REV	Δ	Description	Sheet Effected	Date	Drawn	Checked
A				04.06.06	D.Lanuel	S.Cohen

EMC Laboratory

Ga-ofdm-700

Manufactured by
WaveIP Ltd.

EMC Test Report

According FCC Part2, 27, 15 Requirements

MAY 2006

	Function/Title	Name	Signature	Date
Prepared b	Test Engineer	D.Lanuel		04.06.06
Checked by	Test Engineer	D.Lanuel		04.06.06
Approved by	EMC Lab. Manager	S.Cohen		04.06.06

Table of Contents

Para **Page**

1 GENERAL Information

a. **Description of equipment under test**

Equipment Under Test:	Ga-ofdm-700
FCCID:	QQ2-GAOFDM-700
Manufacturer:	WaveIP.
Serial Numbers:	00-50C21CCFAE
Mode of Operation:	TX MODE
Assigned frequency band:	710-716MHZ 740-746MHz
Year of Manufacture:	2006

b. **Applicant Information**:

Applicant:	WaveIP Ltd.
Applicant Address	TAVOR Building YOKNEAM
Telephone:	+972-4-9937333
FAX:	+972-4-9592614
The testing was observed by:	Yoram Singer
Following applicant's personnel:	Yoram Singer

c. **Test Performance:**

Date of reception for testing:	10.05.06
Dates of testing	17.05.06 - 18.05.06
Test Laboratory Location	TADIRAN EMC LAB, Hashoftim 26 Holon 58102 ISRAEL Tel: 972-3-5574476 Fax: 972-3-5575320
Applicable EMC Specification:	Federal Communication Commission (FCC), Code of Federal Regulations 47, FCC Docket 89-103, Part 15: Radio Frequency Devices, Sections 15.109, 15.207, 15.111, 2.1046, 2.1049, 2.1055, 27.50, 27.53, 27.54.

2 Test Summary and Signatures.

The E.U.T was found to comply with the requirements of the FCC Part 2, 27, 15 Regulations given below

Test Description	Specification Reference	Date of Testing	Test Report Paragraph	Compliance PASS/FAIL
Occupied 26dbc bandwidth	2.1049	20.09.05	4	PASS
Max peak output power	2.1046 27.50c(1)i	18.09.05	5	PASS
Frequency Stability	2.1055, 27.54	21.09.05	6	PASS
Conducted spurious emission at antenna termination	2.1047, 2.1051, 27.53f	18.09.05	7	PASS
Spurious emission radiated	2.1053, 27.53f	18.09.05	8	PASS
Unintentional radiated emission	15.109	18.09.05	9	PASS
Antenna power conducted for receiver	15.111		10	PASS
Conducted emission	15.207	18.09.05	11	PASS

a. **Test performed by:**

Mr. D. Lanuel Test Engineer

b. **Test Report prepared by:**

Mr. D. Lanuel Test Engineer

c. **Test Report Approved by:**

Mr. Samuel Cohen EMC Lab. Manager

3 EUT Description

a. **General**

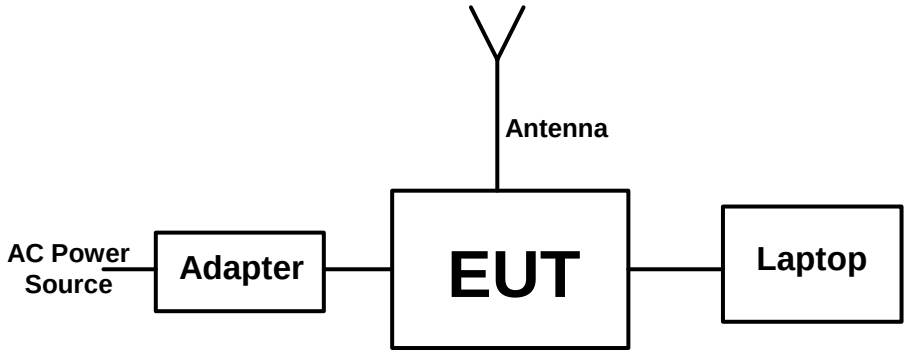
Model Number(s): Ga-ofdm-700

Brief Description (Purpose of Device):

GigAccess™ 700 is WaveIP's wireless point-to-point and point-to-multipoint broadband communication system. The basic subsystem is composed of a single sector, which consists of an AU (Access Unit) and up to 128 SUs (Subscriber Units). Each sector is a stand-alone communication network operating on a star topology with a gateway to the WAN, which allows two-way communication between the SUs and the WAN via the AU. A Sector may be divided into sub sectors, which are consecutive to the SUs within the sector.

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

EUT test configuration is shown in figure bellow



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

(1) Transmit -743MHz
713MHz

(2) Receive

(3) Transmitter Power Source
Adapter 220VAC/12VDC

4 Occupied Bandwidth for According to 2.1049

E.U.T: Ga-ofdm-700 S/N: 0050C21CCFAE
Date: 18.05.06
Relative Humidity: 34%
Ambient Temperature: 23c
Air Pressure: 1051hpa

Testing Engineer: D.Lanuel **Date** 25.05.06

a. **Test Results Summary & Conclusions**

The E.U.T was found in compliance with OCCUPIED BANDWIDTH

b. **Limits of bandwidth**

The test unit shall meet the limits of Table 4.b

Table 4.b Limits For Bandwidth

Assigned Frequency band(MHz)	Modulation envelope reference point dbc
710 - 716	26dbc
740 - 746	

c. **Test Results**

Table 4.c Bandwidth Test Result

Frequency (MHz)	Bandwidth	Bandwidth (MHz)	Plot Results	PASS/ FAIL
713	16QAM	710.373 – 715.685	Plot-1	PASS
	64QAM	710.403 – 715.656	Plot-2	PASS
	BPSK	710.373 – 715.685	Plot-3	PASS
	QPSK	710.433 – 715.626	Plot-4	PASS
743	16QAM	740.373 – 745.715	Plot-5	PASS
	64QAM	740.373 – 745.685	Plot-6	PASS
	BPSK	740.343 – 745.715	Plot-7	PASS
	QPSK	740.343 – 745.745	Plot-8	PASS

d. **Test Instrumentation and Equipment**

Table 4.d Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	31/01/07
Broadband Antenna	BTA-L	FRANKONIA	10.04.07
20db attenuator	2525-200	ATM	18.03.07

e. **Test Procedure**

The EUT output was connected to the spectrum analyzer through 40db attenuator, The test set up are shown in figure 4e bellow

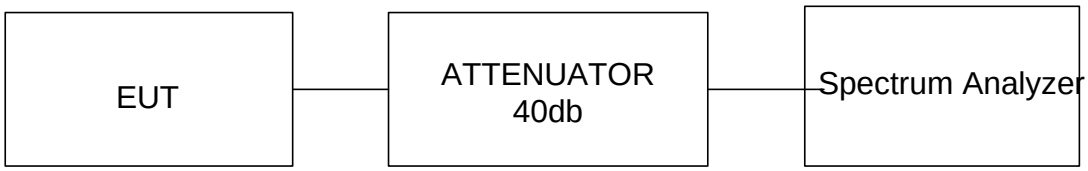


Figure 4e Test Setup for Occupied Bandwidth test

5 Maximum peak output power test according 2.1046 & 27.50

E.U.T:	Ga-ofdm-700 S/N: 0050C21CCFAE
Date:	18.05.06
Relative Humidity:	34%
Ambient Temperature:	23c
Air Pressure:	1051hpa
Test Setup:	Figure 5e

Testing Engineer: D.Lanuel **Date** 25.05.06

a. **Test Results Summary & Conclusions**

The E.U.T was found in compliance with peak output power requirement

b. **Limits**

The test unit shall meet the limits of Table 5.b**.**

Table 5.b peak output power limits

Operating frequency (MHz)	Peak Max Limits(dbm)
713	60
743	

c. **Test Results**

Table 5.c Peak output power Result

Frequency (MHz)	RF out power dbm	**ERP dbm	ERP limit dbm	Plots Result	Pass/ Fail
713MHz	30.71	41.71	60	Plot-9	PASS
743MHz	30.41*	41.41	60	Plot-10	PASS

*See calculation bellow-based on test procedure paragraph 5e

**ERP (dbm) =RF output power+ antenna gain (11dbi)

(1) 713MHz peak power calculation –based on plot-9

a) BW correction factor is: 10log 6db BW of emission/analyzer RBW

b) 10log 6.2/3=3.15

c) Output power: 27.56+3.15=30.71

(2) 743MHz peak power calculation –based on plot-9

a) BW correction factor is: 10log 6db BW of emission/analyzer RBW

b) 10log 6/3=3.01

c) Output power: 27.4+3.01=30.41

d. **Test Instrumentation and Equipment**

Table 5.d Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	31/01/07
20db attenuator	2525-200	ATM	18.03.07

e. **Test Procedure**

(1) Spectrum analyzer measured the transmitter peak output power while the RBW of analyzer is 3MHz and the RBW of transmitter is 5MHz.

(2) When the analyzer RBW is not large enough as required. The peak output power procedure is as follows:

a) *Set the RBW and VBW to the maximum available.*

b) *Set the band limit to 6db*

c) *Set sweep to automatic*

d) *Set the span just enough to capture the emission*

e) *Use the peak detector on max hold*

f) *Set the analyzer on linear mode display*

g) *Let the emission stabilize before making a final reading*

BW correction factor is: 10log 6db BW of emission/analyzer RBW

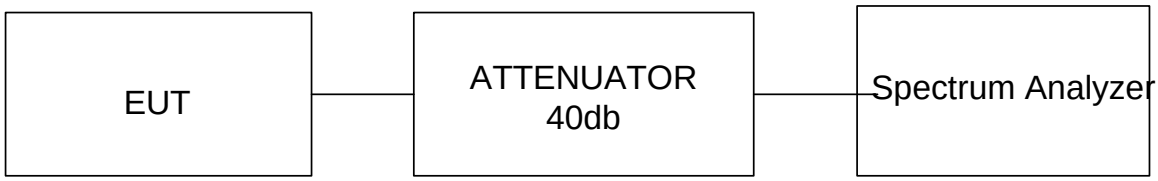
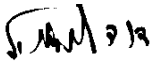


Figure 5e Test Setup for Peak output power

6 Frequency stability according to part 2.1055 & 27.54

E.U.T:	Ga-ofdm-700 S/N: 0050C21CCFAE
Date:	21.05.06
Relative Humidity:	34%
Ambient Temperature:	23c
Air Pressure:	1051hpa
Test Setup:	Figure 5e

Testing Engineer: D.Lanuel  **Date** 28.05.06

a. **Test Results Summary & Conclusions**

The E.U.T was found in compliance with frequency stability

b. **Limits**

The test unit shall meet the limits of Table 6.b**.**

Table 6.b Frequency stability limits

6 MHz channel (MHz)	Maximum allowed freq displacement
710 - 716	26dbc point shall remain within the assigned band
740 - 746	

c. **Test Results**

Table 6.b Frequency stability test results for 713MHz

T°c	Voltage (V)	Measured 26dbc point left (MHz)	Measured 26dbc point right(MHz)	Pass/ Fail
-30	Nominal	710.791	715.852	Pass
-20	Nominal	710.752	715.903	Pass
-10	Nominal	710.801	715.801	Pass
0	Nominal	710.809	715.742	Pass
10	Nominal	710.790	715.756	Pass
20	+15%	710.588	715.732	Pass
20	Nominal	710.438	715.820	Pass
20	-15%l	710.560	715.725	Pass
30	Nominal	710.712	715.827	Pass
40	Nominal	710.718	715.737	Pass
50	Nominal	710.858	715.904	Pass

Table 6.b Frequency stability test results for 743MHz

T°c	Voltage (V)	Measured 26dbc point left (MHz)	Measured 26dbc point right(MHz)	Pass/ Fail
-30	Nominal	745.780	740.495	Pass
-20	Nominal	745.757	740.798	Pass
-10	Nominal	745.753	740.715	Pass
0	Nominal	745.725	740.710	Pass
10	Nominal	745.828	740.710	Pass
20	+15%	745.900	740.610	Pass
20	Nominal	745.851	740.720	Pass
20	-15%l	745.900	740.610	Pass
30	Nominal	745.825	740.620	Pass
40	Nominal	745.622	740.600	Pass
50	Nominal	745.740	740.622	Pass

d. **Test Instrumentation and Equipment**

Table 5.d Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	31/01/07
20db attenuator	2525-200	ATM	18.03.07

e. **Test Procedure**

(1) The EUT was set as shown in figure 6e

(2) The 26dbc point was measured 10 minute after frequency had been stabilized at temperature rang of -30 - 50°c

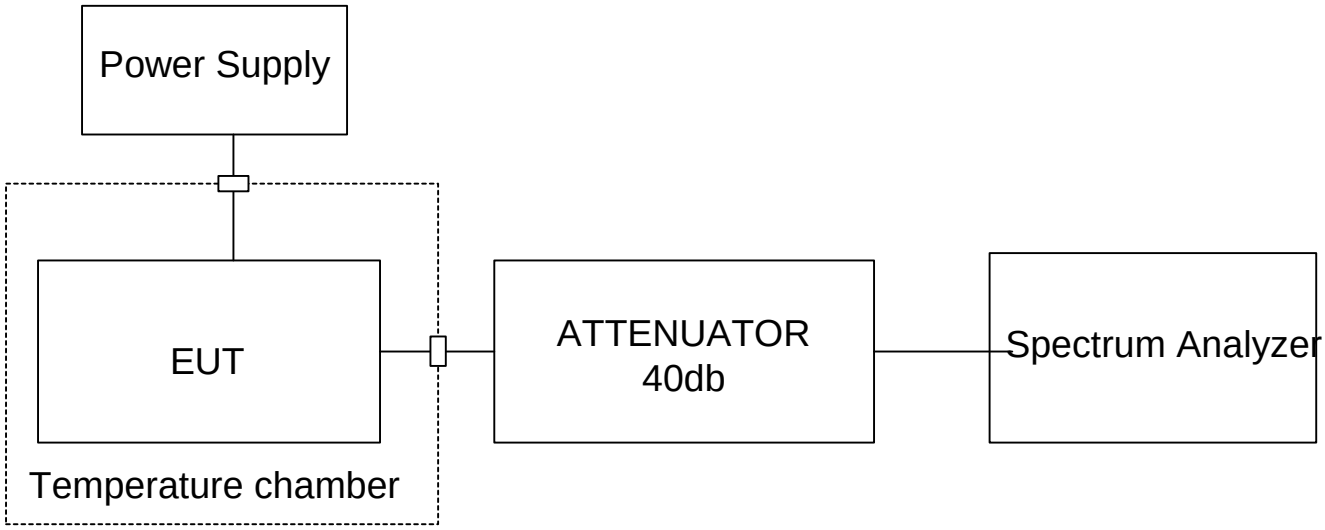


Figure 6e Test Setup for Frequency stability

7 Spurious emission at antenna termination test according t0 2.1047, 2.1051, 27.53f

E.U.T:	Ga-ofdm-700 S/N: 0050C21CCFAE
Date:	17.05.06
Relative Humidity:	34%
Ambient Temperature:	23c
Air Pressure:	1051hpa
Test Setup:	Figure 7.e

Testing Engineer: D.Lanuel **Date** 24.05.06

a. **Test Results Summary & Conclusions**

The E.U.T was found in compliance with Spurious emission at antenna termination test

b. **Limits of conducted emission**

The test unit shall meet the limits of Table 7.b**.**

Table 7.b Limits For 15.247(c)

Frequency range(MHz)	Attenuation below carrier dbc	Limits dbm
0.009 – 7300	43+10logP	-13

c. **Test Results**

Table 7.c Spurious emission at antenna termination test results

Operating Frequency (MHz)	Frequency range (MHz)	Results (dBµV/m)	Plots Result	Pass/ Fail
713MHz	0.009 – 7300	All emission were found Min 20db below the specified limits	11 - 18	Pass
743MHz			19 - 26	Pass

d. **Test Instrumentation and Equipment**

Table 7.d Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	31/01/07
20db attenuator	2525-200	ATM	18.03.07

e. **Test Procedure**

The EUT output was connected to the spectrum analyzer through 40db attenuator.
The test set up is shown in figure 6e bellow.

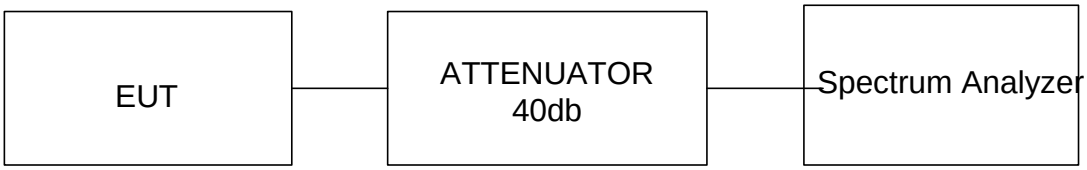


Figure 6e Test Setup for Conducted emission

8 Radiated spurious emission test according 2.053 & 27.53f

E.U.T:	Ga-ofdm-700 S/N: 0050C21CCFAE
Date:	17.05.06
Relative Humidity:	34%
Ambient Temperature:	23c
Air Pressure:	1051hpa
Test Setup:	Figure 8.e1 – 8.e.2

Testing Engineer: D.Lanuel **Date** 24.05.06

a. **Test Results Summary & Conclusions**

The E.U.T was found in compliance with radiated spurious emission test

b. **Limit**: The test unit shall meet the Limits. Of table 8.b

Table 8.b Radiated spurious emission limits

Frequency range (MHz)	Attenuation below carrier dbc	Limits dbm	Equivalent strength limit 3m dbµV/m
0.009 – 7300	43+10logP	-13	84.4*

*Equivalent field strength limit was calculated as follows:

$$E_{V/w} = \frac{1}{d}\sqrt{P_W x30x1.64}$$

P=ERP in W
E=field strength in V/m
1.64=gain of ideal dipole
D=test distance in meter

c. **Results**

(1) Preliminary Results

Table 8.c1 Spurious emission field strength test results

Transmitting Frequency	Measuring Frequency Range	Plots Results	PASS/FAIL
713MHz	9KHz- 7.2GHz	27 - 34	PASS
743MHz	9KHz- 7.2GHz	35 - 41	PASS

(2) Final Test Results

Table 8c2 ERP of Spurious emission test results

Freq (MHz)	Field strength dBµV/m	Ant pol	RF gen Out dbm	Cable loss	ERP dbm	Limit dbm	Margin db	Pass/ fail
All radiated spurious emission were found more than 20db below the limit								

d. **Test Instrumentation and Equipment**

Table 8.d Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	31/01/07
Loop Antenna	HFH2-Z2	Rohde &Schwarz	N.P.C.R
Double Ridge Guide Ant	3105	EMCO	24.04.07
Broadband Antenna	BTA-L	FRANKONIA	10.04.07
Low Noise Amplifier (0-1GHz)	AM-1300-N	MITEQ	14.01.07
Low Noise Amplifier (1-4GHz)	AMM 003N	AVANTEK	14.01.07
Low Noise Amplifier (2-6GHz)	MWA-02060	ELISRA	14.01.07
Low Noise Amplifier (6-18GHz)	MWA-06180	ELISRA	14.01.07
High pass filter 1000MHz	1/15G-10EE	WHK	10.02.07
Band reject filter 740 - 746MHz	WRCG700	WHK	10.02.07

e. **Test Procedure**

Test Procedure for field strength measurement

(1) The EUT was setup as shown in figure 8e1

(2) The EUT was adjusted to produce maximum power output

Test Procedure for substitution ERP measurement of spurious

(3) The EUT was setup as shown in figure 8e2

(4) RF signal generator was set to the EUT carrier frequency and the RF output level was adjusted to produce the same field strength as it was measured from the EUT

(5) The test antenna height was swept to find maximum emission from substitute antenna and RF signal generator was adjusted to produce the same field strength as it was measured from the EUT

(6) The ERP was calculated as a sum of signal generator output power in dbm and antenna gain

(7) Paragraph 4 through 7 was performed in both horizontal and vertical polarization of the test antenna

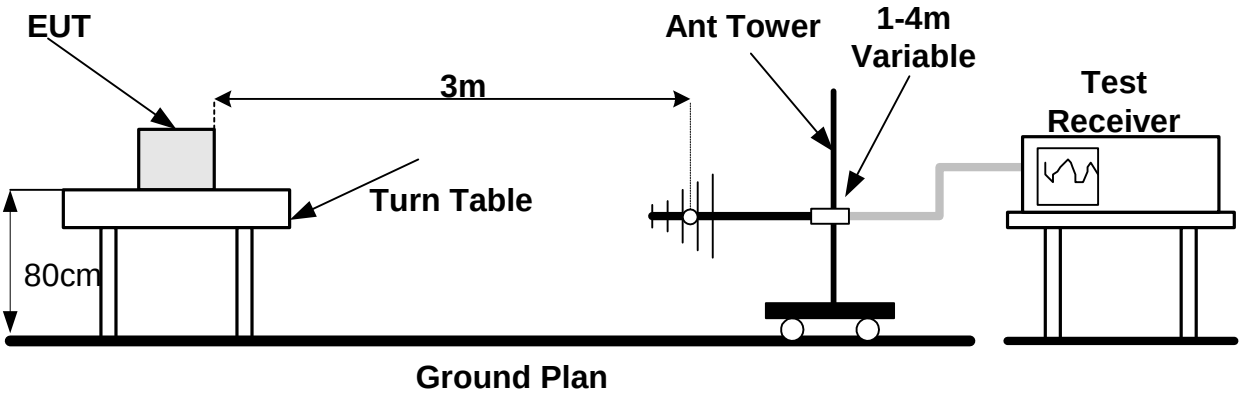


Figure 8e1 Test setup field strength peak power measurement

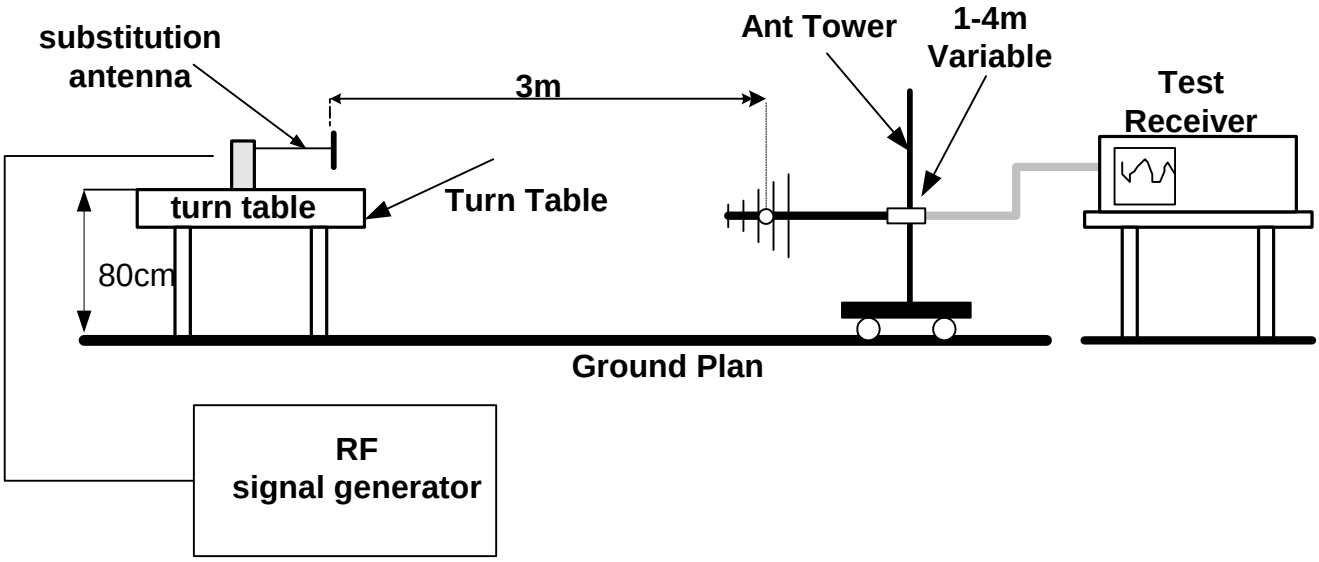
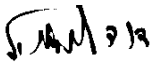


Figure 8e2 Test setup of ERP measurement

9 Unintentional radiated emission test according to 15.109

E.U.T:	Ga-ofdm-700 S/N: 0050C21CCFAE
Date:	17.05.06
Relative Humidity:	34%
Ambient Temperature:	23c
Air Pressure:	1051hpa

Testing Engineer: D.Lanuel  **Date** 24.05.06

a. **Test Results Summary & Conclusions**

The E.U.T was found in compliance with unintentional radiated emission requirements.

b. **Limit**:

Unintentional radiated emission must comply with 15.109 Limits. See limits in table 9b bellow.

Table 9b Limits For 15.109 Class B equipment

Frequency Range (MHz)	Quasi-peak Limits (dBµV/m)	Peak Limit	Average Limit
30 - 88	40	NA	NA
88 - 216	43.5		
216 - 960	46		
960 - 1000	54		
Above 1000	NA	74	54

c. **Test Results**

Table 9.c .Preliminary test results

Antenna Polarization	Frequency Range(MHz)	Plots Results	PASS/ FAIL
Both	30-1000	42	PASS
	1-2.8GHz	43	PASS
	2.8 – 6GHz	44	PASS
	6GHz – 7.5GHz	-	PASS

Table 9c1 Six Highest 15.109

Freq. (MHz	QP Reading (dbµV/m)	QP Limit (dbµV/m)	Margin (db)	Compliance PASS/FAIL	Plots
173.05	25.8	43.5	-17.7	PASS	42

d. **Test Instrumentation and Equipment**

Table 9.d Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	31/01/07
Loop Antenna	HFH2-Z2	Rohde &Schwarz	N.P.C.R
Double Ridge Guide Antenna(1-18GHz)	3105	EMCO	24.04.07
Broadband Antenna(30-1000MHz)	BTA-L	FRANKONIA	10.04.07
Low Noise Amplifier (0-1GHz)	AM-1300-N	MITEQ	14.01.07
Low Noise Amplifier (1-4GHz)	SMC-09	MITEQ	14.01.07
Low Noise Amplifier (2-6GHz)	SMC-09	MITEQ	14.01.07
Low Noise Amplifier (6-10GHz)	SMC-09	MITEQ	14.01.07

e. **Procedure**

The EUT output was connected to the spectrum analyzer through appropriate low noise amplifier while the EUT is in STBY mode.

10 Antenna power conduction for receive according part 15.111

E.U.T: Ga-ofdm-700 S/N: 0050C21CCFAE
Date: 18.05.06
Relative Humidity: 34%
Ambient Temperature: 23c
Air Pressure: 1051hpa

Testing Engineer: D.Lanuel **Date** 25.05.06

a. **Test Results Summary & Conclusions**

The E.U.T was found in compliance with Antenna power conduction for receive requirements.

b. **Limit**:

Antenna power conduction for receive must comply with 15.111 Limits. See limits in table 9b bellow.

Table 10b Limits For 15.111

Frequency range (MHz)	Mode of operation	Spurious (nw)	Spurious (dbµv)
30 - 2000	Receive	2	50

c. **Test Results**

Table 9.c Test results

Mode of Operation	Frequency Range (MHz)	Results	PASS/ FAIL
Receive	30-1000	At least 30db below the limit	PASS
	1-2.8GHz		PASS

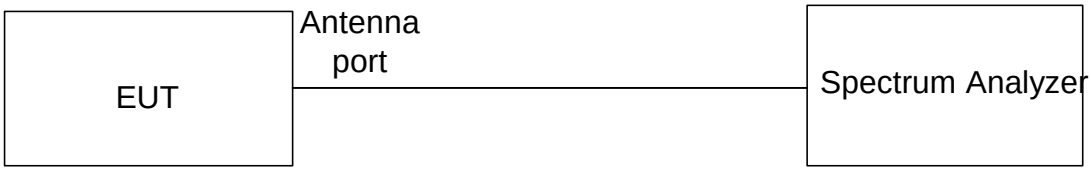
d. **Test Instrumentation and Equipment**

Table 9.d Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	31/01/07

e. **Procedure**

The EUT output was connected to the spectrum analyzer while the EUT is in receiving mode.



11 Conducted emission test according to 15.207.15.107

E.U.T:	Ga-ofdm-700 S/N: 0050C21CCFAE-C3-3D
Date:	18.05.06
Relative Humidity:	34%
Ambient Temperature:	23°c
Air Pressure:	1051hpa
Test Setup:	Figure 11f, 12f

Testing Engineer: D.Lanuel **Date** 25.05.06

a. **Test Results Summary & Conclusions**

The E.U.T was found in compliance with conducted emission power leads requirements.

b. **Limit**:

Conducted emission must comply with 15.207 Limits. See limits in table 10b bellow.

Table 10.b Limits For 15.207 Class B equipment

Frequency (MHz)	Quasi-peak Limits (dBµV/m)
0.15 – 0.5	66-56
0.5 - 5	56
5 - 30	60

c. **Test Results –P LOTS 122,123**

Table 10.c Test results

Frequency Range (MHz)	Tested Line	Plots Results	PASS/ FAIL
0.15 - 1	PHASE	45	PASS
1 - 30	PHASE	46	PASS
0.15 - 1	NEUTRAL	47	PASS
1 - 30	NEUTRAL	48	PASS

Table 10.c1 Six Highest 15.207

Freq. MHz	QP Reading (dbµV/m)	Limit (dbµV/m)	Margin (db)	Plots
1.384	53.1	56	-2.9	45
1.822	52.7	56	-3.3	46
2.907	52.6	56	-3.4	47
3.363	52.2	56	-3.8	48

d. **Test Instrumentation and Equipment**

Table 10.d Test Instrumentation and Equipment

Item	Model	Manufacturer	Next Date Calibration
Spectrum Analyzer	8593E	HP	31/01/07
LISN	DC-AC-20A/01	TADIRAN	N.P.C.R
20DB attenuator	2525	ATM	18.03.07

e. **Test Procedure**

a) The EUT was placed on the top of table 1m by 1.5m, raised 0.8 meters above the conducting ground plane

b) The rear panel of the EUT was located 40cm to the vertical wall of the screen room

c) Each EUT power leads were individually connected through an LISN to the input power source. Unused 50 ohm connector of the LISN was terminated in 50ohm and other was connected to the spectrum analyzer through 20db attenuator for maximum conducted interference

f. **Test setup**

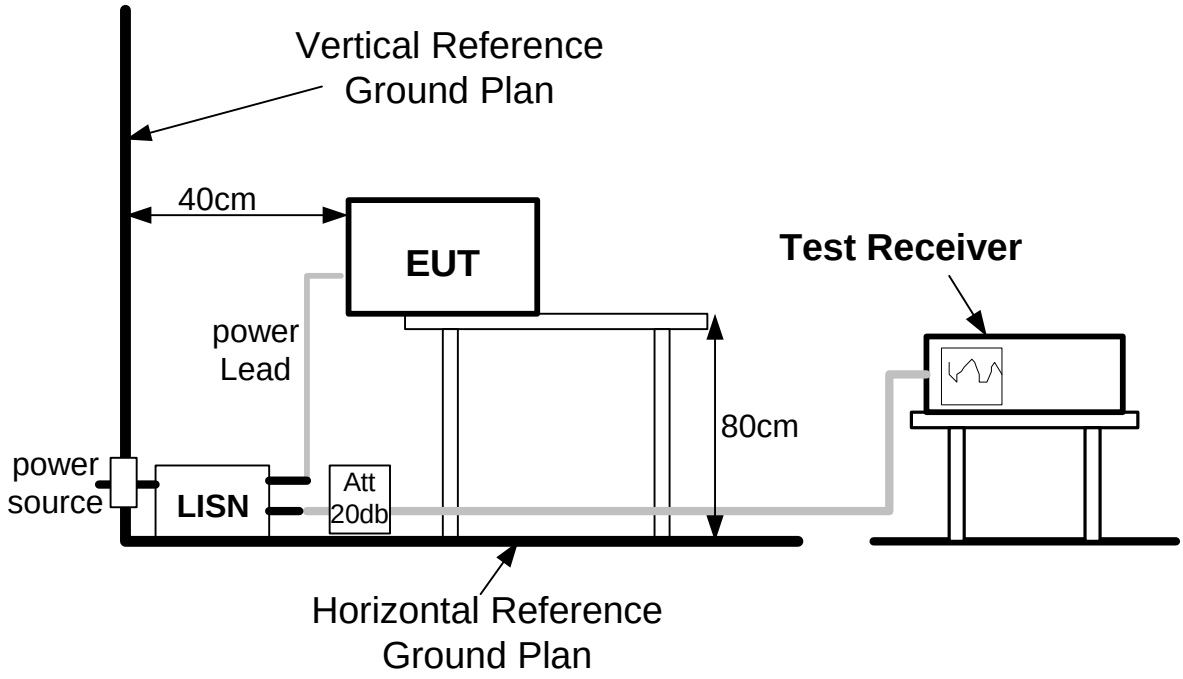


Figure- 11f Conducted emission Test Configuration

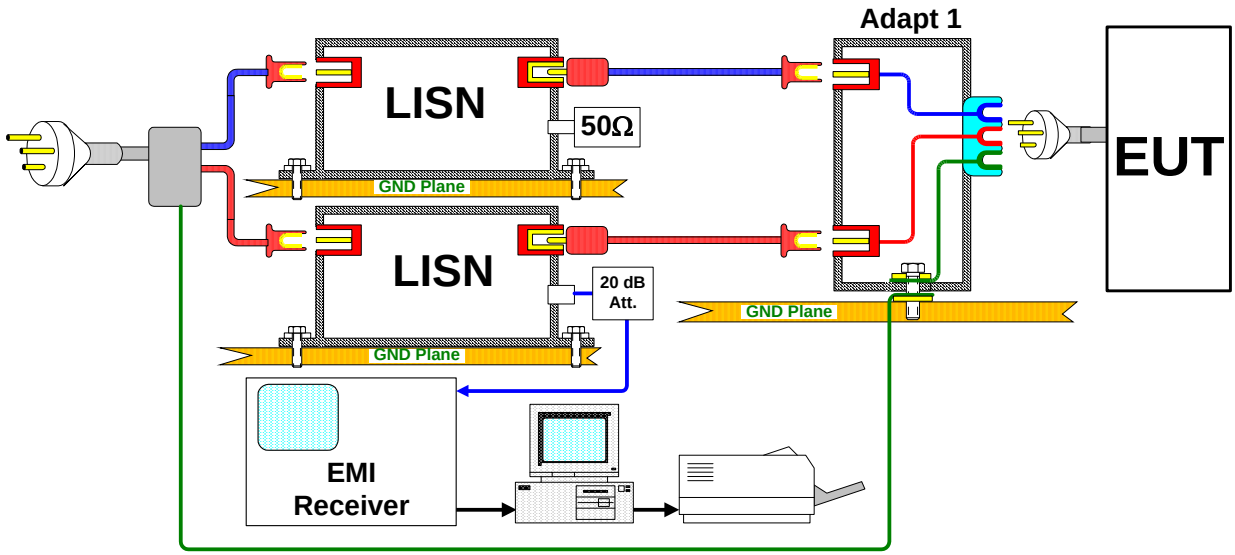
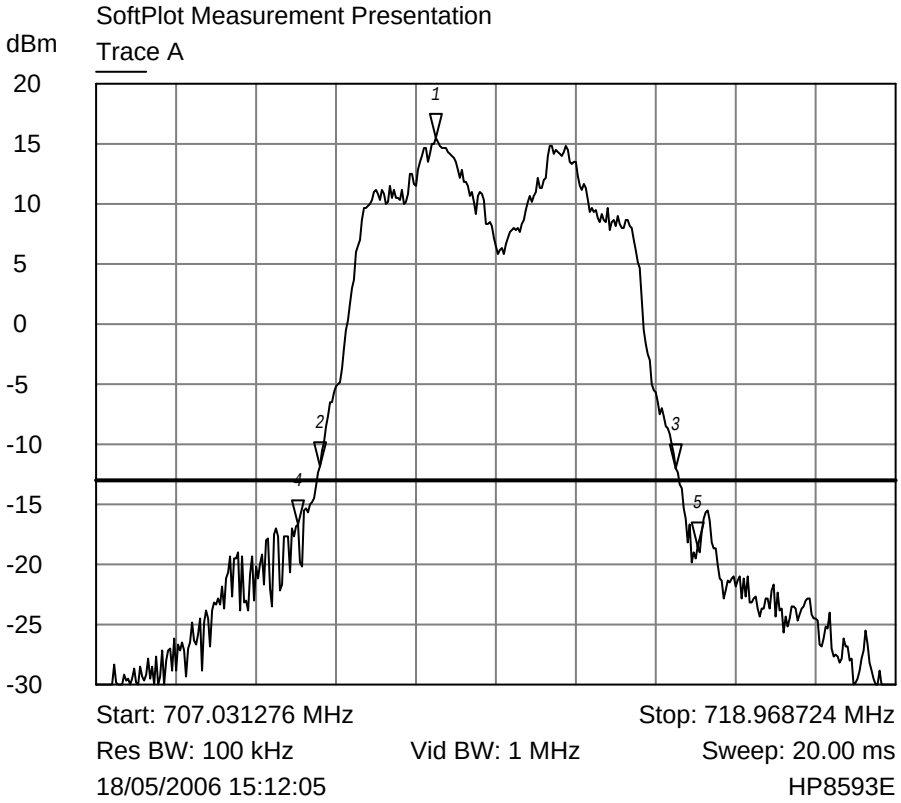


Figure- 12f Conducted emission Test setup

12 Plots

a. Occupied bandwidth plots 1-8

Test Results Plot No 1



1 Trace A
712.104691 MHz
15.4600 dBm

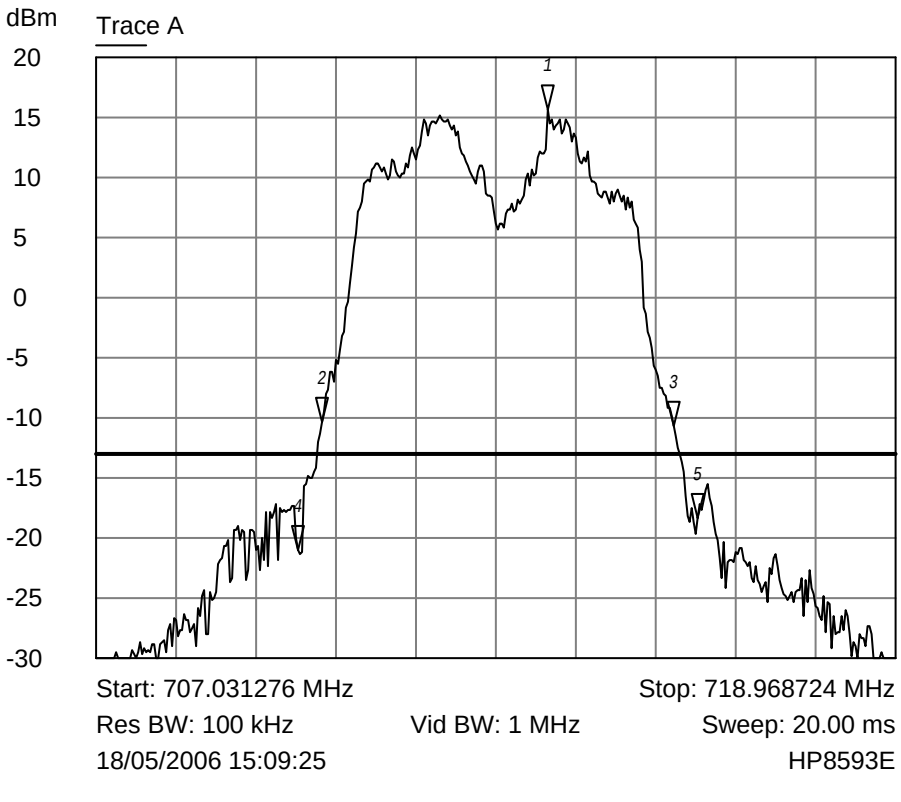
2 Trace A
710.373761 MHz
-11.8000 dBm

3 Trace A
715.685926 MHz
-11.9200 dBm

4 Trace A
710.045482 MHz
-16.5900 dBm

5 Trace A
716.014206 MHz
-18.4600 dBm

Test Results Plot No 2



1 Trace A
713.775934 MHz
15.6900 dBm

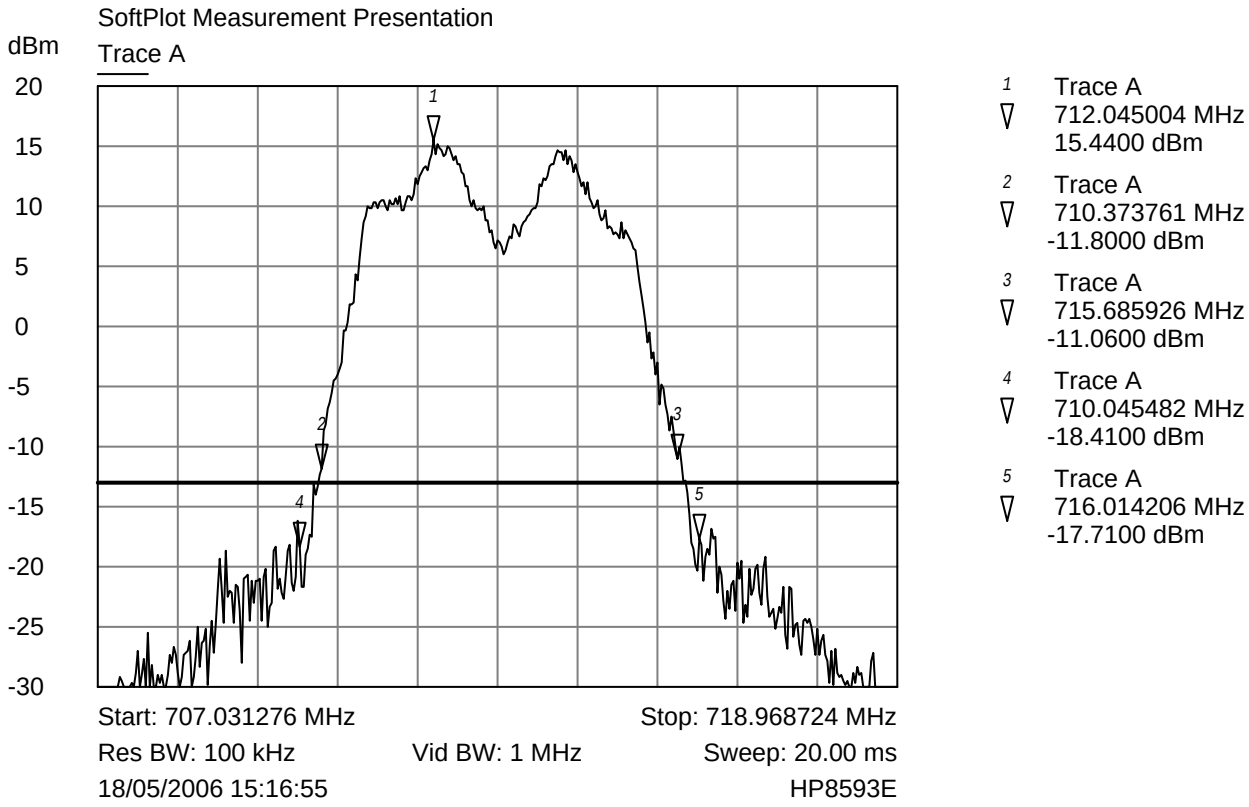
2 Trace A
710.403605 MHz
-10.3600 dBm

3 Trace A
715.656082 MHz
-10.6900 dBm

4 Trace A
710.045482 MHz
-21.0800 dBm

5 Trace A
716.014206 MHz
-18.4100 dBm

Test Results Plot No 3



1 Trace A
712.045004 MHz
15.4400 dBm

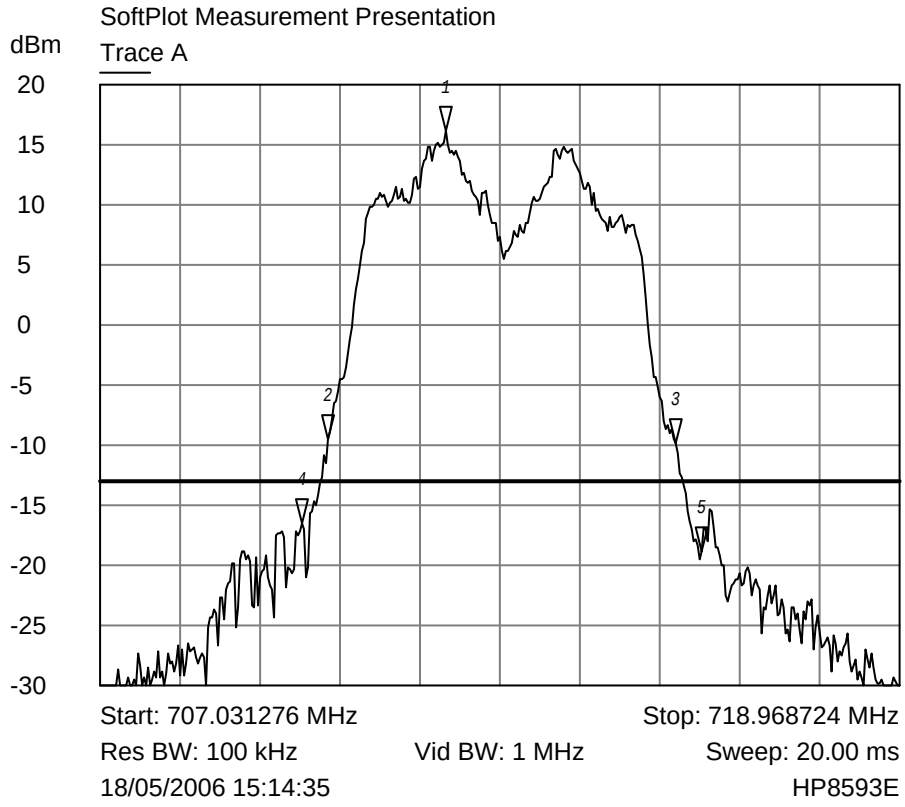
2 Trace A
710.373761 MHz
-11.8000 dBm

3 Trace A
715.685926 MHz
-11.0600 dBm

4 Trace A
710.045482 MHz
-18.4100 dBm

5 Trace A
716.014206 MHz
-17.7100 dBm

Test Results Plot No 4



1 Trace A
712.194222 MHz
16.2400 dBm

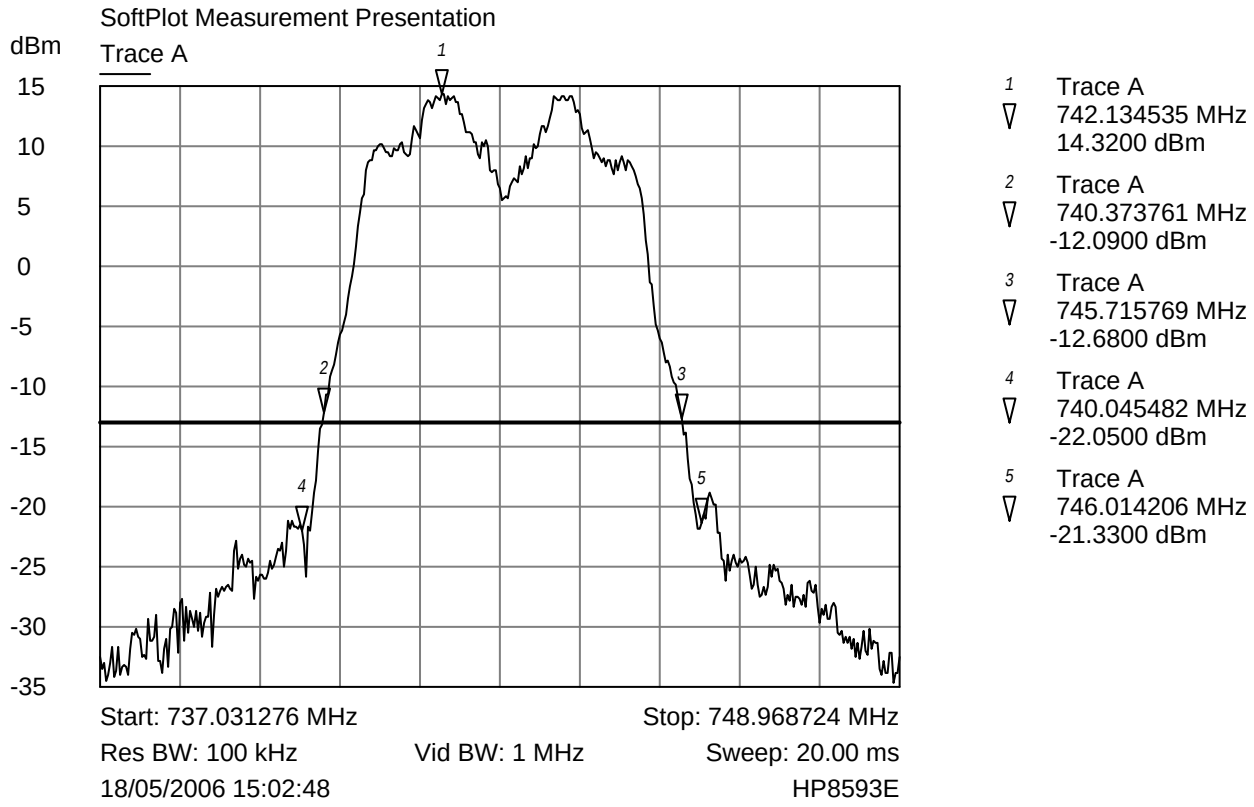
2 Trace A
710.433449 MHz
-9.5700 dBm

3 Trace A
715.626239 MHz
-9.8600 dBm

4 Trace A
710.045482 MHz
-16.4200 dBm

5 Trace A
716.014206 MHz
-18.8100 dBm

Test Results Plot No 5



1 Trace A
742.134535 MHz
14.3200 dBm

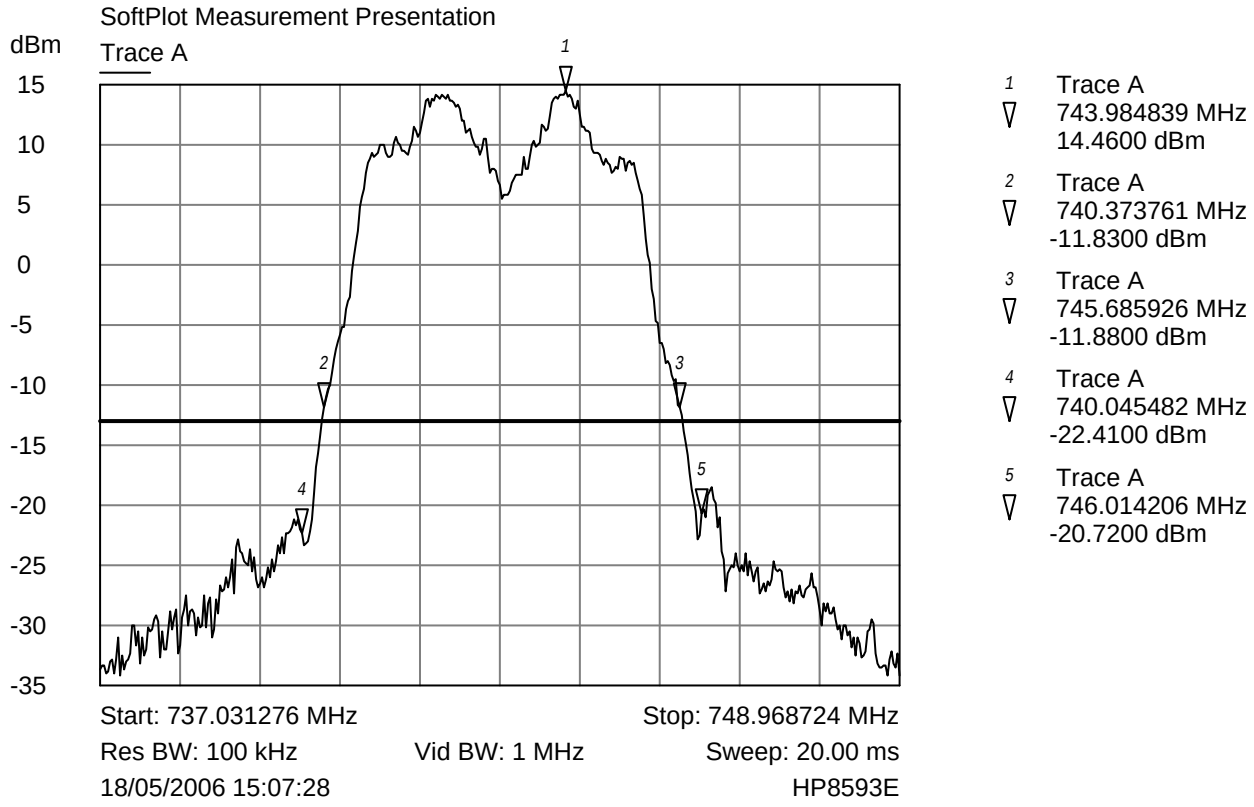
2 Trace A
740.373761 MHz
-12.0900 dBm

3 Trace A
745.715769 MHz
-12.6800 dBm

4 Trace A
740.045482 MHz
-22.0500 dBm

5 Trace A
746.014206 MHz
-21.3300 dBm

Test Results Plot No 6



1 Trace A
743.984839 MHz
14.4600 dBm

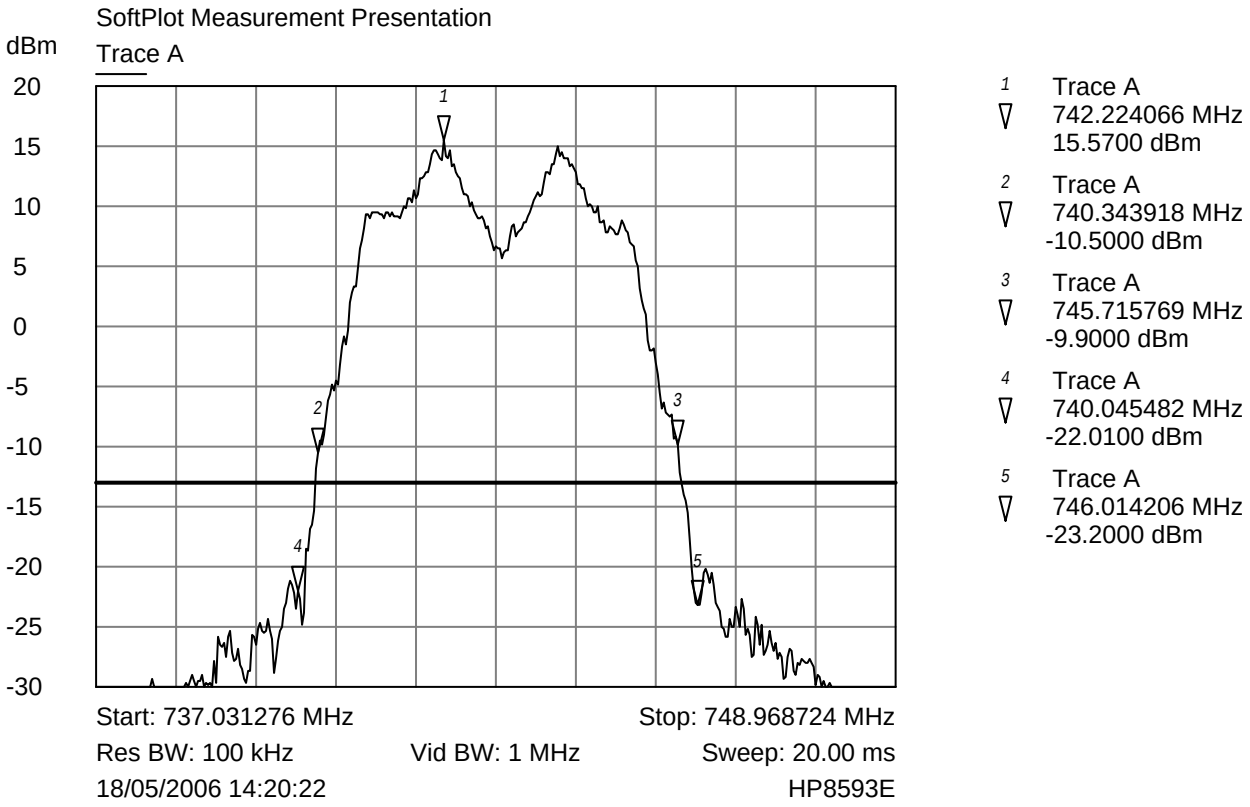
2 Trace A
740.373761 MHz
-11.8300 dBm

3 Trace A
745.685926 MHz
-11.8800 dBm

4 Trace A
740.045482 MHz
-22.4100 dBm

5 Trace A
746.014206 MHz
-20.7200 dBm

Test Results Plot No 7



1 Trace A
742.224066 MHz
15.5700 dBm

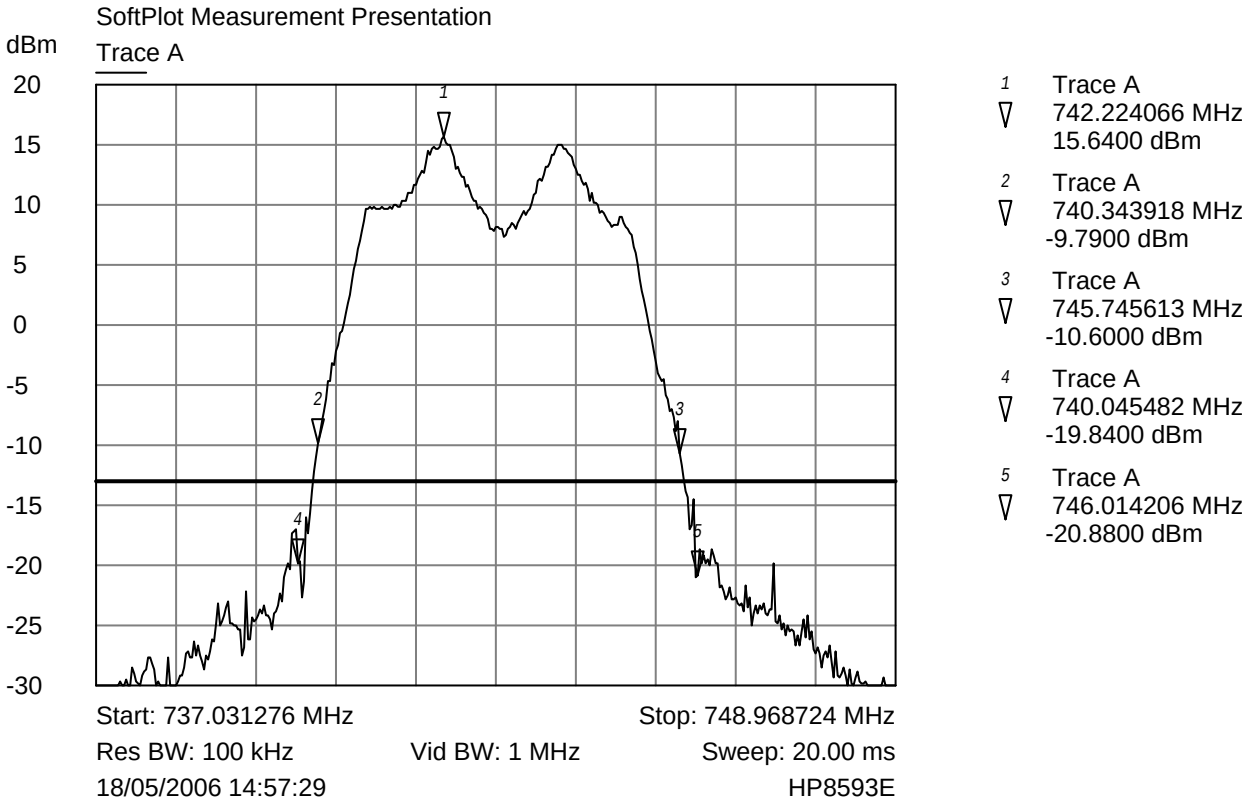
2 Trace A
740.343918 MHz
-10.5000 dBm

3 Trace A
745.715769 MHz
-9.9000 dBm

4 Trace A
740.045482 MHz
-22.0100 dBm

5 Trace A
746.014206 MHz
-23.2000 dBm

Test Results Plot No 8



1 Trace A
742.224066 MHz
15.6400 dBm

2 Trace A
740.343918 MHz
-9.7900 dBm

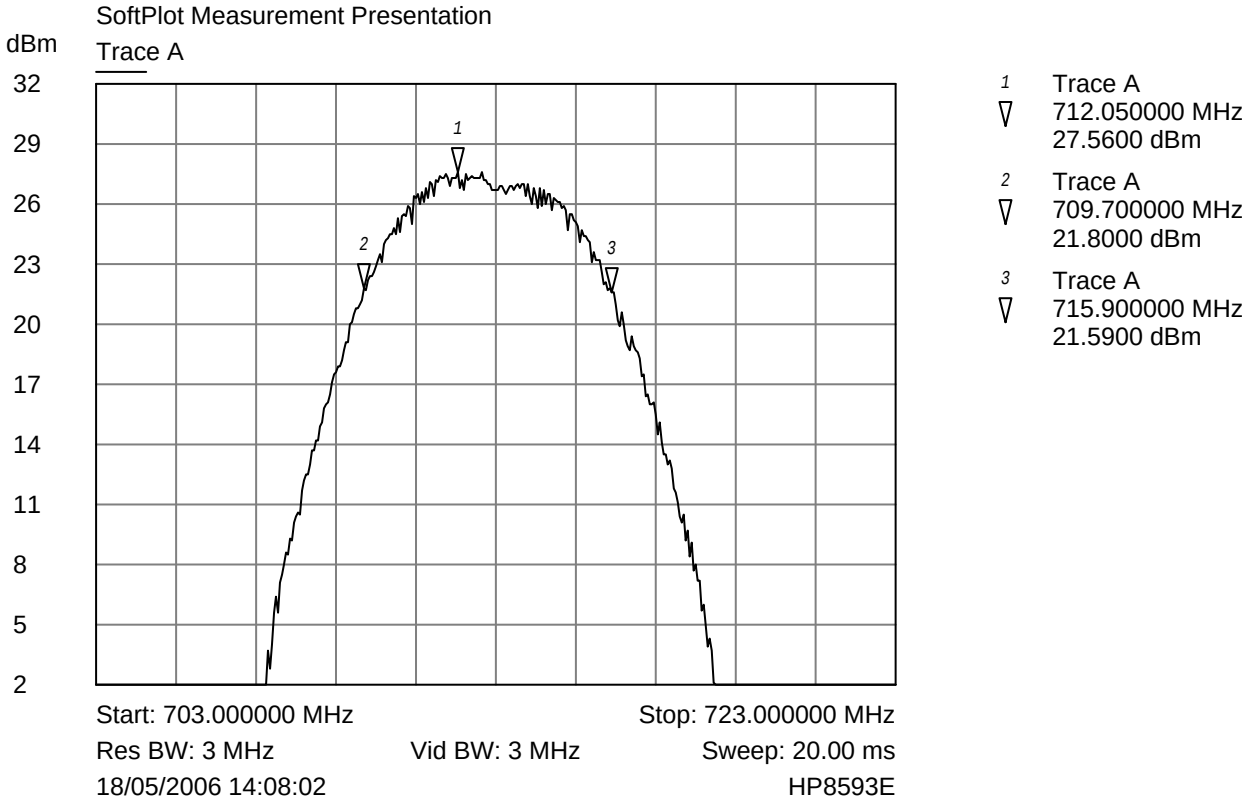
3 Trace A
745.745613 MHz
-10.6000 dBm

4 Trace A
740.045482 MHz
-19.8400 dBm

5 Trace A
746.014206 MHz
-20.8800 dBm

b. **Maximum peak output power plots 9, 10**

Test Results Plot No 9

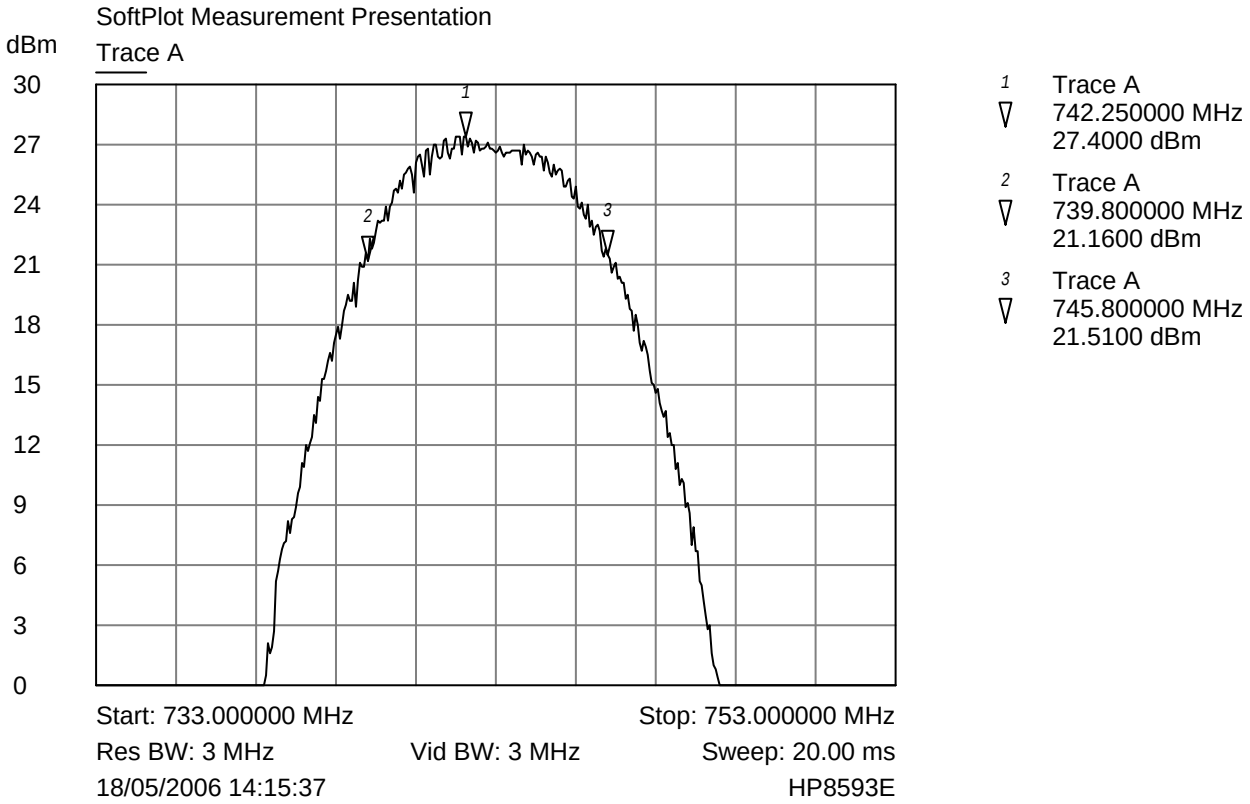


1 Trace A
712.050000 MHz
27.5600 dBm

2 Trace A
709.700000 MHz
21.8000 dBm

3 Trace A
715.900000 MHz
21.5900 dBm

Test Results Plot No 10



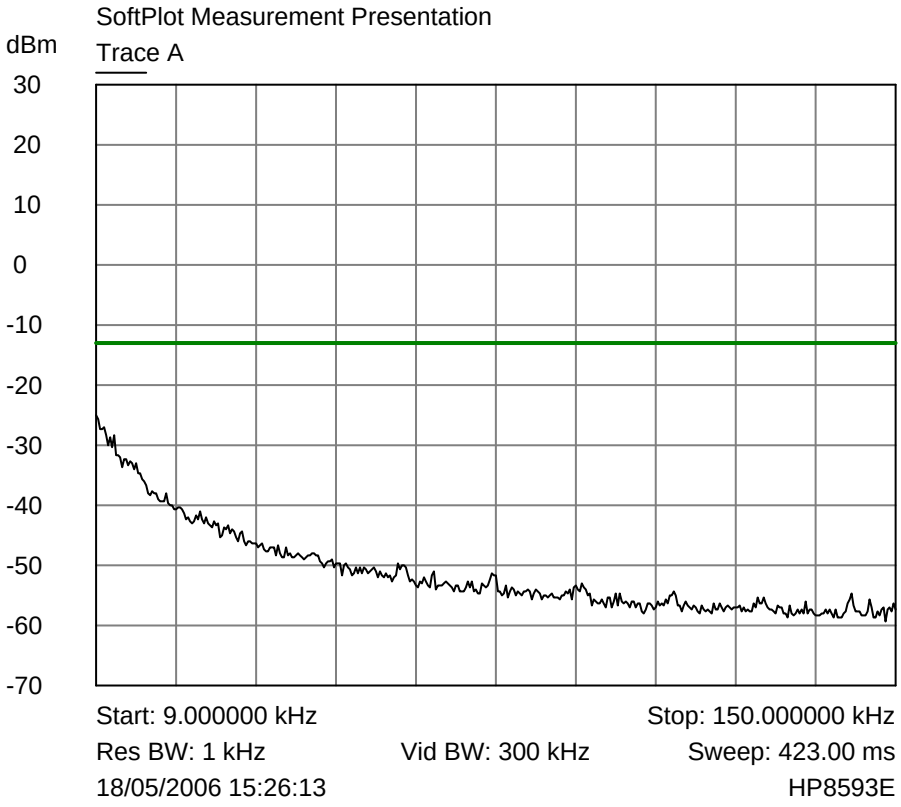
1 Trace A
742.250000 MHz
27.4000 dBm

2 Trace A
739.800000 MHz
21.1600 dBm

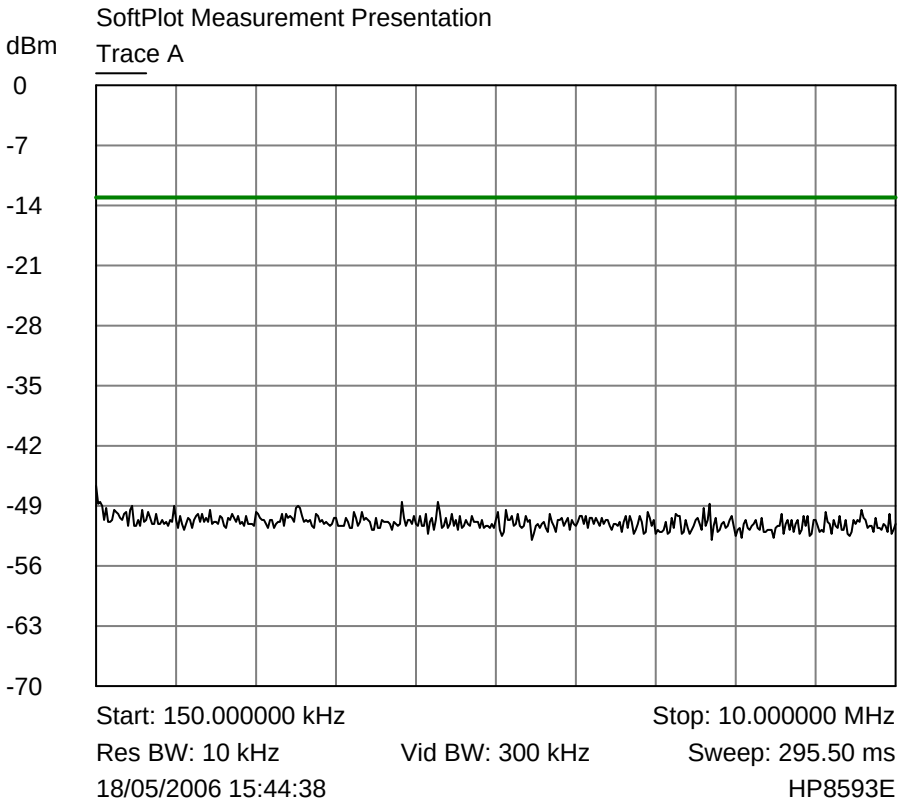
3 Trace A
745.800000 MHz
21.5100 dBm

c. **Spurious at antenna terminals 11 – 26**

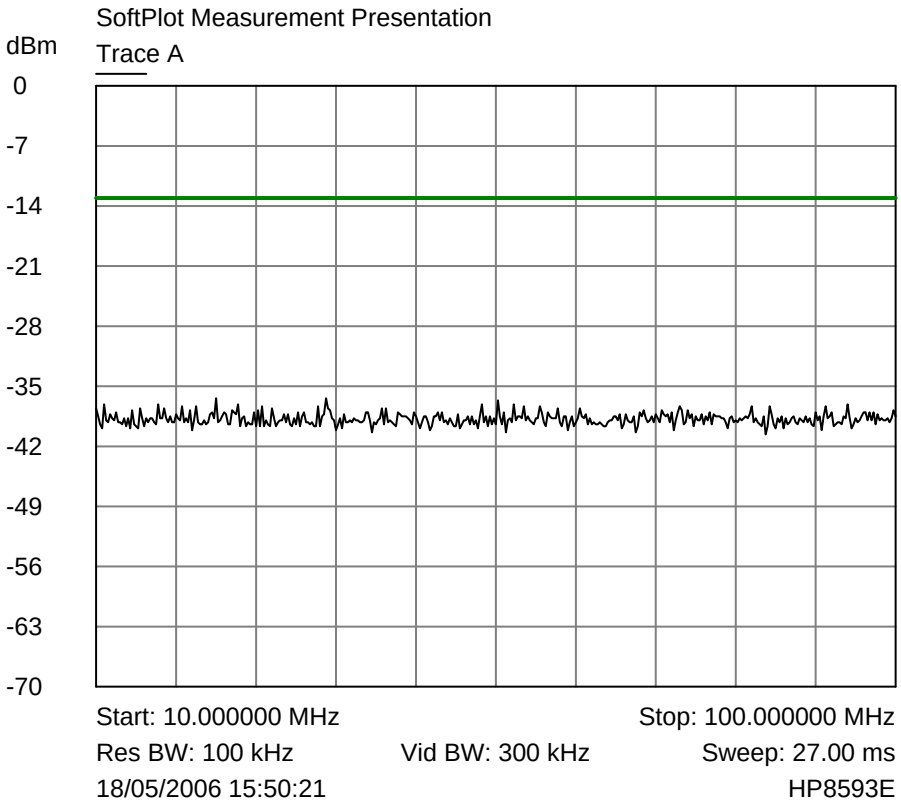
Test Results Plot No 11



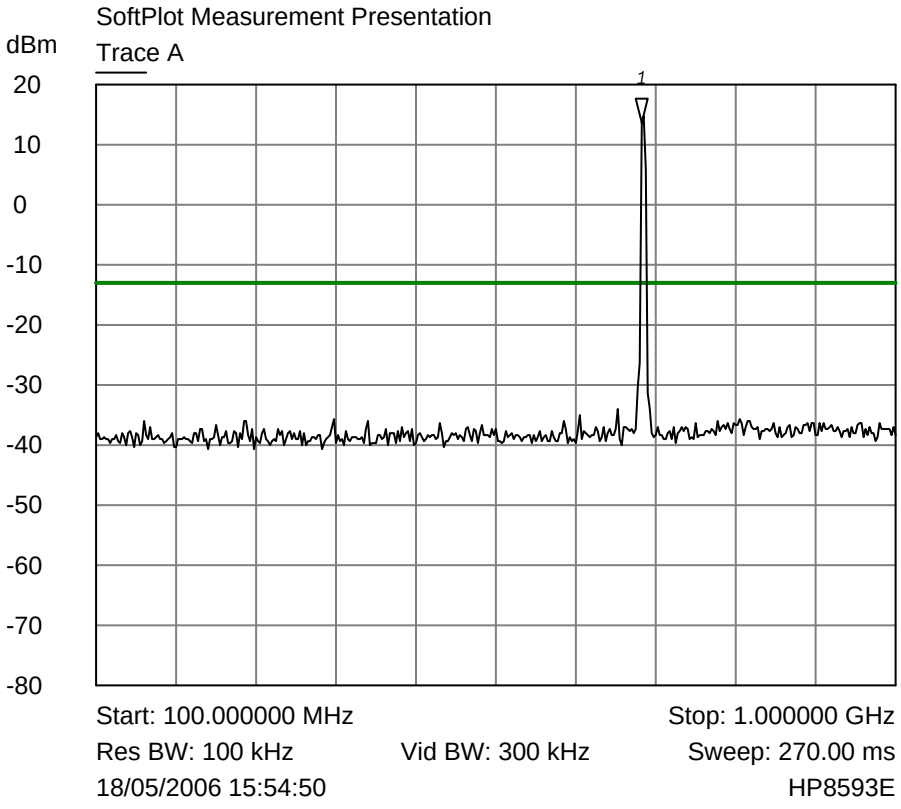
Test Results Plot No 12



Test Results Plot No 13

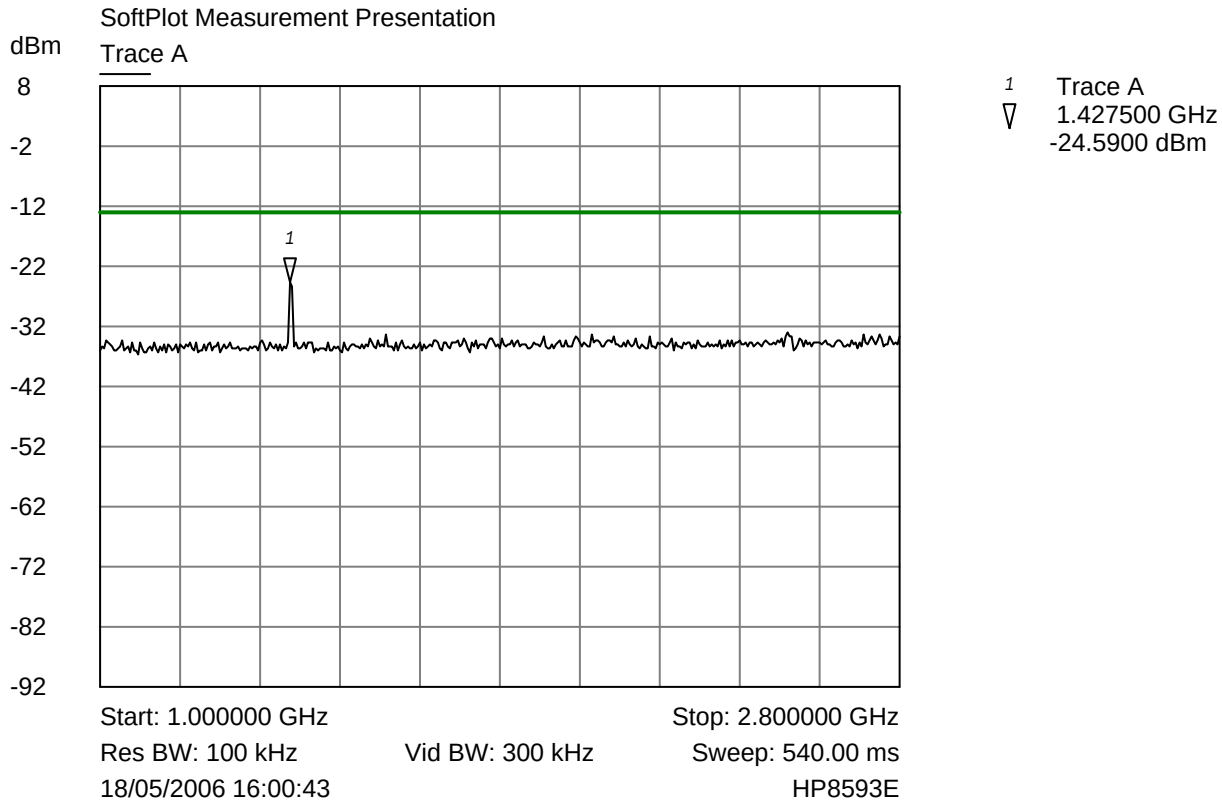


Test Results Plot No 14

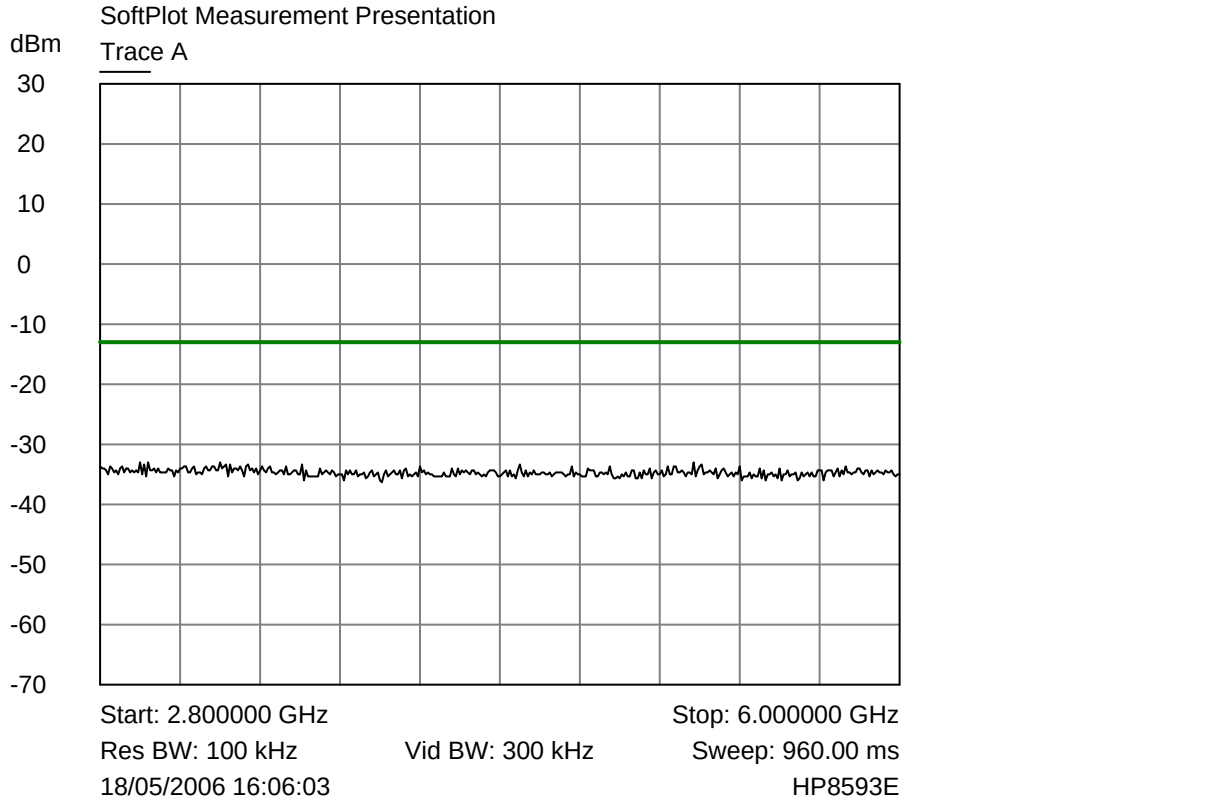


1 Trace A
714.250000 MHz
13.6400 dBm

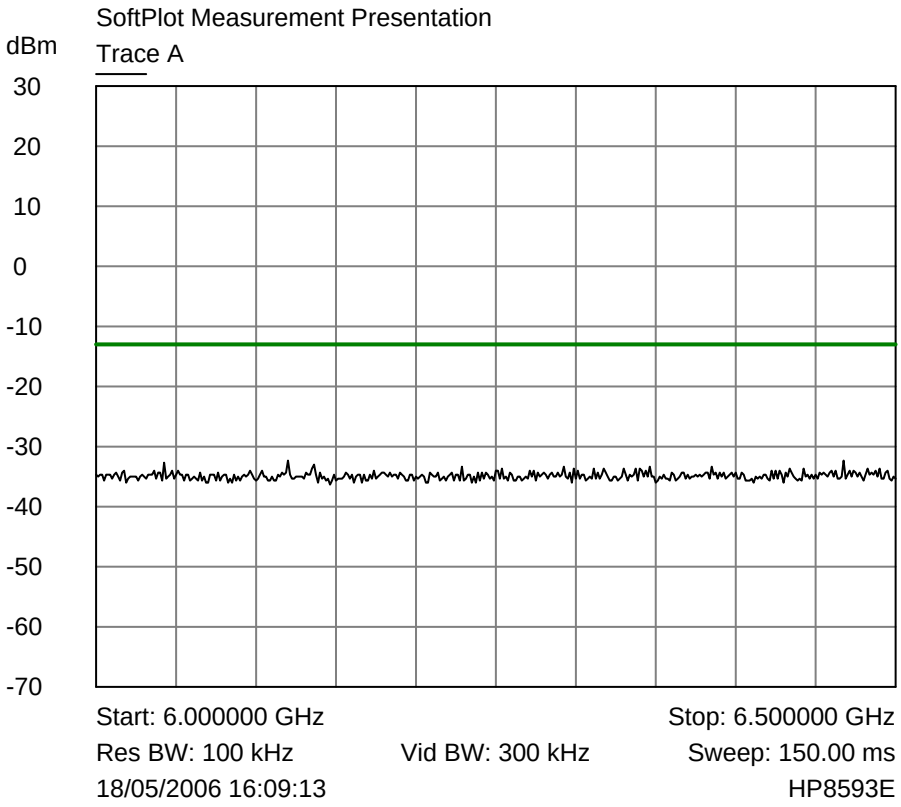
Test Results Plot No 15



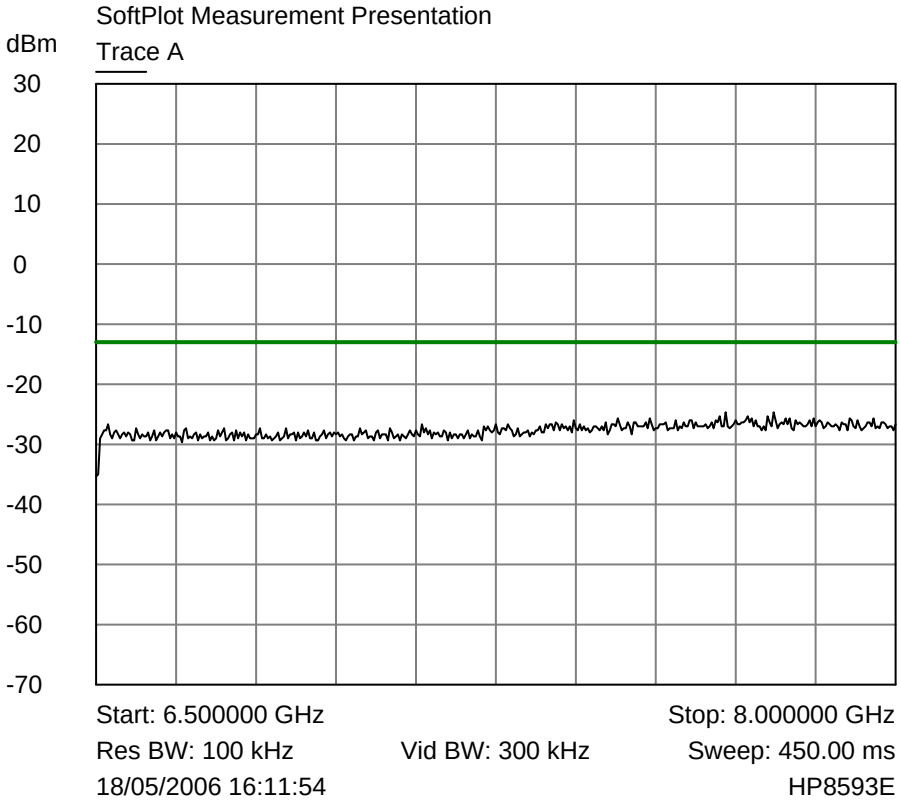
Test Results Plot No 16



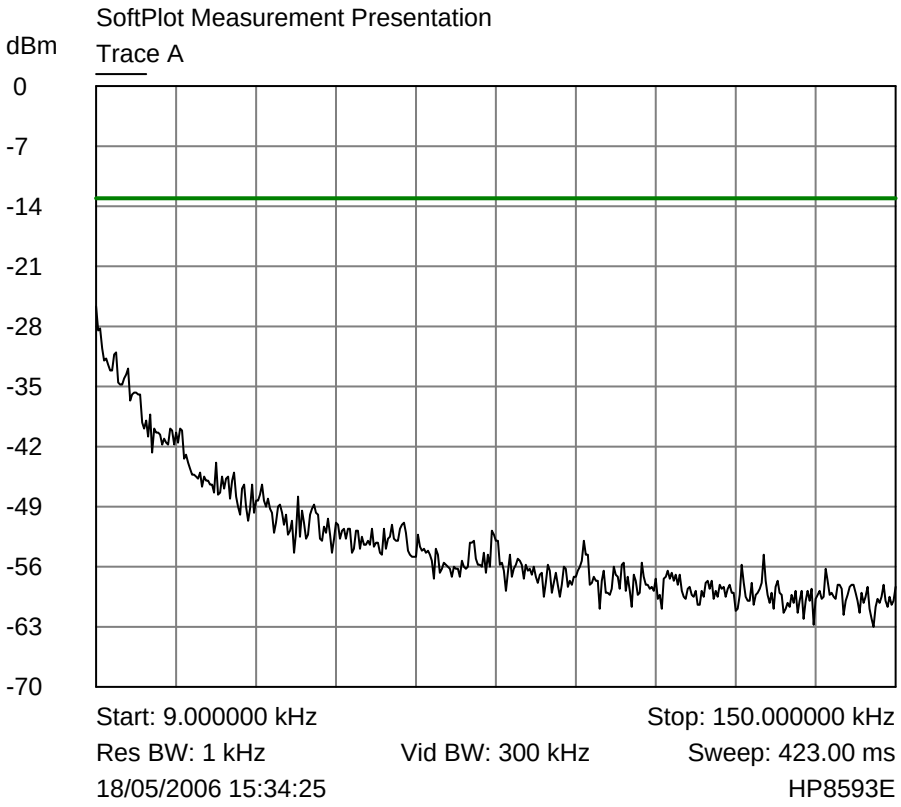
Test Results Plot No 17



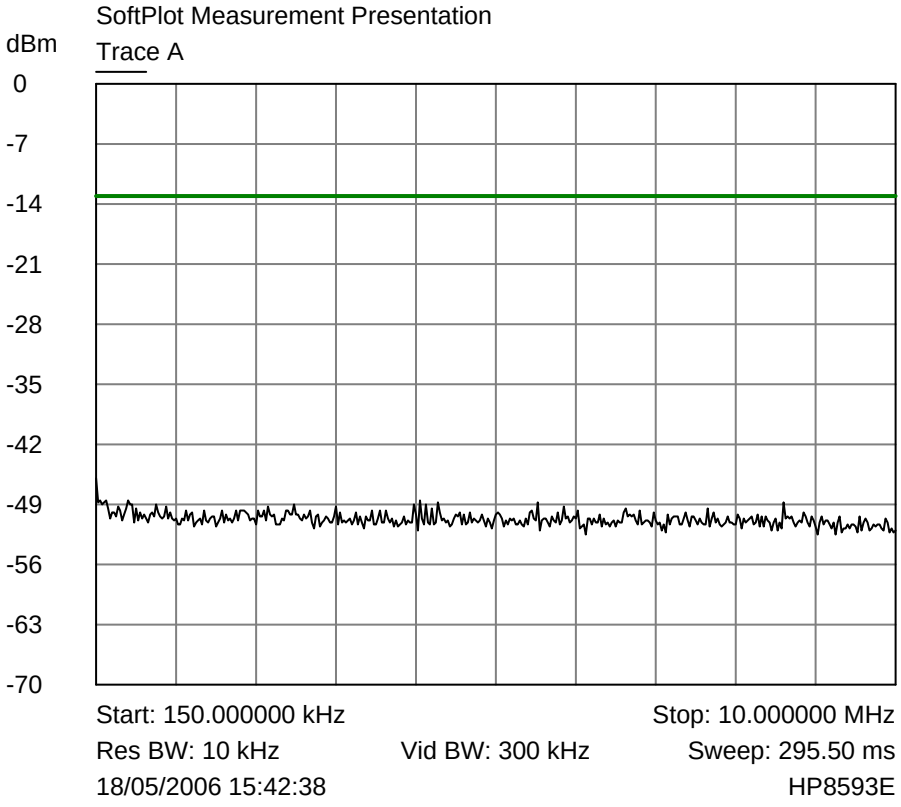
Test Results Plot No 18



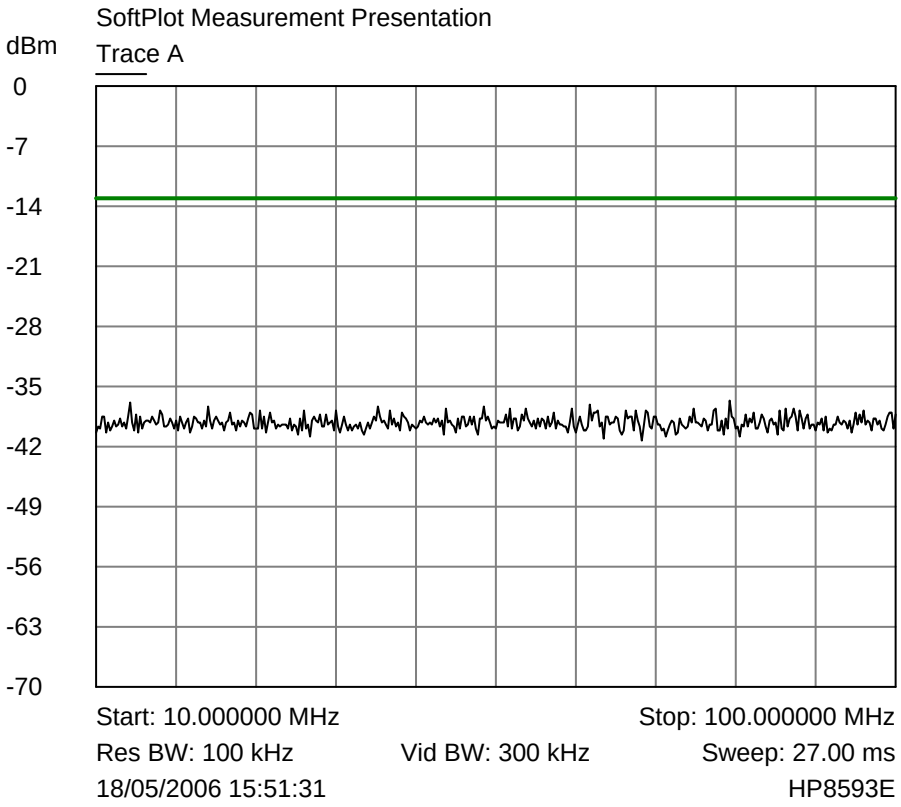
Test Results Plot No 19



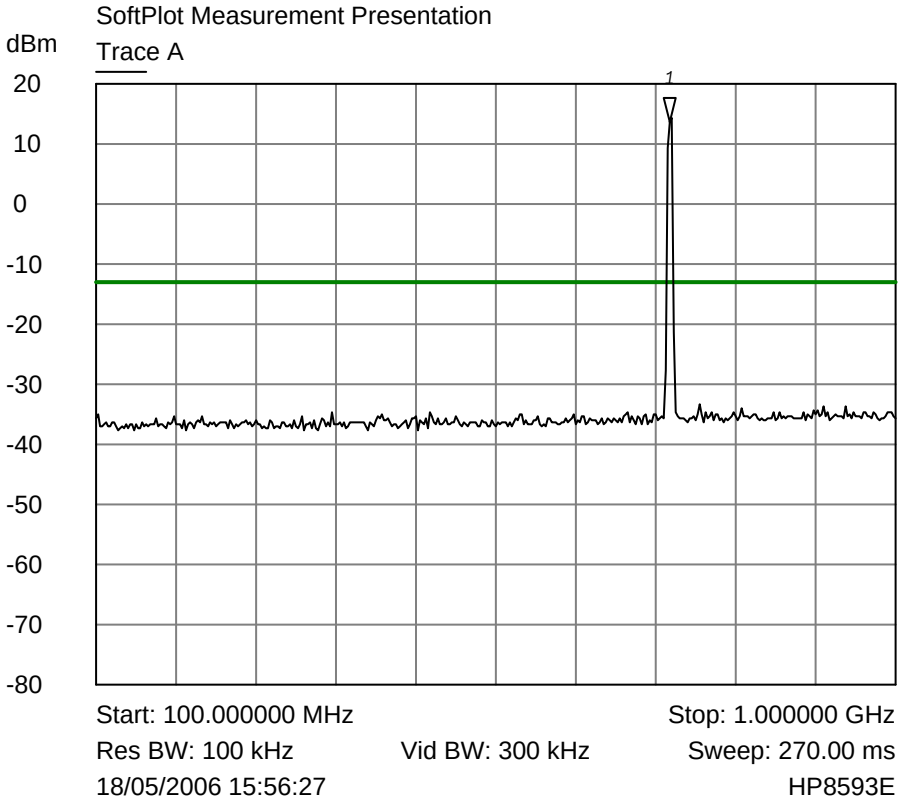
Test Results Plot No 20



Test Results Plot No 21

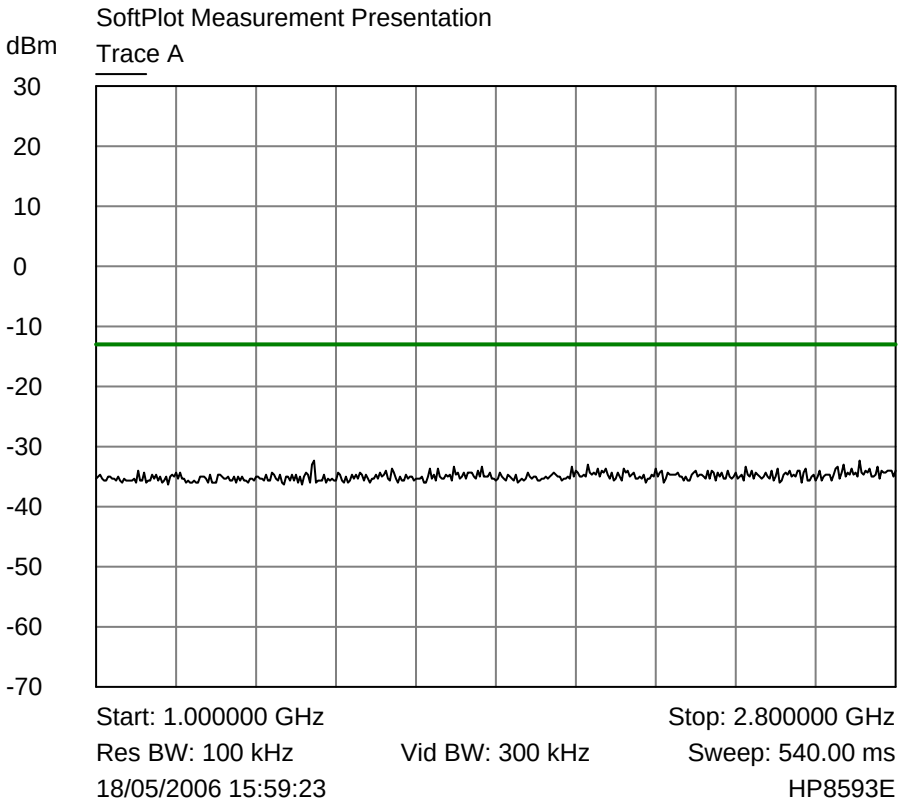


Test Results Plot No 22

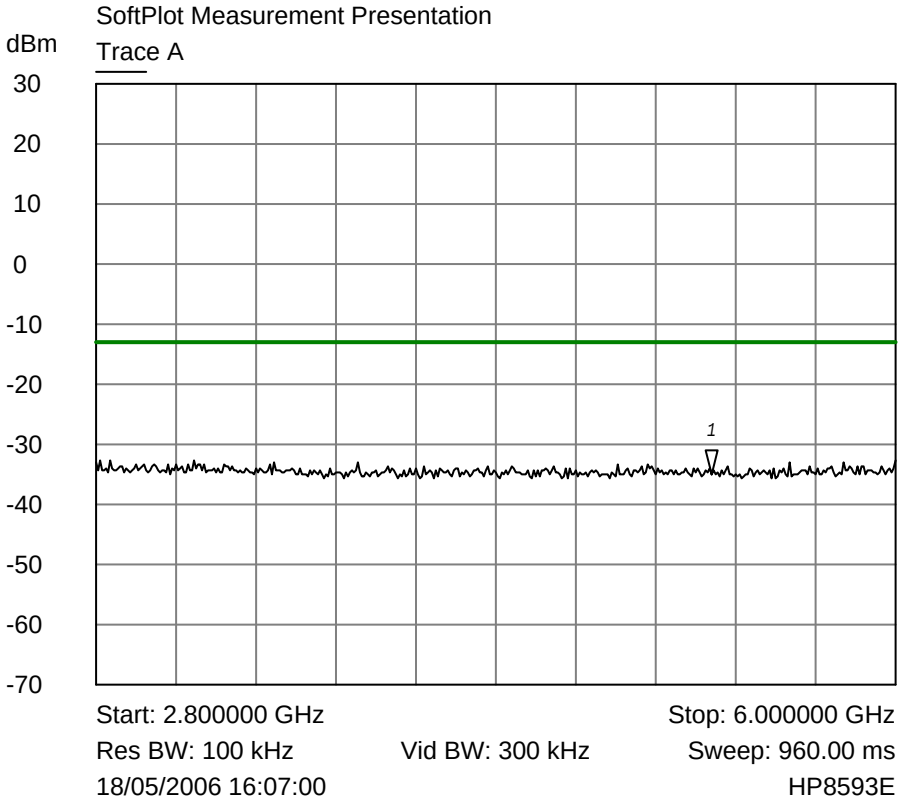


1 Trace A
745.750000 MHz
13.8300 dBm

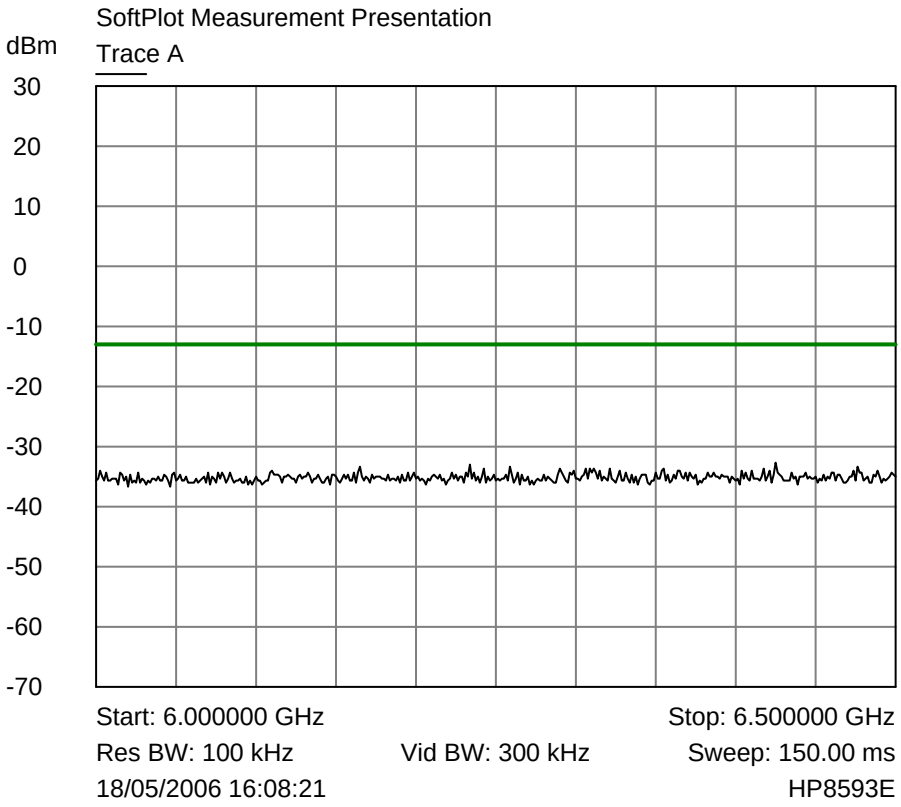
Test Results Plot No 23



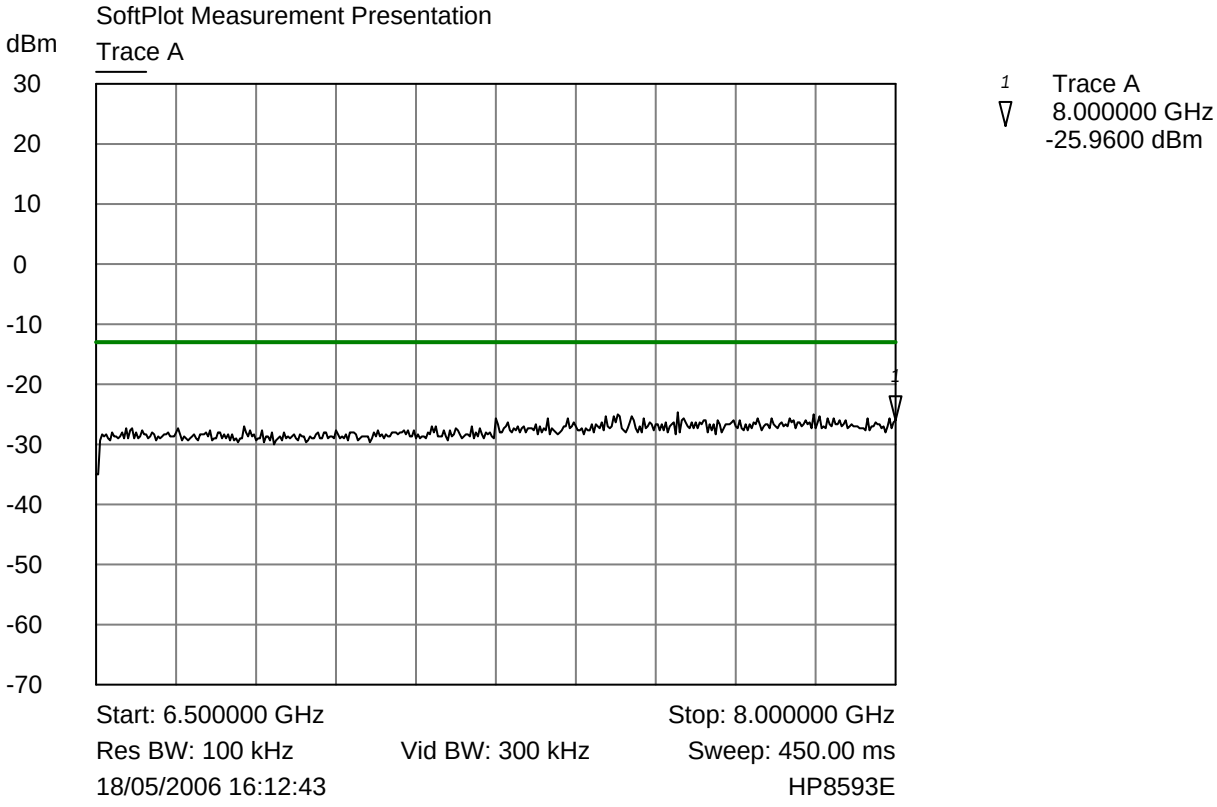
Test Results Plot No 24



Test Results Plot No 25



Test Results Plot No 26



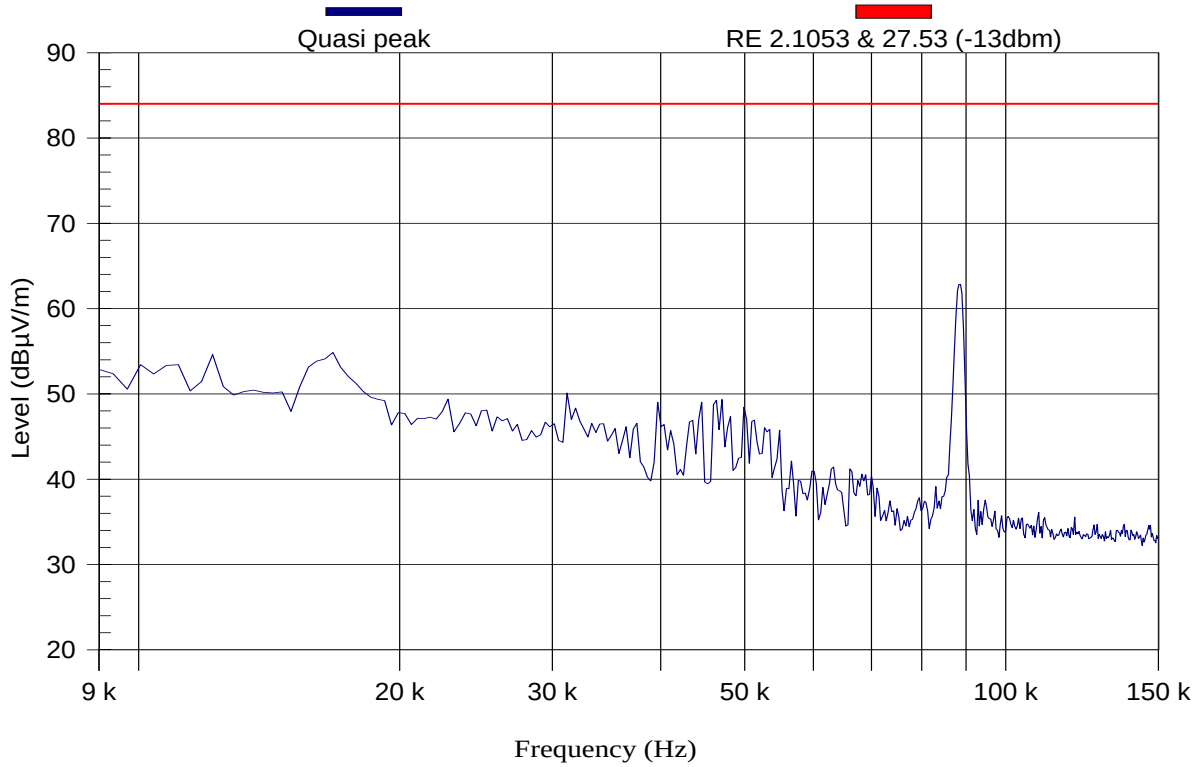
d. **Radiated spurious emission 27 – 41**

Test Results Plot No 27

FCC 2.1053 EMISSION 0.009-0.15MHz 713 10.5db VER

Test & EUT General Information		Receiver Setting	
EUT Name:	GA_OFDM 700	Spect Analyzer	S.A HP 8593E
S/N:	0050C24F73A4	Ref. Level:	90 dBµV
Date of Test:		RBW:	1000 Hz
Test Engineer:		VBW:	1000 kHz
Antenna:	BBH-1100\A	Sweep Time:	Auto: 423 ms
Polarization:	Vertical	Pre Amplifier	No Description Available

TEST REMARKS:17-05-2006



MAXIMUM RESULT DEVIATION:

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

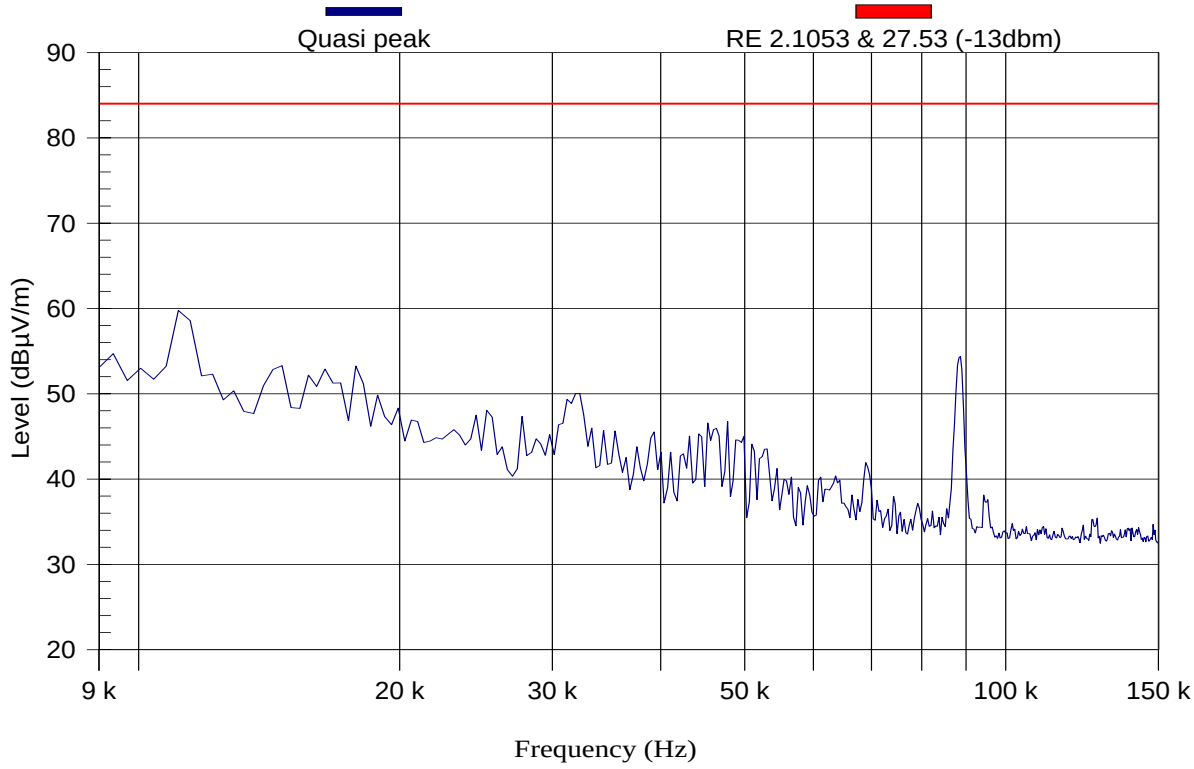
None

Test Results Plot No 28

FCC 2.1053 EMISSION 0.009-0.15MHz 713 10.5db HOR

Test & EUT General Information		Receiver Setting	
EUT Name:	GA_OFDM 700	Spect Analyzer	S.A HP 8593E
S/N:	0050C24F73A4	Ref. Level:	90 dBµV
Date of Test:		RBW:	1000 Hz
Test Engineer:		VBW:	1000 kHz
Antenna:	BBH-1100\A	Sweep Time:	Auto: 423 ms
Polarization:	Horizontal	Pre Amplifier	No Description Available

TEST REMARKS:17-05-2006



MAXIMUM RESULT DEVIATION:

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

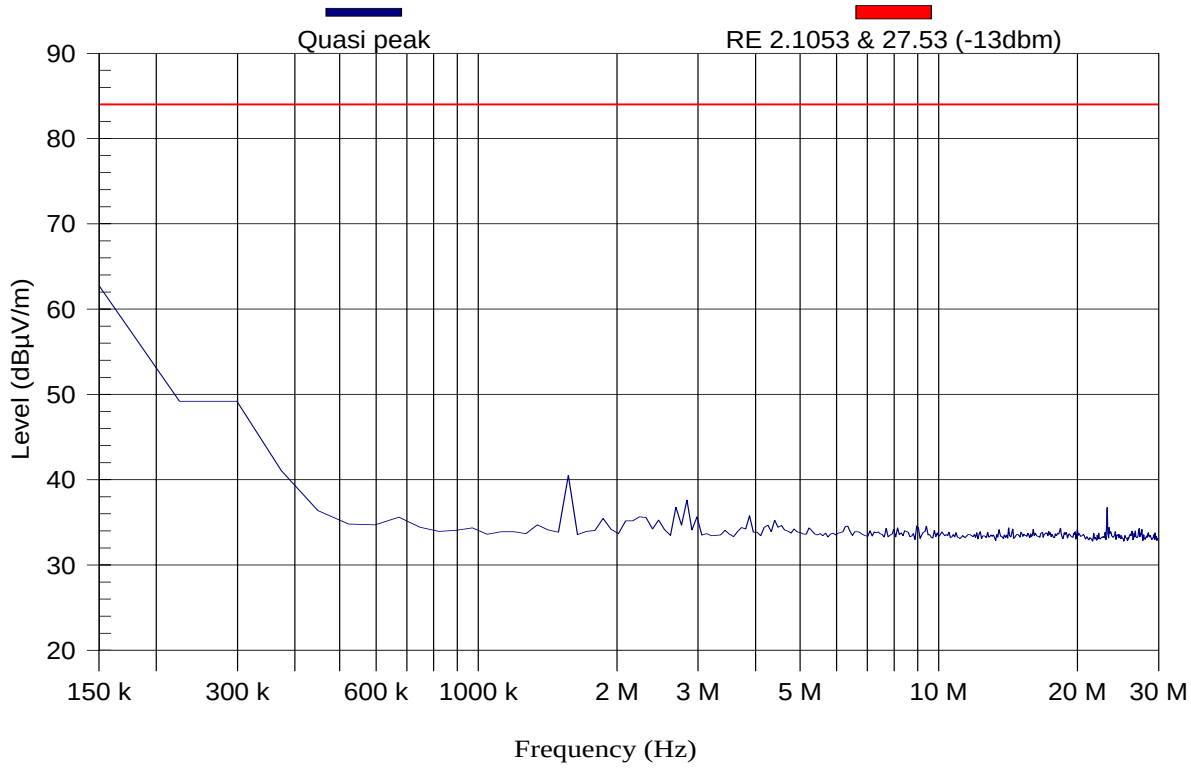
None

Test Results Plot No 29

FCC 2.1053 EMISSION 0.15-30MHz 713 10.5db VER

Test & EUT General Information		Receiver Setting	
EUT Name:	GA_OFDM 700	Spect Analyzer	S.A HP 8593E
S/N:	0050C24F73A4	Ref. Level:	90 dBµV
Date of Test:		RBW:	9 kHz
Test Engineer:		VBW:	1000 kHz
Antenna:	BBH-1100\A	Sweep Time:	Auto: 1.11 s
Polarization:	Vertical	Pre Amplifier	No Description Available

TEST REMARKS:17-05-2006



MAXIMUM RESULT DEVIATION:

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

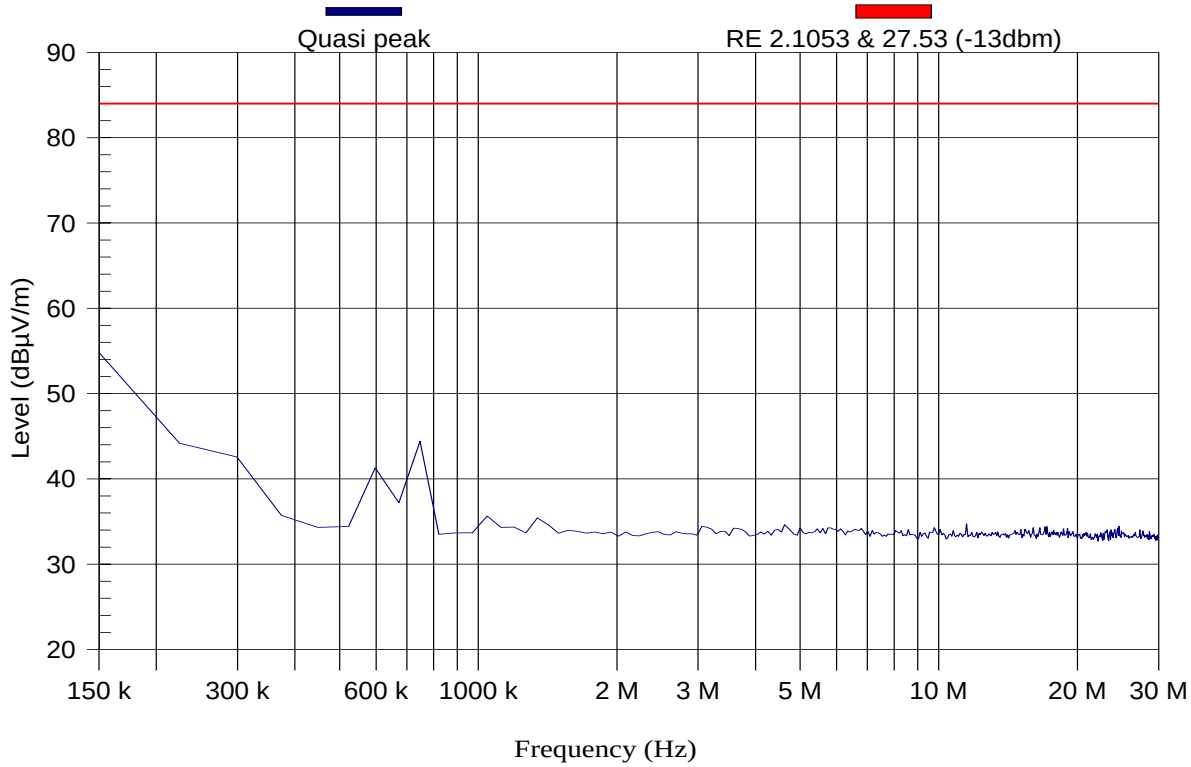
None

Test Results Plot No 30

FCC 2.1053 EMISSION 0.15-30MHz 713 10.5db HOR

Test & EUT General Information		Receiver Setting	
EUT Name:	GA_OFDM 700	Spect Analyzer	S.A HP 8593E
S/N:	0050C24F73A4	Ref. Level:	90 dBµV
Date of Test:		RBW:	9 kHz
Test Engineer:		VBW:	1000 kHz
Antenna:	BBH-1100\A	Sweep Time:	Auto: 1.11 s
Polarization:	Horizontal	Pre Amplifier	No Description Available

TEST REMARKS:17-05-2006



MAXIMUM RESULT DEVIATION:

Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.
None

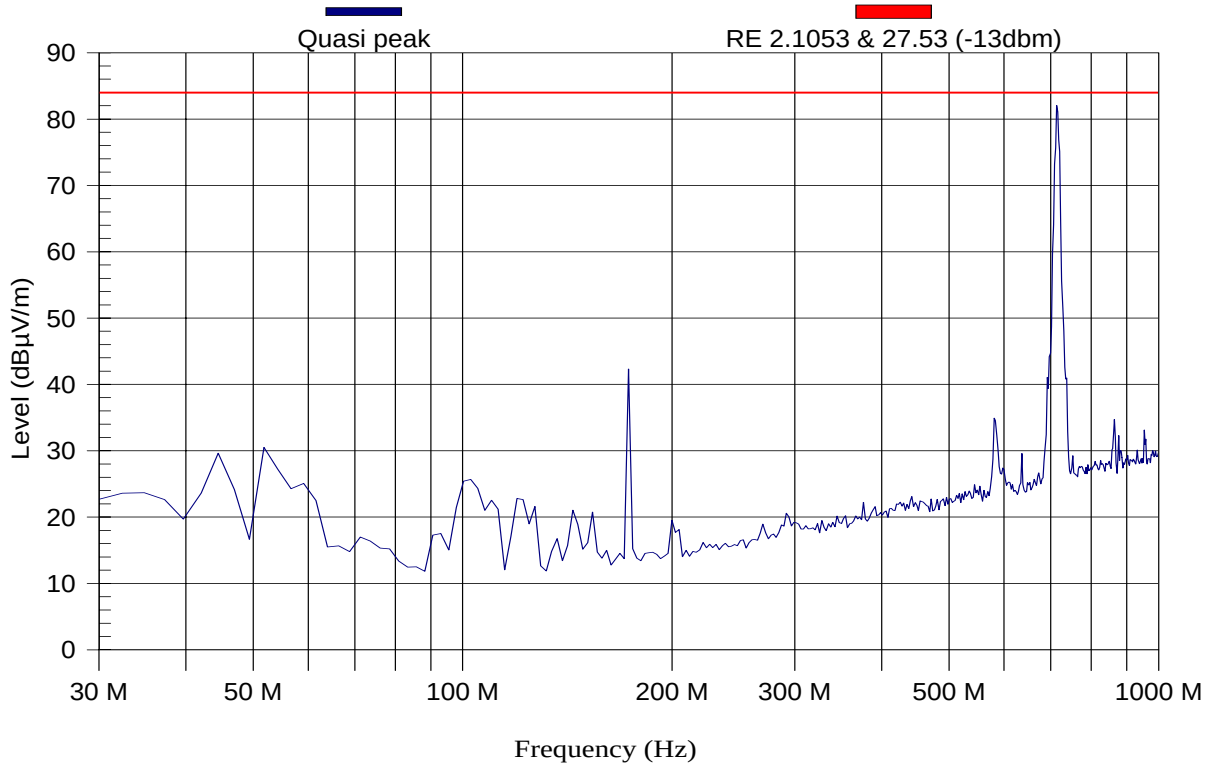
Test Results Plot No 31

RE102 FCC-2.1047,2.1051,27.53f 30-1000MHz 713MHz TX

Q.P

Test & EUT General Information		Receiver Setting	
EUT Name:	GA_OFDM 700	Spect Analyzer	Hewlett Packard 7405A
S/N:	0050C24F73A4	Ref. Level:	100 dBµV
Date of Test:		RBW:	120 kHz
Test Engineer:		VBW:	1000 kHz
Antenna:	Frankonia BTA-L_A 3m	Sweep Time:	Auto: 202.08 ms
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA 29db 0.01-1GHz No-3

TEST REMARKS:17-05-2006



MAXIMUM RESULT DEVIATION:

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

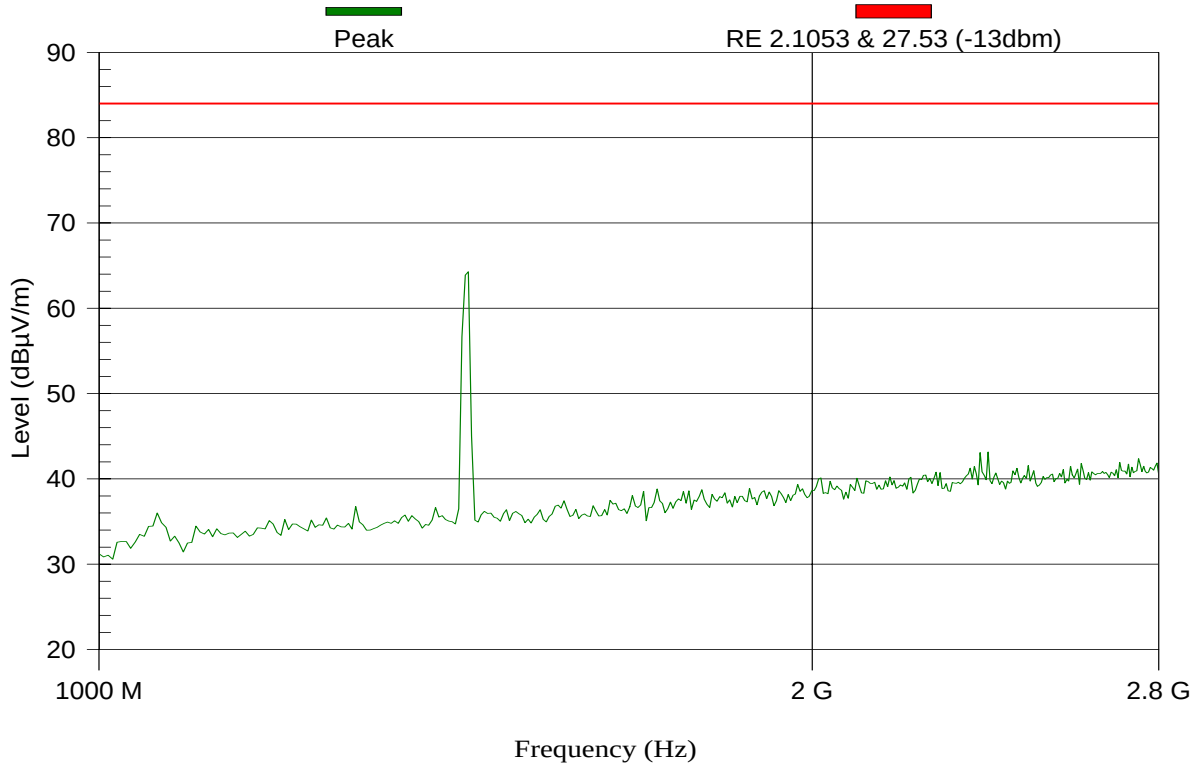
Frequency (MHz)	PK MaxHold (dBµV/m)	Limit (dBµV/m)	QP Limit (dBµV/m)	Result	Angle degrees	Hi (m)	H/V
711.728	79.7	78	84	Pass	0	1.3	V
717.685	78.8	67.6	84	Pass	0	1.6	V

Test Results Plot No 32

FCC 2.1053,27.53 1-2.8GHz TX 713MHz 10.5dbi

Test & EUT General Information		Receiver Setting	
EUT Name:	GA_OFDM 700	Spect Analyzer	S.A HP 8593E
S/N:	0050C24F73A4	Ref. Level:	90 dBµV
Date of Test:		RBW:	1000 kHz
Test Engineer:		VBW:	1000 kHz
Antenna:	ARA DRG-118/A 1-18 GHz 1317	Sweep Time:	Auto: 36 ms
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA 44db 6-18 GHz

TEST REMARKS:17-05-2006



MAXIMUM RESULT DEVIATION:

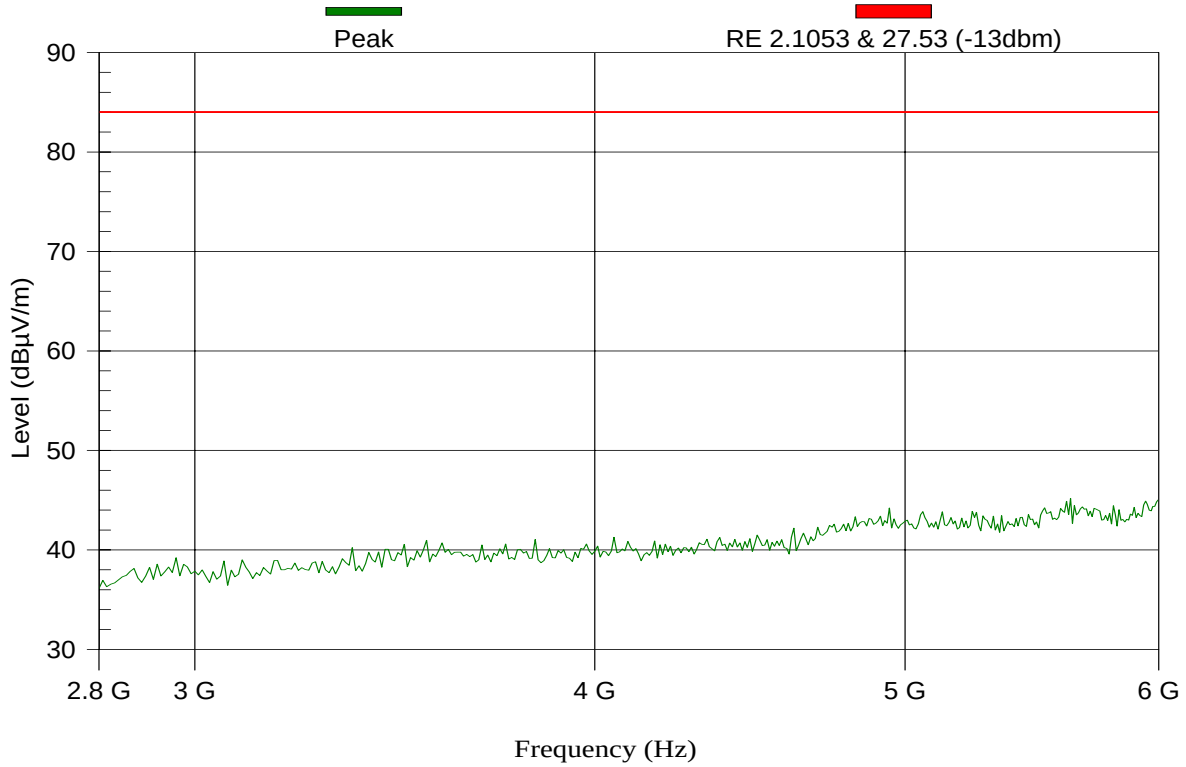
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.

Test Results Plot No 33

FCC 2.1053,27.53 2.8-6GHz TX 713MHz 10.5dbi

Test & EUT General Information		Receiver Setting	
EUT Name:	GA_OFDM 700	Spect Analyzer	S.A HP 8593E
S/N:	0050C24F73A4	Ref. Level:	90 dBµV
Date of Test:		RBW:	1000 kHz
Test Engineer:		VBW:	1000 kHz
Antenna:	ARA DRG-118/A 1-18 GHz 1317	Sweep Time:	Auto: 64 ms
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA 44db 2-6 GHz

TEST REMARKS:17-05-2006



MAXIMUM RESULT DEVIATION:

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

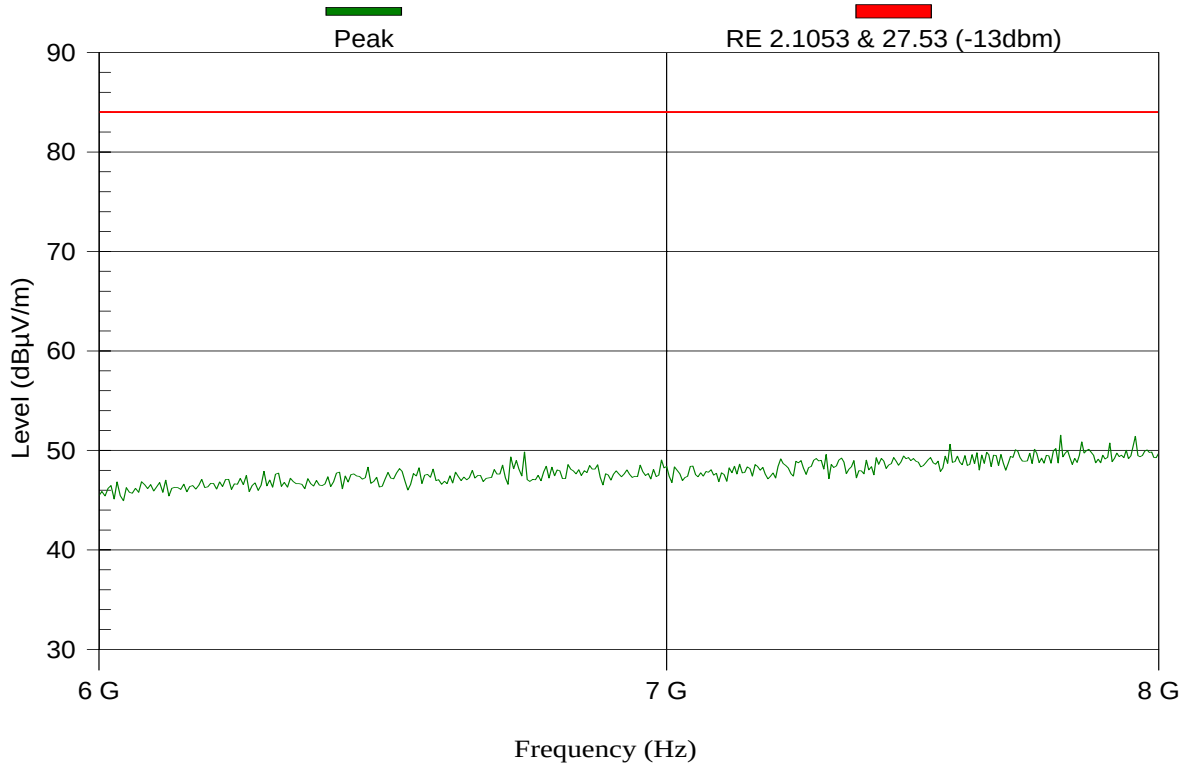
None

Test Results Plot No 34

FCC 2.1053,27.53 6-8GHz TX 713MHz 10.5dbi

Test & EUT General Information		Receiver Setting	
EUT Name:	GA_OFDM 700	Spect Analyzer	S.A HP 8593E
S/N:	0050C24F73A4	Ref. Level:	90 dBµV
Date of Test:		RBW:	1000 kHz
Test Engineer:		VBW:	1000 kHz
Antenna:	ARA DRG-118/A 1-18 GHz 1317	Sweep Time:	Auto: 49.83 ms
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA 44db 2-6 GHz

TEST REMARKS:17-05-2006



MAXIMUM RESULT DEVIATION:

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

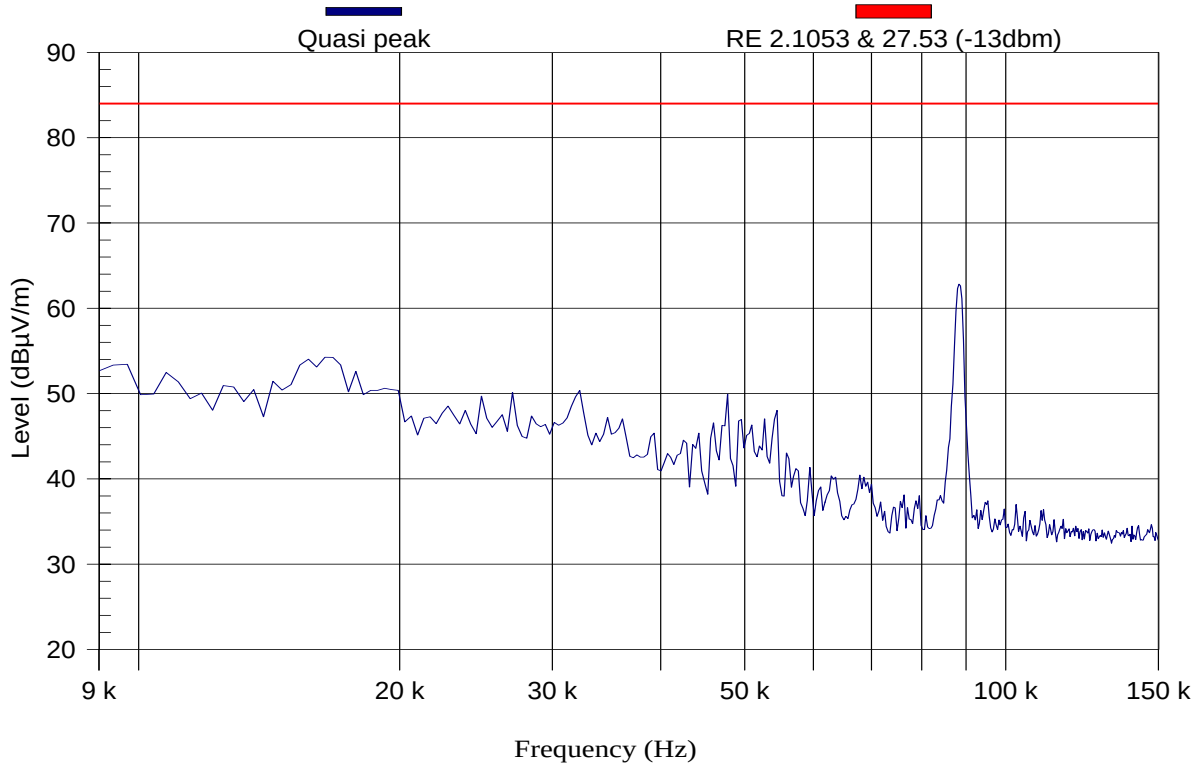
None

Test Results Plot No 35

FCC 2.1053 EMISSION 0.009-0.15MHz 743 10.5db VER

Test & EUT General Information		Receiver Setting	
EUT Name:	GA_OFDM 700	Spect Analyzer	S.A HP 8593E
S/N:	0050C24F73A4	Ref. Level:	90 dBµV
Date of Test:		RBW:	1000 Hz
Test Engineer:		VBW:	1000 kHz
Antenna:	BBH-1100\A	Sweep Time:	Auto: 423 ms
Polarization:	Vertical	Pre Amplifier	No Description Available

TEST REMARKS:17-05-2006



MAXIMUM RESULT DEVIATION:

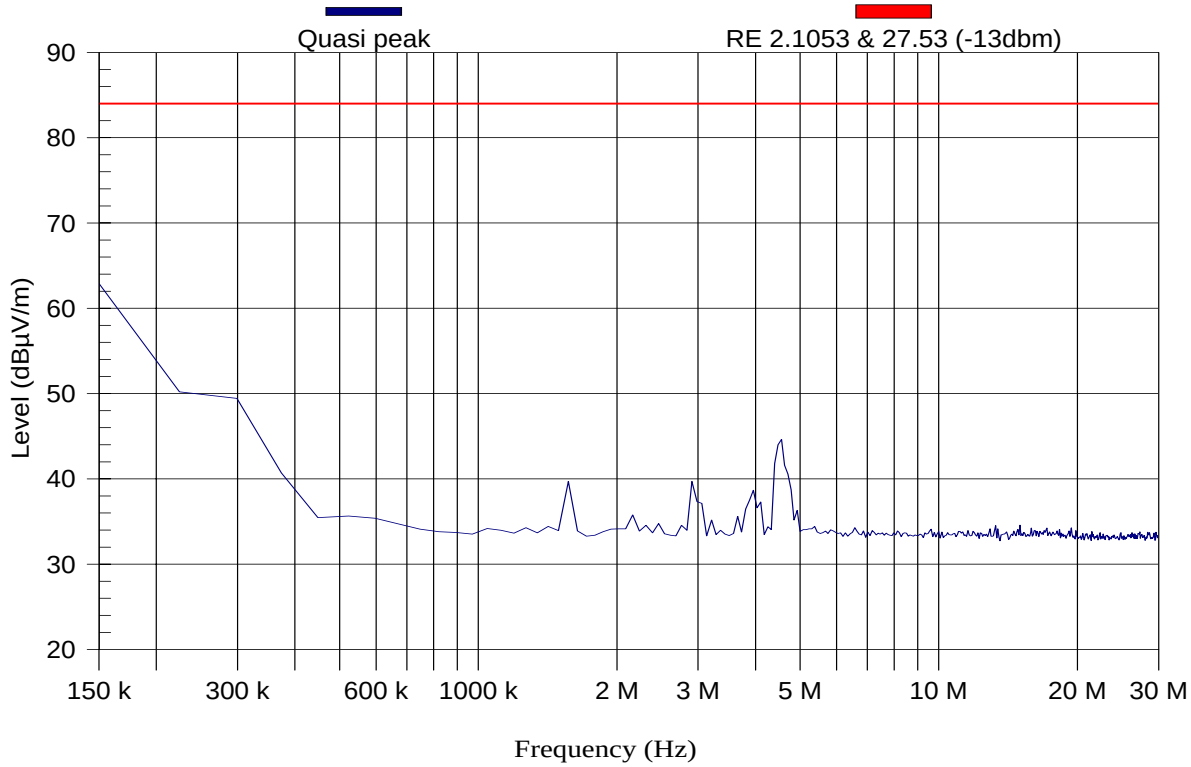
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.
None

Test Results Plot No 36

FCC 2.1053 EMISSION 0.15-30MHz 743 10.5db VER

Test & EUT General Information		Receiver Setting	
EUT Name:	GA_OFDM 700	Spect Analyzer	S.A HP 8593E
S/N:	0050C24F73A4	Ref. Level:	90 dBµV
Date of Test:		RBW:	9 kHz
Test Engineer:		VBW:	1000 kHz
Antenna:	BBH-1100\A	Sweep Time:	Auto: 1.11 s
Polarization:	Vertical	Pre Amplifier	No Description Available

TEST REMARKS:17-05-2006



MAXIMUM RESULT DEVIATION:

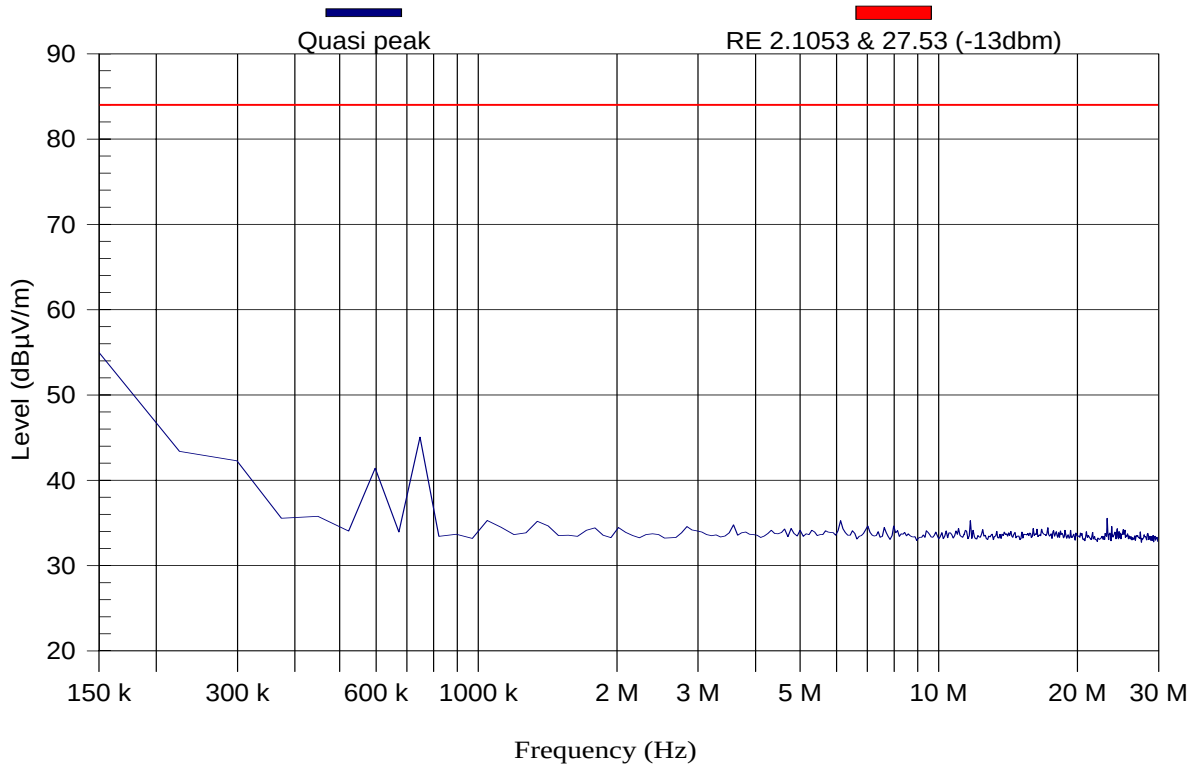
Detect all peaks above 6 dB below the limit line with a maximum of 6 peaks.
None

Test Results Plot No 37

FCC 2.1053 EMISSION 0.15-30MHz 743 10.5db HOR

Test & EUT General Information		Receiver Setting	
EUT Name:	GA_OFDM 700	Spect Analyzer	S.A HP 8593E
S/N:	0050C24F73A4	Ref. Level:	90 dBµV
Date of Test:		RBW:	9 kHz
Test Engineer:		VBW:	1000 kHz
Antenna:	BBH-1100\A	Sweep Time:	Auto: 1.11 s
Polarization:	Horizontal	Pre Amplifier	No Description Available

TEST REMARKS:17-05-2006



MAXIMUM RESULT DEVIATION:

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

None

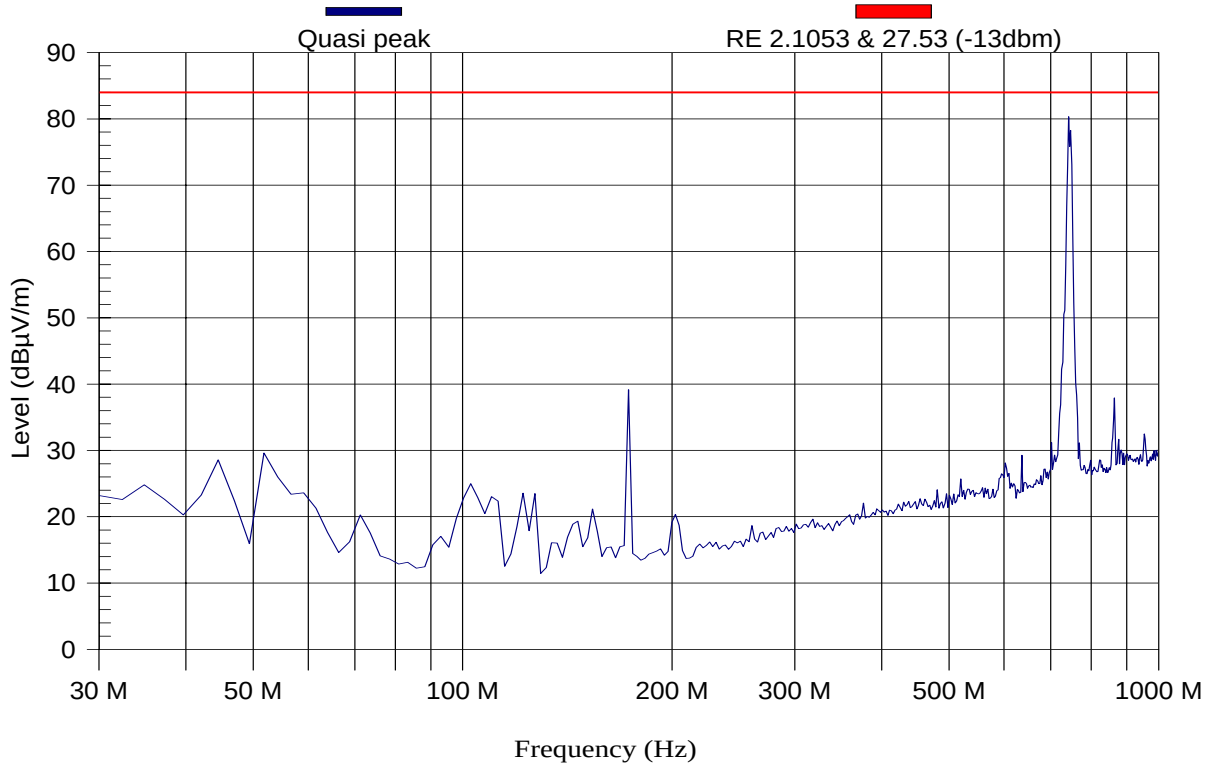
Test Results Plot No 38

RE102 FCC-2.1047,2.1051,27.53f 30-1000MHz 743MHz TX

Q.P

Test & EUT General Information		Receiver Setting	
EUT Name:	GA_OFDM 700	Spect Analyzer	S.A HP 8593E
S/N:	0050C24F73A4	Ref. Level:	100 dBµV
Date of Test:		RBW:	120 kHz
Test Engineer:		VBW:	1000 kHz
Antenna:	Frankonia BTA-L_A 3m	Sweep Time:	Auto: 202.08 ms
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA 29db 0.01-1GHz No-3

TEST REMARKS:17-05-2006



MAXIMUM RESULT DEVIATION:

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

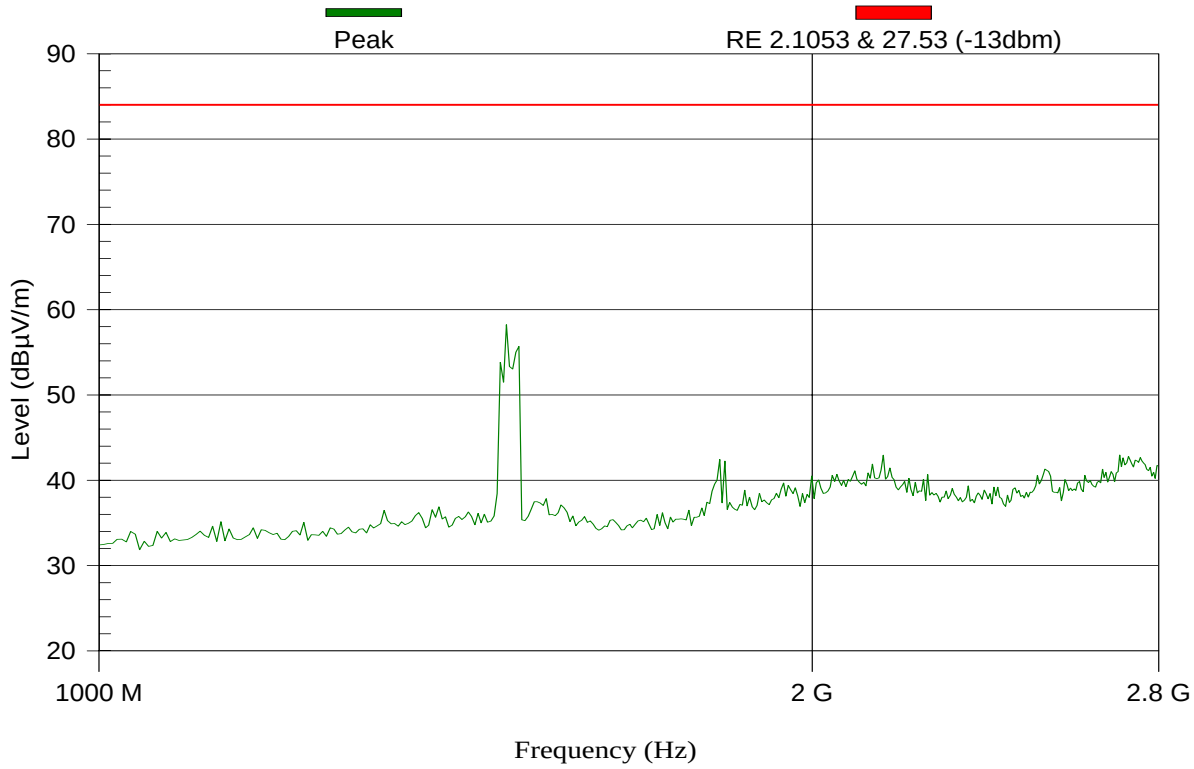
Frequency (MHz)	PK MaxHold (dBµV/m)	QP (dBµV/m)	QP Limit (dBµV/m)	Result	Angle (degrees)	Height (m)	H/V
740.948	79.2	78.1	84	Pass	0	1.3	V
744.942	81.7	74.7	84	Pass	0	1.3	V

Test Results Plot No 39

FCC 2.1053,27.53 1-2.8GHz TX 743MHz 10.5dbi

Test & EUT General Information		Receiver Setting	
EUT Name:	GA_OFDM 700	Spect Analyzer	S.A HP 8593E
S/N:	0050C24F73A4	Ref. Level:	90 dBµV
Date of Test:		RBW:	1000 kHz
Test Engineer:		VBW:	1000 kHz
Antenna:	ARA DRG-118/A 1-18 GHz 1317	Sweep Time:	Auto: 36 ms
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA 44db 2-6 GHz

TEST REMARKS:17-05-2006



MAXIMUM RESULT DEVIATION:

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

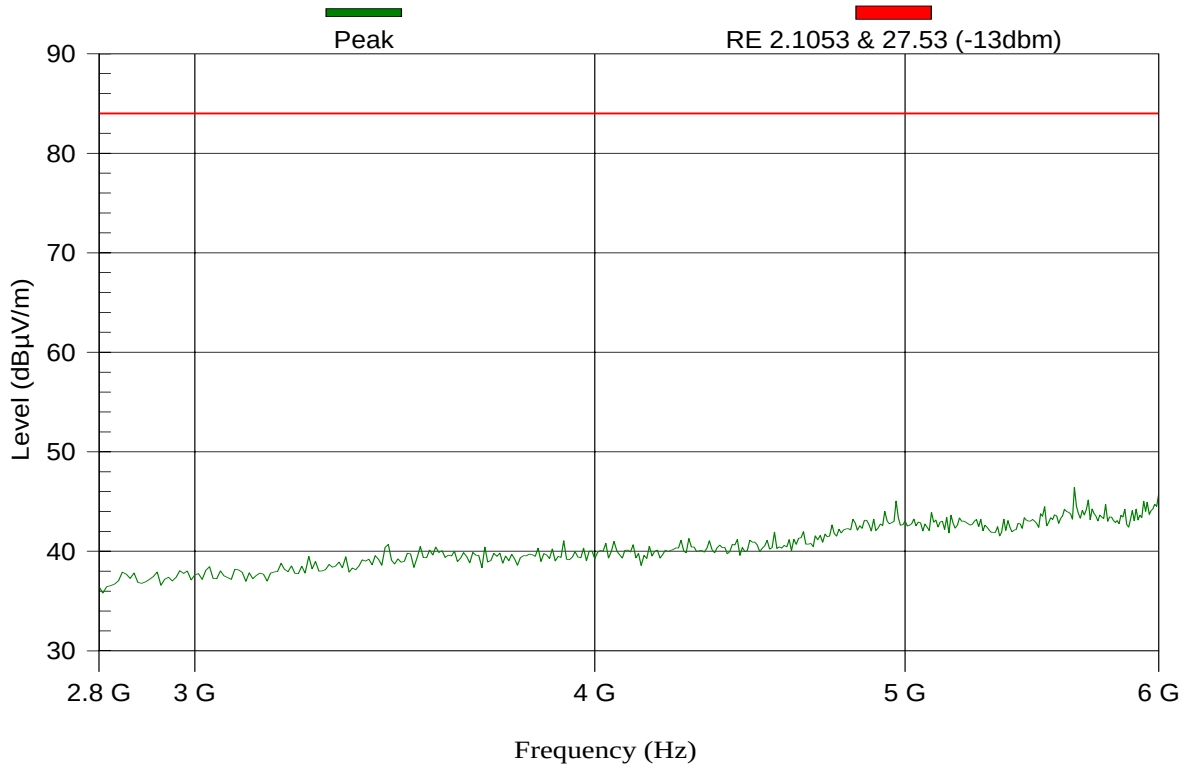
None

Test Results Plot No 40

FCC 2.1053,27.53 2.8-6GHz TX 743MHz 10.5dbi

Test & EUT General Information		Receiver Setting	
EUT Name:	GA_OFDM 700	Spect Analyzer	S.A HP 8593E
S/N:	0050C24F73A4	Ref. Level:	90 dBµV
Date of Test:		RBW:	1000 Hz
Test Engineer:		VBW:	1000 kHz
Antenna:	ARA DRG-118/A 1-18 GHz 1317	Sweep Time:	Auto: 64 ms
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA 44db 2-6 GHz

TEST REMARKS:17-05-2006



MAXIMUM RESULT DEVIATION:

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

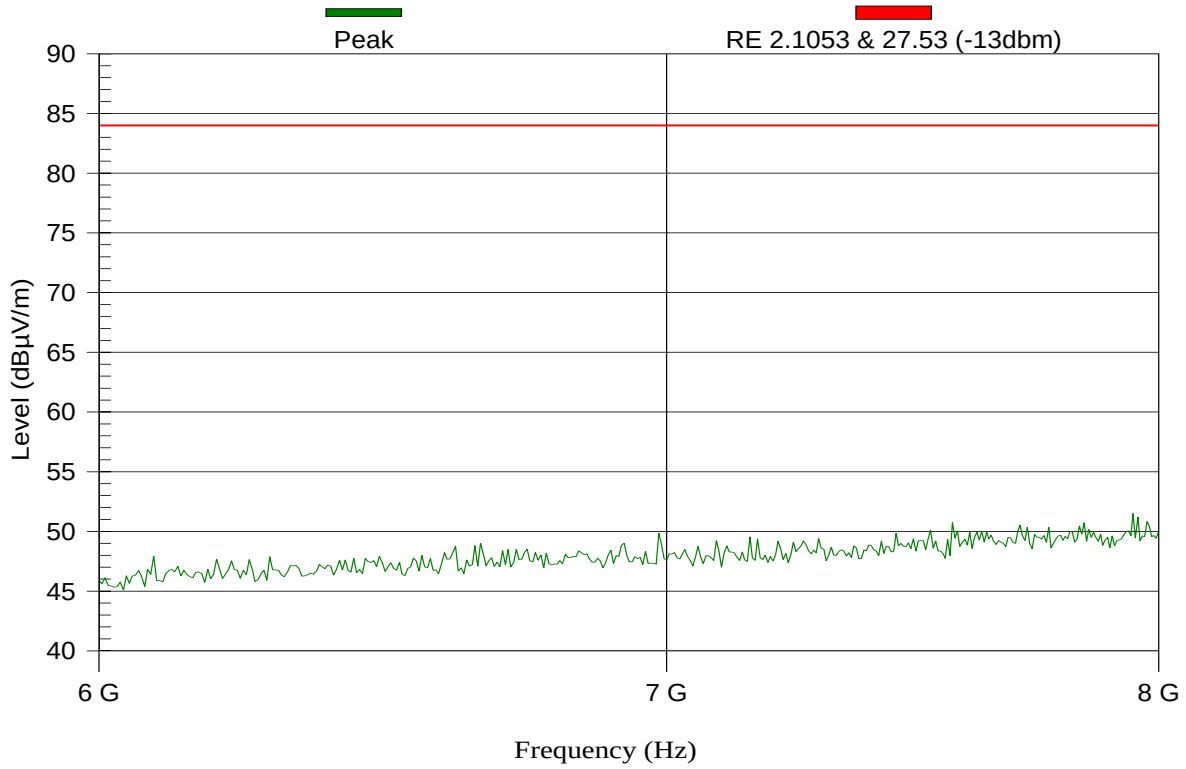
None

Test Results Plot No 41

FCC 2.1053,27.53 6-8GHz TX 743MHz 10.5dbi

Test & EUT General Information		Receiver Setting	
EUT Name:	GA_OFDM 700	Spect Analyzer	S.A HP 8593E
S/N:	0050C24F73A4	Ref. Level:	90 dBµV
Date of Test:		RBW:	1000 kHz
Test Engineer:		VBW:	1000 kHz
Antenna:	ARA DRG-118/A 1-18 GHz 1317	Sweep Time:	Auto: 49.83 ms
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA 44db 2-6 GHz

TEST REMARKS:17-05-2006



MAXIMUM RESULT DEVIATION:

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

None

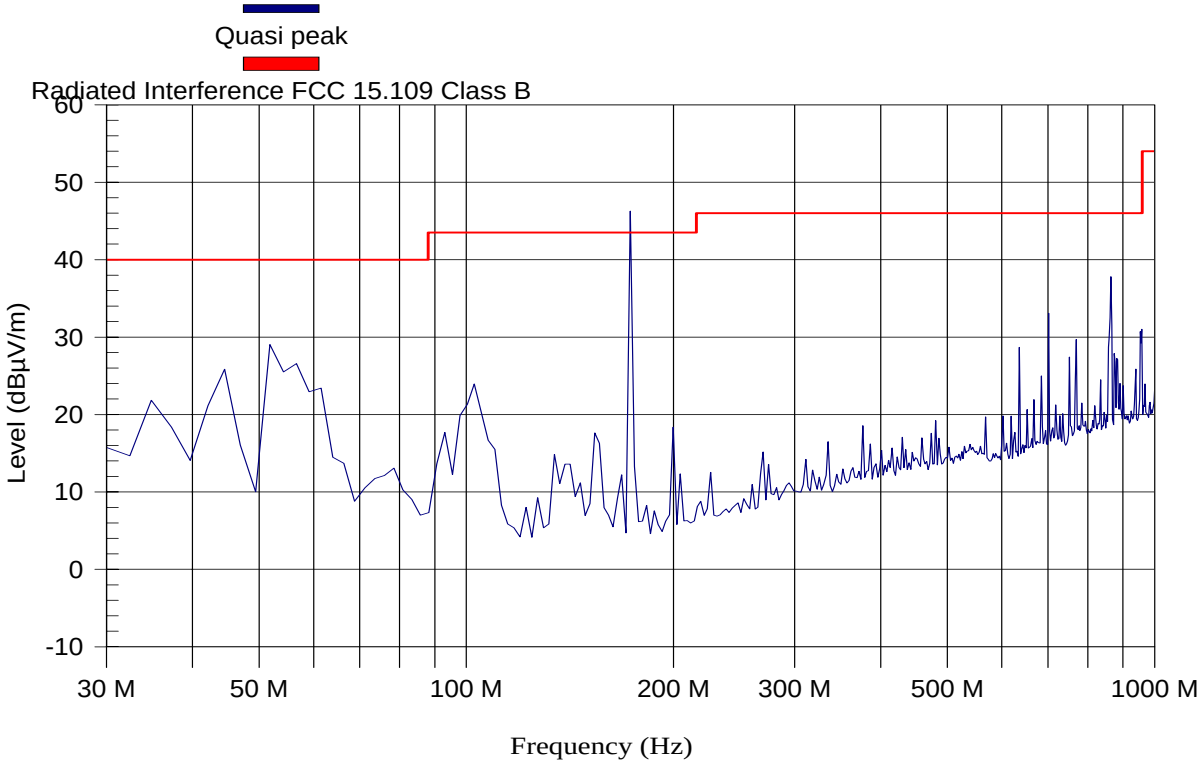
e. **Unintentional Radiated emission 42 – 44**

Test Results Plot No 42

RE102 FCC-15.109 30-1000MHz stby

Test & EUT General Information		Receiver Setting	
EUT Name:	GA_OFDM 700	Spect Analyzer	S.A HP 8593E
S/N:	0050C24F73A4	Ref. Level:	70 dBµV
Date of Test:		RBW:	120 kHz
Test Engineer:		VBW:	1000 kHz
Antenna:	Frankonia BTA-L_A 3m	Sweep Time:	Auto: 202.08 ms
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA 29db 0.01-1GHz No-3

TEST REMARKS:17-05-2006



MAXIMUM RESULT DEVIATION:

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

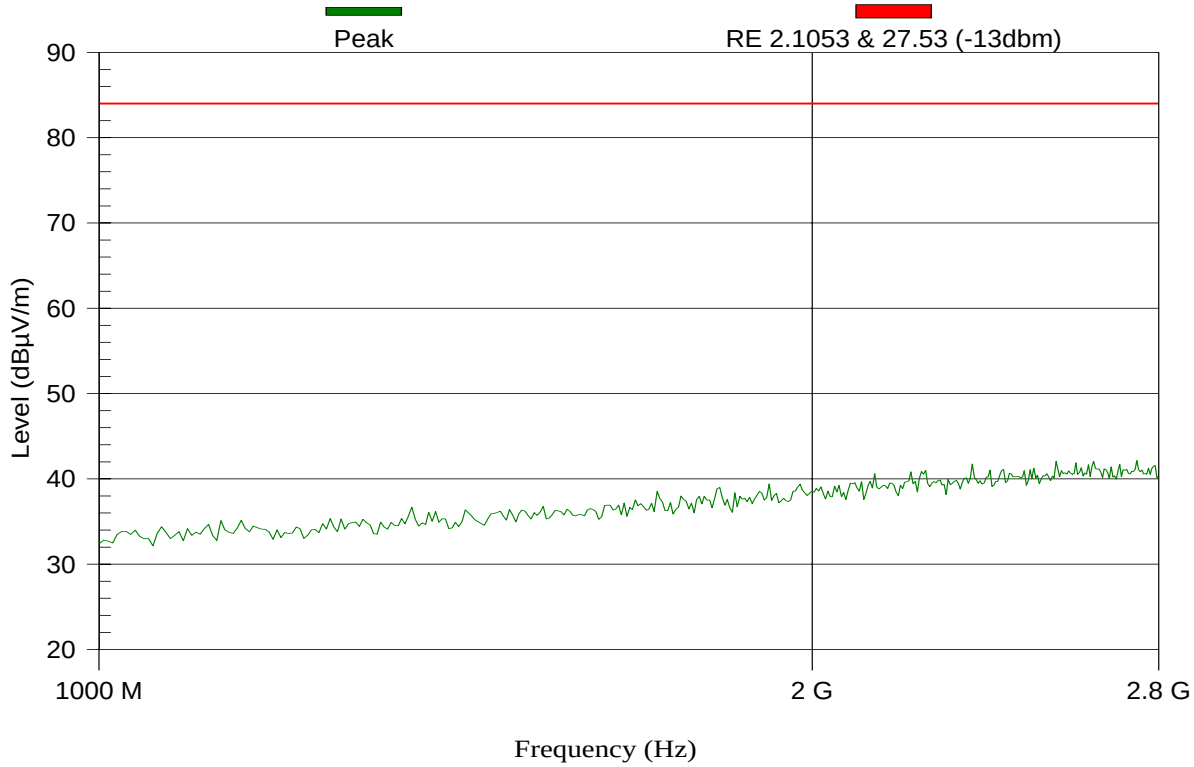
Frequency (MHz)	PK MaxHold (dBµV/m)	QP (dBµV/m)	QP limit (dBµV/m)	Result	Angle (degrees)	Height (m)	H/V
173.075	46.3	25.8	43.5	Pass	240	1.6	H

Test Results Plot No 43

FCC 2.1053,27.53 1-2.8GHz Stby 10.5dbi

Test & EUT General Information		Receiver Setting	
EUT Name:	GA_OFDM 700	Spect Analyzer	S.A HP 8593E
S/N:	0050C24F73A4	Ref. Level:	90 dBµV
Date of Test:		RBW:	1000 kHz
Test Engineer:		VBW:	1000 kHz
Antenna:	ARA DRG-118/A 1-18 GHz 1317	Sweep Time:	Auto: 36 ms
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA 44db 2-6 GHz

TEST REMARKS:17-05-2006



MAXIMUM RESULT DEVIATION:

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

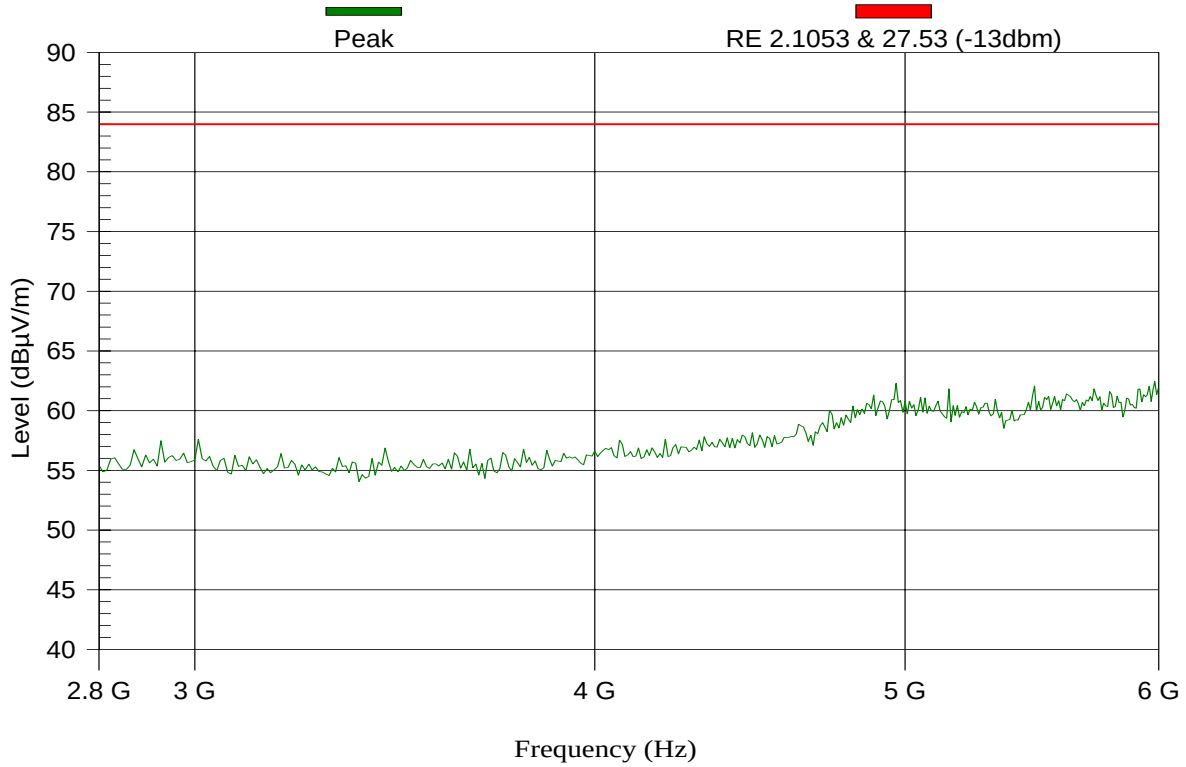
None

Test Results Plot No 44

FCC 2.1053,27.53 2.8-6GHz Stby 10.5dbi

Test & EUT General Information		Receiver Setting	
EUT Name:	GA_OFDM 700	Spect Analyzer	S.A HP 8593E
S/N:	0050C24F73A4	Ref. Level:	90 dBµV
Date of Test:		RBW:	1000 kHz
Test Engineer:		VBW:	1000 kHz
Antenna:	ARA DRG-118/A 1-18 GHz 1317	Sweep Time:	Auto: 64 ms
Polarization:	Horizontal and Vertical	Pre Amplifier	LNA 44db 2-6 GHz

TEST REMARKS:17-05-2006



MAXIMUM RESULT DEVIATION:

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

None

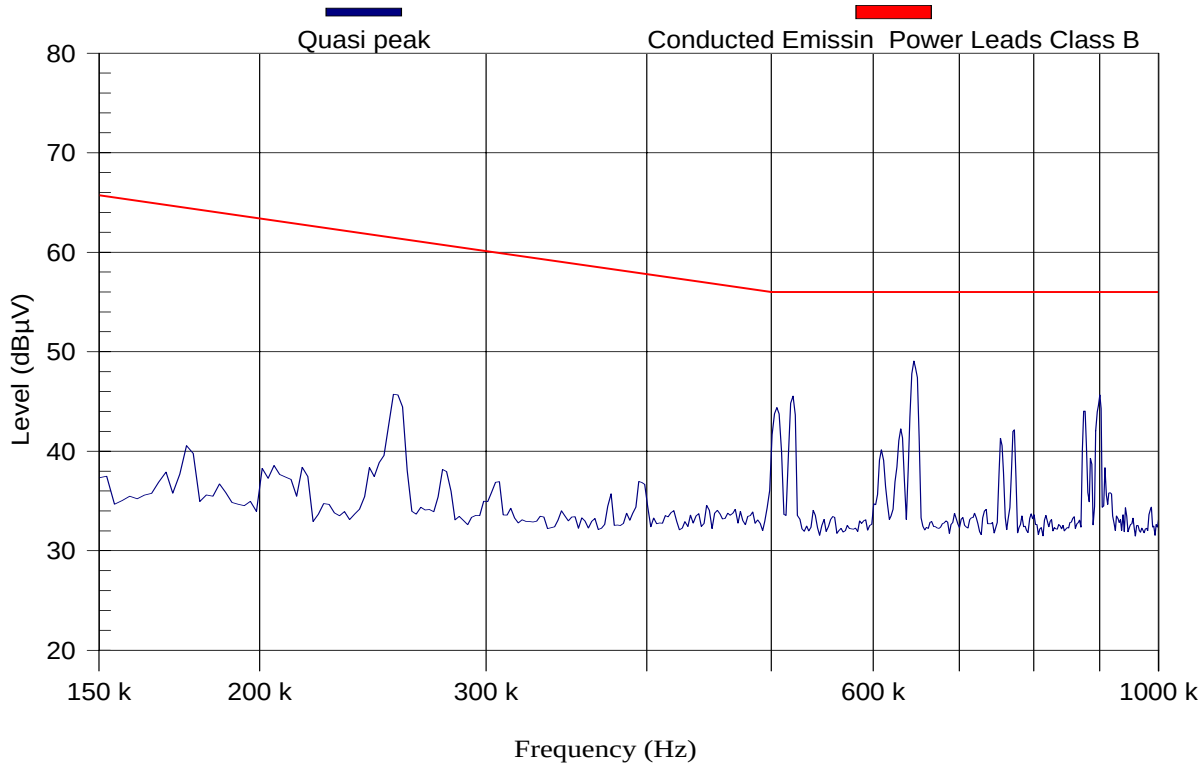
f. **Conducted emission on power leads 45 – 48**

Test Results Plot No 45

CE FCC 15.207 150K-1000KHz PHASE

Test & EUT General Information		Receiver Setting	
EUT Name:	GA_OFDM 700	Spect Analyzer	S.A HP 8593E
S/N:	0050C24F73A4	Ref. Level:	90 dBµV
Date of Test:		RBW:	9 kHz
Test Engineer:		VBW:	1000 kHz
Antenna:	No Description Available	Sweep Time:	Auto: 33.33 ms
Polarization:	||7| polarization||	Pre Amplifier	Attenuator 20db

TEST REMARKS:18-05-2006



MAXIMUM RESULT DEVIATION:

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

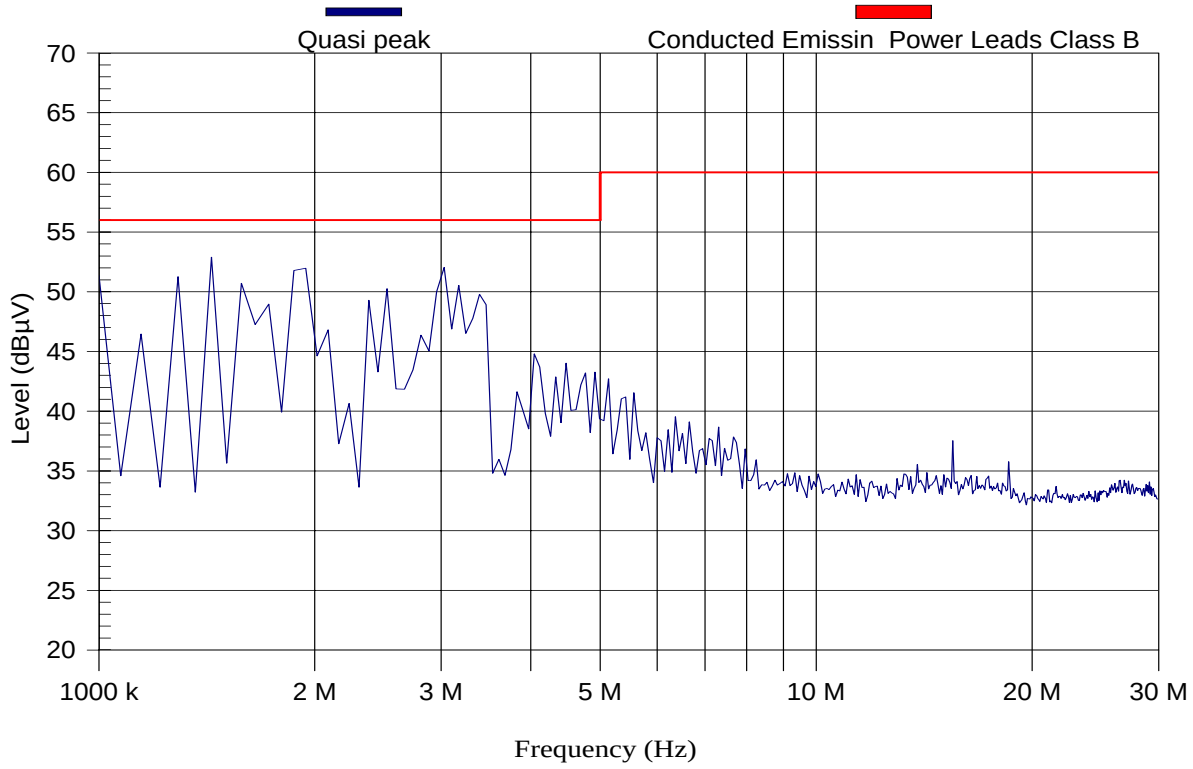
None

Test Results Plot No 46

CE FCC 15.207 1-30MHz PHASE

Test & EUT General Information		Receiver Setting	
EUT Name:	GA_OFDM 700	Spect Analyzer	S.A HP 8593E
S/N:	0050C24F73A4	Ref. Level:	90 dBµV
Date of Test:		RBW:	9 kHz
Test Engineer:		VBW:	1000 kHz
Antenna:	No Description Available	Sweep Time:	Auto: 1.07 s
Polarization:	||1| polarization||	Pre Amplifier	Attenuator 20db

TEST REMARKS:18-05-2006



MAXIMUM RESULT DEVIATION:

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

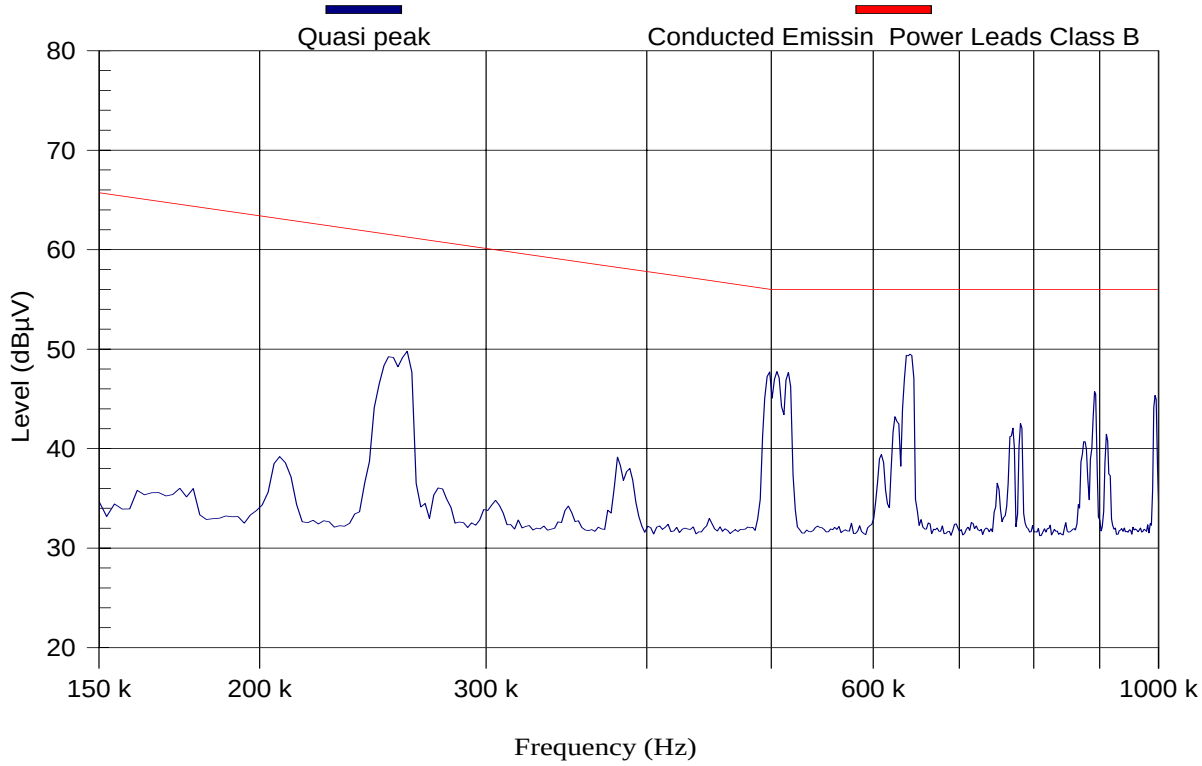
Frequency (MHz)	PK MaxHold (dBµV)	QP (dBµV)	QP Limit (dBµV)	Result	Line
1.226	54.5	53.1	56	Pass	Line 1
1.384	54.3	53.6	56	Pass	Line 1
1.517	53.9	53.1	56	Pass	Line 1
1.822	54.1	52.7	56	Pass	Line 1
2.907	54	52.6	56	Pass	Line 1
3.363	51.4	52.2	56	Pass	Line 1

Test Results Plot No 47

CE FCC 15.207 150K-1000KHz NEUTRAL

Test & EUT General Information		Receiver Setting	
EUT Name:	GA_OFDM 700	Spect Analyzer	S.A HP 8593E
S/N:	0050C24F73A4	Ref. Level:	90 dBµV
Date of Test:		RBW:	9 kHz
Test Engineer:		VBW:	1000 kHz
Antenna:	No Description Available	Sweep Time:	Auto: 33.33 ms
Polarization:	||8| polarization||	Pre Amplifier	Attenuator 20db

TEST REMARKS:18-05-2006



MAXIMUM RESULT DEVIATION:

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

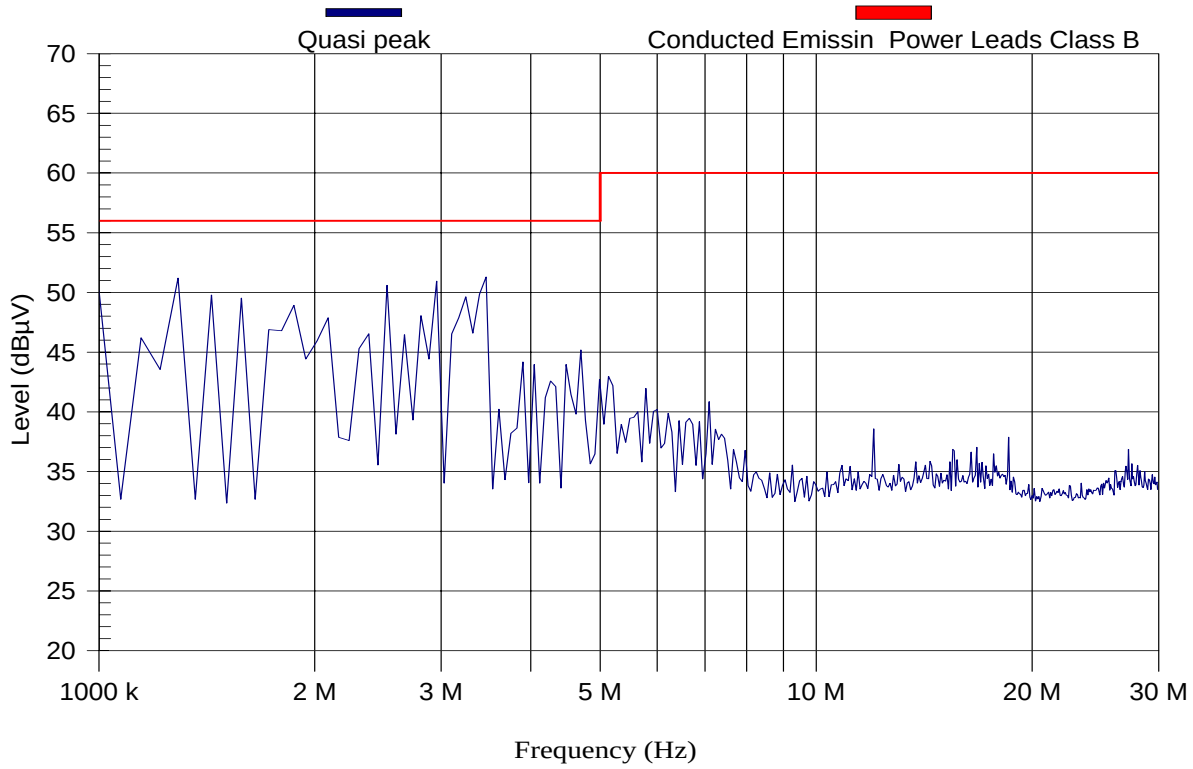
None

Test Results Plot No 48

CE FCC 15.207 1-30MHz NEUTRAL

Test & EUT General Information		Receiver Setting	
EUT Name:	GA_OFDM 700	Spect Analyzer	S.A HP 8593E
S/N:	0050C24F73A4	Ref. Level:	90 dBµV
Date of Test:		RBW:	9 kHz
Test Engineer:		VBW:	1000 kHz
Antenna:	No Description Available	Sweep Time:	Auto: 1.07 s
Polarization:	||9| polarization||	Pre Amplifier	Attenuator 20db

TEST REMARKS:18-05-2006



MAXIMUM RESULT DEVIATION:

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

Frequency (MHz)	PK MaxHold (dBµV)	QP (dBµV)	QP Limit (dBµV)	Result	Line
1.215	52.2	52.5	56	Pass	Neutral
1.388	53.6	52.7	56	Pass	Neutral
1.822	53.6	52.4	56	Pass	Neutral
1.828	53.6	52.5	56	Pass	Neutral
3.356	53.4	52.1	56	Pass	Neutral

13 CORRECTION FACTORS

Correction Factor for **line impedance stabilization network** model DC-AC-20A-01

Frequency (KHz)	Correction Factor (db)
10	4.4
20	1.6
30	0.8
40	0.4
50	0.3
60	0.25
70	0.15
100	0.1
200	0

DOUBLE RIDGE HORN Model 3105 S/N:0050C21CCFAE-C3-3D 2052 Antenna Factor

Frequency (MHz)	Ant. 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
7000	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:0050C21CCFAE-C3-3D 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	700	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		

14 Abbreviations and Acronyms

The following abbreviations and acronyms are applicable in this document

BW	Bandwidth
Db	Decibel
EMI	Electromagnetic interference
E.U.T	Equipment under test
LISN	Line impedance stabilization network
RBW	Resolution band width
S/N	Serial number
VBW	Video bandwidth
N.P.C.R	No Periodic Calibration Required