Test report issued under the responsibility of:
EMITECH MONTPELLIER laboratory
MRA US-EU Designation Number: FR0006
IC Assigned Code: FR0003

RADIO TEST REPORT

RSS-210
FCC part 15.225

Company ..... :	**STID**
Address..... :	20 PA des Pradeaux Boulevard Salvador Allende 13850 GREASQUE FRANCE

Test item description. ..... :	**Access Controller**
Trade Mark. ..... :	STID
Manufacturer. ..... :	STID
Model/Type reference..... :	ARC-AC8 / MS2S-A
FCC ID..... :	OVNAC8
IC. ..... :	10520A-MS2S
Ratings..... :	4.5 Vdc to 9 Vdc

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

Report Reference No..... :	**RR410-19-104825-4A**
Test procedure. ..... :	FCC IC Certification
Diffusion..... :	Mr SILVE
Applicant's name. ..... :	STID
Date of issue..... :	27/11/2019
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Compiled by..... :	Morgan PATEY
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:

1. GENERAL INFORMATIONS 3
2. REFERENCE DOCUMENT(S) 4
3. EQUIPMENT TECHNICAL DESCRIPTION 5
3.1. TEST CONDITIONS 5
3.2. EUT GENERAL VIEW 5
3.3. EUT BACK VIEW & MARKING PLATE 6
3.4. EUT MECHANICAL AND ELECTRICAL DESIGN 6
3.5. EUT INPUT/OUTPUT PORTS 7
3.6. SUPPORTING EQUIPMENT USED DURING TEST 7
3.7. EUT RADIO SPECIFICATIONS 8
4. RESULT SUMMARY 9
5. MEASUREMENT UNCERTAINTY 11
6. TEST CONDITIONS AND RESULTS 12
6.1. CONDUCTED VOLTAGE EMISSION (MEASUREMENT) 12
6.2. OCCUPIED BANDWIDTH 15
6.3. RADIATED SPURIOUS EMISSIONS 17
6.4. FIELD STRENGTH IN THE BAND 13.553-13.567MHZ 41
6.5. FIELD STRENGTH OUTSIDE THE BAND 13.110-14.010MHZ 44
6.6. MEASUREMENT OF FREQUENCY STABILITY 46

1. GENERAL INFORMATIONS

This document submits the results of Radio tests performed on the equipment **Access Controller MS2S-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
Address	145 rue de Massacan 34740 VENDARGUES FRANCE
Test procedure	FCC IC Certification
Tested by	Morgan PATEY
Test supervisor	None
Date of receipt of test item	N/A
Date (s) of performance of tests	October, from 15th to 18th of 2019

APPLICANT'S GENERAL INFORMATIONS:	
Company name	STID
Company address	20 PA des Pradeaux - Boulevard Salvador Allende - 13850 GREASQUE FRANCE
Person(s) present during the tests	Mr. BERLAND
Responsible	Mr SILVE

GENERAL REMARKS:

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		

2. REFERENCE DOCUMENT(S)

NORMATIVE REFERENCES:
The following referenced documents are necessary for the application of the present test report. **FCC part 15, 2018** 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 9, August 2016, Amendment November 2017** Licence-Exempt Radio Apparatus: Category I Equipment **RSS/CNR-Gen, Issue 5, March 2019, Amendment 1** 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
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

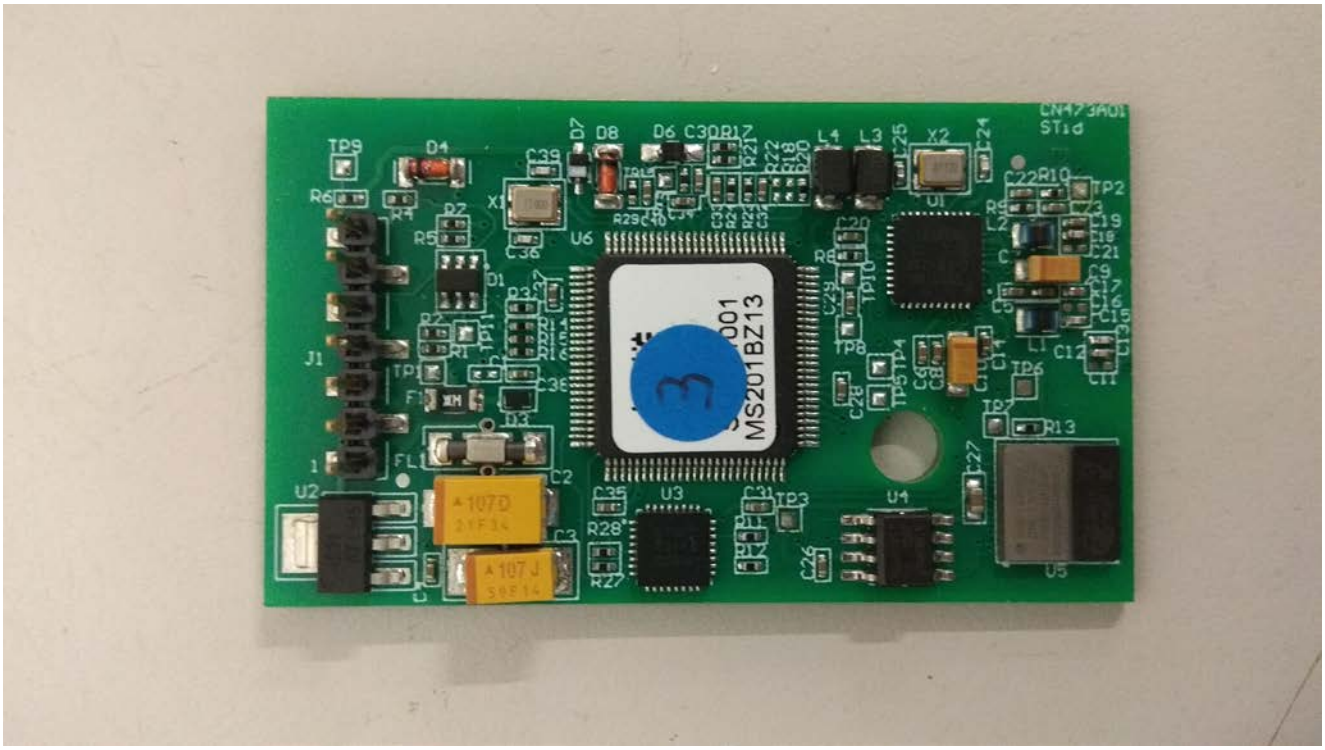
3.1. Test Conditions

Test item description.	:	Access Controller
Model/Type reference.	:	ARC-AC8 / MS2S-A
Trade Mark.	:	STID
FCC ID.	:	OVNAC8
IC.	:	10520A-MS2S
Serial number (S/N).	:	S19311001
Part number (P/N).	:	N/A
Software version.	:	Not communicated
Firmware version.	:	SZ263A
Type of sample.	:	Pre-serial
Function(s).	:	Dual frequency (13.56 MHz and Bluetooth) contactless reader
Manufacturer name.	:	STID
Address.	:	20 PA des Pradeaux - Boulevard Salvador Allende - 13850 GREASQUE

General product information:

This product contain a Bluetooth module (FCC ID : 2AAQS-ISP1302 and IC : 11306A-ISP1302) already certified according to single modular procedure.

3.2. EUT General view



3.3. EUT Back view & Marking Plate

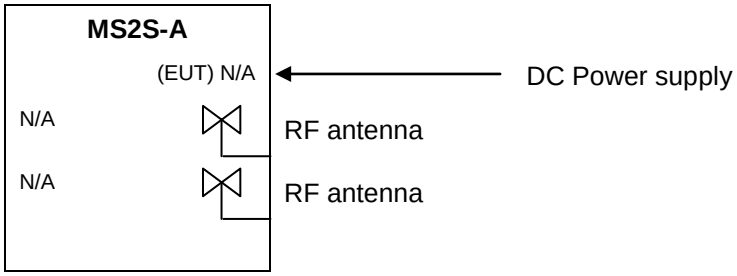
3.4. EUT Mechanical and Electrical Design

Power supply.	:	5 Vdc
Power supply range.	:	4.5 Vdc to 9 Vdc
Power type.	:	DC
Power (W).	:	0.95 (max)
Nominal current (A).	:	0.190 (max)
Dimensions (L x W x H) (m).	:	0.064 x 0.035 x 0.00502
Weight (kg).	:	0.01
Temperature range (°C).	:	-30 to +70
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	PCB
1	DC Power supply	DC	N/A	Not shielded	N/A
2	RF antenna	RF	N/A	N/A	13.56MHz
3	RF antenna	RF	N/A	N/A	2.4GHz

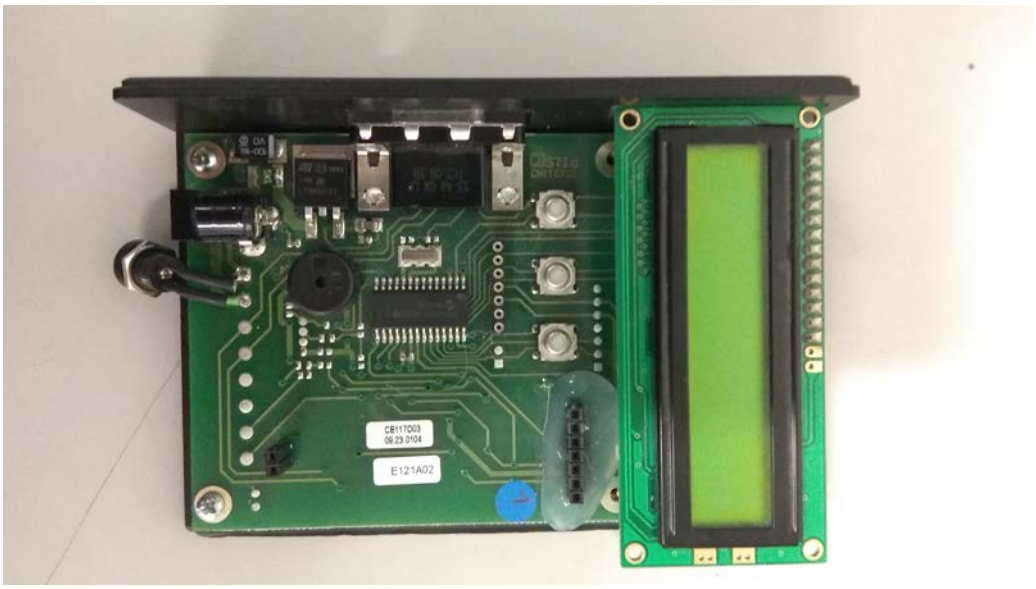
AC/DC : AC/DC Converter port
I/O.....: Input or Output port
N/E .....: Non Electrical port
AC.....: Alternative current port
TP .....: Telecommunication port
DC .....: Discontinuous current port
RF.....: Radio frequency port

3.6. Supporting Equipment Used During Test

Sample subject to the tests was tested with following equipment.

PRODUCT TYPE	MANUFACTURER	MODEL	N°EMITECH / COMMENTS
Card Holder	STID	Not communicated	N/A

CARD HOLDER (EA)



3.7. EUT Radio Specifications

a) General Informations

According to manufacturer's declarations :

EUT type	:	Transceiver
Technology	:	RFID / Bluetooth
Environmental profile	:	Data transmissions
Temperature range	:	Category I (General) (-30°C to +70°C)
Antenna type	:	Integral
Antenna Gain	:	RFID : N/A Bluetooth : 0.6 dBi

Comments:

b) Transmitter Paramitters (Tx)

Frequency bands.	:	RFID : 13.56 MHz Bluetooth : 2402 MHz to 2480 MHz
RF Power	:	RFID : Not communicated Bluetooth : -20 dBm to +4 dBm
Number of channels / Separation	:	RFID : 1 Bluetooth : 39
Modulation type	:	RFID Bluetooth : GFSK
Duty cycle	:	RFID : Not communicated Bluetooth : Not communicated
Tested frequency	:	RFID : 13.56 MHz Bluetooth : 2402 MHz to 2480 MHz (Hopping mode)

c) Receiver Parameters (Rx)

Frequency bands.	:	RFID : 13.56 MHz Bluetooth : 2402 MHz to 2480 MHz
Category/Class	:	Not communicated
Bandwidth	:	RFID : Not communicated Bluetooth : Not communicated

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
UNINTENTIONAL RADIATORS			
Equipment authorization			
- Verification		N/A	
- Declaration of Conformity		N/A	
CPU boards and power supplies used in personal computers		N/A	
Exempted device		N/A	
Information to the user		N/P	See certification documents
Conducted limits		PASS	
Radiated emission limits	Class B	PASS	
Antenna power conduction limits for receivers		N/A	
Power line carrier systems		N/A	
TV interface devices, including cable system terminal devices		N/A	
TV broadcast receivers		N/A	
Cable ready consumer electronics equipment		N/A	
Program blocking technology requirements for TV receivers		N/A	
Scanning receivers and frequency converters used with scanning receivers		N/A	
Labeling of digital cable ready products		N/A	
INTENTIONAL RADIATORS			

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

Sample subject to the test complies 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 account of uncertainty associated with the results.

Opinion(s) and interpretation(s): N/A

5. MEASUREMENT UNCERTAINTY

PARAMETER	MAXIMAL EMITECH UNCERTAINTY	MINIMAL STANDARD UNCERTAINTY
Radio frequency	± 1 x 10^{-7}	±1 x 10^{-7}
RF power, conducted		
RF power	± 0.8dB	± 1 dB
Power spectral density	± 2.3dB	± 3 dB
Occuped bandwidth		
RF power	± 1.2 %	± 5 %
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
PIRE and power spectral density with diode	± 5.4 dB	± 6 dB
Radiated emission (magnetic field)		
9kHz – 30MHz	± 2.7 dB	± 6 dB
Supply voltages	± 3 %	± 3 %
Temperature	± 1 °C	± 1°C
Humidity	± 5 %	± 5 %
Time / Duty cycle	± 4.4 %	± 5 %
Radiated emission (electric field for FCC standard)		
9kHz – 30MHz	± 2.7 dB	/
30MHz – 1GHz	± 5.2 dB	/
1GHz – 18GHz	± 5.3 dB	/
18GHz – 26GHz	± 5.5 dB	/
26GHz – 40GHz	± 5.5 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)

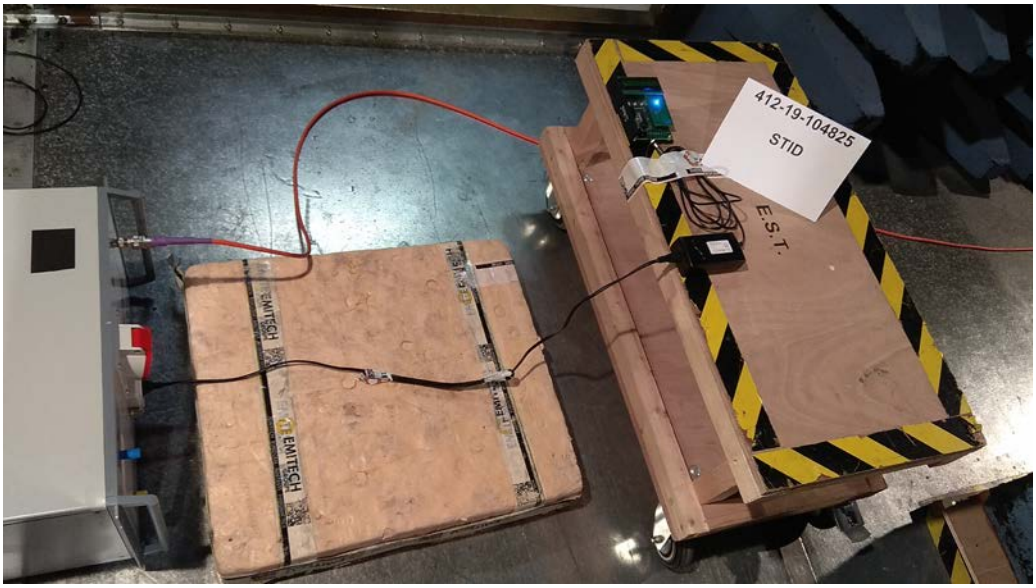
Reference standard:	FCC part 15.107, 15.207 and RSS-Gen
Test method:	ANSI C63.4: 2014
General test setup: Test is done inside a shielded room. EUT is set on an insulating support at 40cm above the ground reference plane. All power was connected to the system through Artificial Mains Network (AMN). The AMN is placed at 80cm from the boundary of the EUT and bonded to a ground reference plane.	

TESTED CABLE	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
110Vac/60Hz power source	150kHz-30MHz	Class B	EMI4644	**PASS**

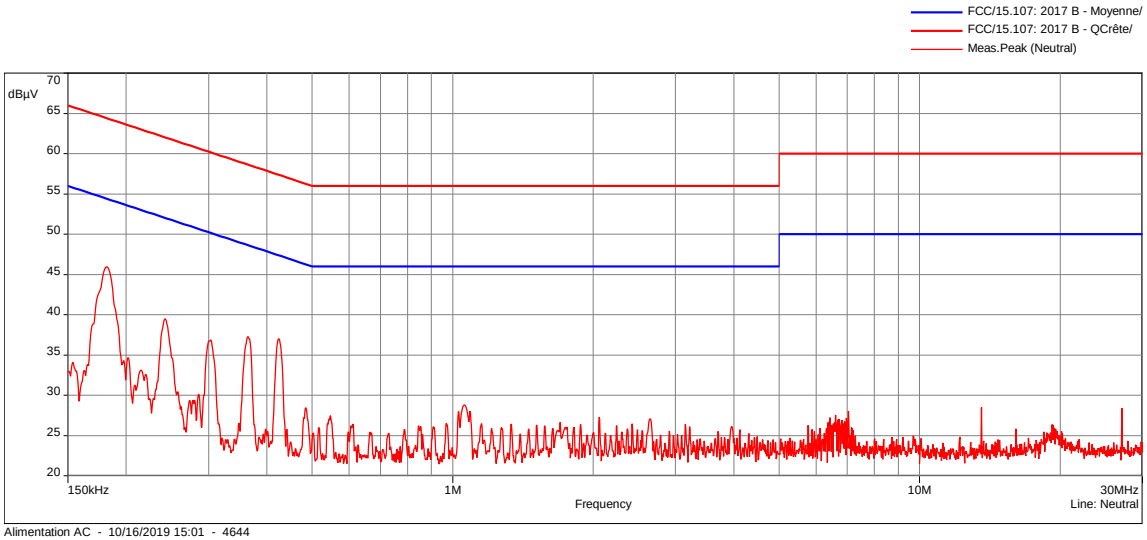
LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	*See Graph(es)*
Relative Humidity	30 to 60 %	*See Graph(es)*
Atmospheric pressure	N/A	*See Graph(es)*
Test method deviation: N/A		
Supplementary information: EUT power supply is done trought a “standard power supply” wich meets FCC and RSS requirements.		

TEST EQUIPMENT USED					
CATEGORY	**BRAND**	**TYPE**	**IDENTIFIER**	**CAL. DATE**	**CAL. DUE**
AC power source	KIKUSUI	PCR2000L	0800	23/07/2019	23/09/2020
Cable	MegaPhase	TM18-N1N1-118	12842	09/05/2018	09/07/2020
Cable	MegaPhase	N-5m	14855	12/02/2018	12/04/2020
Cable	Huber + Suhner	SF102K	16041	28/02/2019	28/04/2021
LISN	AFJ	LT32C\10	12007	10/01/2019	10/03/2020
Receiver	Rohde & Schwarz	FSW43	14830	28/12/2018	28/02/2020
Shielded enclosure	RAY PROOF	C.V2	1423		
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

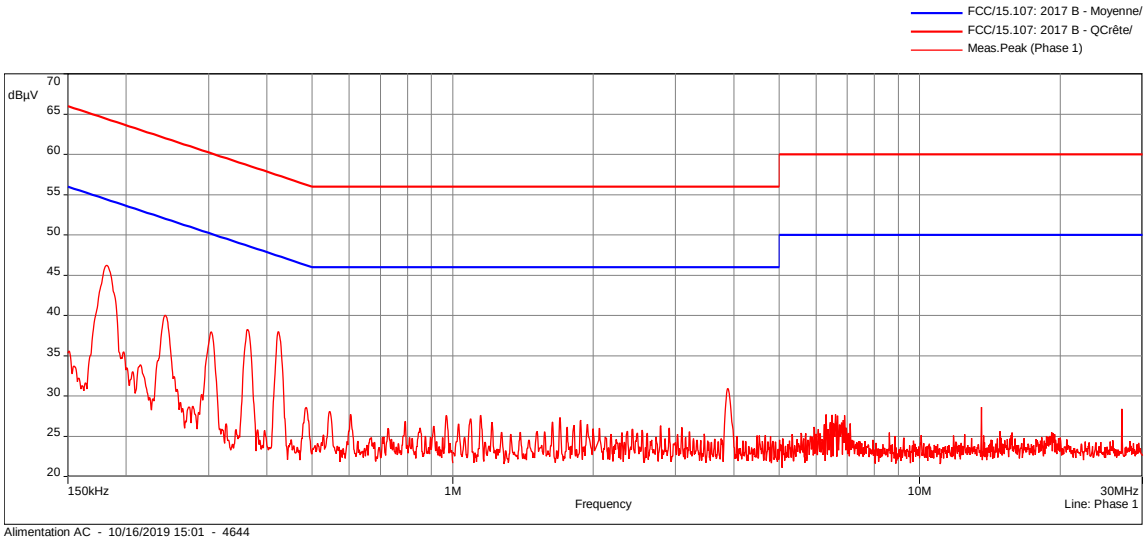
Blank cells = Permanent validity

TEST SETUP PHOTO(S) – POWER SUPPLY USED FOR CONDUCTED MEASUREMENT


CONDUCTED EMISSION (MEASUREMENT) - GRAPH			
110VAC/60HZ AC POWER SOURCE		**EMI4644**	
EUT mode:	#1	**T (°C):**	23.9
Test Date:	16/10/2019 15:01:20	**H (%):**	49.3
Test Operator:	MPA	**P (hPa):**	1002



Alimentation AC - 10/16/2019 15:01 - 4644



Alimentation AC - 10/16/2019 15:01 - 4644

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:	N/A			
EUT modification(s): N/A				

6.2. Occupied Bandwidth

Reference standard:	FCC part 15 Radio part 15.225 & RSS-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).	

TESTED PARAMETER	OBW	SEVERITY	RESULT TAB.	VERDICT
99% Bandwidth	8.5347 kHz	<14kHz	EMI5993	**PASS**

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	29.2°C
Relative Humidity	20 to 75 %	43.1 %
Atmospheric pressure	N/A	1000 hPa
Test method deviation: N/A		
Supplementary information: N/A		

TEST EQUIPMENT USED					
CATEGORY	**BRAND**	**TYPE**	**IDENTIFIER**	**CAL. DATE**	**CAL. DUE**
AC power source	KIKUSUI	PCR4000L	3074	24/07/2019	24/09/2020
Antenna	Emitech	3.5 cm	4653		
Cable	MICRO-COAX	N-3m	10537	05/07/2019	05/09/2021
Multimeter	FLUKE	8808A	12446	19/07/2019	19/09/2020
Spectrum analyzer	Rohde & Schwarz	FSW43	14830	28/12/2018	28/02/2020
Thermohygrometer	Bioblock Scientific	Météostar	0963	25/01/2019	25/03/2021
Thermohygrometer	Testo	608-H2	12268	27/11/2017	27/01/2020

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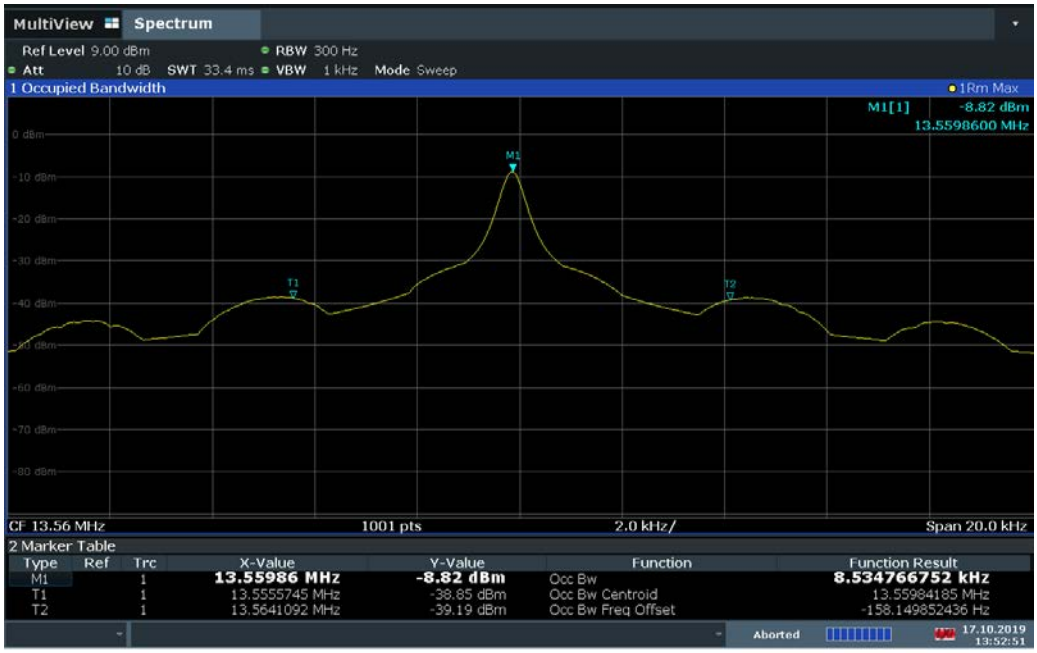
OCCUPIED BANDWIDTH - GRAPH		
99% BANDWIDTH		EMI5993
EUT mode:	D-M3	
Test Date:	17/10/2019	
Test Operator:	MPA	



13:52:52 17.10.2019

Results:	The system has an OBW of 8.5347 kHz

EUT modification(s): N/A

6.3. Radiated spurious emissions

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

General test setup: For f <30MHz, EUT is set on an insulating support at 80cmcm 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
All modes	9kHz-150kHz	15.209	See below	**PASS**
All modes	150kHz-30MHz	15.209	See below	**PASS**
All modes	30MHz-1GHz	15.209	See below	**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	Electro Metrics	BIA-30HF	0824	13/06/2018	13/08/2021
Antenna	Rohde & Schwarz	HL223	3126	13/06/2018	13/08/2021
Antenna	Rohde & Schwarz	HFH2-Z2	5825	20/09/2017	20/11/2019
Antenna	ETS-Lindgren	3117	5456	24/07/2019	24/09/2022
Cable	SUCOFLEX	N-6,5m	14380	25/07/2019	25/09/2021
Cable	MegaPhase	N-3m	14853	12/02/2018	12/04/2020
Cable	TechniWAVE	N-0.23m	14895	23/02/2018	23/04/2020
Cable	TechniWAVE	N-0.23m	14898	23/02/2018	23/04/2020

CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Cable	MegaPhase	N-8m	15813	12/11/2018	12/01/2021
Cable	MegaPhase	TM18-N1N1-118	12842	09/05/2018	09/07/2020
Cable	MegaPhase	N-5m	14855	12/02/2018	12/04/2020
Cable	Huber + Suhner	SF102K	16041	28/02/2019	28/04/2021
Cable	Huber + Suhner	N-20m	8385	11/10/2017	11/12/2019
Filter	Micro-Tronics	HPM 15162	10273	11/01/2019	11/03/2021
Filter	Micro-Tronics	HPM18865	12843	08/06/2018	08/08/2020
Open area test site	EMITECH	Salinelles	3482	10/10/2017	10/12/2020
Preamplifier	IMPULSE	CA118-546ACN	9169	29/10/2018	29/12/2019
Receiver	Rohde & Schwarz	FSW43	14830	28/12/2018	28/02/2020
Receiver	Agilent Technologies	E4440A	5824	18/04/2018	18/06/2020
Receiver	Rohde & Schwarz	ESI	9704	15/02/2019	15/04/2020
Shielded enclosure	COMTEST	SAC 3m	14494		
Shielded enclosure	RAY PROOF	C.V2	1423		
Software	Nexio		0000		
Thermohygrometer	Testo	608-H2	12269	27/11/2017	27/01/2020
Thermohygrometer	Bioblock Scientific	Météostar	0963	25/01/2019	25/03/2021
Thermohygrometer	Testo	608-H1	7562	25/01/2019	25/03/2021
Turntable	INN-CO	CO3000 & DS1200S	11571		

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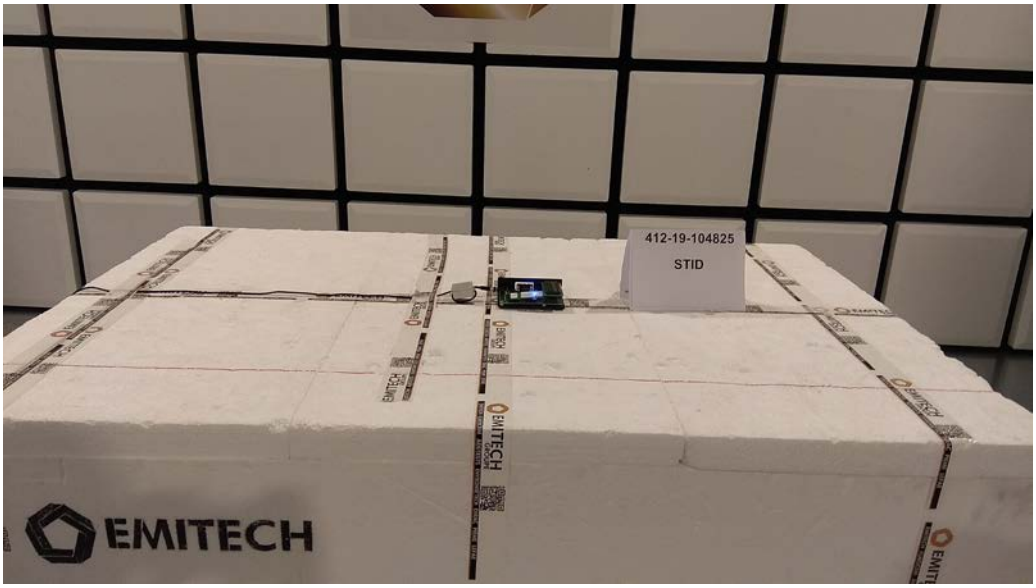
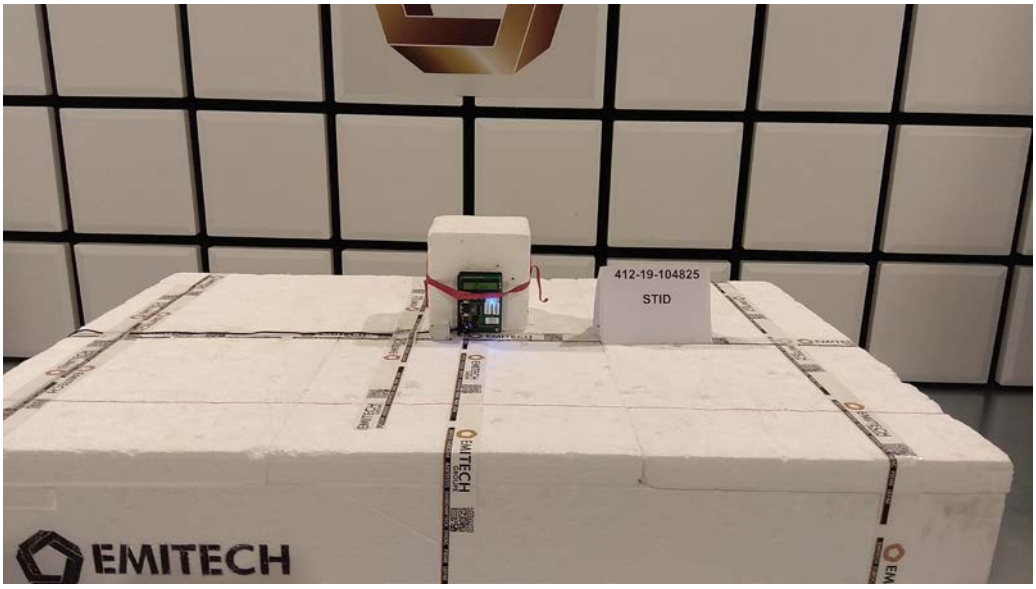
TEST SETUP PHOTO(S) RADIATED EMISSIONS POSITION 1



TEST SETUP PHOTO(S) RADIATED EMISSIONS POSITION 2


TEST SETUP PHOTO(S) RADIATED EMISSIONS POSITION 3


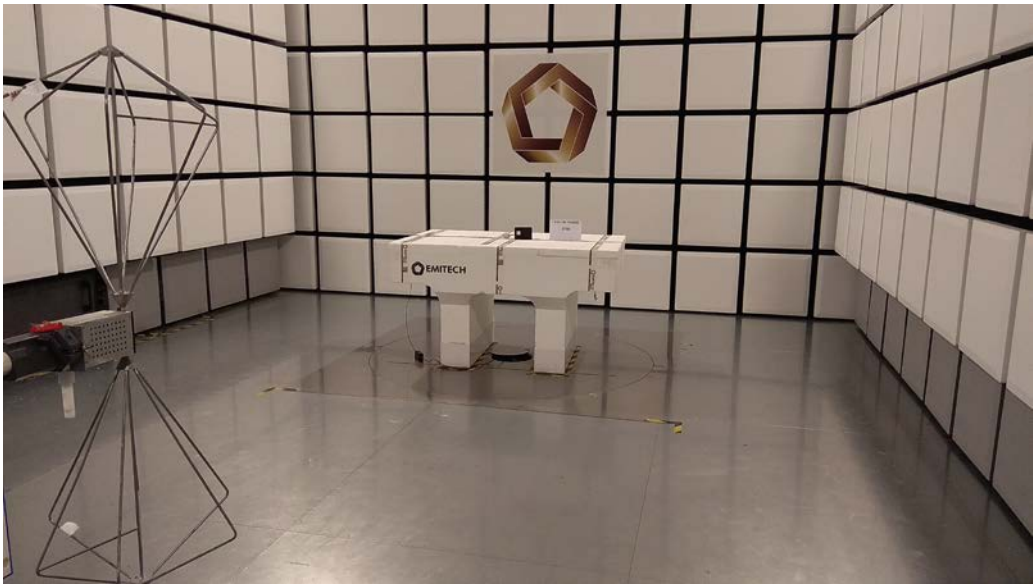
TEST SETUP PHOTO(S) RADIATED EMISSIONS (<30MHZ, PRE MEASUREMENT) POSITION 1


TEST SETUP PHOTO(S) RADIATED EMISSIONS (<30MHZ, PRE MEASUREMENT) POSITION 2

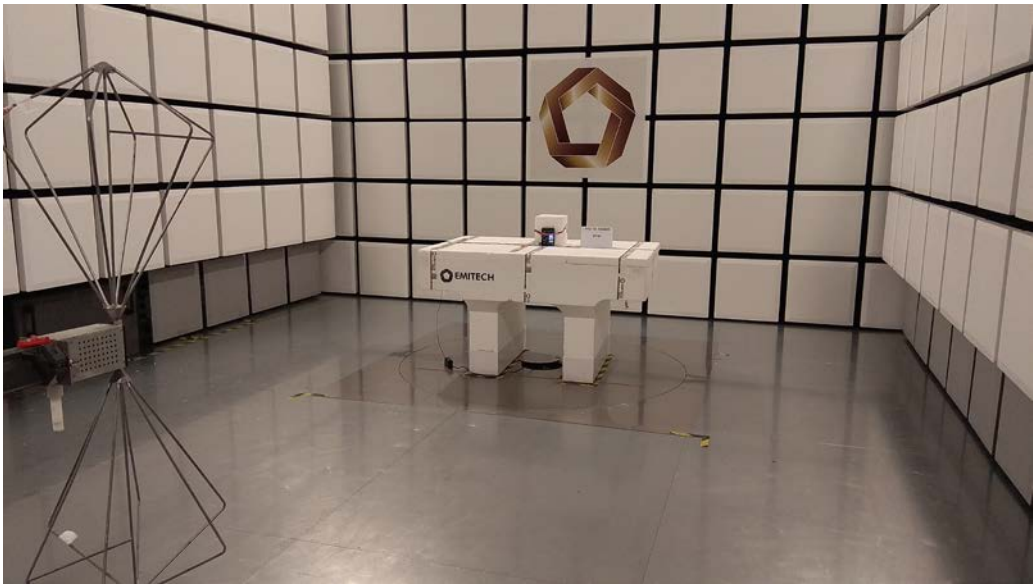

TEST SETUP PHOTO(S) RADIATED EMISSIONS (<30MHZ, PRE MEASUREMENT) POSITION 3

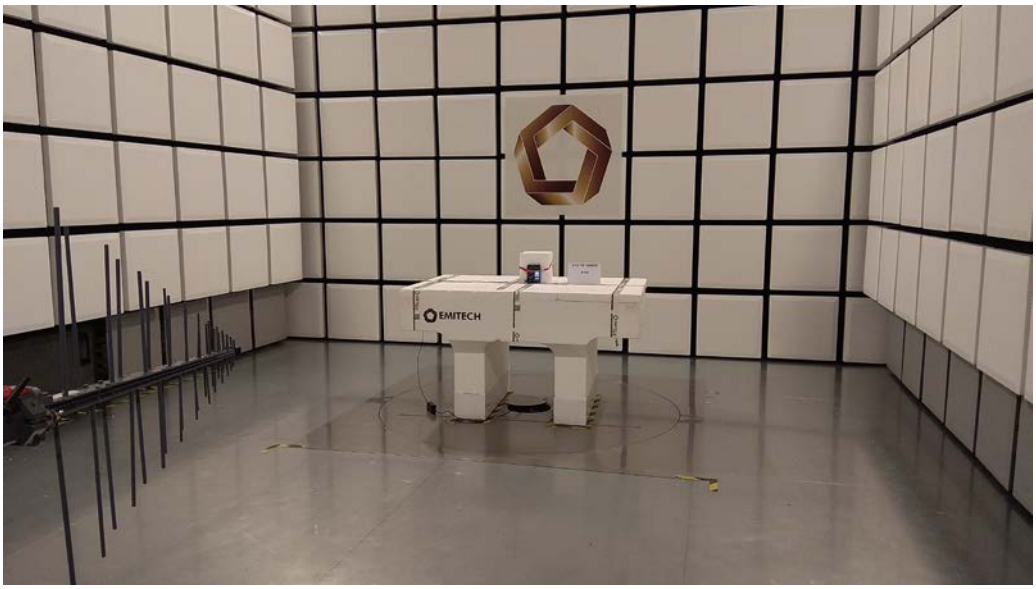

TEST SETUP PHOTO(S) RADIATED EMISSIONS (30MHZ-1GHZ) POSITION 1

TEST SETUP PHOTO(S) RADIATED EMISSIONS (30MHZ-1GHZ) POSITION 2



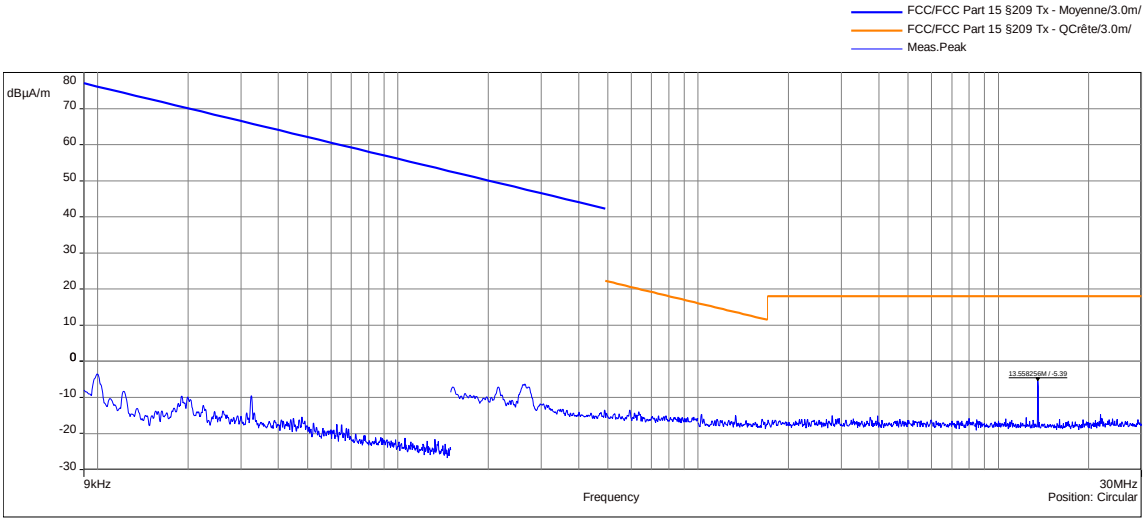
TEST SETUP PHOTO(S) RADIATED EMISSIONS (30MHZ-1GHZ) POSITION 3





TEST SETUP PHOTO(S) RADIATED EMISSION(F<30MHZ, FINAL MEASUREMENT)

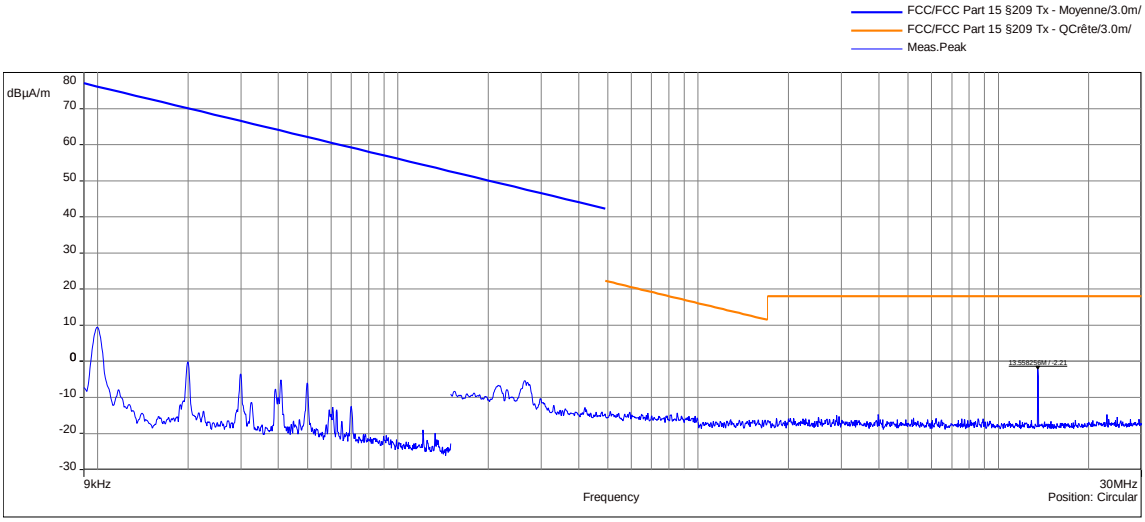

TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH			
TX / 0° / POSITION 1		EMI4519	
EUT mode:	D-M2	**T (°C):**	21.3
Test Date:	16/10/2019 11:25:47	**H (%):**	49.2
Test Operator:	MPA	**P (hPa):**	1002



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

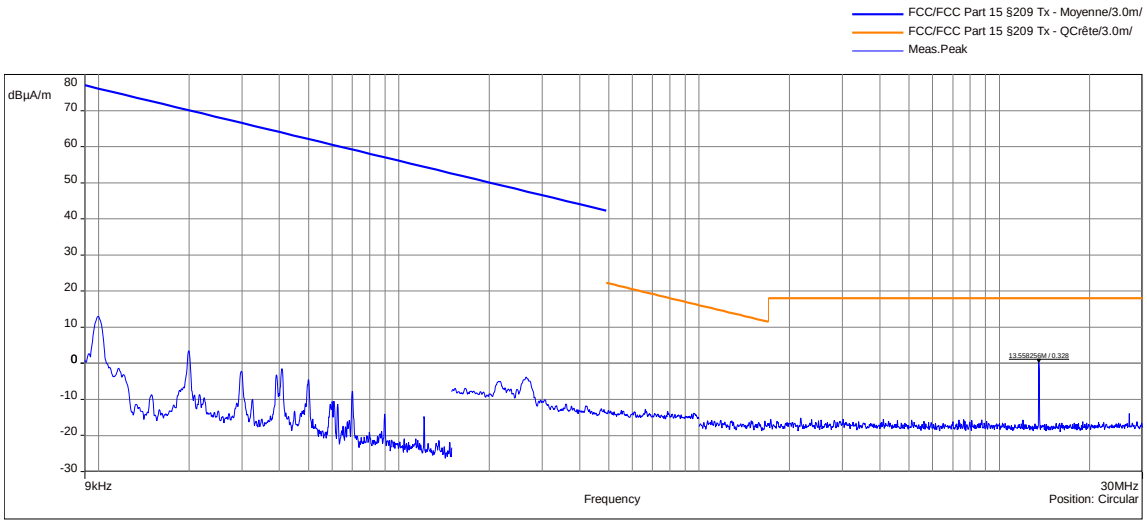
TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH			
TX / 45° / POSITION 1		EMI4543	
EUT mode:	D-M2	**T (°C):**	21.3
Test Date:	16/10/2019 11:30:40	**H (%):**	49.2
Test Operator:	MPA	**P (hPa):**	1002



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

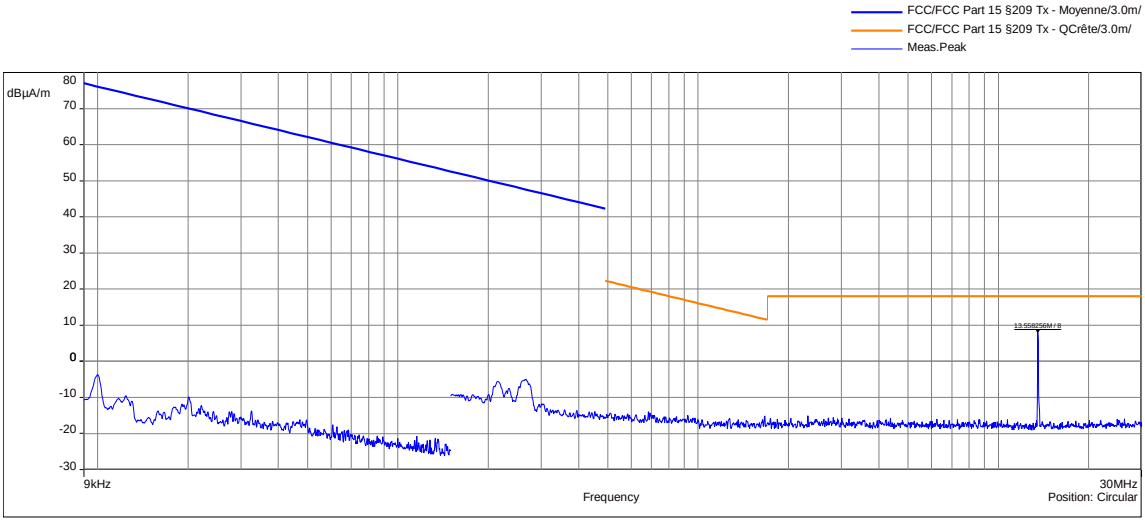
TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH			
TX / 90° / POSITION 1		EMI4544	
EUT mode:	D-M2	**T (°C):**	21.3
Test Date:	16/10/2019 11:34:46	**H (%):**	49.2
Test Operator:	MPA	**P (hPa):**	1002



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

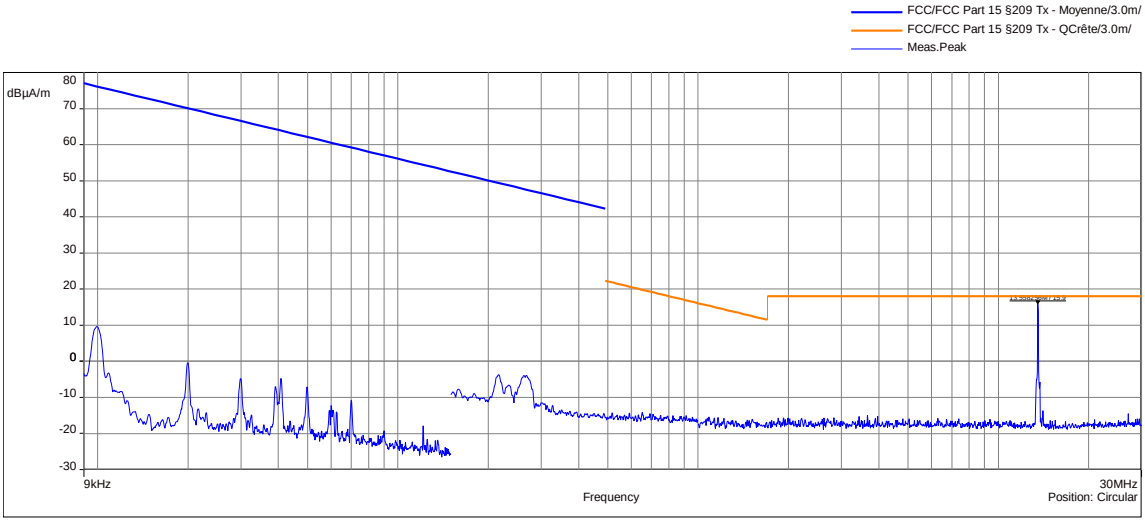
TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH			
TX / 0° / POSITION 2		EMI4545	
EUT mode:	D-M2	**T (°C):**	21.3
Test Date:	16/10/2019 11:57:00	**H (%):**	49.2
Test Operator:	MPA	**P (hPa):**	1002



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

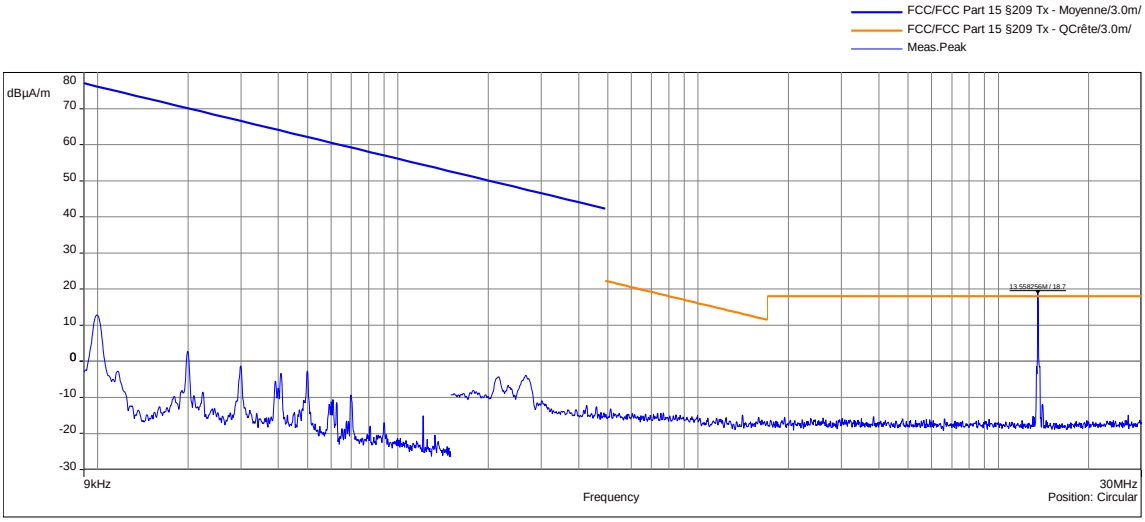
TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH			
TX / 45° / POSITION 2		EMI4546	
EUT mode:	D-M2	**T (°C):**	21.3
Test Date:	16/10/2019 12:00:02	**H (%):**	49.2
Test Operator:	MPA	**P (hPa):**	1002



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

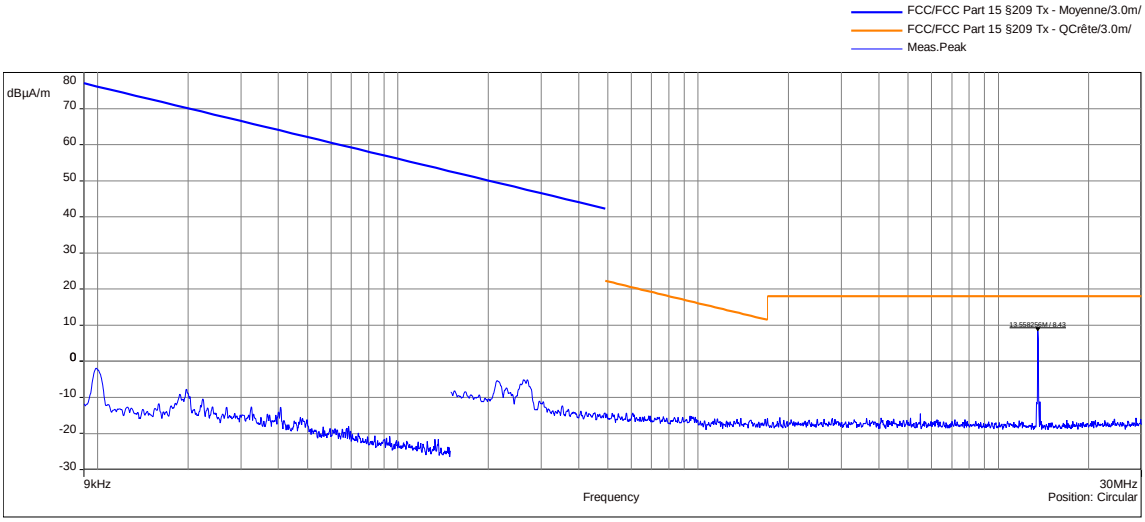
TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH			
TX / 90° / POSITION 2		EMI4547	
EUT mode:	D-M2	**T (°C):**	21.3
Test Date:	16/10/2019 12:02:39	**H (%):**	49.2
Test Operator:	MPA	**P (hPa):**	1002



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

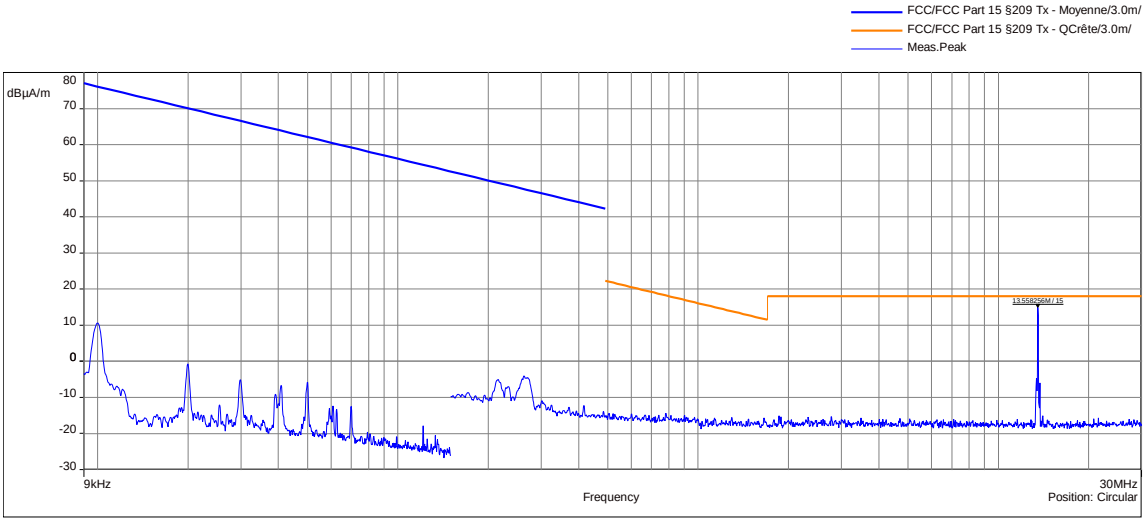
TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH			
TX / 0° / POSITION 3		EMI4548	
EUT mode:	D-M2	**T (°C):**	21.3
Test Date:	16/10/2019 12:07:46	**H (%):**	49.2
Test Operator:	MPA	**P (hPa):**	1002



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

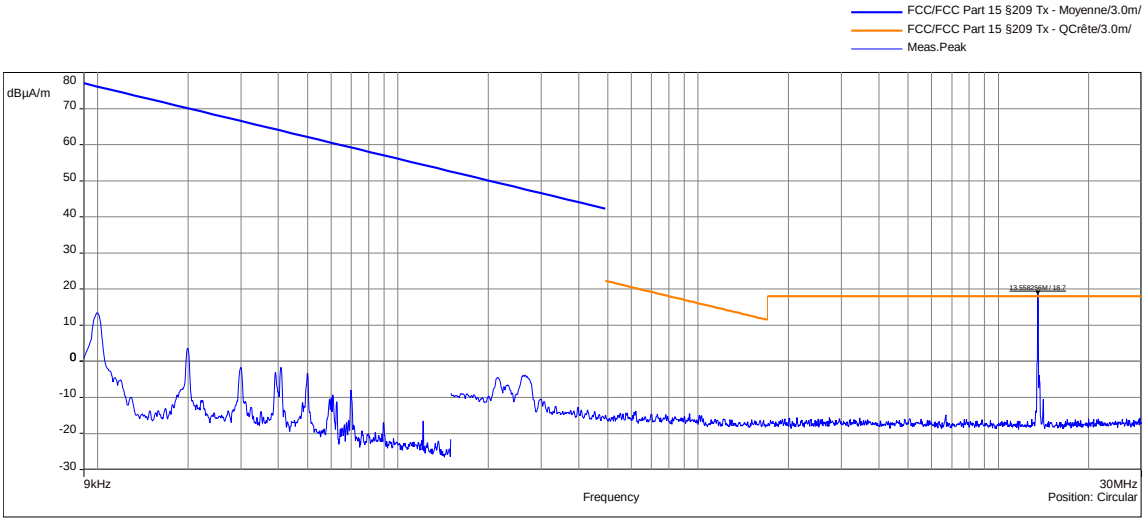
TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH			
TX / 45° / POSITION 3		EMI4549	
EUT mode:	D-M2	**T (°C):**	21.3
Test Date:	16/10/2019 12:10:53	**H (%):**	49.2
Test Operator:	MPA	**P (hPa):**	1002



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

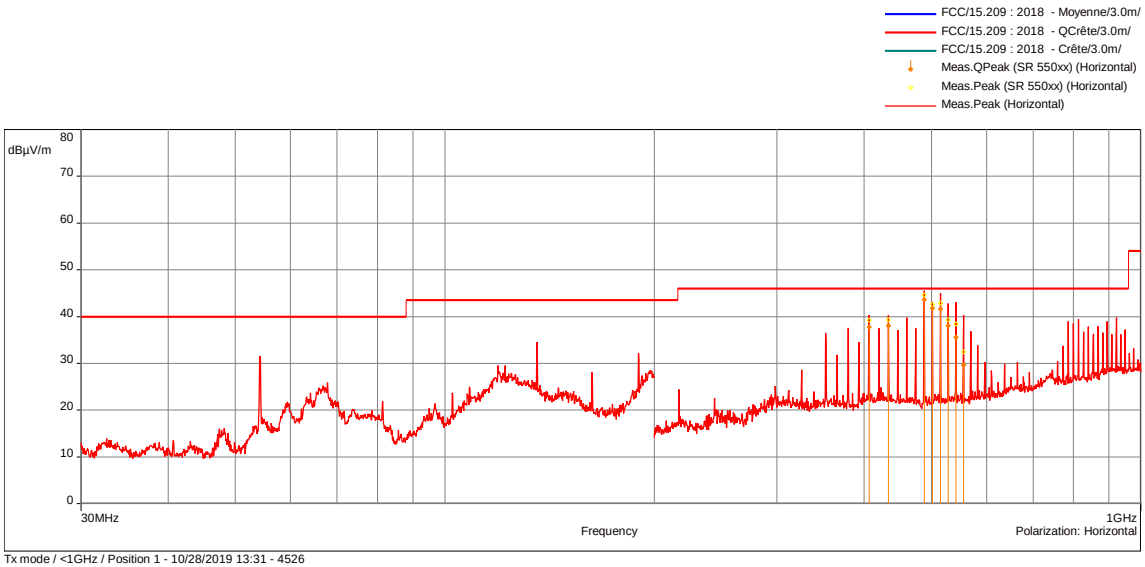
TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES <30MHZ - GRAPH			
TX / 90° / POSITION 3		EMI4550	
EUT mode:	D-M2	**T (°C):**	21.3
Test Date:	16/10/2019 12:13:25	**H (%):**	49.2
Test Operator:	MPA	**P (hPa):**	1002



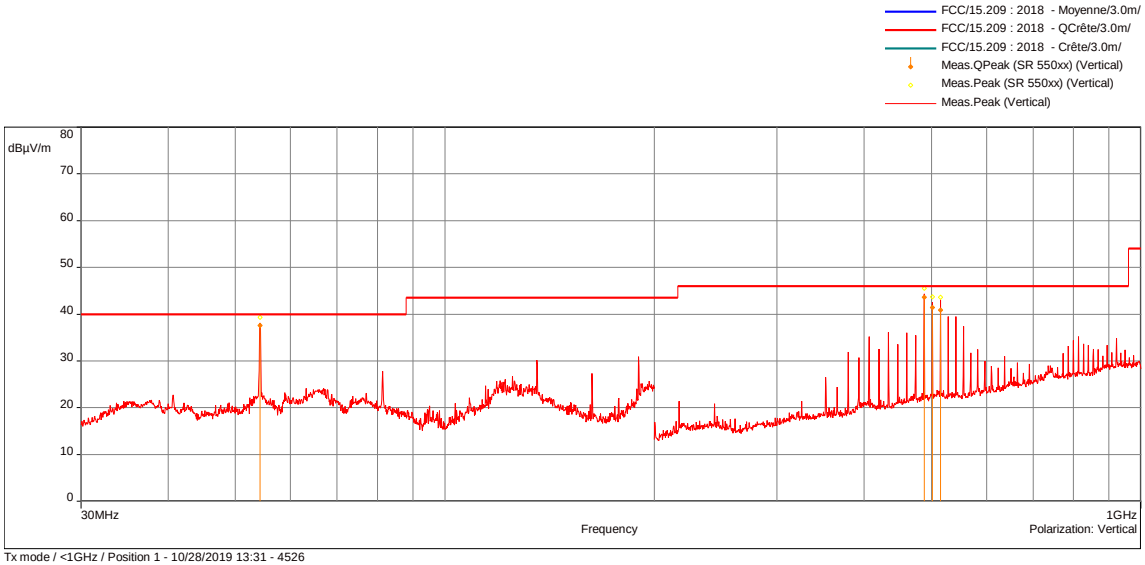
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Circular	9kHz-150kHz	300Hz	1kHz	Peak
Circular	150kHz-1MHz	10kHz	30kHz	Peak
Circular	1MHz-30MHz	10kHz	30kHz	Peak
Configuration:				
Comments:	Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.			

EUT modification(s): N/A

TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHZ - GRAPH			
TX MODE / <1GHZ / POSITION 1		EMI4526	
EUT mode:	D-M2	**T (°C):**	19.3
Test Date:	16/10/2019 10:56:40	**H (%):**	58
Test Operator:	MPA	**P (hPa):**	1002



Tx mode / <1GHz / Position 1 - 10/28/2019 13:31 - 4526

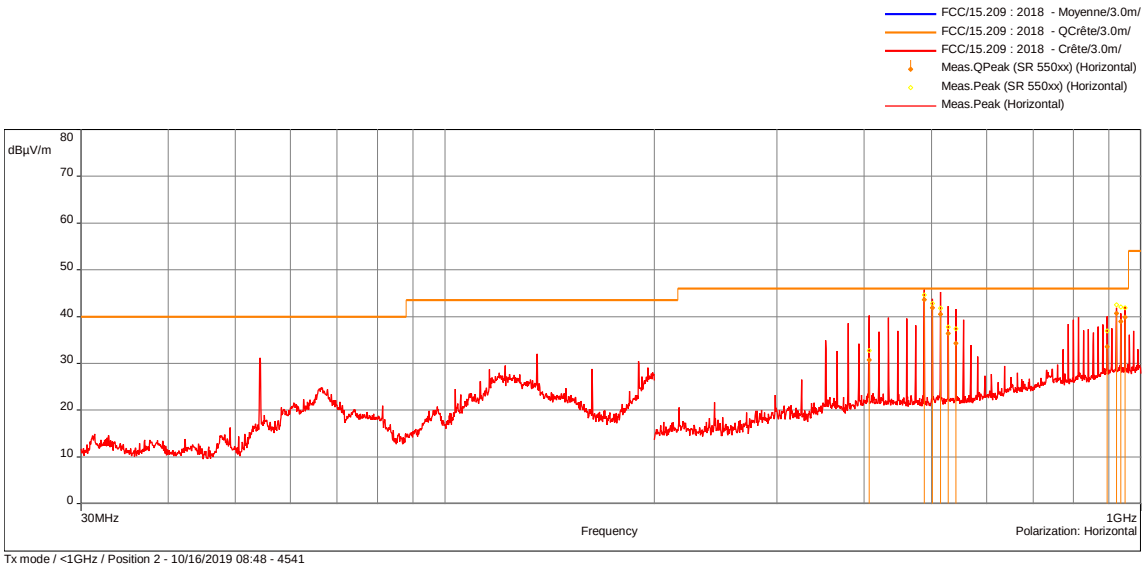


Tx mode / <1GHz / Position 1 - 10/28/2019 13:31 - 4526

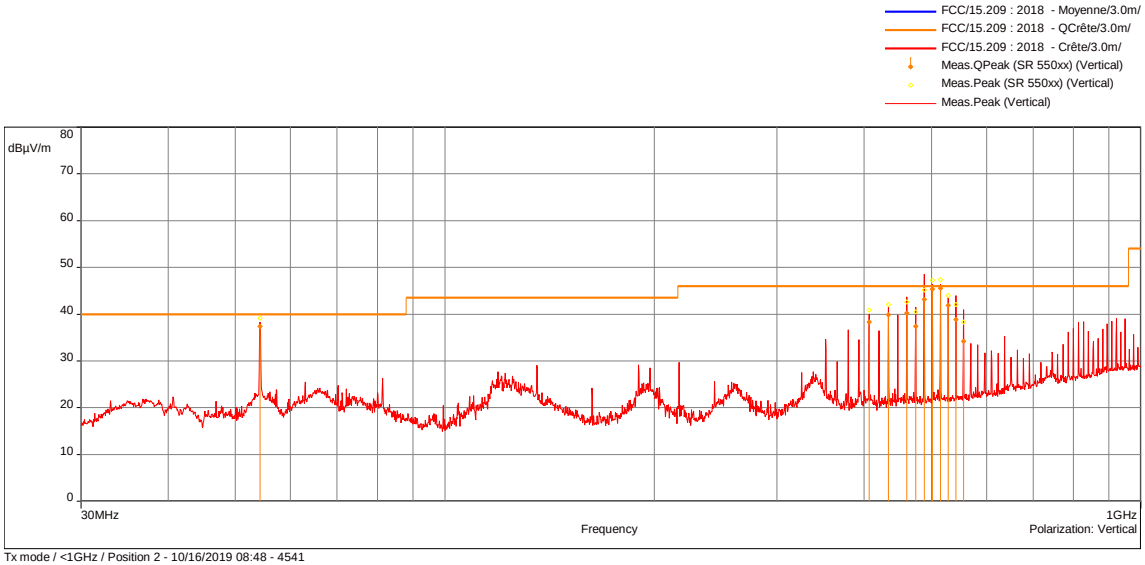
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	30MHz-200MHz	100kHz	300kHz	Peak
Horizontal	30MHz-200MHz	100kHz	300kHz	Peak
Vertical	200MHz-1GHz	100kHz	300kHz	Peak
Horizontal	200MHz-1GHz	100kHz	300kHz	Peak
Configuration:				
Comments:	N/A			
EUT modification(s): N/A				

QPEAK TABLE – TX MODE / <1GHZ / POSITION 1					
Frequency (MHz)	**Polarisation**	**Peak (dBµV/m)**	**QP (dBµV/m)**	**QP Limit (dBµV/m)**	**Margin (dB)**
54.2412404	Vertical	39.29	37.6	40	-2.4
488.121109	Vertical	45.51	43.58	46	-2.42
501.696985	Vertical	43.68	41.4	46	-4.6
515.272861	Vertical	43.65	40.86	46	-5.14
406.763521	Horizontal	39.27	37.76	46	-8.24
433.915273	Horizontal	39.33	38.03	46	-7.97
488.121109	Horizontal	44.59	43.62	46	-2.38
501.696985	Horizontal	42.61	41.77	46	-4.23
515.272861	Horizontal	42.91	41.63	46	-4.37
528.848736	Horizontal	39.34	38.03	46	-7.97
542.424612	Horizontal	38.41	35.59	46	-10.41
556.000488	Horizontal	32.45	29.64	46	-16.36

TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHZ - GRAPH			
TX MODE / <1GHZ / POSITION 2		EMI4541	
EUT mode:	D-M2	**T (°C):**	19.3
Test Date:	16/10/2019 08:48:10	**H (%):**	58
Test Operator:	MPA	**P (hPa):**	1002



Tx mode / <1GHz / Position 2 - 10/16/2019 08:48 - 4541

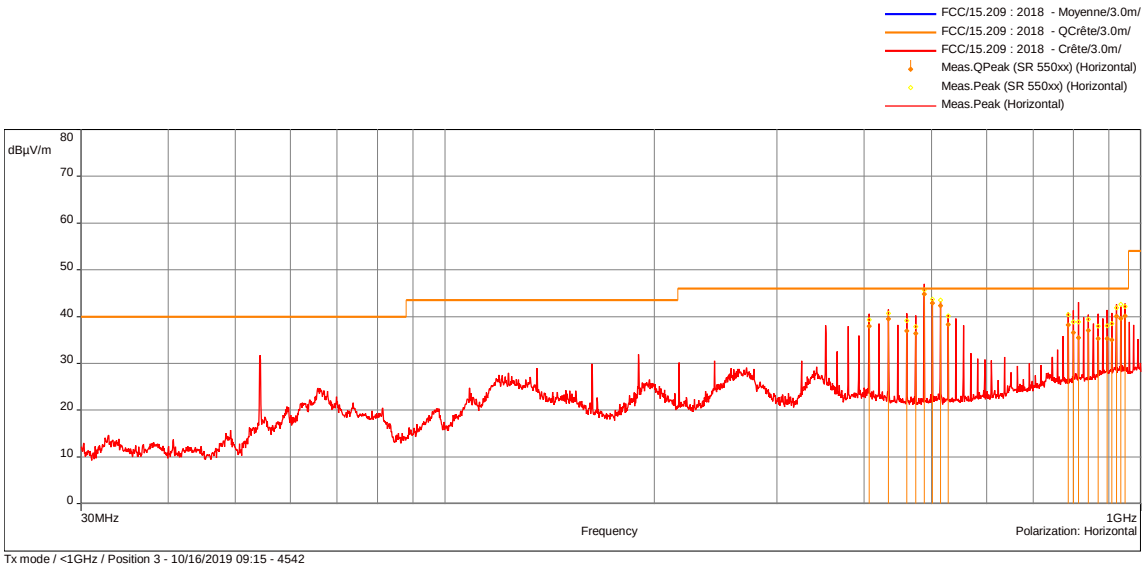


Tx mode / <1GHz / Position 2 - 10/16/2019 08:48 - 4541

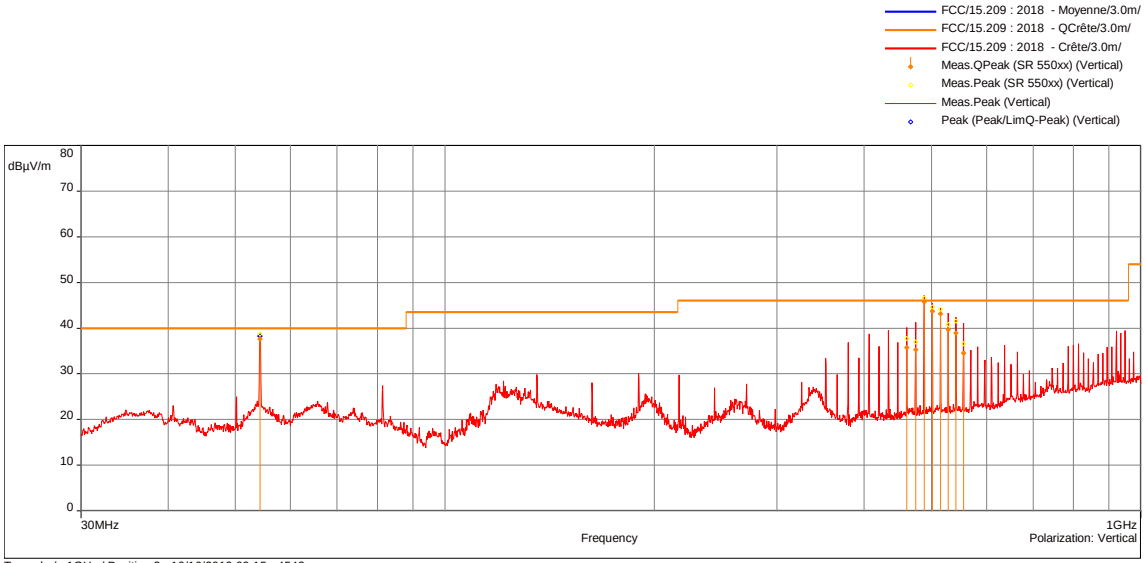
POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Vertical	30MHz-200MHz	100kHz	300kHz	Peak
Horizontal	30MHz-200MHz	100kHz	300kHz	Peak
Vertical	200MHz-1GHz	100kHz	300kHz	Peak
Horizontal	200MHz-1GHz	100kHz	300kHz	Peak
Configuration:				
Comments:	N/A			
EUT modification(s): N/A				

QPEAK TABLE – TX MODE / <1GHZ / POSITION 2					
Frequency (MHz)	**Polarisation**	**Peak (dBµV/m)**	**QP (dBµV/m)**	**QP Limit (dBµV/m)**	**Margin (dB)**
54.2412404	Vertical	39.1	37.44	40	-2.56
406.763521	Vertical	40.89	38.33	46	-7.67
433.915273	Vertical	42.05	39.87	46	-6.13
461.067025	Vertical	42.57	40.22	46	-5.78
474.642901	Vertical	40.47	37.36	46	-8.64
488.121109	Vertical	45.15	43.21	46	-2.79
501.696985	Vertical	47.3	45.33	46	-0.67
515.272861	Vertical	47.33	45.57	46	-0.43
528.848736	Vertical	44.01	41.89	46	-4.11
542.424612	Vertical	42.06	38.88	46	-7.12
556.000488	Vertical	38.33	34.19	46	-11.81
406.763521	Horizontal	32.76	30.69	46	-15.31
488.121109	Horizontal	44.6	43.61	46	-2.39
501.696985	Horizontal	42.83	41.85	46	-4.15
515.272861	Horizontal	41.76	40.48	46	-5.52
528.848736	Horizontal	37.79	36.4	46	-9.6
542.424612	Horizontal	37.42	34.32	46	-11.68
895.006715	Horizontal	36.98	33.54	46	-12.46
922.060798	Horizontal	42.51	40.69	46	-5.31
935.636674	Horizontal	42.09	38.93	46	-7.07
949.21255	Horizontal	41.87	39.9	46	-6.1

TRANSMITTER RADIATED SPURIOUS EMISSIONS AT FREQUENCIES >30MHZ - GRAPH			
TX MODE / <1GHZ / POSITION 3		EMI4542	
EUT mode:	D-M2	**T (°C):**	19.3
Test Date:	16/10/2019 09:15:59	**H (%):**	58
Test Operator:	MPA	**P (hPa):**	1002



Tx mode / <1GHz / Position 3 - 10/16/2019 09:15 - 4542



Tx mode / <1GHz / Position 3 - 10/16/2019 09:15 - 4542

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

QPEAK TABLE – TX MODE / <1GHZ / POSITION 3					
Frequency (MHz)	**Polarisation**	**Peak (dBµV/m)**	**QP (dBµV/m)**	**QP Limit (dBµV/m)**	**Margin (dB)**
54.2412404	Vertical	38.71	37.58	40	-2.42
406.763521	Horizontal	39.28	37.92	46	-8.08
433.915273	Horizontal	40.73	39.55	46	-6.45
461.067025	Vertical	37.71	35.73	46	-10.27
461.067025	Horizontal	39.13	36.99	46	-9.01
474.545233	Horizontal	37.9	36.4	46	-9.6
474.642901	Vertical	36.95	35.29	46	-10.71
488.121109	Horizontal	45.7	44.81	46	-1.19
488.121109	Vertical	46.63	45.78	46	-0.22
501.696985	Horizontal	43.68	42.85	46	-3.15
501.696985	Vertical	44.65	43.74	46	-2.26
515.272861	Vertical	44.19	43.1	46	-2.9
515.272861	Horizontal	43.54	42.3	46	-3.7
528.848736	Horizontal	40.18	38.36	46	-7.64
528.848736	Vertical	40.83	39.68	46	-6.32
542.424612	Vertical	41.56	38.96	46	-7.04
556.000488	Vertical	36.56	34.57	46	-11.43
786.497375	Horizontal	40.43	38.24	46	-7.76
800.073251	Horizontal	38.9	36.61	46	-9.39
813.649127	Horizontal	38.89	35.44	46	-10.56
840.703211	Horizontal	39.4	37.06	46	-8.94
867.854963	Horizontal	37.95	35.31	46	-10.69
894.909047	Horizontal	38.04	35.29	46	-10.71
908.484923	Horizontal	38.49	35.05	46	-10.95
922.060798	Horizontal	41.91	40.05	46	-5.95
935.636674	Horizontal	42.65	39.57	46	-6.43
949.21255	Horizontal	42.2	40.15	46	-5.85

6.4. Field strength in the band 13.553-13.567MHz

Reference standard:	FCC part 15 Radio part 15.225 a) & RSS-210
Test method:	FCC part 15 Radio part 15.225 a) & RSS-210
General test setup: 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
Tx mode	Permanent emission mode	15848µV/m at 30m	-	**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	Rohde & Schwarz	HFH2-Z2	5825	20/09/2017	20/11/2019
Cable	Huber + Suhner	N-20m	8385	11/10/2017	11/12/2019
Controller	Heinrich Deisel	HD100	4036		
Open area test site	EMITECH	Salinelles	3482	10/10/2017	10/12/2020
Receiver	Rohde & Schwarz	ESHS10	3371	20/09/2018	20/11/2019
Turntable	Heinrich Deisel	D4420	4038		

Blank cells = Permanent validity

FIELD STRENGTH - TABULATED RESULTS					
POSITION	Frequency (MHz)	Polarization (°)	Level at 10m (dBµA/m)	Limit at 10m (dBµA/m)	Limit at 30m (µV/m)
1	13.56	0	-15.64	51.58	15848
1	13.56	45	-15.34	51.58	15848
1	13.56	90	-17.34	51.58	15848
2	13.56	0	-2.24	51.58	15848
2	13.56	45	-0.04	51.58	15848
2	13.56	90	2.66	51.58	15848
3	13.56	0	-2.14	51.58	15848
3	13.56	45	-0.24	51.58	15848
3	13.56	90	2.46	51.58	15848

Maximun level at 10m is 2.66dBµA/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 35.08 dBµV/m for a limit at 84 dBµV/m.

TEST SETUP PHOTO(S)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6.5. Field strength outside the band 13.110-14.010MHz

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

FREQUENCY BAND	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	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	16491	25/06/2019	25/08/2021
Cable	Huber + Suhner	SF102K	16041	28/02/2019	28/04/2021
Cable	Radiall	SMA-1m	16563	30/07/2019	30/09/2021
Cable	Radiall	SMA-1m	16564	30/07/2019	30/09/2021
Multimeter	Agilent Technologies	U1252A	6138	24/01/2018	24/03/2020
Power supply	TTi	PL303QMD	8496		
Receiver	Rohde & Schwarz	FSW43	14830	28/12/2018	28/02/2020
Software	Nexio		0000		
Thermohygrometer	Testo	608-H2	12268	27/11/2017	27/01/2020
Thermohygrometer	Bioblock Scientific	Météostar	0963	25/01/2019	25/03/2021

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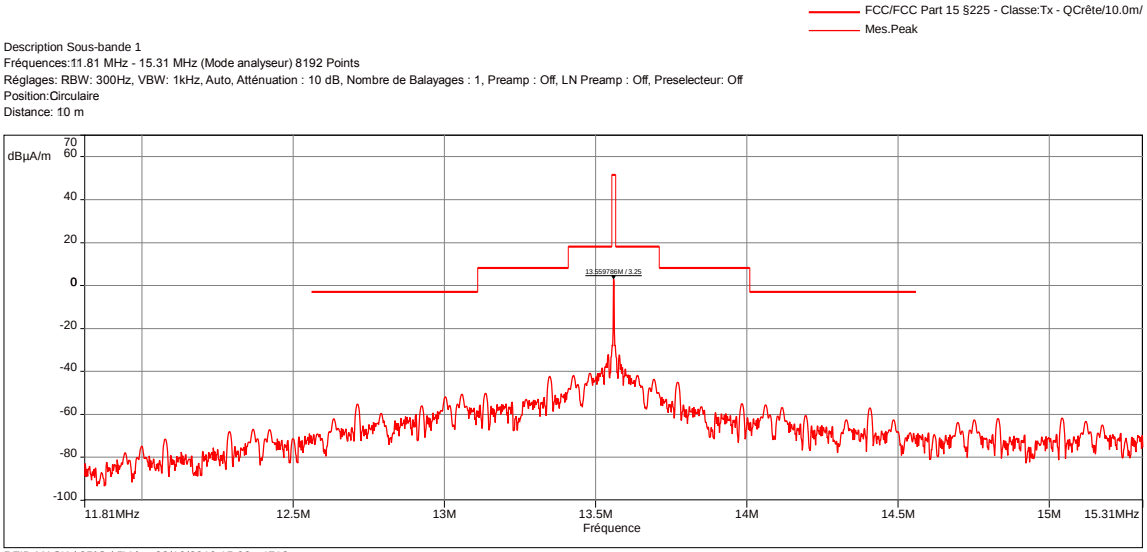
TRANSMITTER SPECTRUM MASK - GRAPH			
RFID MASK / 25°C / 5VDC		**EMI4709**	
EUT mode:	D-M2	**T (°C):**	29.2
Test Date:	17/10/2019 12:24:11	**H (%):**	43.1
Test Operator:	MPA	**P (hPa):**	1000



POSITION	FREQUENCIES	RBW	VBW	DETECTOR
Circular	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 :	FCC part 15 Radio part 15.225 e) and RSS Gen
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	16491	25/06/2019	25/08/2021
Cable	Huber + Suhner	SF102K	16041	28/02/2019	28/04/2021
Cable	Radiall	SMA-1m	16563	30/07/2019	30/09/2021
Cable	Radiall	SMA-1m	16564	30/07/2019	30/09/2021
Climatic enclosure	CLIMATS	EXCAL 7714-HA	14261		
Multimeter	Agilent Technologies	U1252A	6138	24/01/2018	24/03/2020
Power supply	TTi	PL303QMD	8496		
Receiver	Rohde & Schwarz	FSW43	14830	28/12/2018	28/02/2020
Software	Nexio		0000		
Thermohygrometer	Testo	608-H2	12268	27/11/2017	27/01/2020
Thermohygrometer	Bioblock Scientific	Météostar	0963	25/01/2019	25/03/2021
Thermometer contactless	GHM Greisinger	GMH 3710	12968	11/02/2019	11/04/2020

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MEASUREMENT OF FREQUENCY STABILITY - TABULATED RESULTS					
Test Case (Temperature variation)	**Temperature**	**Frequency**	**Delta (Hz)**	**Delta (%)**	**Limit (%)**
Normal conditions	25°C	13.5598851	-	-	0.001
	25°C	13.5598881	2.99	0.00002	0.001
	25°C	13.5598901	4.99	0.00004	0.001
Extremes tests conditions	-30°C	13.559968	82.9	0.00061	0.001
	-30°C	13.559986	100.9	0.00074	0.001
	-30°C	13.559995	109.9	0.00081	0.001
	+70°C	13.55999164	106.54	0.00079	0.001
	+70°C	13.55995026	65.16	0.00048	0.001
	+70°C	13.56000519	120.09	0.00089	0.001

TEST SETUP PHOTO(S)

End of test report