TEST REPORT

N°: 157623-727707-A (File#993667-A1) **Version : 02**

Subject	**Electromagnetic compatibility and Radio spectrum Matters (ERM) tests according to standards:** **FCC CFR 47 Part 15, Subpart B and C** **RSS-247 Issue 2.0**
Issued to	**ENLAPS** 29 Chemin du vieux Chêne 38240 - MEYLAN FRANCE
Apparatus under test	
↳ Product	Timelapse digital cameras
↳ Trade mark	**ENLAPS**
↳ Manufacturer	**ENLAPS**
↳ Family Range	**Tikee PRO / Tikee PRO2 / Tikee PRO2+**
↳ Model under test	**Tikee PRO**
↳ Serial number	**T-PRO-OG-200484** **T-PRO-OG-200632**
↳ FCCID	**2ASLI-TIKEE001**
↳ IC	**24785-TIKEE001**
Conclusion	See Test Program chapter §1
Test date	October 8, 2019 to October 29, 2019
Test location	Fontenay Aux Roses
Test Site	6230B-1
Composition of document	64 pages
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PUBLICATION HISTORY

Version	Date	Author	Modification
01	March 19, 2019	Jonathan PAUC	Creation of the document
02	March 31, 2020	Jonathan PAUC	Adding FCC/IC informations

SUMMARY

1. TEST PROGRAM

References

- **47 CFR Part 15.247**
- **RSS 247 Issue 2**
- **RSS Gen Issue 5**
- **KDB 558074 D01 DTS Meas Guidance v05r02**
- **KDB 662911 D01 Multiple Transmitter Output v02r01**
- **ANSI C63.10-2013 / ANSI C63.4-2014**

EMISSION TEST	LIMITS			RESULTS
Limits for conducted disturbance at mains ports 150kHz-30MHz	**Frequency**	**Quasi-peak value (dBµV)**	**Average value (dBµV)**	☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
	150-500kHz	66 to 56	56 to 46	
	0.5-5MHz	56	46	
	5-30MHz	60	50	
Radiated emissions 9kHz-30MHz *CFR 47 §15.209 (a)* *CFR 47 §15.247 (d)* *RSS-247 §5.5*	**Measure at 300m** 9kHz-490kHz : 67.6dBµV/m /F(kHz) **Measure at 30m** 490kHz-1.705MHz : 87.6dBµV/m /F(kHz) 1.705MHz-30MHz : 29.5 dBµV/m			☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
Radiated emissions 30MHz-25GHz* *CFR 47 §15.209 (a)* *CFR 47 §15.247 (d)* *RSS-247 §5.5* ***Highest frequency :*** ***(Declaration of provider)***	**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** ☐ **FAIL** ☐ **NA** ☐ **NP**
Bandwidth 6dB *CFR 47* §15.247 (a) (2) *RSS-247 §5.2*	**At least 500kHz**			☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
Power spectral Density *CFR 47 §15.247 (e)* *RSS-247 §5.2*	**Limit: 8dBm/3kHz**			☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
Maximum Peak Output Power *CFR 47 §15.247 (b)* *RSS-247 §5.4*	**Limit: 30dBm** Conducted or Radiated measurement			☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
Band Edge Measurement *CFR 47 §15.209 (a)* *CFR 47 §15.247 (d)* *RSS-247 §5.5*	**Limit: -20dBc or** **Radiated emissions limits in restricted bands**			☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
Occupied bandwidth *RSS-Gen §6.7*	**No limit**			☑ **PASS** ☐ **FAIL** ☐ **NA** ☐ **NP**
Receiver Spurious Emission** *RSS-Gen §7.3*	**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** ☐ **FAIL** ☑ **NA** ☐ **NP**

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

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

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

2. SYSTEM TEST CONFIGURATION

2.1. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

Equipment under test (EUT):

Tikee PRO **Serial Number: T-PRO-OG-200632**
T-PRO-OG-200484

Photography of EUT

Power supply:
During all the tests, EUT is supplied by V_{nom}: 3.3VDC (on Battery)
For measurement with different voltage, it will be presented in test method.

Name	Type	Rating	Reference / Sn	Comments
Supply1	☐ AC ☑ DC ☐ Battery	100-240/50-60Hz	Apple A1400	only for charging mode not provided with DUT
Supply2	☐ AC ☐ DC ☑ Battery	LeFePo4 3.3V/12.8Ah	REF : TY1865-1S8P-01A	battery

Inputs/outputs - Cable:

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
Supply1	µUSB – used for charging mode	1	☑	☐	☐	

Auxiliary equipment used during test:

Type	Reference	Sn	Comments
Laptop	Lenovo L450	PF0D29NW	/

Equipment information:

Type:	**WIFI**			
Frequency band:	[2400 – 2483.5] MHz			
Sub-band REC7003:	Annex 3 (a)			
Standard:	☑ 802.11b	☑ 802.11g	☑ 802.11n HT20	☐ 802.11n HT40
Spectrum Modulation:	☑ DSSS		☑ OFDM	
Number of Channel:	13			
Spacing channel:	5MHz			
Channel bandwidth:	☑ 20MHz		☐ 40MHz	
Antenna Type:	☑ Integral	☐ External	☐ Dedicated	
Antenna connector:	☐ Yes	☑ No	☐ Temporary for test	
Transmit chains:	☑ 1	☐ 2	☐ 3	☐ 4
	☑ Single antenna	☐ Symmetrical	☐ Asymmetrical	
	Gain 1: 2.5dBi			
Beam forming gain:	☐ Yes		☑ No	
Receiver chains	☑ 1			
Type of equipment:	☑ Stand-alone	☐ Plug-in	☐ Combined	
Ad-Hoc mode:	☑ Yes		☐ No	
Adaptivity mode:	☑ Yes (Load Based)	☐ Off mode	☐ No	
	Clear Channel Assessment Time		NC	
Duty cycle:	☑ Continuous duty	☐ Intermittent duty	☐ 100% duty	
Equipment type:	☑ Production model		☐ Pre-production model	
Operating temperature range:	Tmin:	☑ -20°C	☐ 0°C	☐ X°C
	Tnom:	20°C		
	Tmax:	☐ 35°C	☐ 55°C	☑ 50°C
Type of power source:	☐ AC power supply	☐ DC power supply	☑ Battery	
Operating voltage range:	Vnom:	☐ 230V/50Hz	☑ 3.3Vdc	
Geo-location capability:	☐ Yes (The geographical location determined by the equipment is not accessible to the end user as defined in section 4.3.2.12.2 of ETSI EN 300 328 V2.1.1 standard)		☑ No	
Minimum performance criteria for Receiver blocking test:	☑ PER less than or equal to 10%		☐ Alternative performance criteria (4)	

NC : Not communicated by customer

(4): Description of the alternative performance criteria:

2.2. EUT CONFIGURATION

Configuration N°1: Photo Acquisition	
Firmware	V2
Power supply	Battery
Process	Photo taken in loop

Configuration N°2: Charging Mode	
Power supply	AC/DC switch power supply
Process	Connected to AC/DC power supply

Configuration N°3: WIFI	
Firmware	1.4
Software	Wifi 2.10
Power supply	Battery

Process

The EUT is set in the following modes during tests with simulator / software (**WIFI: 2.10 / 1.4 (NvRam)**

- Permanent emission with modulation on a fixed channel in the data rate that produced the highest power
All tests are performed at Cmin, Cmid and Cmax.

Following commands with the specific test software "**WIFI: 2.10 / 1.4 (NvRam)**" are used to set the product:

TX Command

802.11.b Canal 1 (debit 2Mbps) : 2 -c 1 -a 1 -p 20 -r 2
802.11.b Canal 6 (debit 2Mbps) : 2 -c 6 -a 1 -p 20 -r 2
802.11.b Canal 11 (debit 2Mbps) : 2 -c 11 -a 1 -p 20 -r 2

802.11.g Canal 1 (debit 6Mbps) : 3 -c 1 -a 1 -p 20 -r 6
802.11.g Canal 6 (debit 6Mbps) : 3 -c 6 -a 1 -p 20 -r 6
802.11.g Canal 11 (debit 6Mbps) : 3 -c 11 -a 1 -p 20 -r 6

802.11.n Canal 1 (mcs 0) : 4 -c 1 -a 1 -p 20 -r 1 -m 0
802.11.n Canal 6 (mcs 0) : 4 -c 6 -a 1 -p 20 -r 1 -m 0
802.11.n Canal 11 (mcs 0) : 4 -c 11 -a 1 -p 20 -r 1-m 0

CHANNEL PLAN	
802.11b / 802.11g / 802.11n HT20	
Channel	Frequency (MHz)
Cmin: 1	**2412**
2	2417
3	2422
4	2427
5	2432
Cmid: 6	**2437**
7	2442
8	2447
9	2452
10	2457
Cmax: 11	**2462**

2.3. EQUIPMENT MODIFICATIONS

☑ None ☐ Modification:

2.4. FIELD STRENGTH CALCULATION

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

FS = RA + AF + CF – AG

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

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

2.5. CALIBRATION DATE

The calibration intervals are extended at 12+2 months. This extended interval is based on the fact that there is sufficient calibration data to statistically establish a trend or based on experience of use of the test equipment to assure good measurement results for a longer period

3. CONDUCTED EMISSION DATA

3.1. ENVIRONMENTAL CONDITIONS

Date of test	:	October 9, 2019
Test performed by	:	Jonathan PAUC
Atmospheric pressure (hPa)	:	994
Relative humidity (%)	:	34.
Ambient temperature (°C)	:	24

3.2. TEST SETUP

Mains terminals

The EUT and auxiliaries are set:

☑ 80cm above the ground on the non-conducting table (Table-top equipment)

☐ 10cm above the ground on isolating support (Floor standing equipment)

The distance between the EUT and the LISN is 80cm. The EUT is 40cm away for the vertical ground plane.

The EUT is powered by V_{nom}.

The EUT is powered through a LISN (measure). Auxiliaries are powered by another LISN.

Test setup – Configuration n°2 (charging mode)

Test setup – Configuration n°2 (charging mode)

3.3. TEST METHOD

The product has been tested according to ANSI C63.10 / C63.4 and FCC Part 15 subpart B and C. The product has been tested with 120V/60Hz power line voltage and compared to the FCC Part 15 limits. Measurement bandwidth was 9kHz from 150kHz to 30MHz. This was followed by a Quasi-Peak, i.e. CISPR measurement for any strong signal. If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary. The LISN (measure) is 50Ω / 50µH. The Peak data are shown on plots in annex 1. Quasi-Peak and Average measurements are detailed in a table with frequencies and levels measured. Interconnecting cables and equipment's were moved to position that maximized emission. A summary of the worst case emissions found in all test configurations and modes is shown on the following page.
Measurements are performed on the phase (L1) and neutral (N) of power line voltage. Graphs are obtained in PEAK detection. Measures are also performed in Quasi-Peak and Average for any strong signal.

3.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Cable + self	-	-	A5329578	10/19	10/20
LISN	RHODE & SCHWARZ	ENV216	C2320291	12/18	12/19
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	12/18	12/19
Transient limiter	RHODE & SCHWARZ	ESH3-Z2	A7122204	02/19	02/20

3.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

3.6. TEST RESULTS

Measurements are performed on the phase (L1) and neutral (N) of the power line.
Results: (PEAK detection)

Measure on L1:	graph **Emc#1**	120V/60Hz	(see annex 1)
Measure on N:	graph **Emc#2**	120V/60Hz	(see annex 1)
Measure on L1:	graph **Emc#3**	240V/50Hz	(see annex 1)
Measure on N:	graph **Emc#4**	240V/50Hz	(see annex 1)

3.7. CONCLUSION

Conducted emission data measurement performed on the sample of the product Tikee PRO, SN: T-PRO-OG-200632, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-247 limits.

4. RADIATED EMISSION DATA

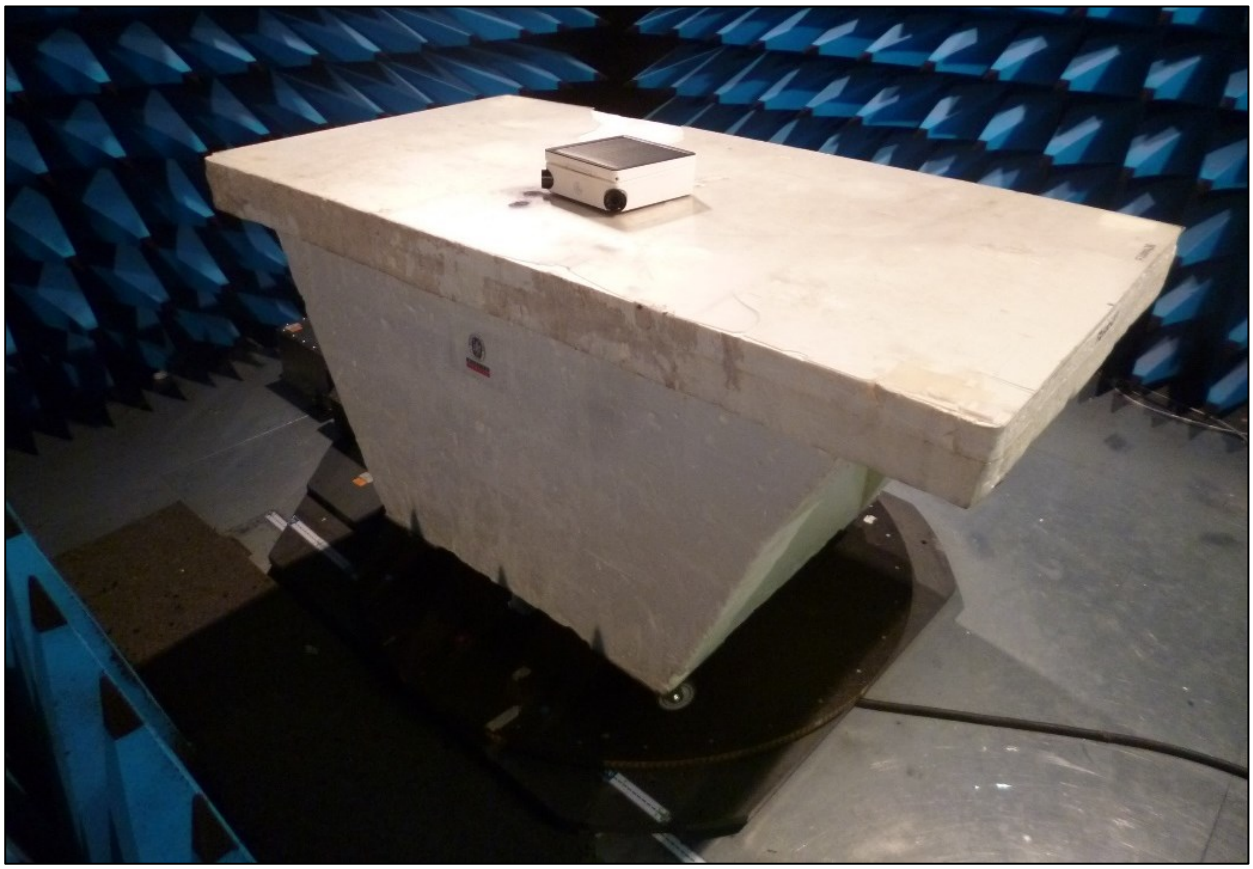
4.1. ENVIRONMENTAL CONDITIONS

Date of test	:	October 15, 2019	October 29, 2019
Test performed by	:	Nicolas BILLAUD	Jonathan PAUC
Atmospheric pressure (hPa)	:	990	995
Relative humidity (%)	:	49	31
Ambient temperature (°C)	:	21	24

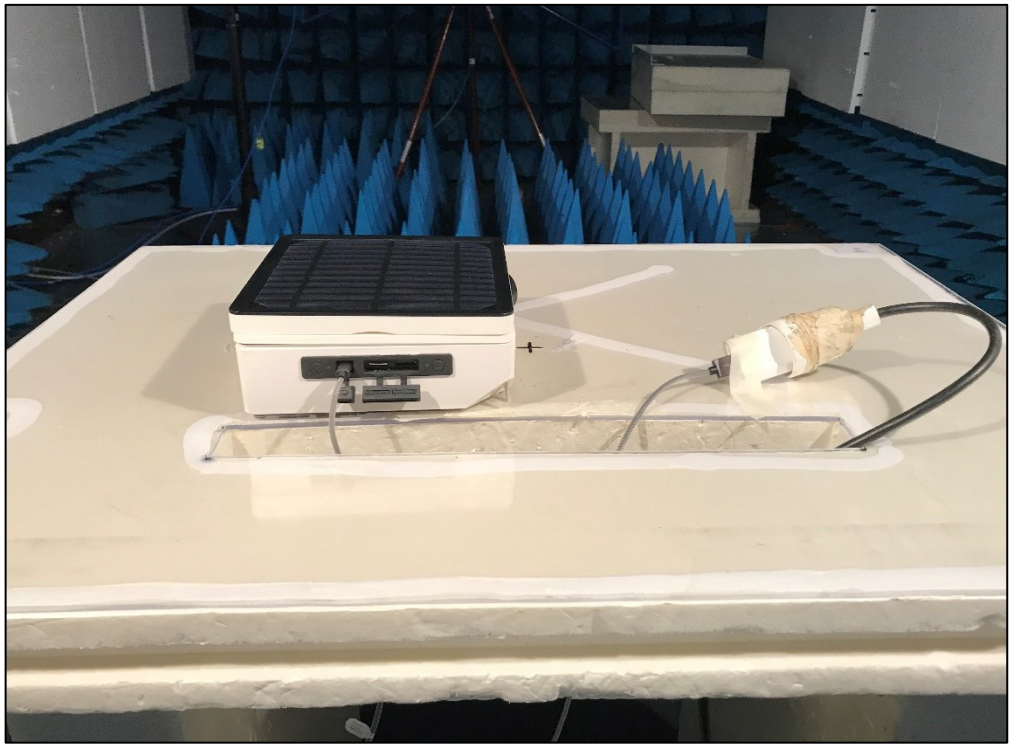
4.2. TEST SETUP

The installation of EUT is identical for pre-characterization measures in a 3 meters semi- anechoic chamber and for measures on the 10 meters Open site.
The EUT and auxiliaries are set:
☑ 80cm above the ground on the non-conducting table (Table-top equipment) - Below 1GHz
☑ 150cm above the ground on the non-conducting table (Table-top equipment) - Above 1GHz
☐ 10cm above the ground on isolating support (Floor standing equipment)
The EUT is powered by V_{nom}.

Test setup on OATS – Configuration n°1

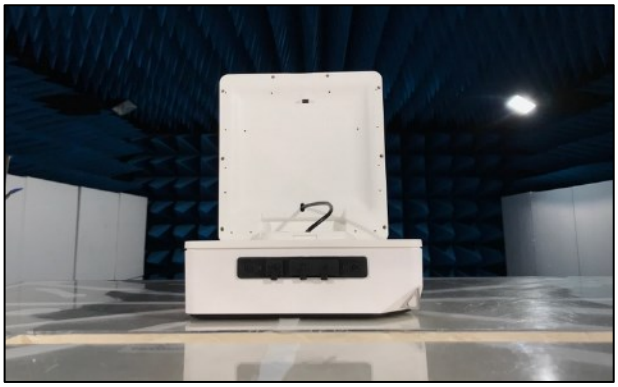


Test setup in anechoic chamber – Configuration n°1 / 3



Test setup in anechoic chamber – Configuration n°2 - Charging mode

XY Position



Z Position

Test setup in anechoic chamber – Configuration n°3 – Wifi

4.3. TEST METHOD

The product has been tested according to ANSI C63.10/ C63.4, FCC part 15 subpart B and C.

Pre-characterisation measurement: (9kHz – 25GHz)
A pre-scan of all the setup has been performed in a 3 meters semi-anechoic chamber for frequency from 30MHz to 25GHz. Test is performed in horizontal (H) and vertical (V) polarization, the loop antenna was rotated during the test to maximize the emission measurement. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on all axis of EUT used in normal configuration.
The pre-characterization graphs are obtained in PEAK detection and PEAK/AVERAGE from 1GHz to 25GHz.

Characterization on 10 meters open site from 9kHz to 1GHz:
Radiated Emissions were measured on an open area test site. A description of the facility is on file with the FCC. The product has been tested at a distance of **10 meters** from the antenna and compared to the FCC part 15 subpart B and C limits. Measurement bandwidth was 9kHz below 30MHz and 120kHz from 30 MHz to 1GHz. Test is performed in horizontal (H) and vertical (V) polarization, the loop antenna was rotated during the test to maximize the emission measurement. The height antenna is varied from 1m to 4m. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on all axis of EUT used in normal configuration. A summary of the worst case emissions found in all test configurations and modes is shown.
Frequency list has been created with anechoic chamber pre-scan results.

Characterization on 3 meters full anechoic chamber from 1GHz to 25GHz:
The product has been tested at a distance of **3 meters** from the antenna and compared to the FCC part 15 subpart B and C limits. Measurement bandwidth was 1MHz from 1GHz to 12.75GHz.
Test is performed in horizontal (H) and vertical (V) polarization. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on all axis of EUT used in normal configuration. A summary of the worst case emissions found in all test configurations and modes is shown.The height antenna is

☐ On mast, varied from 1m to 4m
☑ Fixed and centered on the EUT (EUT smaller than the beamwidth of the measurement antenna, ANSI C63.10 §6.6.5)
Frequency list has been created with anechoic chamber pre-scan results.

4.4. TEST EQUIPMENT LIST

ANECHOIC CHAMBER – Configuration 2 & 3					
DESCRIPTION	**MANUFACTURER**	**MODEL**	**N° LCIE**	**CAL_DATE**	**CAL_DUE**
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078	10/18	10/20
Semi-Anechoic chamber #3	SIEPEL	-	D3044017	03/19	03/21
Turntable chamber (Cage#3)	ETS Lingren	Model 2165	F2000371	-	-
Turntable controller (Cage#3)	ETS Lingren	Model 2090	F2000444		
Table C3	LCIE	-	F2000461	-	-
Rehausse Table C3	LCIE	-	F2000511	-	-
BAT EMC	NEXIO	v3.9.0.10	L1000115	-	-
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060050	12/17	12/19
Amplifier 9kHz - 18GHz	BONN Elektronik	BLNA 3018-BF30S	A7080053		
Cable 1 < GHz	-	< 1GHz	A5329637	02/19	02/20
Cable Measure @3m 18GHz	-	18GHz	A5329038	12/18	12/19
Cable Measure Analyzer-Amplifier SMA	STORMFLEX	26GHz	A5329681	02/19	02/20
Cable Measure @1m	STORMFLEX	26GHz	A5329682	02/19	02/20
Cable Measure @1m	STORMFLEX	26GHz	A5329680	02/19	02/20
High Pass (4.8-18GHz)	BL Microwave	SH4800-1800	A7484034	05/19	05/20
Antenna Bi-log	CHASE	CBL6111A	C2040172	09/18	09/20
Antenna horn 18GHz	EMCO	3115	C2042029	09/18	09/20
Radiated emission comb generator	BARDET	-	A3169050	-	-
HF Radiated emission comb generator	LCIE SUD EST	-	A3169088	-	-

ANECHOIC CHAMBER – Configuration 1					
DESCRIPTION	**MANUFACTURER**	**MODEL**	**N° LCIE**	**CAL_DATE**	**CAL_DUE**
Antenna log-periodic	EMCO	3146	C2040056	-	-
Emission Cable	SUCOFLEX	6GHz	A5329061	02/19	02/20
Emission Cable	-	6GHz	A5329069	11/18	11/19
Cable (OATS)	-	1GHz	A5329623	03/19	03/20
Radiated emission comb generator	BARDET	-	A3169050	-	-
OATS	-	-	F2000409	02/19	02/20
Receiver 20-1000MHz	ROHDE & SCHWARZ	ESVS30	A2642006	12/17	12/19
BAT EMC	NEXIO	v3.9.0.10	L1000115	-	-
Facteur OATS 30M-1GHz	LCIE	V3	L2000042		
Turntable / Mast controller (OATS)	ETS Lindgren	Model 2066	F2000372	-	-
Antenna mast (OATS)	ETS Lindgren	2071-2	F2000392	-	-
Turntable (OATS)	ETS Lindgren	Model 2187	F2000403	-	-
Table C1/OATS	MATURO Gmbh	-	F2000437	-	-
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	08/18	08/20
Amplifier 0.1MHz – 1300 MHz	HEWLETT PACKARD	8447D	A7085009	01/19	01/20
Antenna Bi-Log XWing	TESEQ	CBL6144	C2040146	03/19	03/20
Antenna horn 18GHz	EMCO	3115	C2042027	04/18	04/20
Emission Cable	MICRO-COAX	6GHz	A5329654	06/19	06/20
Emission Cable	MICRO-COAX	6GHz	A5329655	06/19	06/20
Emission Cable	MICRO-COAX	6GHz	A5329656	06/19	06/20
Semi-Anechoic chamber #2	SIEPEL	-	D3044015	04/19	04/20
Radiated emission comb generator	BARDET	-	A3169050	-	-
HF Radiated emission comb generator	LCIE SUD EST	-	A3169088	-	-
Spectrum Analyzer 9kHz - 6GHz	ROHDE & SCHWARZ	FSL6	A2642020	06/18	06/20
BAT EMC	NEXIO	v3.9.0.10	L1000115	-	-
Thermo-hygrometer (C2)	LACROSS Techn.	WS-2357	B4206015	10/18	10/20
Turntable controller (Cage#2)	ETS Lingren	Model 2066	F2000393	-	-
Turntable chamber (Cage#2)	ETS Lingren	Model 2165	F2000404	-	-
Table C2/OATS	LCIE	-	F2000438	-	-

4.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

4.6. TEST RESULTS

4.6.1. Pre-characterization at 3 meters [30MHz-1GHz]

See graphs for 30MHz-1GHz:

Graph identifier		Polarization	Mode	EUT position	Comments
Emr#	1	H & V	Cfg n°1 –Acquisition Mode	Axis XY	ee annex 1
Emr#	2	H & V	Cfg n°1 –Acquisition Mode	Axis Z	ee annex 1
Emr#	5	H & V	Cfg n°2 – Charging Mode	Axis XY	ee annex 1
Emr#	6	H & V	Cfg n°2 – Charging Mode	Axis Z	ee annex 1

4.6.2. Pre-characterization at 3 meters [1GHz-6GHz]

See graphs for 1GHz-6GHz:

Graph identifier		Polarization	Mode	EUT position	Comments
Emr#	3	H & V	Cfg n°1 –Acquisition Mode	Axis XY	See annex 1
Emr#	4	H & V	Cfg n°1 –Acquisition Mode	Axis Z	See annex 1
Emr#	7	H & V	Cfg n°2 – Charging Mode	Axis XY	See annex 1
Emr#	8	H & V	Cfg n°2 – Charging Mode	Axis Z	See annex 1

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

Worst case final data result:
Frequency list has been created with semi-anechoic chamber pre-scan results.
Measurements are performed using a QUASI-PEAK detection.

Test Frequency (MHz)	Meter Reading dB(µV)	Detector (Pk/QP/Av)	Polarity (V/H)	Azimuth (Degrees)	Antenna Height (cm)	Transducer Factor (dB)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Remark
648.040	18.3	QP	V	80	150	25.4	43.7	46.0	**-2.3**	Cfg 1
792.120	10.5	QP	V	80	150	28.3	38.8	46.0	**-7.2**	Cfg 1
648.040	20.5	QP	H	90	160	25.4	45.9	46.0	**-0.1**	Cfg 1
792.120	10.5	QP	H	90	160	28.3	38.8	46.0	**-7.2**	Cfg 1

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

4.6.4. Characterization on 3meters anechoic chamber from 1GHz to 12.75GHz

Worst case final data result:
The frequency list is created from the results obtained during the pre-characterization in anechoic chamber.
Measurements are performed using a PEAK and AVERAGE detection.

Frequency (MHz)	Pol	Mes.Avg (dBµV/m)	Limite (dBµV/m)	Mes.-Lim. (dB)	Correction (dB)	Channel
2364.121	V	13.7	54	-40.3	30.4	**Cmin**
2368.437	V	18	54	-36.0	30.4	**Cmin**
2377.336	V	20.8	54	-33.2	30.4	**Cmin**
2381.831	V	27.8	54	-26.2	30.5	**Cmin**
2386.22	V	25.2	54	-28.8	30.5	**Cmin**
2387.674	V	33.7	54	-20.3	30.5	**Cmin**
4824.041	V	24.4	54	-29.6	1.7	**Cmin**

Frequency (MHz)	Pol	Mes.Peak (dBµV/m)	Limite (dBµV/m)	Mes.-Lim. (dB)	Correction (dB)	Channel
2364.121	V	44.4	74	-29.6	30.4	**Cmin**
2368.437	V	46.9	74	-27.1	30.4	**Cmin**
2377.336	V	46.8	74	-27.2	30.4	**Cmin**
2381.831	V	55.4	74	-18.6	30.5	**Cmin**
2386.22	V	59	74	-15	30.5	**Cmin**
2387.674	V	58.5	74	-15.5	30.5	**Cmin**
4824.041	V	45.7	74	-28.3	1.7	**Cmin**

Frequency (MHz)	Pol	Mes.Avg (dBµV/m)	Limite (dBµV/m)	Mes.-Lim. (dB)	Correction (dB)	Channel
2364.062	H	21.1	54	-32.9	30.4	**Cmin**
2368.526	H	22.6	54	-31.4	30.4	**Cmin**
2377.358	H	23.9	54	-30.1	30.4	**Cmin**
2381.773	H	33	54	-21.0	30.5	**Cmin**
2387.628	H	34.8	54	-19.2	30.5	**Cmin**
4823.832	H	13	54	-41	1.7	**Cmin**

Frequency (MHz)	Pol	Mes.Peak (dBµV/m)	Limite (dBµV/m)	Mes.-Lim. (dB)	Correction (dB)	Channel
2364.062	H	48.6	74	-25.4	30.4	**Cmin**
2368.526	H	52.8	74	-21.2	30.4	**Cmin**
2377.358	H	47.7	74	-26.3	30.4	**Cmin**
2381.773	H	61.9	74	-12.1	30.5	**Cmin**
2387.628	H	63.1	74	-10.9	30.5	**Cmin**
4823.832	H	45.2	74	-28.8	1.7	**Cmin**

Note: Measures have been done at 3m distance.

Frequency (MHz)	Pol	Mes.Avg (dBµV/m)	Limit (dBµV/m)	Mes.-Lim. (dB)	Correction (dB)	Channel
4874.107	H	20.7	54	-33.3	1.9	**Cmid**

Frequency (MHz)	Pol	Mes.Peak (dBµV/m)	Limit (dBµV/m)	Mes.-Lim. (dB)	Correction (dB)	Channel
4874.107	H	44.7	74	-29.3	1.9	**Cmid**

Frequency (MHz)	Pol	Mes.Avg (dBµV/m)	Limit (dBµV/m)	Mes.-Lim. (dB)	Correction (dB)	Channel
4874.133	V	19.8	54	-34.2	1.9	**Cmid**

Frequency (MHz)	Pol	Mes.Peak (dBµV/m)	Limit (dBµV/m)	Mes.-Lim. (dB)	Correction (dB)	Channel
4874.133	V	41.7	74	-32.3	1.9	**Cmid**

Note: Measures have been done at 3m distance.

Frequency (MHz)	Pol	Mes.Avg (dBµV/m)	Limit (dBµV/m)	Mes.-Lim. (dB)	Correction (dB)	Channel
2483.823	H	41	54	-13	31	**Cmax**
2484.431	H	39.1	54	-14.9	31	**Cmax**
2484.758	H	41.6	54	-12.4	31	**Cmax**
2485.185	H	35.7	54	-18.3	31	**Cmax**
2485.297	H	38.8	54	-15.2	31	**Cmax**
2486.202	H	36.9	54	-17.1	31	**Cmax**
2488.244	H	37.2	54	-16.8	31	**Cmax**
2488.909	H	31.6	54	-22.4	31	**Cmax**
2489.614	H	30.1	54	-23.9	31	**Cmax**
2490.204	H	28.5	54	-25.5	31	**Cmax**
2490.852	H	27.2	54	-26.8	31	**Cmax**
2491.511	H	31.1	54	-22.9	31	**Cmax**
2492.134	H	29	54	-25	31	**Cmax**
2492.862	H	39.4	54	-14.6	31	**Cmax**
2494.159	H	35	54	-19	31	**Cmax**
2494.809	H	44.1	54	-9.9	31	**Cmax**
2496.091	H	37.6	54	-16.4	31	**Cmax**
2496.774	H	26.1	54	-27.9	31	**Cmax**
2497.411	H	37.8	54	-16.2	31	**Cmax**
2497.841	H	28.6	54	-25.4	31	**Cmax**
2498.509	H	40	54	-14	31	**Cmax**
2499.108	H	45	54	-9	31	**Cmax**
2499.752	H	33.1	54	-20.9	31	**Cmax**
4923.607	H	25.1	54	-28.9	2.1	**Cmax**

Note: Measures have been done at 3m distance.

Frequency (MHz)	Pol	Mes.Peak (dBµV/m)	Limit (dBµV/m)	Mes.-Lim. (dB)	Correction (dB)	Channel
2483.823	H	63	74	-11	31	**Cmax**
2484.431	H	57.3	74	-16.7	31	**Cmax**
2484.758	H	61	74	-13	31	**Cmax**
2485.185	H	56.4	74	-17.6	31	**Cmax**
2485.297	H	61.5	74	-12.5	31	**Cmax**
2486.202	H	56.5	74	-17.5	31	**Cmax**
2488.244	H	58.8	74	-15.2	31	**Cmax**
2488.909	H	53.6	74	-20.4	31	**Cmax**
2489.614	H	52.6	74	-21.4	31	**Cmax**
2490.204	H	54.5	74	-19.5	31	**Cmax**
2490.852	H	55.2	74	-18.8	31	**Cmax**
2491.511	H	54.7	74	-19.3	31	**Cmax**
2492.134	H	47.8	74	-26.2	31	**Cmax**
2492.862	H	57.6	74	-16.4	31	**Cmax**
2494.159	H	58.6	74	-15.4	31	**Cmax**
2494.809	H	59.4	74	-14.6	31	**Cmax**
2496.091	H	59.3	74	-14.7	31	**Cmax**
2496.774	H	58.2	74	-15.8	31	**Cmax**
2497.411	H	58.5	74	-15.5	31	**Cmax**
2497.841	H	50.2	74	-23.8	31	**Cmax**
2498.509	H	58.7	74	-15.3	31	**Cmax**
2499.108	H	59.8	74	-14.2	31	**Cmax**
2499.752	H	53.2	74	-20.8	31	**Cmax**
4923.607	H	46.7	74	-27.3	2.1	**Cmax**

Note: Measures have been done at 3m distance.

Frequency (MHz)	Pol	Mes.Avg (dBµV/m)	Limite (dBµV/m)	Mes.-Lim. (dB)	Correction (dB)	Channel
2483.855	V	40.8	54	-13.2	31	**Cmax**
2484.495	V	37	54	-17	31	**Cmax**
2484.717	V	36.8	54	-17.2	31	**Cmax**
2485.097	V	39.1	54	-14.9	31	**Cmax**
2485.431	V	32.4	54	-21.6	31	**Cmax**
2486.198	V	37.7	54	-16.3	31	**Cmax**
2488.274	V	33.8	54	-20.2	31	**Cmax**
2488.914	V	33.9	54	-20.1	31	**Cmax**
2489.596	V	28.6	54	-25.4	31	**Cmax**
2490.244	V	22.9	54	-31.1	31	**Cmax**
2490.846	V	35.8	54	-18.2	31	**Cmax**
2491.561	V	26.6	54	-27.4	31	**Cmax**
2492.197	V	25.5	54	-28.5	31	**Cmax**
2492.801	V	29.7	54	-24.3	31	**Cmax**
2494.179	V	34.9	54	-19.1	31	**Cmax**
2494.831	V	39.3	54	-14.7	31	**Cmax**
2495.705	V	31	54	-23	31	**Cmax**
2496.085	V	40.5	54	-13.5	31	**Cmax**
2496.826	V	41.8	54	-12.2	31	**Cmax**
2497.497	V	40.4	54	-13.6	31	**Cmax**
2497.845	V	38.6	54	-15.4	31	**Cmax**
2498.479	V	40.4	54	-13.6	31	**Cmax**
2499.17	V	27.6	54	-26.4	31	**Cmax**
2499.729	V	40.2	54	-13.8	31	**Cmax**
2551.325	V	26.9	54	-27.1	31.2	**Cmax**
4923.785	V	28.9	54	-25.1	2.1	**Cmax**

Note: Measures have been done at 3m distance.

Frequency (MHz)	Pol	Mes.Peak (dBµV/m)	Limite (dBµV/m)	Mes.-Lim. (dB)	Correction (dB)	Channel
2483.855	V	61.2	74	-12.8	31	**Cmax**
2484.495	V	63	74	-11	31	**Cmax**
2484.717	V	58.4	74	-15.6	31	**Cmax**
2485.097	V	60.9	74	-13.1	31	**Cmax**
2485.431	V	60.6	74	-13.4	31	**Cmax**
2486.198	V	58.5	74	-15.5	31	**Cmax**
2488.274	V	59.8	74	-14.2	31	**Cmax**
2488.914	V	54.8	74	-19.2	31	**Cmax**
2489.596	V	54.5	74	-19.5	31	**Cmax**
2490.244	V	54.2	74	-19.8	31	**Cmax**
2490.846	V	53.4	74	-20.6	31	**Cmax**
2491.561	V	55.4	74	-18.6	31	**Cmax**
2492.197	V	49.9	74	-24.1	31	**Cmax**
2492.801	V	52.4	74	-21.6	31	**Cmax**
2494.179	V	56.1	74	-17.9	31	**Cmax**
2494.831	V	55.8	74	-18.2	31	**Cmax**
2495.705	V	55.8	74	-18.2	31	**Cmax**
2496.085	V	59.9	74	-14.1	31	**Cmax**
2496.826	V	60.1	74	-13.9	31	**Cmax**
2497.497	V	59.7	74	-14.3	31	**Cmax**
2497.845	V	58.8	74	-15.2	31	**Cmax**
2498.479	V	59.3	74	-14.7	31	**Cmax**
2499.17	V	60.3	74	-13.7	31	**Cmax**
2499.729	V	60	74	-14	31	**Cmax**
2551.325	V	49	74	-25	31.2	**Cmax**
4923.785	V	47.6	74	-26.4	2.1	**Cmax**

Note: Measures have been done at 3m distance.

4.7. CONCLUSION

Radiated emission data measurement performed on the sample of the product Tikee PRO, SN:T-PRO-OG-200632 , in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-247 limits.

5. BANDWIDTH (15.247)

5.1. TEST CONDITIONS

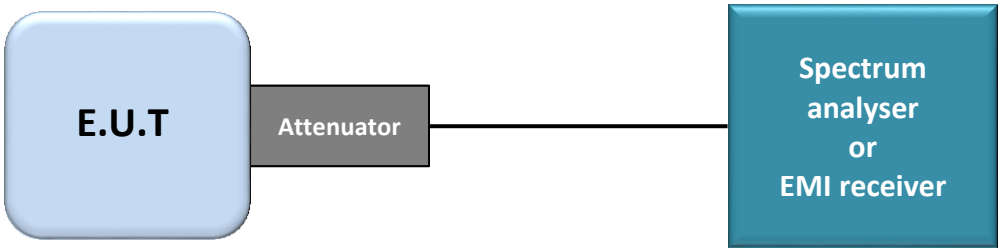
Date of test	:	October 8, 2019
Test performed by	:	Jonathan PAUC
Atmospheric pressure (hPa)	:	996
Relative humidity (%)	:	22.1
Ambient temperature (°C)	:	54.1

5.2. SETUP

☑ ***Conducted measurement:***
The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.
Offset: Attenuator+cable 26.4dB

☐ ***Radiated measurement:***
The EUT is placed in an anechoic chamber; the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete, a delta marker is used to measure the frequency difference as the emission bandwidth.

Measurement Procedure:
☑ KDB 558074 D01 DTS Meas Guidance v05r02 § 8.2
1. Set resolution bandwidth (RBW) = 100kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission. Compare the resultant bandwidth with the RBW setting of the analyzer.



Test set up of 6dB Emission Bandwidth

5.3. TEST EQUIPMENT LIST

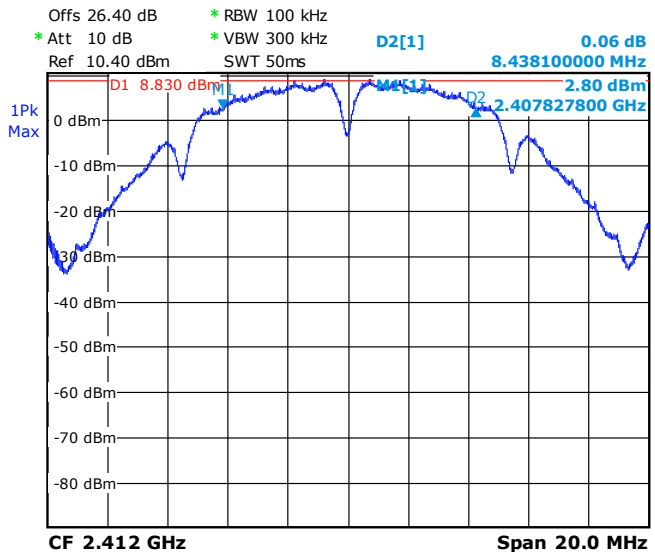
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Attenuator 10dB	AEROFLEX	-	A7122267	06/19	06/20
Attenuator 10dB	AEROFLEX	-	A7122268	06/19	06/20
Cable SMA 60cm	STORMFLEX	6GHz	A5329636	02/19	02/20
Cable SMA 3m	-	-	A5329373	01/19	01/20
Spectrum analyzer	ROHDE & SCHWARZ	FSL	A4060049	06/19	06/20

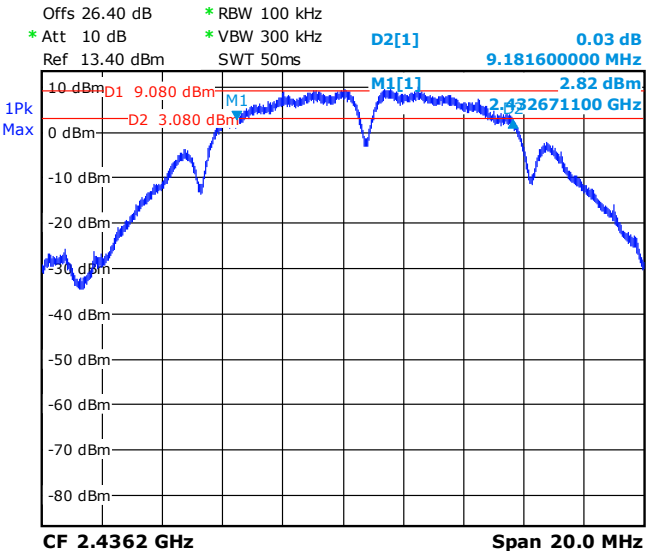
5.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

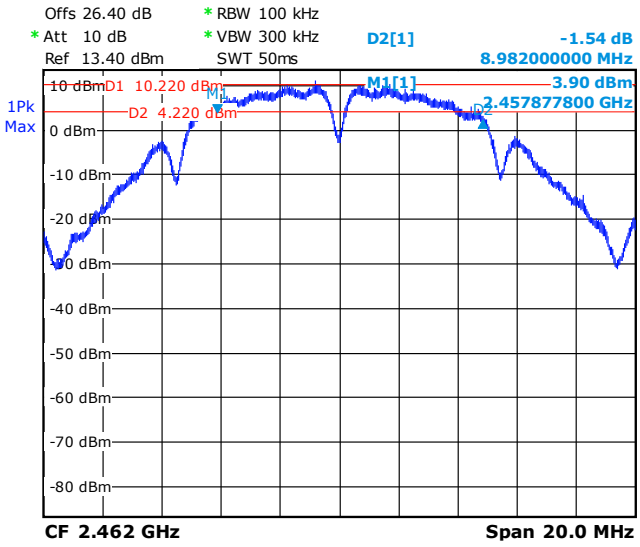
☑ None ☐ Divergence:

5.5. TEST SEQUENCE AND RESULTS

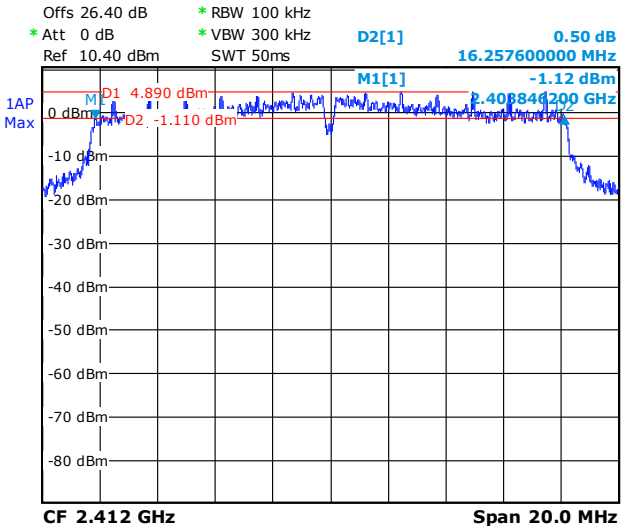
802.11b (2Mbps)			
Channel	**Channel Frequency(MHz)**	**6dB Bandwidth (MHz)**	**Bandwidth Limit(MHz)**
1	2412	**8.438**	**>0.5**
6	2437	**9.182**	**>0.5**
11	2462	**8.982**	**>0.5**

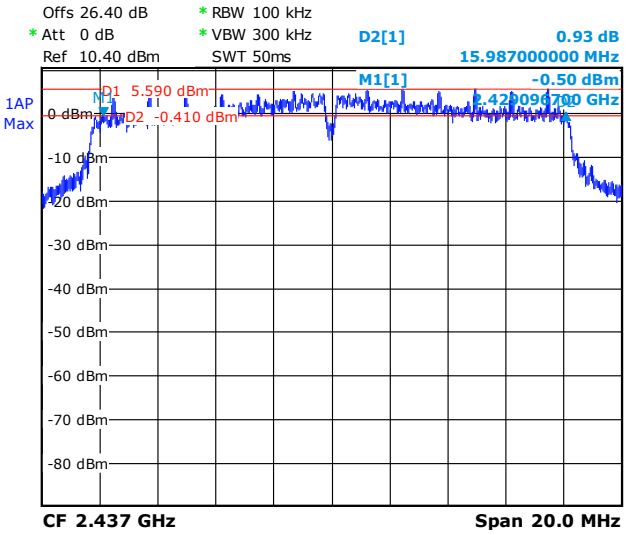


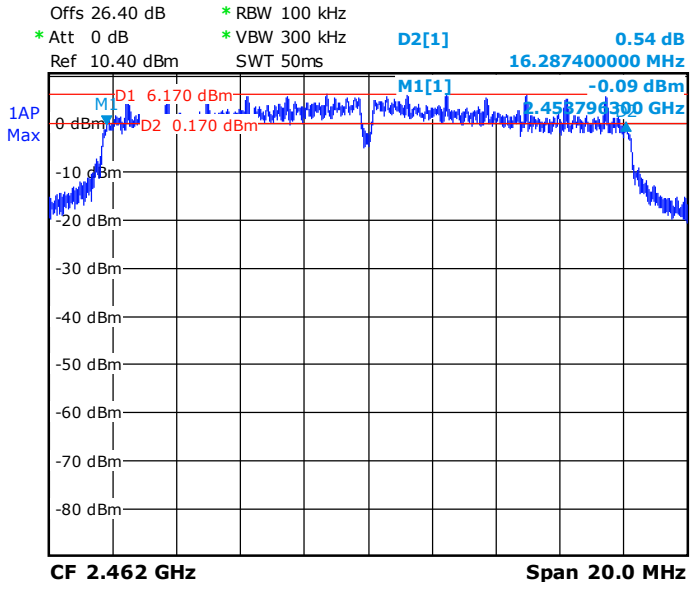




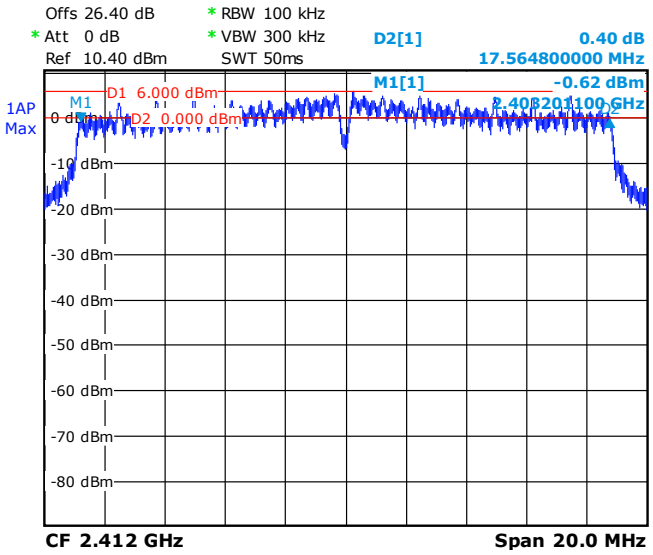
802.11g (6Mbps)			
Channel	**Channel Frequency(MHz)**	**6dB Bandwidth (MHz)**	**Bandwidth Limit(MHz)**
1	2412	**16.257**	**>0.5**
6	2437	**15.987**	**>0.5**
11	2462	**16.287**	**>0.5**

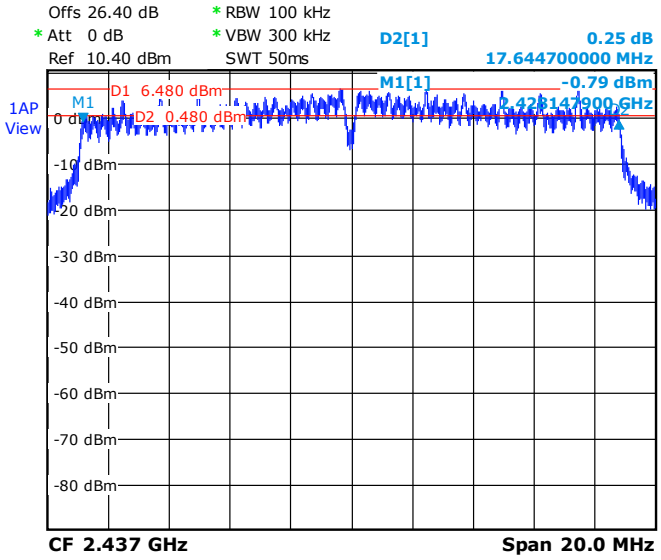


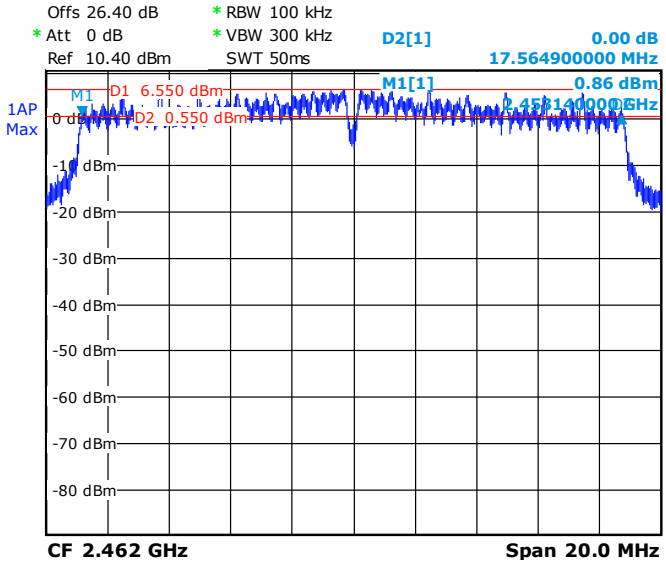




802.11n HT20 (MCS0)			
Channel	**Channel Frequency(MHz)**	**6dB Bandwidth (MHz)**	**Bandwidth Limit(MHz)**
1	2412	**17.564**	**>0.5**
6	2437	**17.644**	**>0.5**
11	2462	**17.564**	**>0.5**







5.1. CONCLUSION

Bandwidth measurement performed on the sample of the product Tikee PRO, SN: T-PRO-OG-200484, in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-247 limits.

6. MAXIMUM PEAK OUTPUT POWER (15.247)

6.1. TEST CONDITIONS

Date of test	:	October 8, 2019
Test performed by	:	Jonathan PAUC
Atmospheric pressure (hPa)	:	996
Relative humidity (%)	:	34.1
Ambient temperature (°C)	:	24.1

6.2. SETUP

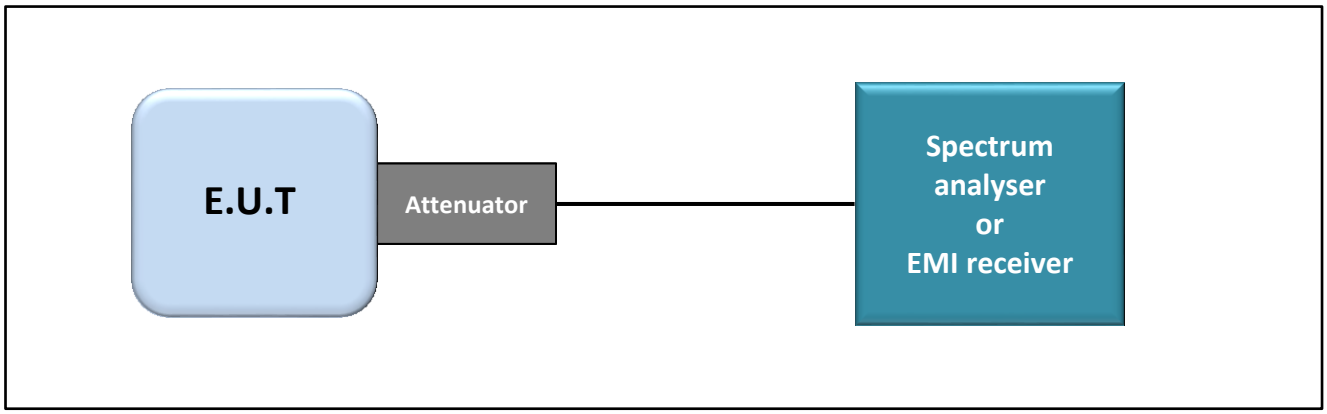
☑ ***Conducted measurement:***
The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency.
Offset: Attenuator+cable 26.4dB
☑ KDB 558074 D01 DTS Meas Guidance v05r02 § 8.3.1.2

☐ ***Radiated measurement:***
The EUT is placed in an anechoic chamber; the center frequency of the spectrum analyzer is set to the fundamental frequency.
The product has been tested at a distance of 3 meters from the antenna. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on 3 axis of EUT. A summary of the worst case emissions found in all test configurations and modes is shown on following table. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.
To demonstrate compliance with peak output power requirement of section 15.247 (b), the transmitter's peak output power is calculated using the following equation:

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

Where:
- E is the measured maximum fundamental field strength in V/m.
- G is the numeric gain of the transmitting antenna with reference to an isotropic radiator.
- d is the distance in meters from which the field strength was measured.
- P is the power in watts for which you are solving:

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



Test set up of Maximum Conducted Output Power

Maximum peak conducted output power

One of the following procedures may be used to determine the maximum peak conducted output power of a DTS EUT.

- ☑ ***RBW ≥ DTS bandwidth***

This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

a) Set the RBW ≥ DTS bandwidth.
b) Set VBW ≥ 3 x RBW.
c) Set span ≥ 3 x RBW
d) Sweep time = auto couple.
e) Detector = peak.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use peak marker function to determine the peak amplitude level.

- ☐ ***Integrated band power method***

This procedure may be used when the maximum available RBW of the measurement instrument is less than the DTS bandwidth.

a) Set the RBW = 1 MHz.
b) Set the VBW ≥ 3 x RBW
c) Set the span ≥ 1.5 x DTS bandwidth.
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges

6.3. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Attenuator 10dB	AEROFLEX	-	A7122267	06/19	06/20
Attenuator 10dB	AEROFLEX	-	A7122268	06/19	06/20
Cable SMA 60cm	STORMFLEX	6GHz	A5329636	02/19	02/20
Cable SMA 3m	-	-	A5329373	01/19	01/20
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060051	06/19	06/20
RF Power sensor	DARE	RPR3006W	A1503030	06/19	06/20

** Under derogation*

6.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

6.5. TEST SEQUENCE AND RESULTS

Modulation: Modulation: **802.11.b (2Mbps)**

Channel	Channel Frequency (MHz)	Peak Output Power (dBm)	Power Limit (dBm)
Cmin (1)	2412	**11.4**	30.0
Cmid (6)	2437	**12.6**	30.0
Cmax (11	2462	**13.1**	30.0

Modulation: Modulation: **802.11.g (6MHz)**

Channel	Channel Frequency (MHz)	Peak Output Power (dBm)	Power Limit (dBm)
Cmin (1)	2412	**10.3**	30.0
Cmid (6)	2437	**11.0**	30.0
Cmax (11)	2462	**11.5**	30.0

Modulation: Modulation: **802.11.n (MCS0)**

Channel	Channel Frequency (MHz)	Peak Output Power (dBm)	Power Limit (dBm)
Cmin (1)	2412	**10.1**	30.0
Cmid (6)	2437	**10.9**	30.0
Cmax (11	2462	**11.6**	30.0

6.6. CONCLUSION

Maximum Peak Output Power measurement performed on the sample of the product Tikee PRO, SN:T-PRO-OG-200484 , in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-247 limits.

7. POWER SPECTRAL DENSITY (15.247)

7.1. TEST CONDITIONS

Date of test	:	October 8, 2019
Test performed by	:	Jonathan PAUC
Atmospheric pressure (hPa)	:	996
Relative humidity (%)	:	34.1
Ambient temperature (°C)	:	24.1

7.2. SETUP

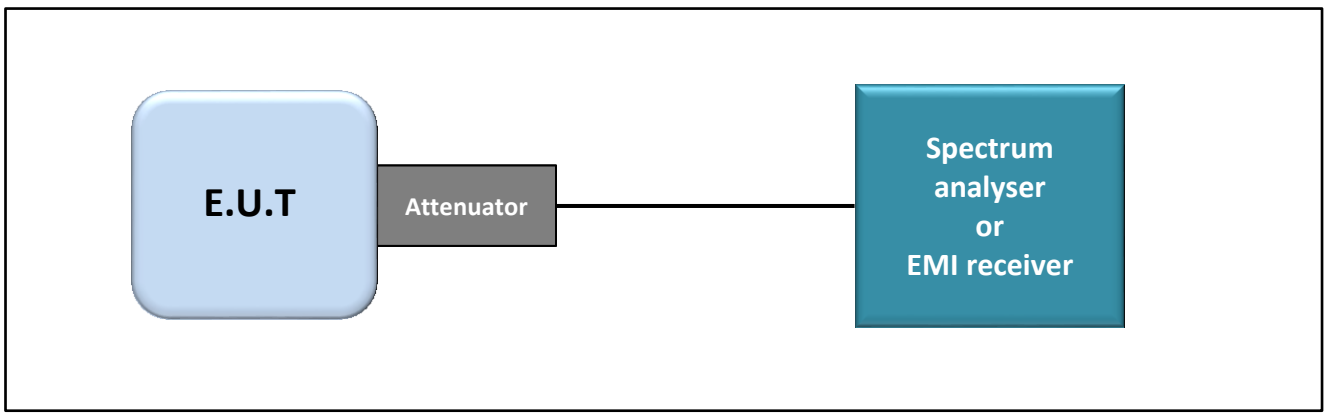
☑ ***Conducted measurement:***
The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency.
Offset: Attenuator+cable 20.3dB
☑ KDB 558074 D01 DTS Meas Guidance v05r02 § 8.4 (Method PKPSD)

☐ ***Radiated measurement:***
The EUT is placed in an anechoic chamber; the center frequency of the spectrum analyzer is set to the fundamental frequency.
The product has been tested at a distance of 3 meters from the antenna. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on 3 axis of EUT. A summary of the worst case emissions found in all test configurations and modes is shown on following table. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.
To demonstrate compliance with peak output power requirement of section 15.247 (b), the transmitter's peak output power is calculated using the following equation:

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

Where:
- E is the measured maximum fundamental field strength in V/m.
- G is the numeric gain of the transmitting antenna with reference to an isotropic radiator.
- d is the distance in meters from which the field strength was measured.
- P is the power in watts for which you are solving:

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



Test set up of Power Spectral Density

Measurement Procedure PKPSD:
a) Set analyzer center frequency to DTS channel center frequency.
b) Set the span to 1.5 times the DTS bandwidth.
c) Set the RBW to: 3 kHz.
d) Set the VBW ≥ 3 x RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW.
j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

7.3. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Attenuator 10dB	AEROFLEX	-	A7122267	06/19	06/20
Attenuator 10dB	AEROFLEX	-	A7122268	06/19	06/20
Cable SMA 60cm	STORMFLEX	6GHz	A5329636	02/19	02/20
Cable SMA 3m	-	-	A5329373	01/19	01/20
Spectrum analyzer	ROHDE & SCHWARZ	FSL	A4060049	06/19	06/20

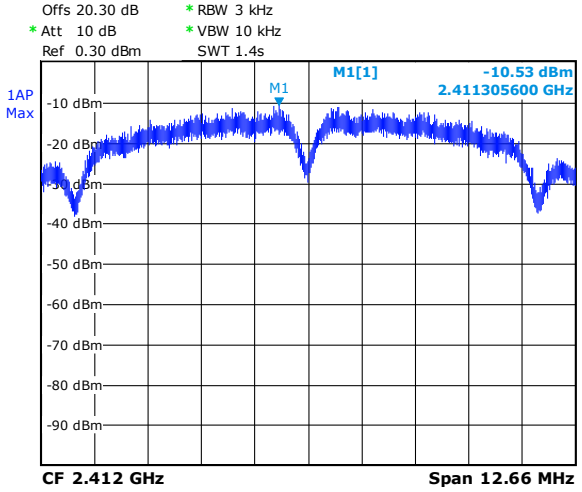
7.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

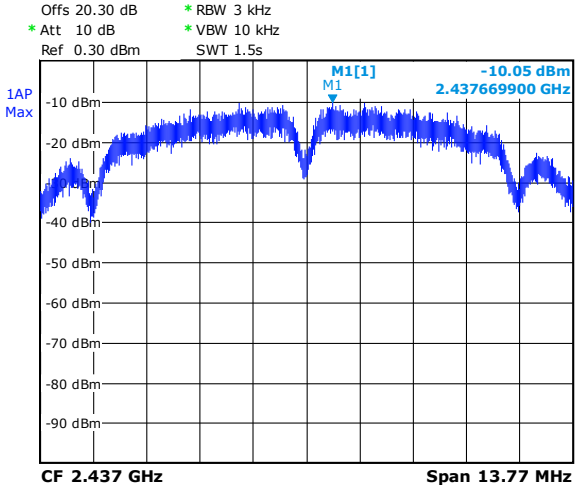
☑ None ☐ Divergence:

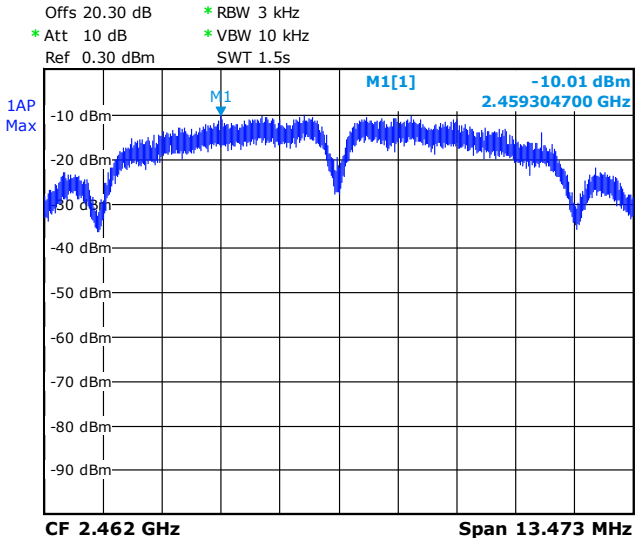
7.5. TEST SEQUENCE AND RESULTS

Modulation:

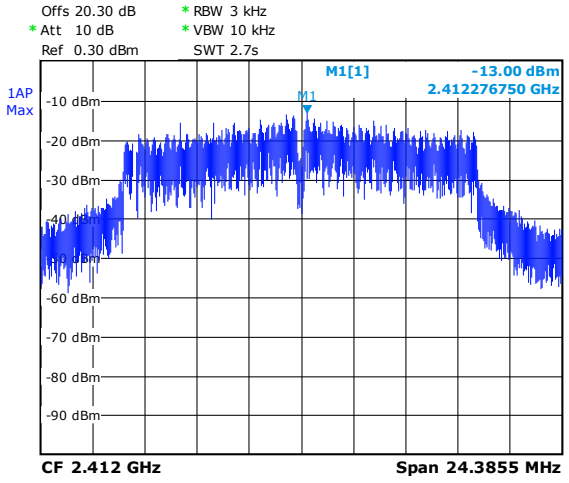
802.11 b (2 Mbps)			
Channel	**Channel Frequency (MHz)**	**Power Spectral Density (dBm)**	**PSD Limit (dBm)**
1	2412	**-10.5**	8.0
6	2437	**-10.0**	8.0
11	2462	**-10.0**	8.0

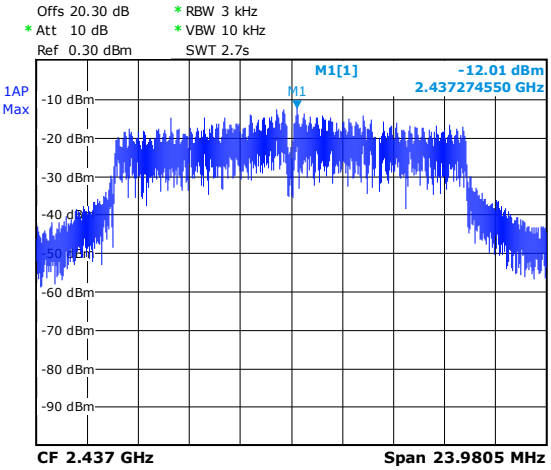


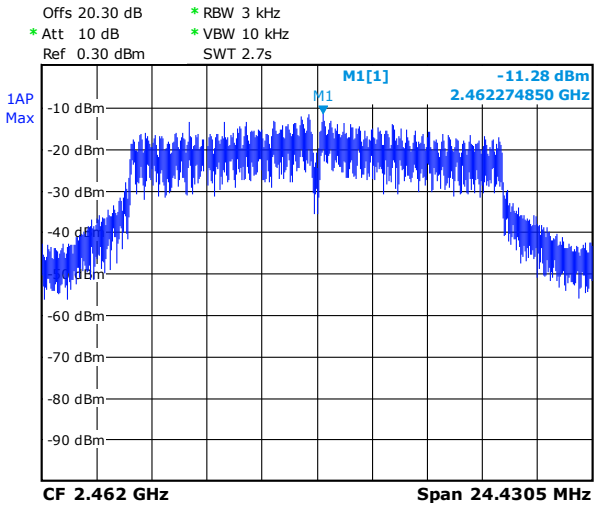




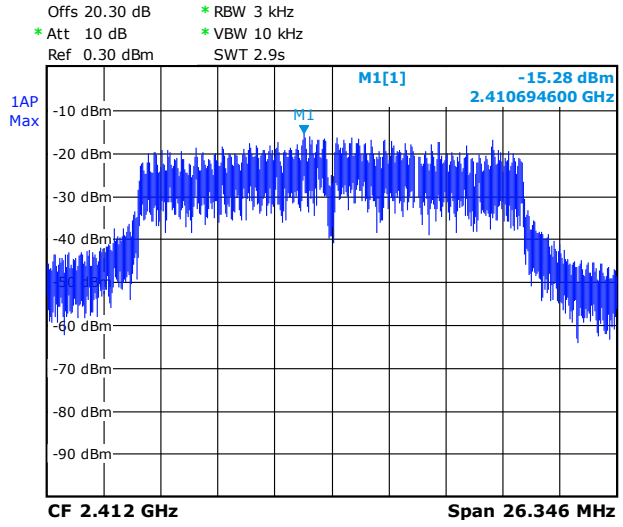
802.11 g (6 Mbps)			
Channel	**Channel Frequency (MHz)**	**Power Spectral Density (dBm)**	**PSD Limit (dBm)**
1	2412	**-13.0**	8.0
6	2437	**-12.0**	8.0
11	2462	**-11.3**	8.0

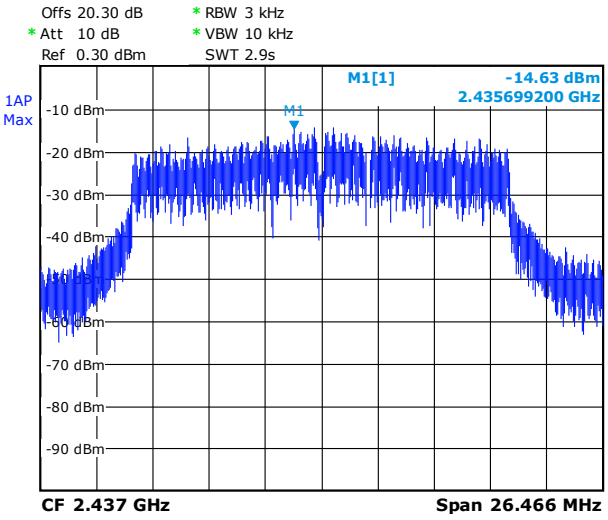


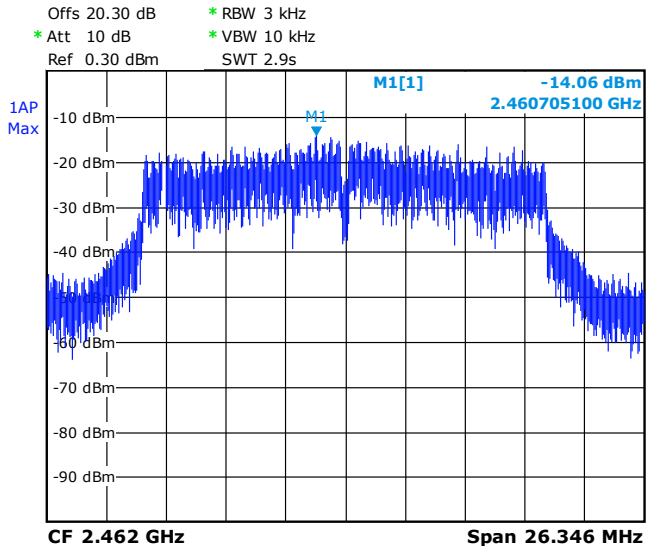




802.11 n (MCS0 SG)			
Channel	**Channel Frequency (MHz)**	**Power Spectral Density (dBm)**	**PSD Limit (dBm)**
1	2412	**-15.3**	8.0
6	2437	**-14.6**	8.0
11	2462	**-14.0**	8.0







7.1. CONCLUSION

Power Spectral Density measurement performed on the sample of the product Tikee PRO, SN:T-PRO-OG-200484 , in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-247 limits.

8. BAND EDGE MEASUREMENT (15.247)

8.1. TEST CONDITIONS

Date of test	:	October 8, 2019
Test performed by	:	Jonathan PAUC
Atmospheric pressure (hPa)	:	996
Relative humidity (%)	:	34.1
Ambient temperature (°C)	:	24.1

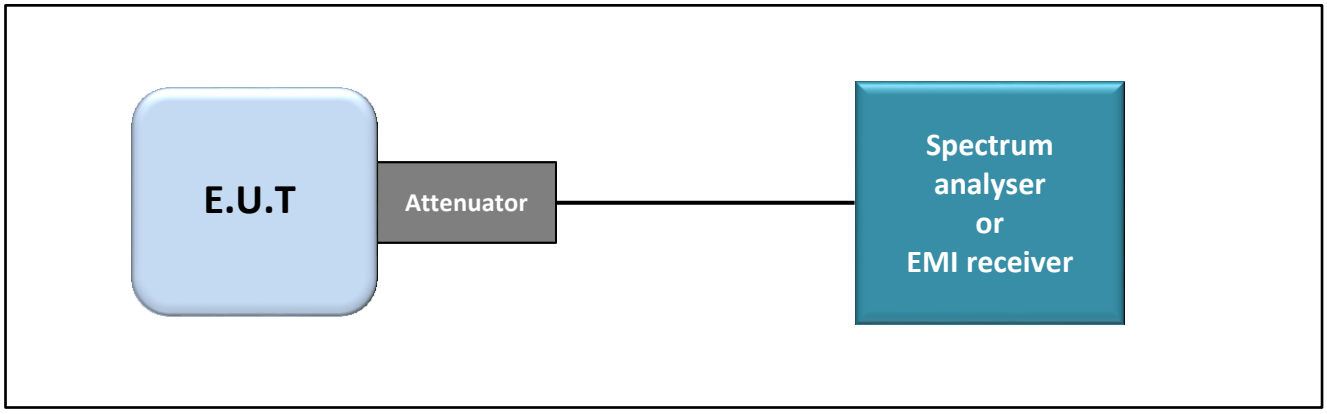
8.2. LIMIT

RF antenna conducted test: § 11 (DTS Measurement Guidance)
Set RBW = 100 kHz, Video bandwidth (VBW) > RBW, scan up through 10th harmonic. All harmonics/spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW. Note: If the device complies with the use of power option 2 the attenuation under this paragraph shall be 30 dB instead of 20 dB. *For -20dBc limit, lowest power output level is considered, worst case.*

Radiated emission test: § 12 (DTS Measurement Guidance)
Applies to harmonics/spurs that fall in the restricted bands listed in Section 15.205. The maximum permitted average field strength is listed in Section 15.209. For measurements above 1 GHz, set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation. See results in Radiated emissions section before.

8.3. SETUP

The EUT is placed in an anechoic chamber; levels have been corrected to be in compliant with Peak Output Power measurement. The EUT is turn ON; the graphs of the restrict frequency band are recorded with a display line indicating the highest level and other the 20dB offset below to show compliance with 15.247 (d) and 15.205. The emissions in restricted bands are compared to 15.209 limits.
RBW: 100kHz
VBW: 300kHz
☑ KDB 558074 D01 DTS Meas Guidance v05r02 § 8.5



Test set up of Unwanted Emissions into Non-Restricted Frequency Bands at the Band Edge

8.4. TEST EQUIPMENT LIST

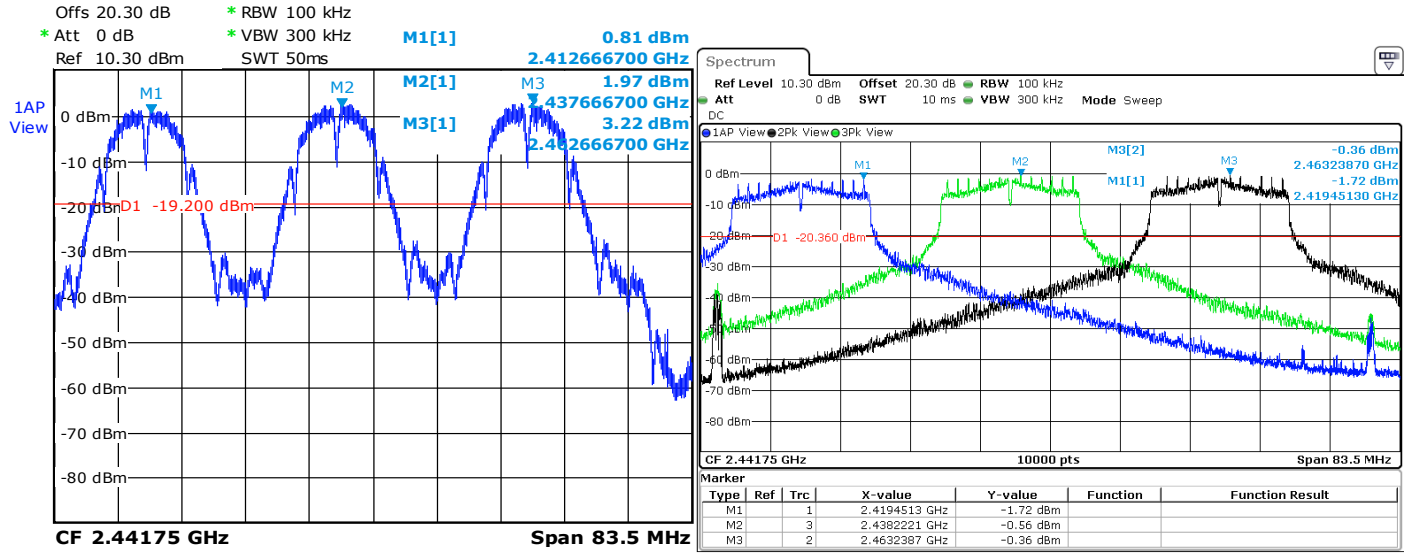
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Attenuator 10dB	AEROFLEX	-	A7122267	06/19	06/20
Attenuator 10dB	AEROFLEX	-	A7122268	06/19	06/20
Cable SMA 60cm	STORMFLEX	6GHz	A5329636	02/19	02/20
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060051	03/19	03/20
Spectrum analyzer	ROHDE & SCHWARZ	FSL	A4060049	06/19	06/20

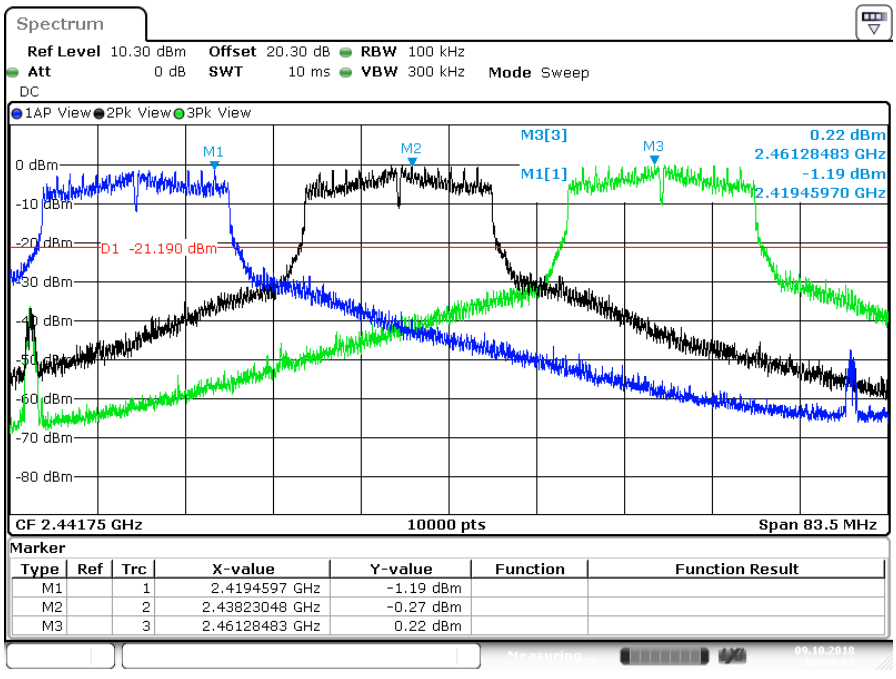
8.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

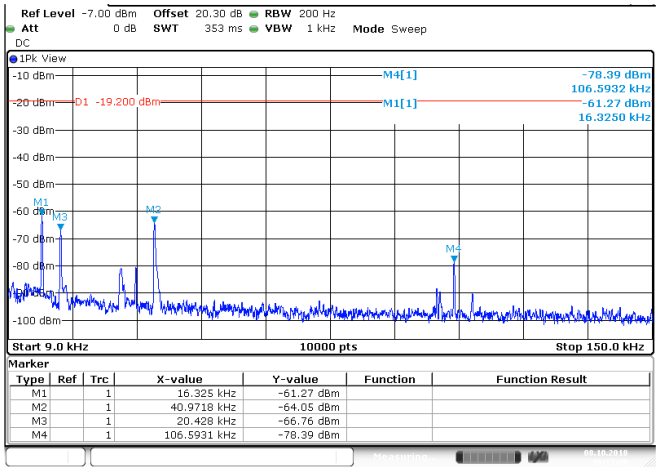
8.6. TEST SEQUENCE AND RESULTS

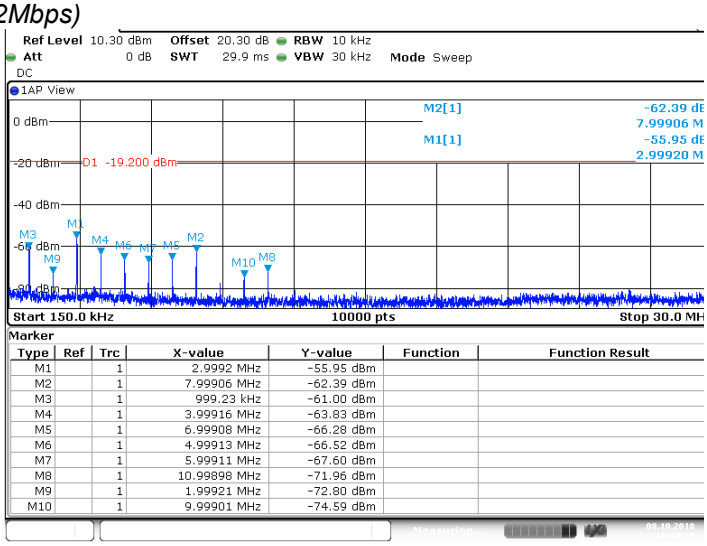
Offset: Attenuator+cable 20.3dB
GRAPH / MODULATION.



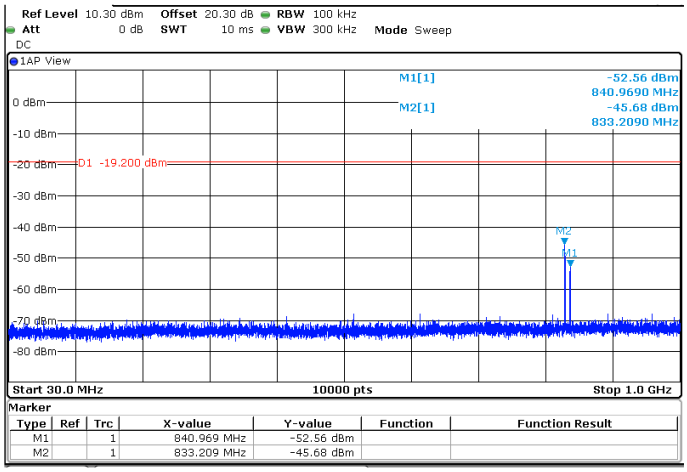


802.11b (2Mbps)

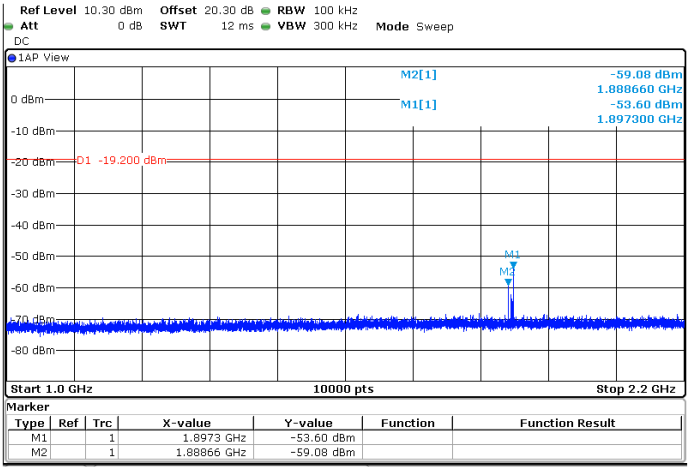




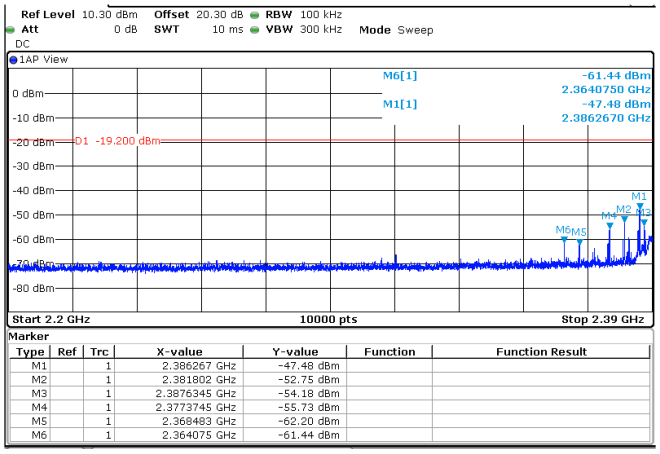
9kHz – 150kHz



150kHz – 30MHz

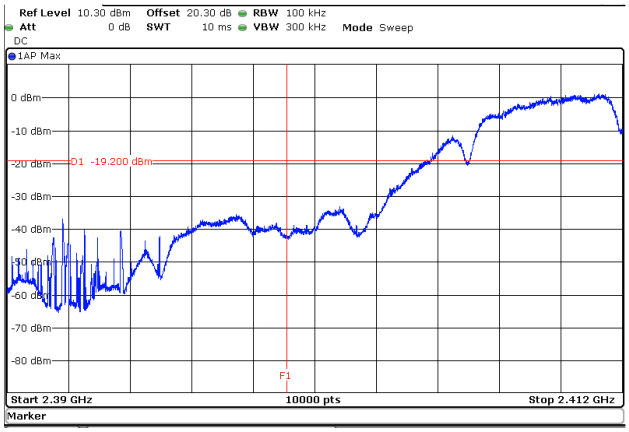


30MHz – 1GHz



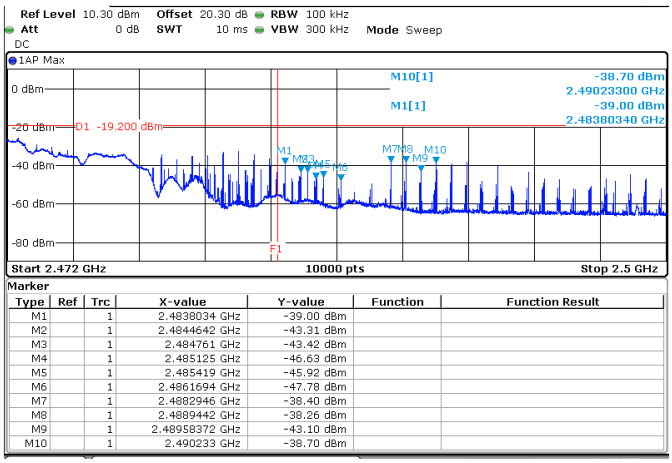
2.2GHz – 2.39GHz

1GHz – 2.2GHz

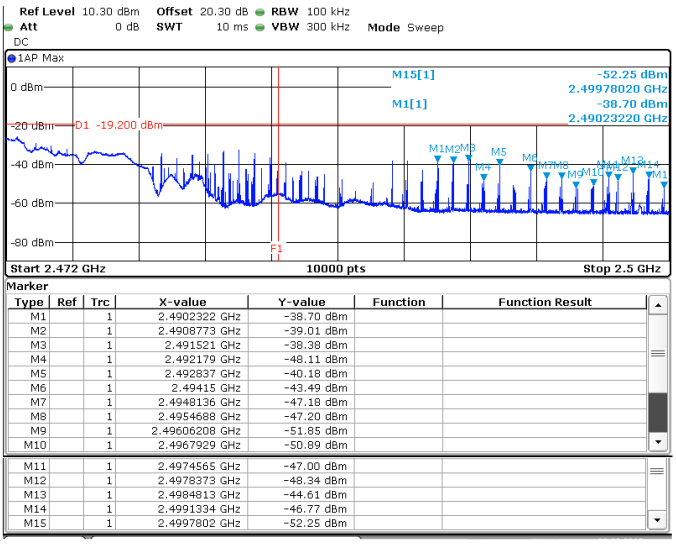


2.39GHz – 2.412GHz

802.11b (2Mbps)

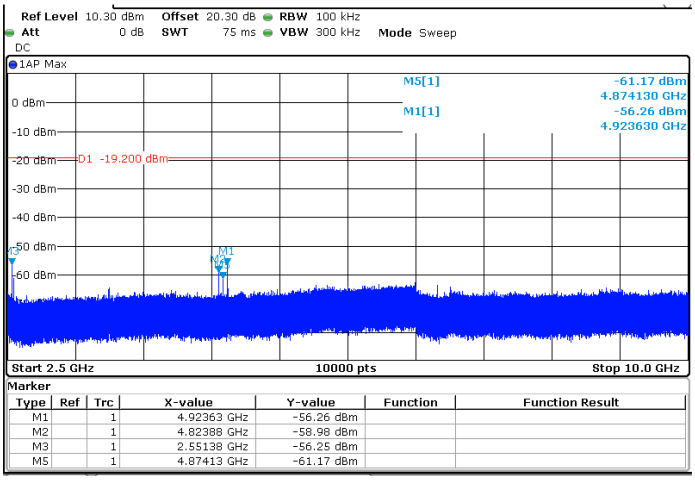


2.472GHz – 2.5GHz

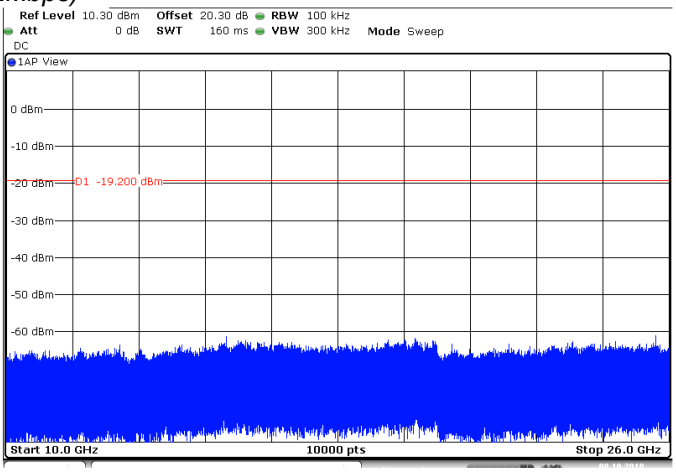


2.472GHz – 2.5GHz

802.11b (2Mbps)

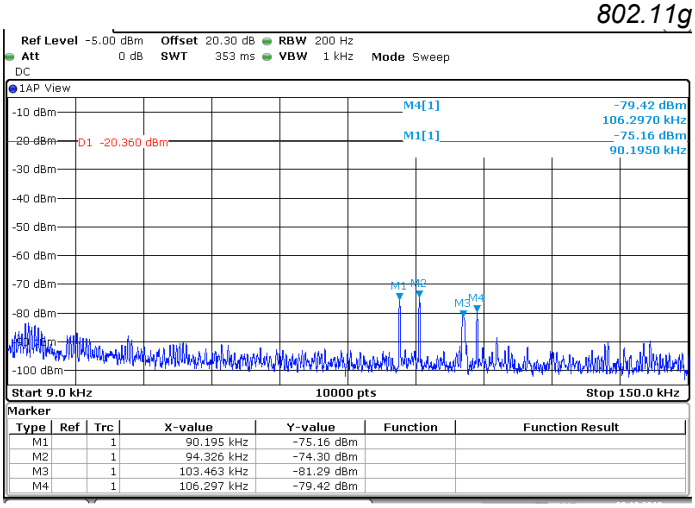


2.5GHz – 10GHz

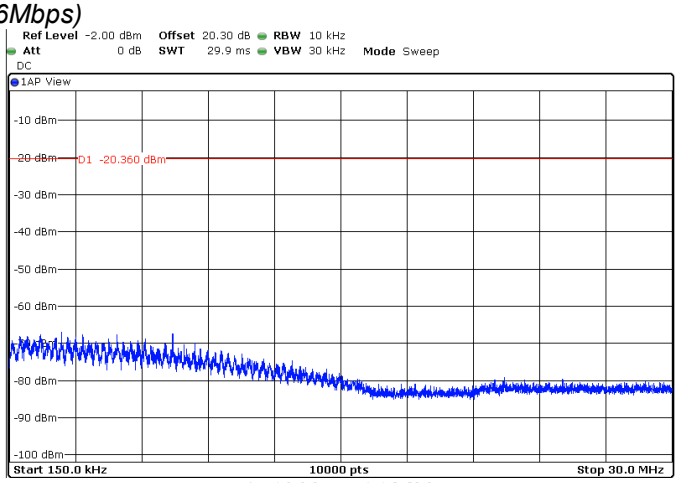


10GHz – 26GHz

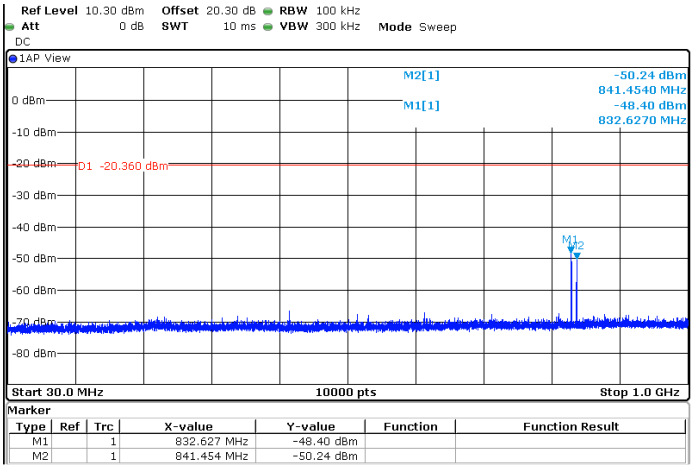
802.11g (6Mbps)



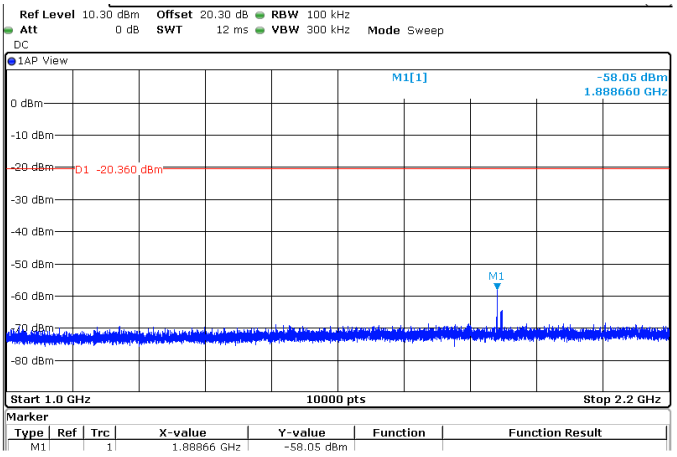
9kHz – 150kHz



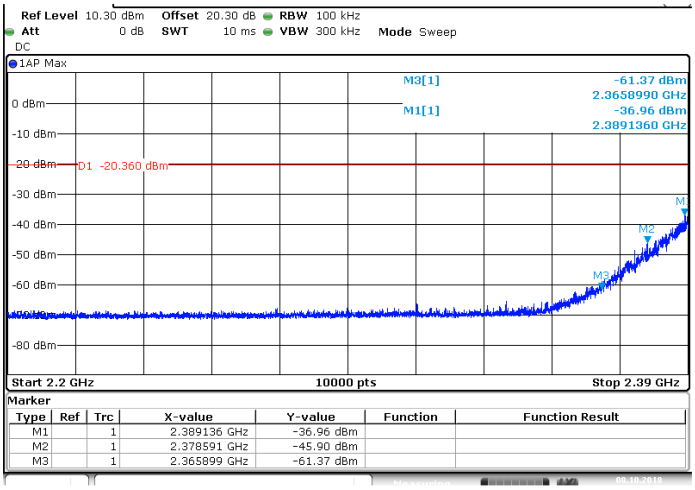
150kHz – 30MHz



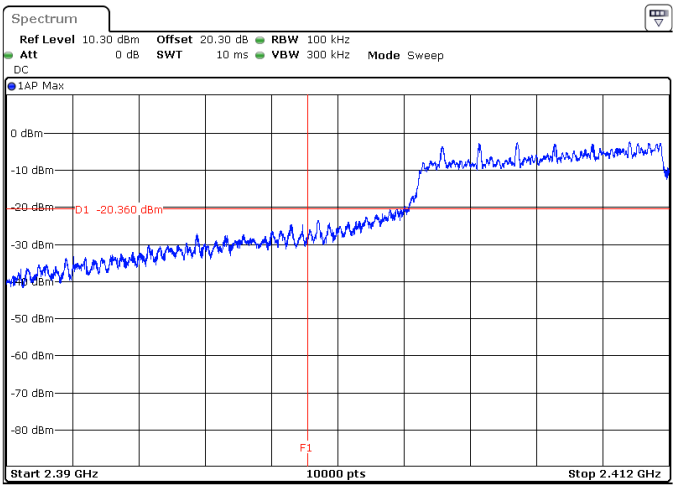
30MHz – 1GHz



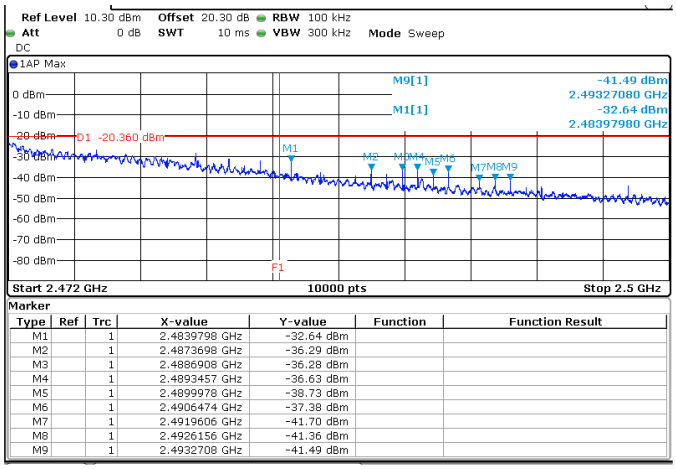
1GHz – 2.2GHz



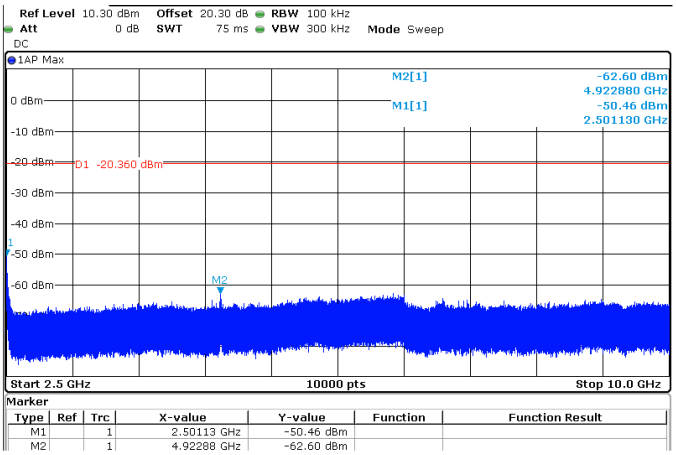
2.2GHz – 2.39GHz



2.39GHz – 2.412GHz

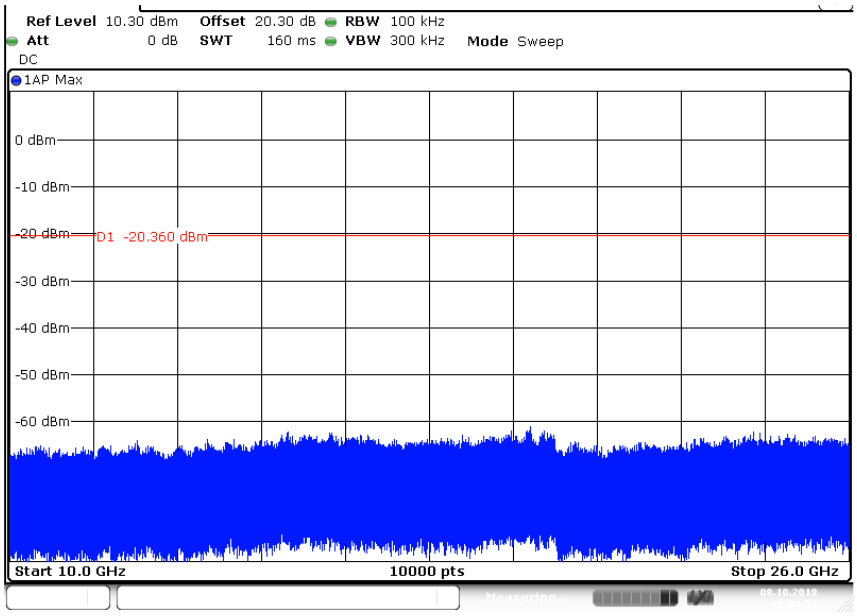


2.472GHz – 2.5GHz



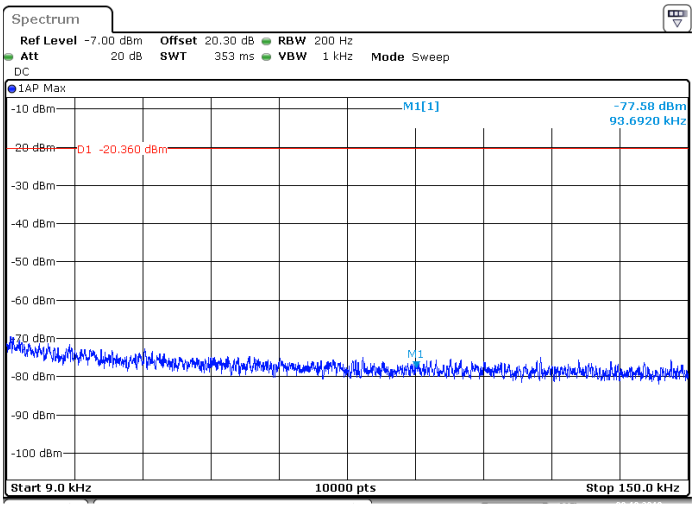
2.5GHz – 10GHz

802.11b (6Mbps)

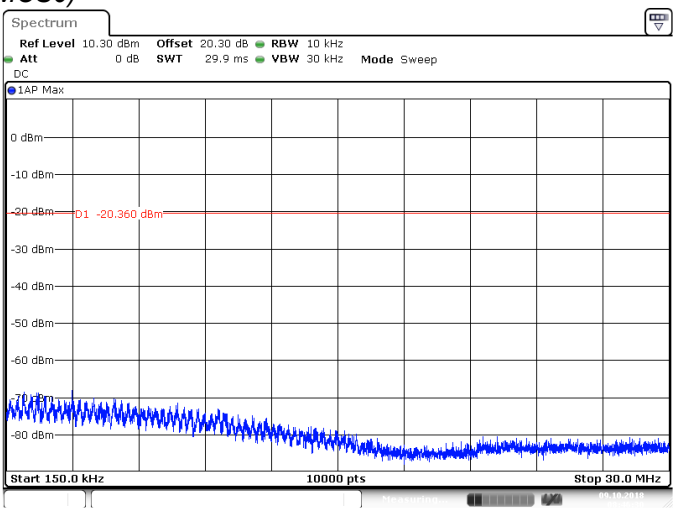


10GHz – 26GHz

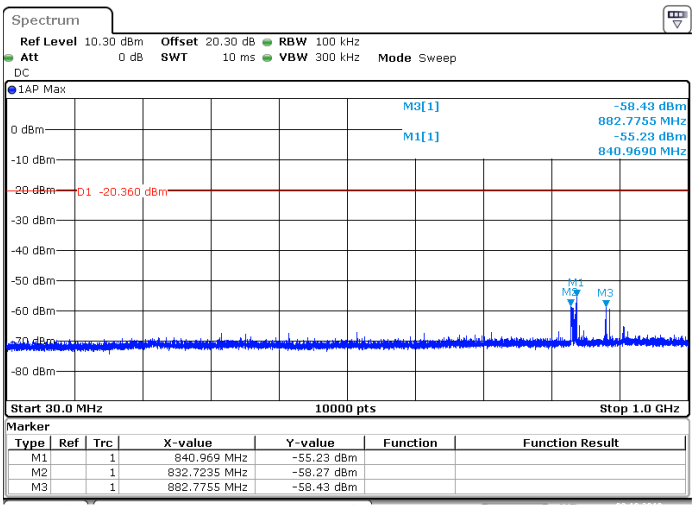
802.11n (MCS0)



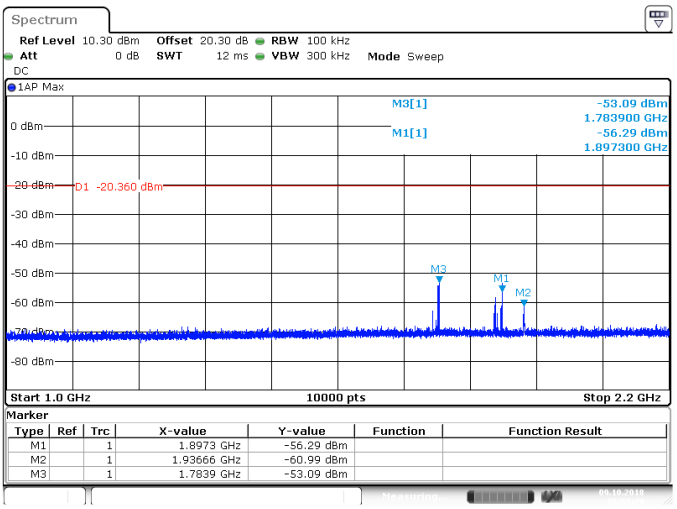
9kHz – 150kHz



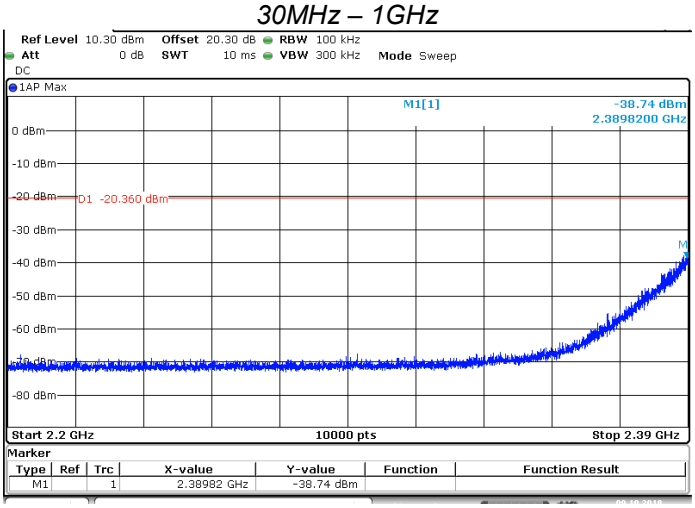
150kHz – 30MHz



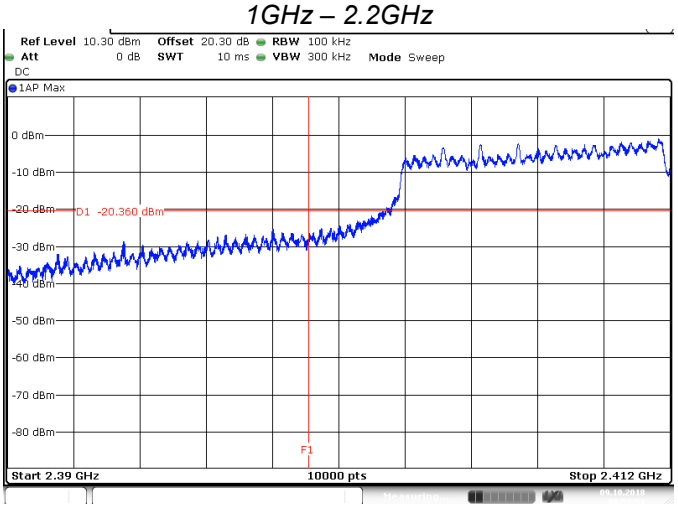
30MHz – 1GHz



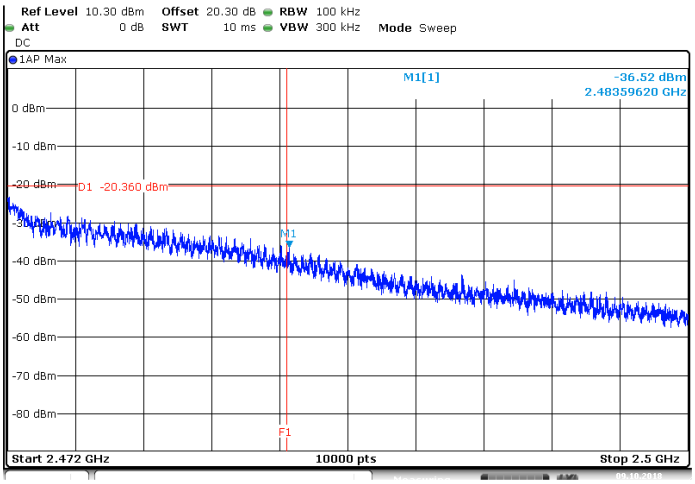
1GHz – 2.2GHz



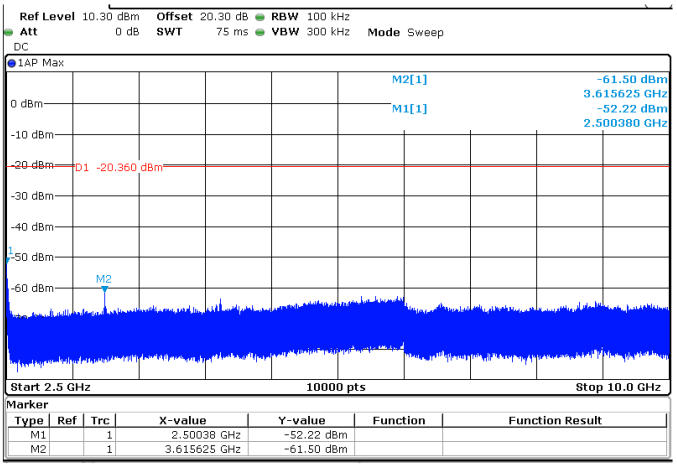
2.2GHz – 2.39GHz



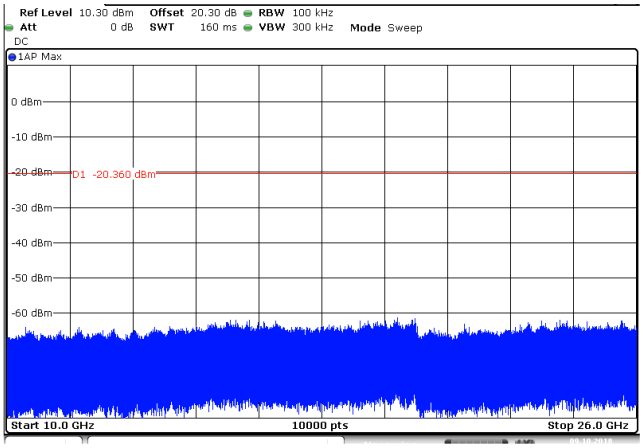
2.39GHz – 2.412GHz



2.472GHz – 2.5GHz



2.5GHz – 10GHz



10GHz – 26GHz

8.7. CONCLUSION

Band Edge Measurement performed on the sample of the product Tikee PRO, SN:T-PRO-OG-200484 , in configuration and description presented in this test report, show levels below the FCC CFR 47 Part 15 and RSS-247 limits.

9. OCCUPIED BANDWIDTH

9.1. TEST CONDITIONS

Date of test	:	October 8, 2019
Test performed by	:	Jonathan PAUC
Atmospheric pressure (hPa)	:	996
Relative humidity (%)	:	34.1
Ambient temperature (°C)	:	24.1

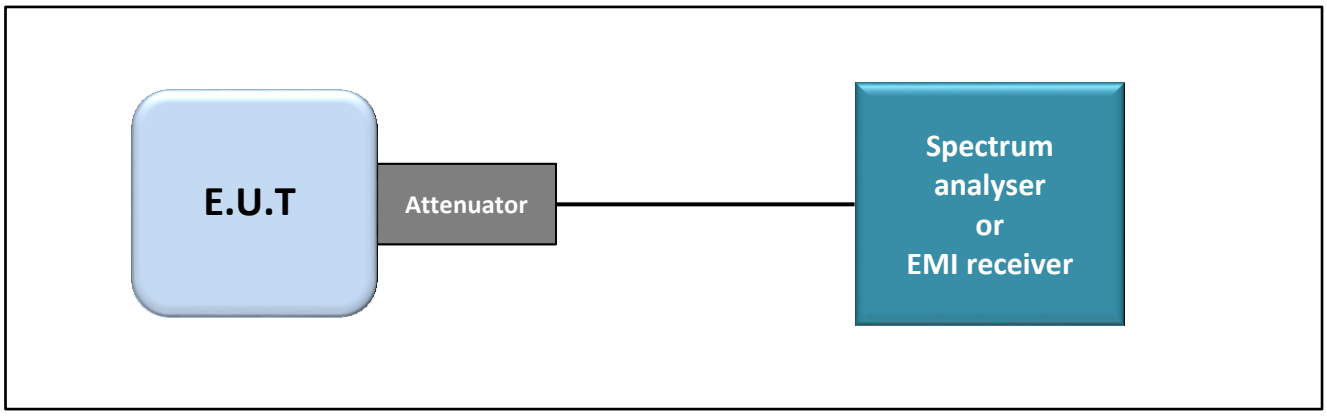
9.2. SETUP

☑ ***Conducted measurement:***
The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.
Offset: Attenuator+cable 20.3dB
☑ RSS-Gen Issue 5 § 6.7
☑ ANSI C63.10 § 6.9.2

☐ ***Radiated measurement:***
The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

Measurement Procedure:

a) RBW shall be in the range of 1% to 5% of the anticipated occupied bandwidth
b) Set the video bandwidth (VBW) ≥ 3 x RBW
c) SPAN = Capture all products of the modulation process
d) Detector = Peak.
e) Trace mode = max hold.
f) Sweep = auto couple.
g) Allow the trace to stabilize.
h) OBW 99% function of spectrum analyzer used



Test set up of Occupied Bandwidth

9.3. TEST EQUIPMENT LIST

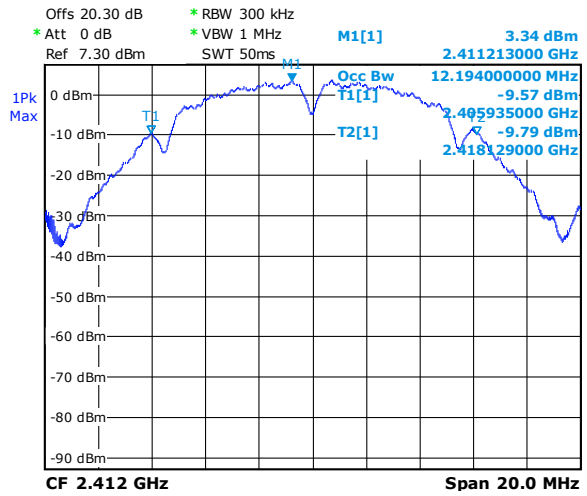
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Attenuator 10dB	AEROFLEX	-	A7122267	06/19	06/20
Attenuator 10dB	AEROFLEX	-	A7122268	06/19	06/20
Cable SMA 60cm	STORMFLEX	6GHz	A5329636	02/19	02/20
Cable SMA 3m	-	-	A5329373	01/19	01/20
Spectrum analyzer	ROHDE & SCHWARZ	FSL	A4060049	06/19	06/20

9.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

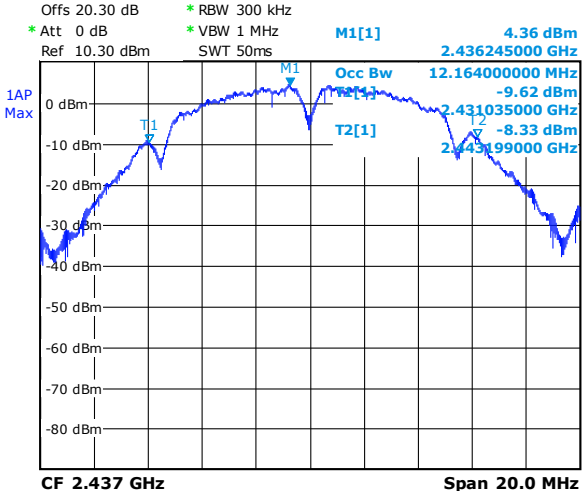
☑ None ☐ Divergence:

9.5. TEST SEQUENCE AND RESULTS

802.11b (2Mbps)		
Channel	**Channel Frequency (MHz)**	**99% Occupied Bandwidth (MHz)**
1	2412	**12.19**
6	2437	**12.16**
11	2462	**12.33**



Date: 8.OCT.2018 14:24:55



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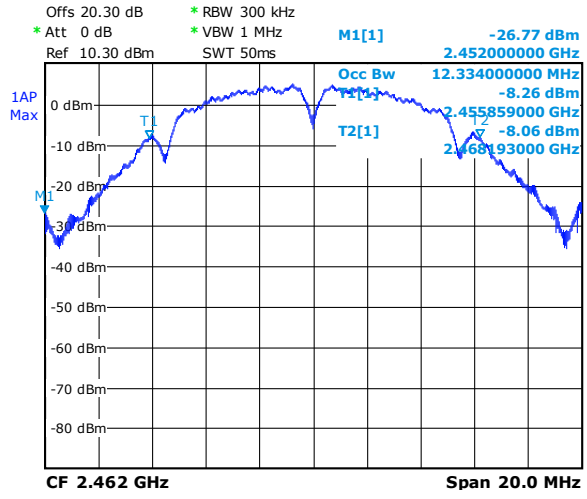
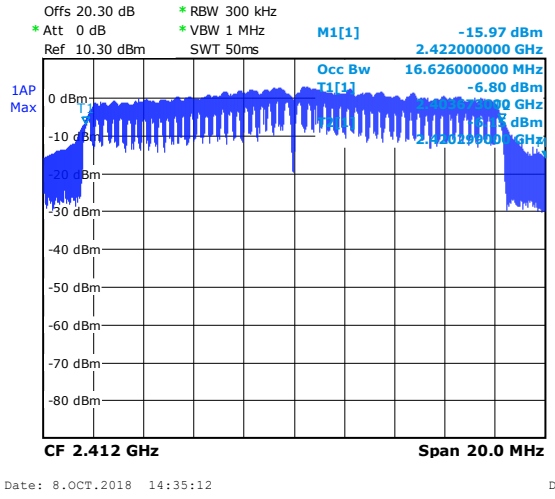
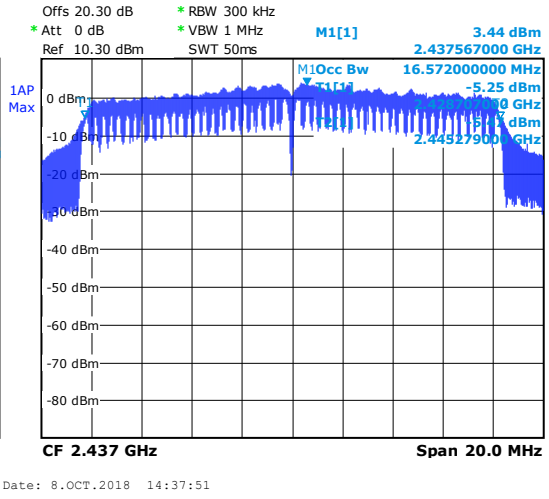
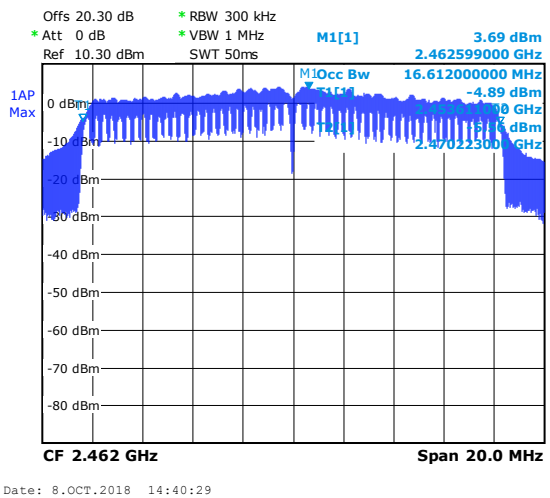


Date: 8.OCT.2018 14:32:07

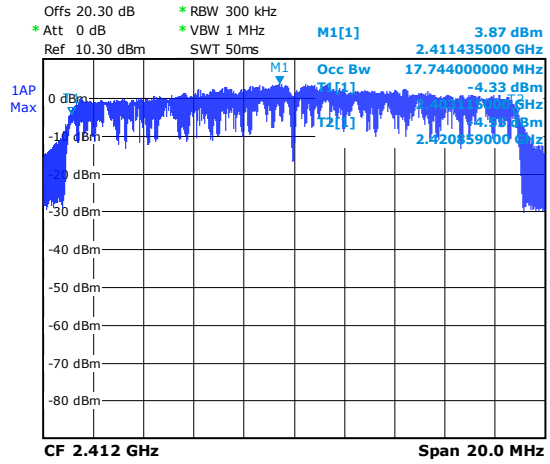
802.11g (6Mbps)		
Channel	**Channel Frequency (MHz)**	**99% Occupied Bandwidth (MHz)**
1	2412	**16.62**
6	2437	**16.57**
11	2462	**16.61**







802.11n (MCS0)		
Channel	**Channel Frequency (MHz)**	**99% Occupied Bandwidth (MHz)**
1	2412	**17.74**
6	2437	**17.71**
11	2462	**17.72**



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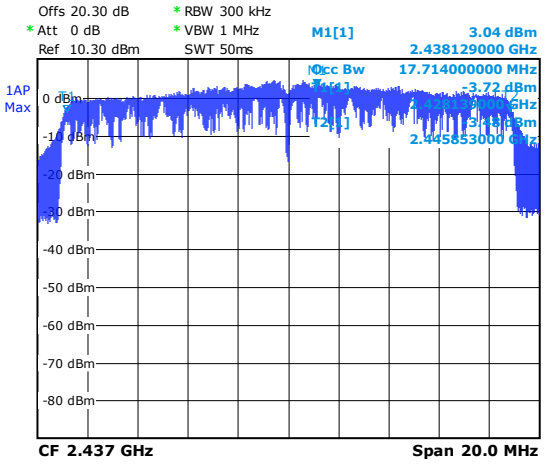

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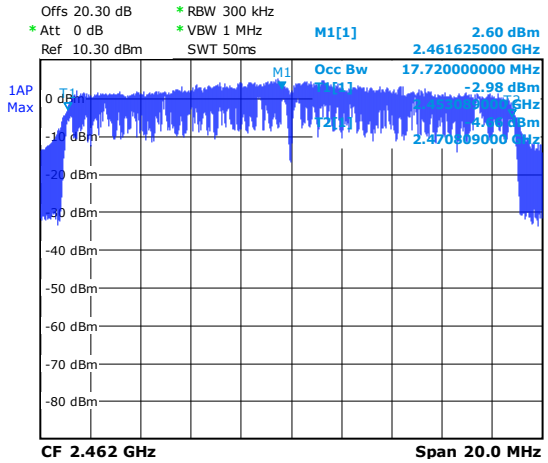
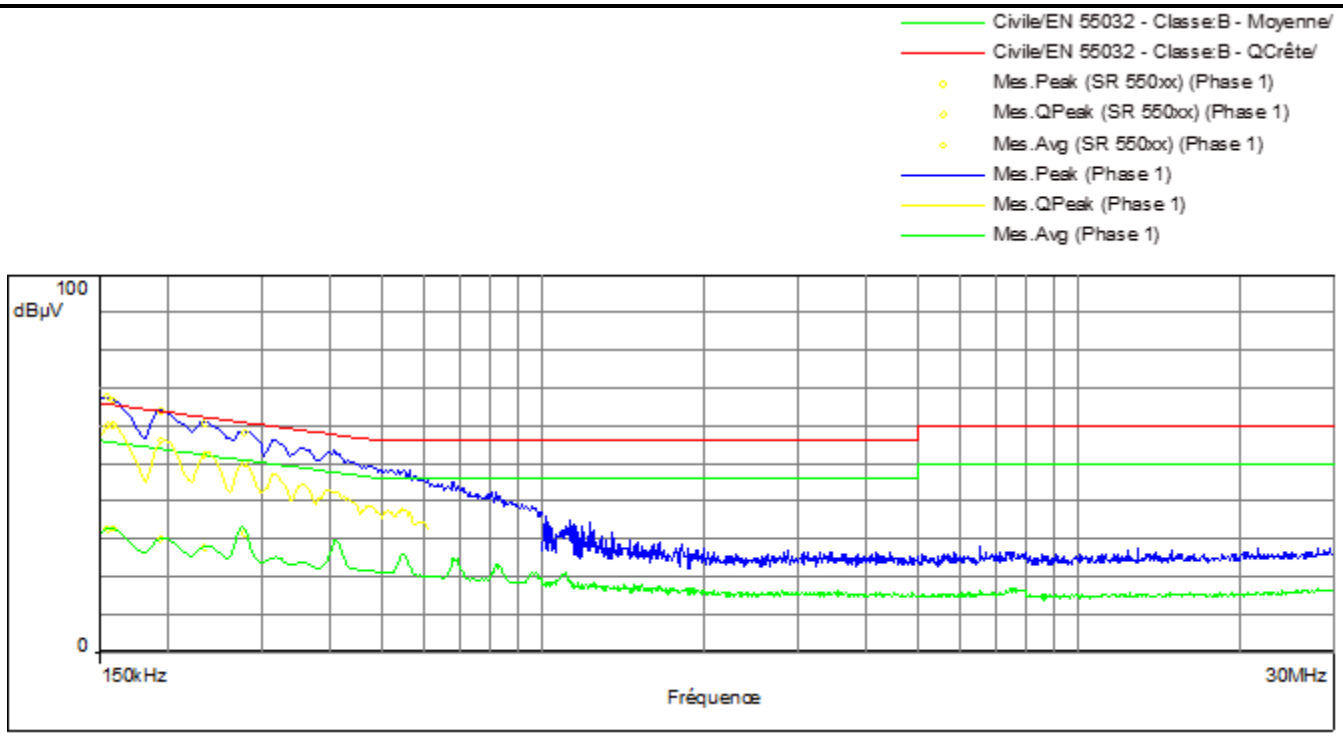


Date: 8.OCT.2018 14:51:04

10. ANNEX 1 (GRAPHS)

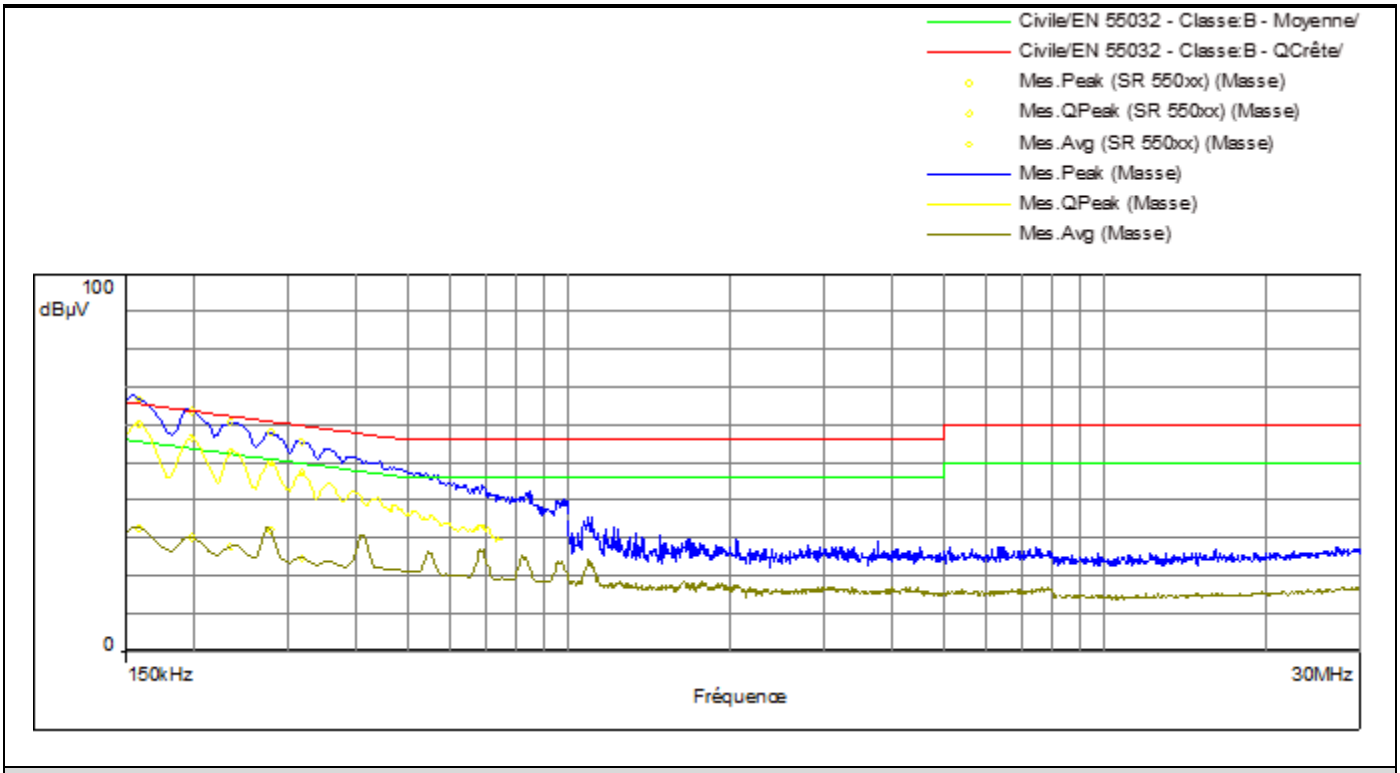
CONDUCTED EMISSIONS			
Graph name:	Emc#1	**Test configuration:**	
Limit:	EN 55032	P (RSIL) ESU8 - 120V	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	120VAC / 60Hz	**RBW :**	10kHz
Line:	Phase	**VBW :**	30kHz



Spurious emissions

Frequency (MHz)	Mes.Peak (dBµV)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)	Line	Correction (dB)
0.154	67.8	60.0	65.8	-5.7	32.5	55.8	-23.3	Phase	19.4
0.158	66.9	60.3	65.6	-5.2	32.7	55.6	-22.9	Phase	19.4
0.194	63.9	56.1	63.9	-7.7	30.0	53.9	-23.9	Phase	19.5
0.234	60.7	52.4	62.3	-9.9	27.6	52.3	-24.8	Phase	19.5
0.278	58.2	50.2	60.9	-10.7	31.3	50.9	-19.6	Phase	19.4

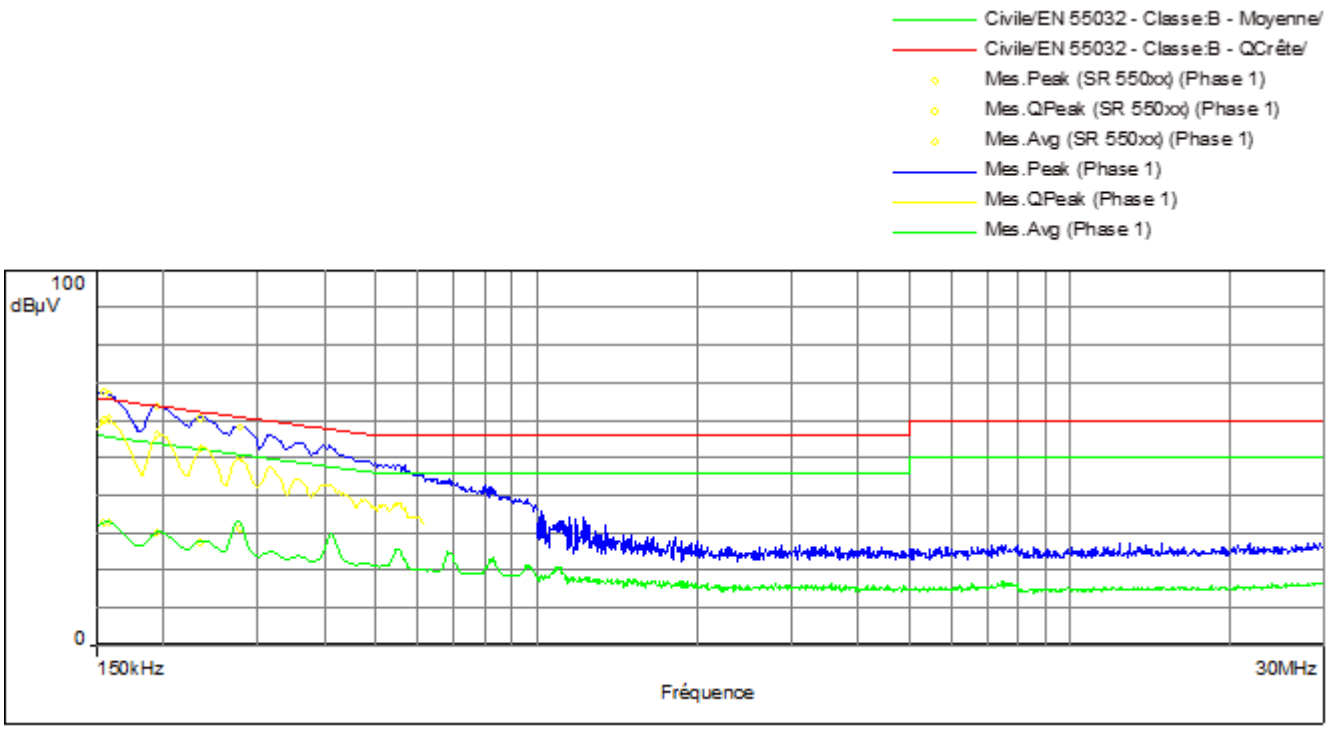
CONDUCTED EMISSIONS			
Graph name:	Emc#2	**Test configuration:**	
Limit:	EN 55032	N (RSIL) ESU8 - 120V	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	120VAC / 60Hz	**RBW :**	10kHz
Line:	Neutral	**VBW :**	30kHz



Spurious emissions

Frequency (MHz)	Mes.Peak (dBµV)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)	Line	Correction (dB)
0.158	66.9	60.2	65.6	-5.3	32.7	55.6	-22.9	Neutral	19.4
0.198	63.7	56.6	63.7	-7.1	30.1	53.7	-23.6	Neutral	19.5
0.234	60.9	52.9	62.3	-9.4	27.7	52.3	-24.6	Neutral	19.5
0.278	58.2	50.1	60.9	-10.8	32.1	50.9	-18.8	Neutral	19.4
0.318	55.6	47.4	59.8	-12.4	24.6	49.8	-25.1	Neutral	19.5

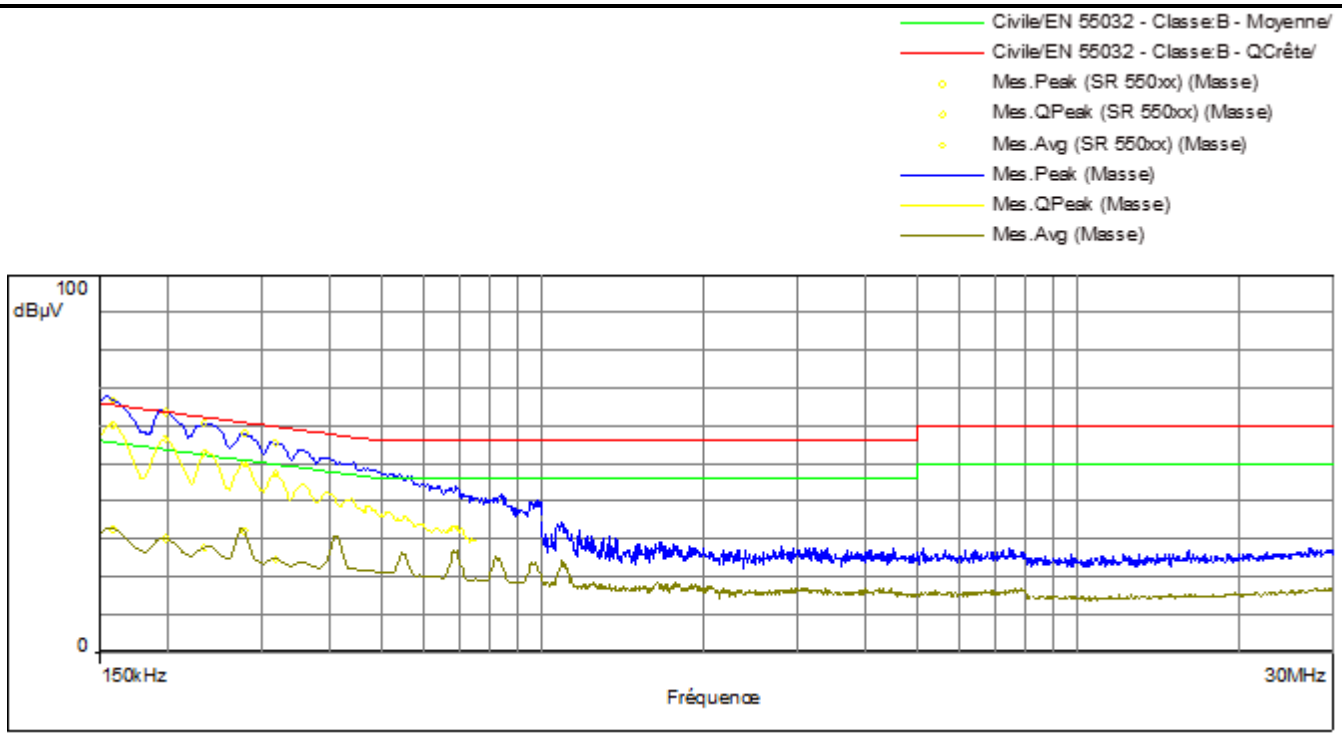
CONDUCTED EMISSIONS			
Graph name:	Emc#3	**Test configuration:**	
Limit:	EN 55032	P (RSIL) ESU8 - 240V	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	240VAC / 50Hz	**RBW :**	10kHz
Line:	Phase	**VBW :**	30kHz



Spurious emissions

Frequency (MHz)	Mes.Peak (dBµV)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)	Line	Correction (dB)
0.154	67.7	59.9	65.8	-5.9	32.4	55.8	-23.4	Phase	19.4
0.158	67.6	61.0	65.6	-4.6	33.4	55.6	-22.2	Phase	19.4
0.194	64.5	56.7	63.9	-7.2	30.6	53.9	-23.3	Phase	19.5
0.234	60.0	51.7	62.3	-10.6	26.9	52.3	-25.4	Phase	19.5
0.278	57.7	49.7	60.9	-11.2	30.8	50.9	-20.1	Phase	19.4

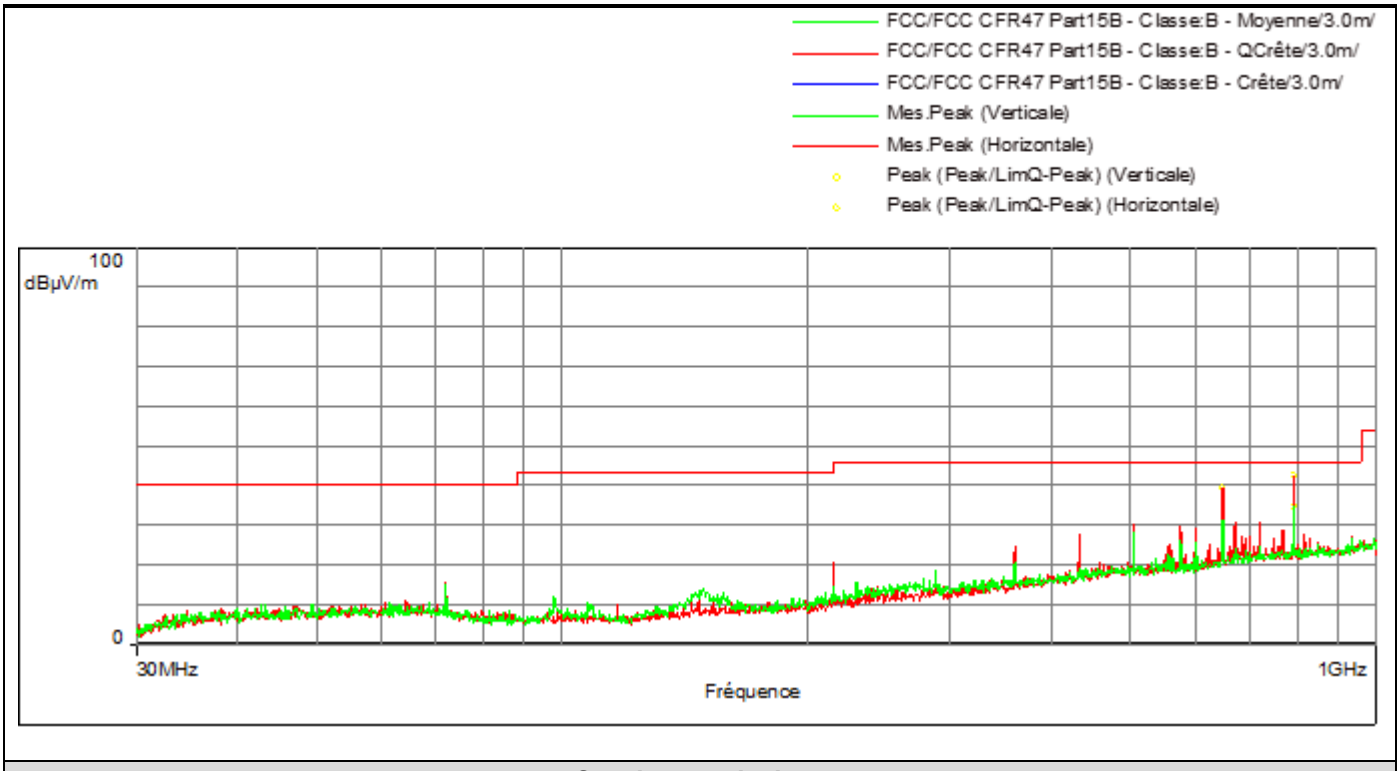
CONDUCTED EMISSIONS			
Graph name:	Emc#4	**Test configuration:**	
Limit:	EN 55032	N (RSIL) ESU8 - 240V	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	240VAC / 50Hz	**RBW :**	10kHz
Line:	Phase	**VBW :**	30kHz



Spurious emissions

Frequency (MHz)	Mes.Peak (dBµV)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)	Line	Correction (dB)
0.158	66.3	59.6	65.6	-6.0	32.1	55.6	-23.5	Neutral	19.4
0.198	64.6	57.5	63.7	-6.2	31.0	53.7	-22.7	Neutral	19.5
0.234	61.6	53.6	62.3	-8.8	28.4	52.3	-24.0	Neutral	19.5
0.278	58.8	50.7	60.9	-10.2	32.7	50.9	-18.2	Neutral	19.4
0.318	56.4	48.2	59.8	-11.6	25.4	49.8	-24.4	Neutral	19.5

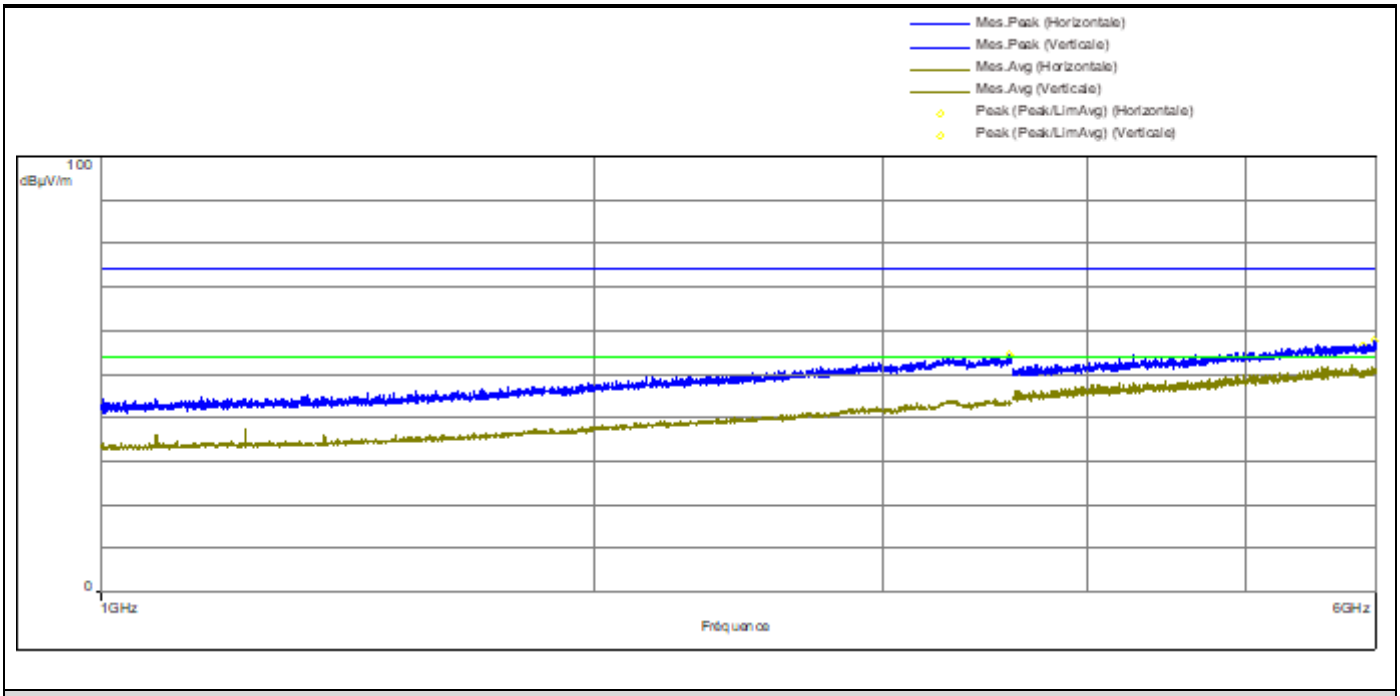
RADIATED EMISSIONS			
Graph name:	Emr#1	**Test configuration:**	
Limit:	EN 55032	(H+V) – Configuration n°1 – acquisition mode<1GHz – Axis XY	
Class:	B		
Frequency range: [30MHz - 1GHz]			
Antenna polarization:	H & V	**RBW :**	100kHz
Azimuth:	0° - 360°	**VBW :**	300kHz



Spurious emissions

Frequency (MHz)	Peak (dBµV/m)	LimQP (dBµV/m)	Peak-LimQP (dB)	Polarization	Correction (dB)
792.120	34.8	46.0	-11.2	Vertical	-5.2
648.040	39.6	46.0	-6.4	Horizontal	-7.3
792.120	42.6	46.0	-3.4	Horizontal	-5.2

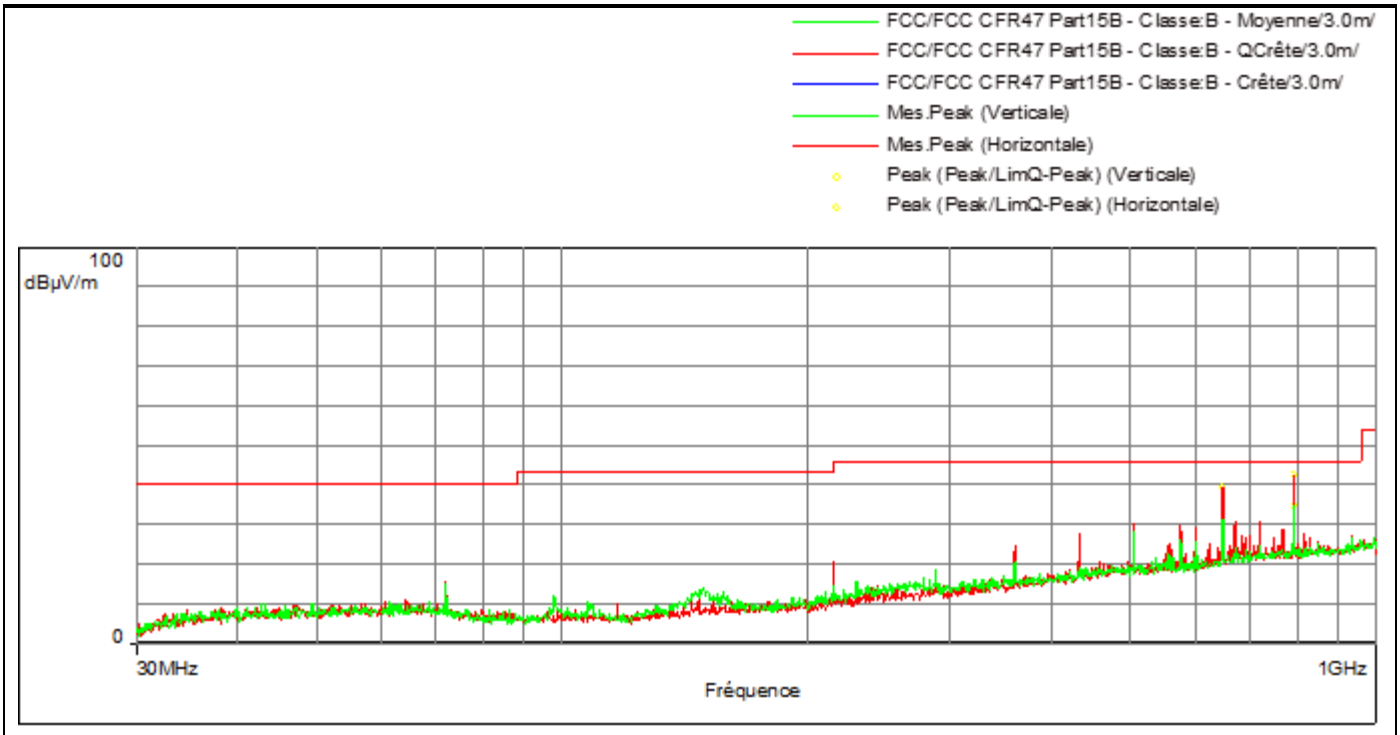
RADIATED EMISSIONS			
Graph name:	Emr#2	**Test configuration:**	
Limit:	EN 55032	(H+V) - Configuration n°1– acquisition mode- ESU [1-6]GHz – Axis XY	
Class:	B		
Frequency range: [1GHz - 6GHz]			
Antenna polarization:	H & V	**RBW :**	1MHz
Azimuth:	0° - 360°	**VBW :**	3MHz



Spurious emissions

Frequency (MHz)	Peak (dBµV/m)	LimM (dBµV/m)	Peak-LimM (dB)	Polarization	Correction (dB)
3590.900	54.2	54.0	0.2	Horizontal	34.2
5896.560	56.6	54.0	2.6	Horizontal	39.4
3584.660	54.6	54.0	0.6	Vertical	34.2
5990.880	57.7	54.0	3.7	Vertical	39.5

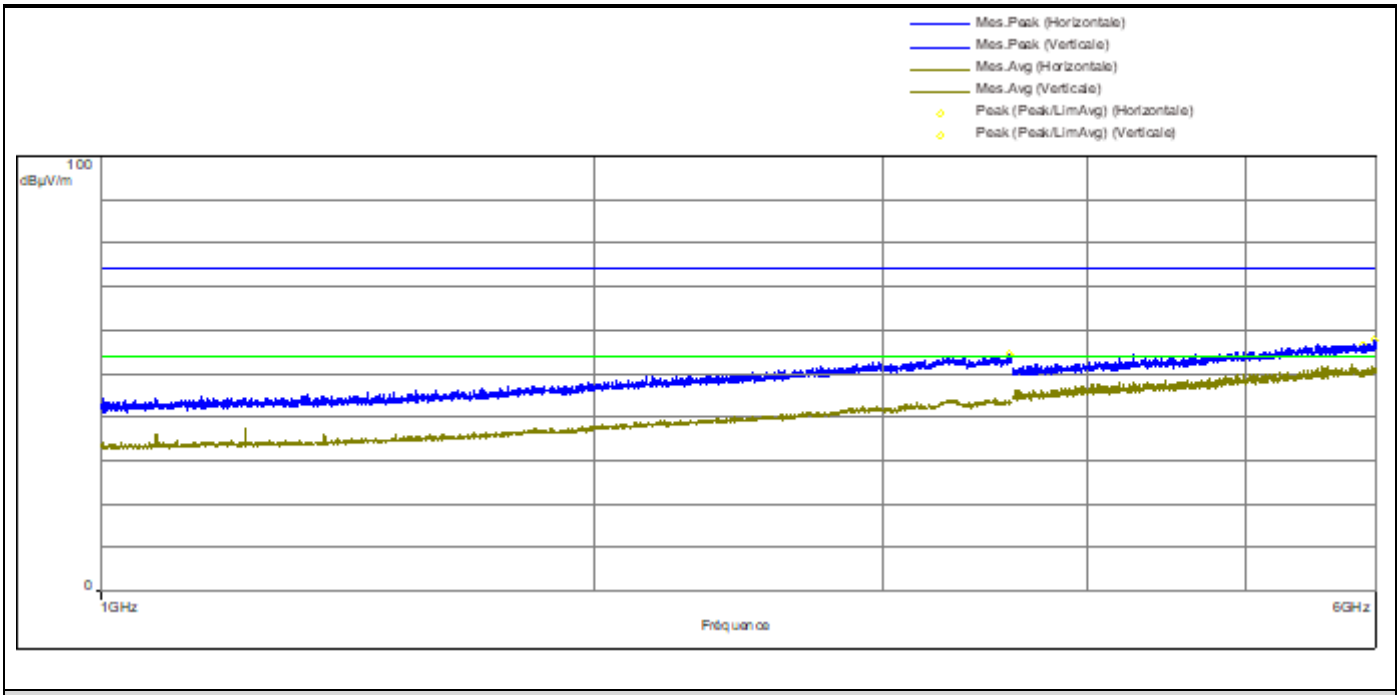
RADIATED EMISSIONS			
Graph name:	Emr#3	**Test configuration:**	
Limit:	EN 55032	(H+V) – Configuration n°1 – acquisition mode<1GHz – Axis Z	
Class:	B		
Frequency range: [30MHz - 1GHz]			
Antenna polarization:	H & V	**RBW :**	100kHz
Azimuth:	0° - 360°	**VBW :**	300kHz



Spurious emissions

Frequency (MHz)	Peak (dBµV/m)	LimQP (dBµV/m)	Peak-LimQP (dB)	Polarization	Correction (dB)
792.12	34.6	47	-12.4	Vertical	-5.2
648.04	40.6	47	-6.4	Horizontal	-7.3
792.12	42.1	47	-4.9	Horizontal	-5.2

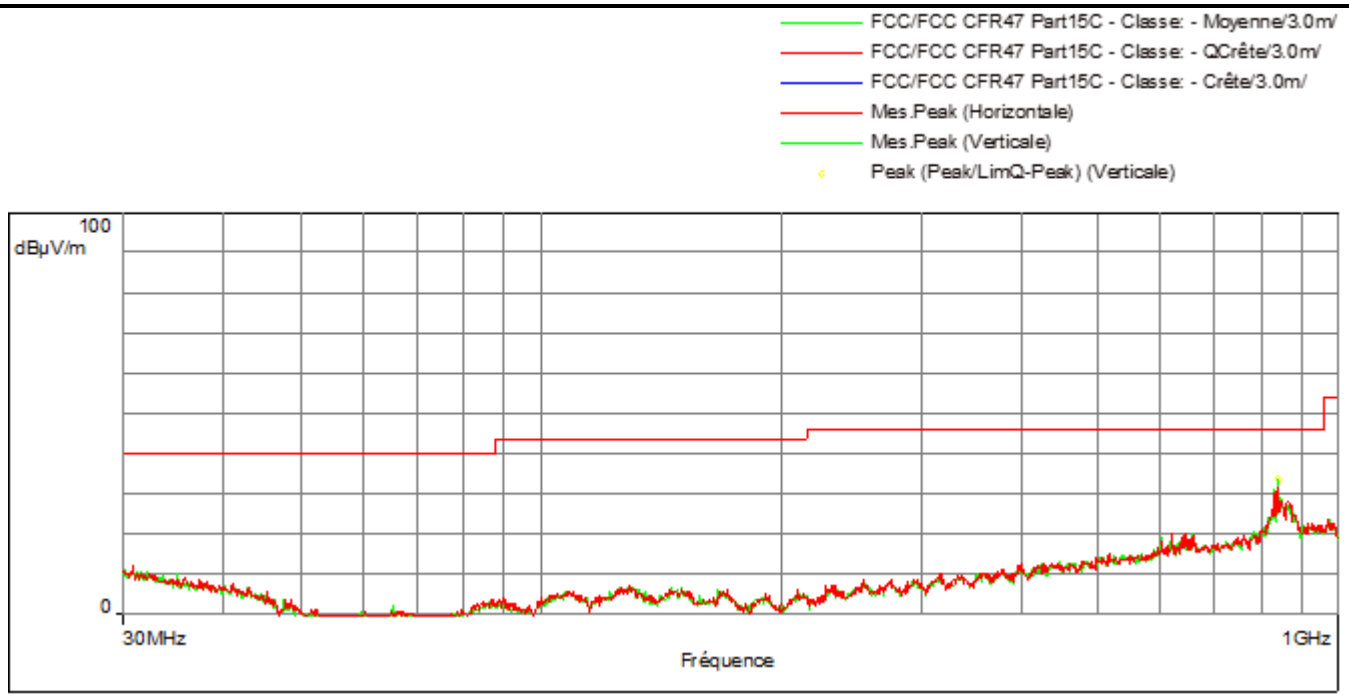
RADIATED EMISSIONS			
Graph name:	Emr#4	**Test configuration:**	
Limit:	EN 55032	(H+V) - Configuration n°1– acquisition mode- ESU [1-6] GHz – Axis Z	
Class:	B		
Frequency range: [1GHz - 6GHz]			
Antenna polarization:	H & V	**RBW :**	1MHz
Azimuth:	0° - 360°	**VBW :**	3MHz



Spurious emissions

Frequency (MHz)	Peak (dBµV/m)	LimM (dBµV/m)	Peak-LimM (dB)	Polarization	Correction (dB)
3590.900	54.2	54.0	0.2	Horizontal	34.2
5896.560	56.6	54.0	2.6	Horizontal	39.4
3584.660	54.6	54.0	0.6	Vertical	34.2
5990.880	57.7	54.0	3.7	Vertical	39.5

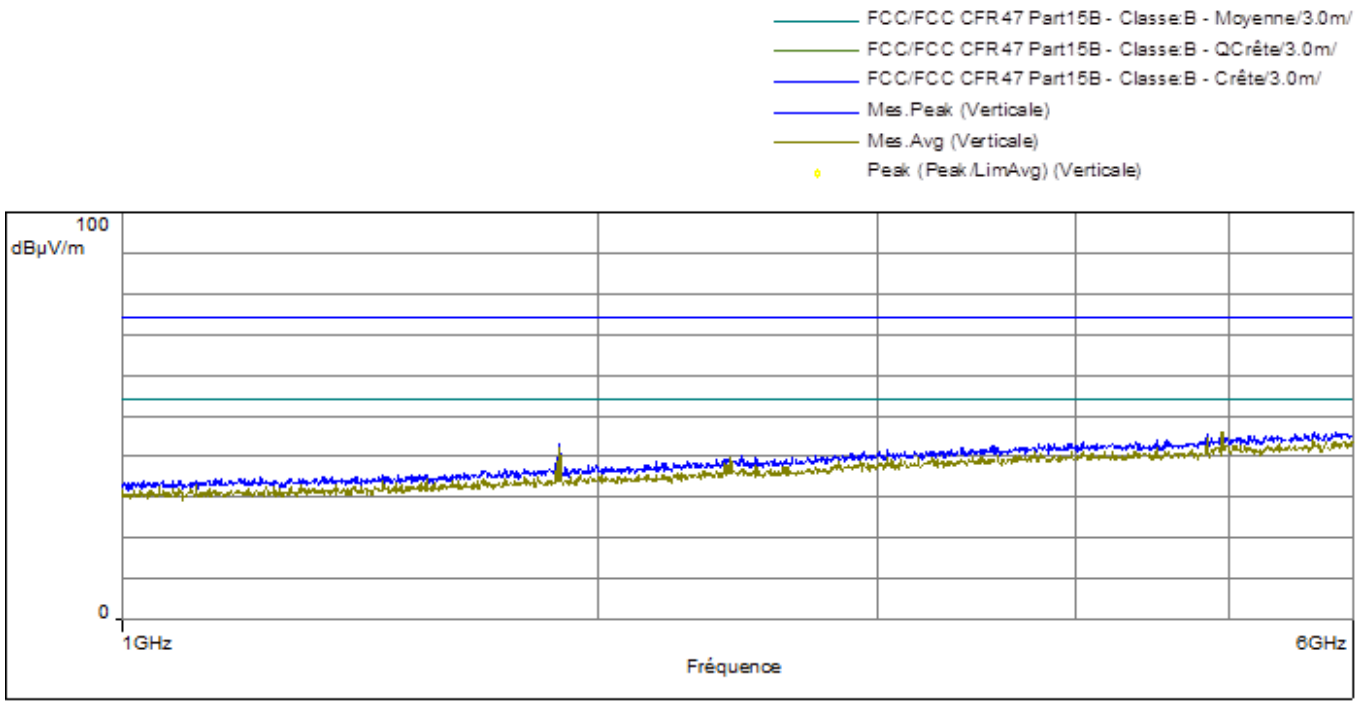
RADIATED EMISSIONS			
Graph name:	Emr#5	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) - charging mode<1GHz – Axis XY	
Class:			
Frequency range: [30MHz - 1GHz]			
Antenna polarization:	Horizontal & Vertical	**RBW :**	100kHz
Azimuth:	0° - 360°	**VBW :**	300kHz



Spurious emissions

Frequency (MHz)	Peak (dBµV/m)	LimQP (dBµV/m)	Peak-LimQP (dB)	Polarization	Correction (dB)
841.440	33.4	46.0	-12.6	Vertical	-12.2

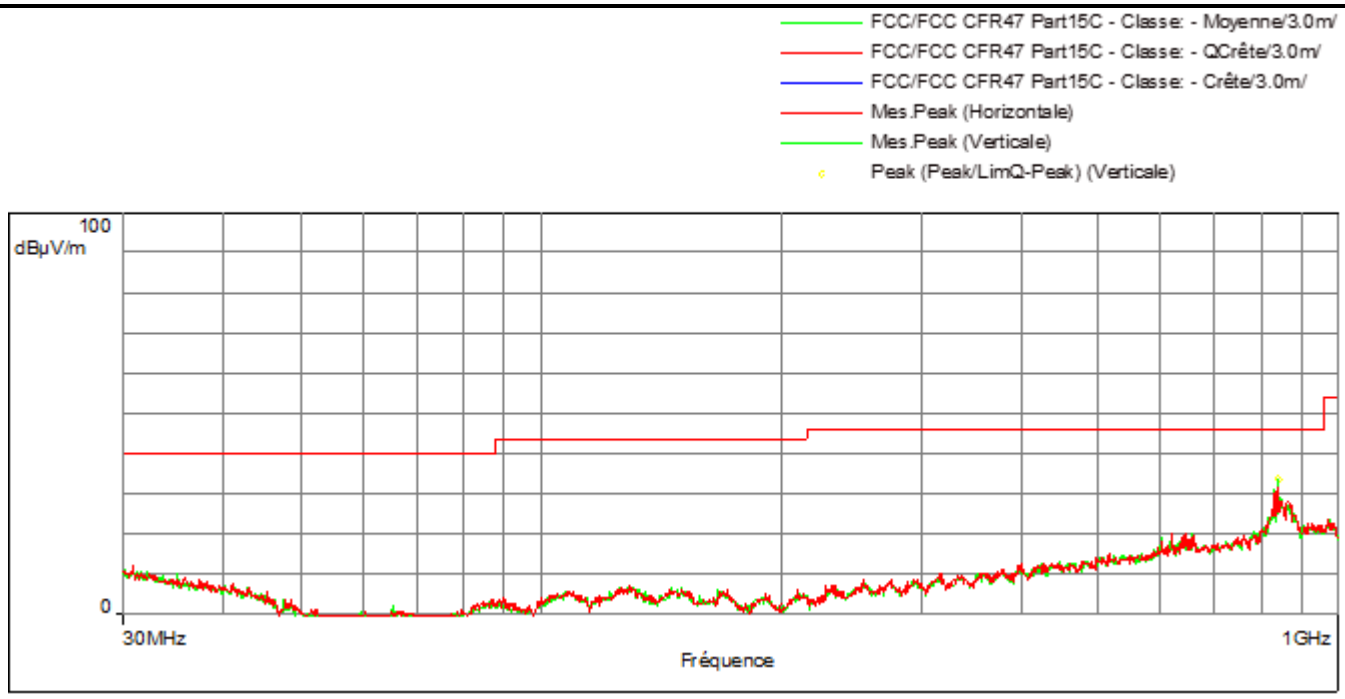
RADIATED EMISSIONS			
Graph name:	Emr#6	**Test configuration:**	
Limit:	FCC CFR47 Part15B	(H+V) - Configuration n°2 – Charging mode > 1GHz – Axis XY	
Class:	B		
Frequency range: [1GHz - 6GHz]			
Antenna polarization:	H & V	**RBW :**	1MHz
Azimuth:	0° - 360°	**VBW :**	3MHz



Spurious emissions

Frequency (MHz)	Peak (dBµV/m)	LimM (dBµV/m)	Peak-LimM (dB)	Polarization	Correction (dB)
2426.360	84.7	54.0	30.7	Vertical	-5.9
4960.560	51.4	54.0	-2.6	Vertical	1.4

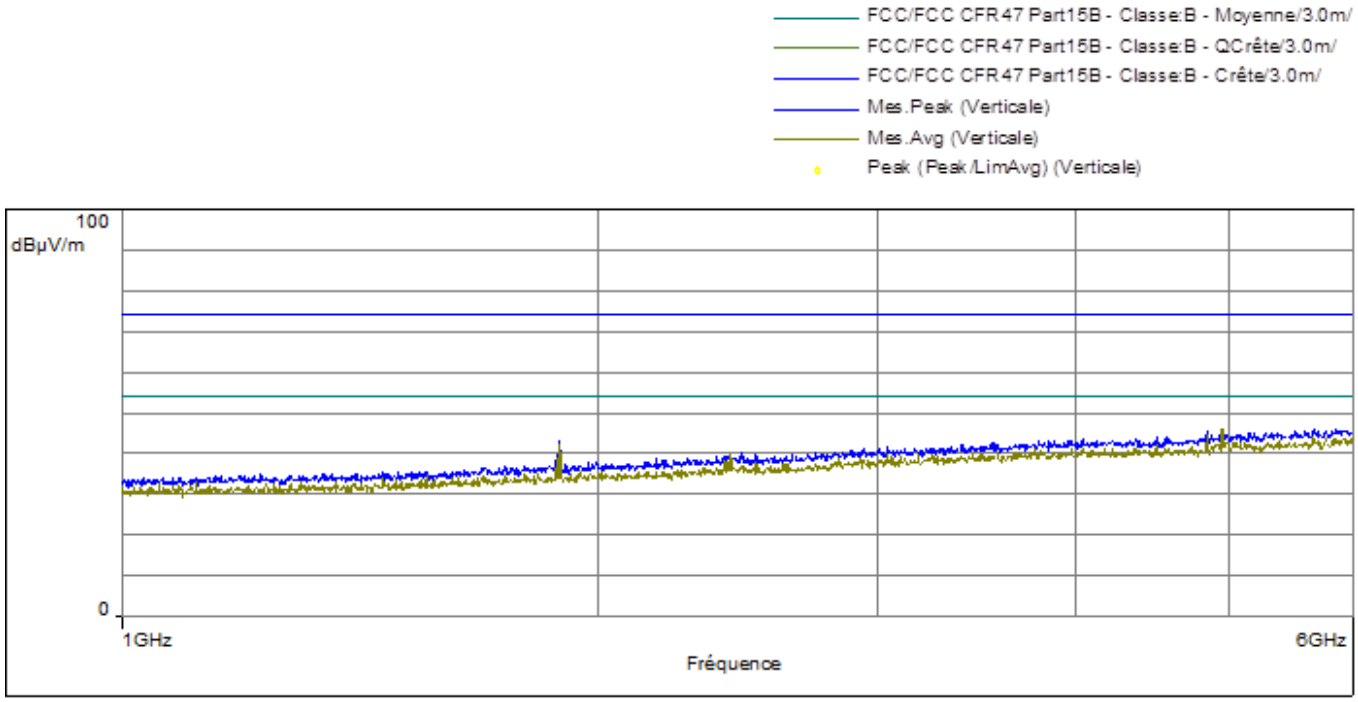
RADIATED EMISSIONS			
Graph name:	Emr#7	**Test configuration:**	
Limit:	FCC CFR47 Part15C	(H+V) – charging mode <1GHz – Axis Z	
Class:			
Frequency range: [30MHz - 1GHz]			
Antenna polarization:	Horizontal & Vertical	**RBW :**	100kHz
Azimuth:	0° - 360°	**VBW :**	300kHz



Spurious emissions

Frequency (MHz)	Peak (dBµV/m)	LimQP (dBµV/m)	Peak-LimQP (dB)	Polarization	Correction (dB)
841.440	33.2	46.0	-12.8	Vertical	-12.2

RADIATED EMISSIONS			
Graph name:	Emr#8	**Test configuration:**	
Limit:	FCC CFR47 Part15B	(H+V) - Configuration n°2 – Charging mode > 1GHz – Axis Z	
Class:	B		
Frequency range: [1GHz - 6GHz]			
Antenna polarization:	H & V	**RBW :**	1MHz
Azimuth:	0° - 360°	**VBW :**	3MHz



Spurious emissions

Frequency (MHz)	Peak (dBµV/m)	LimM (dBµV/m)	Peak-LimM (dB)	Polarization	Correction (dB)
2426.360	84.7	54.0	30.7	Vertical	-5.9
4960.560	51.4	54.0	-2.6	Vertical	1.4

11. UNCERTAINTIES CHART

Type de mesure / *Kind of measurement*	**Incertitude élargie laboratoire / *Wide uncertainty laboratory* (k=2) ± x**	**Incertitude limite du CISPR / *CISPR uncertainty limit* ± y**
Mesure des perturbations conduites en tension sur le réseau d'énergie *Measurement of conducted disturbances in voltage on the power port*	3.51 dB	3.6 dB
Mesure des perturbations conduites en tension sur le réseau de télécommunication *Measurement of conducted disturbances in voltage on the telecommunication port.*	3.26 dB	A l'étude / Under consid.
Mesure des perturbations discontinues conduites en tension *Measurement of discontinuous conducted disturbances in voltage*	3.45 dB	3.6 dB
Mesure des perturbations conduites en courant *Measurement of conducted disturbances in current*	3.09 dB	A l'étude / Under consid.
Mesure du champ électrique rayonné sur le site en espace libre de Moirans *Measurement of radiated electric field on the Moirans open area test site*	5.20 dB	6.3 dB

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