

FCC PART 15 SUBPART C TEST REPORT

FCC PART 15.247

	1001 AN1 13.247				
Report Reference No	MWR1411000405				
FCC ID	RQQHLT-E425				
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Date of issue	Nov 19, 2014				
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Address	Room 509, Hongfa center building Guangdong, China	, Baoan District, Shenzhen,			
Testing Laboratory Name	Shenzhen CTL Testing Technol	ogy Co., Ltd.			
Address:	Floor 1-A, Baisha Technology Par Nanshan,Shenzhen,China	k, No. 3011, Shahexi Road,			
Applicant's name	HYUNDAI CORPORATION				
Address	140-2, Kye-dong, Chongro-ku, Se	oul, South Korea			
Test specification:					
Standard:	FCC Part 15.247: Operation wit 2400-2483.5 MHz and 5725-5850				
TRF Originator	Maxwell International Co., Ltd.				
Master TRF	Dated 2011-05				
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This publication may be reproduced in Maxwell International Co., Ltd. as copy Maxwell International Co., Ltd. takess r resulting from the reader's interpretatio	right owner and source of the mate no responsibility for and will not ass	rial. ume liability for damages			
Test item description	Mobile Phone				
Trade Mark	HYUNDAI				
Manufacturer	WASAM TECHNOLOGY (SHEN 2	ZHEN) CO.,LTD.			
Model/Type reference:	E425				
Listed Models	E420				
Modulation Type:	DSSS(CCK,DQPSK,DBPSK),OFE BPSK)	DM(64QAM,16QAM,QPSK,			
Operation Frequency	From 2412MHz to 2462MHz				
Rating	DC 3.70V				
Hardware version	DR315 V0.1				
Software version:	S11P_HS_W412_HYUNDAI_B24 22_64P8_32P8_FWVGA_W25[D] 2				
Result	PASS				



TEST REPORT

Test Report No. :		MWR1411000405	Nov 19, 2014
			Date of issue
Equipment under Test	:	Mobile Phone	
Model /Type	:	E425	
Listed Models	:	E420	
Applicant	:	HYUNDAI CORPORATI	ON
Address	:	140-2, Kye-dong, Chong	ro-ku, Seoul, South Korea
Manufacturer		WASAM TECHNOLOG	((SHEN ZHEN) CO.,LTD.
Address	:		g Industrial Park), Bogang Taifeng Town, Bao'an District, Shenzhen,

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.



4.4.

4.5.

4.6.

4.7.

4.8.

<u>5.</u>

Power Spectral Density

Antenna Requirement

6dB Bandwidth

Band Edge Compliance of RF Emission

Spurious RF Conducted Emission

23

32

46

62

71

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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: American National Standard for Testing Unlicensed Wireless Devices

<u>KDB558074 D01 V03:</u> Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247



2. <u>SUMMARY</u>

2.1. General Remarks

Date of receipt of test sample	:	Oct 10, 2014
Testing commenced on	:	Oct 11, 2014
Testing concluded on	:	Nov 17, 2014

2.2. Product Description

The **HYUNDAI CORPORATION**'s Model: E425 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	Mobile Phone
Model Number	E425
FCC ID	RQQHLT-E425
Modilation Type	GMSK for GSM/GPRS;QPSK for WCDMA
Antenna Type	Internal
GSM/EDGE/GPRS	Supported GPRS
Extreme temp. Tolerance	-30°C to +50°C
Extreme vol. Limits	3.40VDC to 4.20VDC (nominal: 3.70VDC)
GSM Operation Frequency Band	GSM 850MHz/ PCS 1900MHz
GSM Release Version	R99
GPRS operation mode	Class B
GPRS Multislot Class	12
EGPRS Multislot Class	Only support downlink mode

2.3. Equipment Under Test

Power supply system utilised

Power supply voltage	:	0	120V / 60 Hz	0	115V / 60Hz
		0	12 V DC	0	24 V DC
		•	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

E425 is subscriber equipment in the WCDMA/GSM system. The HSPA/UMTS frequency band is Band II, Band V; The GSM/GPRS/EDGE (EDGE downlink only) frequency and 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 Mobile Phone implements such functions as RF signal receiving/transmitting, HSPA/UMTS and GSM/GPRS/EDGE protocol processing, voice, video MMS service, GPS, AGPS 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		
Test Case	Configuration	Description	
DTS (6 dB) Bandwidth	Measurement Method	FCC KDB 558074 §7.1.10ption2.	
	Test Environment	NTNV	
		11b_L,11b_M,11b_H	
	FUT Configuration	11g_L,11g_M,11g_H	
	EUT Configuration	11n HT20_L, 11n HT20_M, 11n HT20_H	
		11n HT40_L, 11n HT40_M, 11n HT40_H	
	Measurement Method	FCC KDB 558074§7.2.1.1	
	Test Environment NTNV		
Maximum Peak Conducted Output	Test Setup	Test Setup 1	
Power		11b_L,11b_M,11b_H	
Fower	EUT Configuration	11g_L,11g_M,11g_H	
	EOT Configuration	11n HT20_L, 11n HT20_M, 11n HT20_H	
		11n HT40_L, 11n HT40_M, 11n HT40_H	
	Measurement Method	FCC KDB 558074 §7.3.1Option 1 (peak	
	Measurement Method	PSD).	
Maximum Power Spectral Density	Test Environment	NTNV	
Level		11b_L,11b_M,11b_H	
Level	EUT Configuration	11g_L,11g_M,11g_H	
	EOT Configuration	11n HT20_L, 11n HT20_M, 11n HT20_H	
		11n HT40_L, 11n HT40_M, 11n HT40_H	
	Measurement Method	FCC KDB 558074§7.4.1, use Peak PSD.	
	Test Environment	NTNV	
Unwanted Emissions into Non-	Test Setup	Test Setup 1	
Restricted Frequency Bands		11b_L,11b_M,11b_H	
	EUT Configuration	11g_L,11g_M,11g_H	
	Lor configuration	11n HT20_L, 11n HT20_M, 11n HT20_H	
		11n HT40_L, 11n HT40_M, 11n HT40_H	
	Measurement Method	FCC KDB 558074§7.4.2, Conducted	
		(antenna-port).	
Unwanted Emissions into Restricted	Test Environment	NTNV	
Frequency Bands (Conducted)		11b_L,11b_M,11b_H	
	EUT Configuration	11g_L,11g_M,11g_H	
	g	11n HT20_L, 11n HT20_M, 11n HT20_H	
· · · · · · · · · · · · · · · · · · ·		11n HT40_L, 11n HT40_M, 11n HT40_H	
Unwanted Emissions into	Measurement Method	FCC KDB	
Restricted		558074§7.4.2,Radiated(cabinet/case	
		emissions with	
		Impedance matching for antenna-port).	
	Test Environment	NTNV	
		11b_L,11b_M,11b_H	
	EUT Configuration	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			
Test Case	Configuration	Description		
AC Power Line Conducted	Measurement Method	AC mains conducted.		
Emissions	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 802.11mode 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 date of MCS0 and bandwidth of 20MHz using SISO mode.
11n HT40	IEEE 802.11n with data date 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]
		BG 1	Ch No. 1 /		20
	L	BG2	2412MHz		20
11b	М	BG 1	Ch No. 6 / 2437		20
dit	IVI	BG2	MHz		20
	Н	BG 1	Ch No. 11/		20
		BG2	2462MHz		20
	1	BG 1	Ch No. 1 /		20
	L	BG2	2412MHz		20
110	М	BG 1	Ch No. 6 / 2437		20
11g	IVI	BG2	MHz		20
	Н	BG 1	Ch No. 11/		20
		BG2	2462MHz		20
	L	BG 1	Ch No. 1 /		20
		BG2	2412MHz		20
11n HT20	M	BG 1	Ch No. 6 / 2437		20
11111120		BG2	MHz		20
		BG 1	Ch No. 11/		20
		BG2	2462MHz		20
	1	BG 1	Ch No. 3/		40
	L	BG2	2422MHz		40
	NA	BG 1	Ch No. 6 / 2437		40
11n HT40	М	BG2	MHz		40
		BG 1	Ch No. 9/ 2452		40
	Н	BG2	MHz		40

2.7. EUT configuration

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

- - supplied by the manufacturer
- \bigcirc supplied by the lab

0	Power Cable	Length (m) :	/
		Shield :	/
		Detachable :	/
Ο	Multimeter	Manufacturer :	/
		Model No. :	1



2.8. Internal Identification of AE used during the test

AE ID*	Description
AE1	Charger

AE1

Model: E425 INPUT: 100-300V 50/60HZ 0.15A OUTPUT: DC 5.0V,500mAh

*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: RQQHLT-E425 filing to comply with Section 15.247 of the FCC Part 15, Subpart C 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	3.7VDC	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	\checkmark	—	—	—		
802.11g	\checkmark	—	—	—		
802.11n HT20	\checkmark	—	—	—		
802.11n HT40	\checkmark	—	—	—		

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 CTL Testing Technology Co., Ltd.

Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen, China The sites are constructed in conformance with the requirements of ANSI C63.7, 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 No.: 970318

Shenzhen CTL Testing Technology Co., Ltd. has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 970318, Dec 19, 2013

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:< 30dBm – (G[dBi] –6 [dB]),peak; Otherwise :< 30dBm, peak.	PASS
Maximum Power Spectral Density Level	15.247(e)	For directional gain :< 8dBm/3 kHz – (G[dBi] –6[dB]), peak. Otherwise :< 8dBm/3 kHz, peak.	PASS
Band Edges Compliance	15.247(d)	< -20dBr/100 kHz if total peak power ≤power limit.	PASS
Unwanted Emissions into Non- Restricted Frequency Bands	15.247(d)	< -20dBr/100 kHz if total peak power ≤power limit.	PASS
Unwanted Emissions into Restricted Frequency Bands (Conducted)	15.247(d) 15.209	< -20dBr/100 kHz if total peak power ≤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. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may



result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen CTL Testing Technology Co., Ltd. is reported:

Test Items	Measurement Uncertainty	Notes
Frequency stability	25 Hz	(1)
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	1.60 dB	(1)
Radiated spurious emission 9KHz-12.75 GHz	2.20 dB	(1)
Conducted Emission 9KHz-30MHz	3.39 dB	(1)
Radiated Emission 9KHz-30MHz	2.88 dB	(1)
Radiated Emission 30~1000MHz	4.24 dB	(1)
Radiated Emissio 1~18GHz	5.16 dB	(1)
Radiated Emissio 18-40GHz	5.54 dB	(1)
Occupied Bandwidth		(1)
Emission Mask		(1)
Modulation Characteristic		(1)
Transmitter Frequency Behavior		(1)

3.6. Equipments Used during the Test

AC Po	AC Power Conducted Emission						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.		
1	Artificial Mains	Rohde&Schwarz	ENV216	101316	2014/07/02		
2	EMI Test Receiver	Rohde&Schwarz	ESCI3	103710	2014/07/02		
3	Pulse Limiter	Com-Power	LIT-153	53226	2014/07/01		
4	EMI Test Software	Rohde&Schwarz	ES-K1 V1.71	N/A	N/A		
5	RF Cable4	/	Cable000001	/	2014/07/06		

Radia	Radiated Emission					
Item	Test Equipment Manufacturer		Model No.	Serial No.	Last Cal.	
1	Bilog Antenna	Sunol Sciences Corp.	JB1	A061713	2014/07/12	
2	EMI TEST Receivcer	Rohde&Schwarz	ESCI3	103710	2014/07/02	
3	EMI TEST Software	Audix	E3	N/A	N/A	
4	EMI TEST Software	Rohde&Schwarz	ESK1	N/A	N/A	
5	HORN ANTENNA	Sunol Sciences Corp.	DRH-118	A062013	2014/07/12	
6	Amplifer	HP	8447D	3113A07663	2014/10/26	
7	Preamplifier	HP	8349B	3155A00882	2014/07/03	
8	Amplifer	Compliance Direction systems	PAP1-4060	129	2014/07/03	
9	Loop Antenna	Rohde&Schwarz	HFH2-Z2	100020	2014/06/29	
10	TURNTABLE	MATURO	TT2.0		N/A	
11	ANTENNA MAST	MATURO	TAM-4.0-P		N/A	
12	Horn Antenna	SCHWARZBECK	BBHA9170	25849	2014/06/21	
13	Spectrum Analyzer	Rohde&Schwarz	FSU26	201148	2014/07/02	
14	RF Cable 5	/	Cable000005	/	2014/07/06	
15	RF Cable 6	/	Cable000006	/	2014/07/06	

Maxin	Maximum Peak Output Power / Power Spectral Density / 6dB Bandwidth / Band Edge Compliance of RF						
Emiss	Emission / Spurious RF Conducted Emission						
Item	em Test Equipment Manufacturer Model No. Serial No. Last Cal.						
1	Spectrum Analyzer	Rohde&Schwarz	FSU26	201148	2014/07/02		
2	Power Sensor	Rohde&Schwarz	NRR-Z81	256697	2014/07/02		
3	MXA Signal Analyzer Agilent N9020A MY53420615 2014/05/12						
4	RF Cable1	/	Cable000001	/	2014/07/06		

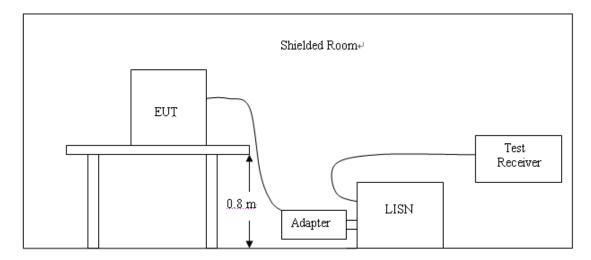
The Cal.Interval was one year



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 C63.10-2009.
- 2. Support equipment, if needed, was placed as per ANSI C63.10-2009
- 3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2009
- 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:

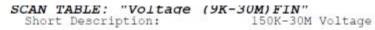
Fraguanay	Maximum RF Line Voltage (dBµV)				
Frequency (MHz)	CLASS A		CLASS B		
(11172)	Q.P.	Ave.	Q.P.	Ave.	
0.15 - 0.50	79	66	66-56*	56-46*	
0.50 - 5.00	73	60	56	46	
5.00 - 30.0	73	60	60	50	

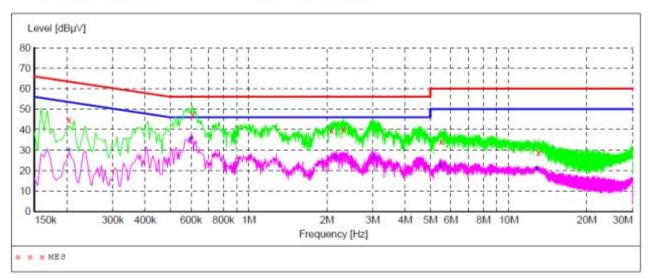
* Decreasing linearly with the logarithm of the frequency

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.







MEASUREMENT RESULT:

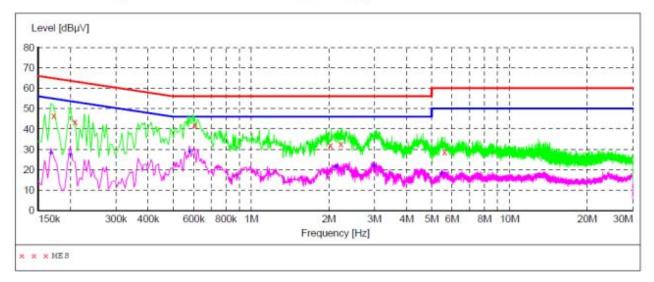
Frequency MHz	Level dBµV	Transd dB	Limit dBµV		Detector	Line	PE
0.204000	44.70	10.4	63.4	18.7	QP	L1	GND
0.609000	47.00	10.3	56.0	9.0	QP	L1	GND
2.085000	39.50	10.3	56.0	16.5	QP	L1	GND
2.319000	40.20	10.3	56.0	15.8	QP	L1	GND
5.514000	34.20	10.3	60.0	25.8	QP	L1	GND
13.042500	28.80	10.7	60.0	31.2	QP	L1	GND

MEASUREMENT RESULT:

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.204000	29.80	10.4	53.4	23.6	AV	L1	GND
0.600000	35.50	10.3	46.0	10.5	AV	L1	GND
2.152500	26.70	10.3	46.0	19.3	AV	L1	GND
3.030000	26.00	10.3	46.0	20.0	AV	L1	GND
5.446500	22.40	10.3	50.0	27.6	AV	L1	GND
12.840000	20,80	10.7	50.0	29.2	AV	L1	GND
·······	20.20	+v.v	~~+~	·**··	***	4.9	VILL



SCAN TABLE: "Voltage (9K-30M) FIN" Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "HTW0410325_fin"

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.172500	46.60	10.3	64.8	18.2	QP	N	GND
0.208500	43.40	10.4	63.3	19.9	QP	N	GND
0.604500	42.00	10.3	56.0	14.0	QP	N	GND
2.031000	31.90	10.3	56.0	24.1	QP	N	GND
2.229000	32.50	10.3	56.0	23.5	QP	N	GND
5.613000	28.60	10.3	60.0	31.4	QP	N	GND

MEASUREMENT RESULT:

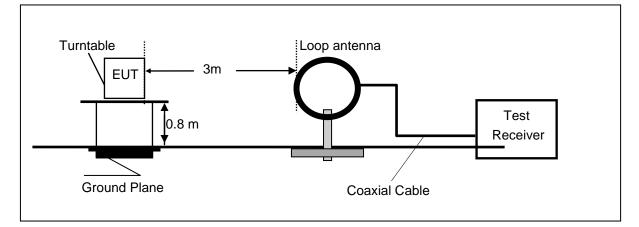
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.168000	28.00	10.3	55.1	27.1	AV	N	GND
0.199500	27.10	10.4	53.6	26.5	AV	N	GND
0.577500	28.60	10.3	46.0	17.4	AV	N	GND
2.130000	21.50	10.3	46.0	24.5	AV	N	GND
2.989500	21.90	10.3	46.0	24.1	AV	N	GND
5.455500	18.20	10.3	50.0	31.8	AV	N	GND



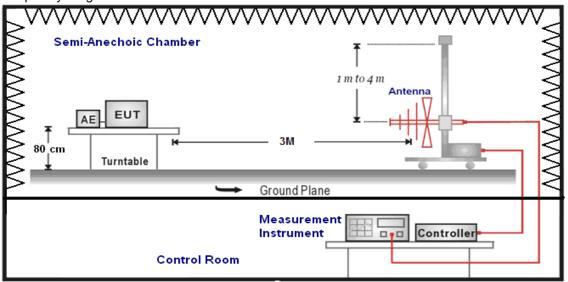
4.2. Radiated Emission

TEST CONFIGURATION

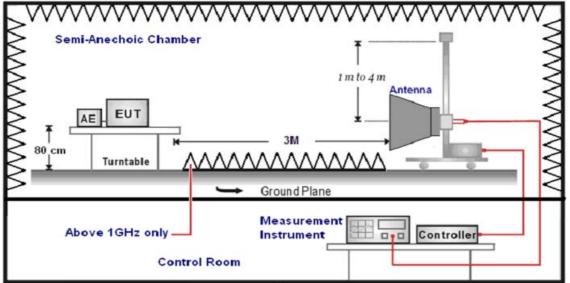
Frequency range 9KHz - 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz





TEST PROCEDURE

1. The EUT was placed on a turn table which is 0.8m 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 EUT minimum operation frequency was 32.768KHz and maximum operation frequency was 2462MHz.so radiated emission test frequency band from 9KHz to 25GHz.

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	

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 the100kHz bandwidth within the band that contains the highest level of desired power.

The frequency spectrum above 1 GHz for Transmitter was investigated. All emission not reported are much lower than the prescribed limits. Set the RBW=1MHz,VBW=3MHz for Peak Detector while the RBW=1MHz,VBW=10Hz for Average Detector,Readings are both peak and average values.

Frequency (MHz)	Distance (Meters)	Radiated (dBµV/m)	Radiated (µV/m)
0.009-0.49	300	20log(2400/F(KHz))+80	2400/F(KHz)
0.49-1.705	30	20log(24000/F(KHz))+40	24000/F(KHz)
1.705-30	30	20log(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.

For 9KHz to 30MHz

Frequency (MHz)	Corrected Reading (dBµV/m)@3m	FCC Limit (dBµV/m) @3m	Margin (dB)	Detector	Result
12.00	44.12	69.54	25.42	QP	PASS
24.00	46.87	69.54	22.67	QP	PASS



For 30MHz to 1000MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization
34.86	48.82	15.82	0.61	32.06	33.19	40.00	6.81	Vertical
113.35	47.28	14.15	1.31	31.83	30.91	43.50	12.59	Vertical
234.17	43.48	14.88	2.04	32.16	28.24	46.00	17.76	Vertical
742.26	38.21	22.34	4.24	31.25	33.54	46.00	12.46	Vertical
34.26	47.64	15.80	0.60	32.06	31.98	40.00	8.02	Horizontal
96.44	46.87	16.02	1.16	31.75	32.30	43.50	11.20	Horizontal
147.36	52.03	11.27	1.55	31.97	32.88	43.50	10.62	Horizontal
239.13	40.97	15.06	2.06	32.16	25.93	46.00	20.07	Horizontal

For 1GHz to 25GHz

_	802.11b Mode(above 1GHz)												
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11b2412MHz)													
	No. Frequency Lev (MHz) (dBu)	Emss	sion	Limit	Morgin	Antenna	Table	Raw	Antenna	Cable	Pre-	Correction	
No.			(dBuV/m)	Margin (dB)	Height	Angle	Value	Factor	Factor	amplifi	Factor		
		(dBu∖	//m)	(ubu v/III)	(ub)	(m)	(Degree)	(dBuV)	(dB/m)	(dB)	er	(dB/m)	
1	4824.00	57.02	ΡK	74.00	16.98	1.00	202	54.92	31.60	7.00	36.5	2.10	
1	4824.00	43.56	AV	54.00	10.44	1.00	202	41.46	31.60	7.00	36.5	2.10	
2	7236.00	58.94	ΡK	74.00	15.06	1.00	288	48.01	37.33	8.90	35.3	10.93	
2	7236.00	42.71	AV	54.00	11.29	1.00	288	31.78	37.33	8.90	35.3	10.93	

	ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11b2412MHz)												
No.	Frequency (MHz)	Emss Lev	el	Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value		Factor	Pre- amplifi		
. ,	(dBu∖	,	```'	()	(m)	(Degree)	(dBuV)	(dB/m)	(dB)	er	(dB/m)		
1	4824.00	54.52	PK	74.00	19.48	1.00	35	52.42	31.60	7.00	36.5	2.10	
1	4824.00	40.41	AV	54.00	13.59	1.00	35	38.31	31.60	7.00	36.5	2.10	
2	7236.00	57.16	ΡK	74.00	16.84	1.00	177	46.23	37.33	8.90	35.3	10.93	
2	7236.00	39.77	AV	54.00	14.23	1.00	177	28.84	37.33	8.90	35.3	10.93	

	ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11b2437MHz)												
No. Frequency (MHz)	Frequency	Emss Lev	el	Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor		Pre- amplifi	Correction Factor	
	(dBu∖	//m)	(ubu v/m)	(ub)	(m)	(Degree)	(dBuV)	(dB/m)	(dB)	er	(dB/m)		
1	4824.00	58.2	ΡK	74.00	15.8	1.00	199	56.08	31.60	7.00	36.5	2.12	
1	4824.00	43.53	AV	54.00	10.47	1.00	199	41.41	31.60	7.00	36.5	2.12	
2	7236.00	59.34	ΡK	74.00	14.66	1.00	27	48.26	37.33	8.90	35.3	11.08	
2	7236.00	42.48	AV	54.00	11.52	1.00	27	31.4	37.33	8.90	35.3	11.08	

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11b--2437MHz)

	No Frequency Emssion		sion	Limit	Morgin	Antenna	Table	Raw	Antenna	Cable	Pre-	Correction
No.	(MHz)	Lev	'el	(dBuV/m)	Margin (dB)	Height	Angle	Value	Factor	Factor	amplifi	Factor
	(101112)	(dBu∖	//m)	(ubu v/m)	(ub)	(m)	(Degree)	(dBuV)	(dB/m)	(dB)	er	(dB/m)
1	4874.00	55.60	ΡK	74.00	18.40	1.00	108	53.48	31.02	7.60	36.5	2.12
1	4874.00	42.00	AV	54.00	12.00	1.00	108	39.88	31.02	7.60	36.5	2.12
2	7311.00	57.38	ΡK	74.00	16.62	1.00	124	46.30	37.28	8.60	34.8	11.08
2	7311.00	40.70	AV	54.00	13.30	1.00	124	29.62	37.28	8.60	34.8	11.08



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	ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11b2462MHz)														
	Frequency	Emss	sion	Limit	Margin	Antenna	Table	Raw	Antenna		Pre-	Correction			
No.	(MHz)	Lev	el	(dBuV/m)	(dB)	Height	Angle	Value	Factor	Factor	amplifi	Factor			
		(dBu∖	//m)	(ubuv/III)	(ub)	(m)	(Degree)	(dBuV)	(dB/m)	(dB)	er	(dB/m)			
1	4924.00	57.35	ΡK	74.00	16.65	1.00	319	54.97	31.58	7.00	36.2	2.38			
1	4924.00	42.30	AV	54.00	11.70	1.00	319	39.92	31.58	7.00	36.2	2.38			
2	7386.00	58.22	ΡK	74.00	15.78	1.00	177	46.51	38.51	8.50	35.3	11.71			
2	7386.00	42.17	AV	54.00	11.83	1.00	177	30.46	38.51	8.50	35.3	11.71			

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11b--2462MHz)

								•			-	
	Fraguanay	Ems	sion	Limit	Morgin	Antenna	Table	Raw	Antenna	Cable	Pre-	Correction
No.	Frequency (MHz)	Lev	/el	(dBuV/m)	Margin (dB)	Height	Angle	Value	Factor	Factor	amplifi	Factor
1	(10112)	(dBu∖	//m)	(ubu v/III)	(ub)	(m)	(Degree)	(dBuV)	(dB/m)	(dB)	er	(dB/m)
1	4924.00	54.6	ΡK	74.00	19.40	1.00	128	52.22	31.58	7.00	36.2	2.38
1	4924.00	41.44	AV	54.00	12.56	1.00	128	39.06	31.58	7.00	36.2	2.38
2	7386.00	56.32	ΡK	74.00	17.68	1.00	125	44.61	38.51	8.50	35.3	11.71
2	7386.00	39.76	AV	54.00	14.24	1.00	125	28.05	38.51	8.50	35.3	11.71

REMARKS: 1. Emission level (dBuV/m)=Raw Value(dBuV)+Correction Factor(dB/m)

- 2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
 - 3. The other emission levels were very low against the limit.
 - 4. Margin value = Limit value- Emission level.
 - 5. For Wireless 802.11b mode at 1Mbps.

802.11g Mode(above 1GHz)
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	ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11g2412MHz)														
No.	Frequency (MHz)	Emss Lev (dBu\	vel	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)		Pre- amplifi er	Correction Factor (dB/m)			
1	4824.00	57.39	ΡK	74.00	16.61	1.00	79	55.29	31.60	7.00	36.5	2.10			
1	4824.00	42.97	AV	54.00	11.03	1.00	79	40.87	31.60	7.00	36.5	2.10			
2	7236.00	58.21	ΡK	74.00	15.79	1.00	166	47.28	37.33	8.90	35.3	10.93			
2	7236.00	41.58	AV	54.00	12.42	1.00	166	30.65	37.33	8.90	35.3	10.93			

	А	NTENN	A PO	LARITY &	TEST DI	STANCE:	VERTICA	_ AT 3 M (802.11g	2412MH	Hz)	
	Frequency	Emss	sion	Limit	Margin	Antenna	Table	Raw	Antenna		Pre-	Correction
No.	(MHz)	Lev	-	(dBuV/m)		Height	Angle	Value			amplifi	
	(101112)	(dBu∖	//m)	(ubu v/m)	(uD)	(m)	(Degree)	(dBuV)	(dB/m)	(dB)	er	(dB/m)
1	4824.00	53.87	ΡK	74.00	20.13	1.00	110	51.77	31.6	7.00	36.5	2.10
1	4824.00	39.59	AV	54.00	14.41	1.00	110	37.49	31.6	7.00	36.5	2.10
2	7236.00	56.50	ΡK	74.00	17.50	1.00	236	45.57	37.33	8.90	35.3	10.93
2	7236.00	39.64	AV	54.00	14.36	1.00	236	28.71	37.33	8.90	35.3	10.93

	ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11g2437MHz)														
	Frequency	Emss	sion	Limit	Margin	Antenna	Table	Raw	Antenna		Pre-	Correction			
No.	(MHz)	Lev	el	(dBuV/m)		Height	Angle	Value	Factor	Factor	amplifi	Factor			
		(dBu∖	//m)	(ubuv/III)	(ub)	(m)	(Degree)	(dBuV)	(dB/m)	(dB)	er	(dB/m)			
1	4874.00	57.46	ΡK	74.00	16.54	1.00	330	55.34	31.02	7.60	36.5	2.12			
1	4874.00	43.36	AV	54.00	10.64	1.00	330	41.24	31.02	7.60	36.5	2.12			
2	7311.00	58.21	ΡK	74.00	15.79	1.00	279	47.13	37.28	8.60	34.8	11.08			
2	7311.00	42.03	AV	54.00	11.97	1.00	279	30.95	37.28	8.60	34.8	11.08			



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	ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11g2437MHz)														
	Fraguanay	Emss	sion	Limit	Morgin	Antenna	Table	Raw	Antenna	Cable	Pre-	Correction			
No.	Frequency (MHz)	Lev	-	(dBuV/m)	Margin (dB)	Height	Angle	Value	Factor	Factor	amplifi	Factor			
	(10112)	(dBu∖	//m)	(ubu v/III)	(ub)	(m)	(Degree)	(dBuV)	(dB/m)	(dB)	er	(dB/m)			
1	4874.00	54.93	ΡK	74.00	19.07	1.00	164	52.81	31.02	7.60	36.5	2.12			
1	4874.00	41.59	AV	54.00	12.41	1.00	164	39.47	31.02	7.60	36.5	2.12			
2	7311.00	56.79	ΡK	74.00	17.21	1.00	108	45.71	37.28	8.60	34.8	11.08			
2	7311.00	40.98	AV	54.00	13.02	1.00	108	29.90	37.28	8.60	34.8	11.08			

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11g--2462MHz)

. L													
		Fraguanay	Emss	sion	Limit	Morgin	Antenna	Table	Raw	Antenna	Cable	Pre-	Correction
	No.	Frequency (MHz)	Lev	'el	(dBuV/m)	Margin (dB)	Height	Angle	Value	Factor	Factor	amplifi	Factor
	1	(11112)	(dBu∖	//m)	(ubu v/III)	(ub)	(m)	(Degree)	(dBuV)	(dB/m)	(dB)	er	(dB/m)
	1	4924.00	56.82	ΡK	74.00	17.18	1.00	274	54.44	31.58	7.00	36.2	2.38
	1	4924.00	41.89	AV	54.00	12.11	1.00	274	39.51	31.58	7.00	36.2	2.38
	2	7386.00	57.51	ΡK	74.00	16.49	1.00	225	45.80	38.51	8.50	35.3	11.71
	2	7386.00	41.98	AV	54.00	12.02	1.00	225	30.27	38.51	8.50	35.3	11.71

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11g--2462MHz)

No.	Frequency (MHz)	Emss Lev	'el	Limit (dBuV/m)	Margin (dB)	Antenna Height	Table Angle	Raw Value	Antenna Factor		Pre- amplifi	
	(101112)	(dBu∖	//m)	(ubu v/m)	(uD)	(m)	(Degree)	(dBuV)	(dB/m)	(dB)	er	(dB/m)
1	4924.00	53.78	ΡK	74.00	20.22	1.00	13	51.40	31.58	7.00	36.2	2.38
1	4924.00	41.07	AV	54.00	12.93	1.00	13	38.69	31.58	7.00	36.2	2.38
2	7311.00	55.46	ΡK	74.00	18.54	1.00	189	43.75	38.51	8.50	35.3	11.71
2	7311.00	39.70	AV	54.00	14.30	1.00	189	27.99	38.51	8.50	35.3	11.71

REMARKS: 1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)

2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor

- 3. The other emission levels were very low against the limit.
- 4. Margin value = Limit value- Emission level.
- 5. For Wireless 802.11g mode at 6Mbps.

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11n HT20--2412MHz) Antenna Cable Pre-Emssion Antenna Table Raw Correction Frequency Limit Margin amplifi No. Level Height Angle Value Factor Factor Factor (MHz) (dBuV/m) (dB) (dBuV) (dB/m) (dBuV/m) (m) (Degree) (dB) er (dB/m)4824.00 55.47 PK 7.00 74.00 18.53 1.00 345 53.37 31.60 36.5 2.10 1 4824.00 41.89 54.00 1.00 345 39.79 31.60 7.00 36.5 2.10 1 AV 12.11 2 7236.00 57.34 ΡK 74.00 16.66 1.00 199 46.41 37.33 8.90 35.3 10.93 2 7236.00 41.30 AV 54.00 1.00 199 30.37 37.33 8.90 35.3 10.93 12.70

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11n HT20--2412MHz) Cable Pre-Emssion Antenna Table Raw Antenna Correction Frequency Limit Margin Factor amplifi No. Level Height Angle Value Factor Factor (MHz) (dBuV/m) (dB) (dBuV/m) (Degree) (dBuV) (dB/m) (dB) (dB/m) (m) er 1 4824.00 53.35 PK 74.00 20.65 1.00 124 51.25 31.6 7.00 36.5 2.10 7.00 2.10 4824.00 124 1 39.30 AV 54.00 14.70 1.00 37.20 31.6 36.5 2 7236.00 55.73 PΚ 74.00 18.27 1.00 166 44.80 37.33 8.90 35.3 10.93 2 7236.00 39.38 AV 54.00 14.62 1.00 166 28.45 37.33 8.90 35.3 10.93

802.11n HT20 Mode(above 1GHz)



	ANTE	NNA PO	OLAR	ITY & TES	T DISTAN	NCE: HOR	IZONTAL	AT 3 M (8	02.11n H ⁻	Г2024	37MHz)	
No.	Frequency (MHz)	Emss Lev (dBu\	'el	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)		Pre- amplifi er	Correction Factor (dB/m)
1	4874.00	56.91	ΡK	74.00	17.09	1.00	26	54.79	31.02	7.60	36.5	2.12
1	4874.00	42.67	AV	54.00	11.33	1.00	26	40.55	31.02	7.60	36.5	2.12
2	7311.00	57.74	ΡK	74.00	16.26	1.00	301	46.66	37.28	8.60	34.8	11.08
2	7311.00	41.46	AV	54.00	12.54	1.00	301	30.38	37.28	8.60	34.8	11.08

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11n HT20--2437MHz)

	Frequency	Emss	sion	Limit	Margin	Antenna	Table	Raw	Antenna		Pre-	Correction
No.	(MHz)	Lev	el	(dBuV/m)		Height	Angle	Value	Factor	Factor	amplifi	Factor
	(10112)	(dBu∖	//m)	(ubu v/III)	(ub)	(m)	(Degree)	(dBuV)	(dB/m)	(dB)	er	(dB/m)
1	4874.00	54.10	ΡK	74.00	19.90	1.00	347	51.98	31.02	7.60	36.5	2.12
1	4874.00	41.33	AV	54.00	12.67	1.00	347	39.21	31.02	7.60	36.5	2.12
2	7311.00	56.40	ΡK	74.00	17.60	1.00	114	45.32	37.28	8.60	34.8	11.08
2	7311.00	40.59	AV	54.00	13.41	1.00	114	29.51	37.28	8.60	34.8	11.08

	ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11n HT202462MHz)														
	Frequency	Emss		Limit	Margin	Antenna	Table	Raw	Antenna		Pre-	Correction			
No.	(MHz)	Lev		(dBuV/m)		Height	Angle	Value			amplifi				
	. ,	(dBu∖	/	(aBat/iii)	(02)	(m)	(Degree)	(dBuV)	(dB/m)	(dB)	er	(dB/m)			
1	4924.00	56.20	ΡK	74.00	17.80	1.00	128	53.82	31.58	7.00	36.2	2.38			
1	4924.00	41.48	AV	54.00	12.52	1.00	128	39.10	31.58	7.00	36.2	2.38			
2	7311.00	58.40	ΡK	74.00	15.60	1.00	33	46.69	38.51	8.50	35.3	11.71			
2	7311.00	42.13	AV	54.00	11.87	1.00	33	30.42	38.51	8.50	35.3	11.71			

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11n HT20--2462MHz)

	Frequency		Emssion		Morgin	Antenna	Table	Raw	Antenna		Pre-	Correction
No.	(MHz)	Lev	-	Limit (dBuV/m)	Margin (dB)	Height	Angle	Value	Factor	Factor	amplifi	Factor
	(10112)	(dBu∖	//m)	(ubu v/m)	(ub)	(m)	(Degree)	(dBuV)	(dB/m)	(dB)	er	(dB/m)
1	4924.00	53.38	ΡK	74	20.62	1.00	200	51.00	31.58	7.00	36.2	2.38
1	4924.00	40.47	AV	54	13.53	1.00	200	38.09	31.58	7.00	36.2	2.38
2	7386.00	56.21	ΡK	74	17.79	1.00	145	44.50	38.51	8.50	35.3	11.71
2	7386.00	40.00	AV	54	14.00	1.00	145	28.29	38.51	8.50	35.3	11.71

REMARKS: 1. Emission level (dBuV/m) =Raw Value (dBuV) + Correction Factor (dB/m)

2. Correction Factor (dB/m) = Antenna Factor (dB/m)+CableFactor (dB)-Pre-amplifier Factor

3. The other emission levels were very low against the limit.

4. Margin value = Limit value- Emission level.

5. For Wireless 802.11n HT20 mode at 6.5Mbps.

802.11n HT40MHz Mode(above 1GHz)

	ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11n HT402422MHz)														
	Frequency	Emssion		Limit	Margin	Antenna	Table	Raw	Antenna		Pre-	Correction			
No.		Lev	el	(dBuV/m)	(dB)	Height	Angle	Value	Factor	Factor	amplifi	Factor			
	(MHz)	(dBuV/m)	//m)	(ubu v/m)	(UD)	(m)	(Degree)	(dBuV)	(dB/m)	(dB)	er	(dB/m)			
1	4844.00	55.78	ΡK	74.00	18.22	1.00	122	53.67	31.01	7.30	36.2	2.11			
1	4844.00	42.06	AV	54.00	11.94	1.00	122	39.95	31.01	7.30	36.2	2.11			
2	7266.00	57.87	ΡK	74.00	16.13	1.00	246	47.07	36.70	8.90	34.8	10.80			
2	7266.00	41.33	AV	54.00	12.67	1.00	246	30.53	36.70	8.90	34.8	10.80			



	ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11n HT402422MHz)														
No.	Frequency (MHz)	Emss Lev (dBu\	'el	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)		Pre- amplifi er	Correction Factor (dB/m)			
1	4844.00	53.86	ΡK	74.00	20.14	1.00	108	51.75	31.01	7.30	36.2	2.11			
1	4844.00	39.56	AV	54.00	14.44	1.00	108	37.45	31.01	7.30	36.2	2.11			
2	7266.00	56.42	ΡK	74.00	17.58	1.00	212	45.62	36.70	8.90	34.8	10.80			
2	7266.00	39.50	AV	54.00	14.50	1.00	212	28.70	36.70	8.90	34.8	10.80			

	ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11n HT402437MHz)														
No.	Frequency (MHz)	Emss Lev (dBu\	el	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)		Pre- amplifi er	Correction Factor (dB/m)			
1	4874.00	57.42	PK	74.00	16.58	1.00	138	55.30	31.02	7.60	36.5	2.12			
1	4874.00	42.79	AV	54.00	11.21	1.00	138	40.67	31.02	7.60	36.5	2.12			
2	7311.00	58.21	ΡK	74.00	15.79	1.00	312	47.13	37.28	8.60	34.8	11.08			
2	7311.00	41.56	AV	54.00	12.44	1.00	312	30.48	37.28	8.60	34.8	11.08			

	ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11n HT402437MHz)														
	Frequency	Emssion		Limit	Margin	Antenna	Table	Raw	Antenna		Pre-	Correction			
No.		Lev	el	(dBuV/m)	(dB)	Height	Angle	Value	Factor	Factor	amplifi	Factor			
	(MHz)	(dBu∖	//m)	(aBuv/m)	(ub)	(m)	(Degree)	(dBuV)	(dB/m)	(dB)	er	(dB/m)			
1	4874.00	53.76	ΡK	74.00	20.24	1.00	68	51.64	31.02	7.60	36.5	2.12			
1	4874.00	41.07	AV	54.00	12.93	1.00	68	38.95	31.02	7.60	36.5	2.12			
2	7311.00	56.02	ΡK	74.00	17.98	1.00	91	44.94	37.28	8.60	34.8	11.08			
2	7311.00	40.50	AV	54.00	13.50	1.00	91	29.42	37.28	8.60	34.8	11.08			

	ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M (802.11n HT402452MHz)														
	Frequency	Emssion		Limit	Margin	Antenna	Table	Raw	Antenna		Pre-	Correction			
No.	(MHz)	Lev	el	(dBuV/m)		Height	Angle	Value	Factor	Factor	amplifi	Factor			
		(dBu∖	//m)	(ubuv/m)	(ub)	(m)	(Degree)	(dBuV)	(dB/m)	(dB)	er	(dB/m)			
1	4904.00	55.47	ΡK	74.00	18.53	1.00	108	53.20	31.47	7.00	36.2	2.27			
1	4904.00	41.09	AV	54.00	12.91	1.00	108	38.82	31.47	7.00	36.2	2.27			
2	7356.00	57.73	ΡK	74.00	16.27	1.00	124	46.08	38.45	8.50	35.3	11.65			
2	7356.00	41.64	AV	54.00	12.36	1.00	124	29.99	38.45	8.50	35.3	11.65			

	ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M (802.11n HT402452MHz)														
	Frequency	Emss	sion	Limit	Margin	Antenna	Table	Raw	Antenna	Cable	Pre-	Correction			
No.	(MHz)	Lev	-	(dBuV/m)		Height	Angle	Value	Factor	Factor	amplifi	Factor			
	(IVI⊟Z)	(dBu∖	dBuV/m)	(ubuv/m)	(ub)	(m)	(Degree)	(dBuV)	(dB/m)	(dB)	er	(dB/m)			
1	4904.00	53.01	ΡK	74.00	20.99	1.00	128	50.74	31.47	7.00	36.2	2.27			
1	4904.00	40.28	AV	54.00	13.72	1.00	128	38.01	31.47	7.00	36.2	2.27			
2	7356.00	55.49	ΡK	74.00	18.51	1.00	124	43.84	38.45	8.50	35.3	11.65			
2	7356.00	39.75	AV	54.00	14.25	1.00	124	28.10	38.45	8.50	35.3	11.65			

REMARKS: 1. Emission level (dBuV/m) =Raw Value (dBuV) + Correction Factor (dB/m) 2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor 3. The other emission levels were very low against the limit.

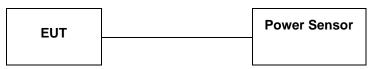
4. Margin value = Limit value- Emission level.

5. For Wireless 802.11n HT40MHz mode at 13.5Mbps.



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 10log (1/x), where x is the duty cycle to the measurement result.

<u>LIMIT</u>

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	16.21	30	PASS
6	2437	16.29	30	PASS
11	2462	16.30	30	PASS

Note: 1. For 802.11b mode at finial test to get the worst-case emission at 1Mbps. 2. The test results including the cable lose.

4.3.2 802.11g Test Mode

A. Test Verdict

Channel	Frequency (MHz)	Measured Output Peak Power (dBm)	Limits (dBm)	Verdict
1	2412	14.25	30	PASS
6	2437	14.33	30	PASS
11	2462	14.34	30	PASS

Note: 1. For 802.11g mode at finial test to get the worst-case emission at 6Mbps.

2. The test results including the cable lose.



4.3.3 802.11n HT20 Test Mode

A. Test Verdict

Channel	Frequency (MHz)	Measured Output Peak Power (dBm)	Limits (dBm)	Verdict
1	2412	14.41	30	PASS
6	2437	14.43	30	PASS
11	2462	14.61	30	PASS

Note: 1. For 802.11n HT20 mode at finial test to get the worst-case emission at 6.5Mbps. 2. The test results including the cable lose.

4.3.4 802.11n HT40 Test Mode

A. Test Verdict

Channel	Frequency (MHz)	Measured Output Peak Power (dBm)	Limits (dBm)	Verdict
3	2422	13.55	30	PASS
6	2437	13.50	30	PASS
9	2452	13.39	30	PASS

Note: 1. For 802.11n HT40 mode at finial test to get the worst-case emission at 13.5Mbps. 2. The test results including the cable lose.



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 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/30kHz)	Refer to Plot	Limits (dBm/3KHz)	Verdict
1	2412	4.455	Plot 4.4.1 A	8	PASS
6	2437	2.199	Plot 4.4.1 B	8	PASS
11	2462	1.564	Plot 4.4.1 C	8	PASS

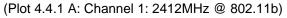
Note: 1. For 802.11b mode at finial test to get the worst-case emission at 1Mbps. 2. The test results including the cable lose.

B. Test Plots



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



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(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/30kHz)	Refer to Plot	Limits (dBm/3KHz)	Verdict
1	2412	-4.602	Plot 4.4.2 A	8	PASS
6	2437	-3.288	Plot 4.4.2 B	8	PASS
11	2462	-3.646	Plot 4.4.2 C	8	PASS

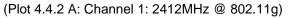
Note: 1. For 802.11g mode at finial test to get the worst-case emission at 6Mbps. 2. The test results including the cable lose.

B. Test Plots



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



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

4.4.3 802.11n HT20 Test Mode

A. Test Verdict

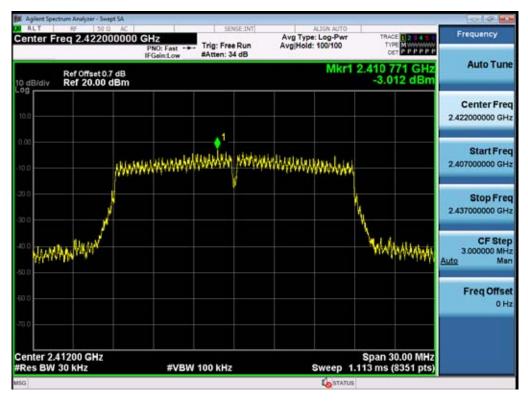
Channel	Frequency (MHz)	Report PSD (dBm/30kHz)	Refer to Plot	Limits (dBm/3KHz)	Verdict
1	2412	-3.012	Plot 4.4.3 A	8	PASS
6	2437	-2.288	Plot 4.4.3 B	8	PASS
11	2462	-3.518	Plot 4.4.3 C	8	PASS

Note: 1. For 802.11n HT20 mode at finial test to get the worst-case emission at 6.5Mbps. 2. The test results including the cable lose.

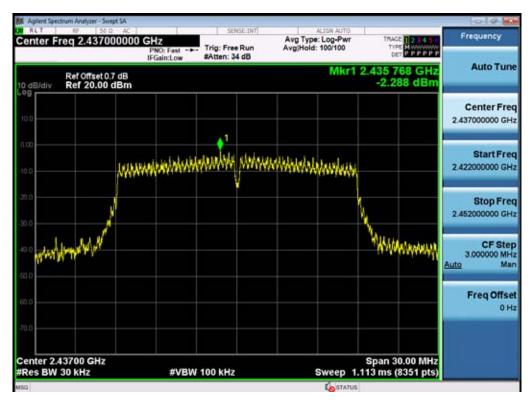
B. Test Plots



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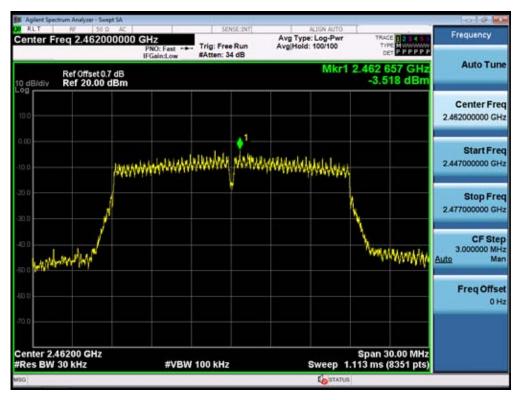




(Plot 4.4.3 B: Channel 6: 2437MHz @ 802.11n HT20)



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

4.4.4 802.11n HT40 Test Mode

A. Test Verdict

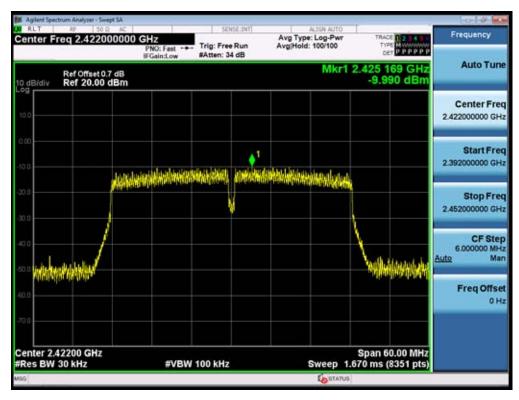
Channel	Frequency (MHz)	Report PSD (dBm/30kHz)	Refer to Plot	Limits (dBm/3KHz)	Verdict
3	2422	-9.990	Plot 4.4.4 A	8	PASS
6	2437	-7.696	Plot 4.4.4 B	8	PASS
9	2452	-10.262	Plot 4.4.4 C	8	PASS

Note: 1. For 802.11n HT40 mode at finial test to get the worst-case emission at 13.5Mbps. 2. The test results including the cable lose.

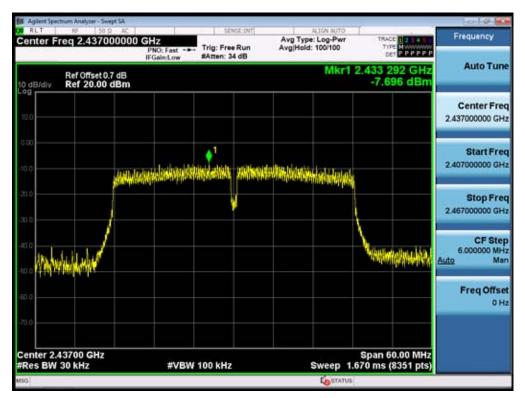
B. Test Plots



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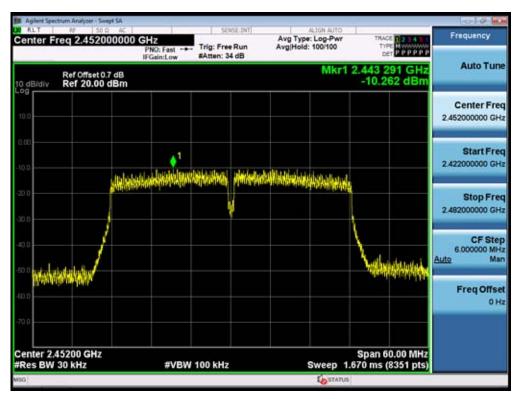




(Plot 4.4.4 B: Channel 6: 2437MHz @ 802.11n HT40)



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(Plot 4.4.4 C: Channel 6: 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

According to KDB 558074 D01 V03 for Antenna-port conducted measurement. Antenna-port conducted measurements may also be used as an alternative to radiated measurements for demonstrating compliance in the restricted frequency bands. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test for cabinet/case spurious emissions is required.

- 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.
- 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 for peak detector and RBW=1MHz, VBW=10Hz for average detector.
- 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.
- 6. Measure the conducted output power (in dBm) using the detector specified by the appropriate regulatory agency (see 12.2.2, 12.2.3, and 12.2.4 for guidance regarding measurement procedures for determining quasi-peak, peak, and average conducted output power, respectively).
- 7. Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP level (see 12.2.5 for guidance on determining the applicable antenna gain)
- 8. Add the appropriate maximum ground reflection factor to the EIRP level (6 dB for frequencies ≤ 30 MHz, 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive and 0 dB for frequencies > 1000 MHz).
- 9. For devices with multiple antenna-ports, measure the power of each individual chain and sum the EIRP of all chains in linear terms (e.g., Watts, mW).
- 10. Convert the resultant EIRP level to an equivalent electric field strength using the following relationship: E = EIRP - 20log D + 104.8

where:

E = electric field strength in $dB\mu V/m$,

EIRP = equivalent isotropic radiated power in dBm

- D = specified measurement distance in meters.
- 11. Since the out-of-band characteristics of the EUT transmit antenna will often be unknown, the use of a conservative antenna gain value is necessary. Thus, when determining the EIRP based on the measured conducted power, the upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands, or 2 dBi, whichever is greater. However, for devices that operate in multiple frequency bands while using the same transmit antenna, the highest gain of the antenna within the operating band nearest in frequency to the restricted band emission being measured may be used in lieu of the overall highest gain when the emission is at a frequency that is within 20 percent of the nearest band edge frequency, but in no case shall a value less than 2 dBi be used.
- 12. Compare the resultant electric field strength level to the applicable regulatory limit.
- 13. Perform radiated spurious emission test dures until all measured frequencies were complete.

<u>LIMIT</u>

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)

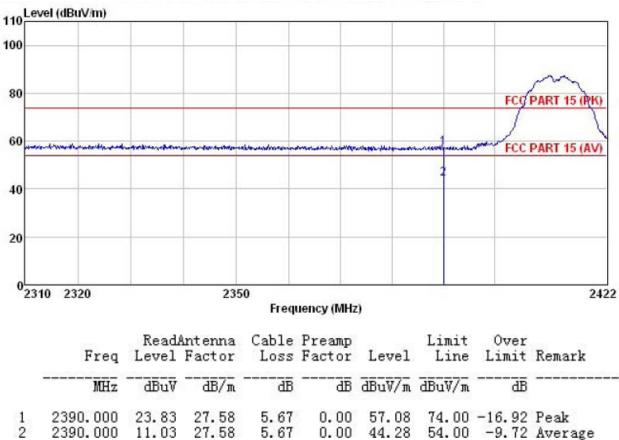
TEST RESULTS

4.5.1 For Radiated Bandedge Measurement

Remark: The Bandedge was measured at difference data rate for each mode and recorded worst case for each mode.

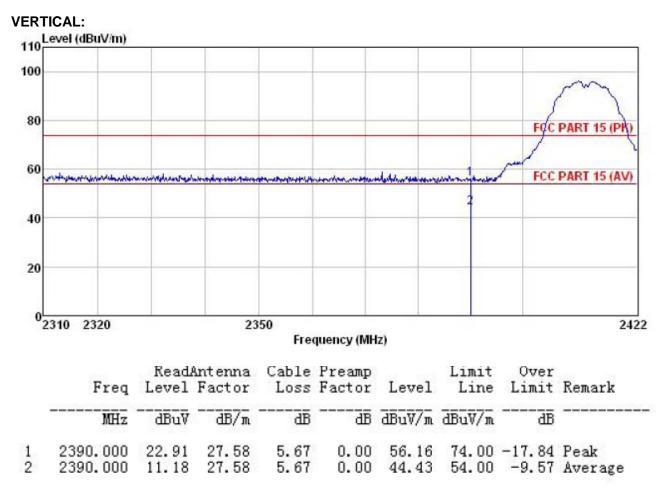
11B:

HORIZONTAL:



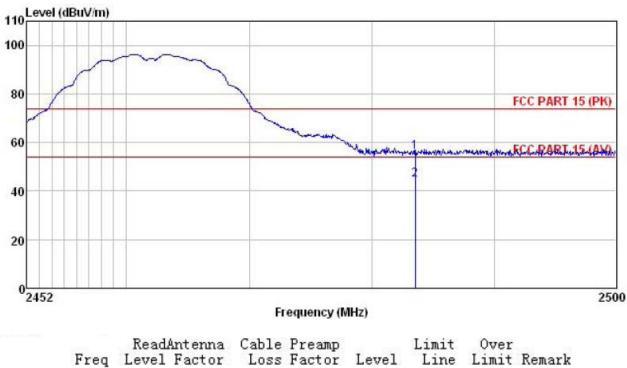
Low Channel





HORIZONTAL:

High Channel

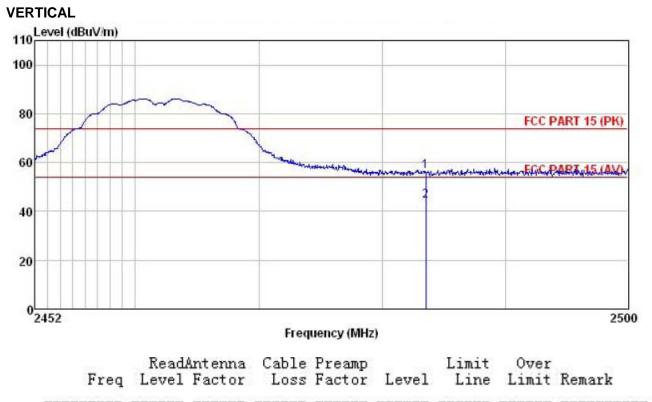


 MHz
 dBuV
 dB/m
 dB
 dB
 dBuV/m
 dB

 1
 2483.500
 22.90
 27.52
 5.70
 0.00
 56.12
 74.00
 -17.88
 Peak

 2
 2483.500
 11.23
 27.52
 5.70
 0.00
 44.45
 54.00
 -9.55
 Average



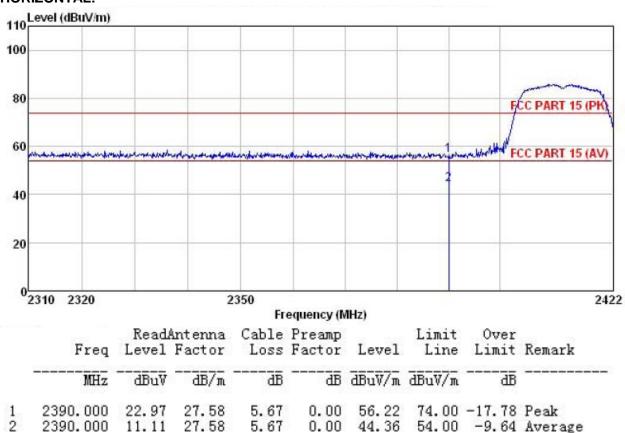


	MHz	dBu∛	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 2	2483.500 2483.500								

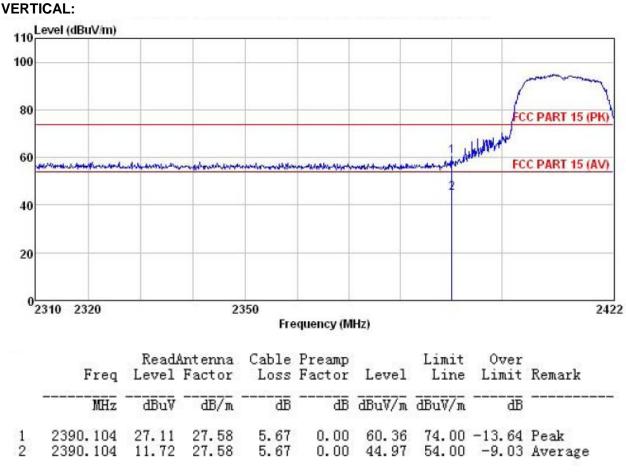




Low Channel

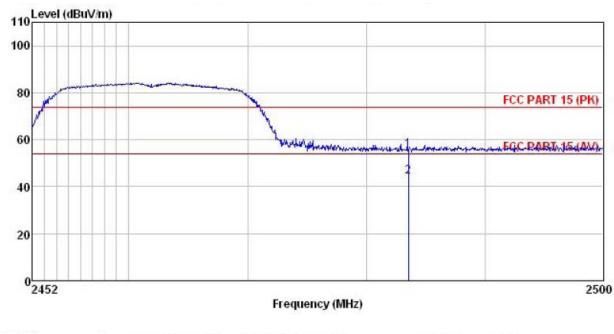






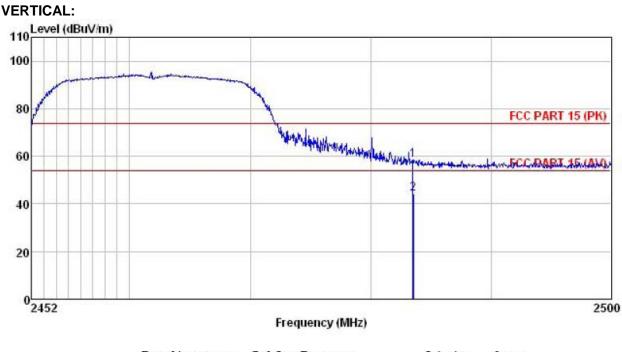


High Channel



	Freq			Cable Preamp Loss Factor					
	MHz	₫₿uŸ		dB	āB	dBuV/m	dBuV/m	āB	
1 2	2483.500 2483.500								

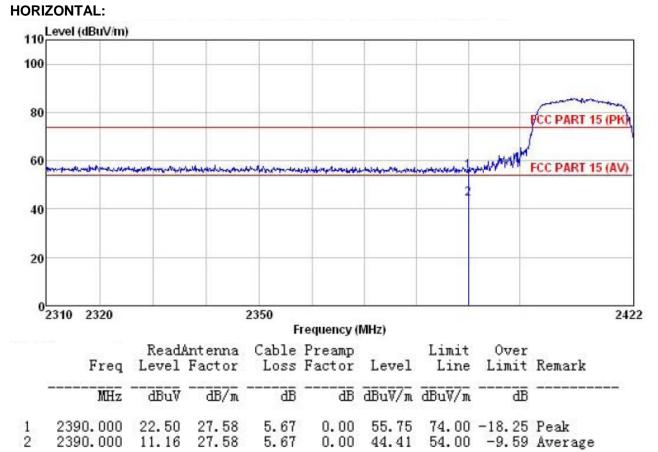




	Freq				Level			Remark
	MHz	dBu∛	 B	B	dBuV/m	dBuV/m	B	
1 2	2483.479 2483.500							

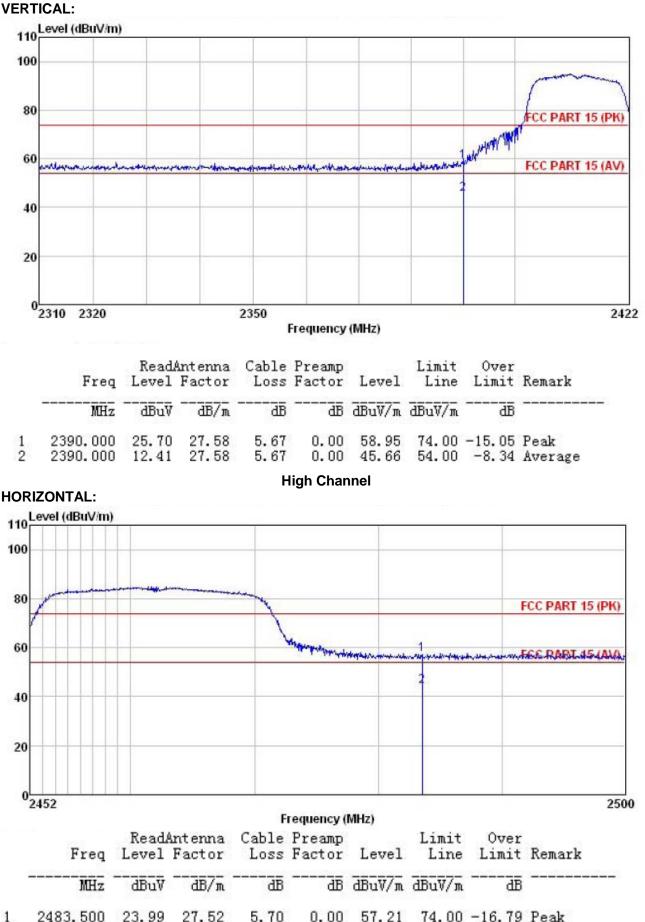
11N(20M):

Low Channel



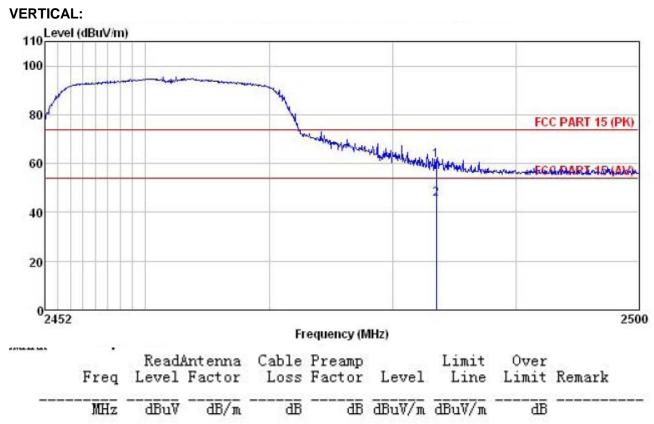


2



2483.500 23.99 27.52 5.70 0.00 57.21 74.00 -16.79 Peak 2483.500 11.03 27.52 5.70 0.00 44.25 54.00 -9.75 Average

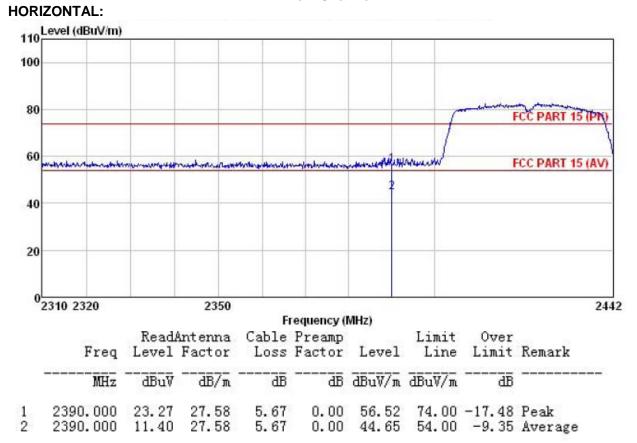




a	2483.500	07 07	07 50	E 70	0 00	61 00	74 00	-10 01	Deels
1	2403.000	21.01	21.02	5. ru	0.00	61.09	14.00	-12.91	reak
2	2483.500	12.29	27.52	5.70	0.00	45.51	54.00	-8.49	Average

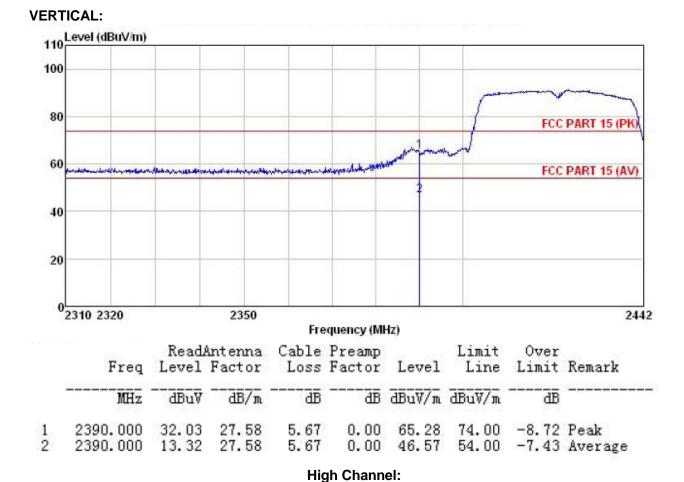
11N(40):

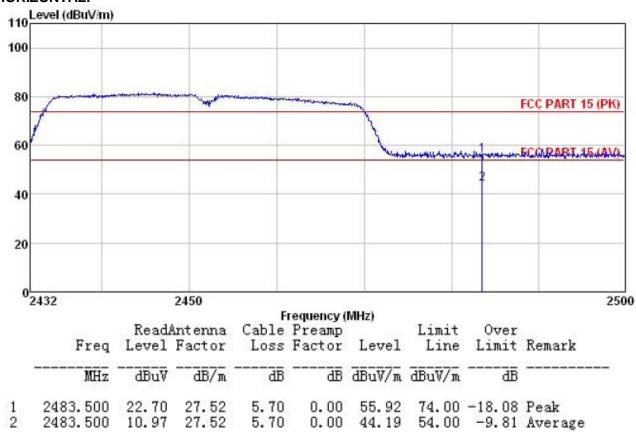
Low Channel:



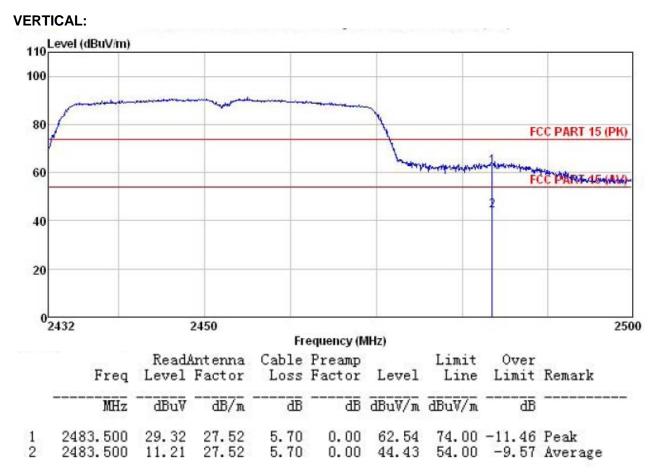


HORIZONTAL:











4.5.2 For Conducted Bandedge Measurement

11B:

A. Test Plots



(Plot 4.5.2.1 A: Channel 01: 2412MHz)



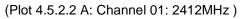
(Plot 4.5.2.1 B: Channel 11: 2462MHz)



11G:

B. Test Plots







(Plot 4.5.2.2 B: Channel 11: 2462MHz)



11N(20M):

C. Test Plots

	trum Analyzer - Se		- 10 - 10 - T. S.	C)) (18	0.4
Center Fr	req 2.4000	000000 GHz	ast Trig: Free Ru	Avg	ALIGN AUTO Type: Log-Pwr (Hold: 100/100	TRACE	Frequency
10 dB/div	Ref Offset	IFGain: 0.7 dB	056			2.399 913 GHz -41.068 dBm	Auto Tune
10.00					فسمانتهم		Center Freq 2.400000000 GHz
-2010			2	population	нчия	-19.00 albe	Start Freq 2.370000000 GHz
60.0 -60.0 70.0	Lange Mary	(changer weight the factor of the	ang the formation of the stand				Stop Freq 2.430000000 GHz
Center 2.4 #Res BW			#VBW 300 kHz	FUNCTION	Sweep 1.0	Span 60.00 MHz 00 ms (5001 pts) FUNCTION VALUE	
1 N 1 2 N 1 3 4 5 6 7 8 9 10	1	2.424 576 GH 2.399 913 GH					Freq Offset 0 Hz
MSG					G STATUS		





(Plot 4.5.2.3 B: Channel 11: 2412MHz)

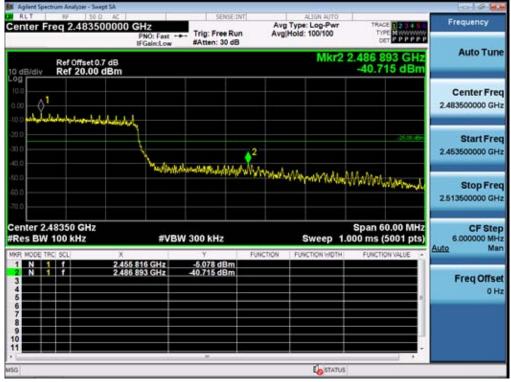


11N(40M):

D. Test Plots

	trum Analyzer - Swe				5.	2	0 6 4
Center Fr	req 2.40000	00000 GHz	SENSE IP	Avg	ALIGN AUTO Type: Log-Pwr (Hold: 100/100	TRACE 2 34 5	Frequency
10 dB/div	Ref Offset 0. Ref 20.00	IFGain:Low	#Atten: 30 dB			2.394 592 GHz -40.130 dBm	
10.0 0.00 -10.0					ر ایران ا	لي منهم روايليزيون	Center Freq 2.400000000 GHz
-20.0 			2	\int		-21.04 attes	Start Freq 2.370000000 GHz
-53.0 61,-1/4 -63.0 -73.0	New Second Street Street	www.hanabhaalahabhabhabhabhabhabhabhabhabhabhabhabhab	r fan in fan Fan in fan in				Stop Free 2.430000000 GHz
Center 2.4 #Res BW		#VE	300 kHz	FUNCTION	Sweep 1.0	Span 60.00 MHz 000 ms (5001 pts) FUNCTION VALUE	CF Step 6.000000 MH Auto Mar
1 N 1 2 N 1 3 4 5 6 7	T	2.427 060 GHz 2.394 592 GHz	-6.044 dBm -40.130 dBm				Freq Offsel 0 Hz
8 9 10 11					(astatus		

(Plot 4.5.2.4 A: Channel 03: 2422MHz)



(Plot 4.5.2.4 B: Channel 09: 2452MHz)



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 C63.10-2009 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.

<u>LIMIT</u>

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 bandege measurement data.

4.6.1 802.11b Test Mode

Α.	Test Verdict	
	1000 1010100	

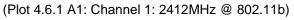
		_	-			
	Channel	Frequency (MHz)	Frequency Range	Refer to Plot	Limit (dBc)	Verdict
	1	2412	2.412 GHz	Plot 4.6.1 A1		PASS
	I	2412	30MHz -26GHz	Plot 4.6.1 A2	-20	PASS
	C	2437	2.437 GHz	Plot 4.6.1 B1		PASS
	6		30MHz -26GHz	Plot 4.6.1 B2	-20	PASS
	11	0400	2.462 GHz	Plot 4.6.1 C1		PASS
		2462	30MHz -26GHz	Plot 4.6.1 C2	-20	PASS

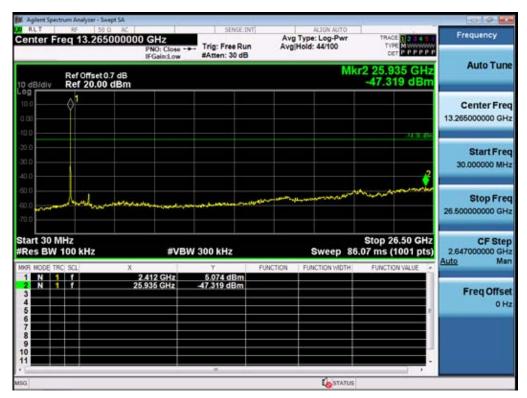
Note: 1. For 802.11b mode at finial test to get the worst-case emission at 1Mbps. 2. The test results including the cable lose.



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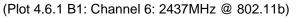


(Plot 4.6.1 A2: Channel 1: 2412MHz @ 802.11b)



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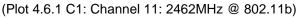


(Plot 4.6.1 B2: Channel 6: 2437MHz @ 802.11b)



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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
1	2412	30MHz-26GHz	Plot 4.6.2 A2	-20	PASS
6	2437	2.437 GHz	Plot 4.6.2 B1		PASS
0	2437	30MHz-26GHz	Plot 4.6.2 B2	-20	PASS
11	2402	2.462 GHz	Plot 4.6.2 C1		PASS
11	2462	30MHz-26GHz	Plot 4.6.2 C2	-20	PASS

Note: 1. For 802.11g mode at finial test to get the worst-case emission at 6Mbps. 2. The test results including the cable lose.

B. Test Plots

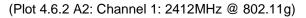


(Plot 4.6.2 A1: Channel 1: 2412MHz @ 802.11g)



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And and a second state of the second	1	ALIGN AUTO	T	SENSE IN	1	RF 50.0 AC	Agilent Spech
Frequency	TRACE	Type: Log-Pwr Hold: 45/100	Avg		GHz PNO: Close -	q 13.26500000	enter Fr
Auto Tun	r2 25.730 GHz -46.062 dBm	Mkr			Pointeow	Ref Offset 0.7 dB Ref 20.00 dBm) dB/div
Center Fre 13.265000000 GH						¢1	99 0.0 00
Start Fre 30.000000 MF							0.0 0.0 0.0
the second s	Mannan and and and and and and and and an		-		-	Anna	10
26.50000000 GF CF Ste 2.64700000 GF	Stop 26.50 GHz .07 ms (1001 pts)	Sweep 86.		300 kHz		00 kHz	art 30 M Res BW 1
26.50000000 GH CF Ste 2.64700000 GH Auto Mi Freq Offs			FUNCTION			00 kHz scl X	tart 30 M Res BW 1 M MODE TRO 1 N 1 2 N 1 3
Stop Fre 25.50000000 GH 2.64700000 GH Auto Ma Freq Offse 0 H	.07 ms (1001 pts)	Sweep 86.		300 kHz -3.045 dBm	#VBV	00 kHz scl X	tart 30 M Res BW 1 1 N 1 2 N 1



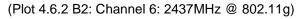


(Plot 4.6.2 B1: Channel 6: 2437MHz @ 802.11g)



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Agilent Spec	trum Analyzer - Swe		SENSE DAT	ALIGN AUTO		0.0.0
enter Fi	req 13.2650	PNO: Close - IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Type: Log-Pwr Avg Hold: 42/100	TRACE	Frequency
0 dB/div	Ref Offset 0. Ref 20.00			М	kr2 25.623 GHz -47.388 dBm	Auto Tu
0.0 1.00	¢'					Center Fr 13.265000000 G
					-13,25,40%	Start Fr 30.000000 N
0.0 0.0 0.0	-layna	and the state of the	nadasan da ila bisaringi	and the second second second	man and a	Stop Fr 26.50000000 G
	100 kHz	#VB	W 300 kHz	Sweep 8	Stop 26.50 GHz 6.07 ms (1001 pts)	CF St 2.647000000 G Auto M
OR MODE TR	C SCL	X 2.439 GHz	Y 1.646 dBm	FUNCTION FUNCTION WIDTH	FUNCTION VALUE +	LINE .
2 N 1		25.623 GHz	-47.388 dBm			Freq Off 0
6 7 8 9						
			п.	Co STATU		





(Plot 4.6.2 C1: Channel 11: 2462MHz @ 802.11g)



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-0-9-8	Q		1 ·	1.00000			m Analyzer - S	lent Spectr
Frequency	TRACE 12145	Type: Log-Pwr Hold: 44/100	Av	. Trig: Free Run	PNO: Close ++	5000000		ter Fre
Auto Tun	r2 25.780 GHz -46.677 dBm	Mk		#Atten: 30 dB	IFGain:Low	t0.7 dB	Ref Offset Ref 20.0	3/div
Center Fre 13.265000000 GF							¢ ¹	
Start Fre 30.000000 MF	-1520 des							
Stop Fre 26.50000000 GF			manna		er-dangen/phat	and and and	halw	marca
CF Ste 2.647000000 GF Auto Ma	Stop 26.50 GHz .07 ms (1001 pts)	Sweep 86	FUNCTION	/ 300 kHz	#VB1	x	00 kHz	t 30 M s BW 1
Freq Offso 0 H			Penenon	-0.756 dBm -46.677 dBm	465 GHz 780 GHz	2.4		N 1 N 1
		STATUS			110			





4.6.3 802.11n HT20MHz Test Mode

A. Test Verdict

Channel	Frequency (MHz)	Frequency Range	Refer to Plot	Limit (dBc)	Verdict
1	2412	2.412 GHz	Plot 4.6.3 A1		PASS
I	1 2412	30MHz-26GHz	Plot 4.6.3 A2	-20	PASS
C	0407	2.437 GHz	Plot 4.6.3 B1		PASS
6	2437	30MHz-26GHz	Plot 4.6.3 B2	-20	PASS
11	1 2462	2.462 GHz	Plot 4.6.3 C1		PASS
11		30MHz-26GHz	Plot 4.6.3 C2	-20	PASS

Note: 1. For 802.11n HT20MHz mode at finial test to get the worst-case emission at 6.5Mbps. 2. The test results including the cable lose.

B. Test Plots



(Plot 4.6.3 A1: Channel 1: 2412MHz @ 802.11n HT20)







M Agilent Spectru			125				14	
Center Fre				Trig: Free Ru	Avg	Type: Log-Pwr Hold: 43/100	TRACE	Frequency
10 dB/div	Ref Offset 0 Ref 20.00	IFG).7 dB	IO: Close - Gain:Low	#Atten: 30 di			cr2 25.755 GHz -47.049 dBm	Auto Tune
10.0 0.00	¢ ¹							Center Freq 13.265000000 GHz
-20.0							-10127-000	Start Free 30.000000 MH
-50.0 -60.0 -70.0	how	a deres de la desarrada	munaler			transferrand and	man and a second	Stop Free 26.50000000 GH
Start 30 Mi #Res BW 1	100 kHz	×	#VB	W 300 kHz	FUNCTION	Sweep 86	Stop 26.50 GHz 5.07 ms (1001 pts	
1 N 1 2 N 1 3 4 5	1	2,412	2 GHz 5 GHz	1,078 dBm -47,049 dBm				Freq Offse 0 H
6 7 8 9 10								
, wsg				н.				



(Plot 4.6.3 A2: Channel 1: 2412MHz @ 802.11n HT20)

(Plot 4.6.3 B1: Channel 6: 2437MHz @ 802.11n HT20)



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E Agilent Spectrum Analyzer - Swept SA	10		<u>a a</u>		N	
RLT NF 50.9 AC Center Freq 13.265000000	PNO: Close =	Trig: Free Run	Avg T	ype: Log-Pwr old: 44/100	TRACE	Frequency
Ref Offset 0.7 dB 10 dB/div Ref 20.00 dBm	IFGain:Low	#Atten: 30 dB		Mk	tr2 26.092 GHz -46.982 dBm	Auto Tun
000 1000						Center Fre 13.26500000 GF
100 200 300					2	Start Fre 30.000000 MF
50 0 60 0 70 0	an a	and the second second second	and the second second	21.0	manume	Stop Fre 26.50000000 GF
Start 30 MHz Res BW 100 kHz	#VB	N 300 kHz		Sweep 86	Stop 26.50 GHz 5.07 ms (1001 pts)	CF Ste 2.647000000 Gi Auto M
	2.439 GHz 3.092 GHz	1.281 dBm -46.982 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE +	Freq Offs
6 6 7 8 9						0
				Lostatus	-	





(Plot 4.6.3 C1: Channel 11: 2462MHz @ 802.11n HT20)



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anter Fre	eq 13.26500	AC 100000 GHz PNO: Close IFGain:Low	Trig: Free R #Atten: 30 d	Avg un Avgi	ALION AUTO Type: Log-Pwr Hold: 44/100	TRACE 2 TYPE N DET P P	345 PPPP	Frequency
dB/div	Ref Offset 0.7 o Ref 20.00 di				M	47.836 c		Auto Tur
	01							Center Fr 13.265000000 G
0.0 0.0 0.0 0.0							2	Start Fr 30.000000 M
					and the second second	and a second and a second	mon	
10 	monteres	1478- and some \$ 1.1 A	جليه من المعند م _ا يد _م اريط	- bankarthannap				100000000000000000000000000000000000000
	Hz	#VI	BW 300 kHz			Stop 26.50 5.07 ms (1001	1 pts)	26.50000000 0 CF St 2.647000000 0
art 30 Mi	Hz 00 kHz SCL	x	BW 300 kHz	FUNCTION			1 pts)	26.50000000 0 CF St 2.647000000 0
tart 30 Mł Res BW 1 9 MODE TRC 1 N 1 2 N 1 3	Hz 00 kHz scl f			FUNCTION	Sweep 8	5.07 ms (1001	1 pts)	26.50000000 0 CF St 2.54700000 0 Auto M
tart 30 MH Res BW 1 9 MODE TRC 1 N 1 2 N 1	Hz 00 kHz scl f	x 2.465 GHz	BW 300 kHz V 0.012 dBm	FUNCTION	Sweep 8	5.07 ms (1001	1 pts)	Stop Fr 26.50000000 0 CF St 2.647000000 0 Auto N Freq Off 0

(Plot 4.6.3 C2: Channel 11: 2462MHz @ 802.11n HT20)



4.6.4 802.11n HT40MHz Test Mode

A. Test Verdict

Channel	Frequency (MHz)	Frequency Range	Refer to Plot	Limit (dBc)	Verdict
3	2422	2.422 GHz	Plot 4.6.4 A1		PASS
3	2422	30MHz-26GHz	Plot 4.6.4 A2	-20	PASS
6	2437	2.437 GHz	Plot 4.6.4 B1		PASS
0	2437	30MHz-26GHz	Plot 4.6.4 B2	-20	PASS
9	0450	2.452 GHz	Plot 4.6.4 C1		PASS
9	2452	30MHz-26GHz	Plot 4.6.3 C2	-20	PASS

Note: 1. For 802.11n HT40MHz mode at finial test to get the worst-case emission at 13.5Mbps. 2. The test results including the cable lose.

B. Test Plots



(Plot 4.6.4 A1: Channel 3: 2422MHz @ 802.11n HT40)



ME Agilent Spectrum Analyzer - Swept SA		24.000.000	ALC: HALLING IN	22 - 22	-0
Center Freq 13.26500000) GHz		g Type: Log-Pwr	TRACE DE LA DE	Frequency
Ref Offset 0.7 dB	PNO: Close Trig	i: Free Run Avi ten: 30 dB		TIPE PPPPP	Auto Tune
10 dB/div Ref 20.00 dBm				-40.886 dBm	Center Freq 13.26500000 GHz
-10.0 -20.0 -30.0 -10.0				SCICARE	Start Freq 30.000000 MHz
50.0 60.0 -70.0		and and an and a second se	mader Alona and the	-	Stop Freq 26.50000000 GHz
Start 30 MHz #Res BW 100 kHz	#VBW 300	kHz FUNCTION		Stop 26.50 GHz 7 ms (1001 pts)	CF Step 2.647000000 GHz Auto Man
1 N 1 7		80 dBm 86 dBm	Pure-turk muter		Freq Offset 0 Hz
MSG			Lo STATUS		





(Plot 4.6.4 B1: Channel 6: 2437MHz @ 802.11n HT40)



	trum Analyzer - See			- 12		
Center F		000000 GHz PNO: Close *	SINSC:	Avg Type: Log-	Pwr TRACE 12345	
10 dB/div	Ref Offset 0.	IFGain:Low	#Atten: 30 dB		Mkr2 2.491 GHz -39.112 dBm	Auto Tune
10.0	¢1					Center Free 13.265000000 GH
-30.0	2				-32 K db	Start Free 30.000000 MH
-50 0 -60 0 -70 0	Anna	and the state and the second second		gegage and the second	un commence	Stop Free 26.50000000 GH
Start 30 M #Res BW		#VE	W 300 kHz	Swee	Stop 26.50 GHz p 86.07 ms (1001 pts	CF Step 2.647000000 GH Auto Mar
MKR MODE TR		× 2.439 GHz	ې -2 317 dBm	FUNCTION FUNCTION	WIDTH FUNCTION VALUE	
2 N 1 3 4 5		2.491 GHz	-39.112 dBm			Freq Offse 0 H
6 7 8 9						
11			10			
ISG				10	STATUS	





(Plot 4.6.4 C1: Channel 9 : 2452MHz @ 802.11n HT40)



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	trum Analyzer - Sw	ept SA	1414-4120-0010		NI	18	0 0 0
Center F	req 13.265	000000 GHz	SENSE D	Ave	ALIGN AUTO Type: Log-Pwr (Hold: 43/100	TRACE	Frequency
10 dB/div	Ref Offset 0 Ref 20.00		#Atten: 30 dB			kr2 2.491 GHz -41.380 dBm	Auto Tune
Log 10.0 0.00	- ∲ ¹						Center Freq 13.265000000 GHz
-20.0	2					-Skifs die	Start Freq 30.000000 MHz
50.0 50.0	have	and the second second		بە مەلىرىنى			Stop Freq 26.50000000 GHz
Start 30 M #Res BW	100 kHz	#VB	W 300 kHz	FUNCTION	Sweep 86	Stop 26.50 GHz .07 ms (1001 pts)	CF Step 2.647000000 GHz Auto Man
1 N 1 2 N 1 3 4 5 6 7 8 9		2.439 GHz 2.491 GHz	-5.159 dBm -41.380 dBm				Freq Offset 0 Hz
10 11					G STATUS	•	

(Plot 4.6.4 C2: Channel 9: 2452MHz @ 802.11n HT40)



4.7. 6dB Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW=100 KHz and VBW=300KHz. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB. According to KDB558074 D01 V03 for one of the following procedures may be used to determine the modulated DTS device signal bandwidth.

- 1. Set RBW = 100 kHz.
- 2. Set the video bandwidth (VBW) \ge 3 RBW.
- 3. Detector = Peak.
- 4. Trace mode = max hold.
- 5. Sweep = auto couple.
- 6. Allow the trace to stabilize.

7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

<u>LIMIT</u>

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

TEST RESULTS

4.7.1 801.11b Test Mode

A. Test Verdict

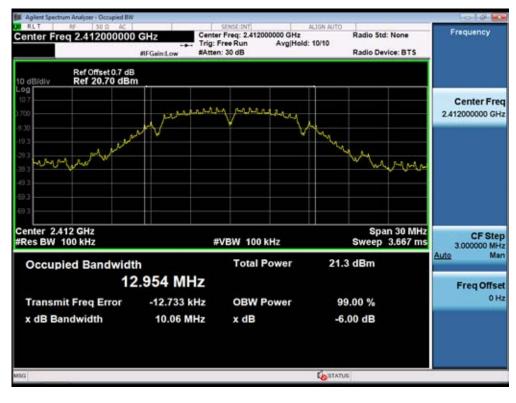
	Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Refer to Plot	Limits (kHz)	Verdict
	1	2412	10.06	Plot 4.7.1 A	≥500	PASS
ſ	6	2437	10.08	Plot 4.7.1 B	≥500	PASS
	11	2462	9.563	Plot 4.7.1 C	≥500	PASS

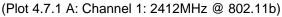
Note: 1. For 802.11b mode at finial test to get the worst-case emission at 1Mbps. 2.The test results including the cable lose.

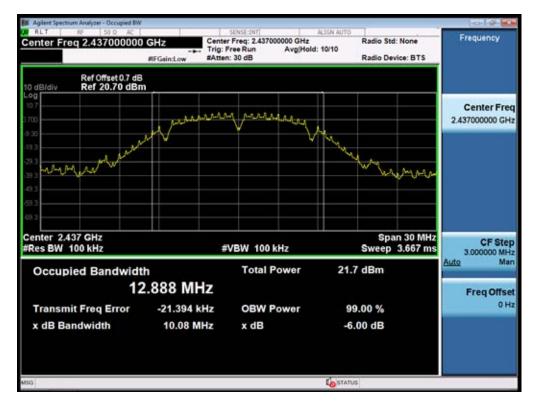
B. Test Plots



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(Plot 4.7.1 B: Channel 6: 2437MHz @ 802.11b)



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Agilant Spectrum Analyzer - Occupi RLT NF 50 Q	AC		ISN AUTO	0 9 80
Center Freq 2.462000	Trig: 1	r Freq: 2.462000000 GHz Free Run Avg Hold: 10 h: 30 dB	Radio Std: None 0/10 Radio Device: BTS	Frequency
Ref Offset 0. 10 dB/div Ref 20.70				
Log 10.7 0.700 	www.	many	<u></u>	Center Free 2.462000000 GH
193 293 393 			Mary along	.
Center 2.462 GHz #Res BW 100 kHz	#	VBW 100 kHz	Span 30 M Sweep 3.667 r	
Occupied Bandw		Total Power	21.6 dBm	Hard Communication
Transmit Freq Erro x dB Bandwidth	12.793 MHz r -33.949 kHz 9.563 MHz	OBW Power x dB	99.00 % -6.00 dB	Freq Offse 0 H
eso -				

(Plot 4.7.1 C: Channel 11: 2462MHz @ 802.11b)

4.7.2 801.11g Test Mode

A. Test Verdict

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Refer to Plot	Limits (kHz)	Verdict
1	2412	15.46	Plot 4.7.2 A	≥500	PASS
6	2437	15.79	Plot 4.7.2 B	≥500	PASS
11	2462	15.35	Plot 4.7.2 C	≥500	PASS

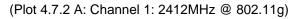
Note: 1. For 802.11g mode at finial test to get the worst-case emission at 6Mbps. 2.The test results including the cable lose.

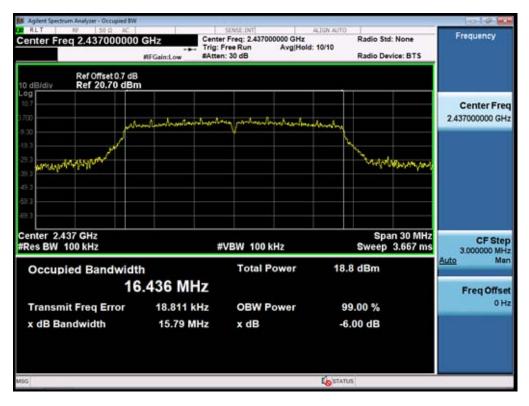
B. Test Plots



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Agilent Spectrum Analyzer - Occupied BW		and the second s			-0-4-
enter Freq 2.412000000	Trig: f	sense bril r Freq: 2.412000000 GHz Free Run Avg Hole h: 30 dB		d: None vice: BTS	Frequency
Ref Offset 0.7 dB					
•g		a pertraction to mar	whenly		Center Fre 2.412000000 GF
30			and the second		
paymonia			Willow	unselvinge	
9.3					
enter 2.412 GHz				an 30 MHz	
Res BW 100 kHz	#	VBW 100 kHz		3.667 ms	CF Ste 3.000000 Mi
Occupied Bandwidt		Total Power	17.5 dBm		Auto Mi
16	6.388 MHz				Freq Offs
Transmit Freq Error	12.472 kHz	OBW Power	99.00 %		01
x dB Bandwidth	15.46 MHz	x dB	-6.00 dB		





(Plot 4.7.2 B: Channel 6: 2437MHz @ 802.11g)



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RLT NF 50.0 AC	Trig: F	r Freq: 2.462000000 GHz Free Run Avg[Hold: h: 30 dB	Radio Std: No 10/10 Radio Device:	
Ref Offset 0.7 dB				
29	and the second second	an portune and the second	Andry	Center Free 2.462000000 GHz
town with the second			monu	utilitan og
3 3 enter 2.462 GHz tes BW 100 kHz	#	VBW 100 kHz	Span 3 Sweep 3.6	
Occupied Bandwidth		Total Power	17.6 dBm	<u>Auto</u> Mar
	.374 MHz			Freq Offset
Transmit Freq Error x dB Bandwidth	10.832 kHz 15.35 MHz	OBW Power x dB	99.00 % -6.00 dB	U.S.
a			La STATUS	

(Plot 4.7.2 C: Channel 11: 2462MHz @ 802.11g)

4.7.3 801.11n HT20MHz Test Mode

A. Test Verdict

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Refer to Plot	Limits (kHz)	Verdict
1	2412	15.97	Plot 4.7.3 A	≥500	PASS
6	2437	15.03	Plot 4.7.3 B	≥500	PASS
11	2462	16.13	Plot 4.7.3 C	≥500	PASS

Note: 1. For 802.11n HT20MHz mode at finial test to get the worst-case emission at 6.5Mbps. 2.The test results including the cable lose.

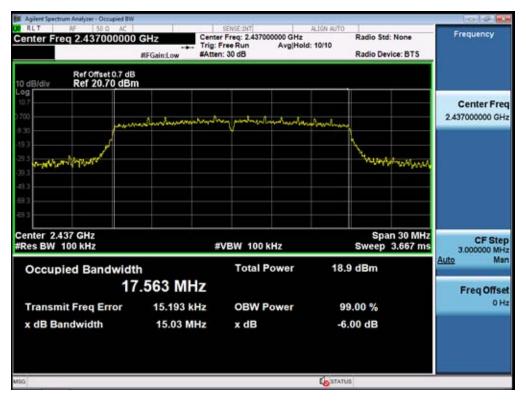
B. Test Plots



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Aglent Spectrum Analyzer - Occupied EW	i p	SENSE INT	ALTON AUTO		0 0 0
Center Freq 2.422000000	Freq: 2.422000000 GHz Free Run Avg[Hold :: 30 dB	Radio	Std: None Device: BTS	Frequency	
10 dB/div Ref Offset 0.7 dB Ref 20.70 dBn					
10.7 0.700	montenter	ay montantin and a	manland		Center Fre 2.422000000 GH
193 293 monetaliment			- NA	barran	
491					
Center 2.422 GHz #Res BW 100 kHz		VBW 100 kHz		pan 30 MHz p 3.667 ms	CF Step 3.000000 MH
Occupied Bandwidt		Total Power 18			<u>Auto</u> Ma
۲۱ Transmit Freq Error x dB Bandwidth	20.300 kHz 15.97 MHz	OBW Power x dB	99.00 % -6.00 dB		Freq Offse 0 H
esa			Costatus		
30			Contras -		





(Plot 4.7.3 B: Channel 6: 2437MHz @ 802.11n HT20)



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Agilent Spectrum Analyzer - Occupied BW				-0	10 0
RLT 85 50 9 AC Center Freq 2.462000000	Trig: F	rreq: 2.462000000 GHz ree Run Avg Hold a: 30 dB	ALIGN AUTO Radio Std: 10/10 Radio Devis		iency
Ref Offset 0.7 dB					
10.7 0.700 .4.30	nenlesselven here here he	en produced and and and and and and and and and an	Buntun		ter Fred
193 393 393 physics (for			and and	dow has	
-61 -63 -63					
Center 2.462 GHz #Res BW 100 kHz	#	VBW 100 kHz	Span Sweep 3		CF Stej
Occupied Bandwidt	^h 7.534 MHz	Total Power	17.8 dBm	Auto	Auto Mar Freq Offse
Transmit Freq Error x dB Bandwidth	12.719 kHz 16.13 MHz	OBW Power x dB	99.00 % -6.00 dB		OH
eso			STATUS		

(Plot 4.7.3 C: Channel 11: 2462MHz @ 802.11n HT20MHz)

4.7.4 801.11n HT40MHz Test Mode

A. Test Verdict

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Refer to Plot	Limits (kHz)	Verdict
3	2422	35.15	Plot 4.7.4 A	≥500	PASS
6	2437	35.22	Plot 4.7.4 B	≥500	PASS
9	2452	35.18	Plot 4.7.4 C	≥500	PASS

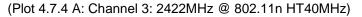
Note: 1. For 802.11n HT40MHz mode at finial test to get the worst-case emission at 13.5Mbps. 2. The test results including the cable lose.

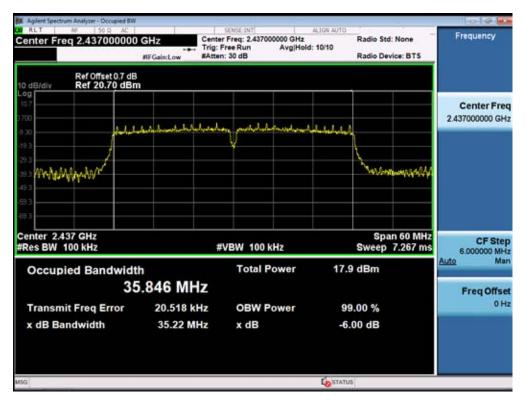
B. Test Plots



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Agilent Spectrum Analyzer - Occupied BW RLT RF 50 Q AC	1 1	SENSE:INT	ALIGN AUTO	-	-0-1-9-1
enter Freq 2.422000000	Trig:	er Freq: 2.422000000 GHz	Radio S Id: 10/10	td: None evice: BTS	Frequency
Ref Offset 0.7 dB					
0.7					Center Fr 2.422000000 G
30 9.3 9.3	ter and a second se	wy post-hold and and and and and and and and and an			
States States and			-	n-hainanteeinn	
9.3					
enter 2.422 GHz Res BW 100 kHz	ala da	#VBW 100 kHz		oan 60 MHz o 7.267 ms	CF St 6.000000 M
Occupied Bandwidt	^h .787 MHz	Total Power	15.7 dBm		Auto M Freg Offs
Transmit Freq Error	13.561 kHz	OBW Power	99.00 %		0
x dB Bandwidth	35.15 MHz	x dB	-6.00 dB		





(Plot 4.7.3 B: Channel 6: 2437MHz @ 802.11n HT40MHz)



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Agilent Spectrum Analyzer - Occupied IIW	15 13		8		-	0 6 🛃
Center Freq 2.452000000	Trig	sense:INT ter Freq: 2.452000000 G : Free Run Avgi en: 30 dB	ALIGN AUTO Hz Hold: 10/10	Radio Sto Radio De		Frequency
Ref Offset 0.7 dB 10 dB/div Ref 20.70 dBm						
Log 107 0700 930						Center Free 2.452000000 GH
49.30 Mahalan 19.3	an a	V	eren franker frankerder og hander og hand I sen er sen e			
393 493 MANIMANNIN				win	n dyeuterry	
60.3						
Center 2.452 GHz #Res BW 100 kHz		#VBW 100 kHz		Span 60 MHz Sweep 7.267 ms		CF Step 6.000000 MH
Occupied Bandwidth 35.789 MH		Total Power		15.5 dBm		Auto Mar Freq Offse
Transmit Freq Error x dB Bandwidth	7.454 kHz 35.18 MHz	OBW Power x dB		9.00 % 00 dB		OH
MSG				\$		

(Plot 4.7.4 C: Channel 9: 2452MHz @ 802.11n HT40MHz)



4.8. Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Refer to statement below for compliance

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

Antenna Connected Construction

The WLAN and Bluetooth sharing same antenna and the maximum antenna gain of WLAN uesed was 0.00 dBi



5. <u>Test Setup Photos of the EUT</u>







.....End of Report.....