FCC TEST REPORT

REPORT NO.: RF921020H06
MODEL NO.: MDCBTSC
RECEIVED: Oct. 21, 2003
TESTED: Oct. 23 to 24, 2003

APPLICANT: BILLIONTON SYSTEMS INC

ADDRESS: No.21, Sui-Lih Rd., Hsin-Chu, 300, Taiwan

ISSUED BY: Advance Data Technology Corporation

LAB LOCATION: No. 81-1, Lu Liao Keng, 9 Ling, Wu Lung Tsuen,
Chiung Lin Hsiang, Hsin Chu Hsien,
Taiwan, R.O.C.

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0536
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Lab Code: 200376-0

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1 CERTIFICATION

PRODUCT : Bluetooth\Modem Combo Card

BRAND NAME : Billionton

MODEL NO. : MDCBTSC

APPLICANT : BILLIONTON SYSTEMS INC

STANDARDS : 47 CFR Part 15, Subpart C (Section 15.247), ANSI C63.4-1992

We, **Advance Data Technology Corporation**, hereby certify that one sample of the designation has been tested in our facility from Oct. 23 to 24, 2003. The test record, data evaluation and Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions herein specified.

CHECKED BY: Carol Liao, **DATE:** *Nov. 03, 2003*

(Carol Liao)

APPROVED BY: _____, **DATE:** *Nov. 03, 2003*

(Eric Lin, Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: 47 CFR Part 15, Subpart C			
Standard Section	**Test Type and Limit**	**Result**	**REMARK**
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit Minimum passing margin is –10.02dBuV at 0.201 MHz
15.247(b)	Maximum Peak Output Power Spec.: max. 30dBm	PASS	Meet the requirement of limit
15.247(c)	Transmitter Radiated Emissions Spec.: Table 15.209	PASS	Meet the requirement of limit Minimum passing margin is –1.5dBuV at 208.90MHz
15.247(c)	Band Edge Measurement	PASS	Meet the requirement of limit

NOTE: This report is prepared for FCC class II permissive change. Only conducted emission, radiated emission, Maximum Peak Output Power and Band Edge Measurement conducted emission were presented in this test report.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Bluetooth\Modem Combo Card
MODEL NO.	MDCBTSC
POWER SUPPLY	3-3.6VDC from host equipment
MODULATION TYPE	FHSS (GFSK)
FREQUENCY RANGE	2402MHz ~ 2480MHz
NUMBER OF CHANNEL	79
OUTPUT POWER	5.23dBm
ANTENNA TYPE	Inverted F Antenna
DATA CABLE	NA
I/O PORTS	NA
ASSOCIATED DEVICES	NA

NOTE:

1. This report is prepared for FCC class II permissive change. The difference compared with the original design are as following:

   ◆ Change one Notebook:

Original Notebook Computer:	
Brand:	COMPAL
Model No.:	CL50-3
New Notebook Computer:	
Brand:	COMPAL
Model No.:	AT23

   ◆ Antenna position changes to bottom of panel.

2. There is one Notebook Computer provided to this EUT and sold together with the EUT:

Product:	Notebook Computer
Brand:	COMPAL
Model No.:	AT23

3. For a more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Bluetooth\Modem Combo Card. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

47 CFR Part 15, Subpart C. (15.247)
ANSI C63.4 : 1992

All tests have been performed and recorded as per the above standards.

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of 47 CFR Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

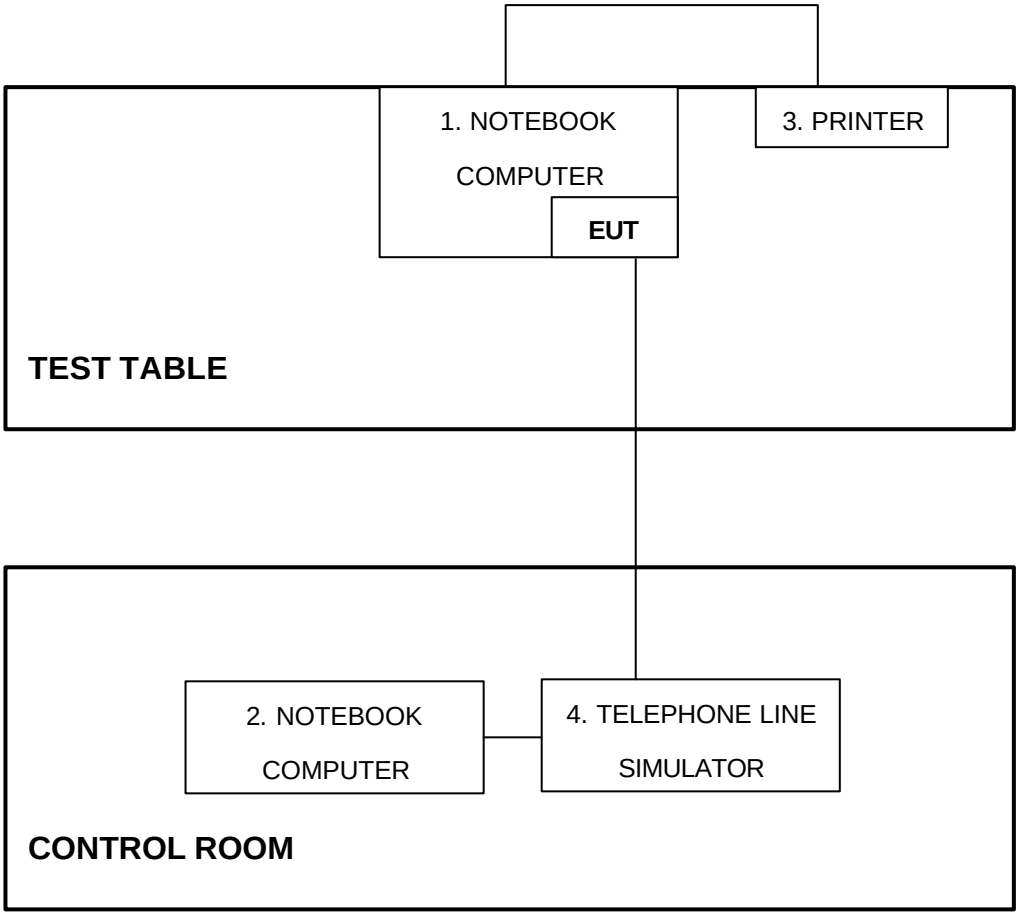
3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1	NOTEBOOK COMPUTER	COMPAL	AT23	NA	NA
2	NOTEBOOK COMPUTER	Compaq	N800C	470048-515	DoC
3	PRINTER	HP	C2642A	MY7961C1FQ	B94C2642X
4	TELEPHONE LINE SIMULATOR	TELTONE	TLS-4A-1	099856	NA

No.	Signal cable description
1	NA
2	NA
3	1.8 m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core.
4	NA

Note: 1. All power cords of the above support units are unshielded (1.8m).



NOTE: 1. Please refer to the photos of test configuration in Item 5 also.

4 TEST PROCEDURES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBµV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

Notes:

1. The lower limit shall apply at the transition frequencies.
2. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	847124/029	Nov. 17, 2003
ROHDE & SCHWARZ LISN (for EUT)	ESHS-Z5	848773/004	Nov. 13, 2003
KYORITSU LISN (for peripheral)	KNW-407	8/1395/12	Jul. 27, 2004
RF Cable (JETBAO)	RG233/U	Cable_CA_01	Jul. 03, 2004
Terminator(for KYORITSU)	50	3	Apr. 11, 2004
Software	Cond-V2e	NA	NA

NOTE:
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in ADT Shielded Room No. A.
3. The VCCI Con A Registration No. is C-817.

4.1.3 TEST PROCEDURES

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

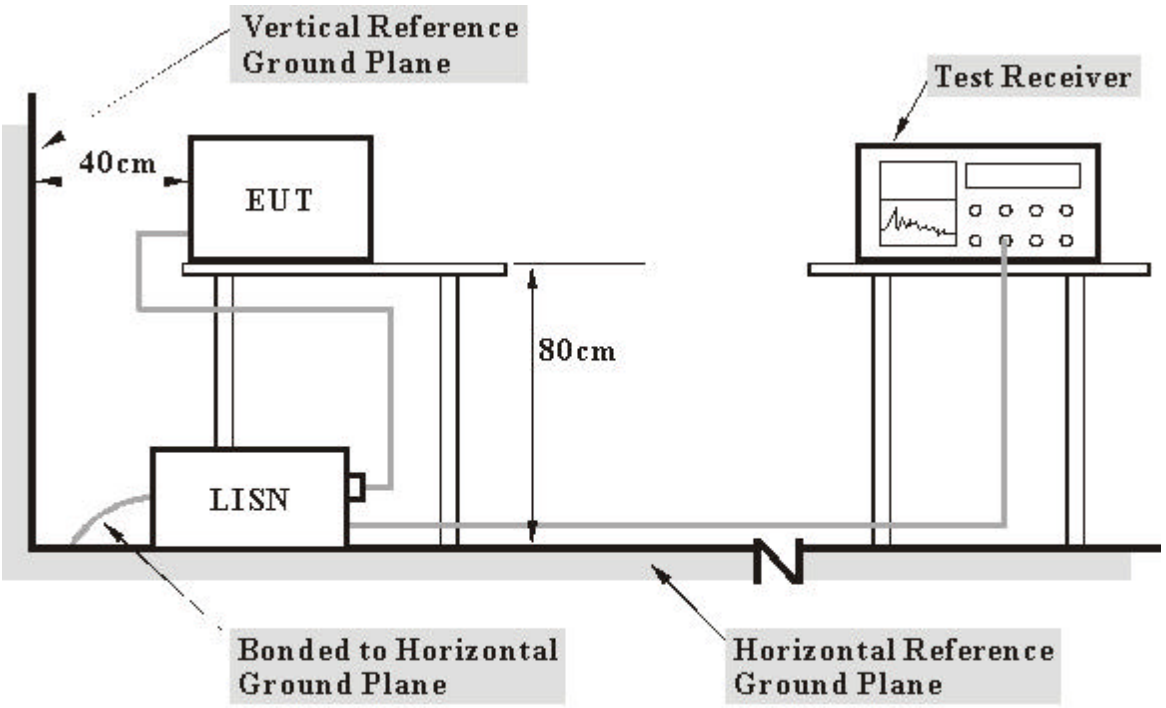
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits could not be reported

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.1.6 EUT OPERATING CONDITIONS

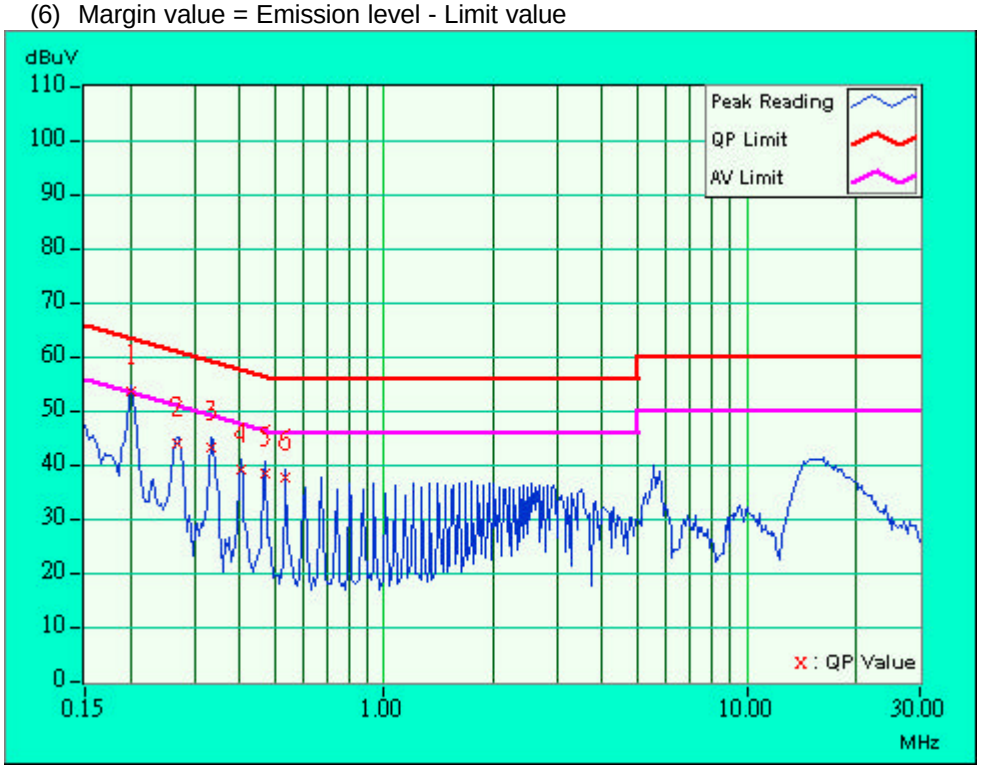
a. Plug the EUT into the support unit 1 (Notebook computer) which placed on a testing table.
b. The support unit 1 (Notebook computer) and CLENT PC ran a test program to enable EUT under transmission condition continuously at specific channel frequency.

4.1.7 TEST RESULTS

EUT	Bluetooth\Modem Combo Card	**MODEL**	MDCBTSC
MODE	Channel 0	**6dB BANDWIDTH**	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**PHASE**	Line (L)
ENVIRONMENTAL CONDITIONS	27 deg. C, 57%RH, 969 hPa	**TESTED BY**	Tony Chen

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.201**	**0.20**	**53.36**	**-**	**53.56**	**-**	**63.58**	**53.58**	**-10.02**	**-**
2	0.270	0.20	43.92	-	44.12	-	61.13	51.13	-17.01	-
3	0.334	0.20	43.16	-	43.36	-	59.36	49.36	-16.00	-
4	0.404	0.20	39.18	-	39.38	-	57.77	47.77	-18.39	-
5	0.470	0.21	38.39	-	38.60	-	56.51	46.51	-17.91	-
6	0.537	0.22	37.52	-	37.74	-	56.00	46.00	-18.26	-

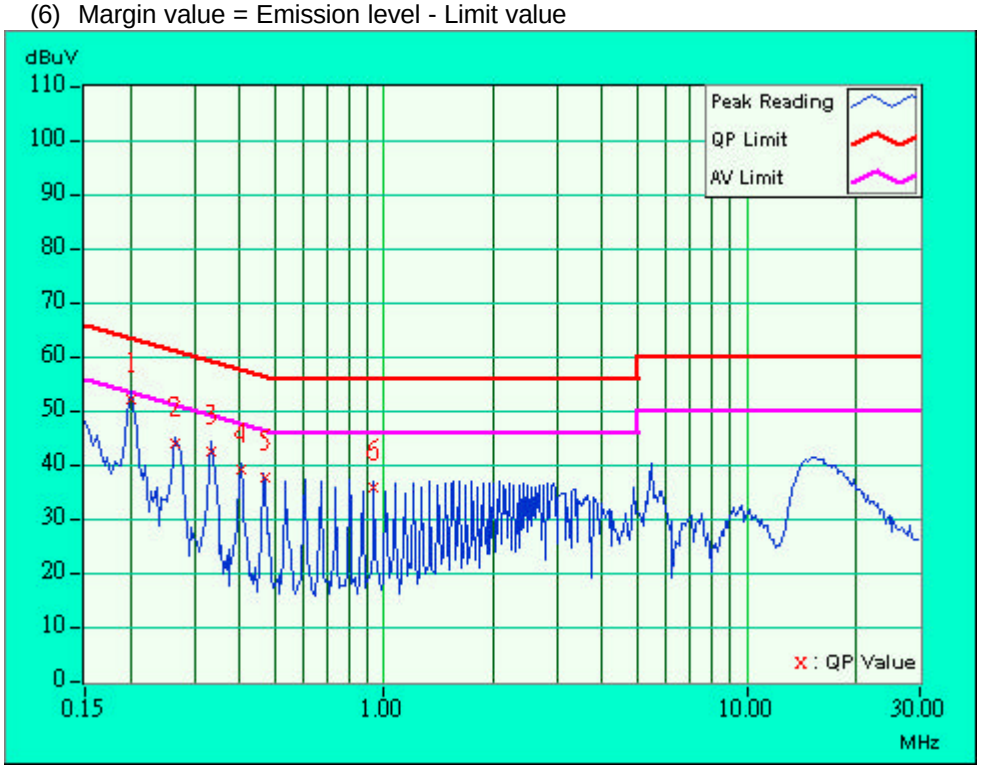
NOTES: (1) "*": Undetectable
(2) Q.P. and AV. are abbreviations of quasi-peak and average.
(3) "-": The Quasi-peak reading value also meets an average limit, thus measurement with the average detector is unnecessary.
(4) The emission levels of other frequencies were very low against the limit.
(5) Correction Factor = Insertion loss + Cable loss
(6) Margin value = Emission level - Limit value



EUT	Bluetooth\Modem Combo Card	**MODEL**	MDCBTSC
MODE	Channel 0	**6dB BANDWIDTH**	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**PHASE**	Neutral (N)
ENVIRONMENTAL CONDITIONS	27 deg. C, 57%RH, 969 hPa	**TESTED BY**	Tony Chen

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.20	52.01	-	52.21	-	63.58	53.58	-11.37	-
2	0.267	0.20	43.64	-	43.84	-	61.20	51.20	-17.36	-
3	0.334	0.20	42.25	-	42.45	-	59.36	49.36	-16.91	-
4	0.404	0.20	38.85	-	39.05	-	57.77	47.77	-18.72	-
5	0.468	0.21	37.63	-	37.84	-	56.55	46.55	-18.71	-
6	0.939	0.29	35.50	-	35.79	-	56.00	46.00	-20.21	-

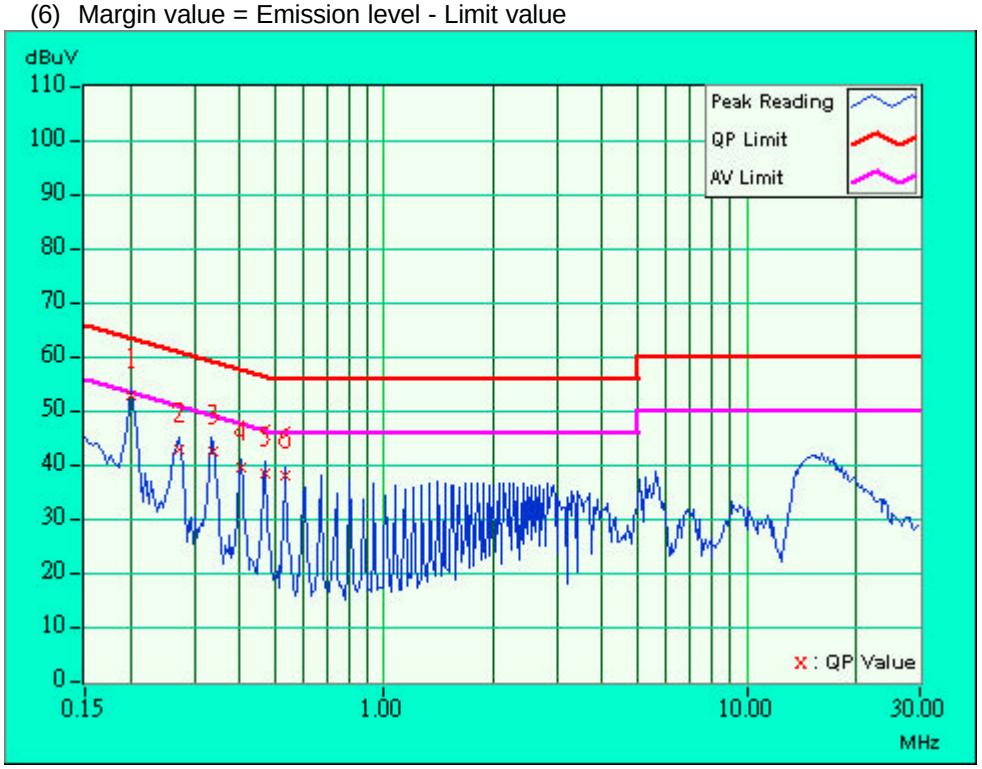
NOTES: (1) "*": Undetectable
(2) Q.P. and AV. are abbreviations of quasi-peak and average.
(3) "-": The Quasi-peak reading value also meets an average limit, thus measurement with the average detector is unnecessary.
(4) The emission levels of other frequencies were very low against the limit.
(5) Correction Factor = Insertion loss + Cable loss
(6) Margin value = Emission level - Limit value



EUT	Bluetooth\Modem Combo Card	**MODEL**	MDCBTSC
MODE	Channel 39	**6dB BANDWIDTH**	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**PHASE**	Line (L)
ENVIRONMENTAL CONDITIONS	27 deg. C, 57%RH, 969 hPa	**TESTED BY**	Tony Chen

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.20	52.61	-	52.81	-	63.58	53.58	-10.77	-
2	0.271	0.20	42.58	-	42.78	-	61.08	51.08	-18.30	-
3	0.337	0.20	42.37	-	42.57	-	59.27	49.27	-16.70	-
4	0.404	0.20	39.40	-	39.60	-	57.77	47.77	-18.17	-
5	0.470	0.21	38.14	-	38.35	-	56.51	46.51	-18.16	-
6	0.537	0.22	37.99	-	38.21	-	56.00	46.00	-17.79	-

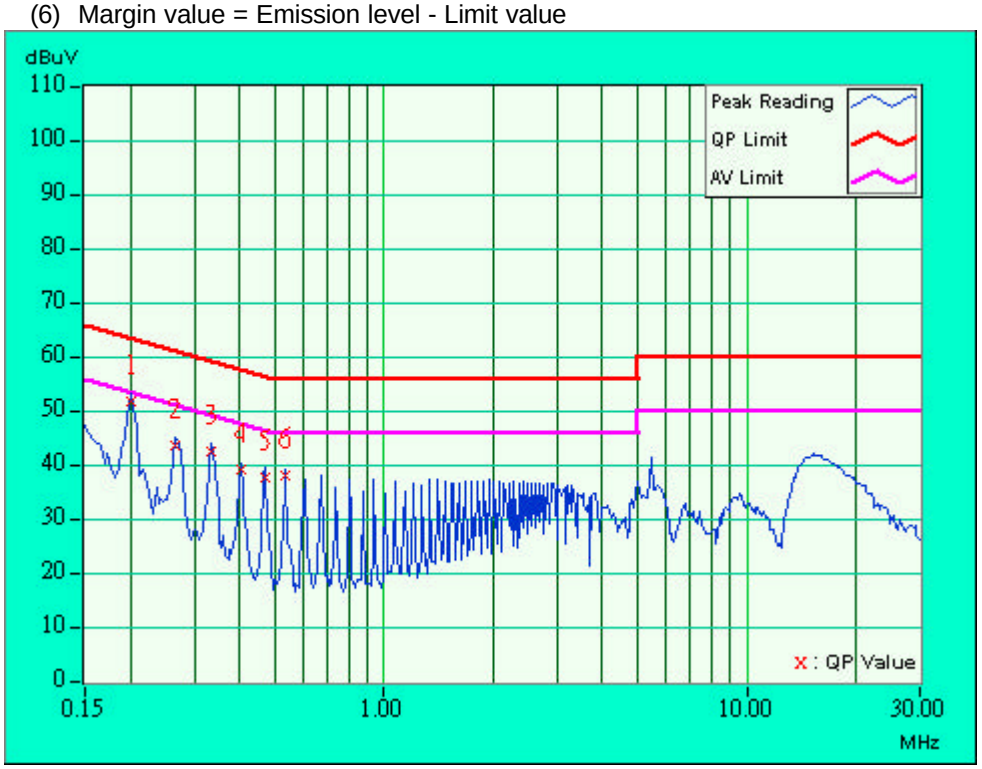
NOTES: (1) "*": Undetectable
(2) Q.P. and AV. are abbreviations of quasi-peak and average.
(3) "-": The Quasi-peak reading value also meets an average limit, thus measurement with the average detector is unnecessary.
(4) The emission levels of other frequencies were very low against the limit.
(5) Correction Factor = Insertion loss + Cable loss
(6) Margin value = Emission level - Limit value



EUT	Bluetooth\Modem Combo Card	**MODEL**	MDCBTSC
MODE	Channel 39	**6dB BANDWIDTH**	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**PHASE**	Neutral (N)
ENVIRONMENTAL CONDITIONS	27 deg. C, 57%RH, 969 hPa	**TESTED BY**	Tony Chen

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.20	51.73	-	51.93	-	63.58	53.58	-11.65	-
2	0.267	0.20	43.42	-	43.62	-	61.20	51.20	-17.58	-
3	0.334	0.20	42.30	-	42.50	-	59.36	49.36	-16.86	-
4	0.404	0.20	39.00	-	39.20	-	57.77	47.77	-18.57	-
5	0.470	0.21	37.58	-	37.79	-	56.51	46.51	-18.72	-
6	0.537	0.22	37.82	-	38.04	-	56.00	46.00	-17.96	-

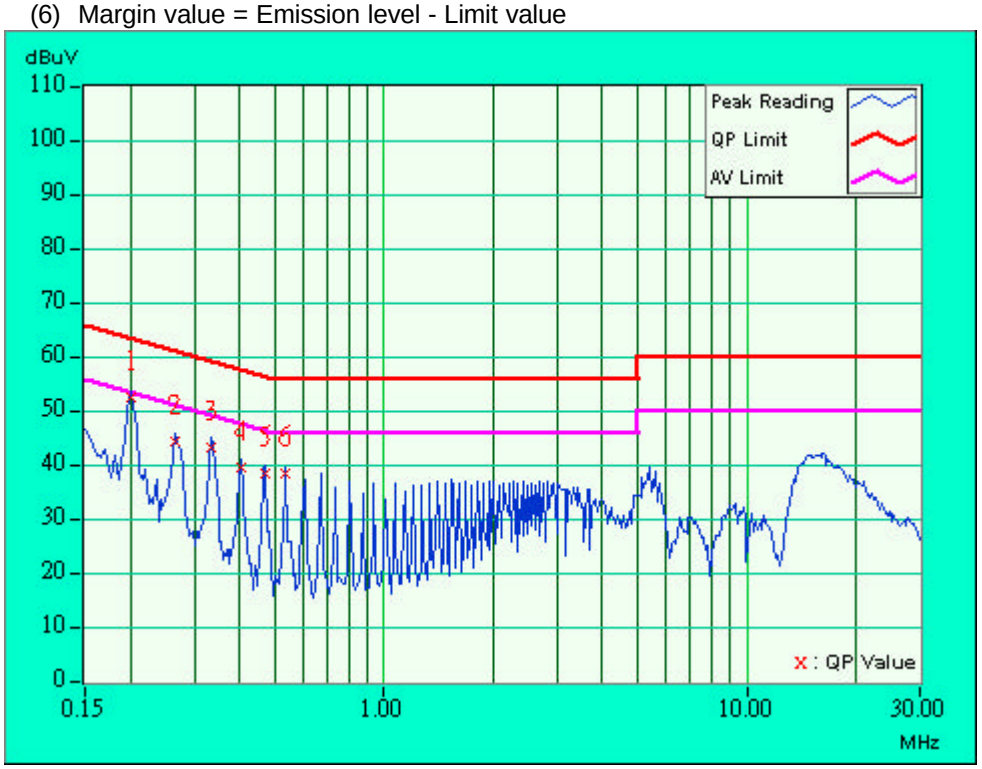
NOTES: (1) "*": Undetectable
(2) Q.P. and AV. are abbreviations of quasi-peak and average.
(3) "-": The Quasi-peak reading value also meets an average limit, thus measurement with the average detector is unnecessary.
(4) The emission levels of other frequencies were very low against the limit.
(5) Correction Factor = Insertion loss + Cable loss
(6) Margin value = Emission level - Limit value



EUT	Bluetooth\Modem Combo Card	**MODEL**	MDCBTSC
MODE	Channel 78	**6dB BANDWIDTH**	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**PHASE**	Line (L)
ENVIRONMENTAL CONDITIONS	27 deg. C, 57%RH, 969 hPa	**TESTED BY**	Tony Chen

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.20	52.45	-	52.65	-	63.58	53.58	-10.93	-
2	0.267	0.20	44.05	-	44.25	-	61.20	51.20	-16.95	-
3	0.334	0.20	43.06	-	43.26	-	59.36	49.36	-16.10	-
4	0.404	0.20	39.46	-	39.66	-	57.77	47.77	-18.11	-
5	0.470	0.21	38.25	-	38.46	-	56.51	46.51	-18.05	-
6	0.537	0.22	38.14	-	38.36	-	56.00	46.00	-17.64	-

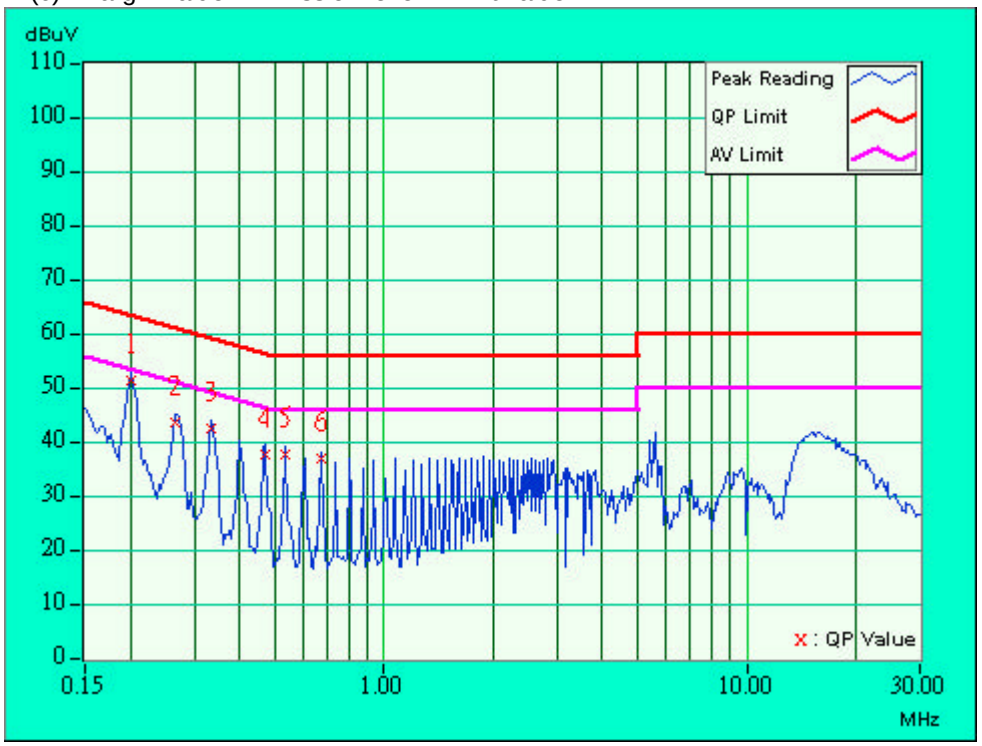
NOTES: (1) "*": Undetectable
(2) Q.P. and AV. are abbreviations of quasi-peak and average.
(3) "-": The Quasi-peak reading value also meets an average limit, thus measurement with the average detector is unnecessary.
(4) The emission levels of other frequencies were very low against the limit.
(5) Correction Factor = Insertion loss + Cable loss
(6) Margin value = Emission level - Limit value



EUT	Bluetooth\Modem Combo Card	**MODEL**	MDCBTSC
MODE	Channel 78	**6dB BANDWIDTH**	9 kHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**PHASE**	Neurral (N)
ENVIRONMENTAL CONDITIONS	27 deg. C, 57%RH, 969 hPa	**TESTED BY**	Tony Chen

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.20	51.26	-	51.46	-	63.58	53.58	-12.12	-
2	0.267	0.20	43.35	-	43.55	-	61.20	51.20	-17.65	-
3	0.334	0.20	42.29	-	42.49	-	59.36	49.36	-16.87	-
4	0.470	0.21	37.43	-	37.64	-	56.51	46.51	-18.87	-
5	0.537	0.22	37.66	-	37.88	-	56.00	46.00	-18.12	-
6	0.670	0.24	36.79	-	37.03	-	56.00	46.00	-18.97	-

NOTES: (1) "*": Undetectable
(2) Q.P. and AV. are abbreviations of quasi-peak and average.
(3) "-": The Quasi-peak reading value also meets an average limit, thus measurement with the average detector is unnecessary.
(4) The emission levels of other frequencies were very low against the limit.
(5) Correction Factor = Insertion loss + Cable loss
(6) Margin value = Emission level - Limit value



4.2 MAXIMUM PEAK OUTPUT POWER –USING SPECTRUM ANALYZER

4.2.1 LIMIT OF HOPPING FREQUENCY USED

At least 15 hopping frequencies, and should be equally spaced.

4.2.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP	1093.4495.30	Dec. 19, 2003

NOTE:

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

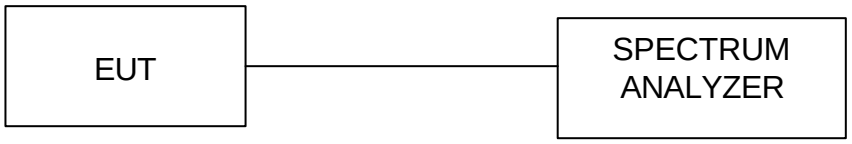
4.2.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect its antenna terminal to measurement 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 SA 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 SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



4.2.6 TEST RESULTS

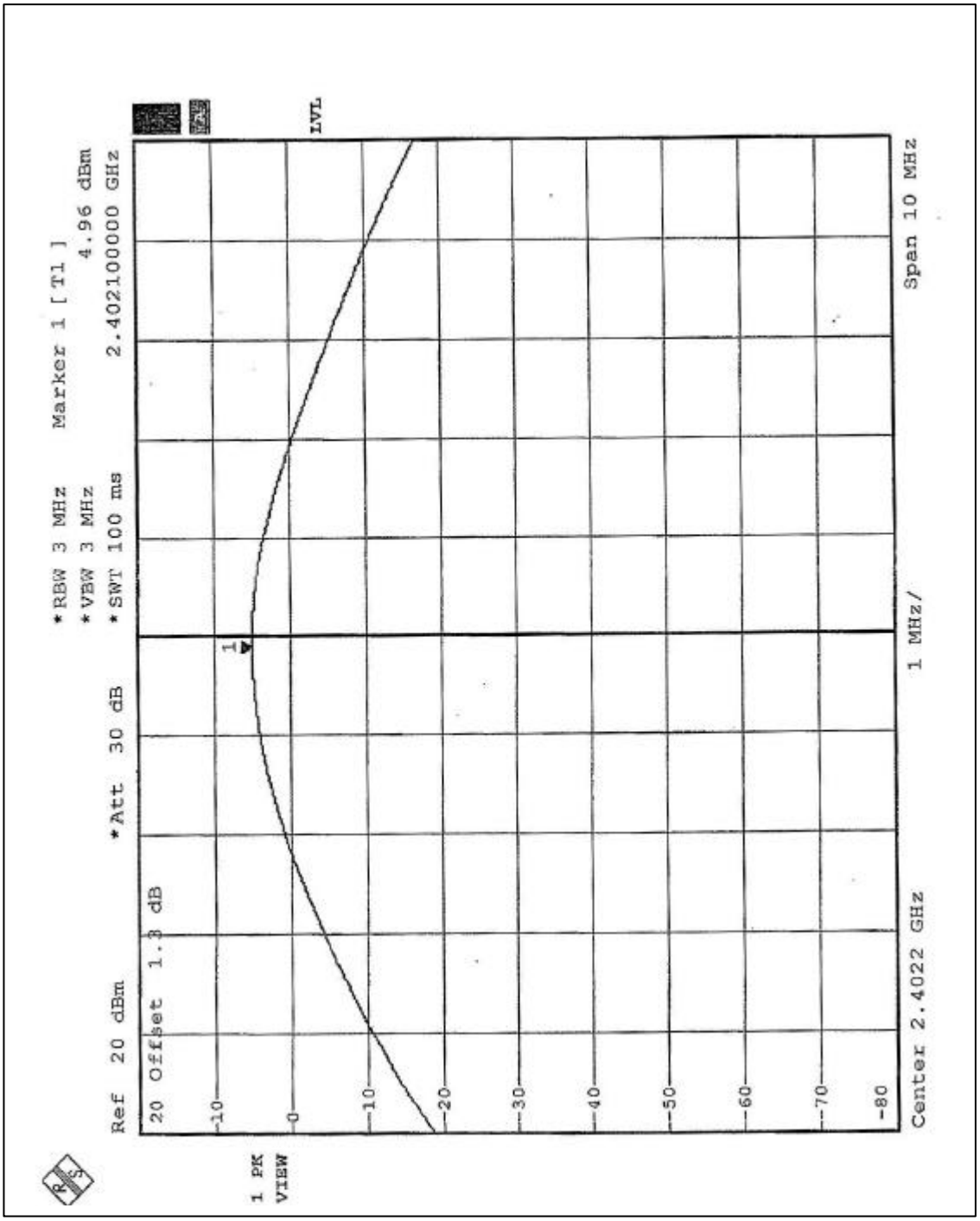
There are 79 hopping frequencies in the hopping mode. Please refer to next two pages for the test result. On the plots, it shows that the hopping frequencies are equally spaced.

TEST RESULTS

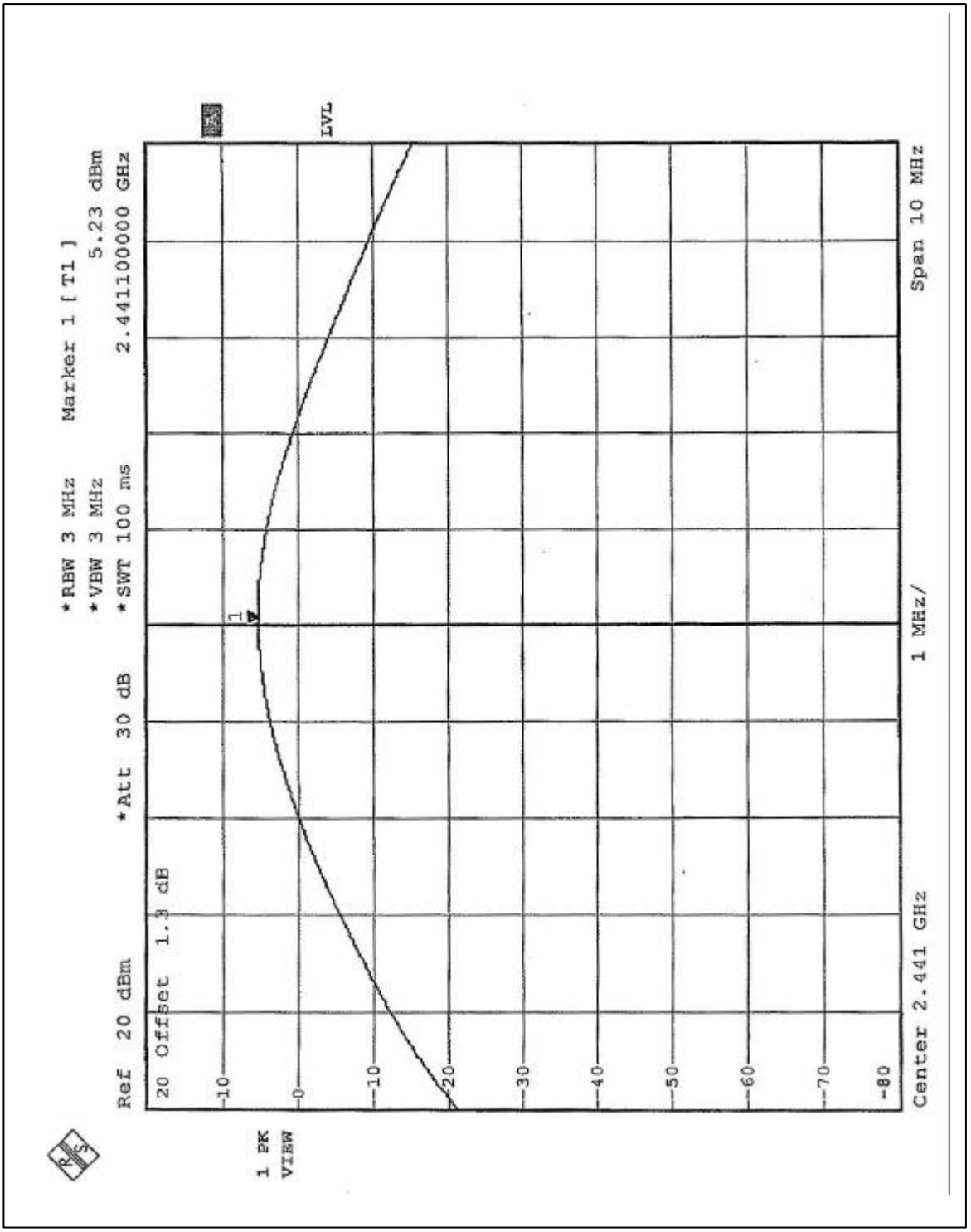
Output Power to Antenna:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
0	2402	4.96	30	PASS
39	2441	5.23	30	PASS
78	2480	4.99	30	PASS

Channel 0


Ref 20 dBm
20 Offset 1.3 dB
*Att 30 dB
*RBW 3 MHz
*VBW 3 MHz
*SWT 100 ms
Marker 1 [T1]
4.96 dBm
2.402100000 GHz
1 PK
VIEW
IVL
-10
0
10
20
30
40
50
60
70
80
Center 2.4022 GHz
1 MHz/
Span 10 MHz

Channel 39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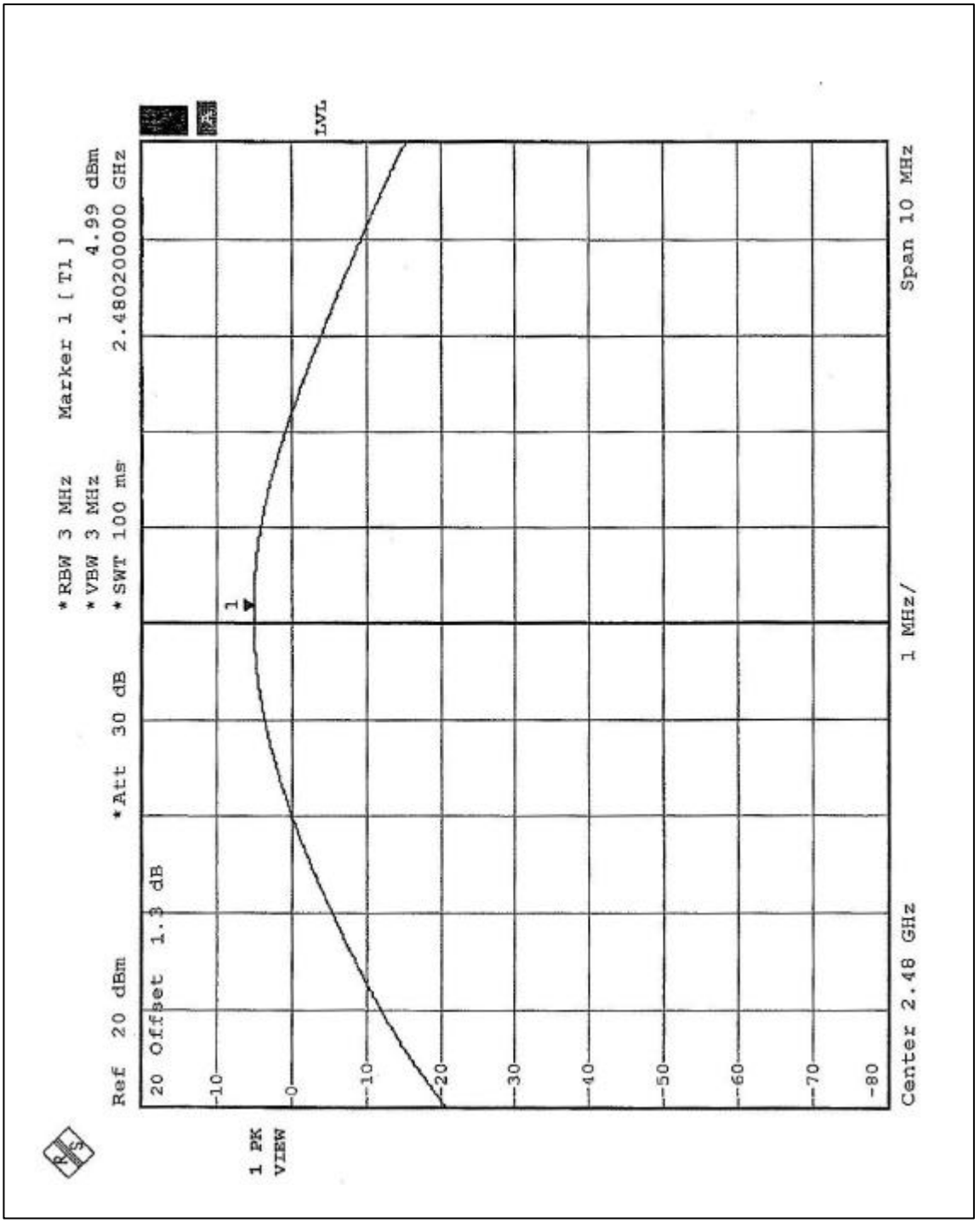
Offset 1.3 dB
*Att 30 dB
*RBW 3 MHz
*VBW 3 MHz
*SWT 100 ms
Marker 1 [T1]
5.23 dBm
2.441100000 GHz
1 PK
VIEW
LVL
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.441 GHz
1 MHz/
Span 10 MHz

Channel 78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20 Offset 1.3 dB
*Att 30 dB
*RBW 3 MHz
*VBW 3 MHz
*SWT 100 ms
Marker 1 [T1]
4.99 dBm
2.480200000 GHz
1 PK
VIEW
LVL
Center 2.48 GHz
1 MHz/
Span 10 MHz

4.3 RADIATED EMISSION MEASUREMENT

4.3.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequencies (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
HP Spectrum Analyzer	8594ER	3829U04676	Jul. 14, 2004
ADVANTEST Spectrum Analyzer	R3271A	85060311	May 21, 2004
CHASE RF Pre_Amplifier	CPA9232	1057	Apr. 24, 2004
HP Pre_Amplifier	8449B	3008A01281	June 27, 2004
ROHDE & SCHWARZ Test Receiver	ESVS 10	849231 /019	Nov. 03, 2003
CHASE Broadband Antenna	CBL6111c	2730	Jul 17, 2004
Schwarzbeck Horn_Antenna	3115	5619	Jul. 17, 2004
SCHWARZBECK Tunable Dipole Antenna	UHAP	897	Mar. 07, 2005
SCHWARZBECK Tunable Dipole Antenna	VHAP	880	Mar. 07, 2005
RF Switches (ARNITSU)	CS-201	1565157	Dec. 01, 2003
RF CABLE (Chaintek) 1GHz-20GHz	SF102	22054-2	Feb. 10. 2004
RF Cable(RICHTEC)	9913-30M	STCCAB-30M-1GHz-021	Nov. 5, 2004
Software	AS60P8	NA	NA
CHANCE MOST Antenna Tower	AT-100	0203	NA
CHANCE MOST Turn Table	TT-100	0203	NA

Note: 1. The calibration interval of the above test instruments is 12 months (36 months for Tunable Dipole Antenna)and the calibrations are traceable to NML/ROC and NIST/USA.
2. * = These equipment are used for the final measurement.
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The test was performed in ADT Open Site No. C.
5. The FCC Site Registration No. is 656396.
6. The VCCI Site Registration No. is R-1626.
7. The CANADA Site Registration No. is IC 3789-C.

4.3.3 TEST PROCEDURES

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. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

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 polarizations 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 rotatable 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.

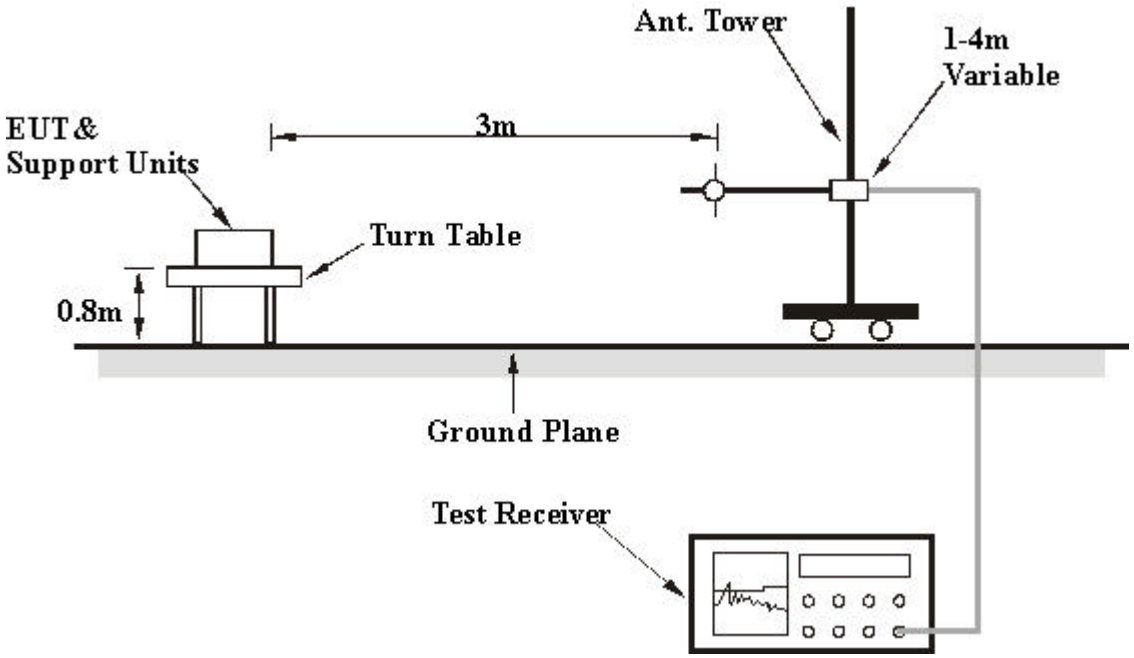
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz 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 at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 300 Hz for Average detection (AV) at frequency above 1GHz.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.3.6 TEST RESULTS

EUT	Bluetooth\Modem Combo Card	**MODEL**	MDCBTSC
MODE	Channel 78	**FREQUENCY RANGE**	Below 1000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**DETECTOR FUNCTION**	Quasi-Peak
ENVIRONMENTAL CONDITIONS	27 deg. C, 57%RH, 969 hPa	**TESTED BY**	Tony Chen

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	199.42	30.30 QP	43.50	-13.20	1.80 H	264	21.30	9.00
2	**208.90**	**42.00 QP**	**43.50**	**-1.50**	**1.15 H**	**260**	**33.10**	**8.90**
3	221.19	30.80 QP	46.00	-15.20	1.74 H	22	21.30	9.50
4	233.48	38.60 QP	46.00	-7.40	1.09 H	275	27.60	11.00
5	258.05	22.70 QP	46.00	-23.30	1.37 H	283	8.50	14.20
6	430.08	23.50 QP	46.00	-22.50	2.23 H	36	5.60	17.90
7	501.42	32.50 QP	46.00	-13.50	1.61 H	315	13.10	19.30
8	586.13	34.30 QP	46.00	-11.70	1.68 H	72	13.20	21.10
9	749.58	34.00 QP	46.00	-12.00	1.30 H	86	10.20	23.80
10	774.15	35.10 QP	46.00	-10.90	1.31 H	82	11.20	23.90
11	798.73	34.90 QP	46.00	-11.10	1.26 H	64	11.10	23.70

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	32.70	31.60 QP	40.00	-8.40	1.27 V	296	13.80	17.80
2	112.21	23.30 QP	43.50	-20.20	1.00 V	76	12.10	11.20
3	193.65	22.10 QP	43.50	-21.40	1.00 V	336	12.80	9.30
4	208.90	36.60 QP	43.50	-6.90	1.16 V	266	27.70	8.90
5	233.48	31.00 QP	46.00	-15.00	1.18 V	210	20.00	11.00
6	258.05	31.60 QP	46.00	-14.40	1.37 V	9	17.40	14.20
7	307.20	25.20 QP	46.00	-20.80	1.17 V	11	10.90	14.30
8	331.78	27.30 QP	46.00	-18.70	1.00 V	1	12.30	14.90
9	430.08	33.30 QP	46.00	-12.70	1.05 V	2	15.40	17.90
10	454.67	32.40 QP	46.00	-13.60	1.37 V	3	14.20	18.20
11	501.41	34.00 QP	46.00	-12.00	1.13 V	157	14.70	19.30
12	586.10	36.50 QP	46.00	-9.50	1.08 V	206	15.40	21.10
13	768.99	34.20 QP	46.00	-11.80	1.18 V	261	10.30	23.90
14	899.54	31.40 QP	46.00	-14.60	1.18 V	11	6.60	24.80

NOTE:
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.

4.3.7 TEST RESULTS

EUT	Bluetooth\Modem Combo Card	**MODEL**	MDCBTSC
MODE	Channel 0	**FREQUENCY RANGE**	1000~25000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27 deg. C, 57%RH, 969 hPa	**TESTED BY**	Tony Chen

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2386.00	38.10 PK	74.00	-35.90	1.68 H	67	7.70	30.40
2	*2402.00	89.30 PK			1.91 H	60	58.80	30.50
2	*2402.00	70.60 AV			1.91 H	60	40.10	30.50
3	2484.00	33.10 PK	74.00	-40.90	1.26 H	54	2.10	31.00
4	4804.00	39.50 PK	74.00	-34.50	1.66 H	89	3.30	36.10

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2385.00	37.00 PK	74.00	-37.00	1.20 V	88	6.60	30.40
2	*2402.00	90.40 PK			1.00 V	324	59.90	30.50
2	*2402.00	71.60 AV			1.00 V	324	41.10	30.50
3	2490.00	34.30 PK	74.00	-39.70	1.38 V	114	3.40	30.90
4	4804.00	43.40 PK	74.00	-30.60	1.32 V	21	7.20	36.10

REMARKS:
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. The limit value is defined as per 15.247
6. " * " : Fundamental frequency

EUT	Bluetooth\Modem Combo Card	**MODEL**	MDCBTSC
MODE	Channel 39	**FREQUENCY RANGE**	1000~25000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27 deg. C, 57%RH, 969 hPa	**TESTED BY**: Tony Chen	

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2363.00	33.00 PK	74.00	-41.00	1.67 H	141	2.70	30.30
2	*2441.00	88.30 PK			1.16 H	334	57.60	30.70
2	*2441.00	70.30 AV			1.16 H	334	39.60	30.70
3	2494.00	33.80 PK	74.00	-40.20	1.40 H	101	3.00	30.80
4	4882.00	41.50 PK	74.00	-32.50	1.31 H	141	5.00	36.50

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2364.00	35.70 PK	74.00	-38.30	1.48 V	78	5.30	30.30
2	*2441.00	86.60 PK			1.46 V	320	55.90	30.70
2	*2441.00	71.00 AV			1.46 V	320	40.30	30.70
3	2497.00	35.10 PK	74.00	-38.90	1.22 V	10	4.40	30.70
4	4882.00	45.50 PK	74.00	-28.50	1.41 V	21	9.00	36.50

REMARKS:
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. The limit value is defined as per 15.247
6. " * " : Fundamental frequency

EUT	Bluetooth\Modem Combo Card	**MODEL**	MDCBTSC
MODE	Channel 78	**FREQUENCY RANGE**	1000~25000 MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	**DETECTOR FUNCTION**	Peak(PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27 deg. C, 57%RH, 969 hPa	**TESTED BY**: Tony Chen	

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2344.00	33.80 PK	74.00	-40.20	1.54 H	25	3.50	30.30
2	*2480.00	85.70 PK			1.00 H	333	54.80	30.90
2	*2480.00	68.40 AV			1.00 H	333	37.50	30.90
3	2492.00	33.80 PK	74.00	-40.20	1.06 H	199	3.00	30.80
4	4960.00	40.50 PK	74.00	-33.50	1.14 H	333	3.60	36.80

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2324.00	38.20 PK	74.00	-35.80	1.43 V	360	8.00	30.20
2	*2480.00	86.10 PK			1.05 V	15	55.10	30.90
2	*2480.00	69.00 AV			1.05 V	15	38.00	30.90
3	2492.00	35.10 PK	74.00	-38.90	1.32 V	231	4.20	30.80
4	4960.00	40.60 PK	74.00	-33.40	1.65 V	333	3.80	36.80

REMARKS:
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. The limit value is defined as per 15.247
6. " * " : Fundamental frequency

4.4 BAND EDGES MEASUREMENT

4.4.1 LIMITS OF BAND EDGES MEASUREMENT

Below –20dB of the highest emission level of operating band (in 100KHz RB).

4.4.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
R&S SPECTRUM ANALYZER	FSP	1093.4495.30	Dec. 19, 2003

NOTE:

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.4.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100 kHz with suitable frequency span including 100 kHz bandwidth from band edge. The band edges was measured and recorded.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 EUT OPERATING CONDITION

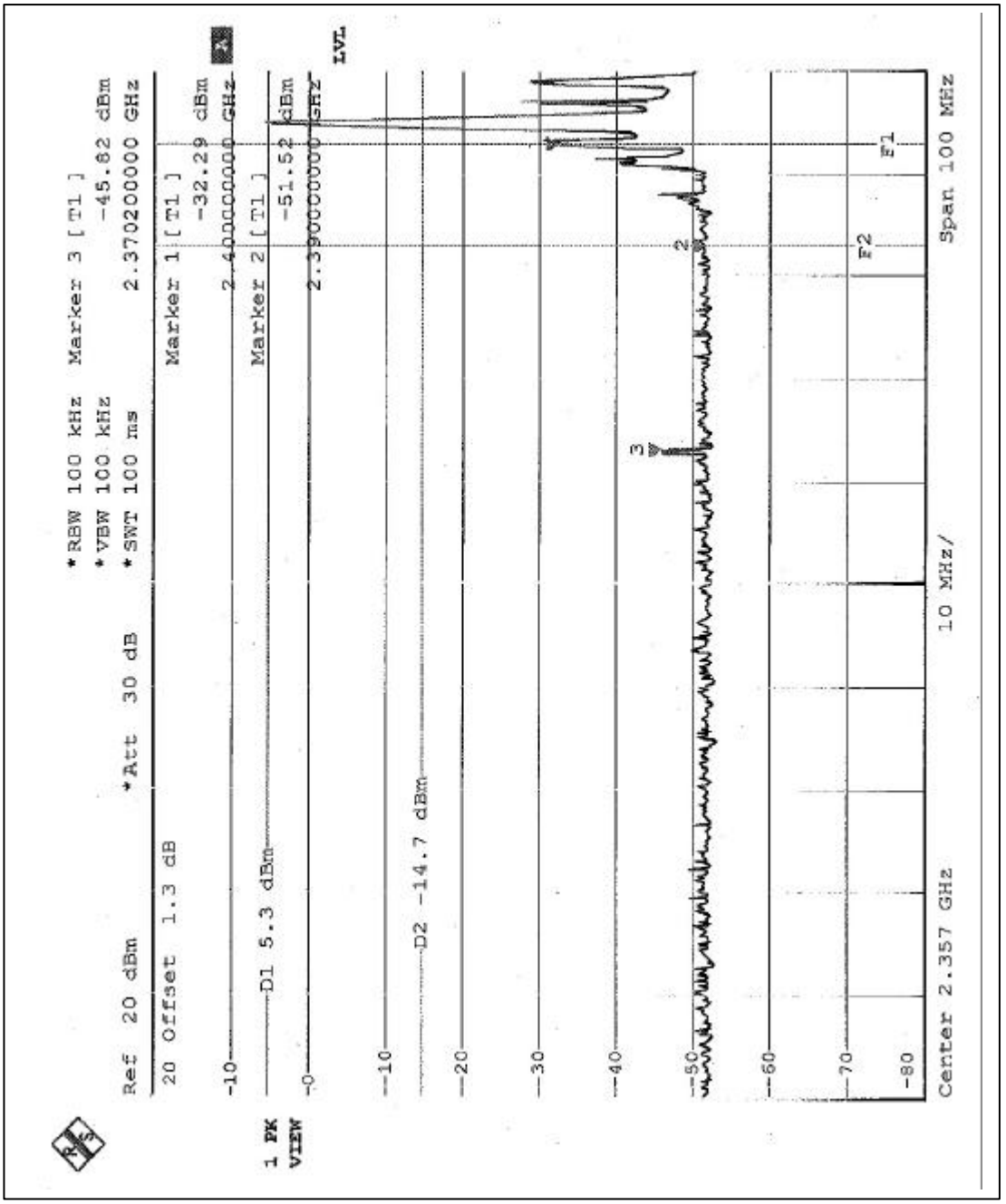
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.4.6 TEST RESULTS

The spectrum plots are attached on the following 2 pages. D2 line indicates the highest level, D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(C).

NOTE: The band edge emission plot on the following first page shows 51.12dB delta between carrier maximum power and local maximum emission in restrict band (2.3702GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.7.7 is 71.60dBuV/m, so the maximum field strength in restrict band is 71.60-51.12=20.48dBuV/m which is under 54 dBuV/m limit.

NOTE: The band edge emission plot on the following second page shows 39.19dB delta between carrier maximum power and local maximum emission in restrict band (2.484GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.7.7 is 69.00dBuV/m, so the maximum field strength in restrict band is 69.00-39.19=29.81dBuV/m which is under 54 dBuV/m limit.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*Att 30 dB
*RBW 100 kHz
*VBW 100 kHz
*SWT 100 ms
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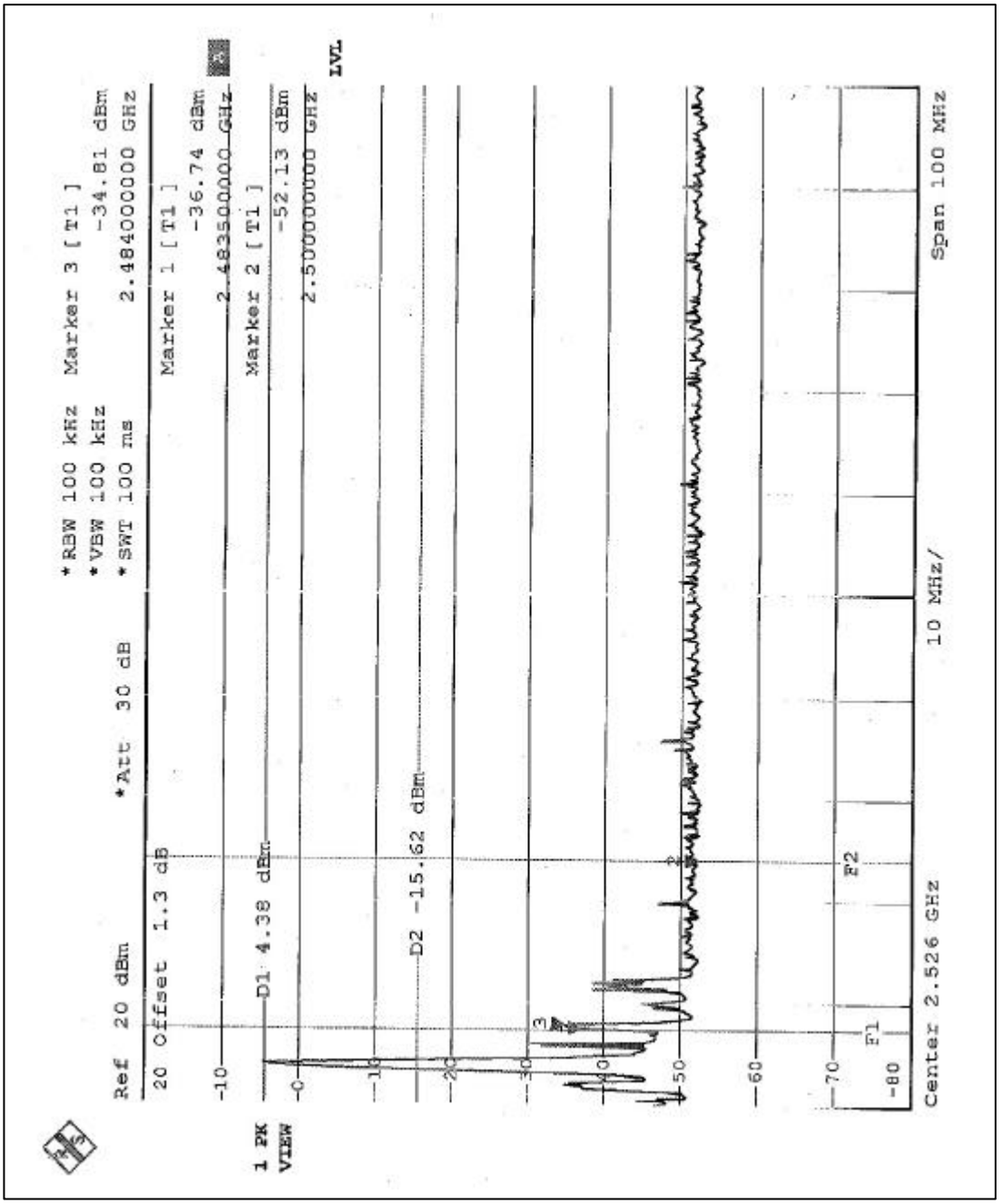
2.370200000 GHz
20 Offset 1.3 dB
Marker 1 [T1]
-32.29 dBm
2.400000000 GHz
Marker 2 [T1]
-51.52 dBm
2.390000000 GHz
D1 5.3 dBm
D2 -14.7 dBm
1 PK
VIEW
LVL
Center 2.357 GHz
10 MHz/
Span 100 MHz


Ref 20 dBm
*Att 30 dB
*RBW 100 kHz
*VBW 100 kHz
*SWT 100 ms
Marker 3 [T1]
-34.81 dBm
2.484000000 GHz
Marker 1 [T1]
-36.74 dBm
2.483500000 GHz
Marker 2 [T1]
-52.13 dBm
2.500000000 GHz
20 Offset 1.3 dB
D1 4.38 dBm
D2 -15.62 dBm
1 PK
VIEW
LVL
Center 2.526 GHz
10 MHz/
Span 100 MHz

4.5 ANTENNA REQUIREMENT

4.5.1 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 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.5.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product is inverted F Antenna and used MHF Series Micro Coaxial connector. The maximum Gain of this antenna is only -4dBi.

5 PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST

RADIATED EMISSION TEST

6 INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025, Guide 25 or EN 45001:

USA	FCC, NVLAP
Germany	TUV Rheinland
Japan	VCCI
New Zealand	MoC
Norway	NEMKO
R.O.C.	BSMI, DGT, CNLA

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5/phtml.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.