

E.M.C Test Report

According to the standards:

FCC 47 CFR PART 15 : 2019 (§15.247)

RSS-247 issue 2 : 2017

RSS-Gen Issue 5 : 2019

Equipment under test:

Blue Connect Module

MC001

(FCC ID: 2AVPG-MCX)

Company:

CELEC SAS


FCC accredited: FR0004

IC accredited: 4379A

Distribution: Mr. PERRIN

(Company: CELEC SAS)

Number of pages: 34 with 2 annexes

Ed.	Date	Modified pages	Written by		Technical Verification and Quality Approval	
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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 production of the item tested.



TEST CERTIFICATION FOR: : FCC and Canada Certifications

NAME OF THE EQUIPMENT UNDER TEST : Blue Connect Module

Serial number : PRO000002003

Reference / model (P/N) : MC001

Software version : -

Firmware version : 0.4.6 + radio firmware DK 3.1.0

NAME OF THE MANUFACTURER : CELEC SAS

ADDRESS OF THE APPLICANT : -

Company : CELEC SAS

Address : 3, boulevard de l'Europe
ZAC du Val de la Béthune
76270 Neufchâtel en Bray FRANCE

Person present during the tests : None

Responsible : Mr. PERRIN

DATES OF TESTS : 2020, from the 25th of February to the 3rd of March

TESTS LOCATION : EMITECH MONTIGNY
3 rue des Coudriers – CAP78 – ZA de
l'observatoire
78180 Montigny-le-Bretonneux

TESTS SUPERVISOR : B.PELLERIN

TESTS OPERATORS : T.CHARRIER

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ANNEX 1: 6 dB BANDWIDTH, 99% BANDWIDTH

ANNEX 2: BAND EDGE

1. INTRODUCTION

This document presents the results of Electromagnetic Compatibility tests performed on the equipment « **Blue Connect Module MC001** » according to reference documents listed below.

2. REFERENCE DOCUMENTS

FCC 47 CFR Part 15: 2019

Code of Federal Regulations. Title 47- Telecommunication

Chapter 1- Federal Communication Commission

Part 15- Radio frequency devices

RSS-247 issue 2: 2017

Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

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.

KDB 558074 D01 DTS Meas Guidance V05 r02

Guidance for performing compliance measurement on Digital Transmission Systems (DTS) operating under § 15.247.

ANSI C63.10 : 2013

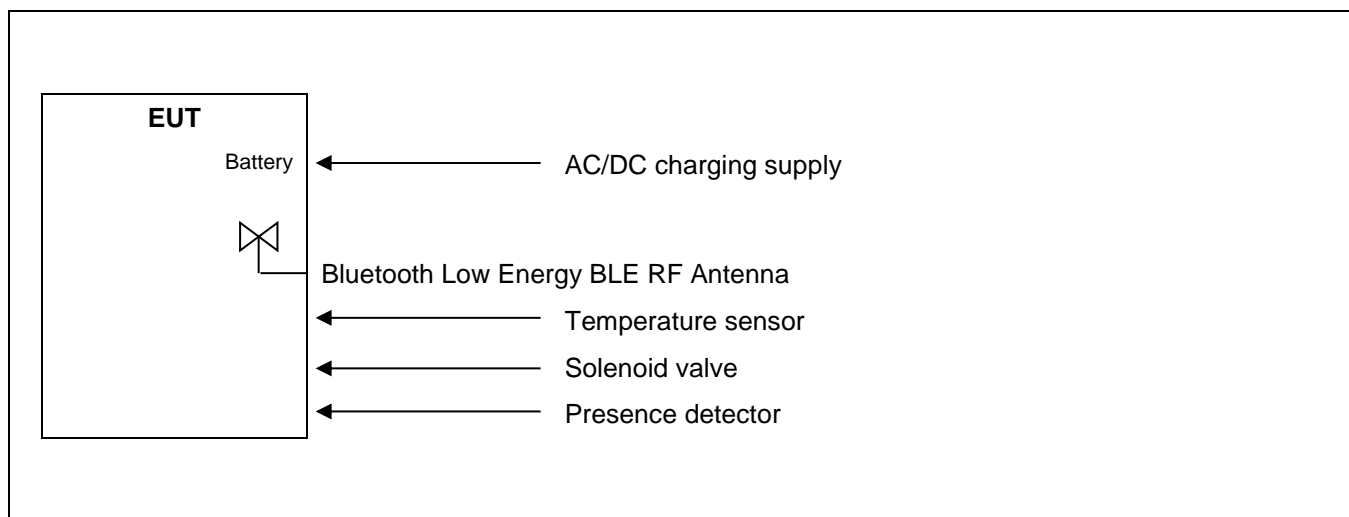
American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

3. PRODUCT DESCRIPTION

Class:	B (Residential and light industrial environment)
Antenna type and gain:	Integral antenna
Operating frequency range:	from 2402 MHz to 2480 MHz
Number of channels:	40
Channel spacing:	2 MHz
Modulation:	Bluetooth Low Energy (BLE)
Power source:	120 Vac / 60 Hz (AC/DC bloc) / 6Vdc Alkaline battery
Output power:	+ 8 dBm
Software power setting:	-

Modification of the equipment during the tests: No.

Measurement and recording of physical quantities such as temperature and humidity – radiofrequency transmission.



E.U.T.: Equipment under Test.

4. TESTS AND CONCLUSION

The following table summarizes test results of the EUT.

Subpart B of the standard FCC part 15 – Unintentional radiators

Test procedure	Designation of test	Test results				Comments
		Pass	Fail	N.A.	N.P.	
15.107	Measurement of conducted emission on AC mains ports	X				
15.109	Radiated emission limits	X				

Subpart C of the standard FCC part 15 – Intentional radiators

Test procedure	Designation of test	Test results				Comments
		Pass	Fail	N.A.	N.P.	
15.205	Restricted bands of operation	X				
15.207	Measurement of conducted emission on AC mains ports	X				
15.209	Radiated emission limits; general requirements	X				
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				
	(c) 20 dB bandwidth and band-edge compliance			X		
15.247	Intentional radiated emissions					
	a) frequency hopping and digitally modulated					
	a) (1) hopping mode			X		
	a) (1) (i) frequency hopping in the band 902-928 MHz			X		
	a) (1) (ii) frequency hopping in the band 5725-5850 MHz			X		
	a) (1) (iii) frequency hopping in the band 2400-2483.5 MHz			X		
	a) (2) systems using digital modulation in the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz (6 dB bandwidth)	X				
	b) maximum peak conducted					
	b) (1) frequency hopping in the bands 2400-2483.5 MHz or 5725-5850 MHz			X		
	b) (2) frequency hopping in the band 902-928 MHz			X		

Test procedure	Designation of test	Test results				Comments
		Pass	Fail	N.A.	N.P.	
15.247	b) (3) systems using digital modulation in the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz	X				
	b) (4) maximum peak conducted > 6 dBi			X		
	b) (4) (i) frequency hopping in the band 2400–2483.5 MHz			X		
	b) (4) (ii) frequency hopping in the band 5725–5850 MHz			X		
	b) (4) (iii) fixed, point-to-point			X		
	c) directional antenna > 6 dBi					
	c) (1) fixed, point-to-point operation			X		
	c) (1) (i) in the band 2400–2483.5 MHz			X		
	c) (1) (ii) in the band 5725–5850 MHz			X		
	c) (1) (iii) fixed, point-to-point			X		
	c) (2) multiple directional beams in the band 2400–2483.5 MHz			X		
	c) (2) (i) information			X		
	c) (2) (ii) sum of the power supplied to all antennas			X		
	c) (2) (iii) one antenna for multiple directional beams			X		
	c) (2) (iv) single directional beam			X		
	d) intentional radiator	X				
	e) peak power spectral density	X				
	f) hybrid system			X		
	g) continuous data stream during the test			X		
	h) to avoid hopping on occupied channels			X		
	i) RF exposure compliance			X		P < 500 mW

N.A.: Not Applicable

N.P.: Not Performed

Standard RSS-247 Issue 2 : 2017

Designation of test	Test results				Comments
	Pass	Fail	N.A.	N.P.	
1. Scope					
3. Certification Requirements					
3.1 RSS-gen compliance			X		See RSS-Gen Issue 5
			X		See RSS-Gen Issue 5
			X		See RSS-Gen Issue 5
			X		See CS-03
			X		See RSS-Gen Issue 5
5.2 Digital Modulation Systems					
(1) -6 dB bandwidth	X				
(2) transmitter power spectral density	X				
5.4 Transmitter Output Power and e.i.r.p. Requirements					
1) 902-928 MHz frequency hopping systems output power / e.i.r.p.			X		
2) 2400-2483.5 MHz frequency hopping systems output power / e.i.r.p.			X		
3) 5725-5850 MHz frequency hopping systems output power / e.i.r.p.			X		
4) Digital modulation systems output power / e.i.r.p.	X				
5) point-to-point systems (2400-2483.5 and 5725-5850 MHz)			X		
6) Multiple directional beams antenna systems (2400-2483.5 MHz)			X		
5.5 Unwanted emission	X				

Standard RSS-Gen Issue 5 : March 2019

Designation of test	Test results				Comments
	Pass	Fail	N.A.	N.P.	
1. Scope					
2. Purpose and application					
2.1 Certification of Radio Apparatus			X		
2.2 Categories of radio Equipment					Category 1
2.3 Exclusions			X		
2.4 Determination of Interference			X		
3. Normative Reference Publications					
4. application for an Exemption					
5. Receivers					
5.1 Scanner Receivers			X		
5.2 Stand-Alone Receivers Operating in the Band 30-960 MHz (Category II)			X		
5.3 Receivers Exempted From Industry Canada Requirement (Category II)			X		
6. Technical Requirements					
6.1 Test Site Facilities					See ANSI C63.4-2014
6.2 Test report					
6.3 External control			X		
6.4 Near Field Measurement Method Below 30 MHz			X		
6.5 Measurement Distance Above 30 MHz					
6.6 Occupied Bandwidth	X				
6.7 Transmitter Antenna for Licensed Radio Apparatus			X		
6.8 Operating Bands and Selection of Test Frequencies			X		
6.9 CISPR Quasi-peak Detector	X				
6.10 Pulsed Operation			X		
6.11 Transmitter Frequency Stability			X		
6.12 Transmitter Output Power	X				See RSS 247
6.13 Transmitter unwanted Emissions	X				
7. Receiver limit					
8. Licence-Exempt radio Apparatus					
8.1 Measurement Bandwidths and Detector Functions	X				
8.2 Amplifiers			X		
8.3 Transmitter Antenna for Licence-Exempt Radio Apparatus			X		
8.4 User Manual notice for Licence-Exempt Radio Apparatus			X		
8.5 Measurement of Licence-Exempt Devices On-Site (in-situ)			X		
8.6 Operating frequency Range of Device in Master/Slave networks			X		
8.7 Radio Frequency identification (RFID) Devices			X		
8.8 AC Power Line Conducted Emission Limits for licence-Exempt Radio Apparatus			X		
8.9 Transmitter Emission limits for Licence-Exempt Radio Apparatus			X		
8.10 Restricted Frequency bands			X		
8.11 Frequency Stability for Licence-Exempt transmitters			X		

Designation of test	Test results				Comments
	Pass	Fail	N.A.	N.P.	
7. Licence-exempt Radio Apparatus					
7.1 General Informations					
7.1.1 External Amplifiers			X		
7.1.2 Transmitter Antenna			X		
7.1.3 User manual Notice			X		User manual shall include the required statements
7.1.4 Radio Apparatus Containing Digital Circuits			X		See ICES-003
7.1.5 Measurement After Installation			X		
7.1.6 operating Frequency range of Devices in Master/Slave Networks			X		
7.1.7 Home-built Devices			X		
7.1.8 RFID Devices			X		
7.2 Measurement Methods and Standard Specifications					
7.2.1 Measurement Bandwidths and Detector Functions	X				
7.2.2 Emissions Falling Within Restricted Frequency Bands			X		
7.2.3 Devices Employing Pulsed Operation			X		
7.2.4 AC Power Line Conducted Emissions Limits			X		
7.2.5 Transmitter Spurious Emission Limits	X				
7.2.6 Transmitter Frequency Stability			X		
7.2.7 Measurement Distance			X		

Note 1: Single / Split / limited modular transmitter.

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

Note 2: Spectrum investigated from 30 MHz or the lowest radio frequency signal generated in the equipment, whichever is lower, without going below 9 kHz to the 10th harmonic of the highest fundamental frequency or 40 GHz, whichever is lower (F<10 GHz) or to the 5th harmonic of the highest fundamental frequency or 100 GHz, whichever is lower (F≥10 GHz).

Note 3: Spectrum investigated from the lowest frequency internally generated or used in the receiver or 30 MHz, whichever is higher to at least 3 times the highest tune-able or local oscillator frequency, whichever is higher without exceeding 40 GHz.

Note 4: The certificate holder shall be able to demonstrate a quality control process used for production.

Inspection and testing in accordance with good engineering practices.

Note 5: The device must be properly identified and labeled.

Note 6: Suppliers of radio apparatus shall provide notices and user information in both English and French.

Note 7: The device shall not have any external controls accessible to the user.

Note 8: When transitioning between bands, the equipment shall not actively transmit

Conclusion:

The tested sample « **Blue Connect Module MC001** » submitted to the tests complies with the requirements of the standards:

- FCC 47 CFR PART 15 : 2019
- RSS-247 issue 2: 2017
- RSS-Gen Issue 5 : March 2019

According to the limits specified in this report.

5. DIGITAL MODULATION SYSTEMS

Standards: FCC 47 CFR PART 15 : 2019
RSS-247 Issue 2 : 2017
RSS-Gen Issue 5 : 2019

Sections: §15.247 a) (2) of FCC 47 CFR PART 15 : 2019
§5.2 a) of RSS-247 issue 2 : 2017
§6.6 of RSS-Gen issue 5 : 2019

Test configuration:

The system is tested in normalized test site.

The test unit is placed on a rotating table, 1.5 m from a ground plane. Zero degree azimuth corresponds to the front of the equipment under test.

The level was maximised in azimuth and polarization. The maximum level measured on the spectrum analyser was recorded.

Distance of antenna: 3 meters

Instrumentation test list:

Category	Manufacturer	Type	Emitech Nr	Last validity date	Next validity date
Antenna	Emco	3115	0941	08/02/2019	08/04/2022
Cable	C&C	N-2m	11178	17/07/2019	17/09/2021
Cable	C&C	N-2m	11182	17/07/2019	17/09/2021
Cable	C&C	N-8m	11183	17/07/2019	17/09/2021
Power supply	Secas	CF1000 50/60	2102	-	-
Receiver	Rohde & Schwarz	ESR7	14768	09/01/2020	09/03/2021
Shielded enclosure	Comtest	SAC 3m	14803	-	-

Equipment under test operating condition:

EUT is in continuous transmission mode.

Measure conditions:

Ambient temperature (°C): 23

Relative humidity (%): 40

Resolution bandwidth: 100 kHz for 6 dB bandwidth

Resolution bandwidth: 5 kHz for 99% bandwidth

Results:

Power source: 120 Vac / 60 Hz (AC/DC bloc)

6 dB bandwidth

Frequency	Results (MHz)	Comments
2402 MHz	514.0	See annex n°2
2426 MHz	510.0	See annex n°2
2480 MHz	510.0	See annex n°2

99% bandwidth

Frequency	Results (MHz)	Comments
2402 MHz	1.038	See annex n°2
2426 MHz	1.038	See annex n°2
2480 MHz	1.036	See annex n°2

Test conclusion: Complies with the requirements of the standards.

6. TRANSMITTER OUTPUT POWER

Standards: FCC 47 CFR PART 15: 2019
RSS-247 Issue 2: 2017

Sections: §15.247 b) (3) of FCC 47 CFR PART 15: 2019
§5.4 of RSS-247 issue 2: 2017

Test configuration:

The system is tested in normalized test site.

The test unit is placed on a rotating table, 1.5 m from a ground plane. Zero degree azimuth corresponds to the front of the equipment under test.

The level was maximised in azimuth and polarization. The maximum level measured on the spectrum analyser was recorded.

Distance of antenna: 3 meters.

Instrumentation test list:

Category	Manufacturer	Type	Emitech Nr	Last validity date	Next validity date
Antenna	Emco	3115	0941	08/02/2019	08/04/2022
Cable	C&C	N-2m	11178	17/07/2019	17/09/2021
Cable	C&C	N-2m	11182	17/07/2019	17/09/2021
Cable	C&C	N-8m	11183	17/07/2019	17/09/2021
Power supply	Secas	CF1000 50/60	2102	-	-
Receiver	Rohde & Schwarz	ESR7	14768	09/01/2020	09/03/2021
Shielded enclosure	Comtest	SAC 3m	14803	-	-

Equipment under test operating condition:

EUT is in continuous transmission mode.

Measure conditions:

Ambient temperature (°C): 23

Relative humidity (%): 40

Resolution bandwidth: 1 MHz

Results:

Power source: 120 Vac / 60 Hz (AC/DC bloc)

Frequency	Electro-magnetic field (dB μ V/m)	TP* (dBm)	Limit (dBm)
2402 MHz	95.92	-1.46	+ 30
2426 MHz	96.41	-0.97	+ 30
2480 MHz	98.99	+1.61	+ 30

* TP = $(E \times d)^2 / (30 \times 1.64)$ for d = 3 m

Test conclusion: Complies with the requirements of the standards.

7. PEAK POWER SPECTRAL DENSITY

Standards: FCC 47 CFR PART 15: 2019
RSS-247 Issue 2: 2017

Sections: §15.247 e) of FCC 47 CFR PART 15: 2019
§5.2 b) of RSS-247 issue 2: 2017

Test configuration:

The system is tested in normalized test site.

The test unit is placed on a rotating table, 1.5m from a ground plane. Zero degree azimuth corresponds to the front of the equipment under test.

The level was maximised in azimuth and polarization. The maximum level measured on the spectrum analyser was recorded.

Distance of antenna: 3 meters

Instrumentation test list:

Category	Manufacturer	Type	Emitech Nr	Last validity date	Next validity date
Antenna	Emco	3115	0941	08/02/2019	08/04/2022
Cable	C&C	N-2m	11178	17/07/2019	17/09/2021
Cable	C&C	N-2m	11182	17/07/2019	17/09/2021
Cable	C&C	N-8m	11183	17/07/2019	17/09/2021
Power supply	Secas	CF1000 50/60	2102	-	-
Receiver	Rohde & Schwarz	ESR7	14768	09/01/2020	09/03/2021
Shielded enclosure	Comtest	SAC 3m	14803	-	-

Equipment under test operating condition:

EUT is in continuous transmission mode.

Measure conditions:

Ambient temperature (°C): 23

Relative humidity (%): 40

Resolution bandwidth: 3 kHz

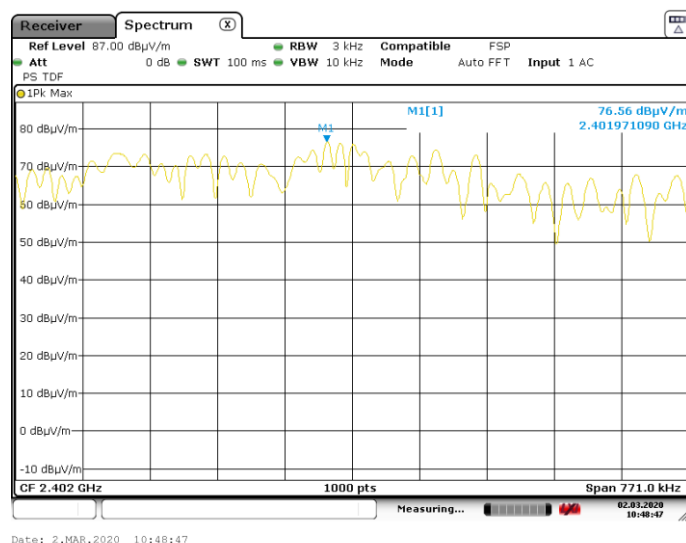
Video bandwidth: 10 kHz

Results:

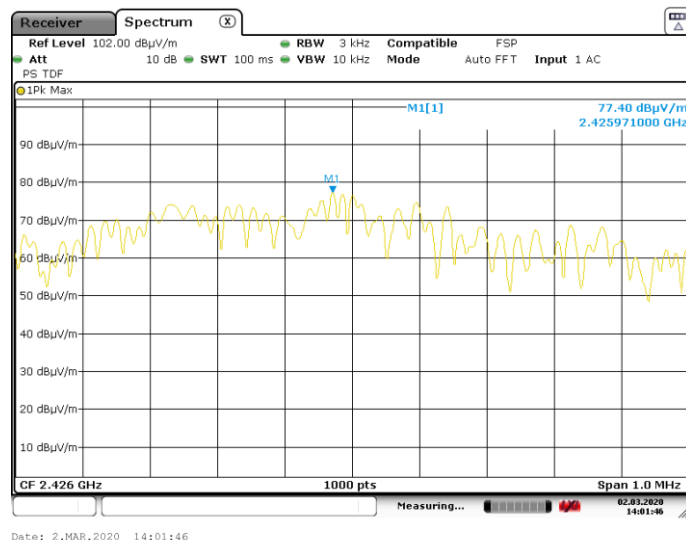
Power source: 120 Vac / 60 Hz (AC/DC bloc)

Frequency	Electro-magnetic field (dBμV/m)	PPSD* (dBm)	Limit (dBm)
2402 MHz	76.56	-20.82	+ 8.0
2426 MHz	77.40	-19.98	
2480 MHz	81.16	-16.22	

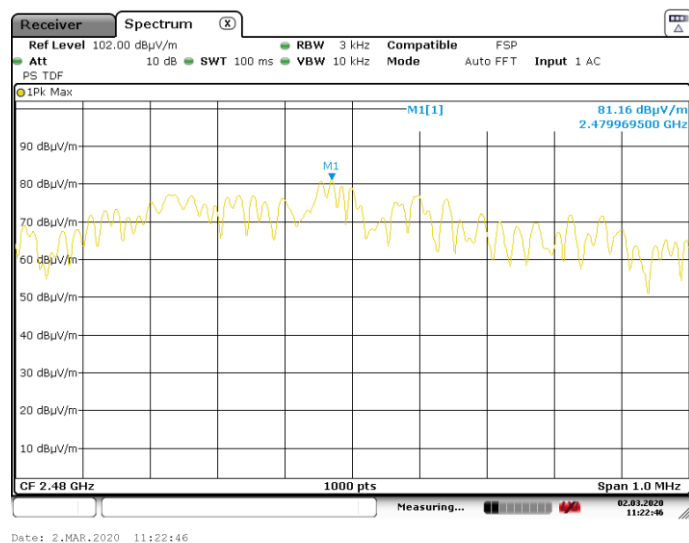
* PPSP = $(E \times d)^2 / (30 \times 1.64)$ for $d = 3$ m



2402 MHz



2426 MHz



2480 MHz

Test conclusion: Complies with the requirements of the standards.

8. ADDITIONAL PROVISIONS TO THE GENERAL RADIATED EMISSIONS LIMITATION

Standards: FCC 47 CFR PART 15: 2019
RSS-247 Issue 2: 2017

Sections: §15.215 (b) and §15.247 (d) of FCC 47 CFR PART 15: 2019
§5.5 of RSS-247 issue 2: 2017

Instrumentation test list:

Category	Manufacturer	Type	Emitech Nr	Last validity date	Next validity date
Antenna	Emco	3115	0941	08/02/2019	08/04/2022
Cable	C&C	N-2m	11178	17/07/2019	17/09/2021
Cable	C&C	N-2m	11182	17/07/2019	17/09/2021
Cable	C&C	N-8m	11183	17/07/2019	17/09/2021
Power supply	Secas	CF1000 50/60	2102	-	-
Receiver	Rohde & Schwarz	ESR7	14768	09/01/2020	09/03/2021
Shielded enclosure	Comtest	SAC 3m	14803	-	-

Equipment under test arrangement:

The system is tested in normalized test site.

The test unit is placed on a rotating table, 1.5 m from a ground plane. Zero degree azimuth corresponds to the front of the equipment under test.

The level was maximised in azimuth and polarization. The maximum level measured on the spectrum analyser was recorded.

Results:

Ambient temperature (°C): 23
Relative humidity (%): 40

Power source: 120 Vac / 60 Hz (AC/DC bloc)

Lower Band Edge: from 2310 MHz to 2390 MHz
Upper Band Edge: from 2483.5 MHz to 2500 MHz

Polarization of test antenna: Horizontal (height = 105 cm) } For 2402 MHz
Position of equipment: azimuth = 195°

Polarization of test antenna: Horizontal (height = 105 cm) } For 2480 MHz
Position of equipment: azimuth = 195°

Fundamental frequency (MHz)	Field Strength Level of fundamental (dB μ V/m)	Detector (Peak or Average)	Frequency of maximum Band-edges Emission (MHz)	Delta Marker (dB) *	Calculated Max Out of Band Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)
2401.77	95.03	Average	2319.41	-	35.97	54.0	18.03
2479.69	99.81	Average	2479.74	-	40.99		13.01

* According to step 2 of Marker-Delta Method DA 00-705.

Band-edge curves are given in annex 3.

Test conclusion: Complies with the requirements of the standards.

9. CONDUCTED EMISSION

Standards: FCC 47 CFR PART 15: 2019
RSS-Gen Issue 5: March 2019

Sections: § 15.107 and 15.207 of FCC 47 CFR PART 15: 2019
§ 8.8 of RSS-Gen Issue 5: March 2019

Test configuration:

Tested cable	Measure with	E.U.T. height
Power supply 120 Vac / 60 Hz	L.I.S.N	80 cm

Frequency band	Tested cable	Detector	Resolution bandwidth	Video bandwidth
150 kHz – 30 MHz	Power supply 120 Vac / 60 Hz	Peak	10 kHz	30 kHz
150 kHz – 30 MHz	Power supply 120 Vac / 60 Hz	Average value	9 kHz	Auto

Test method deviation: No

Instrumentation test list:

Category	Manufacturer	Type	Emitech Nr	Last validity date	Next validity date
Bobine P	Emitech	CISPR 16-2-1 : 2008	10065	-	-
Cable	Sucoflex	N-3m	12920	18/04/2018	18/06/2020
Cable	C&C	BNC-0.5m	16506	25/06/2019	25/08/2021
LISN	Rohde & Schwarz	ENV216	12808	04/04/2019	04/06/2021
Multimeter	Emitech	Absorbeur courant de gaine	9492	06/12/2018	06/02/2021
Power supply	Secas	CF1000 50/60	2102	-	-
Receiver	Rohde & Schwarz	ESR7	14768	09/01/2020	09/03/2021
Software	Nexio	BAT EMC v3.18.0.19	0000	-	-
Test enclosure	Emitech	HC1	14875	-	-

Equipment under test arrangement:

EUT 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 80cm from the boundary of the EUT 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.

Results:

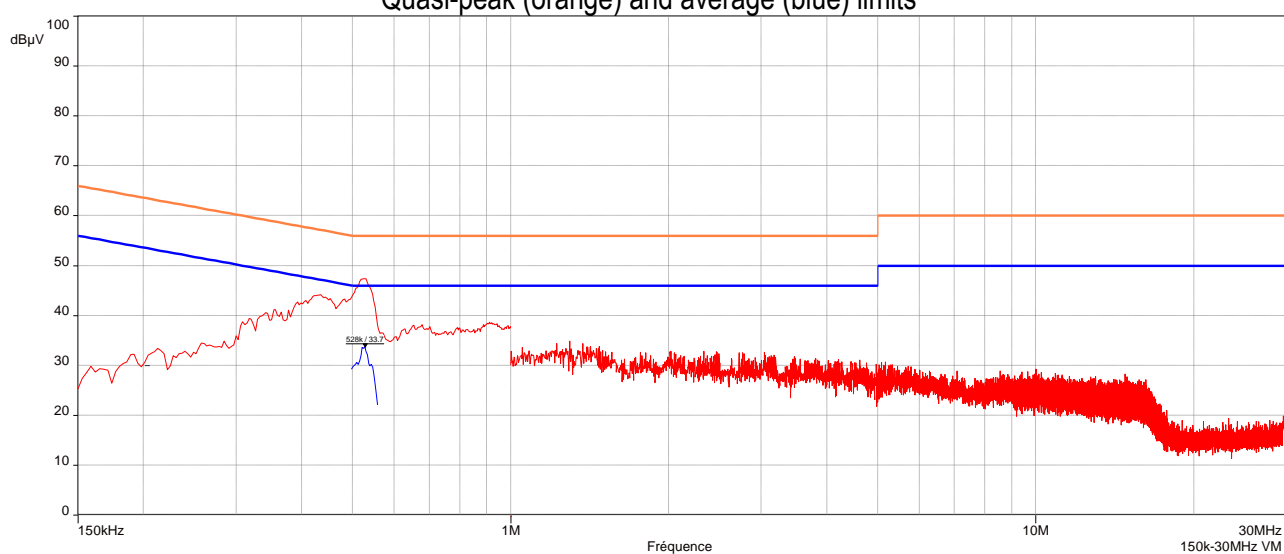
Ambient temperature (°C): 23
Relative humidity (%): 40

Results:

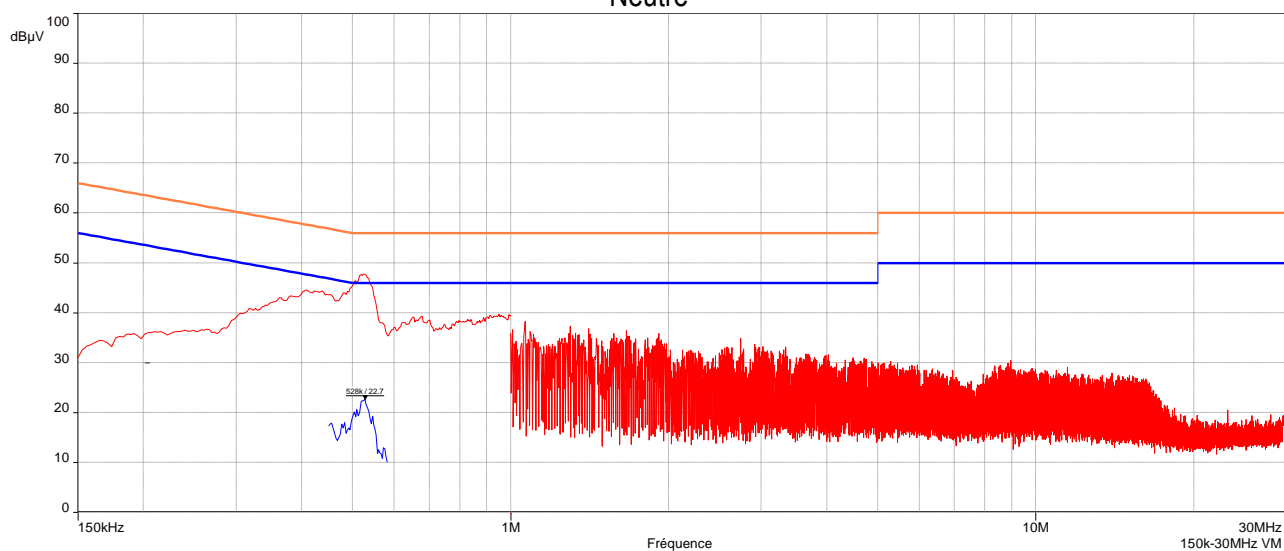
Maximal uncertainty: 3.38 dB

Conducted emission (measurement):

Power supply 120 Vac / 60 Hz in peak (red) and average (blue) detections
Quasi-peak (orange) and average (blue) limits



Neutre



Phase 1

10. UNINTENTIONAL RADIATED EMISSIONS AND TRANSMITTER UNWANTED EMISSION IN THE BAND 9 kHz – 25 GHz

Standards: FCC 47 CFR PART 15 : 2019
RSS-Gen Issue 5 : March 2019

Sections: §15.205; 15.109; 15.209 and §15.247 of FCC 47 CFR PART 15 : 2019
§6.13 of RSS-Gen Issue 5 : March 2019

Equipment under test arrangement:

The equipment under test (EUT) is placed on a non-conductive test table at 0.8 m (<1GHz) and 1.5 m (>1GHz) above the horizontal metal ground 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 - 1 GHz, at 1 m for 9 kHz - 30 MHz and 1.5 m for 1 GHz - 25 GHz. A 360 degrees rotation of the EUT is performed in vertical and horizontal polarization. The frequency azimuth and antenna height are presented in the table on the next pages.

The E.U.T. is blocked in continuous transmission.

Frequencies range: 9 kHz - 30 MHz
30 MHz - 1 GHz
1 GHz - 25 GHz

Detections mode: Peak Quasi-peak for 9 kHz - 30 MHz
Peak Quasi-peak for 30 MHz - 1 GHz
Peak Average for 1 GHz - 25 GHz

Resolutions bandwidth: 1 kHz 200Hz for 9 kHz - 150 kHz
10 kHz 9kHz for 150 kHz - 30 MHz
100 kHz 120 kHz for 30 MHz - 1 GHz
100kHz 1 MHz for 1 GHz - 25 GHz

Measurements distance: 3 meters from 9 kHz to 30 MHz
3 meters from 30 MHz to 25 GHz

Limit for emission radiated outside the frequency band, except the harmonics, shall be attenuated by at least 20 dB below the level of fundamental or the general radiated emission limits.

From 9 kHz to 30 MHz

Frequencies range	Limit ($\mu\text{V/m}$)
9 – 490 kHz	2400/F (F in kHz) *
490 – 1705 kHz	24000/F (F in kHz) **
1.705 – 30 MHz	30 **

* Limits in $\mu\text{V/m}$ can be extrapolated to 3 m using 40 dB / decade.

** Limits in $\mu\text{V/m}$ can be extrapolated to 3 m using 20 dB / decade.

From 30 MHz to 25 GHz

Frequencies range (MHz)	Limit (dB $\mu\text{V/m}$)	Limit ($\mu\text{V/m}$)
30 to 88	40.0	100
88 to 216	43.5	150
216 to 960	46.0	200
Above 960	54.0	500

Instrumentation test list:

Category	Manufacturer	Type	Emitech Nr	Last validity date	Next validity date
Amplifier	HP	8447F - 26dB	14447	25/07/2019	25/09/2020
Amplifier	Agilent	8449B	14487	11/09/2019	11/11/2020
Antenna	Emco	6502	9579	22/10/2019	22/12/2021
Antenna	Schwarzbeck	UHALP 9108	3106	07/04/2017	07/06/2020
Antenna	Schwarzbeck	VHA 9103	3426	05/07/2017	05/09/2020
Antenna	Emco	3115	0941	08/02/2019	08/04/2022
Antenna	Oritel	CM 42/25	1045	27/06/2019	27/08/2022
Cable	C&C	N-5m	11184	17/04/2018	17/06/2020
Cable	C&C	N-4m	14226	12/11/2018	12/01/2021
Cable	C&C	N-8m	11175	17/04/2018	17/06/2020
Cable	C&C	K-2m	11132	23/05/2018	23/07/2020
Cable	C&C	K-4m	11135	23/05/2018	23/07/2020
Filter	Micro-Tronics	HPM 14758	4691	21/05/2019	21/07/2021
Power supply	SECAS	CF1000 50/60	2102	-	-
Receiver	Rohde & Schwarz	ESW26	16030	02/08/2019	02/10/2020
Shielded enclosure	Comtest	SAC 3m	14622	-	-
Software	Nexio	BAT EMC v3.18.0.19	0000	-	-
Spectrum analyzer	Rohde & Schwarz	FSP40 (V 4.00SP1-V3.0-10-2)	5175	20/09/2018	20/11/2020

Results:

Maximal uncertainty: 5.53 dB

Ambient temperature (°C): 23
Relative humidity (%): 40
Power source: 120 Vac / 60 Hz (AC/DC bloc)

Frequency 2402 MHz in Tx

Frequency (GHz)	Height (cm)	Polarization (H or V)	Azimuth (°)	Electro-magnetic field (dBμV/m)	Limit (dBμV/m)	Margin (dB)
12.008	150	V	55	41.10	54	12.9

H : Horizontal – V : Vertical

Frequency 2426 MHz in Tx

Frequency (GHz)	Height (cm)	Polarization (H or V)	Azimuth (°)	Electro-magnetic field (dBμV/m)	Limit (dBμV/m)	Margin (dB)
12.130	150	V	110	38.42	54	15.58

H : Horizontal – V : Vertical

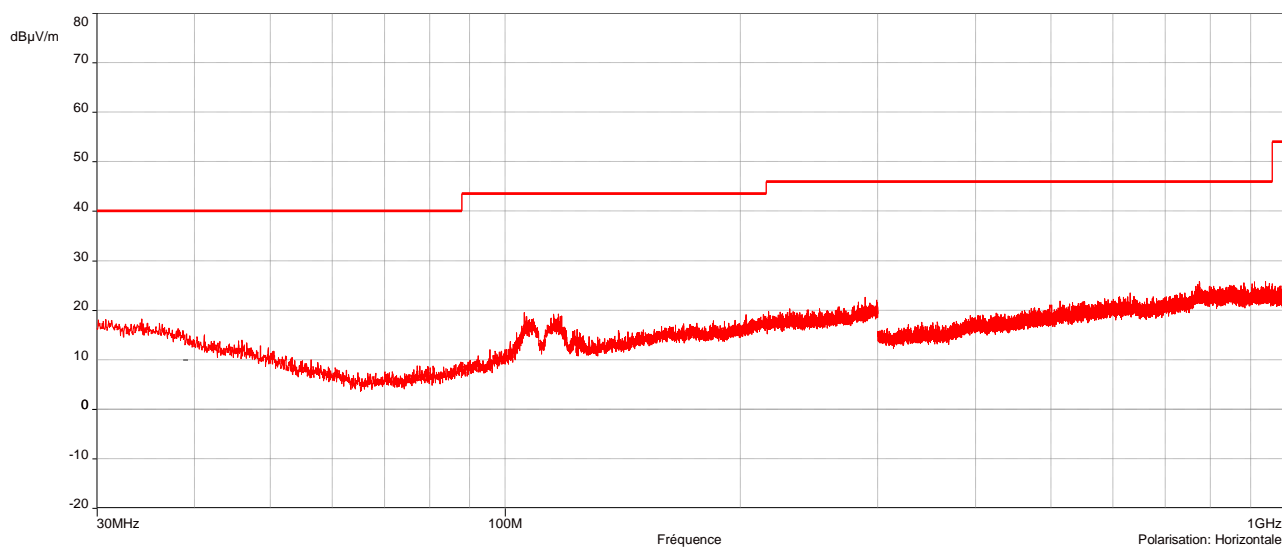
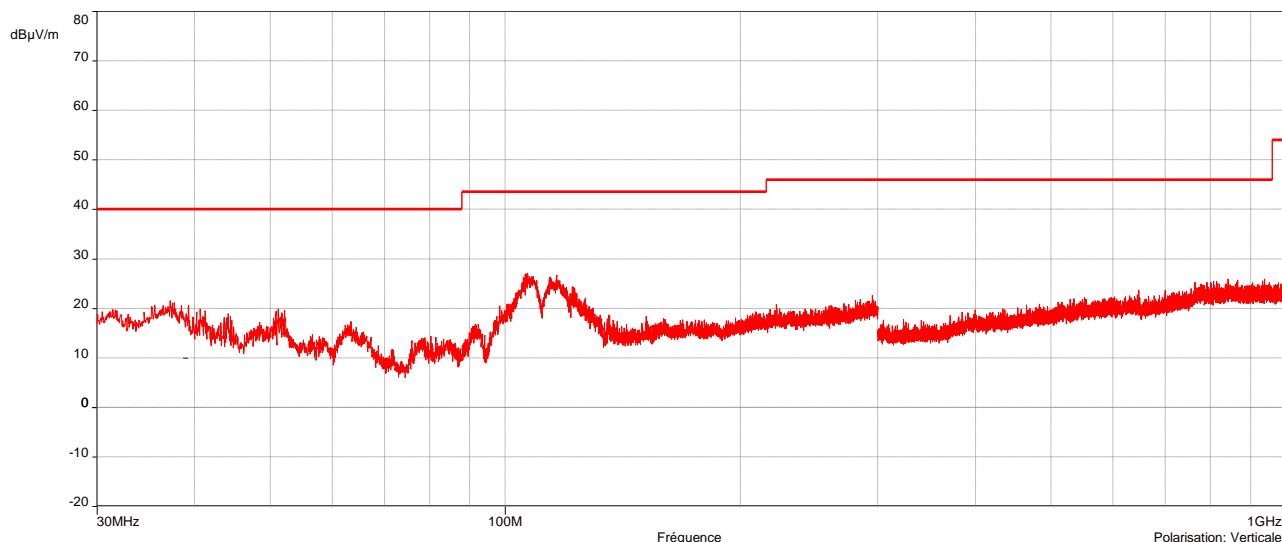
Frequency 2480 MHz in Tx

Frequency (GHz)	Height (cm)	Polarization (H or V)	Azimuth (°)	Electro-magnetic field (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4.959	150	H	55	32.84	54.0	21.16
12.399	190	V	320	38.60	54.0	15.40

H : Horizontal – V : Vertical

No significant frequency has been found other than those given above between 9 kHz to 30 MHz and 1 GHz to 25 GHz.

Frequency 2402 MHz in Tx (30MHz to 1GHz)



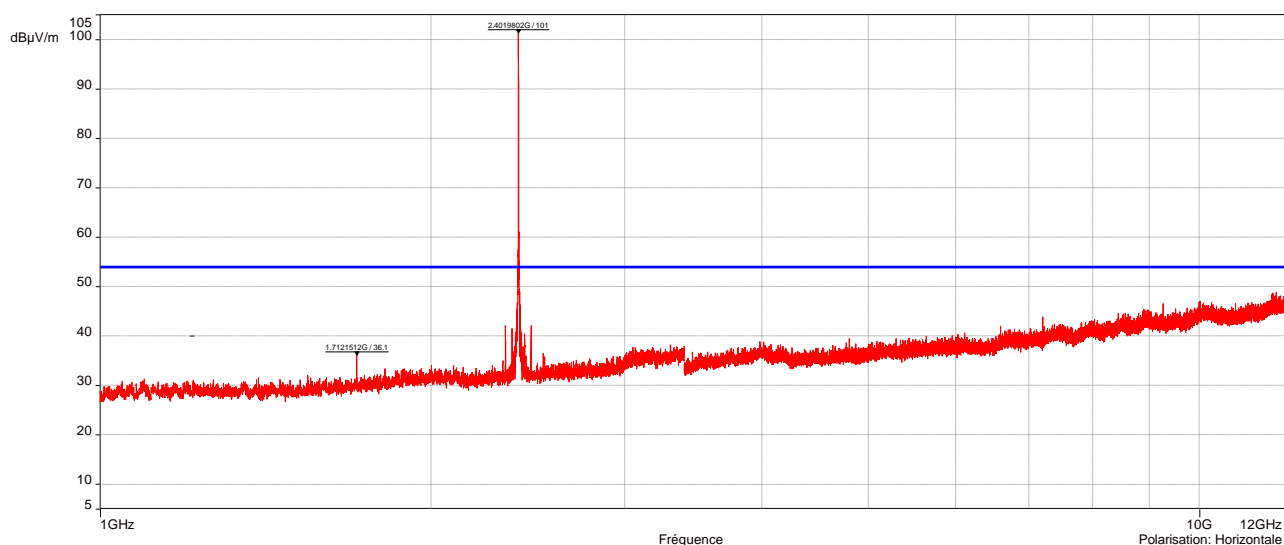
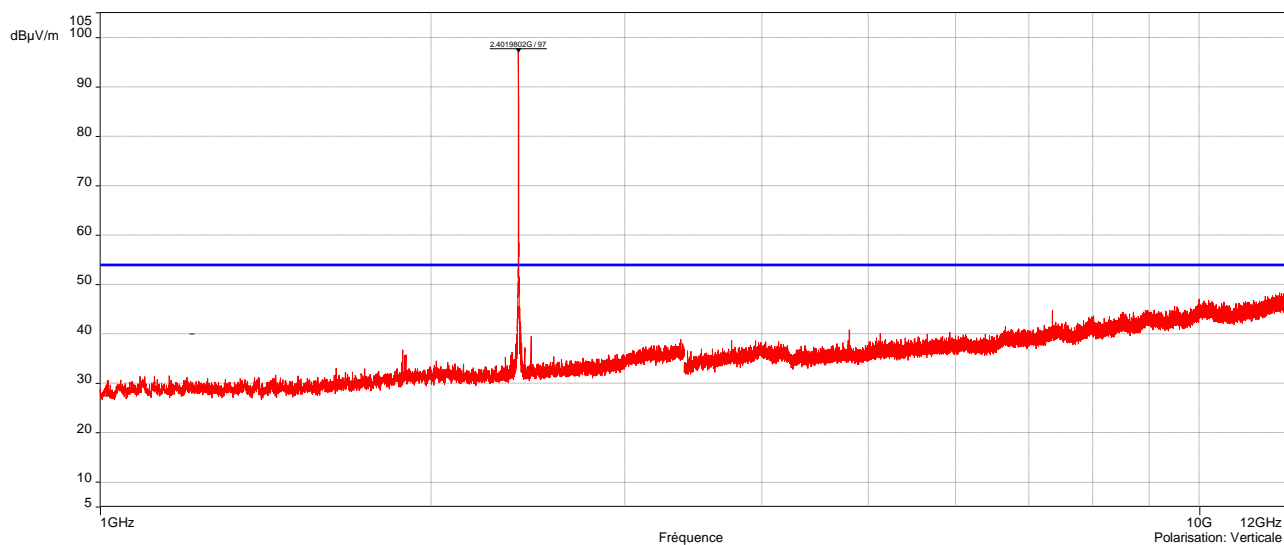
Frequency 2426 MHz in Tx (30MHz to 1GHz)

No curve. Measurement performed manually and no significant frequency has been found other than those given in the tables above between 30 MHz to 1 GHz.

Frequency 2480 MHz in Tx (30MHz to 1GHz)

No curve. Measurement performed manually and no significant frequency has been found other than those given in the tables above between 30 MHz to 1 GHz.

Frequency 2402 MHz in Tx (1GHz to 25GHz)



From 12GHz to 25GHz, a manual verification has been made.

Frequency 2426 MHz in Tx (1GHz to 25GHz)

No curve. Measurement performed manually and no significant frequency has been found other than those given in the tables above between 1 GHz to 25 GHz.

Frequency 2480 MHz in Tx (1GHz to 25GHz)

No curve. Measurement performed manually and no significant frequency has been found other than those given in the tables above between 1 GHz to 25 GHz.

Rx mode

Frequency (MHz)	Height (cm)	Polarization (H or V)	Azimuth (°)	Electro-magnetic field (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
-	-	-	-	-	-	-

H : Horizontal – V : Vertical

No significant frequency has been found between 9 kHz and 25 GHz.

Test conclusion: The equipment complies with the requirements of the standards.

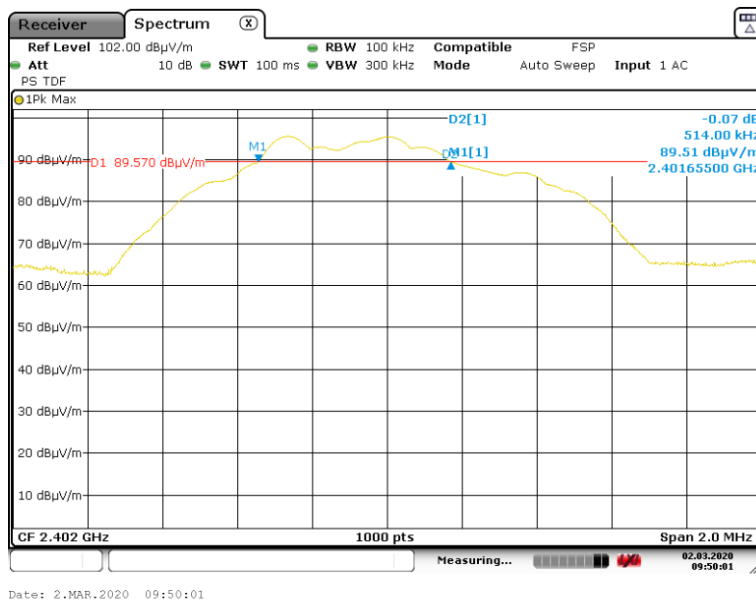
« □□□ End of report, 2 annexes to be forwarded □□□ »

ANNEX 1:

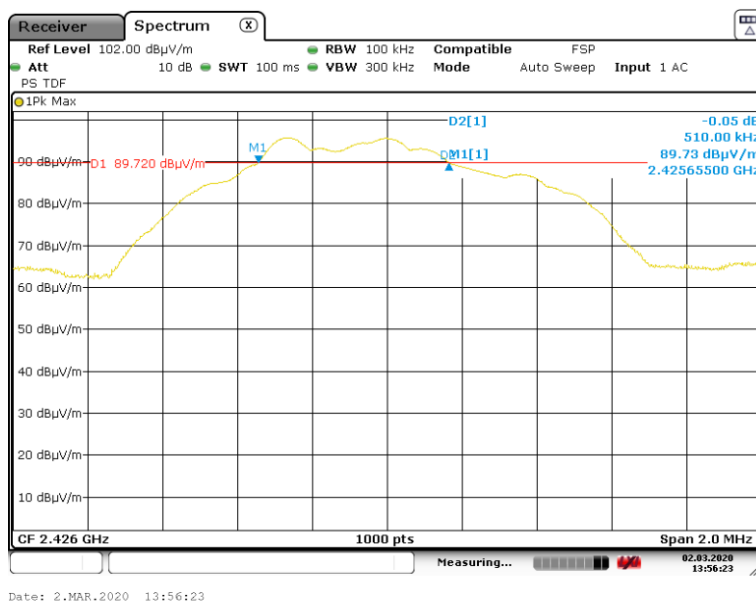
6 dB BANDWIDTH
99% BANDWIDTH

6 dB BANDWIDTH

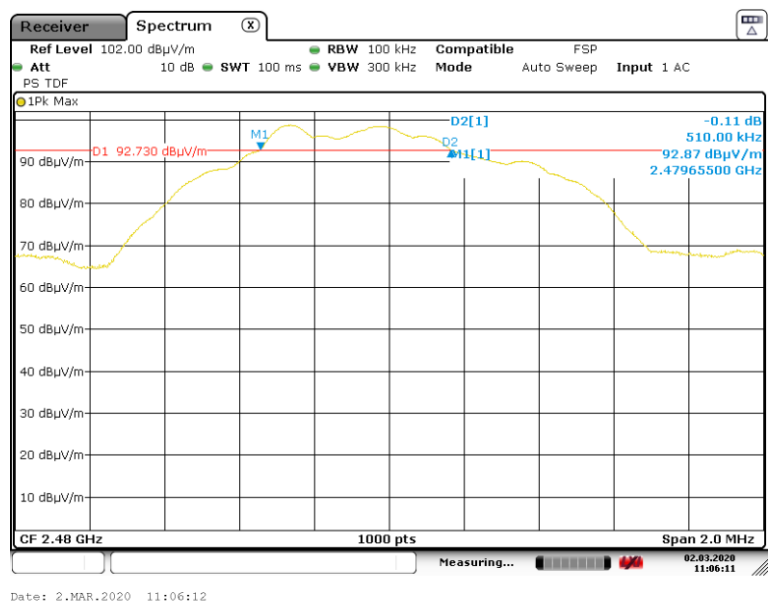
Frequency 2402 MHz



Frequency 2426 MHz

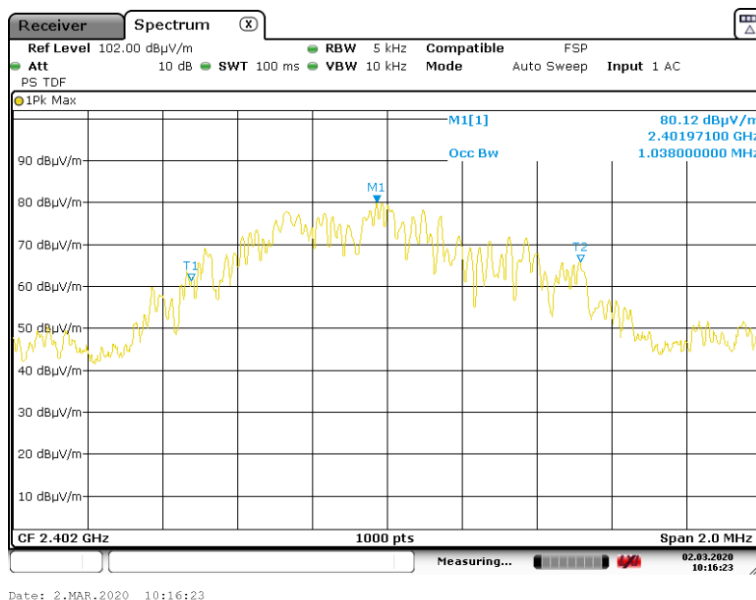


Frequency 2480 MHz

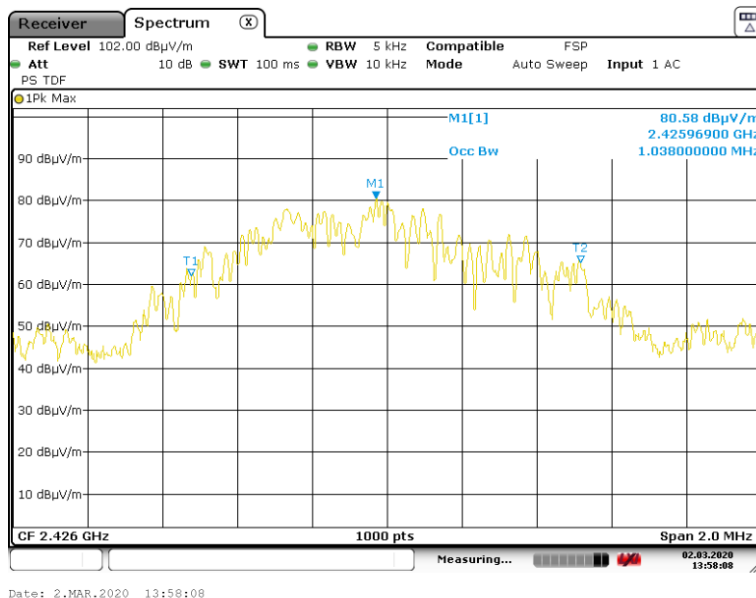


99% BANDWIDTH

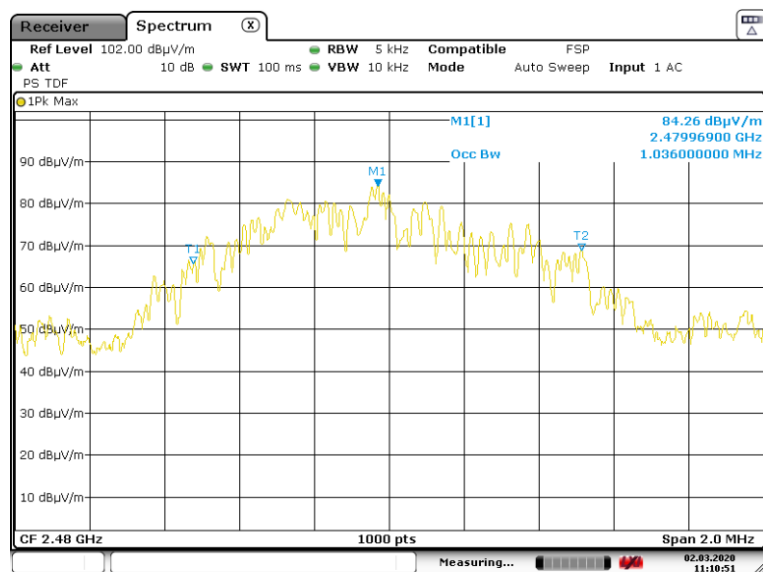
Frequency 2402 MHz



Frequency 2426 MHz



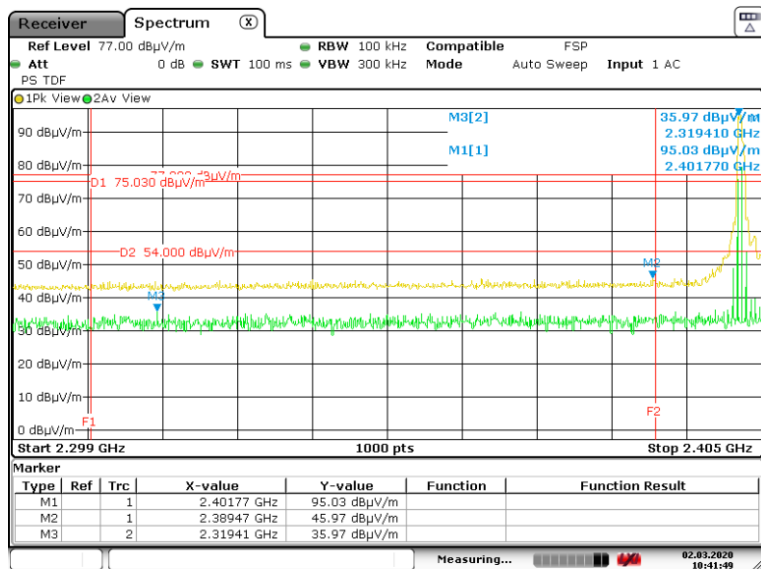
Frequency 2480 MHz



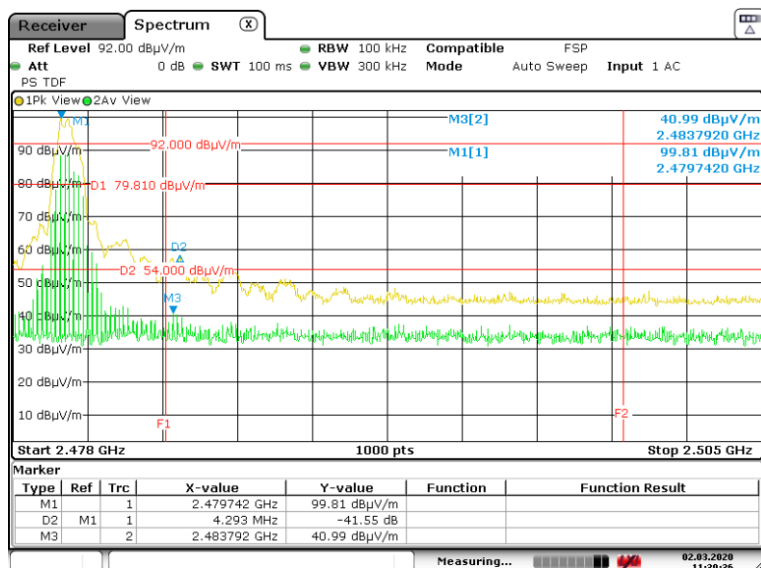
Date: 2.MAR.2020 11:10:51

ANNEX 2:

BAND EDGE



Date: 2.MAR.2020 10:41:50



Date: 2.MAR.2020 11:39:37