M. Flom Associates, Inc.
International Compliance Testing Laboratory
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Chandler, AZ 85225
toll-free: (866) 311-3268
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Sub-part
2.1033(c):

Equipment Identification

FCC ID: ROJEXPLORER500

Nameplate Drawing

Attached, Exhibit 1.

Location

As Per Label Drawing(s)

Date Of Report

August 23, 2005

Supervised By: David E. Lee, Quality Assurance Manager

The Applicant has been cautioned as to the following:

15.21 Information to User.

The users manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a) Special Accessories.

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

Table Of Contents

Required information per ISO/IEC Guide 25-1990, paragraph 13.2:

a) **Test Report**

b) Laboratory: M. Flom Associates, Inc.
(FCC: 31040/SIT) 3356 N. San Marcos Place, Suite 107
(Canada: IC 2044) Chandler, AZ 85225

c) Report Number: d0580056

d) Client: Thrane & Thrane A/S
Lundtoftegardsvej 93D
DK-2800 Lyngby, Denmark

e) Identification: Explorer 500
FCC ID: ROJEXPLORER500
Description: Immersat Terminal

f) EUT Condition: Not required unless specified in individual tests.

g) Report Date: September 23, 2005
EUT Received: August 22, 2005

h, j, k): As indicated in individual tests.

i) Sampling method: No sampling procedure used.

l) Uncertainty: In accordance with MFA internal quality manual.

m) Supervised by:

David E. Lee, Quality Assurance Manager

n) Results: The results presented in this report relate only to the item tested.

List Of General Information Required For Certification

In Accordance with FCC Rules and Regulations,
Volume II, Part 2 and to Part 15.247 (Bluetooth)

Sub-Part 2.1033

©(1): **Name and Address of Applicant**:

Thrane & Thrane A/S
Lundtoftegardsvej 93D
DK-2800 Lyngby, Denmark

Manufacturer:

Applicant

(c)(2): **FCC ID**: ROJEXPLORER500

Model Number: Explorer 500

(c)(3): **Instruction Manual(s)**:

Please See Attached Exhibits

(c)(4): **Type Of Emission**: GFSK

(c)(5): **FREQUENCY RANGE, MHz**: 2400 to 2483.5

(c)(6): **Power Rating, W**: 0.100

____ Switchable X Variable ____ N/A

(c)(7): **Maximum Power Rating, W**: 1.0

15.203: **Antenna Requirement**:

X The antenna is permanently attached to the EUT
____ The antenna uses a unique coupling
____ The EUT must be professionally installed
____ The antenna requirement does not apply

Subpart 2.1033 (continued)
(c)(8): Voltages & Currents in All Elements in Final RF Stage, Including Final Transistor or Solid State Device:

Composite Unit: Figures are with both Part 25 and Part 15.247 units operating;

Collector Current, A	=	3.0
Collector Voltage, Vdc	=	8.0
Supply Voltage, Vdc	=	10 - 16

(c)(9): **Tune-Up Procedure**:

Please See Attached Exhibits

(c)(10): **Circuit Diagram/Circuit Description**:
Including description of circuitry & devices provided for determining and stabilizing frequency, for suppression of spurious radiation, for limiting modulation and limiting power.

Please See Attached Exhibits

(c)(11): **Label Information**:

Please See Attached Exhibits

(c)(12): **Photographs**:

Please See Attached Exhibits

(c)(13): **Digital Modulation Description**:

___ Attached Exhibits
_x_ N/A

(c)(14): **Test And Measurement Data**:

Follows

Sub-part 2.1033(b): **Test And Measurement Data**

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2, Sub-part J, Sections 2.1031, 2.1033, 2.1035, 2.1041, 2.1043, 2.1045, and the following individual Parts:

_____	15.209	Radiated emission limits; general requirements
_____	15.211	Tunnel radio systems
_____	15.213	Cable locating equipment
_____	15.214	Cordless telephones
_____	15.217	Operation in the band 160-190 kHz
_____	15.219	Operation in the band 510-1705 kHz
_____	15.221	Operation in the band 525-1705 kHz (leaky coax)
_____	15.223	Operation in the band 1.705-10 MHz
_____	15.225	Operation in the band 13.553-13.567 MHz
_____	15.227	Operation in the band 26-27.28 MHz (remote control)
_____	15.229	Operation in the band 40.66-40.70 MHz
_____	15.231	Periodic operation in the band 40.66-40.70 MHz and above 70 MHz
_____	15.233	Operation within the bands 43.71-44.49, 46.60-46.98 MHz 48.75-49.51 MHz and 49.66-50.0 MHz
_____	15.235	Operation within the band 49.82-49.90 MHz
_____	15.237	Operation within the bands 72.0-73.0 MHz, 74.6-74.8 MHz and 75.2-76.0 MHz (auditory assistance)
_____	15.239	Operation in band 88-108 MHz
_____	15.241	Operation in the band 174-216 MHz (biomedical)
_____	15.243	Operation in the band 890-940 MHz (materials)
_____	15.245	Operation within the bands 902-928 MHz, 2435-2465 MHz, 5785-5815 MHz, 10500-10550 MHz, and 24075-24175 MHz (filed disturbance sensors)
X	15.247	Operation within bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz (spread spectrum)
_____	15.249	Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz
_____	15.251	Operation within the bands 2.9-3.26 GHz, 3.267-3.332 GHz, 3.339-3.3458 GHz, and 3.358-3.6 GHz (vehicle identification systems)
_____	15.321	Specific requirements for asynchronous devices operating in the 1910-1920 MHz and 2390-2400 MHz bands (Unlicensed PCS)
_____	15.323	Specific requirements for isochronous devices operating in the 1920-1930 MHz sub-band (Unlicensed PCS)

Standard Test Conditions
and
Engineering Practices

Except as noted herein, the following conditions and procedures were observed during the testing:

In accordance with ANSI C63.4-1992/2000, section 6.1.9, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104 °F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Prior to testing, the EUT was tuned up in accordance with the manufacturer's alignment procedures. All external gain controls were maintained at the position of maximum and/or optimum gain throughout the testing.

Measurement results, unless otherwise noted, are worst-case measurements.

THE AMERICAN
ASSOCIATION
FOR LABORATORY
ACCREDITATION

ACCREDITED LABORATORY

A2LA has accredited

M. FLOM ASSOCIATES, INC.
Chandler, AZ

for technical competence in the field of

Electrical Testing

The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration Laboratories" and any additional program requirements in the identified field of testing.

Presented this 16th day of June 2004.

President
For the Accreditation Council
Certificate Number 2152-01
Valid to August 31, 2006

For tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

A2LA

"A2LA has accredited M. Flom Associates, Inc. Chandler, AZ for technical competence in the field of Electrical Testing. The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC 17025 – 1999 'General Requirements for the Competence of Testing and Calibration Laboratories' and any additional program requirements in the identified field of testing."

Certificate Number: **2152-01**

Page Number 6 of 37

Name of Test: Maximum Peak Output Power

Specification: 47 CFR 15.247(b)

Spec. Limit: = 1 Watt peak (0.25 if <50 Hopping Channels)

Test Equipment: Attached

Measurement Data

Peak Output Power, Watts = Worst Case For All Channels

Frequency of Carrier, MHz = 2402.0, 2443.0, 2481.0

Ambient Temperature = 23°C ± 3°C

Power Setting	RF Power, dBm	RF Power, Watts
High	20.0	0.10

Performed by: Fred Chastain, Test Technician

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Name of Test: EIRP Carrier Power (Radiated)

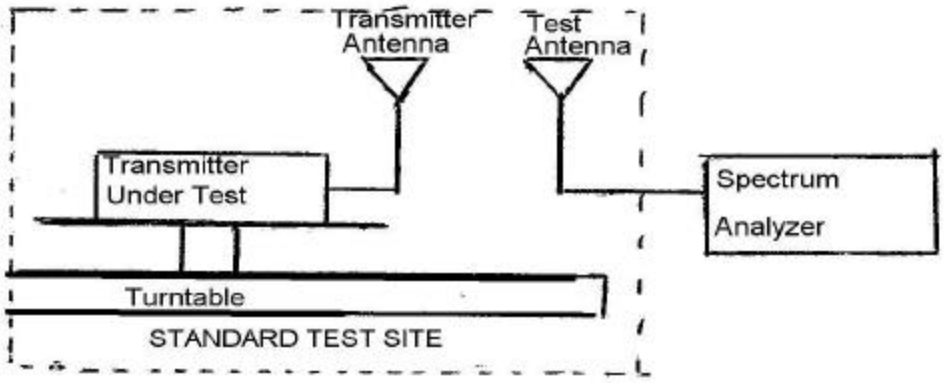
Specification: TIA/EIA 603(Substitution Method)

Measurement Procedure

Definition
The average radiated power of a licensed device is the equivalent power required, when delivered to a half-wave dipole or horn antenna, to produce at a distant point the same average received power as produced by the licensed device.

Method of Measurement:

A) Connect the equipment as illustrated. Place the transmitter to be tested on the turntable in the standard test site.



B) Raise and lower the test antenna from 1m to 6 m with the transmitter facing the antenna and record the highest received signal in dB as LVL.

C) Replace the transmitter under test with a half-wave or horn vertically polarized antenna. The center of the antenna should be at the same location as the transmitter under test. Connect the antenna to a signal generator with a known output power and record the path loss in dB or LOSS.

D) Calculate the radiated output power from the following:

$$\text{average radiated power} = 10 \log_{10} Ó\ 10^{(LVL - LOSS)/10}\ (dBm)$$

Name of Test: EIRP Carrier Power (Radiated)

Test Equipment

	Asset	Description	s/n	Cycle	Last Cal
		Transducer			
	i00088	EMCO 3109-B 25MHz-300MHz	2336	24 mo.	Sep-03
X	i00089	Aprel 2001 200MHz-1GHz	001500	24 mo.	Sep-03
X	i00103	EMCO 3115 1GHz-18GHz	9208-3925	24 mo.	Jan-04
		Amplifier			
X	i00028	HP 8449A	2749A00121	12 mo.	May-05
		Spectrum Analyzer			
X	i00029	HP 8563E	3213A00104	12 mo.	May-05
X	i00033	HP 85462A	3625A00357	12 mo.	Sep-04
		Substitution Generator			
	i00067	HP 8920A Communication TS	3345U01242	12 mo.	Jun-05
X	i00207	HP 8753D Network Analyzer	3410A08514	12 mo.	Jul-05

Measurement Results

g0580149: 2005-Aug-24 Wed 09:00:00
State: 2:High Power Ambient Temperature: 30°C ± 3°C

Frequency Tuned, MHz	Frequency Emission, MHz	Meter, dBuV/m	CF, dB	EIRP, dBm	EIRP, Watts
2402.000000	2402.000000	85.69	32.59	20.9	
2443.000000	2443.000000	85.83	32.7	21.2	0.132
2481.000000	2481.000000	85.16	32.79	20.6	

Performed by: Fred Chastain, Test Technician

Page Number 9 of 37

Name of Test: Unwanted Emissions (Transmitter Conducted)

Specification: 47 CFR 2.1051

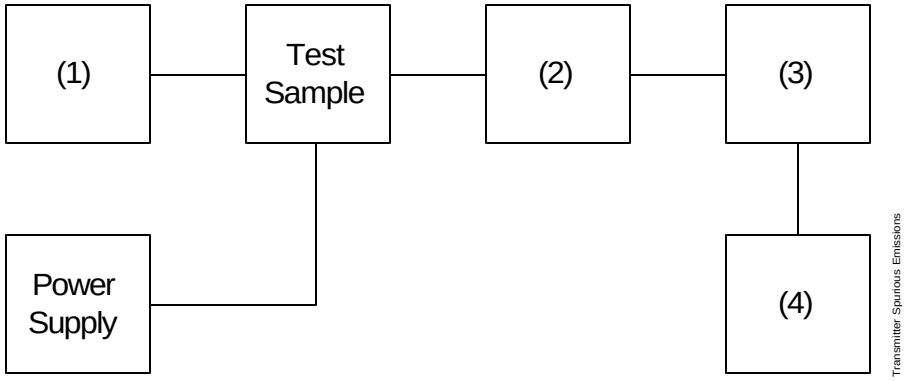
Guide: ANSI/TIA/EIA-603-1992, Paragraph 2.2.13

Measurement Procedure

A) The emissions were measured for the worst case as follows:
   1). within a band of frequencies defined by the carrier frequency plus and minus one channel.
   2). from the lowest frequency generated in the EUT and to at least the 10th harmonic of the carrier frequency, or 40 GHz, whichever is lower.

B) The magnitude of spurious emissions that are attenuated more than 20 dB below the permissible value need not be specified.

Transmitter Test Set-Up: Spurious Emission



	Asset	Description	s/n		
(1) **Audio Oscillator/Generator**					
X	i00017	HP 8903A Audio Analyzer	2216A01753	12 mo.	Apr-05
	i00002	HP 3336B Synthesizer / Level Gen.	1931A01465	12 mo.	Apr-05
(2) **Coaxial Attenuator**					
X	i00231/2	PASTERNACK PE7021-30 (30 dB)	231 or 232	NCR	
	i0012/3	NARDA 766 (10 dB)	7802 or 7802A	NCR	
(3) **Filters; Notch, HP, LP, BP**					
X	-	High Pass, 3GHz	-	NCR	
(4) **Spectrum Analyzer**					
	i00048	HP 8566B Spectrum Analyzer	2511A01467	12 mo.	Oct-04
X	i00029	HP 8563E Spectrum Analyzer	3213A00104	12 mo.	May-05

Page Number 10 of 37

Name of Test: Unwanted Emissions (Transmitter Conducted)

Measurement Results
(Worst Case)

Summary:

Frequency of carrier, MHz	=	2402, 2441, 2480
Spectrum Searched, GHz	=	0 to 10 x F_C
Maximum Response, Hz	=	N/A
All Other Emissions	=	= 20 dB Below Limit
Limit(s), dBc	-(43+10xLOG P) =	-13dBm

Tabulated Results follow:

Name of Test: Unwanted Emissions (Transmitter Conducted)

Measurement Results

g0580125: 2005-Aug-22 Mon 11:39:00
State: 2:High Power Ambient Temperature: 23°C ± 3°C

Frequency Tuned, MHz	Frequency Emission, MHz	Level, dBm	Level, dBc
2402.000000	4803.983333	-74.00	-94.00
2441.000000	4881.973333	-72.00	-92.00
2480.000000	4959.971667	-74.70	-94.70
2402.000000	7205.948333	-72.00	-92.00
2441.000000	7322.960000	-67.00	-87.00
2480.000000	7439.958333	-62.00	-82.00
2402.000000	9608.183333	-75.70	-95.70
2441.000000	9764.190000	-75.80	-95.80
2480.000000	9920.230000	-75.70	-95.70
2402.000000	12009.606667	-76.50	-96.50
2441.000000	12204.658333	-75.70	-95.70
2480.000000	12399.756667	-75.50	-95.50
2402.000000	14411.555000	-74.20	-94.20
2441.000000	14645.911667	-73.50	-93.50
2480.000000	14880.001667	-73.50	-93.50
2402.000000	16813.911667	-73.20	-93.20
2441.000000	17087.231667	-74.00	-94.00
2480.000000	17360.030000	-74.50	-94.50
2402.000000	19215.718333	-73.80	-93.80
2441.000000	19527.893333	-74.00	-94.00
2480.000000	19840.033333	-73.30	-93.30
2402.000000	21617.955000	-72.70	-92.70
2441.000000	21968.983333	-72.50	-92.50

Performed by: Fred Chastain, Test Technician

Name of Test: Restricted Bands of Operation

Specification: 47 CFR 15.205

Test Equipment: As per attached page

Measurement Procedure

The EUT was set up on a three-meter open field site according to the procedure on ANSI C63.4.

Sensitivity of system was measured:

Below 2 GHz:

CISPR Bandwidths	=	8 dBµV
1 MHz RBW, 1 MHz VBW	=	12 dBµV
1 MHz RBW, 10 Hz VBW	=	3 dBµV

Above 2 GHz:

1 MHz RBW, 1 MHz VBW	=	33 dBµV
1 MHz RBW, 10 Hz VBW	=	22 dBµV

Sensitivity of system with preamps:

Below 2 GHz:

Preamps are not used in this range.

Above 2 GHz:

Peak	=	3 dBµV
Average	=	-8 dBµV

Cable Loss:

915 MHz	=	-0.8 dBµV
2450 MHz	=	-3 dBµV

Note:

dB loss vs. frequency included in programmed software.

Reference Level Offset:

set @ 1 dB, accounts for cable and connector loss.

Test Results: No harmonic or spurious emissions were detected in the restricted bands in excess of the limits of 15.205. System measurement sensitivity was –130 dBm.

Performed by: Fred Chastain, Test Technician

Page Number	13 of 37	
Name of Test:	Out of Band Emissions	
Specification:	47 CFR 15.247(c), 15.209(a)	
Spec. Limit:	See Below	
Search Antennas:	10 kHz – 32 MHz:	LOOP 94598-1
	32 MHz – 1 GHz:	SINGER DM105, $T_1T_2T_3$
	1 GHz – 18 GHz:	EMCO 3115

Limit

In any 100 kHz bandwidth outside these frequency bands, radio frequency power that is produced by the modulation products of the spreading sequence, information sequence, and the carrier frequency shall be either:
- at least 20 dB below that in any 100 kHz bandwidth within the band that contains the highest level of the desired power
or
- shall not exceed the general levels specified in 15.209(a), whichever results in the lesser attenuation. All other emissions outside these bands shall not exceed the general radiated emission limits specified in 15.209(a).

Measurements Procedure:
At first, bench tests were performed to locate the emissions around the antenna terminals.

In the field, tests were conducted over the range shown. The test sample was set up on a wooden turntable above ground, and at a distance of three meters from the antenna connected to the spectrum analyzer.

In order to obtain the maximum response at each frequency, the turntable was rotated, and the search antenna was raised and lowered. The EUT was also adjusted for maximum response.

The field strength was calculated from:

$E\ \mu V/m\ @\ 3\ m = LOG_{10}^{-1}\underline{(dBm + 107 + A.F. + C.L.)}$

The following results are worst case conditions. Tests were conducted in Horizontal and Vertical polarization.

Measurement Results: Attached

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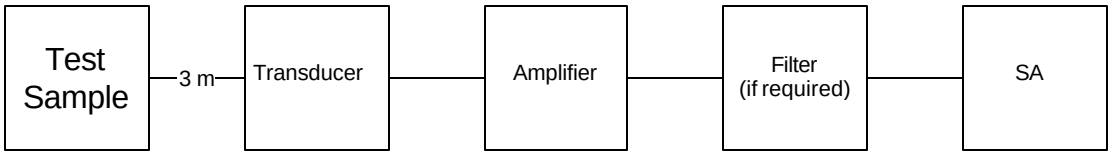
Name of Test: Spurious Radiation

Specification: 47 CFR 2.1053(a)

Measurement Setup



Test Equipment

	Asset (as applicable)	Description	s/n	Cycle (Per ANSI C63.4 -1992/2000 Draft, 10.1.4)	Last Cal
Transducer					
X	i00088	EMCO 3109-B 25MHz-300MHz	2336	24 mo.	Sep-03
	i00065	EMCO 3301-B Active Monopole	2635	24 mo.	Sep-03
X	i00089	Aprel 2001 200MHz-1GHz	001500	24 mo.	Sep-03
X	i00103	EMCO 3115 1GHz-18GHz	9208-3925	24 mo.	Jan-04
Amplifier					
X	i00028	HP 8449A	2749A00121	12 mo.	May-05
Spectrum Analyzer					
X	i00029	HP 8563E	3213A00104	12 mo.	May-05
X	i00033	HP 85462A	3625A00357	12 mo.	Sep-04
	i00048	HP 8566B	2511AD1467	12 mo.	Jun-05

Name of Test: Strength of Spurious Radiation
g0580150: 2005-Aug-24 Wed 09:45:00
State: 2:High Power
Harmonically Related:

Frequency Tuned, MHz	Frequency Emission, MHz	Meter, dBuV	CF, dB	EIRP, dBm	Margin, dB
2402.000000	4803.966666	25.67	15.30	-54.3	-13.0
2441.000000	4881.983333	19.83	15.28	-60.1	-18.9
2481.000000	4959.980000	22.57	15.25	-57.4	-16.2
2402.000000	7205.948333	26.17	17.27	-51.8	-10.6
2441.000000	7322.946666	35.07	17.84	-42.3	-1.1
2481.000000	7439.943333	33.07	18.39	-43.8	-2.5
2402.000000	9607.948333	20.83	23.11	-51.3	-10.1
2441.000000	9763.946666	21.73	22.90	-50.6	-9.4
2481.000000	9919.943333	19.40	22.68	-53.1	-11.9
2402.000000	12009.948333	16.67	26.95	-51.6	-10.4
2441.000000	12204.947999	13.23	25.14	-56.9	-15.6
2481.000000	12399.943333	18.07	23.35	-53.8	-12.6
2402.000000	14411.948333	16.00	22.57	-56.7	-15.4
2441.000000	14645.947999	14.07	23.75	-57.4	-16.2
2481.000000	14879.943333	18.73	26.53	-50.0	-8.7
2402.000000	16813.948333	17.00	19.94	-58.3	-17.1
2441.000000	17086.947999	15.40	18.64	-61.2	-20.0
2481.000000	17359.943333	14.40	21.48	-59.3	-18.1

Digital Scan:

g0580130: 2005-Aug-23 Tue 07:30:00
State: 0:General

Frequency Emission, MHz	Level, dBuV	@ m	C.F., dB	µV/m	@ m	Margin, dB
36.000000	14.60	3	11.57	20.35	3	-13.8
36.300000	14.63	3	11.63	20.56	3	-13.7
36.800000	13.74	3	11.73	18.77	3	-14.5
46.210000	14.42	3	12.27	21.60	3	-13.3
48.000000	17.05	3	12.07	28.58	3	-10.9
50.000000	15.34	3	11.83	22.83	3	-12.8
54.944000	16.45	3	10.95	23.44	3	-12.6
69.310000	14.49	3	7.93	13.21	3	-17.6
72.000000	16.66	3	7.60	16.33	3	-15.7
73.088000	17.44	3	7.51	17.68	3	-15.1
75.000000	13.76	3	7.34	11.35	3	-18.9
84.000000	14.28	3	7.49	12.26	3	-18.2
109.376000	17.13	3	10.48	24.02	3	-15.4
115.520000	14.38	3	10.92	18.41	3	-17.7
120.000000	14.43	3	11.22	19.16	3	-17.4
125.000000	21.90	3	11.55	47.04	3	-9.6
127.520000	16.53	3	11.62	25.56	3	-14.9
138.620000	14.69	3	11.94	21.45	3	-16.4
145.664000	14.46	3	12.12	21.33	3	-16.4
150.000000	9.55	3	12.23	12.27	3	-21.2

Frequency Emission, MHz	Level, dBuV	@ m	C.F., dB	µV/m	@ m	Margin, dB
150.000000	16.18	3	12.23	26.33	3	-14.6
161.730000	12.15	3	12.14	16.39	3	-18.7
163.808000	10.49	3	12.13	13.52	3	-20.4
175.000000	9.59	3	12.10	12.15	3	-21.3
200.000000	11.41	3	13.83	18.28	3	-17.8
225.000000	12.48	3	15.35	24.63	3	-18.2
231.040000	16.75	3	15.66	41.73	3	-13.6
250.000000	21.09	3	16.66	77.18	3	-8.3
260.820000	14.22	3	18.83	44.93	3	-13.0
275.000000	15.65	3	21.47	71.78	3	-8.9
300.000000	12.32	3	15.28	23.99	3	-18.4
350.000000	16.01	3	16.43	41.88	3	-13.6
400.000000	15.63	3	17.49	45.29	3	-12.9
450.000000	8.44	3	18.32	21.78	3	-19.2
500.000000	9.67	3	18.98	27.07	3	-17.4
521.618000	13.60	3	20.24	49.20	3	-12.2
600.000000	14.95	3	24.82	97.39	3	-6.2
782.438000	12.62	3	25.33	78.98	3	-8.1
800.000000	9.40	3	25.10	53.09	3	-11.5
900.000000	11.37	3	26.12	74.90	3	-8.5
999.978000	10.45	3	30.36	109.77	3	-13.2

Performed by: Fred Chastain, Test Technician

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Name of test: Environmental Assessment

Included in MPE Assessment of main unit as this a composite device.

Supervised By: David E. Lee, Quality Assurance Manager

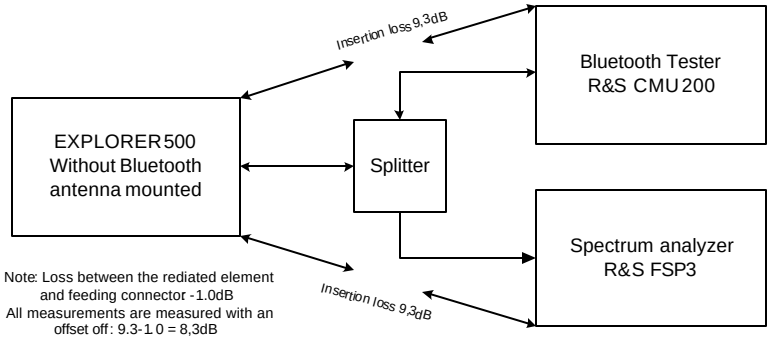
Direct Sequence Spread Spectrum (Emission Masks)

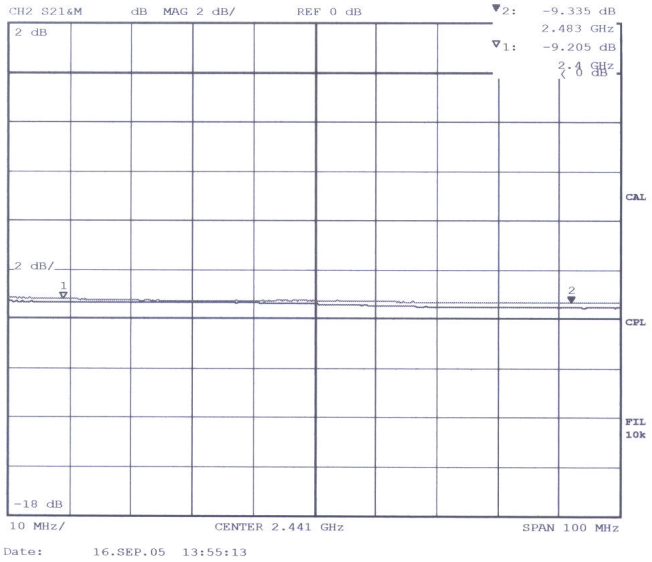
The Bluetooth transceiver uses the RF Micro Devices / Silicon Wave SiW 3500 Chip

The SiW3500 single-chip IC is a complete Bluetooth wireless communications system on a single CMOS chip. The highly integrated IC combines a direct conversion radio modem with an ARM7TDMI core processor, Bluetooth baseband logic, and complete protocol software in ROM. All active RF components have been integrated making it a low total cost solution. The SiW3500 features an on-chip RF match circuit that allows direct insertion onto a PCB (no need for a module). It has been optimized for mobile phones and other battery powered devices. The SiW3500 is Bluetooth Specification Version 1.2 qualified (Certificate B02153) and therefore and meets the spectral density, occupancy and hopping requirements of 15.247

In this application the SiW 3500 is followed by a HPA to make it a Class 1 Bluetooth device (100mW) and the following plots are provided to confirm the emissions after amplification.

Test Equipment





Plot of Insertion Loss between Explorer 500 and CMU 220 / FSP3

R&S Spectrum analyzer FSP3 type 1093.4495.03 serial no.833387/004
R&S Bluetooth tester CMU200 type 1100.0008.53 serial no. 100061

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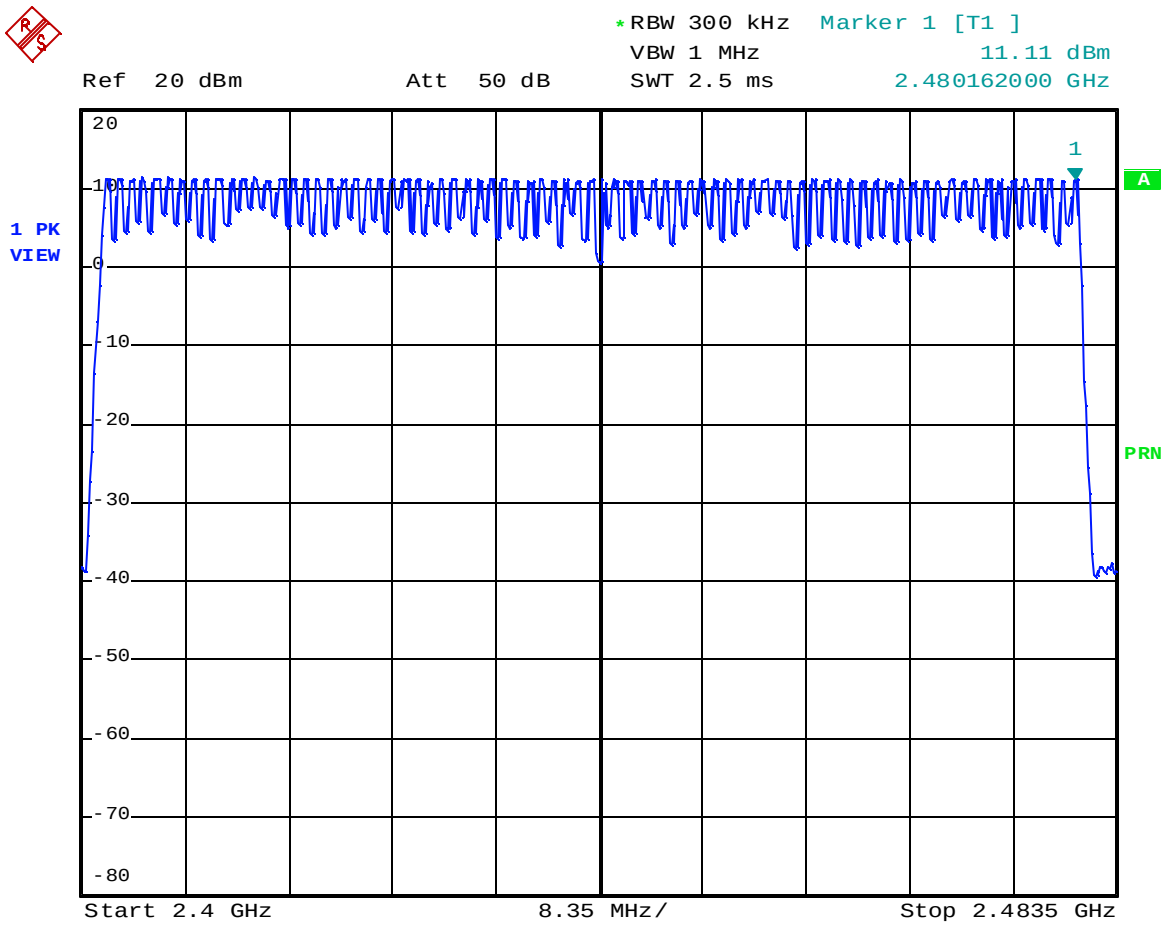
15.247(a)(1) Number of Hopping Channels (79)



Date: 23.SEP.2005 09:03:05

ATTESTED BY: David E. Lee, Quality Assurance Manager

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15.247(a)(1) Additional Information on Bluetooth Protocol

2.2.2 Hopping characteristics

The basic piconet physical channel is characterized by a pseudo-random hopping through all 79 RF channels. The frequency hopping in the piconet physical channel is determined by the Bluetooth clock and BD_ADDR of the master. When the piconet is established, the master clock is communicated to the slaves. Each slave shall add an offset to its native clock to synchronize with the master clock. Since the clocks are independent, the offsets must be updated regularly. All devices participating in the piconet are time-synchronized and hop-synchronized to the channel.

The basic piconet physical channel uses the basic channel hopping sequence and is described in Section 2.6 on page 70.

2.2.3 Time slots

The basic piconet physical channel is divided into time slots, each 625 µs in length. The time slots are numbered according to the most significant 27 bits of the Bluetooth clock CLK_{27-1} of the piconet master. The slot numbering ranges from 0 to 2^{27}-1 and is cyclic with a cycle length of 2^{27}. The time slot number is denoted as k.

A TDD scheme is used where master and slave alternatively transmit, see Figure 2.1 on page 54. The packet start shall be aligned with the slot start. Packets may extend over up to five time slots.

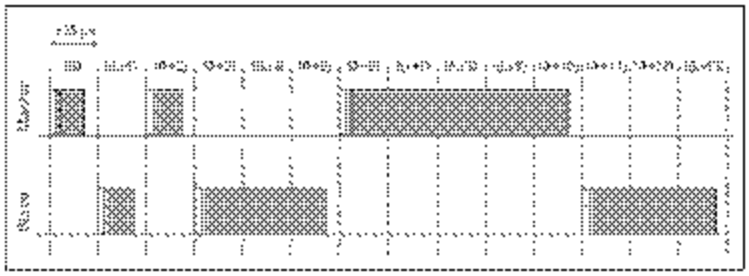

Figure 2.6: Multi-slot packets

The term *slot pair* is used to indicate two adjacent time slots starting with a master-to-slave transmission slot.

ATTESTED BY: David E. Lee, Quality Assurance Manager

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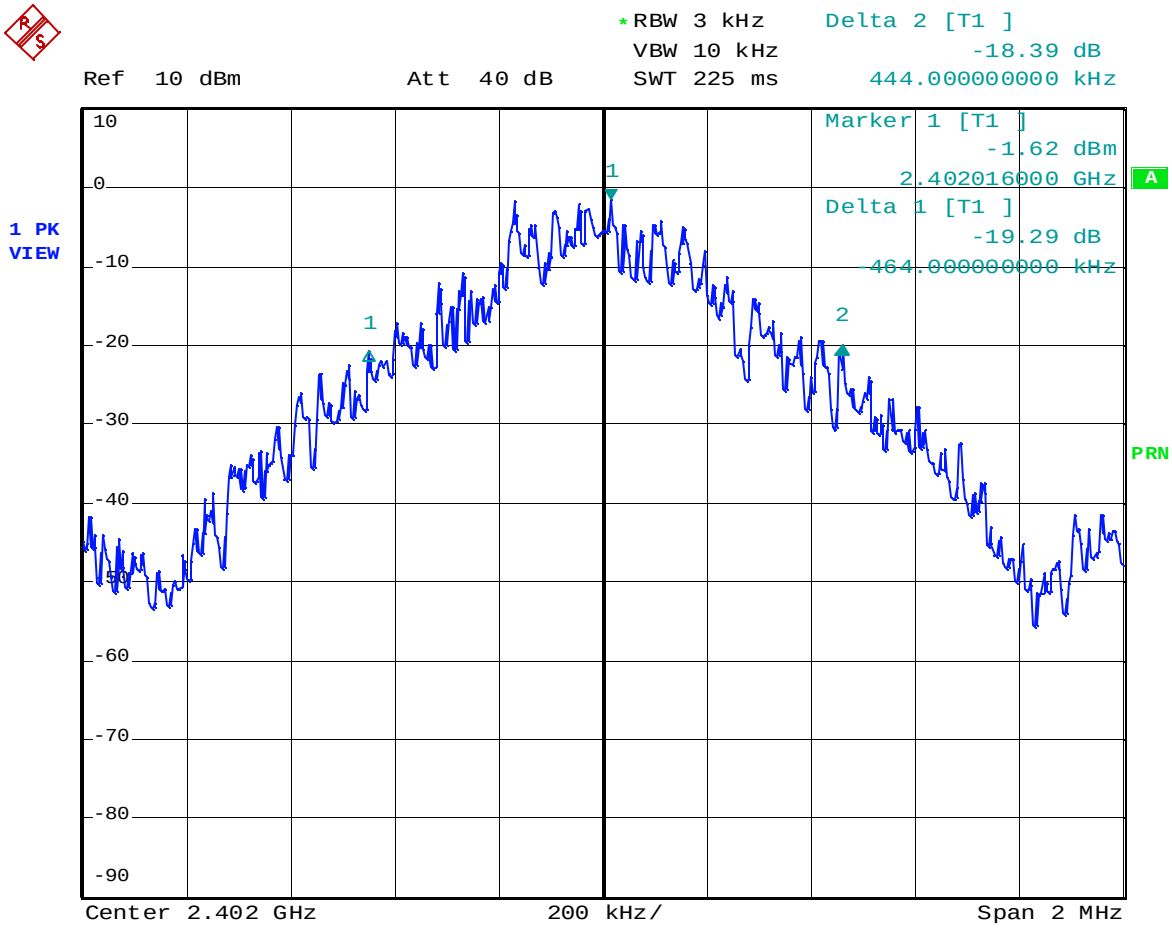
15.247(a)(1) 20dB Bandwidth (Low Channel)



Date: 23.SEP.2005 09:24:07

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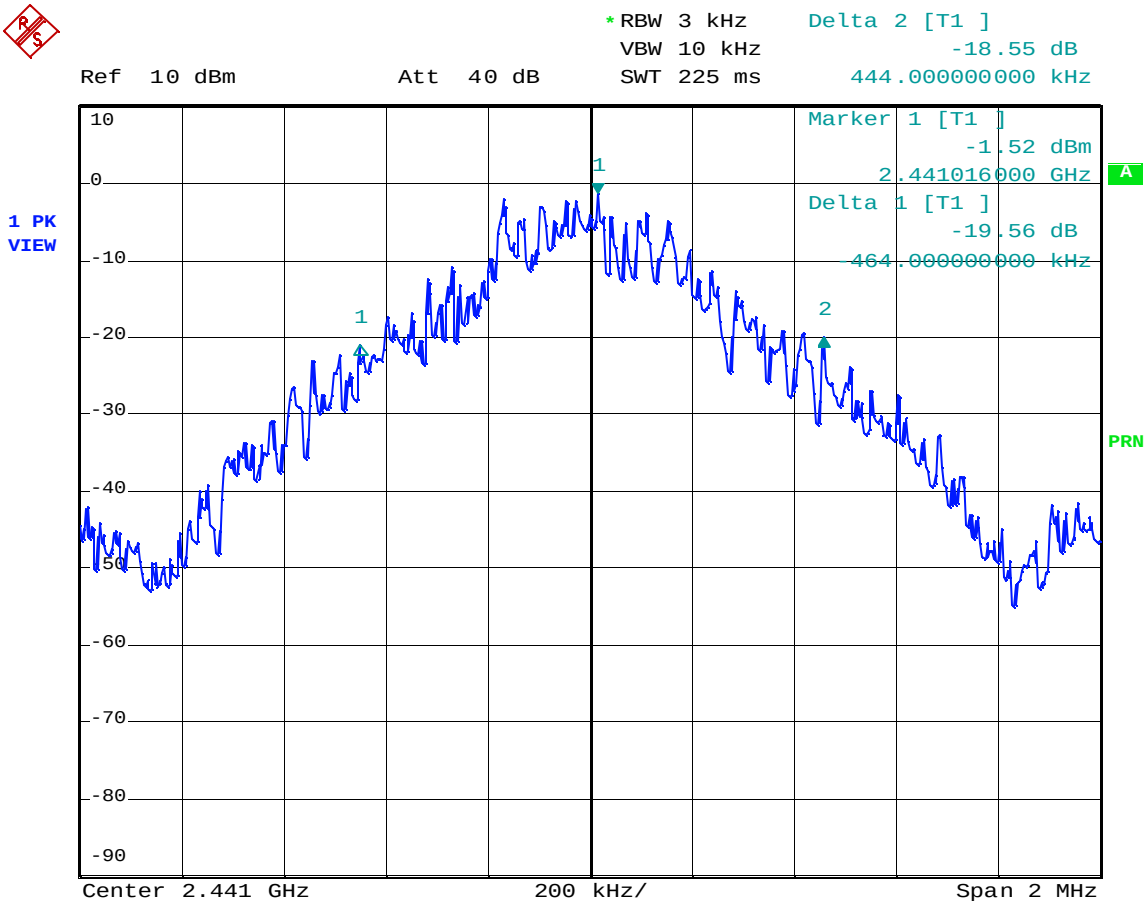
15.247(a)(1) 20dB Bandwidth (Mid Channel)



Date: 23.SEP.2005 09:18:43

ATTESTED BY: David E. Lee, Quality Assurance Manager

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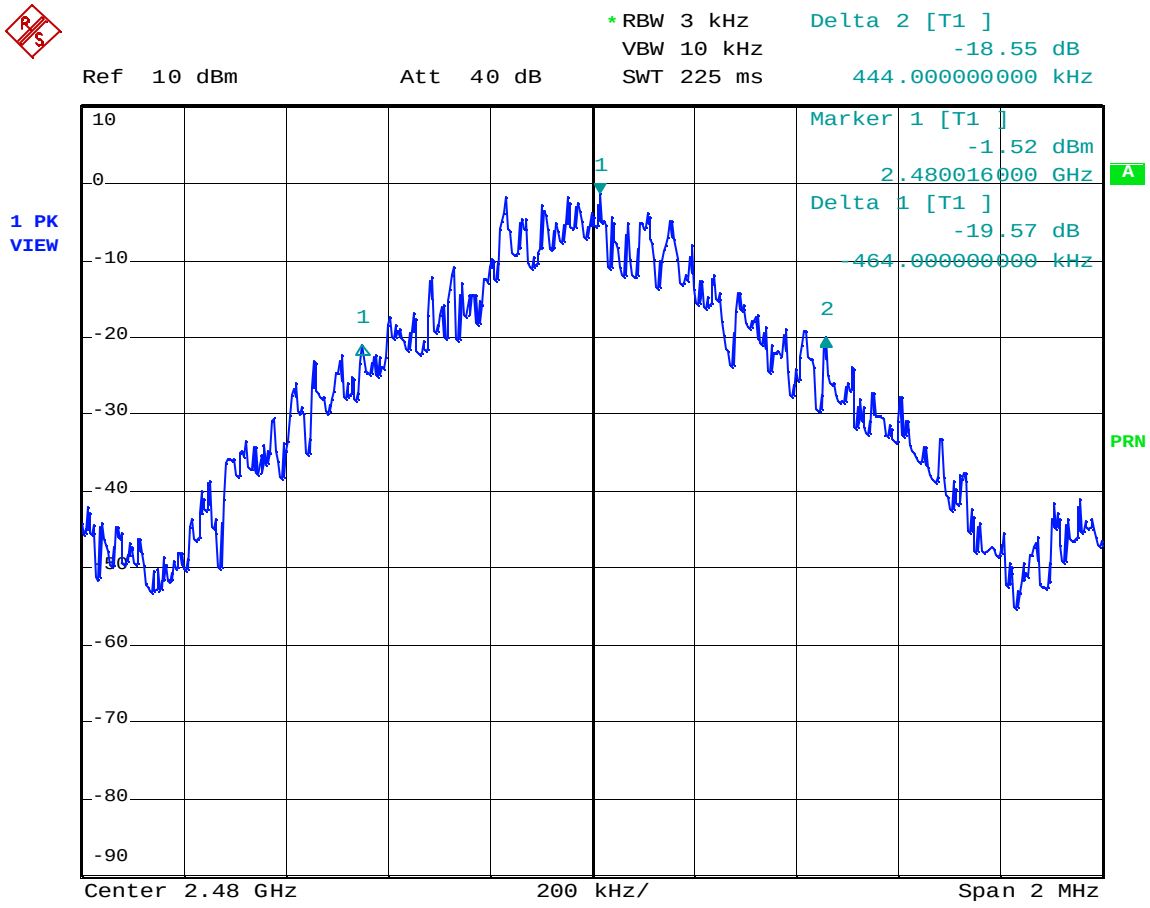
15.247(a)(1) 20dB Bandwidth (High Channel)



Date: 23.SEP.2005 09:31:47

ATTESTED BY: David E. Lee, Quality Assurance Manager

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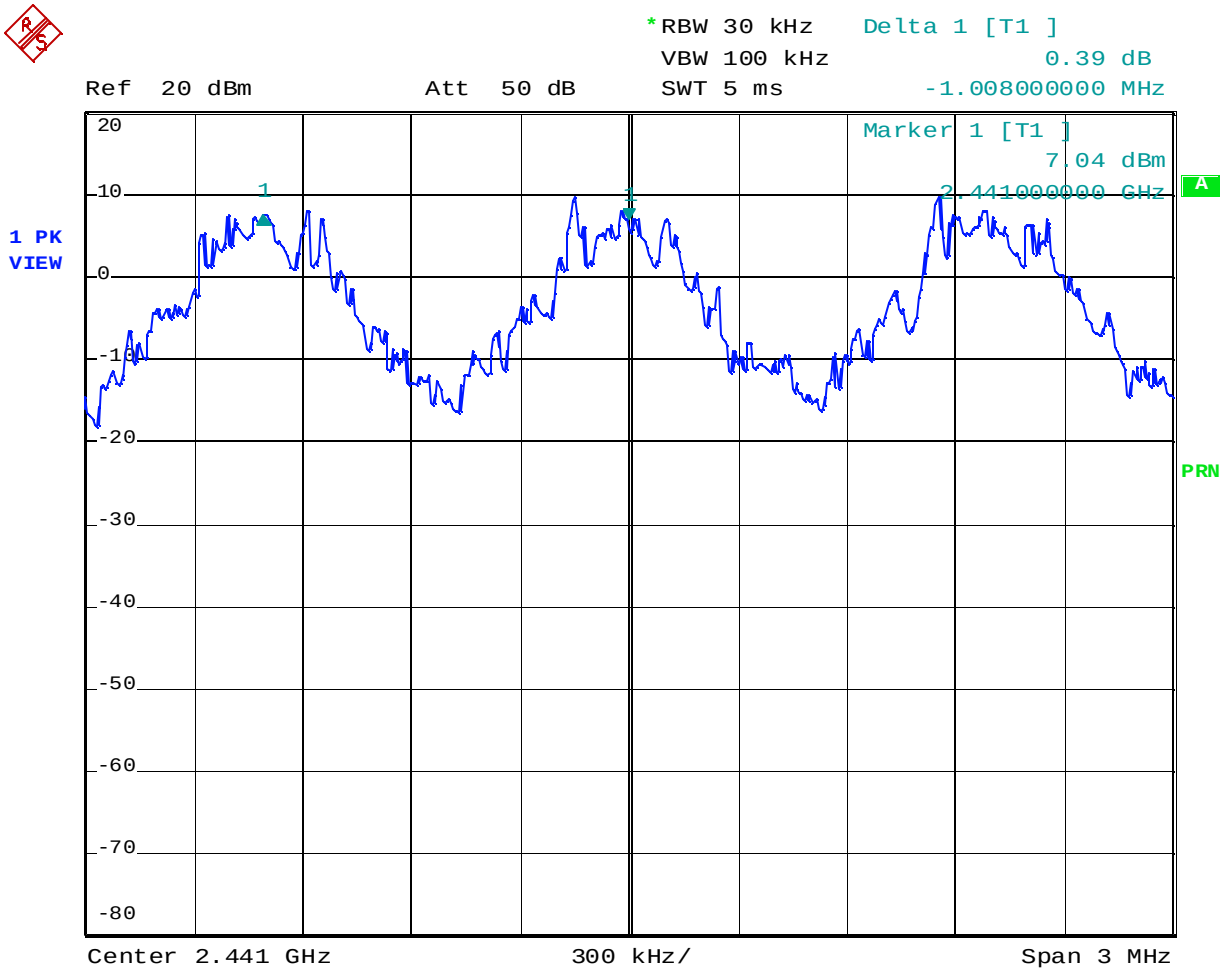
15.247(a)(1) Carrier Frequency Separation



Date: 23.SEP.2005 10:22:44

ATTESTED BY: David E. Lee, Quality Assurance Manager

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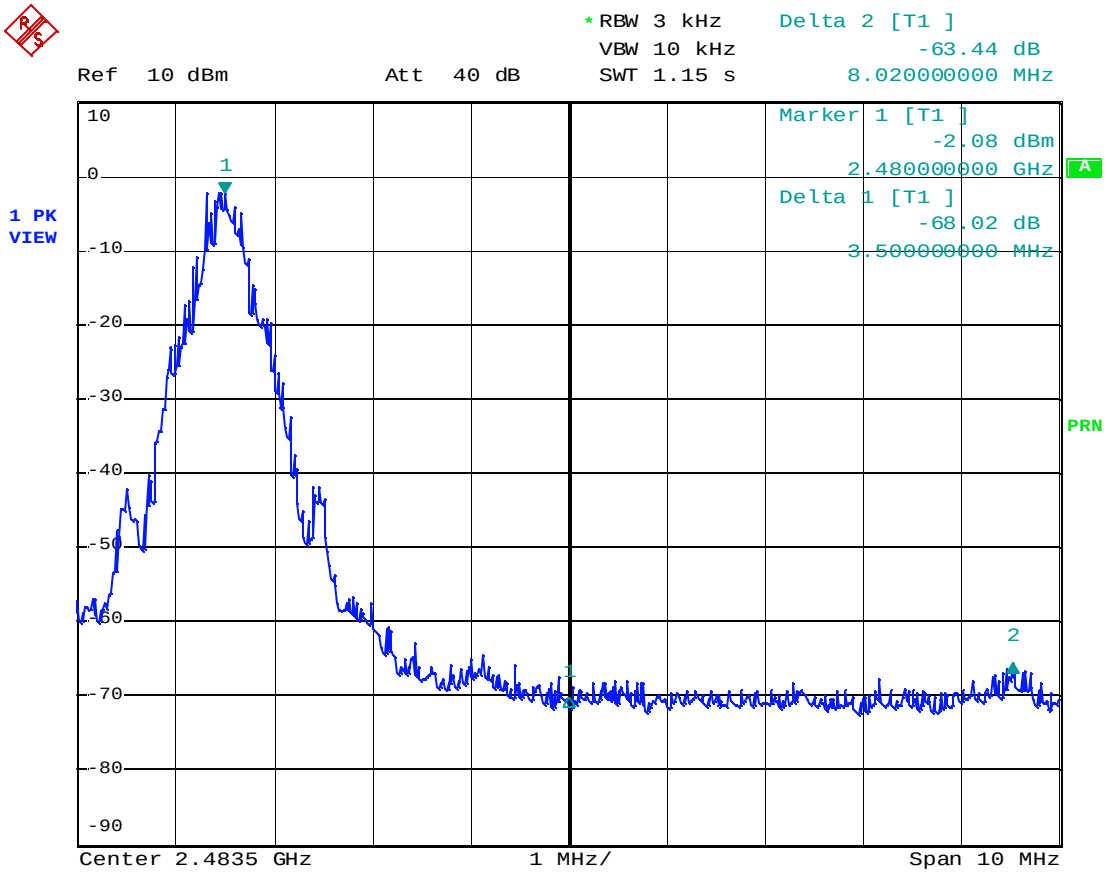
15.247(a)(1) Band Edge above 2483.5MHz



Date: 23.SEP.2005 09:47:26

Cable loss is 8.3dB – add to max reading

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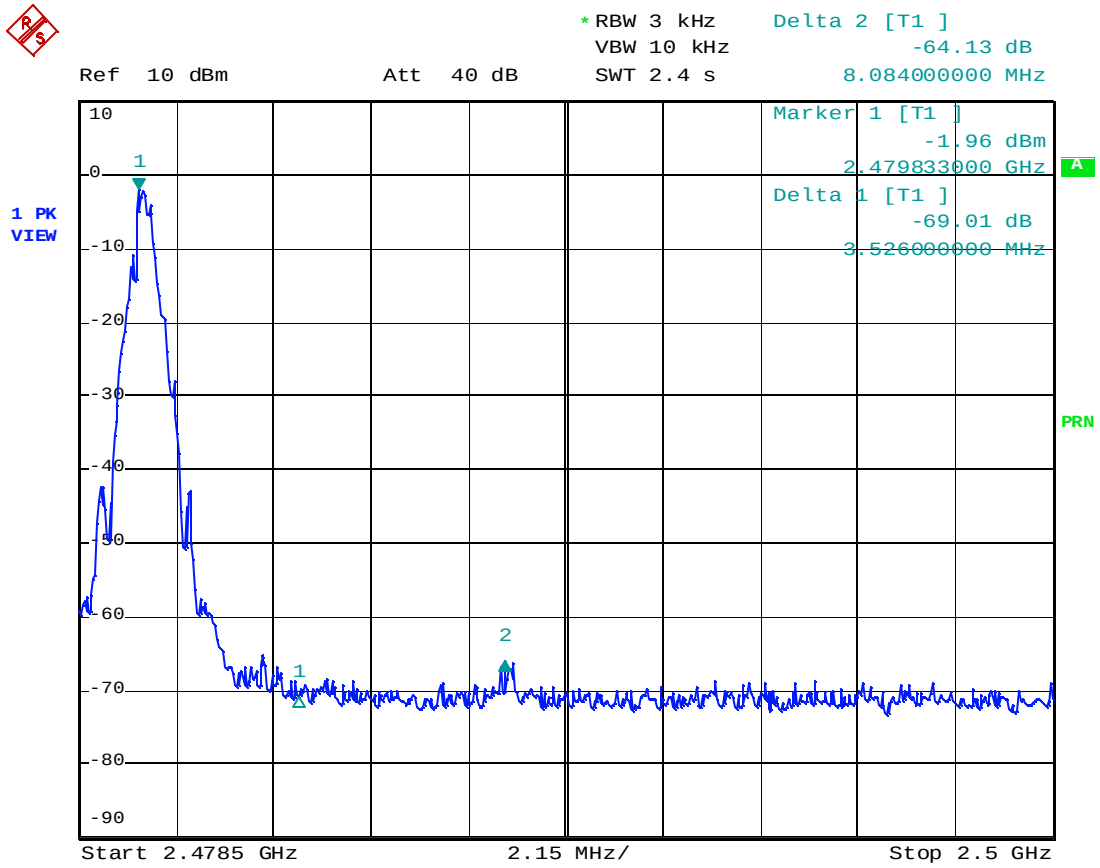
15.247(a)(1) Band Edge 2483.5MHz to 2500MHz



Date: 23.SEP.2005 09:56:54

Cable loss is 8.3dB – add to max reading

ATTESTED BY: David E. Lee, Quality Assurance Manager

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15.247(a)(1)(iii) Dwell Time - Overview

On the physical layer 3 types of bursts is used in the Bluetooth standard. These can be seen below on “page 73 of 790”

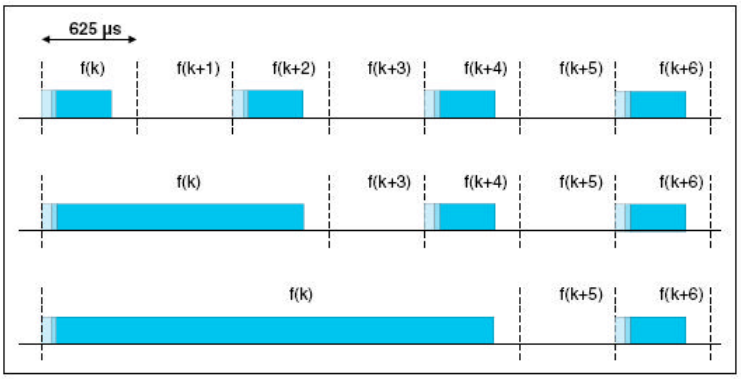

Figure 2.14: Single- and multi-slot packets.

When the adapted channel hopping sequence is used, the pseudo-random sequence contains only frequencies that are in the RF channel set defined by the *AFH_channel_map* input. The adapted sequence has similar statistical properties to the non-adapted hop sequence. In addition, the slave responds with its packet on the same RF channel that was used by the master to address that slave (or would have been in the case of a synchronous reserved slot without a validly received master-to-slave transmission). This is called the *same channel mechanism* of AFH. Thus, the RF channel used for the master to slave packet is also used for the immediately following slave to master packet. An example of the same channel mechanism is illustrated in Figure 2.15 on page 73. The same channel mechanism shall be used whenever the adapted channel hopping sequence is selected.

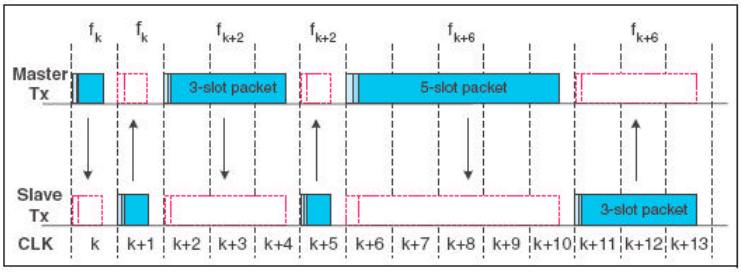

Figure 2.15: Example of the same channel mechanism.

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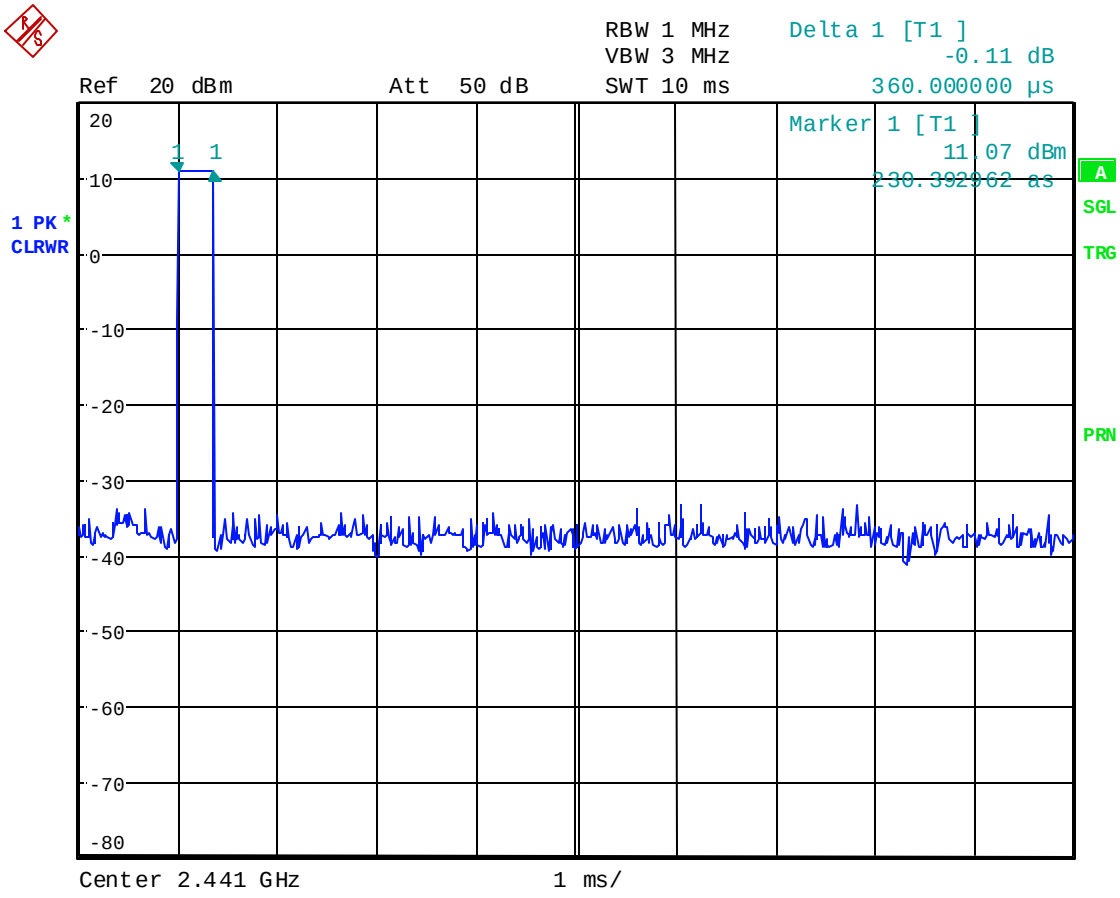
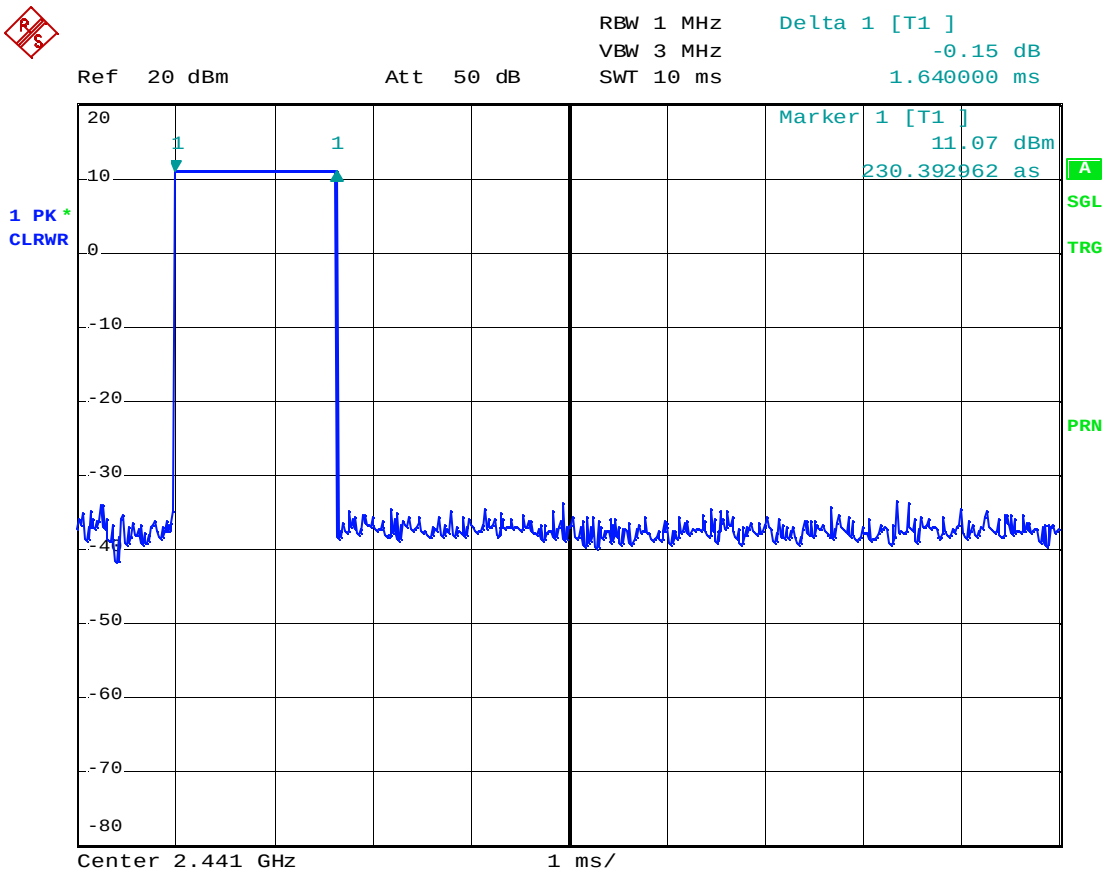
15.247(a)(1)(iii) Dwell Time – DH 1 (1 burst long)



Date: 23.SEP.2005 12:43:36

ATTESTED BY: David E. Lee, Quality Assurance Manager

15.247(a)(1)(iii) Dwell Time – DH 3 (3 burst long)



Date: 23.SEP.2005 12:42:10

ATTESTED BY: David E. Lee, Quality Assurance Manager

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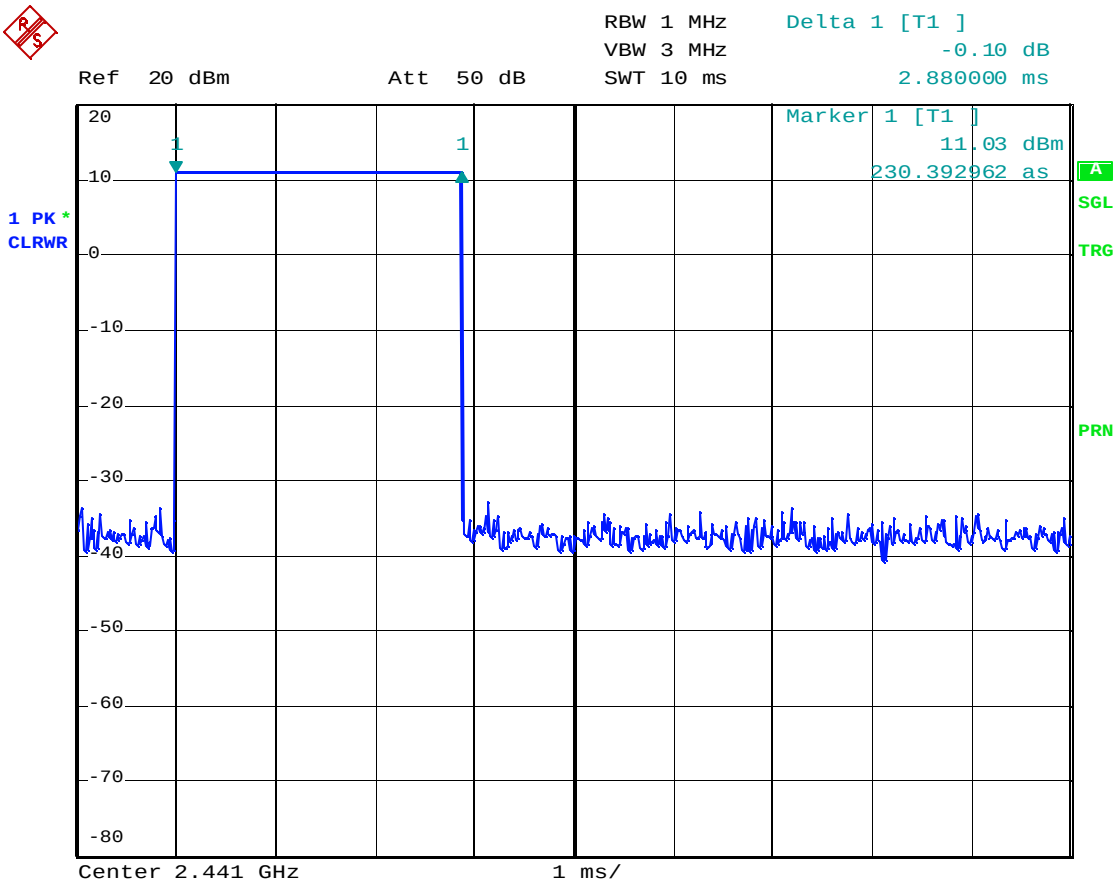
15.247(a)(1)(iii) Dwell Time – DH 5 (5 burst long)



Date: 23.SEP.2005 12:40:45

ATTESTED BY: David E. Lee, Quality Assurance Manager

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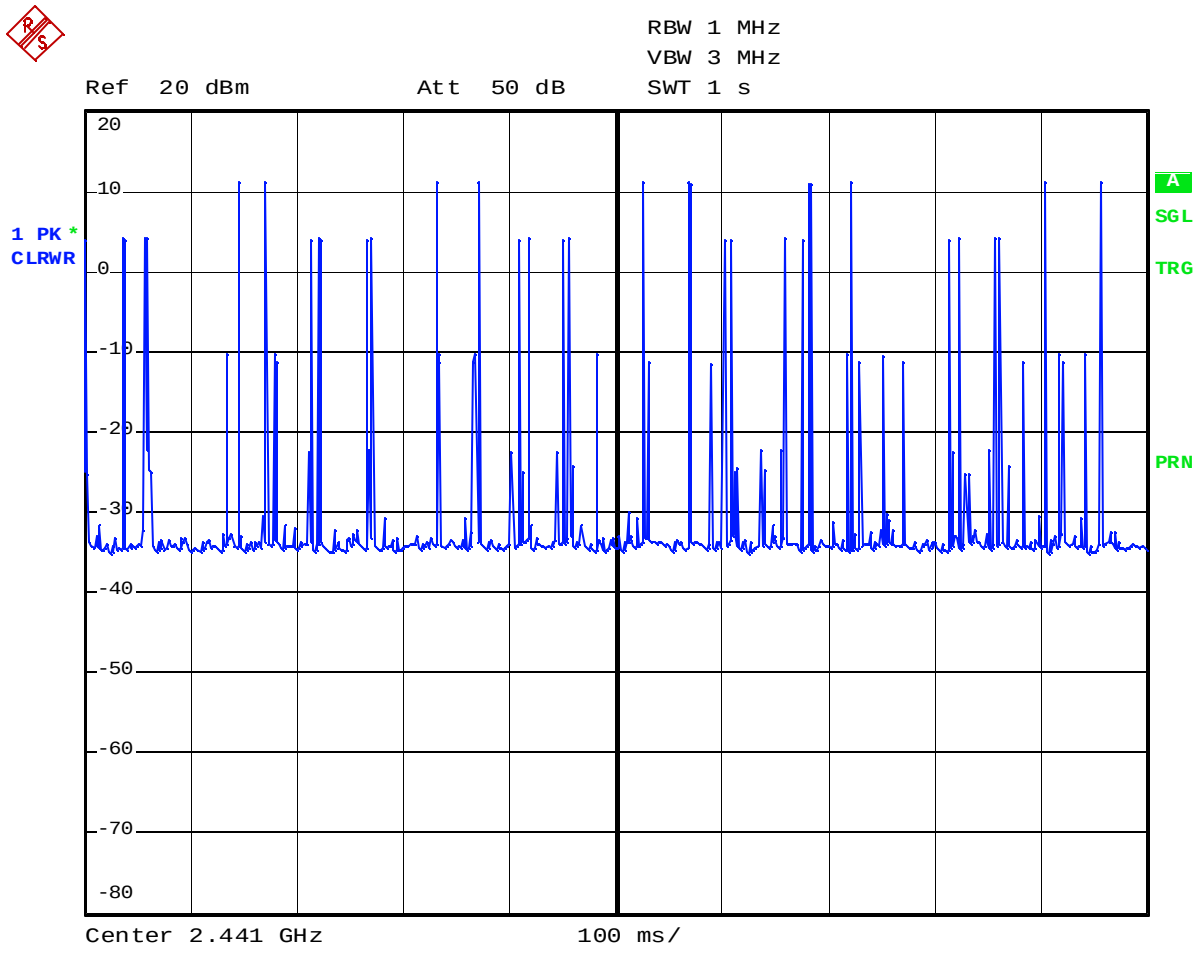
15.247(a)(1) Burst Rate DH1 (10 bursts)

As seen in the Bluetooth standard "page 73 of 790", when a transmitter is transmitting continually DH1 bursts 800 bursts are sent per second. The 800 bursts are pseudo-random hopping through all 79 Channels. Therefore the average bursts at each RF channel is equal 800/79 per second.



Date: 23.SEP.2005 12:49:09

ATTESTED BY: David E. Lee, Quality Assurance Manager

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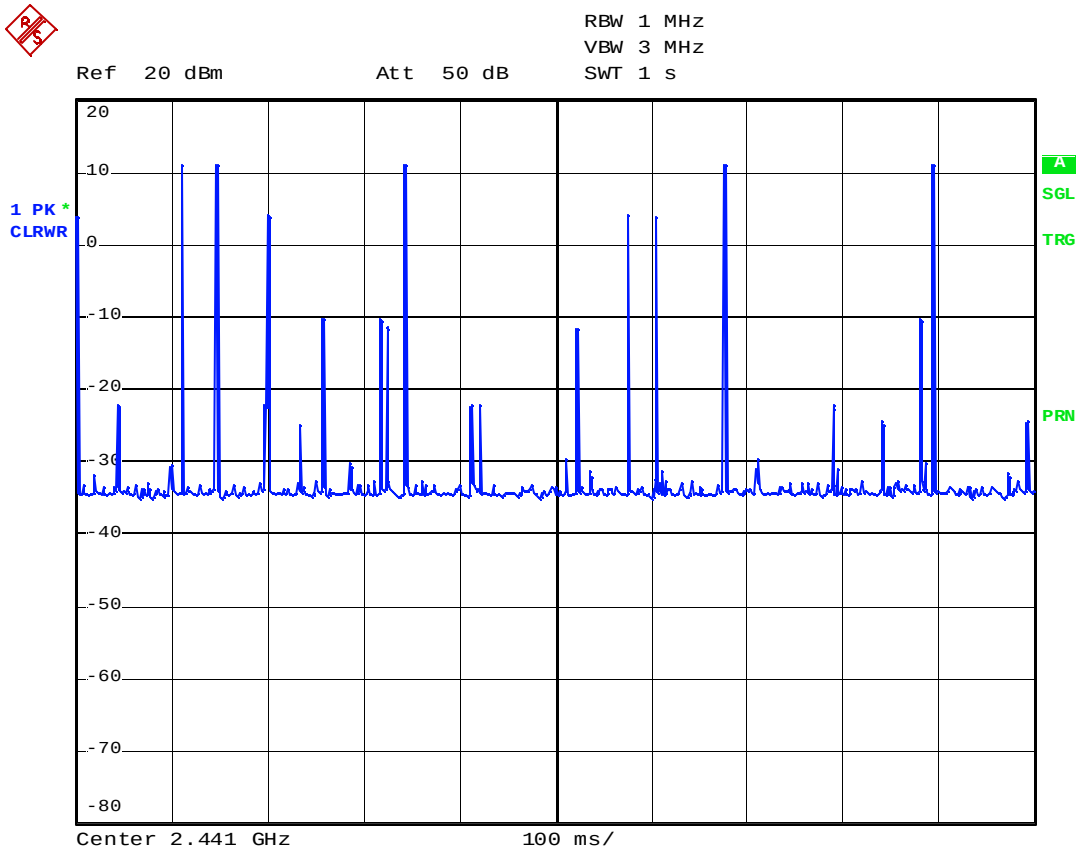
15.247(a)(1) Burst Rate DH3 (5 bursts)

The same calculation can be done on DH3, when a transmitter is transmitting continually DH3 bursts. 400 bursts are sent per second. The 400 bursts are pseudo-random hopping through all 79 Channels. Therefore the average bursts at each RF channel is equal 400/79 per second.

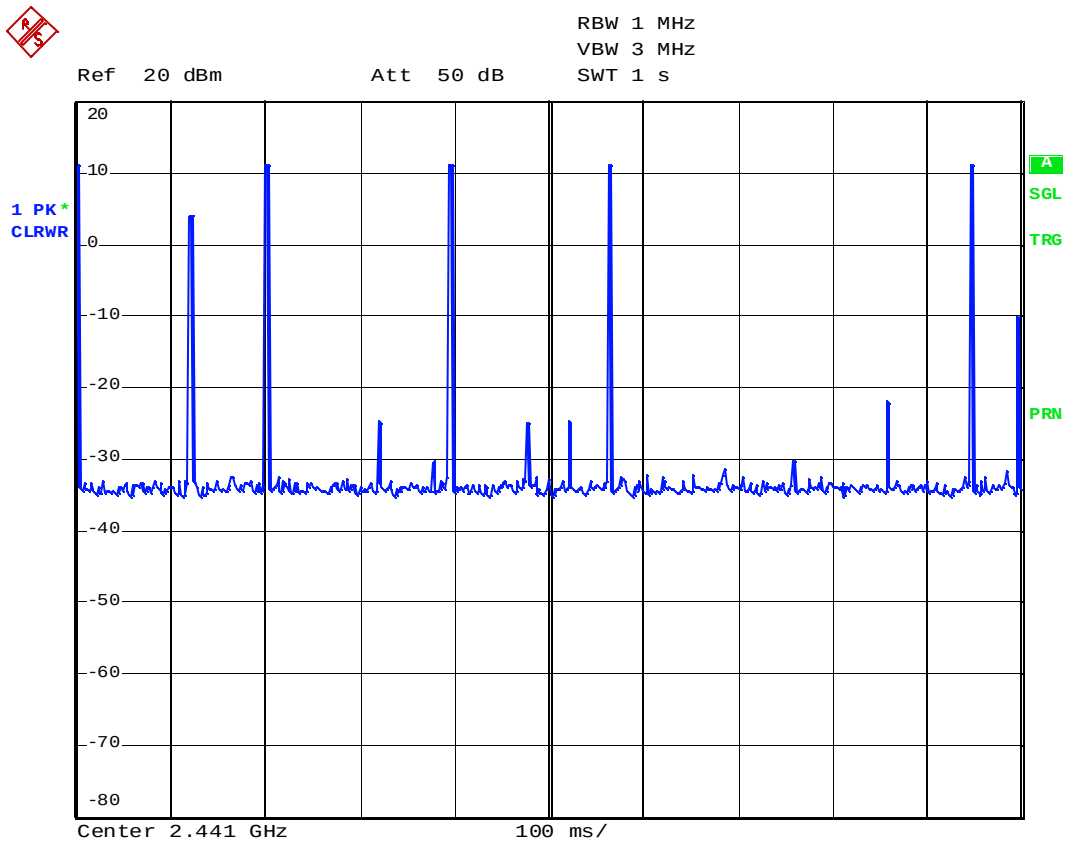


Date: 23.SEP.2005 12:55:24

ATTESTED BY: David E. Lee, Quality Assurance Manager

15.247(a)(1) Dwell Time – DH 5 (3 bursts)

The same calculation can be done on DH5, when a transmitter is transmitting continually DH5 bursts. 267 bursts are sent per second. The 267 bursts are pseudo-random hopping through all 79 Channels. Therefore the average bursts at each RF channel is equal 267/79 per second.



Date: 23.SEP.2005 12:58:19

ATTESTED BY: David E. Lee, Quality Assurance Manager

Page Number	34 of 37
Name of Test:	A/C Powerline Conducted Emissions
Specification:	FCC: 47 CFR 15.107
Guide:	ANSI C63.4-1992/2000
Test Conditions:	S. T. & H.
Test Equipment:	As per attached page

Measurement Procedure

1. The EUT was arranged in accordance with ANSI C63.2-1992/2000.

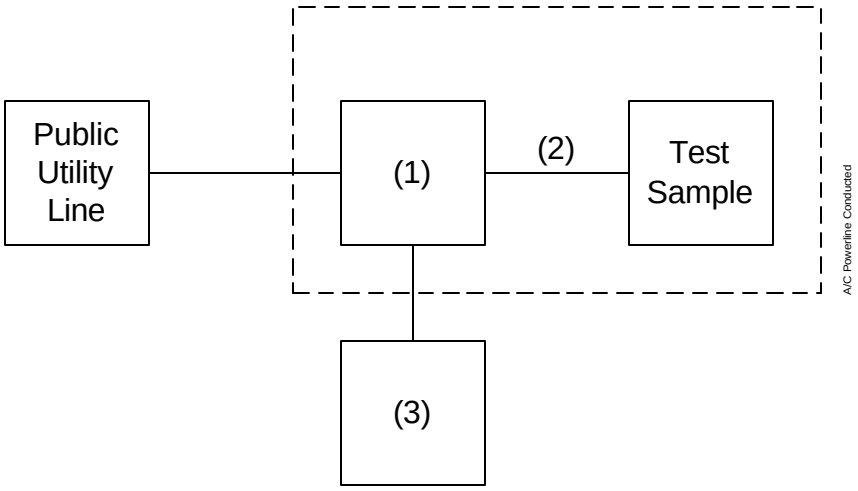
2. A test sample was connected to the Public Utility lines through a LISN 50 μH).

3. A reference level of 250 μV was set on the Spectrum Analyzer. The spectrum was searched over the range of 150 kHz to 30 MHz.

4. All other emissions were 20 dB or more below limit.

5. Measurement Results: Attached.

AC Powerline Conducted Measurements



	Asset	Description	s/n	Cycle	Last Cal
(1) **Line Impedance Stabilization Network**					
X	i00244	Fischer 50-20-2-01	2047	NCR	
(2) **Screen Room**					
X	i00170	Lindgren LG170	4999	NCR	
(3) **Spectrum Analyzer**					
X	i00033	HP 85462A	3625A00357	12 mo.	Oct-04
	i00048	HP 8566B	2511AD1467	12 mo.	May-05

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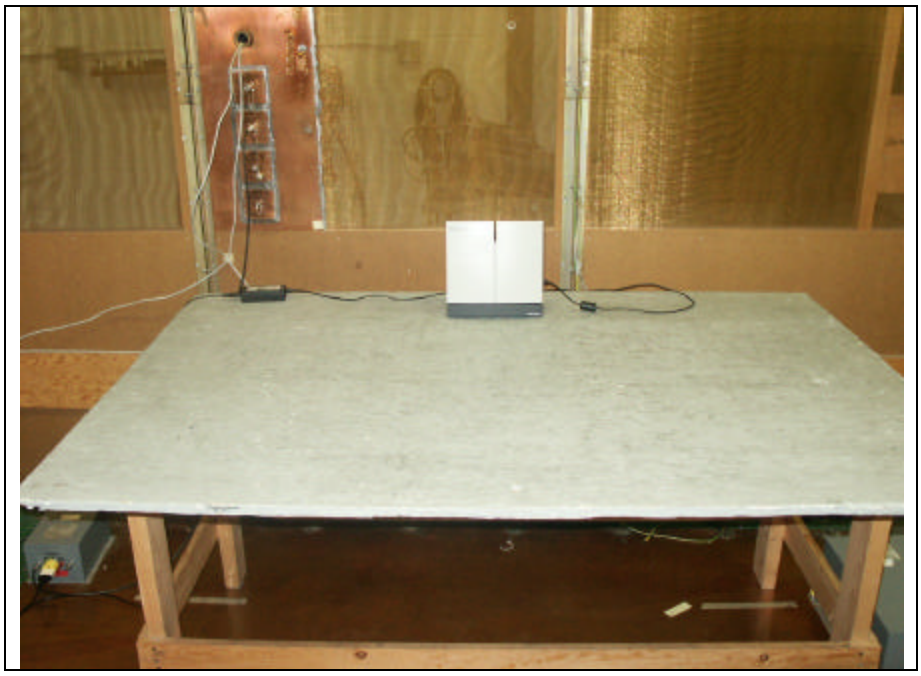
Photograph(s) of Test Setup for Highest Emissions

Test Setup: A/C Powerline Conducted Emissions



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Name of Test: A/C Powerline Conducted Emissions

47 CFR 15.107(a): A/C Powerline Conducted Emission Limits

Inmarsat and Bluetooth operating:

15.107(a) **Class B Conducted Limits**

Frequency of Emission, MHz	µV	dBuV
0.150 - 30	250	48

g0580131: 2005-Aug-23 Tue 08:21:00 : Line

Frequency Tuned, MHz	Frequency Emission, MHz	Level, dBuV	C.F., dB	µV/m
1643.500 / 2445.000	0.150000	46.74	-8.11	85.00
1643.500 / 2445.000	2.310000	41.89	-8.96	44.31
1643.500 / 2445.000	4.400000	41.27	-8.82	41.93
1643.500 / 2445.000	16.270000	33.56	-8.10	18.75
1643.500 / 2445.000	22.020000	38.5	-7.76	34.43
1643.500 / 2445.000	28.360000	25.58	-7.57	7.95

g0580132: 2005-Aug-23 Tue 08:29:00 Neutral

Frequency Tuned, MHz	Frequency Emission, MHz	Level, dBuV	C.F., dB	µV/m
1643.500 / 2445.000	0.220000	46.65	-8.61	79.00
1643.500 / 2445.000	3.060000	39.47	-8.90	33.77
1643.500 / 2445.000	4.480000	40.69	-8.81	39.26
1643.500 / 2445.000	15.900000	50.21	-8.15	126.77
1643.500 / 2445.000	21.870000	44.82	-7.75	71.37
1643.500 / 2445.000	26.490000	30.39	-7.67	13.68

Performed by: Fred Chastain, Test Technician

Radiated Measurements
For Part 15 Transmitters with Integral Antennas

Radiated Measurements

Range Of Measurement	Specification	Resolution B/W	Video B/A
30 to 1000 MHz	CISPR	=100 kHz	=100 kHz
>1000 MHz	FCC, 15.37(b)	1 MHz	=1 MHz
(if averaging)	FCC, 15.37(b)	1 MHz	10 Hz

Measuring Equipment

a. **Antennas**:

EMCO 3109	20 - 300 MHz
APREL AALP2001	200 - 1000 MHz
APREL AAB20200	20 - 200 MHz
APREL AAH118	1 - 18 GHz

b. **Instruments**:

HP8566B	Spectrum Analyzer
HP85685A	Preselector, w/ preamp below 2 GHz
HP85650A	Quasi Peak Adapter
HP8449	Preamp, above 2 GHz
HP8563E	Spectrum Analyzer, above 2 GHz

Occupied Bandwidth

Occupied Bandwidth is measured as a radiated signal without attenuators and/or filter. RBW, VBW and scan settings as shown were set to produce a meaningful result in accordance with ANSI C63.4, Section 13.1.7.

Part 15.21, Information To User

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly avoided by the party responsible for compliance could void the user's authority to operate the equipment.

§ 15.205 Restricted Bands of Operation

(a) Except as shown in paragraph (b) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.25
0.495-0.505	16.69475-16.69625	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-339.4	3600-4400	
13.36-13.41			

Testimonial
And
Statement Of Certification

This is to certify that:

1. **That** the application was prepared either by, or under the direct supervision of, the undersigned.

2. **That** the technical data supplied with the application was taken under my direction and supervision.

3. **That** the data was obtained on representative units, randomly selected.

4. **That**, to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data are true and correct.

Certifying Engineer: David E. Lee, Quality Assurance Manager