

R410-17-103999-1A - DMO / CBU

This document cancels and replace test report ref R410-17-103999-1A Ed.0

RADIO TEST REPORT

According to the standard(s):

FCC part 15 Subpart C
RSS-210: 2016

Equipment under test:

ARCT-X33-A (Model: ARCT-A)
FCC ID: OVNAC6
IC : 10520A-ARCT

Company:

STID

Diffusion: Mrs MONET

(Company: STID)

Number of pages: 27 including 1 annex

Ed.	Date	Modified page(s)	Technical verification Quality approval	
			Name	Visa
1	12 Feb. 18	4 to 6, 15, 17, 19 and 20	Olivier HEYER	

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NAME OF THE EQUIPMENT UNDER TEST (E.U.T.) : ARCT-X33-A (Model: ARCT-A)
FCC ID: OVNAC6
IC : 10520A-ARCT

Serial number : G17170924

Part number : /

Software Version : Not communicated

MANUFACTURER'S NAME : STID

APPLICANT'S ADDRESS:

Company : STID

Address : 20PA des Pradeaux
Boulevard Salvador Allende
13850 GREASQUE
FRANCE

Person(s) present during the tests : Mrs MONET

Responsible : Mrs MONET

DATE(S) OF TESTS : September, the 13th and 14th of 2017

TESTS LOCATION(S) : EMITECH MONTPELLIER laboratory in
VENDARGUES (34) - FRANCE
Open area test site in SALINELLES (30) –
FRANCE
MRA US-EU Designation Number: FR0006
IC Filling number : 4379C-1

TESTS OPERATOR(S) : David MONTAULON

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1. INTRODUCTION

This document submits the results of Electromagnetic Compatibility tests performed on the equipment ARCT-X33-A (denominated hereafter E.U.T.: equipment under test) according to document(s) listed below.

2. REFERENCE DOCUMENT(S)

FCC Part 15	Code of Federal Regulations Title 47 – Telecommunications Chapter 1 – Federal Communications Commission Part 15 – Radio frequency devices Subpart C – Intentional Radiators
RSS-210	Issue 9, August 2016 Licence-exempt Radio Apparatus: Category I Equipment
RSS-Gen	Issue 4, November 2014 General Requirements for Compliance of Radio Apparatus
ANSI C63.10	2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

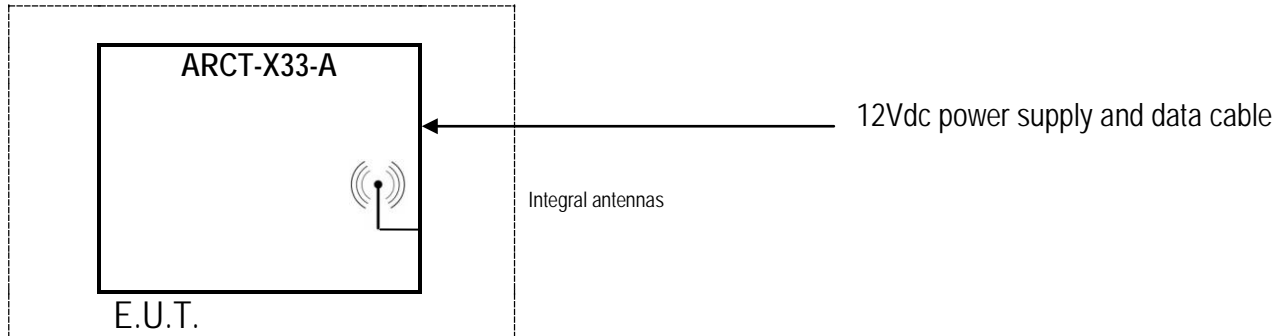
3. EQUIPMENT UNDER TEST CONFIGURATION

Equipment under test (E.U.T.) description: Standard evolutive readers range for all secure access control applications.

ARCT-X33-A

- Permanent transmitter emission with a loop coil antenna
- Integral antenna, dedicated antenna supplied with the equipment
- Maximum frequency range used by E.U.T.: 13.56MHz (RFID)
- Tested frequency: 13.56MHz (RFID)
- Equipment: single frequency
- Total channel available: 1 (For RFID module)
- Power supply: 12Vdc
- Product is declared as a Class A device according to FCC Part 15.3 by STID

Applicant: **STID**
Model: **ARCT-A**
FCC ID: **OVNAC6**
IC : **10520A-ARCT**

4. EQUIPMENT UNDER TEST CONFIGURATION SCHEME

Supplementary information: Main cable is equipped with a ferrite with one turn (supplied by the manufacturer) (ref Würth Elektronik: 74271222) (see photos)

The power supply and data are routed over the connected cable for the duration of the test.

Cycle and operating mode during emission tests: Permanent emission mode with modulation.

Equipment modifications applied during tests: No

5. SUMMARY OF TEST RESULTS

Tests designation	Results satisfying?	Comments
Restricted band of operation - FCC part 15.205 & RSS-Gen §8.10	YES	
Conducted power lines - FCC part 15.207 & RSS-Gen §8.8	YES	
Unwanted radiated emissions - FCC part 15.209 & RSS-Gen §8.9	YES	
Operation within the bands 13.110-14.010 MHz - FCC part 15.225 e) & RSS-210 §B.6	YES	
Occupied bandwidth - RSS-Gen §6.6	YES	

N.P.: Not Performed.

N.A.: Not Applicable.

- **In emission:**

Sample subject to the test complies with prescriptions of the standard(s) FCC part15 Subpart C& RSS-210 Issue 9, August 2016 according to limits specified in this test report.

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

NB: In all the document boards

DATE CAL means Date of Calibration (last calibration)

DATE VAL means Date of Validity (before next calibration)

6. MEASUREMENT UNCERTAINTY

Uncertainties values presented below are asked mandatory by CISPR standards:

Parameter	Maximal Emitech Uncertainty	Standard Uncertainty
Conducted emission (Artificial Mains Network) 150kHz – 30MHz	± 3.4 dB	± 3.4 dB
Radiated emission (magnetic field) 9kHz – 30MHz	± 2.7 dB	/
(electric field in the OATS/SAC) 30MHz – 1GHz	± 5.2 dB	± 6.3 dB
(electric field in the FAR) 30MHz – 1GHz	± 5.2 dB	± 5.3 dB

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

OATS : Open Area Test Site

SAC : Semi Anechoic Chamber

FAR: Fully Anechoic Room

7. CONDUCTED EMISSION

Temperature (°C): 20

Humidity (%HR): 39.1

Pressure (hPa): 1018

Standard: FCC part 15 Subpart C 15.207 & RSS-Gen §8.8

Test method: ANSI C63.10: 2013

Test configuration:

Tested cable(s)	Measure with	E.U.T. height
110Vac/60Hz power supply	L.I.S.N.	40cm
110Vac/60Hz power supply / RF on equivalent load	L.I.S.N.	40cm

Frequency band	Tested cable(s)	Resolution bandwidth	Video bandwidth	Detection mode
150kHz-30MHz	115Vac/60Hz power supply	10kHz	30kHz	Peak
150kHz-30MHz	115Vac/60Hz power supply / RF on equivalent load	10kHz	30kHz	Peak

In order to avoid radiated phenomenon during conducted emissions, test were done with and without RFID antenna (replaced by equivalent load).

Test method deviation: No

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH	DATE CAL.	DATE VAL.
Cable	EMITECH	Current absorber sheath	10653	24/11/2015	24/01/2018
Cable	C&C	N-3m	14334	15/12/2016	15/02/2019
Cable	C&C	N-5m	14340	15/12/2016	15/02/2019
Cable	SUCOFLEX	N-3m	14379	18/01/2017	18/03/2019
LISN	AFJ	LT42C\10	12007	06/10/2016	06/12/2017
Limiter	Hewlett Packard	11947A	0238	25/11/2015	25/01/2018
PE choke	EMITECH	CISPR 16-2-1 : 2008	10081	#	#
PE choke	EMITECH	CISPR 16-2-1 : 2008	11042	#	#
Receiver	Agilent Technologies	E4440A	9704	07/08/2015	07/10/2017
Shielded enclosure	COMTEST	C.V3	14494	#	#
Thermohygrometer	Testo	608-H1	7562	29/12/2016	29/02/2019
Thermohygrometer	Bioblock Scientific	Météostar	0963	29/12/2016	29/02/2019

#: Permanent validity

BAT-EMC software version: V3.6.0.32

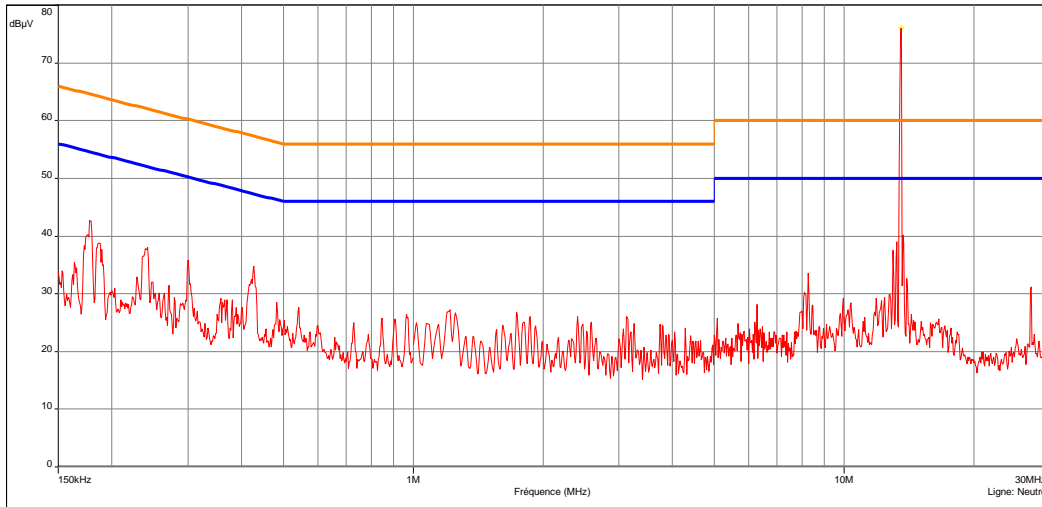
Results: See Graph(s) hereafter.

Limits on the graphs are average and quasi-peak limits (upper limit).

Conducted emission
115Vac/60Hz power supply

EMI1591

- C.E.M. (cM)/FCC Part 15 §107 - Classe:B - Moyenne/
- C.E.M. (cM)/FCC Part 15 §107 - Classe:B - QCrête/
- Mes. Peak (Neutre)
- Peak/LimAvg (Neutre)



Date:
13/09/2017 09:47:06

Technician: DMO

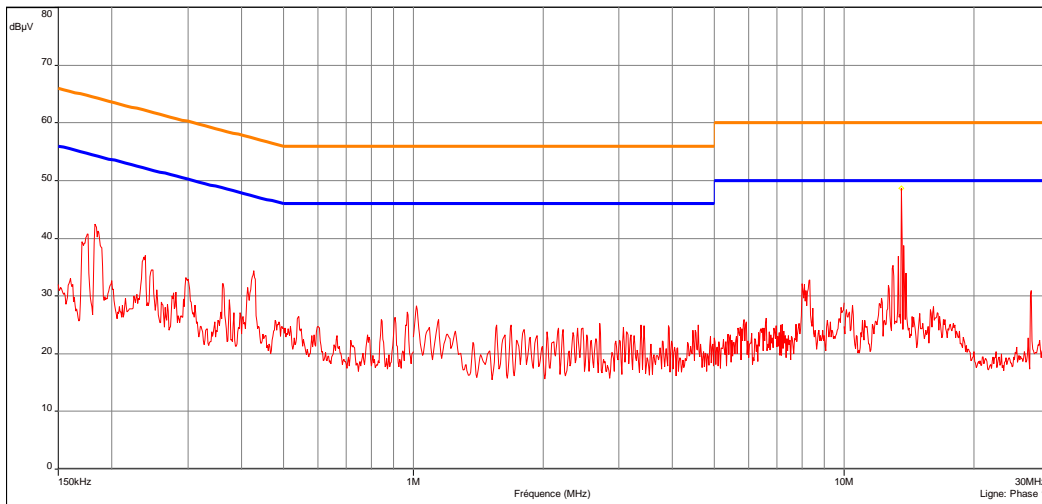
Detection:
Peak

T (°C) : 21.8
H (%) : 46.6
P (hPa) : 1017

Comments:
13.56MHz: Util frequency

Modification(s) during test:
No

- C.E.M. (cM)/FCC Part 15 §107 - Classe:B - Moyenne/
- C.E.M. (cM)/FCC Part 15 §107 - Classe:B - QCrête/
- Mes. Peak (Phase 1)
- Peak/LimAvg (Phase 1)

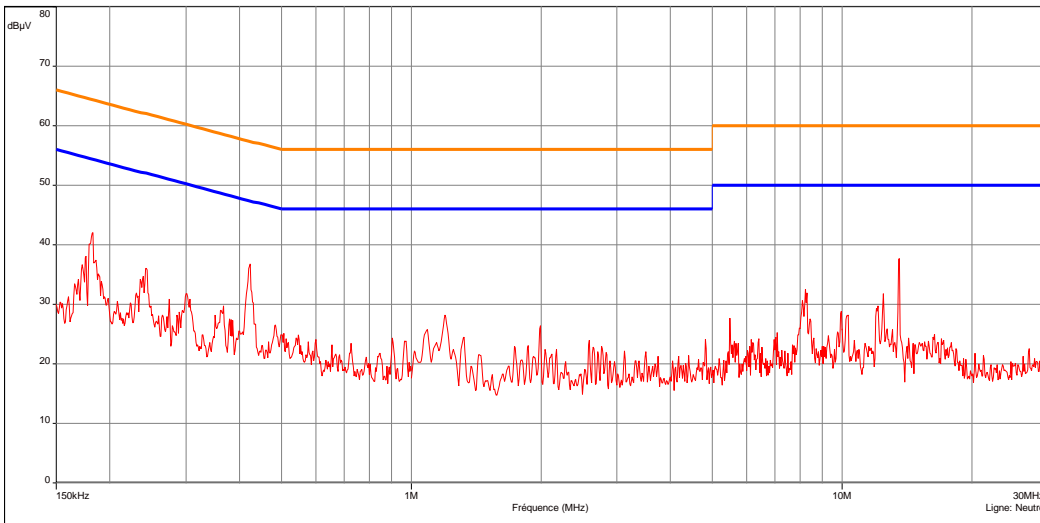


Conducted emission

EMI1591

115Vac/60Hz power supply / RF on equivalent load

— C.E.M. (cM)/FCC Part 15 §107 - Classe:B - Moyenne/
— C.E.M. (cM)/FCC Part 15 §107 - Classe:B - QCrête/
— Mes. Peak (Neutre)



Aimentation 12Vdc / 50 ohms load - 13/09/2017 10:19 - 1592

Date:
13/09/2017 10:19:56

Technician: DMO

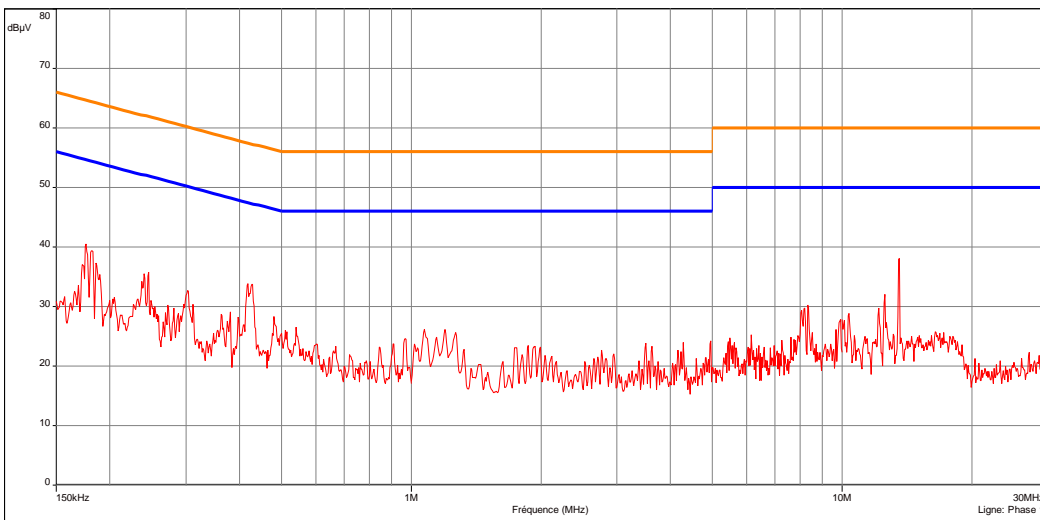
Detection:
Peak

T (°C) : 21.8
H (%) : 46.6
P (hPa) : 1017

Comments:
/

Modification(s) during test:
No

— C.E.M. (cM)/FCC Part 15 §107 - Classe:B - Moyenne/
— C.E.M. (cM)/FCC Part 15 §107 - Classe:B - QCrête/
— Mes. Peak (Phase 1)



Aimentation 12Vdc / 50 ohms load - 13/09/2017 10:19 - 1592

8. UNWANTED RADIATED EMISSIONS

Standard: FCC part 15 Radio part 15.209 & RSS 210:2016

Tests methods: ANSI C63.10: 2013

a) Pre-measurement in semi anechoic chamber:

Frequency band	Tested side	Resolution bandwidth	Video bandwidth	Detection mode	E.U.T. height
9kHz-150kHz	Front side	300Hz	1kHz	Peak	80cm
150kHz-30MHz	Front side	10kHz	30kHz	Peak	80cm
30MHz-1GHz	Front side	100kHz	300kHz	Peak	80cm

Measurements below 30MHz are done with a loop antenna as describe in the standard.
Measurements are done in semi anechoic chamber at 3m. E.U.T. is set on a wooden table.
E.U.T. measurements are maximized at 360° in max-hold peak detection.

Limits: 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 reported in the standard.

Test method deviation: From 9 kHz to 30MHz: measurements are made in peak detection instead of average mode in frequency band 9 kHz-500 kHz

- Measurements are expressed in dB μ A/m instead of μ V/m
- Measuring distance is 3 meters instead of 30 and 300 meters

Radiated emissions limits in this frequency band are specified at 30 or 300 meters. Pre measurement distance used during the test, subject of this report, is 3 meters. Then published limits come from a theoretical conversion using an extrapolation factor of 40dB / decade.

Measuring distance: 3 meters

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH	DATE CAL.	DATE VAL.
Antenna	Rohde & Schwarz	HFH2-Z2	5825	27/01/2015	27/09/2017 ⁽¹⁾
Antenna	Electro Metrics	BIA-30HF	1107	25/04/2015	25/06/2018
Antenna	Rohde & Schwarz	HL223	3126	25/04/2015	25/06/2018
Antenna mast	Maturo	NCD	14656	#	#
Cable	Huber Suhner	N-10m	8472	16/02/2017	16/04/2019
Cable	SUCOFLEX	N-3m	14378	18/01/2017	18/03/2019
Cable	SUCOFLEX	N-6,5m	14380	18/01/2017	18/03/2019
Receiver	Rohde & Schwarz	ESI	9704	07/08/2015	07/10/2017
Shielded enclosure	COMTEST	C.V3	14494	14/02/2017	14/04/2020
Thermohygrometer	Bioblock Scientific	Météostar	0963	27/12/2016	27/02/2019
Thermohygrometer	Testo	608-H2	12269	20/08/2015	20/10/2017
Turntable	Maturo	NCD	14657	#	#

#: Permanent validity

BAT-EMC software version: V3.6.0.32

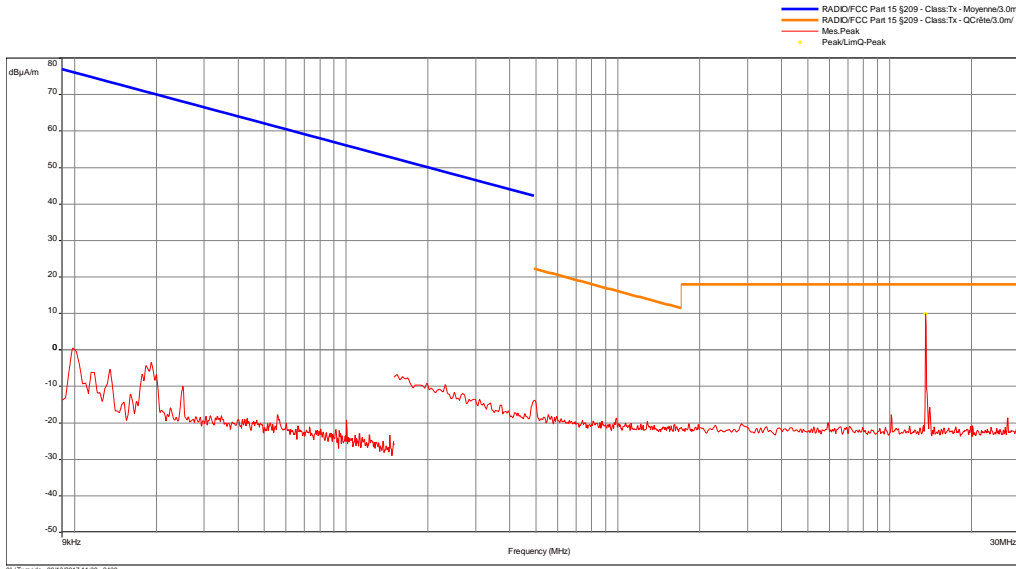
⁽¹⁾ Validity extension under derogation EQSDER000S4100047

Results: See Graphs hereafter.

Radiated field strength

EMI2438

0° / Tx mode



Date: 13/09/2017 11:39:56

Technician: DMO

Detection:
Peak

T (°C): 24.4
H (%): 46.6
P (hpa): 1017

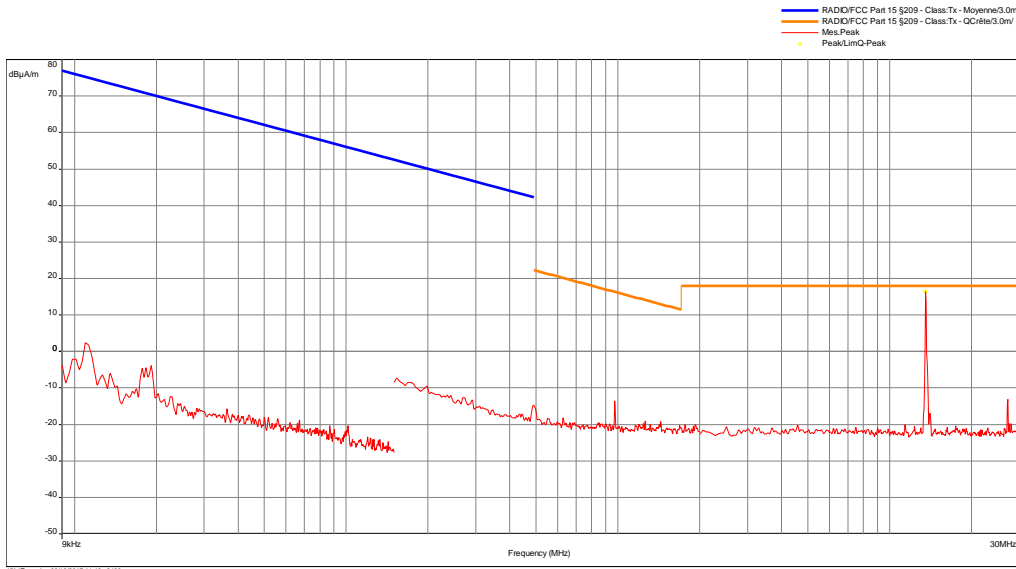
Comments:
/

Modification(s) during test:
None

Radiated field strength

EMI2439

45° / Tx mode



Date: 13/09/2017 11:46:50

Technician: DMO

Detection:
Peak

T (°C): 24.4
H (%): 46.6
P (hpa): 1017

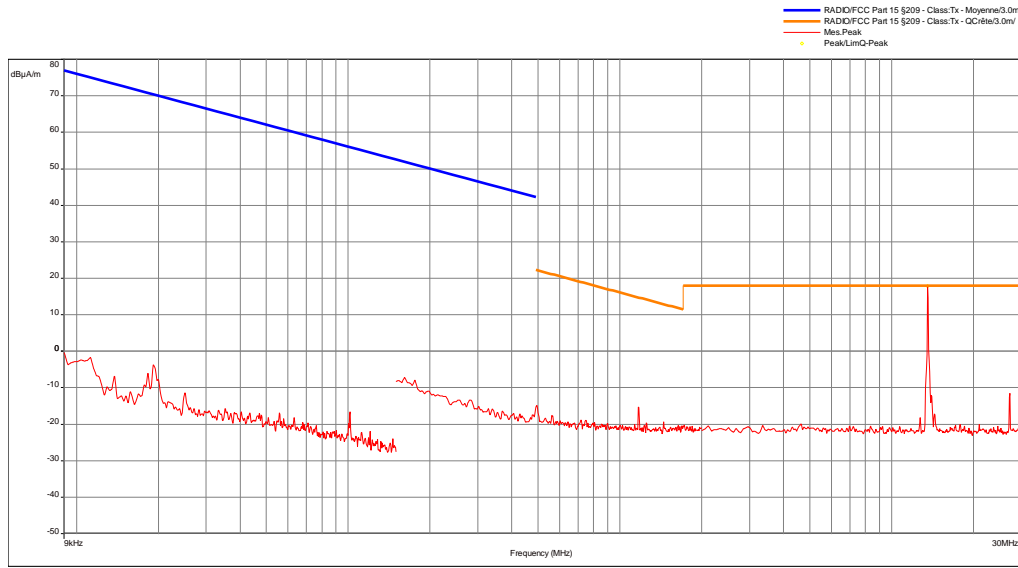
Comments:
/

Modification(s) during test:
None

Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.

Radiated field strength
90° / Tx mode

EMI2440



Date: 13/09/2017 11:54:00

Technician: DMO

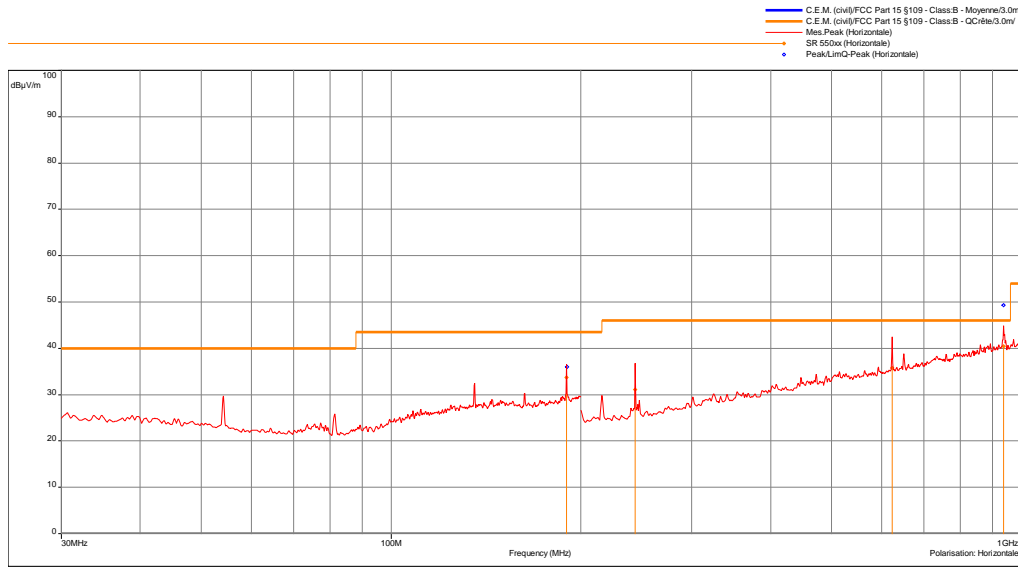
Detection:
Peak

T (°C): 24.4
H (%): 46.6
P (hpa): 1017

Comments:
/

Modification(s) during test:
None

Limit indicated on these plots are calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.

Radiated electric field measurement
Front side
EMI2444


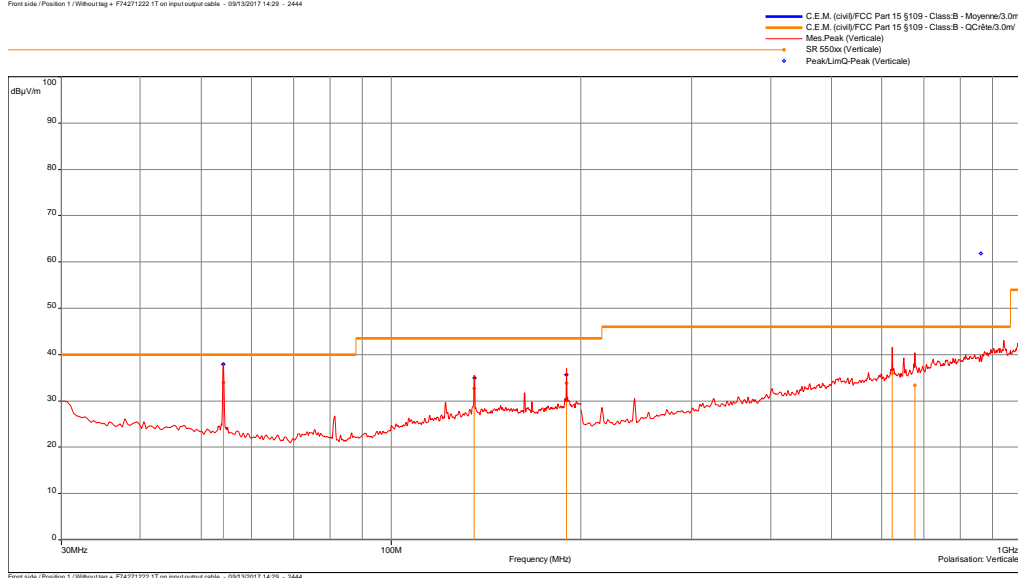
Date: 13/09/2017 14:29:40

Technician: DMO

 Detection:
Peak

 T (°C): 24.4
 H (%): 46.6
 P (hpa): 1017

 Comments:
 /

 Modification(s) during test:
No


b) Measurement on open area test site:

Temperature (°C): 24.4

Humidity (%HR): 46.6

Pressure (hPa): 1017

Test configuration: For each measured frequencies, E.U.T. is set via a turntable in order to find the highest level. Test antenna is set between 1m and 4m in order to find the highest level in vertical and horizontal polarization. Only highest levels are recorded.

Frequency band	Initial position (0°)	Resolution bandwidth	Measuring distance	Detection mode	E.U.T. height
9kHz-150kHz	Front side	300Hz	10m	Quasi-peak	80cm
150kHz-30MHz	Front side	10kHz	10m	Quasi-peak	80cm
30MHz-1GHz	Front side	120kHz	3m	Quasi-peak	80cm

Test method deviation: Between 9 kHz to 30MHz: measurements are expressed in dB μ A/m instead of dB μ V/m (conversion factor: 51.5dB) and measuring distance is 10 meters instead of 300m.

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH	DATE CAL.	DATE VAL.
Antenna	Rohde & Schwarz	HFH2-Z2	5825	27/01/2015	27/09/2017 ⁽¹⁾
Antenna	Electro Metrics	BIA-30HF	1107	25/04/2015	25/06/2018
Antenna	Rohde & Schwarz	HL223	3126	25/04/2015	25/06/2018
Antenna mast	Maturo	NCD	14656	#	#
Cable	Huber Suhner	N-10m	8472	16/02/2017	16/04/2019
Cable	SUCOFLEX	N-3m	14378	18/01/2017	18/03/2019
Cable	SUCOFLEX	N-6,5m	14380	18/01/2017	18/03/2019
Cable	Huber Sumner	N-20m	8385	23/04/2015	31/10/2017 ⁽²⁾
Open area test site	EMITECH	Salinelles	3482	22/04/2014	31/10/2017 ⁽³⁾
Receiver	Rohde & Schwarz	ESI	9704	07/08/2015	07/10/2017
Receiver	Rohde & Schwarz	ESHS10	3371	22/08/2017	22/10/2019
Shielded enclosure	COMTEST	C.V3	14494	14/02/2017	14/04/2020
Thermohygrometer	Bioblock Scientific	Météostar	0963	27/12/2016	27/02/2019
Thermohygrometer	Testo	608-H2	12269	20/08/2015	20/10/2017
Turntable	Maturo	NCD	14657	#	#
Turntable	Heinrich Deisel	D4420	4038	#	#
Turntable controller	Heinrich Deisel	HD100	4036	#	#

#: Permanent validity

⁽¹⁾ Validity extension under derogation EQSDER000S4100047

⁽²⁾ Validity extension under derogation EQSDER000S4100054

⁽³⁾ Validity extension under derogation EQSDER000S4100053

Results: See Boards hereafter.

Frequency (MHz)	Polarization	Azimut (degree)	Antenna Height (cm)	Measure (dB μ A/m)	Limit (dB μ A/m)	Comments
27.12	-	0	90°	-27.73	-2.87	C

C= Compliant

N.C = Not Compliant

Frequency (MHz)	Polarization	Azimuth (degree)	Antenna Height (cm)	Measure (dB μ V/m)	Limit (dB μ V/m)	Comments
54.208	Vertical	0	100	33.94	43	C
135.553	Vertical	0	100	32.753	43	C
189.8	Vertical	0	100	33.787	46	C
623.68	Vertical	0	100	36.04	46	C
678	Vertical	0	100	33.33	46	C
189.8	Horizontal	0	400	33.73	43	C
244.08	Horizontal	0	400	31.14	46	C
623.68	Horizontal	0	400	35.81	46	C
936.72	Horizontal	0	400	40.45	46	C

C= Compliant

N.C = Not Compliant

All other unwanted radiated spurious are at least 20 dB below specified limits.

9. OPERATION WITHIN THE BAND 13.110-14.010 MHZ

Standard: FCC Part 15 Radio part 15.225 a) to d) & RSS-210 §B.6

Tests methods: ANSI C63.10:2013 and RSS Gen: 2014

Test configuration:

Frequency band	Tested side	Resolution bandwidth	Video bandwidth	Detection mode	E.U.T. height
13.11MHz-14.01MHz	Front side / antenna 0	10kHz	30kHz	Peak	80cm
13.11MHz-14.01MHz	Front side / antenna 45	10kHz	30kHz	Peak	80cm
13.11MHz-14.01MHz	Front side / antenna 90	10kHz	30kHz	Peak	80cm

Measure is done with an antenna position of 0°, 90° and 45°. Only higher level is recorded

Test method deviation: Measurements are expressed in dBμA/m instead of dBμV/m (conversion factor: 51.5dB). Final measuring distance is 10m instead of 30 m.

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH	DATE CAL.	DATE VAL.
Antenna	Rohde & Schwarz	HFH2-Z2	5825	27/01/2015	27/09/2017 ⁽¹⁾
Cable	Huber Sumner	N-20m	8385	23/04/2015	31/10/2017 ⁽²⁾
Open area test site	EMITECH	Salinelles	3482	22/04/2014	31/10/2017 ⁽³⁾
Receiver	Rohde & Schwarz	ESHS10	3371	22/08/2017	22/10/2019
Thermohyrometer	Testo	608-H2	12269	20/08/2015	20/10/2017
Turntable	Heinrich Deisel	D4420	4038	#	#
Turntable controller	Heinrich Deisel	HD100	4036	#	#

#: Permanent validity

⁽¹⁾ Validity extension under derogation EQSDER000S4100047

⁽²⁾ Validity extension under derogation EQSDER000S4100054

⁽³⁾ Validity extension under derogation EQSDER000S4100053

Results: See Graph(s) hereafter

Measurement for ARCT-X33-A

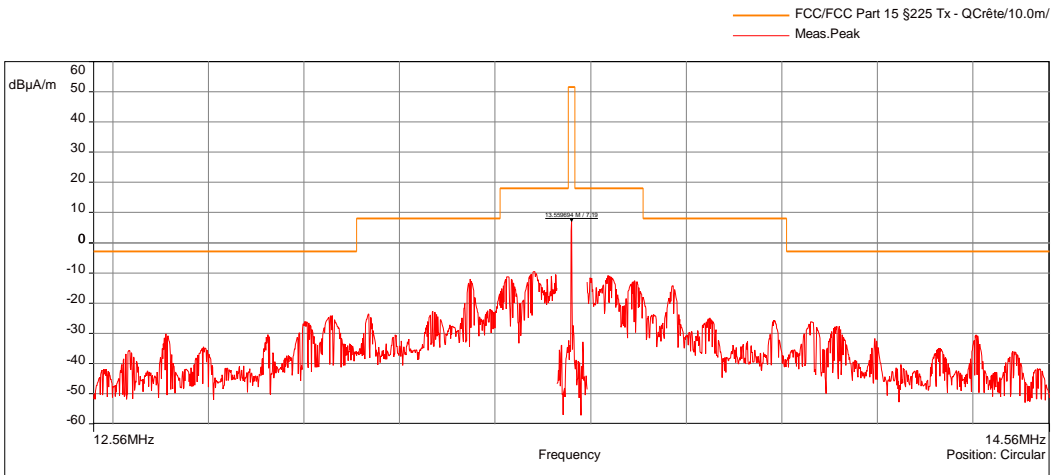
Frequency (MHz)	Polarization	Azimut (degree)	Antenna Height (cm)	Measure (dBμA/m)	Limit (dBμA/m)	Comments
13.56	Horizontal	180	0°	-0.01	51.58	C
13.56	Horizontal	120	45°	4.80	51.58	C
13.56	Horizontal	100	90°	7.49	51.58	C

Carrier measurement at 10m: 7.49dBμA/m (≈ 58.99dBμV/m)

Using an extrapolation factor of 40 dB/decade (as described in section 15.31 (f)), the level at 30m is about 39.91dBμV/m (98.97μV/m) for a limit at 15.848 mV/m.

Transmitter emission levels and spectrum mask measurements
12Vdc/20°C

EMI4561



Date: 31/10/2017 12:34:58

Technician: DMO

Detection:

T (°C): 20

H (%): 42.5

P (hpa): 1025

Comments:

Modification(s) during test:
N/A

Limit indicated on this plot is calculated with 40 dB/decade extrapolation factor and 51.5dB conversion factor.

10. FREQUENCY TOLERANCE

Standard: FCC Part 15 Radio part 15.225 & RSS-210 §B.6

Tests methods: FCC Part 15 Radio part 15.225 e) & RSS Gen: 2014

Test configuration: A near field probe detects field near equipment (relative measurement).

Resolutions:

Frequency	Resolution bandwidth	Video bandwidth
13.56MHz	300Hz	1kHz

Test method deviation: No

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH	DATE CAL.	DATE VAL.
Antenna	EMITECH	3.5 cm	4653	#	#
Atenuator	CLIMATS	10489	4390	25/11/2016	25/01/2018
Climatic enclosure	CLIMATS	10489	14261	04/11/2016	04/01/2018
Cable	MICRO-COAX		10528	24/11/2015	24/01/2018
Multimeter	Agilent	U1252A	6138	24/11/2015	24/01/2018
Thermometer	GHM Greisinger	GMH 3710	12968	27/06/2016	31/11/2017
Power supply	TTi	PL303QMD	8496	#	#
Receiver	Agilent	E4440A	5824	11/01/2016	11/03/2018

#: Permanent validity

Standard limits: +/- 0.01% of the operating frequency

Results: See Board(s) below

E.U.T. operating mode: with modulation

	Temperature	Power supply (Vac)	Measured Frequency (MHz)	Frequency tolerance (%)	Limit (%)
Normal condition	+20°C (Humidity 50%)	12.0	13.559841	-	+/-0.01
		10.2	13.559849	0.00000%	
		13.8	13.559842	0.00006%	
Extremes conditions	-30°C	12.0	13.559914	0.00001%	
		10.2	13.559916	0.00054%	
		13.8	13.559914	0.00055%	
	+50°C	12.0	13.559850	0.00054%	
		10.2	13.559849	0.00007%	
		13.8	13.559851	0.00006%	

11. OCCUPIED BANDWIDTH 99%

Standard: CNR-Gen § 6.6

Test method: CNR-Gen § 6.6

Test configuration: A near field probe detects field near equipment (relative measurement).

Frequency band	Resolution bandwidth	Video bandwidth	Detection mode
13.56MHz	47Hz	150Hz	Max-hold Peak

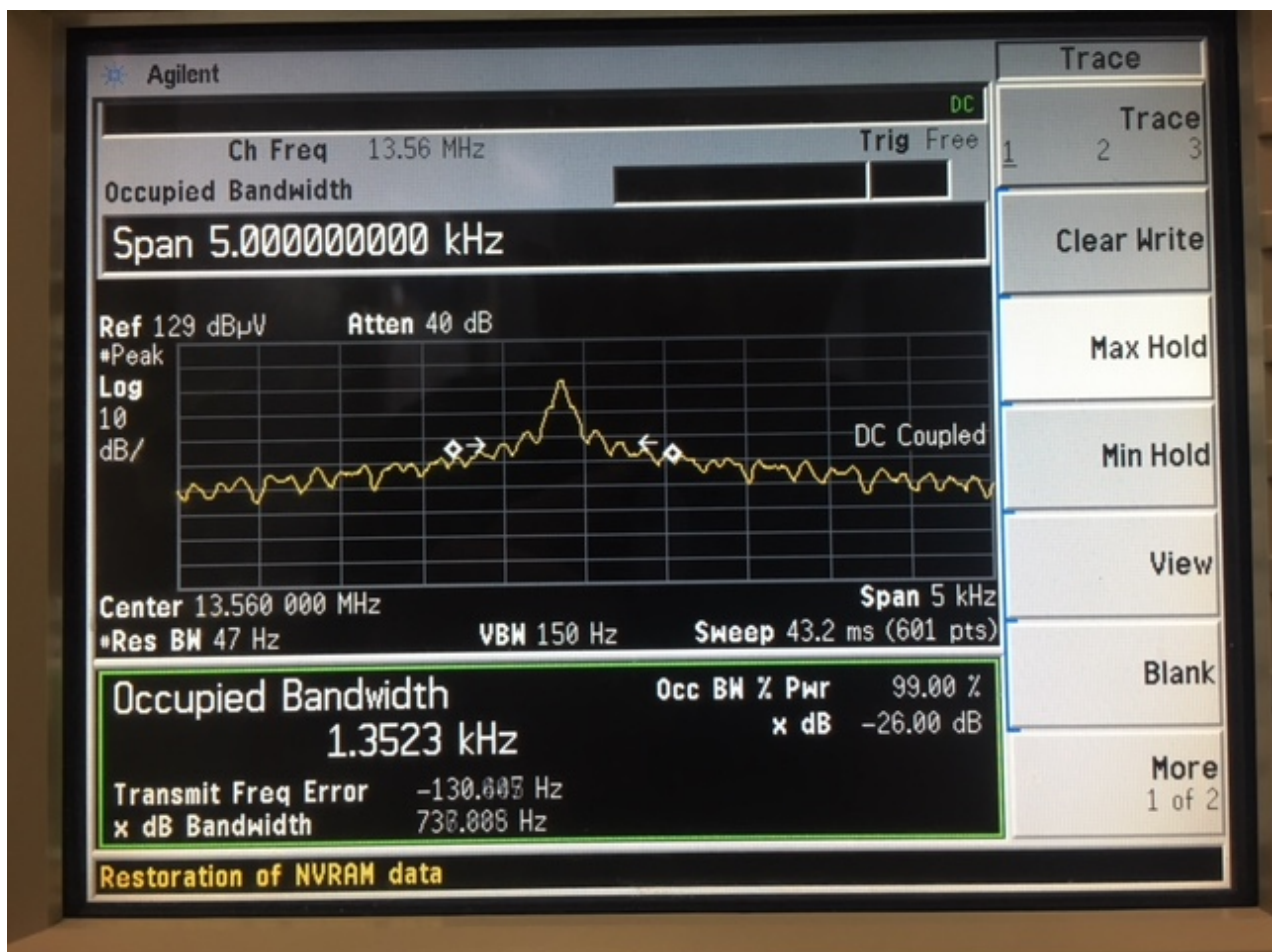
Test method deviation: No

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH	DATE CAL.	DATE VAL.
Antenna	EMITECH	3.5 cm	4653	#	#
Receiver	Agilent	E4440A	5824	11/01/2016	11/03/2018

Results: See Graph(s) hereafter

Occupied Bandwidth 99%: 1.3523 kHz (RBW=47 Hz)



ANNEX: PHOTOGRAPH(S)

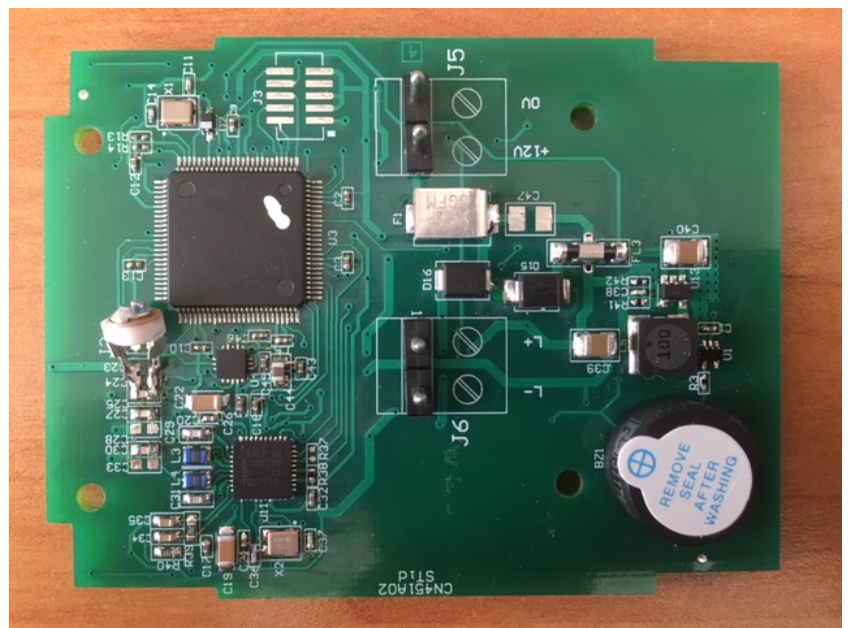
E.U.T.(on stand)



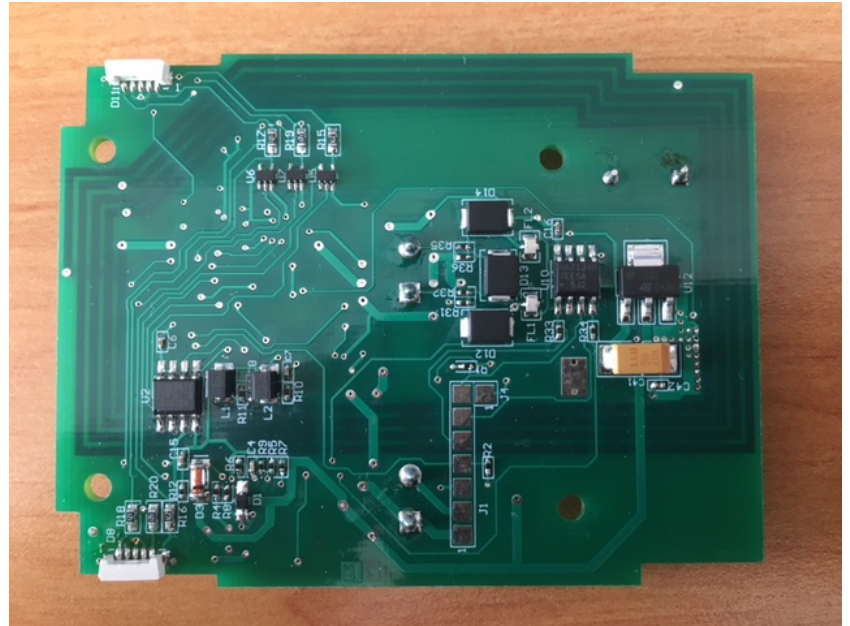
E.U.T. (rear side on stand)



Main electronic board (top side)



Main electronic board (bottom side)



E.U.T.
(Power supply used for conducted emissions)



Measurement on open area test site (f<30MHz)



Radiated measurements
EUT position ($f > 30\text{MHz}$)



Radiated measurements
($f > 30\text{MHz}$)



Radiated measurements
($f > 30\text{MHz}$)



Conducted emissions

