



FCC PART 15 SUBPART C TEST REPORT

FCC PART 15.247

Report Reference No.....: JTT20151100305

FCC ID.....: 2AEP7N502

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Applicant's name.....: NOBLEX ARGENTINA S.A.

Address: Jaramillo 3670 – CIUDAD AUTONOMA DE BUENOS AIRES – ARGENTINA

Test specification

Standard: **FCC Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz**

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Test item description Smart Phone

Trade Mark: NOBLEX

Manufacturer.....: AMER MOBILE CO.,LIMITED

Model/Type reference.....: N502

Listed Models: N/A

Modulation Type: DSSS(CCK,DQPSK,DBPSK),OFDM(64QAM,16QAM,QPSK, BPSK)

Operation Frequency.....: From 2412MHz to 2462MHz

Rating: DC 3.70V

Hardware version: E520_WMCK

Software version: NOBLEX_L500C_V01_20150925

Result.....: **PASS**

TEST REPORT

Test Report No. : JTT20151100305	Nov16, 2015
	Date of issue

Equipment under Test : Smart Phone

Model /Type : N502

Listed Models : N/A

Applicant : **NOBLEX ARGENTINA S.A.**

Address : Jaramillo 3670 – CIUDAD AUTONOMA DE BUENOS
AIRES – ARGENTINA

Manufacturer : **AMER MOBILE CO.,LIMITED**

Address : FLAT / RM 1903 ,19/F PODIUM PLAZA 5 HANOI ROAD
TSIM SHA TSUI KL HONG KONG.

Test Result:	PASS
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1 TEST STANDARDS

The tests were performed according to following standards:

[FCC Rules Part 15.247](#): Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

[ANSI C63.10:2013](#): American National Standard for Testing Unlicensed Wireless Devices

[KDB558074 D01 V03](#): Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

2 SUMMARY

2.1 General Remarks

Date of receipt of test sample	:	Aug 27, 2015
Testing commenced on	:	Aug 28, 2015
Testing concluded on	:	Sep 24, 2015

2.2 Product Description

The **NOBLEX ARGENTINA S.A.**'s Model: N502 or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

Name of EUT	Smart Phone
Model Number	N502
Modulation Type	GMSK for GSM/GPRS, 8-PSK for EDGE, QPSK for UMTS, QPSK, 16QAM for LTE
Antenna Type	Internal
UMTS Operation Frequency Band	Device supported UMTS FDD Band II/V
WLAN FCC Operation frequency	IEEE 802.11b:2412-2462MHz IEEE 802.11g:2412-2462MHz IEEE 802.11n HT20:2412-2462MHz IEEE 802.11n HT40:2422-2452MHz
BT FCC Operation frequency	2402MHz-2480MHz
HSDPA Release Version	Release 10
HSUPA Release Version	Release 6
DC-HSUPA Release Version	Not Supported
WCDMA Release Version	R99
LTE Release Version	R8
UMTS Operation Frequency Band	Device supported FDD band 4, FDD band 7
WLAN FCC Modulation Type	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK) IEEE 802.11n HT40: OFDM (64QAM, 16QAM, QPSK,BPSK)
BT Modulation Type	GFSK,8DPSK, π /4DQPSK(BT 3.0+EDR)
Hardware version	E520_WMCK
Software version	NOBLEX_L500C_V01_20150925
Android version	Android 4.4.2
GPS function	Supported
WLAN	Supported 802.11b/802.11g/802.11n
Bluetooth	Supported BT 4.0/BT 3.0+EDR
GSM/EDGE/GPRS	Supported GSM/GPRS/EDGE
GSM/EDGE/GPRS Power Class	GSM850:Power Class 4/ PCS1900:Power Class 1
GSM/EDGE/GPRS Operation Frequency	GSM850 :824.2MHz-848.8MHz/PCS1900:1850.2MHz-1909.8MHz
GSM/EDGE/GPRS Operation Frequency Band	GSM850/PCS1900/GPRS850/GPRS1900/EDGE850/EDGE1900
GSM Release Version	R99
GPRS/EDGE Multislot Class	GPRS/EDGE: Multi-slot Class 12
Extreme temp. Tolerance	-30°C to +50°C
Extreme vol. Limits	3.40VDC to 4.20VDC (nominal: 3.80VDC)
GPRS operation mode	Class B

2.3 Equipment Under Test

Power supply system utilised

Power supply voltage	:	<input type="radio"/> 120V / 60 Hz	<input type="radio"/> 115V / 60Hz
		<input type="radio"/> 12 V DC	<input type="radio"/> 24 V DC
		<input checked="" type="radio"/> Other (specified in blank below)	

DC 3.70V

2.4 Description of the test mode

IEEE 802.11b/g/n: The product support Third channels but only use Eleventh channels in USA.

Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432		
6	2437		
7	2442		

2.5 Short description of the Equipment under Test (EUT)

2.5.1 General Description

N502 is subscriber equipment in the WCDMA/GSM /LTE system. The HSPA/UMTS frequency band is Band II and Band V, LTE frequency band is band 4 and band 7; The GSM/GPRS/EDGE frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900, but only Band II and Band V and GSM850 and PCS1900 bands test data included in this report. The Smart Phone implements such functions as RF signal receiving/transmitting, HSPA/UMTS ,LTE and GSM/GPRS/EDGE protocol processing, voice, video MMS service, GPS and WIFI etc. Externally it provides micro SD card interface, earphone port (to provide voice service) and SIM card interface. It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

NOTE: Unless otherwise noted in the report, the functional boards installed in the units shall be selected from the below list, but not means all the functional boards listed below shall be installed in one unit.

2.5.2 Test Modes

Test Case	Test Conditions	
	Configuration	Description
DTS (6 dB) Bandwidth	Measurement Method	FCC KDB 558074 §8.2 Option 2
	Test Environment	NTNV
	EUT Configuration	11b_L,11b_M,11b_H 11g_L,11g_M,11g_H 11n HT20_L, 11n HT20_M, 11n HT20_H 11n HT40_L, 11n HT40_M, 11n HT40_H
Maximum Peak Conducted Output Power	Measurement Method	FCC KDB 558074§9.1.2
	Test Environment	NTNV
	Test Setup	Test Setup 1
	EUT Configuration	11b_L,11b_M,11b_H 11g_L,11g_M,11g_H 11n HT20_L, 11n HT20_M, 11n HT20_H 11n HT40_L, 11n HT40_M, 11n HT40_H
Maximum Power Spectral Density Level	Measurement Method	FCC KDB 558074 §10.2 (peak PSD).
	Test Environment	NTNV
	EUT Configuration	11b_L,11b_M,11b_H 11g_L,11g_M,11g_H 11n HT20_L, 11n HT20_M, 11n HT20_H 11n HT40_L, 11n HT40_M, 11n HT40_H

Unwanted Emissions into Non-Restricted Frequency Bands	Measurement Method	FCC KDB 558074§11.0.
	Test Environment	NTNV
	Test Setup	Test Setup 1
	EUT Configuration	11b_L,11b_M,11b_H 11g_L,11g_M,11g_H 11n HT20_L, 11n HT20_M, 11n HT20_H 11n HT40_L, 11n HT40_M, 11n HT40_H
Unwanted Emissions into Restricted Frequency Bands (Conducted)	Measurement Method	FCC KDB 558074§12.2, Conducted (antenna-port).
	Test Environment	NTNV
	EUT Configuration	11b_L,11b_M,11b_H 11g_L,11g_M,11g_H 11n HT20_L, 11n HT20_M, 11n HT20_H 11n HT40_L, 11n HT40_M, 11n HT40_H
Unwanted Emissions into Restricted	Measurement Method	FCC KDB 558074§12.1,Radiated(cabinet/case emissions with Impedance matching for antenna-port).
	Test Environment	NTNV
	EUT Configuration	11b_L,11b_M,11b_H 11g_L,11g_M,11g_H 11n HT20_L, 11n HT20_M, 11n HT20_H 11n HT40_L, 11n HT40_M, 11n HT40_H

Test Case	Test Conditions	
	Configuration	Description
AC Power Line Conducted Emissions	Measurement Method	AC mains conducted.
	Test Environment	NTNV
	EUT Configuration	11g_M (Worst Conf.).

Note: 1. For Radiated Emissions, By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that “Z axis” position was the worst, then the final test was executed the worst condition and test data were recorded in this report.

2. Typical working modes for each IEEE 802.11 mode are selected to perform tests. The manufacturer provide special test software to control TX duty cycle >98% for TX test; recorded worst case at difference data rate as follows:

Test Mode	Test Modes Description
11b	IEEE 802.11b with data rate of 1 Mbps using SISO mode.
11g	IEEE 802.11g with data rate of 6 Mbps using SISO mode.
11n HT20	IEEE 802.11n with data rate of MCS0 and bandwidth of 20MHz using SISO mode.
11n HT40	IEEE 802.11n with data rate of MCS7 and bandwidth of 40MHz using SISO mode.

2.6 EUT operation mode

Test Mode	RF Ch.	BG Port	TX Freq. [MHz]	RX Freq. [MHz]	Ch. BW [MHz]
IEEE 802.11 b	L	BG 1	Ch No. 1 / 2412MHz	---	20
	M	BG 1	Ch No. 6 / 2437 MHz	---	20
	H	BG 1	Ch No. 11/ 2462MHz	---	20
IEEE 802.11 g	L	BG 1	Ch No. 1 / 2412MHz	---	20
	M	BG 1	Ch No. 6 / 2437 MHz	---	20
	H	BG 1	Ch No. 11/ 2462MHz	---	20
IEEE 802.11 n HT20	L	BG 1	Ch No. 1 / 2412MHz	---	20
	M	BG 1	Ch No. 6 / 2437 MHz	---	20
	H	BG 1	Ch No. 11/ 2462MHz	---	20
IEEE 802.11 n HT40	L	BG 1	Ch No. 3 / 2422MHz	---	20
	M	BG 1	Ch No. 6 / 2437 MHz	---	20
	H	BG 1	Ch No. 9 / 2452MHz	---	20

2.7 EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

○	Power Cable	Length (m) :	/
		Shield :	/
		Detachable :	/
○	Multimeter	Manufacturer :	/
		Model No. :	/

2.8 Internal Identification of AE used during the test

AE ID*	Description
AE1	Charger

AE1

Model: S005UA0500100

INPUT: AC100-240V 50/60Hz 150mA

OUTPUT: DC 5.0V 1.0A

*AE ID: is used to identify the test sample in the lab internally.

2.9 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: 2AEP7N502** filing to comply with FCC Part 22 and Part 24 Rules

2.10 Modifications

No modifications were implemented to meet testing criteria.

2.11 Test Environments

NOTE: The values used in the test report maybe stringent than the declared.

Environment Parameter	Selected Values During Tests		
NTNV	Temperature	Voltage	Relative Humidity
	Ambient	3.8VDC	Ambient

1. The frequency bands used in this EUT are listed as follows:

Frequency Band(MHz)	2400-2483.5	5150-5350	5470-5725	5725-5850
802.11b	✓	—	—	—
802.11g	✓	—	—	—
802.11n HT20	✓	—	—	—
802.11n HT40	✓	—	—	—

2. The EUT incorporates a SISO function, Physically, the EUT provides one completed transmitter and one completed receiver.

Modulation Mode	TX Function
802.11b	1TX
802.11g	1TX
802.11n HT20	1TX
802.11n HT40	1TX

3 TEST ENVIRONMENT

3.1 Address of the test laboratory

Shenzhen Academy of Metrology and Quality Inspection

No.4 TongFa Road, Xili TownNanshan District, Shenzhen, China

The sites are constructed in conformance with the requirements of ANSI C63.4 (2003) and CISPR Publication 22.

3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration information:

Shenzhen Academy of Metrology and Quality Inspection

No.4 TongFa Road, Xili TownNanshan District, Shenzhen, China

Test Firm FCC Registration number: 806614

3.3 Environmental conditions

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

Temperature: 15-35 ° C

Humidity: 30-60 %

Atmospheric pressure: 950-1050mbar

3.4 Test Description

Test Item	FCC Part No.	Requirements	Verdict
DTS (6 dB) Bandwidth	15.247(a)(2)	≥ 500 kHz.	PASS
Maximum Peak Conducted Output Power	15.247(b)(3)	For directional gain: $< 30\text{dBm} - (G[\text{dBi}] - 6 [\text{dB}])$, peak; Otherwise : $< 30\text{dBm}$, peak.	PASS
Maximum Power Spectral Density Level	15.247(e)	For directional gain : $< 8\text{dBm}/3$ kHz – $(G[\text{dBi}] - 6[\text{dB}])$, peak. Otherwise : $< 8\text{dBm}/3$ kHz, peak.	PASS
Band Edges Compliance	15.247(d)	$< -20\text{dBm}/100$ kHz if total peak power \leq power limit.	PASS
Unwanted Emissions into Non-Restricted Frequency Bands	15.247(d)	$< -20\text{dBm}/100$ kHz if total peak power \leq power limit.	PASS
Unwanted Emissions into Restricted Frequency Bands (Conducted)	15.247(d) 15.209	$< -20\text{dBm}/100$ kHz if total peak power \leq power limit.	PASS
Unwanted Emissions into Restricted Frequency Bands (Radiated)	15.247(d) 15.209	FCC Part 15.209 field strength limit;	PASS
AC Power Line Conducted Emissions	15.207	FCC Part 15.207 conducted limit;	PASS

Remark: The measurement uncertainty is not included in the test result.

3.5 Summary of measurement results

Test Specification clause	Test case	Test Mode	Test Channel	Recorded In Report		Pass	Fail	NA	NP	Remark
§15.247(b)(4)	Antenna gain	802.11b	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	802.11b	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(e)	Power spectral density	802.11b 802.11g 802.11n HT20 802.11n HT40	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(a)(1)	Spectrum bandwidth – 6 dB bandwidth	802.11b 802.11g 802.11n HT20 802.11n HT40	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(b)(1)	Maximum output power	802.11b 802.11g 802.11n HT20 802.11n HT40	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(d)	Band edge compliance conducted	802.11b 802.11g 802.11n HT20 802.11n HT40	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Highest	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.205	Band edge compliance radiated	802.11b 802.11g 802.11n HT20 802.11n HT40	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Highest	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(d)	TX spurious emissions conducted	802.11b 802.11g 802.11n HT20 802.11n HT40	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	802.11b 802.11g 802.11n HT20 802.11n HT40	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(d)	TX spurious emissions radiated	802.11b 802.11g 802.11n HT20 802.11n HT40	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	802.11b	<input checked="" type="checkbox"/> Lowest <input checked="" type="checkbox"/> Middle <input checked="" type="checkbox"/> Highest	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.109	RX spurious emissions radiated	-/-	-/-	-/-	-/-	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.209(a)	TX spurious Emissions radiated < 30 MHz	802.11b	-/-	802.11b	-/-	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.107(a) §15.207	Conducted Emissions < 30 MHz	802.11b	-/-	802.11b	-/-	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies

Remark:

1. The measurement uncertainty is not included in the test result.
2. NA = Not Applicable; NP = Not Performed

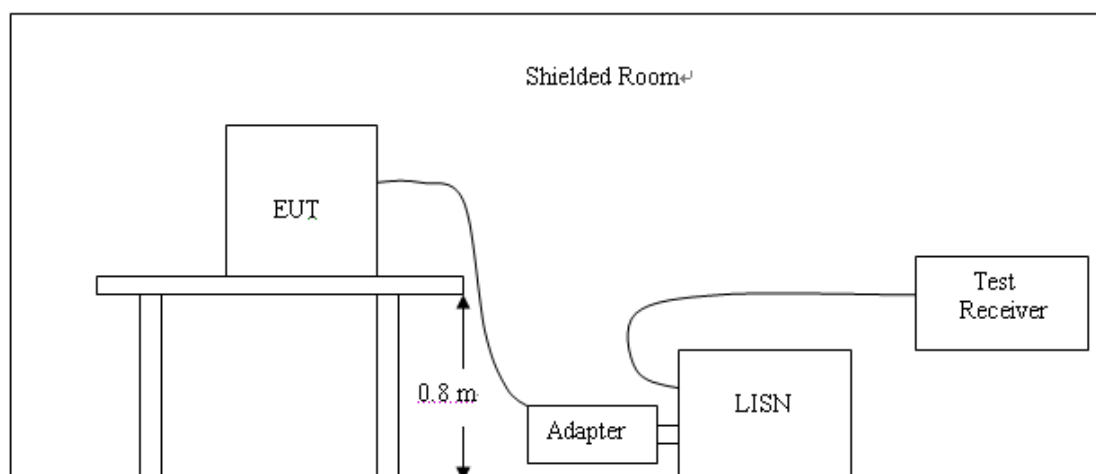
3.6 Equipments Used during the Test

Internal No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. interval
SB2603	EMI Test Receiver	Rohde & Schwarz	ESCS30	Dec.19, 2014	1 Year
SB3321	AMN	Rohde & Schwarz	ESH2-Z5	Jan.18, 2015	1 Year
SB2604	AMN	Rohde & Schwarz	ESH3-Z5	Nov.18, 2015	1 Year
SB8501/09	EMI Test Receiver	Rohde & Schwarz	ESU40	Mar.27, 2015	1 Year
SB8501/04	Bilog Antenna	Schwarzbeck	VULB9163	Jan.21, 2015	3 Year
SB5472/02	Bilog Antenna	Schwarzbeck	VULB9163	Jan.18, 2015	3 Year
SB3435	Horn Antenna	Rohde & Schwarz	HF906	Jan.19, 2015	3 Year
SB3434	Horn Antenna	Rohde & Schwarz	HF906	Jan.19, 2015	3 Year
SB3435/01	Amplifier(1-18GHz)	Rohde & Schwarz	---	Jan.19, 2015	1 Year
SB3435/02	Amplifier(18-40GHz)	Rohde & Schwarz	---	May.15, 2015	1 Year
SB5392/02	Horn Antenna	Amplifier Research	AT4560	May.17, 2015	3 Year
SB3450/01	3m Semi-anechoic chamber	Albatross Projects	9X6X6	Oct.11, 2014	2 Year
SB8501/01	Communication Test Unit	Agilent	8960	Jan.05, 2015	1 Year
SB9721/02	Signal Analyzer	Agilent	N9020A	Jan.05, 2015	1 Year
SB3611	DC Power Supply	KENWOOD	PDS36-10	May.15, 2015	1 Year
SB6691	Climatic Chamber	NANYA	DW-0150	Apr.12, 2015	1 Year
SB3345	Loop Antenna	Schwarzbeck	FMZB1516	Jan.20, 2015	1 Year
SB3589	Power Sensor	Rohde&Schwarz	NRP-Z4	May.15, 2015	1 Year
SB3588	Power Meter	Rohde&Schwarz	NRVS	May.15, 2015	1 Year
N/A	EMI TEST Software	Rohde&Schwarz	ESK1	N/A	N/A
N/A	EMI TEST Software	Rohde&Schwarz	EMC32	N/A	N/A

4 TEST CONDITIONS AND RESULTS

4.1 AC Power Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10-2013.
2. Support equipment, if needed, was placed as per ANSI C63.10-2013
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2013
4. The EUT received DC5V power from the adapter, the adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

AC Power Conducted Emission Limit

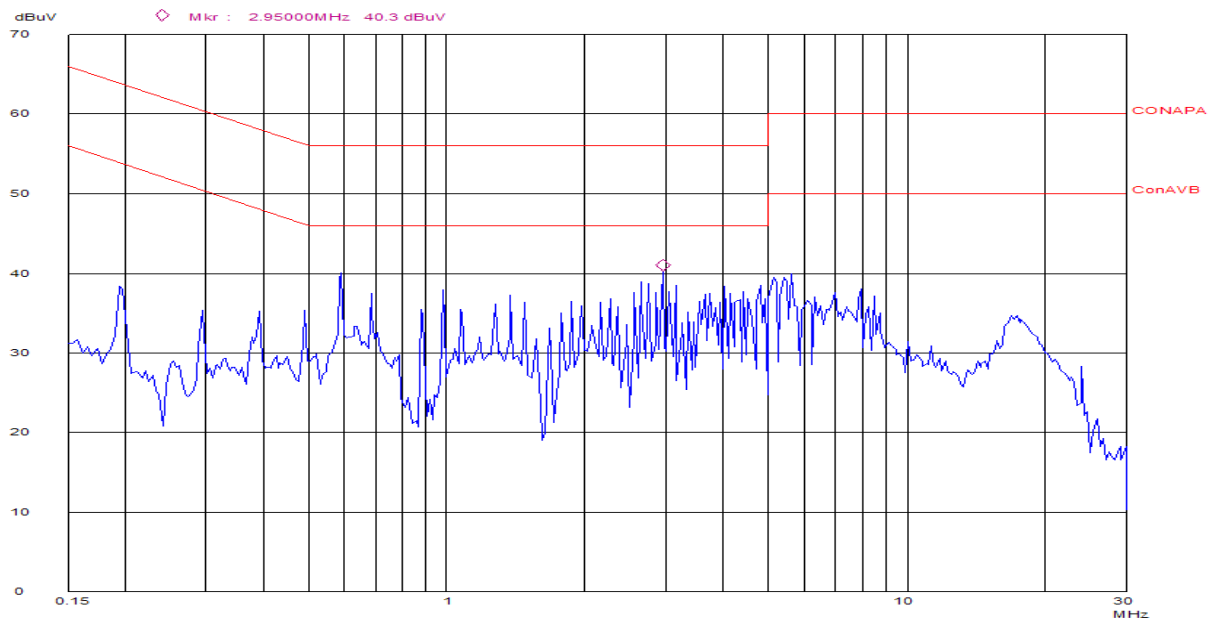
For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following:

Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

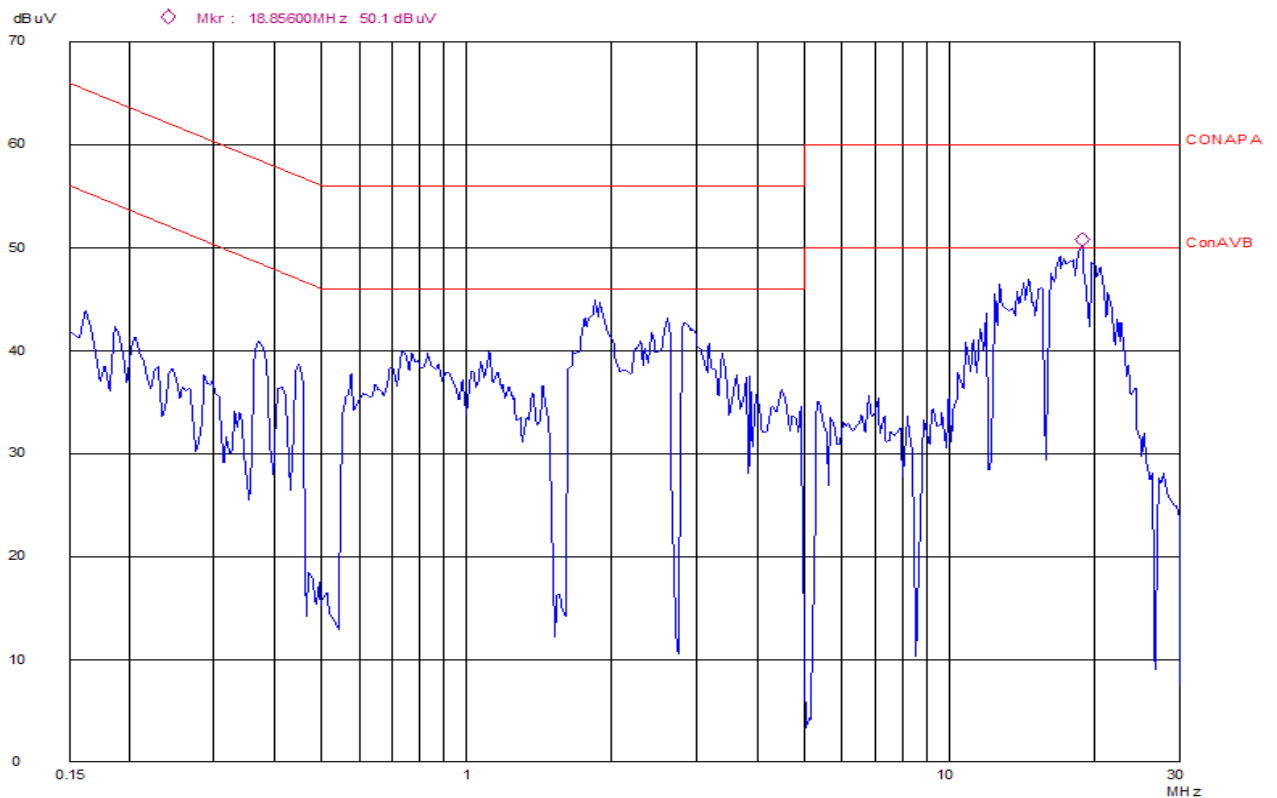
* Decreasing linearly with the logarithm of the frequency

TEST RESULTS

The AC Power Conducted Emission measurement is performed the each test mode (b/g/n) and channel (low/mid/high), the datum recorded below (802.11b mode, the middle channel) is the worst case for all the test modes and channels.

N

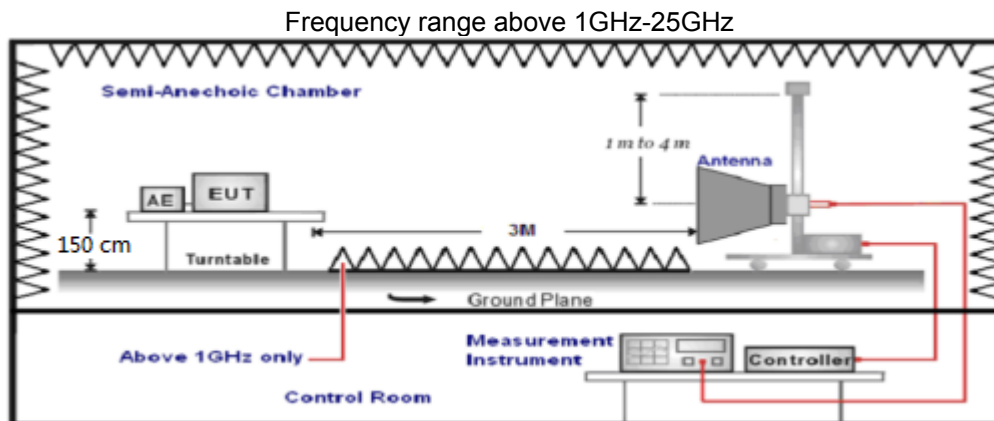
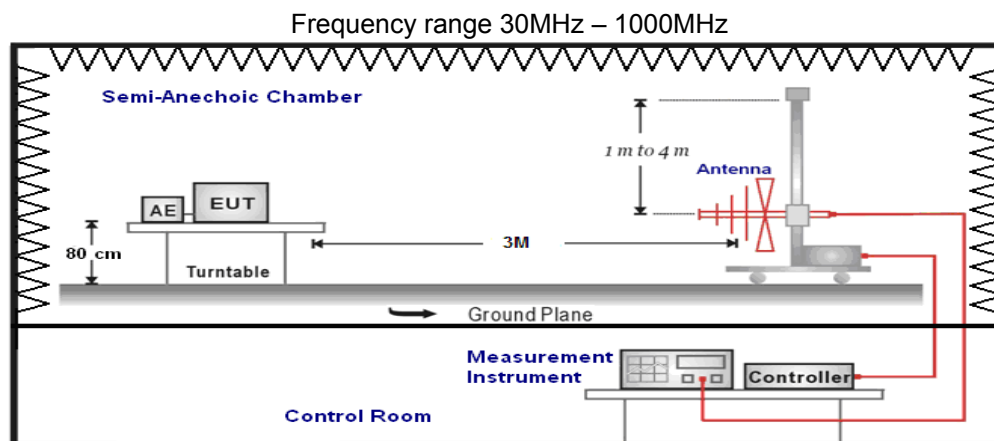
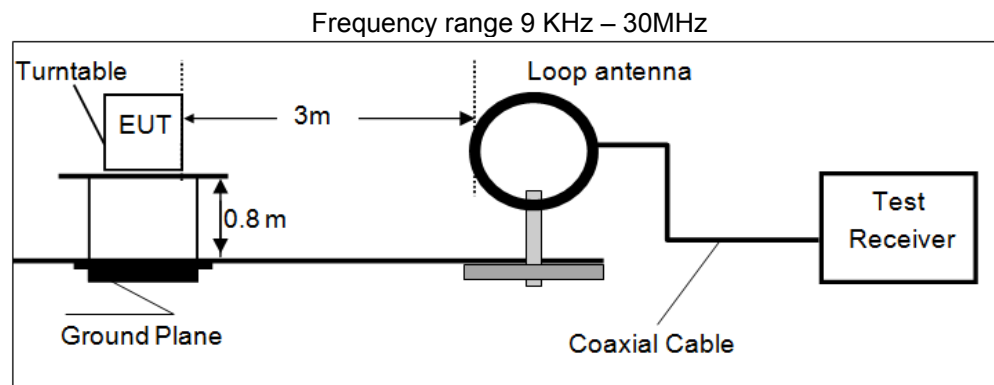
Frequency	QP level	QP Limit	AV level	AV Limit	QP read	AV read	Factor	QP margin	AV margin
0.59	38.2	56	36.1	46	28.4	26.3	9.8	17.8	9.9
2.65	37.1	56	29.6	46	27.2	19.7	9.9	18.9	16.4
2.95	32.7	56	29	46	22.8	19.1	9.9	23.3	17.0

L

Frequency	QP level	QP Limit	AV level	AV Limit	QP read	AV read	Factor	QP margin	AV margin
0.37	37.1	58.5	26.9	48.5	27.4	17.2	9.7	21.4	21.6
1.842	43	56	27.7	46	33.2	17.9	9.8	13.0	18.3
18.865	42.6	60	28.1	50	32.7	18.2	9.9	17.4	21.9

4.2 Radiated Emission

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane for below 1GHz and 1.50m above ground for above 1GHz.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. The EUT minimum operation frequency was 32.768 KHz and maximum operation frequency was 2480MHz.so radiated emission test frequency band from 9 KHz to 25GHz.
6. The distance between test antenna and EUT as following table states:

Test Frequency range	Test Antenna Type	Test Distance
9KHz-30MHz	Active Loop Antenna	3
30MHz-1GHz	Ultra-Broadband Antenna	3
1GHz-18GHz	Double Ridged Horn Antenna	3
18GHz-25GHz	Horn Antennna	1

7. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
9KHz-150KHz	RBW=200Hz/VBW=3KHz, Sweep time=Auto	QP
150KHz-30MHz	RBW=9KHz/VBW=100KHz, Sweep time=Auto	QP
30MHz-1GHz	RBW=120KHz/VBW=1000KHz, Sweep time=Auto	QP
1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto	Peak (Receiver)
	Average Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto	Average (Receiver)

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

For example

Frequency (MHz)	FS (dBμV/m)	RA (dBμV/m)	AF (dB)	CL (dB)	AG (dB)	Transd (dB)
300.00	40	58.1	12.2	1.6	31.90	-18.1

$$\text{Transd} = \text{AF} + \text{CL} - \text{AG}$$

RADIATION LIMIT

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of desired power.

The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos.

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	300	$20\log(2400/F(\text{KHz}))+80$	$2400/F(\text{KHz})$
0.49-1.705	30	$20\log(24000/F(\text{KHz}))+40$	$24000/F(\text{KHz})$
1.705-30	30	$20\log(30)+40$	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST RESULTS

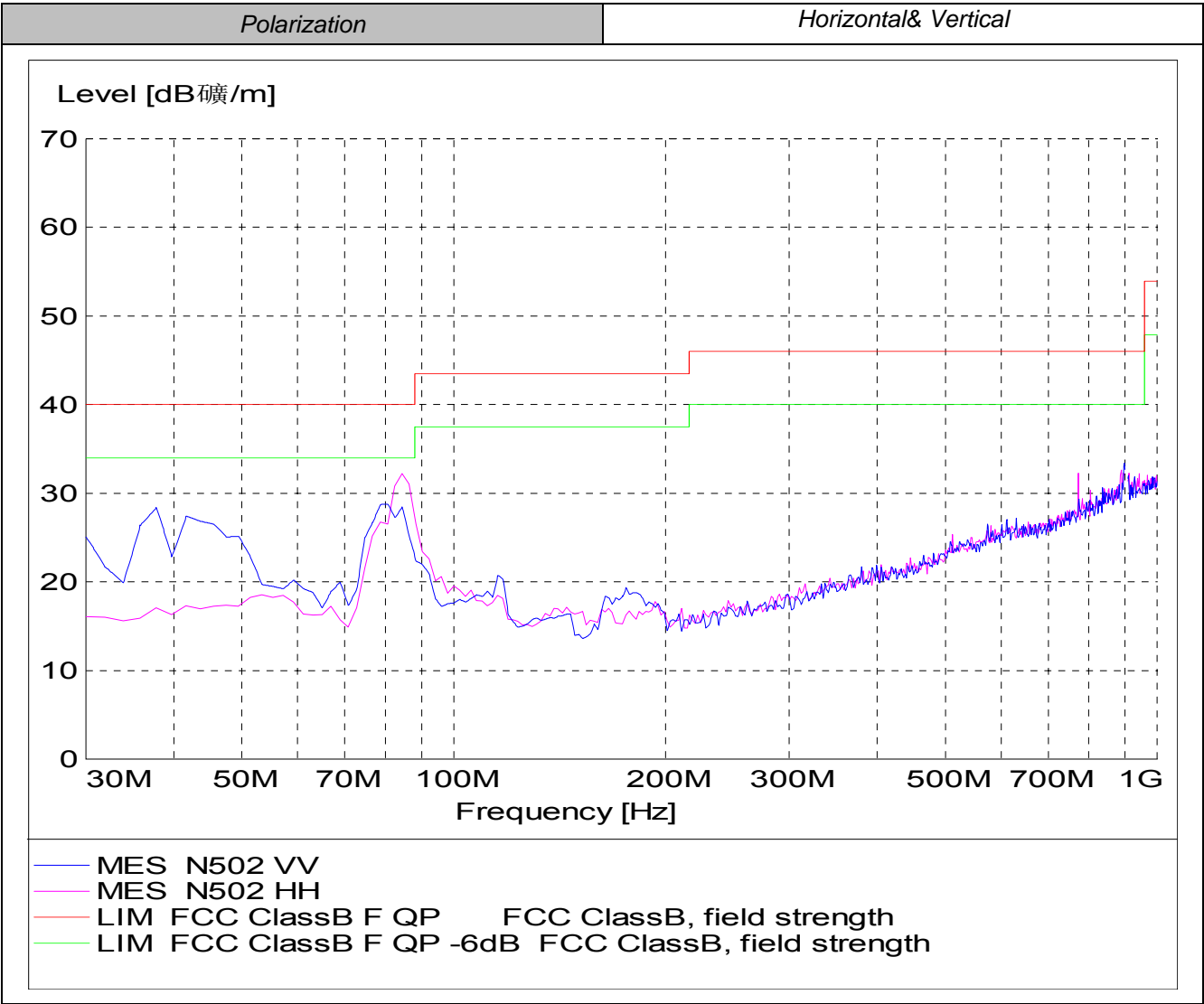
Remark:

1. The radiated measurement are performed the each test mode (b/g/n) and channel (low/mid/high), the datum recorded below (802.11b mode, the middle channel) is the worst case for all the test mode and channel.
2. ULTRA-BROADBAND ANTENNA for the radiation emission test below 1G.
3. HORN ANTENNA for the radiation emission test above 1G.
4. We tested both battery powered and powered by adapter charging mode at three orientate ons, recorded worst case at powered by adapter charging mode.
5. “---” means not recorded as emission levels lower than limit.
6. Margin= Limit - Level

For 9KHz to 30MHz

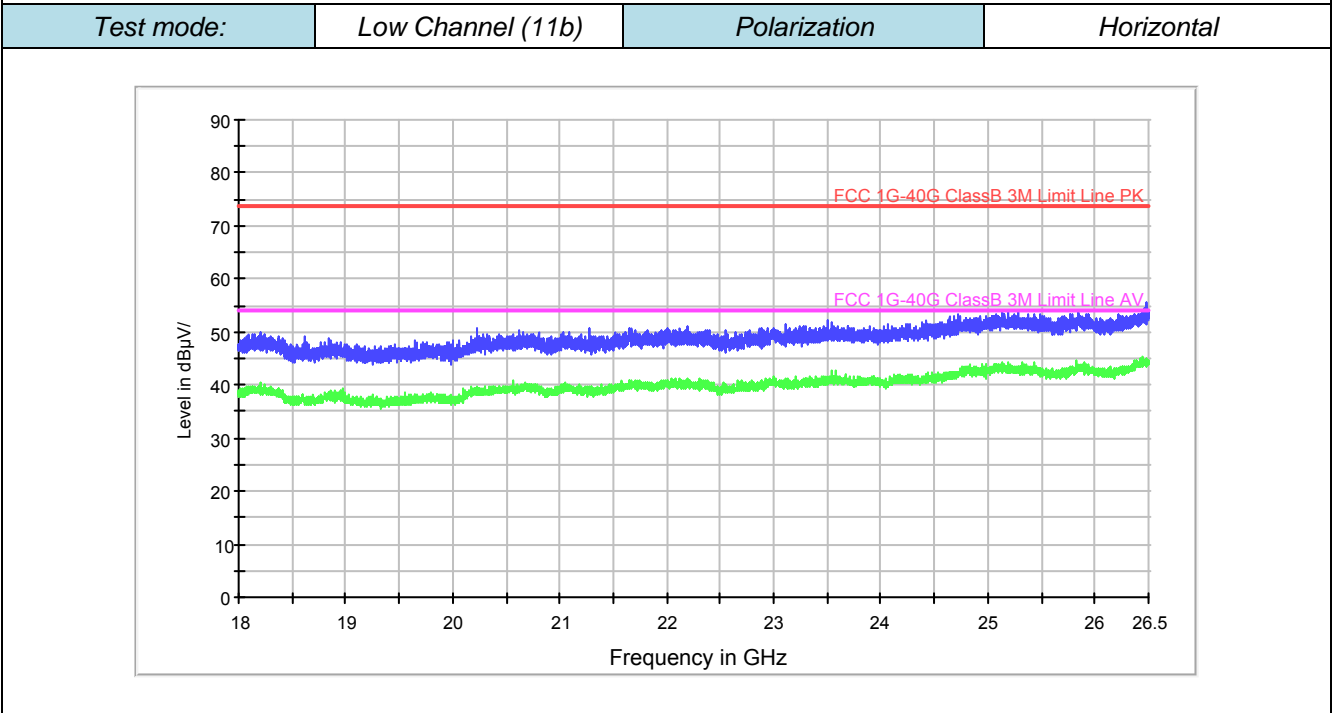
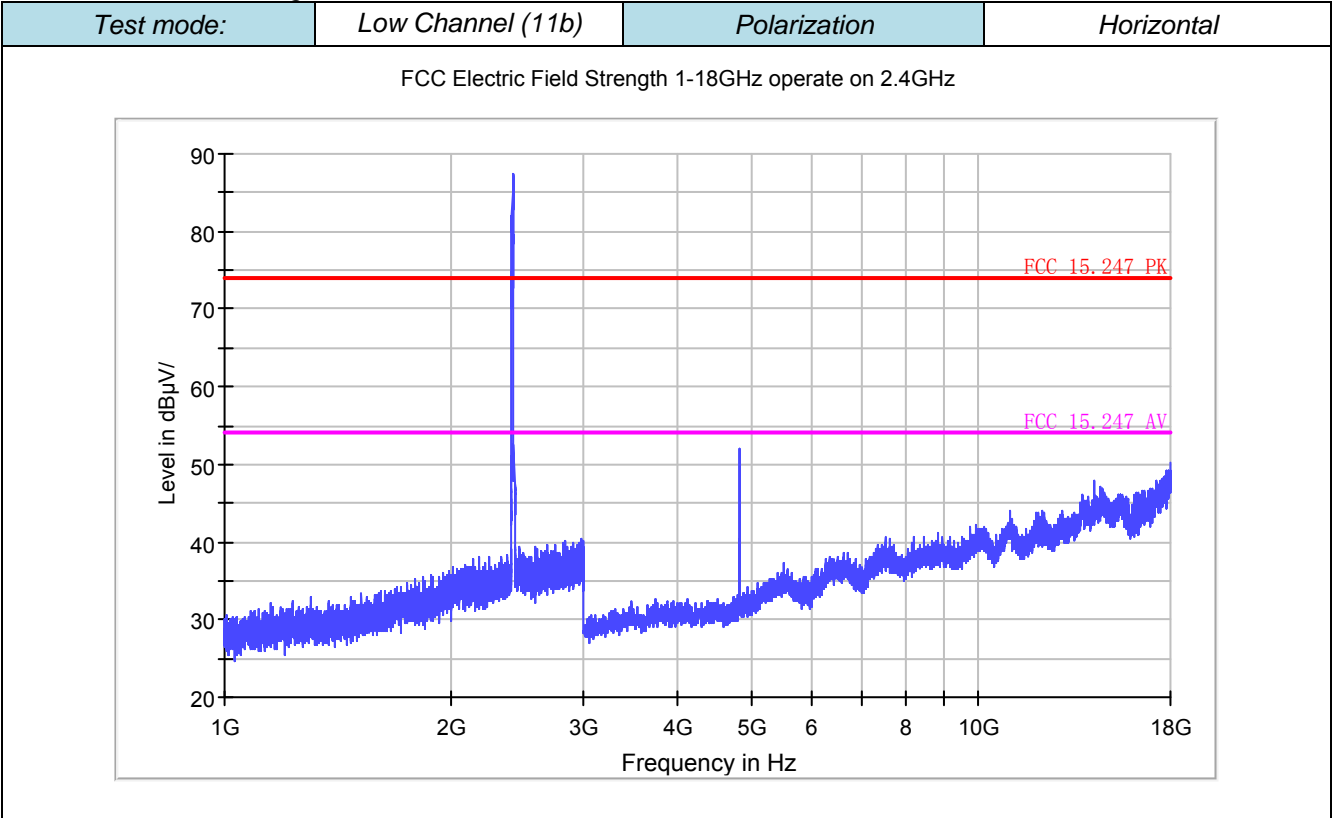
Frequency (MHz)	Corrected Reading (dBμV/m)@3m	FCC Limit (dBμV/m) @3m	Margin (dB)	Detector	Result
11.48	45.88	69.54	23.66	QP	PASS
25.98	43.52	69.54	26.02	QP	PASS

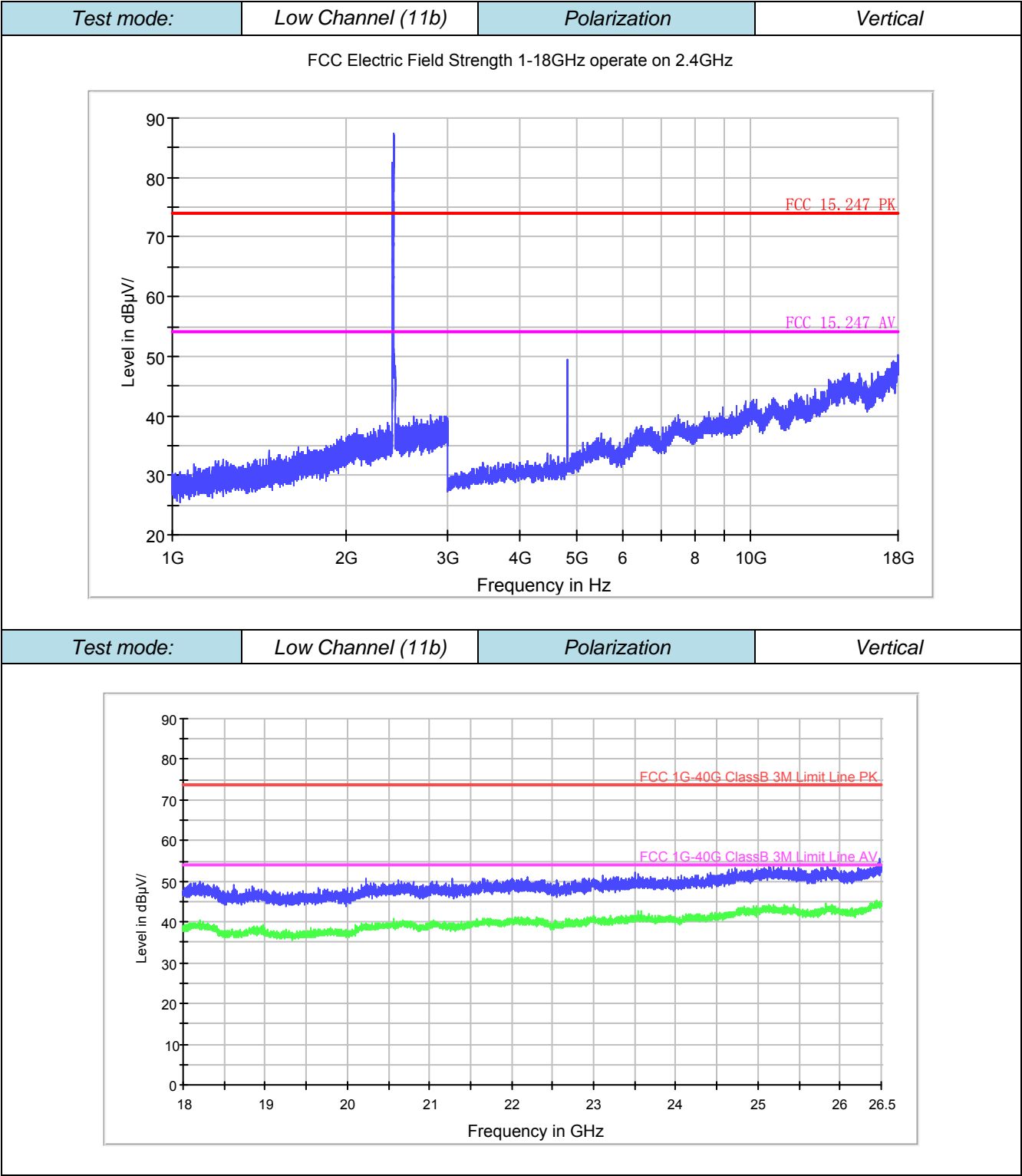
For 30MHz to 1000MHz

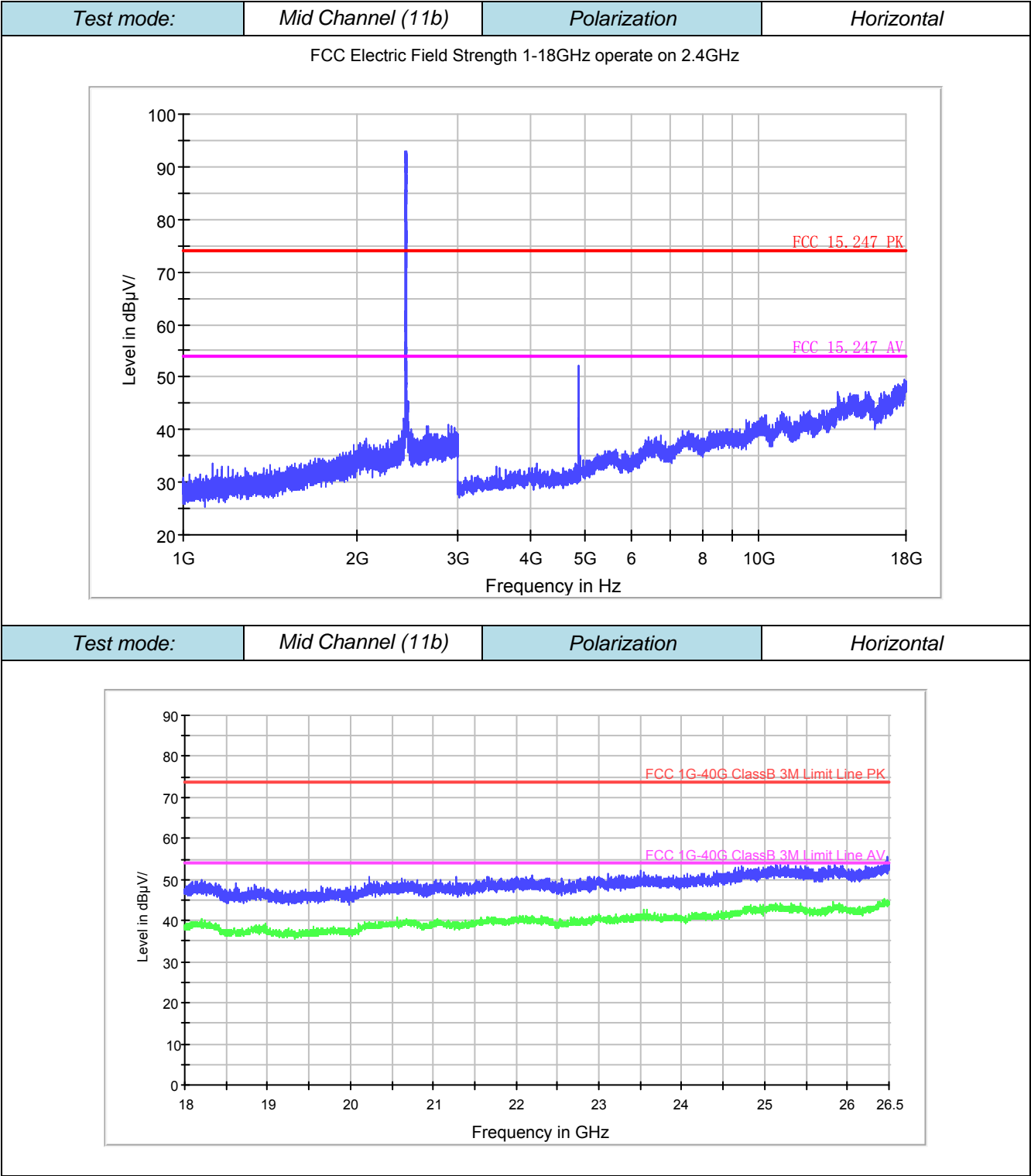


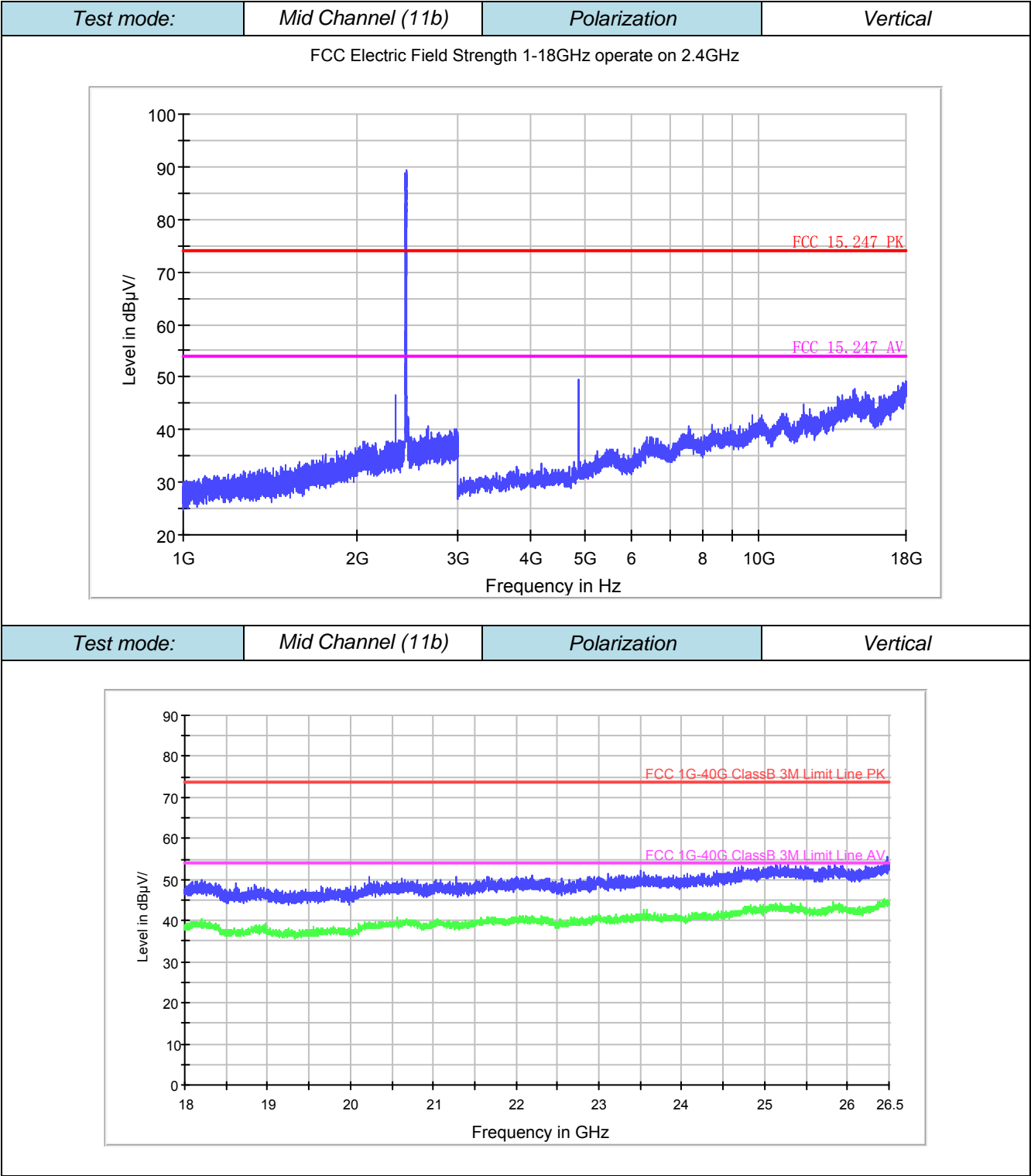
For 1GHz to 25GHz

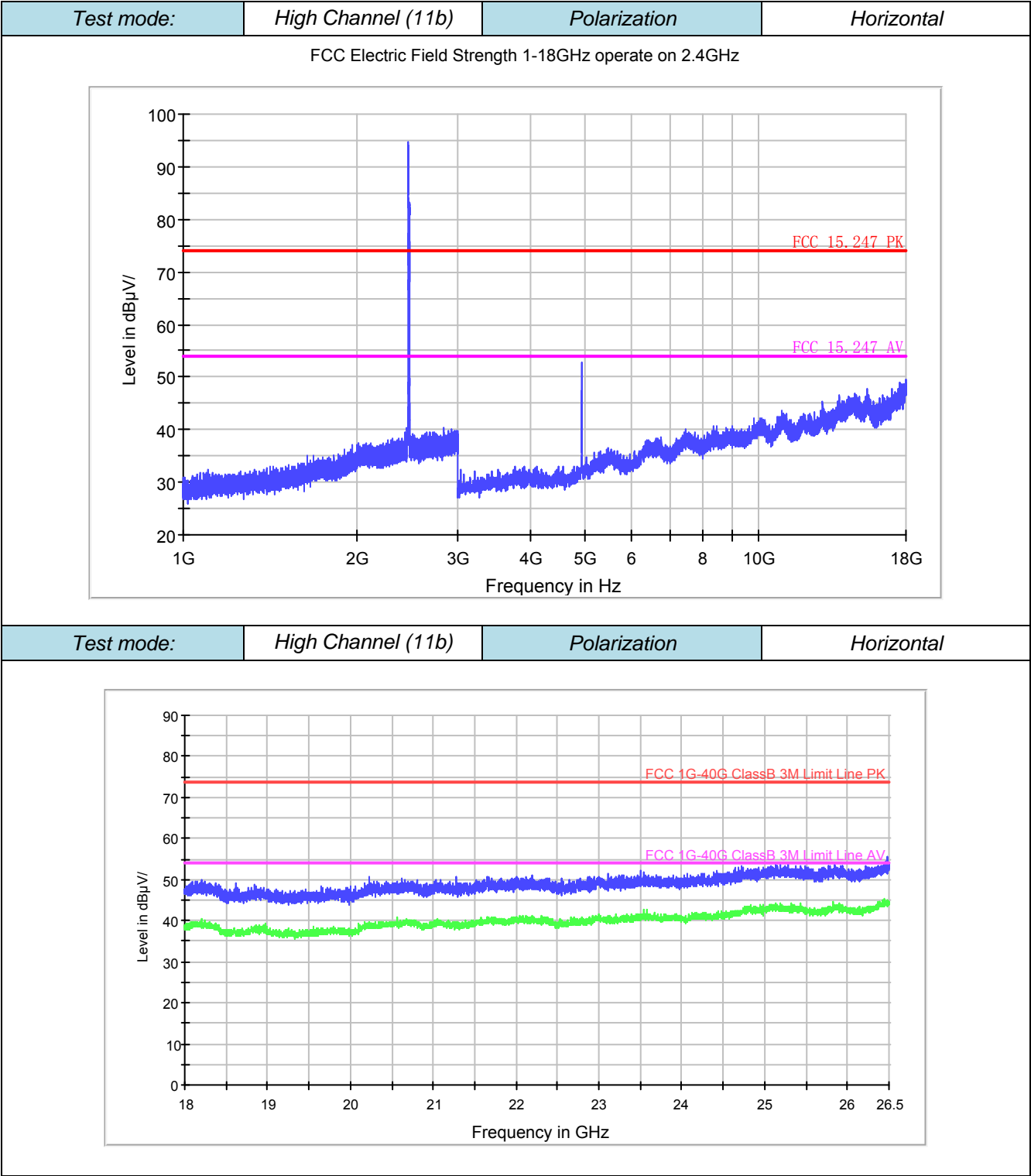
Note: We tested 11b, 11g, 11n HT20, 11n HT40 and recorded the worst case at the 11b Mode.

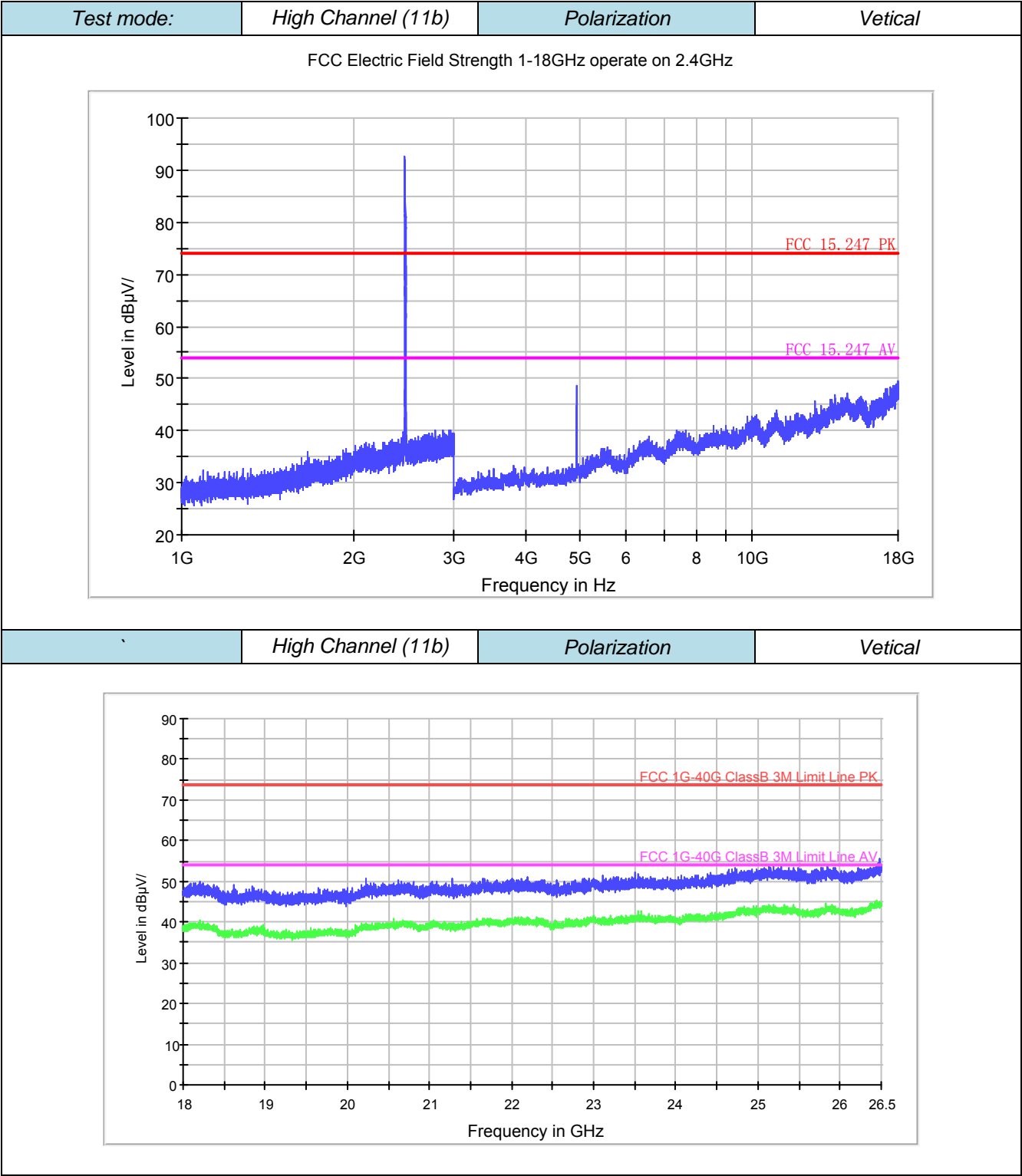






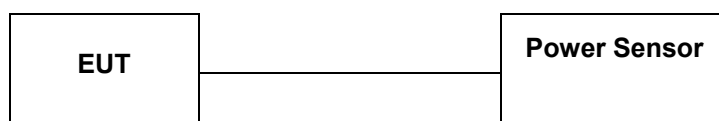






4.3 Maximum Peak Output Power

TEST CONFIGURATION



TEST PROCEDURE

According to KDB558074 D01 DTS Meas Guidance v03:

PKPM1 Peak power meter method: The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

Maximum conducted (average) output power: As an alternative to spectrum analyzer or EMI receiver measurements, measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied.

1. The EUT is configured to transmit continuously, or to transmit with a constant duty factor.
2. At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
3. The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

If the transmitter does not transmit continuously, measure the duty cycle (x) of the transmitter output signal as described in Section 6.0.

Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.

Adjust the measurement in dBm by adding $10\log(1/x)$, where x is the duty cycle to the measurement result.

LIMIT

The Maximum Peak Output Power Measurement is 30dBm.

TEST RESULTS

Remark: We measured output power at difference data rate for each mode and recorded worst case for each mode.

4.3.1 802.11b Test Mode

A. Test Verdict

Channel	Frequency (MHz)	Measured Output Peak Power (dBm)	Limits (dBm)	Verdict
1	2412	15.44	30	PASS
6	2437	15.89	30	PASS
11	2462	15.15	30	PASS

Note:

1. For 802.11b mode at final test to get the worst-case emission at 1Mbps.
2. The test results including the cable loss.

4.3.2 802.11g Test Mode

A. Test Verdict

Channel	Frequency (MHz)	Measured Output Peak Power (dBm)	Limits (dBm)	Verdict
1	2412	19.02	30	PASS
6	2437	20.11	30	PASS
11	2462	18.48	30	PASS

Note:

1. For 802.11g mode at final test to get the worst-case emission at 6Mbps.
2. The test results including the cable loss.

4.3.3 802.11n HT20 Test Mode

A. Test Verdict

Channel	Frequency (MHz)	Measured Output Peak Power (dBm)	Limits (dBm)	Verdict
1	2412	17.95	30	PASS
6	2437	19.05	30	PASS
11	2462	16.61	30	PASS

Note:

1. For 802.11n HT20 mode at final test to get the worst-case emission at 6.5Mbps.
2. The test results including the cable loss.

4.3.4 802.11n HT40 Test Mode

A. Test Verdict

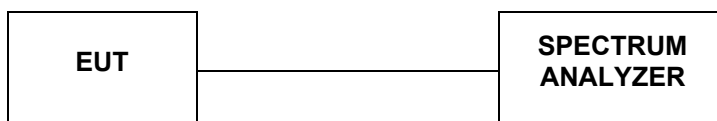
Channel	Frequency (MHz)	Measured Output Peak Power (dBm)	Limits (dBm)	Verdict
3	2422	18.16	30	PASS
6	2437	20.59	30	PASS
9	2452	19.98	30	PASS

Note:

1. For 802.11n HT40 mode at final test to get the worst-case emission at 13.5Mbps.
2. The test results including the cable loss.

4.4 Power Spectral Density

TEST CONFIGURATION



TEST PROCEDURE

According to KDB 558074 D01 V03 Method PKPSD (peak PSD) this procedure shall be used if maximum peak conducted output power was used to demonstrate compliance, and is optional if the maximum conducted (average) output power was used to demonstrate compliance.

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
4. Set the VBW $\geq 3 \text{ RBW}$.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

LIMIT

For digitally modulated systems, the 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 RESULTS

4.4.1 802.11b Test Mode

A. Test Verdict

Channel	Frequency (MHz)	Report PSD (dBm/100KHz)	Refer to Plot	Limits (dBm/3KHz)	Verdict
1	2412	-3.892	Plot 4.4.1 A	8	PASS
6	2437	-2.897	Plot 4.4.1 B	8	PASS
11	2462	-2.622	Plot 4.4.1 C	8	PASS

Note:

1. For 802.11b mode at final test to get the worst-case emission at 1Mbps.
2. The test results including the cable loss.

B. Test Plots



(Plot 4.4.1 A: Channel 1: 2412MHz @ 802.11b)



(Plot 4.4.1 B: Channel 6: 2437MHz @ 802.11b)



(Plot 4.4.1 C: Channel 11: 2462MHz @ 802.11b)

4.4.2 802.11g Test Mode

A. Test Verdict

Channel	Frequency (MHz)	Report PSD (dBm/100KHz)	Refer to Plot	Limits (dBm/3KHz)	Verdict
1	2412	-10.017	Plot 4.4.2 A	8	PASS
6	2437	-6.917	Plot 4.4.2 B	8	PASS
11	2462	-6.100	Plot 4.4.2 C	8	PASS

Note:

1. For 802.11g mode at final test to get the worst-case emission at 6Mbps.
2. The test results including the cable loss.

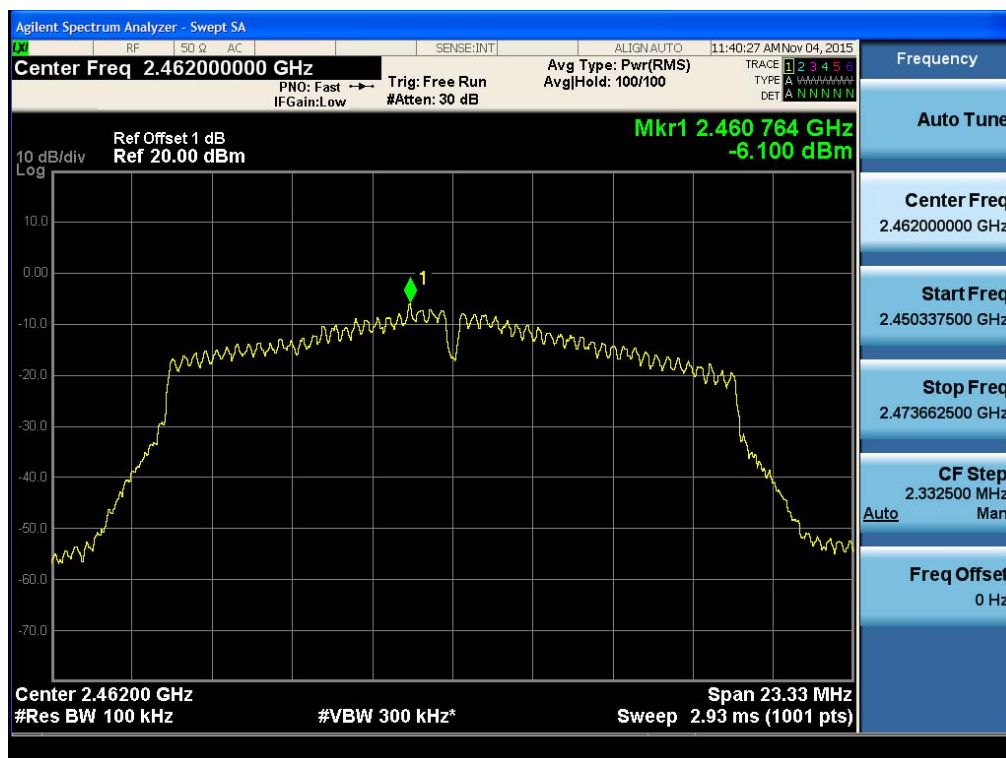
B. Test Plots



(Plot 4.4.2 A: Channel 1: 2412MHz @ 802.11g)



(Plot 4.4.2 B: Channel 6: 2437MHz @ 802.11g)



(Plot 4.4.2 C: Channel 11: 2462MHz @ 802.11g)

4.4.3 802.11n HT20 Test Mode

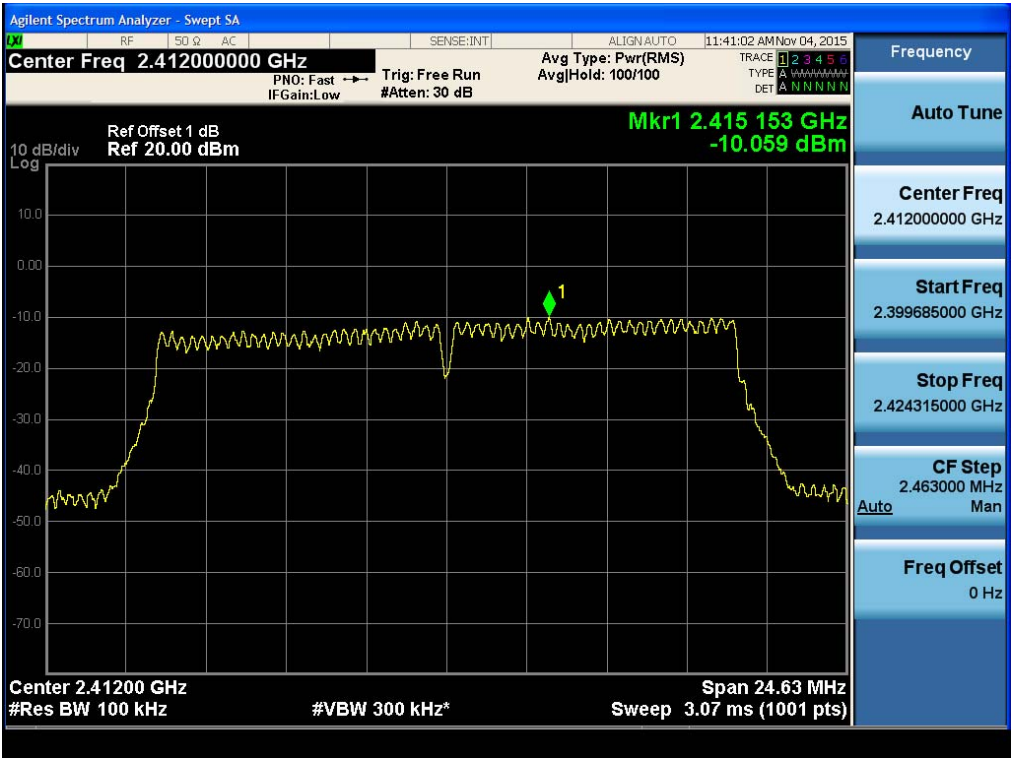
A. Test Verdict

Channel	Frequency (MHz)	Report PSD (dBm/100KHz)	Refer to Plot	Limits (dBm/3KHz)	Verdict
1	2412	-10.059	Plot 4.4.3 A	8	PASS
6	2437	-6.362	Plot 4.4.3 B	8	PASS
11	2462	-7.295	Plot 4.4.3 C	8	PASS

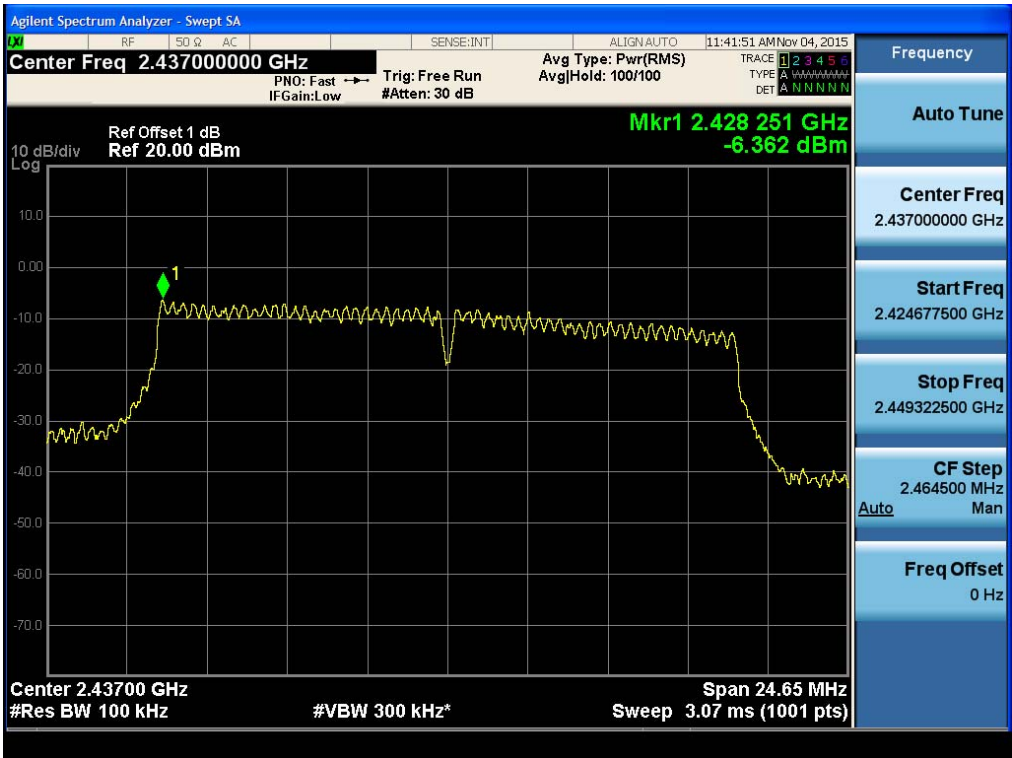
Note:

1. For 802.11n HT20 mode at final test to get the worst-case emission at 6.5Mbps.
2. The test results including the cable loss.

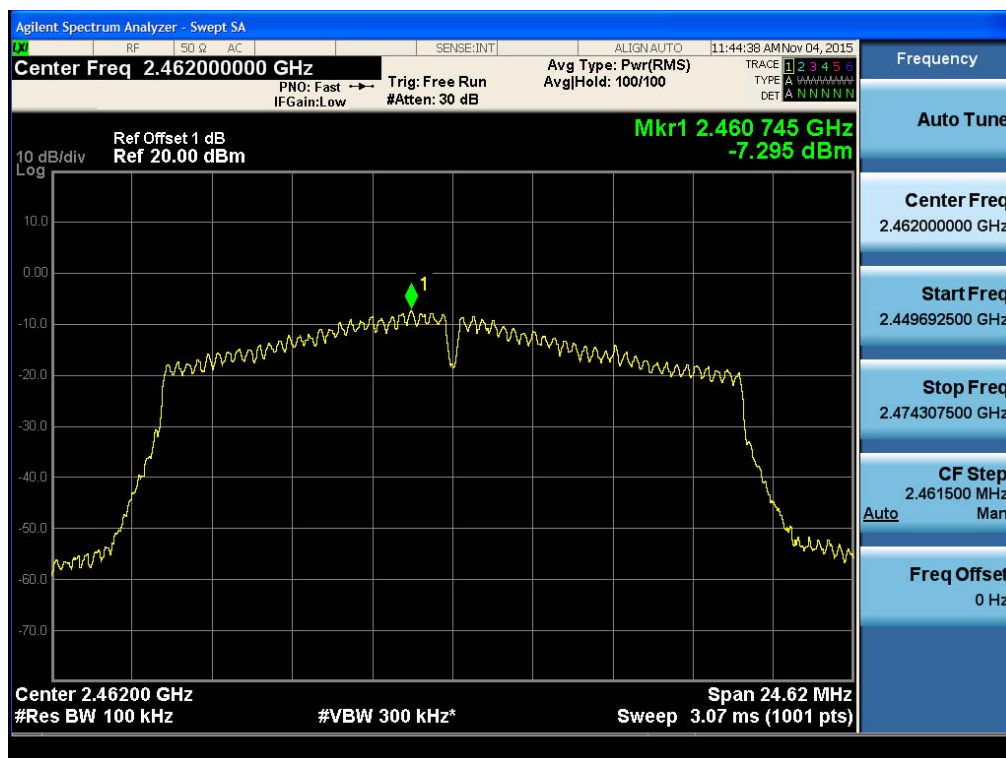
B. Test Plot



(Plot 4.4.3 A: Channel 1: 2412MHz @ 802.11n HT20)



(Plot 4.4.3 B: Channel 6: 2437MHz @ 802.11n HT20)



(Plot 4.4.3 C: Channel 11: 2462MHz @ 802.11n HT20)

4.4.4 802.11n HT40 Test Mode

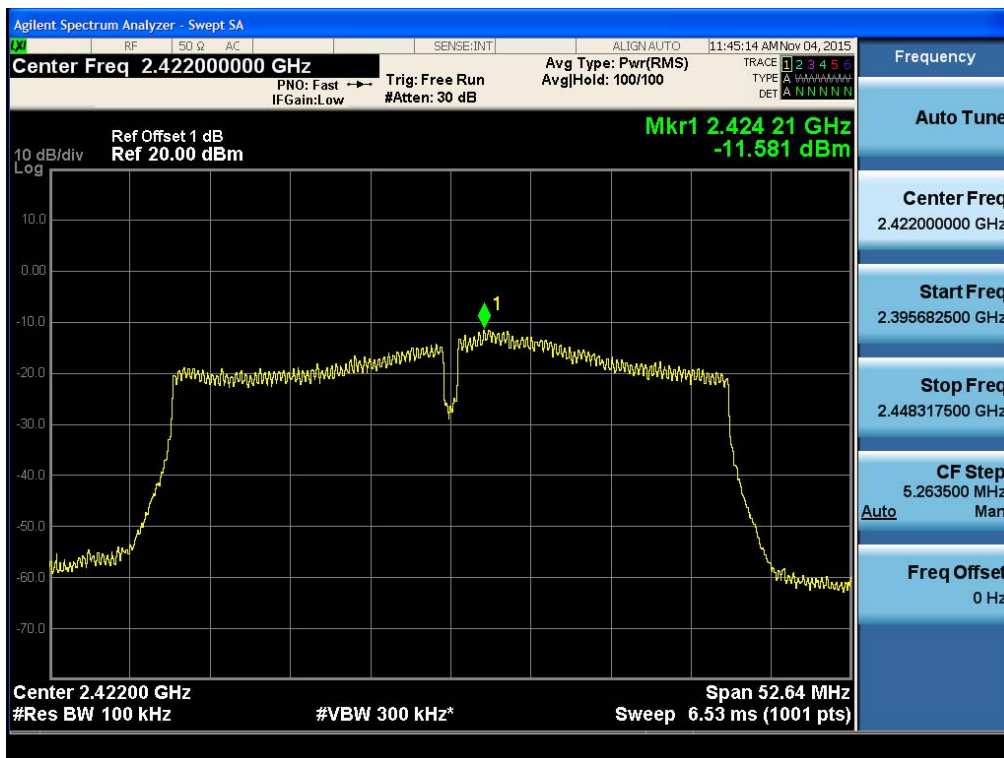
A. Test Verdict

Channel	Frequency (MHz)	Report PSD (dBm/100kHz)	Refer to Plot	Limits (dBm/3KHz)	Verdict
3	2422	-11.581	Plot 4.4.4 A	8	PASS
6	2437	-9.033	Plot 4.4.4 B	8	PASS
9	2452	-12.041	Plot 4.4.4 C	8	PASS

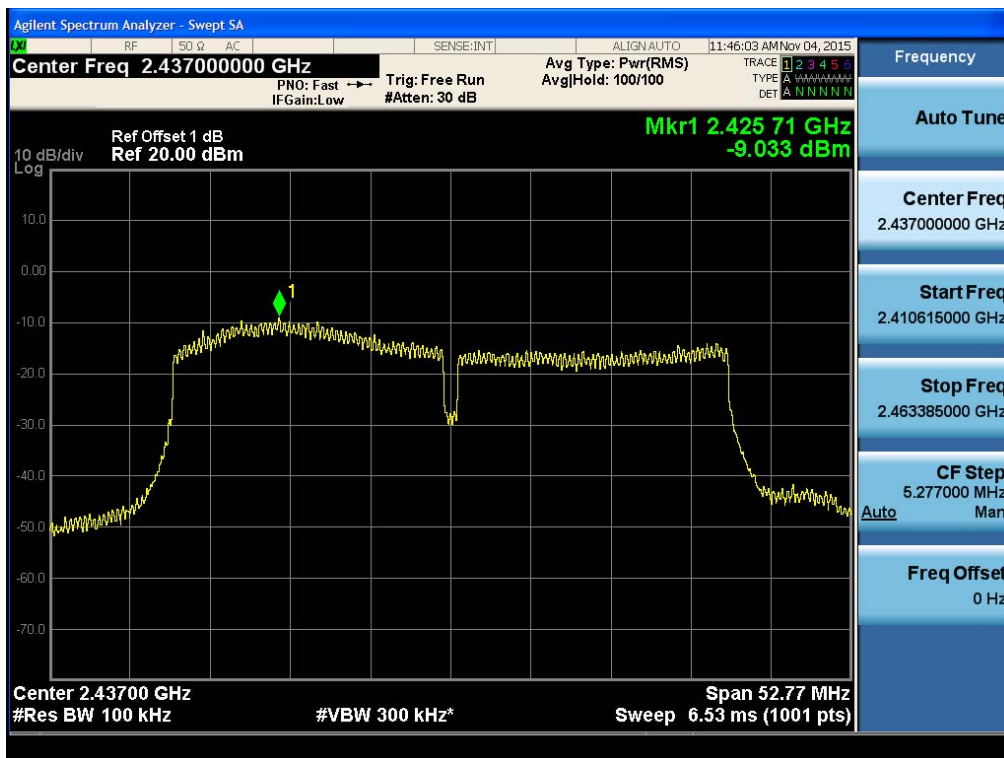
Note:

1. For 802.11n HT40 mode at final test to get the worst-case emission at 13.5Mbps.
2. The test results including the cable loss.

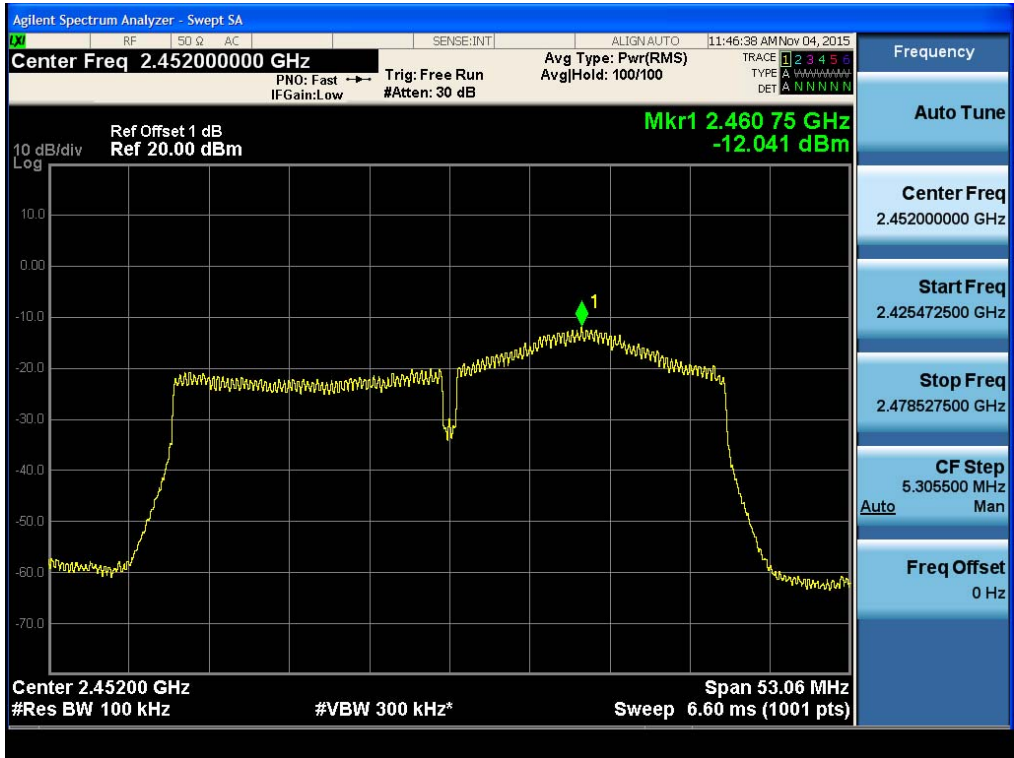
B. Test Plots



(Plot 4.4.4 A: Channel 3: 2422MHz @ 802.11n HT40))



(Plot 4.4.4 B: Channel 6: 2437MHz @ 802.11n HT40)



(Plot 4.4.4 C: Channel 9: 2452MHz @ 802.11n HT40)

4.5 Band Edge Compliance of RF Emission

TEST REQUIREMENT

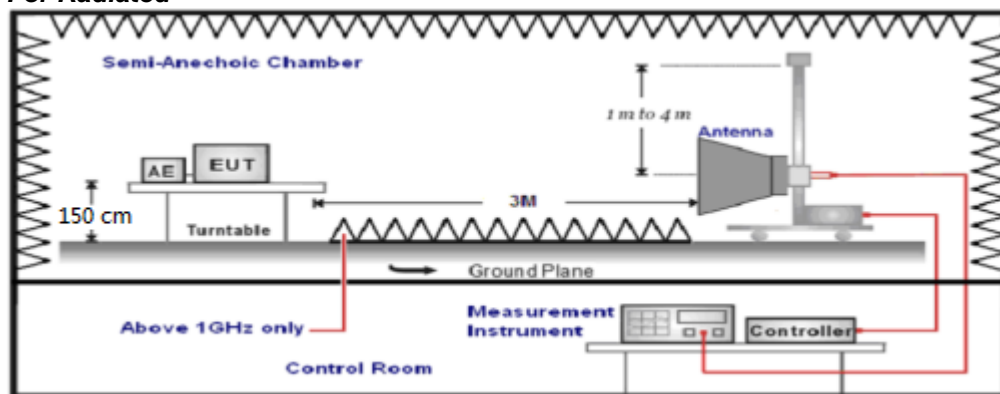
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

TEST PROCEDURE

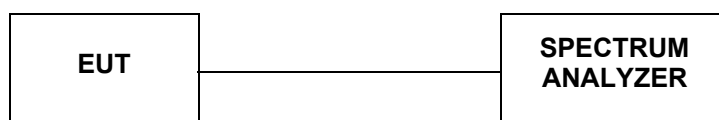
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1MHz, VBW=3MHz.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

TEST CONFIGURATION

For Radiated



For Conducted



TEST PROCEDURE

1. The EUT was placed on a turn table which is 1.50m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed..
5. The distance between test antenna and EUT was 3 meter:
6. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector
----------------------	--------------------------------	----------

1GHz-40GHz	Peak Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto	Peak (Receiver)
1GHz-40GHz	Average Value: RBW=1MHz/VBW=3MHz, Sweep time=Auto	Average (Receiver)

LIMIT

Below -20dB of the highest emission level in operating band.

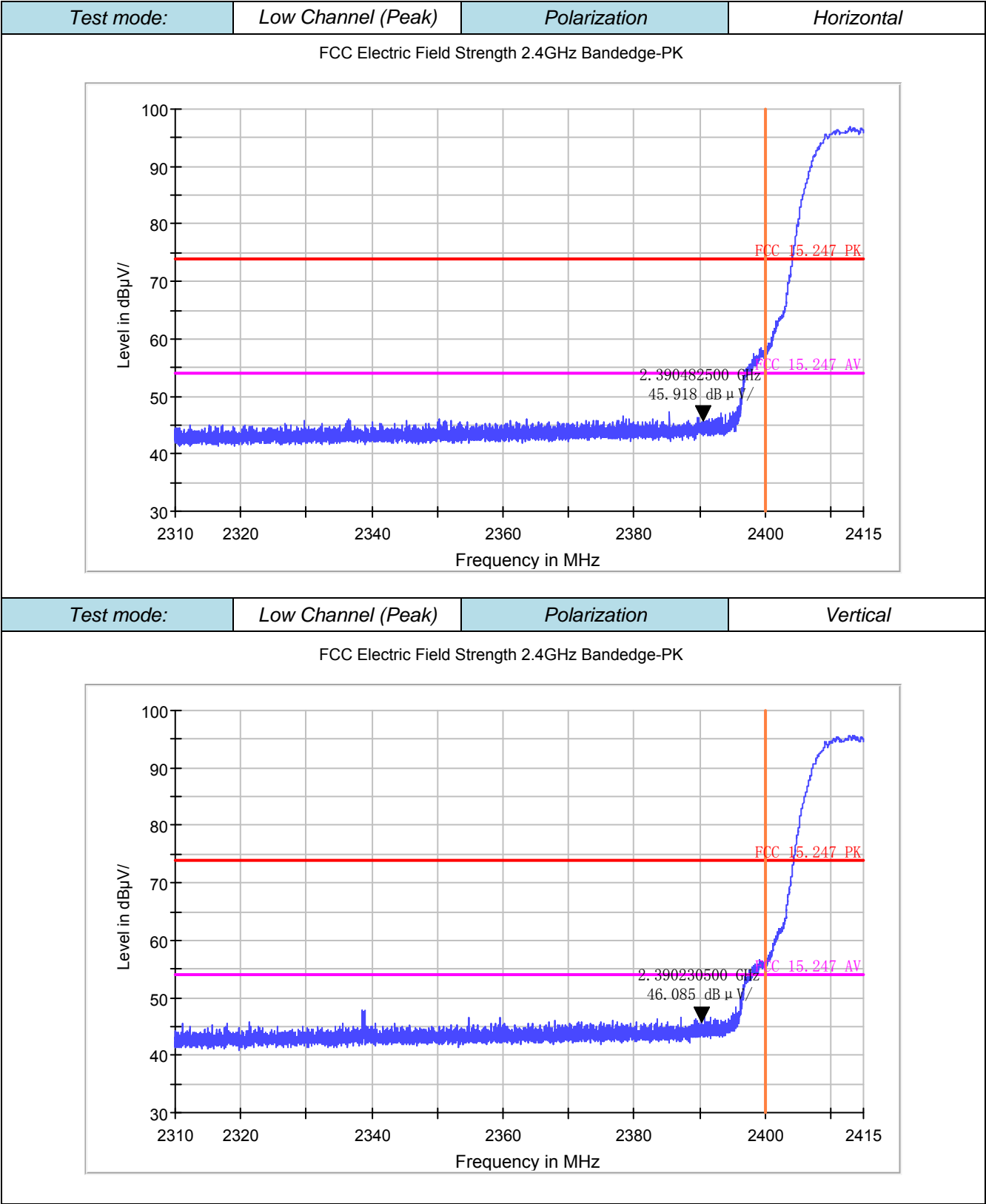
Radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)

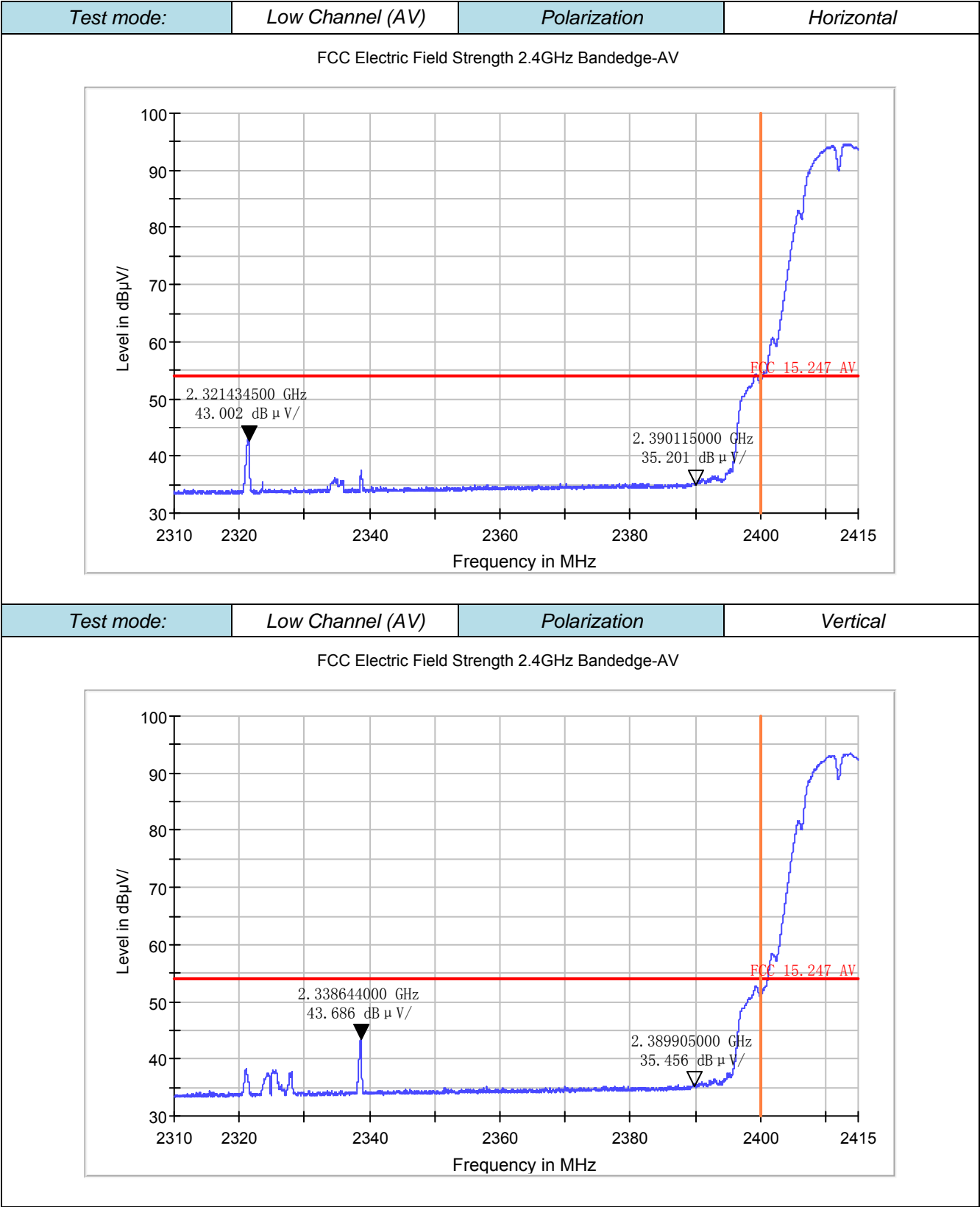
TEST RESULTS**4.5.1 For Radiated Bandedge Measurement**

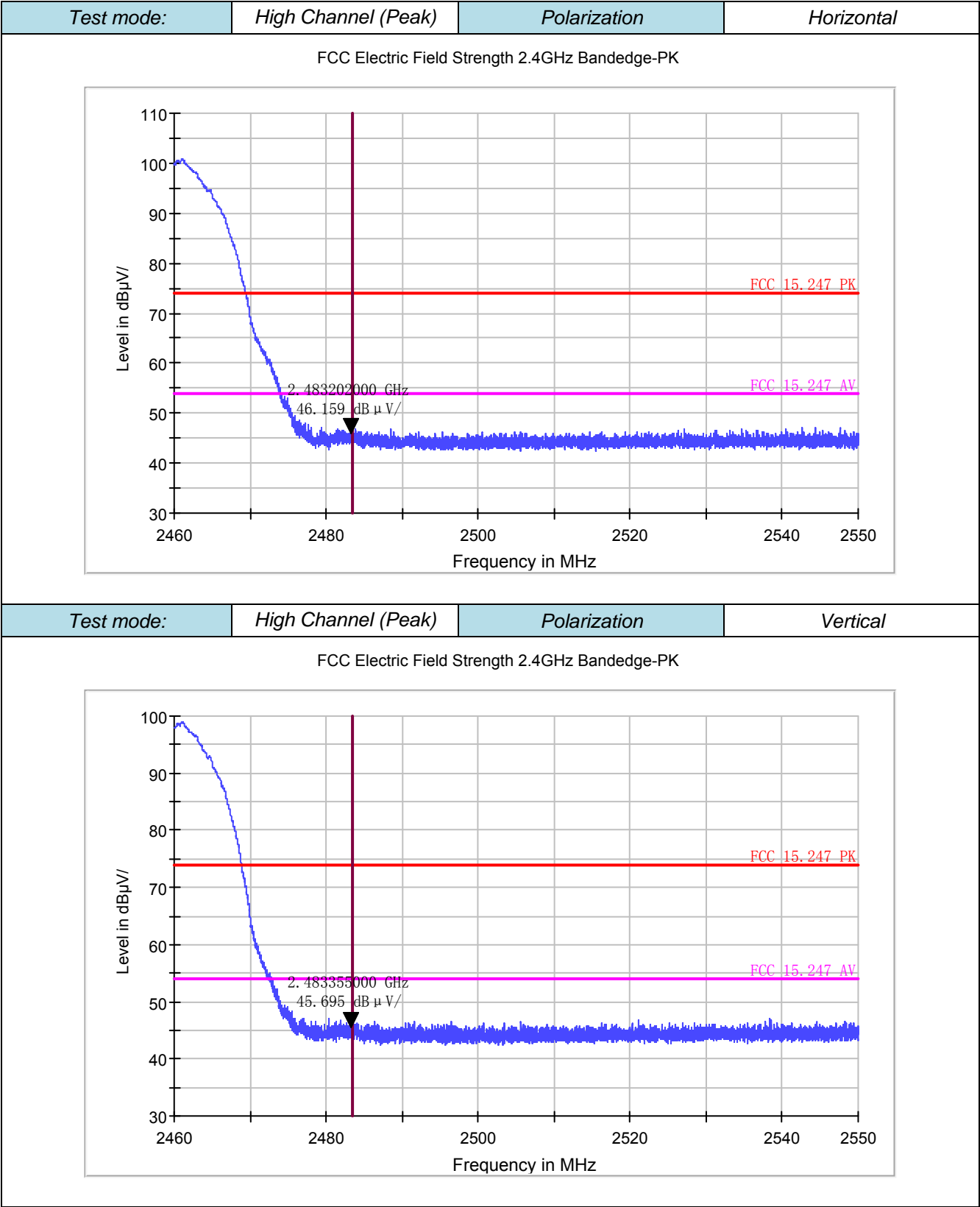
Remark:

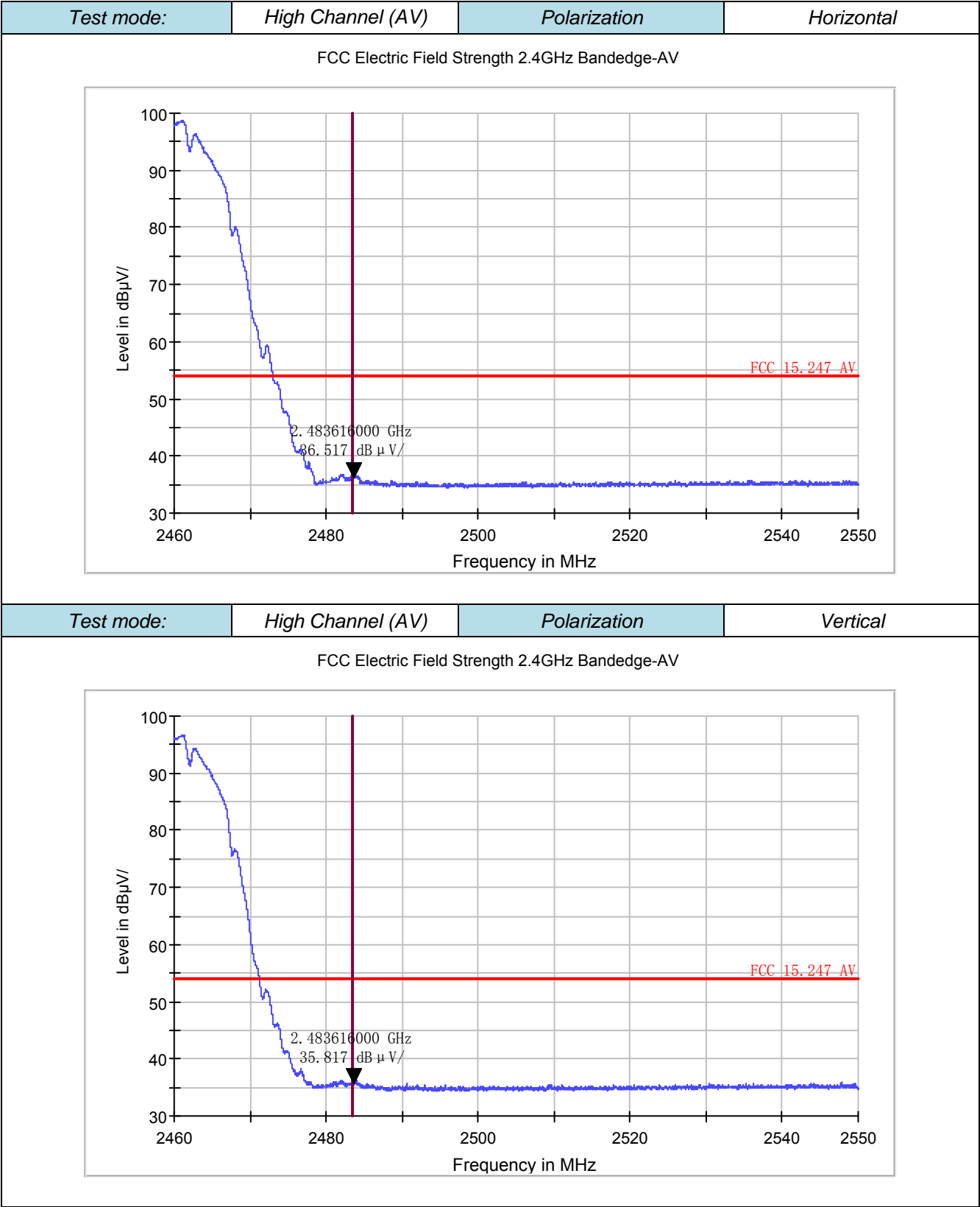
1. The Bandedge was measured at difference data rate for each mode and recorded worst case for 11g.

802.11g:





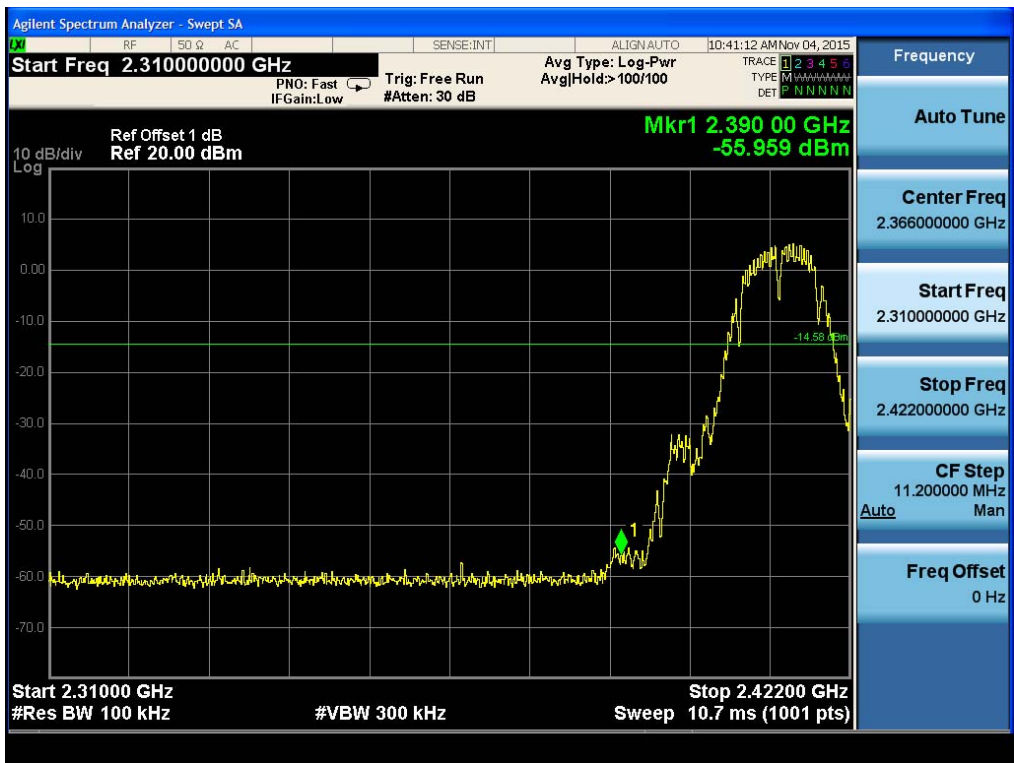




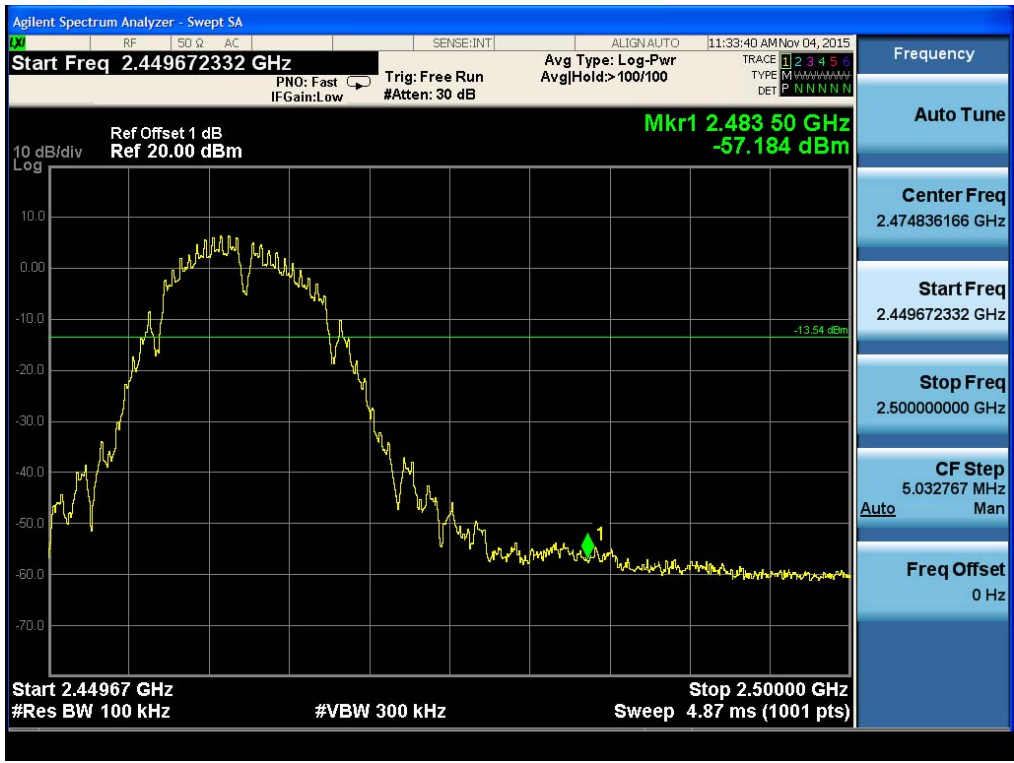
4.5.2 For Conducted Bandedge Measurement

802.11b

A. Test Plots



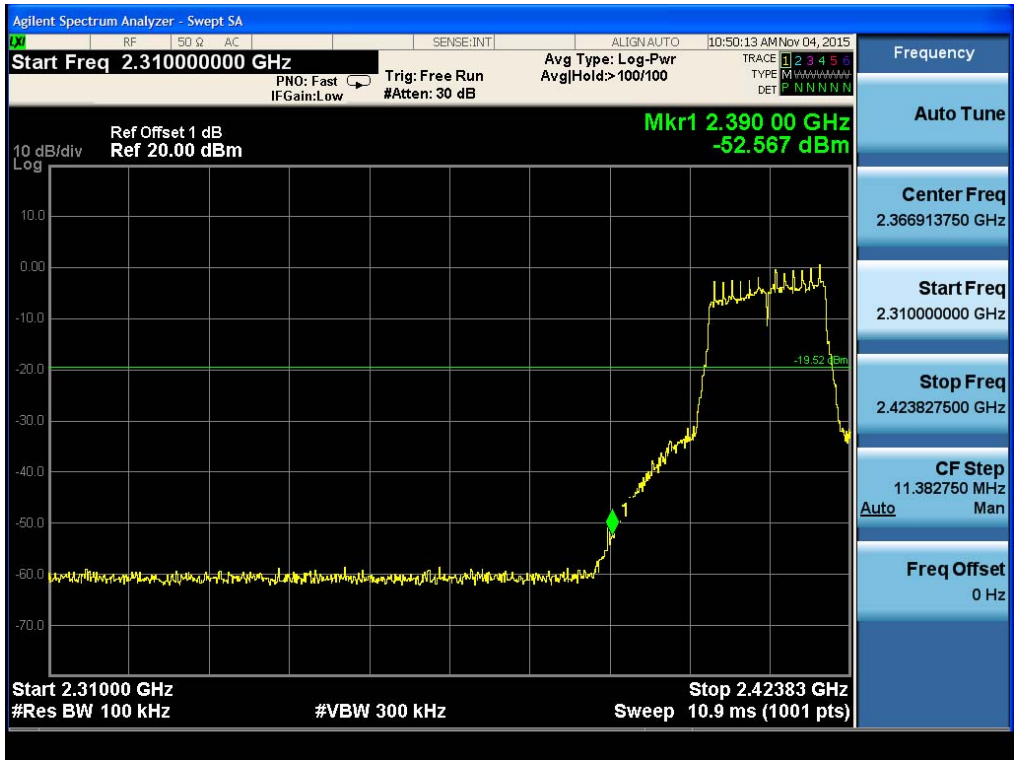
(Plot 4.5.2.1 A: Channel 01: 2412MHz @ 802.11 b)



(Plot 4.5.2.1 B: Channel 11: 2462MHz @ 802.11 b)

802.11g

A. Test Plots



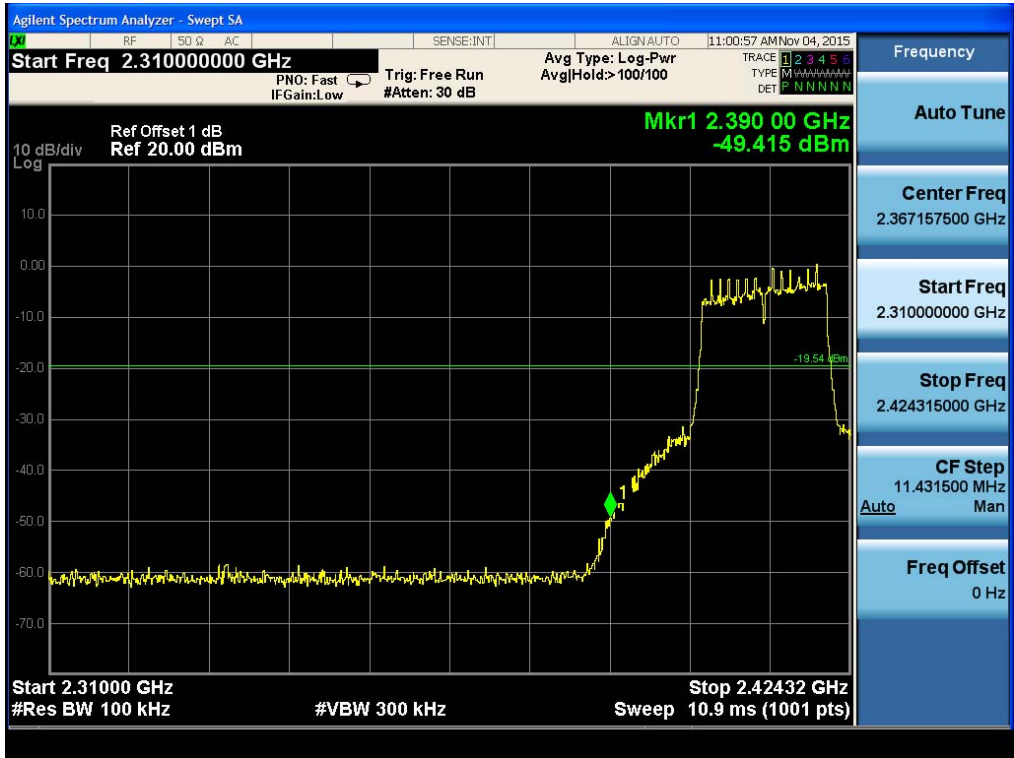
(Plot 4.5.2.2 A: Channel 01: 2412MHz @ 802.11 g)



(Plot 4.5.2.2 B: Channel 11: 2462MHz @ 802.11 g)

802.11n HT20

A. Test Plots



Plot 4.5.2.3 A: Channel 01: 2412MHz @ 802.11n HT20)



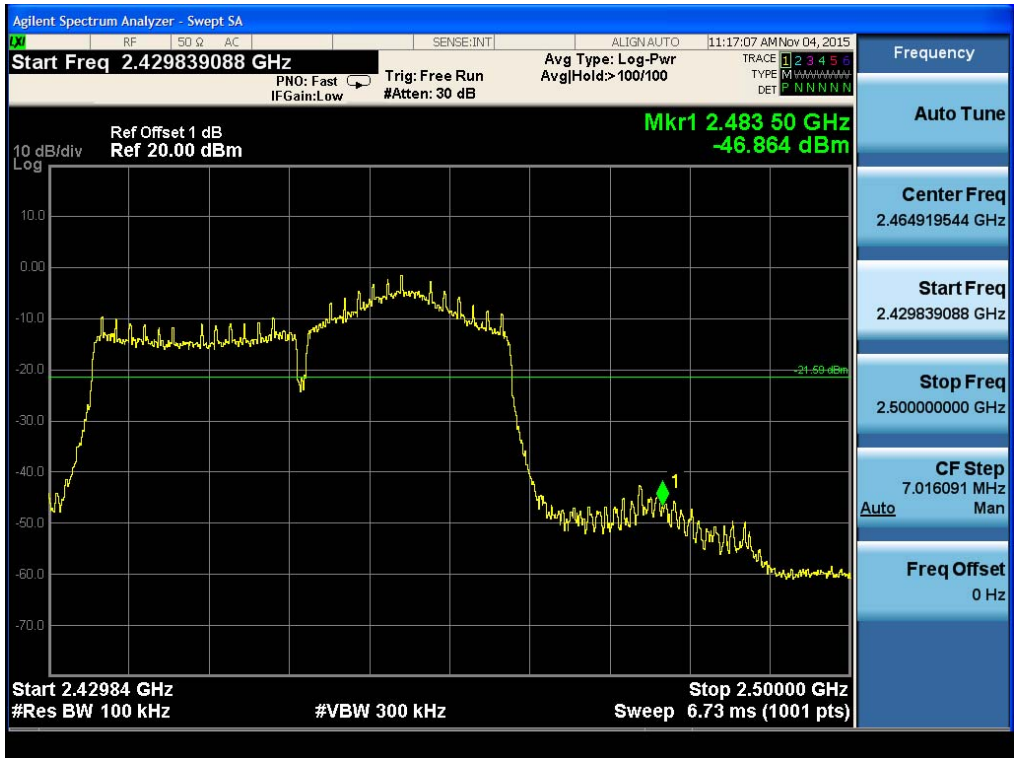
(Plot 4.5.2.3 B: Channel 11: 2412MHz @ 802.11n HT20)

802.11n HT40

A. Test Plots



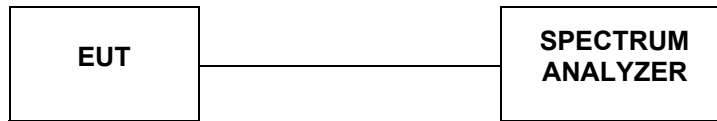
(Plot 4.5.2.4 A: Channel 3: 2422MHz@ 802.11n HT40)



(Plot 4.5.2.4 B: Channel 9: 2452MHz @ 802.11n HT40)

4.6 Spurious RF Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100 kHz and VBW= 300 KHz to measure the peak field strength, and measure frequency range from 9 KHz to 26.5GHz.

LIMIT

1. Below -20dB of the highest emission level in operating band.
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

TEST RESULTS

Remark: The measurement frequency range is from 9 KHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandedge measurement data.

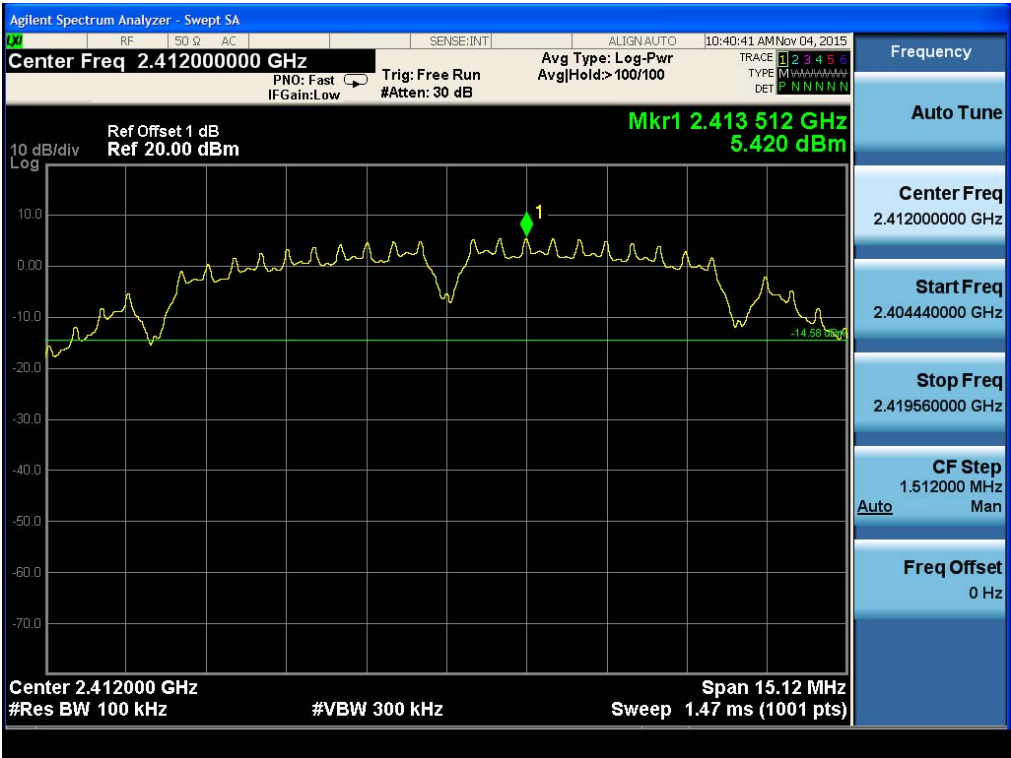
4.6.1 802.11b Test Mode

A. Test Verdict

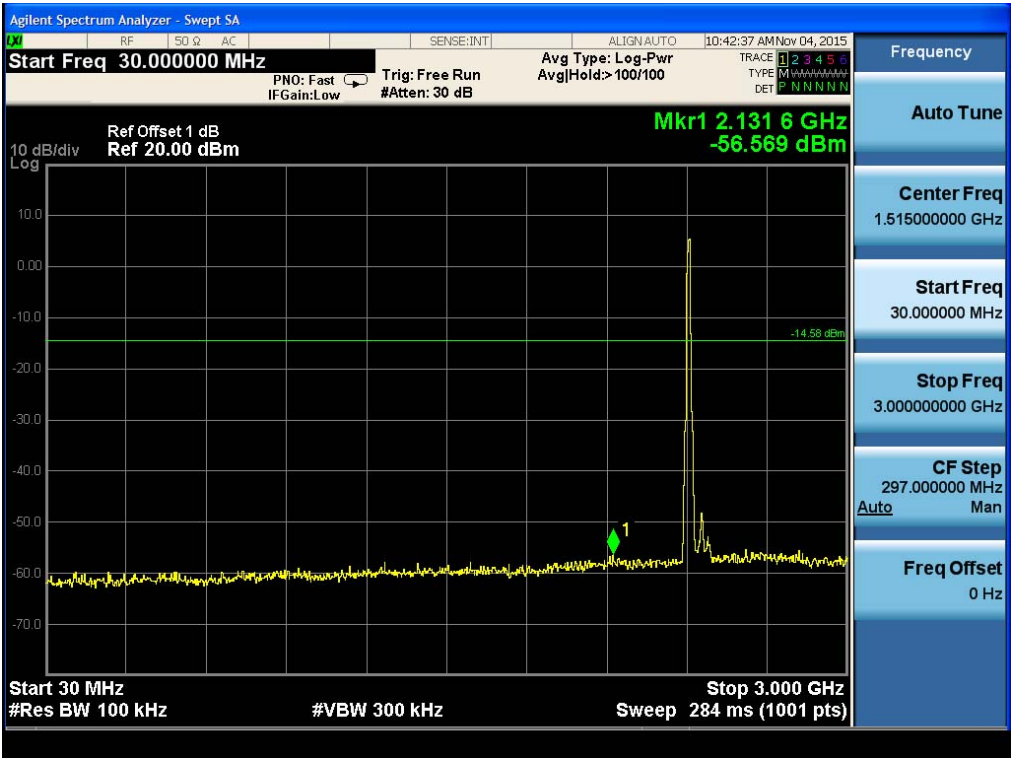
Channel	Frequency (MHz)	Frequency Range	Refer to Plot	Limit (dBc)	Verdict
1	2412	2.412 GHz	Plot 4.6.1 A1	---	PASS
		30MHz -3GHz	Plot 4.6.1 A2	-20	PASS
		3GHz-.5 GHz	Plot 4.6.1 A3	-20	PASS
		3GHz-.10 GHz	Plot 4.6.1 A4		
		10GHz-.15 GHz	Plot 4.6.1 A5		
		15GHz-.25 GHz	Plot 4.6.1 A6		
6	2437	2.437 GHz	Plot 4.6.1 B1	---	PASS
		30MHz -26GHz	Plot 4.6.1 B2	-20	PASS
		3GHz-26.5 GHz	Plot 4.6.1 B3	-20	PASS
		3GHz-.10 GHz	Plot 4.6.1 B4		
		10GHz-.15 GHz	Plot 4.6.1 B5		
		15GHz-.25 GHz	Plot 4.6.1 B6		
11	2462	2.462 GHz	Plot 4.6.1 C1	---	PASS
		30MHz -26GHz	Plot 4.6.1 C2	-20	PASS
		3GHz-26.5 GHz	Plot 4.6.1 C3	-20	PASS
		3GHz-.10 GHz	Plot 4.6.1 C4		
		10GHz-.15 GHz	Plot 4.6.1 C5		
		15GHz-.25 GHz	Plot 4.6.1 C6		

Note:

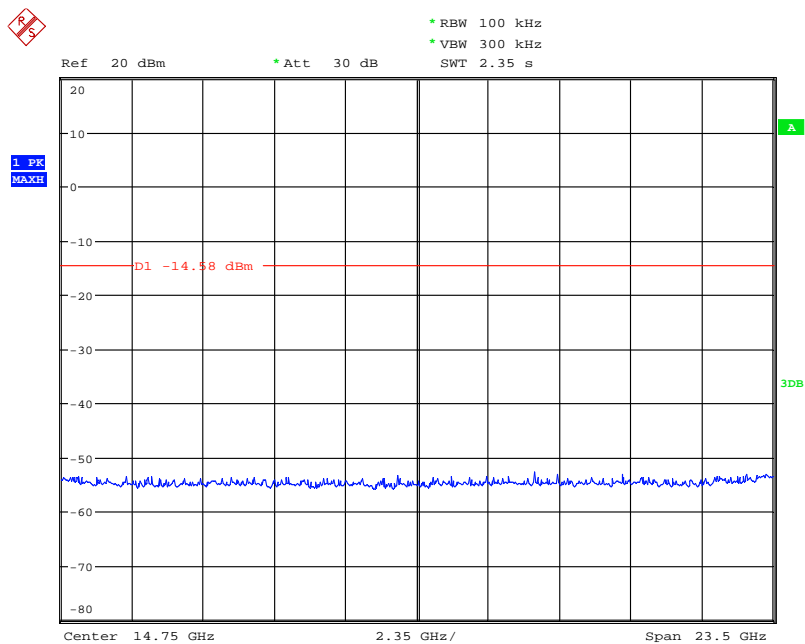
1. For 802.11b mode at final test to get the worst-case emission at 1Mbps.
2. The test results including the cable loss.
3. For 9KHz -30MHz, Because there was only background, So We did not record data.



(Plot 4.6.1 A1: Channel 1: 2412MHz @ 802.11b)



(Plot 4.6.1 A2: Channel 1: 2412MHz @ 802.11b)

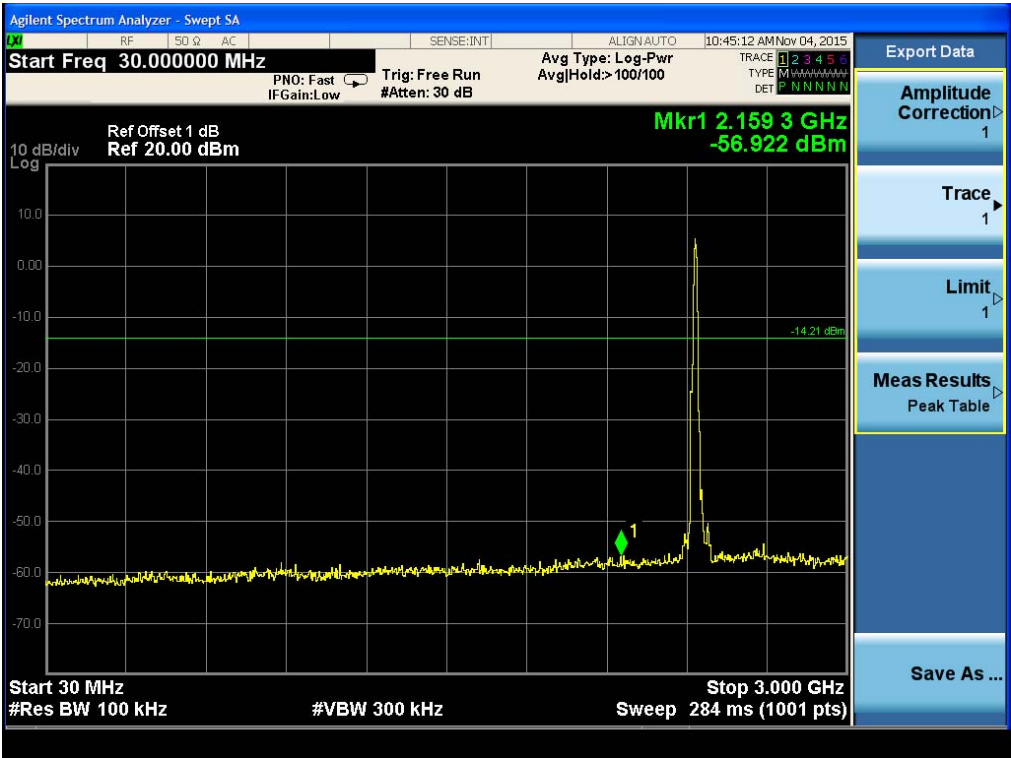


Date: 6.NOV.2015 04:15:18

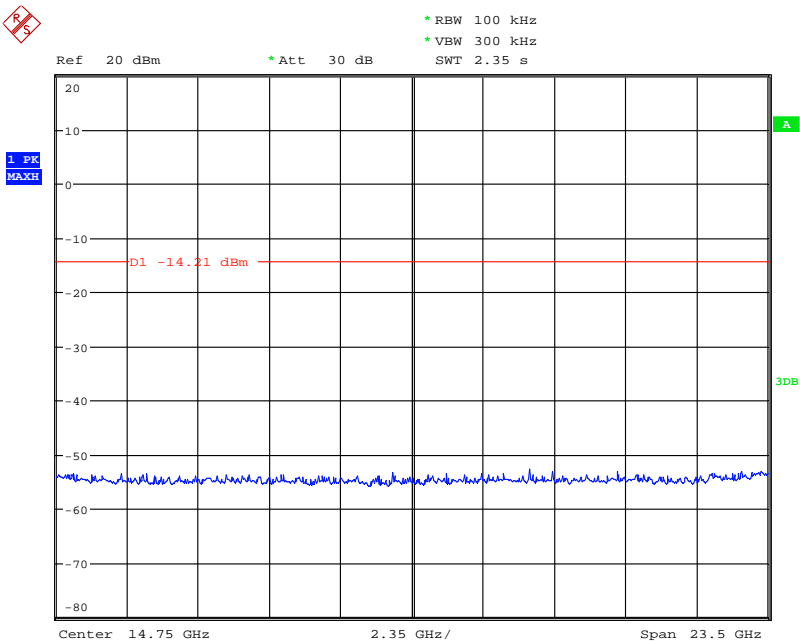
(Plot 4.6.1 A3: Channel 1: 2412MHz @ 802.11b)



(Plot 4.6.1 B1: Channel 6: 2437MHz @ 802.11b)



(Plot 4.6.1 B2: Channel 6: 2437MHz @ 802.11b)

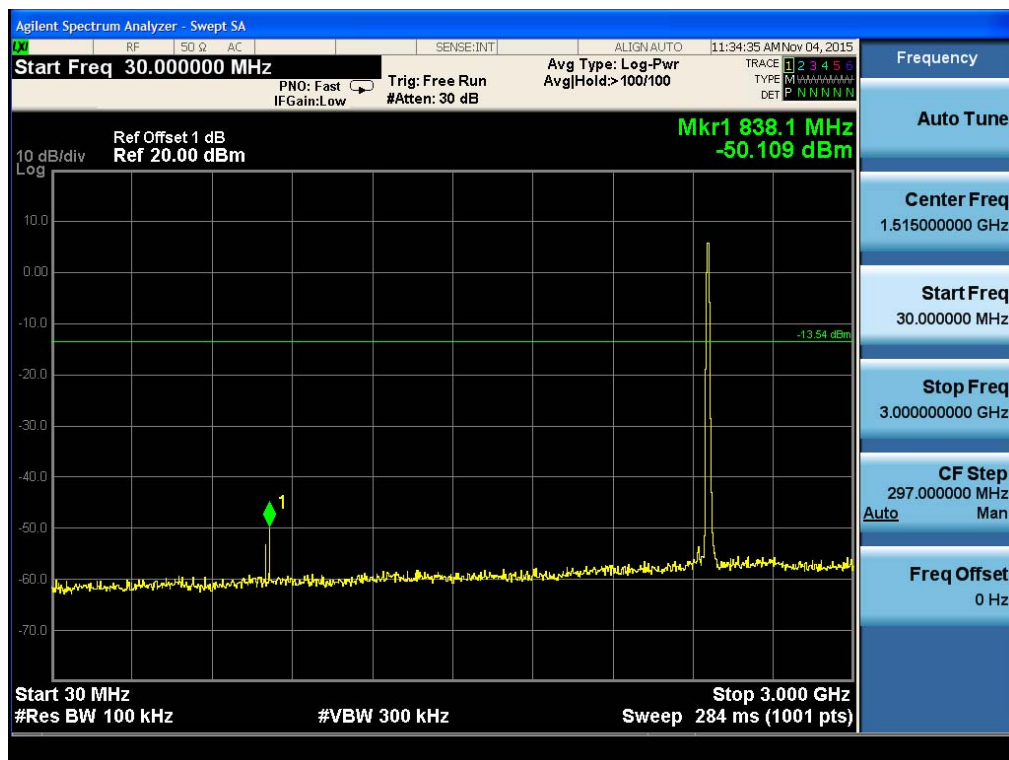


Date: 6.NOV.2015 04:15:35

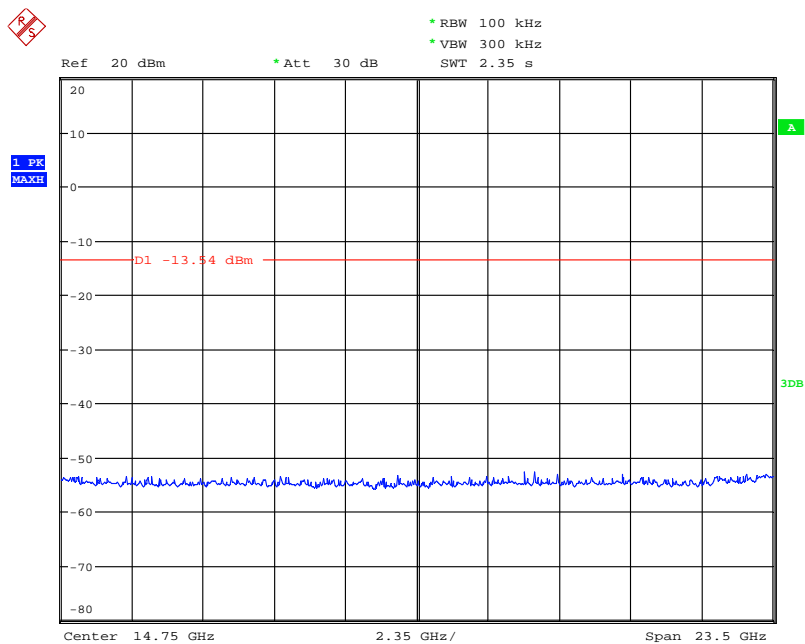
(Plot 4.6.1 B3: Channel 6: 2437MHz @ 802.11b)



(Plot 4.6.1 C1: Channel 11: 2462MHz @ 802.11b)



(Plot 4.6.1 C2: Channel 11: 2462MHz @ 802.11b)



Date: 6.NOV.2015 04:16:00

(Plot 4.6.1 C3: Channel 11: 2462MHz @ 802.11b)

4.6.2 802.11g Test Mode

A. Test Verdict

Channel	Frequency (MHz)	Frequency Range	Refer to Plot	Limit (dBc)	Verdict
1	2412	2.412 GHz	Plot 4.6.2 A1	---	PASS
		30MHz -3GHz	Plot 4.6.2 A2	-20	PASS
		3GHz-.5 GHz	Plot 4.6.2 A3	-20	PASS
		3GHz-.10 GHz	Plot 4.6.2 A4	-20	PASS
		10GHz-.15 GHz	Plot 4.6.2 A5	-20	PASS
		15GHz-.25 GHz	Plot 4.6.2 A6	-20	PASS
6	2437	2.437 GHz	Plot 4.6.2 B1	---	PASS
		30MHz -3GHz	Plot 4.6.2 B2	-20	PASS
		3GHz-.5 GHz	Plot 4.6.2 B3	-20	PASS
		3GHz-.10 GHz	Plot 4.6.2 B4	-20	PASS
		10GHz-.15 GHz	Plot 4.6.2 B5	-20	PASS
		15GHz-.25 GHz	Plot 4.6.2 B6	-20	PASS
11	2462	2.462 GHz	Plot 4.6.2 C1	---	PASS
		30MHz -3GHz	Plot 4.6.2 C2	-20	PASS
		3GHz-.5 GHz	Plot 4.6.2 C3	-20	PASS
		3GHz-.10 GHz	Plot 4.6.2 C4	-20	PASS
		10GHz-.15 GHz	Plot 4.6.2 C5	-20	PASS
		15GHz-.25 GHz	Plot 4.6.2 C6	-20	PASS

Note:

1. For 802.11g mode at final test to get the worst-case emission at 6Mbps.
2. The test results including the cable lose.
3. For 9KHz -30MHz, Because there was only background, So We did not recorded data.

B. Test Plots



(Plot 4.6.2 A1: Channel 1: 2412MHz @ 802.11g)