Test Certificate

A sample of the following product received on May 11, 2011 and tested on December 21, 2011 complied with the requirements of,

- **EN 55022:2010, "Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement" (Class B)**

given the measurement uncertainties detailed in Elliott report R86776.

Summit Data Communications
Model SDC-WB40NBT

Mark E Hill
Staff Engineer

_____
Summit Data Communications

_____
Printed Name

Testing Cert #0214.26

Elliott Laboratories, LLC an NTS Company 41039 Boyce Road 510-578-3500 Phone
www.elliottlabs.com Fremont, CA. 94538 510-440-9525 Fax

EMC Test Report

Class B Information Technology Equipment

EN 55022:2010

Model: SDC-WB40NBT

COMPANY:	Summit Data Communications 526 South Main St. Suite 805 Akron, OH 44311
TEST SITE(S):	Elliott Laboratories 41039 Boyce Road Fremont, CA. 94538-2435
REPORT DATE:	March 14, 2012
FINAL TEST DATES:	December 21, 2011
TOTAL NUMBER OF PAGES:	25

PROGRAM MGR /
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ACCREDITED
Testing Cert #0214.26

REVISION HISTORY

Rev#	Date	Comments	Modified By
-	3-14-2012	First release	

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SCOPE

Governments and standards organizations around the world have published requirements regarding the electromagnetic compatibility (EMC) of electronic equipment. Testing has been performed on the Summit Data Communications model SDC-WB40NBT, pursuant to the following standards.

Standard	Title	Standard Date
EN 55022	Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement	2010

All measurements and evaluations have been in accordance with these specifications, test procedures, and measurement guidelines as outlined in Elliott Laboratories test procedures, and in accordance with the standards referenced therein (refer to Appendix E).

OBJECTIVE

The objective of Summit Data Communications is to declare conformity with the essential requirements of the EMC directive 2004/108/EC using the harmonized standard(s) referenced in this report;

STATEMENT OF COMPLIANCE

The tested sample of Summit Data Communications model SDC-WB40NBT complied with the requirements of:

Standard/Regulation	Equipment Type/Class	Standard Date
EN 55022	Class B	2010

The test results recorded herein are based on a single type test of the Summit Data Communications model SDC-WB40NBT and therefore apply only to the tested sample(s). The sample was selected and prepared by Ron Seide of Summit Data Communications.

Maintenance of compliance is the responsibility of the company. Any modification of the product that could result in increased emissions or susceptibility should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different enclosure, different line filter or power supply, harnessing and/or interface cable changes, etc.).

DEVIATIONS FROM THE STANDARDS

No deviations were made from the published requirements listed in the scope of this report.

INFORMATION TECHNOLOGY EQUIPMENT EMISSIONS TEST RESULTS

The following emissions tests were performed on the Summit Data Communications model SDC-WB40NBT. The measurements were extracted from the data recorded during testing and represent the highest amplitude emissions relative to the specification limits. The complete test data is provided in the appendices of this report.

CONDUCTED EMISSIONS (MAINS PORT)

Testing was not performed as the EUT is a radio module and is powered directly from the host.

CONDUCTED EMISSIONS (TELECOMMUNICATIONS PORTS)

Testing was not performed as the EUT does not have any telecommunication ports

RADIATED EMISSIONS

Frequency Range	Standard/Section	Requirement	Measurement	Margin	Status
30-1000 MHz	EN 55022 Table 6 Class B	30-230 MHz, 30 dBµV/m 230-1000 MHz, 37 dBµV/m (10 m limit)	22.0 dBµV/m @264.20 MHz	-15.0 dB	Complied
Note 1 Radiated emissions testing above 1 GHz was not required because the highest frequency of the internal sources of the EUT was declared to be less than 108 MHz.					

MEASUREMENT UNCERTAINTIES

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below were calculated using the approach described in CISPR 16-4-2:2003 using a coverage factor of k=2, which gives a level of confidence of approximately 95%. The levels were found to be below levels of *U*cispr and therefore no adjustment of the data for measurement uncertainty is required.

Measurement Type	Measurement Unit	Frequency Range	Expanded Uncertainty
Conducted Emissions	dBuV or dBuA	150 kHz – 30 MHz	± 2.2 dB
Radiated Electric Field	dBuV/m	30 – 1000 MHz	± 3.6 dB
		1000 – 40,000 MHz	± 6.0 dB

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Summit Data Communications model SDC-WB40NBT is an 802.11abgn 1x1 with Bluetooth 2.1 module.

The sample was received on May 11, 2011 and tested on December 21, 2011. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Summit Data Communication	SDC-MSD40NBT	802.11abgn (1x1) + BT2.1 radio module	-	TWG-SDCWB40NBT

ENCLOSURE

The EUT does not have an enclosure as it is designed to be installed within the enclosure of a host computer or system.

MODIFICATIONS

No modifications were made to the EUT during the time the product was at Elliott.

SUPPORT EQUIPMENT

The following equipment was used as local support equipment for testing:

Company	Model	Description	Serial Number	FCC ID
-	-	DC Battery pack	-	-

No remote support equipment was used during testing.

EUT INTERFACE PORTS

The I/O cabling configuration during testing was as follows:

Port		Cable(s)		
From	To	Description	Shielded/Unshielded	Length(m)
DC input	DC Battery Pack	2wire	Unshielded	1
Port 0	Antenna	Single wire	Unshielded	0.2
Port 1	Antenna	Single wire	Unshielded	0.2

EUT OPERATION

During emissions testing the EUT was configured to transmit continuously on the noted channel and modulation.

EMISSIONS TESTING

RADIATED AND CONDUCTED EMISSIONS

Final test measurements were taken at the Elliott Laboratories Anechoic Chamber listed below. The test sites contain separate areas for radiated and conducted emissions testing. The sites conform to the requirements of ANSI C63.4: 2003 *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* and CISPR 16-1-4:2007 - *Specification for radio disturbance and immunity measuring apparatus and methods Part 1-4: Radio disturbance and immunity measuring apparatus Ancillary equipment Radiated disturbances*. They are registered with the VCCI and are on file with the FCC and Industry Canada.

Site	Registration Numbers			Location
	VCCI	FCC	Canada	
Chamber 4	R-1684 G-57 C-1796 T-1640	211948	IC 2845B-4	41039 Boyce Road Fremont, CA 94538-2435

RADIATED EMISSIONS CONSIDERATIONS

Radiated emissions measurements were made with the EUT powered from a supply voltage within the expected tolerances of each nominal operating voltage/frequency for each geographical regions covered by the scope of the standards referenced in this report.

EMISSIONS MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1-1:2006 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 7 GHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000 MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz.

INSTRUMENT CONTROL COMPUTER

Measurements are converted to the field strength at an antenna or voltage developed at the LISN (or ISN) measurement port, which is then compared directly with the appropriate specification limit under software control of the test receivers and spectrum analyzers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high-amplitude transient events.

ANTENNAS

A bilog antenna or combination of biconical and log periodic antennas are used to cover the range from 30 MHz to 1000 MHz. Narrowband tuned dipole antennas may be used over the entire 30 to 1000 MHz frequency range for precision measurements of field strength. Above 1000 MHz, horn antennas are used. The antenna calibration factors are included in site factors that are programmed into the test receivers or data collection software.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor drive to vary the antenna height.

ANSI C63.4, CISPR 22 and KN22 specify that the test height above ground for table-mounted devices shall be 80 centimeters. Floor-mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material up to 12-mm thick if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the company's specifications. An appendix of this report contains the list of test equipment used and calibration information.

EMISSIONS TEST PROCEDURES

EUT AND CABLE PLACEMENT

The standards require that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4, CISPR 22 and KN22, and the worst-case orientation is used for final measurements.

RADIATED EMISSIONS (SEMI-ANECHOIC and/or OATS TEST ENVIRONMENT)

Radiated emissions measurements in a semi-anechoic environment are performed in two phases (preliminary scan and final maximization).

Preliminary Scan

A preliminary scan of emissions is conducted in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed from 30 MHz up to the frequency required by the regulations specified on page 1. One or more of these are performed with the antenna polarized vertically and one or more of these are performed with the antenna polarized horizontally. During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied and cable positions are varied to determine the highest emission relative to the limit. A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions if required. Other methods used during the preliminary scan for EUT emissions involve scanning with near-field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final Maximization

During final maximization, the highest-amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth that results in the highest emission is then maintained while varying the antenna height from one to four meters. The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain. Emissions that have values close to the specification limit may also be measured with a tuned dipole antenna to determine compliance.

SAMPLE CALCULATIONS

SAMPLE CALCULATIONS - RADIATED EMISSIONS

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements. A distance factor, when used for electric field measurements, is calculated by using the following formula:

$$F_d = 20*LOG_{10} (D_m/D_s)$$

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = Specification Distance in meters

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_c = Corrected Reading in dBuV/m

L_s = Specification Limit in dBuV/m

M = Margin in dB Relative to Spec

Appendix A Test Equipment Calibration Data

Radiated Emissions, 30 - 1,000 MHz, 22-Dec-11

Manufacturer	Description	Model	Asset #	Cal Due
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	12/6/2012
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1548	6/24/2012
Hewlett Packard	Preamplifier, 100 kHz - 1.3 GHz	8447D OPT 010	1826	5/17/2012

Appendix B Test Data

T83198 Pages 16 - 21

Client:	Summit Data Communications	Job Number:	J78403
Model:	SDC-WB40 and SDC-MSD40NBT (1x1 802.11abg + BT 2.1)	T-Log Number:	T83198
		Account Manager:	Christine Krebill
Contact:	Ron Seide		-
Emissions Standard(s):	EN 301 489-1 V1.8.1/ FCC Part 15B	Class:	B
Immunity Standard(s):	EN 301 489-1 V1.8.1	Environment:	-

EMC Test Data

For The

Summit Data Communications

Model

SDC-WB40 and SDC-MSD40NBT (1x1 802.11abg + BT 2.1)

Date of Last Test: 12/16/2011

Client:	Summit Data Communications	Job Number:	J78403
Model:	SDC-WB40 and SDC-MSD40NBT (1x1 802.11abg + BT 2.1)	T-Log Number:	T83198
		Account Manager:	Christine Krebill
Contact:	Ron Seide		
Standard:	EN 301 489-1 V1.8.1/ FCC Part 15B	Class:	B

Radiated Emissions

(Elliott Laboratories Fremont Facility, Semi-Anechoic Chamber)

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 12/21/2011
Test Engineer: Rafael Varelas
Test Location: Fremont Chamber #4
Config. Used: 3
Config Change: None
EUT Voltage: 3.3Vdc

General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing.

The test distance and extrapolation factor (if applicable) are detailed under each run description.

Note, preliminary testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. Maximized testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 21.4 °C
Rel. Humidity: 35 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
	Radiated Emissions 30 - 1000 MHz, Maximized	EN55022 Class B	Pass	22.0dBµV/m @ 264.20MHz (-15.0dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

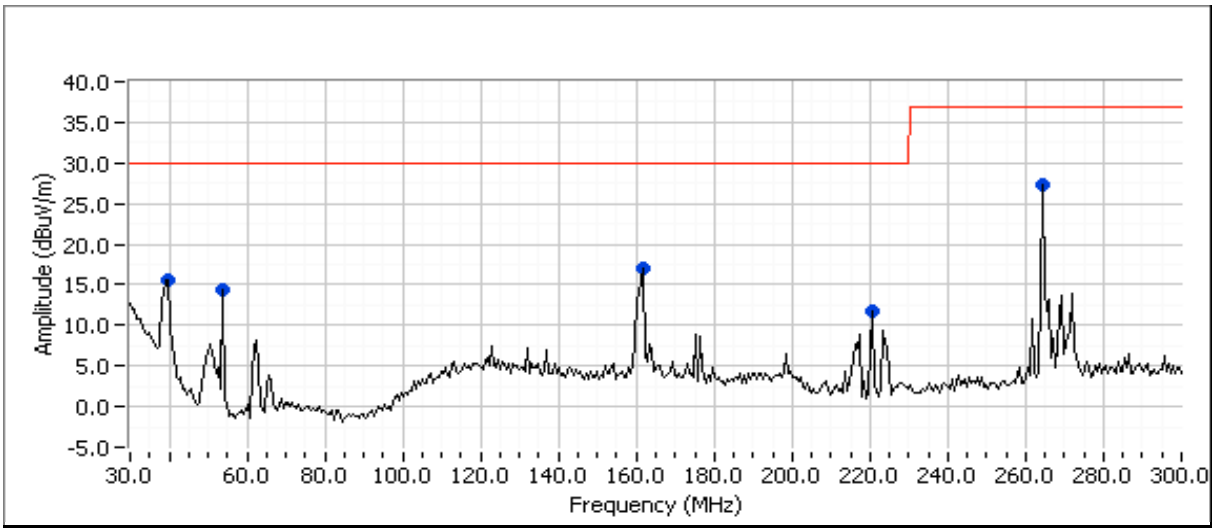
Deviations From The Standard

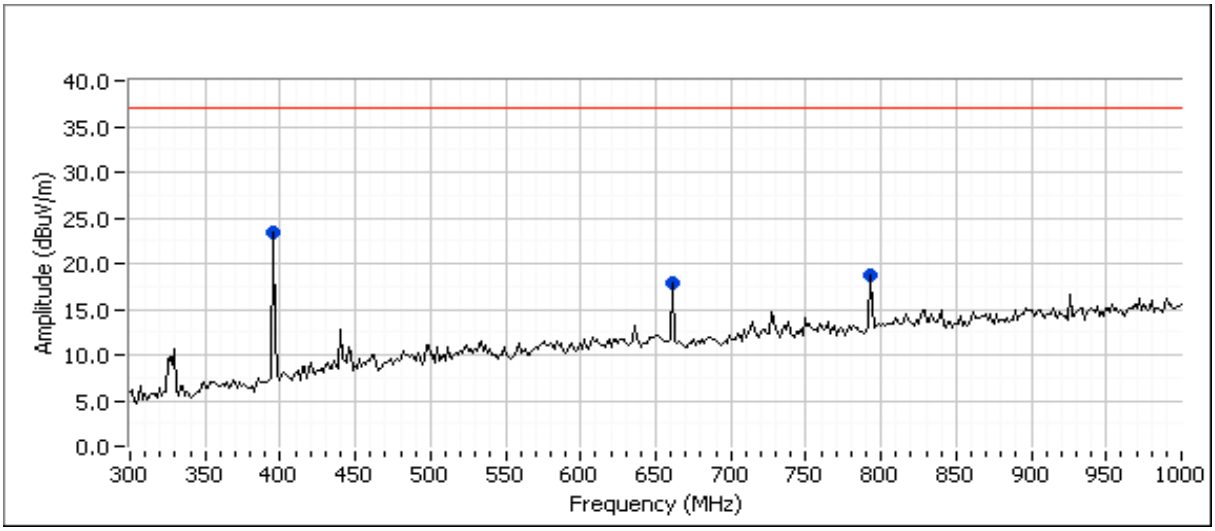
No deviations were made from the requirements of the standard.

Client:	Summit Data Communications	Job Number:	J78403
Model:	SDC-WB40 and SDC-MSD40NBT (1x1 802.11abg + BT 2.1)	T-Log Number:	T83198
		Account Manager:	Christine Krebill
Contact:	Ron Seide		
Standard:	EN 301 489-1 V1.8.1/ FCC Part 15B	Class:	B

Run #1: Preliminary Radiated Emissions, 30 - 1000 MHz

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 1000 MHz	5	10	-6.0





Client:	Summit Data Communications	Job Number:	J78403
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		Account Manager:	Christine Krebill
Contact:	Ron Seide		
Standard:	EN 301 489-1 V1.8.1/ FCC Part 15B	Class:	B

Preliminary peak readings captured during pre-scan

Frequency	Level	Pol	EN55022 Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
39.160	15.6	V	30.0	-14.4	Peak	158	1.0	
52.342	14.4	V	30.0	-15.6	Peak	11	2.0	
163.050	17.0	V	30.0	-13.0	Peak	316	1.0	
220.169	11.8	V	30.0	-18.2	Peak	227	1.0	
264.202	27.4	V	37.0	-9.6	Peak	95	2.0	
398.543	23.4	H	37.0	-13.6	Peak	267	2.0	
661.297	17.8	V	37.0	-19.2	Peak	332	1.0	
792.591	18.8	H	37.0	-18.2	Peak	282	2.0	

Preliminary quasi-peak readings (no manipulation of EUT interface cables)

Frequency	Level	Pol	EN55022 Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
52.342	-3.2	V	30.0	-33.2	QP	12	1.0	random spike
264.202	22.0	V	37.0	-15.0	QP	111	1.0	QP (1.00s)
39.160	7.4	V	30.0	-22.6	QP	159	1.0	QP (1.00s)
220.169	9.8	V	30.0	-20.2	QP	235	1.0	QP (1.00s)
398.543	3.5	H	37.0	-33.5	QP	253	1.4	QP (1.00s)
792.591	19.8	H	37.0	-17.2	QP	279	1.8	QP (1.00s)
163.050	0.6	V	30.0	-29.4	QP	317	1.0	random spike
661.297	7.5	V	37.0	-29.5	QP	339	1.8	QP (1.00s)

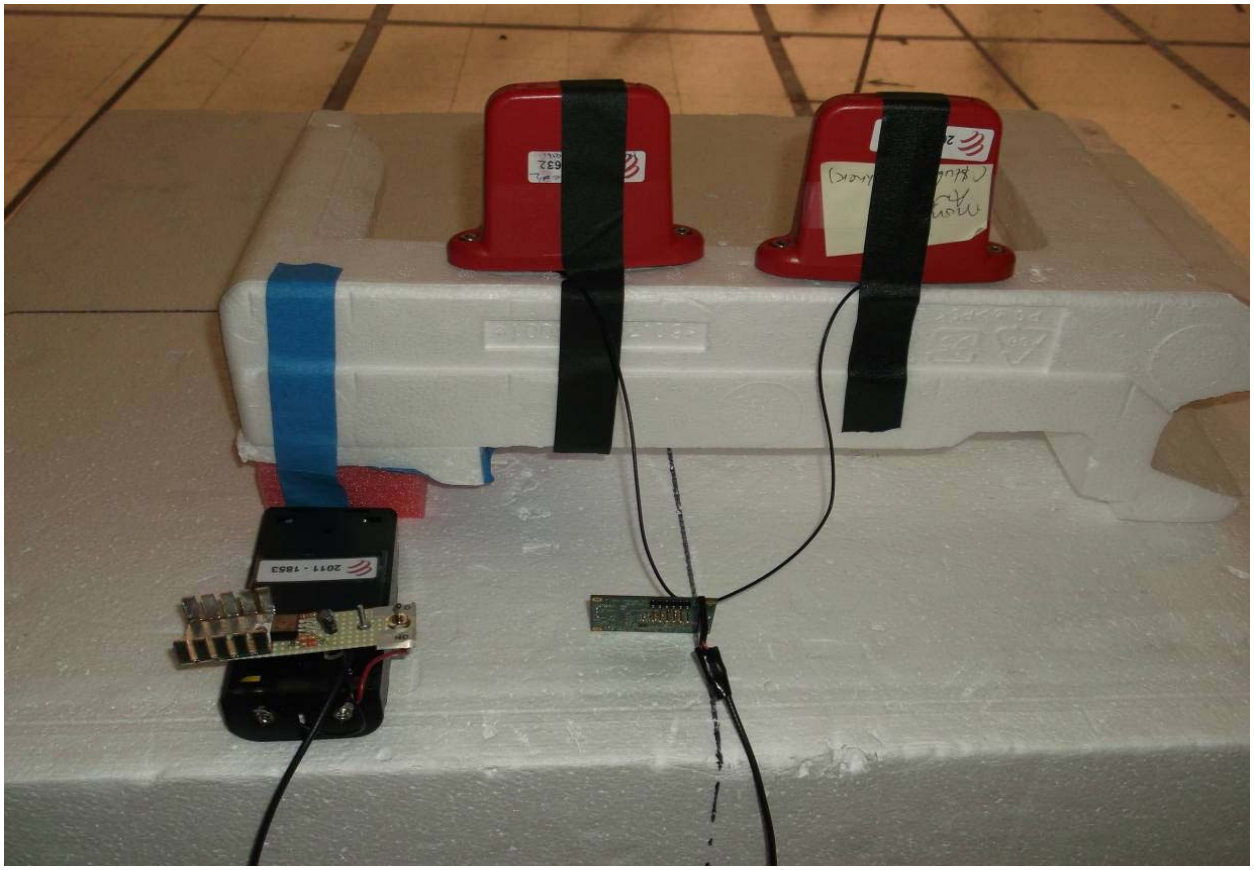
Run #2: Maximized Readings From Run #1

Maximized quasi-peak readings (includes manipulation of EUT interface cables)

Frequency	Level	Pol	EN55022 Class B		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
264.202	22.0	V	37.0	-15.0	QP	111	1.0	QP (1.00s)
792.591	19.8	H	37.0	-17.2	QP	279	1.8	QP (1.00s)
220.169	9.8	V	30.0	-20.2	QP	235	1.0	QP (1.00s)
39.160	7.4	V	30.0	-22.6	QP	159	1.0	QP (1.00s)
661.297	7.5	V	37.0	-29.5	QP	339	1.8	QP (1.00s)
398.543	3.5	H	37.0	-33.5	QP	253	1.4	QP (1.00s)

Client:	Summit Data Communications	Job Number:	J78403
Model:	SDC-WB40 and SDC-MSD40NBT (1x1 802.11abg + BT 2.1)	T-Log Number:	T83198
		Account Manager:	Christine Krebill
Contact:	Ron Seide		
Standard:	EN 301 489-1 V1.8.1/ FCC Part 15B	Class:	B

Test Configuration Photograph #1
(Radiated Emissions)



Client:	Summit Data Communications	Job Number:	J78403
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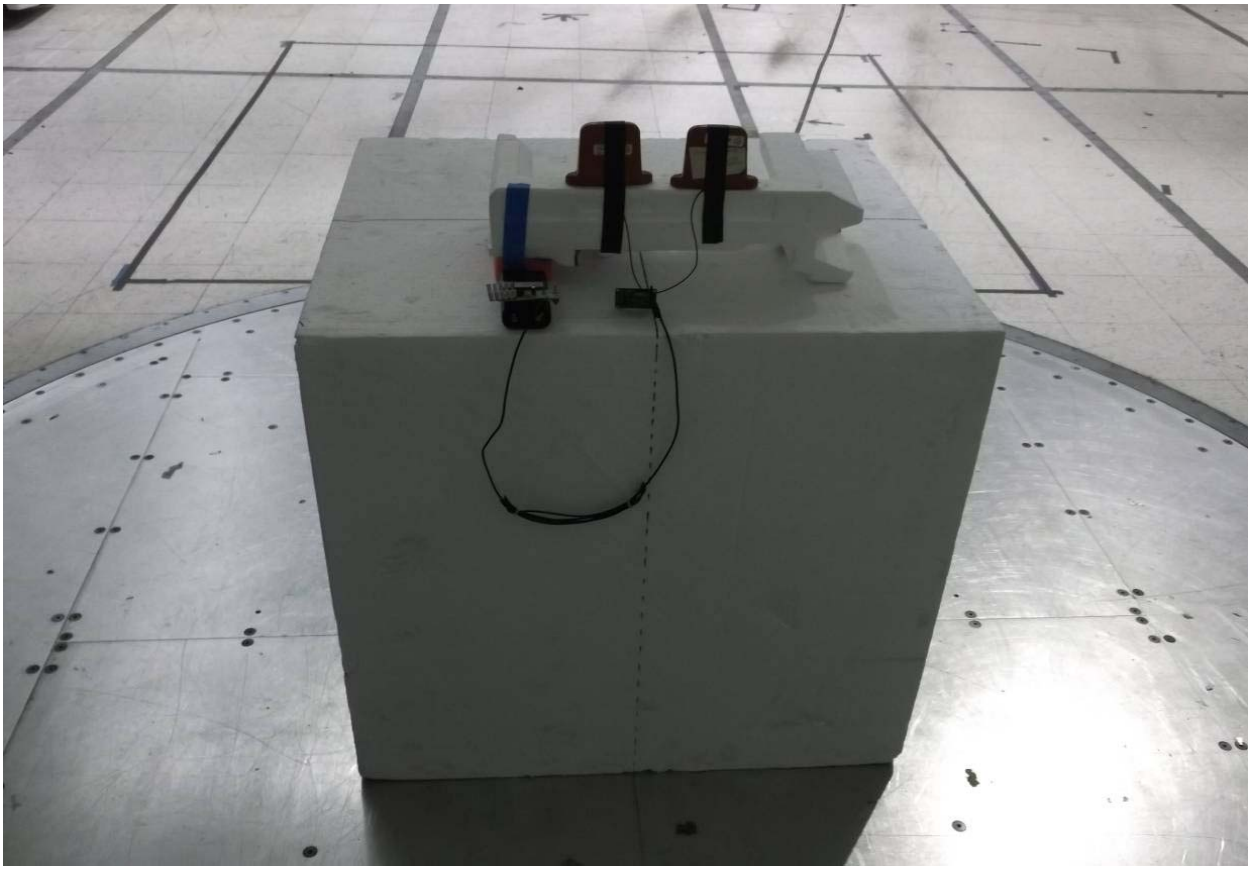
		Account Manager:	Christine Krebill
Contact:	Ron Seide		
Standard:	EN 301 489-1 V1.8.1/ FCC Part 15B	Class:	B

Test Configuration Photograph #2
(Radiated Emissions)



Appendix C Product Labeling Requirements

The following information has been provided to clarify notification, equipment labeling requirements and information that must be included in the operator's manual. These requirements may be found in the standards/regulations listed in the scope of this report.

Label Location

The required label(s) must be in a *conspicuous location* on the product, which is defined as any location readily visible to the user of the device without the use of tools.

Label Attachment

The label(s) must be *permanently attached* to the product, which is defined as attached such that it can normally be expected to remain fastened to the equipment during the equipment's expected useful life. A paper gum label will generally not meet this condition.

Appendix D User Manual Regulatory Statements

Where special accessories, such as shielded cables, are required in order to meet the emission limits, appropriate instructions regarding the need to use such accessories must be contained on the first page of text concerned with the installation of the device in the operator's manual.

A requirement by FCC regulations, and recommended for all regulatory markets, is a cautionary statement to the end user that changes or modifications to the device not expressly approved by you, the manufacturer, could void their right to operate the equipment.

Appendix E Basic and Reference Standards

EN 55022:2010

EN 55022:2010 references various international and European standards to be used when making the required measurements. The references all cite dated versions of the standards, therefore the editions cited are used.

International and EN equivalent standard	Description	Standard Used
CISPR 16-1-1 2007 +A1:2007 EN 55016-1-1 2007 +A1:2007	Specification for radio disturbance and immunity measuring apparatus and methods Part 1-1: Radio disturbance and immunity measuring apparatus - Measuring apparatus	CISPR 16-1-1 2007 +A1:2007
CISPR 16-1-2 2003 + A1 2004 EN 55016-1-2 2004 + A1 2005	Specification for radio disturbance and immunity measuring apparatus and methods Part 1-2: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Conducted disturbances	CISPR 16-1-2 2003 + A1 2004
CISPR 16-1-4:2007 EN 55016-1-4: 2007	Specification for radio disturbance and immunity measuring apparatus and methods Part 1-4: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Radiated disturbances	CISPR 16-1-4:2007
CISPR 16-2-3:2003 +A1:2005 EN 55016-2-3:2004 +A1:2005	Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-3: Methods of measurement of disturbances and immunity – Radiated disturbance measurements	CISPR 16-2-3:2003 +A1:2005
CISPR 16-4-2 2003 EN 55016-4-2 2004	Specification for radio disturbance and immunity measuring apparatus and methods Part 4-2: Uncertainties, statistics and limit modelling - Uncertainty in EMC measurements	CISPR 16-4-2 2003
Unless the international publication has been modified by common modifications, indicated by ***(mod)***, either the intentional or the EN standard may be used. Where the EN standard differs from the intentional standard then the EN version is used. For all of the standards listed above there are no common modifications therefore Elliott makes use of the international version of all standards listed.		

End of Report

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marks the last page of this test report.