Supplemental Information - Checklist for EMC Testing of Wireless Devices

Northwest EMC, Inc.

Purpose

The most economical use of test time can be achieved by thorough preparation prior to the test date. Please use the client Checklist for EMC testing of Wireless Devices.

This document contains supplemental information that will help you confirm the proper operation of your radio device prior to arrival at the test lab.

Part A: Channel Assignments

Section A1: Bluetooth
Section A2: 802.11(b)/(g)
Section A3: 802.11(a)
Section A4: GSM
Section A5: CDMA

Section A1: Bluetooth Channel Assignments

		Channel #	Frequency (MHz)
US Channels	Low	1	2402
	Mid	40	2440
	High	79	2480
ETSI Channels	Low	1	2402
	High	79	2480

Section A2: 802.11(b)/(g) Channel Assignments

		Channel #	Frequency (MHz)
US Channels	Low	1	2412
	Mid	6	2437
	High	11	2462
ETSI Channels	Low	1	2412
	High	13	2472

Section A3: 802.11(a) Channel Assignments

Ch #	Center Frequency (MHz)	FCC Test Channels	FCC 15E Bands	Ch #	Center Frequency (MHz)	ETSI Test Channels, Note 8	ETSI Bands
36	5180	Lowest	5150 - 5250 MHz Band	36	5180	Lowest	5150 - 5350 MHz Band
40	5200			40	5200		
44	5220			44	5220		
48	5240	Highest		48	5240		
52	5260	Lowest	5250 - 5350 MHz Band (requires DFS)	52	5260		
56	5280			56	5280		
60	5300			60	5300		
64	5320	Highest		64	5320	Highest	
100	5500		5470 - 5725 MHz Band (requires DFS)	100	5500	Lowest	5470 - 5725 MHz Band
104	5520			104	5520		
108	5540			108	5540		
112	5560			112	5560		
116	5580			116	5580		
120	5600			120	5600		
124	5620			124	5620		
128	5640			128	5640		
132	5660			132	5660		
136	5680			136	5680		
140	5700			140	5700	Highest	
149	5745	Lowest	5725 - 5825 GHz Band	149	5745		
153	5765			153	5765		
157	5785	Mid		157	5785		
161	5805	Highest		161	5805		
165	5825			165	5825		

Section A4: GSM Channel Assignments

Useful for GSM, GPRS, and Edge modulations

			Channel #	Frequency (MHz)
US Channels	Cellular	Low	128	824.2
		Mid	192	837
		High	251	848.8
	PCS	Low	512	1850.2
		Mid	661	1880
		High	810	1909.8
ETSI Channels	Cellular	Low		
		Mid	62	902.38
		High		
	DCS	Low		
		Mid	701	1748
		High		

Section A5: CDMA Channel Assignments

Useful for CDMA, and EVDO.

			Channel #	Frequency (MHz)
US Channels	**Cellular**	Low	1013	824.7
		Mid	384	836.52
		High	777	848.31
	PCS	Low	25	1851.25
		Mid	600	1880
		High	1175	1908.75
ETSI Channels	**Cellular**	Low		
		Mid		
		High		
	DCS	Low		
		Mid		
		High		

Useful for WCDMA and HSDPA
Note: WCDMA is called UMTS in EU. UMTS does not have a cellular band.

			Channel #	Frequency (MHz)
US Channels	**Cellular**	Low	4132	826.4
		Mid	4182	836.4
		High	4233	846.6
	PCS	Low	9262	1852.4
		Mid	9400	1880
		High	9538	1907.75
ETSI Channels	**Cellular**	Low		
		Mid		
		High		
	DCS	Low	9612	1922.4
		Mid	9750	1950
		High	9888	1977.6

Part B: Modulation Types

Section B1: Bluetooth
Section B2: 802.11(b)/(g)/(a)/(n)
Section B3: GSM
Section B4: CDMA

Section B1: Bluetooth Modulation Types

Bluetooth is an adaptive frequency hopping spread spectrum signal.

Bluetooth Version 1.0 and 1.0B

Bluetooth Version 1.1 1Mbps

Bluetooth Version 1.2: 1Mbps

- PCM
- CVSD (Continuous Variable Slope Delta Modulation) for voice over air

Bluetooth 2.0/ Enhanced data rate (EDR): 3Mbps

- Modulation GFSK, data rate DH5
- Modulation Pi/4-DQPSK, data rate 2DH5
- Modulation 8DPSK, data rate 3DH5

Bluetooth 2.1/ Enhanced data rate (EDR): 3Mbps

- Modulation GFSK, data rate DH5
- Modulation Pi/4-DQPSK, data rate 2DH5
- Modulation 8DPSK, data rate 3DH5

Bluetooth 3.0 (not yet developed): 480Mbps

Section B2: 802.11(b)/(g) Modulation Types

802.11(b)/(g) is a direct sequence spread spectrum signaling method (DSSS).

802.11 Legacy: 1, 2Mbps
- DSSS

802.11(b): 1, 11Mbps
- Modulation DSSS

802.11(g): 6, 36, 54Mbps
- Modulation OFDM

802.11(a): 6, 36, 54Mbps
- Modulation OFDM

802.11(n): up to 248 Mbps
- Modulation MIMO

Note: We usually test this in 6, 36, 54Mbps modes, as well as 20MHz wide/HTO and 40MHz wide/HT15.

Section B3: GSM Modulation Types

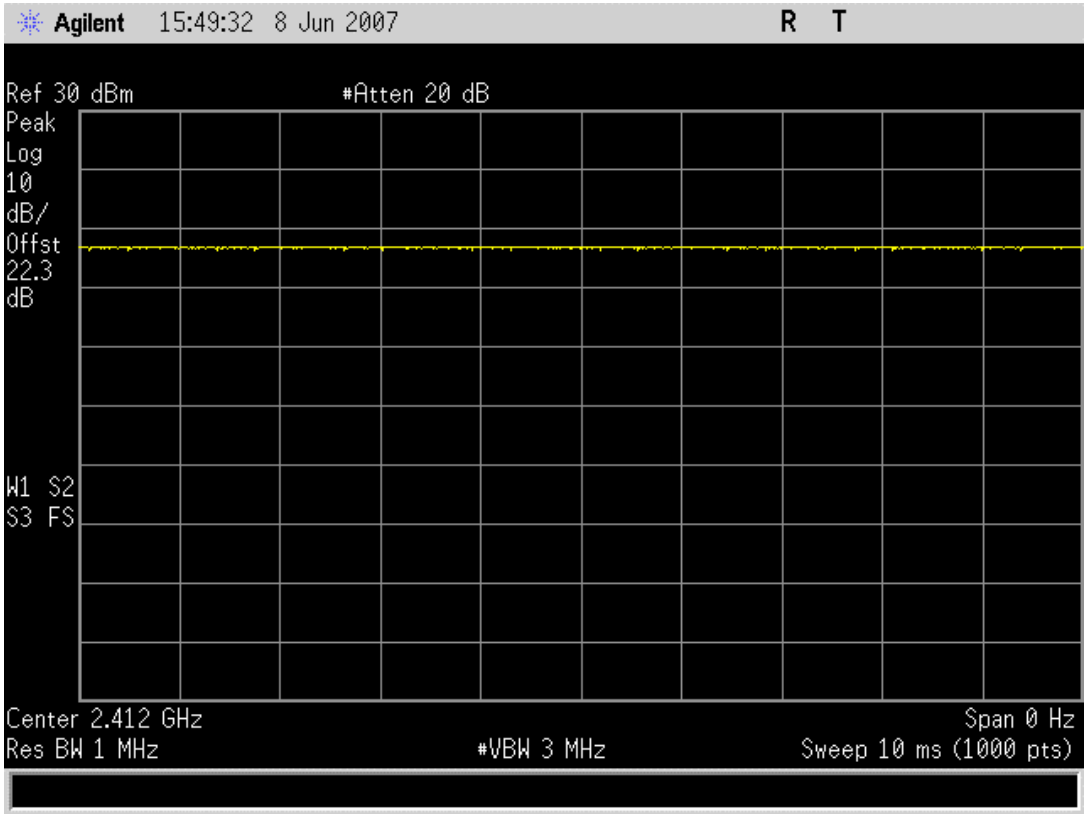
- GSM
- GPRS
- Edge

Section B4: CDMA Modulation Types

- EVDO
- CDMA
- WCDMA (UMTS)

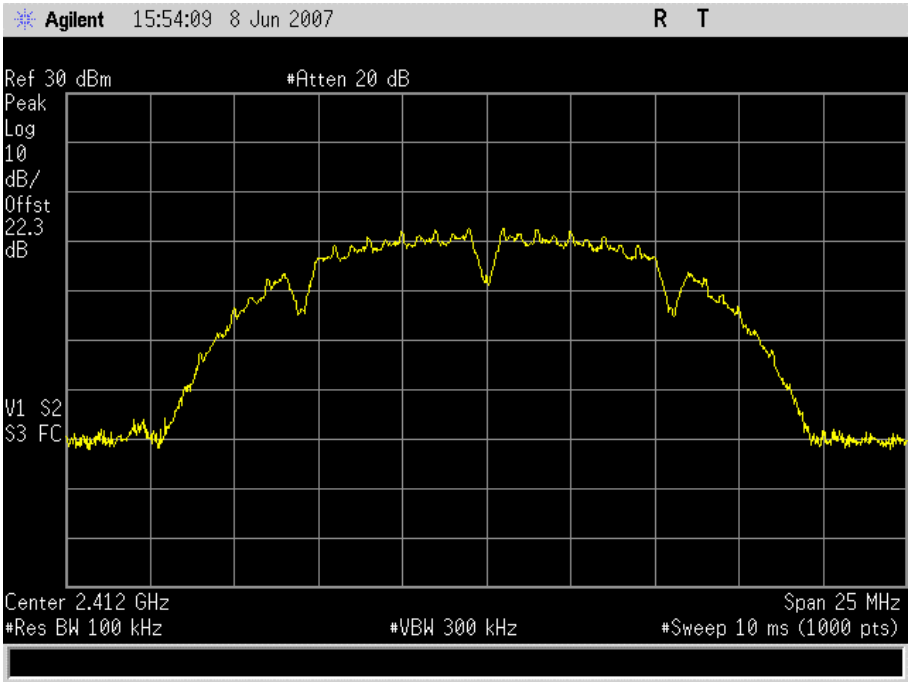
Part C: Sample Data Rate Images for 802.11 and Bluetooth

Note: A zero span sweep should be performed to ensure that the EUT is operating at its maximum spectral density as required for testing. A sample of this sweep for 802.11 is shown below, followed by envelope sweeps of individual modulation/data rates.

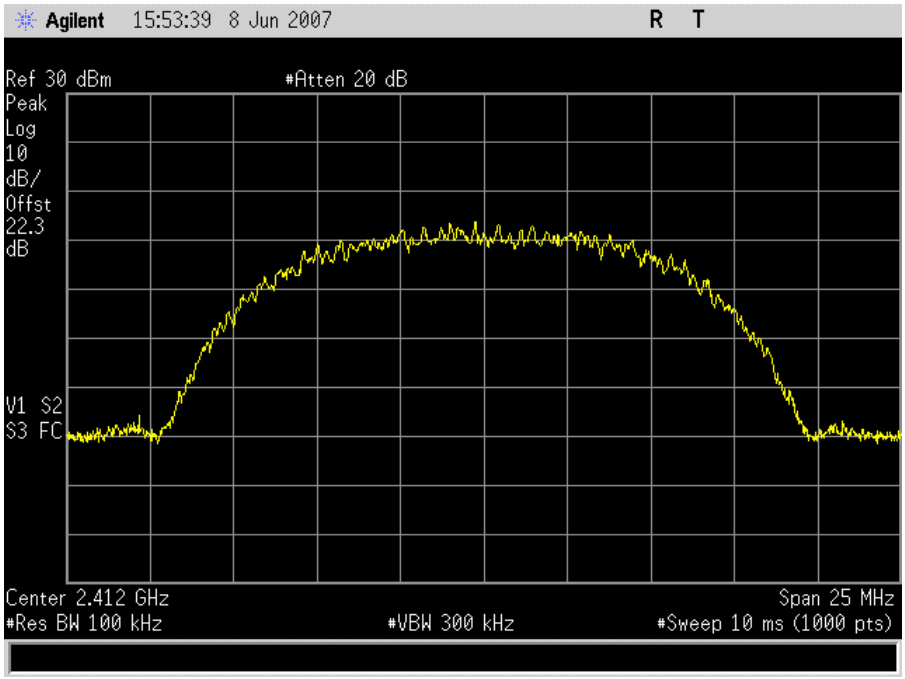


Section C1: 802.11(b)/(g) Sample data rate images

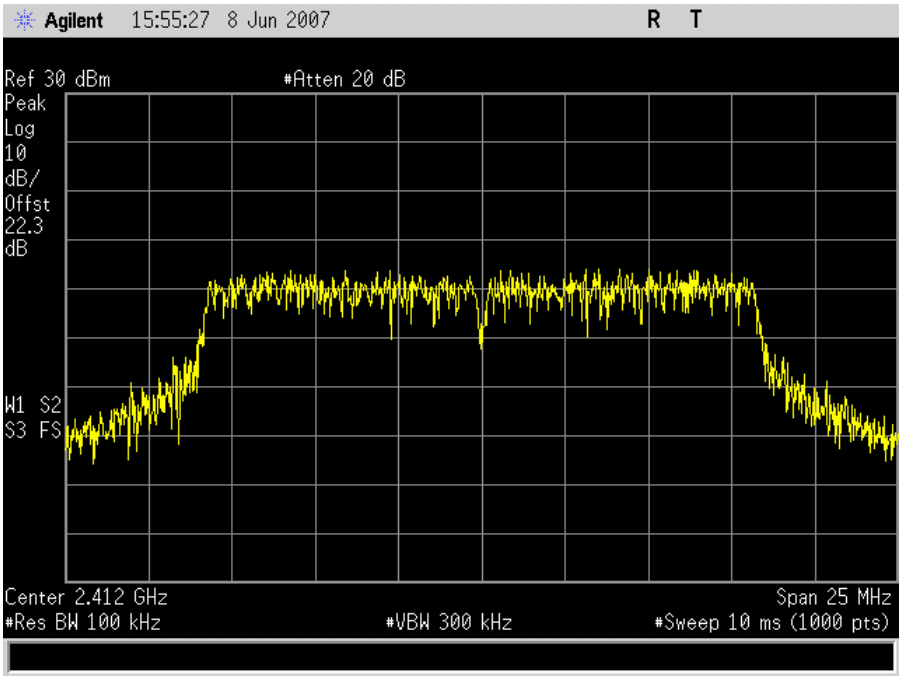
802.11(b), 1Mbps



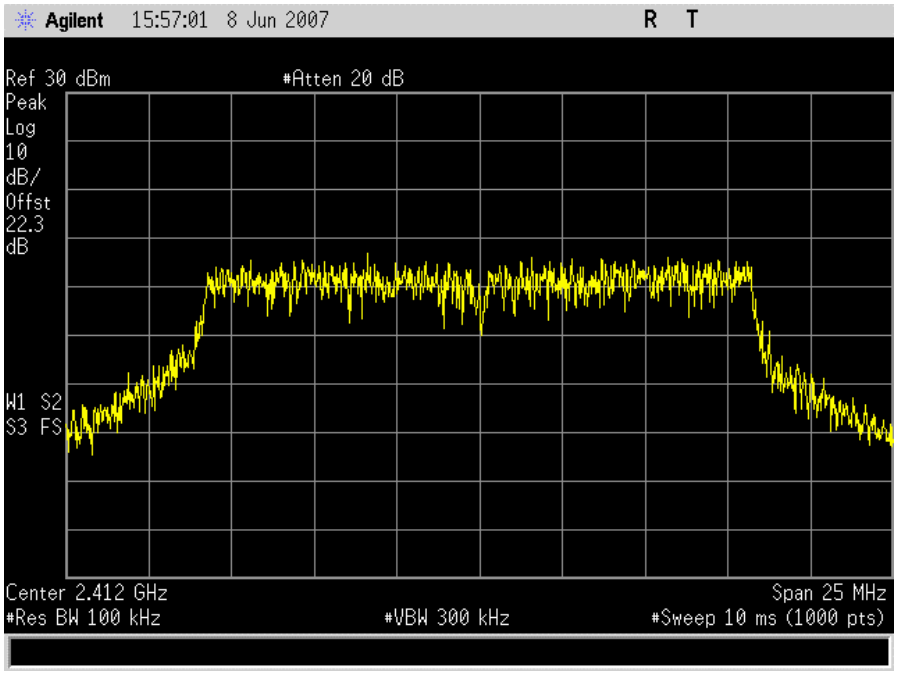
802.11(b), 11Mbps



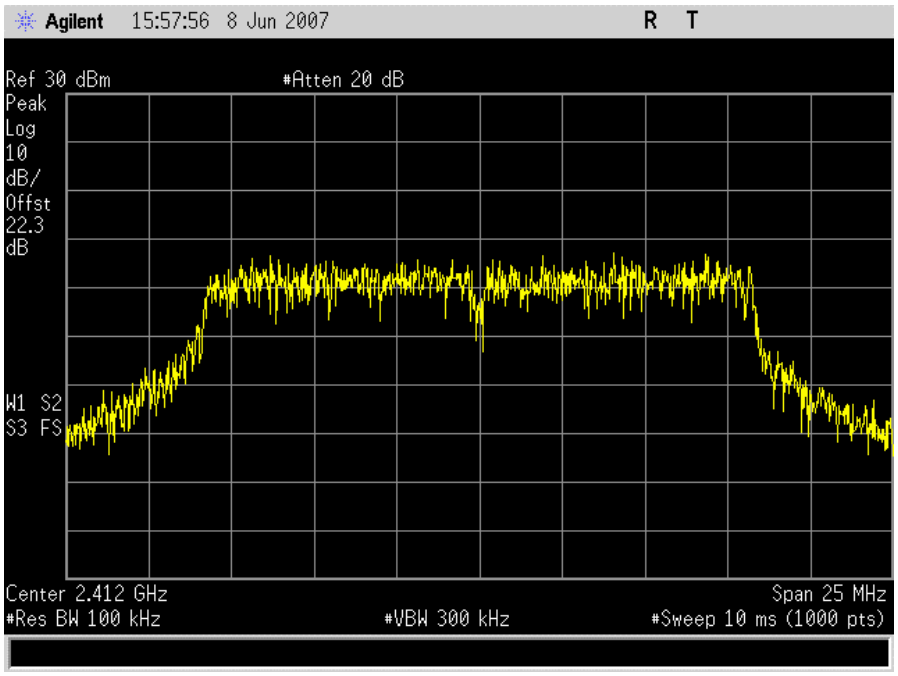
802.11(g), 6Mbps



802.11(g), 36Mbps

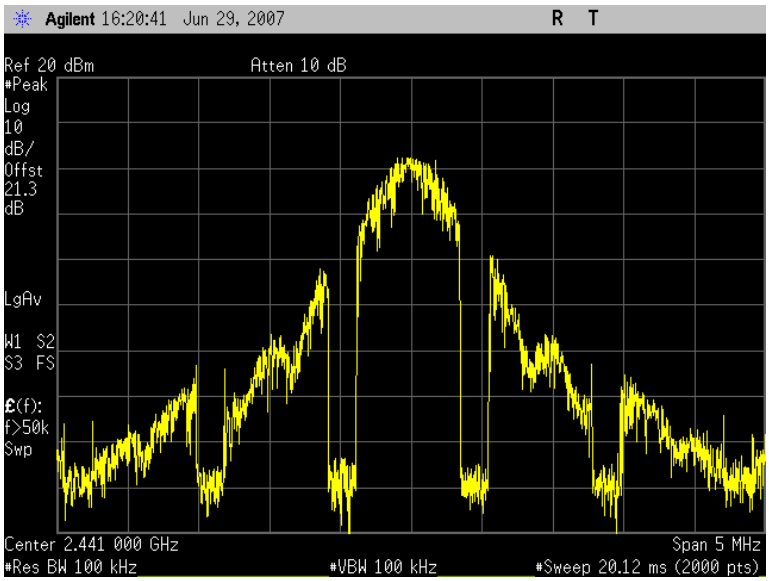


802.11(g), 54Mbps

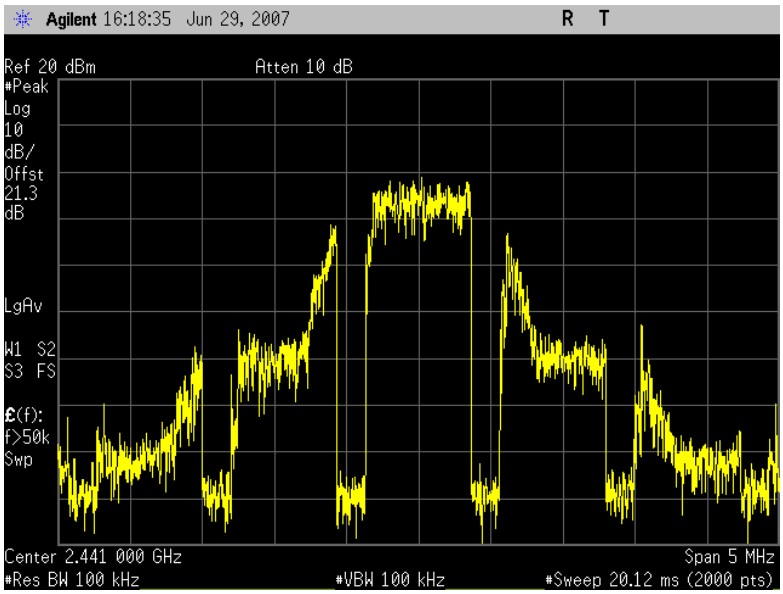


Section C2: Bluetooth EDR Sample data rate images

Bluetooth, DH5



Bluetooth, 2DH5



Bluetooth, 3DH5