CMC Centro Misure Compatibilità S.r.l.
Via dell'Elettronica, 12/C
36016 Thiene (VI) – ITALY
Tel./Fax +39 0445 367702
www.cmclab.it - info@cmclab.it

Independent Testing Laboratory

TEST REPORT nr. R15007201
Federal Communication Commission (FCC)
Industry Canada (IC)

Test item

Description .....: TRANSCEIVER UNIT
Trademark.....: AUTEC
Model/Type .....: Model PCR
Type NKZ21

Test Specification

Standard .....: FCC Rules & Regulations, Title 47:2013
Part 15 paragraph(s): 203, 204, 207, 209 and 247
RSS-210 Issue 8:December 2010
RSS-GEN Issue 4 – November 2014

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 .....: 19.03.15
Contents.....: 69 pages

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1. Summary

Standard:

FCC Rules & Regulations, Title 47:2013
Part 15 paragraph(s): 203, 204, 207, 209 and 247
RSS-210 Issue 8:December 2010
RSS-GEN Issue 4 – November 2014

Test specifications	*Environmental Phenomena*	*Tests sequence*	*Result*
Part 15.203 IC – RSS-GEN Issue 4	Antenna requirements	1	Complies
Part 15.207 IC – RSS-GEN Issue 4	Conducted emissions	2	Complies
Part 15.209 IC – RSS-GEN Issue 4	Radiated emissions	3	Complies
Part 15.247 IC – RSS-GEN Issue 4	20dB Bandwidth	4	Complies
IC – RSS-GEN Issue 4	Occupied bandwidth (99% BW)	5	Complies
Part 15.247 IC – RSS-GEN Issue 4	Channel Separation	6	Complies
Part 15.247 IC – RSS-GEN Issue 4	Number of Hopping Channel	7	Complies
Part 15.247 IC – RSS-GEN Issue 4	Time of occupancy	8	Complies
Part 15.247 IC – RSS-GEN Issue 4	Band edge	9	Complies
Part 15.209 and 15.247 IC – RSS-210 – Annex 8	Peak Output Power	10	Complies
Part 15.209 IC – RSS-210 – Annex 8	Spurious emission	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 and the IC certification

2. Description of Equipment under test (EUT)

Power supply	:	8-30 Vdc
Serial Number	:	--
Type of equipment	:	☑ Transmitter Unit
		☑ Receiver Unit
Type of station	:	☑ Fixed station
		❑ Portable station
		❑ Mobile station
Frequency band	:	915 – 928 MHz
FCC ID	:	OQA-PCRNKZ22

2.1 Test Site

Company	:	CMC Centro Misure Compatibilità S.r.l.
Address	:	Via dell'Elettronica, 12/C
		36016 Thiene (VI) – ITALY
Test site facility's IC registration number	:	9055A

3. Testing and sampling

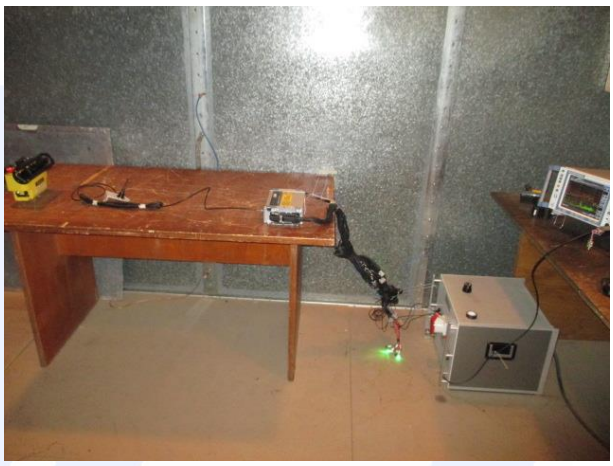
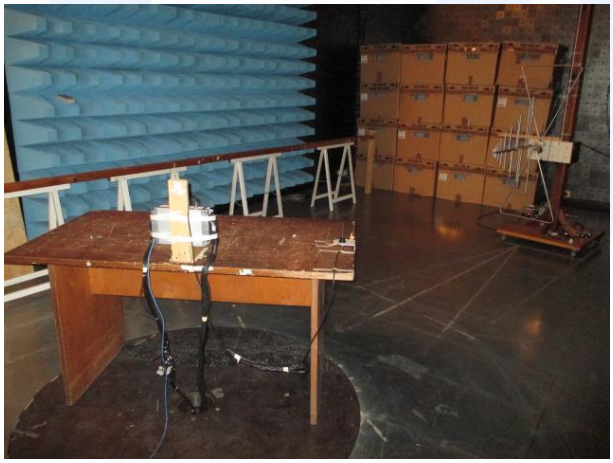
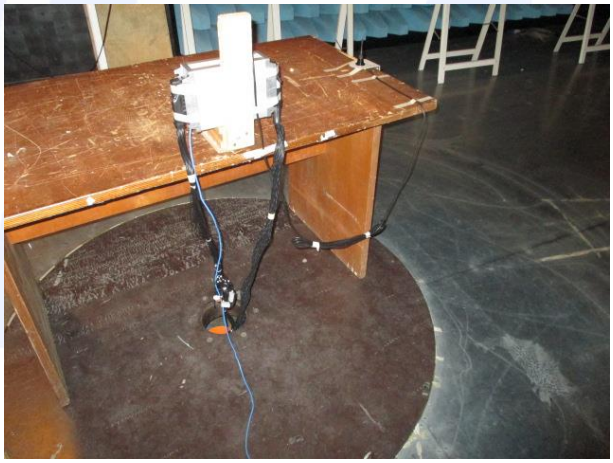
Date of receipt of test item	:	19.01.15
Testing start date	:	19.01.15
Testing end date	:	28.01.15
Samples tested nr.	:	1
Sampling procedure.	:	Equipment used for testing was picked up by the manufacturer, at the end of the production process with random criterion
Internal identification	:	adhesive label with the product number P150041

4. Operative conditions

EUT exercising	:	EUT in continuous transmission at maximum power

5. Photograph(s) of EUT

5.1 Photograph(s) of setup

6. Equipment list

Id. number	*Manufacturer*	*Model*	*Description*	*Serial number*	*Last calibration*	*Due date calibration*
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)	±3.8 dB	1
(50Ω/50µH AMN) - (150 kHz – 30 MHz)	±3.3 dB	1
(Voltage probe) - (150 kHz – 30 MHz)	±3.3 dB	1
(50Ω/5µH AMN) - (150 kHz – 108 MHz)	±2.8 dB	1
Discontinuous Conducted Emission		
Conducted Emission (50Ω/50µH AMN) - (150 kHz – 30 MHz)	±3.3 dB	1
Disturbance Power (30 MHz – 300 MHz)	±3.9 dB	1
Radiated Emission		
(0,150 MHz – 30 MHz)	±4.3 dB	1
(30 MHz – 1000 MHz)	±4.4 dB	1
(1 GHz – 6 GHz)	±4.6 dB	1
Electromagnetic field EMF	±15.0 %	1
Harmonic current emissions test	±2.7 %	1
Voltage fluctuation and flicker test	±2.9 %	1
Insertion loss test	±2.7 dB	1
Radiated electromagnetic disturbance test (loop antenna)	±2.7 dB	1
Radiated electromagnetic field immunity test	0.77 V/m at 3V/m	1
Pulse modulated radiated electromagnetic field immunity test	0.77 V/m at 3V/m	1
Injected currents immunity test	0.48 V at 3V	1
Bulk current	5.3 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)	±4.4 dB	1
Effective radiated power (F > 1GHz)	±3.9 dB	1
Frequency error	< 1x10-7	1
Modulation bandwidth	< 1x10-7	1
Adjacent channel power	±2.6 dB	1
Blocking	±2.6 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	--
RSS-GEN Issue 4 – November 2014	General Requirements for Compliance of Radio Apparatus
RSS-210 Issue 8:December 2010	Low-power licence-exempt radiocommunication devices (all frequency bands): Category I Equipment
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

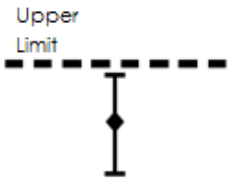
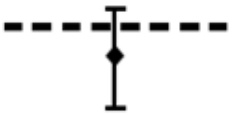
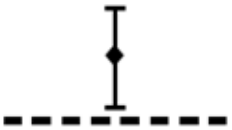
Test case does not apply to the test object ..... : N.A.
Test item does meet the requirement ..... : Complies
Test item does not meet the requirement..... : Does not comply
Test not performed ..... : N.E.

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 is Complies. The measurement results is within the specification limit when the measurement uncertainty is taken into account.	The sample is Complies. It is not possible to state compliance using a 95% coverage probability for the expanded uncertainty although the measurement result is below the limit.	The sample is Not Complies. 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 sample is Not Complies. 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 (%)*
18	100	42

Result

Antenna Type	*External R.F. power amplifier*	*Gain*	*Remarks*	*Results*
External antenna	Not Present	2 dBi	External antenna with cable of 5 m length	Complies
External antenna	Not Present	2 dBi	External antenna with stylus	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

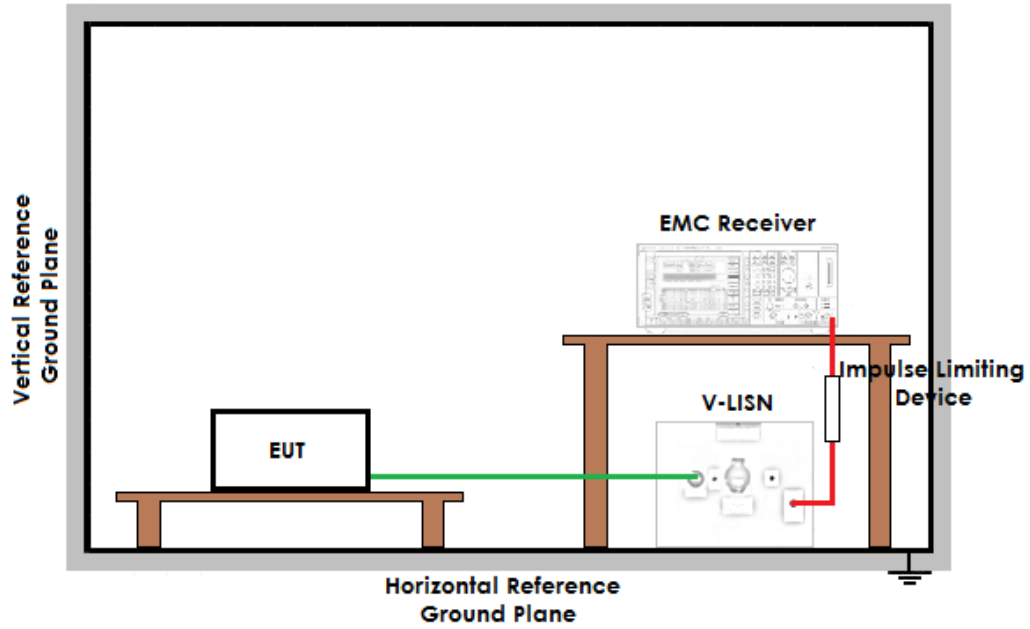
Environmental conditions

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



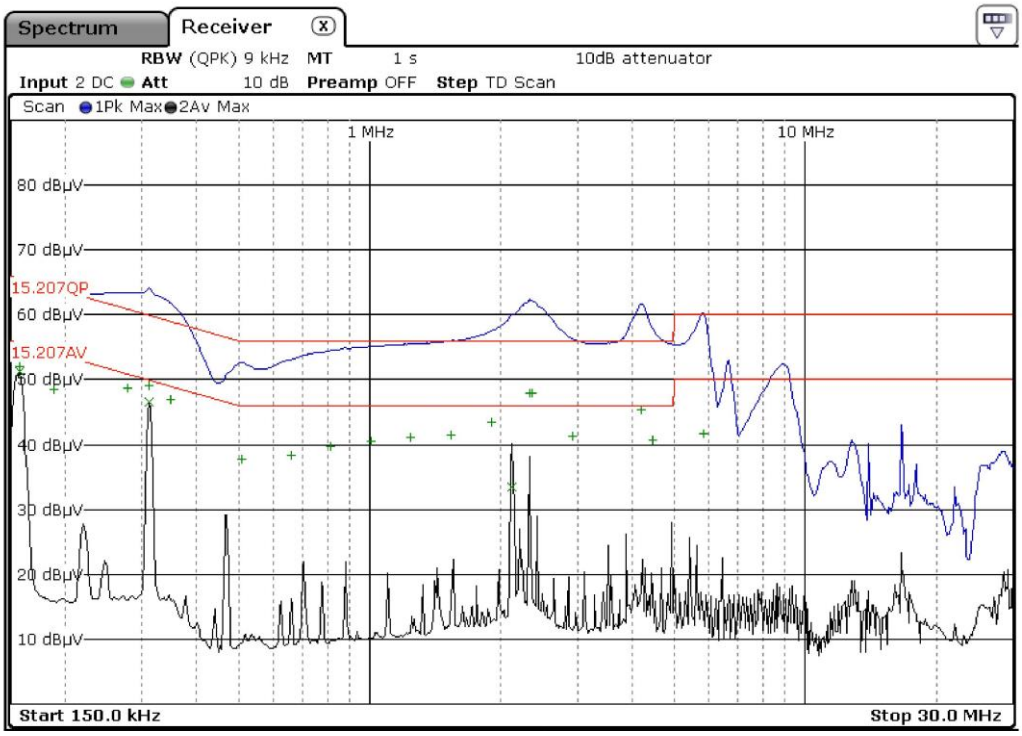
Result

Line	*Graphs*	*Remarks*	*Result*
+	G15007218	--	Complies
-	G15007219	--	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

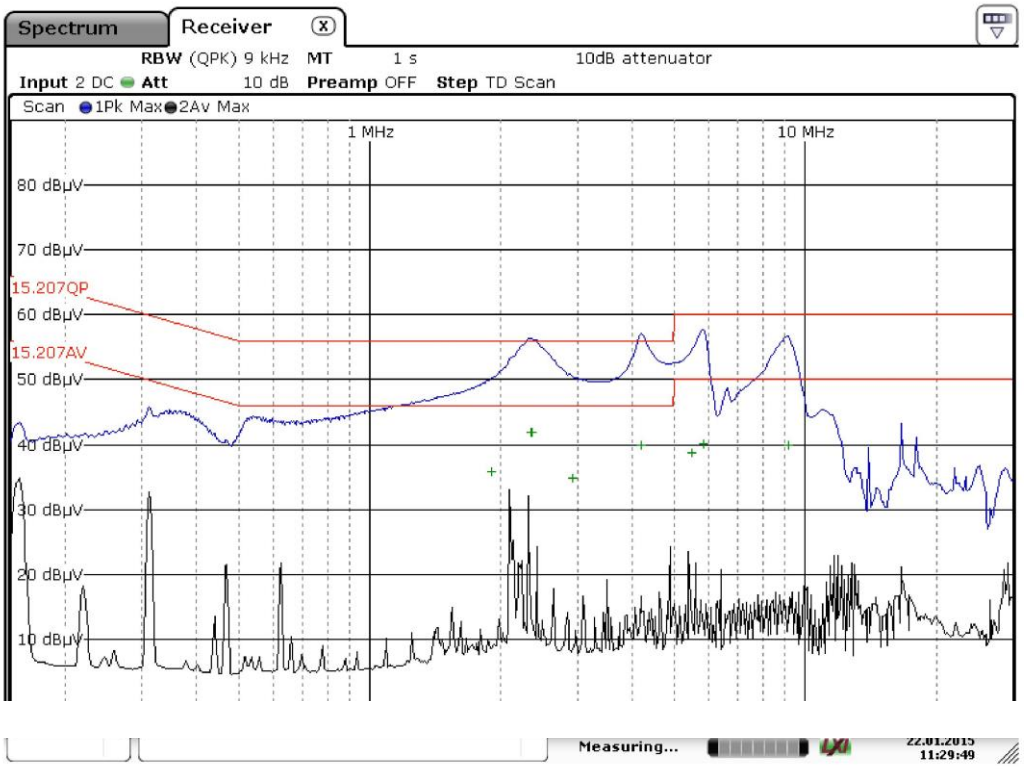
Graphs

G15007218



Gandini 15007218-Line (+) - Tx-Rx hopping Ant.Ext 5m

G15007219



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

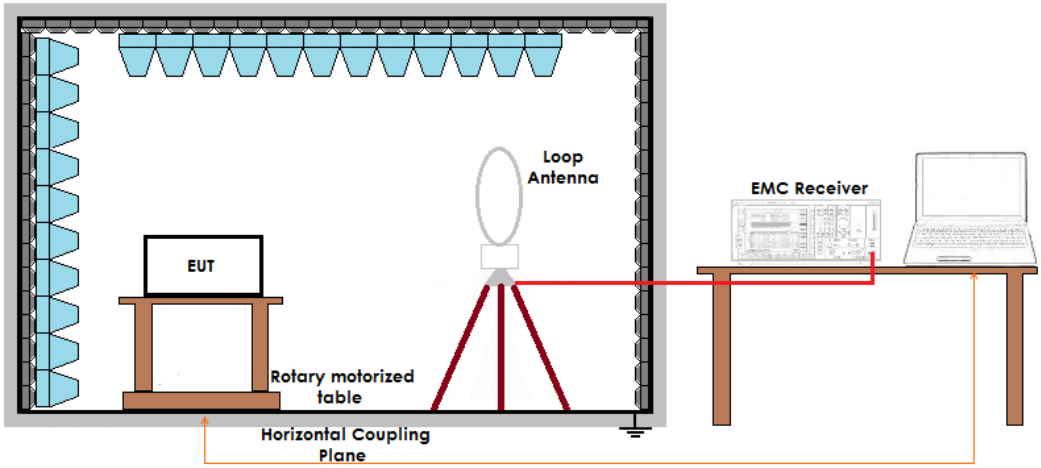
Temperature (°C)	*Atmospheric pressure (kPa)*	*Relative humidity (%)*

Acceptance limits

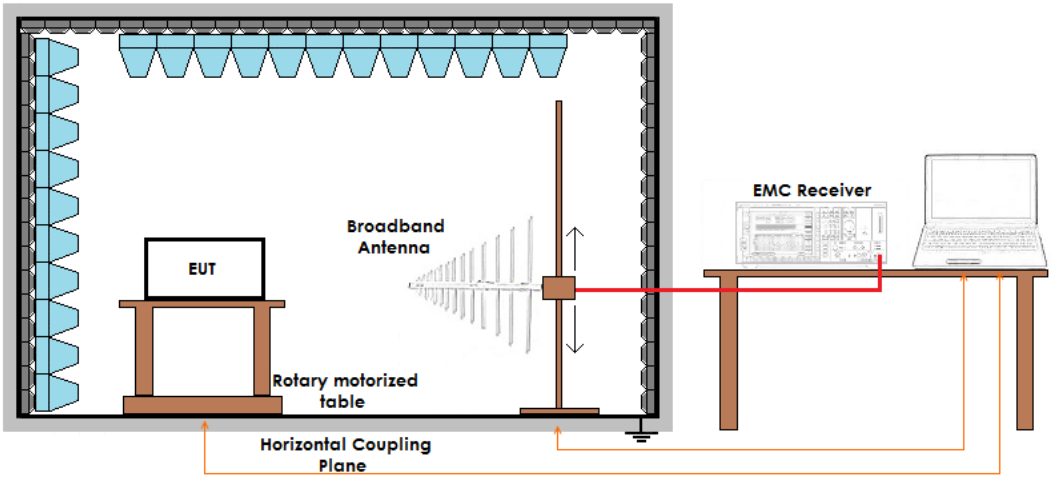
Frequency range (MHz)	*Limits [dB(µV/m)]*
0,009 to 0,490	128,51 to 93,80
0,490 to 1,705	73,80 to 62,97
1,705 to 30	69,54
30 to 88	40
88 to 216	43,52
216 to 960	46,02
Above 960	53,98
Remarks: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except 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

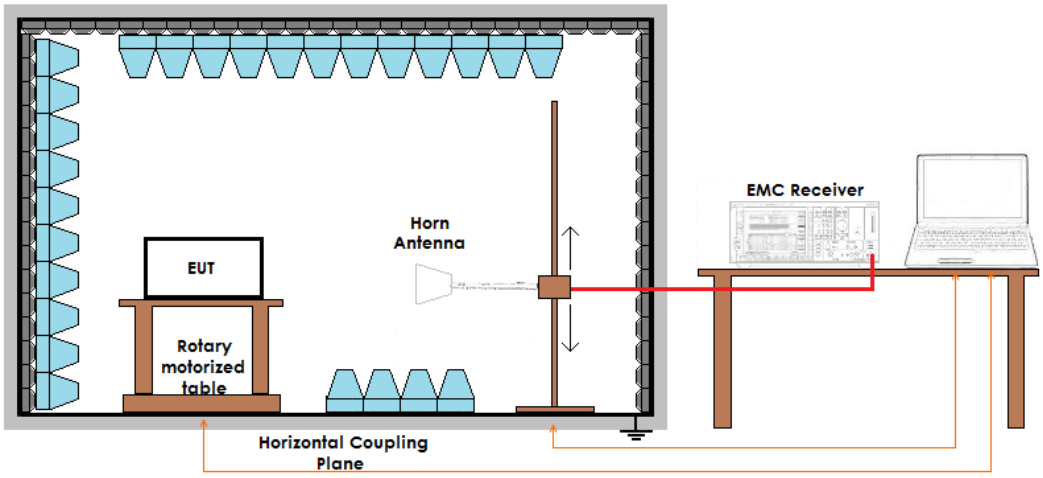
Frequency ≤ 30 MHz



Frequency ≤ 1 GHz



Frequency > 1 GHz



Result

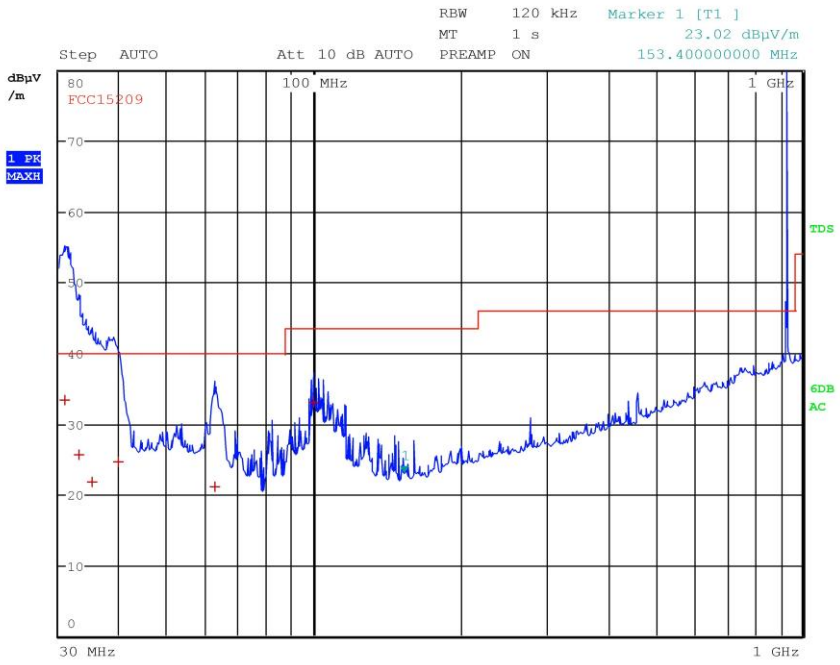
Polarization	*Frequency Range (MHz)*	*Graphs*	*Remarks*	*Result*
Loop	0,009 – 30	G15007207	Worst case	Complies
V	30 – 1000	G15007204	Lowest channel	Complies
H	30 – 1000	G15007203	Lowest channel	Complies
V	30 – 1000	G15007205	Medium channel	Complies
H	30 – 1000	G15007206	Medium channel	Complies
V	30 – 1000	G15007201	Highest channel	Complies
H	30 – 1000	G15007202	Highest channel	Complies
V	1000 – 10000	G15007208	Worst case	Complies
H	1000 – 10000	G15007242	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

G15007201

Meas Type Emission 30-1000MHz
Equipment under Test
Manufacturer
OP Condition Tx-Rx - Fmax - Ant. Ext. 5m
Operator Gandini 15007201
Test Spec
Vert



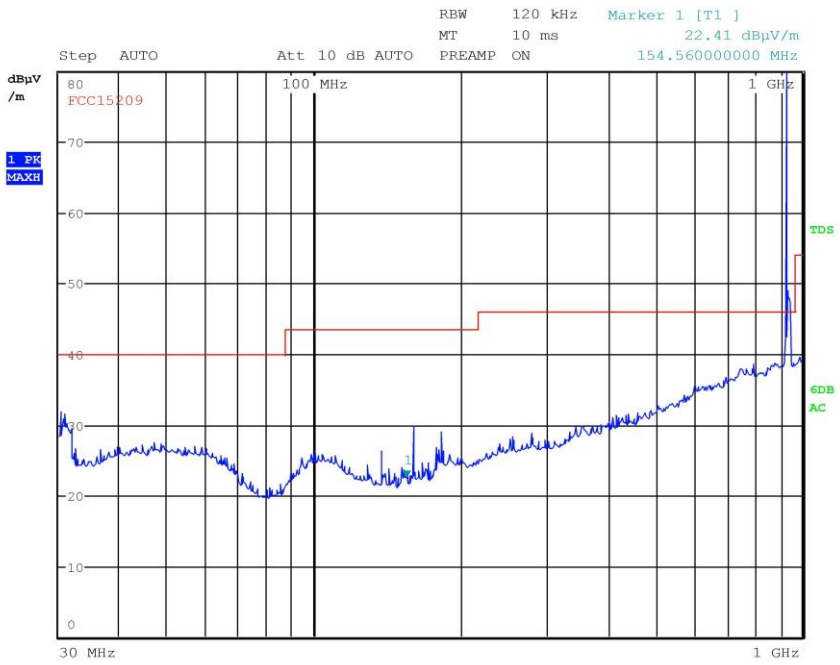
Final Measurement

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

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	30.840000000 MHz	33.43	Quasi Peak	-6.57
1	32.960000000 MHz	25.61	Quasi Peak	-14.39
1	35.160000000 MHz	21.84	Quasi Peak	-18.16
1	39.760000000 MHz	24.54	Quasi Peak	-15.46
1	62.640000000 MHz	21.12	Quasi Peak	-18.88
1	100.000000000 MHz	32.96	Quasi Peak	-10.56

G15007202

Meas Type Emission 30-1000MHz
Equipment under Test
Manufacturer
OP Condition Tx-Rx - Fmax - Ant. Ext. 5m
Operator Gandini 15007202
Test Spec
Horiz

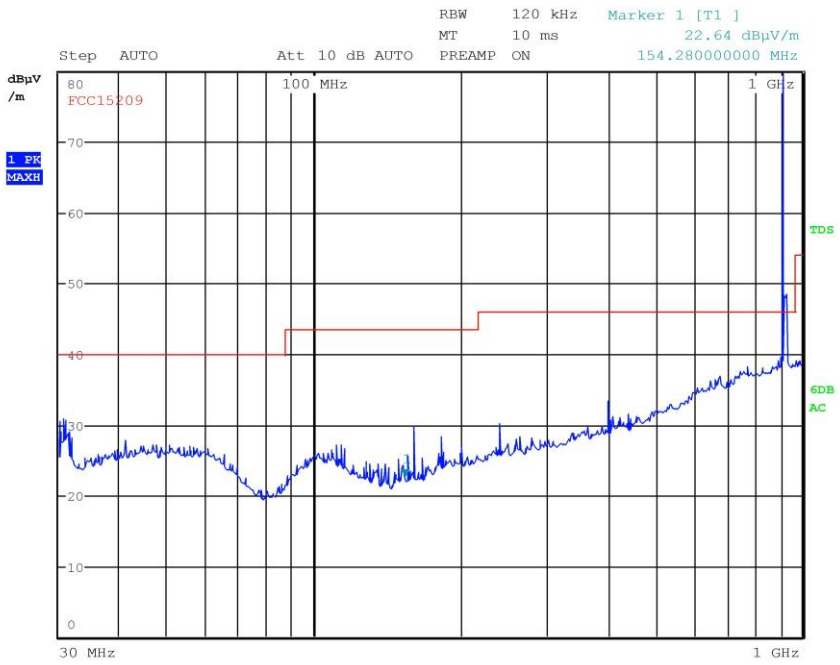


Final Measurement

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

G15007203

Meas Type Emission 30-1000MHz
Equipment under Test
Manufacturer
OP Condition Tx-Rx - Fmin - Ant. Ext. 5m
Operator Gandini 15007203
Test Spec
Horiz



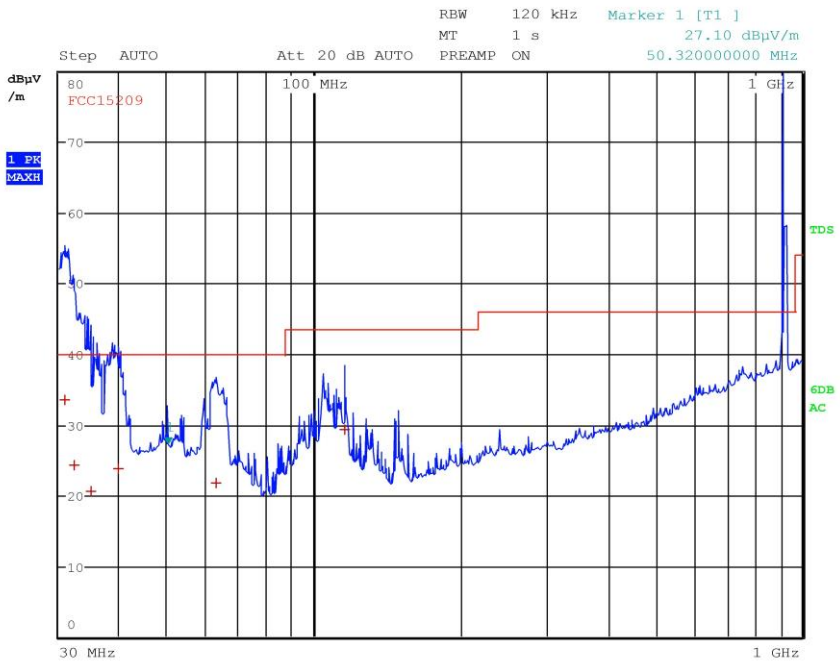
Final Measurement

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

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	915.000000000 MHz	104.39	Max Peak	58.37

G15007204

Meas Type Emission 30-1000MHz
Equipment under Test
Manufacturer
OP Condition Tx-Rx - Fmin - Ant. Ext. 5m
Operator Gandini 15007204
Test Spec
Vert



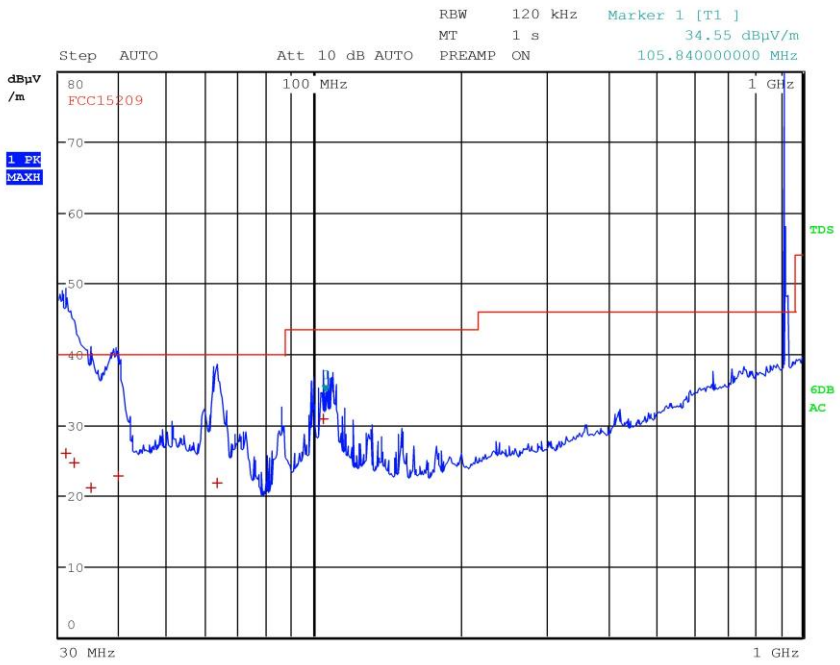
Final Measurement

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

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	30.880000000 MHz	33.61	Quasi Peak	-6.39
1	32.240000000 MHz	24.21	Quasi Peak	-15.79
1	34.920000000 MHz	20.56	Quasi Peak	-19.44
1	39.760000000 MHz	23.76	Quasi Peak	-16.24
1	63.080000000 MHz	21.69	Quasi Peak	-18.31
1	115.560000000 MHz	29.25	Quasi Peak	-14.27

G15007205

Meas Type Emission 30-1000MHz
Equipment under Test
Manufacturer
OP Condition Tx-Rx - Fmid - Ant. Ext. 5m
Operator Gandini 15007205
Test Spec
Vert



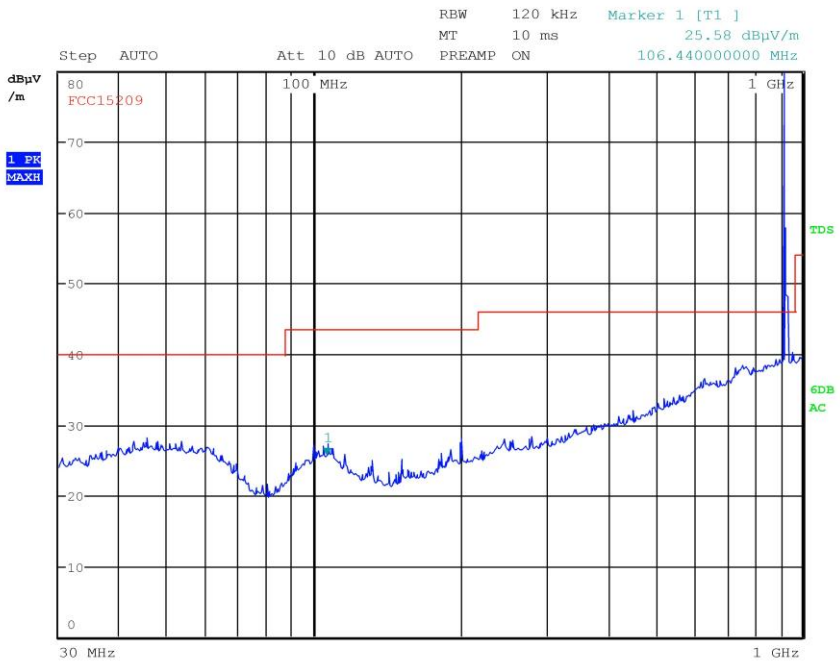
Final Measurement

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

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	30.920000000 MHz	26.00	Quasi Peak	-14.00
1	32.280000000 MHz	24.59	Quasi Peak	-15.41
1	34.920000000 MHz	21.09	Quasi Peak	-18.91
1	39.720000000 MHz	22.85	Quasi Peak	-17.15
1	63.360000000 MHz	21.82	Quasi Peak	-18.18
1	104.440000000 MHz	30.88	Quasi Peak	-12.64

G15007206

Meas Type Emission 30-1000MHz
Equipment under Test
Manufacturer
OP Condition Tx-Rx - Fmid - Ant. Ext. 5m
Operator Gandini 15007206
Test Spec
Horiz

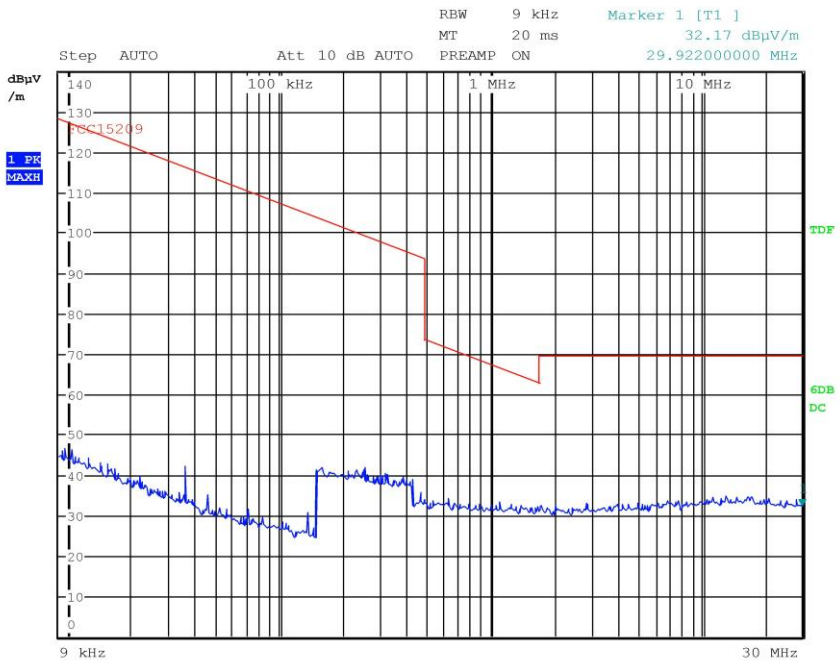


Final Measurement

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

G15007207

Meas Type Emission 0.009-30MHz
Equipment under Test
Manufacturer
OP Condition Tx-Rx - Ant. Ext. 5m
Operator Gandini 15007207
Test Spec
Loop

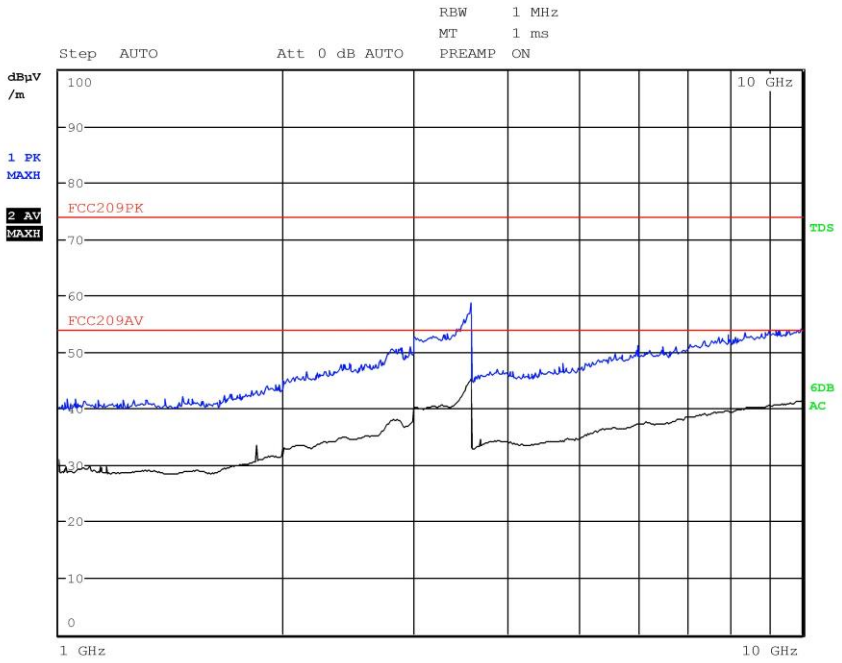


Final Measurement

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

G15007208

Meas Type Emission 1000-10000MHz
Equipment under Test
Manufacturer
OP Condition Tx-Rx - Ant. Ext. 5m
Operator Gandini 15007208
Test Spec
Vert

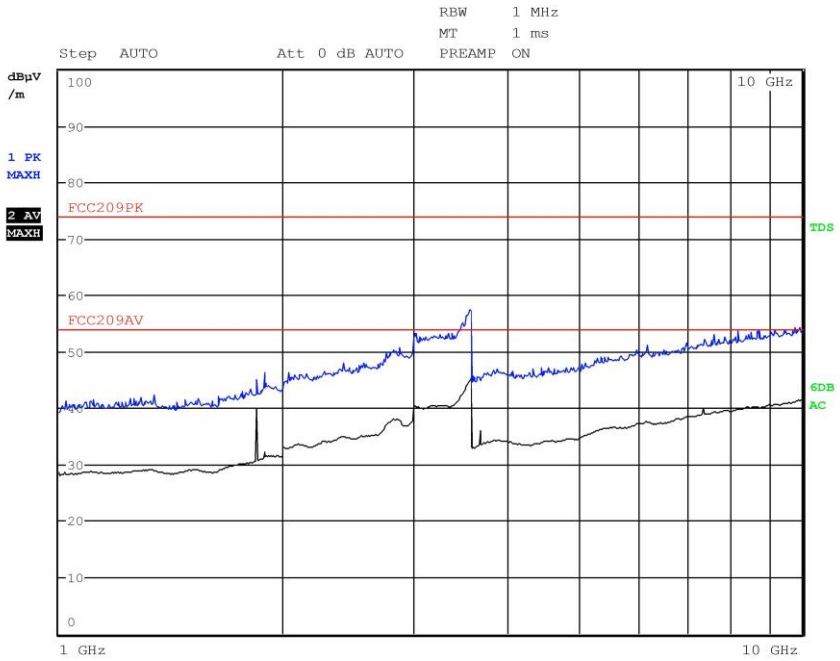


Final Measurement

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

G15007242

Meas Type Emission 1000-10000MHz
Equipment under Test
Manufacturer
OP Condition Tx-Rx - Ant. Ext. 5m
Operator Gandini 15007242
Test Spec
Horiz



Final Measurement

Meas Time: 1 s
Margin: 6 dB
Subranges: 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
- RSS 210 Annex 8
- 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 S227
Measurement uncertainty: See clause 7 of this test report

Test specification

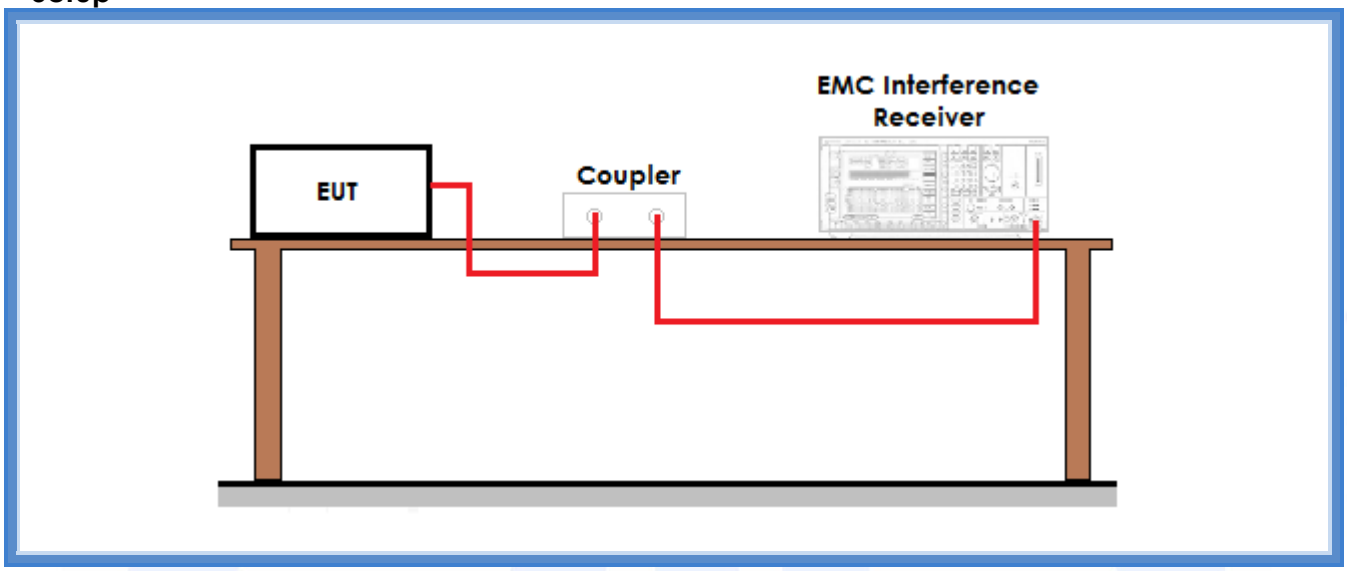
See FCC Part 15.247

Environmental conditions

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

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

Setup

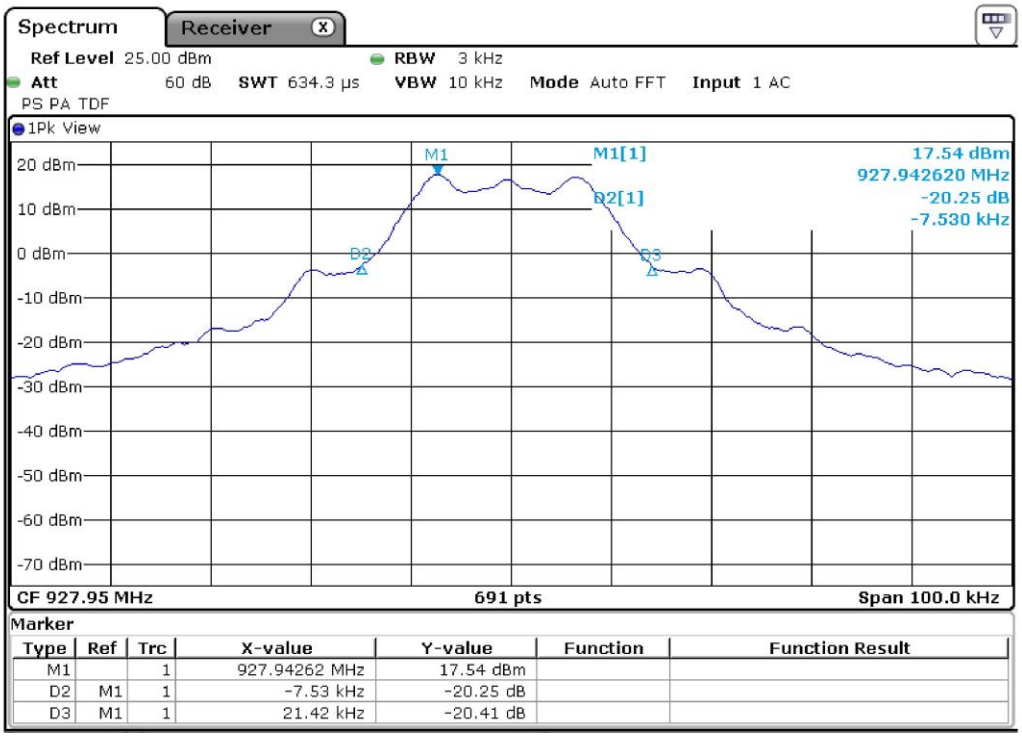


Result

Frequency (MHz)	*Graphs*	*20 dB bandwidth (kHz)*	*Results*
915,05	G15007228	28,510	Complies
921,50	G15007231	28,510	Complies
927,95	G15007221	28,950	Complies

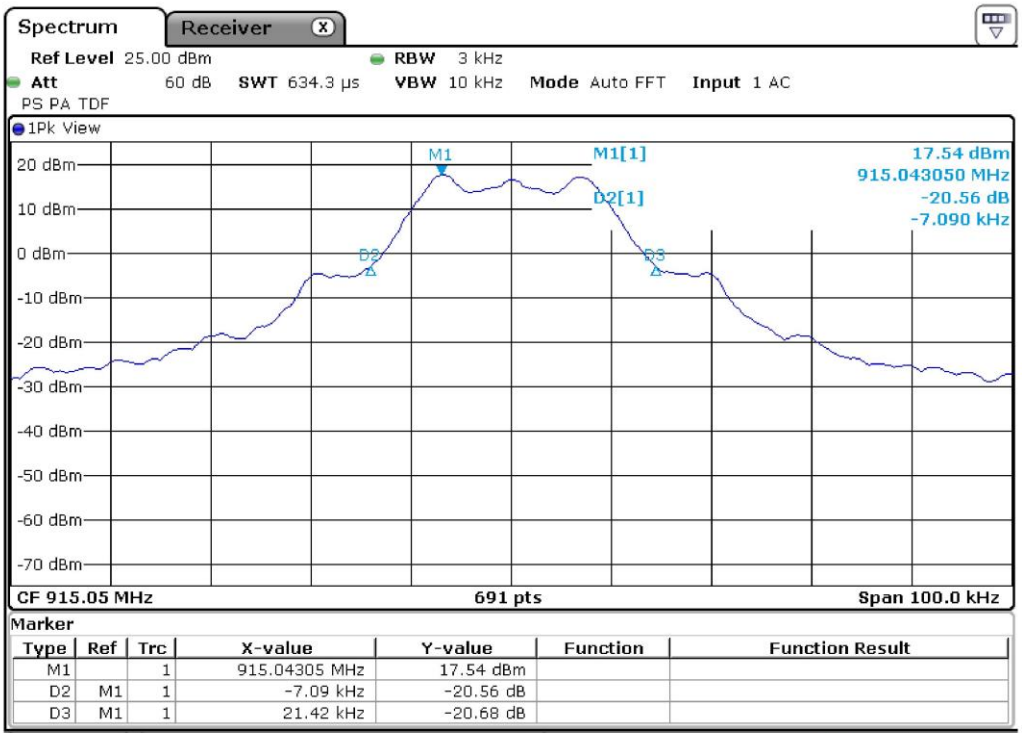
Graphs

G15007221



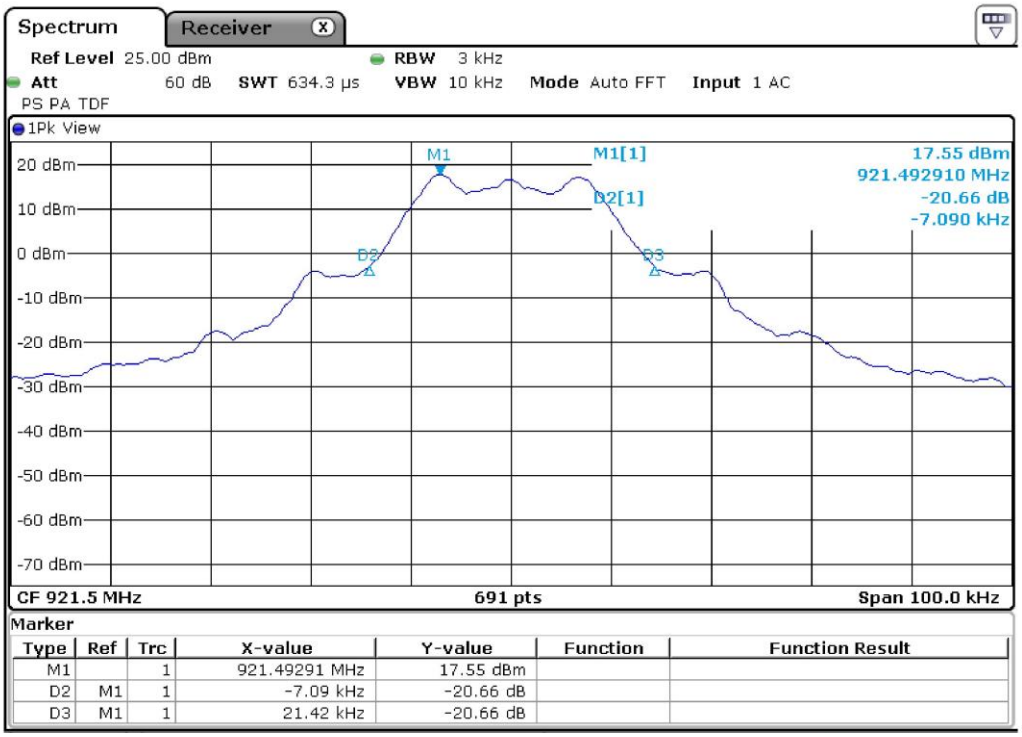
Gandini 15007221-F max

G15007228



Gandini 15007228-F min

G15007231



Gandini 15007231-F mid

Result: The requirements are met

11.5 Occupied bandwidth (99% BW)

Test set-up and execution

- RSS 210 Annex 8
- 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 S227
Measurement uncertainty: See clause 7 of this test report

Test specification

RSS 210 Annex 8

Environmental conditions

Temperature (°C)	*Atmospheric pressure (kPa)*	*Relative humidity (%)*
22	101	42

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