ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

Product Name:	**MID**
Brand Name:	**N/A**
Model No.:	**K71; K7**(* can be 0-9, A-Z or Blank)**
Model Difference:	**Different name for market segmentation**
FCC ID:	**HFS-K7**
Report No.:	**EF/2013/80004**
Issue Date:	**Aug. 19, 2013**
FCC Rule Part:	**§15.247, Cat: DTS**
Prepared for:	**Quanta Computer Inc. No. 188, Wen Hwa 2nd RD,; Kuei Shan Hsiang, Tao Yuan Shien, Taiwan**
Prepared by:	**SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803**

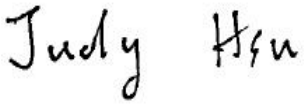
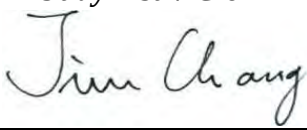
VERIFICATION OF COMPLIANCE

Applicant:	Quanta Computer Inc. No. 188, Wen Hwa 2nd RD,; Kuei Shan Hsiang, Tao Yuan Shien, Taiwan
Product Name:	MID
Brand Name:	N/A
Model No.:	K71; K7**(* can be 0-9, A-Z or Blank)
Model Difference:	Different name for market segmentation
FCC ID:	HFS-K7
File Number:	EF/2013/80004
Date of test:	Aug. 01, 2013 ~ Aug. 16, 2013
Date of EUT Received:	Aug. 01, 2013

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4:2009 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.247.

The test results of this report relate only to the tested sample identified in this report.

Test By:		***Date***	Aug. 19, 2013
	Nick Lin / Engineer		
Prepared By:		***Date***	Aug. 19, 2013
	Judy Hsu / Clerk		
Approved By:		***Date***	Aug. 19, 2013
	Jim Chang / Supervisor		

Version

Version No.	Date	Description
00	Aug. 19, 2013	Initial creation of document

Table of Contents

1 GENERAL INFORMATION

1.1 Product description

General:

Product Name:	MID
Brand Name:	N/A
Model No.:	K71; K7**(* can be 0-9, A-Z or Blank)
Model difference:	Different name for market segmentation
Hardware Version:	N/A
Software Version:	N/A
Power Supply:	19Vdc AC power cord

WLAN:

Wi-Fi	Frequency Range	Channels	Rated Power	Modulation Technology
11b/g	2412-2462	11	b: 19.14dBm g: 23.27dBm	DSSS, OFDM
11n	HT20 2412-2462	11	HT20: 23.18dBm	OFDM
Antenna Designation:		PIFA Antenna, 2.15dBi		
Modulation type:		CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM		
Transition Rate:		802.11 b: 1/2/5.5/11 Mbps 802.11 g: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 65.0Mbps		

The report applied for WLAN.

IEEE 802.11n Spec:

MCS Index	Nss	Modulation	R	NBPSC	NCBPS		NDBPS		Datarate(Mbps)			
									800nsGI		400nsGI	
					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5	7.200	15
1	1	QPSK	1/2	2	104	216	52	108	13.0	27.0	14.400	30
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5	21.700	45
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0	28.900	60
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0	43.300	90
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0	57.800	120
6	1	64-QAM	3/4	6	312	648	234	486	58.5	121.5	65.000	135
7	1	64-QAM	5/6	6	312	648	260	540	65.0	135.0	72.200	150

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bite per single carrier
NCBPS	Number of coded bite per symbol
NDBPS	Number of data bite per symbol
GI	Guard interval

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: HFS-K7** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules. The composite system (digital device) is compliance with Subpart B is authorized under a Doc procedure.

1.3 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4:2009. Radiated testing was performed at an antenna to EUT distance 3 meters.

Tested in accordance with Apr 2013 KDB558074 D01 V03 for compliance to FCC 47CFR 15.247 requirements.

1.4 Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, Wuku Industrial Zone, Taipei County, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2009. FCC Registration Number: 990257. Canada Registration Number: 4620A-4.

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 29, Pau-Tou-Tsuo Valley Chia-Pau Tsuen, Linkou Hsiang, Taipei county, which is constructed and calibrated to meet the CISPR 22/EN 55022 requirements. SGS Site No. 1(3 &10 meters) and FCC Registration Number: 94644.

1.5 Special Accessories

There are no special accessories used while test was conducted.

1.6 Equipment Modifications

There was no modification incorporated into the EUT.

2 SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the general criterion in Section 7.1 of ANSI C63.4:2009.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz, and the measurement procedure 7.3 in ANSI 63.4:2009 is followed to carry out the test. The CISPR Quasi-Peak and Average detector mode is employed according to §15.107

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna. according to the requirements in Section 8 and 13 and of ANSI C63.4:2009,

2.4 Configuration of Tested System

Fig. 2-1 Radiated Emission

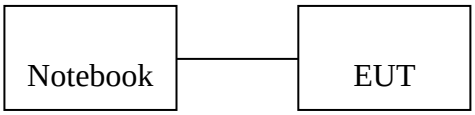


Fig. 2-2 Conducted (Antenna Port) Configuration

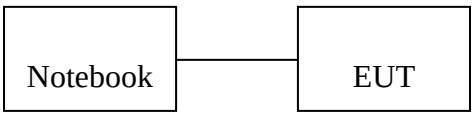


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	Notebook	Lenovo	L412	LR-957X7	Shielded	N/A
2.	WLAN Test Software	N/A	N/A	N/A	N/A	N/A

Fig. 2-3 AC Power Line Conducted Emission

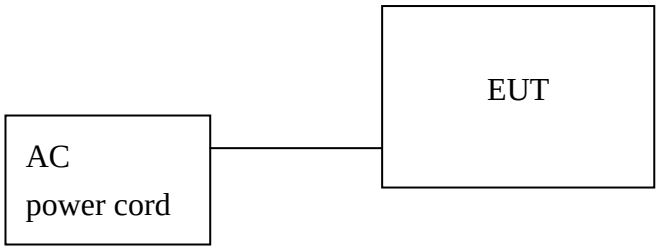


Table 2-2 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	WLAN Test Software	N/A	N/A	N/A	N/A	N/A

3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)	AC Power Line Conducted Emission	Compliant
§15.247(b) (3)	Peak Output Power	Compliant
§15.247(a)(2)	6dB Bandwidth	Compliant
§15.247(d)	100 KHz Bandwidth Of Frequency Band Edges	Compliant
§15.247(d)	Spurious Emission	Compliant
§15.247(e)	Peak Power Density	Compliant
§15.203	Antenna Requirement	Compliant

4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.
Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

802.11 b mode: Channel low (2412MHz)、mid (2437MHz) and high (2462MHz) with 1Mbps lowest data rate are chosen for full testing.

802.11 g mode: Channel low (2412MHz)、mid (2437MHz) and high (2462MHz) with 6Mbps lowest data rate are chosen for full testing.

802.11 n_20MHz mode: Channel low (2412MHz)、mid (2437MHz) and high (2462MHz) with 6.5Mbps lowest data rate are chosen for full testing.

The worst case is determined by the output power that generates the highest emission. As examined in the section of output power measurement, the section 7.5, the lowest data rate at a/b/g/n_HT20/n_HT40 resulted the highest level of fundamental emission, and therefore, the lowest data rate is chosen as the worst-case to conduct the remaining of other mandatory test cases.

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for 802.11b/g/n WLAN Transmitter for channel Low, Mid and High, the worst case H position was reported.

5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Peak Output Power	+/- 1.55dB (for Spectrum) +/- 1.42 dB (for Power Meter)
6dB Bandwidth	+/- 123.36 Hz
100 KHz Bandwidth Of Frequency Band Edges	+/- 1.55 dB
Peak Power Density	+/- 1.55 dB
Temperature	+/- 0.8 °C
Humidity	+/- 4.7 %
DC / AC Power Source	DC= +/- 1%, AC=+/- 0.2%

Radiated Spurious Emission:

Measurement uncertainty (Polarization : **Vertical**)	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

Measurement uncertainty (Polarization : **Horizontal**)	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

6 CONDUCTED EMISSION TEST

6.1 Standard Applicable:

According to §15.207, frequency range within 150KHz to 30MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

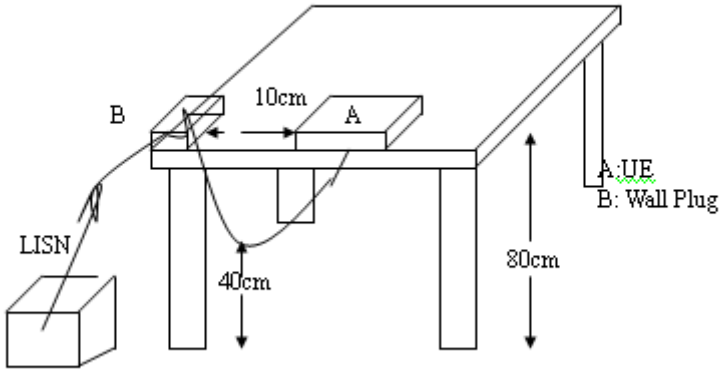
6.2 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
EMI Test Receiver	R&S	ESCI7	100759	02/08/2013	02/07/2014
EMI Receiver	R&S	ESCS 30	828985/004	09/23/2012	09/22/2013
LISN	Rolf-Heine	NNB-2/16Z	99012	03/23/2013	03/22/2014
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	03/23/2013	03/22/2014
Coaxial Cables	N/A	WK CE Cable	N/A	01/05/2013	01/04/2014

6.3 EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4:2009.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

6.4 Test SET-UP (Block Diagram of Configuration)



6.5 Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all phases of power being supplied by given UE are completed

6.6 Measurement Result:

Note1: Refer to next page for measurement data and plots.

Note2: The * reveals the worst-case results that closet to the limit

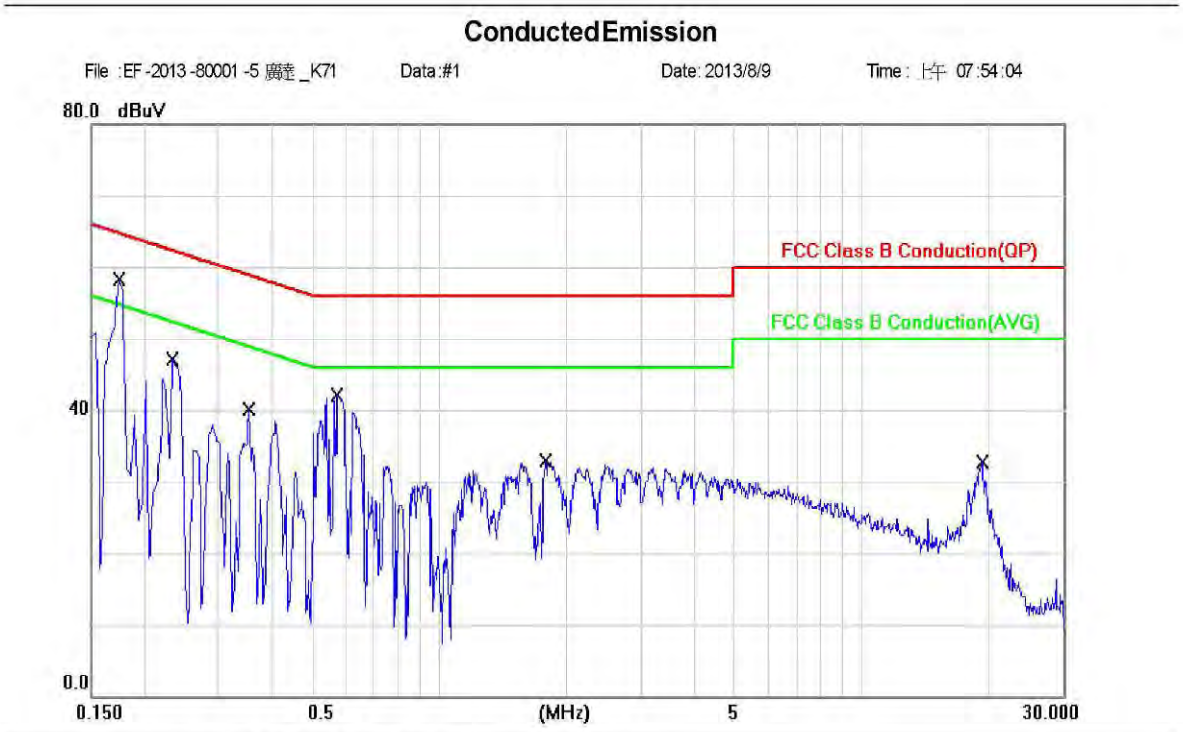
AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation mode			Test Date:	Aug. 09, 2013
Temperature:	26 ℃	Humidity:	60 %	Test By:	Nick

Site ConductionRoom
Limit: FCC Class B Conduction(QP)
EUT: MID
M/N: K7**(* canbe 0-9，A-Z or Blank)
Note:

Phase: L1
Power: AC 120V/60Hz
Distance:
Mode: Operationmode

Temperature: 26 ℃
Humidity: 60%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1740	56.38	0.16	56.54	64.77	-8.23	QP	
2		0.1740	45.08	0.16	45.24	54.77	-9.53	AVG	
3		0.2340	46.97	0.16	47.13	62.31	-15.18	QP	
4		0.3540	39.86	0.17	40.03	58.87	-18.84	QP	
5		0.5740	41.95	0.17	42.12	56.00	-13.88	QP	
6		1.7900	32.61	0.22	32.83	56.00	-23.17	QP	
7		19.2460	32.37	0.43	32.80	60.00	-27.20	QP	

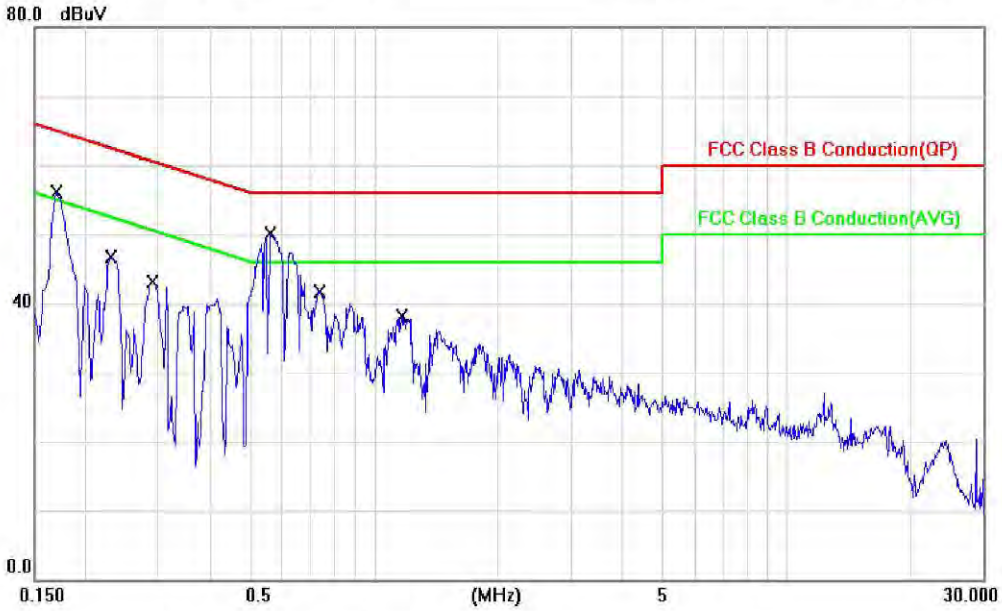
Site ConductionRoom
Limit: FCC Class B Conduction(QP)
EUT: MID
M/N: K7**(* canbe 0-9，A-Z or Blank)
Note:

Phase: N
Power: AC 120V/60Hz
Distance:
Mode: Operation mode

Temperature: 26 ℃
Humidity: 60%

Conducted Emission

File :EF-2013-80001-5 廠產_K71 Data:#2 Date: 2013/8/9 Time : 上午 07:57:38



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1700	54.94	0.18	55.12	64.96	-9.84	QP	
2		0.1700	43.93	0.18	44.11	54.96	-10.85	AVG	
3		0.2300	46.56	0.19	46.75	62.45	-15.70	QP	
4		0.2900	42.96	0.20	43.16	60.52	-17.36	QP	
5		0.5620	48.88	0.21	49.09	56.00	-6.91	QP	
6	*	0.5620	43.07	0.21	43.28	46.00	-2.72	AVG	
7		0.7420	41.53	0.21	41.74	56.00	-14.26	QP	
8		1.1660	37.79	0.23	38.02	56.00	-17.98	QP	

7 PEAK OUTPUT POWER MEASUREMENT

7.1 Standard Applicable:

According to §15.247 (b)

(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

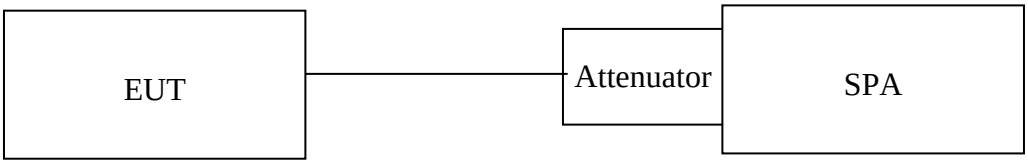
(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

7.2 Measurement Equipment Used:

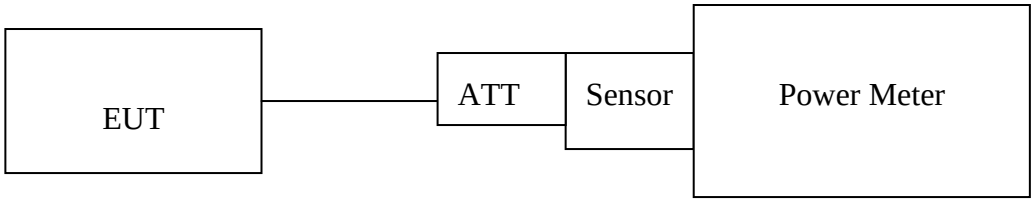
Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Power Meter	Anritsu	ML2495A	1005007	02/08/2012	02/07/2014
Power Sensor	Anritsu	MA2411B	917032	02/08/2012	02/07/2014
Spectrum Analyzer	Agilent	E4446A	MY51100003	05/30/2013	05/29/2014
Spectrum Analyzer	Agilent	E4440A	MY45304525	03/15/2013	03/14/2014
DC Block	Mini-Circuits	BLK-18-S+	1	02/28/2013	02/27/2014
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2013	01/04/2014
Attenuator	Mini-Circuit	BW-S10W2+	002	02/28/2013	02/27/2014
Splitter	Agilent	11636B	N/A	02/28/2013	02/27/2014

7.3 Test Set-up:

Spectrum:



Power Meter:



7.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter or spectrum. (**Peak power setting on Spectrum:** Channel power function, RBW = 1MHz, VBW = 3MHz, Span: 30/60MHz, Detector =peak, Sweep = Auto. Setting on spectrum is adjusted based on the mandatory procedure in 9.1.2 of the KDB558074). Power Meter is used as the auxiliary test equipment to conduct the output power measurement. 9.1.3 in KDB558074 is followed.
   (**Avg. power setting on Spectrum:** Channel power function, RBW = 1MHz, VBW = 3MHz, Span: 30/60MHz, Detector =Avg., Trace avg =100, Sweep = Auto, Setting on spectrum is adjusted based on the mandatory procedure in 9.2.2.4 of the KDB558074). Power Meter is used as the auxiliary test equipment to conduct the output power measurement. 9.2.3, option 3 in KDB558074 is followed.
3. Record the max. Reading as observed from Spectrum or Power Meter.
4. Repeat above procedures until all frequency of interest measured was complete.

Pre-anaysis Check: While conducting average power measurement, duty cycle of each mode (n_ht20) shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle. All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones
b = 99%, g = 96.9%, and n_ht_20 = 95.6%1, where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

Formula:

Duty Cycle = Ton / (Ton+Toff)

Test Procedure:

Set span = 0, RBW = 1MHz, VBW = 3MHz, Detector = Peak

Duty Cycle:

	Duty Cycle
802.11b	0.99
802.11g	0.9694
802.11n_20	0.9558

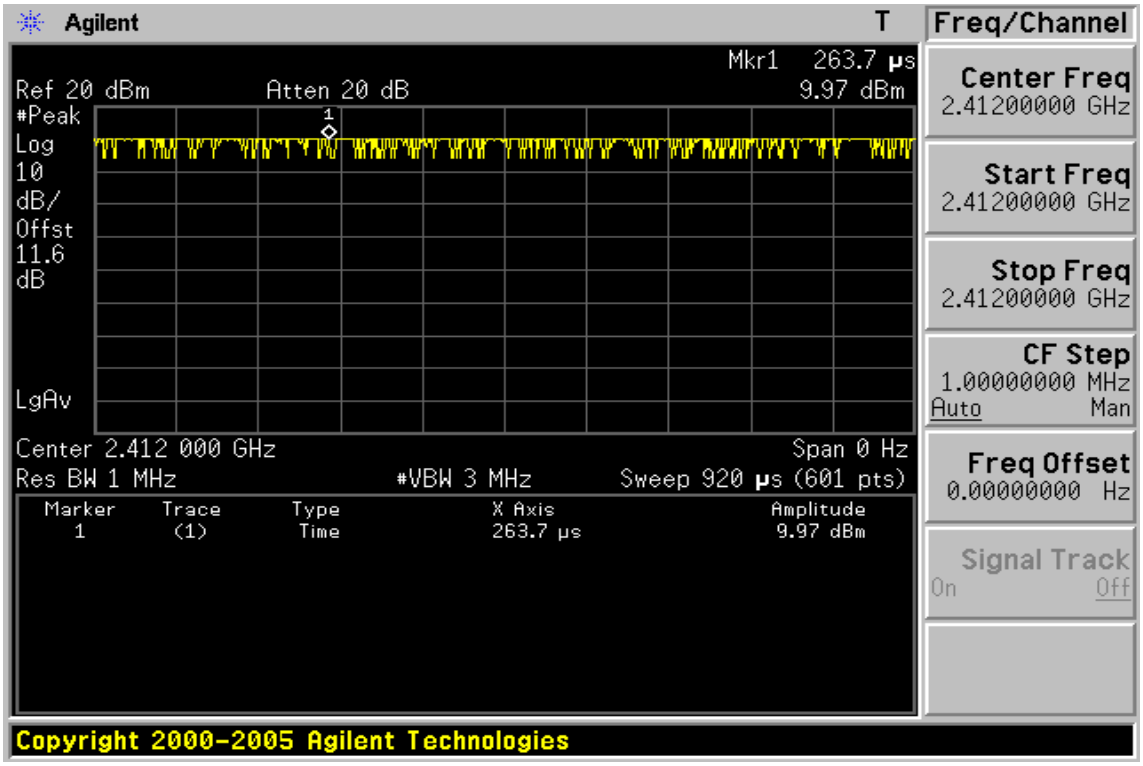
802.11b: Duty Cycle Factor: 10 * log (1/0.99) = 0.04

802.11g: Duty Cycle Factor: 10 * log (1/0.97) = 0.13

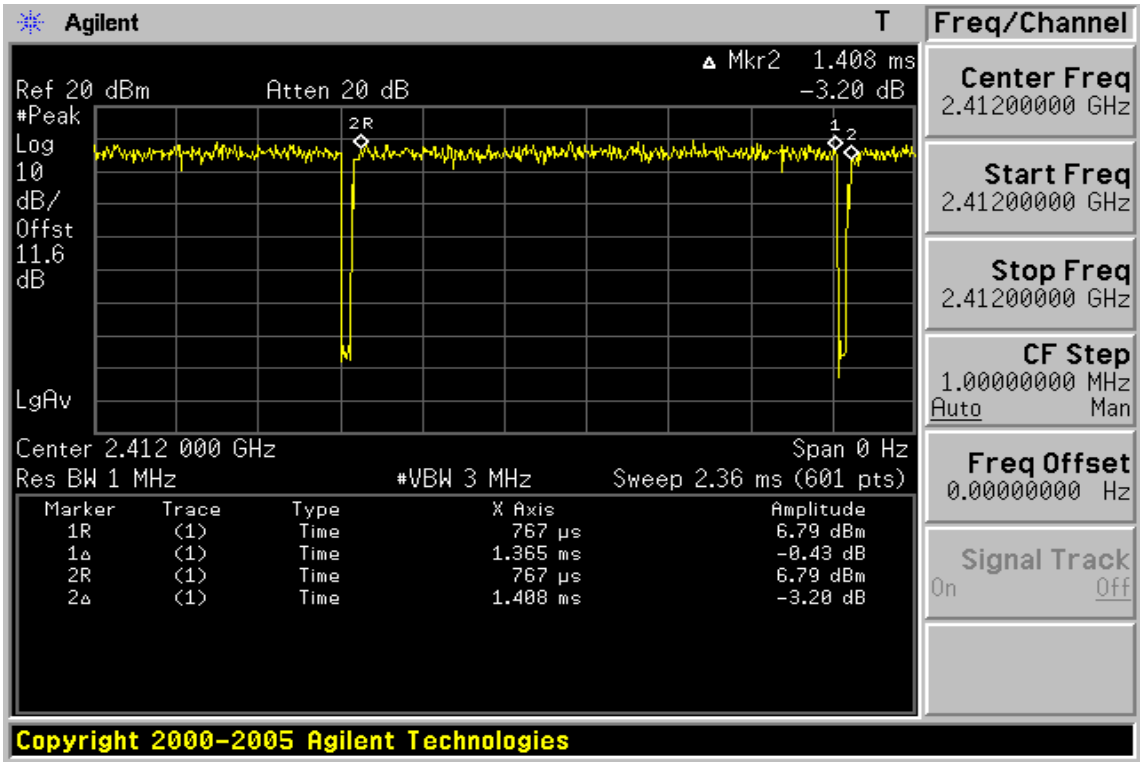
802.11n_20M: Duty Cycle Factor: 10 * log (1/0.96) = 0.2

Duty Factor:

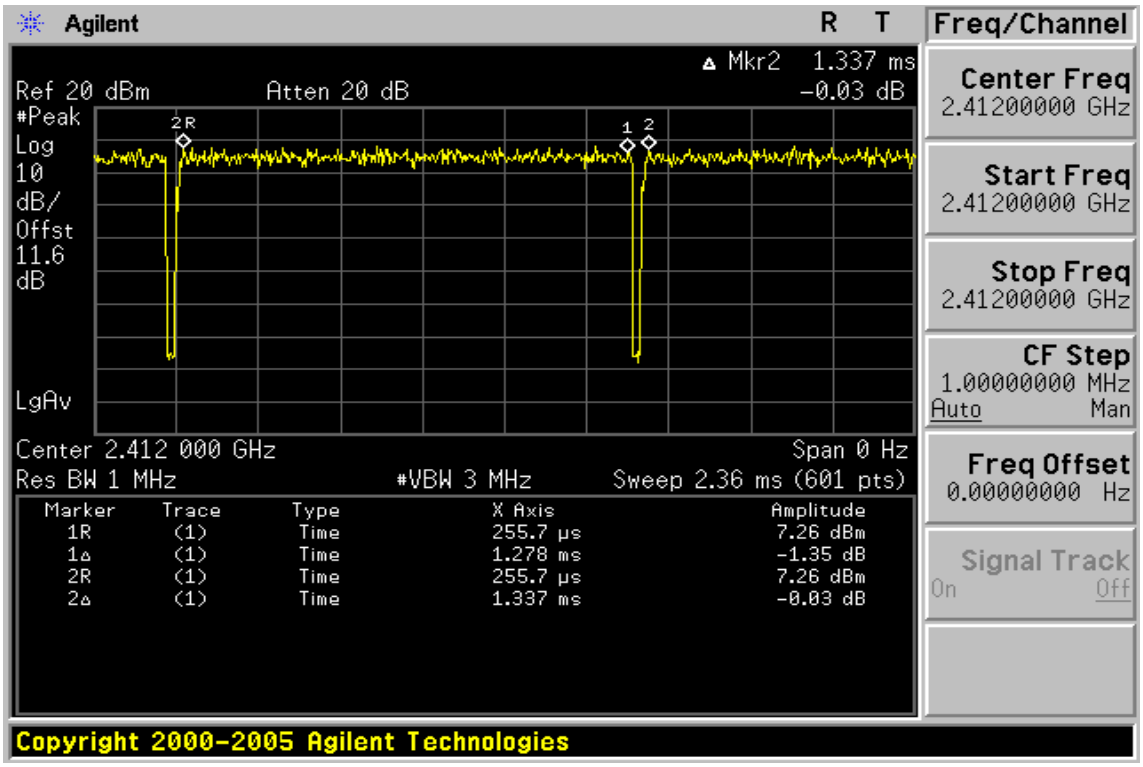
802.11 b



802.11 g



802.11 n_20 MHz



Measurement Result:

802.11b

CH	Frequency (MHz)	Peak Power Output (dBm)				Required Limit
		Data Rate				
		1	2	5.5	11	
1	2412	19.09	18.73	18.41	18.07	1 Watt = 30 dBm
6	2437	**19.14**	18.89	18.64	18.52	1 Watt = 30 dBm
11	2462	18.83	18.68	18.51	18.48	1 Watt = 30 dBm

CH	Frequency (MHz)	Average Power Output (dBm)				Required Limit
		Data Rate				
		1	2	5.5	11	
1	2412	16.96	16.73	16.64	16.43	1 Watt = 30 dBm
6	2437	17.04	16.73	16.62	16.56	1 Watt = 30 dBm
11	2462	16.75	16.58	16.43	16.25	1 Watt = 30 dBm

802.11g

CH	Frequency (MHz)	Peak Power Output(dBm)								Required Limit
		Data Rate								
		6	9	12	18	24	36	48	54	
1	2412	**23.27**	23.09	22.93	22.79	22.65	22.17	21.82	21.54	1 Watt = 30 dBm
6	2437	23.19	23.02	22.91	22.76	22.62	22.16	22.87	21.59	1 Watt = 30 dBm
11	2462	23.02	22.82	22.71	22.42	22.35	21.85	21.49	21.10	1 Watt = 30 dBm

CH	Frequency (MHz)	Average Power Output(dBm)								Required Limit
		Data Rate								
		6	9	12	18	24	36	48	54	
1	2412	13.38	12.97	12.54	12.03	11.8	11.45	11.23	10.86	1 Watt = 30 dBm
6	2437	13.44	12.98	12.61	12.26	11.9	11.65	11.35	11.02	1 Watt = 30 dBm
11	2462	13.17	12.74	12.31	12.92	11.67	11.4	11.18	10.75	1 Watt = 30 dBm

802.11n_20M

CH	Frequency (MHz)	Peak Power Output(dBm)								
		Data Rate								Required Limit
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
1	2412	23.10	22.83	22.41	22.01	21.74	21.38	20.92	20.53	1 Watt = 30 dBm
6	2437	**23.18**	22.74	22.33	21.91	21.67	21.19	21.83	20.46	1 Watt = 30 dBm
11	2462	22.95	22.44	21.89	21.58	21.27	20.94	20.68	20.32	1 Watt = 30 dBm

CH	Frequency (MHz)	Average Power Output(dBm)								
		Data Rate								Required Limit
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
1	2412	13.18	12.85	12.34	11.91	11.42	10.99	10.53	10.01	1 Watt = 30 dBm
6	2437	13.31	13.20	12.85	12.45	11.64	11.24	10.51	10.06	1 Watt = 30 dBm
11	2462	13.01	12.67	12.21	11.75	11.10	10.45	10.12	9.85	1 Watt = 30 dBm

**** Note: The duty cycle factor is compensated to obtain the maximum value of measurement in average.***

8 6dB BANDWIDTH

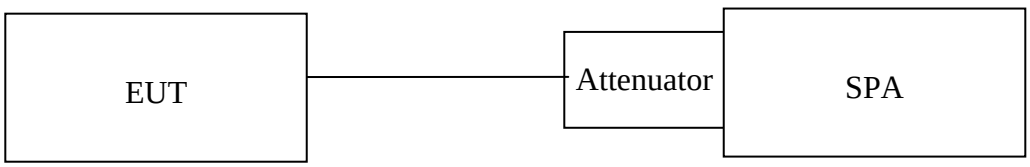
8.1 Standard Applicable:

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

8.2 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Power Meter	Anritsu	ML2495A	1005007	02/08/2012	02/07/2014
Power Sensor	Anritsu	MA2411B	917032	02/08/2012	02/07/2014
Spectrum Analyzer	Agilent	E4446A	MY51100003	05/30/2013	05/29/2014
Spectrum Analyzer	Agilent	E4440A	MY45304525	03/15/2013	03/14/2014
DC Block	Mini-Circuits	BLK-18-S+	1	02/28/2013	02/27/2014
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2013	01/04/2014
Attenuator	Mini-Circuit	BW-S10W2+	002	02/28/2013	02/27/2014
Splitter	Agilent	11636B	N/A	02/28/2013	02/27/2014

8.3 Test Set-up:



8.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 100 kHz, VBW = 3*RBW, Span = 30M/50MHz, Detector=Peak, Sweep=auto, the setting on spectrum is adjusted based on the procedure as guide in 8.1 option 1 of KDB558074.
4. Mark the peak frequency and –6dB (upper and lower) frequency.
5. Repeat above procedures until all frequency of interest measured was complete.

8.5 Measurement Result:

802.11b

Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Result
2412	9098	> 500	PASS
2437	7867	> 500	PASS
2462	8138	> 500	PASS

802.11g

Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Result
2412	15374	> 500	PASS
2437	16328	> 500	PASS
2462	14498	> 500	PASS

802.11n_20M

Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Result
2412	15175	> 500	PASS
2437	15184	> 500	PASS
2462	15187	> 500	PASS

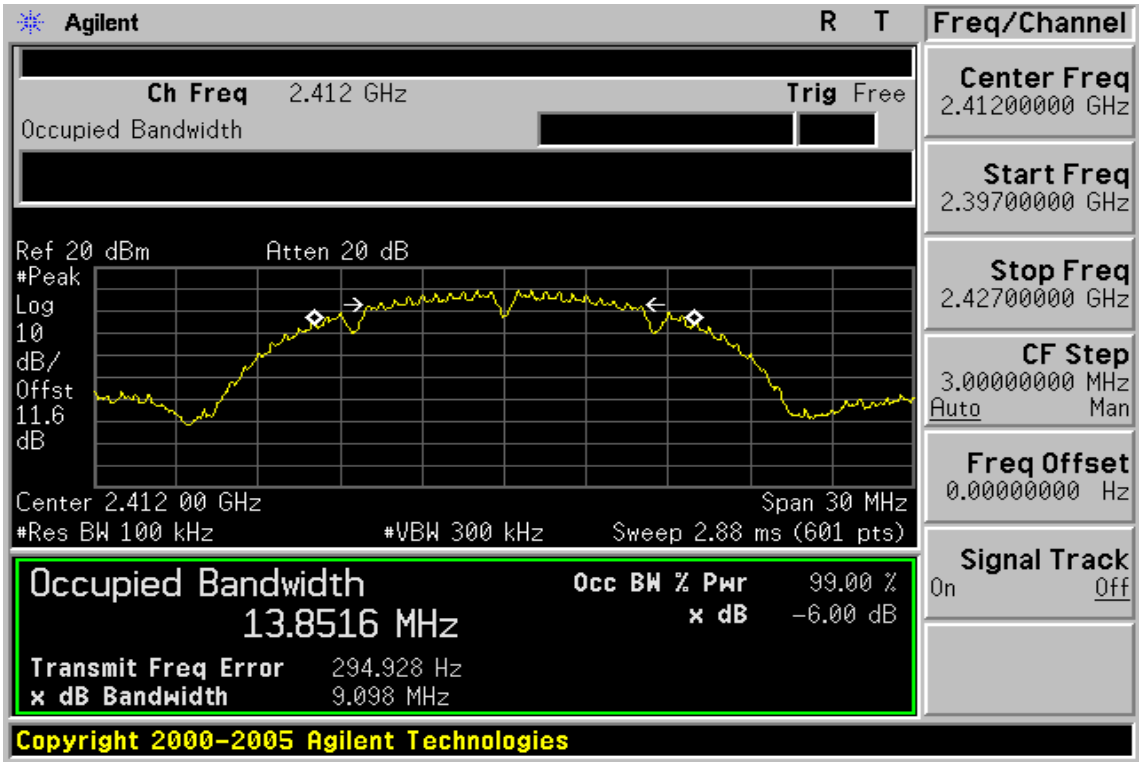
** Note: Offset 11.6dB for 802.11b;*
Offset 11.7dB for 802.11g;
Offset 11.8dB for 802.11/n_20

** Note: The arrow "->" reveals X decibel level*

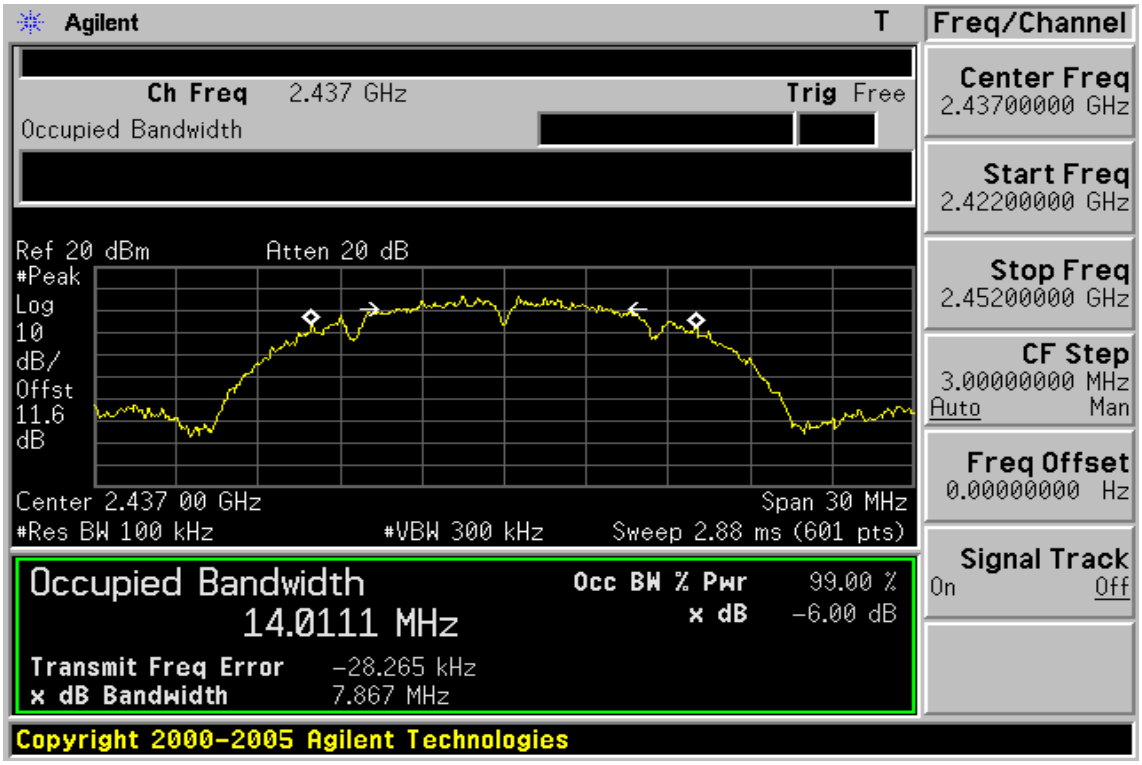
**Refer to next page for plots*

802.11b

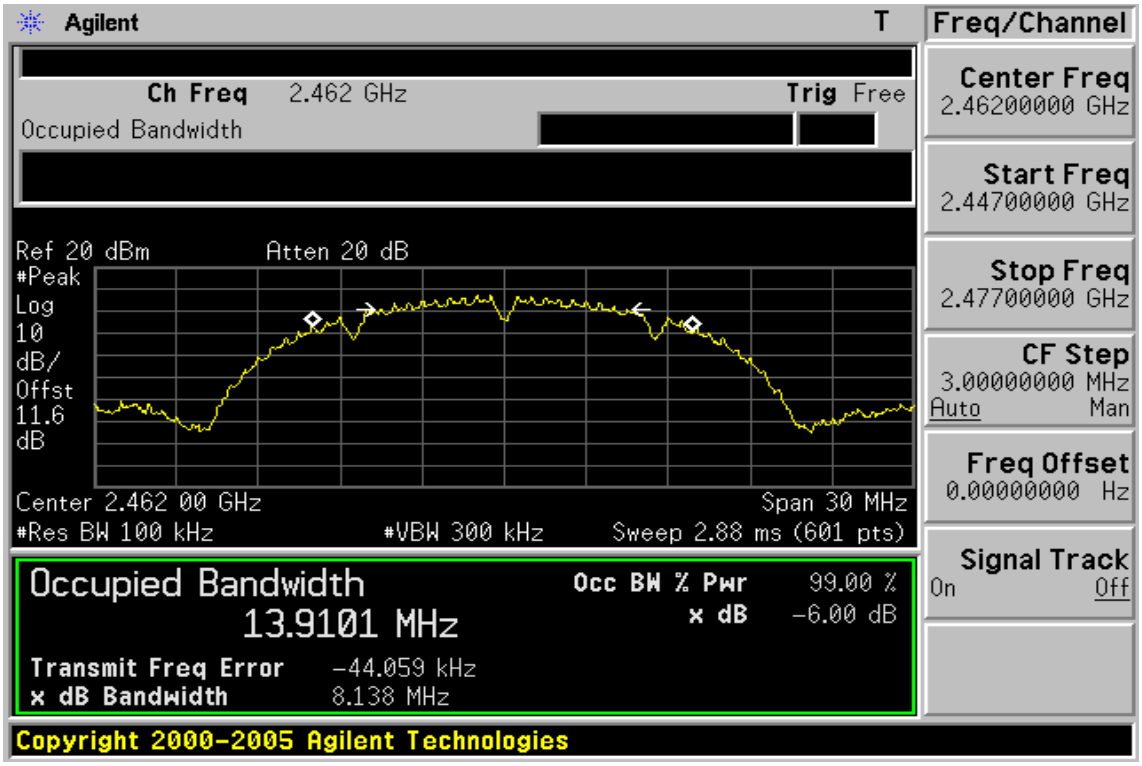
6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid

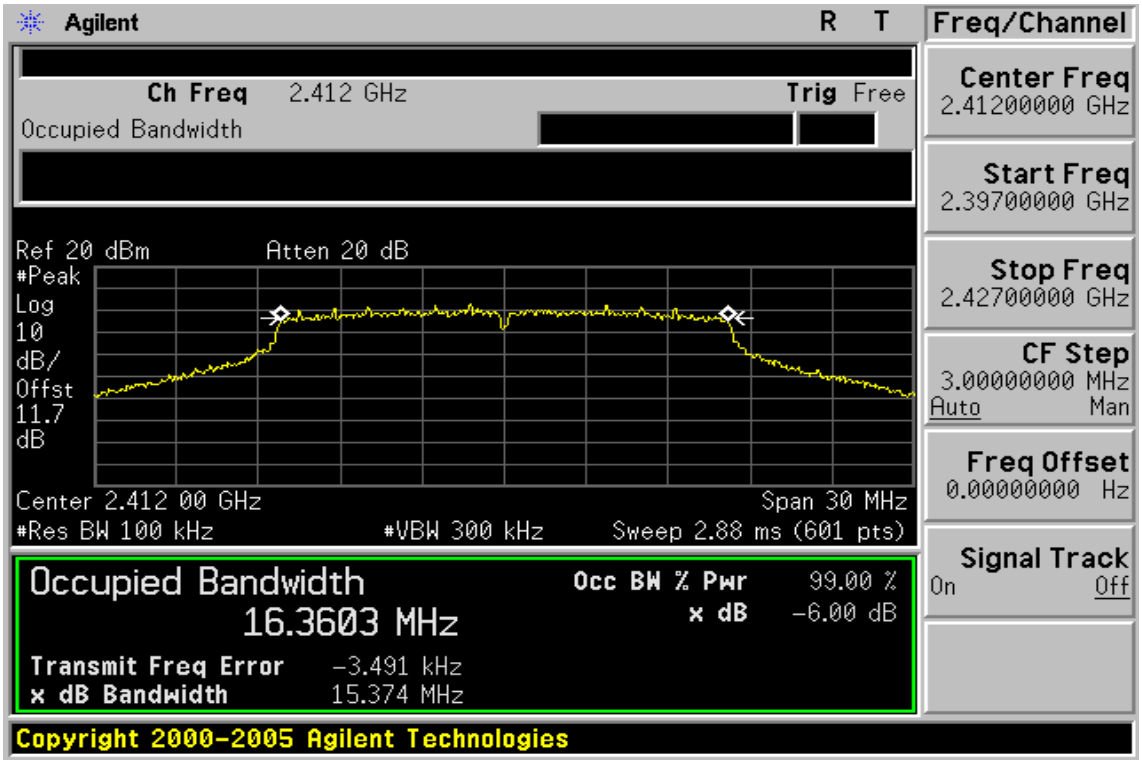


6dB Band Width Test Data CH-High

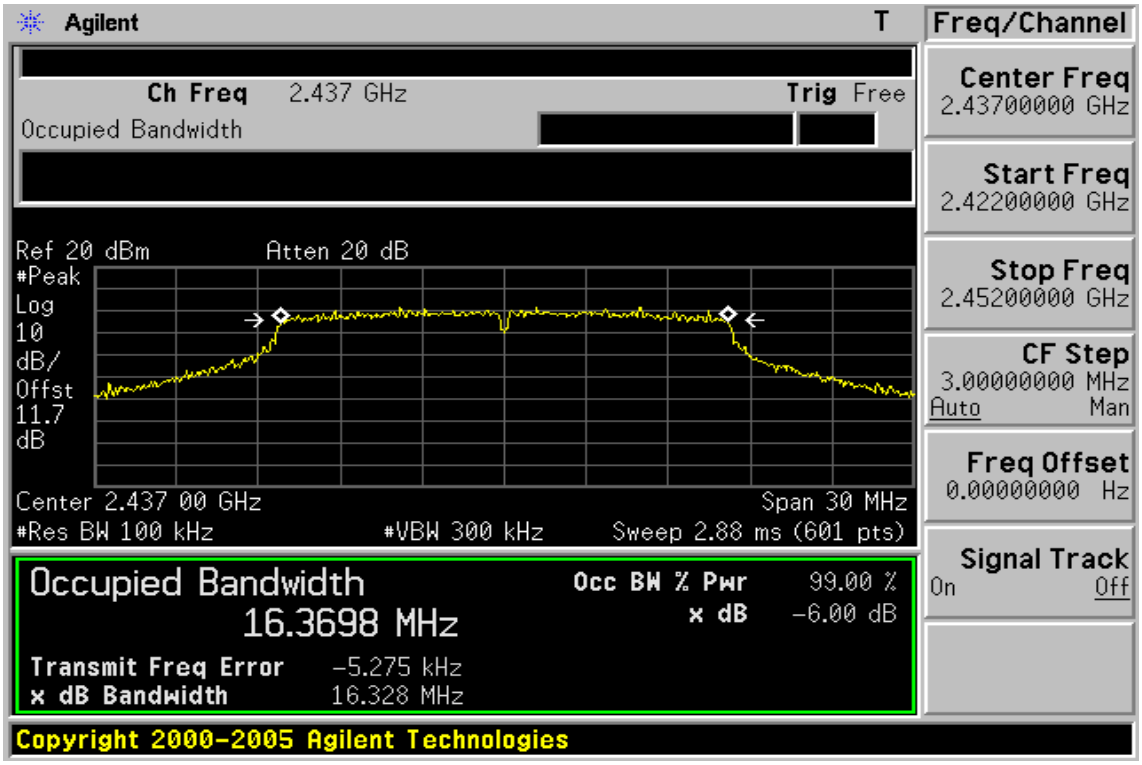


802.11g

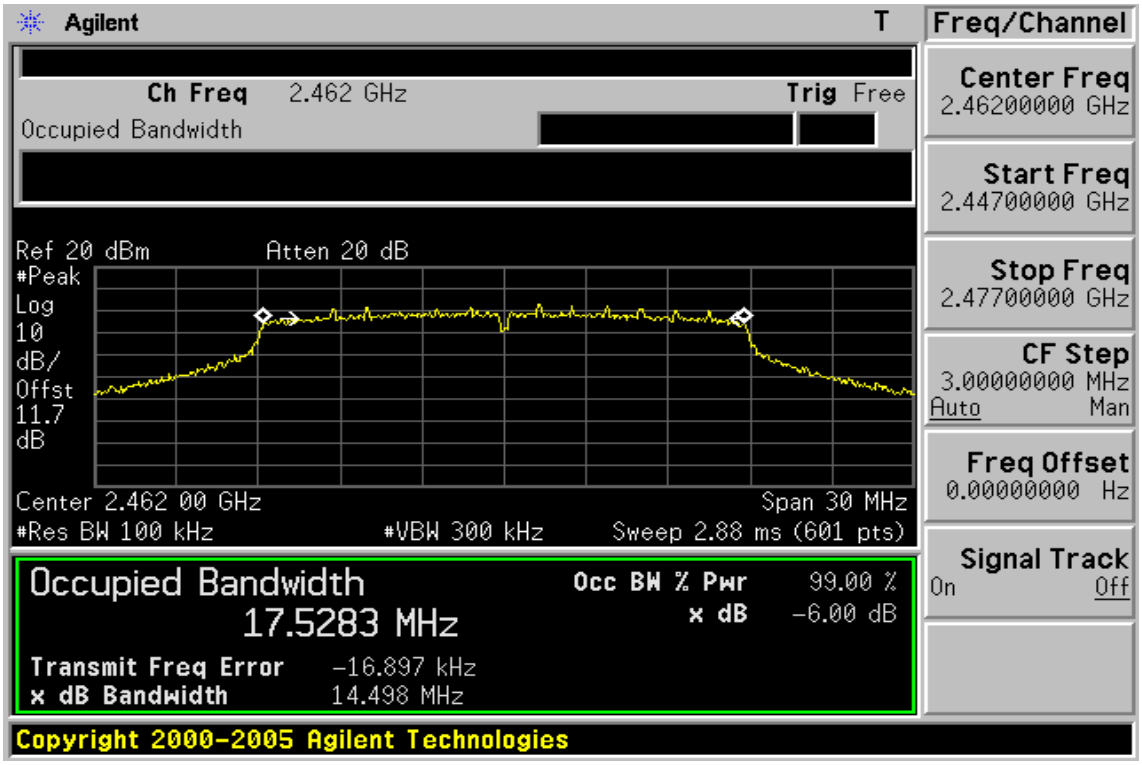
6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid

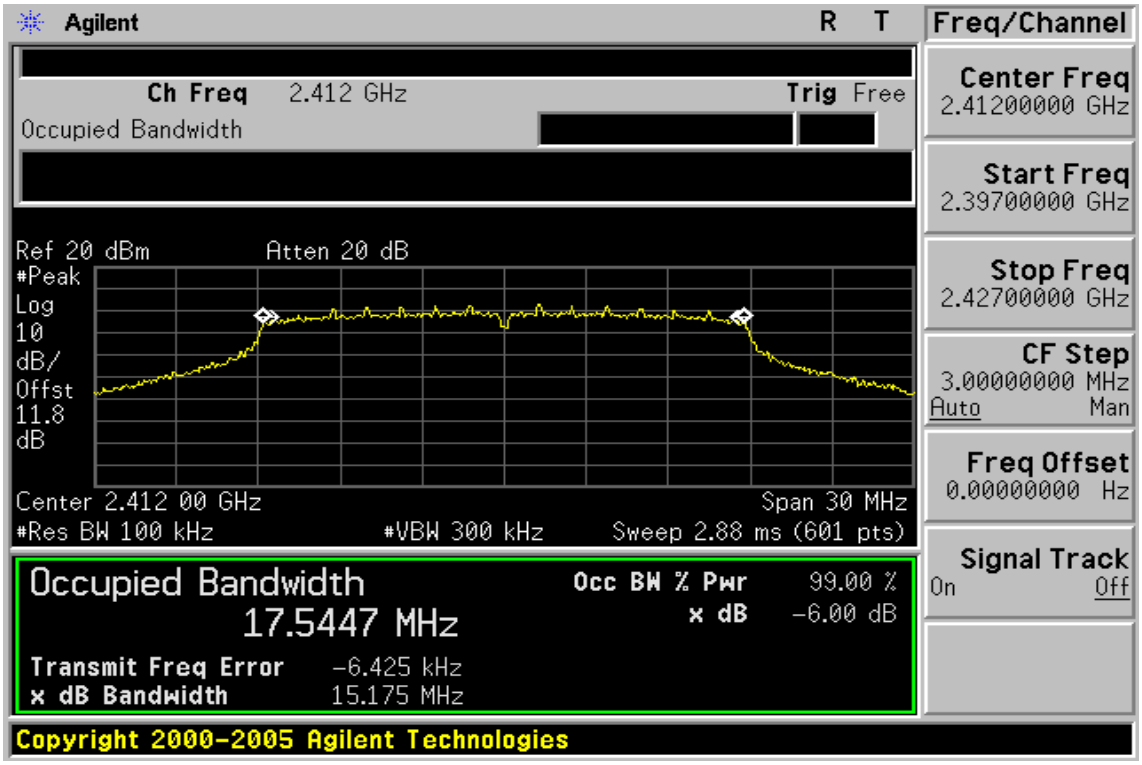


6dB Band Width Test Data CH-High

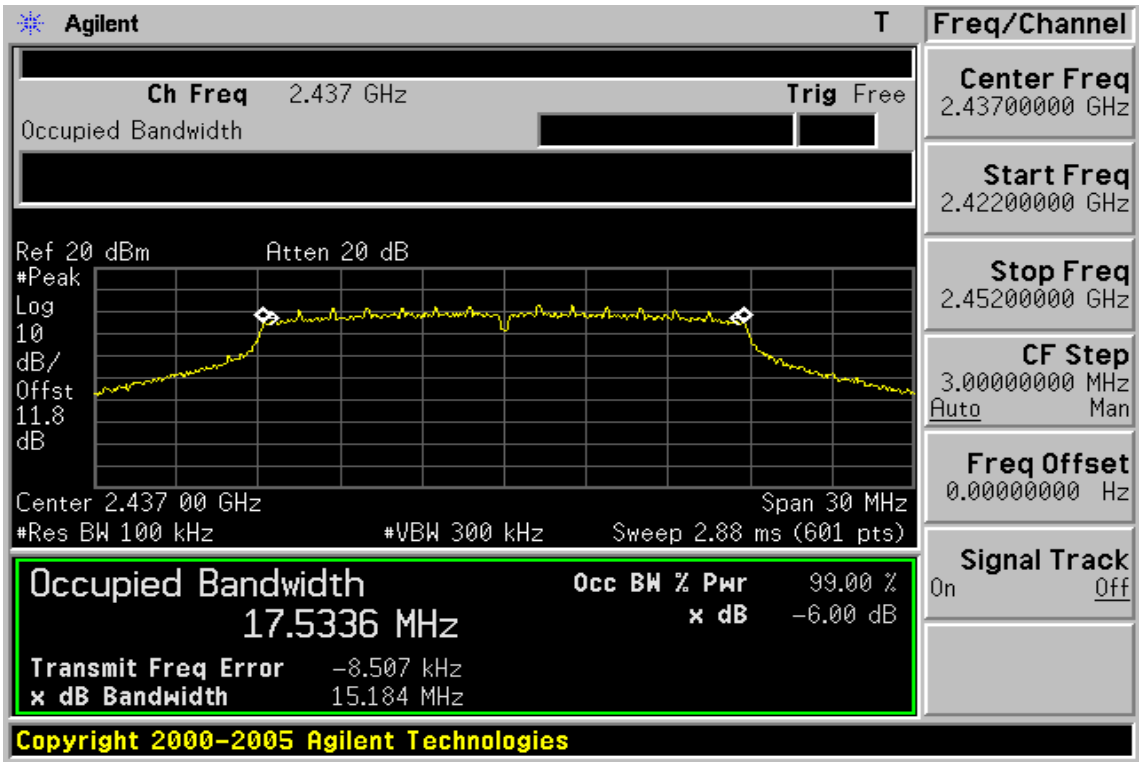


802.11n_20M

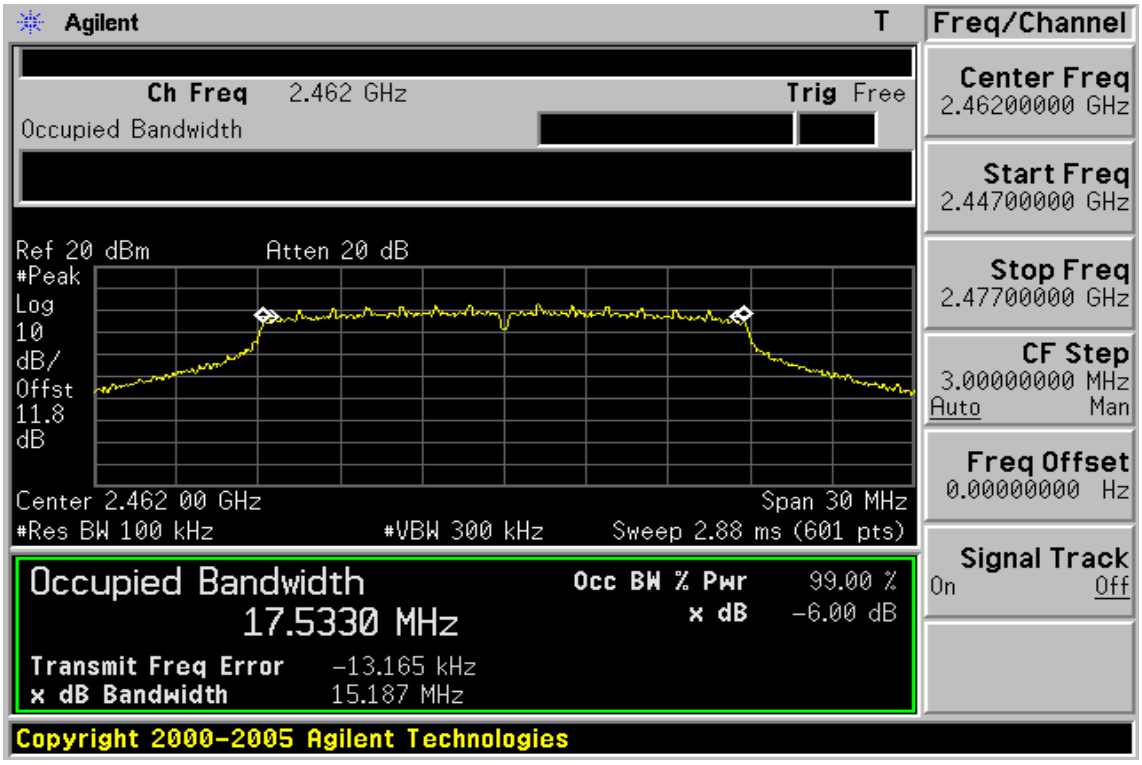
6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High



9 BAND EDGES MEASUREMENT

9.1 Standard Applicable:

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, 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 in15.209(a).

9.2 Measurement Equipment Used:

9.2.1 Conducted Emission at antenna port:

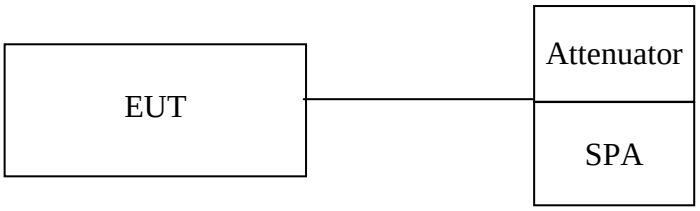
Refer to section 7.2 for details.

9.2.2 Radiated emission:

966 Chamber					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
EMI Test Receiver	R&S	ESCI7	100759	02/08/2013	02/07/2014
Spectrum Analyzer	Agilent	E4446A	MY51100003	05/30/2013	05/29/2014
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	02/06/2013	02/07/2014
Spectrum Analyzer	R&S	FSV-30	101398	10/18/2011	10/17/2013
Bilog Antenna	SCHWAZBECK	VULB9168	378	01/10/2012	01/09/2014
Horn antenna	ETS.LINDGREN	3117	123995	05/31/2013	05/30/2014
Horn Antenna	Schwarzbeck	BBHA9170	184	01/17/2012	01/16/2014
Pre-Amplifier	Agilent	8447D	2944A07676	01/04/2013	01/03/2014
Pre-Amplifier	EMC Instruments Corp.	EMC0126530	980038	01/04/2013	01/03/2014
Filter 2400-2483.5 MHz	EWT	EWT-14-0166	M2	02/28/2013	02/28/2014
Attenuator	Mini-Circuit	BW-S10W2+	004	02/28/2013	02/27/2014
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	HD	MA240-N	240/657	N.C.R	N.C.R
Controller	HD	HD100	N/A	N.C.R	N.C.R
Low Loss Cable	Huber Suhner	966_Rx	9	01/04/2013	01/03/2014
3m Site NSA	SGS	966 chamber	N/A	07/15/2013	07/14/2014
EMI Test Receiver	R&S	ESCI7	100759	02/08/2013	02/07/2014

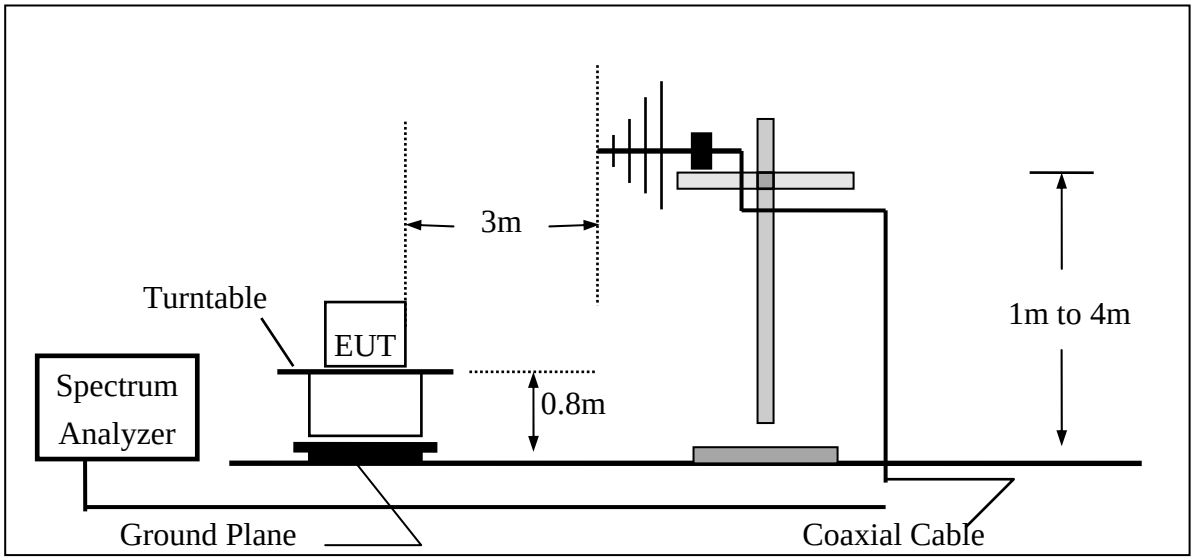
9.3 Test SET-UP:

9.3.1 Conducted Emission at antenna port:

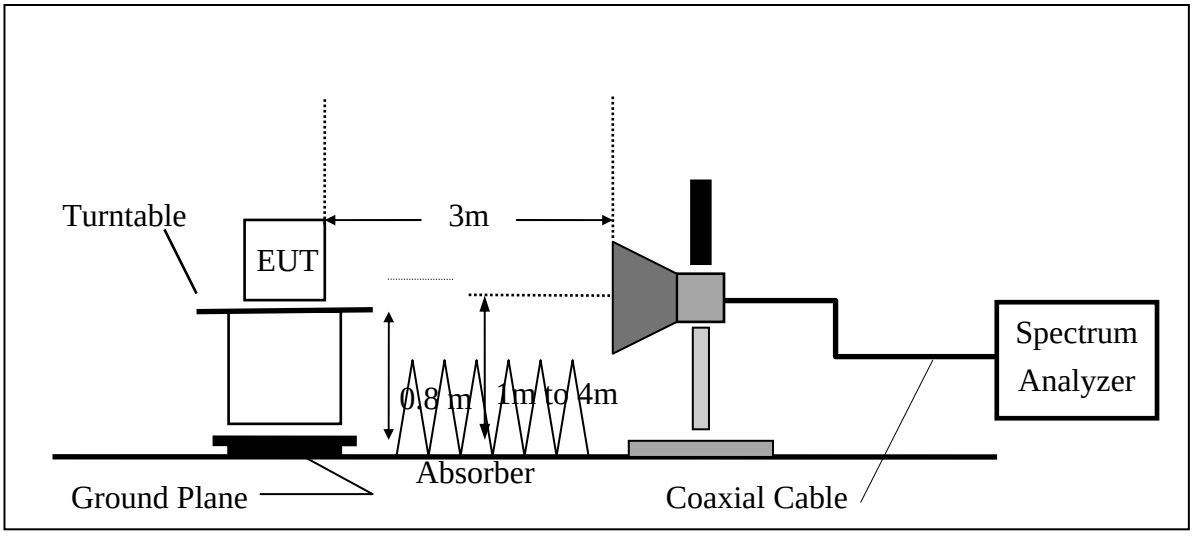


9.3.2 Radiated emission:

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



9.4 Measurement Procedure:

Unwanted Emissions into Non-Restricted Frequency Bands, Measurement Procedure followed by 11.1 of KDB558074 D01:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set start to edge frequency, and stop frequency of spectrum analyzer so as to encompass the spectrum to be examined.
4. Set the spectrum analyzer as RBW, VBW=300KHz, Detector = Peak, Sweep = auto
5. Mark the highest reading of the emission as the reference level measurement.
6. Set DL as the limit = reading on marker 1 – 20dBm
7. Marker on frequency, 2.3999GHz and 2.4836GHz, and examine shall 100 KHz immediately outside the authorized (2400~2483.5) be attenuated by 20dB at least relative to the maximum emission of power.
8. Repeat above procedures until all default test channel (low, middle, and high) was complete.

Unwanted Emission falling into Restricted Frequency Bands, Measurement Procedure followed by 11.1 of KDB558074 D01:

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. On spectrum, following 8.1.2, and RBW = 1MHz, VBW = 3MHz, & Marker 2390MHz, and 2483.5MHz (Peak Measurement). Average Measurement: following 8.2 with the modification span to 1MHz, &RBW = 1MHz, VBW = 3MHz and peak marker function to obtain the highest reading on 2390, and 2483.5MHz.
8. Repeat above procedures until all default test channel (low, middle, and high) was complete

9.5 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

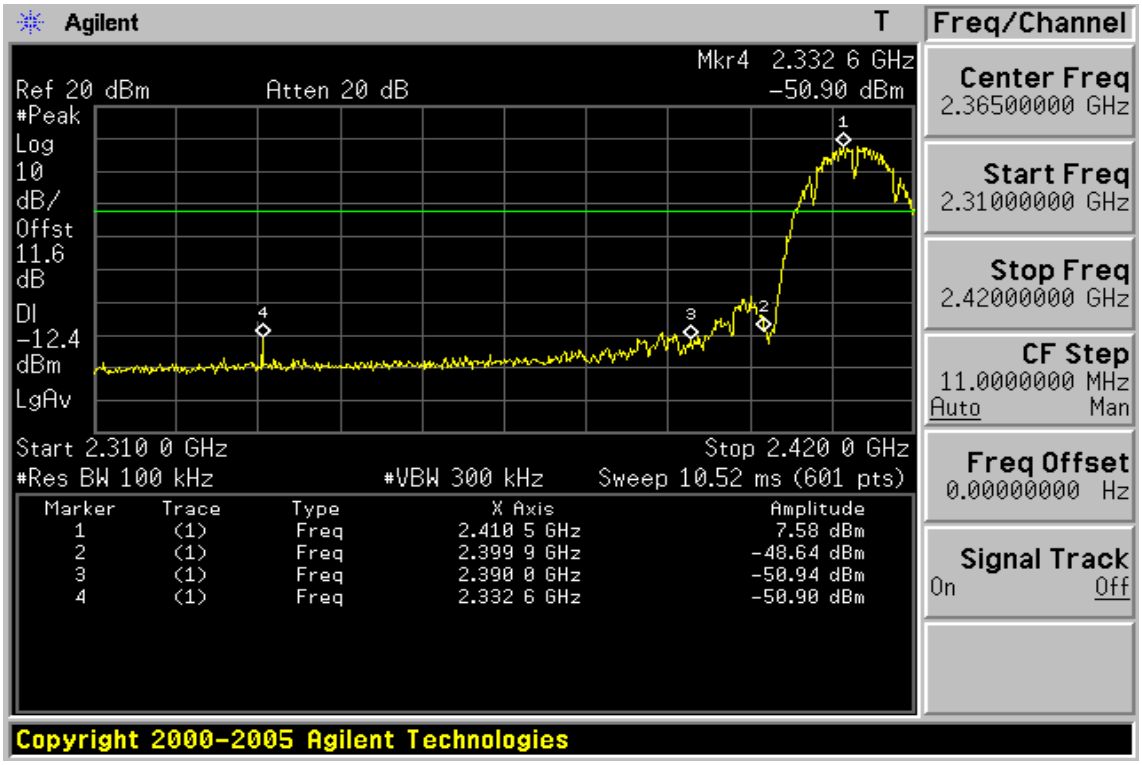
Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

9.6 Measurement Result:

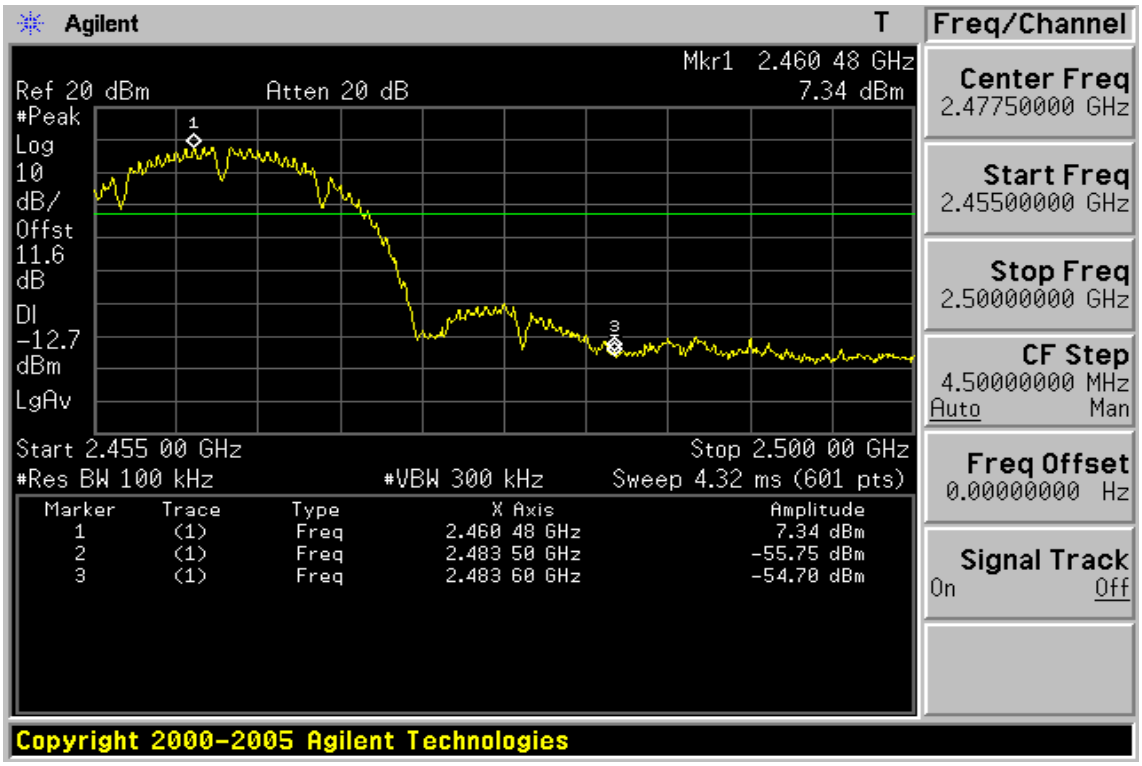
Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

802.11b - Unwanted Emissions into Non-Restricted Frequency Bands

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



Radiated Emission:

(Unwanted Emissions into Restricted Frequency Bands): 802.11 b mode

Operation Band	:802.11 b	Test Date	:2013-08-12
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:Bandedge LOW	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2390.00	E	Average	44.78	2.51	47.29	54.00	-6.71
2390.00	E	Peak	55.60	2.51	58.11	74.00	-15.89

Operation Band	:802.11 b	Test Date	:2013-08-12
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:Bandedge LOW	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2390.00	E	Average	44.79	3.13	47.92	54.00	-6.08
2390.00	E	Peak	55.24	3.13	58.37	74.00	-15.63

Operation Band	:802.11 b	Test Date	:2013-08-12
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:Bandedge HIGH	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	43.45	2.87	46.32	54.00	-7.68
2483.50	E	Peak	55.06	2.87	57.93	74.00	-16.07

Operation Band	:802.11 b	Test Date	:2013-08-12
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:Bandedge HIGH	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

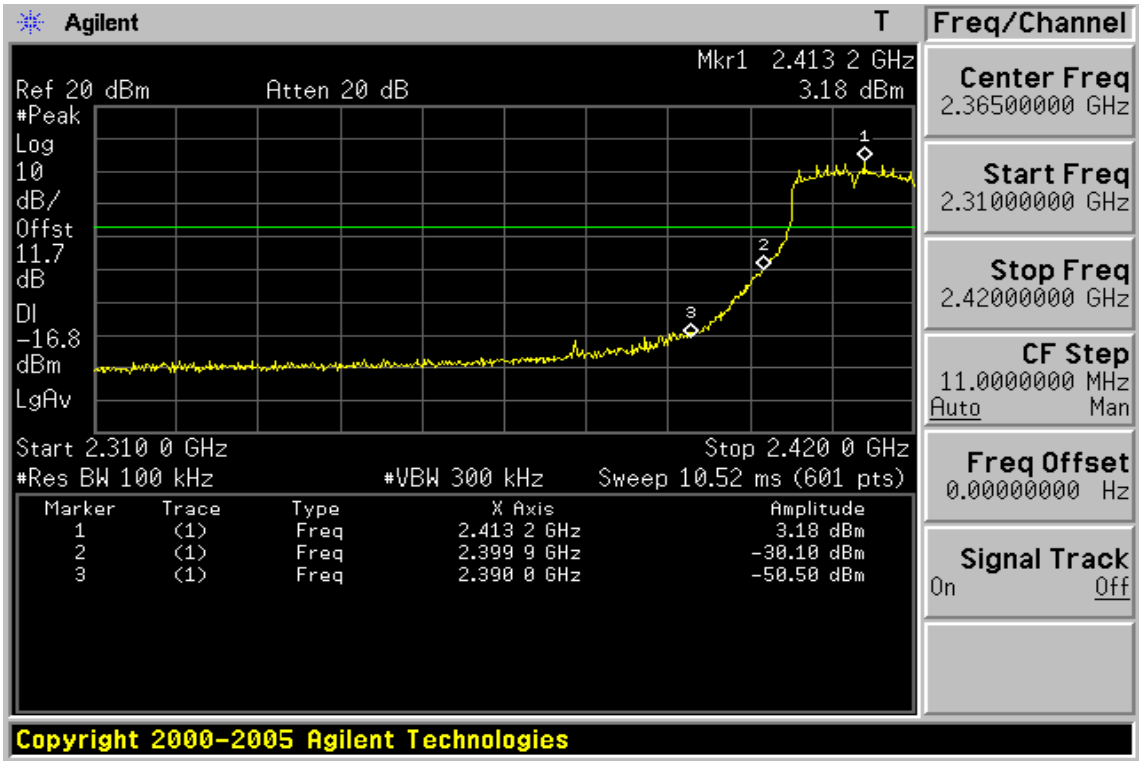
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

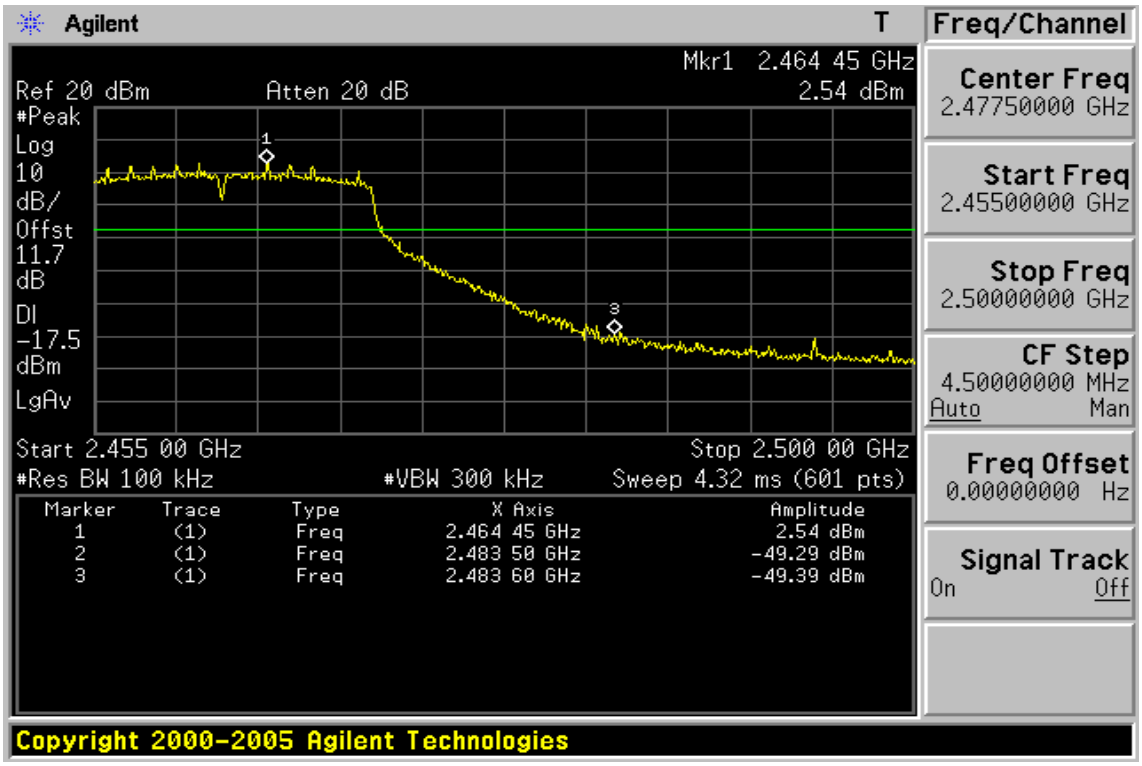
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	43.04	3.90	46.94	54.00	-7.06
2483.50	E	Peak	54.18	3.90	58.08	74.00	-15.92

802.11g - Unwanted Emissions into Non-Restricted Frequency Bands

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



Radiated Emission:

(Unwanted Emissions into Restricted Frequency Bands): 802.11 g mode

Operation Band	:802.11 g	Test Date	:2013-08-12
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:Bandedge LOW	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2390.00	E	Average	45.70	2.51	48.21	54.00	-5.79
2390.00	E	Peak	62.87	2.51	65.38	74.00	-8.62

Operation Band	:802.11 g	Test Date	:2013-08-12
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:Bandedge LOW	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2390.00	E	Average	44.22	3.13	47.35	54.00	-6.65
2390.00	E	Peak	63.23	3.13	66.36	74.00	-7.64

Operation Band	:802.11 g	Test Date	:2013-08-12
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:Bandedge HIGH	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	46.53	2.87	49.40	54.00	-4.60
2483.50	E	Peak	65.28	2.87	68.15	74.00	-5.85

Operation Band	:802.11 g	Test Date	:2013-08-12
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:Bandedge HIGH	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

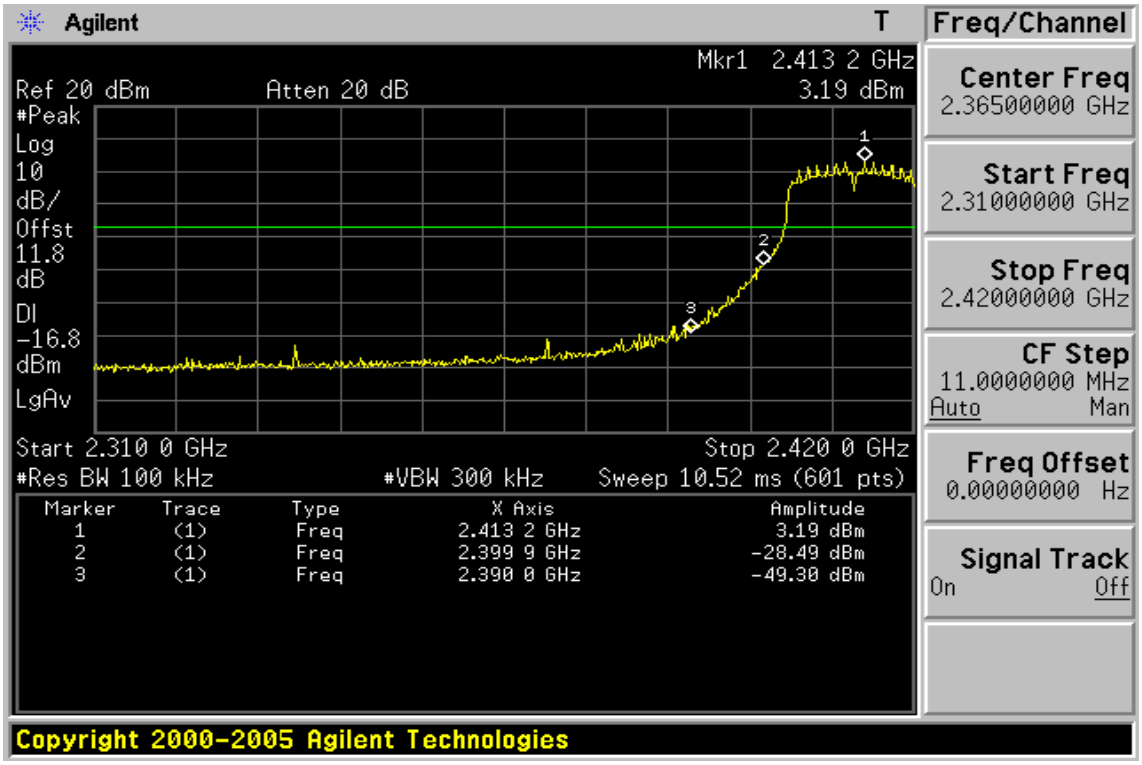
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

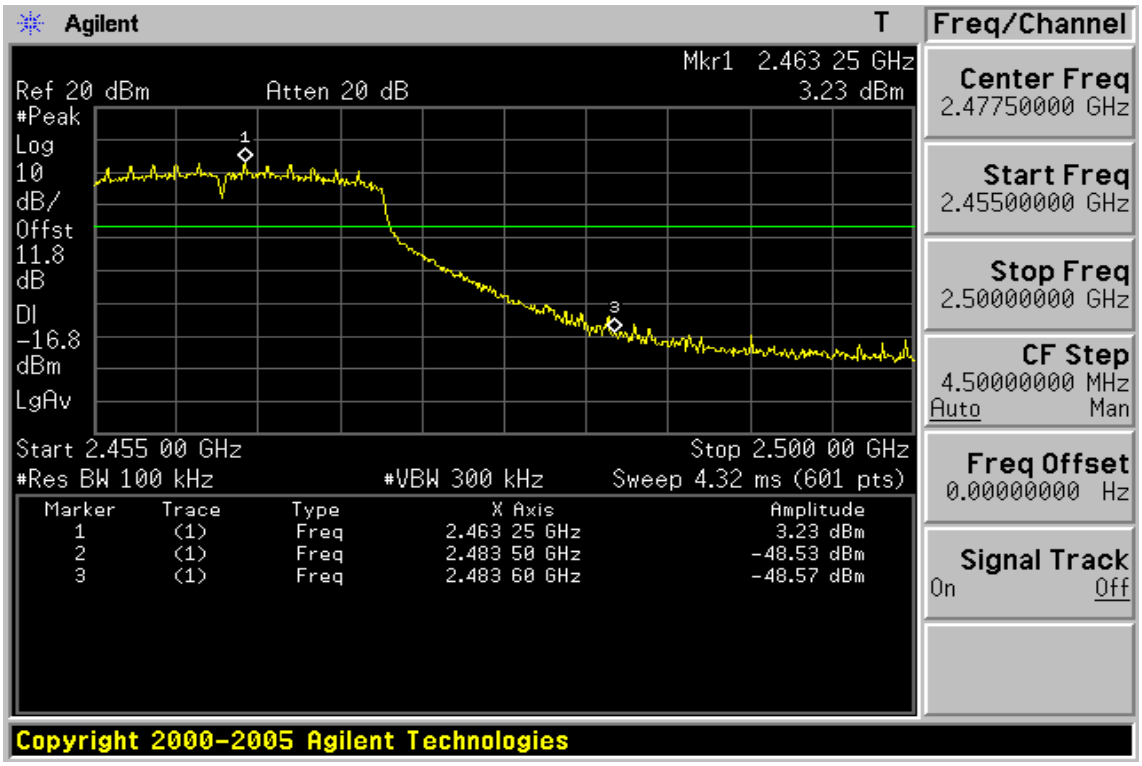
Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	44.60	3.90	48.50	54.00	-5.50
2483.50	E	Peak	61.57	3.90	65.47	74.00	-8.53

802.11n_20M- Unwanted Emissions into Non-Restricted Frequency Bands

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



Radiated Emission: 802.11 n_20M mode

(Unwanted Emissions into Restricted Frequency Bands): 802.11 n_20M mode

Operation Band	:802.11 n20M	Test Date	:2013-08-12
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:Bandedge LOW	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2390.00	E	Average	46.70	2.51	49.21	54.00	-4.79
2390.00	E	Peak	66.99	2.51	69.50	74.00	-4.50

Operation Band	:802.11 n20M	Test Date	:2013-08-12
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:Bandedge LOW	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2390.00	E	Average	47.97	3.13	51.10	54.00	-2.90
2390.00	E	Peak	65.65	3.13	68.78	74.00	-5.22

Operation Band	:802.11 n20M	Test Date	:2013-08-12
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:Bandedge HIGH	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	47.68	2.87	50.55	54.00	-3.45
2483.50	E	Peak	66.43	2.87	69.30	74.00	-4.70

Operation Band	:802.11 n20M	Test Date	:2013-08-12
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:Bandedge HIGH	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
2483.50	E	Average	46.47	3.90	50.37	54.00	-3.63
2483.50	E	Peak	64.79	3.90	68.69	74.00	-5.31

10 SPURIOUS EMISSION TEST

10.1 Standard Applicable

According to §15.247(d),

Emission at antenna port:

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.

Radiated Spurious Emission

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)).

And according to §15.33(a) (1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

10.2 Measurement Equipment Used:

10.2.1 Conducted Emission at antenna port:

Refer to section 7.2 for details.

10.2.2 Radiated emission:

Refer to section 9.2.2 for details.

10.3 Test SET-UP:

10.3.1 Conducted Emission at antenna port:

Refer to section 7.3 for details.

10.3.2 Radiated emission:

Refer to section 9.3.2 for details.

10.4 Measurement Procedure:

Radiated Emission:

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. On spectrum, change spectrum mode in linear display mode, and reduce VBW = 10Hz if average reading is measured.
7. Repeat above procedures until all default test channel measured were complete.

Conducted Emission:

1. To connect Antenna Port of EUT to Spectrum.
2. Set RBW = 100K & VBW = 300K on Spectrum.
3. Sweep the frequency to determine spurious emission as seen on spectrum from span of 30 to 3G, 3G to 8G, 8G to 13G, 13G to 18G and 18G to 26.5GHz, 18G to 40GHz (applicable if operation mode is 5GHz)
4. Via Software, combine 5 spans of frequency range into one plot
5. Repeat above procedures until all default test channel measured were complete.

10.5 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

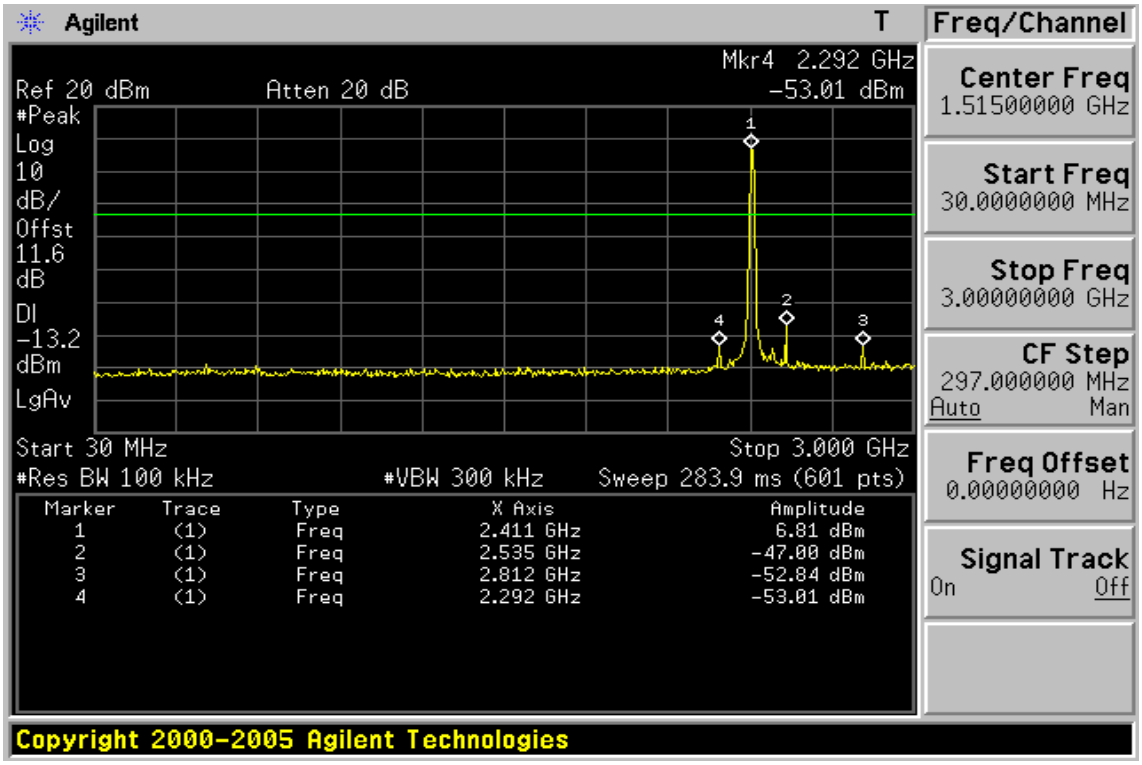
Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

10.6 Measurement Result:

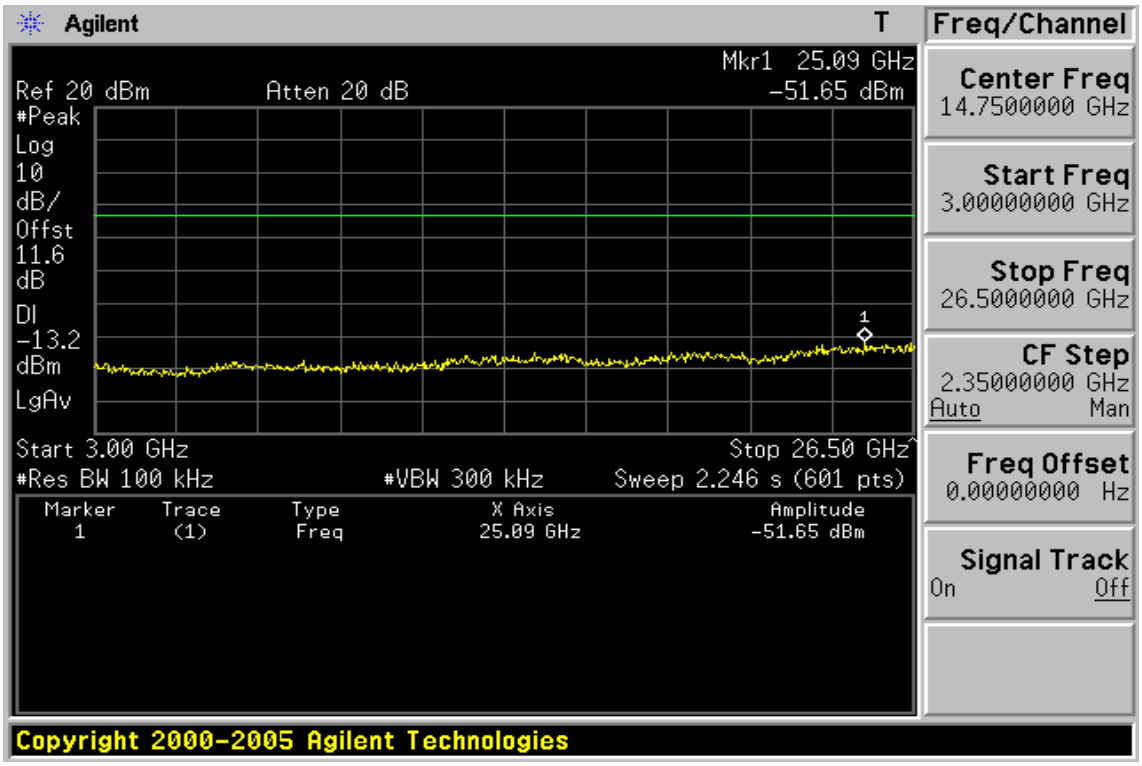
Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

Conducted Spurious Emission Measurement Result (802.11b)

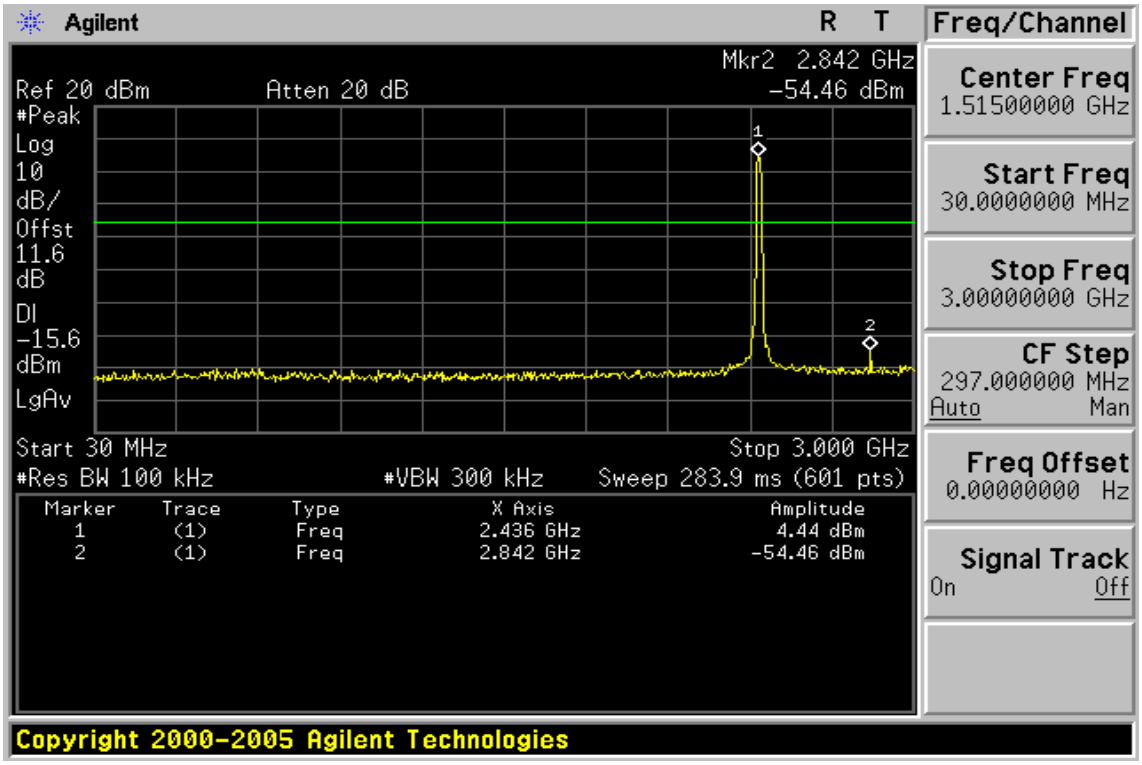
Ch Low 30MHz – 3GHz



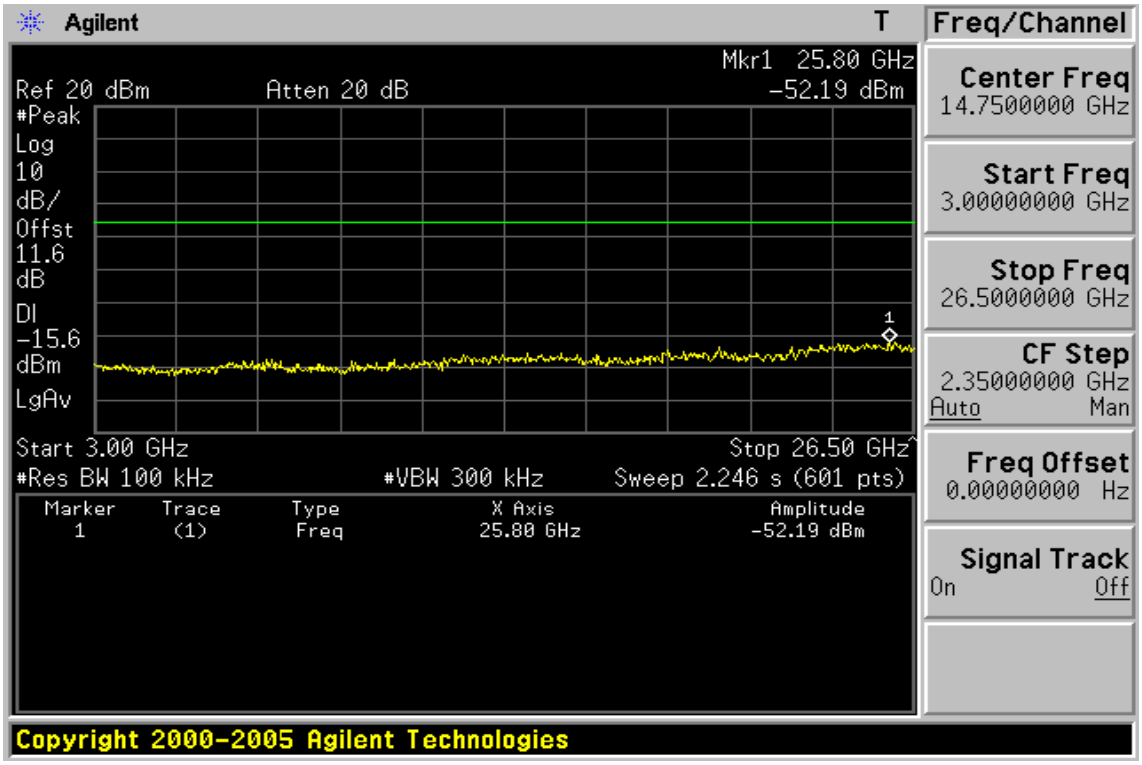
Ch Low 3GHz – 26.5GHz



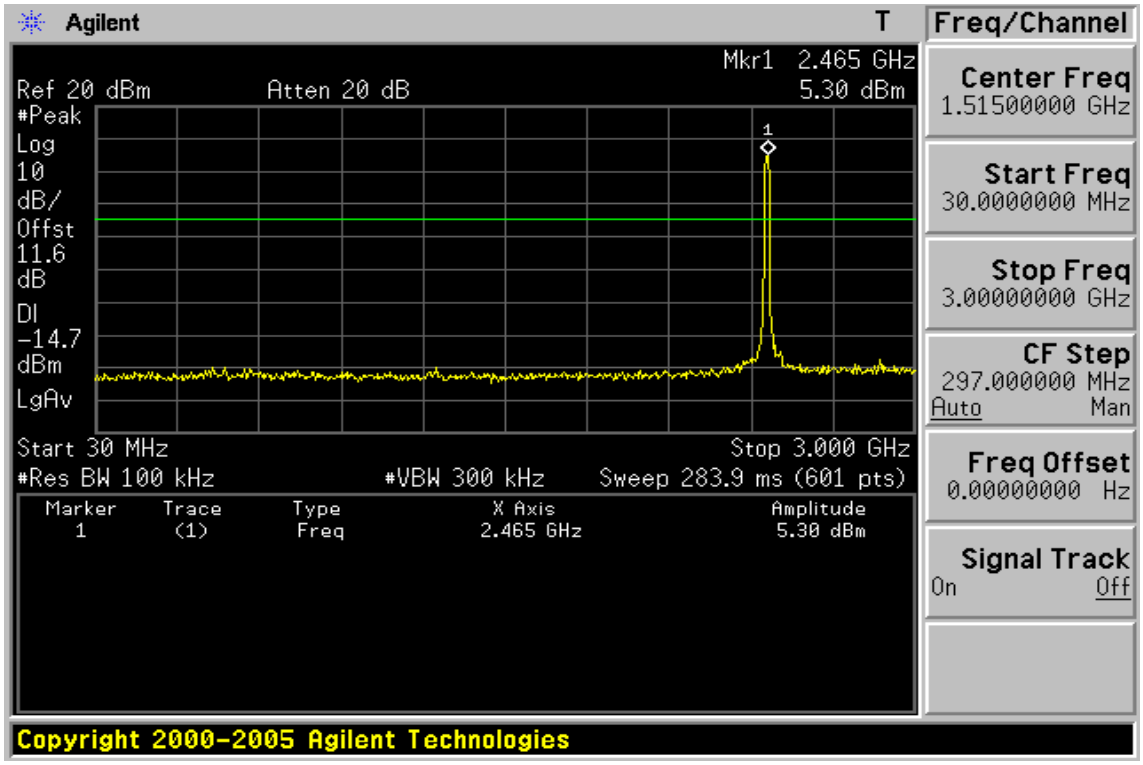
Ch Mid 30MHz – 3GHz



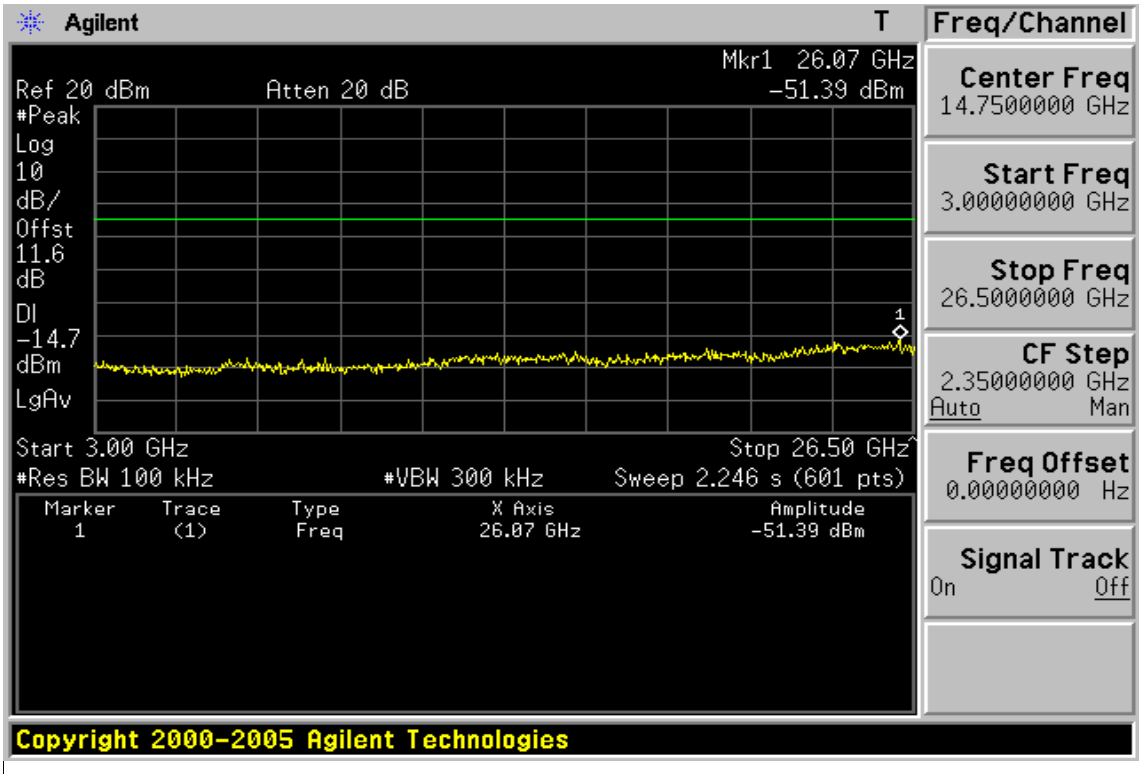
Ch Mid 3GHz – 26.5GHz



Ch High 30MHz – 3GHz

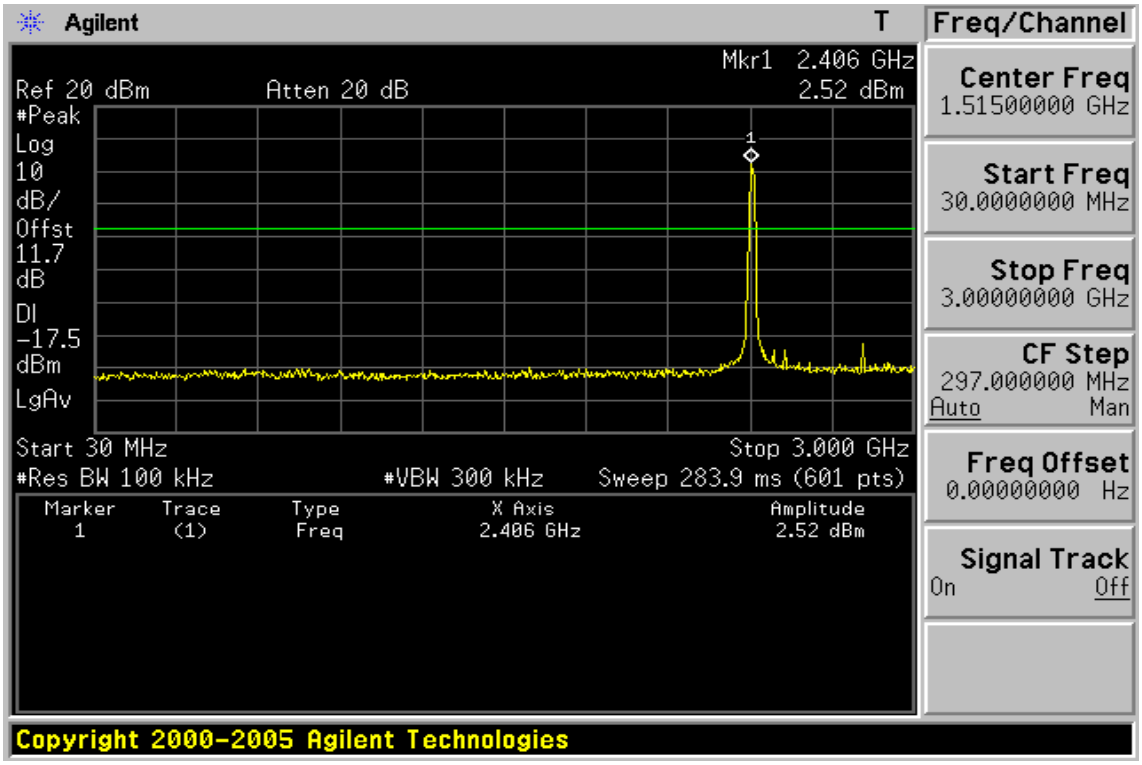


Ch High 3GHz – 26.5GHz

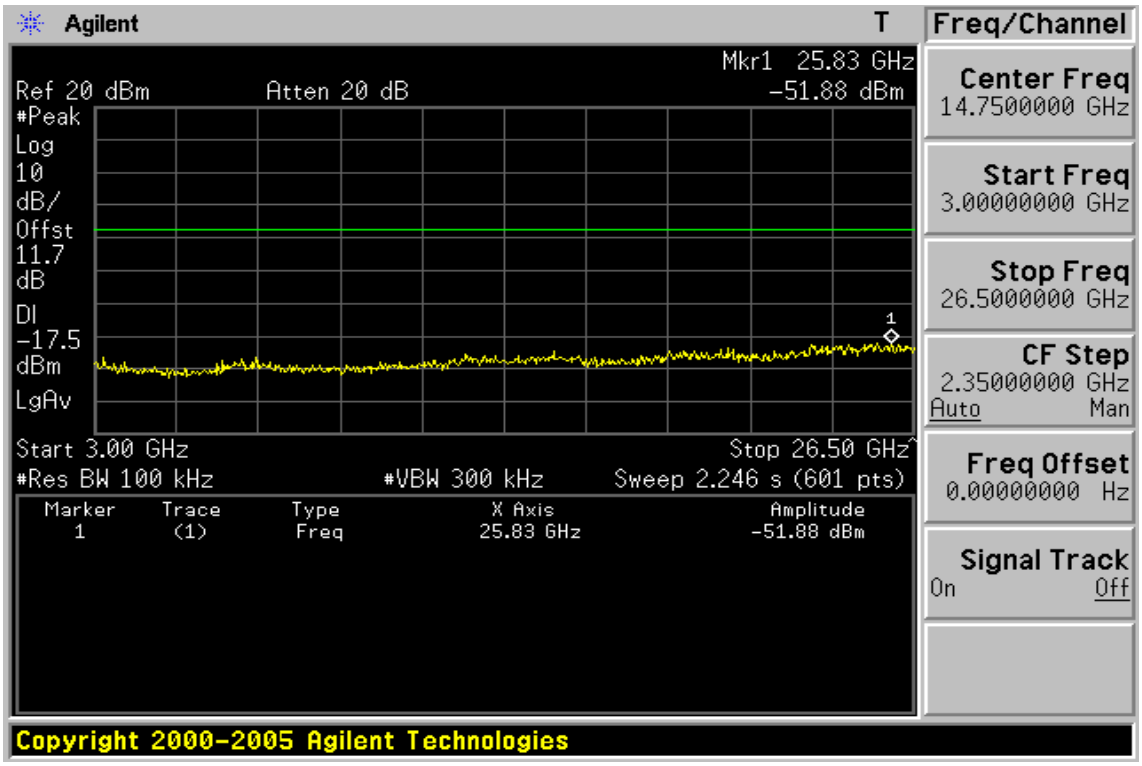


Conducted Spurious Emission Measurement Result (802.11g)

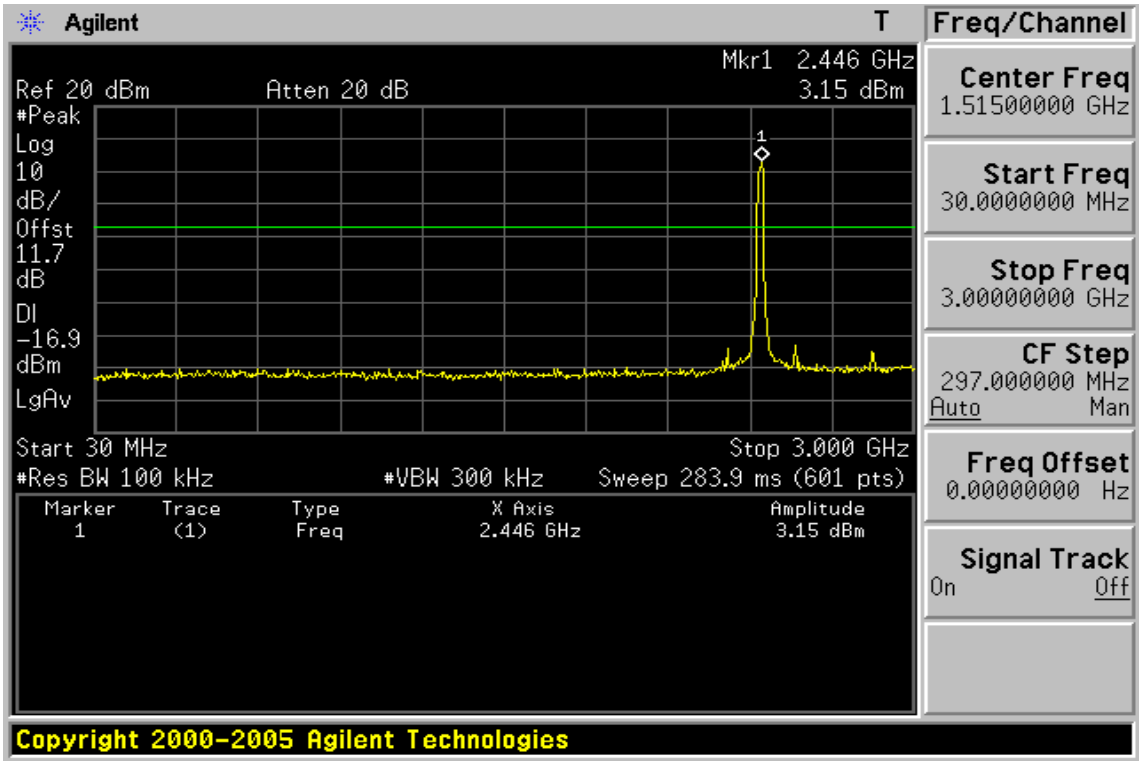
Ch Low 30MHz – 3GHz



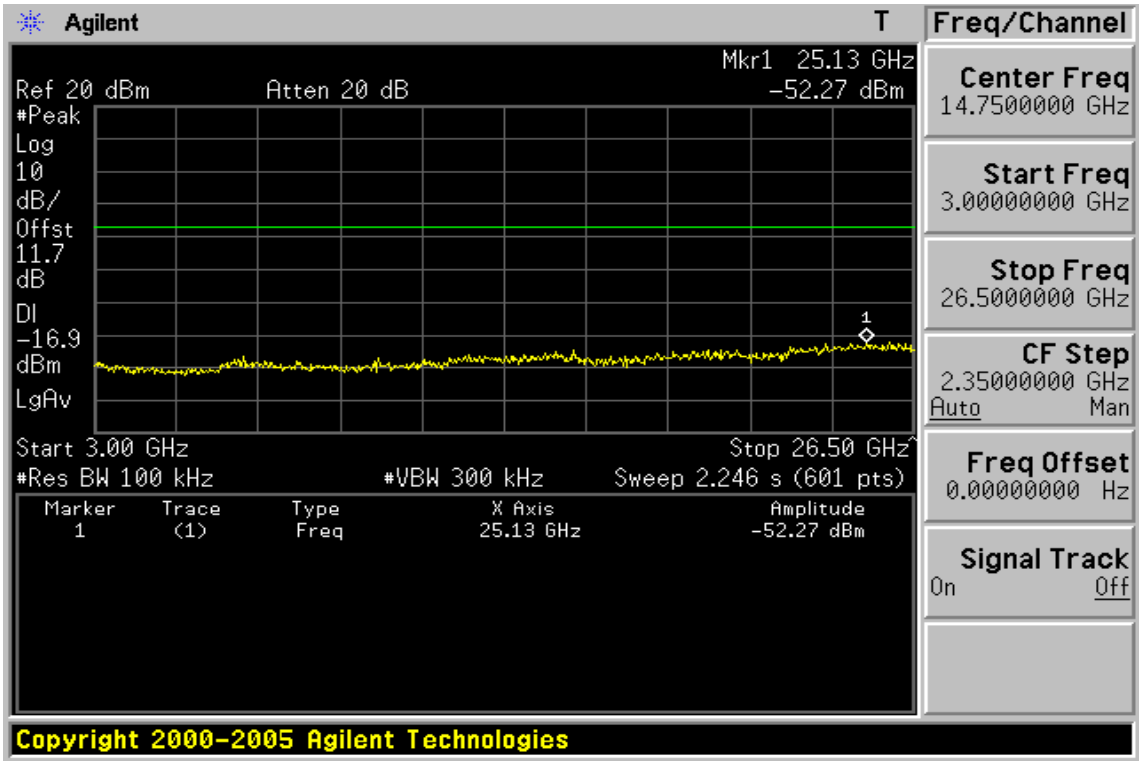
Ch Low 3GHz – 26.5GHz



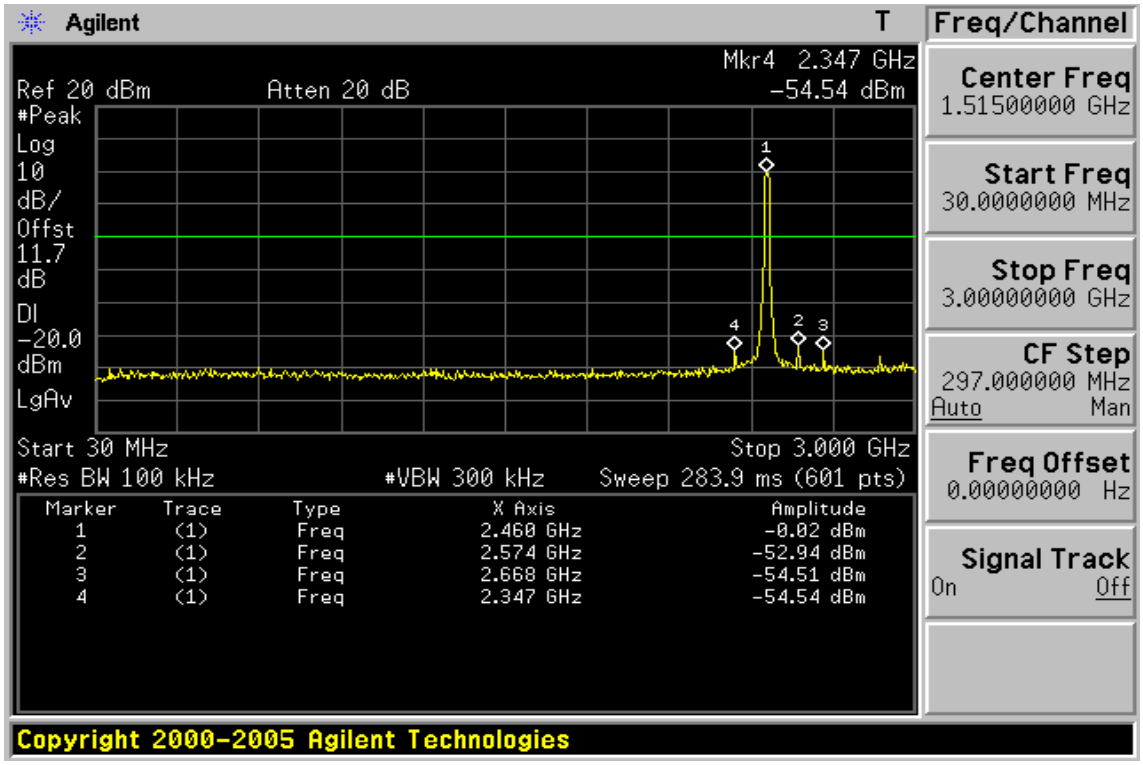
Ch Mid 30MHz – 3GHz



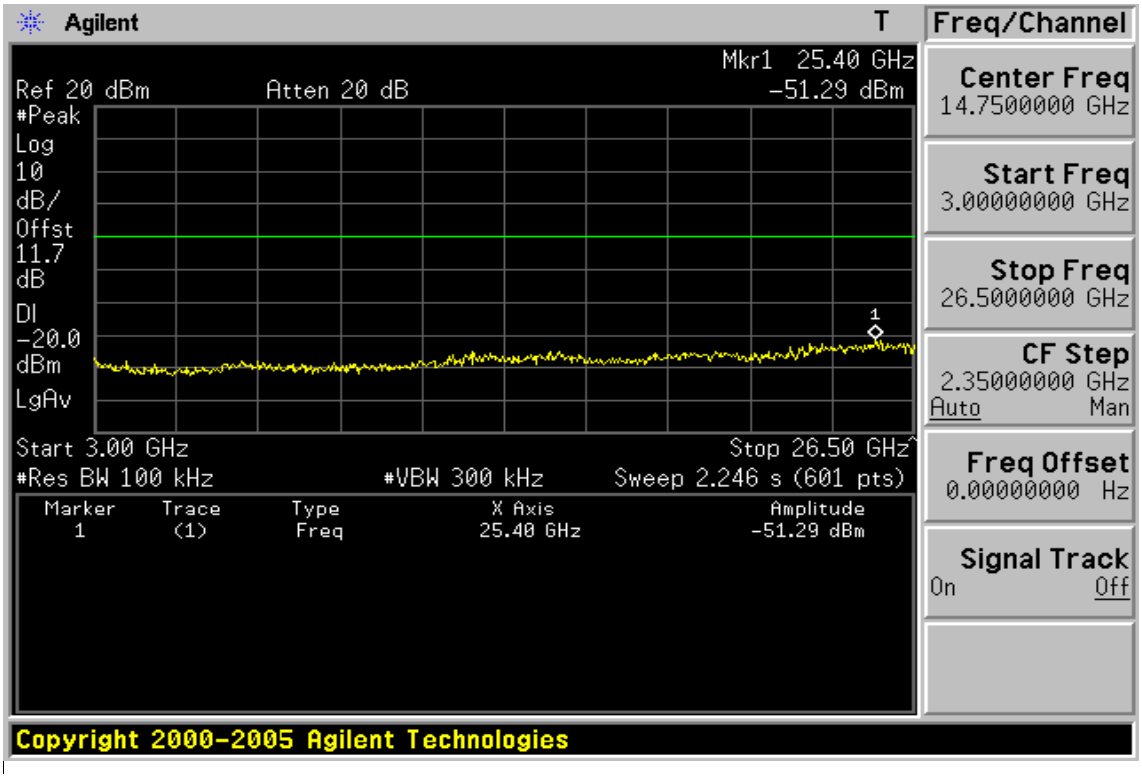
Ch Mid 3GHz – 26.5GHz



Ch High 30MHz – 3GHz

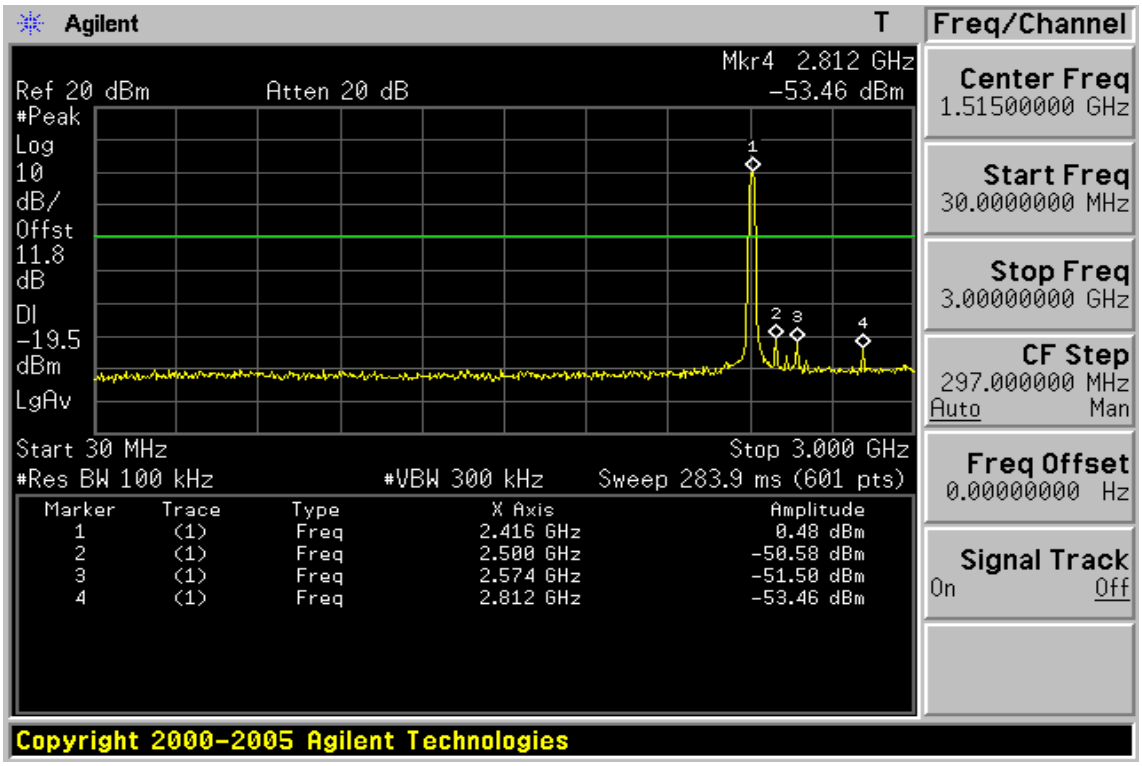


Ch High 3GHz – 26.5GHz

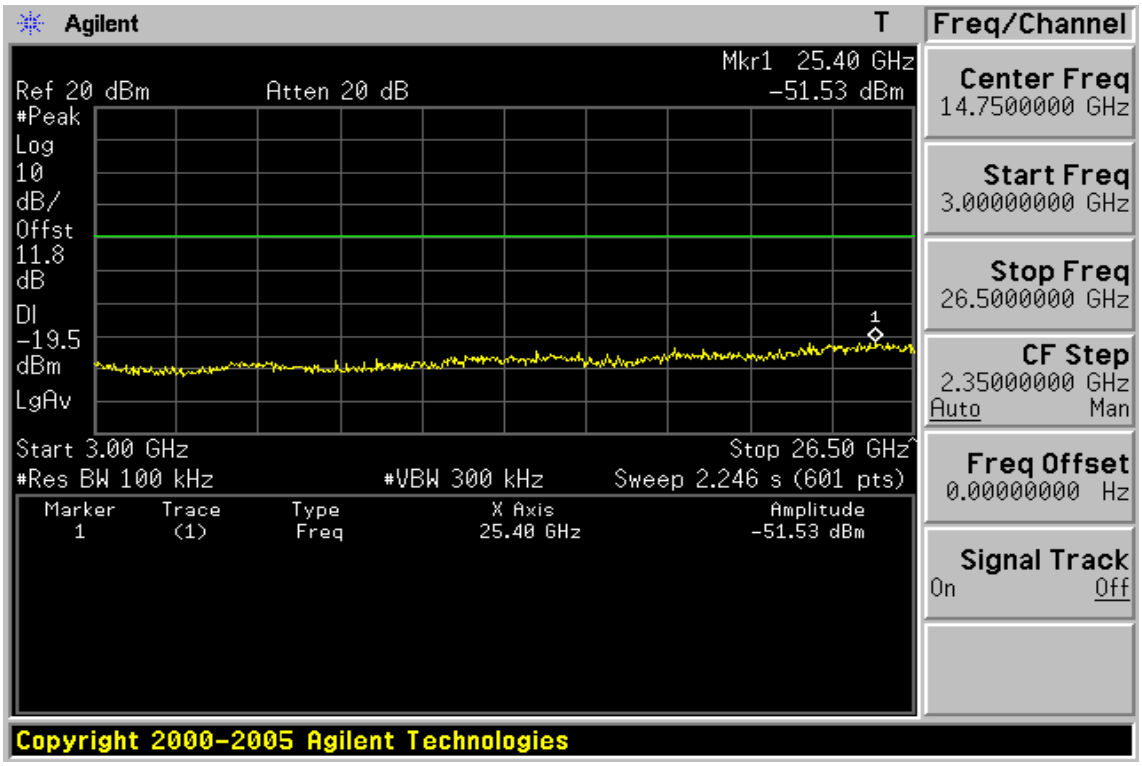


Conducted Spurious Emission Measurement Result (802.11n_20M)

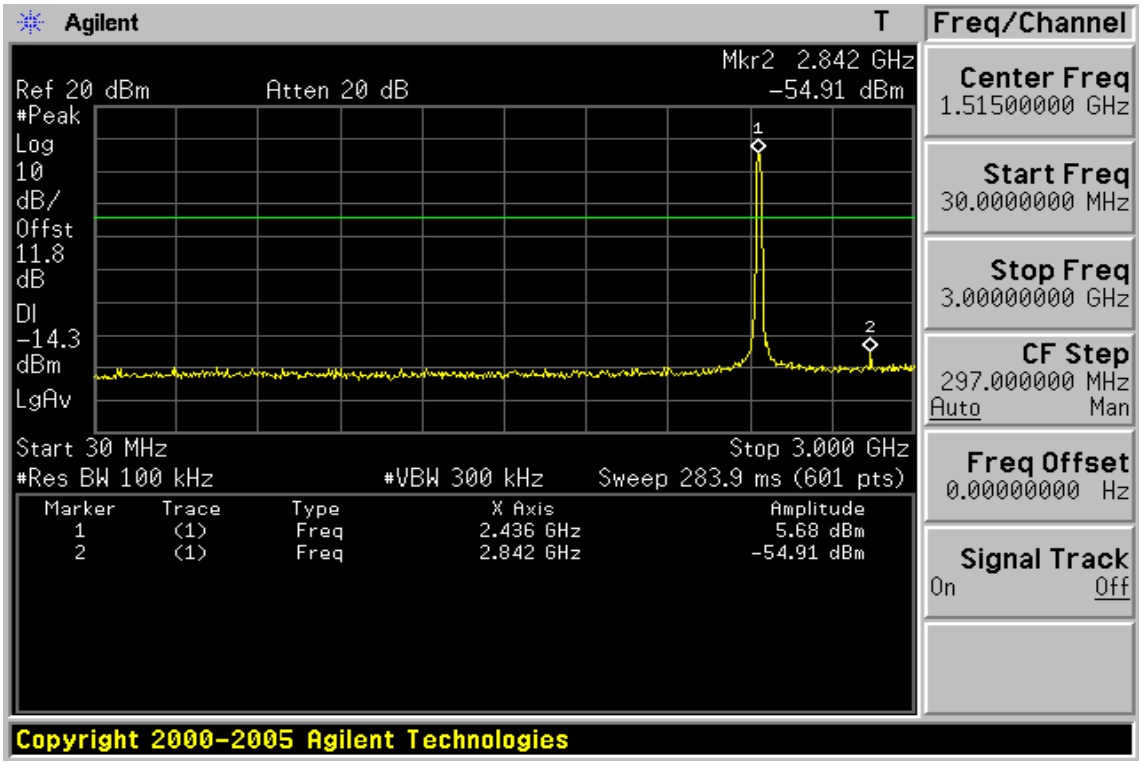
Ch Low 30MHz – 3GHz



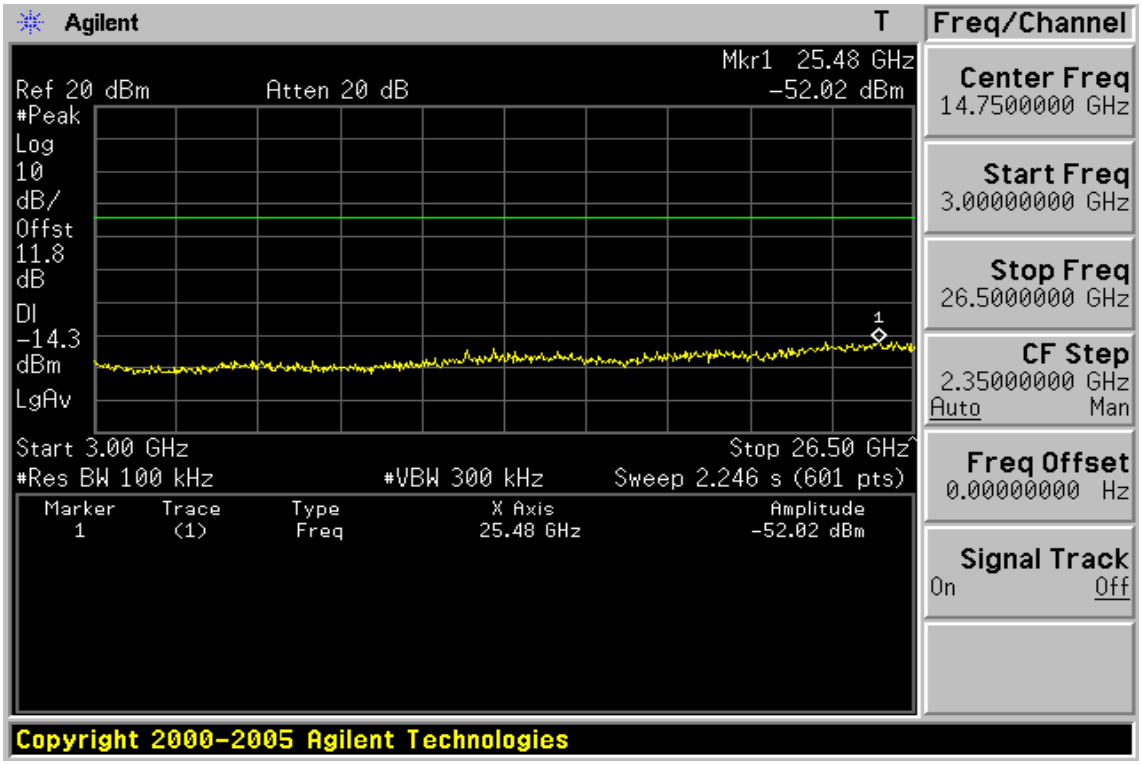
Ch Low 3GHz – 26.5GHz



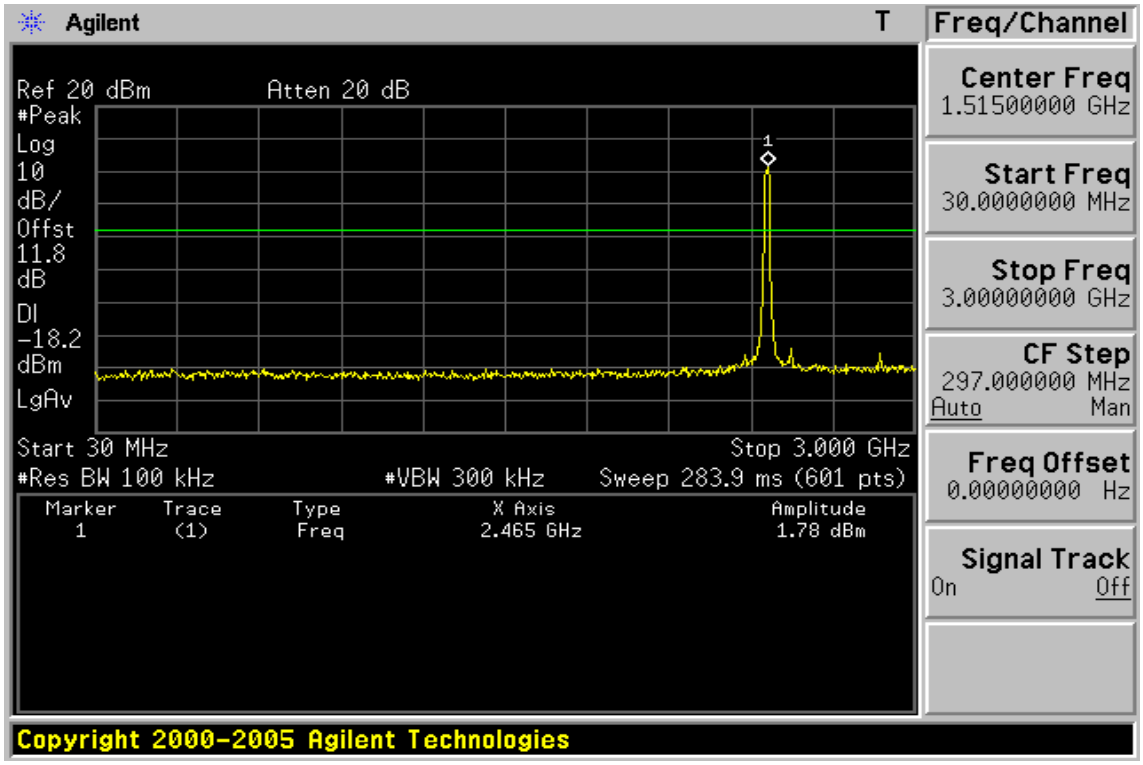
Ch Mid 30MHz – 3GHz



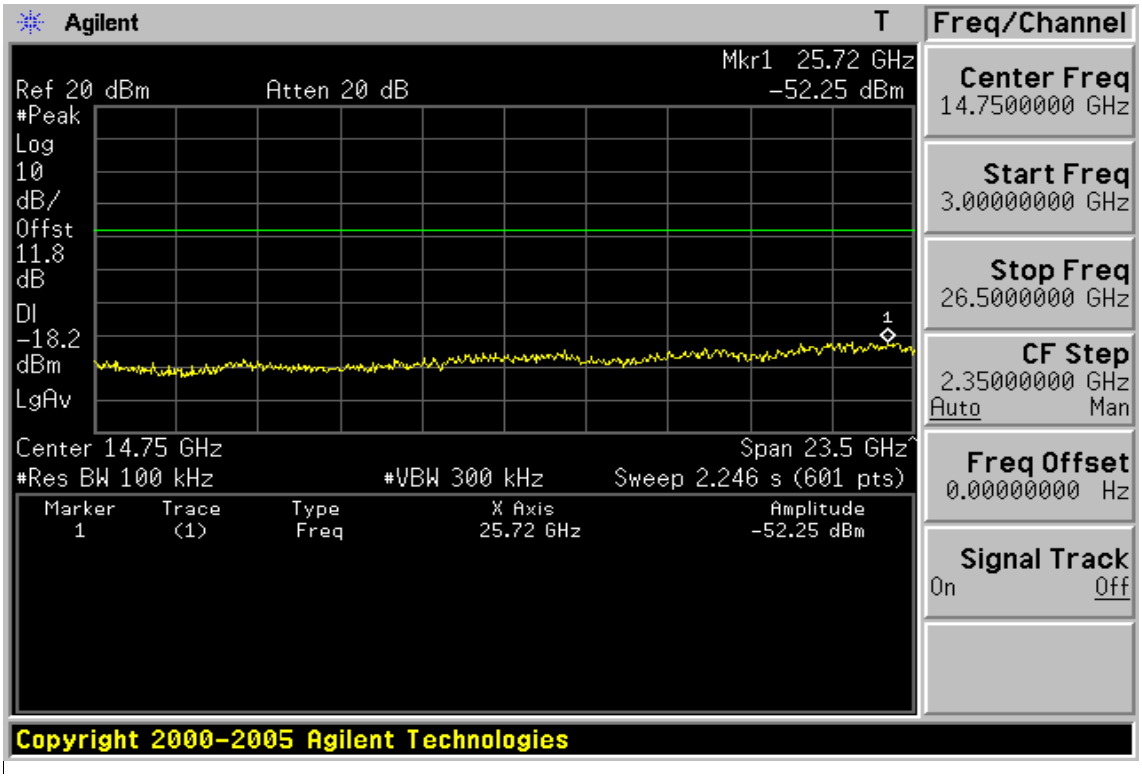
Ch Mid 3GHz – 26.5GHz



Ch High 30MHz – 3GHz



Ch High 3GHz – 26.5GHz



Radiated Spurious Emission Measurement Result (802.11b)

Operation Band	:802.11 b	Test Date	:2013-08-12
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:TX LOW	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
110.51	S	Peak	50.21	-15.42	34.79	43.50	-8.71
216.24	S	Peak	48.55	-15.20	33.35	46.00	-12.65
431.58	S	Peak	48.88	-9.95	38.93	46.00	-7.07
624.61	S	Peak	44.56	-6.07	38.49	46.00	-7.51
719.67	S	Peak	37.21	-4.57	32.64	46.00	-13.36
900.09	S	Peak	31.77	-2.48	29.29	46.00	-16.71
4824.00	H	Average	29.36	7.27	36.63	54.00	-17.37
4824.00	H	Peak	37.48	7.27	44.75	74.00	-29.25
4997.00	S	Average	26.48	7.65	34.13	54.00	-19.87
4997.00	S	Peak	43.19	7.65	50.84	74.00	-23.16
7236.00	H	---					
9648.00	H	---					
12060.00	H	---					
14472.00	H	---					
16884.00	H	---					
19296.00	H	---					
21708.00	H	---					
24120.00	H	---					

Operation Band	:802.11 b	Test Date	:2013-08-12
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:TX LOW	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
121.18	S	Peak	47.76	-14.16	33.60	43.50	-9.90
201.69	S	Peak	49.64	-15.82	33.82	43.50	-9.68
431.58	S	Peak	48.57	-9.95	38.62	46.00	-7.38
647.89	S	Peak	39.79	-5.66	34.13	46.00	-11.87
719.67	S	Peak	39.65	-4.57	35.08	46.00	-10.92
864.20	S	Peak	35.09	-3.03	32.06	46.00	-13.94
4824.00	H	Average	30.04	7.28	37.32	54.00	-16.68
4824.00	H	Peak	38.06	7.28	45.34	74.00	-28.66
4997.00	S	Average	30.09	7.45	37.54	54.00	-16.46
4997.00	S	Peak	42.97	7.45	50.42	74.00	-23.58
7236.00	H	---					
9648.00	H	---					
12060.00	H	---					
14472.00	H	---					
16884.00	H	---					
19296.00	H	---					
21708.00	H	---					
24120.00	H	---					

Operation Band	:802.11 b	Test Date	:2013-08-12
Fundamental Frequency	:2437 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:TX MID	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
115.36	S	Peak	49.51	-14.81	34.70	43.50	-8.80
216.24	S	Peak	47.64	-15.20	32.44	46.00	-13.56
431.58	S	Peak	49.09	-9.95	39.14	46.00	-6.86
624.61	S	Peak	44.52	-6.07	38.45	46.00	-7.55
719.67	S	Peak	36.42	-4.57	31.85	46.00	-14.15
935.98	S	Peak	30.01	-1.91	28.10	46.00	-17.90
4874.00	H	Average	29.12	7.47	36.59	54.00	-17.41
4874.00	H	Peak	37.93	7.47	45.40	74.00	-28.60
4997.00	S	Average	26.28	7.65	33.93	54.00	-20.07
4997.00	S	Peak	43.75	7.65	51.40	74.00	-22.60
7311.00	H	---					
9748.00	H	---					
12185.00	H	---					
14622.00	H	---					
17059.00	H	---					
19496.00	H	---					
21933.00	H	---					
24370.00	H	---					

Operation Band	:802.11 b	Test Date	:2013-08-12
Fundamental Frequency	:2437 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:TX MID	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
118.27	S	Peak	46.72	-14.46	32.26	43.50	-11.24
201.69	S	Peak	49.24	-15.82	33.42	43.50	-10.08
431.58	S	Peak	48.26	-9.95	38.31	46.00	-7.69
647.89	S	Peak	38.93	-5.66	33.27	46.00	-12.73
719.67	S	Peak	40.17	-4.57	35.60	46.00	-10.40
900.09	S	Peak	36.57	-2.48	34.09	46.00	-11.91
4874.00	H	Average	28.20	7.42	35.62	54.00	-18.38
4874.00	H	Peak	38.43	7.42	45.85	74.00	-28.15
4997.00	S	Average	26.03	7.45	33.48	54.00	-20.52
4997.00	S	Peak	42.18	7.45	49.63	74.00	-24.37
7311.00	H	---					
9748.00	H	---					
12185.00	H	---					
14622.00	H	---					
17059.00	H	---					
19496.00	H	---					
21933.00	H	---					
24370.00	H	---					

Operation Band	:802.11 b	Test Date	:2013-08-12
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:TX HIGH	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
108.57	S	Peak	50.90	-15.63	35.27	43.50	-8.23
216.24	S	Peak	48.39	-15.20	33.19	46.00	-12.81
431.58	S	Peak	49.02	-9.95	39.07	46.00	-6.93
624.61	S	Peak	44.14	-6.07	38.07	46.00	-7.93
719.67	S	Peak	37.06	-4.57	32.49	46.00	-13.51
898.15	S	Peak	31.56	-2.51	29.05	46.00	-16.95
4924.00	H	Average	25.67	7.61	33.28	54.00	-20.72
4924.00	H	Peak	37.38	7.61	44.99	74.00	-29.01
4983.00	S	Average	25.44	7.66	33.10	54.00	-20.90
4983.00	S	Peak	44.11	7.66	51.77	74.00	-22.23
7386.00	H	---					
9848.00	H	---					
12310.00	H	---					
14772.00	H	---					
17234.00	H	---					
19696.00	H	---					
22158.00	H	---					
24620.00	H	---					

Operation Band	:802.11 b	Test Date	:2013-08-12
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:TX HIGH	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
119.24	S	Peak	46.95	-14.34	32.61	43.50	-10.89
216.24	S	Peak	48.00	-15.20	32.80	46.00	-13.20
431.58	S	Peak	47.54	-9.95	37.59	46.00	-8.41
647.89	S	Peak	39.09	-5.66	33.43	46.00	-12.57
719.67	S	Peak	39.21	-4.57	34.64	46.00	-11.36
900.09	S	Peak	34.90	-2.48	32.42	46.00	-13.58
4924.00	H	Average	26.34	7.50	33.84	54.00	-20.16
4924.00	H	Peak	36.88	7.50	44.38	74.00	-29.62
4983.00	S	Average	25.55	7.48	33.03	54.00	-20.97
4983.00	S	Peak	42.39	7.48	49.87	74.00	-24.13
7386.00	H	---					
9848.00	H	---					
12310.00	H	---					
14772.00	H	---					
17234.00	H	---					
19696.00	H	---					
22158.00	H	---					
24620.00	H	---					

Radiated Spurious Emission Measurement Result (802.11g)

Operation Band	:802.11 g	Test Date	:2013-08-12
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:TX LOW	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
108.57	S	Peak	50.63	-15.63	35.00	43.50	-8.50
216.24	S	Peak	48.76	-15.20	33.56	46.00	-12.44
431.58	S	Peak	48.59	-9.95	38.64	46.00	-7.36
624.61	S	Peak	43.88	-6.07	37.81	46.00	-8.19
719.67	S	Peak	38.00	-4.57	33.43	46.00	-12.57
867.11	S	Peak	32.01	-2.99	29.02	46.00	-16.98
4824.00	H	Average	25.20	7.27	32.47	54.00	-21.53
4824.00	H	Peak	37.24	7.27	44.51	74.00	-29.49
4990.00	S	Average	25.90	7.65	33.55	54.00	-20.45
4990.00	S	Peak	44.73	7.65	52.38	74.00	-21.62
7236.00	H	---					
9648.00	H	---					
12060.00	H	---					
14472.00	H	---					
16884.00	H	---					
19296.00	H	---					
21708.00	H	---					
24120.00	H	---					

Operation Band	:802.11 g	Test Date	:2013-08-12
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:TX LOW	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
119.24	S	Peak	47.19	-14.34	32.85	43.50	-10.65
233.70	S	Peak	46.95	-14.20	32.75	46.00	-13.25
431.58	S	Peak	47.36	-9.95	37.41	46.00	-8.59
647.89	S	Peak	38.95	-5.66	33.29	46.00	-12.71
719.67	S	Peak	39.51	-4.57	34.94	46.00	-11.06
900.09	S	Peak	35.35	-2.48	32.87	46.00	-13.13
4824.00	H	Average	25.04	7.28	32.32	54.00	-21.68
4824.00	H	Peak	36.59	7.28	43.87	74.00	-30.13
4976.00	S	Average	25.81	7.48	33.29	54.00	-20.71
4976.00	S	Peak	43.59	7.48	51.07	74.00	-22.93
7236.00	H	---					
9648.00	H	---					
12060.00	H	---					
14472.00	H	---					
16884.00	H	---					
19296.00	H	---					
21708.00	H	---					
24120.00	H	---					

Operation Band	:802.11 g	Test Date	:2013-08-12
Fundamental Frequency	:2437 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:TX MID	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
110.51	S	Peak	49.86	-15.42	34.44	43.50	-9.06
216.24	S	Peak	48.77	-15.20	33.57	46.00	-12.43
431.58	S	Peak	49.12	-9.95	39.17	46.00	-6.83
624.61	S	Peak	44.27	-6.07	38.20	46.00	-7.80
719.67	S	Peak	36.33	-4.57	31.76	46.00	-14.24
935.98	S	Peak	30.78	-1.91	28.87	46.00	-17.13
4874.00	H	Average	25.26	7.47	32.73	54.00	-21.27
4874.00	H	Peak	37.25	7.47	44.72	74.00	-29.28
4997.00	S	Average	25.65	7.65	33.30	54.00	-20.70
4997.00	S	Peak	45.02	7.65	52.67	74.00	-21.33
7311.00	H	---					
9748.00	H	---					
12185.00	H	---					
14622.00	H	---					
17059.00	H	---					
19496.00	H	---					
21933.00	H	---					
24370.00	H	---					

Operation Band	:802.11 g	Test Date	:2013-08-12
Fundamental Frequency	:2437 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:TX MID	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
89.17	S	Peak	50.59	-17.36	33.23	43.50	-10.27
197.81	S	Peak	49.18	-15.77	33.41	43.50	-10.09
431.58	S	Peak	48.28	-9.95	38.33	46.00	-7.67
647.89	S	Peak	39.89	-5.66	34.23	46.00	-11.77
719.67	S	Peak	39.10	-4.57	34.53	46.00	-11.47
881.66	S	Peak	34.03	-2.76	31.27	46.00	-14.73
4874.00	H	Average	25.24	7.42	32.66	54.00	-21.34
4874.00	H	Peak	37.52	7.42	44.94	74.00	-29.06
4976.00	S	Average	25.42	7.48	32.90	54.00	-21.10
4976.00	S	Peak	42.98	7.48	50.46	74.00	-23.54
7311.00	H	---					
9748.00	H	---					
12185.00	H	---					
14622.00	H	---					
17059.00	H	---					
19496.00	H	---					
21933.00	H	---					
24370.00	H	---					

Operation Band	:802.11 g	Test Date	:2013-08-12
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:TX HIGH	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
110.51	S	Peak	50.74	-15.42	35.32	43.50	-8.18
216.24	S	Peak	48.58	-15.20	33.38	46.00	-12.62
431.58	S	Peak	48.99	-9.95	39.04	46.00	-6.96
624.61	S	Peak	44.38	-6.07	38.31	46.00	-7.69
719.67	S	Peak	37.36	-4.57	32.79	46.00	-13.21
935.98	S	Peak	31.19	-1.91	29.28	46.00	-16.72
4924.00	H	Average	23.99	7.61	31.60	54.00	-22.40
4924.00	H	Peak	36.83	7.61	44.44	74.00	-29.56
4976.00	S	Average	26.05	7.65	33.70	54.00	-20.30
4976.00	S	Peak	45.09	7.65	52.74	74.00	-21.26
7386.00	H	---					
9848.00	H	---					
12310.00	H	---					
14772.00	H	---					
17234.00	H	---					
19696.00	H	---					
22158.00	H	---					
24620.00	H	---					

Operation Band	:802.11 g	Test Date	:2013-08-12
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:TX HIGH	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
91.11	S	Peak	49.09	-17.25	31.84	43.50	-11.66
216.24	S	Peak	48.02	-15.20	32.82	46.00	-13.18
431.58	S	Peak	48.28	-9.95	38.33	46.00	-7.67
647.89	S	Peak	39.56	-5.66	33.90	46.00	-12.10
719.67	S	Peak	39.84	-4.57	35.27	46.00	-10.73
900.09	S	Peak	34.53	-2.48	32.05	46.00	-13.95
4924.00	H	Average	24.00	7.50	31.50	54.00	-22.50
4924.00	H	Peak	37.46	7.50	44.96	74.00	-29.04
4983.00	S	Average	25.92	7.48	33.40	54.00	-20.60
4983.00	S	Peak	43.66	7.48	51.14	74.00	-22.86
7386.00	H	---					
9848.00	H	---					
12310.00	H	---					
14772.00	H	---					
17234.00	H	---					
19696.00	H	---					
22158.00	H	---					
24620.00	H	---					

Radiated Spurious Emission Measurement Result (802.11n_20M)

Operation Band	:802.11 n20M	Test Date	:2013-08-12
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:TX LOW	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
110.51	S	Peak	50.07	-15.42	34.65	43.50	-8.85
216.24	S	Peak	48.87	-15.20	33.67	46.00	-12.33
431.58	S	Peak	49.29	-9.95	39.34	46.00	-6.66
624.61	S	Peak	43.63	-6.07	37.56	46.00	-8.44
719.67	S	Peak	36.93	-4.57	32.36	46.00	-13.64
900.09	S	Peak	31.12	-2.48	28.64	46.00	-17.36
4824.00	H	Average	25.05	7.27	32.32	54.00	-21.68
4824.00	H	Peak	37.24	7.27	44.51	74.00	-29.49
4997.00	S	Average	25.91	7.65	33.56	54.00	-20.44
4997.00	S	Peak	45.17	7.65	52.82	74.00	-21.18
7236.00	H	---					
9648.00	H	---					
12060.00	H	---					
14472.00	H	---					
16884.00	H	---					
19296.00	H	---					
21708.00	H	---					
24120.00	H	---					

Operation Band	:802.11 n20M	Test Date	:2013-08-12
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:TX LOW	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
118.27	S	Peak	47.21	-14.46	32.75	43.50	-10.75
197.81	S	Peak	48.76	-15.77	32.99	43.50	-10.51
431.58	S	Peak	48.63	-9.95	38.68	46.00	-7.32
647.89	S	Peak	39.11	-5.66	33.45	46.00	-12.55
719.67	S	Peak	40.08	-4.57	35.51	46.00	-10.49
900.09	S	Peak	35.33	-2.48	32.85	46.00	-13.15
4824.00	H	Average	24.94	7.28	32.22	54.00	-21.78
4824.00	H	Peak	37.61	7.28	44.89	74.00	-29.11
4983.00	S	Average	25.70	7.48	33.18	54.00	-20.82
4983.00	S	Peak	42.74	7.48	50.22	74.00	-23.78
7236.00	H	---					
9648.00	H	---					
12060.00	H	---					
14472.00	H	---					
16884.00	H	---					
19296.00	H	---					
21708.00	H	---					
24120.00	H	---					

Operation Band	:802.11 n20M	Test Date	:2013-08-12
Fundamental Frequency	:2437 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:TX MID	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
115.36	S	Peak	49.64	-14.81	34.83	43.50	-8.67
216.24	S	Peak	48.09	-15.20	32.89	46.00	-13.11
431.58	S	Peak	48.99	-9.95	39.04	46.00	-6.96
624.61	S	Peak	43.63	-6.07	37.56	46.00	-8.44
738.10	S	Peak	37.50	-4.34	33.16	46.00	-12.84
900.09	S	Peak	30.99	-2.48	28.51	46.00	-17.49
4874.00	H	Average	25.05	7.47	32.52	54.00	-21.48
4874.00	H	Peak	37.52	7.47	44.99	74.00	-29.01
4983.00	S	Average	25.86	7.66	33.52	54.00	-20.48
4983.00	S	Peak	44.60	7.66	52.26	74.00	-21.74
7311.00	H	---					
9748.00	H	---					
12185.00	H	---					
14622.00	H	---					
17059.00	H	---					
19496.00	H	---					
21933.00	H	---					
24370.00	H	---					

Operation Band	:802.11 n20M	Test Date	:2013-08-12
Fundamental Frequency	:2437 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:TX MID	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
89.17	S	Peak	49.97	-17.36	32.61	43.50	-10.89
201.69	S	Peak	48.39	-15.82	32.57	43.50	-10.93
431.58	S	Peak	47.97	-9.95	38.02	46.00	-7.98
647.89	S	Peak	38.93	-5.66	33.27	46.00	-12.73
719.67	S	Peak	39.31	-4.57	34.74	46.00	-11.26
900.09	S	Peak	35.01	-2.48	32.53	46.00	-13.47
4874.00	H	Average	25.07	7.42	32.49	54.00	-21.51
4874.00	H	Peak	38.16	7.42	45.58	74.00	-28.42
4976.00	S	Average	25.68	7.48	33.16	54.00	-20.84
4976.00	S	Peak	43.37	7.48	50.85	74.00	-23.15
7311.00	H	---					
9748.00	H	---					
12185.00	H	---					
14622.00	H	---					
17059.00	H	---					
19496.00	H	---					
21933.00	H	---					
24370.00	H	---					

Operation Band	:802.11 n20M	Test Date	:2013-08-12
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:TX HIGH	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
110.51	S	Peak	50.34	-15.42	34.92	43.50	-8.58
216.24	S	Peak	48.67	-15.20	33.47	46.00	-12.53
431.58	S	Peak	49.23	-9.95	39.28	46.00	-6.72
624.61	S	Peak	43.64	-6.07	37.57	46.00	-8.43
738.10	S	Peak	37.02	-4.34	32.68	46.00	-13.32
890.39	S	Peak	31.43	-2.63	28.80	46.00	-17.20
4924.00	H	Average	24.02	7.61	31.63	54.00	-22.37
4924.00	H	Peak	36.67	7.61	44.28	74.00	-29.72
4976.00	S	Average	25.39	7.65	33.04	54.00	-20.96
4976.00	S	Peak	44.54	7.65	52.19	74.00	-21.81
7386.00	H	---					
9848.00	H	---					
12310.00	H	---					
14772.00	H	---					
17234.00	H	---					
19696.00	H	---					
22158.00	H	---					
24620.00	H	---					

Operation Band	:802.11 n20M	Test Date	:2013-08-12
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25deg_C/62RH
Operation Mode	:TX HIGH	Engineer	:Louis
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.

"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
108.57	S	Peak	47.31	-15.63	31.68	43.50	-11.82
197.81	S	Peak	48.49	-15.77	32.72	43.50	-10.78
431.58	S	Peak	48.49	-9.95	38.54	46.00	-7.46
647.89	S	Peak	39.59	-5.66	33.93	46.00	-12.07
719.67	S	Peak	39.87	-4.57	35.30	46.00	-10.70
864.20	S	Peak	34.25	-3.03	31.22	46.00	-14.78
4924.00	H	Average	24.50	7.50	32.00	54.00	-22.00
4924.00	H	Peak	36.55	7.50	44.05	74.00	-29.95
4976.00	S	Average	25.51	7.48	32.99	54.00	-21.01
4976.00	S	Peak	44.02	7.48	51.50	74.00	-22.50
7386.00	H	---					
9848.00	H	---					
12310.00	H	---					
14772.00	H	---					
17234.00	H	---					
19696.00	H	---					
22158.00	H	---					
24620.00	H	---					

11 PEAK POWER SPECTRAL DENSITY

11.1 Standard Applicable:

According to §15.247(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

11.2 Measurement Equipment Used:

Refer to section 7.2 for details.

11.3 Test Set-up:

Refer to section 7.3 for details. (Spectrum Option)

11.4 Measurement Procedure (following the measurement procedure 10.2 of KDB558074):

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW ≥ 3 kHz.
4. Set the VBW ≥ 3 x 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.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

11.5 Measurement Result:

802.11b

Frequency MHz	RF Power Density Reading (dBm)	Maximum Limit (dBm)
2412	-6.07	8
2437	-6.02	8
2462	-6.12	8

802.11g

Frequency MHz	RF Power Density Reading (dBm)	Maximum Limit (dBm)
2412	-12.27	8
2437	-10.93	8
2462	-11.79	8

802.11n_20M

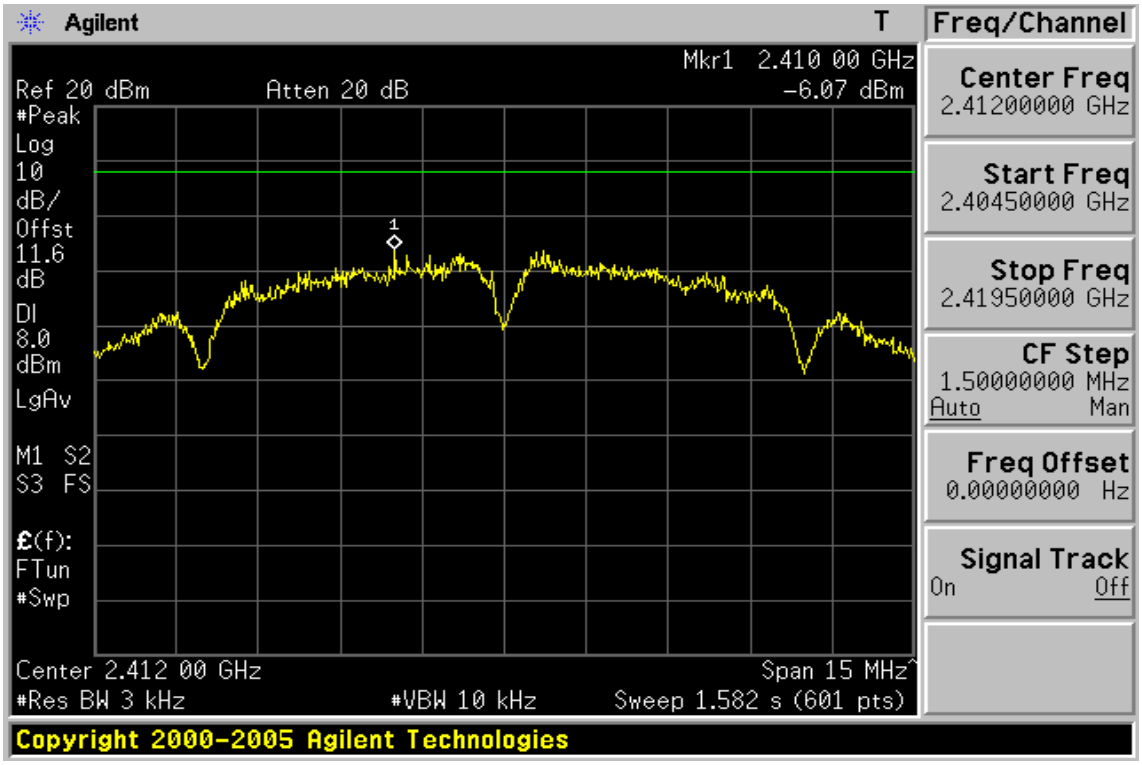
Frequency MHz	RF Power Density Reading (dBm)	Maximum Limit (dBm)
2412	-11.89	8
2437	-11.07	8
2462	-10.51	8

** Note: Offset 11.6dB for 802.11b;*
Offset 11.7dB for 802.11g;
Offset 11.8dB for 802.11n_20

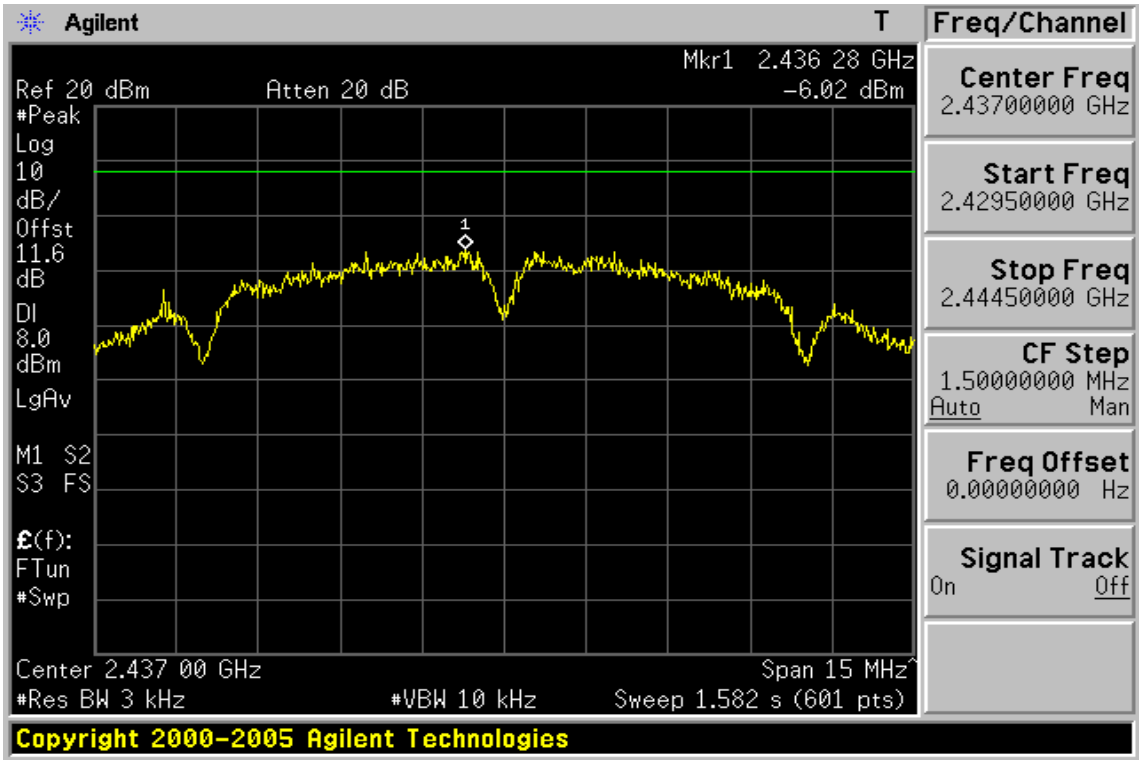
**Refer to next page for plots*

802.11b

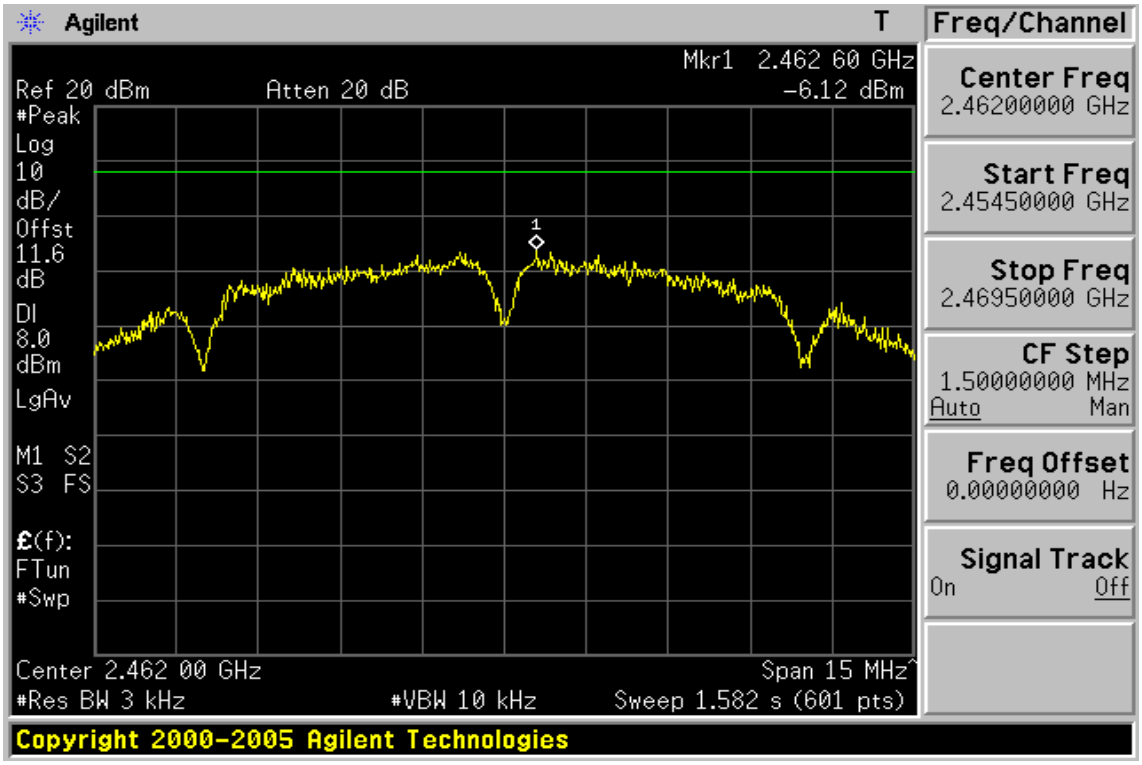
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

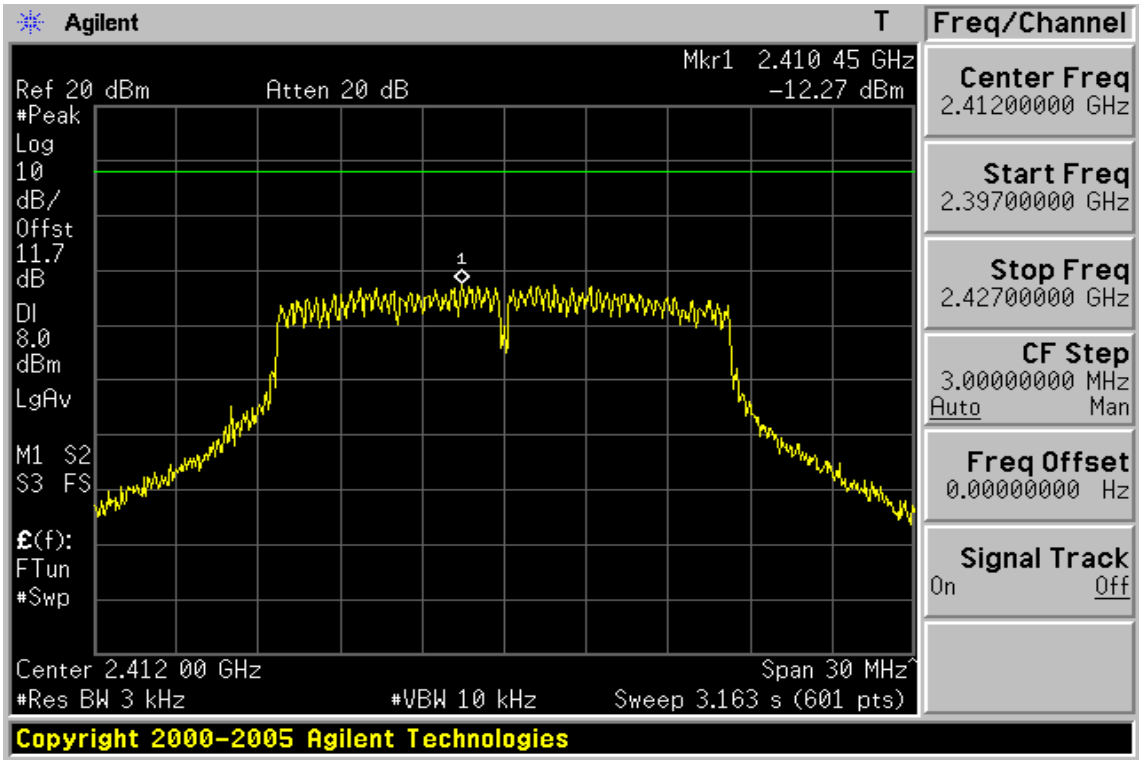


Power Spectral Density Test Plot (CH-High)

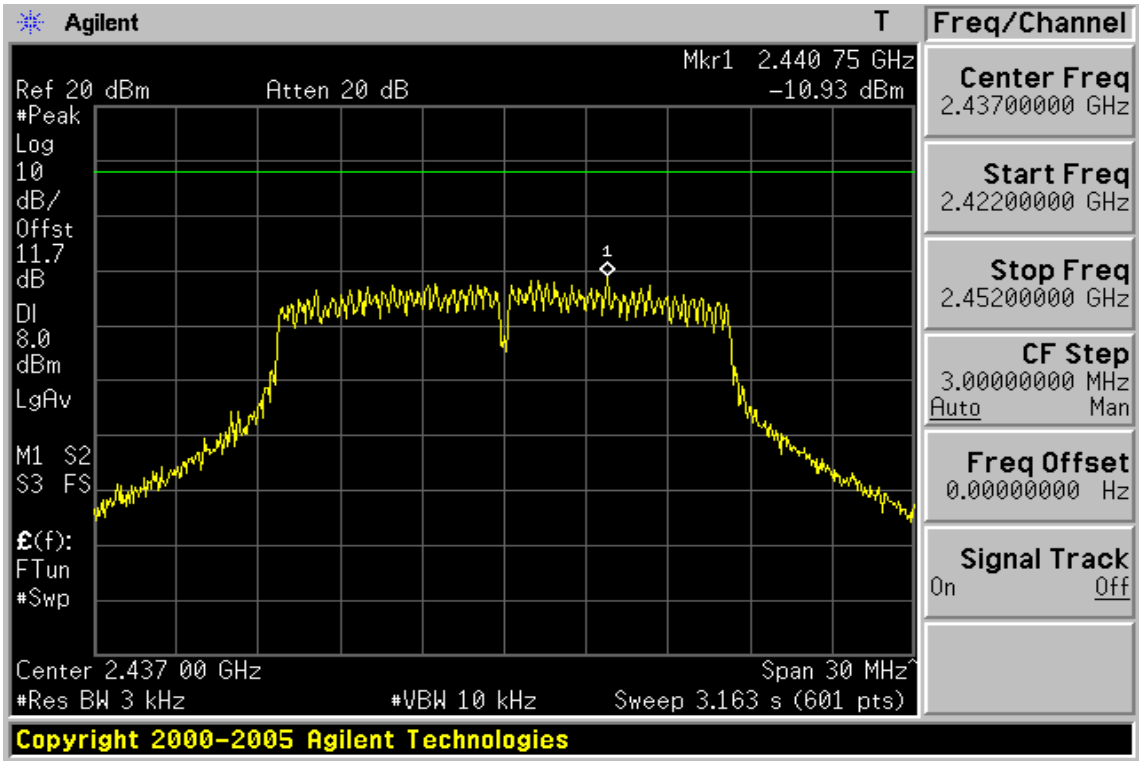


802.11g

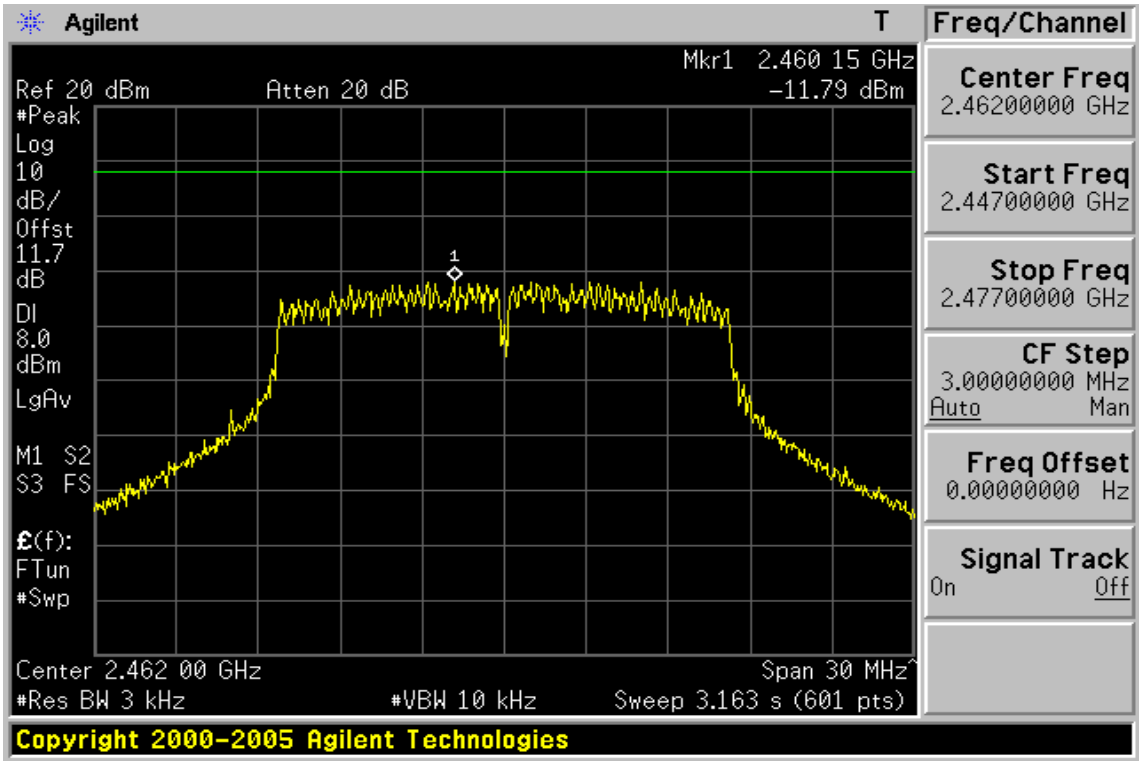
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

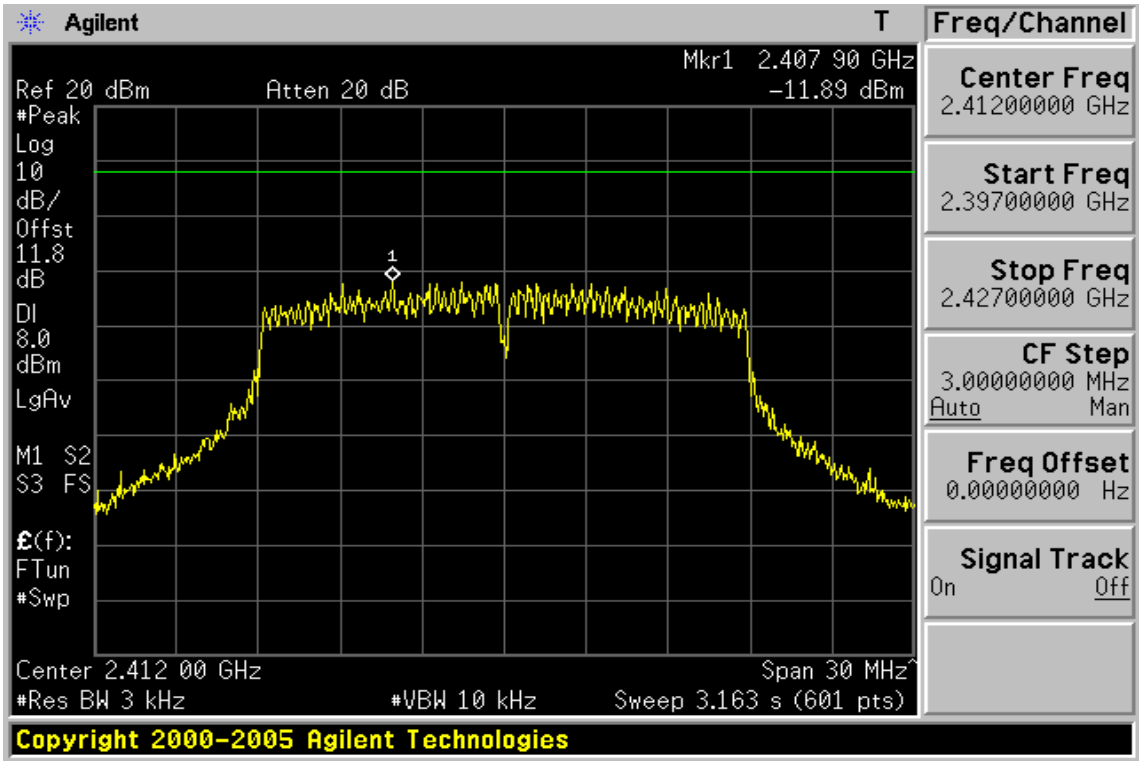


Power Spectral Density Test Plot (CH-High)

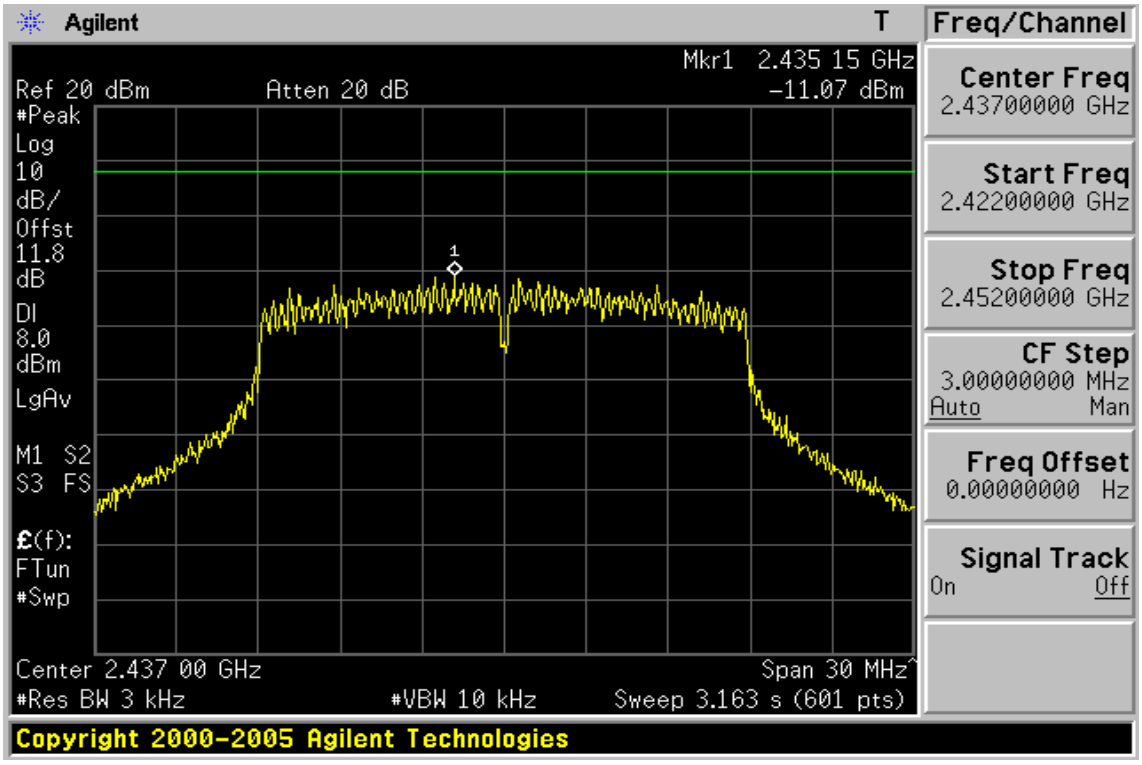


802.11n_20M

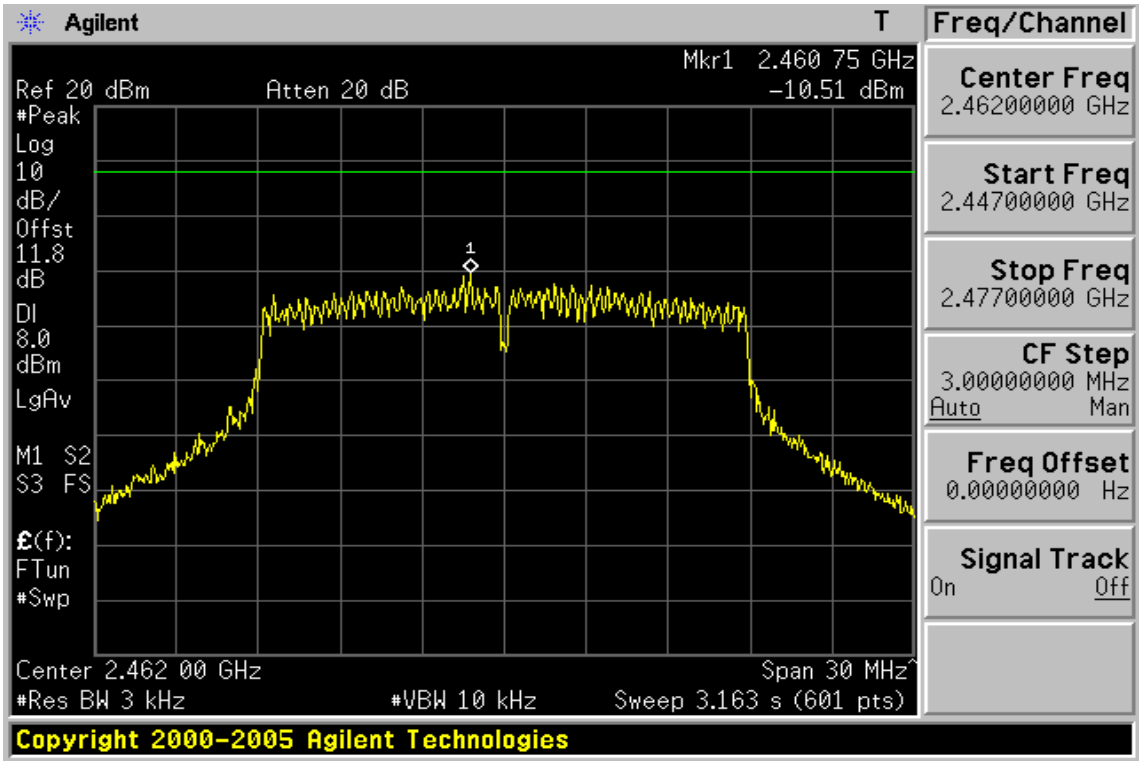
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)



12 ANTENNA REQUIREMENT

12.1 Standard Applicable:

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

12.2 Antenna Connected Construction:

The directional gains of antenna used for transmitting is 2.15dBi and the antenna connector is designed with unique type RF connector and no consideration of replacement. Please see EUT photo and antenna spec. for details.