Template : May 12th, 2022

TEST REPORT

N°: **14580738-777551-A (FILE#4011334)** Version: **02**

Subject **Electromagnetic compatibility tests according to the standards:**
FCC CFR 47 Part 15, Subpart B
ANSI C63.4 (2014)

Issued to

SYCLOPE ELECTRONIQUE
Rue du Bruscos
64230 - SAUVAGNON

Apparatus under test

Product	**Controller for cooling tower managements**
Trade mark	**COOL Touch**
Manufacturer	**SYCLOPE ELECTRONIQUE**
Model under test	**COT0000**
Serial number	**221417714**
FCCID	**2AS3B-COOLTOUCH**
IC	**NC**

Conclusion See Test Program chapter

Test date	May 30, 2022
Test location	LCIE Grenoble
FCC Test site	FR0008 - 197516
ISED Test site	FR0008 - 6500A
Sample receipt date	May 30, 2022
Composition of document	23 pages
Document issued on	August 30, 2022

Written by :
Majid MOURZAGH
Tests operator

Approved by :
Anthony MERLIN
Technical manager

PUBLICATION HISTORY

Version	Date	Author	Modification
01	June 28, 2022	Jonathan SARTO	Creation of the document
02	August 22, 2022	Majid MOURZAGH	Remove ETSI standard on §2

Each new edition of this test report replaces and cancels the previous edition. The control of the old editions of report is under responsibility of client.

SUMMARY

1. TEST PROGRAM

1.1. FCC PART15B / ICES-003

Standard:

- ✓ **FCC Part 15, Subpart B (Digital Devices)**
- ✓ **ANSI C63.4 (2014) / ANSI C63.4a (2017)**

1.1.1. Requirements for disturbance emissions – Class B

EMISSION TEST	LIMITS			RESULTS (Comments)
Limits for conducted disturbance 150kHz-30MHz **FCC §15.107**	**Access: AC power**			**PASS**
	Frequency	**Quasi-peak**	**Average**	
	150-500kHz	66 to 56 dBµV	56 to 46 dBµV	
	0.5-5MHz	56 dBµV	46 dBµV	
	5-30MHz	60 dBµV	50 dBµV	
Radiated emissions 30MHz-1GHz **FCC §15.109**	**Access: Enclosure port of ancillary equipment**			**PASS**
	Frequency	**Quasi-peak @10m**		
	30MHz-88MHz	40.0 dBµV/m		
	88MHz-216MHz	43.5 dBµV/m		
	216MHz-960MHz	46.0 dBµV/m		
	Above 960MHz	54.0 dBµV/m		
Radiated emissions 1GHz- 25GHz* **FCC §15.109**	**Access: Enclosure port of ancillary equipment**			**PASS**
	Frequency	**Peak @3m**	**Average @3m**	
	1- 6GHz	74.0 dBµV/m	54.0 dBµV/m	

NA: Not Applicable / NP: Not Performed, not requested by the customer (It cannot be taken into account for the declaration of conformity)
[D]: Divergence, the last version is used to make it possible to test the product with the standard which describes the current state of the art and thus to answer as well as possible his environment of final use.
***§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.
Special condition for intentional radiator:

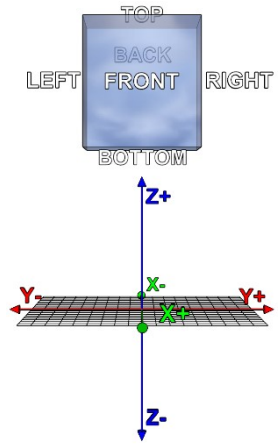
- For a composite system comprised of a digital device using a clock frequency of 1 GHz as the highest frequency for the digital logic and an intentional radiator operating at 2.4 GHz, the composite is required to be investigated to the upper frequency of 24 GHz (in this case, 10 times the intentional radiator frequency is the higher frequency).

- For a composite system comprised of a digital device using a clock frequency of 2 GHz as the highest frequency for the digital logic and an intentional radiator operating at 913 MHz, the composite is required to be investigated to the upper frequency of 10 GHz (in this case, 5 times the unintentional radiator clock frequency is the higher frequency).

2. EQUIPMENT UNDER TEST: CONFIGURATION (DECLARED BY PROVIDER)

2.1. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES)

Equipment under test (EUT):

Model under test :	**COT0000**
Serial Number:	**221417714**
	
Dimensions:	28cm x 22cm x 16cm (Length x Width x Height)
Type :	Panel / Rack / Cabinet (considered like table-top)

Power supply:
During all the tests, EUT is supplied by V_{nom}: **230VAC**
For measurement with different voltage, it will be presented in test method.

Name	Type	Rating	Reference / Sn	Comments
Supply1	AC	100-240V 50/60Hz 6.5A	-	-

NC: Not communicated by provider

Earth:

Access	Type	Length (m)	Width (mm)	Thickness (mm)	Under test	Comments
None						

NC: Not communicated by provider

Inputs/outputs - Cable:

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
Supply1	3wires (L+N+PE)	2	No	No	Yes	-
Access1	RS485	10	No	Yes	Yes	-
Access2	RJ45 Ethernet	5	No	Yes	Yes	-
Access3	RI1	1	Yes	No	No	-
Access4	RI2	1	Yes	No	No	-
Access5	AI1	1	Yes	No	No	-
Access6	DI1	1	Yes	No	No	-
Access7	Led	1	Yes	No	No	-
Access8	USB	-	Yes	Yes	No	Only for maintenance

NC: Not communicated by provider

Auxiliary equipment used during test:

Type	Reference	Sn	Comments
None			

NC: Not communicated by provider

2.2. RADIO FREQUENCY - EQUIPMENT INFORMATION

Type of equipment:	Stand-alone
Equipment intended for use as a:	Fixed use

WIFI	
RF module:	ESP-WROOM-02D
Frequency band:	2400 MHz to 2483.5 MHz – 2.4GHz Band
Antenna type:	Internal
Standby mode*:	Yes
*Tests in standby, receiver or other mode to show conformity to unintentional emissions don't perform like asked by provider.	
Host and radio device testing together:	Yes
Mode under test:	**Wifi - 802.11b**
All frequency bands/modes aren't tested in final product like asked by provider.	
Control signals:	See §criteria and control of good functioning
Level of wanted signal:	>30dB above declared Maximum Usable Sensitivity (MUS)
Exclusion bands:	2.4 GHz band: [2 280 MHz-2 603.5MHz]

Cellular GSM900 /DCS1800			
RF module:	SIM900		
Frequency band:	**2G** ☐ GSM900 TX: 880 MHz to 915MHz Idle: 925 MHz to 960 MHz ☑ DCS1800 TX:1710 MHz to 1785 MHz Idle:1805 MHz to 1880 MHz	**3G** ☐ 3G Band VIII TX: 882 MHz to 913 MHz Idle: 927 MHz to 960 MHz ☐ 3G Band I TX: 1922 MHz to 1978 MHz Idle: 2112 MHz to 2168 MHz	**4G** ☐ Band 3 Tx: 1710MHz to 1785MHz Idle: 1805MHz to 1880MHz ☐ Band 7 Tx: 2500MHz to 2570MHz Idle: 2620MHz to 2690MHz ☐ Band 20 Tx: 832MHz to 862MHz Idle: 791MHz to 821MHz
Frequency band under test:	**2G - DCS1800**		
All frequency bands/modes aren't tested in final product like asked by provider.			
Antenna type:	Internal		
Standby mode*:	Yes		
*Tests in standby, receiver or other mode to show conformity to unintentional emissions don't perform like asked by provider.			
Control signals:	See §criteria and control of good functioning		
Level of wanted signal:	>40dB above declared reference sensitivity.		
Exclusion bands:	**GSM / DCS – 2G**		
	TX: 5 x Channel width ± either side of operating frequency RX: [$Band_{RX}$*(lower)* – 200kHz] MHz to [$Band_{RX}$*(upper)* + 200kHz] MHz		
	UTRA 3G		
	TX: 5 x Channel width ± either side of operating frequency RX: [$Band_{RX}$*(lower)* – 5MHz] MHz to [$Band_{RX}$*(upper)* + 5MHz] MHz		
	E-UTRA – 4G		
	TX: 5 x Channel width ± either side of operating frequency RX: [$Band_{RX}$*(lower)* – 20MHz] MHz to [$Band_{RX}$*(upper)* + 20MHz] MHz		

2.3. EUT CONFIGURATION

Hardware information			
Highest internal frequency (PLL, Quartz, Clock, Microprocessor…):	**$F_{Highest}$:**	**216**	**MHz**
Software (top board):	**V. :**	1.06	
Software (bottom board):	**V. :**	1.0.0	

NC: Not communicated by provider

Running mode n°1:

*Setup:*EUT is powered and functional without radio communication.

2.4. EQUIPMENT MODIFICATIONS DURING THE TESTS

None

2.5. 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

2.6. 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. MEASUREMENT OF CONDUCTED EMISSION

3.1. TEST CONDITIONS

Date of test	:	May 30, 2022
Test performed by	:	Jonathan SARTO
Atmospheric pressure (hPa)	:	998
Relative humidity (%)	:	35
Ambient temperature (°C)	:	21

3.2. TEST SETUP

Mains terminals

The EUT and auxiliaries are set 80cm above the ground on the non-conducting table (Table-top equipment).
The EUT is powered by V_{nom}.
The EUT is powered through a LISN (measure). Auxiliaries are powered by another LISN.

Test setup

3.3. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	**Manufacturer**	**Model**	**Identifier**	**Cal_Date**	**Cal_Due**
BAT EMC	NEXIO	v3.21.0.32	L1000115		
Cable + self	_	_	A5329578	05/22	05/23
EMC comb generator	LCIE SUD EST	_	A3169098		
LISN	ROHDE & SCHWARZ	ENV216	C2320291	08/21	08/22
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	01/21	01/23
Transient limiter	ROHDE & SCHWARZ	ESH3-Z2	A7122204	08/20	08/22
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	10/20	10/22

3.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

3.5. TEST RESULTS – RUNNING MODE N°1

Mains terminals:

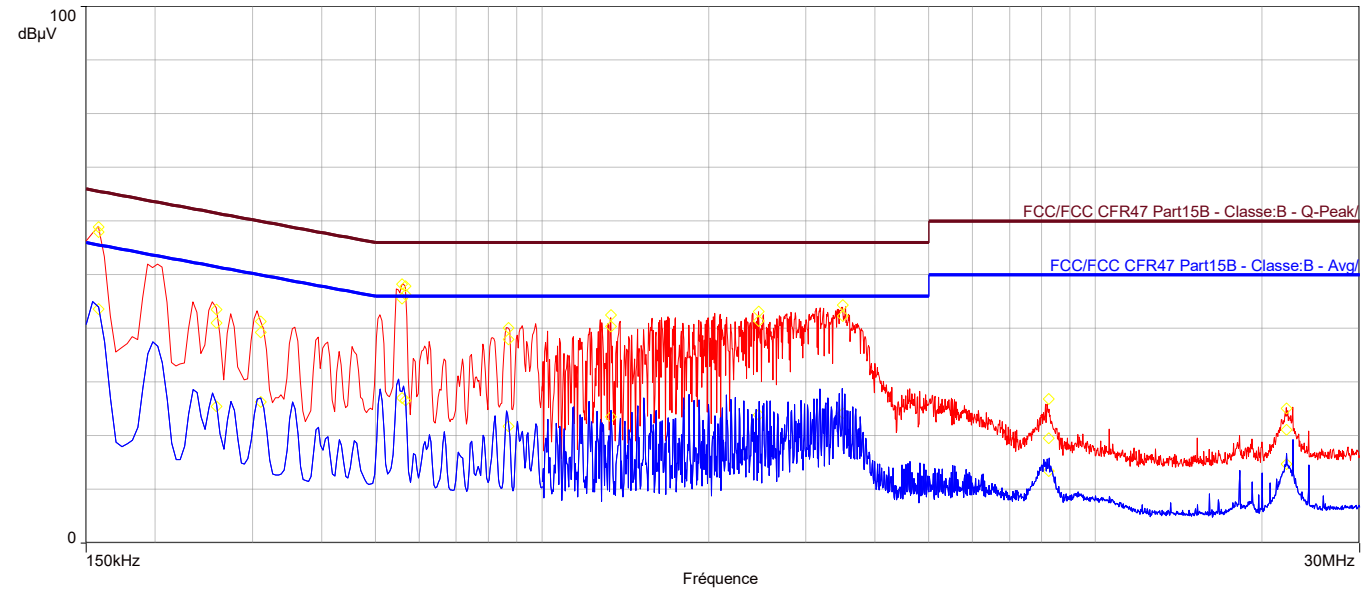
SUPPLY1

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

Results: (PEAK detection)

Graph identifier		Line	Comments	
Emc#	1	Phase	120VAC/60Hz	See below
Emc#	2	Neutral	120VAC/60Hz	See below
Emc#	3	Phase	240VAC/50Hz	See below
Emc#	4	Neutral	240VAC/50Hz	See below

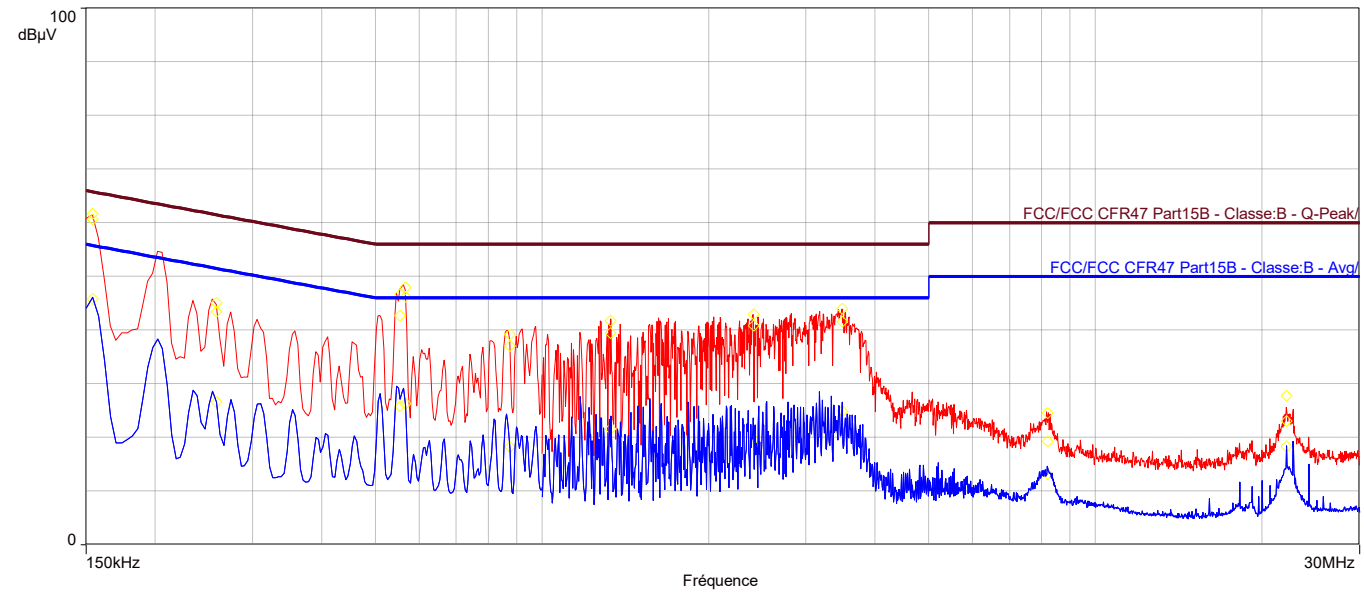
CONDUCTED EMISSIONS					
Graph name:	Emc#1	**Test configuration:**			
Limit:	FCC CFR47 Part15B	Running mode 1			
Class:	B				
Frequency range: [150kHz - 30MHz]					
Voltage / Frequency:	120V/60Hz	**RBW:**	10kHz	**VBW:**	30kHz
Line:	**Phase**	**Trace color & detector:**		PEAK AVG	



Spurious emissions

Frequency (MHz)	Peak (dBµV)	Q-Peak (dBµV)	Lim.Q-Peak (dBµV)	Q-Peak-Lim.Q-Peak (dB)	Avg (dBµV)	Lim.Avg (dBµV)	Avg-Lim.Avg (dB)	Correction (dB)
0.158	58.9	58.0	65.6	-7.6	43.6	55.6	-11.9	19.4
0.258	43.5	41.1	61.5	-20.4	25.5	51.5	-26.0	19.4
0.310	41.3	39.3	60.0	-20.7	26.3	50.0	-23.7	19.5
0.558	48.2	45.6	56.0	-10.4	27.1	46.0	-18.9	19.5
0.566	47.9	46.3	56.0	-9.7	26.6	46.0	-19.4	19.5
0.870	40.1	37.9	56.0	-18.1	21.8	46.0	-24.2	19.5
1.332	42.5	40.4	56.0	-15.6	23.5	46.0	-22.5	19.6
2.464	43.2	41.4	56.0	-14.6	23.9	46.0	-22.1	19.7
3.492	44.4	42.3	56.0	-13.7	24.2	46.0	-21.8	19.7
8.224	26.8	19.5	60.0	-40.5	13.4	50.0	-36.6	20.1
22.124	25.1	21.1	60.0	-38.9	14.7	50.0	-35.3	21.1

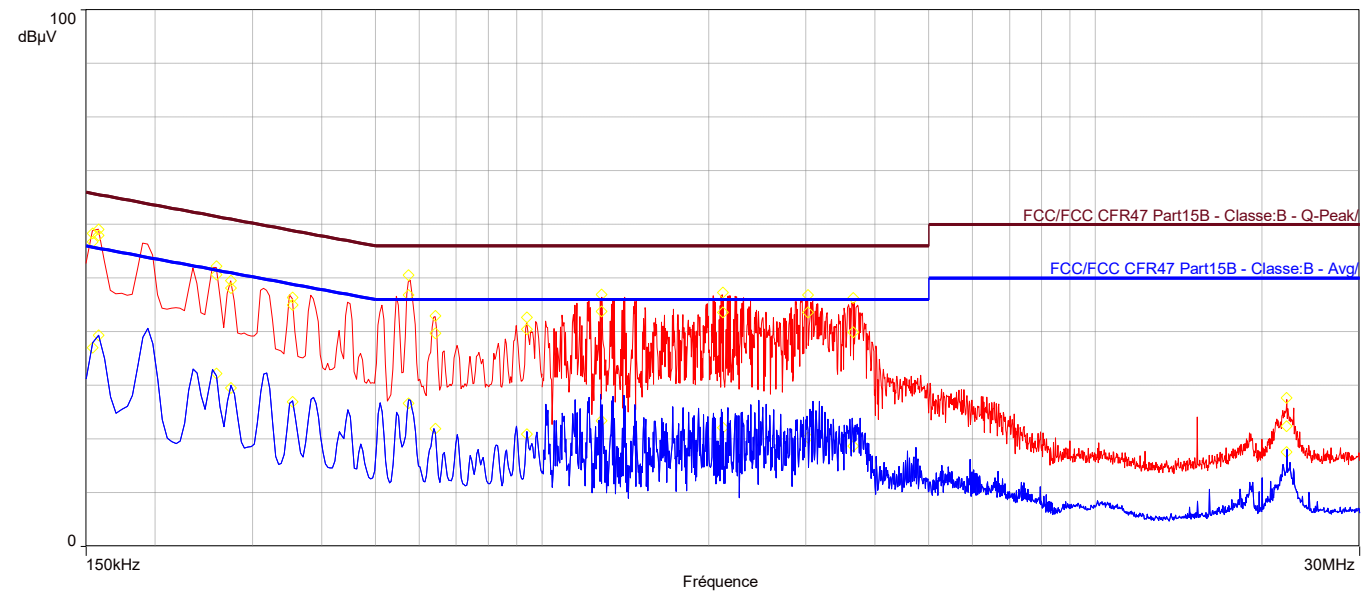
CONDUCTED EMISSIONS				
Graph name:	Emc#2	**Test configuration:**		
Limit:	FCC CFR47 Part15B	Running mode 1		
Class:	B			
Frequency range: [150kHz - 30MHz]				
Voltage / Frequency:	120V/60Hz	**RBW:** 10kHz	**VBW:** 30kHz	
Line:	**Neutral**	**Trace color & detector:**	PEAK AVG	



Spurious emissions

Frequency (MHz)	Peak (dBµV)	Q-Peak (dBµV)	Lim.Q-Peak (dBµV)	Q-Peak-Lim.Q-Peak (dB)	Avg (dBµV)	Lim.Avg (dBµV)	Avg-Lim.Avg (dB)	Correction (dB)
0.154	61.6	60.7	65.8	-5.1	45.9	55.8	-9.9	19.4
0.258	45.1	43.4	61.5	-18.1	26.6	51.5	-24.9	19.4
0.554	46.6	42.7	56.0	-13.3	25.9	46.0	-20.1	19.5
0.566	47.9	46.2	56.0	-9.8	26.3	46.0	-19.7	19.5
0.874	39.2	37.1	56.0	-18.9	18.3	46.0	-27.7	19.5
1.328	41.7	39.4	56.0	-16.6	21.6	46.0	-24.4	19.6
2.412	43.0	40.8	56.0	-15.2	19.7	46.0	-26.3	19.7
3.488	44.0	41.6	56.0	-14.4	24.9	46.0	-21.1	19.7
8.196	24.5	19.3	60.0	-40.7	13.2	50.0	-36.8	20.1
22.136	27.8	23.0	60.0	-37.0	18.3	50.0	-31.7	21.1

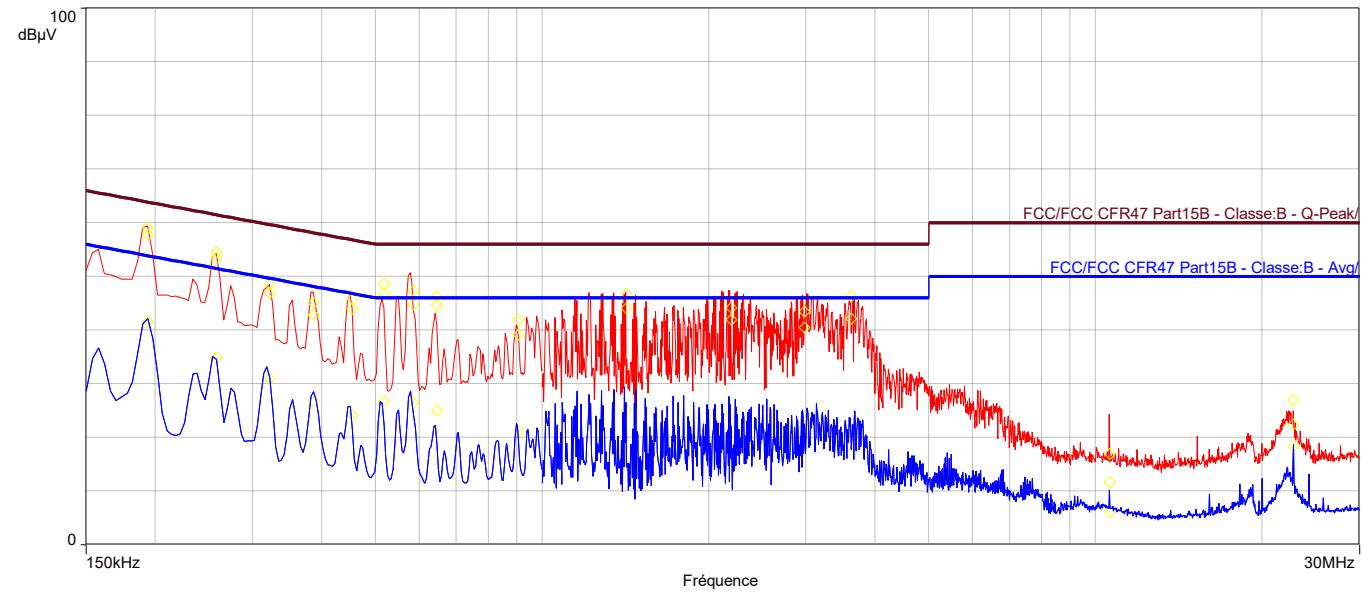
CONDUCTED EMISSIONS			
Graph name:	Emc#3	**Test configuration:**	
Limit:	FCC CFR47 Part15B	Running mode 1	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	240V/50Hz	**RBW:** 10kHz	**VBW:** 30kHz
Line:	**Phase**	**Trace color & detector:**	PEAK AVG



Spurious emissions

Frequency (MHz)	Peak (dBµV)	Q-Peak (dBµV)	Lim.Q-Peak (dBµV)	Q-Peak-Lim.Q-Peak (dB)	Avg (dBµV)	Lim.Avg (dBµV)	Avg-Lim.Avg (dB)	Correction (dB)
0.154	58.3	56.8	65.8	-9.0	37.0	55.8	-18.7	19.4
0.158	59.1	58.0	65.6	-7.6	39.4	55.6	-16.2	19.4
0.258	52.2	50.7	61.5	-10.8	32.2	51.5	-19.3	19.4
0.274	49.6	48.2	61.0	-12.8	29.6	51.0	-21.4	19.5
0.354	46.4	45.0	58.9	-13.8	27.0	48.9	-21.9	19.5
0.574	50.5	46.8	56.0	-9.2	26.7	46.0	-19.3	19.5
0.642	43.0	39.8	56.0	-16.2	21.9	46.0	-24.1	19.5
0.938	42.7	40.5	56.0	-15.5	21.0	46.0	-25.0	19.5
1.280	47.0	43.8	56.0	-12.2	23.4	46.0	-22.6	19.6
2.120	47.3	43.6	56.0	-12.4	22.2	46.0	-23.8	19.6
3.024	46.9	43.6	56.0	-12.4	20.3	46.0	-25.7	19.7
3.648	46.3	40.0	56.0	-16.0	18.7	46.0	-27.3	19.8
22.152	27.7	22.4	60.0	-37.6	17.6	50.0	-32.4	21.1

CONDUCTED EMISSIONS				
Graph name:	Emc#4	**Test configuration:**		
Limit:	FCC CFR47 Part15B	Running mode 1		
Class:	B			
Frequency range: [150kHz - 30MHz]				
Voltage / Frequency:	240V/50Hz	**RBW:** 10kHz	**VBW:**	30kHz
Line:	**Neutral**	**Trace color & detector:**	PEAK AVG	



Spurious emissions

Frequency (MHz)	Peak (dBµV)	Q-Peak (dBµV)	Lim.Q-Peak (dBµV)	Q-Peak-Lim.Q-Peak (dB)	Avg (dBµV)	Lim.Avg (dBµV)	Avg-Lim.Avg (dB)	Correction (dB)
0.194	59.1	57.8	63.9	-6.1	41.6	53.9	-12.3	19.5
0.258	54.6	53.4	61.5	-8.1	34.9	51.5	-16.6	19.4
0.322	48.5	47.0	59.7	-12.7	30.9	49.7	-18.7	19.5
0.386	45.1	42.8	58.2	-15.4	26.7	48.2	-21.5	19.5
0.454	45.9	44.0	56.8	-12.8	24.2	46.8	-22.6	19.5
0.518	48.6	46.9	56.0	-9.1	26.7	46.0	-19.3	19.5
0.586	47.3	44.9	56.0	-11.1	26.5	46.0	-19.5	19.5
0.646	46.2	44.7	56.0	-11.3	25.0	46.0	-21.0	19.5
0.906	42.0	39.2	56.0	-16.8	21.1	46.0	-24.9	19.5
1.420	46.8	44.1	56.0	-11.9	25.1	46.0	-20.9	19.6
2.196	44.2	41.9	56.0	-14.1	24.4	46.0	-21.6	19.6
2.980	43.4	40.5	56.0	-15.5	22.8	46.0	-23.2	19.7
3.620	46.3	42.2	56.0	-13.8	20.9	46.0	-25.1	19.8
10.624	17.0	11.7	60.0	-48.3	6.1	50.0	-43.9	20.3
22.768	26.9	22.4	60.0	-37.6	18.4	50.0	-31.6	21.1

3.6. CONCLUSION

The sample of the equipment **COT0000**, Sn : **221417714**, tested in the configuration presented in this test report **satisfies** to requirements of the product family standard applied (See §Test Program) for conducted emissions.

4. MEASUREMENT OF RADIATED EMISSION

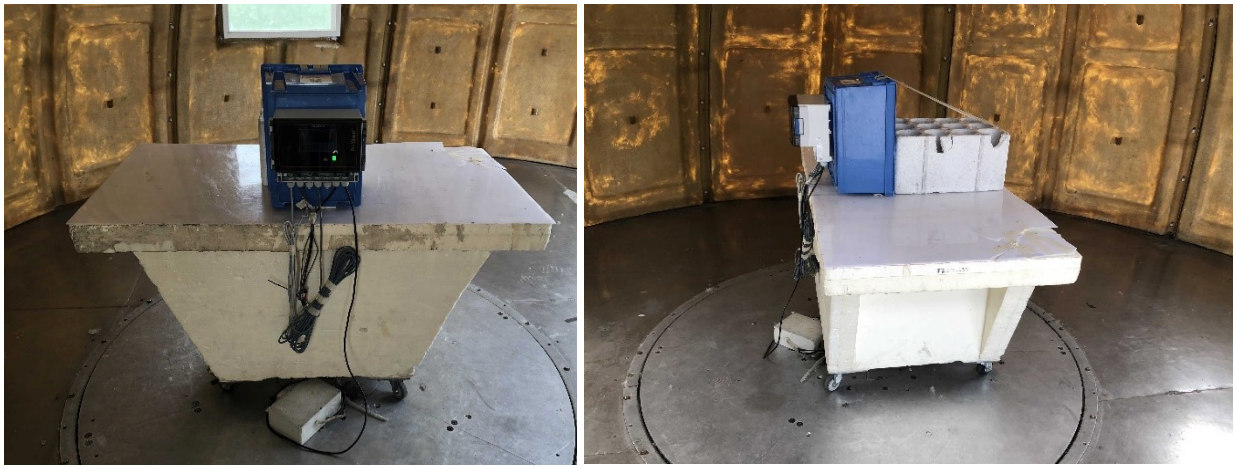
4.1. TEST CONDITIONS

Date of test	:	May 30, 2022
Test performed by	:	Jonathan SARTO
Atmospheric pressure (hPa)	:	998
Relative humidity (%)	:	35
Ambient temperature (°C)	:	21

4.2. TEST SETUP

The EUT and auxiliaries are set 80cm above the ground on the non-conducting table (Table-top equipment).
The EUT is powered by V_{nom}.

Test setup in anechoic chamber



Test setup on OATS

4.3. TEST METHOD

4.3.1. 30MHz –1GHz

Pre-qualification measurement

A pre-scan of all the setup has been performed in a 3 meters semi-anechoic chamber. Test is performed with antenna centered on EUT in horizontal (H) and vertical (V) polarization, continuous linear turntable azimuth search was performed with 360 degrees range. Measurements are performed on all axis of EUT used in normal configuration. The pre-characterization graphs are obtained in PEAK detection.

Qualification

The installation of EUT is identical than for pre-qualification measurements on an Open Area Test Site with a 10 meters distance between EUT and antenna. In this case, it corrected according to requirements of 15.209.e), M@3m = M@10m+10.5dB. Test is performed in horizontal (H) and vertical (V) polarization and the height antenna is varied from 1m to 4m. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurements are 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.

4.3.2. 1GHz – 6GHz:

Pre-qualification measurement

A pre-scan of all the setup has been performed in a 3 meters full anechoic chamber. Test is performed with antenna centered on EUT in horizontal (H) and vertical (V) polarization, continuous linear turntable azimuth search was performed with 360 degrees range. Measurements are performed on all axis of EUT used in normal configuration. The pre-characterization graphs are obtained in PEAK and AVERAGE detection.

Qualification

The installation of EUT is identical for pre-characterization measurements. Test is performed in horizontal (H) and vertical (V) polarization and the height antenna is fixed and centered on the EUT, EUT smaller than the beamwidth of the measurement antenna.

Minimal beamwidth of the measurement antenna used: AINFO 10180 / w@3m=1.4m<14GHz / w@3m=0.8m<18GHz

Continuous linear turntable azimuth search was performed with 360 degrees range. Measurements are 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.

4.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	**Manufacturer**	**Model**	**Identifier**	**Cal_Date**	**Cal_Due**
Amplifier 100kHz – 18GHz	LCIE SUD EST	_	A7085027	11/20	11/22
Antenna Bi-Log Xwing	TESEQ	CBL6144	C2040146	03/17	07/22
Antenna horn 18GHz	AINFO	LB	C2042078	04/21	04/23
BAT EMC	NEXIO	v3.21.0.32	L1000115		
Cable 0.75m	SUCOFLEX	18GHz	A5329919	08/21	08/22
Cable 2.2m N	SUCOFLEX	SF118A/2x11N/2.2M	A5329990	08/21	08/22
Cable 5m	SUCOFLEX	18GHz	A5329918	08/21	08/22
CALCUL_FACTEURS	LCIE SUD EST	V4	L2000035		
Comb EMR HF	YORK	CGE01	A3169114		
Diameter 1.2m / Height 2.25m	LCIE	VSWR 1GHz – 18GHz	D3044015_VSWR	06/19	06/22
Radiated emission comb generator	BARDET	_	A3169050		
Semi-Anechoic chamber #2	SIEPEL	_	D3044015	06/19	06/22
Spectrum Analyzer 9kHz – 6GHz	ROHDE & SCHWARZ	FSL6	A4060049	04/20	08/22
Table C2/OATS	LCIE	_	F2000438		
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	01/21	01/23
Turntable chamber (Cage#2)	ETS Lingren	Model 2165	F2000404		
Turntable controller (Cage#2)	ETS Lingren	Model 2066	F2000393		
Antenna Bi-log	CHASE	CBL6111A	C2040172	04/22	04/24
Antenna Mat (OATS)	ETS Lingren	2071-2	F2000392		
Biconic Antenna	EATON	94455-1	C2040234	03/21	03/23
Cable (OATS)	_	1GHz	A5329623	08/21	08/22
Emission Cable	SUCOFLEX	6GHz	A5329061	08/21	08/22
Emission Cable	MICRO-COAX	1GHz	A5329656	08/21	08/22
OATS	_	_	F2000409	04/21	08/22
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	10/20	10/22
Turntable (OATS)	ETS Lingren	Model 2187	F2000403		
Turntable / Mast controller (OATS)	ETS Lingren	Model 2066	F2000372		

4.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

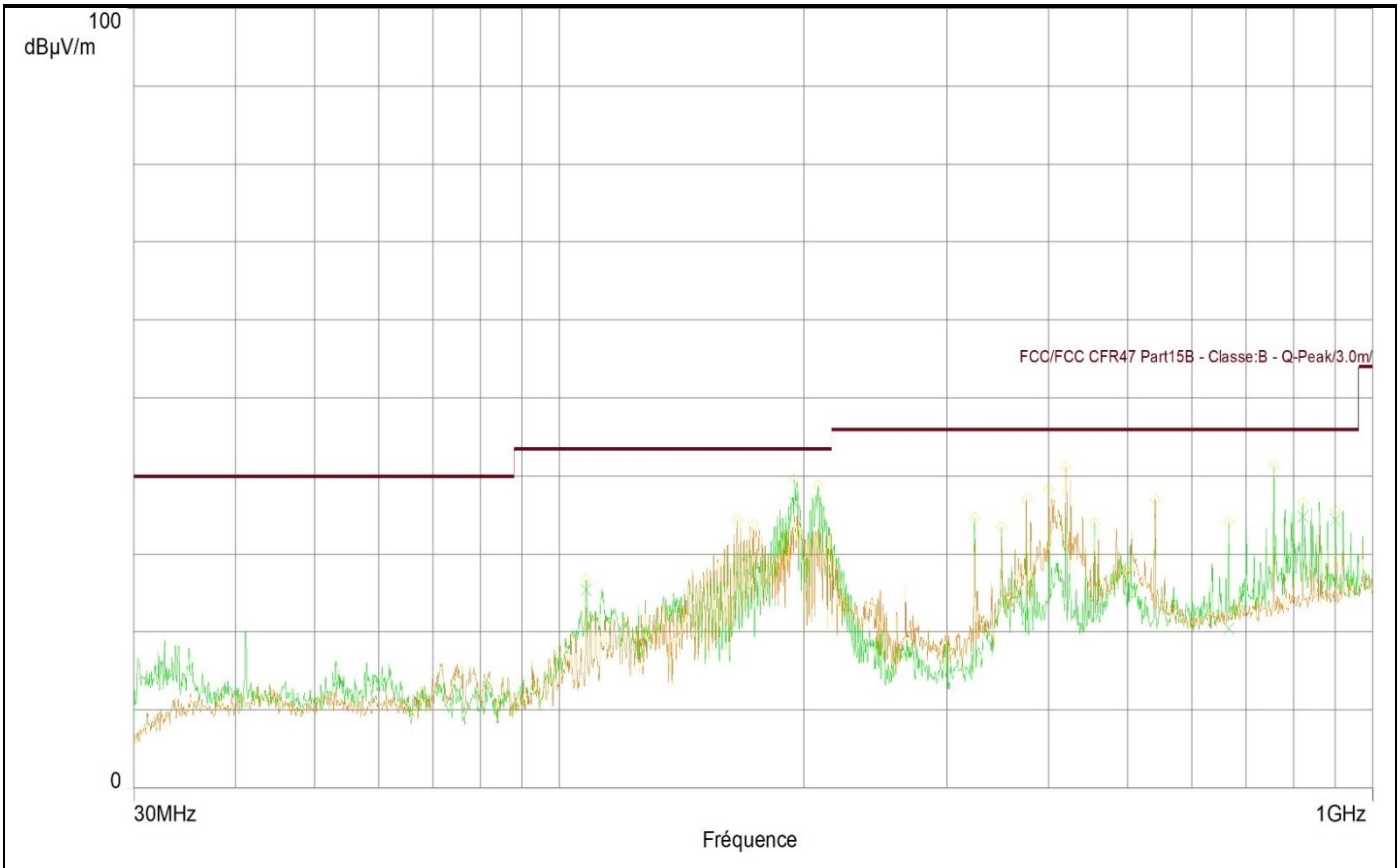
4.6. TEST RESULTS – RUNNING MODE N°1

4.6.1. 30MHz –1GHz

Pre-qualification measurement

Graph identifier	Polarization	EUT position	Comments	
Emr# 1	Horizontal & Vertical	Axis XY	-	See below

RADIATED EMISSIONS					
Graph name:	Emr#1	**Test configuration:**			
Limit:	FCC CFR47 Part15B	Running mode 1			
Class:	B				
Frequency range: [30MHz – 1GHz]					
Antenna polarization:	Horizontal & Vertical	**RBW:**	100kHz	**VBW:**	300kHz
Azimuth: 0° - 360°	**Trace color & detector:** F<GHz: Only Peak detector: Antenna Polarization: Vertical Horizontal				



Spurious emissions

Frequency (MHz)	Peak (dBµV/m)	Lim.Q-Peak (dBµV/m)	Peak-Lim.Q-Peak (dB)	Polarization
108.013	26.8	43.5	-16.8	Vertical
194.424	39.5	43.5	-4.0	Vertical
208.000	38.8	43.5	-4.7	Vertical

Frequency (MHz)	Peak (dBµV/m)	Lim.Q-Peak (dBµV/m)	Peak-Lim.Q-Peak (dB)	Polarization
324.080	34.7	46.0	-11.3	Vertical
350.000	33.5	46.0	-12.5	Vertical
375.000	37.0	46.0	-9.0	Vertical
454.880	34.0	46.0	-12.0	Vertical
664.960	34.1	46.0	-11.9	Vertical
756.200	41.3	46.0	-4.7	Vertical
820.040	36.6	46.0	-9.4	Vertical
899.920	35.6	46.0	-10.4	Vertical

Qualification

The frequency list is created from the results obtained during the pre-qualification.
Measurements are performed using a QUASI-PEAK detection.

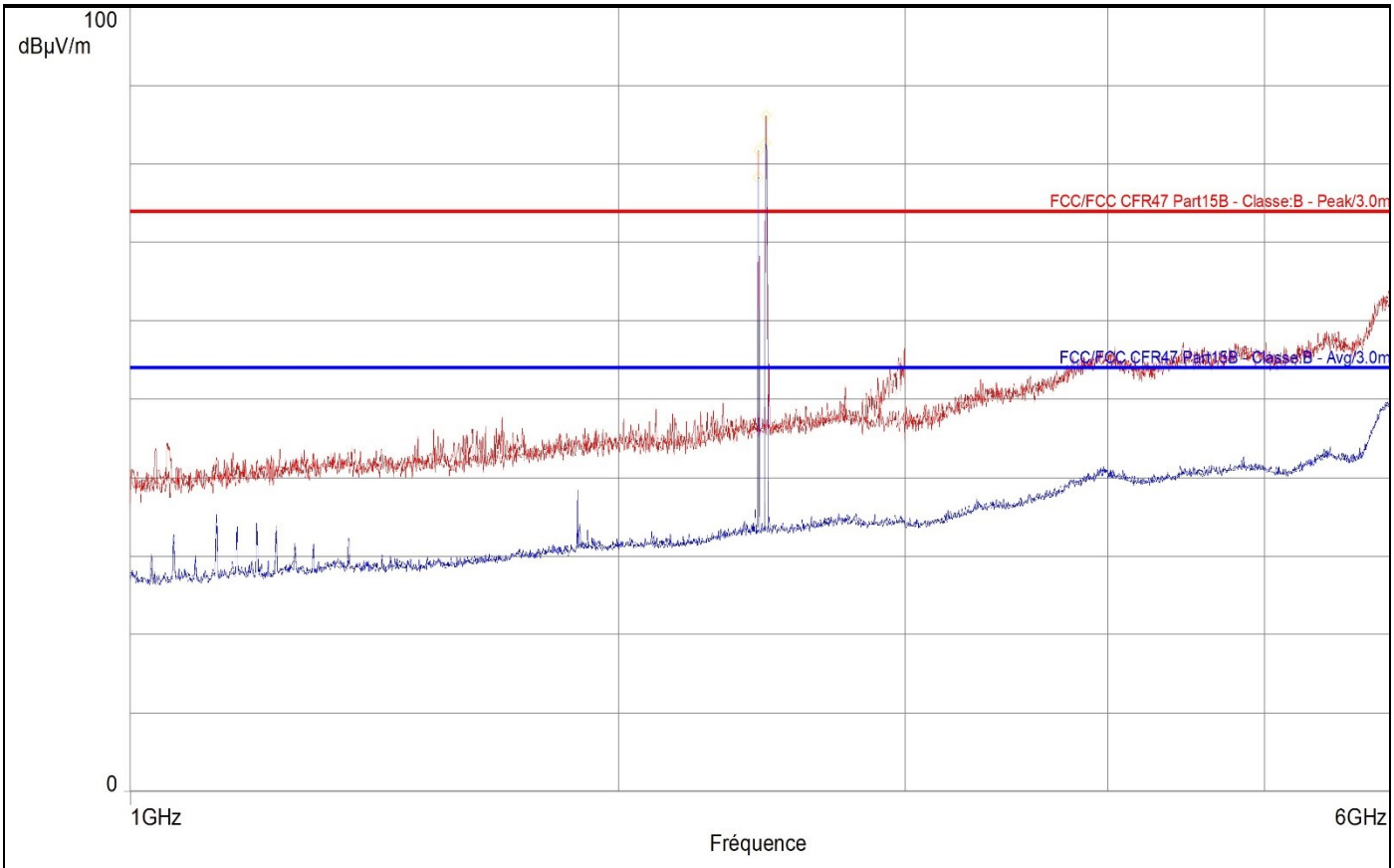
Test Frequency (MHz)	Meter Reading dB(µV)	Detector (Pk/QP/Av)	Polarity (V/H)	Azimuth (Degrees)	Antenna Height (cm)	Transducer Factor (dB)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Remark
108	12,7	QP	V	360	150	13,3	26,0	43,5	**-17,5**	Measure performed at 3m
165,5	19,9	QP	V	116	100	19,7	39,6	43,5	**-3,9**	
173,1	21,2	QP	V	0	100	18,8	40,0	43,5	**-3,5**	
194,4	20,1	QP	H	105	322	18,1	38,2	43,5	**-5,3**	
208	23,1	QP	H	258	265	12,5	35,6	43,5	**-7,9**	
324	21,3	QP	H	219	245	18,0	39,3	46,0	**-6,7**	
375	21,8	QP	H	94	211	19,8	41,6	46,0	**-4,4**	
400	22,4	QP	H	332	169	21,1	43,5	46,0	**-2,5**	
420	22,5	QP	H	186	160	22,1	44,6	46,0	**-1,4**	
540,2	16,7	QP	H	237	123	24,6	41,3	46,0	**-4,7**	
665	10,3	QP	V	0	100	26,9	37,2	46,0	**-8,8**	
756,2	14,3	QP	V	0	165	29,3	43,6	46,0	**-2,4**	
820	4,8	QP	V	0	150	30,6	35,4	46,0	**-10,6**	Measure performed at 3m
900	12,5	QP	V	360	100	31,5	44,0	46,0	**-2,0**	

4.6.2. 1GHz – 6GHz

Pre-qualification measurement

Graph identifier		Polarization	EUT position	Comments	
Emr#	2	Horizontal & Vertical	Axis XY	-	See below

RADIATED EMISSIONS				
Graph name:	Emr#2	**Test configuration:**		
Limit:	FCC CFR47 Part15B	Running mode 1		
Class:	B			
Frequency range: [1GHz – 6GHz]				
Antenna polarization:	Horizontal & Vertical	**RBW:** 1MHz	**VBW:** 3MHz	
Azimuth: 0° - 360°	**Trace color & detector:** F>GHz: for both Antenna Polarization: detector: PEAK AVG			



Spurious emissions

Frequency (MHz)	Average (dBµV/m)	Lim.Average (dBµV/m)	Average-Lim.Average (dB)	Polarization
2437.833	78.3	54.0	24.3	Vertical
2463.167	82.7	54.0	28.7	Horizontal

Wifi frequency

Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Peak-Lim.Peak (dB)	Polarization
2438.667	81.8	74.0	7.8	Vertical
2463.667	86.2	74.0	12.2	Horizontal

Wifi frequency

***Qualification* between 1Ghz to 6GHz**

The frequency list is created from the results obtained during the pre-qualification.
Measurements are performed using a PEAK and AVERAGE detection.

No significative frequency observed excepted wifi frequency

***Qualification* between 6Ghz to 25GHz**

The frequency list is created from the results obtained during the pre-qualification.
Measurements are performed using a PEAK and AVERAGE detection.

No significant frequency observed between 6GHz to 25GHz

4.7. CONCLUSION

The sample of the equipment **COT0000**, Sn : **221417714**, tested in the configuration presented in this test report **satisfies** to requirements of the product family standard applied (See §Test Program) for radiated emissions.

5. 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 (monophasé /triphasé) 150kHz-30MHz *Measurement of conducted disturbances in voltage on the power port (single & three phases)150kHz-30MHz*	3.29dB	3.4dB
Mesure du champ électrique rayonné en cage de Faraday semi-anéchoïque de 30MHz à 1GHz *Measurement of radiated electric field in half-anechoic Faraday room from 30MHz to 1GHz*	5.06dB	5.3dB
Mesure du champ électrique rayonné en cage de Faraday semi-anéchoïque de 1GHz à 6GHz *Measurement of radiated electric field in half-anechoic Faraday room* *From 1GHz à 6GHz*	5.18dB	5.2dB
Mesure du champ électrique rayonné sur le site en espace libre de Moirans 30MHz – 1GHz. *Measurement of radiated electric field on the Moirans open area test site 30MHz – 1GHz.*	5.2dB	6.3dB

Les valeurs d'incertitudes calculées du laboratoire étant inférieures aux valeurs d'incertitudes limites établies par le CISPR, la conformité de l'échantillon est établie directement par les niveaux limites applicables. Ce tableau regroupe l'ensemble des incertitudes maximales pour les essais réalisables dans le laboratoire, qu'ils aient été ou non réalisés dans le cadre du présent rapport / *The uncertainty values calculated by the laboratory are lower than limit uncertainty values defined by the CISPR. The conformity of the sample is directly established by the applicable limits values. This table includes all uncertainties maximum feasible for testing in the laboratory, whether or not made in this report*

Note - L'incertitude de mesure instrumentale est déterminée selon la CISPR 16-4-2. / *The instrumentation measurement uncertainty is determined according to CISPR16-4-2*