



TEST REPORT nr. R15059501

Federal Communication Commission (FCC)

Test item

Description: BLUETOOTH DONGLE FOR CANBUS DIAGNOSTIC

Trademark: VOLKSWAGEN

Model/Type: DataPlug

FCC ID: T8RDP15

Test Specification

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

Client's name: TEXA S.p.A.

Address: Via 1° Maggio, 9 – 31050 Monastier di Treviso (TV) – ITALY

Manufacturer's name : TEXA S.p.A.

Address: Via 1° Maggio, 9 – 31050 Monastier di Treviso (TV) – ITALY

Report

Tested by: G. Gandini – Technician

Approved by: R. Beghetto – Laboratory Manager

Date of issue: 16/07/2015

Contents: 68 pages

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

<i>Test specifications</i>	<i>Environmental Phenomena</i>	<i>Tests sequence</i>	<i>Result</i>
Part 15.203	Antenna requirements	1	Complies
Part 15.207	Conducted emissions	2	Complies
Part 15.209	Radiated emissions	3	Complies
Part 15.247	20dB Bandwidth	4	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

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



Power supply : 12 Vdc

Serial Number..... : TOV FT 000048

Part Number : 5GV.051.629.D

Hardware Version : 518.A1

Type of equipment : ☒ Transmitter Unit
 ☒ Receiver Unit

Type of station : ☒ Fixed station
 ☐ Portable station
 ☐ Mobile station

Frequency band : 2402 MHz – 2480 MHz

Company..... : CMC Centro Misure Compatibilità S.r.l.
Address : Via dell'Elettronica, 12/C
36016 Thiene (VI) – ITALY
Test site facility's FCC registration number : 271947

Date of receipt of test item : 02.04.15

Testing start date : 10.04.15

Testing end date : 23.06.15

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 P150362

EUT exercising : EUT in continuous transmission at maximum power



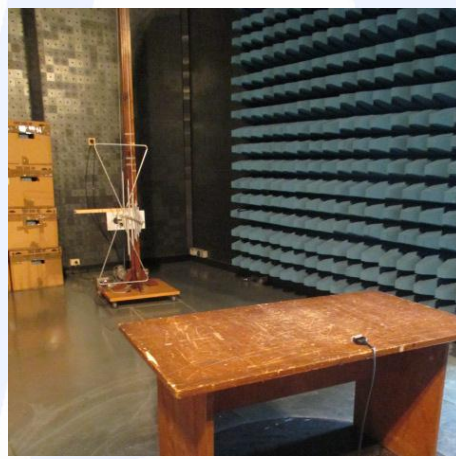
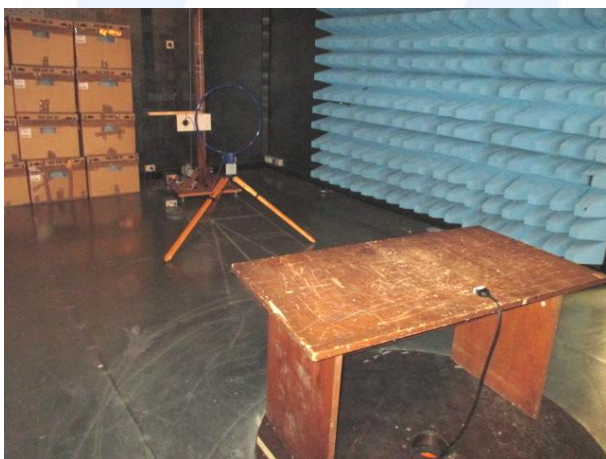
5. Photograph(s) of EUT

5.1 Photograph(s) of EUT





5.2 Photograph(s) of setup





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 '15	January '16
CMC S108	EMCO	3115	Horn Antenna	9811-5622	May '13	May '16
CMC S127	Schaffner	HLA6120	Loop Antenna	1191	January '13	January '16
CMC S129	Rohde & Schwarz	ESPI7	Receiver	836.914/004	January '15	January '16
CMC S136	Schwarzbeck	VULB 9163	Broadband Antenna	9136-205	May '13	May '16
CMC S164	Rohde & Schwarz	ESU26	EMC interference receiver	100052	January '15	January '16
CMC S200	Schwarzbeck	NSLK 8128	V-LISN	8128-273	January '15	January '16
CMC S227	Rohde & Schwarz	ESR7	EMI Test Receiver 7GHz	101121	January '15	January '16



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

Notes

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 C63.4:2009	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
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.

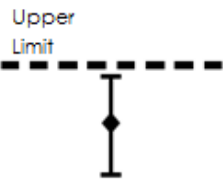
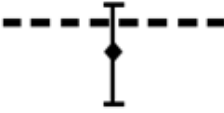
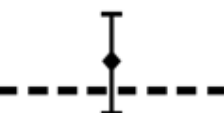


11. Results

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 (%)
23	100	42

Result

Antenna Type	External R.F. power amplifier	Gain	Remarks	Results
Integral antenna	Not Present	-1,3dBi	--	Complies

Result: The requirements are met



11.2 Conducted emissions

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.207
- Internal procedure PM001
- See clause 4 of this test report

Test configuration and test method

Test site:
Shielded chamber

Auxiliary equipment:
See clause 4 of this test report

EUT exercising

See clause 4 of this test report

Test equipment used

CMC S010, CMC S200, CMC S227
Measurement uncertainty: See clause 7 of this test report

Test specification

Port: Main port
Frequency range: 150 kHz – 30 MHz

Environmental conditions

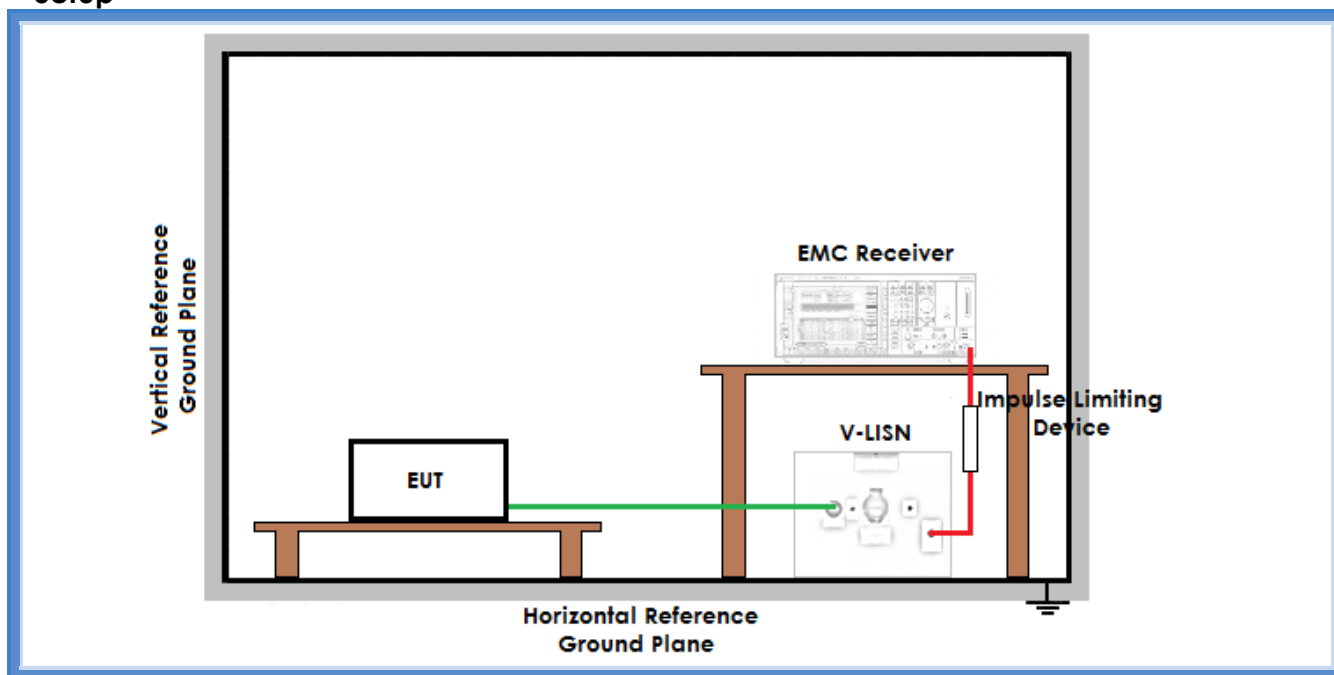
Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
21	98	46

Acceptance limits

Frequency range (MHz)	dB(μV) Quasi-peak	dB(μV) Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50



Setup

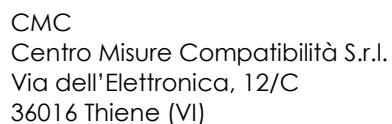


Result

Line	Graphs	Remarks	Result
-12 Vdc	G15059548	--	Complies
+12 Vdc	G15059549	--	Complies
Remarks: --			

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



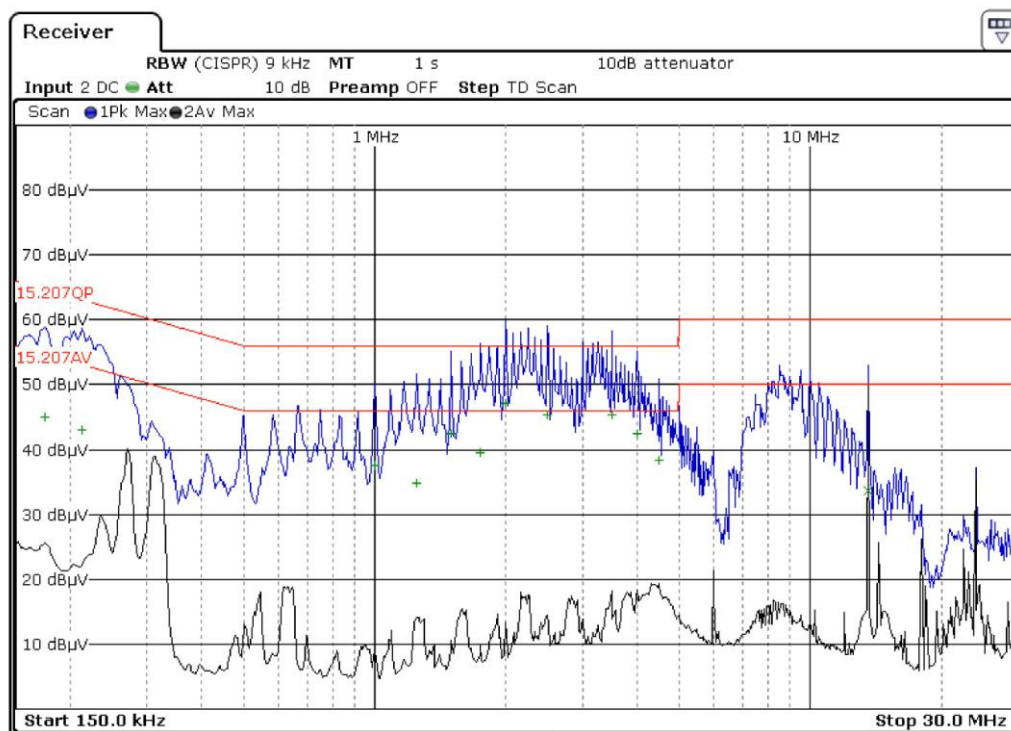
G15059548

Gandini 15059548-Line (-)-Tx-RX BT

Trace/Detector	Frequency	Level dBμV	DeltaLimit
1 Quasi Peak	177.0000 kHz	45.22	-19.41 dB
1 Quasi Peak	204.0000 kHz	39.15	-24.30 dB
1 Quasi Peak	249.0000 kHz	44.04	-17.75 dB
1 Quasi Peak	1.2480 MHz	35.51	-20.49 dB
1 Quasi Peak	1.5000 MHz	41.78	-14.22 dB
1 Quasi Peak	1.7498 MHz	40.39	-15.61 dB
1 Quasi Peak	2.2493 MHz	43.82	-12.18 dB
1 Quasi Peak	2.4990 MHz	46.74	-9.26 dB
1 Quasi Peak	3.2505 MHz	42.34	-13.66 dB
1 Quasi Peak	3.7500 MHz	40.49	-15.51 dB
1 Quasi Peak	4.4993 MHz	40.03	-15.97 dB
1 Quasi Peak	8.4998 MHz	40.34	-19.66 dB
2 Average	13.5600 MHz	31.60	-18.40 dB



G15059549



Gandini 15059549-Line (+)-Tx-RX BT

Trace/Detector	Frequency	Level dBμV	DeltaLimit
1 Quasi Peak	174.7500 kHz	45.03	-19.70 dB
1 Quasi Peak	213.0000 kHz	42.98	-20.11 dB
1 Quasi Peak	1.0005 MHz	37.63	-18.37 dB
1 Quasi Peak	1.2480 MHz	34.84	-21.16 dB
1 Quasi Peak	1.5000 MHz	42.44	-13.56 dB
1 Quasi Peak	1.7498 MHz	39.57	-16.43 dB
1 Quasi Peak	1.9995 MHz	47.12	-8.88 dB
1 Quasi Peak	2.4990 MHz	45.36	-10.64 dB
1 Quasi Peak	3.5003 MHz	45.39	-10.61 dB
1 Quasi Peak	3.9998 MHz	42.53	-13.47 dB
1 Quasi Peak	4.4993 MHz	38.28	-17.72 dB
2 Average	13.5600 MHz	33.71	-16.29 dB

Result: The requirements are met



11.3 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	42

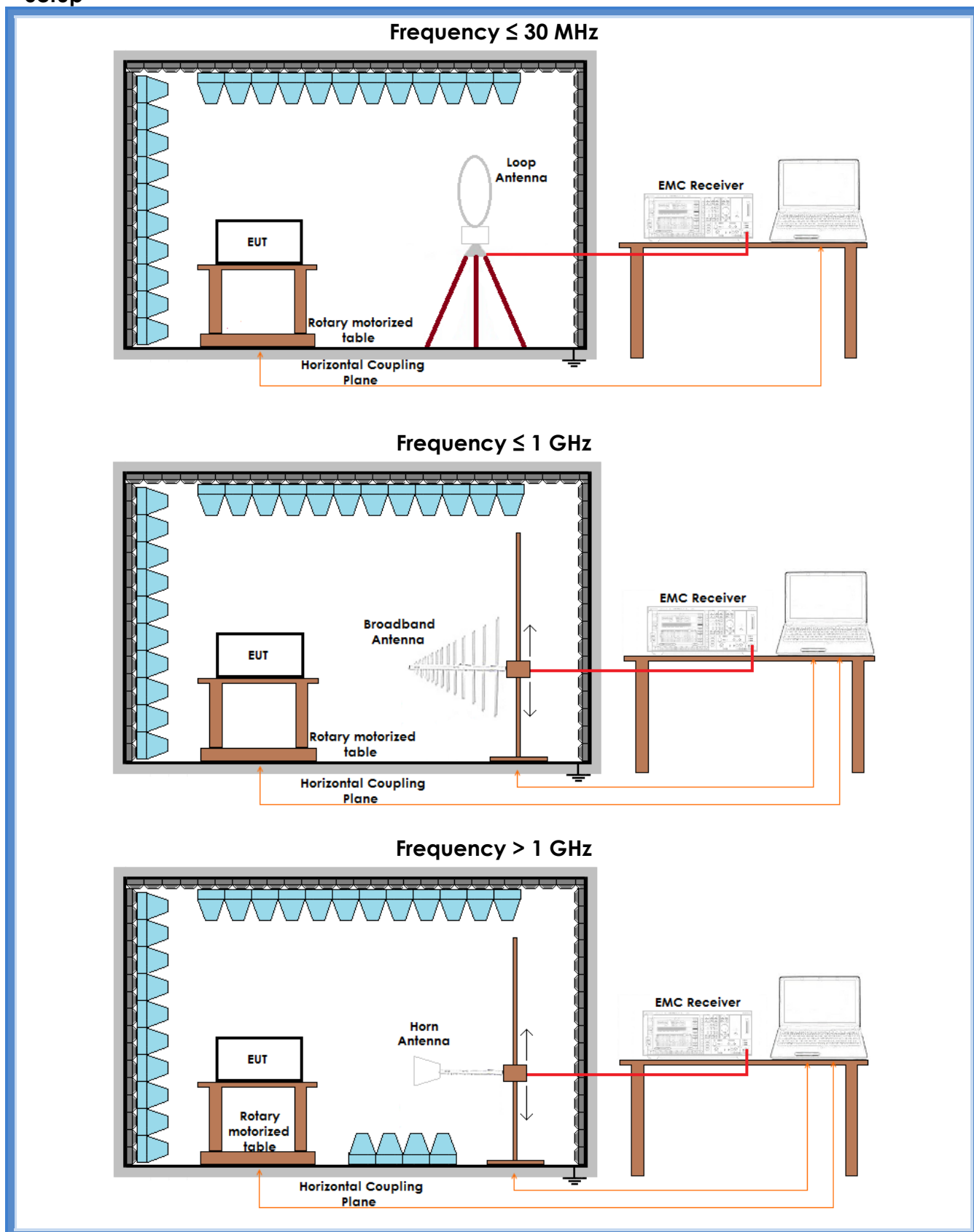
Acceptance limits

Frequency range (MHz)	Limits [dB(μV/m)]
0,009 to 0,490	128,51 to 93,80
0,490 to 1,705	73,80 to 62,97
1,705 to 30	69,54
30 to 88	40
88 to 216	43,52
216 to 960	46,02
Above 960	53,98

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	G15059529	Worst case	Complies
V	30 – 1000	G15059527	Worst case	Complies
H	30 – 1000	G15059528	Worst case	Complies
V	1000 – 18000	G15059519	Lowest frequency	Complies
H	1000 – 18000	G15059520	Lowest frequency	Complies
V	1000 – 18000	G15059526	Medium frequency	Complies
H	1000 – 18000	G15059525	Medium frequency	Complies
V	1000 – 18000	G15059523	Highest frequency	Complies
H	1000 – 18000	G15059524	Highest frequency	Complies
V	18000 – 24000	G15059522	Worst case	Complies
H	18000 – 24000	G15059521	Worst case	Complies

Remarks: --

Graphs Legend

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

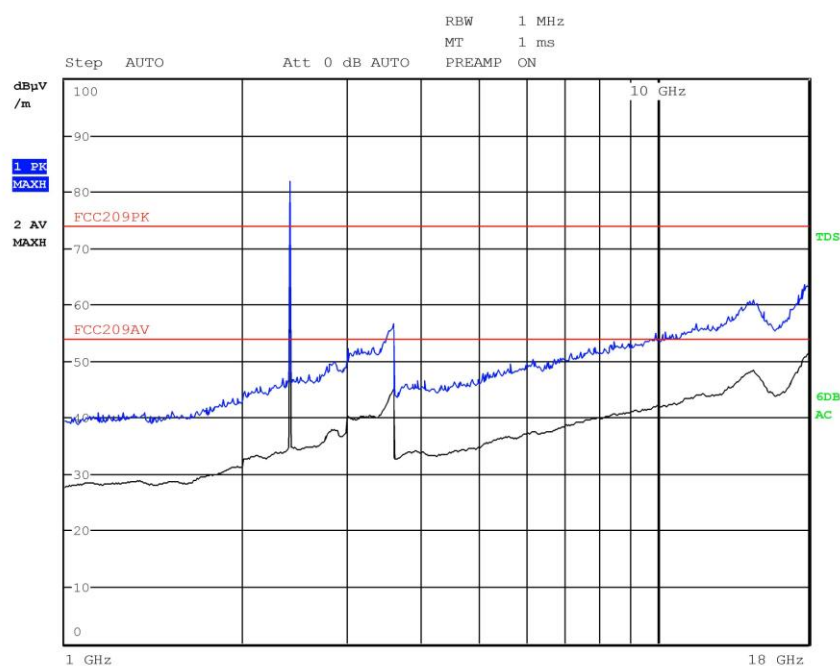
AV: Average; AV [1s] (average at 1 second) values are marked with a x



Graphs

G15059519

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmin
Operator Gandini 15059519
Test Spec
Vert



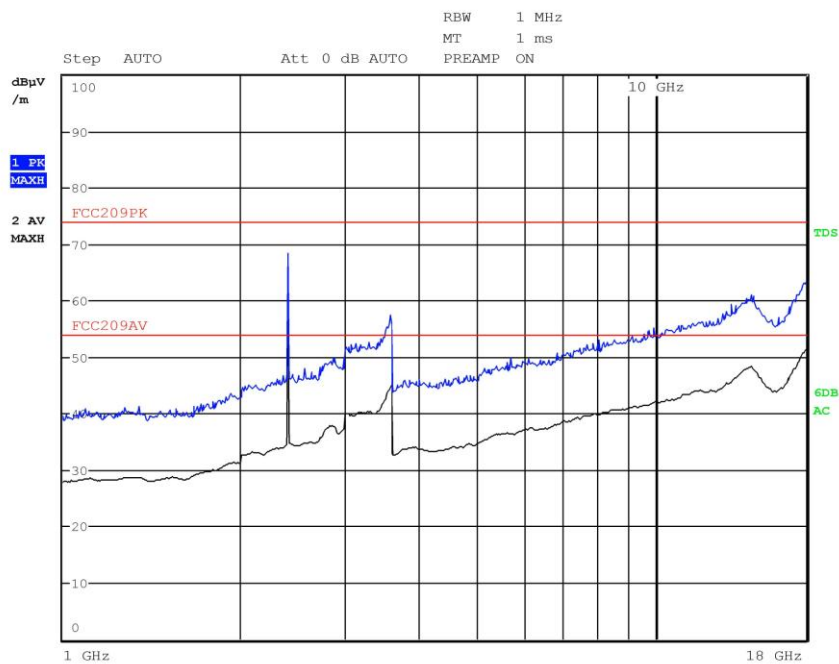
Final Measurement

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



G15059520

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmin
Operator Gandini 15059520
Test Spec
Horiz



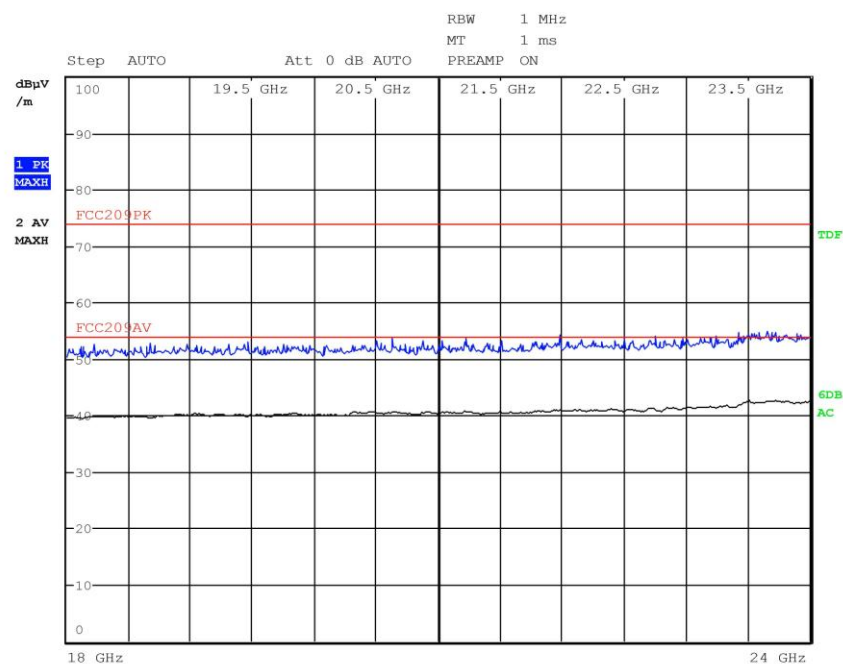
Final Measurement

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



G15059521

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmin
Operator Gandini 15059521
Test Spec
Horiz



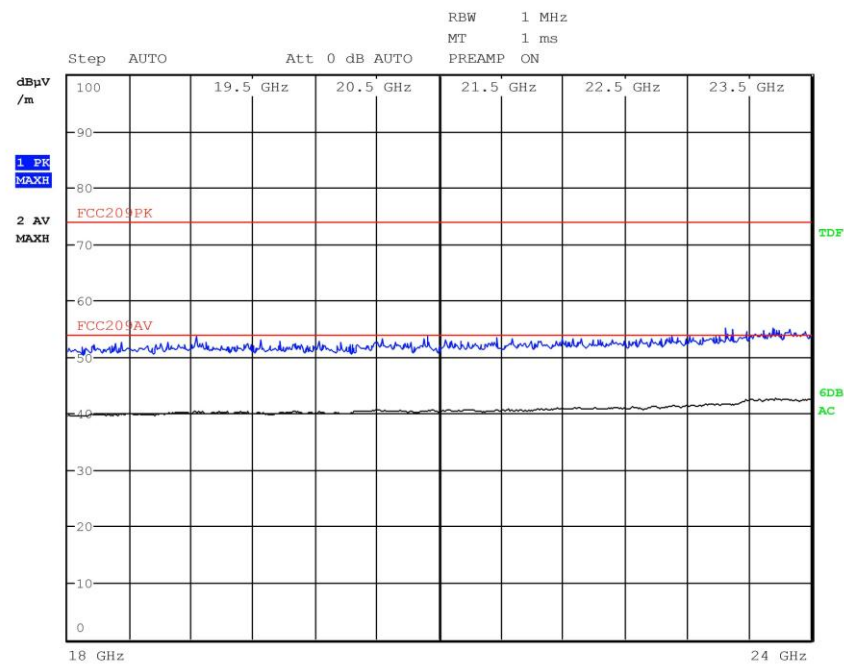
Final Measurement

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



G15059522

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmin
Operator Gandini 15059522
Test Spec
Vert



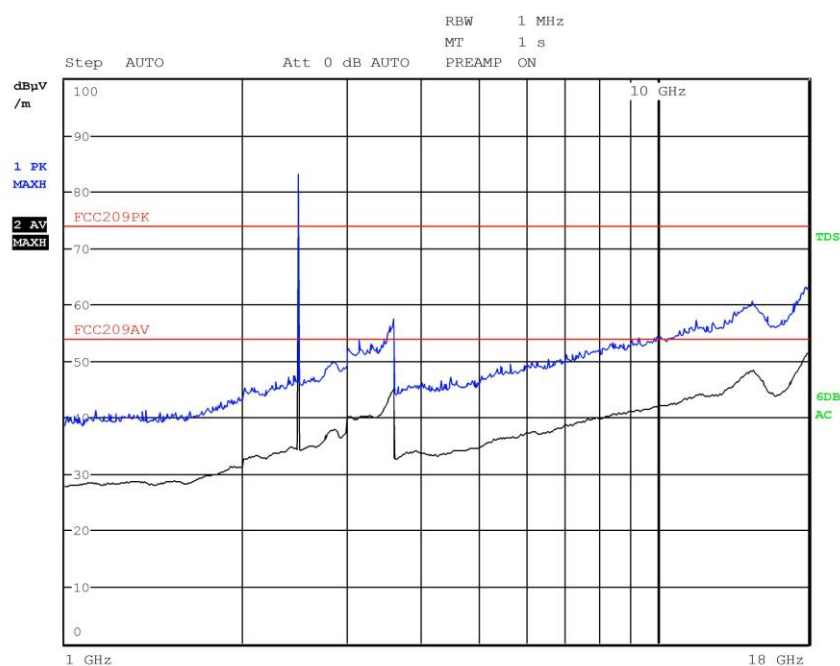
Final Measurement

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



G15059523

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmax
Operator Gandini 15059523
Test Spec
Vert



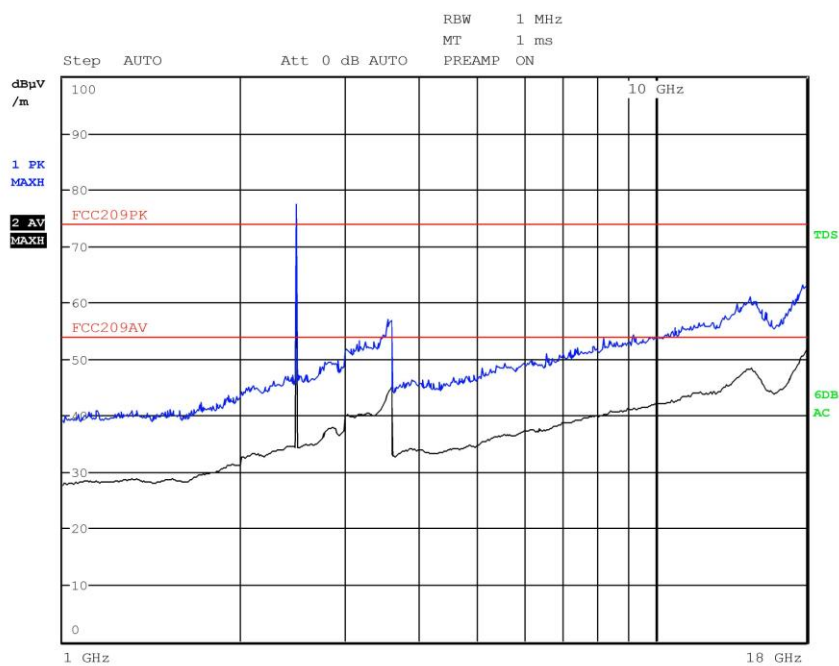
Final Measurement

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



G15059524

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmax
Operator Gandini 15059524
Test Spec
Horiz



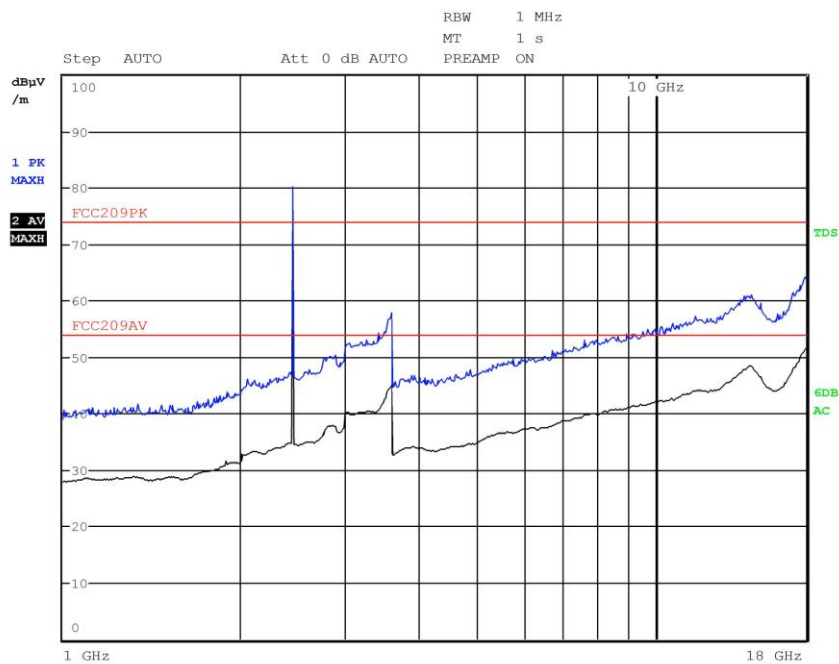
Final Measurement

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



G15059525

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmid
Operator Gandini 15059525
Test Spec
Horiz



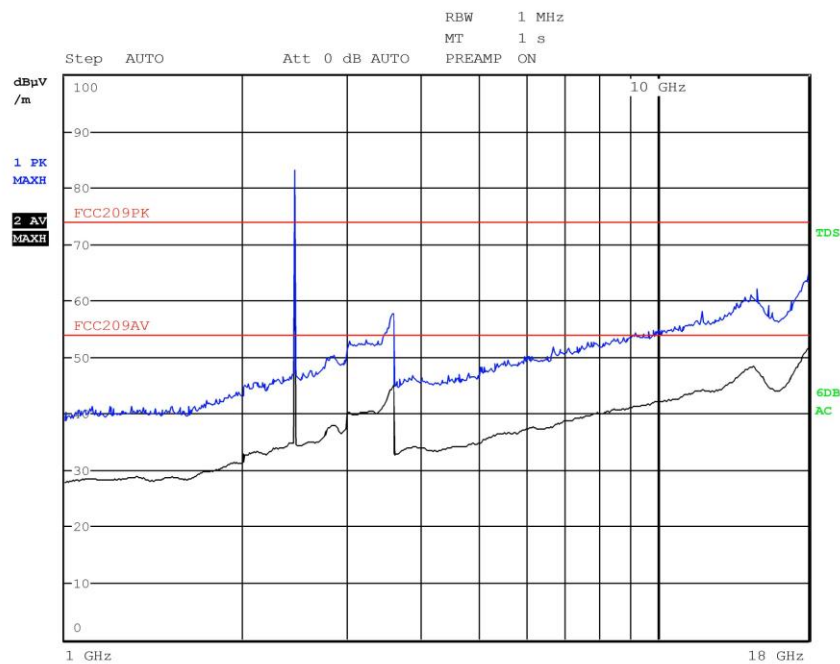
Final Measurement

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



G15059526

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Fmid
Operator Gandini 15059526
Test Spec
Vert



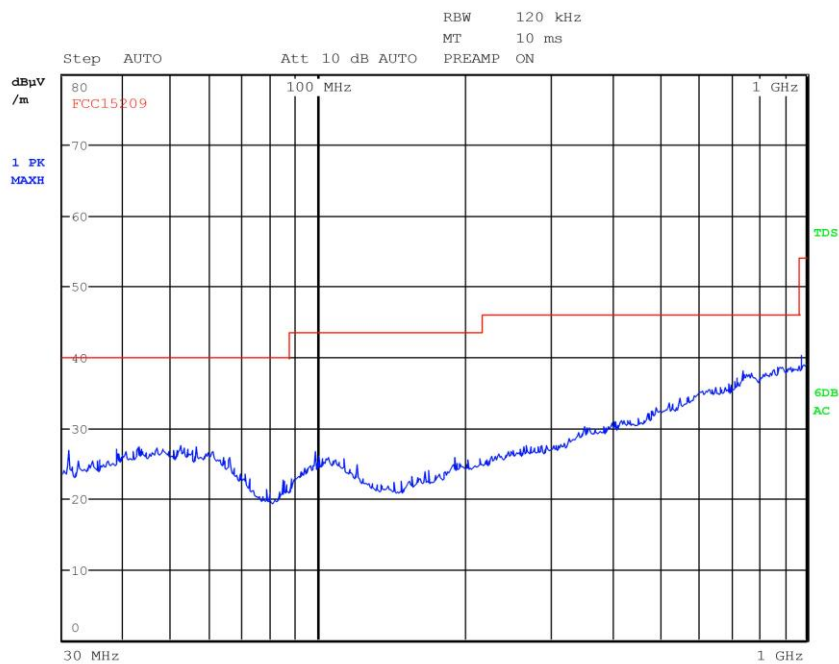
Final Measurement

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



G15059527

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx
Operator Gandini 15059527
Test Spec
Vert



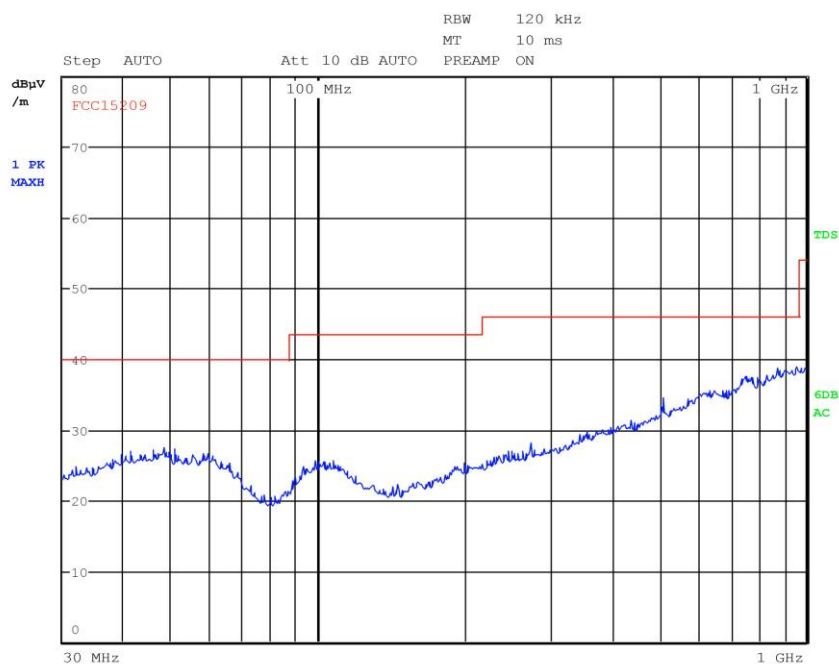
Final Measurement

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



G15059528

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx
Operator Gandini 15059528
Test Spec
Horiz



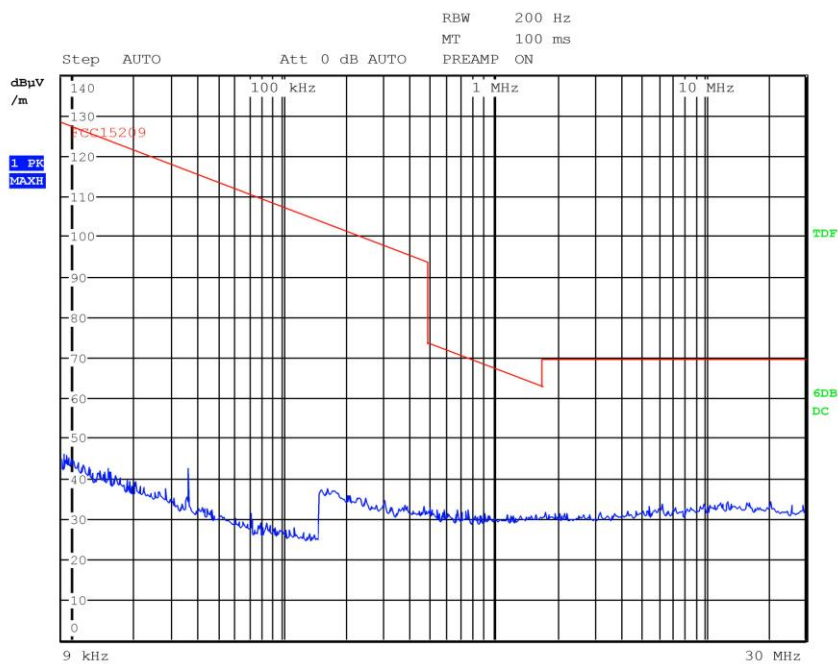
Final Measurement

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



G15059529

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx
Operator Gandini 15059529
Test Spec
Loop



Final Measurement

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

Result: The requirements are met



11.4 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 S164
Measurement uncertainty: See clause 7 of this test report

Test specification

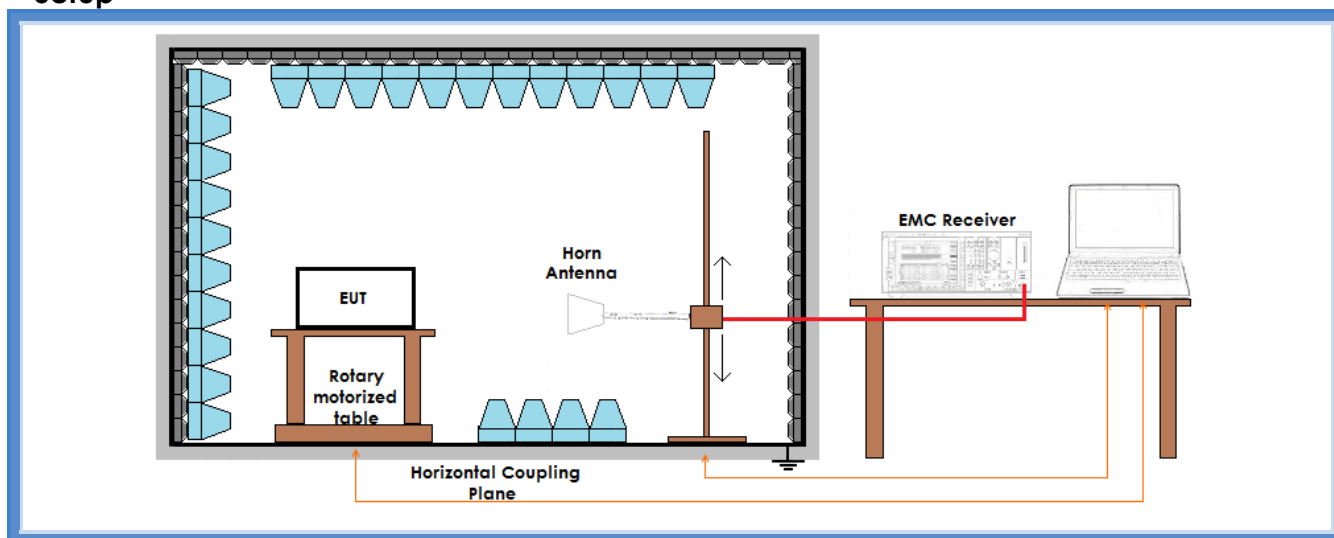
See FCC Part 15.247

Environmental conditions

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



Setup



Result

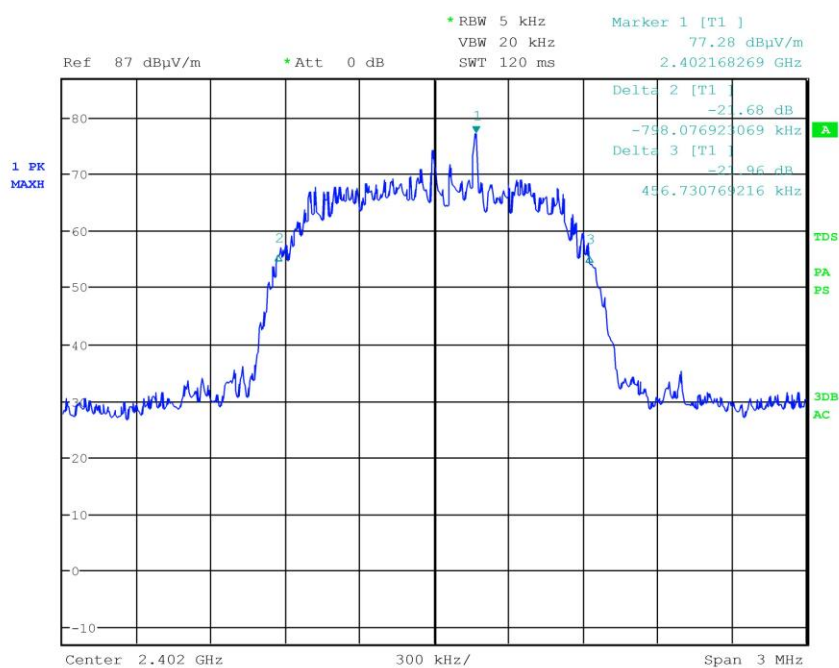
Frequency (MHz)	Graphs	20 dB bandwidth (kHz)	Results
2402	G15059503	1254,8077	Complies
2441	G15059515	1292,6384	Complies
2480	G15059508	1249,9999	Complies



Graphs

G15059503

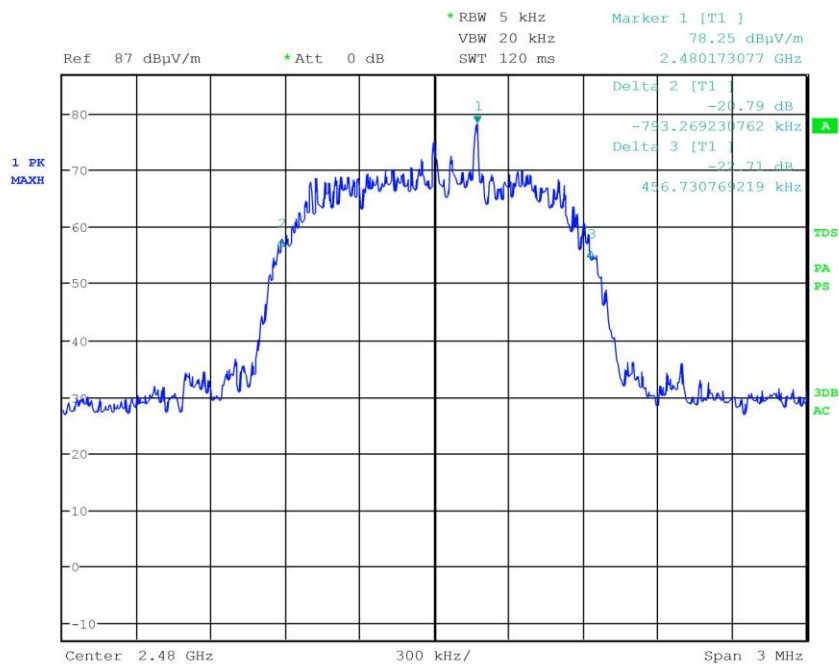
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Equipment under Test
Manufacturer
OP Condition Tx-CH 0
Operator Gandini 15059503
Test Spec
Vert





G15059508

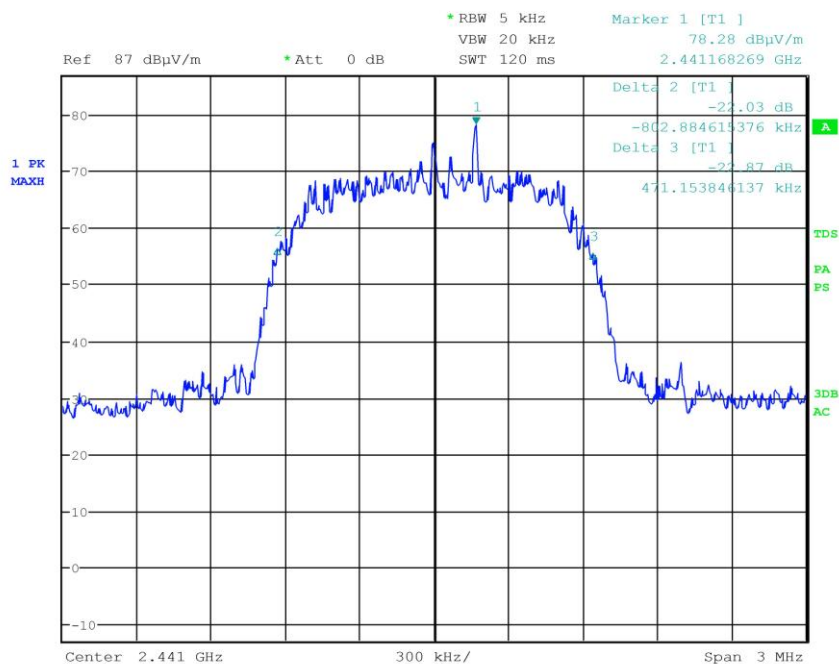
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-CH 78
Operator Gandini 15059508
Test Spec
Vert





G15059515

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-CH 39
Operator Gandini 15059515
Test Spec
Vert



Result: The requirements are met



11.5 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 S164
Measurement uncertainty: See clause 7 of this test report

Test specification

See FCC Part 15.247

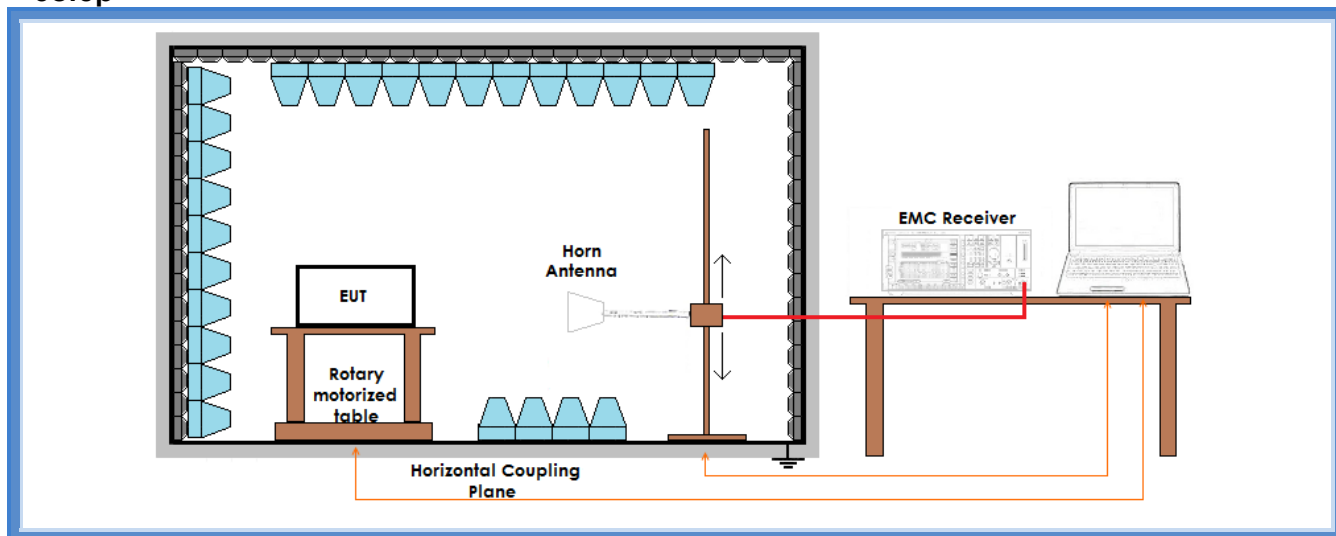
Environmental conditions

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

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

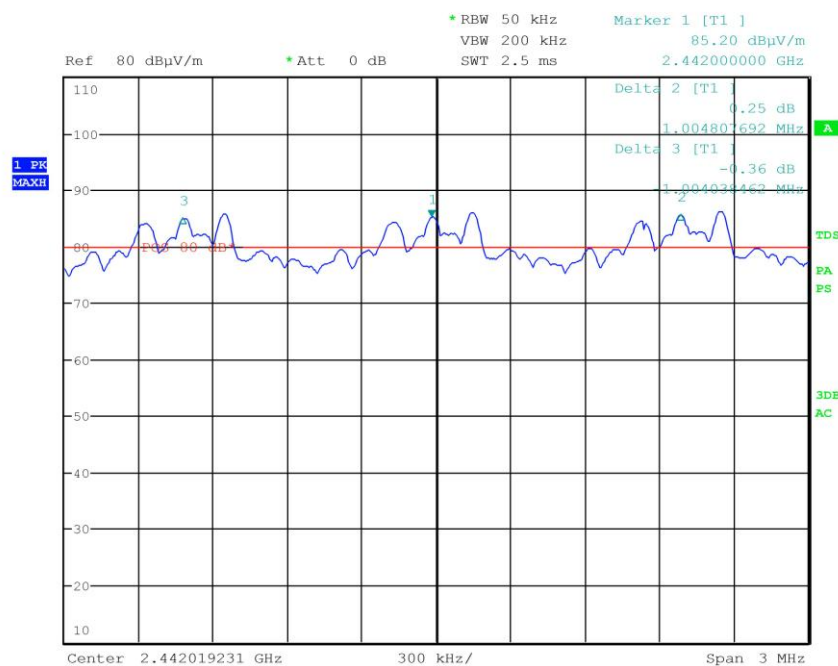
Frequency band (MHz)	Graphs	Channel separation (MHz)	Results
2402 – 2480	G15059541	1,004	Complies



Graphs

G15059541

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Hopping
Operator Gandini 15059541
Test Spec
Vert



Result: The requirements are met



11.6 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 S164
Measurement uncertainty: See clause 7 of this test report

Test specification

See FCC Part 15.247

Environmental conditions

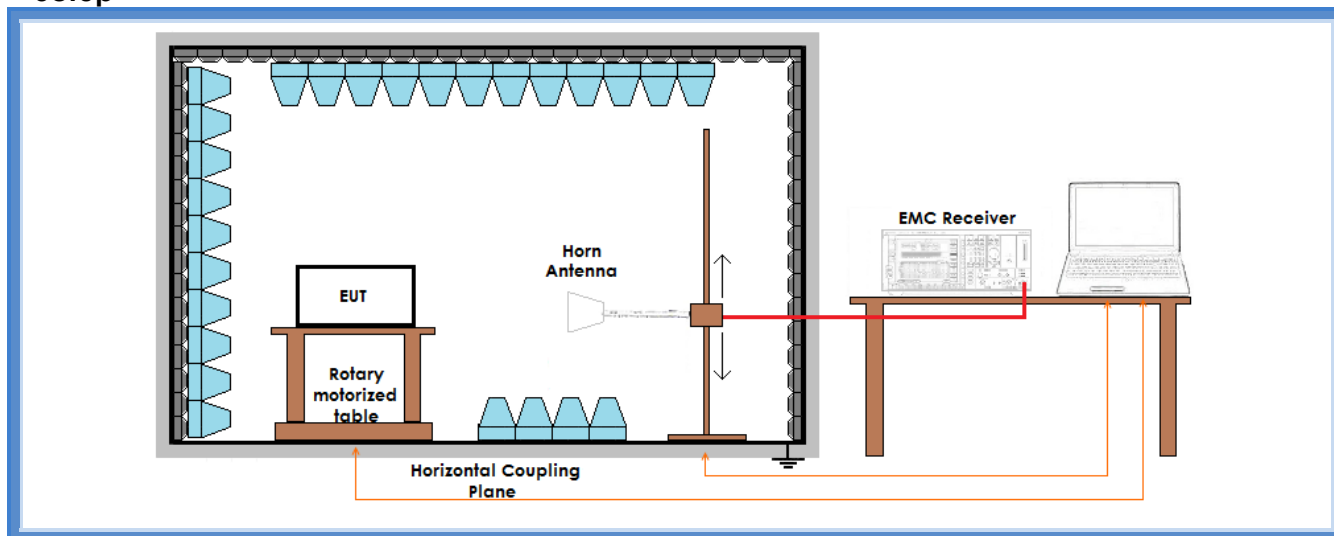
Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
20	100	42

Acceptance limits:

Frequency hopping systems in the 2400–2483,5 MHz band shall use at least 15 channels.



Setup



Result

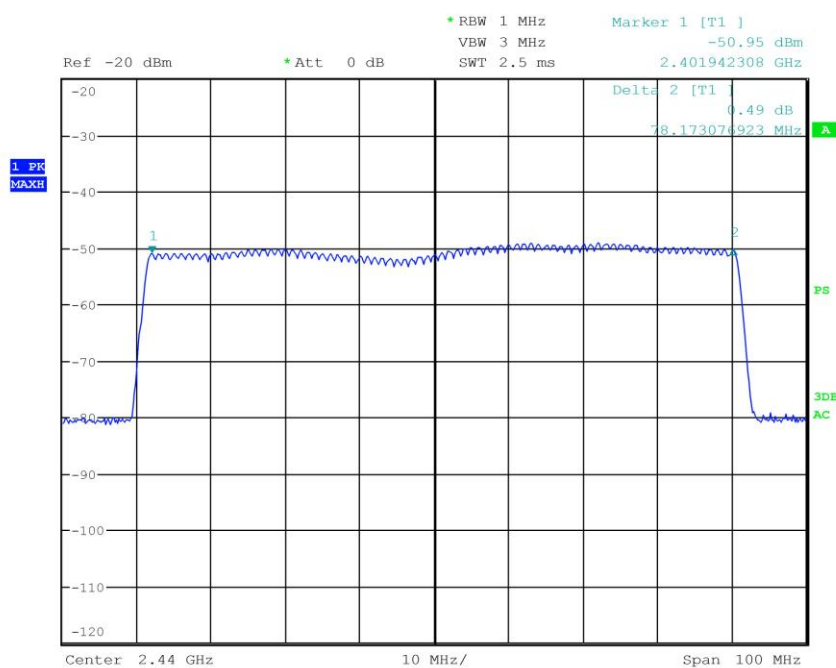
Graphs	Bandwidth	Number of hopping channels	Results
G15059537	1 MHz	79	Complies
G15059538	300 kHz	79	Complies



Graphs

G15059537

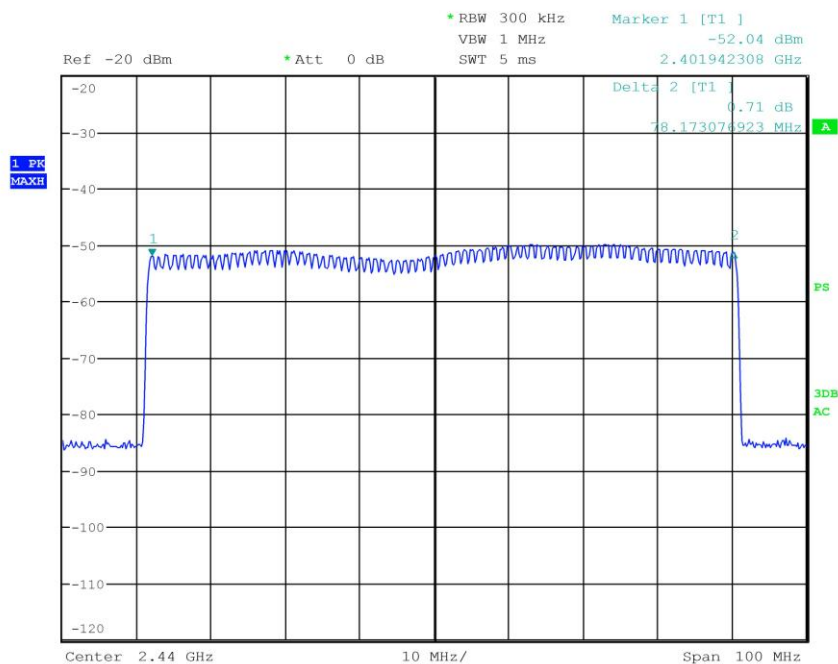
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Hopping
Operator Gandini 15059537
Test Spec
Vert





G15059538

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Hopping
Operator Gandini 15059538
Test Spec
Vert



Result: The requirements are met



11.7 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

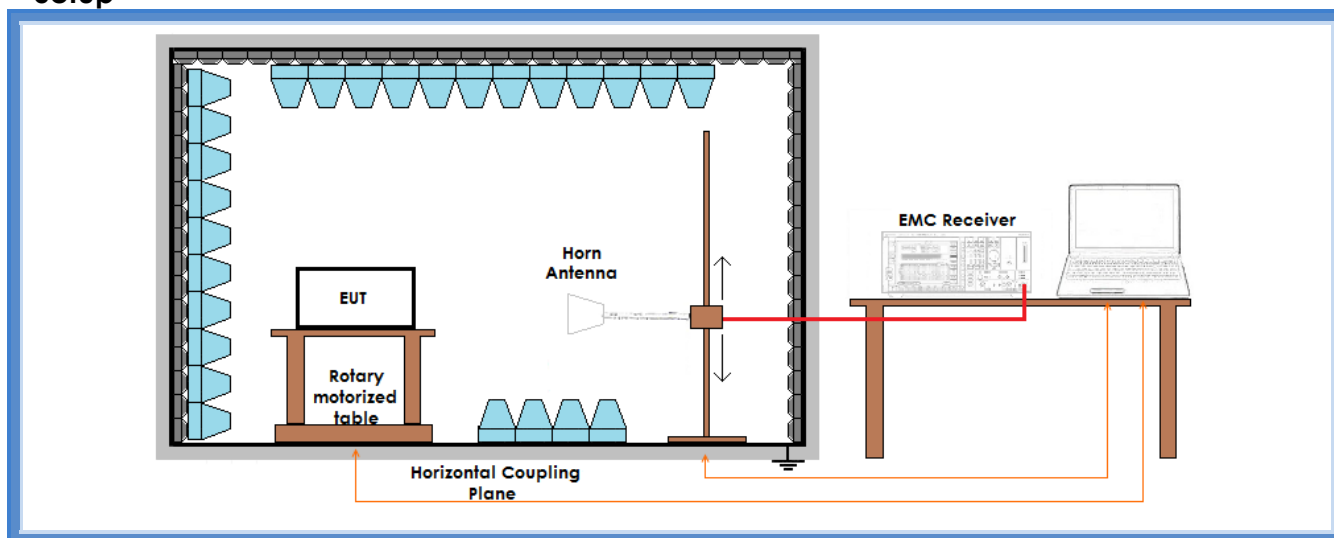
Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
20	100	42

Acceptance limits:

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed



Setup



Result

Dwell time of transmission

Frequency (MHz)	Graphs	Lenght oft transmission (ms)
2452	G15059533	2,9016

Number of transmissions per period

Frequency (MHz)	Graphs	Number of transmissions
2452	G15059534	12 on 3,16 s period

0.4 seconds multiplied by the number of hopping channels = 31.6s

Number of transmission = 120

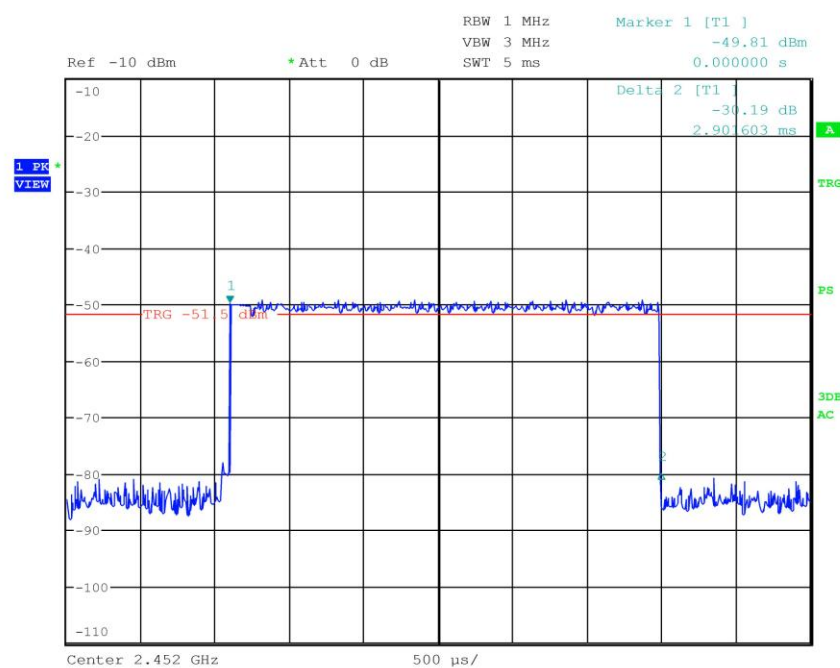
Time of occupancy (Lenght oft transmission x Number of transmissions)	348,192 ms
--	------------



Graphs

G15059533

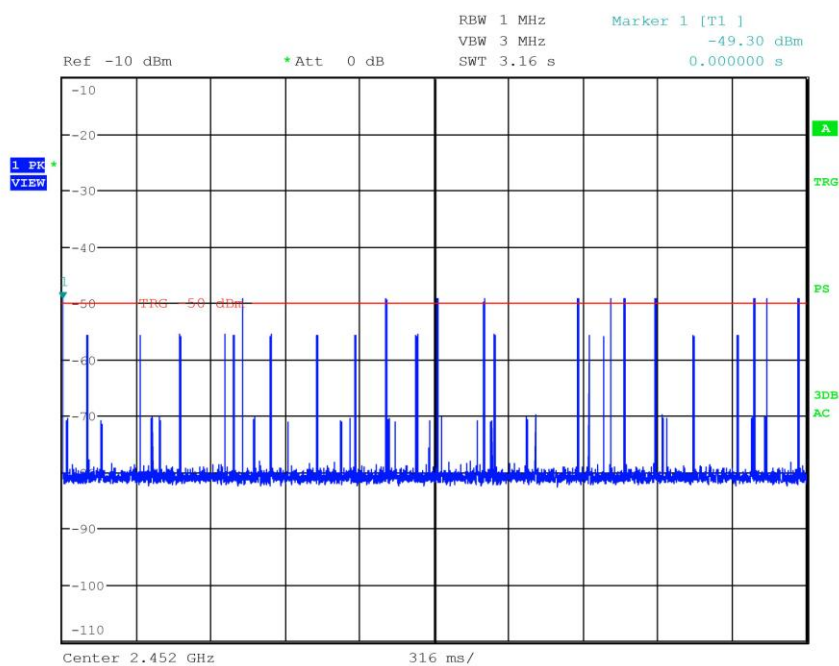
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Hopping
Operator Gandini 15059533
Test Spec
Vert





G15059534

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Hopping
Operator Gandini 15059534
Test Spec
Vert



Result: The requirements are met



11.8 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 S164
Measurement uncertainty: See clause 7 of this test report

Test specification

See FCC Part 15.247

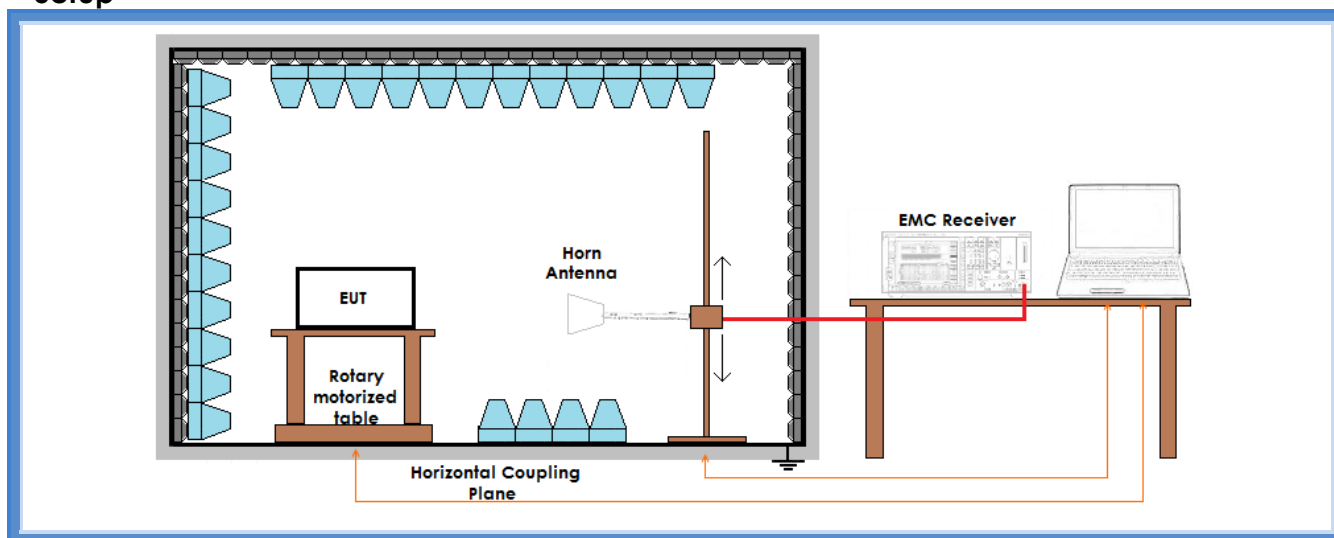
Environmental conditions

Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
21	100	45

Acceptance limits: operation within the band 2400 – 2483,5 MHz



Setup



Result

Frequency (MHz)	Graph(s) – Hopping	Results	
2400,00	G15059517	F_L : 2400,0641 MHz	Complies
	G15059539		
2483,50	G15059518	F_H : 2482,0577 MHz	Complies
	G15059540		

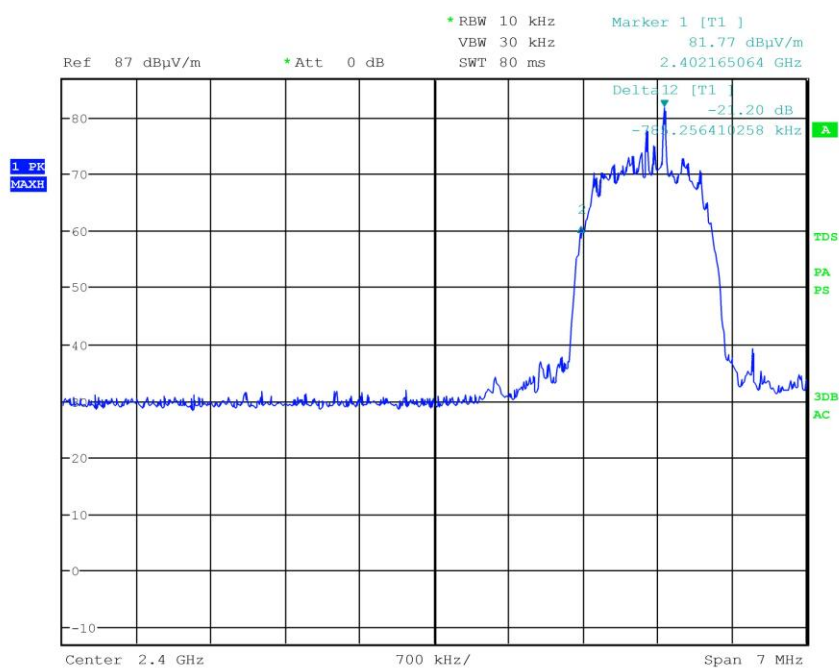
Frequency (MHz)	Graph(s) – No hopping	Results	
2400,00	G15059505	F_L : 2401,3798 MHz	Complies
	G15059506		
2483,50	G15059510	F_H : 2480,6153 MHz	Complies
	G15059511		



Graphs

G15059505

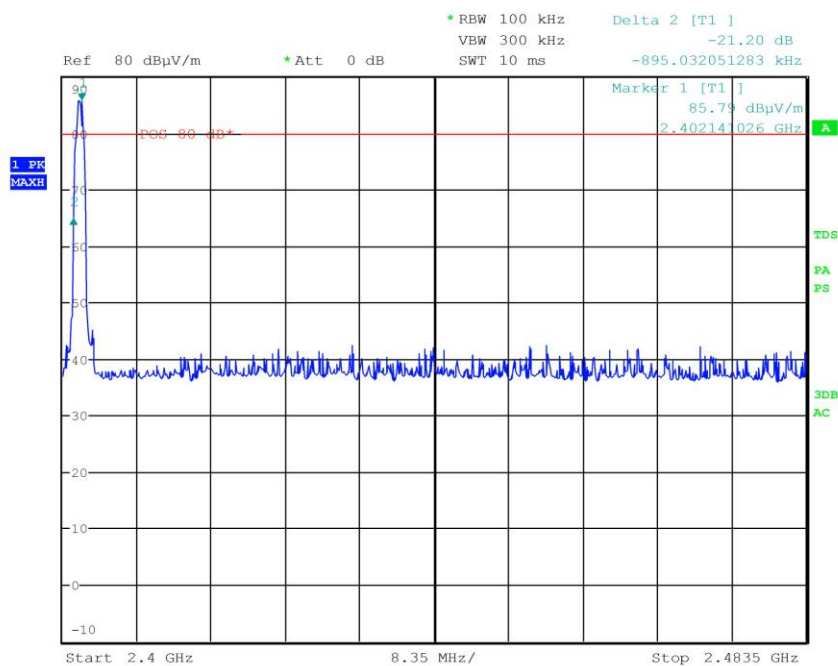
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-CH 0
Operator Gandini 15059505
Test Spec
Vert





G15059506

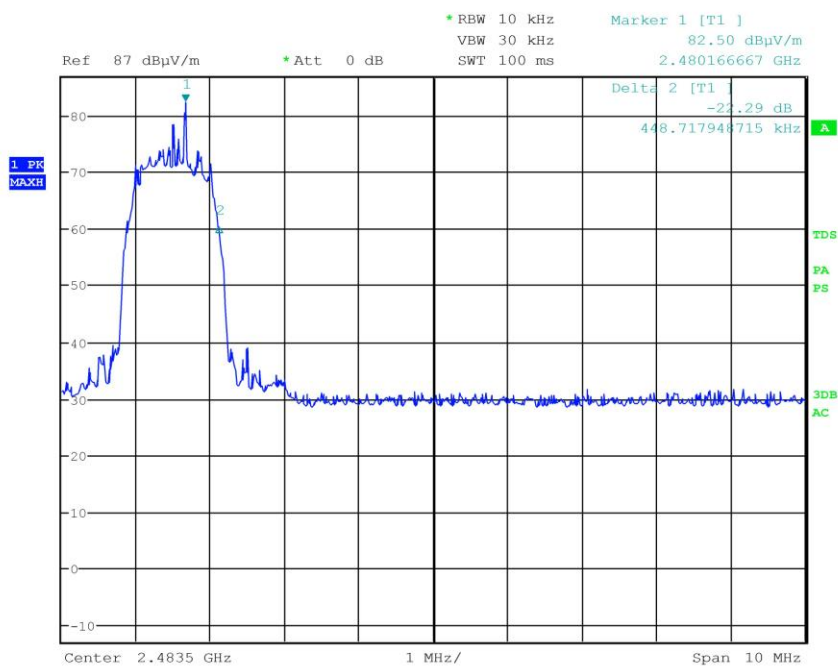
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-CH 0
Operator Gandini 15059506
Test Spec
Vert





G15059510

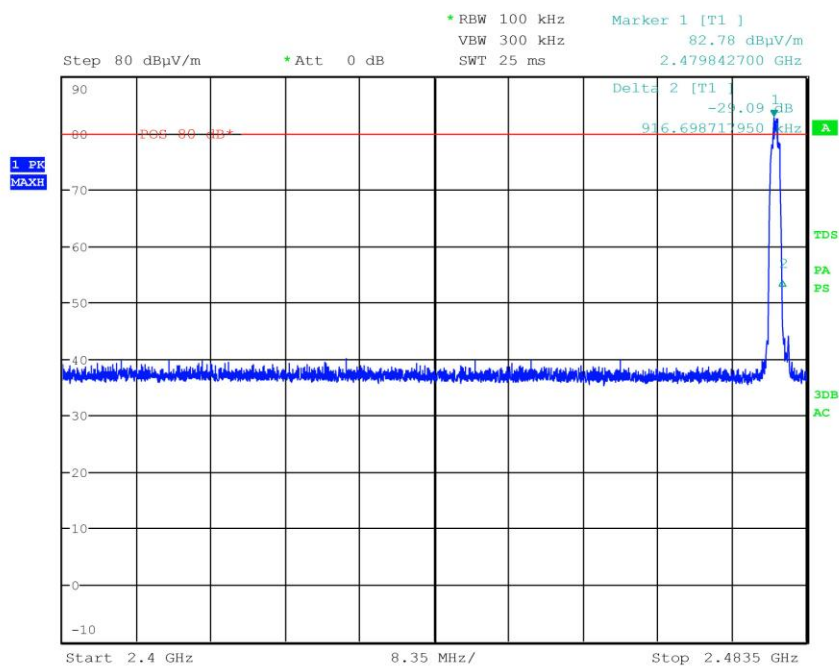
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-CH 78
Operator Gandini 15059510
Test Spec
Vert





G15059511

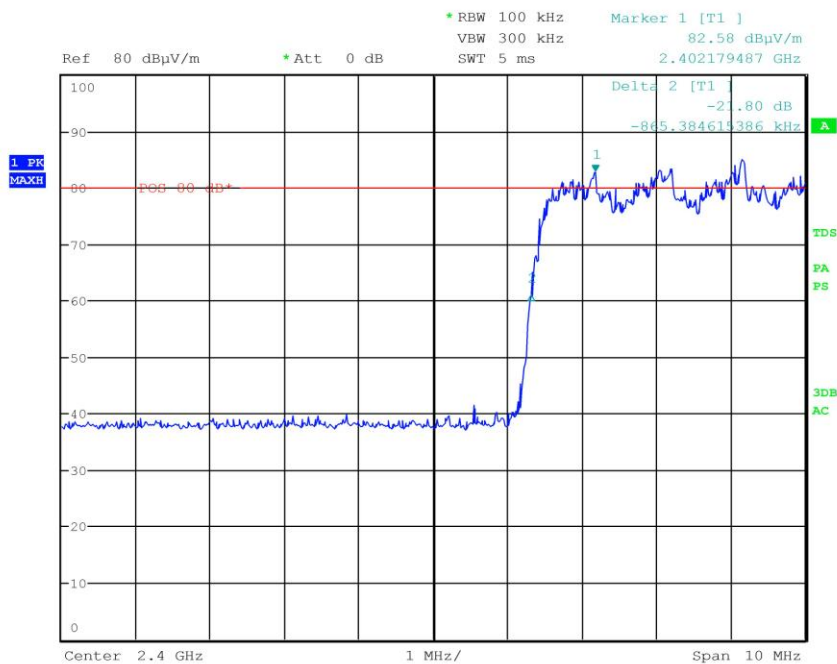
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-CH 78
Operator Gandini 15059511
Test Spec
Vert





G15059517

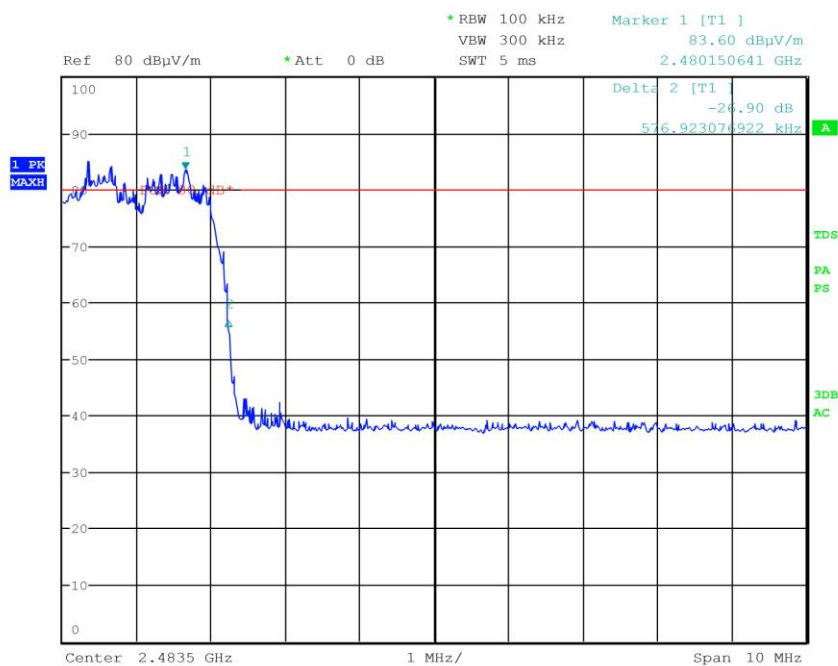
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-Hopp
Operator Gandini 15059517
Test Spec
Vert

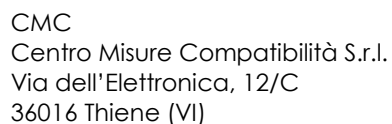




G15059518

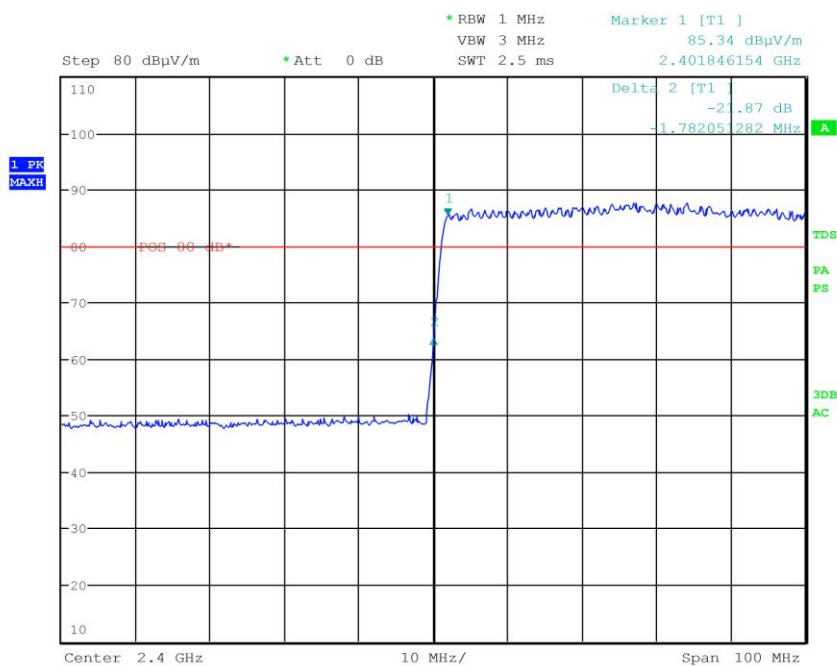
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-Hopp
Operator Gandini 15059518
Test Spec
Vert





G15059539

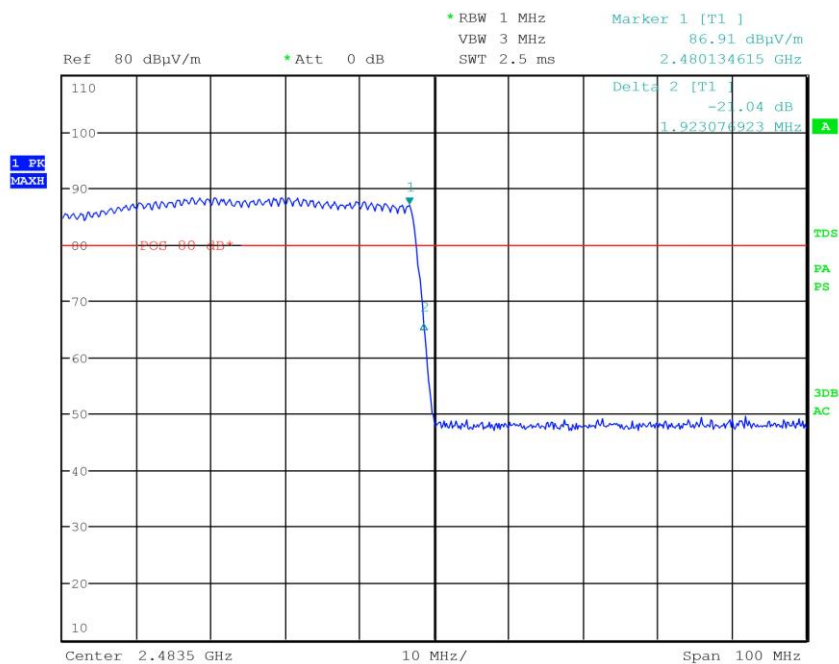
Meas Type	Emission
Equipment under Test	
Manufacturer	
OP Condition	Tx - Hopping
Operator	Gandini 15059539
Test Spec	
Vert	





G15059540

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx - Hopping
Operator Gandini 15059540
Test Spec
Vert



Result: The requirements are met



11.9 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:
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

Environmental conditions

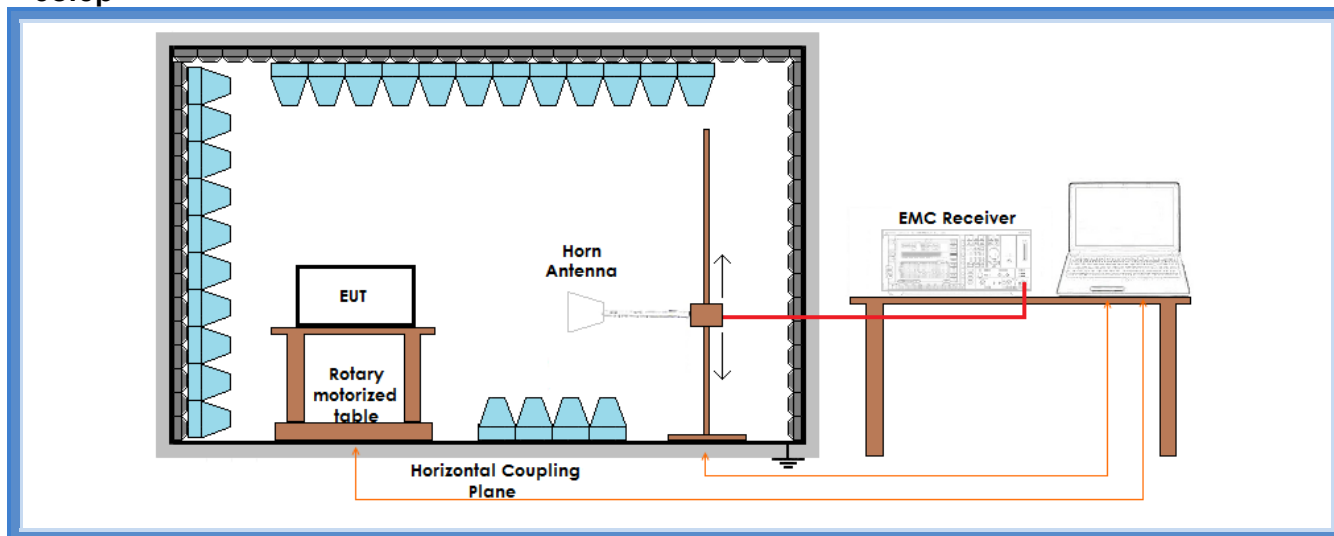
Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
22	100	42

Acceptance limits:

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



Setup



Result

Frequency (MHz)	Polarization	Graphs	Measured PK level (dB μ V/m)	Peak Output Power (mW)	Remarks
2402,2131	Horizontal	G15059502	81,92	0,047	--
2401,9214	Vertical	G15059501	87,69	0,176	--
2440,9102	Horizontal	G15059513	82,29	0,051	--
2440,9775	Vertical	G15059514	88,34	0,205	--
2479,9214	Horizontal	G15059512	82,56	0,054	--
2479,9214	Vertical	G15059507	88,70	0,222	--

Remarks

$$P = (E \times d)^2 / (30 \times G)$$

Where:

E = the measured maximum fundamental field strength in V/m

G = the numeric gain of the transmitting antenna: 1 (0 dBi)

d = the distance in meters from which the field strength was measured (3 m)

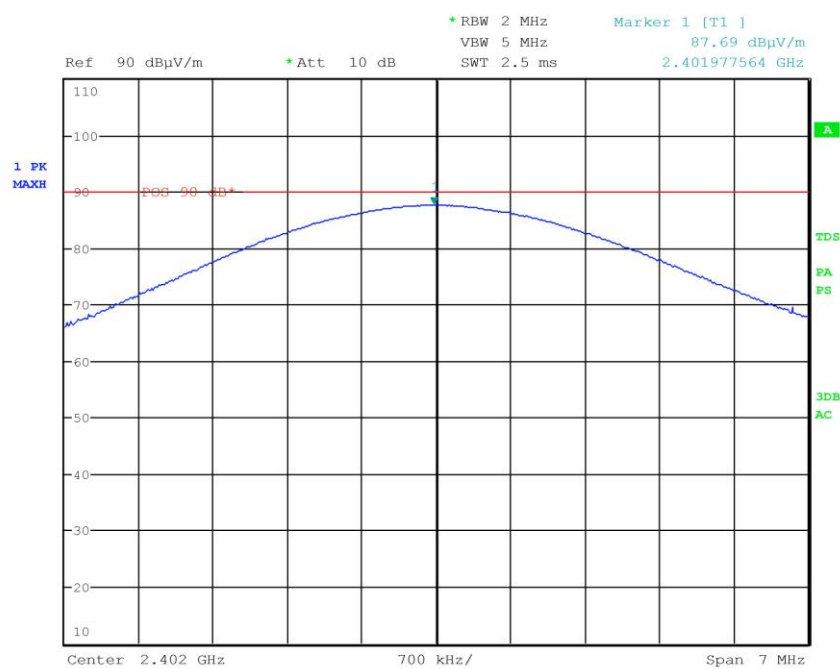
P = the power in watts



Graphs

G15059501

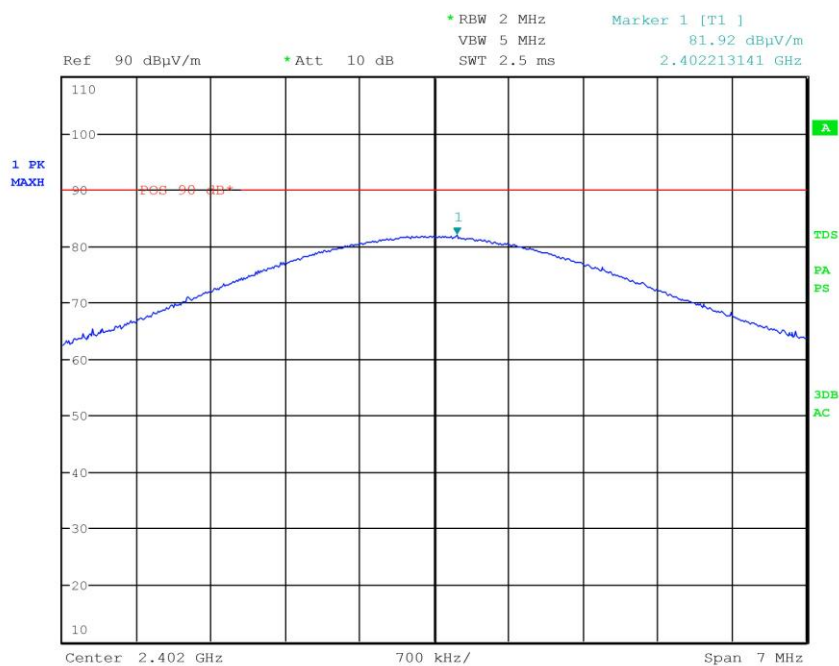
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-CH 0
Operator Gandini 15059501
Test Spec
Vert





G15059502

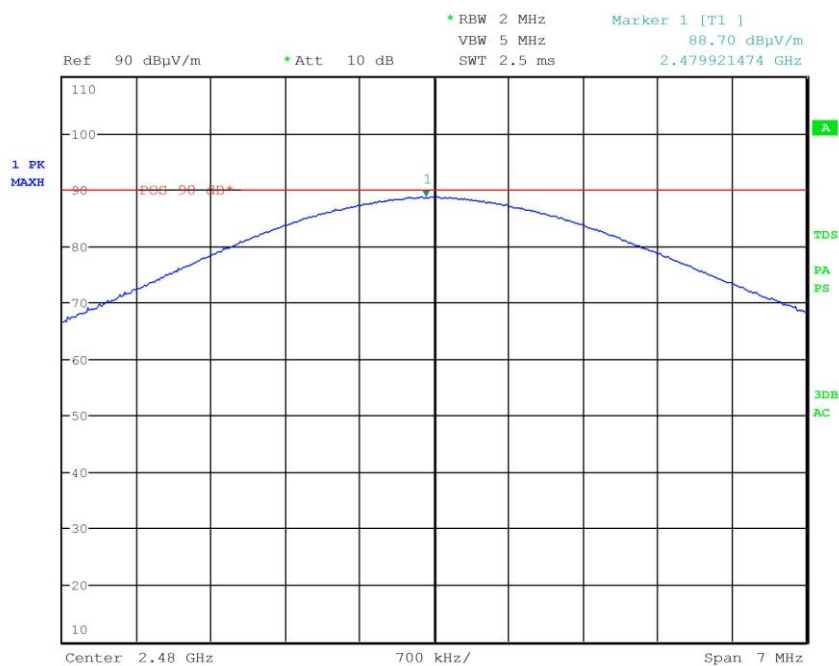
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-CH 0
Operator Gandini 15059502
Test Spec
Horiz





G15059507

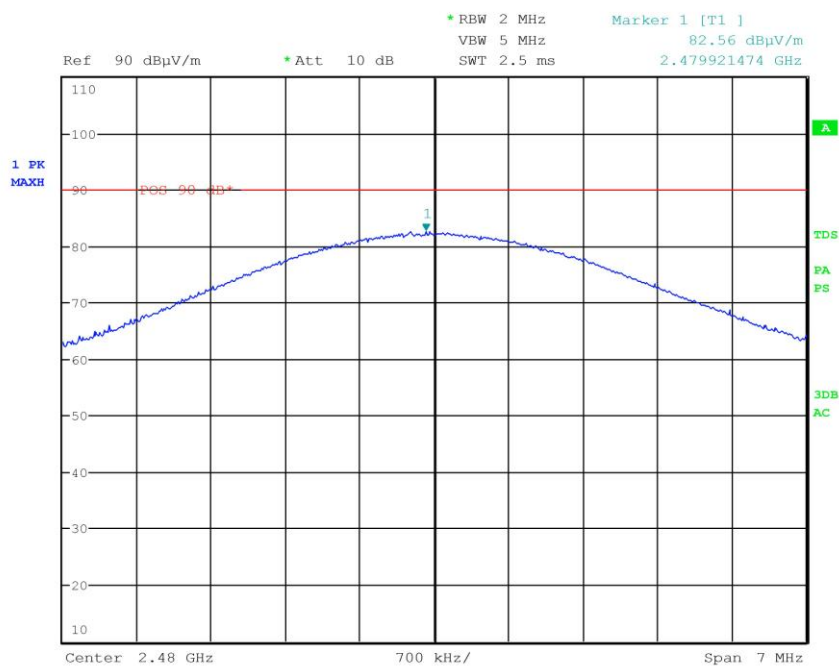
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-CH 78
Operator Gandini 15059507
Test Spec
Vert





G15059512

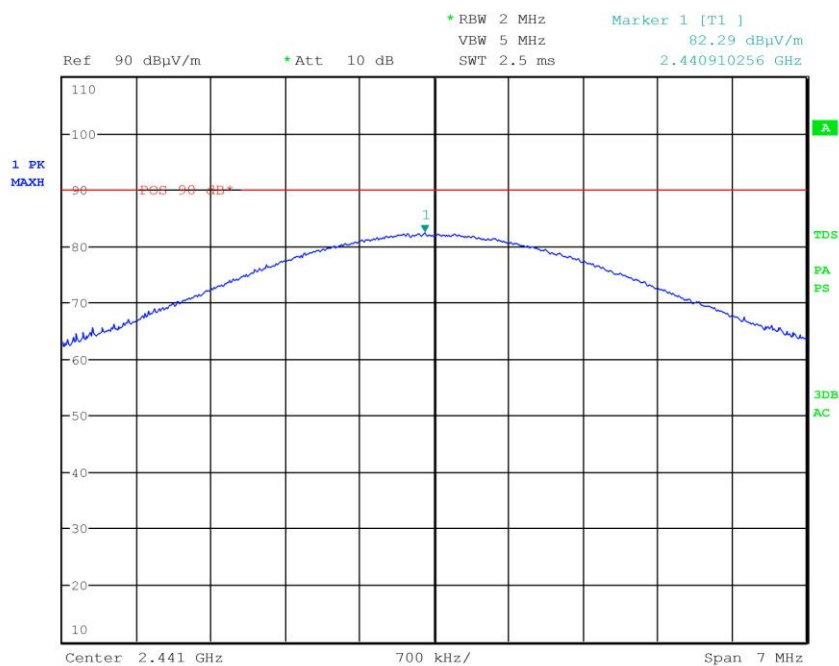
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-CH 78
Operator Gandini 15059512
Test Spec
Horiz





G15059513

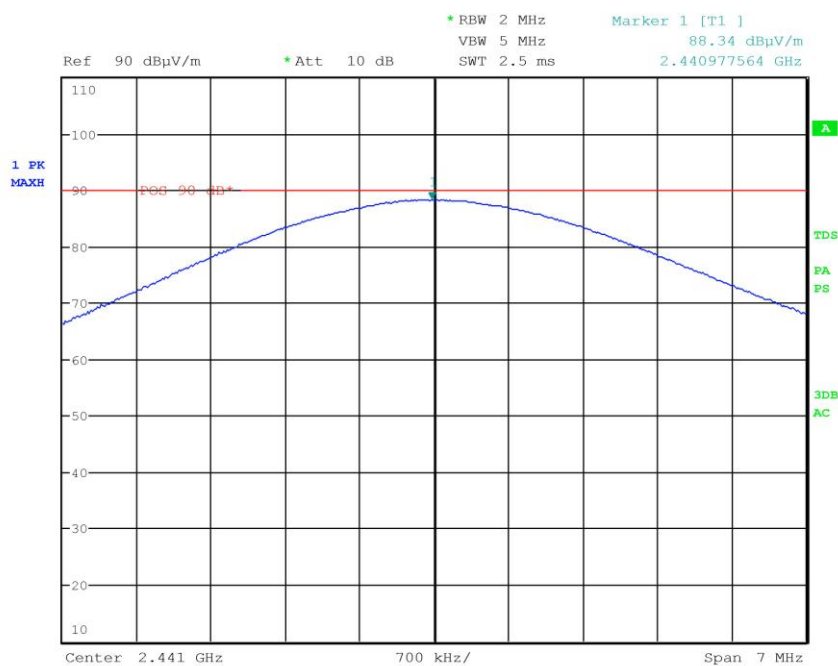
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-CH 39
Operator Gandini 15059513
Test Spec
Horiz





G15059514

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-CH 39
Operator Gandini 15059514
Test Spec
Vert



Result: The requirements are met



11.10 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

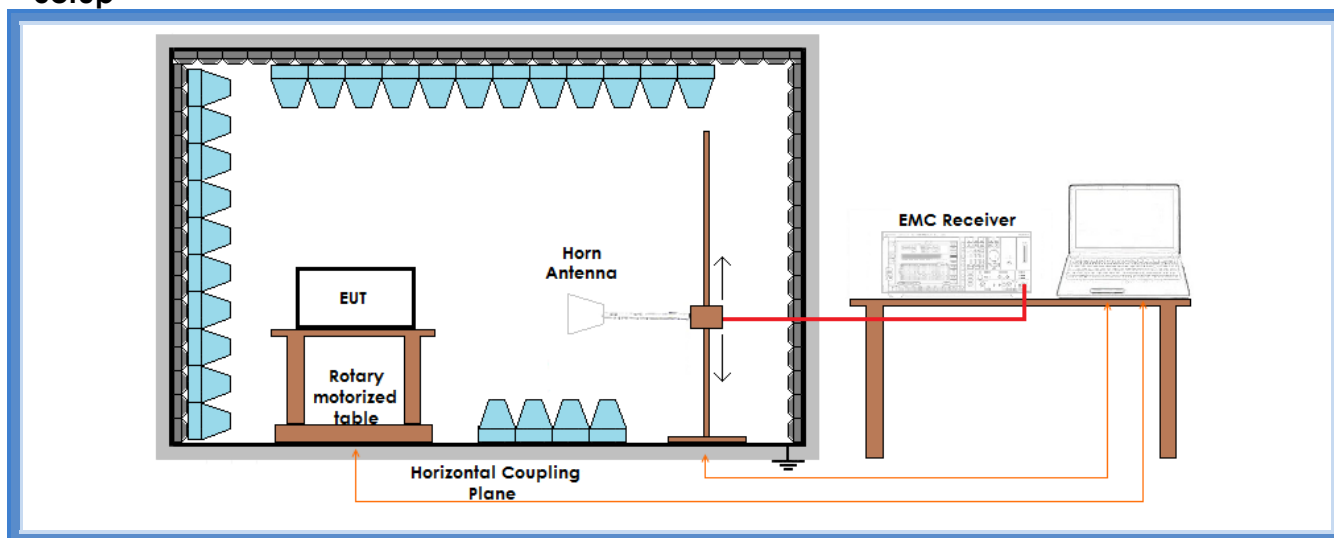
Temperature (°C)	Atmospheric pressure (kPa)	Relative humidity (%)
22	100	45

Acceptance limits

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



Setup



Graphs:

G15059519, G15059520, G15059521, G15059522,
G15059523, G15059524, G15059525, G15059526,
G15059527, G15059528, G15059529



Result – AV detector

Harmonic	Limits (dB μ V/m)	Level (dB μ V/m)			Results
		2402 MHz	2441 MHz	2480 MHz	
II	54	No harmonic detected	No harmonic detected	No harmonic detected	Complies
III	54	No harmonic detected	No harmonic detected	No harmonic detected	Complies
IV	54	No harmonic detected	No harmonic detected	No harmonic detected	Complies
V	54	No harmonic detected	No harmonic detected	No harmonic detected	Complies
VI	54	No harmonic detected	No harmonic detected	No harmonic detected	Complies
VII	54	No harmonic detected	No harmonic detected	No harmonic detected	Complies
VIII	54	No harmonic detected	No harmonic detected	No harmonic detected	Complies
IX	54	No harmonic detected	No harmonic detected	No harmonic detected	Complies
X	54	No harmonic detected	No harmonic detected	No harmonic detected	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
		2402 MHz	2441 MHz	2480 MHz	
II	74	No harmonic detected	No harmonic detected	No harmonic detected	Complies
III	74	No harmonic detected	No harmonic detected	No harmonic detected	Complies
IV	74	No harmonic detected	No harmonic detected	No harmonic detected	Complies
V	74	No harmonic detected	No harmonic detected	No harmonic detected	Complies
VI	74	No harmonic detected	No harmonic detected	No harmonic detected	Complies
VII	74	No harmonic detected	No harmonic detected	No harmonic detected	Complies
VIII	74	No harmonic detected	No harmonic detected	No harmonic detected	Complies
IX	74	No harmonic detected	No harmonic detected	No harmonic detected	Complies
X	74	No harmonic detected	No harmonic detected	No harmonic detected	Complies

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

Result: The requirements are met



11.11 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	906/1500 mW/cm ² = 0,60 mW/cm ² 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
0,60	0,222	0,74 (-1,3 dBi)	0,0014	Measured
Remarks: Power Density = $(P \times G) / (4\pi R^2)$				

Result: The requirements are met