FCC PART 15 SUBPART C

EMI MEASUREMENT AND TEST REPORT

For

AMBIT Microsystems Corporation

4-1, Ming Shen Street, Tu Chen Industrial District.
Tu Chen, Taipei Hsien 236, Taiwan, R.O.C.

FCC ID: MCLT60M665

February 25, 2003

This Report Concerns:	**Equipment Type:**
☒ Original Report	Notebook PC with Bluetooth Wireless Card

Test Engineer:	Jerry Wang
Report No.:	R0301173
Test Date:	February 16, 2003
Reviewed By:	Hans Mellberg
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TABLE OF CONTENTS

1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

The *Ambit Microsystems Corporation*'s Model: *T60M665* or the "EUT" as referred to in this report is a Wireless Card & Antenna installed in the ACER notebook PC. During the test, there were respectively three antennas (BY27, ZG1S and ZI1S) connected to the wireless card. The wireless card measures approximately 2.4" L x 1.7" W x 0.1"H.

** The test data in this test report was good for the test sample only. It may have deviation for other test samples.*

1.2 Objective

This type approval report is prepared on behalf of *AMBIT Microsystems Corporation* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The objective of the manufacturer is to demonstrate compliance with C108.8 & RSS-210 rules for the bluetooth transmitter:

- Maximum Peak Output Power
- Hopping Channel Separation
- Number of Hopping Frequency Used
- 20 dB Bandwidth
- Dwell Time on Each Channel
- 100 kHz Bandwidth of Band Edge
- Conducted Emission
- Spurious Emission
- Radiated Emission
- Antenna Requirement
- RF Exposure Limit

1.3 Related Submittal(s)/Grant(s)

No Related Submittals.

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2000, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.5 Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2000.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratory Corporation is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (NVLAP). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, IEC/CISPR 22: 2002, and AS/NZS CISPR 22: 2002: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167-0.

1.6 Test Equipment List

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Spectrum Analyzer	8568B	2610A02165	12/6/03
HP	Spectrum Analyzer	8593B	2919A00342	12/20/03
HP	Amplifier	8349B	2644A03662	12/20/03
HP	Quasi-Peak Adapter	85650A	917059	12/6/03
HP	Amplifier	8447E	1937A01046	12/6/03
A.H. System	Horn Antenna	SAS0300/571	261	12/27/03
Com-Power	Log Periodic Antenna	AL-100	16005	11/2/03
Com-Power	Biconical Antenna	AB-100	14012	11/2/03
Solar Electronics	LISN	8012-50-R-24-BNC	968447	12/28/03
Com-Power	LISN	LI-200	12208	12/20/03
Com-Power	LISN	LI-200	12005	12/20/03
BACL	Data Entry Software	DES1	0001	12/20/03

*** Statement of Traceability: Bay Area Compliance Laboratory Corp.** certifies that all calibration has been performed using suitable standards traceable to the NATIONAL INSTITUTE of STANDARDS and TECHNOLOGY (NIST).

1.7 Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
ACER	Notebook PC	SKU-4	N/A	DOC
HP	Printer	2225C	N/A	DOC

1.8 External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
Shielded Printer Cable	2.0	Parallel Port/Notebook PC	Printer

2 - SYSTEM TEST CONFIGURATION

2.1 Justification

The host system was configured for testing in a typical fashion (as a normally used by a typical user).

The EUT was tested in the normal (native) operating mode to represent *worst*-case results during the final qualification test.

2.2 EUT Exercise Software

The EUT exercising program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The test software, bluetest, provided by the customer, is started the Windows 98 terminal program under the Windows 98 operating system. Once started, select USB from “choose a protocol”, select TXDATA1 from “bluetest” then click execute. The process is continuous throughout all tests.

2.3 Special Accessories

As shown in section 2.5, all interface cables used for compliance testing are shielded as normally supplied by INMAC and their respective support equipment manufacturers. The host pc and other peripherals featured shielded metal connectors.

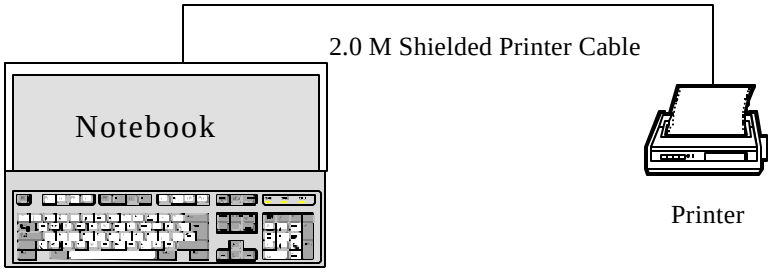
2.4 Schematics / Block Diagram

Please refer to Exhibit D.

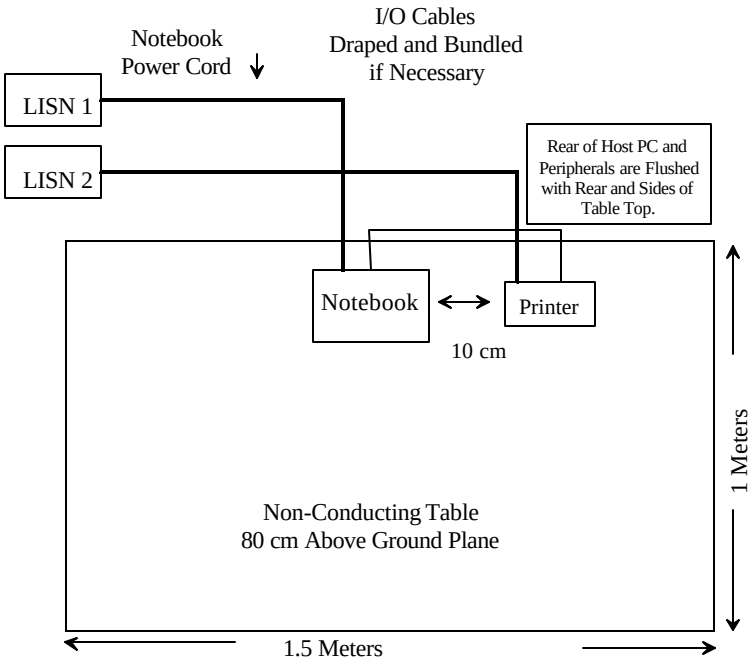
2.5 Equipment Modifications

No modifications were made by BACL Corporation to ensure the EUT to comply with the applicable limits and requirements.

2.6 Configuration of Test System



2.7 Test Setup Block Diagram



3 - SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT	REFERENCE
General Requirements			
§ 2.1091	RF Safety Requirements	Compliant	Section 16 Exhibit H
§15.203	Antenna Requirement	Compliant	Section 14 Appendix I
§15.207 (a)	Conducted Emission	Compliant	Section 13
Bluetooth Transmitter			
§ 15.205	Restricted Bands	Compliant	Section 10
§15.247 (a) (1) (i)	Number of Hopping Frequencies Used	Compliant	Section 6 Appendix C
§15.209 (a)	Radiated Emission	Compliant	Section 12
§15.209 (f)	Spurious Emission	Compliant	Section 10 Appendix G
§15.247 (a) (1)	Hopping Channel Separation	Compliant	Section 7 Appendix D
§15.247 (a) (1) (i)	Dwell Time of Each Frequency within a 10 Second Period	Compliant	Section 9 Appendix F
§15.247 (a) (1) (ii)	20dB Bandwidth	Compliant	Section 5 Appendix B
§15.247 (b) (2)	Maximum Peak Output Power	Compliant	Section 4 Appendix A
§ 15.247 (c)	100 kHz Bandwidth of Frequency Band Edge	Compliant	Section 8 Appendix E
§ 15.247 (g)	Full and complete compliance with applicable requirements for FHSS. Compliance with the definition of frequency hopping system, distribute transmission over minimum number of hopping channel	Compliant	Exhibit G Exhibit H
§ 15.247 (h)	Limitation on avoidance on hopping on occupied channel	Compliant	Exhibit G Exhibit H

4 - MAXIMUM PEAK OUTPUT POWER

4.1 Standard Applicable

According to §15.247(b) (1), for frequency hopping systems in the 2400-2483.5MHz band employing at least 75 hopping channels, and all direct sequence systems, the maximum peak output power of the transmitter shall not exceed 1 Watt.

4.2 Measurement Procedure

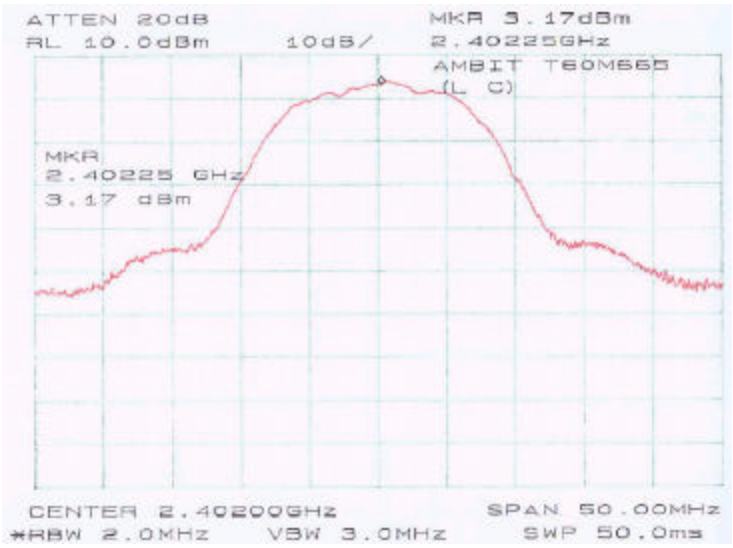
1. Place the EUT on the turntable and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer (power meter).

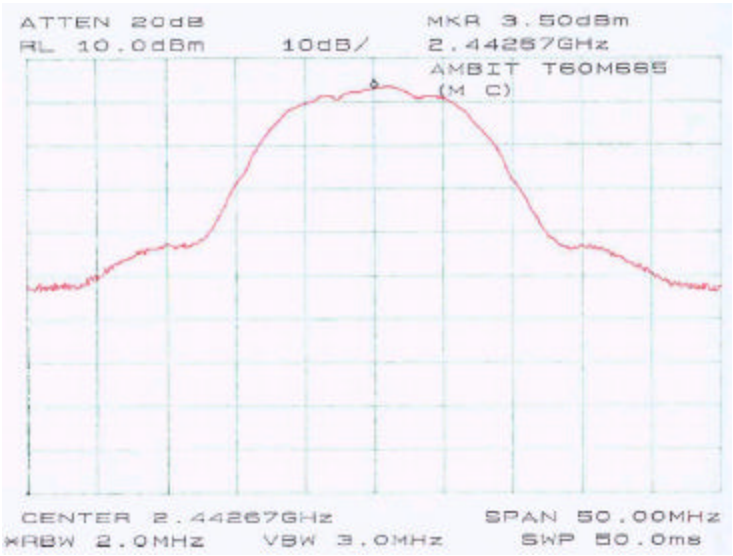
4.3 Measurement Result

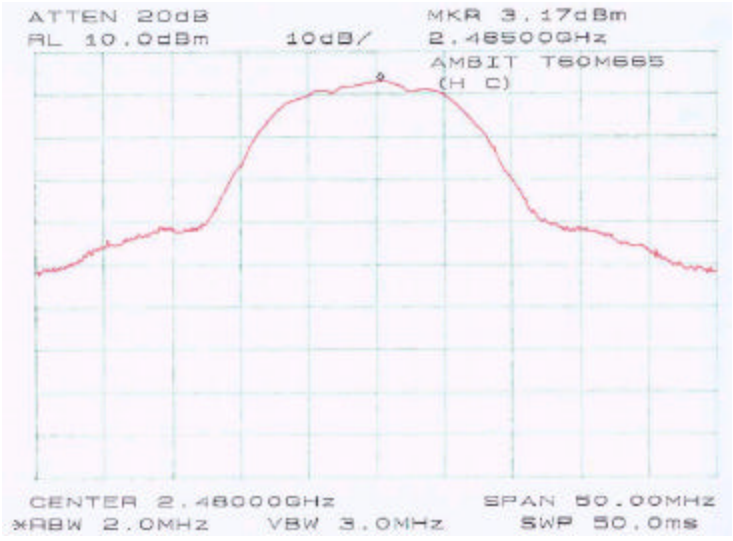
Frequency (MHz)	Output Power in dBm	Output Power in mW	Standard	Result
2402.25	3.17	2.075	≤ 1W	Compliant
2442.67	3.50	2.239	≤ 1W	Compliant
2485.00	3.17	2.075	≤ 1W	Compliant

4.4 Plot of Maximum Peak Output Power

Please refer to the appending for more information.


ATTEN 20dB
RL 10.0dBm
10dB/
MKR 3.17dBm
2.40225GHz
AMBIT T60M665
(L C)
MKR
2.40225 GHz
3.17 dBm
CENTER 2.40200GHz
SPAN 50.00MHz
*RBW 2.0MHz
VBW 3.0MHz
SWP 50.0ms


ATTEN 20dB
RL 10.0dBm
10dB/
MKR 3.50dBm
2.44267GHz
AMBIT T60M665
(M C)
CENTER 2.44267GHz
SPAN 50.00MHz
*RBW 2.0MHz
VBW 3.0MHz
SWP 50.0ms


ATTEN 20dB
RL 10.0dBm
10dB/
MKR 3.17dBm
2.48500GHz
AMBIT T60M665
(H C)
CENTER 2.48000GHz
SPAN 50.00MHz
*RBW 2.0MHz
VBW 3.0MHz
SWP 50.0ms

5 – 20dB BANDWIDTH

5.1 Standard Applicable

According to §15.247(a)(l)(iii), the maximum 20dB bandwidth of the hopping channel is 1MHz.

5.2 Measurement Procedure

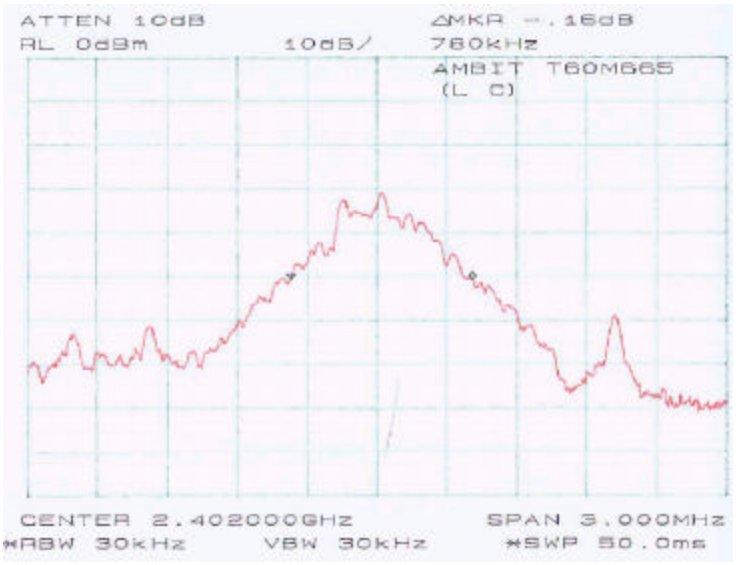
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

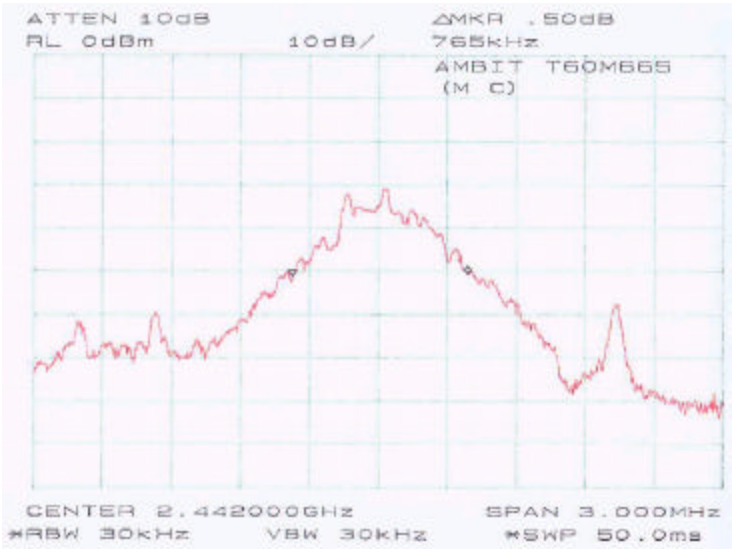
5.3 Measurement Result

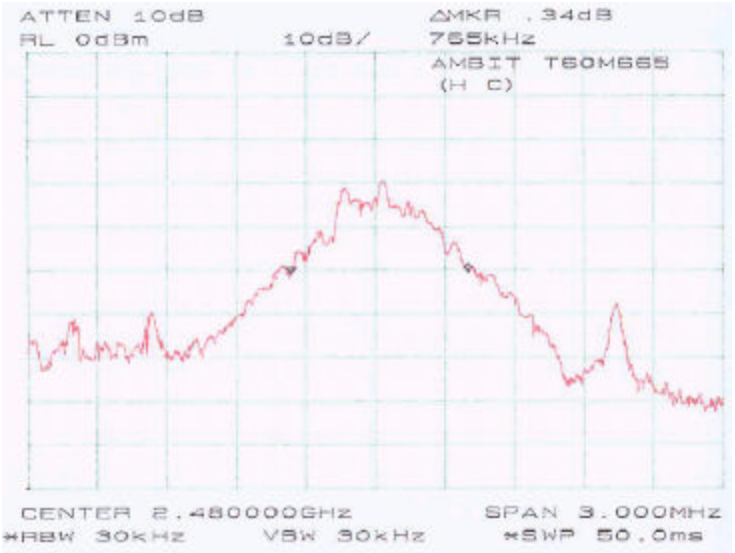
Channel	Measurement	Standard	Result
Low	780kHz	≤ 1MHz	Compliant
Middle	765kHz	≤ 1MHz	Compliant
High	765kHz	≤ 1MHz	Compliant

5.4 Plot of Channel Bandwidth

Please refer to attached plots.


ATTEN 10dB
RL 0dBm
10dB/
ΔMKR -.16dB
780kHz
AMBIT T60M665
(L C)
CENTER 2.402000GHz
SPAN 3.000MHz
*RBW 30kHz
VBW 30kHz
*SWP 50.0ms


ATTEN 10dB
RL 0dBm
10dB/
ΔMKR .50dB
765kHz
AMBIT T60M665
(M C)
CENTER 2.442000GHz
SPAN 3.000MHz
*RBW 30kHz
VBW 30kHz
*SWP 50.0ms


ATTEN 10dB
RL 0dBm
10dB/
ΔMKR .34dB
765kHz
AMBIT T60M665
(H C)
CENTER 2.480000GHz
SPAN 3.000MHz
*RBW 30kHz
VBW 30kHz
*SWP 50.0ms

6 - NUMBER OF HOPPING FREQUENCY USED

6.1 Standard Applicable

According to §15.247(a)(1)(ii), frequency hopping systems operating in the 2400-2483.5Mhz band shall use at least 75 hopping frequencies.

6.2 Measurement Procedure

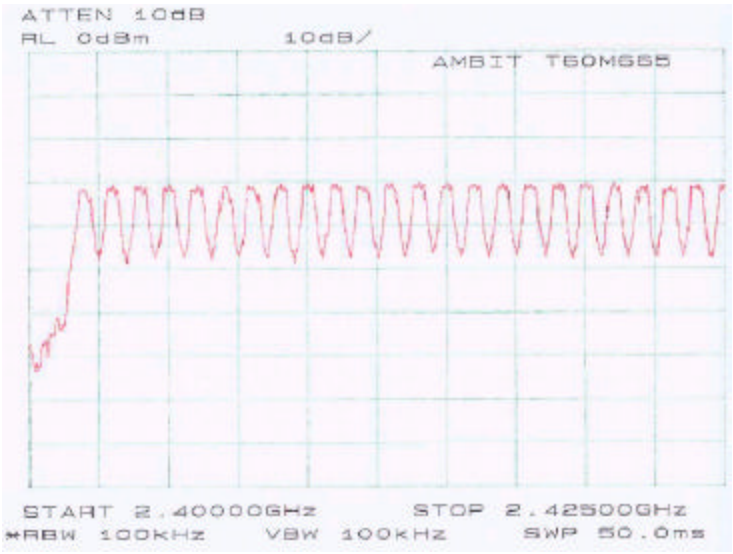
1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on a bench without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low 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 SA on Max-Hold 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.

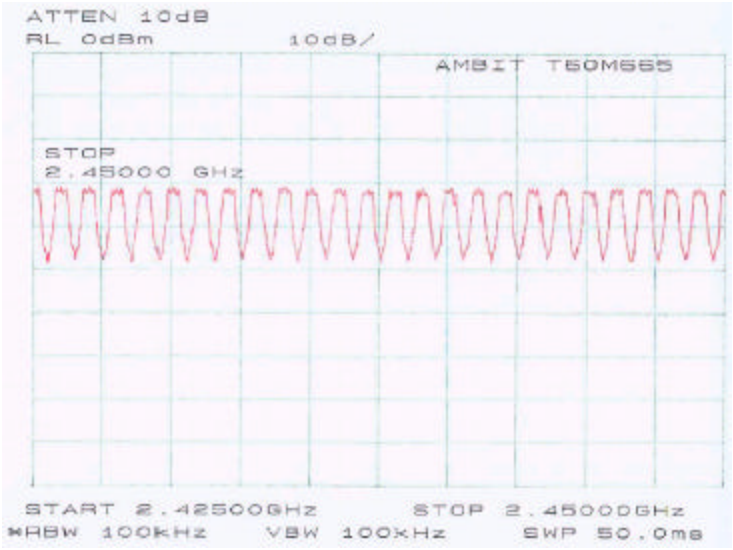
6.3 Measurement Procedure

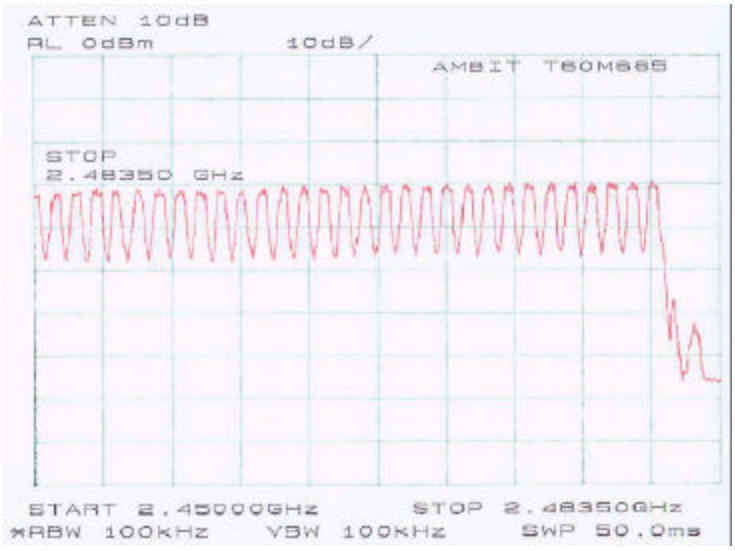
Measurement	Standard	Result
79	75	Compliant

6.4 Plots of Number of Hopping Frequency

Please refer to the attached plots.


ATTEN 10dB
RL 0dBm
10dB/
AMBIT T60M665
START 2.40000GHz
STOP 2.42500GHz
#RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 10dB
RL 0dBm
10dB/
AMBIT T60M665
STOP
2.45000 GHz
START 2.42500GHz
STOP 2.45000GHz
#RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 10dB
RL 0dBm
10dB/
AMBIT T60M665
STOP
2.48350 GHz
START 2.45000GHz
STOP 2.48350GHz
#RBW 100kHz
VBW 100kHz
SWP 50.0ms

7 - HOPPING CHANNEL SEPARATION

7.1 Standard Applicable

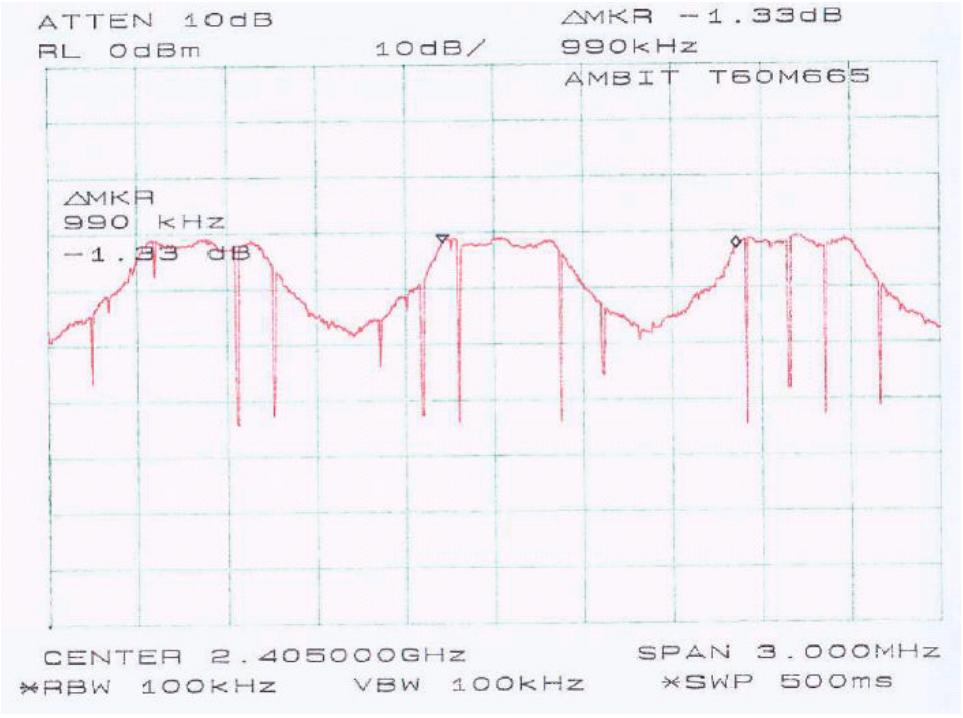
According to §15.247(a)(1), frequency hopping system shall have, hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies.

7.2 Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on a bench 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 Max-Hold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function, and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

7.3 Measurement Data

Please refer to the attached plots.



8 - 100 KHZ BANDWIDTH OF BAND EDGES

8.1 Standard Applicable

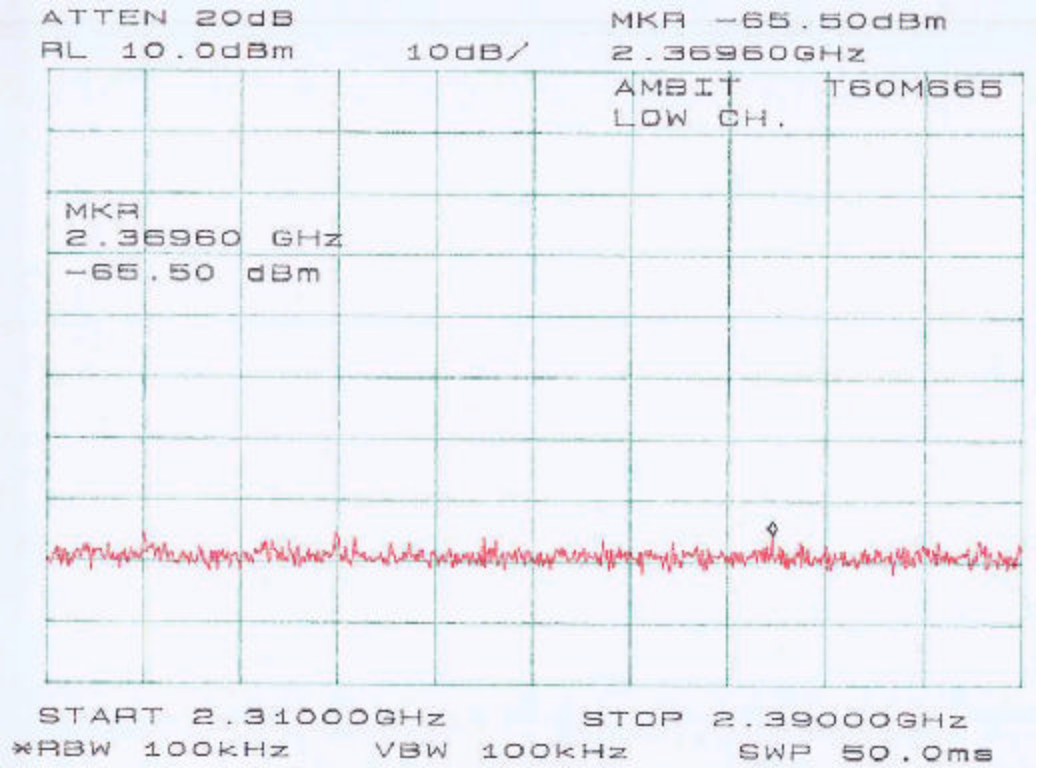
According to §15.247(c), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains 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.

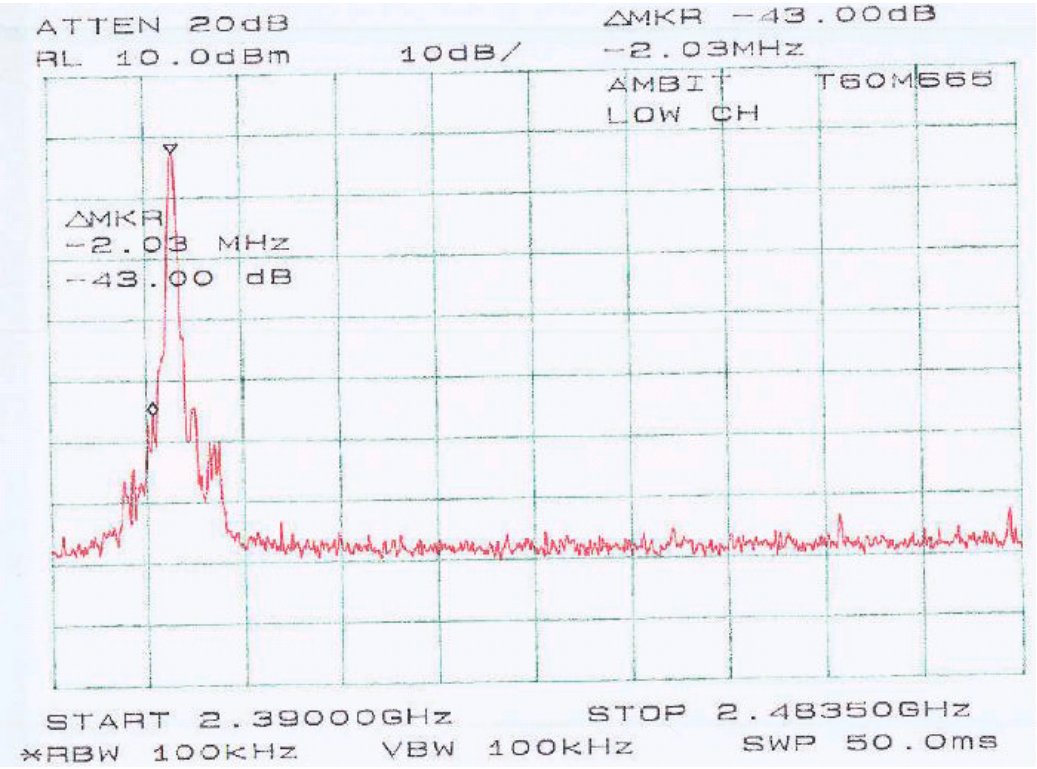
8.2 Measurement Procedure

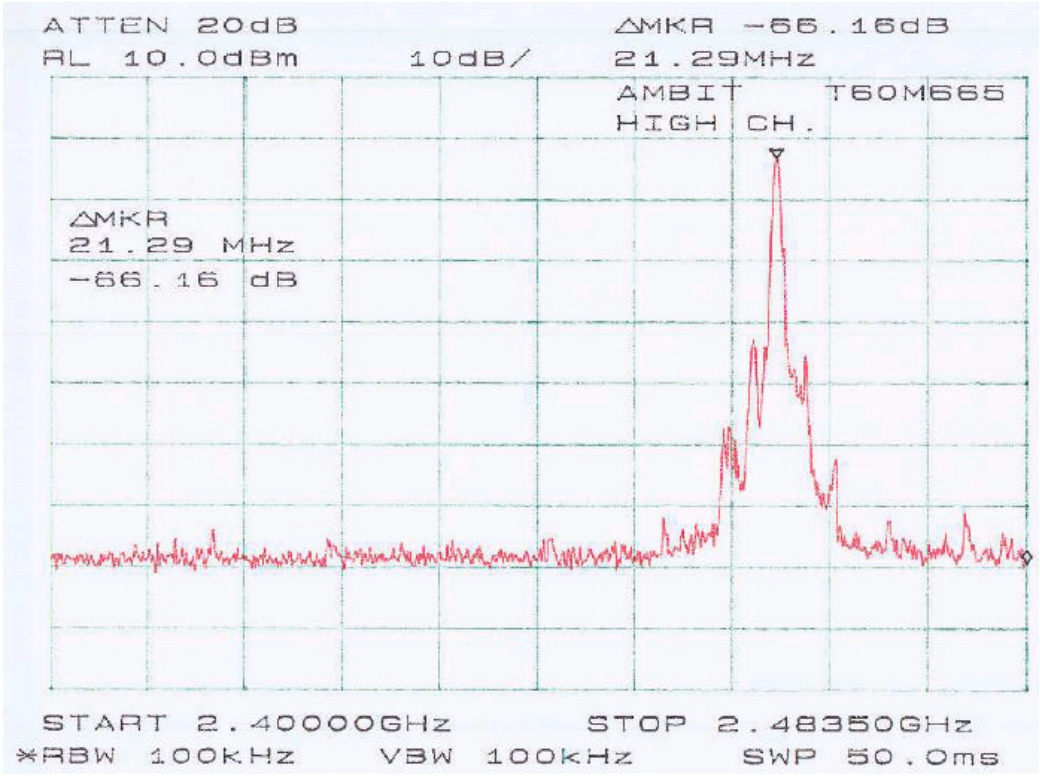
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

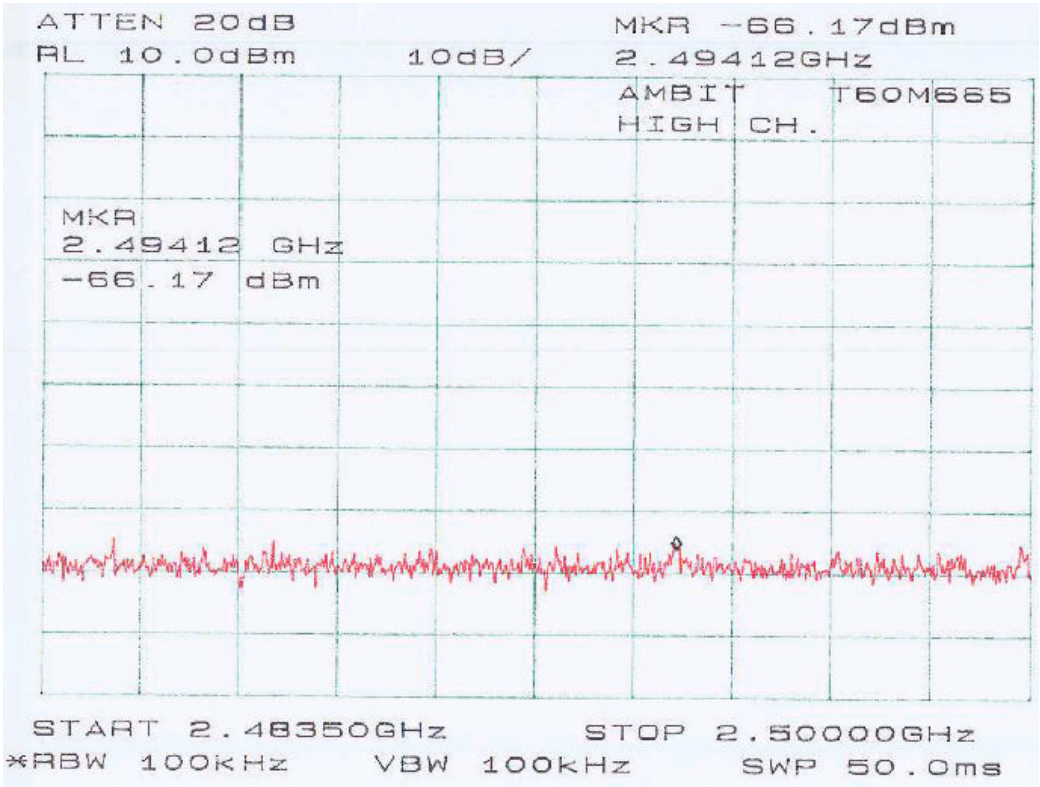
8.3 Measurement Data

Please refer to the attached plots.


ATTEN 20dB
RL 10.0dBm
10dB/
MKR -65.50dBm
2.36960GHz
AMBIT T60M665
LOW CH.
MKR
2.36960 GHz
-65.50 dBm
START 2.31000GHz
STOP 2.39000GHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR -43.00dB
-2.03MHz
AMBIT T60M665
LOW CH
ΔMKR
-2.03 MHz
-43.00 dB
START 2.39000GHz
STOP 2.48350GHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 20dB
RL 10.0dBm
10dB/
ΔMKR -66.16dB
21.29MHz
AMBIT T60M665
HIGH CH.
ΔMKR
21.29 MHz
-66.16 dB
START 2.40000GHz
STOP 2.48350GHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 20dB
RL 10.0dBm
10dB/
MKR -66.17dBm
2.49412GHz
AMBIT T60M665
HIGH CH.
MKR
2.49412 GHz
-66.17 dBm
START 2.48350GHz
STOP 2.50000GHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms

9 - DWELL TIME

9.1 Standard Applicable

According to §15.247 (a)(1)(iii), the average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

9.2 Measurement 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 was set 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 SA on any frequency be measured and set SA 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.

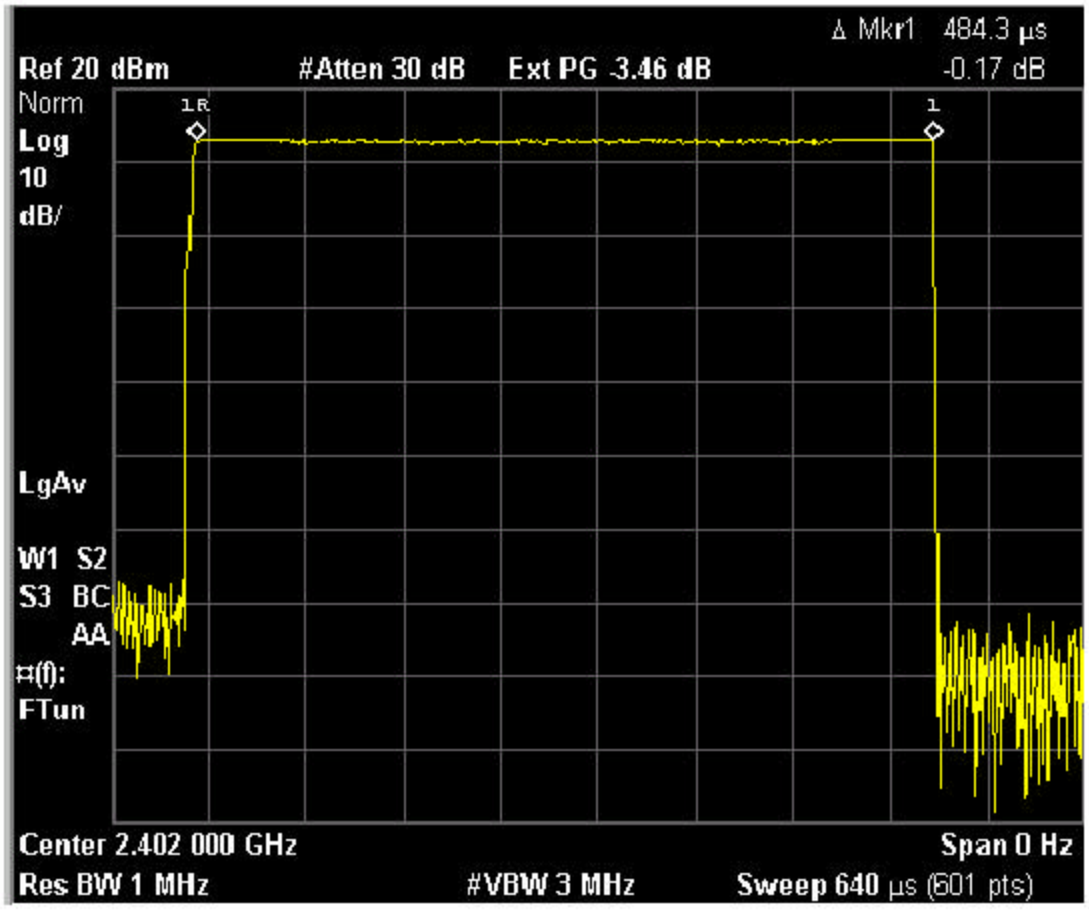
9.3 Measurement Results

The worst case dwell time is (DH5 packet) (4 x 2.952 ms) (dwell time in 1 sec) x 30 seconds = 354.24 ms <0.4 x 79

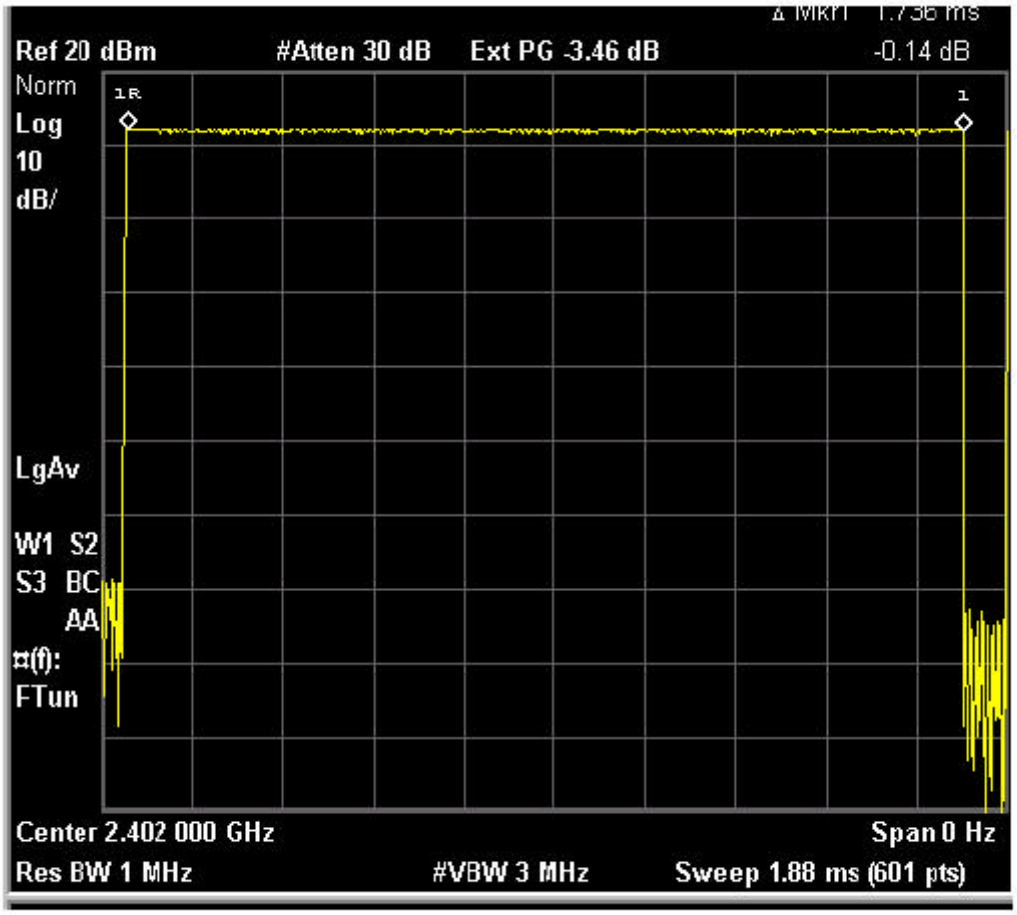
9.4 Plots of Dwell Time

Please refer the following plots.

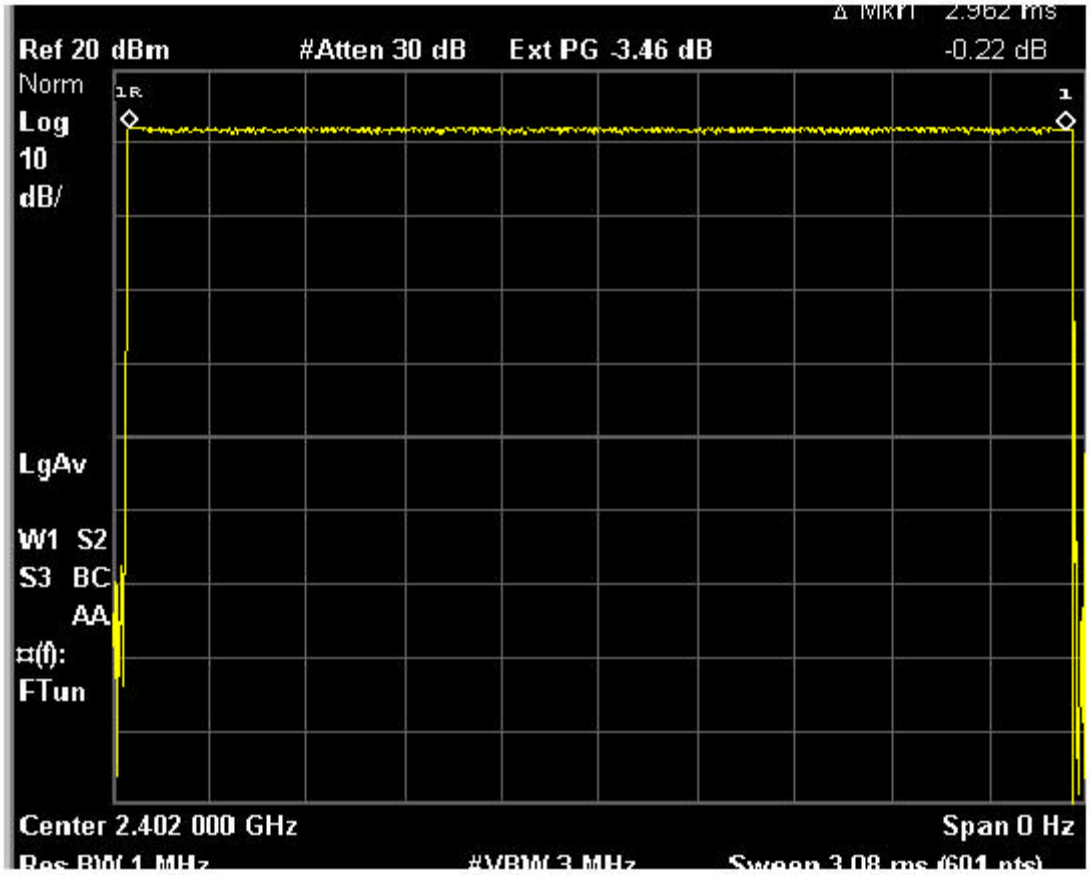
DH1 Mode Dwell Time: DH1 Data Packet – Dwell Time = 484.3 μsec



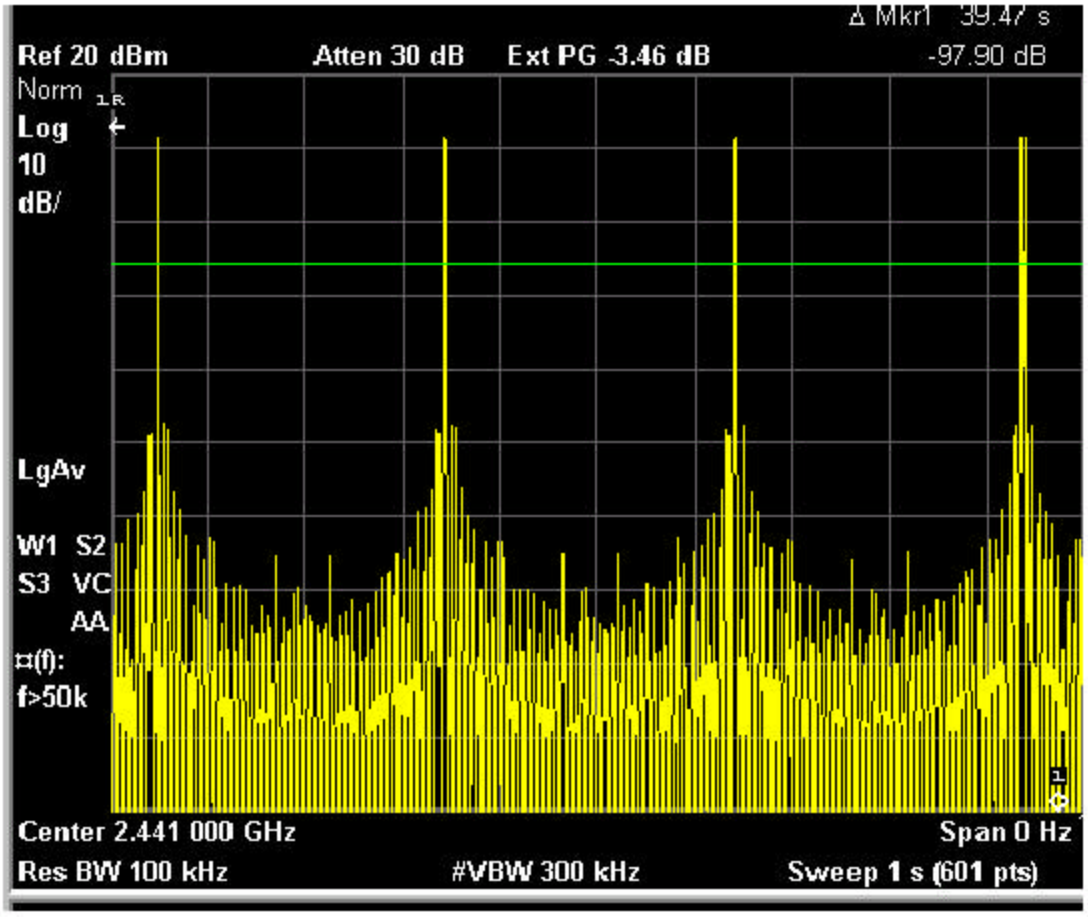
DH3 Mode Dwell Time: DH3 Data Packet – Dwell Time = 1.736 msec



DH5 Mode Dwell Time: DH5 Data Packet – Dwell Time = 2.952 msec



Plot Showing numbers of pulses in 1 second in DH5 Mode: 4 peaks of DH5 packets in 1 second



10 - SPURIOUS EMISSION

10.1 Standard Applicable

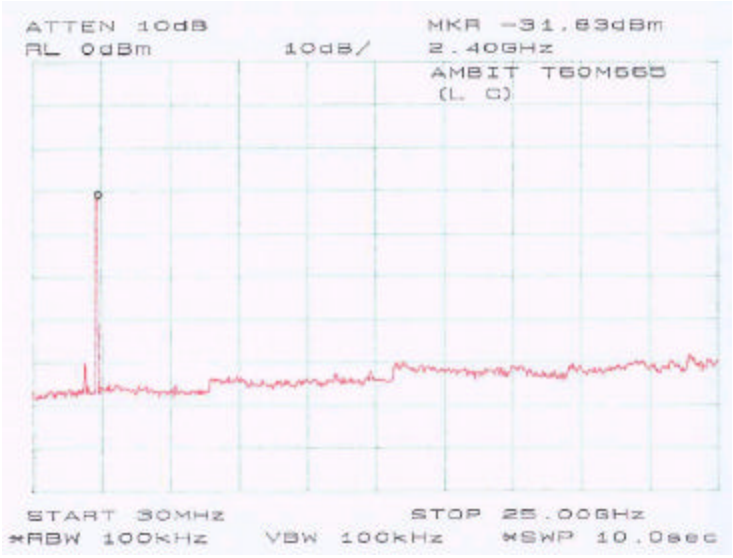
According to §15.209 (f) and §15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation f a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in §15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in §15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit.

10.2 Measurement Procedure

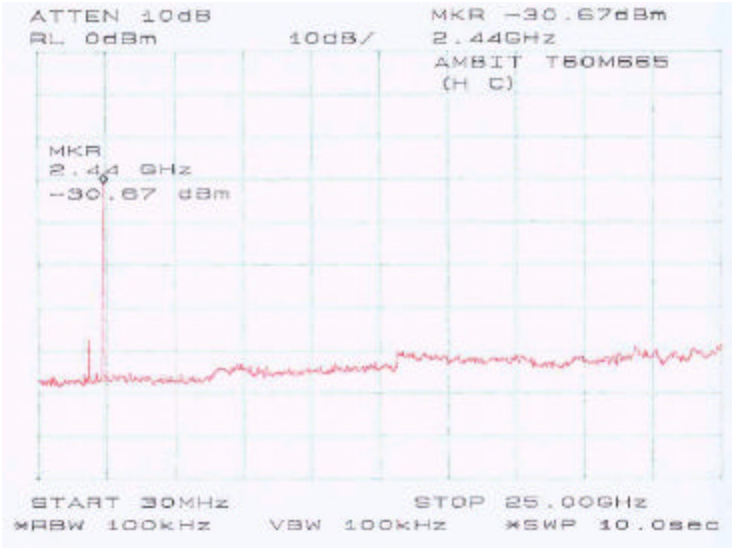
1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on a bench without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low 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 SA on Max-Hold Mode, and then keep the EUT in transmitting 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.

10.3 Measurement Results

Please refer to Appendix G.


ATTEN 10dB
RL 0dBm
10dB/
MKR -31.83dBm
2.40GHz
AMBIT T60M665
(L C)
START 30MHz
STOP 25.00GHz
*RBW 100kHz
VBW 100kHz
*SWP 10.0sec


ATTEN 10dB
RL 0dBm
10dB/
MKR -33.00dBm
2.40GHz
AMBIT T60M665
(M C)
MKR
2.40 GHz
-33.00 dBm
START 30MHz
STOP 25.00GHz
*RBW 100kHz
VBW 100kHz
*SWP 10.0sec


ATTEN 10dB
RL 0dBm
10dB/
MKR -30.67dBm
2.44GHz
AMBIT T60M665
(H C)
MKR
2.44 GHz
-30.67 dBm
START 30MHz
STOP 25.00GHz
*RBW 100kHz
VBW 100kHz
*SWP 10.0sec

11 - RADIATED EMISSION

11.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is $\pm$4.0 dB.

11.2 Test Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with the ANSI C63.4-2000. The specification used was the FCC 15 Subpart C limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The laptop was connected with 120Vac/60Hz power source.

11.3 Spectrum Analyzer Setup

According to FCC Rules, 47 CFR §15.33 (a) (1), the system was tested to 25000 MHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Start Frequency	30 MHz
Stop Frequency	25000 MHz
Sweep Speed	Auto
IF Bandwidth	1 MHz
Video Bandwidth	1 MHz
Quasi-Peak Adapter Bandwidth	120 kHz
Quasi-Peak Adapter Mode	Normal
Resolution Bandwidth	1MHz

12.4 Test Procedure

For the radiated emissions test, both the laptop and all peripheral power cords were connected to the AC floor outlet since the power supply used in the laptop did not provide an accessory power outlet.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dBµV of specification limits), and are distinguished with a "**Qp**" in the data table.

12.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dBµV means the emission is 7dBµV below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. - Class B Limit

12.6 Summary of Test Results

According to the data in section 11.7, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.207, and 15.247, and had the worst margin of:

-10.9 dB at **747.04 MHz** in the **Horizontal** polarization, Low Channel, antenna: BY27

-8.8 dB at **781.74 MHz** in the **Horizontal** polarization, Middle Channel, antenna: BY27

-15.4 dB at **7440.00 MHz** in the **Vertical** polarization, High Channel, antenna: BY27

-14.2 dB at **7206.00 MHz** in the **Horizontal** polarization, Low Channel antenna: ZG1S

-7.4 dB at **4882.00 MHz** in the **Horizontal** polarization, Middle Channel, antenna: ZG1S

-18.4 dB at **7440.00 MHz** in the **Vertical** polarization, High Channel, antenna: ZG1S

-14.7 dB at **149.50 MHz** in the **Horizontal** polarization, Low Channel, antenna: ZI1S

-17.1 dB at**9764.00 MHz** in the **Horizontal** polarization, Middle Channel, antenna: ZI1S

-17.3 dB at **960.00 MHz** in the **Horizontal** polarization, High Channel, antenna: ZI1S

30MHz ~ 25 GHz, 3 Meters, antenna: BY27

Indicated			Table	Antenna		Correction Factor			FCC 15 Subpart C		
Freqency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Mode
MHz	dBμV/m	Degree	Meter	H/V	dBμV/m	dBμV/m	dB	dBμV/m	dBμV/m	dB	
Low Channel											
2402.00	76.3	0	1.0	V	28.1	3.4	30.0	77.8			Ave
2402.00	78.3	200	1.5	H	28.1	3.4	30.0	79.8			Ave
2402.00	78.2	0	1.0	V	28.1	3.4	30.0	79.6			Peak
2402.00	82.5	200	1.5	H	28.1	3.4	30.0	84.0			Peak
747.04	39.8	30	1.5	H	22.4	2.9	30.0	35.1	46.0	-10.9	/
7206.00	28.1	90	1.2	H	35.1	5.6	30.0	38.8	54.0	-15.2	Ave
259.68	44.3	270	1.5	H	13.1	3.0	30.0	30.4	46.0	-15.6	/
7206.00	27.5	200	1.5	V	35.1	5.6	30.0	38.2	54.0	-15.8	Ave
301.30	37.8	270	1.2	V	15.1	4.6	30.0	27.5	46.0	-18.5	/
440.02	36.3	30	1.2	V	17.4	2.7	30.0	26.4	46.0	-19.6	/
4804.00	26.2	0	1.0	V	32.5	4.9	30.0	33.6	54.0	-20.4	Ave
4804.00	25.6	200	1.5	H	32.5	4.9	30.0	33.0	54.0	-21.0	Ave
390.17	34.6	90	1.2	V	16.5	2.8	30.0	23.9	46.0	-22.1	/
229.08	34.7	200	1.2	H	12.1	3.9	30.0	20.7	46.0	-25.3	/
7206.00	36.9	90	1.2	H	35.1	5.6	30.0	47.6	74.0	-26.4	Peak
7206.00	36.2	200	1.5	V	35.1	5.6	30.0	46.9	74.0	-27.1	Peak
4804.00	35.3	0	1.0	V	32.5	4.9	30.0	42.7	74.0	-31.3	Peak
4804.00	34.7	200	1.5	H	32.5	4.9	30.0	42.1	74.0	-31.9	Peak
Middle Channel											
2441.00	83.8	180	2.0	H	28.1	3.4	30.0	85.3			Peak
2441.00	80.1	180	2.0	H	28.1	3.4	30.0	81.6			Ave
2441.00	82.1	180	1.2	V	28.1	3.4	30.0	83.6			Peak
2441.00	79.2	180	1.2	V	28.1	3.4	30.0	80.7			Ave
781.74	39.6	90	2.0	H	23.1	4.5	30.0	37.2	46.0	-8.8	/
7323.00	28.5	90	1.0	V	35.1	5.6	30.0	39.2	54.0	-14.8	Ave
7323.00	28.1	270	2.0	H	35.1	5.6	30.0	38.8	54.0	-15.2	Ave
352.00	39.7	90	1.5	H	15.5	4.3	30.0	29.5	46.0	-16.5	/
4882.00	26.5	180	2.0	H	32.5	4.9	30.0	33.9	54.0	-20.1	Ave
4882.00	26.4	180	1.2	V	32.5	4.9	30.0	33.8	54.0	-20.2	Ave
160.13	36.5	180	1.2	V	13.2	1.6	30.0	21.3	43.5	-22.2	/
270.95	32.6	0	1.2	V	13.9	5.2	30.0	21.7	46.0	-24.3	/
211.26	31.9	30	1.5	H	12.5	4.7	30.0	19.1	43.5	-24.4	/
7323.00	37.8	90	1.0	V	35.1	5.6	30.0	48.5	74.0	-25.5	Peak
1182.00	28.7	270	2.0	H	25.9	3.7	30.0	28.3	54.0	-25.7	/
250.01	33.8	0	2.0	H	13.1	3.0	30.0	19.9	46.0	-26.1	/
7323.00	36.2	270	2.0	H	35.1	5.6	30.0	46.9	74.0	-27.1	Peak
4882.00	37.6	180	2.0	H	32.5	4.9	30.0	45.0	74.0	-29.0	Peak
4882.00	36.5	180	1.2	V	32.5	4.9	30.0	43.9	74.0	-30.1	Peak

High Channel											
2480.00	76.9	200	1.2	V	28.1	3.4	30.0	78.4			Peak
2480.00	74.2	200	1.2	V	28.1	3.4	30.0	75.7			Ave
2480.00	77.2	180	1.2	V	28.1	3.4	30.0	78.7			Peak
2480.00	74.1	180	1.2	V	28.1	3.4	30.0	75.6			Ave
7440.00	27.9	90	1.0	V	35.1	5.6	30.0	38.6	54.0	-15.4	Ave
7440.00	27.5	270	2.0	H	35.1	5.6	30.0	38.2	54.0	-15.8	Ave
1720.31	38.5	180	1.5	H	25.3	2.6	30.0	36.4	54.0	-17.6	/
4960.00	26.5	180	2.0	H	32.5	4.9	30.0	33.9	54.0	-20.1	Ave
4960.00	25.9	180	1.2	V	32.5	4.9	30.0	33.3	54.0	-20.7	Ave
81.80	36.2	270	1.0	V	9.6	1.4	30.0	17.2	40	-22.8	/
240.00	36.2	90	1.2	V	12.6	2.3	30.0	21.1	46	-24.9	/
181.27	30.8	90	2.0	H	13.6	4.0	30.0	18.4	43.5	-25.1	/
1720.31	30.9	90	1.0	V	25.3	2.6	30.0	28.8	54.0	-25.2	/
360.02	29.7	120	1.2	V	15.5	5.2	30.0	20.4	46	-25.6	/
7440.00	37.2	90	1.0	V	35.1	5.6	30.0	47.9	74.0	-26.1	Peak
240.00	34.1	120	2.0	H	12.6	2.3	30.0	19.0	46	-27.0	/
7440.00	35.9	270	2.0	H	35.1	5.6	30.0	46.6	74.0	-27.4	Peak
4960.00	36.5	180	2.0	H	32.5	4.9	30.0	43.9	74.0	-30.1	Peak
4960.00	36.2	180	1.2	V	32.5	4.9	30.0	43.6	74.0	-30.4	Peak

30MHz ~ 25 GHz, 3 Meters, antenna: ZG1S

Indicated			Table	Antenna		Correction Factor			FCC 15 Subpart C		
Freqency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Mode
MHz	dBμV/m	Degree	Meter	H/V	dBμV/m	dBμV/m	dB	dBμV/m	dBμV/m	dB	
Low Channel											
2402.00	77.2	300	1.0	V	28.1	3.4	30.0	78.7			Peak
2402.00	75.2	300	1.0	V	28.1	3.4	30.0	76.7			Ave
2402.00	70.2	180	1.2	H	28.1	3.4	30.0	71.7			Peak
2402.00	68.2	180	1.2	H	28.1	3.4	30.0	69.7			Ave
7206.00	29.1	120	1.2	H	35.1	5.6	30.0	39.8	54.0	-14.2	Ave
299.09	40.2	30	1.2	V	14.9	5.1	30.0	30.2	46.0	-15.8	/
7206.00	25.7	180	1.5	V	35.1	5.6	30.0	36.4	54.0	-17.6	Ave
4804.00	27.8	200	1.2	V	32.5	4.9	30.0	35.2	54.0	-18.8	Ave
766.04	30.5	45	1.2	V	22.7	2.6	30.0	25.8	46.0	-20.2	/
665.90	31.2	300	2.0	H	20.8	3.6	30.0	25.6	46.0	-20.4	/
4804.00	26.1	200	1.5	H	32.5	4.9	30.0	33.5	54.0	-20.5	Ave
72.01	35.9	120	2.0	H	9.6	1.6	30.0	17.1	40.0	-22.9	/
149.89	35.2	270	2.0	H	13.4	1.6	30.0	20.2	43.5	-23.3	/
7206.00	38.2	120	1.2	H	35.1	5.6	30.0	48.9	74.0	-25.1	Peak
150.02	34.2	90	1.2	V	13.0	0.7	30.0	17.9	43.5	-25.6	/
7206.00	36.3	180	1.5	V	35.1	5.6	30.0	47.0	74.0	-27.0	Peak
4804.00	37.6	200	1.2	V	32.5	4.9	30.0	45.0	74.0	-29.0	Peak
4804.00	37.4	200	1.5	H	32.5	4.9	30.0	44.8	74.0	-29.2	Peak

Middle Channel											
2441.00	76.5	160	1.5	H	28.1	3.4	30.0	78.0			Peak
2441.00	71.8	160	1.5	H	28.1	3.4	30.0	73.3			Ave
2441.00	74.3	270	1.2	V	28.1	3.4	30.0	75.8			Peak
2441.00	72.3	270	1.2	V	28.1	3.4	30.0	73.8			Ave
4882.00	39.2	180	1.2	H	32.5	4.9	30.0	46.6	54.0	-7.4	Ave
7323.00	52.8	200	1.5	H	35.1	5.6	30.0	63.6	74.0	-10.4	Peak
4882.00	49.7	180	1.2	H	32.5	4.9	30.0	57.1	74.0	-16.9	Peak
7323.00	25.9	200	1.5	H	35.1	5.6	30.0	36.6	54.0	-17.4	Ave
7323.00	25.0	270	1.0	V	35.1	5.6	30.0	35.7	54.0	-18.3	Ave
72.01	38.2	120	2.0	H	9.6	1.6	30.0	19.4	40.0	-20.6	/
366.02	34.7	60	2.0	H	15.5	5.2	30.0	25.4	46.0	-20.6	/
4882.00	24.8	0	1.2	V	32.5	4.9	30.0	32.3	54.0	-21.8	Ave
144.02	36.8	60	2.5	H	13.2	1.0	30.0	21.0	43.5	-22.5	/
122.06	35.9	0	1.2	V	12.1	2.2	30.0	20.2	43.5	-23.3	/
133.09	35.2	30	1.2	V	12.6	2.0	30.0	19.8	43.5	-23.7	/
240.03	36.2	90	1.2	V	12.6	2.3	30.0	21.1	46.0	-24.9	/
7323.00	36.8	270	1.0	V	35.1	5.6	30.0	47.6	74.0	-26.4	Peak
4882.00	35.3	0	1.2	V	32.5	4.9	30.0	42.7	74.0	-31.3	Peak
High Channel											
2480.00	73.0	180	1.2	V	28.1	3.4	30.0	74.5			Peak
2480.00	71.1	180	1.2	V	28.1	3.4	30.0	72.6			Ave
2480.00	73.5	180	1.5	H	28.1	3.4	30.0	75.0			Peak
2480.00	71.2	330	2.0	H	28.1	3.4	30.0	72.7			Ave
7440.00	24.9	330	1.2	V	35.1	5.6	30.0	35.6	54.0	-18.4	Ave
7440.00	24.8	250	1.5	H	35.1	5.6	30.0	35.6	54.0	-18.4	Ave
4960.00	25.3	330	1.2	V	32.5	4.9	30.0	32.7	54.0	-21.3	Ave
121.80	37.2	270	1.0	V	12.1	2.2	30.0	21.5	43.5	-22.0	/
601.03	30.2	45	1.5	V	20.1	3.0	30.0	23.3	46.0	-22.7	/
249.08	36.2	300	1.0	V	12.6	2.3	30.0	21.1	46.0	-24.9	/
4960.00	21.0	30	1.5	H	32.5	4.9	30.0	28.4	54.0	-25.6	Ave
7440.00	36.7	250	1.5	H	35.1	5.6	30.0	47.4	74.0	-26.6	Peak
144.02	32.4	30	2.0	H	13.2	1.0	30.0	16.6	43.5	-26.9	/
7440.00	35.1	330	1.2	V	35.1	5.6	30.0	45.8	74.0	-28.2	Peak
249.03	32.8	30	2.0	H	12.6	2.3	30.0	17.7	46.0	-28.3	/
4960.00	33.8	330	1.2	V	32.5	4.9	30.0	41.2	74.0	-32.8	Peak
4960.00	31.8	30	1.5	H	32.5	4.9	30.0	39.2	74.0	-34.8	Peak

30MHz ~ 25 GHz, 3 Meters, antenna: ZI1S

Indicated			Table	Antenna		Correction Factor			FCC 15 Subpart C		
Freqency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Mode
MHz	dBμV/m	Degree	Meter	H/V	dBμV/m	dBμV/m	dB	dBμV/m	dBμV/m	dB	
Low Channel											
2402.00	77.8	200	1.2	V	28.1	3.4	30.0	79.3			Peak
2402.00	75.0	200	1.2	V	28.1	3.4	30.0	76.5			Ave
2402.00	78.2	330	2.0	H	28.1	3.4	30.0	79.7			Peak
2402.00	77.0	330	2.0	H	28.1	3.4	30.0	78.5			Ave
149.50	43.8	90	2.0	H	13.4	1.6	30.0	28.8	43.5	-14.7	/
775.10	34.1	90	2.0	H	22.7	3.8	30.0	30.6	46.0	-15.4	/
144.07	41.2	180	1.2	V	13.2	1.0	30.0	25.4	43.5	-18.1	/
229.07	41.8	200	1.2	V	12.1	3.9	30.0	27.8	46.0	-18.2	/
7206.00	24.5	120	1.2	V	35.1	5.6	30.0	35.2	54.0	-18.8	Ave
7206.00	24.5	270	1.2	H	35.1	5.6	30.0	35.2	54.0	-18.8	Ave
612.00	30.9	200	1.2	V	20.0	3.3	30.0	24.2	46.0	-21.8	/
336.30	36.2	120	2.0	H	15.0	2.6	30.0	23.8	46.0	-22.2	/
4804.00	21.2	160	1.2	V	32.5	4.9	30.0	28.6	54.0	-25.4	Ave
4804.00	21.0	270	1.5	H	32.5	4.9	30.0	28.4	54.0	-25.6	Ave
7206.00	35.5	120	1.2	V	35.1	5.6	30.0	46.2	74.0	-27.8	Peak
7206.00	34.7	270	1.2	H	35.1	5.6	30.0	45.4	74.0	-28.6	Peak
4804.00	32.3	160	1.2	V	32.5	4.9	30.0	39.7	74.0	-34.3	Peak
4804.00	32.3	270	1.5	H	32.5	4.9	30.0	39.7	74.0	-34.3	Peak
149.50	43.8	90	2.0	H	13.4	1.6	30.0	28.8	43.5	-14.7	/
Middle Channel											
2441.00	82.2	180	1.5	H	28.1	3.4	30.0	83.6			Peak
2441.00	78.7	180	1.5	H	28.1	3.4	30.0	80.2			Ave
2441.00	80.2	90	1.2	V	28.1	3.4	30.0	81.6			Peak
2441.00	79.1	90	1.2	V	28.1	3.4	30.0	80.6			Ave
9764.00	26.2	120	1.8	H	35.1	5.6	30.0	36.9	54.0	-17.1	Ave
9764.00	26.0	250	1.8	H	35.1	5.6	30.0	36.7	54.0	-17.3	Ave
7323.00	25.0	200	1.5	H	35.1	5.6	30.0	35.7	54.0	-18.3	Ave
7323.00	24.3	300	1.5	H	35.1	5.6	30.0	35.0	54.0	-19.0	Ave
482.10	35.2	120	1.2	V	18.7	2.5	30.0	26.4	46.0	-19.6	/
750.03	28.9	45	2.0	H	22.5	2.4	30.0	23.8	46.0	-22.2	/
168.03	35.9	30	2.0	H	13.3	2.1	30.0	21.3	43.5	-22.2	/
120.06	35.9	45	1.5	V	12.1	2.2	30.0	20.2	43.5	-23.3	/
172.03	34.8	90	1.2	V	13.3	1.4	30.0	19.5	43.5	-24.0	/
4882.00	22.2	180	1.2	H	32.5	4.9	30.0	29.6	54.0	-24.4	Ave
4882.00	22.0	250	2.0	H	32.5	4.9	30.0	29.4	54.0	-24.6	Ave
9764.00	37.5	250	1.8	H	35.1	5.6	30.0	48.2	74.0	-25.8	Peak
9764.00	37.3	120	1.2	V	35.1	5.6	30.0	48.1	74.0	-25.9	Peak
7323.00	35.7	0	1.5	H	35.1	5.6	30.0	46.4	74.0	-27.6	Peak
7323.00	35.4	300	1.0	V	35.1	5.6	30.0	46.1	74.0	-27.9	Peak
4882.00	34.3	250	1.2	V	32.5	4.9	30.0	41.7	74.0	-32.3	Peak
4882.00	32.3	180	1.2	H	32.5	4.9	30.0	39.8	74.0	-34.3	Peak

High Channel											
2480.00	75.2	270	1.0	V	28.1	3.4	30.0	76.6			Peak
2480.00	74.6	270	1.0	V	28.1	3.4	30.0	76.1			Ave
2480.00	78.3	270	2.0	H	28.1	3.4	30.0	79.8			Peak
2480.00	74.2	270	2.0	H	28.1	3.4	30.0	75.6			Ave
960.00	28.7	227	2.0	H	25.2	4.8	30.0	28.7	46.0	-17.3	/
7440.00	25.1	250	1.5	H	35.1	5.6	30.0	35.8	54.0	-18.2	Ave
72.03	40.5	180	1.2	V	9.6	1.6	30.0	21.7	40.0	-18.3	/
7440.00	24.9	90	1.2	V	35.1	5.6	30.0	35.6	54.0	-18.4	Ave
144.07	38.7	200	1.2	V	13.2	1.0	30.0	22.9	43.5	-20.6	/
601.40	30.7	270	2.0	H	20.1	3.0	30.0	23.8	46.0	-22.2	/
4960.00	24.2	300	1.2	V	32.5	4.9	30.0	31.6	54.0	-22.4	Ave
172.08	35.1	300	2.0	H	13.3	1.4	30.0	19.8	43.5	-23.7	/
605.70	27.8	200	1.2	V	20.1	3.0	30.0	20.9	46.0	-25.1	/
4960.00	20.9	90	2.0	H	32.5	4.9	30.0	28.3	54.0	-25.7	Ave
112.90	34.6	270	2.0	H	11.7	1.3	30.0	17.6	43.5	-25.9	/
7440.00	35.8	250	1.5	H	35.1	5.6	30.0	46.5	74.0	-27.5	Peak
7440.00	34.8	90	1.2	V	35.1	5.6	30.0	45.5	74.0	-28.5	Peak
4960.00	34.7	300	1.2	V	32.5	4.9	30.0	42.1	74.0	-31.9	Peak
4960.00	31.8	90	2.0	H	32.5	4.9	30.0	39.2	74.0	-34.8	Peak

12 - CONDUCTED EMISSION

12.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is ±2.4 dB.

12.2 Test Setup

The measurement was performed at the **O**pen **A**rea **T**est **S**ite, using the same setup per ANSI C63.4-2000 measurement procedure. The specification used was FCC 15 Subpart C limits.

The EUT was installed in the notebook. The notebook was put on the center back edge of the test table.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The host PC system was connected with 120Vac/60Hz power source.

12.3 Spectrum Analyzer Setup

The spectrum analyzer was set with the following configurations during the conduction test:

Start Frequency	150 kHz
Stop Frequency	30 MHz
Sweep Speed	Auto
IF Bandwidth	10 kHz
Video Bandwidth	10 kHz
Quasi-Peak Adapter Bandwidth	9 kHz
Quasi-Peak Adapter Mode	Normal

12.4 Test Procedure

During the conducted emission test, the power cord of the host system was connected to the auxiliary outlet of the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of each modes tested to ensure EUT is compliant with all installation combination.

All data was recorded in the peak detection mode. Quasi-peak readings were only performed when an emission was found to be marginal (within -4 dBµV of specification limits). Quasi-peak readings are distinguished with a "**Qp**".

12.5 Summary of Test Results

According to the data in section 12.6, the EUT complied with the FCC Conducted margin for a Class B device, with the *worst* margin reading of:

-12.5 dBµV at 0.150 MHz in the Neutral mode

12.6 Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC CLASS B	
Frequency MHz	Amplitude dBµV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBµV	Margin dB
0.150	53.5	QP	Neutral	66	-12.5
1.165	42.8	QP	Line	56	-13.2
0.150	52.1	QP	Line	66	-13.9
0.180	50.6	QP	Neutral	64	-13.9
0.810	40.9	QP	Neutral	56	-15.1
0.720	40.3	Ave	Line	56	-15.7
0.720	40.1	QP	Line	56	-15.9
0.810	37.4	Ave	Neutral	56	-18.6
0.150	40.0	Ave	Line	66	-26.0
0.150	40.0	Ave	Neutral	66	-26.0
0.200	37.4	Ave	Neutral	64	-26.2
1.165	22.5	Ave	Line	56	-33.5

12.7 Plot of Conducted Emissions Test Data

Plot(s) of Conducted Emissions Test Data is presented in the following page as reference.

Bay Area Compliance Corporation 10. Apr 03 10:48
CISPR CLASS B

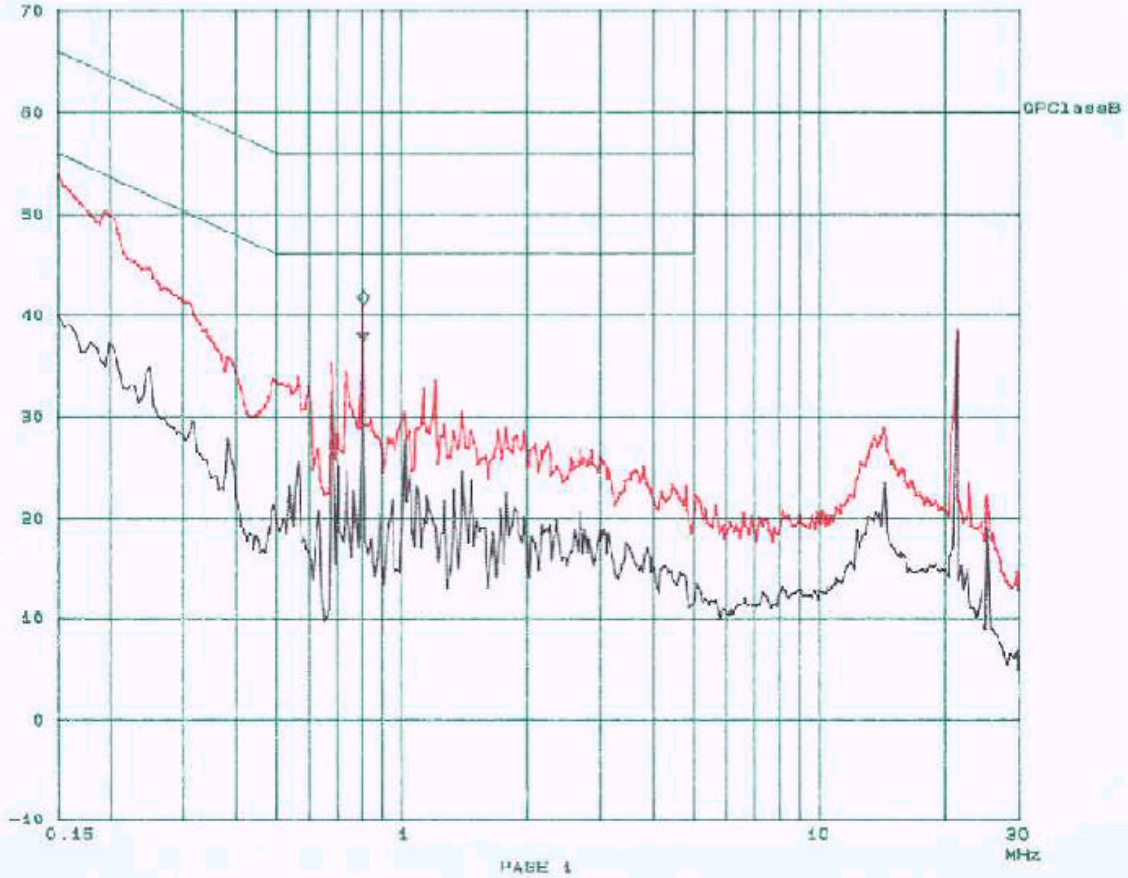
EUT: CTP9410/GHE410
Manuf: Shenzhen Jingneng
Op Cond: Normal
Operator: JERRY
Test Spec: +
Comment: N
File name: AMBIT.RFS

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	30M	5k	9k	QP+CAV	20ms	10dBLN	OFF

Final Measurement: X QP / + CAV
Meas Time: 1 s
Subranges: 28
Acc Margin: 6dB

◊ Mkr : 810.00 kHz 40.8 dBuV
▽ Mkr : 810.00 kHz 37.4 dBuV



PAGE 1

Bay Area Compliance Corporation 16. Apr 03 09:13

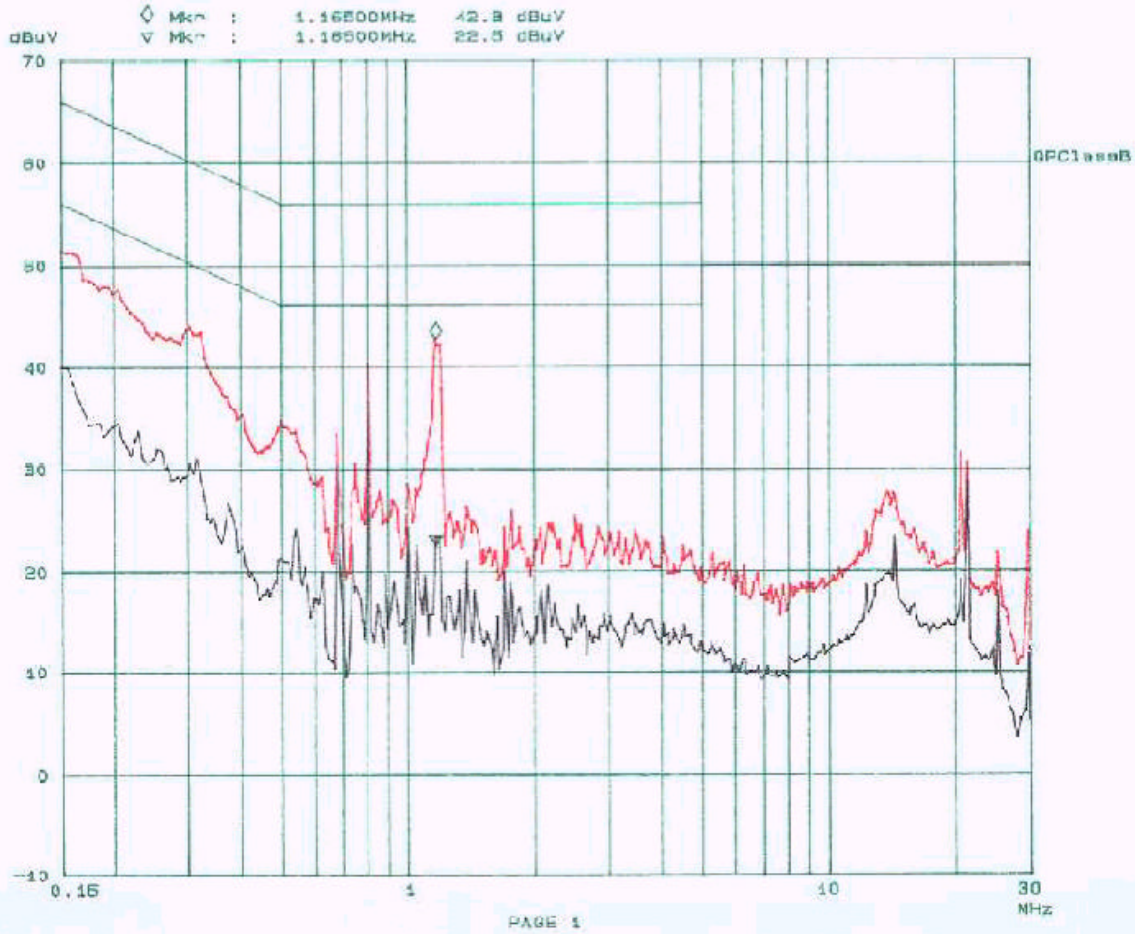
CISPR CLASS B

EUT: CTP8410/GH2410
Manuf: Shenzhen Jingneng
Op Cond: Normal
Operator: Ben
Test Spec: +
Comment: Line
File name: AMBIT.RES

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	30M	5k	9k	QP+CAV	20ms	10dBLN	OFF

Final Measurement: x QP / + CAV
Meas Time: 1 s
Subranges: 25
Acc Margin: 6dB



PAGE 1

Bay Area Compliance Corporation 14. Apr 03 14:27
CISPR CLASS B

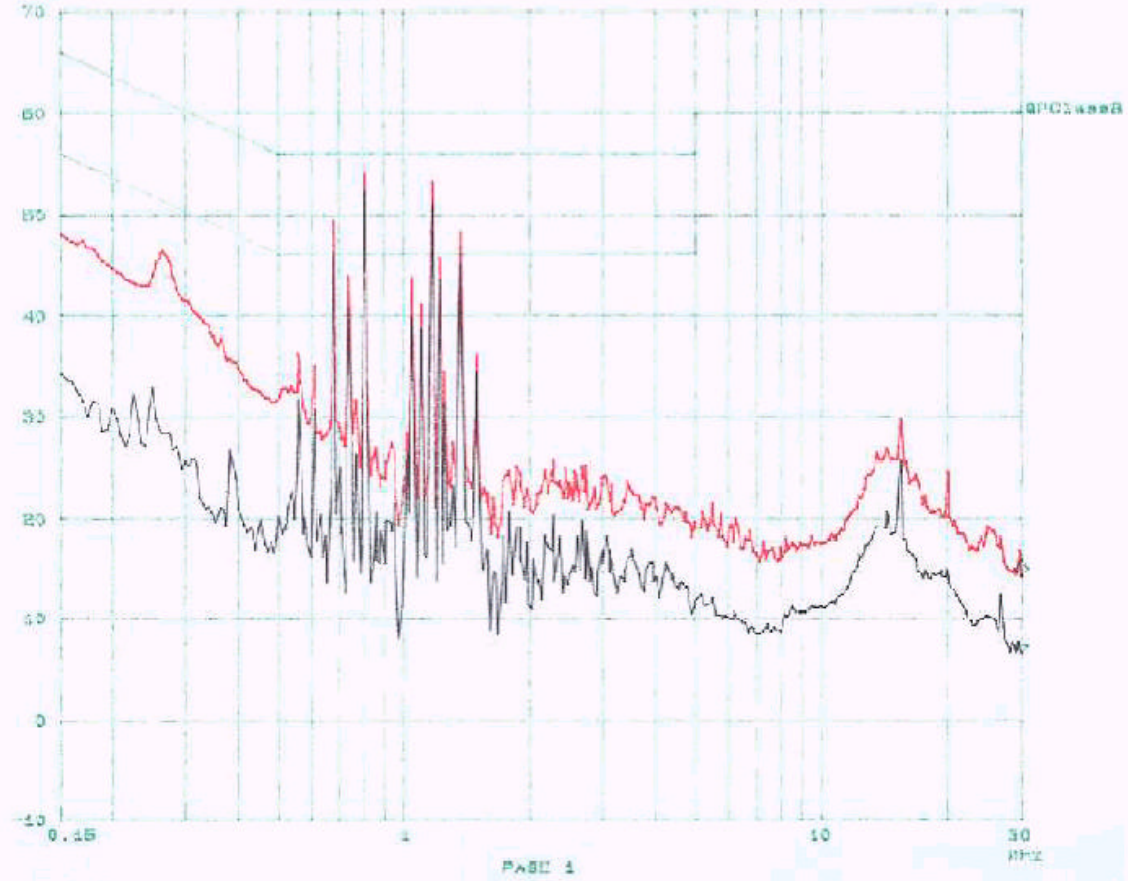
EUT: KWI 1081
Manuf: Innovace
Op Cond: Normal
Operator: Steve
Comment: Line
File name: AMBIT.RFS

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	30M	5k	9k	QP+CAV	20ms	10dB(A)	OFF

Final Measurement: x QP / + CAV
Meas Time: 1 s
Subranges: 20
Acc Margin: 6dB

◇ Mkr : 30.0000 MHz 14.1 dBuV
Y Mkr : 30.0000 MHz 8.6 dBuV



PAGE 1

13 - ANTENNA REQUIREMENT

According to § 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 § 15.247 (1), 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.

The antenna is installed by OET integrator.