



TEST REPORT

Radio Characteristics

Equipment under test: Radio data modem
Model and/or type reference: RipEX-900
Manufacturer: Racom s.r.o., Czech Republic
Applicant: Racom s.r.o., Czech Republic

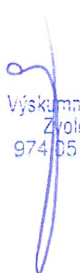
Relevant Standards for Tests: TIA-603-D

Tested by: Roman Ščehovič
Testing Engineer

Approved by: Pavol Solivajs
*Head of Testing and
Metrology Division*

Date of issue: 12.1.2015

Issue (No. / Total No.): 1/2


Test Report No.: 068/608/2014/LRB(R)_Eng



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Research Institute of Posts and Telecommunications

Testing and Metrology Division
Laboratory of Radio Equipment and Electrical Safety
Zvolenská cesta 20, 974 05 Banská Bystrica

1 General Information

1.1 General remarks

- a) The test results presented in this Test Report relate only to the object (EUT) described in item 1.7 of this Test Report, which was tested.
- b) This Test Report shall not be reproduced, except in full, without written approval of the Testing and Metrology Division, Výskumný ústav spojov Banská Bystrica.
- c) "See remark #" refers to a remark in this Test Report.
- d) "See Annex #" refers to an annex of this Test Report.

1.2 Testing laboratory

Výskumný ústav spojov, n. o. (Research Institute of Posts and Telecommunications)
Testing and Metrology Division – Laboratory of Radio Equipment and Electrical Safety
Zvolenská cesta 20
974 05 Banská Bystrica
Slovak Republic

Telephone: +421 48 4324 230

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1.3 Subcontractor

Subcontracted tests: none

1.4 Details of applicant

Applicant:	RACOM s.r.o.
Street / P.O. Box:	Mírová 1283
Town / City:	592 31 Nové Město na Moravě
Country:	Czech Republic
E-mail:	radek.holy@racom.eu
Contact person:	Radek Holý



1.5 Details of manufacturer

Manufacturer: RACOM s.r.o.
Street / P.O. Box: Mírová 1283
Town / City: 592 31 Nové Město na Moravě
Country: Czech Republic

1.6 Dates

Date of receipt of application: 1. 12. 2014
Date of receipt of test item: 3. 12. 2014
Date of test: 9. 1. – 12. 1. 2015

1.7 Equipment under test

Type of product: RipEX-900 (radio data modem)
Model and/or type reference: RipEX-928S
Serial number: Model: S/N 12292421

Documentation: User manual

Test configuration:

	Trade name	Type	HW model code
EUT	RipEX	RipEX-900	RipEX-928S

1.8 Technical specification declared by manufacturer

Equipment category:	Radio data modem
Type of equipment:	Transmitter, receiver
RF power:	0.1 W to 8 W
Frequency characteristics:	Alignment range: 928 - 960 MHz Switching range: 928 - 960 MHz Channel spacing: 12.5, 25 and 50 kHz
Modulation:	Linear: 16DEQAM, D8PSK, $\pi/4$ DQPSK Exponential: 4CPFSK
Extreme test conditions:	-30 to + 55°C
Power supply:	10 - 30 V DC / max 5 A
Antenna	External – TNC connector

1.9 Tested frequencies

Lowest frequency [MHz] K1	Middle frequency [MHz] K2	Upper frequency [MHz] K3
928,025	943,025	959,975



1.10 Environmental conditions for test

$$T_{\text{nom}} = 21 \div 23 \text{ }^{\circ}\text{C}$$

$$T_{\text{min}} = - 30 \text{ }^{\circ}\text{C}$$

$$T_{\text{max}} = + 55 \text{ }^{\circ}\text{C}$$



2 General Remarks for Testing

2.1 Basic test specification

Procedure deviation: none

Non-standard test method: none

2.2 Test result assessment

Test result does meet the requirement: **P**

Test result does not meet the requirement: **F**

Test case does not apply to the test object: **N**

Test case not performed: **X**

2.3 Other notes

a) Place of tests:

All measurements described in this Test Report were performed at the premises of the Testing and Metrology Division – Laboratory of Radio Equipment and Electrical Safety, Zvolenská cesta 20, 974 05 Banská Bystrica, Slovakia.

b) Scope of testing

At Applicant's request the performed testing covered only the measurement of transmitter radiated unwanted emissions in the spurious domain for 50 kHz channel spacing according to 47 CFR part 101.



3 Test Results

3.1 Results summary

TIA-603-D Reference Clause No		Parameter	Test result assessment	Clause of this Report
Test specification	Requirement			
2.2.12.2	47 CFR 101.111	Unwanted emissions: Radiated spurious	P	3.2.1



3.2 Test results details

3.2.1 Transmitter unwanted emissions in the spurious domain (radiated)

Test conditions:

Ambient temperature: +21 °C
Relative humidity: 38 %
Test method: TIA-603-D Clause 2.2.12.2
The measurement was carried out at 8W output level

Test results:

K1		K2	
Frequency of emission [MHz]	Measured level [dBm]	Frequency of emission [MHz]	Measured level [dBm]
	Polarization V/H		Polarization V/H
30-1000	-57.5	30-1000	-56.5
1856.05	-42.2/-43.7	1886.05	-47.6/-46.3
2784.075	-48.0/-49.5	2829.075	-46.6/-46.2
3712.1	-43.6/-44.4	3772.1	-44.8/-46.0
Plots n.	1, 2, 3	Plots n.	4, 5, 6
K3			
Frequency of emission [MHz]	Measured level [dBm]		
	Polarization V/H		
30-1000			
1919.95	-48.6/-44.7		
2879.925	- / -45.3		
3839.9	-44.4/-39.8		
Plots n.	7, 8, 9		

Limits according to 47 CFR 101.111 Emission Limitations (5), (6)

Frequency range	30 MHz – 12.75 GHz
Tx operating	3 μ W (-20 dBm)



The measurement was carried out at 0,1W output level

Test results:

K1		K2	
Frequency of emission [MHz]	Measured level [dBm]	Frequency of emission [MHz]	Measured level [dBm]
	Polarization V/H		Polarization V/H
30-1000	-58.4	30-1000	-58.6
1000-12750	-44.2/-43.3	1000-12750	-44.8
Plots n.	10, 11, 12	Plots n.	13, 14
K3			
Frequency of emission [MHz]	Measured level [dBm]		
	Polarization V/H		
30-1000	-59,1		
1000-12750	-44,7		
Plots n.	15, 16		

Limits according to 47 CFR 101.111 Emission Limitations (5), (6)

Frequency range	30 MHz – 12.75 GHz
Tx operating	3 μ W (-20 dBm)

Uncertainty: ± 5 dB
Test equipment used (see Clause 4): 1, 2, 9, 13, 27, 53, 57,66
Date of test: 12.1.2015



4 List of Test Equipment

No.	Test equipment	Manufacturer	Type	Serial number	Calibration valid due to
1.	Anechoic chamber	Frankonia	—	—	11/2015
2.	Antenna up to 12 GHz	VÚS	—	—	7/2015
3.	Attenuator	Hewlett-Packard	HP 8494B	2812A14886	2/2016
4.	Attenuator	Hewlett-Packard	HP 8495B	3308A17153	2/2016
5.	Attenuator	Hewlett-Packard	HP 8496B	3308A20041	2/2016
6.	Attenuator	Hewlett-Packard	HP 8498A	1801A07157	2/2016
7.	Attenuator	JFW Industries	50FHB-010-5	HIM2972	2/2016
8.	Attenuator 10 dB / 100 W	R&S	RBU	836121/006	2/2016
9.	Attenuator 20 dB / 30 W	R&S	RBU	825723/001	2/2016
10.	Attenuator 40 dB / 1000 W	R&S	RBS	D67077	2/2016
11.	Audio generator	HTSZ Hungary	TR-0157	761-095	-
12.	Autotransformer	RAS	—	212617	-
13.	Calibrated antenna	EMCO	3115	—	3/2017
14.	Calibrated antenna	RFT Germany	DP1	—	3/2017
15.	Calibrated antenna	RFT Germany	DP3	—	3/2017
16.	Channel filter (12.5; 25 kHz)	Tesla Pardubice	—	—	3/2016
17.	Climate chamber	Vötsch Industrietechnik	VC 7060	5956602178001 0	10/2015
18.	Digital multimeter	Mesit	VDM-1	HA0830	12/2015
19.	Digital oscilloscope	LeCroy	9310AM	3182	4/2016
20.	Digital thermometer	ZPA Nový Bor	Digiterm	067090	11/2015
21.	Digital TV & SAT level meter	Promax	Prolink-4C Premium	HIM854	-
22.	Directional coupler	Hewlett-Packard	778D-012	16078	2/2016
23.	Directional coupler	R&S	IN 219.6270.70	870440/24	2/2016
24.	Directional coupler	R&S	IN 219.6270.70	870440/51	2/2016
25.	Directional coupler	R&S	IN 219.6270.74	870441/26	2/2016
26.	Directional coupler	R&S	IN 219.6270.74	870441/28	2/2016
27.	EMI test receiver	R&S	ESU40	1302.6005K40- 100213-cu	2/2015
28.	EMI test receiver	R&S	ESHS10	836495/009	7/2015
29.	EMI test receiver	R&S	ESVS10	836787/002	7/2015
30.	Frame analyser	W&G	PA-41	L-0118	-
31.	Generator	Hewlett-Packard	HP 83640B	—	9/2016
32.	Generator 10 Hz ÷ 10 MHz	Tesla Brno	—	519053	-
33.	Group delay tester	R&S	LFM	881696/025	-



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No.	Test equipment	Manufacturer	Type	Serial number	Calibration valid due to
34.	Half wave dipole	R&S	HZ-12	831781/13	7/2016
35.	HF generator	R&S	SMDU	—	-
36.	High-pass filter	VÚS	—	—	2/2016
37.	LF amplifier	VÚS	—	—	-
38.	Biconic-log-periodic antenna	CHASE	CBL6212A	2283	8/2019
39.	Log-periodic antenna	R&S	HL223	835556/001	7/2016
40.	Loop antenna	R&S	HFH2-Z2	836077/011	7/2016
41.	Modulation analyser	R&S	FMAB	832488/008	11/2016
42.	Network analyser	Agilent	8753ET	US39170511	10/2016
43.	Oscilloscope	Tektronix	2230	E205124	5/2015
44.	Power generator	Comtest	CRI-10C1	9607097	11/2016
45.	Power meter	Marconi	6970	237025/041	5/2016
46.	Power sensor	Marconi	—	—	5/2016
47.	Psophometer	Tesla Brno	—	1202251	-
48.	Signal generator	R&S	SMG	083451/036	5/2016
49.	Signal generator	R&S	SMG	826784/006	5/2016
50.	Signal generator	R&S	SMH	828190/007	5/2016
51.	Spectrum analyser	Hewlett-Packard	HP 8564E	3517A00350	5/2016
52.	Splitter 4 × 50 Ω	—	—	—	-
53.	Sweep generator	Hewlett-Packard	HP 8350B	2933A12777	4/2015
54.	SWR bridge	R&S	ZRC	840804/004	-
55.	Telephone LF bridge	VÚS	—	—	-
56.	Test bridge	R&S	ZRB2	825441/002	-
57.	Test power source	Agilent Technologies	E4356A	US39290262	7/2016
58.	TV monitoring receiver	R&S	EKF 2	883621/002	-
59.	TV test transmitter	R&S	SBUF	883621/002	-
60.	TV test transmitter – modulator	R&S	SBTF	826881/001	-
61.	TV transmitter	Vigintos El.	TV-05D	19401343	-
62.	Video analyser	R&S	UAF	827558/031	-
63.	Video generator	Tesla	GTS 11	84028	-
64.	Waveguide – SMA adapter	Tesla	R100	870440/24	3/2016
65.	Waveguide coupler	Tesla	R100	870440/51	3/2016
66.	Biconical antenna	R&S	HK 116	835555/014	7/2016



5 Photos of EUT



EUT



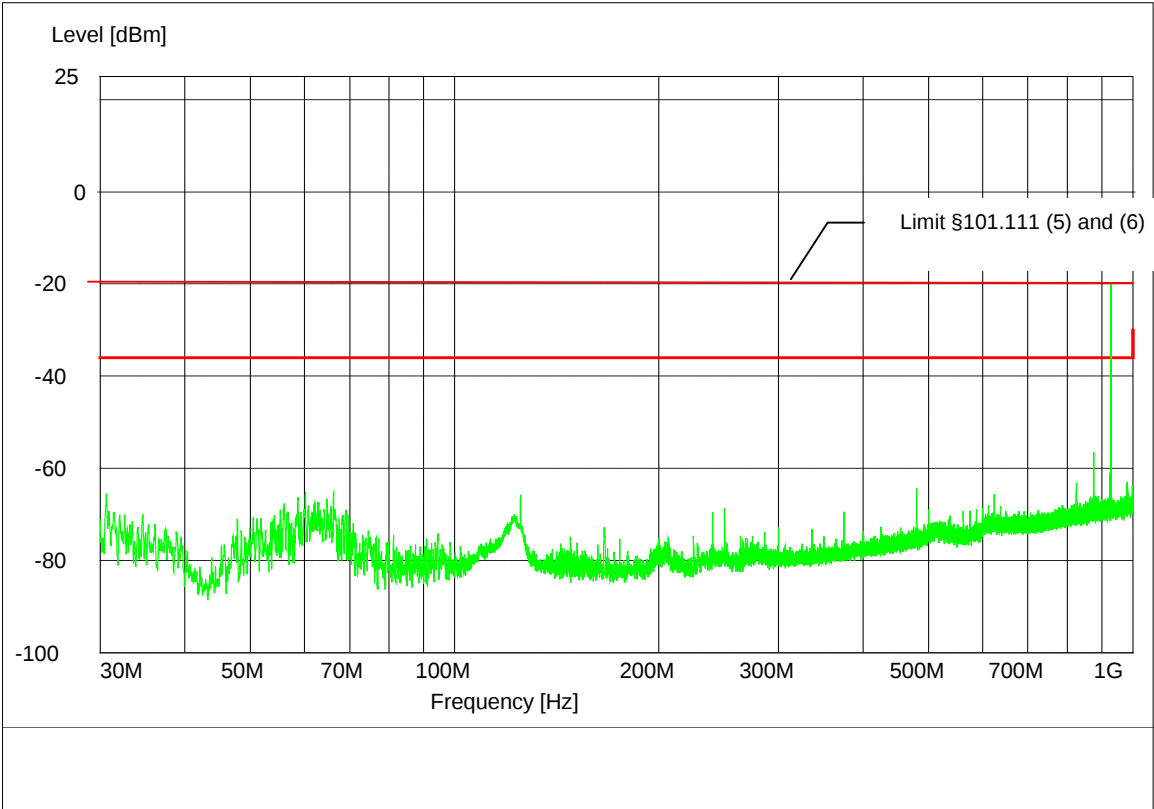
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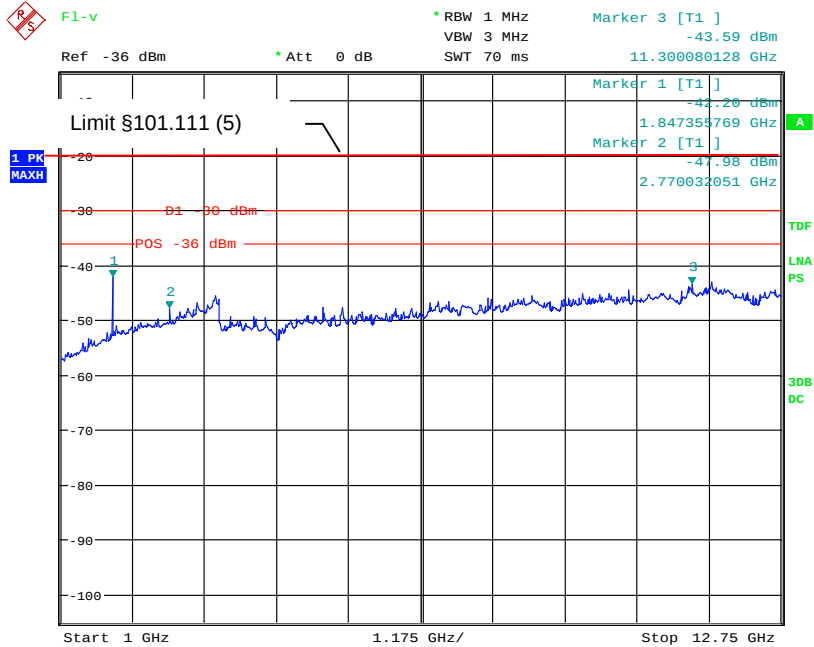
6. List of Annexes

Annex No.	Title and specification of Annex
1	Plots – Spurious emissions

Plots – Spurious emissions

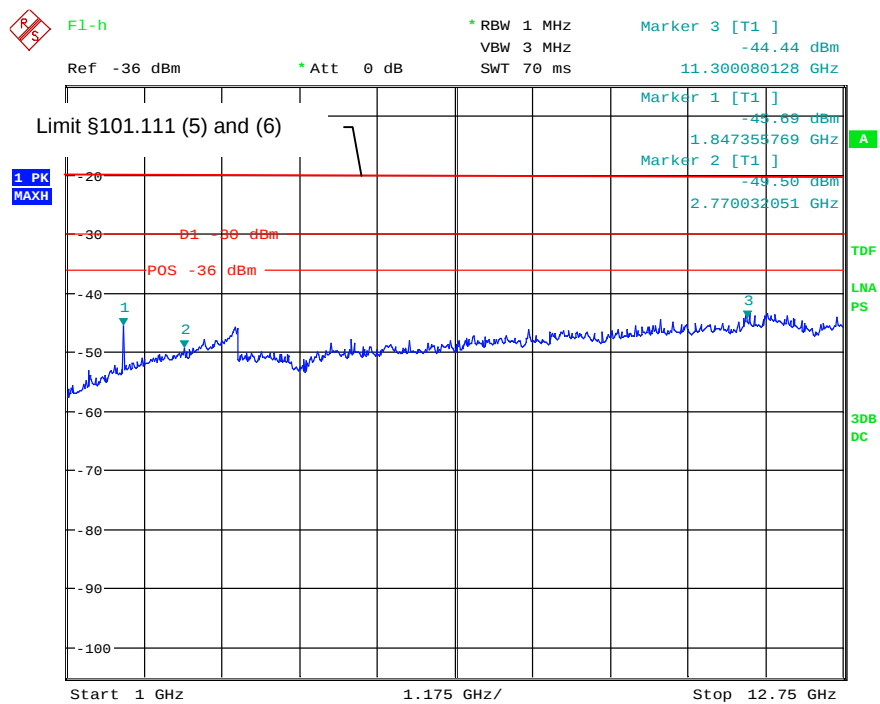


Plot 1



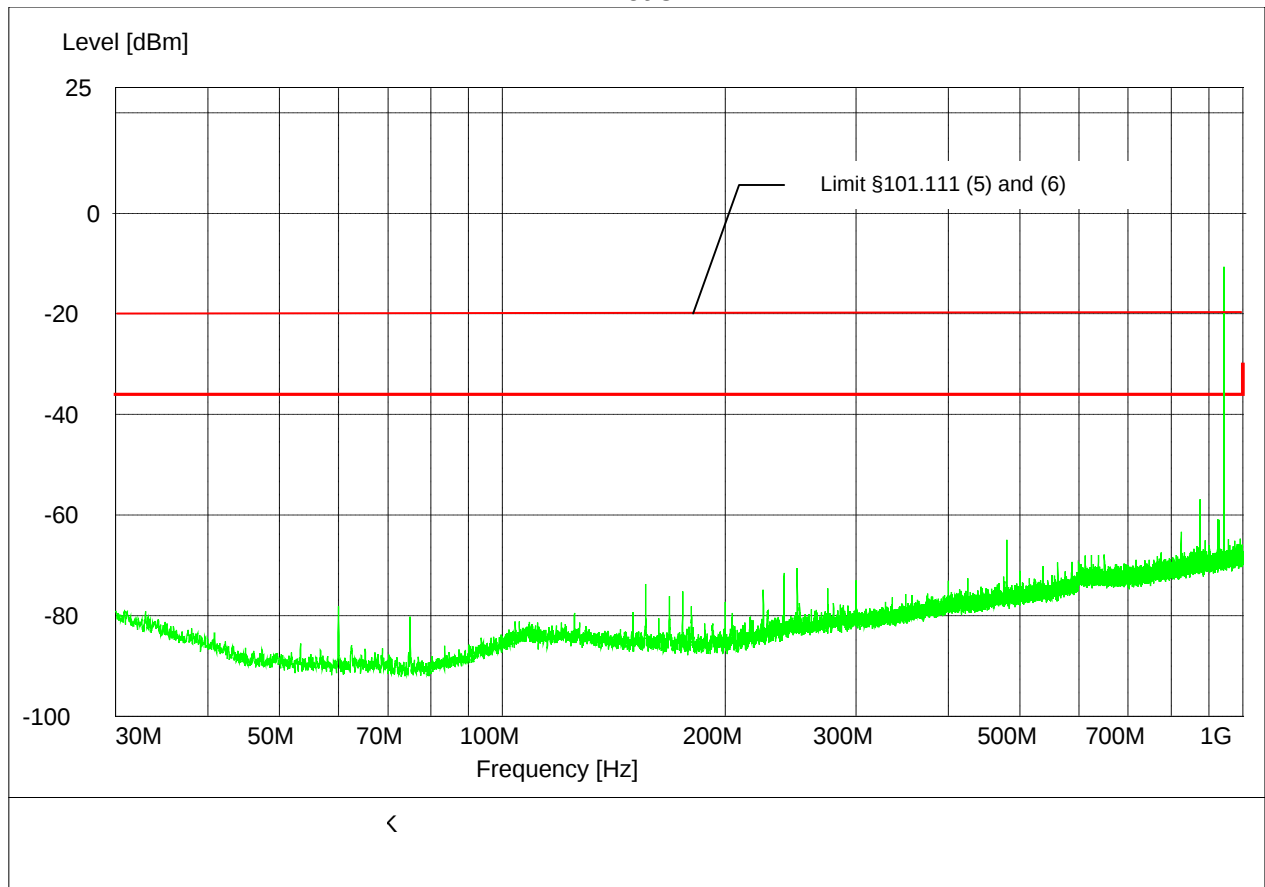
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Plot 2

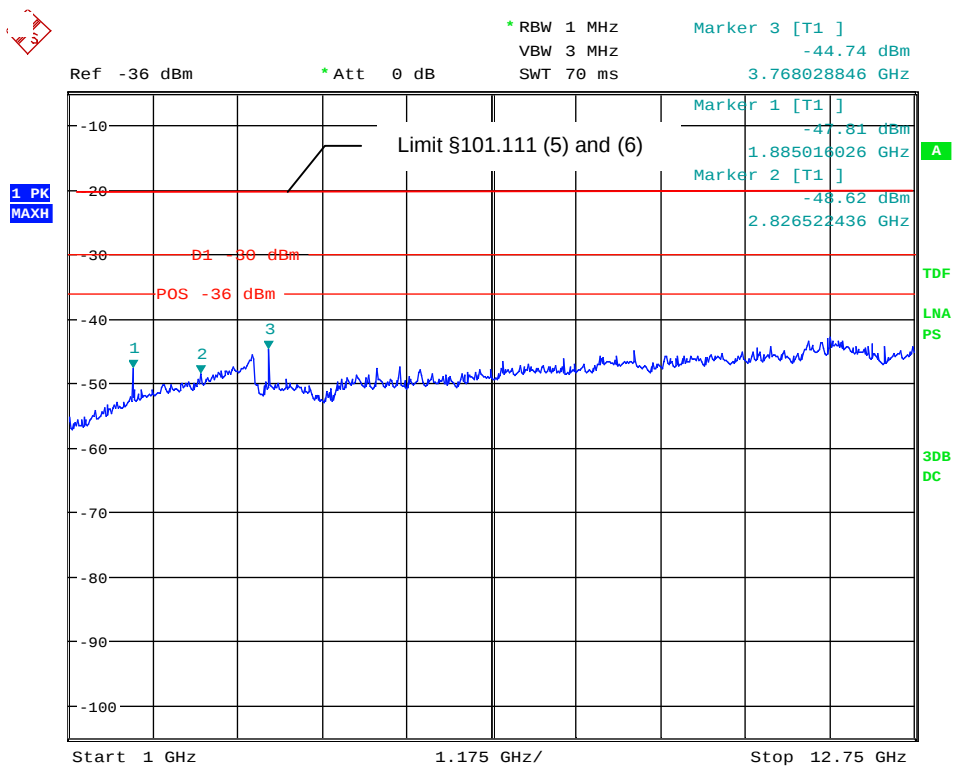


Date: 12.JAN.2015 13:05:30

Plot 3

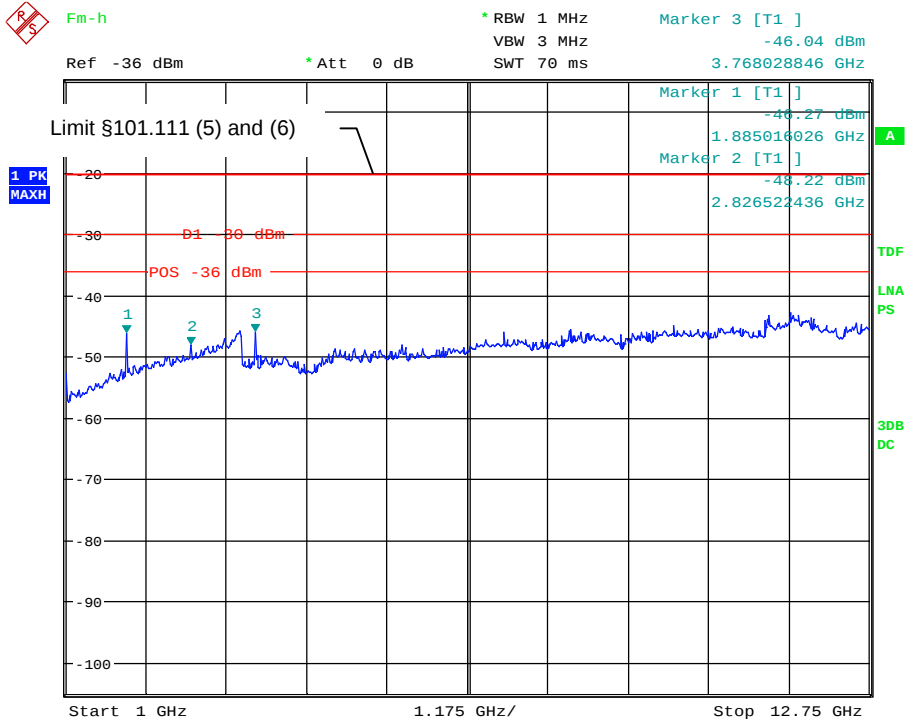


Plot 4



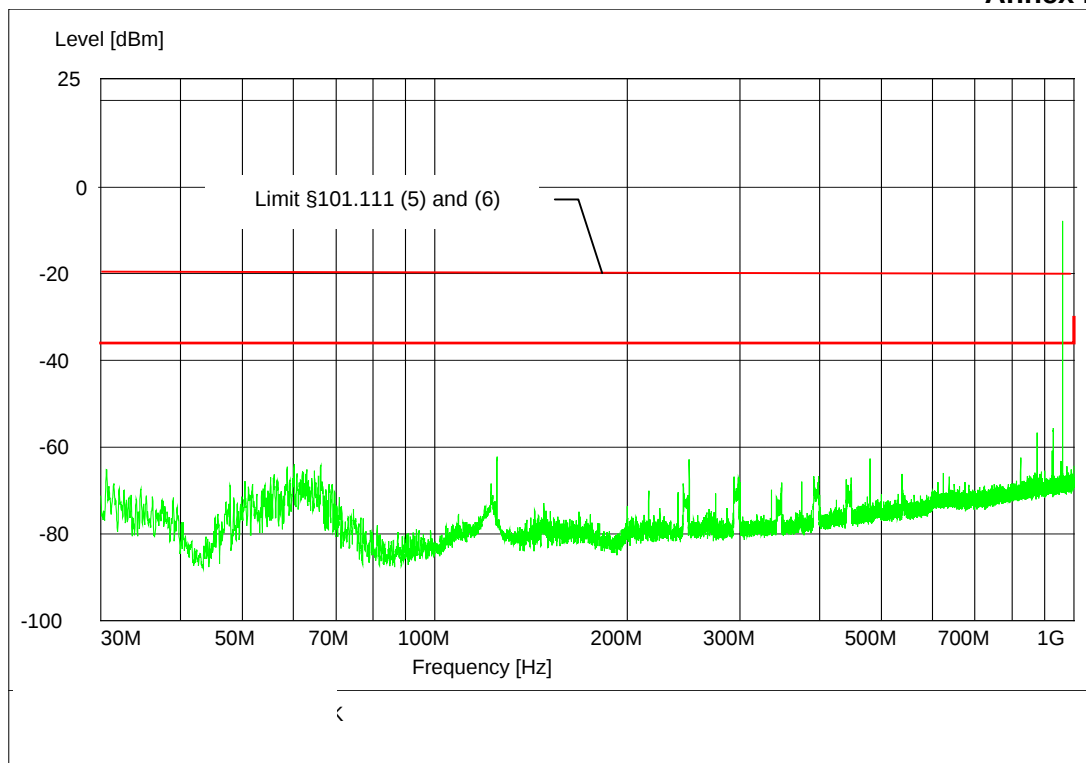
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Plot 5

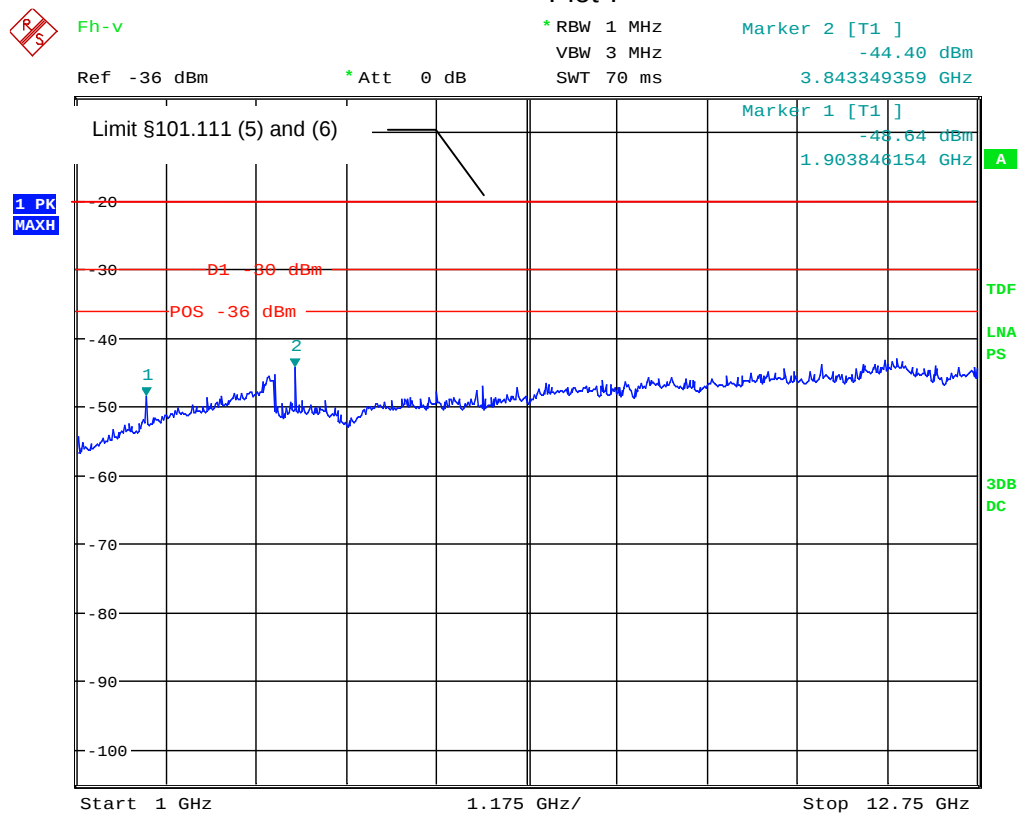


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Plot 6

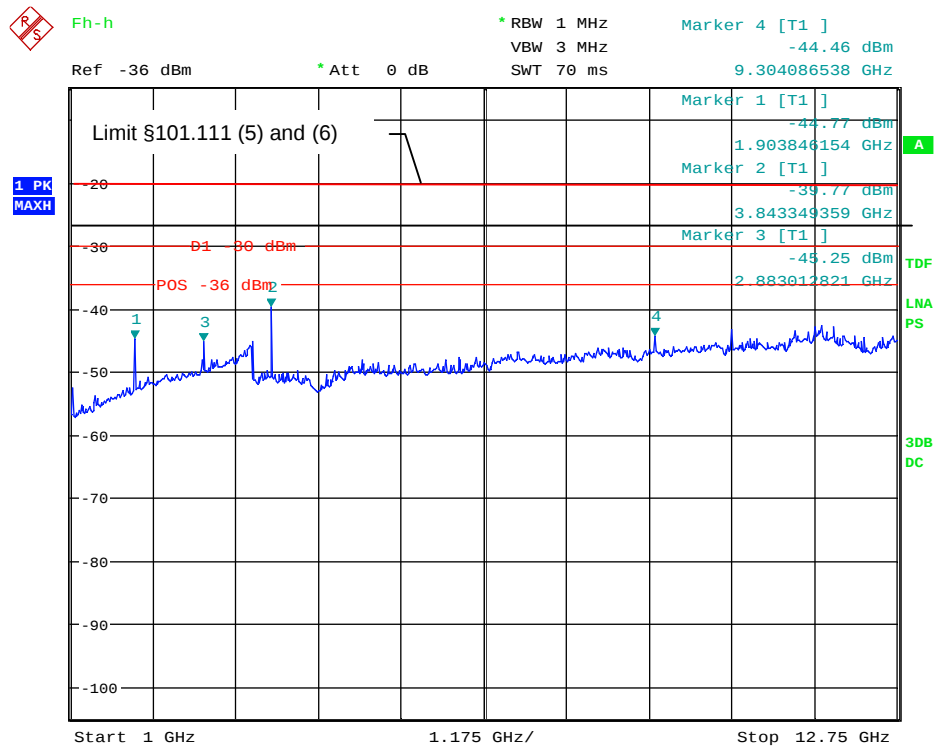


Plot 7



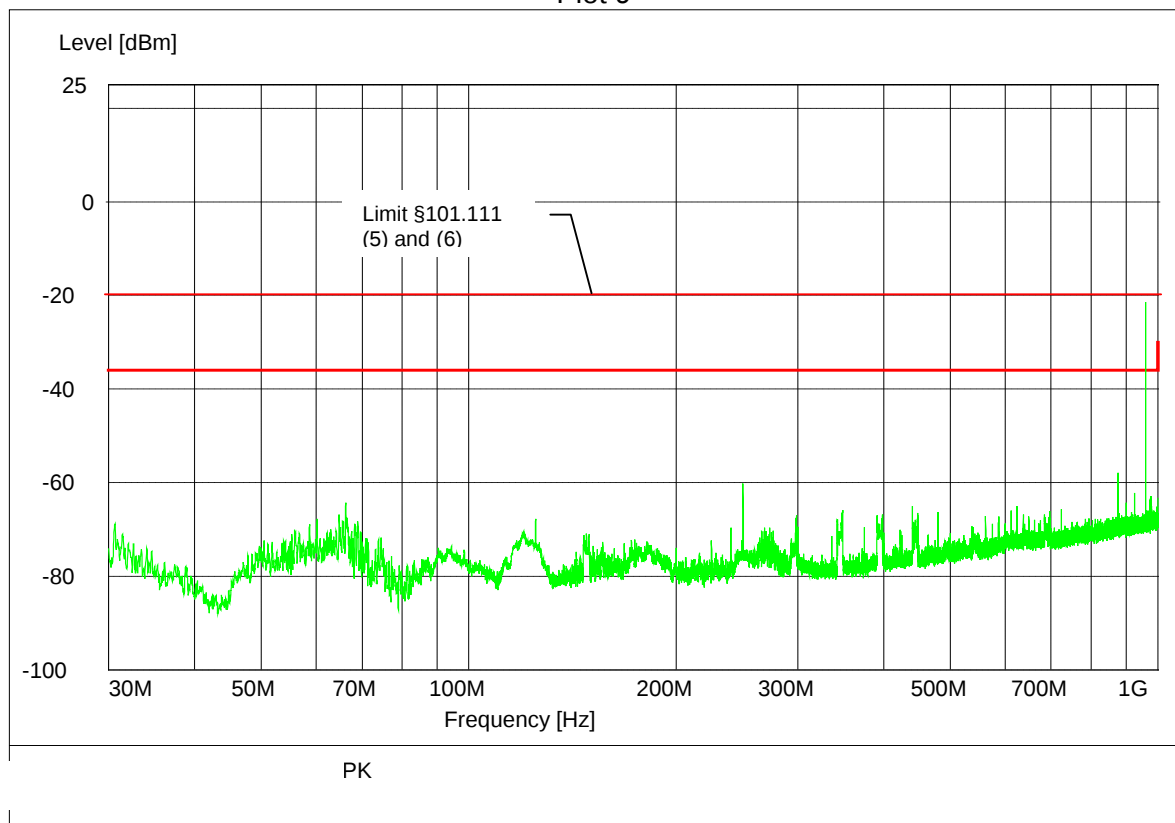
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Plot 8

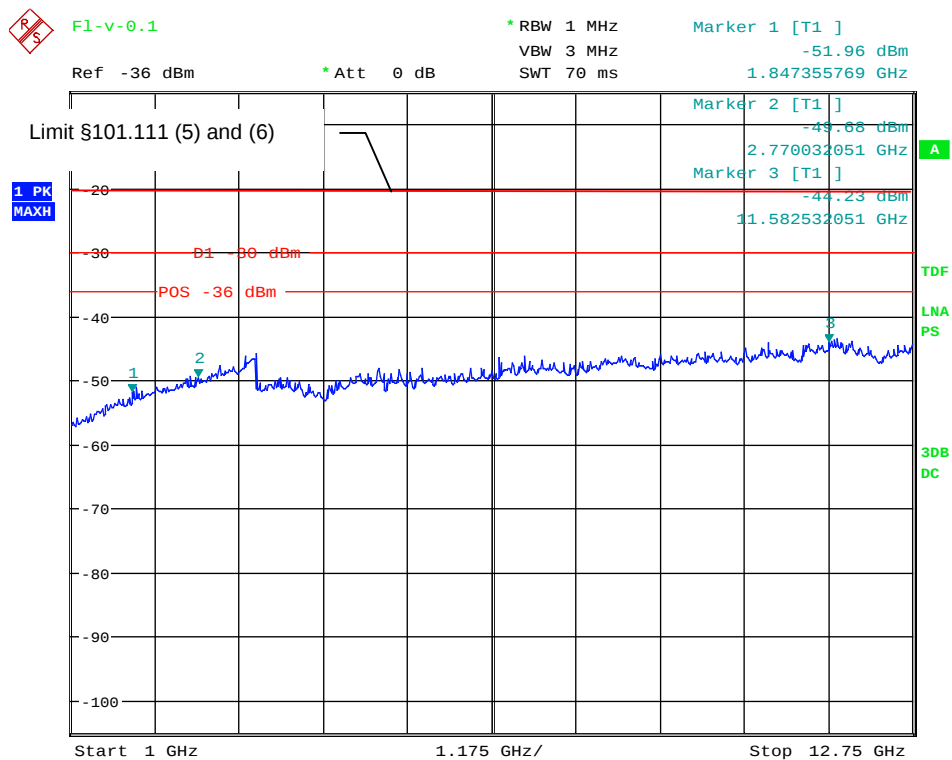


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Plot 9

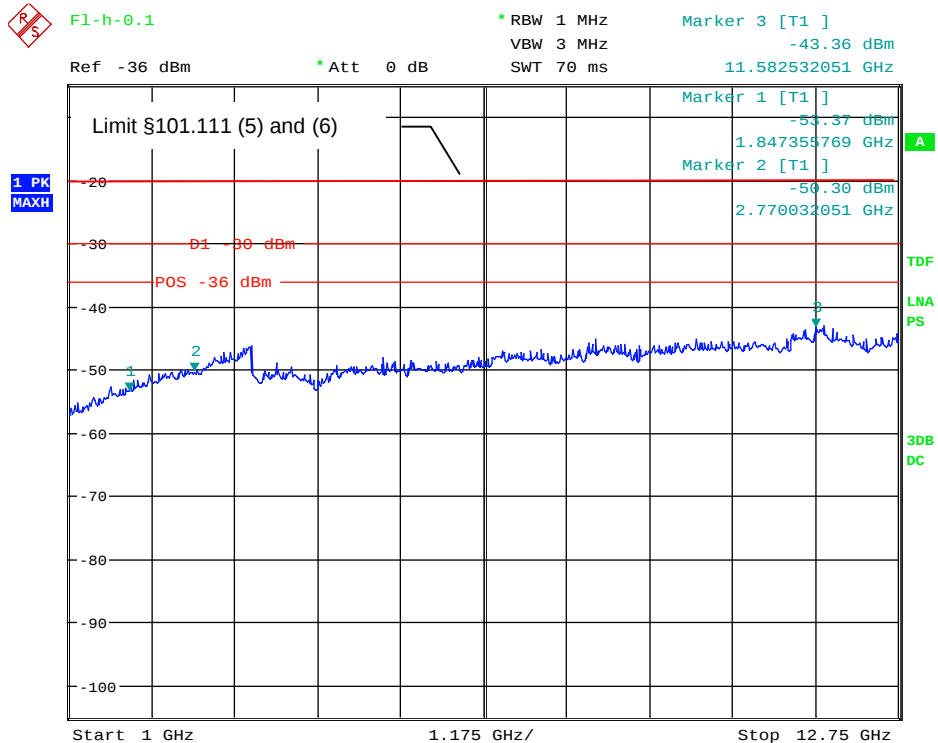


Plot 10



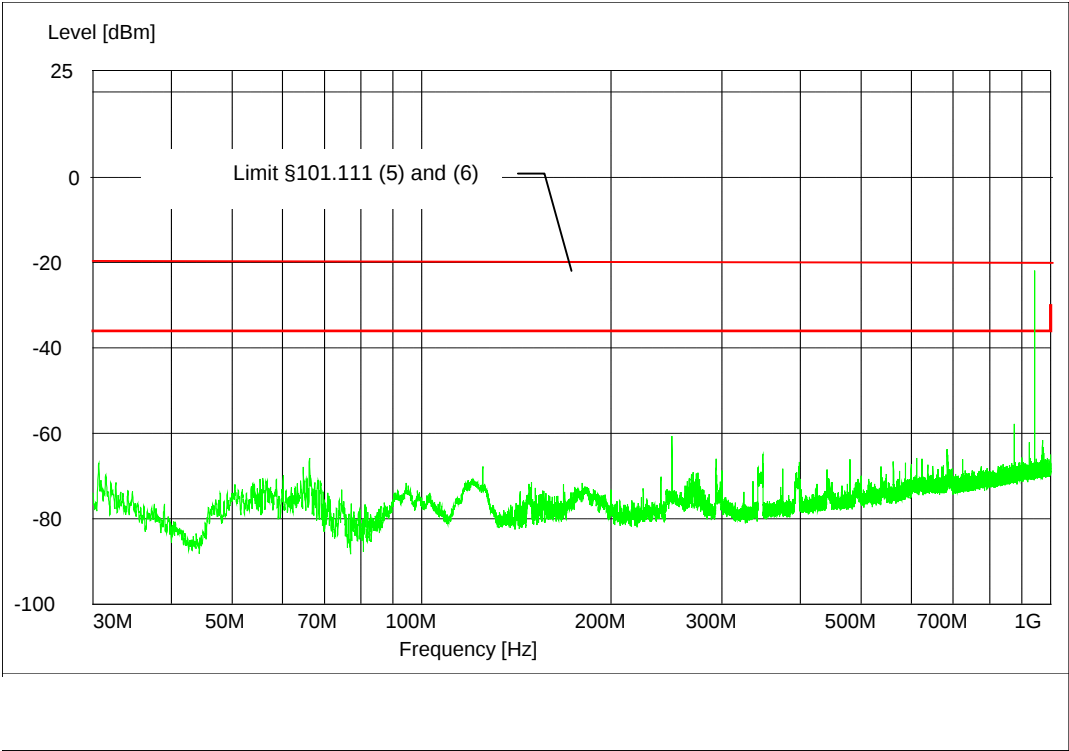
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Plot 11

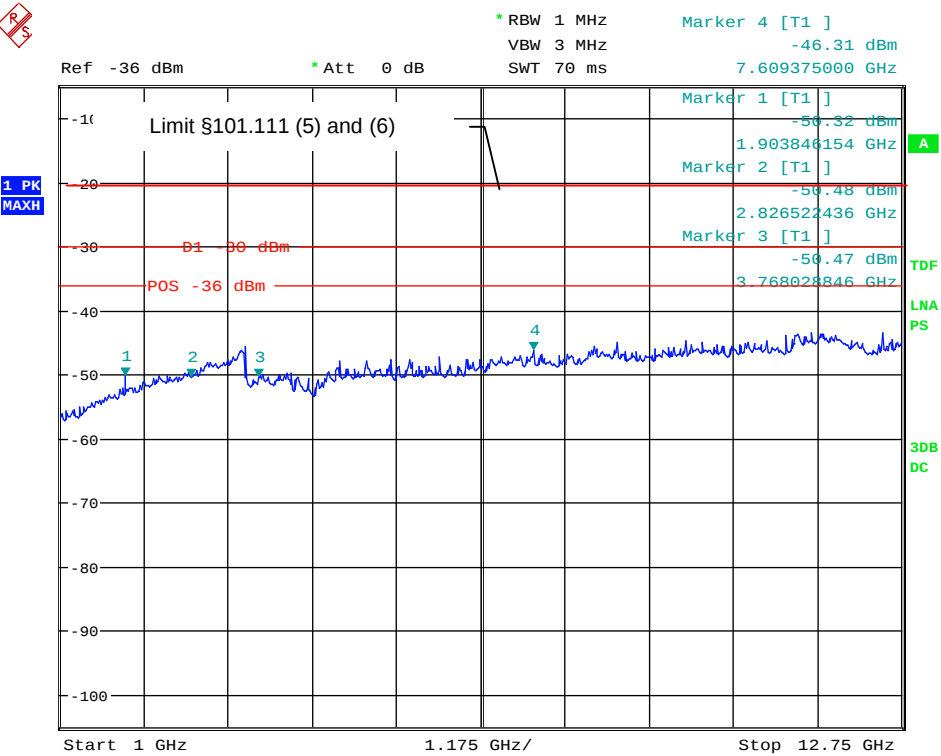


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Plot 12

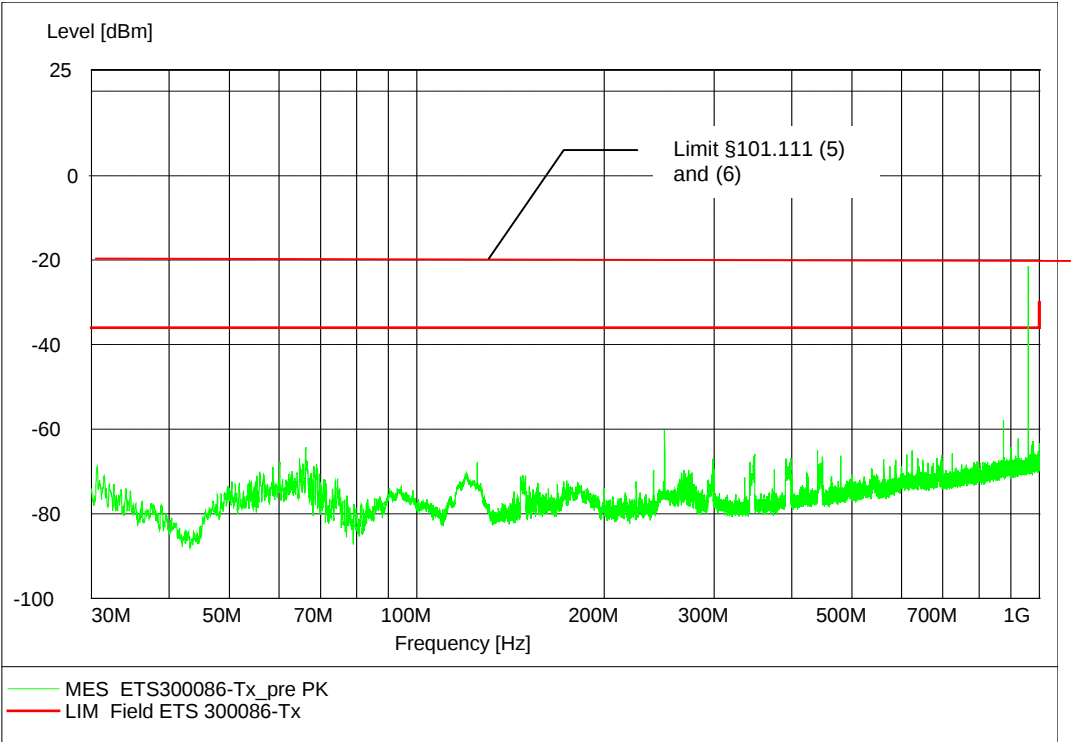


Plot 13

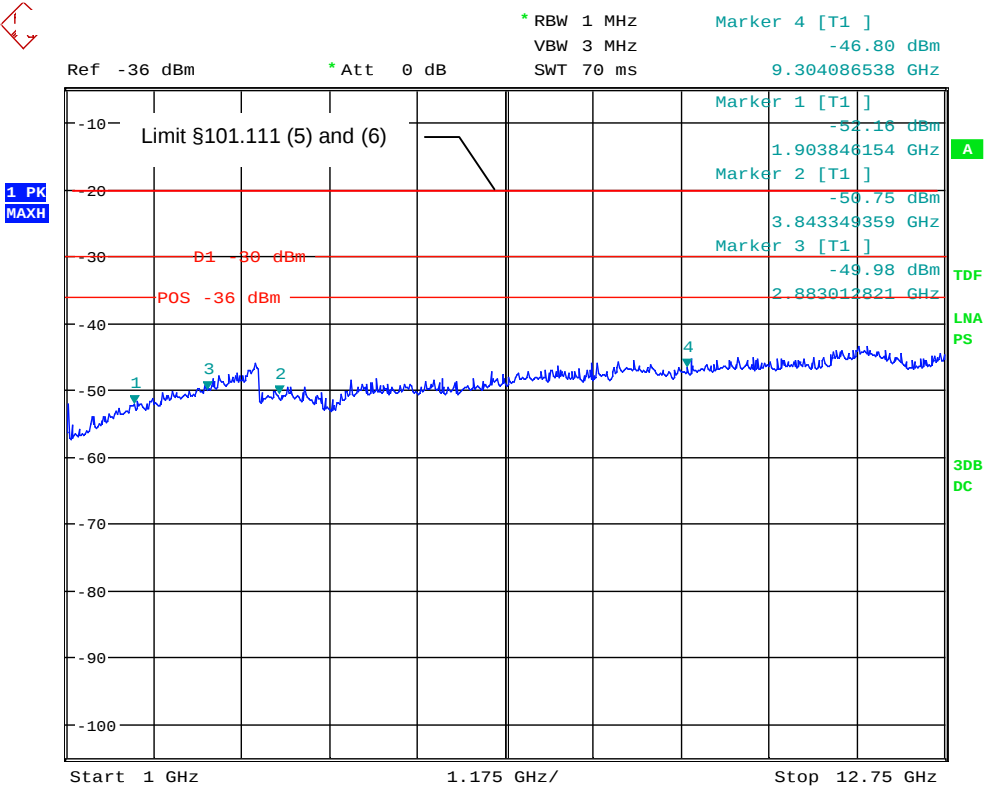


Date: 12.JAN.2015 12:51:53

Plot 14



Plot 15



Date: 12.JAN.2015 12:30:52

Plot 16

End of test report