MEASUREMENT REPORT
of
Bluetooth Modem

Applicant : WELL Communication Corp.

EUT : External Conexant 56K Data/Fax Bluetooth Modem

Model No. : BT-56SA-SCD1; XBT-AM2; AMB-RE01

FCC ID : JCHBT56SASCD1

Report No. : W0115703

Tested by :

Training Research Co., Ltd.

TEL : 886-2-26935155 FAX : 886-2-26934440

No. 255, Nanyang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C.

CERTIFICATION

We here by verify that:

The test data, data evaluation, test procedures and equipment configurations shown in this report were made mainly in accordance with the procedures given in ANSI C63.4 (1992) as a reference. All test were conducted by ***Training Research Co., Ltd.***, No. 255, Nanyang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C. Also, we attest to the accuracy of each.

We further submit that the energy emitted by the sample EUT tested as described in the report is **in compliance with** the technical requirements set forth in the FCC Rules Part 15 Subpart C Section 15.247.

Applicant	:	WELL Communication Corp.
Applicant address	:	11F, No. 788, Chung Cheng Rd., Chung Ho City, Taipei Hsien, Taiwan, R.O.C.
Product name	:	External Conexant 56K Data/Fax Bluetooth Modem
Model name	:	BT-56SA-SCD1; XBT-AM2; AMB-RE01
FCC ID	:	JCHBT56SASCD1
Report No.	:	W0115703
Test Date	:	May 30, 2003

Prepared by: Jack Tsai **Approved by:** Frank Tsai

Conditions of issue :

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(2) ***This report must not be used by the client to claim product endorsement by NVLAP or any agency of U.S. Government.***

★ ***NVLAP LAB CODE: 200174-0***

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Ⅰ. GENERAL

1.1 Introduction

The following measurement report is submitted on behalf of applicant supporting that the *Bluetooth modem* certification in accordance with Part 2 Subpart J and Part 15 Subpart A and C of the Commission's Rules and Regulations.

1.2 Description of EUT

Product Name	:	External Conexant 56K Data/Fax Bluetooth Modem
Model Name	:	BT-56SA-SCD1; XBT-AM2; AMB-RE01
Granted FCC ID	:	JCHBT56SASCD1
Frequency Range	:	2400MHz to 2483.5MHz
Support Channel	:	80 Channels
Channel Spacing	:	1 MHz
Modulation Skill	:	GFSK
Power Type	:	Powered by the AC Adapter; Model No.: MW41-0900800A ; I/P: 120VAC, 60Hz ; O/P: 9VAC, 800mA
Power Cable	:	193cm long, non-shielded, no ferrite core
Data Cable	:	7 feet long, non-shielded, no ferrite core

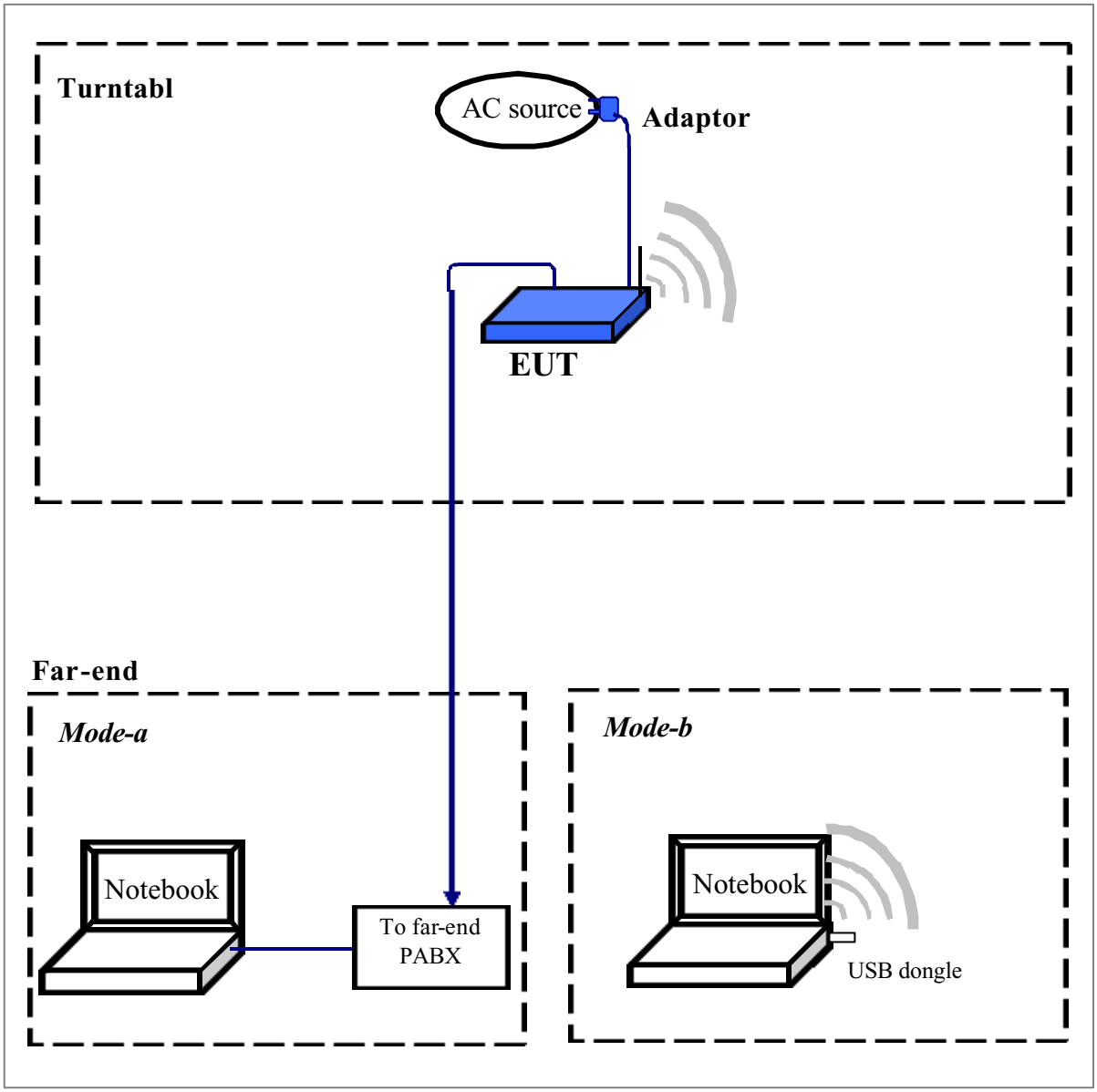
1.3 Test method

1. The notebook PC and test fixture is connected by RS-232 cable then test jig connected to EUT as setting test mode.
2. The Notebook PC and test fixture is moving when test mode set finish. The software provided by the manufacturer, the test is performed under those specific conditions.
3. Set different channel being tested and repeat the procedures above.
   (a) Radiated for intentional test: making EUT to the mode of continuous transmission
   (b) Conducted test: making EUT to the linking (Rx/Tx) mode with far-end USB dongle.

1.4 Description of Support Equipment

PABX	**:**	**King Design**
Model No.	:	KD8705-A
Serial No.	:	GV101101186
Power type	:	Linear
Power Cord	:	Non-shielded, 1.8m long, no ferrite bead
Notebook	**:**	**IBM Think Pad X20**
Model No.	:	2662-11T
Serial No.	:	FX-1192200/09
FCC ID	:	N/A, Doc Approved
檢磁	:	3892B565
Adaptor	**:**	**IBM**
Model No.	:	PA2450U
Serial No.	:	02K6654
FCC ID	:	N/A, Doc Approved
Power type	:	I/P: 100 ~ 240vac, 50 ~ 60 Hz, 0.5A ~ 1.2A; O/P: 16Vdc, 4.5A
Power cord	:	Non-shielded, 1.80m long, Plastic, with ferrite core
Notebook PC	**:**	**ASUSTek Computer**
Model No.	:	AB00F
Serial No.	:	24NP016361
FCC ID	:	Doc Approved
BSMI	:	41016012
Power type	:	100 ~ 240VAC, 1A 50/60 Hz, Switching
Adaptor	**:**	**LITE-ON Electronics, Inc.**
Model No.	:	PA-1530-01
Serial No.	:	00151184
FCC ID	:	Doc Approved
檢磁	:	3882B259
Power cable	:	Non-shielded, 1.72m length, Plastic hood, No ferrite core (Between power adaptor and AC power source)
Power cable	:	Shielded, 1.48m length, Plastic hood, with ferrite core (Between power adaptor and notebook)

1.5 Configuration of System Under Test



The setting up procedure was recorded in 1.3 test method.

1.6 Test Procedure

All measurements contained in this report were performed mainly according to the techniques described in ANSI C63.4 (1992) and the pre-setup was written 1.3 test method, the detail setup was written on each test item.

1.7 Location of the Test Site

The radiated emissions measurements required by the rules were performed on the **three-meter**, **Anechoic Chamber (Registration Number: 93906)** maintained by *Training Research Co., Ltd.* - 255 Nanyang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C. Complete description and measurement data have been placed on file with the commission. The conducted power line emissions tests and other test items were performed in an anechoic chamber also located at Training Research Co., Ltd.

255 Nanyang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C., *Training Research Co., Ltd.* is listed by the FCC as a facility available to do measurement work for others on a contract basis.

1.8 General Test Condition

The conditions under which the EUT operates were varied to determine their effect on the equipment's emission characteristics. The final configuration of the test system and the mode of operation used during these tests were chosen as that which produced the highest emission levels. However, only those conditions, which the EUT was considered likely to encounter in normal uses were investigated.

There is a test condition apply in this test item, the test procedure description as <1.3>. Three channels were tested, one in the top (CH0), one in the middle (CH39) and the other in bottom (CH79).

II. Section 15.203: Antenna requirement

The EUT is equipped with an integral antenna, it is permanently installed outside its case. The antenna cannot be removed or modified without any tools from outside in order to prevent the un-authorized modification. This makes that complies with the antenna requirement stated in Sect.15.203.

The antenna specification list as below:

Manufacturer	:	ANTENNIQUES CORP., LTD.
Part No.	:	MCF 003A-204-01
Connector	:	SMA Plug Reverse
Antenna Type	:	Dipole Antenna
Antenna Gain	:	3dBi (Max.)
Coaxial Cable	:	M17/93 RG-178

III. Section 15.207: Power Line Conducted Emissions for AC Powered Units

3.1 Test Condition & Setup

The power line conducted emission measurements were performed in an anechoic chamber. The EUT was assembled on a wooden table, which is 80 centimeters high, was placed 40 centimeters from the backwall and at least 1 meter from the sidewall.

Power was fed to the EUT from the public utility power grid through a line filter and Line Impedance Stabilization Networks (LISNs). The LISN housing, measuring instrumentation case, ground plane, etc., were electrically bonded together at the same RF potential. The Spectrum analyzer (or EMI receiver) was connected to the AC line through an isolation transformer. The 50-ohm output of the LISN was connected to the spectrum analyzer directly. Conducted emission levels were in the CISPER quasi-peak and average detection mode. The analyzer's 6 dB bandwidth was set to 9 KHz. No post-detector video filter was used.

The spectrum was scanned from 150 KHz to 30 MHz. The physical arrangement of the test system and associated cabling was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude and frequency. All spurious emission frequencies were observed. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in paragraph 2.4.

There is a test condition apply in this test item, the test procedure description as <1.3 test method>. Three channels were tested, one in the top (CH0), one in the middle (CH39) and the other in bottom (CH79).

3.2 List of Test Instruments

				Calibration Date	
Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
EMI Receiver	8546A	H P	3520A00242	06/28/02	06/28/03
RF Filter Section	85460A	H P	3448A00217	06/28/02	06/28/03
LISN (EUT)	LISN-01	TRC	9912-03,04	06/04/02	06/04/03
LISN (Support E.)	LISN-01	TRC	9912-05	07/15/02	07/15/03
Auto Switch Box (< 30MHz)	ASB-01	TRC	9904-01	11/20/02	11/20/03

The level of confidence of 95%, the uncertainty of measurement of conducted emission is ± 2.02 dB.

3.3 Test Results of Conducted Emissions

The following table shows a summary of the highest emissions of power line conducted emissions on the LIVE and NETURAL conductors of the EUT power cord.

Test Conditions: Temperature : 24.2 °C Humidity : 49.9 % RH

Table 1 Test mode: Channel 0

Power Connected Emissions					*FCC Class B*		
Conductor	***Frequency (KHz)***	***Peak (dBμV)***	***QP (dBμV)***	***Average (dBμV)***	***QP-limit (dBμV)***	***AVG-limit (dBμV)***	***Margin (dB)***
Line 1	205.000	48.68	---	---	64.43	54.43	-5.75
	384.000	39.97	---	---	59.31	49.31	-9.34
	456.000	37.20	---	---	57.26	47.26	-10.06
	795.000	24.78	---	---	56.00	46.00	-21.22
	2636.000	33.14	---	---	56.00	46.00	-12.86
	7890.000	27.26	---	---	60.00	50.00	-22.74
Line 2	208.000	47.07	---	---	64.34	54.34	-7.27
	384.000	39.78	---	---	59.31	49.31	-9.53
	456.000	37.57	---	---	57.26	47.26	-9.69
	509.000	32.82	---	---	56.00	46.00	-13.18
	2636.000	34.70	---	---	56.00	46.00	-11.30
	7890.000	29.56	---	---	60.00	50.00	-20.44

NOTE:

(1) Margin = Peak Amplitude – Limit, *The reading amplitudes are all under limit.*

(2) A "+" sign in the margin column means the emission is OVER the Class B Limit and "–" sign of means UNDER the Class B limit

Table 2 Test mode: Channel 39

Power Connected Emissions					*FCC Class B*		
Conductor	*Frequency (KHz)*	*Peak (dBμV)*	*QP (dBμV)*	*Average (dBμV)*	*QP-limit (dBμV)*	*AVG-limit (dBμV)*	*Margin (dB)*
Line 1	205.000	49.80	---	---	64.43	54.43	-4.63
	380.000	39.67	---	---	59.43	49.43	-9.76
	452.000	35.24	---	---	57.37	47.37	-12.13
	989.000	27.14	---	---	56.00	46.00	-18.86
	2636.000	33.21	---	---	56.00	46.00	-12.79
	7890.000	28.00	---	---	60.00	50.00	-22.00
Line 2	205.000	47.85	---	---	64.43	54.43	-6.58
	377.000	39.17	---	---	59.51	49.51	-10.34
	456.000	36.33	---	---	57.26	47.26	-10.93
	989.000	28.92	---	---	56.00	46.00	-17.08
	2636.000	34.84	---	---	56.00	46.00	-11.16
	7890.000	30.26	---	---	60.00	50.00	-19.74

The reading amplitudes are all under limit.

Table 3 Test mode: Channel 79

Power Connected Emissions					*FCC Class B*		
Conductor	*Frequency (KHz)*	*Peak (dBμV)*	*QP (dBμV)*	*Average (dBμV)*	*QP-limit (dBμV)*	*AVG-limit (dBμV)*	*Margin (dB)*
Line 1	203.000	48.10	---	---	64.49	54.49	-6.39
	363.000	39.30	---	---	59.91	49.91	-10.61
	456.000	35.85	---	---	57.26	47.26	-11.41
	998.000	26.17	---	---	56.00	46.00	-19.83
	2610.000	32.39	---	---	56.00	46.00	-13.61
	7890.000	27.33	---	---	60.00	50.00	-22.67
Line 2	205.000	49.26	---	---	64.43	54.43	-5.17
	352.000	40.18	---	---	60.23	50.23	-10.05
	405.000	39.00	---	---	58.71	48.71	-9.71
	998.000	29.84	---	---	56.00	46.00	-16.16
	2636.000	34.66	---	---	56.00	46.00	-11.34
	7890.000	29.20	---	---	60.00	50.00	-20.80

The reading amplitudes are all under limit.

Table 4 Test mode: Standby mode

Power Connected Emissions					*FCC Class B*		
Conductor	*Frequency (KHz)*	*Peak (dBμV)*	*QP (dBμV)*	*Average (dBμV)*	*QP-limit (dBμV)*	*AVG-limit (dBμV)*	*Margin (dB)*
Line 1	203.000	49.90	---	---	64.49	54.49	-4.59
	409.000	39.83	---	---	58.60	48.60	-8.77
	456.000	36.95	---	---	57.26	47.26	-10.31
	998.000	28.16	---	---	56.00	46.00	-17.84
	2610.000	32.75	---	---	56.00	46.00	-13.25
	7890.000	27.53	---	---	60.00	50.00	-22.47
Line 2	203.000	48.38	---	---	64.49	54.49	-6.11
	373.000	39.37	---	---	59.63	49.63	-10.26
	409.000	38.93	---	---	58.60	48.60	-9.67
	456.000	35.89	---	---	57.26	47.26	-11.37
	2636.000	32.04	---	---	56.00	46.00	-13.96
	7890.000	28.73	---	---	60.00	50.00	-21.27

The reading amplitudes are all under limit.

IV. Section 15.247 (a): Technical description of the EUT

Based on the Section 2.1, *Frequency Hopping Spectrum System* is a spread spectrum system in which the carrier has been modulated by a *high speed spreading code* and an *information data stream* with its *known hopping algorithm* and *avoidance method.* The high speed code sequence dominates the "modulating function" and is the direct cause of the wide spreading of the transmitted signal. In the *operational description* demonstrates the operation principles of the base-band processor employed by the EUT, shows that which is a complete FHSS base-band processor and meets the definition of the *Frequency Hopping Spectrum System.*

Ⅴ. Section 15.247(a)(1): Carrier Frequency Separation

5.1 Test Condition

The EUT must have its hopping function enabled. Use the following spectrum analyzer setting

Span = wide enough to capture the peaks of two adjacent channels

Resolution (or IF) bandwidth (RBW)≧ 1% of the span

Video (or Average) Bandwidth (VBW) ≧ RBW

Sweep = Auto

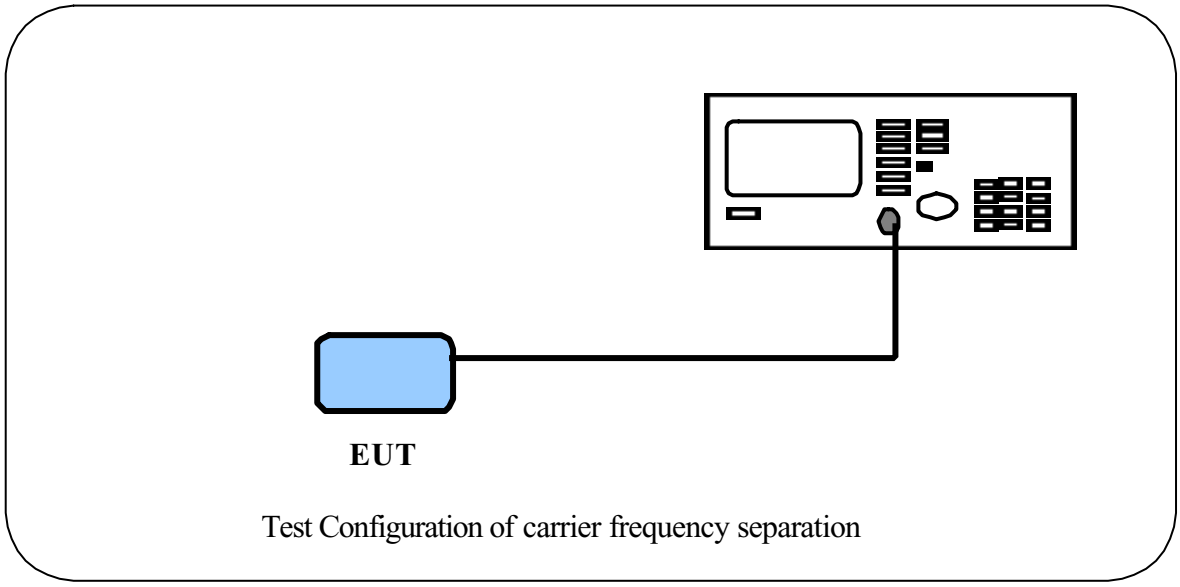
Detector Function = peak

Trace = max hold

Setting up procedure is written on 1.3 test method.

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channel. The limit is specified in one of the subparagraphs of this section. Submit this plot.

5.2 Test Instruments Configuration



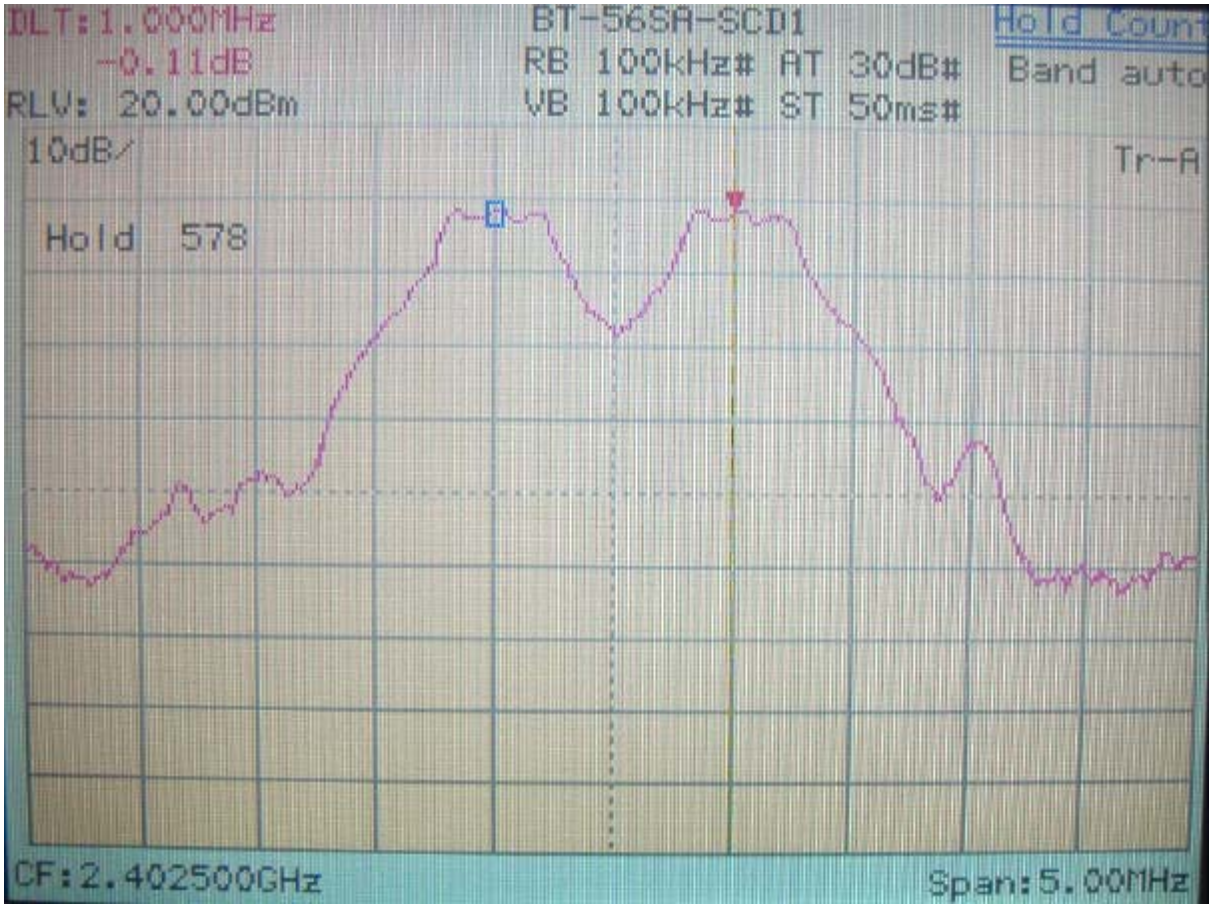
Test Configuration of carrier frequency separation

5.3 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
Spectrum Analyzer	MS2665C	ANRITSU	6200175476	09/11/02	09/11/03

5.4 Test Results

Channel Separation: 1MHz



Ⅵ. Section 15.247(a)(1)(ii) Number of Hopping Frequencies

6.1 Test Condition

The EUT must have its Hopping function enabled. Use the following spectrum analyzer setting:

Span = the frequency band of operation

RBW ≧ 1% of the span

VBW ≧ RBW

Sweep = auto

Detector function = peak

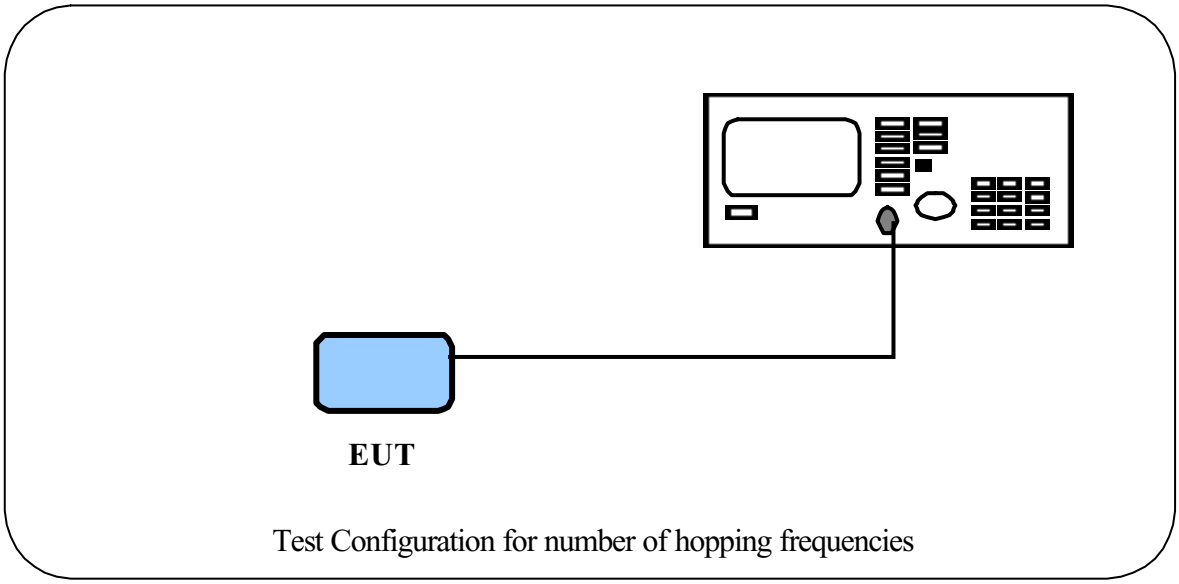
Trace = max hold

Allow the trace to stabilize. It may prove necessary to break the span up to sections. In order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this section. Submit this plots.

6.2 List of Test Instruments

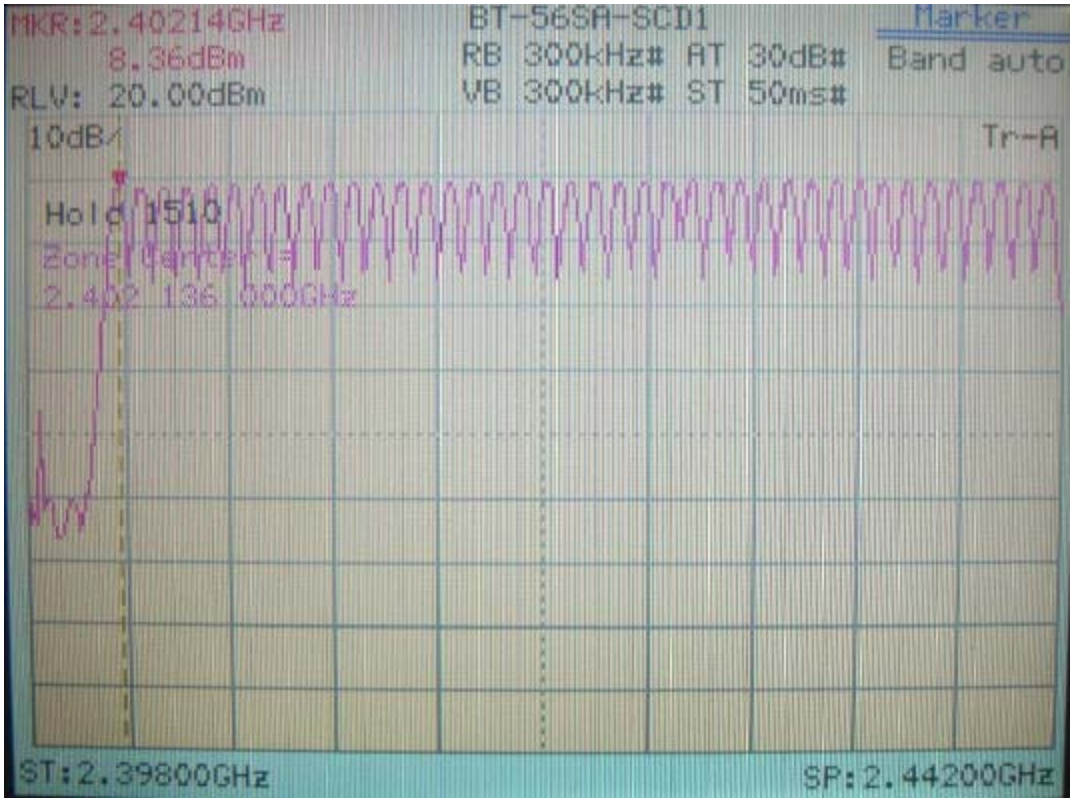
Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
Spectrum Analyzer	MS2665C	ANRITSU	6200175476	09/11/02	09/11/03

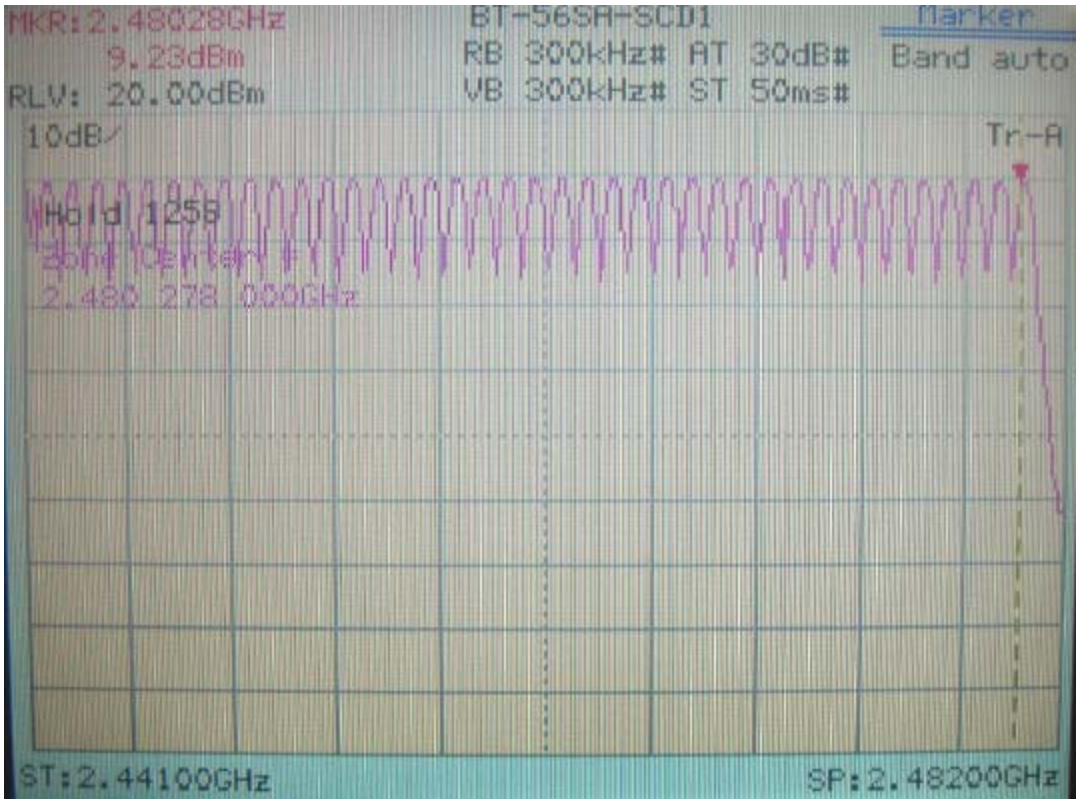
6.3 Test Instruments Configuration



Test Configuration for number of hopping frequencies

6.4 Test Results





VII. Section 15.247(a)(1)(ii) Time of Occupancy (Dwell Time)

7.1 Test Condition

The EUT must have its hopping function enabled. Use the following spectrum analyzer setting:

Span = zero span, centered on a hopping channel

RBW = 1M

VBW ≧ RBW

Sweep = as necessary to capture the entire dwell time per hopping channel

Detector function = peak

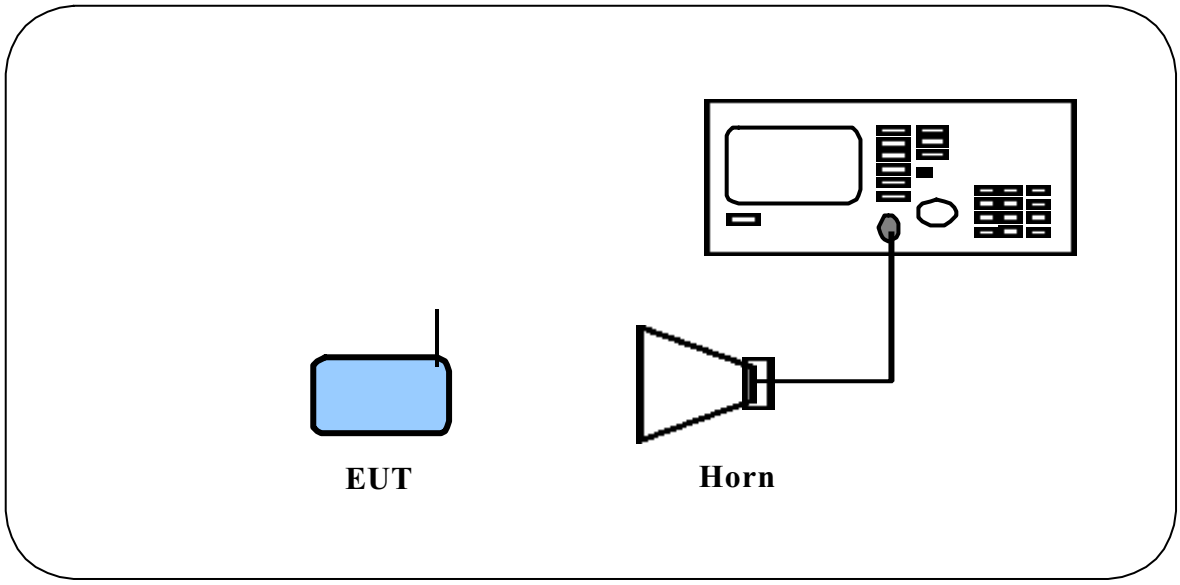
Trace = max hold

If possible, use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this section. Submit this plot(s). An oscilloscope may be used instead of a spectrum analyzer.

7.2 List of Test Instruments

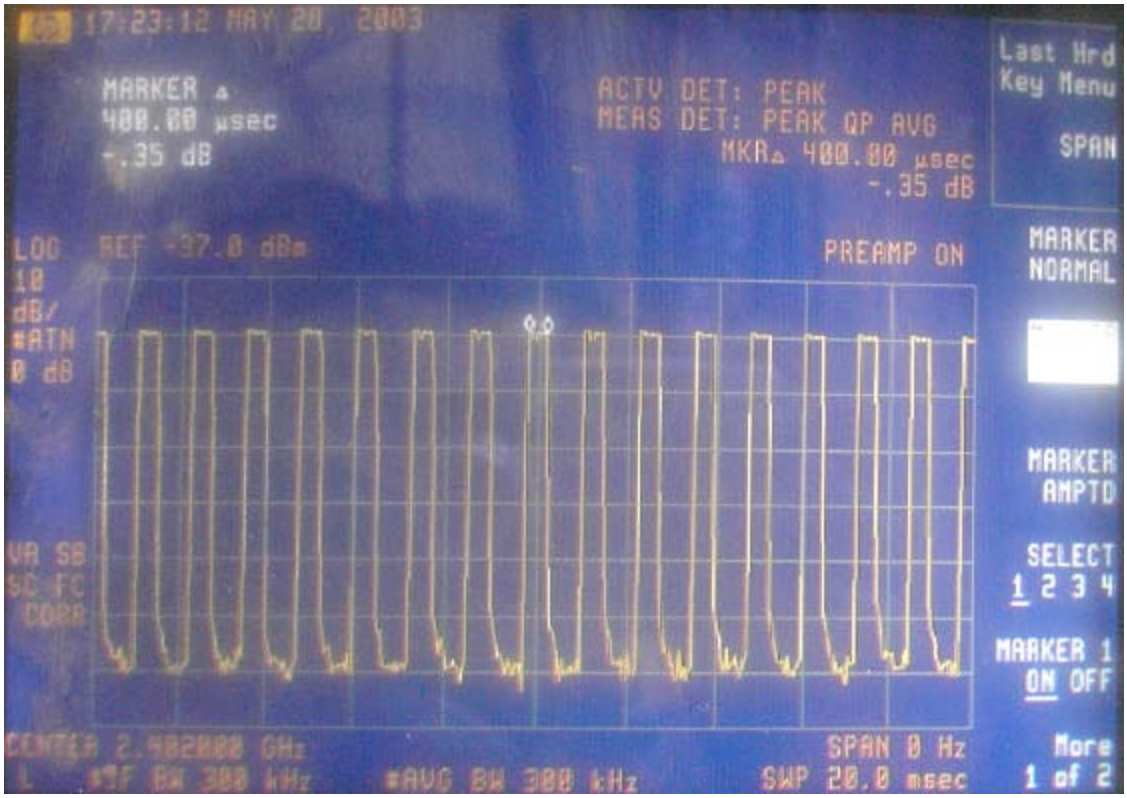
Instrument Name	Model No	Brand	Serial No.	Last time	Next time
EMI Receiver	8546A	H P	3520A00242	10/18/02	10/18/03
RF Filter Section	85460A	H P	3448A00217	10/18/02	10/18/03
Switch/Control Unit (> 30MHz)	3488A	H P	N/A	11/22/02	11/22/03
Auto Switch Box (> 30MHz)	ASB-01	TRC	9904-01	11/22/02	11/22/03
Spectrum Analyzer	8564E	H P	US36433002	08/13/02	08/13/03
Microwave Preamplifier	83051A	H P	3232A00347	08/13/02	08/13/03
Horn Antenna	3115	EMCO	9704 – 5178	08/15/02	08/15/03

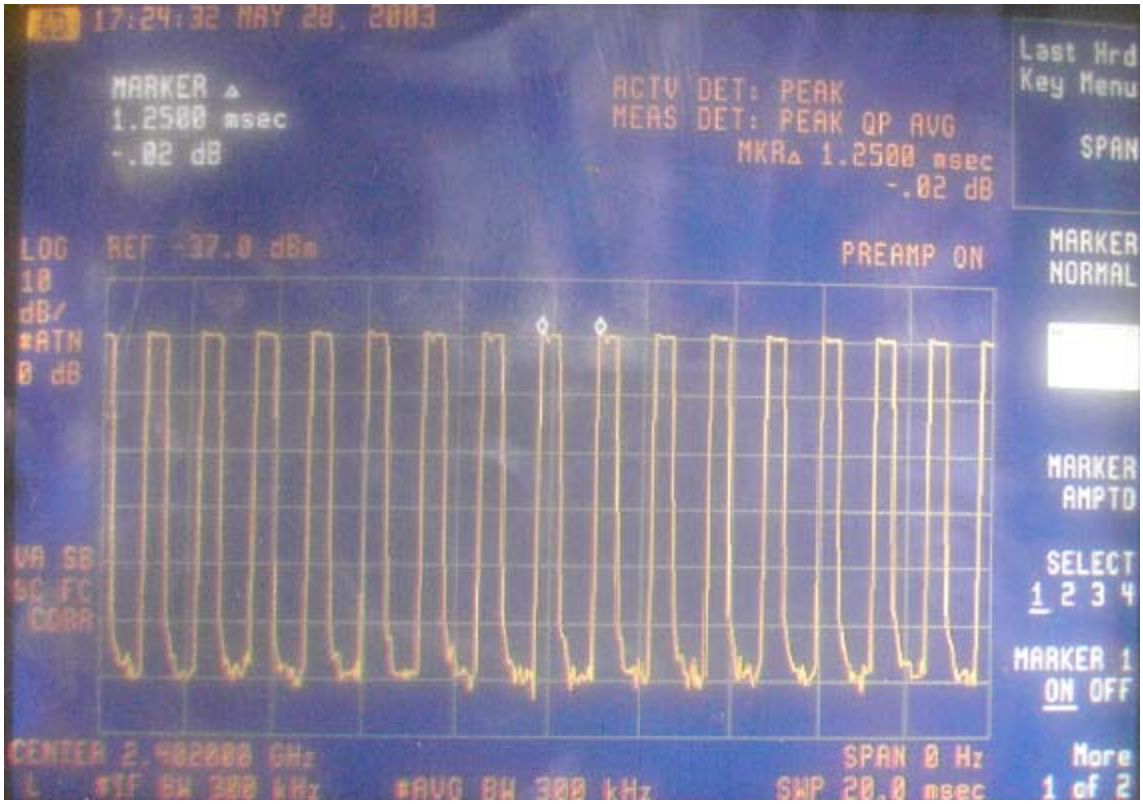
7.3 Test Instruments Configuration



7.4 Test Results

1. Pulse width of one slot measurement:
   Results: 700 μ sec
2. Dwell time measurement
   Results: The average time of occupancy is less than 0.4 second within a 30 second period.
3. as following page.


17:23:12 MAY 20, 2003
MARKER Δ
400.00 µsec
-.35 dB
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 400.00 µsec
-.35 dB
Last Hrd Key Menu
SPAN
LOG
10
dB/
#ATN
0 dB
REF -37.0 dBm
PREAMP ON
MARKER NORMAL
MARKER AMPTD
SELECT 1 2 3 4
MARKER 1 ON OFF
More 1 of 2
VA SB
SC FC
CORR
CENTER 2.402000 GHz
SPAN 0 Hz
#VBW 300 kHz
#AVG BW 300 kHz
SWP 20.0 msec


17:24:32 MAY 20, 2003
MARKER Δ
1.2500 msec
-.02 dB
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 1.2500 msec
-.02 dB
Last Hrd Key Menu
SPAN
LOG
10
dB/
#ATN
0 dB
REF -37.0 dBm
PREAMP ON
MARKER NORMAL
MARKER AMPTD
SELECT 1 2 3 4
MARKER 1 ON OFF
More 1 of 2
VA SB
SC FC
CORR
CENTER 2.402000 GHz
SPAN 0 Hz
#VBW 300 kHz
#AVG BW 300 kHz
SWP 20.0 msec

VIII. Section 15.247(a)(1)(ii) 20dB Bandwidth

8.1 Test Condition

Use the following spectrum analyzer setting:

Span = the frequency band of operation

RBW ≧ 1% of the span

VBW ≧ RBW

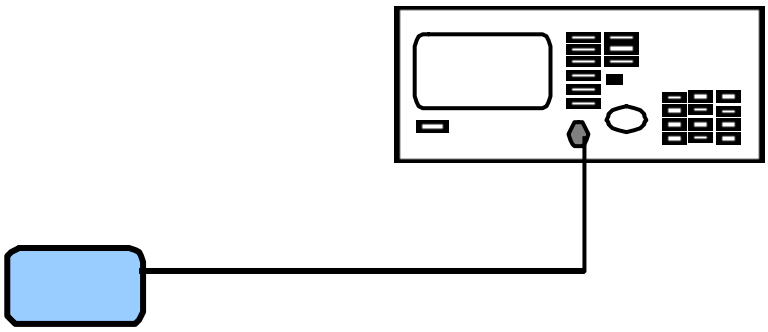
Sweep = auto

Detector function = peak

Trace = max hold

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of emission. Use the marker-delta function to measure 20dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this section. Submit this plot(s).

8.2 Test Instruments Configuration



Test Configuration of Bandwidth for Frequency Hopping Spread Spectrum System

8.3 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
Spectrum Analyzer	MS2665C	ANRITSU	6200175476	09/11/02	09/11/03

8.4 Test Results

Channel	Bandwidth
Channel 0	892 kHz
Channel 39	888 kHz
Channel 79	964 kHz

Note: The data in the above table are summarizing the following attachment spectrum analyzer.

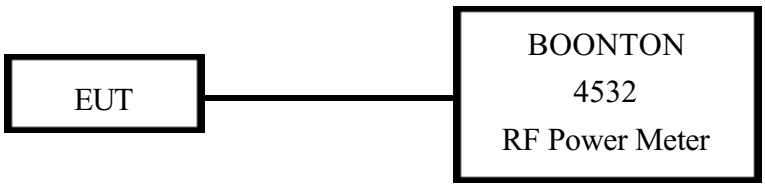
Bandwidth of Channel 0:

Bandwidth of Channel 39:

Bandwidth of Channel 79:

IX. Section 15.247(b) Peak Output Power

9.1 Test Condition & Setup



1. The output of the transmitter is connected to the BOONTON RF Power Meter.
2. The calibration is performed before every test. The values of the output power of the EUT will shown in the dBm directly are the transmitter output peak power. Recording as follows.

9.2 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.
RF Power Meter	4532	BOONTON	117501

9.3 Test Result

Formula:

Signal generator + |Cable loss| = Output peak power

Channel	Signal Generator	Cable Loss	Output peak power	
	dBm	dBm	dBm	mW
CH 0	8.54	0.80	9.34	8.590
CH 39	9.51	0.80	10.31	10.739
CH 78	9.70	0.80	10.50	11.220

X. Section 15.247(c) Band-edge Compliance

10.1 Test Condition

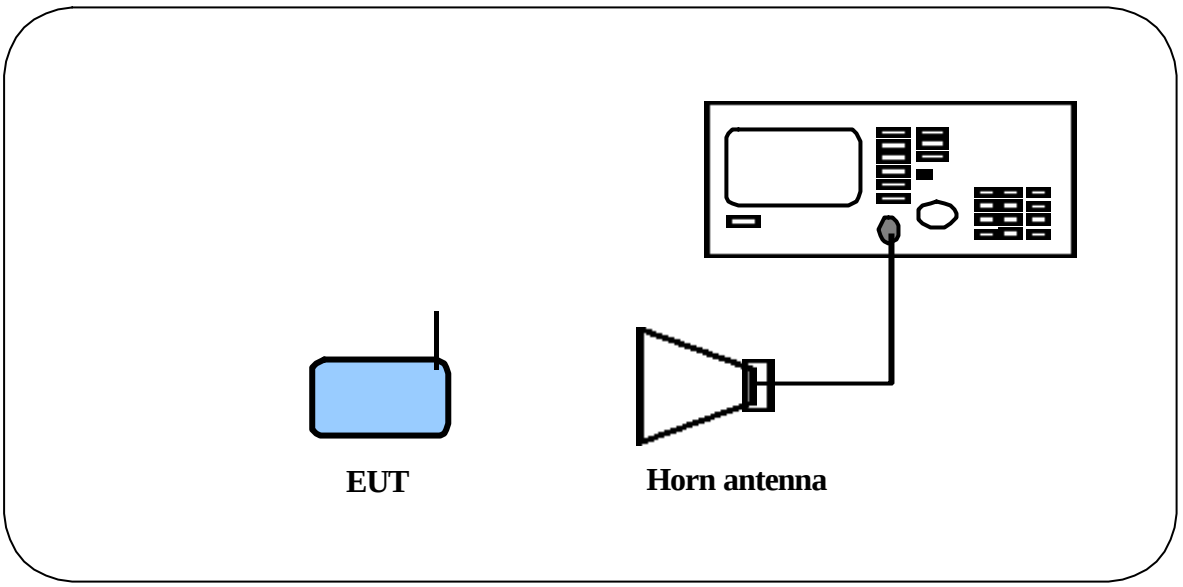
If any 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either *at least 20 dB below that in any 100 kHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified id §15.209(a),*

We perform this section by the *radiated manner*, the RBW is set to 100kHz and VBW>RBW. We'd made the observation *up to 10th harmonics and the criterion is all the harmonic/spurious emissions must be 20dB below the highest emission level measured.* If the emissions fall in the restricted bands stated in the Part15.205(a) must also *comply with the radiated emission limits specified in Part15.209(a). (Peak mode: RBW=VBW=1MHz, Average mode: RBW=1MHz; VBW=10Hz)*

10.2 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
Spectrum Analyzer	MS2665C	ANRITSU	6200175476	09/11/02	09/11/03
RF Filter Section	85460A	H P	3448A00217	10/18/02	10/18/03
Horn Antenna	3115	EMCO	9704 – 5178	08/15/02	08/15/03

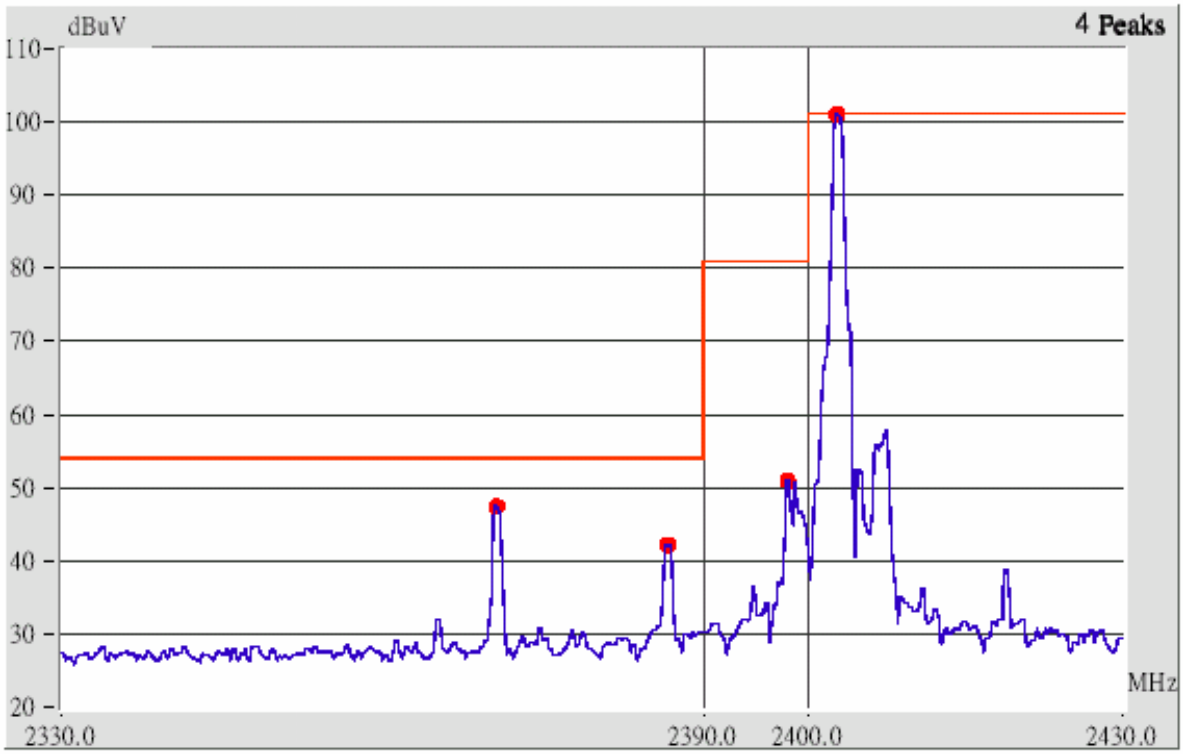
10.3 Test Instruments Configuration



10.4 Test Result of the Bandedge

The following pages show our observations referring to the channel 0 and 79 respectively.

Channel 0

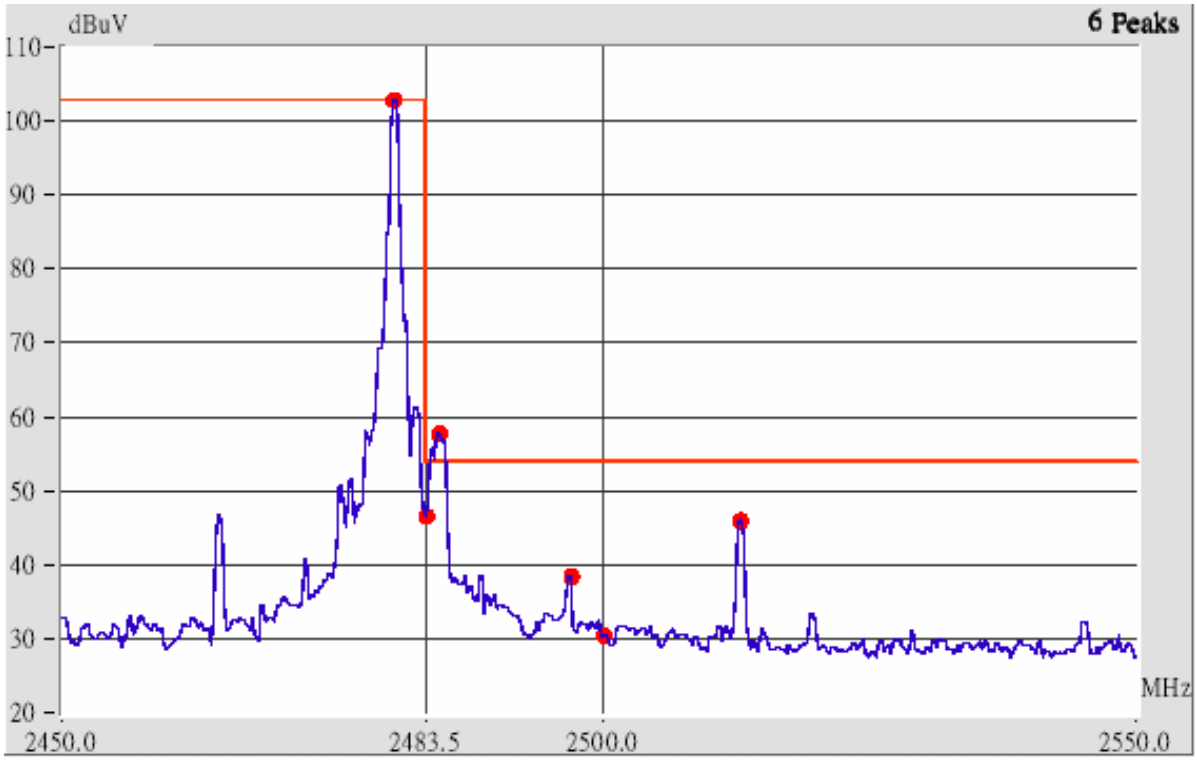


This is the hard copy of our bandedge measurement generated by our bandedge testing program. The plot shown above is the bandedge of channel 1.

1. The lobe left by the fundamental side is already 20dB below the highest emission level.
2. The emissions recorded in the restricted band is do comply with the Part 15.209(a) – as below.

Radiated Emission					*Corrected Amplitude (dBμV/m)*		*FCC Class B*		
Frequency (MHz)	*Ant. P.*	*Ant. H. (m)*	*Table (°)*	*Factors (dB)*	*Peak*	*Average*	*Limit (dBμV/m) Peak*	*Ave.*	*Margin (dB)*
2370.17	Hor	1.00	152	3.07	39.95	---	74.00	53.96	-14.01
2390.06	Hor	1.00	19	3.13	26.44	---	74.00	53.96	-27.52
2370.30	Ver	1.00	93	3.07	47.81	---	74.00	53.96	-6.15
2386.49	Ver	1.00	241	3.12	43.20	---	74.00	53.96	-10.76
2390.06	Ver	1.00	60	3.13	29.97	---	74.00	53.96	-23.99

Channel 79



This is the hard copy of our bandedge measurement generated by our bandedge testing program. The plot shown above is the bandedge of channel 1.

3. The lobe left by the fundamental side is already 20dB below the highest emission level.
4. The emissions recorded in the restricted band is do comply with the Part 15.209(a) – as below.

Radiated Emission					*Corrected Amplitude (dBμV/m)*		*FCC Class B*		
Frequency (MHz)	*Ant. P.*	*Ant. H. (m)*	*Table (°)*	*Factors (dB)*	*Peak*	*Average*	*Limit (dBμV/m) Peak*	*Ave.*	*Margin (dB)*
2484.00	Hor	1.00	92	3.45	54.30	33.27	74.00	53.96	-19.7
2484.27	Hor	1.00	208	3.45	52.11	---	74.00	53.96	-1.85
2512.34	Hor	1.00	174	3.52	41.08	---	74.00	53.96	-12.88
2483.50	Ver	1.00	22	3.45	62.26	36.97	74.00	53.96	-11.74
2484.51	Ver	1.00	65	3.45	61.51	35.42	74.00	53.96	-12.49
2512.62	Ver	1.00	140	3.52	49.14	---	74.00	53.96	-4.82

XI. Section 15.247(c) Spurious Radiated Emissions

11.1 Test Condition and Setup

We' d performed the test by the *radiated emission* skill: The EUT was placed in an anechoic chamber, and set the EUT transmitting continuously and scanned at 3-meter distance to determine its emission characteristics. The physical arrangement of the EUT was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude, directivity, and frequency. The exact system configuration, which produced the highest emissions was noted so it could be reproduced later during the final tests. For the measurement above 1GHz, according to the guidance we' d set the spectrum analyzer' s 6dB bandwidth RBW to 1MHz.

This was done to ensure that the final measurements would demonstrate the worst-case interference potential of the EUT.

Final radiation measurements were made on a three-meter, anechoic chamber. The EUT system was placed on a nonconductive turntable, which is 0.8 meters height, top surface 1.0 x 1.5 meter.

The spectrum was examined from 30 MHz to 1000 MHz using an Hewlett Packard 85460A EMI Receiver, M.E. whole range Bi-log antenna (Model No.: VULB9160) is used to measure frequency from 30 MHz to 1GHz. The final test is used the HP 85460A spectrum and 8564E spectrum was examined from 1GHz to 25GHz using an Hewlett Packard Spectrum Analyzer, EMCO/CMT Horn Antenna (Model 3115 / RA42-K-F-4B-C) for 1G - 25GHz.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarization.

Appropriate preamplifiers were used for improving sensitivity and precautions were taken to avoid overloading or desensitizing the spectrum analyzer. There are two spectrum analyzers use on this testing, HP 85460A for frequency 30MHz to 1000MHz, and 8564E for frequency 1GHz to 25GHz. No post-detector video filters were used in the test. The spectrum analyzer's 6dB bandwidth was set to 120KHz (spectrum was examined from 30 MHz to 1000 MHz), the spectrum analyzer's 6 dB bandwidth was set to 1 MHz (spectrum was examined from 1GHz to 25GHz) and the analyzer was operated in the maximum hold mode. There is a test condition applies in this test item, the test procedure description as the following:

Three channels were tested, one in the top (CH0), one in the middle (CH39) and the other in bottom (CH79). The setting up procedure is recorded on <1.3 test method >

With the transmitter operating from a AC source and using the internal of EUT, radiates spurious emissions falling within the restricted bands of 15.209 were measured at operating frequencies corresponding to upper, middle and bottom channels in the 2400 ~ 2483.5 MHz band.

The actual field intensity in decibels referenced to 1 microvolt per meter (dBμV/m) is determined by algebraically adding the measured reading in dBμV, the antenna factor (dB), and cable loss (dB) at the appropriate frequency. Since the EUT was set to transmit continuously, no *duty cycle* is present.

For frequency between 30MHz to 1000MHz

FIa (dBuV/m) = FIr (dBμV) + Correction Factors

FIa : Actual Field Intensity

FIr : Reading of the Field Intensity

Correction Factors = Antenna Factor + Cable Loss – Amplifier Gain

For frequency between 1GHz to 25GHz

FIa (dBμV/m) = FIr (dBμV) + Correction Factor

FIa : Actual Field Intensity

FIr : Reading of the Field Intensity

Correction Factors = Antenna Factor + Cable Loss – Amplifier Gain

11.2 List of Test Instruments

Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
EMI Receiver	8546A	H P	3520A00242	06/28/02	06/28/03
RF Filter Section	85460A	H P	3448A00217	06/28/02	06/28/03
Bi-log Antenna	VULB9160	M. E.	3064	07/08/02	07/08/03
Switch/Control Unit (>30MHz)	3488A	HP	N/A	11/20/02	11/20/03
Auto Switch Box (>30MHz)	ASB-01	TRC	9904-01	11/20/02	11/20/03
Spectrum Analyzer	8564E	HP	US36433002	08/01/02	08/01/03
Microwave Preamplifier	83051A	HP	3232A00347	08/01/02	08/01/03
Horn Antenna	3115	EMCO	9704 – 5178	08/01/02	08/01/03
Horn Antenna	RA42-K-F-4B-C	CMT	961505-003	02/01/03	02/01/04
Anechoic Chamber (cable calibrated together)				05/20/03	05/20/04

The level of confidence of 95% , the uncertainty of measurement of radiated emission is ± 3.44dB.

11.3 Test Result of Spurious Radiated Emissions

EUT's transmit only

The highest peak values of radiated emissions form the EUT at various antenna heights, antenna polarizations, EUT orientation, etc. are recorded on the following.

Test Conditions: Temperature : 26.2 ° C Humidity : 53.8 % RH

Table 5 30MHz to 1GHz [Antenna polarity Horizontal]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (MHz)	*Amplitude (dBμV)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBμV/m)*	*Limit (dBμV/m)*	*Margin (dB)*
395.14	37.55	1.00	259	0.27	37.82	43.50	-5.68
424.67	32.65	1.00	47	1.58	34.23	46.00	-11.77
452.56	31.43	1.00	54	2.85	34.28	46.00	-11.72
509.54	28.61	1.00	209	5.00	33.61	46.00	-12.39
565.32	28.71	1.00	163	7.43	36.14	46.00	-9.86
733.83	26.60	1.00	157	12.41	39.01	46.00	-6.99

Table 6 30MHz to 1GHz [Antenna polarity Vertical]

Radiated Emission				*Correction Factors*	*Corrected Amplitude*	*FCC Class B (3 m)*	
Frequency (MHz)	*Amplitude (dBμV)*	*Ant. H. (m)*	*Table (°)*	*(dB)*	*(dBμV/m)*	*Limit (dBμV/m)*	*Margin (dB)*
213.09	32.61	1.00	355	-2.71	29.90	43.50	-13.60
282.81	36.24	1.00	302	-2.60	33.64	46.00	-12.36
396.18	34.88	1.00	123	0.30	35.18	46.00	-10.82
509.54	29.83	1.00	148	5.00	34.83	46.00	-11.17
564.48	35.31	1.00	87	7.40	42.71	46.00	-3.29
620.93	27.87	1.00	94	9.36	37.23	46.00	-8.77

Note:

1. Margin = Amplitude – limit, *if margin is minus means under limit.*
2. Corrected Amplitude = Reading Amplitude + Correction Factors
3. Correction factor = Antenna factor + (Cable Loss – Amplitude gain)

Table 7 Channel 0, 1GHz to 25GHz [Antenna polarity Horizontal]

Radiated Emission				*Corrected Amplitude (dBμV/m)*		*FCC Class B (3m)*		
Frequency (MHz)	*Ant. H. (m)*	*Table (°)*	*Correction Factors (dB)*	*Peak*	*Average*	*Limit (dBμV/m) Peak*	*Ave.*	*Margin (dB)*
2435.83	1.00	25	3.29	41.27	---	74.00	53.96	-12.69
2628.33	1.00	179	3.67	46.89	---	74.00	53.96	-7.07
4812.25	1.00	59	-24.39	45.22	---	74.00	53.96	-8.74
7219.25	1.00	182	-17.97	43.14	---	74.00	53.96	-10.82
9615.37	1.00	226	-15.36	51.81	---	74.00	53.96	-2.15

Table 8 Channel 0, 1GHz to 25GHz [Antenna polarity Vertical]

Radiated Emission				*Corrected Amplitude (dBμV/m)*		*FCC Class B (3m)*		
Frequency (MHz)	*Ant. H. (m)*	*Table (°)*	*Correction Factors (dB)*	*Peak*	*Average*	*Limit (dBμV/m) Peak*	*Ave.*	*Margin (dB)*
2370.83	1.00	159	3.07	50.61	---	74.00	53.96	-3.35
2435.83	1.00	347	3.29	49.35	---	74.00	53.96	-4.61
2628.33	1.00	24	3.67	51.40	---	74.00	53.96	-2.56
4812.25	1.00	177	-24.29	49.49	---	74.00	53.96	-4.47
9615.37	1.00	56	-15.36	52.36	---	74.00	53.96	-1.60

Note:

1. Margin = Corrected - Limit.
2. The EUT utilizes a *permanently attached antenna*. In addition the spurious RF radiated emissions levels do comply with the *20dBc limit* both at its bandedges and other spurious emissions.
3. As stated in Section 15.35(b), for any frequencies above 1000MHz, radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. As the results of our test, the peak amplitudes are already below the FCC limit. Thus the average amplitudes of the rest are omitted.

Table 9 Channel 39, 1GHz to 25GHz [Antenna polarity Horizontal]

Radiated Emission				Corrected Amplitude (dBμV/m)		FCC Class B (3m)		
Frequency (MHz)	Ant. H. (m)	Table (°)	Correction Factors (dB)	Peak	Average	Limit (dBμV/m) Peak	Ave.	Margin (dB)
2410.00	1.00	58	3.20	43.44	---	74.00	53.96	-10.52
2474.17	1.00	206	3.41	40.78	---	74.00	53.96	-13.18
4888.37	1.00	33	-23.86	43.53	---	74.00	53.96	-10.43
7331.62	1.00	150	-17.51	43.32	---	74.00	53.96	-10.64
9764.00	1.00	49	-15.13	44.86	---	74.00	53.96	-9.10

Table 10 Channel 39, 1GHz to 25GHz [Antenna polarity Vertical]

Radiated Emission				Corrected Amplitude (dBμV/m)		FCC Class B (3m)		
Frequency (MHz)	Ant. H. (m)	Table (°)	Correction Factors (dB)	Peak	Average	Limit (dBμV/m) Peak	Ave.	Margin (dB)
2410.00	1.00	195	3.20	51.86	---	74.00	53.96	-2.10
2475.00	1.00	163	3.42	48.63	---	74.00	53.96	-5.33
2651.67	1.00	110	3.70	45.29	---	74.00	53.96	-8.67
4892.00	1.00	328	-23.84	48.18	---	74.00	53.96	-5.78
9771.25	1.00	345	-15.11	46.99	---	74.00	53.96	-6.97

Table 11 Channel 79, 1GHz to 25GHz [Antenna polarity Horizontal]

Radiated Emission				*Corrected Amplitude (dBμV/m)*		*FCC Class B (3m)*		
Frequency (MHz)	*Ant. H. (m)*	*Table (°)*	*Correction Factors (dB)*	*Peak*	*Average*	*Limit (dBμV/m) Peak*	*Ave.*	*Margin (dB)*
2449.17	1.00	51	3.33	41.12	---	74.00	53.96	-12.84
2514.17	1.00	269	3.52	41.30	---	74.00	53.96	-12.66
2703.33	1.00	184	3.77	43.39	---	74.00	53.96	-10.57
4968.12	1.00	204	-23.64	41.17	---	74.00	53.96	-12.79
7447.62	1.00	19	-17.00	41.72	---	74.00	53.96	-12.24

Table 12 Channel 79, 1GHz to 25GHz [Antenna polarity Vertical]

Radiated Emission				*Corrected Amplitude (dBμV/m)*		*FCC Class B (3m)*		
Frequency (MHz)	*Ant. H. (m)*	*Table (°)*	*Correction Factors (dB)*	*Peak*	*Average*	*Limit (dBμV/m) Peak*	*Ave.*	*Margin (dB)*
2256.67	1.00	56	2.69	45.63	---	74.00	53.96	-8.33
2513.33	1.00	172	3.52	47.56	---	74.00	53.96	-6.40
2703.33	1.00	24	3.77	45.84	---	74.00	53.96	-8.12
4968.12	1.00	169	-23.64	45.14	---	74.00	53.96	-8.82
9916.25	1.00	140	-15.33	45.35	---	74.00	53.96	-8.61