Template : February 22th, 2023

TEST REPORT

N°: **18337324-787218-B (FILE#5149543)** Version: **01**

Subject	Electromagnetic compatibility tests according to the standards: **FCC CFR 47 Part 15, Subpart B** **ANSI C63.4 / ANSI C63.4a** **ICES-003**
Issued to	**ProMinent GmBH** Im Schuhmachergewann 5 -11 69123 - Heidelberg Germany
Apparatus under test	
↳ Product	**Water Analyser**
↳ Trade mark	**ProMinent GmBH**
↳ Manufacturer	**ProMinent GmBH**
↳ Model under test	**DULCOPOOL PRO**
↳ Similar Model	**DULCOPOOL PRO LIGHT**
↳ Serial number	**230924113**
↳ FCCID	**2BBPH-DULCOPOOLPRO**
↳ IC	**NC**
Conclusion	See Test Program chapter
Test date	March 20, 2023
Test location	LCIE Grenoble
FCC Test site	FR0008 - 197516 (MOI)
ISED Test site	6500A (MOI)
Sample receipt date	March 20, 2023
Composition of document	29 pages
Document issued on	July 28, 2023

Written by :
Akram HAKKARI
Tests operator

Approved by :
Majid MOURZAGH
Technical manager

LABORATOIRE CENTRAL DES INDUSTRIES ÉLECTRIQUES
LCIE SUD-EST
ZI Centr' Alp
170, rue de Chatagnon
38430 MOIRANS
Tél. : 04 76 07 36 36
FAX : 04 76 55 90 88

PUBLICATION HISTORY

Version	Date	Author	Modification
01	July 28, 2023	Akram HAKKARI	Creation of the document

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

Standard:

- ✓ **FCC Part 15, Subpart B (Digital Devices)**
- ✓ **ANSI C63.4 (2014) / ANSI C63.4a (2017)**
- ✓ **ICES-003 (2020)**

1.1. REQUIREMENTS FOR DISTURBANCE EMISSIONS – CLASS B

EMISSION TEST	LIMITS			RESULTS (Comments)
Limits for conducted disturbance 150kHz-30MHz **FCC §15.107 / ICES-003**	**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 @3m**		
	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 30MHz-1GHz **ICES-003**	**Access: Enclosure port of ancillary equipment**			**PASS**
	Frequency	**Quasi-peak @3m**		
	30MHz-88MHz	40.0 dBµV/m		
	88MHz-216MHz	43.5 dBµV/m		
	216MHz-230MHz	46.0 dBµV/m		
	230MHz-960MHz	47.0 dBµV/m		
	Above 960MHz	54.0 dBµV/m		
Radiated emissions 1GHz-13GHz* **FCC §15.109 / ICES-003**	**Access: Enclosure port of ancillary equipment**			**PASS**
	Frequency	**Peak @3m**	**Average @3m**	
	1- 13GHz	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:

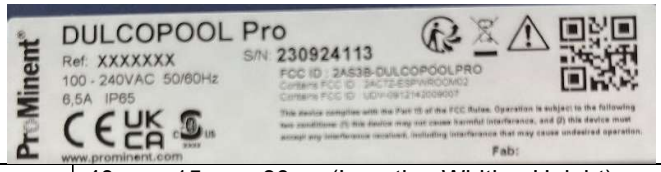
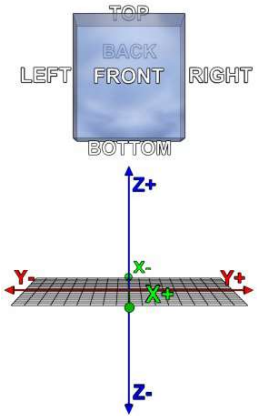
- For a composite system comprised of a digital device using a clock frequency of 1 GHz as the highest frequency for the digital logic and an intentional radiator operating at 2.4 GHz, the composite is required to be investigated to the upper frequency of 24 GHz (in this case, 10 times the intentional 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 :	**DULCOPOOL PRO**
Serial Number:	**230924113**
	  
Dimensions:	40cm x 15cm x 30cm (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
Supply	AC	100-240V 50/60Hz	/	/

NC: Not communicated by provider

Earth:

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

NC: Not communicated by provider

Inputs/outputs - Cable:

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
Supply	3 wires (X1)	2	No	No	Yes	Output 9
Access1	Power Output (PO1)	1	Yes	No	Yes	Output 8
Access2	Proximity cell (DI3)	1	Yes	No	Yes	Output 16
Access3	RS485 (485/PWR)	5	No	Yes	Yes	Output 15
Access4	4-20mA input (AI1)	1	Yes	No	Yes	Output 4
Access5	4-20mA input (AI3)	1	Yes	No	Yes	Output 4
Access6	Voltage input (PI1) Ex : PH	5	No	No	Yes	Output 12
Access7	Ethernet	5	No	Yes	Yes	/

NC: Not communicated by provider

Auxiliary equipment used during test:

Type	Reference	Sn	Comments
Laptop	ASUS	/	/
Radio communication analyser	ANRITSU MT8820C	A2440008	
RS485 converter	/	/	/
Wifi router	/	/	/

NC: Not communicated by provider

2.2. EUT CONFIGURATION

Hardware information			
Highest internal frequency (PLL, Quartz, Clock, Microprocessor…):	**$F_{Highest}$:**	**2400**	**MHz**
Firmware (if applicable):	**V. :**	NC	
Software (if applicable):	**V. :**	NC	

NC: Not communicated by provider

Running mode n°1:

Setup:

EUT is powered and functional with radio communication. Access at EUT webserver by Ethernet and visualize on laptop.

2.3. EQUIPMENT MODIFICATIONS DURING THE TESTS

None

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

2.5. TEST DISTANCE EXTRAPOLATION – FCC/ISED

The field strength is extrapolated to the new measurement distance using formula from FCC Part15.31 (f) and §6.5-6.6 RSS-GEN:

Below 30MHz,

$$FS_{\text{limit}} = FS_{\text{max}} - 40\log\left(\frac{d_{\text{limit}}}{d_{\text{measure}}}\right)$$

Above 30MHz,

$$FS_{\text{limit}} = FS_{\text{max}} - 20\log\left(\frac{d_{\text{limit}}}{d_{\text{measure}}}\right)$$

Where:
FS_{limit} is the calculation of field strength at the limit distance, expressed in dBµV/m
FS_{max} is the measured field strength, expressed in dBµV/m
$d_{measure}$ is the distance of the measurement point from the EUT
d_{limit} is the reference limit distance

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

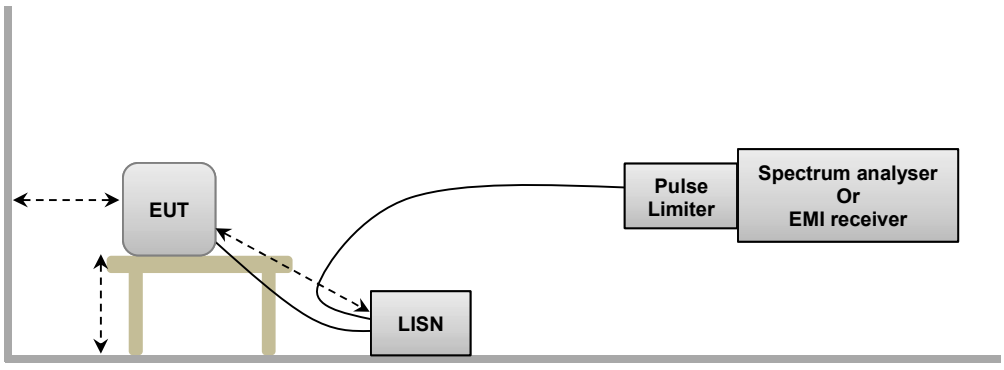
Date of test	:	March 20, 2023
Test performed by	:	Nathalie BUGANZA
Atmospheric pressure (hPa)	:	998
Relative humidity (%)	:	34
Ambient temperature (°C)	:	22

3.2. TEST SETUP

Test procedure:
☑ ANSI C63.10 & FCC Part 15 subpart C

The EUT and auxiliaries are set 80cm above the ground on the non-conducting table (Table-top equipment) and at 80cm from the LISN, the cable has been shorted to 1meter length. The distance between the EUT and the vertical ground plane is 40cm. Measurement is made with a receiver in peak mode. 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. Interconnecting cables and equipment's were moved to position that maximized emission. The EUT is powered like specified in following table, through a LISN (measure); auxiliaries are powered by another LISN.

Type	Measurement performed:	
☑ AC / ☐ DC (Auxiliary used)	☑ 120VAC/60Hz	☑ 240VAC/50Hz
☐ USB (Laptop auxiliary)	☐ 120VAC/60Hz (Laptop auxiliary)	☐ 240VAC/50Hz (Laptop auxiliary)



Test setup of AC Power Line Conducted Emissions

Photo of AC Power Line Conducted Emissions

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	08/22	08/23
LISN tri-phase	ROHDE & SCHWARZ	ESH2-Z5	C2320063	03/22	03/23
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	03/23	03/25
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	01/21	05/23
Transient limiter	ROHDE & SCHWARZ	ESH3-Z2	A7122204	08/22	08/24

3.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

3.5. TEST RESULTS – RUNNING MODE N°1

Mains terminals:

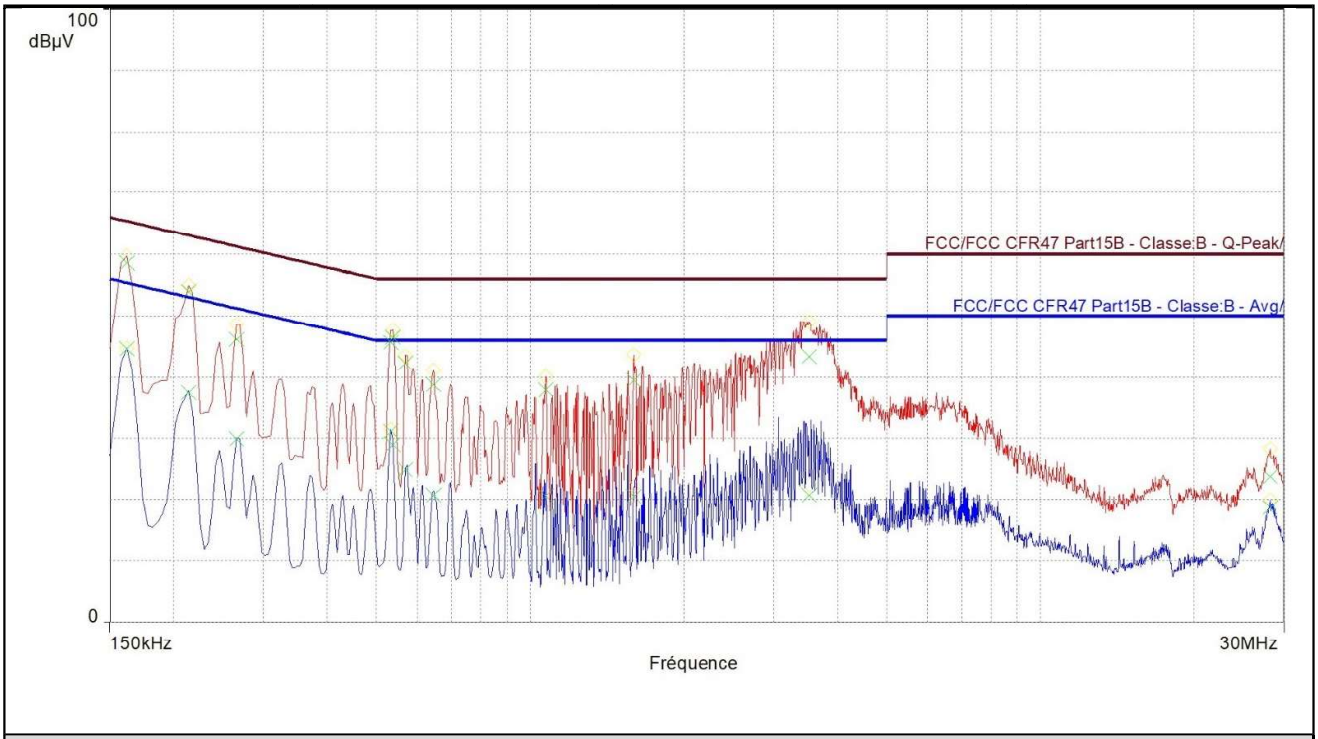
SUPPLY

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

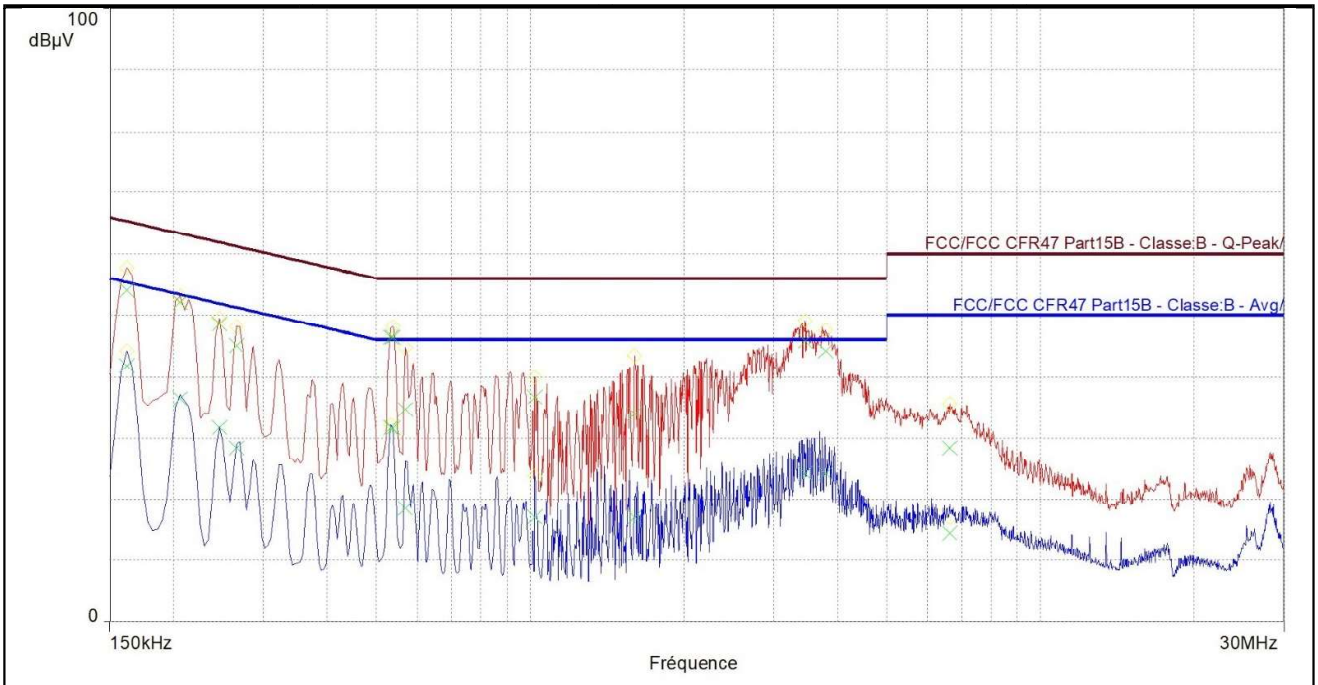
CONDUCTED EMISSIONS				
Graph name:	1	**Test configuration:**		
Limit:	FCC CFR47 Part15B	DULCOPOOL PRO - (66)		
Class:	B			
Frequency range: [150kHz - 30MHz]				
Voltage / Frequency:	120V 60Hz	**RBW:** 10kHz	**VBW:**	30kHz
Line:	L	**Trace color & detector:**	PEAK AVG	



Spurious emissions

Frequency (MHz)	QPeak (dBµV)	Lim.QPeak (dBµV)	QPeak-Lim.QPeak (dB)	CISPR.AVG (dBµV)	Lim.CISPR.AVG (dBµV)	CISPR.AVG-Lim.CISPR.AVG (dB)	Meas.Time	Correction (dB)
0.162	56.57	65.36	-8.79	38.15	55.36	-17.21	0.10	19.83
0.198	54.03	63.69	-9.67	37.35	53.69	-16.35	0.10	19.72
0.262	49.85	61.37	-11.52	32.34	51.37	-19.03	0.10	19.45
0.526	48.42	56.00	-7.58	29.34	46.00	-16.66	0.10	19.83
0.57	49.23	56.00	-6.77	28.77	46.00	-17.23	0.10	19.80
1.988	45.00	56.00	-11.00	21.40	46.00	-24.60	0.01	19.68
3.264	47.95	56.00	-8.05	24.99	46.00	-21.01	0.01	19.73
3.796	46.95	56.00	-9.05	24.11	46.00	-21.89	0.01	19.74
5.056	38.08	60.00	-21.92	19.36	50.00	-30.64	0.01	19.84
27.804	22.99	60.00	-37.01	17.70	50.00	-32.30	0.01	21.19

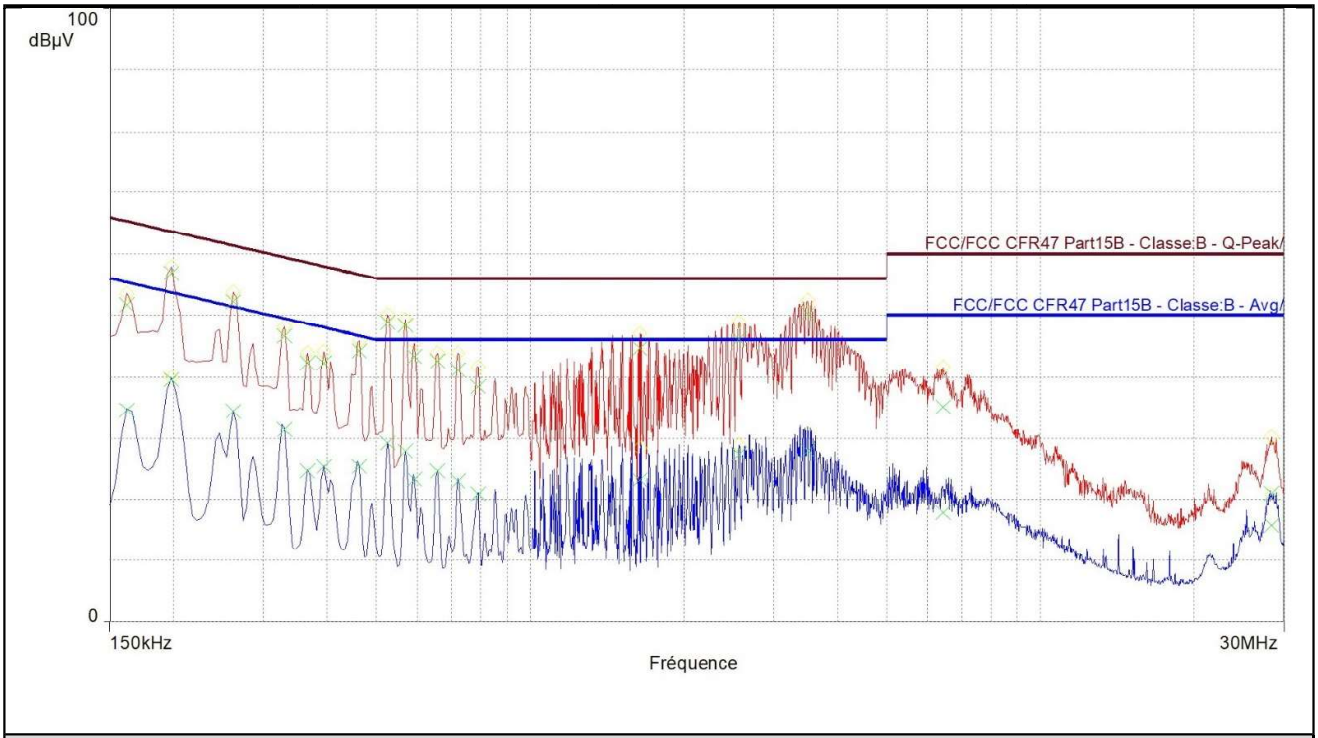
CONDUCTED EMISSIONS				
Graph name:	2	**Test configuration:**		
Limit:	FCC CFR47 Part15B	DULCOPOOL PRO - (66)		
Class:	B			
Frequency range: [150kHz - 30MHz]				
Voltage / Frequency:	120V 60Hz	**RBW:** 10kHz	**VBW:**	30kHz
Line:	N	**Trace color & detector:**	PEAK AVG	



Spurious emissions

Frequency (MHz)	QPeak (dBµV)	Lim.QPeak (dBµV)	QPeak-Lim.QPeak (dB)	CISPR.AVG (dBµV)	Lim.CISPR.AVG (dBµV)	CISPR.AVG-Lim.CISPR.AVG (dB)	Meas.Time	Correction (dB)
0.162	54.04	65.36	-11.32	41.81	55.36	-13.55	0.10	19.83
0.206	52.06	63.37	-11.31	36.44	53.37	-16.92	0.10	19.68
0.246	48.53	61.89	-13.36	31.74	51.89	-20.15	0.10	19.45
0.266	45.01	61.24	-16.23	28.40	51.24	-22.84	0.10	19.47
0.534	46.35	56.00	-9.65	31.68	46.00	-14.32	0.10	19.83
0.538	46.39	56.00	-9.61	31.59	46.00	-14.41	0.10	19.82
0.57	34.69	56.00	-21.31	18.46	46.00	-27.54	0.10	19.80
1.02	36.71	56.00	-19.29	17.04	46.00	-28.96	0.01	19.64
1.6	33.96	56.00	-22.04	17.09	46.00	-28.91	0.01	19.63
3.46	45.77	56.00	-10.23	24.20	46.00	-21.80	0.01	19.73
3.788	44.17	56.00	-11.83	24.16	46.00	-21.84	0.01	19.74
6.636	28.38	60.00	-31.62	14.50	50.00	-35.50	0.01	19.96

CONDUCTED EMISSIONS					
Graph name:	3	**Test configuration:**			
Limit:	FCC CFR47 Part15B	DULCOPOOL PRO - (66)			
Class:	B				
Frequency range: [150kHz - 30MHz]					
Voltage / Frequency:	240V 50Hz	**RBW:**	10kHz	**VBW:**	30kHz
Line:	L	**Trace color & detector:**		PEAK AVG	

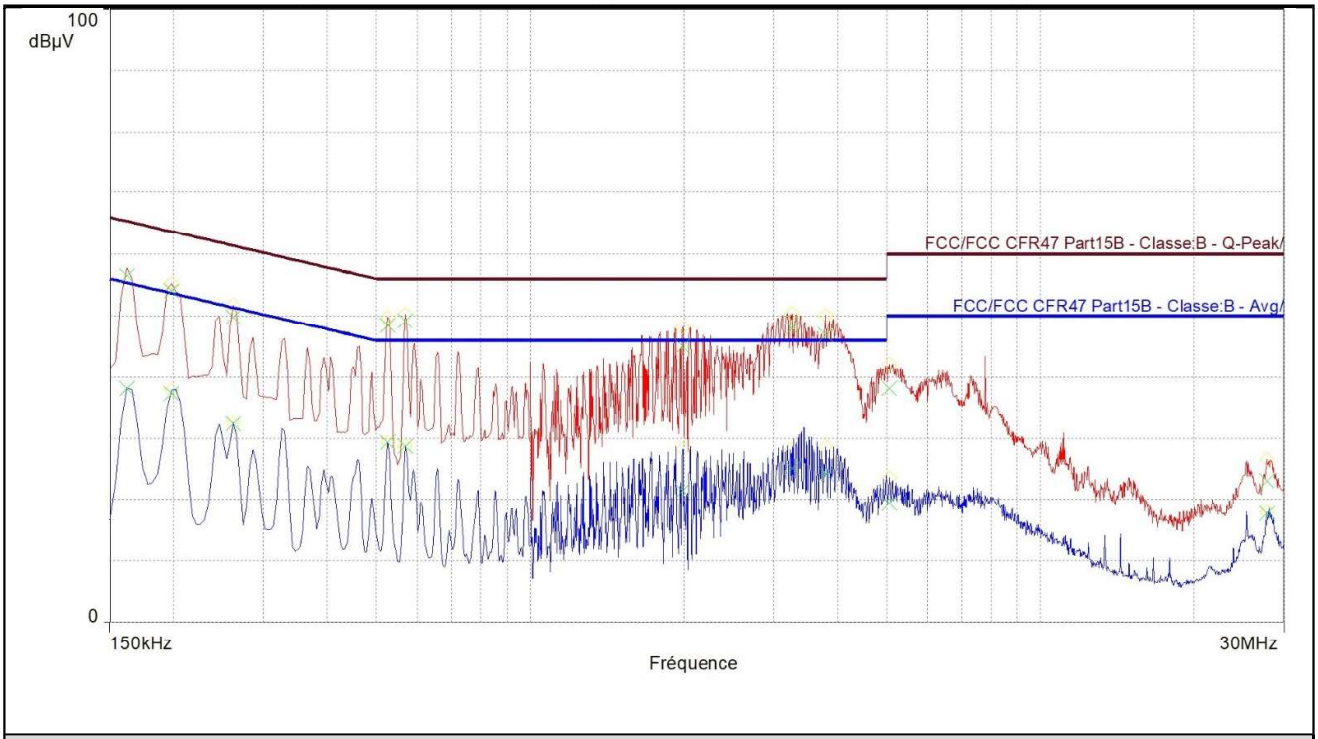


Spurious emissions

frequency (MHz)	QPeak (dBµV)	Lim.QPeak (dBµV)	QPeak-Lim.QPeak (dB)	CISPR.AVG (dBµV)	Lim.CISPR.AVG (dBµV)	CISPR.AVG-Lim.CISPR.AVG (dB)	Meas.Time	Correction (dB)
0.162	51.70	65.36	-13.66	34.64	55.36	-20.72	0.10	19.83
0.198	56.87	63.69	-6.83	39.60	53.69	-14.10	0.10	19.72
0.262	52.18	61.37	-9.18	34.46	51.37	-16.91	0.10	19.45
0.33	46.59	59.45	-12.86	31.38	49.45	-18.07	0.10	19.66
0.366	42.23	58.59	-16.36	24.58	48.59	-24.01	0.10	19.77
0.394	42.29	57.98	-15.69	25.31	47.98	-22.67	0.10	19.80
0.462	44.27	56.66	-12.39	25.27	46.66	-21.38	0.10	19.81
0.526	48.80	56.00	-7.20	29.28	46.00	-16.72	0.10	19.83
0.57	48.33	56.00	-7.67	27.95	46.00	-18.05	0.10	19.80
0.594	43.26	56.00	-12.74	23.26	46.00	-22.74	0.10	19.79
0.658	42.58	56.00	-13.42	24.55	46.00	-21.45	0.10	19.76
0.722	41.15	56.00	-14.85	22.94	46.00	-23.06	0.10	19.74
0.79	38.39	56.00	-17.61	20.86	46.00	-25.14	0.10	19.71

frequency (MHz)	QPeak (dBµV)	Lim.QPeak (dBµV)	QPeak-Lim.QPeak (dB)	CISPR.AVG (dBµV)	Lim.CISPR.AVG (dBµV)	CISPR.AVG-Lim.CISPR.AVG (dB)	Meas.Time	Correction (dB)
1.64	44.66	56.00	-11.34	23.11	46.00	-22.89	0.01	19.65
2.564	46.03	56.00	-9.97	27.40	46.00	-18.60	0.01	19.72
3.496	50.25	56.00	-5.75	27.98	46.00	-18.02	0.01	19.73
6.452	35.12	60.00	-24.88	17.79	50.00	-32.21	0.01	19.95
28.396	21.00	60.00	-39.00	15.70	50.00	-34.30	0.01	21.23

CONDUCTED EMISSIONS					
Graph name:	4	**Test configuration:**			
Limit:	FCC CFR47 Part15B	DULCOPOOL PRO - (66)			
Class:	B				
Frequency range: [150kHz - 30MHz]					
Voltage / Frequency:	240V 50Hz	**RBW:**	10kHz	**VBW:**	30kHz
Line:	N	**Trace color & detector:**		PEAK AVG	



Spurious emissions

Frequency (MHz)	QPeak (dBµV)	Lim.QPeak (dBµV)	QPeak-Lim.QPeak (dB)	CISPR.AVG (dBµV)	Lim.CISPR.AVG (dBµV)	CISPR.AVG-Lim.CISPR.AVG (dB)	Meas.Time	Correction (dB)
0.162	56.57	65.36	-8.79	38.15	55.36	-17.21	0.10	19.83
0.198	54.03	63.69	-9.67	37.35	53.69	-16.35	0.10	19.72
0.262	49.85	61.37	-11.52	32.34	51.37	-19.03	0.10	19.45
0.526	48.42	56.00	-7.58	29.34	46.00	-16.66	0.10	19.83
0.57	49.23	56.00	-6.77	28.77	46.00	-17.23	0.10	19.80
1.988	45.00	56.00	-11.00	21.40	46.00	-24.60	0.01	19.68
3.264	47.95	56.00	-8.05	24.99	46.00	-21.01	0.01	19.73
3.796	46.95	56.00	-9.05	24.11	46.00	-21.89	0.01	19.74
5.056	38.08	60.00	-21.92	19.36	50.00	-30.64	0.01	19.84
27.804	22.99	60.00	-37.01	17.70	50.00	-32.30	0.01	21.19

3.6. CONCLUSION

The sample of the equipment **DULCOPOOL PRO**, Sn : **230924113**, tested in the configuration presented in this test report **satisfies** to requirements of the product family standard applied (See §Test Program) for conducted emissions.

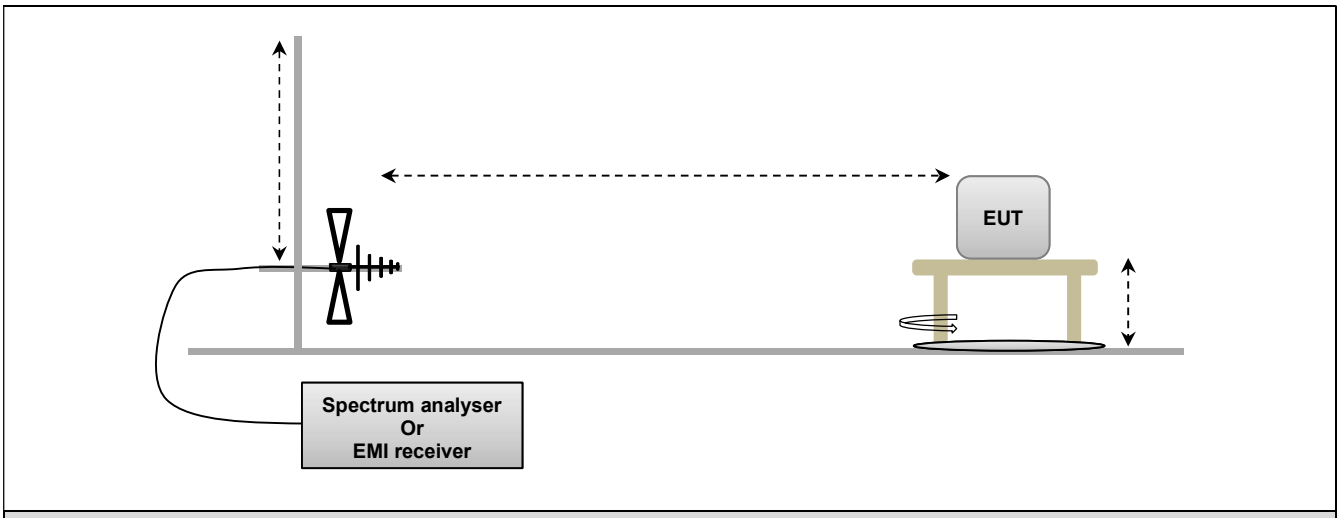
4. MEASUREMENT OF RADIATED EMISSION

4.1. TEST CONDITIONS

Date of test	:	March 20, 2023
Test performed by	:	Nathalie BUGANZA
Atmospheric pressure (hPa)	:	998
Relative humidity (%)	:	34
Ambient temperature (°C)	:	22

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 of Radiated Emission

Same setup is used in semi anechoic chamber during pre-characterization, with a distance of 3m between EUT and antenna.

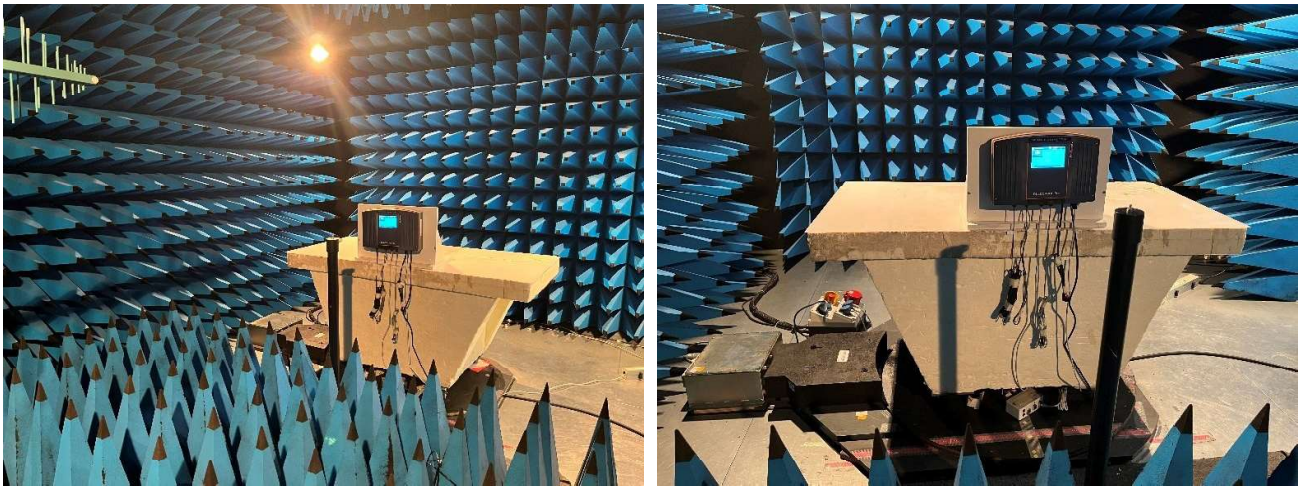


Photo in anechoic chamber – Frequency <1GHz

Photo on OATS

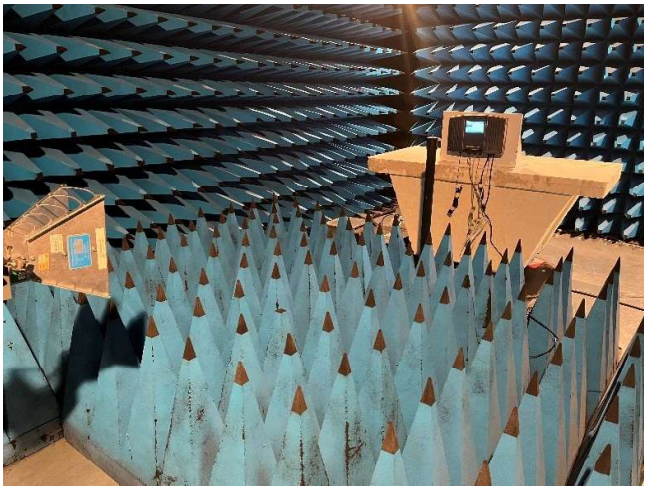
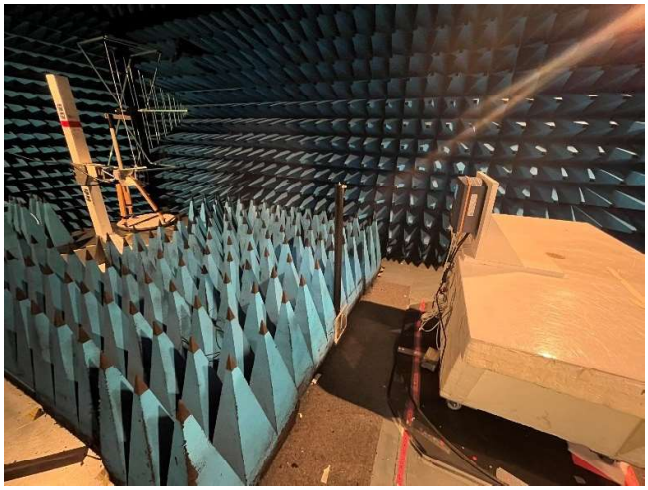



Photo in anechoic chamber – Frequency >1GHz

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 – 13GHz:

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 10kHz - 13.5GHz	LCIE SUD EST	_	A7085028	02/21	06/23
Antenna Bi-Log XWing	TESEQ	CBL6144	C2040146		
Antenna horn 18GHz	AINFO	LB	C2042078	04/21	04/23
BAT EMC	NEXIO	v3.21.0.32	L1000115		
Cable 0.75m	SUCOFLEX	18GHz	A5329919	08/22	08/23
Cable 2.2m N	SUCOFLEX	SF118A/2x11N/2.2M	A5329990	08/22	08/23
Cable 5m	SUCOFLEX	18GHz	A5329918	08/22	08/23
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	08/22	08/25
Radiated emission comb generator	BARDET	_	A3169050		
Semi-Anechoic chamber #2	SIEPEL	_	D3044015	06/22	06/23
Spectrum Analyzer 9kHz - 6GHz	ROHDE & SCHWARZ	FSL6	A4060049	09/22	09/24
Spectrum analyzer	ROHDE & SCHWARZ	FSV 30	A4060051	09/20	06/23
Table C2/OATS	LCIE	_	F2000438		
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	01/21	05/23
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	09/22	09/23
Emission Cable	RADIALEX		A5329061	08/22	08/23
Emission Cable	MICRO-COAX	1GHz	A5329656	08/22	08/23
OATS	_	_	F2000409	07/22	07/23
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	03/23	03/25
Turntable (OATS)	ETS Lingren	Model 2187	F2000403		
Turntable / Mast controller (OATS)	ETS Lingren	Model 2066	F2000372		
Table C1/OATS	MATURO Gmbh	_	F2000437		

4.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

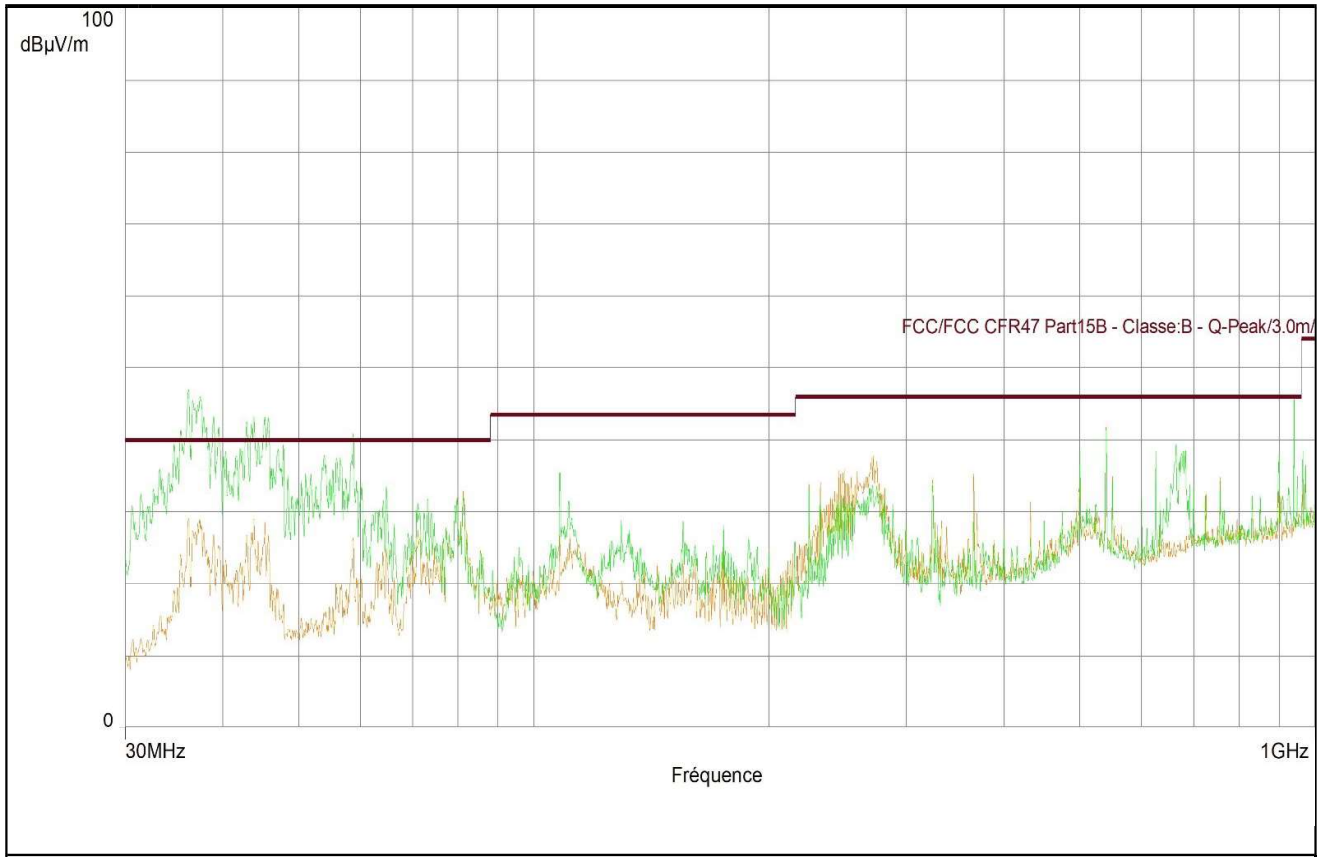
None

4.6. TEST RESULTS – RUNNING MODE N°1

4.6.1. 30MHz –1GHz

Pre-qualification measurement

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



Spurious emissions

Qualification

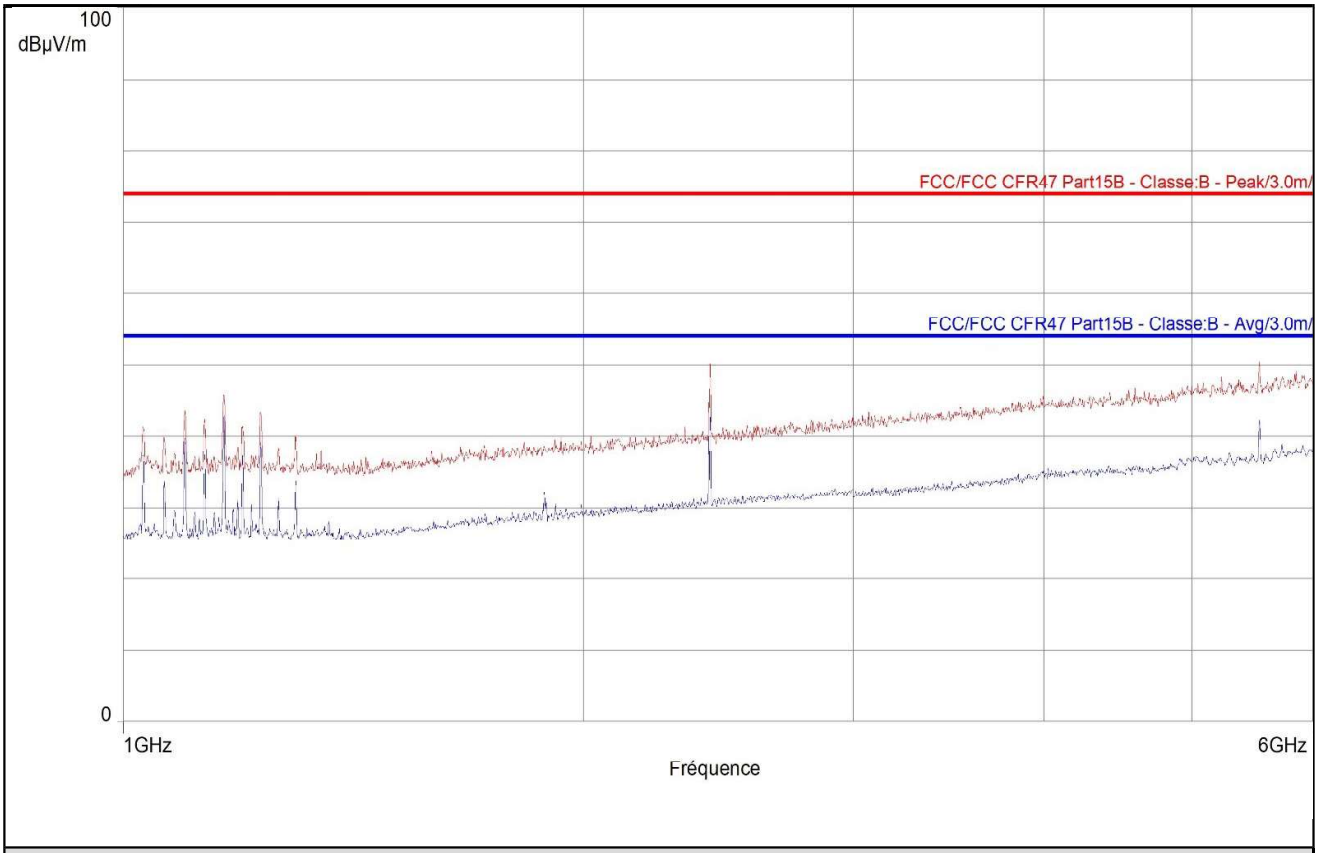
The frequency list is created from the results obtained during the pre-qualification.
Measurements are performed using a QUASI-PEAK detection.

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)
35.5300	22.0	QP	V	0	100	14.7	36.7	40.0	**-3.3**
36.1540	21.5	QP	V	0	100	14.7	36.2	40.0	**-3.8**
45.2490	22.1	QP	V	0	100	13.7	35.8	40.0	**-4.2**
58.7100	24.0	QP	V	0	100	10.0	34.0	40.0	**-6.0**
81.2330	21.5	QP	V	0	100	10.2	31.7	40.0	**-8.3**
110.5200	22.6	QP	V	0	100	13.1	35.7	43.5	**-7.8**
175.0000	21.0	QP	V	180	100	18.5	39.5	43.5	**-4.0**
224.3420	21.6	QP	V	0	100	13.4	35.0	46.0	**-11.0**
277.0410	16.5	QP	V	210	100	16.8	33.3	46.0	**-12.7**
277.0410	16.3	QP	H	100	400	16.8	33.1	46.0	**-12.9**
324.0000	21.7	QP	V	90	100	18.0	39.7	46.0	**-6.3**
540.0000	14.5	QP	V	0	100	24.6	39.1	46.0	**-6.9**
682.8070	14.4	QP	V	60	100	27.0	41.4	46.0	**-4.6**

4.6.2. 1GHz - 13GHz

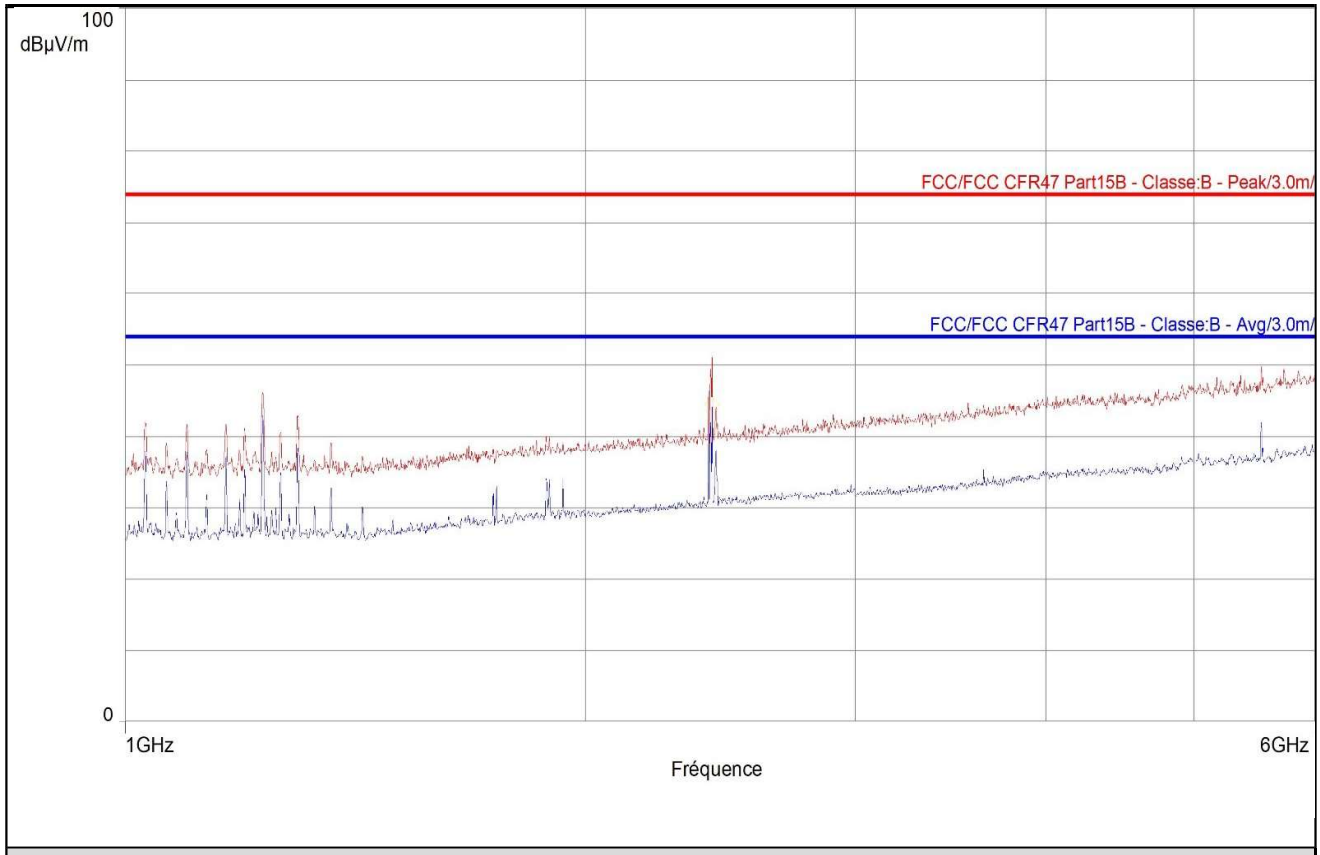
Pre-qualification measurement

RADIATED EMISSIONS					
Graph name:	/	**Test configuration:**			
Limit:	FCC CFR47 Part15B	DULCOPOOL PRO (H) ok FCC			
Class:	B				
Frequency range: [1GHz - 6GHz]					
Antenna polarization:	Horizontal	**RBW:**	1MHz	**VBW:**	3MHz
Azimuth:	0° - 360°				
	Trace color & detector: F>GHz: for both Antenna Polarization: detector: PEAK AVG				



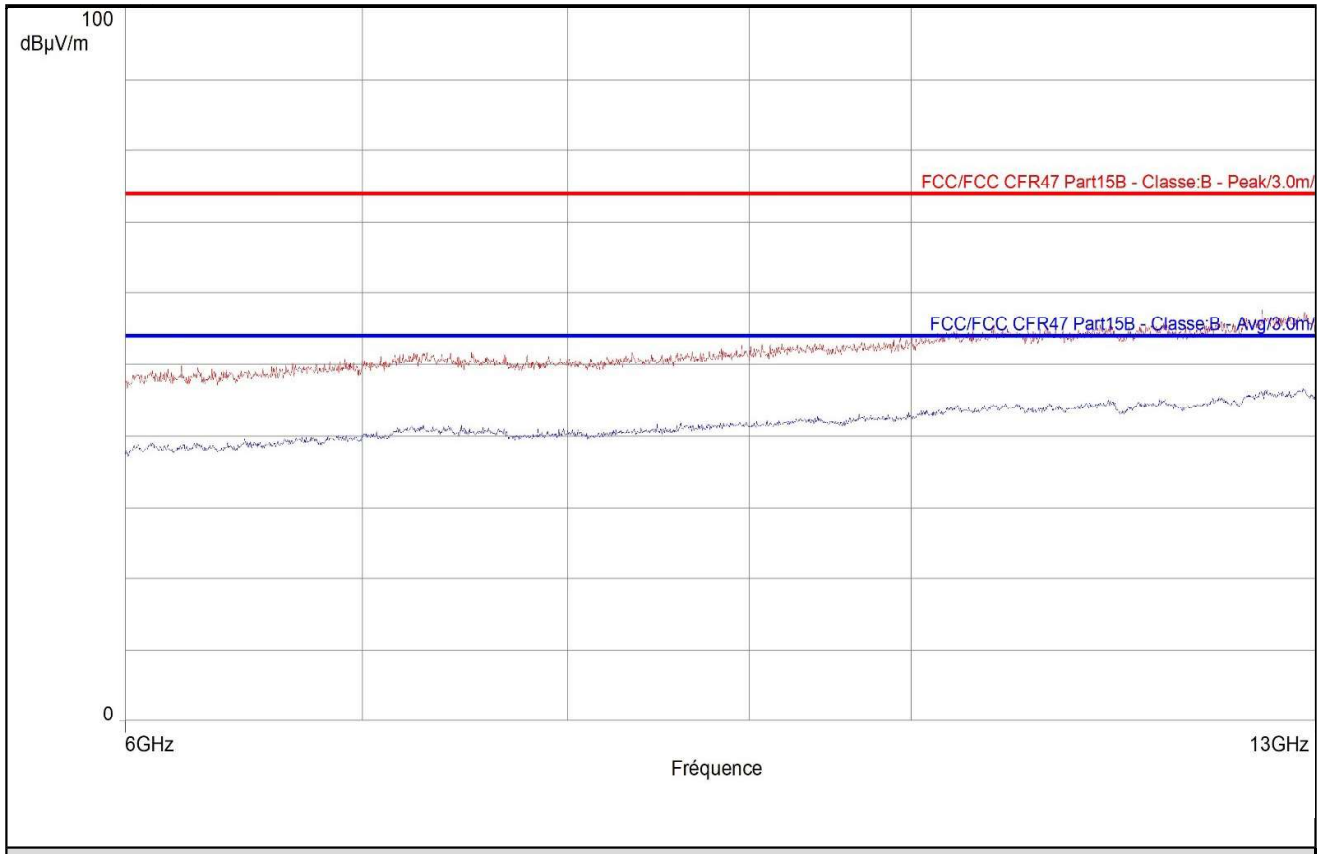
Spurious emissions

RADIATED EMISSIONS					
Graph name:	/	**Test configuration:**			
Limit:	FCC CFR47 Part15B	DULCOPOOL PRO (V) ok FCC			
Class:	B				
Frequency range: [1GHz - 6GHz]					
Antenna polarization:	Vertical	**RBW:**	1MHz	**VBW:**	3MHz
Azimuth:	0° - 360°				
	Trace color & detector: F>GHz: for both Antenna Polarization: detector: PEAK AVG				



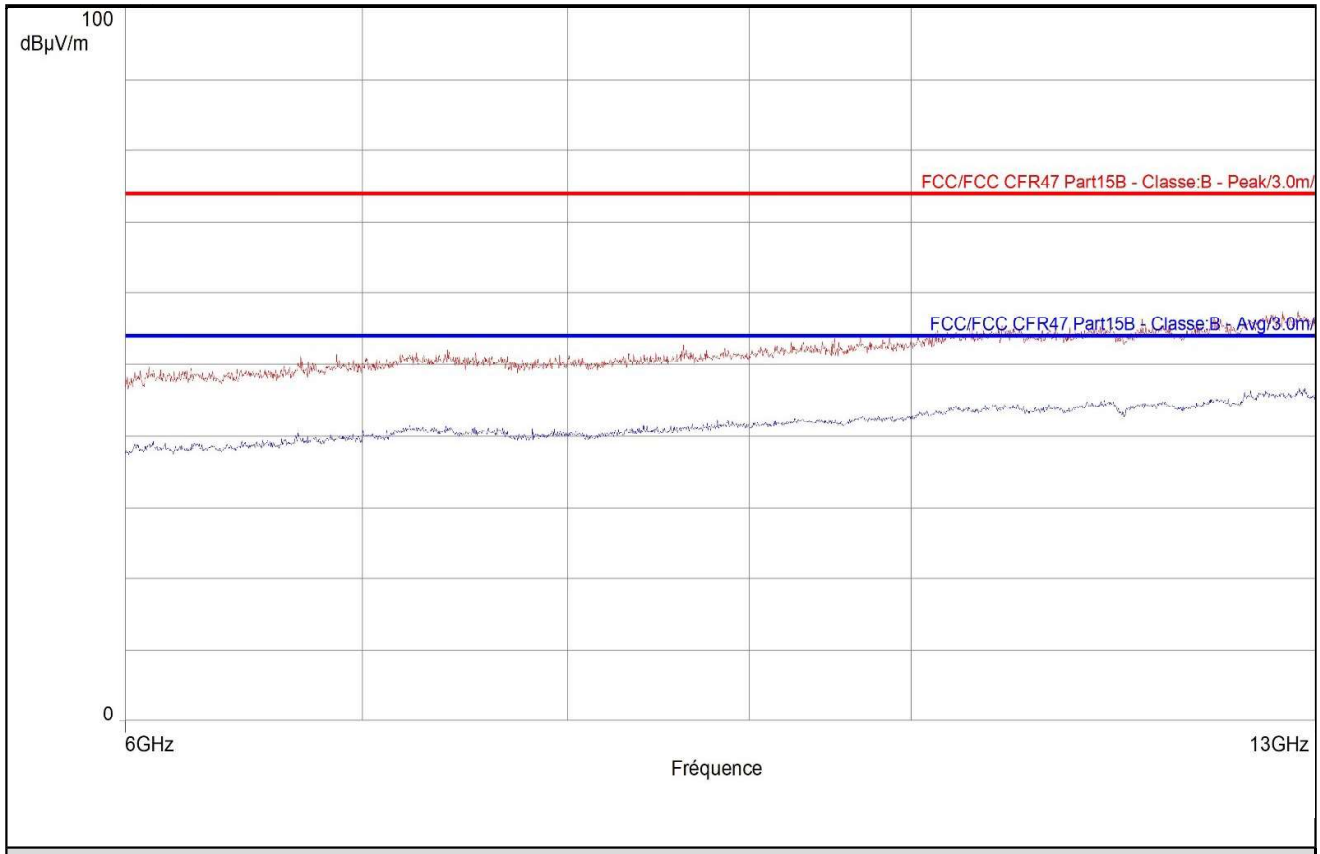
Spurious emissions

RADIATED EMISSIONS					
Graph name:	/	**Test configuration:**			
Limit:	FCC CFR47 Part15B	DULCOPOOL PRO (H) ok FCC			
Class:	B				
Frequency range: [6GHz - 13GHz]					
Antenna polarization:	Horizontal	**RBW:**	1MHz	**VBW:**	3MHz
Azimuth:	0° - 360°				
	Trace color & detector: F>GHz: for both Antenna Polarization: detector: PEAK AVG				



Spurious emissions

RADIATED EMISSIONS					
Graph name:	/	**Test configuration:**			
Limit:	FCC CFR47 Part15B	DULCOPOOL PRO (V) ok FCC			
Class:	B				
Frequency range: [6GHz - 13GHz]					
Antenna polarization:	Vertical	**RBW:**	1MHz	**VBW:**	3MHz
Azimuth:	0° - 360°				
	Trace color & detector: F>GHz: for both Antenna Polarization: detector: PEAK AVG				



Spurious emissions

Qualification

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

Frequency (MHz)	Peak (dBµV)	Lim.Peak (dBµV)	Peak-Lim.Peak (dB)	CISPR.AVG (dBµV)	Lim.CISPR.AVG (dBµV)	CISPR.AVG-Lim.CISPR.AVG (dB)	Polarization
1096.833	43.65	74.0	-30.35	39.79	54.0	-14.21	H
1163.333	45.84	74.0	-28.16	42.86	54.0	-11.14	H
1229.833	43.27	74.0	-30.73	39.17	54.0	-14.83	H
1229.833	46.19	74.0	-27.81	42.84	54.0	-11.16	V
1295.833	42.94	74.0	-31.06	38.54	54.0	-15.50	V

4.7. CONCLUSION

The sample of the equipment **DULCOPOOL PRO**, Sn : **230924113**, 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) 9kHz-150kHz *Measurement of conducted disturbances in voltage on the power port (single & three phases)9kHz-150kHz*	3.7dB	3.8dB
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* LISN 50Ω/50µH Capacitive Voltage Probe	 3.3dB 3.7dB	 3.4dB 3.9dB
Mesure des perturbations conduites en tension sur le réseau de télécommunication *Measurement of conducted disturbances in voltage on the telecommunication port.* AAN avec aLCL = 55 … 40 dBc AAN avec aLCL = 65 … 50 dBc AAN avec aLCL = 75 … 60 dBc	 4.2dB 4.6dB 5.0dB	 4.2dB 4.6dB 5.1dB
Mesure des perturbations discontinues conduites en tension *Measurement of discontinuous conducted disturbances in voltage*	3.4dB	3.4dB
Mesure des perturbations conduites en courant *Measurement of conducted disturbances in current*	2.9dB	2.9dB
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*	6.3dB	6.3dB
Mesure du champ électrique rayonné en cage de Faraday anéchoïque de 1GHz à 6GHz *Measurement of radiated electric field in full-anechoic Faraday room From 1GHz à 6GHz*	5.2dB	5.2dB
Mesure du champ électrique rayonné en cage de Faraday anéchoïque de 6GHz à 18GHz *Measurement of radiated electric field in full-anechoic Faraday room From 6GHz to 18GHz*	5.5dB	5.5dB
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.*	6.3dB	6.3dB
Mesure du champ électrique rayonné IN SITU de 30 à 1000 MHz *IN SITU measurement of radiated electric field from 30 to 1000MHz*	A l'étude / Under consideration	5.2dB
Mesure de la puissance perturbatrice *Measurement of disturbance power*	3.32dB	4.5dB
Mesure des harmoniques de courant *Measurement of current harmonics*	11.11%	/
Mesure du flicker *Flicker measurement*	9.26%	/

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*