

"This report cancels and replaces the test report N° RRA-EMIESS21G095EWA-04A v1"



Test report issued under the responsibility of:
EMITECH ILE DE FRANCE Laboratory
MRA US-EU Designation Number: FR0004
IC Assigned Code: 4379A

RADIO TEST REPORT

FCC 47 CFR PART 15 : 2021
RSS-Gen_Issue 5 : 2019

Company : **EWATTCH**
Address..... : 13 Rue Maurice Jeandon
88100 SAINT DIE DES VOSGES
FRANCE

Test item description. : **TYNESS-FACTORY**
Trade Mark. : Not communicated
Manufacturer..... : **EWATTCH**
Model/Type reference..... : **TYNESS_V3**
Ratings..... : **24Vdc ±5%**

Testing Laboratory : **EMITECH ILE DE FRANCE Laboratory**
Address..... : 30-32, avenue des 3 Peuples
78180 MONTIGNY-LE-BRETONNEUX
FRANCE

Report Reference No. : **RRA-EMIESS21G095EWA-4A v2**
Test procedure. : FCC and CANADA marking
Diffusion..... : Mr. MICHELIN
Applicant's name. : **EWATTCH**
Date of issue..... : 07/11/2023
Total number of pages..... : 26
Revision. : 2
Compiled by..... : C.A. ROBERT (Test technician)
Technical verification..... :

PELLERIN Bruno
Assistant to the EMC and Radio Laboratory Manager



Quality approval..... :

MICHAU Maxime
EMC / Radio Laboratory Manager



Signature
numérique de
Maxime MICHAU
Date : 2023.11.08
09:36:00 +01'00'

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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.

REPORT INDEX:

1. GENERAL INFORMATIONS	3
2. REFERENCE DOCUMENTS	4
3. EQUIPMENT TECHNICAL DESCRIPTION.....	5
3.1. TEST CONDITIONS	5
3.2. E.U.T OVERVIEW	6
3.3. E.U.T MARKING PLATE.....	8
3.4. E.U.T ELECTRONIC BOARD	9
3.5. E.U.T MECHANICAL AND ELECTRICAL DESIGN.....	10
3.6. E.U.T INPUT/OUTPUT PORTS.....	10
3.7. SUPPORTING EQUIPMENT USED DURING TEST.....	11
3.8. AUXILIARY EQUIPMENT	11
3.9. E.U.T RADIO SPECIFICATIONS.....	13
4. RESULT SUMMARY	14
5. MEASUREMENT UNCERTAINTY.....	15
6. TEST CONDITIONS AND RESULTS	16
6.1. MEASUREMENT OF CONDUCTED EMISSION ON AC MAINS PORTS.....	16
6.2. UNINTENTIONAL RADIATED EMISSIONS IN THE BAND 30 MHz – 10 GHz.....	21

REVISION HISTORY:

Revision	Date	Modified pages	Modifications
0	26/03/2023	/	Creation
1	12/10/2023	5	Add of FCC and IC ID
		13	Add of number of channel
2	07/11/2023	4	Retry off ANSI 63.10 Standard
		16 ; 19 ; 20	Table modification

1. GENERAL INFORMATION

This document submits the results of Radio tests performed on the equipment (denominated hereafter E.U.T.: equipment under test) according to documents listed in §2 of this test report.

TESTING PROCEDURE AND TESTING LOCATION:			
Testing Laboratory	EMITECH ILE DE FRANCE Laboratory		
Address.	30-32, avenue des 3 Peuples 78180 MONTIGNY-LE-BRETONNEUX FRANCE		
Test procedure.	CE Marking		
Tested by	C.A. ROBERT / F. LHEUREUX		
Test supervisor	B. PELLERIN		
Date of receipt of test item	25/01/2023		
Dates of performance of tests	From 01/02/2023 to 10/02/2023		
APPLICANT'S GENERAL INFORMATION:			
Company name	EWATTCH		
Company address.	13 Rue Maurice Jeandon 88100 SAINT DIE DES VOSGES FRANCE		
Person present during the tests.	-		
Responsible.	Mr. MICHELIN		
GENERAL REMARKS:			
<i>The information in italics is declared by the manufacturer and is under his responsibility.</i> 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.			
POSSIBLE TEST CASE VERDICTS:			
Test case does not apply to the test object.:	N/A		
Test case not performed.....	N/P		
Test object does meet the requirement.....	P (Pass)		
Test object does not meet the requirement.	F (Fail)		
Test object was not subjected to all tests...	I (Inconclusive)		
DEFINITIONS AND ABBREVIATIONS:			
E.U.T.	Equipement under test	AE	Auxiliary / Associated 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 DOCUMENTS

NORMATIVE REFERENCES:

The following referenced documents are necessary for the application of the present test report.

FCC 47 CFR Part 15 : 2021

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.

RSS-Gen Issue 5 : March 2019

General Requirements and Information for the Certification of Radio Apparatus

ANSI C63.4 : 2014

Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronics Equipment in the range of 9 kHz to 40 GHz.

INFORMATIVE REFERENCES:

/

3. EQUIPMENT TECHNICAL DESCRIPTION

3.1. Test Conditions

Test item description. : *TYNESS-FACTORY*

Model/Type reference..... : *TYNESS_V3*

Trade Mark. : *Not communicated*

Serial number (S/N)..... : *70B3D54750130F2E*

Part number (P/N). : *Not communicated*

Software version..... : *Not communicated*

Firmware version. : *3.30*

Fcc ID : *2BBDC-TYNESS-V3-01*

N°IC : *31217-TYNESSV301*

HVIN/MODEL..... : *TYNESS FACTORY*

Type of sample. : *serial*

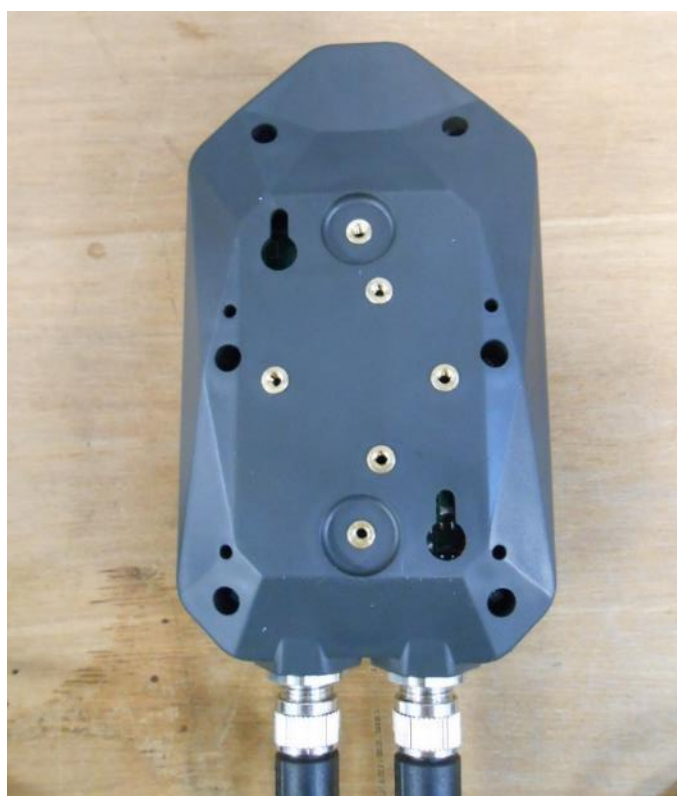
Function. : *TYNESS-FACTORY measures the current of equipment with three current clamps, and measure two 0-24V signals, two temperatures (PT100) and has two 24V pulse counters. The data is transmitted over a LoRaWan network.*

Manufacturer name. : *EWATTCH*

Address. : *13 Rue Maurice Jeandon*
88100 St DIE DES VOSGES
FRANCE

General product information: -

3.2.E.U.T Overview



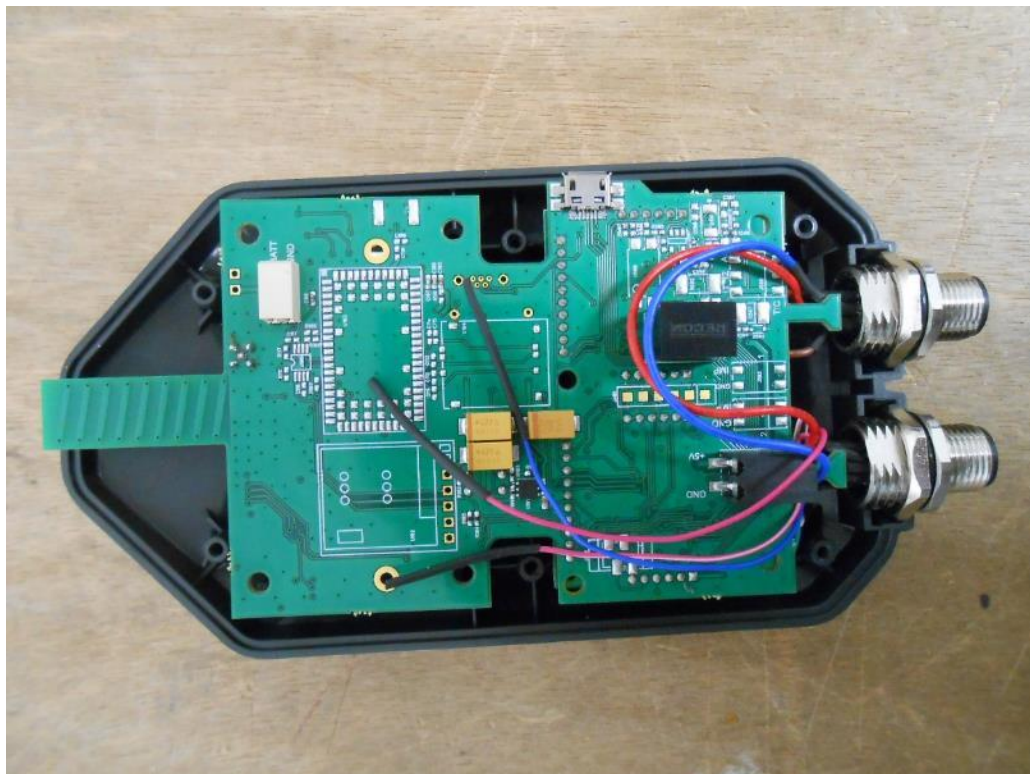
3.2.E.U.T Overview



3.3.E.U.T Marking Plate



3.4.E.U.T Electronic board

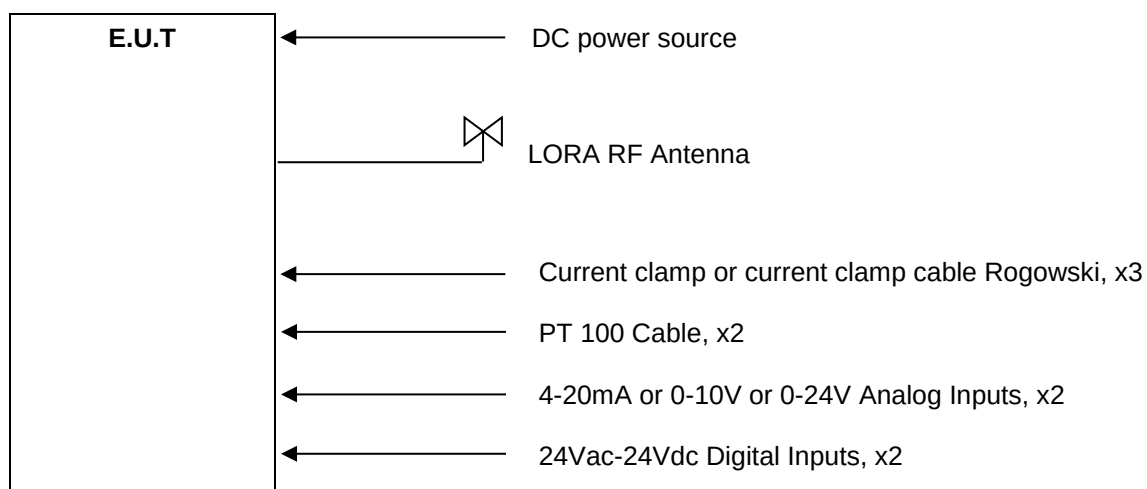


3.5.E.U.T Mechanical and Electrical Design

Power supply. : 24 Vdc
 Power supply range..... : 24 Vdc $\pm 5\%$
 Power type..... : 24 Vdc Power Supply
 Power (W)..... : 1.2
 Nominal current (A). : 0.05
 Dimensions (L x W x H) (mm). : 142 x 77 x 36
 Weight (kg). : 0.15
 Temperature range (°C). : +5 to +65
 Ground bounding strap..... : No

Comments: -

3.6.E.U.T Input/Output ports



PORT	NAME	TYPE	LENGHT	CABLE TYPE	COMMENTS
1	DC power source	DC	< 3m	Not shielded	2 Wires
2	External Lora Antenna	RF	< 3m	Shielded	-
3	Current clamp or current clamp cable Rogowski, x3	I/O	< 3m	Not shielded	-
4	PT 100 Cable, x2	I/O	< 3m	Shielded	-
5	4-20mA or 0-10V or 0-24V Analog Inputs, x2	I/O	< 3m	Not shielded	-
6	24Vac-24Vdc Digital Inputs, x2	I/O	< 3m	Not shielded	-

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: Direct current port

RF : Radio frequency port

3.7. Supporting Equipment Used During Test

Sample subject to the tests was tested with following equipment.

PRODUCT TYPE	MANUFACTURER	MODEL	N°EMITECH / COMMENTS
-	-	-	-

3.8. Auxiliary equipment



3.8. Auxiliary equipment



Power supply for conducted emission

3.9. E.U.T Radio Specifications

a) GENERAL INFORMATIONS	
According to manufacturer's declarations :	
EUT type.....	Transceiver
Technology	LoRa
Environmental profile.....	Residential, Light Industry
Temperature range.....	Low extreme conditions: +5 °C High extreme conditions: +65 °C
Antenna type	External
Antenna Gain.....	+3 dBi
Comments: -	
b) TRANSMITTER PARAMITERS (Tx)	
Frequency bands.....	902.3 MHz - 914.9 MHz (Spread factor : 10 / 125 kHz) 903.0 MHz - 914.2 MHz (Spread factor : 8 / 500 kHz)
RF Power.....	+14 dBm
Number of channels / Separation.....	125kHz OCW : 64 500kHz OCW : 8
Modulation type	LoRa
Duty cycle	maximum transmission time : 400 ms for FHS mode
Tested frequency.....	For spread factor = 10 and bandwidth = 125 kHz (FHS mode) Lowest channel : 902.3 MHz Middle channel : 908.7 MHz Highest channel : 914.9 MHz For spread factor = 8 and bandwidth = 500 kHz (DTS mode) Lowest channel : 903.0 MHz Middle channel : 909.4 MHz Highest channel : 914.2 MHz
c) RECEIVER PARAMETERS (Rx)	
Frequency bands.....	902.3 MHz - 914.9 MHz (Spread factor : 10 / 125 kHz) 903.0 MHz - 914.2 MHz (Spread factor : 8 / 500 kHz) 923.3 MHz - 927.5 MHz (Spread factor : 12)
Category/Class	2
Bandwidth	Not communicated

4. RESULT SUMMARY

Subpart B of the standard FCC part 15 – Unintentional radiators

TEST DESIGNATION	TEST PROCEDURE	VERDICT	COMMENTS
Measurement of conducted emission on AC mains ports	15.107		
- Power supply 120 Vac / 60 Hz	-	-	
- Power supply 120 Vac / 60 Hz (Average value)	-	PASS	
Radiated emission limits	15.109	PASS	

Standard RSS-Gen Issue 5 : 2019

TEST DESIGNATION	TEST PROCEDURE	VERDICT	COMMENTS
6 Technical Requirements			
- 6.9 CISPR Quasi-peak detector	-	PASS	
7.2 Measurement Methods and Standard Specifications			
- 7.2.1 Measurement Bandwidths and Detector Functions	-	N/A	
- 7.2.2 Emissions Falling Within Restricted Frequency Bands	-	N/A	
- 7.2.3 Devices Employing Pulsed Operation	-	N/A	
- 7.2.4 AC Power Line Conducted Emissions Limits	-	PASS	
- 7.2.5 Transmitter Spurious Emission Limits	-	PASS	
- 7.2.6 Transmitter Frequency Stability	-	N/A	
- 7.2.7 Measurement Distance	-	N/A	
8. Licence-Exempt radio Apparatus			
- 8.8 AC Power Line Conducted Emission Limits for licence-Exempt Radio Apparatus	-	PASS	

Sample subject to the test complies with the requirements of the reference document listed in §2 of this test report and, where applicable, with deviations 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.

Modifications : No

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	$\pm 0.8\text{dB}$	$\pm 1 \text{ dB}$
RF power (EN 300328 / EN 301893)	$\pm 1.3\text{dB}$	$\pm 1.5 \text{ dB}$
Power spectral density	$\pm 2.3\text{dB}$	$\pm 3 \text{ dB}$
Occupied bandwidth		
RF power	$\pm 3.8 \%$	$\pm 5 \%$
RF power (EN 300328 / EN 301893)	$\pm 3.8 \%$	$\pm 5 \%$
Maximum frequency deviation		
300 Hz < audio frequency < 6 kHz	$\pm 1.2 \%$	$\pm 5 \%$
6 kHz < audio frequency < 25 kHz	$\pm 1.2 \%$	$\pm 3 \text{ dB}$
Adjacent channel power	$\pm 1.6 \text{ dB}$	$\pm 3 \text{ dB}$
Sensibility of receiver (conducted)	$\pm 2.0 \text{ dB}$	$\pm 3 \text{ dB}$
Blocking	$\pm 4.0 \text{ dB}$	$\pm 4 \text{ dB}$
Transitoire		
Amplitude	$\pm 8.5 \%$	$\pm 20 \%$
At the frequency	$\pm 166 \text{ Hz}$	$\pm 250 \text{ Hz}$
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	$\pm 5.4 \text{ dB}$	$\pm 6 \text{ dB}$
RF power (EN 300328 / EN 301893)	$\pm 5.3 \text{ dB}$	$\pm 6 \text{ dB}$
PIRE and power spectral density with diode	$\pm 5.4 \text{ dB}$	$\pm 6 \text{ dB}$
Radiated emission (magnetic field)		
9kHz – 30MHz	$\pm 3 \text{ dB}$	$\pm 6 \text{ dB}$
RF level for a given BER	$\pm 0.8 \text{ dB}$	$\pm 1.5 \text{ dB}$
Supply voltages	$\pm 3 \%$	$\pm 3 \%$
Temperature	$\pm 1 \text{ }^{\circ}\text{C}$	$\pm 1^{\circ}\text{C}$
Humidity	$\pm 5 \%$	$\pm 5 \%$
Time / Duty cycle	$\pm 4.4 \%$	$\pm 5 \%$
Adaptivity	$\pm 2.9 \text{ dB}$	/
Radiated emission (electric field for FCC standard)		
9kHz – 30MHz	$\pm 2.7 \text{ dB}$	/
30MHz – 1GHz	$\pm 5.0 \text{ dB}$	/
1GHz – 18GHz	$\pm 5.6 \text{ dB}$	/
18GHz – 26GHz	$\pm 5.7 \text{ dB}$	/
26GHz – 40GHz	$\pm 5.7 \text{ dB}$	/

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

6. TEST CONDITIONS AND RESULTS

6.1.Measurement of conducted emission on AC mains ports

Reference standard:	FCC 47 CFR PART 15 : 2021 RSS-Gen Issue 5 : 2019
Test method:	§15.107 of FCC 47 CFR PART 15 : 2021 § 7.2.4 and § 8.8 of RSS-Gen Issue 5 : 2019
General test setup: E.U.T. is set on an insulating support at 80 cm above the ground reference plane. All power was connected to the system through Artificial Mains Network (AMN). The AMN is placed at 40 cm from the boundary of the E.U.T. and bonded to a ground reference plane. All tested telecommunications lines (if applicable) were connected to an Asymmetric Artificial Network (AAN) and conducted voltage measurements on telecommunications lines were made at the output of the AAN. Where an AAN was not appropriate or available, measurements were made using a Capacitive Voltage Probe and/or a Current probe.	

TESTED CABLE	PARAMETER	SEVERITY	VERDICT
Power supply 120 Vac / 60 Hz – Radio OFF	150kHz-30MHz	Class B	-
Power supply 120 Vac / 60 Hz (Average value) - Radio OFF	150kHz-30MHz	Class B	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	15 to 35 °C	22°C
Relative Humidity	30 to 60 %	45 %
Atmospheric pressure	N/A	N/A hPa
Test method deviation: No.		
Supplementary information: -		

TEST EQUIPMENT USED					
Order Nr	Category	Manufacturer	Type	Last validity date	Next validity date
02813	Cable	/	N-2m	20/04/2022	20/06/2024
06602	LISN	Rohde & Schwarz	ESH3-Z5	26/01/2022	26/03/2024
18365	Multimeter	Emitech	Absorbeur courant de gaine	26/01/2022	26/03/2024
04637	Power supply	Schaffner	NSG 1007-5-400	06/10/2022	06/12/2023
00825	Receiver	Rohde & Schwarz	ESH3 (V 335.8017.52)	03/03/2022	03/05/2024
02205	Spectrum analyzer	Agilent Technologies	E7405A (V A.14.06)	03/06/2022	03/08/2024
00000	Software	Nexio	BAT EMC		
00237	Surges Suppressor	Hewlett Packard	11947A	17/08/2020	17/10/2023
14875	Test enclosure	Emitech	HC1		

BAT-EMC software version: V3.18.0.26

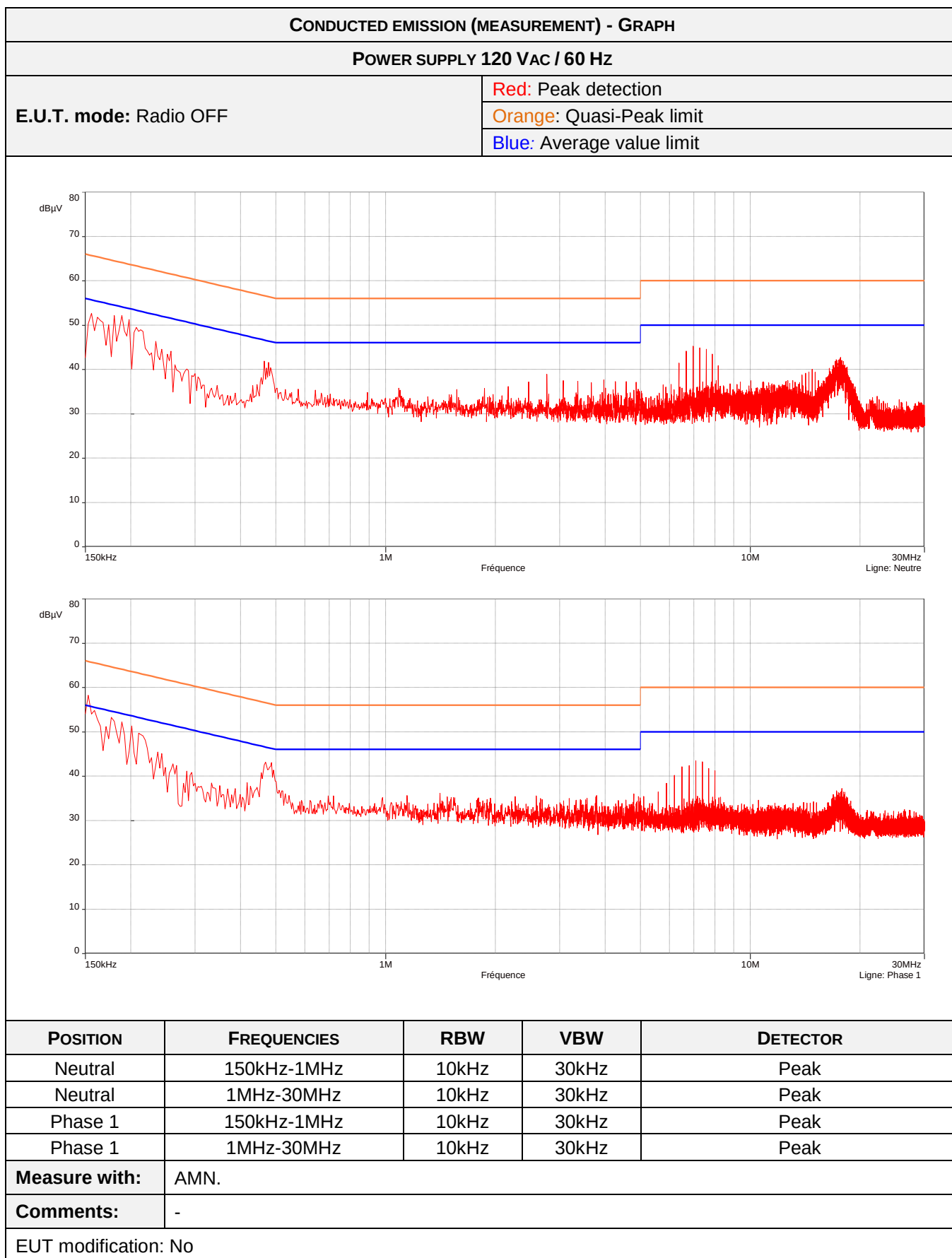
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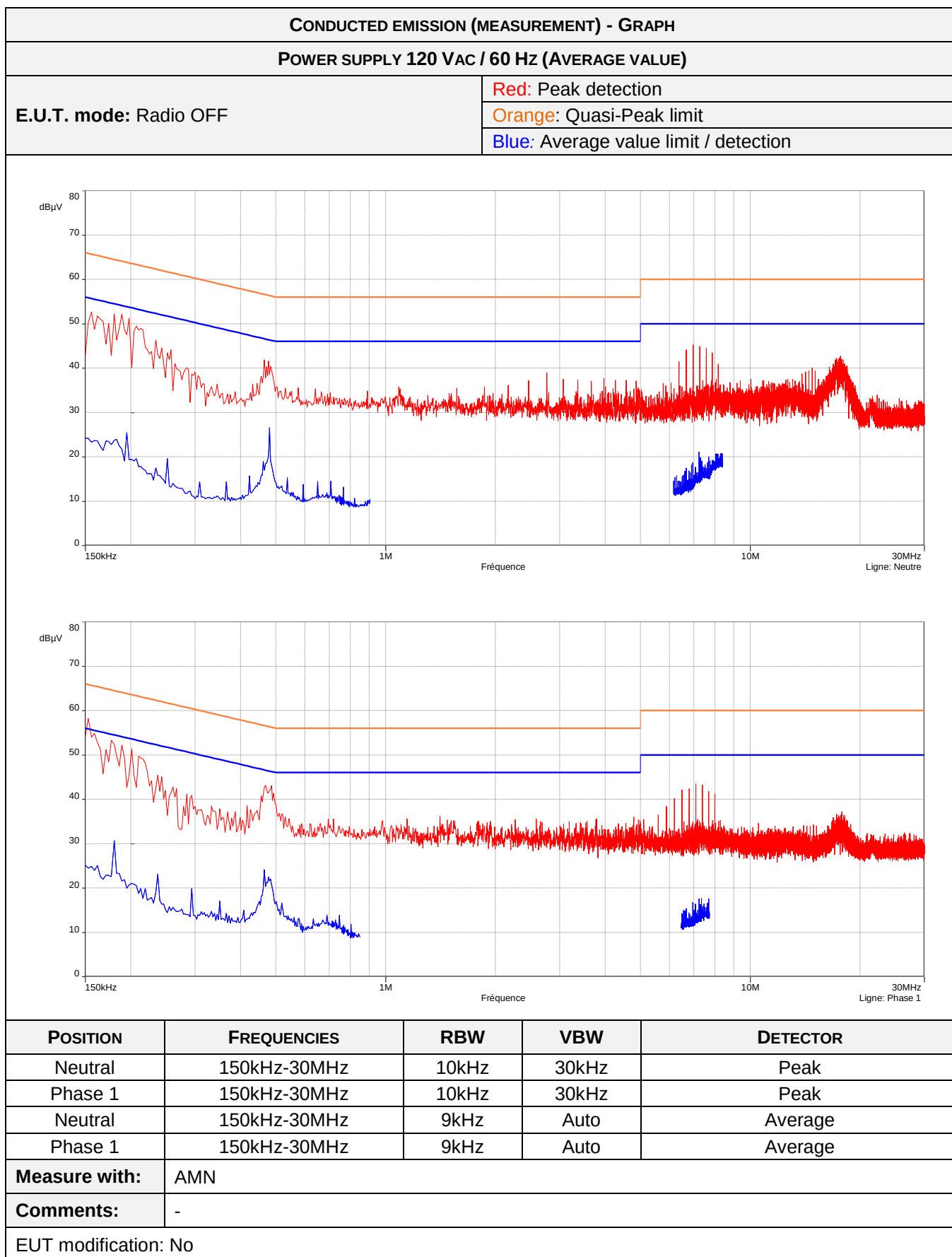
TEST SETUP PHOTOS - POWER SUPPLY 120 VAC / 60 HZ



TEST SETUP PHOTOS - POWER SUPPLY 120 VAC / 60 Hz







6.2. Unintentional radiated emissions in the band 30 MHz – 10 GHz

Reference standard:	FCC 47 CFR PART 15 : 2021 RSS-Gen Issue 5 : 2019
Test method:	§ 15.109 of FCC 47 CFR PART 15 : 2021 § 6.13 of RSS-Gen Issue 5 : 2019
General test setup: E.U.T. is set on an insulating support at 0.8 m (<1GHz) and 1.5 m (>1GHz) above the ground reference plane. For maximum meter reading at each frequency, the antenna height is adjusted between 1 m and 4 m above the ground plane for 30 MHz - 10 GHz. A 360 degrees rotation of the EUT is performed in vertical and horizontal polarization.	

TESTED CONFIGURATION	PARAMETER	VERDICT
Maxhold 360° - Radio Off	30MHz-1GHz	PASS
Maxhold 360° - Radio Off	1GHz-10GHz	PASS

LABORATORY PARAMETERS:	REQUIRED PRIOR TO THE TEST	DURING THE TEST
Ambient Temperature	10 to 40 °C	23°C
Relative Humidity	10 to 90 %	37%
Atmospheric pressure	N/A	N/A
Test method deviation: No		
Supplementary information: -		

TEST EQUIPMENT USED					
CATEGORY	BRAND	TYPE	IDENTIFIER	CAL. DATE	CAL. DUE
Amplifier	HP	8449B	16922	06/04/2022	06/06/2023
Amplifier	Mini-circuit	ZFL-1000LN	00048	11/02/2022	11/04/2023
Antenna	ETS-Lindgren	3117	16000	18/01/2022	18/03/2025
Antenna	Schwarzbeck	UHALP 9108A	03106	02/10/2020	02/12/2023
Antenna	Schwarzbeck	VHA 9103	03426	05/10/2020	05/12/2023
Cable	C&C	K-2m	11133	28/09/2022	28/11/2024
Cable	C&C	K-4m	11135	28/09/2022	28/11/2024
Cable	C&C	N-5m	11184	25/02/2022	25/04/2024
Cable	C&C	N-4m	14226	25/02/2022	25/04/2024
Cable	Micro-Coax	N-8m	08061	25/02/2022	25/04/2024
Cable	Huber + Suhner	N-2m	11417	25/02/2022	25/04/2024
Filter	Trilithic	6HC1300-2.5-KK	01097	13/06/2022	13/08/2025
Power supply	Delta Elektronika	SM52-30	16693		
Receiver	Rohde & Schwarz	ESW44	17058	28/03/2022	28/05/2023
Shielded enclosure	Comtest	SAC 3m	14622	27/04/2022	27/06/2025
Software	Nexio	BAT EMC	00000		
Spectrum analyzer	Rohde & Schwarz	ESR7	12811	11/03/2022	11/05/2023

TEST SETUP PHOTOS - 30 MHz – 1 GHz



TEST SETUP PHOTOS - 30 MHz – 1 GHz



TEST SETUP PHOTOS - 1 GHz – 10 GHz



