Independent Testing Laboratory
CMC Centro Misure Compatibilità S.r.l.
Via dell'Elettronica, 12/C
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TEST REPORT nr. R13222801

Federal Communication Commission (FCC)

Industry Canada (IC)

Test item

Description.....:	Transmitter Unit
Trademark.....:	Teleco Automation
Model/Type.....:	TVTXI916S07B - TVTXI916S07N TVTXI916S06B - TVTXI916S06N TVTXI916S04B - TVTXI916S04N TVTXI916S03B - TVTXI916S03N TVTXI916S02B - TVTXI916S02N TVTXI916S01B - TVTXI916S01N

Test Specification

Standard .....:	FCC Rules & Regulations, Title 47 (2013) - Part 15 paragraph(s) : 207, 209, 215 and 249 RSS-210 (2010) – Annex 2 (A2.9)

Client's name.....:	Teleco Automation Srl
Address.....:	Piazza ex convento Cappuccine, 8 - 31100 Treviso (TV) - ITALY
Manufacturer's name.:	Same ad client
Address.....:	--

Report

Tested by.....:	G. Gandini - *Technician*
Approved by.....:	R. Beghetto - *Laboratory Manager*
Date of issue.....:	25.02.14
Contents .....:	28 pages

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1. Summary

Standard: FCC Rules & Regulations, Title 47
RSS-210 (2010) – Annex 2 (A2.9)

Test specifications	Environmental Phenomena	Tests sequence	Result
FCC – Title 47 Part 15.203 and 15.204 IC – RSS-210	Antenna Requirement	1	Complies
Part 15.215 IC – RSS-210 Annex 2 (A2.9)	20 Bandwidth	2	Complies
IC – RSS-210 Annex 2 (A2.9)	Occupied Bandwidth (99% BW)	3	Complies
Part 15.249 IC – RSS-210 Annex 2 (A2.9)	Peak Output Power	4	Complies
Part 15.215 IC – RSS-210 Annex 2 (A2.9)	Band Edge	5	Complies
Part 15.209 IC – RSS-210 Annex 2 (A2.9)	Radiated Spurious	6	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 IC certification.

2. Description of Equipment under test (EUT)

Power supply	:	3,3 Vdc from internal battery
Type of equipment	:	☒ Transmitter Unit ☐ Receiver Unit
		☐ Fixed station ☒ Portable station ☐ Mobile station
Alignment range	:	916 MHz
Switching frequency	:	916 MHz
Modulation	:	FSK
Information on antenna	:	Embedded
FCC ID	:	P59TVTXI916S
IC number	:	11242A-TVTXI916S

2.1 Test Site

Company	:	CMC Centro Misure Compatibilità S.r.l.
Address	:	Via dell'Elettronica, 12/C – 36016 Thiene (VI) – ITALY

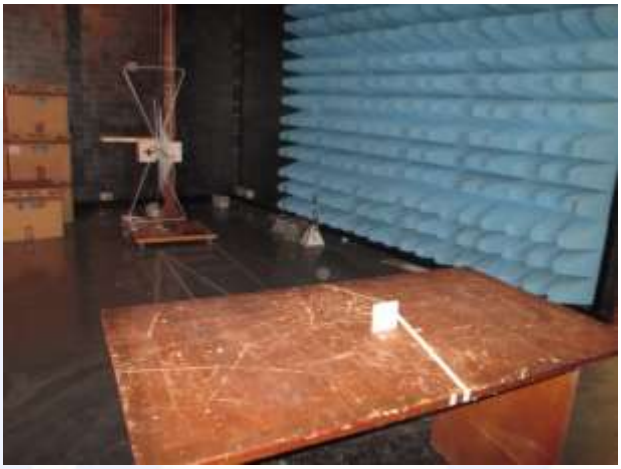
3. Testing and sampling

Date of receipt of test item	:	05.12.13
Testing start date	:	20.12.13
Testing end date	:	20.12.13
Samples tested nr.	:	1
		Test executed on model TVTXI916BB07B.
		The only difference between other models is the number of the buttons (7, 6, 4, 3, 2 and 1) and the colour of the envelope (B = White and N = Black)
		See Operational Description date 08.01.2014
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 P131224

4. Operative conditions

EUT Exercising	:	EUT in continuous transmission at maximum power

5. Photograph(s) of EUT



6. Equipment list

Id. number	*Manufacturer*	*Model*	*Description*	*Serial number*	*Last calibration*	*Due date calibration*
CMC S108	Emco	3115	Horn antenna	9811-5622	April '13	April '16
CMC S124	Spin	AMTP42-20	Horn Antenna 18-26GHz	103	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 '13	January '14
CMC S136	Schwarzbeck	VULB 9163	Broadband Antenna	9136-205	May '13	May '16
CMC S164	Rohde & Schwarz	ESU26	EMC interference receiver	100052	January '13	January '14
CMC S207	Rohde & Schwarz	ESCI 7	EMI receiver	100781	January '13	January '14

7. Measurement uncertainty

Test	*Expanded Uncertainty*	*note*
Conducted Emission		
(50Ω/50μH AMN) - (9 kHz – 150 kHz)	±3.9 dB	1
(50Ω/50μH AMN) - (150 kHz – 30 MHz)	±3.4 dB	1
(Voltage probe) - (150 kHz – 30 MHz)	±3.4 dB	1
(50Ω/5μH AMN) - (150 kHz – 108 MHz)	±2.8 dB	1
DiscontinuousConducted Emission		
Conducted Emission (50Ω/50μH AMN) - (150 kHz – 30 MHz)	±3.4 dB	1
Disturbance Power (30 MHz – 300 MHz)	±3.8 dB	1
Radiated Emission		
(0,150 MHz – 30 MHz)	±4.3 dB	1
(30 MHz – 1000 MHz)	±4.6 dB	1
(1 GHz – 6 GHz)	±4.7 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	±2.9 dB	1
Radiated electromagnetic disturbance test (loop antenna)	±2.8 dB	1
Radiated electromagnetic field immunity test	0.8 V/m at 3V/m	1
Pulse modulated radiated electromagnetic field immunity test	0.8 V/m at 3V/m	1
Injected currents immunity test	0.4 V at 3V	1
Bulk current	9.7 mA at 60 mA	1
Power frequency magnetic field immunity test	0.1 A/m at 10 A/m	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(2004-10) 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 demostrated 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 (2013)	--
RSS-210 Issue 8 – December 2010	Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment
ANSI C63.4:2003	American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz – 40GHz
Internal Procedure PM001 rev. 2.0 (Quality Manual)	Measure Procedure
Internal procedure INC_M rev. 8.1 (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 6dB 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 / N.A.

Test item does meet the requirement..... : P / Pass / Complies

Test item does not meet the requirement..... : F / Fail / Does not comply

Test not performed ..... : NE / Not Executed

11. Results

In this clause tests results are reported.

Measurement uncertainty is in accordance with document CMC INC_M rev. 8.1.

11.1 Antenna Requirements

Test configuration and test method

Test site	Laboratory
Auxiliary equipment	See clause 4 of this test report

Environmental conditions

Temperature	20	ºC	Atmospheric pressure	99	kPa	Relative humidity	49	%

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.203 and 15.204
- RSS-210
- Internal Procedure PM001
- See clause 4 of this test report

Test Requirements

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 unique coupling to the intentional radiator shall be considered sufficient comply with the provisions of this section.
The manufacturer may design the unit so that a broken antenna can replaced by the user, but the use of 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.

Test specification

Port: Antenna.

EUT exercising

See clause 4 of this test report

Result

Antenna Type	*Gain*	*Remarks*	*Results*
Embedded	-1,2 dBi	--	Complies

Remarks ///////////////

Reference documents

See clause 8 of this test report

Result

The requirements are met

11.2 20dB Bandwidth

Test configuration and test method

Test site: Laboratory
Auxiliary equipment: See clause 4 of this test report

Environmental conditions

Temperature 22 ºC Atmospheric pressure 99 kPa Relative humidity 48 %

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.215
- RSS-210 Annex 2 (A2.9)
- Internal Procedure PM001
- See clause 4 of this test report

Test specification

Port: Antenna;

EUT exercising

See clause 4 of this test report

Result

Frequency (MHz)	Graph(s)	*Bandwidth (kHz)*	Remark
915,990	G13222804	48,39	--
Measurement uncertainty: ±1 kHz			

Remarks ////////////////

Reference documents

See clause 8 of this test report

Test equipment used (Id number – see clause 6 of this test report)

CMC S129

Result

The requirements are met

11.3 Occupied Bandwidth (99% BW)

Test configuration and test method

Test site: Laboratory
Auxiliary equipment: See clause 4 of this test report

Environmental conditions

Temperature	22	ºC	Atmospheric pressure	99	kPa	Relative humidity	48	%

Test set-up and execution

- RSS-210 Annex 2 (A2.9)
- Internal Procedure PM001
- See clause 4 of this test report

Test specification

Port: Antenna;

EUT exercising

See clause 4 of this test report

Result

Frequency (MHz)	Graph(s)	*Bandwidth (kHz)*	Remark
915,971	G13222803	53,20	--
Measurement uncertainty: ±1 kHz			

Remarks

////////////////

Reference documents

See clause 8 of this test report

Test equipment used (Id number – see clause 6 of this test report)

CMC S129

Result

The requirements are met

11.4 Peak Output Power

Test configuration and test method

Test site: Laboratory
Auxiliary equipment: See clause 4 of this test report

Environmental conditions

Temperature 24 ºC Atmospheric pressure 99 kPa Relative humidity 50 %

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.209 and 15.249
- RSS-210 Annex 2 (A2.9)
- Internal Procedure PM001
- See clause 4 of this test report

Test specification

Port: Antenna;
Antenna distance: 3m

EUT exercising

See clause 4 of this test report

Acceptance limits

Frequency range	RF power output
902-928 MHz	50mV/m (94dBµV/m)

Result

Frequency (MHz)	*Polarization*	*Graphs*	*Measured QP level (dBµV/m)*	*Peak Output Power (mW)*	*Remark*
915,950	Horizontal	G13222814	87,09	0,202	--
915,956	Vertical	G13222813	86,05	0,159	
Measurement uncertainty: ±3dBm					

Remarks

$P = (E \times d)^2 / (30 \times G)$
Where:
E = the measured maximum fundamental field streght in V/m
G = the numeric gain of the transmitting antenna: 0,76 (-1,2 dBi)
d = the distance in meters from which the field strength was measured (3m)
P = the power in watts

Reference documents
See clause 8 of this test report

Test equipment used (Id number – see clause 6 of this test report)
CMC S164

Result
The requirements are met

11.5 Band Edge

Test configuration and test method

Test site	Laboratory
Auxiliary equipment	See clause 4 of this test report

Environmental conditions

Temperature	23	ºC	Atmospheric pressure	98	kPa	Relative humidity	51	%

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.215
- Internal Procedure PM001
- See clause 4 of this test report

Test specification

Port: Antenna;

EUT exercising

See clause 4 of this test report

Acceptance limits

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Result

Frequency (MHz)	Graph(s)	Remark
915,96	G13222807	--
	G13222808	
Measurement uncertainty: ±1dB		

Remarks

//////////////

Reference documents

See clause 8 of this test report

Test equipment used (Id number – see clause 6 of this test report)

CMC S129

Result

The requirements are met

11.6 Radiated Spurious (Transmitter)

Test configuration and test method

Test site: Semi-anechoic chamber
Auxiliary equipment: None

Environmental conditions

Temperature 23 ºC Atmospheric pressure 98 kPa Relative humidity 51 %

Test set-up and execution

- FCC Rules and Regulation; Titles 47 Part 15.209
- RSS-210 Annex 2 (A2.9)
- Internal Procedure PM001
- See clause 4 of this test report

Test specification

Port: Antenna;
For measurements below 1GHz the resolution bandwidth is set to 100kHz.
For measurements above 1GHz the resolution bandwidth is set to 1MHz.

EUT exercising

See clause 4 of this test report

Acceptance limits

In any 100kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in cl. 15.205(a), must also comply with the radiated emission limits specified in cl. 15.209(a) (see cl.15.205(c)).

Result

Channel	*Polarization*	Frequency Range (MHz)	Graph(s) (peak measurements)	Result	Remarks
916	Horizontal	30 – 1000	G13222805	Complies	--
916	Vertical	30 – 1000	G13222806	Complies	
916	Horizontal	1000 – 10000	G13222810	Complies	
916	Vertical	1000 – 10000	G13222809	Complies	

Antenna	Frequency Range (MHz)	Graph(s)	Result	Remarks
Loop Antenna	9kHz – 30MHz	G13222815	Complies	--

Nr. Harmonics	*AV level (dBµV/m)* 916MHz		*AV Limits (dBµV/m)*	*Remark*
	Frequency	*(dBµV/m)*		
II Harmonic	1831,8830	38,70	54,00	--
III Harmonic	2747,9396	49,91	54,00	
IV Harmonic	3663,8339	47,33	54,00	
V Harmonic	4579,7355	40,78	54,00	
VI Harmonic	--	More than 15dB below limit	54,00	
VII Harmonic	--	More than 15dB below limit	54,00	
VIII Harmonic	--	More than 15dB below limit	54,00	
IX Harmonic	--	More than 15dB below limit	54,00	
X Harmonic	--	More than 15dB below limit	54,00	
Measurement Uncertainty: ±4dB				

Nr. Harmonics	*PK level (dBµV/m)* 916MHz		*AV Limits (dBµV/m)*	*Remark*
	Frequency	*(dBµV/m)*		
II Harmonic	1831,8830	42,31	74,00	--
III Harmonic	2747,9396	51,65	74,00	
IV Harmonic	3663,8339	51,60	74,00	
V Harmonic	4579,7355	49,98	74,00	
VI Harmonic	--	More than 15dB below limit	74,00	
VII Harmonic	--	More than 15dB below limit	74,00	
VIII Harmonic	--	More than 15dB below limit	74,00	
IX Harmonic	--	More than 15dB below limit	74,00	
X Harmonic	--	More than 15dB below limit	74,00	
Measurement Uncertainty: ±4dB				

Remarks
EUT was tested in 3 orthogonal planes. In results table are reported the worst case.

Reference documents
See clause 8 of this test report

Test equipment used (Id number – see clause 6 of this test report)
CMC S108, CMC S124, CMC S136, CMC S164
Measurement uncertainty: See clause 7 of this test report

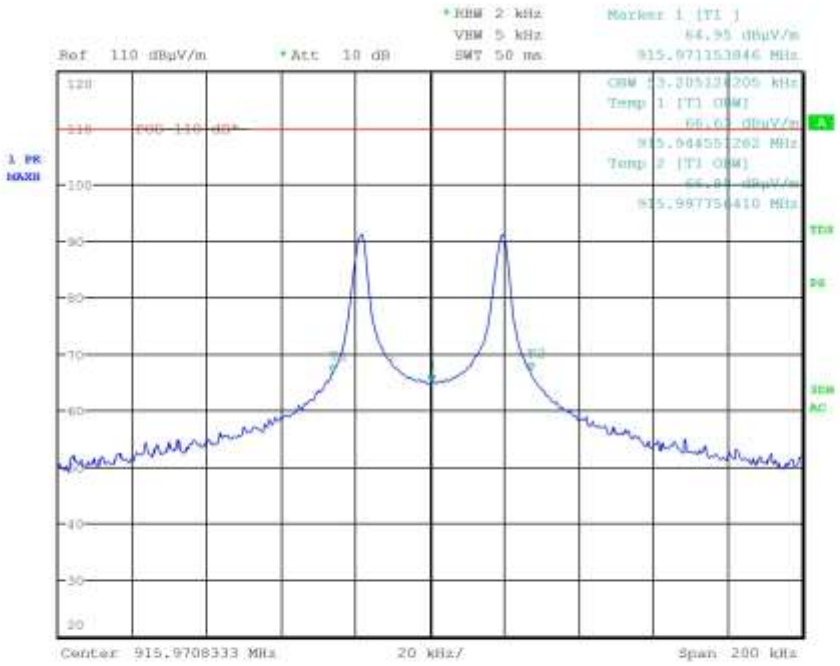
Result The requirements are met

12. Graphs and Tables

G13222803

Meas Type	Emission
Equipment under Test	
Manufacturer	
OP Condition	Tx
Operator	Gandini 1322803
Test Spec	

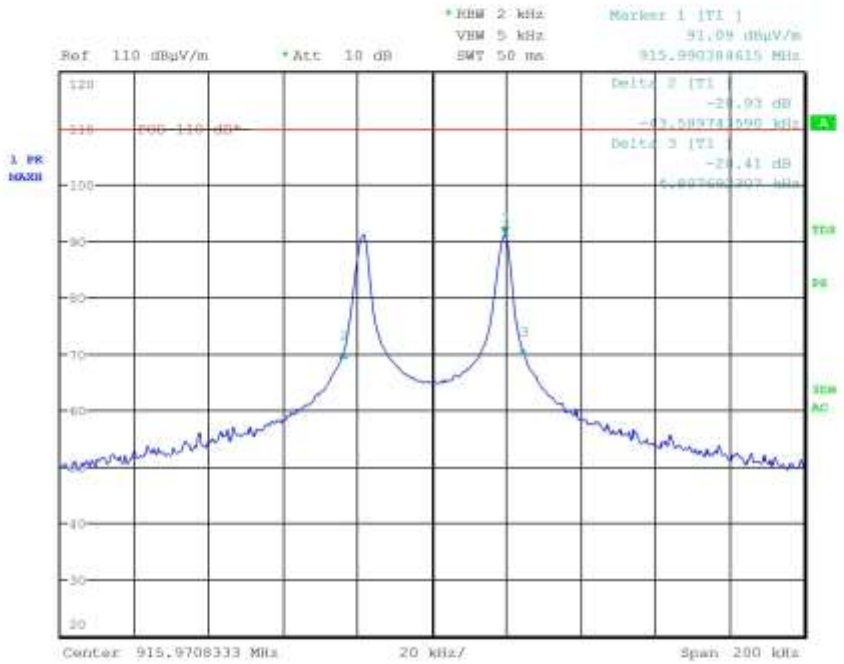
Horiz



G13222804

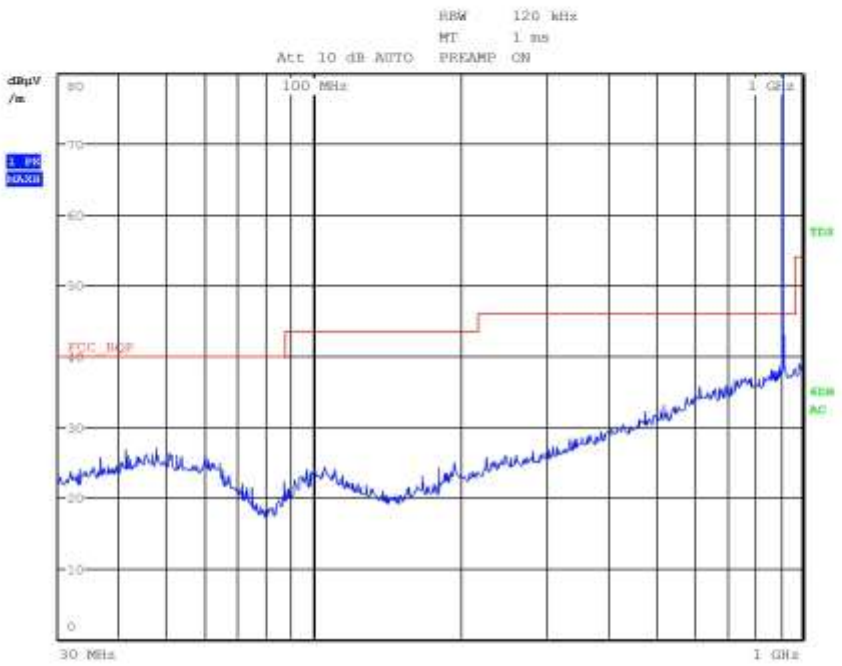
Meas Type	Emission
Equipment under Test	
Manufacturer	
OP Condition	Tx
Operator	Gandini 13222804
Test Spec	

Horiz



G13222805

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx
Operator Gandini 13222805
Test Spec
Horiz

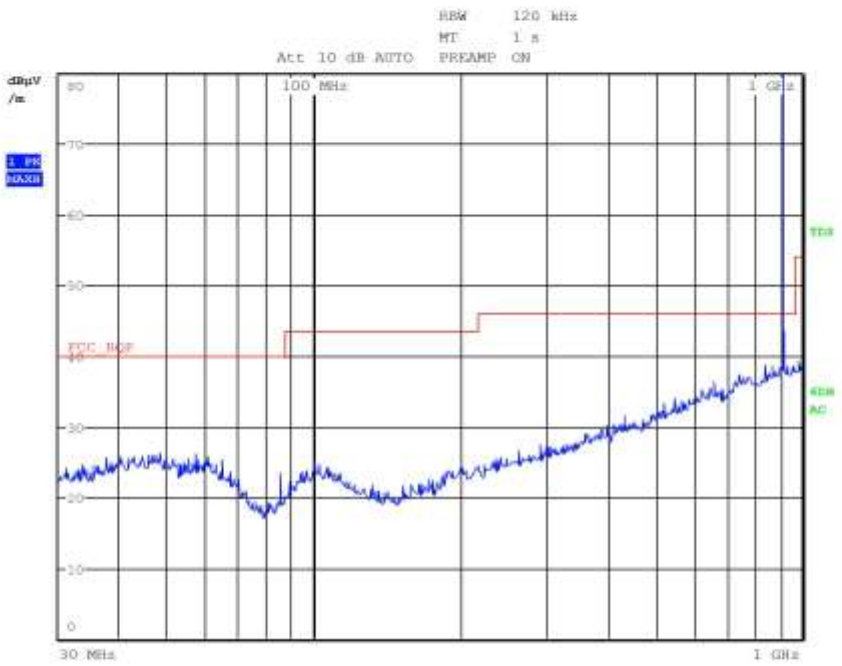


Final Measurement

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

G13222806

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx
Operator Gandini 13222806
Test Spec
Vert



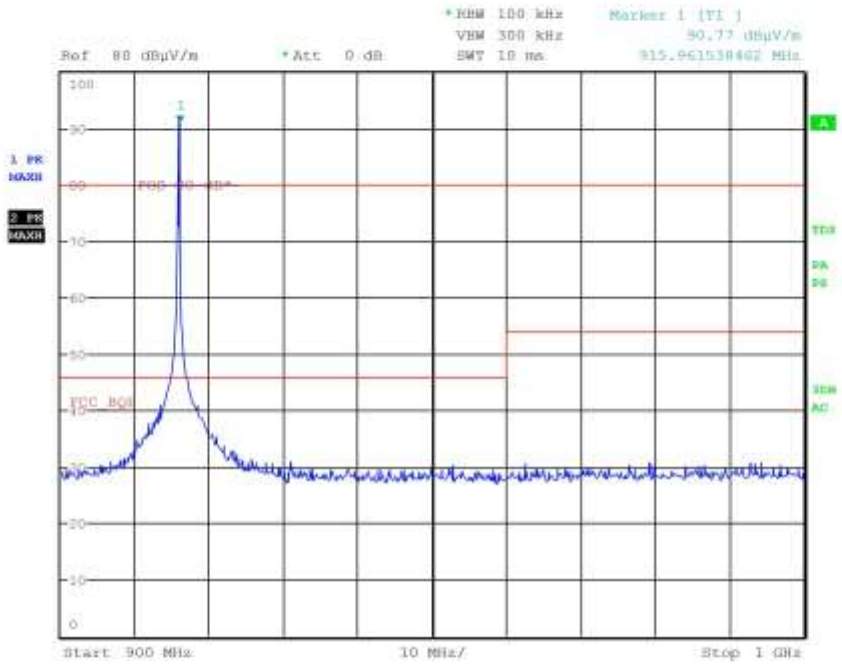
Final Measurement

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

G13222807

Meas Type	Emission
Equipment under Test	
Manufacturer	
OP Condition	Tx
Operator	Gandini 13222807
Test Spec	

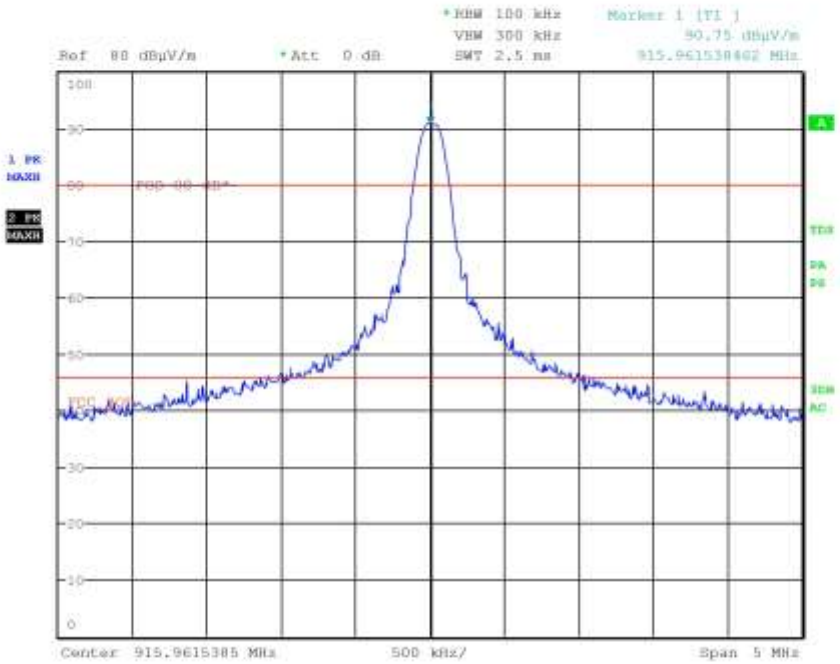
Horiz



G13222808

Meas Type	Emission
Equipment under Test	
Manufacturer	
OP Condition	Tx
Operator	Gandini 13222808
Test Spec	

Horiz



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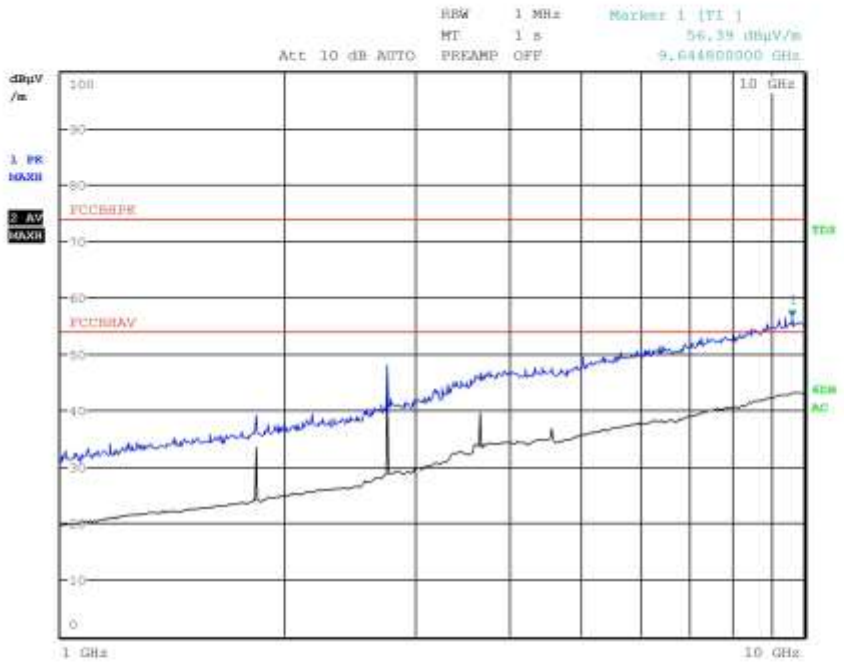
G13222809

Meas Type Emission 1000-10000MHz
Equipment under Test
Manufacturer
OP Condition Tx
Operator Gandini 13222809
Test Spec
Vert

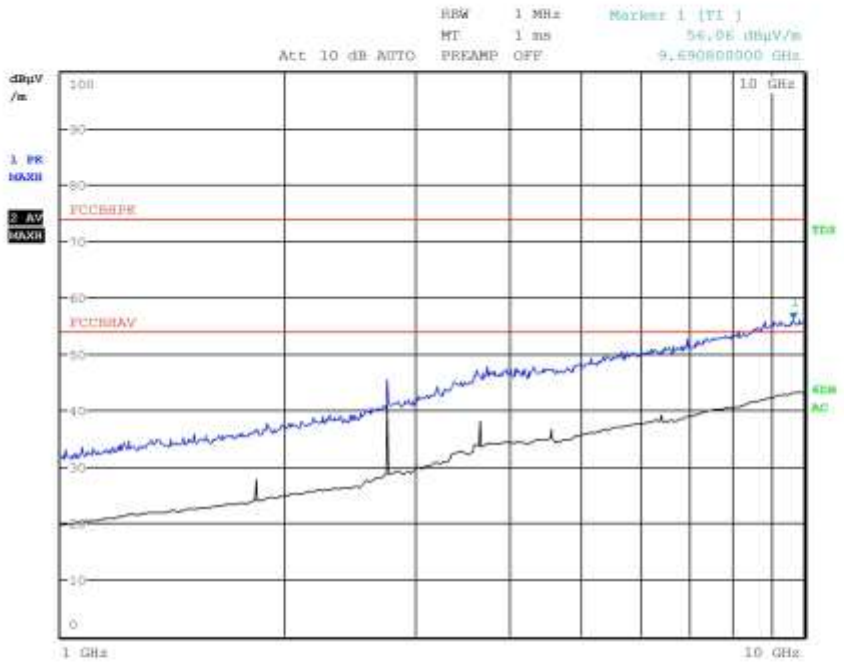


Final Measurement

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

G13222810

Meas Type Emission 1000-10000MHz
Equipment under Test
Manufacturer
OP Condition Tx
Operator Gandini 13222810
Test Spec
Horiz



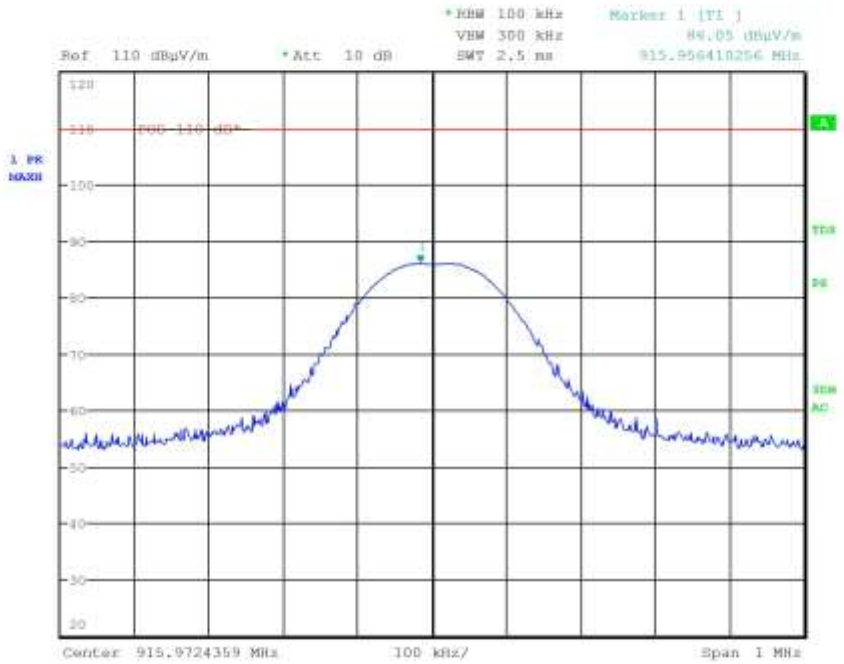
Final Measurement

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

G13222813

Meas Type	Emission
Equipment under Test	
Manufacturer	
OP Condition	Rx
Operator	Gandini 13222813
Test Spec	

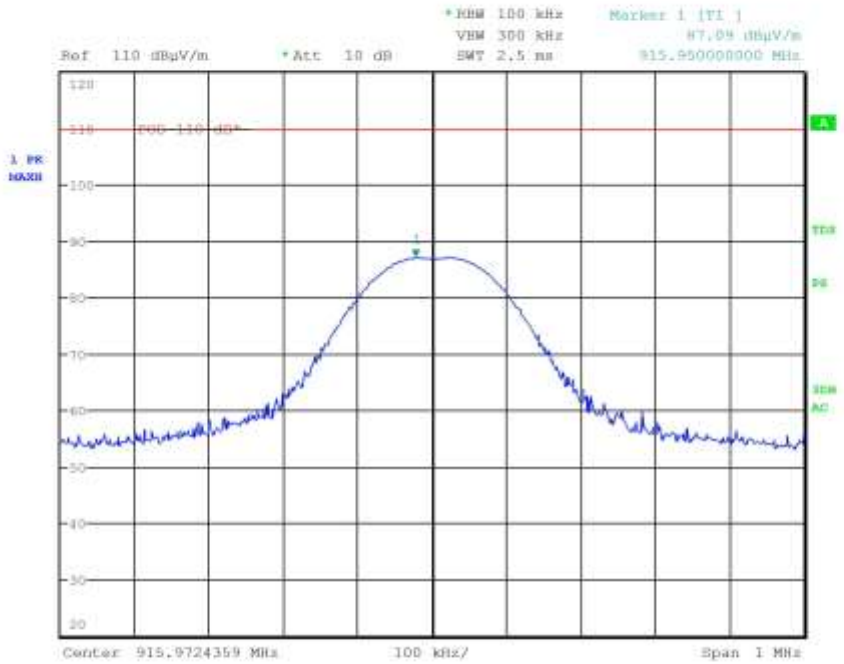
Vert



G13222814

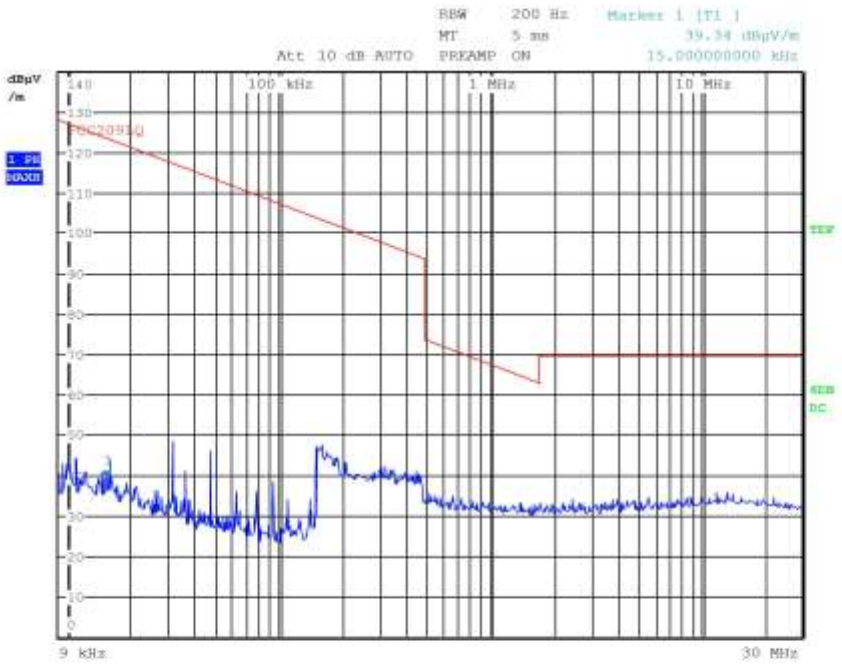
Meas Type	Emission
Equipment under Test	
Manufacturer	
OP Condition	Tx
Operator	Gandini 13222814
Test Spec	

Horiz



G13222815

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx
Operator Gandini 13222815
Test Spec
Loop



Final Measurement

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