

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

Product Name: Wireless Reader

Brand Name: Apotop

Model No.: DW19

Model Difference: N/A

FCC ID: JY8-WIR003

Report No.: E2/2013/A0034

Issue Date: Nov. 29, 2013

FCC Rule Part: §15.247, Cat: DTS

Prepared for: Carry Technology Co., Ltd.
4F, No.119, JianKang Road, Jhonghe Dist, New
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VERIFICATION OF COMPLIANCE

Applicant: Carry Technology Co., Ltd.
4F, No.119, JianKang Road, Jhonghe Dist, New Taipei City 23585, Taiwan

Product Name: Wireless Reader

Brand Name: Apotop

Model No.: DW19

Model Difference: N/A

FCC ID: JY8-WIR003

File Number: E2/2013/A0034

Date of test: Nov. 06, 2013 ~ Nov. 29, 2013

Date of EUT Received: Nov. 06, 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:

Jazz Huang

Date

Nov. 29, 2013

Jazz Huang / Engineer

Prepared By:

Julia Chang

Date

Nov. 29, 2013

Julia Chang / Clerk

Approved By:

Jim Chang

Date

Nov. 29, 2013

Jim Chang / Supervisor

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Version

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00	Nov. 29, 2013	Initial creation of document

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1 GENERAL INFORMATION

1.1 Product description

General:

Product Name:	Wireless Reader	
Brand Name:	Apotop	
Model No.:	DW19	
Model difference:	N/A	
Hardware Version:	N/A	
Software Version:	N/A	
Data Cable:	Model No.: Micro USB 5P Cable, Supplier: N/A	
Power Supply:	3.7Vdc from Lithium Ion Polymer Rechargeable battery or 5V from Micro USB port	
	Battery:	Model No.: AE18650C-26 Supplier: RPC Corporation

WLAN:

Wi-Fi	Frequency Range	Channels	Rated Power	Modulation Technology
11b/g	2412-2462	11	b: 15.44dBm g: 22.33dBm	DSSS, OFDM
11n	HT20 2412-2462	11	HT20: 21.72dBm	OFDM
11n	HT40 2422-2452	7	HT40:21.81dBm	OFDM
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 802.11n_40MHz: 13.5-135Mbps		
Antenna Designation:		Dipole Antenna, 5.43dBi.		

The report applied for WLAN.

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IEEE 802.11n Spec:

MCS Index	Nss	Modulation	R	NBPSC	NCBPS		NDBPS		Data rate(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

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1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: JY8-WIR003** 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.2, Keji 1st Rd., Guishan Township, Taoyuan County, Taiwan 333 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.

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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 placed on a 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 30 MHz, and the measurement procedure 7.3 in ANSI C63.4:2009 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 placed on a 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,

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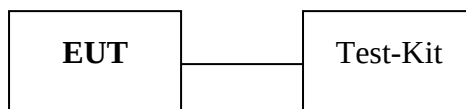
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2.4 Configuration of Tested System

Fig. 2-1 Radiated Emission



Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	Testing Kit	N/A	N/A	N/A	N/A	N/A
2.	WLAN Test Software	N/A	RTL819	2.2.4	N/A	N/A

Fig. 2-2 AC Power Line Conducted Emission & Conducted (Antenna Port) Configuration



Table 2-2 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	Notebook	Lenovo	L430	LR-7HXZA	Shielding	Un-shielding
2.	Testing Kit	N/A	N/A	N/A	N/A	N/A
3.	WLAN Test Software	N/A	RTL819	2.2.4	N/A	N/A

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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

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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.

802.11 n_40MHz mode: Channel low (2422MHz) 、mid (2437MHz) and high (2452MHz) with 13.5Mbps 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 E2 position was reported.

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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.

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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	ESCI 7	100924	05/10/2013	05/09/2014
Coaxial Cables	N/A	N30N30-1042-150 cm	N/A	02/07/2013	02/06/2014
LISN	SCHWARZ BECK	NSLK 8127	8127-648	06/17/2012	06/16/2014
Pulse Limit	narda	PL01	1110X30602	08/14/2013	08/13/2014
Test Software	Farad	EZ-EMC	Ver. SGS-03A1	N.C.R.	N.C.R.

6.3 EUT Setup:

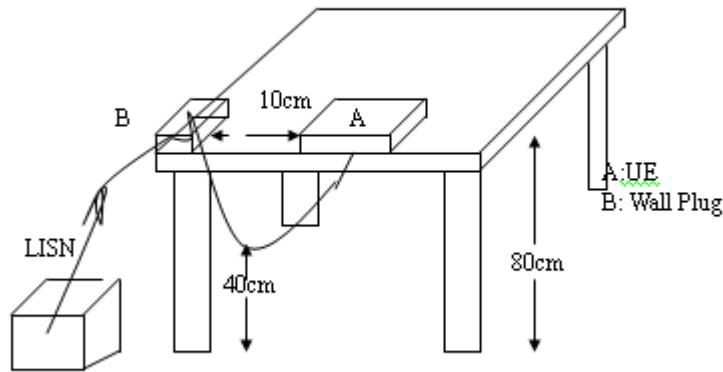
1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4:2009.
2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
3. The LISN was connected with 120Vac/60Hz power source.

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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

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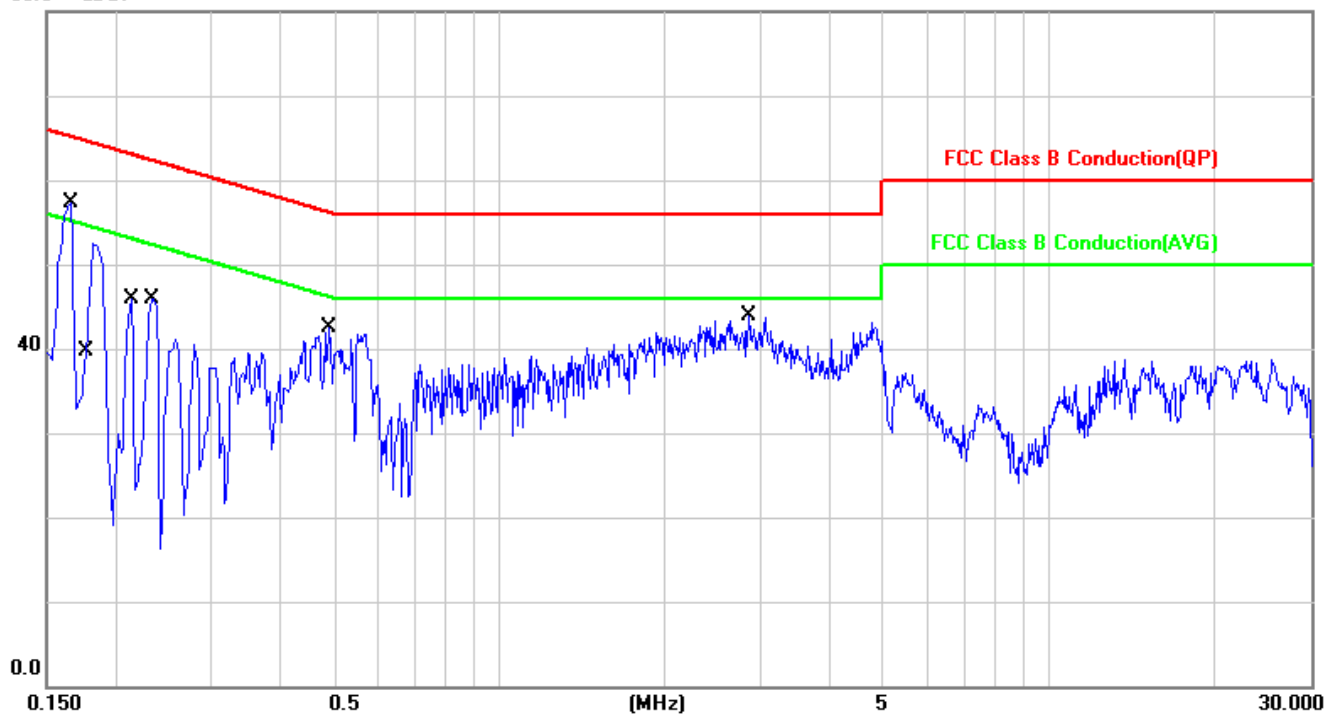
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AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation mode	Test Date:	Nov. 21, 2013
Temperature:	21 °C	Humidity:	64 %
		Test By:	Hurry

80.0 dBuV



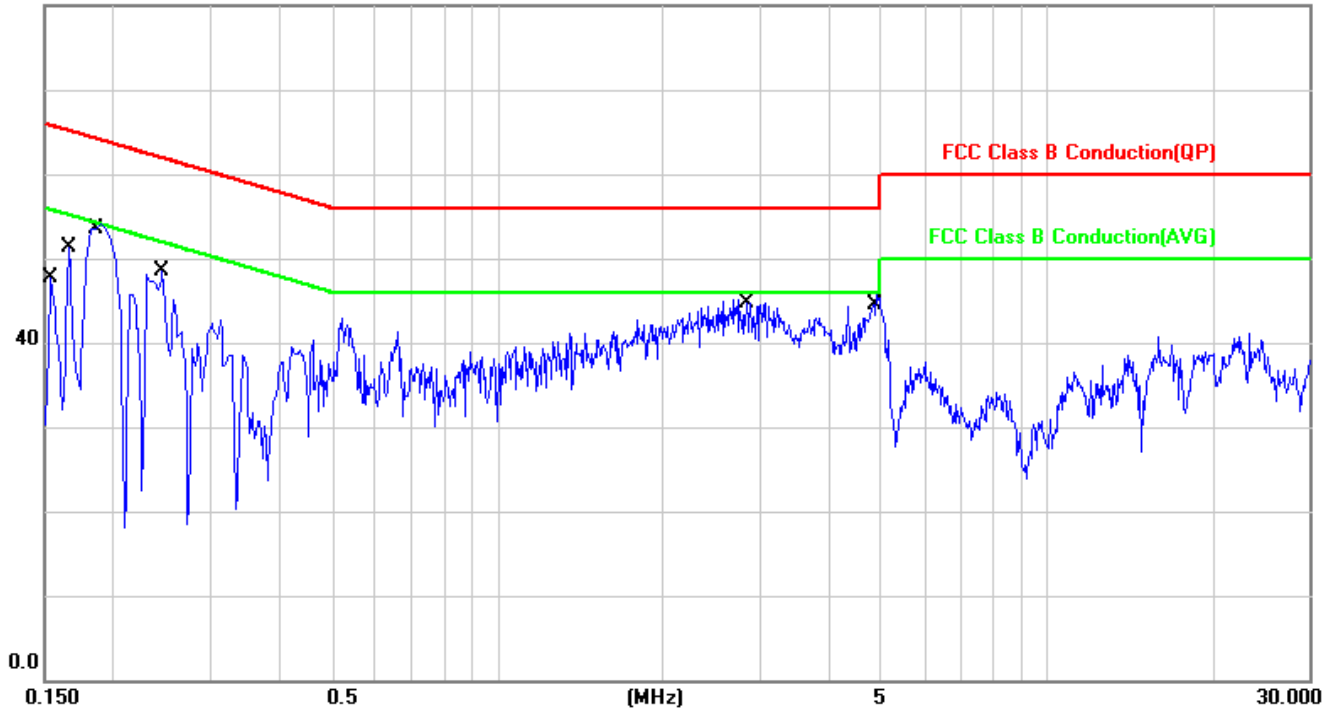
No.	Mk.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector	Comment
1.	*	0.1635	52.00	0.52	52.52	65.28	-12.76	QP	
2.		0.1635	34.50	0.52	35.02	55.28	-20.26	AVG	
3.		0.1742	51.20	0.52	51.72	64.76	-13.04	QP	
4.		0.1742	37.00	0.52	37.52	54.76	-17.24	AVG	
5.		0.2140	45.37	0.51	45.88	63.05	-17.17	QP	
6.		0.2340	45.39	0.51	45.90	62.31	-16.41	QP	
7.		0.4900	41.94	0.54	42.48	56.17	-13.69	QP	
8.		2.8500	37.90	0.67	38.57	56.00	-17.43	QP	
9.		2.8500	31.20	0.67	31.87	46.00	-14.13	AVG	

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80.0 dBuV



No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Comment
		(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)		
1		0.1540	47.57	0.16	47.73	65.78	-18.05	QP	
2		0.1660	51.20	0.16	51.36	65.16	-13.80	QP	
3		0.1835	48.50	0.16	48.66	64.33	-15.67	QP	
4		0.1835	37.30	0.16	37.46	54.33	-16.87	AVG	
5		0.2460	48.33	0.16	48.49	61.89	-13.40	QP	
6		2.8158	38.70	0.35	39.05	56.00	-16.95	QP	
7		2.8158	32.10	0.35	32.45	46.00	-13.55	AVG	
8		4.8378	38.30	0.44	38.74	56.00	-17.26	QP	
9	*	4.8378	33.50	0.44	33.94	46.00	-12.06	AVG	

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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.

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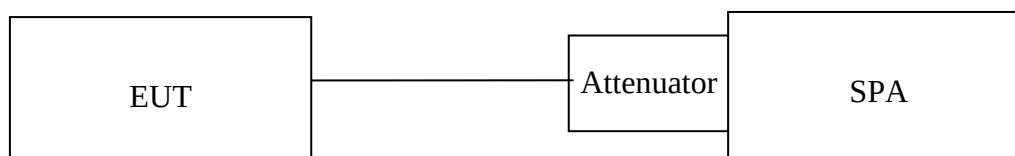
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7.2 Measurement Equipment Used:

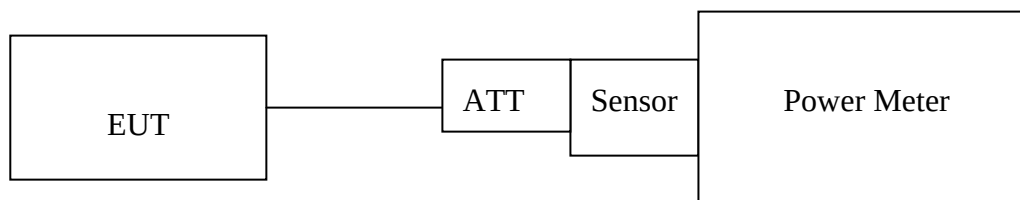
SGS Conducted Room					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY51100003	02/13/2012	02/12/2014
Power Meter	Anritsu	ML2496A	1242004	06/28/2013	06/27/2014
Power Sensor	Anritsu	MA2411B	917032	02/08/2012	02/07/2014
DC Power Supply	HOLA	DP-3003	001	N.C.R.	N.C.R.
Coaxial Cable	WOKEN	conducted #2	001	12/21/2012	12/20/2013
DC Block	Mini-Circuits	BLK-18-S+	002	12/21/2012	12/20/2013
Splitter	RF-LAMBAD	RFLT2W1G18G	11-JSPF412-018	12/21/2012	12/20/2013
Attenuator	Mini-Circuits	BW-S10W2+	002	12/21/2012	12/20/2013
Temperature Chamber	TERCHY	MHK-120LK	1020582	06/20/2013	06/19/2014

7.3 Test Set-up:

Spectrum:



Power Meter:



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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-analysis 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 $n_ht_20 = 95.6\%$, where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

Formula:

$$\text{Duty Cycle} = T_{on} / (T_{on} + T_{off})$$

Test Procedure:

Set span = 0, RBW = 8MHz, VBW = 8MHz, Detector = Peak

Duty Cycle:

	Duty Cycle
802.11b	0.992
802.11g	0.966
802.11n_20	0.932
802.11n_40	0.913

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: $10 * \log (1/0.93) = 0.34$

802.11n_40M: Duty Cycle Factor: $10 * \log (1/0.91) = 0.45$

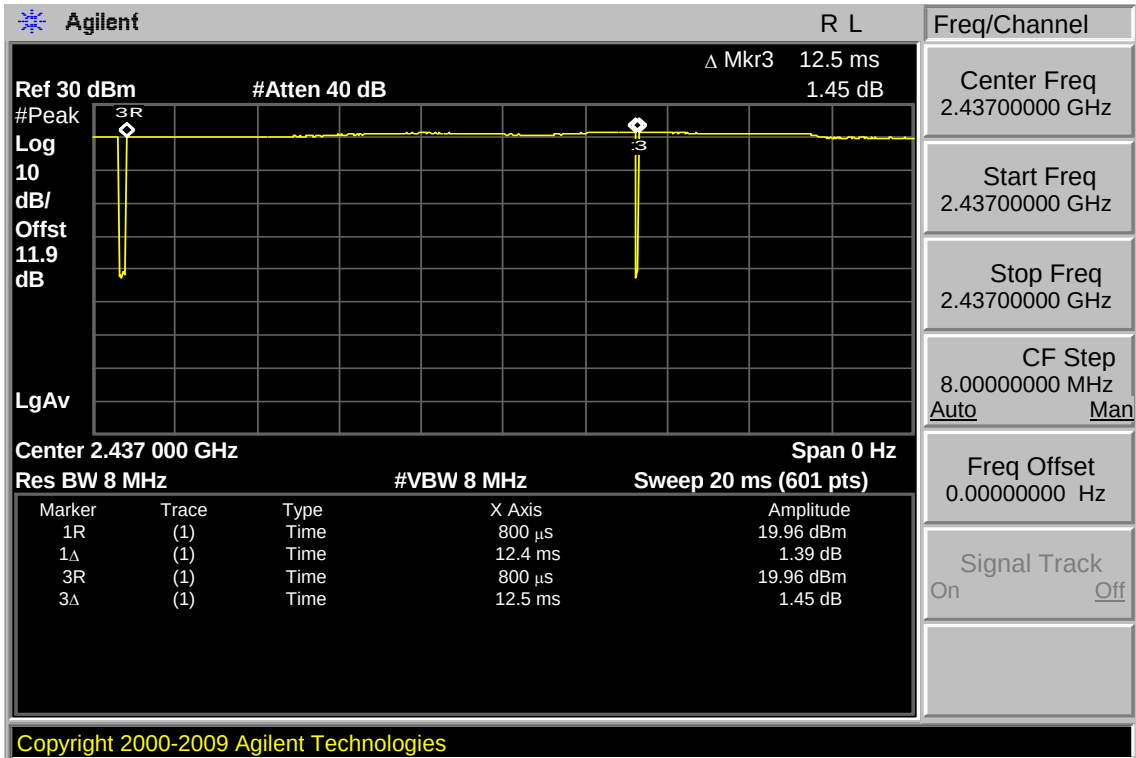
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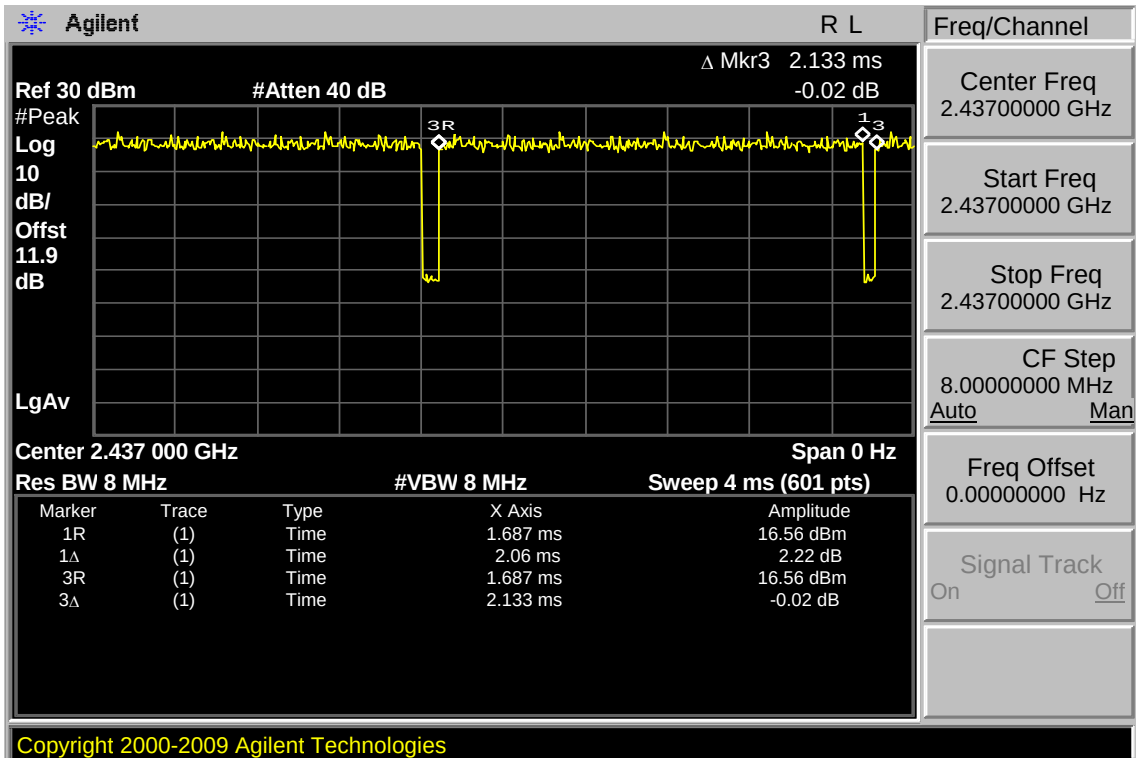
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Duty Factor:

802.11 b



802.11 g

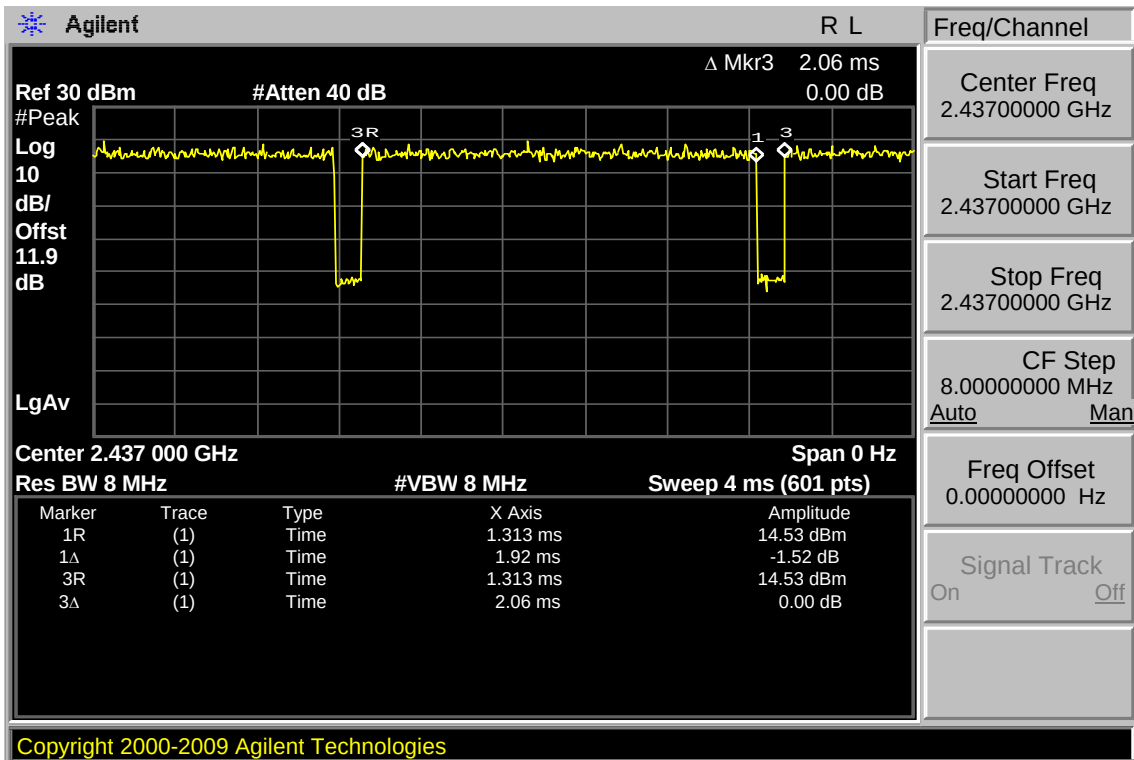


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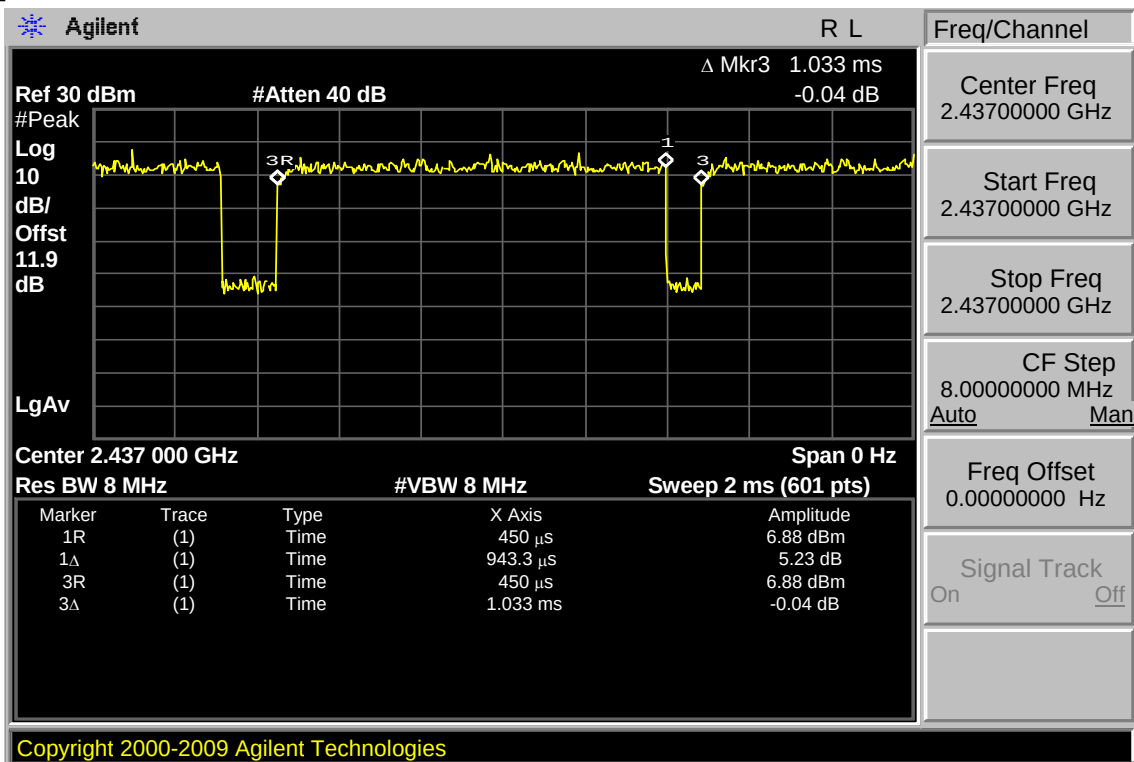
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802.11 n_20 MHz



802.11 n_40 MHz



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Measurement Result:

802.11b

		Peak Power Output (dBm)				
CH	Frequency (MHz)	Data Rate				Required Limit
		1	2	5.5	11	
1	2412	15.44	15.22	15.17	15.15	1 Watt = 30 dBm
6	2437	15.39	15.28	15.17	15.13	1 Watt = 30 dBm
11	2462	14.35	14.20	14.11	13.95	1 Watt = 30 dBm

		Average Power Output (dBm)				
CH	Frequency (MHz)	Data Rate				Required Limit
		1	2	5.5	11	
1	2412	13.13	12.84	12.54	12.47	1 Watt = 30 dBm
6	2437	12.99	12.88	12.80	12.73	1 Watt = 30 dBm
11	2462	11.98	11.82	11.75	11.53	1 Watt = 30 dBm

802.11g

		Peak Power Output(dBm)								
CH	Frequency (MHz)	Data Rate								Required Limit
		6	9	12	18	24	36	48	54	
1	2412	21.17	21.14	21.09	20.99	20.96	20.82	20.79	20.77	1 Watt = 30 dBm
6	2437	22.22	22.19	22.13	22.10	22.08	22.05	22.01	21.98	1 Watt = 30 dBm
11	2462	22.33	22.21	22.16	22.09	21.98	21.87	21.81	21.78	1 Watt = 30 dBm

		Average Power Output(dBm)								
CH	Frequency (MHz)	Data Rate								Required Limit
		6	9	12	18	24	36	48	54	
1	2412	12.03	11.85	11.70	11.68	11.56	11.30	10.93	10.60	1 Watt = 30 dBm
6	2437	13.63	13.42	13.26	13.09	12.92	12.65	12.38	12.15	1 Watt = 30 dBm
11	2462	13.87	13.71	13.65	13.53	13.25	13.09	12.87	12.74	1 Watt = 30 dBm

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802.11n_20M

		Peak Power Output(dBm)								
CH	Frequency (MHz)	Data Rate								Required Limit
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
1	2412	19.33	19.30	19.27	19.23	19.19	19.12	19.04	18.91	1 Watt = 30 dBm
6	2437	21.38	21.23	21.19	21.15	21.12	20.99	20.87	20.75	1 Watt = 30 dBm
11	2462	21.72	21.62	21.56	21.51	21.48	21.46	21.42	21.39	1 Watt = 30 dBm

		Average Power Output(dBm)								
CH	Frequency (MHz)	Data Rate								Required Limit
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
1	2412	10.40	10.09	9.76	9.61	9.33	9.15	9.06	8.97	1 Watt = 30 dBm
6	2437	11.50	11.28	11.09	10.83	10.50	10.46	10.37	10.28	1 Watt = 30 dBm
11	2462	11.94	11.62	11.36	11.16	10.89	10.65	10.38	10.25	1 Watt = 30 dBm

802.11n_40M

		Peak Power Output(dBm)								
CH	Frequency (MHz)	Data Rate								Required Limit
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
1	2422	20.64	20.52	20.47	20.43	20.39	20.35	20.32	20.27	1 Watt = 30 dBm
6	2437	21.76	21.63	21.56	21.47	21.41	21.38	21.32	21.29	1 Watt = 30 dBm
11	2452	21.81	21.76	21.71	21.67	21.63	21.58	21.55	21.51	1 Watt = 30 dBm

		Average Power Output(dBm)								
CH	Frequency (MHz)	Data Rate								Required Limit
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
1	2422	11.51	11.35	10.81	10.19	9.75	9.59	9.05	8.82	1 Watt = 30 dBm
6	2437	11.62	11.31	10.98	10.62	10.12	9.91	9.74	9.65	1 Watt = 30 dBm
11	2452	11.80	11.31	10.94	10.45	10.23	9.87	9.62	9.49	1 Watt = 30 dBm

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

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8 6dB BANDWIDTH

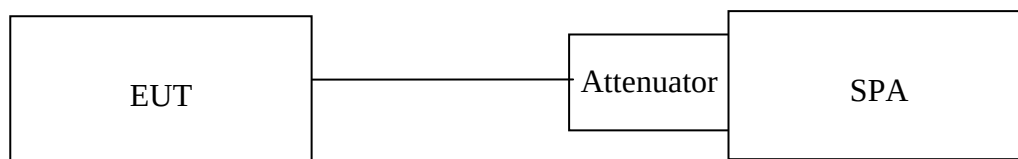
8.1 Standard Applicable:

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:

SGS Conducted Room					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	N9010A	MY51100003	02/13/2012	02/12/2014
Power Meter	Anritsu	ML2496A	1242004	06/28/2013	06/27/2014
Power Sensor	Anritsu	MA2411B	917032	02/08/2012	02/07/2014
DC Power Supply	HOLA	DP-3003	001	N.C.R.	N.C.R.
Coaxial Cable	WOKEN	conducted #2	001	12/21/2012	12/20/2013
DC Block	Mini-Circuits	BLK-18-S+	002	12/21/2012	12/20/2013
Splitter	RF-LAMBDA	RFLT2W1G18G	11-JSPF412-018	12/21/2012	12/20/2013
Attenuator	Mini-Circuits	BW-S10W2+	002	12/21/2012	12/20/2013
Temperature Chamber	TERCHY	MHK-120LK	1020582	06/20/2013	06/19/2014

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.

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8.5 Measurement Result:**802.11b**

Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Result
2412	10073	> 500	PASS
2437	10021	> 500	PASS
2462	10017	> 500	PASS

802.11g

Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Result
2412	16377	> 500	PASS
2437	16393	> 500	PASS
2462	16383	> 500	PASS

802.11n_20M

Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Result
2412	17606	> 500	PASS
2437	17629	> 500	PASS
2462	17637	> 500	PASS

802.11n_40M

Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Result
2422	35402	> 500	PASS
2437	35395	> 500	PASS
2452	35389	> 500	PASS

* Note: Offset 11.9dB for 802.11b/g; 12dB for 802.11/n_20/n_40

* Note: The arrow “->” reveals X decibel level

*Refer to next page for plots

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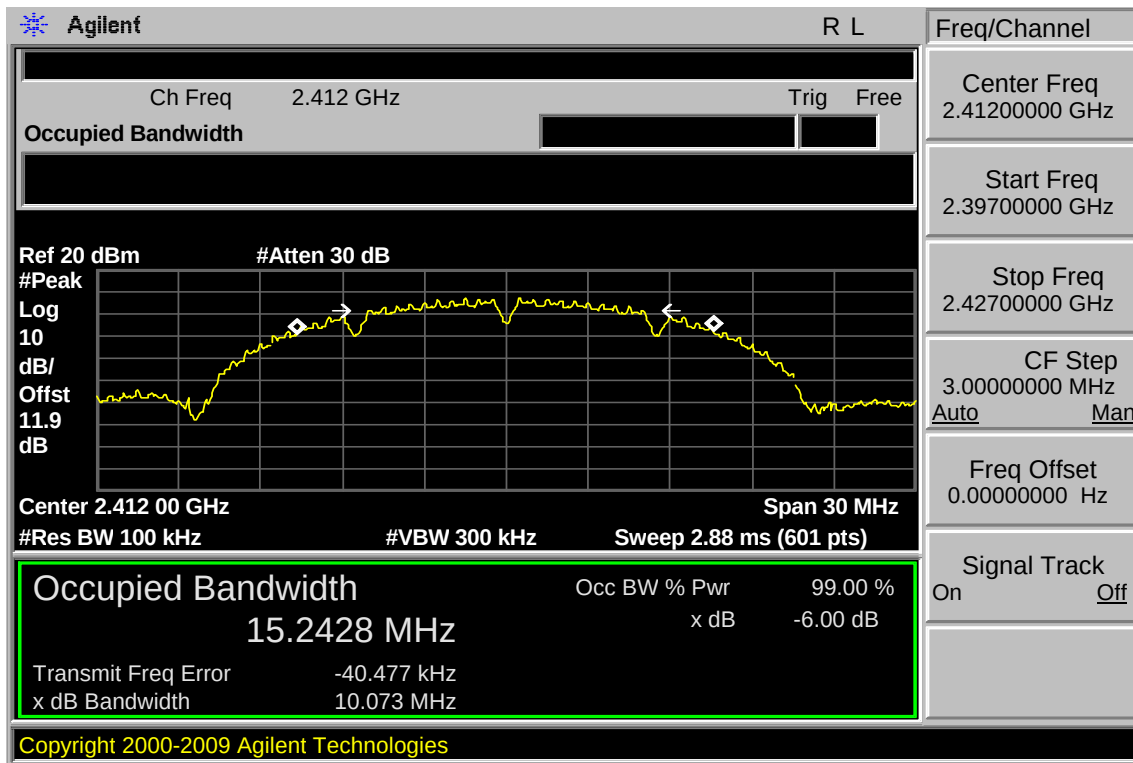
f (886-2) 2298-0488

www.tw.sgs.com

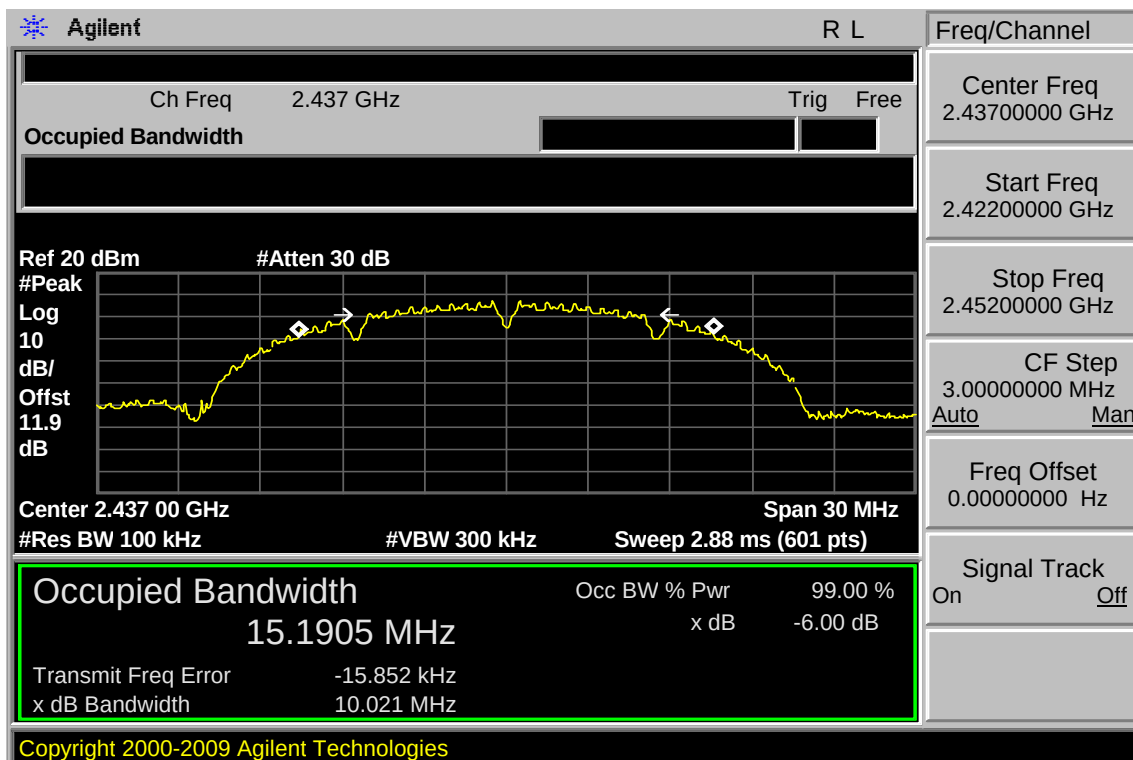
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802.11b

6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid

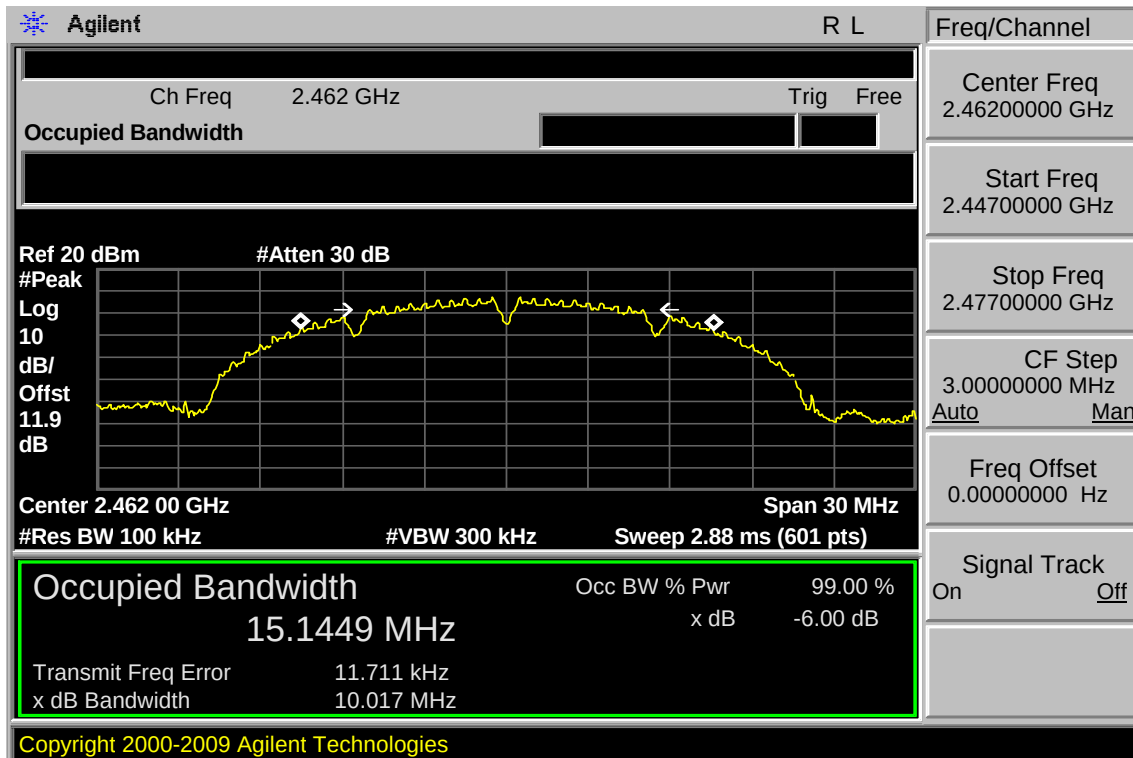


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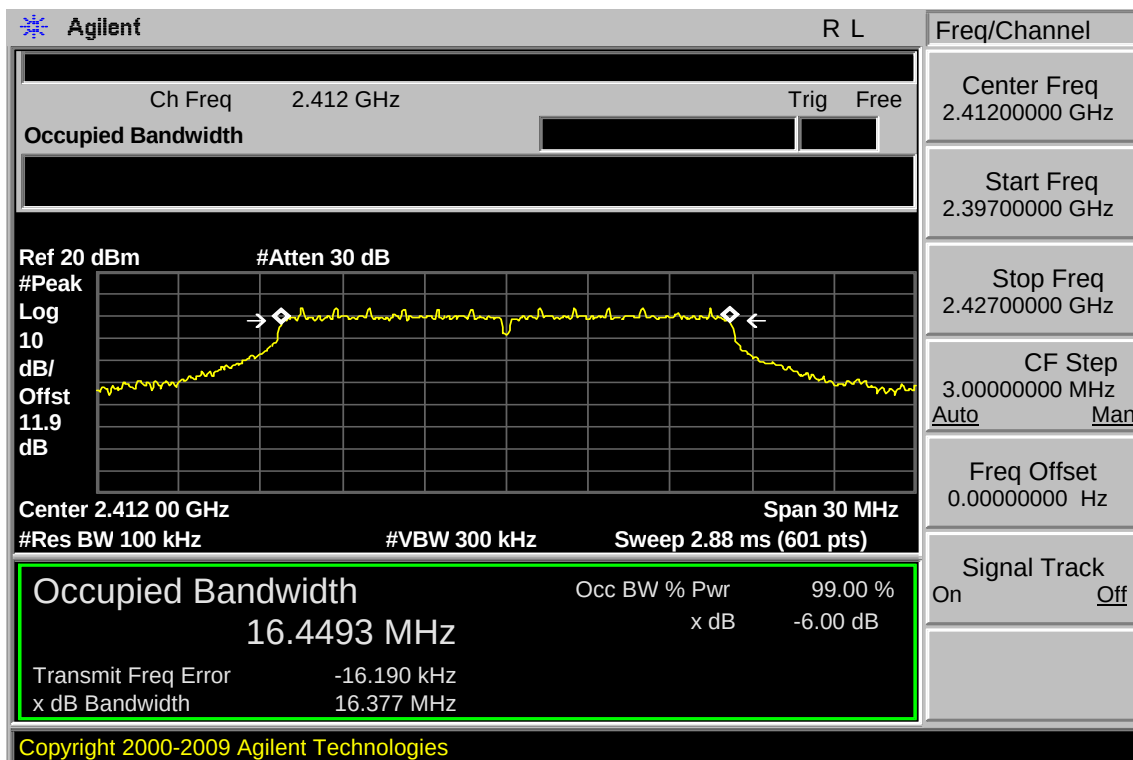
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6dB Band Width Test Data CH-High



802.11g

6dB Band Width Test Data CH-Low

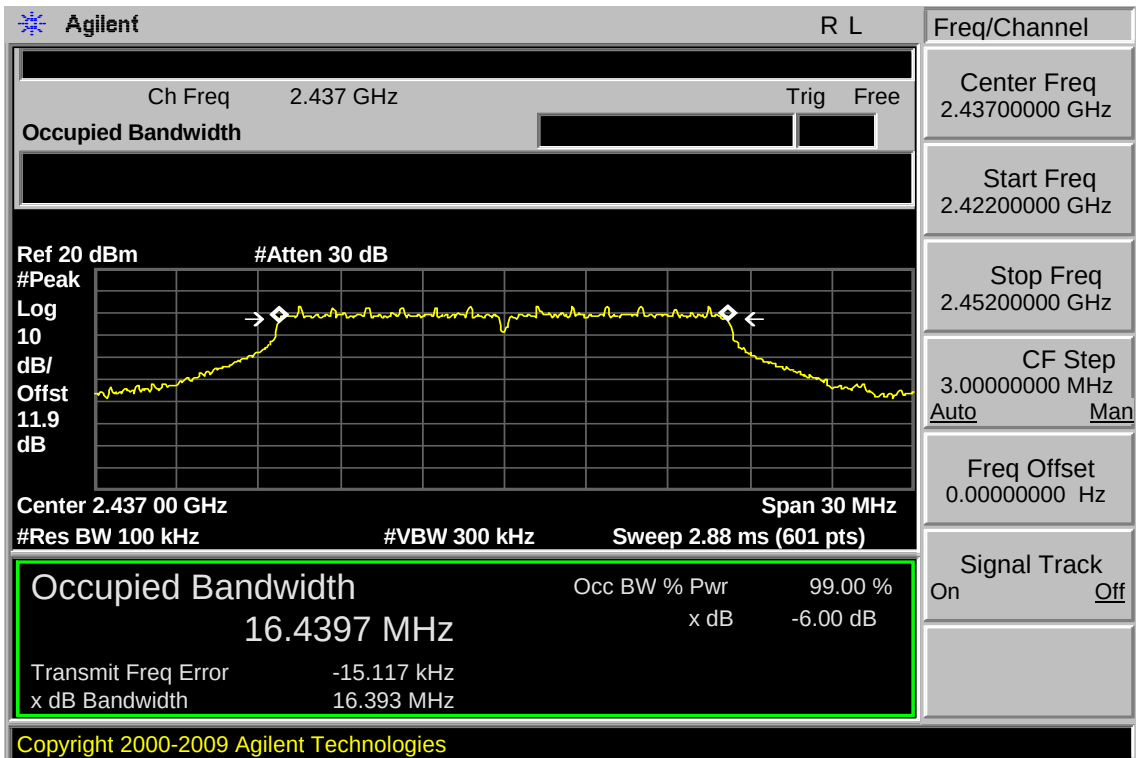


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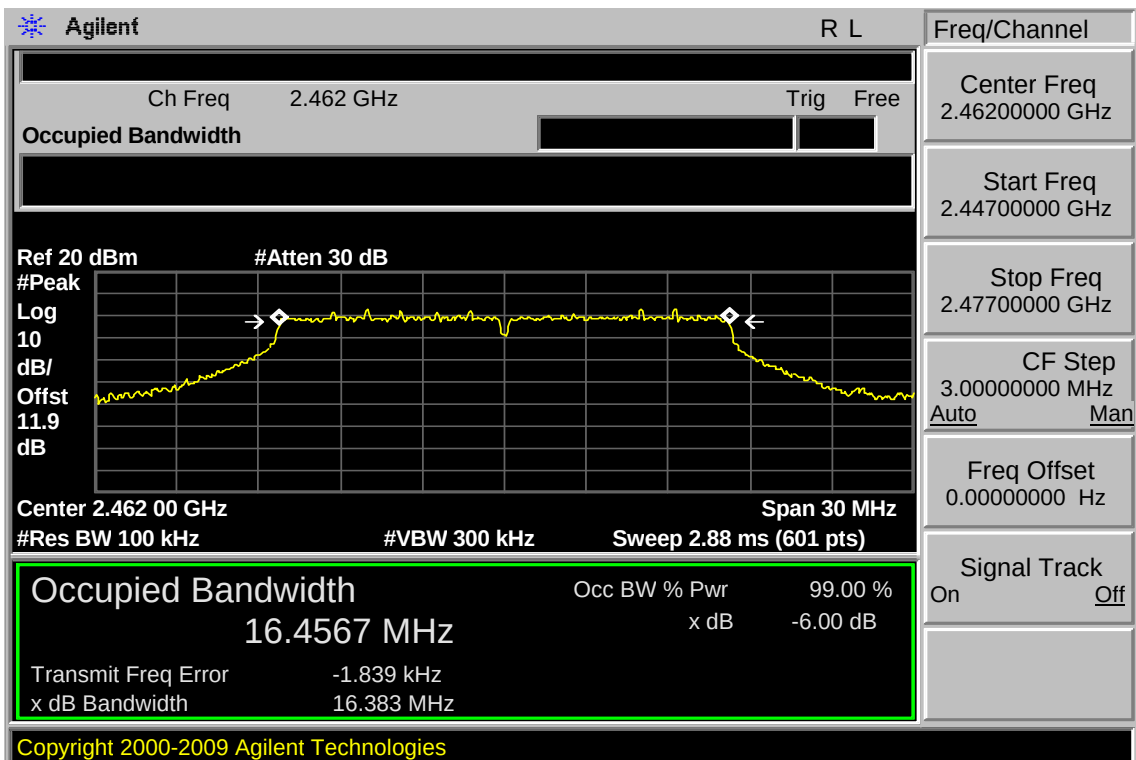
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6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High



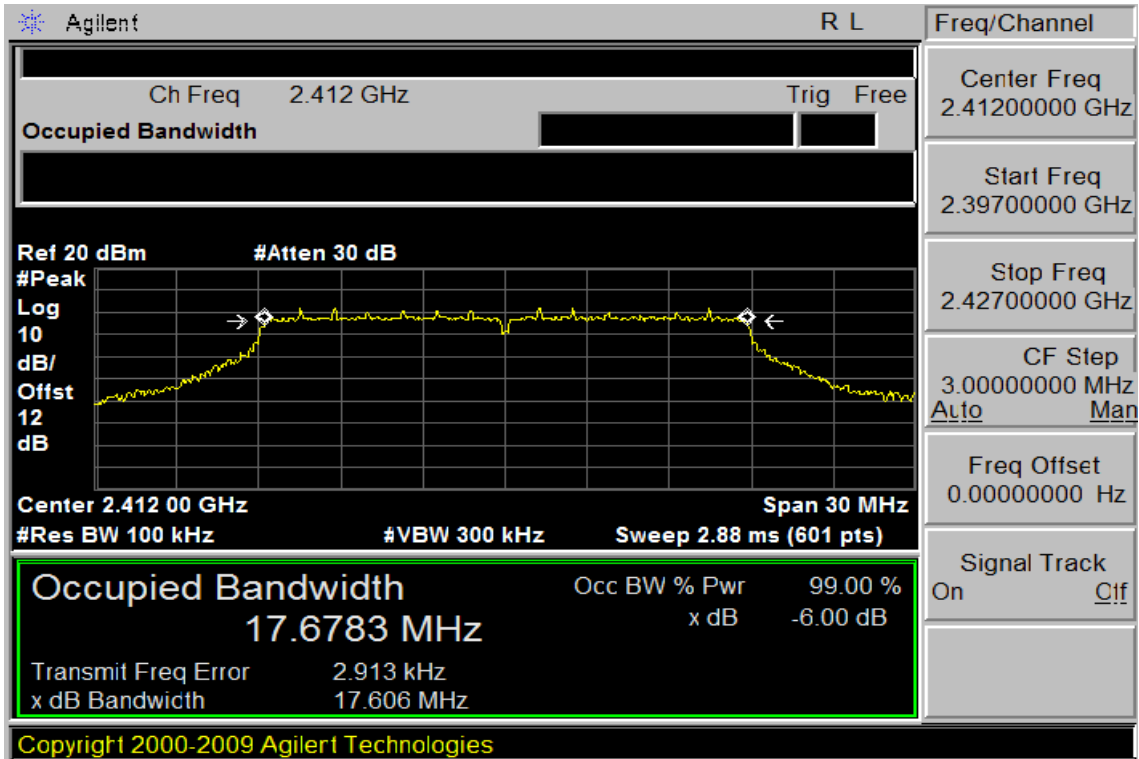
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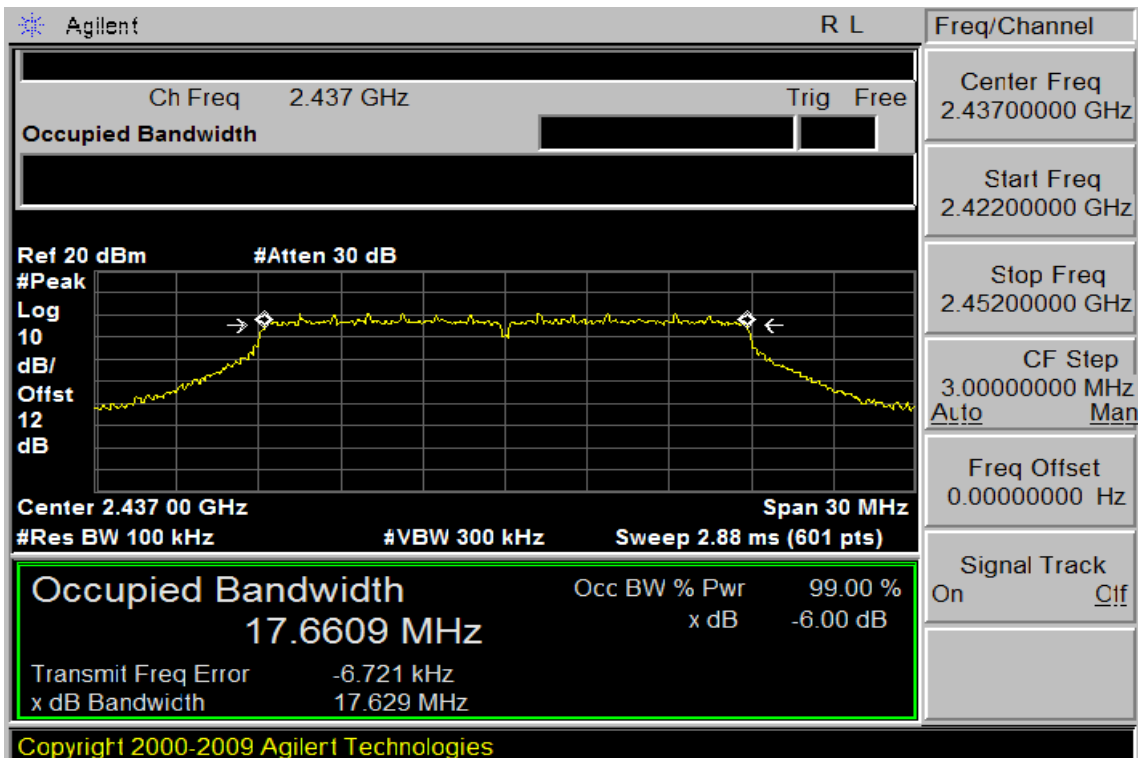
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802.11n_20M

6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid

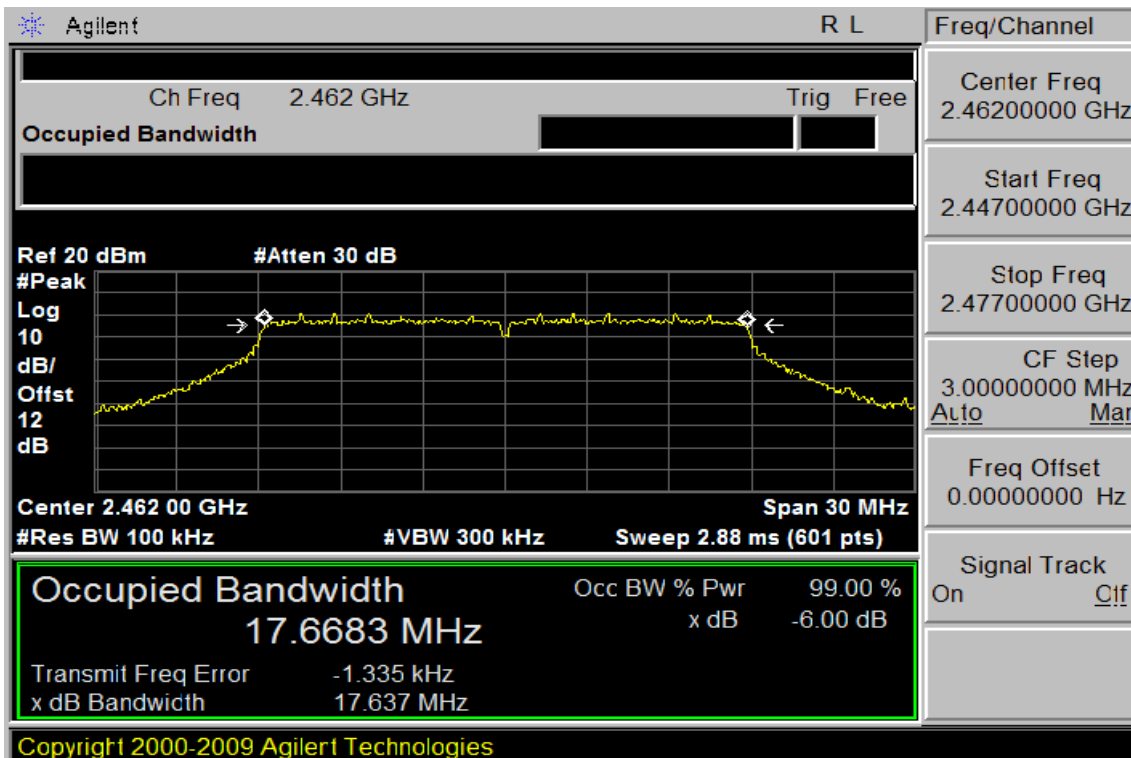


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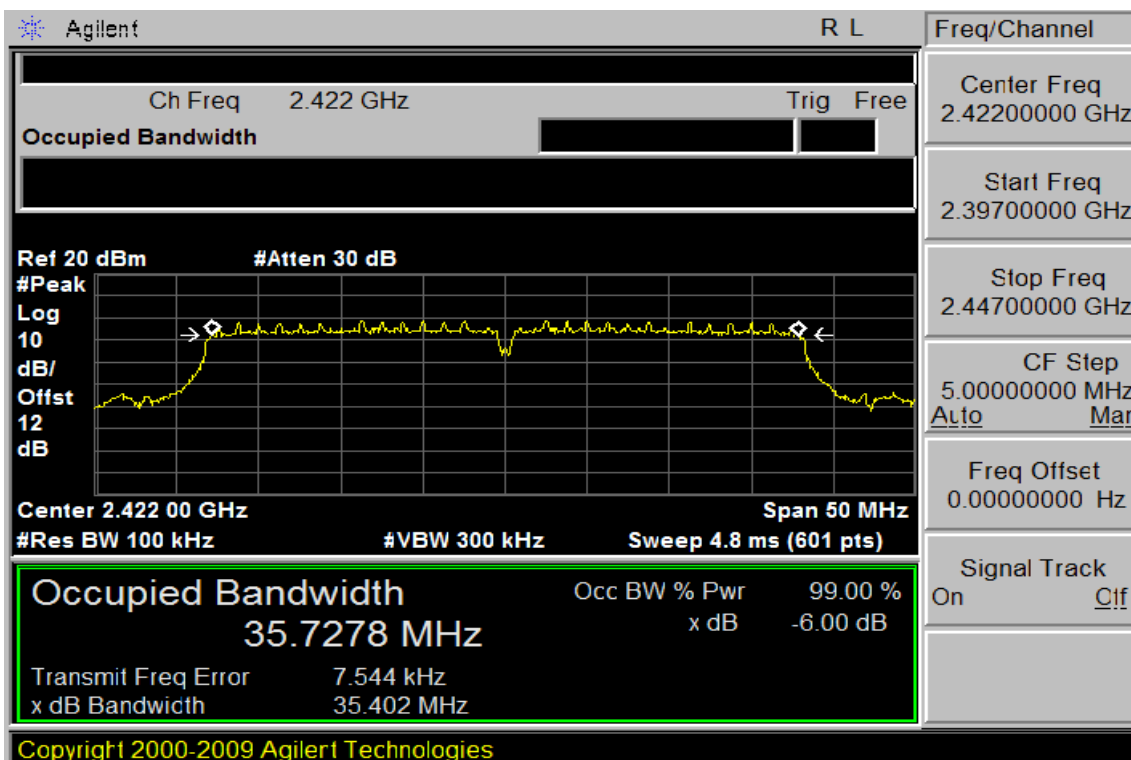
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6dB Band Width Test Data CH-High



802.11n_40M

6dB Band Width Test Data CH-Low

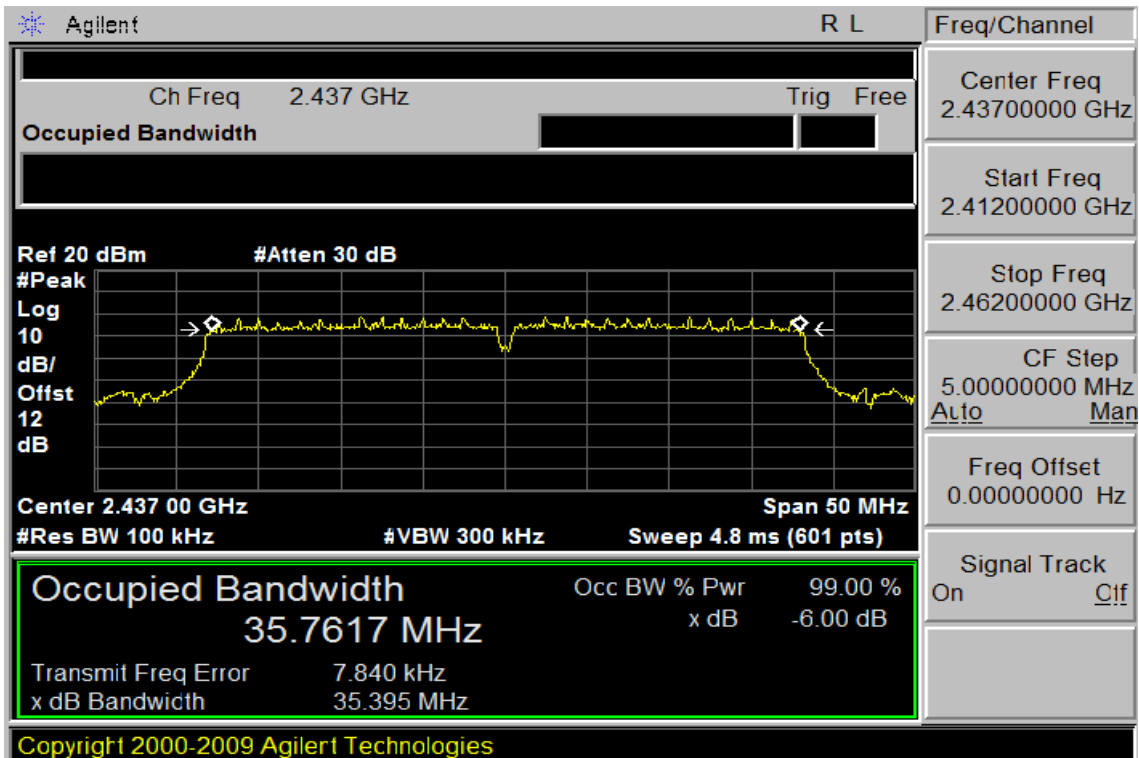


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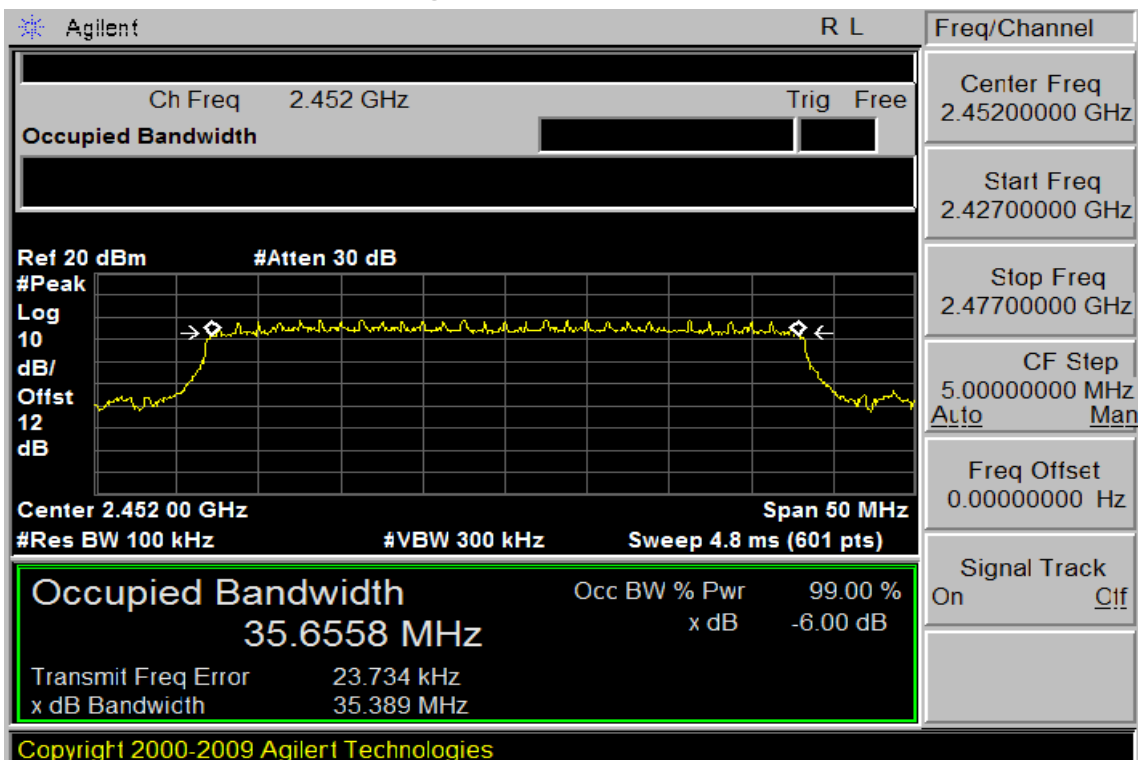
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6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High



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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 is 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 in §15.209(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					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EMI Test Receiver	R&S	ESU 40	100363	01/30/2013	01/29/2014
Broadband Antenna	TESEQ	CBL 6112D	35240	02/04/2013	02/03/2014
Horn Antenna	ETS-Lindgren	3117	00143272	01/16/2013	01/15/2014
Horn Antenna	ETS-Lindgren	3160-09	00117911	02/14/2013	02/13/2014
Pre-Amplifier	R&S	SCU-18	10203	01/21/2013	01/20/2014
Pre-Amplifier	EM Electronics Corp.	EMC330	980096	01/04/2013	01/03/2014
Pre-Amplifier	EM Electronics Corp.	EMC184045	980135	01/28/2013	01/27/2014
Coaxial Cable	Huber+Suhner	SAC-C TX-30M-1GHz	TX1	04/22/2013	04/21/2014
Coaxial Cable	Huber+Suhner	SAC-C TX-1-26.5GHz	TX2	04/22/2013	04/21/2014
Coaxial Cable	Huber+Suhner	SAC-C RX-150k-30MHz	RX1	04/22/2013	04/21/2014
Coaxial Cable	Huber+Suhner	SAC-C RX-30M-1GHz	RX2	04/22/2013	04/21/2014
Coaxial Cable	Huber+Suhner	SAC-C RX-1-26.5GHz	RX3	04/22/2013	04/21/2014
Controller	Chance Most	886	N/A	N.C.R.	N.C.R.
Antenna Master	Chance Most	N/A	N/A	N.C.R.	N.C.R.
Turn Table	Chance Most	N/A	N/A	N.C.R.	N.C.R.
Filter Bank	R&S	TS8996	SCIN.EMC.1023.12	04/22/2013	04/21/2014
Test Software	World-Pallas	Dr. E	V 3.0 Lite	N.C.R.	N.C.R.

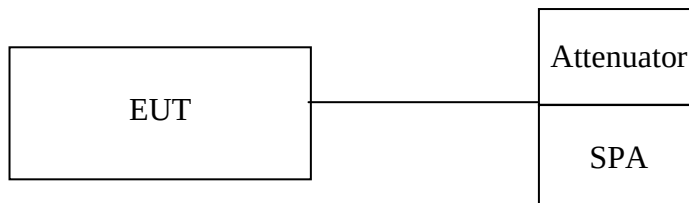
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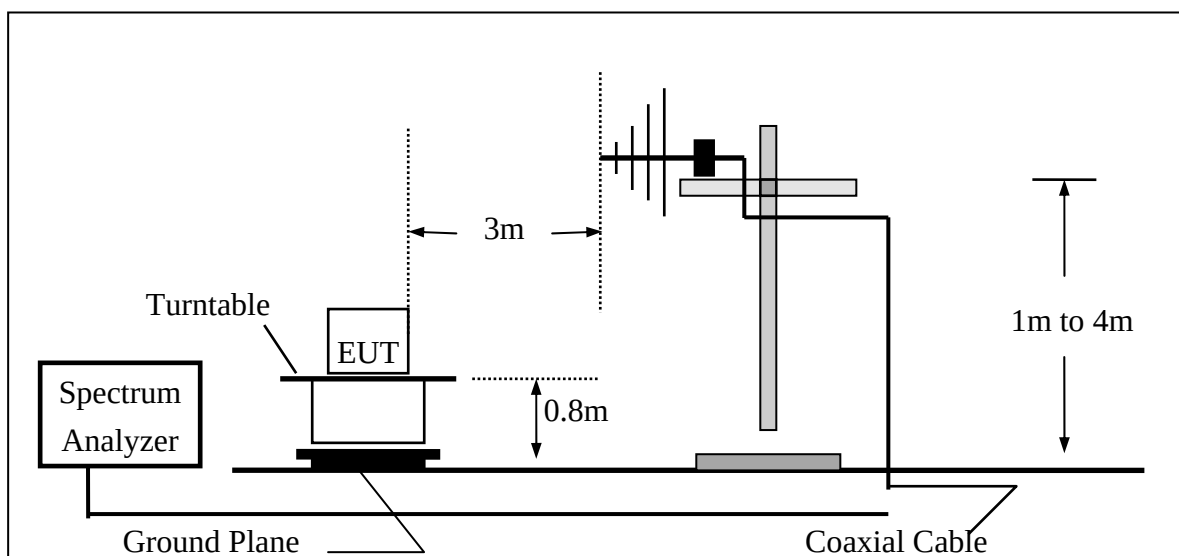
9.3 Test SET-UP:

9.3.1 Conducted Emission at antenna port:

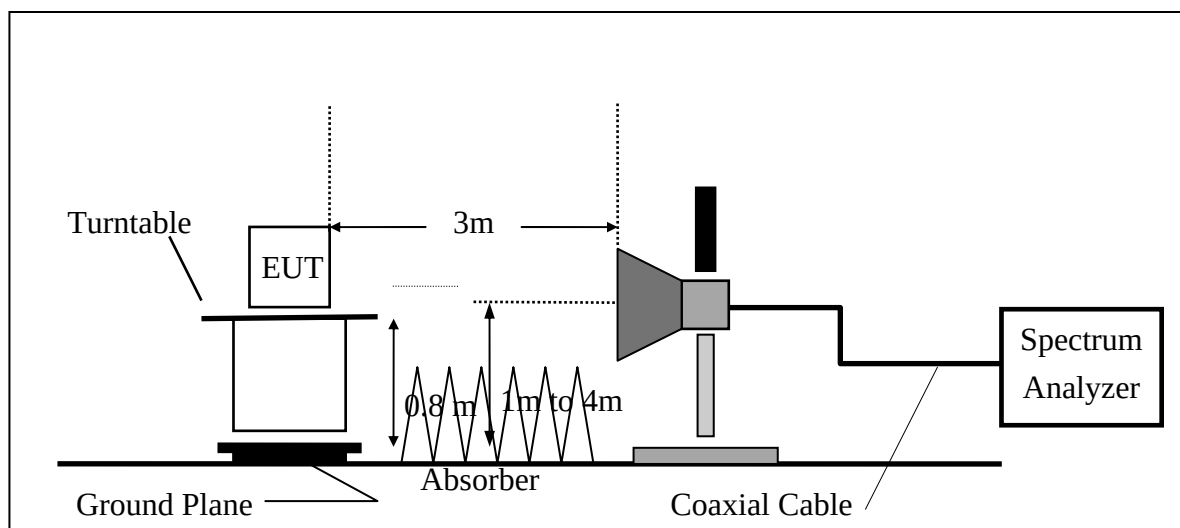


9.3.2 Radiated emission:

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



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



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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

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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.

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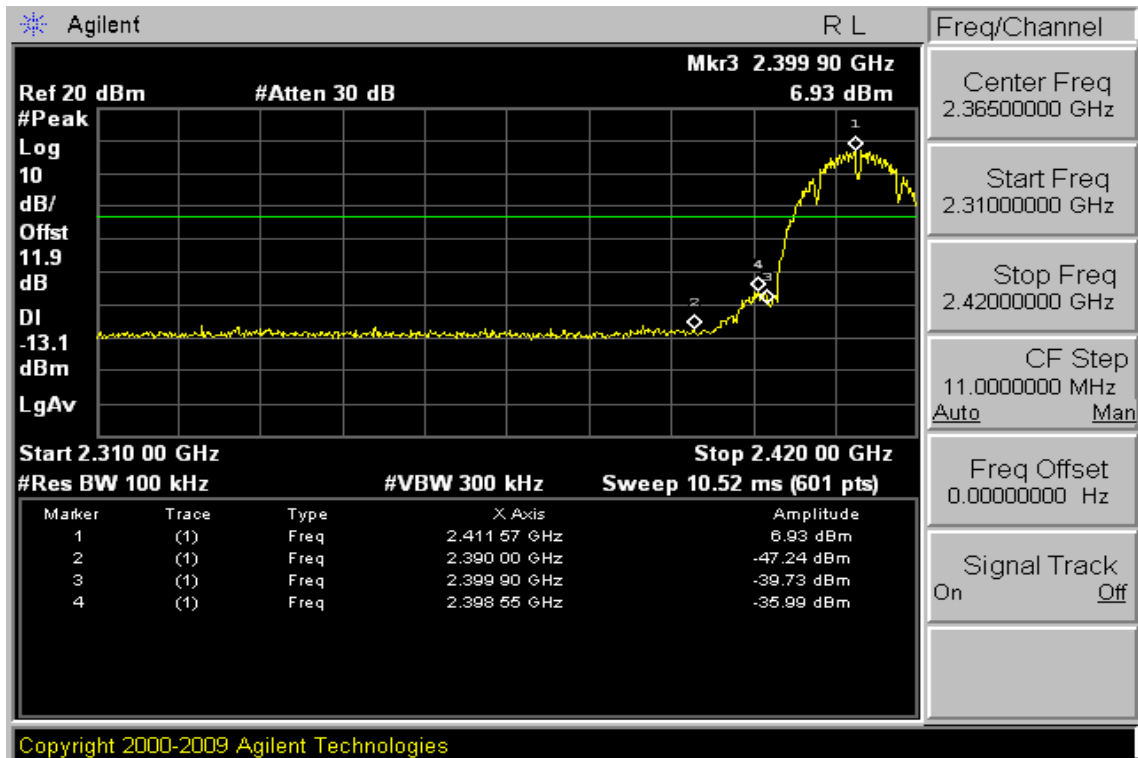
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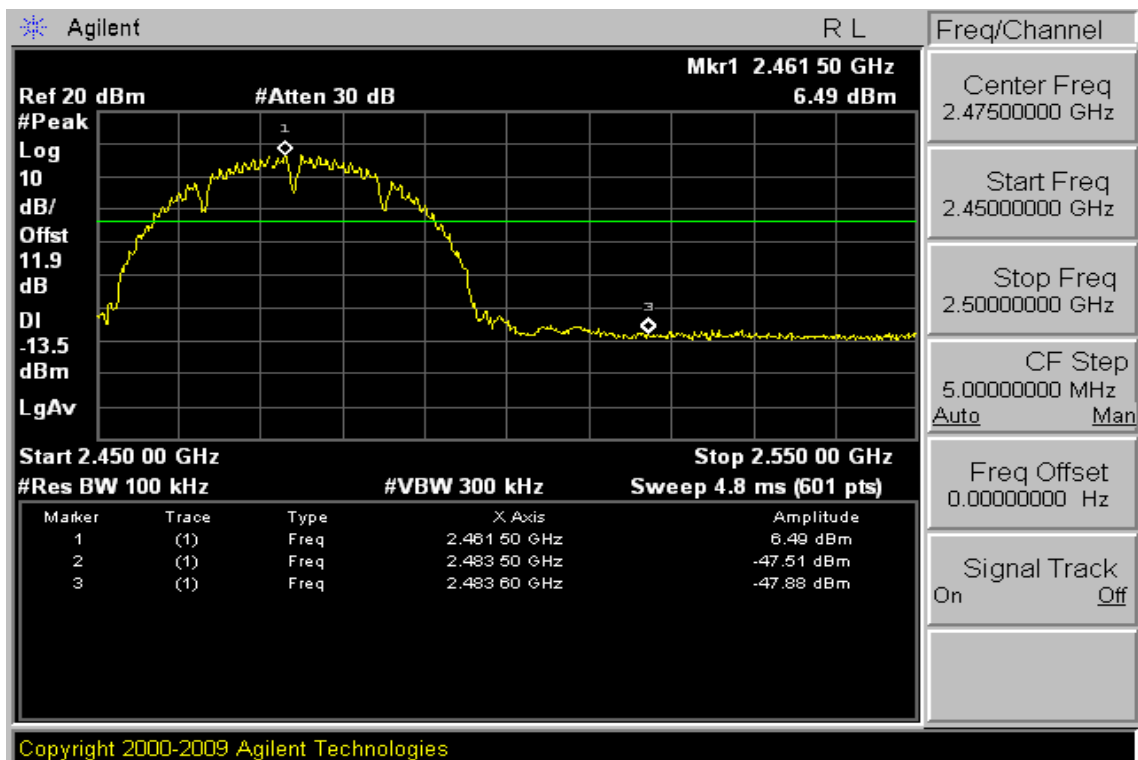
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802.11b - Unwanted Emissions into Non-Restricted Frequency Bands

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



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Radiated Emission:

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

Operation Band	:802.11 b	Test Date	:2013-11-20
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:Bandedge LOW	Engineer	:Vito
EUT Pol.	:E2 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	Peak	55.35	3.14	58.48	74.00	-15.52
2390.00	E	Average	41.33	3.14	44.47	54.00	-9.53

Operation Band	:802.11 b	Test Date	:2013-11-20
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:Bandedge LOW	Engineer	:Vito
EUT Pol.	:E2 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	Peak	63.71	3.14	66.85	74.00	-7.15
2390.00	E	Average	49.55	3.14	52.69	54.00	-1.31

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Operation Band	:802.11 b	Test Date	:2013-11-20
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:Bandedge HIGH	Engineer	:Vito
EUT Pol.	:E2 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	Peak	46.59	3.35	49.95	74.00	-24.05
2483.50	E	Average	34.45	3.35	37.80	54.00	-16.20

Operation Band	:802.11 b	Test Date	:2013-11-20
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:Bandedge HIGH	Engineer	:Vito
EUT Pol.	:E2 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	Peak	48.11	3.35	51.46	74.00	-22.54
2483.50	E	Average	37.78	3.35	41.13	54.00	-12.87

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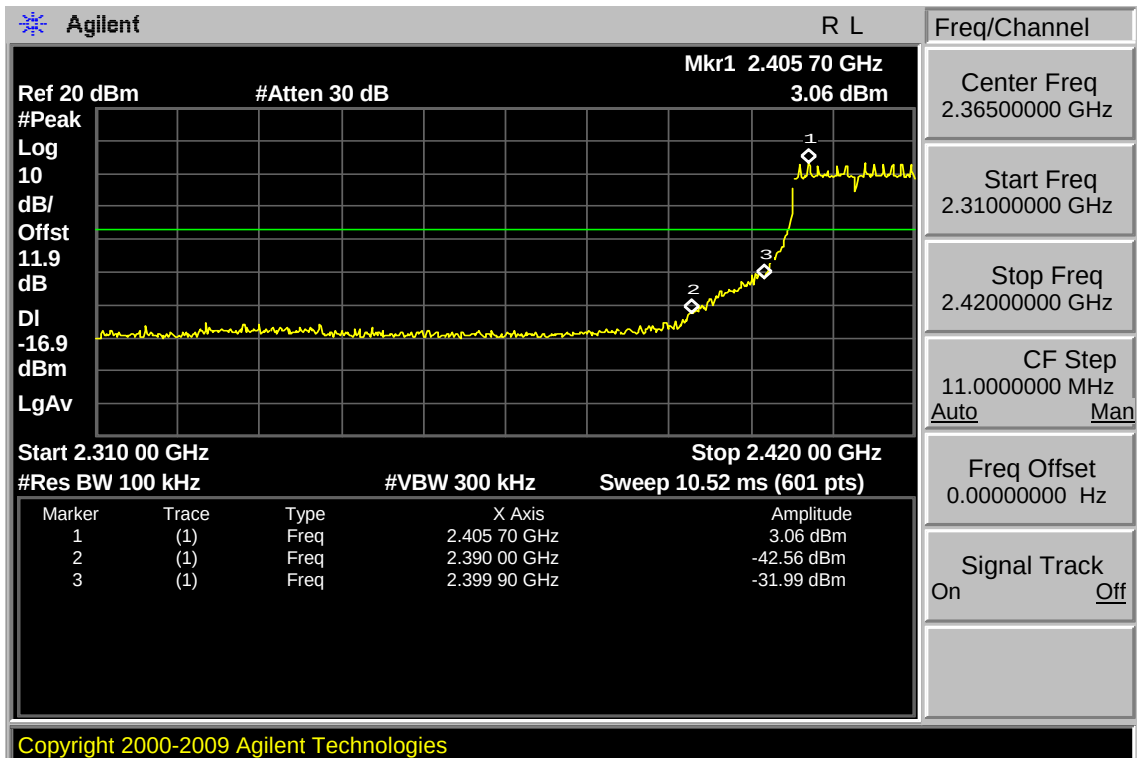
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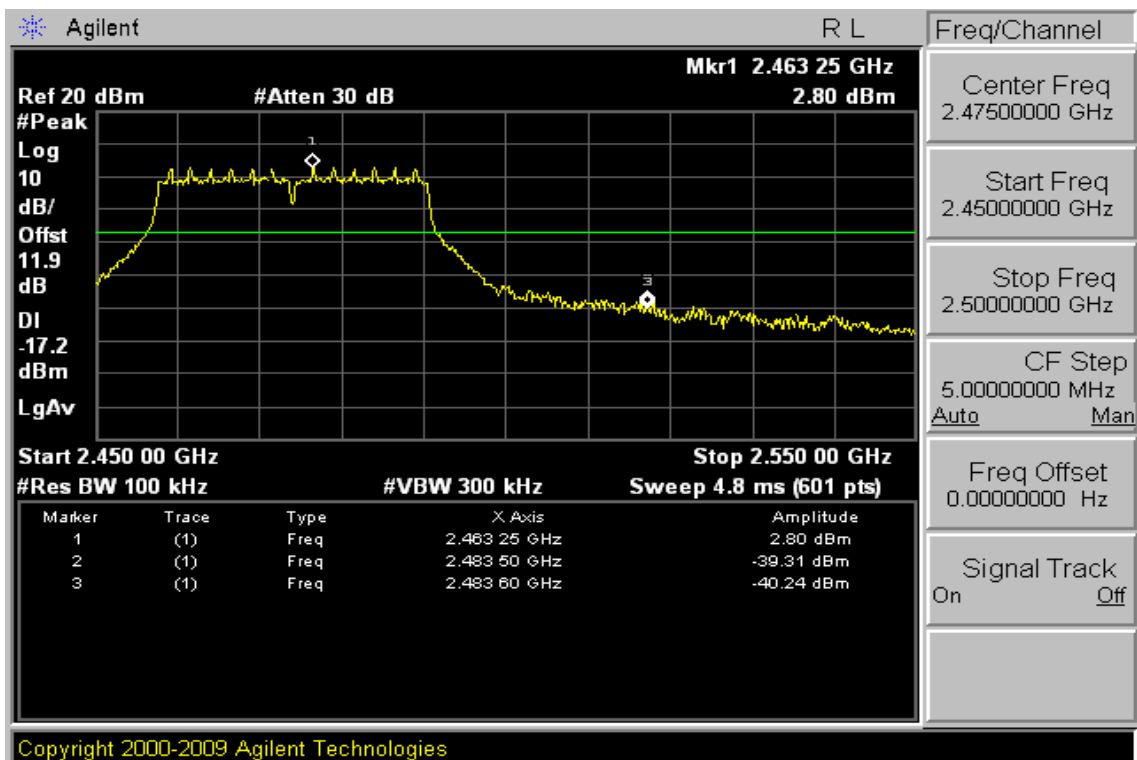
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802.11g - Unwanted Emissions into Non-Restricted Frequency Bands

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



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Radiated Emission:

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

Operation Band	:802.11 g	Test Date	:2013-11-20
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:Bandedge LOW	Engineer	:Vito
EUT Pol.	:E2 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	Peak	59.77	3.14	62.90	74.00	-11.10
2390.00	E	Average	39.28	3.14	42.42	54.00	-11.58

Operation Band	:802.11 g	Test Date	:2013-11-20
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:Bandedge LOW	Engineer	:Vito
EUT Pol.	:E2 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	Peak	69.08	3.14	72.22	74.00	-1.78
2390.00	E	Average	49.67	3.14	52.81	54.00	-1.19

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Operation Band	:802.11 g	Test Date	:2013-11-20
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:Bandedge HIGH	Engineer	:Vito
EUT Pol.	:E2 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	Peak	55.55	3.35	58.90	74.00	-15.10
2483.50	E	Average	38.05	3.35	41.40	54.00	-12.60

Operation Band	:802.11 g	Test Date	:2013-11-20
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:Bandedge HIGH	Engineer	:Vito
EUT Pol.	:E2 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	Peak	62.04	3.35	65.39	74.00	-8.61
2483.50	E	Average	42.91	3.35	46.26	54.00	-7.74

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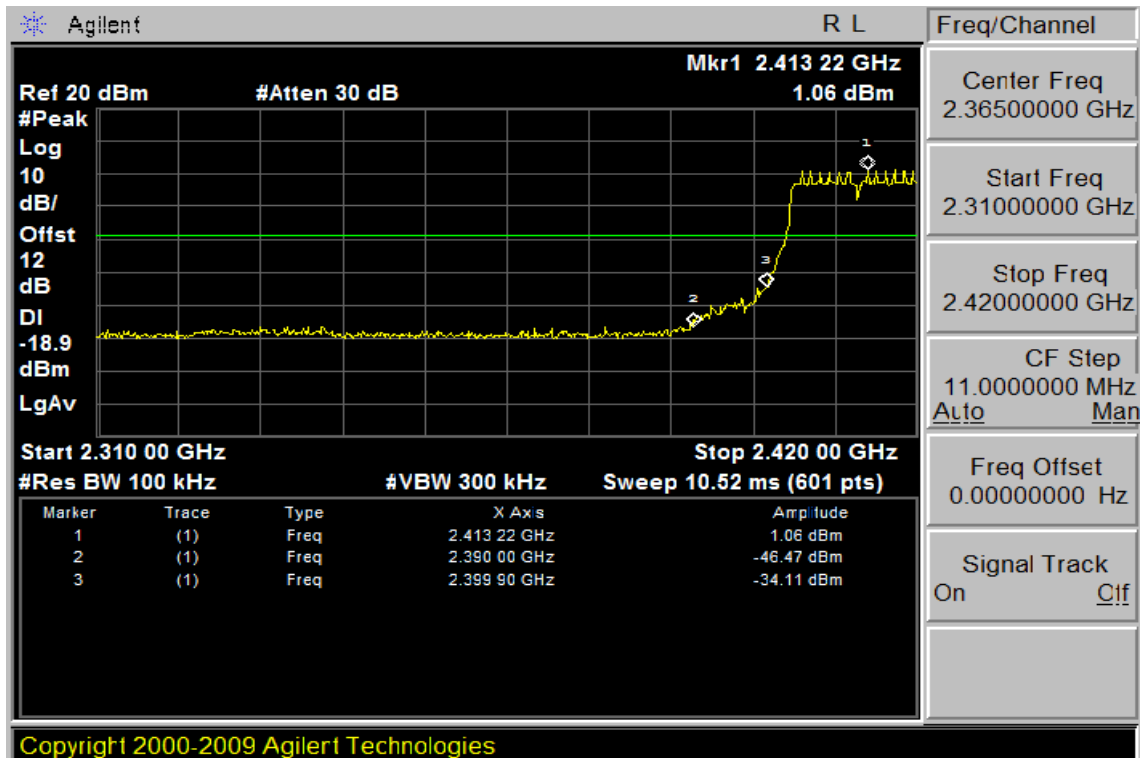
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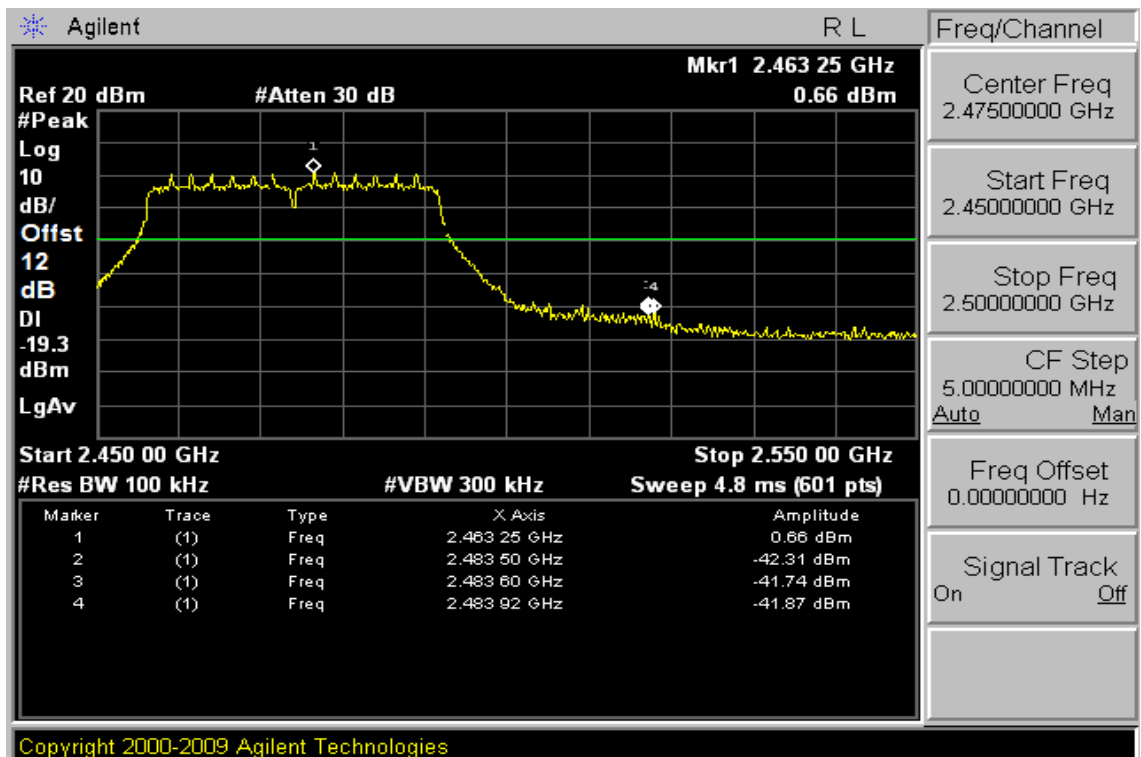
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802.11n_20M- Unwanted Emissions into Non-Restricted Frequency Bands

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



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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	:2013-11-20
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:Bandedge LOW	Engineer	:Vito
EUT Pol.	:E2 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	Peak	59.74	3.14	62.88	74.00	-11.12
2390.00	E	Average	36.83	3.14	39.97	54.00	-14.03

Operation Band	:802.11 n20M	Test Date	:2013-11-20
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:Bandedge LOW	Engineer	:Vito
EUT Pol.	:E2 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	Peak	69.63	3.14	72.77	74.00	-1.23
2390.00	E	Average	44.24	3.14	47.38	54.00	-6.62

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Operation Band	:802.11 n20M	Test Date	:2013-11-20
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:Bandedge HIGH	Engineer	:Vito
EUT Pol.	:E2 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	S	Peak	54.70	3.35	58.05	74.00	-15.95
2483.50	S	Average	35.11	3.35	38.46	54.00	-15.54

Operation Band	:802.11 n20M	Test Date	:2013-11-20
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:Bandedge HIGH	Engineer	:Vito
EUT Pol.	:E2 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	Peak	60.27	3.35	63.62	74.00	-10.38
2483.50	E	Average	38.23	3.35	41.58	54.00	-12.42

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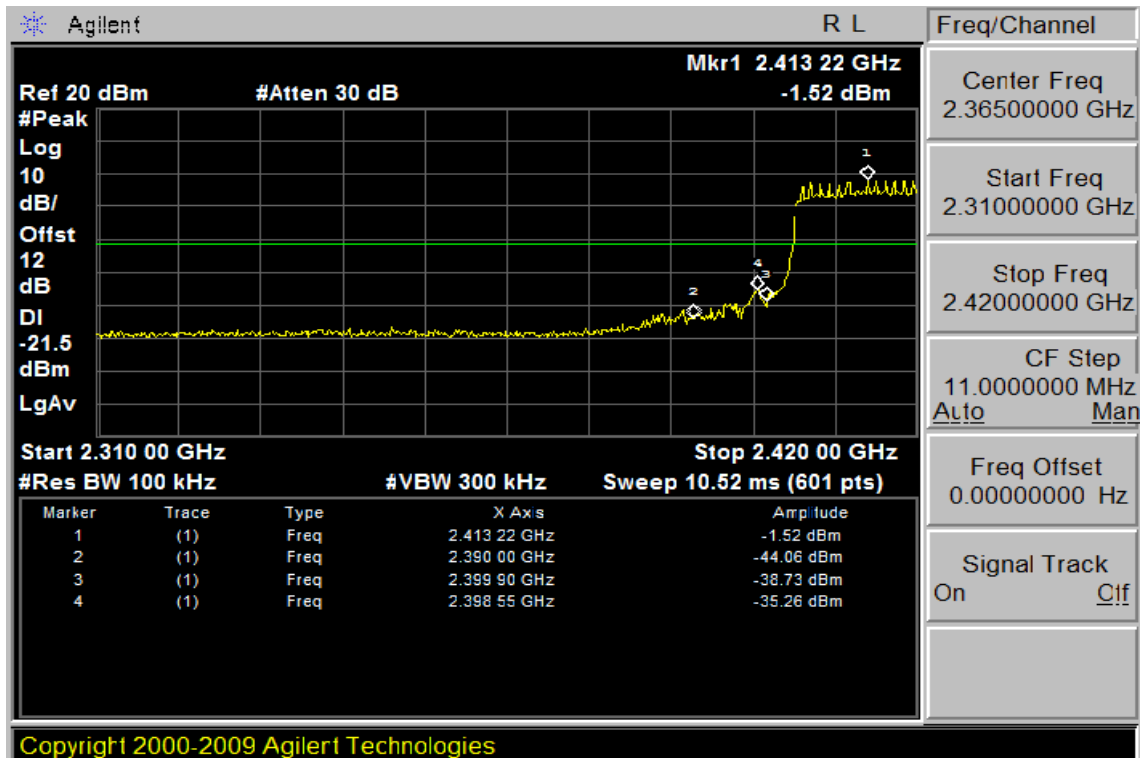
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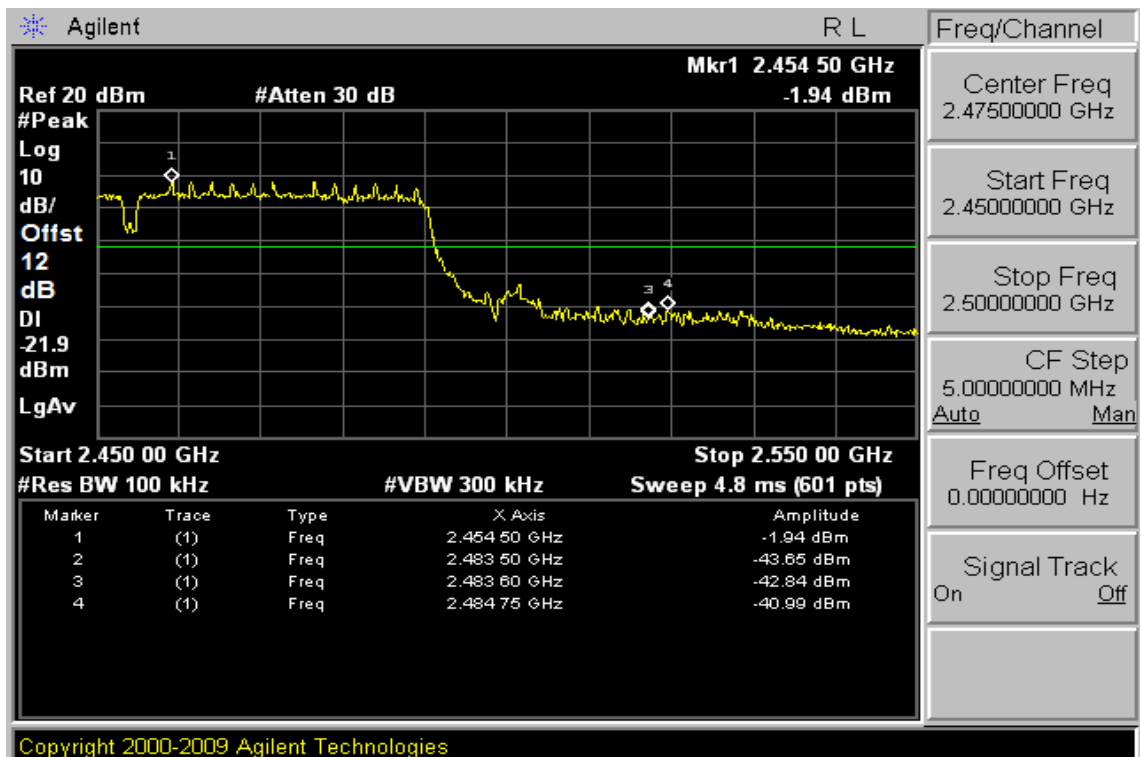
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802.11n_40M- Unwanted Emissions into Non-Restricted Frequency Bands

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



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Radiated Emission: 802.11 n_40M mode

(Unwanted Emissions into Restricted Frequency Bands): 802.11 n_40M mode

Operation Band	:802.11 n40M	Test Date	:2013-11-20
Fundamental Frequency	:2422 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:Bandedge LOW	Engineer	:Vito
EUT Pol.	:E2 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	Peak	58.03	3.14	61.17	74.00	-12.83
2390.00	E	Average	41.31	3.14	44.45	54.00	-9.55

Operation Band	:802.11 n40M	Test Date	:2013-11-20
Fundamental Frequency	:2422 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:Bandedge LOW	Engineer	:Vito
EUT Pol.	:E2 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	Peak	66.99	3.14	70.12	74.00	-3.88
2390.00	E	Average	49.24	3.14	52.38	54.00	-1.62

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Operation Band	:802.11 n40M	Test Date	:2013-11-20
Fundamental Frequency	:2452 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:Bandedge HIGH	Engineer	:Vito
EUT Pol.	:E2 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	Peak	53.82	3.35	57.17	74.00	-16.83
2483.50	E	Average	39.31	3.35	42.66	54.00	-11.34

Operation Band	:802.11 n40M	Test Date	:2013-11-20
Fundamental Frequency	:2452 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:Bandedge HIGH	Engineer	:Vito
EUT Pol.	:E2 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	Peak	60.40	3.35	63.75	74.00	-10.25
2483.50	E	Average	44.68	3.35	48.03	54.00	-5.97

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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.

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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.

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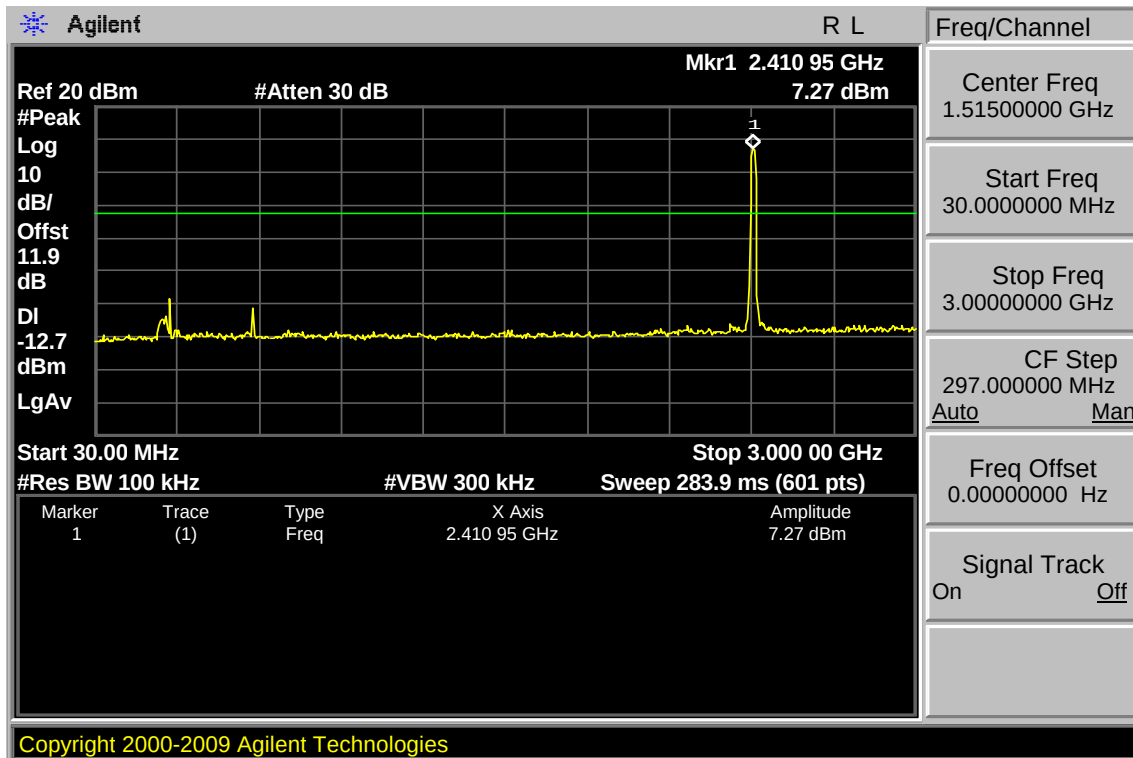
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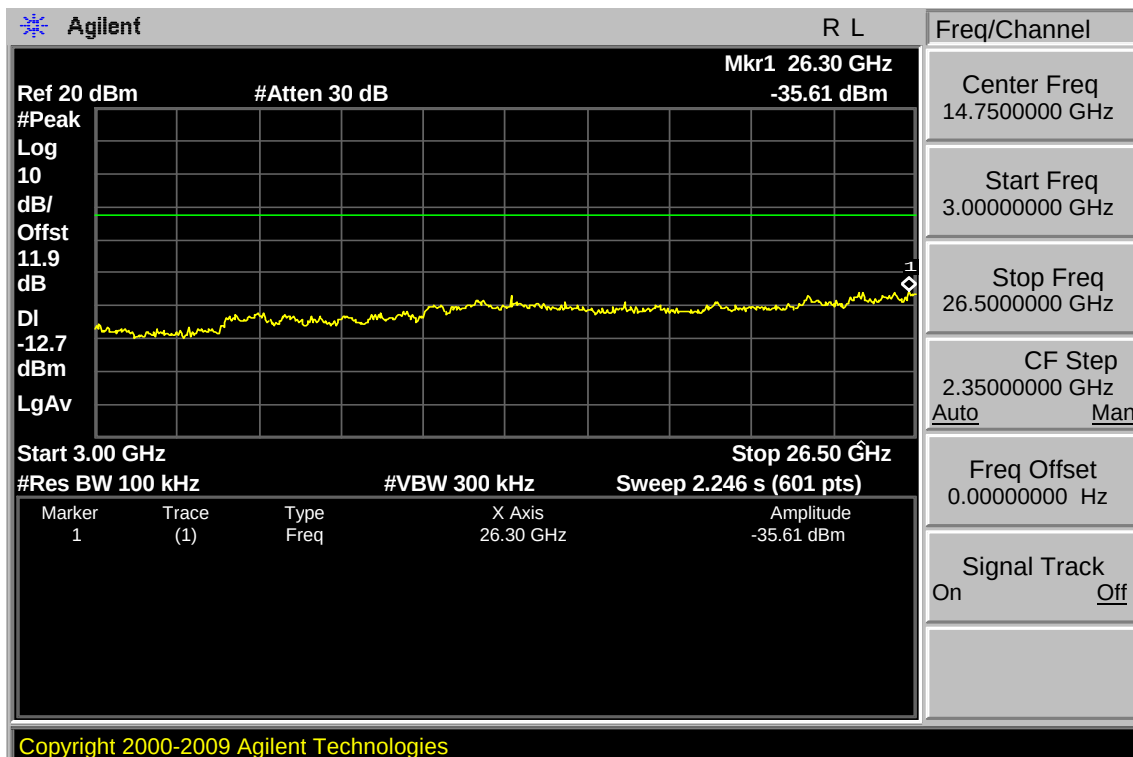
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Conducted Spurious Emission Measurement Result (802.11b)

Ch Low 30MHz – 3GHz



Ch Low 3GHz – 26.5GHz

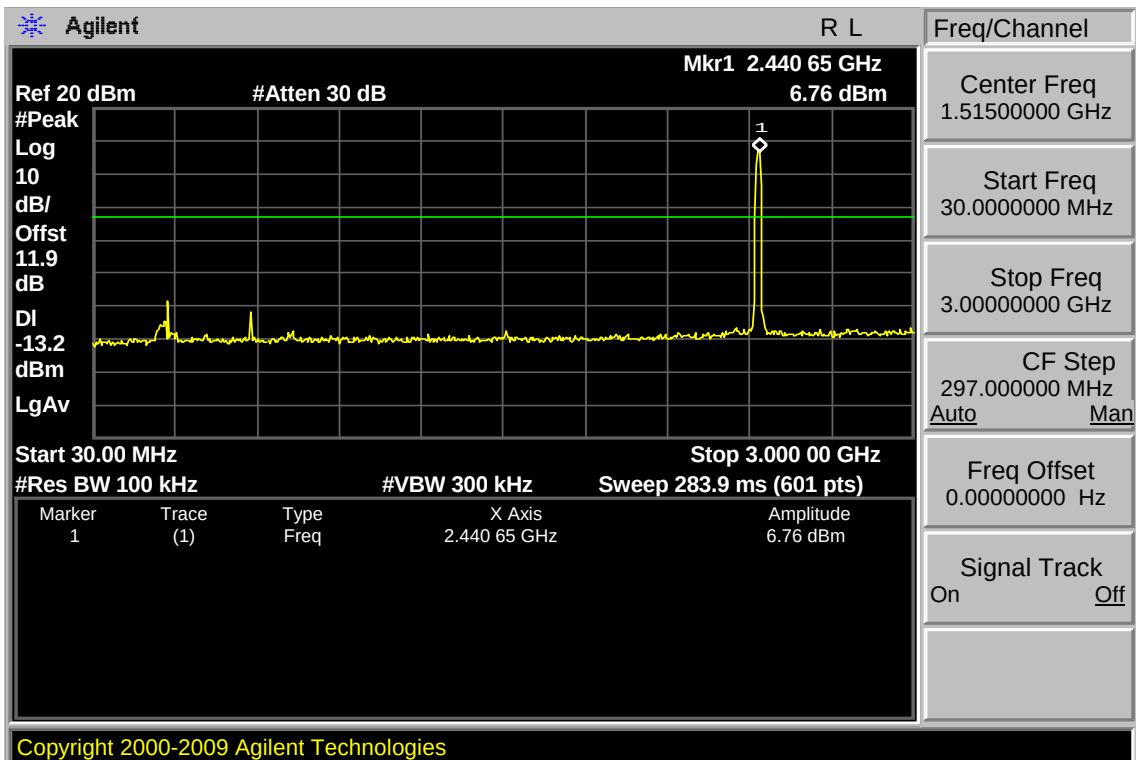


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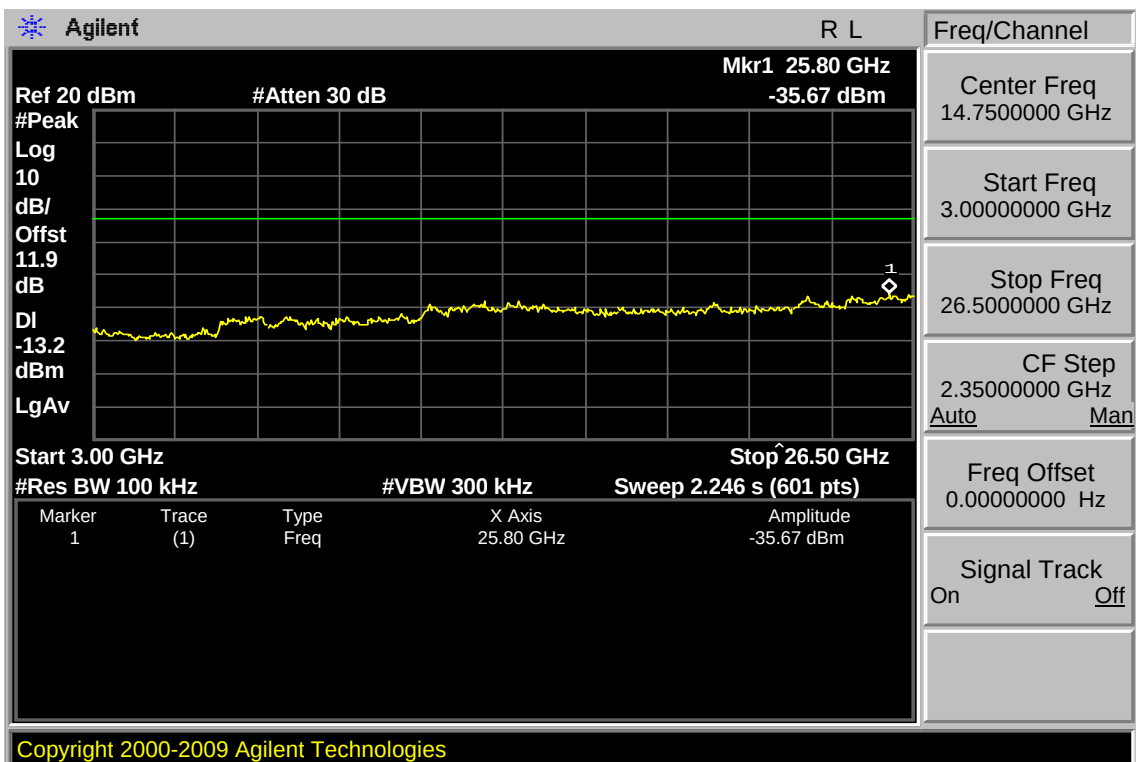
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Ch Mid 30MHz – 3GHz



Ch Mid 3GHz – 26.5GHz

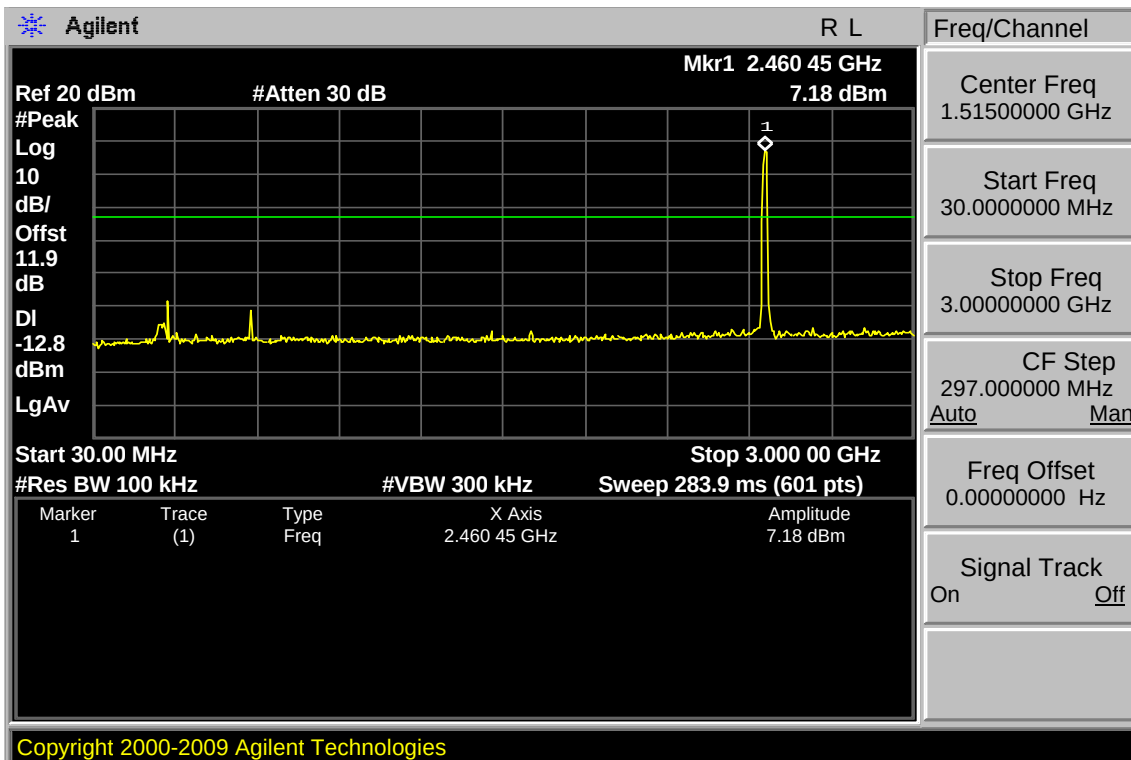


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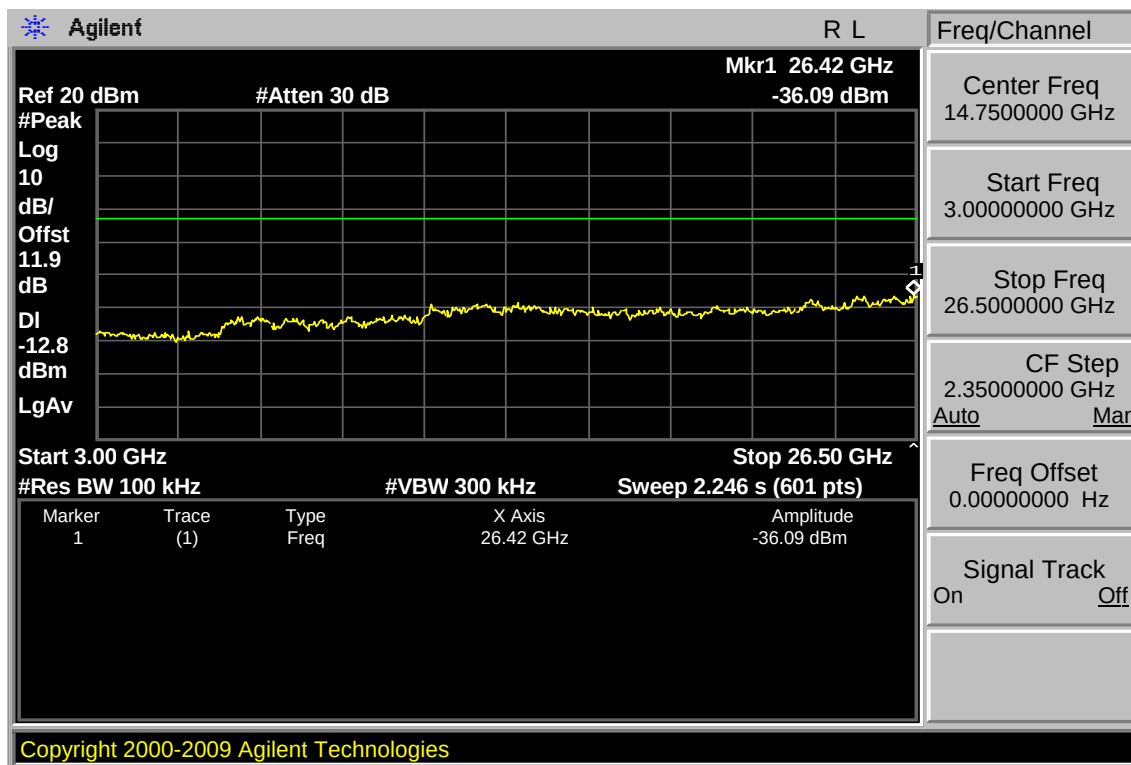
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Ch High 30MHz – 3GHz



Ch High 3GHz – 26.5GHz



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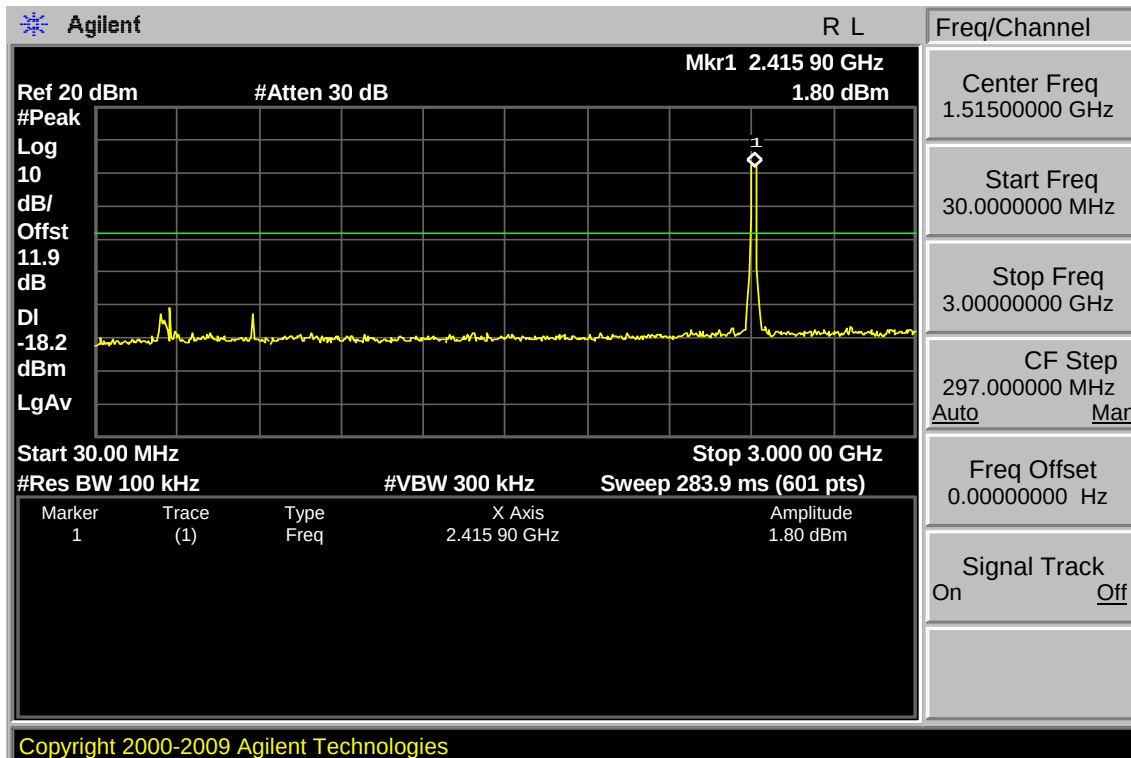
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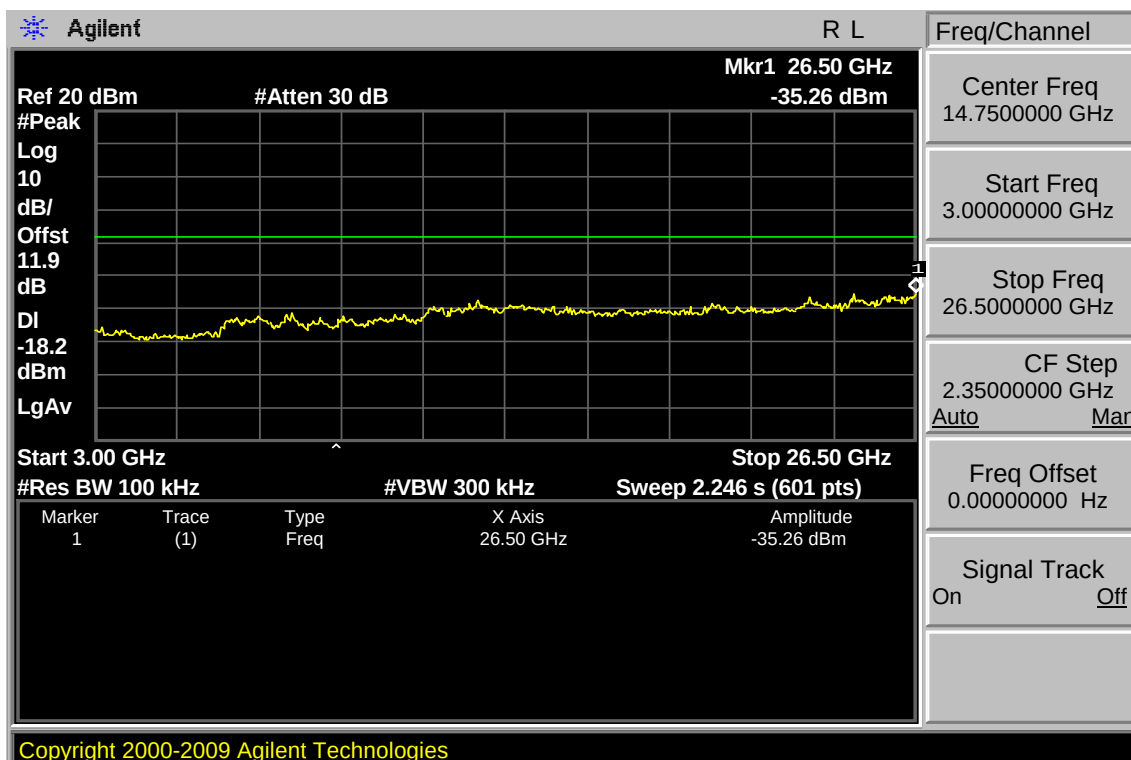
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Conducted Spurious Emission Measurement Result (802.11g)

Ch Low 30MHz – 3GHz



Ch Low 3GHz – 26.5GHz

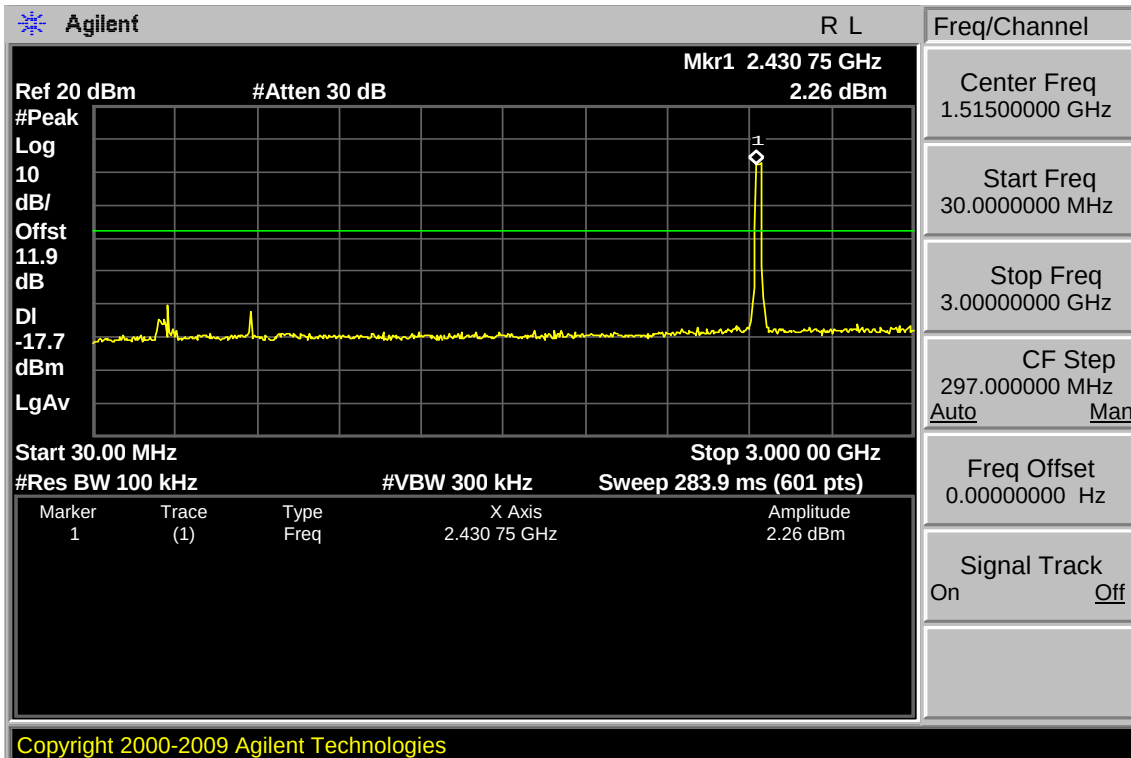


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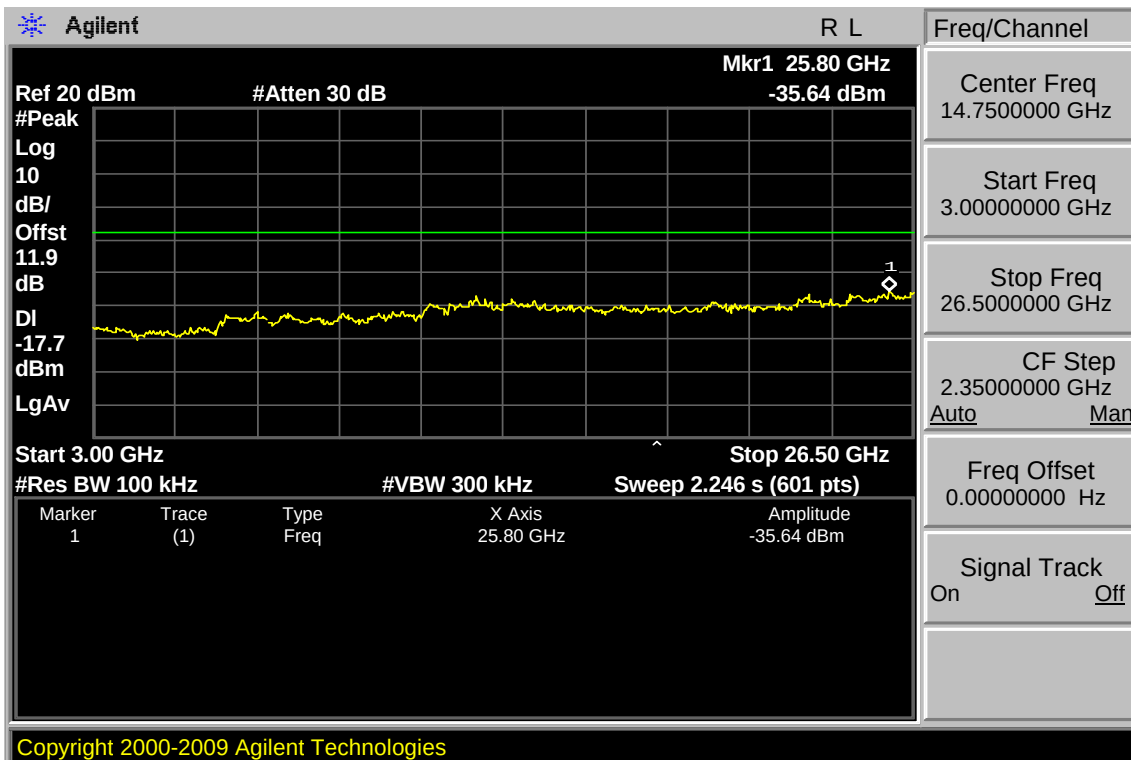
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Ch Mid 30MHz – 3GHz



Ch Mid 3GHz – 26.5GHz



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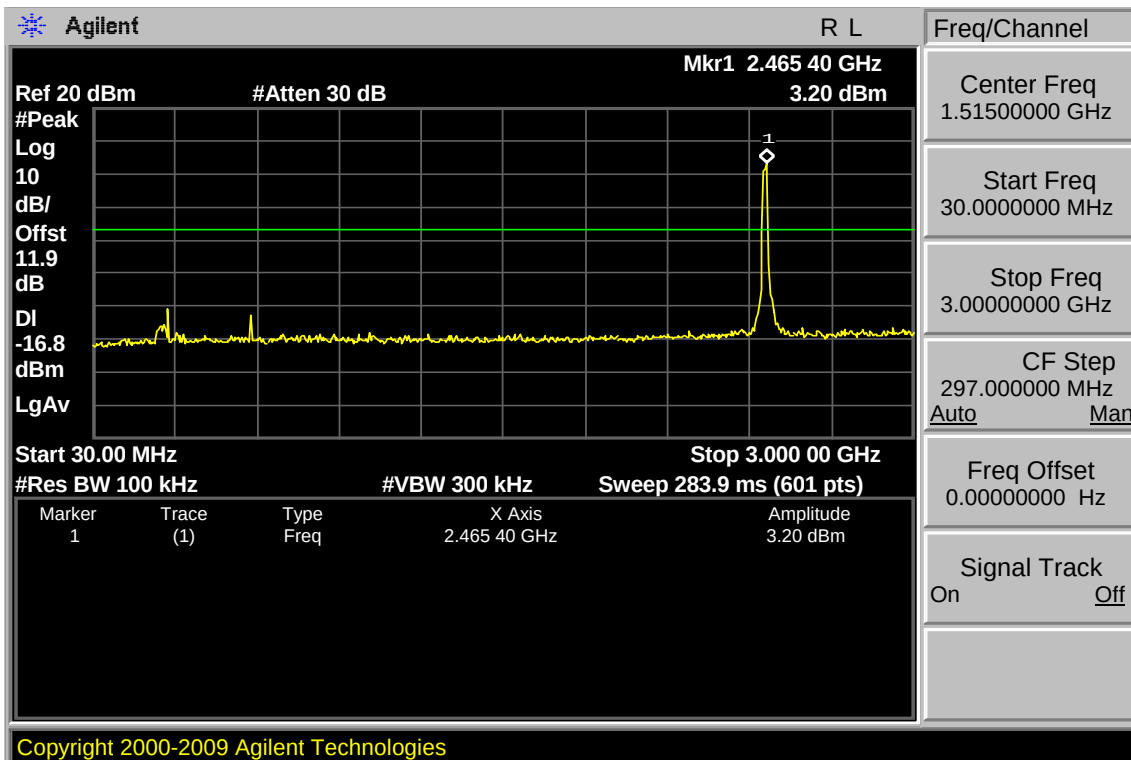
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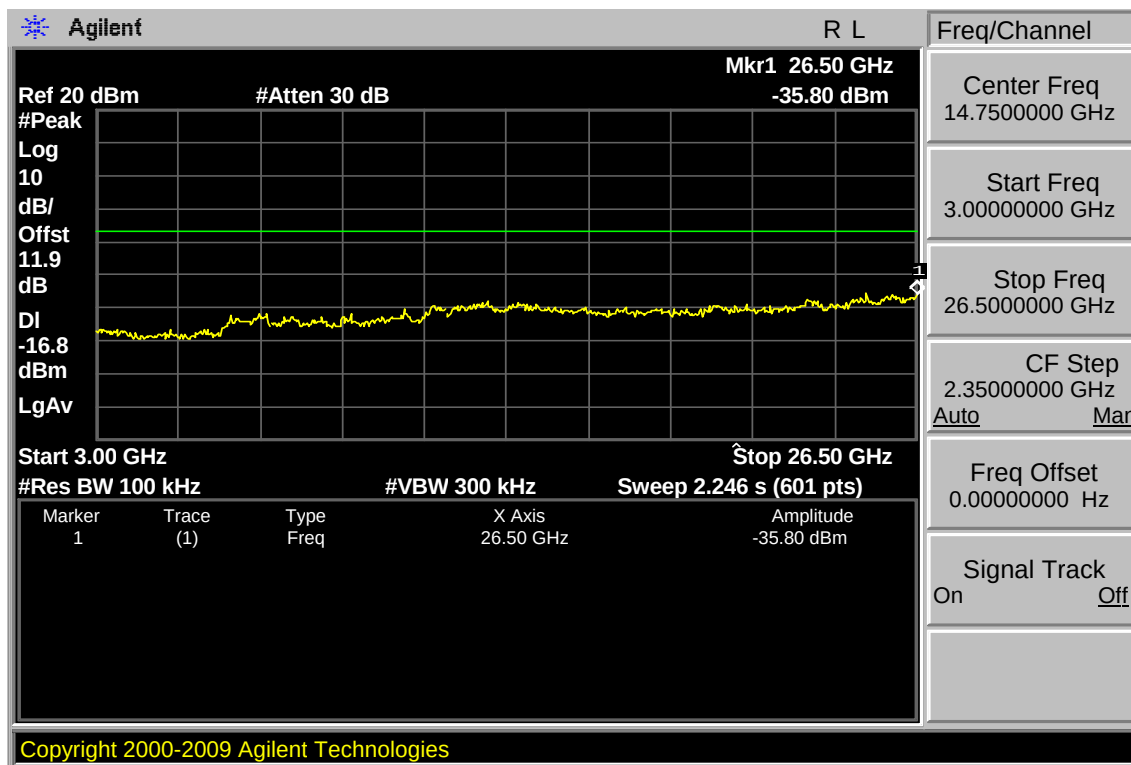
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Ch High 30MHz – 3GHz



Ch High 3GHz – 26.5GHz



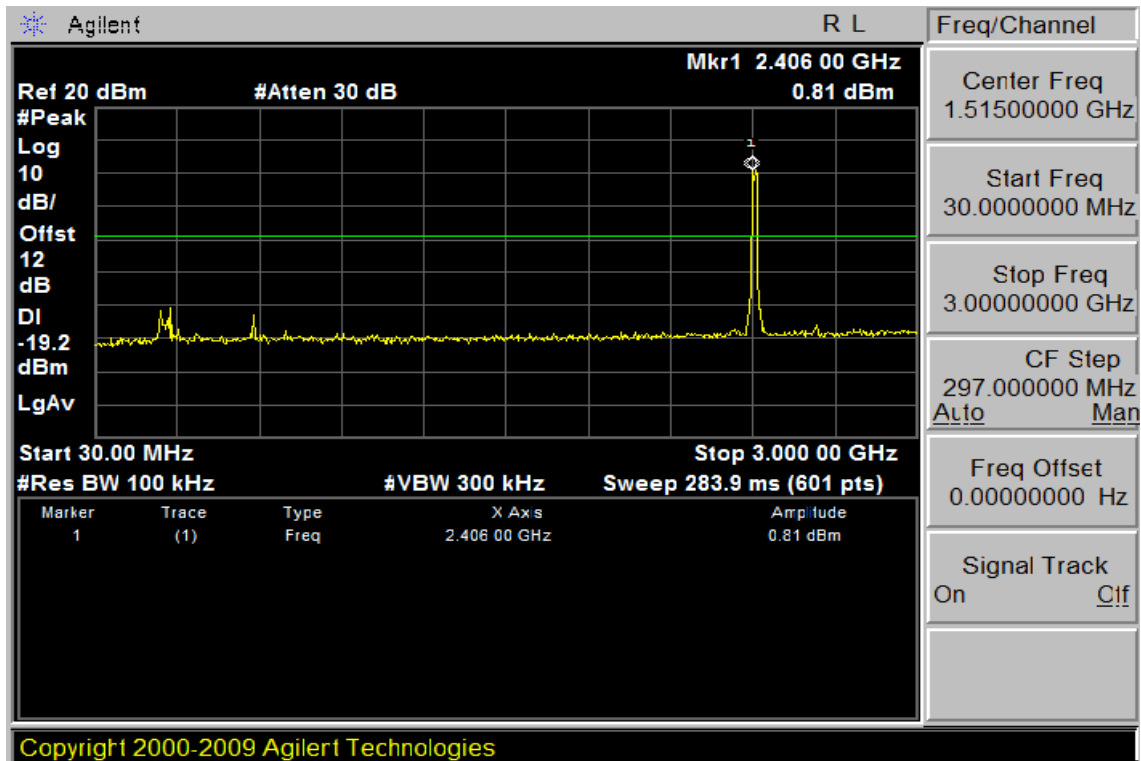
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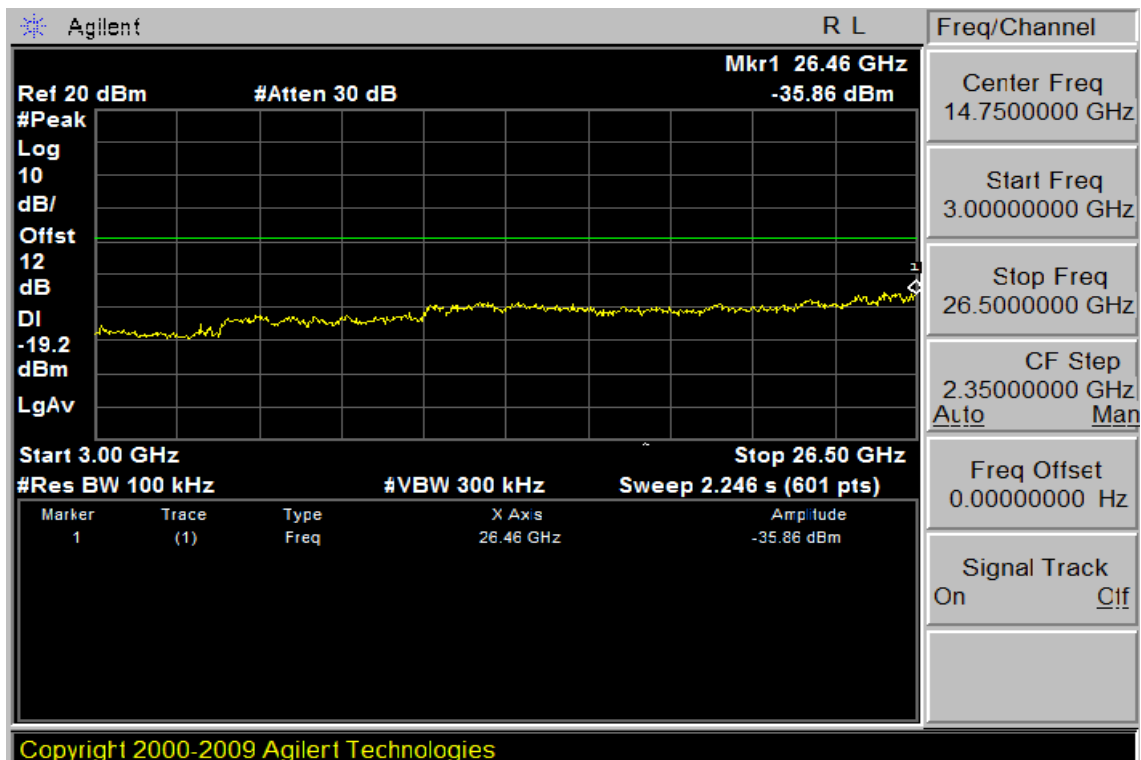
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Conducted Spurious Emission Measurement Result (802.11n_20M)

Ch Low 30MHz – 3GHz



Ch Low 3GHz – 26.5GHz

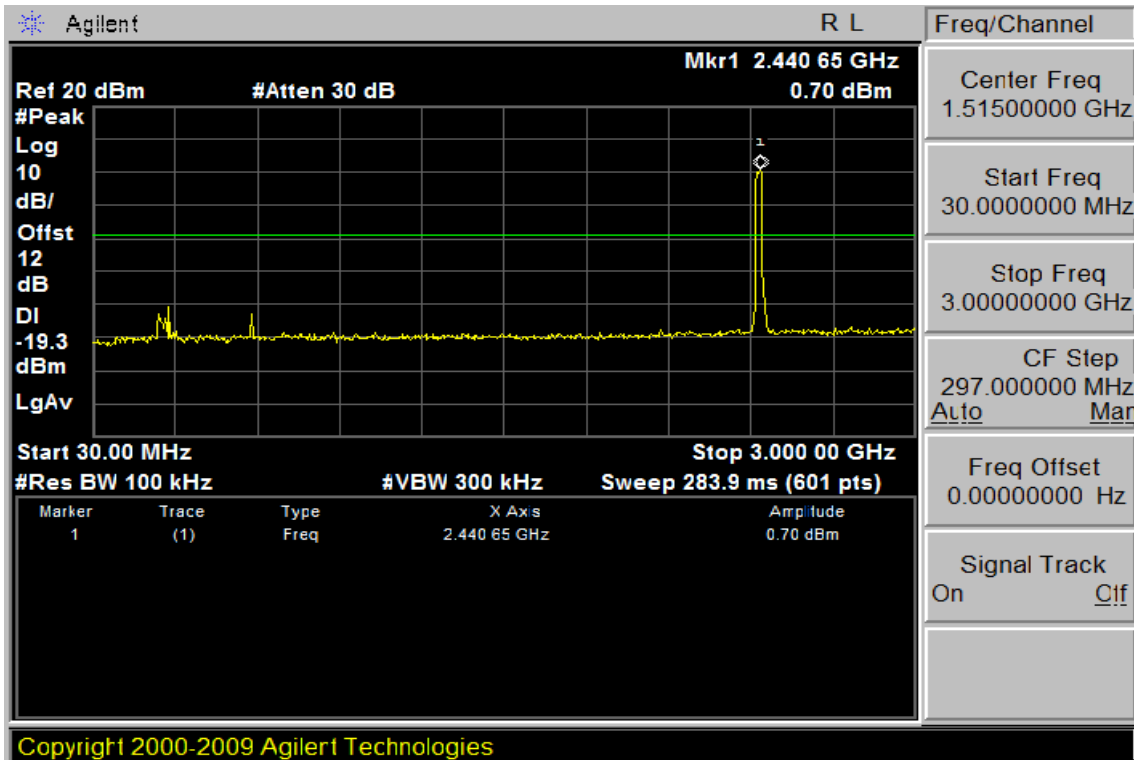


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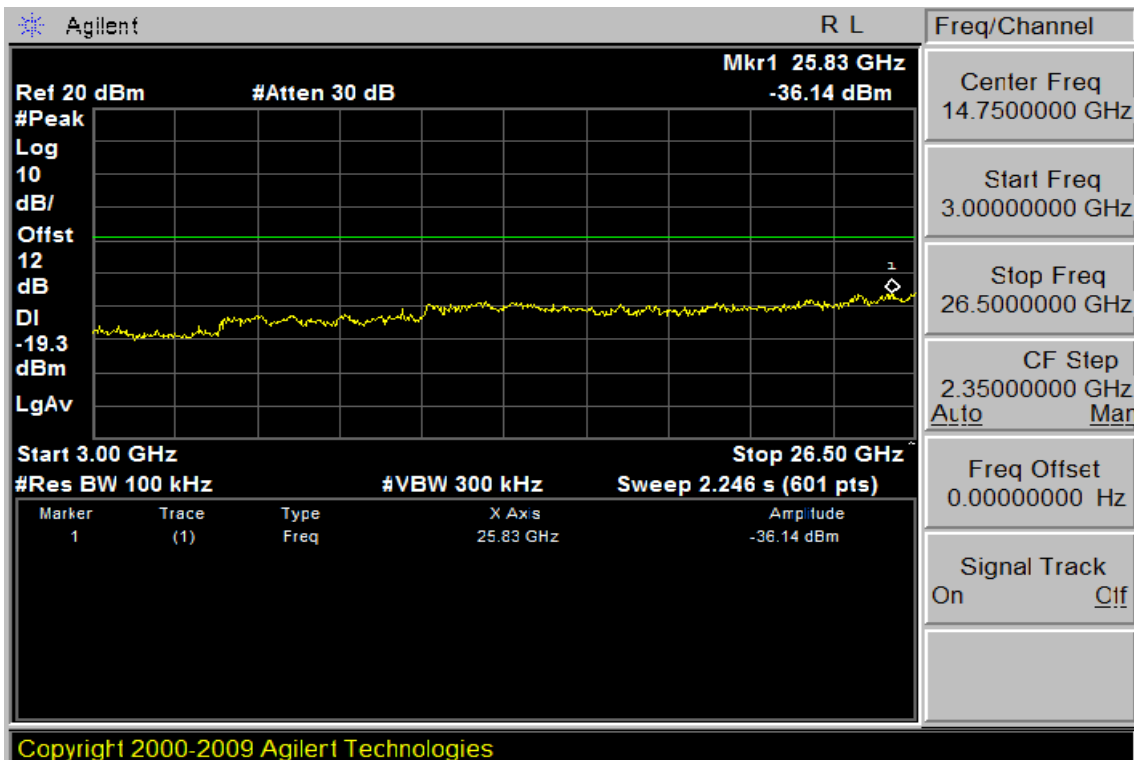
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Ch Mid 30MHz – 3GHz



Ch Mid 3GHz – 26.5GHz



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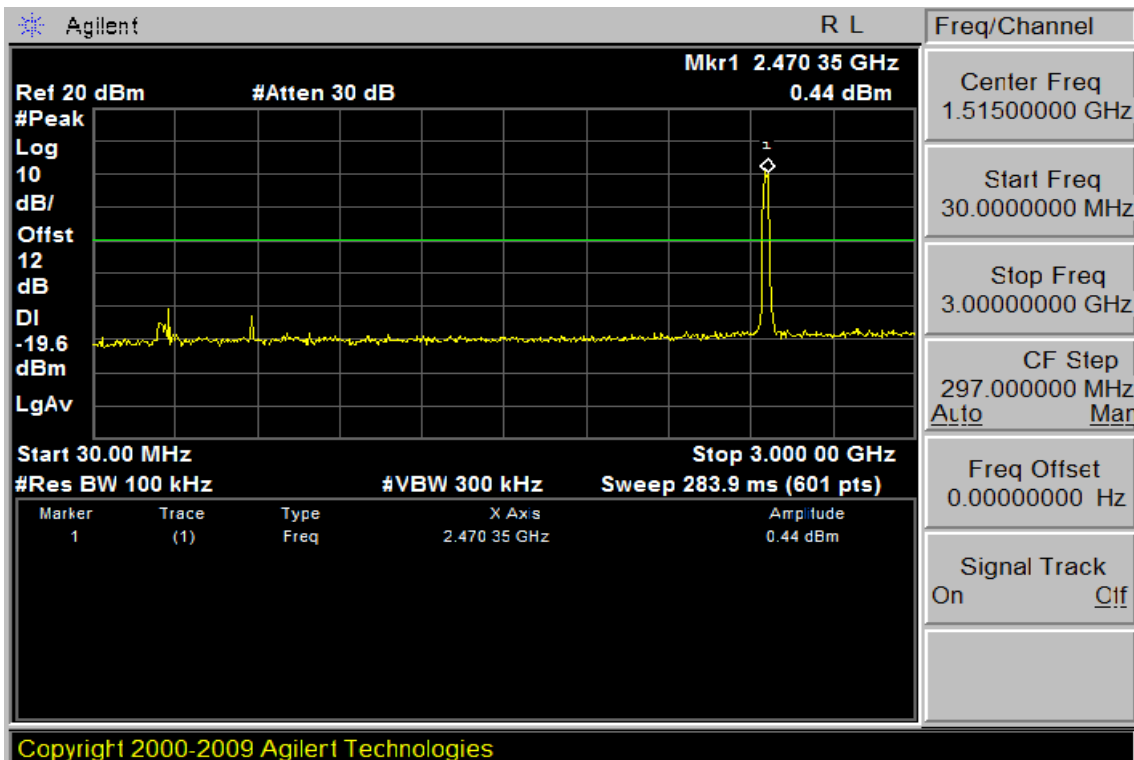
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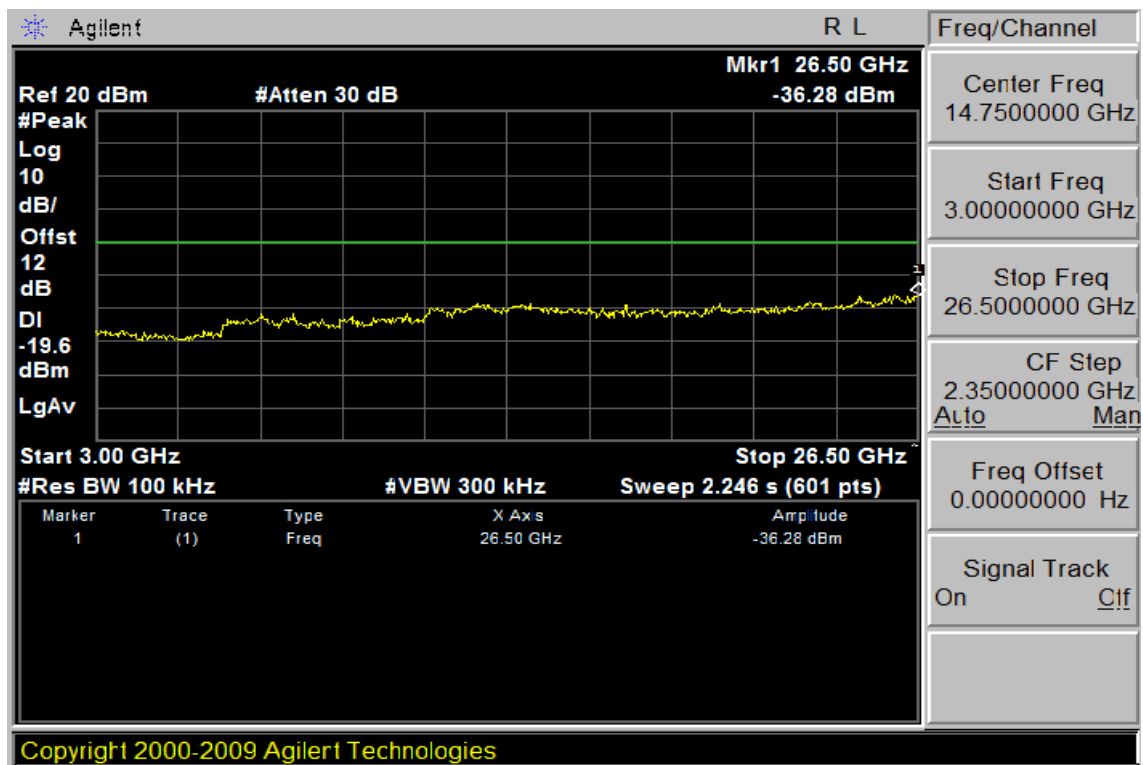
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Ch High 30MHz – 3GHz



Ch High 3GHz – 26.5GHz



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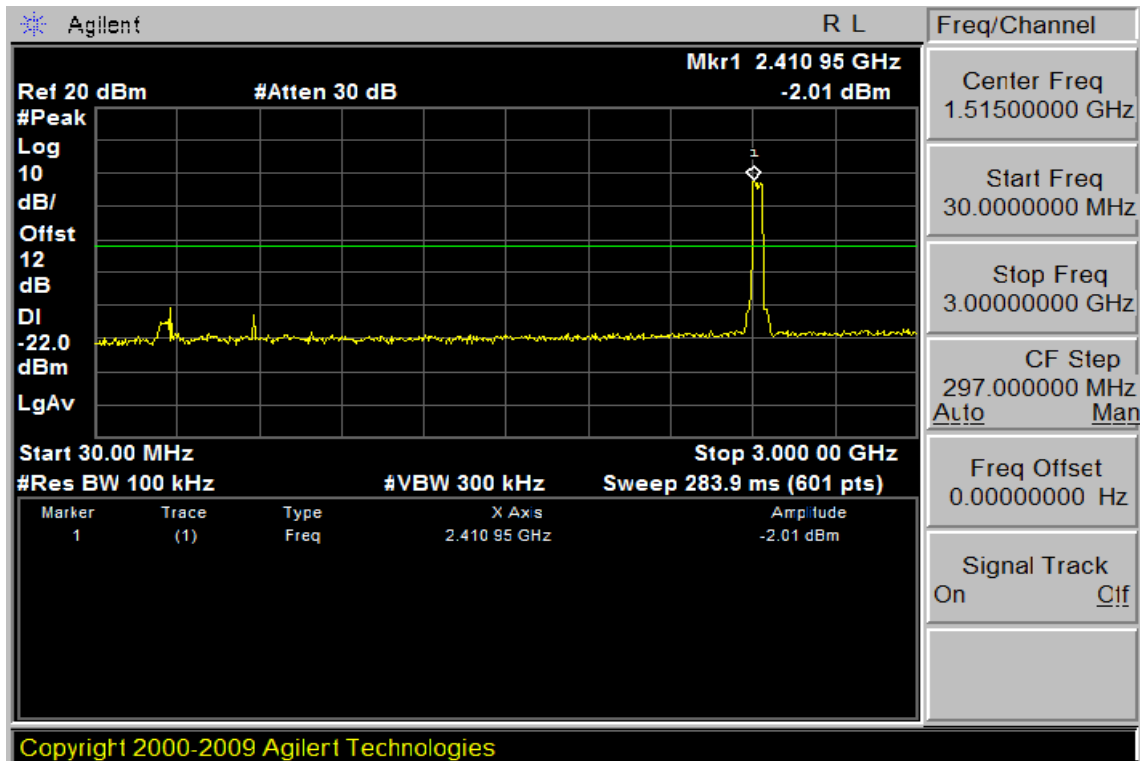
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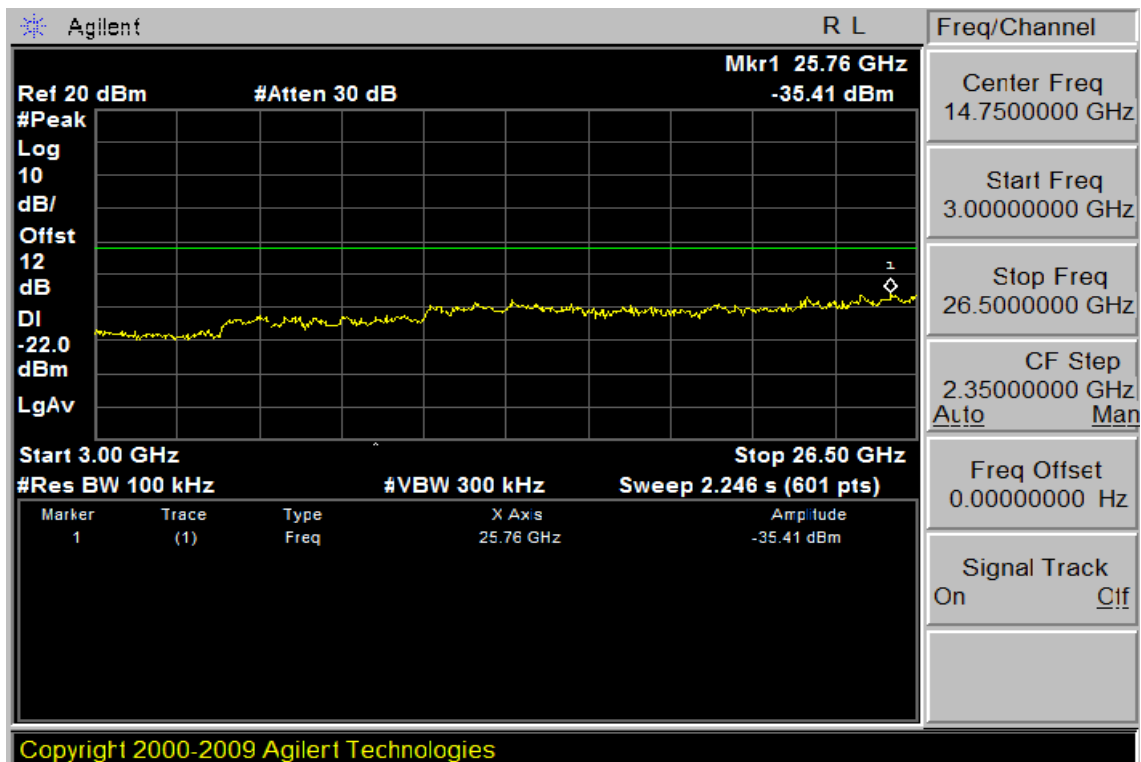
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Conducted Spurious Emission Measurement Result (802.11n_40M)

Ch Low 30MHz – 3GHz



Ch Low 3GHz – 26.5GHz

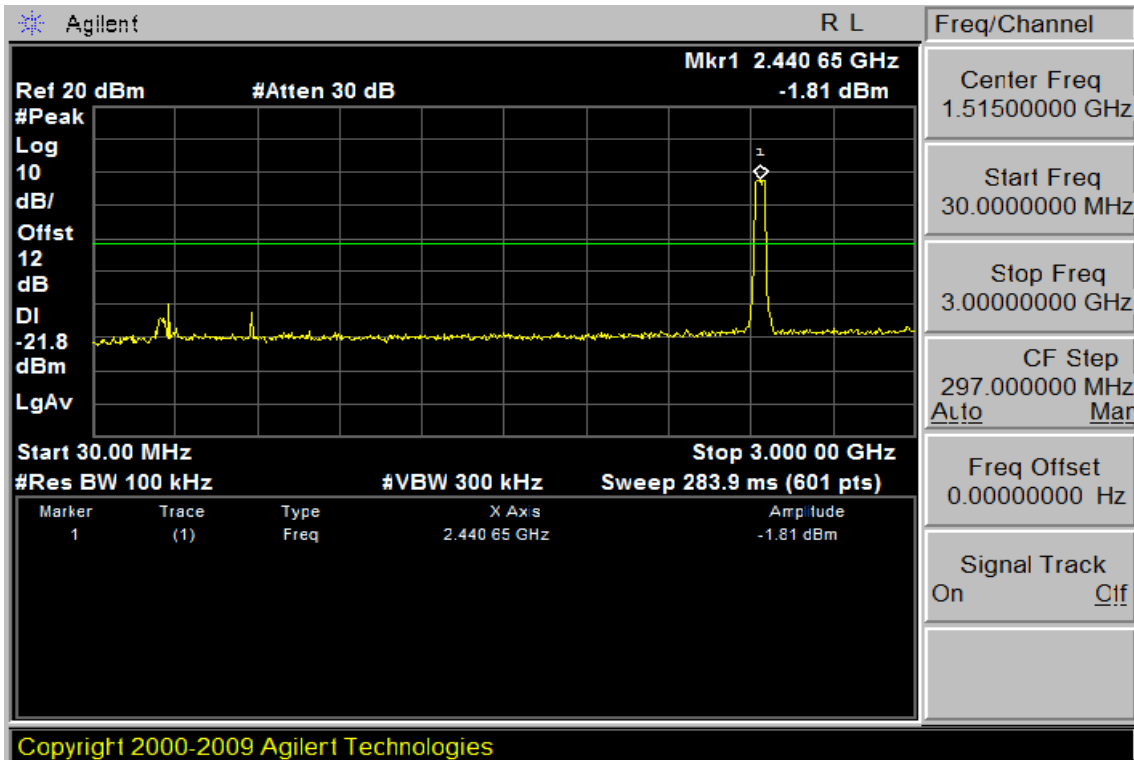


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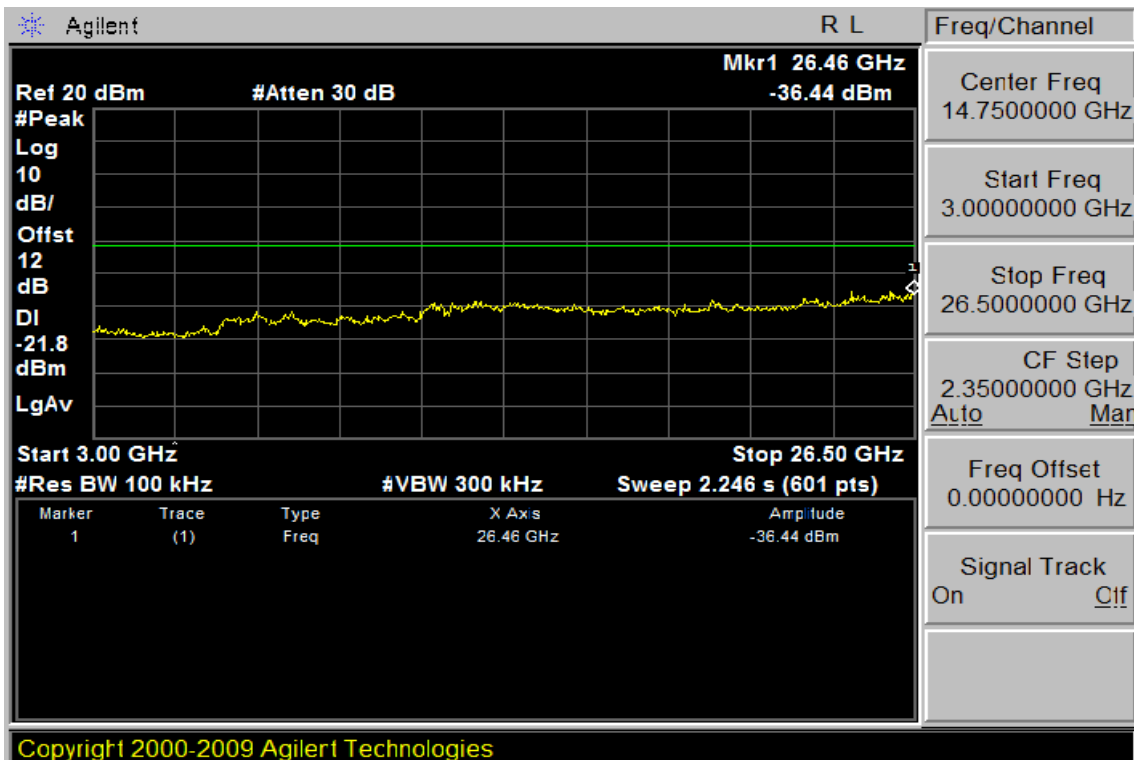
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Ch Mid 30MHz – 3GHz



Ch Mid 3GHz – 26.5GHz



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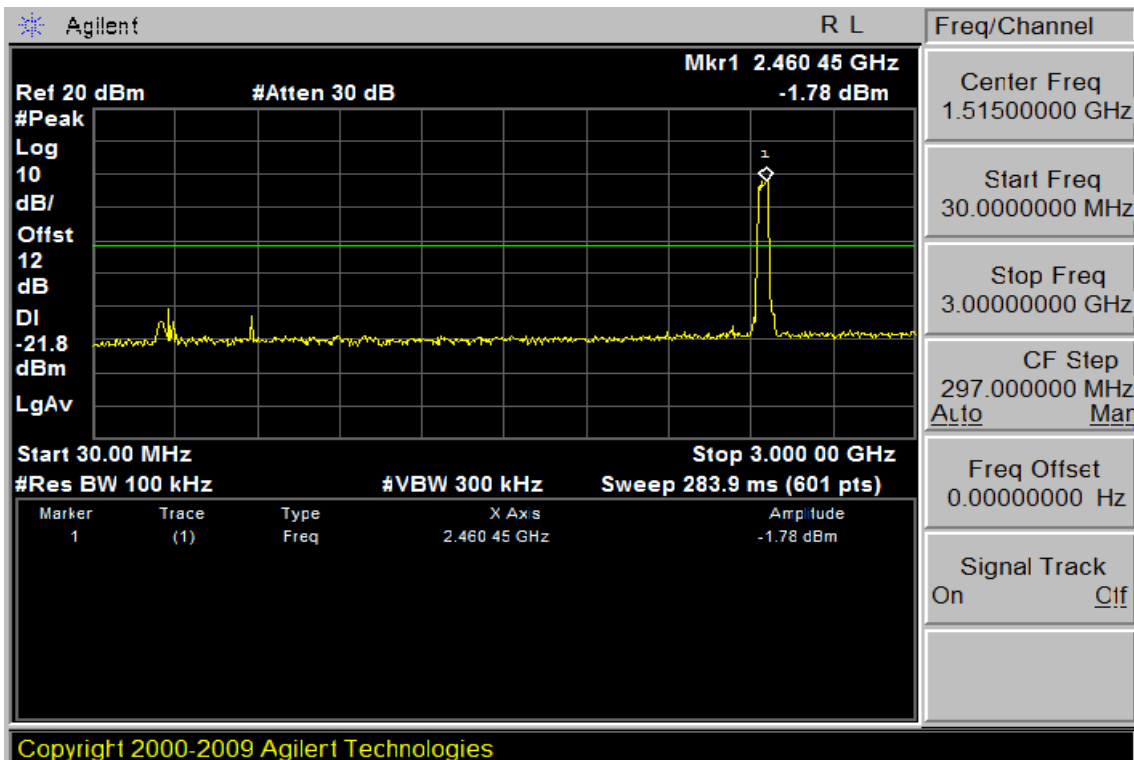
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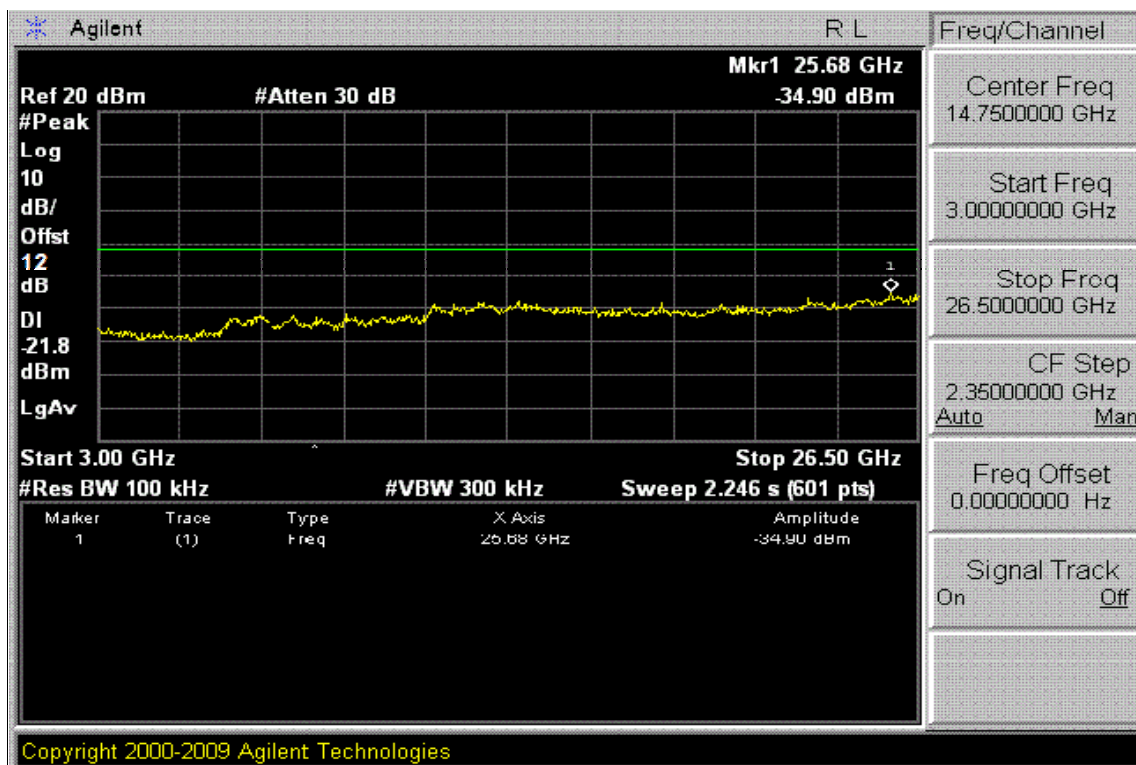
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Ch High 30MHz – 3GHz



Ch High 3GHz – 26.5GHz



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Radiated Spurious Emission Measurement Result (802.11b)

Operation Band	:802.11 b	Test Date	:2013-11-20
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX LOW	Engineer	:Vito
EUT Pol.	:E2 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
48.43	S	Peak	61.83	-25.80	36.03	40.00	-3.97
93.05	S	Peak	63.59	-24.20	39.38	43.50	-4.12
97.90	S	Peak	63.90	-23.50	40.41	43.50	-3.09
199.75	S	Peak	60.82	-23.79	37.02	43.50	-6.48
500.45	S	Peak	51.85	-14.28	37.58	46.00	-8.42
775.93	S	Peak	40.17	-10.21	29.96	46.00	-16.04
3070.00	S	Peak	47.96	-3.40	44.56	74.00	-29.44
3070.00	S	Average	40.92	-3.40	37.52	54.00	-16.48
4824.00	H	Peak	52.33	0.38	52.72	74.00	-21.28
4824.00	H	Average	49.46	0.38	49.84	54.00	-4.16
7236.00	H	Peak					
9648.00	H	Peak					
12060.00	H	Peak					
14472.00	H	Peak					
16884.00	H	Peak					
19296.00	H	Peak					
21708.00	H	Peak					
24120.00	H	Peak					

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Operation Band	:802.11 b	Test Date	:2013-11-20
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX LOW	Engineer	:Vito
EUT Pol.	:E2 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	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
93.05	S	Peak	58.73	-24.20	34.53	43.50	-8.97
199.75	S	Peak	61.19	-23.79	37.40	43.50	-6.10
250.19	S	Peak	57.53	-20.40	37.13	46.00	-8.87
387.93	S	Peak	52.40	-16.32	36.09	46.00	-9.91
500.45	S	Peak	51.89	-14.28	37.62	46.00	-8.38
775.93	S	Peak	43.67	-10.21	33.46	46.00	-12.54
2394.00	S	Peak	61.63	-5.04	56.58	74.00	-17.42
2394.00	S	Average	55.19	-5.04	50.15	54.00	-3.85
4824.00	H	Peak	55.36	0.38	55.75	74.00	-18.26
4824.00	H	Average	51.07	0.38	51.45	54.00	-2.55
7236.00	H	Peak					
9648.00	H	Peak					
12060.00	H	Peak					
14472.00	H	Peak					
16884.00	H	Peak					
19296.00	H	Peak					
21708.00	H	Peak					
24120.00	H	Peak					

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Operation Band	:802.11 b	Test Date	:2013-11-20
Fundamental Frequency	:2437 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX MID	Engineer	:Vito
EUT Pol.	:E2 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
47.46	S	Peak	59.18	-25.34	33.84	40.00	-6.16
93.05	S	Peak	63.62	-24.20	39.42	43.50	-4.08
97.90	S	Peak	61.77	-23.50	38.27	43.50	-5.23
199.75	S	Peak	60.36	-23.79	36.57	43.50	-6.93
500.45	S	Peak	54.19	-14.28	39.91	46.00	-6.09
775.93	S	Peak	39.92	-10.21	29.71	46.00	-16.29
3070.00	S	Peak	47.43	-3.40	44.03	74.00	-29.97
3070.00	S	Average	43.23	-3.40	39.83	54.00	-14.17
4874.00	H	Peak	51.72	0.41	52.12	74.00	-21.88
4874.00	H	Average	49.05	0.41	49.46	54.00	-4.54
7311.00	H	Peak					
9748.00	H	Peak					
12185.00	H	Peak					
14622.00	H	Peak					
17059.00	H	Peak					
19496.00	H	Peak					
21933.00	H	Peak					
24370.00	H	Peak					

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Operation Band	:802.11 b	Test Date	:2013-11-20
Fundamental Frequency	:2437 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX MID	Engineer	:Vito
EUT Pol.	:E2 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	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
93.05	S	Peak	57.57	-24.20	33.36	43.50	-10.14
193.93	S	Peak	70.64	-23.90	46.74	43.50	-
193.93	S	QP	65.10	-23.90	41.20	43.50	-2.30
199.75	S	Peak	61.38	-23.79	37.59	43.50	-5.91
250.19	S	Peak	57.14	-20.40	36.74	46.00	-9.26
500.45	S	Peak	51.89	-14.28	37.61	46.00	-8.39
775.93	S	Peak	43.75	-10.21	33.54	46.00	-12.46
2358.00	S	Peak	55.50	-5.18	50.32	74.00	-23.68
2358.00	S	Average	45.73	-5.18	40.55	54.00	-13.45
3070.00	S	Peak	46.84	-4.40	42.44	74.00	-31.56
3070.00	S	Average	42.44	-4.40	38.04	54.00	-15.96
4874.00	H	Peak	53.08	0.41	53.49	74.00	-20.51
4874.00	H	Average	50.46	0.41	50.87	54.00	-3.13
7311.00	H	Peak					
9748.00	H	Peak					
12185.00	H	Peak					
14622.00	H	Peak					
17059.00	H	Peak					
19496.00	H	Peak					
21933.00	H	Peak					
24370.00	H	Peak					

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Operation Band	:802.11 b	Test Date	:2013-11-20
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX HIGH	Engineer	:Vito
EUT Pol.	:E2 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	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
47.46	S	Peak	59.72	-25.34	34.38	40.00	-5.62
93.05	S	Peak	64.14	-24.20	39.94	43.50	-3.56
193.93	S	Peak	65.88	-23.90	41.98	43.50	-1.52
193.93	S	QP	61.60	-23.90	37.70	43.50	-5.80
500.45	S	Peak	54.13	-14.28	39.86	46.00	-6.14
588.72	S	Peak	51.46	-12.47	38.98	46.00	-7.02
775.93	S	Peak	41.54	-10.21	31.33	46.00	-14.67
3070.00	S	Peak	47.50	-3.40	44.10	74.00	-29.90
3070.00	S	Average	43.17	-3.40	39.77	54.00	-14.23
4924.00	H	Peak	51.69	0.50	52.19	74.00	-21.81
4924.00	H	Average	47.50	0.50	48.00	54.00	-6.00
7356.00	H	Peak					
9808.00	H	Peak					
12260.00	H	Peak					
14712.00	H	Peak					
17164.00	H	Peak					
19616.00	H	Peak					
22068.00	H	Peak					
24520.00	H	Peak					

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Operation Band	:802.11 b	Test Date	:2013-11-20
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX HIGH	Engineer	:Vito
EUT Pol.	:E2 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	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
93.05	S	Peak	57.56	-24.20	33.35	43.50	-10.15
199.75	S	Peak	61.26	-23.79	37.46	43.50	-6.04
250.19	S	Peak	56.54	-20.40	36.14	46.00	-9.86
387.93	S	Peak	52.45	-16.32	36.13	46.00	-9.87
500.45	S	Peak	51.91	-14.28	37.63	46.00	-8.37
775.93	S	Peak	43.81	-10.21	33.61	46.00	-12.39
2344.00	S	Peak	55.40	-5.24	50.16	74.00	-23.84
2344.00	S	Average	43.24	-5.24	38.00	54.00	-16.00
3070.00	S	Peak	48.13	-4.40	43.73	74.00	-30.27
3070.00	S	Average	42.45	-4.40	38.05	54.00	-15.95
4924.00	H	Peak	53.80	0.50	54.30	74.00	-19.70
4924.00	H	Average	50.89	0.50	51.39	54.00	-2.61
7356.00	H	Peak					
9808.00	H	Peak					
12260.00	H	Peak					
14712.00	H	Peak					
17164.00	H	Peak					
19616.00	H	Peak					
22068.00	H	Peak					
24520.00	H	Peak					

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Radiated Spurious Emission Measurement Result (802.11g)

Operation Band	:802.11 g	Test Date	:2013-11-20
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX LOW	Engineer	:Vito
EUT Pol.	:E2 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
47.46	S	Peak	60.86	-25.34	35.52	40.00	-4.48
93.05	S	Peak	61.79	-24.20	37.59	43.50	-5.91
193.93	S	Peak	61.30	-23.90	37.40	43.50	-6.10
500.45	S	Peak	53.25	-14.28	38.97	46.00	-7.03
600.36	S	Peak	50.20	-12.32	37.88	46.00	-8.12
775.93	S	Peak	40.93	-10.21	30.73	46.00	-15.27
2390.00	S	Peak	56.36	-5.06	51.30	74.00	-22.70
2390.00	S	Average	38.25	-5.06	33.19	54.00	-20.81
4824.00	H	Peak	48.73	0.39	49.12	74.00	-24.88
4824.00	H	Average	39.77	0.39	40.16	54.00	-13.85
7236.00	H	Peak					
9648.00	H	Peak					
12060.00	H	Peak					
14472.00	H	Peak					
16884.00	H	Peak					
19296.00	H	Peak					
21708.00	H	Peak					
24120.00	H	Peak					

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Operation Band	:802.11 g	Test Date	:2013-11-20
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX LOW	Engineer	:Vito
EUT Pol.	:E2 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	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
93.05	S	Peak	56.40	-24.20	32.20	43.50	-11.30
199.75	S	Peak	61.35	-23.79	37.56	43.50	-5.94
250.19	S	Peak	57.13	-20.40	36.74	46.00	-9.26
387.93	S	Peak	52.60	-16.32	36.29	46.00	-9.71
500.45	S	Peak	52.42	-14.28	38.14	46.00	-7.86
775.93	S	Peak	43.50	-10.21	33.29	46.00	-12.71
2334.00	S	Peak	56.78	-5.28	51.50	74.00	-22.50
2334.00	S	Average	48.39	-5.28	43.11	54.00	-10.89
2390.00	S	Peak	66.99	-5.06	61.93	74.00	-12.07
2390.00	S	Average	39.84	-5.06	34.78	54.00	-19.22
3070.00	S	Peak	47.87	-4.40	43.47	74.00	-30.53
3070.00	S	Average	42.41	-4.40	38.01	54.00	-15.99
4824.00	H	Peak	47.89	0.38	48.27	74.00	-25.73
4824.00	H	Average	38.58	0.38	38.96	54.00	-15.04
7236.00	H	Peak					
9648.00	H	Peak					
12060.00	H	Peak					
14472.00	H	Peak					
16884.00	H	Peak					
19296.00	H	Peak					
21708.00	H	Peak					
24120.00	H	Peak					

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Operation Band	:802.11 g	Test Date	:2013-11-20
Fundamental Frequency	:2437 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX MID	Engineer	:Vito
EUT Pol.	:E2 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	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
47.46	S	Peak	59.79	-25.34	34.45	40.00	-5.55
93.05	S	Peak	62.21	-24.20	38.01	43.50	-5.49
193.93	S	Peak	68.69	-23.90	44.79	43.50	-
193.93	S	QP	61.10	-23.90	37.20	43.50	-6.30
199.75	S	Peak	60.74	-23.79	36.94	43.50	-6.56
500.45	S	Peak	54.20	-14.28	39.92	46.00	-6.08
590.66	S	Peak	49.40	-12.29	37.10	46.00	-8.90
4874.00	H	Peak	53.63	0.41	54.04	74.00	-19.96
4874.00	H	Average	42.13	0.41	42.54	54.00	-11.46
7311.00	H	Peak	59.79	-25.34	34.45	40.00	-5.55
9748.00	H	Peak					
12185.00	H	Peak					
14622.00	H	Peak					
17059.00	H	Peak					
19496.00	H	Peak					
21933.00	H	Peak					
24370.00	H	Peak					

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Operation Band	:802.11 g	Test Date	:2013-11-20
Fundamental Frequency	:2437 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX MID	Engineer	:Vito
EUT Pol.	:E2 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
93.05	S	Peak	58.39	-24.20	34.19	43.50	-9.31
199.75	S	Peak	61.48	-23.79	37.69	43.50	-5.81
250.19	S	Peak	57.18	-20.40	36.79	46.00	-9.21
387.93	S	Peak	52.67	-16.32	36.36	46.00	-9.64
500.45	S	Peak	51.23	-14.28	36.96	46.00	-9.04
775.93	S	Peak	44.08	-10.21	33.87	46.00	-12.13
2352.00	S	Peak	61.44	-5.21	56.23	74.00	-17.77
2352.00	S	Average	46.59	-5.21	41.38	54.00	-12.62
4874.00	H	Peak	55.51	0.40	55.91	74.00	-18.09
4874.00	H	Average	43.35	0.40	43.76	54.00	-10.25
7311.00	H	Peak					
9748.00	H	Peak					
12185.00	H	Peak					
14622.00	H	Peak					
17059.00	H	Peak					
19496.00	H	Peak					
21933.00	H	Peak					
24370.00	H	Peak					

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Operation Band	:802.11 g	Test Date	:2013-11-20
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX HIGH	Engineer	:Vito
EUT Pol.	:E2 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	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
93.05	S	Peak	61.32	-24.20	37.12	43.50	-6.38
120.21	S	Peak	56.52	-21.73	34.79	43.50	-8.71
199.75	S	Peak	60.67	-23.79	36.88	43.50	-6.62
500.45	S	Peak	53.92	-14.28	39.64	46.00	-6.36
602.30	S	Peak	50.74	-12.41	38.34	46.00	-7.66
775.93	S	Peak	41.54	-10.21	31.34	46.00	-14.66
4924.00	H	Peak	51.82	0.50	52.32	74.00	-21.68
4924.00	H	Average	41.21	0.50	41.71	54.00	-12.29
7356.00	H	Peak					
9808.00	H	Peak					
12260.00	H	Peak					
14712.00	H	Peak					
17164.00	H	Peak					
19616.00	H	Peak					
22068.00	H	Peak					
24520.00	H	Peak					

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Operation Band	:802.11 g	Test Date	:2013-11-20
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX HIGH	Engineer	:Vito
EUT Pol.	:E2 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
93.05	S	Peak	58.39	-24.20	34.19	43.50	-9.31
199.75	S	Peak	61.52	-23.79	37.72	43.50	-5.78
250.19	S	Peak	57.46	-20.40	37.07	46.00	-8.93
387.93	S	Peak	52.29	-16.32	35.98	46.00	-10.02
500.45	S	Peak	52.32	-14.28	38.04	46.00	-7.96
775.93	S	Peak	43.36	-10.21	33.16	46.00	-12.84
2380.00	S	Peak	58.35	-5.10	53.25	74.00	-20.75
2380.00	S	Average	46.84	-5.10	41.74	54.00	-12.26
2492.00	S	Peak	58.24	-4.73	53.51	74.00	-20.49
2492.00	S	Average	39.96	-4.73	35.23	54.00	-18.77
4924.00	H	Peak	56.26	0.53	56.79	74.00	-17.21
4924.00	H	Average	44.32	0.53	44.85	54.00	-9.15
7356.00	H	Peak					
9808.00	H	Peak					
12260.00	H	Peak					
14712.00	H	Peak					
17164.00	H	Peak					
19616.00	H	Peak					
22068.00	H	Peak					
24520.00	H	Peak					

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Radiated Spurious Emission Measurement Result (802.11n_20M)

Operation Band	:802.11 n20M	Test Date	:2013-11-20
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX LOW	Engineer	:Vito
EUT Pol.	:E2 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	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
93.05	S	Peak	63.09	-24.20	38.89	43.50	-4.61
127.00	S	Peak	54.29	-21.55	32.74	43.50	-10.76
199.75	S	Peak	60.10	-23.79	36.30	43.50	-7.20
387.93	S	Peak	46.77	-16.32	30.46	46.00	-15.54
500.45	S	Peak	54.11	-14.28	39.83	46.00	-6.17
600.36	S	Peak	50.14	-12.32	37.82	46.00	-8.18
2390.00	S	Peak	54.89	-5.06	49.83	74.00	-24.17
2390.00	S	Average	37.97	-5.06	32.91	54.00	-21.09
3070.00	S	Peak	49.01	-3.40	45.61	74.00	-28.39
3070.00	S	Average	44.02	-3.40	40.62	54.00	-13.38
4824.00	H	Peak	46.49	0.38	46.87	74.00	-27.13
4824.00	H	Average	40.69	0.38	41.07	54.00	-12.93
7236.00	H	Peak					
9648.00	H	Peak					
12060.00	H	Peak					
14472.00	H	Peak					
16884.00	H	Peak					
19296.00	H	Peak					
21708.00	H	Peak					
24120.00	H	Peak					

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Operation Band	:802.11 n20M	Test Date	:2013-11-20
Fundamental Frequency	:2412 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX LOW	Engineer	:Vito
EUT Pol.	:E2 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
93.05	S	Peak	57.78	-24.20	33.57	43.50	-9.93
199.75	S	Peak	61.38	-23.79	37.59	43.50	-5.91
250.19	S	Peak	56.93	-20.40	36.53	46.00	-9.47
387.93	S	Peak	52.10	-16.32	35.78	46.00	-10.22
500.45	S	Peak	51.78	-14.28	37.51	46.00	-8.49
775.93	S	Peak	44.05	-10.21	33.84	46.00	-12.16
2352.00	S	Peak	56.37	-5.21	51.16	74.00	-22.84
2352.00	S	Average	47.72	-5.21	42.51	54.00	-11.49
2412.00	S	Peak	66.29	-4.98	61.31	74.00	-12.69
2412.00	S	Average	40.68	-4.98	35.70	54.00	-18.30
4824.00	H	Peak	47.58	0.38	47.97	74.00	-26.03
4824.00	H	Average	38.41	0.38	38.79	54.00	-15.21
7236.00	H	Peak					
9648.00	H	Peak					
12060.00	H	Peak					
14472.00	H	Peak					
16884.00	H	Peak					
19296.00	H	Peak					
21708.00	H	Peak					
24120.00	H	Peak					

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Operation Band	:802.11 n20M	Test Date	:2013-11-20
Fundamental Frequency	:2437 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX MID	Engineer	:Vito
EUT Pol.	:E2 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	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
96.93	S	Peak	61.86	-23.64	38.22	43.50	-5.28
118.27	S	Peak	58.04	-21.78	36.26	43.50	-7.24
199.75	S	Peak	60.57	-23.79	36.78	43.50	-6.72
500.45	S	Peak	54.45	-14.28	40.17	46.00	-5.83
581.93	S	Peak	52.19	-12.41	39.78	46.00	-6.22
600.36	S	Peak	50.85	-12.32	38.53	46.00	-7.47
3070.00	S	Peak	47.64	-3.40	44.23	74.00	-29.77
3070.00	S	Average	43.06	-3.40	39.66	54.00	-14.34
4874.00	H	Peak	52.13	0.40	52.54	74.00	-21.46
4874.00	H	Average	40.10	0.40	40.51	54.00	-13.50
7311.00	H	Peak					
9748.00	H	Peak					
12185.00	H	Peak					
14622.00	H	Peak					
17059.00	H	Peak					
19496.00	H	Peak					
21933.00	H	Peak					
24370.00	H	Peak					

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Operation Band	:802.11 n20M	Test Date	:2013-11-20
Fundamental Frequency	:2437 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX MID	Engineer	:Vito
EUT Pol.	:E2 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
93.05	S	Peak	57.42	-24.20	33.22	43.50	-10.28
199.75	S	Peak	61.36	-23.79	37.57	43.50	-5.93
250.19	S	Peak	56.73	-20.40	36.33	46.00	-9.67
387.93	S	Peak	52.16	-16.32	35.84	46.00	-10.16
500.45	S	Peak	51.70	-14.28	37.42	46.00	-8.58
775.93	S	Peak	43.99	-10.21	33.78	46.00	-12.22
2354.00	S	Peak	56.95	-5.20	51.75	74.00	-22.25
2354.00	S	Average	46.54	-5.20	41.34	54.00	-12.66
4874.00	H	Peak	52.24	0.41	52.65	74.00	-21.35
4874.00	H	Average	40.24	0.41	40.65	54.00	-13.35
7311.00	H	Peak					
9748.00	H	Peak					
12185.00	H	Peak					
14622.00	H	Peak					
17059.00	H	Peak					
19496.00	H	Peak					
21933.00	H	Peak					
24370.00	H	Peak					

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Operation Band	:802.11 n20M	Test Date	:2013-11-20
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX HIGH	Engineer	:Vito
EUT Pol.	:E2 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	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
93.05	S	Peak	62.92	-24.20	38.72	43.50	-4.78
122.15	S	Peak	58.45	-21.64	36.81	43.50	-6.69
193.93	S	Peak	62.97	-23.90	39.06	43.50	-4.44
199.75	S	Peak	60.88	-23.79	37.09	43.50	-6.41
500.45	S	Peak	54.39	-14.28	40.12	46.00	-5.88
599.39	S	Peak	50.88	-12.25	38.63	46.00	-7.37
3195.00	S	Peak	47.05	-2.87	44.19	74.00	-29.81
3195.00	S	Average	42.94	-2.87	40.07	54.00	-13.93
4924.00	H	Peak	43.15	0.50	43.65	74.00	-30.35
4924.00	H	Average	38.89	0.50	39.39	54.00	-14.61
7356.00	H	Peak					
9808.00	H	Peak					
12260.00	H	Peak					
14712.00	H	Peak					
17164.00	H	Peak					
19616.00	H	Peak					
22068.00	H	Peak					
24520.00	H	Peak					

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Operation Band	:802.11 n20M	Test Date	:2013-11-20
Fundamental Frequency	:2462 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX HIGH	Engineer	:Vito
EUT Pol.	:E2 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	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
93.05	S	Peak	56.36	-24.20	32.16	43.50	-11.34
199.75	S	Peak	61.61	-23.79	37.81	43.50	-5.69
250.19	S	Peak	57.28	-20.40	36.88	46.00	-9.12
387.93	S	Peak	52.66	-16.32	36.35	46.00	-9.65
500.45	S	Peak	51.74	-14.28	37.46	46.00	-8.54
775.93	S	Peak	43.25	-10.21	33.04	46.00	-12.96
2374.00	S	Peak	57.33	-5.12	52.20	74.00	-21.80
2374.00	S	Average	45.01	-5.12	39.89	54.00	-14.11
2494.00	S	Peak	57.22	-4.73	52.49	74.00	-21.51
2494.00	S	Average	38.90	-4.73	34.17	54.00	-19.83
3070.00	S	Peak	47.74	-4.40	43.34	74.00	-30.66
3070.00	S	Average	42.65	-4.40	38.25	54.00	-15.75
4924.00	H	Peak	54.07	0.53	54.60	74.00	-19.40
4924.00	H	Average	41.53	0.53	42.06	54.00	-11.94
7356.00	H	Peak					
9808.00	H	Peak					
12260.00	H	Peak					
14712.00	H	Peak					
17164.00	H	Peak					
19616.00	H	Peak					
22068.00	H	Peak					
24520.00	H	Peak					

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Radiated Spurious Emission Measurement Result (802.11n_40M)

Operation Band	:802.11 n40M	Test Date	:2013-11-20
Fundamental Frequency	:2422 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX LOW	Engineer	:Vito
EUT Pol.	:E2 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	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
93.05	S	Peak	60.16	-24.20	35.96	43.50	-7.54
97.90	S	Peak	61.21	-23.50	37.71	43.50	-5.79
199.75	S	Peak	58.99	-23.79	35.20	43.50	-8.30
387.93	S	Peak	44.97	-16.32	28.65	46.00	-17.35
593.57	S	Peak	48.17	-12.15	36.03	46.00	-9.97
775.93	S	Peak	39.84	-10.21	29.64	46.00	-16.36
2386.00	S	Peak	61.90	-5.07	56.82	74.00	-17.18
2386.00	S	Average	44.34	-5.07	39.27	54.00	-14.73
3070.00	S	Peak	47.57	-3.40	44.16	74.00	-29.84
3070.00	S	Average	42.74	-3.40	39.34	54.00	-14.66
4844.00	H	Peak	46.07	0.39	46.46	74.00	-27.54
4844.00	H	Average	40.78	0.39	41.17	54.00	-12.83
7266.00	H	Peak					
9688.00	H	Peak					
12110.00	H	Peak					
14532.00	H	Peak					
16954.00	H	Peak					
19376.00	H	Peak					
21798.00	H	Peak					
24220.00	H	Peak					

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Operation Band	:802.11 n40M	Test Date	:2013-11-20
Fundamental Frequency	:2422 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX LOW	Engineer	:Vito
EUT Pol.	:E2 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	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
93.05	S	Peak	57.42	-24.20	33.22	43.50	-10.28
199.75	S	Peak	61.40	-23.79	37.61	43.50	-5.89
250.19	S	Peak	56.21	-20.40	35.81	46.00	-10.19
387.93	S	Peak	51.86	-16.32	35.55	46.00	-10.45
500.45	S	Peak	45.97	-14.28	31.69	46.00	-14.31
775.93	S	Peak	43.57	-10.21	33.36	46.00	-12.64
2386.00	S	Peak	71.07	-5.07	66.00	74.00	-8.00
2386.00	S	Average	54.49	-5.07	49.42	54.00	-4.58
3070.00	S	Peak	46.68	-4.40	42.27	74.00	-31.73
3070.00	S	Average	41.20	-4.40	36.80	54.00	-17.20
4844.00	H	Peak	43.23	0.39	43.63	74.00	-30.37
4844.00	H	Average	37.73	0.39	38.12	54.00	-15.88
7266.00	H	Peak					
9688.00	H	Peak					
12110.00	H	Peak					
14532.00	H	Peak					
16954.00	H	Peak					
19376.00	H	Peak					
21798.00	H	Peak					
24220.00	H	Peak					

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Operation Band	:802.11 n40M	Test Date	:2013-11-20
Fundamental Frequency	:2437 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX MID	Engineer	:Vito
EUT Pol.	:E2 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
47.46	S	Peak	60.23	-25.34	34.89	40.00	-5.11
93.05	S	Peak	60.89	-24.20	36.69	43.50	-6.81
199.75	S	Peak	59.89	-23.79	36.10	43.50	-7.40
500.45	S	Peak	50.97	-14.28	36.69	46.00	-9.31
500.45	S	Peak	50.97	-14.28	36.69	46.00	-9.31
593.57	S	Peak	49.16	-12.15	37.01	46.00	-8.99
2388.00	S	Peak	58.66	-5.07	53.59	74.00	-20.41
2388.00	S	Average	40.36	-5.07	35.29	54.00	-18.71
3070.00	S	Peak	47.04	-3.40	43.64	74.00	-30.36
3070.00	S	Average	43.58	-3.40	40.18	54.00	-13.82
4874.00	H	Peak	47.78	0.41	48.18	74.00	-25.82
4874.00	H	Average	40.35	0.41	40.76	54.00	-13.24
7311.00	H	Peak					
9748.00	H	Peak					
12185.00	H	Peak					
14622.00	H	Peak					
17059.00	H	Peak					
19496.00	H	Peak					
21933.00	H	Peak					
24370.00	H	Peak					

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Operation Band	:802.11 n40M	Test Date	:2013-11-20
Fundamental Frequency	:2437 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX MID	Engineer	:Vito
EUT Pol.	:E2 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
93.05	S	Peak	55.99	-24.20	31.79	43.50	-11.71
199.75	S	Peak	60.94	-23.79	37.15	43.50	-6.35
250.19	S	Peak	57.14	-20.40	36.75	46.00	-9.25
387.93	S	Peak	52.20	-16.32	35.88	46.00	-10.12
500.45	S	Peak	47.15	-14.28	32.87	46.00	-13.13
775.93	S	Peak	43.40	-10.21	33.19	46.00	-12.81
2386.00	S	Peak	67.50	-5.07	62.43	74.00	-11.57
2386.00	S	Average	46.93	-5.07	41.86	54.00	-12.14
4874.00	H	Peak	49.33	0.41	49.74	74.00	-24.26
4874.00	H	Average	38.60	0.41	39.01	54.00	-14.99
7311.00	H	Peak					
9748.00	H	Peak					
12185.00	H	Peak					
14622.00	H	Peak					
17059.00	H	Peak					
19496.00	H	Peak					
21933.00	H	Peak					
24370.00	H	Peak					

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Operation Band	:802.11 n40M	Test Date	:2013-11-20
Fundamental Frequency	:2452 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX HIGH	Engineer	:Vito
EUT Pol.	:E2 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	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
47.46	S	Peak	62.40	-25.34	37.07	40.00	-2.93
63.95	S	Peak	63.59	-29.19	34.40	40.00	-5.60
140.58	S	Peak	56.83	-22.15	34.68	43.50	-8.82
199.75	S	Peak	57.19	-23.79	33.39	43.50	-10.11
438.37	S	Peak	48.58	-15.41	33.17	46.00	-12.83
595.51	S	Peak	45.51	-12.12	33.40	46.00	-12.60
2488.00	S	Peak	56.10	-4.75	51.35	74.00	-22.65
2488.00	S	Average	39.05	-4.75	34.30	54.00	-19.70
3070.00	S	Peak	47.98	-3.40	44.57	74.00	-29.43
3070.00	S	Average	43.09	-3.40	39.69	54.00	-14.31
4904.00	H	Peak	48.78	0.44	49.22	74.00	-24.78
4904.00	H	Average	39.85	0.44	40.29	54.00	-13.71
7356.00	H	Peak					
9808.00	H	Peak					
12260.00	H	Peak					
14712.00	H	Peak					
17164.00	H	Peak					
19616.00	H	Peak					
22068.00	H	Peak					
24520.00	H	Peak					

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Operation Band	:802.11 n40M	Test Date	:2013-11-20
Fundamental Frequency	:2452 MHz	Temp./Humi.	:25.7deg_C/59RH
Operation Mode	:TX HIGH	Engineer	:Vito
EUT Pol.	:E2 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	Spectrum	Factor	Actual	Limit	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
93.05	S	Peak	55.43	-24.20	31.23	43.50	-12.27
199.75	S	Peak	60.89	-23.79	37.10	43.50	-6.40
250.19	S	Peak	56.90	-20.40	36.50	46.00	-9.50
387.93	S	Peak	51.86	-16.32	35.55	46.00	-10.45
500.45	S	Peak	48.23	-14.28	33.95	46.00	-12.05
775.93	S	Peak	43.73	-10.21	33.53	46.00	-12.47
2498.00	S	Peak	61.56	-4.72	56.85	74.00	-17.15
2498.00	S	Average	44.59	-4.72	39.87	54.00	-14.13
4904.00	H	Peak	50.06	0.45	50.51	74.00	-23.49
4904.00	H	Average	39.65	0.45	40.10	54.00	-13.90
7356.00	H	Peak					
9808.00	H	Peak					
12260.00	H	Peak					
14712.00	H	Peak					
17164.00	H	Peak					
19616.00	H	Peak					
22068.00	H	Peak					
24520.00	H	Peak					

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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 $\geq 3 \times$ 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.

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11.5 Measurement Result:

802.11b

Frequency MHz	RF Power Density	Maximum Limit
	Reading (dBm)	(dBm)
2412	-0.80	8
2437	-1.64	8
2462	-0.97	8

802.11g

Frequency MHz	RF Power Density	Maximum Limit
	Reading (dBm)	(dBm)
2412	-11.21	8
2437	-12.69	8
2462	-11.60	8

802.11n_20M

Frequency MHz	RF Power Density	Maximum Limit
	Reading (dBm)	(dBm)
2412	-14.00	8
2437	-14.60	8
2462	-14.56	8

802.11n_40M

Frequency MHz	RF Power Density	Maximum Limit
	Reading (dBm)	(dBm)
2422	-17.56	8
2437	-16.48	8
2452	-16.44	8

* Note: Offset 11.9dB for 802.11b/g;

Offset 12dB for 802.11n_20/n_40

*Refer to next page for plots

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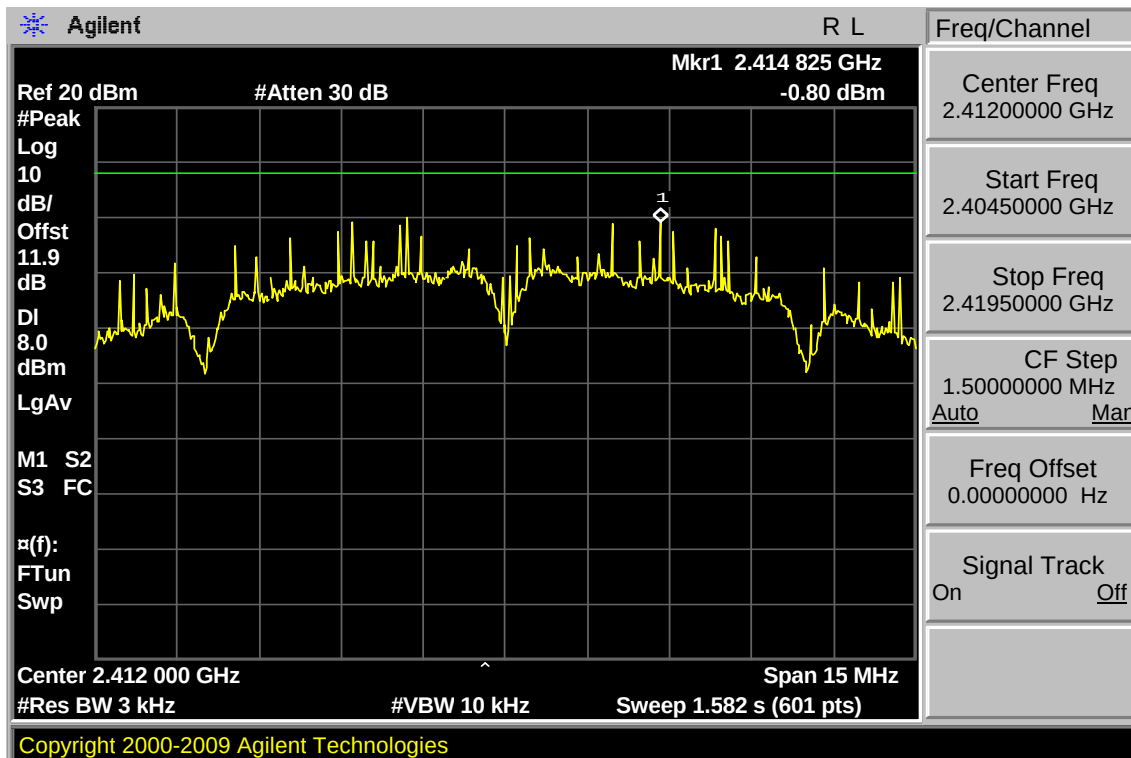
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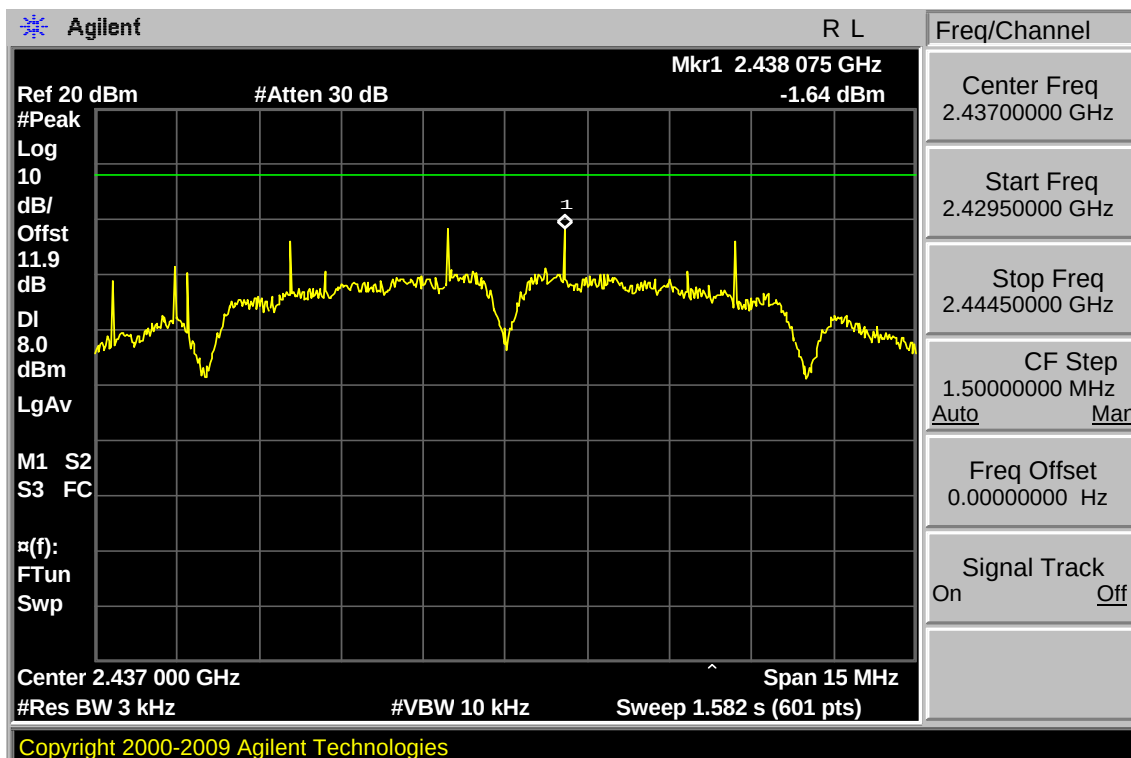
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802.11b

Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

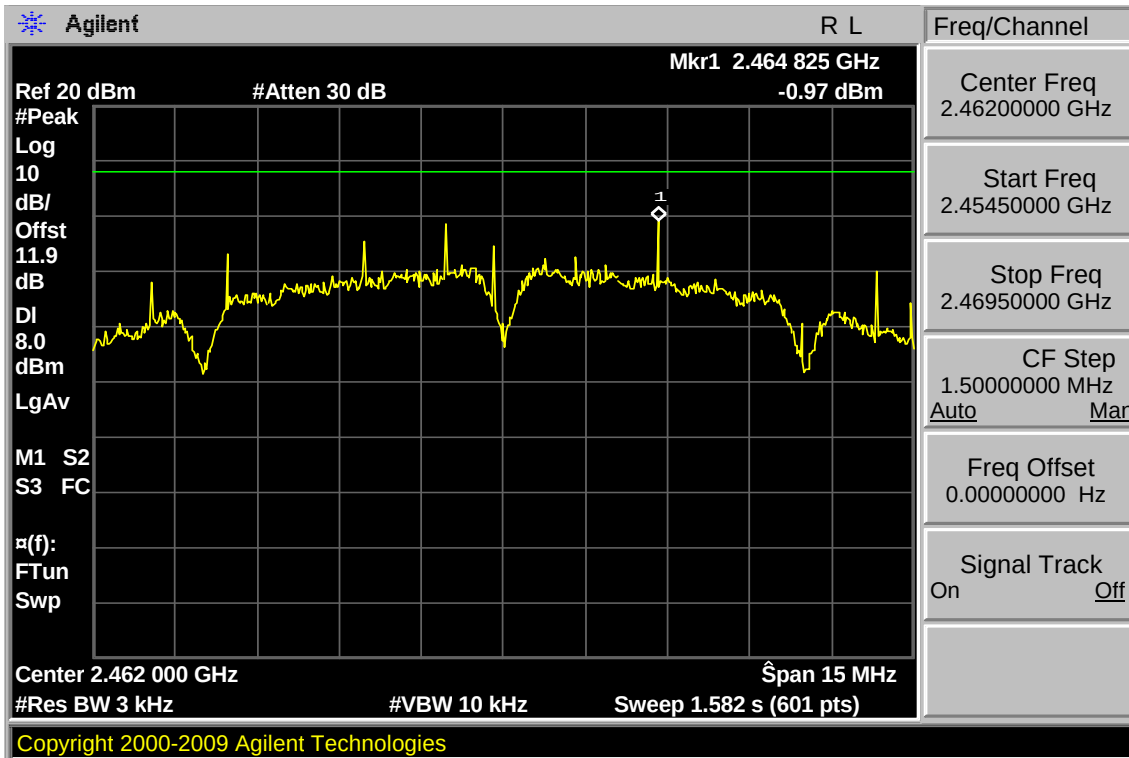


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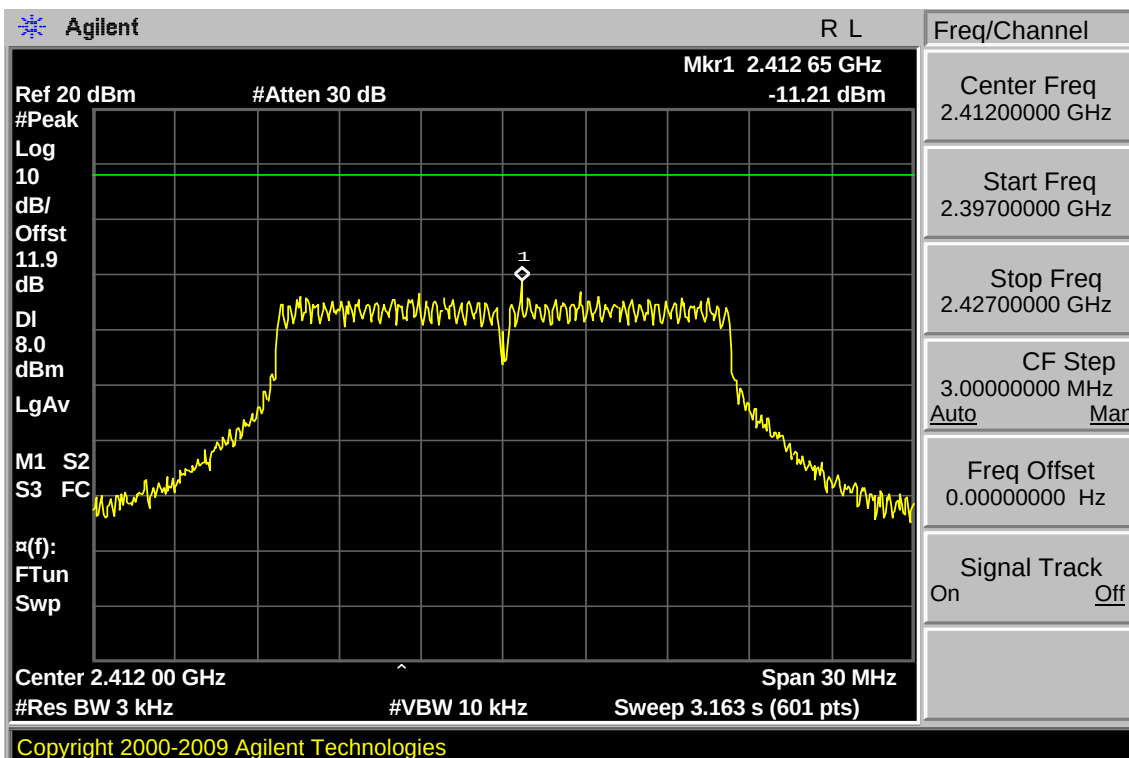
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Power Spectral Density Test Plot (CH-High)



802.11g

Power Spectral Density Test Plot (CH-Low)

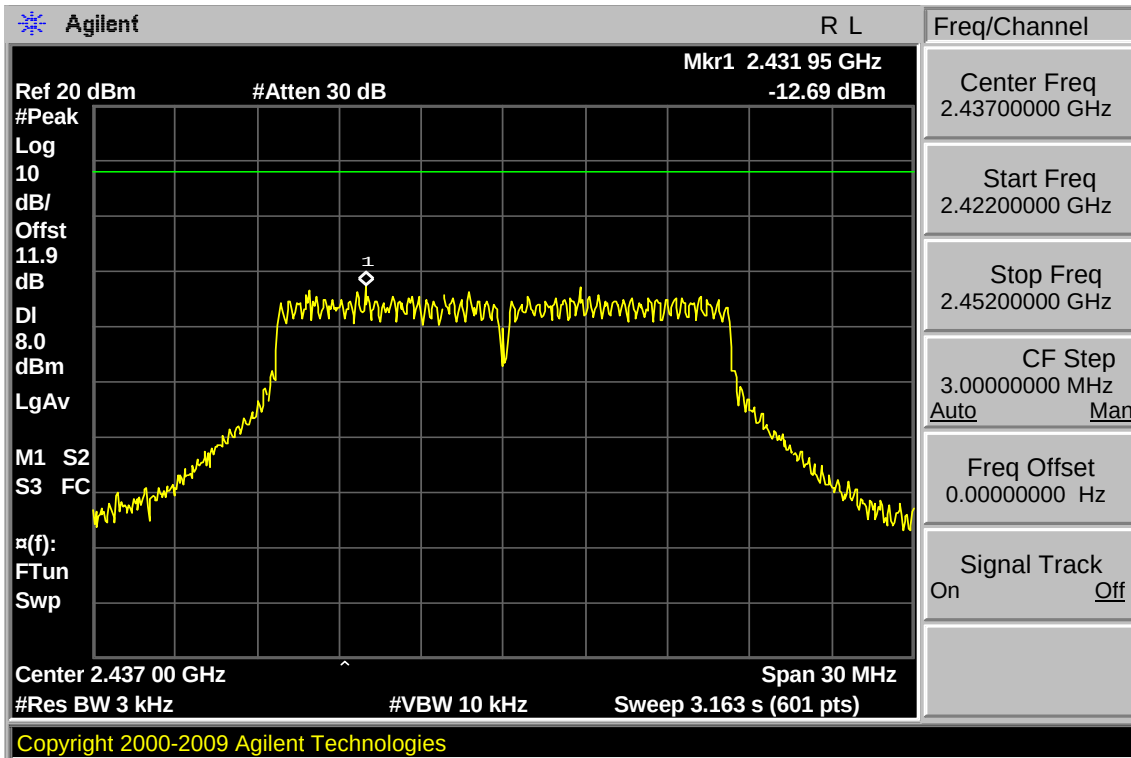


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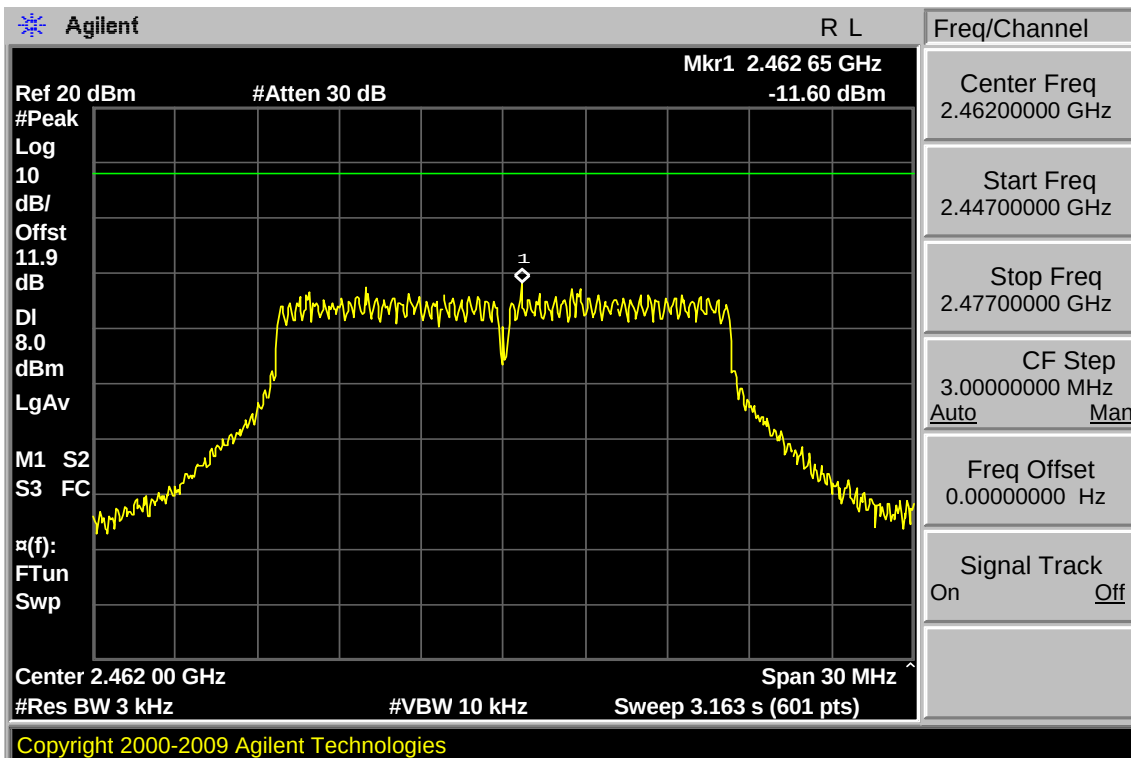
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Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)



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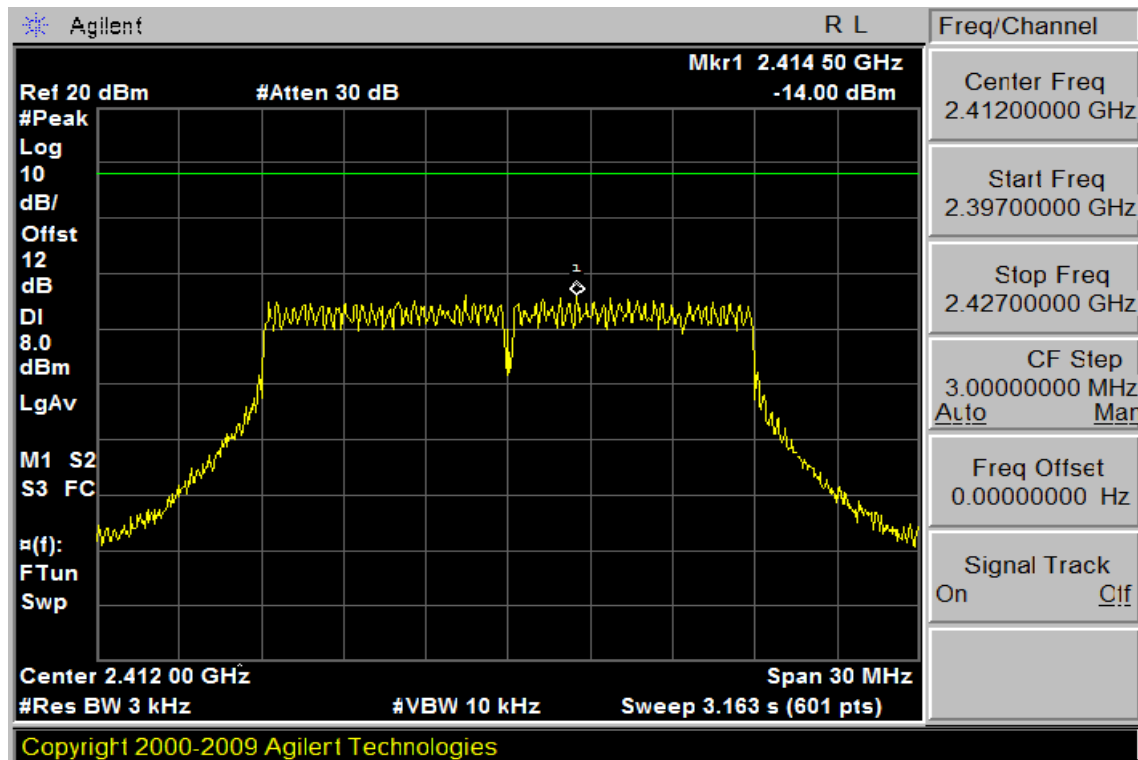
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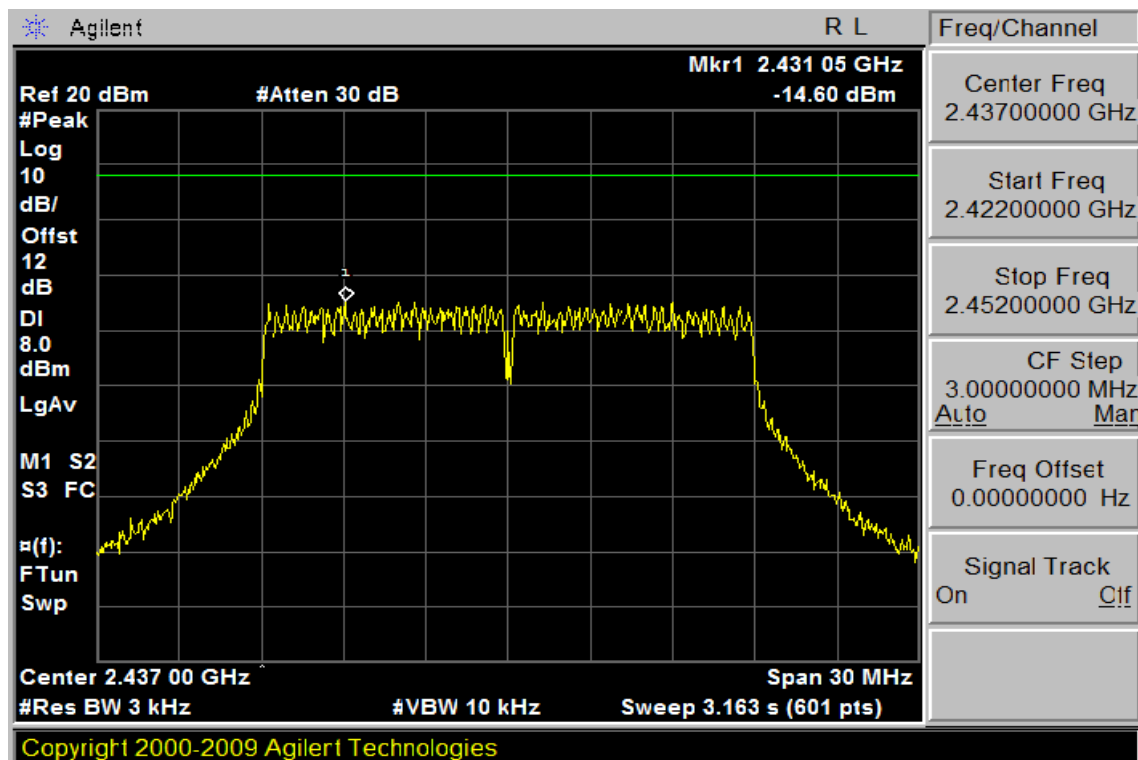
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802.11n_20M

Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)

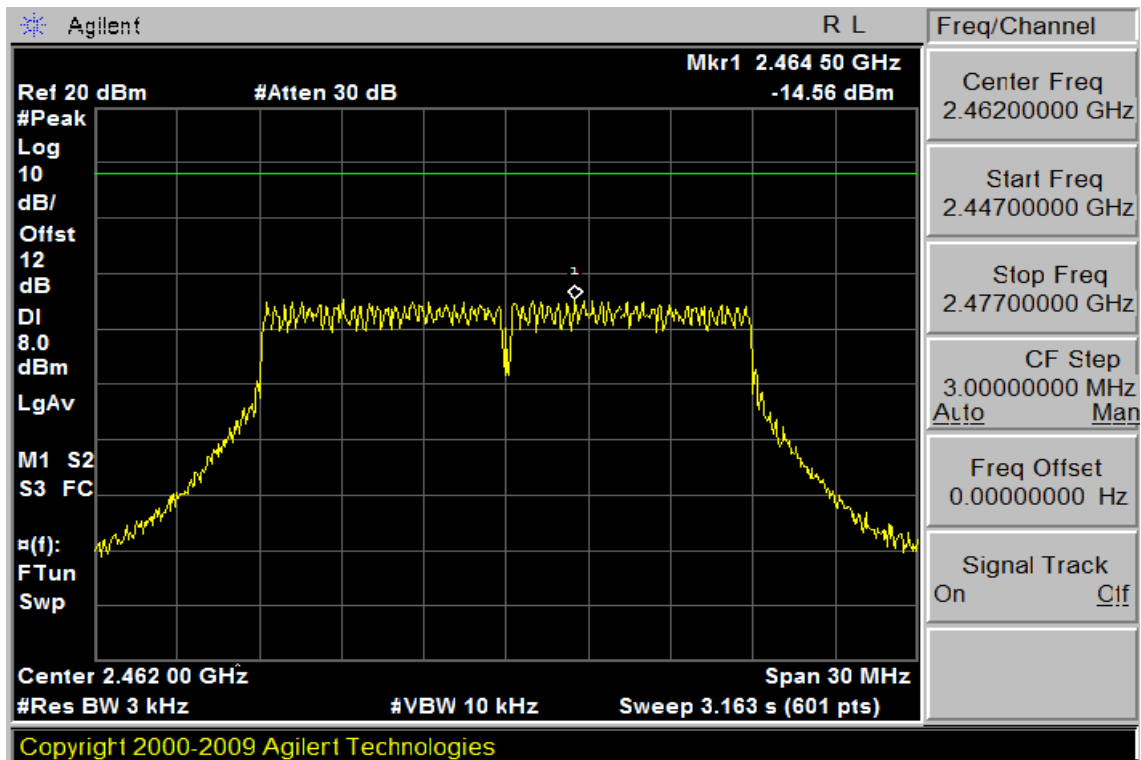


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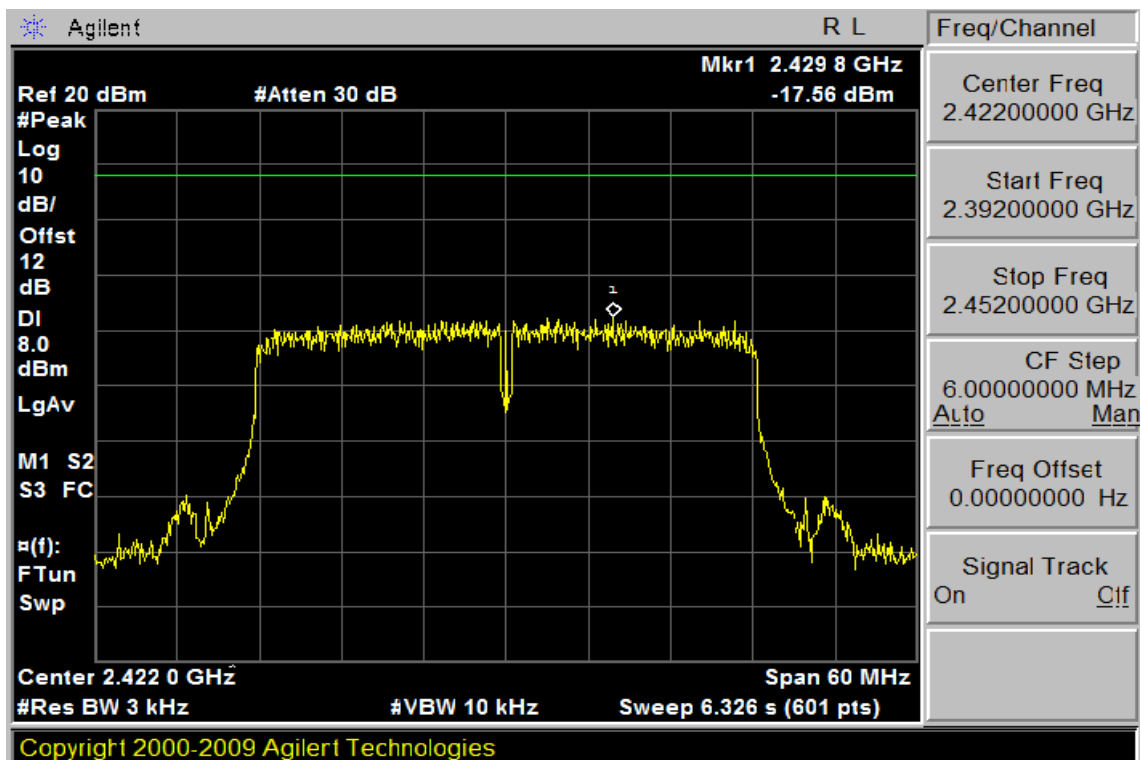
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Power Spectral Density Test Plot (CH-High)



802.11n_40M

Power Spectral Density Test Plot (CH-Low)

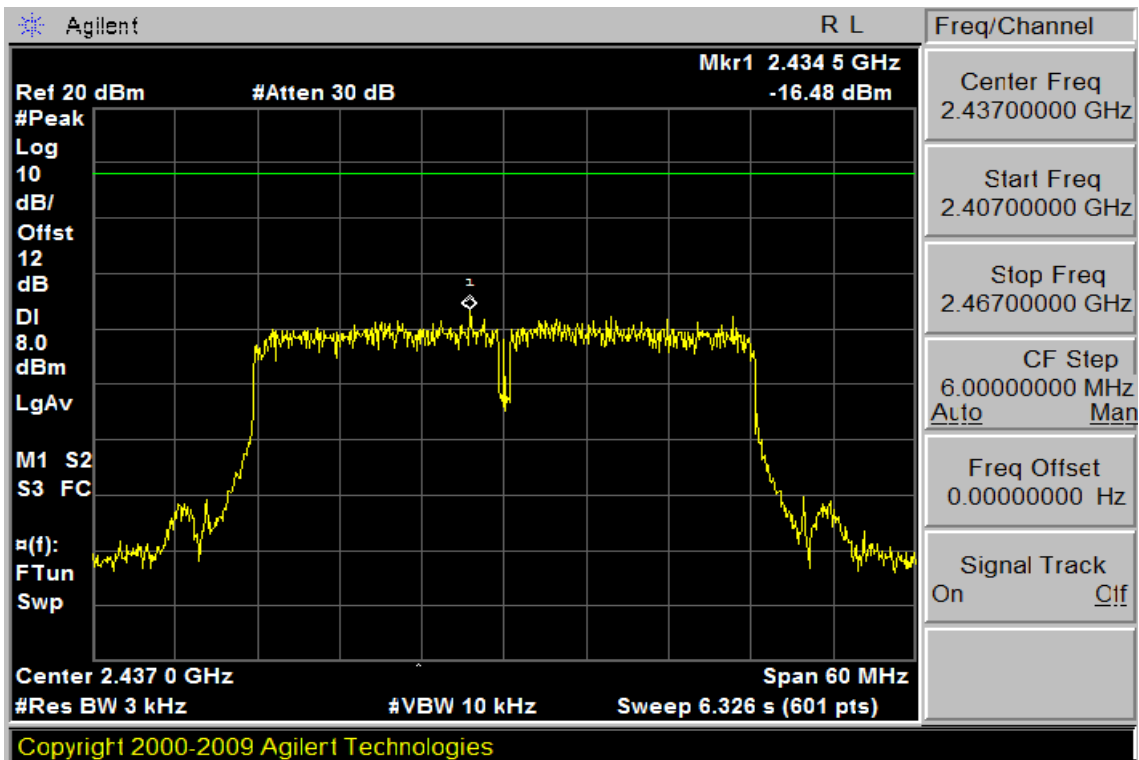


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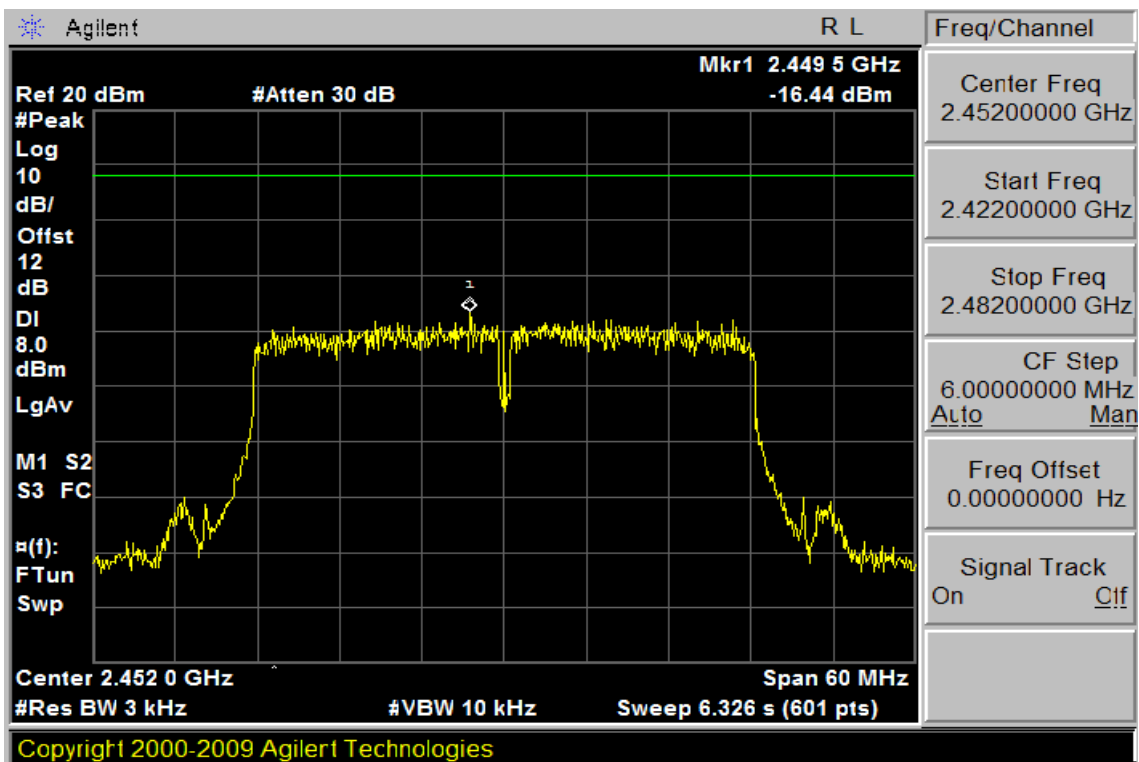
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Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)



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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 5.43dBi 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.

~ *End of Report* ~

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