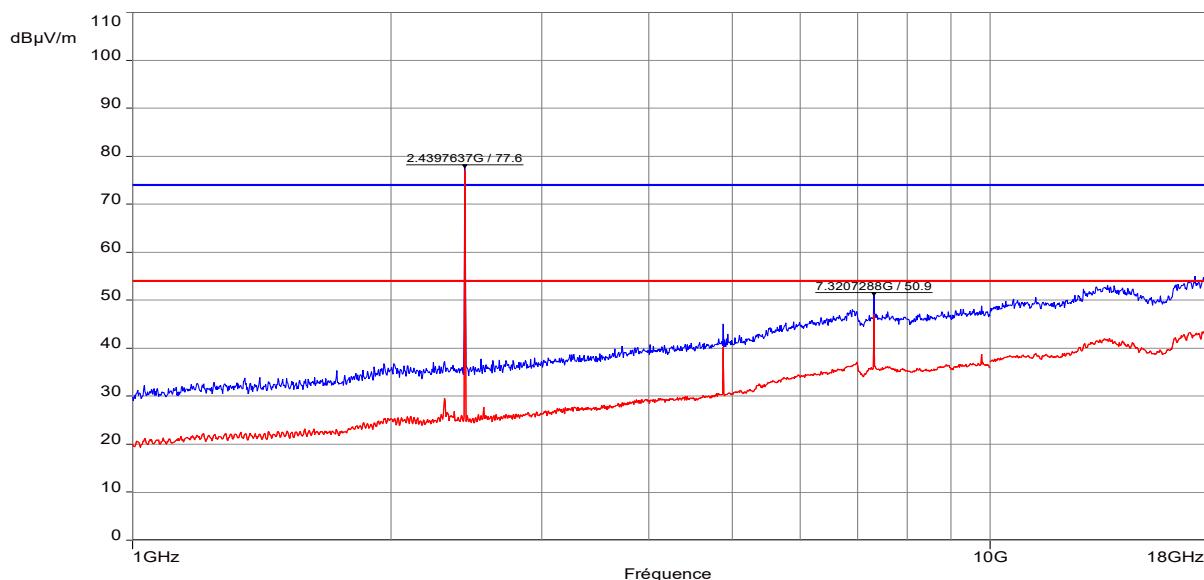
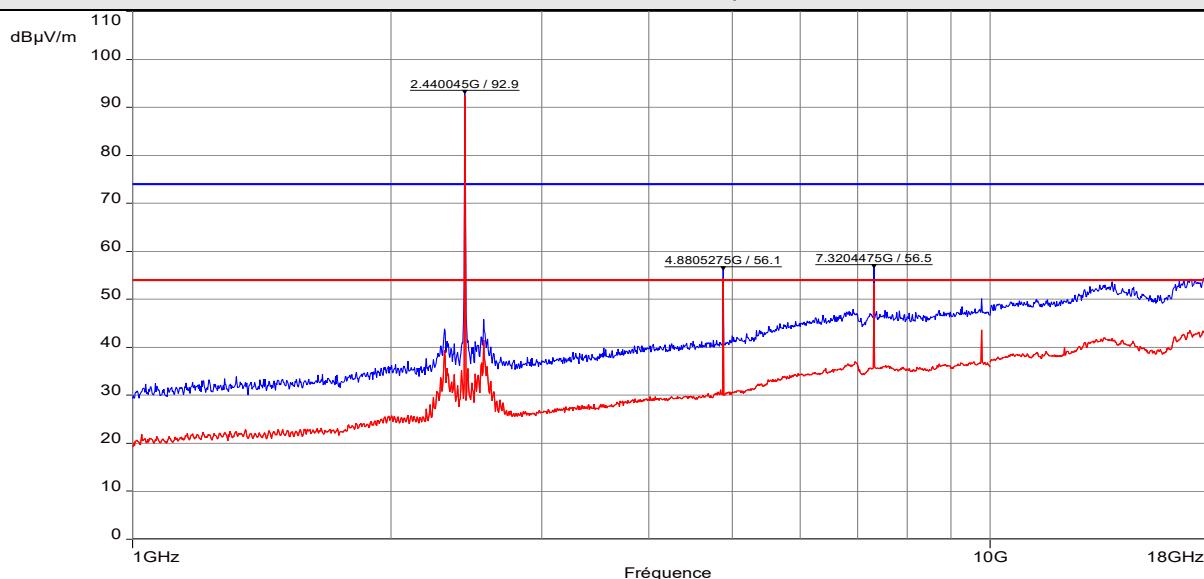
Same result for transmit mode on all channels

Frequency band investigated:	30MHz-1GHz				
Unit :	dB μ V/m				
RBW :	100kHz				
Antenna polarization :	Horizontal & Vertical				
Voltage:	12V DC				
Limit:	FCC 15.209 / RSS-GEN				
Measurement detector:	Peak				
PEAK LIST FROM PRE-SCAN					
Frequency (MHz)	Peak Level (dB μ V/m)	Angle (°)	Limit (dB μ V/m)	Polarization	Comments
185.403	33.9	48.6	43.5	V	

Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 1GHz-18GHz / 3m / Horizontal & Vertical/ Transmit mode) – Low channel


Note: Pre-scan graph only for identification purpose.

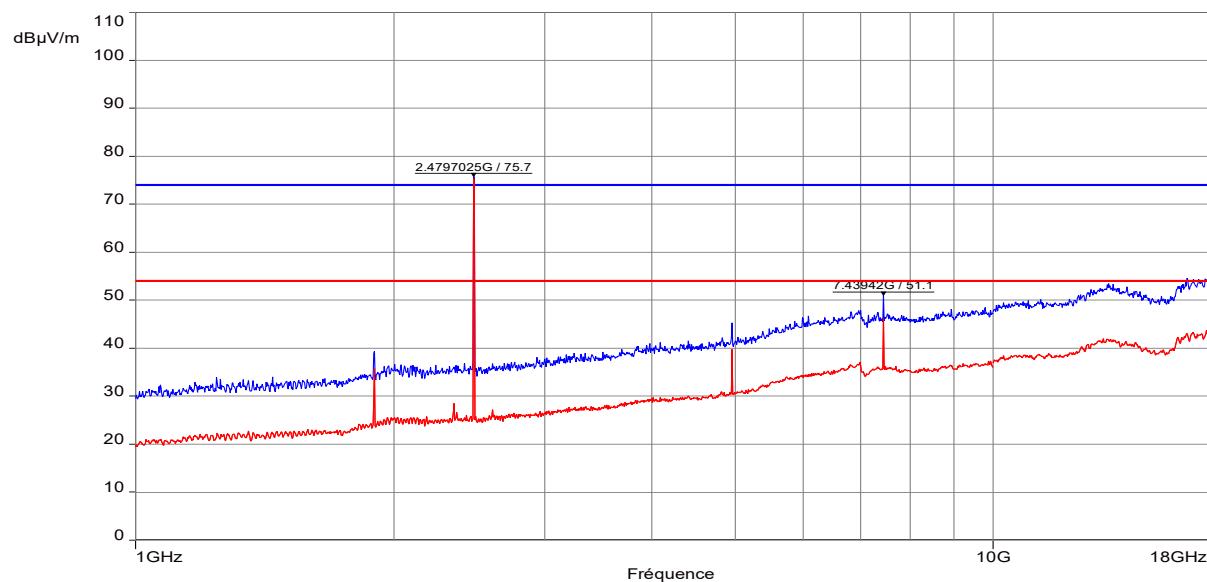
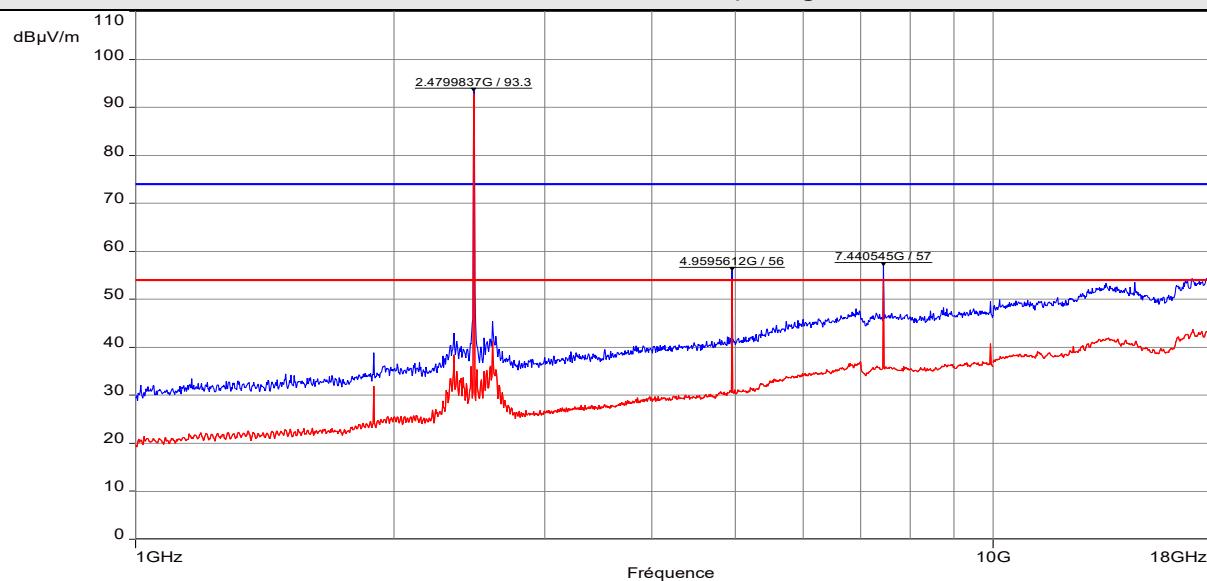
----- : Peak measure	----- : Average measure
Frequency band investigated:	1GHz-18GHz
Unit :	dB μ V/m
RBW :	1MHz
Antenna polarization :	Horizontal & Vertical
Voltage:	12V
Limit:	FCC 15.247 / RSS-247
Measurement detector:	Peak / Average

Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 1GHz-18GHz / 3m / Horizontal & Vertical/ Transmit mode) – Mid channel


Note: Pre-scan graph only for identification purpose.

----- : Peak measure ----- : Average measure

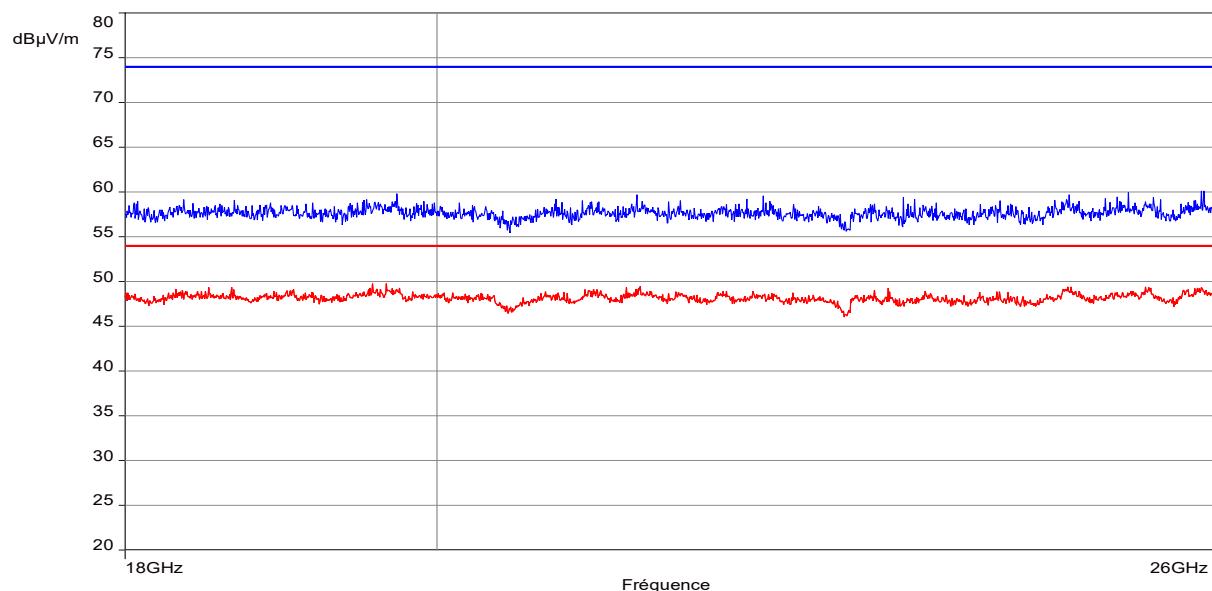
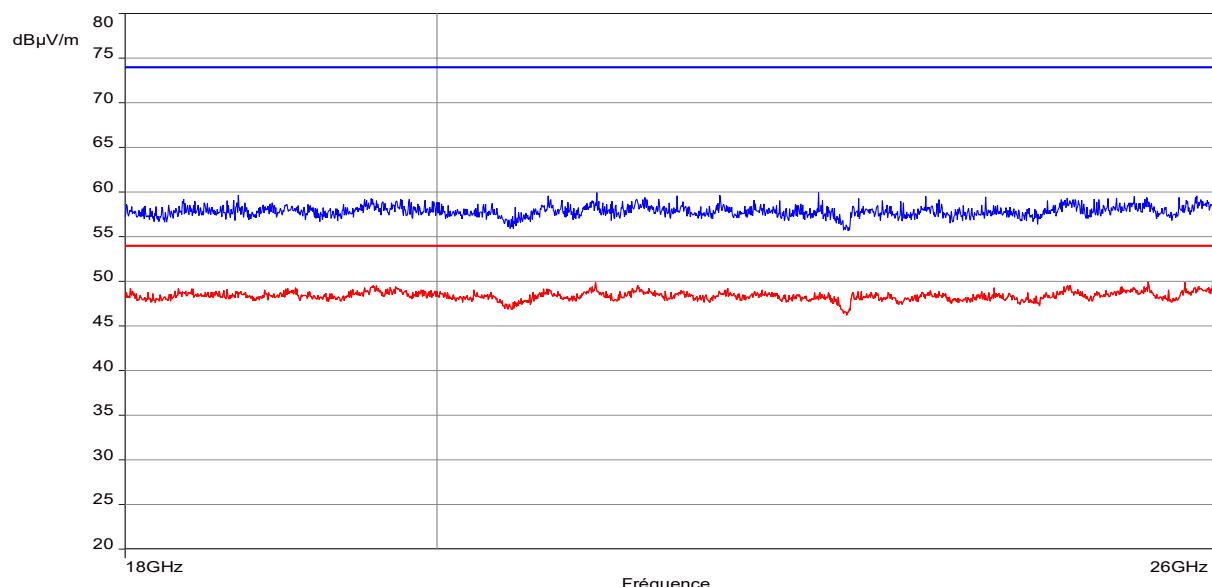
Frequency band investigated:	1GHz-18GHz
Unit :	dBμV/m
RBW :	1MHz
Antenna polarization :	Horizontal & Vertical
Voltage:	12V
Limit:	FCC 15.247 / RSS-247
Measurement detector:	Peak / Average

Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 1GHz-18GHz / 3m / Horizontal & Vertical/ Transmit mode) – High channel


Note: Pre-scan graph only for identification purpose.

----- : Peak measure ----- : Average measure

Frequency band investigated:	1GHz-18GHz
Unit :	dBμV/m
RBW :	1MHz
Antenna polarization :	Horizontal & Vertical
Voltage:	12V
Limit:	FCC 15.247 / RSS-247
Measurement detector:	Peak / Average

Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 18GHz-25GHz / 3m / Horizontal & Vertical/ Transmit mode)


Note: Pre-scan graph only for identification purpose. Pre-scan performed at 1m.
 Same result for transmit mode on all channels.

----- : Peak measure ----- : Average measure

Frequency band investigated: 18GHz-25GHz

Unit : dBμV/m

RBW : 1MHz

Antenna polarization : Horizontal & Vertical

Voltage: 12V

Limit: FCC 15.247 / RSS-247

Measurement detector: Peak / Average

PEAK LIST FROM PRE-SCAN

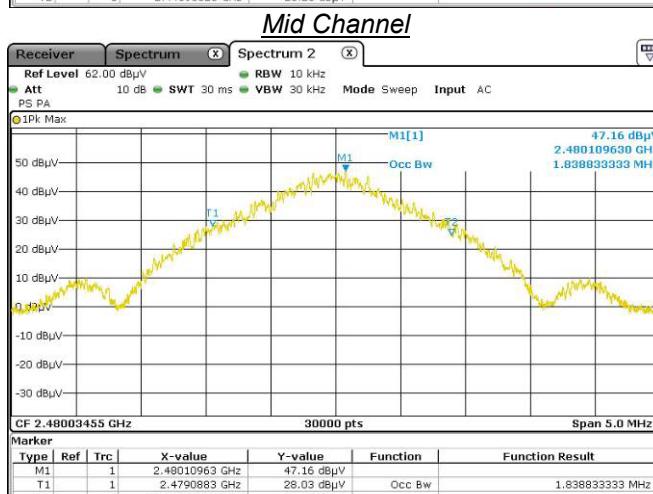
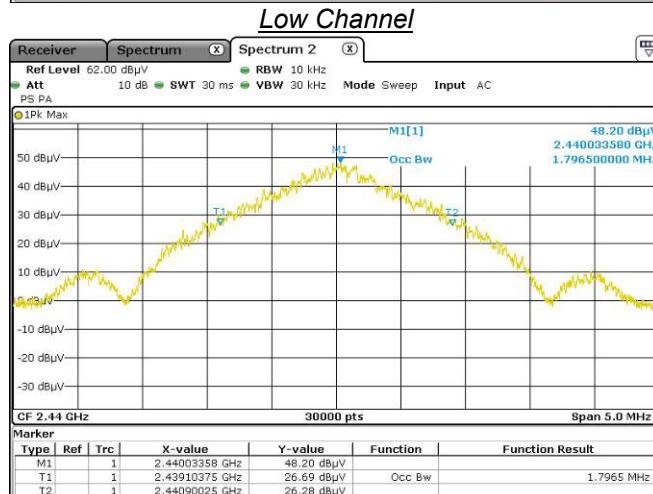
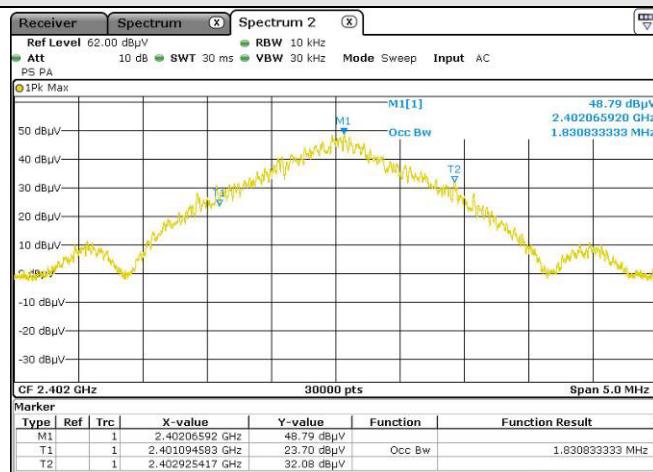
Frequency (MHz)	Peak Level (dBμV/m)	Angle (°)	Limit (dBμV/m)	Polarization	Comments
			None		

16. 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. A radiated measurement is performed. The RBW is set in the range of 1% to 5% of the occupied bandwidth, with VBW $\geq 3 \times$ 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 modulation on low, mid and high channels.			Pass
Laboratory Parameters:	Required prior to the test		During the test
Ambient Temperature	20 to 30 °C		22°C ± 2
Relative Humidity	25 to 70 %		45% ± 5
Supplementary information: Test location: SMEET Test date: April 23th, 2019. Tested by L. CHAPUS			

Test Equipment Used					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Horn antenna	ETS-LINDGREN	3115	ANT-141-013	2018/10	2021/10
RF cable	Pasternack RF	PE302-120	CAB-131-024	2018/4	2019/4
RF cable	HUBER+SUHNER	SF104	CAB-141-030	2018/4	2019/4
Anechoic chamber	COMTEST	214263	CAG-141-001	2017/6	2020/6
Turntable	Innco- Systems	CT0800	PLA-141-001	-	-
Measuring receiver	Rohde&Schwarz	ESRP	REC-151-003	2017/5	2019/5

Tabulated Results for Occupied Bandwidth	
Frequency (MHz)	99% Occupied Bandwidth (MHz)
2402.0	1.8308
2440.0	1.7965
2480.0	1.8388

Graphical representation of Occupied Bandwidth

High Channel

Frequency band investigated:	2400MHz to 2483.5MHz
RBW :	10kHz
Measurement detector:	Peak