



TEST REPORT nr. R15189101

Federal Communication Commission (FCC)

Test item

Description: TRANSCEIVER UNIT
Trademark: AUTEC
Model/Type: Model FJM Type NZ422
FCC ID: OQA-FJMNZ422

Test Specification

Standard: FCC Rules & Regulations, Title 47:2014
Part 15 paragraph(s): 203, 204, 207, 209 and 247

Client's name: AUTEC S.r.l.
Address: Via Pomaroli, 65 – 36030 Caldogno (VI) – ITALY

Manufacturer's name : Same as client
Address: --

Report

Tested by: G. Gandini – Technician
Approved by: R. Beghetto – Laboratory Manager
Date of issue: 16.03.16
Contents: 59 pages

G. Gandini

R. Beghetto

This test report shall not be reproduced except in full without the written approval of CMC.
The test results presented in this report relate only to the item tested.



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1. Summary

Standard:

FCC Rules & Regulations, Title 47:2014
Part 15 paragraph(s): 203, 204, 207, 209 and 247

Test specifications	Environmental Phenomena	Tests sequence	Result
Part 15.203	Antenna requirements	1	Complies
Part 15.207	Conducted emissions	--	N.A. (+)
Part 15.209	Radiated emissions	2	Complies
Part 15.247	20 dB Bandwidth	3	Complies
Part 15.247	Channel Separation	5	Complies
Part 15.247	Number of Hopping Channel	6	Complies
Part 15.247	Time of occupancy	7	Complies
Part 15.247	Band edge	8	Complies
Part 15.209 and 15.247	Peak Output Power	9	Complies
Part 15.209	Spurious emission	10	Complies
Part 1.1310	Maximum permissible exposure	11	Complies

(+) Devices which only employ battery power. See FCC Part 15.207 (c)

The Test Report was given to the Client representatives for necessary documentation of ratification of the tested equipment and it is valid for the FCC certification

2. Description of Equipment under test (EUT)

Power supply : 7,2 Vdc from battery

Serial Number.....: --

Type of equipment : ☒ Transmitter Unit

☒ Receiver Unit

Type of station : ☐ Fixed station

- Portable station

- ☒ Mobile station

Frequency band : F_L : 915,05 MHz F_M : 921,0 MHz F_H : 927,95 MHz

2.1 Test Site

Company.....: CMC Centro Misure Compatibilità S.r.l.

Address : Via della Fisica, 20
36016 Thiene (VI) – ITALY

Test site facility's FCC registration number: 271947

3. Testing and sampling

Date of receipt of test item : 02.10.15

Testing start date : 02.10.15

Testing end date: 04.03.16

Samples tested nr.....: 1

Sampling procedure. : Equipment used for testing was picked up by the manufacturer, at the end of the production process with random criterion

Internal identification : adhesive label with the product number
P151080

4. Operative conditions

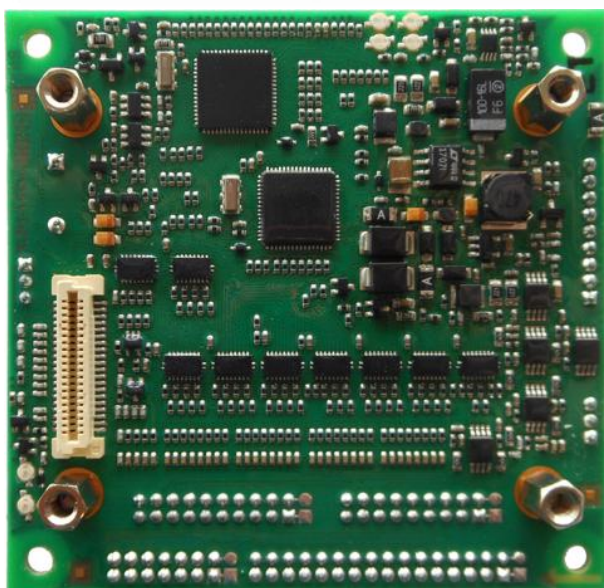
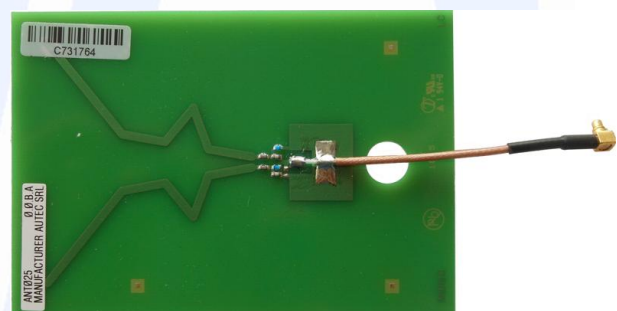
EUT exercising : EUT in continuous transmission at maximum power



5. Photograph(s) of EUT

5.1 Photograph(s) of EUT









6. Equipment list

<i>Id. number</i>	<i>Manufacturer</i>	<i>Model</i>	<i>Description</i>	<i>Serial number</i>	<i>Last calibration</i>	<i>Due date calibration</i>
CMC S010	Rohde & Schwarz	ESH3-Z2	Impulses Limiting Device	---	January '16	January '17
CMC S108	EMCO	3115	Horn Antenna	9811-5622	May '13	May '16
CMC S127	Schaffner	HLA6120	Loop Antenna	1191	January '16	January '19
CMC S129	Rohde & Schwarz	ESPI7	Receiver	836.914/004	January '16	January '17
CMC S136	Schwarzbeck	VULB 9163	Broadband Antenna	9136-205	May '13	May '16
CMC S164	Rohde & Schwarz	ESU26	EMC interference receiver	100052	January '16	January '17
CMC S200	Schwarzbeck	NSLK 8128	V-LISN	8128-273	January '16	January '17
CMC S227	Rohde & Schwarz	ESR7	EMI Test Receiver 7GHz	101121	January '16	January '17



7. Measurement uncertainty

Test	Expanded Uncertainty	note
Conducted Emission		
(50Ω/50μH AMN) - (9 kHz – 150 kHz)	±3.6 dB	1
(50Ω/50μH AMN) - (150 kHz – 30 MHz)	±3.0 dB	1
(Voltage probe) - (150 kHz – 30 MHz)	±2.8 dB	1
(50Ω/5μH AMN) - (150 kHz – 108 MHz)	±2.6 dB	1
Discontinuous Conducted Emission		
Conducted Emission (50Ω/50μH AMN) - (150 kHz – 30 MHz)	±3.0 dB	1
Disturbance Power (30 MHz – 300 MHz)		
	±3.7 dB	1
Radiated Emission		
(0,150 MHz – 30 MHz)	±4.0 dB	1
(30 MHz – 1000 MHz)	±4.3 dB	1
(1 GHz – 6 GHz)	±4.5 dB	1
Electromagnetic field EMF		
	±10.5 %	1
Harmonic current emissions test		
	±1.8 %	1
Voltage fluctuation and flicker test		
	±2.6 %	1
Insertion loss test		
	±2.0 dB	1
Radiated electromagnetic disturbance test (loop antenna)		
	±2.1 dB	1
Radiated electromagnetic field immunity test		
	0.81 V/m at 3V/m	1
Pulse modulated radiated electromagnetic field immunity test		
	0.81 V/m at 3V/m	1
Injected currents immunity test		
	0.45 V at 3V	1
Bulk current		
	3.7 mA at 60 mA	1
Power frequency magnetic field immunity test		
	0.1 A/m at 10 A/m	1
Effective radiated power (F < 1GHz)		
	±4.3 dB	1
Effective radiated power (F > 1GHz)		
	±3.7 dB	1
Frequency error		
	< 1x10 ⁻⁷	1
Modulation bandwidth		
	< 1x10 ⁻⁷	1
Conducted RF power and spurious emission		
	±0.7 dB	1
Adjacent channel power		
	±1.2 dB	1
Blocking		
	±1.2 dB	1
Electrostatic discharge immunity test		
		2
Electrical fast transients / burst immunity test		
		2
Surge immunity test		
		2
Pulse magnetic field immunity test		
		2
Damped oscillatory magnetic field immunity test		
		2
Short interruption immunity test		
		2
Voltage transient emission test		
	±2.2 %	1
Transient immunity test		
		2

Rev_15_01 date 04/05/2015

Note 1:

The expanded uncertainty reported according to EN55016-4-2:2011 is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of p = 95%

Note 2:

It has been demonstrated that the used test equipment meets the specified requirements in the standard with at least a 95% confidence, covering factor k = 2.



8. Reference documents

Reference no.	Description
FCC Rules and Regulation Title 47 part 15:2014	--
ANSI C63.4:2014	American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz – 40 GHz
ANSI C63.10:2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
Internal Procedure PM001 rev. 2.0 (Quality Manual)	Measure Procedure
Internal procedure INC_M rev. 8.2 (Quality Manual)	Measurement uncertainty calculation



9. Deviation from test specification

In agreement with the client, emission tests were performed with peak detector.

At the frequencies where the measures exceed the limit or within 6 dB from it, the test was repeated with quasi-peak detector and/or average detector.

10. Test case verdicts

Test case does not apply to the test object..... : N.A.

Test item does meet the requirement..... : Complies

Test item does not meet the requirement..... : Does not comply

Test not performed : N.E.

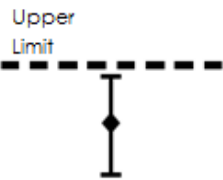
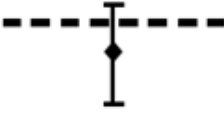
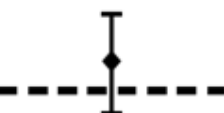


11. Results

In this clause tests results are reported.

Measurement uncertainty is in accordance with document CMC INC_M rev. 8.2.

Judgement of compliance:

Case 1	Case 2	Case 3	Case 4
			
The sample complies with the requirement.	The sample complies with the requirement.	The sample does not comply with the requirement.	The sample does not comply with the requirement.
The measurement results is within the specification limit when the measurement uncertainty is taken into account.	It is not possible to state compliance using a 95% coverage probability for the expanded uncertainty although the measurement result is below the limit.	It is not possible to state compliance using a 95% coverage probability for the expanded uncertainty also the measurement result is upper the limit.	The measurement results is outside the specification limit when the measurement uncertainty is taken into account.

In agreement with ILAC-G8: 03/2009 Guidelines on the Reporting of Compliance with Specification.



11.1 Antenna requirements

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.203 and 15.204
- DA 00-705
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Laboratory

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

--
Measurement uncertainty: See clause 7 of this test report

Test specification

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.
The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, § 15.213, § 15.217, § 15.219, or § 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded

Environmental conditions

Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
20	100	45

Result

Antenna Type	External R.F. power amplifier	Gain	Remarks	Results
Integral antenna	Not Present	--	--	Complies

Result: The requirements are met



11.2 Radiated emissions

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part. 15.209
- DA 00-705
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Semi-anechoic chamber

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S108, CMC S127, CMC S136, CMC S164
Measurement uncertainty: See clause 7 of this test report

Test specification

Port: Enclosure
Frequency range: 0,009 MHz – 1000 MHz
Antenna polarization: Horizontal (H) – Vertical (V)
EUT – Antenna distance: 3 m

Environmental conditions

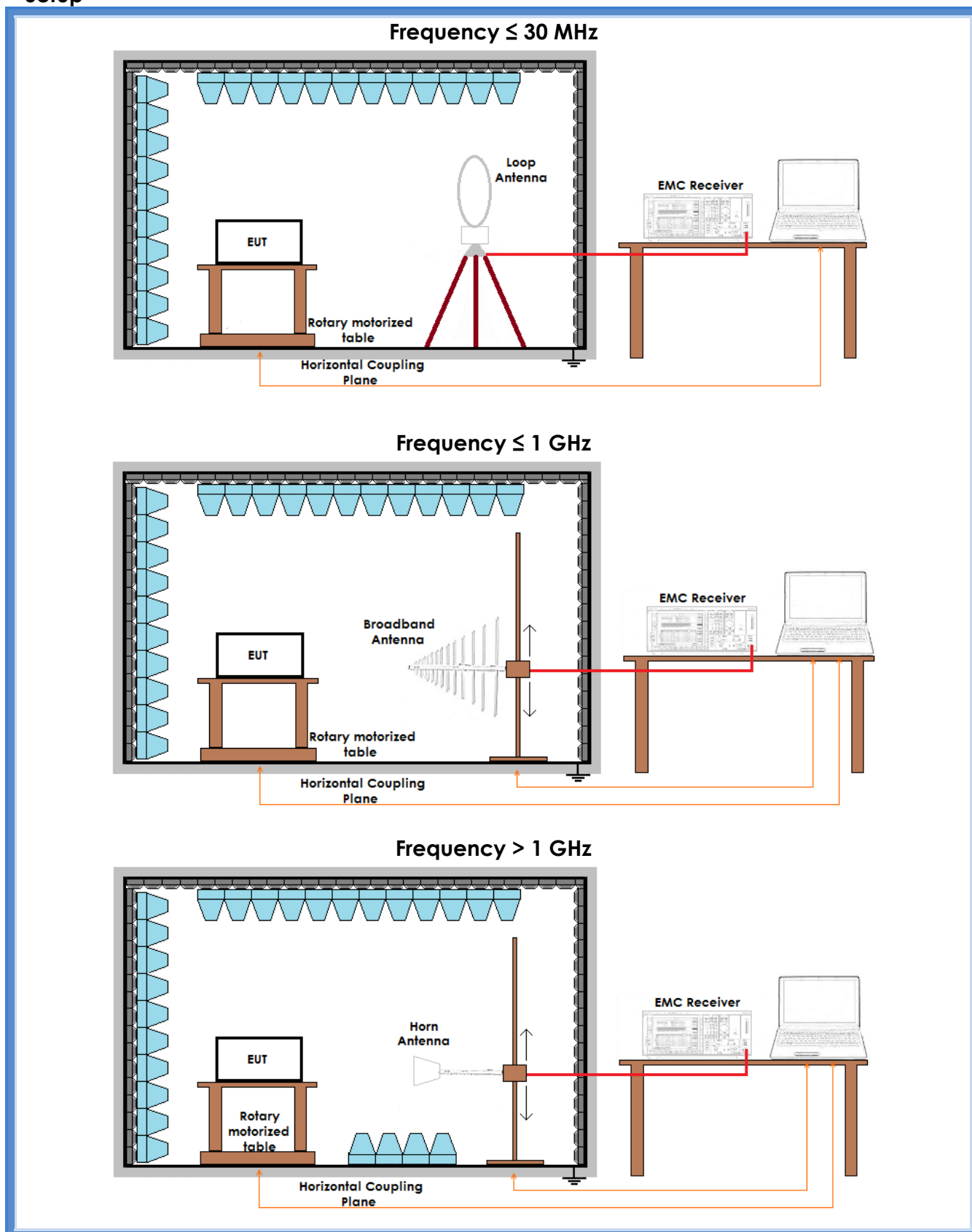
Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
22	100	45

Acceptance limits

Frequency range (MHz)	Limits [dB(μV/m)]
0,009 to 0,490	118,51 to 83,80
0,490 to 1,705	63,80 to 52,97
1,705 to 30	59,54
30 to 88	30
88 to 216	33,52
216 to 960	36,02
Above 960	43,98

Remarks: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Setup





Result

Polarization	Frequency Range (MHz)	Graphs	Remarks	Result
Loop	0,009 – 30	G15189109	Worst case	Complies
V	30 – 1000	G15189103	Lowest frequency	Complies
H	30 – 1000	G15189104	Lowest frequency	Complies
V	30 – 1000	G15189106	Medium frequency	Complies
H	30 – 1000	G15189105	Medium frequency	Complies
V	30 – 1000	G15189107	Highest frequency	Complies
H	30 – 1000	G15189108	Highest frequency	Complies
V	1000 – 10000	G15189102	Worst case	Complies
H	1000 – 10000	G15189101	Worst case	Complies

Remarks: Peaks above the limits are due to the main transmitting frequencies

Graphs Legend

PK: Peak; QP [1s] (quasi-peak at 1 second) values are marked with a +

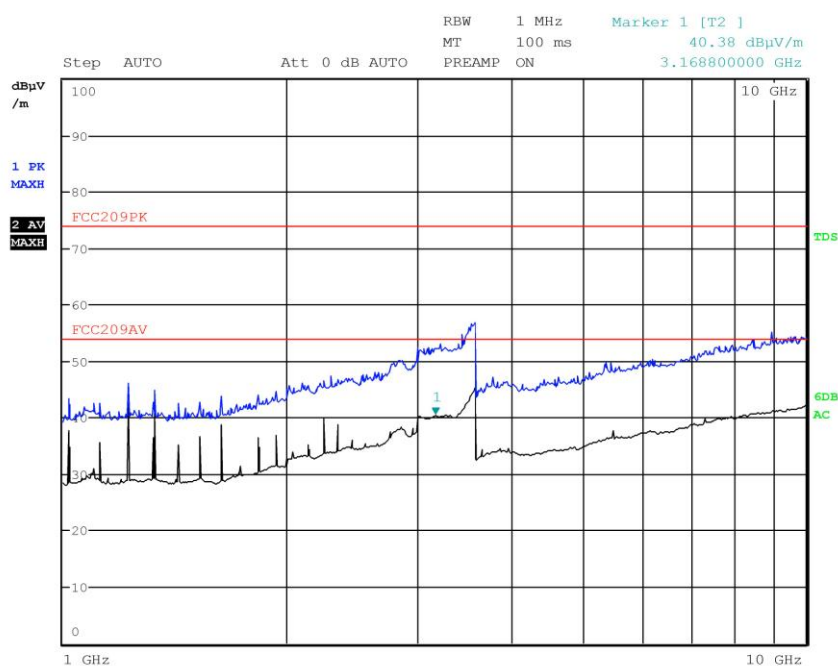
AV: Average; AV [1s] (average at 1 second) values are marked with a x



Graphs

G15189101

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-Rx
Operator Gandini 15189101
Test Spec
Horiz



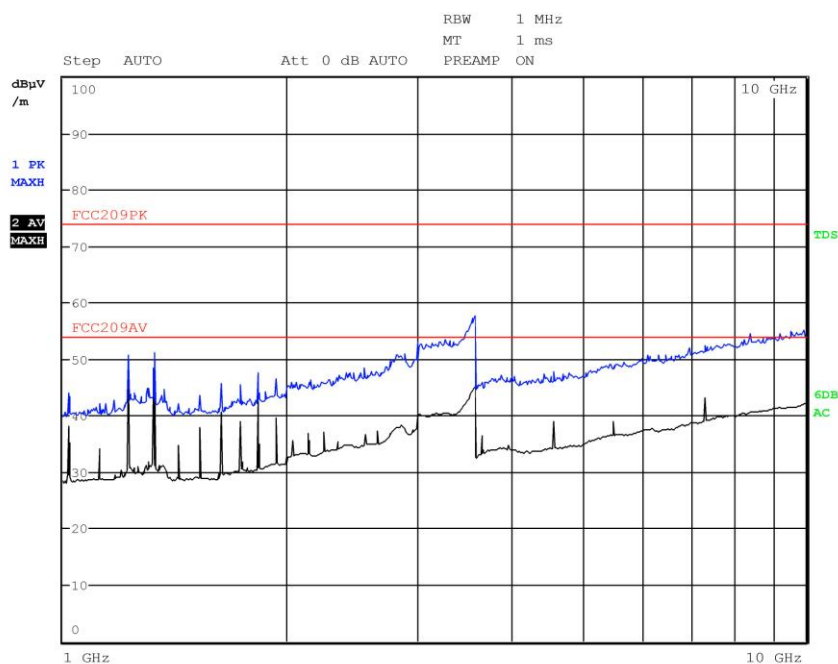
Final Measurement

Meas Time: 1 s
Margin: 6 dB
Peaks: 0



G15189102

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-Rx
Operator Gandini 15189102
Test Spec
Vert



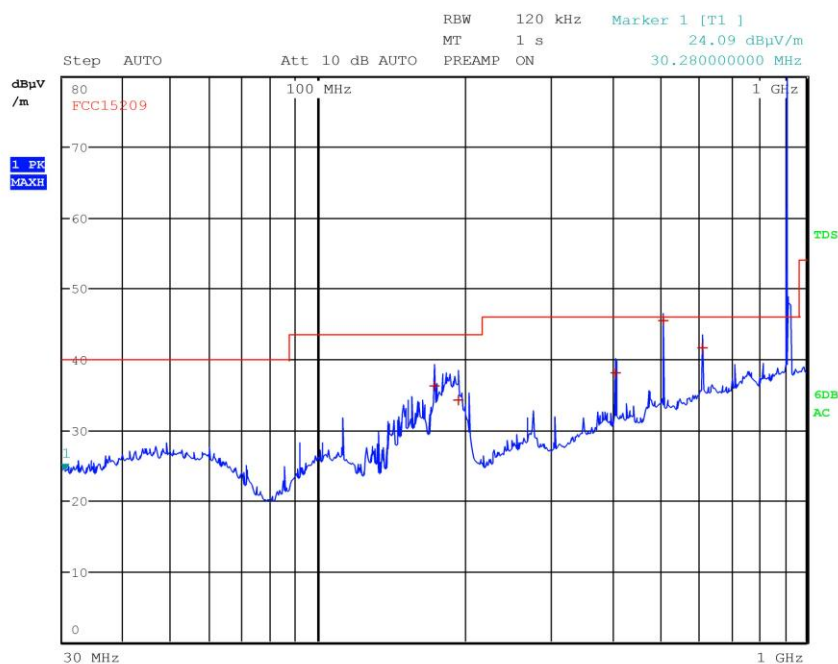
Final Measurement

Meas Time: 1 s
Margin: 6 dB
Peaks: 0



G15189103

Meas Type Emission 30-1000MHz
Equipment under Test
Manufacturer
OP Condition In funzione Tx attiva F min
Operator Panozzo 15189103
Test Spec
Vert



Final Measurement

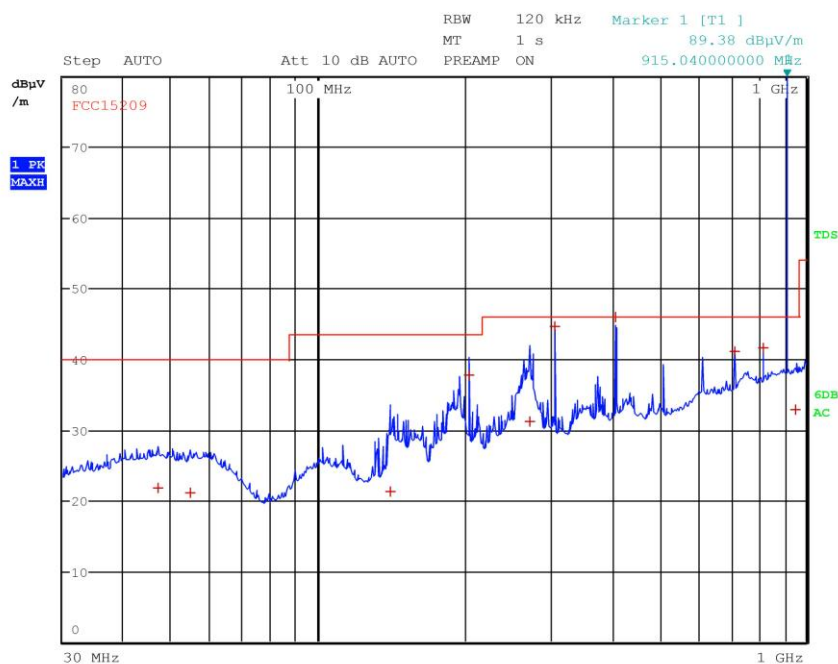
Meas Time: 1 s
Margin: 6 dB
Subranges: 5

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	173.400000000 MHz	36.24	Quasi Peak	-7.28
1	193.800000000 MHz	34.23	Quasi Peak	-9.29
1	408.000000000 MHz	38.04	Quasi Peak	-7.98
1	510.040000000 MHz	45.39	Quasi Peak	-0.63
1	612.040000000 MHz	41.55	Quasi Peak	-4.47



G15189104

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-Rx - Fmin
Operator Gandini 15189104
Test Spec
Horiz



Final Measurement

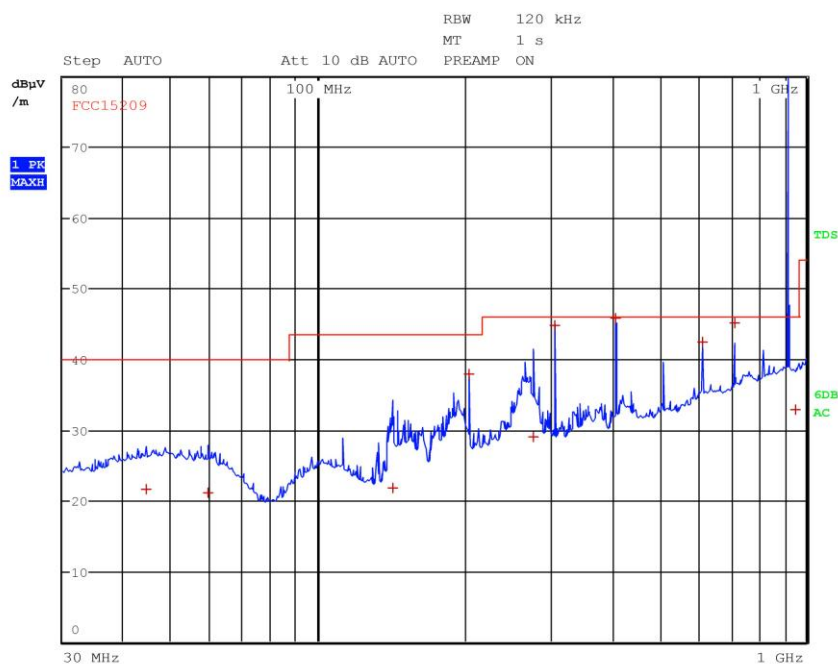
Meas Time: 1 s
Margin: 20 dB
Subranges: 10

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	46.920000000 MHz	21.70	Quasi Peak	-18.30
1	54.800000000 MHz	21.17	Quasi Peak	-18.83
1	140.720000000 MHz	21.31	Quasi Peak	-22.21
1	204.006346154 MHz	37.68	Quasi Peak	-5.84
1	271.960000000 MHz	31.17	Quasi Peak	-14.85
1	306.000000000 MHz	44.67	Quasi Peak	-1.35
1	408.016025641 MHz	45.97	Quasi Peak	-0.05
1	714.040000000 MHz	41.09	Quasi Peak	-4.93
1	816.000000000 MHz	41.65	Quasi Peak	-4.37
1	951.280000000 MHz	32.88	Quasi Peak	-13.14



G15189105

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-Rx - Fmid
Operator Gandini 15189105
Test Spec
Horiz



Final Measurement

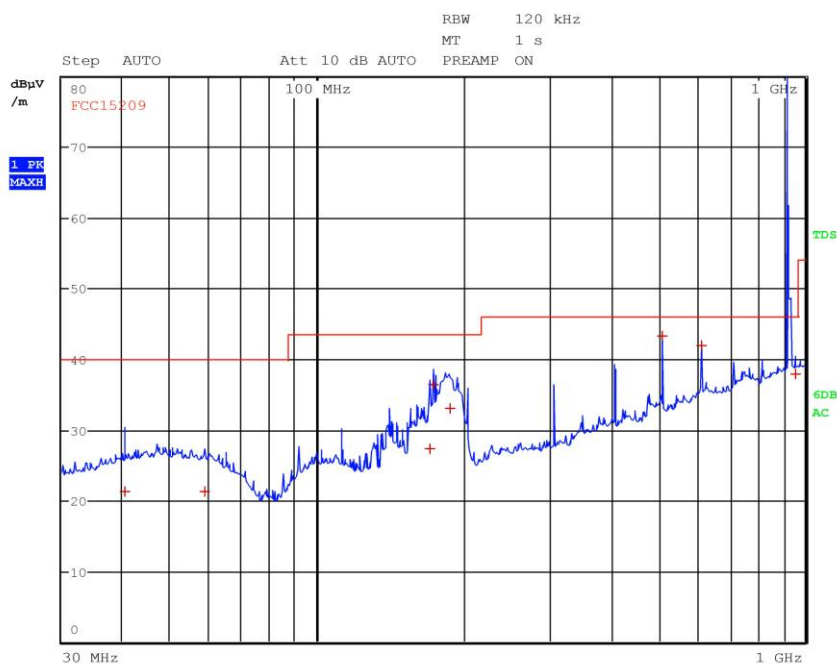
Meas Time: 1 s
Margin: 20 dB
Subranges: 10

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	44.480000000 MHz	21.65	Quasi Peak	-18.35
1	59.400000000 MHz	21.15	Quasi Peak	-18.85
1	142.379679487 MHz	21.79	Quasi Peak	-21.73
1	204.000000000 MHz	37.96	Quasi Peak	-5.56
1	275.920000000 MHz	29.03	Quasi Peak	-16.99
1	306.009615385 MHz	44.71	Quasi Peak	-1.31
1	408.000000000 MHz	45.74	Quasi Peak	-0.28
1	612.040000000 MHz	42.50	Quasi Peak	-3.52
1	714.040000000 MHz	45.17	Quasi Peak	-0.85
1	952.680000000 MHz	32.90	Quasi Peak	-13.12



G15189106

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-Rx - Fmid
Operator Gandini 15189106
Test Spec
Vert



Final Measurement

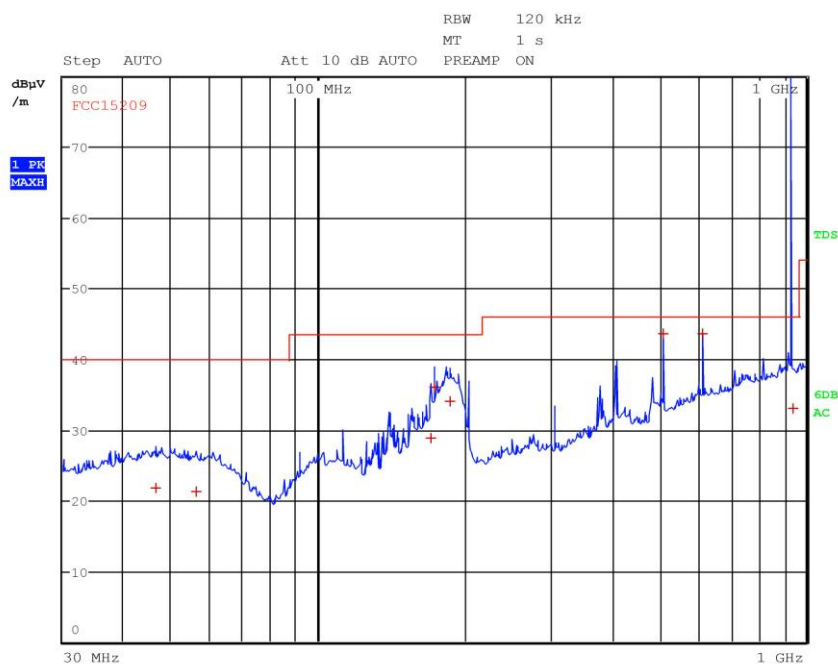
Meas Time: 1 s
Margin: 20 dB
Subranges: 8

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	40.480000000 MHz	21.26	Quasi Peak	-18.74
1	58.760000000 MHz	21.24	Quasi Peak	-18.76
1	169.960000000 MHz	27.30	Quasi Peak	-16.22
1	173.408012821 MHz	36.37	Quasi Peak	-7.15
1	186.848012821 MHz	33.06	Quasi Peak	-10.46
1	510.000000000 MHz	43.28	Quasi Peak	-2.74
1	612.040000000 MHz	41.91	Quasi Peak	-4.11
1	955.600000000 MHz	37.97	Quasi Peak	-8.05



G15189107

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-Rx - Fmax
Operator Gandini 15189107
Test Spec
Vert



Final Measurement

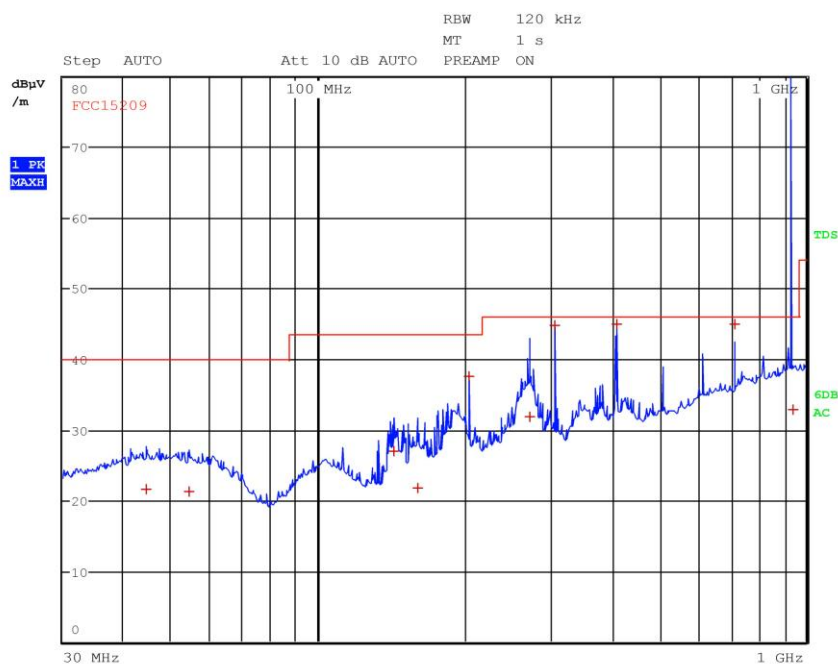
Meas Time: 1 s
Margin: 20 dB
Subranges: 8

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	46.480000000 MHz	21.71	Quasi Peak	-18.29
1	56.400000000 MHz	21.25	Quasi Peak	-18.75
1	170.160000000 MHz	28.89	Quasi Peak	-14.63
1	173.400000000 MHz	35.99	Quasi Peak	-7.53
1	186.760000000 MHz	33.96	Quasi Peak	-9.56
1	510.000000000 MHz	43.67	Quasi Peak	-2.35
1	612.000000000 MHz	43.58	Quasi Peak	-2.44
1	940.240000000 MHz	32.94	Quasi Peak	-13.08



G15189108

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-Rx - Fmax
Operator Gandini 15189108
Test Spec
Horiz



Final Measurement

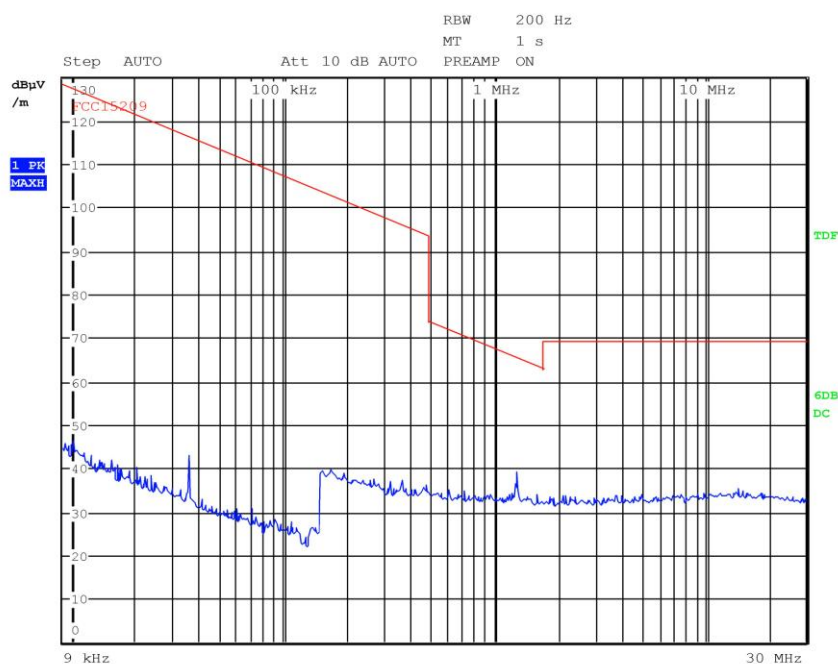
Meas Time: 1 s
Margin: 20 dB
Subranges: 10

Trace	Frequency	Level (dBμV/m)	Detector	Delta Limit/dB
1	44.520000000 MHz	21.58	Quasi Peak	-18.42
1	54.520000000 MHz	21.18	Quasi Peak	-18.82
1	143.080000000 MHz	26.95	Quasi Peak	-16.57
1	160.480000000 MHz	21.84	Quasi Peak	-21.68
1	204.006410256 MHz	37.58	Quasi Peak	-5.94
1	272.000000000 MHz	31.77	Quasi Peak	-14.25
1	306.009615385 MHz	44.87	Quasi Peak	-1.15
1	408.040000000 MHz	44.98	Quasi Peak	-1.04
1	714.040000000 MHz	44.91	Quasi Peak	-1.11
1	942.280000000 MHz	32.80	Quasi Peak	-13.22



G15189109

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Rx
Operator Gandini 15189109
Test Spec
Loop



Final Measurement

Meas Time: 1 s
Margin: 6 dB
Subranges: 0

Result: The requirements are met



11.3 20 dB bandwidth

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.247
- DA 00-705
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Laboratory

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S108, CMC S136, CMC S227
Measurement uncertainty: See clause 7 of this test report

Test specification

See FCC Part 15.247

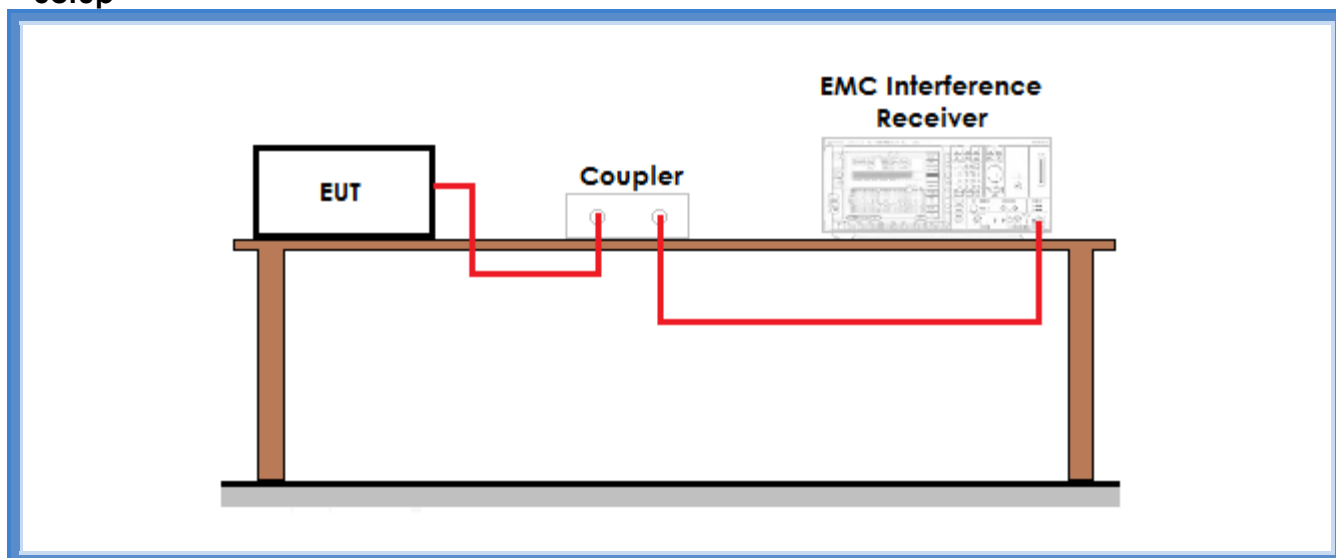
Environmental conditions

Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
22	100	45

Acceptance limits: The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz



Setup



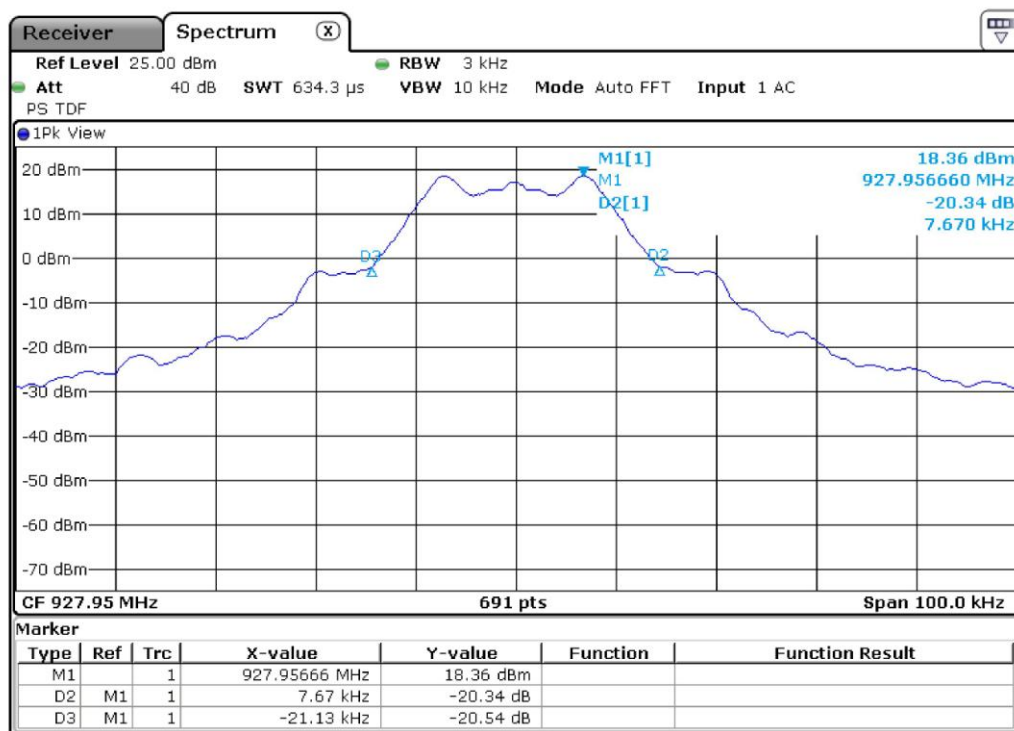
Result

Frequency (MHz)	Graphs	20 dB bandwidth (kHz)	Results
915,05	G15189118	28,55	Complies
921,00	G15189122	28,64	Complies
927,95	G15189111	28,97	Complies



Graphs

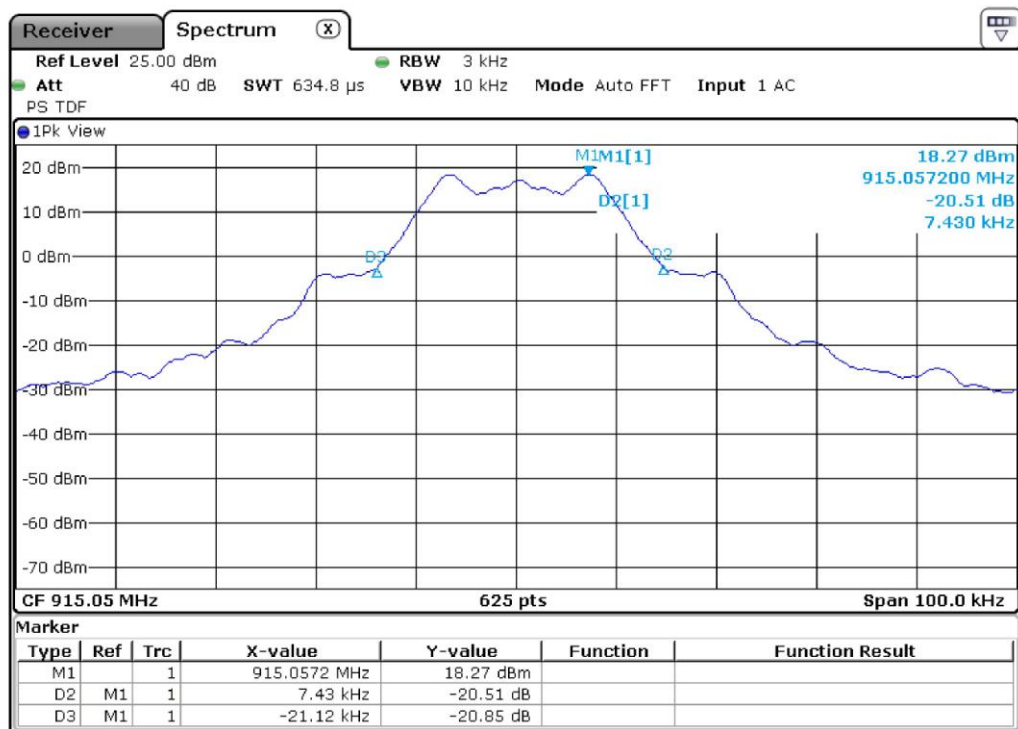
G15189111



Gandini 15189111-Fmax



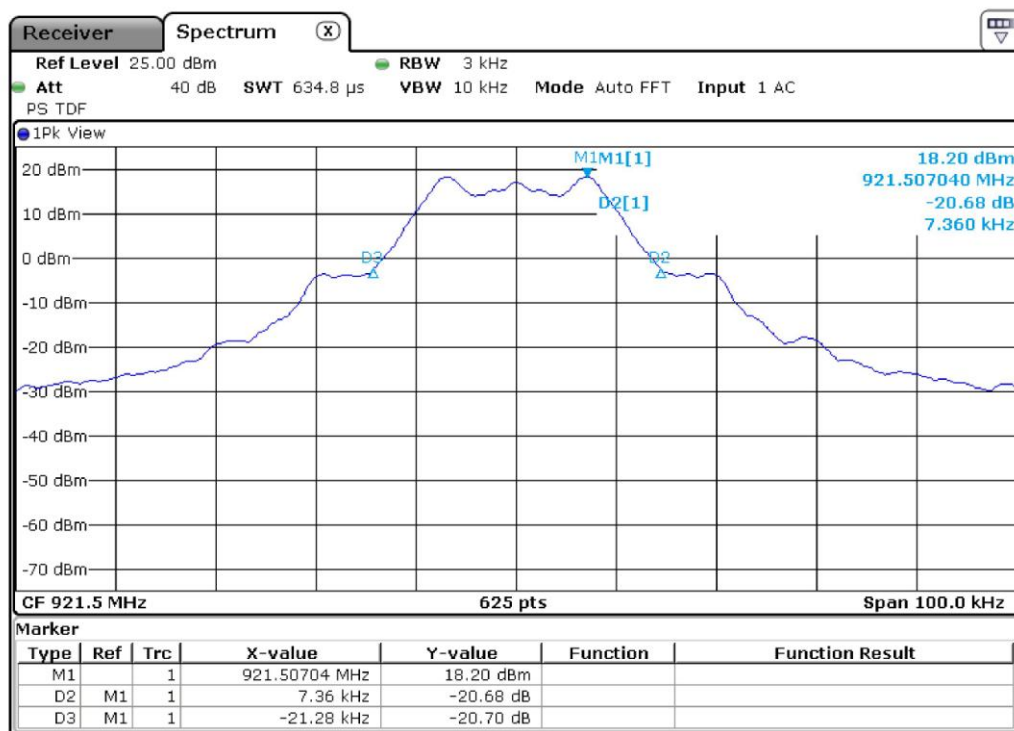
G15189118



Gandini 15189118-Fmin



G15189122



Gandini 15189122-Fmid

Result: The requirements are met



11.4 Channel separation

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.247
- DA 00-705
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Laboratory

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S108, CMC S136, CMC S227
Measurement uncertainty: See clause 7 of this test report

Test specification

See FCC Part 15.247

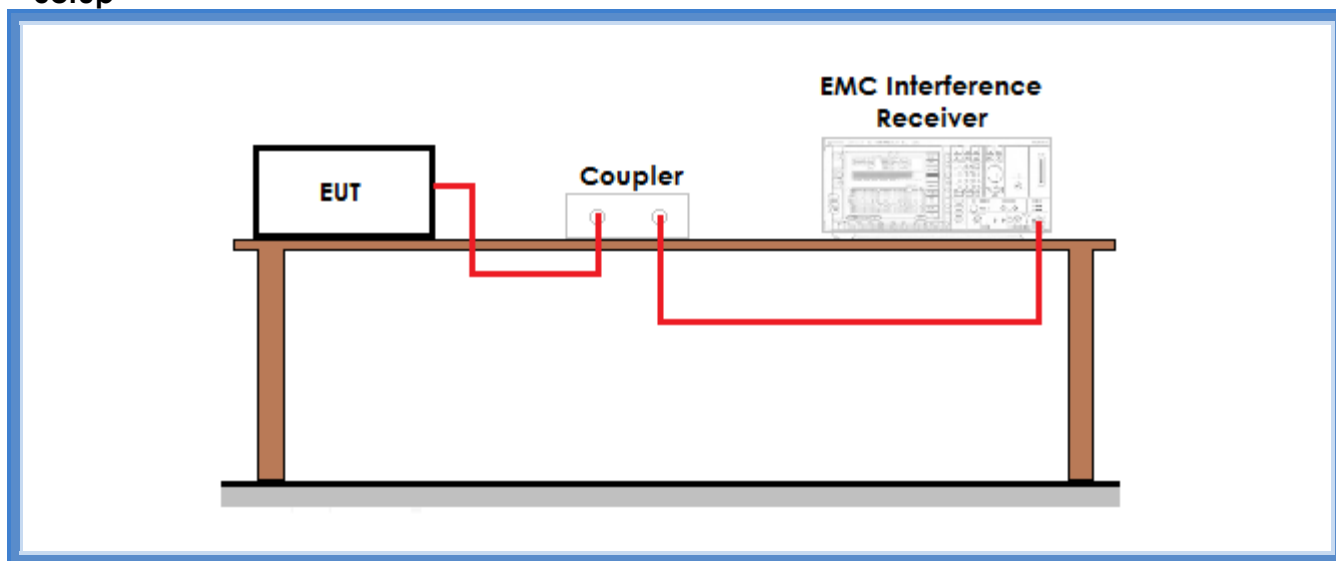
Environmental conditions

Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
20	100	42

Acceptance limits: frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483,5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW



Setup



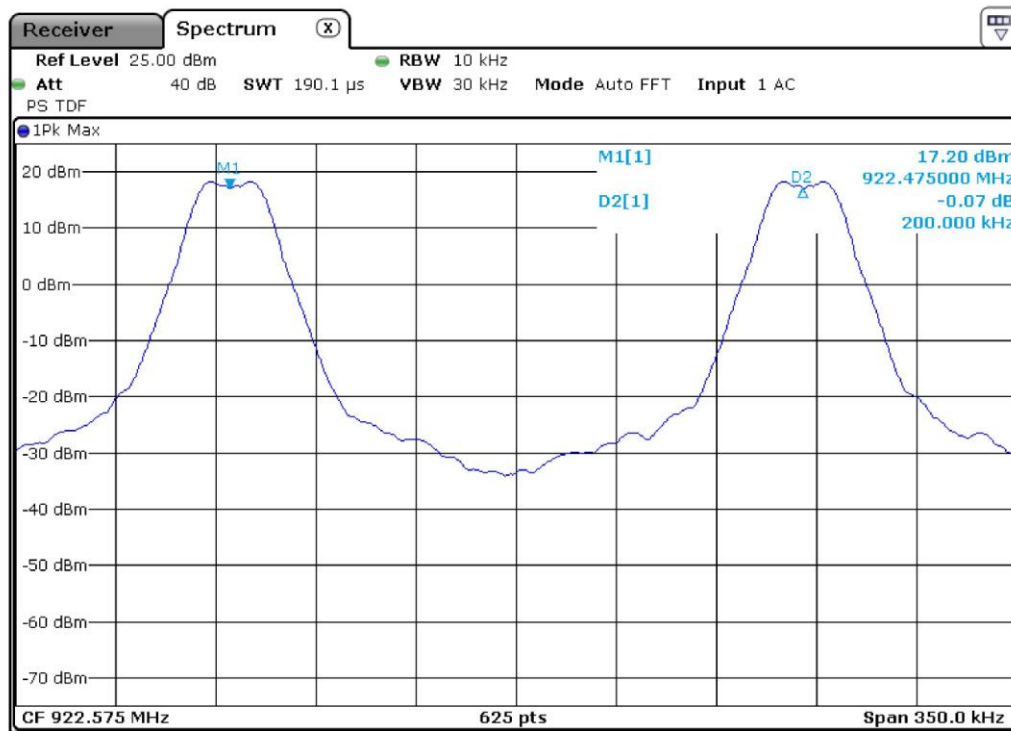
Result

Frequency band (MHz)	Graphs	Channel separation (kHz)	Results
902 – 928	G15189123	200	Complies



Graphs

G15189123



Gandini 15189123-Fhopping

Result: The requirements are met



11.5 Number of hopping channels

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.247
- DA 00-705
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Laboratory

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S108, CMC S136, CMC S227
Measurement uncertainty: See clause 7 of this test report

Test specification

See FCC Part 15.247

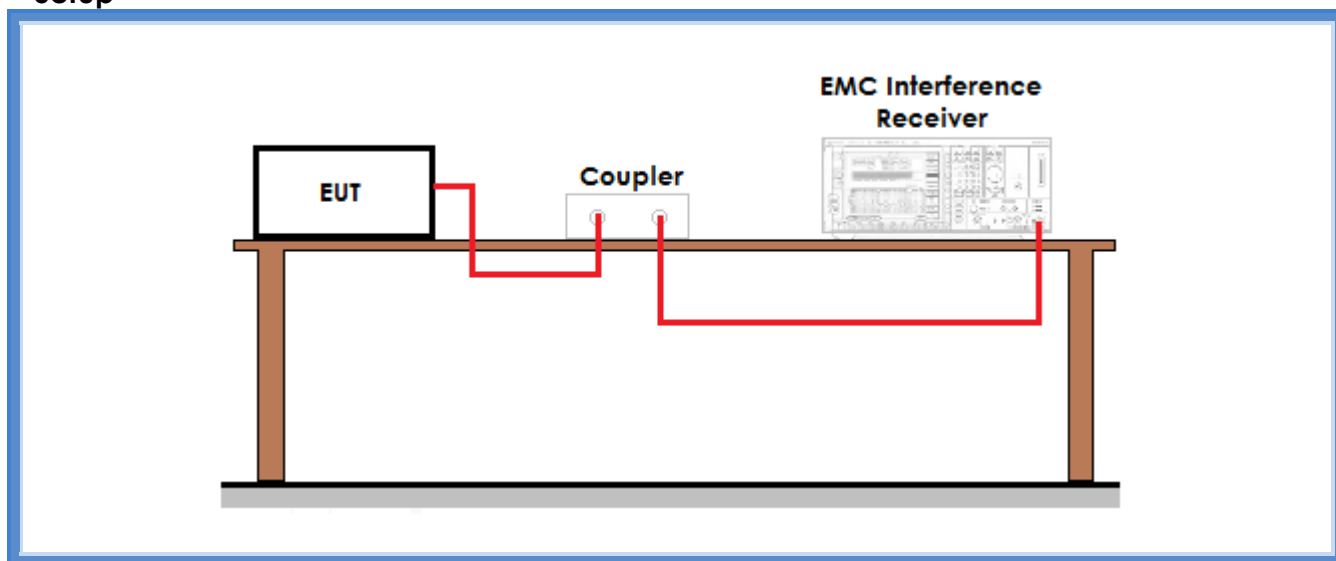
Environmental conditions

Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
20	100	42

Acceptance limits: for frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies. If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies. Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels.



Setup



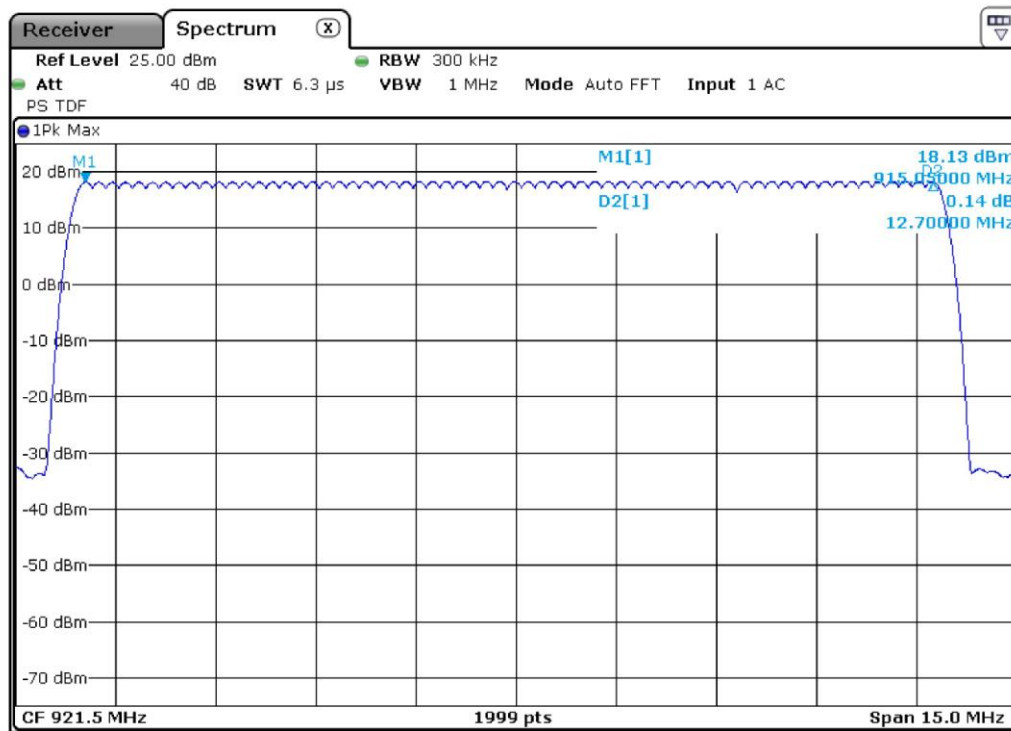
Result

Graphs	Number of hopping channels	Results
G15189126	64	Complies



Graphs

G15189126



Gandini 15189126-Fhopping

Result: The requirements are met



11.6 Time of occupancy

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.247
- DA 00-705
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Laboratory

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S108, CMC S136, CMC S164
Measurement uncertainty: See clause 7 of this test report

Test specification

See FCC Part 15.247

Environmental conditions

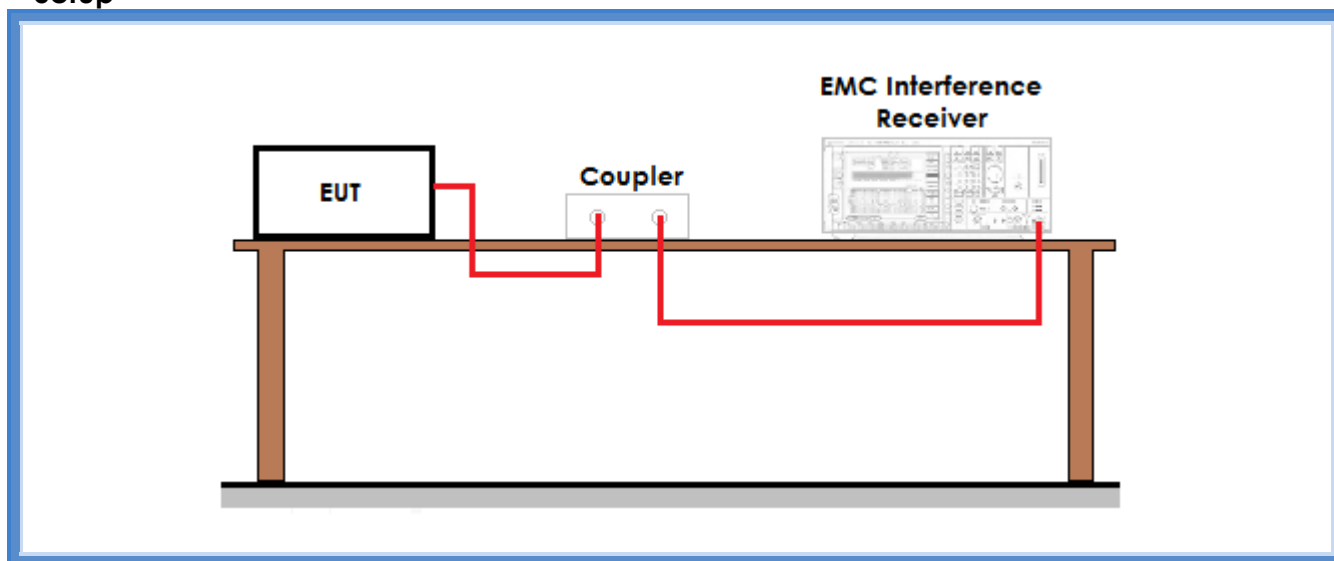
Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
22	100	42

Acceptance limits:

For frequency hopping systems operating in the 902–928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period



Setup



Result

Dwell time of transmission

Frequency (MHz)	Graphs	Dwell time (ms)
921,35	G15189130	19,8667

Number of transmissions per period (20 s)

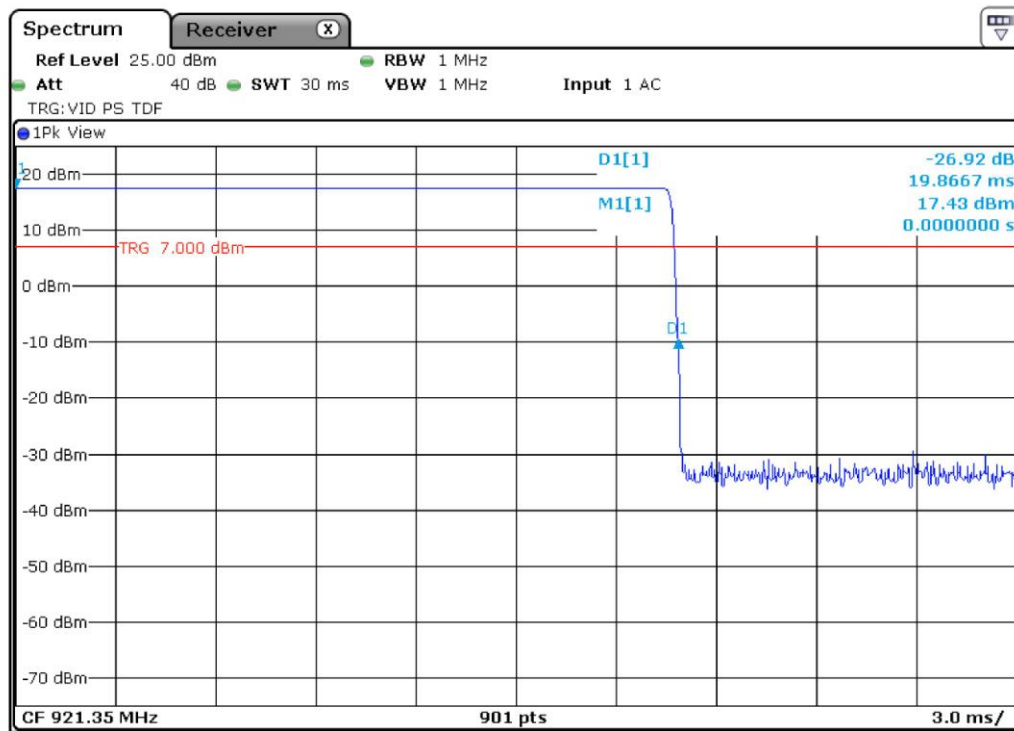
Frequency (MHz)	Time between 2 transmission on the same channel		Number of transmissions
920,45	G15189131	49,81 ms	6,27

Time of occupancy (Dwell time x Number of transmissions)	124,56 ms
---	-----------



Graphs

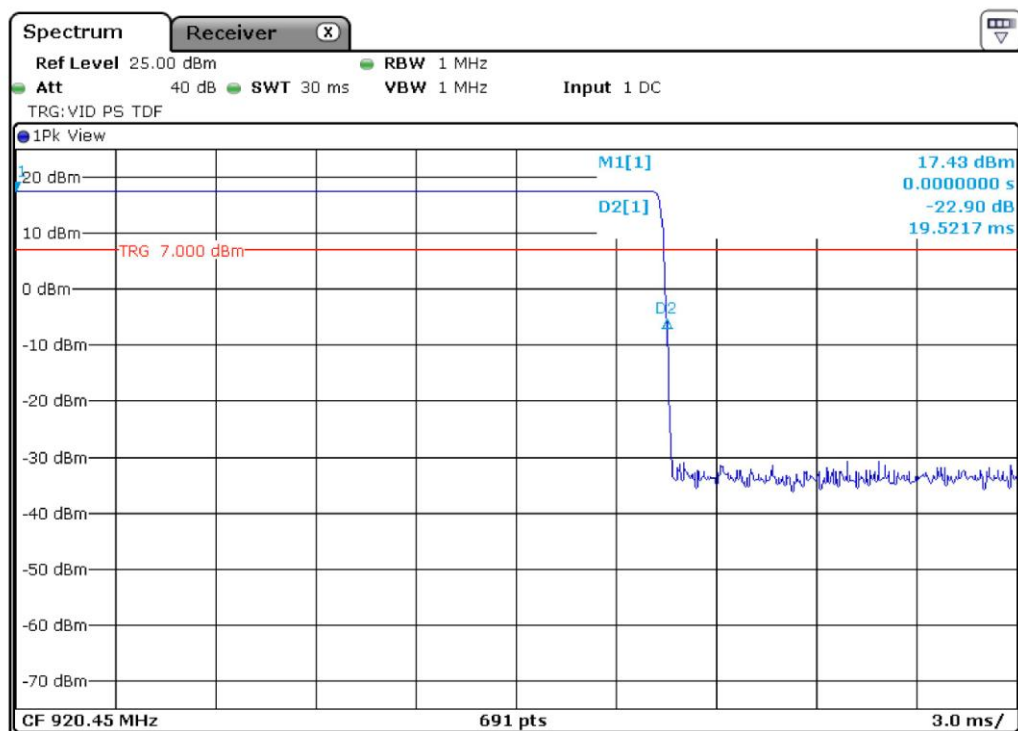
G15189130



Gandini 15189130-Fhopping



G15189131



Gandini 15189131-Fhopping

Result: The requirements are met



11.7 Band edge

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.247
- DA 00-705
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Laboratory

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S108, CMC S136, CMC S227
Measurement uncertainty: See clause 7 of this test report

Test specification

See FCC Part 15.247

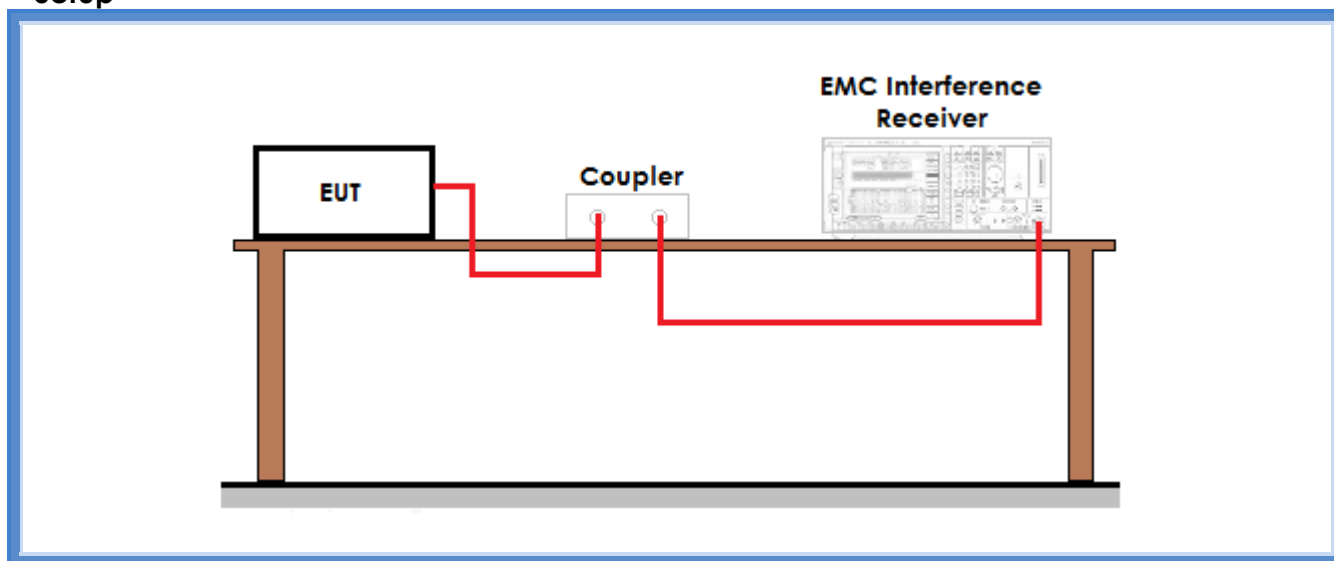
Environmental conditions

Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
22	100	45

Acceptance limits: operation within the band 902 – 928 MHz



Setup



Result

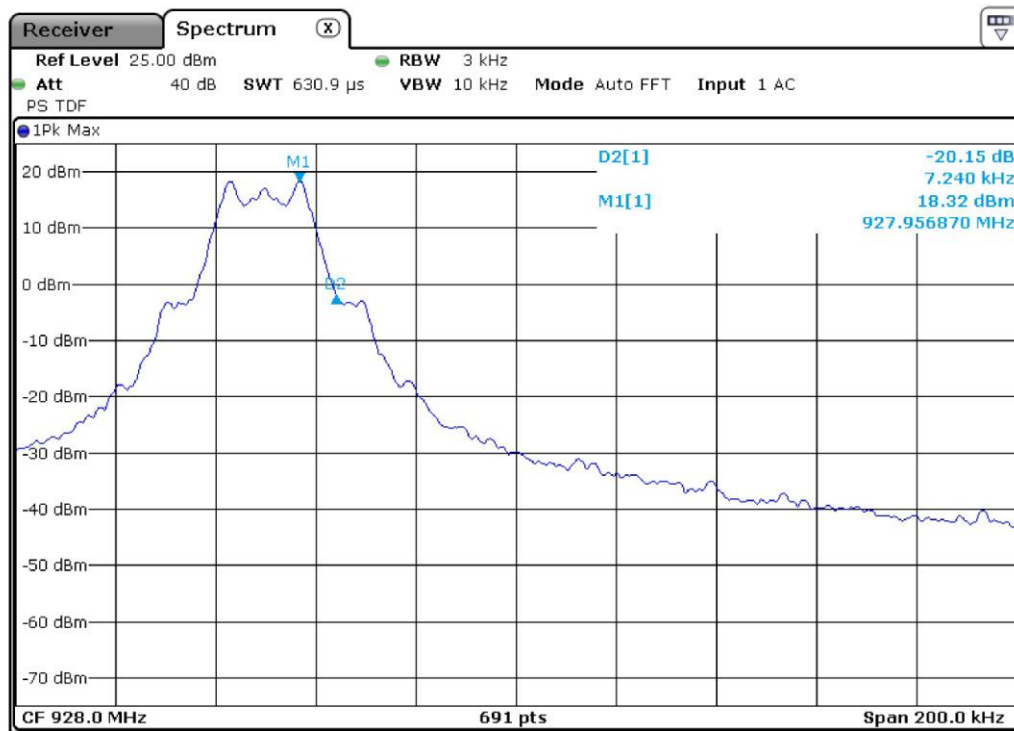
Frequency (MHz)	Graph(s) – Hopping	Results	
915,05	G15189124	F _L : 915,6296 MHz	Complies
	G15189125		
927,75	G15189128	F _H : 927,9753 MHz	Complies
	G15189129		

Frequency (MHz)	Graph(s) – No hopping	Results	
915,05	G15189115	F _L : 915,0362 MHz	Complies
	G15189116		
927,75	G15189113	F _H : 927,9569 MHz	Complies
	G15189114		



Graphs

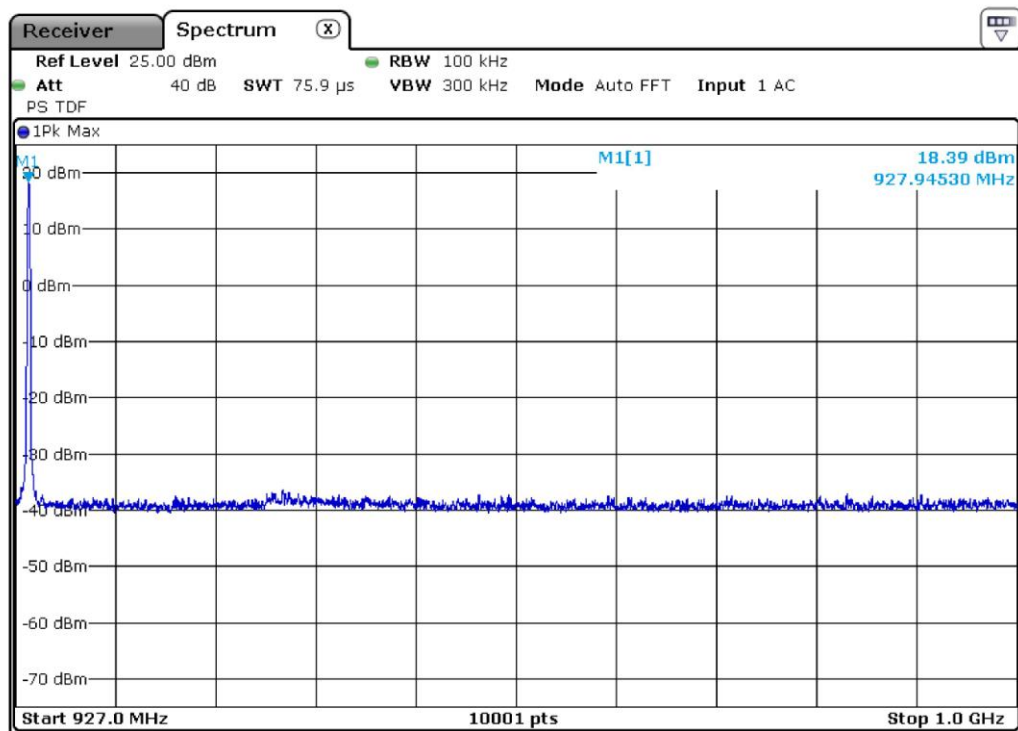
G15189113



Gandini 15189113-Fmax



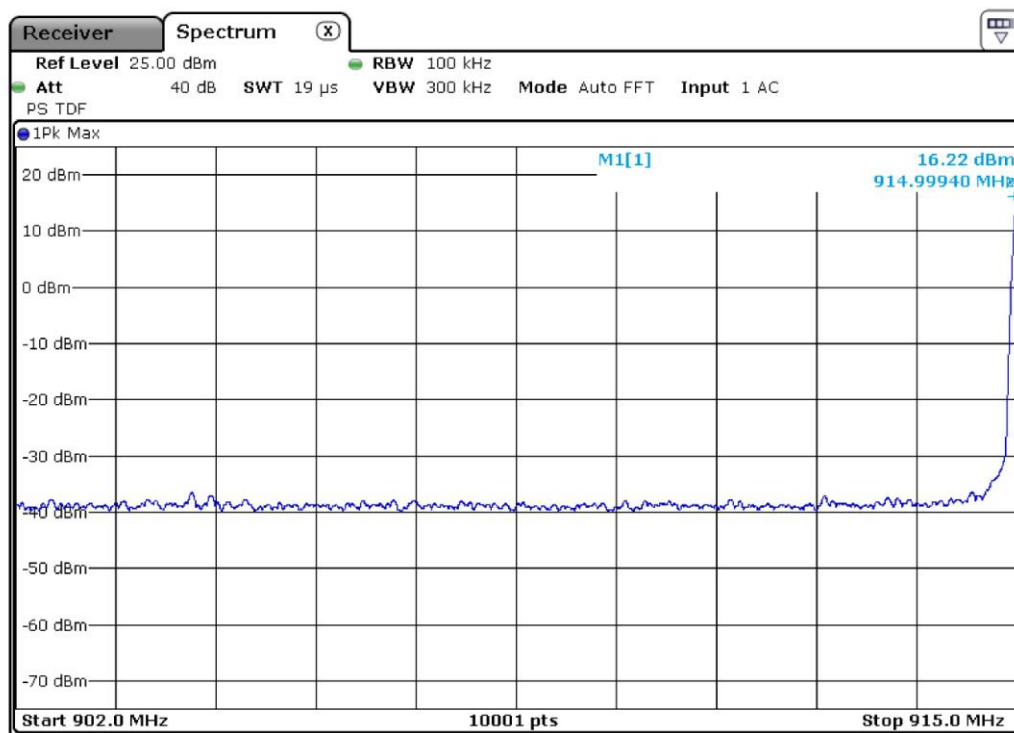
G15189114



Gandini 15189114-Fmax



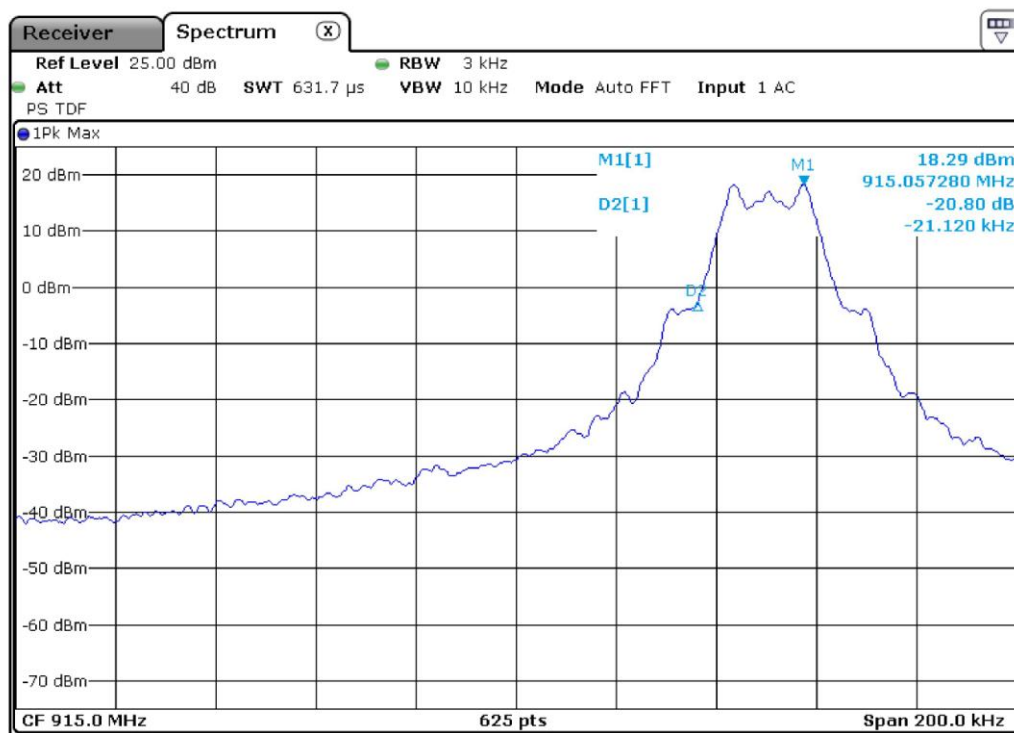
G15189115



Gandini 15189115-Fmin



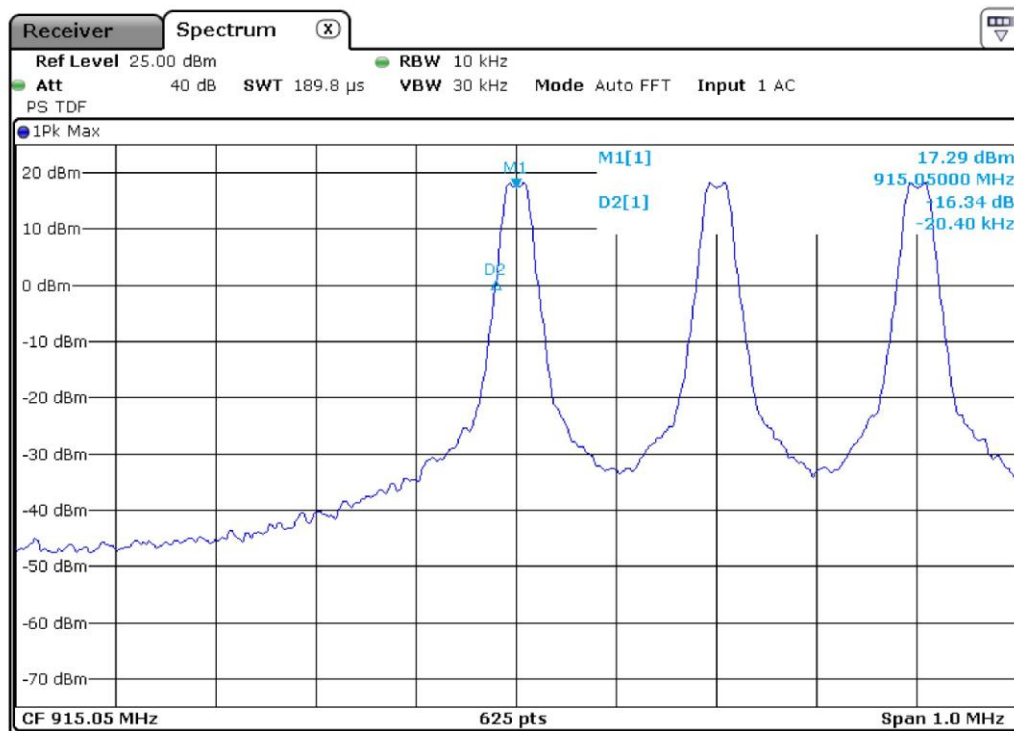
G15189116



Gandini 15189116-Fmin



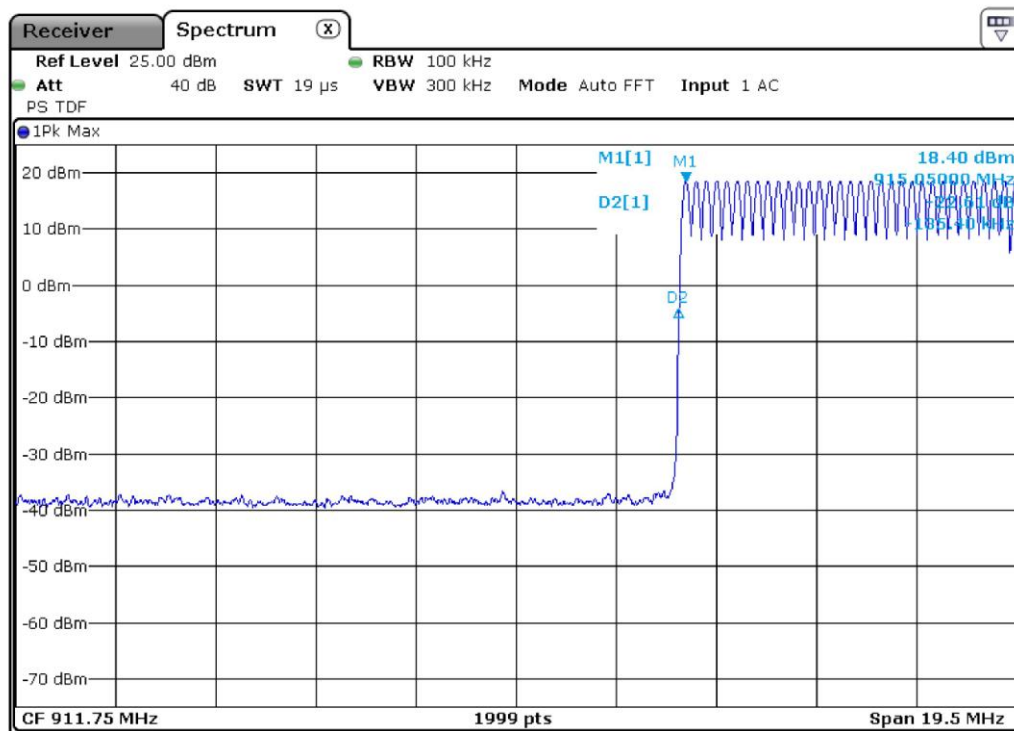
G15189124



Gandini 15189124-Fhopping



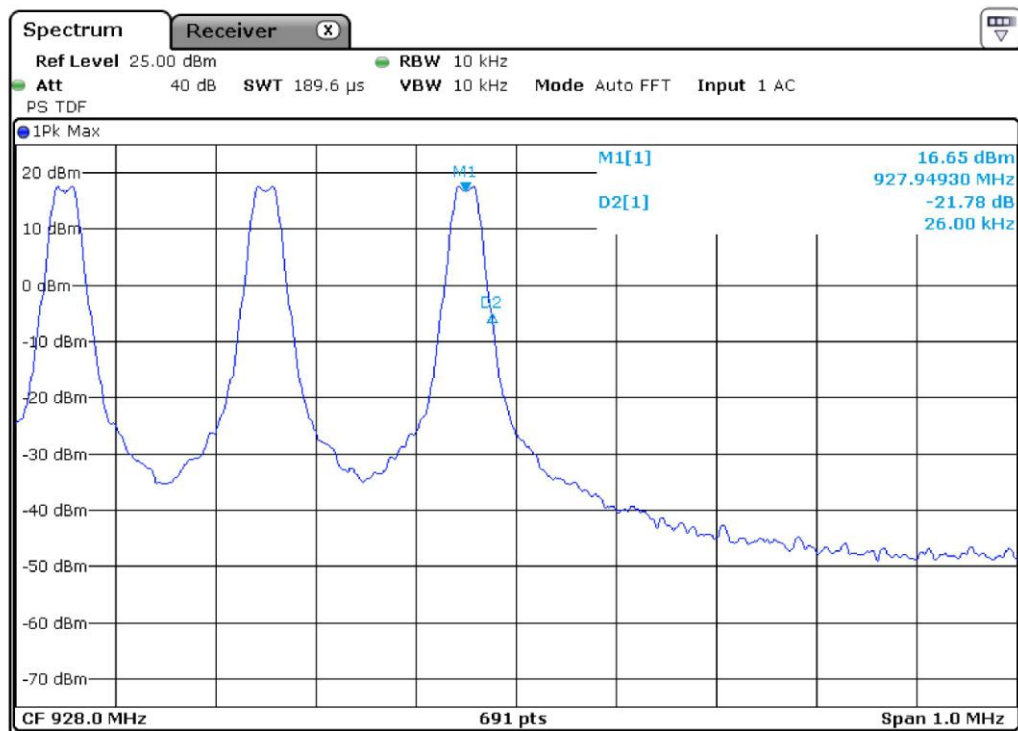
G15189125



Gandini 15189125-Fhopping



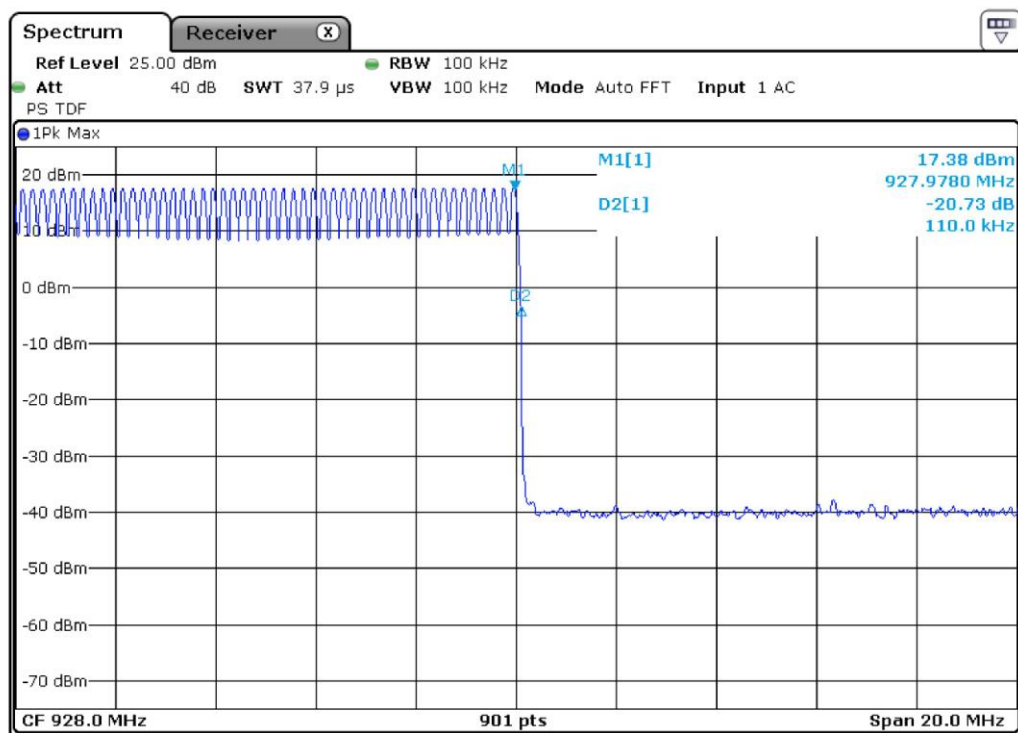
G15189128



Gandini 15189128-Fhopping



G15189129



Gandini 15189129-Fhopping

Result: The requirements are met



11.8 Peak Output Power

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.247
- DA 00-705
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Laboratory

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S108, CMC S136, CMC S227
Measurement uncertainty: See clause 7 of this test report

Test specification

Port: Enclosure
Antenna polarization: Horizontal (H) – Vertical (V)
EUT – Antenna distance: 3 m

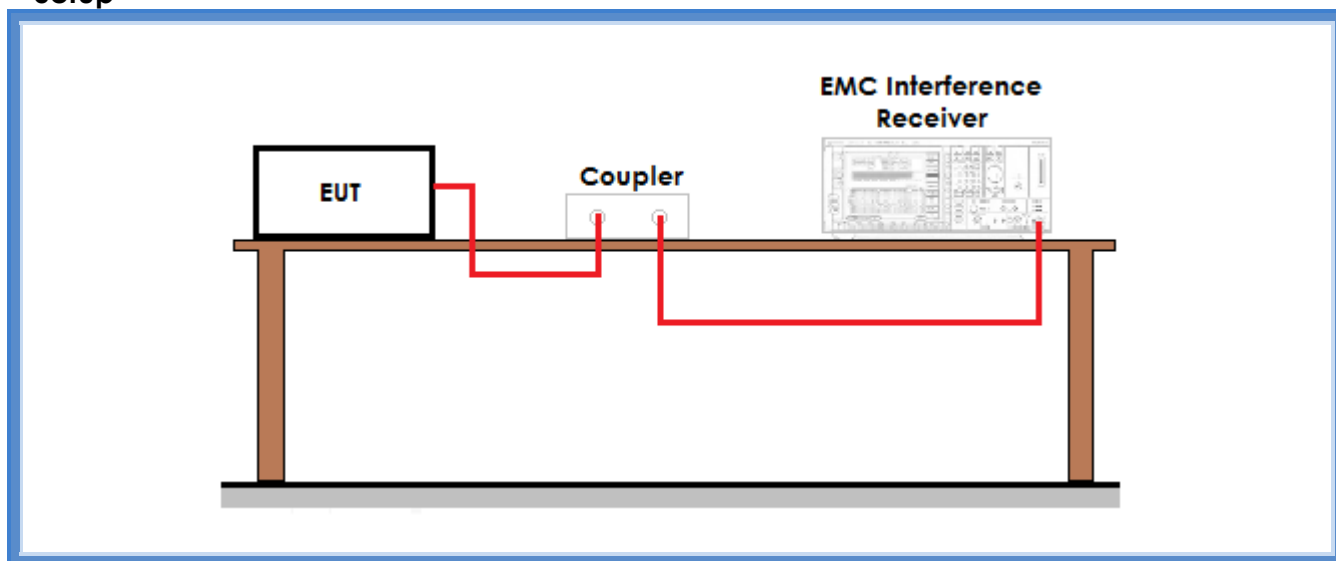
Environmental conditions

Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
20	100	45

For frequency hopping systems operating in the 2400–2483,5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483,5 MHz band: 0,125 watts. For frequency hopping systems operating in the 902–928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0,25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels.



Setup



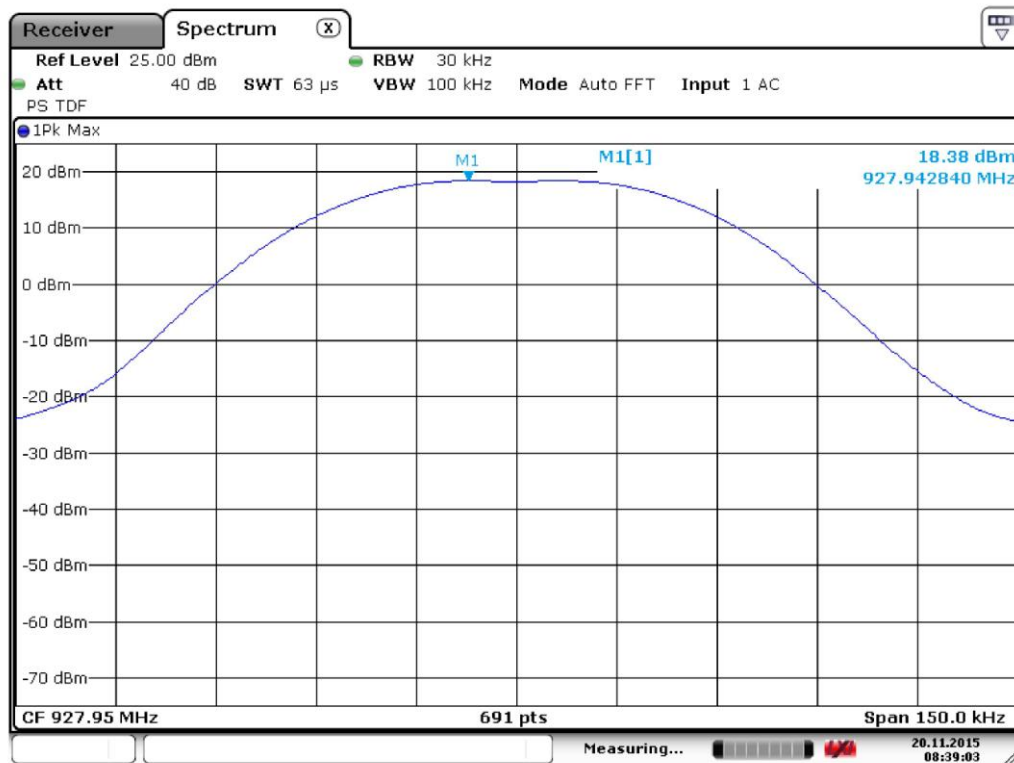
Result

Frequency (MHz)	Graphs	Measured level (dBm)	Remarks
915,0572	G15189119	18,24	--
921,4930	G15189120	18,24	--
927,9428	G15189112	18,38	--



Graphs

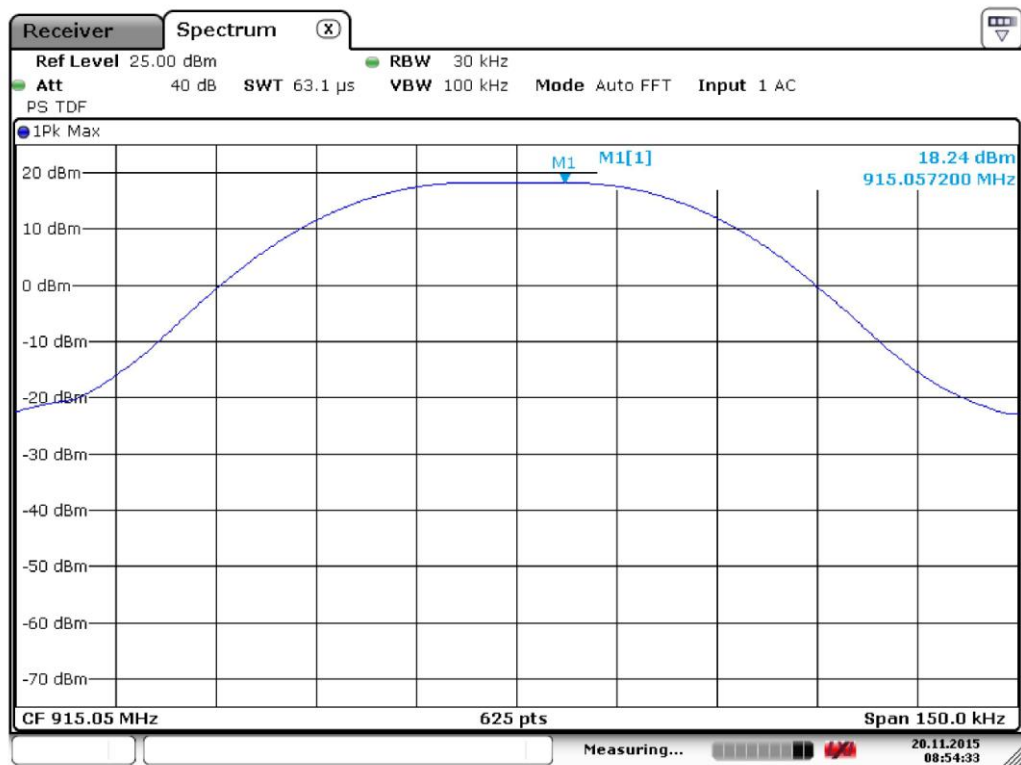
G15189112



Gandini 15189112-Fmax



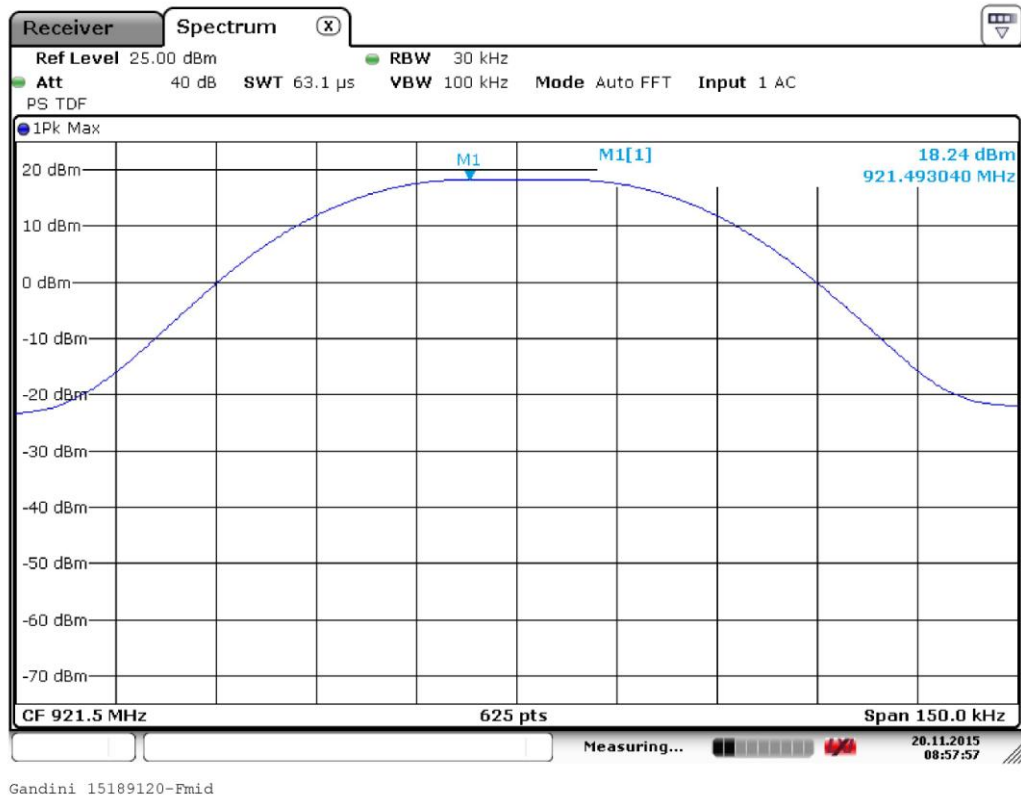
G15189119



Gandini 15189119-Fmin



G15189120



Result: The requirements are met



11.9 Spurious Emission

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.209
- DA 00-705
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Semi-anechoic chamber

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S108, CMC S136, CMC S164
Measurement uncertainty: See clause 7 of this test report

Test specification

Port: Enclosure
Antenna polarization: Horizontal (H) – Vertical (V)
EUT – Antenna distance: 3 m
Detector AV + Peak

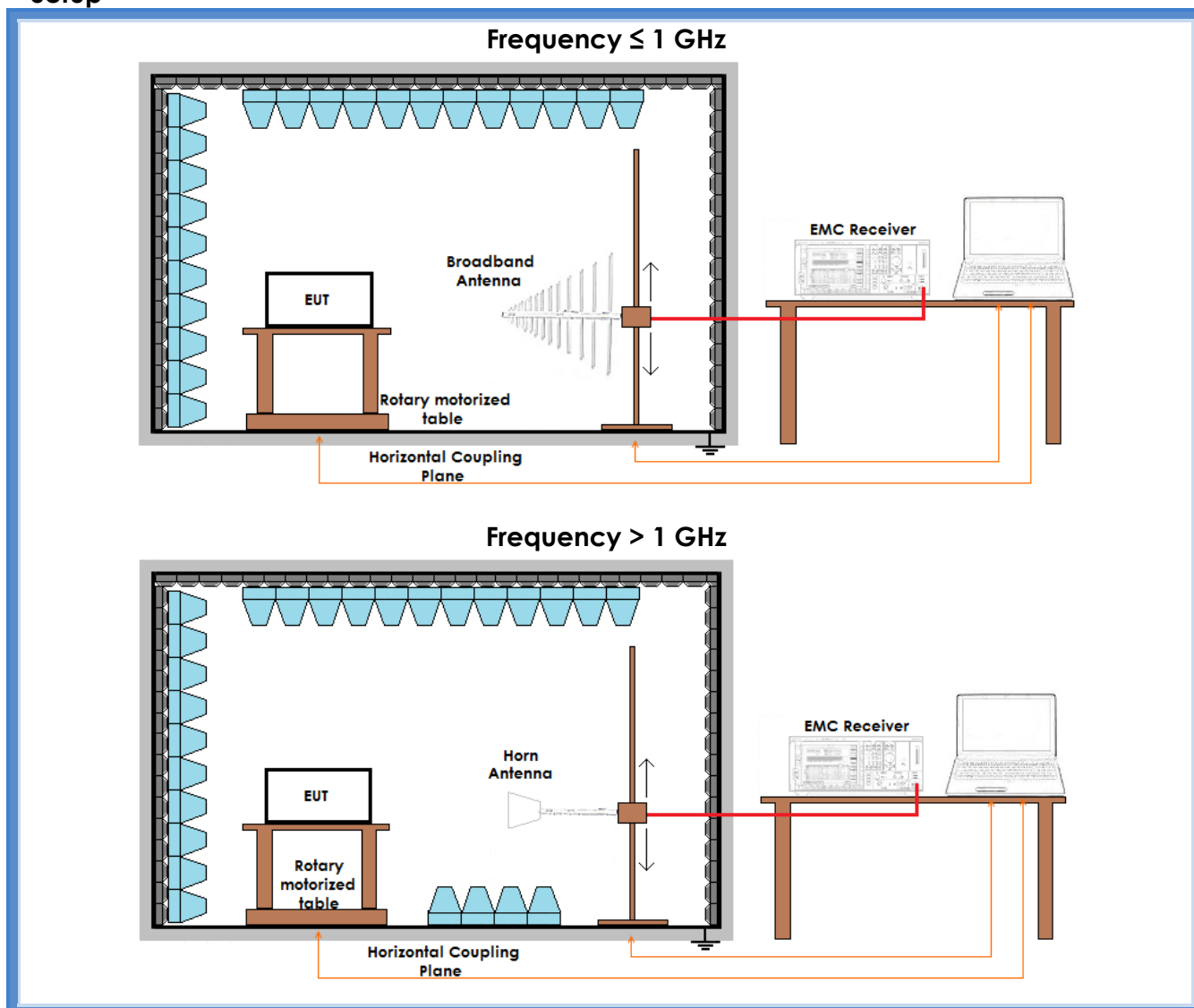
Environmental conditions

Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
22	100	45

Acceptance limits

Frequency (MHz)	AV limits [dB(μV/m)]	Peak limits [dB(μV/m)]
> 1000	54	74

Setup





Result – AV detector

Harmonic	Limits (dB μ V/m)	Level (dB μ V/m)			Results
		915,050 MHz	921,000 MHz	927,950 MHz	
II	54	50,40	48,40	48,00	Complies
III	54	45,20	41,90	42,40	Complies
IV	54	41,10	41,00	40,60	Complies
V	54	42,30	43,50	43,80	Complies
VI	54	46,90	45,00	44,30	Complies
VII	54	More than 20 dB below limit	More than 20 dB below limit	More than 20 dB below limit	Complies
VIII	54	More than 20 dB below limit	More than 20 dB below limit	More than 20 dB below limit	Complies
IX	54	More than 20 dB below limit	More than 20 dB below limit	More than 20 dB below limit	Complies
X	54	More than 20 dB below limit	More than 20 dB below limit	More than 20 dB below limit	Complies

Remarks: EUT was tested in 3 orthogonal planes. The results in this table show the highest values

Result – Peak detector

Harmonic	Limits (dB μ V/m)	Level (dB μ V/m)			Results
		915,050 MHz	921,000 MHz	927,950 MHz	
II	74	51,20	49,30	49,90	Complies
III	74	46,70	44,40	44,60	Complies
IV	74	46,50	46,60	45,70	Complies
V	74	47,10	46,40	48,40	Complies
VI	74	50,50	47,80	48,90	Complies
VII	74	More than 20 dB below limit	More than 20 dB below limit	More than 20 dB below limit	Complies
VIII	74	More than 20 dB below limit	More than 20 dB below limit	More than 20 dB below limit	Complies
IX	74	More than 20 dB below limit	More than 20 dB below limit	More than 20 dB below limit	Complies
X	74	More than 20 dB below limit	More than 20 dB below limit	More than 20 dB below limit	Complies

Remarks: EUT was tested in 3 orthogonal planes. The results in this table show the highest values

Result: The requirements are met



11.10 Maximum permissible exposure

Test set-up and execution

- FCC Rules and Regulation;
Titles 47 Part 1.1310
- Internal procedure PM001
- See clause 4 of this test report

Test configuration

Test site:
Laboratory

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S108, CMC S136, CMC S164
Measurement uncertainty: See clause 7 of this test report

Test specification

Port: Antenna

Acceptance limits

1 mW/cm² max at 20 cm of distance

Result

Power Density Limit (mW/cm ²)	Output Power (mW)	Antenna Gain (G)	Power Density at 20 cm (mW/cm ²)	Remarks
1,00	68,87	--	0,014	Measured
Remarks: Power Density = (P x G) / (4πR ²)				

Result: The requirements are met