



TEST REPORT nr. R13222901

Federal Communication Commission (FCC)

Industry Canada (IC)

Test item

Description.....: Transmitter Unit
Trademark.....: Teleco Automation
Model/Type.....: TVEVO916S42 - TVEVO916S18 - TVEVO916S07
TVEVO916S04 - TVEVO916S03



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.....: 20.02.14
Contents.....: 28 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.



Index

1. SUMMARY	3
2. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)	4
2.1 TEST SITE.....	4
3. TESTING AND SAMPLING	4
4. OPERATIVE CONDITIONS.....	4
5. PHOTOGRAPH(S) OF EUT	5
6. EQUIPMENT LIST	6
7. MEASUREMENT UNCERTAINTY	7
8. REFERENCE DOCUMENTS	8
9. DEVIATION FROM TEST SPECIFICATION	9
10. TEST CASE VERDICTS.....	9
11. RESULTS.....	9
11.1 ANTENNA REQUIREMENTS	10
11.2 20DB BANDWIDTH	11
11.3 OCCUPIED BANDWIDTH (99% BW).....	12
11.4 PEAK OUTPUT POWER	13
11.5 BAND EDGE.....	15
11.6 RADIATED SPURIOUS (TRANSMITTER).....	16
12. GRAPHS AND TABLES.....	18



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.



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2. Description of Equipment under test (EUT)	
Power supply.....	: 3,3 Vdc from internal battery
Type of equipment	: <input checked="" type="checkbox"/> Transmitter Unit <input type="checkbox"/> Receiver Unit <input type="checkbox"/> Fixed station <input checked="" type="checkbox"/> Portable station <input type="checkbox"/> Mobile station
Alignment range.....	: 916 MHz
Switching frequency	: 916 MHz
Modulation	: FSK
Information on antenna.....	: Embedded
FCC ID	: P59TVEVO916S
IC number	: 11242A-TVEVO916S
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 TVEVO916S42. TVEVO916S42, TVEVO916S18, TVEVO916S07, TVEVO916S04, TVEVO916S03 are radio 3-4-7-18 or 42 channel portable transmitters so that to send 42 different information to a remote receiver. 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 P131225
4. Operative conditions	
EUT Exercising	: EUT in continuous transmission at maximum power



5. Photograph(s) of EUT



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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 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 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

<i>Reference no.</i>	<i>Description</i>
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 1 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.

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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 °C 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 be 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

<i>Antenna Type</i>	<i>Gain</i>	<i>Remarks</i>	<i>Results</i>
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 °C 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

<i>Frequency (MHz)</i>	<i>Graph(s)</i>	<i>Bandwidth (kHz)</i>	<i>Remark</i>
915,975	G13222906	48,08	--
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 °C 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

<i>Frequency</i> (MHz)	<i>Graph(s)</i>	<i>Bandwidth</i> (kHz)	<i>Remark</i>
915,975	G13222905	55,13	--
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 °C 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 (94dB μ V/m)

Result

Frequency (MHz)	Polarization	Graphs	Measured QP level (dB μ V/m)	Peak Output Power (mW)	Remark
915,993	Horizontal	G13222903	91,82	0,63	--
915,952	Vertical	G13222904	79,93	0,04	
Measurement uncertainty: ± 3 dBm					

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: 0,76 (-1,2 dBi)

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

P = the power in watts



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36016 Thiene (VI)

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



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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 °C 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
915,55	G13222907	--
	G13222908	
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 °C 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	G13222909	Complies	--
916	Vertical	30 – 1000	G13222910	Complies	
916	Horizontal	1000 – 10000	G13222911	Complies	
916	Vertical	1000 – 10000	G13222912	Complies	

Antenna	Frequency Range (MHz)	Graph(s)	Result	Remarks
Loop Antenna	9kHz – 30MHz	G13222915	Complies	--



Nr. Harmonics	AV level (dB μ V/m) 916MHz		AV Limits (dB μ V/m)	Remark
	Frequency	(dB μ V/m)		
II Harmonic	--	More than 15dB below limit	54,00	--
III Harmonic	--	More than 15dB below limit	54,00	
IV Harmonic	3664,0032	45,72	54,00	
V Harmonic	4580,1442	44,05	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: ± 4 dB				

Nr. Harmonics	PK level (dB μ V/m) 916MHz		AV Limits (dB μ V/m)	Remark
	Frequency	(dB μ V/m)		
II Harmonic	--	More than 15dB below limit	74,00	--
III Harmonic	--	More than 15dB below limit	74,00	
IV Harmonic	3664,0032	50,58	74,00	
V Harmonic	4580,1442	50,35	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: ± 4 dB				

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

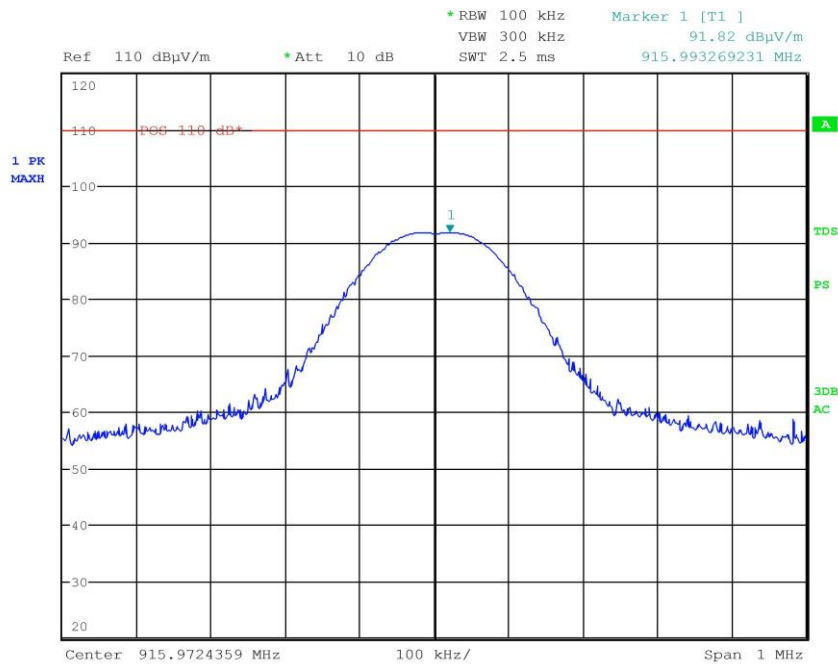
Result The requirements are met



12. Graphs and Tables

G13222903

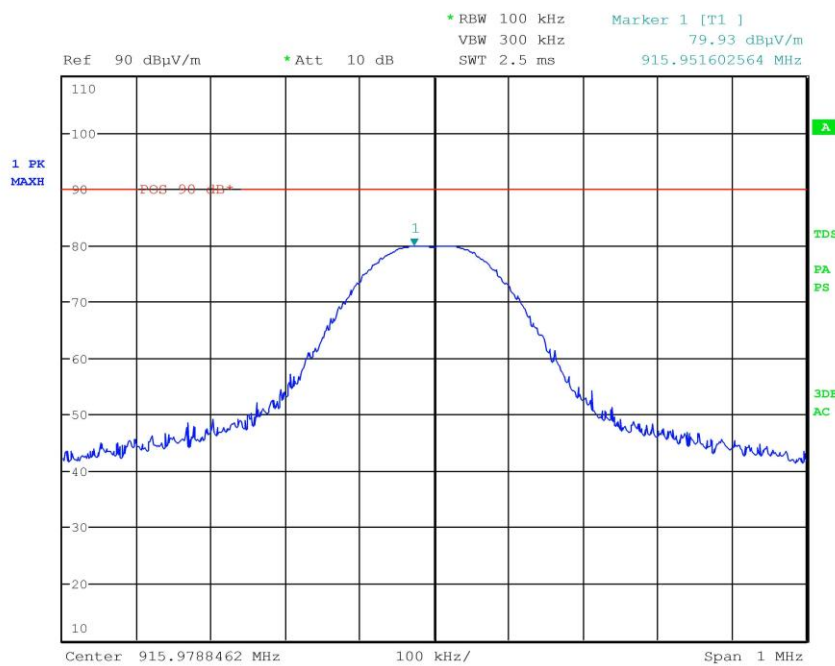
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx
Operator Gandini 13222903
Test Spec
Horiz





G13222904

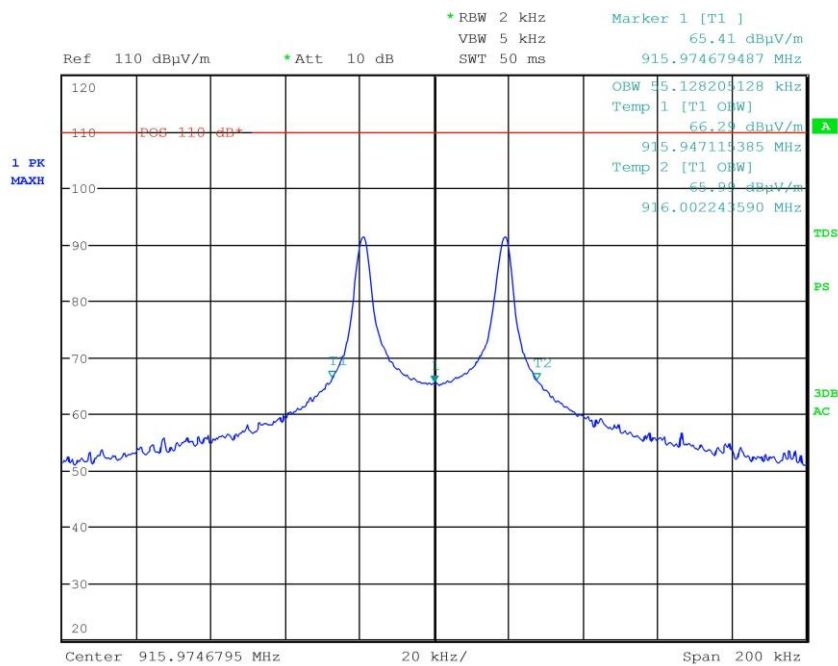
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx
Operator Gandini 13222904
Test Spec
Vert





G13222905

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx
Operator Gandini 13222905
Test Spec
Horiz

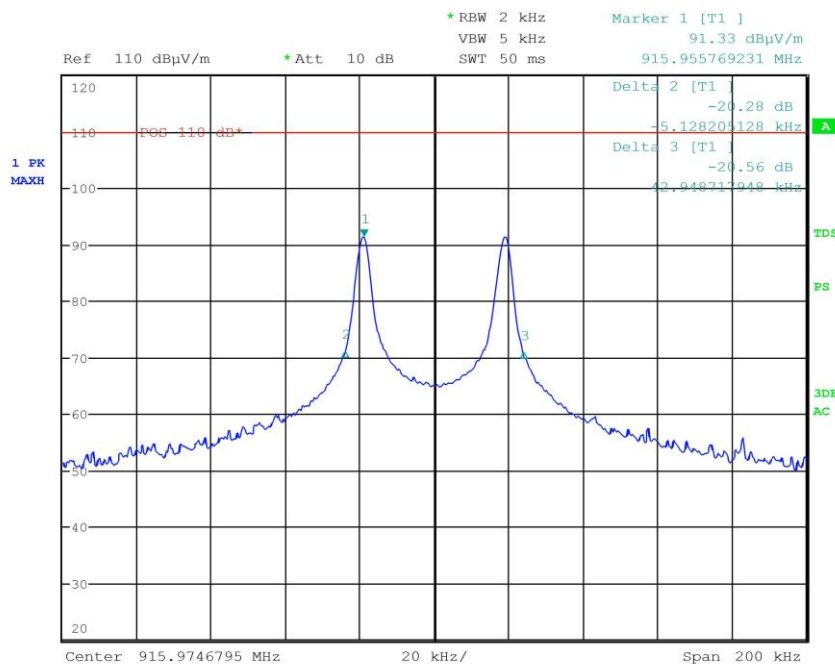


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G13222906

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx
Operator Gandini 13222906
Test Spec
Horiz

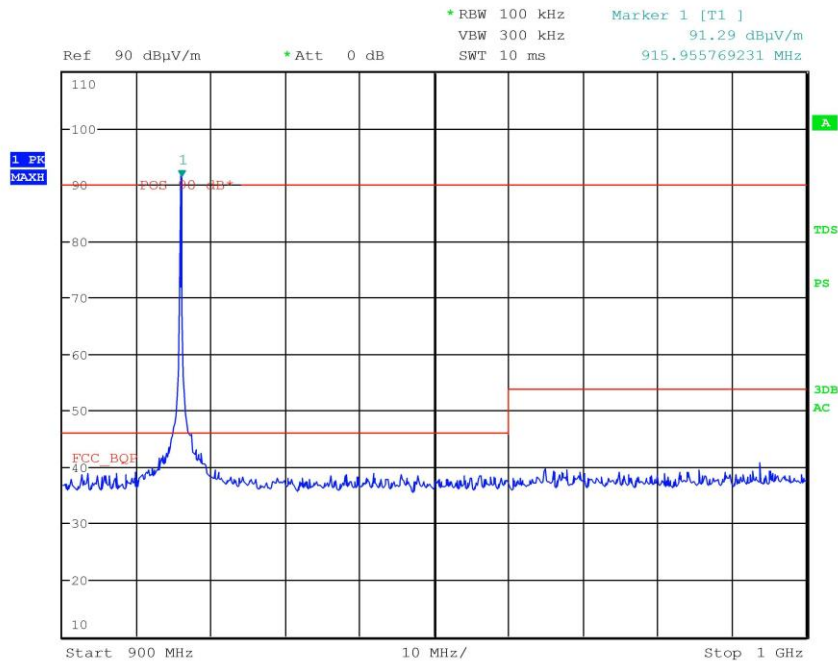


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G13222908

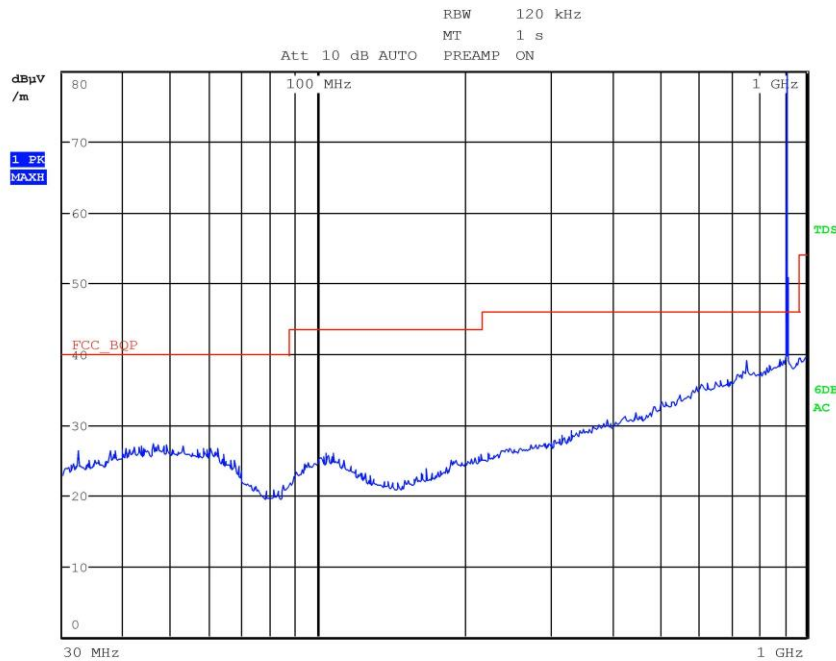
Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx
Operator Gandini 13222908
Test Spec
Horiz





G13222909

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx
Operator Gandini 13222909
Test Spec
Horiz



Final Measurement

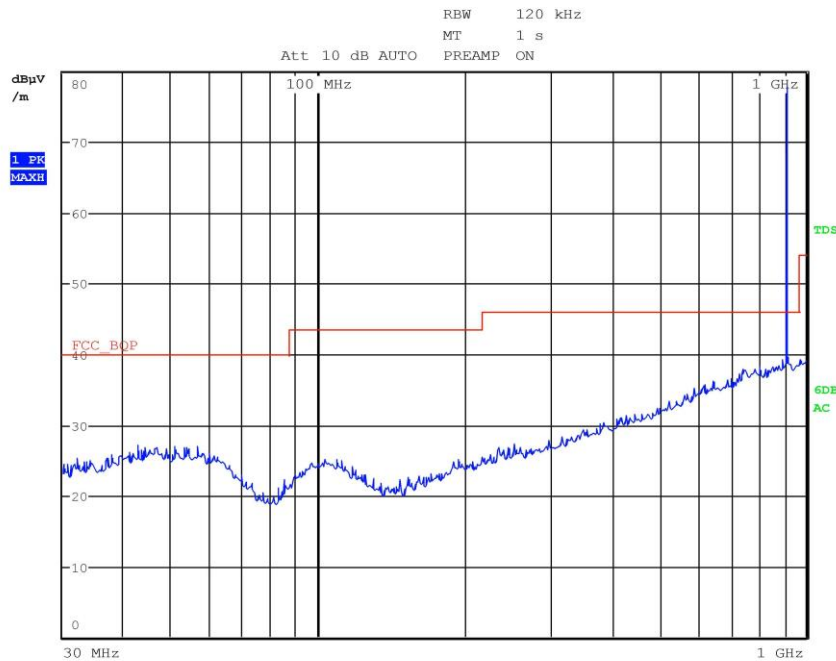
Meas Time: 1 s
Margin: 6 dB
Subranges: 0

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G13222910

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx
Operator Gandini 13222910
Test Spec
Vert



Final Measurement

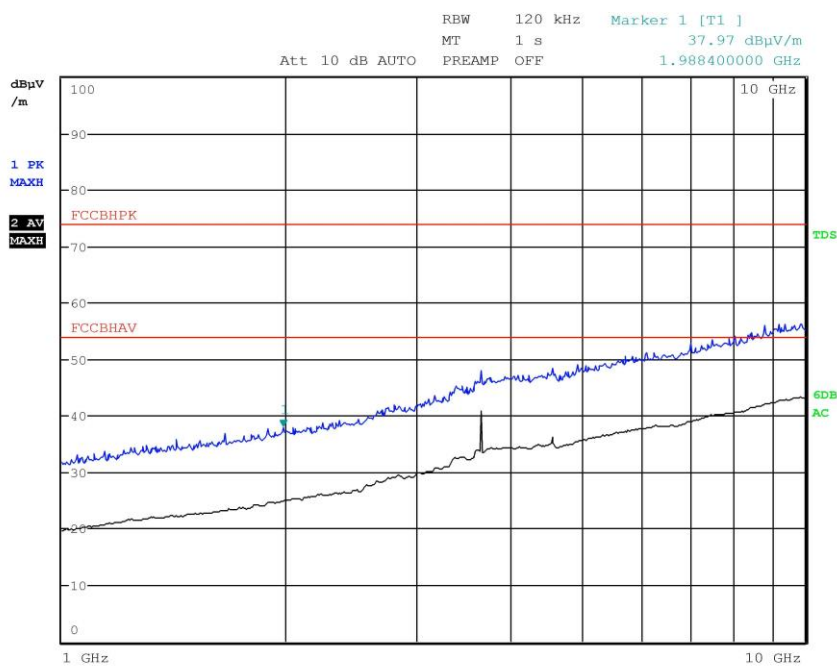
Meas Time: 1 s
Margin: 6 dB
Subranges: 0

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G13222911

Meas Type Emission 1000-10000MHz
Equipment under Test
Manufacturer
OP Condition Tx
Operator Gandini 13222911
Test Spec
Horiz



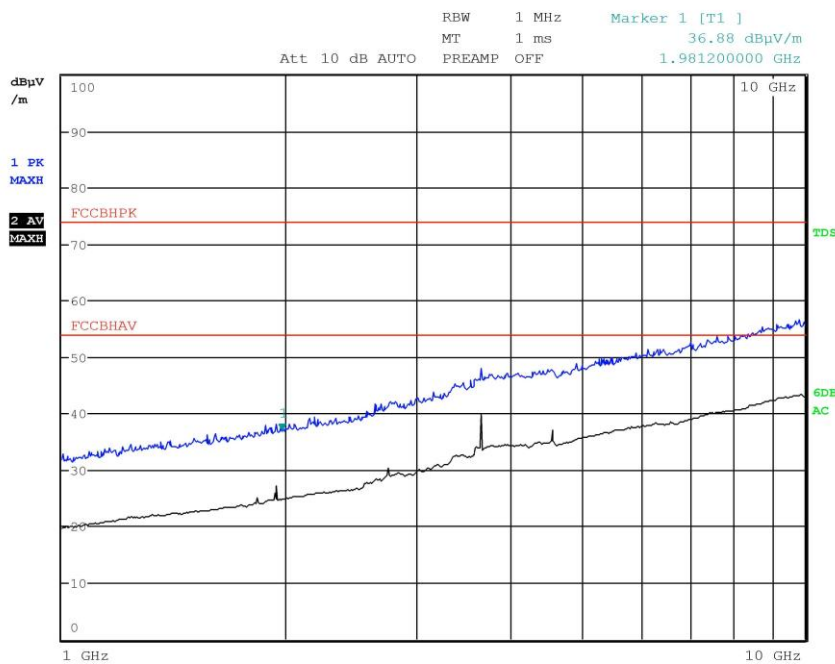
Final Measurement

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



G13222912

Meas Type Emission 1000-10000MHz
Equipment under Test
Manufacturer
OP Condition Tx
Operator Gandini 13222912
Test Spec
Vert



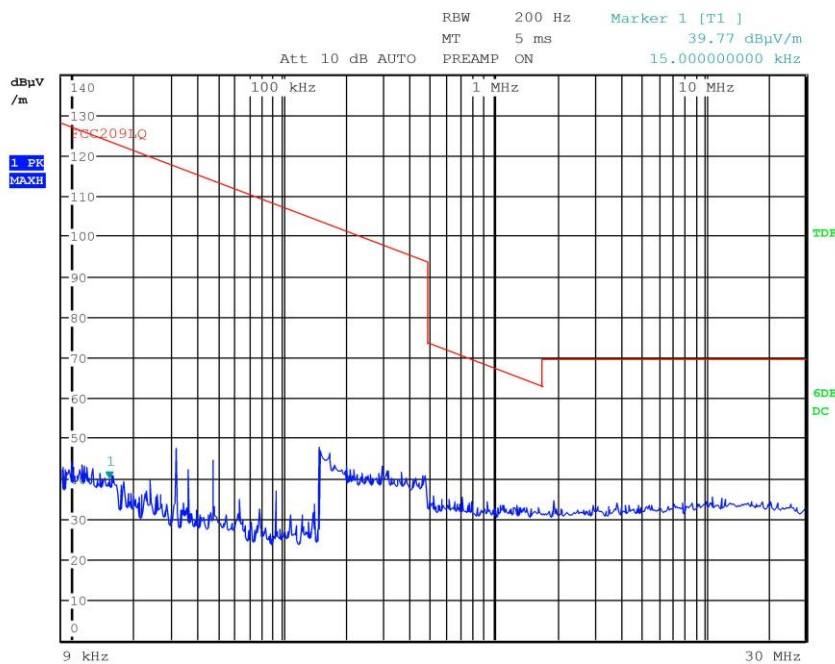
Final Measurement

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



G13222915

Meas Type Emission
Equipment under Test
Manufacturer
OP Condition Tx
Operator Gandini 13222915
Test Spec
Loop



Final Measurement

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