Test Report No. 8912373986 complementary to 8912324759

Applicant: Alvarion Ltd

BreezeMax Extreme 5.8 Base station

Model: EXTR-BS-2SIS-5.8-Ext

From The Standards Institution
Of Israel
Industry Division
Telematics Laboratory
EMC Section

ACLASS®
ISO/IEC 17025 Accredited for Testing

ACLASS Accreditation Services
Certificate Number: IT-1359

42 Chaim Levanon St. Tel-Aviv 69977 Israel. Management: Tel: 972-3-6467800 Fax: 972-3-6467779 www.sii.org.il
Electronics: Tel: 972-3-6465050 Fax: 972-3-7454026 - Alarms Systems Section: Tel: 972-3-6465370 Fax: 972-3-6467262

Table of contest

1. Applicant information

Applicant:	Alvarion Ltd
Address:	21A Habarzel str, Tel-Aviv, 69710, Israel
Sample for test selected by:	The customer
The date of tests:	1- 3, 14-15 March, 2010

Equipment under test information

Description of Equipment Under Test (EUT):	BreezeMax Extreme 5.8 Base station
Model:	EXTR-BS-2SIS-5.8-Ext
Serial Number:	NA
Manufactured by:	Alvarion Ltd

2. Test performance

Location:	SII EMC Section
Purpose of test:	Apparatus compliance verification in accordance with emission requirements
Test specifications:	47CFR part 15.247, part 1 §1.1310

Reference Documents:

CFR 47 FCC:	Rules and Regulations; Part 15. "Radio frequency devices"; Subpart C: "Intentional radiators"

3. Summary of test

The EUT was found to be in compliance with requirements of: 47CFR Part 15, §§ 15.247, 15.207 and 15.209.

Transmitter characteristics	Subclasses
Minimum 6 dB bandwidth	15.247(a)(2)
Maximum output power	15.247(b)(3)
Spurious emissions at antenna terminal	15.247(d)
Out of band spurious emissions radiated	15.205, 15.247(d)
Peak power spectral density	15.247(e)
Conducted emissions on AC power line	see SII test report # 8612337012
Unwonted radiated emissions below 1 GHz	see SII test report # 8612337012

Test performed by: Mr. Michael Feldman
Test technician

Test report approved by: Mr. Yuri Rozenberg.
Head of EMC Branch

Measurement uncertainty.

Were relevant, the following measurement uncertainty level have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:
This uncertainty represents an expended uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test description	Expanded uncertainty
Radiated emissions in the open field test site at 3 m measuring distance:	
30 MHz – 1.0 GHz	2 Uc (E) = ± 4.32 dB
1.0 GHz – 18 GHz	2 Uc (E) = ± 4.47 dB

4. Equipment under test description.

*The customer provided description.

4.1 General description

The BreezeMAX Extreme 5.8 Base station product is high-capacity WiMAX communication system. It shall be compatible with IEEE802.16e standard and support set of Alvarion's enhancements. BreezeMAX Extreme 5.8 is digital modulated TDD system which covers 5470 MHz up to 5950 MHz range. The system contains a base station unit and a subscriber unit. The basic base station system configuration is all outdoor-box configurations.
The BTS Extreme is a low cost 16e mobile WiMAX solution. It should provide high performance and advanced feature set and complement Alvarion's macro-BTS solutions. This product family comes to provide wireless access solutions for the following deployment scenarios:

- Low cost Point to Multi Point wireless access mass deployments in emerging markets for licensed and un-licensed solutions to provide dual play services (Primary VoIP & Data).
- Vertical markets for video surveillance, security and municipalities markets solutions using products licensed and un-licensed portfolio.

Base station Extreme consists of the following main components: One or two 16e WiMax SoCs (System on Chip) with one or two Radio channels using integrated antenna or external antennas. In two Radio channels applications, one antenna is connected to each radio output port.

EUT technical characteristics

Transmitter technical characteristics.			**Note**
Stand-alone/fixed use			
Assigned frequency band	5725 MHz – 5850 MHz		
Operating frequency band	5735 MHz – 5840 MHz		
RF channel spacing	20 MHz		
Antenna connection	Two N-type connectors for external antennas		Professional installation
Type of modulation	4QAM, 16QAM, 64QAM		
Type of multiplexing	OFDM		
Modulating test signal (baseband)	PRBS		
Maximum transmitter duty cycle in normal use	60 %		
Transmitter duty cycle supplied for test	100%		
Antenna information			
Type	**Manufacturer**	**Model**	**Gain**
Internal dual slant	MTI	AN1427-01	15.5 dBi
External, Omni	MTI	AN1435-01	9.5 dBi
External, sector	MTI	AN1353	17 dBi

5. Environmental evaluation and exposure limit according to FCC part 1, §1.1307, §1.1310

Limit for power density for general population/uncontrolled exposure is 1(mW/cm^2) or 10 (W/m^2).
The power density calculation is $S = (Pt / 4\pi r^2)$.
Where:
Pt - The transmitted power (EIRP) (mW)
r - The distance from the unit. (cm)
The limit 1(mW/cm^2) can be calculated from the above based on the following data:
Pt- the maximum EIRP transmitted power whish is equal to the peak output power 25.9 dBm plus external antenna gain 9.5 dBi . The maximum EIRP = 35.4 dBm = 3467.4 mW
Maximum allowed distance "r", where RF exposure limits may not be exceeded,
r = SQRT(3467.4/4π) and is more than 16.6 cm from the antenna main lobe.
Peak power density at worse case distance 20 cm is $Pt/4\pi r^2 = 3.467\ W/4\pi*0.2^2 = 6.9\ W/m^2$
That is less than 10 W/m^2 power density limit.

6. EUT test configuration

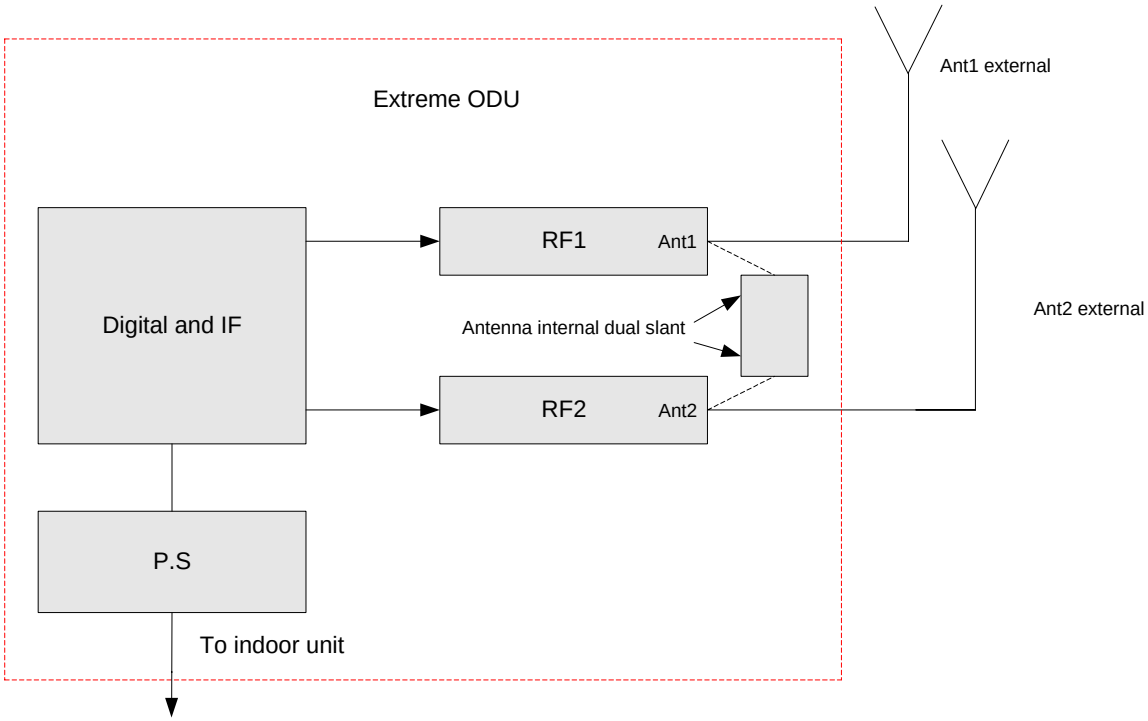


Fig. 1. _EXTR-BS-2SIS-5.8-Ext block diagram.

7. Test results

7.1 Transmitter characteristics

7.1.1 Occupied 6 dB bandwidth for digitally systems.

Method of measurement FCC March 23, 2005 procedure
Operating Frequency Range 5735 – 5840 MHz
Ambient Temperature 21^0 C Relative Humidity 46 % Air Pressure 1007 hPa

Carrier frequency MHz	Measured 6 dB bandwidth, MHz	Reference to plots
5735	19.16	#1
5787.5	19.16	#2
5840	19.15	#3

LIMIT

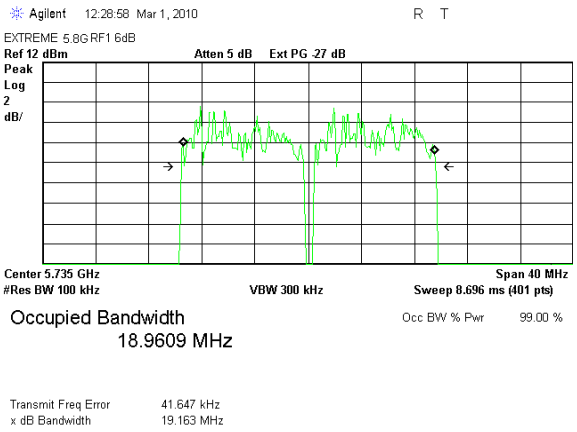
Minimum allowed bandwidth - 500 kHz @ 6 dBc

TEST PROCEDURE

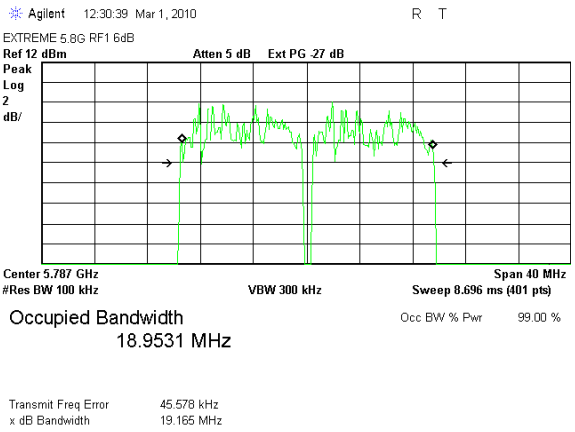
The measurements were performed in normal (transmitting) mode of operation for carrier (channel) frequency at bottom, middle and at the top of 5735 – 5840 MHz frequency band under maximum data transfer bit rate. The EUT RF output was connected to the Spectrum Analyzer through appropriate attenuator and accounted with cable loss in SA settings.

TEST EQUIPMENT USED:

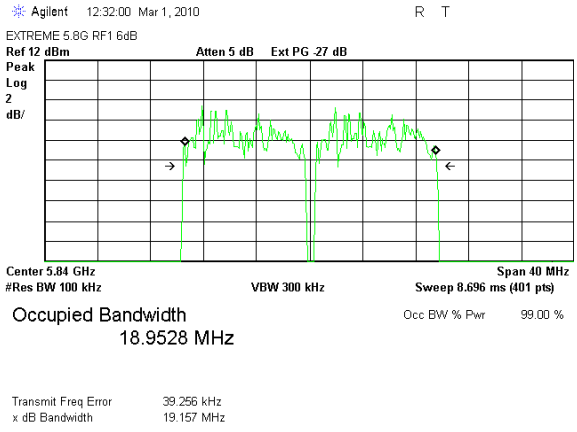
2	3	4	5			



Plot # 1



Plot # 2



Plot # 3

.

7.1.2 Maximum peak conducted output power test according to §15.247 (b)(3).

Method of measurement FCC March 23, 2005 procedure
Operating Frequency Range 5735 – 5840 MHz
Ambient Temperature 23^0 C Relative Humidity 49% Air Pressure 1011 hPa

Carrier frequency MHz	26 dB EBW MHz		Output power, dBm		Calculated limit. dB	Margin, dB		Reference to plots ##	
	Chain 1	Chain 2	Chain 1	Chain 2		Ch.1	Ch.2	Ch.1	Ch.2
5735	19.64	20.14	25.22	24.68	27.2	1.98	2.52	4, 7	10, 13
5787.5	19.64	21.23	25.85	24.45	27.2	1.35	2.75	5, 8	11, 14
5840	19.63	20.12	25.03	24.26	27.2	2.17	2.94	6, 9	12, 15

LIMIT

For systems using digital modulation in the 5725 – 5850 MHz band: 1W (30 dBm).
The conducted output power limit is based on the use of antennas with directional gain that do not exceed 6 dBi. Limit of conducted output power for external antenna 9.5 dBi was calculated as follow:
Pout = 30 dBm – (9.5 – 6) + 0.7 dB = 27.2 dBm. External antenna cable loss 0.7 dB was added to limit calculation.

TEST PROCEDURE

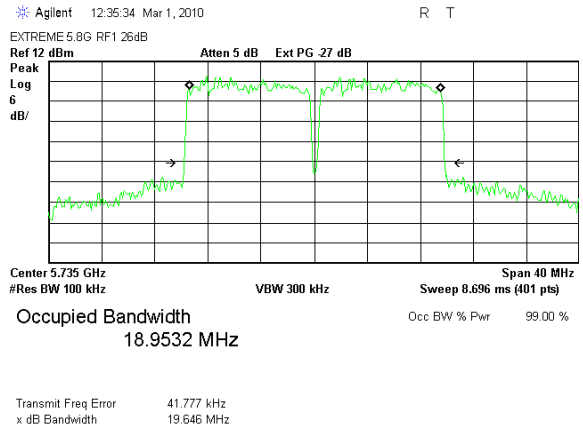
The test was performed at maximum allowed output power that was calculated for antenna Omni 9.5 dBi gain. The measurements were performed in normal (transmitting) mode of operation for carrier (channel) frequency at bottom, middle and the top of the 5735 – 5840 MHz frequency band under maximum data transfer bit rate. The EUT RF output was connected to the Spectrum Analyzer through appropriate attenuator and accounted with cable loss in SA settings.

TEST EQUIPMENT USED:

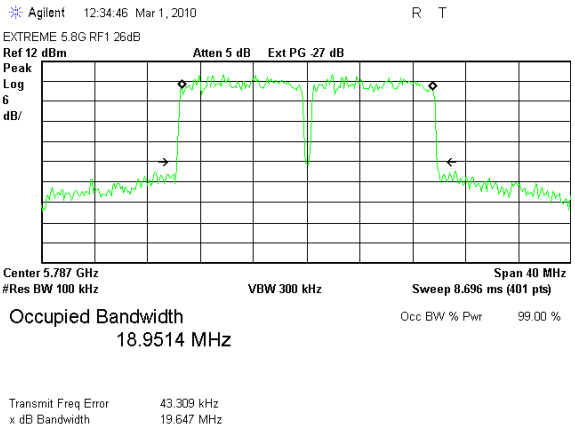
2	3	4	5			

RF chain 1

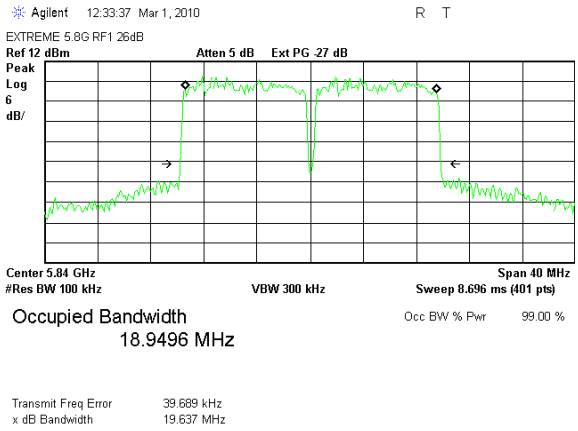
26 dB bandwidth test result



Plot # 4

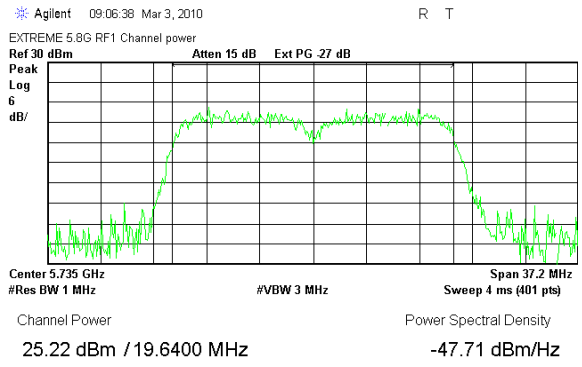


Plot # 5

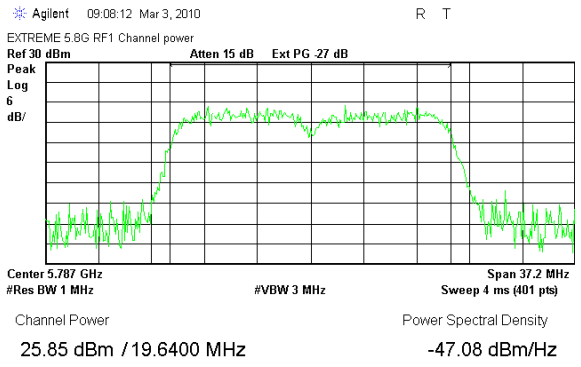


Plot # 6

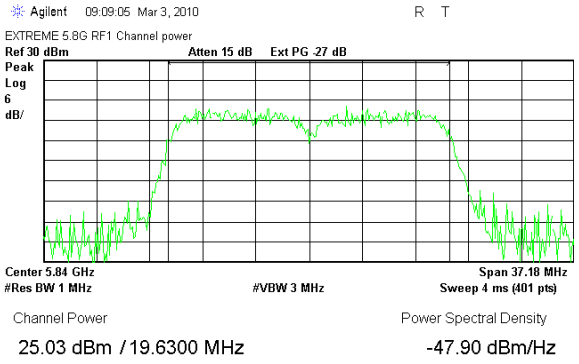
Peak output power results



Plot # 7



Plot # 8

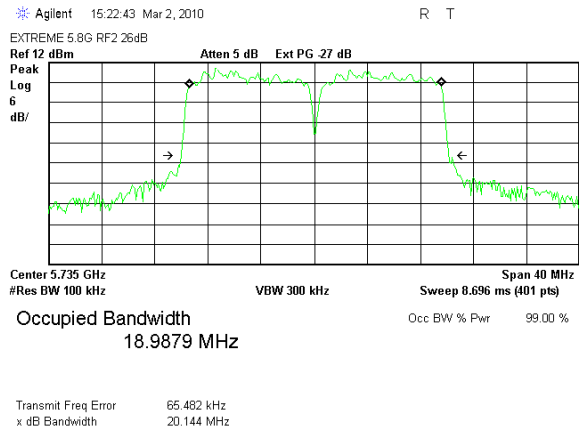


Plot # 9

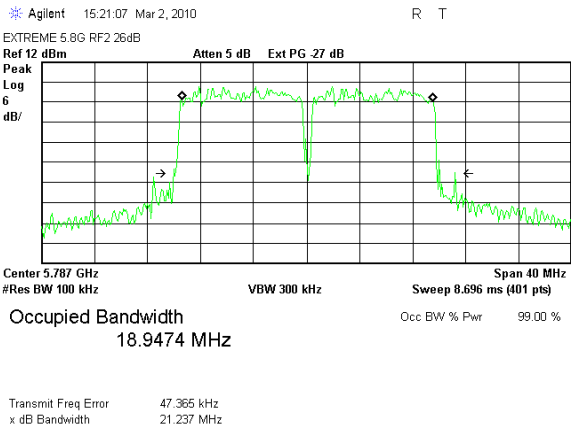
Insertion loss of external attenuator, power splitter and cable = 27 dB

RF chain 2

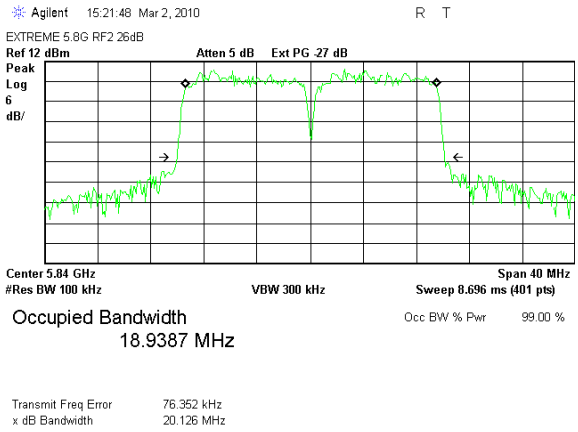
26 dB bandwidth test result



Plot # 10

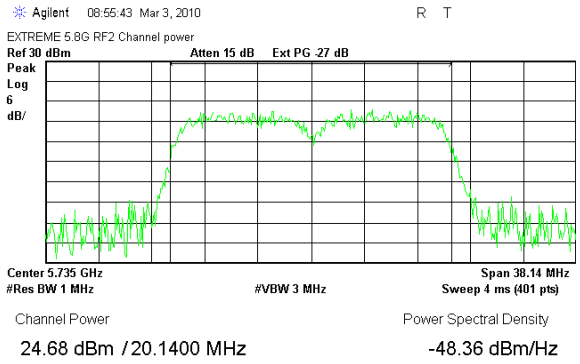


Plot # 11

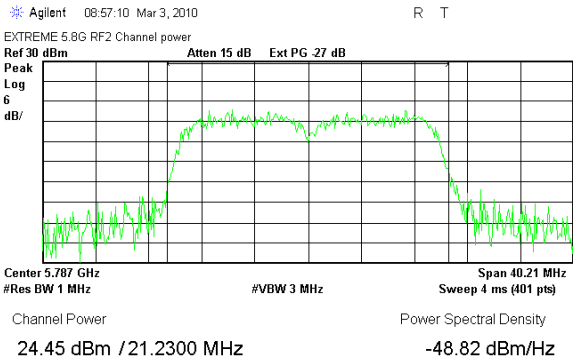


Plot # 12

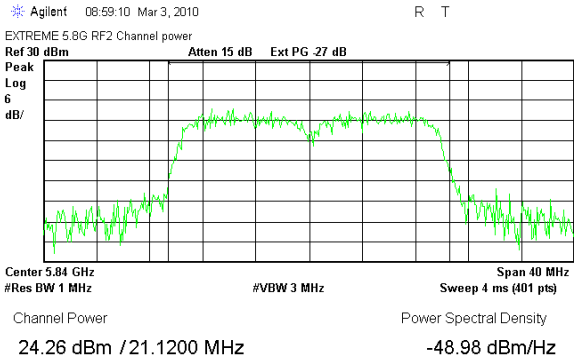
Peak output power results



Plot # 13



Plot # 14



Plot # 15

Insertion loss of external attenuator, power splitter and cable = 27 dB

7.1.3 Conducted emissions out of band test according to §15.247(d)

Method of measurement		FCC March 23, 2005 procedure			
Operating Frequency Range		5735 – 5840 MHz			
Ambient Temperature	23^0 C	Relative Humidity	49%	Air Pressure	1009 hPa

The frequency spectrum was investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz and up to 40 GHz. The emission levels of the EUT in peak mode more than 20 dB lower than the specified limit were not recorded in the table. For the test results refer to plots ## 16-21 in this section.

LIMIT

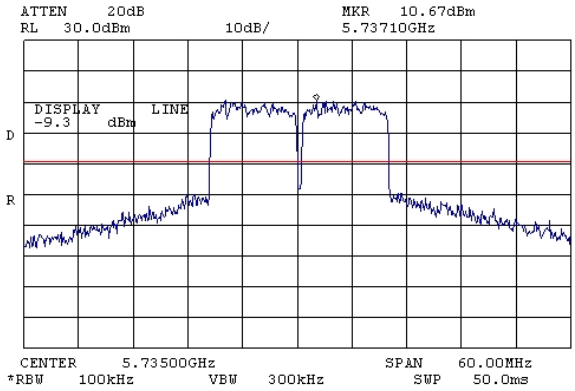
In any 100 kHz bandwidth, outside the frequency band, in which the intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

TEST PROCEDURE

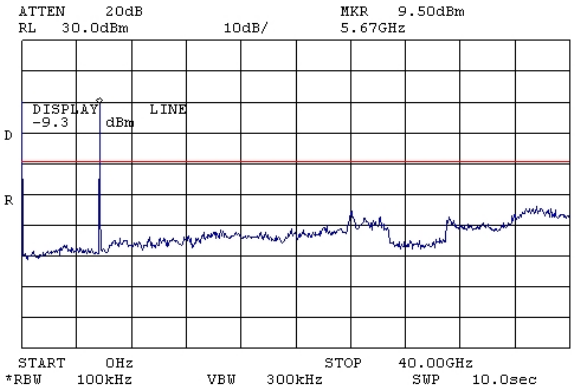
The test was performed at worse case condition - maximum allowed output power for antenna Omni (9 dBi gain) in normal (transmitting) mode of operation for carrier (channel) frequency at bottom, middle and the top of the 5735 – 5840 MHz frequency band under maximum data transfer bit rate. The EUT RF output was connected to the Spectrum Analyzer through appropriate attenuator and accounted with cable loss in SA settings.

TEST EQUIPMENT USED:

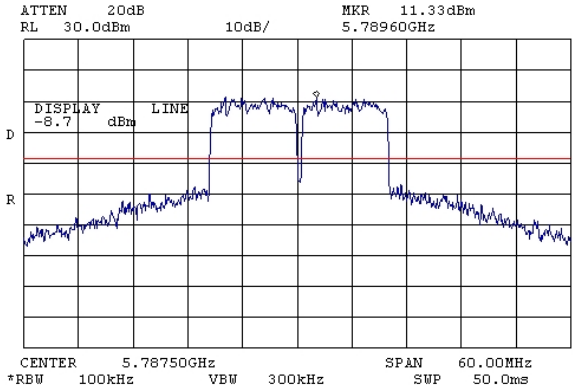
1	3	4	5			



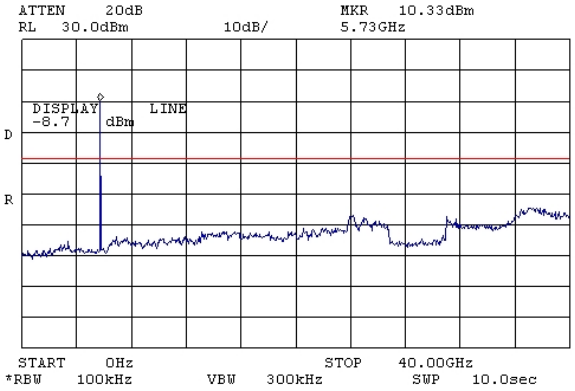
Plot # 16. Carrier frequency 5735 MHz.



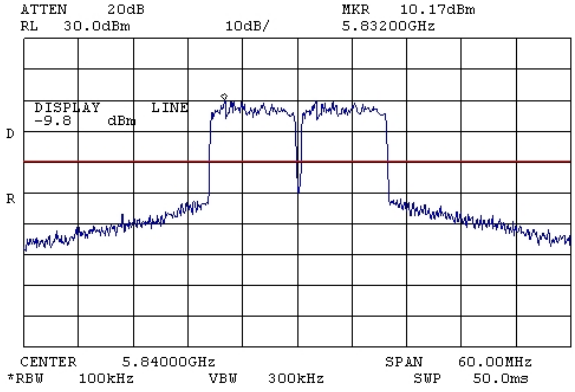
Plot # 17. Carrier frequency 5735 MHz..



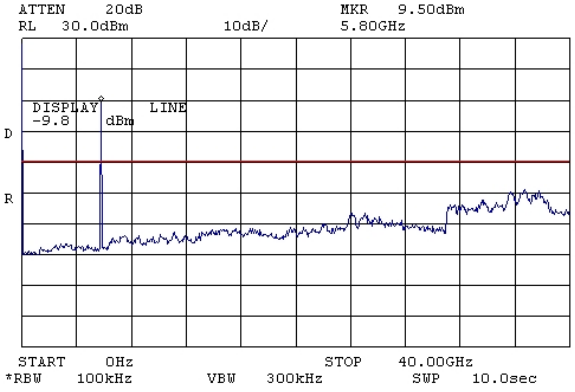
Plot # 18. Carrier frequency 5787.5 MHz**.**



Plot # 19. Carrier frequency 5787.5 MHz**.**



Plot # 20. Carrier frequency 5840 MHz



Plot # 21. Carrier frequency 5840 MHz

7.1.4 Radiated emissions out of band test according to §15.247(d), 15.205

Method of measurement		FCC March 23, 2005 procedure			
Operating Frequency Range		5735 – 5840 MHz			
Ambient Temperature	22^0 C	Relative Humidity	54%	Air Pressure	1009 hPa

The frequency spectrum was investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz and up to 40 GHz. The emission levels of the EUT more than 20 dB lower than the specified limit were not recorded in the tables. For the test results refer to tables and plots in this section.

Internal slant antenna

Carrier frequency 5735 MHz

Frequency, MHz	Emissions level, dB (μV/m)	Peak limit dB (μV/m)	Avg limit, dB (μV/m)	Margin, dB	Note
5427	65.5	*74	-	8.5	Detector peak
5427	47.1	-	*54	6.9	Detector Average.

Carrier frequency 5787.5 MHz

Frequency, MHz	Emissions level, dB (μV/m)	Peak limit dB (μV/m)	Avg limit, dB (μV/m)	Margin, dB	Note
5337	65.8	*74	-	8.2	Detector peak
5404	47.0	-	*54	7.0	Detector Average.

Carrier frequency 5840 MHz

Frequency, MHz	Emissions level, dB (μV/m)	Peak limit dB (μV/m)	Avg limit, dB (μV/m)	Margin, dB	Note
5357	65.7	*74	-	8.3	Detector peak
5404	47.0	-	*54		Detector Average.

*Limit 15.205(b) 3m test distance.

External omni antenna.

Carrier frequency 5735 MHz

Frequency, MHz	Emissions level, dB (μV/m)	Peak limit dB (μV/m)	Avg limit, dB (μV/m)	Margin, dB	Note
5371	66.4	*74	-	7.6	Detector peak
5371	47.3	-	*54	6.7	Detector Average.

Carrier frequency 5787.5 MHz

Frequency, MHz	Emissions level, dB (μV/m)	Peak limit dB (μV/m)	Avg limit, dB (μV/m)	Margin, dB	Note
5460	67.5	*74	-	6.5	Detector peak
5460	47.7	-	*54	6.3	Detector Average.

Carrier frequency 5840 MHz

Frequency, MHz	Emissions level, dB (μV/m)	Peak limit dB (μV/m)	Avg limit, dB (μV/m)	Margin, dB	Note
5371	65.7	*74	-	8.3	Detector peak
5427	47.8	-	*54	6.2	Detector Average.

*Limit 15.205(b) 3m test distance

External sector antenna.

Carrier frequency 5735 MHz

Frequency, MHz	Emissions level, dB (μV/m)	Peak limit dB (μV/m)	Avg limit, dB (μV/m)	Margin, dB	Note
5449	65.6	*74	-	8.4	Detector peak
5449	47.8	-	*54	6.2	Detector Average.

Carrier frequency 5787.5 MHz

Frequency, MHz	Emissions level, dB (μV/m)	Peak limit dB (μV/m)	Avg limit, dB (μV/m)	Margin, dB	Note
5438	66.4	*74	-	7.6	Detector peak
5438	48.0	-	*54	6.0	Detector Average.

Carrier frequency 5840 MHz

Frequency, MHz	Emissions level, dB (μV/m)	Peak limit dB (μV/m)	Avg limit, dB (μV/m)	Margin, dB	Note
5393	66.0	*74	-	8.0	Detector peak
5460	48.1	-	*54	5.9	Detector Average.

*Limit 15.205(b) 3m test distance

TEST PROCEDURE

The test was conducted with three antenna configurations: internal slant, external Omni and external sector. The test was performed for each antenna configuration in single chain (SISO) and in spatial multiplexing (SM-MIMO) modes. Transmitter output power was changed according to standard requirements and antenna configuration:

Antenna configuration	Output power dBm	
	SISO	MIMO
Internal slant antenna 15.5 dBi	20.5	20.5
Antenna Omni 9.5 dBi	*27.2	*24.2
Antenna sector 17 dBi	*19.7	*16.7

*Calculation includes an external antenna cable loss 0.7 dB.

Calculation of transmitter output power was performed as fallow:
For internal antenna Pout = 30 dBm – (Ant. gain – 6).
For external antennas Pout = 30 dBm – (Ant. gain – 6) + external cable loss.
In SM-MIMO mode transmitter output power was reduced by additional 10 Log 2 = 3 dB antenna gain.
The measurements were performed at three transmitted carrier (channel) frequencies at bottom, middle and top of the 5735 – 5840 MHz frequency band under maximum data transfer bit rate. To find maximum radiation the turntable was rotated 360^{o}, measuring antenna height was changed from 1 to 4 m, and the antenna polarization was changed from vertical to horizontal.

LIMIT

In any 100 kHz bandwidth outside the frequency band the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below in band highest level desired power.
Radiated emissions, which fall in the restricted bands, must comply with the radiated emissions limit specified in section 15.205(c).

TEST SUMMARY

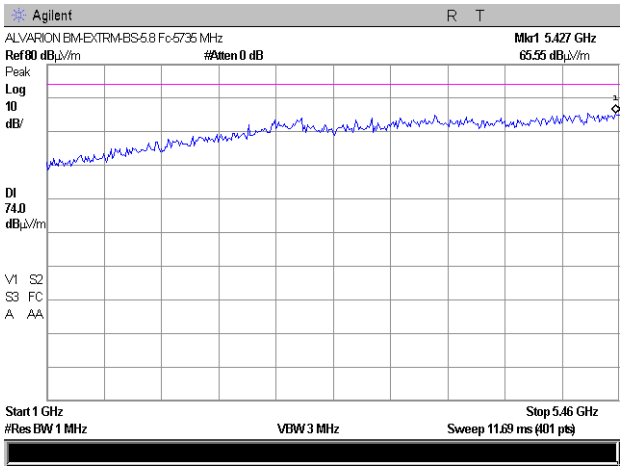
All emissions outside of the 5725 – 5850 MHz band were found below 15.247(d) limit.
No emissions were found above SA noise floor in 6.5 – 40 GHz frequency band that is at least 40 dB under the limit.

TEST EQUIPMENT USED:

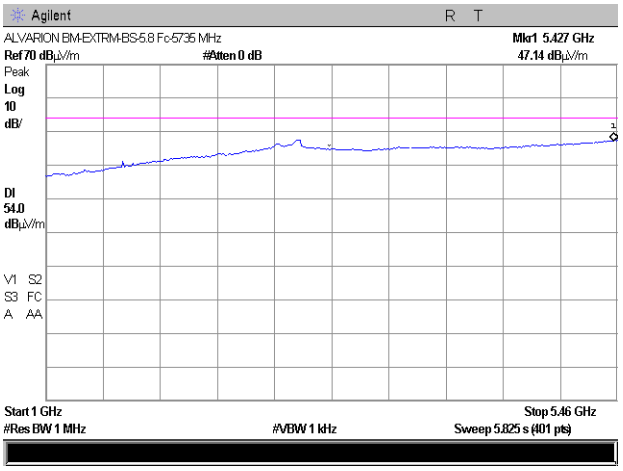
1	5	6	7	9		

Internal slant antenna.

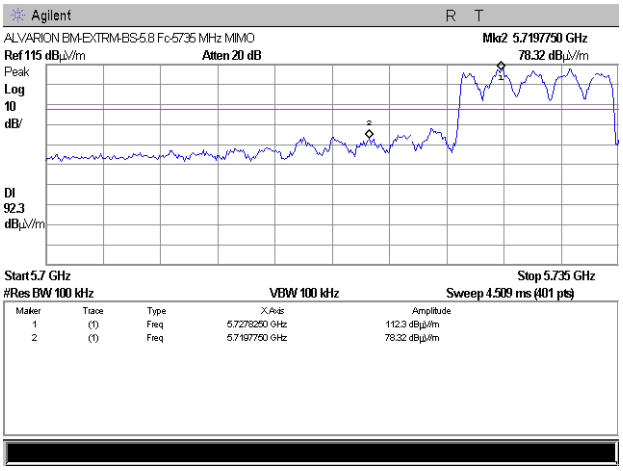
Carrier frequency – 5735 MHz



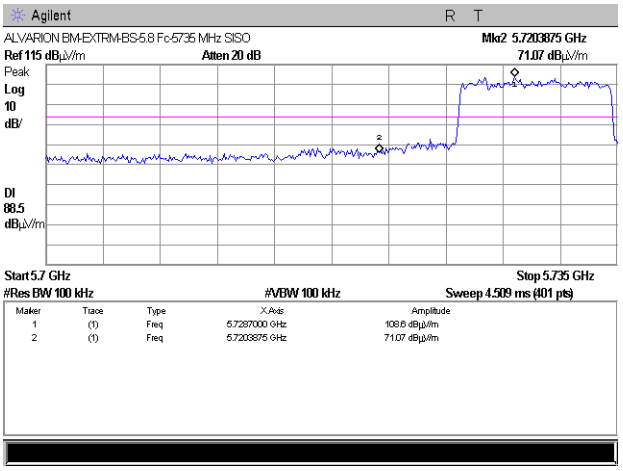
Plot # 22



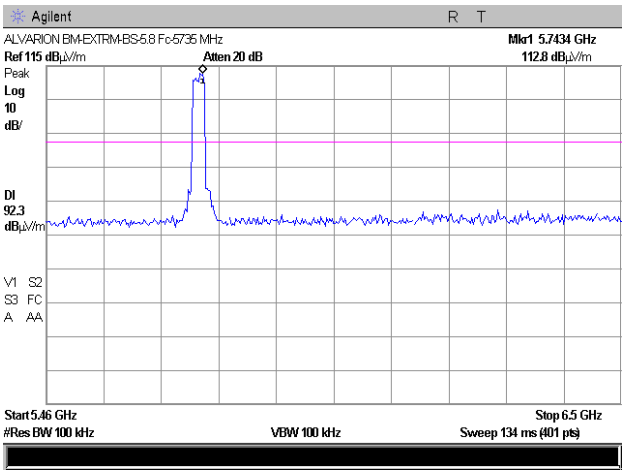
Plot # 23



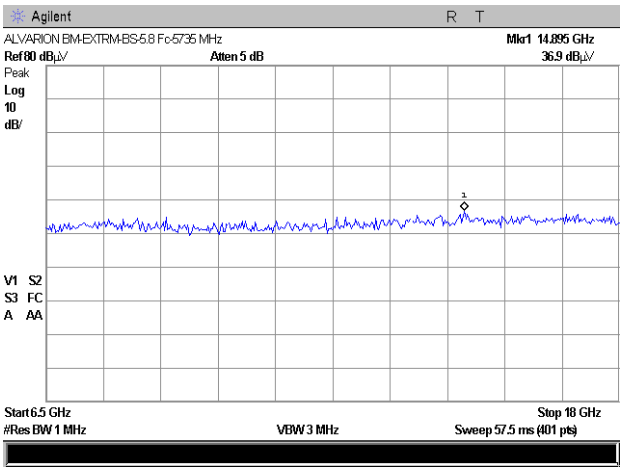
Plot # 24



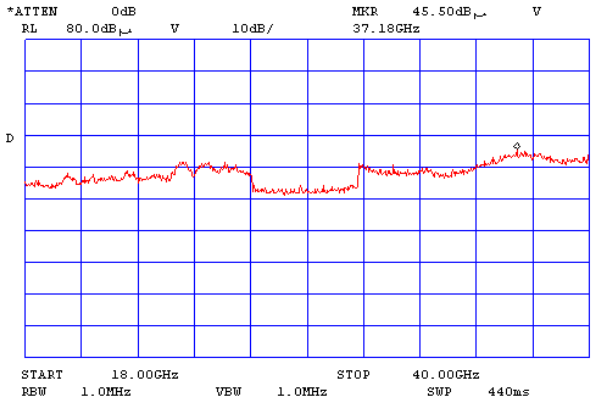
Plot # 25



Plot # 26

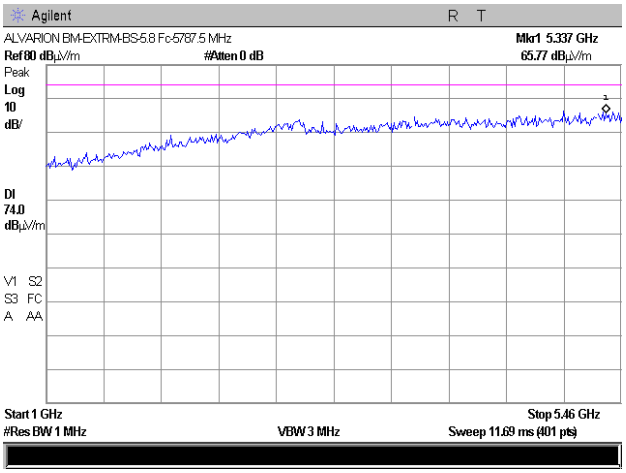


Plot # 27

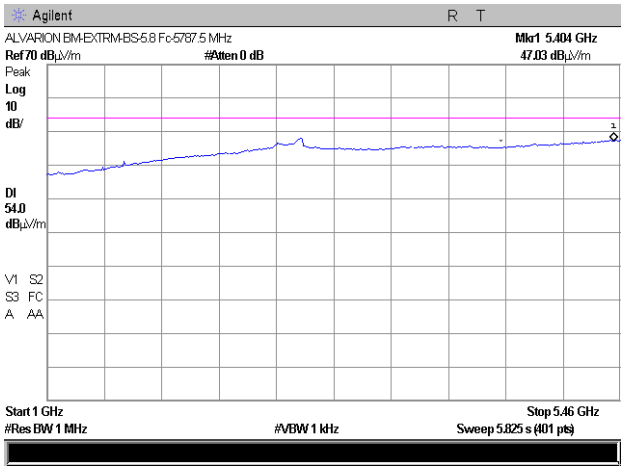


Plot # 28

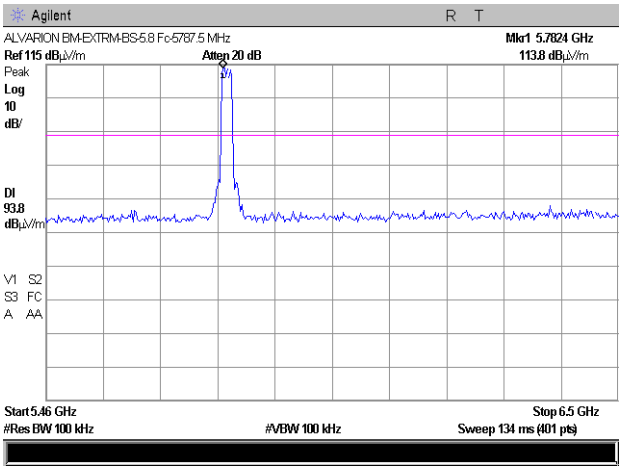
Carrier frequency – 5787.5 MHz



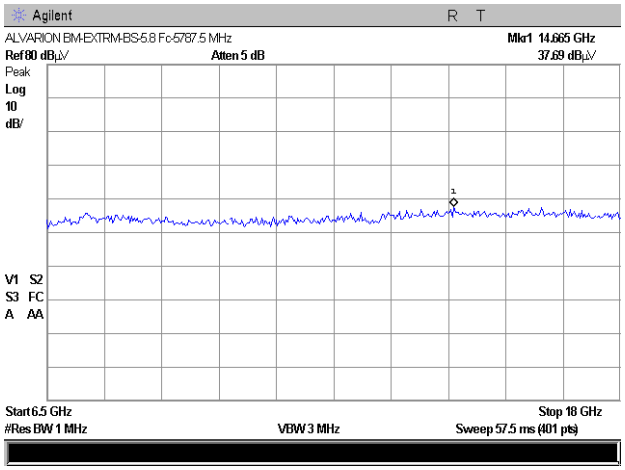
Plot # 29



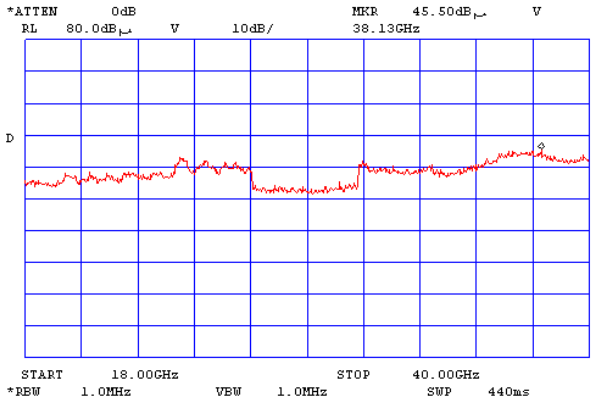
Plot # 30



Plot # 31

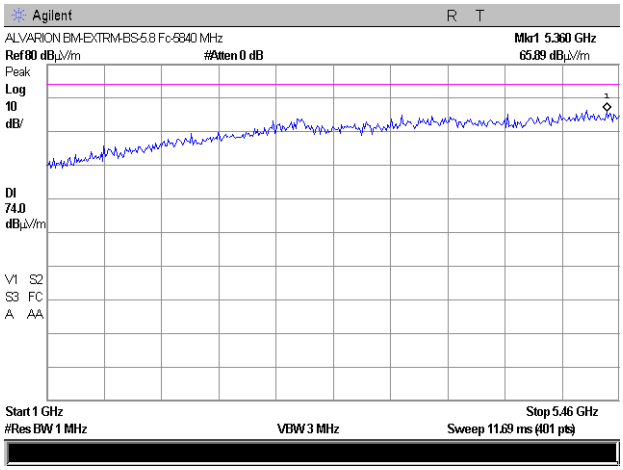


Plot # 32

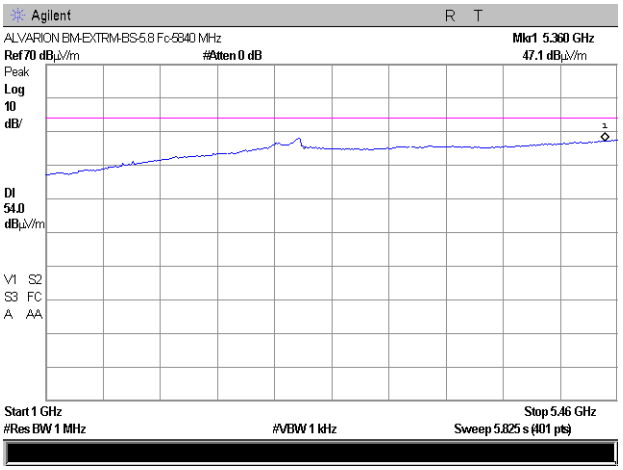


Plot # 33

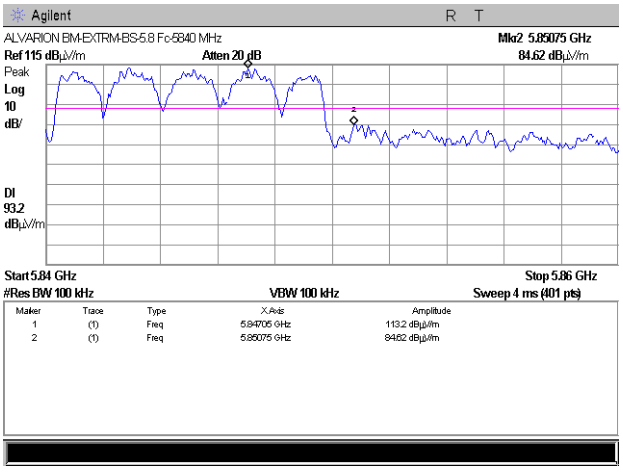
Carrier frequency – 5840 MHz



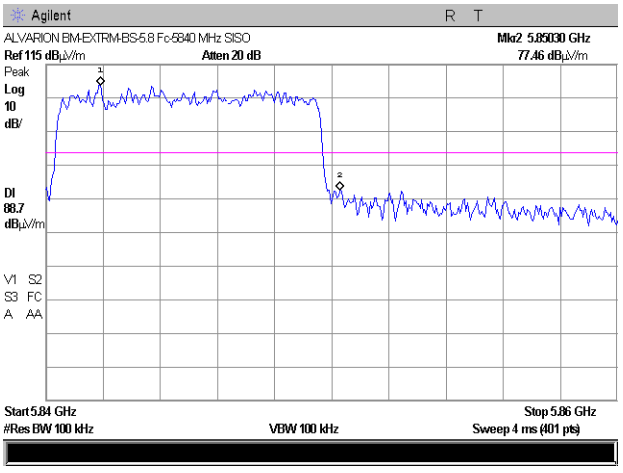
Plot # 34



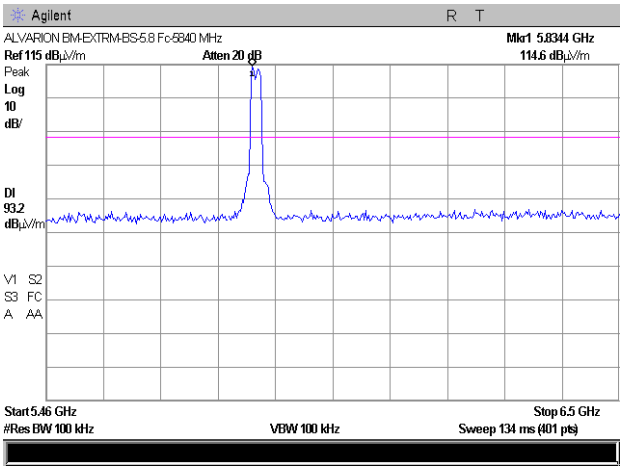
Plot # 35



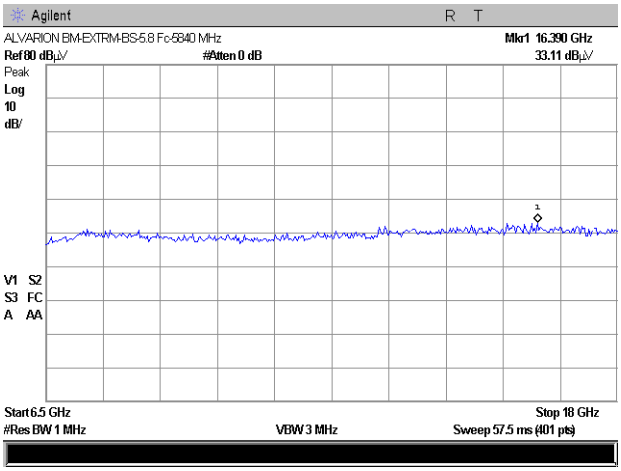
Plot # 36



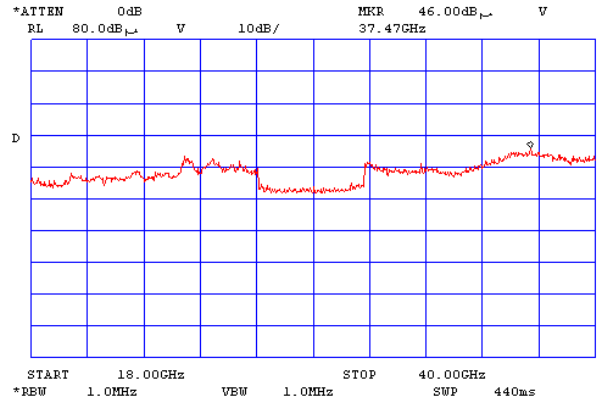
Plot # 37



Plot # 38



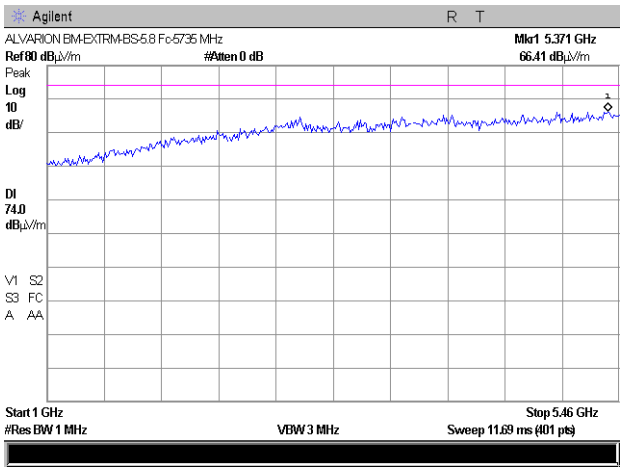
Plot # 39



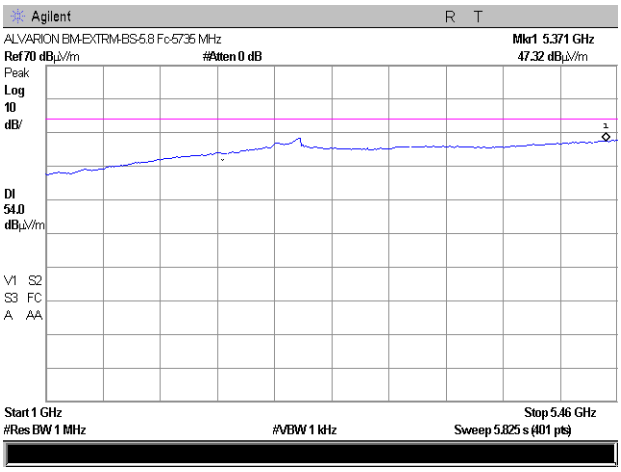
Plot # 40

External Omni antenna test

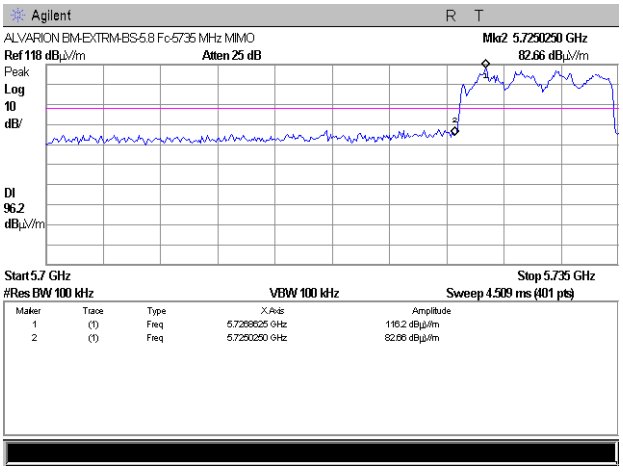
Carrier frequency – 5735 MHz



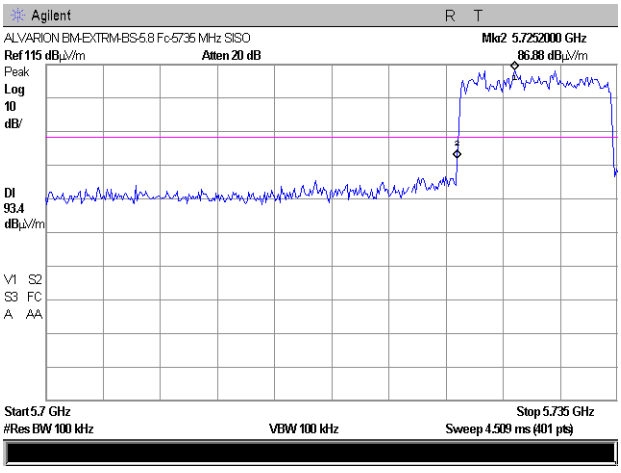
Plot # 41



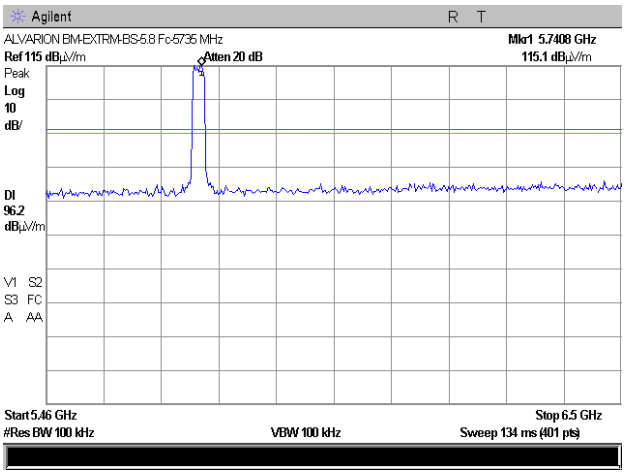
Plot # 42



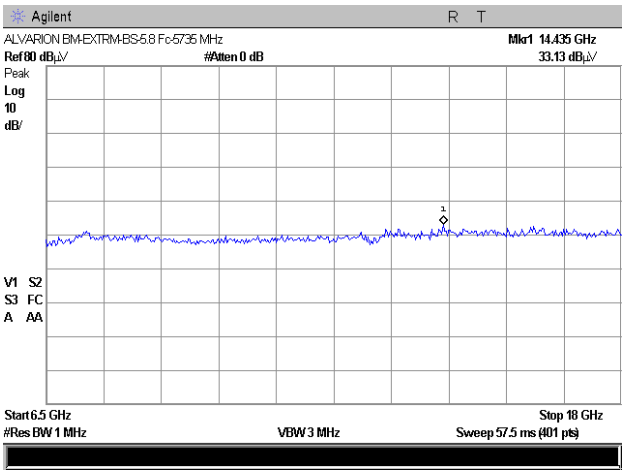
Plot # 43



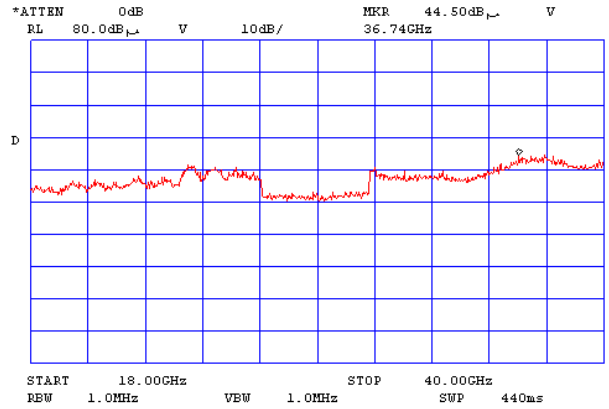
Plot # 44



Plot # 45

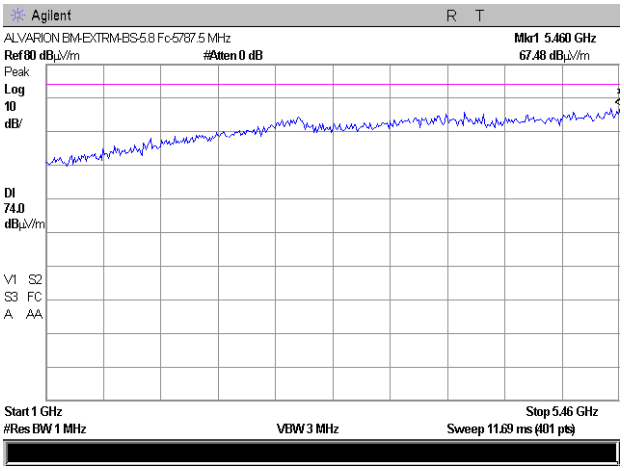


Plot # 46

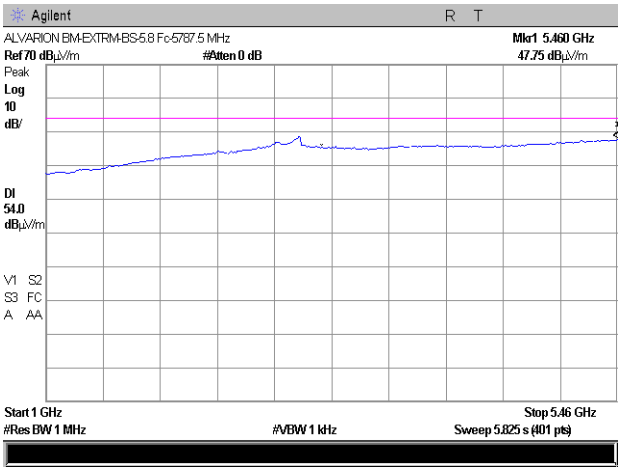


Plot # 47

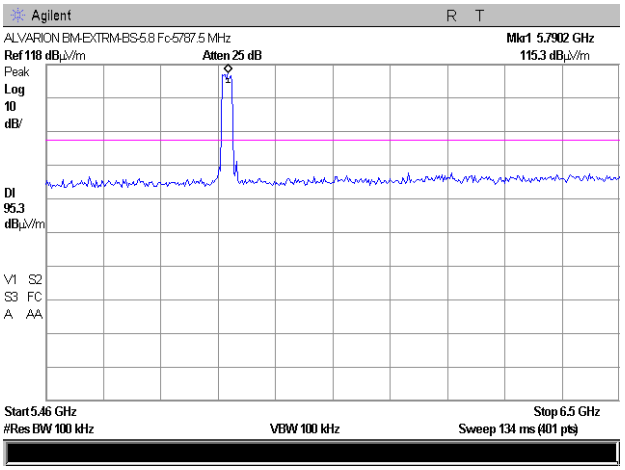
Carrier frequency – 5787.5 MHz



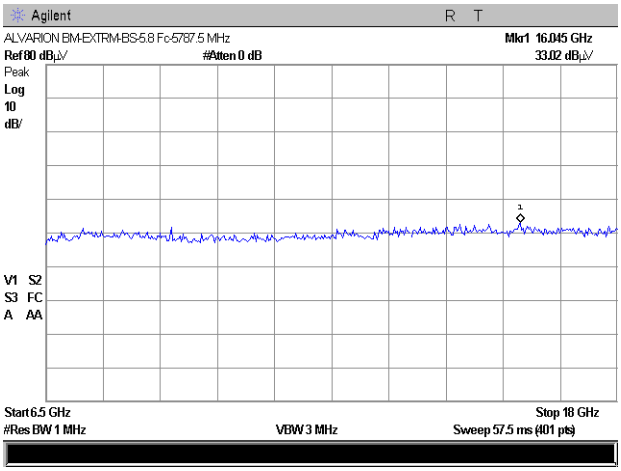
Plot # 48



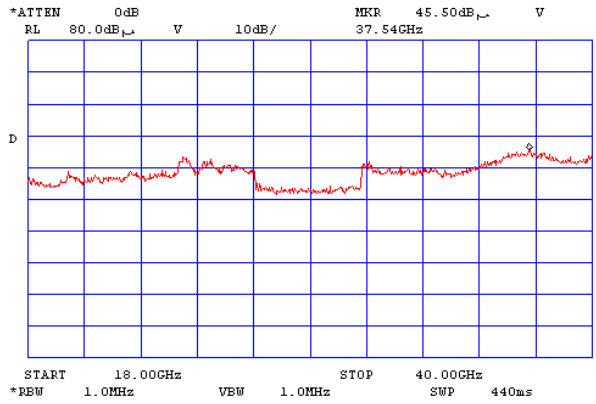
Plot # 49



Plot # 50

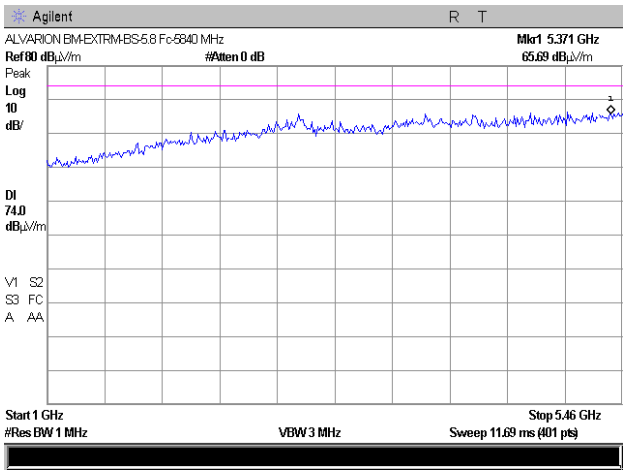


Plot # 51

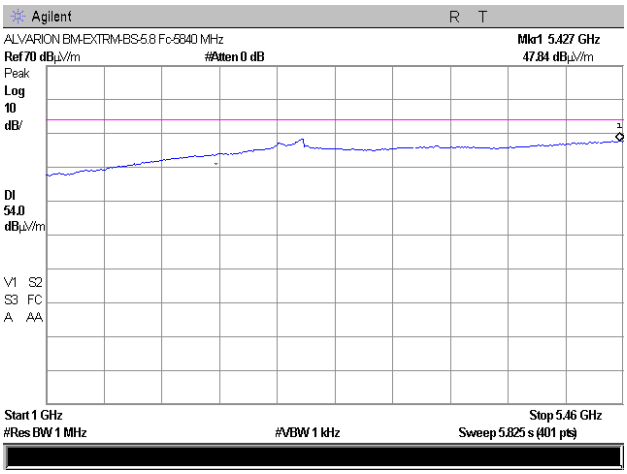


Plot # 52

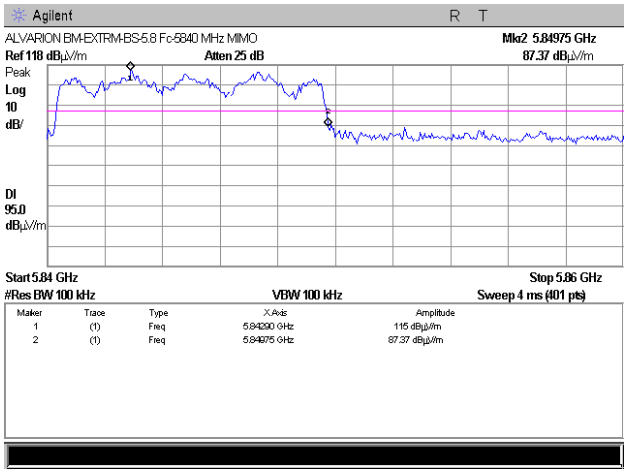
Carrier frequency – 5840 MHz



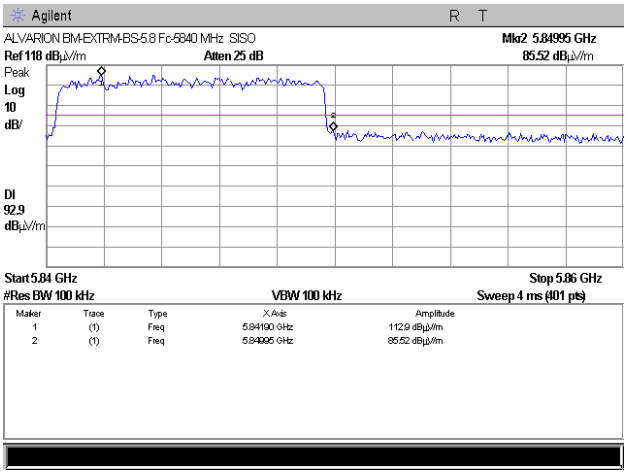
Plot # 53



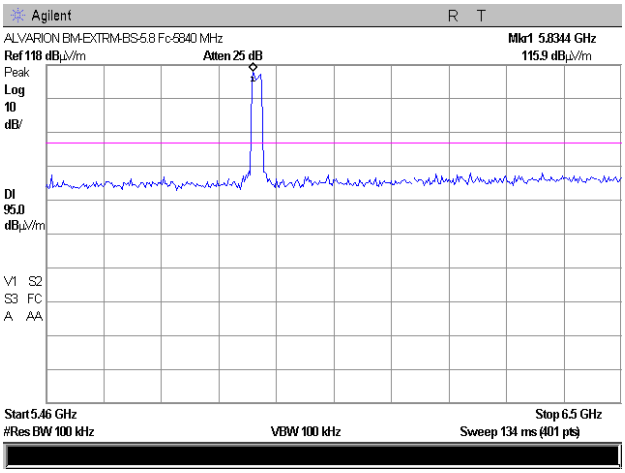
Plot # 54



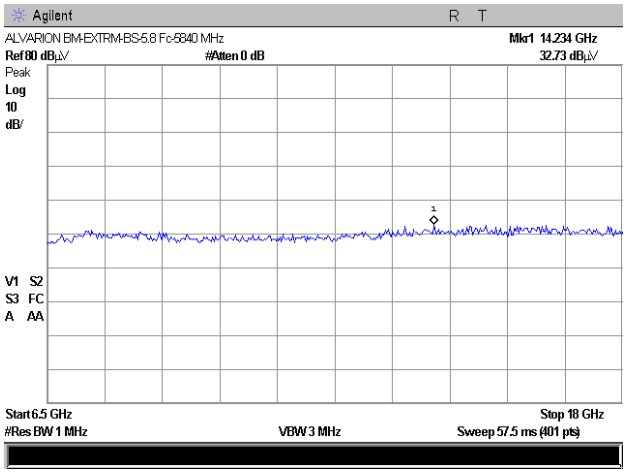
Plot # 55



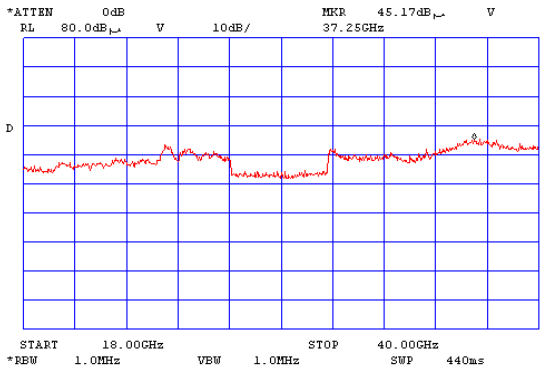
Plot # 56



Plot # 57



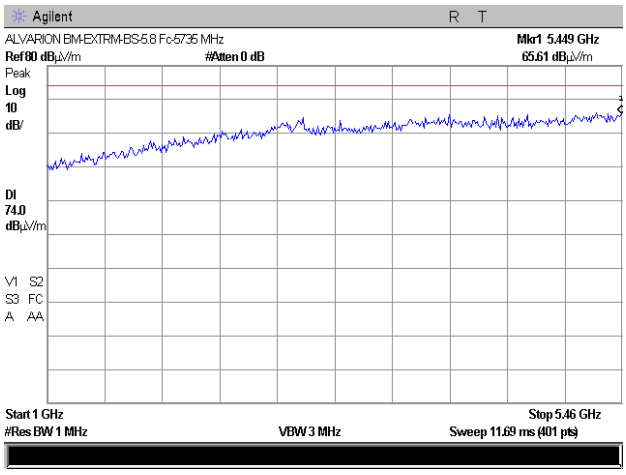
Plot # 58



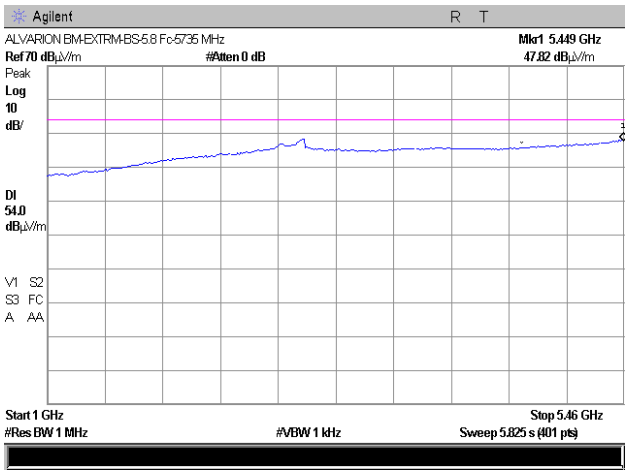
Plot # 59

External sector antenna.

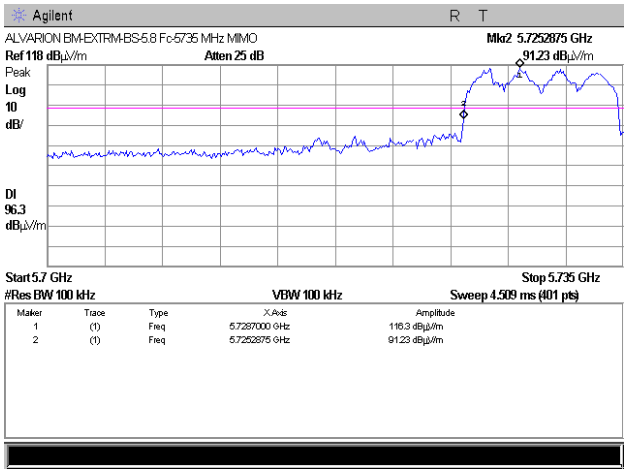
Carrier frequency – 5735 MHz



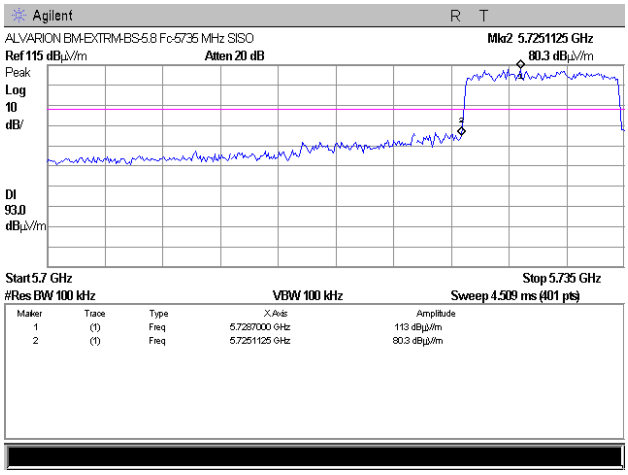
Plot # 60



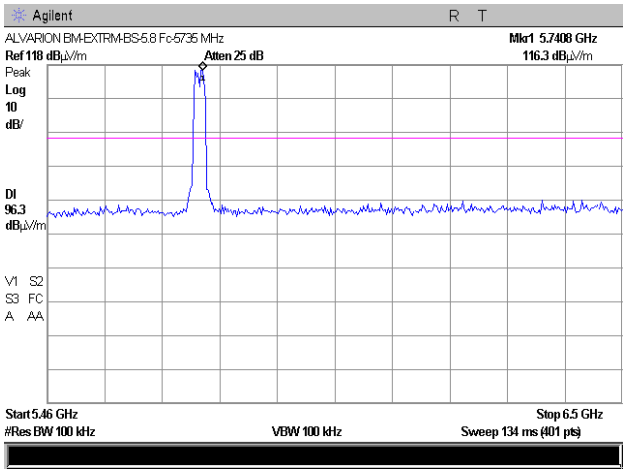
Plot # 61



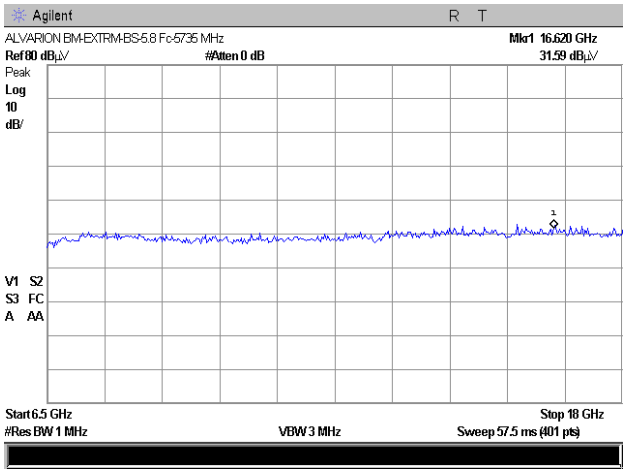
Plot # 62



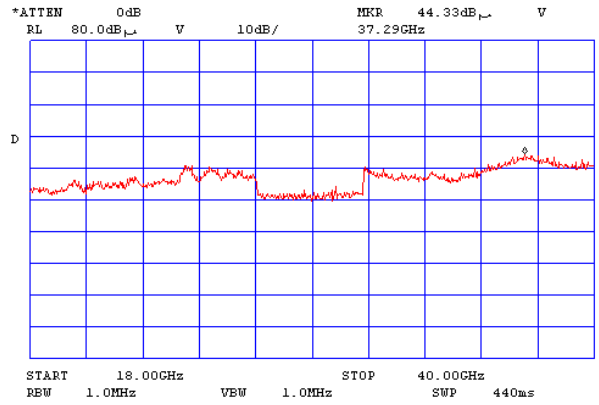
Plot # 63



Plot # 64

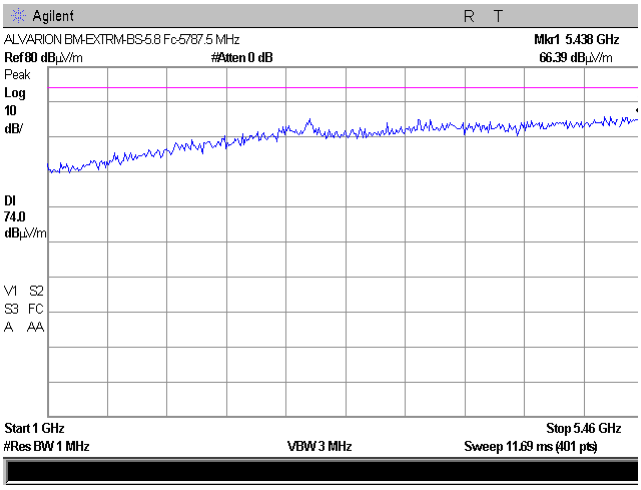


Plot # 65

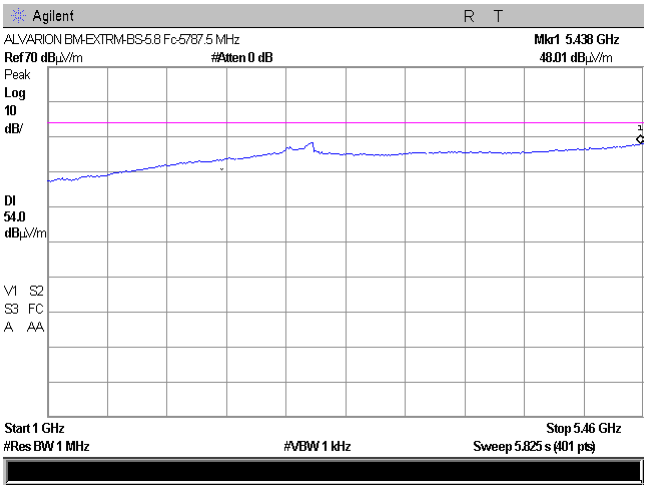


Plot # 66

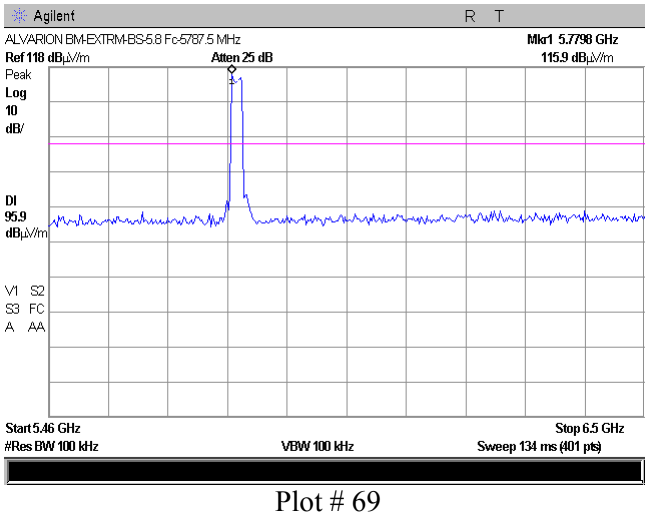
Carrier frequency – 5787.5 MHz



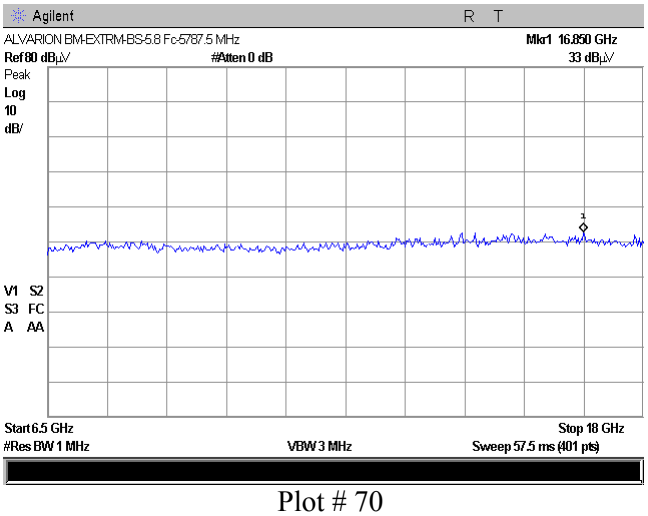
Plot # 67



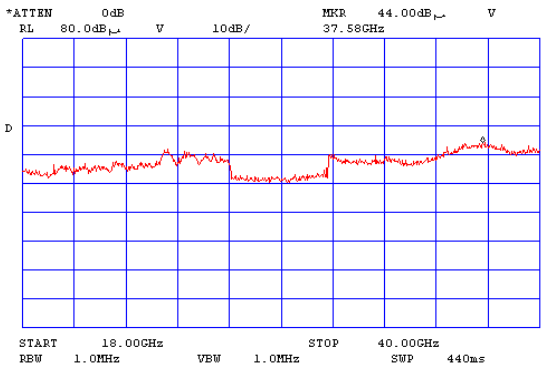
Plot # 68



Plot # 69

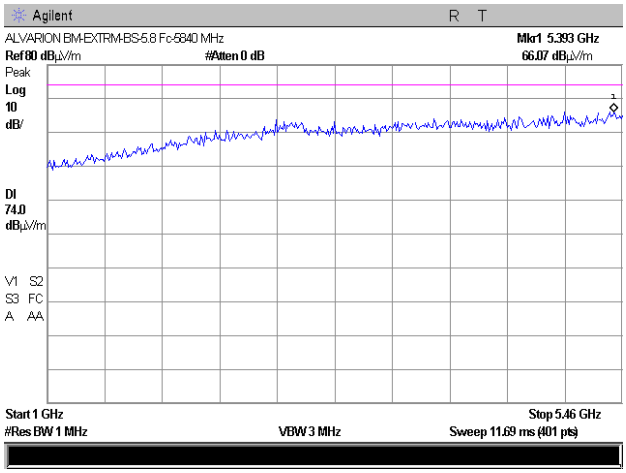


Plot # 70

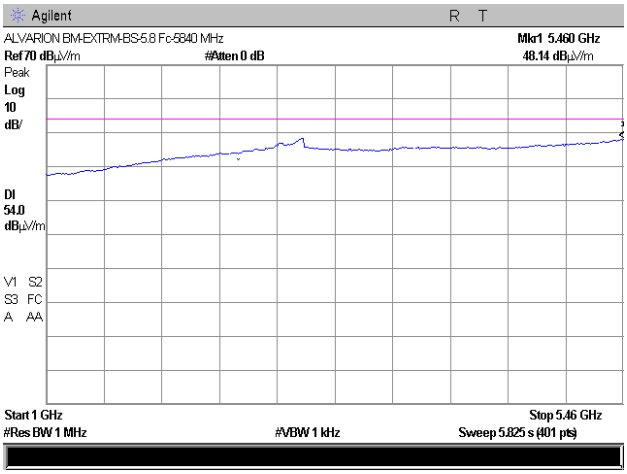


Plot # 71

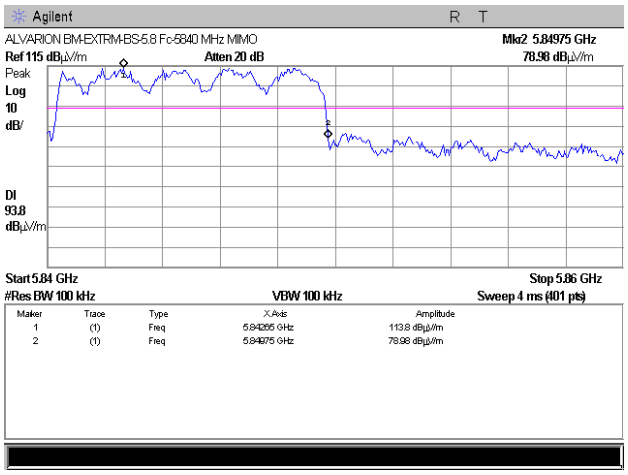
Carrier frequency – 5840 MHz



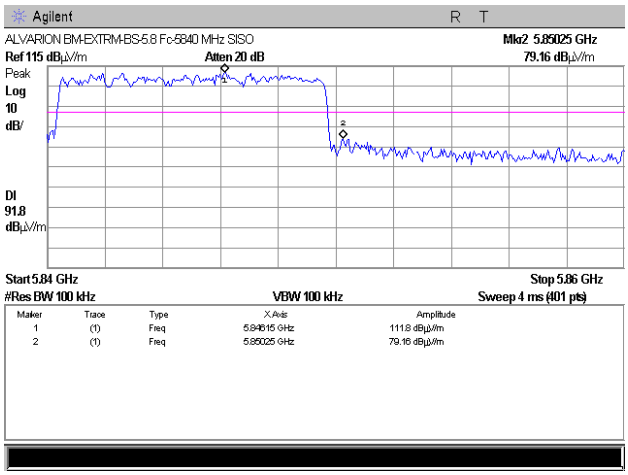
Plot # 72



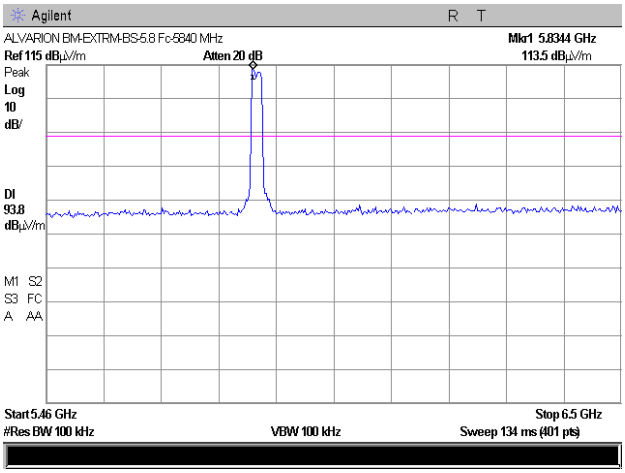
Plot # 73



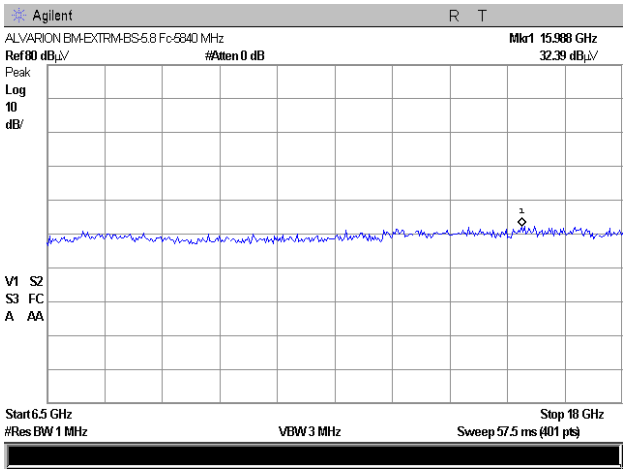
Plot # 74



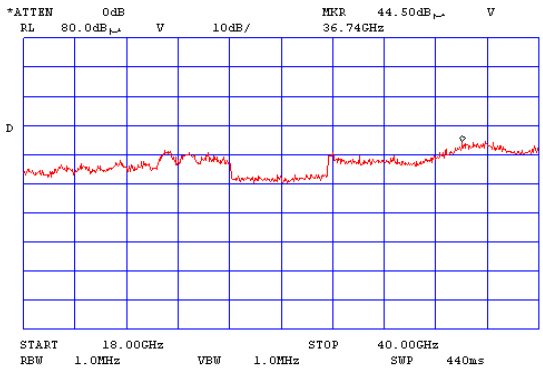
Plot # 75



Plot # 76



Plot # 77



Plot # 78

7.1.5 Power spectral density of digital modulated systems according to § 15.247(e)

Method of measurement FCC March 23, 2005 procedure
Operating Frequency Range 5735 – 5840 MHz
Ambient Temperature 23^0 C Relative Humidity 49% Air Pressure 1007 hPa

Carrier frequency MHz	Measured PSD dBm		Limit, dBm	Margin, dB		Reference to plots	
	Ch1	Ch.2		Ch.1	Ch.2	Ch.1	Ch.2
5735	-8.58	-9.08	8	16.58	17.08	79, 80	85, 86
5787.5	-8.32	-9.96	8	16.32	17.96	81, 82	87, 88
5840	-8.53	-9.57	8	16.53	17.57	83, 84	89, 90

TEST PROCEDURE

Test was performed at maximum permitted output power allowed for antenna Omni 9.5 dBi gain.
The measurements were performed in normal (transmitting) mode of operation for carrier (channel) frequency at bottom, middle and the top of the 5735 – 5840 MHz frequency range under maximum data transfer bit rate. The EUT RF output was connected to the Spectrum Analyzer through appropriate attenuator and accounted with cable loss in SA settings

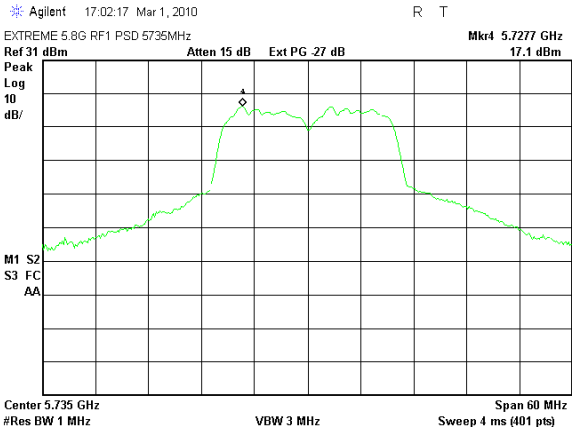
LIMIT

The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

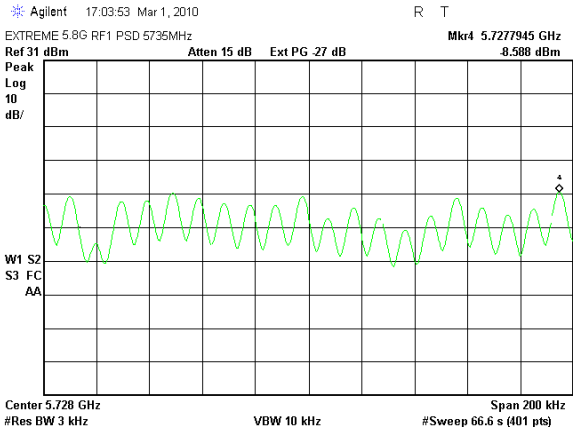
TEST EQUIPMENT USED:

2	3	4	5			

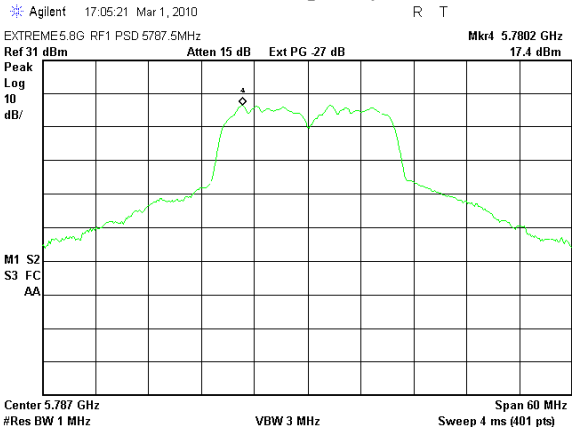
RF chain 1



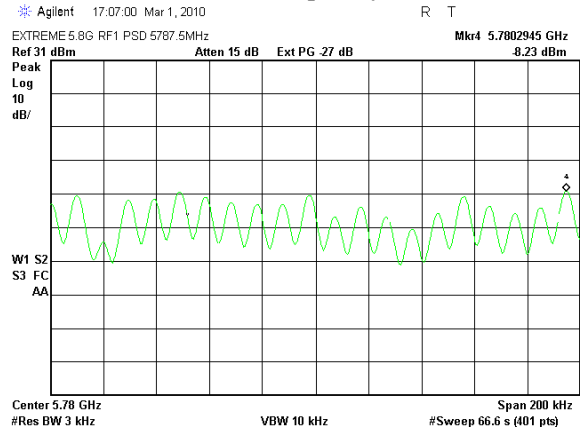
Plot # 79. Carrier frequency 5735 MHz.



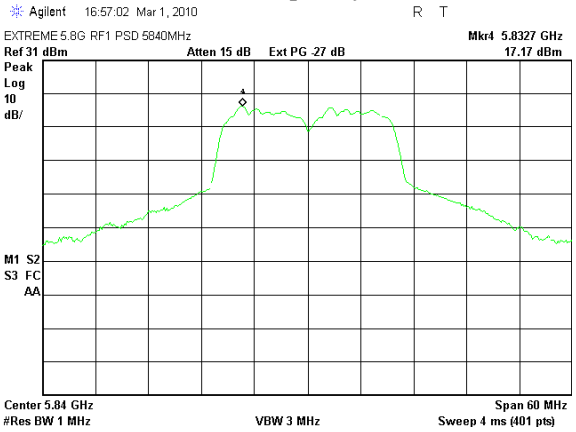
Plot # 80. Carrier frequency 5735 MHz..



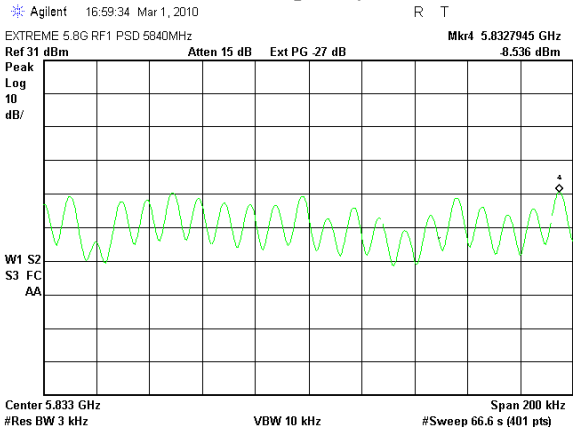
Plot # 81. Carrier frequency 5787.5 MHz.



Plot # 82. Carrier frequency 5787.5 MHz.

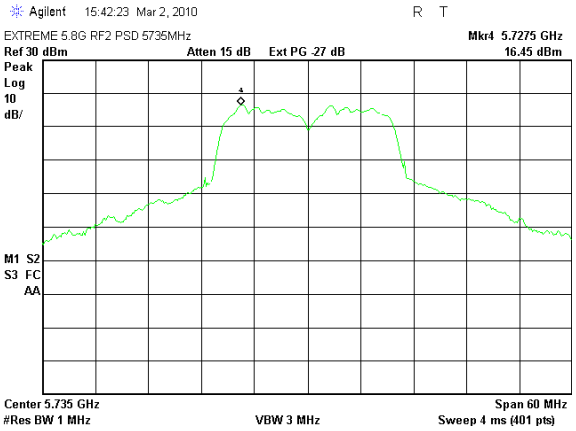


Plot # 83. Carrier frequency 5840 MHz

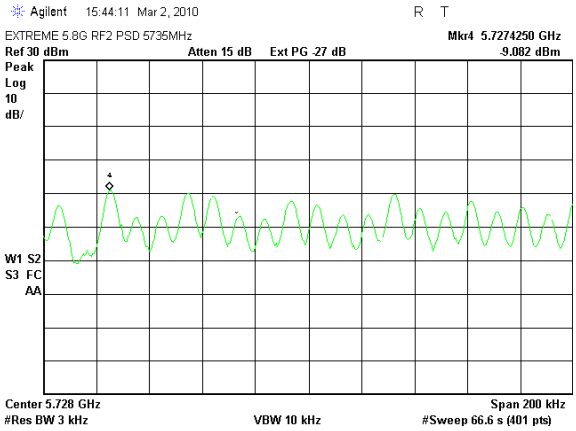


Plot # 84. Carrier frequency 5840 MHz

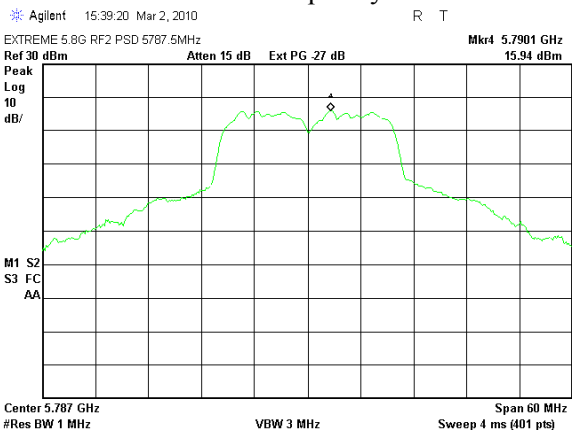
RF chain 2



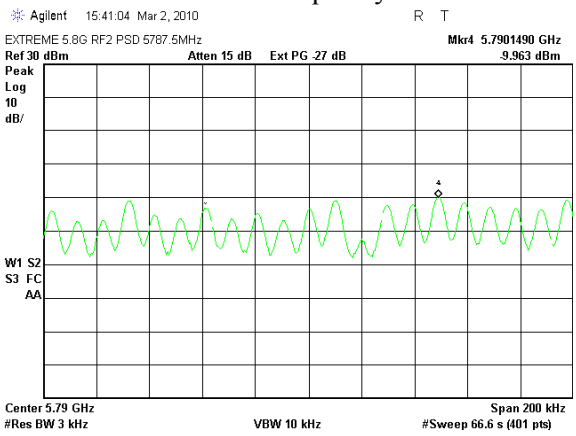
Plot # 85. Carrier frequency 5735 MHz.



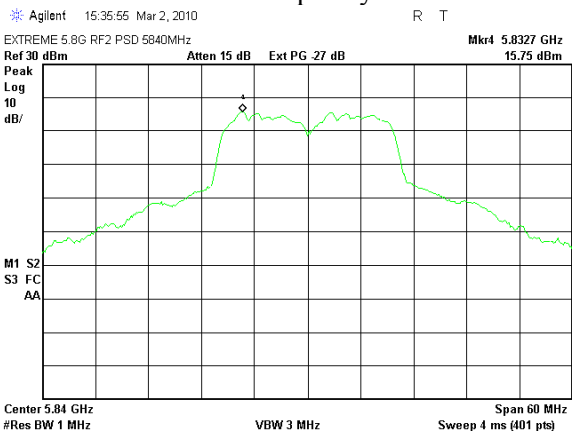
Plot # 86. Carrier frequency 5735 MHz.



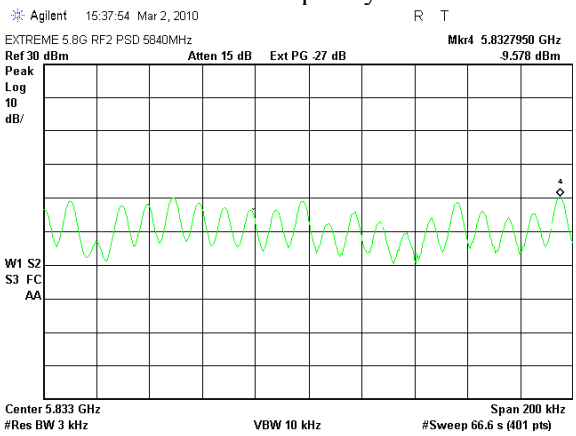
Plot # 87. Carrier frequency 5787.5 MHz**.**



Plot # 88. Carrier frequency 5787.5 MHz**.**



Plot # 89. Carrier frequency 5840 MHz



Plot # 90. Carrier frequency 5840 MHz

8. APPENDIX A

Photo #1. RF conducted emissions test setup.

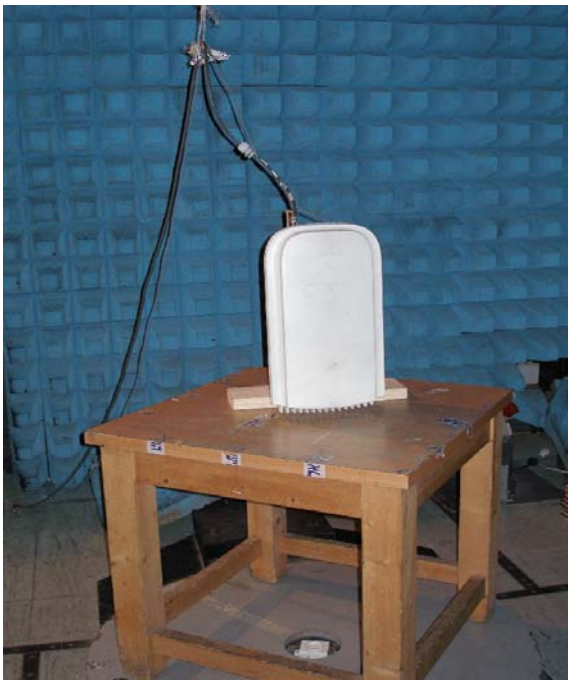


Photo #2. Radiated emissions test setup with internal antenna.

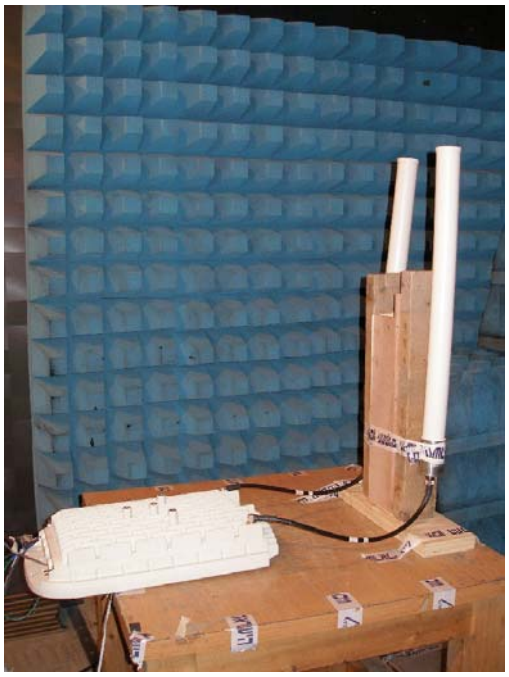


Photo #3. Test setup with external Omni antennas.

Photo #4. Test setup with external sector antennas.

9. APPENDIX B

Test equipment used

No	Description	Manufacturer information			Due Calibration date
		Name	Model No	Serial No	
1	Spectrum Analyzer 9 kHz - 40 GHz	HP	8565E	3835A01359	June 2010
2	Spectrum Analyzer 9 kHz - 26.5 GHz	Agilent	4407B	US40241729	June 2010
3	Attenuators set (2,3,10,20 dB) DC - 18 GHz	M/A-COM	2082	1650	Aug 2010
4	Power splitter 1.7 – 9 GHz	Mini-Circuits	ZN2PD-9G	0142	June 2010
5	Cable RF 1m	Huber-Suhner	Sucoflex 104	21324/4PE	October 2010
6	Double Ridged Guide Antenna 1 – 18 GHz	EMCO	3115	5802	Aug 2010
7	Broadband Horn antenna 15 – 40 GHz	Schwarzbeck Mess-Electronik	BBHA 9170	9170-341	Aug 2010
8	Antenna Biconilog 30 – 2000 MHz	Schaffner-Chase	CBL6112B	S/N 23181	Aug 2010
9	Spectrum analyzer 10 KHz-26.5 GHz	HP	E7405A	SII 4944	April 2010
10	EMI Receiver 9 kHz-6.5 GHz	HP	8546A+85460A	SII 4068	April 2010
11	Spectrum analyzer 20 Hz - 13.6 GHz	Agilent	MXA 9020A	MY48010501	June 2010
12	LISN 9 kHz – 30 MHz	FCC	LISN 250-32-4-16	SII5023	October 2010
13	Transient limiter 0.009-200 MHz	HP	11947A	3107105	October 2010
14	Cable RF 4m	Huber-Suhner	Sucoflex 104PE	21329/4PE	October 2010
15	Cable RF 0.5m	Huber-Suhner	Multiflex 141	520201	October 2010
16	Active Loop antenna 10 kHz – 30 MHz	EMCO	6502	SII 4874	October 2010

Cable Loss (10m cable + Mast)

Point	Frequency (MHz)	Cable Loss (dB)	Point	Frequency (MHz)	Cable Loss (dB)
1	30	0.53	21	1000	3.68
2	50	0.75	22	1100	3.82
3	100	1.08	23	1200	4.07
4	150	1.39	24	1300	4.24
5	200	1.61	25	1400	4.43
6	250	1.752	26	1500	4.6
7	300	2.00	27	1600	4.7
8	350	2.15	28	1700	4.85
9	400	2.26	29	1800	4.98
10	450	2.383	30	1900	5.19
11	500	2.52	31	2000	5.34
12	550	2.606	32	2100	5.51
13	600	2.75	33	2200	5.69
14	650	2.856	34	2300	5.89
15	700	3.06	35	2400	6.07
16	750	3.201	36	2500	6.22
17	800	3.27	37	2600	6.28
18	850	3.38	38	2700	6.41
19	900	3.46	39	2800	6.53
20	950	3.55	40	2900	6.84

Biconilog Antenna, Model Number: CBL-6112D, S/N: 23181.

No.	f / MHz)	AF / dB/m	f / MHz)	AF / dB/m	f / MHz)	AF / dB/m	f / MHz)	AF / dB/m
1	30	17.90	170	9.40	530	17.70	1040	22.20
2	32	16.70	175	9.00	540	18.25	1060	22.50
3	34	15.55	180	8.50	550	18.60	1080	22.50
4	36	14.35	185	8.45	560	14.45	1100	22.40
5	38	13.30	190	8.60	570	18.40	1120	22.60
6	40	12.20	195	8.85	580	18.50	1140	22.45
7	42	11.05	200	8.95	590	18.60	1160	22.50
8	44	9.95	205	8.80	600	18.60	1180	22.40
9	46	8.90	210	8.50	610	18.80	1200	22.80
10	48	8.05	215	8.20	620	18.99	1220	22.95
11	50	7.30	220	8.50	630	19.05	1240	23.10
12	52	6.80	225	9.00	640	19.23	1260	23.40
13	54	6.45	230	9.65	650	19.10	1280	23.35
14	56	6.00	235	10.30	660	19.13	1300	23.62
15	58	5.70	240	11.00	670	19.04	1320	23.64
16	60	5.45	245	11.60	680	19.00	1340	23.86
17	62	5.30	250	12.00	690	19.17	1360	23.95
18	64	5.20	255	12.45	700	19.28	1380	23.90
19	66	5.30	260	12.85	710	19.25	1400	24.45
20	68	5.30	265	12.50	720	19.45	1420	24.74
21	70	5.35	270	12.45	730	19.75	1440	24.93
22	72	5.50	275	12.40	740	19.95	1460	25.03
23	74	5.80	280	12.55	750	20.07	1480	25.45
24	76	6.00	285	12.65	760	19.85	1500	25.30
25	78	6.60	290	12.75	770	19.80	1520	25.25
26	80	6.70	295	12.95	780	19.85	1540	25.36
27	82	7.15	300	13.00	790	19.95	1560	25.58
28	84	7.60	310	13.35	800	20.05	1580	25.50
29	86	8.10	320	13.75	810	20.10	1600	25.65
30	88	8.50	330	13.85	820	20.35	1620	25.60
31	90	8.90	340	14.10	830	20.40	1640	25.70
32	92	9.20	350	14.50	840	20.35	1660	25.83
33	94	9.75	360	14.70	850	20.46	1680	25.97
34	96	9.95	370	14.90	860	20.39	1700	26.10
35	98	10.20	380	15.10	870	20.29	1720	26.25
36	100	10.50	390	15.45	880	20.24	1740	26.04
37	105	11.25	400	16.00	890	20.35	1760	26.14
38	110	11.70	410	16.40	900	20.55	1780	26.20
39	115	11.70	420	16.70	910	20.45	1800	26.40
40	120	11.80	430	16.35	920	20.60	1820	26.64
41	125	11.80	440	16.30	930	20.60	1840	26.86
42	130	11.70	450	16.30	940	20.66	1860	27.12
43	135	11.35	460	16.70	950	20.88	1880	27.00
44	140	10.95	470	17.05	960	21.11	1900	27.25
45	145	10.35	480	17.20	970	20.93	1920	27.36
46	150	10.05	490	17.30	980	21.03	1940	27.68
47	155	9.70	500	17.40	990	21.05	1960	27.10
48	160	9.70	510	17.50	1000	21.10	1980	27.06
49	165	9.45	520	17.60	1020	21.40	2000	27.25

Antenna Factor
Double Ridged Guide Antenna mfr EMCO model 3115 1m calibration

Point	Frequency (MHz)	Antenna Factor (dB/m)
1	1000	23.9
2	2000	28.3
3	3000	31.0
4	4000	33.1
5	4500	32.5
6	5000	32.4
7	6000	53.7
8	6500	35.6
9	7000	36.4
10	7500	36.9
11	8000	37.0
12	8500	38.0
13	9000	38.6
14	9500	38.4
15	10000	38.4
16	10500	38.4
17	11000	38.9
18	11500	39.6
19	12000	39.4
20	12500	39.2
21	13000	40.3
22	13500	41.0
23	14000	41.2
24	14500	41.3
25	15000	40.0
26	15500	38.0
27	16000	38.1
28	16500	40.3
29	17000	42.2
30	17500	44.6
31	18000	46.2

Cable Loss
Type: Sucoflex 104PE; Ser.No.21328/4PE; 4 m length

Point	Frequency (GHz)	Cable Loss (dB)
1	0.0-1.0	1.7
2	1.0– 3.5	3.2
3	3.5– 5.5	4.0
4	5.5 – 7.5	4.7
5	7.5 – 9.5	5.3
6	9.5 – 10.5	5.6
7	10.5 – 12.5	6.2
8	12.5 – 14.5	6.8
9	14.5 – 16.5	7.5
10	16.5 – 18.0	8.1

Antenna Factor
Broadband Horn Antenna model BBHA 9170 1m calibration

Point	Frequency (GHz)	Antenna Factor (dB/m)
1	15.0	38.5
2	16.0	37.7
3	17.0	38.1
4	18.0	37.9
5	19.0	38.0
6	20.0	38.0
7	21.0	37.9
8	22.0	38.2
9	23.0	39.6
10	24.0	39.6
11	25.0	39.3
12	26.0	39.5
13	27.0	39.6
14	28.0	39.6
15	30.0	40.1
16	32.0	41.2
17	34.0	41.5
18	35.0	41.9
19	36.0	42.2
20	38.0	43.8
21	40.0	43.2

10. APPENDIX C

Abbreviations and acronyms

The following abbreviations and acronyms are applicable to this test report:

AC	alternating current
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μV)	decibel referred to one microvolt
dB(μV/m)	decibel referred to one microvolt per meter
EMC	electromagnetic compatibility
EUT	equipment under test
GHz	gigahertz
H	height
Hz	hertz
kHz	kilohertz
L	length
LNA	low noise amplifier
m	meter
Mbps	megabit per second
MHz	megahertz
NA	not applicable
OFDM	Orthogonal Frequency Division Multiple Access
PRBS	pseudo random binary sequence
QP	quasi-peak
RF	radio frequency
RE	radiated emission
SA	spectrum analyzer
rms	root mean square
W	width

Specification references

47 CFR part 15: 2009	Radio Frequency Devices
ANSI C63.2: 1996	American National Standard for Instrumentation Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz Specifications.
ANSI C63.4: 2003	American National Standard for Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz