Test report issued under the responsibility of:
EMITECH MONTPELLIER laboratory
MRA US-EU Designation Number: FR0006 (FCC#: 954701)
Canadian CAB Identifier: FR0003 (ISED#: 4379C)

RADIO TEST REPORT

FCC Part 15
FCC Part 15.225
RSS-210_Issue 10: 2019
RSS/CNR-Gen, Issue 5: 2019

Company	**STid**
Address	20 PA des Pradeaux - Boulevard S. Allende 13850 GREASQUE - FRANCE

Test item description	**RFID Reader Module**
Trade Mark	STid
FCC ID	OVNAC7
IC	10520A-MS2
Manufacturer	STid
Model/Type reference	ARC-AC7 / MS2-A
Ratings	4.5Vdc to 9 Vdc

Testing Laboratory	**EMITECH MONTPELLIER laboratory**
Address	145 rue de Massacan 34740 VENDARGUES FRANCE

Report Reference No	**RR410-20-100109-1A**
Test procedure	FCC IC Certification
Diffusion	Mr BERLAND
Applicant's name	STid
Date of issue	May 13, 2020
Total number of pages	36
Revision	0
Modified page(s)	Creation
Compiled by	Olivier AELBRECHT
Approved by (+ signature)	David MONTAULON (Technical Manager)

Duplication of this test report is only permitted for an integral photographic facsimile. It includes the number of pages referenced here above. This document is the result of testing a specimen or a sample of the product submitted. It does not imply an assessment of the conformity of the whole manufactured products of the tested sample.

REPORT INDEX:

REVISION HISTORY:

Revision	Date	Modified pages	Modifications
0	May 13, 2020	/	Creation

1. GENERAL INFORMATIONS

This document submits the results of Radio tests performed on the equipment **RFID Reader Module MS2-A** (denominated hereafter E.U.T.: equipment under test) according to document(s) listed in §2 of this test report.

TESTING PROCEDURE AND TESTING LOCATION:

Testing Location	:	EMITECH MONTPELLIER laboratory & Open Area Test Site in SALINELLES (30)
Address	:	145 rue de Massacan 34740 VENDARGUES FRANCE
Test procedure.	:	FCC IC Certification
Tested by	:	Olivier AELBRECHT
Test supervisor	:	None
Date of receipt of test item	:	N/A
Date (s) of performance of tests	:	March the 18th and the 19th of 2020

APPLICANT'S GENERAL INFORMATIONS:

Company name	:	STid
Company address.	:	20 PA des Pradeaux - Boulevard S. Allende 13850 GREASQUE - FRANCE
Person(s) present during the tests.	:	No representative for company attended the tests.
Responsible.	:	Mr BERLAND

GENERAL REMARKS:

The information in italics is declared by the manufacturer and is under his responsibility
The test results presented in this report relate only to the object tested.
The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.
Throughout this report the decimal separator is point.

POSSIBLE TEST CASE VERDICTS:

Test case does not apply to the test object.	:	N/A
Test case not performed	:	N/P
Test object does meet the requirement.	:	P (Pass)
Test object does not meet the requirement.	:	F (Fail)

DEFINITIONS AND ABBREVIATIONS:

E.U.T.	Equipement under test	AE	Ancillary equipment	Pk	Peak detector
RBW	Resolution bandwidth	VBW	Video bandwidth	QP	Quasi-peak detector
OATS	Open area test site	FAR	Full anechoic room	Av	Average detector
VP	Vertical Polarization	HP	Horizontal Polarization	RMS	Root Mean Square
RF	Radio frequency	NTR	Nothing to report	N/C	Not communicated

2. REFERENCE DOCUMENT(S)

NORMATIVE REFERENCES:

The following referenced documents are necessary for the application of the present test report.

FCC Part 15
Code of federal regulations. Title 47- Telecommunication Chapter 1- Federal Communication Commission. Part 15- Radio frequency devices Subpart B- Unintentional Radiators. Limits and methods of measurement of radio disturbance. Characteristic of information technology equipment

FCC Part 15.225
Operation within the bands 13.553-13.567MHz

RSS-210_Issue 10: 2019
Licence-exempt Radio Apparatrus: Category I Equipment

RSS/CNR-Gen, Issue 5: 2019
General Requirements for Compliance of Radio Apparatus

ANSI C 63.10: 2013
American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

ANSI C 63.4: 2014
American National Standard for Methods of measurement of Radio-Noise from low-voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz W

Although the product standard uses obsolete technical standards, the latest versions of standards achievable by the laboratory will be used for testing.

INFORMATIVE REFERENCES:

The following referenced documents are not necessary for the application of the present test report but they assist the user with regard to a particular subject area.

3. EQUIPMENT TECHNICAL DESCRIPTION

3.1. Test Conditions

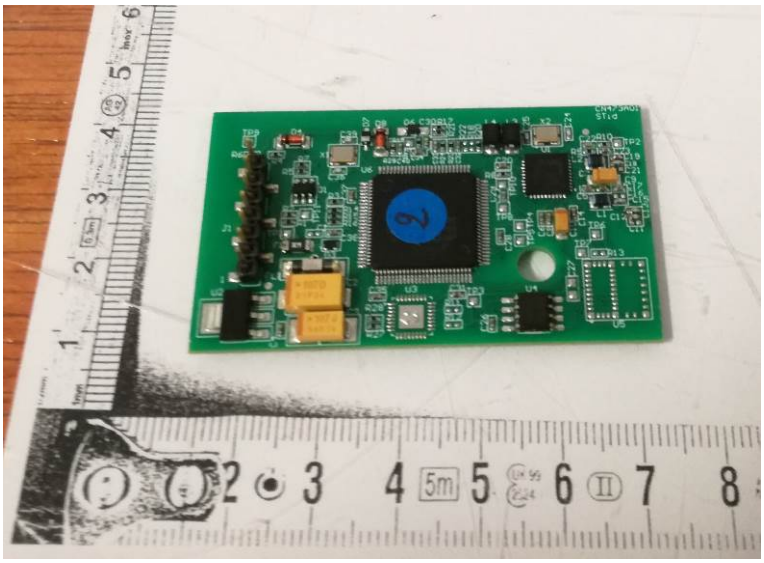
Test item description.	:	RFID Reader Module
Model/Type reference.	:	ARC-AC7 / MS2-A
Trade Mark.	:	STid
Serial number (S/N).	:	S19311000
Part number (P/N).	:	Not communicated
Software version.	:	*N/A*
Firmware version.	:	*SZ260A*
Type of sample.	:	Pre-serial
Function(s).	:	13.56MHz contactless reader
Manufacturer name.	:	STid
Address.	:	20 PA des Pradeaux - Boulevard S. Allende 13850 GREASQUE - FRANCE

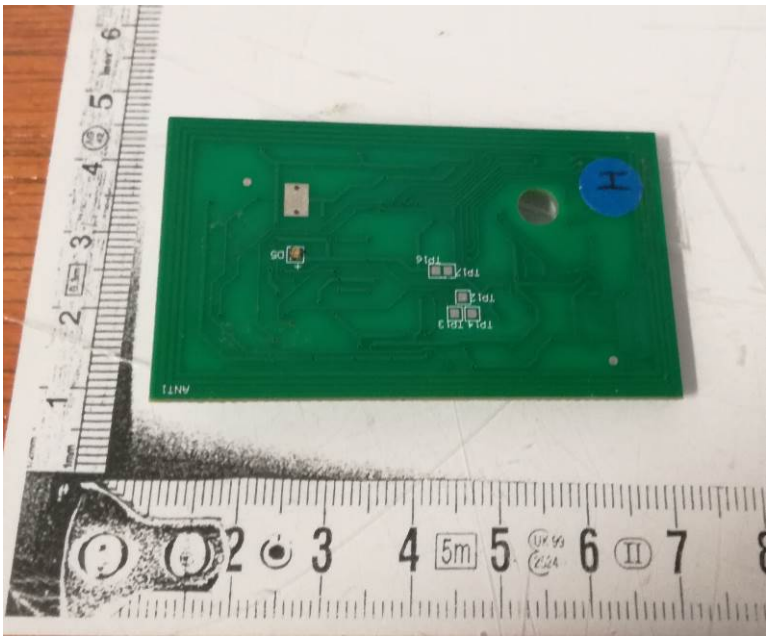
General product information:

N/A

3.2. EUT Marking Plate

3.3. EUT General view





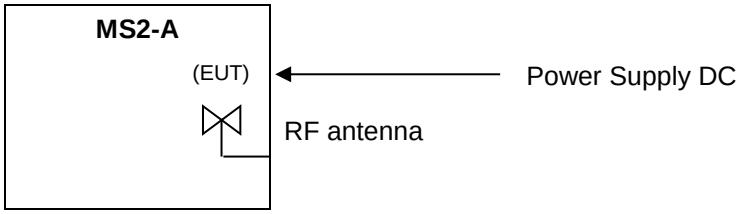
3.4. EUT Mechanical and Electrical Design

Power supply. ..... : *5Vdc*
Power supply range. ..... : *4.5Vdc to 9 Vdc*
Power type. ..... : *DC*
Power (W). ..... : *0.9 (Max)*
Nominal current (A). ..... : *180mA (Max)*
Dimensions (L x W x H) (m). ..... : *0.064 x 0.035 x 0.00502*
Weight (kg). ..... : *10g*
Temperature range (°C). ..... : *-30°C to 70°C*
Ground bounding strap. ..... : *No*

Comments:

N/A

3.5. EUT Input/Output ports



PORT	NAME	TYPE	LENGHT	CABLE TYPE	COMMENTS
0	Main frame	N/E	N/A	N/A	
1	Power Supply DC	DC	N/A	N/A	5Vdc
2	RF antenna	RF	N/A	N/A	PCB printed

AC/DC : AC/DC Converter port
I/O.....: Input or Output port
N/E .....: Non Electrical port
AC.....: Alternative current port
TP .....: Telecommunication port
DC .....: Discontinuous current port
RF.....: Radio frequency port

3.6. Supporting Equipment Used During Test

Sample subject to the tests was tested with following equipment.

PRODUCT TYPE	MANUFACTURER	MODEL	N°EMITECH / COMMENTS
STid Starter-kit	STid	Version 3.0	Used during radiated tests

(EA)

3.7. EUT Radio Specifications

a) General Informations

According to manufacturer's declarations :

EUT type..... : *Transmitter*
Technology..... : *NFC*
Environmental profile..... : *Data transmissions*
Temperature range..... : *-30°C to +70°C*
Antenna type ..... : *Integrated (Internal PCB Antenna)*
Antenna Gain..... : *Not communicated*

Comments:

N/A

b) Transmitter Paramitters (Tx)

Frequency bands..... : *13.56MHz +/- 7kHz*
RF Power..... : *Not communicated*
Number of channels / Separation..... : *1 channel*
Modulation type ..... : *RFID*
Duty cycle ..... : *N/A*
Tested frequency..... : *13.56MHz*

c) Receiver Parameters (Rx)

Frequency bands..... : *13.56MHz*
Category/Class ..... : *N/A*
Bandwidth..... : *N/A*

4. RESULT SUMMARY

TEST DESIGNATION	SEVERITY	VERDICT	COMMENTS
General			
Labeling requirements		N/P	See certification documents
Information to user		N/P	See certification documents
Home-built devices		N/A	
Kits		N/A	
Special Accessories		N/P	See certification documents
Inspection by the Commission		N/A	
Measurement standards		PASS	
Test procedure for CPU boards and computer power supplies		N/A	
Frequency range of radiated measurements		PASS	
Measurement detector functions and bandwidths		PASS	
Transition provisions for compliance with the rules		N/P	See certification documents
Intentional radiators			
Equipment authorization requirement		PASS	Transmitter part is subject to Certification procedure
Certified operating frequency range		N/A	
Antenna requirement		PASS	Dedicated integral antenna
External radio frequency power amplifiers and antenna modifications		N/A	
Restricted bands of operation		PASS	
Conducted limits	Class B	PASS	
Radiated emission limits; general requirements	Class B	PASS	
Tunnel radio systems		N/A	
Modular transmitters		N/A	
Cable locating equipment		N/A	
Cordless telephones		N/A	
Additional provisions to the general radiated emission limits		PASS	
Operation within the band 13.110-14.010 MHz.		PASS	
- Field strength in the band 13.553-13.567 MHz		PASS	
- Field strength in the band 13.410-13.553 MHz and 13.567-13.710 MHz		PASS	
- Field strength in the band 13.110-13.410 MHz and 13.710-14.010 MHz		PASS	
- Field strength outside the band 13.110-14.010 MHz		PASS	
- Frequency tolerance of the carrier signal		PASS	

TEST DESIGNATION	SEVERITY	VERDICT	COMMENTS
- **Radio frequency powered tag**		**N/A**	**EUT is an RFID reader**

Sample subject to the test complies for tests done with the requirements of the reference document(s) listed in §2 of this test report and, where applicable, with deviation(s) specified in this document.

To declare, or not, the compliance with the specifications, it was not explicitly taken into account of uncertainty associated with the results.

5. MEASUREMENT UNCERTAINTY

PARAMETER	MAXIMAL EMITECH UNCERTAINTY	MINIMAL STANDARD UNCERTAINTY
Radio frequency	± 1 x 10^{-7}	±1 x 10^{-7}
Occuped bandwidth		
RF power	± 3.8 %	± 5 %
Adjacent channel power	± 1.6 dB	± 3 dB
Sensibility of receiver (conducted)	± 2.0 dB	± 3 dB
Conducted emission (spurious)		
f ≤ 1 GHz	± 0.8 dB	± 3 dB
1 GHz - 12.75 GHz	± 1.6 dB	
Radiated emission (PAR / PIRE / RNE)		
f ≤ 62.5 MHz	± 5.1 dB	± 6 dB
62.5 MHz - 1 GHz	± 5.1 dB	± 6 dB
1 GHz - 18 GHz	± 5.2 dB	± 6 dB
18 GHz – 26 GHz	± 5.1 dB	± 6 dB
26 GHz – 40 GHz	± 5.4 dB	± 6 dB
180-1000 MHz / 1 – 12.75 GHz (EN 301 908-1)	± 3.0 / 2.9 dB	± 3 dB
RF power (EN 300328 / EN 301893)	± 5.3 dB	± 6 dB
PIRE and power spectral density with diode	± 5.2 dB	± 6 dB
Radiated emission (magnetic field)		
9kHz – 30MHz	± 3 dB	± 6 dB
RF level for a given BER	± 0.8 dB	± 1.5 dB
Supply voltages	± 3 %	± 3 %
Temperature	± 1 °C	± 1°C
Humidity	± 5 %	± 5 %
Time / Duty cycle	± 4.4 %	± 5 %
Adaptivity	± 2.9 dB	/
Radiated emission (electric field for FCC standard)		
9kHz – 30MHz	± 2.7 dB	/
30MHz – 1GHz	± 5.0 dB	/
1GHz – 18GHz	± 5.6 dB	/
18GHz – 26GHz	± 5.7 dB	/
26GHz – 40GHz	± 5.7 dB	/

For the calcul of expanded uncertainty, the confidence interval is 95 % (k=2).

6. TEST CONDITIONS AND RESULTS

6.1. Conducted voltage emission (measurement)

Reference standard:	FCC part 15.107, 15.207 and RSS/CNR-Gen
Test method:	ANSI C63.4: 2014

General test setup: EUT is set on an insulating support at 80cm above the horizontal ground reference plane and 40cm to the Vertical reference ground plane. All power was connected to the system through Artificial Mains Network (AMN). The AMN is placed at 80cm from the boundary of the EUT and bonded to a ground reference plane.

All tested telecommunications lines (if applicable) were connected to an Asymmetric Artificial Network (AAN) and conducted voltage measurements on telecommunications lines were made at the output of the AAN.

Where an AAN was not appropriate or available, measurements were made using a Capacitive Voltage Probe and/or a Current probe.

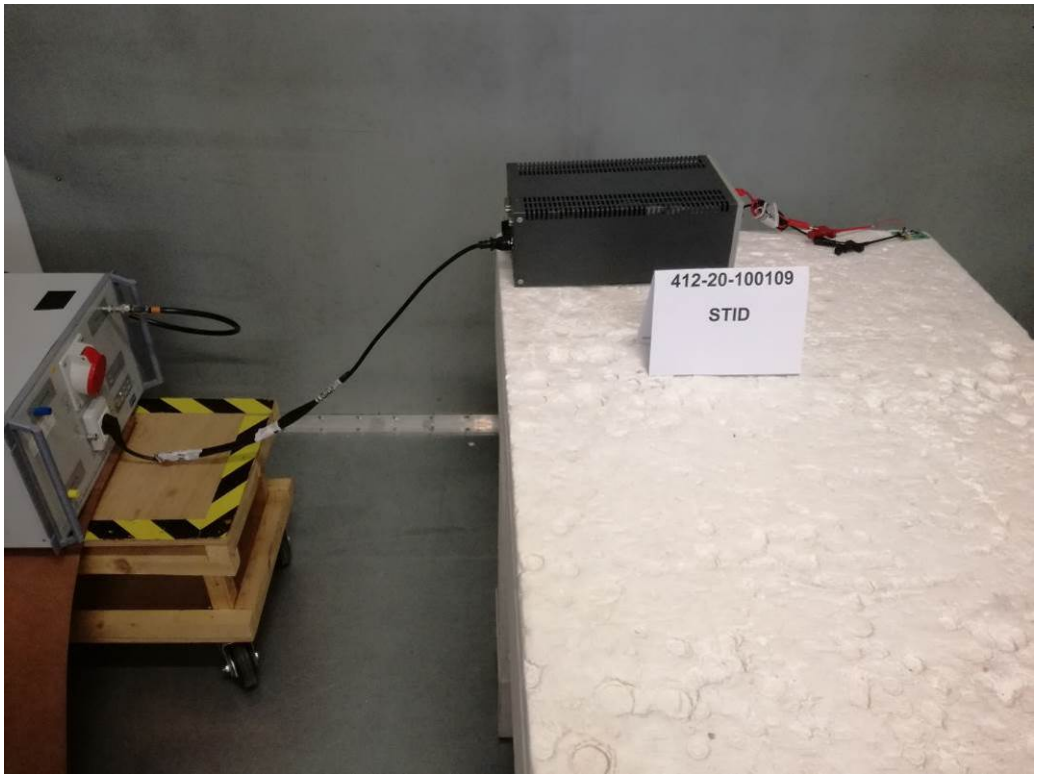
Additionnal ground terminals (if any) are connected to earth terminal of the AMN.

TESTED CABLE	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
AC power source	150kHz-30MHz	Class B	EMI4567	**PASS**
AC power source / RF on 50ohms load	150kHz-30MHz	Class B	EMI4568	**PASS**

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	*See Graph(es)*
Relative Humidity	30 to 60 %	*See Graph(es)*
Atmospheric pressure	N/A	*See Graph(es)*
Test method deviation: N/A		
Supplementary information: EUT power supply is done trought a “standard power supply” wich meets FCC and RSS requirements. In order to avoid radiated measurement phenomenons, RF antenna is replaced by a 50Ohms equivalent load.		

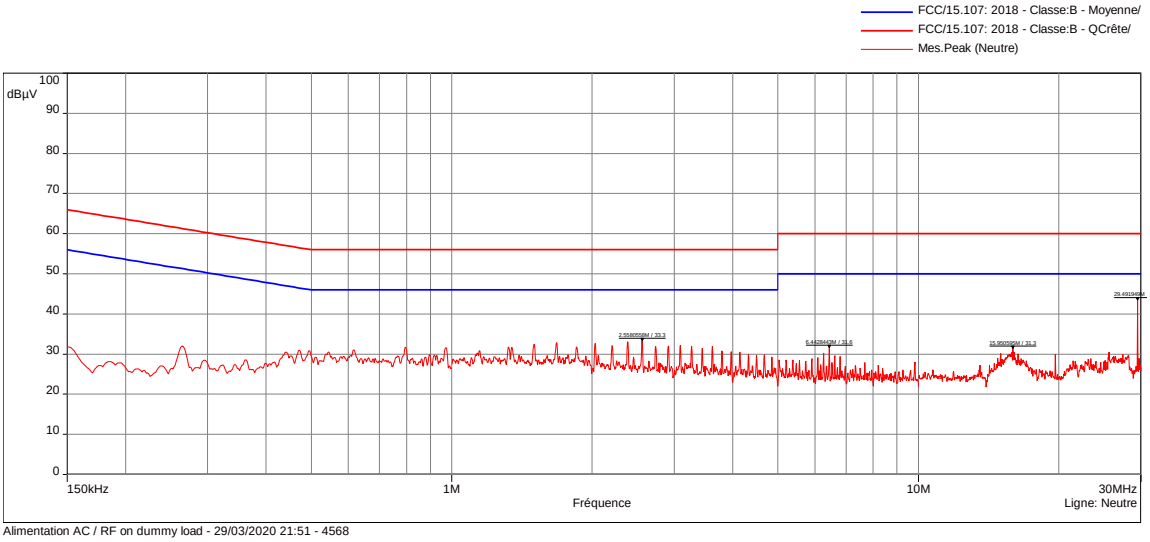
TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
AC power source	CHROMA	61603	12532	25/07/2019	25/09/2020
Cable	N	3m	16415	13/05/2019	13/07/2021
Ground plane	EMITECH	Test area	11569		
LISN	AFJ	LT32C\10	12007	11/01/2019	11/09/2020
Multimeter	FLUKE	8808A	12446	20/07/2019	20/09/2020
Power supply	TTi	TSX-1820P	4365		
Receiver	Rohde & Schwarz	FPL1003	16027	16/01/2019	16/09/2020
Software	Nexio		0000		
Thermohygrometer	Testo	608-H1	7562	25/01/2019	25/03/2021
Thermohygrometer	Bioblock Scientific	Météostar	0963	25/01/2019	25/03/2021

BAT-EMC software version: V3.18.0.26 Blank cells = Permanent validity

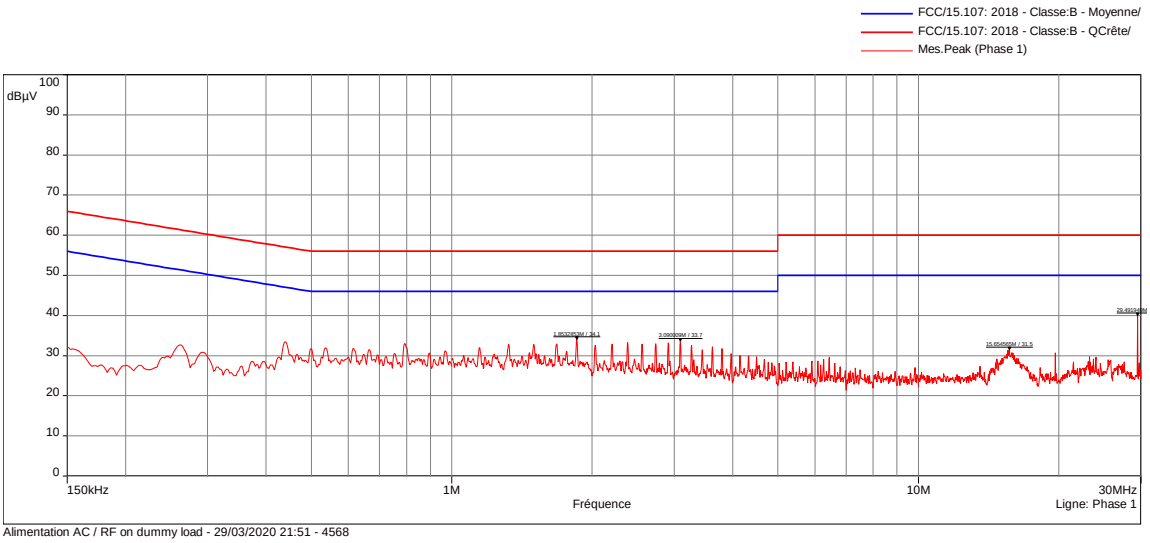
TEST SETUP PHOTO(S)


CONDUCTED EMISSION (MEASUREMENT) - TABULATED RESULTS							
AC POWER SOURCE / RF ON 50OHMS LOAD						EMI4568	
Terminal	**Test Frequency (MHz)**	**Meter Reading dB (µV)**	**Detector (Pk/QP/Av)**	**Gain/Loss Factor (dB)**	**Level dB (µV)**	**Avg Limit dB (µV)**	**Margin (dB)**
Neutral	2.558	22.88	Pk	10.45	33.33	46	-12.67
Neutral	6.443	21.06	Pk	10.49	31.55	50	-18.45
Neutral	15.951	20.9	Pk	10.44	31.34	50	-18.66
Neutral	29.492	33.01	Pk	10.43	43.44	50	-6.56
Phase	1.853	23.63	Pk	10.43	34.06	46	-11.94
Phase	3.090	23.21	Pk	10.46	33.67	46	-12.33
Phase	15.655	21.03	Pk	10.45	31.48	50	-18.52
Phase	29.492	29.54	Pk	10.43	39.97	50	-10.03
Supplementary information: N/A							

CONDUCTED EMISSION (MEASUREMENT) - GRAPH			
ALIMENTATION AC / RF ON 50OHMS LOAD		EMI4568	
EUT mode:	Permanent modulated emission mode	**T (°C):**	22.5
Test Date:	19/03/2020	**H (%):**	31.4
Test Operator:	OAT	**P (hPa):**	1004



Alimentation AC / RF on dummy load - 29/03/2020 21:51 - 4568



Alimentation AC / RF on dummy load - 29/03/2020 21:51 - 4568

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Neutral	150kHz-1MHz	10kHz	30kHz	Peak
Neutral	1MHz-10MHz	10kHz	30kHz	Peak
Neutral	10MHz-30MHz	10kHz	30kHz	Peak
Phase 1	150kHz-1MHz	10kHz	30kHz	Peak
Phase 1	1MHz-10MHz	10kHz	30kHz	Peak
Phase 1	10MHz-30MHz	10kHz	30kHz	Peak
Measure with:	A.M.N.			
Comments:	The 13.56MHz and 27.12MHz are due to radiated RFID signal			
EUT modification(s): RF antenna was replaced by a 50ohms load				

6.2. Occupied Bandwidth, 20 dB Bandwidth & 6dB Bandwidth

Reference standard:	FCC part 15 Radio part 15.225 & RSS/CNR-210
Test method:	ANSI C63.10: 2013
Test description: The occupied bandwidth (OBW) is the Frequency Range in which 99 % of the total mean power of a given emission falls. The residual part of the total power being denoted as β, which, in cases of symmetrical spectra, splits up into β/2 on each side of the spectrum. Unless otherwise specified, β/2 is taken as 0,5 %. The maximum occupied bandwidth includes all associated side bands above the appropriate emissions level and the frequency error or drift under extreme test conditions. EUT is connected to the measuring receiver via 50Ω attenuator(s).	

TEST CASE AND CONDITIONS	RESULT	SEVERITY	RESULT TAB.	VERDICT
OBW 99%	8.146788 kHz	< 14kHz	EMI4471	**PASS**
20dB Bandwidth	1.4808 kHz	N/A	EMI4519	**PASS**
6dB Bandwidth	458 Hz	N/A	EMI4520	**PASS**

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	20.5 °C
Relative Humidity	20 to 75 %	42.1 %
Atmospheric pressure	N/A	1009 hPa
Test method deviation: N/A		
Supplementary information:		

TEST EQUIPMENT USED					
CATEGORY	**BRAND**	**TYPE**	**IDENTIFIER**	**CAL. DATE**	**CAL. DUE**
Antenna	Emitech	1m * 1m	4290		
Attenuator	Radiall	R412710124	16490	25/06/2019	25/08/2021
Cable	N	3m	16415	13/05/2019	13/07/2021
Multimeter	FLUKE	8808A	12446	20/07/2019	20/09/2020
Power supply	TTi	TSX-1820P	4365		
Spectrum analyzer	Rohde & Schwarz	FPL1003	16027	16/01/2019	16/09/2020
Thermohygrometer	Bioblock Scientific	Météostar	0963	25/01/2019	25/03/2021
Thermometer contactless	GHM Greisinger	GMH 3710	12968	11/02/2019	11/04/2020

Blank cells = Permanent validity

MODULATION BANDWIDTH - TABULATED RESULTS				
TEST CASE	**FREQUENCIES**	**LIMITS**	**BANDWIDTH**	**RESULT TAB.**
OBW 99%	13.555831 MHz	13.553 MHz	8.146788 kHz	EMI4471
	13.563978 MHz	13.567 MHz		
20dB Bandwidth	13.559123 MHz	N/A	1.4808 kHz	EMI4519
	13.560605 MHz	N/A		
6dB Bandwidth	13.559634 MHz	N/A	458 Hz	EMI4520
	13.560092 MHz	N/A		

EUT MODIFICATIONS	OPERATOR	TEST DATE	RESULT TAB.
N/A	OAT	19/03/2020	EMI4471

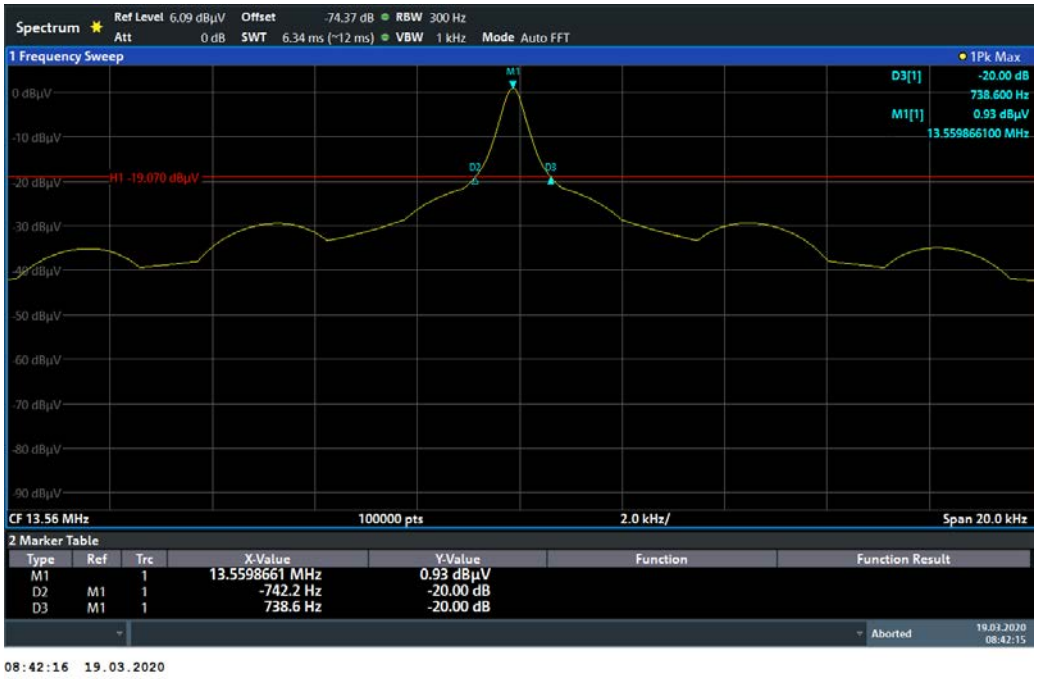
TEST SETUP PHOTO(S)

MODULATION BANDWIDTH - GRAPH		
OBW 99%		**EMI4471**
EUT mode:	PERMANENT MODULATED EMISSION MODE	
Test Date:	19/03/2020	
Test Operator:	OAT	

Results:	The system has an OBW of 8.146788 kHz

EUT modification(s): N/A

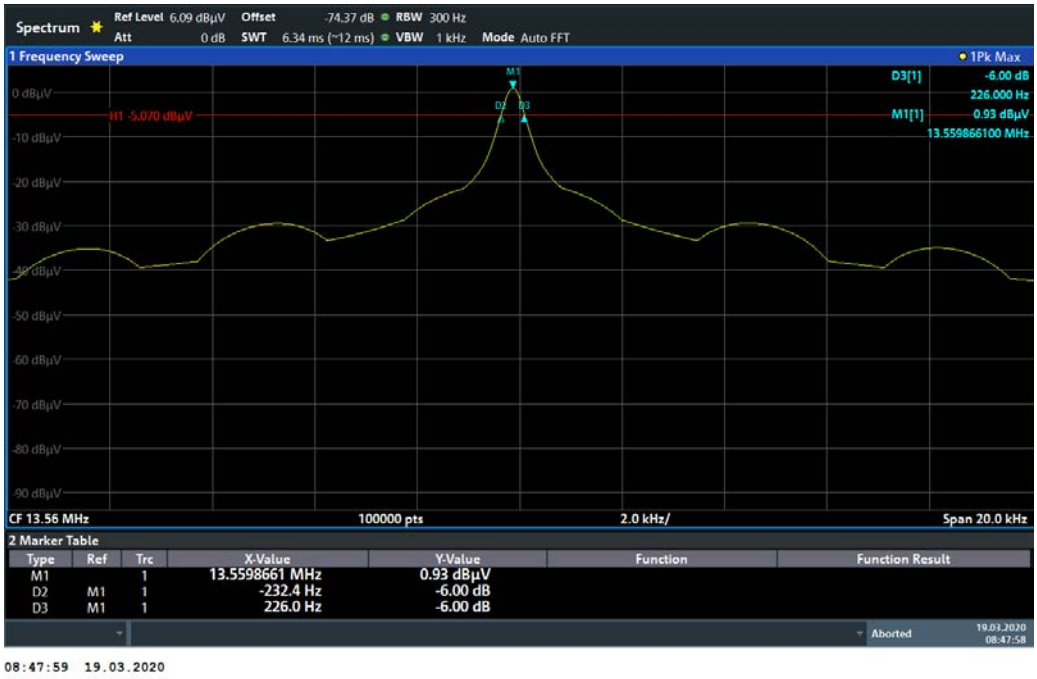
MODULATION BANDWIDTH - GRAPH		
20DB BANDWIDTH		EMI4519
EUT mode:	PERMANENT MODULATED EMISSION MODE	
Test Date:	19/03/2020	
Test Operator:	OAT	



Results:	The system has a 20dB Bandwidth of 1.4808 kHz

EUT modification(s): N/A

MODULATION BANDWIDTH - GRAPH		
6DB BANDWIDTH		EMI4520
EUT mode:	PERMANENT MODULATED EMISSION MODE	
Test Date:	19/03/2020	
Test Operator:	OAT	



Results:	The system has a 6dB Bandwidth of 458 Hz

EUT modification(s): N/A

6.3. Radiated spurious emissions

Reference standard:	FCC part 15 Radio part 15.225 & RSS/CNR-210
Test method:	ANSI C63.10: 2013

General test setup: For f <30MHz, EUT is set on an insulating support at 80cm above the ground reference plane.

Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter in a semi-anechoic chamber. The EUT was rotated 360°in order to maximize radiated levels. Test antenna was oriented in 3 axes (0°, 45° and 90°).

Final measurements (quasi-peak) were then performed in a 10-meter Open Area Test Site that complies to CISPR 16 in the same measurement conditions.

For f > 30MHz, EUT is set on an insulating support at 80cm above the ground reference plane (150cm for f >1GHz).

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 (quasi-peak or average) were then performed in a semi-anechoic chamber or Open Area Test Site that complies to CISPR 16. The EUT was rotated 360° about its azimuth and adjusting the receive antenna height from 1 to 4 m.

All frequencies were investigated, where applicable.

For portable equipements a research of maximum level is done on the 3 axes. Only the highest levels are recorded.

TESTED CONFIGURATION	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
TX-Mode / F < 30MHz / All Posiitons / 0°	9kHz-30MHz	15.209	EMI4510	**PASS**
TX-Mode / F < 30MHz / All Positions / 45°	9kHz-30MHz	15.209	EMI4512	**PASS**
TX-Mode / F < 30MHz / All Positions / 90°	9kHz-30MHz	15.209	EMI4513	**PASS**
Tx mode / 30MHz to 1GHz / All Positions	30MHz-1GHz	15.209	EMI4516	**PASS**

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	*See Graph(es)*
Relative Humidity	20 to 75 %	*See Graph(es)*
Atmospheric pressure	N/A	*See Graph(es)*

Test method deviation: N/A

Supplementary information:

From 9 kHz to 30MHz: limit indicated on the curves is calculated with 40 dB/decade extrapolation factor and 51.5 dB conversion factor.

From 30MHz to 1GHz Quasi peak limit provided is the limit given in §15.209.

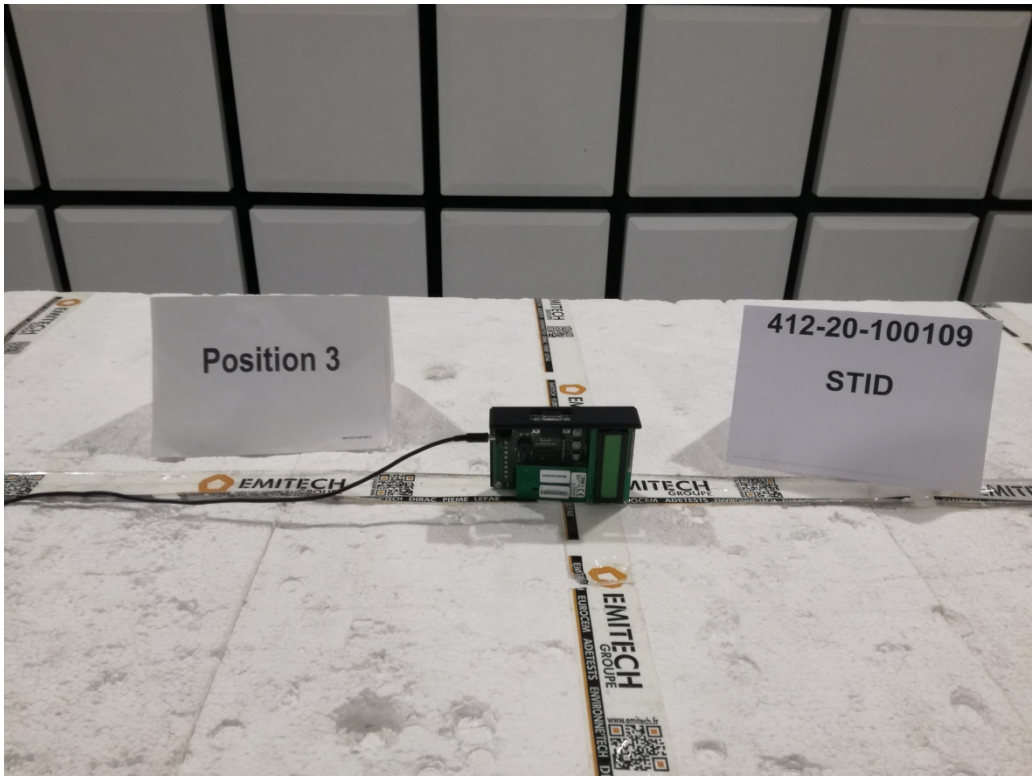
TEST EQUIPMENT USED					
CATEGORY	**BRAND**	**TYPE**	**IDENTIFIER**	**CAL. DATE**	**CAL. DUE**
Antenna	Rohde & Schwarz	HFH2-Z2	5825(*)	21/09/2017	21/05/2020
Antenna	Electro Metrics	BIA-30HF	0824	13/06/2018	13/08/2021
Antenna	Rohde & Schwarz	HL223	3126	13/06/2018	13/08/2021
Cable	MegaPhase	F135N1N28	16664	25/10/2019	25/12/2021
Cable	MegaPhase	F135N1N28	16666	25/10/2019	25/12/2021
Cable	SUCOFLEX	N-6,5m	14380	25/07/2019	25/09/2021
Cable	MegaPhase	N-8m	15813	12/11/2018	12/01/2021
Cable	MegaPhase	TM18-N1N1-118	12841	09/05/2018	09/07/2020
Multimeter	FLUKE	8808A	12446	20/07/2019	20/09/2020
Power supply	TTi	TSX-1820P	4365		
Receiver	Agilent Technologies	E4440A	5824	18/04/2018	18/06/2020
Shielded enclosure	COMTEST	SAC 3m	14494		
Software	Nexio		0000		
Thermohygrometer	Testo	608-H1	7561	25/01/2019	25/03/2021
Thermohygrometer	Bioblock Scientific	Météostar	0963	25/01/2019	25/03/2021

BAT-EMC software version: V3.18.0.26 Blank cells = Permanent validity
(*) Under derogation EQS DER 000 S41 00068

RADIATED SPURIOUS EMISSIONS – TABULATED RESULTS			
Frequency (MHz)	**Antenna Position**	**Level**	**Limit**
N/A	N/A	N/A	N/A

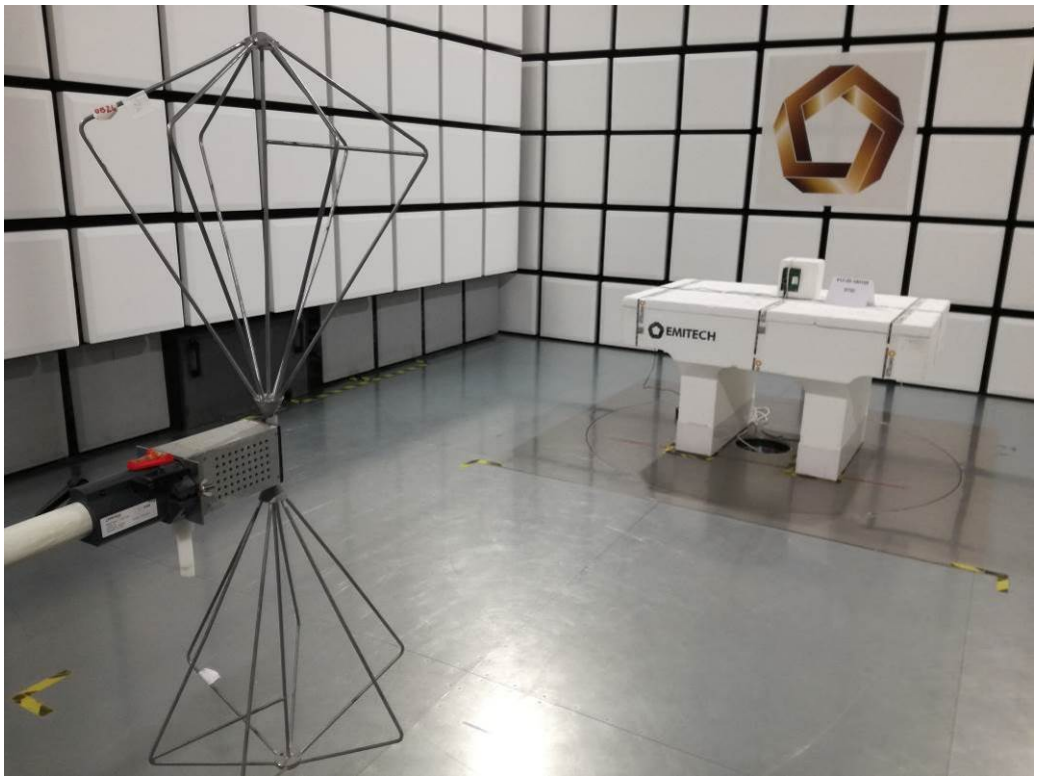
No spurious emissions were detected.

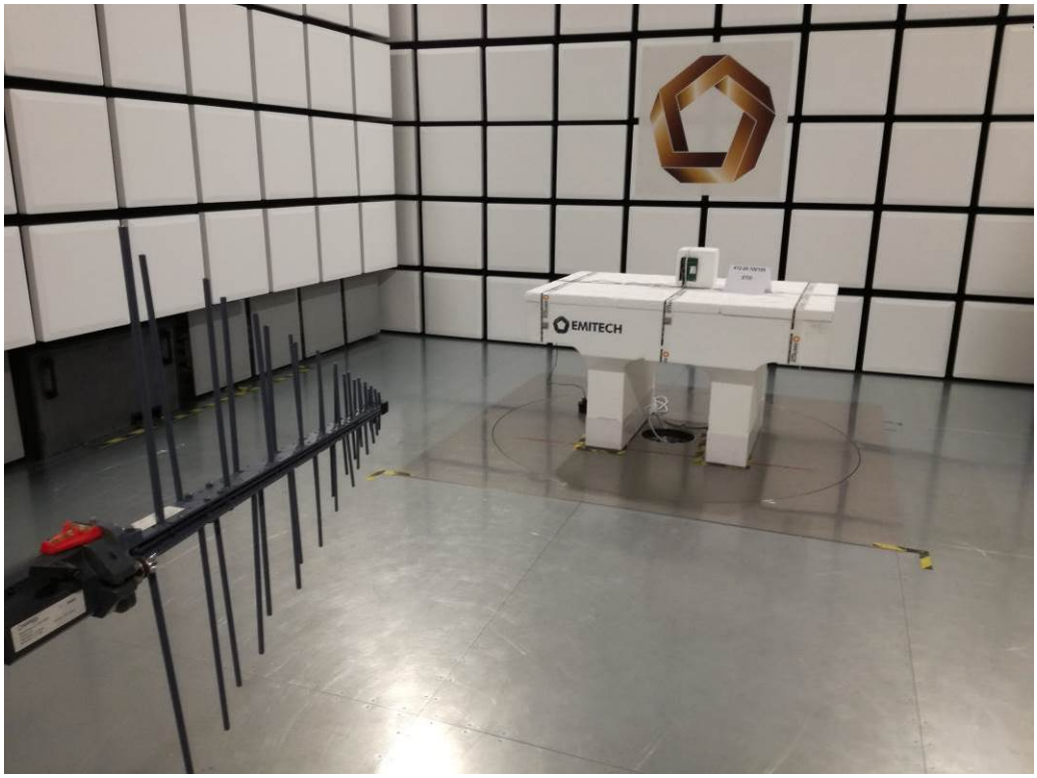
TEST SETUP PHOTO(S) – EUT POSITIONS
   

TEST SETUP PHOTO(S) – EUT POSITIONS


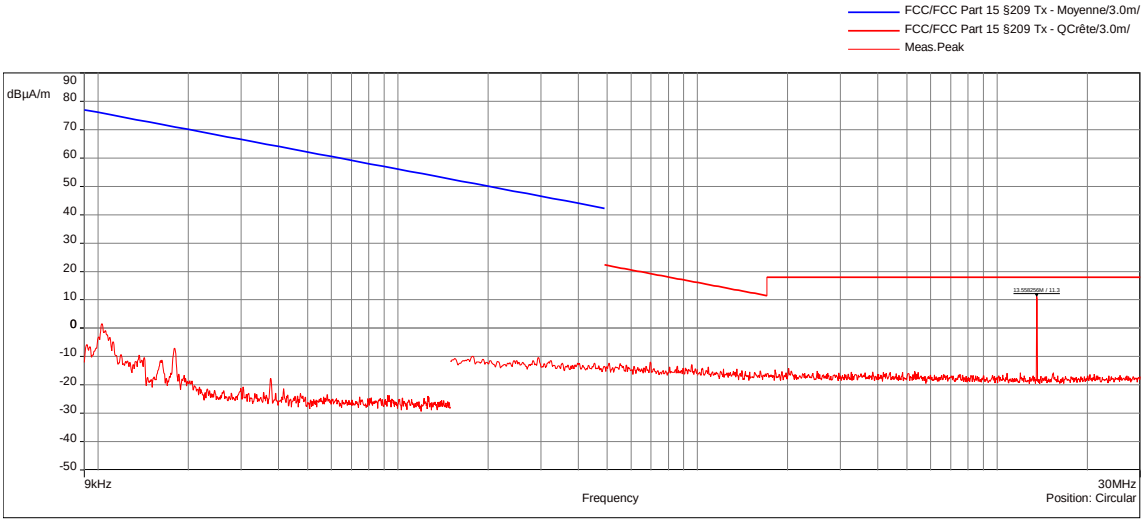
TEST SETUP PHOTO(S) - FOR FREQ < 30MHZ (PRE MEASUREMENT)


TEST SETUP PHOTO(S) - FOR FREQ < 30MHZ (FINAL MEASUREMENT)


TEST SETUP PHOTO(S) - FOR 30MHZ < FREQ < 200MHZ


TEST SETUP PHOTO(S) - FOR 200MHZ < FREQ < 1GHZ


RADIATED SPURIOUS EMISSIONS - GRAPH			
TX-MODE / F < 30MHZ / ALL POSIITONS / 0°		EMI4510	
EUT mode:	Tx mode	**T (°C):**	19.2
Test Date:	18/03/2020	**H (%):**	46.9
Test Operator:	OAT	**P (hPa):**	1020

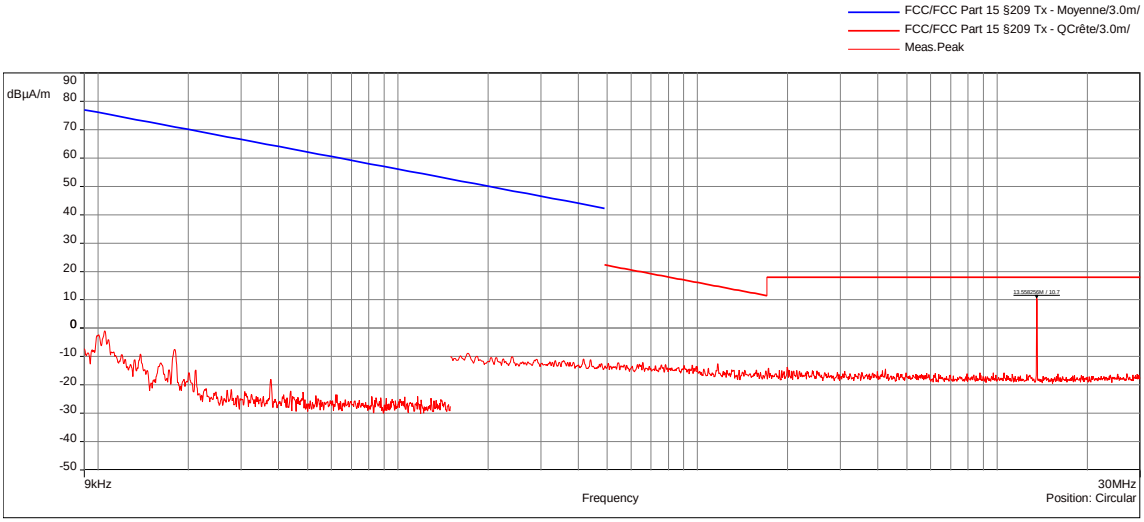


POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Circular	9kHz-150kHz	300Hz	1kHz	Peak
Circular	150kHz-1MHz	10kHz	30kHz	Peak
Circular	1MHz-30MHz	10kHz	30kHz	Peak

Configuration:	N/A
Comments:	Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.
EUT modification(s): N/A	

No spurious emissions were detected.

RADIATED SPURIOUS EMISSIONS - GRAPH			
TX-MODE / F < 30MHZ / ALL POSITIONS / 45°		EMI4512	
EUT mode:	Tx mode	**T (°C):**	19.2
Test Date:	18/03/2020	**H (%):**	46.9
Test Operator:	OAT	**P (hPa):**	1020

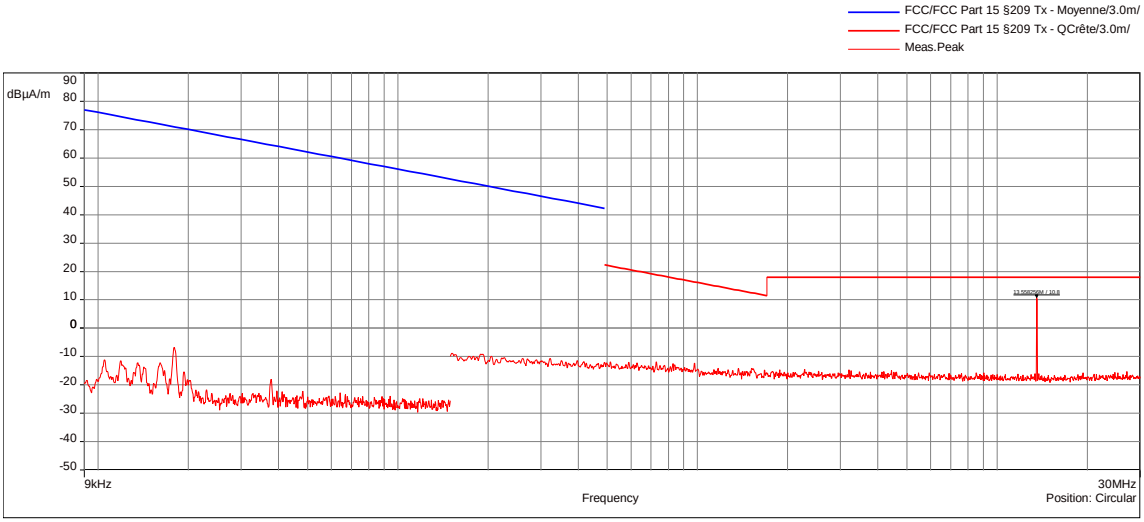


POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Circular	9kHz-150kHz	300Hz	1kHz	Peak
Circular	150kHz-1MHz	10kHz	30kHz	Peak
Circular	1MHz-30MHz	10kHz	30kHz	Peak

Configuration:	N/A
Comments:	Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.
EUT modification(s): N/A	

No spurious emissions were detected.

RADIATED SPURIOUS EMISSIONS - GRAPH			
TX-MODE / F < 30MHZ / ALL POSITIONS / 90°		EMI4513	
EUT mode:	Tx mode	**T (°C):**	19.2
Test Date:	18/03/2020	**H (%):**	46.9
Test Operator:	OAT	**P (hPa):**	1020

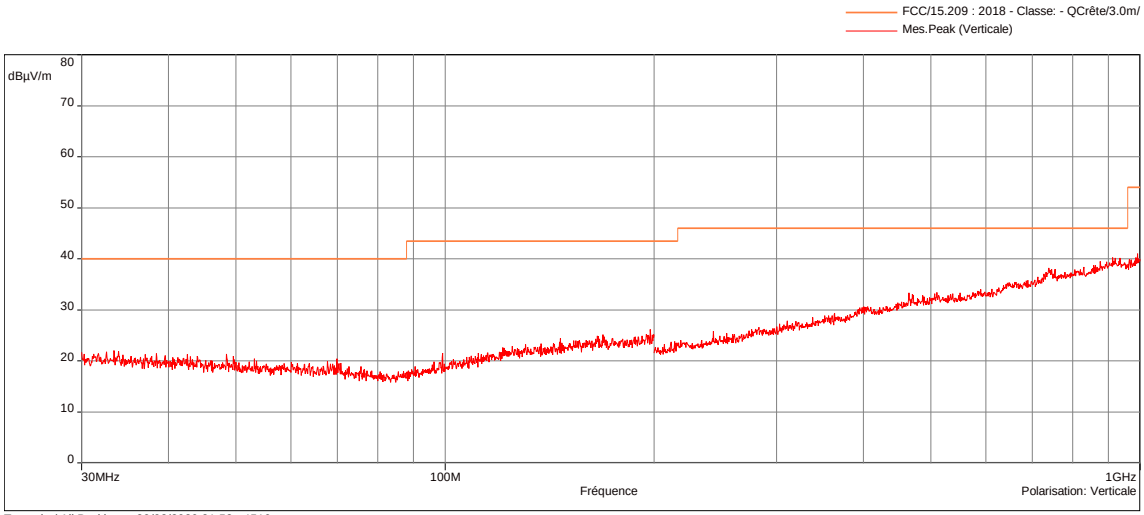


POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Circular	9kHz-150kHz	300Hz	1kHz	Peak
Circular	150kHz-1MHz	10kHz	30kHz	Peak
Circular	1MHz-30MHz	10kHz	30kHz	Peak

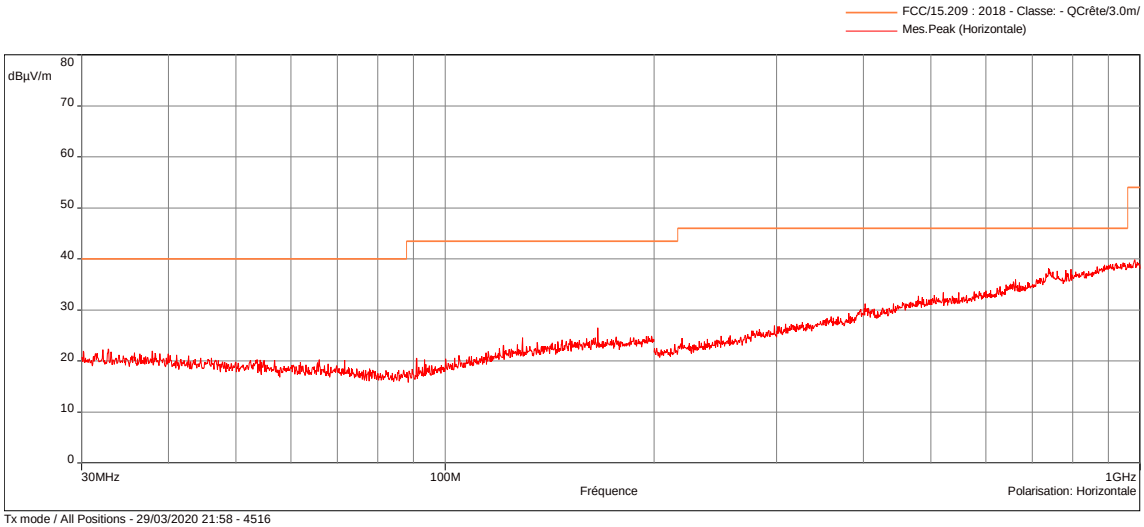
Configuration:	N/A
Comments:	Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.
EUT modification(s): N/A	

No spurious emissions were detected.

RADIATED SPURIOUS EMISSIONS - GRAPH			
TX MODE / 30MHZ TO 1GHZ / ALL POSITIONS		EMI4516	
EUT mode:	Tx mode	**T (°C):**	19.2
Test Date:	18/03/2020	**H (%):**	46.9
Test Operator:	OAT	**P (hPa):**	1020



Tx mode / All Positions - 29/03/2020 21:58 - 4516



Tx mode / All Positions - 29/03/2020 21:58 - 4516

POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	30MHz-200MHz	100kHz	300kHz	Peak
Horizontal	30MHz-200MHz	100kHz	300kHz	Peak
Horizontal	200MHz-1GHz	100kHz	300kHz	Peak
Vertical	200MHz-1GHz	100kHz	300kHz	Peak
Configuration:	N/A			
Comments:	N/A			
EUT modification(s): N/A				

No spurious emissions were detected.

6.4. Field strength in the band 13.553-13.567MHz

Reference standard:	FCC part 15 Radio part 15.225 a) & RSS/CNR-210
Test method:	ANSI C63.10: 2013
Test description: EUT is set on an insulating support at 80cm. Measurements were then performed in a 10-meter Open Area Test Site that complies to CISPR 16. The EUT was rotated 360° in order to maximize radiated levels. Test antenna was oriented in 3 axes (0°, 45° and 90°). For portable equipements a research of maximum level is done on the 3 axes. Only the highest levels are recorded.	

TEST CASE	EUT MODE	SEVERITY	RESULT TAB.	VERDICT
Position 1 / 0°	Permanent Tx	15848µV/m at 30m	EMI4472	**PASS**
Position 1 / 45°	Permanent Tx		EMI4521	**PASS**
Position 1 / 90°	Permanent Tx		EMI4522	**PASS**
Position 2 / 0°	Permanent Tx		EMI4523	**PASS**
Position 2 / 45°	Permanent Tx		EMI4524	**PASS**
Position 2 / 90°	Permanent Tx		EMI4525	**PASS**
Position 3 / 0°	Permanent Tx		EMI4526	**PASS**
Position 3 / 45°	Permanent Tx		EMI4527	**PASS**
Position 3 / 90°	Permanent Tx		EMI4528	**PASS**

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	19.2 °C
Relative Humidity	20 to 75 %	46.9 %
Atmospheric pressure	N/A	1020 hPa
Test method deviation: N/A		
Supplementary information: N/A		

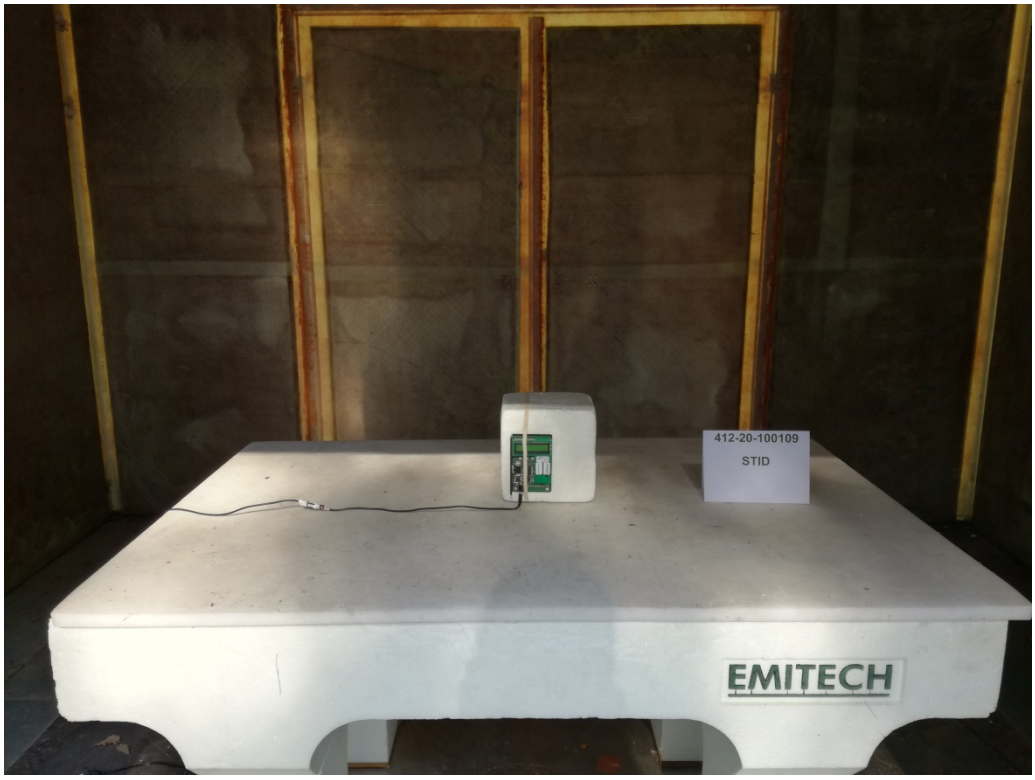
TEST EQUIPMENT USED					
CATEGORY	**BRAND**	**TYPE**	**IDENTIFIER**	**CAL. DATE**	**CAL. DUE**
Antenna	Rohde & Schwarz	HFH2-Z2	5825(*)	21/09/2017	21/05/2020
Cable	Huber + Suhner	N-20m	8385	11/10/2017	11/06/2020
Open area test site	EMITECH	Salinelles	3482	10/10/2017	10/12/2020
Receiver	Rohde & Schwarz	ESHS10	3371(**)	25/09/2018	25/04/2020
Multimeter	FLUKE	8808A	12446	20/07/2019	20/09/2020
Power supply	TTi	TSX-1820P	4365		
Thermohygrometer	Testo	608-H1	7561	25/01/2019	25/03/2021
Thermohygrometer	Bioblock Scientific	Météostar	0963	25/01/2019	25/03/2021

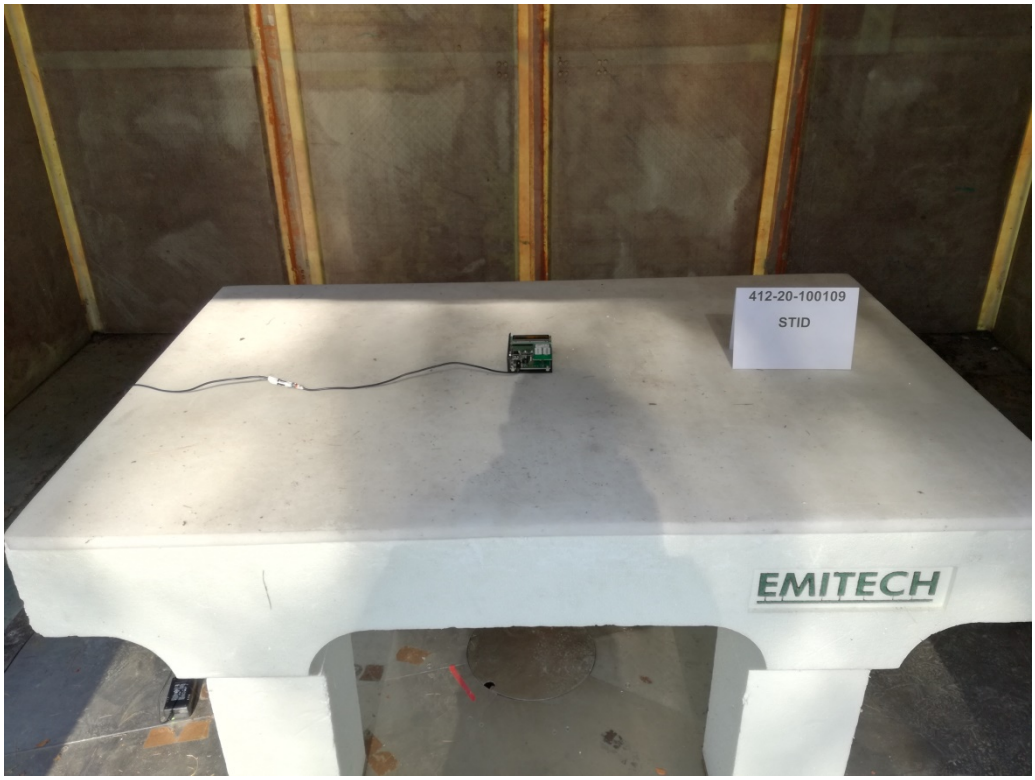
(*) Under derogation EQS DER 000 S41 00068 Blank cells = Permanent validity
(**) Under derogation EQS DER 000 S41 00069

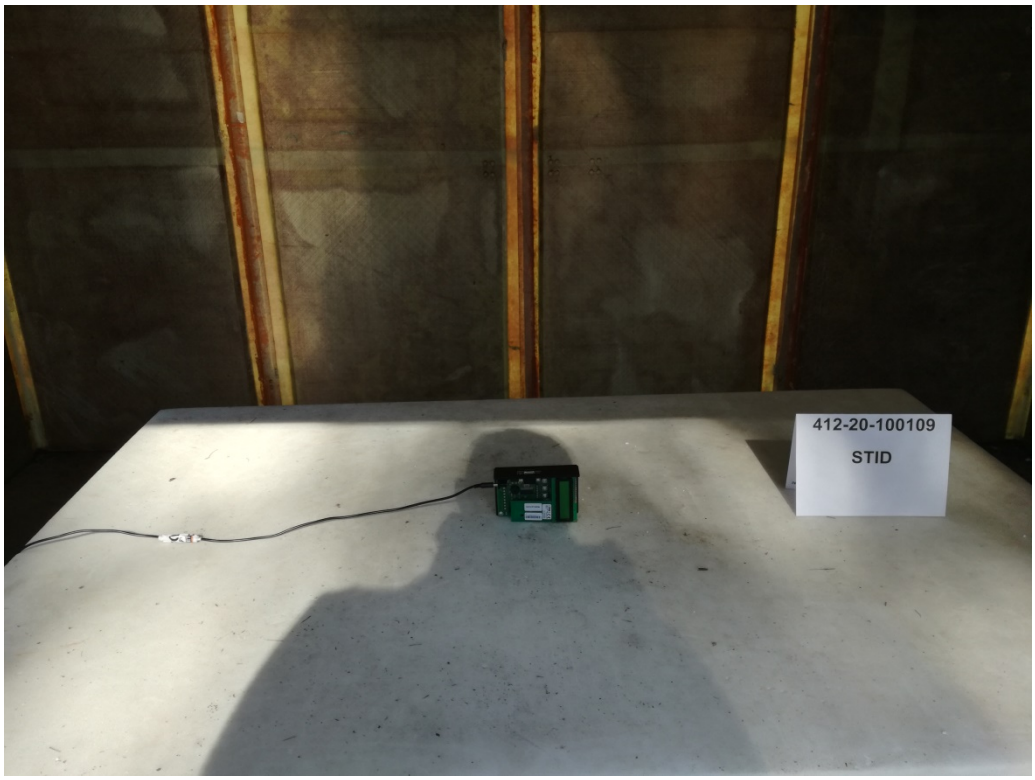
FIELD STRENGTH IN THE BAND 13.553-13.567MHz - TABULATED RESULTS					
TEST CONDITION	ANTENNA POS. AZIM.	FREQUENCY	LEVEL AT 10m (dBµA/m)	LIMIT AT 10m (dBµA/m)	RESULT TAB.
Position 1	0°	13.56 MHz	0.944	51.58	EMI4472
Position 1	45°	13.56 MHz	-3.556	51.58	EMI4521
Position 1	90°	13.56 MHz	-14.756	51.58	EMI4522
Position 2	0°	13.56 MHz	-16.056	51.58	EMI4523
Position 2	45°	13.56 MHz	-18.156	51.58	EMI4524
Position 2	90°	13.56 MHz	-15.756	51.58	EMI4525
Position 3	0°	13.56 MHz	-0.456	51.58	EMI4526
Position 3	45°	13.56 MHz	-4.756	51.58	EMI4527
Position 3	90°	13.56 MHz	-13.856	51.58	EMI4528

Maximun level at 10m is 0.94dBµA/m for a limit at 51.58 dBµA/m.
Using an extrapolation factor of 40dB/dec and a conversion factor of -51.5dB, level at 30m is 33.36 dBµV/m for a limit at 84 dBµV/m.

EUT MODIFICATIONS	OPERATOR	TEST DATE	RESULT TAB.
N/A	OAT	19/03/2020	-

TEST SETUP PHOTO(S) – EUT POSITION 1


TEST SETUP PHOTO(S) – EUT POSITION 2


TEST SETUP PHOTO(S) – EUT POSITION 3


TEST SETUP PHOTO(S)


6.5. Field strength outside the band 13.110-14.010MHz

Reference standard:	FCC part 15 Radio part 15.225 b) c) & d) & RSS/CNR-210
Test method:	FCC part 15 Radio part 15.225 a) c) & d) & RSS/CNR-210
Test description: EUT is set inside the climatic enclosure. Carrier level are correlated with the maximum carrier level measured in normal conditions.	

TESTED CONFIGURATION	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
Below 13.110MHz	§15.209		See graphic & §6.3 of this report	**PASS**
13.110-13.410MHz	106µV/m at 30m		See graphic	**PASS**
13.410-13.553MHz	334µV/m at 30m		See graphic	**PASS**
13.553-13.567MHz	15,848µV/m at 30m		See graphic & §6.4 of this report	**PASS**
13.567-13.710MHz	334µV/m at 30m		See graphic	**PASS**
13.710-14.010MHz	106µV/m at 30m		See graphic	**PASS**
Above 14.010MHz	§15.209		See graphic & §6.3 of this report	**PASS**

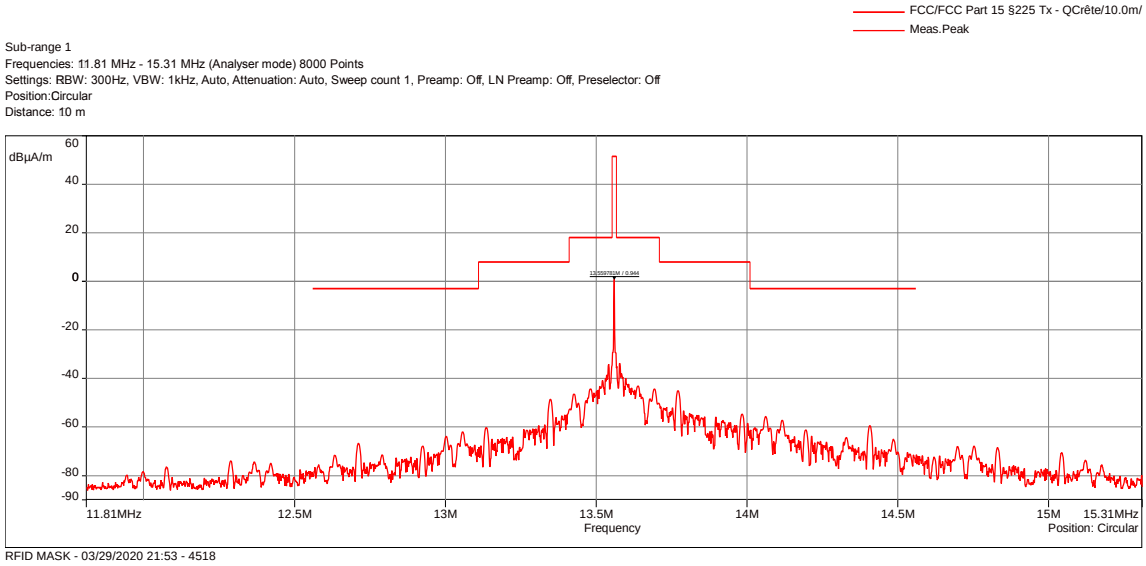
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	*See Graph(es)*
Relative Humidity	20 to 75 %	*See Graph(es)*
Atmospheric pressure	N/A	*See Graph(es)*
Test method deviation: N/A		
Supplementary information: N/A		

TEST EQUIPMENT USED

CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	Emitech	3.5 cm	4653		
Attenuator	Radiall	R412710124	16490	25/06/2019	25/08/2021
Cable	N	3m	16415	13/05/2019	13/07/2021
Climatic enclosure	CLIMATS	EXCAL 7714-HA	14261	19/09/2019	19/11/2020
Multimeter	FLUKE	8808A	12446	20/07/2019	20/09/2020
Power supply	TTi	TSX-1820P	4365		
Receiver	Agilent Technologies	E4440A	5824	18/04/2018	18/06/2020
Software	Nexio		0000		
Thermohygrometer	Testo	608-H1	7561	25/01/2019	25/03/2021
Thermohygrometer	Bioblock Scientific	Météostar	0963	25/01/2019	25/03/2021

BAT-EMC software version: V3.18.0.26 Blank cells = Permanent validity

FIELD STRENGTH IN THE BAND 13.110-14.010MHZ AND OUTSIDE - GRAPH			
FIELD STRENGTH IN THE BAND 13.110-14.010MHZ AND OUTSIDE		EMI4518	
EUT mode:	Tx mode	**T (°C):**	20.5
Test Date:	19/03/2020	**H (%):**	42.1
Test Operator:	OAT	**P (hPa):**	1009



POSITION	FREQUENCIES	RBW	VBW	DETECTOR
N/A	11.81MHz-15.31MHz	300Hz	1kHz	Peak
Configuration:				
Comments:	Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.			

EUT modification(s): N/A

6.6. Measurement of Frequency Stability

Reference standard:	FCC part 15 Radio part 15.225 e) & RSS-210
Test method :	ANSI C63.10 :2013
General test setup: The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation. EUT is set inside the climatic enclosure. Carrier level are correlated with the maximum carrier level measured in normal conditions.	

TEST CASE	EUT MODE	SEVERITY	RESULT TAB.	VERDICT
Tx mode	Tx mode	+/-0.01%	-	**PASS**

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	N/A
Relative Humidity	20 to 75 %	N/A
Atmospheric pressure	N/A	N/A
TEST METHOD DEVIATION: N/A		
Supplementary information: N/A		

TEST EQUIPMENT USED					
CATEGORY	**BRAND**	**TYPE**	**IDENTIFIER**	**CAL. DATE**	**CAL. DUE**
Antenna	Emitech	3.5 cm	4653		
Attenuator	Radiall	R412710124	16490	25/06/2019	25/08/2021
Cable	N	3m	16415	13/05/2019	13/07/2021
Climatic enclosure	CLIMATS	EXCAL 7714-HA	14261	19/09/2019	19/11/2020
Multimeter	FLUKE	8808A	12446	20/07/2019	20/09/2020
Power supply	TTi	TSX-1820P	4365		
Spectrum analyzer	Rohde & Schwarz	FPL1003	16027	16/01/2019	16/09/2020
Thermohygrometer	Bioblock Scientific	Météostar	0963	25/01/2019	25/03/2021
Thermometer contactless	GHM Greisinger	GMH 3710	12968	11/02/2019	11/04/2020

Blank cells = Permanent validity

FREQUENCY STABILITY - TABULATED RESULTS				
TEST CASE (TEMPERATURE VARIATION)	**TEMPERATURE (°C)**	**POWER SUPPLY (VDC)**	**FREQUENCY (MHZ)**	**FREQUENCY ERROR (%)**
Normal conditions	25	5	13.559901	-
		4.5	13.559895	-0.00004
		9	13.559887	-0.00010
Extremes tests conditions	-30	5	13.559876	-0.00018
		4.5	13.559891	-0.00007
		9	13.5598507	-0.00037
	+70	5	13.559909	0.00006
		4.5	13.559902	0.00001
		9	13.559914	0.00010

TEST SETUP PHOTO(S)

End of test report