
Radio Intentional EMC Test Report: EDCS - 769314

For

CP-9971-C-K9, CP-9971-CL-K9, CP-9971-W-K9 & CP-9971-WL-K9

Bluetooth Module

Against the following Specifications :

47 CFR 15.247

RSS-210

RSS-102

Cisco Systems

EMC Laboratory

170 West Tasman Drive

San Jose, CA 95134

Author: Dean Yarza

Approved By: Craig Mullis

Title: Regulatory Compliance Manager

This report replaces any previously entered test report under EDCS -769314



This test report has been electronically authorized and archived using the CISCO Engineering Document Control system.

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Section 1: Overview

Test Summary

The samples were assessed against the tests detailed in section 3 under the requirements of the following standards:

Emissions:

CFR47 Part 15.247

RSS-210

RSS102

Notes:

- 1) Measurements were made in accordance with FCC docket #:DA 02-2138, ET docket 96-8, KDB Publication No. 558074& measurement method of spurious emission tolerance to the International Telecommunication Union (ITU) Recommendation SM329.

Section 2: Assessment Information

2.1 General

This report must not be used to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the federal Government.

With regard to this assessment, the following points should be noted:

- a) The results contained in this report relate only to the items tested and were obtained in the period between the date of the initial assessment and the date of issue of the report. Manufactured products will not necessarily give identical results, due to production tolerances and measurement uncertainties.
- b) The apparatus was set up and exercised using the configuration and modes of operation defined in this report only.
- c) Where relevant, the apparatus was only assessed using the susceptibility criteria defined in this report and the Test Assessment Plan (TAP).
- d) All testing was performed under the following environmental conditions:
 - Temperature 15°C to 35°C (54°F to 95°F)
 - Atmospheric Pressure 860mbar to 1060mbar (25.4" to 31.3")
 - Humidity 10% to 75*%
- e) All AC testing was performed at one or more of the following supply voltages:
 - 110V (+/-10%) 60Hz
 - 220V (+/-10%) 50 or 60Hz
- f) Cisco Systems, Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). The scope of accreditation, certificate number 1178-01 is referenced in appendix C, along with further details.

This report must not be reproduced except in full, without written approval of Cisco Systems, Inc.



2.2 Start Date of Testing

30-Mar-2009

2.3 Report Issue Date

Cisco Systems, Inc. uses an electronic system to issue, store and control the revision of test reports. This system is called the Engineering Document Control System (EDCS). The actual report issue date is embedded into the original file on EDCS. Any copies of this report, either electronic or paper, that are not on EDCS must be considered uncontrolled

2.4 Testing facilities

This assessment was performed by:

Testing Laboratory

Cisco Systems, Inc.,
170 West Tasman Drive
San Jose, CA 95134,
USA

Registration Numbers for Industry Canada

Cisco System Site	Site Identifier
Building P, 10m Chamber	Company #: 4624-2
Building P, 5m Chamber	Company #: 4624-1
Building N, 5m Chamber	Company #: 6111
Building I, 5m Chamber	Company #: 6112

Test Engineers

Dean Yarza

2.5 Equipment Assessed (EUT)

CP-9971-C-K9

2.6 EUT Description

Roundtable is the next generation of desktop phones. It will support the use of 802.11a/b/g in addition to Ethernet as network interface. This SFS defines the requirements for 802.11a/b/g support.

The WLAN subsystem of Roundtable phones will comprise of the MuRata LBEH1WULQC module with support for TNET1253 for WLAN and BRF6350 for Bluetooth support.

Report will be used to cover the following Models:

CP-9971-C-K9: Charcoal with Thick Handset

CP-9971-CL-K9: Charcoal with Thin Handset

CP-9971-W-K9: Charcoal with Thick Handset

CP-9971-WL-K9: Charcoal with Thin Handset

2.7 Scope of Assessment

Tests have been performed in accordance with the relevant Test and Assessment Plan (TAP), a copy of which is contained in Appendix F of this report, and the relevant Cisco Systems, Inc. radio test procedures (EDCS-420238). This test report may not cover all of the tests highlighted in the test plan.

2.8 Units of Measurement

The units of measurements defined in the appendices are reported in specific terms, which are test dependent. Where radiated measurements are concerned these are defined at a particular distance. Basic voltage measurements are defined in units of [dBuV]

As an example, the basic calculation for all measurements is as follows:

$$\text{Emission level [dBuV]} = \text{Indicated voltage level [dBuV]} + \text{Cable Loss [dB]} + \text{Other correction factors [dB]}$$

The combinations of correction factors are dependent upon the exact test configurations [see test equipment lists for further details] and may include:-

Antenna Factors, Pre Amplifier Gain, LISN Loss, Pulse Limiter Loss and Filter Insertion Loss..

Note: to convert the results from dBuV/m to uV/m use the following formula:-

$$\text{Level in uV/m} = \text{Common Antilogarithm} [(X \text{ dBuV/m})/20] = Y \text{ uV/m}$$

2.9 Report Template Control No.

EDCS#: 703456



Section 3: Result Summary

3.1 Results Summary Table

Conducted emissions

Basic Standard	Test Details / Comments	Result
Peak Output Power	15.247: The maximum conducted output power of the intentional radiator for systems using digital modulation in the 2400-2483.5MHz band shall not exceed 1 Watt (30dBm). If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. (RSS-210 A8.4)	Pass
20dB Bandwidth	15.247: Systems using digital modulation techniques may operate in the 5725-5850MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz. (RSS-210 A8.2)	Pass
Conducted Spurious Emissions	15.247: In any 100 kHz bandwidth outside the frequency band in which the digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.(RSS-210 A8.5)	Pass
Restricted Bandedge Measurements	Conducted emissions which fall in the restricted bands, as defined in Sec. 15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a). (RSS-210 Sec2.7)	Pass

Radiated emissions

Basic Standard	Test Details / Comments	Result
Radiated Spurious and Harmonic Emissions	Radiated emissions which fall in the restricted bands, as defined in Sec. 15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a). (RSS-210 Sec2.7)	Pass



Section 4: Sample Details

Note: Each sample was evaluated to ensure that its condition was suitable to be used as a test sample prior to the commencement of testing. During preliminary testing all three planes (X,Y & Z) were evaluated to determine "Worst Case". The data collected determine that the orientation used for this report was determined "Worst Case".

4.1 Sample Details

Sample Number	Equipment Details	Serial Number	Part Number
S01	CP-9971	FCH13068HYM	68-3145-01 55*

The following antennas were evaluated as part of this testing process. The antennas listed reflect the maximum gain allowed for each family type of antenna:

Fixed internal Antenna, Gain = 0.44dBi (no external antenna can be used.)

4.2 System Details

System #	Description	Samples
1	Bluetooth Radio Test Sample	S01

4.3 Mode of Operation Details

Mode#	Description	Comments
1	Bluetooth Test Mode	System is connected to the MT8852B Bluetooth Tester and placed in a continuous Tx Mode with Hopping Turned ON or OFF per test requirements.

Section 5: Modifications

5.1 Sample Modifications Performed During Assessment

No modifications were performed during assessment.



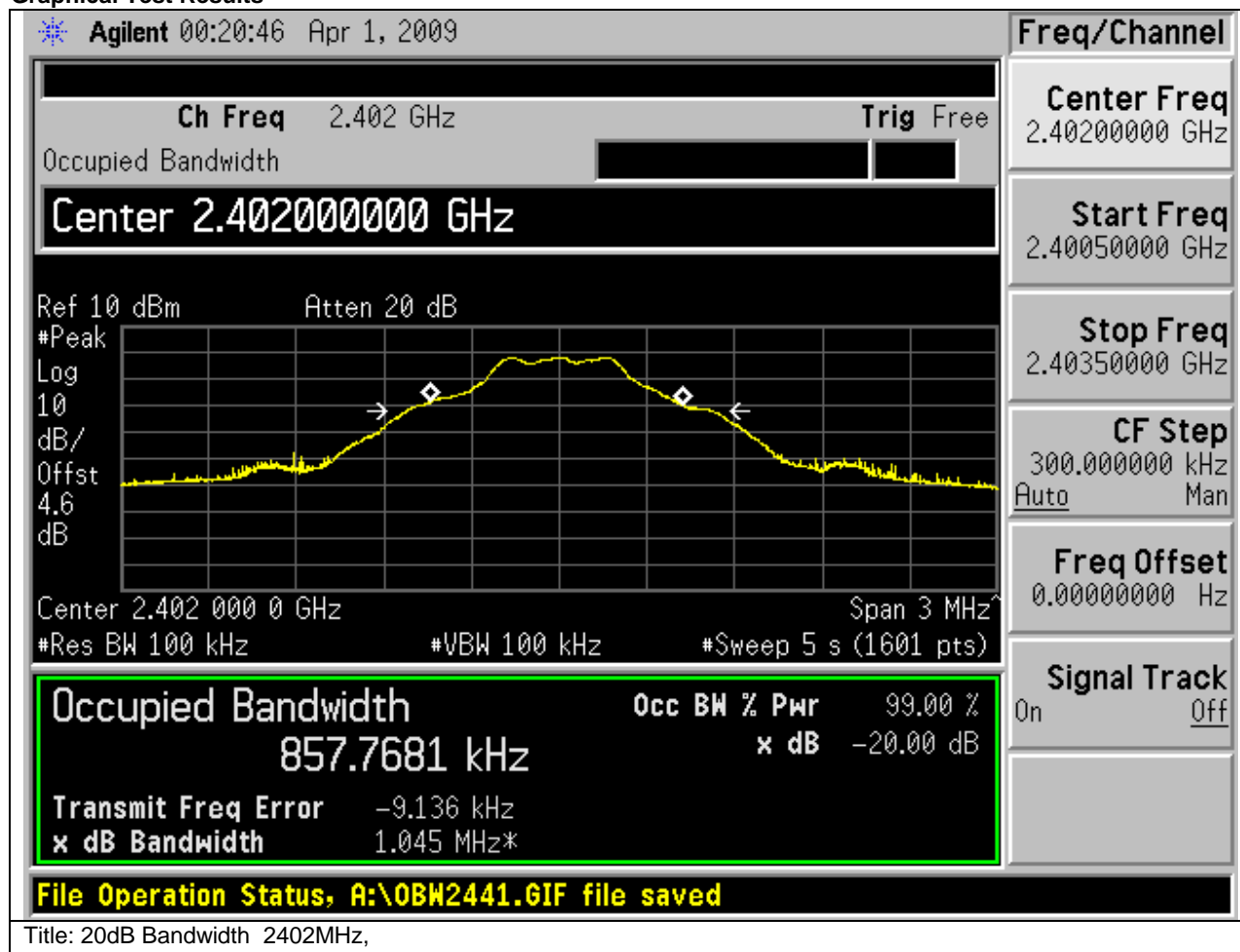
Appendix A: Formal Test Results

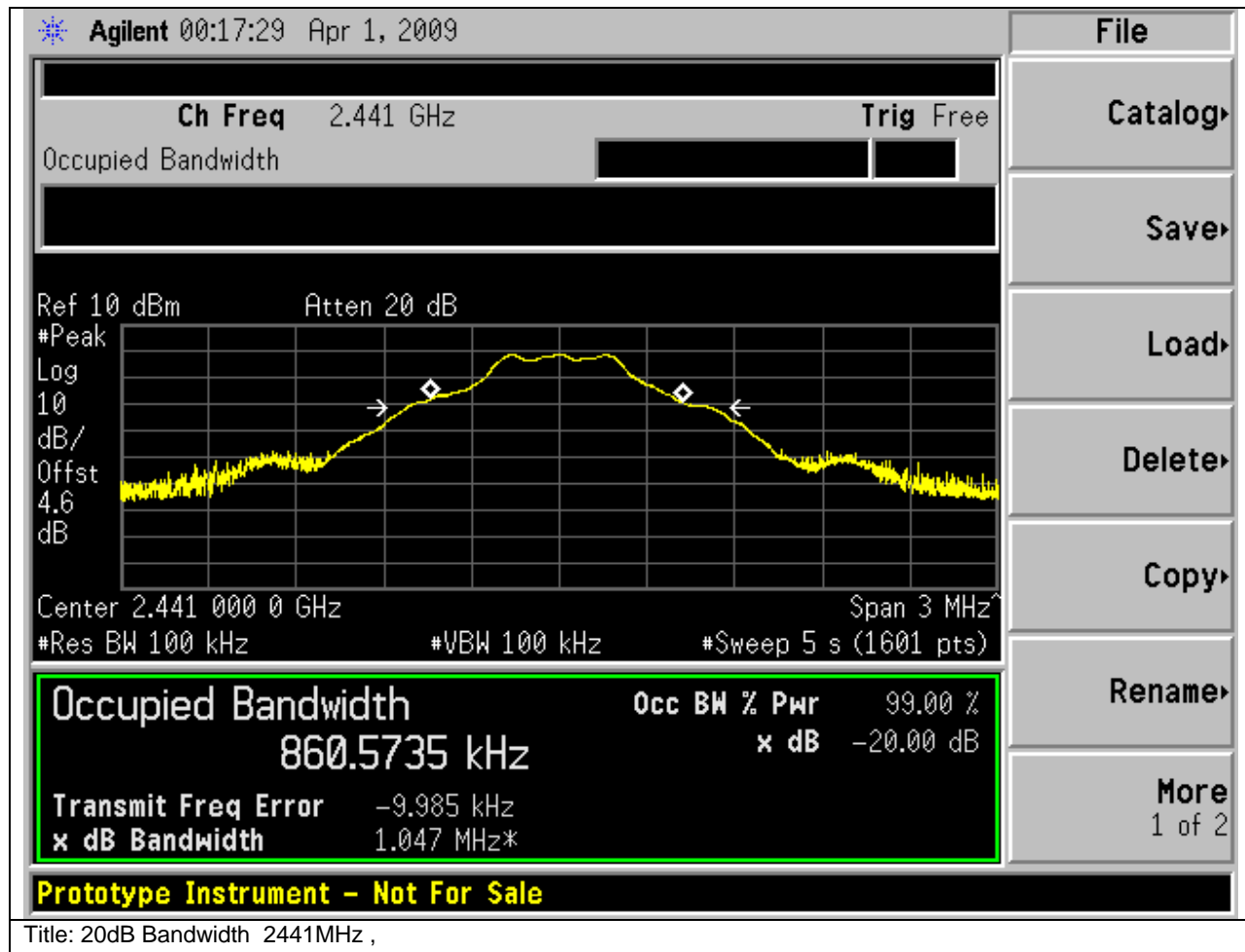
20dB Bandwidth

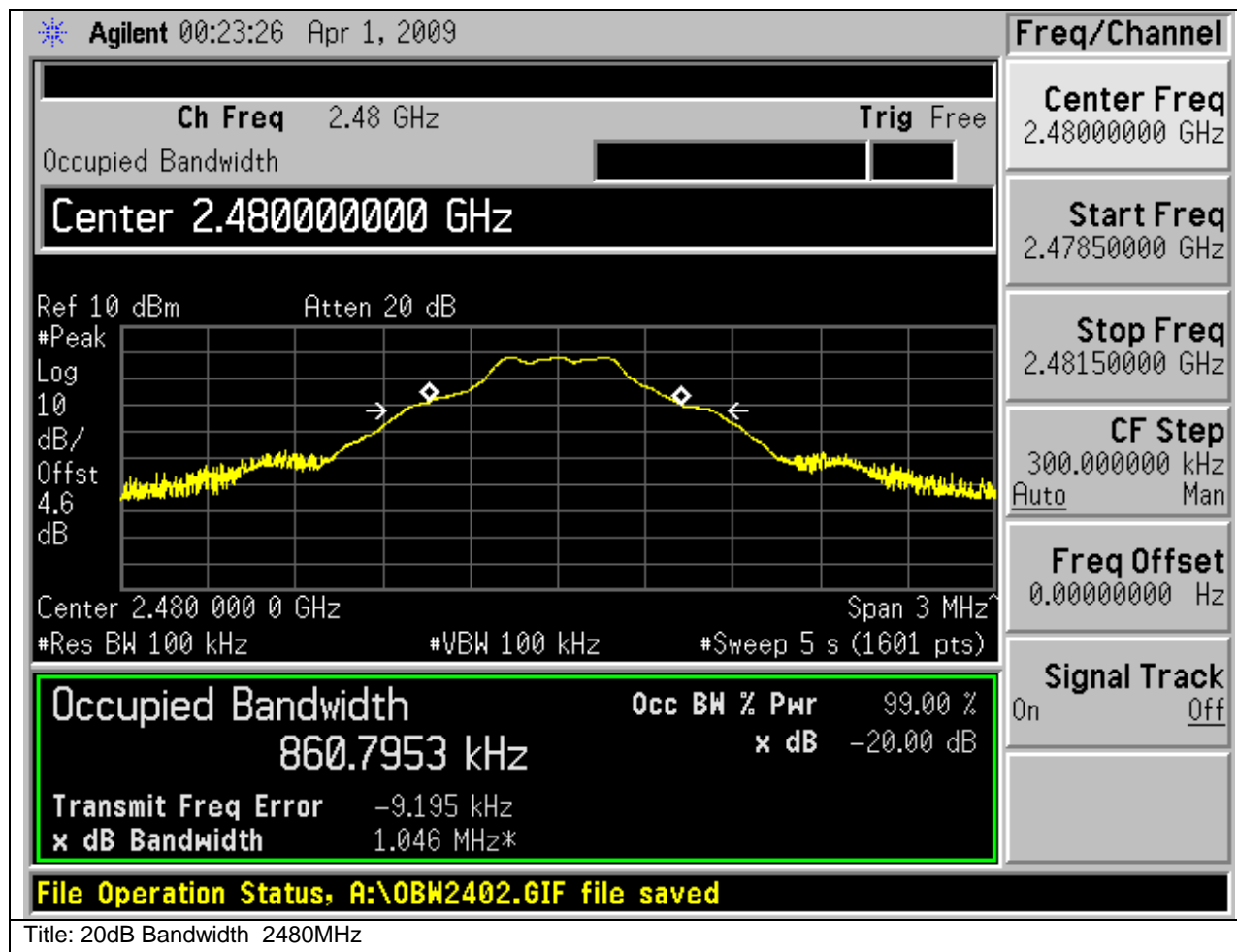
20dB bandwidth of a frequency hopping channel is the 2400-2483.5MHz with hopping stopped.

Frequency (MHz)	20dB Bandwidth (kHz)
2402	1045
2441	1047
2480	1046

Graphical Test Results









Peak Output Power

15.247 & RSS-210 A8.4:

The maximum conducted output power of the intentional radiator for systems using frequency hopping systems in the 2400-2483.5MHz band shall not exceed 1 Watt (30dBm). If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)
2402	2.87	30	-27.13
2441	2.79	30	-27.21
2480	1.87	30	-28.13

**Anritsu
BlueTest2 Test Report**

Test Set Serial Number: 000830002
EUT Bluetooth Address: 0017E86767C5

Date: 4/1/2009
Time: 10:37:47 AM

Overall Result: PASS

Model: CP-9971G (Bluetooth Version 2.1)

SN: FCH13068HYM

Data Rate: DH1

TRM/CA/01/C (Output Power)

Packet Length Tested: DH1

Hopping OFF	<u>Low</u>	<u>Med</u>	<u>High</u>	<u>Limits</u>
Average Power	2.77 dBm	2.70 dBm	1.77 dBm	
Max Power	2.80 dBm	2.71 dBm	1.78 dBm	< 20.00 dBm
Min Power	2.75 dBm	2.69 dBm	1.76 dBm	> -6.00 dBm
Peak Power	2.87 dBm	2.79 dBm	1.87 dBm	< 10.00 dBm
Total Packets Failed	0	0	0	
Total Packets Tested	500	500	500	
Result	Pass	Pass	Pass	

Measurement procedure as per KDB Publication No. 558074 power output option 1, peak power meter.



Carrier Frequency Separation

15.247 & RSS-210 A8.1:

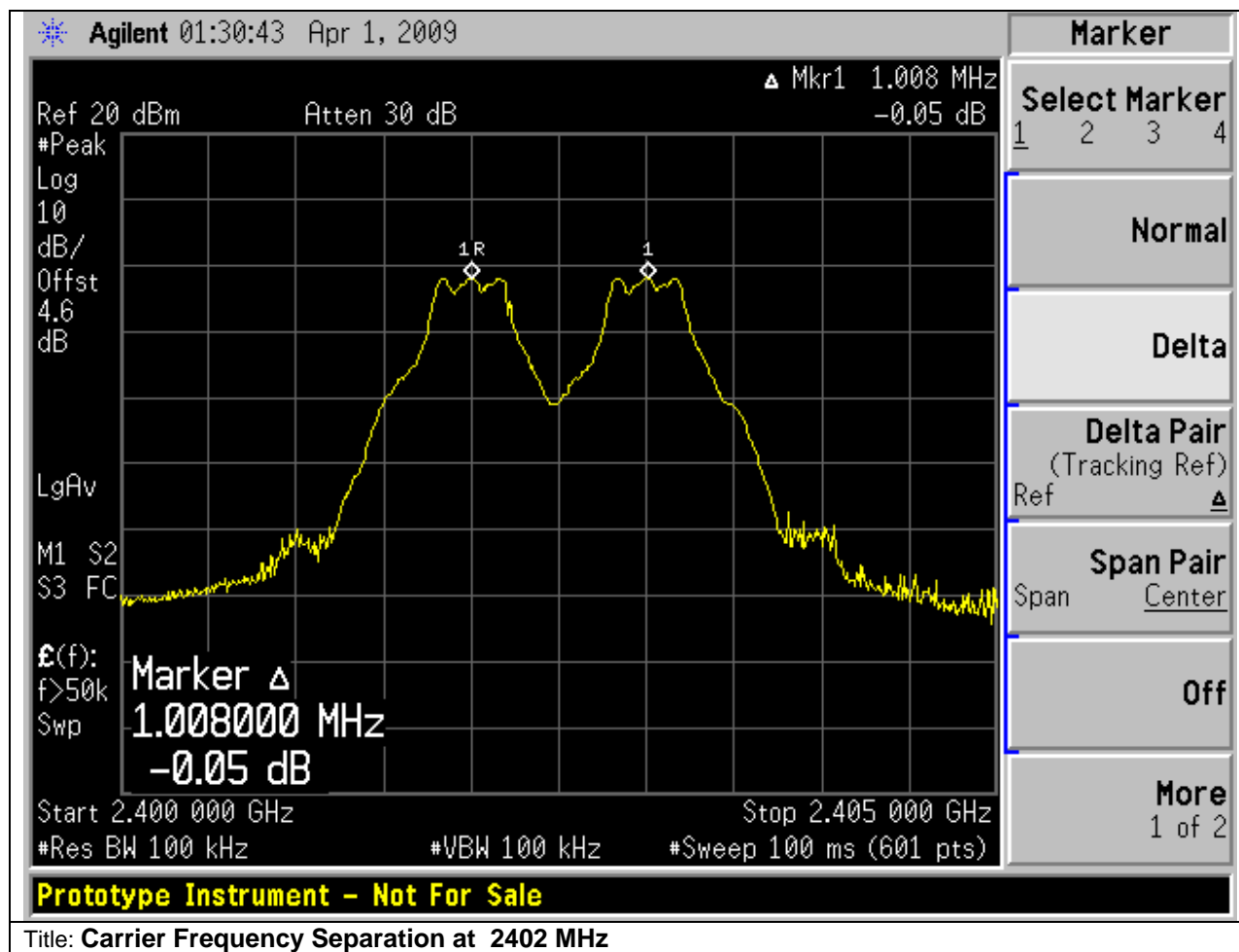
For frequency hopping systems operating in the 2400-2483.5MHz band may have hopping channel frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided the system operates with an output power no greater than 0.125W.

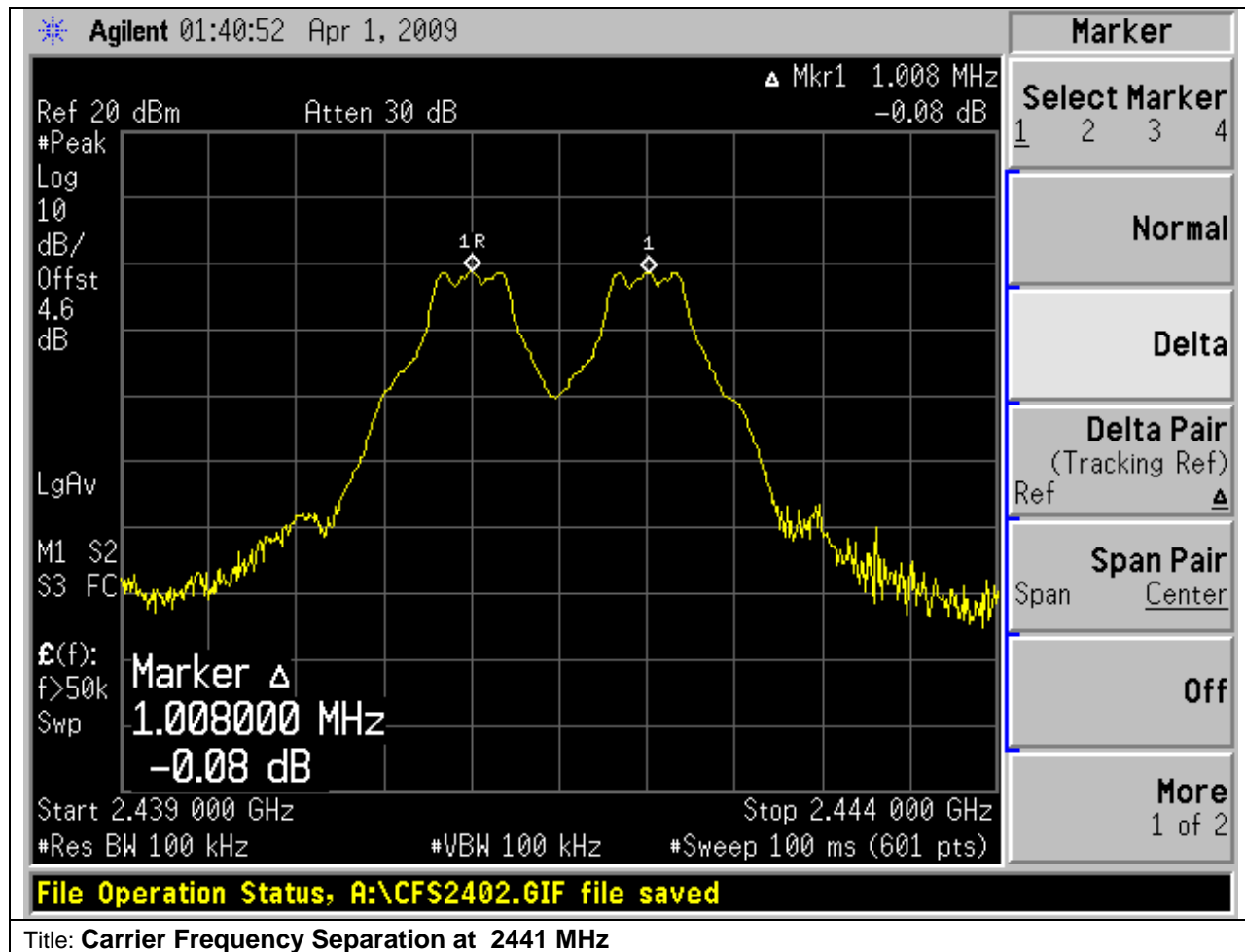
The smallest 20dB bandwidth for all channels is 1.045MHz. The minimum channel carrier frequencies separation is calculated as $2/3(1045) = 696.67\text{kHz}$

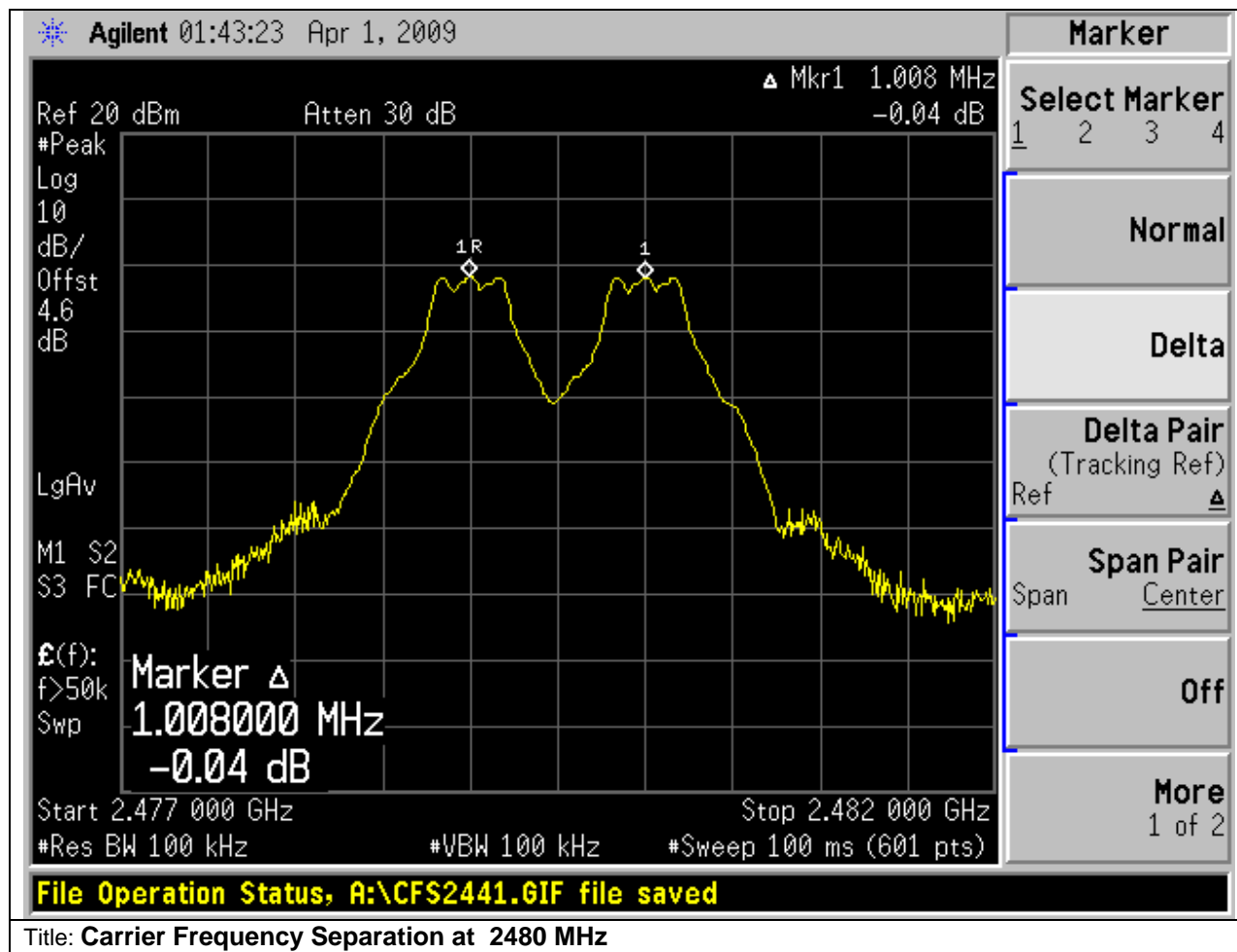
Frequency (MHz)	Carrier Frequency Separation (kHz)	Limit (kHz)	Margin (kHz)
2402	1000.00	696.67	-303.33
2441	1000.00	696.67	-303.33
2480	1000.00	696.67	-303.33



Graphical Test Results

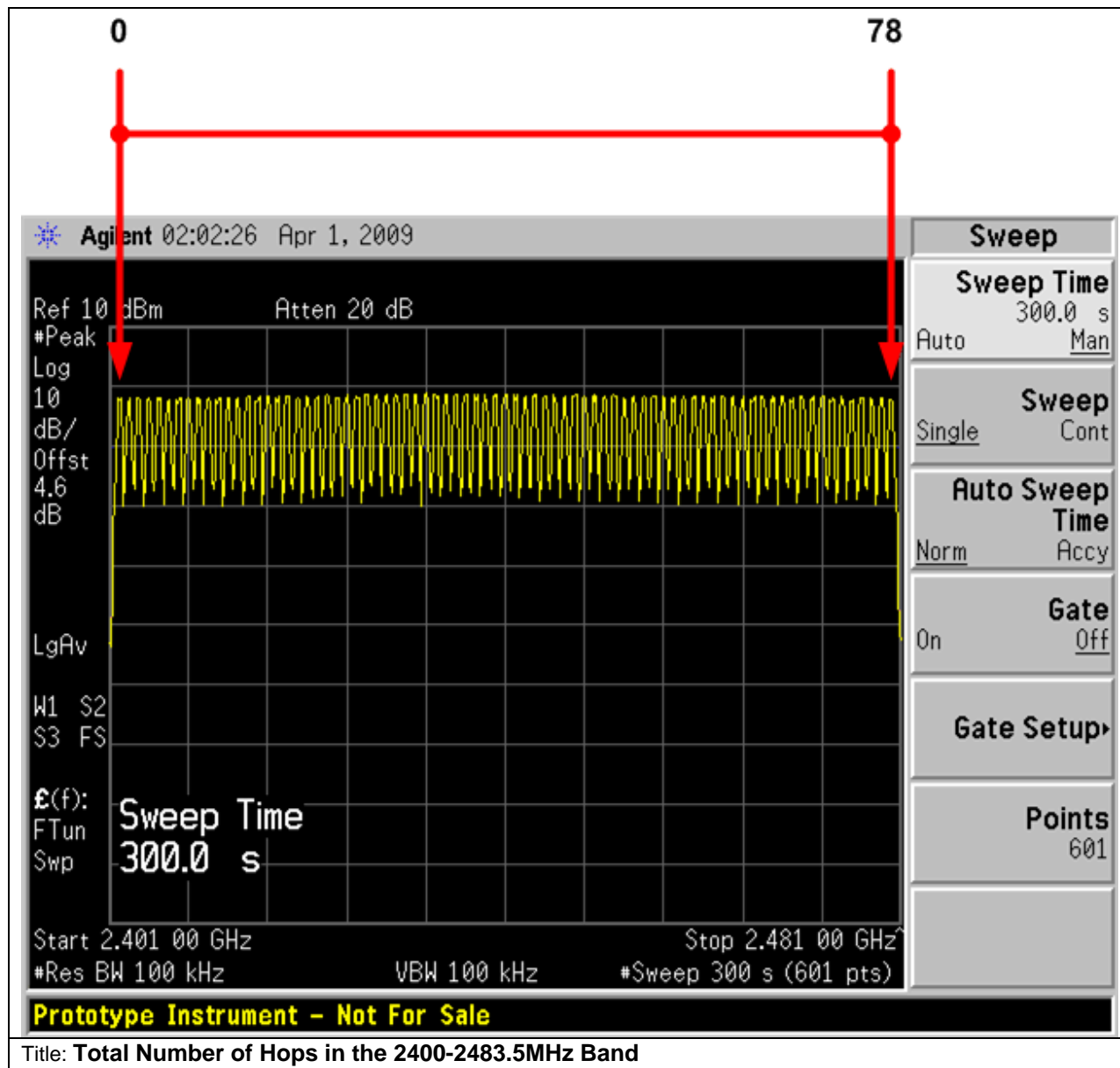






Number of Hopping Frequencies

Total number of hopping frequencies is the 2400-2483.5MHz Band = 79 Channels



Average Time of Occupancy

15.247 & RSS-210 A8.1:

Frequency hopping systems operating in the band 2400-2483.5MHz shall use at least 15 hopping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

The total sweep time is $0.4(79) = 31.6$ seconds.

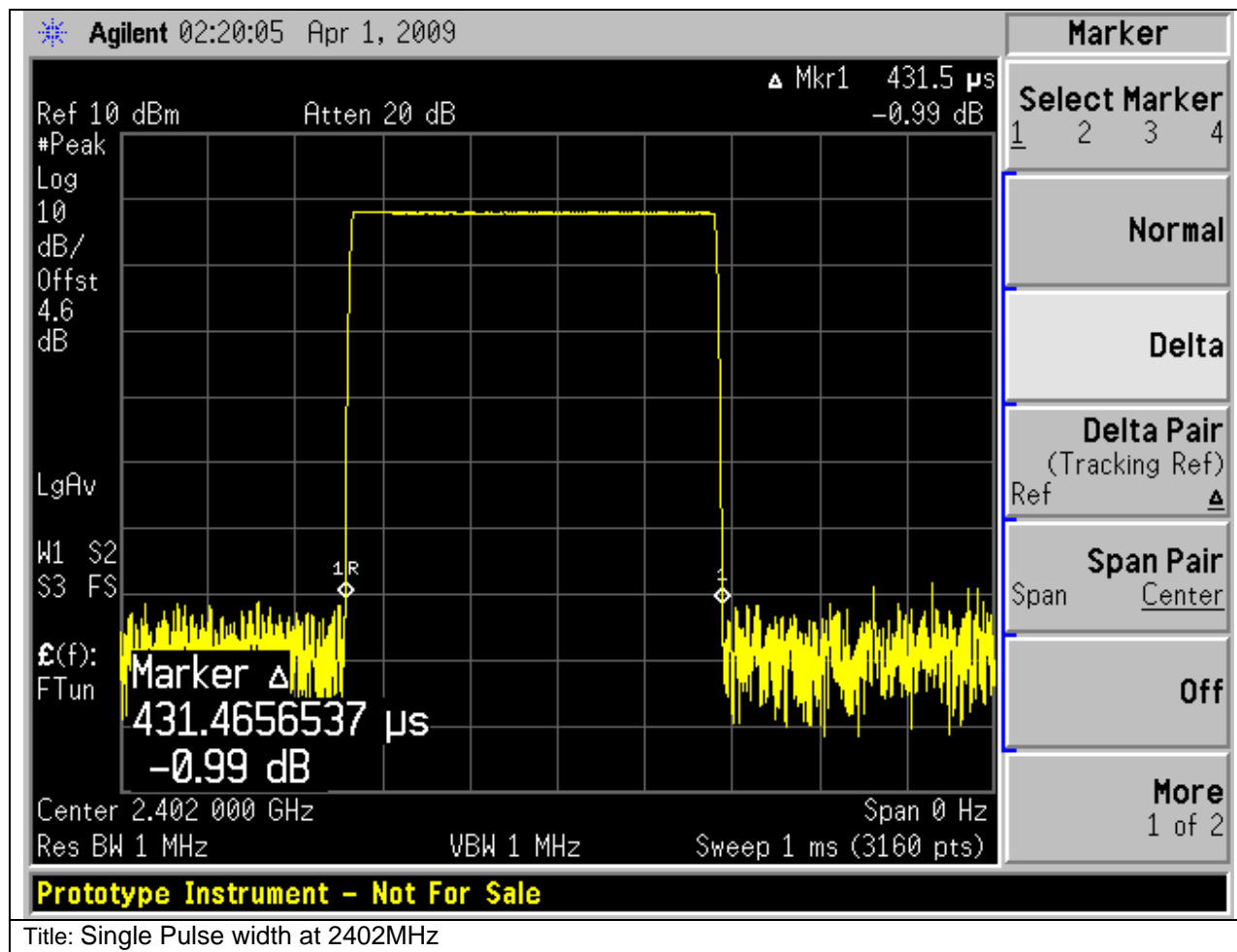
Due to the number of hops in the 31.6s sweep we determined to reduce the sweep time to 3.16s, count the number of hops and multiply by 10. The total number of hops will be multiplied by the measured time of one pulse.

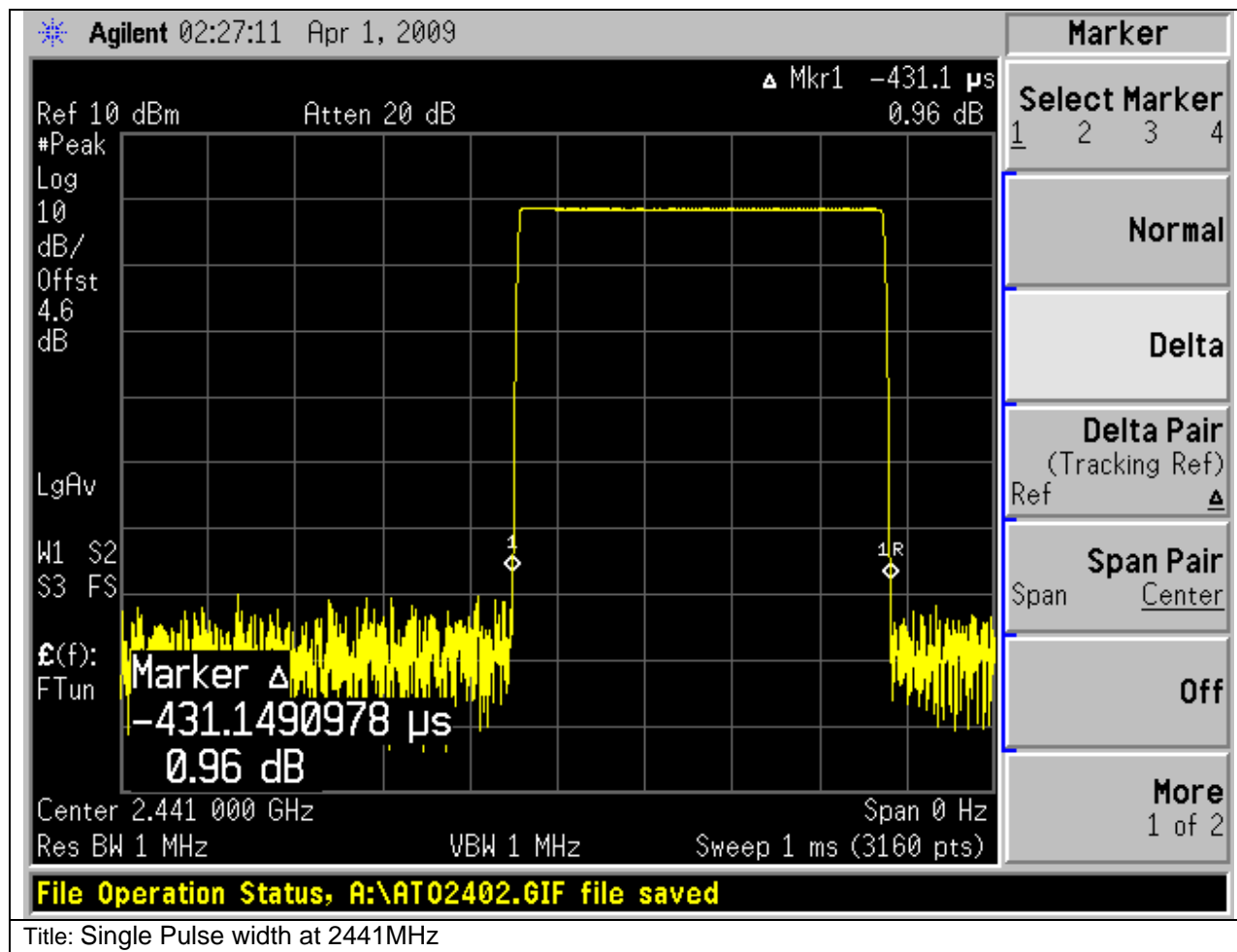
Example: Number of Hops in 3.16s = 32. Total Number of Hops in 31.6s = $32(10) = 320$

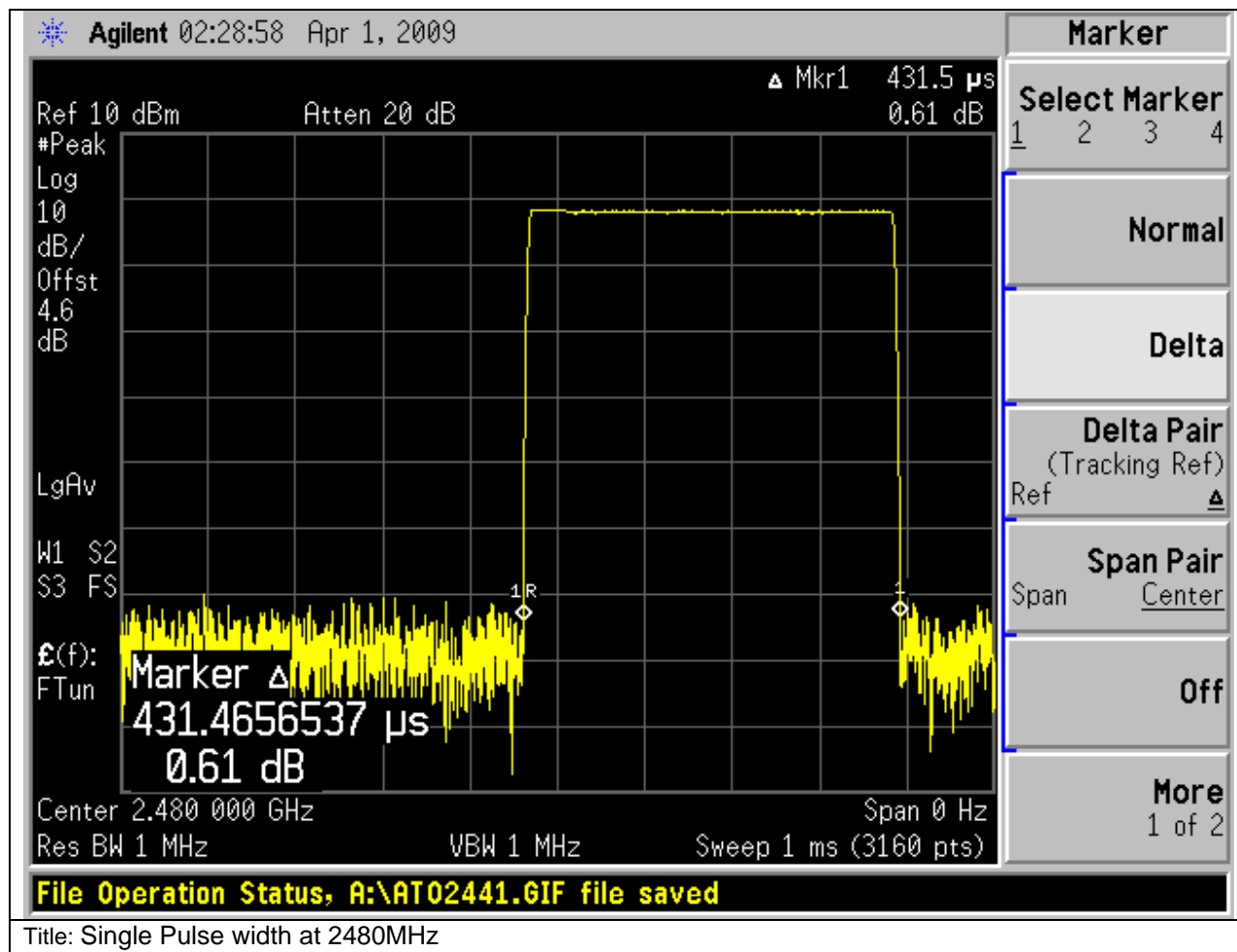
Single Pulse Width = 0.00043147s. Time of Occupancy = $320(0.00042292) = 0.14$ s

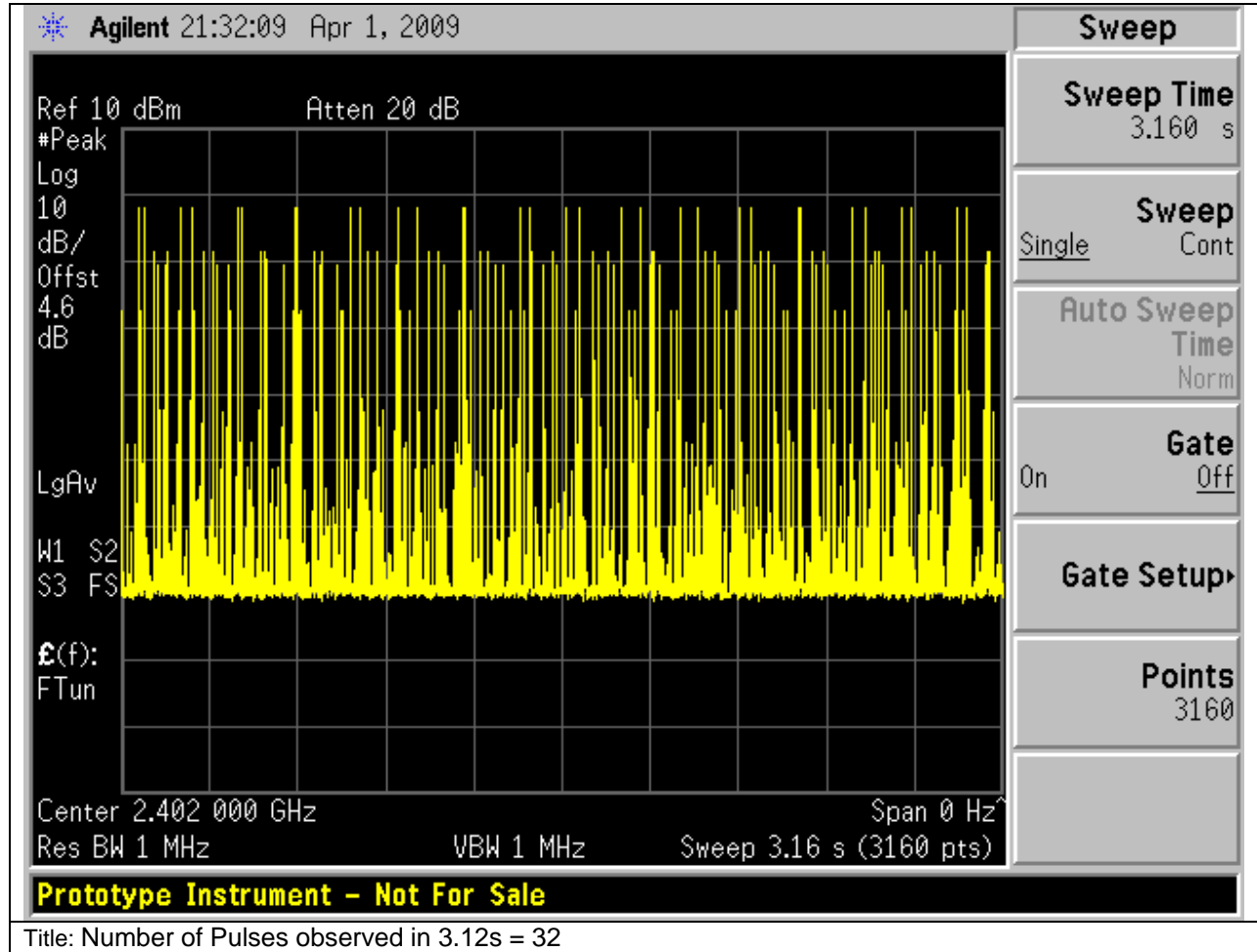
Single Pulse Width = 0.00043115s. Time of Occupancy = $320(0.00043115) = 0.14$ s

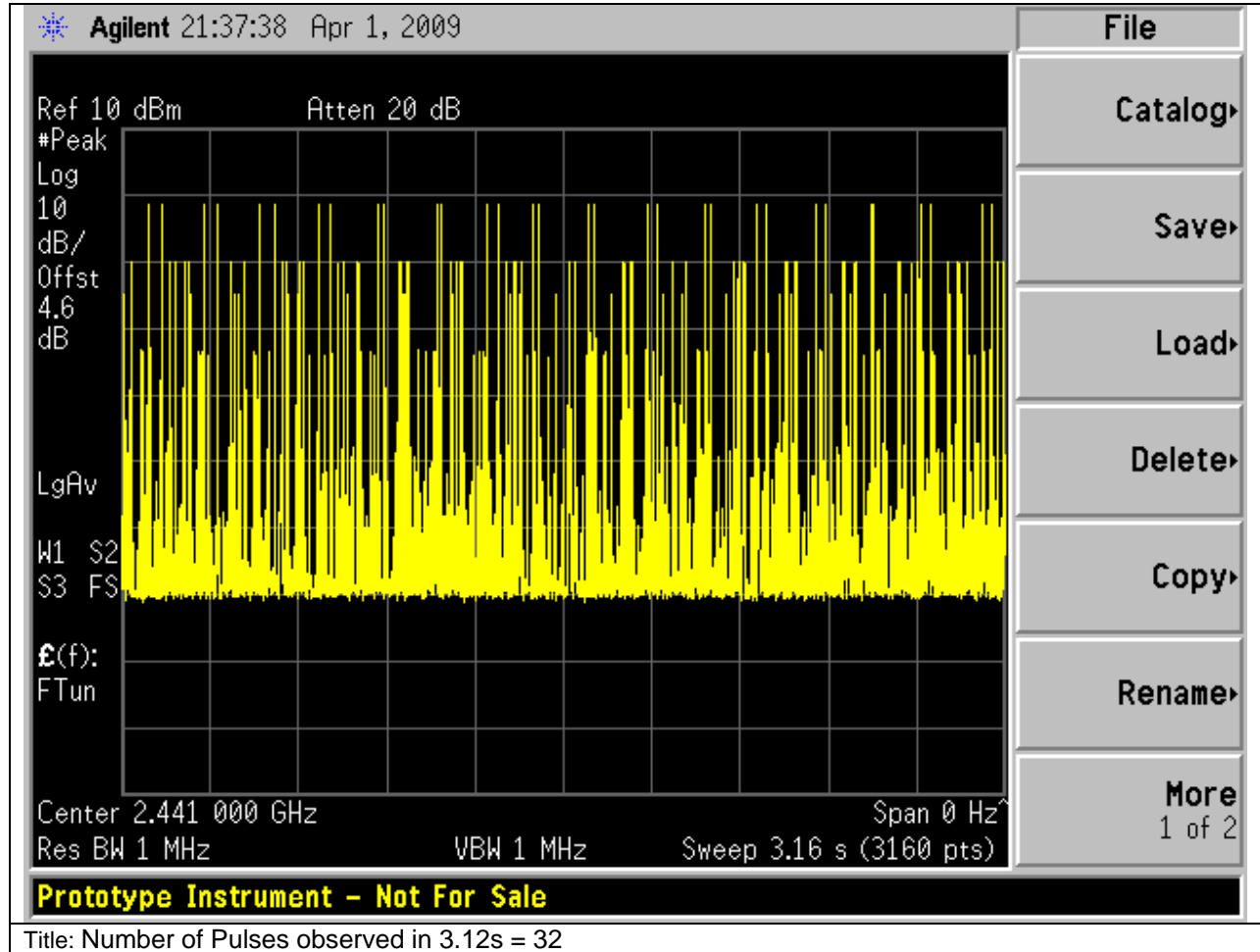
Frequency (MHz)	Time of Occupancy (sec)	Limit (sec)	Margin (sec)
2402	0.14	0.4	-0.27
2441	0.14	0.4	-0.26
2480	0.14	0.4	-0.27

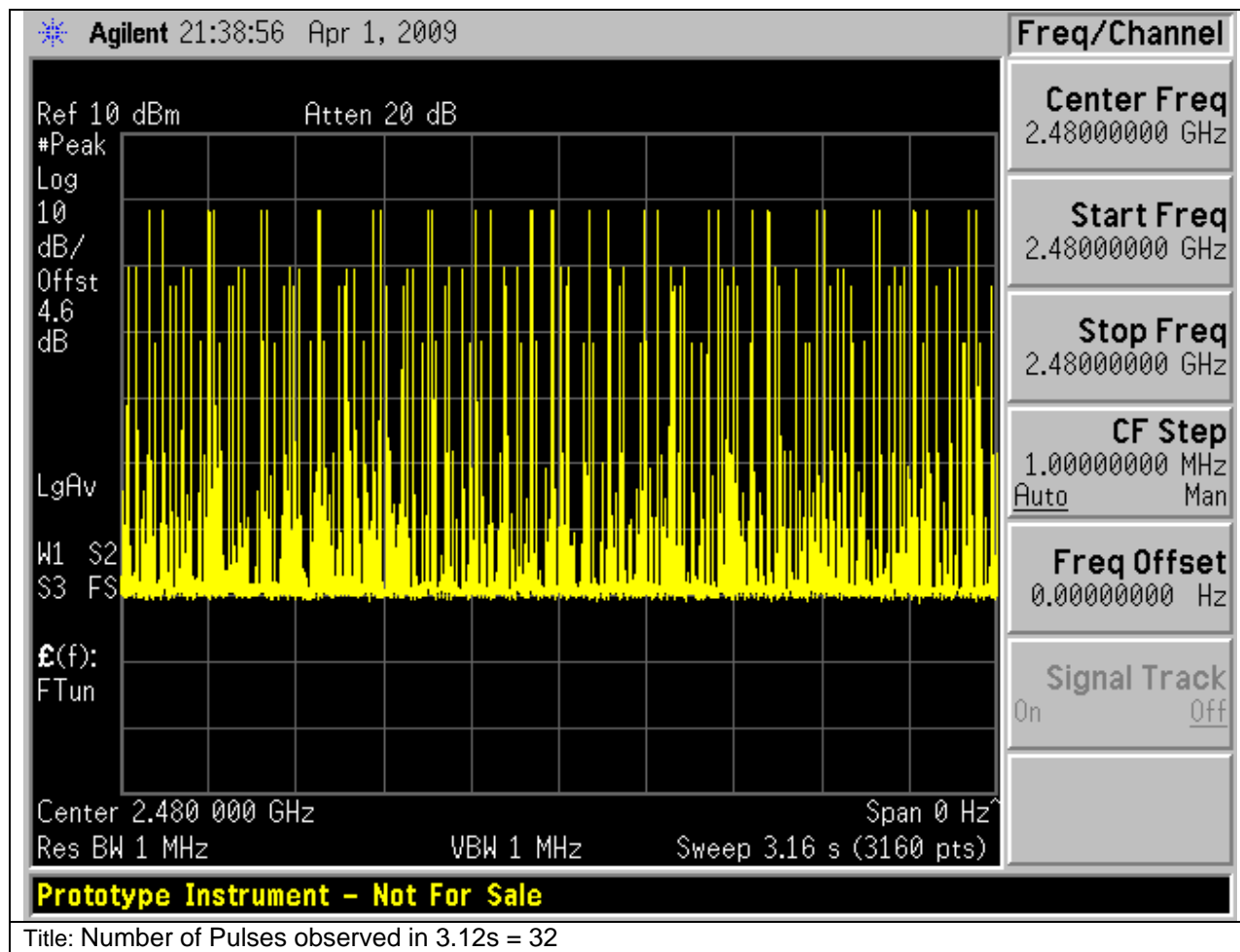














Conducted Spurious emissions

15.247 & RSS-210 A8.5:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum modulated device is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

Test Results

Test Number: 35630		Spec ID: 652		
Basic Standard	Applied to	Class	Freq Range	Test Details / Comments
Conducted Spurious Emissions	RF Ports	N/A	30MHz - xGHz	Also complies with RSS 210, LP0002, HKTA1039
Operating Mode	Mode : 1, Bluetooth Test Mode			
Power Input	110, 60Hz (+/-20%)			
Overall Result	Pass			
Comments	No further comments			
Deviation	There were no deviations from the specification			

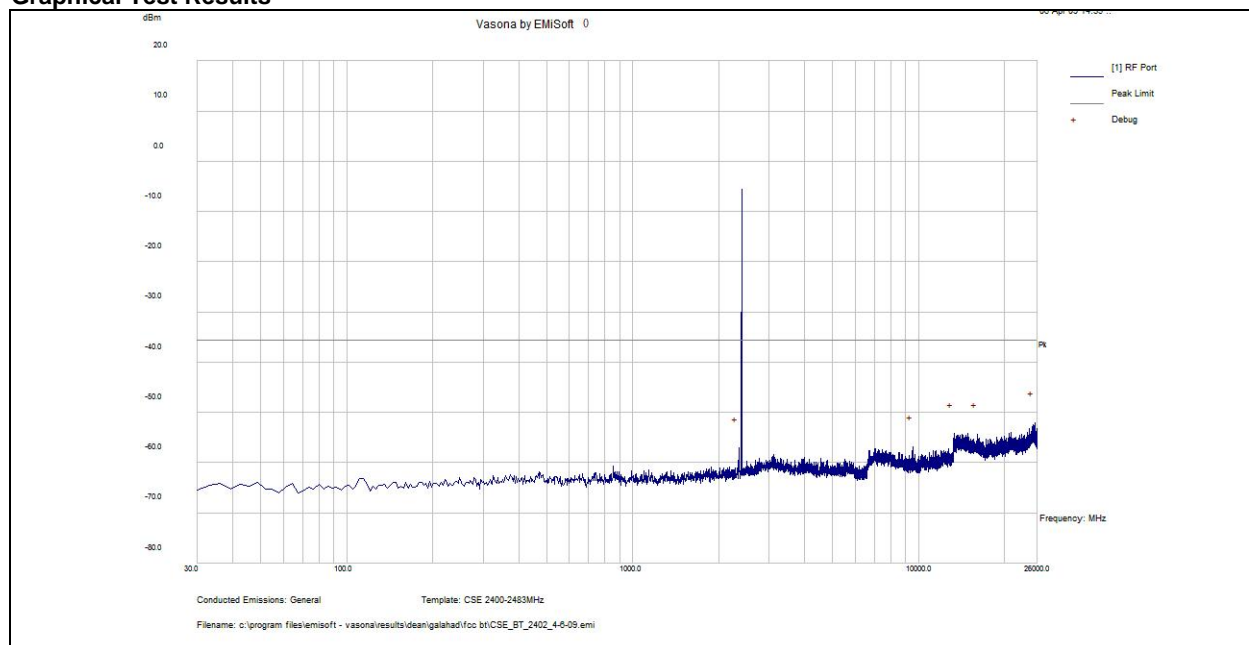
System Number	Description	Samples	System under test	Support equipment
1	Bluetooth Radio Test Sample	S01	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Subtest Number: 35630 - 1		Subtest Date: 16-Apr-2009	
Engineer	Dean Yarza		
Lab Information	Building B, Shield Room		
Subtest Results			
Line Under Test	[A] Antenna Port		
Transducer	Direct		
Subtest Result	Pass		
Highest Frequency	27000.0		
Lowest Frequency	30.0		
Comments on the above Test Results	No further comments		
Environmental Conditions:			
Temperature: within range of 54 to 95 F:	Yes		



Humidity: between 10 and 75%:	Yes		
Comments:			
Equipment used:			
Equipment No	Manufacturer	Model	Description
CIS002396	Omega	CT485B	Temp/Humidity Recorder
CIS025717	HP	11500E	Radio testing cable 3.5mm
CIS005972	HP	83712B	Synthesized CW Generator
CIS033988	Agilent	E4446A	PSA Spectrum Analyzer
CIS034974	Midwest Microwave	ATT-0640-20-29M-02	Attenuator, 20dB, DC-40GHz
CIS041987	Murata Electronics	MXGS83RK3000	Special Radio Test Adaptor Cable

Graphical Test Results



Title: Bluetooth Channel 2402MHz

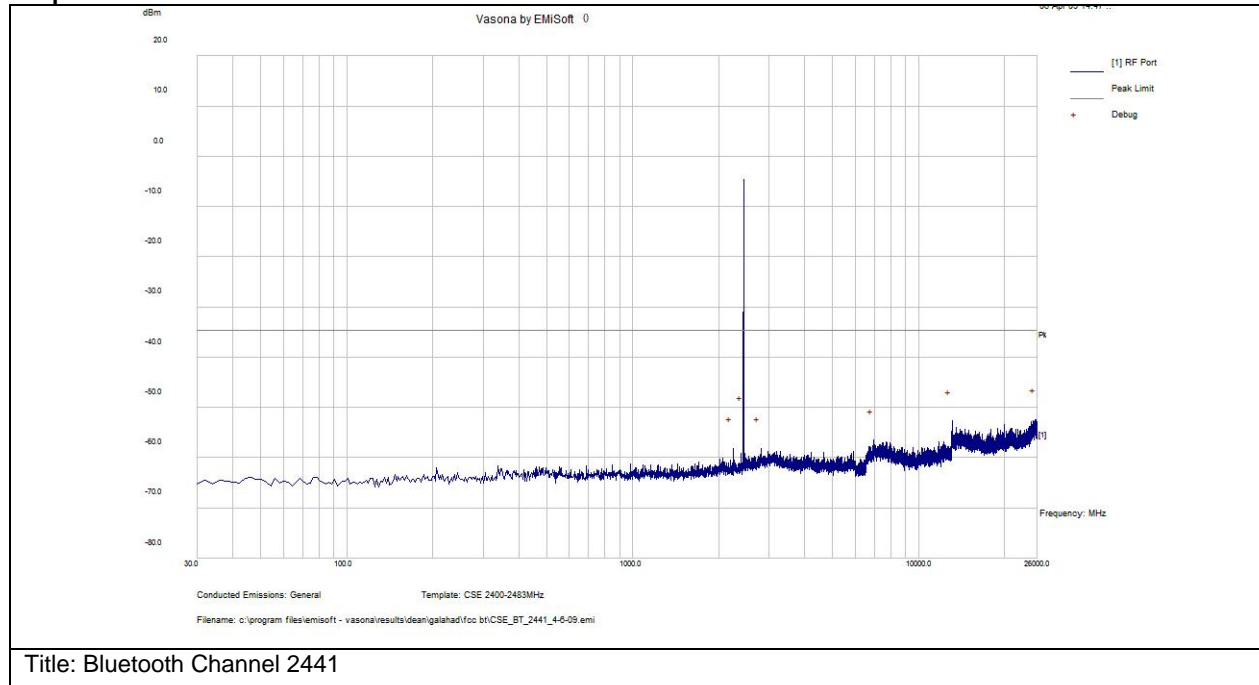
Test Results Table

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurement Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
25477.732	-73.4	1.1	20.3	-52	NA	RF	-35.7	-16.3	Pass	
27000	-74.1	0	20.4	-53.8	NA	RF	-35.7	-18.1	Pass	
13307.6	-75	0.7	20	-54.3	Peak(Scan)	RF	-35.7	-18.6	Pass	
16084.677	-75.2	0.8	20	-54.4	Peak(Scan)	RF	-35.7	-18.7	Pass	
9570.672	-77.4	0.6	19.9	-56.9	Peak(Scan)	RF	-35.7	-21.2	Pass	
2348.958	-78.1	1.1	19.8	-57.2	Peak(Scan)	RF	-35.7	-21.5	Pass	



Subtest Number: 35630 - 2		Subtest Date: 16-Apr-2009	
Engineer	Dean Yarza		
Lab Information	Building B, Shield Room		
Subtest Results			
Line Under Test	[A] Antenna Port		
Transducer	Direct		
Subtest Result	Pass		
Highest Frequency	26000.0		
Lowest Frequency	30.0		
Comments on the above Test Results	No further comments		
Environmental Conditions:			
Temperature: within range of 54 to 95 F:	Yes		
Humidity: between 10 and 75%:	Yes		

Graphical Test Results



Title: Bluetooth Channel 2441



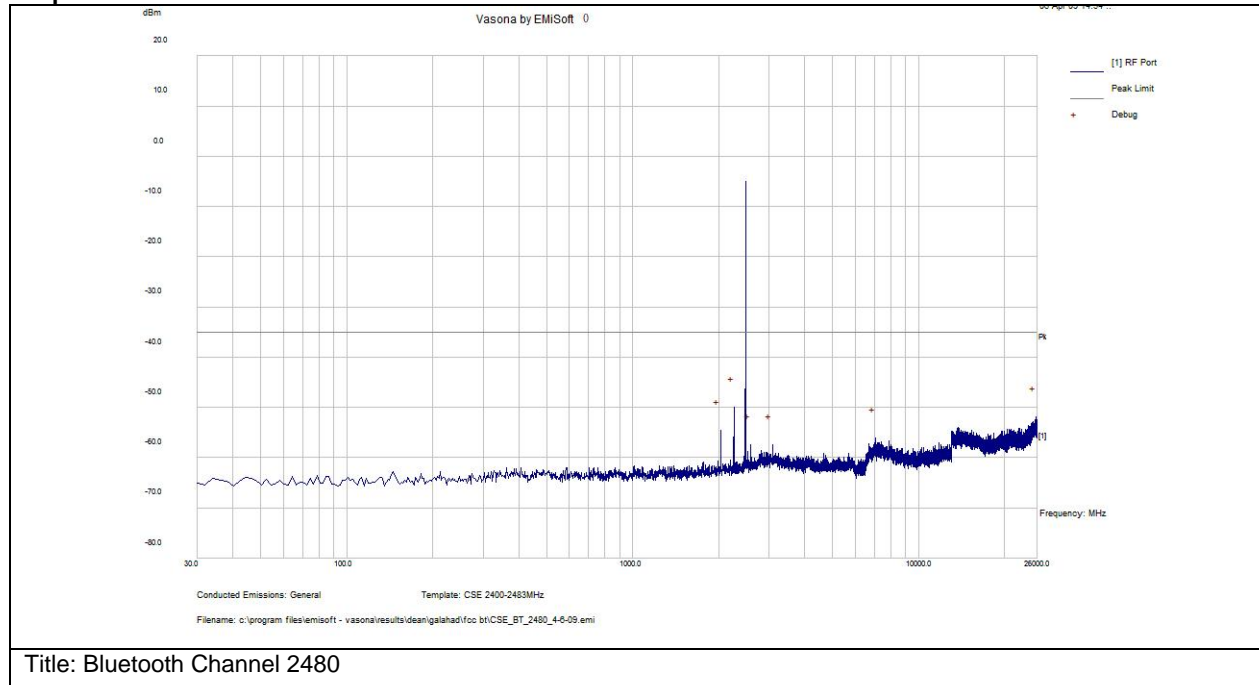
Test Results Table

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurement Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
25805.59	-73.8	1.1	20.3	-52.4	NA	RF	-34.7	-17.7	Pass	
13069.678	-73.4	0.7	19.9	-52.7	NA	RF	-34.7	-18	Pass	
2433.805	-74.8	1.1	19.8	-53.8	NA	RF	-34.7	-19.2	Pass	
6982.282	-76.9	0.5	19.8	-56.5	Peak(Scan)	RF	-34.7	-21.8	Pass	
2810.473	-79.2	1.2	19.8	-58.2	Peak(Scan)	RF	-34.7	-23.5	Pass	
2245.473	-79	1	19.8	-58.2	Peak(Scan)	RF	-34.7	-23.5	Pass	



Subtest Number: 35630 - 3		Subtest Date: 16-Apr-2009	
Engineer	Dean Yarza		
Lab Information	Building B, Shield Room		
Subtest Results			
Line Under Test	[A] Antenna Port		
Transducer	Direct		
Subtest Result	Pass		
Highest Frequency	26000.0		
Lowest Frequency	30.0		
Comments on the above Test Results	No further comments		
Environmental Conditions:			
Temperature: within range of 54 to 95 F:	Yes		
Humidity: between 10 and 75%:	Yes		

Graphical Test Results



Title: Bluetooth Channel 2480



Test Results Table

Frequency MHz	Raw dBm	Cable Loss	Factors dB	Level dBm	Measurement Type	Line	Limit dBm	Margin dB	Pass /Fail	Comments
2265.721	-70.8	1.1	19.8	-50	NA	RF	-35	-14.9	Pass	
25799.514	-73.4	1.1	20.3	-51.9	NA	RF	-35	-16.9	Pass	
2030.808	-75.4	1	19.8	-54.6	NA	RF	-35	-19.5	Pass	
7085.574	-76.5	0.5	19.8	-56.1	Peak(Scan)	RF	-35	-21.1	Pass	
3079.793	-78.5	1.2	19.8	-57.5	Peak(Scan)	RF	-35	-22.4	Pass	
2585.7	-78.4	1.1	19.8	-57.5	Peak(Scan)	RF	-35	-22.5	Pass	



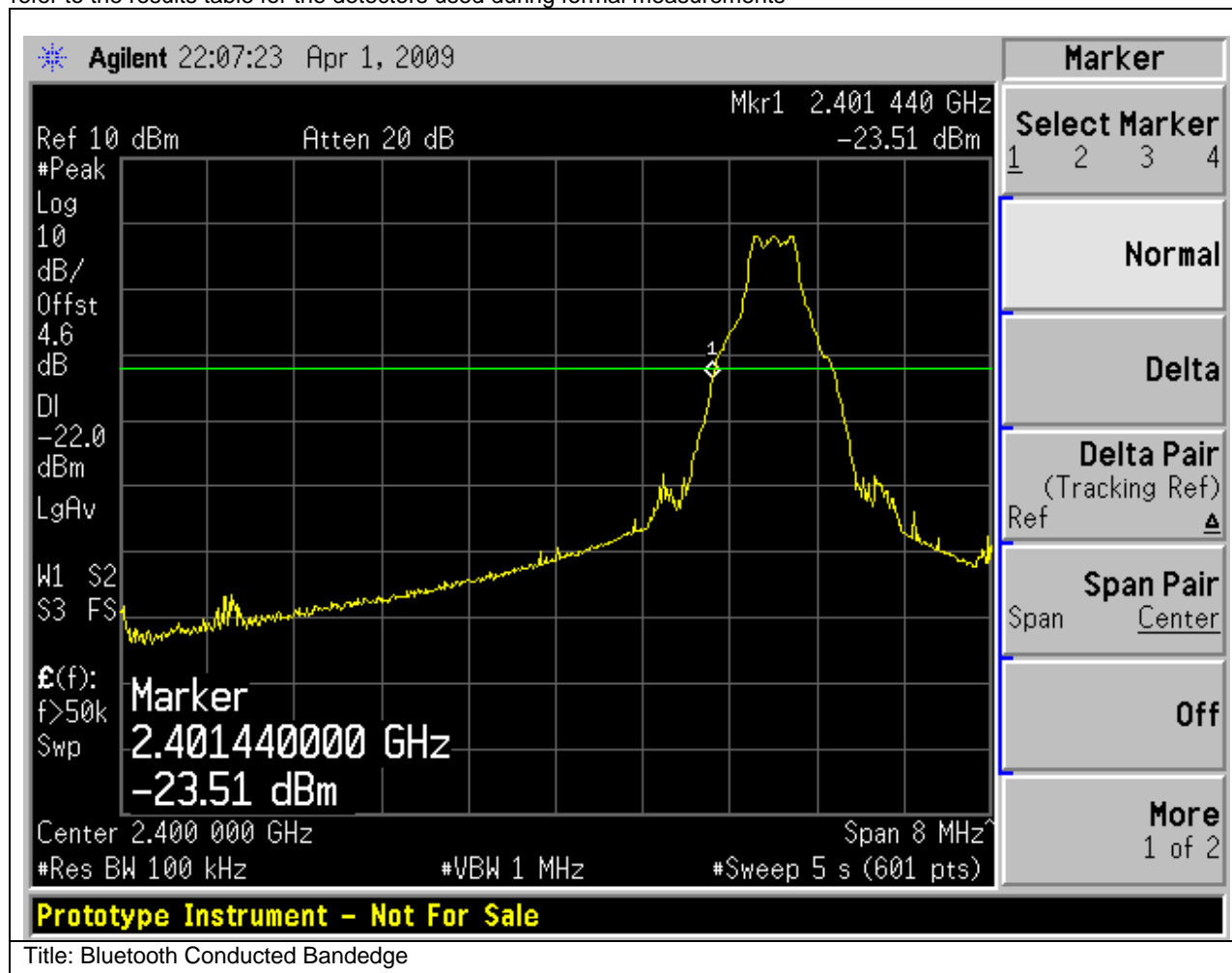
Conducted Band Edge Measurements

15.205 & RSS-210 sec2.7:

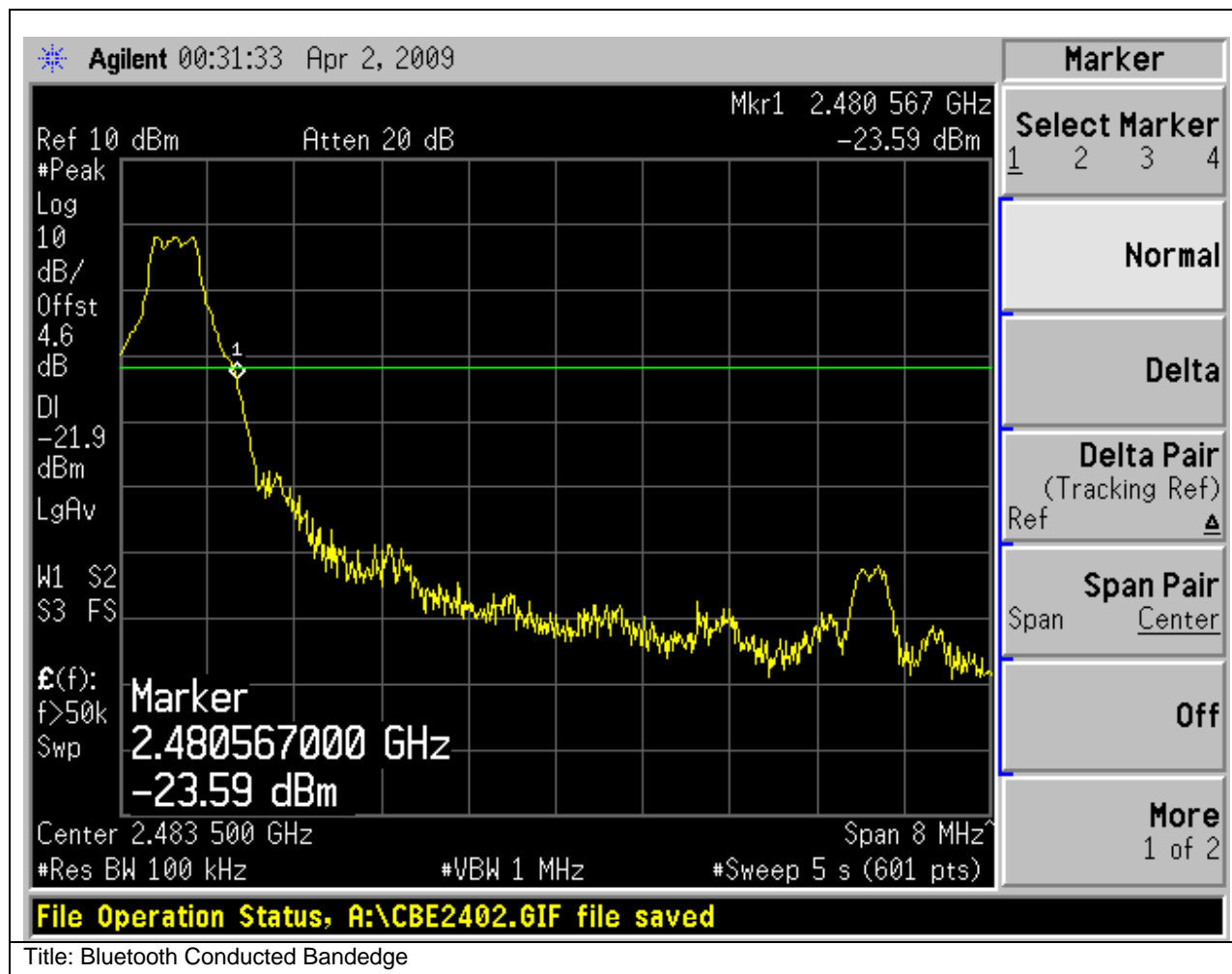
Conducted emissions which fall in the restricted bands, as defined in Sec. 15.205(a), must also comply with the radiated emission limits specified in Sec. 15.209(a).

Graphical Test Results

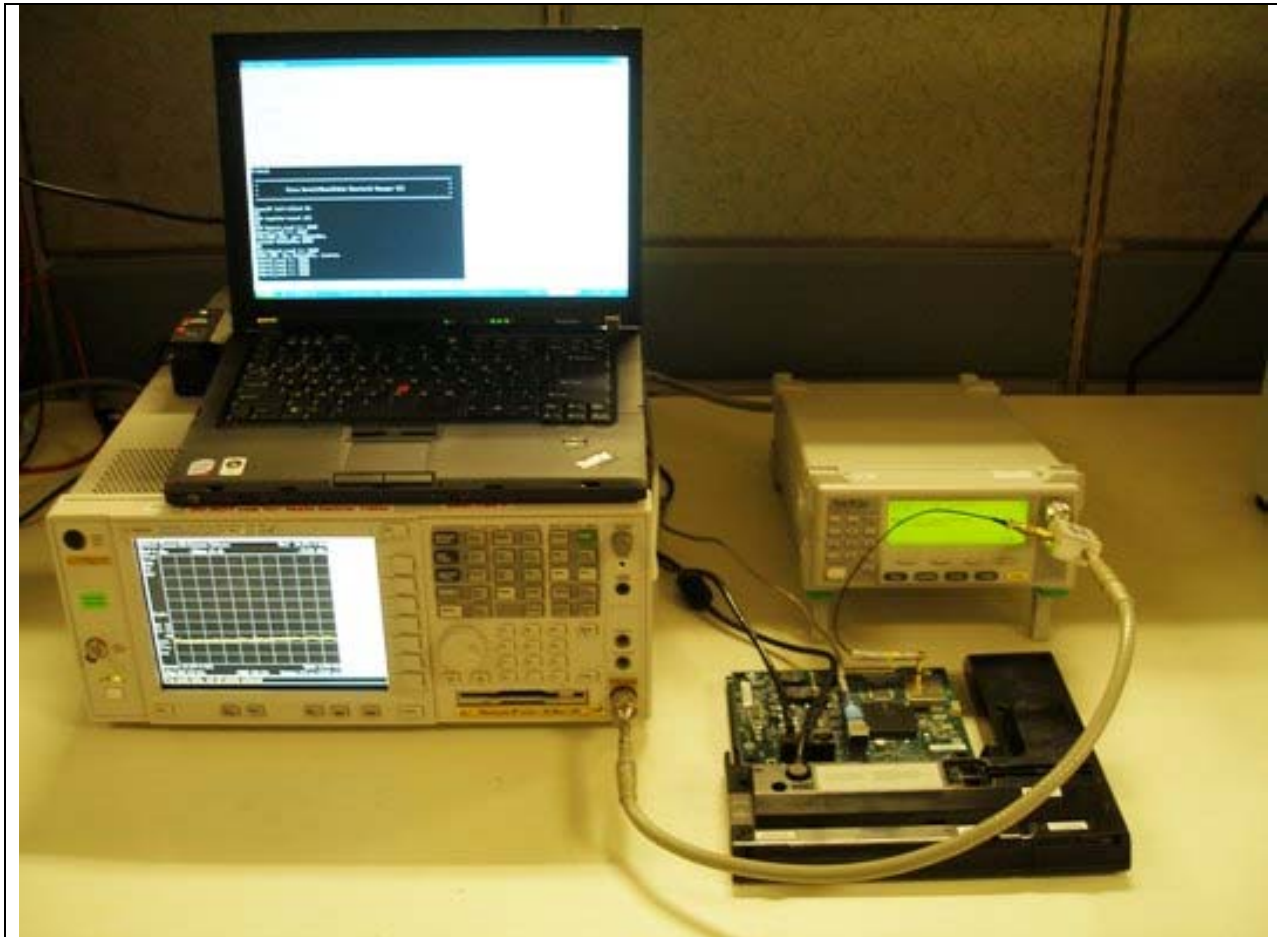
Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements



Title: Bluetooth Conducted Bandedge



Physical Test arrangement Photograph:



Title: Bluetooth Bench Setup



Radiated Spurious and Harmonics Emissions

15.205 & RSS-210 sec2.7:

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

Test Number: 35606		Spec ID: 647		
Basic Standard	Applied to	Class	Freq Range	Test Details / Comments
Radiated Spurious Emissions	Enclosure	B	30MHz - 26.5GHz	CFR47 Part 15.109CFR47 Part 15.247, RSS-210, LP0002 HKTA1039
Operating Mode	Mode : 1, Bluetooth Test Mode			
Power Input	110, 60Hz (+/-20%)			
Overall Result	Pass			
Comments	No further comments			
Deviation	There were no deviations from the specification			

System Number	Description	Samples	System under test	Support equipment
1	Bluetooth Radio Test Sample	S01	<input checked="" type="checkbox"/>	<input type="checkbox"/>

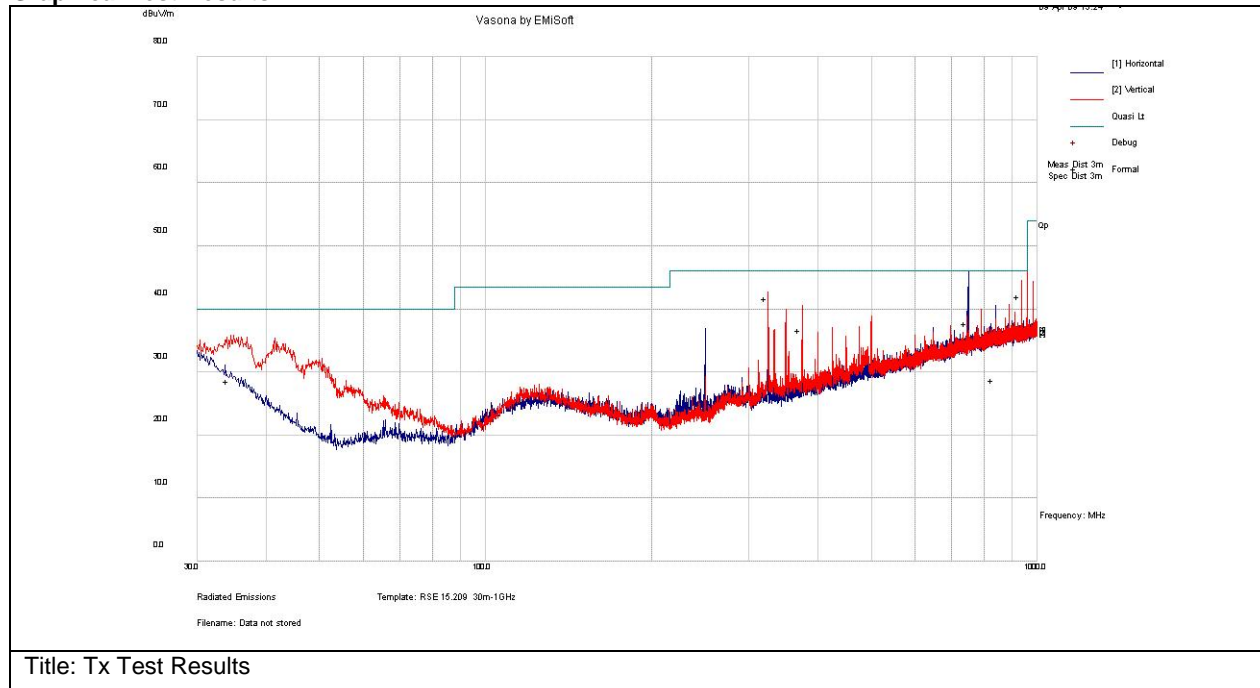
Subtest Number: 35606 - 1		Subtest Date: 14-Apr-2009		
Engineer	Dean Yarza			
Lab Information	Building I, 5m Anechoic			
Subtest Results				
Subtest Title	Radiated Spurious Emissions: 30-1GHz			
Subtest Result	Pass			
Highest Frequency	1000.0			
Lowest Frequency	30.0			
Comments on the above Test Results	n/a			
Environmental Conditions:				
Temperature: within range of 54 to 95 F:	Yes			
Humidity: between 10 and 75%:	Yes			
Comments:				
Equipment used:				
Equipment No	Manufacturer	Model	Description	
CIS001937	Cisco	NSA 5m Chamber	NSA 5m Chamber	



CIS002395	Omega	CT485B	Temp/Humidity Recorder
CIS002119	EMC Test Systems	3115	Double Ridged Guide Horn Antenna
CIS002383	Omega	CT485B	Temp/Humidity Recorder
CIS008022	Huber + Suhner	SF106A	1 meter Sucoflex cable
CIS008024	Huber + Suhner	SF106A	3 meter Sucoflex cable
CIS008103	Cisco	Unifield 5m Chamber	Unifield 5m Chamber
CIS005691	Miteq	NSP1800-25-S1	Broadband Preamplifier (1-18GHz)
CIS018314	EMC Test Systems	3115	Double Ridged Guide Horn Antenna
CIS024201	Rohde & Schwarz	FSEK30	Spectrum Analyzer 20Hz - 40GHz
CIS027235	York	CNE V	Comparison Noise Emitter
CIS028072	Cisco	1840	18-40GHz EMI Test Head/Verification Fixture
CIS030443	Micro-Coax	UFB311A-0-1560-520520	RF Coaxial Cable, to 18GHz, 156 In.
CIS031995	HP	83712B	Synthesized CW Signal Generator
CIS033602	Midwest Microwave	CSY-NMNM-80-273001	RF Coaxial Cable, 27ft. to 18GHz
CIS034074	Schaffner	RSG 2000	Reference Spectrum Generator, 1-18GHz
CIS037023	Panashield	5m Chamber	5m Anechoic Chamber
CIS037235	JFW	50CB-015	Control Box, GPIB
CIS039114	Sunol Sciences	JB1	Combination Antenna
CIS039130	Cisco	TH0118-PS	Power Supply for TH0118 1-18GHz Preamplifier
CIS040523	Rohde & Schwarz	ESCI	EMI Test Receiver
CIS041991	Cisco	TH0118	Mast Mount Preamplifier Array, 1-18GHz
CIS042000	Agilent	E4440A	Spectrum Analyzer



Graphical Test Results



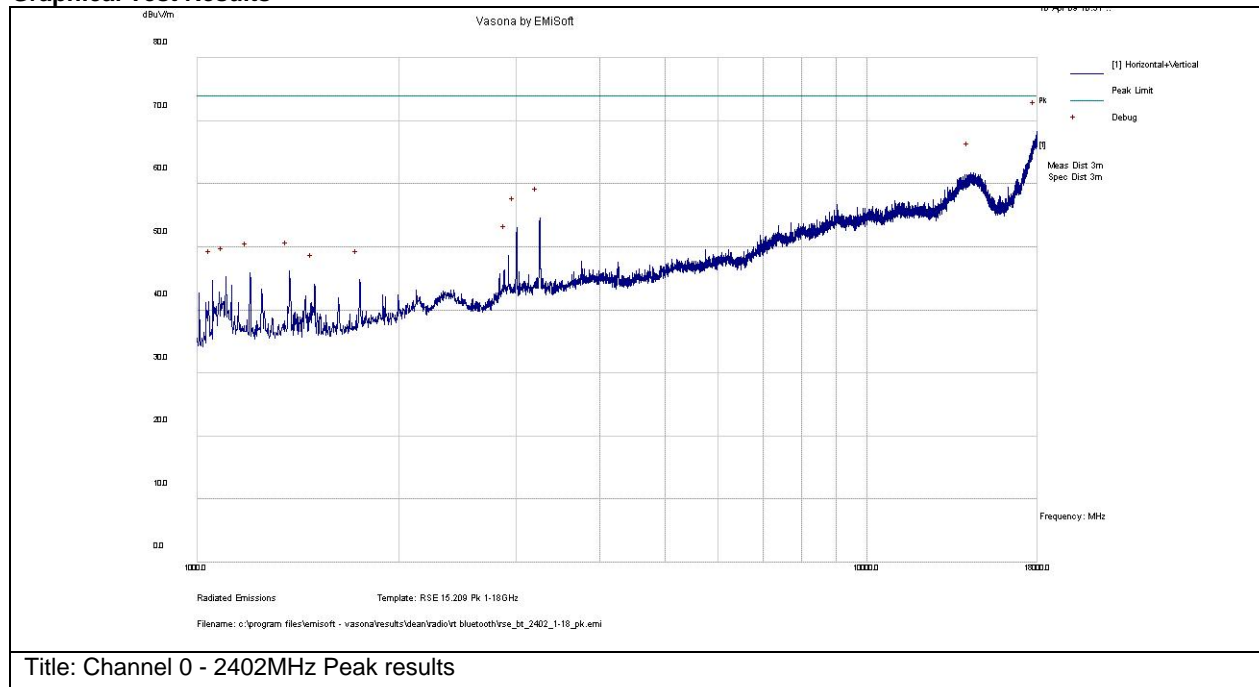
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
935.985	16.8	2.6	22.6	42	Qp	V	104	62	46	-4	Pass	
325.012	26.1	1.5	14	41.6	Qp	V	147	296	46	-4.4	Pass	
750.009	14.7	2.3	20.7	37.7	Qp	H	153	171	46	-8.3	Pass	
374.926	20	1.6	15	36.7	Qp	V	139	247	46	-9.3	Pass	
34.445	10.5	0.5	17.6	28.5	Qp	V	127	313	40	-11.5	Pass	
839.789	4.5	2.5	21.8	28.7	Qp	H	106	139	46	-17.3	Pass	



Subtest Number: 35606 - 2		Subtest Date: 14-Apr-2009	
Engineer	Dean Yarza		
Lab Information	Building I, 5m Anechoic		
Subtest Results			
Subtest Title	Radiated Spurious Emissions: 1-18GHz		
Subtest Result	Pass		
Highest Frequency	18000.0		
Lowest Frequency	1000.0		
Comments on the above Test Results	No further comments		
Environmental Conditions:			
Temperature: within range of 54 to 95 F:	Yes		
Humidity: between 10 and 75%:	Yes		

Graphical Test Results





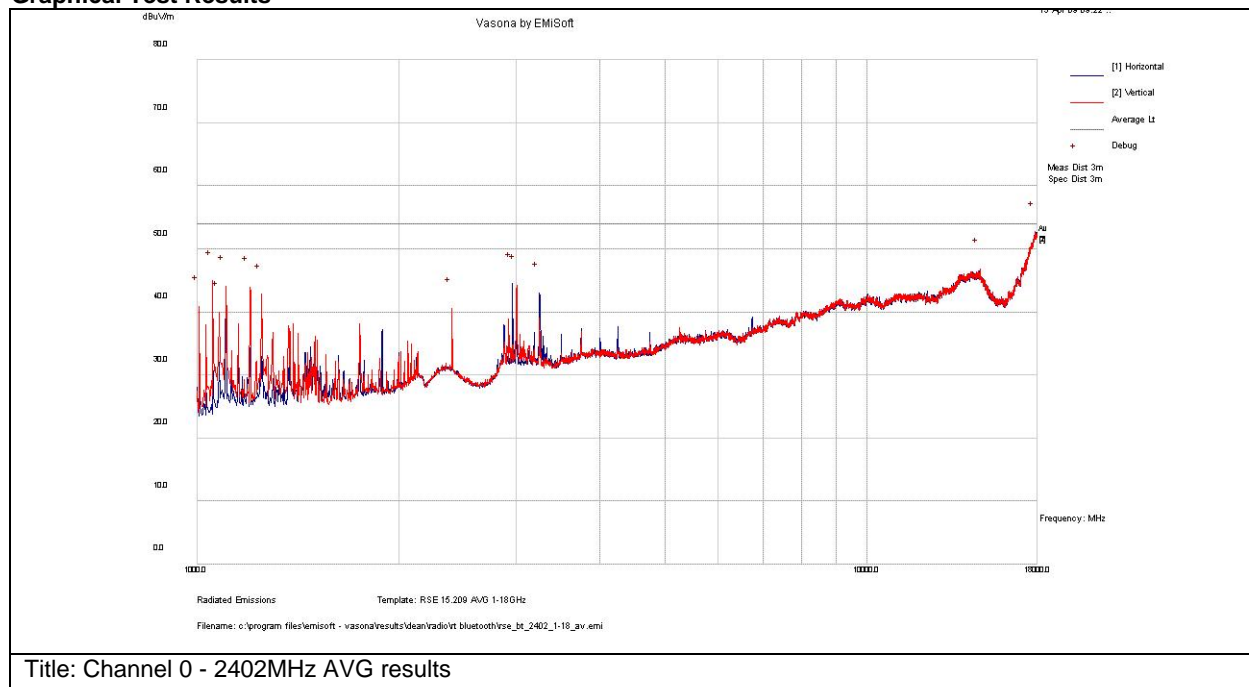
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
17992.046	43.4	13.1	11.9	68.4	NA	H	125	0	74	-5.6	Pass	
14314.722	43.9	11.4	6.5	61.8	NA	H	100	0	74	-12.2	Pass	
3250.936	53	5.7	-4.2	54.6	NA	H	100	0	74	-19.4	Pass	
3001.716	51.9	5.8	-4.7	53.1	NA	H	100	0	74	-20.9	Pass	
2916.875	47.5	6.4	-5.2	48.7	NA	H	100	0	74	-25.3	Pass	
1373.83	50.3	3.7	-7.8	46.1	NA	V	100	0	74	-27.9	Pass	



Subtest Number: 35606 - 3		Subtest Date: 14-Apr-2009	
Engineer	Dean Yarza		
Lab Information	Building I, 5m Anechoic		
Subtest Results			
Subtest Title	Radiated Spurious Emissions: 1-18GHz		
Subtest Result	Pass		
Highest Frequency	18000.0		
Lowest Frequency	1000.0		
Comments on the above Test Results	No further comments		
Environmental Conditions:			
Temperature: within range of 54 to 95 F:	Yes		
Humidity: between 10 and 75%:	Yes		

Graphical Test Results





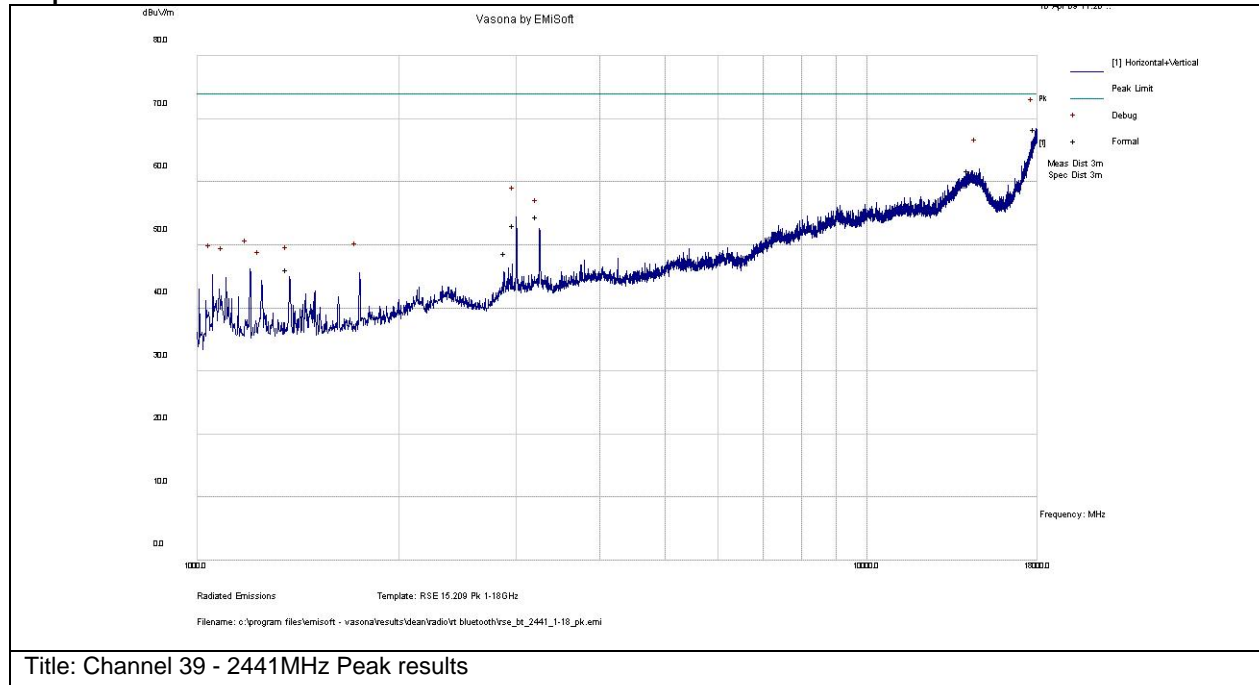
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
17884.503	26.8	13	11.6	51.4	Av	V	115	183	54	-2.6	Pass	Noise Floor
1056.073	49.9	3.2	-8.9	44.1	Av	V	115	12	54	-9.9	Pass	
1104.012	49.2	3.3	-8.4	44	Av	V	117	176	54	-10	Pass	
3000.719	37.1	5.8	-4.7	38.2	Av	H	112	189	54	-15.8	Pass	
3001.219	36.5	5.8	-4.7	37.7	Av	H	115	183	54	-16.3	Pass	
1199.928	38.9	3.5	-8.2	34.2	Av	V	114	208	54	-19.8	Pass	



Subtest Number: 35606 - 4		Subtest Date: 14-Apr-2009	
Engineer	Dean Yarza		
Lab Information	Building I, 5m Anechoic		
Subtest Results			
Subtest Title	Radiated Spurious Emissions: 1-18GHz		
Subtest Result	Pass		
Highest Frequency	18000.0		
Lowest Frequency	1000.0		
Comments on the above Test Results	No further comments		
Environmental Conditions:			
Temperature: within range of 54 to 95 F:	Yes		
Humidity: between 10 and 75%:	Yes		

Graphical Test Results





Test Results Table

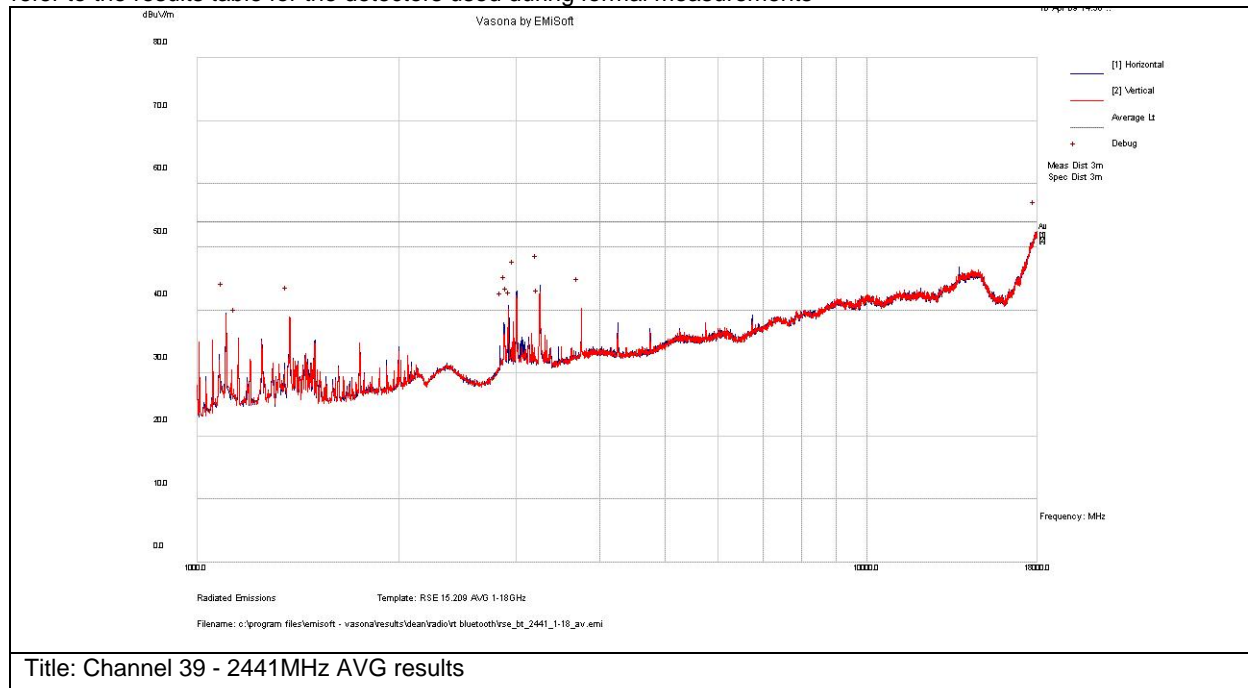
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
17904.554	43.8	13	11.7	68.5	NA	H	100	0	74	-5.5	Pass	
14725.671	44.9	11.6	5.5	62	NA	H	100	0	74	-12	Pass	
2999.064	53.3	5.8	-4.7	54.4	NA	H	100	0	74	-19.6	Pass	
3248.284	51	5.7	-4.2	52.6	NA	H	125	0	74	-21.4	Pass	
1198.846	50.8	3.5	-8.2	46.1	NA	V	100	0	74	-27.9	Pass	
1747.661	48.3	4.4	-7.1	45.6	NA	V	125	0	74	-28.4	Pass	



Subtest Number: 35606 - 5		Subtest Date: 14-Apr-2009	
Engineer	Dean Yarza		
Lab Information	Building I, 5m Anechoic		
Subtest Results			
Subtest Title	Radiated Spurious Emissions: 1-18GHz		
Subtest Result	Pass		
Highest Frequency	18000.0		
Lowest Frequency	1000.0		
Comments on the above Test Results	No further comments		
Environmental Conditions:			
Temperature: within range of 54 to 95 F:	Yes		
Humidity: between 10 and 75%:	Yes		

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements





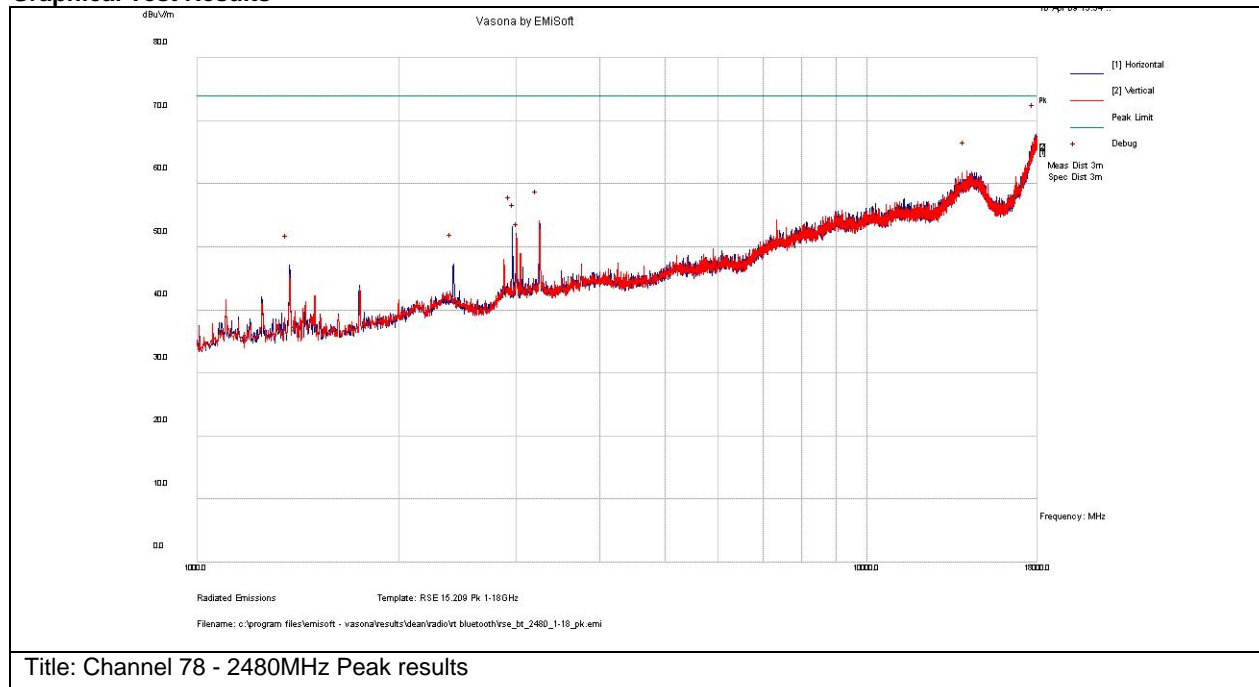
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
1104.052	49.5	3.3	-8.4	44.3	Av	V	112	187	54	-9.7	Pass	
15896.533	27.3	12	1.6	40.9	Av	H	99	-1	54	-13.1	Pass	Noise Floor
3000.087	36	5.8	-4.7	37.2	Av	H	120	186	54	-16.8	Pass	
3250.31	33.6	5.7	-4.2	35.1	Av	H	114	212	54	-18.9	Pass	
3749.795	28.1	5.8	-3.3	30.6	Av	V	99	202	54	-23.4	Pass	
2916.198	26.7	6.4	-5.2	28	Av	H	99	224	54	-26	Pass	



Subtest Number: 35606 - 6		Subtest Date: 14-Apr-2009	
Engineer	Dean Yarza		
Lab Information	Building I, 5m Anechoic		
Subtest Results			
Subtest Title	Radiated Spurious Emissions: 1-18GHz		
Subtest Result	Pass		
Highest Frequency	18000.0		
Lowest Frequency	1000.0		
Comments on the above Test Results	No further comments		
Environmental Conditions:			
Temperature: within range of 54 to 95 F:	Yes		
Humidity: between 10 and 75%:	Yes		

Graphical Test Results





Test Results Table

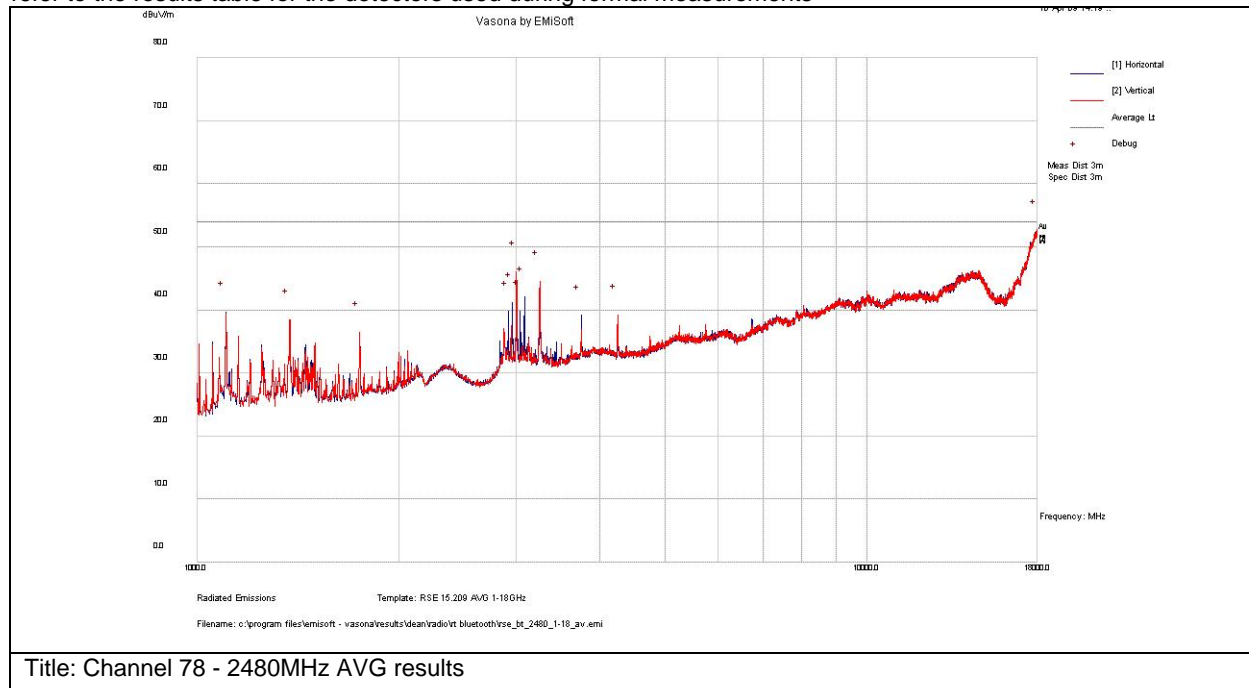
Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
17944.323	43	13	11.8	67.8	NA	H	125	0	74	-6.2	Pass	
14123.83	44.5	11.1	6.4	62	NA	V	100	0	74	-12	Pass	
3248.284	52.6	5.7	-4.2	54.1	NA	V	125	0	74	-19.9	Pass	
2959.295	52.2	6	-4.9	53.2	NA	H	100	0	74	-20.8	Pass	
2999.064	50.9	5.8	-4.7	52.1	NA	H	100	0	74	-21.9	Pass	
3038.833	47.8	5.8	-4.6	49	NA	V	100	0	74	-25	Pass	



Subtest Number: 35606 - 7		Subtest Date: 14-Apr-2009
Engineer	Dean Yarza	
Lab Information	Building I, 5m Anechoic	
Subtest Results		
Subtest Title	Radiated Spurious Emissions: 1-18GHz	
Subtest Result	Pass	
Highest Frequency	18000.0	
Lowest Frequency	1000.0	
Comments on the above Test Results	No further comments	
Environmental Conditions:		
Temperature: within range of 54 to 95 F:	Yes	
Humidity: between 10 and 75%:	Yes	

Graphical Test Results

Note that the data displayed on the plots detailed in this appendix were measured using a 'Peak Detector'. Please refer to the results table for the detectors used during formal measurements





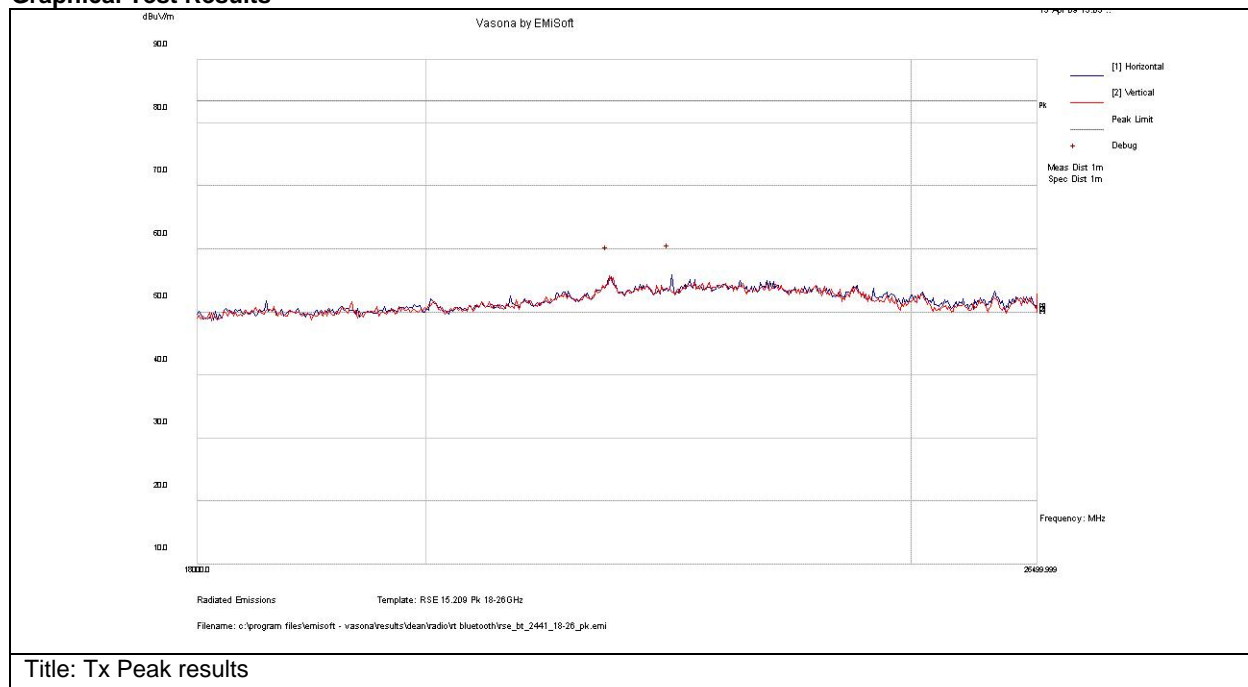
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
17983.328	26.1	13.1	11.9	51	Av	H	99	360	54	-3	Pass	Noise Floor
3000.169	36.6	5.8	-4.7	37.7	Av	H	122	196	54	-16.3	Pass	
3000.176	36.6	5.8	-4.7	37.7	Av	H	122	196	54	-16.3	Pass	
2999.935	36	5.8	-4.7	37.2	Av	V	116	175	54	-16.8	Pass	
3000.122	35.8	5.8	-4.7	37	Av	V	137	173	54	-17	Pass	
3249.344	30.5	5.7	-4.2	32	Av	V	137	200	54	-22	Pass	



Subtest Number: 35606 - 8		Subtest Date: 14-Apr-2009	
Engineer	Dean Yarza		
Lab Information	Building I, 5m Anechoic		
Subtest Results			
Subtest Title	Radiated Spurious Emissions: 18-26.5GHz		
Subtest Result	Pass		
Highest Frequency	26499.999		
Lowest Frequency	18000.0		
Comments on the above Test Results	No further comments		
Environmental Conditions:			
Temperature: within range of 54 to 95 F:	Yes		
Humidity: between 10 and 75%:	Yes		

Graphical Test Results



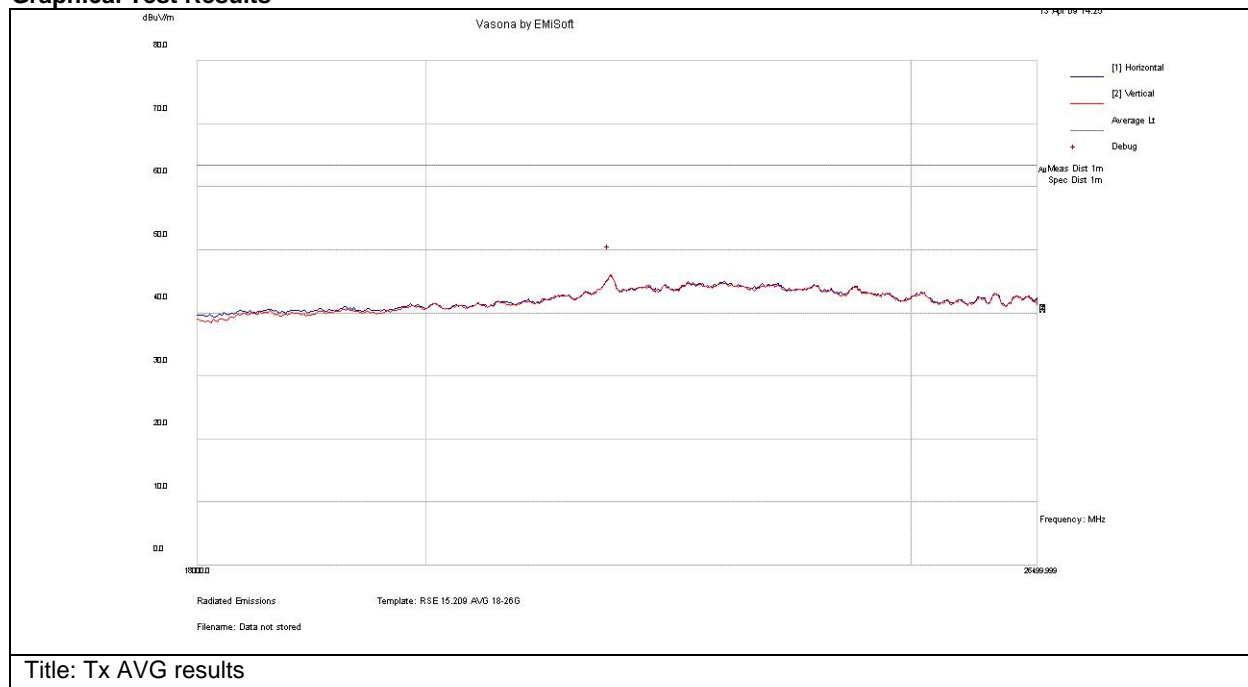
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
21764.126	38.2	0	17.4	55.7	Peak(Scan)	V	101	-1	83.5	-27.8	Pass	
22393.944	38.7	0	17.2	55.9	Peak(Scan)	H	101	-1	83.5	-27.6	Pass	



Subtest Number: 35606 - 9		Subtest Date: 14-Apr-2009
Engineer	Dean Yarza	
Lab Information	Building I, 5m Anechoic	
Subtest Results		
Subtest Title	Radiated Spurious Emissions: 18-26.5GHz	
Subtest Result	Pass	
Highest Frequency	26499.999	
Lowest Frequency	18000.0	
Comments on the above Test Results	No further comments	
Environmental Conditions:		
Temperature: within range of 54 to 95 F:	Yes	
Humidity: between 10 and 75%:	Yes	

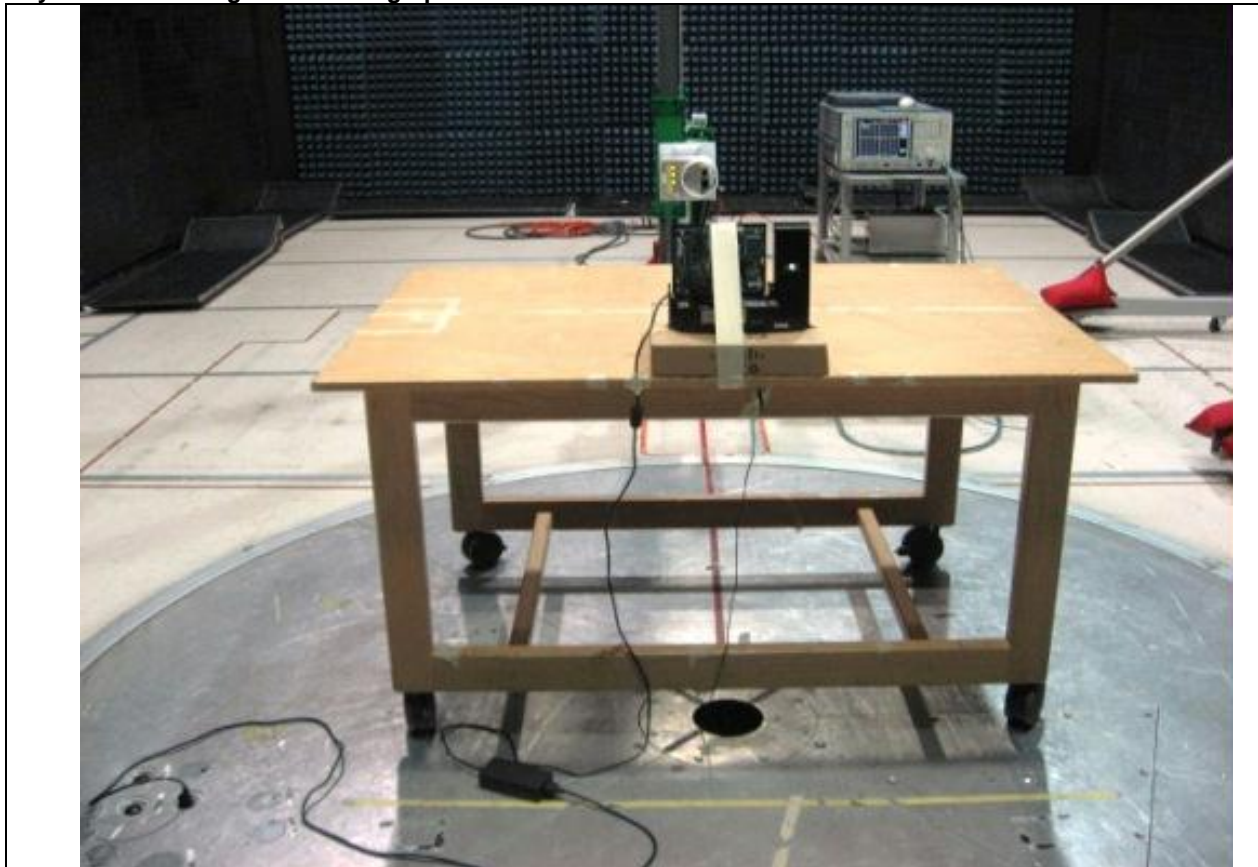
Graphical Test Results



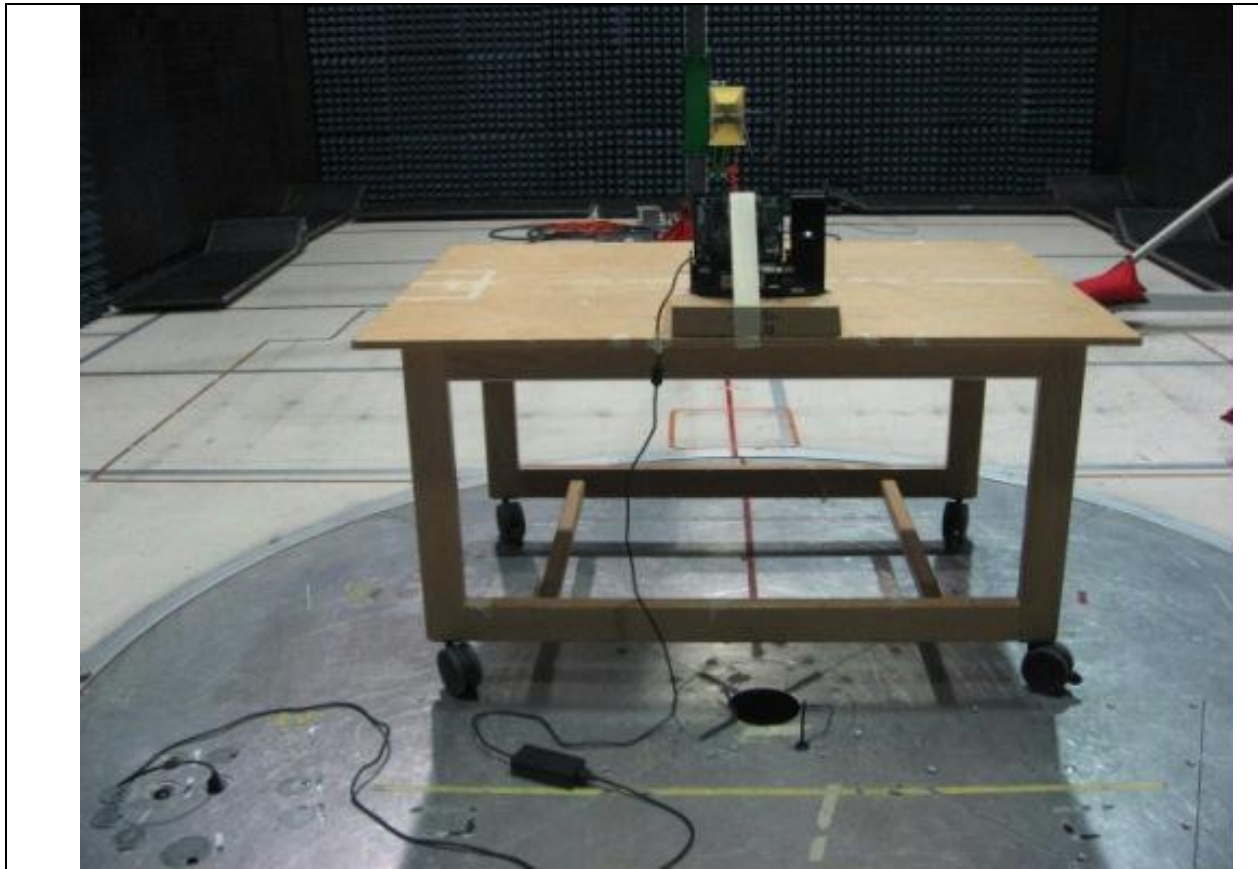
Test Results Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
21780.753	33.5	0	17.4	50.9	Av	H	101	-1	63.5	-12.6	Pass	

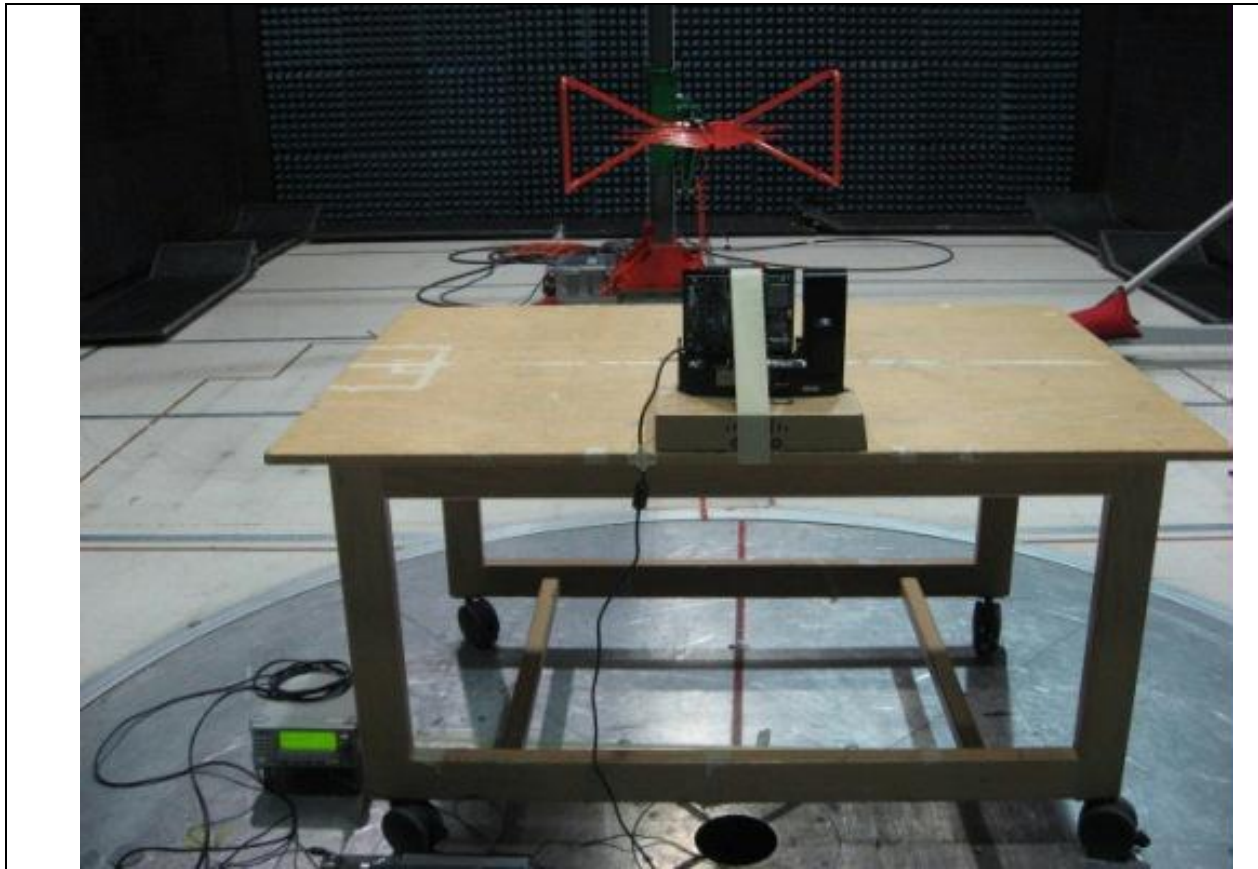
Physical Test arrangement Photograph:



Title: Radiated Spurious test configuration: 18-26.5GHz



Title: Radiated Spurious test configuration: 1-18GHz



Title: Radiated Spurious test configuration: 30-1GHz



Appendix B: Abbreviation Key and Definitions

The following table defines abbreviations used within this test report.

Abbreviation	Description	Abbreviation	Description
EMC	Electro Magnetic Compatibility	°F	Degrees Fahrenheit
EMI	Electro Magnetic Interference	°C	Degrees Celsius
EUT	Equipment Under Test	Temp	Temperature
ITE	Information Technology Equipment	S/N	Serial Number
TAP	Test Assessment Schedule	Qty	Quantity
ESD	Electro Static Discharge	emf	Electromotive force
EFT	Electric Fast Transient	RMS	Root mean square
EDCS	Engineering Document Control System	Qp	Quasi Peak
Config	Configuration	Av	Average
CIS#	Cisco Number (unique identification number for Cisco test equipment)	Pk	Peak
Cal	Calibration	kHz	Kilohertz (1×10^3)
EN	European Norm	MHz	MegaHertz (1×10^6)
IEC	International Electro technical Commission	GHz	Gigahertz (1×10^9)
CISPR	International Special Committee on Radio Interference	H	Horizontal
CDN	Coupling/Decoupling Network	V	Vertical
LISN	Line Impedance Stabilization Network	dB	decibel
PE	Protective Earth	V	Volt
GND	Ground	kV	Kilovolt (1×10^3)
L1	Line 1	μ V	Microvolt (1×10^{-6})
L2	Line2	A	Amp
L3	Line 3	μ A	Micro Amp (1×10^{-6})
DC	Direct Current	mS	Milli Second (1×10^{-3})
RAW	Uncorrected measurement value, as indicated by the measuring device	μ S	Micro Second (1×10^{-6})
RF	Radio Frequency	μ S	Micro Second (1×10^{-6})
SLCE	Signal Line Conducted Emissions	m	Meter
Meas dist	Measurement distance	Spec dist	Specification distance
N/A or NA	Not Applicable	SL	Signal Line (or Telecom Line)
P	Power Line	L	Live Line
N	Neutral Line	R	Return
S	Supply	AC	Alternating Current



Appendix C: Test Equipment Used to perform the test

Equip#	Manufacturer/ Model	Description	Last Cal	Next Due	Test Number(s)
001937	Cisco/ NSA 5m Chamber	NSA 5m Chamber	06-DEC-08	06-DEC-09	[35606]
002119	EMC Test Systems/ 3115	Double Ridged Guide Horn Antenna	03-JUN-08	03-JUN-09	[35606]
002383	Omega/ CT485B	Temp/Humidity Recorder	31-JUL-08	31-JUL-09	[35606]
002395	Omega/ CT485B	Temp/Humidity Recorder	11-JUL-08	11-JUL-09	[35606]
002396	Omega/ CT485B	Temp/Humidity Recorder	27-MAY-08	27-MAY-09	[35630]
005691	Miteq/ NSP1800-25-S1	Broadband Preamplifier (1- 18GHz)	09-OCT-08	09-OCT-09	[35606]
005972	HP/ 83712B	Synthesized CW Generator	29-JAN-09	29-JAN-10	[35630]
008022	Huber + Suhner/ SF106A	1 meter Sucoflex cable	03-DEC-08	03-DEC-09	[35606]
008024	Huber + Suhner/ SF106A	3 meter Sucoflex cable	11-NOV-08	11-NOV-09	[35606]
008103	Cisco/ Unifield 5m Chamber	Unifield 5m Chamber	17-DEC-08	17-DEC-09	[35606]
018314	EMC Test Systems/ 3115	Double Ridged Guide Horn Antenna	Cal Not Required	N/A	[35606]
024201	Rohde & Schwarz/ FSEK30	Spectrum Analyzer 20Hz - 40GHz	21-NOV-08	21-NOV-09	[35606]
025717	HP/ 11500E	Radio testing cable 3.5mm	30-APR-08	30-APR-09	[35630]
027235	York/ CNE V	Comparison Noise Emitter	Cal Not Required	N/A	[35606]
028072	Cisco/ 1840	18-40GHz EMI Test Head/Verification Fixture	07-OCT-08	07-OCT-09	[35606]
030443	Micro-Coax/ UFB311A-0-1560- 520520	RF Coaxial Cable, to 18GHz, 156 In.	11-NOV-08	11-NOV-09	[35606]
031995	HP/ 83712B	Synthesized CW Signal Generator	17-DEC-08	17-DEC-09	[35606]
033602	Midwest Microwave/ CSY-NMNM-80- 273001	RF Coaxial Cable, 27ft. to 18GHz	11-NOV-08	11-NOV-09	[35606]
033988	Agilent/ E4446A	PSA Spectrum Analyzer	12-NOV-08	12-NOV-09	[35630]
034074	Schaffner/ RSG 2000	Reference Spectrum Generator, 1-18GHz	Cal Not Required	N/A	[35606]
034974	Midwest Microwave/ ATT-0640-20-29M- 02	Attenuator, 20dB, DC-40GHz	15-MAY-08	15-MAY-09	[35630]
035613	Micro-Tronics/ BRM50702-02	Notch Filter, SB:2.4-2.5GHz, to 18GHz	12-JUN-08	12-JUN-09	[35606]
037023	Panashield/ 5m Chamber	5m Anechoic Chamber	Cal Not Required	N/A	[35606]



037235	JFW/ 50CB-015	Control Box, GPIB	Cal Not Required	N/A	[35606]
039114	Sunol Sciences/ JB1	Combination Antenna	29-DEC-08	29-DEC-09	[35606]
039130	Cisco/ TH0118-PS	Power Supply for TH0118 1- 18GHz Preamplifier	19-MAY-08	19-MAY-09	[35606]
040523	Rohde & Schwarz/ ESCI	EMI Test Receiver	26-JUN-08	26-JUN-09	[35606]
041987	Murata Electronics/ MXGS83RK3000	Special Radio Test Adaptor Cable	10-MAY-08	10-MAY-09	[35630]
041991	Cisco/ TH0118	Mast Mount Preamplifier Array, 1-18GHz	19-MAY-08	19-MAY-09	[35606]
042000	Agilent/ E4440A	Spectrum Analyzer	04-JUN-08	04-JUN-09	[35606]

Appendix D: Test Procedures

Measurements were made in accordance with

- FCC docket #:DA 00-0705,
- ET docket 96-8, KDB Publication No. 558074
- measurement method of spurious emission tolerance to the International Telecommunication Union (ITU) Recommendation SM329.
- ANSI PC63.10
- ANSI C63.4