CMC Centro Misure Compatibilità S.r.l.
Via della Fisica, 20
36016 Thiene (VI) – ITALY
Tel./Fax +39 0445 367702
www.cmclab.it - info@cmclab.it

LAB N° 0168

Independent Testing Laboratory
Accredited by ACCREDIA according to UNI CEI EN ISO/IEC 17025 cert. nr. 0168

TEST REPORT nr. R16068201

Federal Communication Commission (FCC)

Test item

Description .....: TRANSCEIVER UNIT
Trademark .....: AUTEC
Model/Type .....: Model FJR Type NZ422
FCC ID .....: OQA-FJRNZ422

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 .....: A. Bertezzolo – *Technician*
Approved by .....: R. Beghetto – *Laboratory Manager*
Date of issue .....: 14.09.16
Contents .....: 60 pages

Index

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	:	7,4 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: 921,50 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

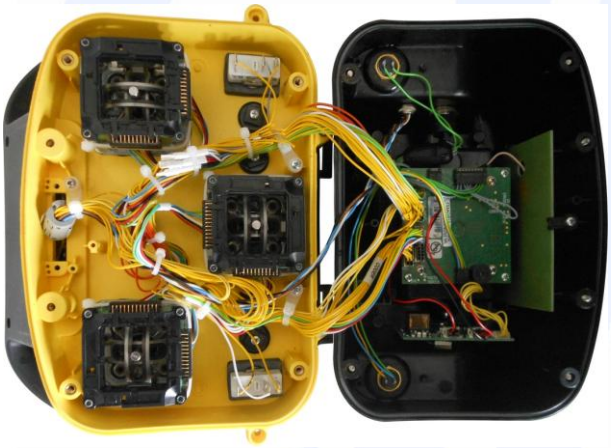
Date of receipt of test item	:	29.03.16
Testing start date	:	11.04.16
Testing end date	:	15.04.16
Samples tested nr.	:	1
Sampling procedure.	:	Equipment used for testing was picked up by the manufacturer, at the end of the production process with random criterion
Internal identification	:	adhesive label with the product number P160378

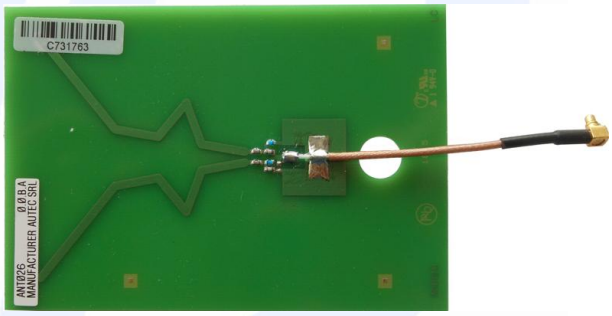
4. Operative conditions

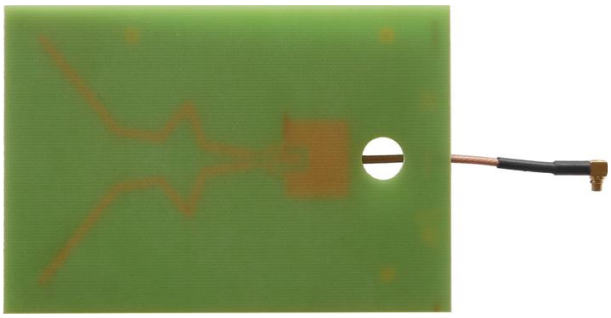
EUT exercising	:	EUT in continuous transmission at maximum power

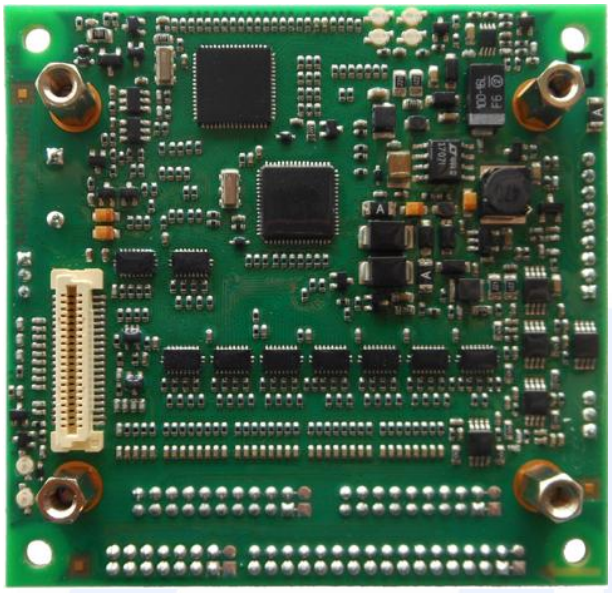
5. Photograph(s) of EUT

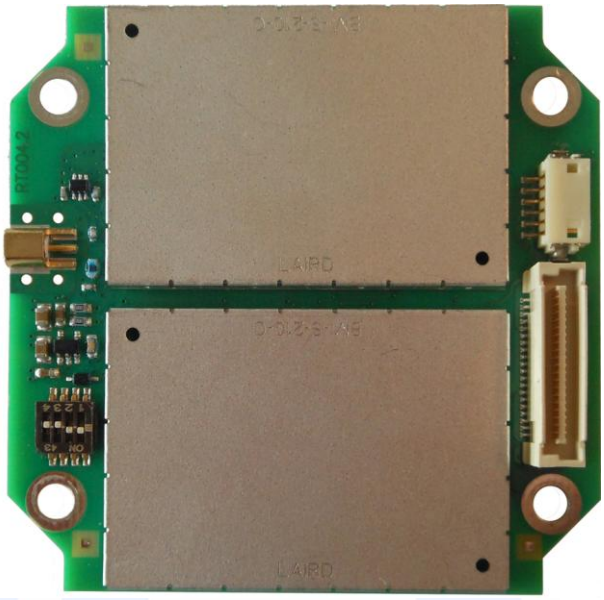
5.1 Photograph(s) of EUT



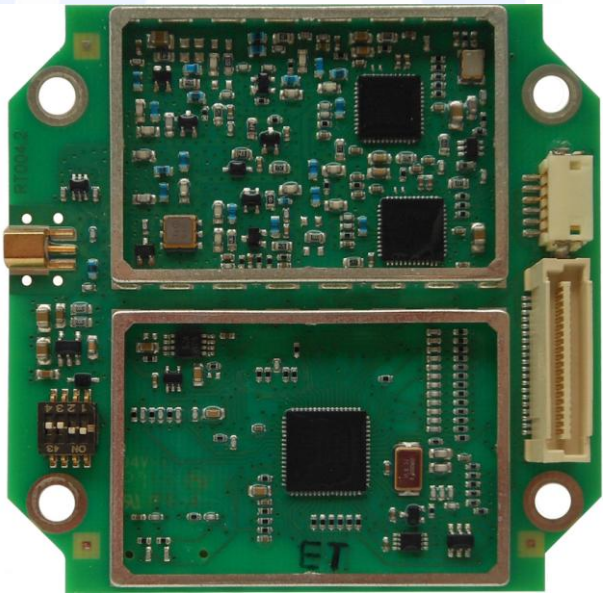




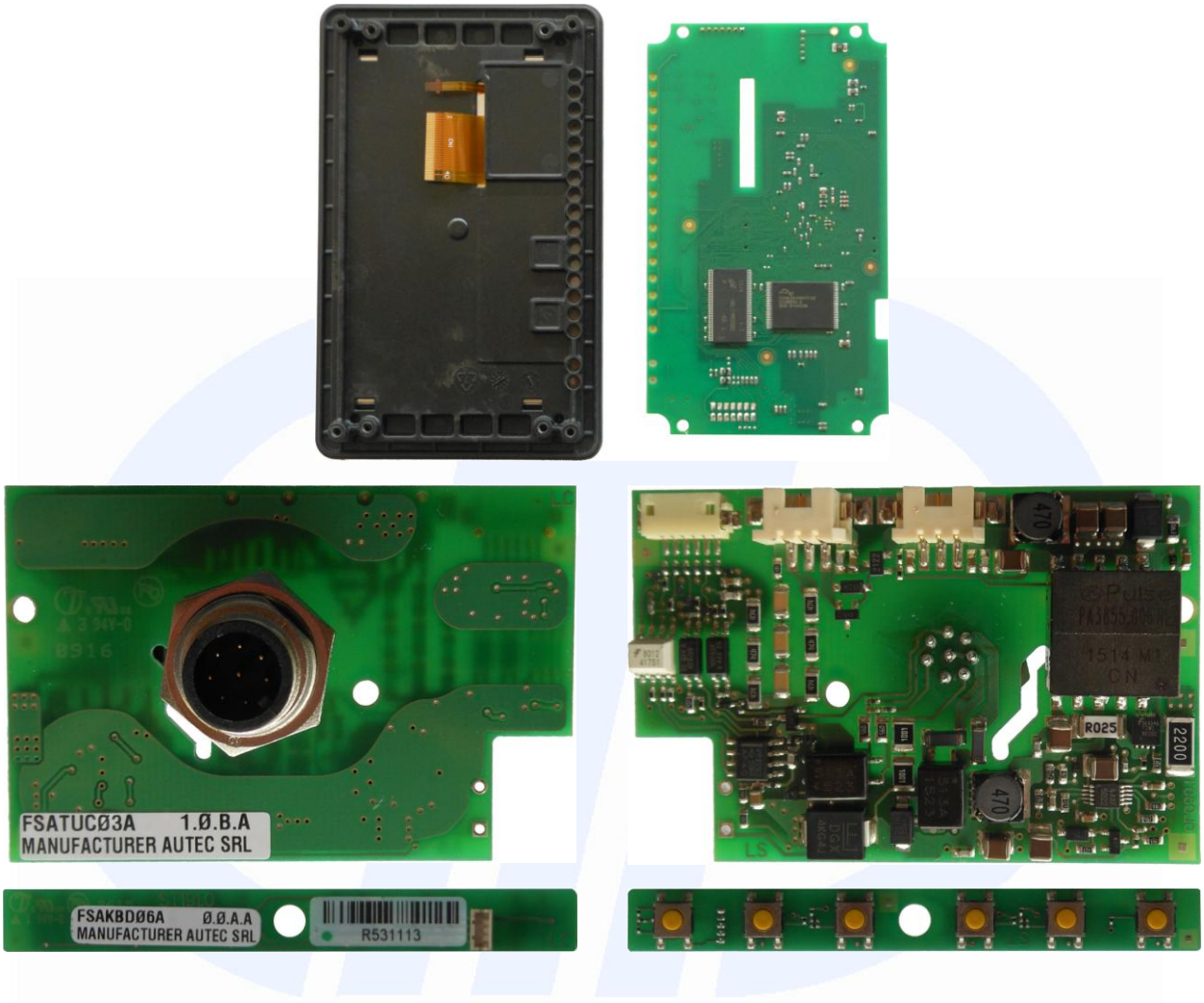





FSARTBAU1 1.Ø.E.E
MANUFACTURER AUTEC SRL
R471750




autec



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 '16	January '17
CMC S108	EMCO	3115	Horn Antenna	9811-5622	May '16	May '19
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 '16	May '19
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
CMC S260	CMC	Wfr_N	Shielded Cable	Wfr_ant10-1	November '15	November '16
CMC S261	CMC	Wfr_N	Shielded Cable	Wfr_ant20-1	November '15	November '16
CMC S262	CMC	Wfr_N_fix	Shielded Cable	Wfr_fix32-1	November '15	November '16
CMC S263	CMC	Wfr_N_fix	Shielded Cable	Wfr_fix31-1	November '15	November '16
CMC S264	CMC	Wfr_N	Shielded Cable	Wfr_ext03-1	November '15	November '16
CMC S288	CMC	W_sma_white	Joint Shielded Cable	W_001	November '15	November '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)	±2.9 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)	±3.4 dB	1
Radiated Emission		
(0,150 MHz – 30 MHz)	±3.8 dB	1
(30 MHz – 1000 MHz)	±3.8 dB	1
(1 GHz – 6 GHz)	±4.3 dB	1
Electromagnetic field EMF	±10.5 %	1
Harmonic current emissions test	±1.2 %	1
Voltage fluctuation and flicker test	±3.8 %	1
Insertion loss test	±2.0 dB	1
Radiated electromagnetic disturbance test (loop antenna)	±1.5 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	0.23 A/m at 10 A/m	1
Effective radiated power (F < 1GHz)	±3.8 dB	1
Effective radiated power (F > 1GHz)	±5.5 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_16_01 date 09/02/2016		

Note 1:
The expanded uncertainty reported according to EN 55016-4-2:2011 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

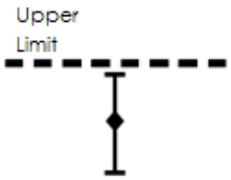
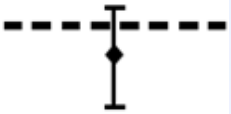
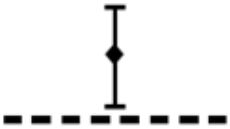
Test case does not apply to the test object ..... : N.A.
Test item does meet the requirement ..... : Complies
Test item does not meet the requirement..... : Does not comply
Test not performed ..... : N.E.

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	2 dBi	--	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:
10 m for frequencies ≤ 1000 MHz
3 m for frequencies > 1000 MHz

Environmental conditions

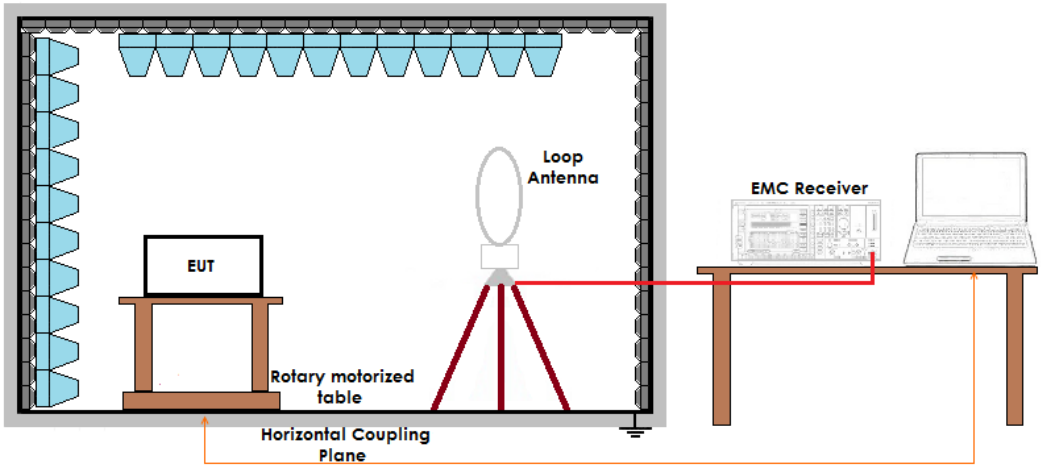
Temperature (°C)	*Atmospheric pressure (kPa)*	*Relative humidity (%)*
22	100	45

Acceptance limits

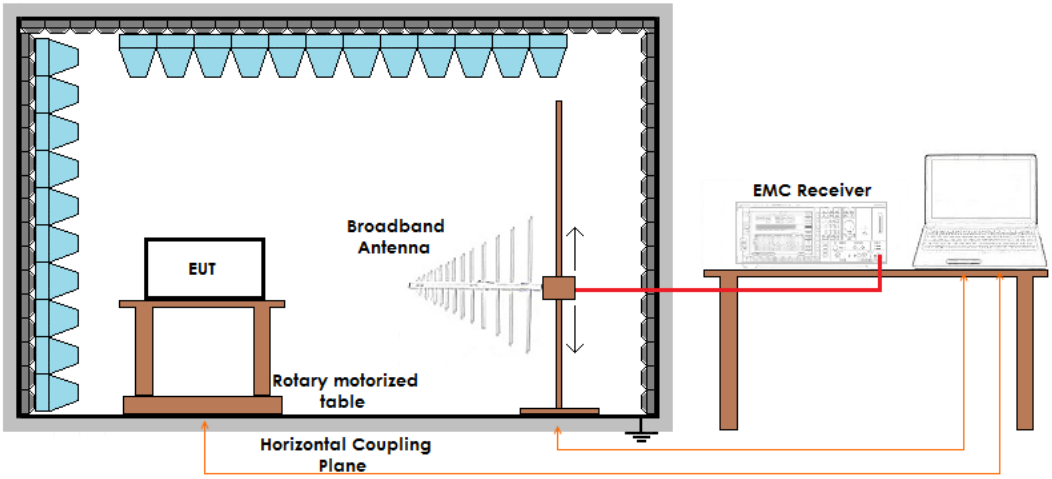
Frequency range (MHz)	*Limits [dB(µV/m)]*
0,009 to 0,490	107,60 to 72,89
0,490 to 1,705	52,89 to 42,05
1,705 to 30	48,63
30 to 88	30
88 to 216	33,52
216 to 960	36,02
Above 960	43,98
Remarks: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except 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

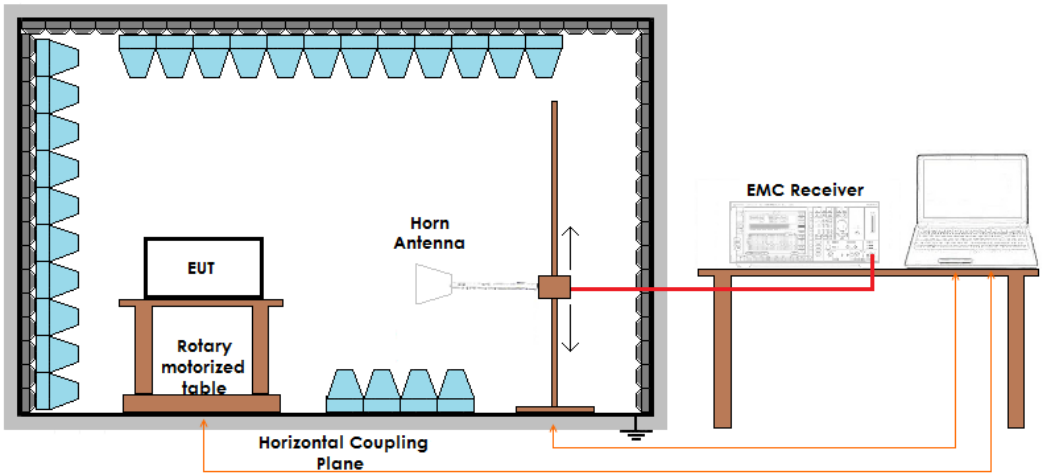
Frequency ≤ 30 MHz



Frequency ≤ 1 GHz



Frequency > 1 GHz



Result

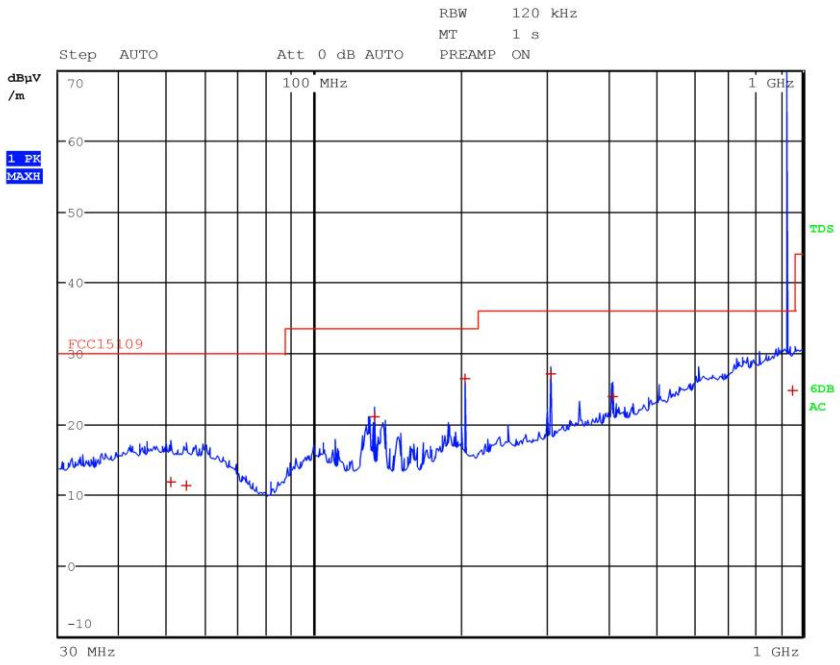
Polarization	*Frequency Range (MHz)*	*Graphs*	*Remarks*	*Result*
Loop	0,009 – 30	G16068226	Worst case	Complies
V	30 – 1000	G16068224	Lowest frequency	Complies
H	30 – 1000	G16068225	Lowest frequency	Complies
V	30 – 1000	G16068223	Medium frequency	Complies
H	30 – 1000	G16068222	Medium frequency	Complies
V	30 – 1000	G16068220	Highest frequency	Complies
H	30 – 1000	G16068221	Highest frequency	Complies
V	1000 – 10000	G16068227	Worst case	Complies
H	1000 – 10000	G16068228	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

G16068220

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-Rx - Fmax
Operator Gandini 16068220
Test Spec
Vert



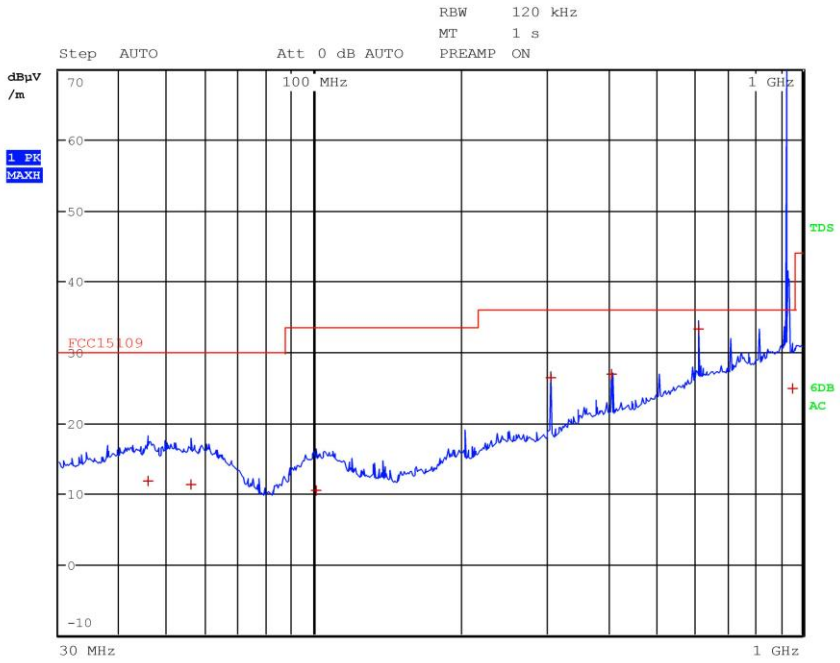
Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 7

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	50.769423077 MHz	11.85	Quasi Peak	-18.15
1	54.680000000 MHz	11.29	Quasi Peak	-18.71
1	132.603205128 MHz	20.95	Quasi Peak	-12.57
1	204.006410256 MHz	26.36	Quasi Peak	-7.16
1	306.009615385 MHz	27.05	Quasi Peak	-8.97
1	408.040000000 MHz	23.79	Quasi Peak	-12.23
1	954.840000000 MHz	24.77	Quasi Peak	-11.25

G16068221

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-Rx - Fmax
Operator Gandini 16068221
Test Spec
Horiz



Final Measurement

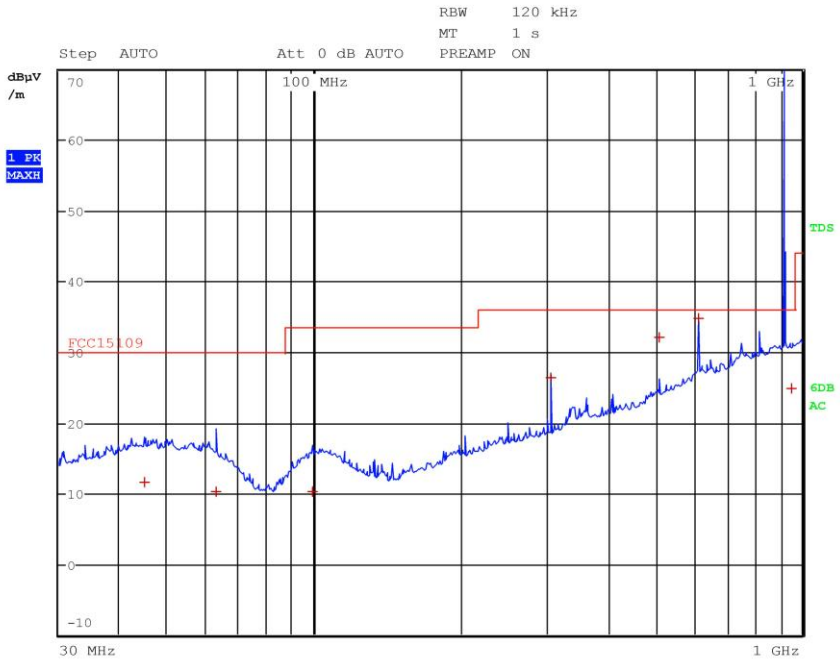
Meas Time: 1 s
Margin: 20 dB
Subranges: 7

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	45.600000000 MHz	11.85	Quasi Peak	-18.15
1	56.000000000 MHz	11.28	Quasi Peak	-18.72
1	101.200000000 MHz	10.46	Quasi Peak	-23.06
1	306.012820513 MHz	26.31	Quasi Peak	-9.71
1	408.014423077 MHz	26.90	Quasi Peak	-9.12
1	612.024038462 MHz	33.35	Quasi Peak	-2.67
1	958.560000000 MHz	24.87	Quasi Peak	-11.15

G16068222

Meas Type	Emission
Equipment under Test	
Manufacturer	
OP Condition	Tx-Rx - Fmid
Operator	Gandini 16068222
Test Spec	

Horiz



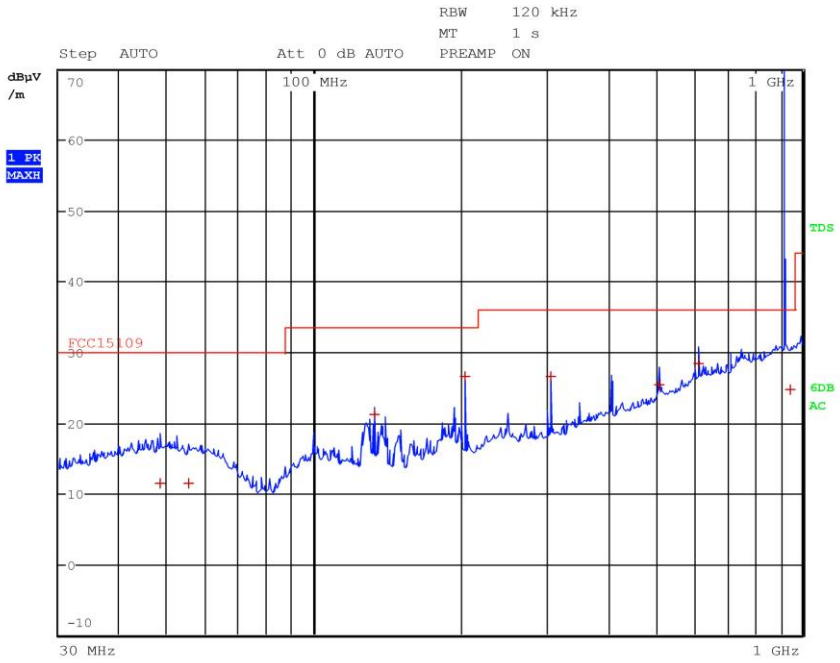
Final Measurement

Meas Time:	1 s
Margin:	20 dB
Subranges:	7

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	44.800000000 MHz	11.52	Quasi Peak	-18.48
1	63.120000000 MHz	10.22	Quasi Peak	-19.78
1	99.280000000 MHz	10.20	Quasi Peak	-23.32
1	306.011217949 MHz	26.32	Quasi Peak	-9.70
1	510.020769231 MHz	32.17	Quasi Peak	-3.85
1	612.025576923 MHz	34.85	Quasi Peak	-1.17
1	952.920000000 MHz	24.84	Quasi Peak	-11.18

G16068223

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-Rx - Fmid
Operator Gandini 16068223
Test Spec
Vert



Final Measurement

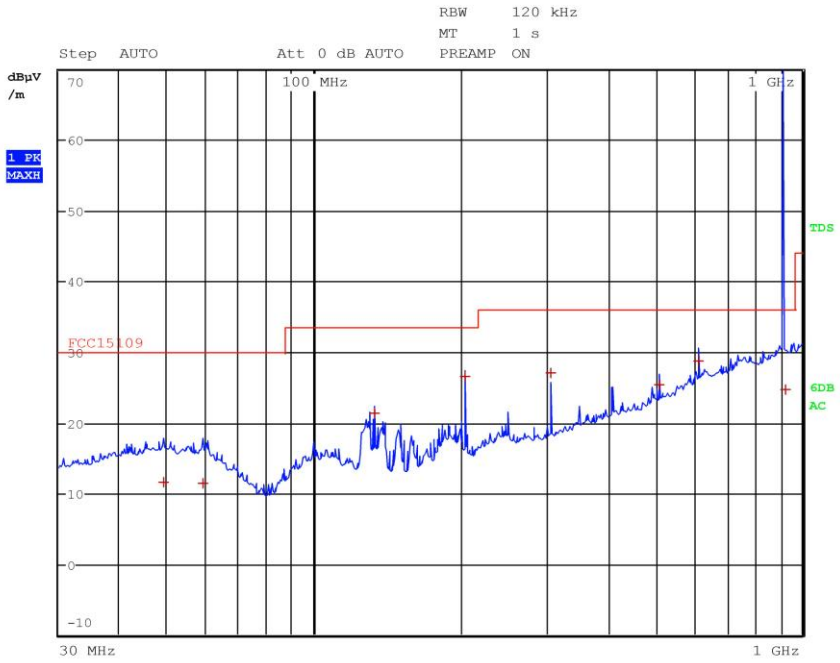
Meas Time: 1 s
Margin: 20 dB
Subranges: 8

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	48.360000000 MHz	11.36	Quasi Peak	-18.64
1	55.160000000 MHz	11.36	Quasi Peak	-18.64
1	132.606410256 MHz	21.12	Quasi Peak	-12.40
1	204.007948718 MHz	26.57	Quasi Peak	-6.95
1	306.014358974 MHz	26.56	Quasi Peak	-9.46
1	510.019166667 MHz	25.30	Quasi Peak	-10.72
1	612.040000000 MHz	28.41	Quasi Peak	-7.61
1	945.360000000 MHz	24.66	Quasi Peak	-11.36

G16068224

Meas Type	Emission
Equipment under Test	
Manufacturer	
OP Condition	Tx-Rx - Fmin
Operator	Gandini 16068224
Test Spec	

Vert



Final Measurement

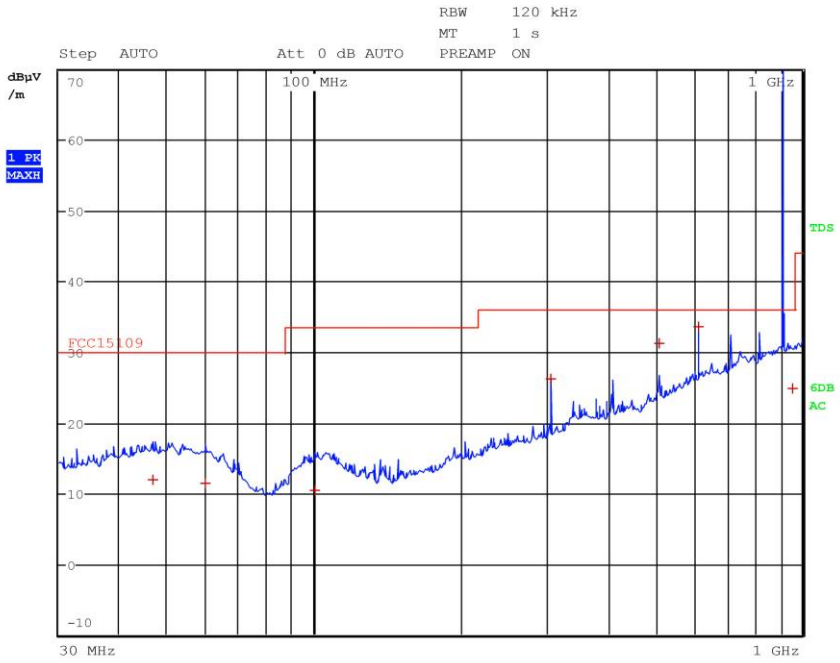
Meas Time:	1 s
Margin:	20 dB
Subranges:	8

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	49.200000000 MHz	11.61	Quasi Peak	-18.39
1	59.320000000 MHz	11.35	Quasi Peak	-18.65
1	132.604807692 MHz	21.31	Quasi Peak	-12.21
1	204.006410256 MHz	26.59	Quasi Peak	-6.93
1	306.009615385 MHz	27.00	Quasi Peak	-9.02
1	510.020833333 MHz	25.30	Quasi Peak	-10.72
1	612.022371795 MHz	28.67	Quasi Peak	-7.35
1	922.400000000 MHz	24.62	Quasi Peak	-11.40

G16068225

Meas Type	Emission
Equipment under Test	
Manufacturer	
OP Condition	Tx-Rx - Fmin
Operator	Gandini 16068225
Test Spec	

Horiz



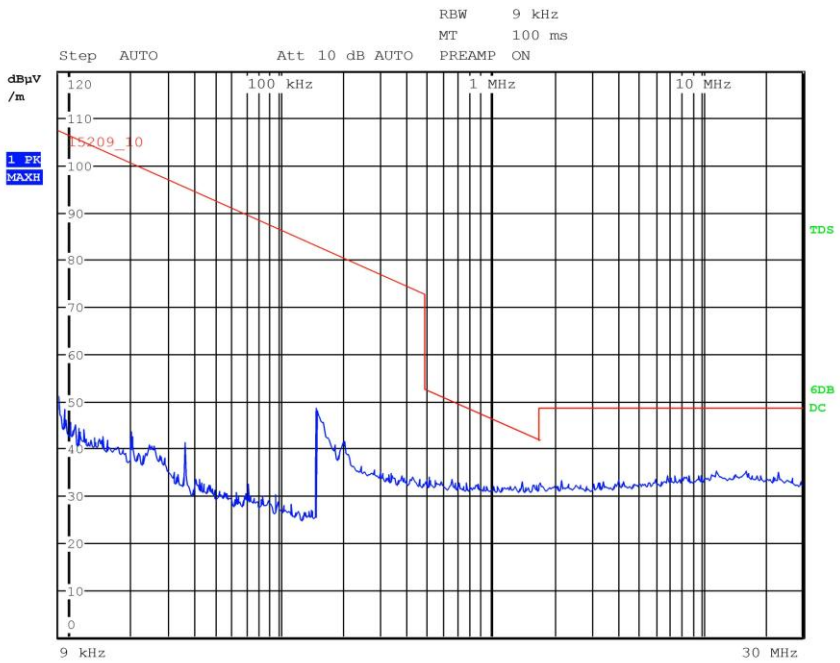
Final Measurement

Meas Time:	1 s
Margin:	20 dB
Subranges:	7

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	46.720000000 MHz	11.89	Quasi Peak	-18.11
1	59.720000000 MHz	11.46	Quasi Peak	-18.54
1	100.120000000 MHz	10.44	Quasi Peak	-23.08
1	306.012820513 MHz	26.29	Quasi Peak	-9.73
1	510.020833333 MHz	31.34	Quasi Peak	-4.68
1	612.025641026 MHz	33.62	Quasi Peak	-2.40
1	958.680000000 MHz	24.87	Quasi Peak	-11.15

G16068226

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-Rx
Operator Gandini 16068226
Test Spec
Loop

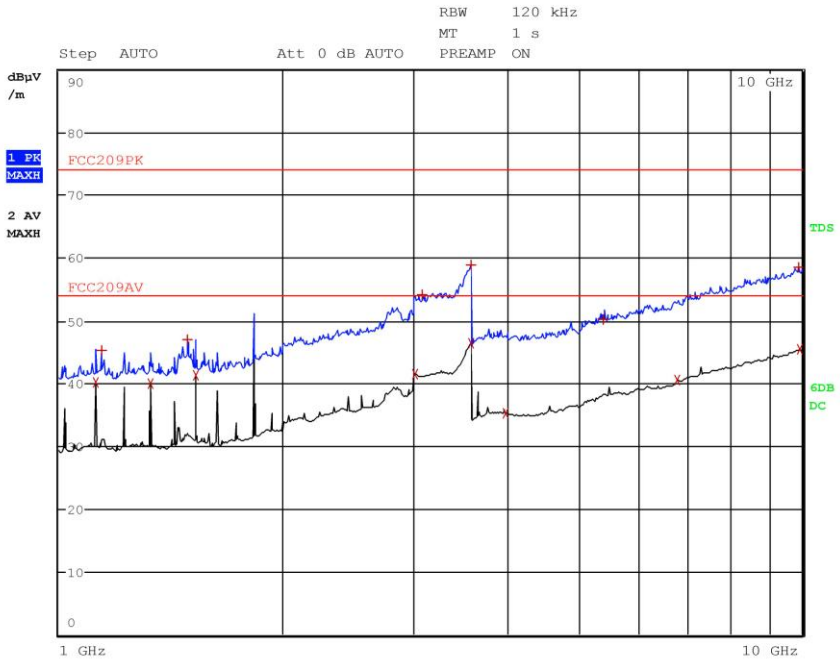


Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 0

G16068227

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-Rx
Operator Gandini 16068227
Test Spec
Vert



Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-Rx
Operator Gandini 16068227
Test Spec
Vert

Final Measurement

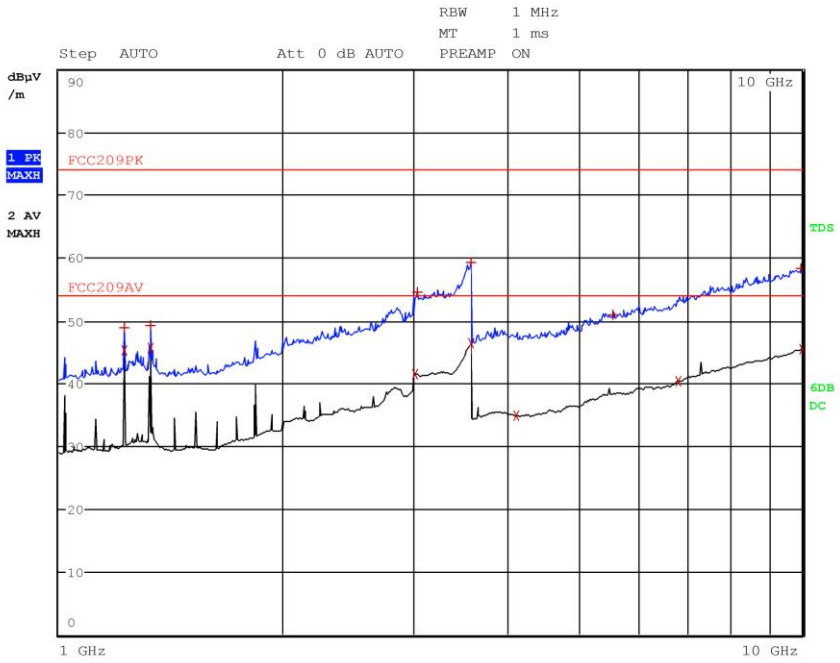
Meas Time: 1 s
Margin: 20 dB
Subranges: 14

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
2	1.122000000 GHz	40.25	Average	-13.75
1	1.141200000 GHz	45.29	Max Peak	-28.71
2	1.326000000 GHz	40.00	Average	-14.00
1	1.490800000 GHz	47.02	Max Peak	-26.98
2	1.530000000 GHz	41.26	Average	-12.74
2	3.018400000 GHz	41.47	Average	-12.53
1	3.084400000 GHz	54.25	Max Peak	-19.75
1	3.583600000 GHz	58.96	Max Peak	-15.04
2	3.598400000 GHz	46.50	Average	-7.50
2	3.994000000 GHz	35.23	Average	-18.77
1	5.400000000 GHz	50.16	Max Peak	-23.84
2	6.789600000 GHz	40.50	Average	-13.50
1	9.900000000 GHz	58.49	Max Peak	-15.51
2	9.910800000 GHz	45.44	Average	-8.56

G16068228

Meas Type	Emission
Equipment under Test	
Manufacturer	
OP Condition	Tx-Rx
Operator	Gandini 16068228
Test Spec	

Horiz



Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx-Rx
Operator Gandini 16068228
Test Spec
Horiz

Final Measurement

Meas Time: 1 s
Margin: 20 dB
Subranges: 13

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	1.224000000 GHz	48.88	Max Peak	-25.12
2	1.224000000 GHz	45.23	Average	-8.77
2	1.326000000 GHz	45.57	Average	-8.43
1	1.326000000 GHz	49.30	Max Peak	-24.70
2	3.018000000 GHz	41.59	Average	-12.41
1	3.035200000 GHz	54.60	Max Peak	-19.40
1	3.594800000 GHz	59.21	Max Peak	-14.79
2	3.598800000 GHz	46.37	Average	-7.63
2	4.123200000 GHz	34.87	Average	-19.13
1	5.569600000 GHz	50.95	Max Peak	-23.05
2	6.812800000 GHz	40.39	Average	-13.61
1	9.973200000 GHz	58.42	Max Peak	-15.58
2	9.994000000 GHz	45.46	Average	-8.54

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

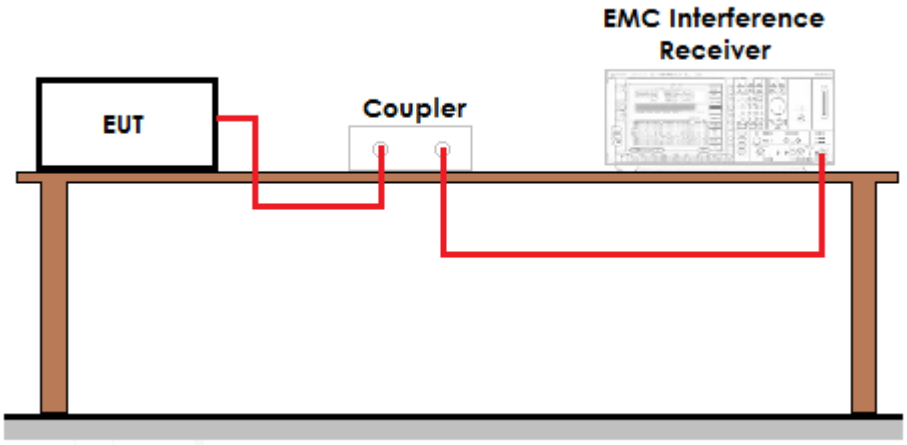
See FCC Part 15.247

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

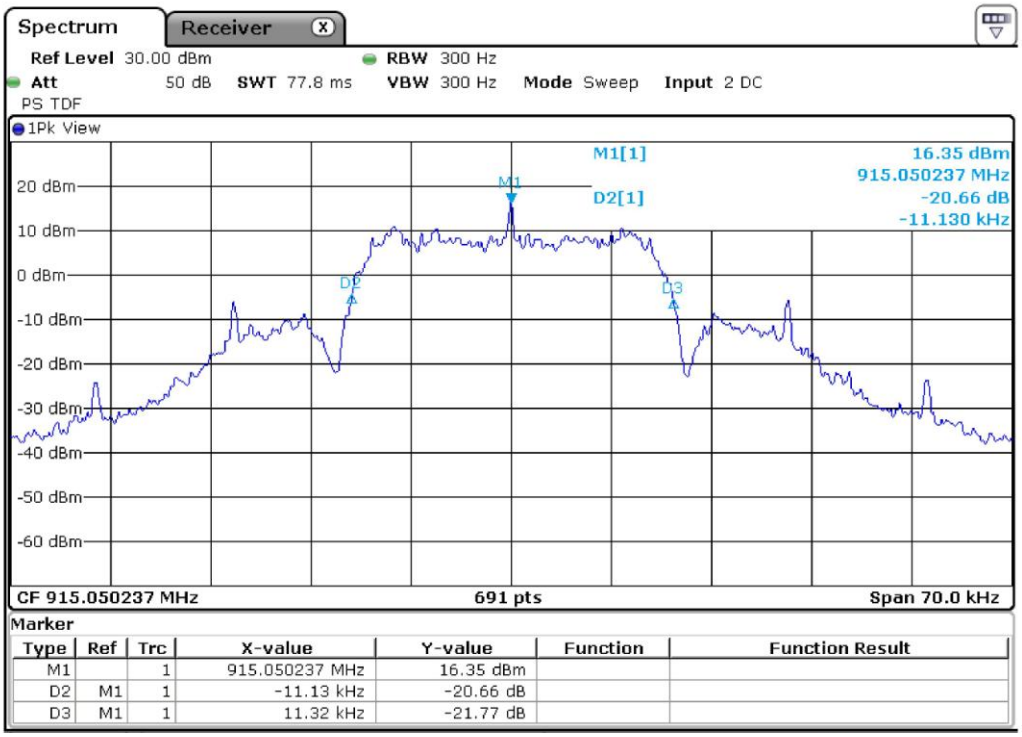


Result

Frequency (MHz)	*Graphs*	*20 dB bandwidth (kHz)*	*Results*
915,05	G16068203	22,345	Complies
921,50	G16068207	22,380	Complies
927,95	G16068208	22,190	Complies

Graphs

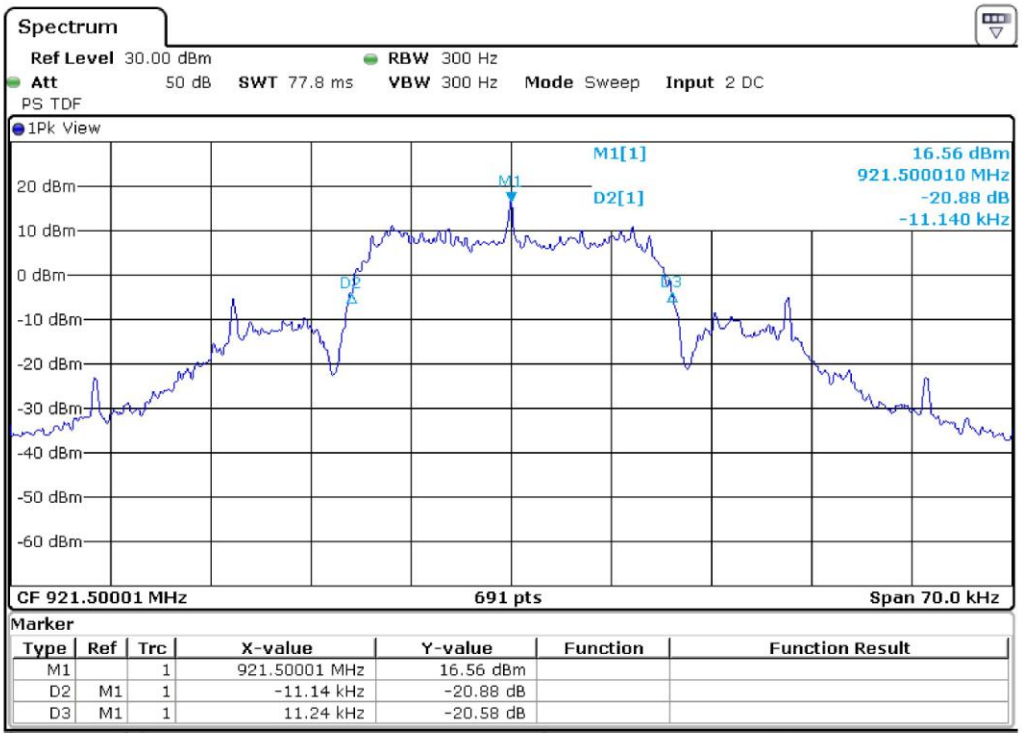
G16068203



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	915.050237 MHz	16.35 dBm		
D2	M1	1	-11.13 kHz	-20.66 dB		
D3	M1	1	11.32 kHz	-21.77 dB		

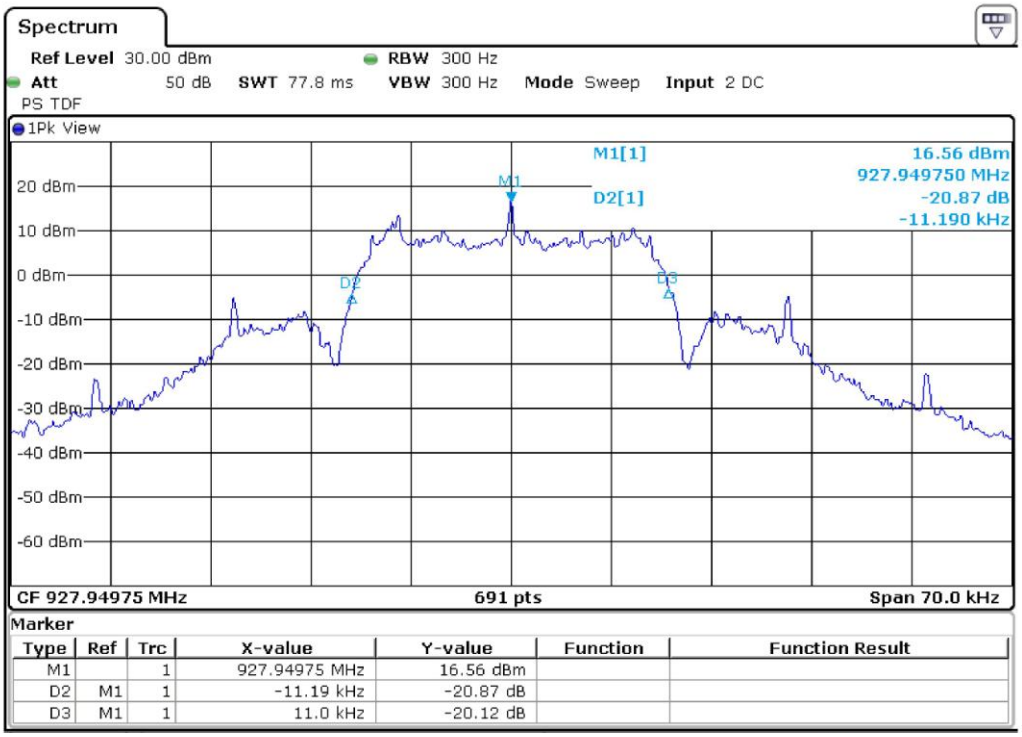
Bertezzolo 16068203

G16068207



Bertezzolo 16068207

G16068208



Bertezzolo 16068208

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

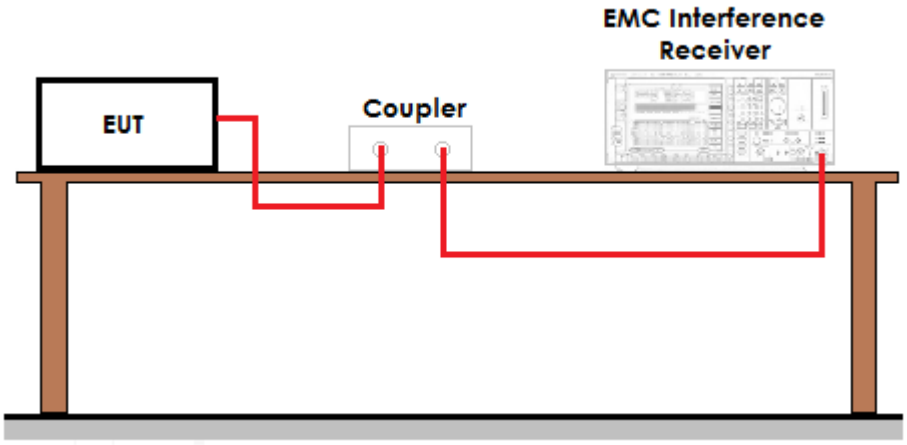
See FCC Part 15.247

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

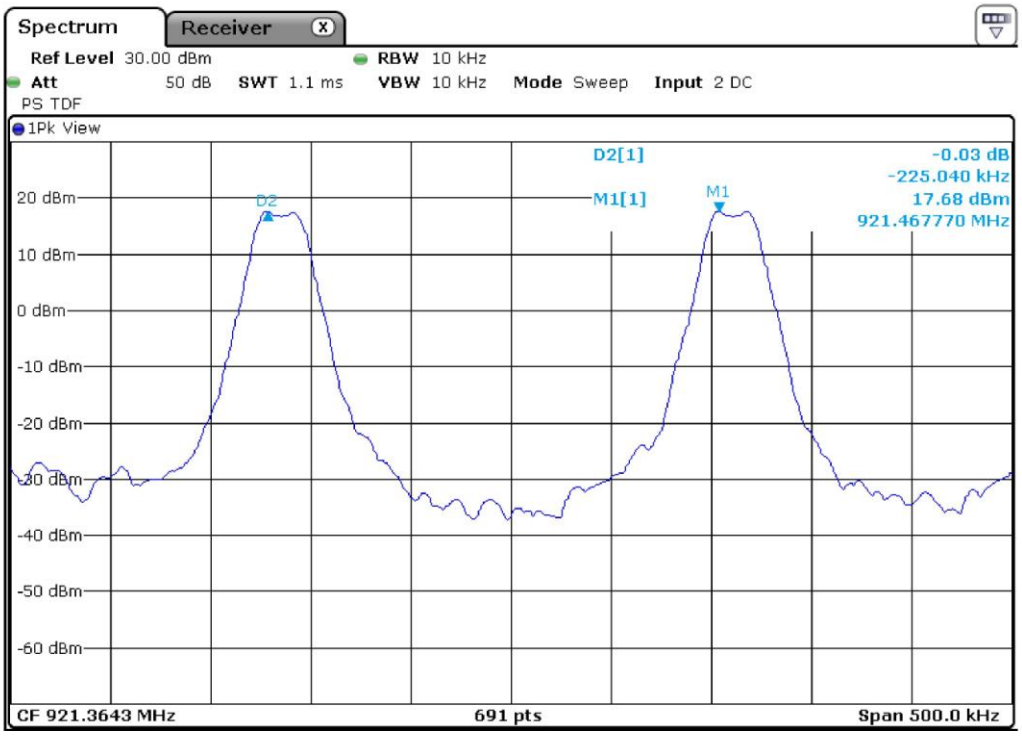


Result

Frequency band (MHz)	*Graphs*	*Channel separation (kHz)*	*Minimum channel separation required (kHz)*	*Results*
902 – 928	G16068205	225,040	25	Complies

Graphs

G16068205



Bertezzolo 16068205

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

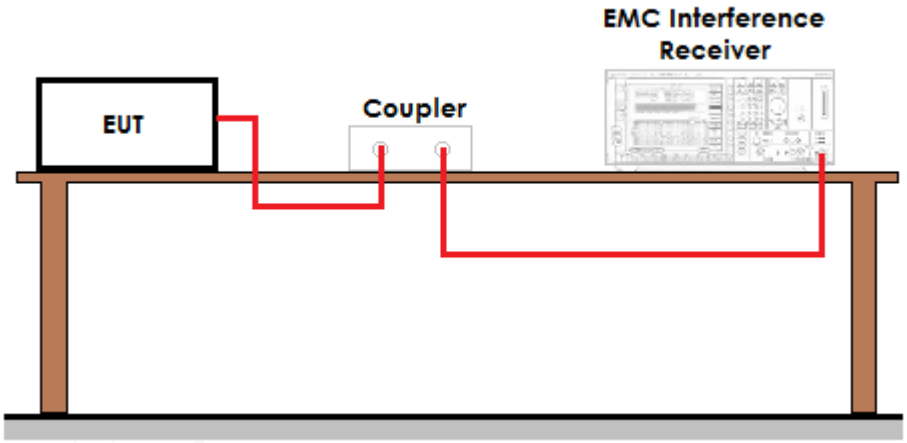
See FCC Part 15.247

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

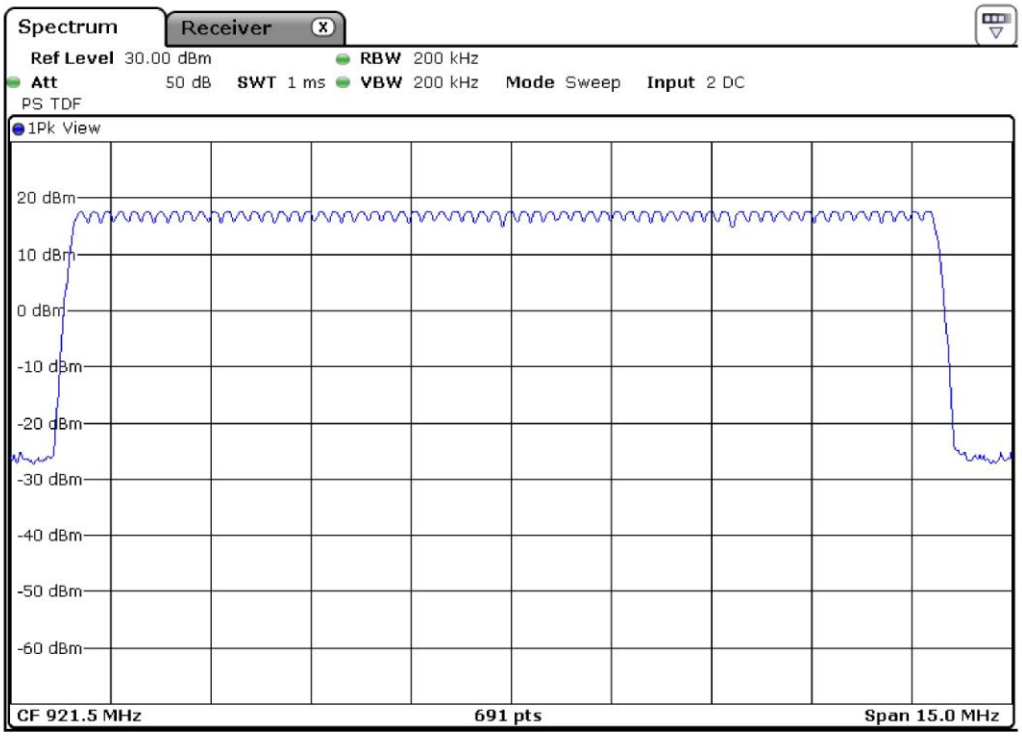


Result

Graphs	*Number of hopping channels*	*Minimum hopping channels required*	*Results*
G16068201	64	50 if the 20 dB bandwidth is less than 250 kHz 25 if the 20 dB bandwidth is 250 kHz or greater	Complies

Graphs

G16068201



Bertezzolo 16068201

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

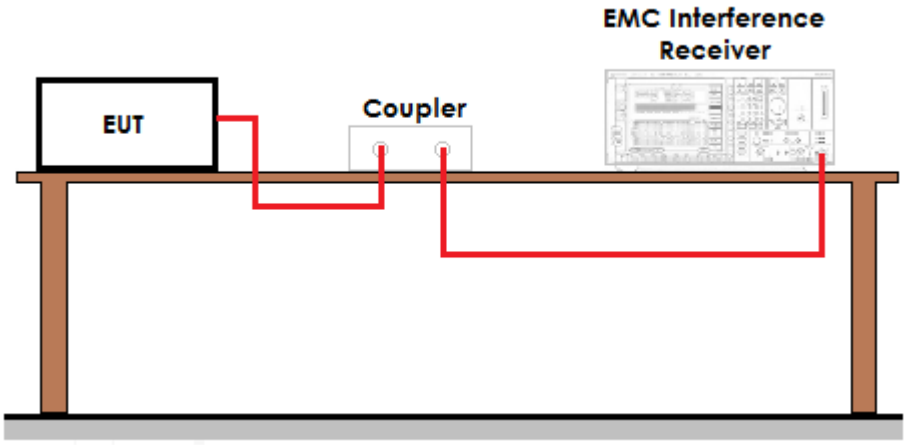
See FCC Part 15.247

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)*
921,475	G16068206	21,30

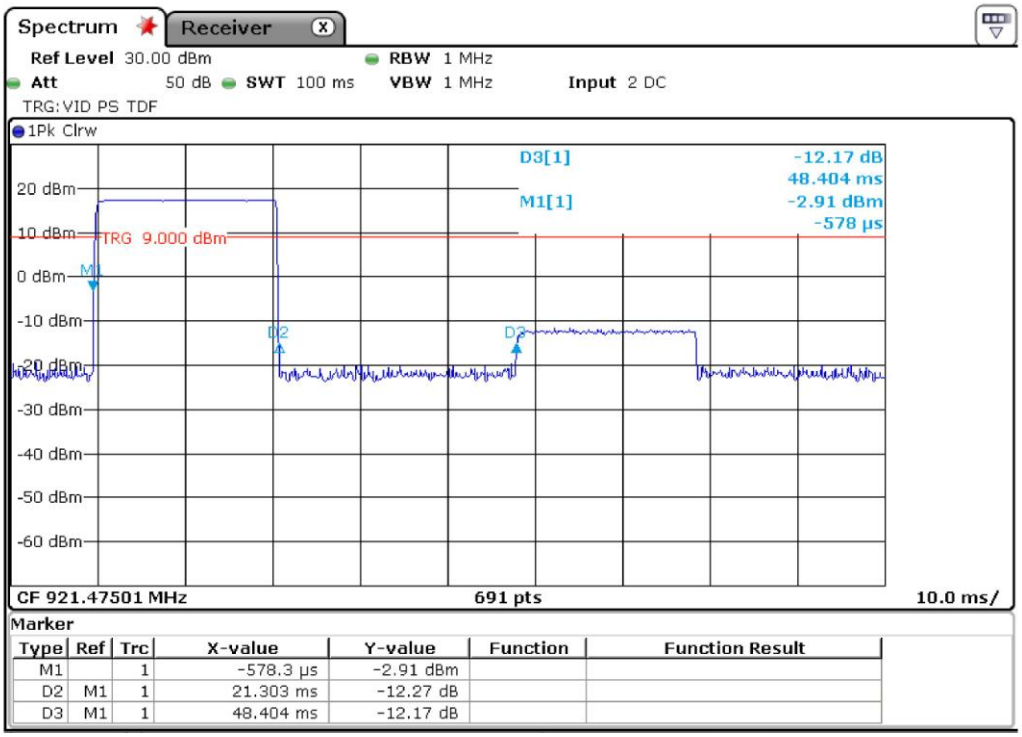
Number of transmissions per period (20 s)

Frequency (MHz)	*Time between 2 transmission on the same channel*		*Number of transmissions*
921,475	G16068206	48,40	6,46

Time of occupancy (Dwell time x Number of transmissions)	138 ms

Graphs

G16068206



Bertezzolo 16068206

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

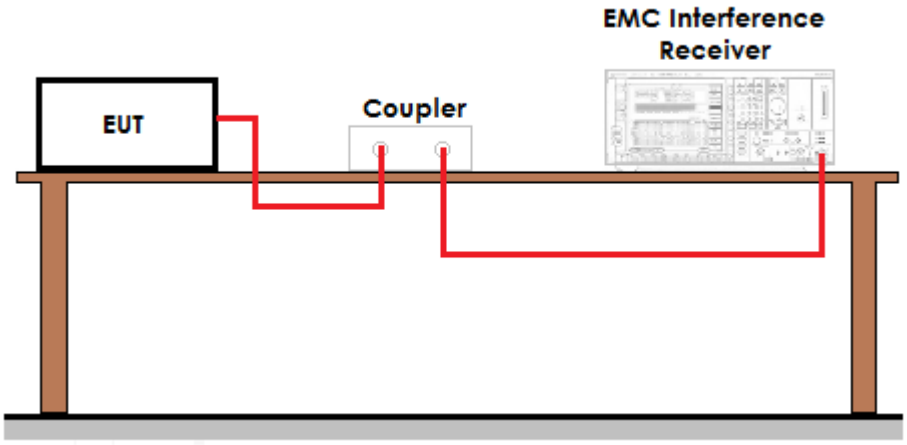
See FCC Part 15.247

Environmental conditions

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

Acceptance limits: operation within the band 902 – 928 MHz

Setup



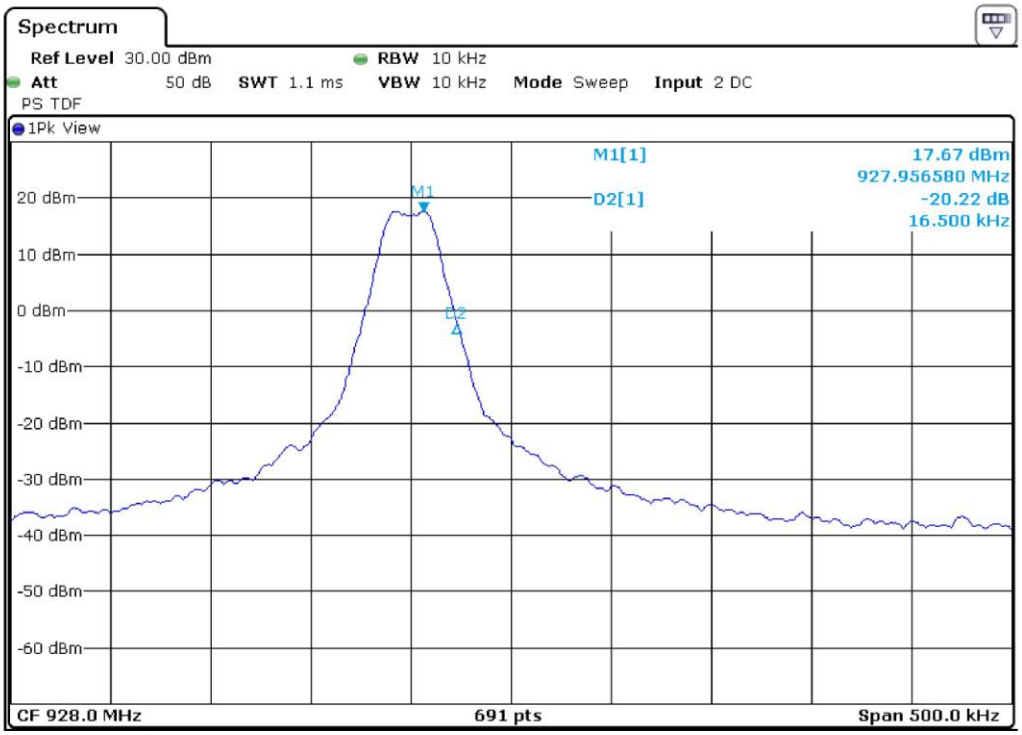
Result

Frequency (MHz)	*Graph(s) – Hopping*	*Results*	
915,05	G16068219	F_L: 915,02677 MHz	Complies
	G16068218		
927,75	G16068215	F_H: 927,97309 MHz	Complies

Frequency (MHz)	*Graph(s) – No hopping*	*Results*	
915,05	G16068216	F_L: 915,026050 MHz	Complies
	G16068217		
927,75	G16068214	F_H: 927,973308 MHz	Complies

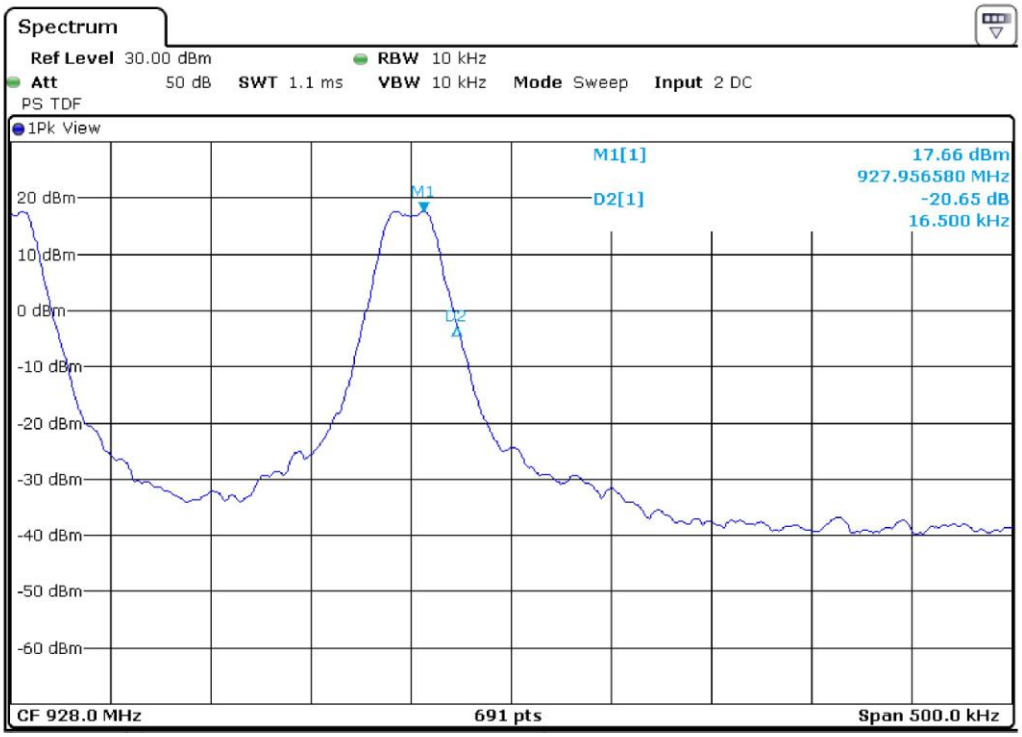
Graphs

G16068214



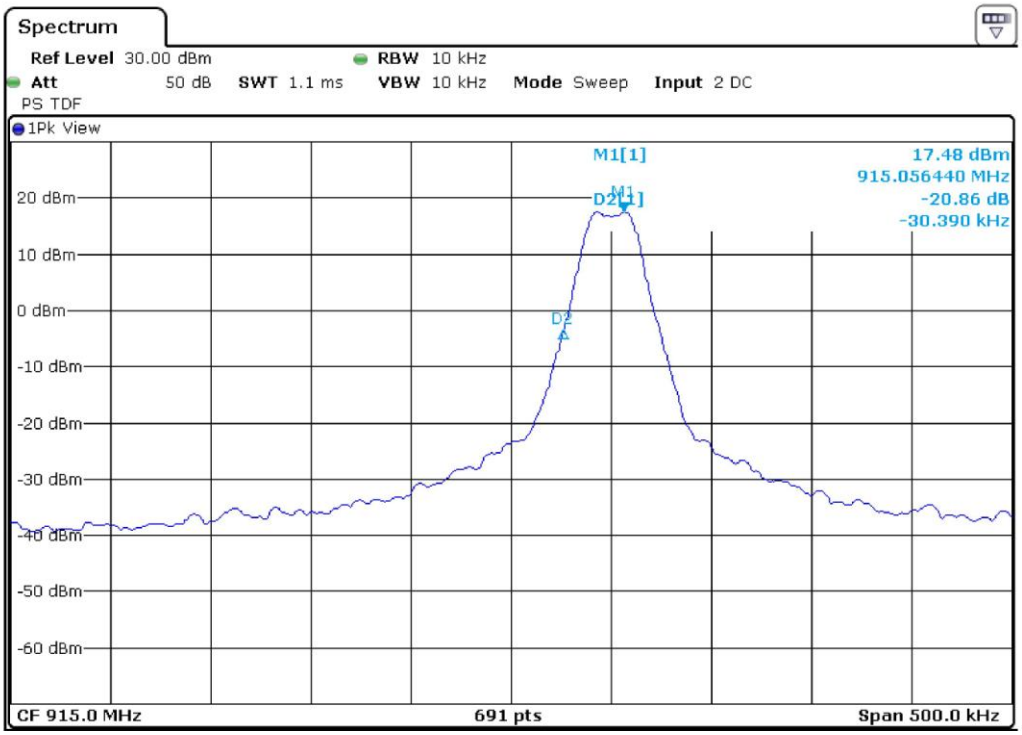
Bertezzolo 16068214

G16068215



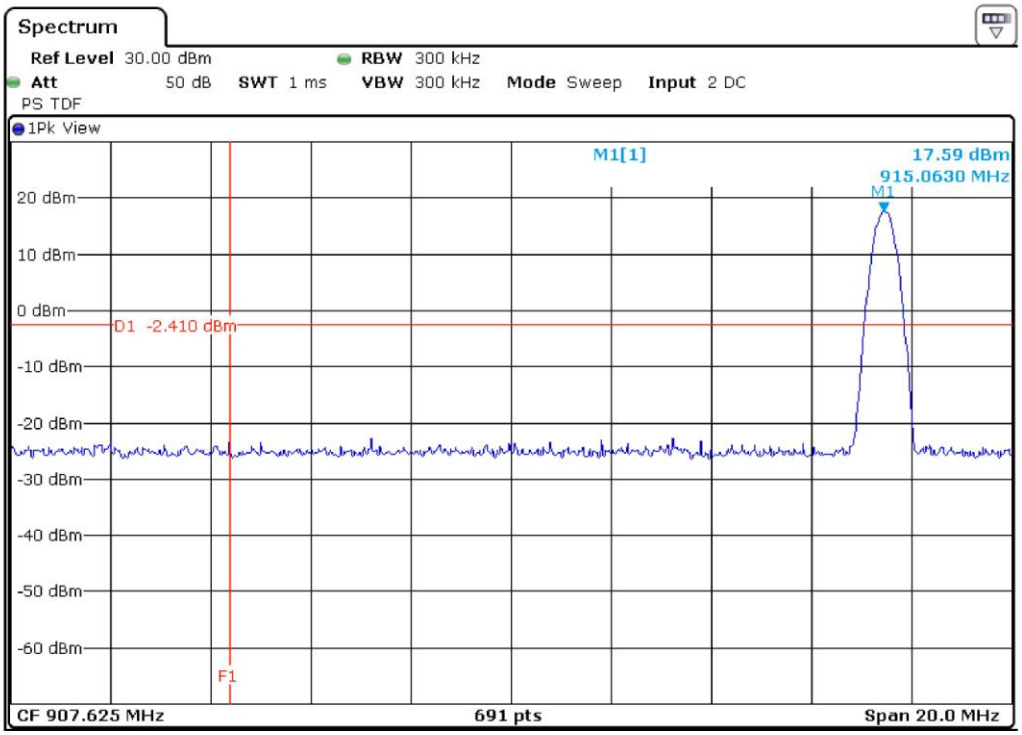
Bertezzolo 16068215

G16068216



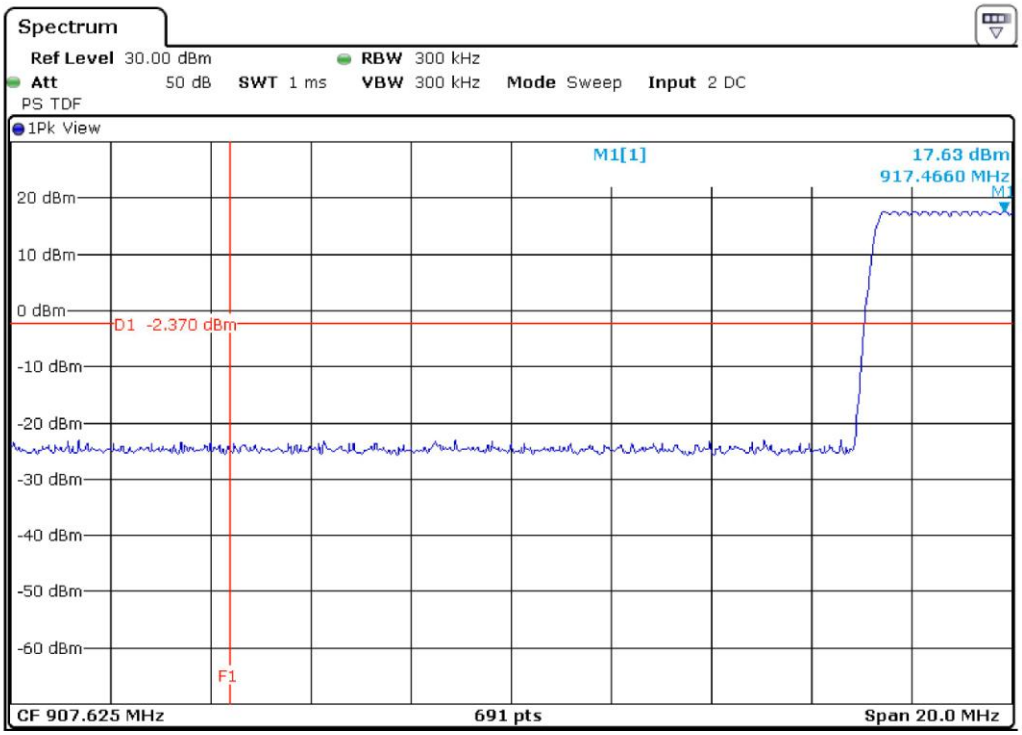
Bertezzolo 16068216

G16068217



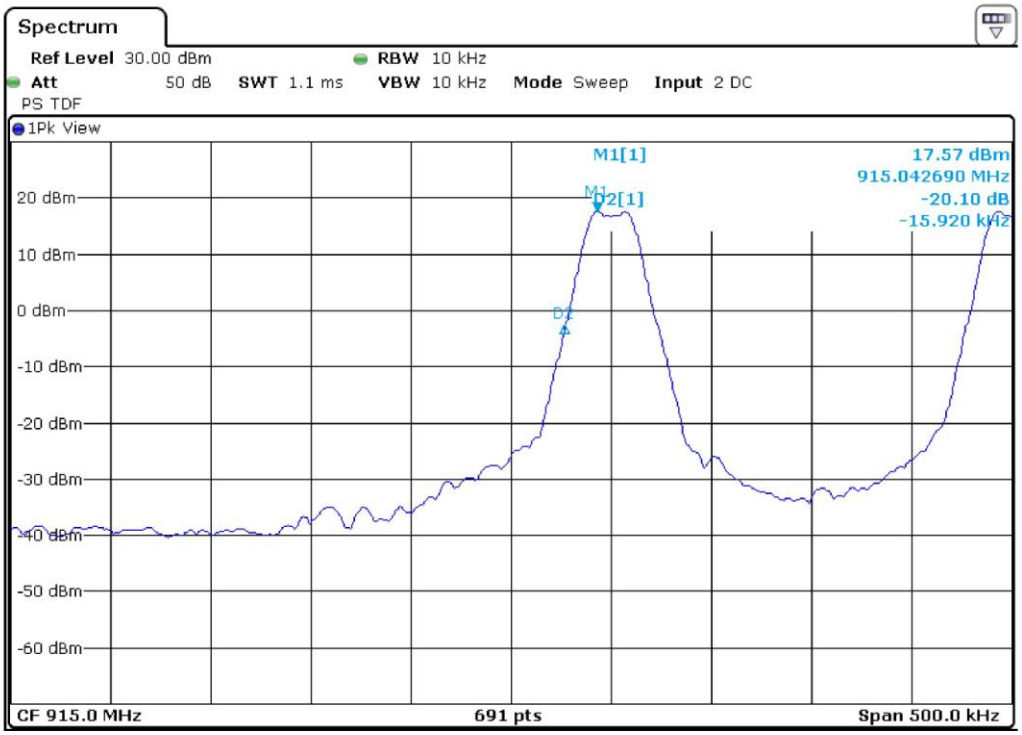
Bertezzolo 16068217

G16068218



Bertezzolo 16068218

G16068219



Bertezzolo 16068219

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

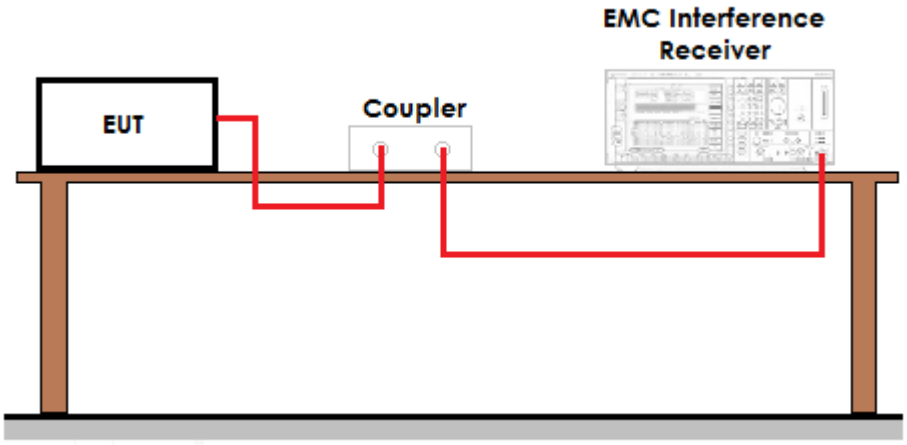
Port: Antenna

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

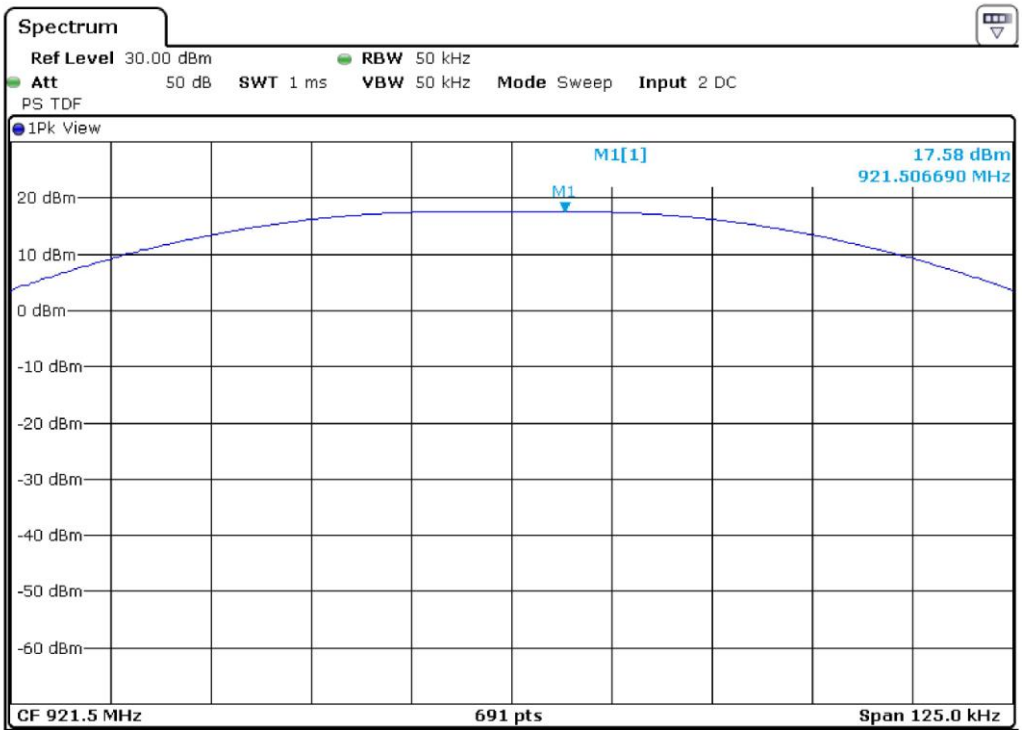


Result

Frequency (MHz)	*Graphs*	*Conducted measured level (dBm)*	*Calculated radiated level (dBµV/m)*
915,044030	G16068212	17,44	114,67
921,506690	G16068211	17,58	114,81
927,944210	G16068213	17,63	114,86

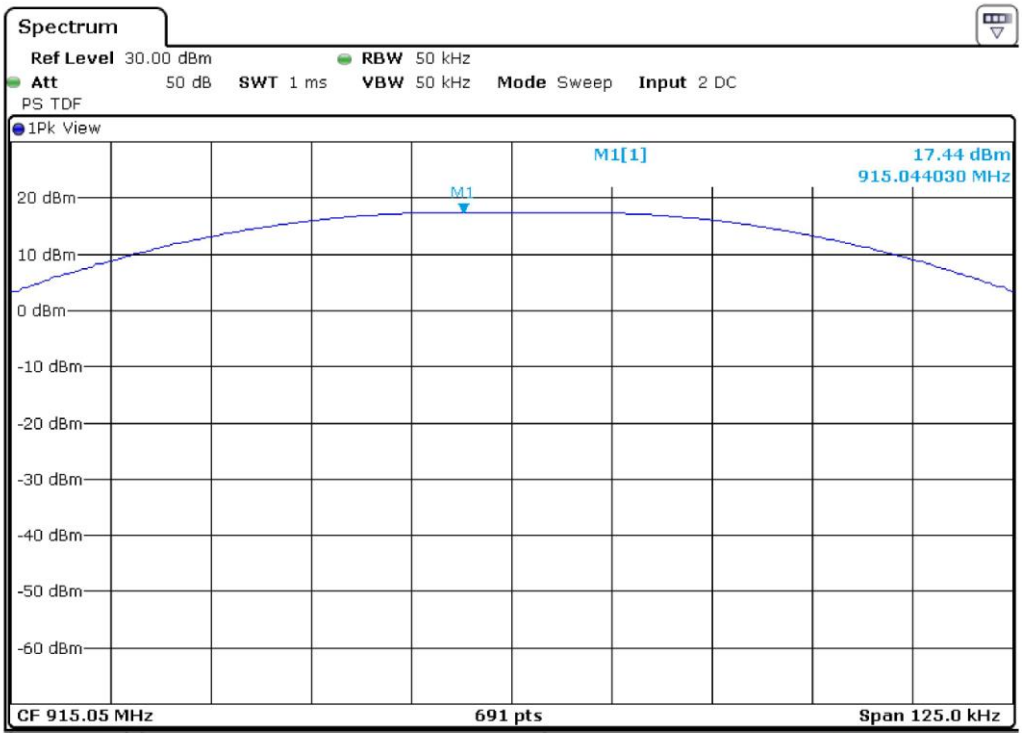
Graphs

G16068211



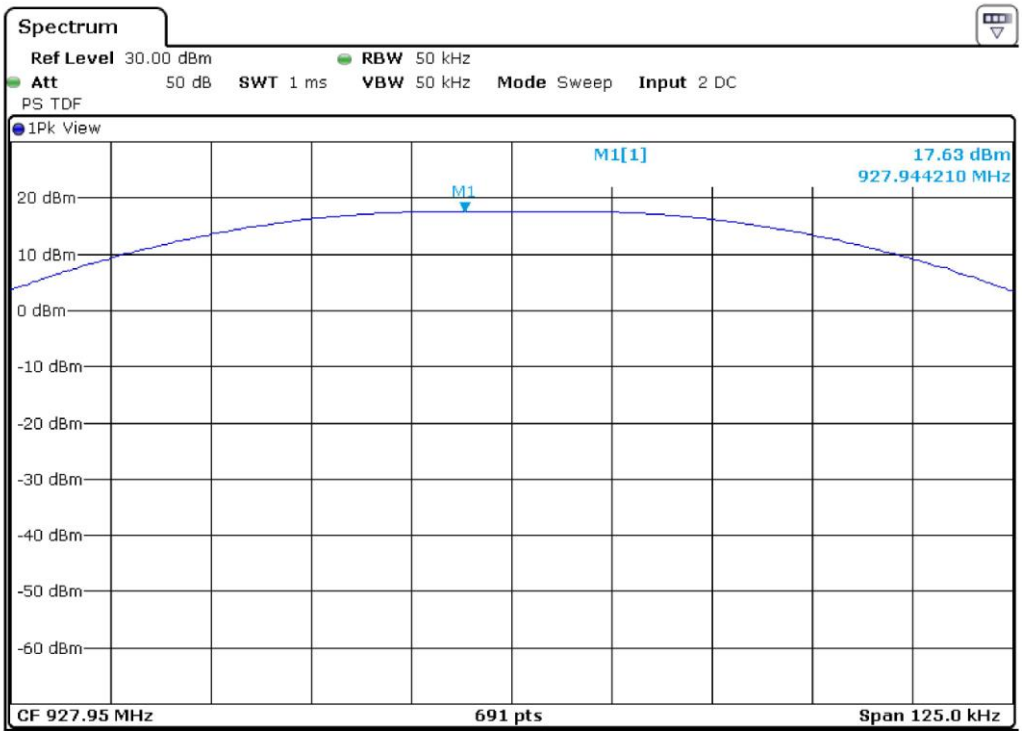
Bertezzolo 16068211

G16068212



Bertezzolo 16068212

G16068213



Bertezzolo 16068213

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

Acceptance limits for emissions in restricted frequency bands		
Frequency (MHz)	*AV limits [dB(µV/m)]*	*Peak limits [dB(µV/m)]*
> 1000	54	74

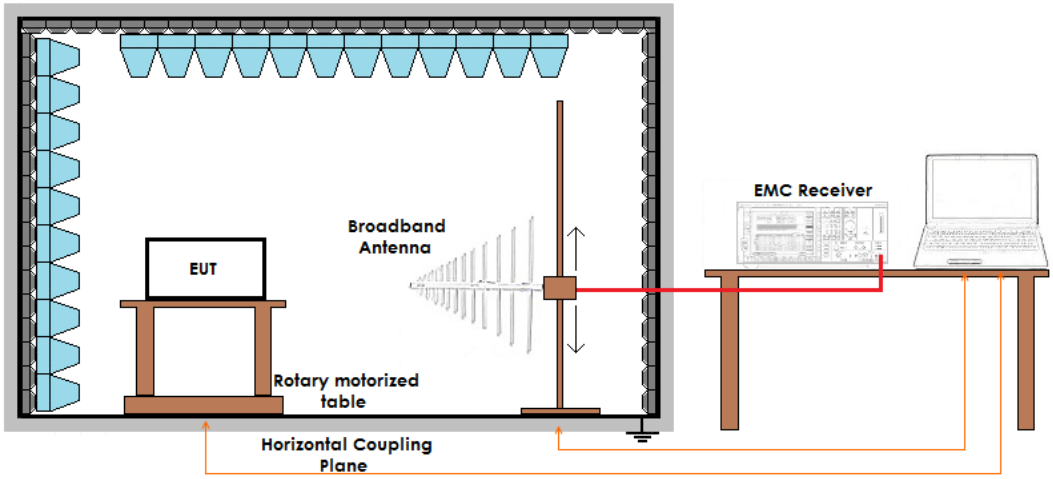
The restricted frequency bands are listed in the following table

MHz	MHz	MHz	GHz
0,090 – 0,110	16,42 – 16,423	399,9 – 410	4,5 – 5,15
0,495 – 0,505	16,69475 – 16,69525	608 – 614	5,35 – 5,46
2,1735 – 2,1905	16,80425 – 16,80475	960 – 1240	7,25 – 7,75
4,125 – 4,128	25,5 – 25,67	1300 – 1427	8,025 – 8,5
4,17725 – 4,17775	37,5 – 38,25	1435 – 1626,5	9,0 – 9,2
4,20725 – 4,20775	73 – 74,6	1645,5 – 1646,5	9,3 – 9,5
6,215 – 6,218	74,8 – 75,2	1660 – 1710	10,6 – 12,7
6,26775 – 6,26825	108 – 121,94	1718,8 – 1722,2	13,25 – 13,4
6,31175 – 6,31225	123 – 138	2200 – 2300	14,47 – 14,5
8,291 – 8,294	149,9 – 150,05	2310 – 2390	15,35 – 16,2
8,362 – 8,366	156,52475 – 156,52525	2483,5 – 2500	17,7 – 21,4
8,37625 – 8,38675	156,7 – 156,9	2690 – 2900	22,01 – 23,12
8,41425 – 8,41475	162,0125 – 167,17	3260 – 3267	23,6 – 24,0
12,29 – 12,293	167,72 – 173,2	3332 – 3339	31,2 – 31,8
12,51975 – 12,52025	240 – 285	3345,8 – 3358	36,43 – 36,5
12,57675 – 12,57725	322 – 335,4	3600 – 4400	Above 38,6
13,36 – 13,41			

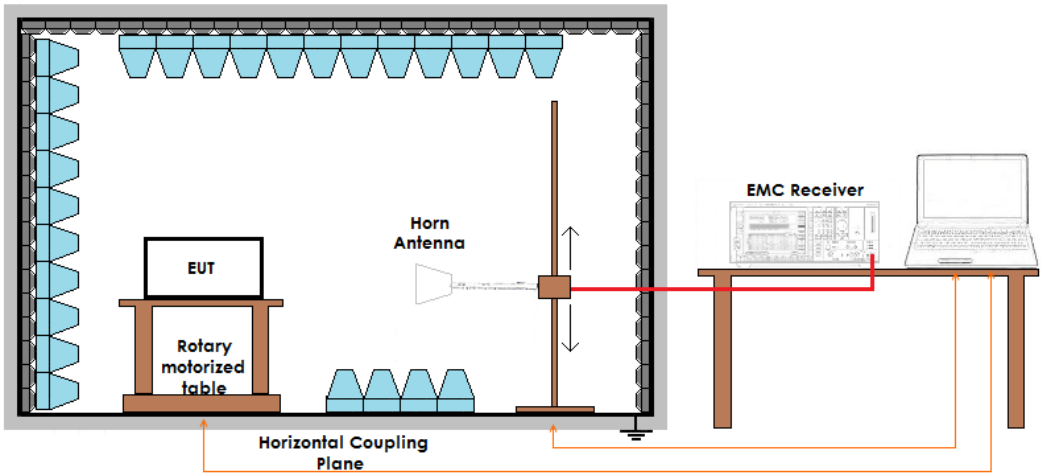
Acceptance limits for emissions in non-restricted frequency bands
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

Setup

Frequency ≤ 1 GHz



Frequency > 1 GHz



Result – AV detector

Harmonic	915,05 MHz channel Level (dBµV/m)	915,05 MHz channel Limits (dBµV/m)	921,50 MHz channel Level (dBµV/m)	921,50 MHz channel Limits (dBµV/m)	927,95 MHz channel Level (dBµV/m)	927,95 MHz channel Limits (dBµV/m)	Results
II	49,00 *	94,67	50,00 *	94,81	47,90 *	94,86	Complies
III	48,50	54,00	48,00	54,00	48,50	54,00	Complies
IV	46,10	54,00	47,80	54,00	48,20	54,00	Complies
V	46,00	54,00	44,90	54,00	45,10	54,00	Complies
VI	46,10 *	94,67	45,30 *	94,81	45,40 *	94,86	Complies
VII	45,10 *	94,67	44,90 *	94,81	46,50 *	94,86	Complies
VIII	48,40	54,00	48,60	54,00	48,30	54,00	Complies
IX	More than 20 dB below limit	54,00	More than 20 dB below limit	54,00	More than 20 dB below limit	54,00	Complies
X	More than 20 dB below limit	54,00	More than 20 dB below limit *	94,81	More than 20 dB below limit *	94,86	Complies

Remarks: EUT was tested in 3 orthogonal planes. The results in this table show the highest values. The emission values marked with * have been detected in non-restricted frequency bands

Result – Peak detector

Harmonic	915,05 MHz channel Level (dBµV/m)	915,05 MHz channel Limits (dBµV/m)	921,50 MHz channel Level (dBµV/m)	921,50 MHz channel Limits (dBµV/m)	927,95 MHz channel Level (dBµV/m)	927,95 MHz channel Limits (dBµV/m)	Results
II	51,60 *	114,67	52,60 *	114,81	51,40 *	114,86	Complies
III	53,80	74,00	52,50	74,00	56,60	74,00	Complies
IV	52,20	74,00	53,00	74,00	53,30	74,00	Complies
V	52,00	74,00	52,70	74,00	52,40	74,00	Complies
VI	53,90 *	114,67	54,30 *	114,81	54,80 *	114,86	Complies
VII	55,30 *	114,67	55,10 *	114,81	55,90 *	114,86	Complies
VIII	57,20	74,00	57,90	74,00	57,10	74,00	Complies
IX	More than 20 dB below limit	74,00	More than 20 dB below limit	74,00	More than 20 dB below limit	74,00	Complies
X	More than 20 dB below limit	74,00	More than 20 dB below limit *	114,81	More than 20 dB below limit *	114,86	Complies

Remarks: EUT was tested in 3 orthogonal planes. The results in this table show the highest values. The emission values marked with * have been detected in non-restricted frequency bands

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/cm^2 max at 20 cm of distance

Result

Power Density Limit (mW/cm2)	*Maximum Output Power P (mW)*	*Antenna Gain (G)*	*Power Density at 20 cm (mW/cm2)*	*Remarks*
1,00	57,94	1,58	0,018	Measured
Remarks: Power Density = (P x G) / (4πR^2)				

Result: The requirements are met