

RRA-EMIESS24D491PAR-07Av0

Certification Radio test report

According to the standard:

CFR 47 FCC PART 15

RSS GEN – Issue 5

RSS 247 – Issue 3

Equipment under test:

SKYCONTROLLER UKR

FCC ID: 2AG6IMPPU2

IC NUMBER: 21053-MPPU2

Company:

PARROT

Distribution: Mr Guerrab

(Company: PARROT)

Number of pages: 34 with 2 annexes

Ed.	Date	Modified Page(s)	Technical Verification and Quality Approval	
			Name and Function	Visa
0	14-Jan-25	Creation	B. VOVARD, Radio Technician	

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Information in italics are declared by the manufacturer/customer and are under his responsibility

DESIGNATION OF PRODUCT: *SKYCONTROLLER UKR*

Serial number (S/N): *PI040507P14D000072*

Reference / model (P/N): *MPP U2*

Software version: *8.1.0 beta2*

MANUFACTURER: *PARROT*

COMPANY SUBMITTING THE PRODUCT:

Company: PARROT

Address: 174, Quai de Jemmapes
75010 PARIS
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Responsible: Mr Guerrab

Person present during the tests: Mr Guerrab

DATE(S) OF TEST: From 2-Oct-24 to 10-Dec-24

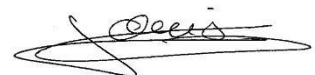
TESTING LOCATION: EMITECH ANGERS laboratory at JUIGNE SUR LOIRE (49) FRANCE

FCC Accredited under US-EU MRA Designation Number: FR0009
Test Firm Registration Number: 873677

ISED Accredited under CANADA-EU MRA Designation Number: FR0001
Industry Canada Registration Number: 4452A

TESTED BY: S. LOUIS

VISA:



WRITTEN BY: S. LOUIS

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REVISIONS HISTORY

Revision	Date	Modified pages	Modifications
0	9-Jan-25	/	Creation

1. INTRODUCTION

This report presents the results of partial radio test carried out on the following radio equipment: **Skycontroller UKR model 'MPP U2'**, in accordance with normative reference.

The equipment under test integrates:

- Proprietary protocol MARS 2.4 GHz transceiver radio function not already certified,
- Lora transceiver radio part module already certified referenced '**LBAA0QB1SJ**', (FCC ID: VPYLBAA0QB1SJ / IC:772C-LBAA0QB1SJ).
- GNSS multifrequencies receiver.

This report concerns only Proprietary protocol MARS 2.4 GHz radio part.

The applicant declared that this radio is not operational during charging mode.

Firstly, all tests were performed at the frequencies of 2407MHz, 2447MHz and 2477MHz and a power setting regulated to 16.

However, during the Band-Edge tests, we noticed this last test does not respected the standard.

So, we have reduced the power setting at 12 and retired 9 channels to respect Band-edge High Channel.

All tests were redone except:

- Occupied bandwidth,
- Radiated spurious emissions (more critical with the first parameters).

The host device of certified module(s) shall be properly labeled to identify the module(s) within.

2. PRODUCT DESCRIPTION

Category of equipment (ISED):	I
Class:	B
Utilization:	Portable
Antenna type and gain:	8 dBi / integral antenna
Operating frequency range:	From 2407 MHz to 2468 MHz
Type of modulation:	OFDM signal with frequency hopping scheme and frequency evasion mechanism
Data rate:	up to 6.2 Mbps
Number of channels:	62
Channel spacing:	1MHz
Nominal Channel bandwidth:	9MHz
Power setting:	12
Power source:	7.2Vdc by Lithium-ion rechargeable battery

3. NORMATIVE REFERENCE

The standards and testing methods related throughout this report are those listed below. They are applied on the whole test report even though the extensions (version, date and amendment) are not repeated.

CFR 47 FCC Part 15 (2024) Radio Frequency Devices

ANSI C63.10 2013
Procedures for Compliance Testing of Unlicensed Wireless Devices.

558074 D01 15.247 Meas Guidance v05r02
Guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices operating under section 15.247 of the FCC rules.

RSP-100 Issue 12, August 2019
Certification of Radio Apparatus and Broadcasting equipment

RSS-Gen Issue 5, April 2018
General Requirements for Compliance of Radio Apparatus

RSS-247 Issue 3, August 2023
Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

4. TEST METHODOLOGY

Radio performance tests procedures given in CFR 47 part 15:

Subpart C – Intentional Radiators

- Paragraph 203: Antenna requirement
- Paragraph 205: Restricted bands of operation
- Paragraph 207: Conducted limits
- Paragraph 209: Radiated emission limits; general requirements
- Paragraph 215: Additional provisions to the general radiated emission limitations
- Paragraph 247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz

Radio performance tests procedures given in RSS-Gen:

- Paragraph 2 - General
- Paragraph 3 - Normative publications and related documents
- Paragraph 4 - Labelling requirements
- Paragraph 6 - General administrative and technical requirements
- Paragraph 8 - Licence-exempt Radio Apparatus

Radio performance tests procedures given in RSS-247:

- Paragraph 3 - Certification requirements
- Paragraph 4 - Measurement method
- Paragraph 5 - Standard specifications for frequency hopping systems and digital transmission systems operating in the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz

5. TEST EQUIPMENT CALIBRATION DATES

Emitech Number	Model	Type	Last calibration	Calibration interval (years)	Next calibration due
0	BAT-EMC V3.18.0.26	Software	/	/	/
1406	EMCO 6502	Loop antenna	04/04/2024	1	04/04/2025
4087	Filtek LP03/1000-7GH	Low Pass Filter	07/02/2023	3	06/02/2026
4088	R&S FSP40	Spectrum Analyzer	10/06/2024	2	10/06/2026
7124	A.H. Systems SAS-572	Antenna	23/05/2022	3	22/05/2025
7171	R&S HL223	Antenna	19/05/2022	3	18/05/2025
7190	R&S HL223	Antenna	17/03/2022	3	16/03/2025
7240	Emco 3110	Biconical antenna	17/03/2022	3	16/03/2025
7299	Microtronics BRM50702	Reject band filter	16/08/2022	3	15/08/2025
7566	Testo 608-H1	Meteo station	12/12/2022	2	11/12/2024
8528	Schwarzbeck VHA 9103	Biconical antenna	19/05/2022	3	18/05/2025
8548	Midwest Microwave 10dB	Attenuator	08/02/2023	3	07/02/2026
8896	ACQUISYS GPS8	Satellite synchronized frequency standard	/	/	/
8974	STORM MICROWAE k-20cm	cable	29/01/2024	2	28/01/2026
8975	STORM MICROWAE k-20cm	cable	29/01/2024	2	28/01/2026
9398	N-1.5m	cable	10/07/2024	2	10/07/2026
10759	COMTEST Cage 3	Anechoic chamber	/	/	/
10771	EMCO 3117	Antenna	30/11/2022	3	30/11/2025
10789	MATURO	Turntable and mat controller NCD	/	/	/
12590	LUCIX Corp S005180M3201	Low-noise amplifier	29/05/2024	1	29/05/2025
14303	SUCOFLEX N-2m	cable	30/12/2022	2	30/12/2024
14831	Fluke 177	Multimeter	22/12/2023	2	21/12/2025
19154	QOTANA DBLNA317202120S	Low-noise amplifier 18-26GHz	23/09/2024	1	23/09/2025
19246	HYTEM - N - 5m	Cable	22/01/2024	2	21/01/2026
19250	HYTEM - N - 2.5m	Cable	22/01/2024	2	21/01/2026
19274	ASC - ASC805C	Low-noise amplifier	12/01/2024	1	11/01/2025
/	GPBShot V2.4	Software	/	/	/

(1) The equipment is not verified; instead, the output voltage is checked before each measurement with the calibrated multimeter.

6. TESTS RESULTS SUMMARY

6.1 CFR 47 part 15 requirements

Test procedure	Description of test	Respected criteria?				Comment
		Yes	No	NAp	NAs	
FCC Part 15.203	ANTENNA REQUIREMENT	X				Note 1
FCC Part 15.205	RESTRICTED BANDS OF OPERATION	X				
FCC Part 15.207	CONDUCTED LIMITS			X		
FCC Part 15.209	RADIATED EMISSION LIMITS; general requirements	X				Note 2
FCC part 15.215	ADDITIONAL PROVISIONS TO THE GENERAL RADIATED EMISSION LIMITATIONS					
	(a) Alternative to general radiated emission limits	X				
	(b) Unwanted emissions outside of §15.247 frequency bands	X				Note 3
	(c) 20 dB bandwidth and band-edge compliance	X				
FCC Part 15.247	OPERATION WITHIN THE BANDS 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz					
	(a) (1) Hopping systems			X		Note 5
	(a) (2) Digital modulation techniques	X				Note 4
	(b) Maximum peak output power	X				Note 4
	(c) Operation with directional antenna gains > 6 dBi	X				
	(d) Intentional radiator	X				
	(e) Peak power spectral density	X				
	(f) Hybrid system			X		Note 5
	(g) Frequency hopping requirements			X		
	(h) Frequency hopping intelligence			X		
	(i) RF exposure compliance	X				See SAR report

NAp: Not Applicable

NAs: Not Asked

Note 1: Dedicated antenna without standard connector.

Note 2: See FCC part 15.247 (d).

Note 3: See FCC part 15.209. Unwanted emissions levels are all below the fundamental emission field strength level.

Note 4: We used the radiated method in Full Anechoic Room.

Note 5: The minimum 6 dB bandwidth of the equipment is 8320 kHz.

6.2 RSS-Gen requirements

Test procedure	Description of test	Criteria respected ?				Comment
		Yes	No	NAp	NAs	
Paragraph 8	Licence-exempt radio apparatus					
§ 8.1	Measurement Bandwidths and Detector Functions	X				
§ 8.2	Pulsed operation	X				
§ 8.3	Prohibition of amplifiers	X				
§ 8.4	User manual notice	X				see certification documents
§ 8.5	Measurement of licence-exempt devices on-site (in-situ)			X		
§ 8.6	Operating frequency range of devices in master/slave networks	X				
§ 8.7	Radio frequency identification (RFID) devices			X		
§ 8.8	AC power line conducted emissions limits			X		Note 1
§ 8.9	Transmitter emission limits	X				
§ 8.10	Restricted frequency bands	X				
§ 8.11	Frequency stability			X		

NAP: Not Applicable

NAs: Not Asked

Note 1: The applicant declared that the radio is not operational in charging mode.

6.3 RSS-247 requirements

Test Procedure RSS-247	Description of test	Criteria respected ?				Comment
		Yes	No	NAp	NAs	
Paragraph 5	Standard specifications for frequency hopping system and digital transmission systems operating in the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz					
5.1	Frequency hopping systems (FHSS)			X		
5.2	Digital transmission systems	X				Note 1
5.3	Hybrid systems			X		
5.4	Transmitter output power and equivalent isotropically radiated power (e.i.r.p.) requirements	X				
5.5	Unwanted emissions	X				

NAP: Not Applicable

NAs: Not Asked

DTS:

Note 1: The minimum 6 dB bandwidth of the equipment is 8320 kHz.

7. MEASUREMENT UNCERTAINTY

To declare, or not, the compliance with the specifications, it was not explicitly taken into account of uncertainty associated with the result(s)

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for normal distribution corresponds to a coverage probability of approximately 95%.

Parameter	Emitech Uncertainty
RF power, conducted	$\pm 0.8\text{dB}$
Radiated emission valid to 26 GHz	
9kHz – 30MHz	$\pm 4.3\text{ dB}$
30MHz – 1GHz	$\pm 5.9\text{ dB}$
1GHz – 18GHz	$\pm 4.8\text{ dB}$
18GHz – 40GHz	$\pm 5.9\text{ dB}$
AC Power Lines conducted emissions	$\pm 3.7\text{ dB}$
Temperature	$\pm 0.95\text{ }^{\circ}\text{C}$
Humidity	$\pm 4.6\text{ \%}$

8. OCCUPIED BANDWIDTH**Temperature (°C) :** 22**Humidity (%HR):** 48**Date :** October 12, 2024**Technician :** S. LOUIS**Standard:** FCC Part 15
RSS-247**Test procedure:**

Method of paragraphs 11.8 of ANSI C63.10 (6dB Measurement)

Method of paragraphs 6.9.3 of ANSI C63.10 (99% Measurement)

Test set up:Radiated test

Test realized in near field.

Setting:

Measure	6dB	99%
Center frequency	The centre frequency of the channel under test	
Detector	Peak	
Span	2 to 5 times the OBW	1.5 to 5 times the OBW
RBW	100kHz	1% to 5% of the OBW
VBW	300kHz	3 x RBW
Trace	Max hold	
Sweep	Auto	

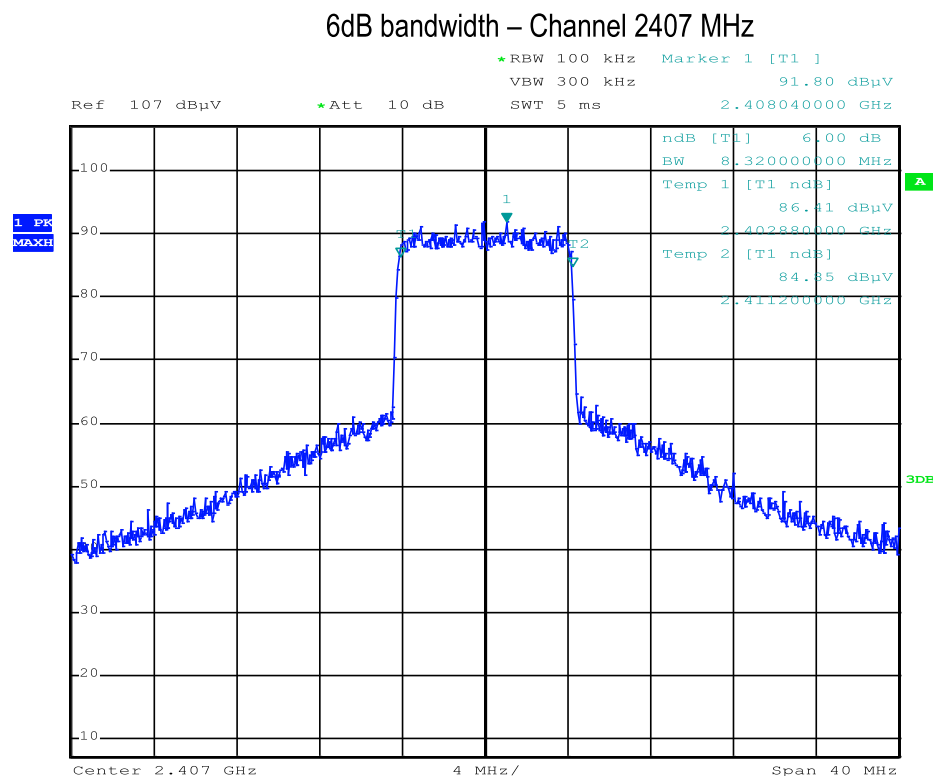
Test operating condition of the equipment:

The equipment under test is blocked in continuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

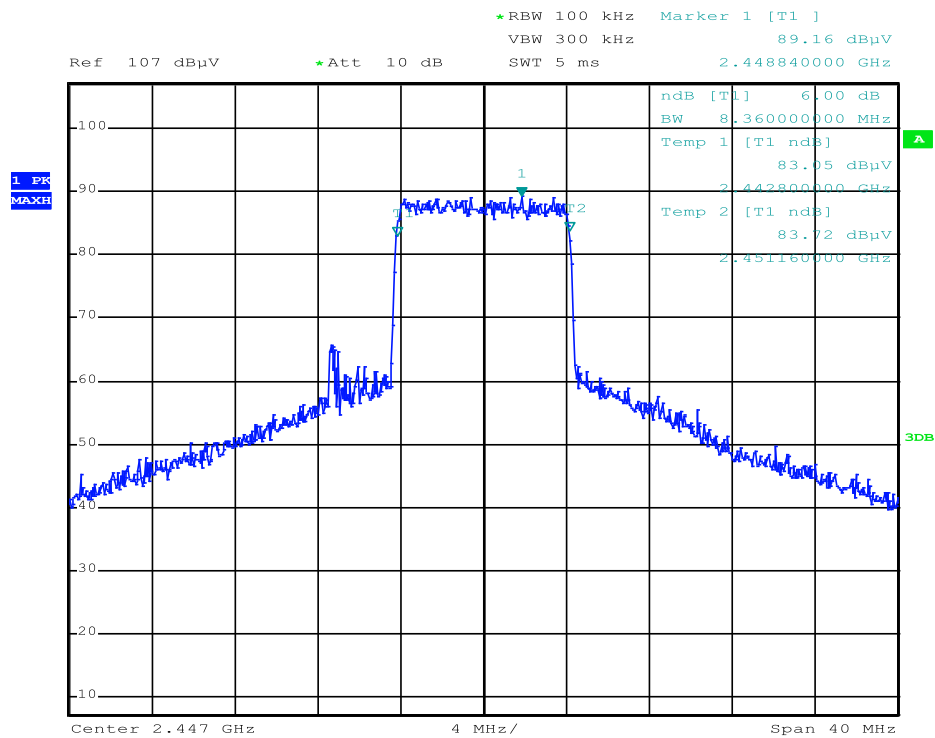
We used for power source the 7.2Vdc Li-ion Polymer internal battery fully charged of the equipment.

Results:

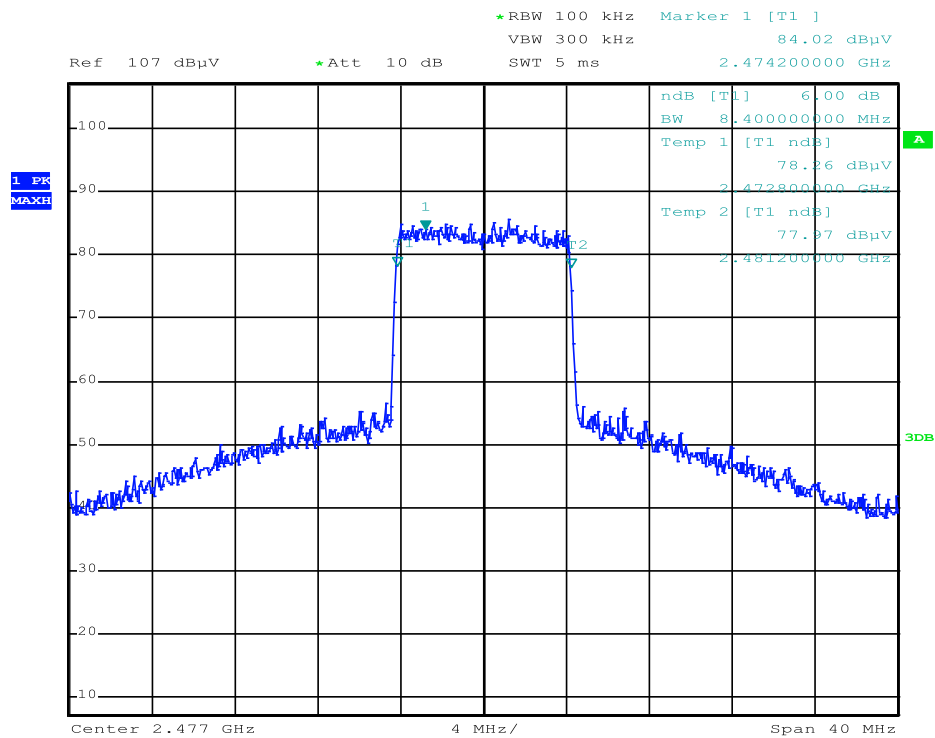
Sample N° 1



6dB bandwidth – Channel 2447 MHz



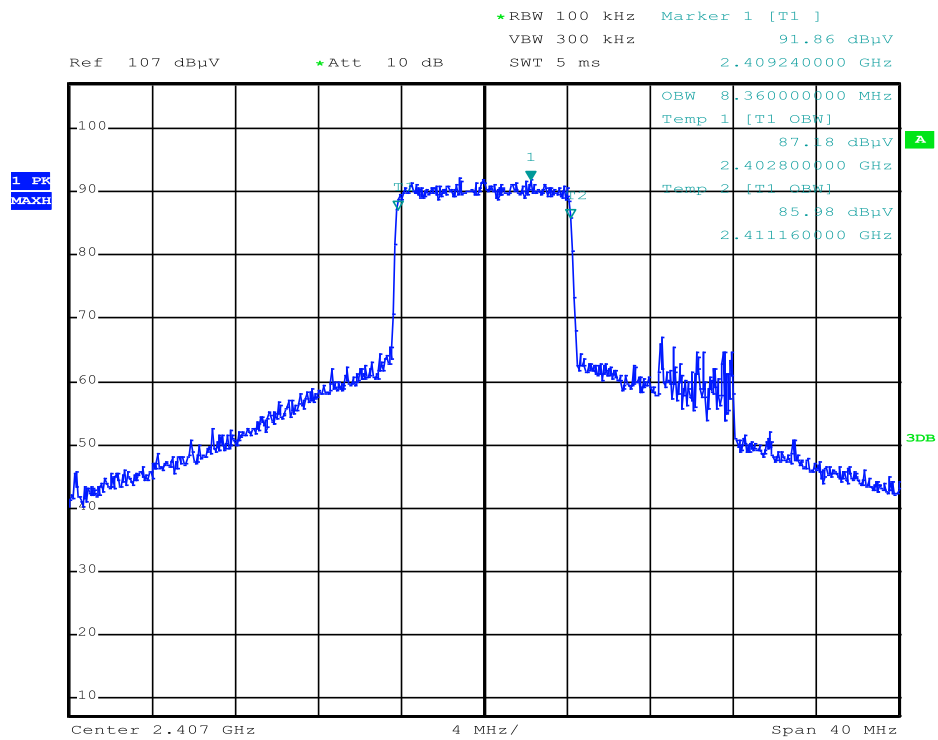
6dB bandwidth – Channel 2477 MHz



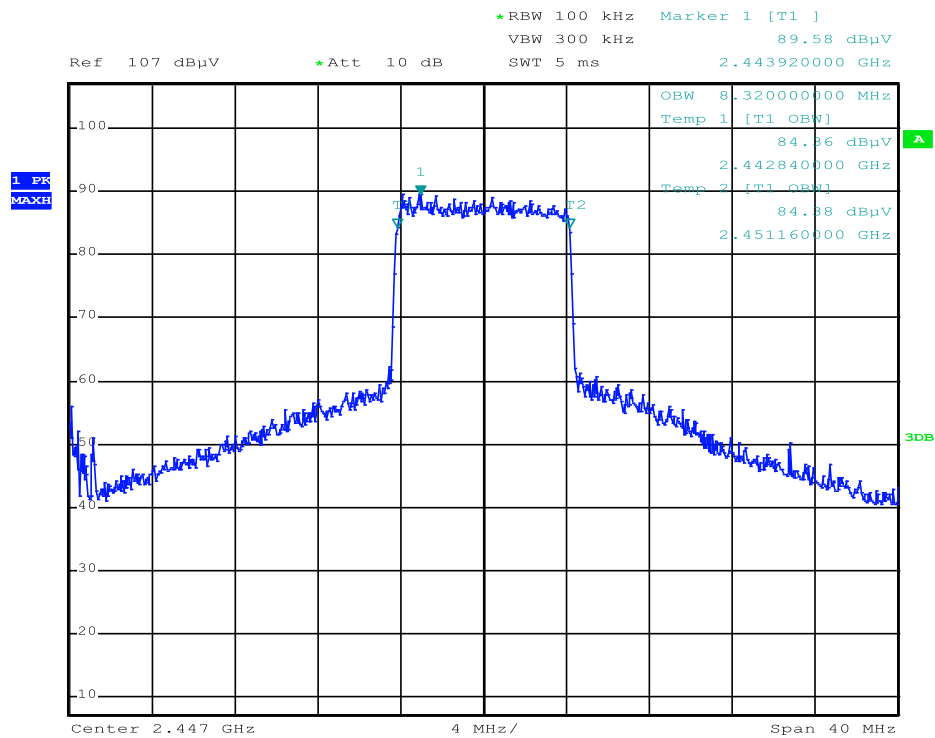
Limit:

Shall be at least 500 kHz

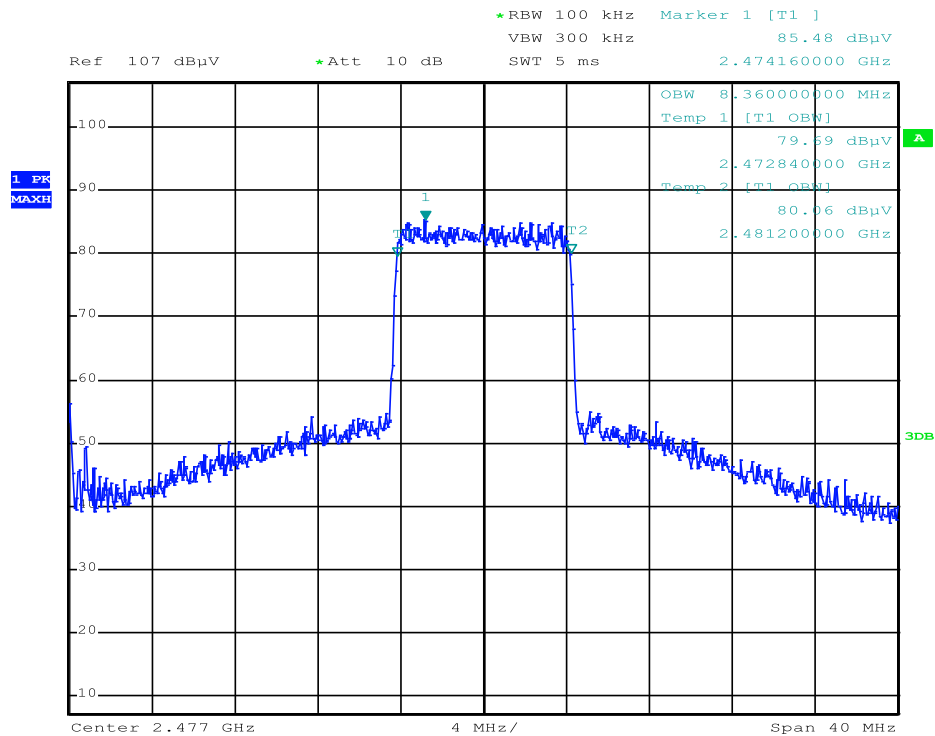
99% bandwidth – Channel 2407 MHz



99% bandwidth – Channel 2447 MHz



99% bandwidth – Channel 2477 MHz



Measure realized for reporting only

Test conclusion:

RESPECTED STANDARD

9. BAND EDGE
Temperature (°C) : 21

Humidity (%HR): 45

Date : December 10, 2024

Technician : S. LOUIS

Standard: FCC Part 15
RSS-247

Test procedure:
DTS:

Method of paragraph 11.13.4 of ANSI C63.10

Test set up:

Test realized in near field. All field strength measurements are correlated with the radiated maximum peak output power.

Test operating condition of the equipment:

The equipment under test is blocked in continuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

We used for power source the 7.2Vdc Li-ion Polymer internal battery fully charged of the equipment.

Results:

Lower Band Edge: From 2398 MHz to 2400 MHz

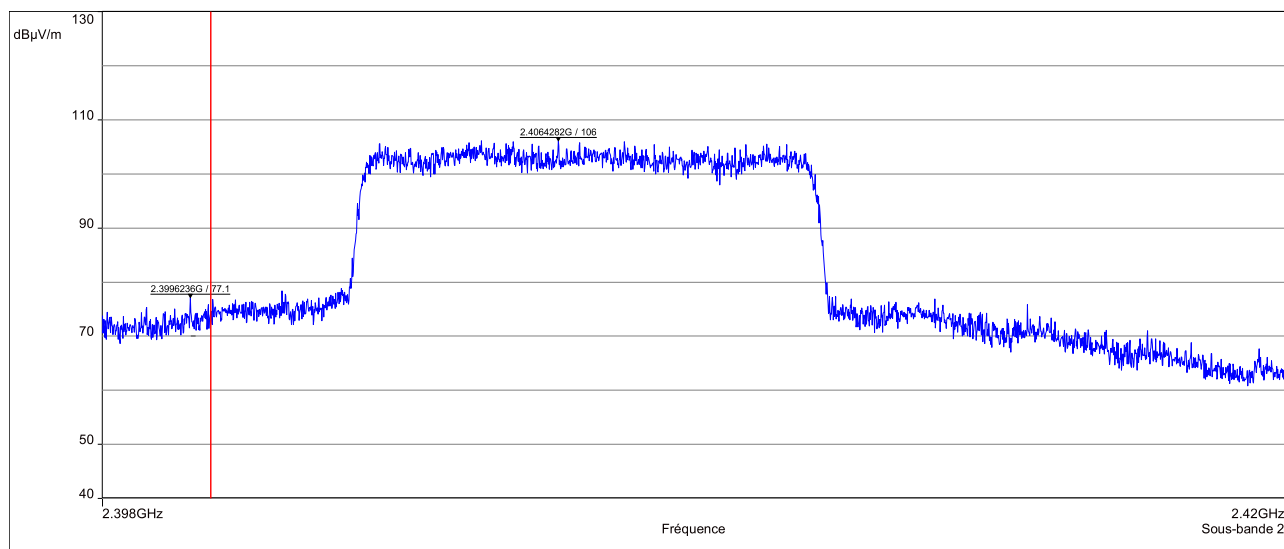
Upper Band Edge: From 2483.5 MHz to 2485.5 MHz

Sample N° 1

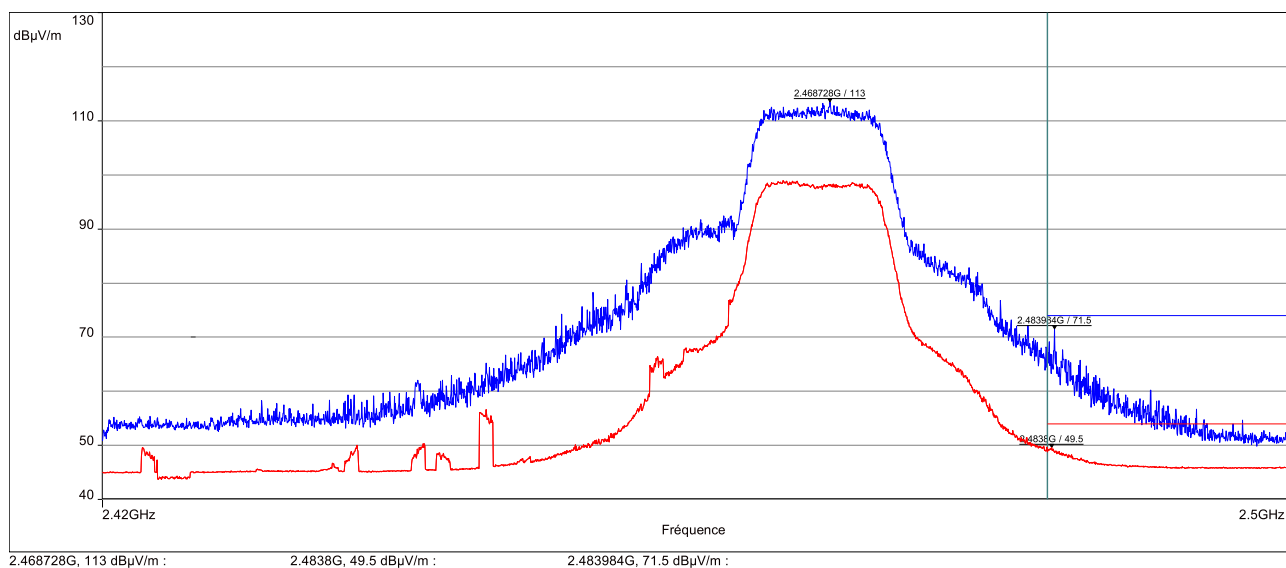
Fundamental frequency (MHz)	Field Strength Level of fundamental (dBμV/m)	RBW (kHz)	Detector (Peak or Average)	Frequency of maximum Band-edges Emission (MHz)	Delta Marker (dB) (1)	Calculated Max Out-of-Band Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2407	106.1	100	Peak	2399.6	29.0	77.1	86	8.9
2468	113.5	1000	Peak	2483.8	42.0	71.5	74	2.5
2468	113.5	1000	Average	2483.8	64.0	49.5	54	4.5

(1) Marker-Delta method

Low channel



High channel



Test conclusion:

RESPECTED STANDARD

10. PEAK CONDUCTED OUTPUT POWER**Temperature (°C) :** 21**Humidity (%HR):** 45**Date :** December 10, 2024**Technician :** S. LOUIS**Standard:** FCC Part 15
RSS-247**Test procedure:**

For FCC Part 15: paragraph 15.247 (b)

For RSS-247: paragraph 5.4

RBW≥DTS bandwidth method of paragraph 11.9.1.1 of ANSI C63.10

Test set up: (Refer Appendix 2)

First an exploratory radiated measurement was performed.

During this phase the product is oriented in three orthogonal planes.

Then the final measurement is realized with the product on the most critical orientation.

The system is tested in anechoic chamber, the EUT is placed on a rotating table, 1.5 m from a ground plane.

Zero degree azimuths correspond to the front of the device under test.

See test setup in appendix 2.

Distance of antenna: 3 meters**Antenna height:** 1 to 2.20 m (0.5 m above the top of the EUT)**Antenna polarization:** vertical and horizontal (only the highest level is recorded)

The measurement of the radiated electro-magnetic field is realized with an analyser and peak detector. The resolution bandwidth is adjusted at 10 MHz and video bandwidth at 10 MHz. (11.9.1.1 of ANSI C63.10)

Finally the radiated electro-magnetic field is converted in dBm with the following formula:

$$\text{EIRP(dBm)} = E \text{ (dB}\mu\text{V/m)} + 20\log(D) - 104.8;$$
where D is the measurement distance in meters and antenna Gain = 8 dBi.**Equipment under test operating condition:**

The equipment under test is blocked in continuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

We used for power source the 7.2Vdc Li-ion Polymer internal battery fully charged of the equipment.

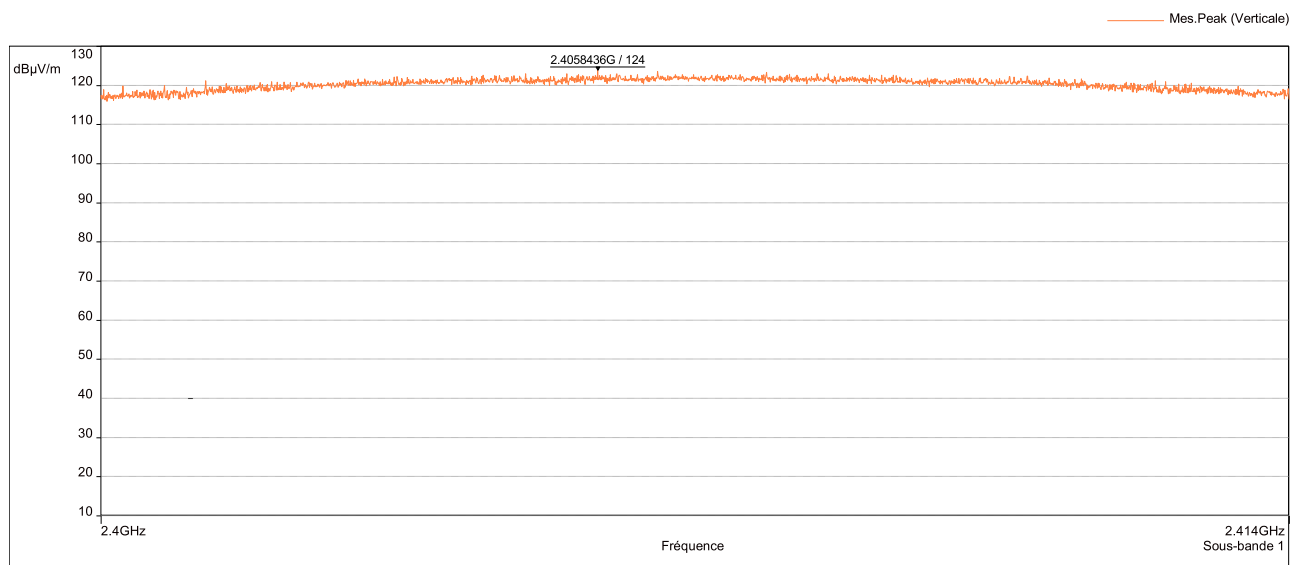
Results:

Sample N° 1 F = 2407 MHz

	Electro-magnetic field (dBμV/m):	Maximum Peak conducted output power (1)		Limit (W)	Maximum Peak EIRP		Limit (W)
		(dBm)	(W)		(dBm)	(W)	
Nominal supply voltage:	123.9	20.67	0.116	0.632	28.67	0.736	2.512

Polarization of test antenna: horizontal (height: 150 cm)

Position of equipment: Position 3 - (azimuth: 180 degrees)



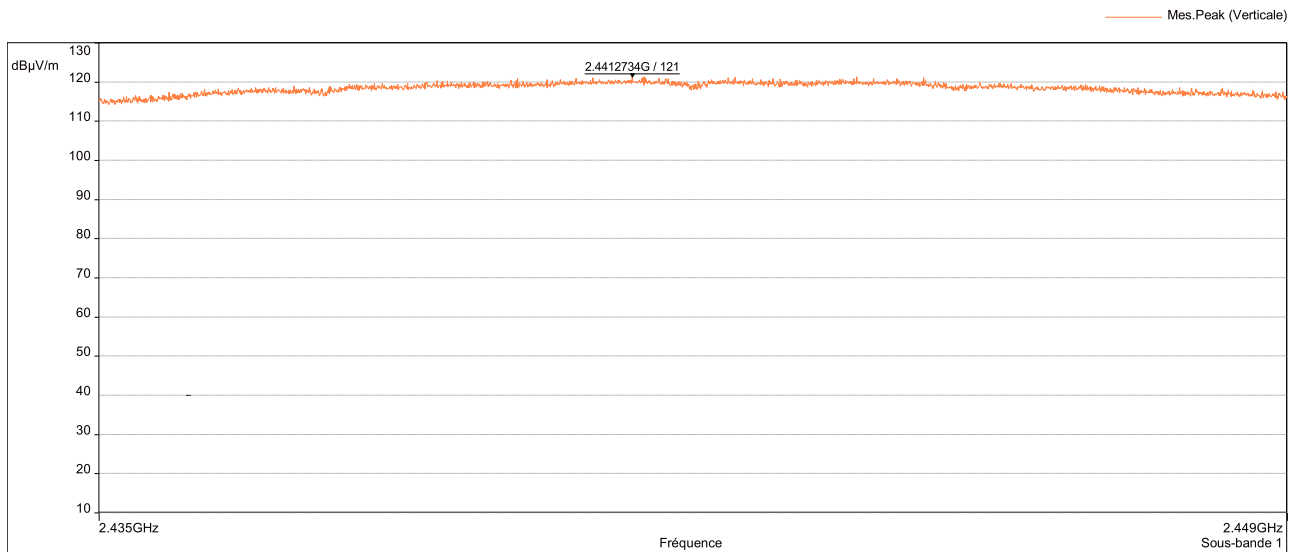
2.4058436G, 124 dBμV/m :

Sample N° 1 F = 2442 MHz

	Electro-magnetic field (dB μ V/m):	Maximum Peak conducted output power (1)		Limit (W)	Maximum Peak EIRP		Limit (W)
		(dBm)	(W)		(dBm)	(W)	
Nominal supply voltage:	121.3	18.07	0.064	0.632	26.07	0.404	2.512

Polarization of test antenna: horizontal (height: 132 cm)

Position of equipment: Position 3 - (azimuth: 180 degrees)



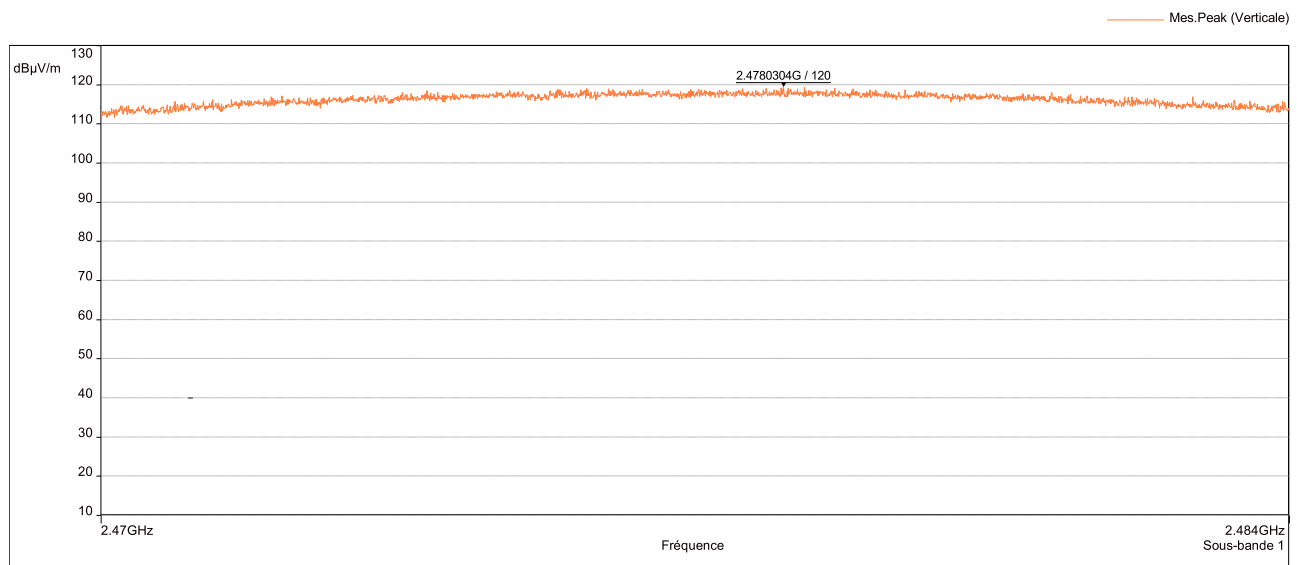
2.4412734G, 121 dB μ V/m :

Sample N° 1 F = 2468 MHz

	Electro-magnetic field (dBμV/m):	Maximum Peak conducted output power (1)		Limit (W)	Maximum Peak EIRP		Limit (W)
		(dBm)	(W)		(dBm)	(W)	
Nominal supply voltage:	119.7	16.47	0.045	0.632	24.47	0.280	2.512

Polarization of test antenna: horizontal (height: 155 cm)

Position of equipment: Position 3 - (azimuth: 180 degrees)



2.4780304G, 120 dBμV/m :

Maximum Peak conducted output power (1):

$EIRP(dBm) = E(dBμV/m) + 20\log(D) - 104.8$; where D is the measurement distance in meters and antenna Gain = 8 dBi.

Test conclusion:

RESPECTED STANDARD

11. RADIATED SPURIOUS EMISSIONS**Temperature (°C) :** 22**Humidity (%HR):** 56**Date :** October 10, 2024**Technician :** S. LOUIS**Standard:** FCC Part 15
RSS-247**Test procedure:**

For FCC Part 15: paragraph 15.205, paragraph 15.209, paragraph 15.247 (d)

For RSS-247: paragraph 5.5

Emissions in non-restricted frequency bands method of paragraph 11.11 of ANSI C63.10

Emissions in restricted frequency bands method of paragraph 11.12 of ANSI C63.10

Test set up: (Refer Appendix 2)

First an exploratory radiated measurement was performed.

During this phase the product is oriented in three orthogonal planes.

Then the final measurement is realized with the product on the most critical orientation.

The measure is realized on open area test site under 1 GHz and in anechoic chamber above 1 GHz.

When the system is tested in an open area test site (OATS), the EUT is placed on a rotating table, 0.8m from a ground plane.

When the system is tested in anechoic chamber, the EUT is placed on a rotating table, 1.5 m from a ground plane.

Zero degree azimuths correspond to the front of the device under test.

See test setup in appendix 2.

Frequency range: From 9 kHz to 26GHz - 10th harmonic of the highest fundamental frequency (2477MHz)**Detection mode:** Quasi-peak ($F < 1 \text{ GHz}$)Peak / Average ($F > 1 \text{ GHz}$)**Bandwidth:** 200Hz ($9 \text{ kHz} < F < 150\text{kHz}$)
9 kHz ($150 \text{ kHz} < F < 30\text{MHz}$)
120 kHz ($30 \text{ MHz} < F < 1 \text{ GHz}$)
100 kHz / 1 MHz ($F > 1 \text{ GHz}$)**Distance of antenna:** 10 meters (in open area test site) / 3 meters (in anechoic room)

Antenna height: 1 to 4 meters (in open area test site) / 1 to 2.20 meters (0.5 m above the top of the EUT) in anechoic room)

Antenna polarization: vertical and horizontal (only the highest level is recorded)

Equipment under test operating condition:

The equipment under test is blocked in continuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

Power Setting adjusted to 16.

We used for power source the 7.2Vdc Li-ion Polymer internal battery fully charged of the equipment.

Results:

Sample N° 1 Low Channel - F = 2407 MHz

Frequencies (MHz)	Detector P QP Av	RBW (kHz)	Position	Polarization H: Horizontal V: Vertical	Field strength Measured at 3 m (dBμV/m)	Limits at 3 m (dBμV/m)	Margin (dB)
4813.2 (1)	P	1000	3	H	68.5	74	5.5
4813.2 (1)	Av	1000	3	H	53.9	54	0.1
7220	P	100	2	V	64.4	86	21.6
9628	P	100	1	H	60.1	86	25.9

P= Peak, QP=Quasi-peak, Av=Average

(1) Restricted bands of operation in 15.205

(1) Restricted bands of operation as defined in Table 6 of RSS-Gen

Sample N° 1 Central Channel - F = 2447 MHz

Frequencies (MHz)	Detector P QP Av	RBW (kHz)	Position	Polarization H: Horizontal V: Vertical	Field strength Measured at 3 m (dBμV/m)	Limits at 3 m (dBμV/m)	Margin (dB)
4893.2 (1)	P	1000	3	H	62.3	74	11.7
4893.2 (1)	Av	1000	3	H	47.7	54	6.3
7341.2 (1)	P	1000	1	V	52.3 (2)	74	21.7
9787.3	P	100	3	V	59.4	86	26.6

P= Peak, QP=Quasi-peak, Av=Average

(1) Restricted bands of operation in 15.205

(1) Restricted bands of operation as defined in Table 6 of RSS-Gen

(2) The peak level is lower than the average limit (54 dBμV/m)

Sample N° 1 High Channel (F = 2477 MHz)

Frequencies (MHz)	Detector P QP Av	RBW (kHz)	Position	Polarization H: Horizontal V: Vertical	Field strength Measured at 3 m (dBμV/m)	Limits at 3 m (dBμV/m)	Margin (dB)
4952.9 (1)	P	1000	3	H	56.7	74	17.3
4952.9 (1)	Av	1000	3	H	42.1	54	11.9
7431.2 (1)	P	1000	3	H	53.9 (2)	74	20.1
9907.6	P	100	1	H	59.3	86	26.7

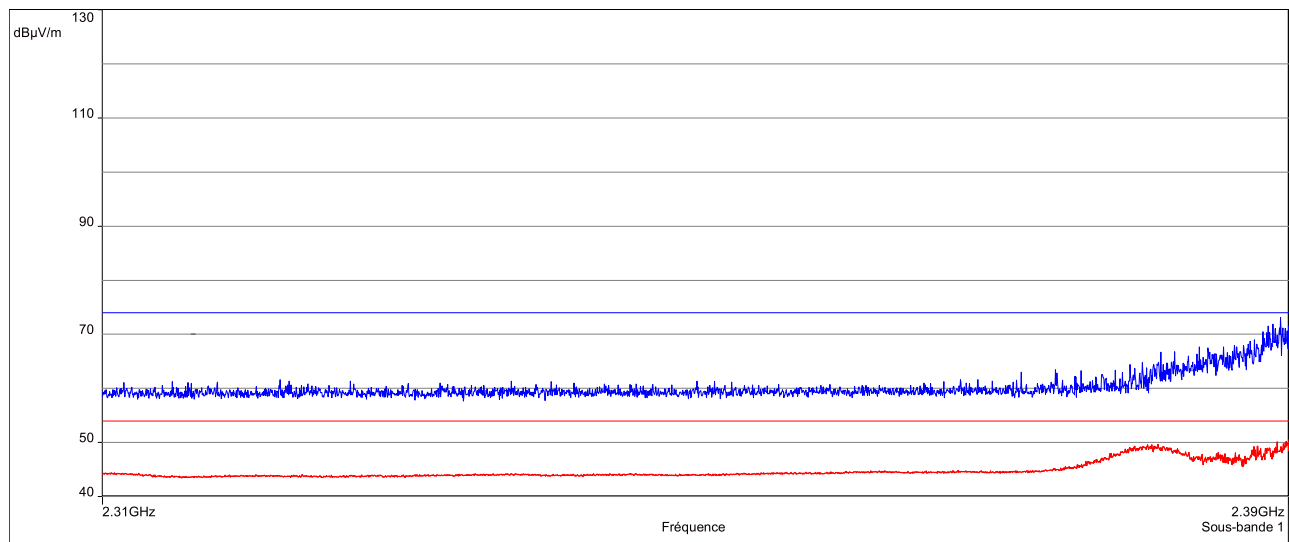
P= Peak, QP=Quasi-peak, Av=Average

(1) Restricted bands of operation in 15.205

(1) Restricted bands of operation as defined in Table 6 of RSS-Gen

(2) The peak level is lower than the average limit (54 dBμV/m)

Band edge worst case measurement (band 2.31GHz to 2.39GHz)



Applicable limits: In any 100 kHz 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

The highest level recorded in a 100 kHz bandwidth is 106 dBμV/m on low channel.

So the applicable limit is 86 dBμV/m.

In addition, radiated emissions which fall in the restricted band, as defined in section 15.205 (a), must also comply with the radiated emission limits specified in section 15.209 (a) (see section 15.205 (c)).

In addition, radiated emissions which fall in the restricted band, as defined in Table 6 of RSS-Gen, must also comply with the radiated emission limits specified in Table 4 and Table 5 of RSS-Gen.

Test conclusion:

RESPECTED STANDARD

12. PEAK CONDUCTED POWER SPECTRAL DENSITY**Temperature (°C) :** 21**Humidity (%HR):** 45**Date :** December 10, 2024**Technician :** S. LOUIS**Standard:** FCC Part 15
RSS-247**Test procedure:**

For FCC Part 15: paragraph 15.247 (e), paragraph 15.247 (f)

For RSS-247: paragraph 5.2

PKPSD (Peak PSD) method of paragraph 11.10.2 of ANSI C63.10

Test set up: (Refer Appendix 2)

First an exploratory radiated measurement was performed.

During this phase the product is oriented in three orthogonal planes.

Then the final measurement is realized with the product on the most critical orientation.

The system is tested in anechoic chamber, the EUT is placed on a rotating table, 1.5 m from a ground plane.

Zero degree azimuths correspond to the front of the device under test.

See test setup in appendix 2

Distance of antenna: 3 meters (in anechoic room)**Antenna height:** 1 to 2.20 meters (0.5 m above the top of the EUT) in anechoic room**Antenna polarization:** vertical and horizontal (only the highest level is recorded)

The measurement of the radiated electro-magnetic field is realized with an analyser.

Span:	14 MHz
Resolution bandwidth:	3 kHz
Video bandwidth:	10 kHz
Detector:	Peak
Number of points:	2001
Sweep time:	Auto
Trace mode:	Max Hold

Then the peak marker function is used.

Finally the radiated electro-magnetic field is converted in dBm with the following formula:

$$\text{EIRP(dBm)} = E \text{ (dB}\mu\text{V/m)} + 20\log(D) - 104.8;$$
where D is the measurement distance in meters and antenna Gain = 8 dBi.

Equipment under test operating condition:

The equipment under test is blocked in continuous modulated transmission mode, at the highest output power level at which the transmitter is intended to operate.

We used for power source the 7.2Vdc Li-ion Polymer internal battery fully charged of the equipment.

Results:

Sample N° 1 Low Channel (F = 2407 MHz)

	Electro-magnetic field (dBμV/m):	Maximum Peak conducted power density(1) (dBm / 3 kHz)	Limit (dBm / 3 kHz)
Nominal supply voltage:	88.8	-14.43	8

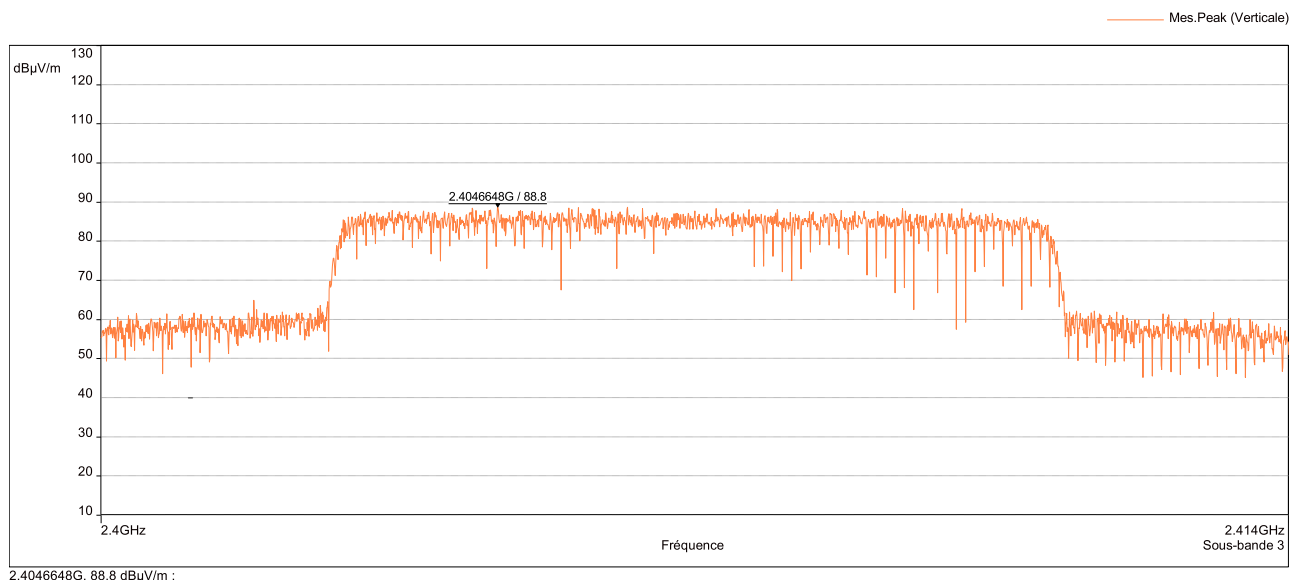
Polarization of test antenna: horizontal (height: 100 cm)

Position of equipment: Position 3 - (azimuth: 180 degrees)

Maximum Peak conducted power density:

$EIRP(dBm / 3 kHz) = E (dBμV/m / 3 kHz) + 20\log(D) - 104.8$; where D is the measurement distance in meters and antenna Gain = 8 dBi.

Declared maximum antenna gain: 8 dBi



Sample N° 1 Central Channel (F = 2442 MHz)

	Electro-magnetic field (dBμV/m):	Maximum Peak conducted power density(1) (dBm / 3 kHz)	Limit (dBm / 3 kHz)
Nominal supply voltage:	86.5	-16.73	8

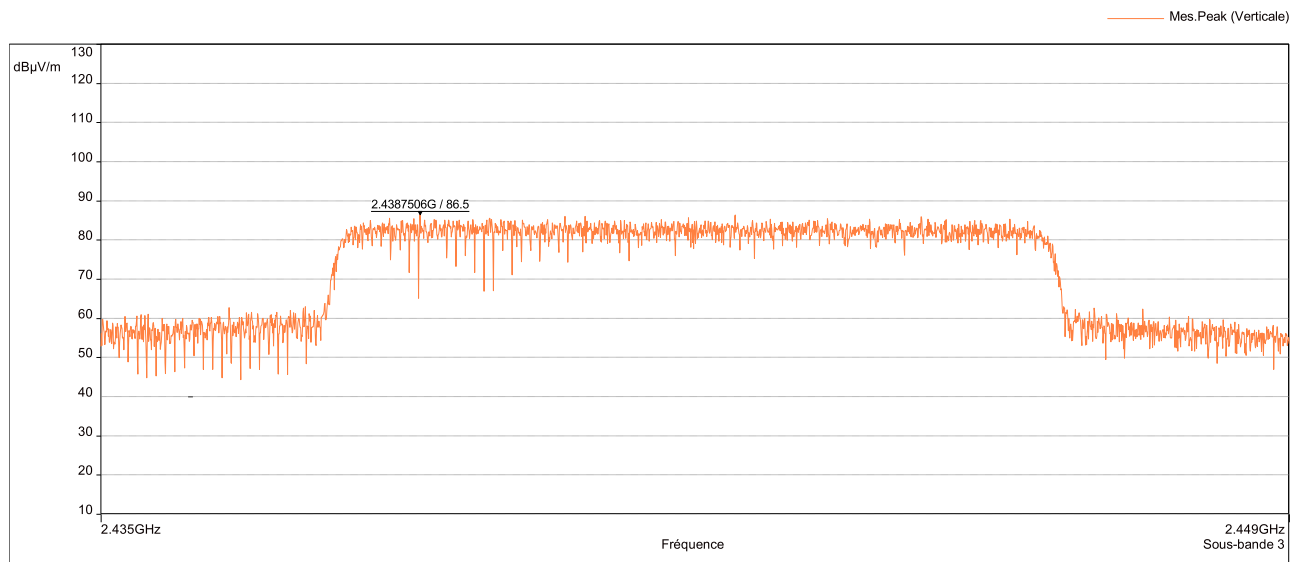
Polarization of test antenna: horizontal (height: 100 cm)

Position of equipment: Position 3 - (azimuth: 180 degrees)

Maximum Peak conducted power density:

$EIRP(dBm / 3 \text{ kHz}) = E (dB\mu V/m / 3 \text{ kHz}) + 20\log(D) - 104.8$; where D is the measurement distance in meters and antenna Gain = 8 dBi.

Declared maximum antenna gain: 8 dBi



2.4387506G, 86.5 dBμV/m :

Sample N° 1 High Channel (F = 2468 MHz)

	Electro-magnetic field (dBμV/m):	Maximum Peak conducted power density(1) (dBm / 3 kHz)	Limit (dBm / 3 kHz)
Nominal supply voltage:	84.7	-18.53	8

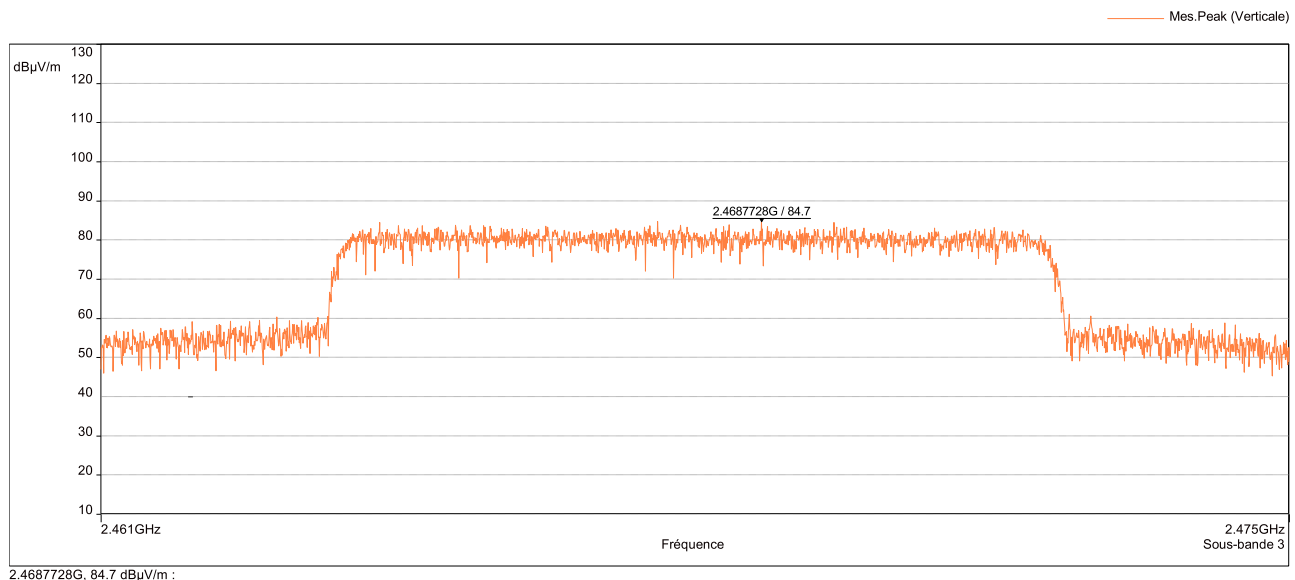
Polarization of test antenna: horizontal (height: 155 cm)

Position of equipment: Position 3 - (azimuth: 180 degrees)

Maximum Peak conducted power density:

$EIRP(dBm / 3 \text{ kHz}) = E (dB\mu V/m / 3 \text{ kHz}) + 20\log(D) - 104.8$; where D is the measurement distance in meters and antenna Gain = 8 dBi.

Declared maximum antenna gain: 8 dBi



Test conclusion:

RESPECTED STANDARD

□□□ End of report, 2 appendixes to be forwarded □□□

APPENDIX 1: Test equipment list

Occupied bandwidth

TYPE	MANUFACTURER	EMITECH NUMBER
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Antenna 3117	ETS-Lindgren	10771
N-2M Cable	SUCOFLEX	14303
N-5M Cable	HYTEM	19246
N-2.5M Cable	HYTEM	19250
Multimeter 177	Fluke	14831
Meteo station 608-H1	Testo	7566
Software	GPBShot V2.4	/

Band edge

TYPE	MANUFACTURER	EMITECH NUMBER
Full anechoic chamber	EMITECH	10759
Turntable and mat controller NCD	MATURO	10789
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Antenna 3117	ETS-Lindgren	10771
Low-noise amplifier S005180M3201	LUCIX Corp.	12590
Attenuator 10dB	Midwest Microwave	8548
N-1.5M Cable	SUCOFLEX	9398
N-2M Cable	SUCOFLEX	14303
N-5M Cable	HYTEM	19246
N-2.5M Cable	HYTEM	19250
Multimeter 177	Fluke	14831
Meteo station 608-H1	Testo	7566
Software	BAT-EMC V3.18.0.26	0000

Peak conducted output power

TYPE	MANUFACTURER	EMITECH NUMBER
Full anechoic chamber	EMITECH	10759
Turntable and mat controller NCD	MATURO	10789
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Antenna 3117	ETS-Lindgren	10771
N-2M Cable	SUCOFLEX	14303
N-5M Cable	HYTEM	19246
N-2.5M Cable	HYTEM	19250
Multimeter 177	Fluke	14831
Meteo station 608-H1	Testo	7566
Software	BAT-EMC V3.18.0.26	0000

Radiated spurious emissions

TYPE	MANUFACTURER	EMITECH NUMBER
Full anechoic chamber	EMITECH	10759
Turntable and mat controller NCD	MATURO	10789
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Loop antenna 6502	EMCO	1406
Biconical antenna VHA 9103	Schwarzbeck	8528
Biconical antenna 3110	Emco	7240
Log periodic antenna HL223	Rohde & Schwarz	7171
Log periodic antenna HL223	Rohde & Schwarz	7190
Antenna 3117	ETS-Lindgren	10771
Antenna SAS-572	A.H Systems	7124
Low-noise amplifier ASC-805C	ASC	19274
Low-noise amplifier S005180M3201	LUCIX Corp.	12590
Low-noise amplifier DBLNA317202120S	QOTANA	19154
N-1.5M Cable	SUCOFLEX	9398
N-2M Cable	SUCOFLEX	14303
N-5M Cable	HYTEM	19246
N-2.5M Cable	HYTEM	19250
Cable k-20cm	STORM MICROWAE	8974
Cable k-20cm	STORM MICROWAE	8975
Low pass filter LP03/1000-7GH	Filtek	4087
Reject band filter BRM50702	Microtronics	7299
Multimeter 177	Fluke	14831
Meteo station 608-H1	Testo	7566
Software	BAT-EMC V3.18.0.26	0000

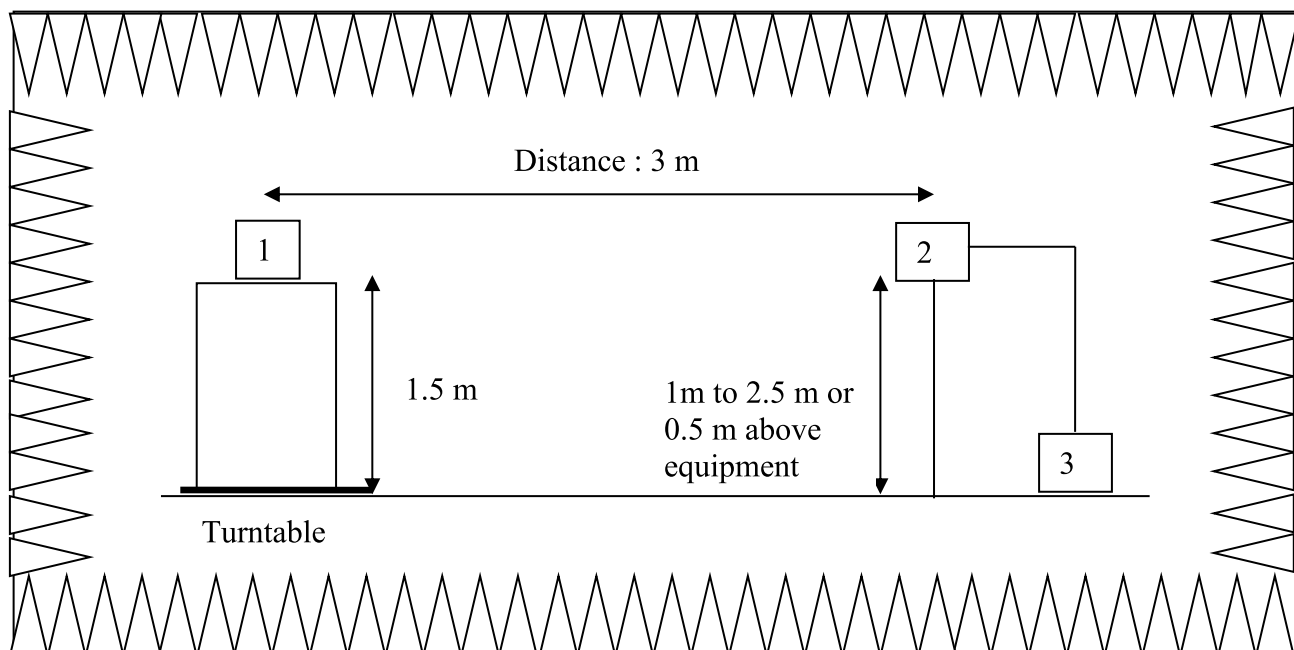
Peak conducted power spectral density

TYPE	MANUFACTURER	EMITECH NUMBER
Full anechoic chamber	EMITECH	10759
Turntable and mat controller NCD	MATURO	10789
Satellite synchronized frequency standard GPS8	ACQUISYS	8896
Spectrum Analyzer FSP40	Rohde & Schwarz	4088
Antenna 3117	ETS-Lindgren	10771
N-2M Cable	SUCOFLEX	14303
N-5M Cable	HYTEM	19246
N-2.5M Cable	HYTEM	19250
Multimeter 177	Fluke	14831
Meteo station 608-H1	Testo	7566
Software	BAT-EMC V3.18.0.26	0000

APPENDIX 2: Radiated Test Setup

Anechoic chamber setup

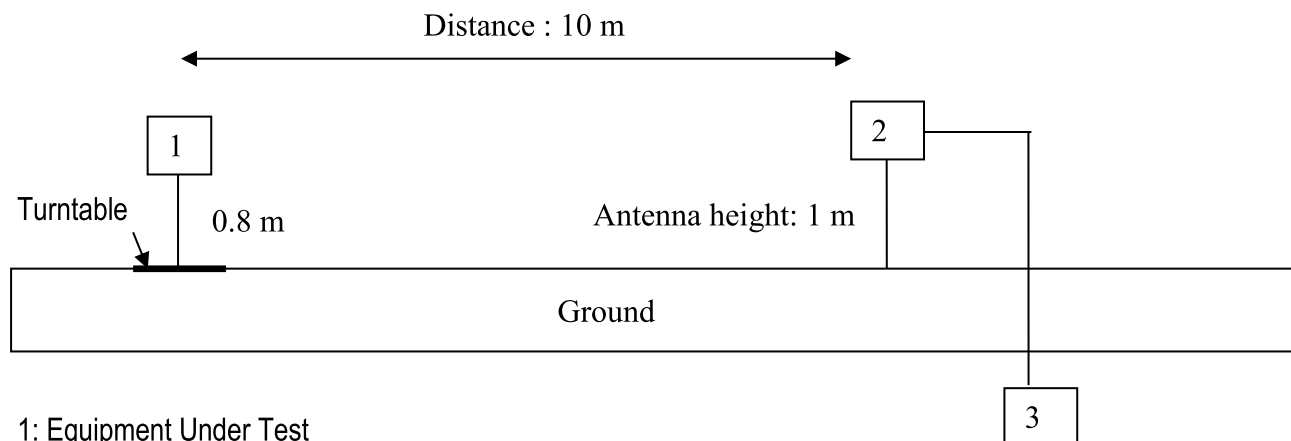
Above 1 GHz



- 1: Equipment Under Test
- 2: Measurement antenna
- 3: Measurement equipment

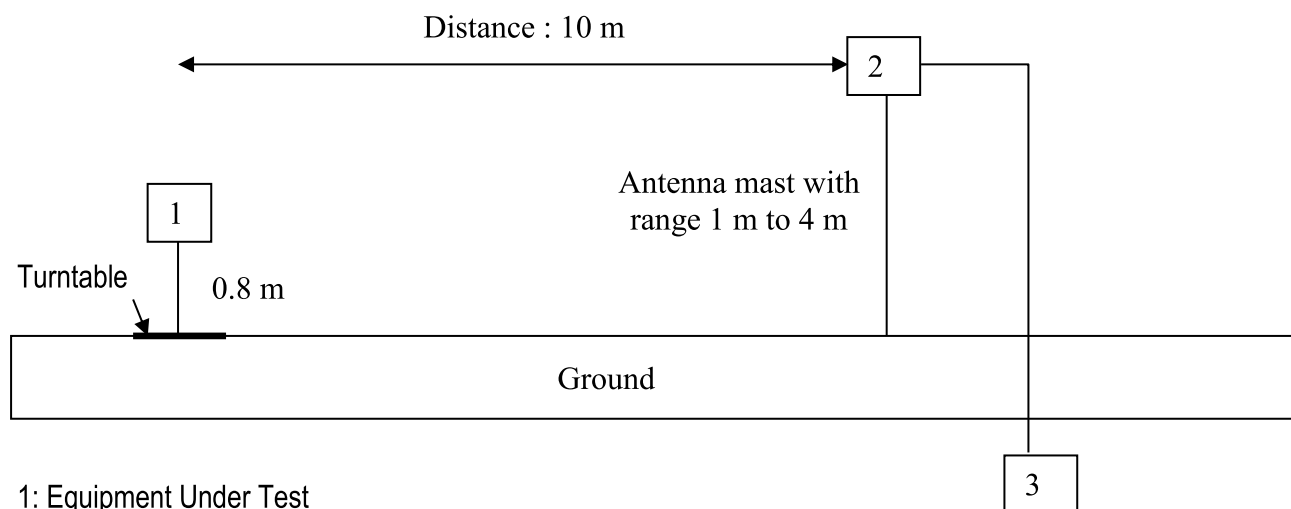
Open area setup

Below 30 MHz



- 1: Equipment Under Test
- 2: Measurement antenna
- 3: Measurement equipment

Between 30 MHz and 1 GHz



- 1: Equipment Under Test
- 2: Measurement antenna
- 3: Measurement equipment