

Spectrum Technology

IX270-BT2022

June 28, 2006

Report No. SPTE0017

Report Prepared By



www.nwemc.com

1-888-EMI-CERT

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EMC Test Report



22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test
Issue Date: June 28, 2006
Spectrum Technology
Model: IX270-BT2022

Emissions				
Test Description	Specification	Test Method	Pass	Fail
AC Powerline Conducted Emissions	FCC 15.207:2006	ANSI C63.4:2003	☒	☐
AC Powerline Conducted Emissions	FCC 15.107 Class B:2006	ANSI C63.4:2003	☒	☐
Spurious Radiated Emissions	FCC 15.247:2006	ANSI C63.4:2003	☒	☐
Spurious Radiated Emissions	FCC 15.109 Class B:2006	ANSI C63.4:2003	☒	☐

Modifications made to the product

See the Modifications section of this report

Test Facility

The measurement facility used to collect the data is located at:

Northwest EMC, Inc.
22975 NW Evergreen Parkway, Suite 400; Hillsboro, OR 97124
Phone: (503) 844-4066
Fax: 844-3826

This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada.

Approved By:

Greg Kiemel, Director of Engineering

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America.

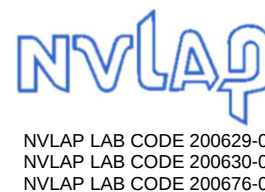
Product compliance is the responsibility of the client, therefore the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested, the specific description is noted in each of the individual sections of the test report supporting this certificate of test.

Revision Number	Description	Date	Page Number
00	None		

FCC: Accredited by NVLAP for performance of FCC radio, digital, and ISM device testing. Our Open Area Test Sites, certification chambers, and conducted measurement facilities have been fully described in reports filed with the FCC and accepted by the FCC in letters maintained in our files. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by the FCC as a Telecommunications Certification Body (TCB). This allows Northwest EMC to certify transmitters to FCC specifications in accordance with 47 CFR 2.960 and 2.962.



NVLAP: Northwest EMC, Inc. is accredited under the United States Department of Commerce, National Institute of Standards and Technology, and National Voluntary Laboratory Accreditation Program for satisfactory compliance with the requirements of ISO/IEC 17025 for Testing Laboratories. The NVLAP accreditation encompasses Electromagnetic Compatibility Testing in accordance with the European Union EMC Directive 89/336/EEC, ANSI C63.4, MIL-STD 461E, DO-160D and SAE J1113. Additionally, Northwest EMC is accredited by NVLAP to perform radio testing in accordance with the European Union R&TTE Directive 1999/5/EEC, the requirements of FCC, and the RSS radio standards for Industry Canada.



Industry Canada: Accredited by NVLAP for performance of Industry Canada RSS and ICES testing. Our Open Area Test Sites and certification chambers comply with RSS 212, Issue 1 (Provisional) and have been filed with Industry Canada and accepted. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by NIST and recognized by Industry Canada as a Certification Body (CB) per the APEC Mutual Recognition Arrangement (MRA). This allows Northwest EMC to certify transmitters to Industry Canada technical requirements.



CAB: Designated by NIST and validated by the European Commission as a Conformity Assessment Body (CAB) to conduct tests and approve products to the EMC directive and transmitters to the R&TTE directive, as described in the U.S. - EU Mutual Recognition Agreement.



TÜV Product Service: Included in TÜV Product Service Group's Listing of Recognized Laboratories. It qualifies in connection with the TÜV Certification after Recognition of Agent's Testing Program for the product categories and/or standards shown in TÜV's current Listing of CARAT Laboratories, available from TÜV. A certificate was issued to represent that this laboratory continues to meet TÜV's CARAT Program requirements. Certificate No. USA0401C.



TÜV Rheinland: Authorized to carryout EMC tests by order and under supervision of TÜV Rheinland. This authorization is based on "Conditions for EMC-Subcontractors" of November 1992.



NEMKO: Assessed and accredited by NEMKO (Norwegian testing and certification body) for European emissions and immunity testing. As a result of NEMKO's laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification (Authorization No. ELA 119).



Australia/New Zealand: The National Association of Testing Authorities (NATA), Australia has been appointed by the ACA as an accreditation body to accredit test laboratories and competent bodies for EMC standards. Accredited test reports or assessments by competent bodies must carry the NATA logo. Test reports made by an overseas laboratory that has been accredited for the relevant standards by an overseas accreditation body that has a Mutual Recognition Agreement (MRA) with NATA are also accepted as technical grounds for product conformity. The report should be endorsed with the respective logo of the accreditation body (NVLAP).



VCCI: Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. (Registration Numbers. - Hillsboro: C-1071, R-1025, and R-2318, Irvine: C-2094 and R-1943, Sultan: R-871, C-1784 and R-1761).



BSMI: Northwest EMC has been designated by NIST and validated by C-Taipei (BSMI) as a CAB to conduct tests as described in the APEC Mutual Recognition Agreement. License No.SL2-IN-E-1017.



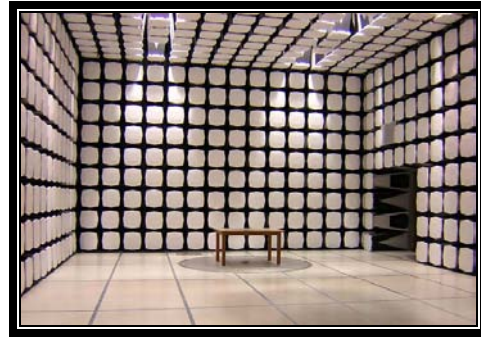
GOST: Northwest EMC, Inc. has been assessed and accredited by the Russian Certification bodies Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC, to perform EMC and Hygienic testing for Information Technology Products. As a result of their laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification



SCOPE

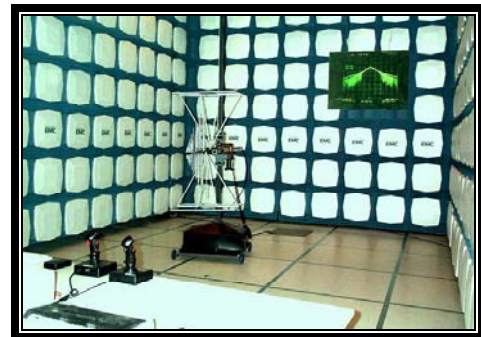
For details on the Scopes of our Accreditations, please visit:

<http://www.nwemc.com/scope.asp>



**California – Orange County Facility
Labs OC01 – OC13**

41 Tesla Ave. Irvine, CA 92618
(888) 364-2378 Fax: (503) 844-3826



**Oregon – Evergreen Facility
Labs EV01 – EV11**

22975 NW Evergreen Pkwy. Suite 400 Hillsboro, OR 97124
(503) 844-4066 Fax: (503) 844-3826



**Washington – Sultan Facility
Labs SU01 – SU07**

14128 339th Ave. SE Sultan, WA 98294
(888) 364-2378

Party Requesting the Test

Company Name:	Spectrum Technology
Address:	209 Dayton Street Suite #205
City, State, Zip:	Edmonds, WA 98020
Test Requested By:	Rod Munro
Model:	IX270-BT2022
First Date of Test:	6/21/2006
Last Date of Test:	6/23/2006
Receipt Date of Samples:	6/21/2006
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test**Functional Description of the EUT (Equipment Under Test):**

Bluetooth radio module installed in the Itronix Model Titan XR1

Testing Objective:

Demonstrate compliance with FCC 15.247 and FCC 15B requirements. The Bluetooth module was previously certified. This testing will be limited to radiated spurious emissions and AC Powerline conducted emissions testing in the new host configuration. The antenna port direct-connect data contained in the original certification report continues to be representative of the Bluetooth module in this new host configuration.

CONFIGURATION 1 SPTE0017

Software/Firmware Running during test	
Description	Version
CSR Bluetest	v

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
EUT (Bluetooth)	Itronix, Corp.	IX270-BT2022	Unknown

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Host IX270 Notebook PC	Itronix, Corp.	IX-270	None
AC Adapter	Delta Electronics	ADP-90SB BB	VCW0552024972
Mouse	Logitech	M-BE58	LZE02357693

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power	No	1.8m	No	AC Adapter	AC Mains
DC Lead	PA	1.8m	PA	AC Adapter	Host Notebook PC
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATION 3 SPTE0017

Software/Firmware Running during test	
Description	Version
CSR Bluetest	v

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
EUT (Bluetooth)	Itronix, Corp.	IX270-BT2022	Unknown

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Host IX270 Notebook PC	Itronix, Corp.	IX-270	None
AC Adapter	Delta Electronics	ADP-90SB BB	VCW0552024976
Internal Antenna 1	Well Green	22+600211+00R	None
Keyboard	Microsoft	E06401COMB	51061
USB Gamepad	Microsoft	X04-63237	00623744
Headphones	Sony	MDR-013	None
Microphone	Telex	700373-000	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power	No	1.8m	No	AC Adapter	AC Mains
DC Lead	PA	1.8m	PA	AC Adapter	Host Notebook PC
USB	Yes	1.0m	No	Host IX270 Notebook PC	CF Card Reader
Serial	Yes	1.0m	No	Host IX270 Notebook PC	Unterminated
Modem	Yes	1.0m	No	Host IX270 Notebook PC	Unterminated
VGA	Yes	1.0m	No	Host IX270 Notebook PC	Unterminated
USB	Yes	1.2m	No	Host IX270 Notebook PC	USB Mouse
Audio	No	1.3m	No	Host IX270 Notebook PC	Unterminated
Ethernet	No	1.8m	No	Host IX270 Notebook PC	Unterminated
USB	Yes	1.9m	No	Host IX270 Notebook PC	Unterminated
Audio	PA	1.0m	No	Microphone	Host IX270 Notebook PC
Audio	PA	1.0m	No	Headphones	Host IX270 Notebook PC
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

Equipment modifications					
Item	Date	Test	Modification	Note	Disposition of EUT
1	6/21/2006	AC Power Line Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	6/23/2006	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

SPURIOUS RADIATED EMISSIONS

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION

Transmit Bluetooth, high channel

Transmit Bluetooth, mid channel

Transmit Bluetooth, low channel

POWER SETTINGS INVESTIGATED

120VAC/60Hz

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26 GHz
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CLOCKS AND OSCILLATORS

Unknown

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
High Pass Filter	Micro-Tronics	HPM50111	HFO	4/4/2006	13
EV01 cables g,h,i			EVB	3/30/2006	13
EV01 cables c,g, h			EVA	3/30/2006	13
Pre-Amplifier	Miteq	AMF-4D-010100-24-10P	APW	8/2/2005	13
Pre-Amplifier	Miteq	AM-1616-1000	AOL	1/4/2006	13
Antenna, Horn	EMCO	3115	AHC	8/30/2005	12
Antenna, Biconilog	EMCO	3141	AXE	12/28/2005	24
Spectrum Analyzer	Agilent	E4446A	AAT	4/4/2006	12

MEASUREMENT BANDWIDTHS

	Frequency Range	Peak Data	Quasi-Peak Data	Average Data
	(MHz)	(kHz)	(kHz)	(kHz)
	0.01 - 0.15	1.0	0.2	0.2
	0.15 - 30.0	10.0	9.0	9.0
	30.0 - 1000	100.0	120.0	120.0
	Above 1000	1000.0	N/A	1000.0
Measurements were made using the bandwidths and detectors specified. No video filter was used.				

MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

TEST DESCRIPTION

The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and the EUT antenna in three orthogonal axis, and adjusting measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.4:2003). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

NORTHWEST

EMC

SPURIOUS RADIATED EMISSIONS

PSA 2006.05.30
EMI 2006.6.15

EUT: IX270-BT2022		Work Order: SPTE0017	
Serial Number: None		Date: 06/23/06	
Customer: Spectrum Technology		Temperature: 24	
Attendees: None		Humidity: 34%	
Project: None		Barometric Pres.: 30.23	
Tested by: Holly Ashkannejhad		Power: 120VAC/60Hz	
		Job Site: EV01	

TEST SPECIFICATIONS

FCC 15.247:2006
FCC 15.109 Class B:2006

Test Method
ANSI C63.4:2003
ANSI C63.4:2003

TEST PARAMETERS

Antenna Height(s) (m)1 - 4

Test Distance (m)3

COMMENTS

EUT OPERATING MODES

Transmit Bluetooth

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #2

Configuration #1

ResultsPass

NVLAP Lab Code 200630-0

SignatureHolly Ashkannejhad

80.0

70.0

60.0

50.0

40.0

30.0

20.0

10.0

0.0

18000.000

19000.000

20000.000

21000.000

22000.000

23000.000

24000.000

25000.000

26000.000

dBuV/m

MHz

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
19840.000	27.0	12.7	11.0	1.1	3.0	0.0	+High Horr	AV	0.0	39.7	54.0	-14.3	High channel, laptop screen horizontal
22320.000	25.8	13.1	19.0	1.1	3.0	0.0	+High Horr	AV	0.0	38.9	54.0	-15.1	High channel, laptop screen horizontal
22320.000	25.6	13.1	59.0	1.1	3.0	0.0	-High Horr	AV	0.0	38.7	54.0	-15.3	High channel, normal position
19520.000	26.8	11.9	13.0	1.1	3.0	0.0	+High Horr	AV	0.0	38.7	54.0	-15.3	Mid channel, laptop screen horizontal
19840.000	25.6	12.7	55.0	1.1	3.0	0.0	-High Horr	AV	0.0	38.3	54.0	-15.7	High channel, normal position
19520.000	26.4	11.9	159.0	1.1	3.0	0.0	-High Horr	AV	0.0	38.3	54.0	-15.7	Mid channel, normal position
19215.900	27.0	11.1	48.0	1.0	3.0	0.0	+High Horr	AV	0.0	38.1	54.0	-15.9	Low channel, laptop screen horizontal
19215.900	26.2	11.1	233.0	1.1	3.0	0.0	-High Horr	AV	0.0	37.3	54.0	-16.7	Low channel, normal position
19215.900	41.6	11.1	48.0	1.0	3.0	0.0	+High Horr	PK	0.0	52.7	74.0	-21.3	Low channel, laptop screen horizontal
19840.000	39.3	12.7	11.0	1.1	3.0	0.0	+High Horr	PK	0.0	52.0	74.0	-22.0	High channel, laptop screen horizontal
22320.000	38.2	13.1	19.0	1.1	3.0	0.0	+High Horr	PK	0.0	51.3	74.0	-22.7	High channel, laptop screen horizontal
19520.000	39.3	11.9	13.0	1.1	3.0	0.0	+High Horr	PK	0.0	51.2	74.0	-22.8	Mid channel, laptop screen horizontal
22320.000	38.1	13.1	59.0	1.1	3.0	0.0	-High Horr	PK	0.0	51.2	74.0	-22.8	High channel, normal position
19215.900	39.9	11.1	233.0	1.0	3.0	0.0	-High Horr	PK	0.0	51.0	74.0	-23.0	Low channel, normal position
19840.000	37.9	12.7	55.0	1.1	3.0	0.0	-High Horr	PK	0.0	50.6	74.0	-23.4	High channel, normal position
19520.000	37.3	11.9	159.0	1.1	3.0	0.0	-High Horr	PK	0.0	49.2	74.0	-24.8	Mid channel, normal position

NORTHWEST

EMC

SPURIOUS RADIATED EMISSIONS

PSA 2006.05.30
EMI 2006.6.15

EUT: IX270-BT2022				Work Order: SPT0017			
Serial Number: None				Date: 06/23/06			
Customer: Spectrum Technology				Temperature: 24			
Attendees: None				Humidity: 34%			
Project: None				Barometric Pres.: 30.23			
Tested by: Holly Ashkannejhad		Power: 120VAC/60Hz		Job Site: EV01			

TEST SPECIFICATIONS

FCC 15.247:2006
FCC 15.109 Class B:2006

Test Method
ANSI C63.4:2003
ANSI C63.4:2003

TEST PARAMETERS

Antenna Height(s) (m)1 - 4

Test Distance (m)3

COMMENTS

EUT OPERATING MODES

Transmit Bluetooth

DEVIATIONS FROM TEST STANDARD

No deviations.

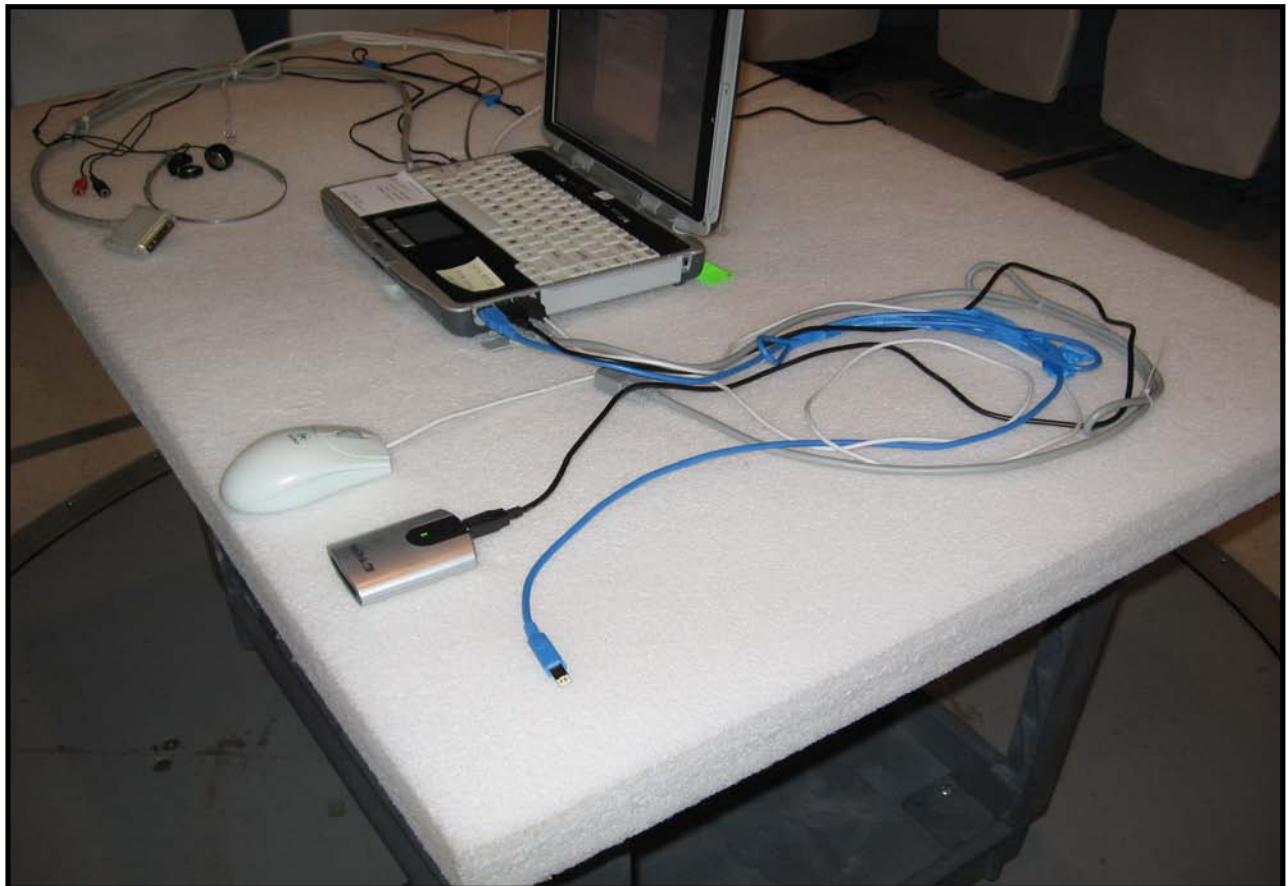
Run #	3	NVLAP Lab Code 200630-0	Signature <i>Holly Ashkannejhad</i>
Configuration #	1		
Results	Pass		

The graph displays the measured spurious emissions in dBuV/m across a frequency range from 2400.000 to 2500.000 MHz. The y-axis ranges from 0.0 to 80.0 dBuV/m. A blue horizontal line at approximately 54.0 dBuV/m represents the specification limit. Green dots represent individual test results, which are clustered between 2483.5 MHz and 2488.5 MHz, with values ranging from approximately 45.0 to 61.0 dBuV/m.

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
2483.537	25.8	0.5	187.0	3.0	3.0	20.0	H-Horn	AV	0.0	46.3	54.0	-7.7	High channel, Laptop in normal operat
2483.823	25.6	0.5	360.0	1.6	3.0	20.0	H-Horn	AV	0.0	46.1	54.0	-7.9	High channel, Laptop screen horizonta
2483.500	25.4	0.5	322.0	1.6	3.0	20.0	H-Horn	AV	0.0	45.9	54.0	-8.1	High channel, Laptop on side
2485.700	25.0	0.5	80.0	1.2	3.0	20.0	V-Horn	AV	0.0	45.5	54.0	-8.5	High channel, Laptop screen horizonta
2485.877	25.0	0.5	25.0	1.2	3.0	20.0	V-Horn	AV	0.0	45.5	54.0	-8.5	High channel, Laptop in normal operat
2483.670	24.4	0.5	192.0	1.1	3.0	20.0	V-Horn	AV	0.0	44.9	54.0	-9.1	High channel, Laptop on side
2484.900	40.3	0.5	360.0	1.6	3.0	20.0	H-Horn	PK	0.0	60.8	74.0	-13.2	High channel, Laptop screen horizonta
2483.577	38.2	0.5	187.0	3.0	3.0	20.0	H-Horn	PK	0.0	58.7	74.0	-15.3	High channel, Laptop in normal operat
2483.553	37.5	0.5	322.0	1.6	3.0	20.0	H-Horn	PK	0.0	58.0	74.0	-16.0	High channel, Laptop on side
2483.690	37.1	0.5	192.0	1.1	3.0	20.0	V-Horn	PK	0.0	57.6	74.0	-16.4	High channel, Laptop on side
2484.517	36.7	0.5	25.0	1.2	3.0	20.0	V-Horn	PK	0.0	57.2	74.0	-16.8	High channel, Laptop in normal operat
2485.267	36.7	0.5	80.0	1.2	3.0	20.0	V-Horn	PK	0.0	57.2	74.0	-16.8	High channel, Laptop screen horizonta

Spurious Radiated Emissions





Spurious Radiated Emissions



Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

MODES OF OPERATION

Bluetooth high channel
Bluetooth mid channel
Bluetooth low channel

POWER SETTINGS INVESTIGATED

120VAC/60Hz

SAMPLE CALCULATIONS

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
High Pass Filter	T.T.E.	7766	HFG	12/19/2005	13
Attenuator	Coaxicom	66702 2910-20	RBR	5/3/2006	13
LISN	Solar	9252-50-R-24-BNC	LIP	12/13/2005	13
Spectrum Analyzer	Hewlett-Packard	8568B	AAI	12/21/2005	13
Spectrum Analyzer Display	Hewlett Packard	85662A	AAID	12/21/2005	13
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQD	12/21/2005	13

MEASUREMENT BANDWIDTHS

	Frequency Range	Peak Data	Quasi-Peak Data	Average Data
	(MHz)	(kHz)	(kHz)	(kHz)
	0.01 - 0.15	1.0	0.2	0.2
	0.15 - 30.0	10.0	9.0	9.0
	30.0 - 1000	100.0	120.0	120.0
	Above 1000	1000.0	N/A	1000.0

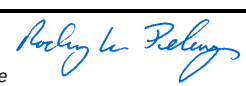
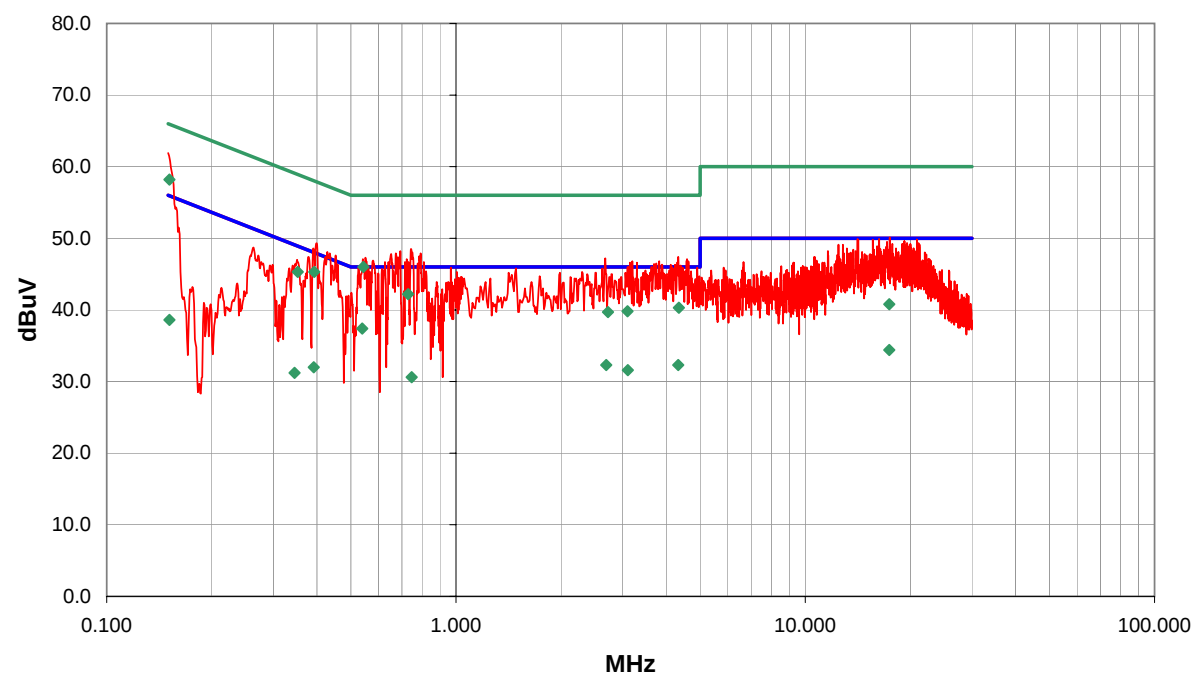
Measurements were made using the bandwidths and detectors specified. No video filter was used.

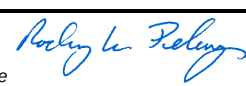
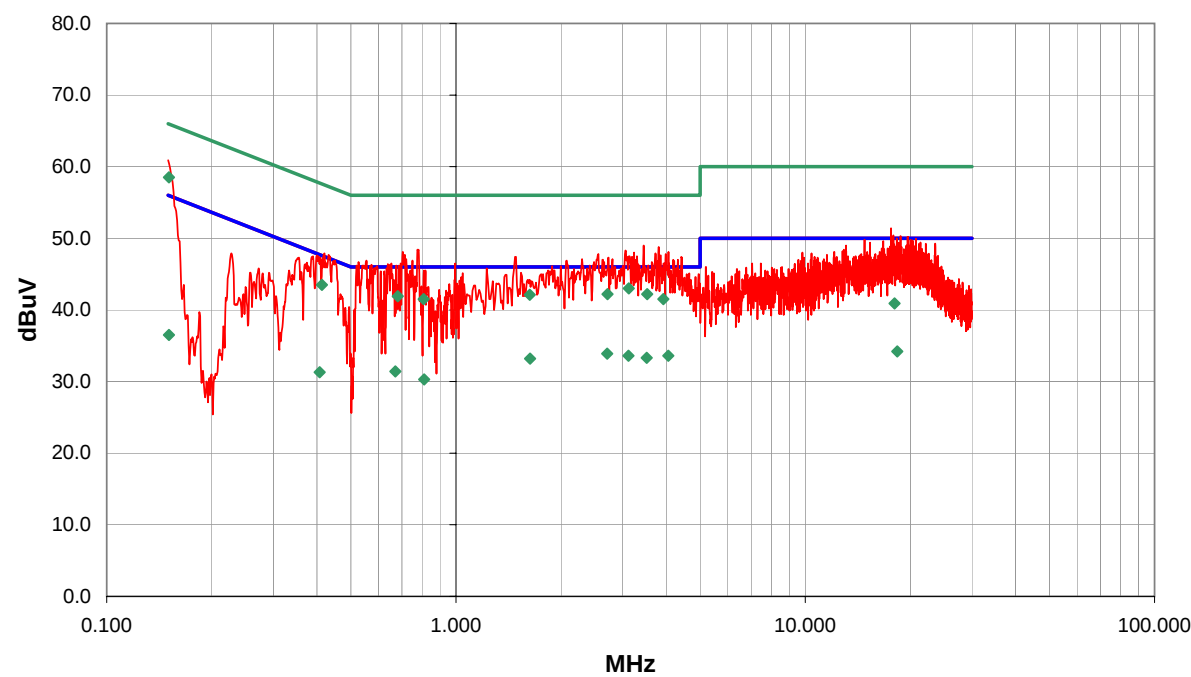
MEASUREMENT UNCERTAINTY

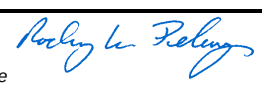
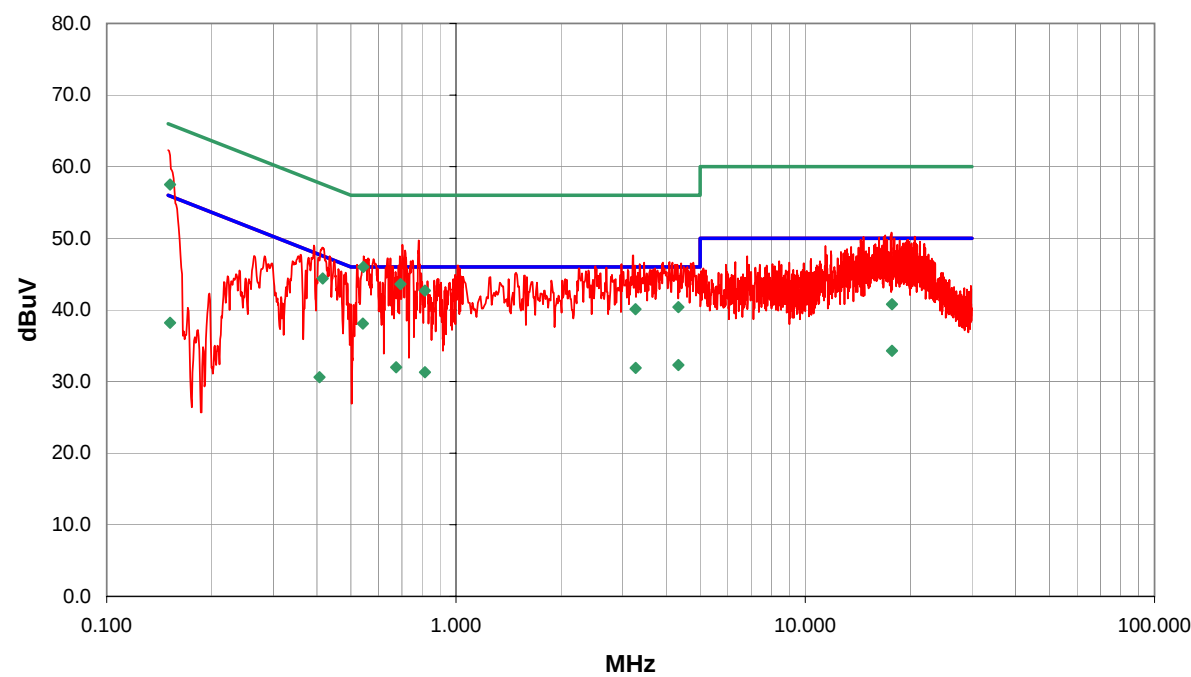
Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

TEST DESCRIPTION

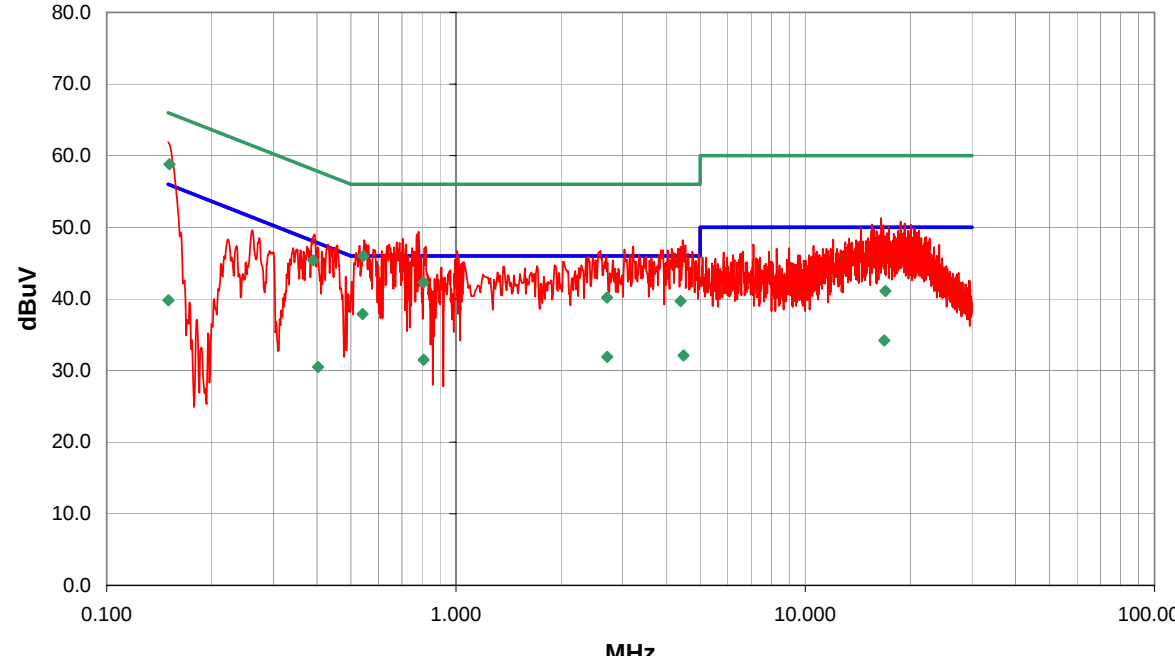
Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50 Ω measuring port is terminated by a 50 Ω EMI meter or a 50 Ω resistive load. All 50 Ω measuring ports of the LISN are terminated by 50 Ω .

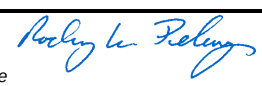
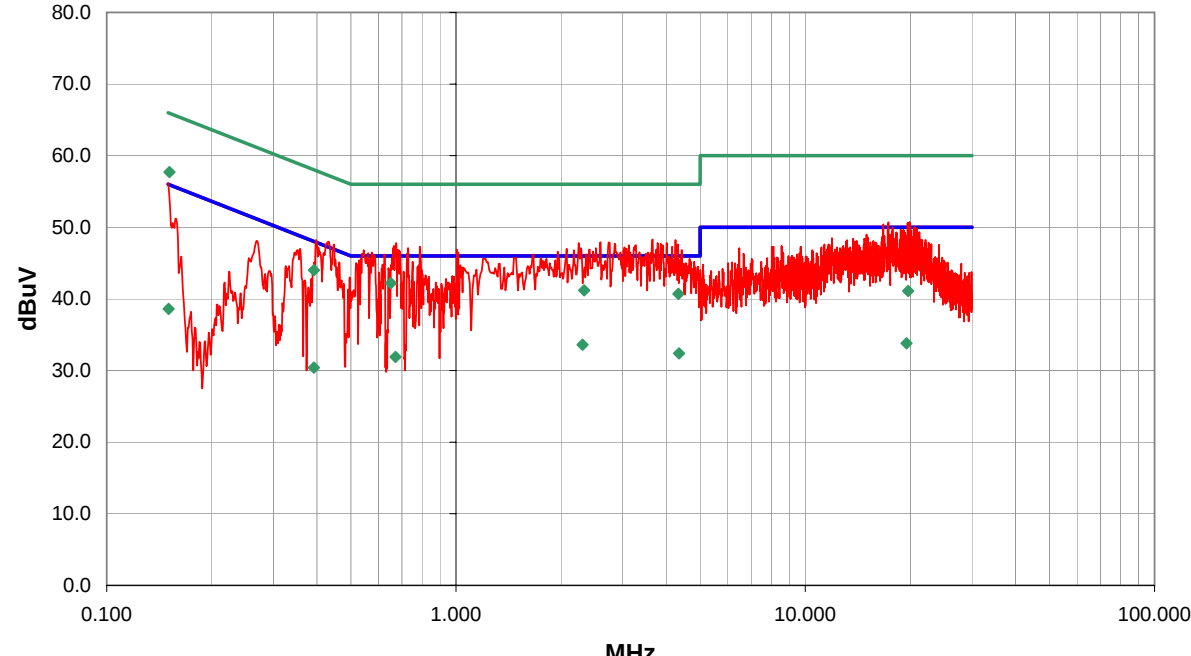
NORTHWEST EMC		AC POWERLINE CONDUCTED EMISSIONS		ACQ-2006.05.30 EMI 2005.9.18					
EUT: IX270-BT220			Work Order: SPTE0017						
Serial Number: None			Date: 06/21/06						
Customer: Spectrum Technology			Temperature: 23						
Attendees: None			Humidity: 47%						
Project: None			Barometric Pres.: 29.98						
Tested by: Rod Peloquin		Power: 120VAC/60Hz		Job Site: EV01					
TEST SPECIFICATIONS			Test Method						
FCC 15.207:2006			ANSI C63.4:2003						
FCC 15.107 Class B:2006			ANSI C63.4:2003						
TEST PARAMETERS									
Cable or Line Tested			L1						
COMMENTS									
Internal antenna . Notebook configuration.									
EUT OPERATING MODES									
Bluetooth low channel									
DEVIATIONS FROM TEST STANDARD									
No deviations.									
Run #	7	 Signature							
Configuration #	3								
Results	Pass								
NVLAP Lab Code 200630-0									
									
Freq (MHz)	Amplitude (dBuV)		Transducer (dB)	Cable (dB)	External Attenuation (dB)	Detector (blank equal peaks [PK] from scan)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.151	38.2		0.0	0.0	20.0	QP	58.2	65.9	-7.7
0.539	17.4		0.0	0.0	20.0	AV	37.4	46.0	-8.6
0.543	26.0		0.0	0.0	20.0	QP	46.0	56.0	-10.0
0.393	25.3		0.0	0.0	20.0	QP	45.3	58.0	-12.7
0.352	25.3		0.0	0.0	20.0	QP	45.3	58.9	-13.6
2.692	12.3		0.0	0.0	20.0	AV	32.3	46.0	-13.7
4.327	12.3		0.0	0.0	20.0	AV	32.3	46.0	-13.7
0.729	22.2		0.0	0.0	20.0	QP	42.2	56.0	-13.8
3.103	11.6		0.0	0.0	20.0	AV	31.6	46.0	-14.4
0.747	10.6		0.0	0.0	20.0	AV	30.6	46.0	-15.4
17.401	14.4		0.0	0.0	20.0	AV	34.4	50.0	-15.6
4.344	20.3		0.0	0.0	20.0	QP	40.3	56.0	-15.7
0.392	12.0		0.0	0.0	20.0	AV	32.0	48.0	-16.0
3.099	19.8		0.0	0.0	20.0	QP	39.8	56.0	-16.2
2.722	19.7		0.0	0.0	20.0	QP	39.7	56.0	-16.3
0.151	18.6		0.0	0.0	20.0	AV	38.6	55.9	-17.3
0.345	11.2		0.0	0.0	20.0	AV	31.2	49.1	-17.9
17.401	20.8		0.0	0.0	20.0	QP	40.8	60.0	-19.2
3.106	26.0		0.0	0.0	20.0		46.0	46.0	0.0

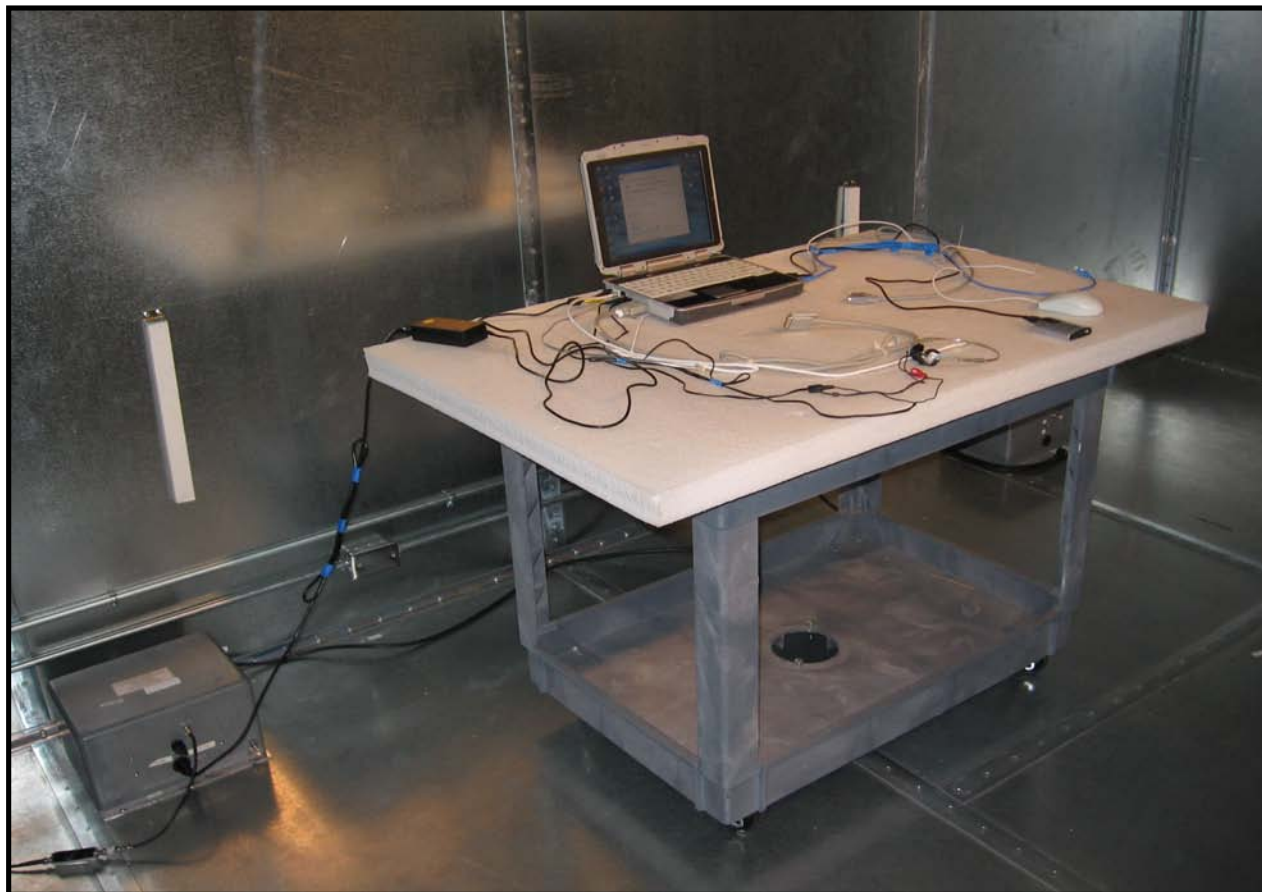
NORTHWEST EMC		AC POWERLINE CONDUCTED EMISSIONS		ACQ-2006.05.30 EMI 2005.9.18					
EUT: IX270-BT220			Work Order: SPTE0017						
Serial Number: None			Date: 06/21/06						
Customer: Spectrum Technology			Temperature: 23						
Attendees: None			Humidity: 47%						
Project: None			Barometric Pres.: 29.98						
Tested by: Rod Peloquin		Power: 120VAC/60Hz		Job Site: EV01					
TEST SPECIFICATIONS			Test Method						
FCC 15.207:2006			ANSI C63.4:2003						
FCC 15.107 Class B:2006			ANSI C63.4:2003						
TEST PARAMETERS									
Cable or Line Tested		N							
COMMENTS									
Internal antenna . Notebook configuration.									
EUT OPERATING MODES									
Bluetooth low channel									
DEVIATIONS FROM TEST STANDARD									
No deviations.									
Run #	8	 Signature							
Configuration #	3								
Results	Pass								
NVLAP Lab Code 200630-0									
									
Freq (MHz)	Amplitude (dBuV)		Transducer (dB)	Cable (dB)	External Attenuation (dB)	Detector (blank equal peaks [PK] from scan)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.151	38.5		0.0	0.0	20.0	QP	58.5	66.0	-7.5
2.710	13.9		0.0	0.0	20.0	AV	33.9	46.0	-12.1
4.055	13.6		0.0	0.0	20.0	AV	33.6	46.0	-12.4
3.117	13.6		0.0	0.0	20.0	AV	33.6	46.0	-12.4
3.514	13.3		0.0	0.0	20.0	AV	33.3	46.0	-12.7
1.629	13.2		0.0	0.0	20.0	AV	33.2	46.0	-12.8
3.125	23.0		0.0	0.0	20.0	QP	43.0	56.0	-13.0
2.714	22.2		0.0	0.0	20.0	QP	42.2	56.0	-13.8
3.526	22.2		0.0	0.0	20.0	QP	42.2	56.0	-13.8
1.627	22.1		0.0	0.0	20.0	QP	42.1	56.0	-13.9
0.413	23.5		0.0	0.0	20.0	QP	43.5	57.6	-14.1
0.681	21.9		0.0	0.0	20.0	QP	41.9	56.0	-14.1
0.808	21.5		0.0	0.0	20.0	QP	41.5	56.0	-14.5
3.924	21.5		0.0	0.0	20.0	QP	41.5	56.0	-14.5
0.670	11.4		0.0	0.0	20.0	AV	31.4	46.0	-14.6
0.811	10.3		0.0	0.0	20.0	AV	30.3	46.0	-15.7
18.333	14.2		0.0	0.0	20.0	AV	34.2	50.0	-15.8
0.407	11.3		0.0	0.0	20.0	AV	31.3	47.7	-16.4
18.022	20.9		0.0	0.0	20.0	QP	40.9	60.0	-19.1
0.151	16.5		0.0	0.0	20.0	AV	36.5	56.0	-19.5

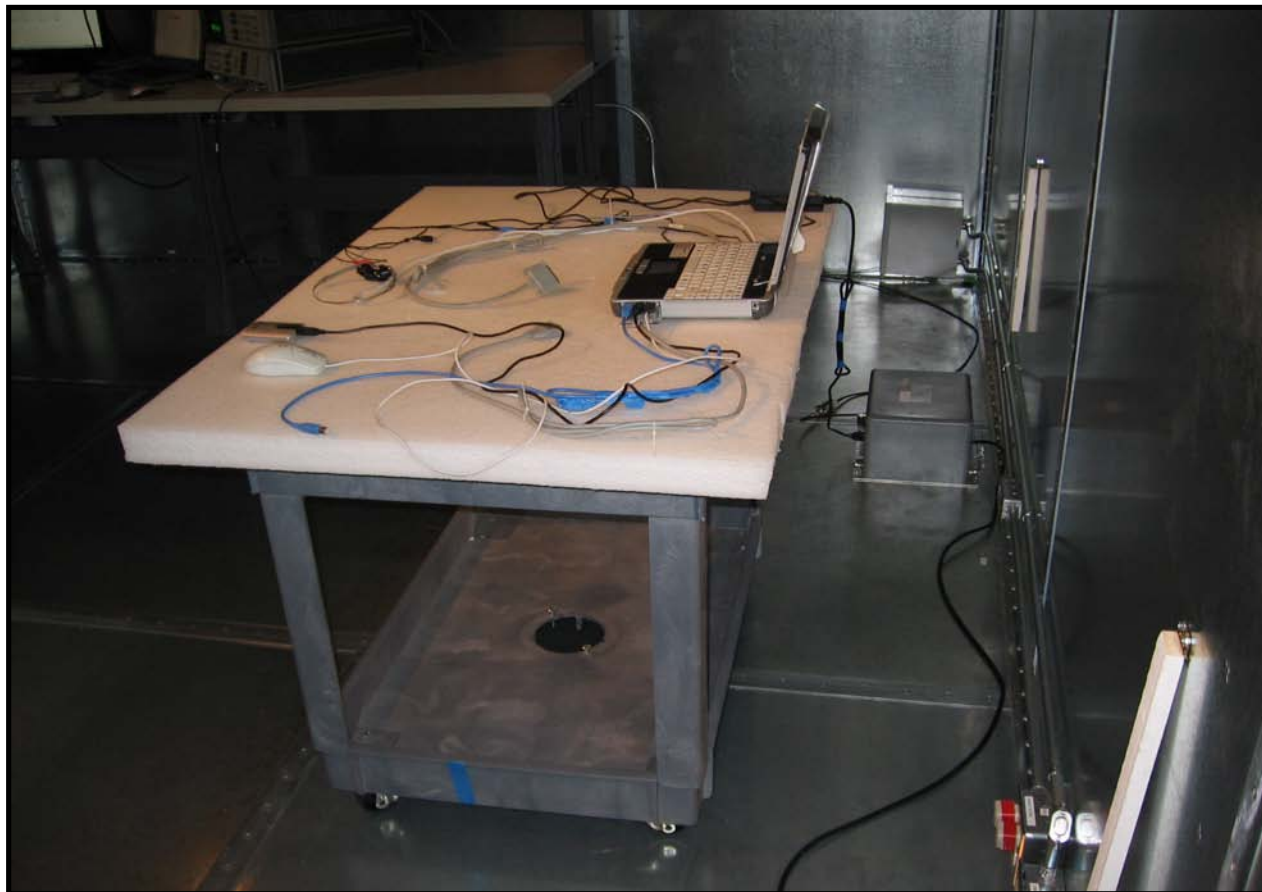
NORTHWEST EMC		AC POWERLINE CONDUCTED EMISSIONS		ACQ-2006.05.30 EMI 2005.9.18					
EUT: IX270-BT220			Work Order: SPTE0017						
Serial Number: None			Date: 06/21/06						
Customer: Spectrum Technology			Temperature: 23						
Attendees: None			Humidity: 47%						
Project: None			Barometric Pres.: 29.98						
Tested by: Rod Peloquin		Power: 120VAC/60Hz		Job Site: EV01					
TEST SPECIFICATIONS			Test Method						
FCC 15.207:2006			ANSI C63.4:2003						
FCC 15.107 Class B:2006			ANSI C63.4:2003						
TEST PARAMETERS									
Cable or Line Tested		L1							
COMMENTS									
Internal antenna . Notebook configuration.									
EUT OPERATING MODES									
Bluetooth mid channel									
DEVIATIONS FROM TEST STANDARD									
No deviations.									
Run #	9	 Signature							
Configuration #	3								
Results	Pass								
NVLAP Lab Code 200630-0									
									
Freq (MHz)	Amplitude (dBuV)		Transducer (dB)	Cable (dB)	External Attenuation (dB)	Detector (blank equal peaks [PK] from scan)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.541	18.1		0.0	0.0	20.0	AV	38.1	46.0	-7.9
0.152	37.5		0.0	0.0	20.0	QP	57.5	65.9	-8.4
0.543	26.0		0.0	0.0	20.0	QP	46.0	56.0	-10.0
0.693	23.6		0.0	0.0	20.0	QP	43.6	56.0	-12.4
0.416	24.4		0.0	0.0	20.0	QP	44.4	57.5	-13.1
0.815	22.7		0.0	0.0	20.0	QP	42.7	56.0	-13.3
4.332	12.3		0.0	0.0	20.0	AV	32.3	46.0	-13.7
0.674	12.0		0.0	0.0	20.0	AV	32.0	46.0	-14.0
3.269	11.9		0.0	0.0	20.0	AV	31.9	46.0	-14.1
0.815	11.3		0.0	0.0	20.0	AV	31.3	46.0	-14.7
4.335	20.4		0.0	0.0	20.0	QP	40.4	56.0	-15.6
17.720	14.3		0.0	0.0	20.0	AV	34.3	50.0	-15.7
3.266	20.1		0.0	0.0	20.0	QP	40.1	56.0	-15.9
0.407	10.6		0.0	0.0	20.0	AV	30.6	47.7	-17.1
0.152	18.2		0.0	0.0	20.0	AV	38.2	55.9	-17.7
17.720	20.8		0.0	0.0	20.0	QP	40.8	60.0	-19.2
4.487	26.0		0.0	0.0	20.0		46.0	46.0	0.0
4.597	26.0		0.0	0.0	20.0		46.0	46.0	0.0
17.988	30.0		0.0	0.0	20.0		50.0	50.0	0.0

NORTHWEST		ACQ-2006.05.30 EMI 2005.9.18						
EMC AC POWERLINE CONDUCTED EMISSIONS								
EUT: IX270-BT220		Work Order: SPTE0017						
Serial Number: None		Date: 06/21/06						
Customer: Spectrum Technology		Temperature: 23						
Attendees: None		Humidity: 47%						
Project: None		Barometric Pres.: 29.98						
Tested by: Rod Peloquin		Power: 120VAC/60Hz	Job Site: EV01					
TEST SPECIFICATIONS		Test Method						
FCC 15.207:2006		ANSI C63.4:2003						
FCC 15.107 Class B:2006		ANSI C63.4:2003						
TEST PARAMETERS								
Cable or Line Tested		N						
COMMENTS								
Internal antenna . Notebook configuration.								
EUT OPERATING MODES								
Bluetooth mid channel								
DEVIATIONS FROM TEST STANDARD								
No deviations.								
Run #	10	 Signature						
Configuration #	3							
Results	Pass							
Freq (MHz)	Amplitude (dBuV)	Transducer (dB)	Cable (dB)	External Attenuation (dB)	Detector (blank equal peaks [PK] from scan)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.150	39.0	0.0	0.0	20.0	QP	59.0	66.0	-7.0
3.932	15.0	0.0	0.0	20.0	AV	35.0	46.0	-11.0
2.713	13.5	0.0	0.0	20.0	AV	33.5	46.0	-12.5
0.394	25.0	0.0	0.0	20.0	QP	45.0	58.0	-13.0
0.676	22.4	0.0	0.0	20.0	QP	42.4	56.0	-13.6
2.724	21.5	0.0	0.0	20.0	QP	41.5	56.0	-14.5
1.084	11.3	0.0	0.0	20.0	AV	31.3	46.0	-14.7
19.517	15.1	0.0	0.0	20.0	AV	35.1	50.0	-14.9
1.030	20.7	0.0	0.0	20.0	QP	40.7	56.0	-15.3
4.037	20.6	0.0	0.0	20.0	QP	40.6	56.0	-15.4
0.673	10.4	0.0	0.0	20.0	AV	30.4	46.0	-15.6
0.406	10.4	0.0	0.0	20.0	AV	30.4	47.7	-17.3
19.516	20.9	0.0	0.0	20.0	QP	40.9	60.0	-19.1
0.150	11.6	0.0	0.0	20.0	AV	31.6	56.0	-24.4
0.526	26.0	0.0	0.0	20.0		46.0	46.0	0.0
1.395	26.0	0.0	0.0	20.0		46.0	46.0	0.0
4.147	26.0	0.0	0.0	20.0		46.0	46.0	0.0
1.215	25.9	0.0	0.0	20.0		45.9	46.0	-0.1
4.617	25.9	0.0	0.0	20.0		45.9	46.0	-0.1

NORTHWEST EMC		AC POWERLINE CONDUCTED EMISSIONS		ACQ-2006.05.30 EMI 2005.9.18					
EUT: IX270-BT220			Work Order: SPTE0017						
Serial Number: None			Date: 06/21/06						
Customer: Spectrum Technology			Temperature: 23						
Attendees: None			Humidity: 47%						
Project: None			Barometric Pres.: 29.98						
Tested by: Rod Peloquin		Power: 120VAC/60Hz		Job Site: EV01					
TEST SPECIFICATIONS			Test Method						
FCC 15.207:2006			ANSI C63.4:2003						
FCC 15.107 Class B:2006			ANSI C63.4:2003						
TEST PARAMETERS									
Cable or Line Tested		L1							
COMMENTS									
Internal antenna . Notebook configuration.									
EUT OPERATING MODES									
Bluetooth high channel									
DEVIATIONS FROM TEST STANDARD									
No deviations.									
Run #	11	 Signature							
Configuration #	3								
Results	Pass								
NVLAP Lab Code 200630-0									
									
Freq (MHz)	Amplitude (dBuV)		Transducer (dB)	Cable (dB)	External Attenuation (dB)	Detector (blank equal peaks [PK] from scan)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.151	38.8		0.0	0.0	20.0	QP	58.8	65.9	-7.1
0.540	17.9		0.0	0.0	20.0	AV	37.9	46.0	-8.1
0.543	26.0		0.0	0.0	20.0	QP	46.0	56.0	-10.0
0.390	25.4		0.0	0.0	20.0	QP	45.4	58.1	-12.7
0.808	22.3		0.0	0.0	20.0	QP	42.3	56.0	-13.7
4.483	12.1		0.0	0.0	20.0	AV	32.1	46.0	-13.9
2.710	11.9		0.0	0.0	20.0	AV	31.9	46.0	-14.1
0.808	11.5		0.0	0.0	20.0	AV	31.5	46.0	-14.5
16.837	14.2		0.0	0.0	20.0	AV	34.2	50.0	-15.8
2.706	20.2		0.0	0.0	20.0	QP	40.2	56.0	-15.8
0.150	19.8		0.0	0.0	20.0	AV	39.8	56.0	-16.2
4.399	19.7		0.0	0.0	20.0	QP	39.7	56.0	-16.3
0.403	10.5		0.0	0.0	20.0	AV	30.5	47.8	-17.3
16.965	21.1		0.0	0.0	20.0	QP	41.1	60.0	-18.9
0.792	26.0		0.0	0.0	20.0		46.0	46.0	0.0
2.686	26.0		0.0	0.0	20.0		46.0	46.0	0.0
14.436	30.0		0.0	0.0	20.0		50.0	50.0	0.0
20.568	29.9		0.0	0.0	20.0		49.9	50.0	-0.1
20.556	29.9		0.0	0.0	20.0		49.9	50.0	-0.1

NORTHWEST EMC		AC POWERLINE CONDUCTED EMISSIONS		ACQ-2006.05.30 EMI 2005.9.18					
EUT: IX270-BT220			Work Order: SPTE0017						
Serial Number: None			Date: 06/21/06						
Customer: Spectrum Technology			Temperature: 23						
Attendees: None			Humidity: 47%						
Project: None			Barometric Pres.: 29.98						
Tested by: Rod Peloquin		Power: 120VAC/60Hz		Job Site: EV01					
TEST SPECIFICATIONS			Test Method						
FCC 15.207:2006			ANSI C63.4:2003						
FCC 15.107 Class B:2006			ANSI C63.4:2003						
TEST PARAMETERS									
Cable or Line Tested		N							
COMMENTS									
Internal antenna . Notebook configuration.									
EUT OPERATING MODES									
Bluetooth high channel									
DEVIATIONS FROM TEST STANDARD									
No deviations.									
Run #	12	 Signature							
Configuration #	3								
Results	Pass								
NVLAP Lab Code 200630-0									
									
Freq (MHz)	Amplitude (dBuV)		Transducer (dB)	Cable (dB)	External Attenuation (dB)	Detector (blank equal peaks [PK] from scan)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.151	37.7		0.0	0.0	20.0	QP	57.7	65.9	-8.2
2.304	13.6		0.0	0.0	20.0	AV	33.6	46.0	-12.4
4.351	12.4		0.0	0.0	20.0	AV	32.4	46.0	-13.6
0.651	22.2		0.0	0.0	20.0	QP	42.2	56.0	-13.8
0.392	24.0		0.0	0.0	20.0	QP	44.0	58.0	-14.0
0.671	11.9		0.0	0.0	20.0	AV	31.9	46.0	-14.1
2.328	21.2		0.0	0.0	20.0	QP	41.2	56.0	-14.8
4.333	20.7		0.0	0.0	20.0	QP	40.7	56.0	-15.3
19.497	13.8		0.0	0.0	20.0	AV	33.8	50.0	-16.2
0.150	18.6		0.0	0.0	20.0	AV	38.6	56.0	-17.4
0.392	10.4		0.0	0.0	20.0	AV	30.4	48.0	-17.6
19.711	21.1		0.0	0.0	20.0	QP	41.1	60.0	-18.9
17.772	30.0		0.0	0.0	20.0		50.0	50.0	0.0
4.077	25.9		0.0	0.0	20.0		45.9	46.0	-0.1
20.880	29.8		0.0	0.0	20.0		49.8	50.0	-0.2
1.465	25.7		0.0	0.0	20.0		45.7	46.0	-0.3
18.756	29.7		0.0	0.0	20.0		49.7	50.0	-0.3
20.122	29.6		0.0	0.0	20.0		49.6	50.0	-0.4
1.195	25.6		0.0	0.0	20.0		45.6	46.0	-0.4





BLUETOOTH APPROVALS

FCC Procedure Received from Joe Dichoso on 2-15-02

The following exhibit indicates the FCC Spread Spectrum requirements in Section 15.247 for devices meeting the Bluetooth Specifications in the 2.4 GHz band as of February 2001 operating in the USA. The purpose of this exhibit is to help expedite the approval process for Bluetooth devices. This exhibit provides items that vary for each device and also provides a list of items that are common to Bluetooth devices that explains the remaining requirements. The list of common items can be submitted for each application for equipment authorization. This exhibit only specifies requirements in Section 15.247, requirements in other rule Sections for intentional radiators such as in Section 15.203 or 15.207 must be also be addressed. A Bluetooth device is a FHSS transmitter in the data mode and applies as a Hybrid spread spectrum device in the acquisition mode.

For each individual device, the following items, 1-7 will vary from one device to another and must be submitted.

- 1) The occupied bandwidth in Section 15.247(a)(1)(ii).
- 2) Conducted output power specified in Section 15.247(b)(1).
- 3) EIRP limit in Section 15.247(b)(3).
- 4) RF safety requirement in Section 15.247(b)(4)
- 5) Spurious emission limits in Section 15.247(c).
- 6) Processing gain and requirements for Hybrids in Section 15.247(f) in the acquisition mode.
- 7) Power spectral density requirement in Section 15.247(f) in the acquisition mode.

For all devices, the following items, 1-12, are common to all Bluetooth devices and will not vary from one device to another. This list can be copied into the filing.

1 Output power and channel separation of a Bluetooth device in the different operating modes:

The different operating modes (data-mode, acquisition-mode) of a Bluetooth device don't influence the output power and the channel spacing. There is only one transmitter which is driven by identical input parameters concerning these two parameters. Only a different hopping sequence will be used. For this reason, the RF parameters in one op-mode is sufficient.

2 Frequency range of a Bluetooth device:

The maximum frequency of the device is: **2402 – 2480 MHz**.

This is according the Bluetooth Core Specification V 1.0B (+ critical errata) for devices which will be operated in the USA. Other frequency ranges (e.g. for Spain, France, Japan) which are allowed according the Core Specification must **not be** supported by the device.

3 Co-ordination of the hopping sequence in data mode to avoid simultaneous occupancy by multiple transmitters:

Bluetooth units which want to communicate with other units must be organized in a structure called piconet. This piconet consist of max. 8 Bluetooth units. One unit is the master the other seven are the slaves. The master co-ordinates frequency occupation in this piconet for all units. As the master hop sequence is derived from it's BD address which is unique for every Bluetooth device, additional masters intending to establish new piconets will always use different hop sequences.

4 Example of a hopping sequence in data mode:

Example of a 79 hopping sequence in data mode:

40, 21, 44, 23, 42, 53, 46, 55, 48, 33, 52, 35, 50, 65, 54, 67,
56, 37, 60, 39, 58, 69, 62, 71, 64, 25, 68, 27, 66, 57, 70, 59,
72, 29, 76, 31, 74, 61, 78, 63, 01, 41, 05, 43, 03, 73, 07, 75,
09, 45, 13, 47, 11, 77, 15, 00, 64, 49, 66, 53, 68, 02, 70, 06,
01, 51, 03, 55, 05, 04

5 Equally average use of frequencies in data mode and short transmissions:

The generation of the hopping sequence in connection mode depends essentially on two input values:

1. LAP/UAP of the master of the connection
2. Internal master clock

The LAP (lower address part) are the 24 LSB's of the 48 BD_ADDRESS. The BD_ADDRESS is an unambiguous number of every Bluetooth unit. The UAP (upper address part) are the 24 MSB's of the 48 BD_ADDRESS. The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and is never turned off. For synchronization with other units, only the offsets are used. It has no relation to the time of the day. Its resolution is at least half the RX/TX slot length of 312.5 μ s. The clock has a cycle of about one day (23h30). In most case it is implemented as 28 bit counter. For the deriving of the hopping sequence the entire LAP (24 bits), 4 LSB's (4 bits) (Input 1) and the 27 MSB's of the clock (Input 2) are used. With this input values different mathematical procedures (permutations, additions, XOR-operations) are performed to generate the sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions, the Bluetooth system has the following behavior:

The first connection between the two devices is established, a hopping sequence is generated. For transmitting the wanted data, the complete hopping sequence is not used and the connection ends. The second connection will be established. A new hopping sequence is generated. Due to the fact that the Bluetooth clock has a different value, because the period between the two transmission is longer (and it cannot be shorter) than the minimum resolution of the clock (312.5 μ s). The hopping sequence will always differ from the first one.

6 Receiver input bandwidth, synchronization and repeated single or multiple packets:

The input bandwidth of the receiver is 1 MHz.

In every connection, one Bluetooth device is the master and the other one is the slave. The master determines the hopping sequence (see chapter 5). The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection (e.g. single or multi-slot packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing is according to the packet type of the connection. Also, the slave of the connection uses these settings. Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence

7 Dwell time in data mode

The dwell time of 0.3797s within a 30 second period in data mode is independent from the packet type (packet length). The calculation for a 30 second period is as follows:

Dwell time = time slot length * hop rate / number of hopping channels * 30s

Example for a DH1 packet (with a maximum length of one time slot)

Dwell time = 625 μ s * 1600 1/s / 79 * 30s = 0.3797s (in a 30s period)

For multi-slot packet the hopping is reduced according to the length of the packet.

Example for a DH5 packet (with a maximum length of five time slots)

Dwell time = $5 * 625 \mu s * 1600 * 1/5 * 1/s / 79 * 30s = 0.3797s$ (in a 30s period)

This is according the Bluetooth Core Specification V 1.0B (+ critical errata) for all Bluetooth devices. Therefore, all Bluetooth devices **comply** with the FCC dwell time requirement in the data mode.

This was checked during the Bluetooth Qualification tests.

The Dwell time in hybrid mode is approximately 2.6 mS (in a 12.8s period)

8 Channel Separation in hybrid mode

The nominal channel spacing of the Bluetooth system is 1Mhz independent of the operating mode.

The maximum "initial carrier frequency tolerance" which is allowed for Bluetooth is $f_{center} = 75 \text{ kHz}$.

This was checked during the Bluetooth Qualification tests (Test Case: TRM/CA/07-E) for three frequencies (2402, 2441, 2480 MHz).

9 Derivation and examples for a hopping sequence in hybrid mode

For the generation of the inquiry and page hop sequences the same procedures as described for the data mode are used (see item 5), but this time with different input vectors:

****For the inquiry hop sequence, a predefined fixed address is always used. This results in the same 32 frequencies used by all devices doing an inquiry but every time with a different start frequency and phase in this sequence.**

****For the page hop sequence, the device address of the paged unit is used as the input vector. This results in the use of a subset of 32 frequencies which is specific for that initial state of the connection establishment between the two units. A page to different devices would result in a different subset of 32 frequencies.**

So it is ensured that also in hybrid mode, the frequency is used equally on average.

Example of a hopping sequence in inquiry mode:

48, 50, 09, 13, 52, 54, 41, 45, 56, 58, 11, 15, 60, 62, 43, 47, 00, 02, 64, 68, 04, 06, 17, 21, 08, 10, 66, 70, 12, 14, 19, 23

Example of a hopping sequence in paging mode:

08, 57, 68, 70, 51, 02, 42, 40, 04, 61, 44, 46, 63, 14, 50, 48, 16, 65, 52, 54, 67, 18, 58, 56, 20, 53, 60, 62, 55, 06, 66, 64

10 Receiver input bandwidth and synchronization in hybrid mode:

The receiver input bandwidth is the same as in the data mode (1 MHz). When two Bluetooth devices establish contact for the first time, one device sends an inquiry access code and the other device is scanning for this inquiry access code. If two devices have been connected previously and want to start a new transmission, a similar procedure takes place. The only difference is, instead of the inquiry access code, a special access code, derived from the BD_ADDRESS of the paged device will be, will be sent by the master of this connection. Due to the fact that both units have been connected before (in the inquiry procedure) the paging unit has timing and frequency information about the page scan of the paged unit. For this reason the time to establish the connection is reduced.

11 Spread rate / data rate of the direct sequence signal

The Spread rate / Data rate in inquiry and paging mode can be defined via the access code. The access code is the only criterion for the system to check if there is a valid transmission or not. If you regard the presence of a valid access code as one bit of information, and compare it with the length of the access code of 68 bits, the Spread rate / Data rate will be 68/1.

12 Spurious emission in hybrid mode

The Dwell in hybrid mode is shorter than in data mode. For this reason the spurious emissions average level in data mode is worst case. The spurious emissions peak level is the same for both modes.