



FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

Bluetooth USB Dongle

Model: UBTBR1E

Brand Name: Cadmus

Issued for

Cadmus Micro Inc.

1840 Carlos Ave.,

Ontario, CA 91761

Issued by

**Compliance Certification Services Inc.
Hsinchu Lab.**

Rm. 258, Bldg. 17, NO.195, Sec.4 Chung Hsing Rd.,
ChuTung Chen, Hsinchu, Taiwan 310, R.O.C

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FAX: (03) 582-5720





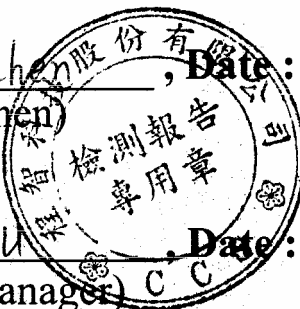
Test Report Certification

Applicant : Cadmus Micro Inc.
Address : 1840 Carlos Ave., Ontario, CA 91761
Equipment Under Test : Bluetooth USB Dongle
Brand Name : Cadmus
Model : UBTBR1E
Tested Date : April 08 ~ 12, 2005

APPLICABLE STANDARD	
STANDARD	TEST RESULT
FCC Part 15 Subpart C (2004)	No non-compliance noted

Tested By : Vincent Chen, **Date** : April 19, 2005
(Vincent Chen)

Approved By : C.F. Wu, **Date** : April 19, 2005
(C.F. Wu, Manager)



WE HEREBY CERTIFY THAT: The measurements shown in the attachment were made in accordance with the procedures indicated, and the energy emitted by the equipment was found to be within the limits applicable. We assume full responsibility for the accuracy and completeness of these measurements and vouch for the qualifications of all persons taking them.



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1. EUT DESCRIPTION

1.1 Description of EUT & Power

Product Name	Bluetooth USB Dongle
Model Number	UBTBR1E
Frequency Range	2402MHz to 2480MHz $f = 2402 + n\text{MHz}$, $n = 0, \dots, 78$
Channel Spacing	1MHz
Channel Number	79
Air Data Rate	723kbps
Type of Modulation	Frequency Hopping Spread Spectrum
Frequency Selection	by software / firmware
Transmitter Classification	portable device
Antenna Type	Inverter F type Antenna (layout on PCB), Antenna Gain: -1dBi
Power Source	5VDC (From USB interface of Notebook)

Multiple List :

Company	Address	Model Name
Cadmus Mirco Inc.	1840 Carlos Ave., Ontario, CA 91761	UBTBR1E, UBTBR1E-C, UBTBR1E-X, UBTBR1E-N
Billionton systems Inc.	No. 21, Sui-Lih Rd., Hsin-Chu, 300, Taiwan	UBTBR1E-B
Ziga	1840 Carlos Ave., Ontario, CA 91761	UBTBTR1E-Z
CARECA S.p.a. (HAMLET)	Via Borsellino 14, 42010 Arceto di Scandiano (RE), Italy	HBTUS100
2L INTERNATIONAL BV (CONCEPTRONIC)	DATABANKWEG 7-3821 AL AMERSFOORT, PO BOX 150-3800 AD AMERSFOORT, NE	UBTBR1E-N-2L2
ASBISC ENTERPRISES LIMITED (Canyon)	63 KOLONAKIOU STREET, CY-4013 LIMASSOL, CYPRUS 4013 CYPRUS	UBTBR1E-N-CYT
BANDBRIDGE EUROPE N.V. (Bandridge)	BANDBRIDGE INT'L ASIA R602, 6F EMPRES 17-19, CHATHAM RD SOUTH KOWLOON HK	UBTBR1E-N-BB
DATAMATIC S.P.A. (Datamatic)	VIA AGORDAT, 34 MILANO MI 20124 ITALY	UBTBR1E-N-DM
CityCom Corp. (Cubix)	3F, NO. 532, SEC.2, JHONGSHAN RD., JHONGHE CITY, TAIPEI HSIEN, TAIWAN, R.O.C.	UBTBR1E-N-CTC
Ting Immediately Ind Co., LTd. (Tinlex)	NO25 Lane80 Ta Hsin Rd., Tan Tzu Hsiang Taichung Hsien. Taiwan, R.O.C.	UBTBR1E-N-TL



2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CRF 47 2.1046, 2046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.247.

3. FACILITIES AND ACCREDITATION

SITE DESCRIPTION :

FCC Certificate NO. : 90585
BSMI Certificate NO. : SL2-IN-E-0002
NVLAP Lab Code : 200118-0
CNLA Certificate NO. : CNLA-ZL97018E
VCCI Certificate NO. : R-1229, C-1250
TÜV Rheinland Certificate NO. : 10008375

NAME OF SITE : Compliance Certification Services Inc. Hsinchu Lab.
SITE LOCATION : Rm.258, Bldg.17, NO.195 , Sec. 4, Chung Hsing Rd.,
Chu-Tung Chen. Hsin-Chu, Taiwan 310 R.O.C.



4. CALIBRATION AND UNCERTAINTY

4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 1000 MHz	+/- 3.2 dB
Radiated Emission, 1 to 26.5GHz	+/- 3.2 dB
Power Line Conducted Emission	+/- 2.9 dB

Uncertainty figures are valid to a confidence level of 95%

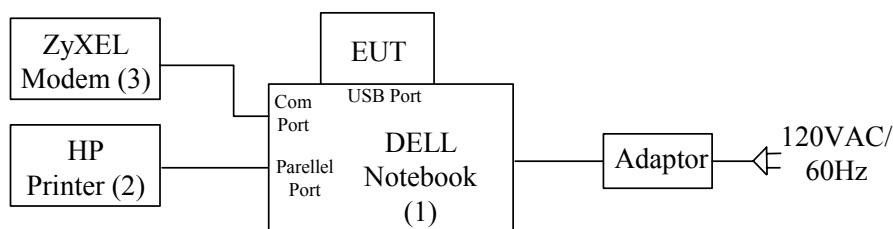


5. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

No.	Product	Manufacturer	Model No.	Serial No.	Input Power	Output Power
1	Notebook PC	DELL	PP01L	CN-09C748-48155 -1AP-6081	20VDC/3.5A (From Power Adapter)	-----
	Adapter	DELL	ADP-70EB	-----	100~240VAC/ 1.5A, 70W	20VDC/3.5A
2	Printer	HP	C6431D	CN19T6S011	100~240VAC, 50/60Hz, 0.7A	-----
3	Modem	ZyXEL	Omni 56K	S1Z4107729	1880MN156K	9VAC(From Power Adapter)

SETUP DIAGRAM FOR TESTS



The indicated numbers (1)(2), please refer to item 1.3

EUT OPERATING CONDITION

1. Run Broadcom Blue Tool → Blue Tool.
2. Choice Transport → HCI Control → USB and press ok.
3. Choice Enable USB HID Emulation, and press ok.
4. Start Tx mode test :
 - (a)Choice Set_Tx_Carrier_Frequency, key in channel MHz.
 - (b) Set Mode , choice Modulatel PRBS9, press ok.
 - (c) Set Transmit_Power , choice 0dB
 - (d) press OK
5. Start RX mode test :
 - (a) Choice Write_Receive_Only, key in channel MHz, press ok.



6. APPLICABLE LIMITS AND TEST RESULTS

6.1 20dB BANDWIDTH FOR HOPPING

LIMIT

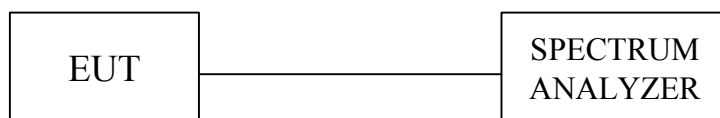
Limit : N/A

TEST REQUIREMENT: 15.247(a)(1)

TEST EQUIPMENTS

Description & Manufacturer	Model No.	Serial No.	Date of Calibration
ROHDE & SCHWARZ SPECTRUM ANALYZER	FSEK30	835253/002	September 06, 2004

TEST SETUP



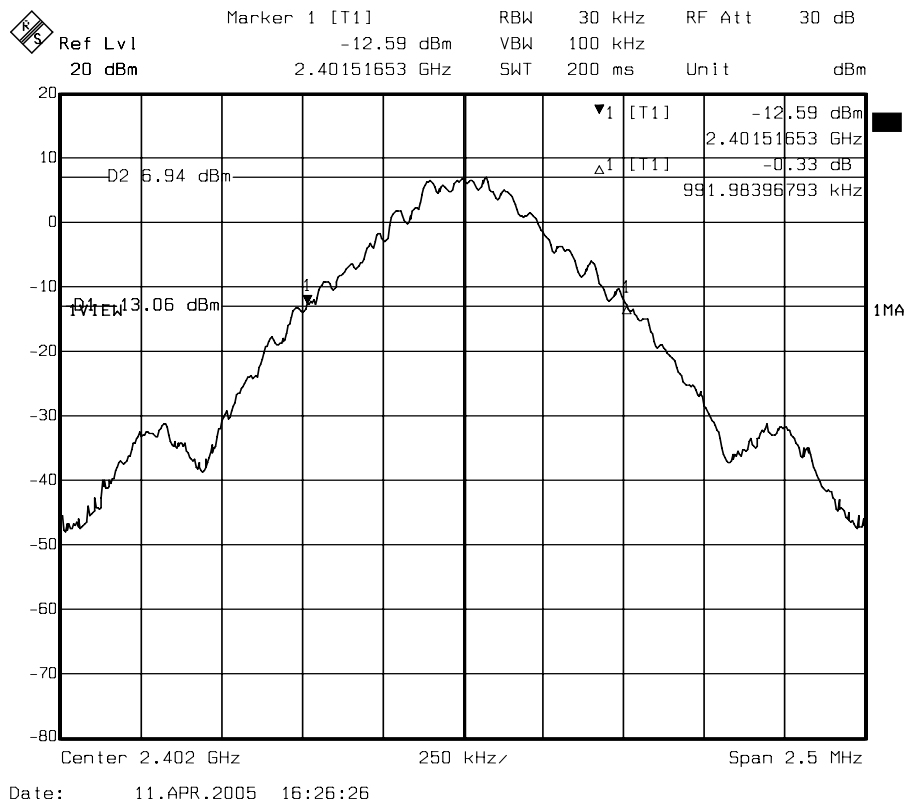
TEST PROCEDURE

The 20dB band width was measured with a spectrum analyzer connected to RF antenna connector(conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency. The analyzer center frequency was set to the EUT carrier frequency, using the analyzer. Display Line and Marker Delta functions, the 20dB band width of the emission was determined.

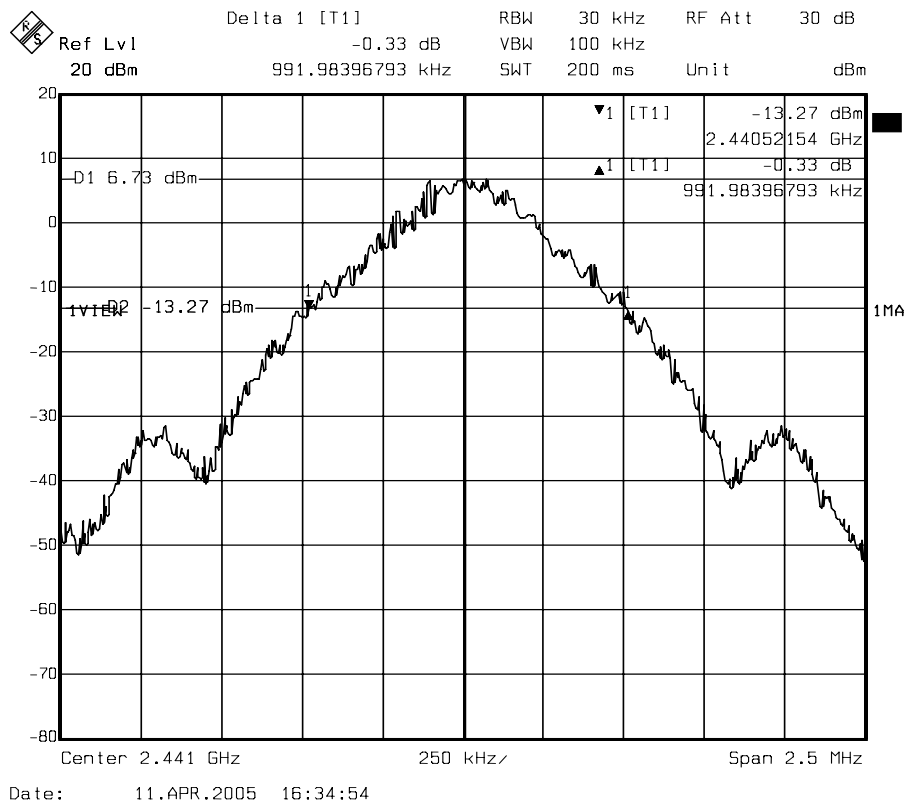
TEST RESULTS

No non-compliance noted

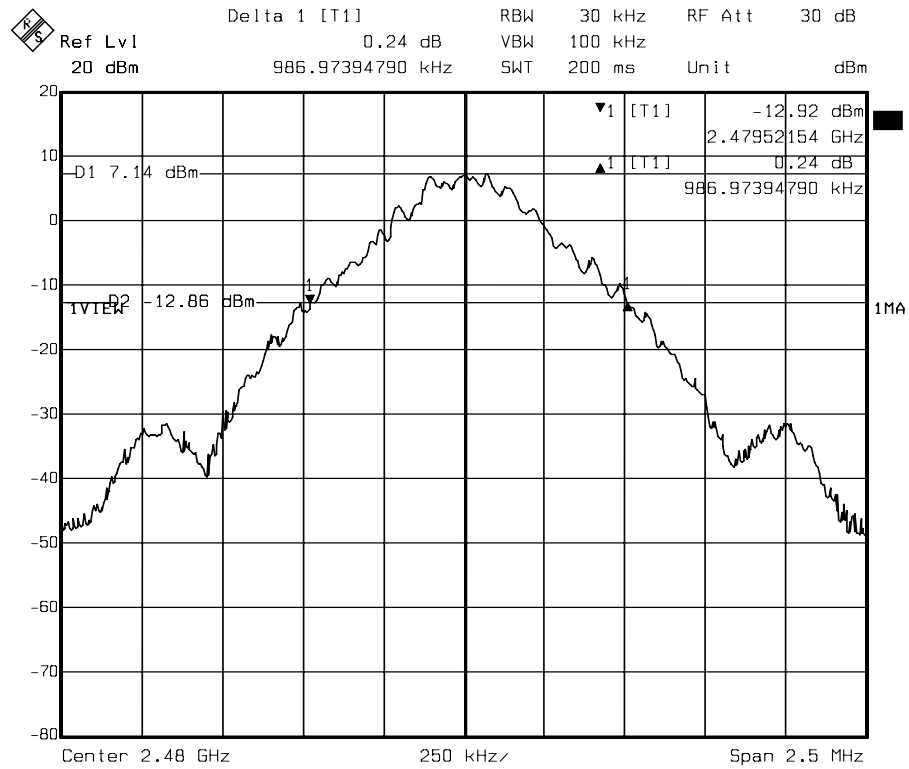
Channel	Channel Frequency (MHz)	20dB Bandwidth (MHz)	Pass / Fail
01 (Low)	2402	991.98	N/A
40 (Mid)	2441	991.98	N/A
79 (High)	2480	986.97	N/A

**20db BANDWIDTH**

Channel Low



Channel Mid



Date: 11.APR.2005 16:41:29

Channel High



6.2 MAXIMUM PEAK OUTPUT POWER

LIMIT

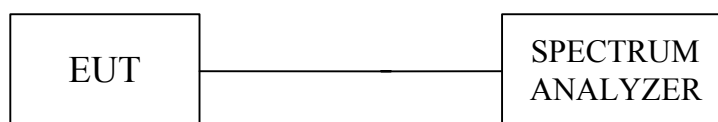
The Maximum Peak Output Power Measurement is 125mW for frequency hopping systems operating in 2400~2483.5 MHz employing at least 15 hopping channels.

TEST REQUIREMENT: 15.247(b)(1)

TEST EQUIPMENTS

Description & Manufacturer	Model No.	Serial No.	Date of Calibration
ROHDE & SCHWARZ SPECTRUM ANALYZER	FSEK30	835253/002	September 06, 2004

TEST SETUP



TEST PROCEDURE

The RF power output was measured with a Power meter connected to the RF Antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency, A spectrum analyzer was used to record the shape of the transmit signal.

TEST RESULTS

No non-compliance noted

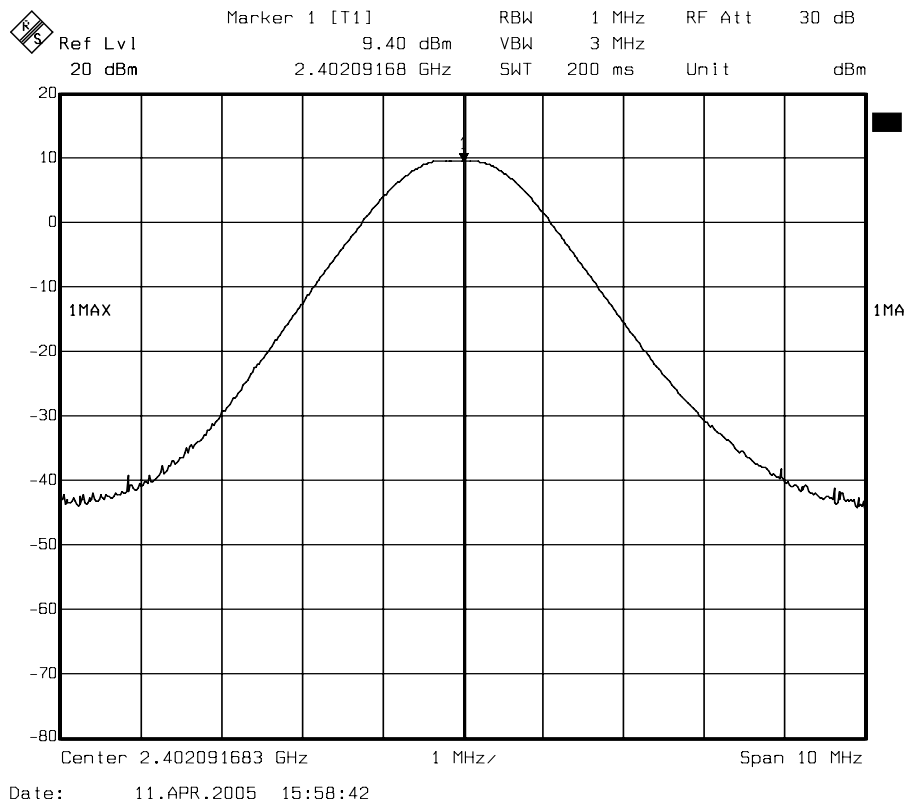
Cable loss = 0dB

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Pass / Fail
01 (Low)	2402	9.40	20.97	PASS
40 (Mid)	2441	9.81	20.97	PASS
79 (High)	2480	9.91	20.97	PASS

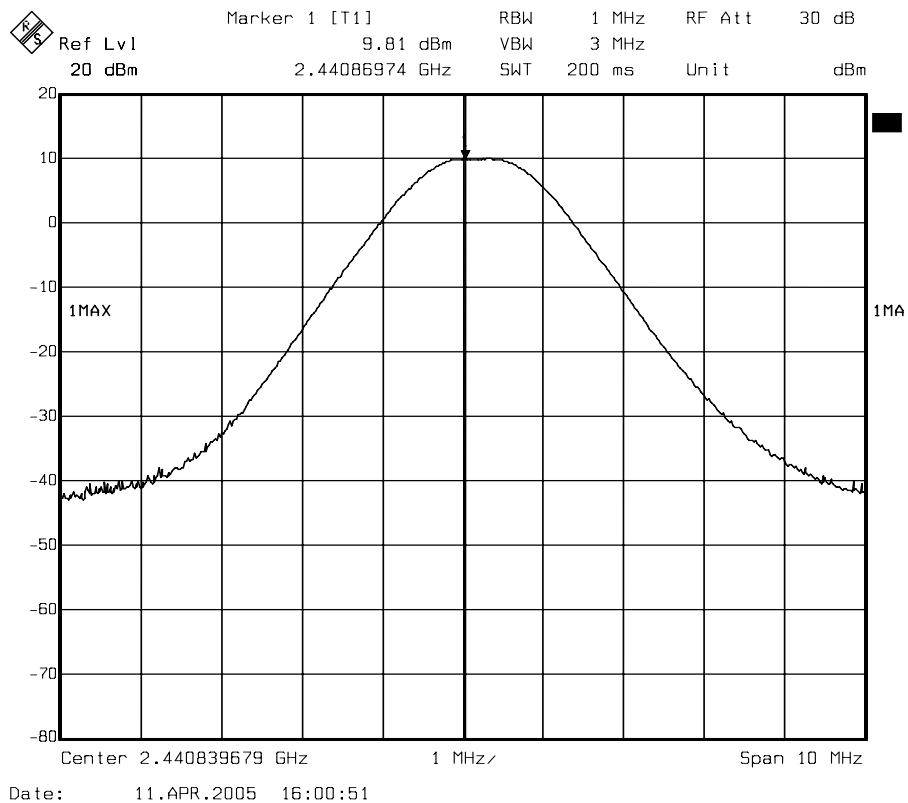
- Note :
1. At final test to get the worst-case emission at 1Mbps.
 2. The result basic equation calculation as follow :
Peak Power Output = Peak Power Reading + Cable loss
 3. The EUT is a portable device.



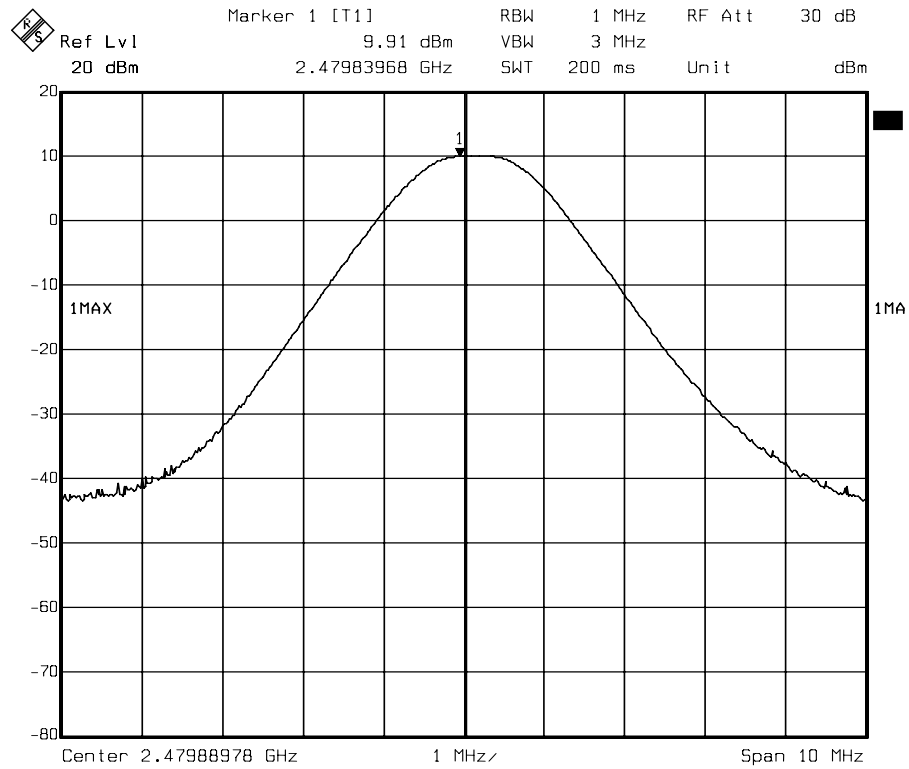
MAXIMUM PEAK OUTPUT POWER



Channel Low



Channel Mid



Date: 11.APR.2005 16:03:10

Channel High



6.3 HOPPING CHANNEL SEPARATION

LIMIT

According to 15.247(a) (1), frequency hopping system operating in 2400-2483.5MHz Band may have hopping channel carrier frequencies that are separated by 25kHz or two-third of 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

TEST REQUIREMENT: 15.247(a)(1)

TEST EQUIPMENTS

Description & Manufacturer	Model No.	Serial No.	Date of Calibration
ROHDE & SCHWARZ SPECTRUM ANALYZER	FSEK30	835253/002	September 06, 2004

TEST SETUP



TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the MaxHold function record the separation of adjacent channels.
4. Measure the frequency difference of these two adjacent channels by spectrum analyzer MARK function. And then plot the result on spectrum analyzer screen.
5. Repeat above procedures until all frequencies measured were complete.

TEST RESULTS

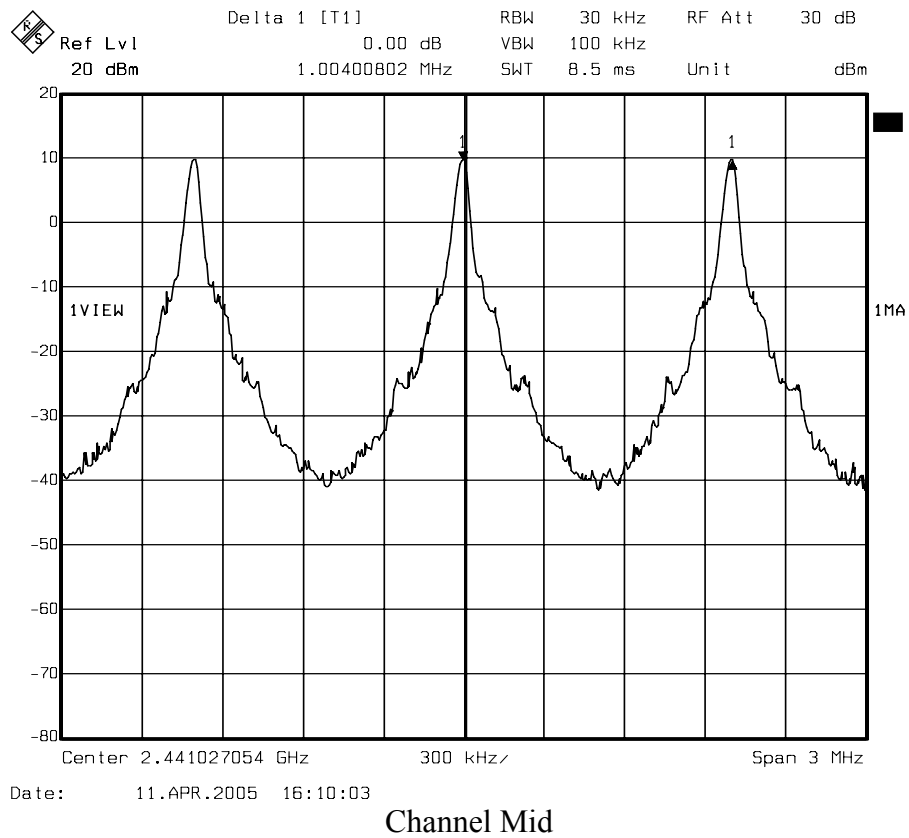
No non-compliance noted

Refer to section 6.1, 20dB bandwidth measurement, the measured channel separation should be greater than two-third of 20dB bandwidth or Minimum bandwidth.

Channel	Adjacent Hopping Channel Separation (kHz)	Two –third of 20dB bandwidth (kHz)	Minimum Bandwidth	Result
2441MHz (Mid)	1004 kHz	661.32 kHz	25 kHz	PASS



HOPPING CHANNEL SEPARATION





6.4 NUMBER OF HOPPING FREQUENCY USED

LIMIT

According to 15.247(a)(1)(iii), for frequency hopping system operating in the 2400-2483.5MHz bands shall use at least 15 hopping frequencies

TEST REQUIREMENT: 15.247(a)(1)(iii)

TEST EQUIPMENTS

Description & Manufacturer	Model No.	Serial No.	Date of Calibration
ROHDE & SCHWARZ SPECTRUM ANALYZER	FSEK30	835253/002	September 06, 2004

TEST SETUP



TEST PROCEDURE

- 1 Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.
- 2 Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- 3 Set the spectrum analyzer on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
- 4 Set the spectrum analyzer on View mode and then plot the result on spectrum analyzer screen.
- 5 Repeat above procedures until all frequencies measured were complete.

TEST RESULTS

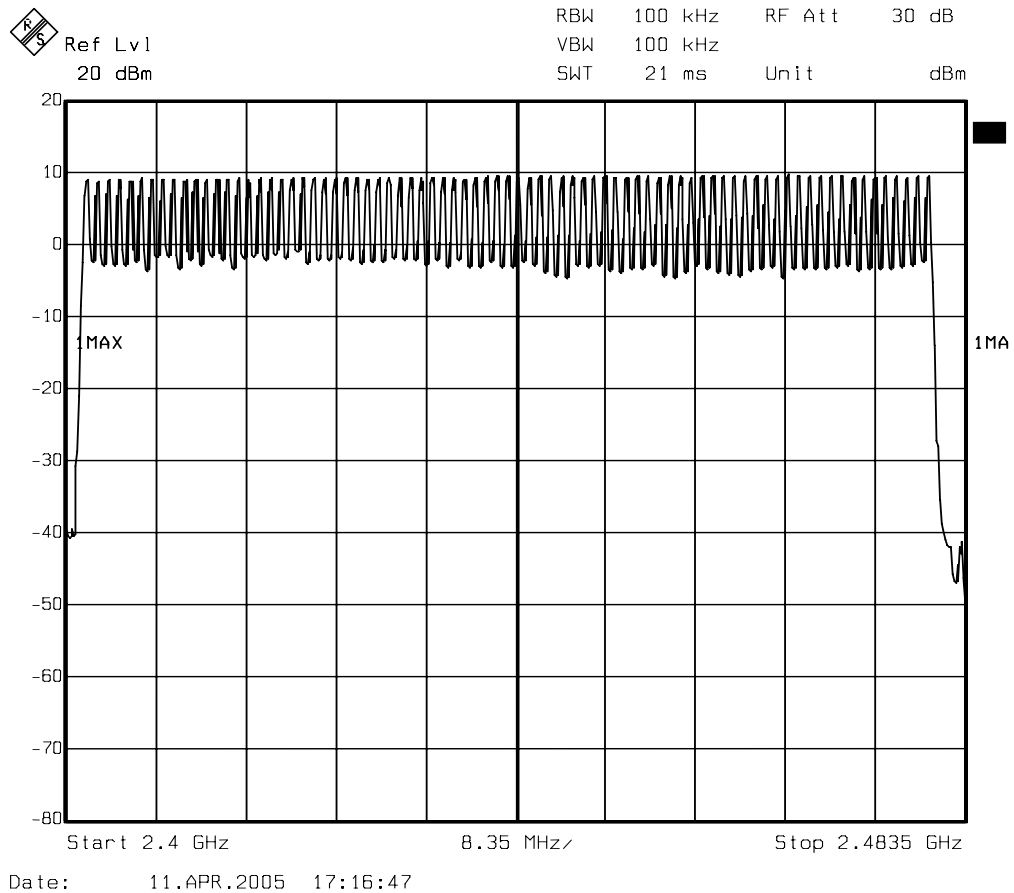
No non-compliance noted

Refer to the attached plot.

There are 79 hopping frequencies in a hopping sequence.



NUMBER OF HOPPING FREQUENCY USED





6.5 DWELL TIME ON EACH CHANNEL

LIMIT

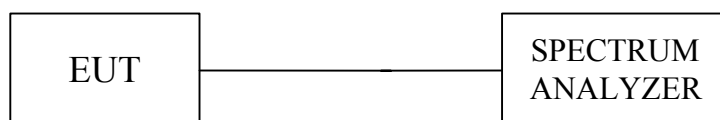
According to 15.247(a)(1)(iii), for frequency hopping system operating in the 2400-2483.5MHz band, the average time of occupancy on any frequency shall not be greater than 0.4 second within a 31.6 second period.

TEST REQUIREMENT: 15.247(a)(1)(iii)

TEST EQUIPMENTS

Description & Manufacturer	Model No.	Serial No.	Date of Calibration
ROHDE & SCHWARZ SPECTRUM ANALYZER	FSEK30	835253/002	September 06, 2004

TEST SETUP



TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of spectrum analyzer on any frequency be measured and set spectrum analyzer to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.
6. The Bluetooth USB Dongle has 3 type of payload, DH1, DH3, DH5. The hopping rate is 1600 per second.
The longer the payload is, the slower the hopping rate is.

**TEST RESULTS**

No non-compliance noted

Time of occupancy on the TX channel in 31.6sec = time domain slot length × hop rate ÷ number of hop per channel × 31.6

Refer to the attached graph.

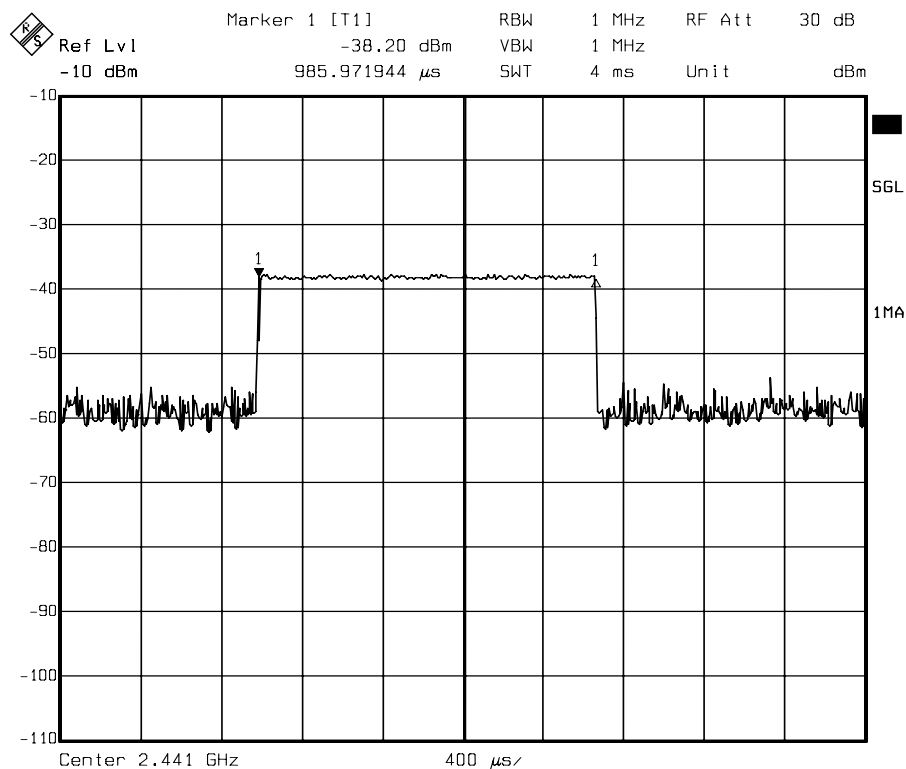
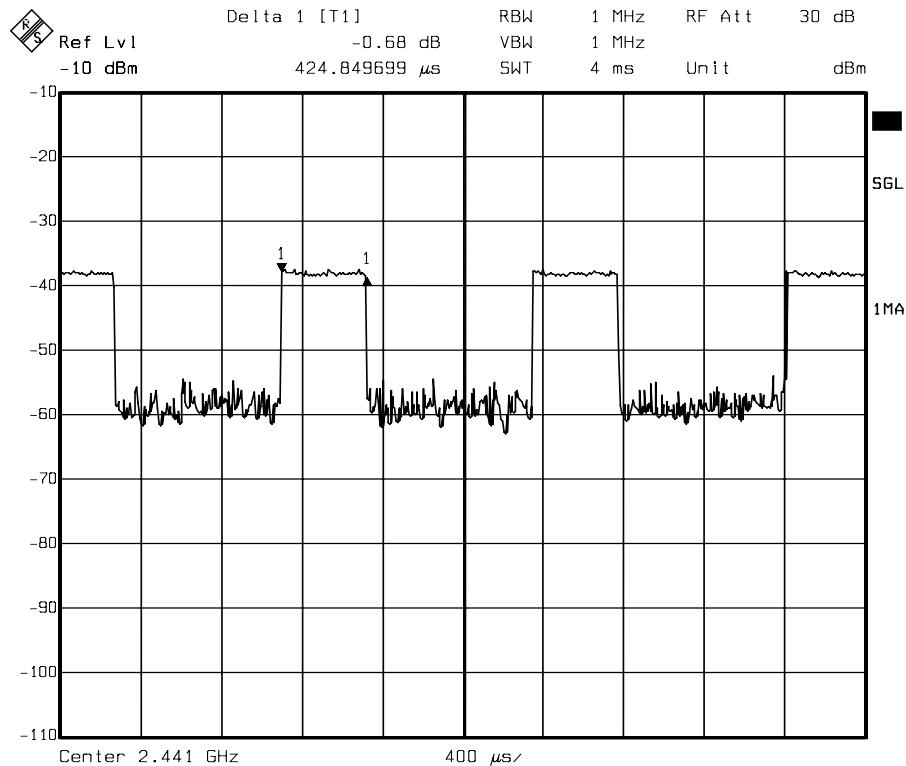
The hopping rates of Bluetooth devices change with different types of payload. The longer the payload is, the slower the hopping rate. The hopping rate scenario is defined in Bluetooth core specification.

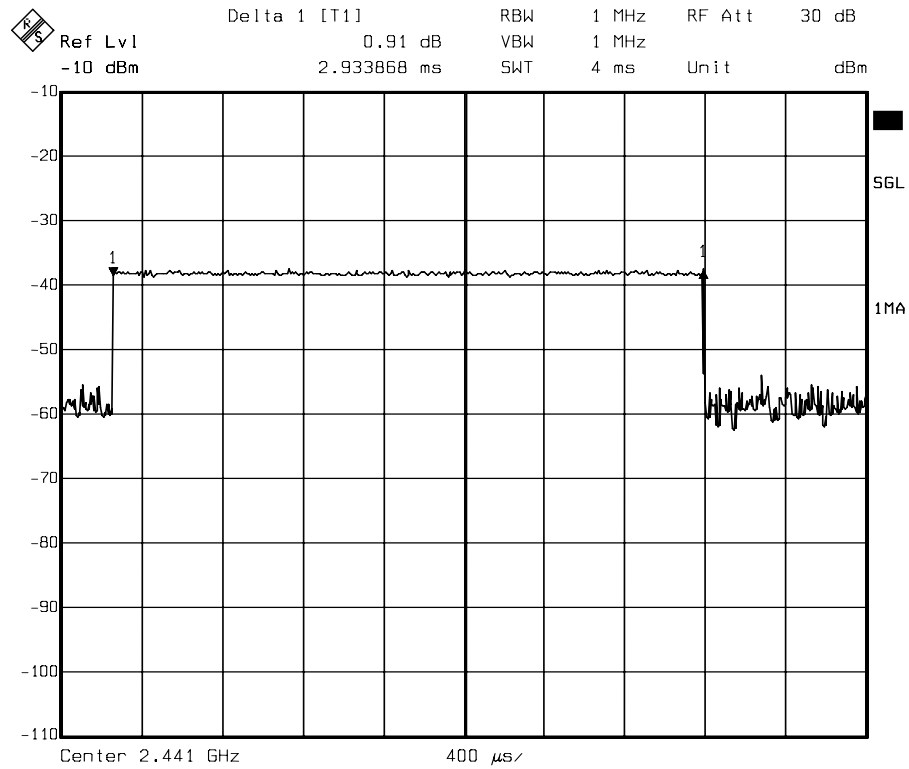
Transmitting Frequency	Packet type	Dwell time (ms)	Time of occupancy on the TX channel in 31.6sec (ms)	Limit for Time of occupancy on the TX channel in 31.6sec (ms)	Results
2441MHz	DH1	0.424	135.68	400	PASS
2441MHz	DH3	0.985	157.60	400	PASS
2441MHz	DH5	2.930	312.53	400	PASS

DH1 Dwell time = $0.424 \text{ ms} \times (1600 \div 2) \div 79 \times 31.6 = 135.68 \text{ (ms)}$

DH3 Dwell time = $0.985 \text{ ms} \times (1600 \div 4) \div 79 \times 31.6 = 157.60 \text{ (ms)}$

DH5 Dwell time = $2.930 \text{ ms} \times (1600 \div 6) \div 79 \times 31.6 = 312.53 \text{ (ms)}$

**DWELL TIME ON EACH PAYLOAD**



Date: 12.APR.2005 14:56:03

DH5 CH Mid



6.6 POWER SPECTRAL DENSITY MEASUREMENT

LIMIT

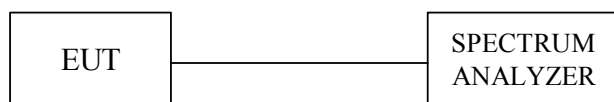
The peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission

TEST REQUIREMENT: 15.247(e)

TEST EQUIPMENTS

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Calibration Period
ROHDE & SCHWARZ SPECTRUM ANALYZER	FSEK30	835253/002	September 06, 2004	1 Year

TEST SETUP



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3KHz RBW and 30KHz VBW, set sweep time=span / 3KHz.

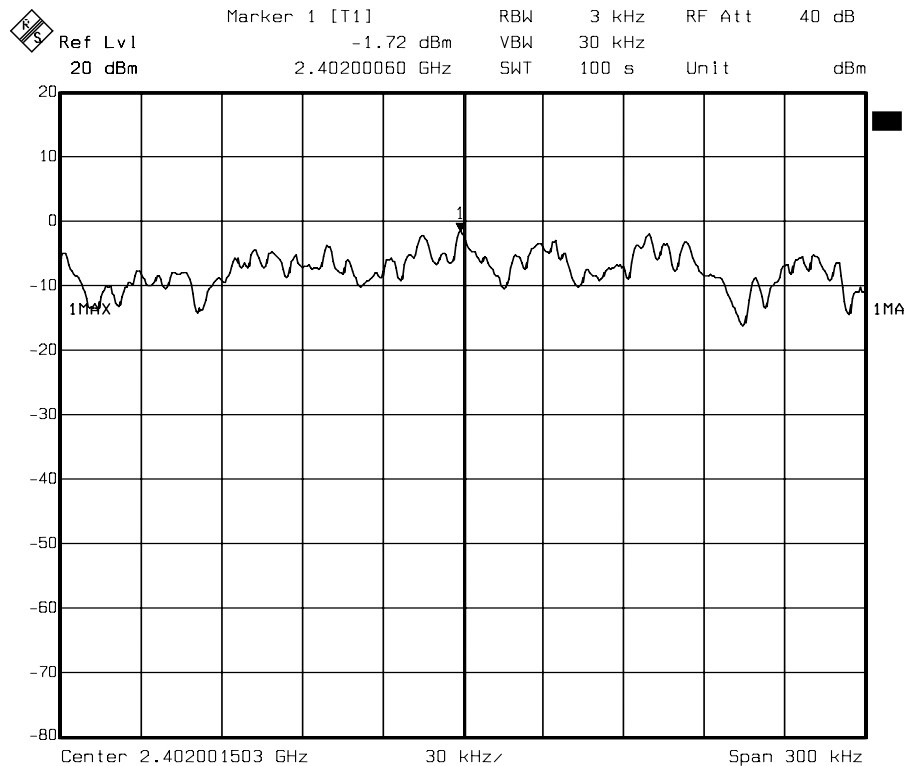
The power spectral density was measured and recorded.

The sweep time is allowed to be longer than span / 3KHz for a full response of the mixer in the spectrum analyzer.

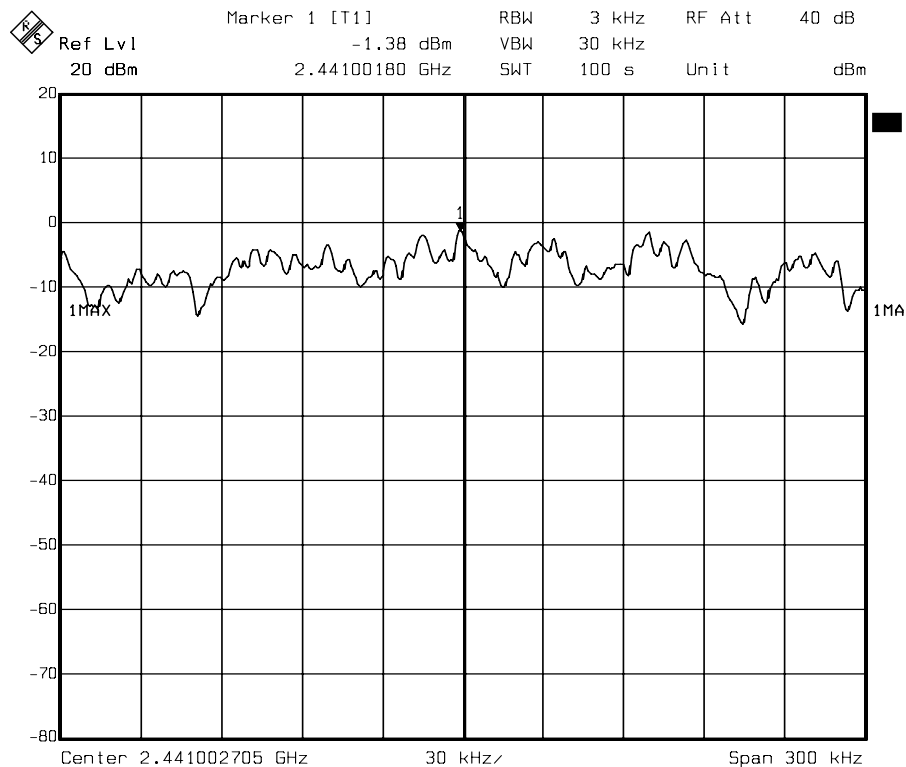
TEST RESULTS

No non-compliance noted

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)	Maximum Limit (dBm)	Pass / Fail
01(Low)	2402	-1.72	8	PASS
40(Mid)	2441	-1.38	8	PASS
79(High)	2480	-1.20	8	PASS

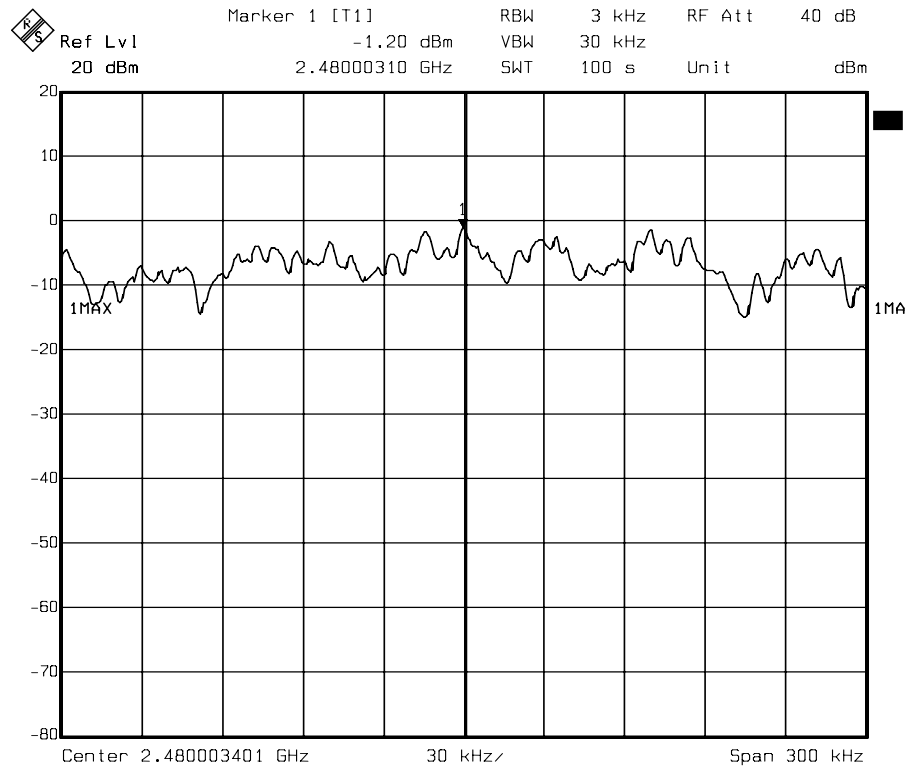
**POWER SPECTRAL DENSITY MEASUREMENT**

Date: 11.APR.2005 15:55:35

Channel Low

Date: 11.APR.2005 15:52:36

Channel Mid



Date: 11.APR.2005 15:49:39

Channel High



6.7 CONDUCTED SPURIOUS EMISSION

LIMITS

§ 15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

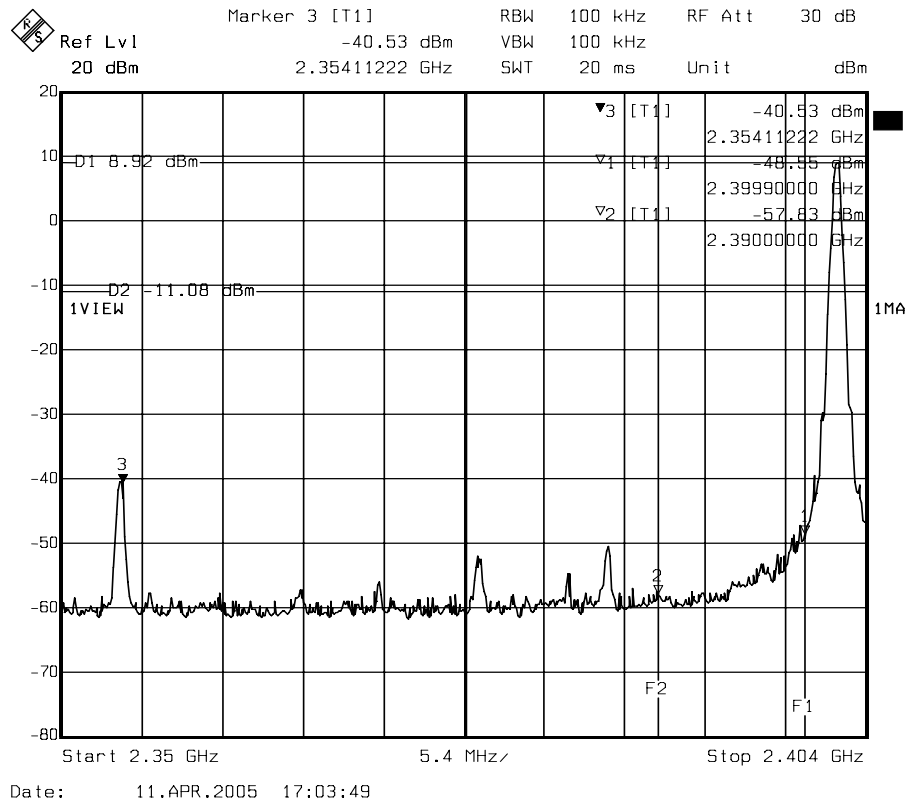
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

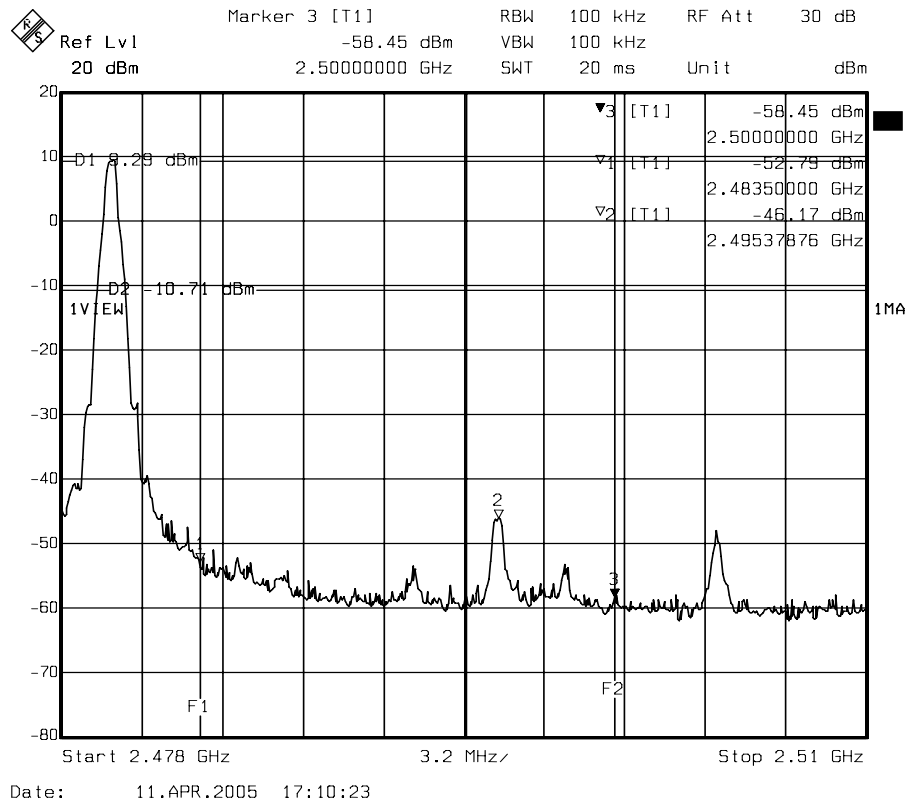
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

TEST RESULTS

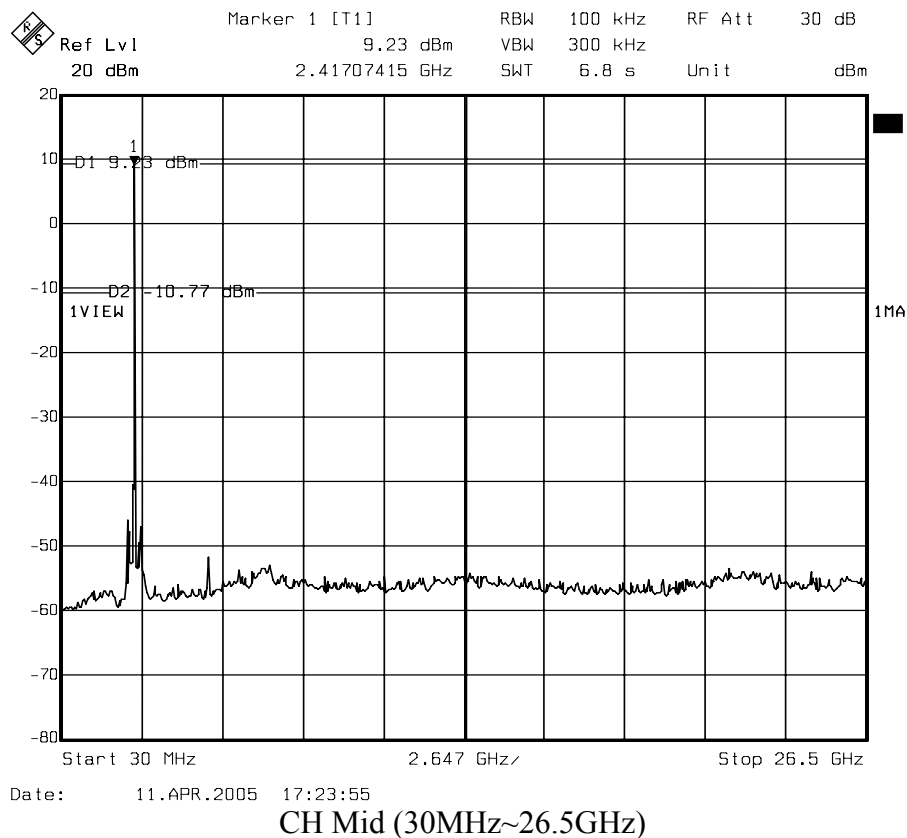
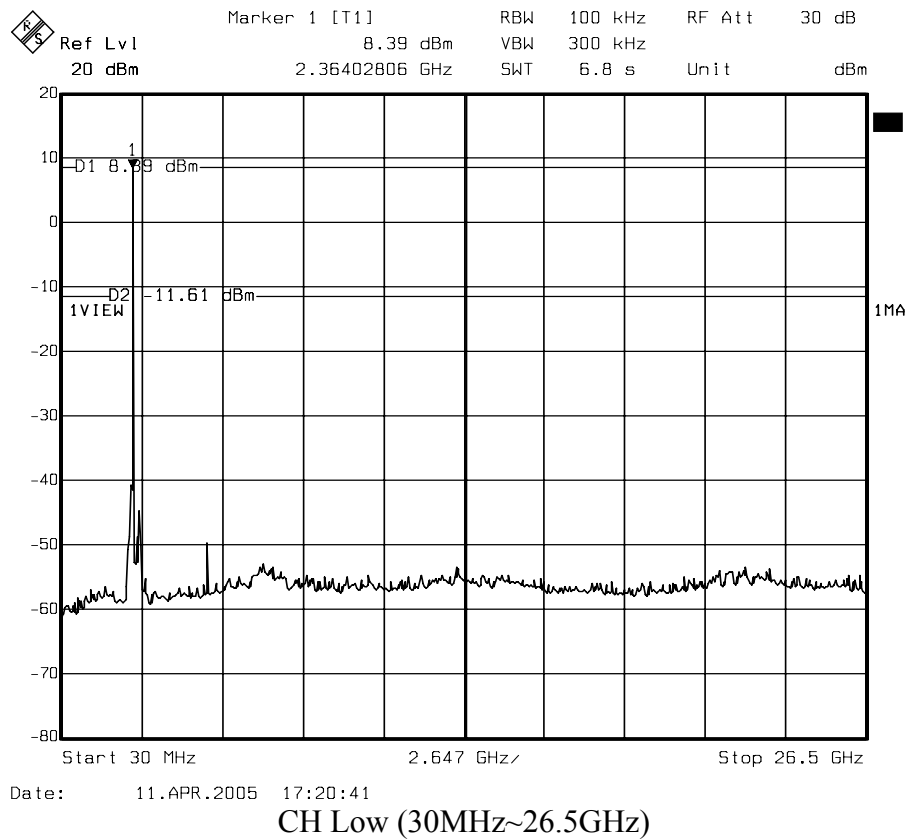
No non-compliance noted

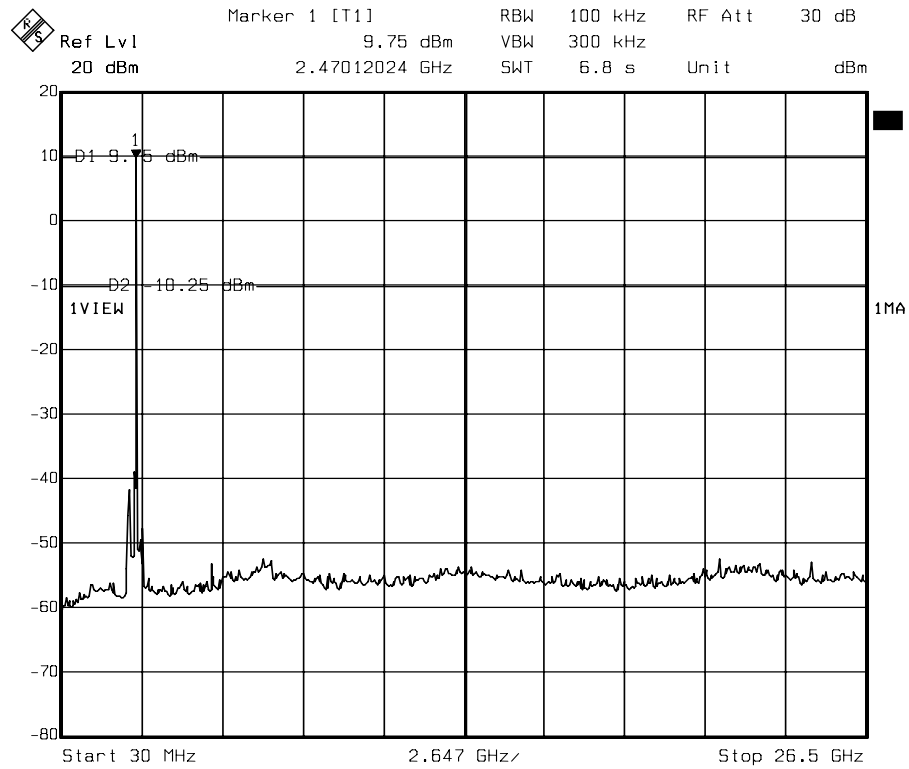
**BAND EDGE COMPLIANCE OF RF CONDUCTED EMISSIONS**

CH Low



CH High

**OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT**



Date: 11.APR.2005 17:25:48

CH High (30MHz~26.5GHz)



6.8. RADIATED EMISSIONS

6.8.1 TRANSMITTER RADIATED SUPURIOUS EMISSIONS

LIMITS

§ 15.205 (a) Except as shown in paragraph (d) 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 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	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 - 3338	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

§ 15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



§ 15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table :

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz, However, operation within these frequency bands is permitted under other sections of this Part, e-g, Sections 15.231 and 15.241.

§ 15.209 (b) In the emission table above, the tighter limit applies at the band edges.

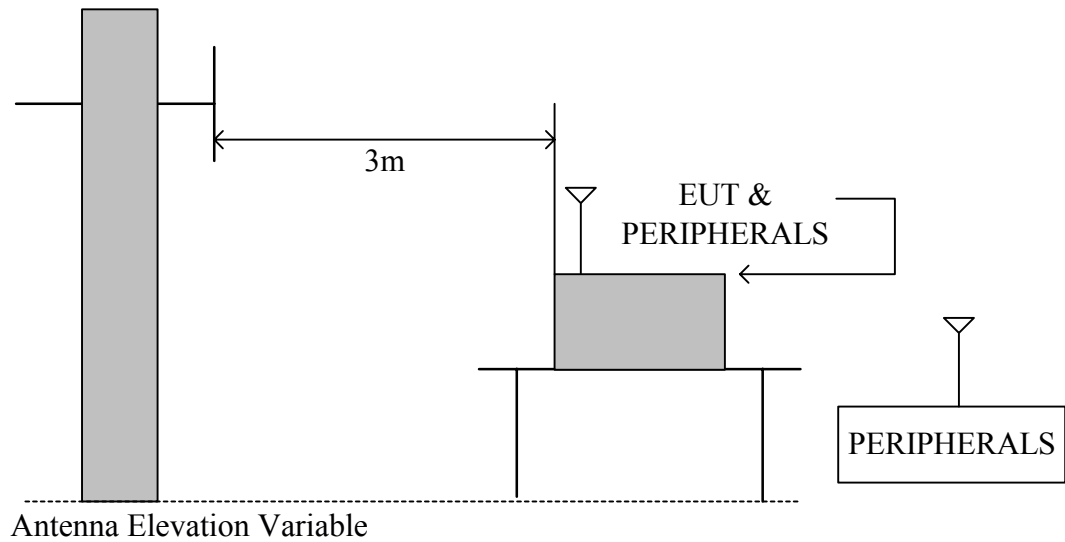
TEST EQUIPMENTS

The following test equipments are utilized in making the measurements contained in this report.

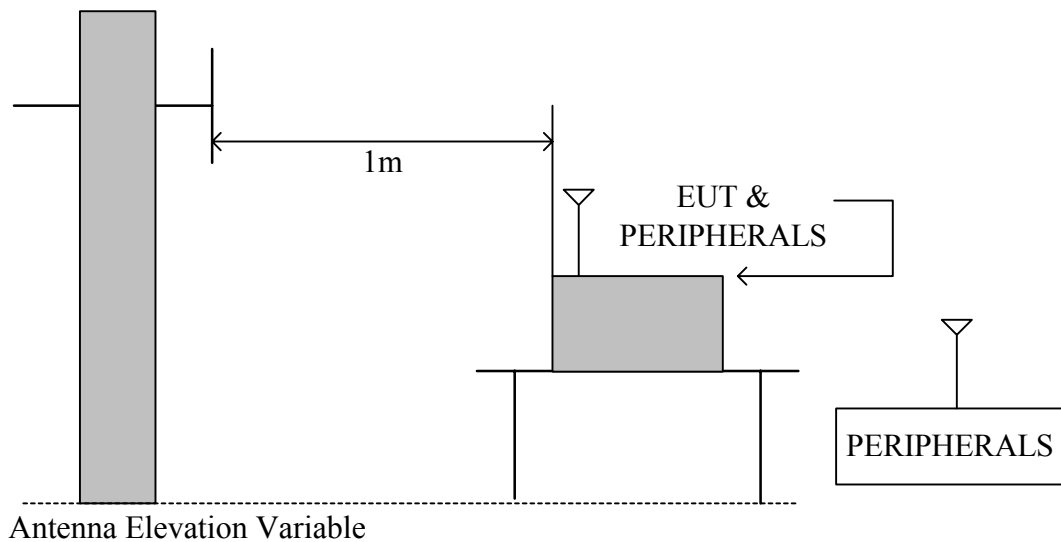
Manufacturer or Type	Model No.	Serial No.	Date of Calibration	Calibration Period	Remark
CHASE BI-LOG ANTENNA	CBL6112B	2562	May 20, 2004	1 Year	FINAL
OPEN SITE	-----	No.1	N/A	1 Year	FINAL
N TYPE COAXIAL CABLE	CHA9525	015	July 13, 2004	1 Year	FINAL
Horn Antenna	AH-118	10090	February 25, 2005	1 Year	FINAL
HP Pre-amplifier	8449B	3008A01916	September 27, 2004	1 Year	FINAL
HP High pass filter	84300/80038	002	cal. on use	1 Year	FINAL
R/S SPECTRUM ANALYZER	FSEK30	835253/002	September 06, 2004	1 Year	FINAL

TEST SETUP

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 to 1GHz.



The diagram below shows the test setup that is utilized to make the measurements for emission above 1GHz.





TEST PROCEDURE

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. While measuring the radiated emission below 1GHz, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. While measuring the radiated emission above 1GHz, the EUT was set 1 meters away from the interference-receiving antenna
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Note :

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.

TEST RESULTS

No non-compliance noted

**6.8.2 WORST-CASE RADIATED EMISSION BELOW 1 GHz**

Company	Cadmus Micro Inc.	Test Date	2005/04/11
Product Name	Bluetooth USB Dongle	Test By	Vincent Chen
Model Name	UBTBR1E	TEMP&Humidity	21.9°C, 68%

Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading at 3m(dBμV)		Limits (dBμV/m)	Emission Level at 3m(dBμV/m)	
			Horizontal	Vertical		Horizontal	Vertical
150.02	11.85	2.40	5.80	6.20	43.50	20.05	20.45
167.13	11.27	2.55	4.20	3.60	43.50	18.02	17.42
210.00	11.32	2.70	5.20	6.50	43.50	19.22	20.52
250.35	13.23	3.10	3.60	5.20	46.00	19.93	21.53
263.57	13.42	3.15	4.50	6.10	46.00	21.08	22.68
297.06	13.92	3.29	3.80	6.10	46.00	21.00	23.30
528.11	18.82	4.36	7.20	8.40	46.00	30.37	31.57

- REMARKS:
1. * Undetectable
 2. Emission level (dBμV/M) = Antenna Factor (dB/m) + Cable loss (dB) + Meter Reading (dBμV).
 3. According to technical experience, all spurious emission at channel 1, 40 and 79 are almost the same below 1GHz, so the spurious emission test result of the channel 1 was chosen as representative in final test.

**6.8.3 TRANSMITTER RADIATED EMISSION ABOVE 1 GHz**

Company	Cadmus Micro Inc.	Test Date	2005/04/13
Product Name	Bluetooth USB Dongle	Test By	Vincent Chen
Model Name	UBTBR1E	TEMP&Humidity	23.9°C, 65%

CH01 (2402 MHz) TX (Low)				Measurement Distance at 1m Horizontal polarity							
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
* 2353.00	27.88	31.85	3.56	0.00	9.50	0.00	53.78	74.00	-20.22	P	1.00
* 2353.00	18.34	31.85	3.56	0.00	9.50	0.00	44.24	54.00	-9.76	A	1.00
* 2390.00	25.52	31.81	3.57	0.00	9.50	0.00	51.40	74.00	-22.60	P	1.00
* 2390.00	10.98	31.81	3.57	0.00	9.50	0.00	36.86	54.00	-17.14	A	1.00
* 1401.18	57.50	27.47	2.79	35.84	9.50	0.00	42.42	74.00	-31.58	P	1.00
* 1401.18	44.78	27.47	2.79	35.84	9.50	0.00	29.70	54.00	-24.30	A	1.00
* 4804.08	48.08	34.31	5.08	35.14	9.50	2.08	44.90	74.00	-29.10	P	1.00
* 4804.08	39.60	34.31	5.08	35.14	9.50	2.08	36.42	54.00	-17.58	A	1.00

Note :

1. The measurement was searched to 10th harmonic, Remark "---" means that the emissions level is too low to be measured.
2. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
3. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
4. Remark "*" means that Restricted band.
5. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
6. The result basic equation calculation is as follow:
Level=Reading + AF + Cable – Preamp + Filter – Dist, Margin = Level-Limit
7. The other emission levels were 20dB below the limit
8. The test limit distance is 3M limit.



Company	Cadmus Micro Inc.	Test Date	2005/04/13
Product Name	Bluetooth USB Dongle	Test By	Vincent Chen
Model Name	UBTBR1E	TEMP&Humidity	23.9°C, 65%

CH01 (2402 MHz) TX (Low)				Measurement Distance at 1m Vertical polarity							
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
* 2353.00	22.50	31.85	3.56	0.00	9.50	0.00	48.40	74.00	-25.60	P	1.00
* 2353.00	18.40	31.85	3.56	0.00	9.50	0.00	44.30	54.00	-9.70	A	1.00
* 2390.00	16.80	31.81	3.57	0.00	9.50	0.00	42.68	74.00	-31.32	P	1.00
* 2390.00	7.80	31.81	3.57	0.00	9.50	0.00	33.68	54.00	-20.32	A	1.00
* 1401.18	59.25	27.47	2.79	35.84	9.50	0.00	44.17	74.00	-29.83	P	1.00
* 1401.18	45.52	27.47	2.79	35.84	9.50	0.00	30.44	54.00	-23.56	A	1.00
* 4804.27	48.74	34.31	5.08	35.14	9.50	2.08	45.57	74.00	-28.43	P	1.00
* 4804.27	41.26	34.31	5.08	35.14	9.50	2.08	38.09	54.00	-15.91	A	1.00

Note :

1. The measurement was searched to 10th harmonic, Remark "---" means that the emissions level is too low to be measured.
2. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
3. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
4. Remark "*" means that Restricted band.
5. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
6. The result basic equation calculation is as follow:
Level = Reading + AF + Cable – Preamp + Filter - Dist, Margin = Level - Limit
7. The other emission levels were 20dB below the limit
8. The test limit distance is 3M limit.



Company	Cadmus Micro Inc.	Test Date	2005/04/13
Product Name	Bluetooth USB Dongle	Test By	Vincent Chen
Model Name	UBTBR1E	TEMP&Humidity	23.9 °C, 65%

CH40 (2441 MHz) TX (Mid)				Measurement Distance at 1m Horizontal polarity							
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
* 1403.69	57.35	27.48	2.79	35.83	9.50	0.00	42.29	74.00	-31.71	P	1.00
* 1403.69	44.48	27.48	2.79	35.83	9.50	0.00	29.42	54.00	-24.58	A	1.00
* 4882.90	45.13	34.83	5.10	35.21	9.50	1.77	42.12	74.00	-31.88	P	1.00
* 4882.90	33.58	34.83	5.10	35.21	9.50	1.77	30.57	54.00	-23.43	A	1.00
* 7323.00	50.68	39.77	6.80	35.64	9.50	2.00	54.12	74.00	-19.88	P	1.00
* 7323.00	44.11	39.77	6.80	35.64	9.50	2.00	47.55	54.00	-6.45	A	1.00

Note :

1. The measurement was searched to 10th harmonic, Remark "---" means that the emissions level is too low to be measured.
2. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
3. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
4. Remark "*" means that Restricted band.
5. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
6. The result basic equation calculation is as follow:
Level = Reading + AF + Cable – Preamp + Filter - Dist, Margin = Level - Limit
7. The other emission levels were 20dB below the limit
8. The test limit distance is 3M limit.



Company	Cadmus Micro Inc.	Test Date	2005/04/13
Product Name	Bluetooth USB Dongle	Test By	Vincent Chen
Model Name	UBTBR1E	TEMP&Humidity	23.9 °C, 65%

CH40 (2441 MHz) TX (Mid)				Measurement Distance at 1m Vertical polarity							
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
* 1403.69	55.55	27.48	2.79	35.83	9.50	0.00	40.49	74.00	-33.51	P	1.00
* 1403.69	43.09	27.48	2.79	35.83	9.50	0.00	28.03	54.00	-25.97	A	1.00
* 4882.84	44.04	34.83	5.10	35.21	9.50	1.77	41.03	74.00	-32.97	P	1.00
* 4882.84	33.90	34.83	5.10	35.21	9.50	1.77	30.89	54.00	-23.11	A	1.00
* 7323.00	48.86	39.77	6.80	35.64	9.50	2.00	52.30	74.00	-21.70	P	1.00
* 7323.00	43.16	39.77	6.80	35.64	9.50	2.00	46.60	54.00	-7.40	A	1.00

Note :

1. The measurement was searched to 10th harmonic, Remark "---" means that the emissions level is too low to be measured.
2. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
3. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
4. Remark "*" means that Restricted band.
5. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
6. The result basic equation calculation is as follow:
Level = Reading + AF + Cable – Preamp + Filter - Dist, Margin = Level - Limit
7. The other emission levels were 20dB below the limit
8. The test limit distance is 3M limit.



Company	Cadmus Micro Inc.	Test Date	2005/04/13
Product Name	Bluetooth USB Dongle	Test By	Vincent Chen
Model Name	UBTBR1E	TEMP&Humidity	23.9°C, 65%

CH79 (2480 MHz) TX (High)				Measurement Distance at 1m Horizontal polarity							
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
* 2483.50	28.28	31.72	3.61	0.00	9.50	0.00	54.11	74.00	-19.89	P	1.00
* 2483.50	21.43	31.72	3.61	0.00	9.50	0.00	47.26	54.00	-6.74	A	1.00
* 2495.51	27.46	31.70	3.62	0.00	9.50	0.00	53.28	74.00	-20.72	P	1.00
* 2495.51	17.00	31.70	3.62	0.00	9.50	0.00	42.82	54.00	-11.18	A	1.00
* 1403.69	58.44	27.48	2.79	35.83	9.50	0.00	43.38	74.00	-30.62	P	1.00
* 1403.69	43.98	27.48	2.79	35.83	9.50	0.00	28.92	54.00	-25.08	A	1.00
* 4961.02	47.06	35.34	5.13	35.27	9.50	1.46	44.22	74.00	-29.78	P	1.00
* 4961.02	37.42	35.34	5.13	35.27	9.50	1.46	34.58	54.00	-19.42	A	1.00
* 7440.02	49.60	39.72	6.88	35.61	9.50	2.00	53.09	74.00	-20.91	P	1.00
* 7440.02	43.44	39.72	6.88	35.61	9.50	2.00	46.93	54.00	-7.07	A	1.00

Note :

1. The measurement was searched to 10th harmonic, Remark "---" means that the emissions level is too low to be measured.
2. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
3. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
4. Remark "*" means that Restricted band.
5. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
6. The result basic equation calculation is as follow:
Level = Reading + AF + Cable – Preamp + Filter - Dist, Margin = Level - Limit
7. The other emission levels were 20dB below the limit
8. The test limit distance is 3M limit.



Company	Cadmus Micro Inc.	Test Date	2005/04/13
Product Name	Bluetooth USB Dongle	Test By	Vincent Chen
Model Name	UBTBR1E	TEMP&Humidity	23.9°C, 65%

CH79 (2480 MHz) TX (High)				Measurement Distance at 1m Vertical polarity							
Freq. (MHz)	Reading (dBμV)	AF (dBμV)	Cable (dB)	Pre-amp (dB)	Dist (dB)	Filter (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Mark (P/Q/A)	Height (Meter)
* 2483.50	29.04	31.72	3.61	0.00	9.50	0.00	54.87	74.00	-19.13	P	1.00
* 2483.50	24.43	31.72	3.61	0.00	9.50	0.00	50.26	54.00	-3.74	A	1.00
* 2495.51	27.01	31.70	3.62	0.00	9.50	0.00	52.83	74.00	-21.17	P	1.00
* 2495.51	15.41	31.70	3.62	0.00	9.50	0.00	41.23	54.00	-12.77	A	1.00
* 1403.80	54.80	27.48	2.79	35.83	9.50	0.00	39.75	74.00	-34.25	P	1.00
* 1403.80	40.62	27.48	2.79	35.83	9.50	0.00	25.57	54.00	-28.43	A	1.00
* 4961.00	47.75	35.34	5.13	35.27	9.50	1.46	44.91	74.00	-29.09	P	1.00
* 4961.00	41.86	35.34	5.13	35.27	9.50	1.46	39.02	54.00	-14.98	A	1.00
* 7440.12	47.96	39.72	6.88	35.61	9.50	2.00	51.45	74.00	-22.55	P	1.00
* 7440.12	39.16	39.72	6.88	35.61	9.50	2.00	42.65	54.00	-11.35	A	1.00

Note :

1. The measurement was searched to 10th harmonic, Remark “---” means that the emissions level is too low to be measured.
2. AF: Antenna Factor, Cable: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
3. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
4. Remark “*” means that Restricted band.
5. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
6. The result basic equation calculation is as follow:
Level = Reading + AF + Cable – Preamp + Filter - Dist, Margin = Level - Limit
7. The other emission levels were 20dB below the limit
8. The test limit distance is 3M limit.



6.8.4 BAND EDGE MEASUREMENT

LIMITS

The emission not fallen in restricted bands should be 20dB below the highest emission level of operating band (in 100KHz Resolution Bandwidth).

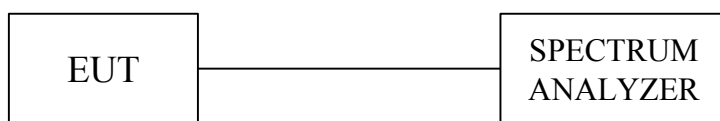
For the emissions fallen in the restricted bands listed in section 15.205, the maximum permitted average field strength should meet the requirement listed in section 15.209.

Test Requirement: 15.247(d)

TEST EQUIPMENTS

Description & Manufacturer	Model No.	Serial No.	Date of Calibration
ROHDE & SCHWARZ SPECTRUM ANALYZER	FSEK30	835253/002	September 06, 2004

TEST SETUP



TEST PROCEDURE

The band edge compliance of RF radiated emission should be measured by following the guidance in ANSI C63.4 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW and VBM to 1MHz to measure the peak field strength and set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength.

**TEST RESULTS**

No non-compliance noted

Refer to the section 6.8.3, the measured radiated band edge emissions are listed below :

Band edge Frequency (MHz)		Measured radiated band edge field strength (dBuV/m)		Radiated band edge field strength limit (dBuV/m)		Test result
		Horizontal	Vertical	Horizontal	Vertical	
2390.00	PK	51.40	42.68	74.00	74.00	PASS
	AV	36.86	33.68	54.00	54.00	
2483.50	PK	54.11	54.87	74.00	74.00	PASS
	AV	47.26	50.26	54.00	54.00	

Note : 1. Radiated band edge field strength is measured with is measured with measurement procedure
ANSI C63.4-2003



6.9 POWERLINE CONDUCTED EMISSIONS

LIMITS

§ 15.207 (a) Except as shown in paragraph (b) and (c) this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

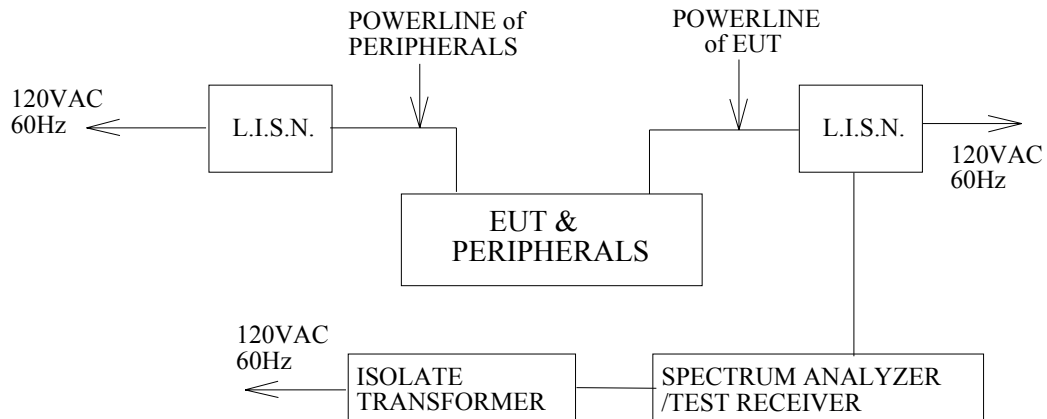
The lower limit applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted limit (dB μ v)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56	56 to 46
0.5 - 5	56	46
5 - 30	60	50

TEST EQUIPMENTS

The following test equipments are used during the conducted powerline tests :

Manufacturer or Type	Model No.	Serial No.	Date of Calibration	Calibration Period	Remark
HP SPECTRUM ANALYZER	8594E	3801A05627	April 26, 2004	1 Year	PRETEST
SOLAR ISOLATION TRANSFORMER	7032-1	N/A	N/A	N/A	FINAL
EMCO L.I.S.N.	3850/2	9311-1025 9401-1028	January 10, 2005 For Characteristic impedance	1 Year	FINAL
			May 18, 2004 For Insertion loss		
R & S TEST RECEIVER	ESHS30	838550/003	February 21, 2005	1 Year	FINAL
KEENE SHIELDED ROOM	5983	No.1	N/A	N/A	FINAL
R & S PULSE LIMIT	EHS3Z2	357.8810.52	July 10, 2004	1 Year	FINAL
N TYPE COAXIAL CABLE	-----	-----	July 10, 2004	1 Year	FINAL
50 Ω TERMINATOR	-----	-----	July 10, 2004	1 Year	FINAL

**TEST SETUP****TEST PROCEDURE**

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80cm above the horizontal ground plane. The EUT IS CONFIGURED IN ACCORDANCE WITH ANSI C63.4.

The resolution bandwidth is set to 9 kHz for both quasi-peak detection and average detection measurements.

Line conducted data is recorded for both NEUTRAL and LINE.

TEST RESULTS

No non-compliance noted

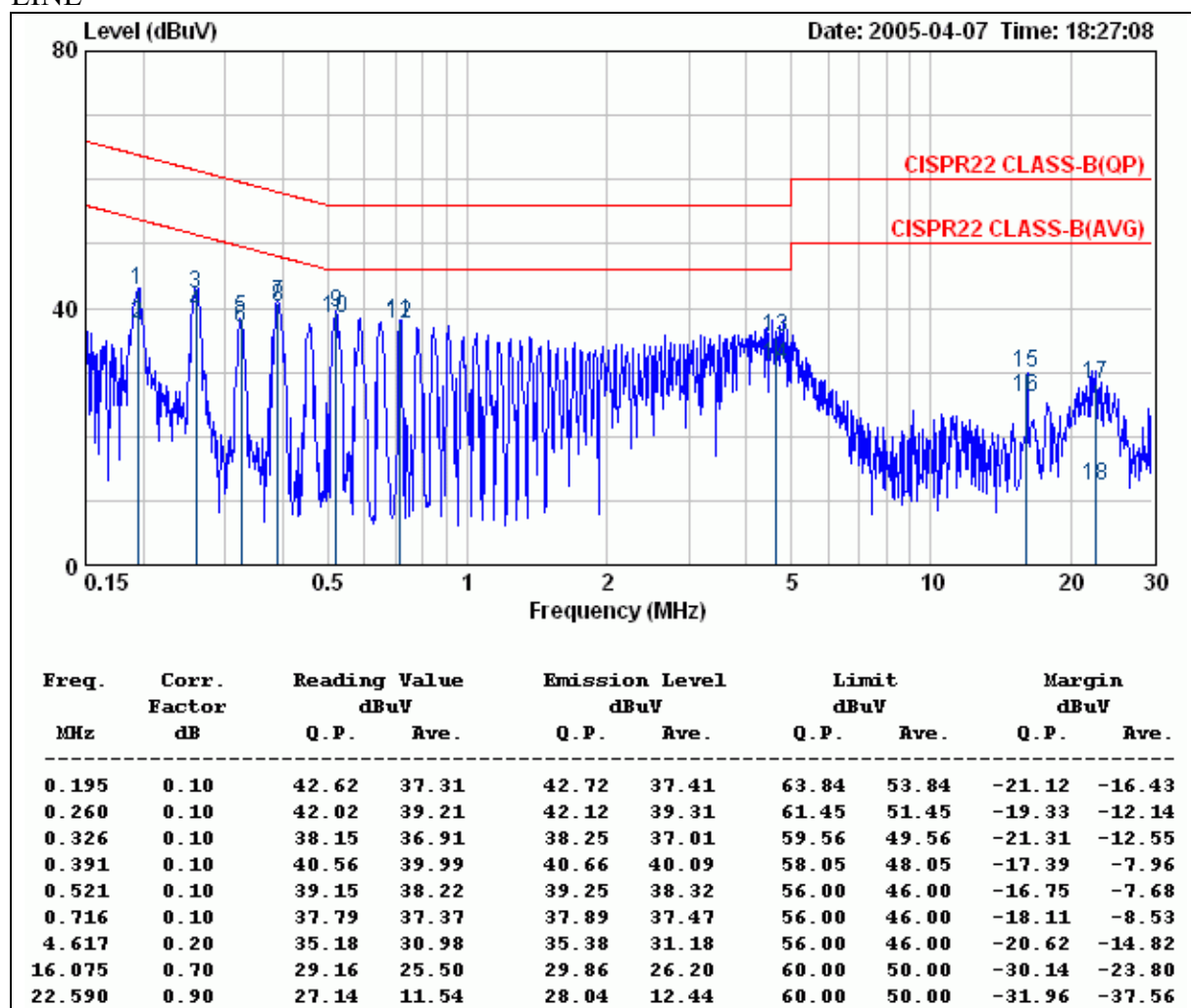


CONDUCTED RF VOLTAGE MEASUREMENT

The frequency spectrum from 0.15 MHz to 30 MHz was investigated. All emissions not reported are much lower than the prescribed limits.

Company	Cadmus Micro Inc.	Test Date	2005/04/07
Product Name	Bluetooth USB Dongle	Test By	Vincent Chen
Model Name	UBTBR1E	TEMP&Humidity	25°C, 60%

LINE

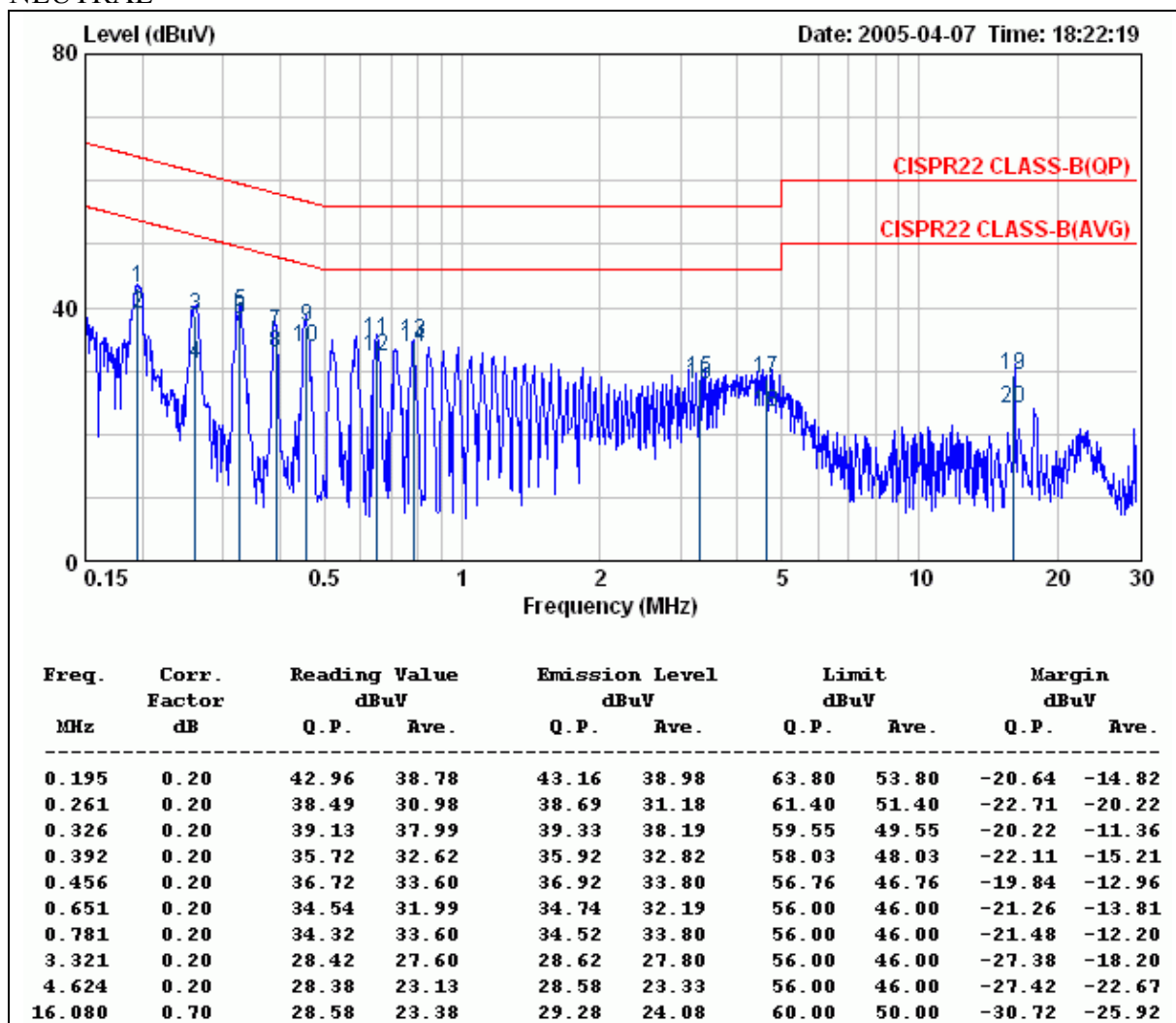


REMARKS: 1. Correction Factor = Insertion loss + cable loss
2. Margin value = Emission level – Limit value
3. The EUT can be operated in transmitting, stand-by and receiving mode. After preliminary scan, EUT in transmitting mode has highest emission.
The EUT was set in transmitting mode at final test to get the worst case test results.



Company	Cadmus Micro Inc.	Test Date	2005/04/07
Product Name	Bluetooth USB Dongle	Test By	Vincent Chen
Model Name	UBTBR1E	TEMP&Humidity	25°C, 60%

NEUTRAL



REMARKS: 1. Correction Factor = Insertion loss + cable loss
2. Margin value = Emission level – Limit value
3. The EUT can be operated in transmitting, stand-by and receiving mode. After preliminary scan, EUT in transmitting mode has highest emission.
The EUT was set in transmitting mode at final test to get the worst case test results.



7. SETUP PHOTOS

RADIATED RF MEASUREMENT SETUP







POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP





8. ANTENNA REQUIREMENT

8.1 STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

8.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product is Inverter F type (layout on PCB) antenna. The maximum Gain of the antenna only -1dBi