NEBRASKA CENTER FOR EXCELLENCE IN ELECTRONICS
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ACCREDITED
Certificate Number 1953-01

Test Report

Company: Radiotronix, Inc.
207 Industrial Blvd.
Moore, OK 73160
Contact: Tom Marks

Product: Suretalk RF microphone pack
FCC ID: Q7V-3F0001RDTX

Test Report No: R042303-01-01

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General Manager

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Test Engineer

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Total Pages: 17

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1.0 Summary of test results

1.1 Test Results

Test	Test Specification	Results
CFR 47, FCC Part 15.203	Part 15.203	Complies
CFR 47, FCC Part 15.207	Part 15.207	Complies
CFR 47, FCC Part 15.209	Part 15.209, Class B	Complies
CFR 47, FCC Part 15.249	Part 15.249	Complies

1.2 Test Methods

1.2.1 Conducted Emissions

Measurements of conducted emissions were not performed, as the EUT does not tie into any mains networks. The EUT powered by battery. Modifications were made to the base station portion of the EUT to allow for an AC/DC adapter in order to facilitate charging, the EUT does not operate while charging.

1.2.2 Radiated Emissions

Compliance to CFR 47 Parts 15.209 and 15.249 was tested in accordance with the methods of ANSI/IEEE C63.4, 2001. Several configurations were examined the results presented represent a worst-case scenario. The EUT was placed on a wooden table approximately 80cm high and centered on a 4m diameter turntable. The table was rotated to maximize emissions. All measurements were taken at a distance of 3m from the EUT.

2.0 Description

2.1 Equipment under test

The Suretalk RF microphone belt-pack is a low power FM transmitter for audio when between a law enforcement officer and the base station/charger mounted in their vehicle. The digital (FSK) transceiver controls the channel selection of the unit prior to activation of the FM transmitter, but after it is removed from the base station/charger.

2.1.1 Identification: Suretalk RF microphone belt-pack

2.1.2 EUT tested dates: June 2nd, September 8th and 9th 2004

2.1.3 Manufacturer: Radiotronix, Inc.

2.1.4 Serial number: FCCTEST1

2.2 Laboratory description

All testing was performed at the NCEE Lincoln facility, which is a FCC registered lab. This site has been fully described in a report submitted to the FCC, and accepted in a letter dated May 4, 2001. Laboratory environmental conditions varied slightly throughout the tests:

Relative humidity of 46 ± 4%
Temperature of 21 ± 3° Celsius

2.3 Special equipment or setup

The device was modified to enable the transmitter to be active continuously and to have operator selectable frequency control. The battery was fully charged prior to the start of each test.

3.0 Test equipment used

Serial #	*Manufacturer*	*Model*	*Description*	*Last cal.*
1647	EMCO	3142B	Biconilog antenna	10-Nov-03
6416	EMCO	3115	DRG Horn	17-Sep-03
100037	Rohde & Schwarz	ESIB26	EMI Test Receiver	08-Jun-04
082001/003	Rohde & Schwarz	TS-PR18	Preamplifier	N/A
2575	Rohde & Schwarz	ES-K1	Software v1.60	N/A

4.0 Detailed Results

Radiated emissions measurements were made by first using a spectrum analyzer getting a rough signal spectrum, any points were then measured using a CISPR 16 compliant receiver with the following bandwidth setting:

30MHz - 1GHz: 120kHz IF bandwidth, 60kHz steps
Above 1GHz: 1MHz IF bandwidth, 500kHz steps

All results shown are corrected to incorporate cables losses, antenna factors, and any amplification.

4.1 FCC Part 15.203 unique connector for antenna

The antenna for the transceiver is part of the circuit board itself and cannot be removed from the circuit board. Figure 3 is a photo of the antenna mounted to the PCB.

4.2 FCC Part 15.207 Conducted Emissions

The EUT is exempt from conducted emissions testing, as no provisions exist for the product to tie into an AC mains network; it is a battery-powered device.

4.3 FCC Part 15.209 Radiated Emissions

The EUT was found to not produce any emissions in excess of the limits. The test setup can be seen in Figures 1 and 2. More information on the radiated emissions can be found in Section 4.4. The transmitter was not active for these measurements.

4.4 FCC Part 15.249 Radiated Emissions

The EUT was tested at a distance of 3-meters with the emissions maximized according to ANSI C63.4. The EUT was set in a continuous transmit mode, both the analog and digital transmitters were selected to be active at the same time. The frequencies that were used are shown below. Values, as measured with a quasi-peak detector (30MHz –1GHz) or an average detector (above 1GHz), were found not to exceed the limits. Tables of the highest results and plots of the measurements below 1GHz can be seen in Appendix B.

<u>Center Frequencies (MHz)</u>

Analog Tx

Channel 1:	906.0152
Channel 10:	915.0066
Channel 20:	924.9966

Digital Tx/Rx

Channel 1:	902.3623
Channel 10:	914.9233
Channel 20:	927.6664

Appendix A

Test setup photos

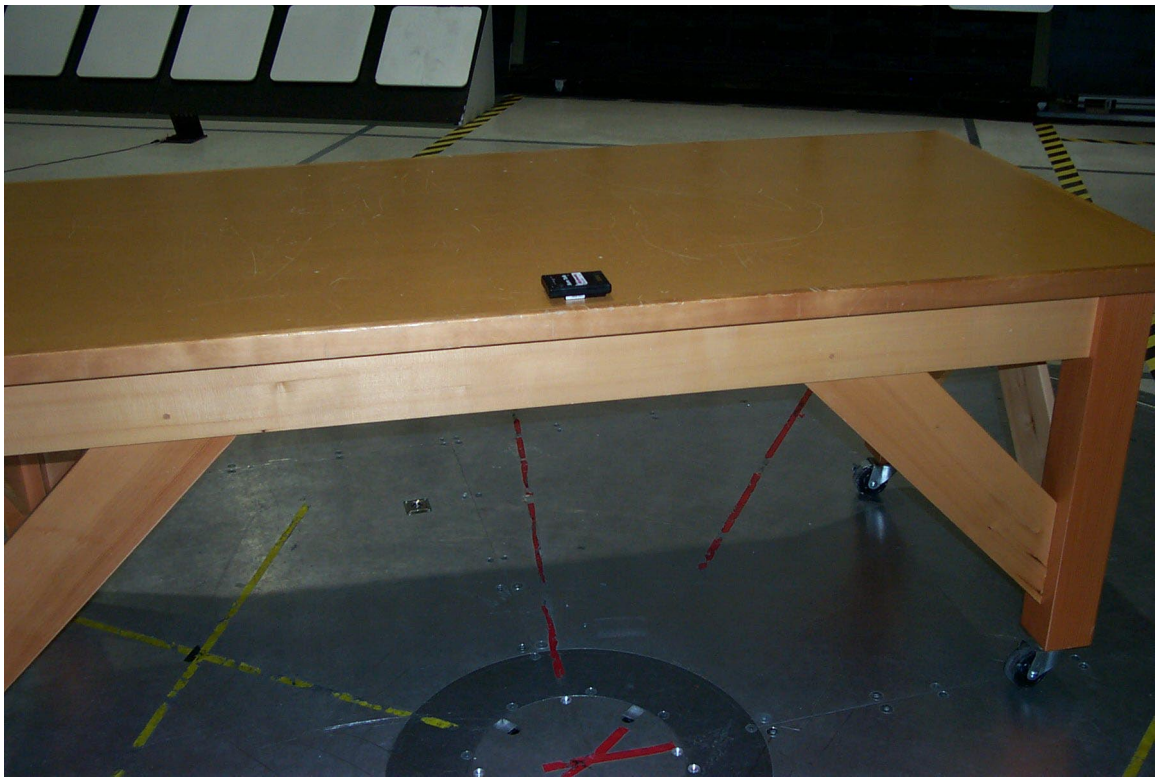

Figure 1 Test Setup

Figure 2 Test setup

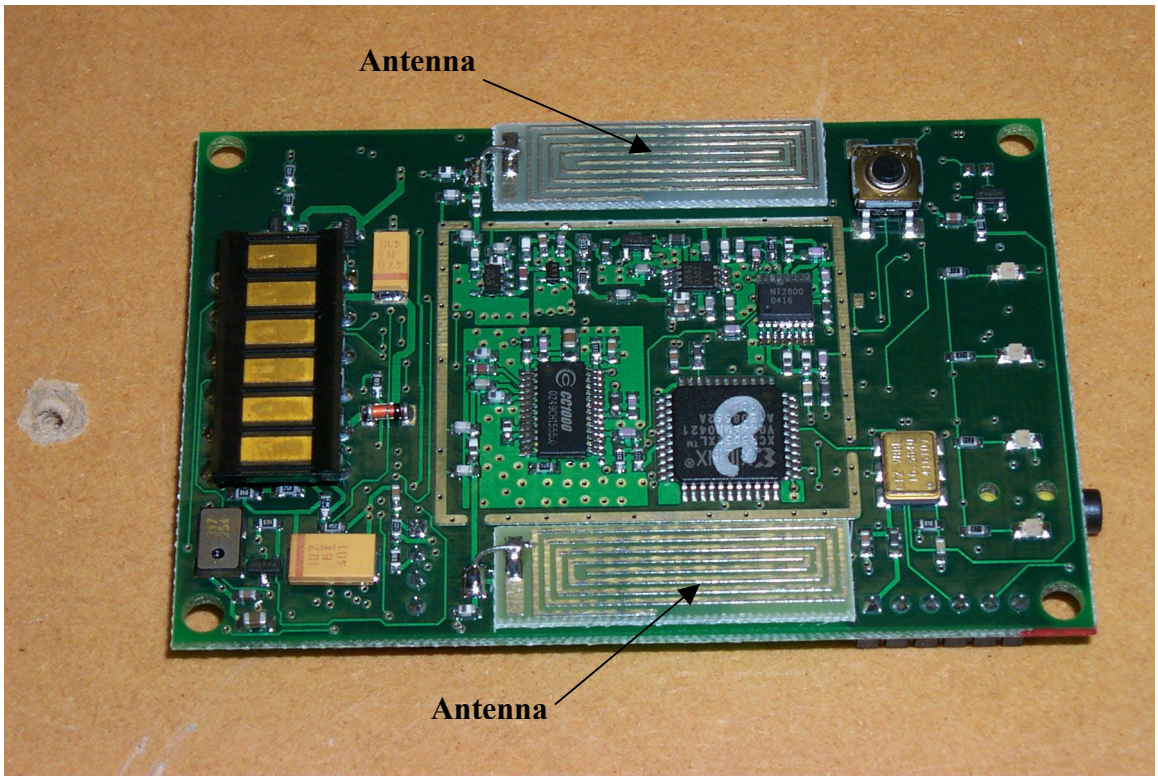

Figure 3 Antenna on PCB

Appendix B

Emissions results and plots

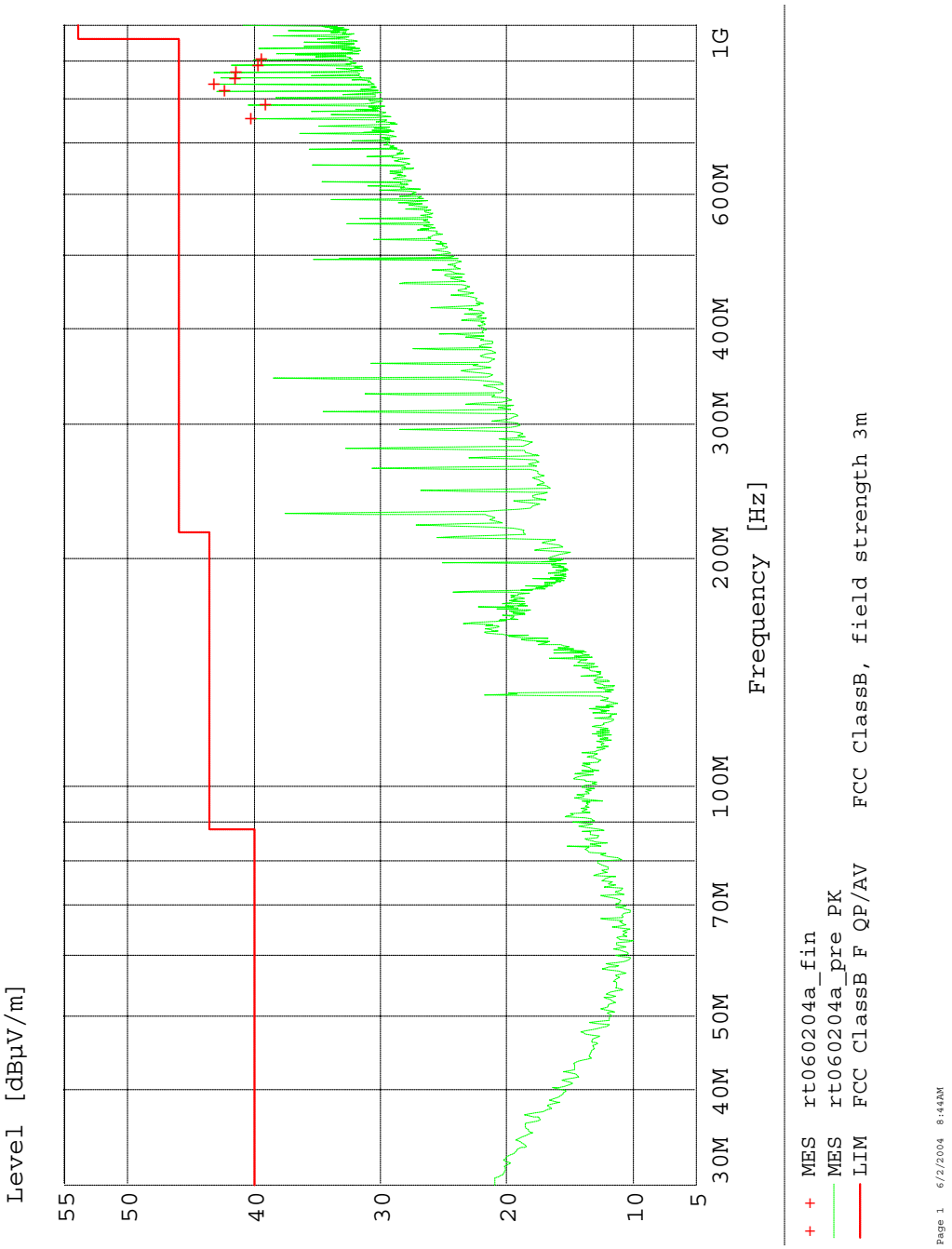

Figure 4 EUT set to receive mode

Table 1:Digital Receiver active (no analog receiver) transmitters off; QUASI-PEAK

Freq MHz	Level dBµV/m	Measured dBµV	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
753.660	40.61	15.30	46.0	5.4	117.0	125	HORI
786.420	39.41	13.44	46.0	6.6	100.0	43	VERT
819.180	42.66	16.25	46.0	3.3	114.0	251	HORI
835.560	43.44	16.89	46.0	2.6	101.0	277	HORI
851.940	41.77	15.01	46.0	4.2	98.0	271	VERT
868.320	41.70	14.50	46.0	4.3	99.0	263	VERT
884.700	39.99	12.41	46.0	6.0	99.0	255	HORI
901.140	39.77	11.98	46.0	6.2	101.0	258	VERT

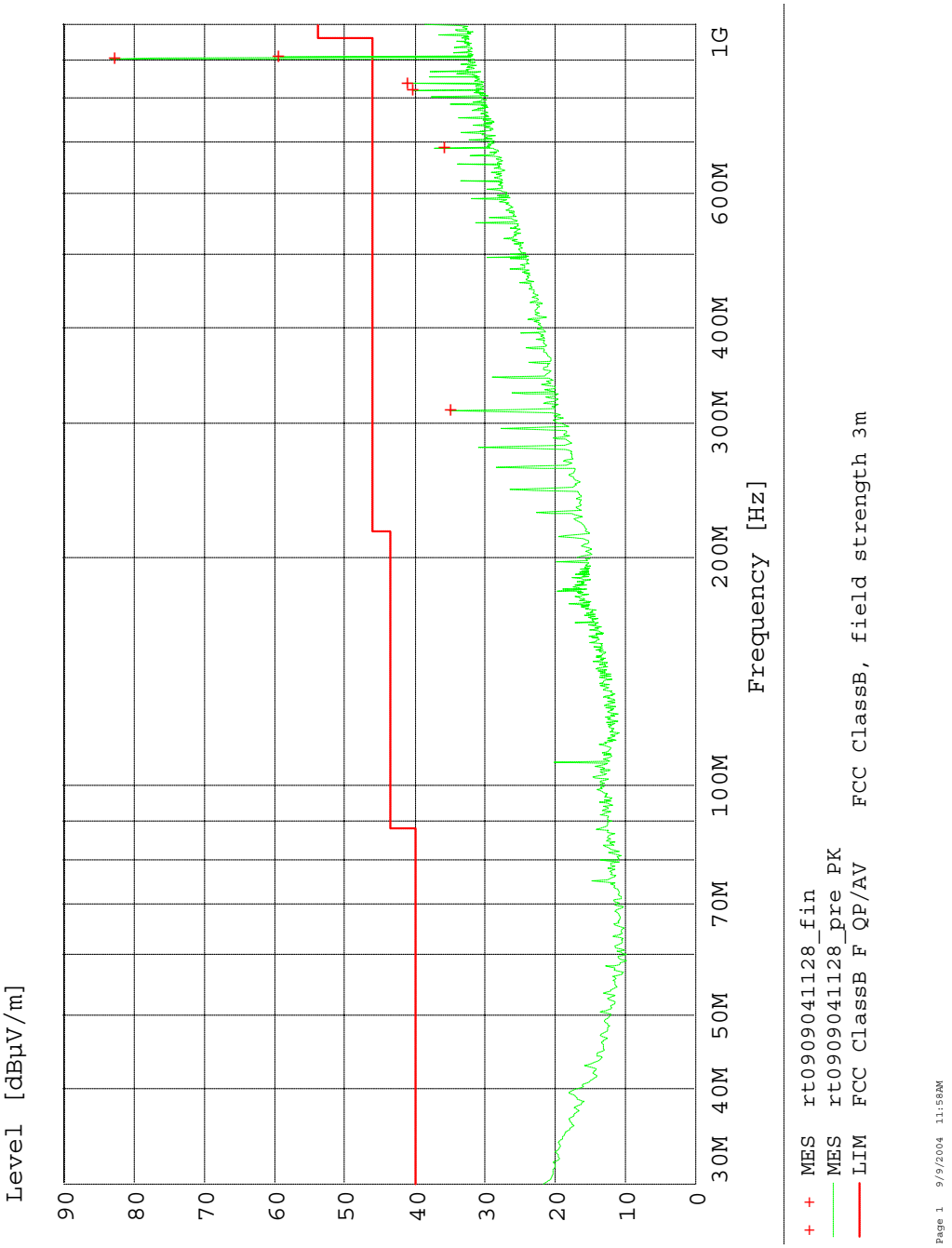

Figure 5 Representative plot with active transmitter, actual data in tables following.

Table 2: Digital Channel 1; Analog Channel 1; QUASI-PEAK

Freq. MHz	Level dBµV/m	Measured dBµV	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
311.280	35.38	18.76	46.0	10.6	100.0	173	HORI
688.140	36.34	11.19	46.0	9.7	100.0	297	HORI
819.180	40.76	14.36	46.0	5.2	99.0	238	HORI
835.560	41.56	15.01	46.0	4.4	101.0	244	HORI
902.100	83.29	55.51	93.9	10.6	100.0	246	HORI
906.000	59.92	32.18	93.9	33.9	100.0	152	HORI

(values on Figure 5 shown in Table 2 above)

Table 3: Digital Channel 10; Analog Channel 10; QUASI-PEAK

Freq. MHz	Level dBµV/m	Measured dBµV	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
262.140	28.41	13.84	46.0	17.6	100.0	144	HORI
278.520	30.79	15.64	46.0	15.2	100.0	174	HORI
311.280	35.00	18.38	46.0	11.0	99.0	173	HORI
688.140	36.20	11.05	46.0	9.8	100.0	294	HORI
802.800	38.61	12.46	46.0	7.4	100.0	288	HORI
819.180	41.22	14.82	46.0	4.8	98.0	240	HORI
835.560	42.60	16.04	46.0	3.4	99.0	238	HORI
851.940	38.32	11.56	46.0	7.7	100.0	239	HORI
868.320	38.93	11.72	46.0	7.1	100.0	210	HORI
914.940	86.81	59.06	93.9	7.1	101.0	241	HORI
933.900	36.15	8.31	46.0	9.9	101.0	218	HORI
966.660	37.40	9.37	53.9	16.5	100.0	217	HORI

Table 4: Digital Channel 20; Analog Channel 20; QUASI-PEAK

Freq. MHz	Level dBµV/m	Measured dBµV	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
278.520	30.31	15.17	46.0	15.7	100.0	359	HORI
311.280	34.22	17.61	46.0	11.8	100.0	354	HORI
688.140	35.60	10.45	46.0	10.4	99.0	121	HORI
802.800	39.28	13.13	46.0	6.7	104.0	168	HORI
819.180	42.70	16.29	46.0	3.3	101.0	198	HORI
835.560	44.28	17.72	46.0	1.7	100.0	199	HORI
851.940	39.44	12.68	46.0	6.6	99.0	193	HORI
868.320	40.34	13.13	46.0	5.7	99.0	190	HORI
901.080	36.95	9.16	46.0	9.0	101.0	192	HORI
924.960	52.06	24.26	93.9	41.0	101.0	162	HORI
927.600	88.72	60.91	93.9	5.2	98.0	188	HORI
927.660	90.60	62.79	93.9	3.3	98.0	241	HORI
927.720	88.26	60.45	93.9	5.4	100.0	233	HORI
931.320	41.13	13.30	46.0	4.9	101.0	241	HORI
966.660	36.84	8.80	53.9	17.1	100.0	241	HORI

Table 5: Digital Channel 1; Analog Channel 10; AVERAGE

Freq. MHz	Level dBµV/m	Measured dBµV	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
1032.000	36.93	40.60	53.9	17.0	107.0	168	HORI
1804.500	46.00	45.64	53.9	7.9	101.0	87	VERT
1830.000	36.95	36.41	53.9	16.9	106.0	181	VERT
2706.500	42.95	37.55	53.9	10.9	99.0	74	HORI
2745.000	49.15	43.46	53.9	4.7	115.0	124	VERT
3608.500	34.48	25.72	53.9	19.4	99.0	76	VERT
3660.000	51.09	42.04	53.9	2.81	128.0	21	VERT
4511.000	44.39	33.85	53.9	9.5	128.0	4	HORI
4575.000	42.81	31.91	53.9	11.1	141.0	266	VERT
5490.000	41.21	26.10	53.9	12.7	178.0	102	VERT
5675.000	30.01	13.40	53.9	23.9	250.0	251	HORI
8135.500	35.00	16.35	53.9	18.9	258.0	330	VERT
8875.500	48.37	28.60	53.9	5.5	150.0	107	HORI

Table 6: Digital Channel 1; Analog Channel 10; PEAK

Freq. MHz	Level dBµV/m	Measured dBµV	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
1032.000	40.93	44.59	73.9	32.97	107.0	168	HORI
1804.500	49.22	48.86	73.9	24.68	101.0	87	VERT
1830.000	41.26	40.72	73.9	32.64	106.0	181	VERT
2706.500	46.25	40.85	73.9	27.65	99.0	74	HORI
2745.000	52.63	46.94	73.9	21.27	115.0	124	VERT
3608.500	43.39	34.63	73.9	30.51	99.0	76	VERT
3660.000	53.61	44.56	73.9	20.29	128.0	21	VERT
4511.000	49.37	38.83	73.9	24.53	128.0	4	HORI
4575.000	47.25	36.35	73.9	26.65	141.0	266	VERT
5490.000	48.03	32.92	73.9	25.87	178.0	102	VERT
5675.000	43.59	26.98	73.9	30.31	250.0	251	HORI
8135.500	49.33	30.67	73.9	24.57	258.0	330	VERT
8875.500	49.41	29.63	73.9	24.49	150.0	107	HORI

Table 7: Digital Channel 10; Analog Channel 20; AVERAGE

Freq. MHz	Level dBµV/m	Measured dBµV	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
1830.000	44.46	43.92	53.9	9.44	120.0	263	HORI
1850.000	44.24	43.56	53.9	9.7	100.0	356	VERT
2744.500	40.30	34.61	53.9	13.6	115.0	264	HORI
2775.000	50.99	45.62	53.9	8.28	105.0	177	VERT
3660.000	35.72	26.68	53.9	18.2	99.0	359	VERT
3700.000	49.92	40.78	53.9	4.0	100.0	36	VERT
4574.500	39.02	28.12	53.9	14.9	169.0	1	HORI
4625.000	41.07	29.82	53.9	12.8	141.0	333	VERT
9096.500	35.81	15.60	53.9	18.1	250.0	338	VERT

Table 8: Digital Channel 10; Analog Channel 20; PEAK

Freq. MHz	Level dBµV/m	Measured dBµV	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
1830.000	51.40	50.86	73.9	22.5	120.0	263	HORI
1850.000	47.15	46.47	73.9	26.75	100.0	356	VERT
2744.500	45.04	39.35	73.9	28.86	115.0	264	HORI
2775.000	52.83	47.06	73.9	21.07	105.0	177	VERT
3660.000	44.60	35.56	73.9	29.3	99.0	359	VERT
3700.000	52.58	43.44	73.9	21.32	100.0	36	VERT
4574.500	45.79	34.90	73.9	28.11	169.0	1	HORI
4625.000	46.55	35.29	73.9	27.35	141.0	333	VERT
9096.500	49.19	28.98	73.9	24.71	250.0	338	VERT

Table 9: Digital Channel 20; Analog Channel 1; AVERAGE

Freq. MHz	Level dBµV/m	Measured dBµV	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
1812.000	43.26	42.85	53.9	10.6	100.0	5	VERT
1855.500	46.10	45.39	53.9	7.8	100.0	84	HORI
2718.000	50.39	44.90	53.9	3.51	120.0	340	VERT
2783.000	45.16	39.38	53.9	8.74	134.0	70	VERT
3624.000	49.83	40.98	53.9	4.1	150.0	181	VERT
3711.000	34.20	24.98	53.9	19.7	99.0	9	VERT
4530.000	44.36	33.75	53.9	9.5	258.0	10	VERT

Table 10: Digital Channel 20; Analog Channel 1; PEAK

Freq. MHz	Level dBµV/m	Measured dBµV	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
1812.000	45.73	45.32	73.9	28.17	100.0	5	VERT
1855.500	48.98	48.27	73.9	24.92	100.0	84	HORI
2718.000	52.16	46.67	73.9	21.74	120.0	340	VERT
2783.000	48.63	42.85	73.9	25.27	134.0	70	VERT
3624.000	51.86	43.00	73.9	22.04	150.0	181	VERT
3711.000	45.30	36.08	73.9	28.60	99.0	9	VERT
4530.000	48.34	37.73	73.9	25.56	258.0	10	VERT

Appendix C

Sample calculation

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF – (-CF + AG) + AV

where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

AG = Amplifier Gain

AV = Averaging Factor (if applicable)

Assume a receiver reading of 55 dBµV is obtained. The Antenna Factor of 12 and a Cable Factor of 1.1 is added. The Amplifier Gain of 20 dB is subtracted, giving a field strength of 48.1 dBµV/m.

FS = 55 + 12 – (-1.1 + 20) + 0 = 48.1 dBµV/m

The 48.1 dBµV/m value can be mathematically converted to its corresponding level in µV/m.

Level in µV/m = Common Antilogarithm [(48.1 dBµV/m)/20]= 254.1 µV/m