



FCC Part 15.247(WIFI) TEST REPORT

for

Inmarsat BGAN Class 9 (FB250)

Model Name: GX-9
Trade Name: /
Report No.: SH10030058W01
FCC ID: XP4GLGX9

prepared for

Glocom, Inc.
22 Firstfield Rd., Ste 125 Gaithersburg, MD 20878 USA



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Bluetooth®

CTIA Authorized Test Lab

LAB CODE 20081223-00

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Table of Contents

1.	TEST REPORT CERTIFICATION	4
2.	GENERAL INFORMATION	5
2.1.	DESCRIPTION OF EUT.....	5
2.2.	Objective.....	5
2.3.	Test Standards and Results	6
2.4.	List of Equipments Used	6
2.5.	Test Facility	6
2.6.	Environmental conditions	7
2.7.	Setup of Equipment Under Test	7
2.7.1.	DESCRIPTION OF SUPPORT UNITS	7
2.7.2.	EUT Operating Condition	7
3.	RADIATED EMISSION TEST	8
1.1.	Limits of Radiated Emission.....	8
1.2.	Test Procedure.....	8
1.3.	Test Setup	9
1.4.	EUT Setup and Operating Conditions.....	9
1.5.	Test Results.....	10
4.	6DB BANDWIDTH MEASUREMENT	11
2.1.	Definition	11
2.2.	Test Procedure.....	11
2.3.	Test Setup	11
2.4.	Setup and Operating Conditions.....	11
2.5.	Test Results.....	12
5.	MAXIMUM PEAK OUTPUT POWER.....	14
3.1.	Requirement of the standard	14
3.2.	Test Procedure.....	14
3.3.	Test Setup	14
3.4.	EUT Setup and Operating Conditions.....	14
3.5.	Test Results.....	14
6.	BAND EDGE.....	16

4.1.	Requirement of the standard	16
4.2.	Test Procedure.....	16
4.3.	Test Setup	16
4.4.	EUT Setup and Operating Conditions.....	16
4.5.	Test Results	16
7.	CONDUCTED SPURIOUS EMISSION	19
5.1.	Requirement of the standard	19
5.2.	Test Procedure.....	19
5.3.	Test Setup	19
5.4.	EUT Setup and Operating Conditions.....	19
5.5.	Test Results	19
8.	POWER SPECTRUM DENSITY MEASUREMENT	22
6.1.	Limits of Power Spectrum Density	22
6.2.	Test Procedure.....	22
6.3.	Test Setup	22
6.4.	EUT Setup and Operating Conditions.....	22
6.5.	Test Results	22



Report No.: SH10030058W01

1. Test Report Certification

Equipment under Test: Inmarsat BGAN Class 9 (FB250)

Brand Name: /

Model Name: GX9

FCC ID: XP4GLGX9

Applicant: Glocom, Inc.

22 Firstfield Rd., Ste 125 Gaithersburg, MD 20878 USA

Manufacturer: Glocom, Inc.

22 Firstfield Rd., Ste 125 Gaithersburg, MD 20878 USA

Test Standards: 47 CFR Part 15, Subpart C

Test Date(s): Sept, 6, 2010 – Sept, 10, 2010

Test Result: PASS

* We Hereby Certify That:

The equipment under test was tested by Shenzhen Electronic Product Quality Testing Center Morlab Laboratory. The test data, data evaluation, test procedures and equipment configurations shown in this report were made in accordance with the requirement of related European Commission's standards.

The test results of this report only apply for the tested sample equipment identified above. The test report shall be invalid without all the signatures of the test engineer, the reviewer and the approver.

Tested by:

Zhang Wenjie
Zhang Wenjie

Dated:

2010.10.29

Reviewed by:

Zhang Jun
Zhang Jun

Dated:

2010.10.29

Approved by:

Wei Bei
Wei Bei

Dated:

2010.10.29



2. General Information

2.1. DESCRIPTION OF EUT

Product	Inmarsat BGAN Class 9 (FB250)
Brand Name	/
Model Number	GX9
WIFI module Model name	Huges WLAN daughter card
WIFI module Brand name	Huges Network
Frequency Range	2412 ~ 2472 MHz
Transmit Power	≤20dBm
Modulation Technique	DSSS
Number of Channels	11 Channels
Antenna Information	3dBi Gain(Max)
Hardware Version	GX series IPB V1.1
Software Version	Boot_V1.50; App_V31.06; CPLD_V1.1

NOTE:

1. The EUT provides Wi-Fi (IEEE 802.11b) wireless interface, operating at 2.4GHz ISM band. The Wi-Fi modulations are Direct Sequence Spread Spectrum (DSSS) for IEEE 802.11b. The Channels and transmitter center frequencies are:

- Channel 1: 2412 MHz (lowest channel)
- Channel 2: 2417 MHz
- Channel 3: 2422 MHz
- Channel 4: 2427 MHz
- Channel 5: 2432 MHz
- Channel 6: 2437 MHz (middle channel)
- Channel 7: 2442 MHz
- Channel 8: 2447 MHz
- Channel 9: 2452 MHz
- Channel 10: 2457 MHz
- Channel 11: 2462 MHz (highest channel)

2. Please refer to External photos and Internal Photos of the EUT. For a more detailed features description about the EUT, please refer to User's Manual.

2.2. Objective

Perform EMC test according to FCC Part 15 Subpart C (Wi-Fi, 2.4GHz ISM band radiator).

2.3. Test Standards and Results

The EUT has been tested according to 47 CFR Part 15, Radio Frequency Devices.

Test items and the results are as bellow:

No	FCC Rules	Test Type	Result
1	§15.207	Conducted Emission	(N.A)
2	§15.209 §15.247(c)	Radiated Emission	PASS
3	§15.247(a)	6dB Bandwidth	PASS
4	§15.247(b)	Maximum Peak Output Power	PASS
5	§15.247(c)	Band Edge	PASS
6	§15.247(c)	Conducted Spurious Emission	PASS
7	§15.247(d)	Power Spectrum Density	PASS

2.4. List of Equipments Used

Description	Manufacturer	Model No.	Cal. Date	Serial No.
Test Receiver	Rohde & Schwarz	ESIB26	2010.09	A0304218
Test Receiver	Schwarzbeck	FCKL1528	2010.09	A0304230
Spectrum Analyzer	Rohde & Schwarz	FSP13	2010.09	M-030176
Spectrum Analyzer	Agilent	E4440A	2010.09	MY46187763
LISN	Schwarzbeck	NSLK8127	2010.09	A0304233
Loop Antenna	Rohde & Schwarz	HFH2-Z2	2010.09	A0304220
Ultra Broadband Ant.	Rohde & Schwarz	HL562	2010.09	A0304224
Horn Ant.	Rohde & Schwarz	HF906	2010.09	100150
Shield Room	Nanbo Tech	Site 1	2010.09	A0304188
Anechoic Chamber	Albatross	EMC12.8×6.8× 6.4(m)	2010.09	A0304210

2.5. Test Facility

Shenzhen Electronic Product Quality Testing Center Morlab Laboratory is a testing organization accredited by China National Accreditation Board for Laboratories (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659.

All measurement facilities used to collect the measurement data are located at Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen 518055 CHINA. The test site is constructed

in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22; the FCC registration number is 741109.

2.6. Environmental conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	20 - 25
Relative Humidity (%):	40 - 60
Atmospheric Pressure (kPa):	96

2.7. Setup of Equipment Under Test

2.7.1. DESCRIPTION OF SUPPORT UNITS

NO	Description	Manufacturer	Model No.
1	Note book PC	DELL	Latitude D610
2	Note book PC	HP	nx6130
3	Wi-Fi wireless router	D-LINK	DI-624+A

2.7.2. EUT Operating Condition

1. Use the two Note book PC to Setup the communication system for test
2. Wireless Router to provide IP to the EUT.
3. Notebook PC (1) ping 192.168.1.212 to EUT.
4. Notebook PC (2) ping 192.168.0.151 to EUT.
6. All of the function are under run.
7. Start test.

3. Radiated Emission Test

1.1. Limits of Radiated Emission

According to FCC §15.247(c), radiated emission outside the frequency band attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

According to FCC §15.209 (a), Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency(MHz)	Field Strength(μ V/m)	Measurement Distance(m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector. When average radiated emission measurements are specified in this part, including emission measurements below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules,

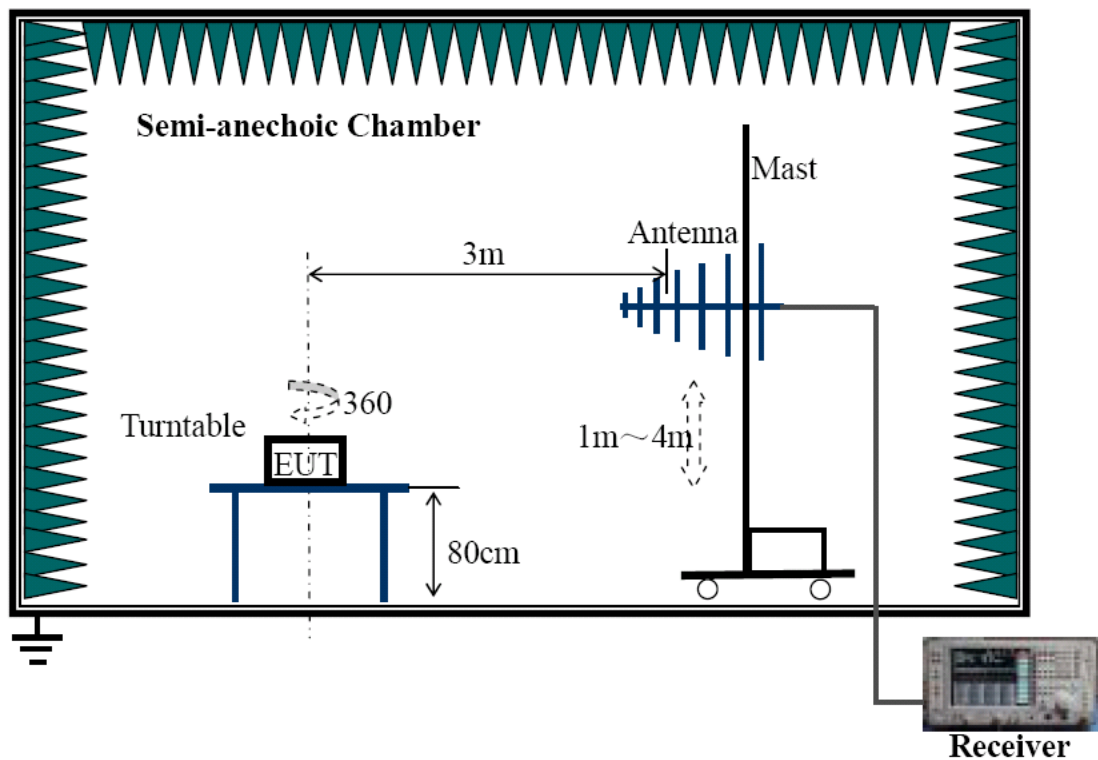
1.2. Test Procedure

- The EUT was placed on the top of a ratable 0.8 meters above the ground at a semi-anechoic chamber.
- In the frequency range of 9 kHz to 30 MHz, magnetic field was measured with loop antenna. The antenna was positioned with its plane vertical at 1 m distance from the EUT. The center of the loop was 1 m above the ground. During the measurement the loop antenna rotated about its vertical axis for maximum response at each azimuth about the EUT.
- In the frequency range above 30MHz, ultra-broadband bi-log antenna (30 MHz to 1 GHz) and horn antenna (above 1GHz) were used. Antenna was 3 meters away from the EUT. Antenna height was varied from one meter to four meter above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to

make the measurement.

- d) For measurements below 1GHz the resolution bandwidth is set to 100kHz for peak detection measurements or 120kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.
- e) For measurements above 1GHz the resolution bandwidth is set to 1MHz, then the videobandwidth is set to 1MHz for peak measurements and 10Hz for average measurements.
- f) The spectrum from 30MHz to 25GHz is investigated with the transmitter set to the lowest, middle and highest channels in the 2.4GHz band.

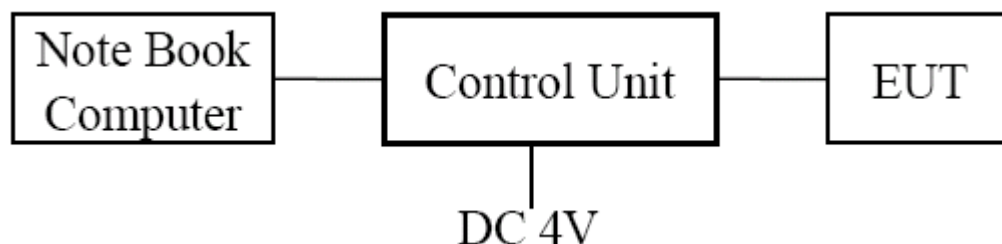
1.3. Test Setup



For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

1.4. EUT Setup and Operating Conditions

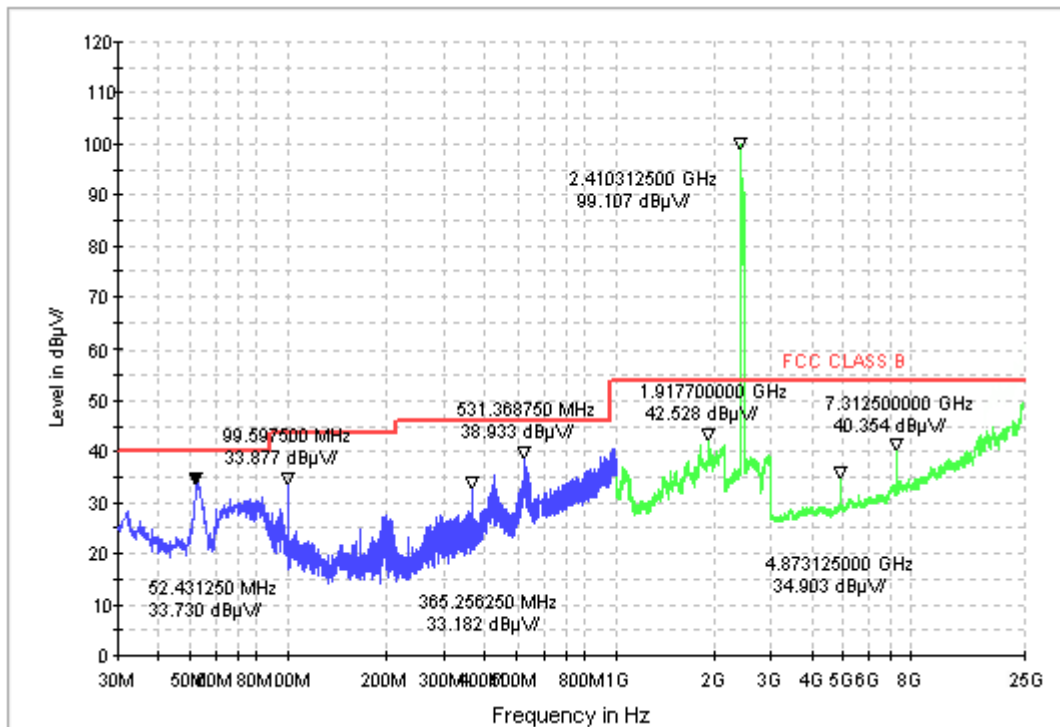
The EUT was connected to and controlled by a control unit provided by the applicant.



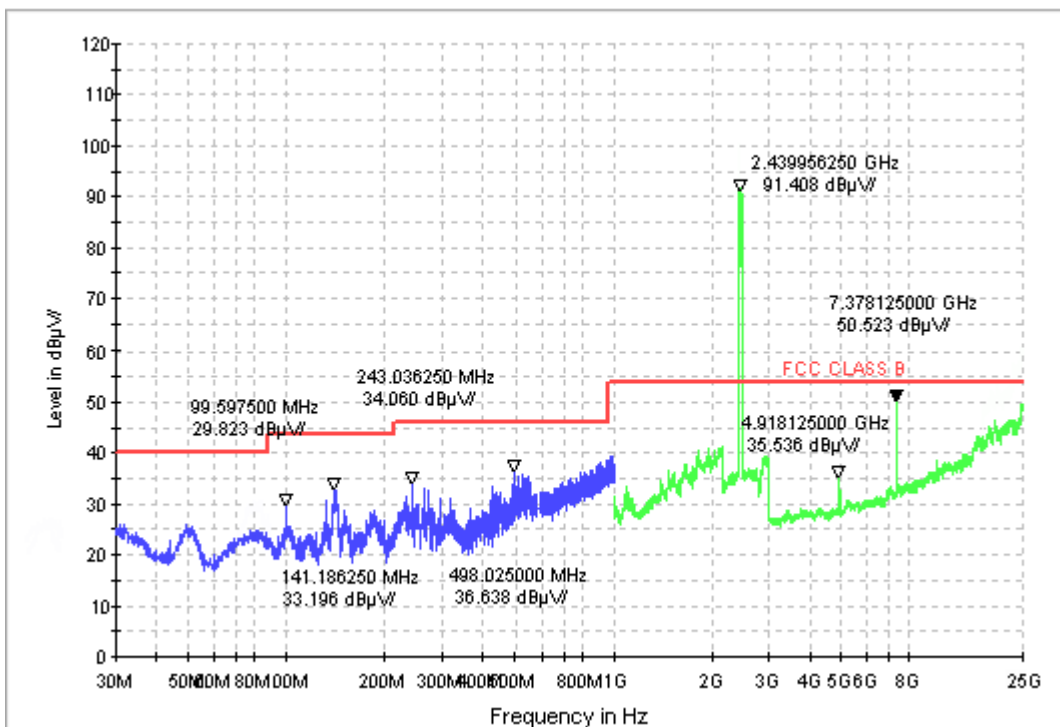
The EUT was set to continuous Wi-Fi transmitting at maximum power and maximum data rate,

e.g., 11 Mbps for IEEE802.11b (DSSS).

1.5. Test Results



Antenna: Horizontal



Antenna: Vertical

4. 6dB Bandwidth Measurement

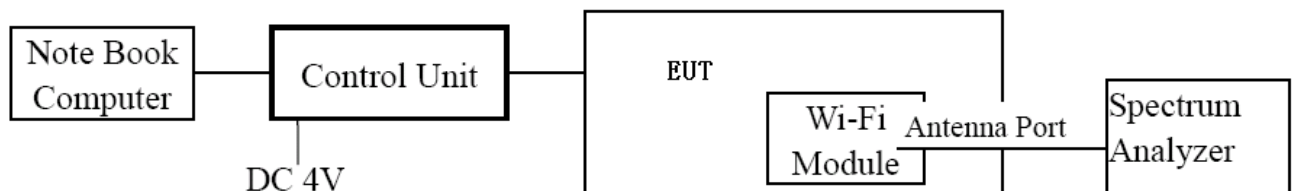
2.1. Definition

According to FCC §15.247 (a) (2), Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

2.2. Test Procedure

- The EUT temporary antenna port was coupled to the spectrum analyzer. The lost of the cables the test system is calibrated to correct the reading.
- The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.
- The resolution bandwidth of the spectrum analyzer was set to at least 1% of the EUT emission bandwidth. RBW=100 kHz, VBW=300 kHz.

2.3. Test Setup



For the actual test configuration, please refer to the related item-Photographs of the Test Configuration.

2.4. Setup and Operating Conditions

The EUT was connected to and controlled by a control unit provided by the applicant.

The EUT was set to continuous Wi-Fi transmitting at maximum power and maximum data rate, e.g., 11 Mbps for IEEE802.11b (DSSS).

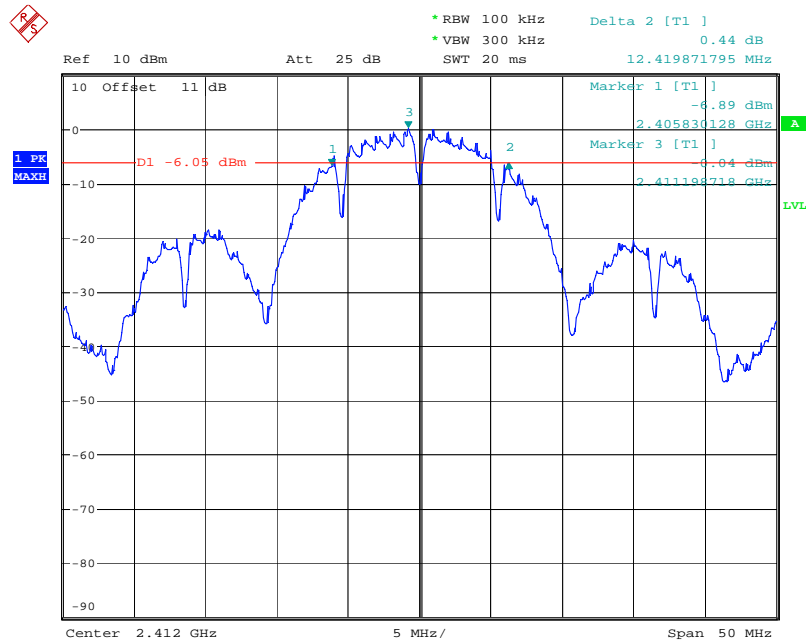
At each operating mode, lowest, middle and highest channels were measured respectively.

2.5. Test Results

EUT Modulation	EUT Operating Frequency (MHz)	6dB Bandwidth (MHz)	FCC Requirement
DSSS	2412	12.41	>500 kHz
	2437	11.05	
	2462	12.17	

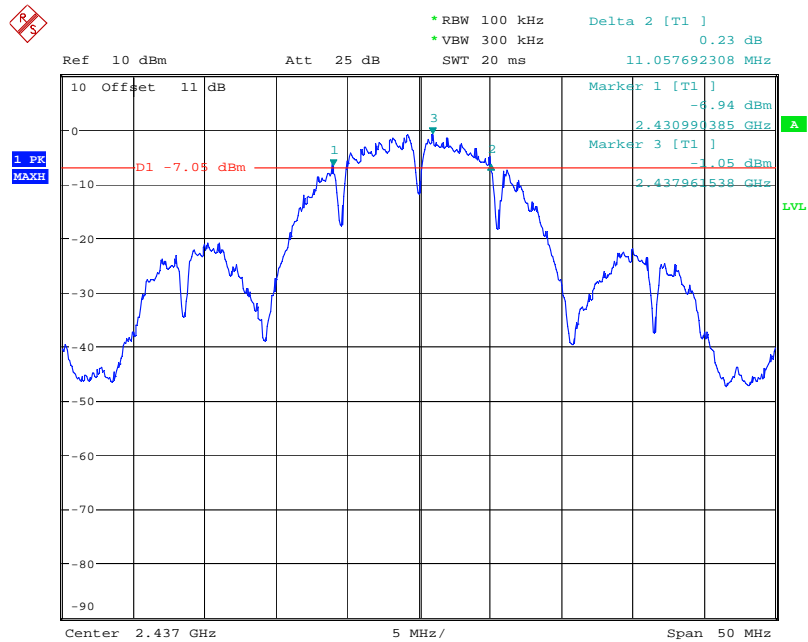
Test Plots

1. DSSS-2412MHz



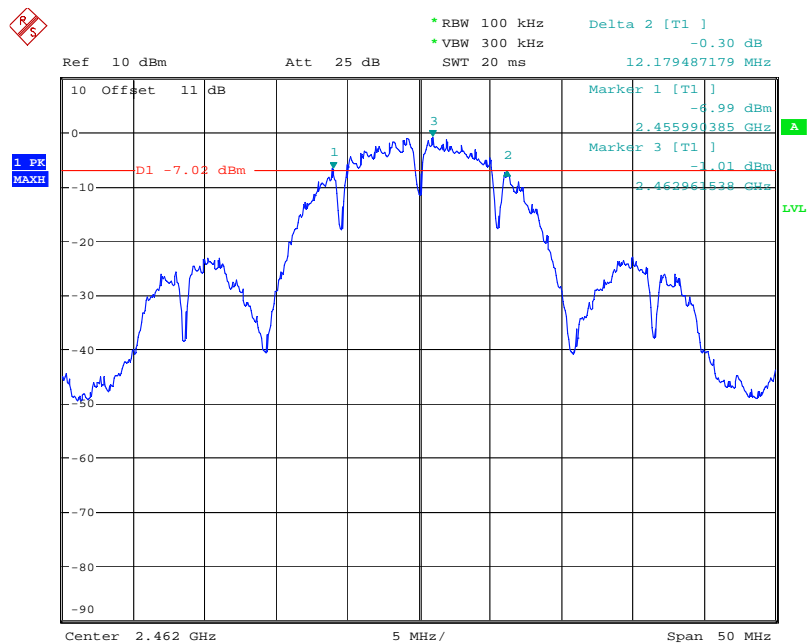
Date: 20.SEP.2010 13:17:14

2. DSSS-2437MHz



Date: 20.SEP.2010 13:19:20

3. DSSS-2462MHz



Date: 20.SEP.2010 13:21:05

5. Maximum Peak Output Power

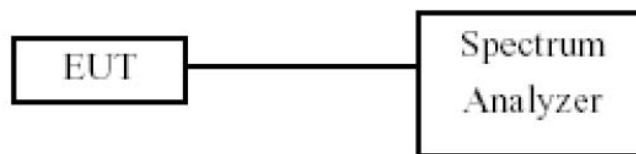
3.1. Requirement of the standard

According to FCC §15.247 (b) (3), the maximum peak output power of systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands is 1 Watt.

3.2. Test Procedure

The EUT temporary antenna port was coupled to the Spectrum Analyzer. The radio frequency load attached to the EUT antenna terminal was 50 Ohm. The loss of the cables the test system is calibrated to correct the reading.

3.3. Test Setup



3.4. EUT Setup and Operating Conditions

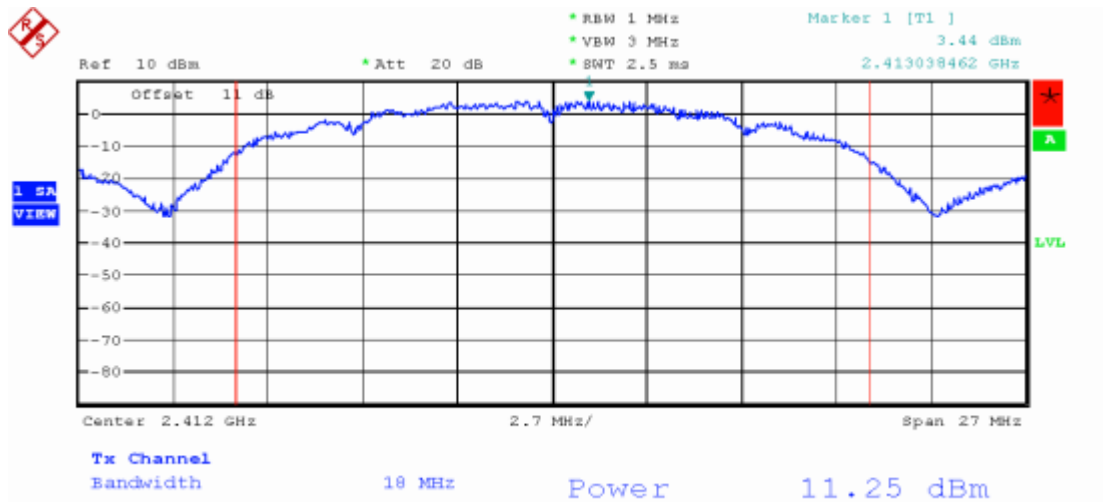
Same as 5.4

3.5. Test Results

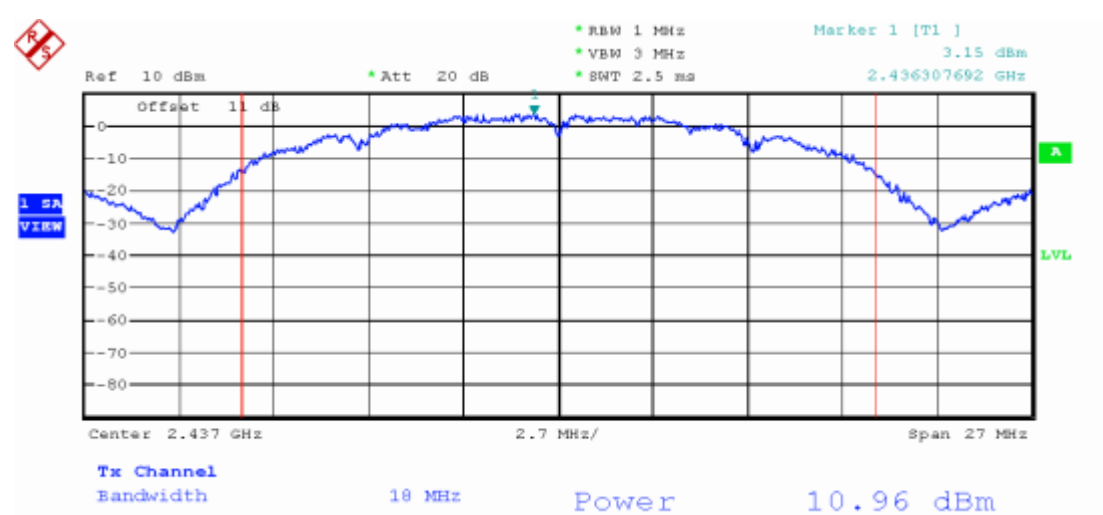
Modulation	Operating Frequency (MHz)	Peak Output Power		Limit (W)
		(dBm)	(W)	
DSSS	2412	11.25	0.01334	1
	2437	10.96	0.01247	1
	2462	11.04	0.01271	1

Test Plots

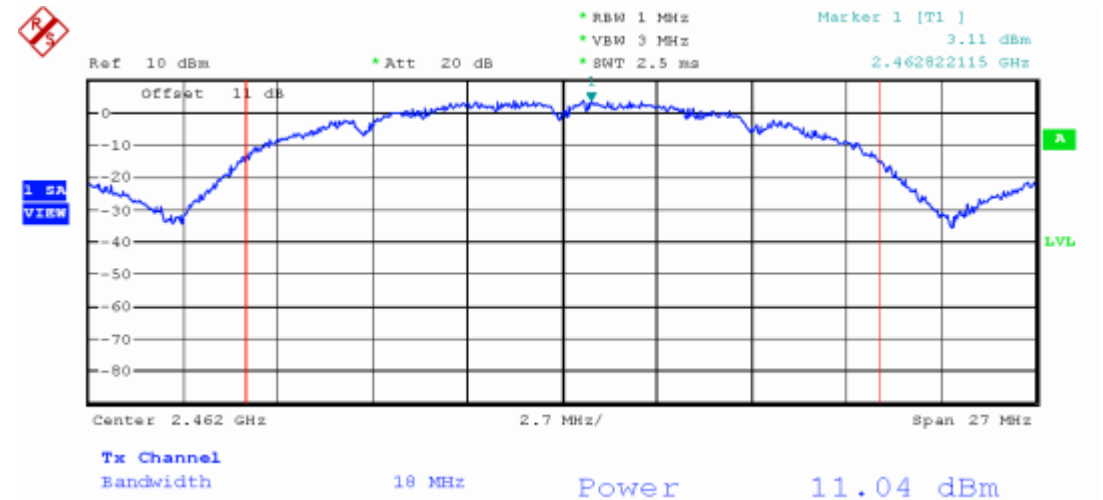
1. DSSS-2412MHz



2. DSSS-2437MHz



3. DSSS-2462MHz



6. Band Edge

4.1. Requirement of the standard

According to FCC §15.247(c), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, based on either an RF conducted or a radiated measurement.

4.2. Test Procedure

- a. The EUT was coupled to the spectrum analyzer and the base station simulator through a power divider. The radio frequency load attached to the EUT antenna terminal was 50 Ohm. The loss of the cables the test system is calibrated to correct the reading.
- b. The spectrum analyzer was set to Maxpeak Detector function and Average Detector function and Maximum Hold mode.
- c. According to the standard requirement, the resolution bandwidth of the spectrum analyzer was set to RBW=100 kHz, VBW=300 kHz.

4.3. Test Setup

Same as 5.3

4.4. EUT Setup and Operating Conditions

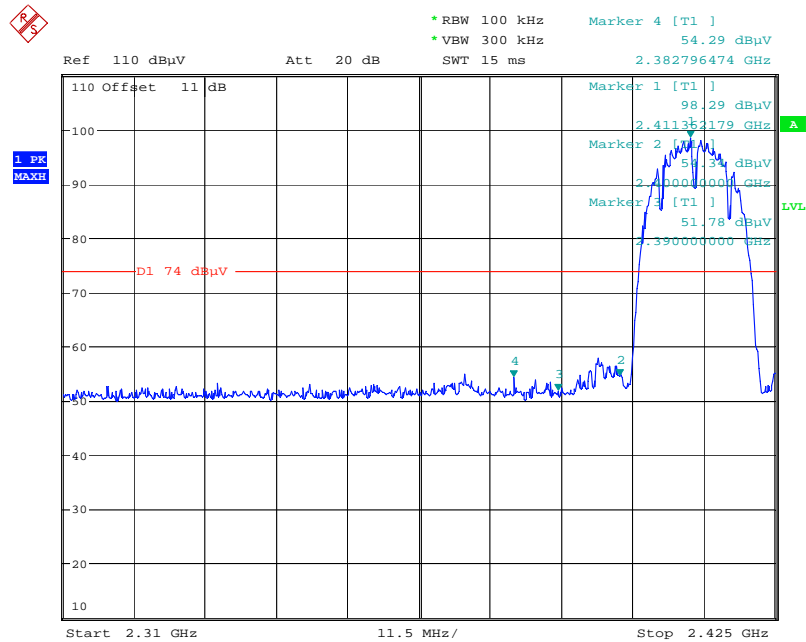
Same as 5.4

4.5. Test Results

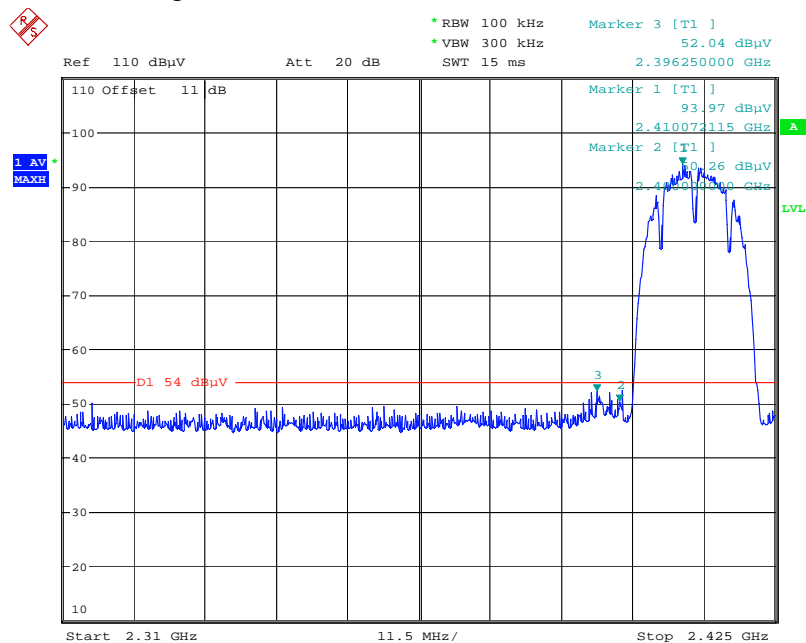
The radio frequency power beyond the band edges was 20dB below the peak output power, measured with 100 kHz resolution bandwidth. Refer to the following test plots.

Test Plots

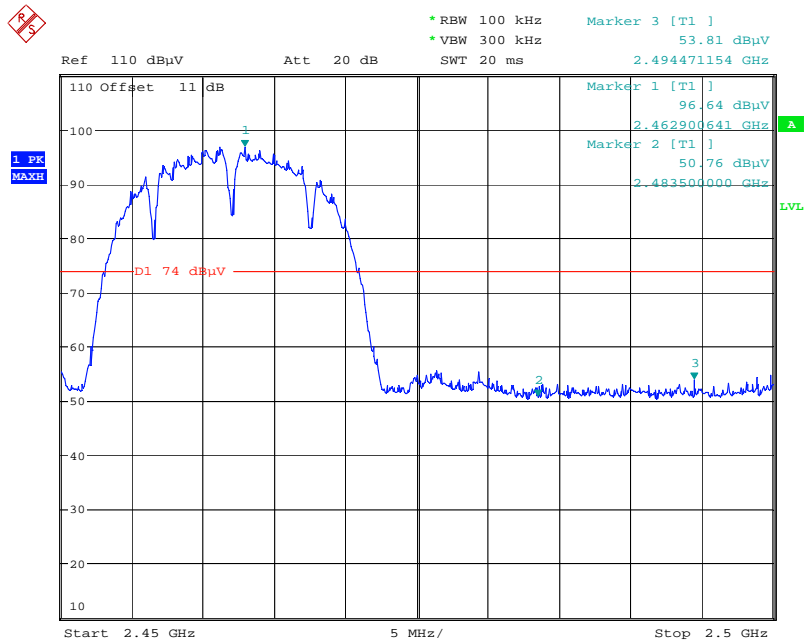
1. DSSS-2412MHz Maxpeak Detector



2. DSSS-2412MHz Average Detector

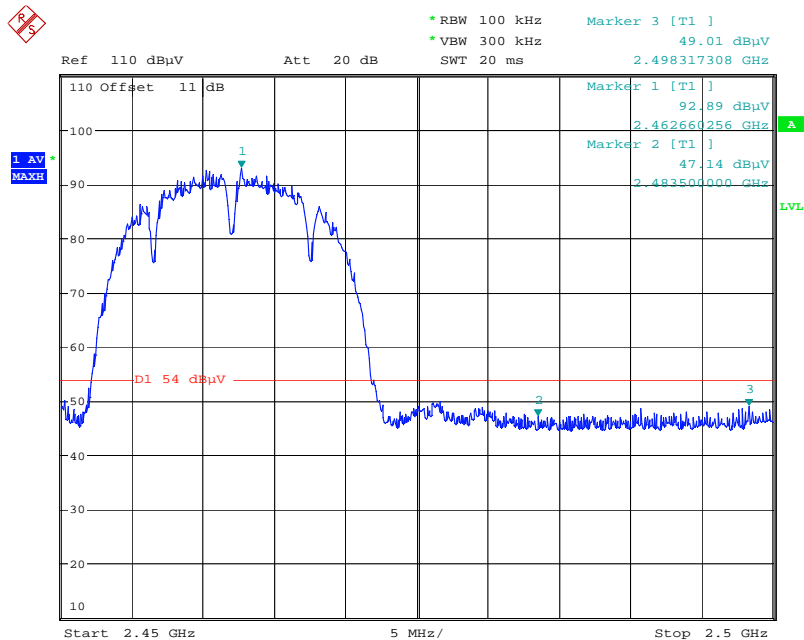


3. DSSS-2462MHz Maxpeak Detector



Date: 27.AUG.2010 15:29:59

4. DSSS-2462MHz Average Detector



Date: 27.AUG.2010 15:31:22

7. Conducted Spurious Emission

5.1. Requirement of the standard

According to FCC §15.247(c), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, based on either an RF conducted or a radiated measurement.

5.2. Test Procedure

- a. The EUT was coupled to the spectrum analyzer and the base station simulator through a power divider. The radio frequency load attached to the EUT antenna terminal was 50 Ohm. The loss of the cables the test system is calibrated to correct the reading.
- b. The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.
- c. The spurious Emissions from 9 KHz to 10th harmonic of the fundamental frequency were researched.
- d. According to the standard requirement, the resolution bandwidth of the spectrum analyzer was set to RBW=100 kHz, VBW=300 kHz.

5.3. Test Setup

Same as 5.3

5.4. EUT Setup and Operating Conditions

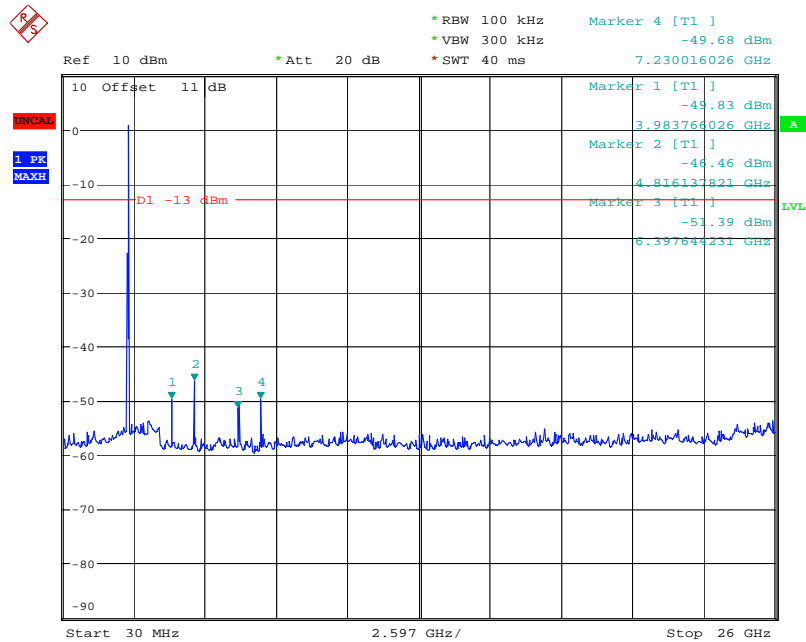
Same as 5.4

5.5. Test Results

The following test plots shows that spurious emissions in the whole frequency range were below the 20dBc limit line.

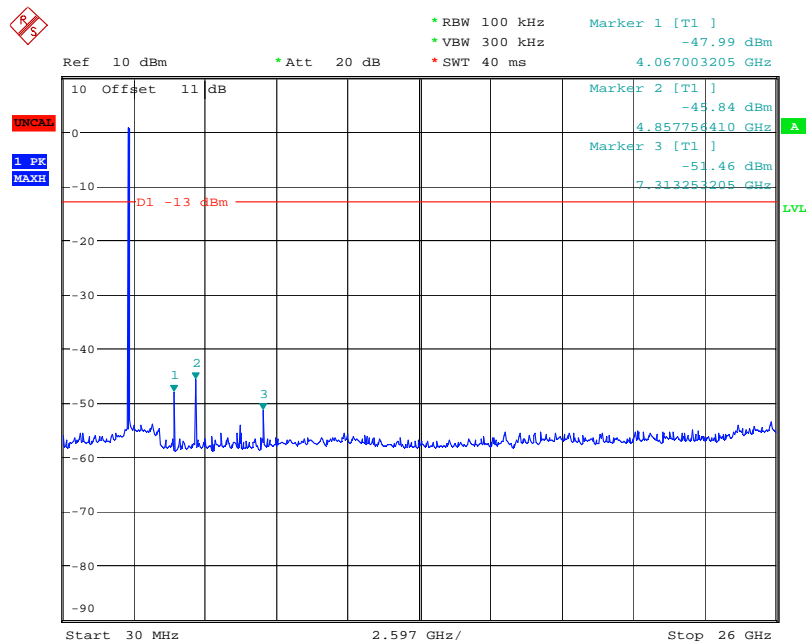
Test Plots

1. DSSS-2412MHz



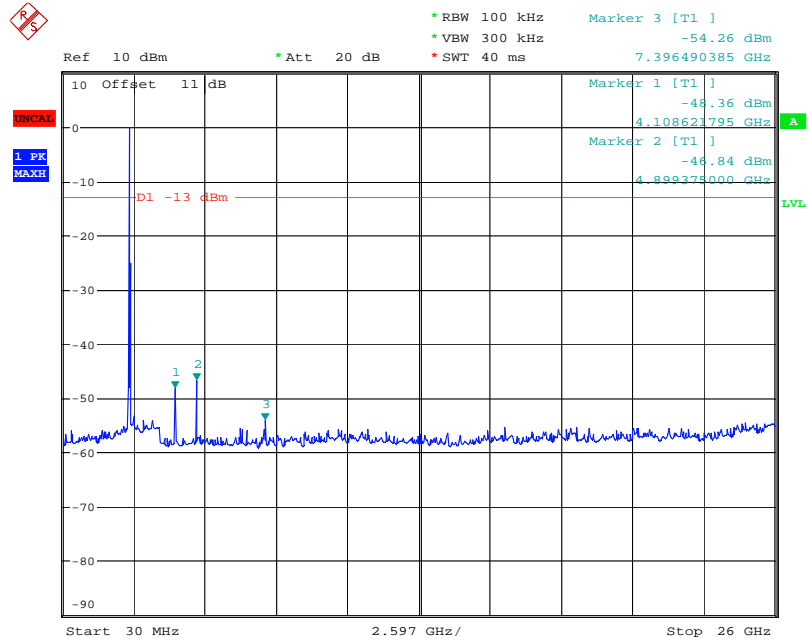
Date: 27.AUG.2010 15:00:05

2. DSSS-2437MHz



Date: 27.AUG.2010 14:59:05

3. DSSS-2462MHz



Date: 27.AUG.2010 15:01:17

8. Power Spectrum Density Measurement

6.1. Limits of Power Spectrum Density

According to FCC §15.247(d), for digitally modulated systems, 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.

6.2. Test Procedure

- a. The EUT temporary antenna port was coupled to the spectrum analyzer. The loss of the cables in the test system is calibrated to correct the reading.
- b. The spectrum analyzer was set to Maxpeak Detector function and Maximum Hold mode.
- c. The resolution bandwidth of the spectrum analyzer was set to 3 kHz.

6.3. Test Setup

Same as 5.3

6.4. EUT Setup and Operating Conditions

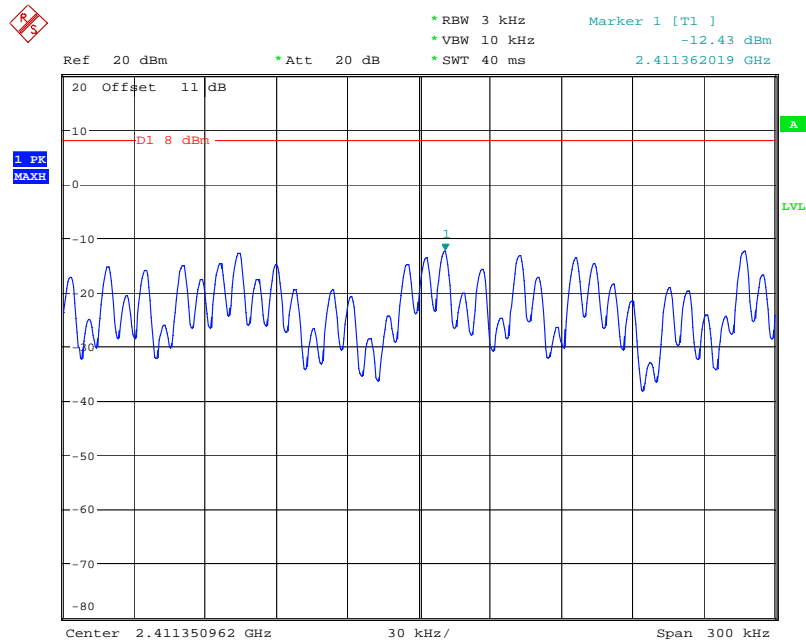
Refer to 5.4.

6.5. Test Results

EUT Modulation	Operating Frequency (MHz)	Power spectrum density (dBm/3kHz)	Limit (dBm/3kHz)
DSSS	2412	-12.43	8
	2437	-12.57	
	2462	-12.32	

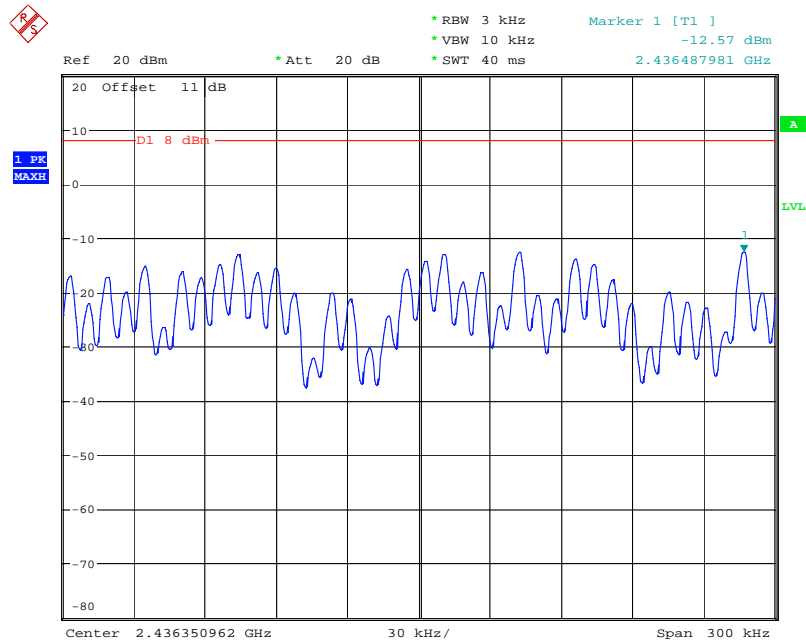
Test Plots:

1. DSSS-2412MHz



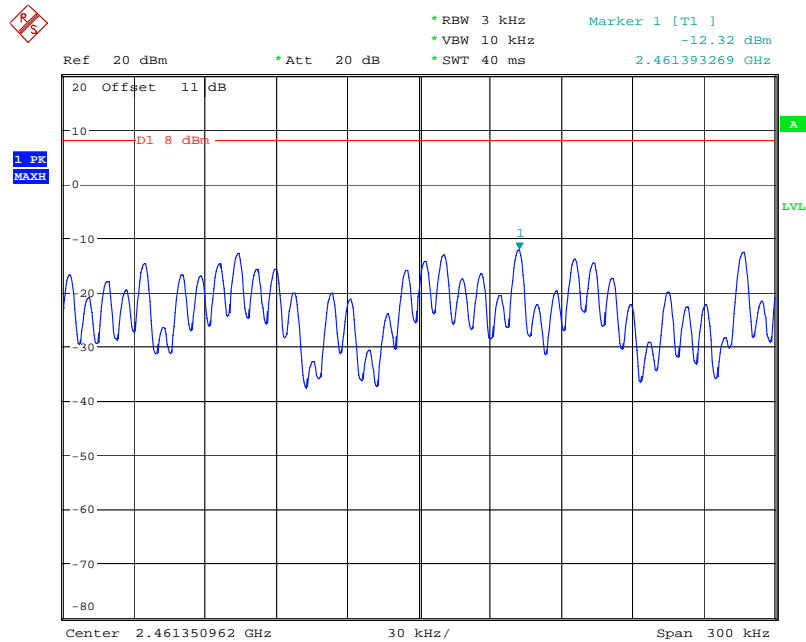
Date: 27.AUG.2010 15:10:45

2. DSSS-2437MHz



Date: 27.AUG.2010 15:09:44

3. DSSS-2462MHz



Date: 27.AUG.2010 15:08:10

**** END OF REPORT ****