



Accreditation
N°1-0312
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TEST REPORT

N°: 13316294 - 775172

Version : 02

Subject

Electromagnetic compatibility (EMC) :

FCC CFR 47 Part 15, Subpart B of 2019
ANSI C63.4 of 2014
ICES-003 issue 7 of 2020

Issued to

ALDEBARAN
43, rue du Colonel Pierre Avia
75015 PARIS
FRANCE

Apparatus under test

↳ Product Mobile Serving Robot
↳ Trade mark PLATO
↳ Manufacturer SoftBank Robotics Europe
↳ Model under test E02100
↳ Serial number P2_#18

Test date

March 31, 2022 to May 4, 2022

Test location

LCIE, Villebon

Test performed by

Lauriane Bron

Composition of document

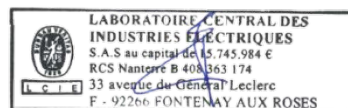
38 pages

Document issued on

September 8, 2022

Written by :
Lauriane Bron
Tests operator

Approved by :
Guylaine Raphose
Technical manager



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PUBLICATION HISTORY

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.

Version	Date	Author	Modification
01	May 24, 2022	Lauriane Bron	Creation of the document
02	Sept. 8, 2022	Lauriane Bron	Add values for conducted disturbance



SUMMARY

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1. Test Program

References

- ✓ CFR 47 Part 15 Subpart B - Radio frequency devices - Unintentional radiators 2019
- ✓ ICES -003 issue 7 of 2020
- ✓ ANSI 63.4 of 2014

Emission tests:

Test Description	Main characteristics	Test result - Comments
Measurement of radiated electric field in shielded room 15.109 (a), (b) & (c)	☐ Class A ☒ Class B	☒ PASS ☐ FAIL ☐ NA ☐ NP (Limited Program)
Measurement of radiated electric field in open space	☐ Class A ☐ Class B	☐ PASS ☐ FAIL ☒ NA ☐ NP (Limited Program)
Measurement of conducted disturbance on the AC main power port 15.107 (a) (c) (d)	☐ Class A ☒ Class B	☒ PASS ☐ FAIL ☐ NA (1) ☐ NP (Limited Program)

(1): EUT not directly or indirectly connected to the AC Power Public Network

The product is compliant with CFR 47 Part 15 Subpart B - Radio frequency devices - Unintentional radiators & ICES -003 standards.

PASS: EUT complies with standard's requirement

FAIL: EUT does not comply with standard's requirement

NA: Not Applicable

NP: Test Not Performed

2. Equipment Description (declared by provider)

2.1. EQUIPMENT OF THE SAME FAMILY

Model	Ethernet Boards	Interface Type
Serving Robot PLATO E02100	-	-

2.2. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

Equipment under test (EUT): E02100PLATO E02100

Serial Number: P2_#18



Equipment Under Test



Inputs/outputs - Cable:

Access	Inputs / Outputs	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
Main power supply	Input	L1-N	1,85	☒	☐	☒	-
Power supply	Input	L1-N	1,8	☒	☐	☒	-

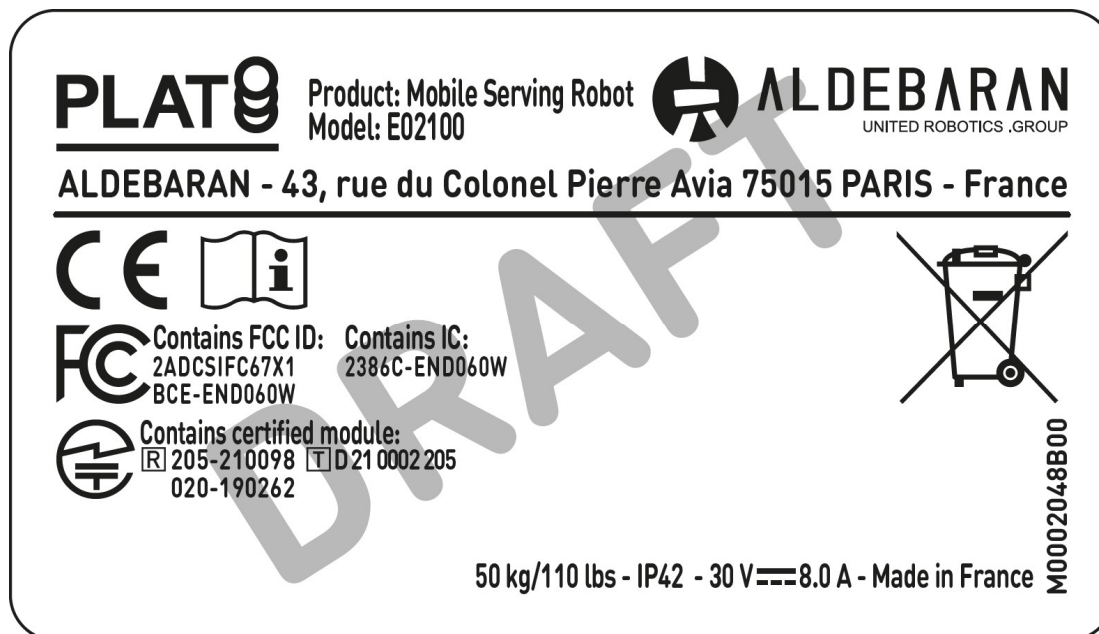
Auxiliary equipment used during test:

Type	Reference	Sn	Comments
AC-DC Power Supply	ADP-240ER	-	Output : 30Vdc 8A
Li-ion Battery	7S12P/LIC18650-MH1B	-	Output : 29,4Vdc Max Rated Capacity : 36,2Ah

Equipment information:

Apparatus Description	PLATO is a mobile service robot helping staff in restaurants (commercial environment), to help waiters by carrying dishes to the customers and also getting back the dirty dishes.		
Type of power source:	☒ AC power supply	☐ DC power supply	☒ Battery (Lithium)
Test source voltage:	Vmin-Vmax:	☒ 90 - 264 V / 47 - 63 Hz	☒ 30 VDC
Operating Modes	Mode 1	Battery power source (no power supply plugged) + motorized wheels at 1,9 km/h	
	Mode 2	Power Supply for battery charging mode (motorized wheels off/0 km/h)	
	Mode 3	For radiated immunity only: Battery power source (no power supply plugged) + safety functions activated (Emergency stop button ON + Bumper pressed + Object < 30 cm from Lidar)	
	Mode 4	For radiated immunity only: Battery power source (no power supply plugged) + motorized wheels at 2,4 km/h (Overspeed safety function activated)	

2.3. EQUIPMENT LABELLING



Equipment Labelling

2.4. EQUIPMENT MODIFICATIONS

☒ None ☐ Modification:

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

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.

$$FS = 52.5 + 7.4 + 1.1 - 29 = 32 \text{ dB}\mu\text{V/m}$$

The 32 dBμV/m value can be mathematically converted to its corresponding level in μV/m.

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(32\text{dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}.$$



3. Measurement of radiated emissions

3.1. ENVIRONMENTAL CONDITIONS

Test performed by : **Lauriane Bron**
Date of test : April 22, 2022
Ambient temperature : 20.2°C
Relative humidity : 34%

3.2. TEST SETUP

Specifications:

Frequency	30 – 1000 MHz	RBW 120 kHz
	1-6GHz	RBW 1MHz
Detector	Peak and Quasi-Peak	

Pre characterization in semi anechoic room is performed to define the critical frequencies

Operating conditions:

- The Equipment under Test is installed:

- ☒ Measure in semi anechoic room
- ☐ Measure in open area site

- Measuring distance:

- ☒ 3m
- ☐ 10m

- Deviation method:

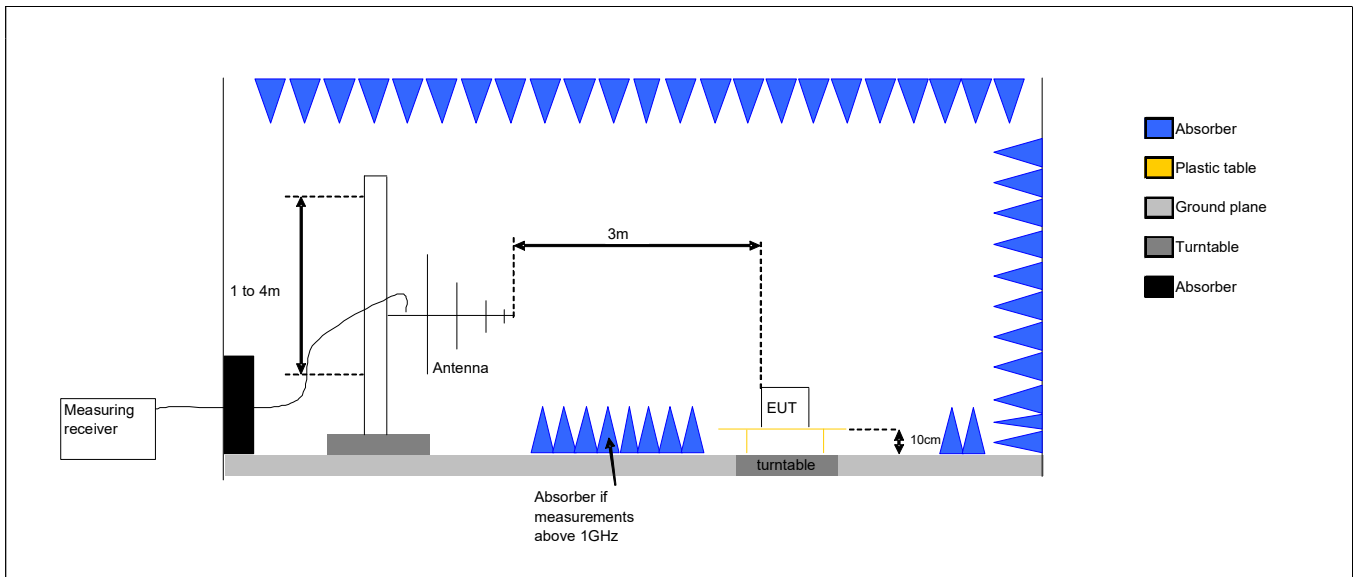
- ☐ Yes
- ☒ No

-Product installation:

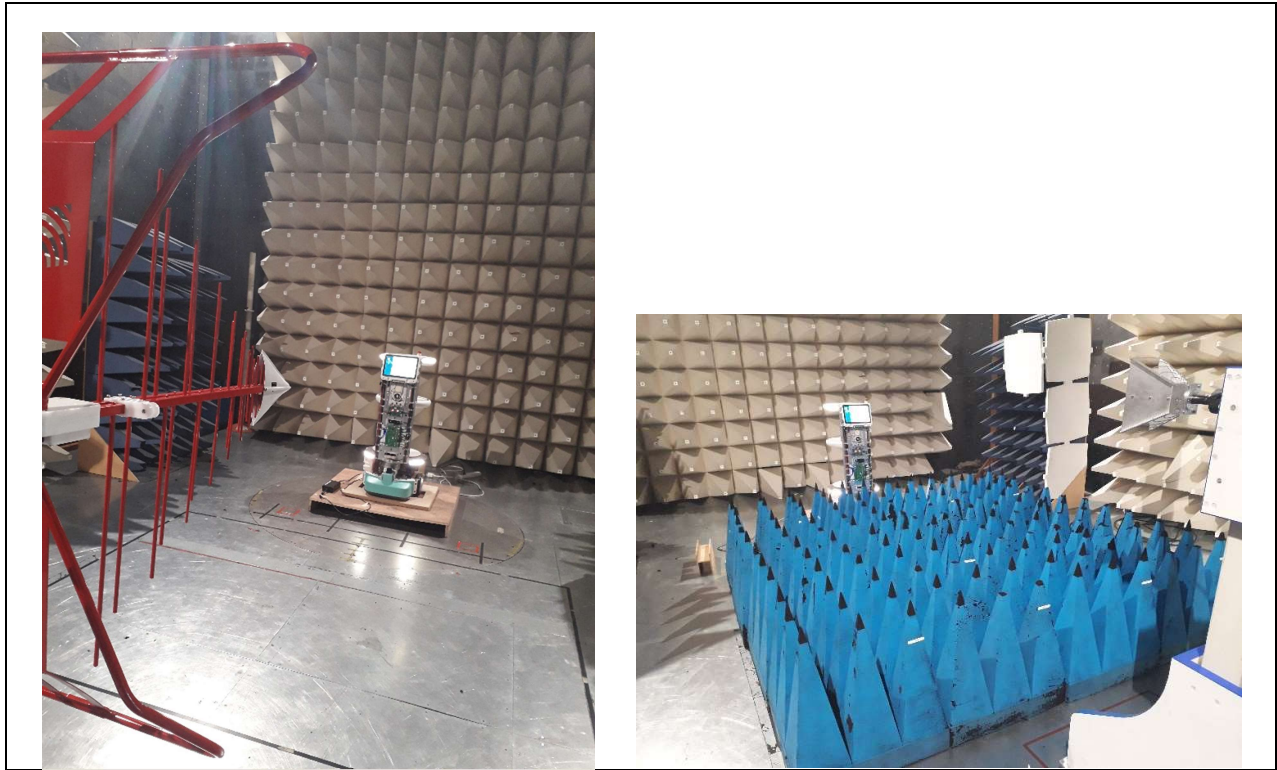
- ☐ The EUT was tested as a tabletop equipment and was placed on a non-conducting platform the top of which is 0.8m above the metal ground plane.
- ☒ The EUT is at 10cm height from reference plane

Operating mode:

☒ Mode 1 ☒ Mode 2 ☐ Mode 3 ...



Test Set up for radiated measurement in semi anechoic chamber



Measurement of radiated disturbances.

3.3. LIMIT

☐ at 3m Class A

Frequency Bands/frequencies	dB (μV/m) quasi-peak	dB (μV/m) peak	dB (μV/m) average
30-88MHz	49.5	-	-
88 – 216MHz	53.9	-	-
216 – 960 MHz	56.9	-	-
960 – 1000 MHz	60	-	-
1000-6000MHz	-	80	60

☒ at 3m Class B

Frequency Bands/frequencies	dB (μV/m) quasi-peak	dB (μV/m) peak	dB (μV/m) average
30-88MHz	40	-	-
88 – 216MHz	43.5	-	-
216 – 960 MHz	46	-	-
960 – 1000 MHz	53.9	-	-
1000-6000MHz	-	73.9	53.9



☐ at 10m Class A

Frequency Bands/frequencies	dB (μV/m) quasi-peak	dB (μV/m) peak	dB (μV/m) average
30-88MHz	39.5	-	-
88 – 216MHz	43.9	-	-
216 – 960 MHz	46.9	-	-
960 – 1000 MHz	50	-	-
1000-6000MHz	-	70	50

☐ at 10m Class B

Frequency Bands/frequencies	dB (μV/m) quasi-peak	dB (μV/m) peak	dB (μV/m) average
30-88MHz	30	-	-
88 – 216MHz	33.5	-	-
216 – 960 MHz	36	-	-
960 – 1000 MHz	43.9	-	-
1000-6000MHz	-	63.9	43.9

3.4. TEST EQUIPMENT LIST

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Semi anechoic chamber	SIEPEL	V05 (ANE)	D3044031	2021/03	2024/03
Semi anechoic chamber	SIEPEL	V05 (VSWR)	D3044031	2021/03	2024/03
Software v3.21.0.9	NEXIO	BAT-EMC	LCIE	-	-
Thermo-hygrometer	OTIO	-	B4204095	2021/10	2023/10
Cable	-	-	A5329747	2022/02	2023/02
Cable	-	-	A5329747	2022/02	2023/02
Bilog antenna	ETS LINDGREN	3142E	C2040271	2021/01	2023/03
Ferrite	SCHWARZBECK	CMAD 1614	C2320379	2020/08	2022/08
Receiver	ROHDE & SCHWARZ	ESR 7	A2642023	2021/04	2023/04
Horn antenna	A-infoMW	Broadband 1-18	C2042056	2021/04	2023/04
Preamplifier	SCHWARZBECK	BBV9743 B	A7080076	2022/02	2023/02



3.5. RESULTS

- FCC/FCC 15.109 - Classe: - Moyenne/3.0m/
- FCC/FCC 15.109 - Classe: - QCrête/3.0m/
- FCC/FCC 15.109 - Classe: - Crête/3.0m/
- Peak (Horizontale)
- Mes QPeak (Results) (Horizontale)

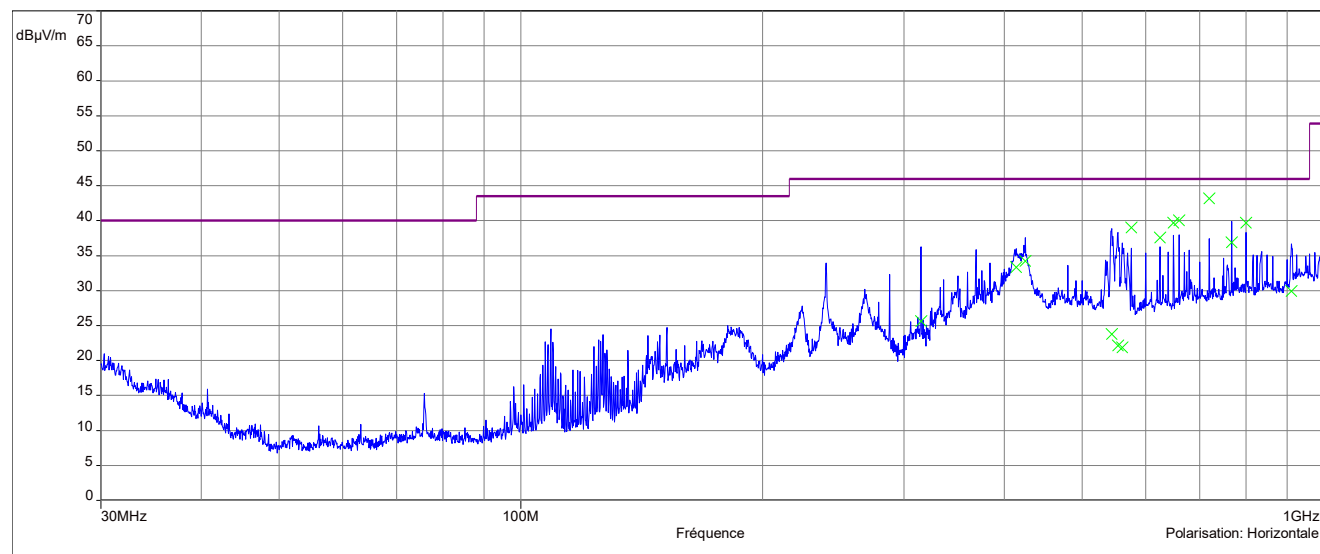
Description Sous-bande 1

Fréquences: 30 MHz - 1 GHz (Mode: Lin, Pas: 50 kHz)

Réglages: RBW: 120kHz, VBW: Auto, Durée balayage: 30 ms/Pts, Atténuation: Auto, Nombre de Balayages: 1, Preamp: On: 10 dB, LN Preamp: Off, Preselecteur: Off

Polarisation: Horizontale

Distance: 3 m



Horizontal Polarization (30-1000MHz) : Mode 1



- FCC/FCC 15.109 - Classe: - Moyenne/3.0m/
- FCC/FCC 15.109 - Classe: - QCrête/3.0m/
- FCC/FCC 15.109 - Classe: - Crête/3.0m/
- Peak (Verticale)
- Mes QPeak (Results) (Verticale)

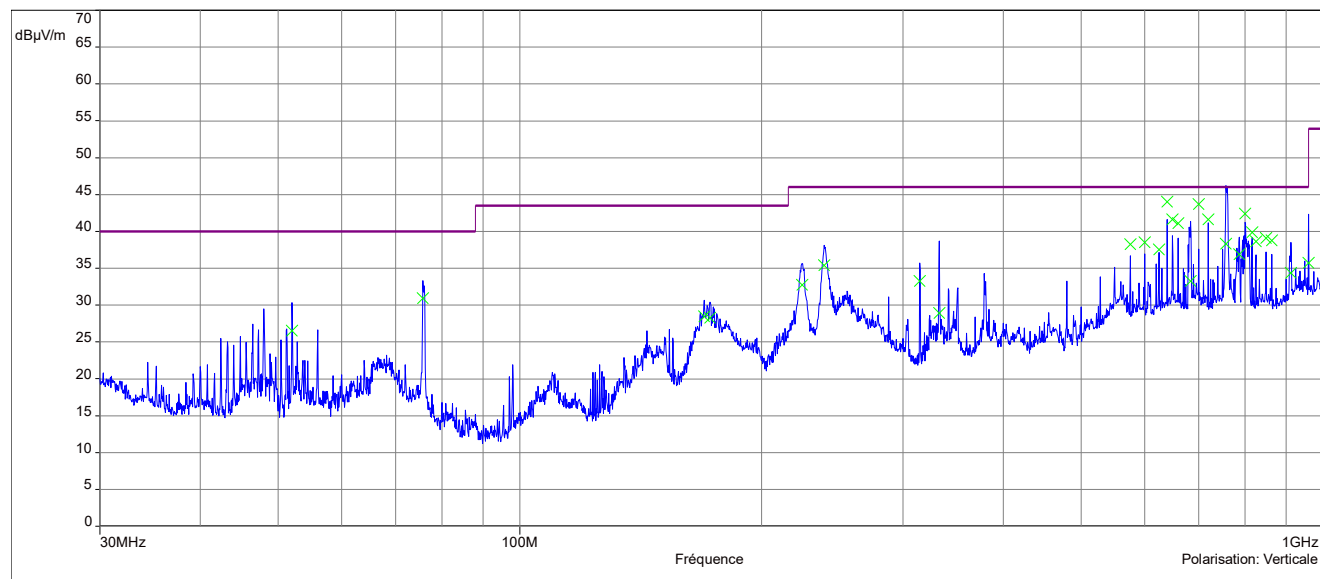
Description Sous-bande 2

Fréquences: 30 MHz - 1 GHz (Mode: Lin, Pas: 50 kHz)

Réglages: RBW: 120kHz, VBW: Auto, Durée balayage: 30 ms/Pts, Atténuation: Auto, Nombre de Balayages: 1, Preamp: On: 10 dB, LN Preamp: Off, Preselecteur: Off

Polarisation: Verticale

Distance: 3 m



Vertical Polarization (30-1000MHz) : Mode 1



L C I E

Fréquence (MHz)	SB	Mes Peak	Mes QPeak (dBμV/m)	DeltaQP	Max Height	Max Angle	RBW	Meas.Time	Correction (dB)
315	1	39.70	25.63	21.37	1.82	189.16	120k	0.03	16.65
414	1	38.06	33.35	13.65	1.61	356.57	120k	0.03	21.20
425	1	38.98	34.25	12.75	1.32	22.36	120k	0.03	21.16
544.45	1	41.59	23.74	23.26	1.00	315.85	120k	0.03	24.91
554.45	1	39.92	22.15	24.85	1.33	1.66	120k	0.03	24.86
561	1	39.96	21.89	25.11	1.54	229.59	120k	0.03	24.66
576	1	41.62	39.03	7.97	1.47	83.46	120k	0.03	24.26
625	1	40.78	37.54	9.46	1.54	171.63	120k	0.03	26.81
650	1	43.02	39.71	7.29	1.00	104.46	120k	0.03	26.10
660	1	42.33	40.05	6.95	1.03	84.25	120k	0.03	26.46
720	1	45.56	43.14	3.86	1.00	67.85	120k	0.03	27.59
768	1	40.16	36.89	10.11	1.12	79.30	120k	0.03	27.94
800	1	44.05	39.65	7.35	1.18	150.29	120k	0.03	28.65
911.1	1	38.85	29.88	17.12	1.25	300.58	120k	0.03	29.80
52.05	2	33.03	26.53	13.47	1.06	185.67	120k	0.03	8.06
75.75	2	34.23	30.95	9.05	1.06	293.28	120k	0.03	8.45
169.7	2	35.08	28.43	11.57	1.06	196.00	120k	0.03	11.92
172.55	2	34.28	28.23	11.77	1.00	192.19	120k	0.03	12.08
224.8	2	37.40	32.74	7.26	1.06	333.71	120k	0.03	13.87
239.35	2	40.00	35.42	11.58	1.00	204.77	120k	0.03	14.74
314.95	2	45.40	33.28	13.72	1.00	219.59	120k	0.03	16.65
332.95	2	42.47	28.91	18.09	1.33	100.98	120k	0.03	17.62
576	2	40.61	38.26	8.74	1.32	102.22	120k	0.03	24.26
600	2	41.90	38.48	8.52	1.75	360.00	120k	0.03	25.50
625	2	41.20	37.51	9.49	1.75	127.71	120k	0.03	26.81
640	2	45.55	44.03	2.97	1.89	18.65	120k	0.03	26.40
650	2	45.13	41.61	5.39	1.89	23.59	120k	0.03	26.10
660	2	43.20	41.11	5.89	1.25	39.99	120k	0.03	26.46
684.65	2	41.22	33.27	13.73	1.47	342.59	120k	0.03	27.10
700	2	46.23	43.67	3.33	1.68	37.63	120k	0.03	27.28
720	2	44.45	41.62	5.38	1.82	41.12	120k	0.03	27.59
757.4	2	46.23	38.29	8.71	1.00	14.83	120k	0.03	27.77
786.85	2	43.17	36.91	10.09	1.11	103.34	120k	0.03	28.34
800	2	46.47	42.41	4.59	1.40	95.70	120k	0.03	28.65
816	2	42.53	39.84	7.16	1.32	155.23	120k	0.03	28.57
825	2	41.88	38.66	8.34	1.47	99.52	120k	0.03	28.53
850	2	42.59	39.12	7.88	1.40	144.90	120k	0.03	28.81
864	2	41.57	38.77	8.23	1.40	231.16	120k	0.03	28.58
911.95	2	41.72	34.33	12.67	1.25	344.04	120k	0.03	29.84
960	2	41.82	35.70	11.30	1.18	49.54	120k	0.03	30.27

TEST REPORT



- FCC/FCC 15.109 - Classe: - Moyenne/3.0m/
- FCC/FCC 15.109 - Classe: - QCrête/3.0m/
- FCC/FCC 15.109 - Classe: - Crête/3.0m/
- Peak (Horizontale)
- Mes QPeak (Results) (Horizontale)

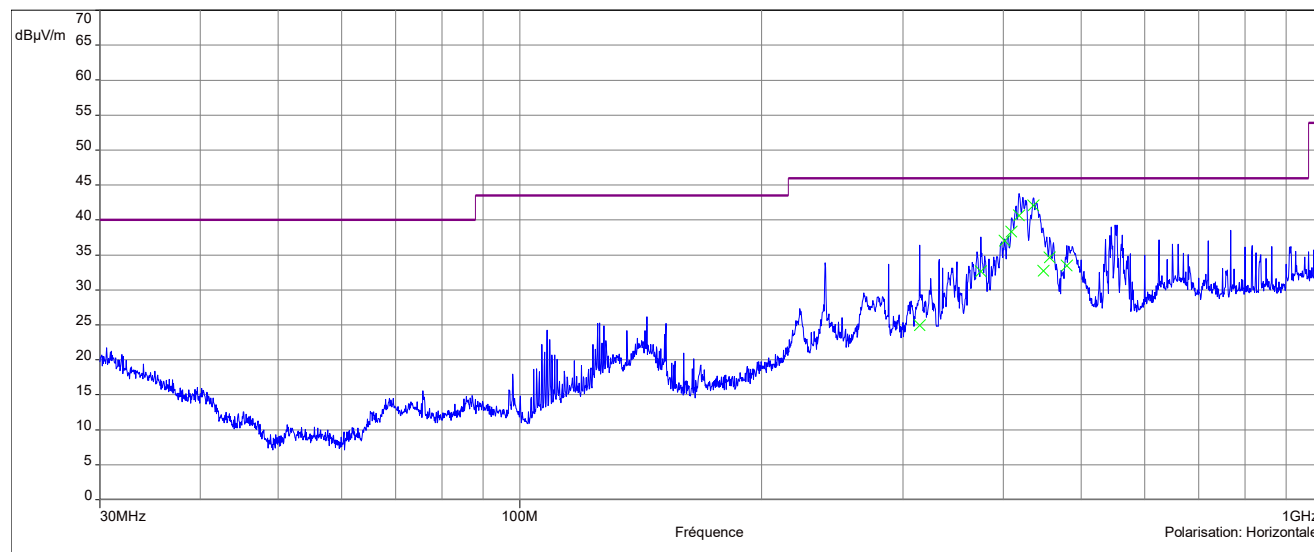
Description Sous-bande 1

Fréquences: 30 MHz - 1 GHz (Mode: Lin, Pas: 50 kHz)

Réglages: RBW: 120kHz, VBW: Auto, Durée balayage: 30 ms/Pts, Atténuation: Auto, Nombre de Balayages: 1, Preamp: On: 10 dB, LN Preamp: Off, Preselecteur: Off

Polarisation: Horizontale

Distance: 3 m



Horizontal Polarization (30-1000MHz) : Mode 2

- FCC/FCC 15.109 - Classe: - Moyenne/3.0m/
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- FCC/FCC 15.109 - Classe: - Crête/3.0m/
- Peak (Verticale)
- Mes QPeak (Results) (Verticale)

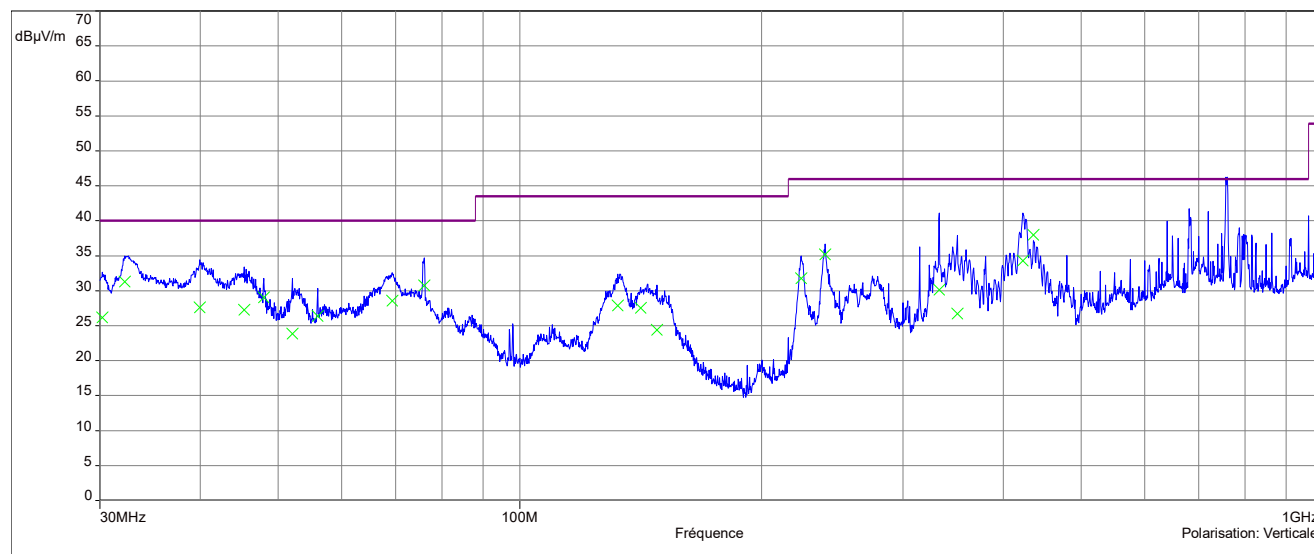
Description Sous-bande 2

Fréquences: 30 MHz - 1 GHz (Mode: Lin, Pas: 50 kHz)

Réglages: RBW: 120kHz, VBW: Auto, Durée balayage: 30 ms/Pts, Atténuation: Auto, Nombre de Balayages: 1, Preamp: On: 10 dB, LN Preamp: Off, Preselecteur: Off

Polarisation: Verticale

Distance: 3 m



Vertical Polarization (30-1000MHz) : Mode 2



L C I E

Fréquence (MHz)	SB	Mes Peak	Mes QPeak (dBµV/m)	DeltaQP	Max Height	Max Angle	RBW	Meas.Time	Correction (dB)
314.65	1	38.64	24.95	22.05	1.00	126.26	120k	0.03	16.64
375	1	37.05	32.64	14.36	1.54	47.63	120k	0.03	19.82
401.45	1	40.07	37.02	9.98	1.02	120.86	120k	0.03	21.24
409.6	1	41.76	38.34	8.66	1.06	130.07	120k	0.03	21.22
418.6	1	43.36	40.61	6.39	1.02	112.55	120k	0.03	21.18
436	1	45.58	42.09	4.91	1.18	44.93	120k	0.03	21.38
448.85	1	37.48	32.69	14.31	1.11	168.94	120k	0.03	21.64
457	1	39.24	34.60	12.40	1.00	161.75	120k	0.03	21.81
480	1	39.53	33.47	13.53	1.00	135.02	120k	0.03	22.31
30.2	2	31.23	26.14	13.86	1.68	164.00	120k	0.03	17.17
32.2	2	35.34	31.31	8.69	1.06	201.06	120k	0.03	16.07
39.95	2	32.97	27.60	12.40	1.00	352.81	120k	0.03	11.55
45.35	2	32.84	27.27	12.73	1.06	294.85	120k	0.03	9.21
48	2	34.09	29.05	10.95	1.00	115.13	120k	0.03	8.58
52.1	2	31.84	23.82	16.18	1.00	289.12	120k	0.03	8.06
56	2	30.33	26.39	13.61	1.75	348.99	120k	0.03	8.03
69.4	2	32.88	28.54	11.46	1.75	359.11	120k	0.03	8.58
76.05	2	35.37	30.76	9.24	1.25	298.90	120k	0.03	8.44
132.45	2	34.19	27.88	12.12	1.18	280.70	120k	0.03	10.38
141.5	2	33.81	27.51	12.49	1.00	245.20	120k	0.03	10.73
148.1	2	31.60	24.36	15.64	1.03	142.99	120k	0.03	11.30
224.15	2	36.50	31.74	8.26	1.06	337.64	120k	0.03	13.84
240	2	41.89	35.15	11.85	1.02	209.71	120k	0.03	14.78
332.85	2	42.39	30.09	16.91	1.54	109.74	120k	0.03	17.62
350.75	2	35.87	26.68	20.32	1.40	28.54	120k	0.03	18.94
423.3	2	38.42	34.31	12.69	1.00	55.27	120k	0.03	21.16
436.35	2	41.40	38.01	8.99	1.00	71.67	120k	0.03	21.39

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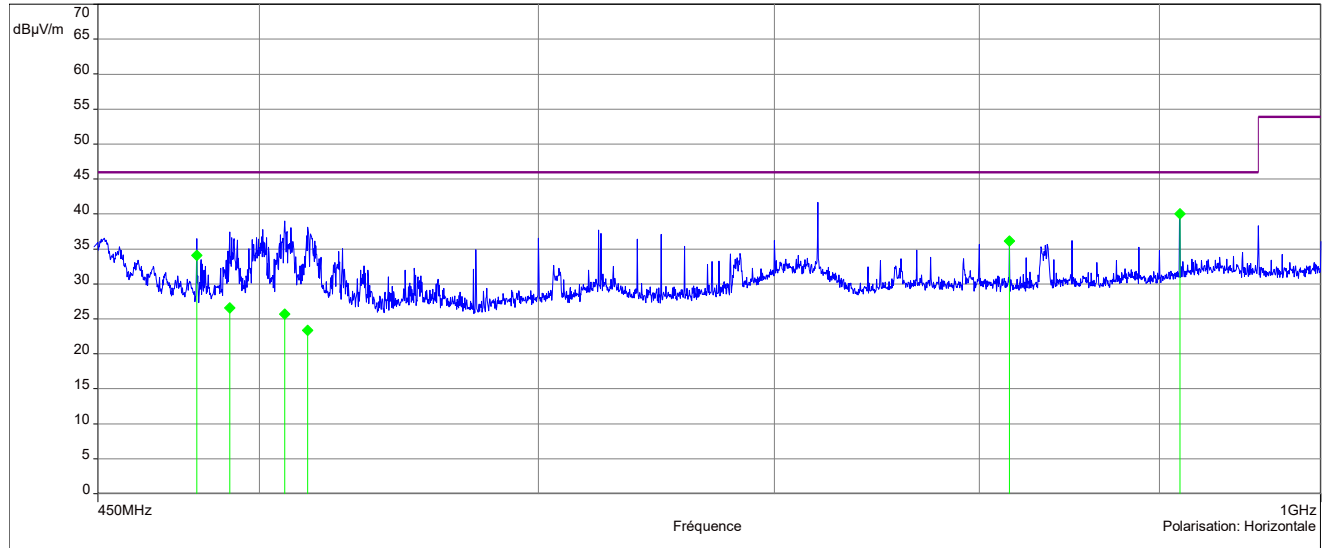
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Réglages: RBW: 120kHz, VBW: Auto, Durée balayage: 30 ms/Pts, Atténuation: Auto, Nombre de Balayages: 1, Preamp: On: 10 dB, LN Preamp: Off, Preselecteur: Off

Polarisation: Horizontale

Distance: 3 m



Horizontal Polarization (450-1000MHz) : Mode 2

Fréquence (MHz)	SB	Mes Peak	Mes QPeak (dBμV/m)	DeltaQP	Max Height	Max Angle	RBW	Meas.Time	Correction (dB)
480	1	39.31	34.08	12.92	1.32	12.14	120k	0.03	22.31
490.5	1	43.52	26.57	20.43	1.18	90.76	120k	0.03	22.57
508.35	1	42.81	25.66	21.34	1.02	37.75	120k	0.03	23.44
516	1	39.98	23.37	23.63	1.11	38.87	120k	0.03	23.99
816	1	39.61	36.11	10.89	1.00	251.83	120k	0.03	28.57
912	1	43.19	40.04	6.96	1.06	28.42	120k	0.03	29.84

TEST REPORT

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- Peak (Verticale)
- Q-Peak (Verticale)
- ◆ Mes QPeak (Results) (Verticale)

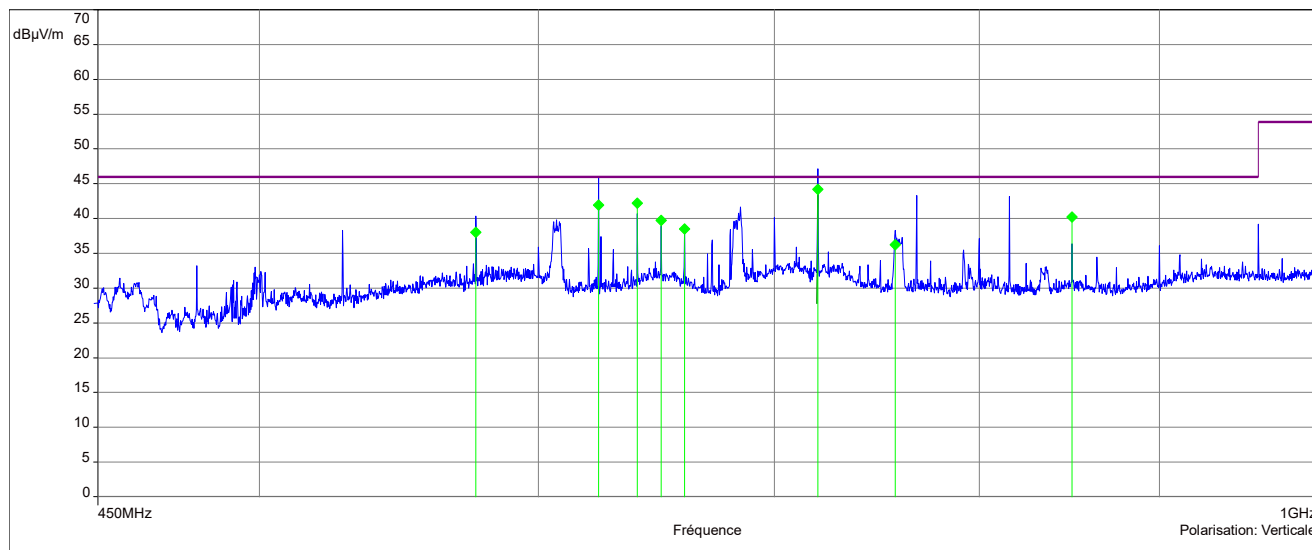
Description Sous-bande 2

Fréquences: 30 MHz - 1 GHz (Mode: Lin, Pas: 50 kHz)

Réglages: RBW: 120kHz, VBW: Auto, Durée balayage: 30 ms/Pts, Atténuation: Auto, Nombre de Balayages: 1, Preamp: On: 10 dB, LN Preamp: Off, Preselecteur: Off

Polarisation: Verticale

Distance: 3 m



Vertical Polarization (450-1000MHz) : Mode 2

Fréquence (MHz)	SB	Mes Peak	Mes QPeak (dBμV/m)	DeltaQP	Max Height	Max Angle	RBW	Meas.Time	Correction (dB)
576	2	41.22	38.02	8.98	1.47	354.94	120k	0.03	24.26
624	2	44.11	41.92	5.08	1.40	2.95	120k	0.03	26.76
640	2	43.87	42.19	4.81	1.89	70.54	120k	0.03	26.40
650	2	42.76	39.71	7.29	1.89	73.24	120k	0.03	26.10
660	2	40.95	38.52	8.48	1.75	3.43	120k	0.03	26.46
720	2	48.88	44.23	2.77	1.25	353.82	120k	0.03	27.59
757.3	2	43.69	36.27	10.73	1.18	75.94	120k	0.03	27.77
850	2	43.11	40.21	6.79	1.25	135.02	120k	0.03	28.81

TEST REPORT



- FCC/FCC 15.109 - Classe: - Moyenne/3.0m/
- FCC/FCC 15.109 - Classe: - QCrête/3.0m/
- FCC/FCC 15.109 - Classe: - Crête/3.0m/
- Peak (Horizontale)
- Avg (Horizontale)

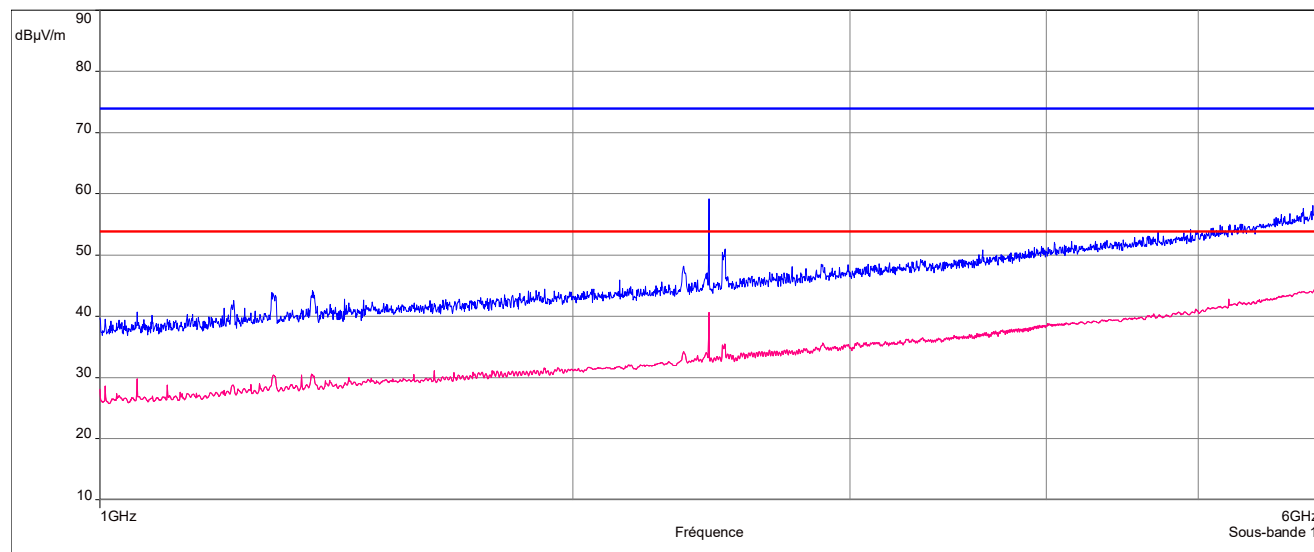
Description Sous-bande 1

Fréquences: 1 GHz - 6 GHz (Mode: Lin, Pas: 500 kHz)

Réglages: RBW: 1MHz, VBW: Auto, Durée balayage : 10 ms/Pts, Atténuation : Auto, Nombre de Balayages : 1, Preamp : On: 10 dB, LN Preamp : Off, Preselecteur: Off

Polarisation:Horizontale

Distance: 3 m



Horizontal Polarization (1-6GHz) : Mode 1

- FCC/FCC 15.109 - Classe: - Moyenne/3.0m/
- FCC/FCC 15.109 - Classe: - QCrête/3.0m/
- FCC/FCC 15.109 - Classe: - Crête/3.0m/
- Peak (Verticale)
- Avg (Verticale)

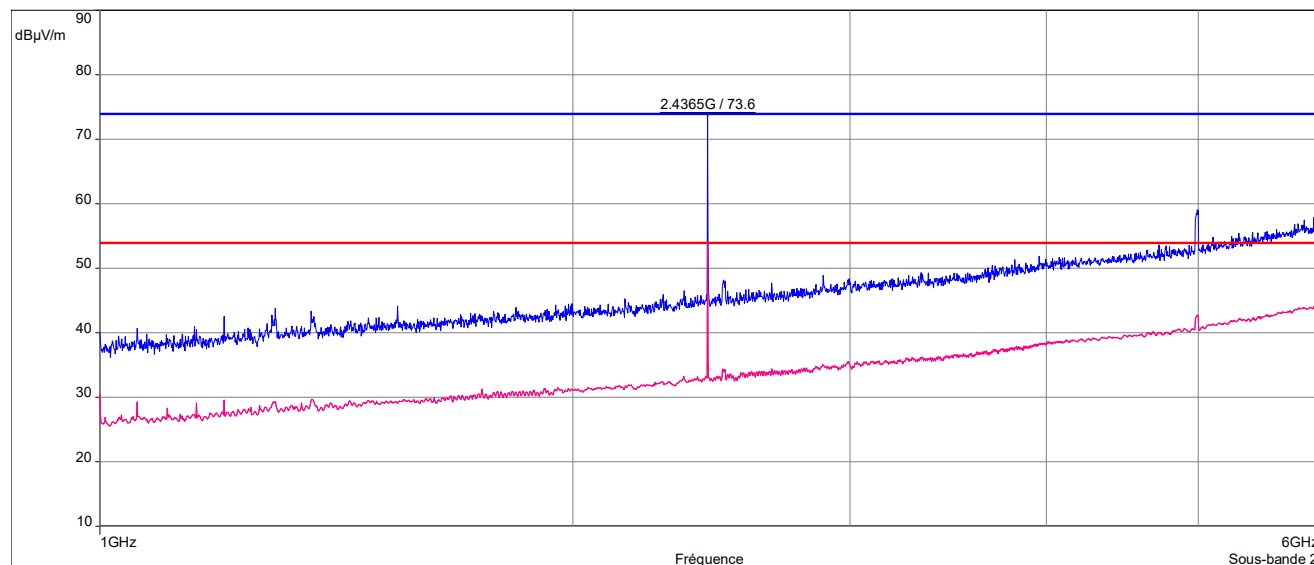
Description Sous-bande 2

Fréquences: 1 GHz - 6 GHz (Mode: Lin, Pas: 500 kHz)

Réglages: RBW: 1MHz, VBW: Auto, Durée balayage : 10 ms/Pts, Atténuation : Auto, Nombre de Balayages : 1, Preamp : On: 10 dB, LN Preamp : Off, Preselecteur: Off

Polarisation:Verticale

Distance: 3 m



Vertical Polarization (1-6GHz) : Mode 1

2.4GHz : Wifi Band

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- FCC/FCC 15.109 - Classe: - Moyenne/3.0m/
- FCC/FCC 15.109 - Classe: - QCrête/3.0m/
- FCC/FCC 15.109 - Classe: - Crête/3.0m/
- Peak (Horizontale)
- Avg (Horizontale)

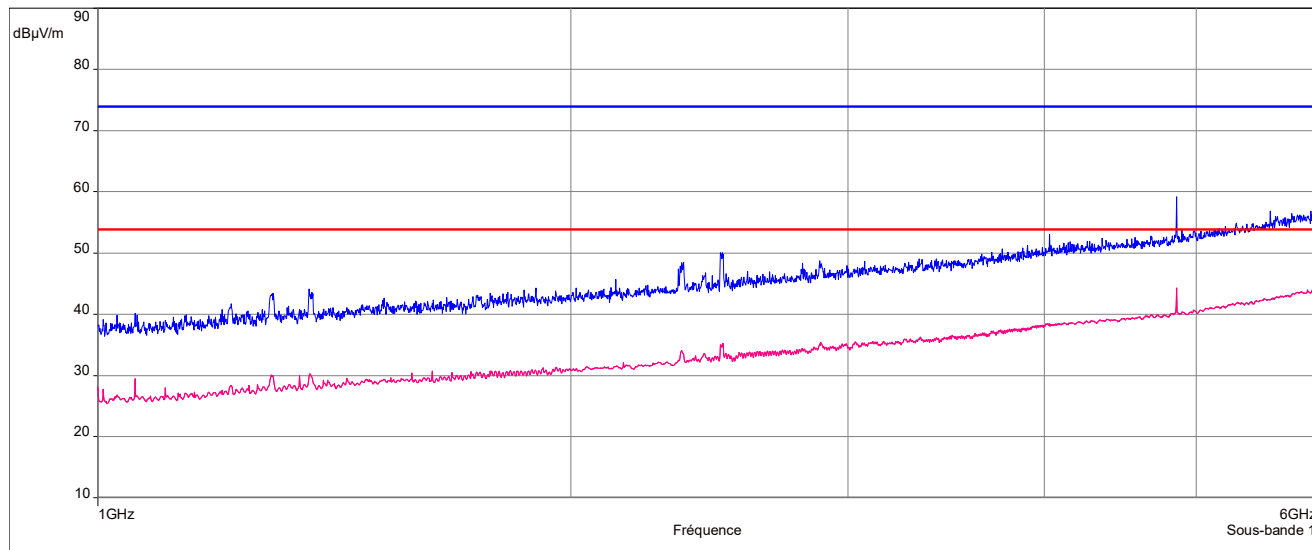
Description Sous-bande 1

Fréquences: 1 GHz - 6 GHz (Mode: Lin, Pas: 500 kHz)

Réglages: RBW: 1MHz, VBW: Auto, Durée balayage : 10 ms/Pts, Atténuation : Auto, Nombre de Balayages : 1, Preamp : On: 10 dB, LN Preamp : Off, Preselecteur: Off

Polarisation: Horizontale

Distance: 3 m



Horizontal Polarization (1-6GHz) : Mode 2

- FCC/FCC 15.109 - Classe: - Moyenne/3.0m/
- FCC/FCC 15.109 - Classe: - QCrête/3.0m/
- FCC/FCC 15.109 - Classe: - Crête/3.0m/
- Peak (Verticale)
- Avg (Verticale)

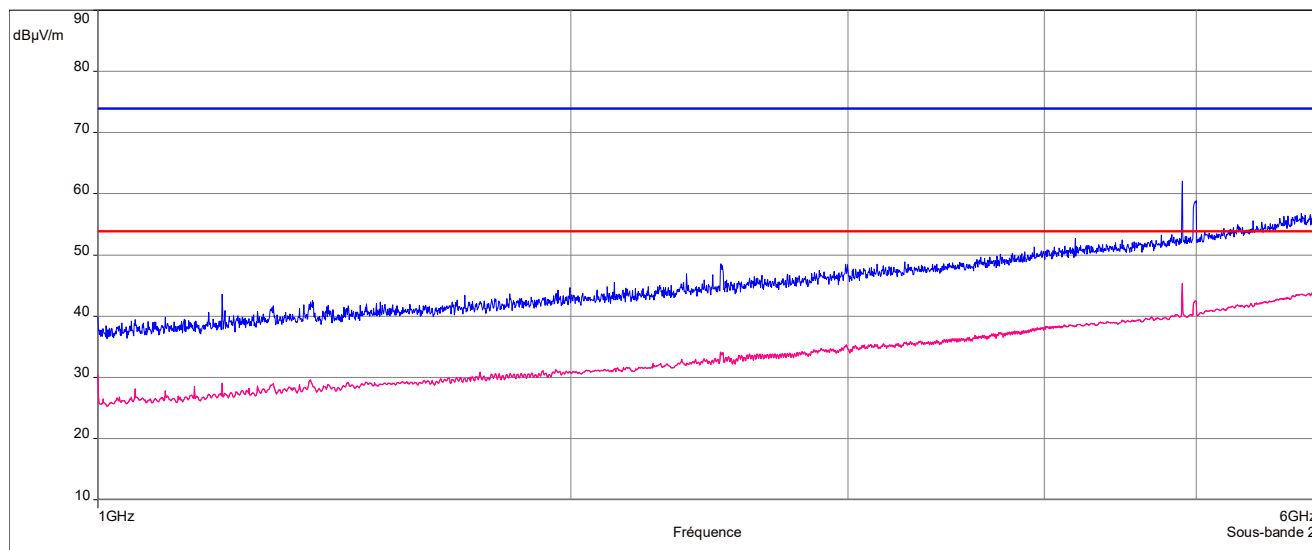
Description Sous-bande 2

Fréquences: 1 GHz - 6 GHz (Mode: Lin, Pas: 500 kHz)

Réglages: RBW: 1MHz, VBW: Auto, Durée balayage : 10 ms/Pts, Atténuation : Auto, Nombre de Balayages : 1, Preamp : On: 10 dB, LN Preamp : Off, Preselecteur: Off

Polarisation: Verticale

Distance: 3 m



Vertical Polarization (1-6GHz) : Mode 2

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3.6. CONCLUSION

Measures of Radiated Emission, performed on the sample of the product **E02100**, SN: **P2_#18**, in configuration and description presented in this test report, show levels **conform to** the FCC part 15 & ICES -003 limits.



4. Measurement of conducted disturbance

4.1. ENVIRONMENTAL CONDITIONS

Test performed by : **Lauriane Bron**
Date of test : April 4, 2022
Ambient temperature : 18°C
Relative humidity : 5%

4.2. TEST SETUP

Specifications:

Frequency 0.15 – 30 MHz RBW 9 kHz
Detector Peak , Quasi Peak and average

The measurement is performed on power supply with a LISN and telecommunication lines with RSI or current clamp for shielded cables.

Operating conditions:

- Deviation method:

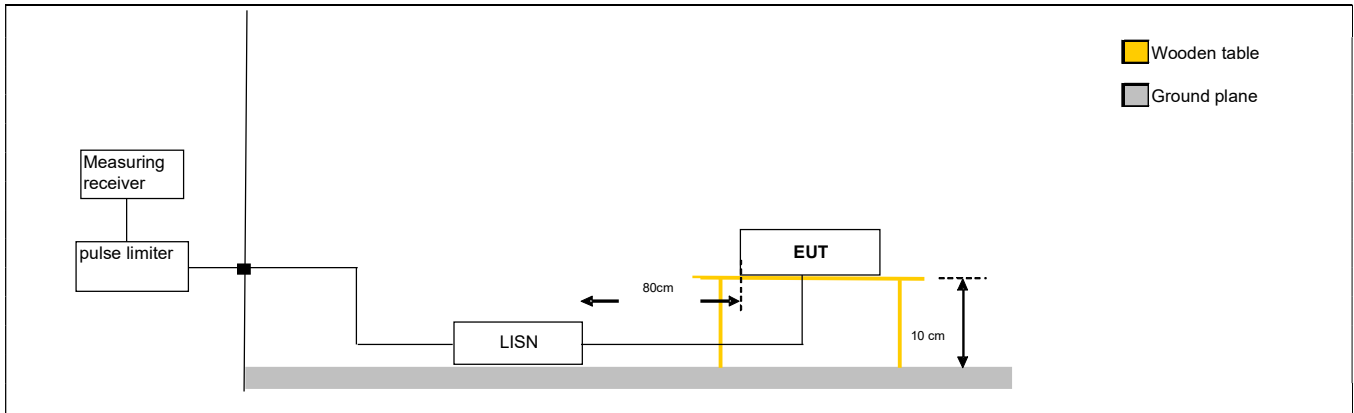
- ☐ Yes
☒ No

-Product installation:

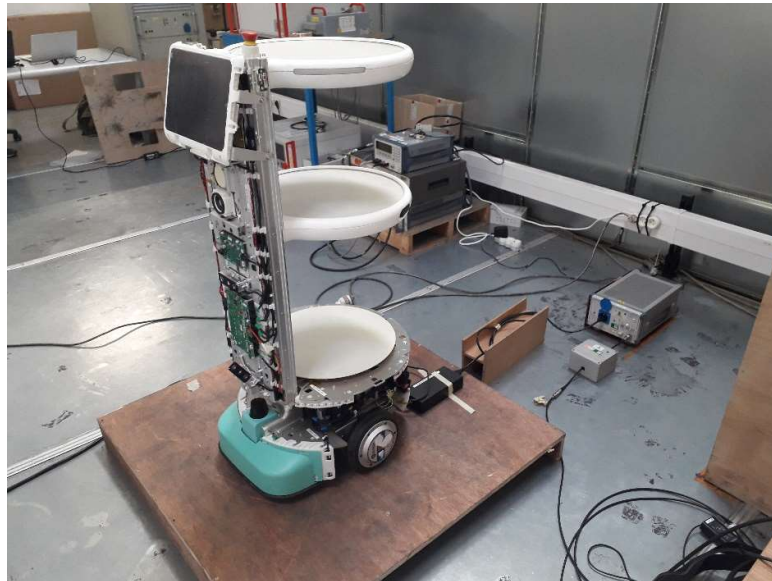
- ☐ The EUT is installed on a wooden table 80 cm above the reference plane, at 80cm of the LISN and at 40cm of the vertical conductive wall
☐ The EUT is installed on a wooden table 40 cm above the reference plane, at 80cm of the LISN.
☒ The EUT is installed 10 cm above the reference plane, at 80cm of the LISN..

Operating mode:

- ☐ Mode 1 ☒ Mode 2 ☐ Mode 3 ...



Test set up of conducted emission on power supply



Test set up of conducted emission on power supply



4.3. LIMIT

☐ Power supply Class A

Frequency Bands/frequencies	dB (μ V/m) quasi-peak	dB (μ V/m) average
0.15-0.5MHz	79	66
0.5-30 MHz	73	60

☒ Power supply Class B

Frequency Bands/frequencies	dB (μ V/m) quasi-peak	dB (μ V/m) average
0.15-0.5MHz	66-56	56-46
0.5-5 MHz	56	46
5-30 MHz	60	50



4.4. TEST EQUIPMENT LIST

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Reference ground plane 3 x 6,5 m	LCIE	V03	-	-	-
Software v3.21.0.9	NEXIO	BAT-EMC	LCIE	-	-
Current absorber	LCIE	-	A5329924	2021/03	2023/03
Receiver	ROHDE & SCHWARZ	ESCI	A2642017	2021/03	2023/03
Variable power supply AC	DANA	DSC 10.000M	-	-	-
RSIL	ROHDE & SCHWARZ	ENV216	C2320163	2022/03	2023/02

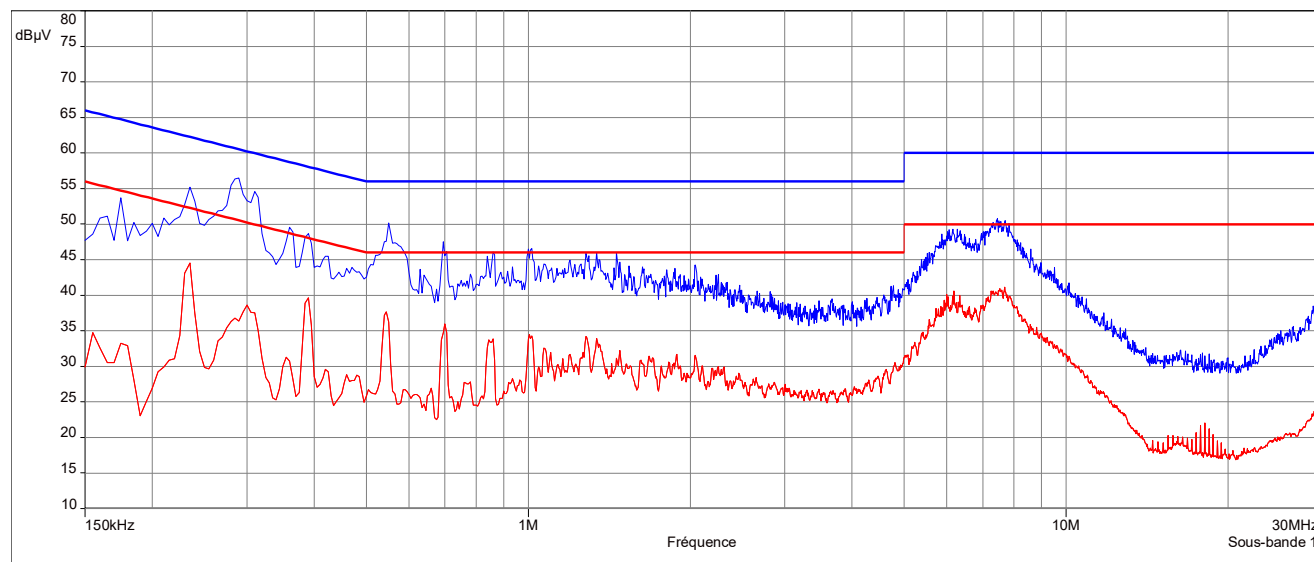
4.5. RESULTS

Description Sous-bande 1

Fréquences: 150 kHz - 30 MHz (Mode: Lin, Pas: 5 kHz)

Réglages: RBW: 9kHz, VBW: Auto, Durée balayage: 50 ms/Pts, Atténuation: Auto, Nombre de Balayages: 1, Preamp: Off, LN Preamp: Off, Preselecteur: On
Ligne: Phase 1

FCC/FCC 15.107 - Classe:B - Moyenne/
FCC/FCC 15.107 - Classe:B - QCrête/
Peak (Phase 1)
Avg (Phase 1)



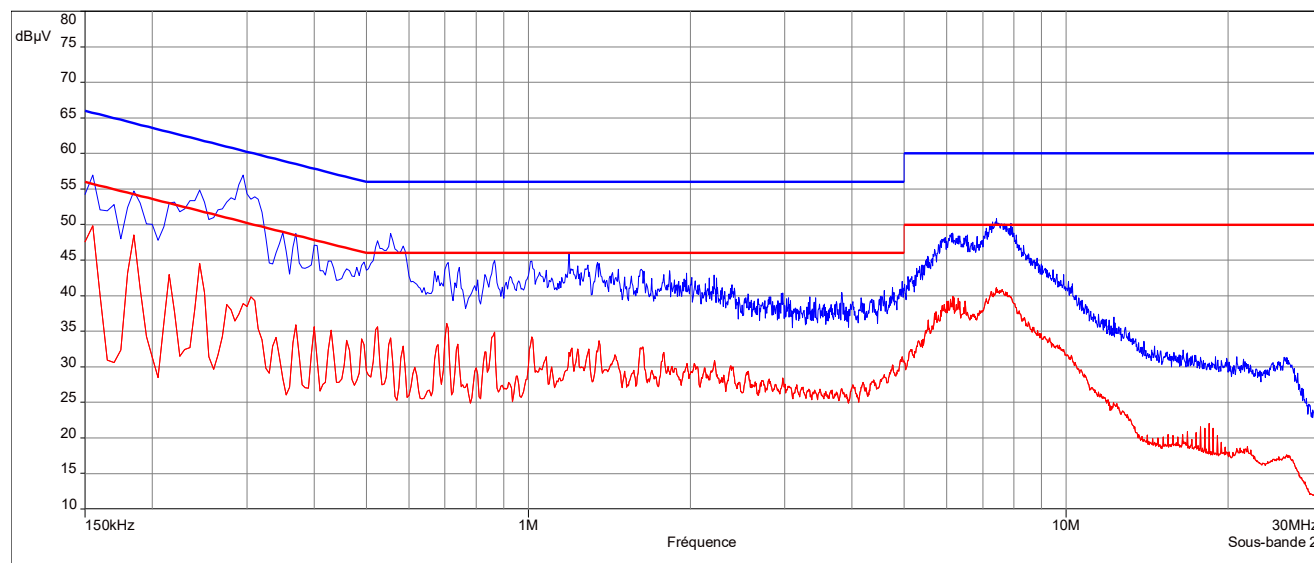
Line measure 240V 50Hz

Description Sous-bande 2

Fréquences: 150 kHz - 30 MHz (Mode: Lin, Pas: 5 kHz)

Réglages: RBW: 9kHz, VBW: Auto, Durée balayage: 50 ms/Pts, Atténuation: Auto, Nombre de Balayages: 1, Preamp: Off, LN Preamp: Off, Preselecteur: On
Ligne: Neutre

FCC/FCC 15.107 - Classe:B - Moyenne/
FCC/FCC 15.107 - Classe:B - QCrête/
Peak (Neutre)
Avg (Neutre)



Neutral measure 240V 50Hz



Fréquence (kHz)	SB	Mes Peak	Mes Qpeak (dBμV)	Delta QP
150	1	51.1	31.8	19.3
175	1	53.7	33.7	20
235	1	55.1	44.5	10.6
290	1	56.5	32.1	24.4
300	1	53.9	38.6	15.3
310	1	54.6	37.7	16.9
360	1	49.5	31.9	17.6
390	1	48.0	39.6	8.4
545	1	47.5	37.7	9.8
550	1	50.2	36.8	13.4
695	1	47.5	35.6	11.9
700	1	45.7	36	9.7
860	1	46.0	33.9	12.1
1005	1	45.6	34.5	11.1
1015	1	46.5	34.4	12.1
1190	1	46.1	32.3	13.8
1345	1	44.7	32.6	12.1
1355	1	44.6	33.7	10.9
1635	1	43.1	32.8	10.3
1830	1	43.5	30	13.5
6450	1	48.9	39.1	9.8
6155	1	47.6	39.9	7.7
7415	1	52	41.1	10.9
155	2	57	49.8	7.2
185	2	54.8	48.5	6.3
215	2	53.1	43	10.1
245	2	54.9	44.5	10.4
295	2	56.9	39	17.9
305	2	54.1	39.8	14.3
370	2	48.2	36.1	12.1
400	2	46.3	35.8	10.5
430	2	44.9	35.1	9.8
525	2	47.4	35.7	11.7
555	2	48.7	38	10.7
705	2	44.5	36.1	8.4
710	2	44.7	35.8	8.9
865	2	44.8	34.9	9.9
1015	2	44.5	34.2	10.3
1190	2	46.1	32.3	13.8
1345	2	44.7	32.6	12.1
1355	2	44.5	33.7	10.8
1635	2	44.2	32.8	11.4
1830	2	43.5	28.4	15.1
6155	2	48.1	33.9	14.2
6450	2	48.9	37	11.9
7415	2	50.9	41.1	9.8



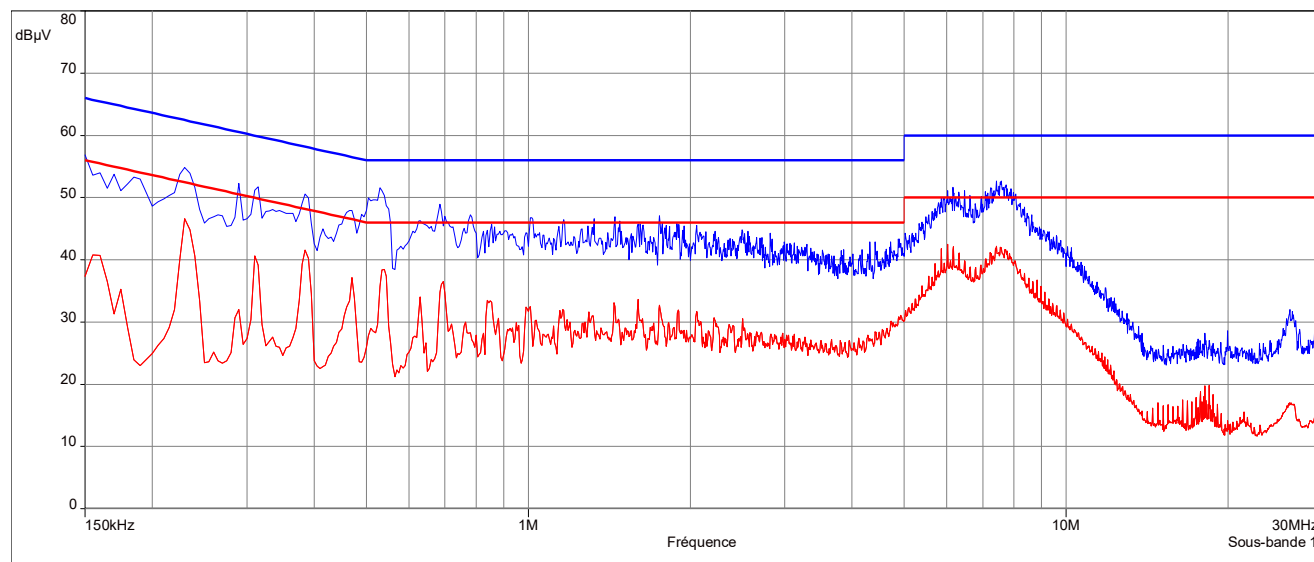
— FCC/FCC 15.207 - Classe:B - QCrête/
— FCC/FCC 15.107 - Classe:B - Moyenne/
— Peak (Phase 1)
— Avg (Phase 1)

Description Sous-bande 1

Fréquences: 150 kHz - 30 MHz (Mode: Lin, Pas: 5 kHz)

Réglages: RBW: 9kHz, VBW: Auto, Durée balayage: 50 ms/Pts, Atténuation: Auto, Nombre de Balayages: 1, Preamp: Off, LN Preamp: Off, Preselecteur: On

Ligne:Phase 1



Line measure 120V 60Hz

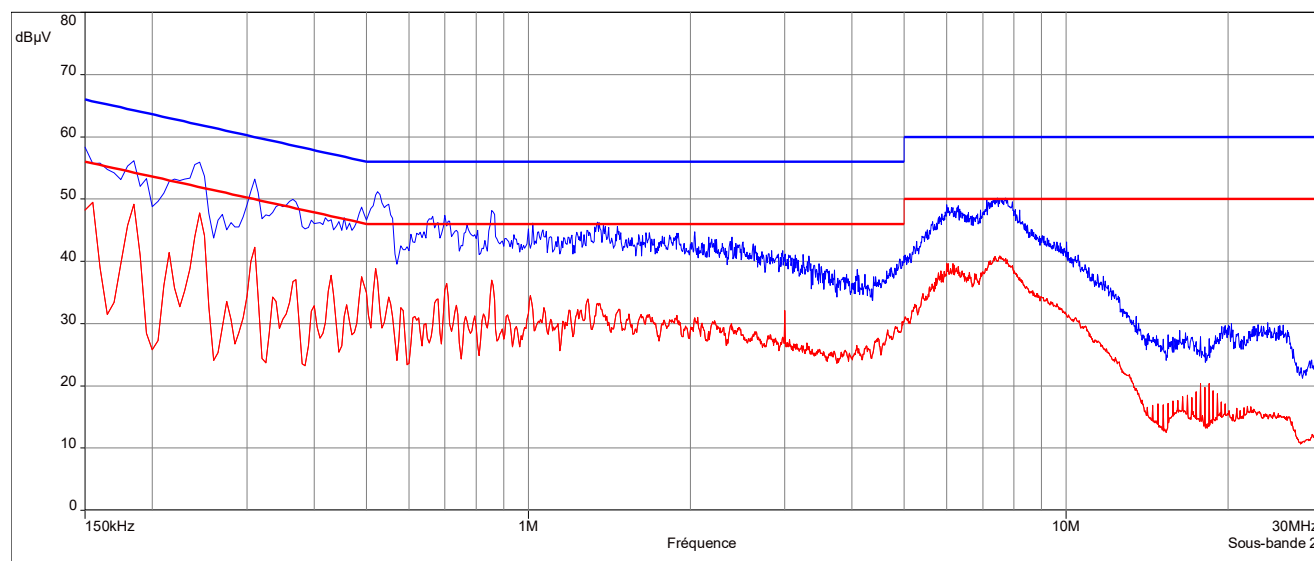
— FCC/FCC 15.207 - Classe:B - QCrête/
— FCC/FCC 15.107 - Classe:B - Moyenne/
— Peak (Neutre)
— Avg (Neutre)

Description Sous-bande 2

Fréquences: 150 kHz - 30 MHz (Mode: Lin, Pas: 5 kHz)

Réglages: RBW: 9kHz, VBW: Auto, Durée balayage: 50 ms/Pts, Atténuation: Auto, Nombre de Balayages: 1, Preamp: Off, LN Preamp: Off, Preselecteur: On

Ligne:Neutre



Neutral measure 120V 60Hz

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Fréquence (kHz)	SB	Mes Peak	Mes Qpeak (dBμV)	Delta QP
150	1	56.9	37.6	19.3
155	1	54.1	40.8	13.3
170	1	53.8	32.4	21.4
230	1	54.7	46.6	8.1
290	1	52.3	32.1	20.2
310	1	50.6	40.7	9.9
315	1	51.8	37.7	14.1
385	1	50.5	41.6	8.9
470	1	48	37.1	10.9
505	1	50	28.1	21.9
530	1	51.6	36.9	14.7
540	1	50.2	38.5	11.7
630	1	46.2	34	12.2
685	1	48.9	35.5	13.4
695	1	45.5	36.5	9
780	1	47.3	27.6	19.7
840	1	44.7	33.5	11.2
1010	1	46.4	32.5	13.9
1165	1	46.5	30	16.5
1325	1	46.6	30.9	15.7
1445	1	46.2	33.1	13.1
1600	1	45.8	33.6	12.2
1755	1	47.1	32.4	14.7
6015	1	51.3	42.5	8.8
6165	1	51.7	42	9.7
7420	1	52.2	42.2	10
150	2	58.3	48.8	9.5
155	2	56.7	49.5	7.2
185	2	56.5	49.2	7.3
245	2	56.2	47.7	8.5
310	2	53.1	42.2	10.9
370	2	49.6	37.1	12.5
430	2	47	37.8	9.2
520	2	50.9	38.8	12.1
525	2	51.2	35.1	16.1
700	2	47.4	36.3	11.1
705	2	45.9	36.4	9.5
855	2	48.6	37	11.6
1010	2	43	34.5	8.5
1020	2	46.1	32.6	13.5
1290	2	44.9	33.9	11
1345	2	46.3	33.1	13.2
3000	2	40.9	32.1	8.8
6000	2	49.1	39.7	9.4
6030	2	48.8	39.6	9.2
7535	2	49	40.9	8.1
7715	2	50.2	40.3	9.9

4.6. CONCLUSION

Measures of Conducted Emission, performed on the sample of the product E02100, SN: P2_#18, in configuration and description presented in this test report, show levels **conform to** the FCC part 15 & ICES -003 limits.



5. Uncertainties Chart

Kind of measurement	Wide uncertainty laboratory (k=2) $\pm x$ (dB)	CISPR uncertainty limit $\pm y$ (dB)
Measurement of conducted disturbances in voltage on the AC power port (9 kHz – 150 kHz)	2.67	3.8
Measurement of conducted disturbances in voltage on the AC power port (150 kHz – 30 MHz)	2.67	3.4
Measurement of conducted disturbances in voltage on the telecommunication port. (AAN)	3.67	5.0
Measurement of conducted disturbances in current (current clamp)	2.73	2.9
Measurement of disturbance power	4.26	4.5
Measurement of radiated magnetic field from 10kHz to 30MHz in SAC V01	4.48	/
Measurement of radiated magnetic field from 10kHz to 30MHz in SAC C01	4.48	/
Measurement of radiated electric field from 30 to 1000MHz in horizontal position on the OATS (Ecuelles)	4.87	6.3
Measurement of radiated electric field from 30 to 1000MHz in vertical position on the OATS (Ecuelles)	4.94	6.3
Measurement of radiated electric field from 1 to 6 GHz on the Ecuelles site	5.38	5.2
Measurement of radiated electric field from 6 to 18GHz on the Ecuelles site	5.92	5.5
Measurement of radiated electric field from 30 to 1000MHz in horizontal position in SAC C01	5.29	6.3
Measurement of radiated electric field from 30 to 1000MHz in vertical position in SAC C01	5.36	6.3
Measurement of radiated electric field from 30 to 1000MHz in horizontal position in SAC V01	5.25	6.3
Measurement of radiated electric field from 30 to 1000MHz in vertical position in SAC V01	5.32	6.3
Measurement of radiated electric field from 30 to 1000MHz in horizontal position in SAC V05	5.15	6.3
Measurement of radiated electric field from 30 to 1000MHz in vertical position in SAC V05	5.22	6.3
Measurement of radiated electric field from 1 to 6 GHz C01	4.84	5.2
Measurement of radiated electric field from 6 to 18 GHz C01	5.02	5.5
Measurement of radiated electric field from 1 to 6 GHz V01	4.57	5.2
Measurement of radiated electric field from 1 to 6 GHz V05	4.59	5.2
Measurement of radiated magnetic field from 10kHz to 30MHz on the OATS (Ecuelles)	4.48	/

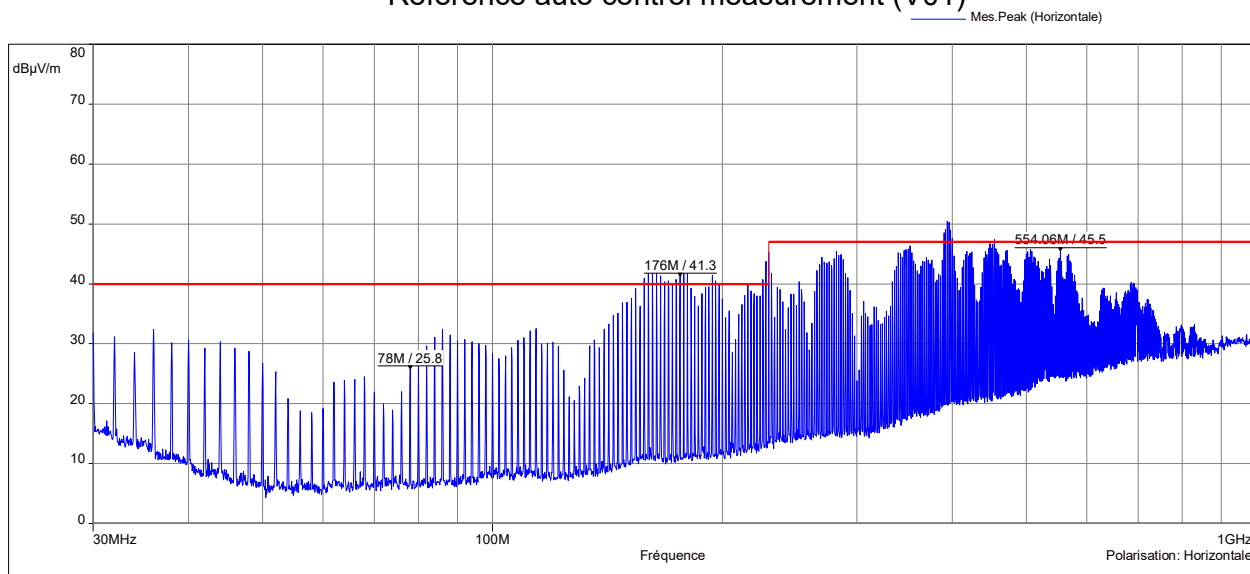
End of test report

AUTO CONTROL

1. Measurement of radiated emissions

Horizontal polarization

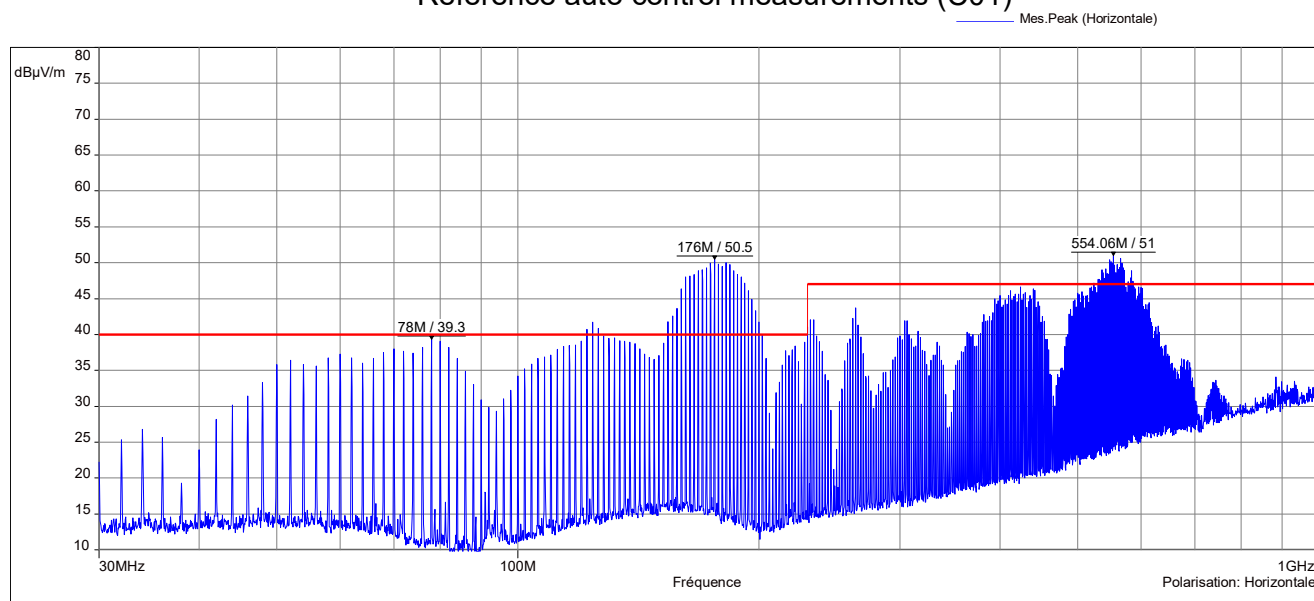
Reference auto control measurement (V01)



Auto control measurement before test



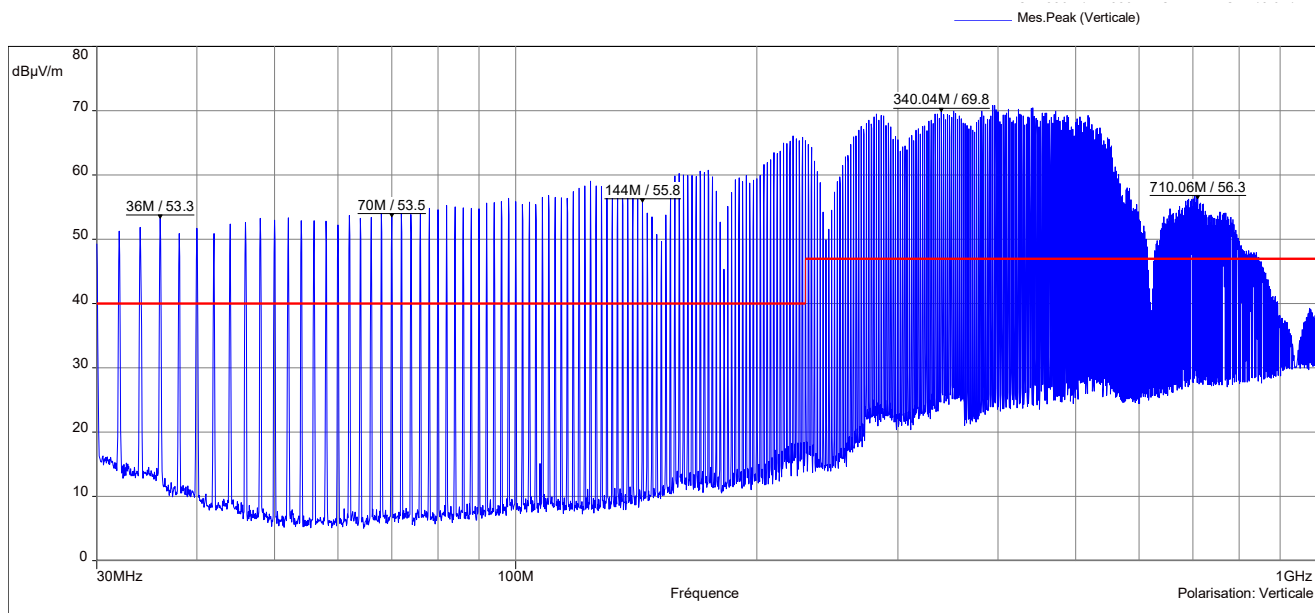
Reference auto control measurements (C01)



Auto control measurement before test



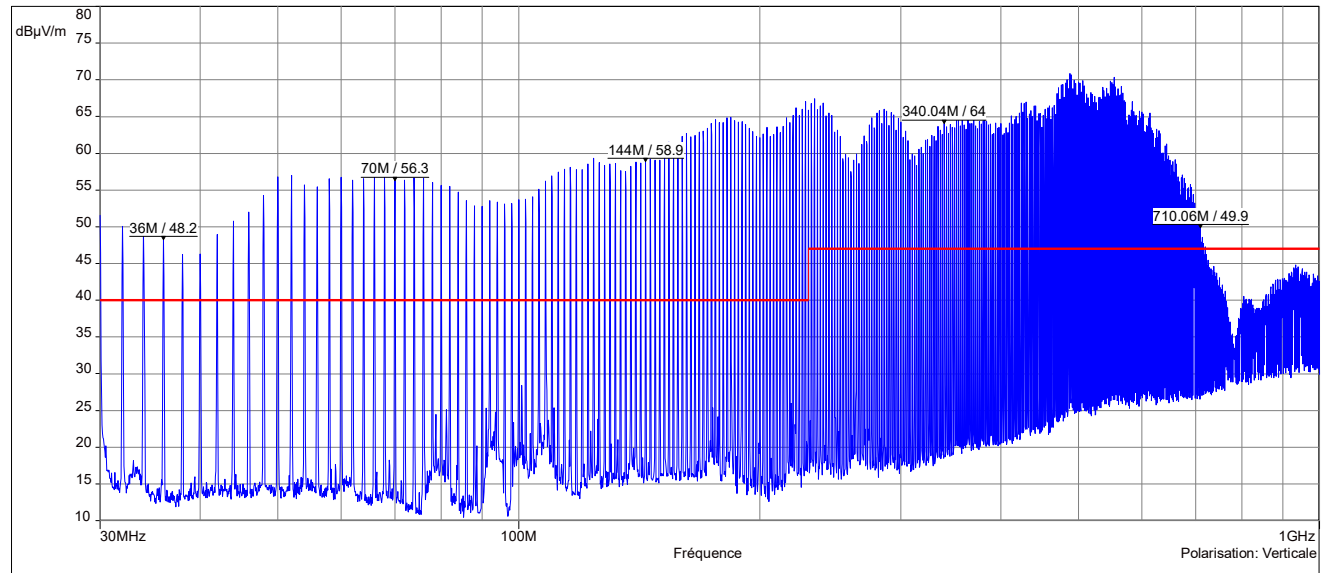
Vertical Polarization
Reference auto control measurement (V01)



Auto control measurement before test



Reference auto control measurements (C01)



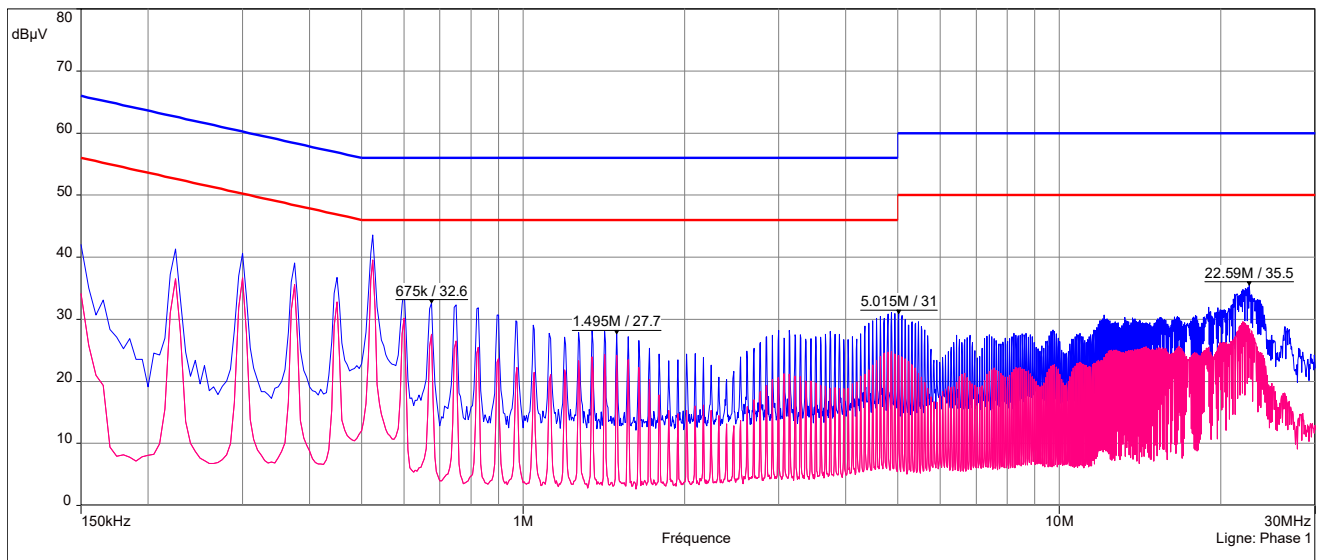
Auto control measurement before test



2. Measurement of conducted disturbance

Line Reference auto control measurement (V01)

Description Sous-bande 1
Fréquences: 150 kHz - 30 MHz (Mode: Lin, Pas: 5 kHz)
Réglages: RBW: 9kHz, VBW: Auto, Durée balayage : 50 ms/Pts, Atténuation : Auto, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: On
Ligne: Phase 1



Auto control measurement before test



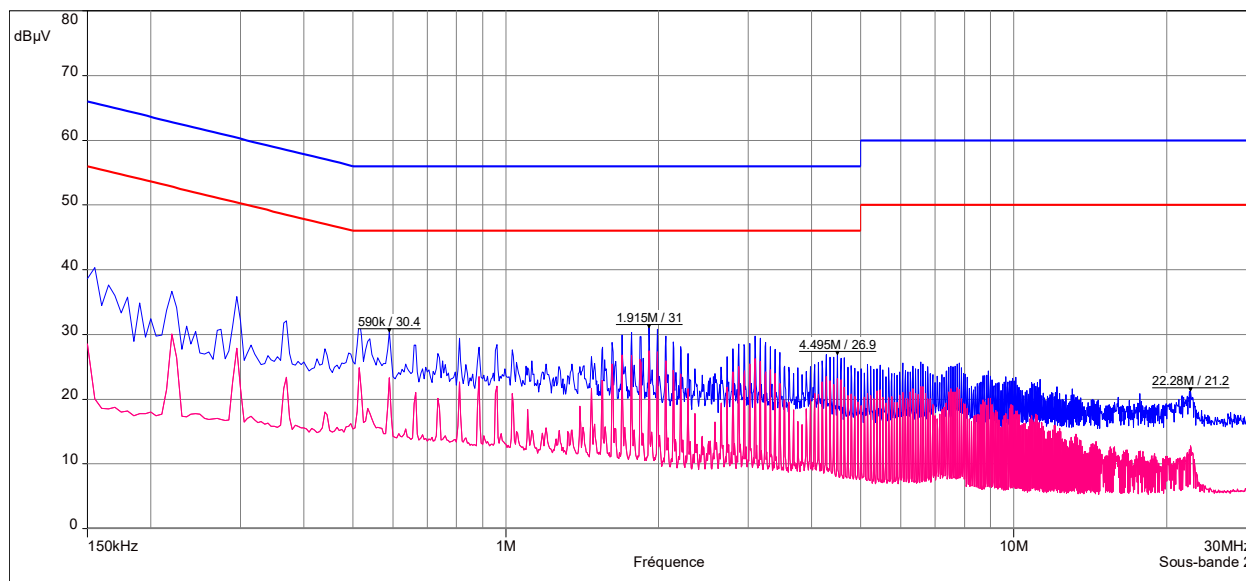
Reference auto control measurements (C01)

Description Sous-bande 2

Fréquences: 150 kHz - 30 MHz (Mode: Lin, Pas: 5 kHz)

Réglages: RBW: 9kHz, VBW: Auto, Durée balayage : 50 ms/Pts, Atténuation : 10 dB, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: On

Ligne:Phase 1

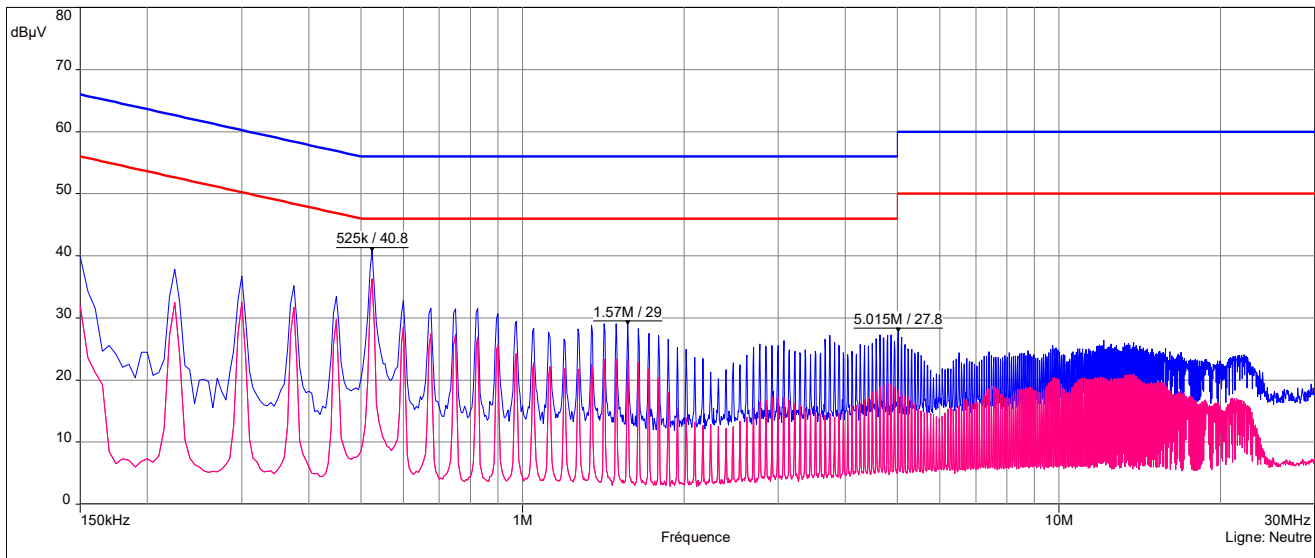


Auto control measurement before test



Neutral
Reference auto control measurement (V01)

Description Sous-bande 2
Fréquences: 150 kHz - 30 MHz (Mode: Lin, Pas: 5 kHz)
Réglages: RBW: 9kHz, VBW: Auto, Durée balayage : 50 ms/Pts, Atténuation : Auto, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: On
Ligne: Neutre



Auto control measurement before test



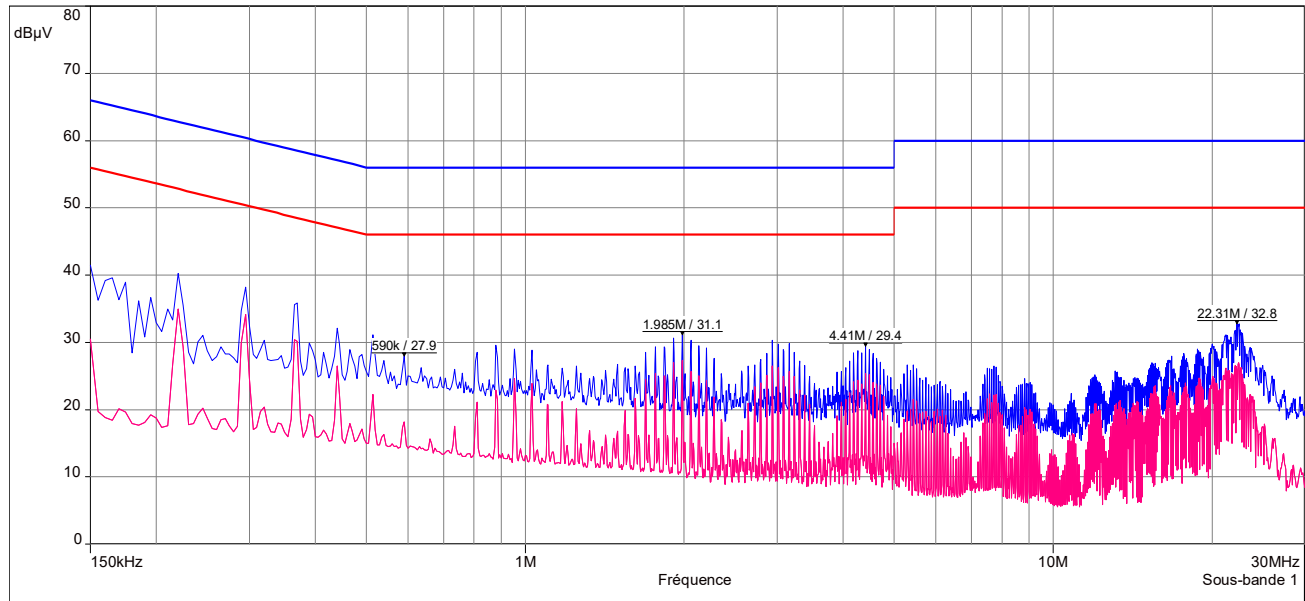
Reference auto control measurements (C01)

Description Sous-bande 1

Fréquences: 150 kHz - 30 MHz (Mode: Lin, Pas: 5 kHz)

Réglages: RBW: 9kHz, VBW: Auto, Durée balayage : 50 ms/Pts, Atténuation : 10 dB, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: On

Ligne: Neutre



Auto control measurement before test