EMC EMISSIONS - TEST REPORT (FULL)

Test Report No.	**BC500220-1**	Issue Date:	**May 17, 2005**
Model / Serial No.	**M1B / 2513**		
Product Type	**Utility Automated Meter Reading Radio**		
Client	**Metron Farnier**		
Manufacturer	**Transparent Technologies**		
License holder	**Transparent Technologies**		
Address	**5665 Airport Blvd**		
	Boulder, CO 80301		
Test Criteria Applied	**FCC CFR47 Part 15.247**		
Test Result	**PASS**		
Test Project Number	**BC500220-1**	Title 47 CFR 15: RADIO FREQUENCY DEVICES	
References			
Total Pages Including Appendices:	38		

Todd Jeffery
Reviewed By :

Robert Cromwell
Approved By :

International Approval Laboratories and its professional staff hold government and professional organization certifications and are members of IEEE, NVLAP, and VCCI.

Lab Code:200264-0

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 ±2.30dB and for Radiated Emissions is calculated to be ±3.60dB in the frequency range of 30MHz – 200MHz and ±3.38dB in the frequency range of 200MHz – 1000MHz.

EUT Received Date: 29-April-2005

Testing Start Date: 29-April-2005

Testing End Date: 3-May-2005

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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) - Not Applicable

Test Result

Minimum limit margin	NA	dB	at	NA MHz
Maximum limit exceeding		dB	at	MHz

Remarks:

Radiated Emissions (15.209) - PASS

Test Result

Minimum limit margin	-2.0	dB	at	0.06 MHz
Maximum limit exceeding		dB	at	MHz

Remarks:

Bandwidth 15.247 (a)(2) - PASS

Test Result

Remarks: The 6dB was measured to be 585kHz

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

Test Result

Minimum limit margin	-16.3	dB	at	920.0 MHz
Maximum limit exceeding		dB	at	MHz

Remarks:

Radiated Emissions 15.205/15.247(c) - PASS

Test Result

Minimum limit margin	-8.6	dB	at	2760.04 MHz
Maximum limit exceeding		dB	at	MHz

Remarks:

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Spectral Density 15.247(d) - PASS

Test Result

Remarks: Maximum measured value = 6.66dBm/delta from the limit = -1.34

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 International Approvals Laboratories, LLC.

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.

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 verified per Part 15.31 to find worst case emissions.

The actual test distance for the FCC Part 15.209 testing was conducted at 10m for the fact that the device was being tested to EN55022 Class B from 30 MHz to 1000 MHz (meets/exceeds the FCC Part 15.209 & 109B limits) The data is automatically extrapolated back to the FCC 3m limits and measurements are corrected to better show the compliance to FCC requirements and reduce confusion. A correction factor of 10.54dB is used in cases of 30MHz and up for a difference between 10m and 3m measurement distances. All measurements that are lesser than 30MHz where applicable are accompanied with the fall of measurements and calculations to support the interpolation.

Modifications required to pass:

Test Specification Deviations: Additions to or Exclusions from

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Required Information In Accordance to FCC CFR 47 Part 2.1033:

Rule Part 11, 15 & 18 Devices	*Other Rule Part Devices*	*Description*	*Comments*
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
2. Operation Description
3. Block Diagram
4. Report of Measurement
5. External & Internal Photographs
6. Schematic
7. Parts List
8. Tuning Procedure (if applicable)
9. Test Setup Photograph
10. Label Drawings and or Photograpghs
11. Description of Support Equipment (where Applicable)

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

Information Required	*Description*	*Comments*
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	

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Test-setup photo(s):
Conducted Emissions

Not Applicable

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

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

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Test-setup photo(s):
Conducted Port Emissions

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Appendix A

Test Data Sheets

and

Test Equipment Used

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15.209 Test Data

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Radiated Electromagnetic Emissions

Test Report #:	**BC500220 Run 03**	Test Area:	Pinewood Site 1 (3m)	Temperature:	21.0	°C
Test Method:	FCC pt. 15.209	Test Date:	03-May-2005	Relative Humidity:	<26	%
EUT Model #:	M1B	EUT Power:	3.6 VDC Battery Powered	Air Pressure:	81	kPa
EUT Serial #:	2513					
Manufacturer:	Metron					
EUT Description:	M1B Utility Radio					
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) (dB\m) (dB)	(dbuV)	(m) (DEG)	15.209 <30MHz	15.209 >30MHz
Loop Antenna is perpendicular						
0.0320	48.1 Qp	0.0 / 11.9 / 0.0	60.0	V / 1.0 / 0.0	-37.5	N/A
0.0600	79.4 Qp	0.1 / 10.5 / 0.0	90.0	V / 1.0 / 0.0	-2.0	N/A
0.0990	52.8 Qp	0.1 / 10.5 / 0.0	63.3	V / 1.0 / 0.0	-24.4	N/A
2.49	33.7 Qp	0.1 / 10.2 / 0.0	44.1	V / 1.0 / 0.0	-5.4	N/A
10.91	12.6 Qp	0.2 / 10.3 / 0.0	23.1	V / 1.0 / 0.0	-26.4	N/A
29.60	10.0 Qp	0.5 / 8.3 / 0.0	18.8	V / 1.0 / 0.0	-30.7	N/A
Loop antenna is Parallel						
0.0600	73.6 Qp	0.1 / 10.5 / 0.0	84.1	V / 1.0 / 0.0	-7.9	N/A
0.0990	47.1 Qp	0.1 / 10.5 / 0.0	57.7	V / 1.0 / 0.0	-30.0	N/A
2.49	27.8 Qp	0.1 / 10.2 / 0.0	38.1	V / 1.0 / 0.0	-11.4	N/A
10.91	12.8 Qp	0.2 / 10.3 / 0.0	23.3	V / 1.0 / 0.0	-26.2	N/A
29.60	10.0 Qp	0.5 / 8.3 / 0.0	18.8	V / 1.0 / 0.0	-30.7	N/A
30.00	25.5 Qp	0.5 / 12.9 / 28.4	10.5	V / 1.0 / 0.0	-39.0	-29.5
43.13	30.3 Qp	0.7 / 11.5 / 28.4	14.1	V / 1.0 / 0.0	N/A	-25.9
48.00	34.3 Qp	0.7 / 10.8 / 28.4	17.4	V / 1.0 / 0.0	N/A	-22.6
113.28	29.8 Qp	1.1 / 11.1 / 28.1	13.8	V / 1.0 / 0.0	N/A	-29.7
115.40	27.8 Qp	1.2 / 11.2 / 28.1	12.0	V / 1.0 / 0.0	N/A	-31.5
90 degrees						
115.40	28.9 Qp	1.2 / 11.2 / 28.1	13.1	V / 1.0 / 90.0	N/A	-30.4
180 degrees						
43.13	30.5 Qp	0.7 / 11.5 / 28.4	14.2	V / 1.0 / 180.0	N/A	-25.8

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Radiated Electromagnetic Emissions

Test Report #:	**BC500220 Run 03**	Test Area:	Pinewood Site 1 (3m)	Temperature:	21.0	°C
Test Method:	FCC pt. 15.209	Test Date:	03-May-2005	Relative Humidity:	<26	%
EUT Model #:	M1B	EUT Power:	3.6 VDC Battery Powered	Air Pressure:	81	kPa
EUT Serial #:	2513					
Manufacturer:	Metron					
EUT Description:	M1B Utility Radio					
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) (dB\m) (dB)	(dbuV)	(m) (DEG)	15.209 <30MHz	15.209 >30MHz
270 degrees						
190.00	25.2 Qp	1.4 / 12.8 / 27.7	11.8	V / 1.0 / 270.0	N/A	-31.7
No significant emissions found within 20 dB of the limit.						
Changing to Horizontal						
30.00	21.1 Qp	0.5 / 12.9 / 28.4	6.1	H / 2.0 / 0.0	-43.4	-33.9
43.13	23.1 Qp	0.7 / 11.5 / 28.4	6.9	H / 2.0 / 0.0	N/A	-33.1
48.00	24.8 Qp	0.7 / 10.8 / 28.4	8.0	H / 2.0 / 0.0	N/A	-32.0
113.28	23.3 Qp	1.1 / 11.1 / 28.1	7.4	H / 2.0 / 0.0	N/A	-36.1
115.40	24.8 Qp	1.2 / 11.2 / 28.1	9.0	H / 2.0 / 0.0	N/A	-34.5
190.00	21.5 Qp	1.4 / 12.8 / 27.7	8.1	H / 2.0 / 0.0	N/A	-35.4
90 degrees						
No higher emissions found at 90 degrees.						
180 degrees						
No higher emissions found at 180 degrees.						
270 degrees						
No higher emissions found at 270 degrees						
No significant emissions found within 30 dB of the limit.						
0 degrees						
No significant emissions detected at 0 degrees.						
90 degrees						
No significant emissions detected between 200 - 1000 MHz.						
The following are noise floor points.						
200.00	19.9 Qp	1.5 / 10.9 / 27.6	4.6	V / 1.0 / 90.0	N/A	-38.9
400.00	18.8 Qp	2.2 / 14.8 / 27.9	7.9	V / 1.0 / 90.0	N/A	-38.1

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Radiated Electromagnetic Emissions

Test Report #:	**BC500220 Run 03**	Test Area:	Pinewood Site 1 (3m)	Temperature:	21.0	°C
Test Method:	FCC pt. 15.209	Test Date:	03-May-2005	Relative Humidity:	<26	%
EUT Model #:	M1B	EUT Power:	3.6 VDC Battery Powered	Air Pressure:	81	kPa
EUT Serial #:	2513					
Manufacturer:	Metron					
EUT Description:	M1B Utility Radio					
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) (dB\m) (dB)	(dbuV)	(m) (DEG)	15.209 <30MHz	15.209 >30MHz
600.00	24.8 Qp	2.9 / 18.6 / 28.5	17.8	V / 1.0 / 90.0	N/A	-28.2
800.00	19.3 Qp	3.3 / 20.5 / 28.9	14.1	V / 1.0 / 90.0	N/A	-31.9
999.78	18.9 Qp	3.7 / 23.2 / 27.4	18.5	V / 1.0 / 90.0	N/A	-35.5
Changing to Horizontal						
No significant emissions detected between 200 - 1000 MHz, Horizontal.						
The following are noise floor points.						
300.00	18.6 Qp	1.9 / 13.5 / 27.2	6.7	H / 2.5 / 0.0	N/A	-39.3
500.00	19.2 Qp	2.6 / 17.0 / 28.6	10.3	H / 2.5 / 0.0	N/A	-35.7
700.00	19.3 Qp	3.3 / 20.6 / 28.5	14.7	H / 2.5 / 0.0	N/A	-31.3
900.00	19.0 Qp	3.6 / 22.4 / 28.1	16.9	H / 2.5 / 0.0	N/A	-29.1
No significant emissions detected between 1 - 4 GHz, Vertical.						
The following are noise floor points.						
1000.00	33.8 Av	3.7 / 24.2 / 37.5	24.2	V / 1.0 / 0.0	N/A	-29.8
3000.00	34.5 Av	4.6 / 30.3 / 37.5	31.8	V / 1.0 / 0.0	N/A	-22.2
Changing to Horizontal						
No significant emissions detected between 1 - 4 GHz, Horizontal.						
The following are noise floor points.						
2000.00	35.1 Av	3.2 / 27.4 / 37.3	28.5	H / 1.0 / 0.0	N/A	-25.5
4000.00	34.1 Av	5.7 / 32.8 / 37.6	35.0	H / 1.0 / 0.0	N/A	-19.0
Scanned from 4 - 8 GHz at 0 degrees and 270 degrees.						
No significant emissions detected between 4 - 8 GHz, Horizontal.						
The following are noise floor points.						

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Radiated Electromagnetic Emissions

Test Report #:	**BC500220 Run 03**	Test Area:	Pinewood Site 1 (3m)	Temperature:	21.0	°C
Test Method:	FCC pt. 15.209	Test Date:	03-May-2005	Relative Humidity:	<26	%
EUT Model #:	M1B	EUT Power:	3.6 VDC Battery Powered	Air Pressure:	81	kPa
EUT Serial #:	2513					
Manufacturer:	Metron					
EUT Description:	M1B Utility Radio					
Notes:						

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 <30MHz	DELTA2 (dB) 15.209 >30MHz
5000.00	32.3 Av	7.6 / 33.5 / 39.1	34.3	H / 1.0 / 0.0	N/A	-19.7
7000.00	31.3 Av	8.1 / 35.6 / 40.0	35.0	H / 1.0 / 0.0	N/A	-19.0
Changing to Vertical						
No significant emissions detected between 4 - 8 GHz, Vertical.						
The following are noise floor points.						
6000.00	31.7 Av	7.7 / 34.7 / 39.1	34.9	V / 1.0 / 0.0	N/A	-19.1
8000.00	30.3 Av	8.3 / 36.9 / 40.5	35.0	V / 1.0 / 0.0	N/A	-19.0
Scanned from 8 - 10 GHz at 0 and 90 degrees.						
No significant emisssions detected, the following is noise floor.						
9000.00	38.9 Av	8.5 / 37.4 / 46.8	38.0	V / 1.0 / 0.0	N/A	-16.0
Changing to Horizontal						
No significant emissions detected between 8 - 10 GHz, Horizontal.						
The following is noise floor.						
10000.0	42.2 Av	9.5 / 38.4 / 48.3	41.8	V / 1.0 / 0.0	N/A	-12.2
End of Run						

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Radiated Electromagnetic Emissions

Test Report #:	**BC500220 Run 03**	Test Area:	Pinewood Site 1 (3m)	Temperature:	21.0	°C
Test Method:	FCC pt. 15.209	Test Date:	03-May-2005	Relative Humidity:	<26	%
EUT Model #:	M1B	EUT Power:	3.6 VDC Battery Powered	Air Pressure:	81	kPa
EUT Serial #:	2513					
Manufacturer:	Metron					
EUT Description:	M1B Utility Radio					
Notes:						

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 <30MHz	DELTA2 (dB) 15.209 >30MHz
********** **Measurement Summary** **********						
0.0600	79.4 Qp	0.1 / 10.5 / 0.0	90.0	V / 1.0 / 0.0	-2.0	N/A
2.49	33.7 Qp	0.1 / 10.2 / 0.0	44.1	V / 1.0 / 0.0	-5.4	N/A
10000.0	42.2 Av	9.5 / 38.4 / 48.3	41.8	V / 1.0 / 0.0	N/A	-12.2
9000.00	38.9 Av	8.5 / 37.4 / 46.8	38.0	V / 1.0 / 0.0	N/A	-16.0
4000.00	34.1 Av	5.7 / 32.8 / 37.6	35.0	H / 1.0 / 0.0	N/A	-19.0
7000.00	31.3 Av	8.1 / 35.6 / 40.0	35.0	H / 1.0 / 0.0	N/A	-19.0
8000.00	30.3 Av	8.3 / 36.9 / 40.5	35.0	V / 1.0 / 0.0	N/A	-19.0
6000.00	31.7 Av	7.7 / 34.7 / 39.1	34.9	V / 1.0 / 0.0	N/A	-19.1
5000.00	32.3 Av	7.6 / 33.5 / 39.1	34.3	H / 1.0 / 0.0	N/A	-19.7
3000.00	34.5 Av	4.6 / 30.3 / 37.5	31.8	V / 1.0 / 0.0	N/A	-22.2
48.00	34.3 Qp	0.7 / 10.8 / 28.4	17.4	V / 1.0 / 0.0	N/A	-22.6
0.0990	52.8 Qp	0.1 / 10.5 / 0.0	63.3	V / 1.0 / 0.0	-24.4	N/A
2000.00	35.1 Av	3.2 / 27.4 / 37.3	28.5	H / 1.0 / 0.0	N/A	-25.5
43.13	30.5 Qp	0.7 / 11.5 / 28.4	14.2	V / 1.0 / 180.0	N/A	-25.8
10.91	12.8 Qp	0.2 / 10.3 / 0.0	23.3	V / 1.0 / 0.0	-26.2	N/A
600.00	24.8 Qp	2.9 / 18.6 / 28.5	17.8	V / 1.0 / 90.0	N/A	-28.2
900.00	19.0 Qp	3.6 / 22.4 / 28.1	16.9	H / 2.5 / 0.0	N/A	-29.1
30.00	25.5 Qp	0.5 / 12.9 / 28.4	10.5	V / 1.0 / 0.0	-39.0	-29.5
113.28	29.8 Qp	1.1 / 11.1 / 28.1	13.8	V / 1.0 / 0.0	N/A	-29.7
1000.00	33.8 Av	3.7 / 24.2 / 37.5	24.2	V / 1.0 / 0.0	N/A	-29.8
115.40	28.9 Qp	1.2 / 11.2 / 28.1	13.1	V / 1.0 / 90.0	N/A	-30.4
29.60	10.0 Qp	0.5 / 8.3 / 0.0	18.8	V / 1.0 / 0.0	-30.7	N/A
700.00	19.3 Qp	3.3 / 20.6 / 28.5	14.7	H / 2.5 / 0.0	N/A	-31.3
190.00	25.2 Qp	1.4 / 12.8 / 27.7	11.8	V / 1.0 / 270.0	N/A	-31.7
800.00	19.3 Qp	3.3 / 20.5 / 28.9	14.1	V / 1.0 / 90.0	N/A	-31.9
999.78	18.9 Qp	3.7 / 23.2 / 27.4	18.5	V / 1.0 / 90.0	N/A	-35.5
500.00	19.2 Qp	2.6 / 17.0 / 28.6	10.3	H / 2.5 / 0.0	N/A	-35.7
0.0320	48.1 Qp	0.0 / 11.9 / 0.0	60.0	V / 1.0 / 0.0	-37.5	N/A
400.00	18.8 Qp	2.2 / 14.8 / 27.9	7.9	V / 1.0 / 90.0	N/A	-38.1

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Radiated Electromagnetic Emissions

Test Report #:	**BC500220 Run 03**	Test Area:	Pinewood Site 1 (3m)	Temperature:	21.0	°C
Test Method:	FCC pt. 15.209	Test Date:	03-May-2005	Relative Humidity:	<26	%
EUT Model #:	M1B	EUT Power:	3.6 VDC Battery Powered	Air Pressure:	81	kPa
EUT Serial #:	2513					
Manufacturer:	Metron					
EUT Description:	M1B Utility Radio					
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) (dB\m) (dB)	(dbuV)	(m) (DEG)	15.209 <30MHz	15.209 >30MHz
200.00	19.9 Qp	1.5 / 10.9 / 27.6	4.6	V / 1.0 / 90.0	N/A	-38.9
300.00	18.6 Qp	1.9 / 13.5 / 27.2	6.7	H / 2.5 / 0.0	N/A	-39.3

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15.247(a)(2) Test Data

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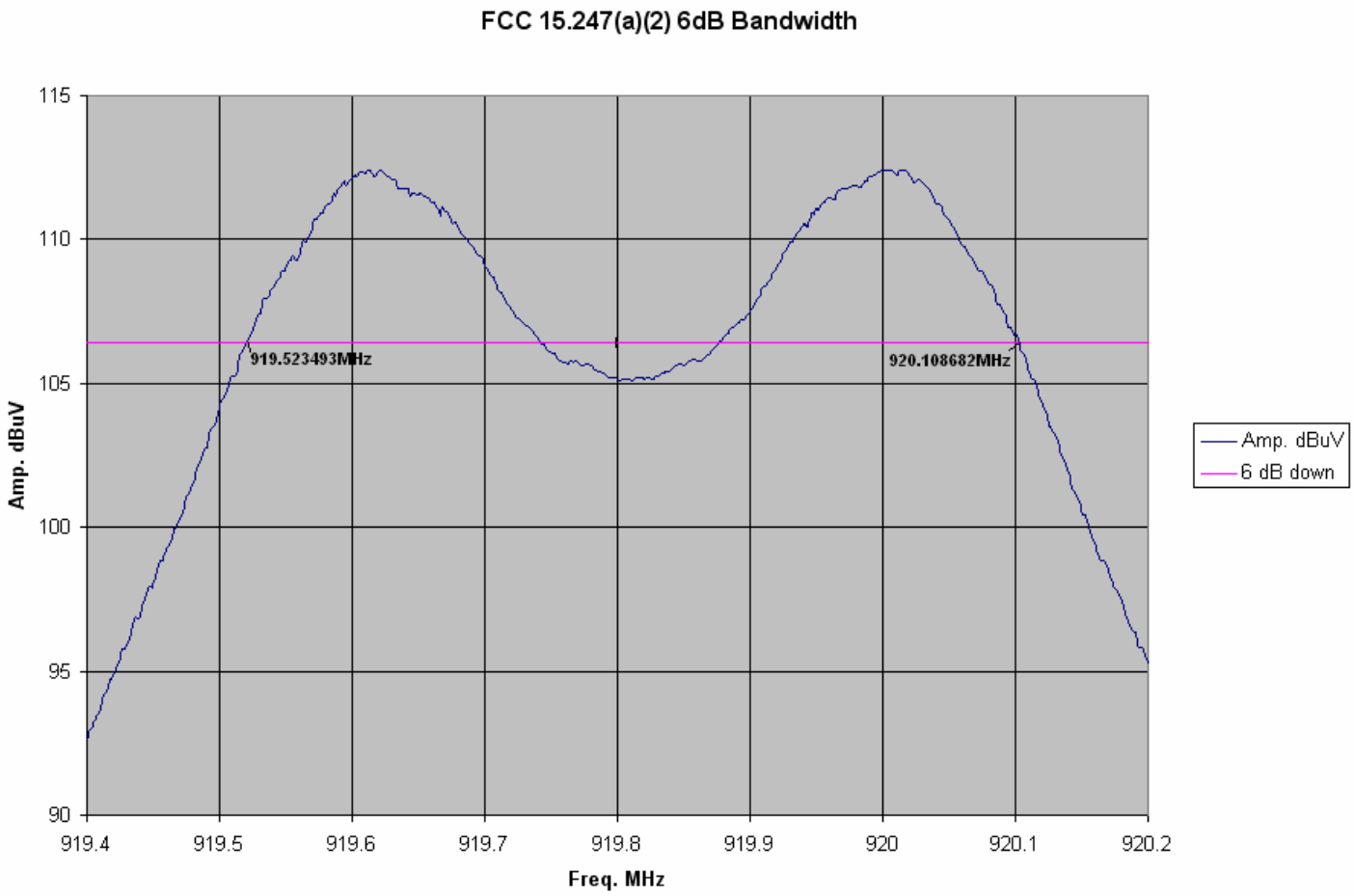

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15.247 (b)(3), (c)/15.205 Test Data

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Field Strength Measurements
Fundamental and Spurious of the Transmitter

Test Report #:	**BC500220 Run 03**	Test Area:	Pinewood Site 1 (3m)	Temperature:	22.6 °C
Test Method:	FCC pt. 15.209	Test Date:	03-May-2005	Relative Humidity:	<26 %
EUT Model #:	M1B	EUT Power:	3.6 VDC Battery Powered	Air Pressure:	80 kPa
EUT Serial #:	2513				
Manufacturer:	Metron				
EUT Description:	M1B Utility Radio				
Notes:					

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) (dB\m) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
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 $20*\log_{10}$(duty cycle in 100mS) “not to exceed 20dB”								
Part 15.247 and 15.205 Respectively								
Eut is Flat on table. Maximizing fundamental frequency.								
919.59	73.3 Qp	3.6 / 22.5 / 0.0	99.4	V / 1.0 / 152.0	0	99.4	125.2	-25.80
920	73.3 Qp	3.6 / 22.4 / 0.0	99.3	V / 1.0 / 152.0	0	99.3	125.2	-25.90
919.59	80.2 Qp	3.6 / 22.5 / 0.0	106.3	H / 1.4 / 210.0	0	106.3	125.2	-18.90
920	80.1 Qp	3.6 / 22.4 / 0.0	106.1	H / 1.4 / 210.0	0	106.1	125.2	-19.10
EUT is Vertical on table, antenna on top.								
919.59	75.7 Qp	3.6 / 22.5 / 0.0	101.8	H / 1.0 / 44.0	0	101.8	125.2	-23.40
920	75.7 Qp	3.6 / 22.4 / 0.0	101.7	H / 1.0 / 44.0	0	101.7	125.2	-23.50
920	82.9 Qp	3.6 / 22.4 / 0.0	108.9	V / 1.0 / 92.0	0	108.9	125.2	-16.30
919.59	82.6 Qp	3.6 / 22.5 / 0.0	108.7	V / 1.0 / 92.0	0	108.7	125.2	-16.50
EUT is on its side, Battery on bottom								
919.59	76.7 Qp	3.6 / 22.5 / 0.0	102.8	V / 1.0 / 232.0	0	102.8	125.2	-22.40
920	76.5 Qp	3.6 / 22.4 / 0.0	102.5	V / 1.0 / 232.0	0	102.5	125.2	-22.70
919.59	78.2 Qp	3.6 / 22.5 / 0.0	104.4	H / 1.0 / 36.0	0	104.4	125.2	-20.80
920	78.1 Qp	3.6 / 22.4 / 0.0	104.1	H / 1.0 / 36.0	0	104.1	125.2	-21.10
EUT vertical on table with antenna on top was determined to be worst case position.								
Testing continued in that position.								
1839.2	34.5 Pk	3.1 / 26.7 / 0.0	64.3	V / 1.0 / 90.0	-20	44.3	105.2	-60.90
1839.2	39.7 Pk	3.1 / 26.7 / 0.0	69.4	H / 2.1 / 145.0	-20	49.4	105.2	-55.80
1840	34.0 Pk	3.1 / 26.7 / 0.0	63.7	V / 1.0 / 0.0	-20	43.7	105.2	-61.50
1840.05	39.5 Pk	3.1 / 26.7 / 0.0	69.3	H / 2.1 / 145.0	-20	49.3	105.2	-55.90

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Field Strength Measurements
Fundamental and Spurious of the Transmitter

Test Report #:	**BC500220 Run 03**	Test Area:	Pinewood Site 1 (3m)	Temperature:	22.6	°C
Test Method:	FCC pt. 15.209	Test Date:	03-May-2005	Relative Humidity:	<26	%
EUT Model #:	M1B	EUT Power:	3.6 VDC Battery Powered	Air Pressure:	80	kPa
EUT Serial #:	2513					
Manufacturer:	Metron					
EUT Description:	M1B Utility Radio					
Notes:						

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) (dB\m) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m)	(dB)

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 $20*\log_{10}$(duty cycle in 100mS) “not to exceed 20dB”

Part 15.247 and 15.205 Respectively

2758.72	68.8 Pk	4.3 / 29.4 / 37.5	65.1	V / 1.0 / 120.0	-20	45.1	54	-8.90
2758.77	65.4 Pk	4.3 / 29.4 / 37.5	61.6	H / 1.0 / 220.0	-20	41.6	54	-12.40
2760.04	65.7 Pk	4.3 / 29.4 / 37.5	62	H / 1.0 / 220.0	-20	42	54	-12.00
2760.04	69.1 Pk	4.3 / 29.4 / 37.5	65.4	V / 1.0 / 120.0	-20	45.4	54	-8.60
3678.37	59.8 Pk	5.1 / 32.0 / 37.9	59	H / 1.0 / 0.0	-20	39	54	-15.00
3678.38	56.2 Pk	5.1 / 32.0 / 37.9	55.4	V / 2.0 / 200.0	-20	35.4	54	-18.60
3680.05	60.1 Pk	5.1 / 32.0 / 37.9	59.3	H / 1.0 / 0.0	-20	39.3	54	-14.70
3680.05	56.0 Pk	5.1 / 32.0 / 37.9	55.2	V / 2.0 / 200.0	-20	35.2	54	-18.80
4597.95	52.4 Pk	6.8 / 32.5 / 39.3	52.4	V / 1.0 / 245.0	-20	32.4	54	-21.60
4597.95	48.8 Pk	6.8 / 32.5 / 39.3	48.9	H / 1.0 / 225.0	-20	28.9	54	-25.10
4600.05	52.6 Pk	6.8 / 32.5 / 39.3	52.7	V / 1.0 / 245.0	-20	32.7	54	-21.30
4600.05	49.4 Pk	6.8 / 32.5 / 39.3	49.5	H / 1.0 / 225.0	-20	29.5	54	-24.50
5517.56	43.4 Pk	6.7 / 34.3 / 38.6	45.8	V / 1.0 / 220.0	-20	25.8	105.2	-79.40
5517.56	48.7 Pk	6.7 / 34.3 / 38.6	51.1	H / 1.0 / 140.0	-20	31.1	105.2	-74.10
5520.07	45.0 Pk	6.7 / 34.3 / 38.6	47.4	V / 1.0 / 220.0	-20	27.4	105.2	-77.80
5520.07	49.6 Pk	6.7 / 34.3 / 38.6	52	H / 1.0 / 140.0	-20	32	105.2	-73.20
6437.14	37.7 Pk	8.4 / 34.9 / 39.0	41.9	V / 1.0 / 102.0	-20	21.9	105.2	-83.30
6437.14	41.2 Pk	8.4 / 34.9 / 39.0	45.5	H / 1.0 / 142.0	-20	25.5	105.2	-79.70
6440.09	39.1 Pk	8.4 / 34.9 / 39.0	43.4	V / 1.0 / 102.0	-20	23.4	105.2	-81.80
6440.09	42.6 Pk	8.4 / 34.9 / 39.0	46.9	H / 1.0 / 142.0	-20	26.9	105.2	-78.30
7356.77	34.7 Pk	8.2 / 36.5 / 40.3	39.1	V / 1.0 / 270.0	-20	19.1	54	-34.90
7356.77	34.2 Pk	8.2 / 36.5 / 40.3	38.5	H / 1.0 / 0.0	-20	18.5	54	-35.50
7360.09	35.5 Pk	8.2 / 36.5 / 40.3	39.8	V / 1.0 / 270.0	-20	19.8	54	-34.20
7360.09	34.1 Pk	8.2 / 36.5 / 40.3	38.4	H / 1.0 / 0.0	-20	18.4	54	-35.60
8276.37	40.3 Pk	8.4 / 37.1 / 45.2	40.6	H / 1.0 / 0.0	-20	20.6	54	-33.40
8276.37	41.6 Pk	8.4 / 37.1 / 45.2	41.9	V / 1.0 / 0.0	-20	21.9	54	-32.10
8280.09	42.3 Pk	8.4 / 37.1 / 45.2	42.5	H / 1.0 / 0.0	-20	22.5	54	-31.50
8280.09	42.8 Pk	8.4 / 37.1 / 45.2	43.1	V / 1.0 / 0.0	-20	23.1	54	-30.90

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Field Strength Measurements
Fundamental and Spurious of the Transmitter

Test Report #:	**BC500220 Run 03**	Test Area:	Pinewood Site 1 (3m)	Temperature:	22.6	°C
Test Method:	FCC pt. 15.209	Test Date:	03-May-2005	Relative Humidity:	<26	%
EUT Model #:	M1B	EUT Power:	3.6 VDC Battery Powered	Air Pressure:	80	kPa
EUT Serial #:	2513					
Manufacturer:	Metron					
EUT Description:	M1B Utility Radio					
Notes:						

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) (dB\m) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m)	(dB)

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 $20*\log_{10}$(duty cycle in 100mS) “not to exceed 20dB”

Part 15.247 and 15.205 Respectively

9195.97	44.3 Pk	8.9 / 37.6 / 47.2	43.6	H / 1.0 / 0.0	-20	23.6	54	-30.40
9195.97	43.5 Pk	8.9 / 37.6 / 47.2	42.7	V / 1.0 / 0.0	-20	22.7	54	-31.30
9200.01	44.5 Pk	8.9 / 37.6 / 47.2	43.8	H / 1.0 / 0.0	-20	23.8	54	-30.20
9200.01	43.2 Pk	8.9 / 37.6 / 47.2	42.5	V / 1.0 / 0.0	-20	22.5	54	-31.50

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15.247 (d) Test Data

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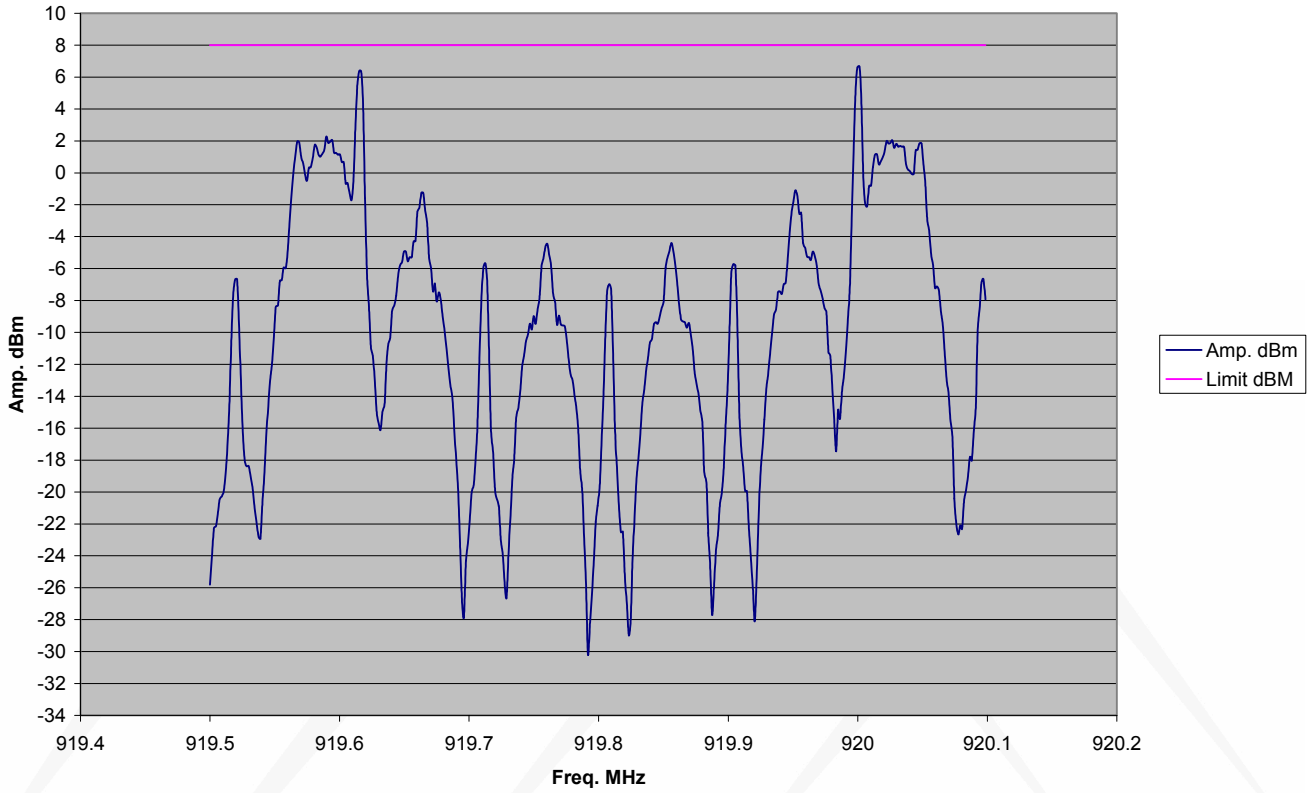
FCC 15.247(d) Spectral Denstiy 3kHz RBW



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Equipment Utilized during testing

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Project Report

Begin Date: 4/29/2005 **End Date:** 5/3/2005

Technician Mike Spataro **Project** BC500220

Capital Asset ID	Manufacturer	Model #	Serial #	Description	Test Performed	Service Type	Service Date	Service Due
6	Hewlett-Packard	8594E	3223A00145	Spectrum Analyzer	R Radiated Emissions	For Cal	1/6/2005	1/6/2006
106	TENSOR	4105	2020	Ridged Guide Antenna 1-18GHz	R Radiated Emissions	For Cal	6/28/2004	6/28/2005
135	EMCO	3146	9402-3775	Log Periodic Antenna (200-1000MHz)	R Radiated Emissions	For Cal	9/18/2004	9/18/2005
138	EMC TEST SYSTEMS	3109	3142	Biconical Antenna 30-300MHz	R Radiated Emissions	For Cal	9/30/2004	9/30/2005
195	EMCO	6502	9205-2738	Magnetic loop	R Radiated Emissions	For Cal	6/2/2004	6/2/2005
202	Avantek	AWT-18037	1002	RF Pre-Amplifier (8-18 GHz)	R Radiated Emissions	For Ver	4/4/2005	4/4/2006
203	Avantek	AFT97-8434-10F	1007	RF Pre-Amplifier (4-8 GHz)	R Radiated Emissions	For Ver	4/4/2005	4/4/2006
213	Mini-Circuits Lab	ZHL-42	N052792-2	Amplifier	R Radiated Emissions	For Ver	5/6/2005	5/6/2006
248	Hewlett-Packard	8447F	3113A05545	9 kHz- 1.3GHz Pre Amp	R Radiated Emissions	For Ver	5/6/2005	5/6/2006
259	Hewlett-Packard	E7405A	My44211889	Spectrum Analyzer	R Radiated Emissions	For Cal	10/11/2004	10/11/2005

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Appendix B

Test Plan

and

Constructional Data Form

International Approvals Laboratories, LLC
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Request for Estimate:

Agent/Test Lab: International Approvals Laboratories, LLC
Address: 5541 Central Avenue Suite 110 Boulder, CO 80301
Contact: Todd Seeley
Title: Principal Engineer (Services Development Focus)
Phone Number: (303) 402-5272
Cell Number: (303) 503-2491
Fax Number: (303) 449-6160
Email Address: todd@ialabs.com

License Holder: **Transparent Technologies, Inc.**
Address: **5665 Airport Blvd**
Contact: **Mark Shamley**
Title: **Operations Manager**
Phone Number: 720-406-1294 / 303-449-8833
Fax Number: **303-441-0203**

Please provide all pertinent information below and email this Form to Todd Seeley at todd@ialabs.com for a quotation:

General Product Information:

Product/Model Number:	**M1B**
Description of product:	**Utility Automatic Meter Reading Radio**
Intended Use:	☐ **Household** ■ **Commercial** ■ **Industrial** ☐ **Hospital** ☐ **Life Supporting**
Intended Location:	■ **Dry** ■ **Damp** ■ **Wet** ☐ **Hazardous Location**
Product Type:	■ **Prototype** ☐ **Production Sample** ☐ **Manufacturing Design Change: Please Describe**
If more than one product, what are the differences?	
Is the Product Enclosure:	☐ **Metal** ■ **Plastic** ☐ **Both**

Size:	Length:4”	Width: 1.5”	Height: 5”	Weight: 1 lb

What Voltages/Current does the EUT run at?	Rated Voltage:3.6V Rated Current: # of Phases/Conductors: / # of Power Cords:
Are there Multiple Modes of Operation?	☐ **Yes** ■ **No** **If Yes Please Describe:**
Can all modes of operation be operated simultaneously?	☐ **Yes** ☐ **No** **Explain:**
In which countries will you be selling the product?	**USA**

EMC Information:

What EMC certifications are desired?	■ FCC/ICES (US & Canada) ☐ CE / EMC / MMD ☐ BSMI (Taiwan) ☐ VCCI (Japan) ☐ SII (Israel) ☐ AS/NZS (Australia/New Zealand) ☐ Other: Please Specify
Highest frequency utilized for device operation:	**928 MHz**
List of Clock Frequencies:	**Refer to previous testing**
What is the time that it takes for the device to complete a full cycle of operation? (time required to identify any degradation in performance)	**Same as M1**
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)**	**1**
Number of Dedicated Earth Equalization Ports	
Number of Ethernet and/or Telecommunications Ports	**1**

Radio Information:

What Radio certifications are desired?	■ FCC (USA) ☐ Industry Canada ☐ ETSI (R&TTE) ☐ Other: Please Specify
Operating Frequency:	**919.80**
RF Output Power:	**DTS mode under FCC 15.247 Wideband FSK 520 KHz**
Number of Antennas & Description: **(Internal, External, etc.)**	**1**
Modulation Technique:	**DTS**
Number of Channels:	**1**
Can the device be operated in CW Mode?	■ **Yes** ☐ **No**

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Safety Information:

What safety certifications are desired?	☐ NRTL Listing ☐ CE / LVD / MDD ☐ CB Certification ☐ Other: Please Specify
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: Organization tested by: ☐ Yes ☐ No
Is the power supply	☐ An approved off the shelf power supply OR ☐ A Custom Model that will need evaluation/ certification
Does the device contain batteries?	■ Yes ☐ No What Type? **Lithium Thionyl Chloride C-Cell** How Many? **1**
What technology is used? (i.e., lasers, X Ray, etc.)	**RF and IrDA**

If Laser:	Class:	Output Power:	Beam Divergence Angle:	Wavelength:

Is the product a Medical Device?	☐ Yes ■ No
Is it an In Vitro Diagnostic Device?	☐ Yes ■ No
Testing location: (to be filled in by IALabs)	

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Additional Information:

This information is required to be filled in to act as a test plan and constructional data form required to be supplied as part of the test report in accordance to the required standards. This information is not required to obtain a quote.

Support Equipment:

IALabs requires our customers provide all support equipment necessary to fully operate the EUT.

Item	Description	Manufacturer	Model No.
1			
2			
3			
4			

Cabling Information:

Cable	Function*	Type of Shield	Length	Connectors	Connection**
1					
2					
3					
4					
5					
6					

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

Monitoring the EUT:

Please provide instructions below on how to observe the EUT to verify proper operation in all modes. (including software revision)

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.

Note: To insert files and photos within this document please fill in the information above and then unlock the FORM by:

1. Right click on the tool bar above and select “Form”
2. Select the Lock Button within the “form” toolbar

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Emissions Testing Required		
☒ *FCC Part 15*	☐ *ICES-003*	☐ *VCCI*
☐ *FCC Part 18*	☐ *BSMI*	☐ *CISPR 22/EN 55022*
☐ *CISPR 11/EN 55011*	☐ *IEC/EN 61326*	☐ *IEC/EN61000-6-3*
☐ *IEC/EN61000-6-4*	☐ *CNS13438*	☐ *AS/NZS 3548*
☐ *IEC/EN61000-3-2*	☐ *IEC/EN61000-3-3*	☐ *ETSI/EN 301 489*
☐ *Other:*		
OATS Testing Voltages		
☐ *100VAC/50 Hz*	☐ *120VAC/60Hz*	☐ *230VAC/50Hz*
☐ *110VAC/60Hz*	☐ *220VAC/60Hz*	☐ *240VAC/50Hz*
☐ *Other:*		
Immunity Product Family Standard		
☐ *CISPR24/EN 55024*	☐ *IEC/EN 61000-6-1*	☐ *IEC/EN 61000-6-2*
☐ *IEC/EN 60601-1-2*	☐ *IEC/EN 61326*	☐ *CISPR14/ EN 55014-2*
☐ *ETSI/EN 401 489*		
☐ *Other:*		
Immunity Methods		
☐ *EN61000-4-2*	☐ 4kV/8kV ☐ 6kV/8kV ☐ 8kV ☐ 12kV ☐ 15kV	☐ *Other:*
☐ *EN61000-4-3*	☐ 3V/m ☐ 10V/m ☐ 1 kHz Modulation ☐ 400 Hz Modulation ☐ 2 Hz Modulation	☐ *Other:*
☐ *EN61000-4-4*	☐ 0.5 kV ☐ 1.0 kV ☐ 2.0 kV	☐ *Other:*
☐ *EN61000-4-5*	☐ 0.5 kV ☐ 1.0 kV ☐ 2.0 kV ☐ 4.0 kV	☐ *Other:*
☐ *EN61000-4-6*	☐ 3Vrms ☐ 10Vrms ☐ 1 kHz Modulation ☐ 400 Hz Modulation ☐ 2 Hz Modulation	☐ *Other:*
☐ *EN61000-4-8*	☐ 1A/m ☐ 30A/m ☐ 400A/m	☐ *Other:*
☐ *EN61000-4-11*	☐ >95% 0.5 Cycles ☐ 60% 5 Cycles ☐ 30% 25 Cycles ☐ >95% 250 Cycles	☐ *Other:*

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Appendix C

Measurement Protocol

And

Test Procedures

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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 it's 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 dBμV, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the applicable limit.

To convert between dBμV and μV, the following conversions apply:

- dBμV = 20(log μV)
- μV = Inverse log(dBμV/20)

RADIATED EMISSIONS

The final level, expressed in dBμV/m, is arrived at by taking the reading from the spectrum analyzer (Level dBμV) 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 dBμV:

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

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DETAILS OF TEST PROCEDURES

General Standard Information

The test methods used comply with ANSI C63.4-1992 - "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 μH (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.

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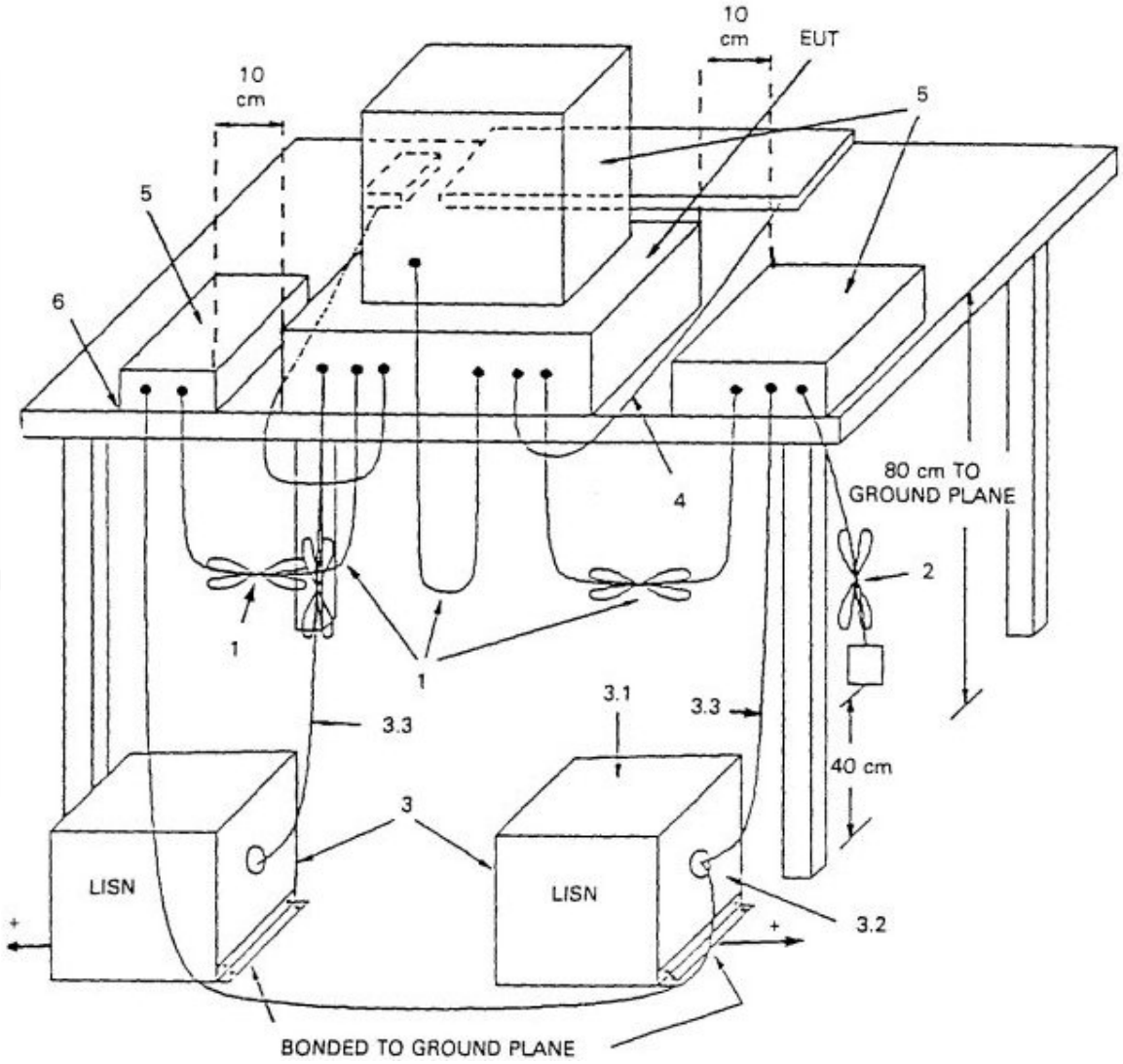
Conducted Emissions Diagram:



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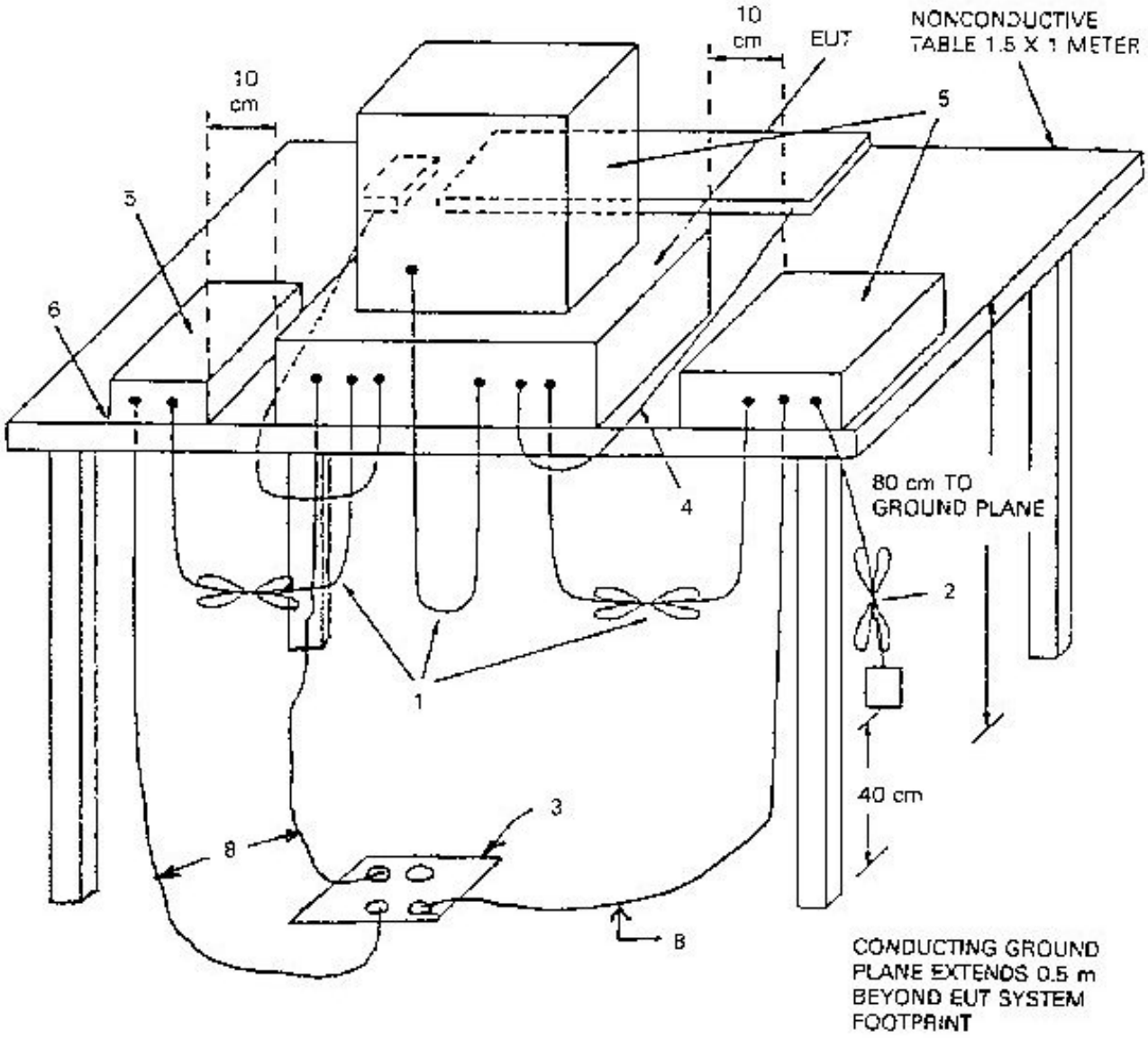
Radiated Emissions Diagram:



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