R041-15-107354-1A - DM / CBU

⇨ This report cancels and replaces the test report R041-15-107354-1A Ed.0

RADIO TEST REPORT

According to the standard(s):

FCC Part 15 Radio part 15.247
RSS-247_Issue 1, May2015
OET Bulletin 65 (1997), RSS 102 (2010)

Equipment under test:

APPI-COM
(Model: BS-APC2U-00/01/02/03/B0/B1/B2/B3)
FCC ID: 2AG7HBSAPC2U01
IC: 21024-BSAPC2U01

Company:

BODYSENS SAS

Diffusion: Mr COULON (Company: BODYSENS SAS)

Number of pages: 35 including 1 annex

Ed.	Date	Modified page(s)	Technical verification Quality approval Name / Visa
1	05 Jul. 16	Refer to lines in the margin	Olivier HEYER

Duplication of this report is only permitted for an integral photographic facsimile. It includes the number of pages referenced 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 production of the item tested.

NAME OF THE EQUIPMENT UNDER TEST (E.U.T.)	:	APPI-COM Model: BS-APC2U-00/01/02/03/B0/B1/B2/B3)
Serial number	:	BS-APC2U-B0: 000-000-801 BS-APC2U-B1: 000-000-802 BS-APC2U-B2: 000-000-803 BS-APC2U-B3: 000-000-804 BS-APC2U-00: 000-000-805 BS-APC2U-01: 000-000-806 BS-APC2U-02: 000-000-807 BS-APC2U-03: 000-000-808
P/N	:	FCC ID: 2AG7HBSAPC2U01 IC: 21024-BSAPC2U01
Software version	:	/
MANUFACTURER'S NAME	:	BODYSENS SAS
APPLICANT'S ADDRESS:		
Company	:	BODYSENS SAS
Address	:	442 rue Georges Besse Espace Innovation 3 30000 NIMES CEDEX 1 FRANCE
Person(s) present during the tests	:	Mr COULON & Mr MARIN
Responsible	:	Mr COULON
DATE(S) OF TESTS	:	February 17th, 18th , 23rd and March 30th of 2016
TESTS LOCATION(S)	:	EMITECH MONTPELLIER laboratory in VENDARGUES (34) Open Area Test Site in SALINELLES (30) FRANCE FCC Test Firm Registration Number: 954701 IC Filling number : 4379C-1
TESTS OPERATOR(S)	:	David MONTAULON

CONTENTS

1. INTRODUCTION

This document submits the results of Radio tests performed on the equipment APPI-COM(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- 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 15.247	Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850MHz. (frequency hopping and digitally modulated)
RSS-247_Issue 1, May2015	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence Exempt Local Area Network (LE-LAN) Devices
RSS/CNR-Gen, Issue 4, November 2014	Exigences générales et information relatives à la certification du matériel de radiocommunication
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
ANSI C 63.10:2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

3. EQUIPMENT UNDER TEST CONFIGURATION

Equipment under test (E.U.T.) description: This application is for a full-duplex radio transceiver enabling Audio communication on a dedicated network for several team members.

For these four APPI-Com products looking alike, the model number is based on the antenna configuration: there are 3 types of non-detachable antenna and one internal antenna.
Thus Model 00 stands for an internal antenna, model 01 for a ½ wave antenna, model 02 for a ¼ wave antenna, and model 03 for short antenna.

Note: the external antennas are non-detachable ones (super glue / SMA connectors). Any attempt to unscrew and external antenna would irremediably damage the product.

In regards to the internal Bluetooth radio module that may be installed in the APPI-Com product, it has already been certified by the manufacturer (FCC ID: QOQWT32I/ IC: 5123A-BGTWT32I). APPI-Com products with this Bluetooth module would be identified with a "B" reference as in "BS-APC2U-B0" for internal antenna module with Bluetooth.

FCC ID: 2AG7HBSAPC2U01
IC: 21024-BSAPC2U01

Frequency range: 902MHz – 928MHz
Number of channels: 16 groups x 50 channels
Tested frequencies: 902MHz-928MHz (hopping mode) on A1 and A8 groups (lower and upper)
RF max conducted output power: 500mW

Power supply: 3.3 VDC Li-POly rechargeable Batteries
Dimensions (H x L x P) / Weight: 91×48×15 mm / around 80 g (2.8 Oz)
Operating temperatures: -20°C/+50°C

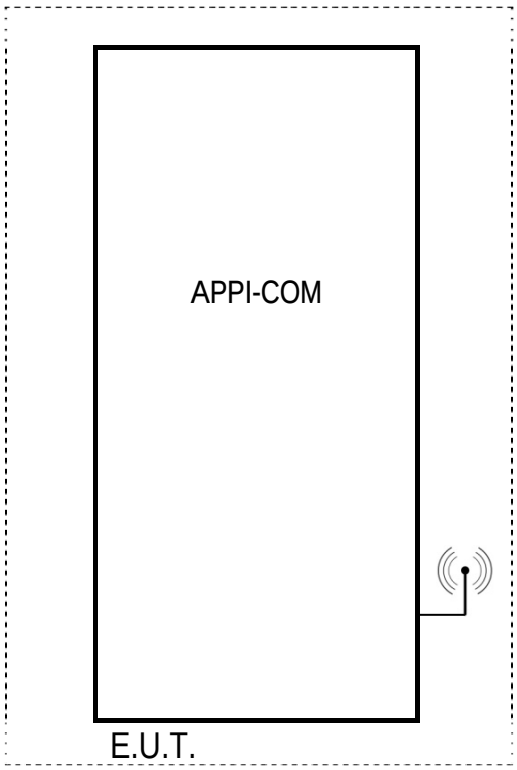
Antennas:
Dedicated antennas (non-detachable) with maximum gain declared less than 6dBi

Designation :	Integral Antenna	Short half Wave	Quarter wave	Short Quarter wave
Model	BS-APC2U-00	BS-APC2U-01	BS-APC2U-02	BS-APC2U-03
Serial Number	M02-000-001	C01-000-001	C01-000-023	C01-000-045
Antenna type	Integral	Half Wave / short	Quarter wave	Quarter wave / short
Model	Chip-Antenna WE-MCA	SMAP-925S	ANT-916	SMAP 900-1
Manufacturer	WURTH	SAM WOO	LINX	SAM WOO
Gain	-0.7dBi Max	2dBi	1.8dBi	0dBi

Cycle and operating mode during emission tests: Frequency hopping emission mode

Equipment modifications applied during tests: No

4. EQUIPMENT UNDER TEST CONFIGURATION SCHEME



Powered by internals batteries.
(Battery is loaded through a standard 110Vac/60Hz power supply)

Dedicated and non-detachables antennas

5. SUMMARY OF TEST RESULTS

Tests designation	Results satisfying?	Comments
Antenna requirement FCC part 15.203	YES	Dedicated and non-detachables antennas
Restricted band of operation - FCC part 15.205 and RSS Gen:2010 §7.2.2	YES	
Conducted power lines FCC part 15.107 and 15.207 and RSS Gen:2010 §7.2.4	YES	
Frequency hopping and digitally modulated FCC part 15 Radio part 15.247 a) and §5.1 of RSS-247:2015	YES	
Maximum peak conducted FCC part 15.247 b) and §5.4 of RSS-247:2015	YES	
Intentional radiator FCC part 15.247 d) and §5.5 of RSS-247:2015	YES	
Unwanted emissions FCC part 15.215 b) and §5.5 of RSS-247:2015	YES	
Measurement of frequency stability §15.215 (c)	YES	
Collocation OET Bulletin 65:1997, RSS 102:2010	YES	

N.P.: Not Performed. N.A.: Not Applicable.

- In emission:

Sample subject to the test complies with prescriptions of the standard(s) FCC Part 15 Radio part 15.247 according to limits, specified in this test report.

6. CONDUCTED EMISSION

Temperature (°C): 25.3 *Humidity (%HR):* 55.1 *Pressure (hPa):* 1005

Standard: FCC part 15.107 and 15.207 and RSS Gen:2010 §7.2.4

Test method: ANSI C63.4: 2014

Test configuration:

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

E.U.T. is in permanent emission mode. Measurement is done on the dedicated 110Vac/60Hz power supply (see photos in annex)

Frequency band	Tested cable(s)	Resolution bandwidth	Video bandwidth	Detection mode
10MHz-30MHz	110Vac/60Hz power supply	10kHz	30kHz	Peak and average
150kHz-1MHz	110Vac/60Hz power supply	10kHz	30kHz	Peak and average
1MHz-10MHz	110Vac/60Hz power supply	10kHz	30kHz	Peak and average

Test method deviation: No

Test equipment list:

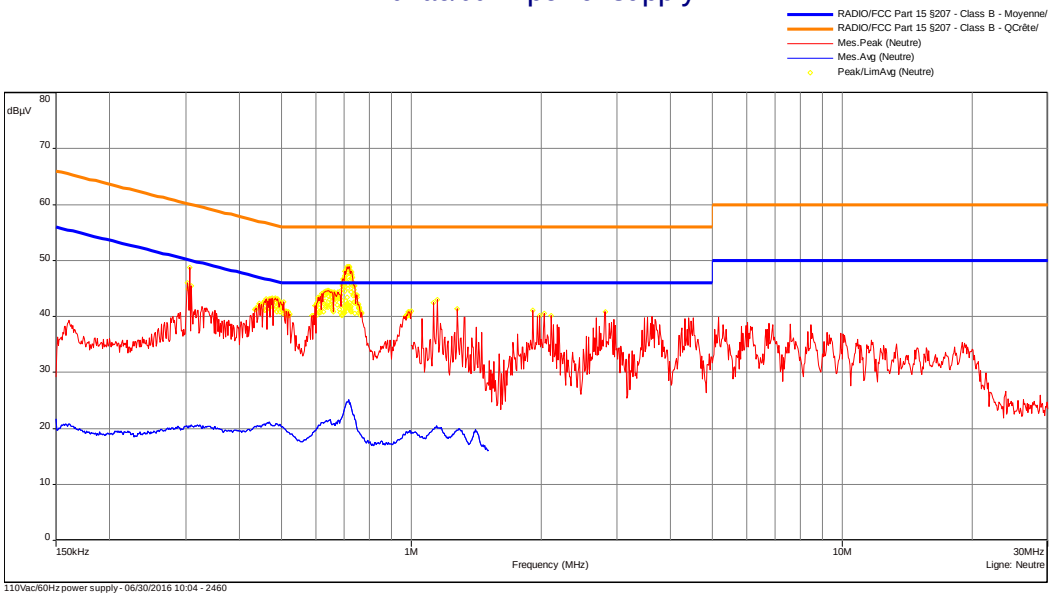
CATEGORY	BRAND	TYPE	N° EMITECH	DATE CAL.	DATE VAL
Cable	EMITECH	Current absorber sheath	10653	24/11/2015	24 months
Cable	MICRO-COAX	N-3m	10535	24/11/2015	24 months
Cable	MICRO-COAX	N-5m	10527	24/11/2015	24 months
LISN	AFJ	LT42C\10	12007	04/05/2015	12 months
PE choke	EMITECH	CISPR 16-2-1 : 2008	10071	#	#
PE choke	EMITECH	CISPR 16-2-1 : 2008	10080	#	#
Receiver	Agilent Technologies	E4440A	5824	11/01/2016	24 months
Shielded enclosure	RAY PROOF	C.V1	1123	#	#
Software	Nexio	BAT EMC v3.6.0.32	0000	#	#
Thermohygrometer	Testo	608-H1	7561	26/09/2014	24 months

#: Permanent validity *BAT-EMC software version: V3.6.0.32*

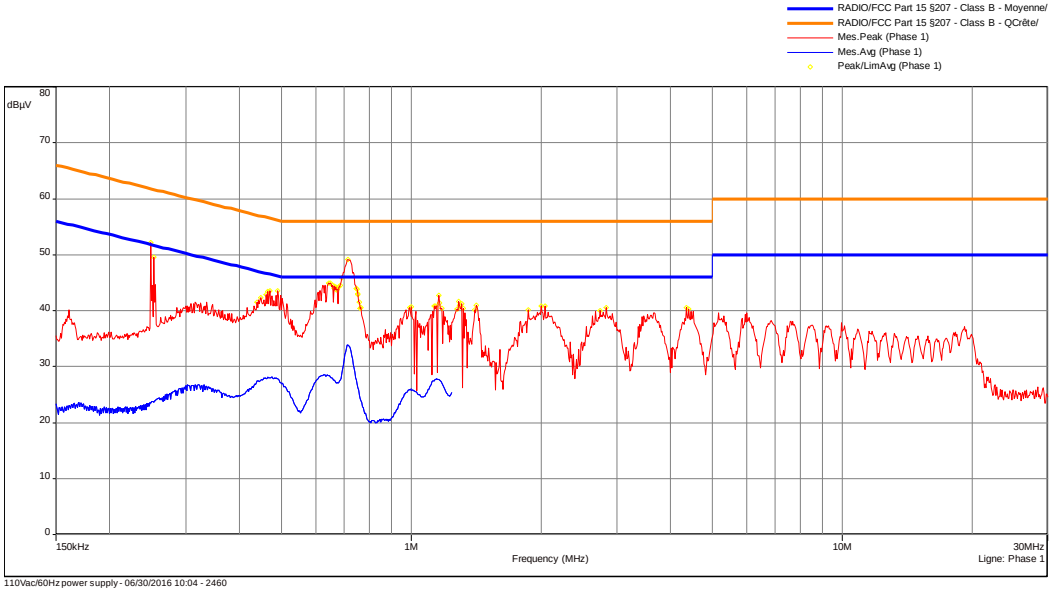
Results: See Graph(s) hereafter.
Limits on the graphs are average and quasi-peak limits (upper limit).

Conducted voltage emission (measurement) | EMI2460

110Vac/60Hz power supply



110Vac/60Hz power supply - 06/30/2016 10:04 - 2460



110Vac/60Hz power supply - 06/30/2016 10:04 - 2460

Date: 30/06/2016 10:04:40

Technician: DMO

Classe: B of the standard

Detection:
Peak and average

Modification(s) during test:
None

7. *FREQUENCY HOPPING AND DIGITALLY MODULATED*

Standard: FCC part 15 Radio part 15.247 and RSS-247 _ Issue 1, May 2015

Test method: FCC part 15.247 a) (1) & a) (1) (i) and RSS-247 _ Issue 1, May 2015 §5.1

6.1) Frequency hopping channel separation

The system uses 16*50 channels numbered in hexadecimal from 1 to 50 in 16 groups named A1 to A16.
Tests are done in max-hold mode in order to capture all hopping channels. Measurements are done in conducted emission on A1 and A8 groups (lower and upper).

Test method deviation: No

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH	DATE CAL.	DATE VAL
Attenuator	Radiall	R412710124	4390	25/11/2015	24 months
Attenuator	Radiall	R412720124	4391	25/11/2015	24 months
Cable	STORM MICROWAVE	N-0.2m	10265	23/04/2015	24 months
Cable	C&C	N-3m	10557	25/11/2015	24 months
Receiver	Agilent Technologies	E4440A	5824	11/01/2016	24 months
Shielded enclosure	RAY PROOF	C.V1	1123	#	#
Software	Nexio	BAT EMC	0000	#	#
Thermohygrometer	Bioblock Scientific	Météostar	0963	31/10/2014	24 months
Thermohygrometer	Testo	608-H1	7561	26/09/2014	24 months

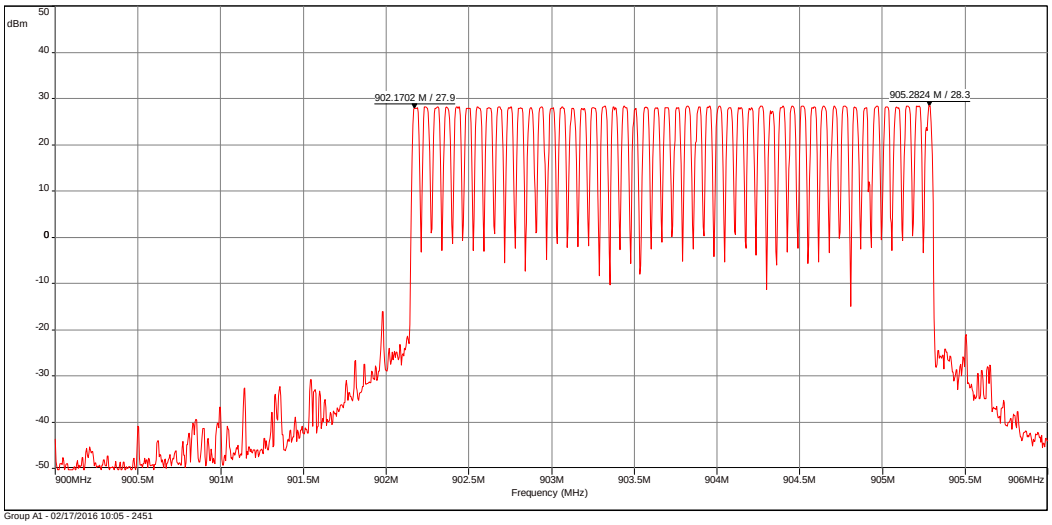
#: Permanent validity *BAT-EMC software version: V3.6.0.32*

Results: See Curves hereafter.

Average power (conducted) — EMI2451

Group A1

Frequency (MHz) : 900 MHz - 906 MHz (Analyzer mode)
Settings: RBW: 10 kHz, VBW: 300 kHz, Auto, sweep count 1
RADIO/EN 300 220-1 V2.4.1 §7.3 - Class c - QCrête/
Mes.Peak



Group A1 - 02/17/2016 10:05 - 2451

Date: 17/02/2016 10:05:15

Technician: DM

Detection:
Peak max hold

T (°C): 21.1
H (%): 26.3
P (hpa): 1015

Comments:

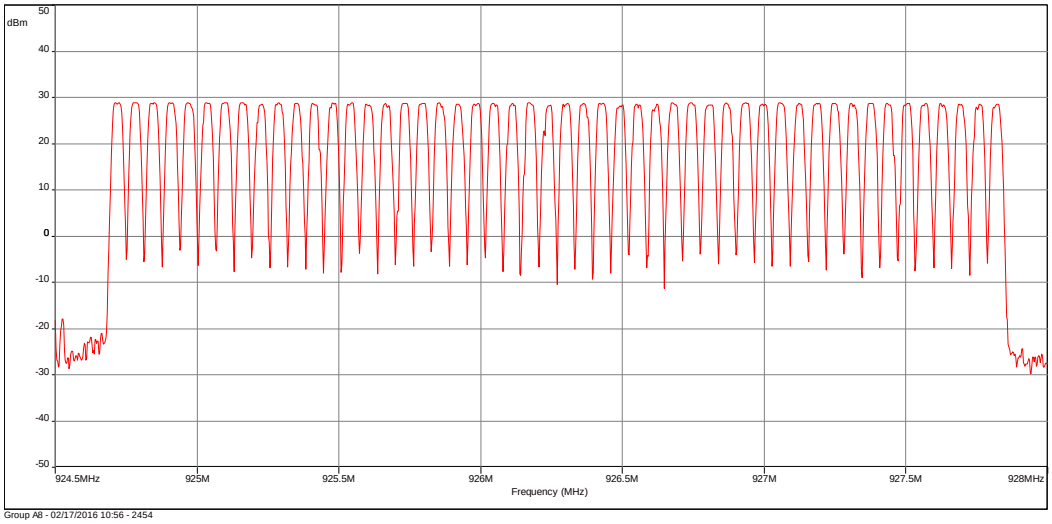
Modification(s) during test:
None

A1 group uses 50 channels.

Average power (conducted) — EMI2454

Group A8

Frequency (MHz) : 924.5 MHz - 928 MHz (Analyzer mode)
Settings: RBW: 10 kHz, VBW: 300 kHz, Auto, sweep count 1
RADIO/EN 300 220-1 V2.4.1 §7.3 - Class c - QCrête/
Mes.Peak



Group A8 - 02/17/2016 10:56 - 2454

Date: 17/02/2016 10:56:41

Technician: DM

Detection:
Peak max hold

T (°C): 21.1
H (%): 26.3
P (hpa): 1015

Comments:

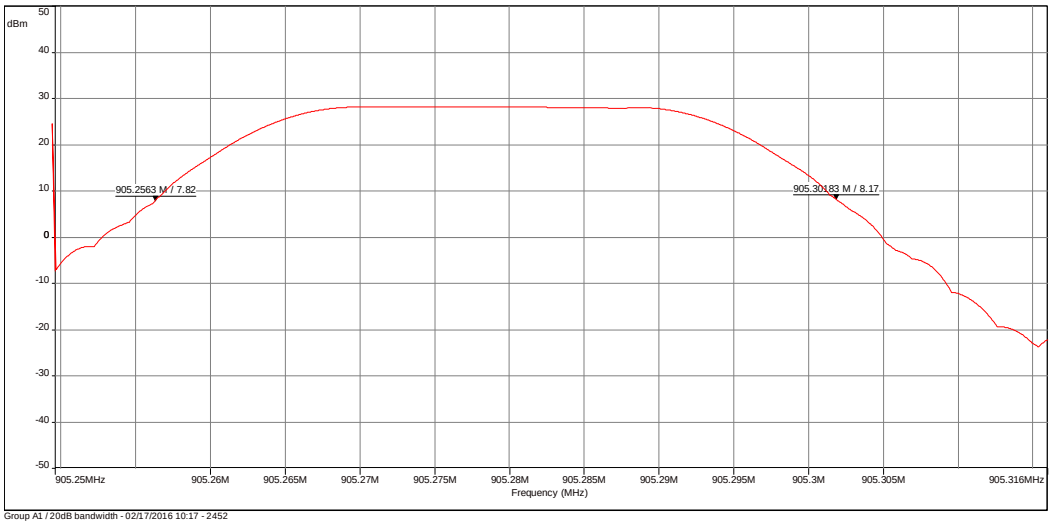
Modification(s) during test:
None

A8 group uses 50 channels.

Average power (conducted) — EMI2452

20dB bandwidth

Frequency (MHz) : 905.25 MHz - 905.316 MHz (Analyzer mode)
Settings: RBW: 10 kHz, VBW: 300 kHz, Auto, sweep count 1
RADIO/EN 300 220-1 V2.4.1 §7.3 - Class c - QCrête/
Mes.Peak



Group A1 / 20dB bandwidth - 02/17/2016 10:17 - 2452

Date: 17/02/2016 10:17:06

Technician: DM

Detection:
Peak max hold

T (°C): 21.1
H (%): 26.3
P (hpa): 1015

Comments:

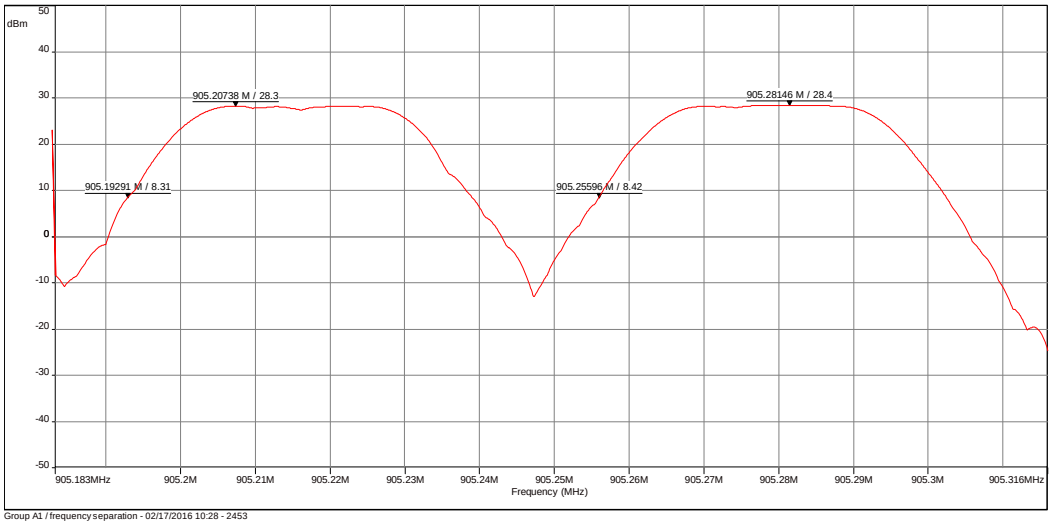
Modification(s) during test:
None

The 20dB bandwidth of each hopping channel is 45.53kHz (in RBW=10kHz).That is less than 500kHz.

Average power (conducted) — EMI2453

Frequency separation

Frequency (MHz) : 905.183 MHz - 905.316 MHz (Analyzer mode)
Settings: RBW: 10 kHz, VBW: 300 kHz, Auto, sweep count 1
RADIO/EN 300 220-1 V2.4.1 §7.3 - Class c - QCrête/
Mes.Peak



Group A1 / frequency separation - 02/17/2016 10:28 - 2453

Date: 17/02/2016 10:28:08

Technician: DM

Detection:
Peak max hold

T (°C): 21.1
H (%): 26.3
P (hpa): 1015

Comments:

Modification(s) during test:
None

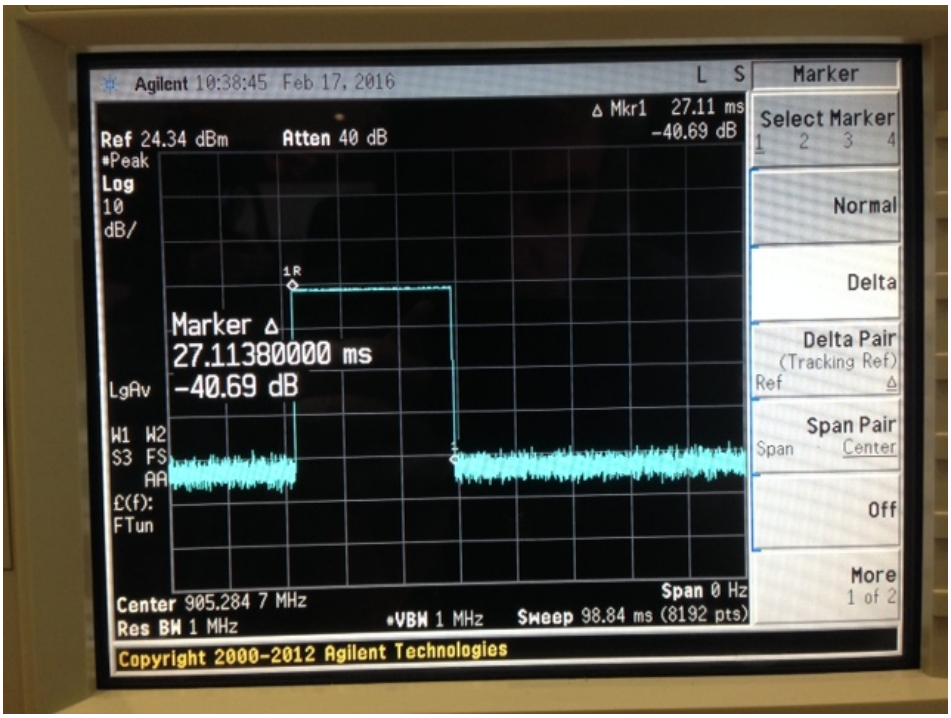
The channel separation is almost 63.05kHz which is greater than the 20dB bandwidth

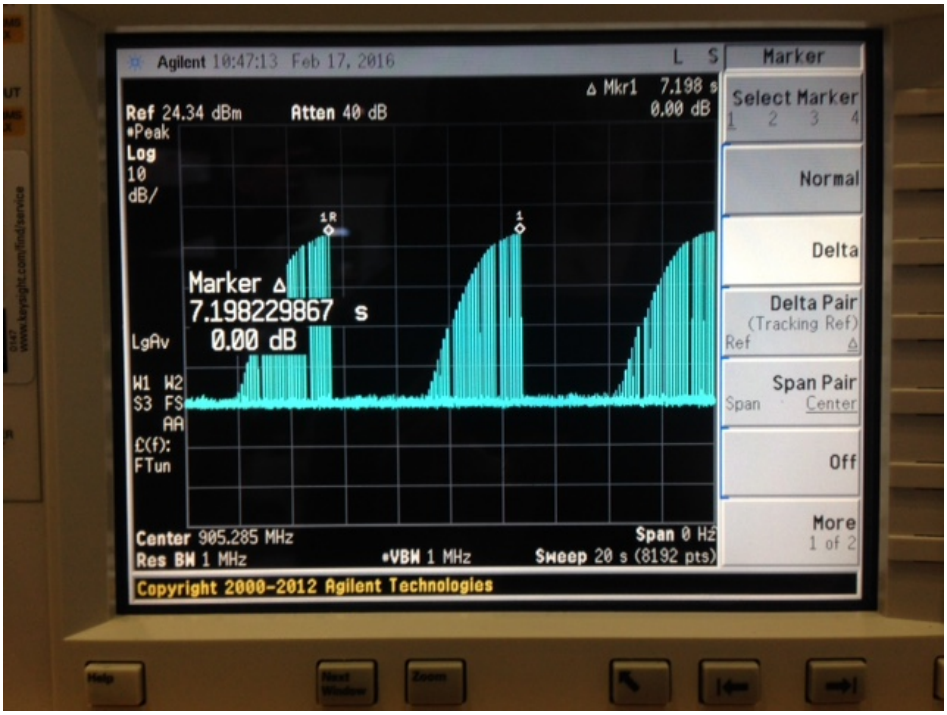
6.2) Frequency hopping channel separation

The system uses 50 channels in any conditions and the averaging time of occupancy on any channel is less than 0.4 seconds within a period of 20.0 seconds.

The measurement during a long transmission gives 27.11ms every 7.2s on each channel, so the average time within a period of 20.0 second is 75.30ms which is less than the 400ms limit.

Thus the duty cycle correction factor is 20 log (27.11/100) = -11.33dB





8. MAXIMUM PEAK CONDUCTED POWER

Standard: FCC part 15 Radio part 15.247 and §5.1 of RSS-247:2015

Test method: FCC part 15.247 b) (2) and §5.1 of RSS-247:2015

Test configuration:

Frequency band	Tested configuration	Resolution bandwidth	Video bandwidth	Detection mode
902MHz-928MHz	A1 group	100kHz	300kHz	Max-hold Peak
902MHz-928MHz	A8 group	100kHz	300kHz	Max-hold Peak

Test is done in max-hold peak detection. E.U.T. output is directly connected to spectrum analyzer throught attenuators. Measurements are performed on groups A1 and A8 (lower and upper).

Test method deviation: No

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH	DATE CAL.	DATE VAL
Attenuator	Radiall	R412710124	4390	25/11/2015	24 months
Attenuator	Radiall	R412720124	4391	25/11/2015	24 months
Cable	STORM MICROWAVE	N-0.2m	10265	23/04/2015	24 months
Cable	C&C	N-3m	10557	25/11/2015	24 months
Receiver	Agilent Technologies	E4440A	5824	11/01/2016	24 months
Shielded enclosure	RAY PROOF	C.V1	1123	#	#
Software	Nexio	BAT EMC	0000	#	#
Thermohygrometer	Bioblock Scientific	Météostar	0963	31/10/2014	24 months
Thermohygrometer	Testo	608-H1	7561	26/09/2014	24 months

BAT-EMC software version: V3.6.0.32

Results:

Maximum peak conducted: See **Board** below.

Frequency (MHz)	Group	Maximum peak power (dBm)	Power limit (dBm)
902.184	A1	27.9	30
905.087	A1	28.1	30
924.844	A8	28.5	30
927.829	A8	28.3	30

Calculated radiated electric field at 3m distance:

Maximum Radiated electric field is calculated using the formula:

E(V/m) = $\frac{\sqrt{30 \times P(W) \times G(dB)}}{d(m)}$ where G is the declared antenna gain (dBi) in numerical.

Frequency (MHz)	Antenna type	Gain (dB)	Radiated power (dBµV/m)
902.184	Integral antenna	-0.7	122.42
905.087	Integral antenna	-0.7	122.62
924.844	Integral antenna	-0.7	123.02
927.829	Integral antenna	-0.7	122.82
902.184	Short half wave	2	125.12
905.087	Short half wave	2	125.32
924.844	Short half wave	2	125.72
927.829	Short half wave	2	125.52
902.184	Quarter wave	1.8	124.92
905.087	Quarter wave	1.8	125.12
924.844	Quarter wave	1.8	125.52
927.829	Quarter wave	1.8	125.32
902.184	Short quarter wave	0	123.13
905.087	Short quarter wave	0	123.33
924.844	Short quarter wave	0	123.73
927.829	Short quarter wave	0	123.53

9. INTENTIONAL RADIATOR

Standard: FCC part 15 Radio part 15.247 and §5.5 of RSS-247:2015

Test method: FCC part 15.247 d) and §5.5 of RSS-247:2015

Test configuration:

Frequency band	Tested	Resolution bandwidth	Video bandwidth	Detection mode	E.U.T. height
900MHz-908MHz	Band Edge (A1 Group)	100kHz	300kHz	Max-hold Peak	0cm
922MHz-932MHz	Band Edge (A8 Group)	100kHz	300kHz	Max-hold Peak	0cm

Test is done in max-hold peak detection; transmitter output is directly connected to a spectrum analyzer throught attenuators. Measurements are performed on lower and upper channels groups.

The purpose of this test is to demonstrate in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

Test method deviation: No

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH	DATE CAL.	DATE VAL
Attenuator	Radiall	R412710124	4390	25/11/2015	24 months
Attenuator	Radiall	R412720124	4391	25/11/2015	24 months
Cable	STORM MICROWAVE	N-0.2m	10265	23/04/2015	24 months
Cable	C&C	N-3m	10557	25/11/2015	24 months
Receiver	Agilent Technologies	E4440A	5824	11/01/2016	24 months
Shielded enclosure	RAY PROOF	C.V1	1123	#	#
Software	Nexio	BAT EMC	0000	#	#
Thermohygrometer	Bioblock Scientific	Météostar	0963	31/10/2014	24 months
Thermohygrometer	Testo	608-H1	7561	26/09/2014	24 months

BAT-EMC software version: V3.6.0.32

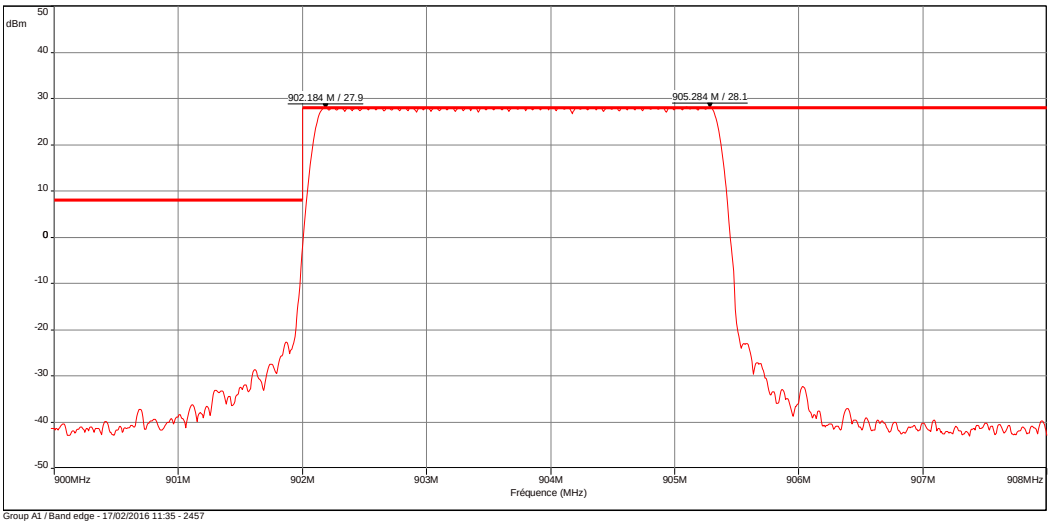
Results: See Graph(s) hereafter.

Average power (conducted) | EMI2457

Group A1 / Band edge

Fréquence (MHz) : 898 MHz - 908 MHz (Mode analyseur)
Réglage: RBW: 100 kHz, VBW: 300 kHz, Auto, nombre de Balayages 1

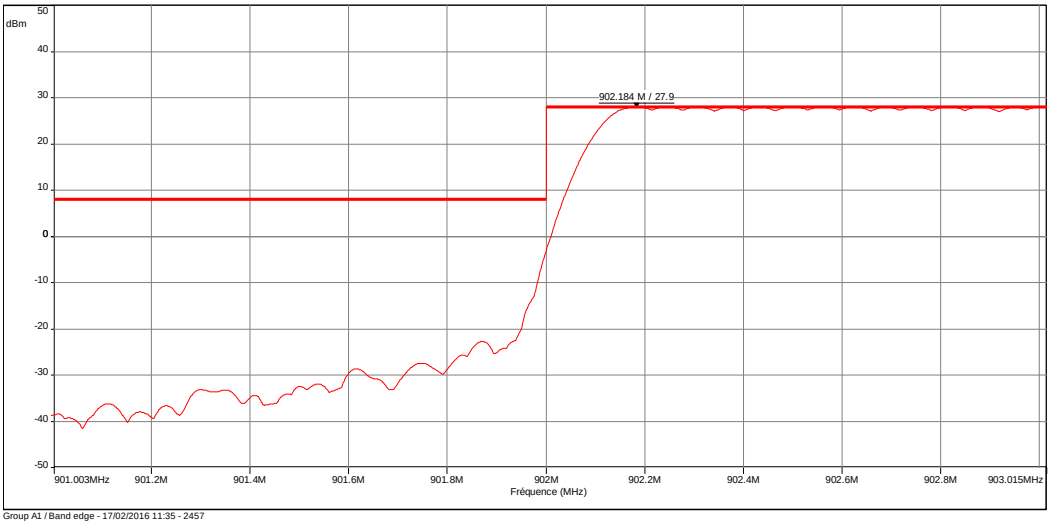
FCC/CNR/FCC Part15 §247 d) (BODYSENS) - Classe:Tr - Crête/
Mes.Peak



Group A1 / Band edge - 17/02/2016 11:35 - 2457

Fréquence (MHz) : 898 MHz - 908 MHz (Mode analyseur)
Réglage: RBW: 100 kHz, VBW: 300 kHz, Auto, nombre de Balayages 1

FCC/CNR/FCC Part15 §247 d) (BODYSENS) - Classe:Tr - Crête/
Mes.Peak



Group A1 / Band edge - 17/02/2016 11:35 - 2457

Date: 17/02/2016 11:35:22

Technician: DM

Detection:
Peak max hold

T (°C): 21.1
H (%): 26.3
P (hpa): 1015

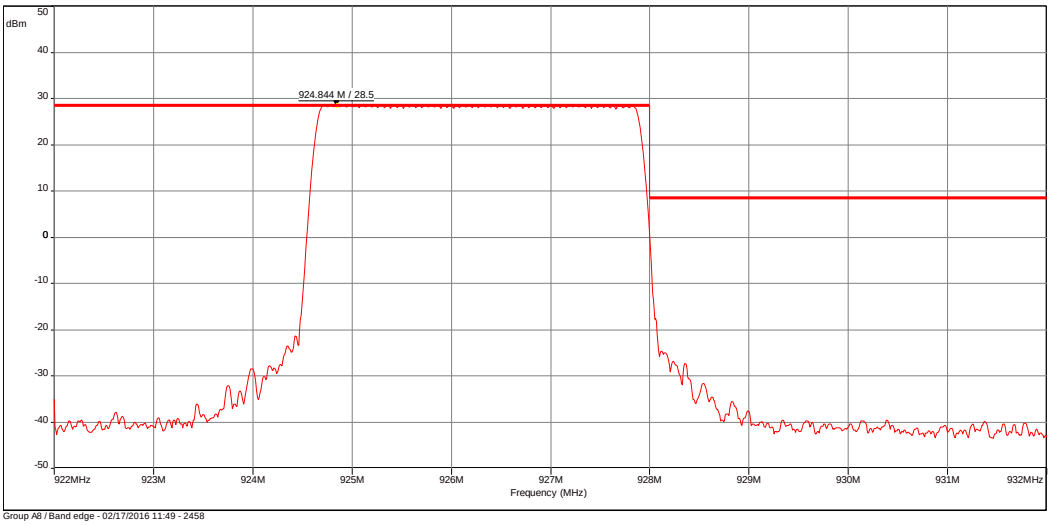
Comments:

Modification(s) during test:
None

Average power (conducted) | EMI2458

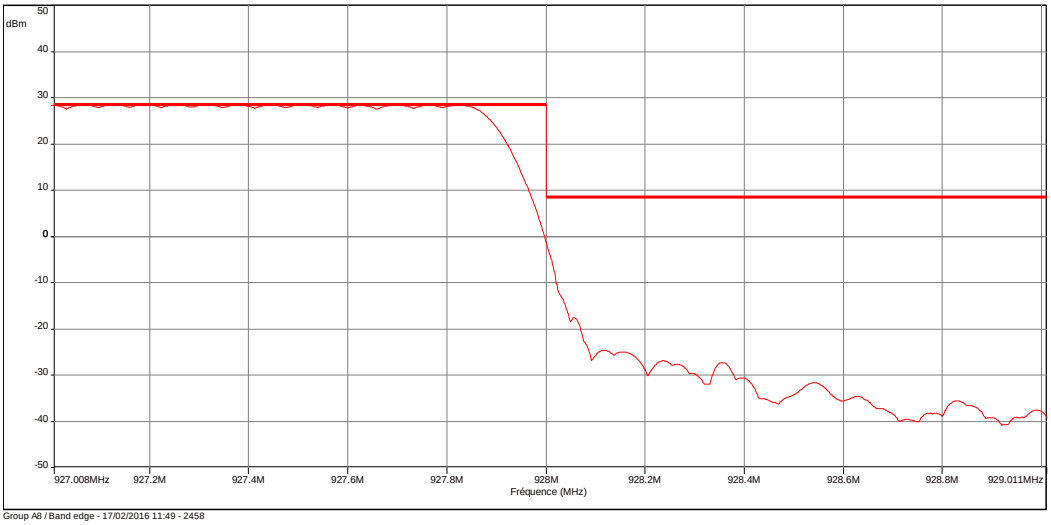
Group A8 / Band edge

Frequency (MHz) : 922 MHz - 932 MHz (Analyzer mode)
Settings: RBW: 100 kHz, VBW: 300 kHz, Auto, sweep count 1



Group A8 / Band edge - 02/17/2016 11:49 - 2458

Fréquence (MHz) : 922 MHz - 932 MHz (Mode analyseur)
Réglage: RBW: 100 kHz, VBW: 300 kHz, Auto, nombre de Balayages 1



Group A8 / Band edge - 17/02/2016 11:49 - 2458

Date: 17/02/2016 11:49:31

Technician: DM

Detection:
Peak max hold

T (°C): 21.1
H (%): 26.3
P (hpa): 1015

Comments:

Modification(s) during test:
None

10. UNWANTED EMISSIONS OUTSIDE OF §15.247 FREQUENCY BANDS

Standard: FCC part 15 Radio part 15.247

Test method: FCC part 15.109, 15.209, 15.215 b), 15.247

Frequency band	Tested side	Resolution bandwidth	Video bandwidth	Detection mode	E.U.T. height
30MHz-1GHz	360°	120kHz	3m	Quasi-peak	80cm
1GHz-10GHz	360°	1MHz	3m	Average	80cm
10GHz-18GHz	360°	1MHz	3m	Average	80cm

Below 1GHz pre-measurements are done in a semi anechoic chamber at 3m. Finals measurements are conducted on a normalized Open Area Test Site.
Below 30MHz are done with a loop antenna as describe in the standard.
Measure is done with an antenna position of 0°, 90° and 45°.
Above 1GHz test is done in fully anechoic shielded chamber at 3m. E.U.T. is set on a styrofoam table. In order to find highest levels, tests are done on 3 axes of E.U.T.
For collocations tests measurements are performed from 30MHz to 18GHz with Bluetooth module active (2402-2480MHz) and with UHF module (902-928MHz) in hopping mode.
Measurements are done in max-hold peak detection in hopping mode maximized at 360°.
Only highest levels are recorded on each configurations of E.U.T.

Limits:
From 30MHz to 1GHz Quasi peak limit provided is the limit given in §15.209.
Above 1GHz average limit in restricted bands §15.205 is 54dBµV/m. Otherwise, the limit is 20dB under carrier emission level at 3m without averaging with duty cycle factor.
The averaging correction factor of -11.33dB is used only when necessary in restricted bands as defined in 15.205.

Test method deviation: No

Measuring distance: 3 meters

Test equipment list:

CATEGORY	BRAND	TYPE	N° EMITECH	DATE CAL.	DATE VAL
Antenna	ETS-Lindgren	3117	5456	17/08/2012	36 months
Antenna	Electro Metrics	BIA-30HF	1107	25/04/2015	36 months
Antenna	Rohde & Schwarz	HL223	1137	25/04/2015	36 months
Antenna	Rohde & Schwarz	HL223	3126	25/04/2015	36 months
Antenna	Rohde & Schwarz	HFH2-Z2	5825	27/01/2015	24 months
Cable	Huber Suhner	N-14m	8146	25/09/2015	24 months
Cable	Huber Suhner	N-20m	8385	23/04/2015	24 months
Cable	C&C	N-3m	10557	25/11/2015	24 months
Cable	C&C	N-3m	10558	24/11/2015	24 months
Cable	C&C	N-3m	10558	25/11/2015	24 months

CATEGORY	BRAND	TYPE	N° EMITECH	DATE CAL.	DATE VAL
Cable	C&C	N-5m	10560	25/11/2015	24 months
Filter	Micro-Tronics	HPM 11630	4392	07/08/2014	24 months
Filter	Micro-Tronics	HPM 15162	10273	23/04/2015	24 months
Filter	Wainwright Instruments	WRCG 2400/2483	9771	12/02/2015	24 months
Filter	Wainright	WTRCTV5-700-1000	-	-	-
Mast controller	INNCO	CO3000	10260	#	#
Open area test site	Emitech	Salinelles	3482	18/04/2014	36 months
Preamplifier	IMPULSE	CA118-546ACN	9169	11/08/2015	12 months
Receiver	Agilent Technologies	E4440A	5824	11/01/2016	24 months
Receiver	Rohde & Schwarz	ESVS10	3211	17/04/2015	24 months
Shielded room	RAY PROOF	C.V1	1123	#	#
Software	Nexio	BAT EMC	0000	#	#
Thermohygrometer	Testo	608-H1	7561	26/09/2014	24 months
Thermohygrometer	Bioblock Scientific	Météostar	0963	31/10/2014	24 months
Turntable	Heinrich Deisel	D4420	4038	#	#
Turntable controller	Heinrich Deisel	HD100	4036	#	#

#: Permanent validity

BAT-EMC software version: V3.6.0.32

Results: See Board(s) below.

Collocations tests: No intermodulations products were detected otherwise than those reported below.

INTEGRAL ANTENNA

Frequency (MHz)	E.U.T. position / Polarization	Level (dBµV/m) (Peak values)	Averaging (with duty cycle correction factor of -11.33dB)	Average Limit (dBµV/m)	Margin (dB)
1808.2	AXE 1 / H	73.95	-	102.42	-28.47
2708.2	AXE 1 / H	46.83	-	54	-7.17
3612.7	AXE 1 / H	44.56	-	54	-9.44
4513.6	AXE 1 / H	50.57	-	54	-3.43
5417.2	AXE 1 / H	55.13	43.8	54	-10.20
6316.3	AXE 1 / H	49.351	-	102.42	-53.069
1805.5	AXE 1 / V	64.00	-	102.42	-38.42
2711.8	AXE 1 / V	44.87	-	54	-9.13
3610	AXE 1 / V	45.33	-	54	-8.67
4517.2	AXE 1 / V	50.70	-	54	-3.30
5431.6	AXE 1 / V	57.22	45.89	54	-8.11
6316.3	AXE 1 / V	52.14	-	102.42	-50.28
9941.5	AXE 1 / V	50.03	-	102.42	-52.39
1810	AXE 2 / H	82.06	-	102.42	-20.36
2715.4	AXE 2 / H	48.51	-	54	-5.49
3615.4	AXE 2 / H	49.31	-	54	-4.69
5421.7	AXE 2 / H	55.33	44	54	-10.00
6326.2	AXE 2 / H	50.06	-	102.42	-52.36
1810.9	AXE 2 / V	69.58	-	102.42	-32.84
2714.5	AXE 2 / V	46.45	-	54	-7.55
4512.7	AXE 2 / V	46.91	-	54	-7.09
5420.8	AXE 2 / V	55.15	43.82	54	-10.18
6335.2	AXE 2 / V	50.34	-	102.42	-52.08
1808.2	AXE 3 / V	78.47	-	102.42	-23.95
2706.4	AXE 3 / V	51.57	-	54	-2.43
3620.8	AXE 3 / V	63.25	51.92	54	-2.08
4516.3	AXE 3 / V	45.60	-	54	-8.40
5429.8	AXE 3 / V	52.39	-	54	-1.61
1808.2	AXE 3 / H	65.65	-	102.42	-36.77
2707.3	AXE 3 / H	58.31	46.98	54	-7.02
3620.8	AXE 3 / H	62.16	50.83	54	-3.17
4517.2	AXE 3 / H	49.30	-	54	-4.70
5422.6	AXE 3 / H	58.96	47.63	54	-6.37
6335.2	AXE 3 / H	54.09	42.76	102.42	-59.66

Averaging duty cycle correction factor is applied when measured peak value is above average limit.
All other radiated emissions are at least 20dB below the limit.

SHORT HALF WAVE ANTENNA

Frequency (MHz)	E.U.T. position / Polarization	Level (dBµV/m) (Peak values)	Averaging (with duty cycle correction factor of -11.33dB)	Average Limit (dBµV/m)	Margin (dB)
1808.2	AXE 1 / H	72.51	-	105.12	-32.61
2708.2	AXE 1 / H	48.91	-	54	-5.09
3612.7	AXE 1 / H	51.18	-	54	-2.82
4513.6	AXE 1 / H	45.42	-	54	-8.58
5417.2	AXE 1 / H	51.09	-	54	-2.91
6316.3	AXE 1 / H	54.73	-	105.12	-50.39
7219.9	AXE 1 / H	49.09	-	54	-4.91
8145.1	AXE 1 / H	49.93	-	54	-4.07
1805.5	AXE 1 / V	64.28	-	105.12	-40.84
2711.8	AXE 1 / V	47.74	-	54	-6.26
3610	AXE 1 / V	44.98	-	54	-9.02
4517.2	AXE 1 / V	47.18	-	54	-6.82
5431.6	AXE 1 / V	51.84	-	54	-2.16
6316.3	AXE 1 / V	60.93	-	105.12	-44.19
7217.2	AXE 1 / V	52.31	-	54	-1.69
8128.9	AXE 1 / V	53.62	42.29	54	-11.71
9045.1	AXE 1 / V	50.05	-	54	-3.95
1808.2	AXE 2 / H	73.23	-	105.12	-31.89
2708.2	AXE 2 / H	48.82	-	54	-5.18
3612.7	AXE 2 / H	51.34	-	54	-2.66
4513.6	AXE 2 / H	47.23	-	54	-6.77
5417.2	AXE 2 / H	50.15	-	54	-3.85
6316.3	AXE 2 / H	56.34	-	105.12	-48.78
7219.9	AXE 2 / H	46.96	-	54	-7.04
1805.5	AXE 2 / V	64.84	-	105.12	-40.28
2711.8	AXE 2 / V	47.32	-	54	-6.68
3610	AXE 2 / V	46.60	-	54	-7.40
4517.2	AXE 2 / V	48.93	-	54	-5.07
5431.6	AXE 2 / V	52.26	-	54	-1.74
6316.3	AXE 2 / V	61.28	-	105.12	-43.84
7217.2	AXE 2 / V	53.37	42.04	54	-11.96
8128.9	AXE 2 / V	52.43	-	54	-1.57
9045.1	AXE 2 / V	50.38	-	54	-3.62
1808.2	AXE 3 / H	58.87	-	105.12	-46.25
2708.2	AXE 3 / H	48.24	-	54	-5.76
3612.7	AXE 3 / H	48.82	-	54	-5.18
4513.6	AXE 3 / H	50.66	-	54	-3.34
5417.2	AXE 3 / H	52.00	-	54	-2.00
6316.3	AXE 3 / H	59.92	-	105.12	-45.20
7219.9	AXE 3 / H	51.03	-	54	-2.97
8145.1	AXE 3 / H	51.06	-	54	-2.94

Frequency (MHz)	E.U.T. position / Polarization	Level (dBµV/m) (Peak values)	Averaging (with duty cycle correction factor of -11.33dB)	Average Limit (dBµV/m)	Margin (dB)
1805.5	AXE 3 / V	64.50	-	105.12	-40.62
2711.8	AXE 3 / V	47.66	-	54	-6.34
3610	AXE 3 / V	50.74	-	54	-3.26
4517.2	AXE 3 / V	49.57	-	54	-4.43
5431.6	AXE 3 / V	53.49	42.16	54	-11.84
6316.3	AXE 3 / V	55.81	-	105.12	-49.31
7217.2	AXE 3 / V	51.95	-	54	-2.05
8128.9	AXE 3 / V	52.71	-	54	-1.29
9045.1	AXE 3 / V	49.76	-	54	-4.24

Averaging duty cycle correction factor is applied when measured peak value is above average limit.
All other radiated emissions are at least 20dB below the limit.

QUARTER WAVE ANTENNA

Frequency (MHz)	E.U.T. position / Polarization	Level (dBµV/m) (Peak values)	Averaging (with duty cycle correction factor of -11.33dB)	Limit (dBµV/m)	Margin (dB)
1808.2	AXE 1 / H	87.19	-	104.92	-17.73
2708.2	AXE 1 / H	50.02	-	54	-3.98
3612.7	AXE 1 / H	50.44	-	54	-3.56
4513.6	AXE 1 / H	49.93	-	54	-4.07
5417.2	AXE 1 / H	53.25	41.92	54	-12.08
6316.3	AXE 1 / H	60.22	-	104.92	-44.70
7219.9	AXE 1 / H	47.47	-	54	-6.53
8145.1	AXE 1 / H	50.63	-	54	-3.37
9024.4	AXE 1 / H	52.42	-	54	-1.58
9948.7	AXE 1 / H	51.25	-	104.92	-53.67
1805.5	AXE 1 / V	77.95	-	104.92	-26.97
2711.8	AXE 1 / V	50.81	-	54	-3.19
3610	AXE 1 / V	46.00	-	54	-8.00
4517.2	AXE 1 / V	50.14	-	54	-3.86
5431.6	AXE 1 / V	56.48	45.15	54	-8.85
6316.3	AXE 1 / V	65.12	-	104.92	-39.80
7217.2	AXE 1 / V	51.76	-	54	-2.24
8128.9	AXE 1 / V	54.39	43.06	54	-10.94
9045.1	AXE 1 / V	55.74	44.41	54	-9.59
9953.2	AXE 1 / V	51.43	-	104.92	-53.49
1808.2	AXE 2 / H	87.72	-	104.92	-17.20
2708.2	AXE 2 / H	50.50	-	54	-3.50
3612.7	AXE 2 / H	51.32	-	54	-2.68
4513.6	AXE 2 / H	50.88		54	-3.12
5417.2	AXE 2 / H	54.01	42.77	54	-11.23
6316.3	AXE 2 / H	61.33	-	104.92	-43.59
7219.9	AXE 2 / H	48.57	-	54	-5.43
8146.9	AXE 2 / H	49.22	-	54	-4.78
9051.4	AXE 2 / H	52.40	-	54	-1.60
9937	AXE 2 / H	52.24	-	104.92	-52.68
1805.5	AXE 2 / V	76.88	-	104.92	-28.04
2711.8	AXE 2 / V	48.62	-	54	-5.38
3610	AXE 2 / V	45.49	-	54	-8.51
4517.2	AXE 2 / V	48.52	-	54	-5.48
5431.6	AXE 2 / V	54.30	42.97	54	-11.03
6316.3	AXE 2 / V	64.36	-	104.92	-40.56
7217.2	AXE 2 / V	52.34	-	54	-1.66
8128.9	AXE 2 / V	54.74	43.41	54	-10.59
9045.1	AXE 2 / V	55.99	44.66	54	-9.34
9929.8	AXE 2 / V	50.90	-	104.92	-54.02
1808.2	AXE 3 / V	85.53	-	104.92	-19.39

Frequency (MHz)	E.U.T. position / Polarization	Level (dBµV/m) (Peak values)	Averaging (with duty cycle correction factor of -11.33dB)	Limit (dBµV/m)	Margin (dB)
2708.2	AXE 3 / V	48.25	-	54	-5.75
3612.7	AXE 3 / V	56.26	44.93	54	-9.07
4513.6	AXE 3 / V	52.58	-	54	-1.42
5417.2	AXE 3 / V	56.62	45.29	54	-8.71
6316.3	AXE 3 / V	62.96	-	104.92	-41.96
7219.9	AXE 3 / V	49.43	-	54	-4.57
8145.1	AXE 3 / V	51.99	-	54	-2.01
9040.6	AXE 3 / V	53.13	-	54	-0.87
9958.6	AXE 3 / V	53.87	-	104.92	-51.05
1805.5	AXE 3 / H	68.79	-	104.92	-36.13
2711.8	AXE 3 / H	44.17	-	54	-9.83
3610	AXE 3 / H	45.89	-	54	-8.11
4517.2	AXE 3 / H	50.00	-	54	-4.00
5431.6	AXE 3 / H	57.17	45.84	54	-8.16
6316.3	AXE 3 / H	65.12	-	104.92	-39.80
7217.2	AXE 3 / H	49.61	-	54	-4.39
8128.9	AXE 3 / H	50.38	-	54	-3.62
9045.1	AXE 3 / H	51.38	-	54	-2.62
9947.8	AXE 3 / H	50.85	-	104.92	-54.07

Averaging duty cycle correction factor is applied when measured peak value is above average limit.
All other radiated emissions are at least 20dB below the limit.

SHORT QUARTER WAVE ANTENNA

Frequency (MHz)	E.U.T. position / Polarization	Level (dBµV/m) (Peak values)	Averaging (with duty cycle correction factor of -11.33dB)	Limit (dBµV/m)	Margin (dB)
1808.2	AXE 1 / H	68.50		103.13	-34.63
2708.2	AXE 1 / H	49.11		54	-4.89
3612.7	AXE 1 / H	46.29		54	-7.71
4513.6	AXE 1 / H	48.91		54	-5.09
5417.2	AXE 1 / H	50.25		54	-3.75
6316.3	AXE 1 / H	57.86	-	103.13	-45.27
7219.9	AXE 1 / H	48.08	-	54	-5.92
8145.1	AXE 1 / H	48.65	-	54	-5.35
9024.4	AXE 1 / H	50.31	-	54	-3.69
9948.7	AXE 1 / H	50.38	-	103.13	-52.75
1805.5	AXE 1 / V	59.63	-	103.13	-43.50
2711.8	AXE 1 / V	48.75	-	54	-5.25
3610	AXE 1 / V	43.67	-	54	-10.33
4517.2	AXE 1 / V	46.15	-	54	-7.85
5431.6	AXE 1 / V	53.25	41.92	54	-12.08
6316.3	AXE 1 / V	65.49	-	103.13	-37.64
7217.2	AXE 1 / V	52.55	41.22	54	-12.78
8128.9	AXE 1 / V	54.16	42.83	54	-11.17
9045.1	AXE 1 / V	54.83	43.50	54	-10.50
9953.2	AXE 1 / V	49.63	-	103.13	-53.50
1808.2	AXE 2 / H	68.30	-	103.13	-34.83
2708.2	AXE 2 / H	46.03	-	54	-7.97
3612.7	AXE 2 / H	45.83	-	54	-8.17
4513.6	AXE 2 / H	46.97	-	54	-7.03
5417.2	AXE 2 / H	47.00	-	54	-7.00
6316.3	AXE 2 / H	60.34	-	103.13	-42.79
8146.9	AXE 2 / H	49.22	-	54	-4.78
9051.4	AXE 2 / H	50.48	-	54	-3.52
9937	AXE 2 / H	51.54	-	103.13	-51.59
1805.5	AXE 2 / V	59.10	-	103.13	-44.03
2711.8	AXE 2 / V	48.10	-	54	-5.90
3610	AXE 2 / V	43.33	-	54	-10.67
4517.2	AXE 2 / V	49.92	-	54	-4.08
5431.6	AXE 2 / V	54.38	43.02	54	-10.98
6316.3	AXE 2 / V	65.63	-	103.13	-37.50
7217.2	AXE 2 / V	52.30	40.97	54	-13.03
8128.9	AXE 2 / V	55.17	43.84	54	-10.16
9045.1	AXE 2 / V	55.72	44.39	54	-9.61
9929.8	AXE 2 / V	49.69	-	103.13	-53.44
1808.2	AXE 3 / V	56.54	-	103.13	-46.59
2708.2	AXE 3 / V	47.09	-	54	-6.91

Frequency (MHz)	E.U.T. position / Polarization	Level (dBµV/m) (Peak values)	Averaging (with duty cycle correction factor of -11.33dB)	Limit (dBµV/m)	Margin (dB)
3612.7	AXE 3 / H	47.17	-	54	-6.83
4513.6	AXE 3 / H	52.28	-	54	-1.72
5417.2	AXE 3 / H	54.68	43.35	54	-10.65
6316.3	AXE 3 / H	65.35	-	103.13	-37.78
7219.9	AXE 3 / H	50.09	-	54	-3.91
8145.1	AXE 3 / H	51.90	-	54	-2.10
9040.6	AXE 3 / H	52.14	-	54	-1.86
9958.6	AXE 3 / H	50.87	-	103.13	-52.26
1805.5	AXE 3 / V	60.52	-	103.13	-42.61
2711.8	AXE 3 / V	47.73	-	54	-6.27
3610	AXE 3 / V	49.81	-	54	-4.19
4517.2	AXE 3 / V	50.61	-	54	-3.39
5431.6	AXE 3 / V	50.11	-	54	-3.89
6316.3	AXE 3 / V	61.45	-	103.13	-41.68
7217.2	AXE 3 / V	49.94	-	54	-4.06
8128.9	AXE 3 / V	51.47	-	54	-2.53
9045.1	AXE 3 / V	53.69	42.36	54	-11.64
9947.8	AXE 3 / V	52.06	-	103.13	-51.07

Averaging duty cycle correction factor is applied when measured peak value is above average limit.
All other radiated emissions are at least 20dB below the limit.

11. MEASUREMENT OF FREQUENCY STABILITY §15.215 (C) AND RSS-GEN

Standard: FCC part 15 Radio part 15.215 c)

Test method: FCC part 15.215 c)

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.

Measurements were conducted according to the operating temperature range and voltage range given in the user guide.
Measure is performed in conducted emission.

Test method deviation: Measurement in maxhold mode with modulation.

Test equipment list:

CATEGORIE	MARQUE	TYPE	N° EMITECH	DATE CAL.	DATE VAL
Attenuator	Radiall	R412710124	4390	21/01/2014	24 months
Attenuator	Radiall	R412720124	4391	21/01/2014	24 months
Cable	C&C	N-3m	10557	25/11/2015	24 months
Receiver	Agilent Technologies	E4440A	5824	11/01/2016	24 months
Software	Nexio	BAT EMC	0000	#	#
Thermohygrometer	Bioblock Scientific	Météostar	0963	31/10/2014	24 months
Thermohygrometer	Testo	608-H1	7561	26/09/2014	24 months

Results: See Board(s) below.

E.U.T. OPERATING MODE: A1 GROUP (LOW CHANNEL)

Conditions	Temperature °C	Power supply Vdc	Frequency MHz	Frequency error kHz
Normal conditions	23	5	902.180140	-
Extremes tests conditions	-20	5	902.179968	-0.172
	55	5	902.179570	-0.570

E.U.T. OPERATING MODE: A8 GROUP (UPPER CHANNEL)

Conditions	Temperature °C	Power supply Vdc	Frequency MHz	Frequency error kHz
Normal conditions	23	5	927.821367	-
Extremes tests conditions	-20	5	927.818565	-2.802
	55	5	927.820200	-1.167

Conclusion: No out of band operation under extremes tests conditions.

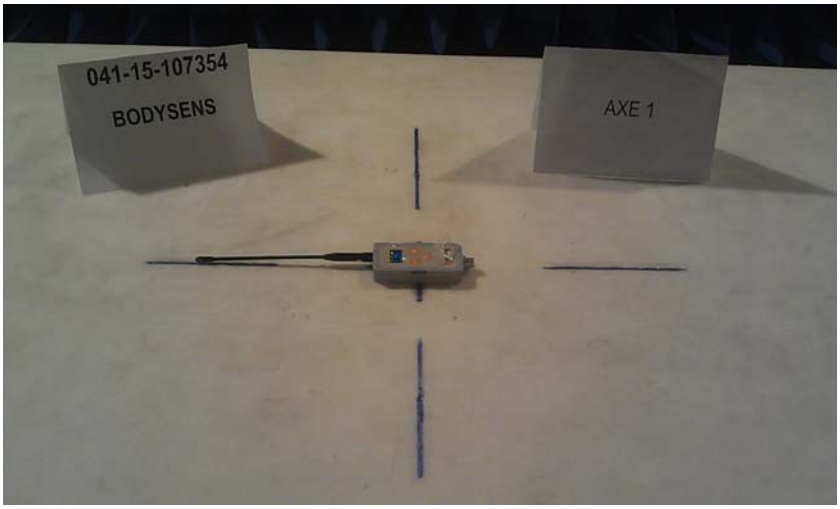
End of report – 1 annex to be forwarded

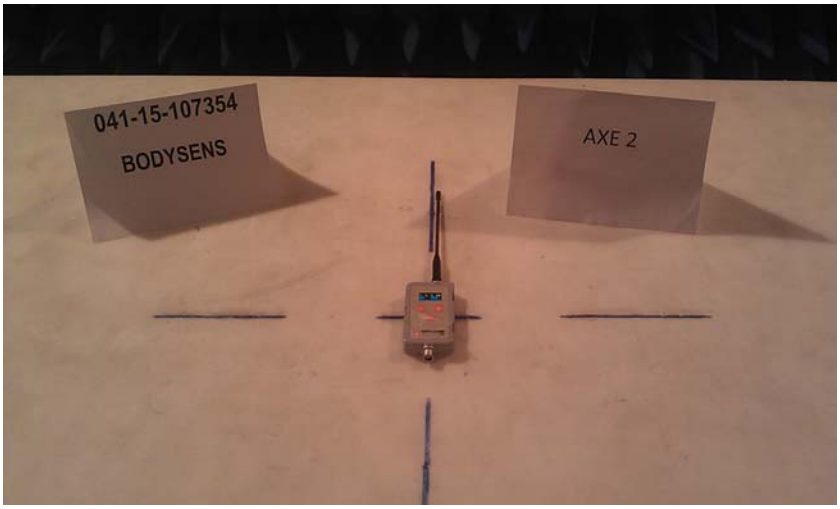
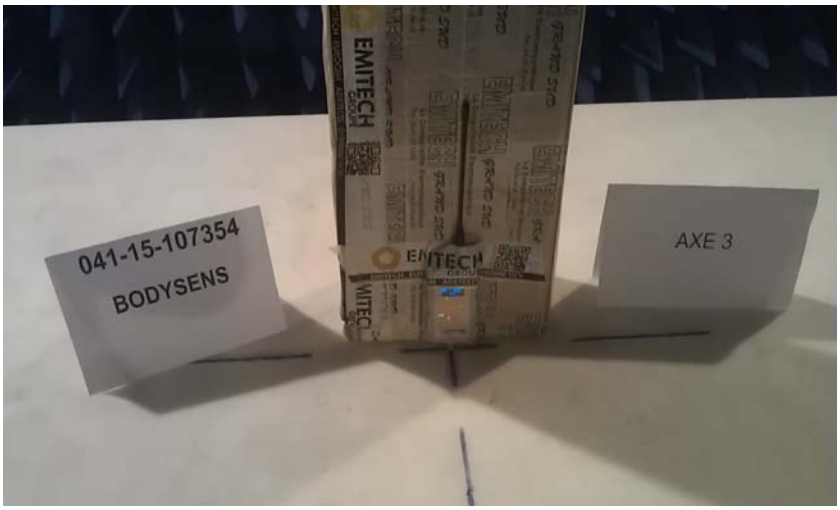
ANNEX:
PHOTOGRAPH(S)

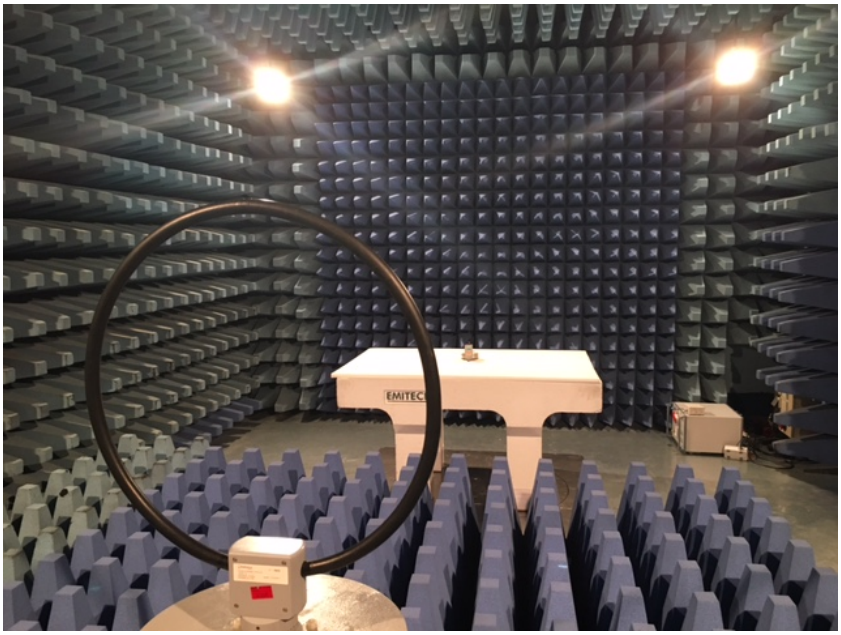
EQUIPMENT UNDER TEST (E.U.T.) PHOTOGRAPH(S)

APPI-COM

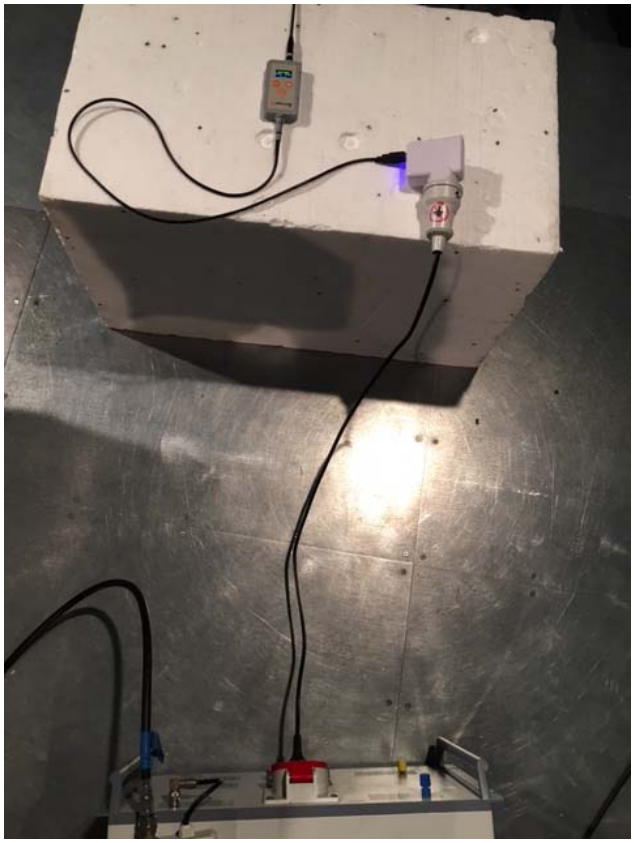
E.U.T. positions
(Shielded chamber)



E.U.T. positions (Shielded chamber)	
	
	

Radiated pre measurement	
E.U.T. positions (Loading mode measurement Open area test site)	

Open area test site measurements	
	

Open area test site measurements	
Conducted emissions	

Power supply used for conducted emissions	
Power supplymarking plate