

*FCC PART 15, SUBPART B and C
TEST REPORT*

for
AIRBORNE WLN-B MODULE
MODEL: ABDB-AN-DPxxx

Prepared for

DPAC TECHNOLOGIES
 7321 LINCOLN WAY
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DATE: APRIL 27, 2005

	REPORT BODY	APPENDICES					TOTAL
		<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	
PAGES	21	2	2	2	23	98	148

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FIGURE	TITLE
1	Conducted Emissions Test Setup
2	Plot Map and Layout of 3 Meter Radiated Site

GENERAL REPORT SUMMARY

This electromagnetic emission test report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced without the written permission of Compatible Electronics, unless done so in full.

This report must not be used to claim product endorsement by NVLAP, NIST, or any other agency of the U.S. Government.

Device Tested: Airborne WLN-B Module
Model: ABDB-AN-DPxxx
S/N: N/A

Product Description: See Expository Statement.

Modifications: The EUT was not modified during the testing.

Manufacturer: DPAC Technologies
7321 Lincoln Way
Garden Grove, California 92841

Test Dates: April 13, 14, 15, 18, and 19, 2005

Test Specifications: EMI requirements
Limits: CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.207, 15.209, and 15.247

Test Procedure: ANSI C63.4: 2003

Test Deviations: The test procedure was not deviated from during the testing.

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 150 kHz – 30 MHz	Complies with the Class B limits of CFR Title 47, Part 15 Subpart B; and Subpart C, section 15.207
2	Spurious Radiated RF Emissions, 10 kHz - 25000 MHz	Complies with the Class B limits of CFR Title 47, Part 15, Subpart B; and CFR Title 47, Part 15, Subpart C, section 15.247(d)
3	Fundamental and Emissions produced by the intentional radiator in non-restricted bands, 10 kHz – 40 GHz	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart C, section 15.247(d)
4	Emissions produced by the intentional radiator in restricted bands, 10 kHz – 40 GHz	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart C, section 15.205, 15.209(a), and section 15.247 (d)
5	6 dB Bandwidth	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart C, section 15.247(a)(2)
6	Peak Power Output	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart C, section 15.247(b)(3)
7	RF Conducted Antenna Test	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart C, section 15.247(d)
8	Peak Power Spectral Density Conducted from the Intentional Radiator to the Antenna	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart C, section 15.247 (e)

1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the Airborne WLN-B Module Model: ABDB-AN-DPxxx. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4: 2003. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the specification limits defined by CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.207, 15.209, and 15.247.



2. ADMINISTRATIVE DATA

2.1 Location of Testing

The EMI tests of the testing described herein were performed at the test facility of Compatible Electronics at 114 Olinda Drive, Brea, California 92823.

2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

2.3 Cognizant Personnel

DPAC Technologies

Paul Shklanko Engineer

Compatible Electronics, Inc.

Kyle Fujimoto Test Engineer
Benigno Chavez Test Engineer
Michael Christensen Lab Manager

2.4 Date Test Sample was Received

The test sample was received on April 13, 2005.

2.5 Disposition of the Test Sample

The sample has not been returned to DPAC Technologies as of April 27, 2005.

2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
HP	Hewlett Packard
ITE	Information Technology Equipment
CML	Corrected Meter Limit
LISN	Line Impedance Stabilization Network

3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this EMI Test Report.

SPEC	TITLE
FCC Title 47, Part 15 Subpart C	FCC Rules - Radio frequency devices (including digital devices) – Intentional Radiators
ANSI C63.4 2003	Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz
FCC Title 47, Part 15 Subpart B	FCC Rules - Radio frequency devices (including digital devices) – Unintentional Radiators

4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration - EMI

Setup and operation of the equipment under test.

Specifics of the EUT and Peripherals Tested

The EUT was connected to was directly connected to the modular PCB. The modular PCB was connected to an AC Adapter via its power port. The modular PCB was also connected to a laptop via its serial port. The laptop was placed 30 feet away from the test site.

Operation of the EUT during the testing

The EUT was controlled by a program on the laptop that locked one channel at a time so that the low, middle, and high channels could be tested. This program also allowed the EUT to either be in transmit or receive mode. Also commands were sent and received by the serial port.

Two antennas were tested – a Swivel Antenna and a Swivel Base Antenna.

The final radiated as well as the conducted data was taken in the mode above. Please see Appendix E for the data sheets.

4.1.1 Cable Construction and Termination

Cable 1 This is a 6 foot unshielded cable connecting the Modular PCB to the AC adapter. It has a 1/8 inch power connector at the laptop end and is hard wired into the AC Adapter.

Cable 2 This is a 30 foot unshielded cable connecting the EUT to the laptop. It has a D-9 pin metallic connector at the laptop end and is hard wired into the EUT.

Cable 3 This is a 30 foot unshielded cable connecting the EUT to the laptop. It has an RJ-45 connector at the laptop end and is hard wired into the EUT.

Cable 4 **(for the Swivel Antenna)** This is a 3 1/2 inch braid shielded cable connecting the EUT to the Swivel Antenna. It has a UFL connector at the EUT end and a reverse SMA connector at the EUT end.

Cable 5 **(for the Swivel Base Antenna)** This is a 3 1/2 inch braid shielded cable connecting the EUT to cable #6. It has a UFL connector at the EUT end and a reverse SMA connector at the other end.

Cable 6 **(for the Swivel Base Antenna)** This is a 2 meter braid shielded cable connecting the Swivel Base Antenna to cable #5. It has a reverse SMA connector at the cable #5 end and is hard wired into the Swivel Base Antenna.

5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

5.1 EUT and Accessory List

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID
AIRBORNE WLN-B MODULE	DPAC TECHNOLOGIES	ABDB-AN-DPxxx	N/A	RTTAB-WLNB
SWIVEL ANTENNA	NEARSON	151	P/N: S151AH-2450S	N/A
SWIVEL BASE ANTENNA	NEARSON	151	P/N: S151M2-L-2450S	N/A
LAPTOP	IBM	TYPE: 2653	78-G2003	DoC
AC ADAPTER FOR MODULAR PCB	GLOBTEK, INC.	48-5-1000R	P/N: WR1A1000CCP-N	N/A

5.2 **EMI Test Equipment for Brea Facility – Part 1**

EQUIPMENT TYPE	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
Radiated Emissions Manual Test – Radiated	Compatible Electronics	N/A	N/A	N/A	N/A
Conducted Emissions Test Program	Compatible Electronics	N/A	N/A	N/A	N/A
Spectrum Analyzer – Main Section	Hewlett Packard	8566B	3638A08768	June 24, 2004	June 24, 2005
Spectrum Analyzer – Display Section	Hewlett Packard	85662A	3701A22262	June 24, 2004	June 24, 2005
Quasi-Peak Adapter	Hewlett Packard	85650A	2811A01363	June 24, 2004	June 24, 2005
Microwave Preamplifier	Com-Power	PA-102	1017	January 5, 2005	Jan. 5, 2006
Biconical Antenna	Com Power	AL-100	1548	September 29, 2004	Sept. 29, 2005
Log Periodic Antenna	Com Power	AL-100	16060	September 27, 2004	Sept. 27, 2005
Computer	Hewlett Packard	D5251A 888	US74458128	N/A	N/A
Monitor	Hewlett Packard	D5258A	DK74889705	N/A	N/A
LISN	Com Power	LI-215	12078	October 28, 2004	Oct. 28, 2005
LISN	Com Power	LI-215	12082	October 28, 2004	Oct. 28, 2005
Transient Limiter	Seaward	252A910	K39-0220	September 20, 2004	Sept. 20, 2005

5.3 **EMI Test Equipment for Brea Facility – Part 2**

EQUIPMENT TYPE	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
EMI Receiver	Rohde & Schwarz	ESIB40	100172	October 28, 2004	Oct. 28, 2005
Loop Antenna	Com-Power	AL-130	17089	September 3, 2004	Sept. 3, 2005
Horn Antenna	Com-Power	AH826	0071957	November 5, 2003	Nov. 5, 2005
Horn Antenna	Antenna Research	DRG-118/A	1053	January 16, 2004	Jan. 16, 2006
Microwave Preamplifier	Com Power	PA-122	25195	February 25, 2005	Feb. 25, 2006
Microwave Preamplifier	Com Power	PA-840	711013	February 25, 2005	Feb. 25, 2006
RF Peak Power Meter / Analyzer	Boonton Electronics Corp.	4500A-01-30	1282	February 23, 2004	Feb. 23, 2006
Peak Power Sensor	Boonton Electronics Corp.	57318	3723	February 23, 2004	Feb. 23, 2006
RF Attenuator	Weinschel Corporation	2	BJ6396	August 12, 2004	August 12, 2005

6. TEST SITE DESCRIPTION

6.1 Test Facility Description

Please refer to section 2.1 and 7.1 of this report for EMI test location.

6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 0.8 meters above the ground plane.

The EUT was not grounded.

7. CHARACTERISTICS OF THE TRANSMITTER

7.1 Antenna Gain

The antennas both tested have a gain of 5 dBi.



8. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

8.1 RF Emissions

8.1.1 Conducted Emissions Test

The spectrum analyzer was used as a measuring meter. The data was collected with the spectrum analyzer in the peak detect mode with the "Max Hold" feature activated. The quasi-peak was used only where indicated in the data sheets. A 10 dB attenuation pad was used for the protection of the spectrum analyzer input stage, and the offset was adjusted accordingly to read the actual data measured. The LISN output was measured using the spectrum analyzer. The output of the second LISN was terminated by a 50 ohm termination. The effective measurement bandwidth used for this test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The EUT was powered through the LISN, which was bonded to the ground plane. The LISN power was filtered and the filter was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI C63.4: 2003. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The conducted emissions from the EUT were maximized for operating mode as well as cable placement. The final data was collected under program control by the Compatible Electronics conducted emissions software in several overlapping sweeps by running the spectrum analyzer at a minimum scan rate of 10 seconds per octave. The final qualification data is located in Appendix E.

Test Results:

The EUT complies with the **Class B** limits of CFR Title 47, Part 15 Subpart B for conducted emissions; and the limits of CFR Title 47, Part 15, Subpart C, Section 15.207.

8.1.2

Radiated Emissions (Spurious and Harmonics) Test

The spectrum analyzer and EMI Receiver were used as a measuring meter along with the quasi-peak adapter. Amplifiers were used to increase the sensitivity of the instrument. The Com Power Preamplifier Model: PA-102 was used for frequencies from 30 MHz to 1 GHz, the Com-Power Microwave Preamplifier Model: PA-122 was used for frequencies from 1 GHz to 18 GHz, and the Com Power Microwave Preamplifier Model: PA-840 was used for frequencies from 18 GHz to 25 GHz. The spectrum analyzer and EMI Receiver were used in the peak detect mode with the "Max Hold" feature activated. In this mode, the spectrum analyzer and/or EMI Receiver records the highest measured reading over all the sweeps.

The quasi-peak adapter was used only for those readings which are marked accordingly on the data sheets.

The frequencies above 1 GHz were averaged manually by narrowing the video filter down to 10 Hz and putting the sweep time on AUTO on the spectrum analyzer to keep the amplitude reading calibrated.

The measurement bandwidths and transducers used for the radiated emissions test were:

FREQUENCY RANGE	EFFECTIVE MEASUREMENT BANDWIDTH	TRANSDUCER
10 kHz to 150 kHz	200 Hz	Active Loop Antenna
150 kHz to 30 MHz	9 kHz	Active Loop Antenna
30 MHz to 300 MHz	120 kHz	Biconical Antenna
300 MHz to 1 GHz	120 kHz	Log Periodic Antenna
1 GHz to 25 GHz	1 MHz	Horn Antenna

The open field test site of Compatible Electronics, Inc. was used for radiated emission testing. This test site is set up according to ANSI C63.4: 2003. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT by the Radiated Emission Manual Test software. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength). The gunsight method was used when measuring with the horn antenna in order to ensure accurate results.

Radiated Emissions (Spurious and Harmonics) Test (con't)

The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT. The EUT was tested at a 3 meter test distance to obtain the final data.

Test Results:

The EUT complies with the **Class B** limits of CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.209, and 15.247 (d). Please see the data sheets located in Appendix E.

8.2 6 dB and 20 dB Bandwidth

The 6 dB and 20 dB bandwidth was measured using the EMI Receiver. The bandwidth was measured using a direct connection from the RF out on the EUT. The resolution bandwidth was 100 kHz and the video bandwidth was 300 kHz.

Test Results:

This test complies with the relevant requirements of CFR Title 47, Part 15, Subpart C section 15.247 (a)(2).

8.3 Peak Output Power

The Peak Output Power was taken using the power meter and power sensor. The EUT was directly connected to the power sensor, which was directly connected to the power meter. The Peak Output Power was then taken.

Test Results:

This test complies with the relevant requirements of CFR Title 47, Part 15, Subpart C section 15.247 (b)(3).

8.4 RF Antenna Conducted Test

The RF antenna conducted test was taken using the EMI Receiver. The RF antenna conducted test was measured using a direct connection from the RF out on the EUT into the input of the analyzer. The resolution bandwidth was 100 kHz, and the video bandwidth 300 kHz. The spans were wide enough to include all the harmonics and emissions that were produced by the intentional radiator.

Test Results:

This test complies with the relevant requirements of CFR Title 47, Part 15, Subpart C section 15.247 (d).

8.5 Spectral Density Output

The spectral density output was measured using the EMI Receiver. The spectral density output was measured using a direct connection from the RF out on the EUT into the input of the EMI Receiver. The resolution bandwidth was 3 kHz, and the video bandwidth was 10 kHz. The highest 4.5 MHz of the signal was used as the frequency span with the sweep rate being 1 second for every 3 kHz of span.

Test Results:

This test complies with the relevant requirements of CFR Title 47, Part 15, Subpart C section 15.247 (e).

8.6 RF Band Edges

The RF band edges were taken at the start of the restricted bands (2390 MHz and 2483.5 MHz). The readings taken were also averaged by the EMI Receiver. Data sheets are included in Appendix E, which compares the reading from the EMI Receiver to the spec limit.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (d). The RF power at the restricted bands closest to the band edges at 2390 MHz and 2483.5 MHz meet the limits of section 15.209. Please see the data sheets located in Appendix E.

9. CONCLUSIONS

The Airborne WLN-B Module Model: ABDB-AN-DPxxx meets all of the specification limits defined in FCC Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.207, 15.209, and 15.247.



APPENDIX A

LABORATORY RECOGNITIONS

Brea Division
114 Olinda Drive
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(714) 579-0500

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Lake Forest Division
20621 Pascal Way
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LABORATORY RECOGNITIONS

Compatible Electronics has the following agency accreditations:

National Voluntary Laboratory Accreditation Program - Lab Code: 200528-0

Voluntary Control Council for Interference - Registration Numbers: R-983, C-1026, R-984 and C-1027

Bureau of Standards and Metrology Inspection - Reference Number: SL2-IN-E-1031

Conformity Assessment Body for the EMC Directive Under the US/EU MRA Appointed by NIST

Compatible Electronics is recognized or on file with the following agencies:

Federal Communications Commission

Industry Canada

Radio-Frequency Technologies (Competent Body)

APPENDIX B

MODIFICATIONS TO THE EUT

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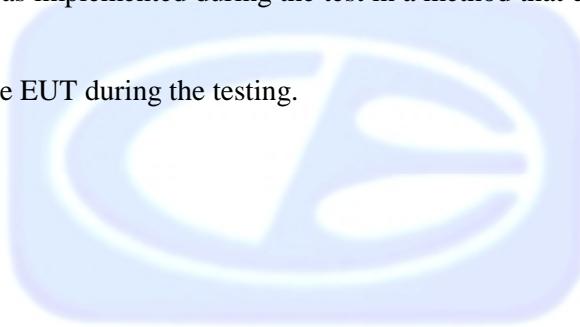
Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400

MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC Subpart B and Subpart C specifications.

All the rework described below was implemented during the test in a method that could be reproduced in all the units by the manufacturer.

No modifications were made to the EUT during the testing.



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APPENDIX C

ADDITIONAL MODELS COVERED UNDER THIS REPORT

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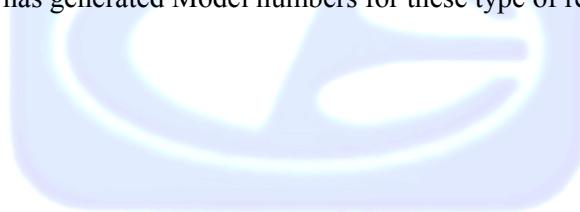
ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

Airborne WLN-B Module
Model: ABDB-AN-DPxxx
S/N: Prototype

The xxx can be anything from 000 to 999 and represents different configurations.

The xxx would be used to note specific configurations. Configurations would include different firmware version that provide different functionality. The hardware would not be changed. The firmware differences would include the application code that specific customers have locked down since they have conducted their DVT and do not want a new version. Other firmware version would include support of different interfaces (Serial, SPI, Ethernet, etc.). Yet other models would include the use of the standard skirt (plastic fixture for both boards) or the high vibration version of the skirt. Our marketing group has generated Model numbers for these type of reasons.



APPENDIX D

DIAGRAMS, CHARTS, AND PHOTOS

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FIGURE 1: CONDUCTED EMISSIONS TEST SETUP

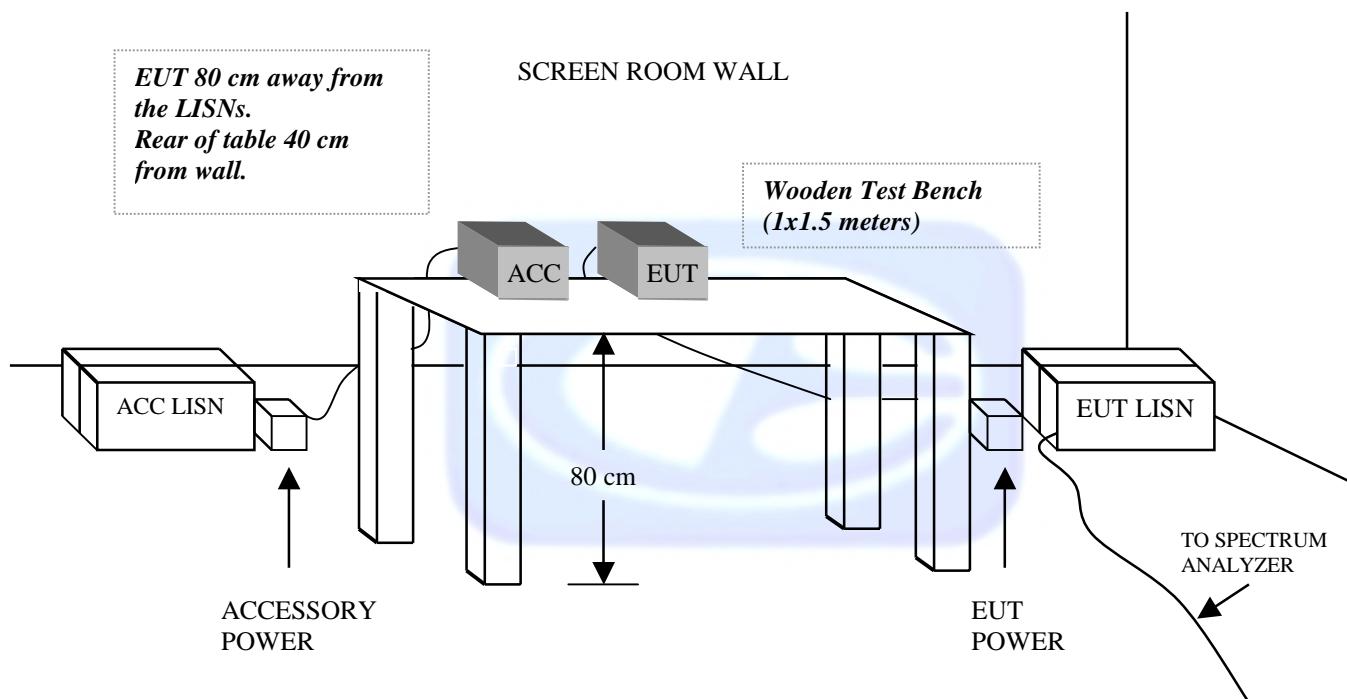
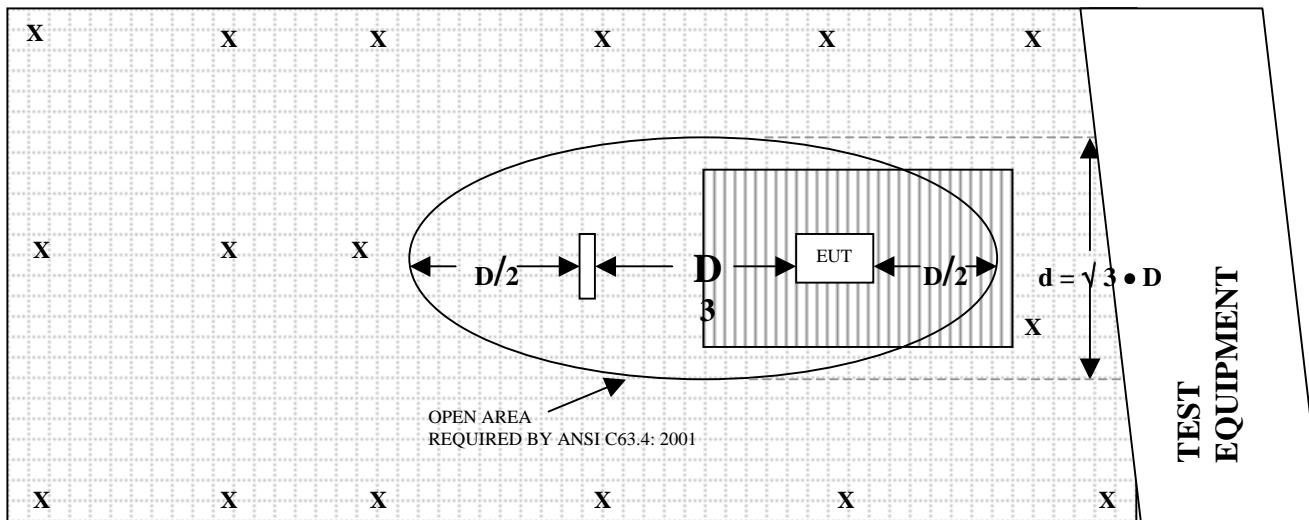
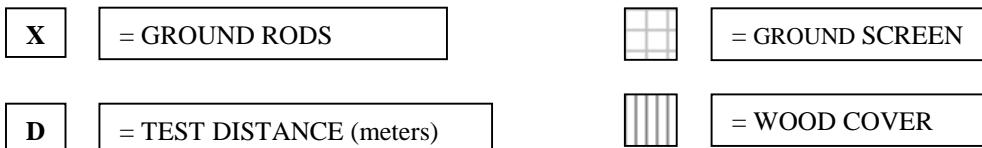


FIGURE 2: PLOT MAP AND LAYOUT OF 3 METER RADIATED SITE

OPEN LAND > 15 METERS



OPEN LAND > 15 METERS





FRONT VIEW

DPAC TECHNOLOGIES
AIRBORNE WLN-B MODULE

MODEL: ABDB-AN-DPxxx

FCC SUBPART B and C - RADIATED EMISSIONS – SWIVEL ANTENNA

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

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**REAR VIEW**

DPAC TECHNOLOGIES
AIRBORNE WLN-B MODULE
MODEL: ABDB-AN-DPxxx

FCC SUBPART B and C - RADIATED EMISSIONS – SWIVEL ANTENNA

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**

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**FRONT VIEW**

DPAC TECHNOLOGIES
AIRBORNE WLN-B MODULE
MODEL: ABDB-AN-DPxxx

FCC SUBPART B and C - RADIATED EMISSIONS – SWIVEL ANTENNA

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**

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REAR VIEW

DPAC TECHNOLOGIES
AIRBORNE WLN-B MODULE
MODEL: ABDB-AN-DPxxx

FCC SUBPART B and C - RADIATED EMISSIONS – SWIVEL ANTENNA

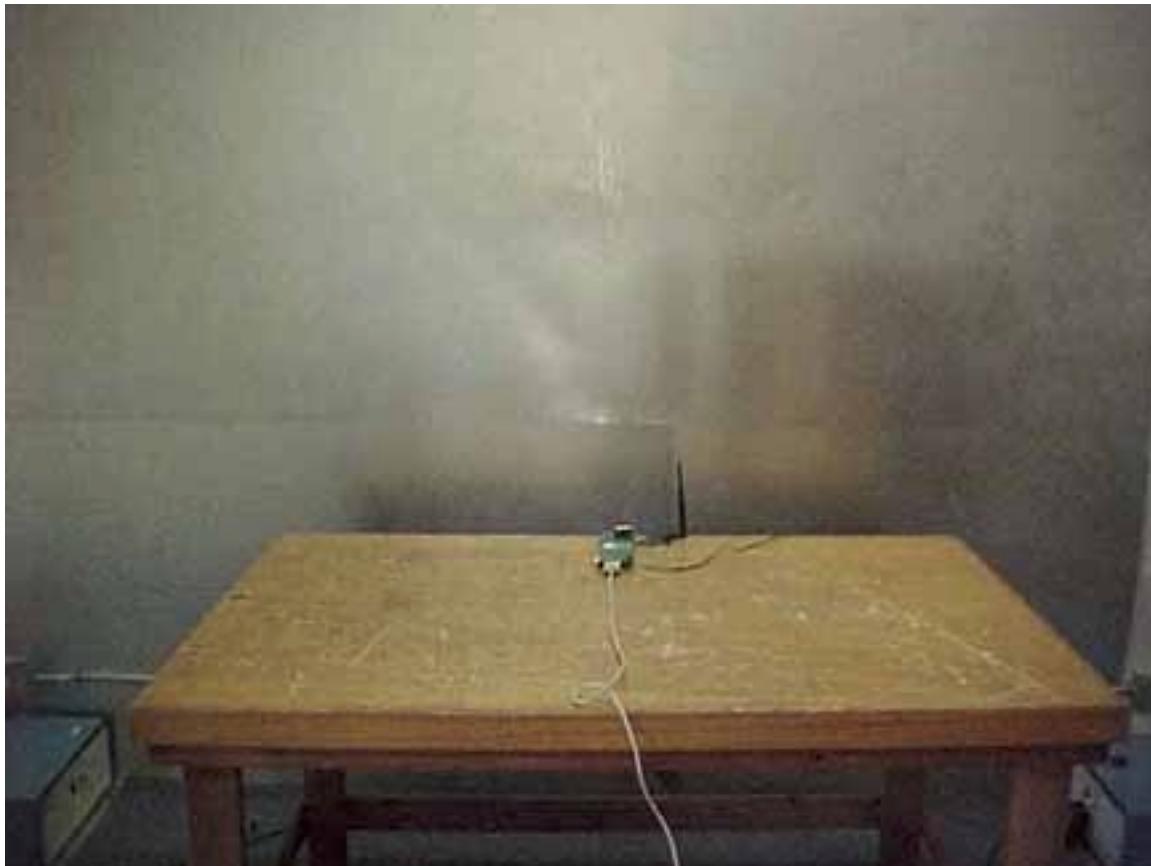
PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

Brea Division
114 Olinda Drive
Brea, CA 92823
(714) 579-0500

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400



FRONT VIEW

DPAC TECHNOLOGIES
AIRBORNE WLN-B MODULE
MODEL: ABDB-AN-DPxxx

FCC SUBPART B and C - CONDUCTED EMISSIONS – SWIVEL ANTENNA

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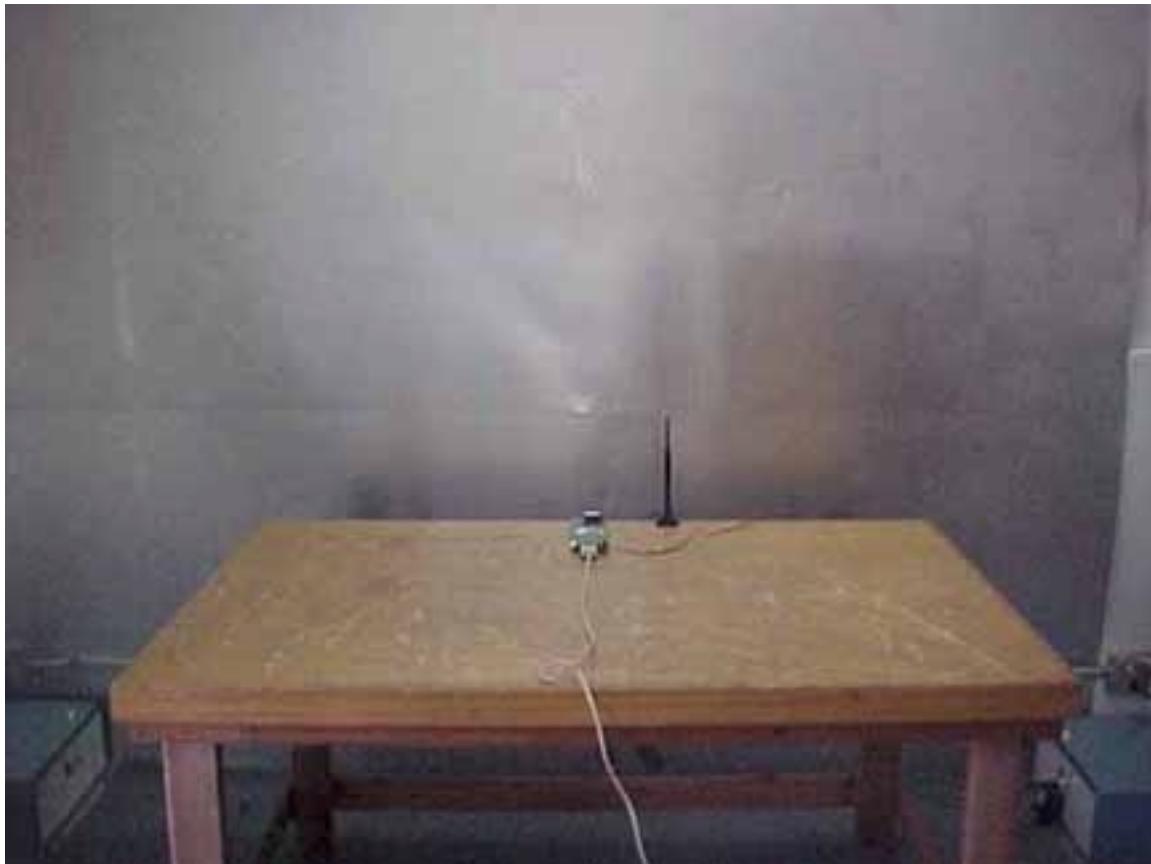
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COM-POWER AB-100
BICONICAL ANTENNA
S/N: 1548
CALIBRATION DATE: SEPTEMBER 29, 2004

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	13.87	140	12.02
35	12.48	150	11.70
40	12.66	160	13.55
45	12.49	175	14.36
50	12.47	180	14.67
60	10.30	200	14.95
70	8.26	250	16.86
80	7.94	275	18.16
90	8.36	287.5	23.23
100	8.73	295	19.10
120	11.06	300	19.70
125	10.64		

COM-POWER AL-100**LOG PERIODIC ANTENNA****S/N: 16060****CALIBRATION DATE: SEPTEMBER 27, 2004**

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
300	12.30	700	19.20
400	14.10	800	21.30
500	15.20	900	21.90
600	15.90	1000	25.20

COM-POWER PA-102

PREAMPLIFIER

S/N: 1017

CALIBRATION DATE: JANUARY 5, 2005

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	38.4	300	38.5
40	38.3	350	38.5
50	38.2	400	38.3
60	38.4	450	38.0
70	38.4	500	38.0
80	38.3	550	38.1
90	38.3	600	38.2
100	37.7	650	37.8
125	38.4	700	37.9
150	38.6	750	37.5
175	38.4	800	37.2
200	38.5	850	37.6
225	38.	900	36.9
250	38.6	950	37.0
275	38.4	1000	36.3

COM-POWER PA-122
MICROWAVE PREAMPLIFIER
S/N: 25195
CALIBRATION DATE: FEBRUARY 25, 2005

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	31.45	6.0	31.35
1.1	31.34	6.5	31.10
1.2	31.29	7.0	30.54
1.3	31.28	7.5	29.72
1.4	31.25	8.0	29.22
1.5	31.21	8.5	28.75
1.6	31.14	9.0	28.67
1.7	31.07	9.5	29.14
1.8	31.12	10.0	30.12
1.9	31.04	11.0	29.30
2.0	31.20	12.0	29.86
2.5	31.56	13.0	30.57
3.0	32.17	14.0	29.90
3.5	32.56	15.0	30.14
4.0	32.51	16.0	31.13
4.5	32.52	17.0	29.97
5.0	32.33	18.0	28.77
5.5	31.60		

COM-POWER PA-840

MICROWAVE PREAMPLIFIER

S/N: 711013

CALIBRATION DATE: FEBRUARY 25, 2005

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
18.0	27.193	29.5	28.341
18.5	26.721	30.0	28.166
19.0	25.938	30.5	28.259
19.5	25.678	31.0	27.227
20.0	25.192	31.5	27.134
20.5	24.643	32.0	27.349
21.0	23.898	32.5	26.701
21.5	24.261	33.0	26.965
22.0	24.544	33.5	27.326
22.5	24.984	34.0	26.536
23.0	25.008	34.5	26.753
23.5	25.268	35.0	26.133
24.0	25.697	35.5	25.759
24.5	26.304	36.0	25.538
25.0	26.716	36.5	26.126
25.5	26.939	37.0	26.719
26.0	27.009	37.5	26.713
26.5	27.299	38.0	26.035
27.0	27.931	38.5	24.438
27.5	27.516	39.0	24.013
28.0	27.402	39.5	23.474
28.5	27.457	40.0	24.467
29.0	27.926		

ANTENNA RESEARCH DRG-118/A

HORN ANTENNA

S/N: 1053

CALIBRATION DATE: JANUARY 16, 2004

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	24.4	10.0	38.7
1.5	25.2	10.5	39.0
2.0	28.2	11.0	38.9
2.5	28.5	11.5	41.3
3.0	30.1	12.0	40.5
3.5	31.0	12.5	40.0
4.0	31.2	13.0	40.2
4.5	31.9	13.5	40.5
5.0	33.2	14.0	41.6
5.5	33.7	14.5	44.8
6.0	34.3	15.0	41.4
6.5	35.0	15.5	39.2
7.0	36.7	16.0	39.4
7.5	37.3	16.5	40.9
8.0	37.1	17.0	42.6
8.5	37.3	17.5	45.1
9.0	37.7	18.0	41.7
9.5	38.6		

COM-POWER AL-130
LOOP ANTENNA
S/N: 17089
CALIBRATION DATE: SEPTEMBER 3, 2004

FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)
0.009	-40.8	10.7
0.01	-40.9	10.6
0.02	-41.8	9.7
0.05	-42.0	9.5
0.07	-41.5	10.0
0.1	-41.7	9.8
0.2	-44.1	7.4
0.3	-41.6	9.9
0.5	-41.5	10.0
0.7	-41.4	10.1
1	-41.0	10.5
2	-40.6	10.9
3	-40.8	10.7
4	-41.0	10.5
5	-40.4	11.1
10	-40.7	10.8
15	-41.6	9.9
20	-41.3	10.2
25	-43.0	8.5
30	-42.6	8.9

COM-POWER AH826
HORN ANTENNA
S/N: 0071957
CALIBRATION DATE: NOVEMBER 05, 2003

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
18.0	33.3	22.5	32.9
18.5	32.9	23.0	33.0
19.0	32.7	23.5	33.6
19.5	32.6	24.0	33.6
20.0	32.7	24.5	33.5
20.5	33.0	25.0	33.5
21.0	33.0	25.5	33.7
21.5	33.2	26.0	34.1
22.0	32.9	26.5	34.5