Structus Building Technologies

TEST REPORT FOR

AutoPRO
Model: 21000

Tested To The Following Standards:

FCC Part 15 Subpart C Section(s)
15.207 and 15.225

Report No.: 96012-6

Date of issue: August 29, 2014

ACCREDITED
Testing Certificates:
803.01, 803.02, 803.05, 803.06

This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of EMC testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Structus Building Technologies
20870 Redside Court
Bend, OR 97701

REPRESENTATIVE: Mike House
Customer Reference Number: MH000131

REPORT PREPARED BY:

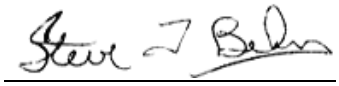
Morgan Tramontin
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 96012

DATE OF EQUIPMENT RECEIPT: August 5, 2014
DATE(S) OF TESTING: August 5, 2014

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.



Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information

Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
22116 23rd Drive S.E., Suite A
Bothell, WA 98021-4413

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.00.14
Immunity	5.00.07

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Bothell	US0081	SL2-IN-E-1145R	3082C-1	318736	A-0148

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C

Test Procedure/Method	Description	Modifications*	Results
15.207 / ANSI C63.4	Conducted Emissions	NA	Pass
15.215(c)	Occupied Bandwidth	NA	Pass
15.225(a)(b)(c) / ANSI C63.4	Fundamental Field Strength Emissions	NA	Pass
15.225(d) / ANSI C63.4	Field Strength of Spurious Emissions	NA	Pass
15.225(e)	Frequency Tolerance & Voltage Variation	NA	Pass

Modifications*/Conditions During Testing

This list is a summary of the conditions noted for or modifications made to the equipment during testing.

Summary of Conditions
None

***Modifications listed above must be incorporated into all production units.**

EQUIPMENT UNDER TEST (EUT)

EQUIPMENT UNDER TEST

AutoPRO
Manuf: Structus Building Technologies
Model: 21000
Serial: 0101

PERIPHERAL DEVICES

The EUT was not tested with peripheral devices.

FCC PART 15 SUBPART C

This report contains EMC emissions test results under United States Federal Communications Commission (FCC) CFR 47 Section 15 Subpart C requirements for Intentional Radiators.

15.207 AC Conducted Emissions

Test Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **Structus Building Technologies**
Specification: **15.207 AC Mains - Average**
Work Order #: **96012** Date: 8/5/2014
Test Type: **Conducted Emissions** Time: 09:28:14
Equipment: **AutoPRO** Sequence#: 1
Manufacturer: Structus Building Technologies Tested By: Steven Pittsford
Model: 21000 120V 60Hz
S/N: 0101

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP05435	Attenuator	PE7015-10	10/5/2012	10/5/2014
T2	ANP05305	Cable	ETSI-50T	2/20/2014	2/20/2016
T3	ANP06505	Cable	32026-29080-29080-84	10/18/2013	10/18/2015
T4	AN01492	50uH LISN-Line	3816/2NM	7/21/2013	7/21/2015
	AN01492	50uH LISN-Neutral	3816/2NM	7/21/2013	7/21/2015
	AN02673	Spectrum Analyzer	E4446A	10/4/2013	10/4/2015
T5	AN02611	High Pass Filter	HE9615-150K-50-720B	3/26/2014	3/26/2016

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
AutoPRO*	Structus Building Technologies	21000	0101

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

Temperature: 23°C
Pressure: 102.0kPa
Humidity: 39%
Frequency: 150k-30MHz

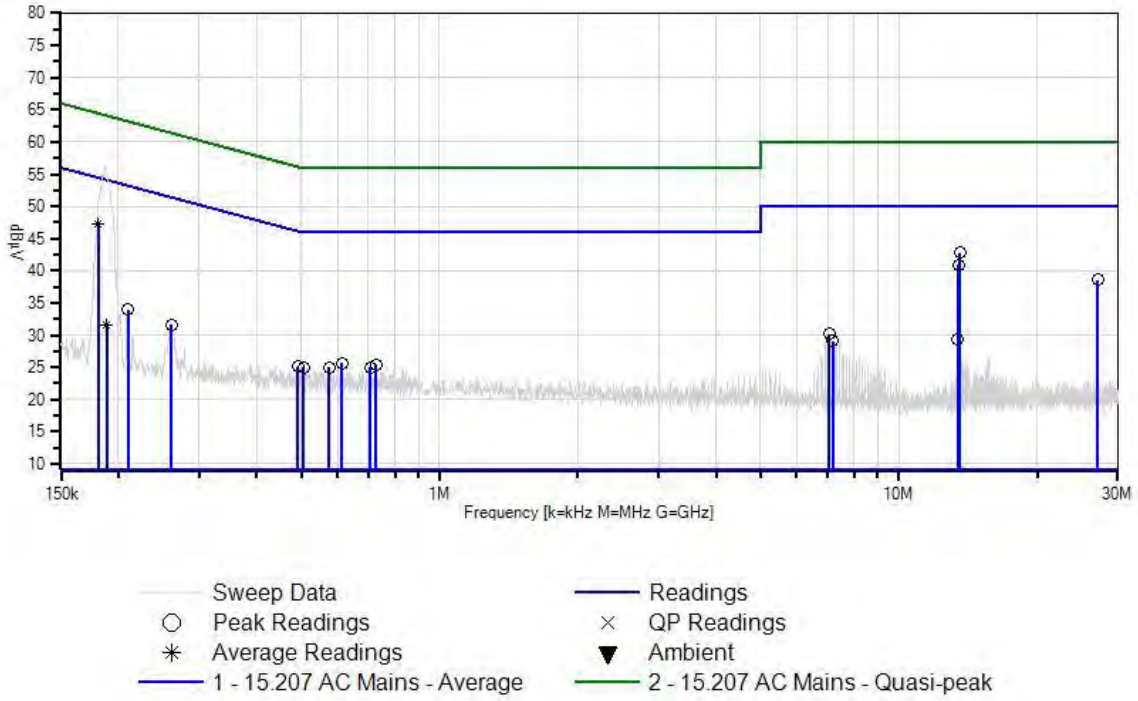
Mode:
EUT is constantly transmitting at 13.56MHz
AutoPRO software V1.3

Ext Attn: 0 dB

Measurement Data: Reading listed by margin. Test Lead: Line

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	13.580M	32.8	+9.0 +0.2	+0.1	+0.1	+0.6	+0.0	42.8	50.0	-7.2	Line
2	180.858k Ave	36.3	+9.0 +0.3	+0.0	+0.0	+1.6	+0.0	47.2	54.4	-7.2	Line
^	180.858k	44.6	+9.0 +0.3	+0.0	+0.0	+1.6	+0.0	55.5	54.4	+1.1	Line
4	13.508M	30.9	+9.0 +0.2	+0.1	+0.1	+0.6	+0.0	40.9	50.0	-9.1	Line
5	27.122M	28.0	+9.1 +0.2	+0.3	+0.2	+0.8	+0.0	38.6	50.0	-11.4	Line
6	209.631k	23.4	+9.0 +0.2	+0.0	+0.0	+1.3	+0.0	33.9	53.2	-19.3	Line
7	260.535k	21.4	+9.0 +0.2	+0.0	+0.0	+1.0	+0.0	31.6	51.4	-19.8	Line
8	7.049M	20.5	+9.0 +0.1	+0.1	+0.1	+0.4	+0.0	30.2	50.0	-19.8	Line
9	613.957k	16.0	+9.0 +0.2	+0.0	+0.0	+0.4	+0.0	25.6	46.0	-20.4	Line
10	728.129k	15.7	+9.0 +0.2	+0.1	+0.0	+0.4	+0.0	25.4	46.0	-20.6	Line
11	13.418M	19.5	+9.0 +0.1	+0.1	+0.1	+0.6	+0.0	29.4	50.0	-20.6	Line
12	7.175M	19.4	+9.0 +0.1	+0.1	+0.1	+0.4	+0.0	29.1	50.0	-20.9	Line
13	506.331k	15.3	+9.0 +0.2	+0.0	+0.0	+0.5	+0.0	25.0	46.0	-21.0	Line
14	492.514k	15.4	+9.0 +0.2	+0.0	+0.0	+0.5	+0.0	25.1	46.1	-21.0	Line
15	707.767k	15.3	+9.0 +0.2	+0.1	+0.0	+0.4	+0.0	25.0	46.0	-21.0	Line
16	576.143k	15.3	+9.0 +0.2	+0.0	+0.0	+0.5	+0.0	25.0	46.0	-21.0	Line
17	188.542k Ave	20.8	+9.0 +0.3	+0.0	+0.0	+1.5	+0.0	31.6	54.1	-22.5	Line
^	188.542k	45.3	+9.0 +0.3	+0.0	+0.0	+1.5	+0.0	56.1	54.1	+2.0	Line

CKC Laboratories, Inc. Date: 8/5/2014 Time: 09:28:14 Structus Building Technologies WO#: 96012
Test Lead: Line 120V 60Hz Sequence#: 1 Line
Structus Building Technologies AutoPRO P/N: 21000



Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **Structus Building Technologies**
Specification: **15.207 AC Mains - Average**
Work Order #: **96012** Date: 8/5/2014
Test Type: **Conducted Emissions** Time: 09:36:35
Equipment: **AutoPRO** Sequence#: 2
Manufacturer: Structus Building Technologies Tested By: Steven Pittsford
Model: 21000 120V 60Hz
S/N: 0101

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP05435	Attenuator	PE7015-10	10/5/2012	10/5/2014
T2	ANP05305	Cable	ETSI-50T	2/20/2014	2/20/2016
T3	ANP06505	Cable	32026-29080-29080-84	10/18/2013	10/18/2015
	AN01492	50uH LISN-Line	3816/2NM	7/21/2013	7/21/2015
T4	AN01492	50uH LISN-Neutral	3816/2NM	7/21/2013	7/21/2015
	AN02673	Spectrum Analyzer	E4446A	10/4/2013	10/4/2015
T5	AN02611	High Pass Filter	HE9615-150K-50-720B	3/26/2014	3/26/2016

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
AutoPRO*	Structus Building Technologies	21000	0101

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

Temperature: 23°C
Pressure: 102.0kPa
Humidity: 39%
Frequency: 30-1000MHz

Mode:
EUT is constantly transmitting at 13.56MHz
AutoPRO software V1.3

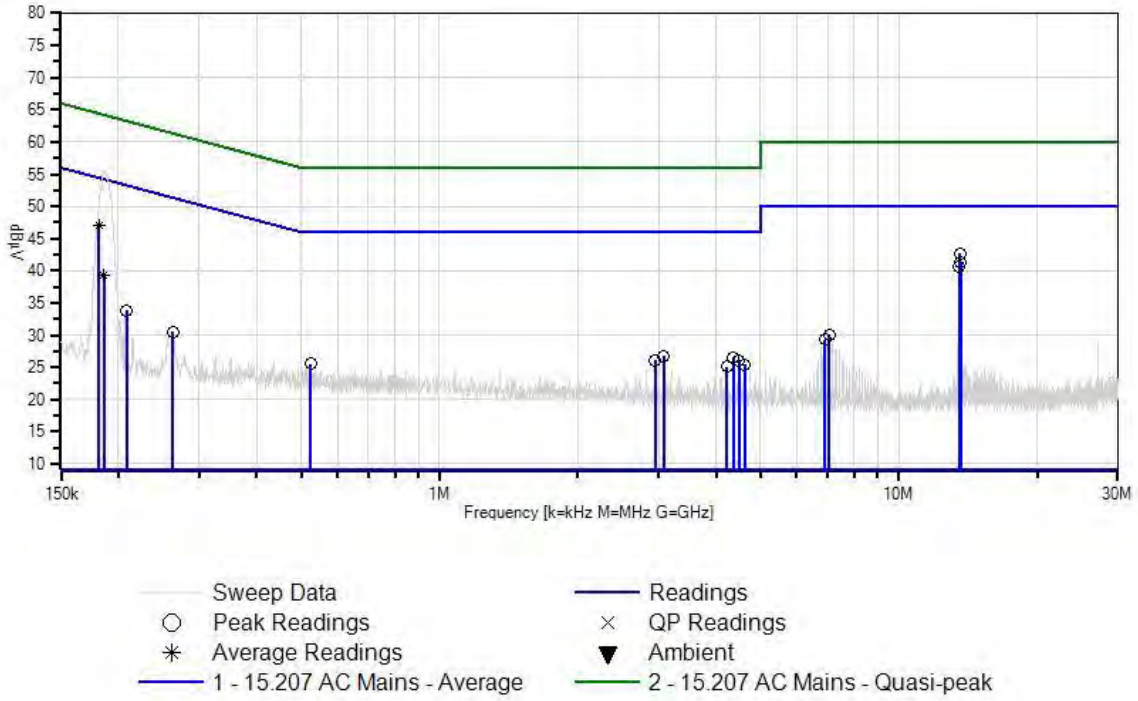
Ext Attn: 0 dB

Measurement Data: Reading listed by margin. Test Lead: Neutral

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	13.580M	32.6	+9.0 +0.2	+0.1	+0.1	+0.7	+0.0	42.7	50.0	-7.3	Neutr
2	181.278k Ave	36.1	+9.0 +0.3	+0.0	+0.0	+1.6	+0.0	47.0	54.4	-7.4	Neutr
3	13.616M	31.1	+9.0 +0.2	+0.1	+0.1	+0.7	+0.0	41.2	50.0	-8.8	Neutr
4	13.517M	30.5	+9.0 +0.2	+0.1	+0.1	+0.7	+0.0	40.6	50.0	-9.4	Neutr

5 Ave	186.360k	28.5	+9.0 +0.3	+0.0	+0.0	+1.5	+0.0	39.3	54.2	-14.9	Neutr
^	186.360k	44.9	+9.0 +0.3	+0.0	+0.0	+1.5	+0.0	55.7	54.2	+1.5	Neutr
7	3.076M	17.1	+9.0 +0.1	+0.1	+0.0	+0.4	+0.0	26.7	46.0	-19.3	Neutr
8	4.356M	16.9	+9.0 +0.1	+0.1	+0.0	+0.4	+0.0	26.5	46.0	-19.5	Neutr
9	208.176k	23.3	+9.0 +0.2	+0.0	+0.0	+1.3	+0.0	33.8	53.3	-19.5	Neutr
10	2.948M	16.6	+9.0 +0.1	+0.1	+0.0	+0.3	+0.0	26.1	46.0	-19.9	Neutr
11	4.484M	16.4	+9.0 +0.1	+0.1	+0.1	+0.4	+0.0	26.1	46.0	-19.9	Neutr
12	7.049M	20.3	+9.0 +0.1	+0.1	+0.1	+0.4	+0.0	30.0	50.0	-20.0	Neutr
13	523.784k	15.8	+9.0 +0.2	+0.0	+0.0	+0.5	+0.0	25.5	46.0	-20.5	Neutr
14	4.611M	15.7	+9.0 +0.1	+0.1	+0.1	+0.4	+0.0	25.4	46.0	-20.6	Neutr
15	6.914M	19.6	+9.0 +0.1	+0.1	+0.1	+0.4	+0.0	29.3	50.0	-20.7	Neutr
16	262.717k	20.3	+9.0 +0.2	+0.0	+0.0	+1.0	+0.0	30.5	51.3	-20.8	Neutr
17	4.224M	15.5	+9.0 +0.1	+0.1	+0.0	+0.4	+0.0	25.1	46.0	-20.9	Neutr

CKC Laboratories, Inc. Date: 8/5/2014 Time: 09:36:35 Structus Building Technologies WO#: 96012
Test Lead: Neutral 120V 60Hz Sequence#: 2 Neutral
Structus Building Technologies AutoPRO P/N: 21000



Test Setup Photo

15.215(c) Occupied Bandwidth

Engineer Name: Steven Pittsford
Test Date: 08/05/2014

Test Equipment					
Asset #	**Description**	**Model**	**Manufacturer**	**Cal Date**	**Cal Due**
02673	Spectrum Analyzer	E4446A	Agilent	10/04/2013	10/04/2015
P06505	Cable	32026-29080-29080-84	Astrolab	10/18/2013	10/18/2015
P05547	Cable	Heliax	Andrews	09/07/2012	09/07/2014
00052	Loop Antenna	6502	EMCO	05/20/2014	05/20/2016

Test Conditions / Setup

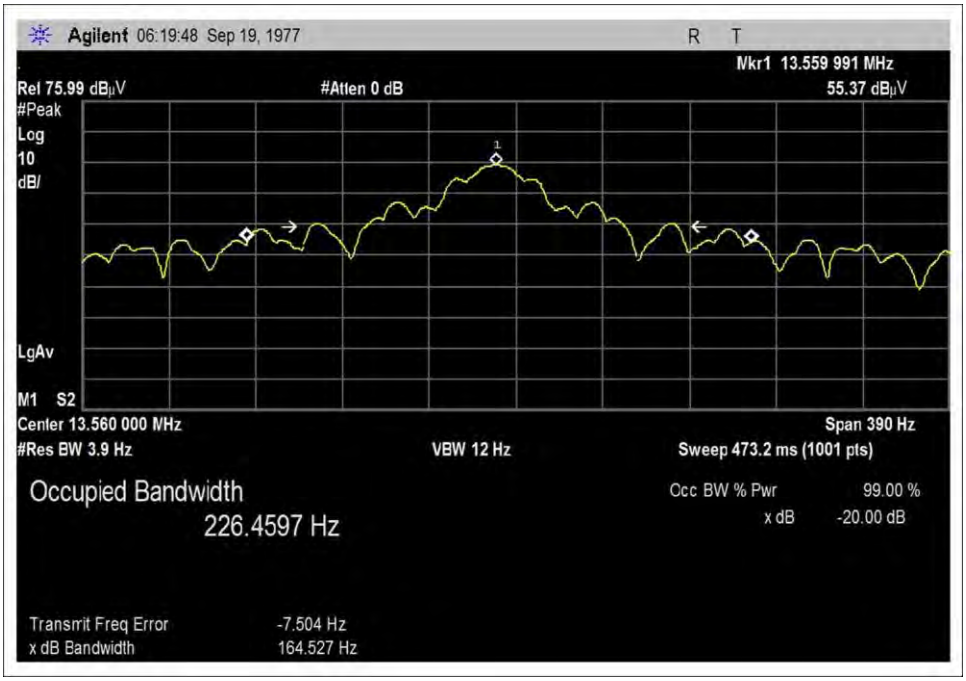
Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

Temp: 22°C
Humidity: 36%
Pressure: 102.3kPa

EUT is located on the test bench. Antenna is located at 3m from the EUT. Measurement performed at ambient temperature. TX frequency is 13.56MHz. AutoPRO software V1.3

Freq	20dB OBW	99% OBW
13.56MHz	164.5Hz	226.5Hz

Test Data


Agilent 06:19:48 Sep 19, 1977
R T
Mkr1 13.559 991 MHz
Ref 75.99 dBµV
#Atten 0 dB
55.37 dBµV
#Peak
Log
10
dB/
LgAv
M1 S2
Center 13.560 000 MHz
Span 390 Hz
#Res BW 3.9 Hz
VBW 12 Hz
Sweep 473.2 ms (1001 pts)
Occupied Bandwidth
226.4597 Hz
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error -7.504 Hz
x dB Bandwidth 164.527 Hz

Test Setup Photos

15.225(a)(b)(c) Fundamental Field Strength Emissions

Engineer Name: Steven Pittsford
Test Date: 08/05/2014

Test Equipment					
Asset #	**Description**	**Model**	**Manufacturer**	**Cal Date**	**Cal Due**
02673	Spectrum Analyzer	E4446A	Agilent	10/4/2013	10/4/2015
P06505	Cable	32026-29080-29080-84	Astrolab	10/18/2013	10/18/2015
P05547	Cable	Heliax	Andrews	9/7/2012	9/7/2014
00052	Loop Antenna	6502	EMCO	5/20/2014	5/20/2016

Test Conditions / Setup

(a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
(b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
(c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

Temp: 22°C
Humidity: 31%
Pressure: 101.9kPa

EUT is located on the test bench. Antenna is located at 3m from the EUT. Measurement performed at ambient temperature. TX frequency is 13.56MHz. AutoPRO software V1.3. Emissions were maximized with only the worst being reported.

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **Structus Building Technologies**
Specification: **15.225 Max Power**
Work Order #: **96012** Date: 8/5/2014
Test Type: **Maximized Emissions** Time: 10:12:17
Equipment: **AutoPRO** Sequence#: 3
Manufacturer: Structus Building Technologies Tested By: Steven Pittsford
Model: 21000
S/N: 0101

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00052	Loop Antenna	6502	5/20/2014	5/20/2016
T2	ANP05305	Cable	ETSI-50T	2/20/2014	2/20/2016
T3	ANP06505	Cable	32026-29080-29080-84	10/18/2013	10/18/2015
T4	AN02673	Spectrum Analyzer	E4446A	10/4/2013	10/4/2015

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
AutoPRO*	Structus Building Technologies	21000	0101

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

Temperature: 23°C
Pressure: 102.0kPa
Humidity: 39%
Frequency: 30-1000MHz

Mode:
EUT is constantly transmitting at 13.56MHz
AutoPRO software V1.3

15.31 (e) Checked at Nominal voltage and at 85% & 115% of nominal voltage

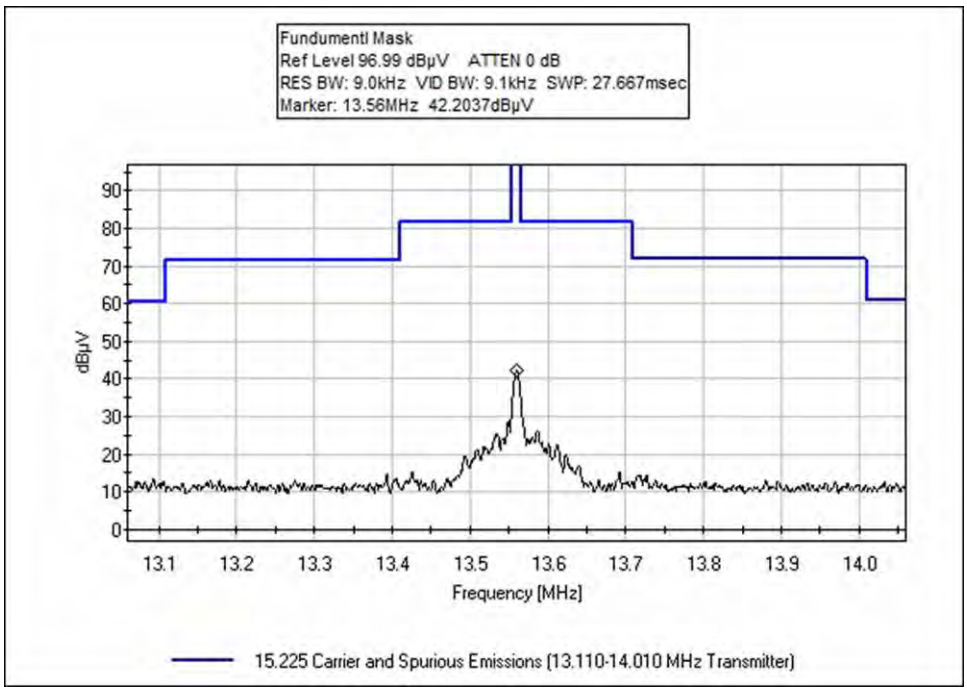
Max Power 3.508 microvolts/meter at 30 meters.

Ext Attn: 0 dB

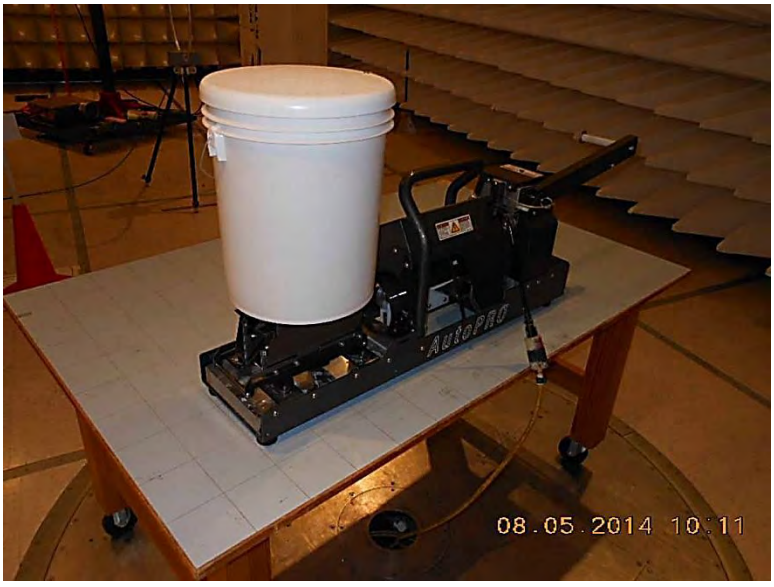
Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	13.560M	42.2	+8.5	+0.1	+0.1	+0.0	-40.0	10.9	84.0 Nom Voltage	-73.1	Vert
2	13.560M	42.2	+8.5	+0.1	+0.1	+0.0	-40.0	10.9	84.0 115% Nom Voltage	-73.1	Vert
3	13.560M	42.2	+8.5	+0.1	+0.1	+0.0	-40.0	10.9	84.0 85% Nom Voltage	-73.1	Vert

Test Data


Fundumentl Mask
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 9.0kHz VID BW: 9.1kHz SWP: 27.667msec
Marker: 13.56MHz 42.2037dBµV
dBµV
90
80
70
60
50
40
30
20
10
0
13.1
13.2
13.3
13.4
13.5
13.6
13.7
13.8
13.9
14.0
Frequency [MHz]
15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)

Test Photos



15.225(d) Field Strength of Spurious Emissions

Test Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717

Customer: **Structus Building Technologies**
Specification: **15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)**
Work Order #: **96012** Date: 8/5/2014
Test Type: **Maximized Emissions** Time: 10:32:52
Equipment: **AutoPRO** Sequence#: 3
Manufacturer: Structus Building Technologies Tested By: Steven Pittsford
Model: 21000
S/N: 0101

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00052	Loop Antenna	6502	5/20/2014	5/20/2016
T2	ANP05305	Cable	ETSI-50T	2/20/2014	2/20/2016
T3	ANP06505	Cable	32026-29080-29080-84	10/18/2013	10/18/2015
T4	AN02673	Spectrum Analyzer	E4446A	10/4/2013	10/4/2015
T5	AN02307	Preamp	8447D	3/14/2014	3/14/2016
	AN01996	Biconilog Antenna	CBL6111C	7/16/2014	7/16/2016
	ANP05360	Cable	RG214	12/3/2012	12/3/2014
	ANP05963	Cable	RG-214	2/21/2014	2/21/2016
	ANP06505	Cable	32026-29080-29080-84	10/18/2013	10/18/2015
	AN02673	Spectrum Analyzer	E4446A	10/4/2013	10/4/2015

***Equipment Under Test* (* = EUT):**

Function	Manufacturer	Model #	S/N
AutoPRO*	Structus Building Technologies	21000	0101

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

Temperature: 23°C
Pressure: 102.0kPa
Humidity: 39%
Frequency: 9k-1000MHz

Mode:
EUT is constantly transmitting at 13.56MHz.
AutoPRO software V1.3
CISPR Bandwidths used

Parallel and perpendicular/Vertical and Horizontal polarities investigated.

Ext Attn: 0 dB

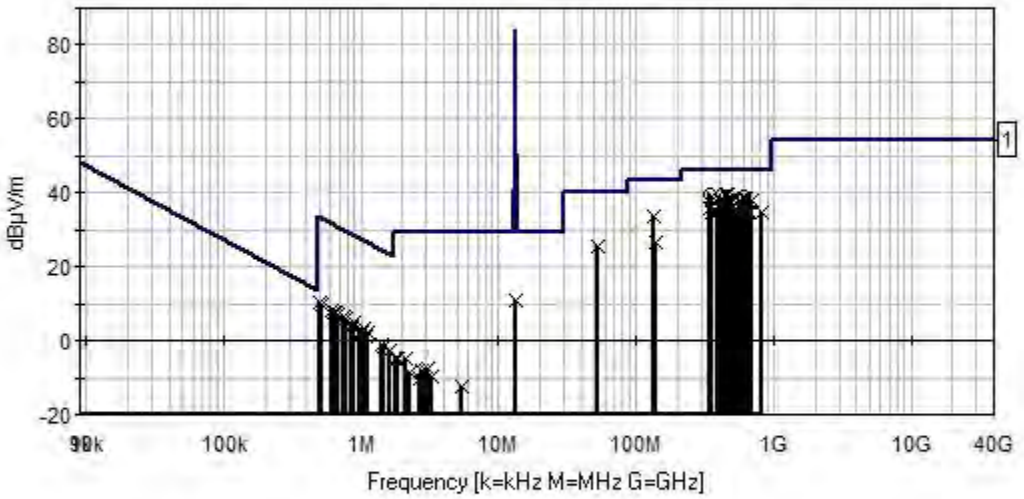
Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	450.302M	47.1	-27.9 +0.6	+17.4	+1.4	+1.0	+0.0	39.6	46.0	-6.4	Vert 129
2	346.999M QP	49.0	-27.2 +0.6	+15.1	+1.1	+0.9	+0.0 245	39.5	46.0	-6.5	Vert 145
^	346.999M	50.1	-27.2 +0.6	+15.1	+1.1	+0.9	+0.0	40.6	46.0	-5.4	Vert 129
4	460.873M	46.7	-27.9 +0.6	+17.6	+1.4	+1.0	+0.0	39.4	46.0	-6.6	Vert 129
5	616.308M QP	43.4	-28.2 +0.7	+20.4	+1.6	+1.2	+0.0 294	39.1	46.0	-6.9	Vert 100
^	616.308M	44.6	-28.2 +0.7	+20.4	+1.6	+1.2	+0.0	40.3	46.0	-5.7	Vert 129
7	450.543M QP	46.5	-27.9 +0.6	+17.4	+1.4	+1.0	+0.0 326	39.0	46.0	-7.0	Horiz 176
^	450.543M	49.6	-27.9 +0.6	+17.4	+1.4	+1.0	+0.0	42.1	46.0	-3.9	Horiz 124
9	357.330M	48.2	-27.3 +0.6	+15.4	+1.2	+0.9	+0.0	39.0	46.0	-7.0	Vert 129
10	440.212M QP	46.4	-27.9 +0.6	+17.2	+1.4	+1.0	+0.0 245	38.7	46.0	-7.3	Vert 145
^	440.212M	47.3	-27.9 +0.6	+17.2	+1.4	+1.0	+0.0	39.6	46.0	-6.4	Vert 129
12	605.978M	43.2	-28.3 +0.7	+20.3	+1.6	+1.2	+0.0	38.7	46.0	-7.3	Vert 129
13	626.759M	42.9	-28.2 +0.7	+20.4	+1.6	+1.2	+0.0	38.6	46.0	-7.4	Vert 129
14	502.314M	45.0	-28.1 +0.7	+18.3	+1.4	+1.1	+0.0	38.4	46.0	-7.6	Vert 129
15	688.741M	41.7	-28.1 +0.8	+20.7	+1.7	+1.3	+0.0	38.1	46.0	-7.9	Vert 129
16	564.296M	43.0	-28.3 +0.7	+19.6	+1.6	+1.2	+0.0	37.8	46.0	-8.2	Vert 129
17	678.290M	41.2	-28.2 +0.8	+20.6	+1.7	+1.3	+0.0	37.4	46.0	-8.6	Vert 129
18	419.311M	45.3	-27.8 +0.6	+16.9	+1.3	+1.0	+0.0	37.3	46.0	-8.7	Horiz 124
19	419.432M	45.3	-27.8 +0.6	+16.9	+1.3	+1.0	+0.0	37.3	46.0	-8.7	Vert 129
20	481.534M	44.1	-28.0 +0.7	+17.9	+1.4	+1.1	+0.0	37.2	46.0	-8.8	Vert 129
21	595.287M	41.7	-28.3 +0.7	+20.2	+1.6	+1.2	+0.0	37.1	46.0	-8.9	Vert 129
22	429.882M	44.8	-27.8 +0.6	+17.0	+1.4	+1.0	+0.0	37.0	46.0	-9.0	Horiz 124
23	440.332M QP	44.2	-27.9 +0.6	+17.2	+1.4	+1.0	+0.0 270	36.5	46.0	-9.5	Horiz 176

^	440.332M	47.7	-27.9 +0.6	+17.2	+1.4	+1.0	+0.0	40.0	46.0	-6.0	Horiz 124
^	440.332M	46.5	-27.9 +0.6	+17.2	+1.4	+1.0	+0.0 270	38.8	46.0	-7.2	Horiz 176
26	502.434M	43.1	-28.1 +0.7	+18.3	+1.4	+1.1	+0.0	36.5	46.0	-9.5	Horiz 124
27	347.119M	45.5	-27.2 +0.6	+15.1	+1.1	+0.9	+0.0	36.0	46.0	-10.0	Horiz 124
28	134.627M	47.7	-27.7 +0.4	+11.8	+0.7	+0.5	+0.0	33.4	43.5	-10.1	Horiz 124
29	409.221M	43.8	-27.7 +0.6	+16.7	+1.3	+1.0	+0.0	35.7	46.0	-10.3	Horiz 124
30	357.330M	44.1	-27.3 +0.6	+15.4	+1.2	+0.9	+0.0	34.9	46.0	-11.1	Horiz 124
31	398.651M	42.9	-27.6 +0.6	+16.5	+1.3	+1.0	+0.0	34.7	46.0	-11.3	Horiz 124
32	460.873M	41.9	-27.9 +0.6	+17.6	+1.4	+1.0	+0.0	34.6	46.0	-11.4	Horiz 124
33	533.425M	40.6	-28.2 +0.7	+18.9	+1.5	+1.1	+0.0	34.6	46.0	-11.4	Horiz 124
34	808.020M	35.6	-27.7 +0.8	+22.6	+1.9	+1.4	+0.0	34.6	46.0	-11.4	Horiz 124
35	657.750M	38.4	-28.2 +0.8	+20.5	+1.7	+1.3	+0.0	34.5	46.0	-11.5	Horiz 124
36	678.290M	38.3	-28.2 +0.8	+20.6	+1.7	+1.3	+0.0	34.5	46.0	-11.5	Horiz 124
37	51.930M	44.3	-27.9 +0.2	+8.4	+0.4	+0.3	+0.0 114	25.7	40.0	-14.3	Vert 100
38	139.820M	40.9	-27.6 +0.4	+11.8	+0.7	+0.5	+0.0	26.7	43.5	-16.8	Vert 100
39	505.419k	40.6	+9.6	+0.0	+0.0	+0.0	-40.0	10.2	33.5	-23.3	Paral
40	526.326k	40.2	+9.6	+0.0	+0.0	+0.0	-40.0	9.8	33.2	-23.4	Perpe
41	622.499k	38.6	+9.6	+0.0	+0.0	+0.0	-40.0	8.2	31.7	-23.5	Paral
42	662.222k	38.1	+9.6	+0.0	+0.0	+0.0	-40.0	7.7	31.2	-23.5	Paral
43	898.471k	35.0	+9.8	+0.1	+0.0	+0.0	-40.0	4.9	28.5	-23.6	Paral
44	762.576k	36.5	+9.6	+0.1	+0.0	+0.0	-40.0	6.2	29.9	-23.7	Paral
45	781.392k	36.3	+9.6	+0.1	+0.0	+0.0	-40.0	6.0	29.7	-23.7	Paral
46	747.941k	36.6	+9.6	+0.1	+0.0	+0.0	-40.0	6.3	30.1	-23.8	Paral
47	1.034M	33.3	+9.8	+0.1	+0.0	+0.0	-40.0	3.2	27.3	-24.1	Perpe
48	632.952k	37.9	+9.6	+0.0	+0.0	+0.0	-40.0	7.5	31.6	-24.1	Paral
49	676.857k	37.3	+9.6	+0.0	+0.0	+0.0	-40.0	6.9	31.0	-24.1	Paral

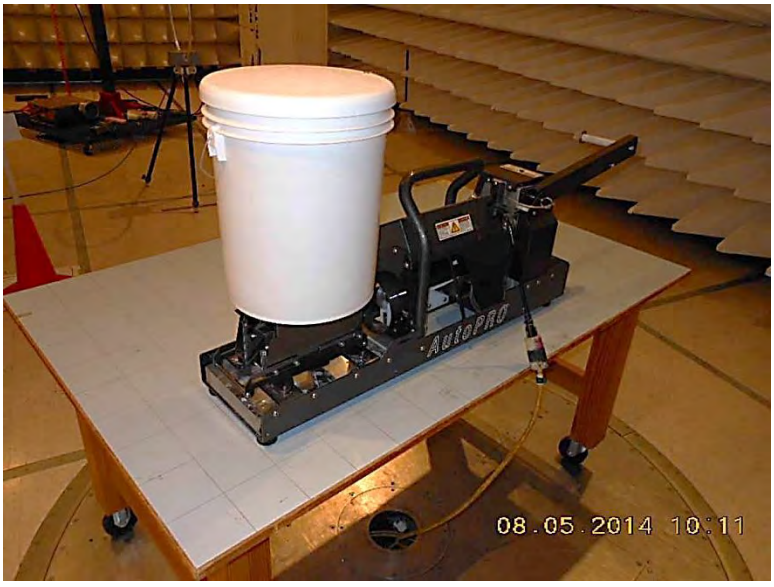
50	1.133M	32.3	+9.8	+0.1	+0.0	+0.0	-40.0	2.2	26.5	-24.3	Paral
51	756.304k	35.8	+9.6	+0.1	+0.0	+0.0	-40.0	5.5	30.0	-24.5	Perpe
52	856.657k	33.9	+9.7	+0.1	+0.0	+0.0	-40.0	3.7	28.9	-25.2	Perpe
53	971.646k	32.5	+9.8	+0.1	+0.0	+0.0	-40.0	2.4	27.8	-25.4	Perpe
54	1.005M	32.1	+9.8	+0.1	+0.0	+0.0	-40.0	2.0	27.5	-25.5	Paral
55	1.082M	31.4	+9.8	+0.1	+0.0	+0.0	-40.0	1.3	26.9	-25.6	Paral
56	1.396M	29.2	+9.7	+0.1	+0.0	+0.0	-40.0	-1.0	24.6	-25.6	Paral
57	1.641M	27.6	+9.7	+0.1	+0.0	+0.0	-40.0	-2.6	23.2	-25.8	Paral
58	1.473M	28.5	+9.7	+0.1	+0.0	+0.0	-40.0	-1.7	24.2	-25.9	Paral
59	1.810M	25.5	+9.6	+0.1	+0.0	+0.0	-40.0	-4.8	29.5	-34.3	Perpe
60	1.866M	25.4	+9.6	+0.1	+0.0	+0.0	-40.0	-4.9	29.5	-34.4	Perpe
61	2.113M	25.3	+9.6	+0.1	+0.0	+0.0	-40.0	-5.0	29.5	-34.5	Perpe
62	3.052M	22.6	+9.5	+0.1	+0.0	+0.0	-40.0	-7.8	29.5	-37.3	Perpe
63	2.745M	22.1	+9.5	+0.1	+0.0	+0.0	-40.0	-8.3	29.5	-37.8	Perpe
64	2.916M	22.1	+9.5	+0.1	+0.0	+0.0	-40.0	-8.3	29.5	-37.8	Perpe
65	2.268M	21.9	+9.6	+0.1	+0.0	+0.0	-40.0	-8.4	29.5	-37.9	Perpe
66	3.277M	20.9	+9.5	+0.1	+0.0	+0.0	-40.0	-9.5	29.5	-39.0	Perpe
67	2.700M	20.4	+9.5	+0.1	+0.0	+0.0	-40.0	-10.0	29.5	-39.5	Perpe
68	5.457M	18.1	+9.5	+0.1	+0.1	+0.0	-40.0	-12.2	29.5	-41.7	Perpe
69	13.560M	42.2	+8.5	+0.1	+0.1	+0.0	-40.0	10.9	84.0	-73.1	Perpe
70	13.561M	42.2	+8.5	+0.1	+0.1	+0.0	-40.0	10.9	84.0	-73.1	Paral

CKC Laboratories, Inc. Date: 8/5/2014 Time: 10:32:52 Structus Building Technologies WO#: 96012
Test Distance: 3 Meters Sequence#: 3 Perp & Para
Structus Building Technologies AutoPRO P/N: 21000



Readings
1 - 15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)
× Peak Readings
○ QP Readings

Test Setup Photos



15.225(e) Frequency Tolerance & Voltage Variation

Engineer Name: Steven Pittsford
Test Date: 08/05/2014

Test Equipment

Asset #	Description	Model	Manufacturer	Cal Date	Cal Due
02757	Temperature Chamber	F100/350-8	Bemco	01/22/2013	01/22/2015
03029	Thermometer, Digital Infrared	566	Fluke	02/01/2013	02/01/2015
02673	Spectrum Analyzer	E4446A	Agilent	10/04/2013	10/04/2015

Test Data

e) The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of –20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

EUT is located inside the temperature chamber. The temperature will change from -20°C to +50°C in 10° increments. An infrared thermometer with a thermocouple attachment is being used to monitor the actual temperature on the EUT. After the EUT has reached thermal stabilization the measurements are performed. Frequency variation cannot be higher than ±0.01% or ±1.356kHz.

Device Model #:	21000	
Operating Voltage:	115	**VDC/VAC**
Frequency Limit:	100	**PPM**

Temperature Variations

		Channel 1 (MHz)	Dev. (PPM)
Channel Frequency:		13.56	
Temp (C)	Voltage		
-20	115	13.560065	4.79351
-10	115	13.560069	5.08850
0	115	13.560068	5.01475
10	115	13.560049	3.61357
20	115	13.56001	0.73746
30	115	13.559973	1.99115
40	115	13.559936	4.71976
50	115	13.559897	7.59587

Voltage Variations (±15%)

20	97.8	13.56001	0.73746
20	115	13.56001	0.73746
20	132.3	13.560009	0.66372

Max Deviation (PPM)	**7.59587**
	PASS

Test Setup Photos

Inside Temperature Chamber

Outside Temperature Chamber

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

The reported measurement uncertainties are calculated based on the worst case of all laboratory environments from CKC Laboratories, Inc. test sites. Only those parameters which require estimation of measurement uncertainty are reported. The reported worst case measurement uncertainty is less than the maximum values derived in CISPR 16-4-2. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Compliance is deemed to occur provided measurements are below the specified limits.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBµV/m, the spectrum analyzer reading in dBµV was corrected by using the following formula. This reading was then compared to the applicable specification limit.

SAMPLE CALCULATIONS		
	Meter reading	(dBµV)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or carrot ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point the measuring device is set into the linear mode and the scan time is reduced.