



This test report cancels and replaces R410-18-101238-4A Ed.0
Test report issued under the responsibility of:
EMITECH MONTPELLIER laboratory
MRA US-EU Designation Number: FR0006

RADIO TEST REPORT

FCC 47 CFR PART 15.517

Company: **UWINLOC**
Address.....: CAMPUS MILLENNIALS
IMPASSE LOUIS PUEYO BAT2 - RDC
31700 BLAGNAC
FRANCE

Test item description: **TAG**
Trade Mark: UTAG
Manufacturer: UWINLOC
Type reference: 6033
Model: UTAG-V2.3-4GHz-R-US
FCC ID.....: 2APEGTAG
Ratings.....: Internal batteries

Testing Laboratory: **EMITECH MONTPELLIER laboratory**
Address.....: 145 rue de Massacan BP80025
34741 VENDARGUES Cedex
FRANCE

Report Reference No.: **R410-18-101238-4A**
Test procedure: FCC Certification
Diffusion.....: Mr CHAN
Applicant's name: UWINLOC
Date of issue.....: 03/10/2018
Total number of pages.....: 26
Revision: 1
Modified page(s).....: Refer to lines in margin
Compiled by.....: Fabien MOINACHE
Approved by (+ signature).....: David MONTAULON (Technical Manager)

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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.*



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This document submits the results of Electromagnetic Compatibility tests performed on the equipment **TAG (UTAG-V2.3-4GHz-R-US)** (denominated hereafter E.U.T.: equipment under test) according to document(s) listed in §2 of this test report.

[illegible]

Company name : UWINLOC
Company address : CAMPUS MILLENNIALS
 IMPASSE LOUIS PUEYO BAT2 - RDC
 31700 BLAGNAC
 FRANCE
Person(s) present during the tests : Mr SAUMAGNE
Responsible : Mr CHAN

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.

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
 "(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.

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)
 Test object was not subjected to all tests..... : I (Inconclusive)

E.U.T.	Equipment under test	AE	Ancillary equipment
RBW	Resolution bandwidth	VBW	Video bandwidth
OATS	Open area test site	FAR	Full anechoic room
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 47 CFR PART 15: 2017

Code of federal regulations – Title 47 telecommunication

Part 15- Radio frequency devices

FCC part 15.517

Technical requirements for indoor UWB systems.

FCC part 15.521

Technical requirements applicable to all UWB devices.

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

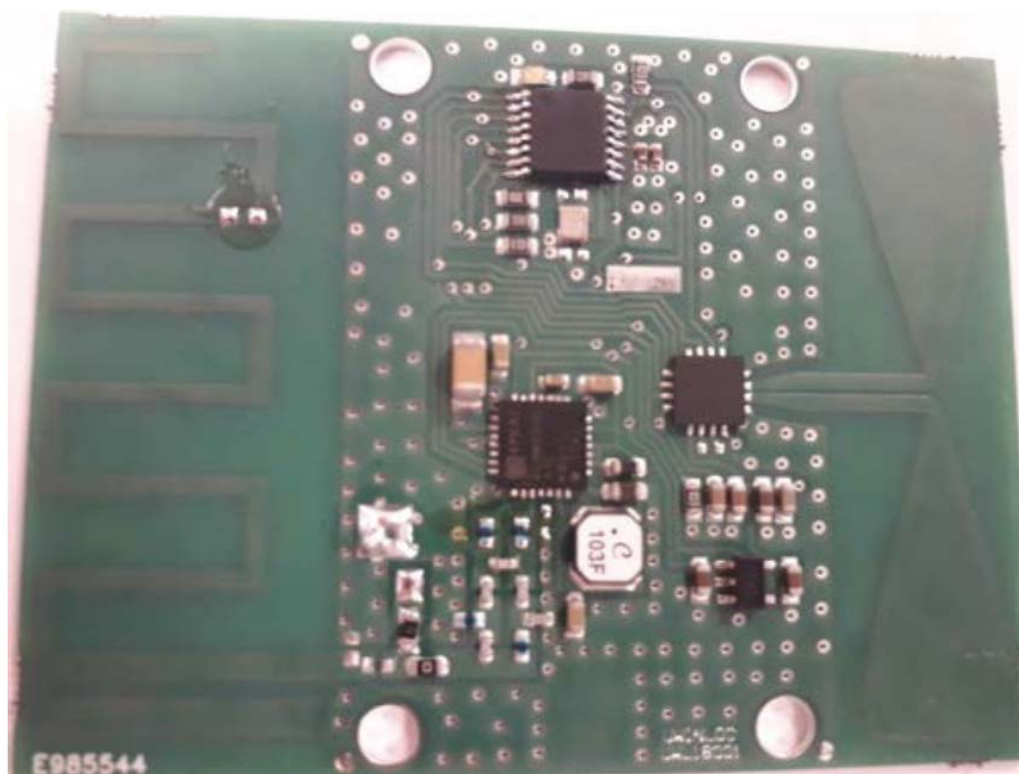
INFORMATIVE REFERENCES:

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.

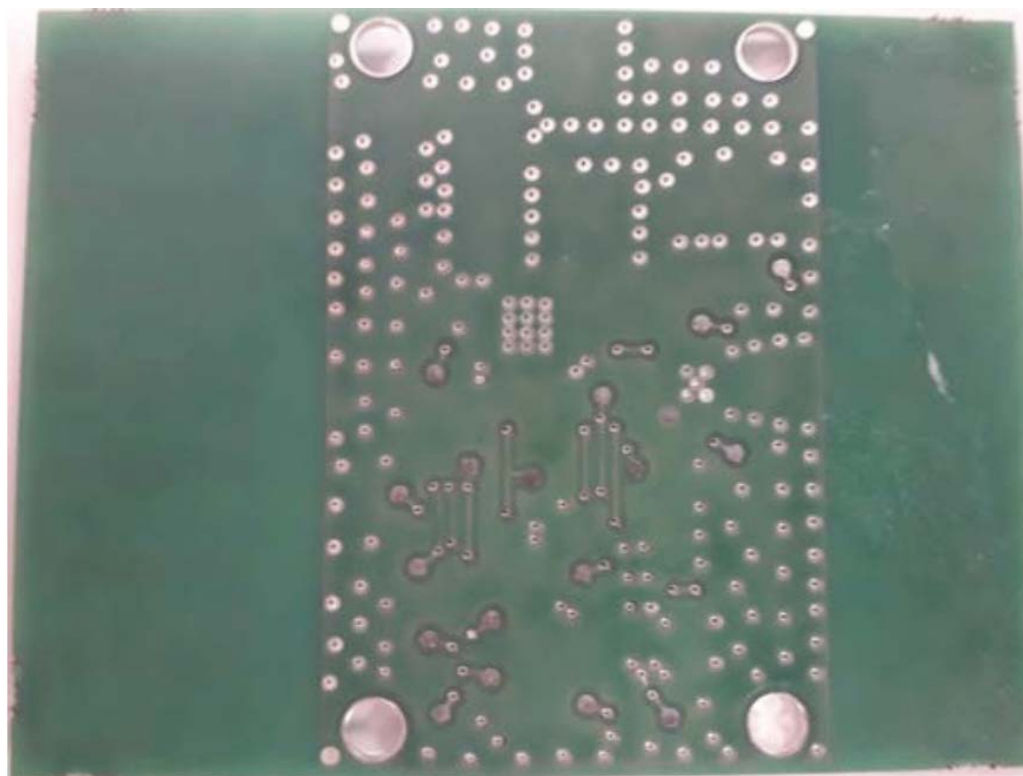
3.3. EUT external view (bottom)



3.4. EUT electronic board view (top)



3.5. EUT electronic board view (bottom)



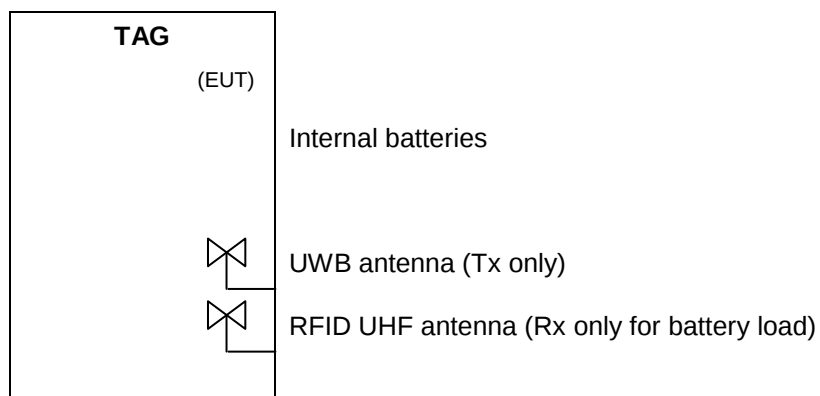
3.6. EUT Mechanical and Electrical Design

Power supply. : Internal batteries
 Power supply range. : 4.75-5.5Vdc
 Power type. : Internal batteries
 Power (W). : N/C
 Nominal current (A). : N/C
 Dimensions (L x W x H) (mm). : 78*51*28mm
 Weight (kg). : 0.2
 Temperature range (°C). : Not communicated
 Ground bounding strap. : No

Comments:

N/A

3.7. EUT Input/Output ports



PORT	NAME	TYPE	LENGHT	TYPE	COMMENTS
0	Main frame	N/E	N/A	Plastic	
1	UWB antenna	RF		Integral	Tx only
2	RFID UHF antenna	RF		Integral	Rx only for battery load

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

3.8. EUT EMC & Radio Specifications

Electromagnetic environment : Light Industry
Professional use ? : YES
Typical mounting : Indoor use only

Comments:

N/A

a) EUT OPERATION MODES:	
MODE #	DESCRIPTION
1	Tx permanent modulated mode (UWB emission)
2	N/A
3	N/A
4	N/A
5	N/A
b) GENERAL INFORMATIONS	
According to manufacturer's declarations :	
EUT type..... : Transmitter	
Technology : UWB (Tx mode)	
Environmental profile..... : Data transmission	
Temperature range..... : Not communicated	
Antenna type : Integral for UWB Tx RFID UHF Rx mode	
Antenna Gain..... : Not communicated (integral)	
Comments:	
N/A	
c) TRANSMITTER PARAMITERS (Tx)	
Frequency bands..... : UWB 3600MHz to 10600MHz	
RF Power..... : UWB :-30 dBm (max)	
Number of channels / Separation..... : UWB : 1	
Modulation type : GFSK	
Duty cycle : Not communicated	
Tested frequency..... : 4100 MHz	
d) RECEIVER PARAMETERS (Rx)	
Frequency bands..... : 902-928MHz (RFID UHF)	
Category/Class : N/A	
Bandwidth : N/A	

4. RESULT SUMMARY

TEST DESIGNATION	SEVERITY	VERDICT	BASIC STANDARDS / COMMENTS
SUBPART A - GENERAL			
Labeling requirements		PASS	15.19 / See certification documents
Information to user		PASS	15.21 / See certification documents
Home-built devices		N/A	15.23
Kits		N/A	15.25
Special Accessories		PASS	15.27 / See certification documents
Inspection by the Commission		N/A	15.29
Measurement standards		PASS	15.31
Test procedure for CPU boards and computer power supplies		N/A	15.32
Frequency range of radiated measurements		PASS	15.33
Measurement detector functions and bandwidths		PASS	15.35
Transition provisions for compliance with the rules		PASS	15.37 / See certification documents
SUBPART B – UNINTENTIONAL RADIATORS			
Equipment authorization			15.101
- Verification		N/A	
- Declaration of Conformity		N/A	
CPU boards and power supplies used in personal computers		N/A	15.102
Exempted device		N/A	15.103
Information to the user		PASS	15.105 / See certification documents
Conducted limits	Class B	N/A	15.107 / battery powered
Radiated emission limits	Class B	PASS	15.109
Antenna power conduction limits for receivers		N/A	15.111
Power line carrier systems		N/A	15.113
TV interface devices, including cable system terminal devices		N/A	15.115
TV broadcast receivers		N/A	15.117
Cable ready consumer electronics equipment		N/A	15.118
Program blocking technology requirements for TV receivers		N/A	15.120
Scanning receivers and frequency converters used with scanning receivers		N/A	15.121
Labeling of digital cable ready products		N/A	15.123
SUBPART C –INTENTIONAL RADIATORS			

TEST DESIGNATION	SEVERITY	VERDICT	BASIC STANDARDS / COMMENTS
Equipment authorization requirement		PASS	15.201 / Transmitter part is subject to Certification procedure
Certified operating frequency range		N/A	15.202
Antenna requirement		PASS	15.203 / Dedicated integral antenna
External radio frequency power amplifiers and antenna modifications		N/A	15.204
Restricted bands of operation		PASS	15.205
Conducted limits	Class B	N/A	15.207 / battery powered
Radiated emission limits; general requirements	Class B	PASS	15.209
Tunnel radio systems		N/A	15.211
Modular transmitters		N/A	15.212
Cable locating equipment		N/A	15.213
Cordless telephones		N/A	15.214
Additional provisions to the general radiated emission limits		PASS	15.215
Technical requirements for indoor UWB systems			15.517
- Indoor use only		PASS	a) / See certification documents and note 1
- Operating between 3100MHz and 10600MHz		PASS	b)
- Radiated emissions above 960MHz		PASS	c)
- Radiated emissions in additional restricted bands		PASS	d)
- Peak level of carrier frequency		PASS	e)
- Mandatory statement		PASS	f) / See certification documents and note 1

Note 1 :

UWB systems operating under the provisions of 15.517 shall bear the following or similar statement in a conspicuous location on the device or in the instruction manual supplied with the device:

"This equipment may only be operated indoors. Operation outdoors is in violation of 47 U.S.C. 301 and could subject the operator to serious legal penalties."

EUT is not a toy and it is designed for indoor operation only, No operation onboard an aircraft, a ship or a satellite.

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	$\pm 1 \times 10^{-7}$	$\pm 1 \times 10^{-7}$
RF power, conducted		
RF power	$\pm 0.8\text{dB}$	$\pm 1\text{ dB}$
Power spectral density	$\pm 2.3\text{dB}$	$\pm 3\text{ dB}$
Occupied bandwidth		
RF power	$\pm 1.2\%$	$\pm 5\%$
Conducted emission (spurious)		
$f \leq 1\text{ GHz}$	$\pm 0.8\text{ dB}$	$\pm 3\text{ dB}$
1 GHz - 12.75 GHz	$\pm 1.6\text{ dB}$	
Radiated emission (PAR / PIRE / RNE)		
$f \leq 62.5\text{ MHz}$	$\pm 5.1\text{ dB}$	$\pm 6\text{ dB}$
62.5 MHz - 1 GHz	$\pm 5.1\text{ dB}$	$\pm 6\text{ dB}$
1 GHz - 18 GHz	$\pm 5.2\text{ dB}$	$\pm 6\text{ dB}$
18 GHz – 26 GHz	$\pm 5.1\text{ dB}$	$\pm 6\text{ dB}$
26 GHz – 40 GHz	$\pm 5.4\text{ dB}$	$\pm 6\text{ dB}$
PIRE and power spectral density with diode	$\pm 5.4\text{ dB}$	$\pm 6\text{ dB}$
Radiated emission (magnetic field)		
9kHz – 30MHz	$\pm 2.7\text{ dB}$	$\pm 6\text{ dB}$
Supply voltages	$\pm 3\%$	$\pm 3\%$
Temperature	$\pm 1\text{ }^{\circ}\text{C}$	$\pm 1\text{ }^{\circ}\text{C}$
Humidity	$\pm 5\%$	$\pm 5\%$
Time / Duty cycle	$\pm 4.4\%$	$\pm 5\%$
Radiated emission (electric field for FCC standard)		
9kHz – 30MHz	$\pm 2.7\text{ dB}$	/
30MHz – 1GHz	$\pm 5.2\text{ dB}$	/
1GHz – 18GHz	$\pm 5.3\text{ dB}$	/
18GHz – 26GHz	$\pm 5.5\text{ dB}$	/
26GHz – 40GHz	$\pm 5.5\text{ dB}$	/

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

6. TEST CONDITIONS AND RESULTS

6.1. UWB 10dB bandwidth

Reference standard:	FCC part 15 Radio part 15.517
Test method:	ANSI C63.10 §10
Test description: b): The UWB bandwidth of a UWB system operating under the provisions of this section must be contained between 3100 MHz and 10600 MHz. f_M is the frequency at which the highest emission occurs. EUT is connected to the measuring receiver via 50Ω attenuator(s). Tests are done in max-hold mode in order to capture all channels.	

TESTED PARAMETER	SEVERITY	VERDICT
10dB Bandwidth	3100MHz-10600MHz	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	21.8 °C
Relative Humidity	20 to 75 %	31.8 %
Atmospheric pressure	N/A	1018 hPa
Test method deviation: N/A		
Supplementary information: N/A		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Attenuator	Techniwave	TWSMA-20dB-18G-SMA	14679	21/09/2017	21/11/2019
Cable	Radiall	SMA-0,5m	14889	23/02/2018	23/04/2020
Receiver	Rohde & Schwarz	FSW43	14830	13/11/2017	13/01/2019
Thermohygrometer	Testo	608-H1	7562	27/12/2016	27/02/2019
Thermohygrometer	Bioblock Scientific	Météostar	0963	27/12/2016	27/02/2019

Blank cells = Permanent validity

UWB 10dB BANDWIDTH - GRAPH	
F_M	
EUT mode:	#1
Test Date:	03/10/2018
Test Operator:	MPA
	
Configuration:	N/A
Comments:	N/A
EUT modification(s): N/A	

UWB 10dB BANDWIDTH - TABULATED RESULTS			
F_M			
Frequency	RBW	10 dB BW	Limit
4125.35 MHz	1MHz	677.30 MHz $f_L=3786.7$ MHz $f_H=4464$ MHz	$f_L > 3100$ MHz $f_H < 10600$ MHz

$(f_H - f_L) = 677.30\text{MHz}$ wich is greater than 500MHz.

6.2. Radiated spurious emissions

Reference standard:	FCC part 15 Radio 15.109, 15.209, 15.205, 15.215 & 15.517
Test method:	ANSI C63.10
General test description: c) and d) For $f < 30\text{MHz}$, EUT is set on an insulating support at 80cm above the ground reference plane. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter in a semi-anechoic chamber. The EUT was rotated 360° in order to maximize radiated levels. Test antenna was oriented in 3 axes (0°, 45° and 90°). Final measurements (quasi-peak) were then performed in a 10-meter Open Area Test Site that complies to CISPR 16 in the same measurement conditions. For $f > 30\text{MHz}$, EUT is set on an insulating support at 80cm above the ground reference plane (150cm for $f > 1\text{GHz}$). 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. Above 960MHz, radiated measurements were done at 1m test distance in order to optimise measurement dynamic. All frequencies were investigated, where applicable. For portable equipments a research of maximum level is done on the 3 axes. Only the highest levels are recorded.	

TESTED CONFIGURATION	PARAMETER	SEVERITY	RESULT TAB.	VERDICT
UWB	9kHz-150kHz	15.209	See below	PASS
UWB	150kHz-30MHz	15.209	See below	PASS
UWB	30MHz-960MHz	15.209	See below	PASS
UWB	960MHz-40GHz	15.517	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 960MHz Quasi peak limit provided is the limit given in §15.209. Above 960MHz average limit of §15.517 c) and d).		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	ETS-Lindgren	3117	5456	16/03/2016	16/05/2019
Antenna	ETS lindgren	3160-09	14690	25/09/2017	25/11/2020
Antenna	ETS lindgren	3160-10	14692	22/09/2017	22/11/2020

CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	Electro Metrics	BIA-30HF	1107	25/05/2015	25/07/2018
Antenna	Rohde & Schwarz	HFH2-Z2	5825	20/09/2017	20/11/2019
Antenna	Rohde & Schwarz	HL223	1137	25/04/2015	25/06/2018
Antenna mast	Maturo	NCD	14656		
Attenuator	Techniwave	TWSMA-20dB-18G-SMA	14679	21/09/2017	21/11/2019
Cable	Huber + Suhner	K-5m	14460	13/03/2017	13/05/2019
Cable	JYE BAO	K30K30-5003-40G1	14887	02/03/2018	02/05/2020
Cable	Huber + Suhner	K-1m	14522	24/04/2017	24/06/2019
Cable	TechniWAVE	N-0.23m	14891	23/02/2018	23/04/2020
Cable	TechniWAVE	N-0.23m	14893	23/02/2018	23/04/2020
Cable	Huber Suhner	N-10m	8472	16/02/2017	16/04/2019
Cable	SUCOFLEX	N-3m	14379	18/01/2017	18/03/2019
Cable	SUCOFLEX	N-5,5m	14381	18/01/2017	18/03/2019
Cable	SUCOFLEX	N-6,5m	14380	18/01/2017	18/03/2019
Preamplifier	Wright Technologie	ASL40-B3015	14851	08/03/2018	08/05/2019
Preamplifier	IMPULSE	CA118-546ACN	9169	13/10/2017	13/12/2018
Receiver	Rohde & Schwarz	FSW43	14830	13/11/2017	13/01/2019
Shielded enclosure	RAY PROOF	C.V2	1423		
Shielded enclosure	COMTEST	SAC 3m	14494	14/02/2017	14/04/2020
Software	Nexio	BAT EMC v3.17.0.22	0000		
Thermohygrometer	Testo	608-H1	7562	27/12/2016	27/02/2019
Thermohygrometer	Testo	608-H2	12269	27/11/2017	27/01/2020
Turntable	Maturo	NCD	14657		

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RADIATED SPURIOUS EMISSIONS - TABULATED RESULTS					
UWB				EMI5831	
Frequency MHz	Polarization	Level peak dBμV	Level Qpeak dBμV	Limit dBμV/m	Margin dB
475.07	Vertical	32.22	26.93	46	-19.07
525.08	Vertical	33.09	27.86	46	-18.14
853.36	Vertical	38.94	33.48	46	-12.52
449.99	Horizontal	32.60	26.58	46	-19.42
500.07	Horizontal	34.34	28.14	46	-17.86
525.08	Horizontal	33.36	27.86	46	-18.14
600.1	Horizontal	36.88	29.12	46	-16.88
625.11	Horizontal	39.45	30.13	46	-15.87
650.04	Horizontal	37.03	29.78	46	-16.22
885.96	Horizontal	39.68	34.19	46	-11.81

Spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported

RADIATED SPURIOUS EMISSIONS - TABULATED RESULTS					
UWB				EMI5793	
Frequency MHz	Polarization	Level peak dBm	Level Avg dBm	Limit dBm	Margin dB
8355.35	Horizontal	-60.8	-71.36	-41.3	-30.06
12358.07	Horizontal	-57.6	-67.47	-51.3	-16.17
16524.45	Horizontal	-53.9	-64.56	-51.3	-13.26

RADIATED SPURIOUS EMISSIONS - TABULATED RESULTS

UWB				EMI5793	
20433.69	Horizontal	-65.6	-77.21	-51.3	-25.91

Spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported

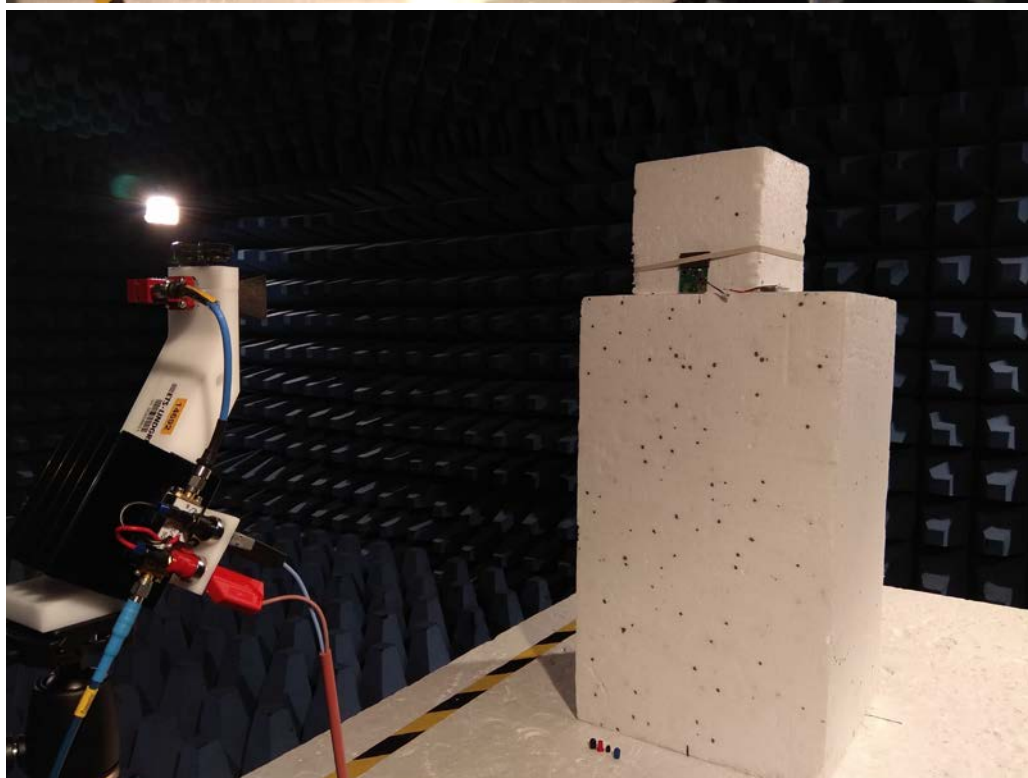
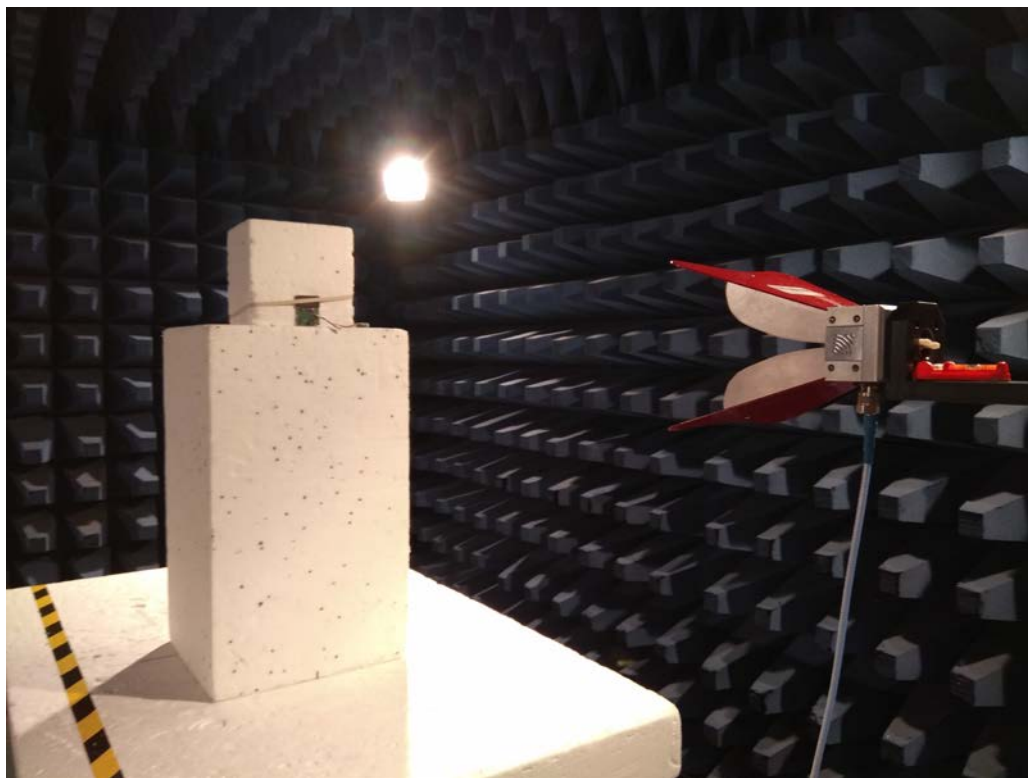
RADIATED SPURIOUS EMISSIONS - TABULATED RESULTS

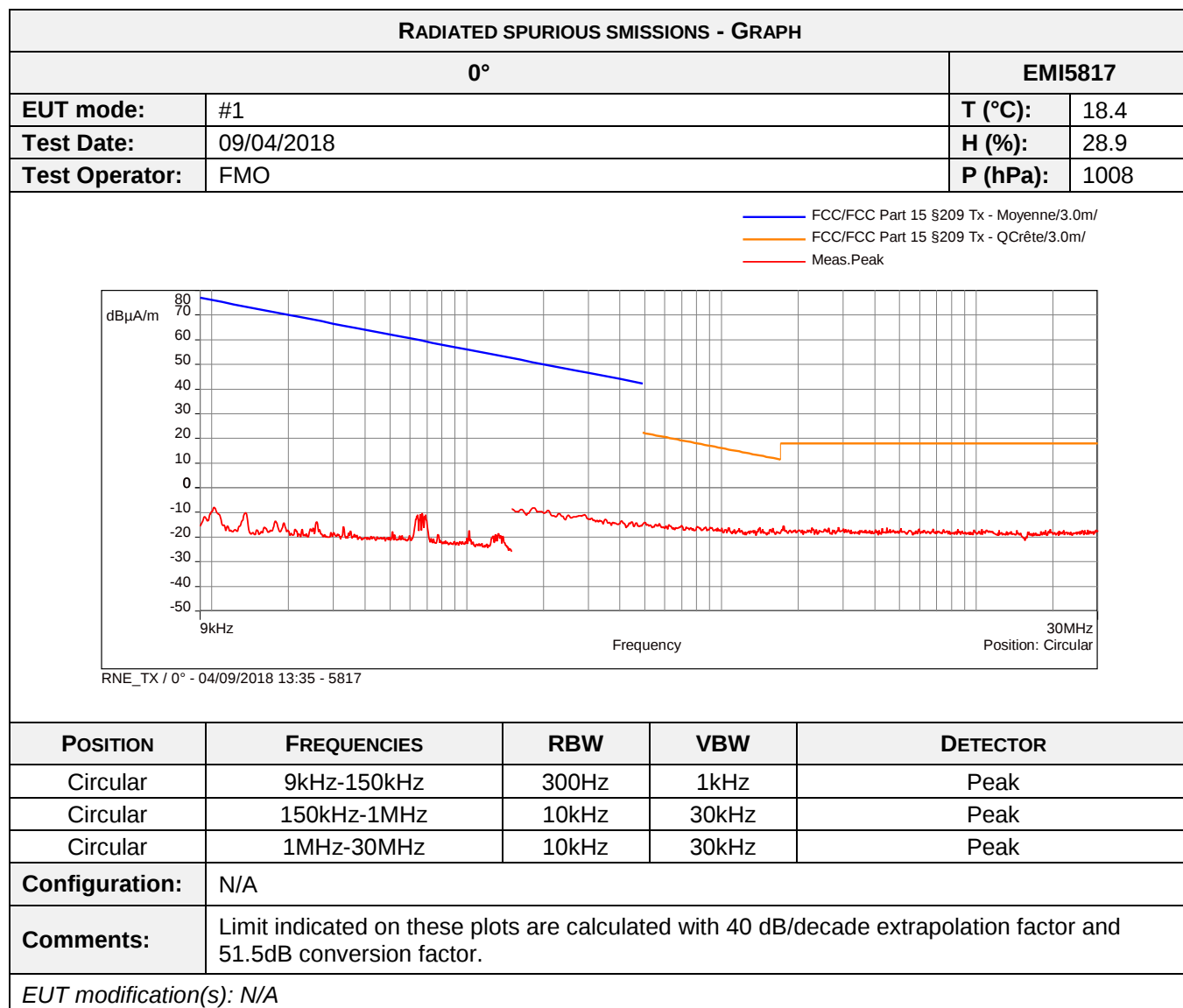
UWB				EMI5837	
Frequency MHz	Polarization	Level peak dBm	Level Avg dBm	Limit dBm	Margin dB
1175.8	Horizontal	-88.3	-	-85.3	-3.00
1200.2	Horizontal	-89.9	-	-85.3	-4.60
1225.2	Horizontal	-86.9	-	-85.3	-1.60
1575.2	Horizontal	-89.6	-	-85.3	-4.30
1600.2	Horizontal	-90.3	-	-85.3	-5.00

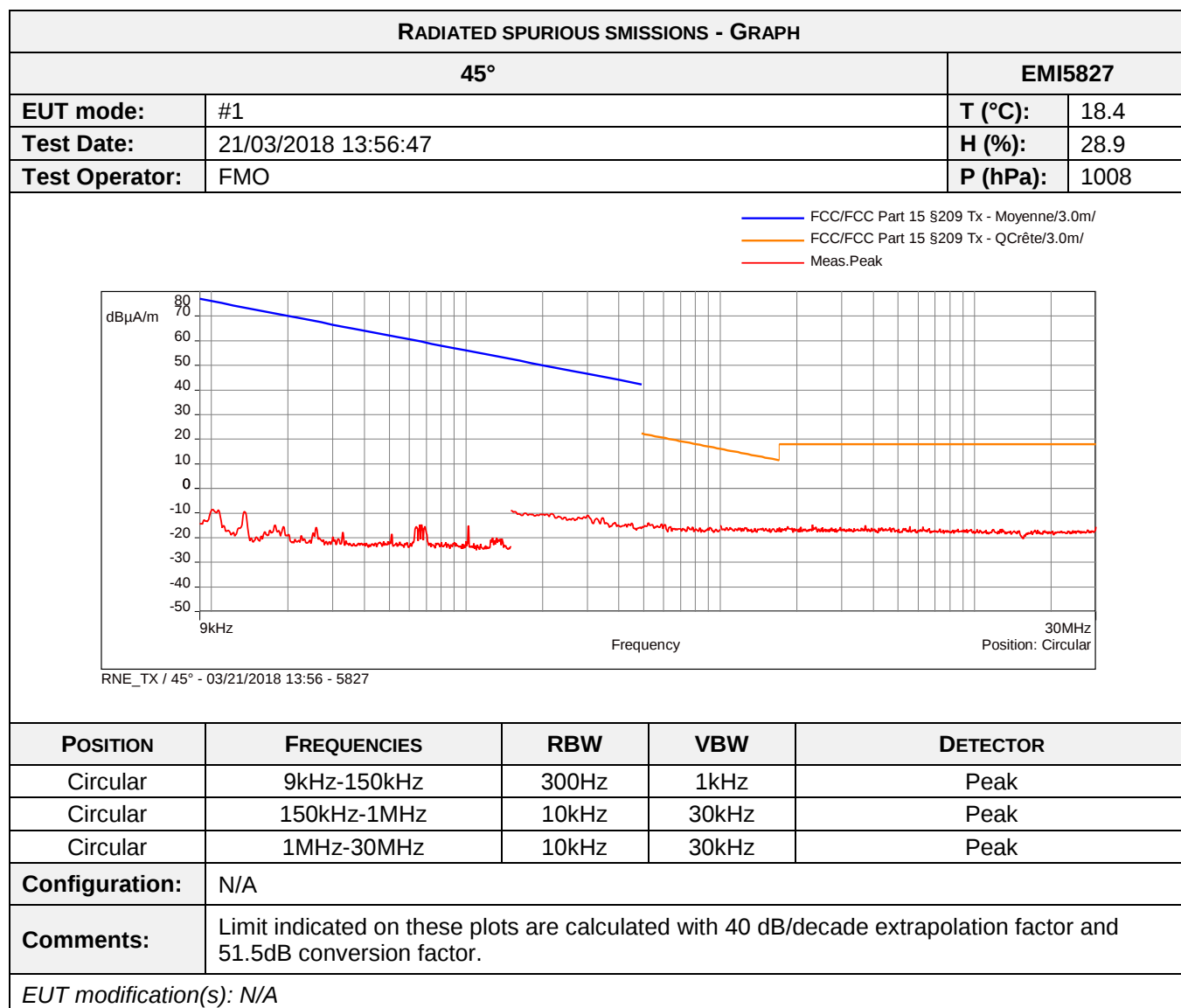
Spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported

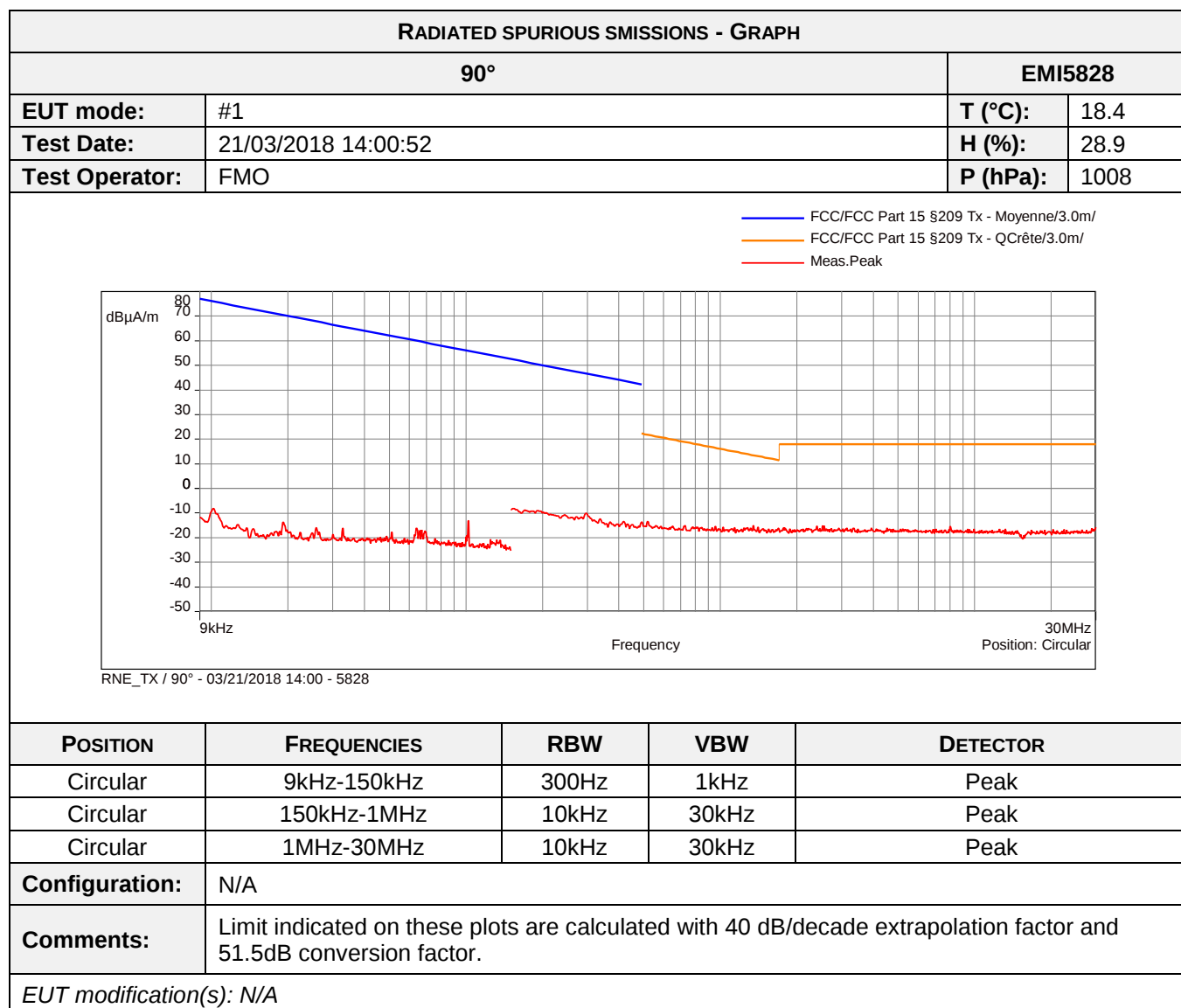
TEST SETUP PHOTO(S)

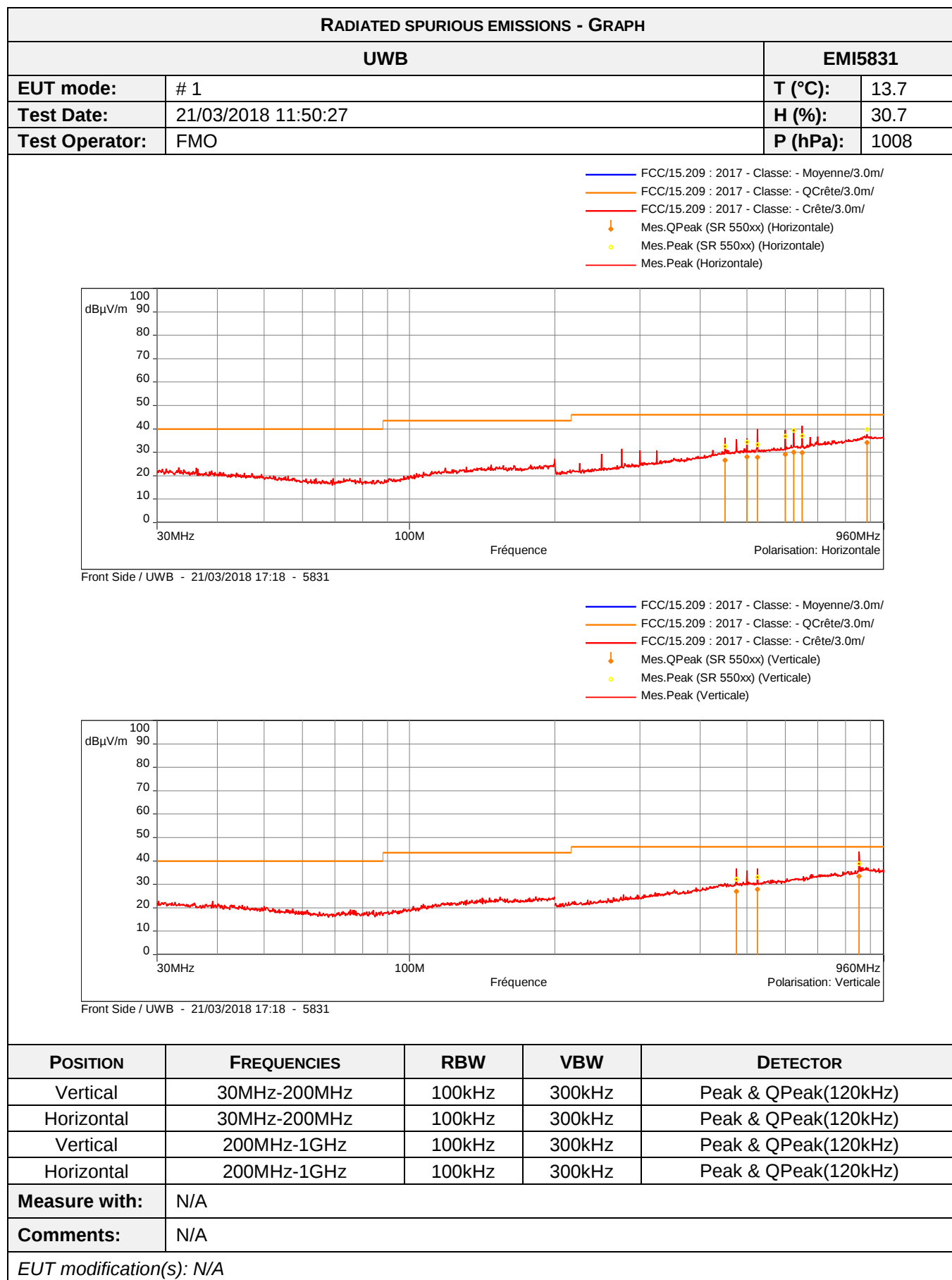

TEST SETUP PHOTO(S)

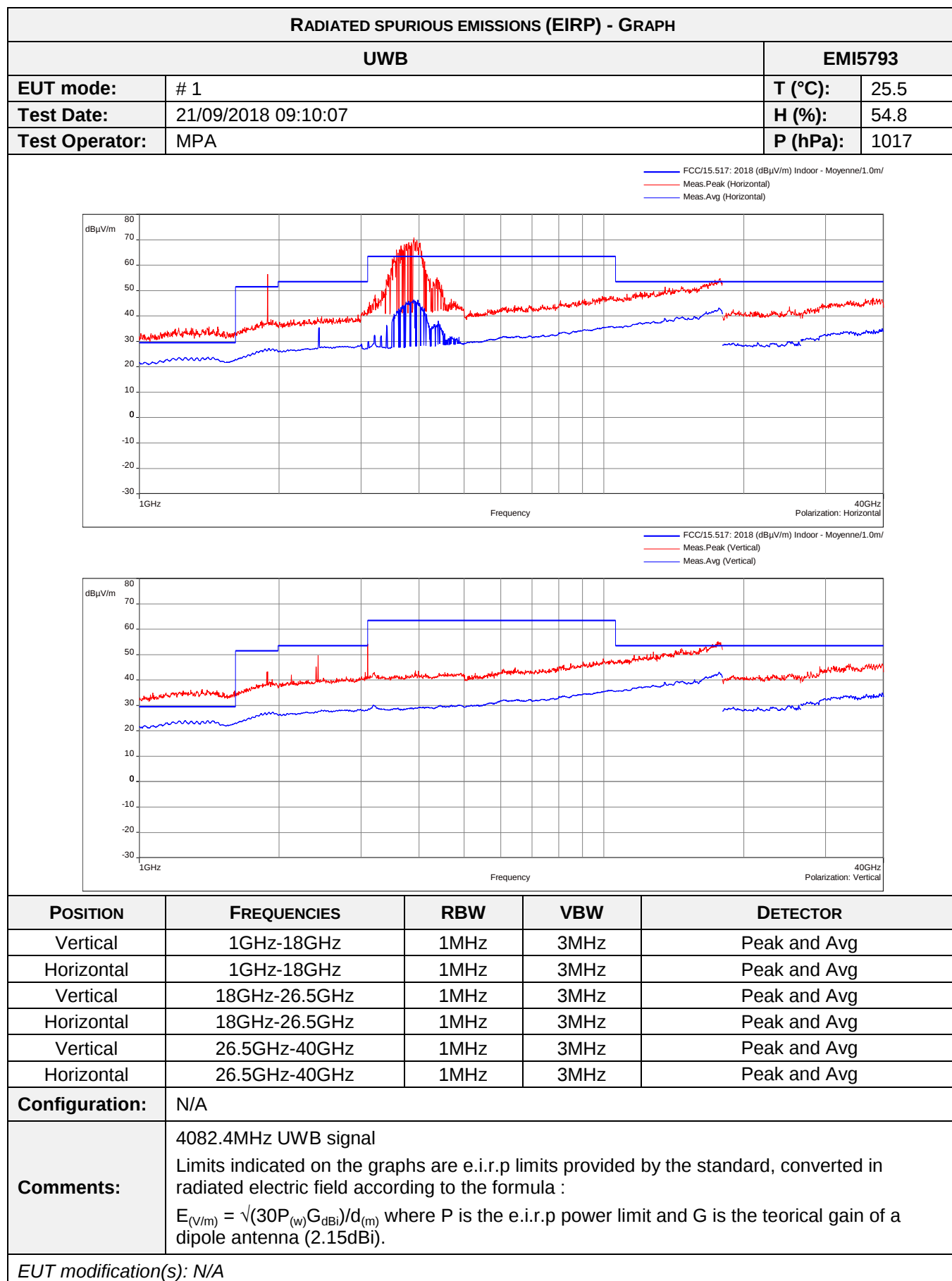


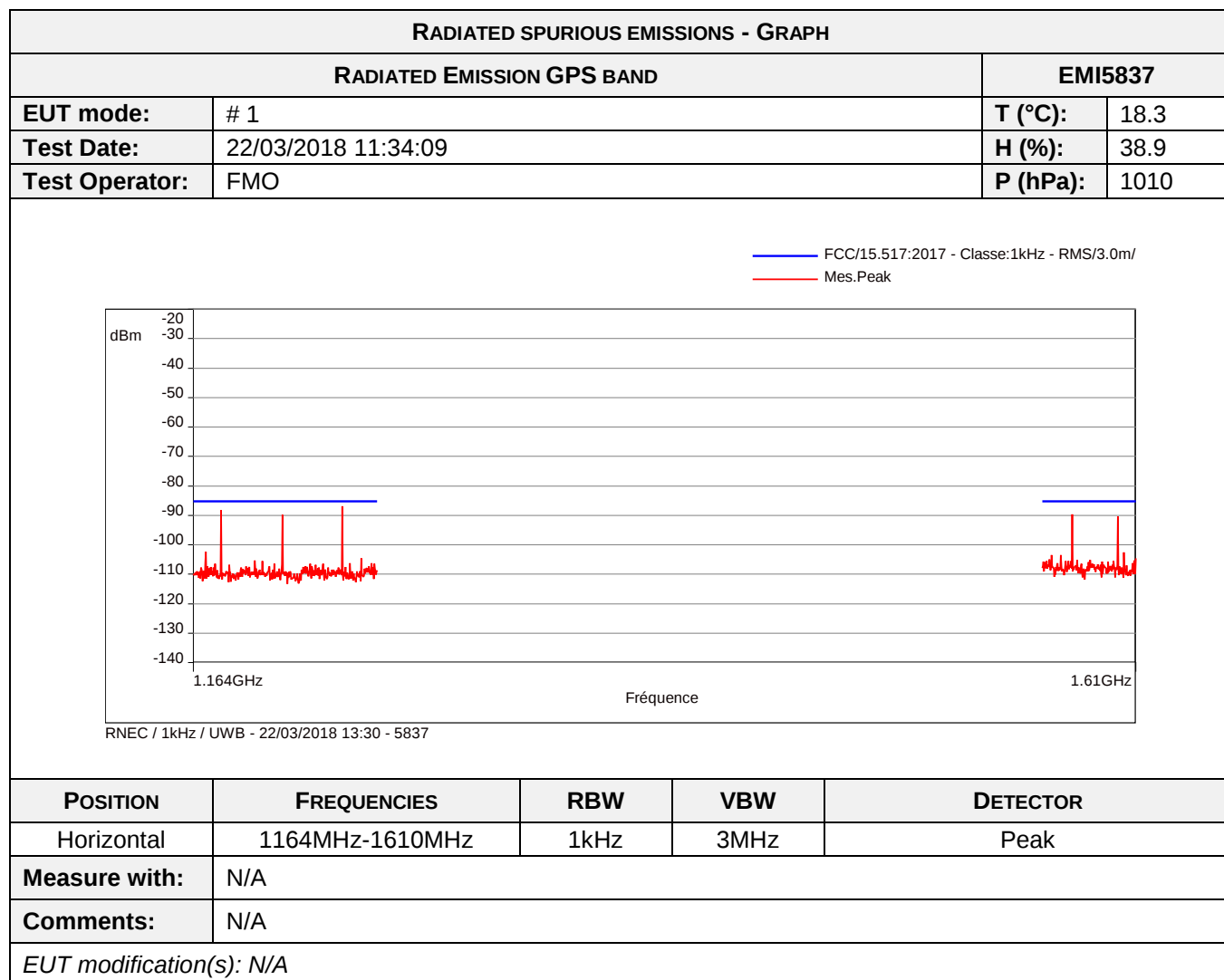












6.3. Maximum peak output power of UWB device

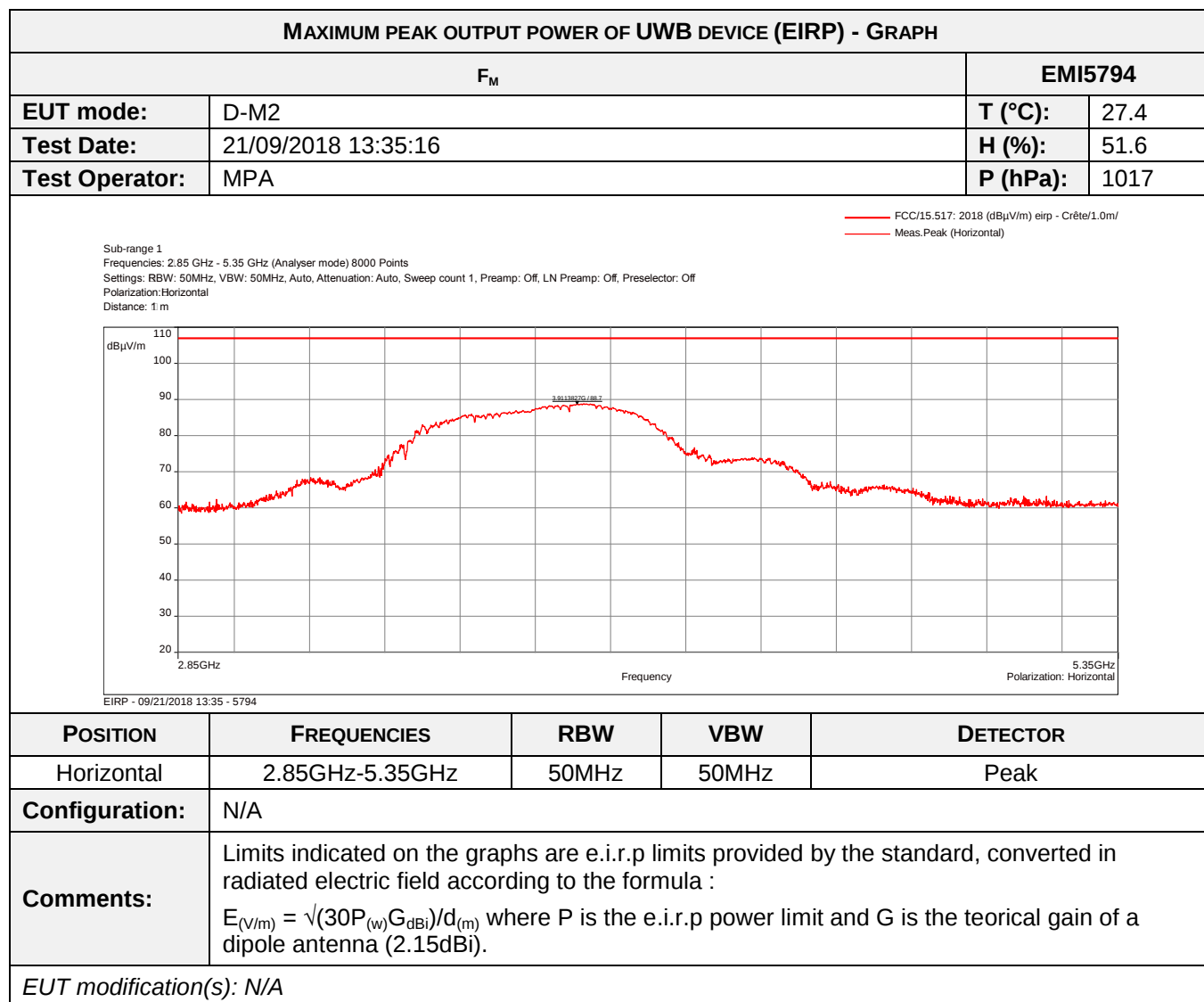
Reference standard:	FCC part 15 Radio part 15.517
Test method:	ANSI C63.10
Test description: e) There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs, f_M. That limit is 0 dBm EIRP. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in §15.521. For $f > 1\text{GHz}$, EUT is set on an insulating support at 150cm above the ground reference plane. Measurements are performed in a semi-anechoic chamber at 1m test distance in order to optimise measurement dynamic. For portable equipments a research of maximum level is done on the 3 axes. Only the highest levels are recorded.	

TESTED PARAMETER	SEVERITY	VERDICT
Maximum peak output power of UWB device	0dBm	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	21.8 °C
Relative Humidity	20 to 75 %	31.8 %
Atmospheric pressure	N/A	1018 hPa
Test method deviation: N/A		
Supplementary information: N/A		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Antenna	ETS-Lindgren	3117	5456	16/03/2016	16/05/2019
Cable	SUCOFLEX	N-3m	14379	18/01/2017	18/03/2019
Cable	MegaPhase	TM18-N1N1-118	12841	09/05/2018	09/07/2020
Preamplifier	IMPULSE	CA118-546ACN	9169	13/10/2017	13/12/2018
Receiver	Rohde & Schwarz	FSW43	14830	13/11/2017	13/01/2019
Shielded enclosure	RAY PROOF	C.V2	1423		
Software	Nexio	BAT EMC v3.17.0.25	0000		
Thermohygrometer	Testo	608-H1	7562	27/12/2016	27/02/2019
Thermohygrometer	Bioblock Scientific	Météostar	0963	27/12/2016	27/02/2019

Blank cells = Permanent validity



MAXIMUM PEAK OUTPUT POWER OF UWB DEVICE - TABULATED RESULTS			
F _M			
Frequency	RBW	Output power (e.i.r.p.)	Limit
4100 MHz	50MHz	-18.2dBm (*)	0dBm

(*)according to the formula :

$E_{(V/m)} = \sqrt{(30P_{(w)}G_{dBi})/d_{(m)}}$ where P is the e.i.r.p and G is the teorical gain of a dipole antenna (2.15dBi).

●●● End of test report ●●●