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A				15/06/2009	M. Reuben	S.Cohen

**EMC Laboratory**




# AY-Z12 LONG RANGE READER

**FCCID: GCD-AY-Z12**  
**Manufactured by**  
**ROSSLARE Enterprises LTD.**

## **Test Report**

**According to FCC Part 15 Requirements**

**June 2009**

	Function/Title	Name	Signature	Date
Prepared by	Technical Writer	M. Reuben		15/06/2009
Checked by	Test Engineer	I. Arbitman		15/06/2009
Approved by	EMC Lab. Manager	S. Cohen		5-Jul-09

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## 1 INTRODUCTION

- a. Scope  
This document describes the measurement procedures and tests for FCC part 15 of the AY-Z12 Manufactured by Rosslare Ltd.

- b. Description of equipment Under Test.

Equipment Under Test:	AY-Z12
FCCID	GCD-AY-Z12
Manufacturer:	Rosslare Ltd.
Serial Numbers:	0049
Mode of Operation:	TX MODE
Receiver operating frequency:	125 kHz
Year of Manufacture:	2008

- c. Applicant Information:

Applicant:	Rosslare Ltd.
Applicant Address	Suite 912 Wing Fat Industrial Building, 12 Wang Tai Road, Kowloon Bay, Hong - Kong
Telephone:	+972-3-9386838
FAX:	+972-3-9386830
The testing was observed by:	ALLAN GREEN
Following applicant's personnel:	ALLAN GREEN

- d. Test Performance:




Date of reception for testing:	15/01/2009
Dates of testing	15/01/2009 – 25/01.2009
Test Laboratory Location	Elbit Systems Land and C <sup>4</sup> I – Tadiran Ltd. EMC LAB, Hashoftim 26 Holon 58102 ISRAEL Tel: 972-3-5574476 Fax: 972-3-5575320
Applicable EMC Specification:	
Code of Federal Regulations	47, FCC Docket 89-103, Part 15: Radio Frequency Devices, Sections 15.109, 15.209 & 15.231

## 2 TEST SUMMARY AND SIGNATURES.

Elbit Systems Land and C<sup>4</sup>I – Tadiran Ltd., EMC Laboratory has completed testing of E.U.T in accordance with the requirements of the FCC Part 15 Regulations for Class B equipment.

The E.U.T was found to comply with the requirements of the FCC Part 15 Regulations given below

Test	Test Description	Section	PASS/FAIL
1	Bandwidth of the emission	2.1049	PASS
2	Radiation emission	15.209	PASS
3	Power Line Conducted Interference	15.207	PASS

	Function/Title	Name	Signature	Date
<b>Test performed by</b>	Test Engineer	I. Arbitman		03/02/2009
<b>Test Report prepared by</b>	Technical Writer	M. Reuben		03/02/2009
<b>Test Report Approved by</b>	EMC Lab. Manager	S Cohen		03/02/2009

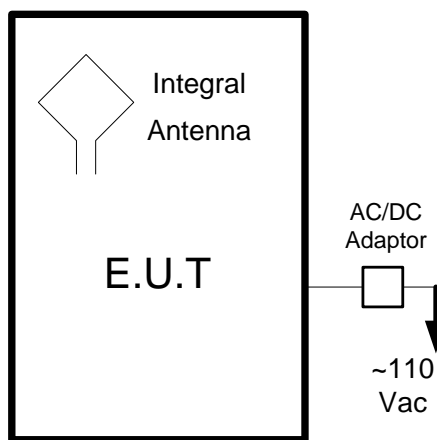
### **3 E.U.T INFORMATION**

**a.** E.U.T description

- (1) The AY-Z12 is a proximity reader intended to read ID's from 125 kHz passive proximity tags (passive - tags has no battery). RF section of the reader is comprised of 125 kHz oscillator with feedback input from the antenna matching section. The 125KHz oscillator output is feeded into an antenna driver and then into the antenna coil. The transmitted 125 kHz carrier is the energy source powering the passive proximity tag presented by system users.

**b.** E.U.T Test Configuration

E.U.T. test configuration is shown in figure bellow



**Figure 1: Test Configuration**

**c.** E.U.T Mode of Operation description

- (1) The AY-Z12 Long-range Reader is an RFID proximity card reader, utilized with access control systems. The transmitted 125 kHz carrier is the energy source powering the passive proximity tag presented by system users.

**d.** Changes made to EUT

- (1) Ferrite T36/23/15-4A11 from Philips (turned 5 times) was added on DC input of the EUT.

#### 4 OCCUPAED BANDWIDTH OF THE EMISSION PART 2.1049— TEST RESULTS

E.U.T: AY-Z12  
 S/N: 0049  
 Test Method: ANSI 63.4  
 Date: 22/01/2009  
 Relative Humidity: 29%  
 Ambient Temperature: 21c  
 Air Pressure: 1053hpa  
 Test Setup: Figure 1

Testing Engineer: I. Arbitman  Date 22/01/2009

- a. Test Results Summary & Conclusions  
The E.U.T was found in compliance with Bandwidth of Radiated Emission fundamental frequency requirement
- b. Limits of bandwidth  
The test unit shall meet the limits of Table 4.b

*Table 4.b: Limits for Bandwidth*

Frequency (MHz)	Bandwidth Max Limits (%)
0.125	Not Spec.

- c. Test Instrumentation and Equipment

*Table 4.c: Test Instrumentation and Equipment*

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	20.05.09
Loop Antenna	HFH2-Z2	R&S	14/05/2009

- d. Test Results

*Table 4.d: Bandwidth Test Result*

Frequency (kHz)	Bandwidth (KHz)	Plot No	PASS/FAIL
125	450	1	PASS

- e. Procedure  
The Bandwidth is determined at the point 20db down from the modulated carrier, while the spectrum analyzer was set to “max hold” and R.B.W – 100 Hz.

## 5 RADIATED EMISSION PART 15.209 -TEST RESULTS

E.U.T AY-Z12  
 S/N: 0049  
 Test Method: ANSI 63.4  
 Date: 03/05/2009  
 Relative Humidity: 29%  
 Ambient Temperature: 20c  
 Air Pressure: 1053hpa  
 Test Setup: Figure 1

Testing Engineer: I. Arbitman 

Date 03/05/2009

- a. Test Results Summary & Conclusions  
The E.U.T was found in compliance with fundamental frequency requirement
- b. Limits of Transmitter Radiation Emission according 15.209  
The test unit shall meet the limits of Table 5.b.

*Table 5.b: Limits for Radiation Emission*

Frequency (MHz)	Field strength ( $\mu\text{V/m}$ )	Measurement distance(/m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	2400/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

- c. Limits below 0.49 MHz are specified at test distance of 300 meters. However as specified by section 15.31 (f)(2), measurements may be performed at closer distance, and the measured level corrected to the specified measurement distance by using the square of an inverse linear distance extrapolation factor (40 dB/decade)

d. Test Instrumentation and Equipment

Table 5.c: Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	20/05/2009
Loop Antenna	HFH2-Z2	R&S	14/05/2009
Double Ridge Guide Antenna(1-18GHz)	DRG-118/A	ARA	09/12/2009
Broadband Antenna(30-1000MHz)	BTA-L	FRANKONIA	15/05/2009
Low Noise Amplifier (0-1GHz)	AM-1300-N	MITEQ	09/04/2009
Low Noise Amplifier (1-4GHz)	AMM 003N	Avantek	11/06/2009
Low Noise Amplifier (2-18GHz)	PE 2-38	Planar	14/09/2009

e. Test Results

Table 5.d.1: Peak Result of Fundamental

Frequency (kHz)	Peak Result (dB $\mu$ V/m)	Dist. Correction (dB)	AVG Limits @3m (dB $\mu$ V/m)	Margin (dB)	Plot No	Pass/Fail
125	82.62	80	105.7	-23.08	2	PASS

f. Test Procedure

The EUT was placed on the top of rotating table 0.8 meters above the ground and the table was rotated 360°, the height of antenna is one meter (vertical and horizontal polarization) to determine the max field strength of fundamental

g. Final Test Results

Table 5.e: Six Highest 15.209

Mode Of Operation	Frequency (MHz)	Pk Reading (dB $\mu$ V/m)	Limit dB $\mu$ V/m	Margin (dB)	Polarity Ver/Hor	Height (m)	Pass/Fail
TX	19.995	55.47	70	-14.53	V	1	PASS
	34.996	32.4	40	-7.6	V	1	PASS
	42.324	26.1	40	-13.9	V	1.2	PASS
	64.024	27.6	40	-12.4	V	1	PASS



## 6 POWER LINE CONDUCTED INTERFERENCE PART 15.207-TEST RESULTS

**a.** Preliminary Radiated emission Test Result According Part 15.207

E.U.T AY-Z12  
 S/N: 0049  
 Test Method: ANSI 63.4  
 Date: 22/01/2009  
 Relative Humidity: 29%  
 Ambient Temperature: 21c  
 Air Pressure: 1053hpa  
 Test Setup: Figure 1

Testing Engineer: I. Arbitman 

Date 22/01/2009

**b.** Test Results Summary & Conclusions  
 The E.U.T was found in compliance with 15.207

**c.** Limits of Radiated Interference Field Strength according 15.207  
 The test unit shall meet the limits of Table 8c for Class B equipment.

*Table 8c: Limits for 15.207 Class B equipment*

Frequency (MHz)	Quasi Peak Limits (dBμV)	Average Limits (dBμV)
0.15 – 0.5	66 – 56	56 – 46
0.5 – 5.0	56	46
5.0 – 30	60	50

**d.** Test Instrumentation and Equipment

*Table 8.d: Test Instrumentation and Equipment*

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	20/05/2009
Double Ridge Guide Antenna(1-18GHz)	DRG-118/A	ARA	09/12/2009
Broadband Antenna(30-1000MHz)	BTA-L	FRANKONIA	15/05/2009
Low Noise Amplifier (0-1GHz)	AM-1300-N	MITEQ	09/04/2009
Low Noise Amplifier (1-4GHz)	AMM 003N	Avantek	11/06/2009
Low Noise Amplifier (2-18GHz)	PE 2-38	Planar	14/09/2009

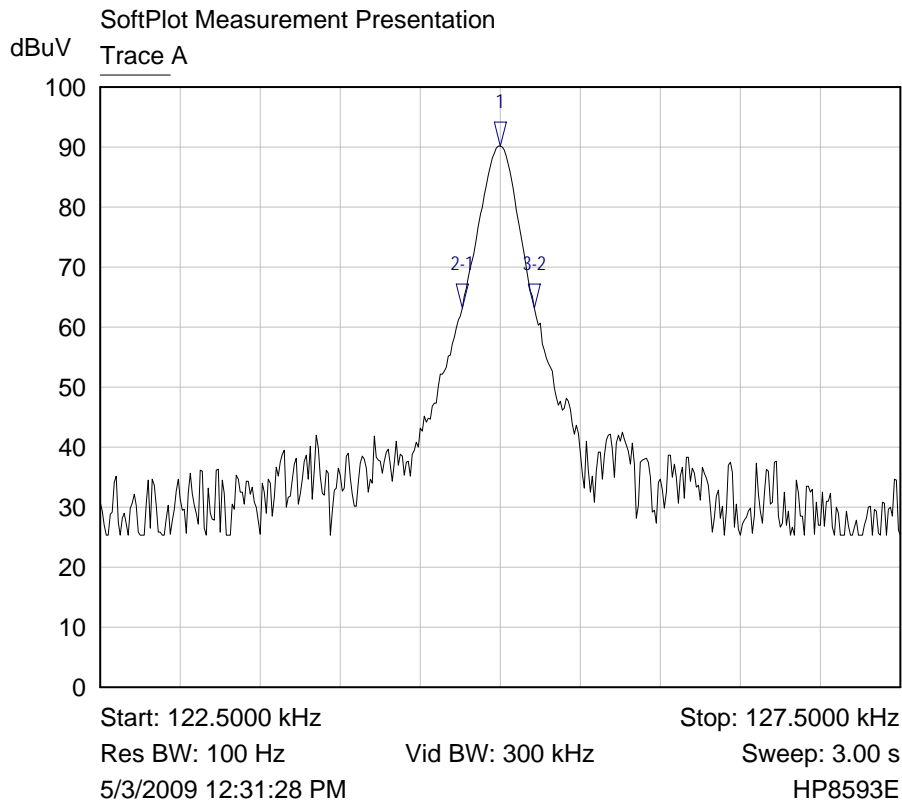
**e.** Test Data

*Table 6.d: Test Results for Conducted Interference Part 15.207*

Tested Line	Freq. Range MHz	Res. BW (kHz)	Plot No.	PASS/FAIL
Neutral	0.15 – 0.50	9	8	PASS
	0.50 - 30		9	PASS
Phase	0.15 – 0.50		10	PASS
	0.50 - 30		11	PASS

## 7 PLOTS

### a. BANDWIDTH OF THE EMISSION part 2.1049



Mkr	Trace	X-Axis	Value	Notes
1 ▽	Trace A	125.0000 kHz	90.16 dBuV	
2-1 ▽	Trace A	-237.5000 Hz	-27.04 dB	
3-2 ▽	Trace A	450.0000 Hz	0.05 dB	

***Test Results Plot No 1***

**b. Radiated emission part 15.209**

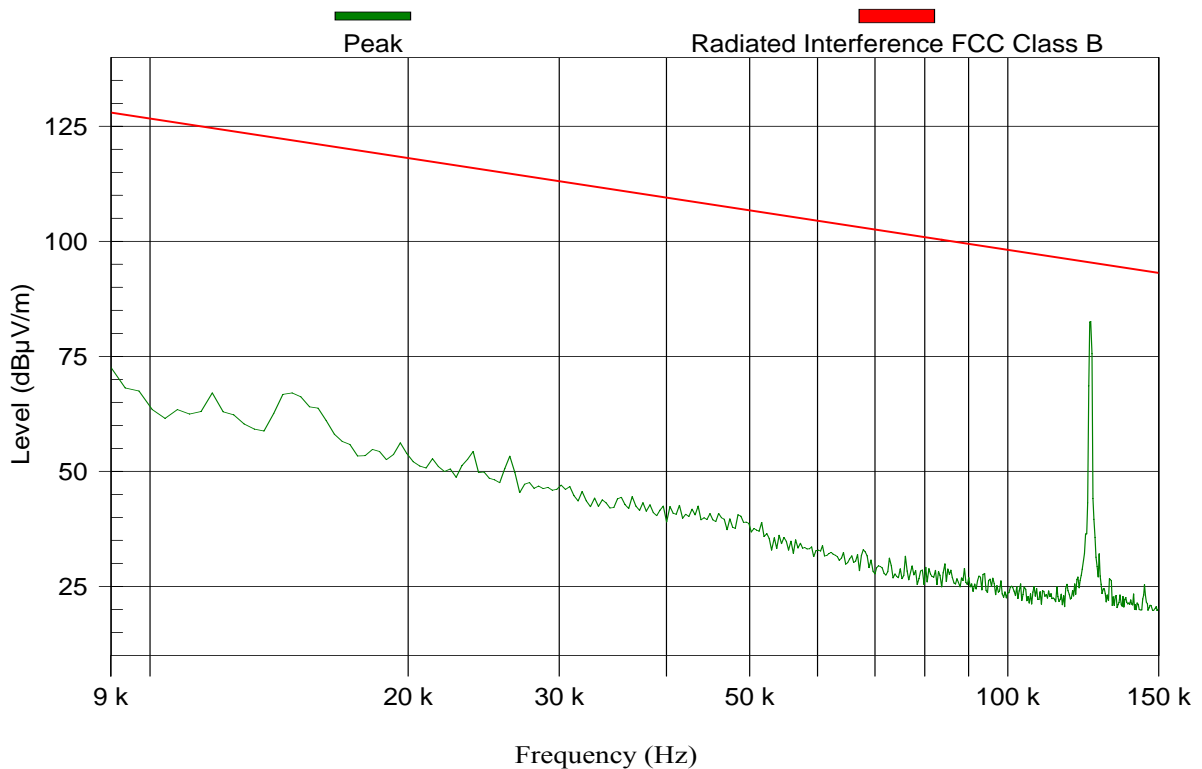
**Test Results Plot No 2**

RE FCC Class B 9-150 KHz

Test & EUT General Information		Receiver Setting	
EUT Name:	AY-Z12	Spect Analyzer	S.A HP 8593E
S/N:	0049	Ref. Level:	110 dB $\mu$ V
Date of Test:		RBW:	200 Hz
Test Engineer:	Ilya Arbitman	VBW:	300 Hz
Antenna:	Loop Antenna HFH2-Z2	Sweep Time:	Auto: 86.33 s
Polarization:	Vertical	Pre Amplifier	LNA MITEQ 0.01-1GHz No-1

**TEST REMARKS:** Sunday, May 03, 2009 12:24:29 PM

TX 125 kHz



**MAXIMUM RESULT DEVIATION:**

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

Nr	Frequency (MHz)	PK MaxHold (dB $\mu$ V/m)	AVG Limit (dB $\mu$ V/m)	Result	Angle (degrees)	Height (m)	H/V
1	0.125	82.617	105.7	Pass	0	1	V

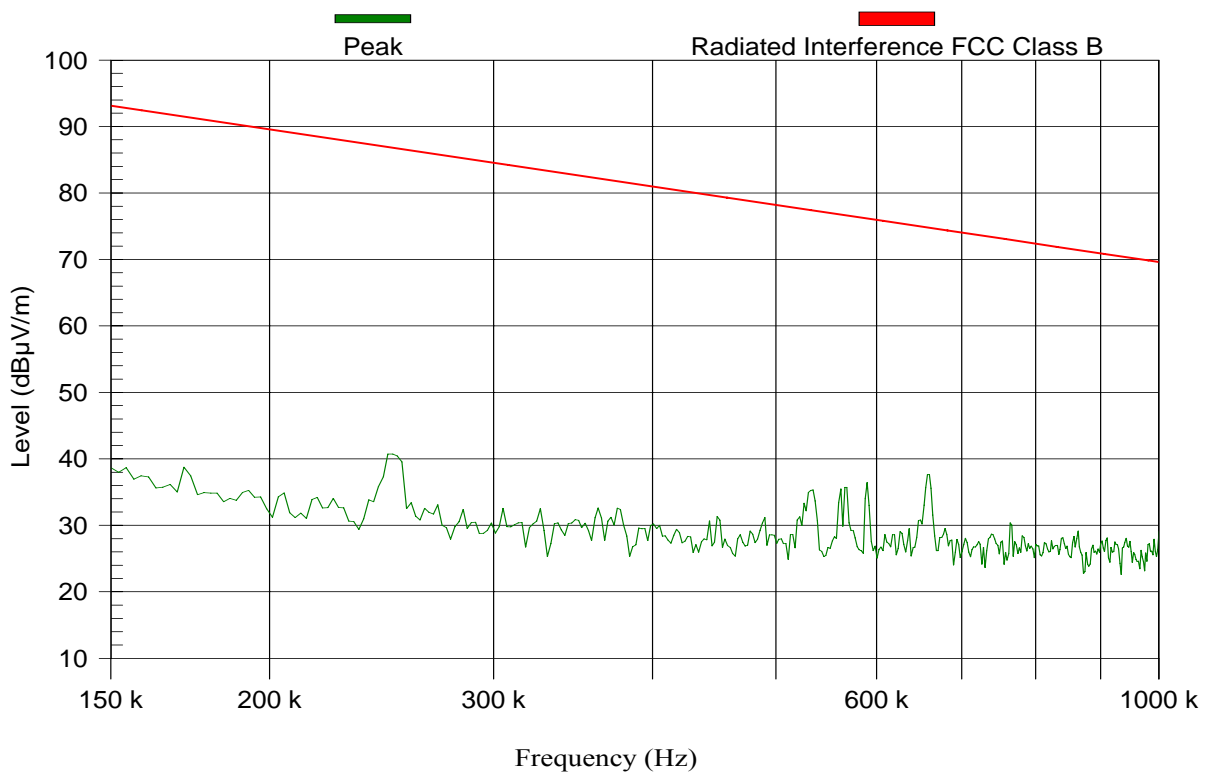
**Test Results Plot No 3**

RE FCC Class B 0.150-1MHz

Test & EUT General Information		Receiver Setting	
EUT Name:	AY-Z12	Spect Analyzer	S.A HP 8593E
S/N:	0049	Ref. Level:	100 dB $\mu$ V
Date of Test:		RBW:	9 kHz
Test Engineer:	Ilya Arbitman	VBW:	30 kHz
Antenna:	Loop Antenna HFH2-Z2	Sweep Time:	Auto: 33.33 ms
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA MITEQ 0.01-1GHz No-1

**TEST REMARKS:** Sunday, May 03, 2009 11:57:37 AM

TX 125 kHz



**MAXIMUM RESULT DEVIATION:**

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None

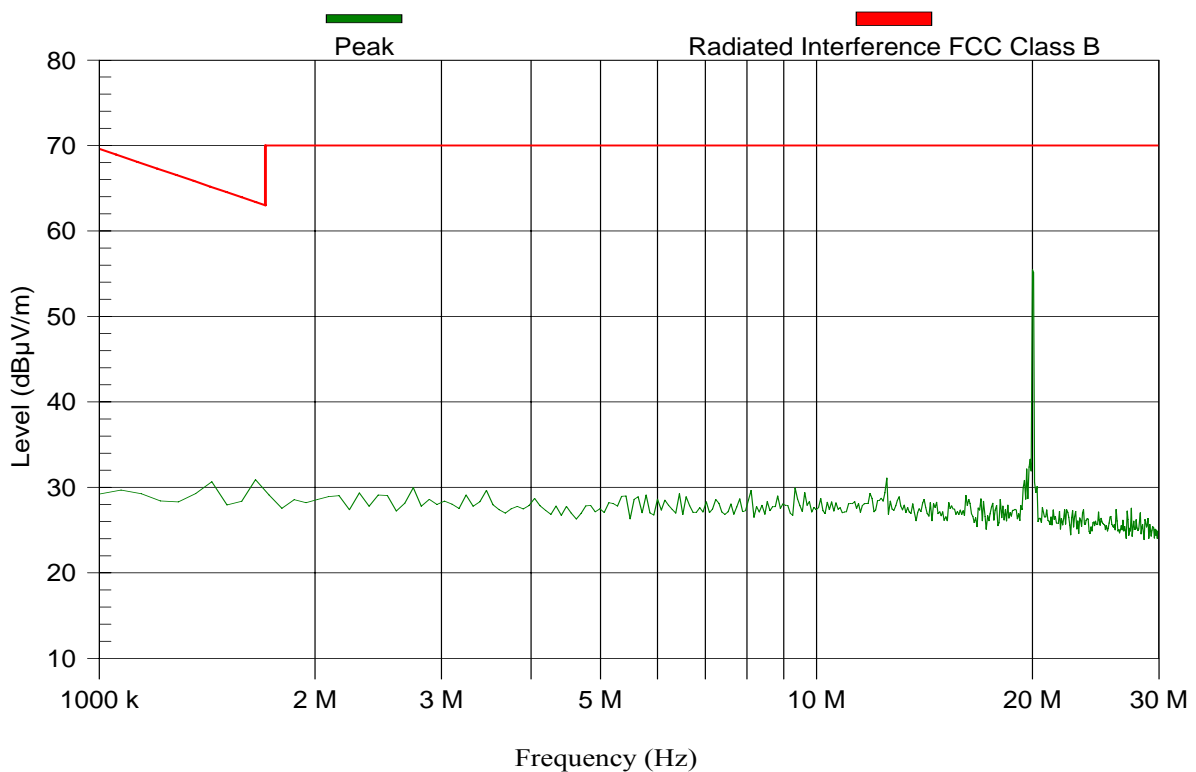
**Test Results Plot No 4**

RE FCC Class B 1-30MHz

Test & EUT General Information		Receiver Setting	
EUT Name:	AY-Z12	Spect Analyzer	S.A HP 8593E
S/N:	0049	Ref. Level:	100 dB $\mu$ V
Date of Test:		RBW:	9 kHz
Test Engineer:	Ilya Arbitman	VBW:	30 kHz
Antenna:	Loop Antenna HFH2-Z2	Sweep Time:	Auto: 1.07 s
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA MITEQ 0.01-1GHz No-1

**TEST REMARKS:** Sunday, May 03, 2009 12:09:10 PM

TX 125 kHz



**MAXIMUM RESULT DEVIATION:**

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

Nr	Frequency (MHz)	PK MaxHold (dB $\mu$ V/m)	AVG Limit (dB $\mu$ V/m)	Result	Angle (degrees)	Height (m)	H/V
1	19.995	55.469	70	Pass	1	1	V

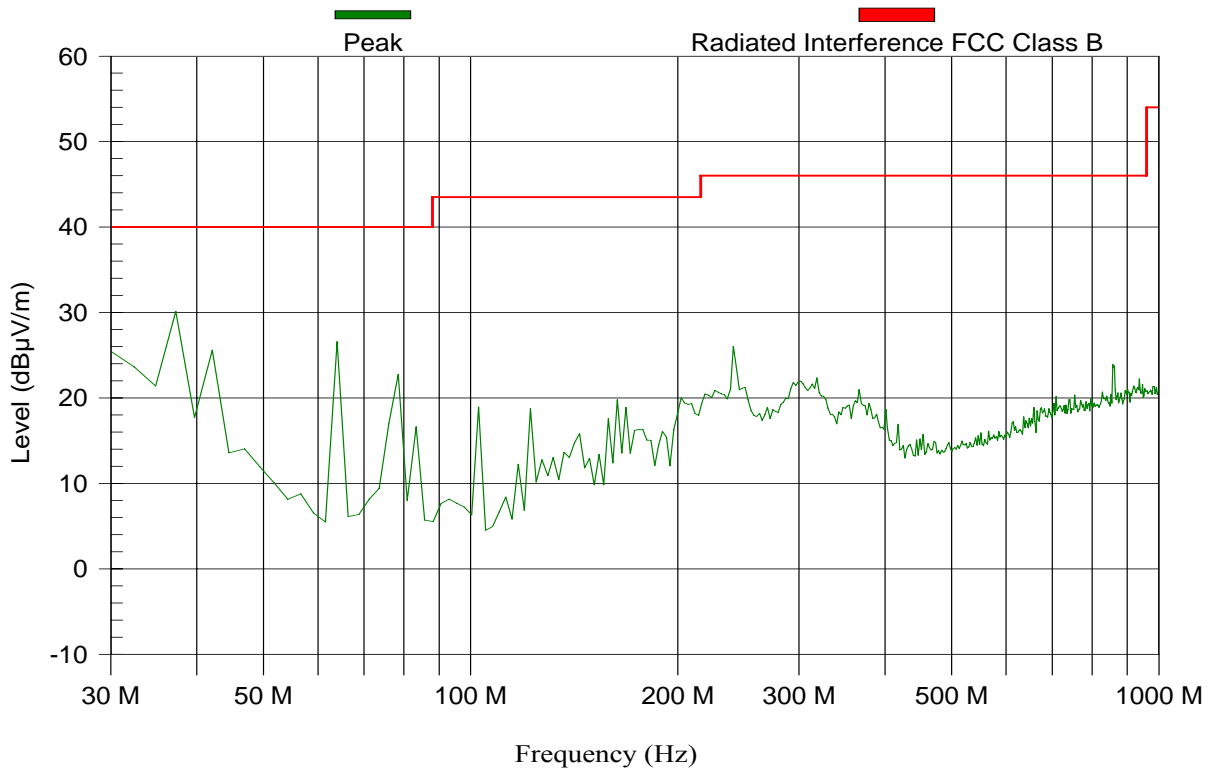
Test Results Plot No 5

FCC 30-1000MHz TX

Test & EUT General Information		Receiver Setting	
EUT Name:	AY-Z12	Spect Analyzer	S.A HP 8593E
S/N:	0049	Ref. Level:	90 dB $\mu$ V
Date of Test:		RBW:	100 kHz
Test Engineer:	Ilya Arbitman	VBW:	1000 kHz
Antenna:	Frankonia BTA red -L_A 3m	Sweep Time:	Auto: 291 ms
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA MITEQ 0.01-1GHz No-1

TEST REMARKS: Sunday, May 03, 2009 10:32:14 AM

TX 125 kHz



**MAXIMUM RESULT DEVIATION:**

Detect all peaks above 15 dB below the limit line with a maximum of 6 peaks.

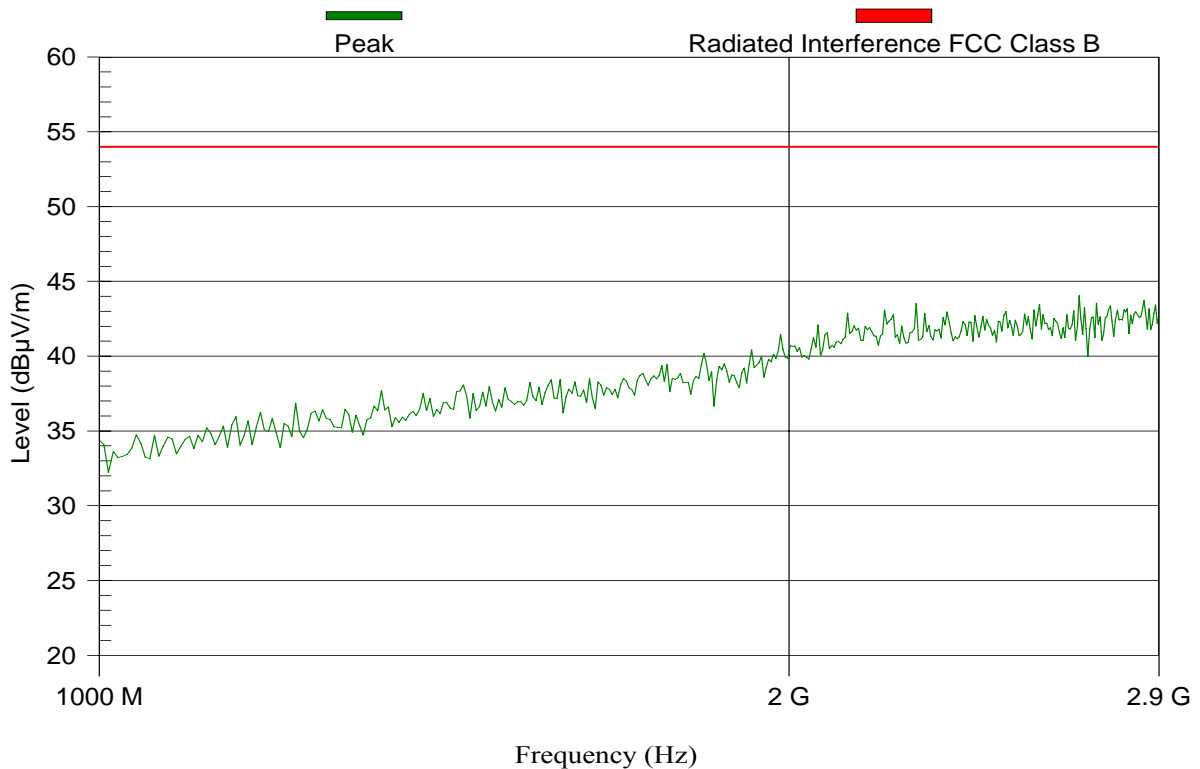
Nr	Frequency (MHz)	PK Value (dB $\mu$ V/m)	QP Value (dB $\mu$ V/m)	QP Limit (dB $\mu$ V/m)	Result	Angle (degrees)	Height (m)	H/V
1	34.996	32.4	30.9	40	Pass	65	1	V
2	42.324	26.1	24.6	40	Pass	180	1.2	V
3	64.024	27.6	26.3	40	Pass	0	1	V

**Test Results Plot No 6**

FCC 1-2GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	AY-Z12	Spect Analyzer	S.A HP 8593E
S/N:	0049	Ref. Level:	90 dB $\mu$ V
Date of Test:		RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG-118A 1-18GHz SER 1317	Sweep Time:	Auto: 38 ms
Polarization:	Horizontal and Vertical	Pre Amplifier	pre amp 1GHz-4GHz

**TEST REMARKS:** Sunday, May 03, 2009 11:17:39 AM



**MAXIMUM RESULT DEVIATION:**

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

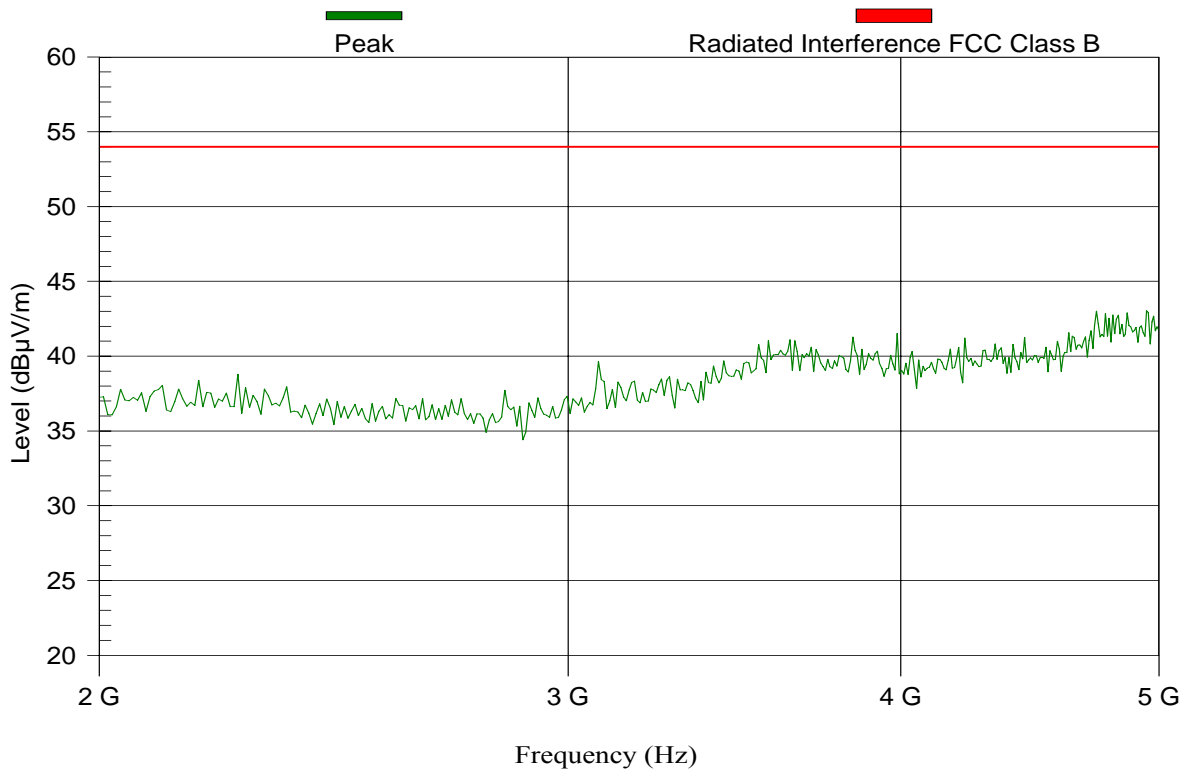
None

**Test Results Plot No 7**

FCC 2-5GHz

Test & EUT General Information		Receiver Setting	
EUT Name:	AY-Z12	Spect Analyzer	S.A HP 8593E
S/N:	0049	Ref. Level:	90 dB $\mu$ V
Date of Test:		RBW:	1000 kHz
Test Engineer:	Ilya Arbitman	VBW:	3 MHz
Antenna:	ARA DRG-118A 1-18GHz SER 1317	Sweep Time:	Auto: 46.43 ms
Polarization:	Horizontal and Vertical	Pre Amplifier	ELISRA AMP 2-6 GHz

**TEST REMARKS:** Sunday, May 03, 2009 10:59:17 AM



**MAXIMUM RESULT DEVIATION:**

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None



**Test Results Plot No 8**

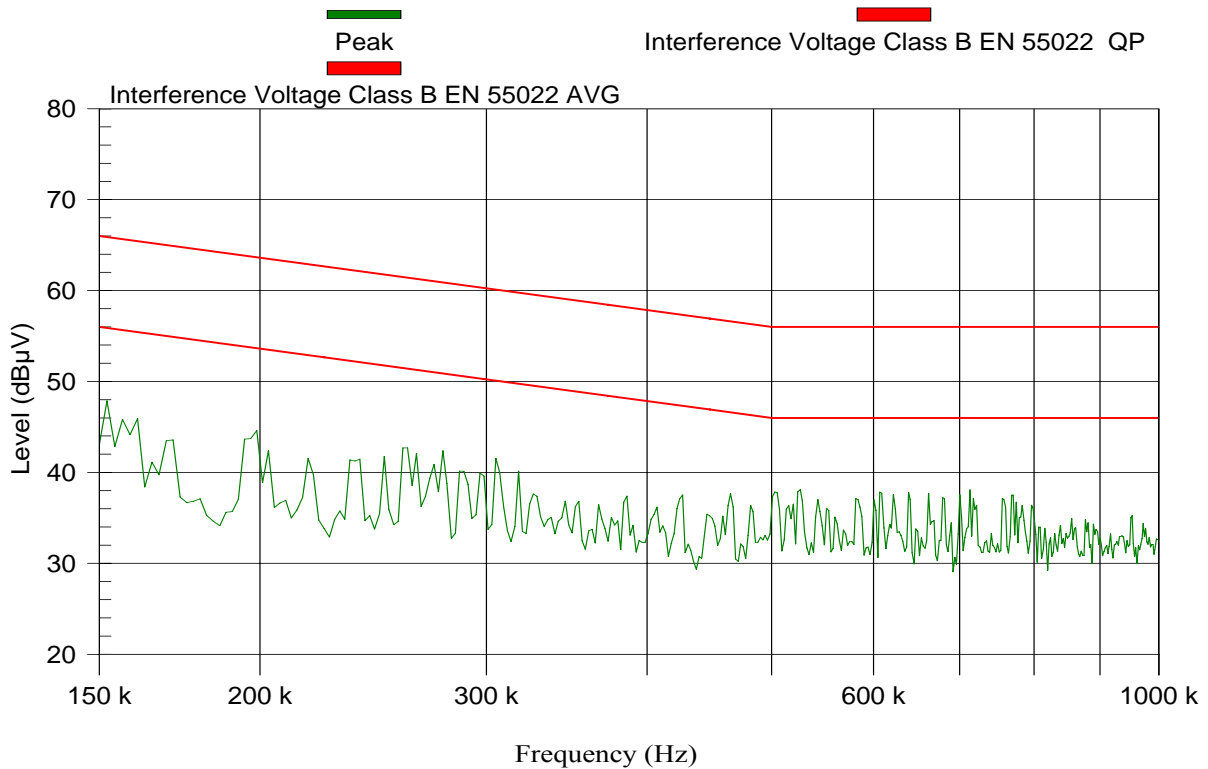
FCC 15.207 0.15-1MHz NEUTRAL

Test & EUT General Information		Receiver Setting	
EUT Name:	PIP 12VDC	Spect Analyzer	S.A HP 8593E
S/N:		Ref. Level:	80 dB $\mu$ V
Date of Test:		RBW:	9 kHz
Test Engineer:	Ilya Arbitman	VBW:	1000 kHz
Antenna:	No Description Available	Sweep Time:	Auto: 33.33 ms
Polarization:	1  polarization	Pre Amplifier	Attenuator 20db

**TEST REMARKS:** Wednesday, July 08, 2009 3:15:16 PM

NEUTRAL LINE

WITH FERRITE FROM FISHER



**MAXIMUM RESULT DEVIATION:**

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None

*Test Results Plot No 9*

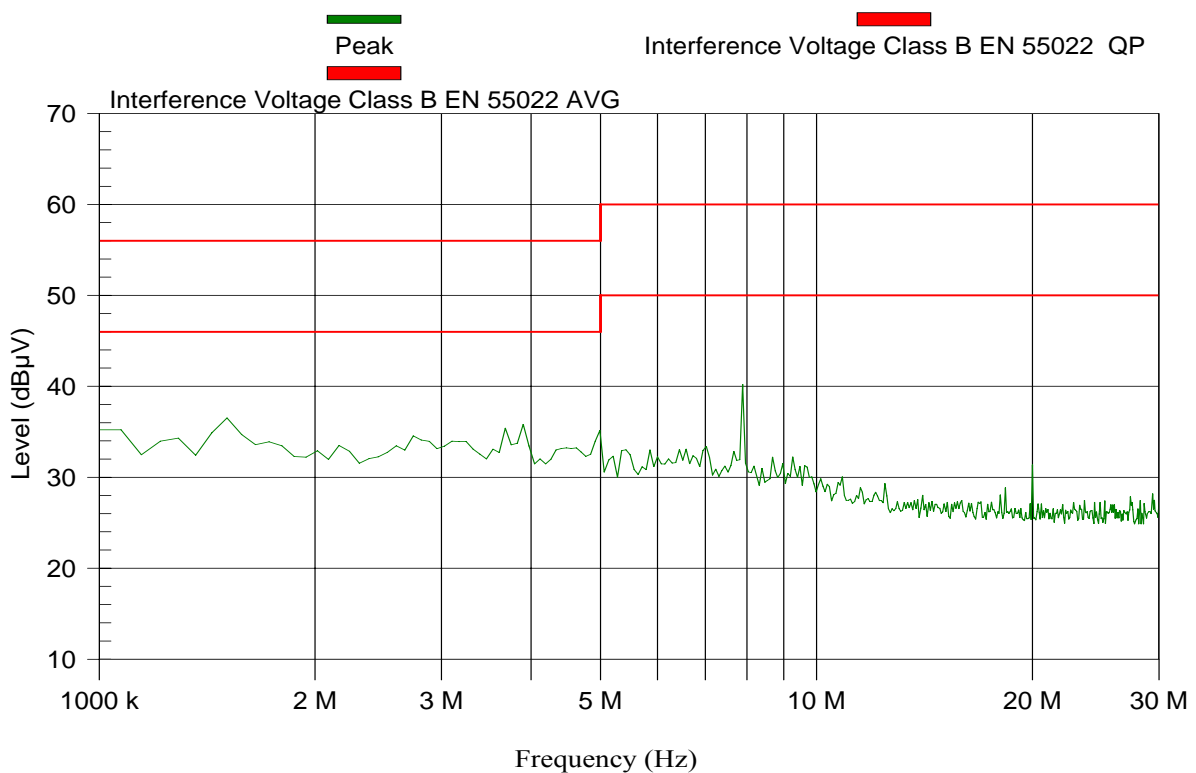
FCC 15.207 1-30MHz NEUTRAL

Test & EUT General Information		Receiver Setting	
EUT Name:	PIP 12VDC	Spect Analyzer	S.A HP 8593E
S/N:		Ref. Level:	80 dB $\mu$ V
Date of Test:		RBW:	9 kHz
Test Engineer:	Ilya Arbitman	VBW:	1000 kHz
Antenna:	No Description Available	Sweep Time:	Auto: 1.07 s
Polarization:	2  polarization	Pre Amplifier	Attenuator 20db

**TEST REMARKS:** Wednesday, July 08, 2009 3:42:34 PM

NEUTRAL

WITH FERRITE FROM FISHER



**MAXIMUM RESULT DEVIATION:**

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None

**Test Results Plot No 10**

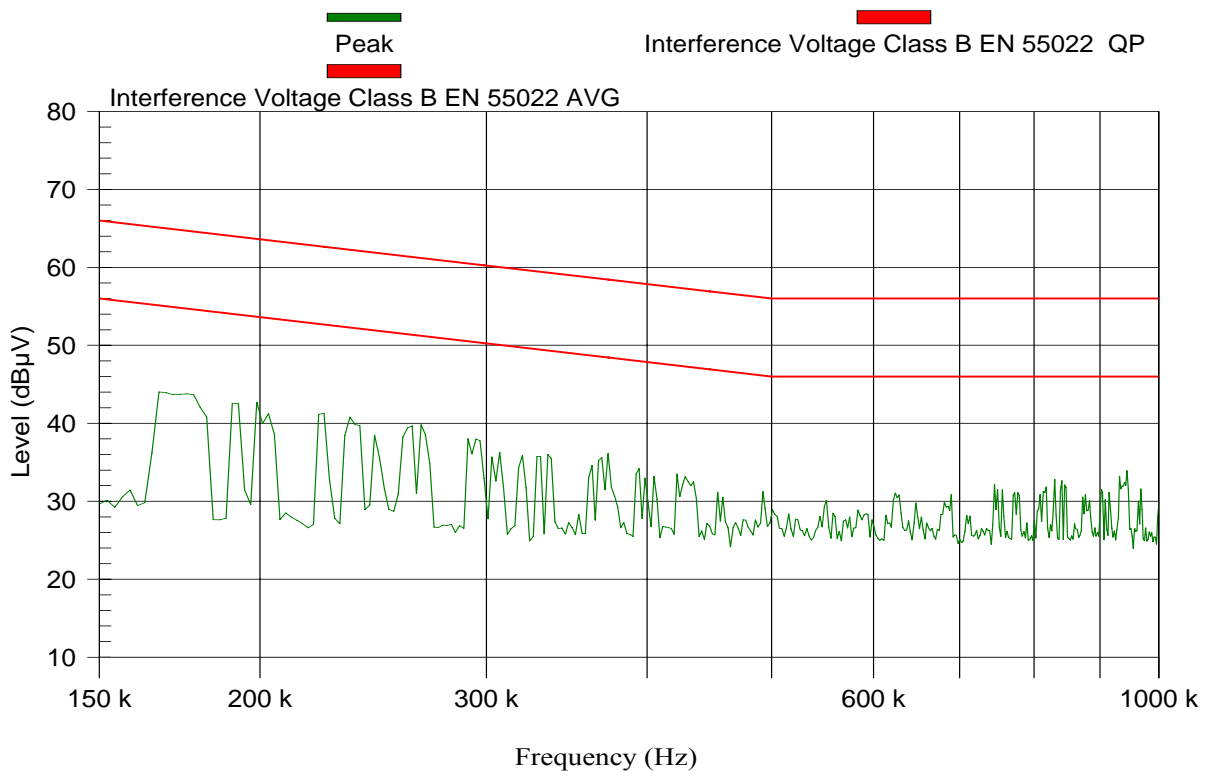
FCC 15.207 0.15-1MHz PHASE

Test & EUT General Information		Receiver Setting	
EUT Name:	PIP 12VDC	Spect Analyzer	S.A HP 8593E
S/N:		Ref. Level:	80 dB $\mu$ V
Date of Test:		RBW:	9 kHz
Test Engineer:	Ilya Arbitman	VBW:	1000 kHz
Antenna:	No Description Available	Sweep Time:	Auto: 33.33 ms
Polarization:	3  polarization	Pre Amplifier	Attenuator 20db

**TEST REMARKS:** Wednesday, July 08, 2009 3:46:36 PM

PHASE

WITH FERRITE FROM FISHER



**MAXIMUM RESULT DEVIATION:**

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None

*Test Results Plot No 11*

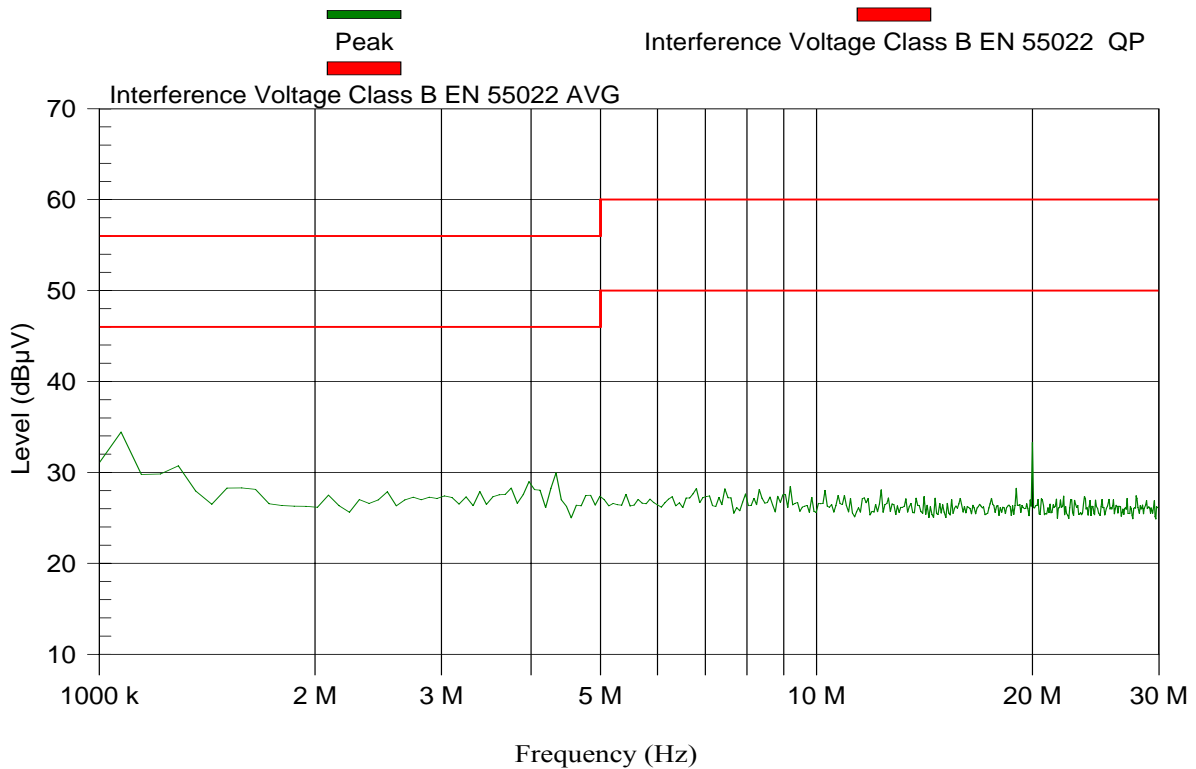
FCC 15.207 1-30MHz PHASE

Test & EUT General Information		Receiver Setting	
EUT Name:	PIP 12VDC	Spect Analyzer	S.A HP 8593E
S/N:		Ref. Level:	80 dB $\mu$ V
Date of Test:		RBW:	9 kHz
Test Engineer:	Ilya Arbitman	VBW:	1000 kHz
Antenna:	No Description Available	Sweep Time:	Auto: 1.07 s
Polarization:	4  polarization	Pre Amplifier	Attenuator 20db

**TEST REMARKS:** Wednesday, July 08, 2009 3:47:29 PM

PHASE

WITH FERRITE FROM FISHER



**MAXIMUM RESULT DEVIATION:**

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

None

## **8 CORRECTION FACTORS**

DOUBLE RIDGE HORN Model 3105 S/N:00-50C2-1C-C468 2052 Antenna Factor

Frequency (MHz)	Antenna Factor (db/m)
1000	24.4
2000	26.2
3000	30
4000	32.6
5000	33.8
6000	34.9
7000	36.2
8000	36.9
9000	37.8
10000	38.4
11000	39.1
12000	40.1
13000	42
14000	40.6
15000	39.3
16000	40.3

Antenna Factor for broadband antenna model BTA-L S/N:00-50C2-1C-C468 980045L

Frequency (KHz)	Ant. Factor (db/m)	Frequency (KHz)	Ant. Factor (db/m)
30	19.05	300	14.35
32	19.13	310	14.28
34	18.74	320	14.43
36	18.03	330	14.13
38	16.61	340	14.48
40	15.44	350	14.89
45	13.66	360	15.12
50	11.52	370	15.70
55	10.04	380	15.78
60	7.68	390	16.22
65	6.11	400	16,45
70	5.47	425	16.99
75	5.98	450	17.59
80	6.86	475	17.28
85	7.20	500	17.69
90	7.47	525	18.91
95	7.23	550	19.06
100	7.20	575	18.20
105	7.30	600	18.87
110	7.37	625	18.81
115	7.02	650	19.64
120	6.82	675	19.92
125	7.05	700	20.66
130	7.83	725	21.08
135	9.61	750	21.53
140	7.93	775	22.39
145	8.03	800	22.66
150	8.29	825	22.87
160	8.72	850	22.65
170	9.18	875	23.12
180	9.05	900	23.70
190	9.80	925	23.40
200	10.61	950	23.43
210	10.34	975	23.30
220	11.21	1000	24.02
230	11.69		
240	11.62		
250	11.85		
260	12.45		
270	13.16		
280	13.48		
290	13.74		

## **9 ABBREVIATIONS AND ACRONYMS**

The following abbreviations and acronyms are applicable in this document

BW	Bandwidth
R.BW	Resolution Bandwidth
V.BW	Video Bandwidth
db	Decibel
EMI	Electromagnetic interference
E.U.T	Equipment under test
LISN	Line impedance stabilization network
S/N	Serial number
QP	Quasi peak
PK	Peak



**10 PHOTOGRAPHS**

