433MHz Template: Release April 14th, 2021

TEST REPORT

N°: 171893-763343-B **Version : 02**

Subject	**Radio spectrum matters tests according to standards: 47 CFR Part 15.231 & RSS-210 Issue 10 & RSS-Gen Issue 5**
Issued to	**BODYCAP 3, rue du docteur Laënnec 14200 – Hérouville Saint Clair FRANCE**
Apparatus under test	
Product	**Continuous Measurement System, Reliable and Precise, Recording of Gastrointestinal Temperature by Telemetry**
Trade mark	**e-Celsius Medical System**
Manufacturer	**BODYCAP**
Model under test	**e-Med Connect (P110)**
Serial number	**-**
FCC ID	**2AENH015**
IC	**27427_M P110**
Conclusion	See Test Program chapter
Test date	: April 26, 2021 to April 30, 2021
Test location	Moirans
Test Site	6500A-1 & 6500A-3
Registration Number	197516
Designation Number	FR0008
Sample receipt date	April 26, 2021
Composition of document	49 pages
Document issued on	December 13, 2022

Written by :
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Tests operator

Approved by :
Julien Bouraud
Technical manager

PUBLICATION HISTORY

Version	Date	Author	Modification
01	August 7, 2022	Armand MAHOUNGOU	Creation of the document
02	December 13, 2022	Ali AKEB	Correction of the product's FCC ID Correction Of the FCC Limits on page 48

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

References

- **47 CFR Part 15.231**
- **RSS 210 Issue 10**
- **RSS Gen Issue 5**
- **ANSI C63.10-2013**

Radio requirement:

Clause (47CFR Part 15.231 & RSS-249 Issue 2 & RSS-Gen Issue 5) Test Description	Test result - Comments			
Occupied Bandwidth	☑ PASS	☐ FAIL	☐ NA	☐ NP(1)
20 dB bandwidth	☑ PASS	☐ FAIL	☐ NA	☐ NP(1)
Duty cycle	☑ PASS	☐ FAIL	☐ NA	☐ NP(1)
Frequency Tolerance	☑ PASS	☐ FAIL	☐ NA	☐ NP(1)
Limit of Transmission Time	☑ PASS	☐ FAIL	☐ NA	☐ NP(1)
Field strength of fundamental & Field strength of harmonics	☑ PASS	☐ FAIL	☐ NA()	☐ NP(1)
AC Power Line Conducted Emission	☑ PASS	☐ FAIL	☐ NA(2)	☐ NP(1)
Unwanted Emissions into Restricted Frequency Bands	☑ PASS	☐ FAIL	☐ NA	☐ NP(1)
Receiver Radiated emissions	☑ PASS	☐ FAIL	☐ NA	☐ NP(1)
This table is a summary of test report, see conclusion of each clause of this test report for detail.				

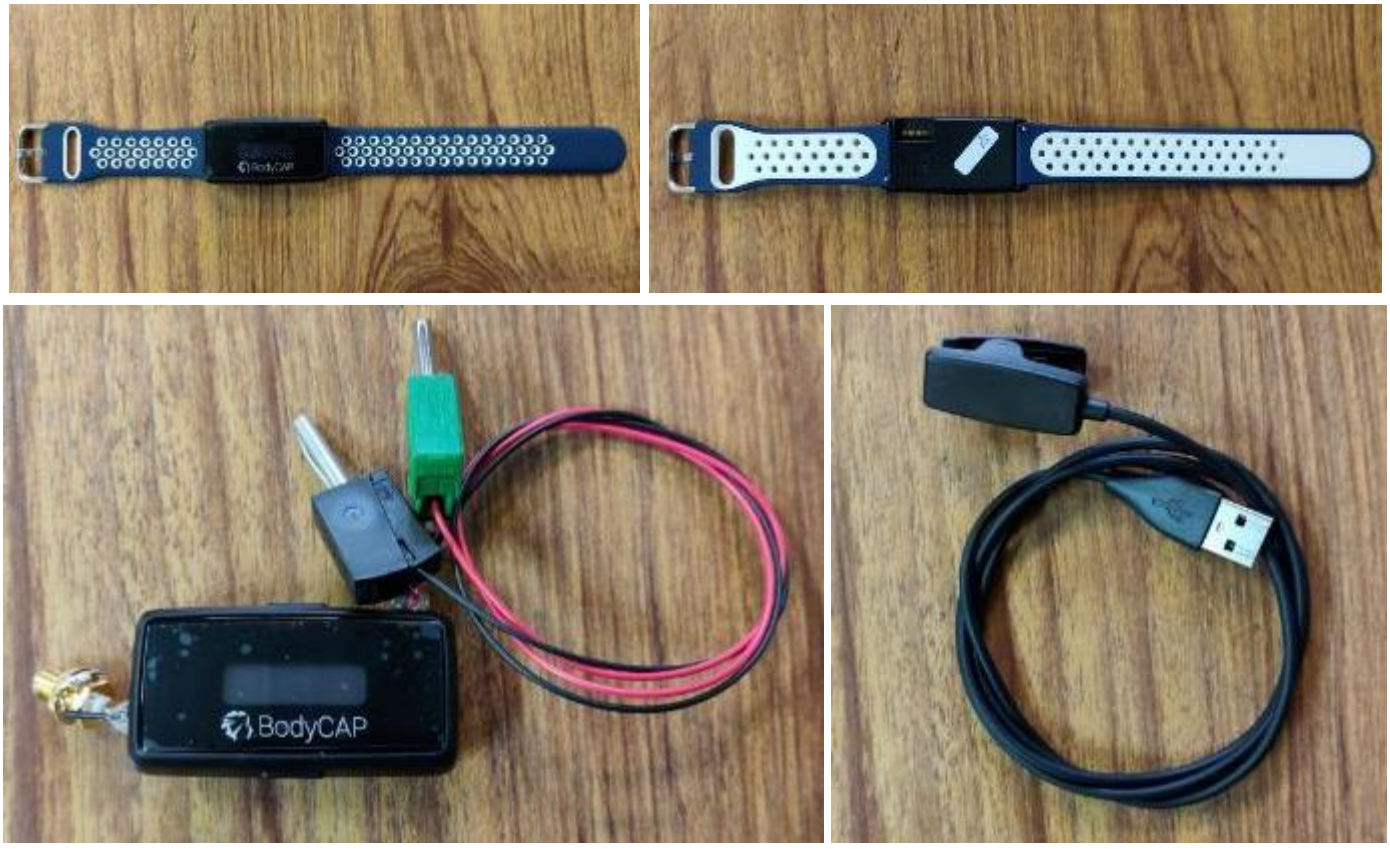
(1): Limited program
(2): EUT not directly or indirectly connected to the AC Power Public Network

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 UNDER TEST: CONFIGURATION (DECLARED BY PROVIDER)

2.1. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

Equipment under test (EUT):
e-Celsius **Medical System** e-Med **Connect (P110)** **Serial Number:** -



Equipment Under Test

Power supply:
During all the tests, EUT is supplied by **V_{nom}: 3.7Vdc**
For measurement with different voltage, it will be presented in test method.

Name	Type	Rating	Reference / Sn	Comments
Supply1	☐ AC ☑ DC ☐ Battery	2.7 to 4.2V	-	-

Inputs/outputs – Cable/:

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
1	USB cable	1	☐	☐	☐	-

Equipment information:

Type:	**433MHz**		
Chipset Ref :	sx1262		
Frequency band:	[433.05–434.79] MHz		
Number of Channel:	8		
Spacing channel:	0.2MHz		
Channel bandwidth:	0.2MHz		
Antenna Type:	☑ Integral	☐ External	☐ Dedicated
Antenna connector:	☐ Yes	☐ No	☑ Temporary for test
Antenna Requirements §15.203	Conducted Method (welded connection, according to manufacturer's requirements)		
Transmit chains:	☑ 1	☐ 2	
Receiver chains	☑ 1	☐ 2	
Type of equipment:	☑ Stand-alone	☐ Plug-in	☐ Combined
Equipment arrangement:	☐ Tabletop	☐ Floor-standing	☑ Multiple orientations
Duty cycle:	☑ Continuous duty	☐ Intermittent duty	☐ 100% duty
Equipment type:	☑ Production model	☐ Pre-production model	
Operating temperature range:	Tnom:	20°C	
Type of power source:	☐ AC power supply	☐ DC power supply	☑ Battery
Operating voltage range:	Vnom:	☐ 120V/60Hz	☑ 3.7VDC

Antenna Characteristic			
Antenna assembly	**Gain (dBi)**	**Frequency Band (MHz)**	**Impedance(Ω)**
1	0.83	30 - 1000	50

CHANNEL PLAN	
Channel	**Frequency (MHz)**
Cmin : C1	433.220
C2	433.420
C3	433.620
Cnom : C4	433.820
C5	434.020
C6	434.220
C7	434.420
Cmax : C8	434.620

Modulation Type	**Worst Case Modulation**
GFSK	☑

Hardware information		
Software (if applicable):	**V. :**	**LCIE_18dBM_g75e138f.zip**

2.2. RUNNING MODE

Test mode	Description of test mode
Test mode 1	Permanent emission with modulation on a fixed channel in the data rate that produced the highest power

Test	Running mode	
Occupied Bandwidth	☑ Test mode 1 (1)	☐ Alternative test mode()
20 dB bandwidth	☑ Test mode 1 (1)	☐ Alternative test mode()
Duty cycle	☑ Test mode 1 (1)	☐ Alternative test mode()
Frequency Tolerance	☑ Test mode 1 (1)	☐ Alternative test mode()
Limit of Transmission Time	☑ Test mode 1 (1)	☐ Alternative test mode()
Field strength of fundamental & Field strength of harmonics	☑ Test mode 1 (1)	☐ Alternative test mode()
AC Power Line Conducted Emission	☑ Test mode 1 (1)	☐ Alternative test mode()
Unwanted Emissions into Restricted Frequency Bands	☑ Test mode 1 (1)	☐ Alternative test mode()

(1) Following commands are used to set the product:

a. – See document “Mode emploi firmware LCIE.docx”(provided by customer) for the command used during test.

2.3. EQUIPMENT LABELLING

No labelling

2.4. EQUIPMENT MODIFICATION

☑ 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 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.

2.6. *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. OCCUPIED BANDWIDTH

3.1. TEST CONDITIONS

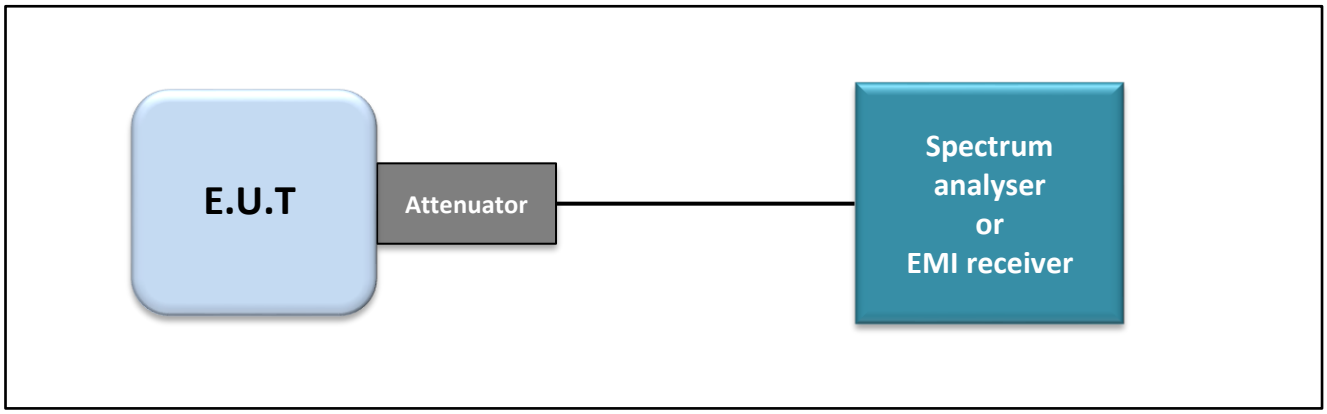
Test performed by	: Armand MAHOUNGOU
Date of test	: April 29, 2021
Ambient temperature	: 26°C
Relative humidity	: 46%

3.2. TEST SETUP

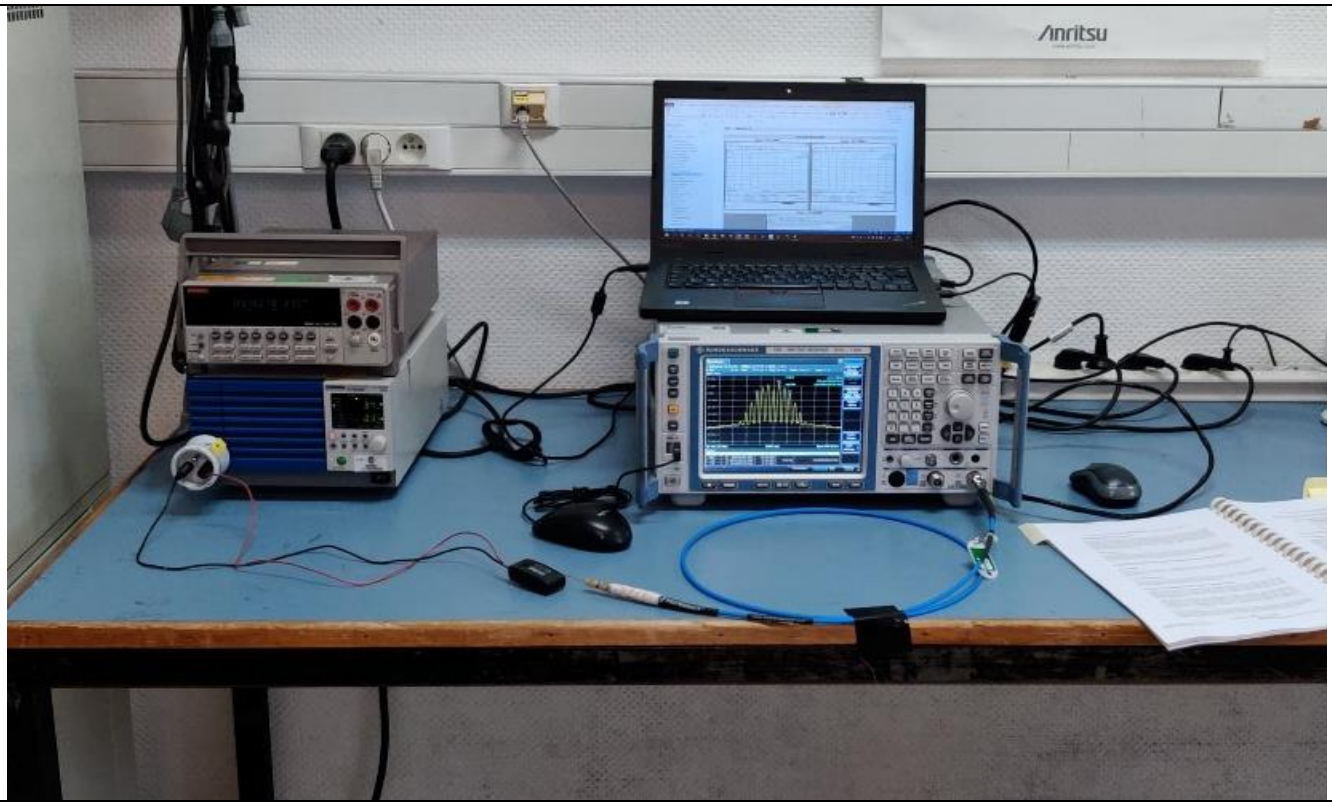
- The Equipment Under Test is installed:
☑ On a table
☐ In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:
☑ Conducted Method
☐ Radiated Method

- Test Procedure:
☑ RSS-Gen Issue 5 § 6.7



Test set up of Occupied Bandwidth



Photograph for Occupied bandwidth

3.3. LIMIT

None

3.4. TEST EQUIPMENT LIST

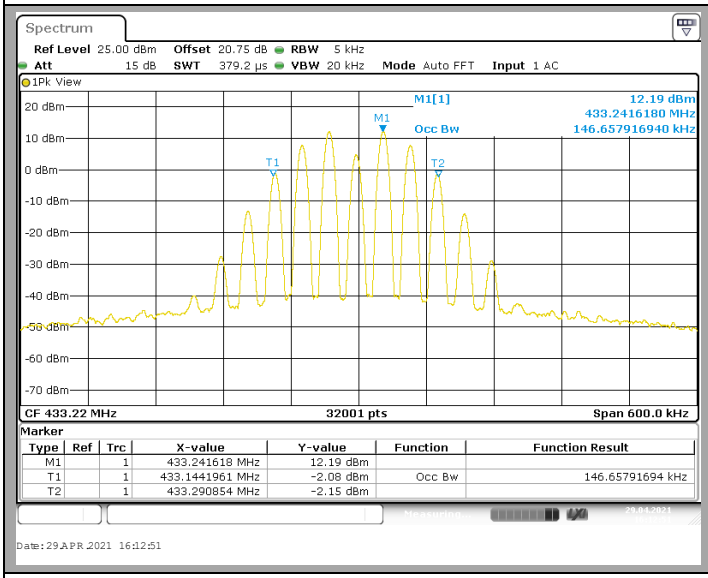
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
EMI receiver	ROHDE & SCHWARZ	ESR7	A2642026	2019/07	2021/07
Multimeter	KEITHLEY	2000	A1242090	2021/03	2023/03
Power supply	KIKUSUI	PCR500M	A7040079	See Multimeter	See Multimeter
Cable + Attenuateur 20dB	PASTERNACK	PE350-150CM	A5329970	2020/09	2021/09

Note: In our quality system, the test equipment calibration due is more & less 2 months

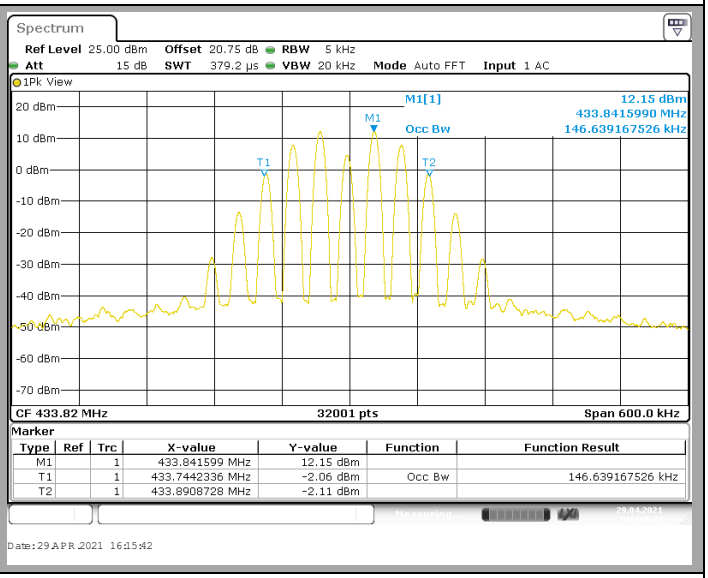
3.5. RESULTS

Occupied Bandwidth

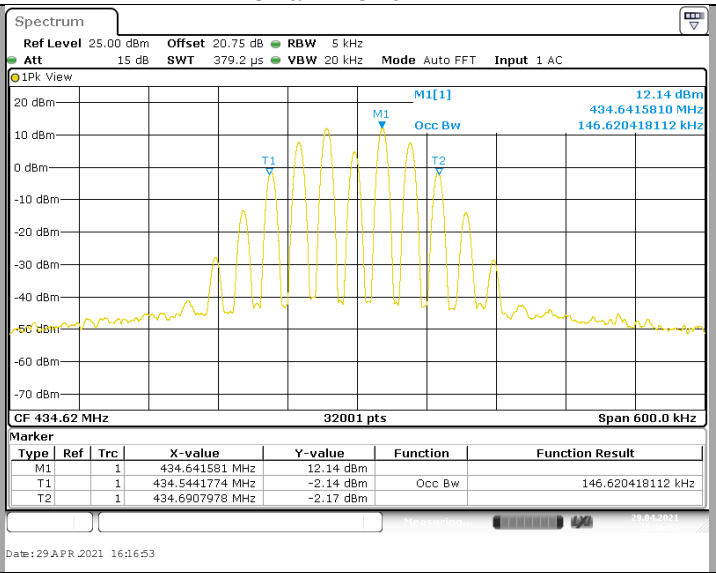
Cmin = 433.22MHz



Cnom = 433.82MHz



Cmax = 434.62MHz



Channel	Occupied Bandwidth (MHz)
Cmin	146.6579
Cnom	146.6392
Cmax	146.6204

3.6. CONCLUSION

Occupied Channel Bandwidth measurement performed on the sample of the product e-Celsius **Medical System** e-Med **Connect (P110)**, SN: **-**, in configuration and description presented in this test report, show levels **compliant** to the RSS-GEN Issue 5 limits.

4. 20dB Emission Bandwidth

4.1. TEST CONDITIONS

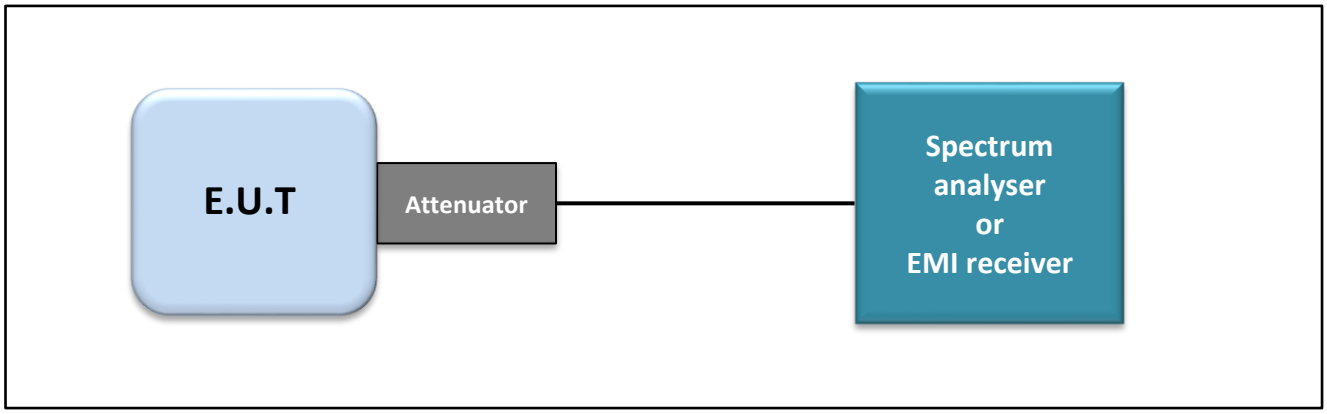
Test performed by	: Armand MAHOUNGOU
Date of test	: April 29, 2021
Ambient temperature	: 26°C
Relative humidity	: 46%

4.2. TEST SETUP

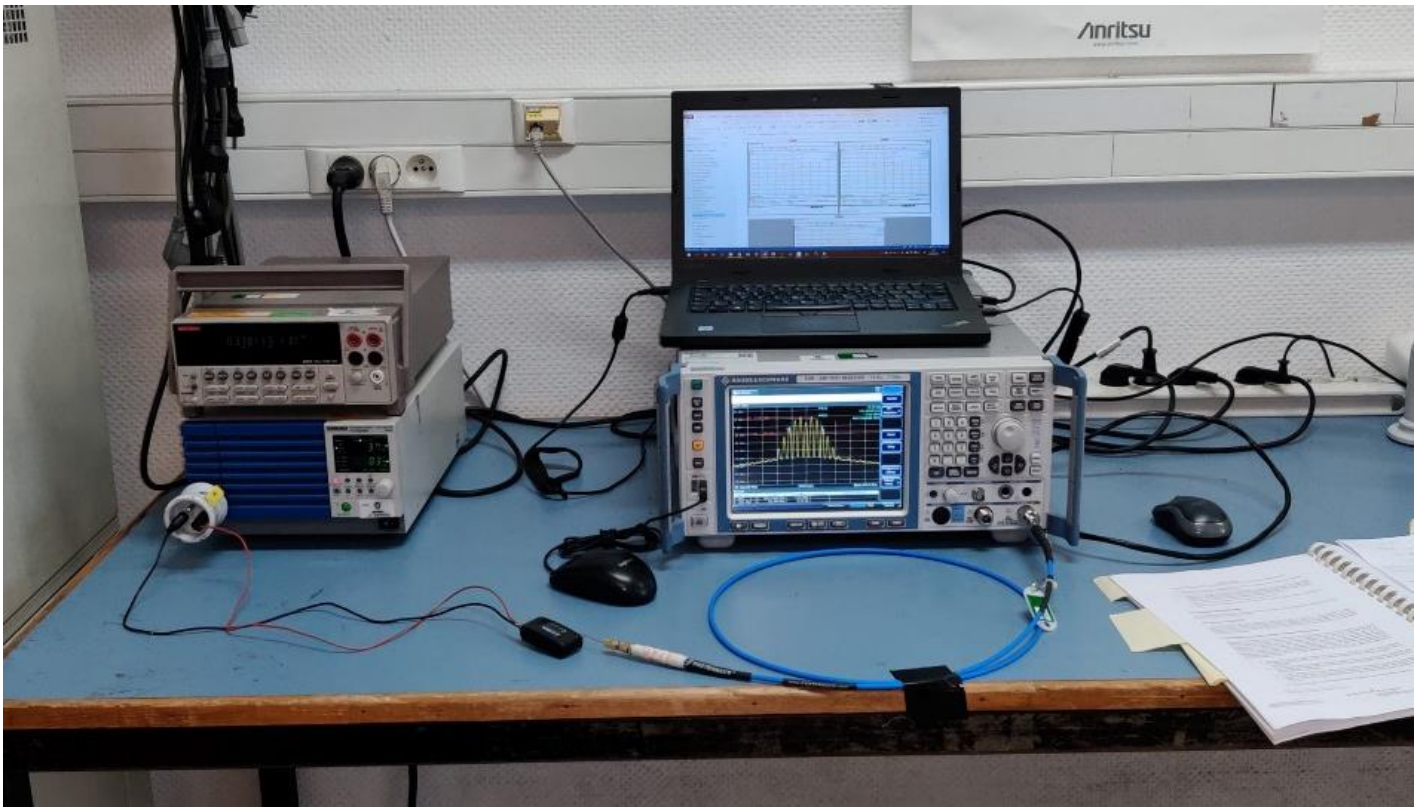
- The Equipment Under Test is installed:
☑ On a table
☐ In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:
☑ Conducted Method
☐ Radiated Method

- Test Procedure:
☑ ANSI C63.10 § 6.9.2



Test set up of 20dB Emission Bandwidth



Photograph for 20dB emission bandwidth

4.1. LIMIT

The bandwidth shall be less than 0.25% of the center frequency (for frequency between 70MHz and 900MHz)
The bandwidth shall be less than 0.50% of the center frequency (for frequency above 900MHz)

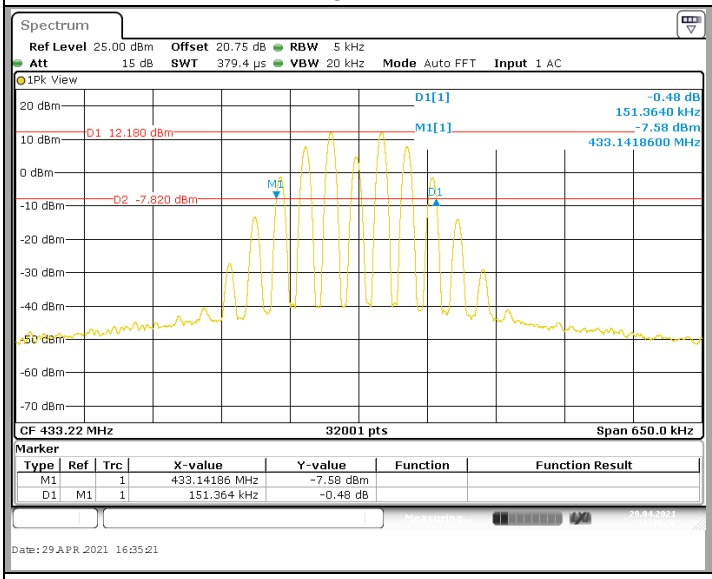
4.2. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
EMI receiver	ROHDE & SCHWARZ	ESR7	A2642026	2019/07	2021/07
Multimeter	KEITHLEY	2000	A1242090	2021/03	2023/03
Power supply	KIKUSUI	PCR500M	A7040079	See Multimeter	See Multimeter
Cable + Attenuateur 20dB	PASTERNACK	PE350-150CM	A5329970	2020/09	2021/09

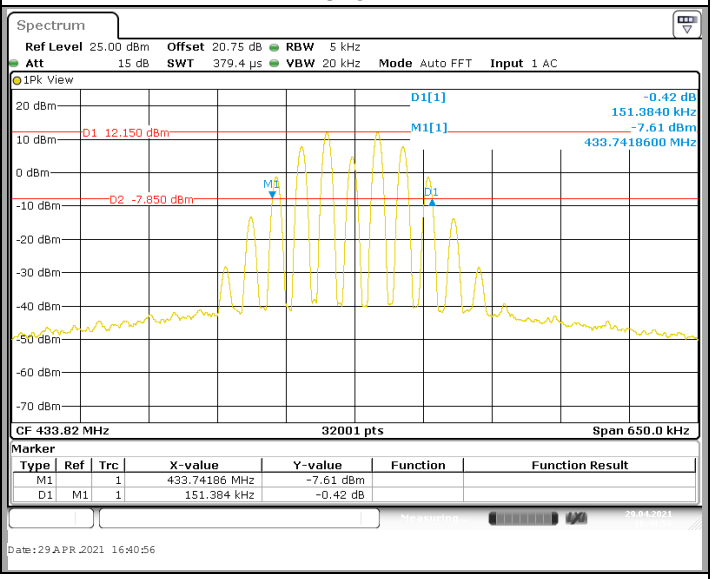
Note: In our quality system, the test equipment calibration due is more & less 2 months

4.3. RESULTS

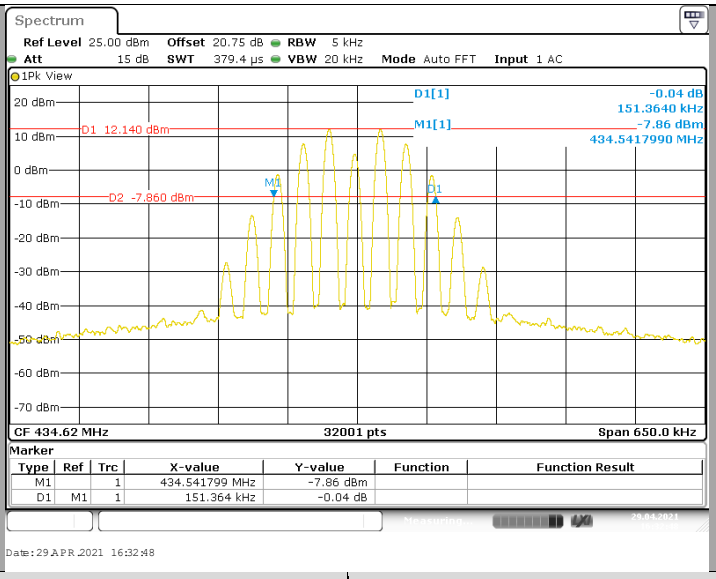
Cmin



Cnom



Cmax



Channel	20dB Bandwidth (MHz)
Cmin	151.364
Cnom	151.384
Cmax	151.364

4.4. CONCLUSION

20dB Emission Bandwidth measurement performed on the sample of the product e-Celsius **Medical System** e-Med **Connect (P110)**, SN: **-**, in configuration and description presented in this test report, show levels **compliant** to the **PART 15.231 & RSS 210 ISSUE 10** limits.

5. DUTY CYCLE

5.1. TEST CONDITIONS

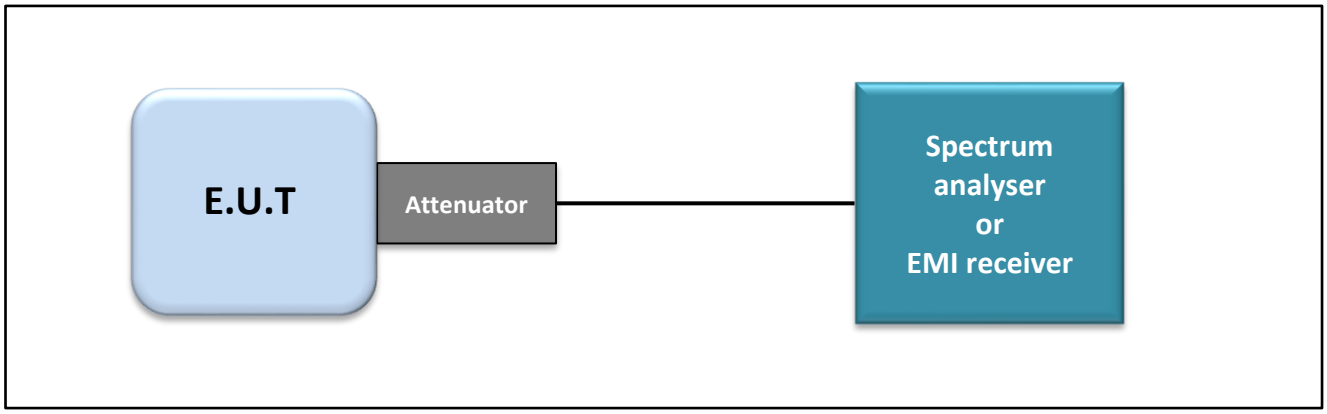
Test performed by	: Armand MAHOUNGOU
Date of test	: April 29, 2021
Ambient temperature	: 26°C
Relative humidity	: 46%

5.2. TEST SETUP

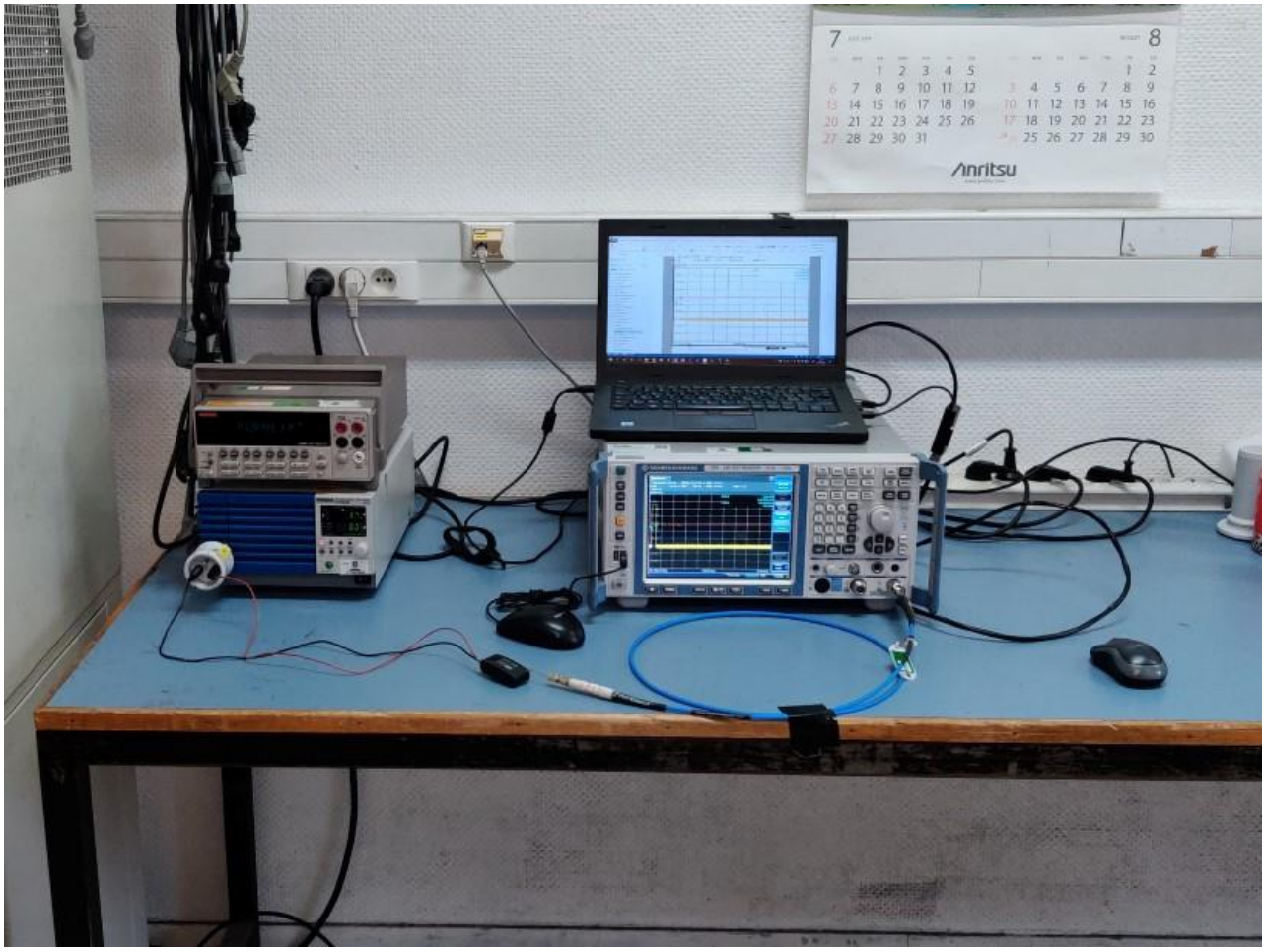
- The Equipment Under Test is installed:
☑ On a table
☐ In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:
☑ Conducted Method
☐ Radiated Method

- Test Procedure:
☑ ANSI C63.10 § 11.6



Test set up of Duty Cycle



Photograph for Duty Cycle

5.3. LIMIT

None

5.4. TEST EQUIPMENT LIST

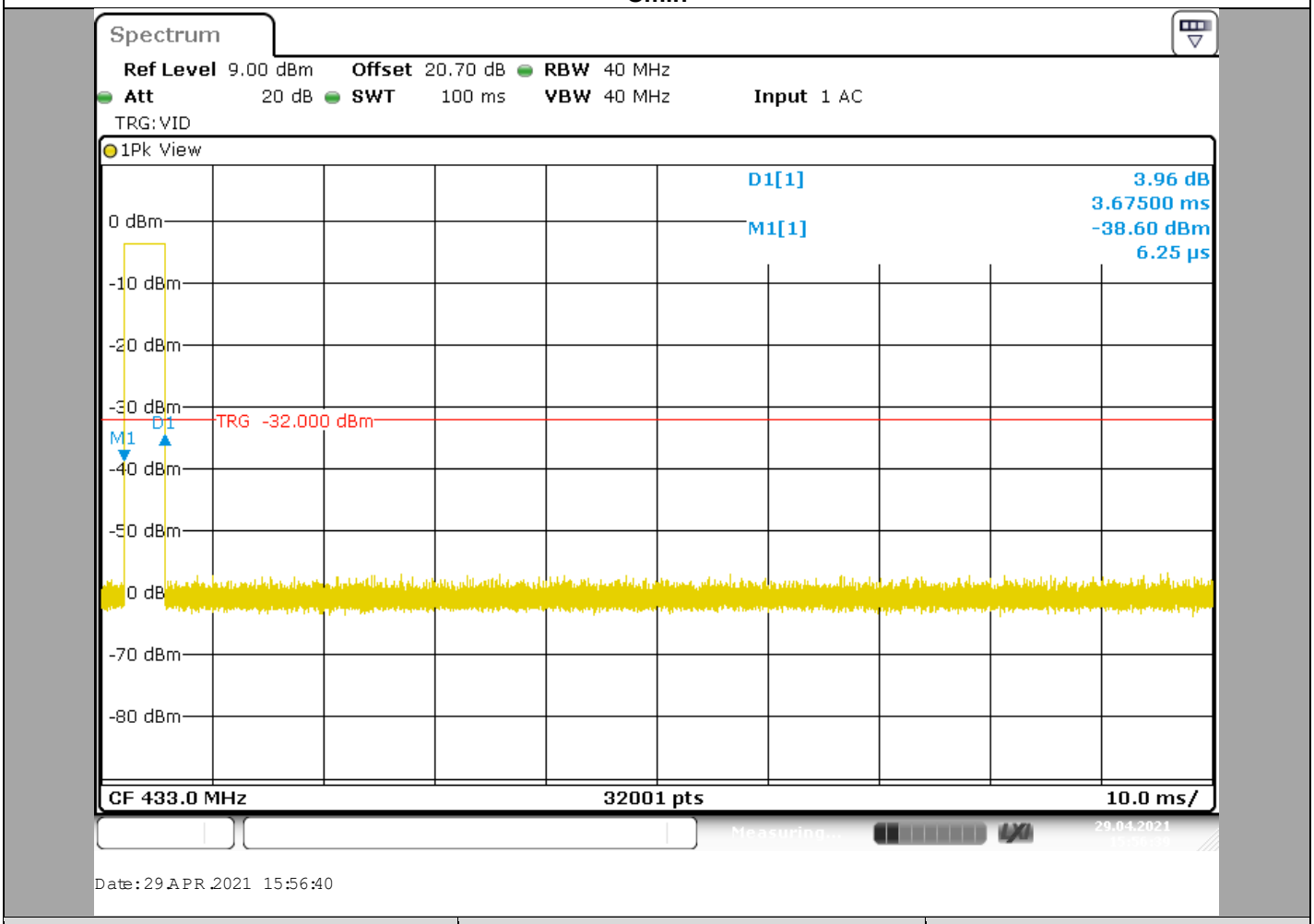
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
EMI receiver	ROHDE & SCHWARZ	ESR7	A2642026	2019/07	2021/07
Multimeter	KEITHLEY	2000	A1242090	2021/03	2023/03
Power supply	KIKUSUI	PCR500M	A7040079	See Multimeter	See Multimeter
Cable + Attenuateur 20dB	PASTERNACK	PE350-150CM	A5329970	2020/09	2021/09

Note: In our quality system, the test equipment calibration due is more & less 2 months

5.5. RESULTS

Duty Cycle

Cmin



Channel	Duty Cycle (%)	Duty Cycle Correction (dB)
Channel	3.675	$20\log\left(\frac{1}{duty\ cycle}\right) = 28.695$

Note: For the purpose of the test inside this test report the product is testing with a continous modulated signal. The real duty cycle of the product is show above so the duty cycle correction is used inside “Field strength of emission & Field” and “unwanted Emissions in Restricted frequency bands” to lower average value.

5.6. CONCLUSION

Duty Cycle measurement performed on the sample of the product e-Celsius **Medical System e-Med Connect (P110)**, SN: **-**, in configuration and description presented in this test report, show levels **compliant** to the **PART 15.231 & RSS 210 ISSUE 10** limits.

6. LIMIT OF TRANSMISSION TIME

6.1. TEST CONDITIONS

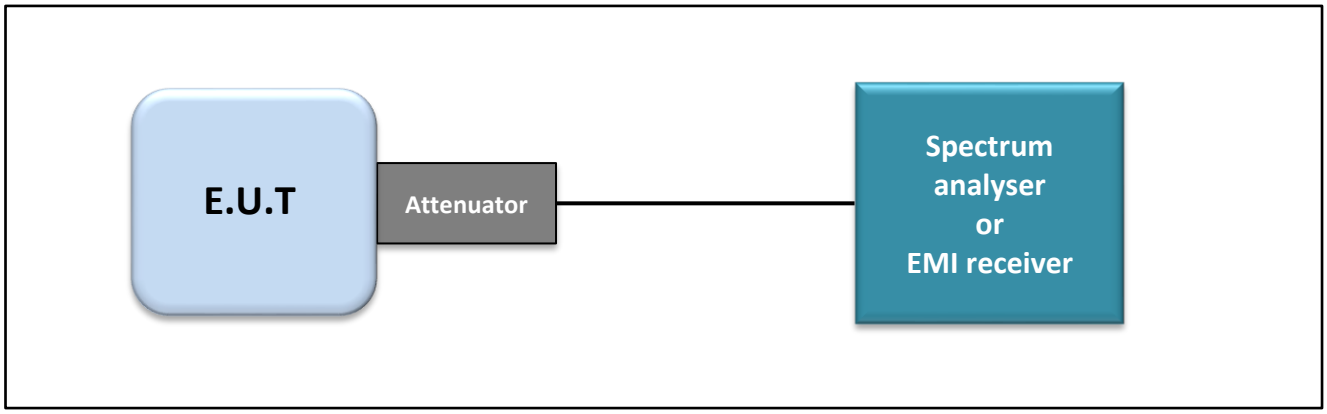
Test performed by	: Armand MAHOUNGOU
Date of test	: April 30, 2021
Ambient temperature	: 24°C
Relative humidity	: 44%

6.2. TEST SETUP

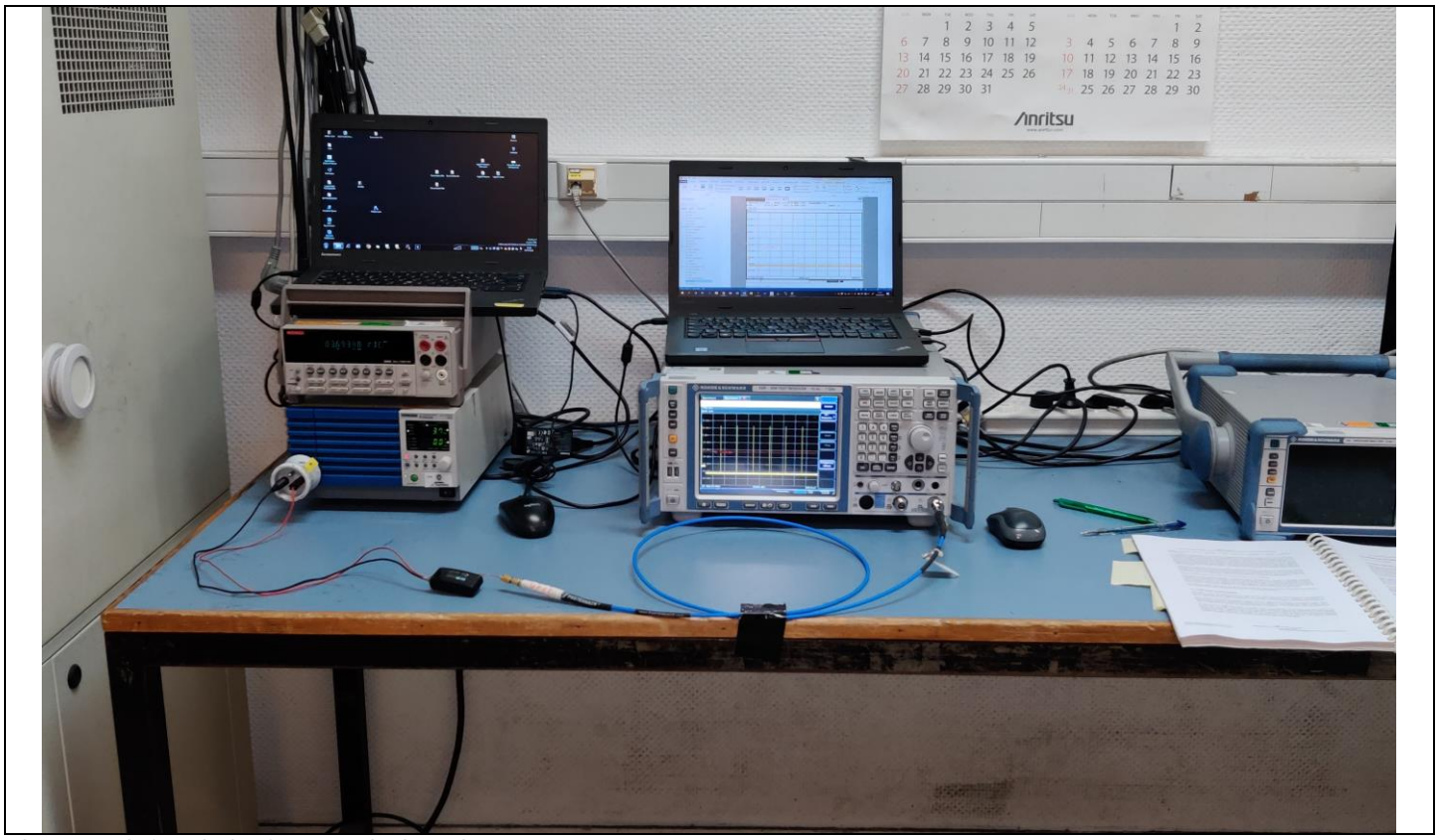
- The Equipment Under Test is installed:
☑ On a table
☐ In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:
☑ Conducted Method
☐ Radiated Method

- Test Procedure:
☑ ANSI C63.10 § 11.6



Test set up of Limit of Transmission Time



Photograph for Limit of Transmission Time

6.3. LIMIT

None

6.4. TEST EQUIPMENT LIST

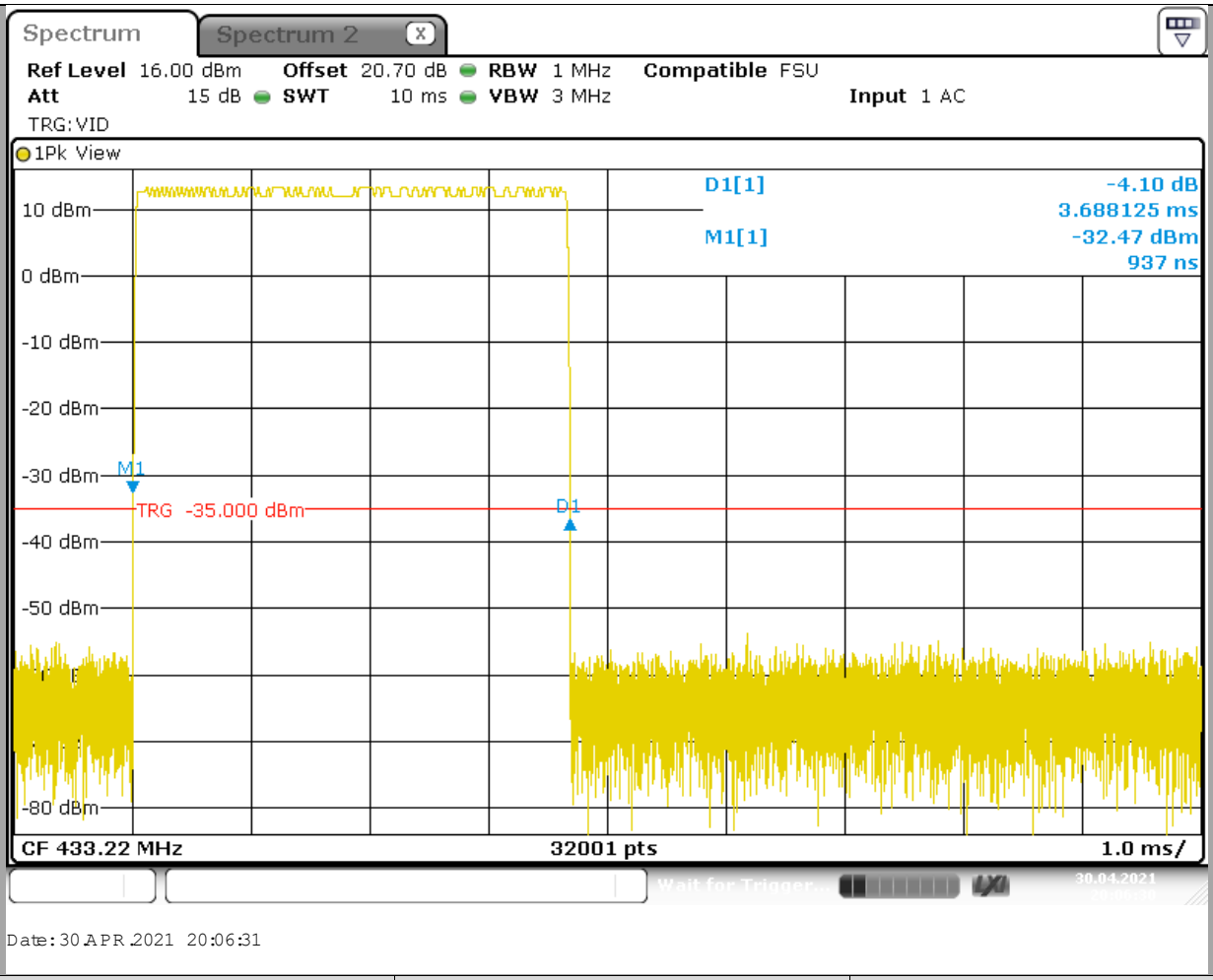
DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
EMI receiver	ROHDE & SCHWARZ	ESR7	A2642026	2019/07	2021/07
Multimeter	KEITHLEY	2000	A1242090	2021/03	2023/03
Power supply	KIKUSUI	PCR500M	A7040079	See Multimeter	See Multimeter
Cable + Attenuateur 20dB	PASTERNACK	PE350-150CM	A5329970	2020/09	2021/09

Note: In our quality system, the test equipment calibration due is more & less 2 months

6.5. RESULTS

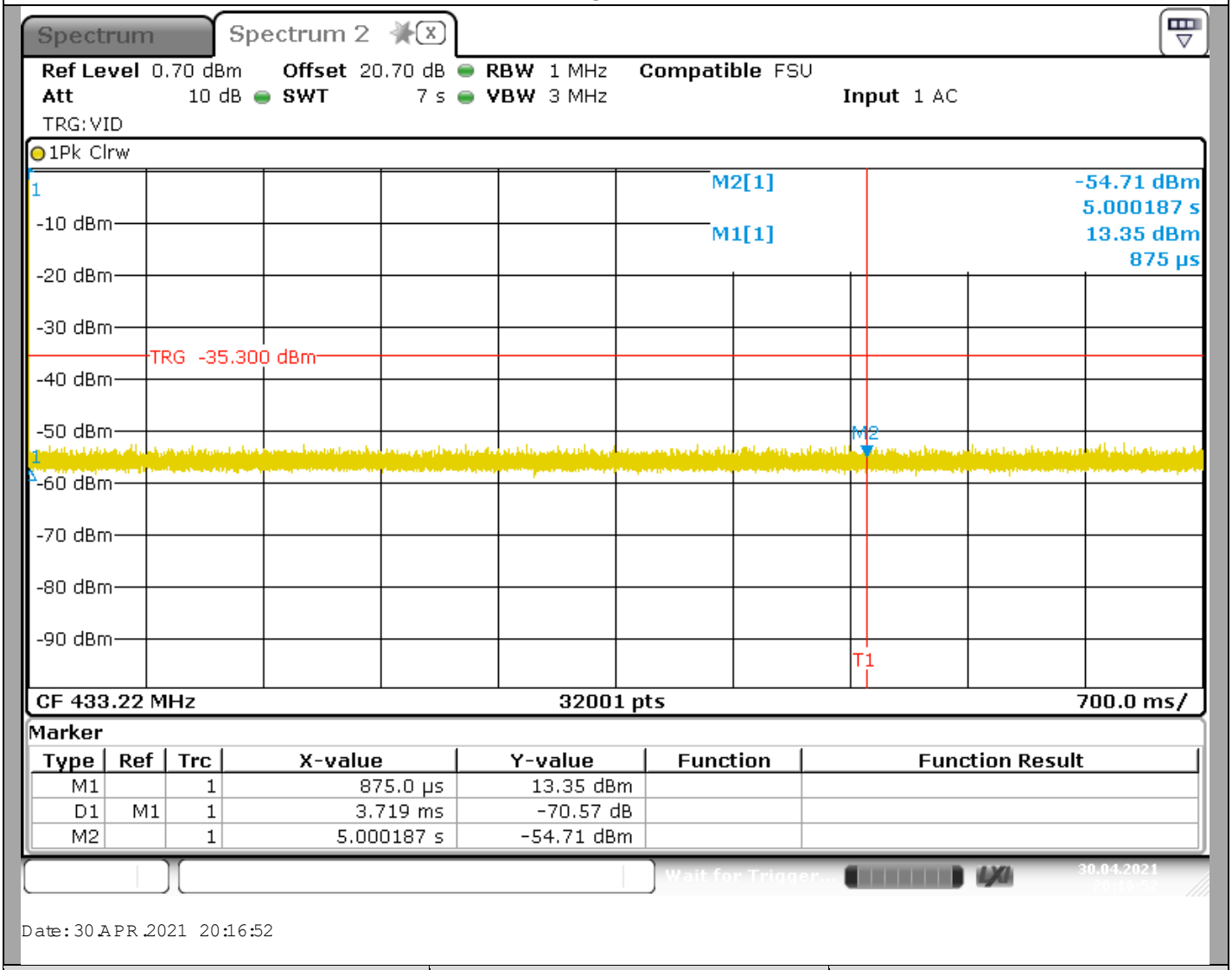
Limit of transmission time

Cmin



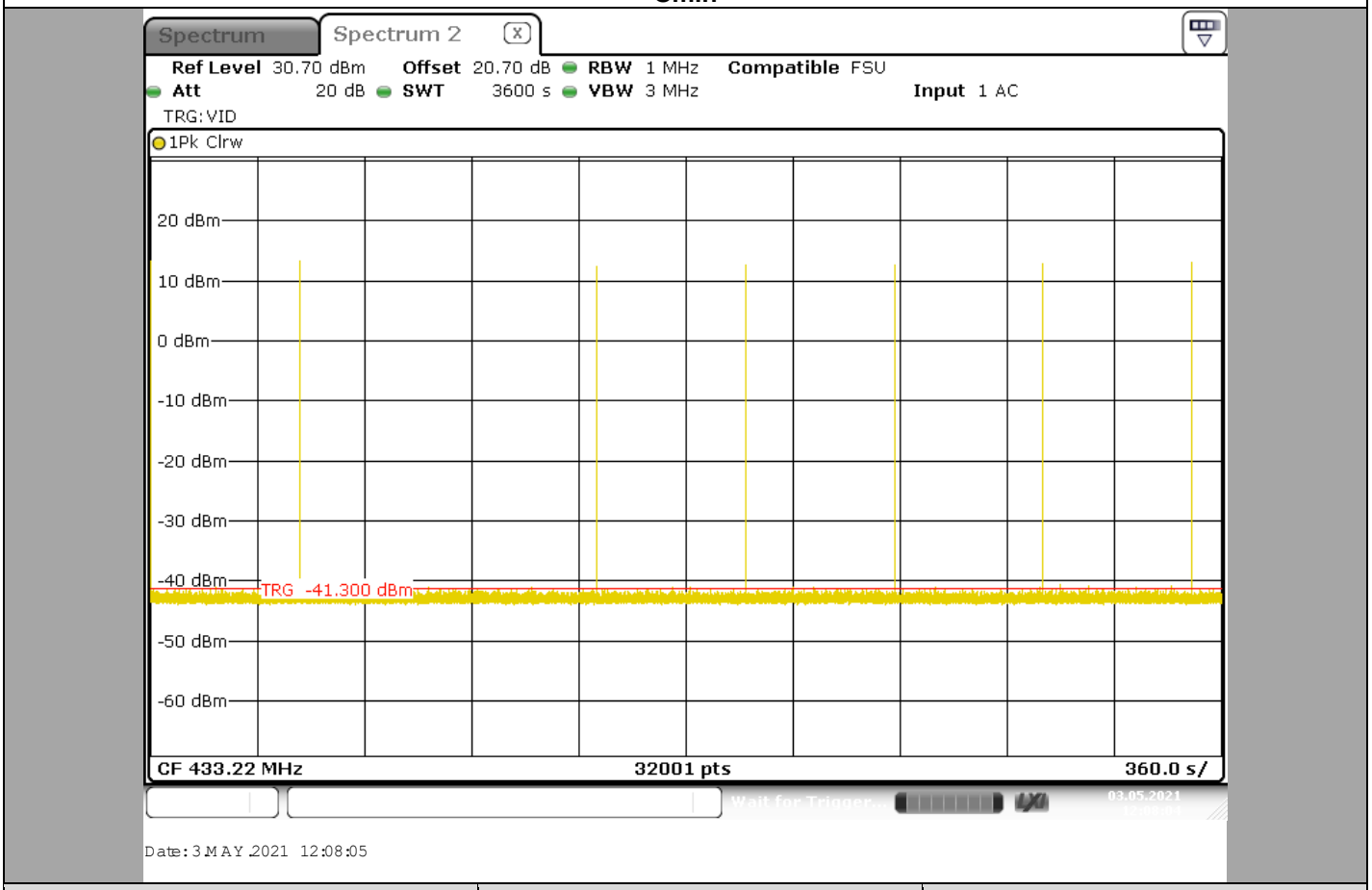
Channel	Duration of one burst (s)	Limit (s)
Cmin	0.003688	1

Limit of transmission time
Cmin



Channel	Duration of one burst (s)	Limit (s)
Cmin	0.003719	5

Limit of transmission time
Cmin



Channel	Total duration (s)	Limit (s)
Cmin	0.0295	2

6.6. CONCLUSION

Duty Cycle measurement performed on the sample of the product e-Celsius **Medical System e-Med Connect (P110)**, SN: **-**, in configuration and description presented in this test report, show levels **compliant** to the **PART 15.231 & RSS 210 ISSUE 10** limits.

7. AC POWER LINE CONDUCTED EMISSIONS

7.1. TEST CONDITIONS

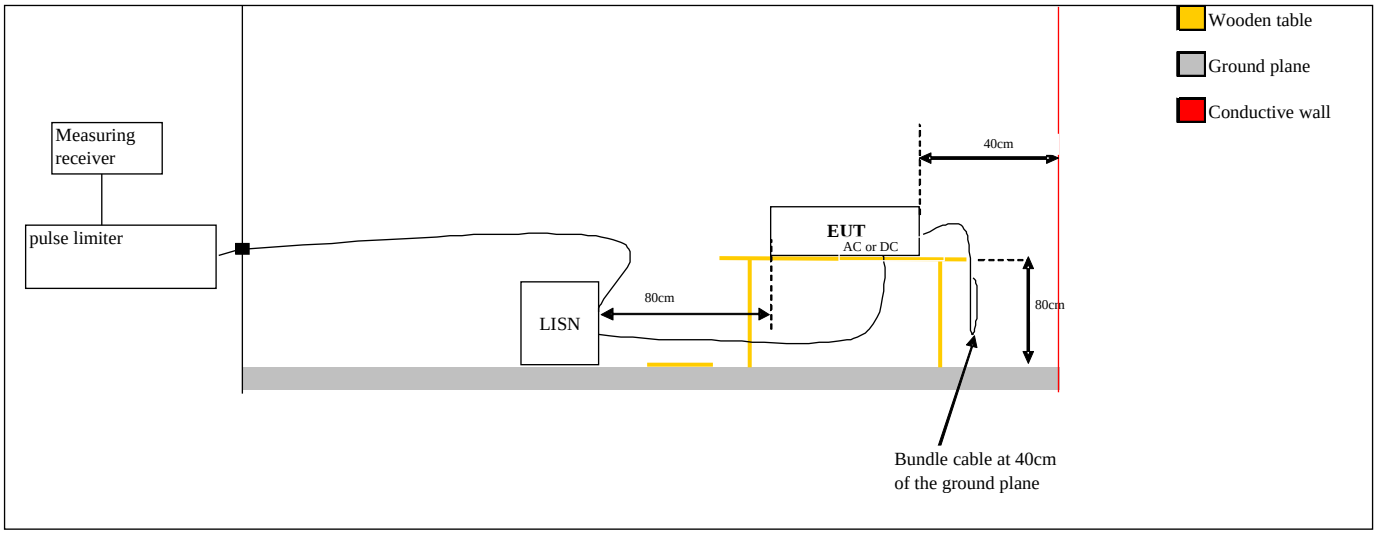
Test performed by	: Armand MAHOUNGOU
Date of test	: April 30, 2021
Ambient temperature	: 24°C
Relative humidity	: 47%

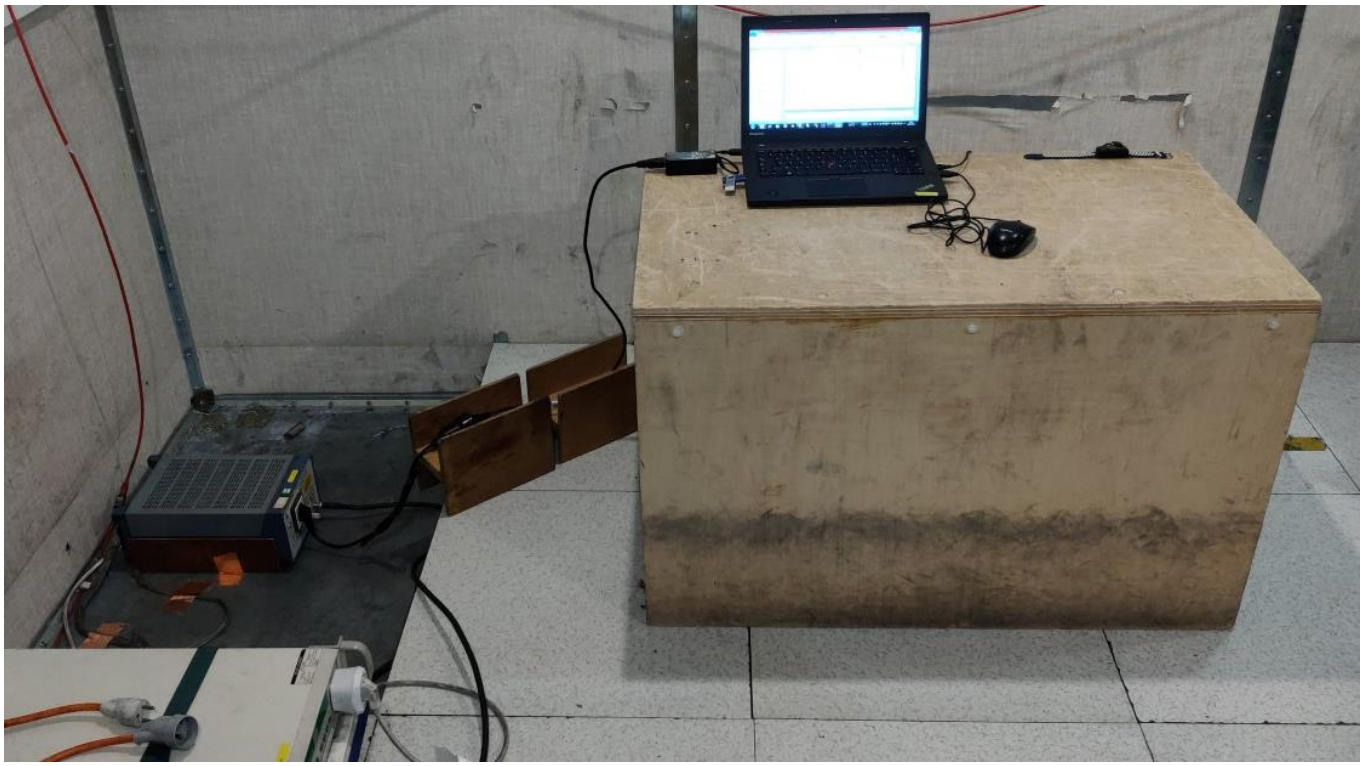
7.2. TEST SETUP

The product has been tested according to ANSI C63.10 method. The EUT is placed on the ground reference plane, at 80cm from the LISN. The distance between the EUT and the vertical ground plane is 40cm. Auxiliaries are powered by another LISN. The cable has been shorted to 1meter length. The EUT is powered through the LISN. 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. The LISN (measure) is 50Ω / 50µH. Interconnecting cables and equipment's were moved to position that maximized emission.

Voltage table used (for Power Line Conducted Emissions):

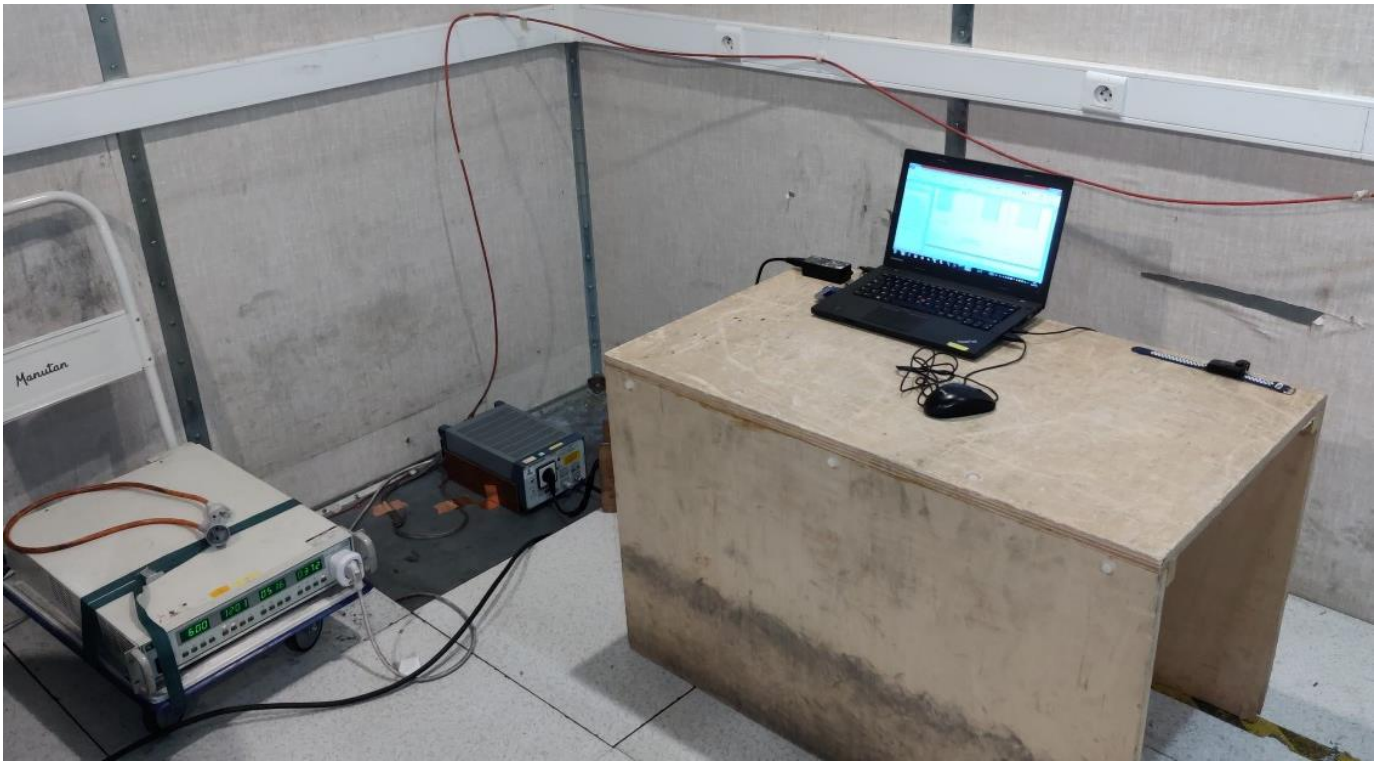
Type	Measurement performed:	
☐ AC / ☐ DC (Auxiliary used)	☐ 120VAC/60Hz	☐ 240VAC/50Hz
☑ USB (Laptop auxiliary)	☑ 120VAC/60Hz (Laptop auxiliary)	☐ 240VAC/50Hz(Laptop auxiliary)





Photograph for AC Power Line Conducted Emissions (Front view)

Photograph for AC Power Line Conducted Emissions (Front view)



Photograph for AC Power Line Conducted Emissions (Front view)

7.3. LIMIT

Frequency range	Level	Detector
0,15kHz to 0,5MHz	66dBµV to 56µV*	QPeak
	56dBµV to 46µV*	Average
0,5MHz to 5MHz	56dBµV	QPeak
	46dBµV	Average
5MHz to 30MHz	60BµV	QPeak
	50dBµV	Average

*Decreases with the logarithm of the frequency

7.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
BAT EMC Software	NEXIO	Version 3,19,1,18	-	-	-
SEMI ANECHOIC CHAMBER	SIEPEL	ZONE HOMOGENE	D3044008	2020/05	2021/05
EMI receiver	ROHDE & SCHWARZ	ESIB	A2642021	2019/07	2021/07
Pulse limiter	ROHDE & SCHWARZ	ESH3-Z1	A2649004	2020/09	2021/09
AC power supply	ADAPTIVE POWER SYSTEM	FC210	A7360017	See RSIL	See RSIL
RSIL	ROHDE & SCHWARZ	ESH3-Z5	C2322003	2020/05	2021/05
Cable	-	-	A5329947	2020/01	2021/01

Note: In our quality system, the test equipment calibration due is more & less 2 months

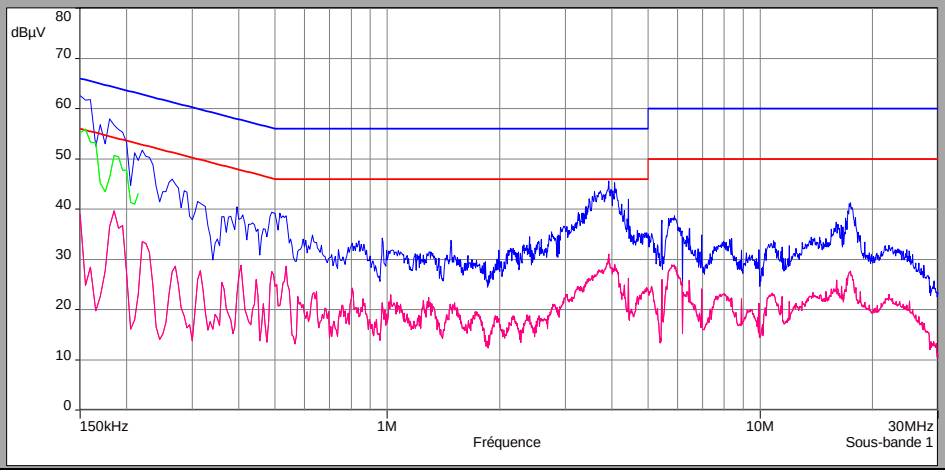
7.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

7.6. RESULTS

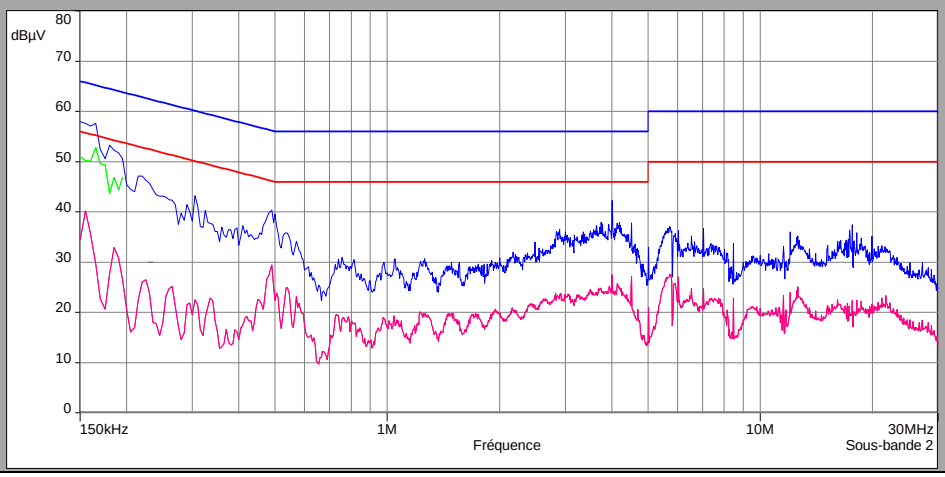
Cmin

Phase



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
Ligne:Phase 1

Line



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
Ligne:Neutre

Phase Line / Cmin							
Frequency (MHz)	**Peak Level (dBµV)**	**Quasi-Peak Level (dBµV)**	**Quasi-Peak Limit (dBµV)**	**Margin Quasi-Peak (dBµV)**	**Average Level (dBµV)**	**Average Limit (dBµV)**	**Margin Average (dBµV)**
0.15	62.63	55.22	66	3.37	38.91	56	17.09
0.16	61.80	55.92	65.5	3.7	28.41	55.5	27.09
0.18	57.98	50.70	64.48	6.5	39.68	54.48	14.8
0.22	51.72	43.13	62.78	11.06	33.48	52.78	19.3
3.93	45.63	-	56	10.37	31.02	46	14.98
17.44	41.21	-	60	18.79	27.64	50	22.36

Neutral Line / Cmin							
Frequency (MHz)	**Peak Level (dBµV)**	**Quasi-Peak Level (dBµV)**	**Quasi-Peak Limit (dBµV)**	**Margin Quasi-Peak (dBµV)**	**Average Level (dBµV)**	**Average Limit (dBµV)**	**Margin Average (dBµV)**
0.15	57.98	50.92	66	8.02	34.37	56	21.63
0.165	57.61	52.85	65.21	7.6	40.19	55.21	15.02
0.185	53.26	46.88	64.26	11	32.89	54.26	21.37
0.49	40.32	-	56.16	15.84	28.24	46.16	17.92
4	42.32	-	56	13.68	27.47	46	18.53
7.05	36.68	-	56	19.32	24.69	46	21.31
8.48	36.02	-	56	19.98	22.81	46	23.19
17.65	37.39	-	56	18.61	22.35	46	23.65

7.7. CONCLUSION

Ac Power Line Conducted Emission measurement performed on the sample of the product e-Celsius **Medical System** e-Med **Connect (P110)**, SN: **-**, in configuration and description presented in this test report, show levels **compliant** to the **PART 15.231 & RSS 210 ISSUE 10** limits.

8. FIELD STRENGHT OF EMISSION & FIELD STRENGHT OF HARMONICS

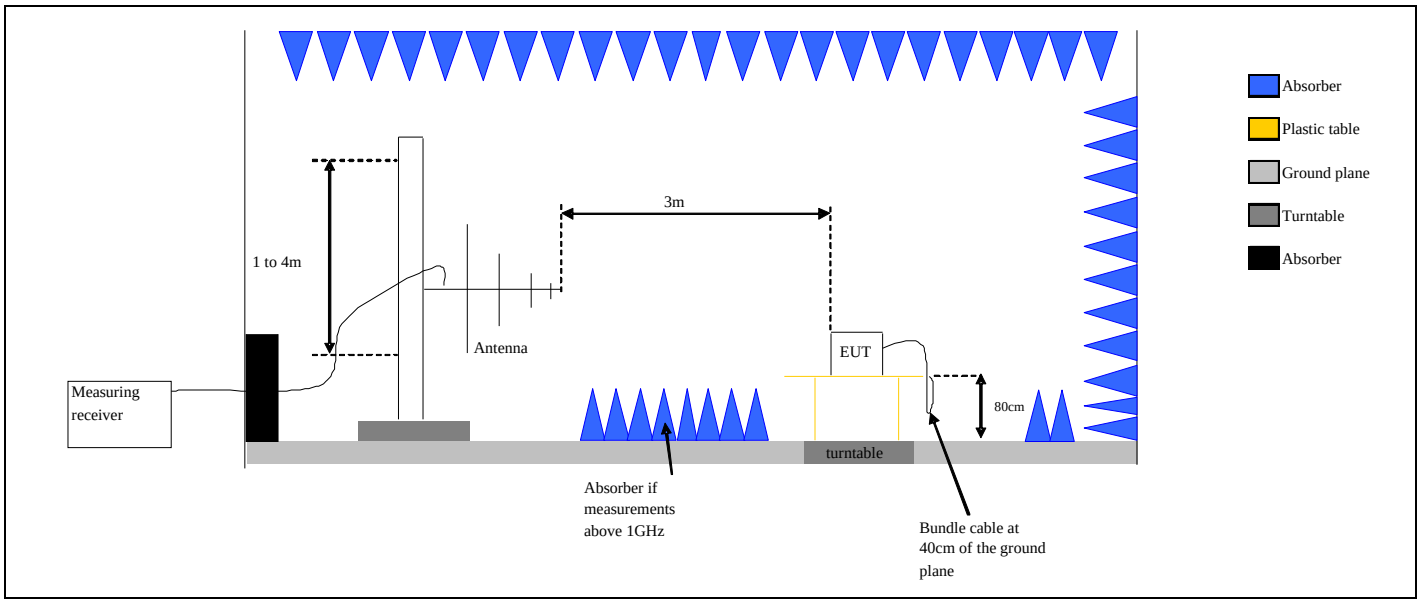
8.1. TEST CONDITIONS

Test performed by : Armand MAHOUNGOU
Date of test : April 30, 2021
Ambient temperature : 24°C
Relative humidity : 47%

8.2. TEST SETUP

The product has been tested according to ANSI C63.10 and FCC part 15 subpart C:

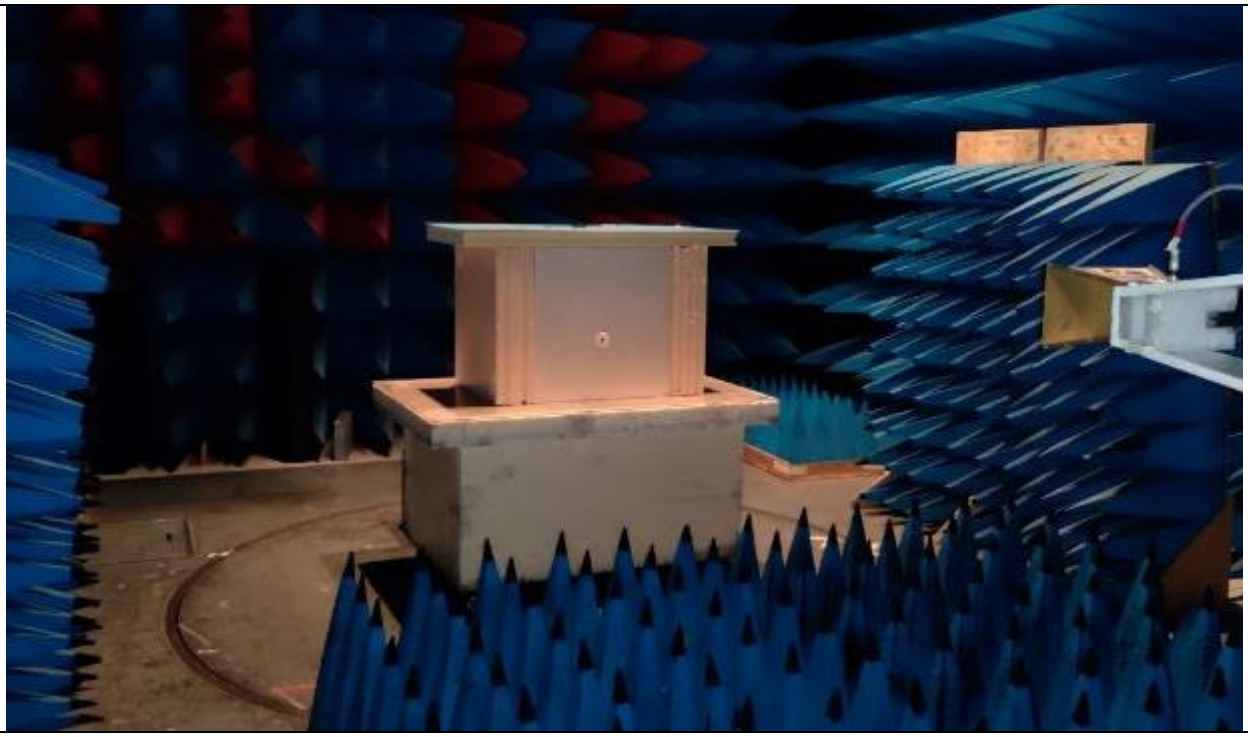
Frequency range :	**From 30MHz to 1GHz**	**Above 1GHz**
Antenna Polarization :	Horizontal And Vertical	Horizontal And Vertical
Antenna Height :	Varied from 1m to 4m	Varied from 1m to 4m
Antenna Type :	Bi-Log	Horn
RBW Filter :	120kHz	1MHz
Maximization :	Turntable rotation of 360 degrees range	
EUT height :	0.8m	1.5m
Test site :	Semi-Anechoic Chamber	Semi-Anechoic Chamber
Distance EUT-Antenna :	3m	3m



Photograph for Field strength of fundamental & Field strength of harmonics

Photograph for Field strength of fundamental & Field strength of harmonics

Photograph for Field strength of fundamental & Field strength of harmonics



Photograph for Field strength of fundamental & Field strength of harmonics

8.3. LIMIT

Measure at 300m		
Frequency range	**Level**	**Detector**
9kHz-490kHz	67.6dBµV/m /F(kHz)	QPeak
Measure at 30m		
Frequency range	**Level**	**Detector**
490kHz-1.705MHz	87.6dBµV/m /F(kHz)	QPeak
1.705MHz-30MHz	29.5dBµV/m	QPeak
Measure at 3m		
Frequency range	**Level**	**Detector**
30MHz to 88MHz	40dBµV/m	QPeak
88MHz to 216MHz	43.5dBµV/m	QPeak
216MHz to 960MHz	46BµV/m	QPeak
960MHz to 1000MHz	54dBµV/m	QPeak
Above 1000MHz	74dBµV/m	Peak
	54dBµV/m	Average

8.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
BAT EMC Software	NEXIO	Version 3,19,1,18	-	-	-
SEMI ANECHOIC CHAMBER	SIEPEL	ZONE HOMOGENE	D3044008	2020/05	2021/05
EMI receiver	ROHDE & SCHWARZ	ESIB	A2642021	2019/07	2021/07
Bilog antenna	SCHWARZBECK	VULB9160	C2040150	2020/12	2022/12
Cable	-	-	A5329461	2021/01	2022/01
Cable	-	-	A5329947	2021/01	2022/01
Cable	-	-	A5329364	2021/03	2022/03
Horn antenna	EMCO	3115	C2042018	2020/12	2022/12
High Pass Filter 433MHz	WAINWRIGHT	WHKE5-460	A7484071	2019/12	2021/12

Note: In our quality system, the test equipment calibration due is more & less 2 months

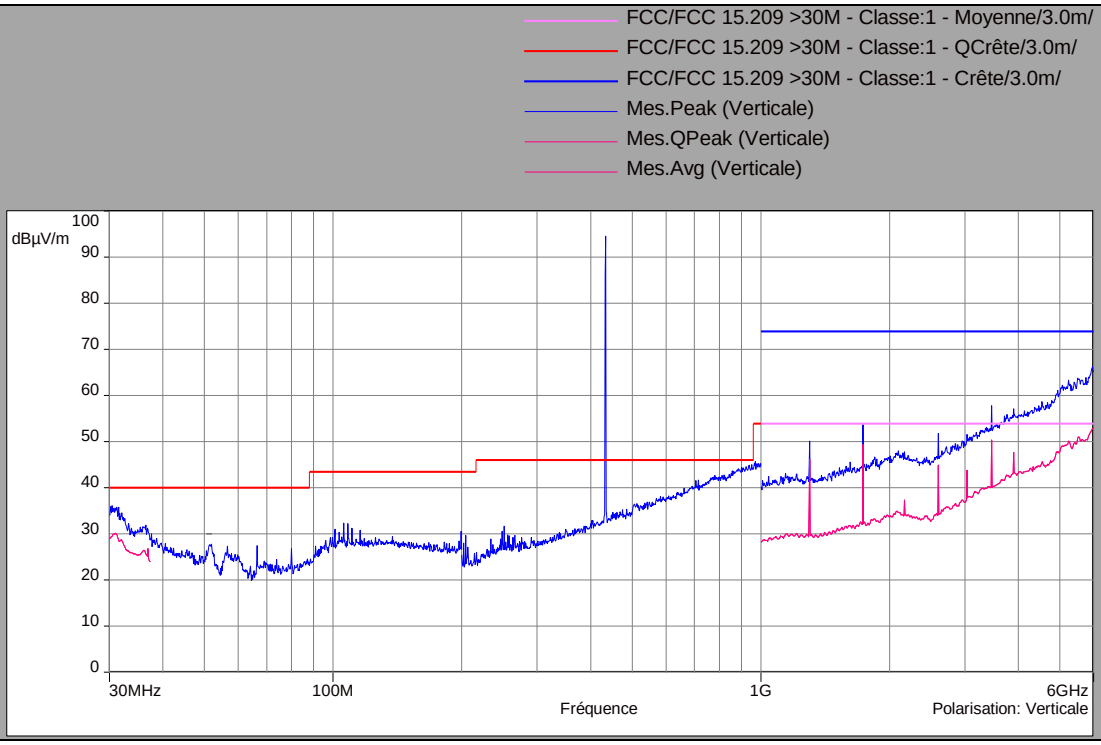
8.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

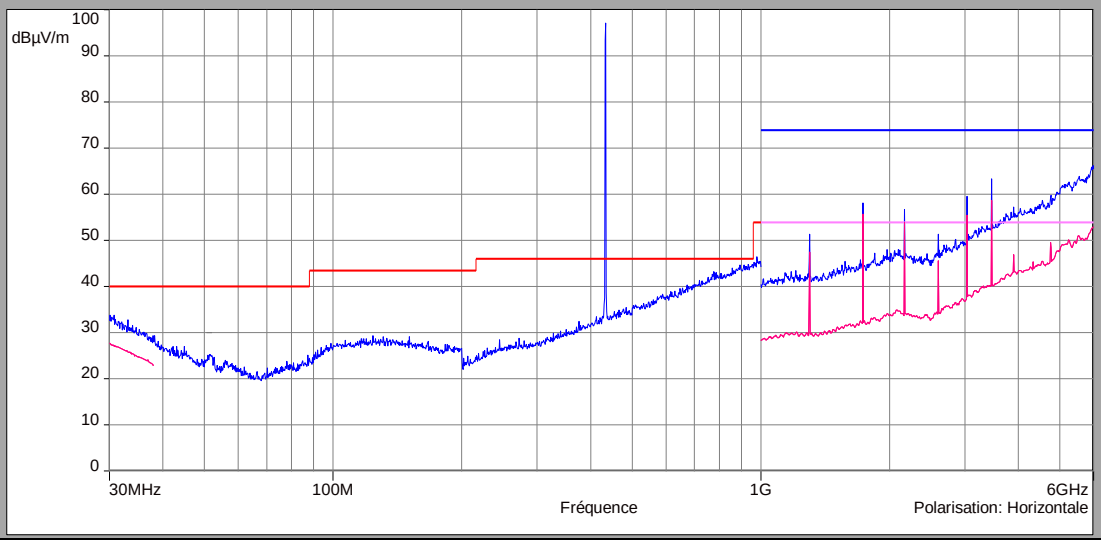
8.6. RESULTS

Cmin

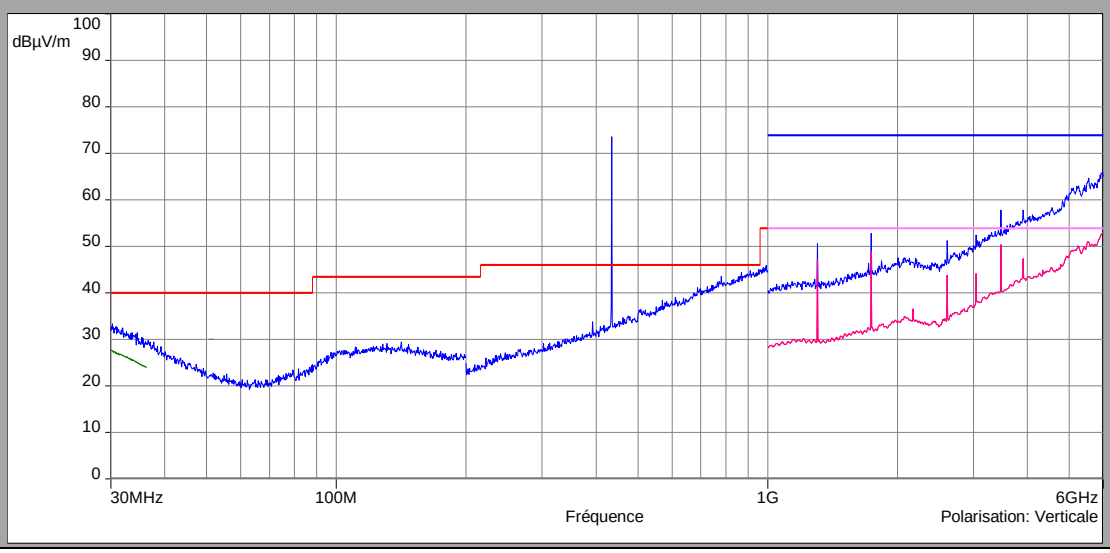
Vertical Polarization



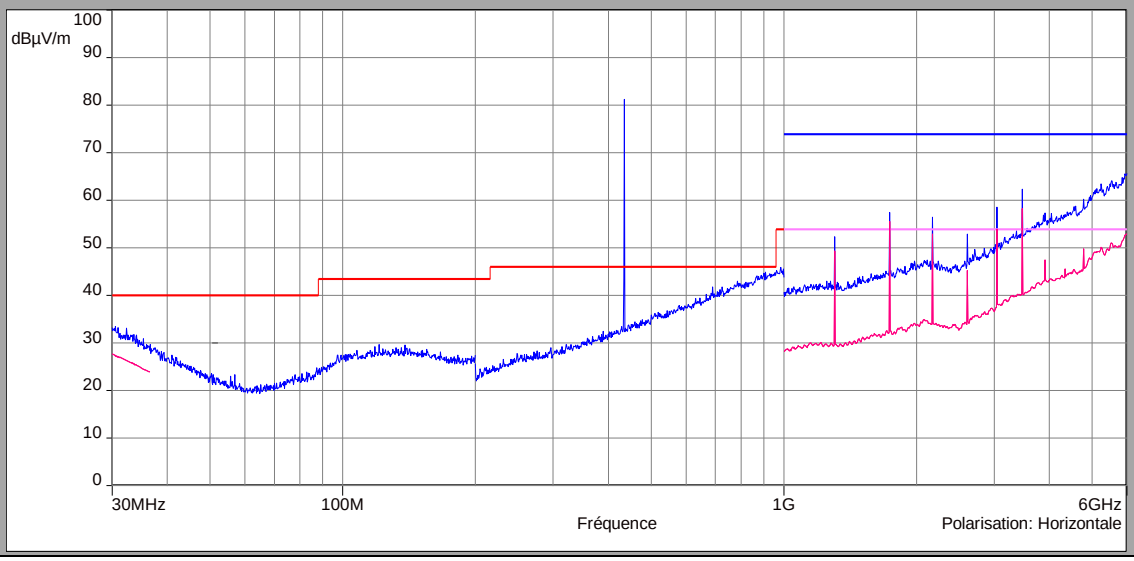
Horizontal polarization



Cmax
Vertical Polarization



Horizontal polarization



Cmin				
Polarization	**Frequency (MHz)**	**Peak Level (dBµV/m)**	**Peak Level – Duty cycle Factor (dBµV/m)**	**FCC Limit (dBµV/m)**
Vertical	433.16	94.55	65.86	93.98
Horizontal	433.16	97.15	68.46	93.98
Horizontal	1299	51.32	22.63	53.98
Horizontal	17.33	58.06	29.37	53.98
Horizontal	21.66	56.73	28.04	53.98
Horizontal	2599	51.36	22.67	53.98
Horizontal	3032	59.54	30.85	53.98
Horizontal	3466	63.38	34.69	53.98
Horizontal	3899	57.27	28.58	53.98
Horizontal	47.65	59.83	31.14	53.98

Cmax				
Polarization	**Frequency (MHz)**	**Peak Level (dBµV/m)**	**Peak Level – Duty cycle Factor (dBµV/m)**	**FCC Limit (dBµV/m)**
Vertical	434.66	73.58	44,9	93.98
Horizontal	434.66	81.19	52,51	93.98
Horizontal	1304	52.32	23,64	53.98
Horizontal	1738	57.47	28,79	53.98
Horizontal	2173	56.41	27,73	53.98
Horizontal	2607	52.86	24,18	53.98
Horizontal	3042	58.61	29,93	53.98
Horizontal	3477	62.65	33,97	53.98
Horizontal	3911	57.37	28,69	53.98
Horizontal	4780	60.28	31,6	53.98

8.7. CONCLUSION

Field strength of fundamental & Field strength of harmonics measurement performed on the sample of the product e-Celsius **Medical System** e-Med **Connect (P110)**, SN: **-**, in configuration and description presented in this test report, show levels **compliant** to the **PART 15.231 & RSS 210 ISSUE 10** limits.

9. UNWANTED EMISSIONS IN RESTRICTED FREQUENCY BANDS

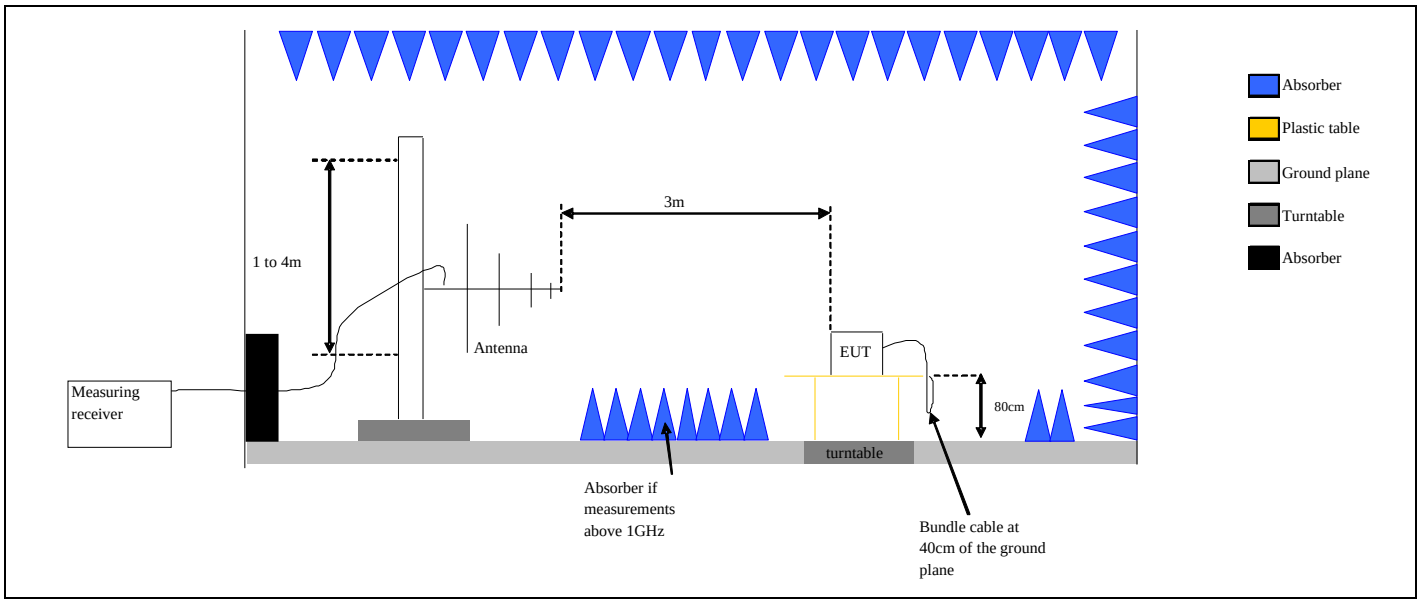
9.1. TEST CONDITIONS

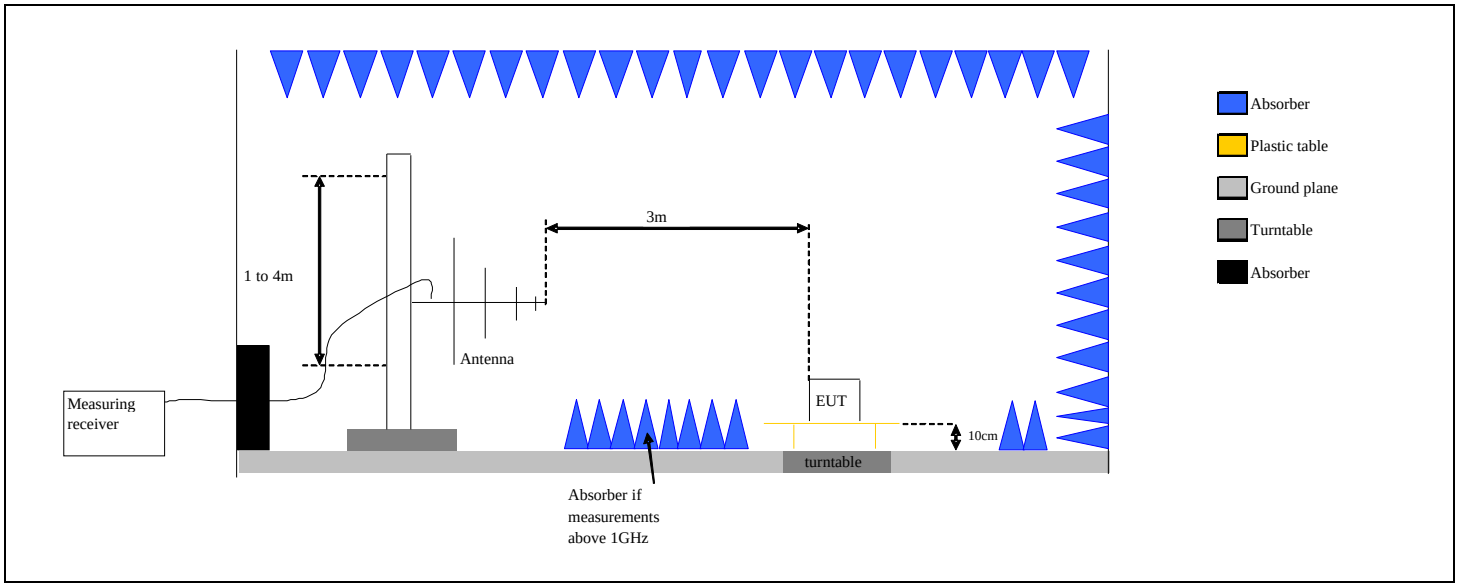
Test performed by	: Armand MAHOUNGOU & Laurent DENEUX
Date of test	: April 30, 2021 & May 3th ,2021
Ambient temperature	: 19 to 24°C
Relative humidity	: 45 to 47%

9.2. TEST SETUP

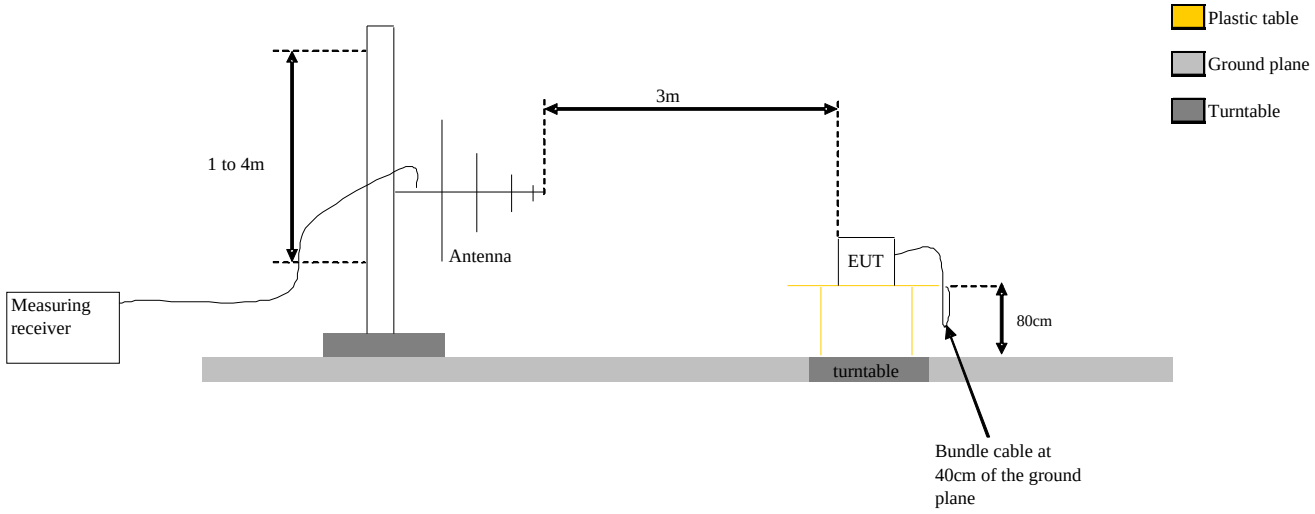
The product has been tested according to ANSI C63.10 and FCC part 15 subpart C:

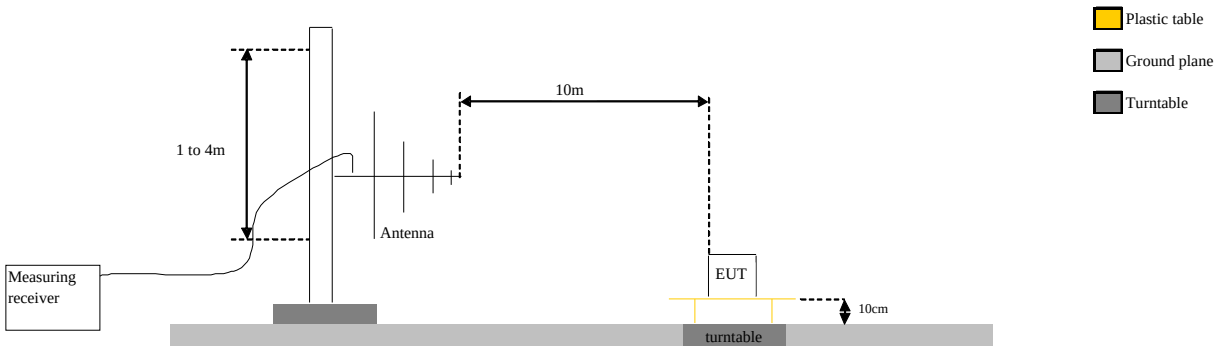
Frequency range :	**Below 30MHz**	**From 30MHz to 1GHz**	**Above 1GHz**
Antenna Polarization :	Parallel, Perpendicular And Ground parallel	Horizontal And Vertical	Horizontal And Vertical
Antenna Height :	1m	Varied from 1m to 4m	Varied from 1m to 4m
Antenna Type :	Loop	Bi-Log	Horn
RBW Filter :	200Hz below 150kHz 9kHz above 150kHz	120kHz	1MHz
Maximization :	Turntable rotation of 360 degrees range		
EUT height :	0.8m		1.5m
Test site :	Open Aera Test Site	Semi-Anechoic Chamber	Semi-Anechoic Chamber
Distance EUT-Antenna :	3m	3m	3m





Test set up of Unwanted Emissions in Restricted Frequency Bands in semi anechoic chamber





Test Set up for radiated measurement in open area test site

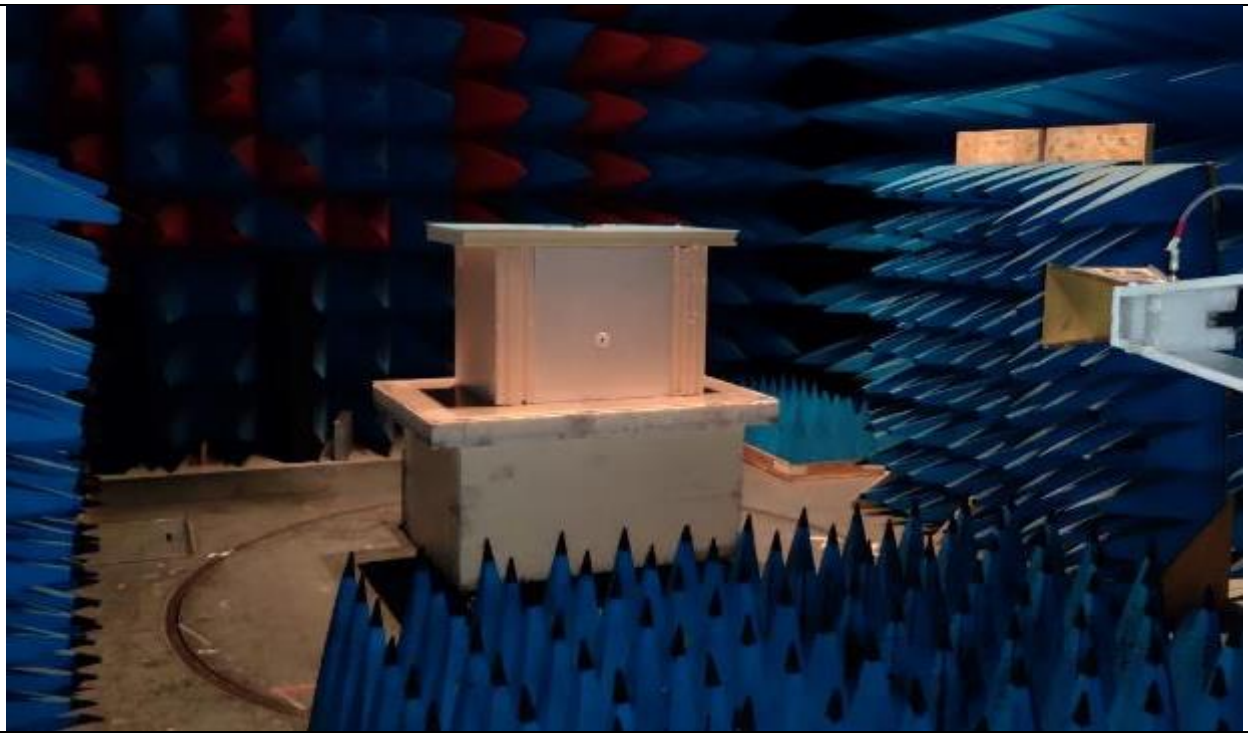
Photograph for Unwanted Emission in restricted frequency bands

Photograph for Unwanted Emission in restricted frequency bands

Photograph for Unwanted Emission in restricted frequency bands

Photograph for Unwanted Emission in restricted frequency bands

Photograph for Unwanted Emission in restricted frequency bands



Photograph for Unwanted Emission in restricted frequency bands

9.3. LIMIT

Measure at 300m		
Frequency range	**Level**	**Detector**
9kHz-490kHz	67.6dBµV/m /F(kHz)	QPeak
Measure at 30m		
Frequency range	**Level**	**Detector**
490kHz-1.705MHz	87.6dBµV/m /F(kHz)	QPeak
1.705MHz-30MHz	29.5dBµV/m	QPeak
Measure at 10m		
Frequency range	**Level**	**Detector**
30MHz to 88MHz	29.5dBµV/m	QPeak
88MHz to 216MHz	33dBµV/m	QPeak
216MHz to 960MHz	35.5BµV/m	QPeak
960MHz to 1000MHz	43.5dBµV/m	QPeak
Above 1000MHz	63.5dBµV/m	Peak
	43.5dBµV/m	Average
Measure at 3m		
Frequency range	**Level**	**Detector**
30MHz to 88MHz	40dBµV/m	QPeak
88MHz to 216MHz	43.5dBµV/m	QPeak
216MHz to 960MHz	46BµV/m	QPeak
960MHz to 1000MHz	54dBµV/m	QPeak
Above 1000MHz	74dBµV/m	Peak
	54dBµV/m	Average

9.4. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
BAT EMC Software	NEXIO	Version 3,19,1,18	-	-	-
SEMI ANECHOIC CHAMBER	SIEPEL	ZONE HOMOGENE	D3044008	2020/05	2021/05
EMI receiver	ROHDE & SCHWARZ	ESIB	A2642021	2019/07	2021/07
Bilog antenna	SCHWARZBECK	VULB9160	C2040150	2020/12	2022/12
Cable	-	-	A5329461	2021/01	2022/01
Cable	-	-	A5329947	2021/01	2022/01
Cable	-	-	A5329364	2021/03	2022/03
Horn antenna	EMCO	3115	C2042018	2020/12	2022/12
High Pass Filter 433MHz	WAINWRIGHT	WHKE5-460	A7484071	2019/12	2021/12
Recepteur	R&S	ESU	A2642018	01/2020	01/2022
Cable	-	-	A5329442	12/2020	12/2021
loop antenna	ROHDE & SCHWARZ	HFH2-Z2	C2040269	09/2020	09/2022
Cable	-	-	A5329416	02/2021	02/2022
Recepteur	R&S	ESU	A2642018	01/2020	01/2022
OATS	L.C.I.E.	-	F2000400	09/2020	09/2021
Cable	-	-	A5329442	12/2020	12/2021

Note: In our quality system, the test equipment calibration due is more & less 2 months

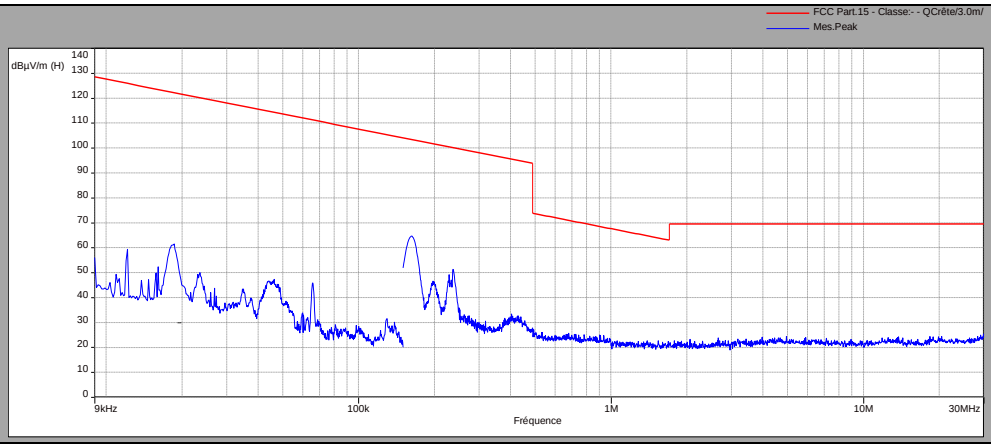
9.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

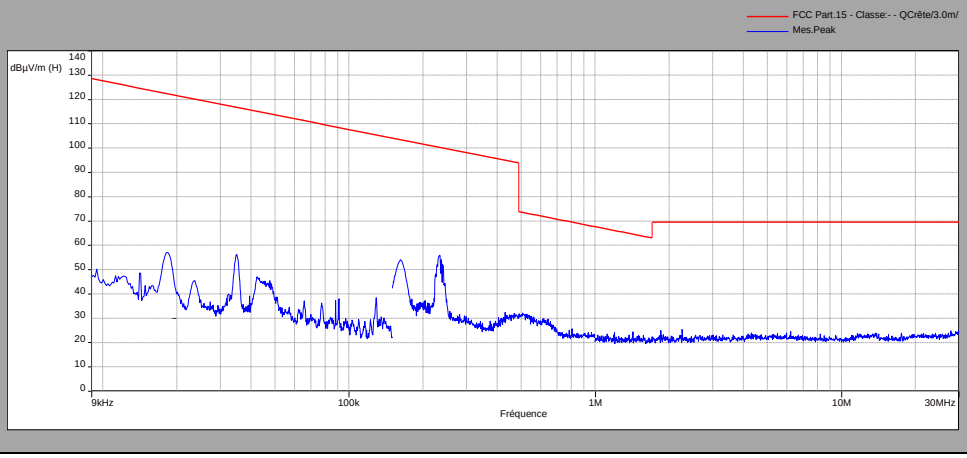
9.6. RESULTS

9kHz to 30MHz

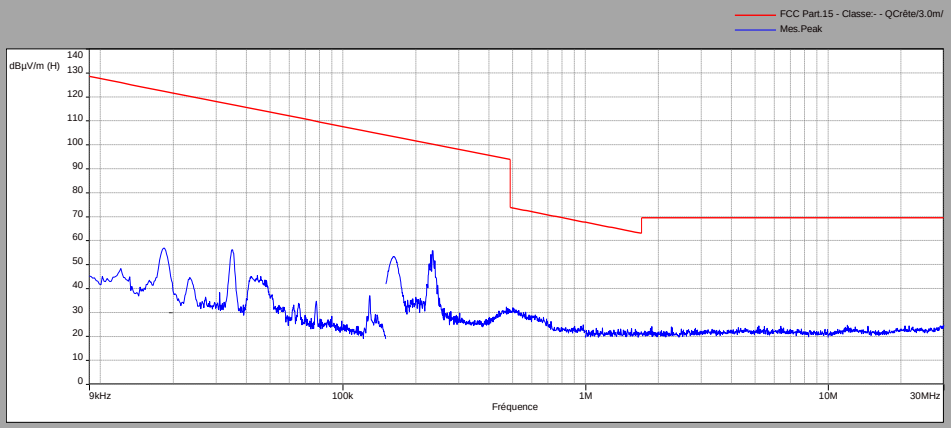
Parallel Axis



Perpendicular Axis



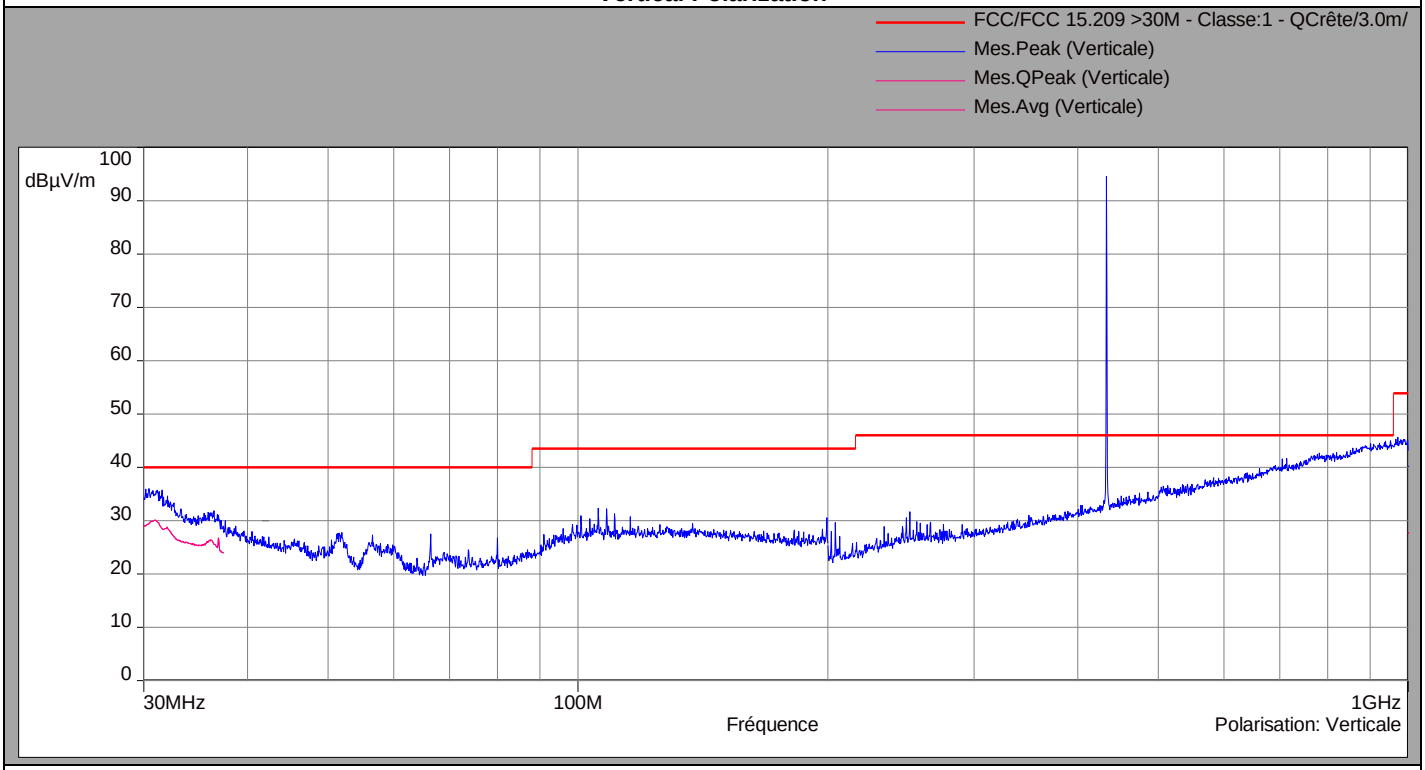
Ground Parallel Axis



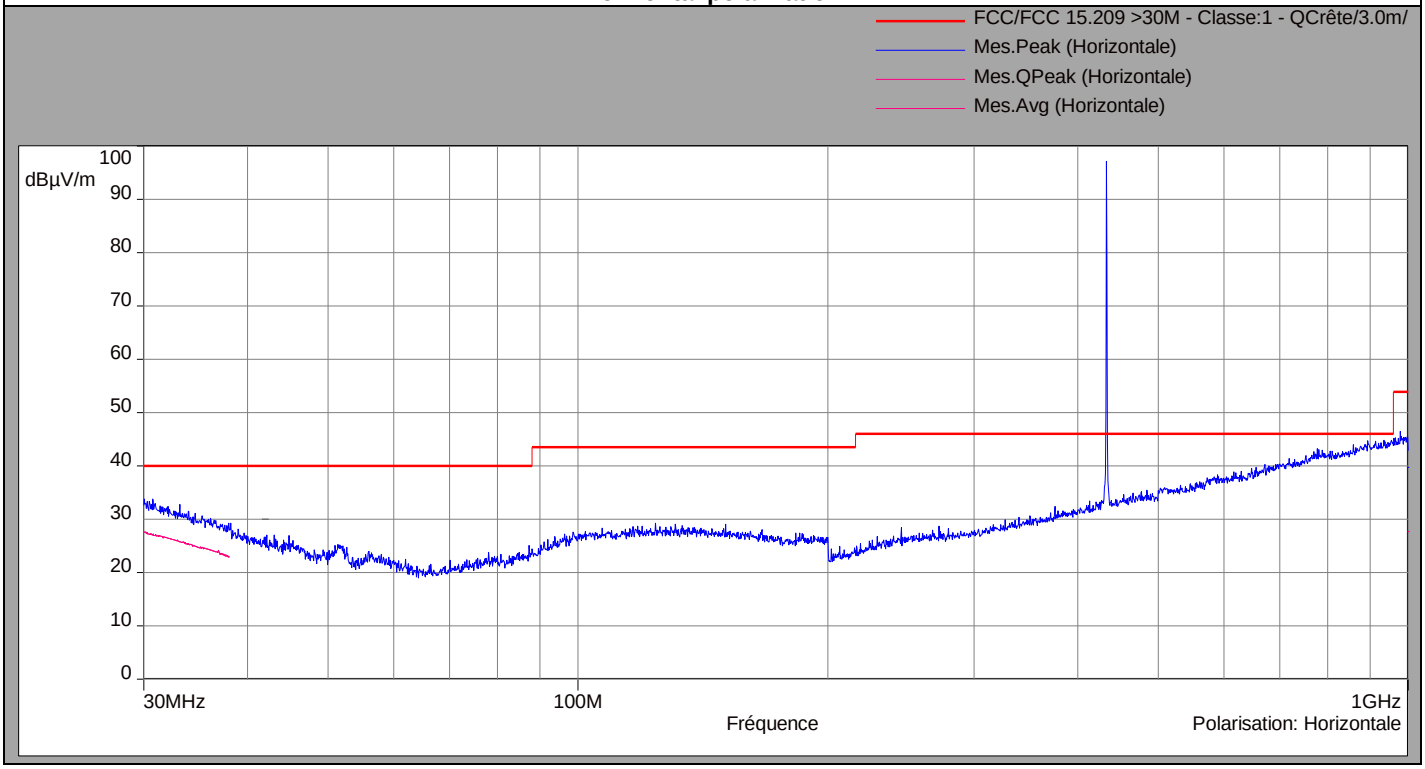
Below 1GHz

Cmin

Vertical Polarization



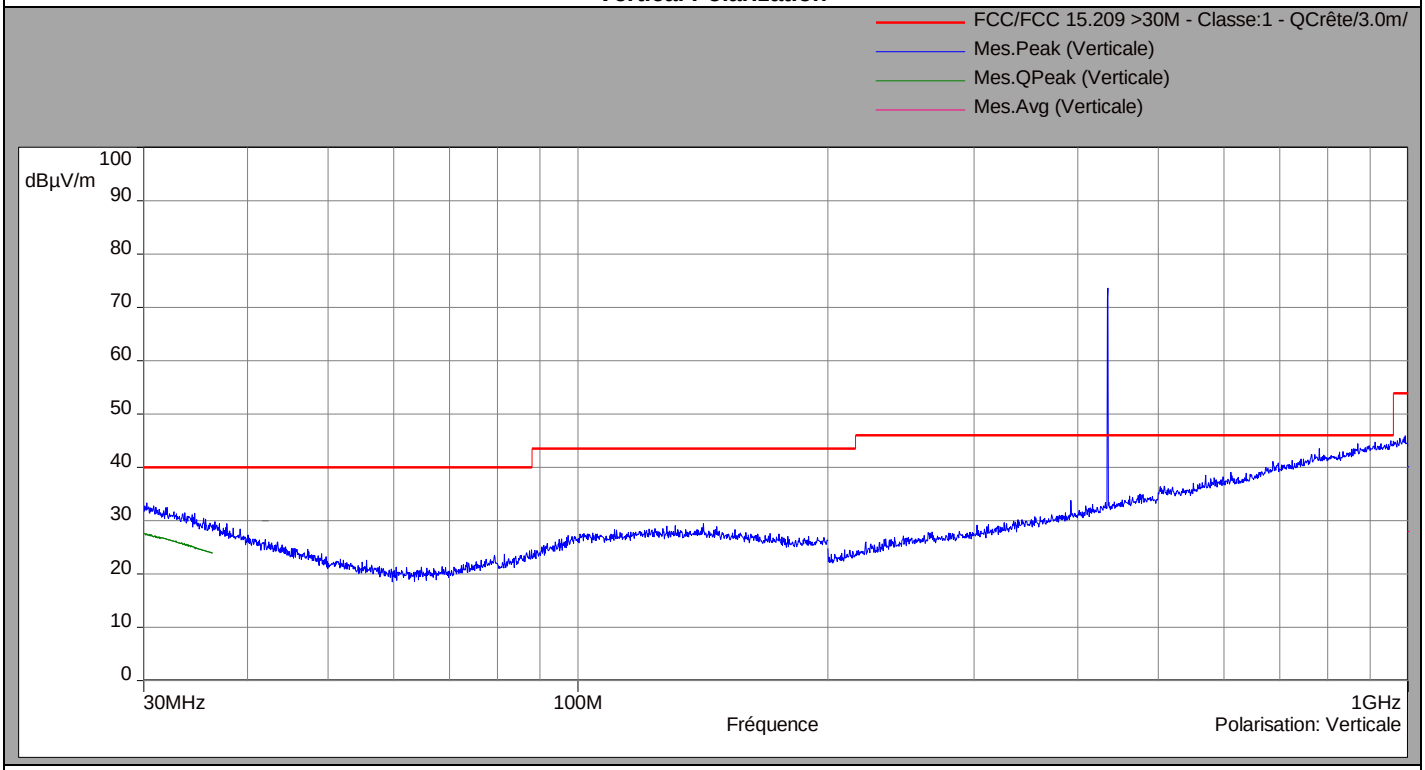
Horizontal polarization



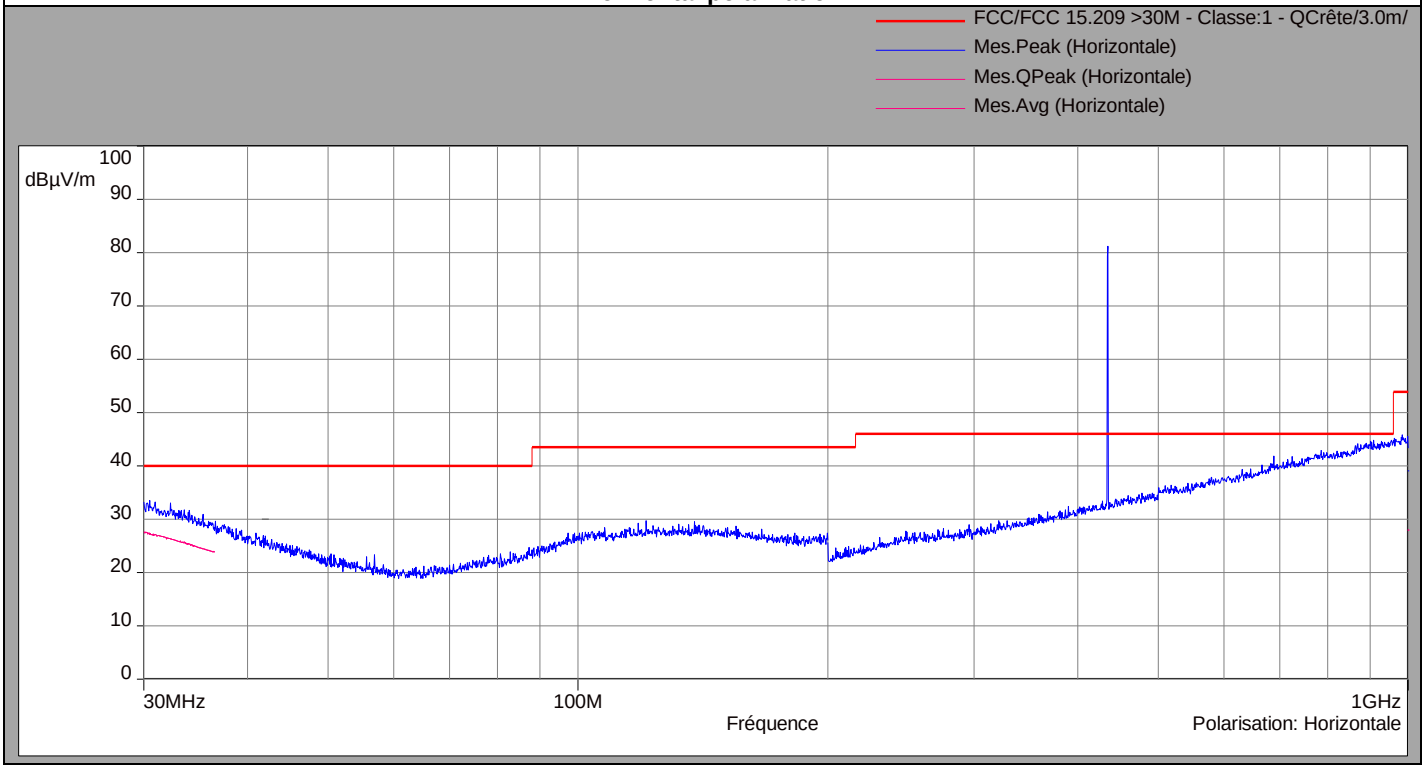
Below 1GHz

Cmax

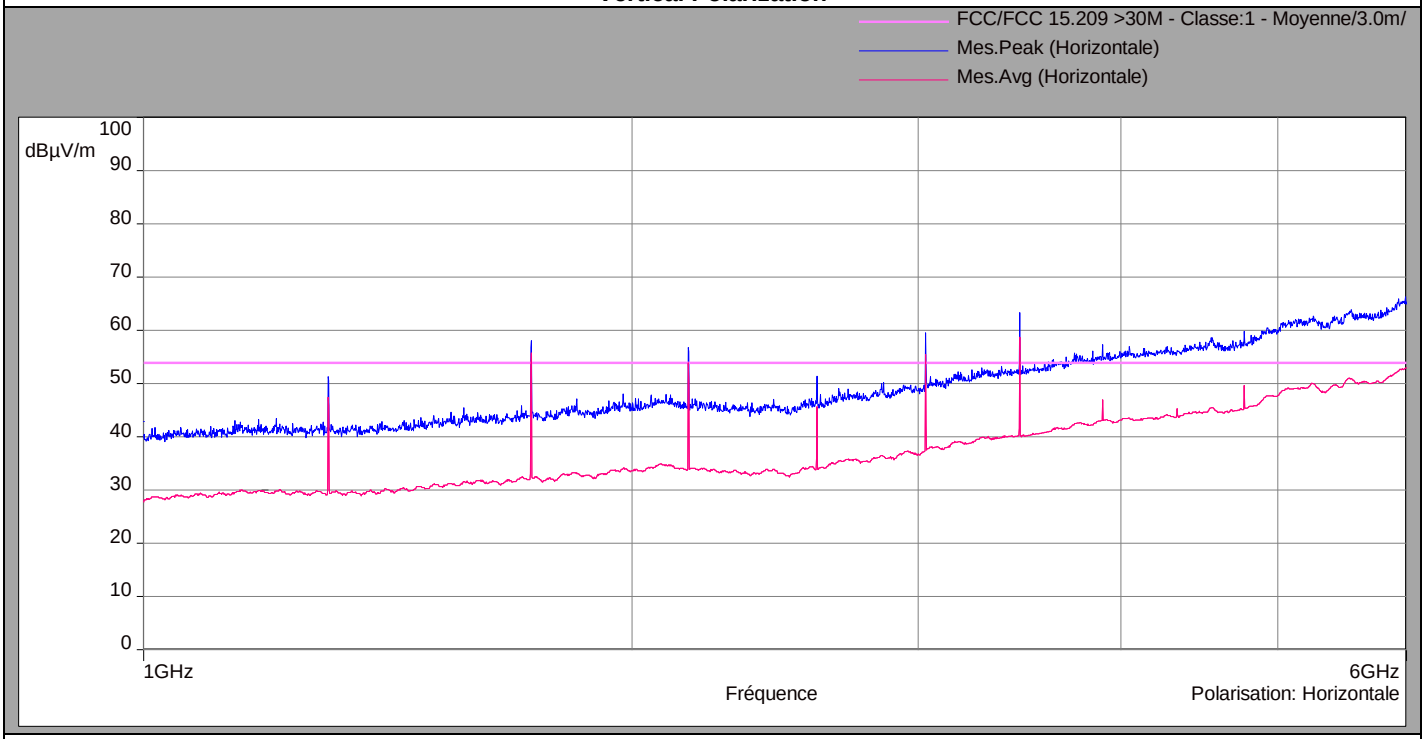
Vertical Polarization



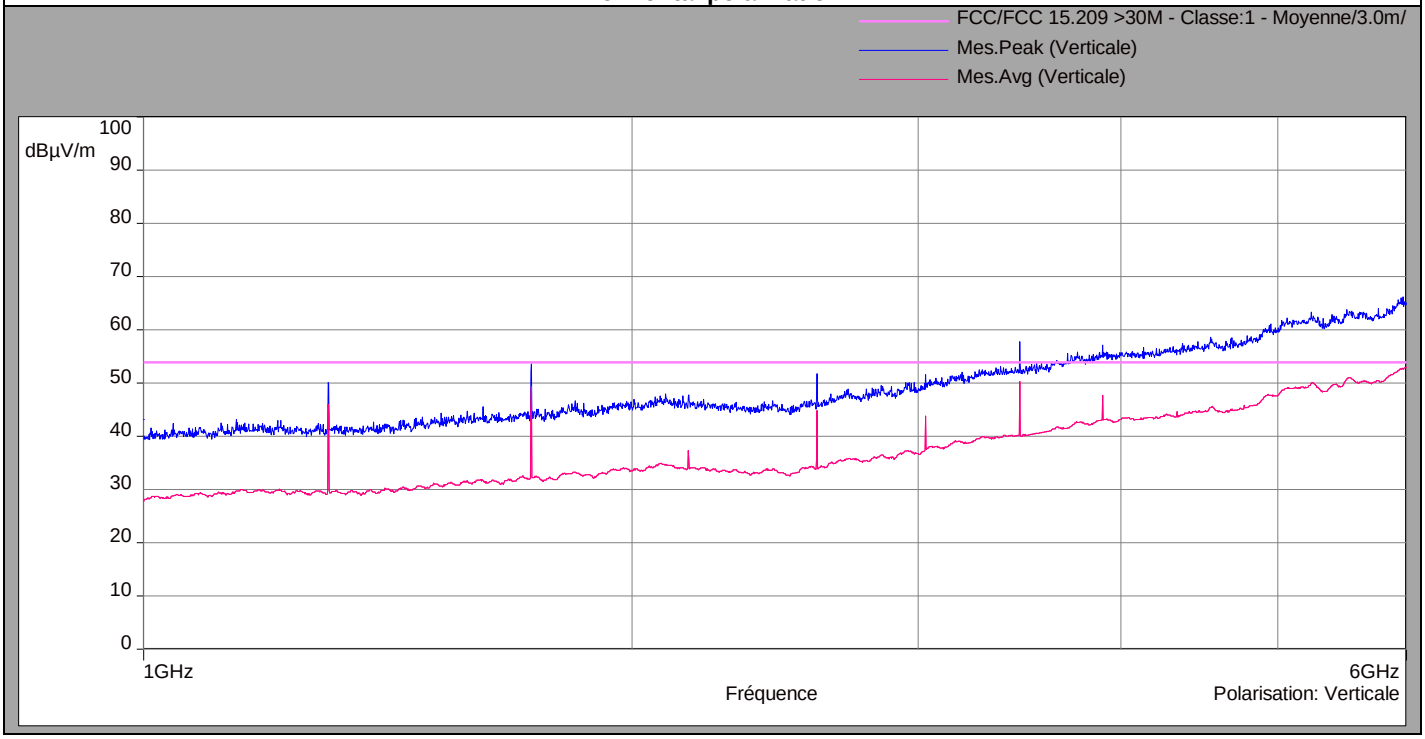
Horizontal polarization



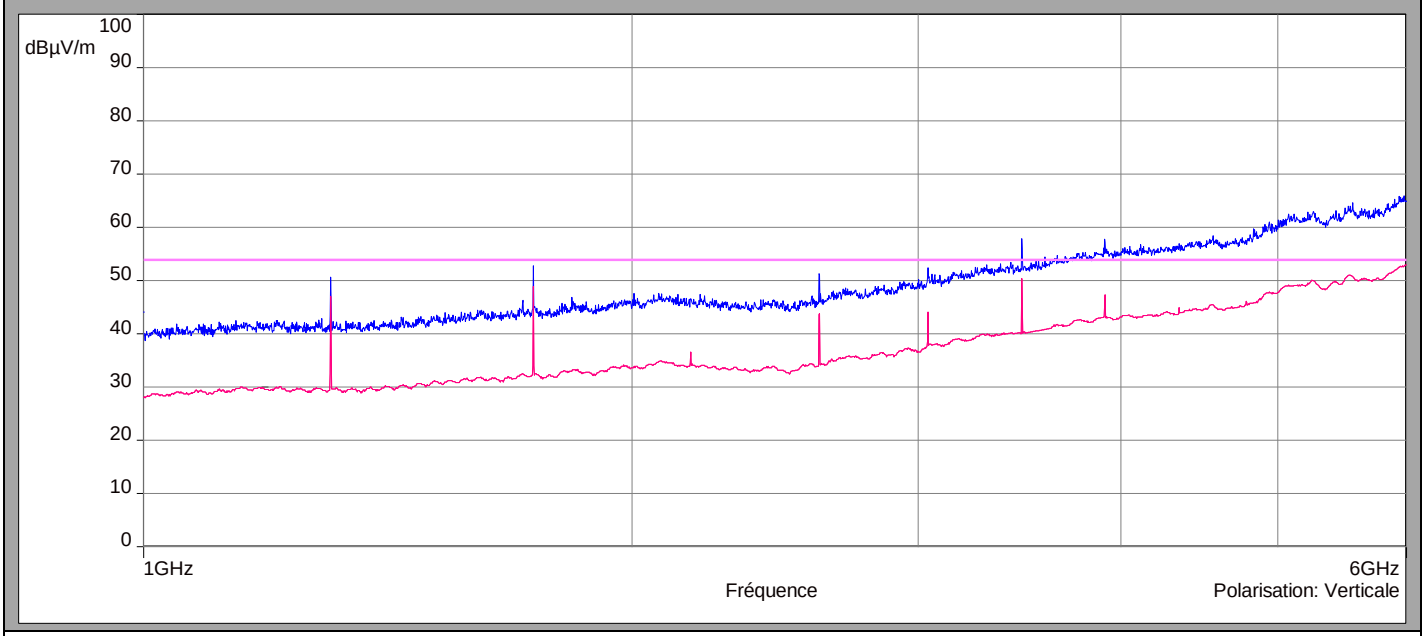
Above 1GHz
Cmin
Vertical Polarization



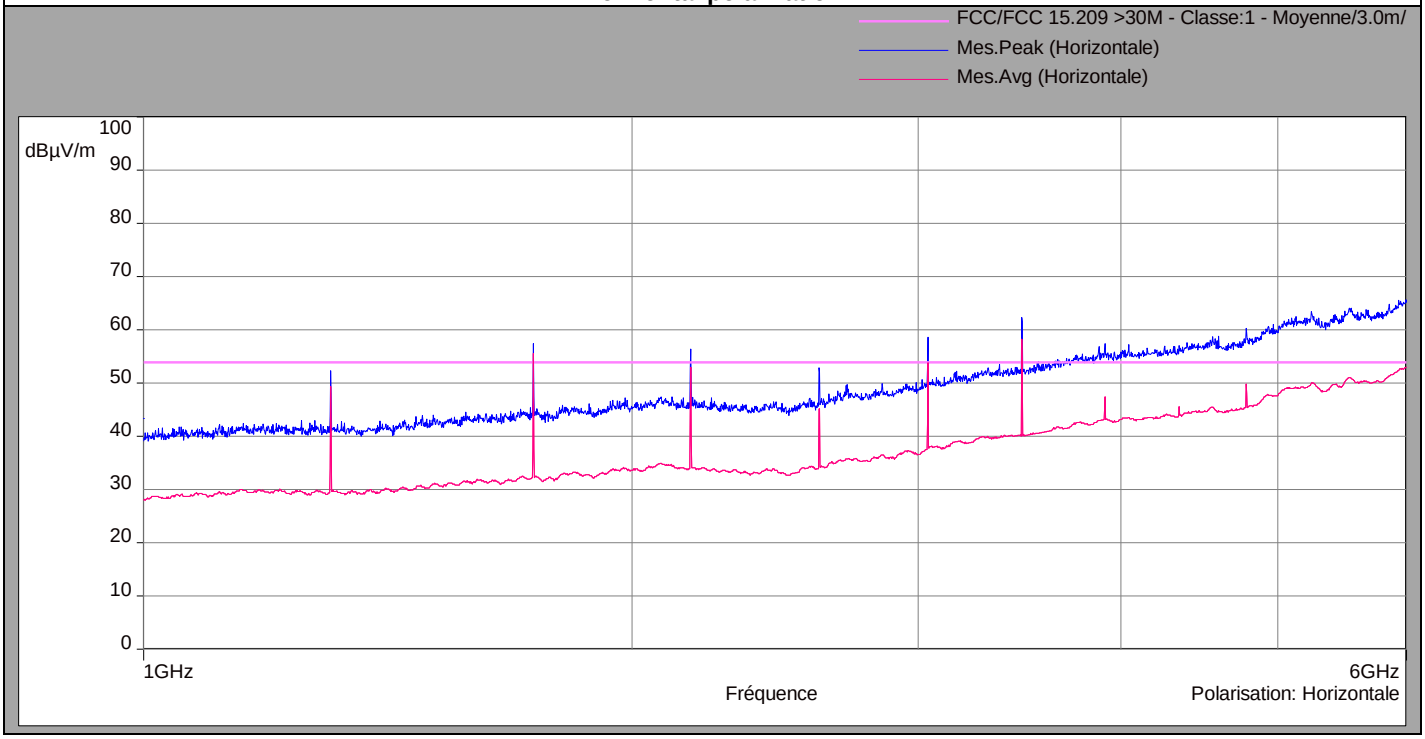
Horizontal polarization



Above 1GHz
Cmax
Vertical Polarization



Horizontal polarization



9kHz to 30MHz				
Polarization	**Frequency (MHz)**	**Peak Level (dBµV/m)**	**QPeak Level (dBµV/m)**	**Limit (dBµV/m)**
all emissions were greater than 20 dB below the limit				

30MHz to 1GHz				
Polarization	**Frequency (MHz)**	**Peak Level (dBµV/m)**	**QPeak Level (dBµV/m)**	**Limit (dBµV/m)**
Horizontal	433.22	97.15	-	93.98
Horizontal	434.62	81.19	-	93.98

30MHz to 1GHz				
Polarization	**Frequency (MHz)**	**Peak Level (dBµV/m)**	**QPeak Level (dBµV/m)**	**Limit (dBµV/m)**
Horizontal	433.22	68.46	-	93.98
Horizontal	434.62	52.5	-	93.98

Above 1GHz								
Cmin / Cmax								
Polarization	**Frequency (MHz)**	**Duty cycle correction (dB)**	**Average Level (dBµV/m)**	**Average Limit (dBµV/m)**	**Average Margin (dBµV/m)**	**Peak Level (dBµV/m)**	**Peak Limit (dBµV/m)**	**Peak Margin (dBµV/m)**
Horizontal	1299	28.69	18,77	54	35,23	22,63	74	51,37
Horizontal	1304	28.69	20,68	54	33,32	23,63	74	50,37
Horizontal	1733	28.69	27,03	54	26,97	29,37	74	44,63
Horizontal	1738	28.69	26,86	54	27,14	28,76	74	45,24
Horizontal	2166	28.69	25,16	54	28,84	28,04	74	45,96
Horizontal	2173	28.69	24,25	54	29,75	27,72	74	46,28
Horizontal	2599	28.69	16,92	54	37,08	22,67	74	51,33
Horizontal	2607	28.69	16,49	54	37,51	24,17	74	49,83
Horizontal	3032	28.69	26,81	54	27,19	30,85	74	43,15
Horizontal	3042	28.69	25,15	54	28,85	29,92	74	44,08
Horizontal	3466	28.69	30,01	54	23,99	34,69	74	39,31
Horizontal	3477	28.69	29,59	54	24,41	33,66	74	40,34
Horizontal	3899	28.69	18,22	54	35,78	28,6	74	45,4
Horizontal	3911	28.69	18,76	54	35,24	28,68	74	45,32
Horizontal	4765	28.69	20,91	54	33,09	31,14	74	42,86
Horizontal	4780	28.69	21,1	54	32,9	31,59	74	42,41

9.7. CONCLUSION

Unwanted Emission in restricted frequency bands measurement performed on the sample of the product e-Celsius **Medical System** e-Med **Connect (P110)**, SN: **-**, in configuration and description presented in this test report, show levels **compliant** to the **PART 15.231 & RSS 210 ISSUE 10** limits.

10. UNCERTAINTIES CHART

47 CFR Part 15.209 & 15.207 Kind of test	Wide uncertainty laboratory (k=2) ±x(dB) / (Hz)/ ms	Uncertainty limit
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	2,67	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)	4,88	6.3
Measurement of radiated electric field from 1 to 18GHz on the Ecuelles site	5.16	/
Measurement of radiated electric field from 30 to 1000MHz in vertical position on the OATS (Ecuelles)	4,99	6.3
Measurement of radiated electric field from 30 to 1000MHz in horizontal position in SAC C01	5,08	6.3
Measurement of radiated electric field from 30 to 1000MHz in vertical position in SAC C01	5,16	6.3
Measurement of radiated electric field from 30 to 1000MHz in horizontal position in SAC V01	5,08	6.3
Measurement of radiated electric field from 30 to 1000MHz in vertical position in SAC V01	5,15	6.3
Measurement of radiated electric field from 1 to 6 GHz C01	5,1	5.2
Measurement of radiated electric field from 1 to 6 GHz V01	4,85	5.2
Measurement of radiated magnetic field from 10kHz to 30MHz on the OATS (Ecuelles)	4,48	/

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