Test Report No. 8812345986

For ALVARION Ltd.

Equipment Under Test:

BreezeMax 4Motion™
Broadband Wireless Access System

Band B

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

ACCREDITED

Certificate No. 1487-01

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Test report No: 8812345986 **Page 1 of 47 Pages**
Title: BreezeMAX 4Motion™ Broadband Wireless Access System
Model: ODU-2590-2690-000N-38-4x2-N-0 **FCC ID: LKT-BMAX-BA4M-B25**

Table of Contents

1. Applicant information

Order placed by:	Alvarion Ltd
Address:	21A Habarzel str, Tel-Aviv, 69710, Israel
Sample for test selected by:	The customer
The date of test:	July 2008

Equipment under test information

Description of Equipment Under Test (EUT):	Transmitter BreezeMAX 4Motion™
Model:	ODU-2590-2690-000N-38-4x2-N-0
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, part 27, part 2 §§ 2.1049, 2.1053, part 1 §1.1310

This Test Report contains 47 pages and may be used only in full.	This Test Report applies only to the specimen tested and may not be applied to other specimens of the same product.

3. Summary of test:

The EUT was found to be in compliance with requirements of: 47CFR Part 15 §§ 15.207 and 15.209 part 27, §§ 27.50, 27.53, 27.54 and part 2 §§ 2.1049

Parameter	Subclasses
Transmitter characteristics	
Occupied bandwidth	2.1049
Peak output power	27.50
Power spectral density	27.50
Spurious emissions at antenna terminal	27.53
Spurious emissions radiated	27.53
Frequency stability	27.54
Conducted emissions	15.207
Radiated emissions	15.209

Test performed by: Mr. Michael Feldman test technician

Test report prepared by: Mr. Michael Feldman test technician

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

4. Equipment under test description.

*The customer provided description.

4.1 General description

BreezeMAX 4M 2.5GHz is digital modulated TDD system operating in the 2500MHz up to 2700MHz band. The system contains a base station unit and a subscriber unit.
The basic system configuration is a two-box configuration that contains

1. Indoor unit that contains the IF unit, digital card, power supply and modem.
2. Outdoor unit contain the radio {Basic + HPA} and digital control section unit.

The outdoor unit (ODU) is a high-power, multi-carrier radio unit that connects to one or more external antennas. The ODU is designed to provide high system gain and interference robustness utilizing high transmit power and low noise figure. It is HW-ready for supporting a bandwidth of up to 20 MHz, enabling future options such as increased capacity through the use of a multiplexer or wider frequency channels.

EUT technical characteristics

Transmitter technical characteristics.		**Note**
Stand-alone/fixed use		
Assigned frequency range	**2590 MHz - 2690 MHz**	
Operating frequency range	**2592.5 MHz - 2687.5 MHz**	5 MHz channel spacing
	2595 MHz - 2685 MHz	10 MHz channel spacing
RF channel spacing	**5 MHz; 10 MHz**	
Maximum rated output power	**38 dBm**	At transmitter 50 Ω RF output connector
Antenna connection	**Standard connector: N - type**	Professional installation
Type of modulation	**BPSK, 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	**60 %**	

Antenna information			
Type	**Manufacturer**	**Model**	**Gain**
Remote Tilt Panel	Argus Technologies	LPX310RT	18 dBi

4.1.1 Environmental evaluation and exposure limit according to FCC CFR 47 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 $S = (Pt / 4\pi r^2)$.
Where
Pt - The transmitted power (EIRP) (mW)
r - The distance from the unit. (cm)
The 1(mW/cm^2) limit can be calculated from the above based on the following data:
Pt- the transmitted power whish is equal to the output power 38.3 dBm plus external antenna gain 18 dBi. The maximum EIRP = 56.3 dBm = 426579 mW
Minimum allowed distance from antenna were FCC RF exposure limit may not be exceeded
$r = SQRT(426579/4\pi) = 1.85$ m.

4.2 EUT test configuration

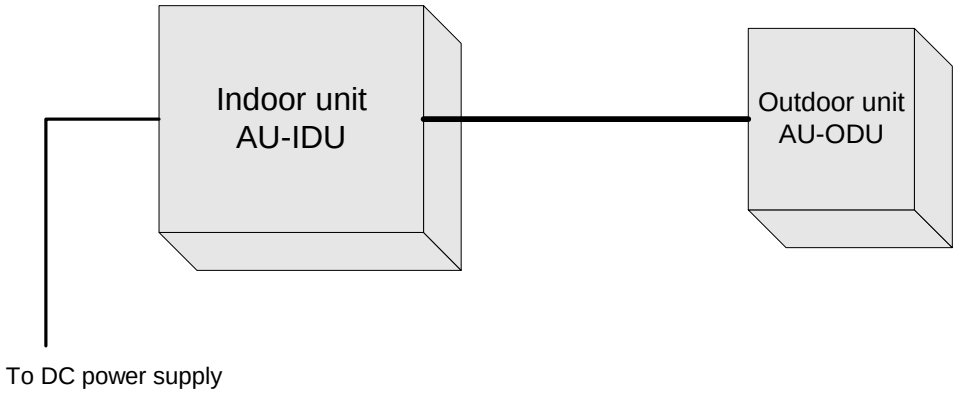


Fig. 1 EUT test setup.

5. Test results

5.1 Transmitter characteristics

5.1.1 Occupied bandwidth according to § 2.1049

Method of measurement ANSI 63.4 §13.1.7
Operating Frequencies Range 2592.5 – 2687.5 MHz
Ambient Temperature 23^0 C Relative Humidity 49% Air Pressure 1009 hPa

Channel spacing - 5 MHz.

Carrier frequency MHz	Measured occupied bandwidth, MHz	Reference to plot number
2592.5	4.77	#1
2640.0	4.77	#2
2687.5	4.77	#3

Channel spacing - 10 MHz.

Carrier frequency MHz	Measured occupied bandwidth, MHz	Reference to plot number
2595.0	9.6	#4
2640.0	9.6	#5
2685.0	9.6	#6

TEST PROCEDURE

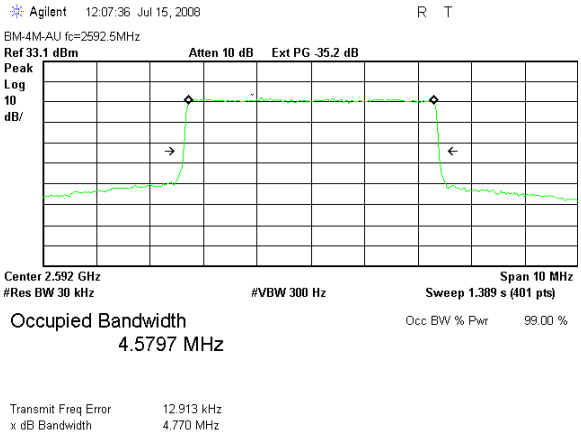
The measurements were performed in normal (transmitting) mode at three transmitted carrier (channel) frequencies of the 2590 – 2690 MHz frequency range under maximum data transfer bit rate. The EUT RF output was connected to the Spectrum Analyzer through appropriate attenuator and accounted with cable loss in SA settings.

TEST EQUIPMENT USED:

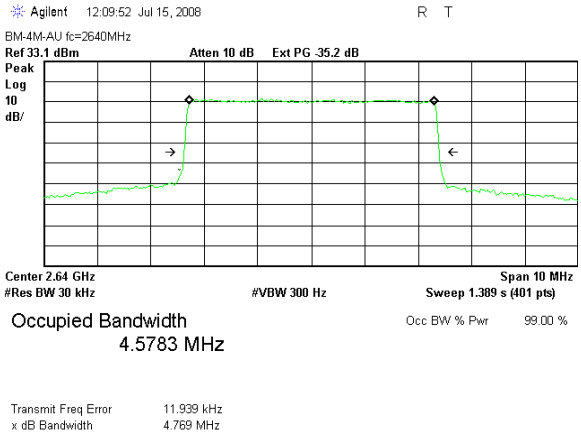
1	2	3				

Occupied bandwidth test results.

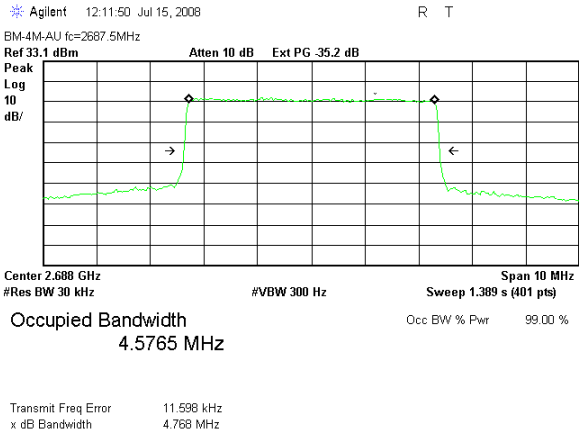
Channel spacing 5 MHz



Plot # 1. Carrier Frequency 2592.5 MHz

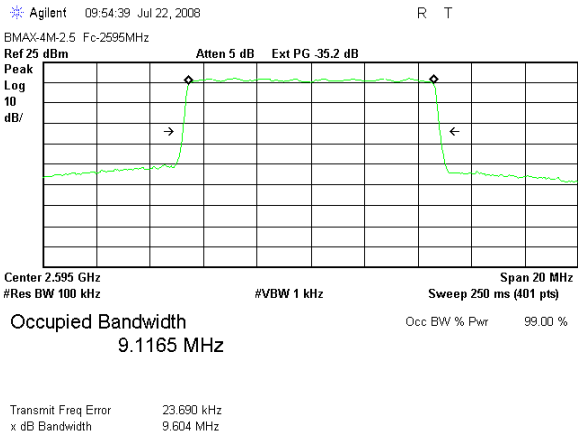


Plot # 2. Carrier Frequency 2640 MHz

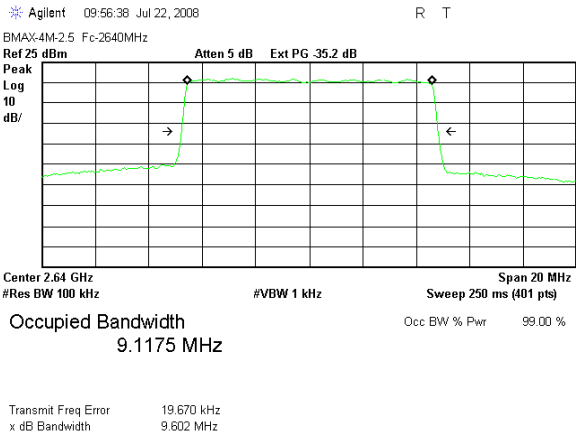


Plot # 3. Carrier Frequency 2687.5 MHz

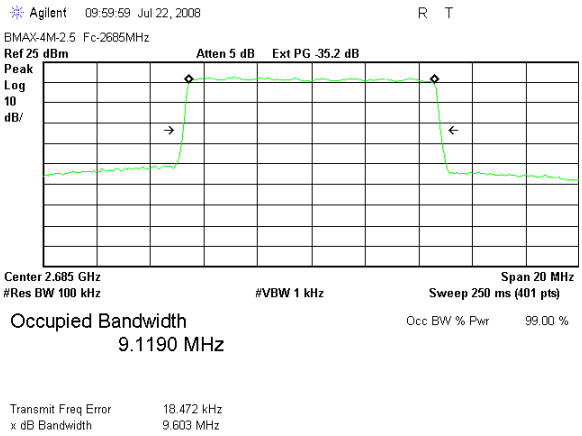
Channel spacing - 10 MHz



Plot # 4. Carrier Frequency 2595 MHz



Plot # 5. Carrier Frequency 2640 MHz



Plot # 6. Carrier Frequency 2685 MHz

5.1.2 Peak output power test § 27.50(h) (1) (ii)

Operating Frequencies Range 2592.5 – 2687.5 MHz
Ambient Temperature 23^0 C Relative Humidity 52% Air Pressure 1009 hPa

Peak EIRP power test result

Channel spacing 5 MHz

Carrier frequency MHz	Peak output power. dBm	EIRP power (+ 18 dBi antenna gain) dBm	EIRP limit dBm	Reference to plot number
2592.5	38.3	56.3	69.6	#7
2640.0	37.9	55.9	69.6	#8
2687.5	37.6	55.6	69.6	#9

Channel spacing - 10 MHz

Carrier frequency MHz	Peak output power. dBm	EIRP power (+ 18 dBi antenna gain) dBm	EIRP limit dBm	Reference to plot number
2595.0	38.3	56.3	72.6	#10
2640.0	38.0	56.0	72.6	#11
2685.0	38.3	56.3	72.6	#12

The maximum EIRP in dBW in a given direction shall be determined by the following formula: EIRP = 33 dBW + 10 log(X/Y) dBW + 10log (360/beamwidth) dBW, where X is the actual channel width in MHz, Y is 6 MHz.
For 5 MHz channel spacing EIRP = 33 dBW + 10 log (5/6) + 10log (360/65°) = 69.6 dBm
For 10 MHz channel spacing EIRP = 33 dBW + 10 log (10/6) dBW + 10log (360/65°) = 72.6 dBm.

TEST PROCEDURE

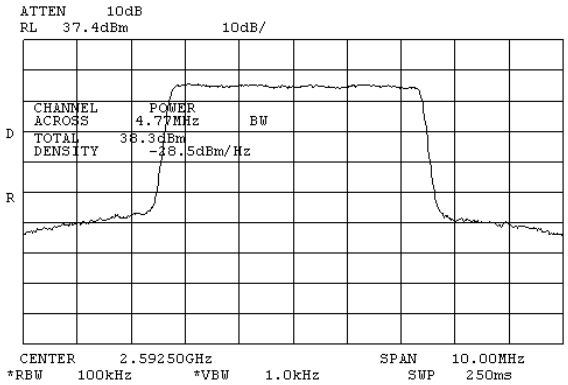
The measurements were performed in normal (transmitting) mode at three transmitted carrier (channel) frequencies of the 2590 – 2690 MHz frequency range under maximum data transfer bit rate. The EUT RF output was connected to the Spectrum Analyzer through appropriate attenuator and accounted with cable loss in SA settings.
Calculation of measured EIRP with external antenna was performed as follows:
Plot result + Antenna gain.

TEST EQUIPMENT USED:

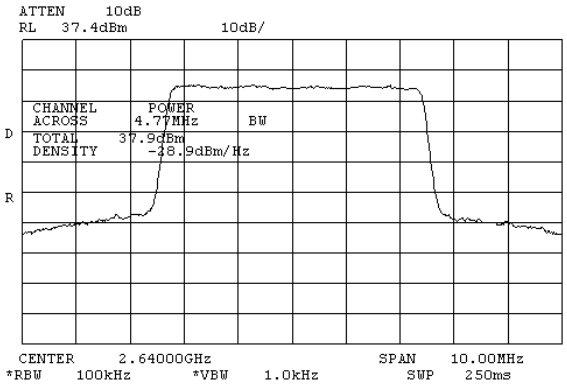
1	2	3	4			

Peak output power test results.

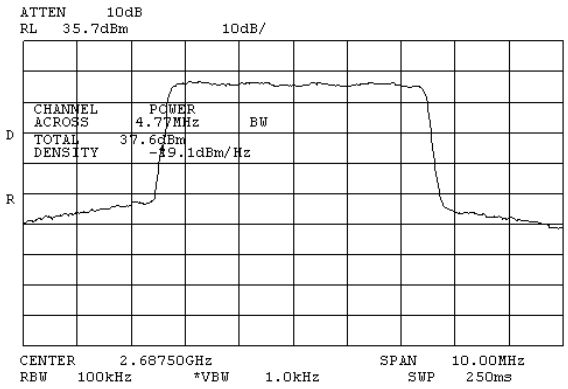
Channel spacing 5 MHz



Plot # 7. Carrier Frequency 2592.5 MHz

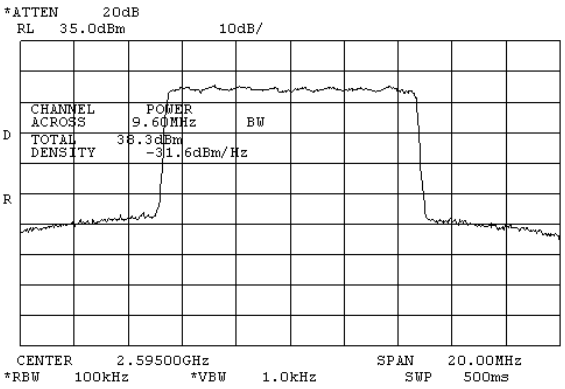


Plot # 8. Carrier Frequency 2640.0 MHz

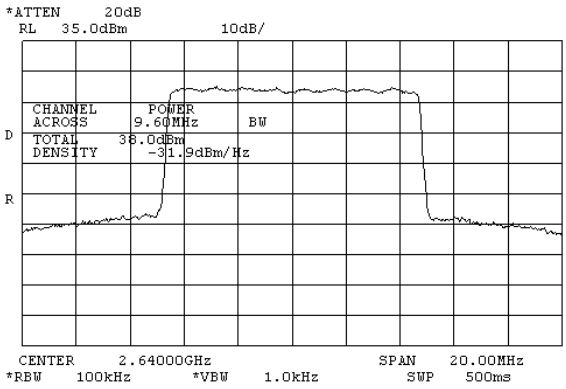


Plot # 9. Carrier Frequency 2687.5 MHz

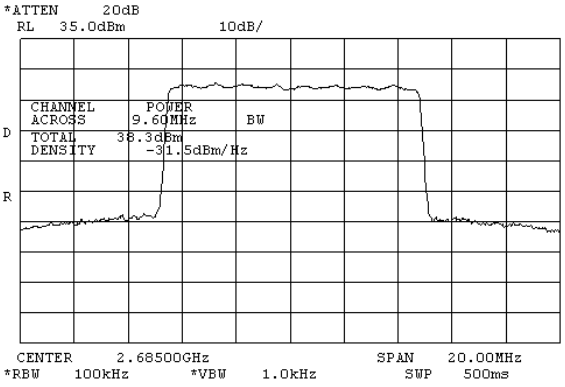
Channel spacing 10 MHz



Plot # 10. Carrier Frequency 2595 MHz



Plot # 11. Carrier Frequency 2640 MHz



Plot # 12. Carrier Frequency 2685 MHz

5.1.2 Spectral power density test § 27.50(h) (4)

Operating Frequencies Range 2592.5 – 2687.5 MHz
Ambient Temperature 23^0 C Relative Humidity 49% Air Pressure 1008 hPa

Spectral power density test result

Channel spacing 5 MHz

Carrier frequency MHz	Spectral power density dBm	PSD limit dBm	Reference to plot number
2592.5	22.1	28.0	#13
2640.0	21.7	28.0	#14
2687.5	22.2	28.0	#15

Channel spacing - 10 MHz

Carrier frequency MHz	Spectral power density dBm	PSD limit dBm	Reference to plot number
2595.0	18.8	25.0	#16
2640.0	18.3	25.0	#17
2685.0	18.8	25.0	#18

According to standard requirements power spectral density in any 100 kHz segment of the channel bandwidth is limited to EIRP power/ (bandwidth/RBW).
For 5 MHz channel spacing 2000W/50 = 40W. At antenna terminal 46dBm – 18 dB = 28dBm.
For 10 MHz channel spacing 2000W/100 = 20W.At antenna terminal 43dBm – 18 dB = 25dBm.

TEST PROCEDURE

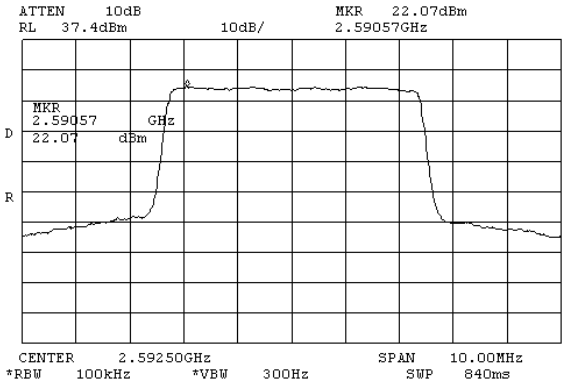
The measurements were performed in normal (transmitting) mode at three transmitted carrier (channel) frequencies of the 2590 – 2690 MHz frequency range under maximum data transfer bit rate. The EUT RF output was connected to the Spectrum Analyzer through appropriate attenuator and accounted with cable loss in SA settings.

TEST EQUIPMENT USED:

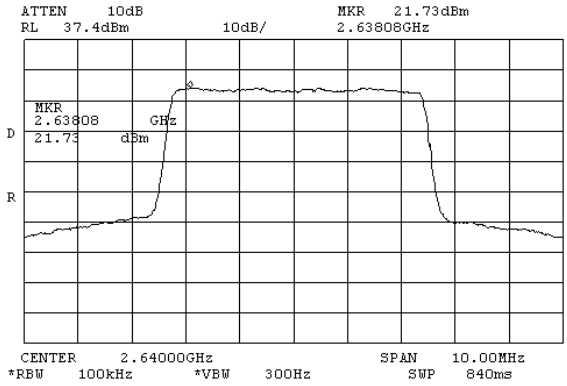
1	2	3	4			

Spectral power density test results.

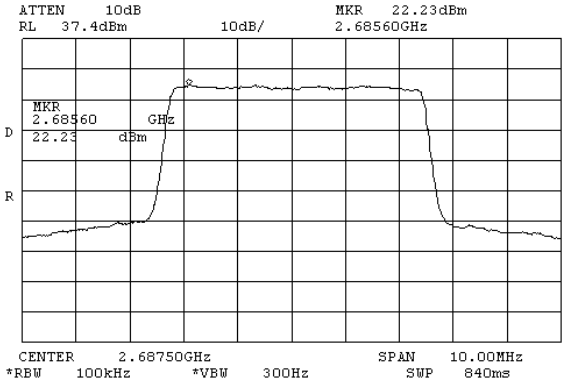
Channel spacing 5 MHz



Plot # 13. Carrier Frequency 2592.5 MHz

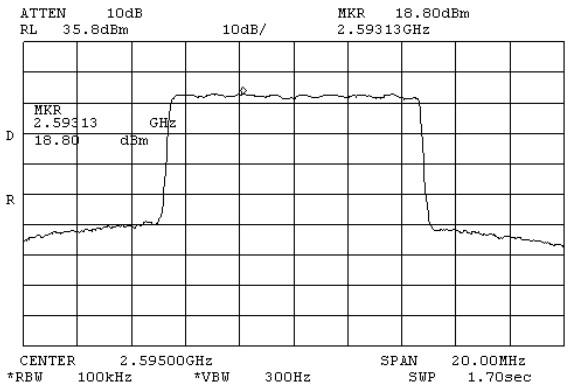


Plot # 14. Carrier Frequency 2640.0 MHz

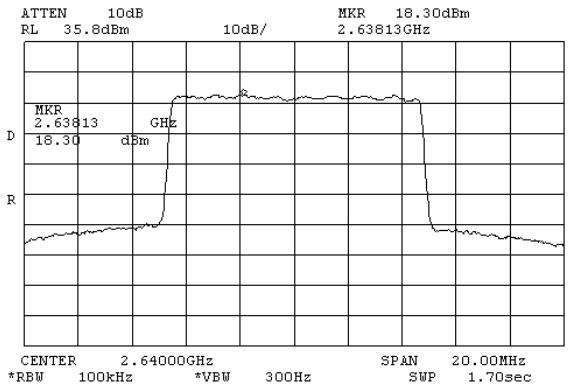


Plot # 15. Carrier Frequency 2687.5 MHz

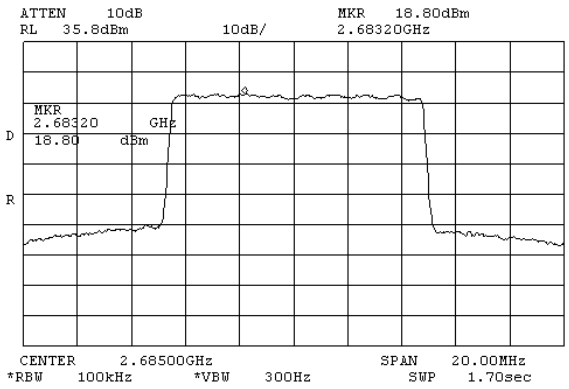
Channel spacing 10 MHz



Plot # 16. Carrier Frequency 2595 MHz



Plot # 17. Carrier Frequency 2640 MHz



Plot # 18. Carrier Frequency 2685 MHz

5.1.3 Spurious emissions at antenna terminal § 27.53

Operating Frequencies Range 2592.5 – 2687.5 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, up to the tenth harmonic of the highest fundamental frequency. The emissions levels of the EUT more than 20 dB lower than the specified limit were not recorded in the tables.

Channel spacing – 5 MHz

Carrier frequency = 2592.5 MHz

Frequency, MHz	Measured emissions, dBm	Limit, dBm	Margin, dB	Reference to Plot number
2355	-29.5	-13.0	16.5	#20
2589	-18.2	-13.0	5.2	#22
2595	-18.2	-13.0	5.2	#24

Carrier frequency = 2640.0 MHz

Frequency, MHz	Measured emissions, dBm	Limit, dBm	Margin, dB	Reference to Plot number
2637.5	-18.1	-13.0	5.1	#30
2642.5	-18.4	-13.0	5.4	#32

Carrier frequency = 2687.5 MHz

Frequency, MHz	Measured emissions, dBm	Limit, dBm	Margin, dB	Reference to Plot number
2450	-18.3	-13.0	5.3	#36
2685	-19.7	-13.0	6.7	#38
2690	-19.6	-13.0	6.6	#40

Channel spacing – 10 MHz

Carrier frequency = 2595.0 MHz

Frequency, MHz	Measured emissions, dBm	Limit, dBm	Margin, dB	Reference to Plot number
2357	-29.1	-13.0	16.1	#44
2590	-21.8	-13.0	8.8	#46
2600	-23.5	-13.0	10.5	#48

Carrier frequency = 2640.0 MHz

Frequency, MHz	Measured emissions, dBm	Limit, dBm	Margin, dB	Reference to Plot number
2635	-22.1	-13.0	9.1	#54
2645	-23.3	-13.0	10.3	#56

Carrier frequency = 2685.0 MHz

Frequency, MHz	Measured emissions, dBm	Limit, dBm	Margin, dB	Reference to Plot number
2449	-21.6	-13.0	8.6	#60
2680	-22.7	-13.0	9.7	#62
2645	-23.3	-13.0	10.3	#64

Measured results not noted in the tables above presented:
In 5 – 2575 MHz band present in plots: ## 19, 20; ## 43, 44
In 5 – 2620 MHz band present in plots: ## 27, 28; ## 51, 52
In 5 – 2670 MHz band present in plots: ## 35, 36; ## 59, 60
In 2610 – 26900 MHz band present in plots: ## 25, 26; ## 33, 34; ## 41, 42; ## 49, 50; ## 57, 58; ## 65, 66.

LIMIT

For operation in the declare 2590 – 2690 MHz band, the power of any emissions outside the authorized frequency band of operation shall be attenuated below the transmitter power (P) measured in watts, by a factor not less then: 43+10Log(P) dB = -13 dBm.

TEST PROCEDURE

The measurements were performed in normal (transmitting) mode at 3 transmitted carrier (channel) frequencies of the 2590 – 2690 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.

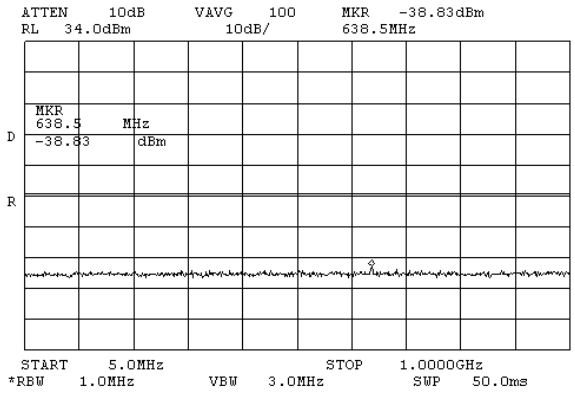
TEST EQUIPMENT USED:

1	2	3	4			

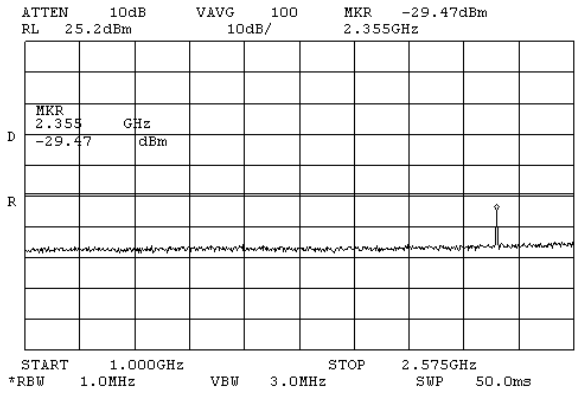
Spurious emissions at antenna terminal test results.

Channel spacing – 5 MHz

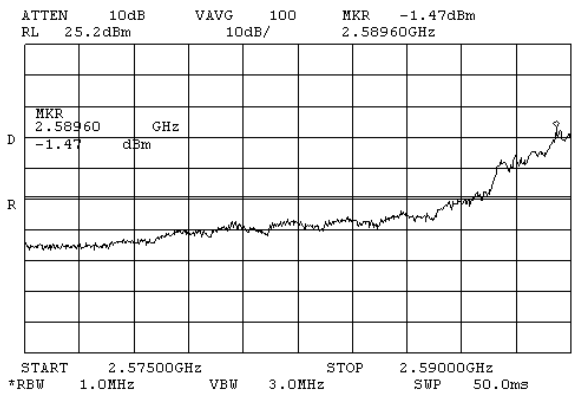
Frequency carrier 2592.5 MHz.



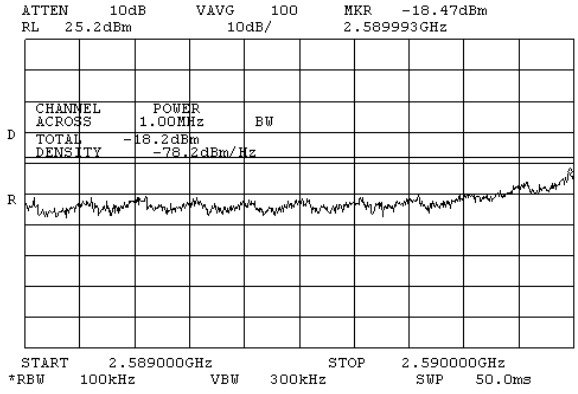
Plot # 19



Plot # 20

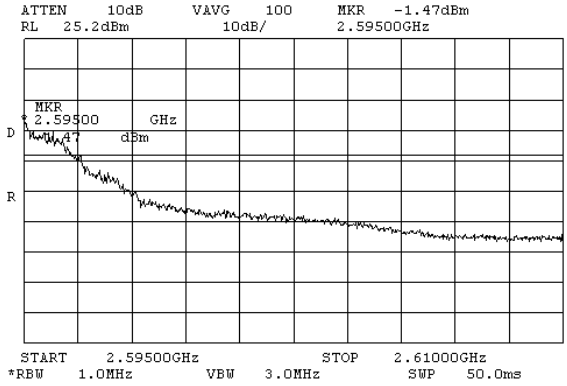


Plot # 21

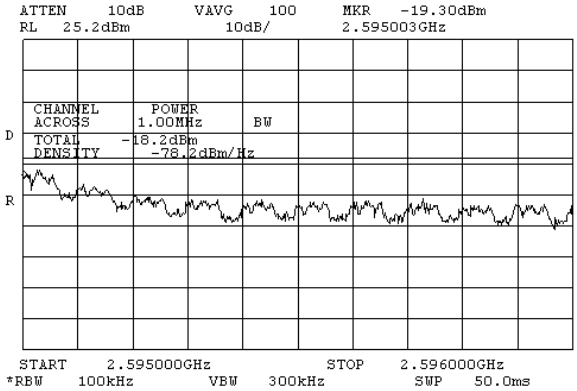


Plot # 22.

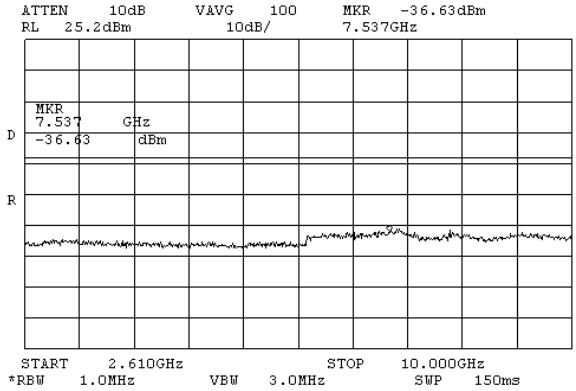
External attenuation was added to SA settings.
External loss of external attenuator, splitter and cable is 35.2 dB



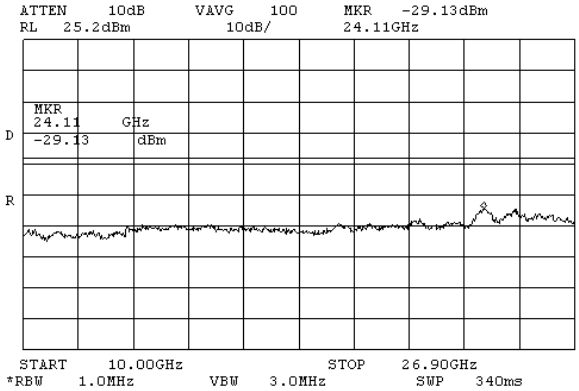
Plot # 23



Plot # 24

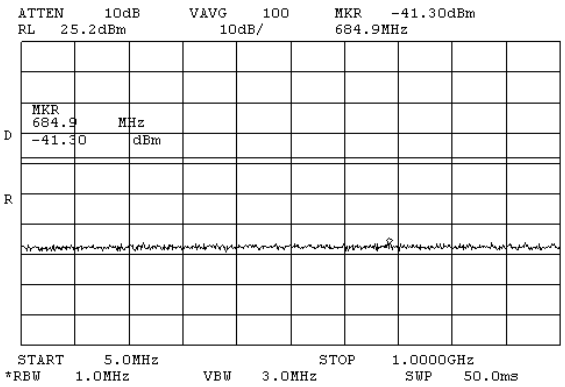


Plot # 25

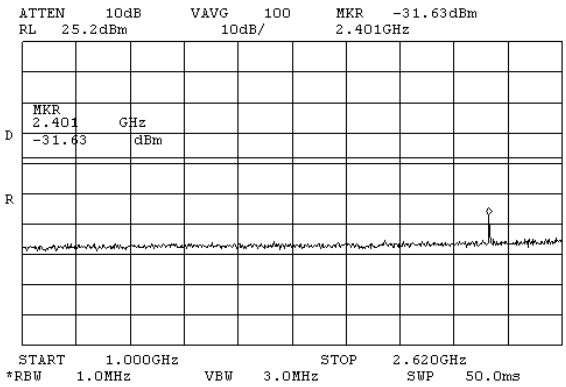


Plot # 26

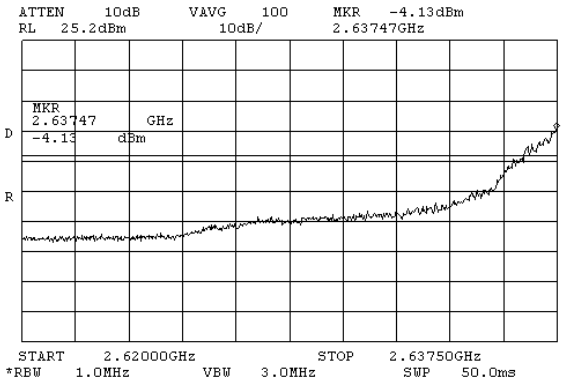
Frequency carrier 2640 MHz



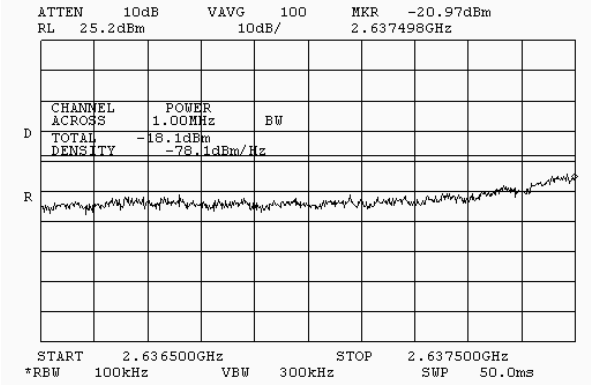
Plot # 27.



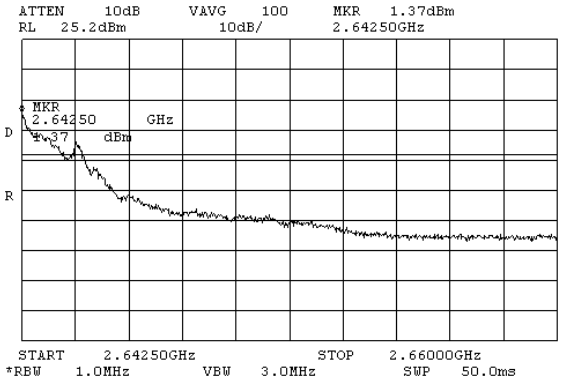
Plot # 28.



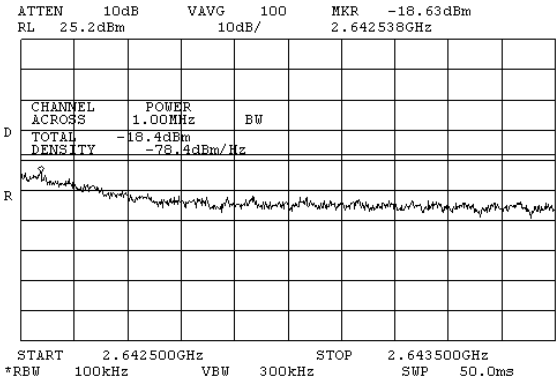
Plot # 29



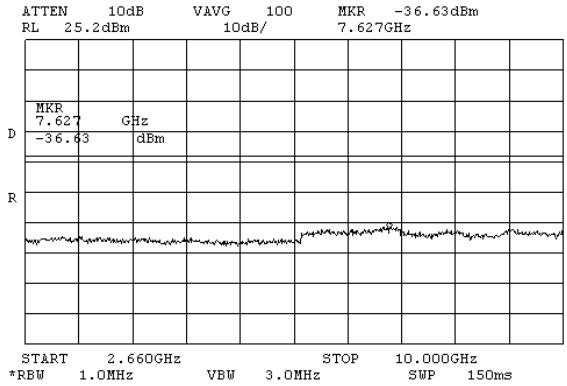
Plot # 30



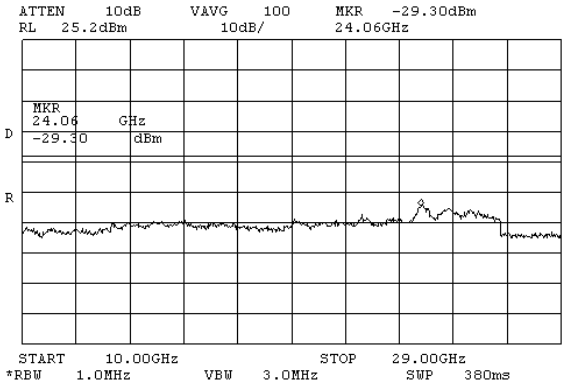
Plot # 31



Plot # 32

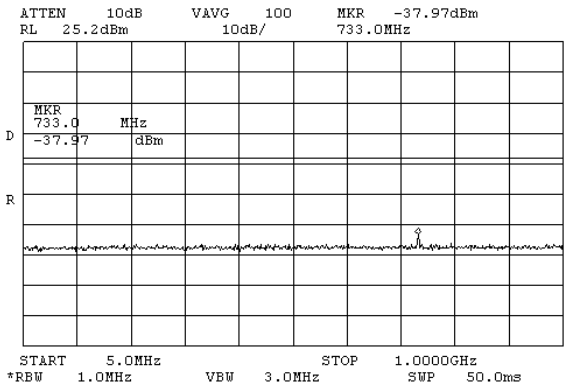


Plot # 33

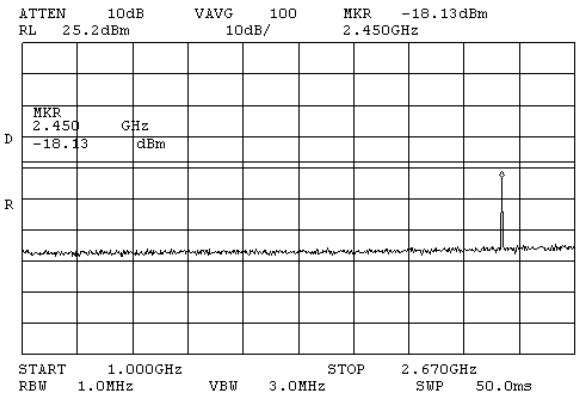


Plot # 34

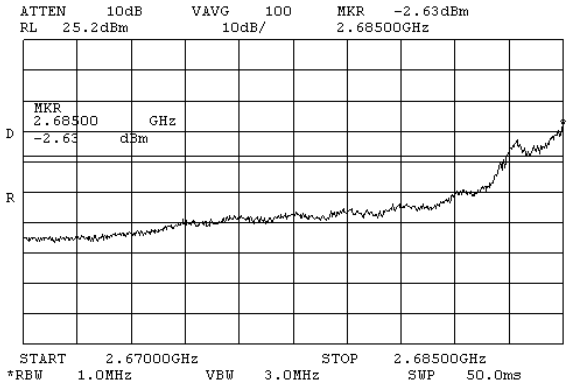
Frequency carrier 2687.5 MHz.



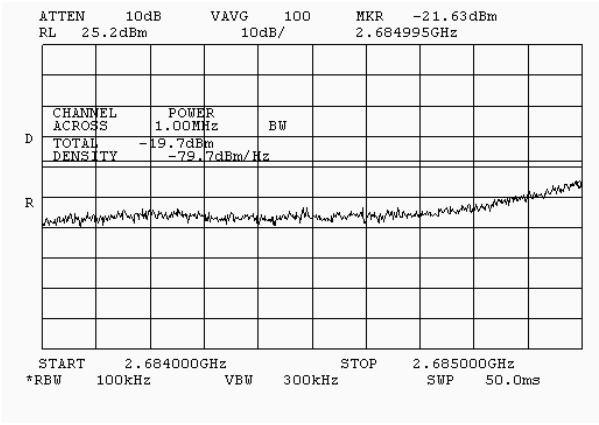
Plot # 35



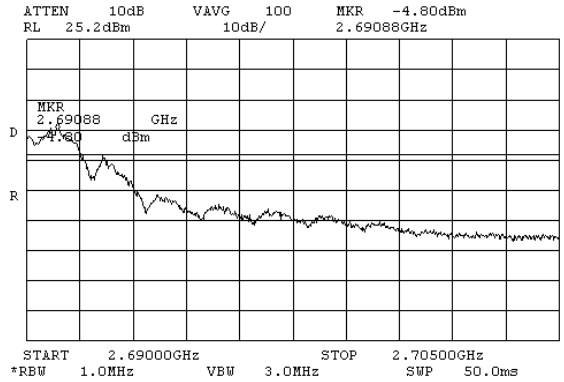
Plot # 36



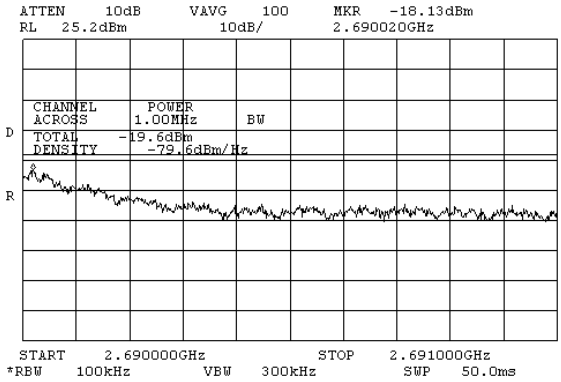
Plot # 37



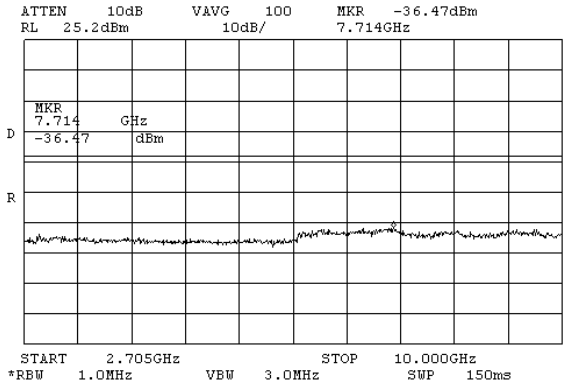
Plot # 38.



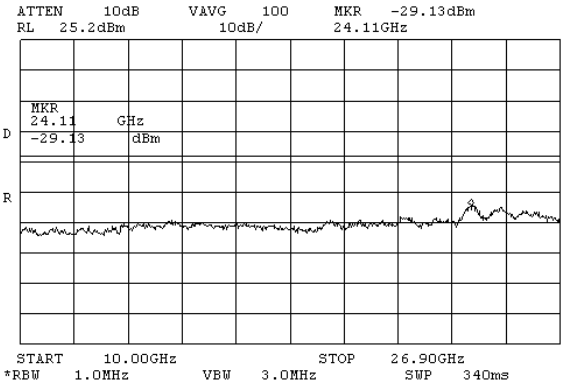
Plot # 39.



Plot # 40.



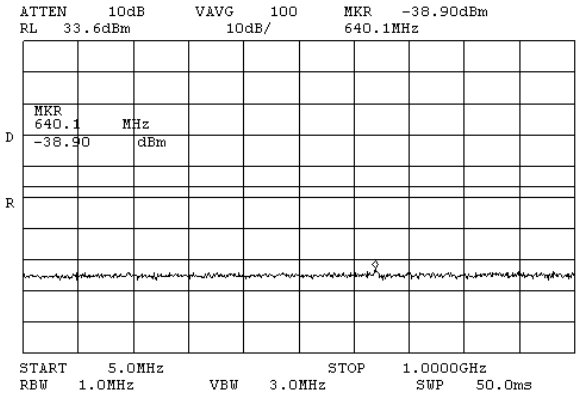
Plot # 41



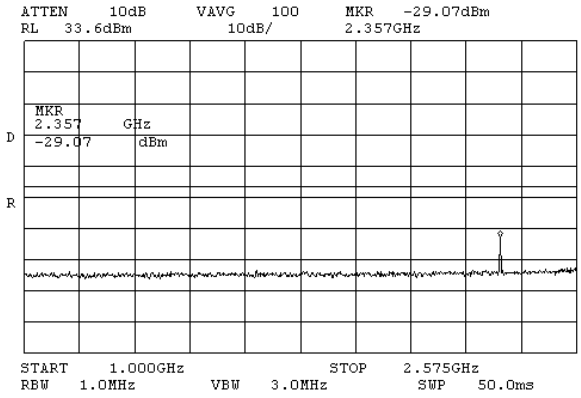
Plot # 42.

Channel spacing – 10 MHz

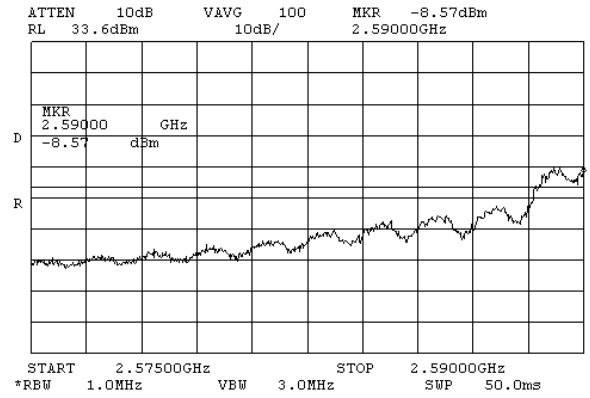
Frequency carrier 2595 MHz.



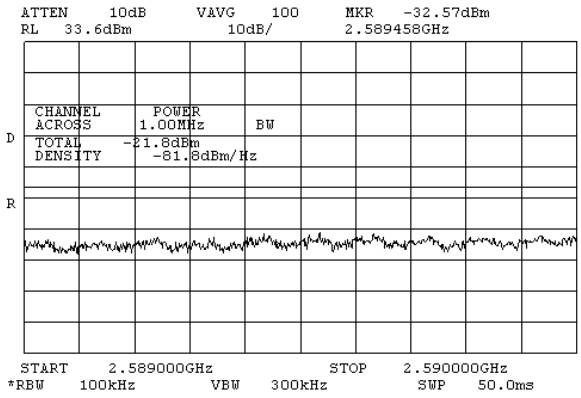
Plot # 43



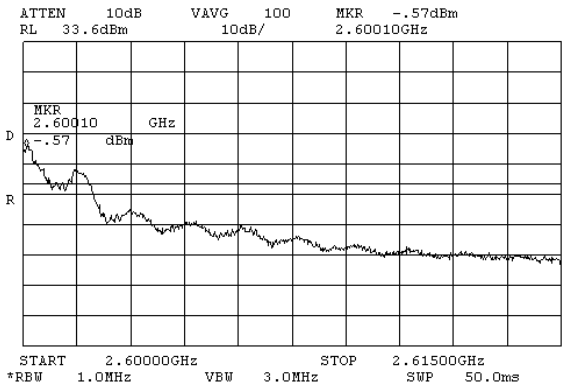
Plot # 44



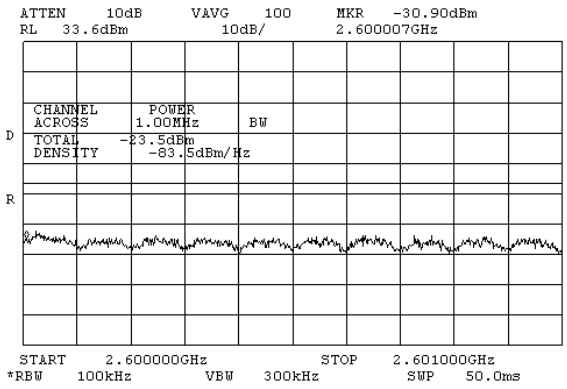
Plot # 45



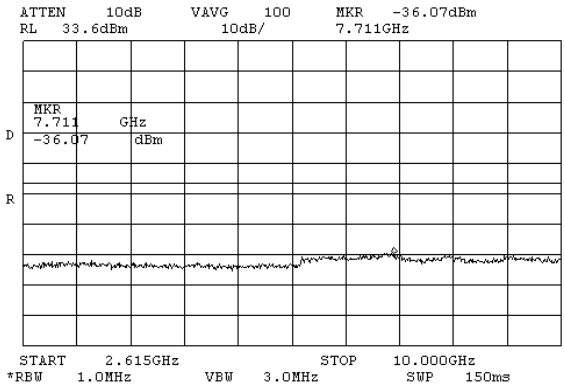
Plot # 46



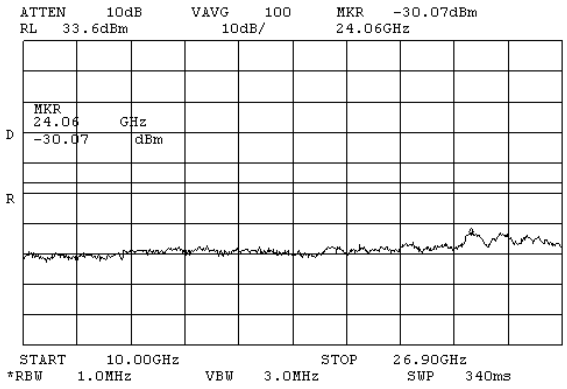
Plot # 47



Plot # 48

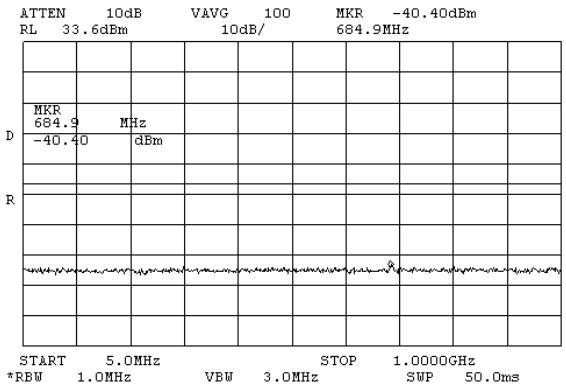


Plot # 49

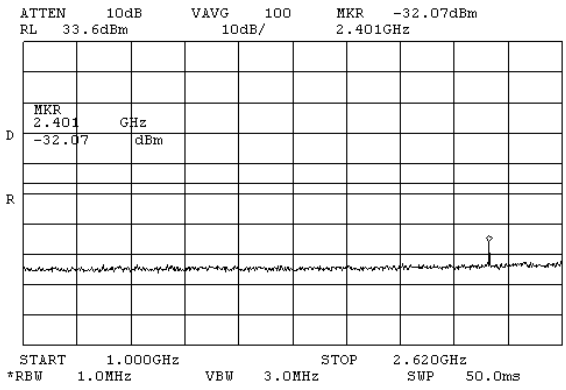


Plot # 50

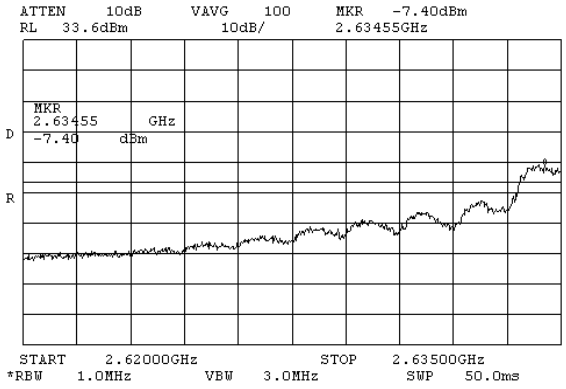
Frequency carrier 2640 MHz.



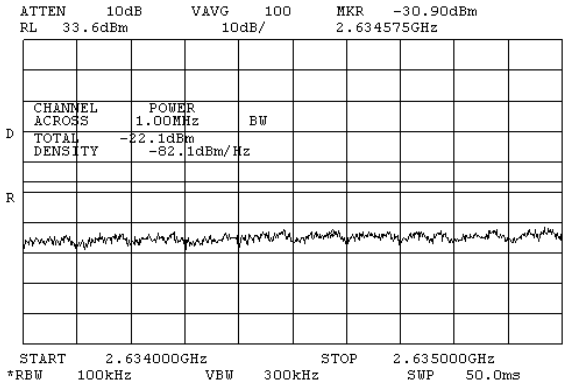
Plot # 51



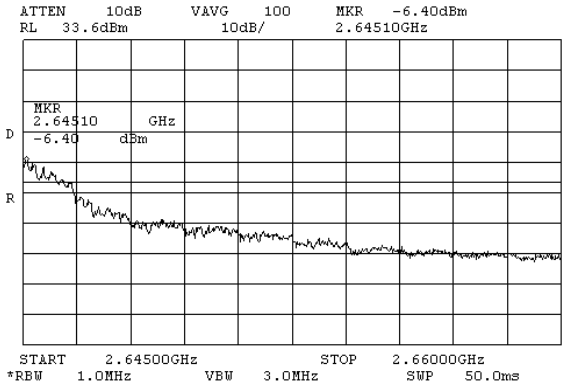
Plot # 52



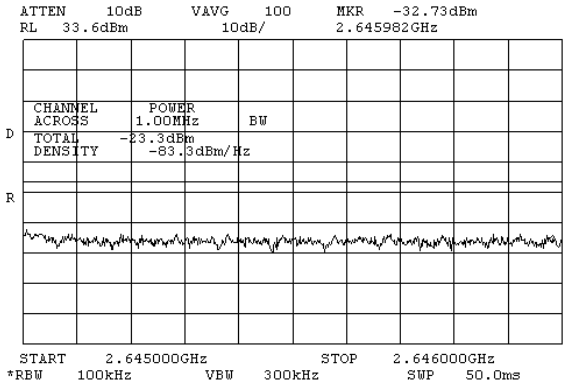
Plot # 53



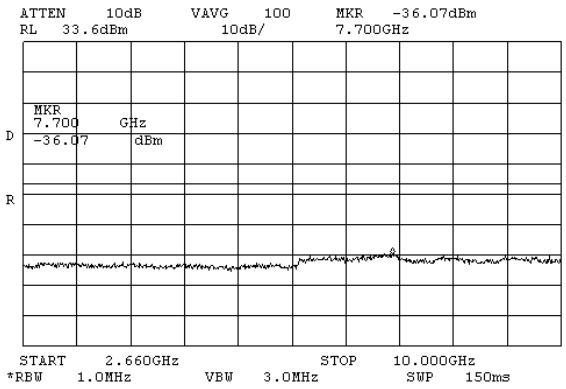
Plot # 54



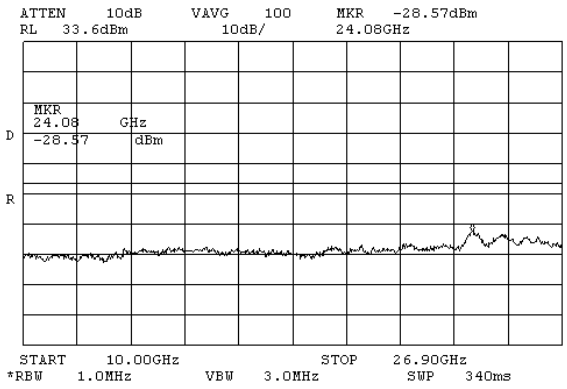
Plot # 55



Plot # 56

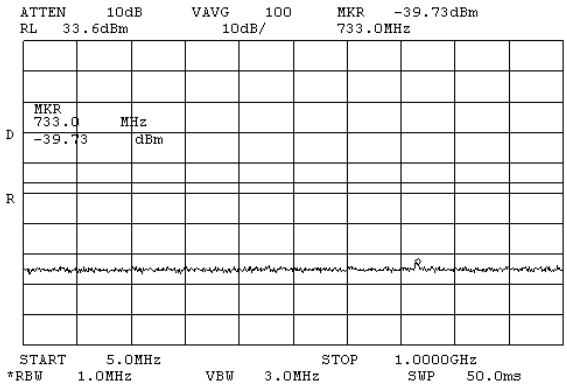


Plot # 57

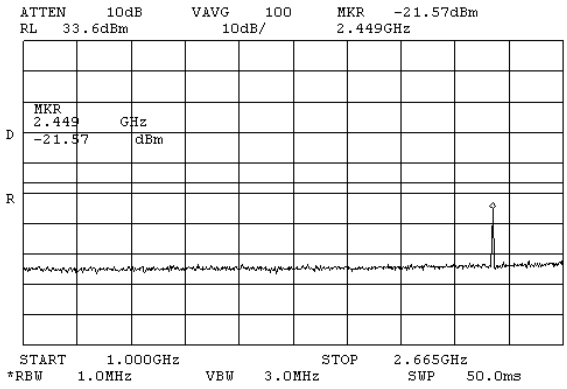


Plot # 58.

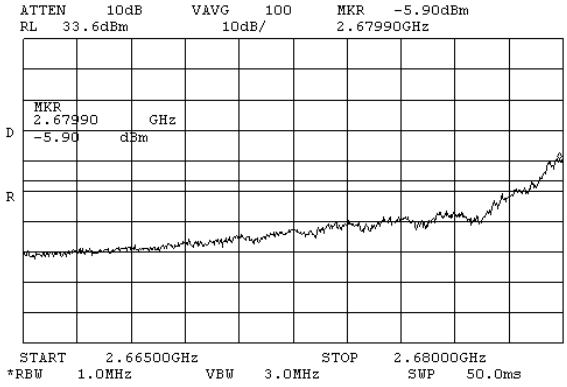
Frequency carrier 2685 MHz.



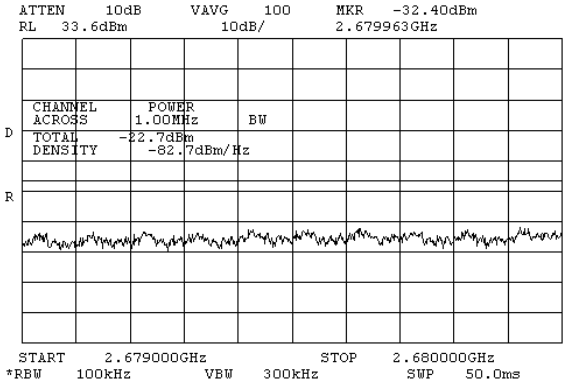
Plot # 59



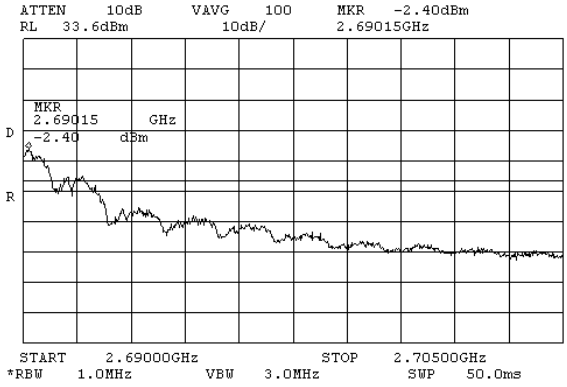
Plot # 60



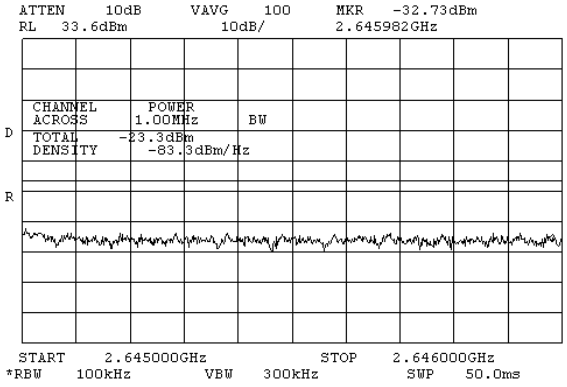
Plot # 61



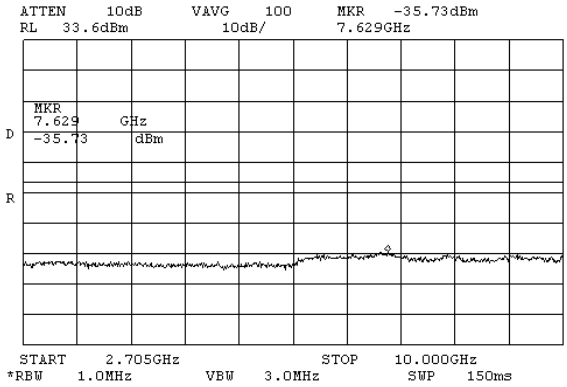
Plot # 62



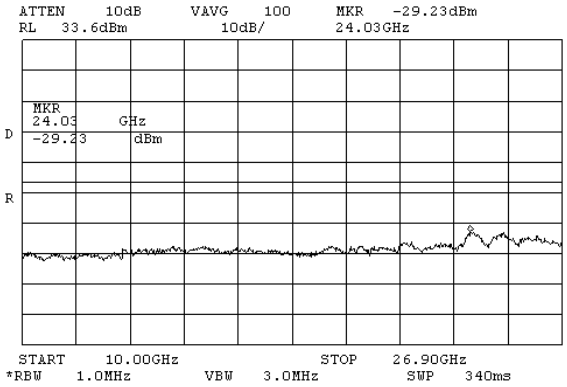
Plot # 63



Plot # 64



Plot # 65



Plot # 66

5.1.4 Radiated emissions according to §§ 2.1053, 27.53

Operating Frequencies Range	2592.5 – 2687.5 MHz				
Ambient Temperature	22^0 C	Relative Humidity	52%	Air Pressure	1007 hPa

TEST PROCEDURE

The frequency spectrum was investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to the tenth harmonic of the highest fundamental frequency. 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 Plots in this section.

Substitution method

The measurements were performed according to ANSI/TIA-603-C-2004 section 2.2.12 test method. Transmitter was operated with internal antenna in 3 carrier frequencies at low; middle and high point of the band. Investigation of transmitter spurious emissions was performed. EUT was replaced by generator and substitution antenna. Level calculated from generator output level, substitution antenna gain and connected cable loss was compared with the limit.

LIMIT

For operation in the declare 2590 – 2690 band, the power of any emissions outside the authorized frequency ranges of operation shall be attenuated below the transmitter power (P) measured in watts by a factor not less then 43+10Log(P) dB = -13 dBm@ 82.2 dBµV/m at 3m distance.

TEST SUMMARY

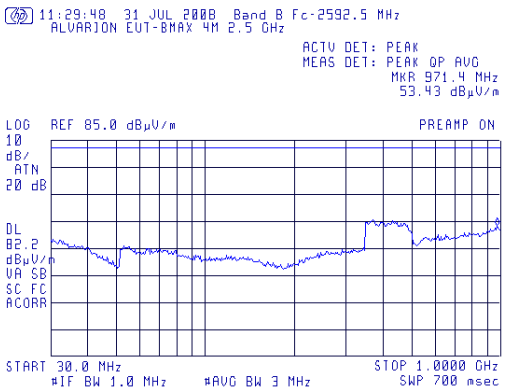
No emissions were found closer than 20 dB to FCC p.27.53 specified limit except presented the worse case result for:
Frequency carrier 2687.5 MHz at 2690 MHz is 3.9 dB under the limit in plot #77.
Frequency carrier 2640 MHz at 2645 MHz is 7.1 dB under the limit in plot #85.
The emissions in the 6.5 – 27 GHz band were found below the spectrum analyzer noise level which is at least 40 dB below the limit.
2592.5 MHz carrier present in plots ## 67 – 70; 2595 MHz carrier present in plots ## 79 - 82.
2640 MHz carrier present in plots ## 71 – 74; #83 – 86;
2687.5 MHz carrier present in plots ## 75 – 78; 2685 MHz carrier present in plots ## 87 - 90.

TEST EQUIPMENT USED:

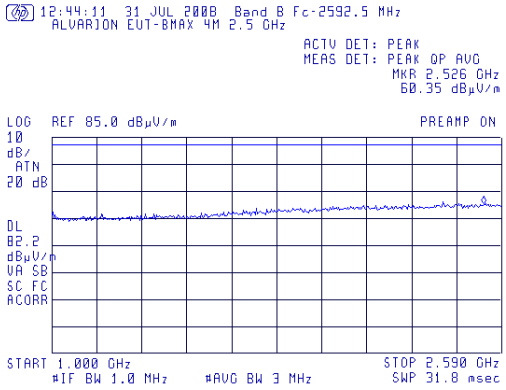
1	4	5	6	12		

Channel spacing – 5 MHz

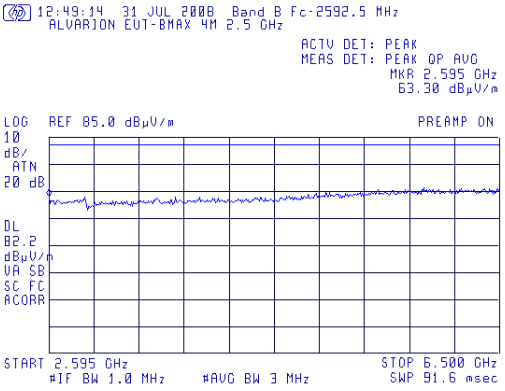
Frequency carrier 2592.5 MHz.



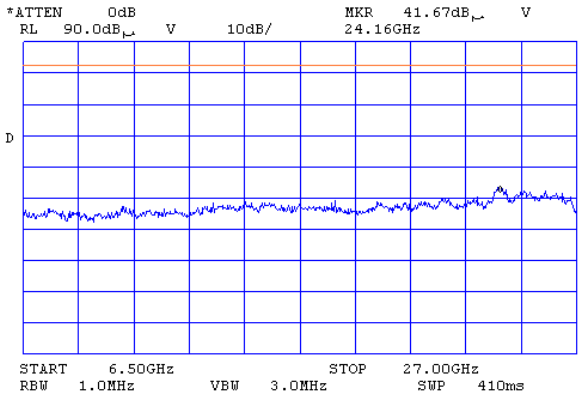
Plot # 67



Plot # 68

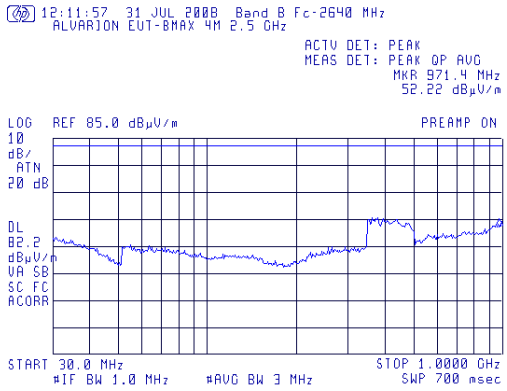


Plot # 69

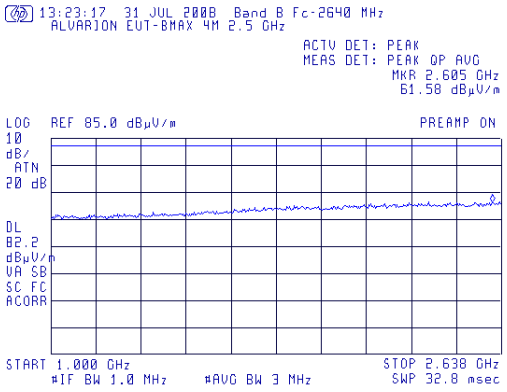


Plot # 70

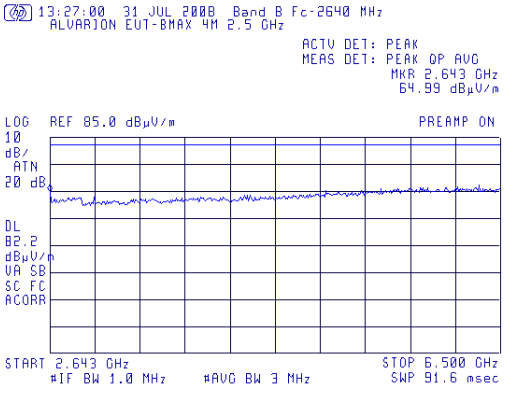
Frequency carrier 2640 MHz



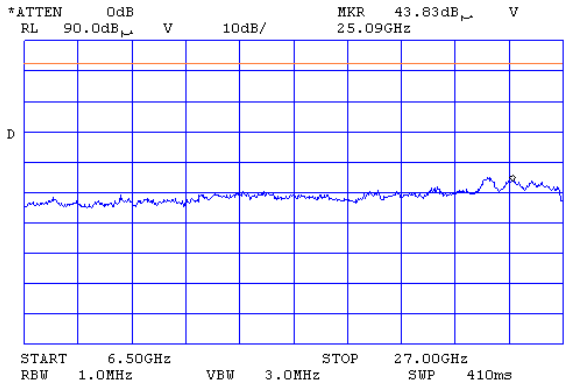
Plot # 71



Plot # 72



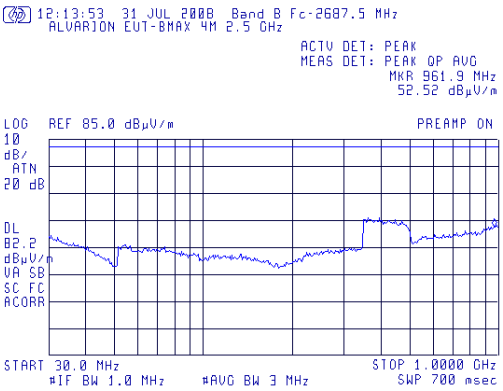
Plot # 73



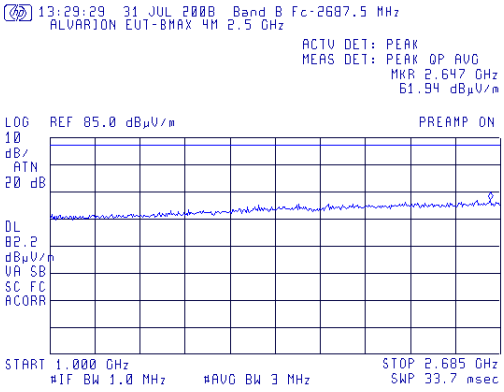
Plot # 74

Test report No: 8812345986 **Page 31 of 47 Pages**
Title: BreezeMAX 4Motion™ Broadband Wireless Access System
Model: ODU-2590-2690-000N-38-4x2-N-0 **FCC ID: LKT-BMAX-BA4M-B25**

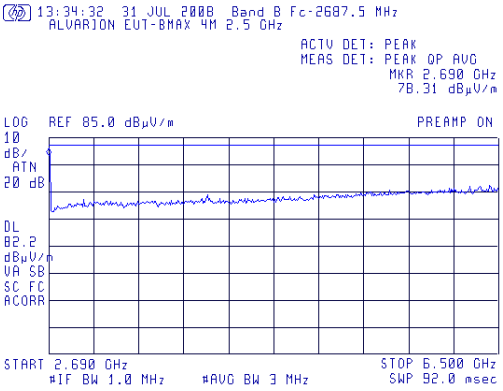
Frequency carrier 2687.5 MHz.



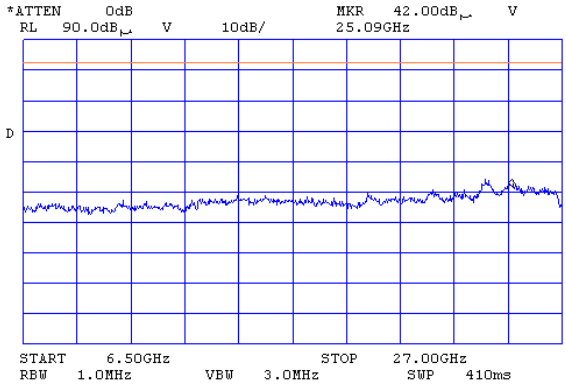
Plot # 75



Plot # 76



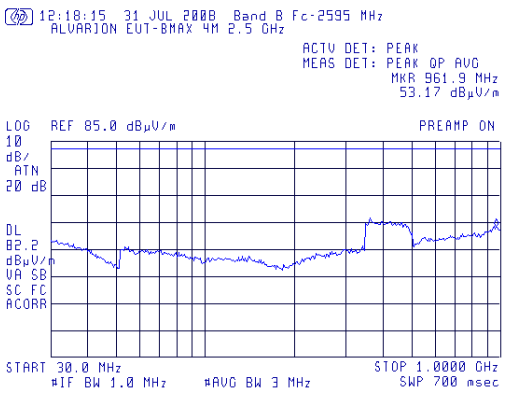
Plot # 77



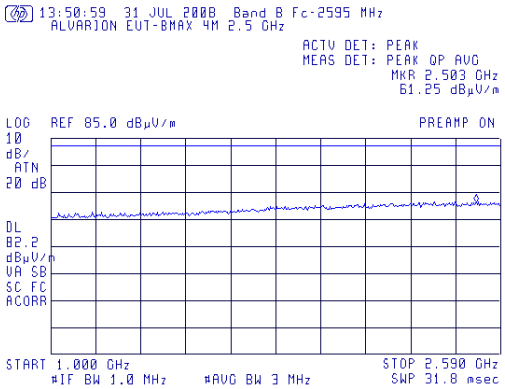
Plot # 78

Channel spacing – 10 MHz

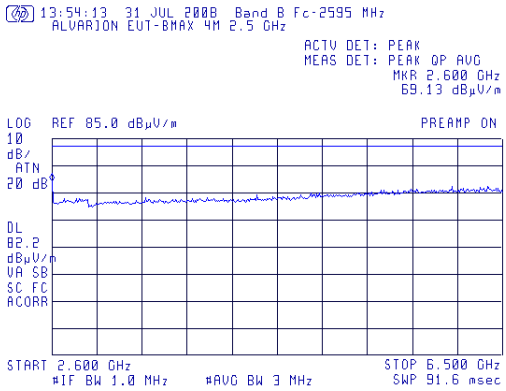
Frequency carrier 2595 MHz.



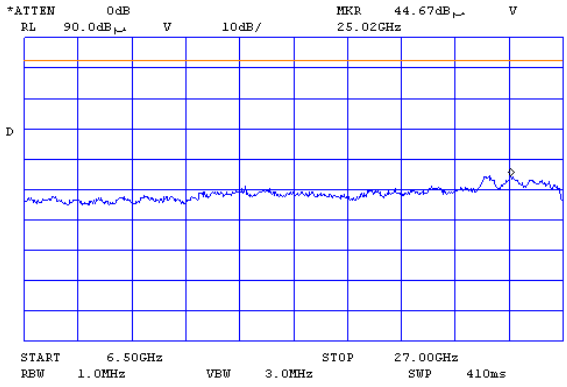
Plot # 79



Plot # 80

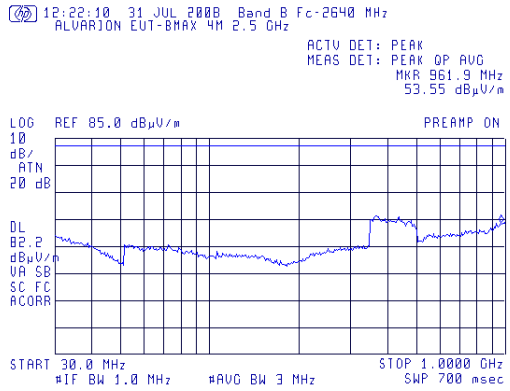


Plot # 81

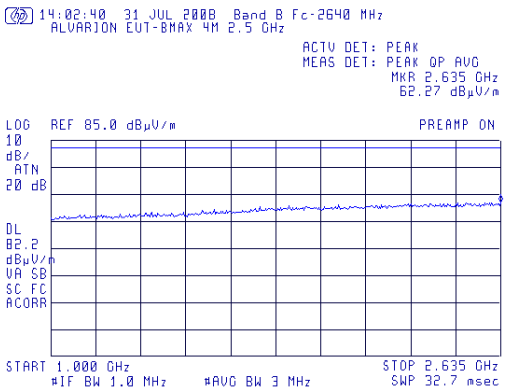


Plot # 82

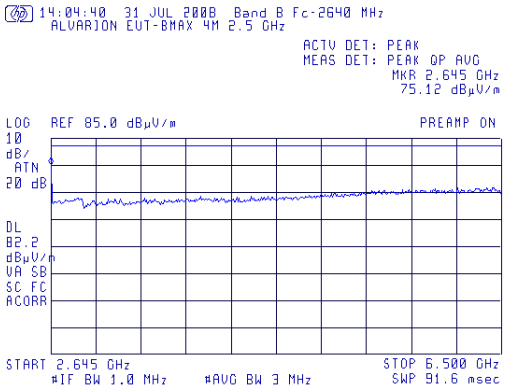
Frequency carrier 2640 MHz



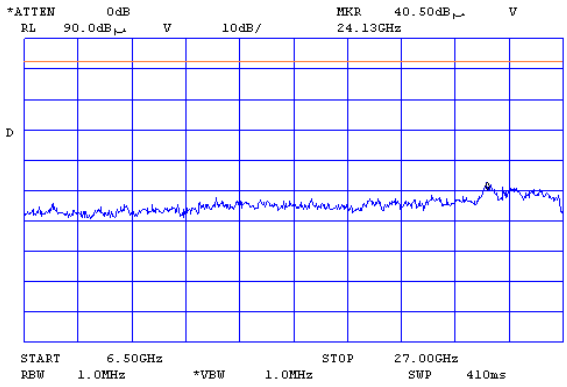
Plot # 83



Plot # 84

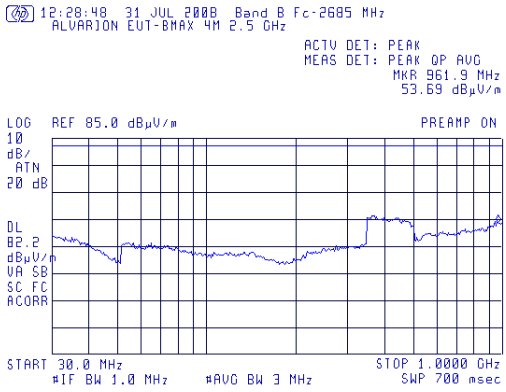


Plot # 85

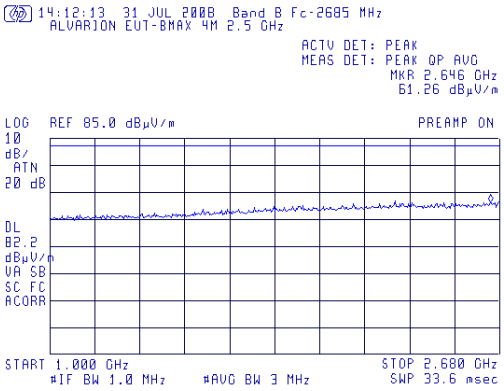


Plot # 86

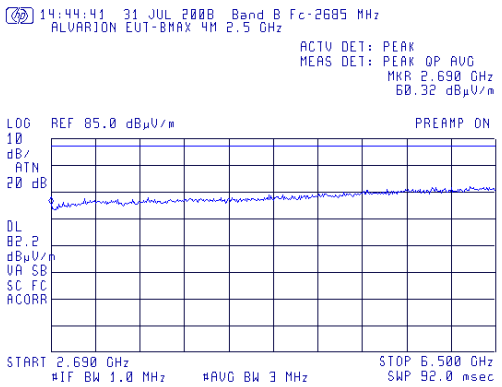
Frequency carrier 2685 MHz.



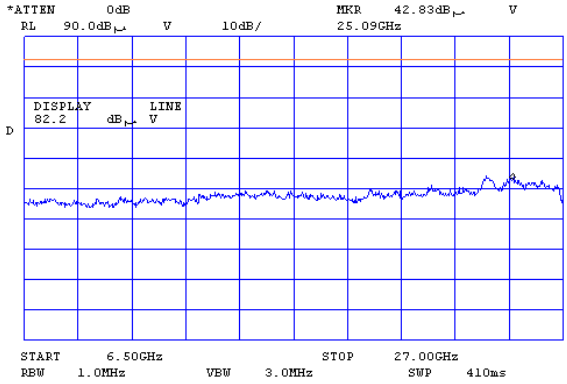
Plot # 87



Plot # 88



Plot # 89



Plot # 90

5.1.5 Frequency stability test according to § 27.54

Operating Frequencies Range 2592.5 – 2687.5 MHz
Ambient Temperature 24^0 C Relative Humidity 59% Air Pressure 1007 hPa

Channel spacing 5 MHz

TEST CONDITIONS		Carrier frequency, 2592.5 MHz	Carrier frequency, 2687.5 MHz
Test temperature	**Test voltage(DC)**		
+20°C	Vmin (40.5)	2.592495730	2.687493540
	Vmax (57)	2.592496930	2.687491280
-30°C	Vnom (48)	2.592498270	2.687494310
-20°C	Vnom (48)	2.592490250	2.687492870
-10°C	Vnom (48)	2.592493190	2.687492570
0°C	Vnom (48)	2.592485440	2.687491370
+10°C	Vnom (48)	2.592491390	2.687474460
+20°C	Vnom (48)	2.592485290	2.687486650
+30°C	Vnom (48)	2.592494880	2.687496350
+40°C	Vnom (48)	2.592492950	2.687492560
+50°C	Vnom (48)	2.592489870	2.687482640

Channel spacing 10 MHz

TEST CONDITIONS		Carrier frequency, 2595 MHz	Carrier frequency, 2685 MHz
Test temperature	**Test voltage(DC)**		
+20°C	Vmin (40.5)	2.594998020	2.685000372
	Vmax (57)	2.594997900	2.684999220
-30°C	Vnom (48)	2.594998100	2.684998680
-20°C	Vnom (48)	2.594997730	2.684999630
-10°C	Vnom (48)	2.594997670	2.684997630
0°C	Vnom (48)	2.594997740	2.684999650
+10°C	Vnom (48)	2.594998922	2.684996470
+20°C	Vnom (48)	2.594996670	2.684998120
+30°C	Vnom (48)	2.594997040	2.684999230
+40°C	Vnom (48)	2.594999230	2.684998350
+50°C	Vnom (48)	2.594998330	2.684999410

TEST PROCEDURE

The EUT was placed in a climatic chamber and allowed to stabilize at 20ºC temperature and nominal voltage for at list 15 min. The reference carrier frequency was taken. The input voltage was changed from 85% of nominal to 115%. Frequency changes were noted. The temperature in climatic chamber was varied from -30ºC to +50ºC. Measured frequencies were noted in table above.

LIMIT

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized frequency bands of operation.

TEST SUMMARY

Transmitter carrier frequency stay within the authorized frequency bands 2590 – 2690 MHz.

TEST EQUIPMENT USED:

2	3	12				

5.2 Radiated emissions test according to § 15.209

Method of measurement		ANSI 63.4 §13.1.4			
Ambient Temperature	24^0 C	Relative Humidity	55%	Air Pressure	1009 hPa

TEST DESCRIPTION:

The measurements were performed at the Open Area Test Site. The test configuration is shown in Fig.1. The EUT was arranged on a wooden table 0.8 m placed on the turn - table.
The measurements were performed at a 10 m measurement distance. The Biconilog 30 MHz-2 GHz antenna was used. The frequency range was investigated from 30 MHz to 1 GHz. The measurements were performed at each frequency at which the signal was 10 dB below the limit or less. The level was maximized by initially rotating turntable through 360°, varying the antenna height between 1 m and 4 m, rerouting EUT cables and changing antenna polarization from vertical to horizontal.

REQUIREMENTS:

EUT radiated emission shall not exceed value required in section 15.209

TEST RESULT:

Test results are presented in Table 1.
Results more than 20 dB under the limit were not inserted in the table #1.

Test equipment used

6	7	10			

Table 1. Radiated emission test results

Frequency (MHz)	Antenna Polariz V/H	Turn-table Angle (°)	Antenna Height (m)	Emission Level Note 1 (dBμV/m)	Limit @ 3m (dBμV/m)	Margin Note 2 (dB)	Results
61.0	V	25	1.2	26.4	40	13.6	Pass
102.0	V	22	1.2	33.5	43.5	10.0	Pass
120.0	H	112	2.2	29.7	43.5	13.8	Pass
184.8	H	5	3.1	32.2	43.5	11.3	Pass
990.0	H	48	3.8	31.2	54.0	16.4	Pass

Note 1: Emission level = E Reading (dBμV) + Cable loss (dB) + Antenna Factor (dB/m) + 10 dB
Where 10 dB is an extrapolation distance factor.
For Cable Loss and Antenna Factor refer to Appendix 2.

Note 2: Margin (dB) = Limit (dBμV/m) – Emission level (dBμV/m)

5.3 Conducted emissions according to § 15.207

Method of measurement ANSI 63.4 §13.1.3
Ambient Temperature 22^0 C Relative Humidity 50% Air Pressure 1008 hPa

Frequency, MHz	dB (μV)	
	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

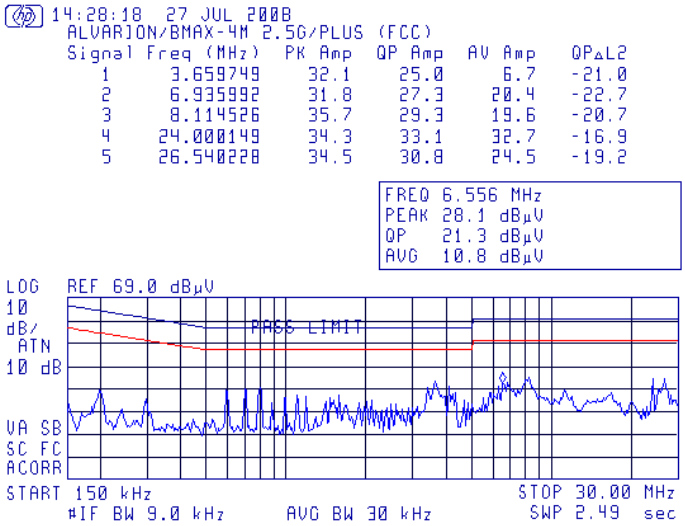
EUT was placed on a wooden table in a shielded chamber at a height of 80 cm from the floor and 40 cm from the vertical reference plane. The measurements were performed at mains terminals by means of LISN, connected to spectrum analyzer in the frequency range as referred to in the table above. The measurements were made with quasi-peak (CISPR) detectors under limit average. The position of the EUT cables was varied to determine maximum emission level.

TEST RESULT:

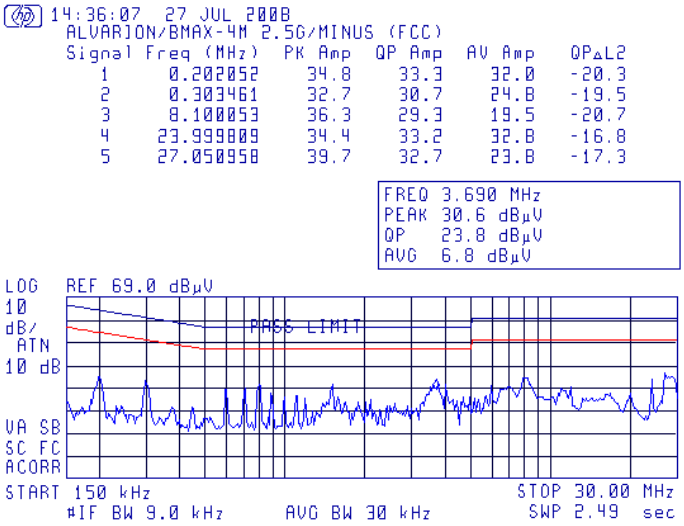
Test results are shown at plots ## 91 for line +48VDC and 92 for line -48VDC.

Test equipment used:

7	8	9	10		



Plot # 91. Conducted emissions test. Line +48VDC.



Plot # 92. Conducted emissions test. Line -48VDC.

APPENDIX A Photographs

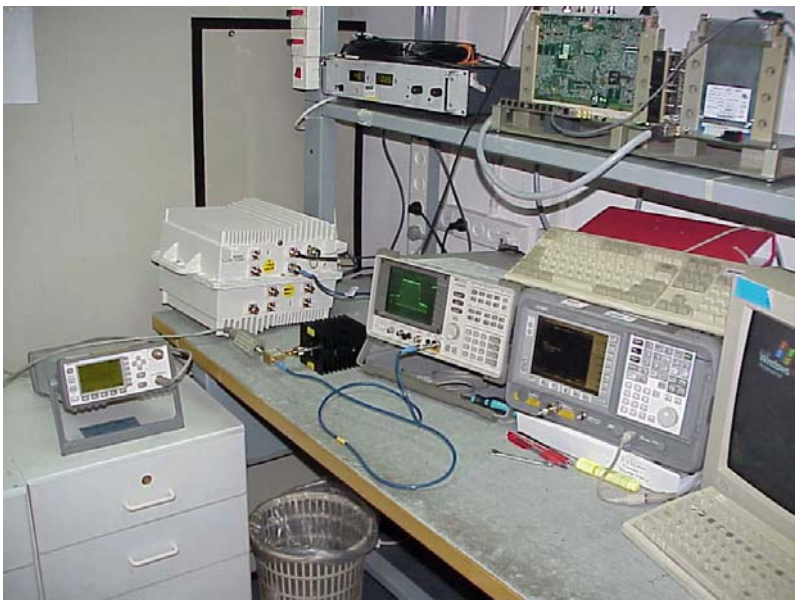


Photo 1. Conducted measurements. Test setup.

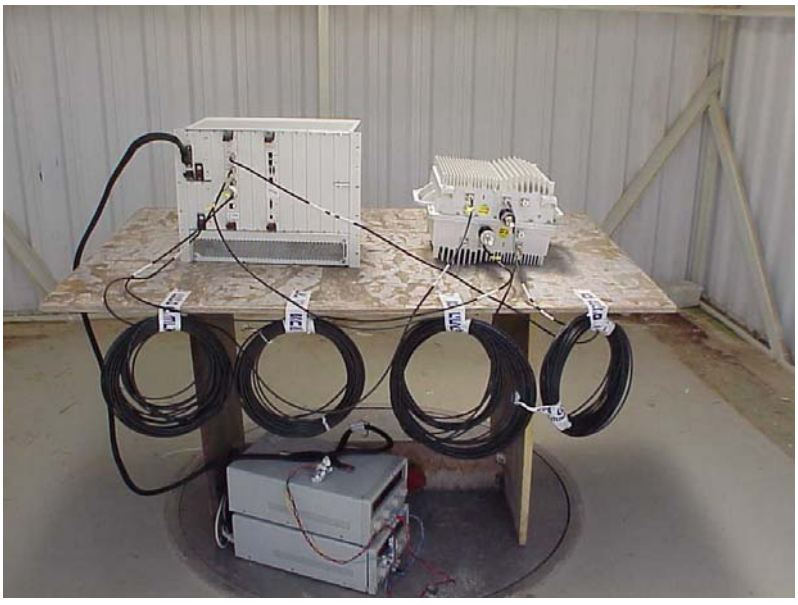


Photo 2. Test setup on OATS.

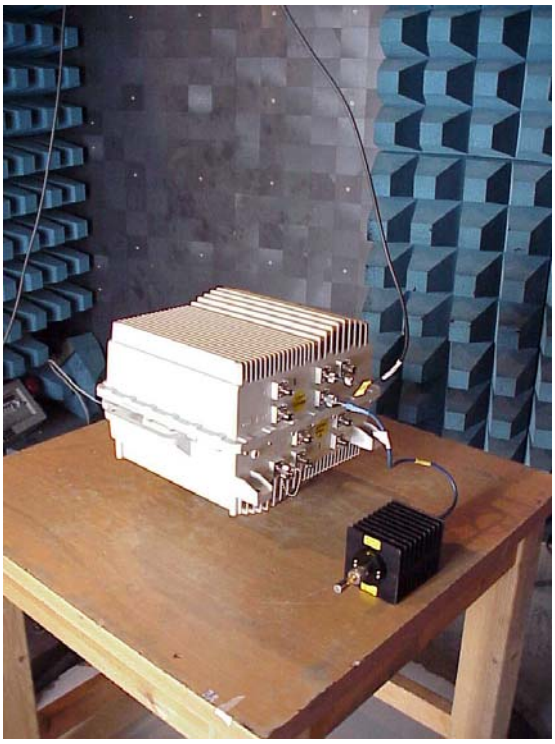


Photo 3. Test setup in anechoic chamber.

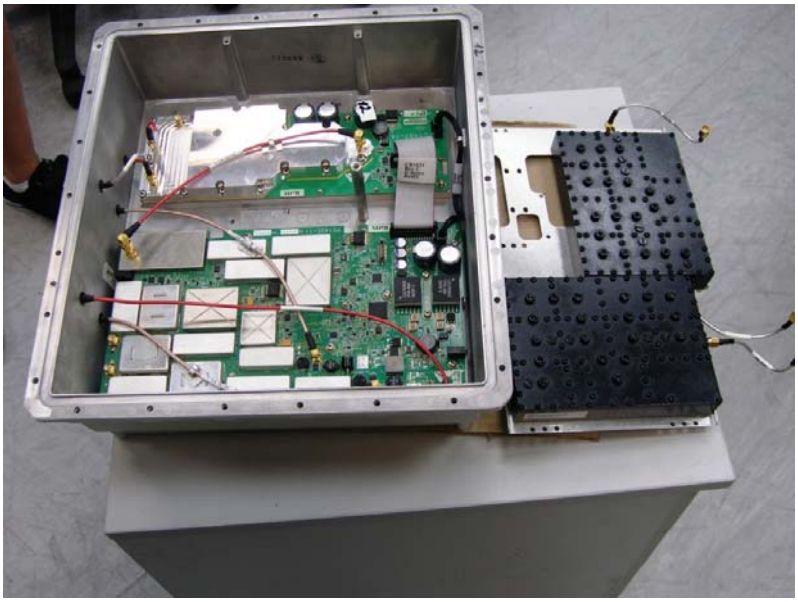


Photo 4. Internal view of outdoor unit.

APPENDIX B Test equipment used

Test equipment used

No	Description	Manufacturer information			Due Calibration date
		Name	Model No	Serial No	
1	Spectrum Analyzer 9 kHz - 50 GHz	HP	8565E	3720A00699	June 2009
2	Spectrum Analyzer 9 kHz - 26.5 GHz	Adjilent	4407B	US40241729	June 2009
3	Attenuators 30 dB 100W	Inmet	64671	6N100W-30	June 2009
4	Cable RF 1m	Huber-Suhner	Sucoflex 104	21324/4PE	Aug 2009
5	Double Ridged Guide Antenna 1 – 18 GHz	EMCO	3115	5802	March 2009
6	Antenna Biconilog 30 – 2000 MHz	Schaffner-Chase	CBL6112B	S/N 23181	May 2009
7	EMI Receiver 9 kHz-6.5 GHz	HP	8546A+8546 0A	SII 4068	April 2009
8	LISN 9 kHz – 30 MHz	FCC	LISN 250-32-4-16	SII5023	March 2009
9	Transient limiter 0.009-200 MHz	HP	11947A	3107105	March 2009
10	Spectrum analyzer 10 KHz-26.5 GHz	HP	E7405A	SII 4944	March 2009
11	Attenuator 50 Ohm 3 dB DC-18 GHz	HP	8491B	50655	May 2009
12	Cable RF 3m	Huber-Suhner	Sucoflex 104PE	21328/4PE	Aug 2009

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; 3 m length

Point	Frequency (GHz)	Cable Loss (dB)
0	0.0-1.8	1.67
1	1.8 – 3.6	2.39
2	3.6 – 5.4	3.04
3	5.4-7.2	3.58
4	7.2-9.0	4.06
5	9.0-10.8	4.49
6	10.8-12.6	4.91
7	12.6-14.4	5.31
8	14.4-16.2	5.66
9	16.2-18.00	6.01

APPENDIX C General information

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
rms	root mean square
W	width

Specification references

47 CFR part 15: 2007	Radio Frequency Devices
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
ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communication Equipment Measurement and Performance.