

R410-17-100991-2A - FMO / CBU

RADIO TEST REPORT

According to the standard(s):

FCC part 15 Subpart C
RSS-210: 2016

Equipment under test:

ARC1S-R33 (Model: ARC-AC5)
FCC ID: OVNAC5
IC: 10520A-ARC1S

Company:

STID

Diffusion: Mr POITRAT

(Company: STID)

Number of pages: 26 including 1 annex

Ed.	Date	Modified page(s)	Technical verification Quality approval	Visa
			Name	
0	24 Mar. 17	Creation	David MONTAULON	

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NAME OF THE EQUIPMENT UNDER TEST (E.U.T.) : ARC1S-R33 (Model: ARC-AC5)
FCC ID: OVNAC5
IC: 10520A-ARC1S

Serial number : G17038009

Part number : /

Software Version : C05

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 : Ms MONET

Responsible : Mr POITRAT

DATE(S) OF TESTS : March, the 16th and 17th 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) : Fabien MOINACHE

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(*) Test not made under COFRAC accreditation.

1. INTRODUCTION

This document submits the results of Electromagnetic Compatibility tests performed on the equipment **ARC1S-R33** (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.

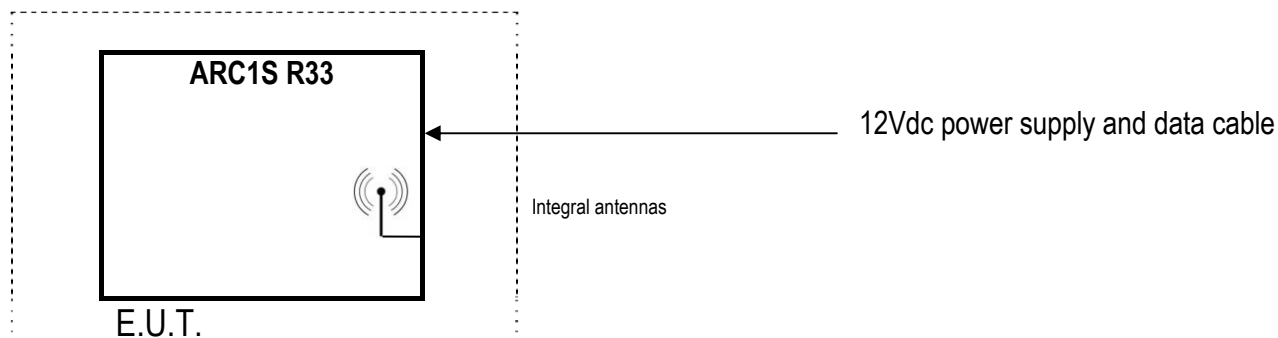
3. EQUIPMENT UNDER TEST CONFIGURATION

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

ARC1S-R33

- 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

Applicant: **STID**
Model: **ARC-ARC5**
FCC ID: **OVNAC5**
IC: **10520A-ARC1S**

4. EQUIPMENT UNDER TEST CONFIGURATION SCHEME

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.

(*) Test not made under COFRAC accreditation.

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	110Vac/60Hz power supply	10kHz	30kHz	Peak
150kHz-30MHz	110Vac/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	9491	04/10/2016	04/12/2018
Cable	MICRO-COAX	N-3m	10535	24/11/2015	24/01/2018
Cable	MICRO-COAX	N-5m	10527	24/11/2015	24/01/2018
LISN	PMM	L3-25	0833	26/11/2015	26/01/2018
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	5824	11/01/2016	11/03/2018
Shielded enclosure	RAY PROOF	C.V2	1423	#	#
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

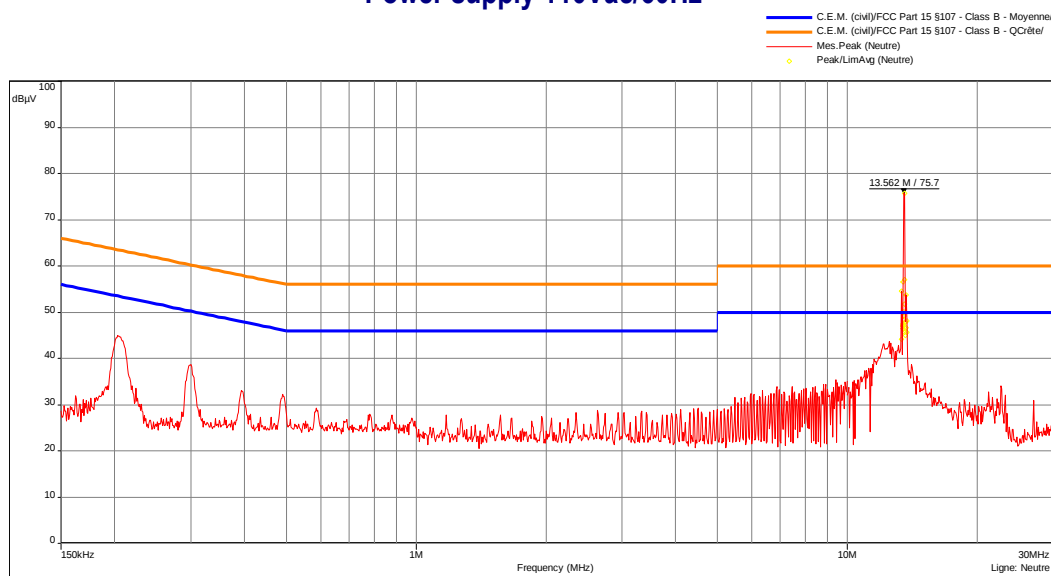
Results: See **Graph(s)** hereafter.

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

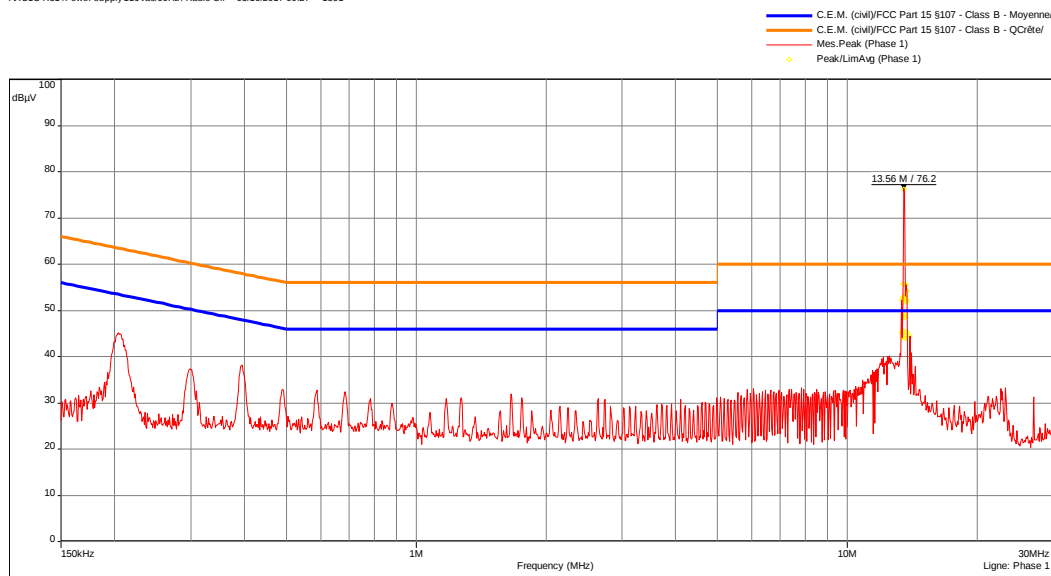
Conducted emission

Power supply 110Vac/60Hz

EMI1591



ARC15-R31 /Power supply 110Vac/60Hz / Radio Off - 03/16/2017 09:27 - 1591



ARC15-R31 /Power supply 110Vac/60Hz / Radio Off - 03/16/2017 09:27 - 1591

Date: 16/03/2017 09:27:04

Technician: FMO

Detection:
Peak

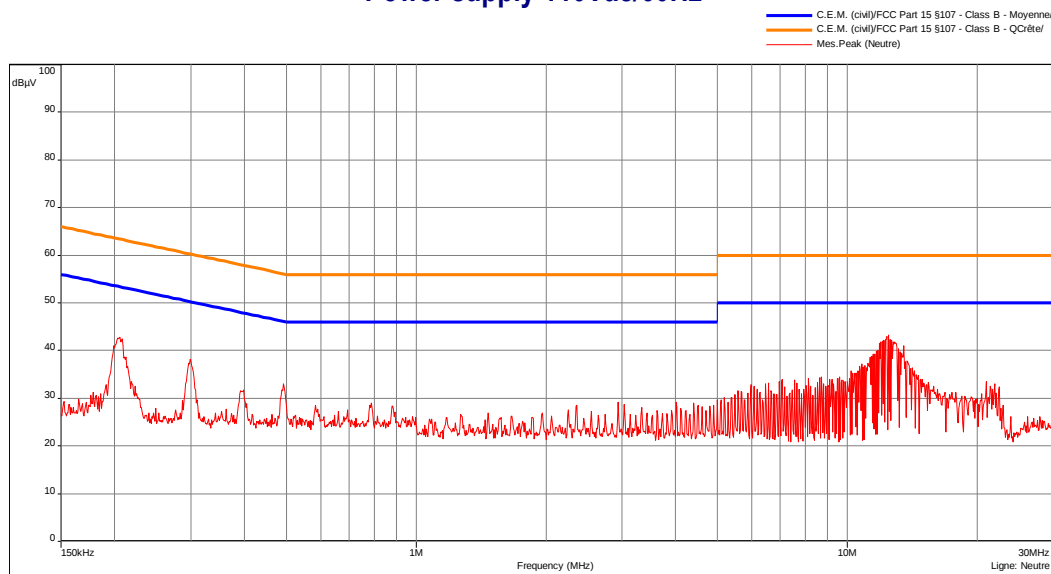
T (°C): 20
H (%): 39.1
P (hpa): 1018

Comments:
/

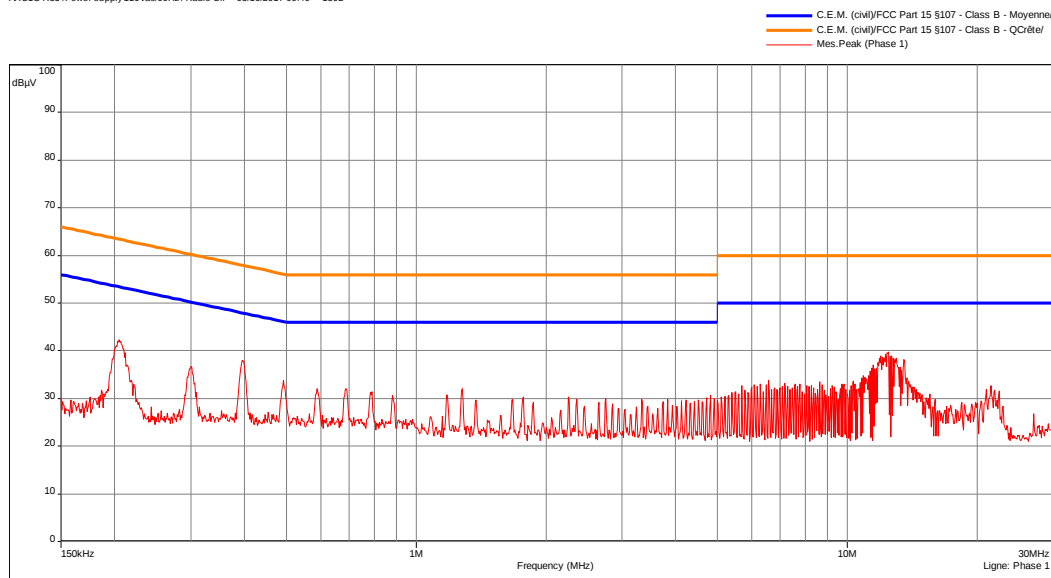
Modification(s) during test:
No

Conducted emission

Power supply 110Vac/60Hz

EMI1592


ARC15-R33 /Power supply 110Vac/60Hz / Radio Off - 03/16/2017 09:40 - 1592



ARC15-R33 /Power supply 110Vac/60Hz / Radio Off - 03/16/2017 09:40 - 1592

 Date: **16/03/2017 09:40:24**

 Technician: **FMO**

 Detection:
Peak

 T (°C): **20**
 H (%): **39.1**
 P (hpa): **1018**

 Comments:
 /

 Modification(s) during test:
No

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	200Hz	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	27/06/2015	27/08/2017
Antenna	Electro Metrics	BIA-30HF	0824	25/04/2015	25/06/2018
Antenna	Electro Metrics	LPA-30	0855	25/04/2015	25/06/2018
Cable	MegaPhase	TM18-N1N1-197	12840	05/04/2016	05/06/2018
Cable	MegaPhase	TM18-N1N1-118	12841	05/04/2016	05/06/2018
Receiver	Agilent Technologies	E4440A	5824	11/01/2016	11/03/2018
Shielded enclosure	RAY PROOF	C.V2	1423	#	#
Thermohygrometer	Bioblock Scientific	Météostar	0963	27/12/2016	27/02/2019
Thermohygrometer	Testo	608-H1	7562	27/12/2016	27/02/2019

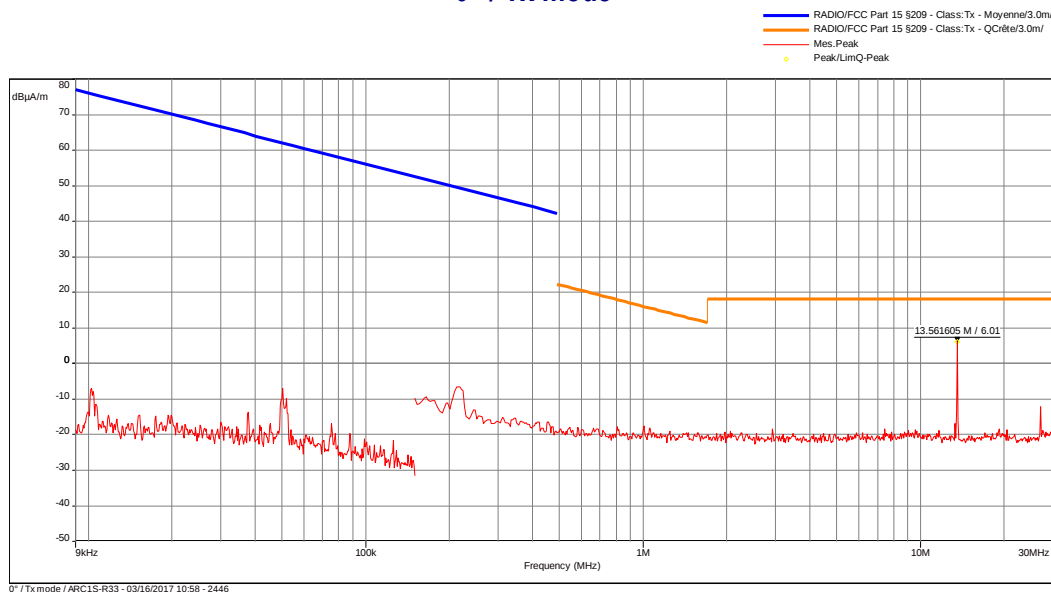
#: Permanent validity

BAT-EMC software version: V3.6.0.32

Results: See **Graphs** hereafter.

Radiated field strength 0° / Tx mode

EMI2446



Date: 16/03/2017 10:58:17

Technician: FMO

Detection:
Peak

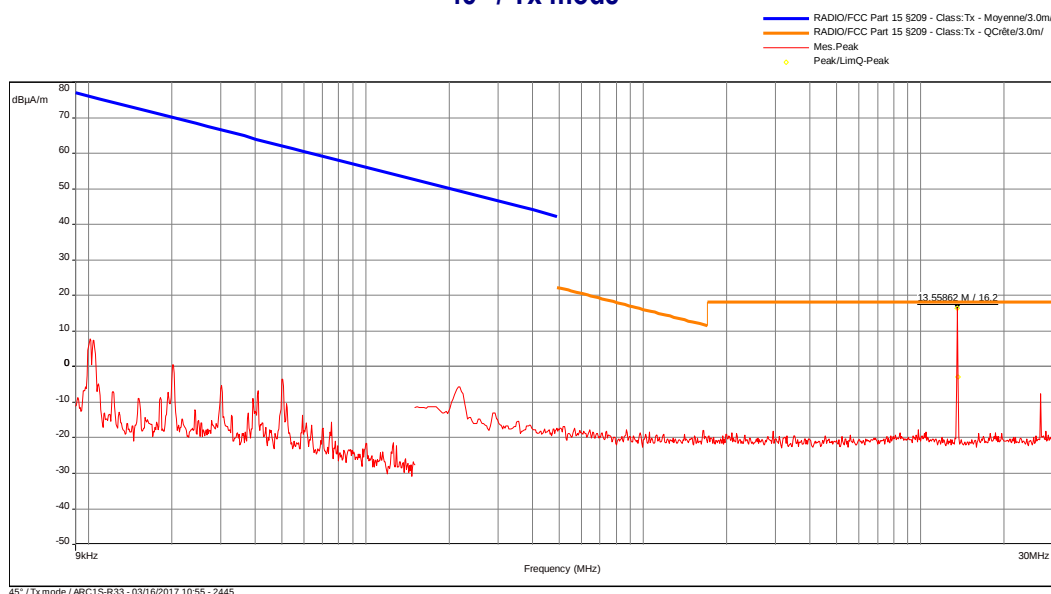
T (°C): 20
H (%): 39.1
P (hpa): 1018

Comments:
/

Modification(s) during test:
None

Radiated field strength 45° / Tx mode

EMI2445



Date: 16/03/2017 10:55:47

Technician: FMO

Detection:
Peak

T (°C): 20
H (%): 39.1
P (hpa): 1018

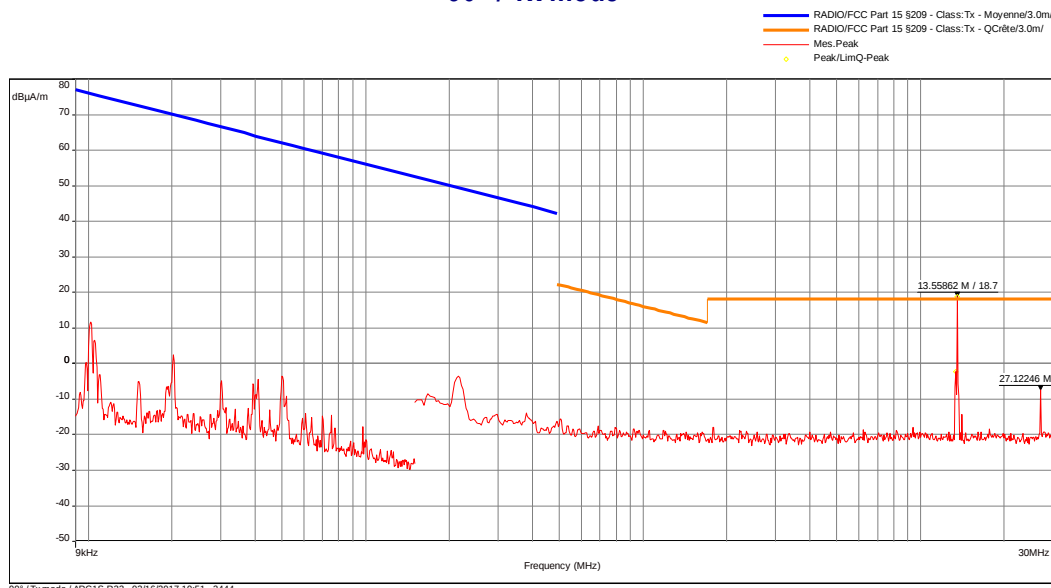
Comments:
/

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

EMI2444



Date: 16/03/2017 10:51:54

Technician: FMO

Detection:
Peak

T (°C): 20
H (%): 39.1
P (hpa): 1018

Comments:
/

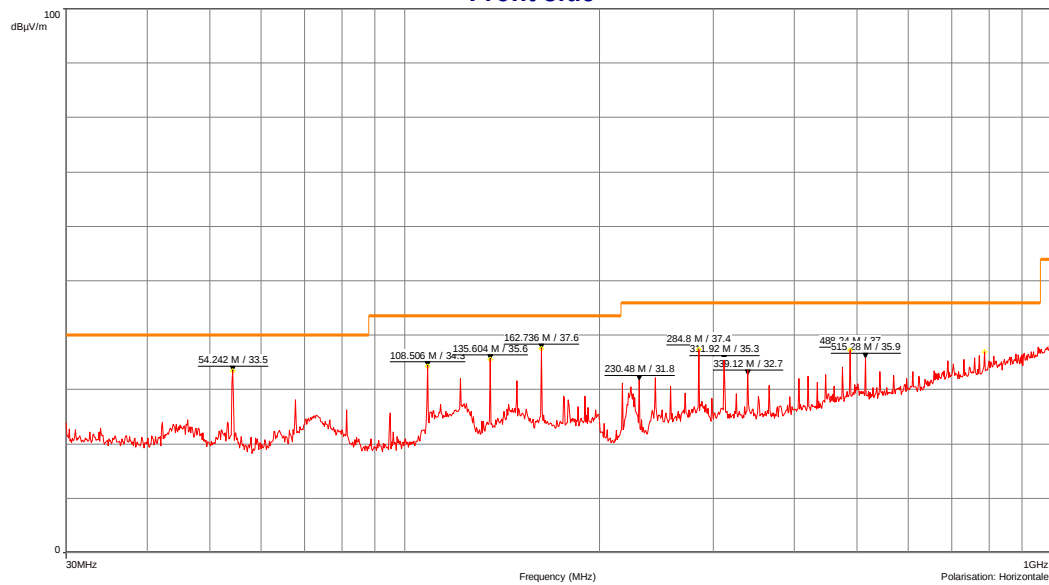
Modification(s) during test:
None

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

Radiated electric field measurement

EMI1588

Front side



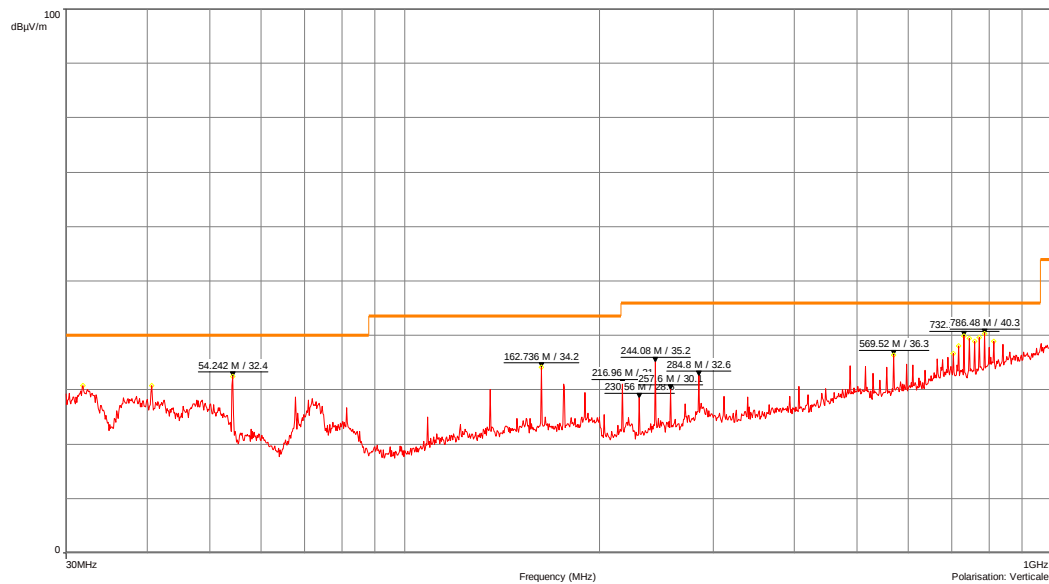
Date: 16/03/2017 11:08:21

Technician: FMO

Detection:
Peak

T (°C): 20
H (%): 39.1
P (hpa): 1018

Comments:
/

Modification(s) during test:
No


b) Measurement on open area test site:
Temperature (°C): 15
Humidity (%HR): 56
Pressure (hPa): -

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	200Hz	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 dBμA/m instead of dBμV/m (conversion factor: 51.5dB) and measuring distance is 10 meters instead of 300m.

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH	CAL DATE	CAL DATE
Antenna	Rohde & Schwarz	HL223	3126	25/04/2015	25/06/2018
Antenna	Rohde & Schwarz	HFH2-Z2	5825	27/06/2015	27/08/2017
Antenna	Electro-Metrics	BIA-30HF	1107	17/06/2015	17/08/2018
Antenna mast	INNCO	MA4000-EP-O	10261	#	#
Cable	Huber Sumner	N-14m	8146	25/09/2015	25/11/2017
Cable	Huber Sumner	N-20m	8385	23/04/2015	23/06/2017
Mast controller	INNCO	CO3000	10260	#	#
Open area test site	EMITECH	Salinelles	3482	22/04/2014	22/06/2017
Receiver	Agilent	7405A	2161	11/05/2015	11/07/2017
Receiver	Rohde & Schwarz	ESVS10	3211	17/04/2015	17/06/2017
Receiver	Rohde & Schwarz	ESHS10	3371	16/04/2015	16/06/2017
Turntable	Heinrich Deisel	D4420	4038	#	#
Turntable controller	Heinrich Deisel	HD100	4036	#	#

#: Permanent validity

Results: See **Boards** hereafter.

Frequency (MHz)	Polarization	Azimut (degree)	Antenna Height (cm)	Measure (dBμA/m)	Limit (dBμA/m)	Comments
27.12	-	0	90°	--23.36	-2.87	C

C= Compliant

N.C = Not Compliant

Frequency (MHz)	Polarization	Azimuth (degree)	Antenna Height (cm)	Measure (dBμV/m)	Limit (dBμV/m)	Comments
54.25	Horizontal	150	250	26.35	40	C
108.48	Horizontal	150	250	34.44	43	C
122.03	Horizontal	150	150	30.81	43	C
135.60	Horizontal	150	250	35.24	43	C
162.72	Horizontal	150	250	35.98	43	C
54.24	Vertical	0	100	24.87	40	C
135.60	Vertical	0	100	23.63	43	C
162.72	Vertical	0	100	32.53	43	C
216.96	Vertical	0	200	28.02	46	C
230.52	Vertical	0	100	28.93	46	C
244.08	Vertical	0	200	27.32	46	C
257.63	Vertical	0	200	25.07	46	C
284.75	Vertical	0	150	28.93	46	C
569.52	Vertical	200	150	36.65	46	C
732.24	Vertical	0	150	39.64	46	C
786.47	Vertical	0	150	40.67	46	C
230.51	Horizontal	250	100	35.98	46	C
284.75	Horizontal	150	100	37.39	46	C
311.87	Horizontal	150	100	38.75	46	C
338.99	Horizontal	150	100	38.93	46	C
488.15	Horizontal	0	200	38.19	46	C
515.27	Horizontal	0	200	36.22	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.	DUE DATE
Antenna	Rohde & Schwarz	HFH2-Z2	5825	27/06/2015	27/08/2017
Cable	Huber Sumner	N-20m	8385	23/04/2015	23/06/2017
Open area test site	EMITECH	Salinelles	3482	22/04/2014	22/06/2017
Receiver	Agilent	7405A	2161	11/05/2015	11/07/2017
Receiver	Rohde & Schwarz	ESHS10	3371	26/11/2016	26/01/2019
Turntable	Heinrich Deisel	D4420	4038	#	#
Turntable controller	Heinrich Deisel	HD100	4036	#	#

#: Permanent validity

BAT-EMC software version: V3.6.0.32

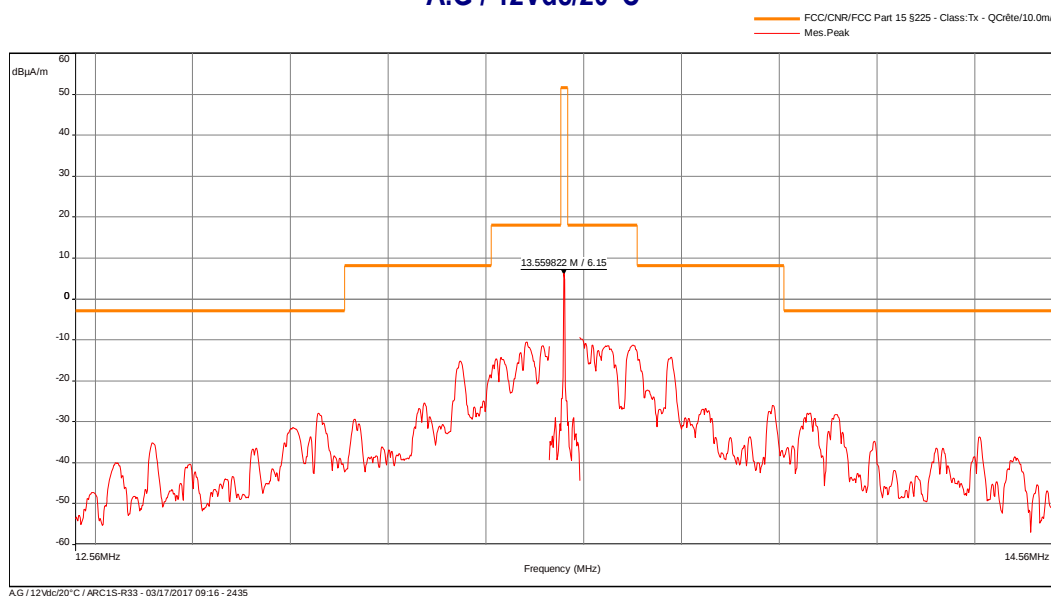
Results: See Graph(s) hereafter

Measurement for ARC1S-R33

Frequency (MHz)	Polarization	Azimet (degree)	Antenna Height (cm)	Measure (dBμA/m)	Limit (dBμA/m)	Comments
13.56	Horizontal	0	0°	-2.26	51.58	C
13.56	Horizontal	90	45°	2.81	51.58	C
13.56	Horizontal	90	90°	6.41	51.58	C

Carrier measurement at 10m: 6.41dBμA/m (≈ 57.91dBμV/m)

Using an extrapolation factor of 40 dB/decade (as described in section 15.31 (f)), the level at 30m is about 38.83dBμV/m (87.38μV/m) for a limit at 15.848 mV/m.

Transmitter emission levels and spectrum mask measurements
EMI2435
A.G / 12Vdc/20°C

Date: **17/03/2017 09:16:58**

Technician: **FMO**

Detection:
Peak

T (°C): **18.4**
H (%): **50.9**
P (hpa): **1015**

Comments:
/

Modification(s) during test:
None

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	3Hz	10Hz

Test method deviation: No

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH	CAL DATE	DUE DATE
Antenna	EMITECH	3.5 cm	4653	#	#
Climatic enclosure	Secasi	SM600C	1670	#	#
Multimeter	Agilent	U1252A	6138	24/11/2015	24/01/2018
Thermometer	GHM Greisinger	GMH 3710	12968	22/07/2016	22/09/2017
Power supply	KIKUSUI	PCR2000L	0800	#	#
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	13.55991	-	+/-0.01
		10.2	13.559554	-0.00263	
		13.8	13.559555	0.00262	
Extremes conditions	-30°C	12.0	13.55991	0.0000	
		10.2	13.55903	-0.00649	
		13.8	13.559929	0.00014	
	+50°C	12.0	13.559962	0.00038	
		10.2	13.559963	0.00039	
		13.8	13.5596	-0.00229	

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

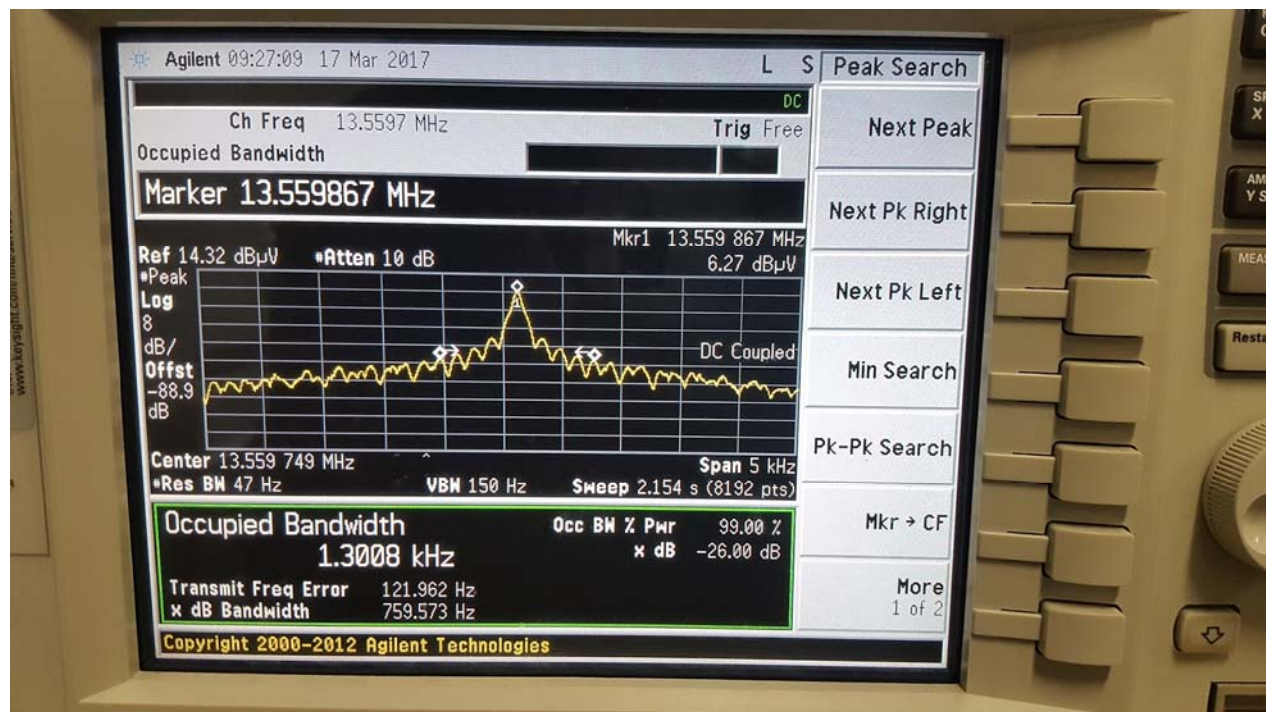
Test method deviation: No

Test equipment list:

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

Results: See Graph(s) hereafter

Occupied Bandwidth 99% ARC1SR31: 1.3008 kHz (RBW=47 Hz)



□□□ End of report – 1 annex to be forwarded □□□

ANNEX: PHOTOGRAPH(S)

E.U.T.



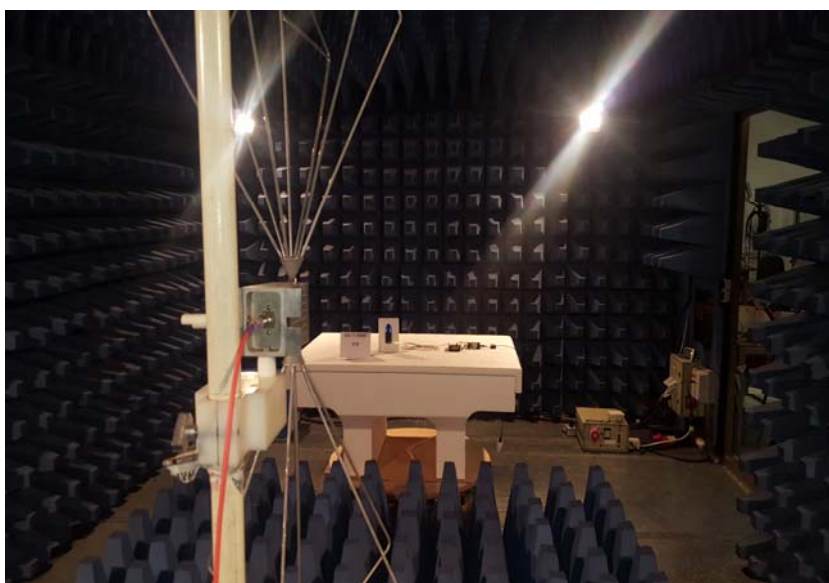
**E.U.T.
PCB**



**E.U.T.
Power supply**



**Radiated measurements pre
measurements**



**Radiated measurements pre
measurements**



Conducted emissions



Measurement on open area test site



Radiated measurement on open area test site (carriers measurements)



**Radiated measurement on open
area test site**



**Radiated measurement on open
area test site**

