

FCC Test Firm Designation Number: FR0014
SED Wireless Device Testing Laboratory CAB Number: FR0004

Matériel testé :
Equipment under test:

IDENTEC SOLUTIONS /
iMARK EC (IDS1014), iMARK IC (IDS1015)
(Trademark / Marketing name or product reference)

Client / Demandeur:
Customer / Applicant : **IDENTEC SOLUTIONS AG**
Millennium Park 2
A-6890 Lustenau – Austria

Rapport délivré à :
Issued to: **IDENTEC SOLUTIONS AG**
Millennium Park 2
A-6890 Lustenau – Austria

Référence de la proposition : 10123
Proposal number:

Numéro d'affaire : DV-10212
Work number :

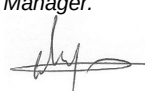
Date de l'essai : Du 4 au 12 mars 2024
Date of test: March 4th to 12th, 2024

Objectif des essais : EMC qualification according to following standards:
Test purpose: - CFR 47, FCC Part 15, Subpart C
- Industry Canada, RSS-Gen Issue 5 / RSS-210 Issue 10
Low power transmitter below 1705KHz
Measurement standards:
ANSI C63.10 (2013)

Lieu du test: SMEE, 385 rue René Rambaud
Test location: 38500 VOIRON - France

Test réalisé par : Chemseddine KERMICHE
Test realized by:

Conclusion : L'équipement satisfait aux prescriptions et essais des normes citées en référence.
Conclusion: The appliance complies with requirements and tests of above mentioned standards.

Ed.	Date	Modifications / Pages	Written by: Visa	Approved by: Visa
1	September 10 th , 2024	Initial Edition	Chemseddine KERMICHE Test operator.	Laurent CHAPUS Technical Manager. 

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1. Normatives References

FCC qualification according to:		
Standards	Applied	Title
ANSI C63.10 (2013)	X	American National Standard for Testing Unlicensed Wireless Devices
CFR47, Part 15	X	Telecommunication – Federal Communication Commission – Radio frequency devices, Sections 15.207 / 15.209

ISED Canada qualification according to:		
Standards	Applied	Title
RSS-Gen (Issue 5/2018, amendments 2019 and 2021)	X	General Requirements and Information for the Certification of Radio Apparatus
RSS-210 (Issue10/2019)	X	Licence-exempt Radio Apparatus: Category I Equipment,

Deviation from standards: None.

2. Test synthesis

TEST	Paragraph number FCC Part 15 ISED RSS-210	Spec. FCC Part 15 ISED RSS-210	RESULTS (comments)
Conducted emissions test	15.207 (a) RSS-Gen: Issue 5, §8.8	15.207 (a) Table 4, §8.8	PASS
Unwanted emissions outside the specified frequency band and harmonics	15.209 RSS-210: Issue 10 RSS-Gen: Issue 5, §8.9	Measure at 300m 9-490kHz: 2400µV/m/F(kHz) 6.370µA/m/F (kHz) Measure at 30m 0.490-1.705: 24000µV/m/F(kHz) 63.70µA/m/F (kHz) 1.705-30MHz: 30µV/m 0.08µA/m Measure at 3m 30MHz-88MHz : 40 dBµV/m 88MHz-216MHz : 43.5 dBµV/m 216MHz-960MHz : 46.0 dBµV/m Above 960MHz : 54.0 dBµV/m	PASS
Occupied Bandwidth	FCC Part 15.215 c) RSS-Gen: Issue 5, §6.7	-20dB and 99% BW	PASS
Antenna requirement	FCC 15.203 RSS-GEN § 6.8	Note: extern coil antenna used non-standard contactor	PASS

- General conclusion:**

Measures and tests performed on the sample of the product **IDENTEC SOLUTIONS / iMark EC&IC**, in configuration and description presented in this test report, show compliance with standards FCC CFR 47, PART 15, Subpart C and Industry Canada RSS-Gen & RSS-210.

3. Equipment Under Test (EUT)

Nom /
Identification

**IDENTEC SOLUTIONS /
iMARK EC (IDS1014), iMARK IC (IDS1015)**
(Trademark / Marketing name or product reference)

Sn:
iMark EC 0.445.005.550
iMark IC 0.445.004.525

FCC ID:
IC:
Model / HVIN:
Product name / PMN:
FVIN:

OO4-IDS1014
IC: 3538A-IDS1014
IDS1014 and IDS1015
iMARK EC and iMARK IC
IDS1014: V1.0-TagType18
IDS1015: V1.0-TagType21

Modular approval:

No

Alimentation /
Power supply

24V DC from power supply adapter (Input 100-240V)
Model: ESC30-24 (for iMark-EC) and TRG30R240V (for iMark-IC).

Auxiliaires /
Auxiliaries

- Laptop PC Hp pavillon g6
- IDENTEC reader: i-POINT Si, model : IDS1001
- Power supply adapter (Input 100-240V)
Model: ESC30-24 (for iMark-EC) and TRG30R240V (for iMark-IC)

Entrées-Sorties /
Input / Output

	Câbles pour essai / Cables for test	Blindé / Shielded	Prévu pour >3m / Intended for >3m
DC input cable	1.5m	No	Yes
LF antenna connector (2 wires) (Only for iMark EC model)	1.5m to antenna coil	No	Yes

Mode de fonctionnement /
Running mode

Equipment running modes are:
The tested sample is able to be set in following modes:
- Transmit a modulated carrier frequency on the LF channel (125kHz)
- Transmit an unmodulated carrier frequency on the LF channel (125kHz)

Programme de test /
Test program /

PC test program "Gen3 Tag Certification tool Version : 1.0.1.29513"

Informations supplémentaires /
Additional informations

Declaration of the applicant:
- Type of technology: LF Marker.
- Emission bands: 125kHz.
- Equipment intended for use as a fixed station.
- Equipment designed for continuous operation.
- Antenna type for iMark IC: Integral coil antenna
- Antenna type for iMark EC: External coil (1.85mx0.8m, 2 turns)
- Rated output power is set at 100% with 2 slots active (10 empty slots).

Dimensions de l'EST /
Dimensions of EUT

100mm x 100mm x 40mm

4. Test conditions

Equipment under test: 24V DC from power supply adapter.
Auxiliaries: 120V AC 60Hz.

5. Modifications of the EUT

None.

6. Special accessories

None required for compliance with emission limits.

7. Measurement Uncertainty

Test Description	Expanded uncertainty
Conducted emissions test (150k-30MHz, AC mains)	± 3.5dB
Radiated emission test (9kHz-30MHz, electric field)	± 4.0dB
Radiated emission test (30-300MHz, OATS)	± 5.6dB
Radiated emission test (300-1000MHz, OATS)	± 5.3dB
Radiated emission test (1-40GHz, OATS / FAC)	± 5.6dB
Conducted RF output power at antenna port	± 1.6dB
Radiated RF output power (Peak, Power density)	± 5.6dB
DTS Bandwidth, 99% OBW	±4%
Temperature	± 1°C
Time and duty cycle calculation	±1%
AC and DC voltage	±1%

Note: Expanded uncertainty at 95% confidence (k=2)

8. Field Strength Calculation

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

$$FS = RA + AF + CF - AG$$

Where FS = Field Strength (Level)

RA = Receiver Amplitude (Meter Reading)

AF = Antenna Factor

CF = Cable Factor

AG = Amplifier Gain

Total factor = AF+CF-AG

Margin value = Emission level – Limit value

Example:

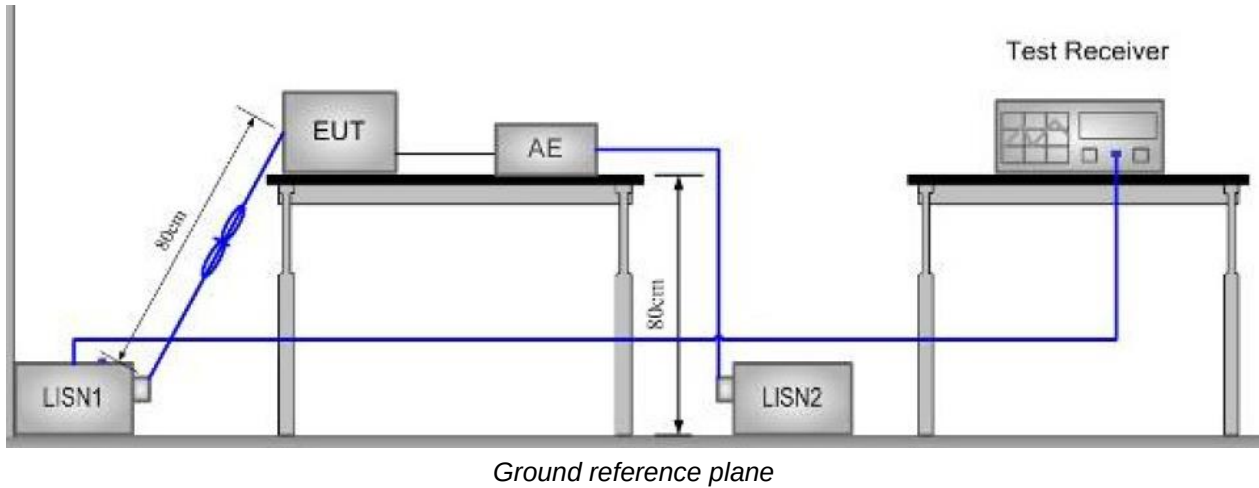
RA: 14.0dBμV / AF: 16.5 dBm⁻¹ / CF: 3.5dB / AG: 15dB

→ Total factor: 5dBm⁻¹

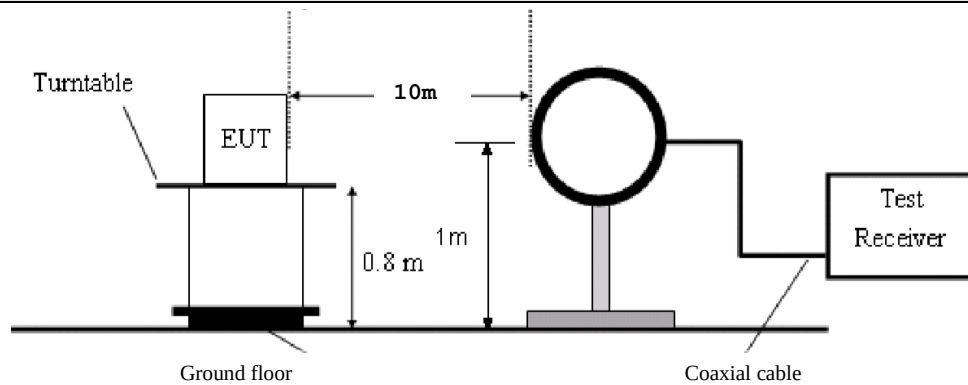
→ Field level: 19.0dBμV/m (-21.0dB for margin if limit is 40dBμV/m)

9. Test Setup Diagram

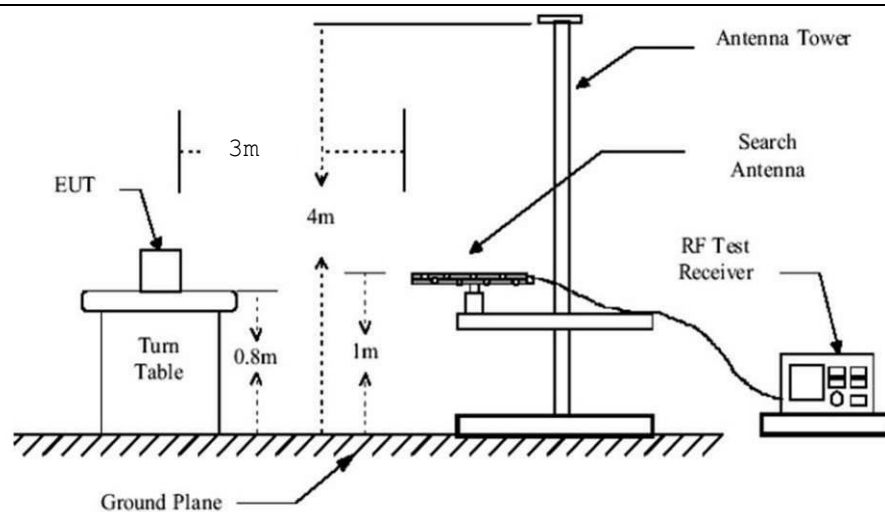
Test Setup for conducted emission



Test Setup for radiated emission

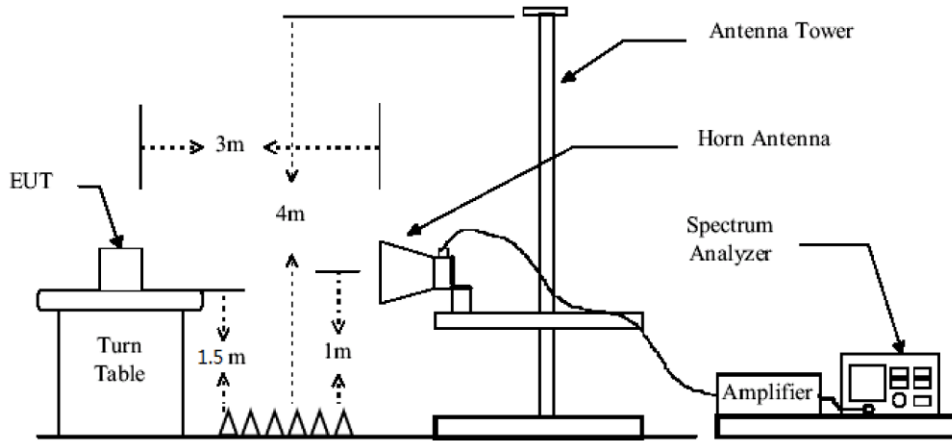


Test setup for 9k-30MHz (FS OATS)



Test setup for 30-1000MHz (SAC 3m)

Test Setup for radiated emission



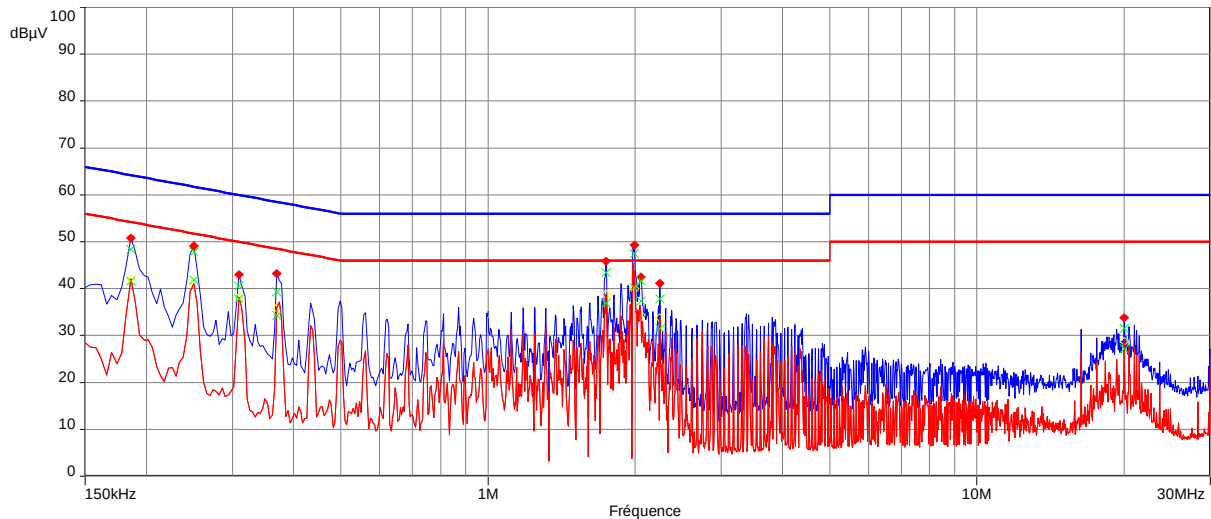
Test setup for 1-25GHz (SAC 3m, tilt antenna mast used)

10. Conducted Emission Measurement (150 kHz-30MHz)

TEST: Limits for conducted disturbance 150kHz – 30MHz				Verdict
<u>Method:</u> The LISN is placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane. This distance was between the closest points of the AMN and the EUT. All other units of the EUT and associated equipment were at least 0,8 m from the AMN. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on lines were made at the output of the LISN. The EUT is 80cm above the ground reference plane and 40cm from the vertical ground plane. The AC power cable is 1m length.				Pass
Laboratory Parameters:		Required prior to the test		During the test
Ambient Temperature		17 - 27 °C		21°C ± 2
Relative Humidity		25 - 65 %		48% ± 5
Fully configured sample scanned over the following frequency range		Frequency range on each side of line		Measurement Point
		150kHz to 30MHz		AC input port (120V/60Hz)
Limits				
Frequency (MHz)	Limit dB (µV)			
	Quasi-Peak	Result	Average	Result
0.15 – 0.50	66 \ 56	PASS	56 \ 46	PASS
0.50 - 5	56	PASS	46	PASS
5 – 30	60	PASS	50	PASS
Supplementary information: Test location: SMEE Test date: March 12 th , 2024. Tested by C. KERMICHE Power supply voltage: 24V DC from power supply adapter 120V 60Hz.				

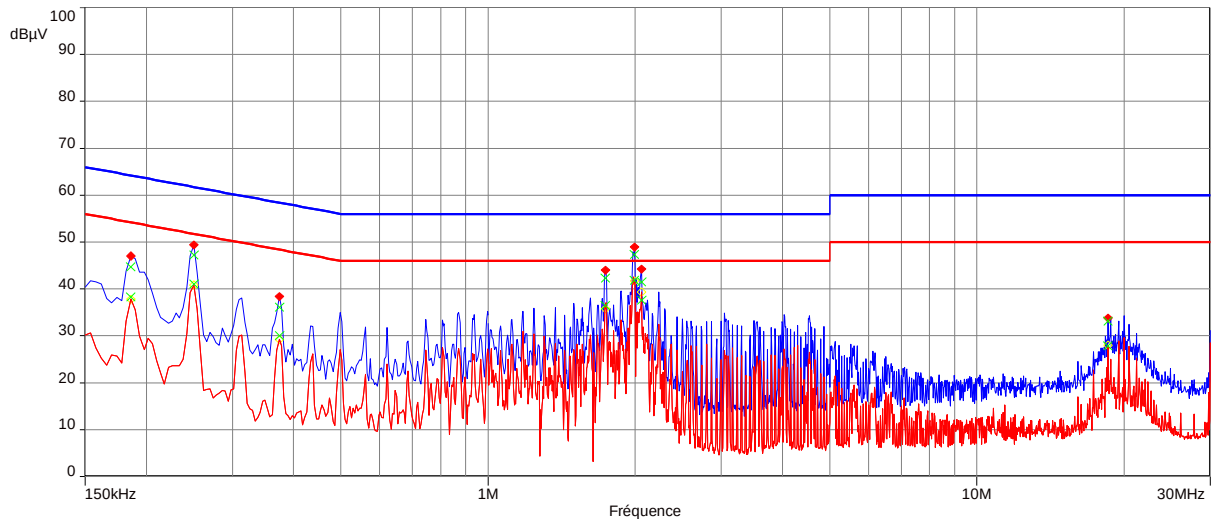
IDS1014

Graphical representation of Conducted Disturbance Measurement (Peak and Average detection) AC port, Line L1



Note : Same result for all transmit modes on all channels.

Graphical representation of Conducted Disturbance Measurement (Peak and Average detection) AC port, Line Neutral



Note : Same result for all transmit modes on all channels.

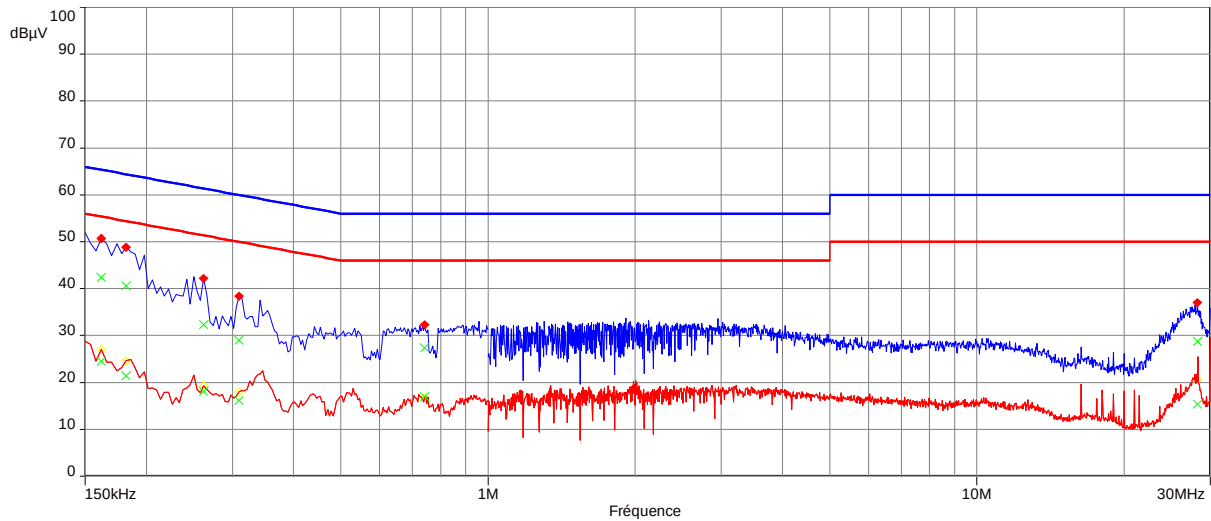
~~~~~: Peak

~~~~~: Average

| IDS1014 | | | | | | | | |
|---|----------|---------|--|-----------|---------|----------|-----------|------|
| Tabulated Results for Mains Terminal Disturbance Voltage on AC port | | | | | | | | |
| FREQ | Meas. PK | Mes. QP | LIMIT QP | Margin QP | Mes. AV | LIMIT AV | Margin AV | Line |
| (MHz) | (dBμV) | (dBμV) | (dBμV) | (dB) | (dBμV) | (dBμV) | (dB) | |
| 0.186 | 51.90 | 48.37 | 64.21 | -15.84 | 41.67 | 54.21 | -12.54 | L1 |
| 0.25 | 50.53 | 47.84 | 61.76 | -13.92 | 41.86 | 51.76 | -9.90 | L1 |
| 0.31 | 43.19 | 40.63 | 59.97 | -19.34 | 37.81 | 49.97 | -12.16 | L1 |
| 0.37 | 43.91 | 39.30 | 58.50 | -19.20 | 34.36 | 48.50 | -14.14 | L1 |
| 1.744 | 46.13 | 43.44 | 56.00 | -12.56 | 36.99 | 46.00 | -9.01 | L1 |
| 1.992 | 49.85 | 47.43 | 56.00 | -8.57 | 40.21 | 46.00 | -5.79 | L1 |
| 2.056 | 44.77 | 41.62 | 56.00 | -14.38 | 37.39 | 46.00 | -8.61 | L1 |
| 2.244 | 41.36 | 37.91 | 56.00 | -18.09 | 31.60 | 46.00 | -14.40 | L1 |
| 20 | 35.93 | 31.53 | 60.00 | -28.47 | 27.18 | 50.00 | -22.82 | L1 |
| 0.186 | 48.60 | 44.68 | 64.21 | -19.53 | 38.27 | 54.21 | -15.95 | N |
| 0.25 | 49.50 | 47.26 | 61.76 | -14.49 | 41.07 | 51.76 | -10.69 | N |
| 0.374 | 39.77 | 36.13 | 58.41 | -22.29 | 30.06 | 48.41 | -18.35 | N |
| 1.74 | 45.15 | 42.35 | 56.00 | -13.65 | 36.47 | 46.00 | -9.53 | N |
| 1.996 | 49.52 | 47.35 | 56.00 | -8.65 | 41.82 | 46.00 | -4.18 | N |
| 2.06 | 44.64 | 41.56 | 56.00 | -14.44 | 37.61 | 46.00 | -8.39 | N |
| 18.536 | 37.02 | 33.15 | 60.00 | -26.85 | 27.90 | 50.00 | -22.10 | N |
| RBW: | | | 9kHz | | | | | |
| Voltage: | | | 120V/60Hz | | | | | |
| Limit: | | | FCC Part 15.207/ RSS-Gen: Issue 5, §8.8 Table 4 | | | | | |
| Final measurement detector: | | | Quasi-Peak and CISPR Average (AV) | | | | | |
| RESULT: | | | PASS | | | | | |
| Measured value calculation: | | | <p>The measured value (level) is calculated by adding the Cable Factor, the Transient suppressor attenuation and LISN attenuation from the receiver amplitude reading. The basic equation is as follow:</p> $\text{Meas.} = \text{RA} + \text{CF} + \text{ATT}_{\text{TRAN}} + \text{ATT}_{\text{LISN}}$ <p>Where Meas. = Level (dBμV)
 RA = Receiver Amplitude
 CF = Cable Factor
 ATT_{TRAN} = Transient suppressor attenuation
 ATT_{LISN} = LISN attenuation</p> <p>Margin value = Emission level – Limit value (A negative margin shows compliance to limit)</p> | | | | | |

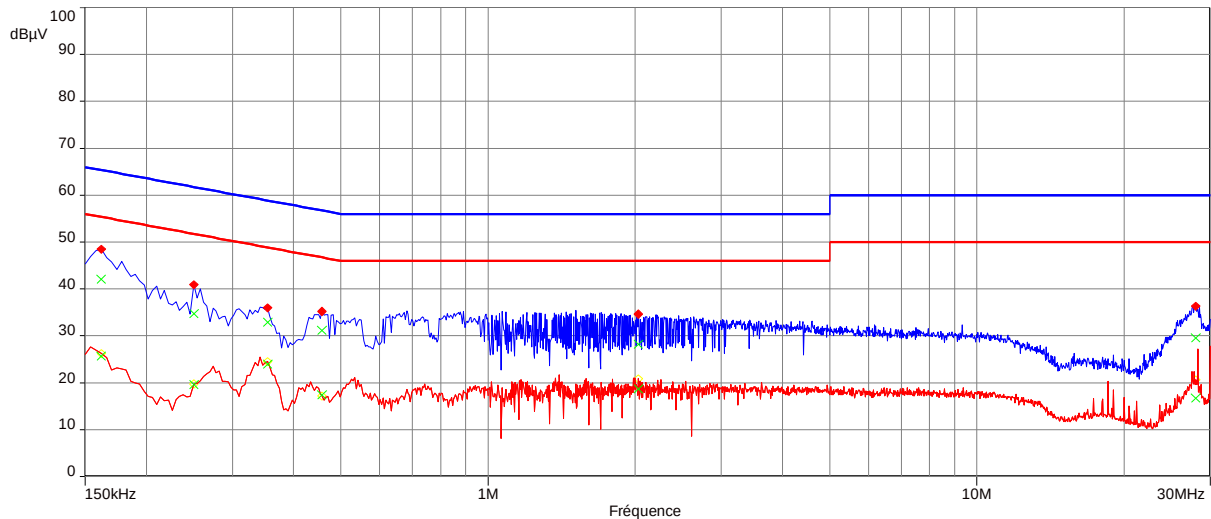
IDS1015

Graphical representation of Conducted Disturbance Measurement (Peak and Average detection) AC port, Line L1



Note : Same result for all transmit modes on all channels.

Graphical representation of Conducted Disturbance Measurement (Peak and Average detection) AC port, Line Neutral



Note : Same result for all transmit modes on all channels.

~~~~~: Peak

~~~~~: Average

| IDS1015 | | | | | | | | |
|---|----------|---------|--|-----------|---------|----------|-----------|------|
| Tabulated Results for Mains Terminal Disturbance Voltage on AC port | | | | | | | | |
| FREQ | Meas. PK | Mes. QP | LIMIT QP | Margin QP | Mes. AV | LIMIT AV | Margin AV | Line |
| (MHz) | (dBμV) | (dBμV) | (dBμV) | (dB) | (dBμV) | (dBμV) | (dB) | |
| 0.162 | 49.78 | 42.41 | 65.36 | -22.95 | 24.54 | 55.36 | -30.82 | L1 |
| 0.182 | 47.16 | 40.64 | 64.39 | -23.75 | 21.50 | 54.39 | -32.89 | L1 |
| 0.262 | 38.94 | 32.33 | 61.37 | -29.04 | 18.16 | 51.37 | -33.21 | L1 |
| 0.31 | 36.18 | 29.01 | 59.97 | -30.96 | 16.16 | 49.97 | -33.81 | L1 |
| 0.742 | 32.74 | 27.39 | 56.00 | -28.61 | 17.01 | 46.00 | -28.99 | L1 |
| 28.252 | 35.96 | 28.81 | 60.00 | -31.19 | 15.41 | 50.00 | -34.59 | L1 |
| 0.162 | 49.05 | 42.12 | 65.36 | -23.24 | 25.73 | 55.36 | -29.63 | N |
| 0.25 | 40.90 | 34.71 | 61.76 | -27.05 | 19.63 | 51.76 | -32.13 | N |
| 0.354 | 36.33 | 32.91 | 58.87 | -25.96 | 23.99 | 48.87 | -24.88 | N |
| 0.458 | 34.98 | 31.19 | 56.73 | -25.54 | 17.46 | 46.73 | -29.27 | N |
| 2.028 | 35.30 | 28.16 | 56.00 | -27.84 | 18.66 | 46.00 | -27.34 | N |
| 28 | 37.06 | 29.61 | 60.00 | -30.39 | 16.81 | 50.00 | -33.19 | N |
| RBW: | | | 9kHz | | | | | |
| Voltage: | | | 120V/60Hz | | | | | |
| Limit: | | | FCC Part 15.209 a) / RSS-Gen: Issue 5, §8.8 Table 4 | | | | | |
| Final measurement detector: | | | Quasi-Peak and CISPR Average (AV) | | | | | |
| RESULT: | | | PASS | | | | | |
| Measured value calculation: | | | <p>The measured value (level) is calculated by adding the Cable Factor, the Transient suppressor attenuation and LISN attenuation from the receiver amplitude reading. The basic equation is as follow:</p> $\text{Meas.} = \text{RA} + \text{CF} + \text{ATT}_{\text{TRAN}} + \text{ATT}_{\text{LISN}}$ <p>Where Meas. = Level (dBμV)
 RA = Receiver Amplitude
 CF = Cable Factor
 ATT_{TRAN} = Transient suppressor attenuation
 ATT_{LISN} = LISN attenuation</p> <p>Margin value = Emission level – Limit value (A negative margin shows compliance to limit)</p> | | | | | |

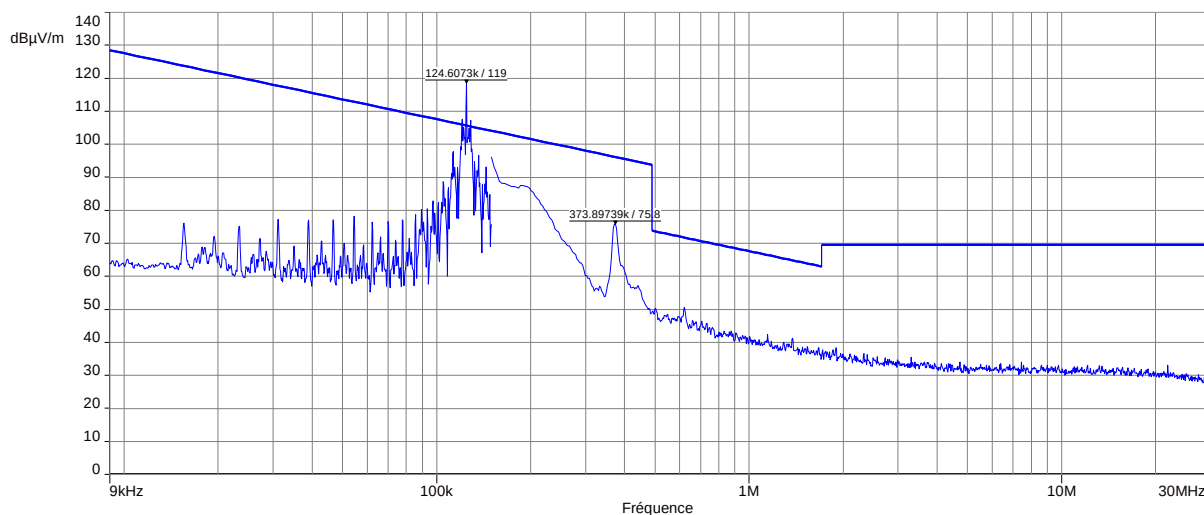
11. Radiated Emission Measurement (9 kHz-10GHz)

| TEST: Radiated Emission Measurement (9kHz-10GHz) | | Verdict |
|---|--|---------------------------|
| <p>Method: Measurements were made in a 3-meter Semi Anechoic Room (SAR) for frequency 30MHz to 1GHz and in a 3-meter Full Anechoic environment (SAR with floor absorbers) above 1GHz. The Semi Anechoic Room complies with CISPR16-1-4 / ANSI C63.4 requirements. For frequency 9kHz to 30MHz, measurements are performed on a free-space open area test site at 10m distance. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3 meter. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in horizontal and vertical polarities. Final measurements (Peak, Quasi-peak, Average) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4 m. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.</p> | | Pass |
| Laboratory Parameters: | Required prior to the test | During the test |
| Ambient Temperature | 20 to 30 °C | 21°C ± 2 |
| Relative Humidity | 30 to 70 % | 45% ± 5 |
| Fully configured sample scanned over the following frequency range | Frequency range on each side of line | Measurement Point |
| | 9kHz – 30MHz | 10 m measurement distance |
| | 30MHz – 10GHz | 3 m measurement distance |
| Limits – FCC Part 15.209 / RSS-GEN / RSS-210 | | |
| Frequency (MHz) | Limits (dBµV/m) | |
| | Level / Detector / Distance | Results |
| 0.009 to 0.090 | 48.5 – 28.5 / AV / 300m
68.5 – 48.5 / PK / 300m | Pass |
| 0.090 to 0.110 | 28.5 – 26.8 / QP / 300m | Pass |
| 0.110 to 0.490 | 26.8 – 13.8 / AV / 300m
46.8 – 33.8 / PK / 300m | Pass |
| 0.490 to 1.705 | 33.8 – 23.0 / QP / 30m | Pass |
| 1.705 to 30 | 29.5 / QP / 30m | Pass |
| 30 to 88 | 40.0 / QP / 3m | Pass |
| 88 to 216 | 43.5 / QP / 3m | Pass |
| 216 to 960 | 46.0 / QP / 3m | Pass |
| 960-1000 | 54.0 / QP / 3m | Pass |
| Above 1GHz | 54.0 / AV / 3m
74.0 / PK / 3m | Pass |
| <p>Supplementary information:
 Test location: SMEE
 Test date: March 11th, 2024. Tested by C. KERMICHE
 Power supply voltage: 24V DC</p> | | |

| IDS1014 | | | | | | | | |
|---|----------------|----------------------|--|--------------|--------|------------|-------------|--------------------|
| Tabulated Results for Unwanted emissions (9kHz-490kHz) | | | | | | | | |
| FREQ | RF field @ 10m | RF field @ 300m | Limit @ 300m | Detector | Margin | Ant. angle | Table angle | Correc. Fact. (CF) |
| MHz | dBμV/m | dBμV/m | dBμV/m | Pk / QP / AV | dB | Degree | Degree | dB |
| 0.125 | 95.8 | 36.7 ⁽¹⁾ | 45.6 | Pk | -8.9 | 90 | 0 | 11.6 |
| 0.125 | 76.5 | 17.4 ⁽¹⁾ | 25.6 | AV | -8.2 | 90 | 0 | 11.6 |
| 0.250 | 58.7 | -0.4 ⁽¹⁾ | 39.6 | Pk | -40.0 | 90 | 0 | 11.5 |
| 0.250 | 45.2 | -13.9 ⁽¹⁾ | 19.6 | AV | -33.5 | 90 | 0 | 11.5 |
| 0.375 | 61.5 | 2.4 ⁽¹⁾ | 36.1 | Pk | -33.7 | 90 | 0 | 11.5 |
| 0.375 | 49.9 | -9.2 ⁽¹⁾ | 16.1 | AV | -25.3 | 90 | 0 | 11.5 |
| Supplementary information:
Frequency list measured on the Open Area Test Site has been created with pre-scan results.
Worst case results for all communication modes. | | | | | | | | |
| Frequency band investigated: | | | 9kHz-490kHz | | | | | |
| RBW: | | | 200Hz (9kHz-150kHz)
9kHz (150kHz-30MHz) | | | | | |
| Measurement distance: | | | 10m | | | | | |
| Final measurement detector: | | | Peak / Quasi-Peak / Average | | | | | |
| Limit: | | | FCC Part 15.209 / RSS-Gen | | | | | |
| Note: | | | CF: Correction factor = Antenna factor + Cable loss
(1) : Measure have been done at 10m distance and corrected according to requirements of 15.209.e / RSS-Gen clause 6.5)
(M@300m = M@10m-59.1dB)
Loop antenna used and rotated about its axis to maximize any emission. | | | | | |
| Tabulated Results for Unwanted emissions (490kHz-30MHz) | | | | | | | | |
| FREQ | RF field @ 10m | RF field @ 30m | Limit @ 30m | Detector | Margin | Ant. angle | Table angle | Correc. Fact. (CF) |
| MHz | dBμV/m | dBμV/m | dBμV/m | QP | dB | Degree | Degree | dB |
| 0.500 | 44.6 | 25.5 ⁽¹⁾ | 33.6 | QP | -8.1 | 90 | 0 | 11.5 |
| 0.625 | 42.4 | 23.3 ⁽¹⁾ | 31.7 | QP | -8.4 | 90 | 0 | 11.6 |
| Supplementary information:
Frequency list measured on the Open Area Test Site has been created with pre-scan results.
Worst case results for all communication modes. | | | | | | | | |
| Frequency band investigated: | | | 490kHz-30MHz | | | | | |
| RBW: | | | 9kHz (150kHz-30MHz) | | | | | |
| Measurement distance: | | | 10m | | | | | |
| Final measurement detector: | | | Quasi-Peak | | | | | |
| Limit: | | | FCC Part 15.209 / RSS-Gen | | | | | |
| Note: | | | CF: Correction factor = Antenna factor + Cable loss
(1): Measure have been done at 10m distance and corrected according to requirements of 15.209.e / RSS-Gen clause 6.5)
(M@30m = M@10m-19.1dB)
Loop antenna used and rotated about its axis to maximize any emission. | | | | | |

IDS1014

Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 9kHz-30MHz / 3m / Parallel & Perpendicular & Horizontal antenna position / Transmit mode)



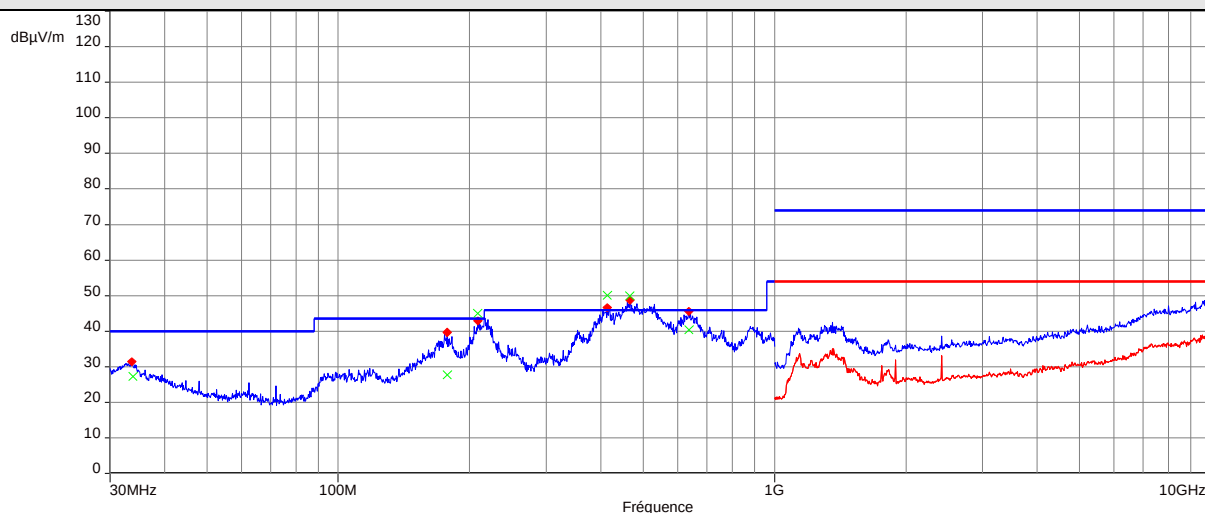
Notes: Pre-scan graph only for identification purpose.

| | |
|------------------------------|--|
| Frequency band investigated: | 9kHz-30MHz |
| Unit : | dBμV/m |
| RBW : | 200Hz (9kHz-150kHz)
9kHz (150kHz-30MHz) |
| Antenna polarization : | Parallel & Perpendicular to measurement axis |

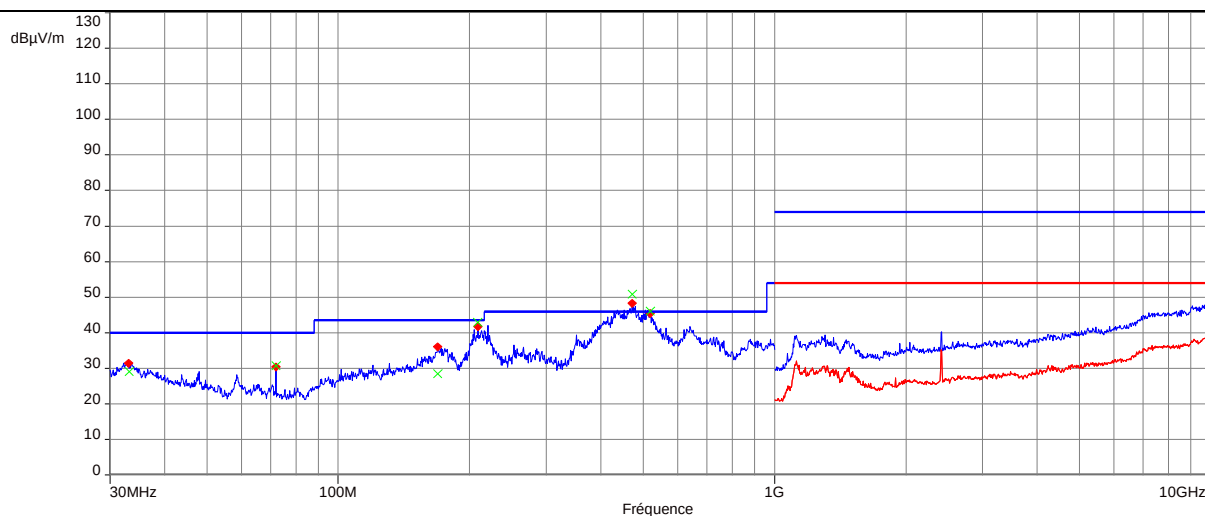
IDS1014

Graphical representation of Radiated Disturbance Measurement (Peak detection, Full Anechoic Chamber pre-scan, 30MHz-10GHz / 3m / Transmit mode / Worst position)

HORIZONTAL POLARIZATION



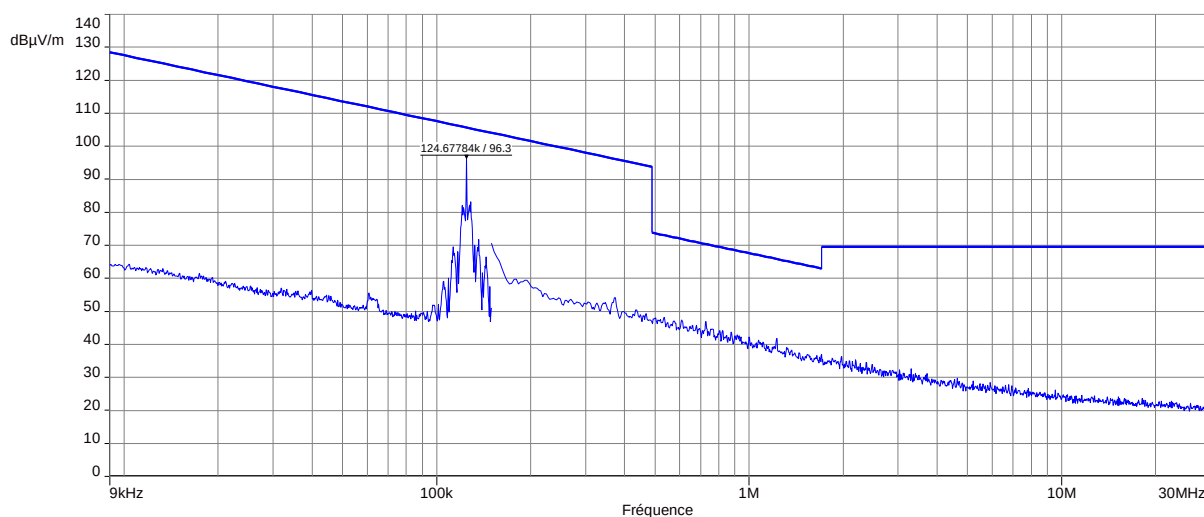
VERTICAL POLARIZATION



| FREQ (MHz) | Field Strength 3m PK (dBμV/m) | Field Strength 3m QP or AV (dBμV/m) | Limit PK (dBμV/m) | Margin Peak (dBμV/m) | Limit QP or AV (dB) | Margin QP or AV (dBμV/m) | Table angle (°) | Ant height (m) | Total factor (dB) | Pol (H/V) | Detector & Limit QP |
|---------------------------|-------------------------------|-------------------------------------|---|----------------------|---------------------|--------------------------|-----------------|----------------|-------------------|-----------|---------------------|
| 33.844227 | 27.29 | 22.72 | - | - | 40.00 | -17.28 | 125.10 | 1.72 | 17.88 | H | QP |
| 177.875407 | 27.79 | 23.42 | - | - | 43.50 | -20.08 | 148.10 | 1.00 | 16.51 | H | QP |
| 209.100713 | 45.04 | 41.94 | - | - | 43.50 | -1.56 | 306.00 | 1.73 | 12.50 | H | QP |
| 414.02465 | 50.03 | 46.00 | - | - | 46.00 | 0.00 | 212.70 | 1.00 | 17.91 | H | QP |
| 466.410547 | 50.02 | 45.51 | - | - | 46.00 | -0.49 | 305.50 | 1.00 | 19.40 | H | QP |
| 636.39861 | 40.38 | 35.50 | - | - | 46.00 | -10.50 | 315.10 | 1.00 | 22.46 | H | QP |
| 33.210988 | 29.06 | 24.91 | - | - | 40.00 | -15.09 | 270.50 | 1.00 | 18.05 | V | QP |
| 72.00085 | 30.70 | 28.04 | - | - | 40.00 | -11.96 | 360.00 | 1.00 | 7.90 | V | QP |
| 168.820873 | 28.47 | 24.61 | - | - | 43.50 | -18.89 | 148.10 | 2.90 | 16.48 | V | QP |
| 209.080147 | 43.01 | 39.81 | - | - | 43.50 | -3.69 | 268.90 | 1.73 | 12.50 | V | QP |
| 471.055093 | 50.90 | 45.55 | - | - | 46.00 | -0.45 | 236.00 | 1.08 | 19.52 | V | QP |
| 518.214163 | 46.08 | 41.55 | - | - | 46.00 | -4.45 | 212.40 | 1.00 | 20.46 | V | QP |
| Frequency and Limit band: | | | 30Mz-10GHz / FCC 15.209 / RSS-GEN | | | | | | | | |
| RBW and Limit detector: | | | Below 1GHz: RBW= 100kHz, Quasi-Peak Limit / above 1GHz: RBW= 1MHz, Peak and CISPR Average Limit | | | | | | | | |
| Results | | | PASS | | | | | | | | |

IDS1015

Graphical representation of Radiated Disturbance Measurement (Peak detection, Anechoic chamber pre-scan, 9kHz-30MHz / 3m / Parallel & Perpendicular & Horizontal antenna position / Transmit mode)



Notes: Pre-scan graph only for identification purpose. Nominal power LF mode. (24V or POE power supply)

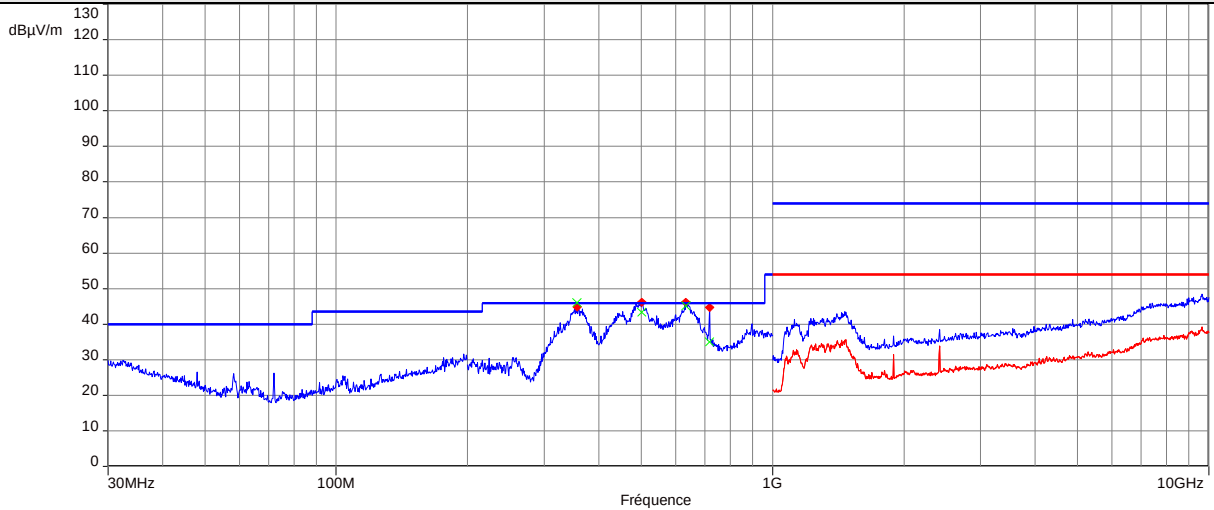
| | |
|------------------------------|--|
| Frequency band investigated: | 9kHz-30MHz |
| Unit : | dBμV/m |
| RBW : | 200Hz (9kHz-150kHz)
9kHz (150kHz-30MHz) |
| Antenna polarization : | Parallel & Perpendicular to measurement axis |

| IDS1015 | | | | | | | | |
|---|----------------|----------------------|--|--------------|------------|-------------|--------------------|--------------------|
| Tabulated Results for Unwanted emissions (9kHz-490kHz) | | | | | | | | |
| FREQ | RF field @ 10m | RF field @ 300m | Limit @ 300m | Detector | Margin | Ant. angle | Table angle | Correc. Fact. (CF) |
| MHz | dBµV/m | dBµV/m | dBµV/m | Pk / QP / AV | dB | Degree | Degree | dB |
| 0,125 | 68.5 | 9.4 ⁽¹⁾ | 45.6 | Pk | -36.2 | 90 | 0 | 11.6 |
| 0,125 | 64.5 | 5.4 ⁽¹⁾ | 25.6 | AV | -20.2 | 90 | 0 | 11.6 |
| 0.250 | 62.6 | 3.5 ⁽¹⁾ | 39.6 | Pk | -36.1 | 90 | 0 | 11.5 |
| 0.250 | 49.5 | -9.6 ⁽¹⁾ | 19.6 | AV | -29.2 | 90 | 0 | 11.5 |
| 0.375 | 54.5 | -4.6 ⁽¹⁾ | 36.1 | Pk | -40.7 | 90 | 0 | 11.5 |
| 0.375 | 42.2 | -16.9 ⁽¹⁾ | 16.1 | AV | -33.0 | 90 | 0 | 11.5 |
| Supplementary information:
Frequency list measured on the Open Area Test Site has been created with pre-scan results.
Worst case results for all communication modes. | | | | | | | | |
| Frequency band investigated: | | | 9kHz-490kHz | | | | | |
| RBW: | | | 200Hz (9kHz-150kHz)
9kHz (150kHz-30MHz) | | | | | |
| Measurement distance: | | | 10m | | | | | |
| Final measurement detector: | | | Peak / Quasi-Peak / Average | | | | | |
| Limit: | | | FCC Part 15.209 / RSS-Gen | | | | | |
| Note: | | | CF: Correction factor = Antenna factor + Cable loss
(1) : Measure have been done at 10m distance and corrected according to requirements of 15.209.e / RSS-Gen clause 6.5)
(M@300m = M@10m-59.1dB)
Loop antenna used and rotated about its axis to maximize any emission. | | | | | |
| Tabulated Results for Unwanted emissions (490kHz-30MHz) | | | | | | | | |
| FREQ | RF field @ 30m | Limit @ 30m | Detector | Margin | Ant. angle | Table angle | Correc. Fact. (CF) | |
| MHz | dBµV/m | dBµV/m | Pk / QP | dB | Degree | Degree | dB | |
| All levels are at least 10dB below applicable limits | | | | | | | | |
| Supplementary information:
Frequency list measured on the Open Area Test Site has been created with pre-scan results.
Worst case results for all communication modes. | | | | | | | | |
| Frequency band investigated: | | | 490kHz-30MHz | | | | | |
| RBW: | | | 9kHz (150kHz-30MHz) | | | | | |
| Measurement distance: | | | 10m | | | | | |
| Final measurement detector: | | | Quasi-Peak | | | | | |
| Limit: | | | FCC Part 15.209 / RSS-Gen | | | | | |
| Note: | | | CF: Correction factor = Antenna factor + Cable loss
(1): Measure have been done at 10m distance and corrected according to requirements of 15.209.e / RSS-Gen clause 6.5)
(M@30m = M@10m-19.1dB)
Loop antenna used and rotated about its axis to maximize any emission. | | | | | |

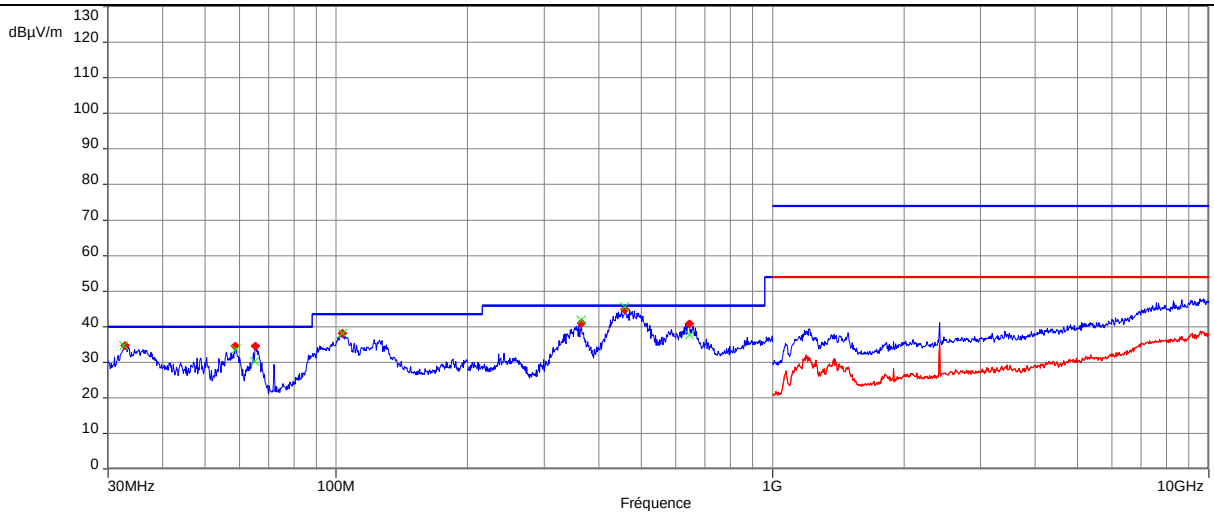
IDS1015

Graphical representation of Radiated Disturbance Measurement (Peak detection, Full Anechoic Chamber pre-scan, 30MHz-10GHz / 3m / Transmit mode / Worst position)

HORIZONTAL POLARIZATION



VERTICAL POLARIZATION

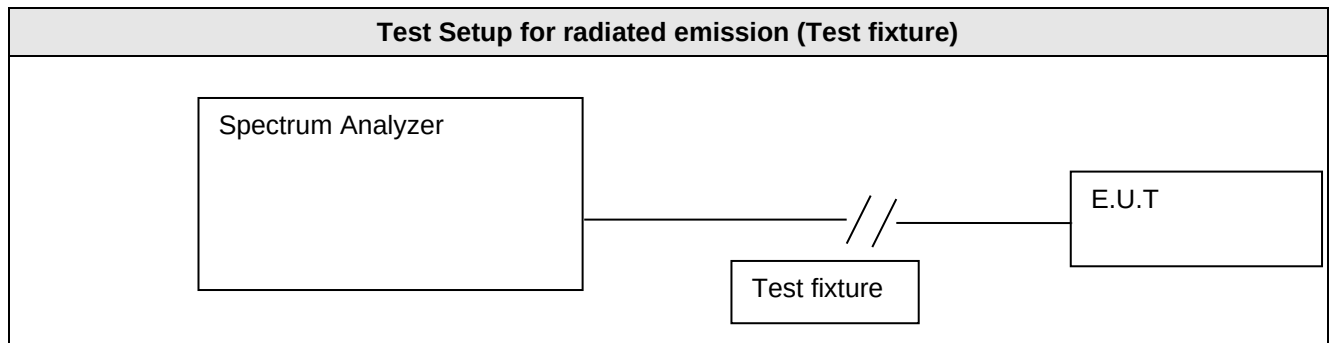


Pre-scan graph only for identification purpose.

| FREQ (MHz) | Field Strength 3m PK (dBμV/m) | Field Strength 3m QP or AV (dBμV/m) | Limit PK (dBμV/m) | Margin Peak (dBμV/m) | Limit QP or AV (dB) | Margin QP or AV (dBμV/m) | Table angle (°) | Ant height (m) | Total factor (dB) | Pol (H/V) | Detector & Limit QP |
|---------------------------|-------------------------------|-------------------------------------|---|----------------------|---------------------|--------------------------|-----------------|----------------|-------------------|-----------|---------------------|
| 356.166453 | 46.05 | 42.49 | - | - | 46.00 | -3.51 | 92.10 | 1.00 | 16.50 | H | QP |
| 501.062187 | 43.41 | 38.83 | - | - | 46.00 | -7.17 | 149.30 | 1.00 | 20.52 | H | QP |
| 632.914397 | 45.17 | 40.42 | - | - | 46.00 | -5.58 | 210.80 | 1.00 | 22.40 | H | QP |
| 717.302427 | 34.98 | 29.09 | - | - | 46.00 | -16.91 | 147.10 | 2.89 | 24.31 | H | QP |
| 32.649637 | 34.76 | 29.63 | - | - | 40.00 | -10.37 | 235.70 | 1.00 | 18.18 | V | QP |
| 58.861428 | 33.72 | 28.60 | - | - | 40.00 | -11.40 | 360.00 | 1.00 | 8.33 | V | QP |
| 65.13304 | 30.23 | 24.65 | - | - | 40.00 | -15.35 | 360.00 | 1.00 | 7.09 | V | QP |
| 103.210797 | 38.21 | 33.43 | - | - | 43.50 | -10.07 | 360.00 | 1.00 | 11.05 | V | QP |
| 364.863193 | 41.95 | 37.98 | - | - | 46.00 | -8.02 | 241.60 | 1.49 | 16.54 | V | QP |
| 459.256357 | 45.58 | 40.65 | - | - | 46.00 | -5.35 | 212.10 | 1.00 | 19.12 | V | QP |
| 644.47005 | 37.66 | 32.47 | - | - | 46.00 | -13.53 | 46.70 | 2.91 | 22.54 | V | QP |
| Frequency and Limit band: | | | 30Mz-10GHz / FCC 15.209 / RSS-GEN | | | | | | | | |
| RBW and Limit detector: | | | Below 1GHz: RBW= 100kHz, Quasi-Peak Limit / above 1GHz: RBW= 1MHz, Peak and CISPR Average Limit | | | | | | | | |
| Results | | | PASS | | | | | | | | |

12. 99% and -20dB Occupied Bandwidth

| TEST: Occupied Bandwidth / 15.215 – RSS-Gen | | | Verdict |
|---|----------------------------|-----------------|---------|
| <u>Method:</u> The setup is in an anechoic chamber. The spectrum analyzer is connected to the measuring antenna.
The RBW is set at 1kHz, with VBW ≥ 3 x RBW.
The SPAN is wide enough to capture all products of the modulation process.
A MaxHold Peak detector is used.
Measures are performed with OBW 99% & -20dB function of the spectrum analyser. | | | Pass |
| Laboratory Parameters: | Required prior to the test | During the test | |
| Ambient Temperature | 10 to 40 °C | 20°C | |
| Relative Humidity | 10 to 90 % | 55% | |
| Supplementary information:
Test location: SMEE
Test date: March 4 th , 2024. Tested by C. KERMICHE
Power supply voltage: 24V DC | | | |

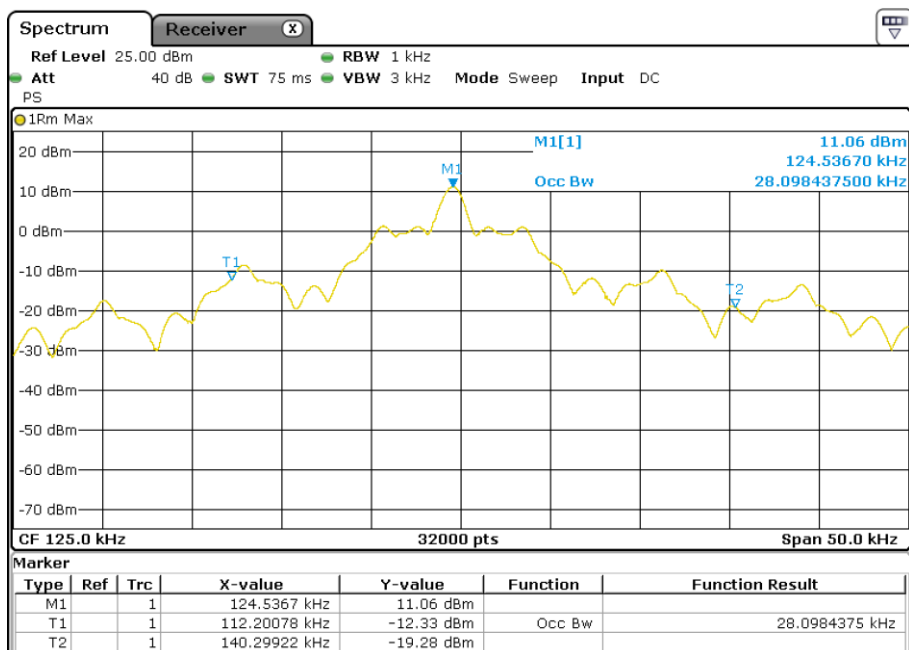


| IDS1014 | |
|--|------------------|
| Tabulated Results for 99% Occupied Bandwidth | |
| Frequency
(kHz) | Results
(kHz) |
| 124.6 | 28.098 |
| Tabulated Results for -20dB Bandwidth | |
| Frequency
(kHz) | Results
(kHz) |
| 124.6 | 11.948 |

| IDS1015 | |
|--|------------------|
| Tabulated Results for 99% Occupied Bandwidth | |
| Frequency
(kHz) | Results
(kHz) |
| 124.6 | 23.845 |
| Tabulated Results for -20dB Bandwidth | |
| Frequency
(kHz) | Results
(kHz) |
| 124.6 | 11.589 |

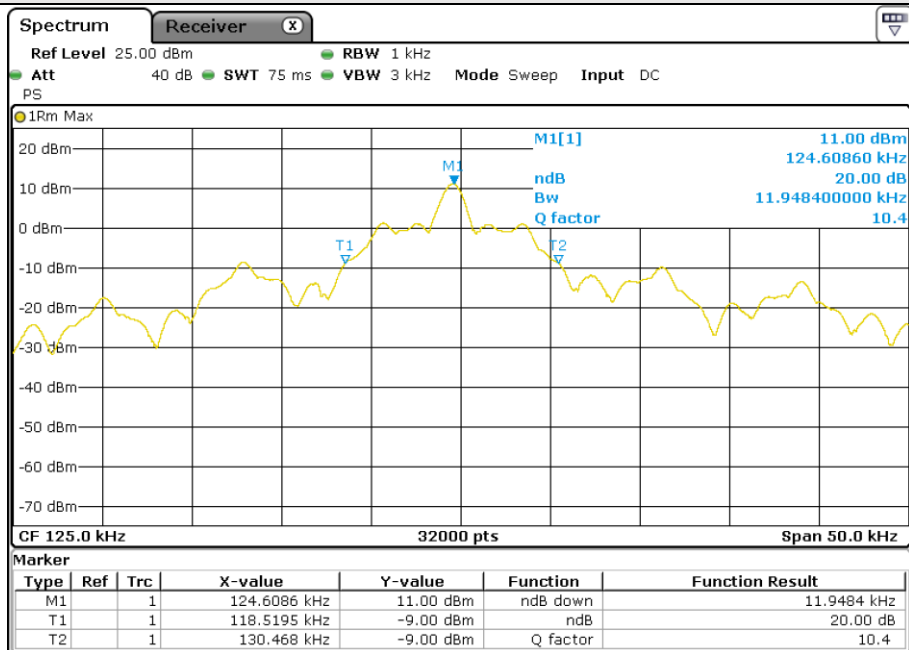
IDS1014

Graphical representation of Occupied Bandwidth



99% Occupied Bandwidth

Graphical representation of -20dB Occupied Bandwidth



-20dB Occupied Bandwidth

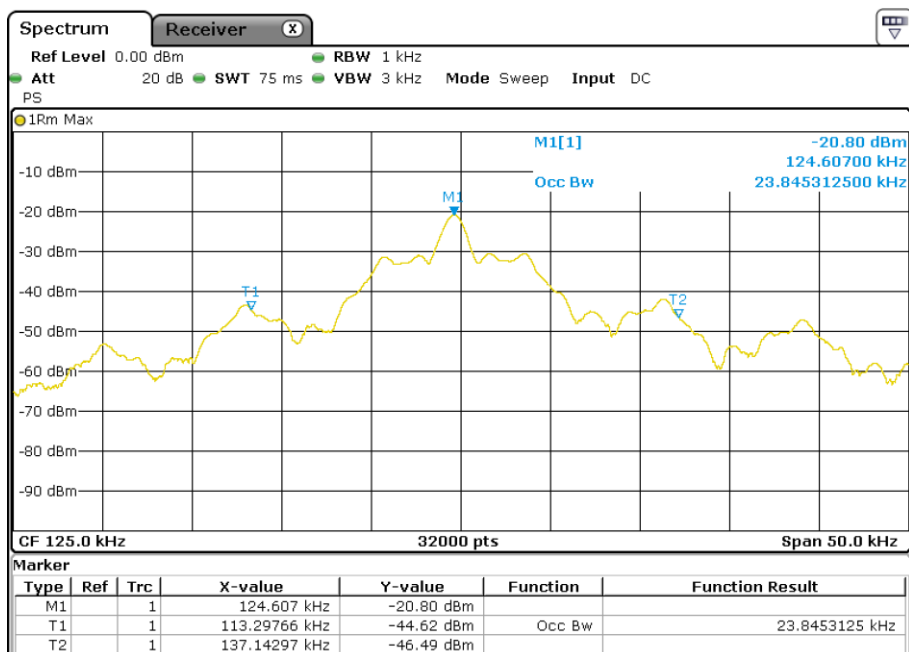
Frequency: 125kHz

RBW / VBW: 1kHz / 3kHz

Measurement detector: Peak

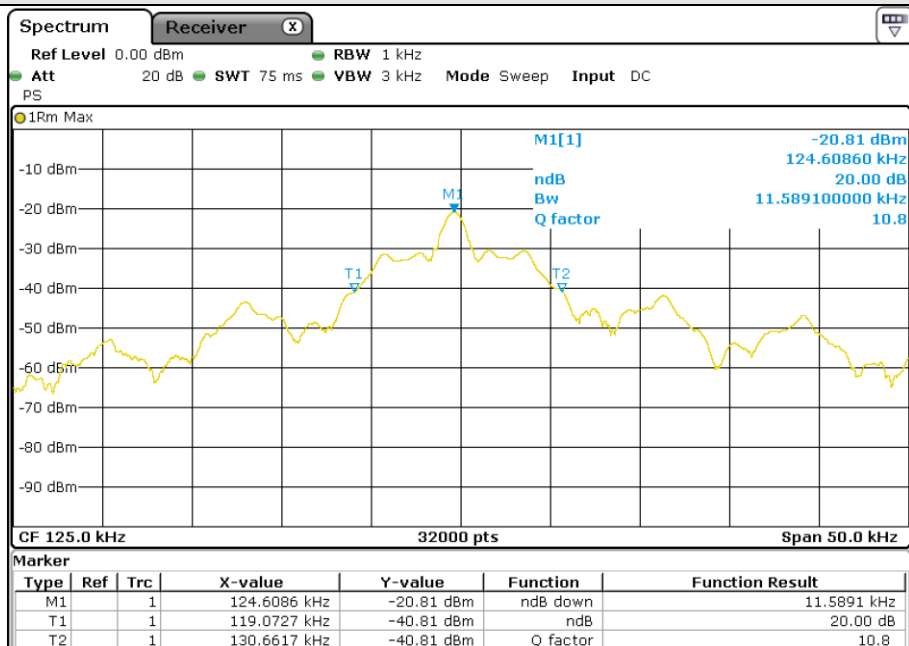
IDS1015

Graphical representation of Occupied Bandwidth



99% Occupied Bandwidth

Graphical representation of -20dB Occupied Bandwidth



-20dB Occupied Bandwidth

| | |
|-----------------------|-------------|
| Frequency: | 125kHz |
| RBW / VBW: | 1kHz / 3kHz |
| Measurement detector: | Peak |

13. Test Equipment List

| Description | Manufacturer | Model | ID | Date Cal. | Nxt. Cal. |
|----------------------|------------------|---------------|-------------|-----------|-----------|
| Loop antenna | EMCO | 6502 | ANT-101-009 | 2023/9 | 2025/9 |
| Log-periodic antenna | EMCO | 3146 | ANT-191-019 | 2024/3 | 2026/3 |
| Biconnic antenna | COM-POWER | AB- 900A | ANT-201-021 | 2023/01 | 2025/1 |
| Horn antenna | COM-POWER | AH-118 | ANT-101-004 | 2021/7 | 2024/7 |
| High-Pass filter | Wainwright Inst. | HK6-948-1200 | FIL-141-004 | 2023/4 | 2024/4 |
| RF cable | HUBER+SUHNER | SF126E / 2m | CAB-231-043 | 2023/4 | 2024/4 |
| RF cable | HUBER+SUHNER | SF104E / 5.3m | CAB-231-044 | 2023/4 | 2024/4 |
| RF cable | HUBER+SUHNER | SF126E / 7m | CAB-231-045 | 2023/4 | 2024/4 |
| Semi anechoic room | COMTEST | 218292 | CAG-201-002 | 2022/4 | 2025/2 |
| FS OATS | Div | 10m | SIT-201-002 | - | - |
| Antenna mast | Innco- Systems | MA4640-XP-ET | MAT-201-002 | - | - |
| Turntable | Innco- Systems | CT0800 | PLA-141-001 | - | - |
| Turntable | Innco- Systems | DS1500-S-1t | PLA-201-003 | - | - |
| Pre-amplifier | COM-POWER | 1-18GHz | PRE-221-005 | 2023/4 | 2024/4 |
| Measuring Rec | Rohde&Schwarz | ESRP | REC-151-002 | 2021/12 | 2024/6 |
| Spectrum analyzer | Rohde&Schwarz | FSV40 | ASP-171-004 | 2021/10 | 2024/4 |
| EMC Software | NEXIO | BAT EMC | SOF-101-001 | - | - |
| Ref. Comb generator | SMEE | EMR-10M | REF-111-002 | - | - |
| Ref. Comb generator | SMEE | EMR 1-6GHz | REF-141-003 | - | - |

END OF REPORT.