

EMC EMISSIONS - TEST REPORT (In-Part)

Test Report No.	3090967-1	Issue Date:	03/09/2006
Model / Serial No.	PC-W/ 110405J3		
Product Type	Pace Clock		
Client	Colorado Time Systems		
Manufacturer	Colorado Time Systems		
License holder	Colorado Time Systems		
Address	1551 East 11th Street Loveland, CO 80537		
Test Criteria Applied	FCC CFR47 Part 15.247		
Test Result	PASS		
Test Project Number	3090967	Title 47 CFR 15: RADIO FREQUENCY DEVICES	
References			
Total Pages			
Including	51		
Appendices:			
<i>Michael Spataro</i>	<i>Robert Creswell</i>		
Reviewed By : Mike Spataro	Approved By :		

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Lab Code:200264-0

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STATEMENT OF MEASUREMENT UNCERTAINTY

The data and results referenced in this document are true and accurate. The measurement uncertainty for Conducted Emissions in the frequency range of 150kHz – 30MHz is calculated to be $\pm 2.30\text{dB}$ and for Radiated Emissions is calculated to be $\pm 3.60\text{dB}$ in the frequency range of 30MHz – 200MHz and $\pm 3.38\text{dB}$ in the frequency range of 200MHz – 1000MHz.

EUT Received Date: 9-Jan-2006

Testing Start Date: 9-Jan-2006

Testing End Date: 9-Feb-2006

The tests were performed according to following regulations :

1. FCC CFR47 Part 15.205
2. FCC CFR47 Part 15.207
3. FCC CFR47 Part 15.209
4. FCC CFR47 Part 15.247
5. ICES-003

Emission Test Results:

Conducted Emissions, Powerline (15.207) - PASS

Test Result

Minimum limit margin -8.5 dB at 13.17 MHz

Maximum limit exceeding _____ dB at _____ MHz

Remarks: _____

Radiated Emissions (15.209) - PASS

Test Result

Minimum limit margin -3.6 dB at 101.38 MHz

Maximum limit exceeding _____ dB at _____ MHz

Remarks: _____

Radiated Emissions (15.205)/(15.247) (c) - PASS

Test Result

Minimum limit margin -2.7 dB at 3624.95 MHz

Maximum limit exceeding _____ dB at _____ MHz

Remarks: _____

Peak Output Power 15.247 (b)(3) - PASS

Test Result

Minimum limit margin -12.4 dB at 905.79 MHz

Maximum limit exceeding _____ dB at _____ MHz

Remarks: _____

Bandwidth 15.247 (a)(2) - PASS

Remarks: The minimum 6dB bandwidth shall be 500kHz.

Power Spectral Density 15.247 (e) - PASS

Remarks: The power spectral density conducted to the antenna shall be less than +8dBm.

GENERAL REMARKS:

The following remarks are to be considered as “where applicable” and are taken into account while completing any FCC/IC/ETSI radio tests at Intertek, ETL Semko.

Testing was performed in 3 different orthogonal axis to determine the worst case emissions from the device. The worst case emissions measurements are shown in this report.

FCC CFR47 Part 15.31: Measurement Standards: In any case where the device is powered off a battery, a fresh battery was used during test. In cases where the device is powered off an AC supply, voltage was varied per Part 15.31 to find worst case emissions.

FCC CFR47 Part 15.35: Measurement Detector Functions and Bandwidths: FCC Part 15.35 was utilized when performing the measurements within this report.

Whenever possible the approved test procedures specified in FCC KDB 558074 for DTS devices was used for testing.

Limit Calculation:

At the time of testing, Intertek ETL Semko was unable to obtain the gain of the antenna for the EUT from the manufacture of the EUT or from the manufacture of the antenna. Therefore, the following calculation was used to determine the field strength limit for a test distance of 3m. This calculation assumes ideal isotropic radiation from the source.

$$P = 20 \cdot \log(E) - 95.2289$$

P is power in dBm

E is uV/m

Modifications required to pass: None

Test Specification Deviations: Additions to or Exclusions from: None

Required Information In Accordance to FCC CFR 47 Part 2.1033:

<i>Rule Part 11, 15 & 18 Devices</i>	<i>Other Rule Part Devices</i>	<i>Description</i>	<i>Comments</i>
2.1033(b)(1)	2.1033(c)(1)	Manu. Contact	See Page 1 of this report
2.1033(b)(2)	2.1033(c)(2)	FCC Identifier	
2.1033(b)(3)	2.1033(c)(3)	Users Manual to include Operating, installation	Attached as Exhibit
	2.1033(c)(4)	Emissions Designator per 2.	
	2.1033(c)(5)	Frequency Range	Not Applicable to Part 15 Devcies
	2.1033(c)(6)	Power range and controls	Not Applicable to Part 15 Devcies
	2.1033(c)(7)	Maximum power ouput rating	Not Applicable to Part 15 Devcies
	2.1033(c)(8)	DC Voltage and Current suplying final RF stages	Not Applicable to Part 15 Devcies
2.1033(b)(3)	2.1033(c)(9)	Tune –up procedure	Please refer to the users manual for applicability
2.1033(b)(4&5)	2.1033(c)(10)	Complete Circuit Diagrams and circuit operation description	Attached as Exhibit
2.1033(b)(7)	2.1033(c)(11)	Photographs/drawings of the identification label & its location on the device	Attached as Exhibit
2.1033(b)(7)	2.1033(c)(12)	Photographs of the external and internal surfaces, and construction	Attached as Exhibit
	2.1033(c)(13)	Digital Modulation	Not Applicable
2.1033(b)(6)	2.1033(c)(14)	Report of Measurement Data Required by 2.1046 – 2.1057	See Data Below (This report consists of the testing required under Part 15.231)
2.1033(b)(8)		Description of publicly available support equipment used during test	Refer to Exhibit B of this report (Client Test Plan)
2.1033(b)(9)		Statement of Autorization to Part 15.37 of CFR47	The equipment herein is being authorized in accordance to 15.37 of the CFR47 Rules.
2.1033(b)(10)		Direct Sequence Spread Spectrum Devices (DSSS)	Exhibit of compliance to 15.247(e)
2.1033(b)(10)		Frequency Hopping Devices	Exhibit of compliance to 15.247(a)(1)
2.1033(b)(11)		Scanning receiver construction	Exhibit stating compliance to construction in accordance to 15.121.
15.31	15.31	Transmitter Supply Voltage	Testing herein was completed in accordance to FCC CFR47 Part 15.31

Exhibits Including (where applicable):

- | | |
|------------------------------------|---|
| 1. Users Manual | 7. Parts List |
| 2. Operation Description | 8. Tuning Procedure (if applicable) |
| 3. Block Diagram | 9. Test Setup Photograph |
| 4. Report of Measurement | 10. Label Drawings and or Photograpghs |
| 5. External & Internal Photographs | 11. Description of Support Equipment (where Applicable) |
| 6. Schematic | |

Required Information in Accordance to Industry Canada Regulations (In addition to the above):

<i>Information Required</i>	<i>Description</i>	<i>Comments</i>
Modulation Type	(i.e. ASK, NON, FSK, DSSS, FHSS, etc.)	
Emissions Designator	Per TRC-49	
In Country Representative	Contact Information	
99% Bandwidth Measurement	Per RSS-210	

Test-setup photo(s):
Conducted Emissions



Test-setup photo(s):
Conducted Emissions



Test-setup photo(s):
Radiated Unintentional Emissions:



Test-setup photo(s):
Radiated Unintentional Emissions:



Test-setup photo(s):
Radiated Intentional Emissions:



Test-setup photo(s):
Radiated Intentional Emissions:



Appendix A

Test Data Sheets
and
Test Equipment Used

1.1310 Calculation
RF Exposure limits.

RF Exposure

Test Report #:	3090967	Test Area:	GP1-1
Test Method:	FCC Part 1.1310	Test Date:	08-March-2006
EUT Model #:	PC-W	EUT Power:	120 VAC 60 Hz
EUT Serial #:	110405J3		
Manufacturer:	Colorado Time Systems		
EUT Description:	Pace clock		
Notes:			

Temperature:	18.0	°C
Relative Humidity:	26	%
Air Pressure:	81	kPa

Page:

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av – Average	

The following limit was calculated from table 1 (B) Limits for General Population/Uncontrolled Exposure in FCC part 1.1310:

$$L=f/1500$$

Where: L is the limit in mW / cm²
f is the frequency in MHz

Using the lowest transmit frequency from the EUT of 902MHz

$$L=0.601 \text{ mW / cm}^2$$

The following calculation was used to determine compliance to the above limit.
The following assumes the gain of the antenna to be ≤1.

$$P(W/cm^2)=(E^2/R)/10,000$$

Where R= 377Ω

E=Field Strength in this case, a conducted measurement made at the antenna port and the measured voltage in a 50 ohm system was 0.88V.

In this case the power (P) is:

$$0.000000205 \text{ Watts / cm}^2$$

Or

$$0.000205 \text{ mW / cm}^2$$

15.207 Test Data

Conducted Electromagnetic Emissions

Test Report #: **3090967 Run 02**
 Test Method: **FCC Part 15.107 Class B QP**
 EUT Model #: **PC-W**
 EUT Serial #: **110405J3**
 Manufacturer: **Colorado Time Systems**
 EUT Description: **Pace Clock**
 Notes: **Customer tested with a shielded power cord.**

Test Area: **Pinewood Site 1 Cond**
 Test Date: **09-Feb-2006**
 EUT Power: **120VAC 60Hz**

Temperature: **20.1** °C
 Relative Humidity: **23.3** %
 Air Pressure: **84** kPa

Page:

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av – Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / LISN / ATTN (dB)	FINAL (dBuV)	TEST POINT	DELTA1 (dB) QP15.107B	DELTA2 (dB) AV15.107B
13.17	34.5 Qp	0.7 / 0.1 / -10.0	45.3	Line 1	-14.7	N/A
13.17	30.7 Av	0.7 / 0.1 / -10.0	41.5	Line 1	N/A	-8.5
11.59	27.7 Qp	0.7 / 0.1 / -10.0	38.5	Line 1	-21.5	N/A
11.59	22.9 Av	0.7 / 0.1 / -10.0	33.7	Line 1	N/A	-16.3
0.198	32.5 Qp	0.1 / 1.1 / -9.6	43.4	Line 1	-20.3	N/A
0.198	28.6 Av	0.1 / 1.1 / -9.6	39.5	Line 1	N/A	-14.2
0.150	26.5 Qp	0.1 / 1.6 / -9.5	37.7	Line 1	-28.3	N/A
9.80	20.0 Qp	0.7 / 0.1 / -9.9	30.8	Line 1	-29.2	N/A
23.20	13.5 Qp	1.0 / 0.4 / -10.0	24.9	Line 1	-35.1	N/A
13.17	34.7 Qp	0.7 / 0.1 / -10.0	45.5	Neutral	-14.5	N/A
13.17	30.6 Av	0.7 / 0.1 / -10.0	41.4	Neutral	N/A	-8.6
13.43	27.5 Av	0.7 / 0.1 / -10.0	38.3	Neutral	N/A	-11.7
12.90	28.2 Av	0.7 / 0.1 / -10.0	39.0	Neutral	N/A	-11.0
12.90	30.8 Qp	0.7 / 0.1 / -10.0	41.6	Neutral	-18.4	N/A
11.59	28.6 Qp	0.7 / 0.1 / -10.0	39.4	Neutral	-20.6	N/A
11.59	23.3 Av	0.7 / 0.1 / -10.0	34.1	Neutral	N/A	-15.9
9.80	23.1 Qp	0.7 / 0.1 / -9.9	33.9	Neutral	-26.1	N/A
0.150	26.0 Qp	0.1 / 1.6 / -9.5	37.2	Neutral	-28.8	N/A
0.198	34.4 Qp	0.1 / 1.1 / -9.6	45.3	Neutral	-18.4	N/A
0.198	31.5 Av	0.1 / 1.1 / -9.6	42.4	Neutral	N/A	-11.3
23.70	16.6 Qp	1.0 / 0.4 / -10.0	28.0	Neutral	-32.0	N/A

Conducted Electromagnetic Emissions

Test Report #: **3090967 Run 02** Test Area: Pinewood Site 1 Cond
 Test Method: FCC Part 15.107 Class B QP Test Date: 09-Feb-2006
 EUT Model #: PC-W EUT Power: 120VAC 60Hz
 EUT Serial #: 110405J3
 Manufacturer: Colorado Time Systems
 EUT Description: Pace Clock
 Notes: Customer tested with a shielded power cord.

Temperature: 20.1 °C
 Relative Humidity: 23.3 %
 Air Pressure: 84 kPa
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Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av – Average	

FREQ	LEVEL	CABLE / LISN / ATTEN	FINAL	TEST POINT	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB)	(dBuV)		QP15.107B	AV15.107B
***** Measurement Summary *****						
13.17	30.7 Av	0.7 / 0.1 / -10.0	41.5	Line 1	N/A	-8.5
12.90	28.2 Av	0.7 / 0.1 / -10.0	39.0	Neutral	N/A	-11.0
0.198	31.5 Av	0.1 / 1.1 / -9.6	42.4	Neutral	N/A	-11.3
13.43	27.5 Av	0.7 / 0.1 / -10.0	38.3	Neutral	N/A	-11.7
11.59	23.3 Av	0.7 / 0.1 / -10.0	34.1	Neutral	N/A	-15.9
9.80	23.1 Qp	0.7 / 0.1 / -9.9	33.9	Neutral	-26.1	N/A
0.150	26.5 Qp	0.1 / 1.6 / -9.5	37.7	Line 1	-28.3	N/A
23.70	16.6 Qp	1.0 / 0.4 / -10.0	28.0	Neutral	-32.0	N/A
23.20	13.5 Qp	1.0 / 0.4 / -10.0	24.9	Line 1	-35.1	N/A

15.209 Test Data

Radiated Electromagnetic Emissions

Test Report #: **BC500397 Run 02**
 Test Method: FCC Part 15.209
 EUT Model #: PC-W
 EUT Serial #: 110405J3
 Manufacturer: Colorado Time Systems
 EUT Description: Pace Clock
 Notes:

Test Area: Pinewood Site 1 (3m)
 Test Date: 12-Jan-2006
 EUT Power: 120 VAC 60 Hz

Temperature: 11.0 °C
 Relative Humidity: 26 %
 Air Pressure: 81 kPa

Page:

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	15.209 <1GHz	15.209 >1GHz
No significant emissions detected between 10 kHz and 30 MHz.						
Loop antenna is perpendicular to EUT.						
The following are noise floor points.						
0.0100	53.5 Qp	0.0 / 18.5 / 0.0	72.0	V / 1.0 / 0.0	-55.6	N/A
0.100	55.8 Qp	0.1 / 11.0 / 0.0	66.9	V / 1.0 / 0.0	-40.7	N/A
2.00	30.7 Qp	0.1 / 10.2 / 0.0	41.0	V / 1.0 / 0.0	-28.5	N/A
10.11	19.2 Qp	0.2 / 10.5 / 0.0	30.0	V / 1.0 / 0.0	-39.5	N/A
20.00	20.1 Qp	0.4 / 10.3 / 0.0	30.9	V / 1.0 / 0.0	-38.6	N/A
Loop antenna is parallel to EUT.						
The following are noise floor points.						
0.0763	51.9 Qp	0.1 / 10.9 / 0.0	62.8	H / 1.0 / 0.0	-47.1	N/A
5.16	23.8 Qp	0.2 / 10.2 / 0.0	34.1	H / 1.0 / 0.0	-35.4	N/A
14.91	20.4 Qp	0.3 / 10.7 / 0.0	31.5	H / 1.0 / 0.0	-38.0	N/A
29.00	16.4 Qp	0.5 / 8.7 / 0.0	25.5	H / 1.0 / 0.0	-44.0	N/A
Antenna: EMCO Bicon						
Vertical, 0 degrees						
31.39	36.8 Qp	0.6 / 12.8 / 28.2	21.9	V / 1.0 / 0.0	-18.1	N/A
31.12	38.5 Qp	0.6 / 12.9 / 28.2	23.7	V / 1.0 / 0.0	-16.3	N/A
30.85	39.6 Qp	0.5 / 12.9 / 28.2	24.9	V / 1.0 / 0.0	-15.1	N/A
39.82	40.1 Qp	0.6 / 11.7 / 28.1	24.4	V / 1.0 / 0.0	-15.6	N/A
40.07	41.0 Qp	0.7 / 11.7 / 28.1	25.3	V / 1.0 / 0.0	-14.7	N/A
40.35	40.5 Qp	0.7 / 11.6 / 28.2	24.6	V / 1.0 / 0.0	-15.4	N/A
40.61	39.1 Qp	0.7 / 11.6 / 28.2	23.2	V / 1.0 / 0.0	-16.8	N/A
46.12	38.5 Qp	0.7 / 10.9 / 28.2	21.9	V / 1.0 / 0.0	-18.1	N/A
52.73	41.5 Qp	0.7 / 9.9 / 28.1	24.0	V / 1.0 / 0.0	-16.0	N/A
52.98	41.6 Qp	0.7 / 9.9 / 28.1	24.1	V / 1.0 / 0.0	-15.9	N/A
52.46	41.6 Qp	0.7 / 9.9 / 28.1	24.2	V / 1.0 / 0.0	-15.8	N/A
54.62	36.5 Qp	0.7 / 9.6 / 28.1	18.7	V / 1.0 / 0.0	-21.3	N/A
58.80	36.2 Qp	0.7 / 9.0 / 28.1	17.8	V / 1.0 / 0.0	-22.2	N/A
60.77	35.9 Qp	0.7 / 8.8 / 28.1	17.3	V / 1.0 / 0.0	-22.7	N/A
64.56	41.2 Qp	0.8 / 8.5 / 28.1	22.5	V / 1.0 / 0.0	-17.5	N/A

Radiated Electromagnetic Emissions

Test Report #: **BC500397 Run 02**
 Test Method: FCC Part 15.209
 EUT Model #: PC-W
 EUT Serial #: 110405J3
 Manufacturer: Colorado Time Systems
 EUT Description: Pace Clock
 Notes:

Test Area: Pinewood Site 1 (3m)
 Test Date: 12-Jan-2006
 EUT Power: 120 VAC 60 Hz

Temperature: 11.0 °C
 Relative Humidity: 26 %
 Air Pressure: 81 kPa

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Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	15.209 <1GHz	15.209 >1GHz
72.45	39.6 Qp	0.8 / 9.0 / 28.0	21.4	V / 1.0 / 0.0	-18.6	N/A
75.51	39.1 Qp	0.9 / 7.7 / 28.0	19.7	V / 1.0 / 0.0	-20.3	N/A
79.15	34.5 Qp	0.9 / 7.1 / 28.0	14.5	V / 1.0 / 0.0	-25.5	N/A
82.98	46.2 Qp	0.9 / 6.9 / 28.0	26.1	V / 1.0 / 0.0	-13.9	N/A
86.19	36.3 Qp	1.0 / 7.2 / 28.0	16.5	V / 1.0 / 0.0	-23.5	N/A
93.85	37.5 Qp	1.0 / 8.3 / 27.9	18.8	V / 1.0 / 0.0	-24.7	N/A
101.38	50.8 Qp	1.1 / 9.3 / 27.9	33.3	V / 1.0 / 0.0	-10.2	N/A
108.56	39.0 Qp	1.1 / 10.3 / 27.9	22.6	V / 1.0 / 0.0	-20.9	N/A
109.89	38.6 Qp	1.1 / 10.5 / 27.9	22.4	V / 1.0 / 0.0	-21.1	N/A
112.28	38.5 Qp	1.1 / 10.8 / 27.8	22.7	V / 1.0 / 0.0	-20.8	N/A
115.93	40.0 Qp	1.2 / 11.3 / 27.8	24.7	V / 1.0 / 0.0	-18.8	N/A
117.01	36.4 Qp	1.2 / 11.5 / 27.8	21.2	V / 1.0 / 0.0	-22.3	N/A
120.72	39.0 Qp	1.2 / 11.8 / 27.8	24.2	V / 1.0 / 0.0	-19.3	N/A
121.22	38.3 Qp	1.2 / 11.8 / 27.8	23.5	V / 1.0 / 0.0	-20.0	N/A
126.78	35.6 Qp	1.2 / 12.2 / 27.7	21.4	V / 1.0 / 0.0	-22.1	N/A
135.73	37.1 Qp	1.3 / 12.6 / 27.6	23.3	V / 1.0 / 0.0	-20.2	N/A
141.74	35.0 Qp	1.3 / 12.5 / 27.6	21.3	V / 1.0 / 0.0	-22.2	N/A
145.41	36.5 Qp	1.3 / 12.5 / 27.6	22.7	V / 1.0 / 0.0	-20.8	N/A
149.07	40.1 Qp	1.3 / 12.3 / 27.5	26.2	V / 1.0 / 0.0	-17.3	N/A
152.97	33.0 Qp	1.3 / 12.3 / 27.5	19.2	V / 1.0 / 0.0	-24.3	N/A
156.43	33.8 Qp	1.4 / 12.4 / 27.5	20.0	V / 1.0 / 0.0	-23.5	N/A
160.08	32.4 Qp	1.4 / 12.4 / 27.5	18.7	V / 1.0 / 0.0	-24.8	N/A
163.85	32.8 Qp	1.4 / 12.4 / 27.5	19.1	V / 1.0 / 0.0	-24.4	N/A
165.92	32.2 Qp	1.4 / 12.4 / 27.5	18.6	V / 1.0 / 0.0	-24.9	N/A
167.51	31.8 Qp	1.4 / 12.5 / 27.4	18.2	V / 1.0 / 0.0	-25.3	N/A
171.18	30.4 Qp	1.4 / 12.6 / 27.4	17.0	V / 1.0 / 0.0	-26.5	N/A
193.58	29.2 Qp	1.5 / 13.7 / 27.2	17.2	V / 1.0 / 0.0	-26.3	N/A
90 degrees						
30.85	40.0 Qp	0.5 / 12.9 / 28.2	25.2	V / 1.0 / 90.0	-14.8	N/A
39.82	43.2 Qp	0.6 / 11.7 / 28.1	27.5	V / 1.0 / 90.0	-12.5	N/A
40.07	44.5 Qp	0.7 / 11.7 / 28.1	28.8	V / 1.0 / 90.0	-11.2	N/A
40.35	45.0 Qp	0.7 / 11.6 / 28.2	29.1	V / 1.0 / 90.0	-10.9	N/A

Radiated Electromagnetic Emissions

Test Report #: **BC500397 Run 02**

Test Area: Pinewood Site 1 (3m)

Temperature: 11.0 °C

Test Method: FCC Part 15.209

Test Date: 12-Jan-2006

Relative Humidity: 26 %

EUT Model #: PC-W

EUT Power: 120 VAC 60 Hz

Air Pressure: 81 kPa

EUT Serial #: 110405J3

Page:

Manufacturer: Colorado Time Systems

EUT Description: Pace Clock

Notes:

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av – Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	15.209 <1GHz	15.209 >1GHz
40.61	43.6 Qp	0.7 / 11.6 / 28.2	27.7	V / 1.0 / 90.0	-12.3	N/A
46.12	40.4 Qp	0.7 / 10.9 / 28.2	23.8	V / 1.0 / 90.0	-16.2	N/A
52.46	42.5 Qp	0.7 / 9.9 / 28.1	25.0	V / 1.0 / 90.0	-15.0	N/A
52.73	42.6 Qp	0.7 / 9.9 / 28.1	25.2	V / 1.0 / 90.0	-14.8	N/A
64.56	50.4 Qp	0.8 / 8.5 / 28.1	31.6	V / 1.0 / 90.0	-8.4	N/A
79.15	38.0 Qp	0.9 / 7.1 / 28.0	18.0	V / 1.0 / 90.0	-22.0	N/A
93.85	38.2 Qp	1.0 / 8.3 / 27.9	19.6	V / 1.0 / 90.0	-23.9	N/A
101.38	54.0 Qp	1.1 / 9.3 / 27.9	36.6	V / 1.0 / 90.0	-6.9	N/A
180 degrees						
101.38	55.2 Qp	1.1 / 9.3 / 27.9	37.8	V / 1.0 / 180.0	-5.7	N/A
75.51	42.0 Qp	0.9 / 7.7 / 28.0	22.5	V / 1.0 / 180.0	-17.5	N/A
72.45	41.5 Qp	0.8 / 9.0 / 28.0	23.3	V / 1.0 / 180.0	-16.7	N/A
52.98	44.4 Qp	0.7 / 9.9 / 28.1	26.8	V / 1.0 / 180.0	-13.2	N/A
52.73	45.1 Qp	0.7 / 9.9 / 28.1	27.6	V / 1.0 / 180.0	-12.4	N/A
52.46	45.0 Qp	0.7 / 9.9 / 28.1	27.5	V / 1.0 / 180.0	-12.5	N/A
46.12	41.5 Qp	0.7 / 10.9 / 28.2	24.9	V / 1.0 / 180.0	-15.1	N/A
31.12	40.2 Qp	0.6 / 12.9 / 28.2	25.4	V / 1.0 / 180.0	-14.6	N/A
30.85	40.9 Qp	0.5 / 12.9 / 28.2	26.1	V / 1.0 / 180.0	-13.9	N/A
270 degrees						
160.08	30.5 Qp	1.4 / 12.4 / 27.5	16.8	V / 1.0 / 270.0	-26.7	N/A
The following were maximized between 30 - 200 MHz, Vertical.						
40.35	45.8 Qp	0.7 / 11.6 / 28.2	29.9	V / 1.0 / 71.0	-10.1	N/A
64.56	51.1 Qp	0.8 / 8.5 / 28.1	32.4	V / 1.0 / 127.0	-7.6	N/A
101.38	57.4 Qp	1.1 / 9.3 / 27.9	39.9	V / 1.0 / 140.0	-3.6	N/A
Horizontal, 0 degrees						
30.85	30.2 Qp	0.5 / 12.9 / 28.2	15.4	H / 2.0 / 0.0	-24.6	N/A
31.39	28.2 Qp	0.6 / 12.8 / 28.2	13.3	H / 2.0 / 0.0	-26.7	N/A
40.61	30.4 Qp	0.7 / 11.6 / 28.2	14.5	H / 2.0 / 0.0	-25.5	N/A
52.46	35.1 Qp	0.7 / 9.9 / 28.1	17.6	H / 2.0 / 0.0	-22.4	N/A
52.73	34.0 Qp	0.7 / 9.9 / 28.1	16.5	H / 2.0 / 0.0	-23.5	N/A
60.77	42.0 Qp	0.7 / 8.8 / 28.1	23.5	H / 2.0 / 0.0	-16.5	N/A
64.56	48.5 Qp	0.8 / 8.5 / 28.1	29.7	H / 2.0 / 0.0	-10.3	N/A

Radiated Electromagnetic Emissions

Test Report #: **BC500397 Run 02**
 Test Method: FCC Part 15.209
 EUT Model #: PC-W
 EUT Serial #: 110405J3
 Manufacturer: Colorado Time Systems
 EUT Description: Pace Clock
 Notes:

Test Area: Pinewood Site 1 (3m)
 Test Date: 12-Jan-2006
 EUT Power: 120 VAC 60 Hz

Temperature: 11.0 °C
 Relative Humidity: 26 %
 Air Pressure: 81 kPa

Page:

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	15.209 <1GHz	15.209 >1GHz
75.51	41.2 Qp	0.9 / 7.7 / 28.0	21.7	H / 2.0 / 0.0	-18.3	N/A
79.15	37.5 Qp	0.9 / 7.1 / 28.0	17.6	H / 2.0 / 0.0	-22.4	N/A
82.98	49.3 Qp	0.9 / 6.9 / 28.0	29.2	H / 2.0 / 0.0	-10.8	N/A
86.19	43.4 Qp	1.0 / 7.2 / 28.0	23.6	H / 2.0 / 0.0	-16.4	N/A
93.85	40.5 Qp	1.0 / 8.3 / 27.9	21.9	H / 2.0 / 0.0	-21.6	N/A
101.38	56.0 Qp	1.1 / 9.3 / 27.9	38.6	H / 2.0 / 0.0	-4.9	N/A
108.56	38.4 Qp	1.1 / 10.3 / 27.9	22.0	H / 2.0 / 0.0	-21.5	N/A
115.93	38.3 Qp	1.2 / 11.3 / 27.8	23.0	H / 2.0 / 0.0	-20.5	N/A
117.01	37.0 Qp	1.2 / 11.5 / 27.8	21.8	H / 2.0 / 0.0	-21.7	N/A
126.78	32.1 Qp	1.2 / 12.2 / 27.7	17.9	H / 2.0 / 0.0	-25.6	N/A
135.73	39.6 Qp	1.3 / 12.6 / 27.6	25.8	H / 2.0 / 0.0	-17.7	N/A
141.74	45.1 Qp	1.3 / 12.5 / 27.6	31.4	H / 2.0 / 0.0	-12.1	N/A
145.41	41.0 Qp	1.3 / 12.5 / 27.6	27.3	H / 2.0 / 0.0	-16.2	N/A
149.07	40.0 Qp	1.3 / 12.3 / 27.5	26.0	H / 2.0 / 0.0	-17.5	N/A
171.18	29.4 Qp	1.4 / 12.6 / 27.4	16.0	H / 2.0 / 0.0	-27.5	N/A
193.58	24.6 Qp	1.5 / 13.7 / 27.2	12.6	H / 2.0 / 0.0	-30.9	N/A
90 degrees						
40.07	36.0 Qp	0.7 / 11.7 / 28.1	20.2	H / 2.0 / 90.0	-19.8	N/A
46.12	45.9 Qp	0.7 / 10.9 / 28.2	29.3	H / 2.0 / 90.0	-10.7	N/A
52.98	43.5 Qp	0.7 / 9.9 / 28.1	26.0	H / 2.0 / 90.0	-14.0	N/A
60.77	43.5 Qp	0.7 / 8.8 / 28.1	24.9	H / 2.0 / 90.0	-15.1	N/A
135.73	43.4 Qp	1.3 / 12.6 / 27.6	29.5	H / 2.0 / 90.0	-14.0	N/A
141.74	48.4 Qp	1.3 / 12.5 / 27.6	34.6	H / 2.0 / 90.0	-8.9	N/A
145.41	42.5 Qp	1.3 / 12.5 / 27.6	28.7	H / 2.0 / 90.0	-14.8	N/A
149.07	40.9 Qp	1.3 / 12.3 / 27.5	26.9	H / 2.0 / 90.0	-16.6	N/A
160.08	32.9 Qp	1.4 / 12.4 / 27.5	19.1	H / 2.0 / 90.0	-24.4	N/A
163.85	36.1 Qp	1.4 / 12.4 / 27.5	22.5	H / 2.0 / 90.0	-21.0	N/A
165.92	34.6 Qp	1.4 / 12.4 / 27.5	20.9	H / 2.0 / 90.0	-22.6	N/A
167.51	35.2 Qp	1.4 / 12.5 / 27.4	21.6	H / 2.0 / 90.0	-21.9	N/A
193.58	34.9 Qp	1.5 / 13.7 / 27.2	22.8	H / 2.0 / 90.0	-20.7	N/A
180 degrees						
149.07	41.6 Qp	1.3 / 12.3 / 27.5	27.7	H / 2.0 / 180.0	-15.8	N/A

Radiated Electromagnetic Emissions

Test Report #: **BC500397 Run 02**
 Test Method: FCC Part 15.209
 EUT Model #: PC-W
 EUT Serial #: 110405J3
 Manufacturer: Colorado Time Systems
 EUT Description: Pace Clock
 Notes:

Test Area: Pinewood Site 1 (3m)
 Test Date: 12-Jan-2006
 EUT Power: 120 VAC 60 Hz

Temperature: 11.0 °C
 Relative Humidity: 26 %
 Air Pressure: 81 kPa

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Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL (dBuV)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) 15.209 <1GHz	DELTA2 (dB) 15.209 >1GHz
145.41	44.0 Qp	1.3 / 12.5 / 27.6	30.2	H / 2.0 / 180.0	-13.3	N/A
117.01	40.0 Qp	1.2 / 11.5 / 27.8	24.9	H / 2.0 / 180.0	-18.6	N/A
112.28	40.5 Qp	1.1 / 10.8 / 27.8	24.7	H / 2.0 / 180.0	-18.8	N/A
82.98	51.0 Qp	0.9 / 6.9 / 28.0	30.9	H / 2.0 / 180.0	-9.1	N/A
64.56	52.5 Qp	0.8 / 8.5 / 28.1	33.7	H / 2.0 / 180.0	-6.3	N/A
270 degrees						
46.12	45.0 Qp	0.7 / 10.9 / 28.2	28.5	H / 2.0 / 270.0	-11.5	N/A
171.18	33.0 Qp	1.4 / 12.6 / 27.4	19.6	H / 2.0 / 270.0	-23.9	N/A
The following were maximized between 30 - 200 MHz, Horizontal.						
64.56	54.8 Qp	0.8 / 8.5 / 28.1	36.0	H / 3.1 / 156.0	-4.0	N/A
82.98	51.7 Qp	0.9 / 6.9 / 28.0	31.6	H / 2.2 / 195.0	-8.4	N/A
101.38	56.6 Qp	1.1 / 9.3 / 27.9	39.1	H / 1.8 / 21.0	-4.4	N/A
141.74	49.4 Qp	1.3 / 12.5 / 27.6	35.6	H / 1.4 / 75.0	-7.9	N/A
Antenna: EMCO Log						
Vertical, 0 degrees						
200.96	26.9 Qp	1.5 / 11.5 / 27.0	12.9	V / 1.0 / 0.0	-30.6	N/A
208.95	29.4 Qp	1.5 / 11.4 / 26.9	15.5	V / 1.0 / 0.0	-28.0	N/A
212.01	35.8 Qp	1.5 / 11.4 / 26.9	21.8	V / 1.0 / 0.0	-21.7	N/A
214.35	29.2 Qp	1.5 / 11.3 / 26.8	15.3	V / 1.0 / 0.0	-28.2	N/A
221.22	33.8 Qp	1.6 / 11.2 / 26.8	19.8	V / 1.0 / 0.0	-26.2	N/A
222.61	28.9 Qp	1.6 / 11.2 / 26.8	15.0	V / 1.0 / 0.0	-31.0	N/A
230.43	25.9 Qp	1.6 / 11.2 / 26.7	12.0	V / 1.0 / 0.0	-34.0	N/A
233.79	24.3 Qp	1.6 / 11.4 / 26.7	10.7	V / 1.0 / 0.0	-35.3	N/A
239.65	32.0 Qp	1.7 / 11.8 / 26.6	18.9	V / 1.0 / 0.0	-27.1	N/A
244.00	29.4 Qp	1.7 / 12.0 / 26.6	16.5	V / 1.0 / 0.0	-29.5	N/A
248.92	27.9 Qp	1.7 / 12.2 / 26.6	15.2	V / 1.0 / 0.0	-30.8	N/A
249.26	27.5 Qp	1.7 / 12.3 / 26.6	14.9	V / 1.0 / 0.0	-31.1	N/A
250.68	26.2 Qp	1.7 / 12.3 / 26.6	13.7	V / 1.0 / 0.0	-32.3	N/A
251.73	27.1 Qp	1.7 / 12.4 / 26.6	14.5	V / 1.0 / 0.0	-31.5	N/A
253.58	25.4 Qp	1.7 / 12.5 / 26.6	13.0	V / 1.0 / 0.0	-33.0	N/A
256.50	27.6 Qp	1.8 / 12.6 / 26.6	15.3	V / 1.0 / 0.0	-30.7	N/A
257.19	26.1 Qp	1.8 / 12.7 / 26.6	13.9	V / 1.0 / 0.0	-32.1	N/A

Radiated Electromagnetic Emissions

Test Report #: **BC500397 Run 02**
 Test Method: FCC Part 15.209
 EUT Model #: PC-W
 EUT Serial #: 110405J3
 Manufacturer: Colorado Time Systems
 EUT Description: Pace Clock
 Notes:

Test Area: Pinewood Site 1 (3m)
 Test Date: 12-Jan-2006
 EUT Power: 120 VAC 60 Hz

Temperature: 11.0 °C
 Relative Humidity: 26 %
 Air Pressure: 81 kPa

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Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB/m) (dB)	(dBuV)	(m) (DEG)	15.209 <1GHz	15.209 >1GHz
260.41	25.6 Qp	1.8 / 12.8 / 26.6	13.5	V / 1.0 / 0.0	-32.5	N/A
261.83	24.6 Qp	1.8 / 12.9 / 26.6	12.7	V / 1.0 / 0.0	-33.3	N/A
263.26	27.0 Qp	1.8 / 12.9 / 26.6	15.1	V / 1.0 / 0.0	-30.9	N/A
267.58	26.0 Qp	1.8 / 13.1 / 26.6	14.3	V / 1.0 / 0.0	-31.7	N/A
268.20	24.2 Qp	1.8 / 13.1 / 26.6	12.5	V / 1.0 / 0.0	-33.5	N/A
276.53	26.2 Qp	1.8 / 13.4 / 26.6	14.9	V / 1.0 / 0.0	-31.1	N/A
285.73	25.4 Qp	1.8 / 13.8 / 26.6	14.4	V / 1.0 / 0.0	-31.6	N/A
294.96	24.9 Qp	1.9 / 14.2 / 26.6	14.3	V / 1.0 / 0.0	-31.7	N/A
304.17	24.2 Qp	1.9 / 14.7 / 26.5	14.2	V / 1.0 / 0.0	-31.8	N/A
313.38	29.9 Qp	1.9 / 15.3 / 26.5	20.7	V / 1.0 / 0.0	-25.3	N/A
322.59	28.4 Qp	2.0 / 15.1 / 26.4	19.0	V / 1.0 / 0.0	-27.0	N/A
331.82	27.8 Qp	2.0 / 14.8 / 26.4	18.1	V / 1.0 / 0.0	-27.9	N/A
341.03	26.1 Qp	2.0 / 15.0 / 26.5	16.6	V / 1.0 / 0.0	-29.4	N/A
350.24	39.2 Qp	2.1 / 15.2 / 26.6	29.9	V / 1.0 / 0.0	-16.1	N/A
359.46	30.9 Qp	2.1 / 15.4 / 26.7	21.6	V / 1.0 / 0.0	-24.4	N/A
368.69	27.3 Qp	2.1 / 15.6 / 26.9	18.1	V / 1.0 / 0.0	-27.9	N/A
377.89	27.4 Qp	2.1 / 15.7 / 27.0	18.3	V / 1.0 / 0.0	-27.7	N/A
387.11	39.6 Qp	2.2 / 15.8 / 27.1	30.5	V / 1.0 / 0.0	-15.5	N/A
396.33	27.8 Qp	2.2 / 16.0 / 27.1	18.8	V / 1.0 / 0.0	-27.2	N/A
405.53	27.4 Qp	2.2 / 16.2 / 27.0	18.8	V / 1.0 / 0.0	-27.2	N/A
406.61	34.0 Qp	2.2 / 16.2 / 27.0	25.3	V / 1.0 / 0.0	-20.7	N/A
414.75	29.1 Qp	2.3 / 16.4 / 27.0	20.7	V / 1.0 / 0.0	-25.3	N/A
423.98	29.9 Qp	2.3 / 16.6 / 27.0	21.7	V / 1.0 / 0.0	-24.3	N/A
433.19	29.2 Qp	2.4 / 16.8 / 27.2	21.1	V / 1.0 / 0.0	-24.9	N/A
470.05	30.9 Qp	2.5 / 17.9 / 27.7	23.6	V / 1.0 / 0.0	-22.4	N/A
488.50	23.6 Qp	2.6 / 18.5 / 27.8	16.8	V / 1.0 / 0.0	-29.2	N/A
494.33	28.2 Qp	2.6 / 18.6 / 27.8	21.7	V / 1.0 / 0.0	-24.3	N/A
506.92	27.4 Qp	2.6 / 19.0 / 27.8	21.2	V / 1.0 / 0.0	-24.8	N/A
534.57	27.3 Qp	2.6 / 18.9 / 27.9	20.9	V / 1.0 / 0.0	-25.1	N/A
543.79	30.0 Qp	2.6 / 19.1 / 27.9	23.9	V / 1.0 / 0.0	-22.1	N/A
553.00	25.2 Qp	2.7 / 19.3 / 28.0	19.2	V / 1.0 / 0.0	-26.8	N/A
562.23	25.2 Qp	2.7 / 19.4 / 28.0	19.3	V / 1.0 / 0.0	-26.7	N/A

Radiated Electromagnetic Emissions

Test Report #: **BC500397 Run 02**
 Test Method: FCC Part 15.209
 EUT Model #: PC-W
 EUT Serial #: 110405J3
 Manufacturer: Colorado Time Systems
 EUT Description: Pace Clock
 Notes:

Test Area: Pinewood Site 1 (3m)
 Test Date: 12-Jan-2006
 EUT Power: 120 VAC 60 Hz

Temperature: 11.0 °C
 Relative Humidity: 26 %
 Air Pressure: 81 kPa

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Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL (dBuV)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) 15.209 <1GHz	DELTA2 (dB) 15.209 >1GHz
654.38	24.1 Qp	3.0 / 20.4 / 26.1	21.5	V / 1.0 / 0.0	-24.5	N/A
699.28	25.4 Qp	3.2 / 21.6 / 23.3	26.9	V / 1.0 / 0.0	-19.1	N/A
No significant emissions detected between 700 and 1000 MHz.						
The following are noise floor points.						
750.00	19.9 Qp	3.2 / 21.3 / 17.0	27.4	V / 1.0 / 0.0	-18.6	N/A
90 degrees						
230.43	30.9 Qp	1.6 / 11.2 / 26.7	17.0	V / 1.0 / 90.0	-29.0	N/A
263.26	28.1 Qp	1.8 / 12.9 / 26.6	16.2	V / 1.0 / 90.0	-29.8	N/A
267.58	26.9 Qp	1.8 / 13.1 / 26.6	15.2	V / 1.0 / 90.0	-30.8	N/A
276.53	28.1 Qp	1.8 / 13.4 / 26.6	16.8	V / 1.0 / 90.0	-29.2	N/A
285.73	28.9 Qp	1.8 / 13.8 / 26.6	17.9	V / 1.0 / 90.0	-28.1	N/A
294.96	26.6 Qp	1.9 / 14.2 / 26.6	16.0	V / 1.0 / 90.0	-30.0	N/A
304.17	30.4 Qp	1.9 / 14.7 / 26.5	20.5	V / 1.0 / 90.0	-25.5	N/A
341.03	30.2 Qp	2.0 / 15.0 / 26.5	20.8	V / 1.0 / 90.0	-25.2	N/A
350.24	41.2 Qp	2.1 / 15.2 / 26.6	31.9	V / 1.0 / 90.0	-14.1	N/A
359.46	33.0 Qp	2.1 / 15.4 / 26.7	23.8	V / 1.0 / 90.0	-22.2	N/A
368.69	31.6 Qp	2.1 / 15.6 / 26.9	22.3	V / 1.0 / 90.0	-23.7	N/A
405.53	38.0 Qp	2.2 / 16.2 / 27.0	29.4	V / 1.0 / 90.0	-16.6	N/A
414.75	36.4 Qp	2.3 / 16.4 / 27.0	28.0	V / 1.0 / 90.0	-18.0	N/A
423.98	37.6 Qp	2.3 / 16.6 / 27.0	29.4	V / 1.0 / 90.0	-16.6	N/A
433.19	32.6 Qp	2.4 / 16.8 / 27.2	24.6	V / 1.0 / 90.0	-21.4	N/A
488.50	29.1 Qp	2.6 / 18.5 / 27.8	22.3	V / 1.0 / 90.0	-23.7	N/A
180 degrees						
359.46	33.9 Qp	2.1 / 15.4 / 26.7	24.6	V / 1.0 / 180.0	-21.4	N/A
331.82	34.0 Qp	2.0 / 14.8 / 26.4	24.3	V / 1.0 / 180.0	-21.7	N/A
322.59	33.6 Qp	2.0 / 15.1 / 26.4	24.2	V / 1.0 / 180.0	-21.8	N/A
313.38	33.3 Qp	1.9 / 15.3 / 26.5	24.1	V / 1.0 / 180.0	-21.9	N/A
294.96	31.9 Qp	1.9 / 14.2 / 26.6	21.3	V / 1.0 / 180.0	-24.7	N/A
285.73	30.8 Qp	1.8 / 13.8 / 26.6	19.8	V / 1.0 / 180.0	-26.2	N/A
233.79	29.2 Qp	1.6 / 11.4 / 26.7	15.6	V / 1.0 / 180.0	-30.4	N/A
230.43	33.2 Qp	1.6 / 11.2 / 26.7	19.4	V / 1.0 / 180.0	-26.6	N/A
270 degrees						

Radiated Electromagnetic Emissions

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 Test Method: FCC Part 15.209
 EUT Model #: PC-W
 EUT Serial #: 110405J3
 Manufacturer: Colorado Time Systems
 EUT Description: Pace Clock
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Test Area: Pinewood Site 1 (3m)
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FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dBm) (dB)	FINAL (dBuV)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) 15.209 <1GHz	DELTA2 (dB) 15.209 >1GHz
331.82	35.7 Qp	2.0 / 14.8 / 26.4	26.1	V / 1.0 / 270.0	-19.9	N/A
341.03	34.5 Qp	2.0 / 15.0 / 26.5	25.1	V / 1.0 / 270.0	-20.9	N/A
506.92	29.2 Qp	2.6 / 19.0 / 27.8	22.9	V / 1.0 / 270.0	-23.1	N/A
The following were maximized between 200 - 1000 MHz, Vertical.						
212.01	36.0 Qp	1.5 / 11.4 / 26.9	21.9	V / 1.0 / 10.0	-21.6	N/A
350.24	45.1 Qp	2.1 / 15.2 / 26.6	35.8	V / 1.0 / 226.0	-10.2	N/A
387.11	39.9 Qp	2.2 / 15.8 / 27.1	30.8	V / 1.0 / 0.0	-15.2	N/A
405.53	38.2 Qp	2.2 / 16.2 / 27.0	29.6	V / 1.0 / 85.0	-16.4	N/A
423.98	37.9 Qp	2.3 / 16.6 / 27.0	29.7	V / 1.0 / 86.0	-16.3	N/A
Changed to Horizontal, 0 degrees						
212.01	29.0 Qp	1.5 / 11.4 / 26.9	15.0	H / 1.6 / 0.0	-28.5	N/A
221.22	26.4 Qp	1.6 / 11.2 / 26.8	12.3	H / 1.6 / 0.0	-33.7	N/A
230.43	25.6 Qp	1.6 / 11.2 / 26.7	11.7	H / 1.6 / 0.0	-34.3	N/A
239.65	27.4 Qp	1.7 / 11.8 / 26.6	14.3	H / 1.6 / 0.0	-31.7	N/A
256.50	26.6 Qp	1.8 / 12.6 / 26.6	14.4	H / 1.6 / 0.0	-31.6	N/A
263.26	26.4 Qp	1.8 / 12.9 / 26.6	14.4	H / 1.6 / 0.0	-31.6	N/A
267.58	25.9 Qp	1.8 / 13.1 / 26.6	14.2	H / 1.6 / 0.0	-31.8	N/A
285.73	25.8 Qp	1.8 / 13.8 / 26.6	14.8	H / 1.6 / 0.0	-31.2	N/A
304.17	31.3 Qp	1.9 / 14.7 / 26.5	21.3	H / 1.6 / 0.0	-24.7	N/A
313.38	37.5 Qp	1.9 / 15.3 / 26.5	28.3	H / 1.6 / 0.0	-17.7	N/A
322.59	36.6 Qp	2.0 / 15.1 / 26.4	27.2	H / 1.6 / 0.0	-18.8	N/A
331.82	32.9 Qp	2.0 / 14.8 / 26.4	23.3	H / 1.6 / 0.0	-22.7	N/A
350.24	31.9 Qp	2.1 / 15.2 / 26.6	22.7	H / 1.6 / 0.0	-23.3	N/A
359.46	28.9 Qp	2.1 / 15.4 / 26.7	19.7	H / 1.6 / 0.0	-26.3	N/A
377.89	29.1 Qp	2.1 / 15.7 / 27.0	20.0	H / 1.6 / 0.0	-26.0	N/A
387.11	38.5 Qp	2.2 / 15.8 / 27.1	29.4	H / 1.6 / 0.0	-16.6	N/A
405.53	46.0 Qp	2.2 / 16.2 / 27.0	37.4	H / 1.6 / 0.0	-8.6	N/A
406.61	35.6 Qp	2.2 / 16.2 / 27.0	27.0	H / 1.6 / 0.0	-19.0	N/A
414.75	43.4 Qp	2.3 / 16.4 / 27.0	35.0	H / 1.6 / 0.0	-11.0	N/A
423.98	37.6 Qp	2.3 / 16.6 / 27.0	29.5	H / 1.6 / 0.0	-16.5	N/A
433.19	38.1 Qp	2.4 / 16.8 / 27.2	30.1	H / 1.6 / 0.0	-15.9	N/A
470.05	33.5 Qp	2.5 / 17.9 / 27.7	26.2	H / 1.6 / 0.0	-19.8	N/A

Radiated Electromagnetic Emissions

Test Report #: **BC500397 Run 02**
 Test Method: FCC Part 15.209
 EUT Model #: PC-W
 EUT Serial #: 110405J3
 Manufacturer: Colorado Time Systems
 EUT Description: Pace Clock
 Notes:

Test Area: Pinewood Site 1 (3m)
 Test Date: 12-Jan-2006
 EUT Power: 120 VAC 60 Hz

Temperature: 11.0 °C
 Relative Humidity: 26 %
 Air Pressure: 81 kPa

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Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dBm) (dB)	FINAL (dBuV)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) 15.209 <1GHz	DELTA2 (dB) 15.209 >1GHz
488.50	37.6 Qp	2.6 / 18.5 / 27.8	30.8	H / 1.6 / 0.0	-15.2	N/A
494.33	30.0 Qp	2.6 / 18.6 / 27.8	23.4	H / 1.6 / 0.0	-22.6	N/A
534.57	30.6 Qp	2.6 / 18.9 / 27.9	24.2	H / 1.6 / 0.0	-21.8	N/A
562.23	31.2 Qp	2.7 / 19.4 / 28.0	25.3	H / 1.6 / 0.0	-20.7	N/A
562.23	32.1 Qp	2.7 / 19.4 / 28.0	26.3	H / 2.5 / 0.0	-19.7	N/A
494.33	33.3 Qp	2.6 / 18.6 / 27.8	26.7	H / 2.5 / 0.0	-19.3	N/A
405.53	38.8 Qp	2.2 / 16.2 / 27.0	30.1	H / 2.5 / 0.0	-15.9	N/A
322.59	38.0 Qp	2.0 / 15.1 / 26.4	28.7	H / 2.5 / 0.0	-17.3	N/A
313.38	41.0 Qp	1.9 / 15.3 / 26.5	31.7	H / 2.5 / 0.0	-14.3	N/A
304.17	34.5 Qp	1.9 / 14.7 / 26.5	24.5	H / 2.5 / 0.0	-21.5	N/A
90 degrees						
331.82	36.5 Qp	2.0 / 14.8 / 26.4	26.9	H / 2.5 / 90.0	-19.1	N/A
506.92	31.4 Qp	2.6 / 19.0 / 27.8	25.2	H / 2.5 / 90.0	-20.8	N/A
543.79	33.9 Qp	2.6 / 19.1 / 27.9	27.7	H / 2.5 / 90.0	-18.3	N/A
396.33	32.2 Qp	2.2 / 16.0 / 27.1	23.3	H / 1.6 / 90.0	-22.7	N/A
256.50	28.8 Qp	1.8 / 12.6 / 26.6	16.5	H / 1.6 / 90.0	-29.5	N/A
230.43	33.1 Qp	1.6 / 11.2 / 26.7	19.3	H / 1.6 / 90.0	-26.7	N/A
221.22	34.4 Qp	1.6 / 11.2 / 26.8	20.4	H / 1.6 / 90.0	-25.6	N/A
200.96	31.0 Qp	1.5 / 11.5 / 27.0	17.0	H / 1.6 / 90.0	-26.5	N/A
180 degrees						
239.65	33.1 Qp	1.7 / 11.8 / 26.6	20.0	H / 1.6 / 180.0	-26.0	N/A
350.24	37.6 Qp	2.1 / 15.2 / 26.6	28.3	H / 2.5 / 180.0	-17.7	N/A
270 degrees						
239.65	33.6 Qp	1.7 / 11.8 / 26.6	20.4	H / 2.5 / 270.0	-25.6	N/A
494.33	34.1 Qp	2.6 / 18.6 / 27.8	27.5	H / 2.5 / 270.0	-18.5	N/A
553.00	27.6 Qp	2.7 / 19.3 / 28.0	21.6	H / 2.5 / 270.0	-24.4	N/A
The following were maximized between 200 - 1000 MHz, Horizontal.						
313.38	41.4 Qp	1.9 / 15.3 / 26.5	32.1	H / 2.5 / 5.0	-13.9	N/A
405.53	46.1 Qp	2.2 / 16.2 / 27.0	37.5	H / 1.6 / 0.0	-8.5	N/A
414.75	43.7 Qp	2.3 / 16.4 / 27.0	35.3	H / 1.7 / 355.0	-10.7	N/A
488.50	39.0 Qp	2.6 / 18.5 / 27.8	32.3	H / 1.4 / 12.0	-13.7	N/A
No emissions detected from 700 MHz - 1000 MHz.						

Radiated Electromagnetic Emissions

Test Report #: **BC500397 Run 02**
 Test Method: FCC Part 15.209
 EUT Model #: PC-W
 EUT Serial #: 110405J3
 Manufacturer: Colorado Time Systems
 EUT Description: Pace Clock
 Notes:

Test Area: Pinewood Site 1 (3m)
 Test Date: 12-Jan-2006
 EUT Power: 120 VAC 60 Hz

Temperature: 11.0 °C
 Relative Humidity: 26 %
 Air Pressure: 81 kPa

Page:

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB\m) (dB)	FINAL (dBuV)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) 15.209 <1GHz	DELTA2 (dB) 15.209 >1GHz
The following are noise floor points.						
850.00	19.4 Qp	3.4 / 22.4 / 27.8	17.4	H / 1.6 / 0.0	-28.6	N/A
950.00	19.8 Qp	3.7 / 23.5 / 27.5	19.4	H / 1.6 / 0.0	-26.6	N/A
1 - 4 GHz, Vertical, 0 degrees						
0, 90, 180, 270 degrees						
No significant emissions detected between 1 - 4 GHz, vertical.						
The following are noise floor points.						
1000.00	34.5 Av	3.7 / 22.0 / 37.6	22.6	V / 1.0 / 0.0	N/A	-31.4
2000.00	35.1 Av	3.2 / 25.9 / 36.4	27.8	V / 1.0 / 0.0	N/A	-26.2
3000.00	35.7 Av	4.6 / 27.7 / 37.4	30.5	V / 1.0 / 0.0	N/A	-23.5
Horizontal						
0, 90, 180, 270 degrees						
No significant emissions detected, the following are noise floor points.						
1500.00	34.3 Av	2.9 / 23.7 / 25.8	35.1	H / 1.0 / 0.0	N/A	-18.9
2500.00	34.5 Av	4.0 / 26.3 / 37.4	27.3	H / 1.0 / 0.0	N/A	-26.7
3500.00	34.0 Av	4.8 / 28.6 / 36.7	30.8	H / 1.0 / 0.0	N/A	-23.2
4 - 8 GHz						
No significant emissions the following are noise floor points.						
Horizontal						
4000.00	33.2 Av	5.7 / 29.7 / 39.8	28.9	H / 1.0 / 0.0	N/A	-25.1
5000.00	33.9 Av	7.6 / 31.4 / 40.4	32.5	H / 1.0 / 0.0	N/A	-21.5
6000.00	32.0 Av	7.7 / 32.2 / 39.6	32.3	H / 1.0 / 0.0	N/A	-21.7
7000.00	32.9 Av	8.1 / 33.1 / 40.5	33.6	H / 1.0 / 0.0	N/A	-20.4
Vertical						
4500.00	34.6 Av	6.6 / 30.1 / 40.5	30.8	V / 1.0 / 0.0	N/A	-23.2
5500.00	33.0 Av	6.7 / 32.0 / 40.3	31.5	V / 1.0 / 0.0	N/A	-22.5
6500.00	32.5 Av	8.5 / 32.0 / 40.3	32.6	V / 1.0 / 0.0	N/A	-21.4
7500.00	32.7 Av	8.2 / 34.2 / 39.9	35.2	V / 1.0 / 0.0	N/A	-18.8
8 - 10 GHz						
No significant emissions detected between 8 - 10 GHz.						
The following are noise floor points.						
Vertical.						

Radiated Electromagnetic Emissions

Test Report #: **BC500397 Run 02** Test Area: Pinewood Site 1 (3m)
 Test Method: FCC Part 15.209 Test Date: 12-Jan-2006
 EUT Model #: PC-W EUT Power: 120 VAC 60 Hz
 EUT Serial #: 110405J3
 Manufacturer: Colorado Time Systems
 EUT Description: Pace Clock
 Notes:

Temperature: 11.0 °C
 Relative Humidity: 26 %
 Air Pressure: 81 kPa

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Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av – Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB\m) (dB)	FINAL (dBuV)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) 15.209 <1GHz	DELTA2 (dB) 15.209 >1GHz
8000.00	42.0 Av	8.3 / 34.3 / 46.5	38.1	V / 1.0 / 0.0	N/A	-15.9
9000.00	43.5 Av	8.5 / 35.1 / 48.6	38.5	V / 1.0 / 0.0	N/A	-15.5
10000.0	44.7 Av	9.5 / 35.4 / 48.6	41.0	V / 1.0 / 0.0	N/A	-13.0
Horizontal						
8500.00	43.3 Av	8.5 / 34.6 / 48.0	38.4	H / 1.0 / 0.0	N/A	-15.6
9500.00	44.0 Av	9.4 / 35.6 / 48.8	40.2	H / 1.0 / 0.0	N/A	-13.8
End of Run						

Radiated Electromagnetic Emissions

Test Report #:	BC500397 Run 02	Test Area:	Pinewood Site 1 (3m)
Test Method:	FCC Part 15.209	Test Date:	12-Jan-2006
EUT Model #:	PC-W	EUT Power:	120 VAC 60 Hz
EUT Serial #:	110405J3		
Manufacturer:	Colorado Time Systems		
EUT Description:	Pace Clock		
Notes:			

Temperature:	11.0	°C
Relative Humidity:	26	%
Air Pressure:	81	kPa

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Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	15.209 <1GHz	15.209 >1GHz
***** Measurement Summary *****						
101.38	57.4 Qp	1.1 / 9.3 / 27.9	39.9	V / 1.0 / 140.0	-3.6	N/A
64.56	54.8 Qp	0.8 / 8.5 / 28.1	36.0	H / 3.1 / 156.0	-4.0	N/A
141.74	49.4 Qp	1.3 / 12.5 / 27.6	35.6	H / 1.4 / 75.0	-7.9	N/A
82.98	51.7 Qp	0.9 / 6.9 / 28.0	31.6	H / 2.2 / 195.0	-8.4	N/A
405.53	46.1 Qp	2.2 / 16.2 / 27.0	37.5	H / 1.6 / 0.0	-8.5	N/A
40.35	45.8 Qp	0.7 / 11.6 / 28.2	29.9	V / 1.0 / 71.0	-10.1	N/A
350.24	45.1 Qp	2.1 / 15.2 / 26.6	35.8	V / 1.0 / 226.0	-10.2	N/A
46.12	45.9 Qp	0.7 / 10.9 / 28.2	29.3	H / 2.0 / 90.0	-10.7	N/A
414.75	43.7 Qp	2.3 / 16.4 / 27.0	35.3	H / 1.7 / 355.0	-10.7	N/A
40.07	44.5 Qp	0.7 / 11.7 / 28.1	28.8	V / 1.0 / 90.0	-11.2	N/A
40.61	43.6 Qp	0.7 / 11.6 / 28.2	27.7	V / 1.0 / 90.0	-12.3	N/A
52.73	45.1 Qp	0.7 / 9.9 / 28.1	27.6	V / 1.0 / 180.0	-12.4	N/A
39.82	43.2 Qp	0.6 / 11.7 / 28.1	27.5	V / 1.0 / 90.0	-12.5	N/A
52.46	45.0 Qp	0.7 / 9.9 / 28.1	27.5	V / 1.0 / 180.0	-12.5	N/A
10000.0	44.7 Av	9.5 / 35.4 / 48.6	41.0	V / 1.0 / 0.0	N/A	-13.0
52.98	44.4 Qp	0.7 / 9.9 / 28.1	26.8	V / 1.0 / 180.0	-13.2	N/A
145.41	44.0 Qp	1.3 / 12.5 / 27.6	30.2	H / 2.0 / 180.0	-13.3	N/A
488.50	39.0 Qp	2.6 / 18.5 / 27.8	32.3	H / 1.4 / 12.0	-13.7	N/A
9500.00	44.0 Av	9.4 / 35.6 / 48.8	40.2	H / 1.0 / 0.0	N/A	-13.8
30.85	40.9 Qp	0.5 / 12.9 / 28.2	26.1	V / 1.0 / 180.0	-13.9	N/A
313.38	41.4 Qp	1.9 / 15.3 / 26.5	32.1	H / 2.5 / 5.0	-13.9	N/A
135.73	43.4 Qp	1.3 / 12.6 / 27.6	29.5	H / 2.0 / 90.0	-14.0	N/A
31.12	40.2 Qp	0.6 / 12.9 / 28.2	25.4	V / 1.0 / 180.0	-14.6	N/A
60.77	43.5 Qp	0.7 / 8.8 / 28.1	24.9	H / 2.0 / 90.0	-15.1	N/A
387.11	39.9 Qp	2.2 / 15.8 / 27.1	30.8	V / 1.0 / 0.0	-15.2	N/A
9000.00	43.5 Av	8.5 / 35.1 / 48.6	38.5	V / 1.0 / 0.0	N/A	-15.5
8500.00	43.3 Av	8.5 / 34.6 / 48.0	38.4	H / 1.0 / 0.0	N/A	-15.6
149.07	41.6 Qp	1.3 / 12.3 / 27.5	27.7	H / 2.0 / 180.0	-15.8	N/A
433.19	38.1 Qp	2.4 / 16.8 / 27.2	30.1	H / 1.6 / 0.0	-15.9	N/A
8000.00	42.0 Av	8.3 / 34.3 / 46.5	38.1	V / 1.0 / 0.0	N/A	-15.9

Radiated Electromagnetic Emissions

Test Report #: **BC500397 Run 02**
 Test Method: FCC Part 15.209
 EUT Model #: PC-W
 EUT Serial #: 110405J3
 Manufacturer: Colorado Time Systems
 EUT Description: Pace Clock
 Notes:

Test Area: Pinewood Site 1 (3m)
 Test Date: 12-Jan-2006
 EUT Power: 120 VAC 60 Hz

Temperature: 11.0 °C
 Relative Humidity: 26 %
 Air Pressure: 81 kPa

Page:

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	15.209 <1GHz	15.209 >1GHz
423.98	37.9 Qp	2.3 / 16.6 / 27.0	29.7	V / 1.0 / 86.0	-16.3	N/A
86.19	43.4 Qp	1.0 / 7.2 / 28.0	23.6	H / 2.0 / 0.0	-16.4	N/A
72.45	41.5 Qp	0.8 / 9.0 / 28.0	23.3	V / 1.0 / 180.0	-16.7	N/A
322.59	38.0 Qp	2.0 / 15.1 / 26.4	28.7	H / 2.5 / 0.0	-17.3	N/A
75.51	42.0 Qp	0.9 / 7.7 / 28.0	22.5	V / 1.0 / 180.0	-17.5	N/A
31.39	36.8 Qp	0.6 / 12.8 / 28.2	21.9	V / 1.0 / 0.0	-18.1	N/A
543.79	33.9 Qp	2.6 / 19.1 / 27.9	27.7	H / 2.5 / 90.0	-18.3	N/A
494.33	34.1 Qp	2.6 / 18.6 / 27.8	27.5	H / 2.5 / 270.0	-18.5	N/A
117.01	40.0 Qp	1.2 / 11.5 / 27.8	24.9	H / 2.0 / 180.0	-18.6	N/A
750.00	19.9 Qp	3.2 / 21.3 / 17.0	27.4	V / 1.0 / 0.0	-18.6	N/A
112.28	40.5 Qp	1.1 / 10.8 / 27.8	24.7	H / 2.0 / 180.0	-18.8	N/A
115.93	40.0 Qp	1.2 / 11.3 / 27.8	24.7	V / 1.0 / 0.0	-18.8	N/A
7500.00	32.7 Av	8.2 / 34.2 / 39.9	35.2	V / 1.0 / 0.0	N/A	-18.8
1500.00	34.3 Av	2.9 / 23.7 / 25.8	35.1	H / 1.0 / 0.0	N/A	-18.9
406.61	35.6 Qp	2.2 / 16.2 / 27.0	27.0	H / 1.6 / 0.0	-19.0	N/A
331.82	36.5 Qp	2.0 / 14.8 / 26.4	26.9	H / 2.5 / 90.0	-19.1	N/A
699.28	25.4 Qp	3.2 / 21.6 / 23.3	26.9	V / 1.0 / 0.0	-19.1	N/A
120.72	39.0 Qp	1.2 / 11.8 / 27.8	24.2	V / 1.0 / 0.0	-19.3	N/A
562.23	32.1 Qp	2.7 / 19.4 / 28.0	26.3	H / 2.5 / 0.0	-19.7	N/A
470.05	33.5 Qp	2.5 / 17.9 / 27.7	26.2	H / 1.6 / 0.0	-19.8	N/A
121.22	38.3 Qp	1.2 / 11.8 / 27.8	23.5	V / 1.0 / 0.0	-20.0	N/A
7000.00	32.9 Av	8.1 / 33.1 / 40.5	33.6	H / 1.0 / 0.0	N/A	-20.4
193.58	34.9 Qp	1.5 / 13.7 / 27.2	22.8	H / 2.0 / 90.0	-20.7	N/A
506.92	31.4 Qp	2.6 / 19.0 / 27.8	25.2	H / 2.5 / 90.0	-20.8	N/A
108.56	39.0 Qp	1.1 / 10.3 / 27.9	22.6	V / 1.0 / 0.0	-20.9	N/A
341.03	34.5 Qp	2.0 / 15.0 / 26.5	25.1	V / 1.0 / 270.0	-20.9	N/A
163.85	36.1 Qp	1.4 / 12.4 / 27.5	22.5	H / 2.0 / 90.0	-21.0	N/A
109.89	38.6 Qp	1.1 / 10.5 / 27.9	22.4	V / 1.0 / 0.0	-21.1	N/A
54.62	36.5 Qp	0.7 / 9.6 / 28.1	18.7	V / 1.0 / 0.0	-21.3	N/A
359.46	33.9 Qp	2.1 / 15.4 / 26.7	24.6	V / 1.0 / 180.0	-21.4	N/A
6500.00	32.5 Av	8.5 / 32.0 / 40.3	32.6	V / 1.0 / 0.0	N/A	-21.4
304.17	34.5 Qp	1.9 / 14.7 / 26.5	24.5	H / 2.5 / 0.0	-21.5	N/A

Radiated Electromagnetic Emissions

Test Report #: **BC500397 Run 02**
 Test Method: FCC Part 15.209
 EUT Model #: PC-W
 EUT Serial #: 110405J3
 Manufacturer: Colorado Time Systems
 EUT Description: Pace Clock
 Notes:

Test Area: Pinewood Site 1 (3m)
 Test Date: 12-Jan-2006
 EUT Power: 120 VAC 60 Hz

Temperature: 11.0 °C
 Relative Humidity: 26 %
 Air Pressure: 81 kPa

Page:

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	15.209 <1GHz	15.209 >1GHz
5000.00	33.9 Av	7.6 / 31.4 / 40.4	32.5	H / 1.0 / 0.0	N/A	-21.5
93.85	40.5 Qp	1.0 / 8.3 / 27.9	21.9	H / 2.0 / 0.0	-21.6	N/A
212.01	36.0 Qp	1.5 / 11.4 / 26.9	21.9	V / 1.0 / 10.0	-21.6	N/A
6000.00	32.0 Av	7.7 / 32.2 / 39.6	32.3	H / 1.0 / 0.0	N/A	-21.7
534.57	30.6 Qp	2.6 / 18.9 / 27.9	24.2	H / 1.6 / 0.0	-21.8	N/A
167.51	35.2 Qp	1.4 / 12.5 / 27.4	21.6	H / 2.0 / 90.0	-21.9	N/A
79.15	38.0 Qp	0.9 / 7.1 / 28.0	18.0	V / 1.0 / 90.0	-22.0	N/A
126.78	35.6 Qp	1.2 / 12.2 / 27.7	21.4	V / 1.0 / 0.0	-22.1	N/A
58.80	36.2 Qp	0.7 / 9.0 / 28.1	17.8	V / 1.0 / 0.0	-22.2	N/A
5500.00	33.0 Av	6.7 / 32.0 / 40.3	31.5	V / 1.0 / 0.0	N/A	-22.5
165.92	34.6 Qp	1.4 / 12.4 / 27.5	20.9	H / 2.0 / 90.0	-22.6	N/A
396.33	32.2 Qp	2.2 / 16.0 / 27.1	23.3	H / 1.6 / 90.0	-22.7	N/A
3500.00	34.0 Av	4.8 / 28.6 / 36.7	30.8	H / 1.0 / 0.0	N/A	-23.2
4500.00	34.6 Av	6.6 / 30.1 / 40.5	30.8	V / 1.0 / 0.0	N/A	-23.2
156.43	33.8 Qp	1.4 / 12.4 / 27.5	20.0	V / 1.0 / 0.0	-23.5	N/A
3000.00	35.7 Av	4.6 / 27.7 / 37.4	30.5	V / 1.0 / 0.0	N/A	-23.5
368.69	31.6 Qp	2.1 / 15.6 / 26.9	22.3	V / 1.0 / 90.0	-23.7	N/A
171.18	33.0 Qp	1.4 / 12.6 / 27.4	19.6	H / 2.0 / 270.0	-23.9	N/A
152.97	33.0 Qp	1.3 / 12.3 / 27.5	19.2	V / 1.0 / 0.0	-24.3	N/A
160.08	32.9 Qp	1.4 / 12.4 / 27.5	19.1	H / 2.0 / 90.0	-24.4	N/A
553.00	27.6 Qp	2.7 / 19.3 / 28.0	21.6	H / 2.5 / 270.0	-24.4	N/A
654.38	24.1 Qp	3.0 / 20.4 / 26.1	21.5	V / 1.0 / 0.0	-24.5	N/A
294.96	31.9 Qp	1.9 / 14.2 / 26.6	21.3	V / 1.0 / 180.0	-24.7	N/A
4000.00	33.2 Av	5.7 / 29.7 / 39.8	28.9	H / 1.0 / 0.0	N/A	-25.1
221.22	34.4 Qp	1.6 / 11.2 / 26.8	20.4	H / 1.6 / 90.0	-25.6	N/A
239.65	33.6 Qp	1.7 / 11.8 / 26.6	20.4	H / 2.5 / 270.0	-25.6	N/A
377.89	29.1 Qp	2.1 / 15.7 / 27.0	20.0	H / 1.6 / 0.0	-26.0	N/A
285.73	30.8 Qp	1.8 / 13.8 / 26.6	19.8	V / 1.0 / 180.0	-26.2	N/A
2000.00	35.1 Av	3.2 / 25.9 / 36.4	27.8	V / 1.0 / 0.0	N/A	-26.2
200.96	31.0 Qp	1.5 / 11.5 / 27.0	17.0	H / 1.6 / 90.0	-26.5	N/A
230.43	33.2 Qp	1.6 / 11.2 / 26.7	19.4	V / 1.0 / 180.0	-26.6	N/A
950.00	19.8 Qp	3.7 / 23.5 / 27.5	19.4	H / 1.6 / 0.0	-26.6	N/A

Radiated Electromagnetic Emissions

Test Report #: **BC500397 Run 02**
 Test Method: FCC Part 15.209
 EUT Model #: PC-W
 EUT Serial #: 110405J3
 Manufacturer: Colorado Time Systems
 EUT Description: Pace Clock
 Notes:

Test Area: Pinewood Site 1 (3m)
 Test Date: 12-Jan-2006
 EUT Power: 120 VAC 60 Hz

Temperature: 11.0 °C
 Relative Humidity: 26 %
 Air Pressure: 81 kPa

Page:

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL (dBuV)	POL / HGT / AZ (m) (DEG)	DELTA1 (dB) 15.209 <1GHz	DELTA2 (dB) 15.209 >1GHz
2500.00	34.5 Av	4.0 / 26.3 / 37.4	27.3	H / 1.0 / 0.0	N/A	-26.7
208.95	29.4 Qp	1.5 / 11.4 / 26.9	15.5	V / 1.0 / 0.0	-28.0	N/A
214.35	29.2 Qp	1.5 / 11.3 / 26.8	15.3	V / 1.0 / 0.0	-28.2	N/A
2.00	30.7 Qp	0.1 / 10.2 / 0.0	41.0	V / 1.0 / 0.0	-28.5	N/A
850.00	19.4 Qp	3.4 / 22.4 / 27.8	17.4	H / 1.6 / 0.0	-28.6	N/A
276.53	28.1 Qp	1.8 / 13.4 / 26.6	16.8	V / 1.0 / 90.0	-29.2	N/A
244.00	29.4 Qp	1.7 / 12.0 / 26.6	16.5	V / 1.0 / 0.0	-29.5	N/A
256.50	28.8 Qp	1.8 / 12.6 / 26.6	16.5	H / 1.6 / 90.0	-29.5	N/A
263.26	28.1 Qp	1.8 / 12.9 / 26.6	16.2	V / 1.0 / 90.0	-29.8	N/A
233.79	29.2 Qp	1.6 / 11.4 / 26.7	15.6	V / 1.0 / 180.0	-30.4	N/A
248.92	27.9 Qp	1.7 / 12.2 / 26.6	15.2	V / 1.0 / 0.0	-30.8	N/A
267.58	26.9 Qp	1.8 / 13.1 / 26.6	15.2	V / 1.0 / 90.0	-30.8	N/A
222.61	28.9 Qp	1.6 / 11.2 / 26.8	15.0	V / 1.0 / 0.0	-31.0	N/A
249.26	27.5 Qp	1.7 / 12.3 / 26.6	14.9	V / 1.0 / 0.0	-31.1	N/A
1000.00	34.5 Av	3.7 / 22.0 / 37.6	22.6	V / 1.0 / 0.0	N/A	-31.4
251.73	27.1 Qp	1.7 / 12.4 / 26.6	14.5	V / 1.0 / 0.0	-31.5	N/A
257.19	26.1 Qp	1.8 / 12.7 / 26.6	13.9	V / 1.0 / 0.0	-32.1	N/A
250.68	26.2 Qp	1.7 / 12.3 / 26.6	13.7	V / 1.0 / 0.0	-32.3	N/A
260.41	25.6 Qp	1.8 / 12.8 / 26.6	13.5	V / 1.0 / 0.0	-32.5	N/A
253.58	25.4 Qp	1.7 / 12.5 / 26.6	13.0	V / 1.0 / 0.0	-33.0	N/A
261.83	24.6 Qp	1.8 / 12.9 / 26.6	12.7	V / 1.0 / 0.0	-33.3	N/A
268.20	24.2 Qp	1.8 / 13.1 / 26.6	12.5	V / 1.0 / 0.0	-33.5	N/A
5.16	23.8 Qp	0.2 / 10.2 / 0.0	34.1	V / 1.0 / 0.0	-35.4	N/A
14.91	20.4 Qp	0.3 / 10.7 / 0.0	31.5	V / 1.0 / 0.0	-38.0	N/A
20.00	20.1 Qp	0.4 / 10.3 / 0.0	30.9	V / 1.0 / 0.0	-38.6	N/A
10.11	19.2 Qp	0.2 / 10.5 / 0.0	30.0	V / 1.0 / 0.0	-39.5	N/A
0.100	55.8 Qp	0.1 / 11.0 / 0.0	66.9	V / 1.0 / 0.0	-40.7	N/A
29.00	16.4 Qp	0.5 / 8.7 / 0.0	25.5	V / 1.0 / 0.0	-44.0	N/A
0.0763	51.9 Qp	0.1 / 10.9 / 0.0	62.8	V / 1.0 / 0.0	-47.1	N/A
0.0100	53.5 Qp	0.0 / 18.5 / 0.0	72.0	V / 1.0 / 0.0	-55.6	N/A

15.247 (b)(3), (c)/15.205 Test Data

Field Strength Measurements

Fundamental and Spurious of the Transmitter

Test Report #:	3090967	Test Area:	Pinewood Site 1 (3m)	Temperature:	18.0 °C
Test Method:	FCC Part 15.247	Test Date:	09-Jan-2006	Relative Humidity:	26 %
EUT Model #:	PC-W	EUT Power:	120 VAC 60 Hz	Air Pressure:	81 kPa
EUT Serial #:	110405J3			Page:	
Manufacturer:	Colorado Time Systems				
EUT Description:	Pace clock				
Notes:					

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	Duty Cycle Correction	Final Corrected	Limit	DELTA
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
The following duty cycle was declared by the manufacturer. "In this case, the maximum time that the carrier would dwell on any hopping channel is 18.8 mS in a 100 mS window. Therefore, the maximum Duty Factor correction factor of 11.3 dB was utilized in the calculations for the final measurement."								
Averaging method for pulsed signals and calculation in accordance to FCC CFR47 Part 15.35 utilized to calculate field strength emissions.								
The testing performed in accordance to FCC CFR47 Part 15.205 (restricted bands of operation) and 15.247 emissions and delta limits were calculated as follows: Final Corrected Peak Measurement – Duty Cycle Correction Factor* = Final Calculated Emission The Final Calculated Emission was then compared to the Limits in CFR47 Part 15.209 and 15.247 and the emission/limit delta was calculated. the DTCF is calculated as follows $20 \cdot \log_{10}(\text{duty cycle in 100ms})$ "not to exceed 20dB"								
Part 15.247 and 15.205 Respectively								
Determining worst case position								
EUT is in Axis 1 (EUT standing normal)								
Channel 1								
903.26	84.5 Pk	3.6 / 23.2 / 0.0	111.3	V / 1.6 / 120.0	0	111.3	125	-13.7
903.26	77.2 Pk	3.6 / 23.2 / 0.0	103.9	H / 2.5 / 115.0	0	103.9	125	-21.1
Channel 8								
908.03	76.9 Pk	3.6 / 23.2 / 0.0	103.7	H / 1.7 / 118.0	0	103.7	125	-21.3
908.03	84.8 Pk	3.6 / 23.2 / 0.0	111.5	V / 1.2 / 350.0	0	111.5	125	-13.5
Channel 5								
905.79	85.0 Pk	3.6 / 23.2 / 0.0	111.8	V / 1.2 / 353.0	0	111.8	125	-13.2
905.79	81.7 Pk	3.6 / 23.2 / 0.0	108.4	H / 1.0 / 298.0	0	108.4	125	-16.6
Eut is in Axis 2, EUT standing vertical on its side.								
Channel 5								
905.79	82.8 Pk	3.6 / 23.2 / 0.0	109.6	H / 2.5 / 51.0	0	109.6	125	-15.4
905.79	79.3 Pk	3.6 / 23.2 / 0.0	106.1	V / 1.9 / 109.0	0	106.1	125	-18.9
Channel 1								
902.78	78.5 Pk	3.6 / 23.2 / 0.0	105.3	V / 1.5 / 110.0	0	105.3	125	-19.7
902.78	81.5 Pk	3.6 / 23.2 / 0.0	108.3	H / 1.2 / 15.0	0	108.3	125	-16.7
Channel 8								
908.03	83.3 Pk	3.6 / 23.2 / 0.0	110.1	H / 1.5 / 49.0	0	110.1	125	-14.9
908.03	78.4 Pk	3.6 / 23.2 / 0.0	105.2	V / 3.2 / 277.0	0	105.2	125	-19.8
Axis 3, EUT Flat on table								
Channel 8								
908.03	77.2 Pk	3.6 / 23.2 / 0.0	104	V / 3.7 / 0.0	0	104	125	-21.0
908.03	85.1 Pk	3.6 / 23.2 / 0.0	111.9	H / 1.1 / 103.0	0	111.9	125	-13.1

Field Strength Measurements

Fundamental and Spurious of the Transmitter

Test Report #:	3090967	Test Area:	Pinewood Site 1 (3m)	Temperature:	18.0 °C
Test Method:	FCC Part 15.247	Test Date:	09-Jan-2006	Relative Humidity:	26 %
EUT Model #:	PC-W	EUT Power:	120 VAC 60 Hz	Air Pressure:	81 kPa
EUT Serial #:	110405J3			Page:	
Manufacturer:	Colorado Time Systems				
EUT Description:	Pace clock				
Notes:					

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	Duty Cycle Correction	Final Corrected	Limit	DELTA
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
The following duty cycle was declared by the manufacturer. "In this case, the maximum time that the carrier would dwell on any hopping channel is 18.8 mS in a 100 mS window. Therefore, the maximum Duty Factor correction factor of 11.3 dB was utilized in the calculations for the final measurement."								
Averaging method for pulsed signals and calculation in accordance to FCC CFR47 Part 15.35 utilized to calculate field strength emissions.								
The testing performed in accordance to FCC CFR47 Part 15.205 (restricted bands of operation) and 15.247 emissions and delta limits were calculated as follows: Final Corrected Peak Measurement – Duty Cycle Correction Factor* = Final Calculated Emission The Final Calculated Emission was then compared to the Limits in CFR47 Part 15.209 and 15.247 and the emission/limit delta was calculated. the DTCF is calculated as follows $20 \cdot \log_{10}(\text{duty cycle in 100ms})$ "not to exceed 20dB"								
Part 15.247 and 15.205 Respectively								
Channel 1								
903.26	79.8 Pk	3.6 / 23.2 / 0.0	106.5	H / 2.2 / 234.0	0	106.5	125	-18.5
903.26	81.0 Pk	3.6 / 23.2 / 0.0	107.7	V / 2.5 / 351.0	0	107.7	125	-17.3
Channel 5								
905.79	82.0 Pk	3.6 / 23.2 / 0.0	108.7	V / 2.5 / 355.0	0	108.7	125	-16.3
905.79	85.8 Pk	3.6 / 23.2 / 0.0	112.6	H / 1.1 / 105.0	0	112.6	125	-12.4
Axis 3 determined to be worst case position. EUT left in this position for remaining testing.								
Harmonics 2 - 4								
Channel 5								
1811.51	66.8 Pk	3.1 / 25.1 / 35.3	59.6	V / 1.6 / 251.0	-11.3	48.3	120	-71.7
1811.51	66.2 Pk	3.1 / 25.1 / 35.3	59.1	H / 1.0 / 135.0	-11.3	47.8	120	-72.2
2717.25	59.1 Pk	4.3 / 26.9 / 37.6	52.7	V / 1.3 / 71.0	-11.3	41.4	54	-12.6
2717.25	59.8 Pk	4.3 / 26.9 / 37.6	53.3	H / 1.2 / 111.0	-11.3	42	54	-12.0
3624.95	60.0 Pk	5.0 / 28.9 / 37.8	56.1	V / 1.7 / 204.0	-11.3	44.8	54	-9.2
3624.95	66.5 Pk	5.0 / 28.9 / 37.8	62.6	H / 1.2 / 112.0	-11.3	51.3	54	-2.7
4528.71	44.6 Pk	6.7 / 30.2 / 40.5	41	V / 1.3 / 250.0	-11.3	29.7	54	-24.3
4528.71	47.6 Pk	6.7 / 30.2 / 40.5	44	H / 1.6 / 118.0	-11.3	32.7	54	-21.3
5437.38	35.2 Pk	6.8 / 31.9 / 40.2	33.7	H / 1.3 / 60.0	-11.3	22.4	54	-31.6
5437.38	34.6 Pk	6.8 / 31.9 / 40.2	33.1	V / 1.3 / 70.0	-11.3	21.8	54	-32.2
Harmonics 7 thru 10 were not seen above the noise floor.								
Channel 8								
1817.01	68.7 Pk	3.1 / 25.1 / 35.4	61.4	H / 1.3 / 137.0	-11.3	50.1	120	-69.9
1817.01	67.7 Pk	3.1 / 25.1 / 35.4	60.4	V / 1.1 / 85.0	-11.3	49.1	120	-70.9
2725.48	59.5 Pk	4.3 / 26.9 / 37.6	53.1	H / 1.0 / 113.0	-11.3	41.8	54	-12.2
2725.48	57.7 Pk	4.3 / 26.9 / 37.6	51.3	V / 1.0 / 65.0	-11.3	40	54	-14.0

Field Strength Measurements

Fundamental and Spurious of the Transmitter

Test Report #: 3090967	Test Area: Pinewood Site 1 (3m)	Temperature: 18.0 °C
Test Method: FCC Part 15.247	Test Date: 09-Jan-2006	Relative Humidity: 26 %
EUT Model #: PC-W	EUT Power: 120 VAC 60 Hz	Air Pressure: 81 kPa
EUT Serial #: 110405J3		Page:
Manufacturer: Colorado Time Systems		
EUT Description: Pace clock		
Notes:		

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	Duty Cycle Correction	Final Corrected	Limit	DELTA
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m)	(dB)

The following duty cycle was declared by the manufacturer.

"In this case, the maximum time that the carrier would dwell on any hopping channel is 18.8 mS in a 100 mS window. Therefore, the maximum Duty Factor correction factor of 11.3 dB was utilized in the calculations for the final measurement."

Averaging method for pulsed signals and calculation in accordance to FCC CFR47 Part 15.35 utilized to calculate field strength emissions.

The testing performed in accordance to FCC CFR47 Part 15.205 (restricted bands of operation) and 15.247 emissions and delta limits were calculated as follows:

Final Corrected Peak Measurement – Duty Cycle Correction Factor* = Final Calculated Emission

The Final Calculated Emission was then compared to the Limits in CFR47 Part 15.209 and 15.247 and the emission/limit delta was calculated.

the DTCF is calculated as follows $20 \cdot \log_{10}(\text{duty cycle in 100ms})$ "not to exceed 20dB"

Part 15.247 and 15.205 Respectively

3633.96	66.2 Pk	5.0 / 28.9 / 37.8	62.3	H / 1.3 / 129.0	-11.3	51	54	-3.0
3633.96	59.1 Pk	5.0 / 28.9 / 37.8	55.3	V / 1.7 / 208.0	-11.3	44	54	-10.0
4539.97	48.2 Pk	6.7 / 30.2 / 40.5	44.6	H / 2.0 / 220.0	-11.3	33.3	54	-20.7
4539.97	48.2 Pk	6.7 / 30.2 / 40.5	44.6	V / 1.0 / 66.0	-11.3	33.3	54	-20.7

Harmonics 6 thru 10 were not seen above the noise floor.

Channel 1

1806.49	68.0 Pk	3.1 / 25.0 / 35.1	60.9	V / 1.7 / 268.0	-11.3	49.6	120	-70.4
1806.49	65.3 Pk	3.1 / 25.0 / 35.1	58.3	H / 1.3 / 140.0	-11.3	47	120	-73.0
2709.7	55.8 Pk	4.3 / 26.9 / 37.6	49.3	V / 1.8 / 105.0	-11.3	38	54	-16.0
2709.7	58.5 Pk	4.3 / 26.9 / 37.6	52	H / 1.1 / 100.0	-11.3	40.7	54	-13.3
3612.91	58.1 Pk	5.0 / 28.9 / 37.9	54.1	V / 1.7 / 213.0	-11.3	42.8	54	-11.2
3612.91	64.8 Pk	5.0 / 28.9 / 37.9	60.8	H / 1.4 / 244.0	-11.3	49.5	54	-4.5
4513.66	50.0 Pk	6.6 / 30.2 / 40.5	46.3	H / 1.7 / 124.0	-11.3	35	54	-19.0
4513.68	48.5 Pk	6.6 / 30.2 / 40.5	44.8	V / 1.5 / 175.0	-11.3	33.5	54	-20.5

Harmonics 6 thru 10 were not seen above the noise floor.

15.247 (a)(2) Test Data

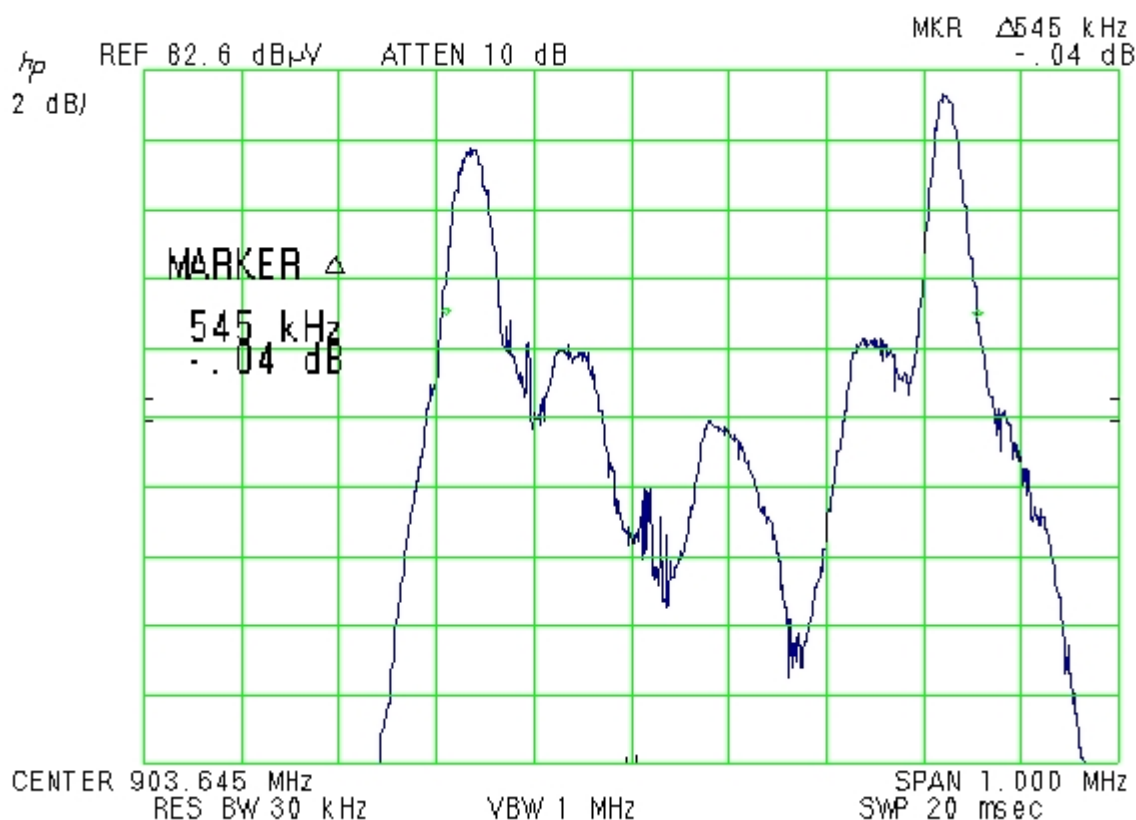
Minimum 6dB bandwidth

Test Report #:	3090967	Test Area:	GP1-1
Test Method:	FCC Part 15.247	Test Date:	09-Jan-2006
EUT Model #:	PC-W	EUT Power:	120 VAC 60 Hz
EUT Serial #:	110405J3		
Manufacturer:	Colorado Time Systems		
EUT Description:	Pace clock		
Notes:			

Temperature:	18.0	°C
Relative Humidity:	26	%
Air Pressure:	81	kPa

Page:

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av – Average	



15.247 (e) Test Data
Power Spectral Density

Power Spectral Density

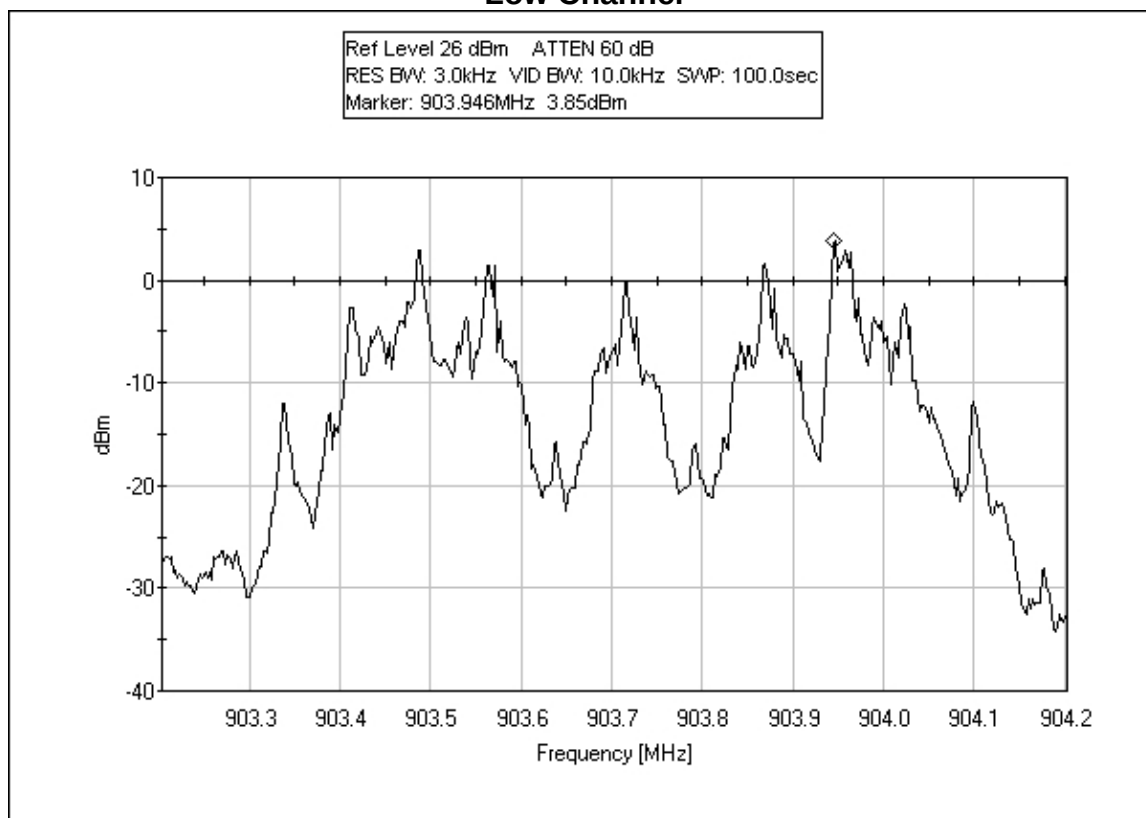
Test Report #:	3090967	Test Area:	GP1-1
Test Method:	FCC Part 15.247	Test Date:	08-March-2006
EUT Model #:	PC-W	EUT Power:	120 VAC 60 Hz
EUT Serial #:	110405J3		
Manufacturer:	Colorado Time Systems		
EUT Description:	Pace clock		
Notes:	The following conducted measurements were performed at the antenna port.		

Temperature:	18.0	°C
Relative Humidity:	26	%
Air Pressure:	81	kPa

Page:

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av – Average	

Low Channel



Power Spectral Density

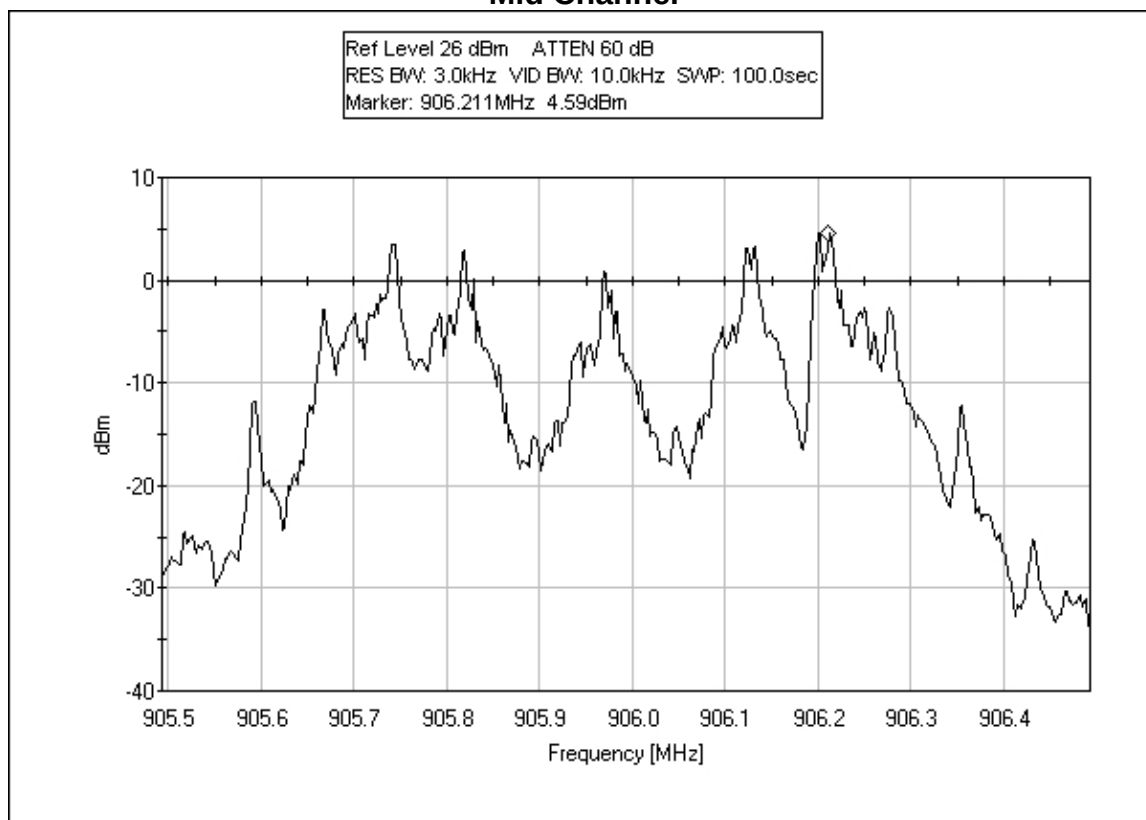
Test Report #:	3090967	Test Area:	GP1-1
Test Method:	FCC Part 15.247	Test Date:	08-March-2006
EUT Model #:	PC-W	EUT Power:	120 VAC 60 Hz
EUT Serial #:	110405J3		
Manufacturer:	Colorado Time Systems		
EUT Description:	Pace clock		
Notes:	The following conducted measurements were performed at the antenna port.		

Temperature:	18.0	°C
Relative Humidity:	26	%
Air Pressure:	81	kPa

Page:

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av – Average	

Mid Channel



Power Spectral Density

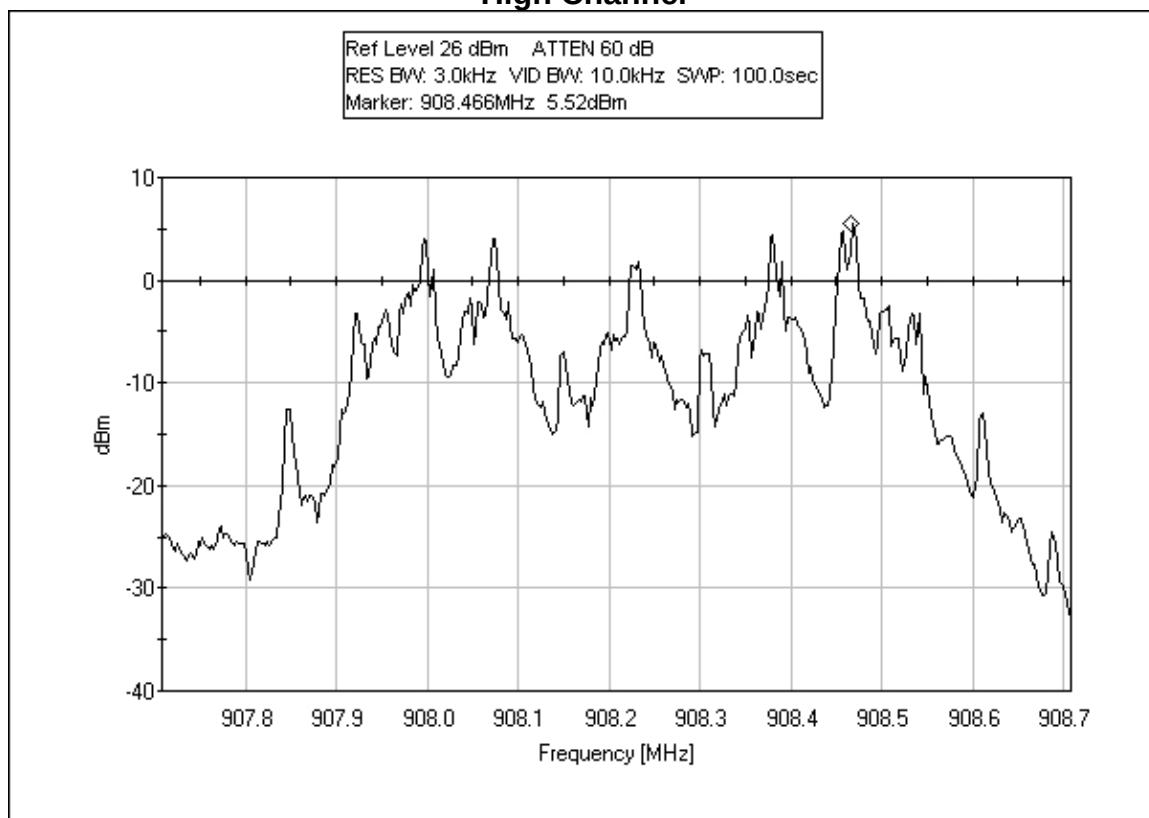
Test Report #:	3090967	Test Area:	GP1-1
Test Method:	FCC Part 15.247	Test Date:	08-March-2006
EUT Model #:	PC-W	EUT Power:	120 VAC 60 Hz
EUT Serial #:	110405J3		
Manufacturer:	Colorado Time Systems		
EUT Description:	Pace clock		
Notes:	The following conducted measurements were performed at the antenna port.		

Temperature:	18.0	°C
Relative Humidity:	26	%
Air Pressure:	81	kPa

Page:

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av – Average	

High Channel



Project Report

Begin Date: 1/9/2006 **End Date:** 2/9/2006

Technician Mike Spataro

Project 3090967

Capital Asset ID	Manufacturer	Model #	Serial #	Description	Test Performed	Service Type	Service Date	Service Due
18765	EMCO	3825/2	9202-1945	LISN	C Conducted Emissions	For Ver	2/28/2005	2/28/2006
18802	RHODE & SCHWARZ	ESH3	872318/036	Low Frequency Receiver (9 kHz - 30 MHz)	C Conducted Emissions	For Cal	6/20/2005	6/20/2006
18885	Hewlett-Packard	11947A	3107A00700	Transient Limiter	C Conducted Emissions	For Ver	2/7/2006	2/7/2007
18880	Hewlett-Packard	85650A	2811A01300	Q.P Adapter	R Radiated Emissions	For Cal	11/8/2005	11/8/2006
18881	Hewlett-Packard	85662A	2403A08749	Display Section	R Radiated Emissions	For Cal	8/8/2005	8/8/2006
18882	Hewlett-Packard	8566B	2410A00154	Spectrum Analyzer (dc-22 GHz)	R Radiated Emissions	For Cal	8/8/2005	8/8/2006
18887	EMCO	3115	9205-3886	Horn Antenna 1-18GHz	R Radiated Emissions	For Cal	1/18/2005	1/18/2006
18888	EMCO	3146	9402-3775	Log Periodic Antenna (200-1000MHz)	R Radiated Emissions	For Cal	9/30/2005	9/30/2006
18889	EMC TEST SYSTEMS	3109	3142	Biconical Antenna 30-300MHz	R Radiated Emissions	For Cal	9/30/2005	9/30/2006
18897	EMCO	6502	9205-2738	Magnetic loop	R Radiated Emissions	For Cal	7/13/2005	7/13/2006
18900	Avantek	AFT97-8434-10F	1007	RF Pre-Amplifier (4-8 GHz)	R Radiated Emissions	For Ver	4/4/2005	4/4/2006
18901	Avantek	AWT-18037	1002	RF Pre-Amplifier (8-18 GHz)	R Radiated Emissions	For Ver	4/4/2005	4/4/2006
18906	Mini-Circuits Lab	ZHL-42	N052792-2	Amplifier	R Radiated Emissions	For Ver	5/6/2005	5/6/2006
18912	Hewlett-Packard	8447F	3113A05545	9 kHz- 1.3GHz Pre Amp	R Radiated Emissions	For Ver	5/6/2005	5/6/2006
18913	Hewlett-Packard	E7405A	My44211889	Spectrum Analyzer	R Radiated Emissions	For Cal	12/14/2005	12/14/2006

Appendix B

Test Plan
and
Constructional Data Form

To be supplied by the customer

What Radio certifications are desired?	☒ FCC (USA) ☐ Industry Canada ☐ ETSI (R&TTE) ☐ Other: Please Specify	
Operating Frequency:	903MHz-926.25MHz	
RF Output Power:	+11dBm	
Is there an RF Conducted Port?	☐ Yes ☒ No	Description:
Number of Antennas & Description: (Internal, External, Known Gain, etc.)	1 external	
Modulation Technique:	Direct Spread	
Number of Channels/Number of Discrete frequencies per Channel:	32/1	
Can the device be operated in CW Mode?	☐ Yes ☒ No	
What is the lowest utilized frequency within the device?	903.0 MHz	

NOTES:

Follow FCC Part 15.247 on the low, medium and high channels.

QP below 1 GHz and peak with averaging in accordance to 15.25 above 1 GHz They can set it up in regular transmit mode and we can QP the signal or we can use the peak detector use that data for compliance.

Scheduled 2 days for testing because it is not known if 15.207 is needed or not

Start 15.209 at 10kHz.

Appendix C

Measurement Protocol

And

Test Procedures

MEASUREMENT PROTOCOL

GENERAL INFORMATION

Test Methodology

Conducted and radiated emission testing is performed according to the procedures in ANSI C63.4 & CNS13438.

Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into its characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

CONDUCTED EMISSIONS

The final level, expressed in dB μ V, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the applicable limit.

To convert between dB μ V and μ V, the following conversions apply:

- $\text{dB}\mu\text{V} = 20(\log \mu\text{V})$
- $\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$

RADIATED EMISSIONS

The final level, expressed in dB μ V/m, is arrived at by taking the reading from the spectrum analyzer (Level dB μ V) and adding the antenna correction factor and cable loss factor (Factor dB) to it. This result then has the applicable limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets in Attachment B. The amplifier gain is automatically accounted for by using an analyzer offset.

Example: At a Test Frequency of 30 MHz, with a peak reading on the spectrum analyzer or measuring receiver of 14 dB μ V:

Measured Level	+	Transducer & Cable Loss factor	=	Corrected Reading	Specification Limit	-	Corrected Reading	=	Delta Specification
(dB μ V)		(dB)		(dB μ V/m)	(dB μ V/m)		(dB μ V/m)		
14.0		14.9		28.9	40.0		28.9		-11.1

DETAILS OF TEST PROCEDURES

General Standard Information

The test methods used comply with 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."

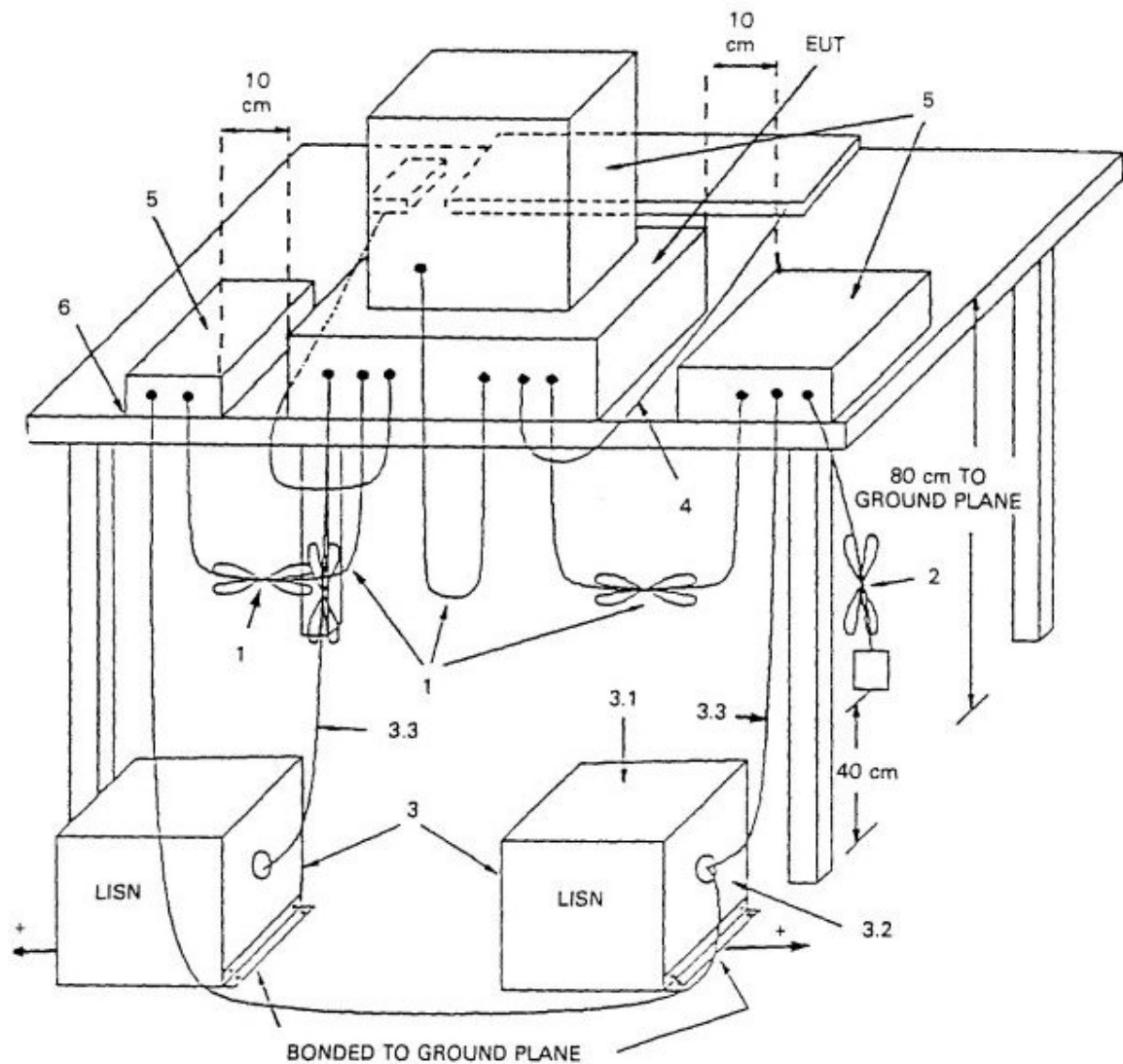
Conducted Emissions

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with 50 Ω /50 μ H (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. In some cases, a pre-scan using a spectrum analyzer is initially performed on the units comprising the system under test to locate the highest emissions. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver or spectrum analyzer with quasi-peak and average detection and recorded on the data sheets.

Radiated Emissions

Radiated emissions from the EUT are measured in the frequency range of 30 to 22GHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and peak detection. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3, 10 or 30 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees.

Conducted Emissions Diagram:



Radiated Emissions Diagram:

