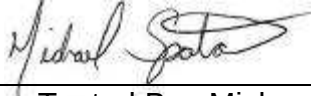
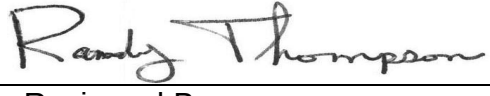


EMC EMISSIONS - TEST REPORT (Full)

Test Report No.	3169536DEN-005	Issue Date:	December 31, 2008
Model / Serial No.	MN: WXATX-1 /SN: EMC1		
Product Type	433MHz Transmitter with garage door sensor		
Client	B&C Electronic Engineering Inc.		
Manufacturer	B&C Electronic Engineering Inc.		
License holder	B&C Electronic Engineering Inc.		
Address	1294 S. Bannock St.		
	Denver CO, 80223		
Test Criteria Applied	FCC 47 CFR Part 15.231 IC RSS-210 issue 7		Title 47 CFR 15: RADIO FREQUENCY DEVICES
Test Result	PASS		Subpart C – Intentional Radiators
Test Project Number	3169536		Low-power License-exempt Radio Communication Devices
References			(All Frequency Bands):
Total Pages	35		Category I Equipment
Including			
Appendices:			
			
Tested By : Michael Spataro	Reviewed By :		

REVISION SUMMARY - The following changes have been made to this Report:

Rev.	Revision Statement	Author	Revision Date	Reviewer
	Initial Release of Document	See above	See above	

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DIRECTORY

Documentation

Page(s)

Test report

1 – 35

Directory

2

Test Regulations

3

General Remarks

4

Test-setup Photographs

5 - 9

Appendix A

Test Data Sheets and Test Equipment Used

10 - 23

Appendix B

Test Plan/Constructional Data Form

24 - 30

Appendix C

Measurement Protocol/Test Procedures

31 - 35

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 $\pm 3.14\text{dB}$ and for Radiated Emissions is calculated to be $\pm 4.4\text{dB}$ in the frequency range of 10kHz – 1000MHz at 3m and $\pm 4.9\text{dB}$ in the frequency range of 1 – 18GHz at 3m. For testing at 10m $\pm 4.8\text{dB}$ in the frequency range of 30 – 1000MHz. For Disturbance Power, $\pm 3.3\text{dB}$ in the frequency range of 30 – 1000MHz. For Flicker and Harmonics testing the equipment used is calibrated by the manufacture and is within the tolerances specified in 61000-3-2/3. These uncertainties have been calculated using CISPR 16-4-2:2003 and represent a 95% confidence level ($k=2$).

EUT Received Date: 17-December-2008

Testing Start Date: 17-December-2008

Testing End Date: 18-December-2008

The tests were performed according to following regulations:

1. FCC CFR47 Part 15 subpart C
2. IC RSS-210e Issue 7 2007
3. IC RSS-GEN Issue 2 2007

Emission Test Results:

Conducted Emissions 15.207 - NA

Test Result

Minimum limit margin 0.0 dB at 0.0 MHz

Remarks: EUT is battery powered

Radiated Unintentional and Spurious Emissions 15.231(b)(3) /15.205/209 - PASS

Test Result

Minimum limit margin -21.7 dB at 3500.00 MHz

Remarks: Covers RSS-210 tables 1 and 2.

Field Strength of the Fundamental 15.231(b) - PASS

Test Result

Minimum limit margin -1.2 dB at 433.92 MHz

Remarks: Covers RSS-210 table 5.

Field Strength of Harmonics 15.231(b) - PASS

Test Result

Minimum limit margin -20.0 dB at 3471.39 MHz

Remarks: Covers RSS-210 table 5.

Automatic Shutoff 15.231(a)(2) - PASS

Test Result

Remarks: Covers RSS-210 A1.1.1(b).

20dB Bandwidth 15.231(c) - PASS

Test Result

Remarks: Covers RSS-210 A1.1.3.

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.

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.

Sample:

☒ Production ☐ Prototype ☐ See Appendix B

Modifications required to pass: None

Test Specification Deviations: Additions to or Exclusions from: None

Test-setup photo(s):
Radiated Intentional Emissions: Axis 1



Test-setup photo(s):
Radiated Intentional Emissions: Axis 2



Test-setup photo(s):
Radiated Intentional Emissions: Axis 3



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



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



Appendix A

Test Data Sheets and Test Equipment Used

**Spurious Emissions
And
Unintentional Emissions
15.231(b)(3) and 15.205/209**

Radiated Electromagnetic Emissions

Test Report #: **3169536**
 Test Method: FCC Part 15.209
 EUT Model #: WXATX-1/WGARX-1
 EUT Serial #: EMC1
 Manufacturer: B & C Electronics.
 EUT Description: 433 MHz Transmitter with pressure sensor
 Notes: Transmitter WXATX-1 and Receiver WGARX-1 were tested simultaneously.

Test Area: Pinewood Site 1 (3m)
 Test Date: 17-Dec-2008
 EUT Power: 3VDC Battery.

Temperature: 22.3 °C
 Relative Humidity: 17 %
 Air Pressure: 79.9 kPa

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
No emissions found 4 to 4.5 GHz Vertical.						
The following are noise floor.						
4500.00	35.2 Av	5.2 / 31.3 / 40.7	31.0	V / 1.0 / 0.0	N/A	-23.0
No emissions found 4 to 4.5 GHz horizontal.						
The following are noise floor.						
4250.00	33.8 Av	5.0 / 31.3 / 40.7	29.4	H / 1.0 / 0.0	N/A	-24.6
No emissions found 1 to 4 GHz Horizontal.						
The following are noise floor.						
2000.00	34.5 Av	3.0 / 26.9 / 38.1	26.3	H / 1.0 / 0.0	N/A	-27.7
3500.00	35.6 Av	4.4 / 30.5 / 38.2	32.3	H / 1.0 / 0.0	N/A	-21.7
No emissions found 1 to 4 GHz Vertical.						
Noise floor.						
1000.00	35.1 Av	3.7 / 23.2 / 38.2	23.8	V / 1.0 / 0.0	N/A	-30.2
2500.00	35.6 Av	3.2 / 27.5 / 38.5	27.9	V / 1.0 / 0.0	N/A	-26.1
No emissions found 200 to 1000 MHz Vertical.						
The following are noise floor.						
250.00	30.0 Qp	1.7 / 11.6 / 27.2	16.1	V / 1.0 / 0.0	-29.9	N/A
500.00	23.4 Qp	2.6 / 21.3 / 28.2	19.1	V / 1.0 / 0.0	-26.9	N/A
900.00	21.4 Qp	3.6 / 22.3 / 27.6	19.7	V / 1.0 / 0.0	-26.3	N/A
No emissions found 200 to 1000 MHz Horizontal.						
The following are noise floor.						
200.00	26.4 Qp	1.5 / 11.3 / 27.3	11.8	H / 1.0 / 0.0	-31.7	N/A
400.00	21.7 Qp	2.2 / 17.2 / 27.7	13.3	H / 1.0 / 0.0	-32.7	N/A
800.00	21.6 Qp	3.3 / 21.0 / 27.8	18.0	H / 1.0 / 0.0	-28.0	N/A
No emissions found 30 to 200 MHz.						
The following are noise floor.						
30.00	29.9 Qp	0.5 / 13.0 / 28.2	15.3	V / 1.0 / 0.0	-24.7	N/A

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
195.00	30.7 Qp	1.5 / 13.3 / 27.4	18.0	V / 1.0 / 0.0	-25.5	N/A
No emissions found 30 to 200 MHz Horizontal.						
The following are noise floor.						
No emissions found 3 to 30 MHz.						
The following are noise floor.						
3.00	13.9 Qp	0.2 / 10.7 / 0.0	24.8	V / 1.0 / 0.0	-44.7	N/A
20.00	9.4 Qp	0.4 / 10.2 / 0.0	20.1	V / 1.0 / 0.0	-49.4	N/A

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 *****						
3500.00	35.6 Av	4.4 / 30.5 / 38.2	32.3	H / 1.0 / 0.0	N/A	-21.7
4500.00	35.2 Av	5.2 / 31.3 / 40.7	31.0	V / 1.0 / 0.0	N/A	-23.0
4250.00	33.8 Av	5.0 / 31.3 / 40.7	29.4	H / 1.0 / 0.0	N/A	-24.6
30.00	29.9 Qp	0.5 / 13.0 / 28.2	15.3	V / 1.0 / 0.0	-24.7	N/A
195.00	30.7 Qp	1.5 / 13.3 / 27.4	18.0	V / 1.0 / 0.0	-25.5	N/A
2500.00	35.6 Av	3.2 / 27.5 / 38.5	27.9	V / 1.0 / 0.0	N/A	-26.1
900.00	21.4 Qp	3.6 / 22.3 / 27.6	19.7	V / 1.0 / 0.0	-26.3	N/A
500.00	23.4 Qp	2.6 / 21.3 / 28.2	19.1	V / 1.0 / 0.0	-26.9	N/A
2000.00	34.5 Av	3.0 / 26.9 / 38.1	26.3	H / 1.0 / 0.0	N/A	-27.7
800.00	21.6 Qp	3.3 / 21.0 / 27.8	18.0	H / 1.0 / 0.0	-28.0	N/A
250.00	30.0 Qp	1.7 / 11.6 / 27.2	16.1	V / 1.0 / 0.0	-29.9	N/A
1000.00	35.1 Av	3.7 / 23.2 / 38.2	23.8	V / 1.0 / 0.0	N/A	-30.2
200.00	26.4 Qp	1.5 / 11.3 / 27.3	11.8	H / 1.0 / 0.0	-31.7	N/A
400.00	21.7 Qp	2.2 / 17.2 / 27.7	13.3	H / 1.0 / 0.0	-32.7	N/A
3.00	13.9 Qp	0.2 / 10.7 / 0.0	24.8	V / 1.0 / 0.0	-44.7	N/A
20.00	9.4 Qp	0.4 / 10.2 / 0.0	20.1	V / 1.0 / 0.0	-49.4	N/A

**Fundamental field strength
And
Harmonics of the Fundamental
15.231(e)**

Field Strength Measurements Fundamental and Spurious of the Transmitter

Test Report #: 3169536	Test Area: Pinewood Site 1 (3m)	Temperature: 22.3 °C
Test Method: FCC CFR47 Part 15.231	Test Date: 17-Dec-2008	Relative Humidity: 17.0 %
EUT Model #: WXATX-1	EUT Power: 3VDC Battery.	Air Pressure: 79.9 kPa
EUT Serial #: EMC1		
Manufacturer: B & C Electronics.		
EUT Description: 433 MHz Transmitter with pressure sensor		
Notes:		

Level Key

Pk – Peak	Pk – Peak
Qp – QuasiPeak	Qp – QuasiPeak
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.

12.8ms

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 15.231 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 15.231 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"

Axis 1 EUT is vertical on the table.

433.92	72.5 Pk	2.4 / 17.8 / 0.0	92.7	H / 2.2 / 306.0	-17.84	74.9	80.1	-5.2
433.92	65.7 Pk	2.4 / 17.8 / 0.0	85.9	V / 2.0 / 5.0	-17.84	68.1	80.1	-12.0
867.85	31.6 Pk	3.5 / 22.1 / 0.0	57.1	H / 1.0 / 264.0	-17.84	39.3	60.8	-21.5
867.85	27.8 Pk	3.5 / 22.1 / 0.0	53.3	V / 1.0 / 141.0	-17.84	35.5	60.8	-25.3
1301.77	55.6 Pk	2.3 / 24.2 / 37.8	44.3	V / 1.0 / 172.0	-17.84	26.5	54	-27.5
1301.77	58.3 Pk	2.3 / 24.2 / 37.8	47	H / 1.3 / 102.0	-17.84	29.2	54	-24.8
1735.7	51.4 Pk	2.7 / 26.1 / 37.8	42.4	V / 1.1 / 282.0	-17.84	24.6	60.8	-36.2
1735.7	53.2 Pk	2.7 / 26.1 / 37.8	44.2	H / 1.1 / 25.0	-17.84	26.4	60.8	-34.4
2169.62	57.6 Pk	3.1 / 26.9 / 38.2	49.4	V / 1.1 / 280.0	-17.84	31.6	60.8	-29.2
2169.62	62.4 Pk	3.1 / 26.9 / 38.2	54.2	H / 1.1 / 180.0	-17.84	36.4	60.8	-24.4
2603.54	59.0 Pk	3.4 / 28.1 / 38.2	52.3	V / 2.2 / 0.0	-17.84	34.5	60.8	-26.3
2603.54	57.9 Pk	3.4 / 28.1 / 38.2	51.1	H / 1.0 / 5.0	-17.84	33.3	60.8	-27.5
3037.47	60.4 Pk	3.8 / 29.6 / 38.2	55.5	V / 1.3 / 352.0	-17.84	37.7	60.8	-23.1
3037.47	59.4 Pk	3.8 / 29.6 / 38.2	54.5	H / 1.9 / 5.0	-17.84	36.7	60.8	-24.1
3471.39	61.9 Pk	4.4 / 30.4 / 38.1	58.6	V / 1.5 / 178.0	-17.84	40.8	60.8	-20.0
3471.39	56.5 Pk	4.4 / 30.4 / 38.1	53.3	H / 2.7 / 120.0	-17.84	35.5	60.8	-25.3
3905.32	42.9 Pk	4.7 / 31.9 / 37.5	41.9	V / 1.0 / 0.0	-17.84	24.1	54	-29.9
3905.32	43.5 Pk	4.7 / 31.9 / 37.5	42.5	H / 2.0 / 255.0	-17.84	24.7	54	-29.3
4339.24	38.0 Pk	5.1 / 31.2 / 40.7	33.7	H / 1.0 / 0.0	-17.84	15.9	54	-38.1
4339.24	44.1 Pk	5.1 / 31.2 / 40.7	39.8	V / 1.3 / 218.0	-17.84	22.0	54	-32.0

Axis 2 EUT is vertical on the table.

433.92	76.7 Pk	2.4 / 17.8 / 0.0	96.9	V / 1.0 / 58.0	-17.84	79.1	80.1	-1.0
433.92	75.7 Pk	2.4 / 17.8 / 0.0	95.8	H / 2.5 / 267.0	-17.84	78.0	80.1	-2.1
867.85	27.1 Pk	3.5 / 22.1 / 0.0	52.6	V / 1.0 / 5.0	-17.84	34.8	60.8	-26.0
867.85	27.0 Pk	3.5 / 22.1 / 0.0	52.5	H / 1.0 / 223.0	-17.84	34.7	60.8	-26.1
1301.77	52.1 Pk	2.3 / 24.2 / 37.8	40.8	H / 1.0 / 228.0	-17.84	23.0	54	-31.0
1301.77	56.8 Pk	2.3 / 24.2 / 37.8	45.4	V / 1.3 / 75.0	-17.84	27.6	54	-26.4

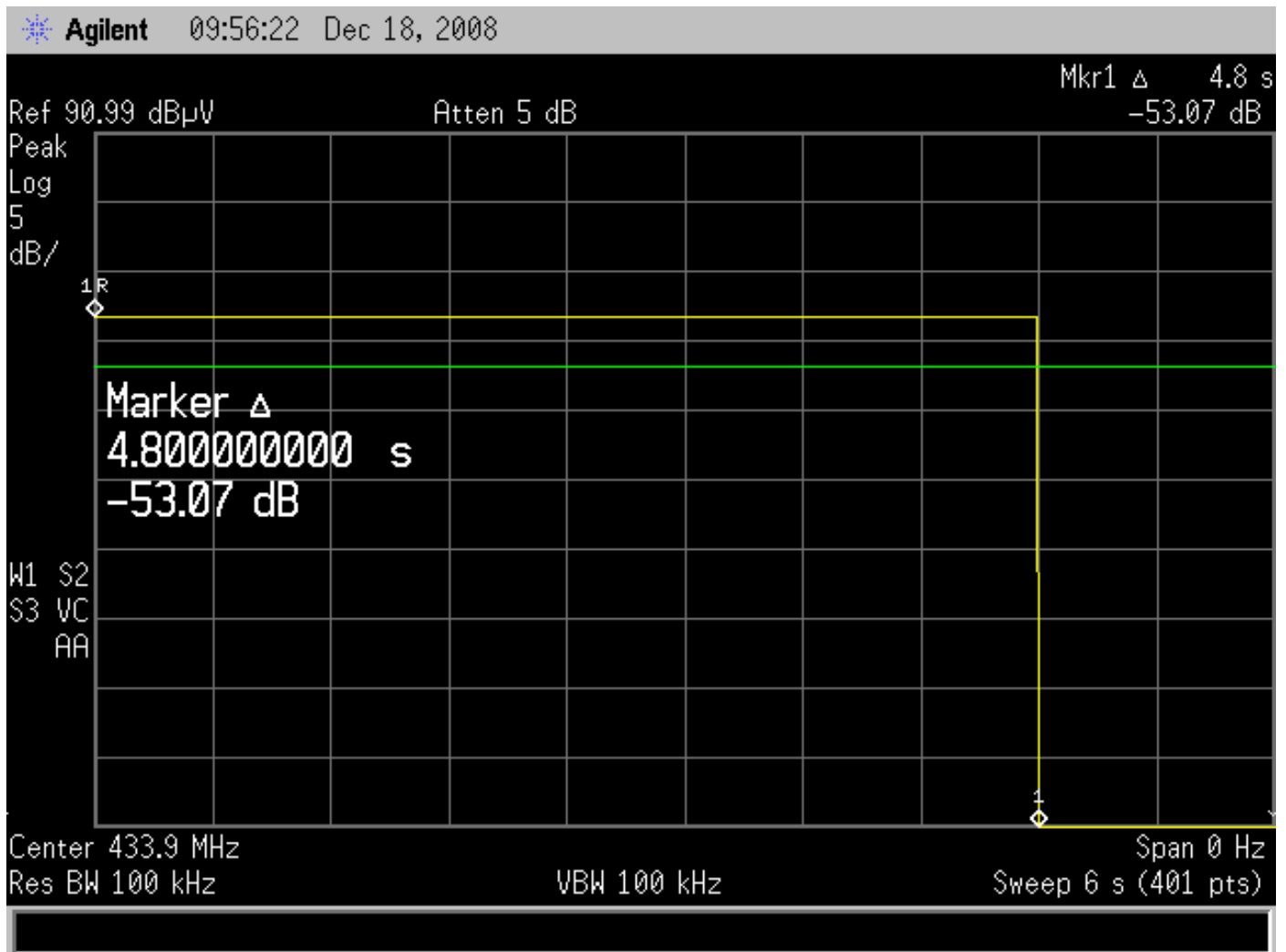
FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	Duty Cycle Correction	Final Corrected	Limit	DELTA
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
1735.7	48.2 Pk	2.7 / 26.1 / 37.8	39.2	H / 1.0 / 251.0	-17.84	21.4	60.8	-39.4
1735.7	55.6 Pk	2.7 / 26.1 / 37.8	46.6	V / 1.0 / 75.0	-17.84	28.8	60.8	-32.0
2169.62	59.4 Pk	3.1 / 26.9 / 38.2	51.2	H / 1.0 / 158.0	-17.84	33.4	60.8	-27.4
2169.62	56.0 Pk	3.1 / 26.9 / 38.2	47.8	V / 1.1 / 147.0	-17.84	30.0	60.8	-30.8
2603.54	58.4 Pk	3.4 / 28.1 / 38.2	51.7	H / 1.4 / 186.0	-17.84	33.9	60.8	-26.9
2603.54	58.5 Pk	3.4 / 28.1 / 38.2	51.8	V / 1.0 / 186.0	-17.84	34.0	60.8	-26.8
3037.47	48.3 Pk	3.8 / 29.6 / 38.2	43.5	H / 1.4 / 188.0	-17.84	25.7	60.8	-35.1
3037.47	47.5 Pk	3.8 / 29.6 / 38.2	42.7	V / 1.2 / 10.0	-17.84	24.9	60.8	-35.9
3471.39	54.8 Pk	4.4 / 30.4 / 38.1	51.5	H / 1.6 / 69.0	-17.84	33.7	60.8	-27.1
3471.39	61.0 Pk	4.4 / 30.4 / 38.1	57.7	V / 1.6 / 335.0	-17.84	39.9	60.8	-20.9
3905.32	41.5 Pk	4.7 / 31.9 / 37.5	40.6	H / 1.6 / 69.0	-17.84	22.8	54	-31.2
3905.32	46.5 Pk	4.7 / 31.9 / 37.5	45.6	V / 1.0 / 20.0	-17.84	27.8	54	-26.2
4339.24	46.6 Pk	5.1 / 31.2 / 40.7	42.2	H / 1.9 / 197.0	-17.84	24.4	54	-29.6
4339.24	43.1 Pk	5.1 / 31.2 / 40.7	38.7	V / 1.9 / 180.0	-17.84	20.9	54	-33.1
Axis 3 EUT is vertical on the table rotated 90deg.								
433.92	76.5 Pk	2.4 / 17.8 / 0.0	96.7	H / 2.1 / 333.0	-17.84	78.9	80.1	-1.2
433.92	69.7 Pk	2.4 / 17.8 / 0.0	89.8	V / 2.1 / 250.0	-17.84	72.0	80.1	-8.1
867.85	30.1 Pk	3.5 / 22.1 / 0.0	55.7	H / 1.0 / 58.0	-17.84	37.9	60.8	-22.9
867.85	26.6 Pk	3.5 / 22.1 / 0.0	52.1	V / 1.0 / 237.0	-17.84	34.3	60.8	-26.5
1301.77	52.5 Pk	2.3 / 24.2 / 37.8	41.1	V / 1.0 / 120.0	-17.84	23.3	54	-30.7
1301.77	57.0 Pk	2.3 / 24.2 / 37.8	45.7	H / 1.1 / 152.0	-17.84	27.9	54	-26.1
1735.7	49.1 Pk	2.7 / 26.1 / 37.8	40.1	V / 1.0 / 99.0	-17.84	22.3	60.8	-38.5
1735.7	51.0 Pk	2.7 / 26.1 / 37.8	42	H / 1.0 / 184.0	-17.84	24.2	60.8	-36.6
2169.62	53.9 Pk	3.1 / 26.9 / 38.2	45.7	V / 1.1 / 314.0	-17.84	27.9	60.8	-32.9
2169.62	57.2 Pk	3.1 / 26.9 / 38.2	49	H / 1.2 / 182.0	-17.84	31.2	60.8	-29.6
2603.54	60.4 Pk	3.4 / 28.1 / 38.2	53.7	V / 1.1 / 238.0	-17.84	35.9	60.8	-24.9
2603.54	61.0 Pk	3.4 / 28.1 / 38.2	54.3	H / 1.2 / 180.0	-17.84	36.5	60.8	-24.3
3037.47	47.1 Pk	3.8 / 29.6 / 38.2	42.3	V / 1.4 / 27.0	-17.84	24.5	60.8	-36.3
3037.47	48.8 Pk	3.8 / 29.6 / 38.2	43.9	H / 1.4 / 32.0	-17.84	26.1	60.8	-34.7
3471.39	53.2 Pk	4.4 / 30.4 / 38.1	49.9	V / 1.1 / 10.0	-17.84	32.1	60.8	-28.7
3471.39	59.5 Pk	4.4 / 30.4 / 38.1	56.2	H / 1.4 / 15.0	-17.84	38.4	60.8	-22.4
3905.32	45.3 Pk	4.7 / 31.9 / 37.5	44.3	V / 1.5 / 75.0	-17.84	26.5	54	-27.5
3905.32	44.2 Pk	4.7 / 31.9 / 37.5	43.3	H / 1.5 / 210.0	-17.84	25.5	54	-28.5
4339.24	42.1 Pk	5.1 / 31.2 / 40.7	37.7	V / 1.0 / 105.0	-17.84	19.9	54	-34.1
4339.24	41.1 Pk	5.1 / 31.2 / 40.7	36.7	H / 1.0 / 85.0	-17.84	18.9	54	-35.1

Automatic Shutoff

Test Report #:	3169536	Test Area:	Pinewood Site 1 (3m)
Test Method:	FCC CFR47 Part 15.231	Test Date:	17-Dec-2008
EUT Model #:	WXATX-1	EUT Power:	3VDC Battery.
EUT Serial #:	EMC1		
Manufacturer:	B & C Electronics.		
EUT Description:	433 MHz Transmitter with pressure sensor		
Notes:	15.231(a)(2) Transmitter shall cease transmission within 5 seconds after activation.		

Temperature:	22.3	°C
Relative Humidity:	17.0	%
Air Pressure:	79.9	kPa

Level Key	
Pk – Peak	Pk – Peak
Qp – QuasiPeak	Qp – QuasiPeak
Av - Average	



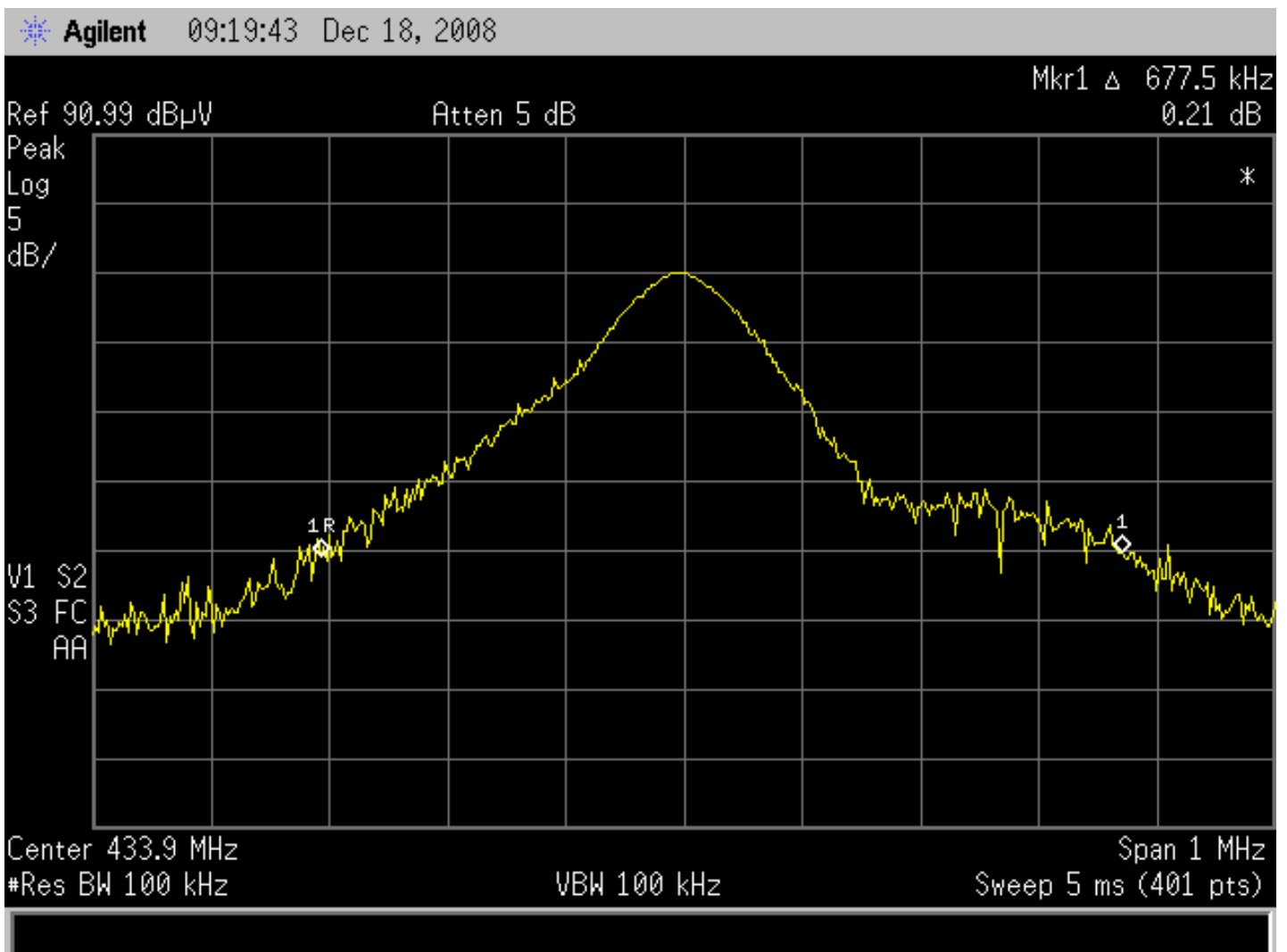
20dB Bandwidth

Test Report #:	3169536	Test Area:	Pinewood Site 1 (3m)
Test Method:	FCC CFR47 Part 15.231	Test Date:	17-Dec-2008
EUT Model #:	WXATX-1	EUT Power:	3VDC Battery.
EUT Serial #:	EMC1		
Manufacturer:	B & C Electronics.		
EUT Description:	433 MHz Transmitter with pressure sensor		
Notes:	15.231(c) – Bandwidth = 0.25% of the center frequency. 433.9*.0025=1.08MHz		

Temperature:	22.3	°C
Relative Humidity:	17.0	%
Air Pressure:	79.9	kPa

Level Key	
Pk – Peak	Pk – Peak
Qp – QuasiPeak	Qp – QuasiPeak
Av - Average	

The 20dB bandwidth is 677.5kHz

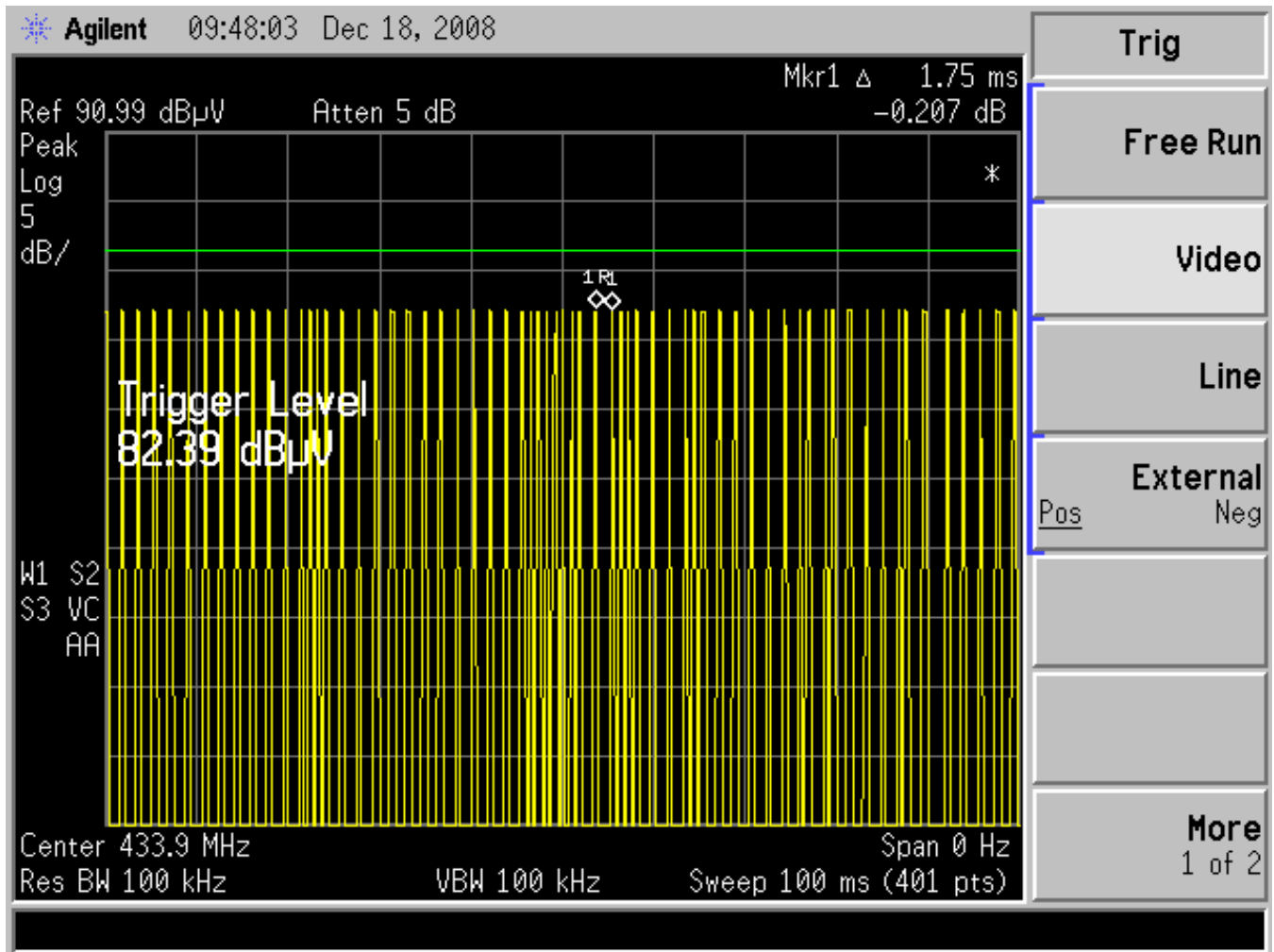


Duty Cycle Justification

Test Report #:	3169536	Test Area:	Pinewood Site 1 (3m)
Test Method:	FCC CFR 47 Part 15.35	Test Date:	17-Dec-2008
EUT Model #:	WXATX-1	EUT Power:	3VDC Battery.
EUT Serial #:	EMC1		
Manufacturer:	B & C Electronics.		
EUT Description:	433 MHz Transmitter with pressure sensor		
Notes:	15.35		
See operational description for further evidence of 11mS duty cycle.			

Temperature:	22.3	°C
Relative Humidity:	17.0	%
Air Pressure:	79.9	kPa

Level Key	
Pk – Peak	Pk – Peak
Qp – QuasiPeak	Qp – QuasiPeak
Av - Average	

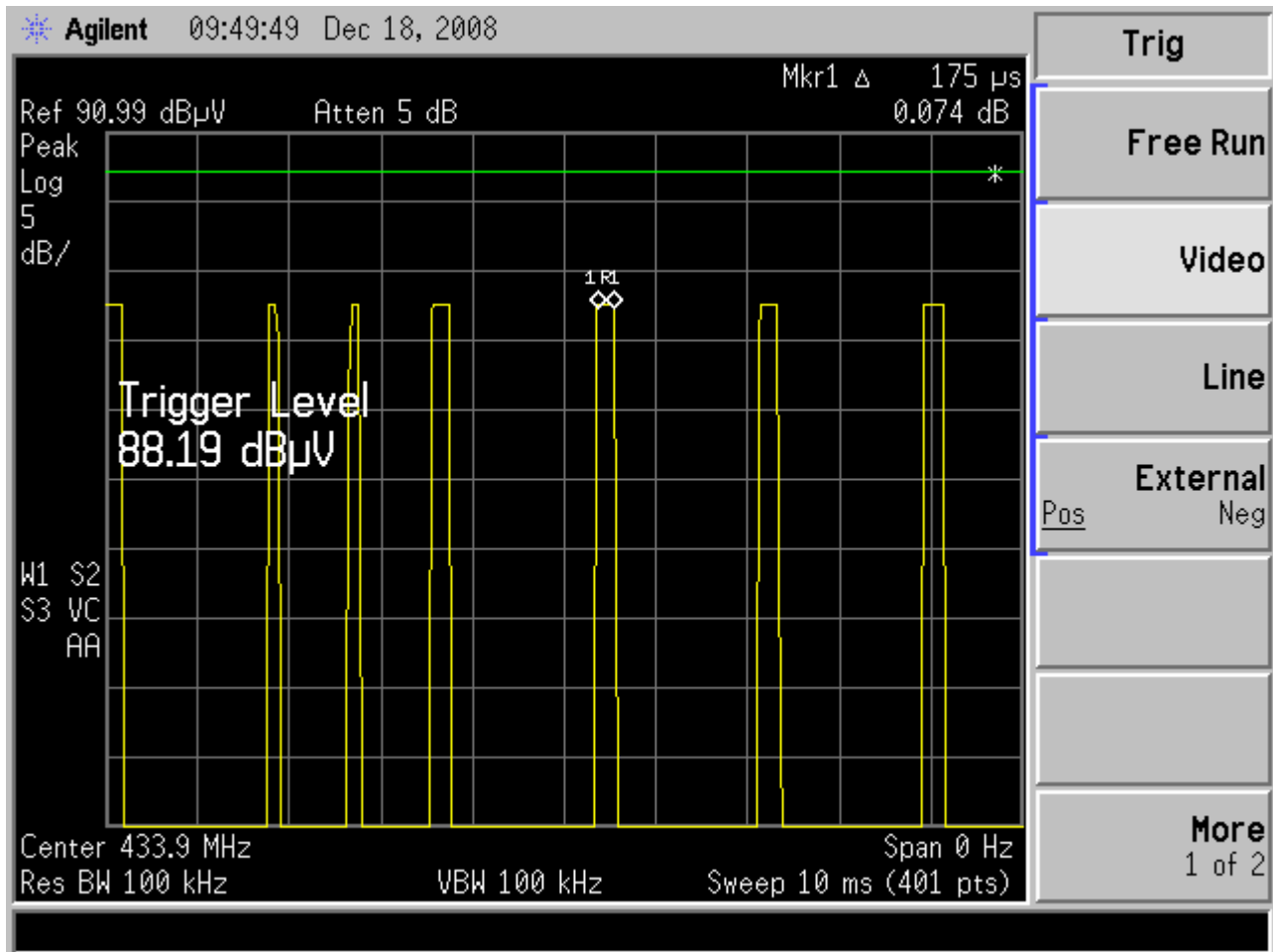


Duty Cycle Justification

Test Report #:	3169536	Test Area:	Pinewood Site 1 (3m)
Test Method:	FCC CFR 47 Part 15.35	Test Date:	17-Dec-2008
EUT Model #:	WXATX-1	EUT Power:	3VDC Battery.
EUT Serial #:	EMC1		
Manufacturer:	B & C Electronics.		
EUT Description:	433 MHz Transmitter with pressure sensor		
Notes:	15.35		
See operational description for further evidence of 11mS duty cycle.			

Temperature:	22.3	°C
Relative Humidity:	17.0	%
Air Pressure:	79.9	kPa

Level Key	
Pk – Peak	Pk – Peak
Qp – QuasiPeak	Qp – QuasiPeak
Av - Average	



List of Equipment Utilized for Final Test

Project Report

Begin Date: 12/17/2008

End Date: 12/18/2008

Technician Mike Spataro

Project 3169536

Capital Asset ID	Manufacturer	Model #	Serial #	Description	Test Performed	Service Type	Service Date	Service Due
18798	EMCO	3109	9801-3142	Bicon Antenna 30 - 300 MHz	R Radiated Emissions	For Cal	2/20/2008	2/20/2009
18880	Hewlett-Packard	85650A	2811A01300	Q.P Adapter	R Radiated Emissions	For Cal	12/11/2008	12/11/2009
18882	Hewlett-Packard	8566B	2410A00154	Spectrum Analyzer (dc-22 GHz)	R Radiated Emissions	For Cal	12/10/2008	12/10/2009
18886	TENSOR	4105	2020	Ridged Guide Antenna 1-18GHz	R Radiated Emissions	For Cal	3/6/2008	3/6/2009
18888	EMCO	3146	9402-3775	Log Periodic Antenna (200-1000MHz)	R Radiated Emissions	For Cal	10/21/2008	10/21/2009
18900	Avantek	AFT97-8434-10F	1007	RF Pre-Amplifier (4-8 GHz)	R Radiated Emissions	For Ver	5/2/2008	5/2/2009
18906	Mini-Circuits Lab	ZHL-42	N052792-2	Amplifier	R Radiated Emissions	For Ver	5/2/2008	5/2/2009
18912	Hewlett-Packard	8447F	3113A05545	9 kHz- 1.3GHz Pre Amp	R Radiated Emissions	For Ver	5/2/2008	5/2/2009

Appendix B

Test Plan and Constructional Data Form



Request for Quotation (Non Medical Devices)

Contact Information:

Company:	BIC Electronic Engineering Inc.
Address:	1294 South Bannock St., Denver, 80223
Contact:	Eric Elmquist or Carl Johnson
Title:	
Phone Number:	303-777-3389
Fax Number:	303-777-3193
Email Address:	CJohnson@BCE-Inc.com E-Elmquist@BCE-Inc.com

Date samples and documentation will be ready for testing:	SENT	Requested completion date:	ASAP
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Please fill out the pertinent pages within this document and email this form to Bryant Hart at Bryant.Hart@Intertek.com for a quotation. Pages that do not pertain to your device can be left blank.

This document is compiled as a WORD FORM. To enable the FORM tool, right click on the tool bar and select FORMS. You will then be able to add attachments, drawings etc by clicking on the "Lock" Graphic to unlock the FORM document. To make all the check boxes work within the FORM, the "Lock" graphic must be selected.

Estimates Requested:

EMC Testing and Services	
☐ Compliance Testing	☐ Compliance testing at your location
☐ Pre-Compliance Scans / Engineering testing	☐ Pre-Compliance testing at your location
Radio Device Testing and Certification	
☒ FCC Certification	☐ Canada Certification (Transmitters and Receivers)
☐ Europe	☐ TCB Services
Safety Testing and Certification	
☐ ETL Listing For US	☐ ETL Listing for Canada
☐ Preliminary Design Review	☐ CB Report and Certificate
☐ CE Testing for Europe	☐ Other:
Additional Services	
☐ Global Market Access Program	☐ Energy Star Compliance
☐ IntertekCheck Performance Mark	☐ Green Services (RoHS, WEEE, REACH, Prop. 65)
☐ Environmental Testing	☐ Hazardous Location (Intrinsic Safety, Ex-Proof, ATEX)
☐ Shock and Vibration Testing	☐ Other:


General Product Information: (Required for all Devices)

Product/Model Number(s):				
Description of product(s): Please provide product literature if available.	Remote sensing of sensor based status (open/closed). Initially for garage door monitoring in homes but allows other applications			
Intended Use:	☒ Household/Office ☒ Commercial ☒ Industrial			
Intended Location:	☒ Dry ☐ Damp ☐ Wet ☐ Hazardous Location			
Product Type:	☐ Prototype ☒ Production Sample ☐ Revision of already listed product			
If part of a system, please describe system parts and accessories: sensor & transmitter, receiver with indicator lights Both units battery operated				
If there is more than one product/model what are the differences? NO				
Is the Product Enclosure: ☐ Metal ☒ Plastic ☐ Both				
Size:	Length:	Width:	Height:	Weight:
☐ AC Wall Adapter ☐ AC Internal Power Supply ☒ Battery ☐ External DC Power Supply		Rated Voltage: Rated Current: # of Phases/Conductors: # of Power Cords:		
Are there multiple suppliers of power supplies?		☐ Yes ☐ No If Yes Please Describe: N/A		
Are there Multiple Modes of Operation? ☐ Yes ☒ No If Yes Please Describe:				
Is there programmable software? ☐ Yes ☐ No Not by user/customer				
Can all modes of operation be operated simultaneously? ☐ Yes ☐ No Explain:				
In which countries will you be selling the product? US / CANADA				

**EMC Specific Information:** (Required only if EMC work is requested)

What EMC certifications are desired?	
☐ FCC/ICES (US & Canada)	☐ SII (Israel)
☐ CE (Europe)	☐ AS/NZS (Australia/New Zealand)
☐ BSMI (Taiwan)	☐ Korea MIC Certification / RRL
☐ VCCI (Japan)	☐ Other: Please Specify
Highest frequency utilized for device operation: 433 MHz	
List of Clock Frequencies: 24.5 / 3MHz with 80KHz / 10KHz	
For each mode of operation, please list the amount of time required to notice degradation of performance (cycle time)	
Total Number of I/O Cables: # Greater than 3m (9.75 feet) in Length # Greater than 30m (97.5 feet) in Length # of cables at a longer length (specify)	
Number of Earth Ground Connections (Do NOT include AC Mains Ground): None	
Please list all Ethernet, USB, Parallel and/or Telecommunications Ports and their function N/A	
When the device is a compilation of subsystems (in separate chassis) how many interconnecting I/O cables are greater than 1 meter in length between the Subsystem chassis? 0	
Please list any specific test requirements or standards:	



General Safety Information: (Required only if Safety Listing/Certification/Testing is requested)
Please provide product literature or photos if possible.

What Safety certifications are desired?				
☐ Listing US/Canada ☐ CB Certification (Worldwide outside of US/Canada) ☐ EU Investigation (EU – LVD/MDD) ☐ Field Label (Onsite Inspection)	☐ Limited Production Certification ☐ S Mark ☐ GS Mark ☐ Other: Please Specify			
Please list all applicable safety standards that you would like your device certified under:				
Has the device been tested and certified for product safety before?				
A. If it has been previously tested, to which standard and by which organization? B. Can you provide the test report?	☐ Yes ☒ No Standard tested to: Tested by: ☐ Yes ☐ No			
Can you provide manuals, installation instructions or data sheets at this time?				
☒ Yes ☐ No				
Power Supply Safety Information:				
A. Is the Power Supply Listed or Recognized? B. Can you provide the test report/CB Report?	N/A ☐ Yes ☐ No Standard tested to: Tested by: ☐ Yes ☐ No			
Does the device contain batteries?				
☒ Yes ☐ No What Type? CR2450 How Many? BR1225				
What technology is used? (i.e., lasers, X Ray, resistance heating, etc.)				
N/A				
If Laser:	Class:	Output Power:	Beam Divergence Angle:	Wavelength:
Preferred testing location:		☐ Intertek Local Lab ☐ Customer site ☐ First Available Intertek Lab		
NEMA Rating:				
IP Rating:				

**Radio Specific Information:** (Required only if the device contains an intentional transmitter)

What Radio certifications are desired?	
☒ FCC (USA)	☐ Notified or Competent Body TCF Review
☒ Industry Canada	☐ Other: Please Specify
☐ ETSI (R&TTE)	
Please list the particular radio standards that apply.	
Operating Frequency:	
RF Output Power:	
Is there an RF Conducted Port?	☐ Yes ☐ No Description:
Number of Antennas & Description: (Internal, External, Known Gain, etc.)	Internal
Modulation Technique:	on/off keying
Number of Channels/Number of Discrete frequencies per Channel:	1 /
Can the device be operated in CW Mode?	☐ Yes ☐ No N/A
What is the lowest utilized frequency within the device?	10Khz

Notes: Please ensure to bring a notch filter covering your fundamental operating frequency.

**Additional Information:****Support Equipment:**

Customers should be prepared to provide all support equipment necessary to fully operate the device undergoing testing. This includes any filters required for testing radio devices, computer equipment, etc.

Item
Description
Manufacturer
Model No.

Cabling Information:

Cable
Function*
Type of Shield
Length
Connectors
Connection**

* Function examples (Ethernet, RS232, USB, Analog, physiological parameter, etc.)
** Connection examples (Outside Plant, Patient Coupled, Ring Voltage, etc.)

Monitoring the Equipment:

Please provide instructions below on how to observe the device to verify proper operation in all modes.

Any other information required: (Notes, Photos, Block Diagrams, Drawings, etc.)

A minimum of a block diagram showing the equipment under test and its support equipment.

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.

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.

Rev.No 1



Radiated Emissions Diagram:

