Nebraska Center for Excellence in Electronics
4740 Discovery Drive
Lincoln, NE 68521-5376
Phone: 402.472.5880
Fax: 402.472.5881

FCC Test Report

Company:	MetroTel Corp 26 First Ave SE New London, MN 56273
Contact:	Doug Ferguson
Product:	WESROC RMS Satellite Repeater
FCC ID: IC:	RWB-MT-9100R-SAT 115A-MT9100RSAT
Test Report No:	R041808-20
APPROVED BY:	Doug Kramer Senior Test Engineer
DATE:	27 May 2008
Total Pages:	40

1.0 Summary of test results

1.1 Test Results

The EUT has been tested according to the following specifications:

APPLIED STANDARDS: FCC Part 15, Subpart C			
Standard Section	**Test Type and Limit**	**Result**	**Remark**
15.203 RSS-Gen	Unique Antenna Requirement	Pass	PCB Antenna
15.207 RSS-Gen	Conducted Emissions	Pass	Meets the requirement of the limit.
15.209 RSS-Gen	Radiated Emissions	Pass	Meets the requirement of the limit.
15.247(a)(2) RSS-210 Issue 7	Minimum Bandwidth, Limit: Min. 500kHz	Pass	Meets the requirement of the limit.
15.247(b) RSS-210 Issue 7	Maximum Peak Output Power, Limit: Max. 30dBm	Pass	Meets the requirement of the limit.
15.247(c) RSS-210 Issue 7	Transmitter Radiated Emissions, Limit: Table 15.209	Pass	Meets the requirement of the limit.
15.247(d) RSS-210 Issue 7	Power Spectral Density, Limit: Max. 8dBm	Pass	Meets the requirement of the limit.
15.247(c) RSS-210 Issue 7	Band Edge Measurement, Limit: 20dB less than the peak value of fundamental frequency	Pass	Meets the requirement of the limit.

1.2 Test Methods

1.2.1 Conducted Emissions

The EUT was powered by an AC adapter that converted 120VAC/60Hz to 9VDC. Conducted emissions measurements were made according to ANSI/IEEE C63.4: 2003 and compared to the limits as found in 47 CFR Part 15.207.

1.2.2 Radiated Emissions

Compliance to 47 CFR Parts 15.209 and 15.247 was tested in accordance with the methods of ANSI/IEEE C63.4: 2003. Several configurations were examined and 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 find the angles of maximum emissions and the receiving antenna was moved from 1m to 4m in both vertical and horizontal positions. All measurements were taken at a distance of 3m from the EUT for Part 15.209 intentional radiator measurements, and 3m for 15.247 measurements of the fundamental frequency in the 902MHz to 928MHz band and subsequent harmonics.

2.0 Description

2.1 Equipment under test

The Equipment Under Test (EUT) was a WESROC RMS Satellite Repeater (MT-9100R-SAT), which is designed to communicate directly with any WESROC remote telemetry system. Any number of repeaters can be "daisy-chained" together to extend the effective range further. All functions are automatic and no user configuration is required.

The EUT also contains a pre-approved transmitter (FCC ID: L2V-STX2-1, IC: 3989A-STX21) which sends data to through the Globalstar simplex data host server. This transmitter operates at 1611.25, 1613.75, 1616.26 and 1618.25 MHz. The data is relayed from one repeater to another via the satellite communication, and then from the repeater to the base station via the 911.980-920.980MHz wireless connection. The system is hardcoded to prevent simultaneous transmissions.

EUT Received Date: 13 May 2008
EUT Tested Date: 13, 14 May 2008

PRODUCT	WESROC RMS Satellite Repeater
MODEL	MT-9100R-SAT
POWER SUPPLY	AC adapter, 9VDC, 300mA
MODULATION TYPE	QFSK
RADIO TECHNOLOGY	Half-duplex RF Link
TRANSFER RATE	2400 bit per second, transmit and receive
FREQUENCY RANGE	911.980 – 920.980MHz
NUMBER OF CHANNELS	19
MAXIMUM OUTPUT POWER	7.52dBm (5.65mW)
ANTENNA TYPE	PCB mounted dipole
SERIAL NUMBER OF TEST UNIT	00248673

NOTE:
1. For more detailed features description, please refer to the manufacturer's specifications or User's Manual.

2.2 Laboratory description

All testing was performed at the NCEE Lincoln facility, which is a FCC and IC registered lab. This site has been fully described in previously submitted reports. Laboratory environmental conditions varied slightly throughout the tests:

Relative humidity of 45 ± 4%
Temperature of 20 ± 3° Celsius

2.3 Description of test modes

Channel	Frequency
1	911.980
19	920.980

2.4 Applied standards

The EUT is a digital transmission device operating between 902 MHz and 928 MHz. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.247) using ANSI/IEEE C63.4: 2003
Industry Canada, RSS 210, Issue 7, Category I Equipment

All test items have been performed and recorded as per the above standards.

2.5 Description of support units

The power AC power adapter used was a Condor 9VDC unregulated power supply. P/N 85-60-003, 120VAC/60Hz input.

2.6 Configuration of system under test

The EUT was powered by a 9VDC power supply and had no auxiliary devices; it was tested by itself. The EUT was programmed by the manufacturer to transmit continually for testing purposes only.

3.0 Test equipment used

DESCRIPTION AND MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CALIBRATION DATE
Rohde & Schwarz Test Receiver	ESIB26	100037	14 August 2007
Rohde & Schwarz Test Receiver	ESIB7	100007	16 May 2007
EMCO Biconilog Antenna	3142B	1654	8 February 2008
EMCO Horn Antenna	3115	6416	5 February 2008

4.0 Detailed results

4.1 Unique antenna requirement

4.1.1 Standard applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

4.1.2 Antenna description

The antenna supplied with the EUT is an internal PCB mounted antenna and not interchangeable.

4.2 Radiated emissions

4.2.1 Limits for radiated emissions measurements

Emissions radiated outside of the specified bands shall be applied to the limits in 15.209 as followed:

FREQUENCIES (MHz)	FIELD STRENGTH (μV/m)	MEASUREMENT DISTANCE (m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	3
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

NOTE:
1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 * log * Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits by more than 20dB under any condition of modulation.

REMARKS:
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. *Radiated limits according to 15.209 do not apply within the 902MHz to 928MHz band for transmitters.
6.**For frequencies not in a restricted band as specified in 15.205, spurious emissions shall be at least 20dB less than the field strength at the fundamental frequency.

4.2.2 Test procedures

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground plane in a 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna was a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are used to make the measurement.

d. For each suspected emission, the EUT was arranged to maximize its emissions and then the antenna height was varied from 1 meter to 4 meters and the rotating table was turned from 0 degrees to 360 degrees to find the maximum emission reading.

e. The test-receiver system was set to use a peak detector with a specified resolution bandwidth. For spectrum analyzer measurements, the composite maximum of several analyzer sweeps was used for final measurements.

f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE:
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequencies below 1GHz.

2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for peak and average detectors at frequencies above 1GHz.

4.2.3 Deviations from test standard

No deviation.

4.2.4 Test setup

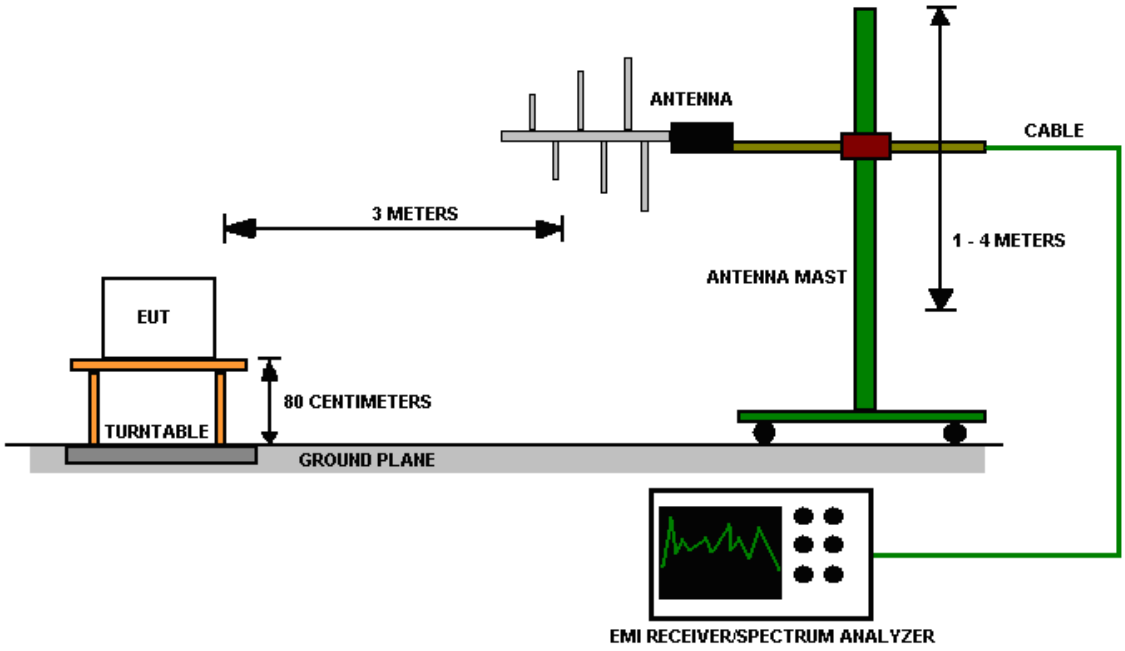


Figure 1 - Radiated Emissions Test Setup

For the actual test configuration, please refer to Appendix A for photographs of the test configuration.

4.2.5 EUT operating conditions

The EUT was powered by a 9VDC power supply and had no auxiliary devices, so it was tested by itself. The EUT was programmed by the manufacturer to transmit continually for testing purposes only.

4.2.6 Test results

EUT	WESROC RMS Satellite Repeater	Model	MT-9100R-SAT
MODE	Transmit, Ch. 1	FREQUENCY RANGE	30MHz – 1GHz
INPUT POWER (SYSTEM)	9VDC	ORIENTATION	Vertical/Horizontal
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	NJohnson

Quasi-peak Measurements

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm	deg	
35.700000	13.45	40.0	26.6	141.0	178	VERT
100.020000	32.78	43.5	10.7	112.0	167	VERT
200.100000	28.37	43.5	15.1	100.0	45	VERT
210.060000	24.91	43.5	18.6	99.0	360	VERT
250.020000	33.88	46.0	12.1	101.0	196	VERT
375.000000	22.20	46.0	23.8	331.0	178	VERT
462.840000	29.33	46.0	16.7	286.0	228	VERT
693.240000	35.96	46.0	10.0	190.0	127	VERT
903.900000	32.57	46.0	13.4	100.0	195	VERT
911.940000	106.66	N/A*	N/A	106.0	195	VERT
927.000000	27.28	N/A*	N/A	231.0	106	HORI
931.500000	46.48	86.66**	40.18	102.0	201	VERT

EUT	WESROC RMS Satellite Repeater	Model	MT-9100R-SAT
MODE	Transmit, Ch. 1	FREQUENCY RANGE	30MHz – 1GHz
INPUT POWER (SYSTEM)	9VDC	ORIENTATION	Vertical/Horizontal
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	NJohnson

Average Measurements

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm	deg	
1824.000000	48.10	53.9	5.8	222.0	304	VERT
2738.500000	38.88	53.9	15.0	237.0	0	HORI

Peak Measurements

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm	deg	
1824.000000	54.64	73.9	13.0	222.0	304	VERT
2738.500000	52.04	73.9	21.9	237.0	0	HORI

EUT	WESROC RMS Satellite Repeater	Model	MT-9100R-SAT
MODE	Receive, Ch. 1	FREQUENCY RANGE	1MHz – 10GHz
INPUT POWER (SYSTEM)	9VDC	ORIENTATION	Vertical/Horizontal
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	NJohnson

Quasi-peak Measurements

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm	deg	
100.020000	31.12	43.5	12.4	100.0	177	VERT
199.980000	28.68	43.5	14.8	119.0	300	VERT
250.020000	39.60	46.0	6.4	99.0	244	VERT
693.240000	36.68	46.0	9.3	399.0	210	HORI
911.880000	42.10	46.0	3.9	109.0	93	VERT

Average Measurements

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm	deg	
1823.500000	34.57	53.9	19.3	235.0	187	HORI
2747.000000	38.93	53.9	15.0	332.0	137	VERT

Peak Measurements

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm	deg	
1823.500000	47.48	73.9	26.4	235.0	187	HORI
2747.000000	52.24	73.9	21.7	332.0	137	VERT

EUT	WESROC RMS Satellite Repeater	Model	MT-9100R-SAT
MODE	Transmit, Ch. 19	FREQUENCY RANGE	1MHz – 10GHz
INPUT POWER (SYSTEM)	9VDC	ORIENTATION	Vertical/Horizontal
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	NJohnson

Quasi-peak Measurements

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm	deg	
35.820000	18.53	40.0	21.5	100.0	249	VERT
102.720000	21.20	43.5	22.3	100.0	280	VERT
121.080000	28.40	43.5	15.1	100.0	149	VERT
199.980000	32.38	43.5	11.1	164.0	286	VERT
210.840000	18.96	43.5	24.5	99.0	78	VERT
225.000000	28.27	46.0	17.7	170.0	206	VERT
462.780000	18.72	46.0	27.3	105.0	177	HORI
693.240000	41.30	46.0	4.7	183.0	229	VERT
901.500000	26.98	46.0	19.0	102.0	187	VERT
908.880000	41.35	46.0	4.6	102.0	206	VERT
921.000000	105.78	N/A*	N/A	107.0	206	VERT
927.240000	34.11	46.0	11.9	100.0	201	VERT
933.300000	40.35	46.0	5.6	154.0	200	VERT

Average Measurements

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm	deg	
1842.500000	46.05	53.9	7.9	177.0	206	VERT
2763.000000	46.55	53.9	7.4	100.0	238	VERT

Peak Measurements

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm	deg	
1842.500000	56.35	73.9	17.6	177.0	206	VERT
2763.000000	56.85	73.9	17.0	100.0	238	VERT

EUT	WESROC RMS Satellite Repeater	Model	MT-9100R-SAT
MODE	Receive, Ch. 19	FREQUENCY RANGE	1MHz – 10GHz
INPUT POWER (SYSTEM)	9VDC	ORIENTATION	Vertical/Horizontal
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	NJohnson

Quasi-peak Measurements

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm	deg	
150.000000	26.90	43.5	16.6	99.0	134	VERT
200.040000	30.25	43.5	13.2	100.0	177	VERT
462.780000	19.83	46.0	26.2	400.0	0	VERT
693.240000	34.20	46.0	11.8	399.0	360	VERT
920.880000	40.47	46.0	5.5	112.0	93	VERT

Average Measurements

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm	deg	
1851.500000	38.19	53.9	15.7	192.0	205	VERT
2758.000000	39.07	53.9	14.8	398.0	188	VERT

Peak Measurements

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm	deg	
1851.500000	48.45	73.9	14.5	192.0	205	VERT
2758.000000	52.41	73.9	18.5	398.0	188	VERT

4.3 Conducted AC Mains Emissions

4.3.1 Limits for conducted emissions measurements

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBµV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

NOTE: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.3.2 Test Procedures

a. The EUT was placed 0.8m above a ground reference plane and 0.4 meters from the conducting wall of a shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). The LISN provides 50 ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference as well as the ground.

c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits could not be reported

d. Results of testing a PC alone and with the EUT connected were compared to verify that the EUT does not cause the emissions of the PC to go over the 15.207 limits.

4.3.3 Deviation from the test standard

No deviation

4.3.4 Test setup

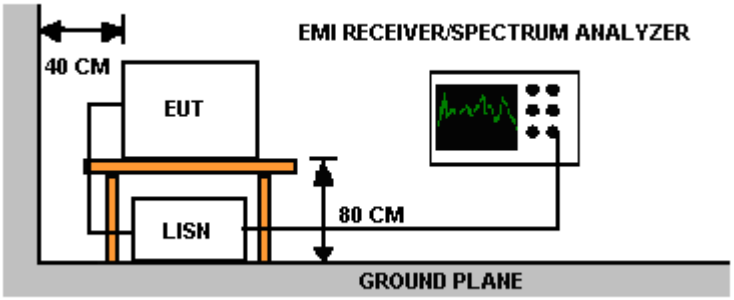


Figure 2 - Conducted Emissions Test Setup

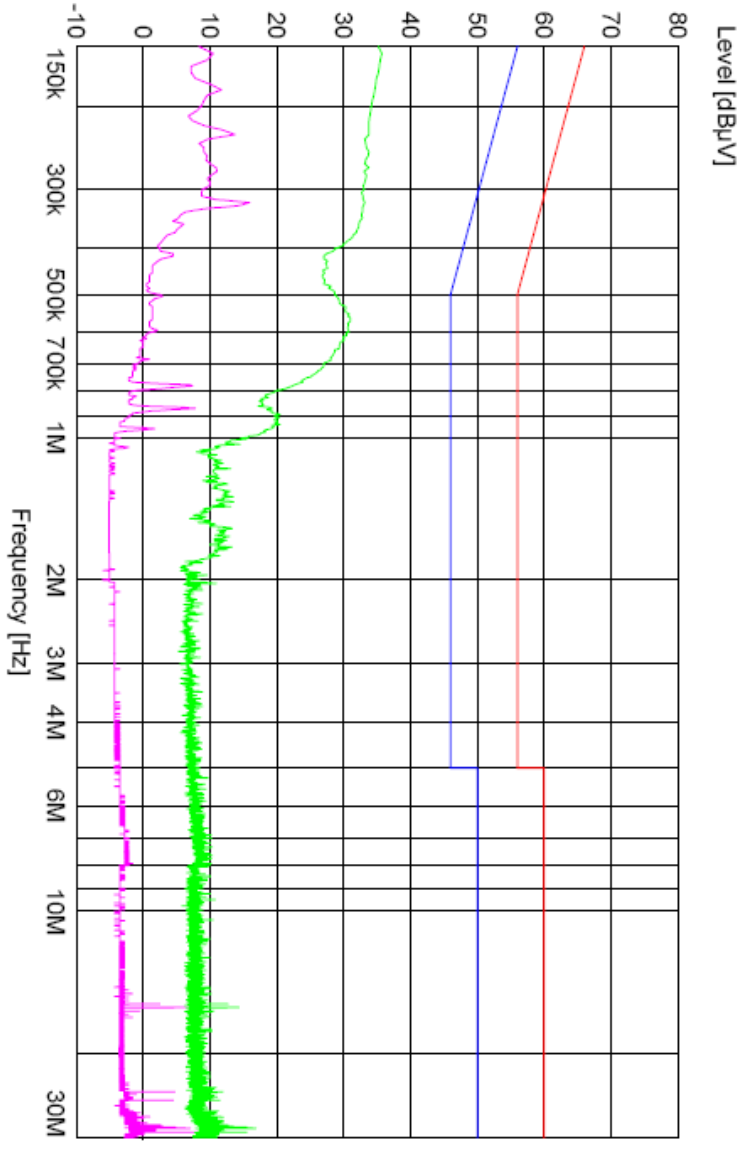
For actual test configuration, see photographs in Appendix A

4.3.5 EUT operating conditions

The EUT was powered by a 9VDC power supply and had no auxiliary devices, so it was tested by itself. The EUT was programmed by the manufacturer to transmit continually for testing purposes only.

4.3.6 Test Results

EUT	WESROC RMS Satellite Repeater	Model	MT-9100R-SAT
MODE	AC Adapter, 6V	FREQUENCY RANGE	150kHz – 30MHz
INPUT POWER (SYSTEM)	120VAC/60 to adapter	PHASE	Line, Neutral
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	NJohnson



REMARKS:
1. Q.P. measurements are in green, average measurements are in magenta.
2.All emission levels were very low against the limit.

4.4 Bandwidth

4.4.1 Limits of bandwidth measurements

The 6dB bandwidth of the signal must be greater than 0.50MHz

4.4.2 Test procedures

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 kHz RBW and 100 kHz VBW. The 6 dB bandwidth is defined as the bandwidth of which is higher than peak power minus 6dB.

The 99% occupied is defined as the bandwidth at which 99% of the signal power is found. This corresponds to 20dB down from the maximum power level. The maximum power was measured with the largest resolution bandwidth possible (10MHz) and this value was recorded. The signal was then captured with a 100kHz resolution bandwidth and the frequencies where the measurements were 20dB below the maximum power were marked. The bandwidth between these frequencies was recorded as the 99% occupied bandwidth.

4.4.3 Deviations from test standard

No deviation.

4.4.4 Test setup

4.4.5 EUT operating conditions

The EUT was powered by a 9VDC power supply and had no auxiliary devices, so it was tested by itself. The EUT was programmed by the manufacturer to transmit continually for testing purposes only.

4.4.6 Test results

EUT	Wesroc RMS Repeater	MODEL	MT-9100R
INPUT POWER (SYSTEM)	AC adapter, 9VDC	ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC
TECHNICIAN	NJohnson	MODE	Continuous Transmit

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BW (kHz)	6dB MINIMUM LIMIT (MHz)	99% Occupied BW (kHz)	RESULT
1	911.980	634.44	500.00	806.64	PASS
19	920.980	720.91	500.00	890.11	PASS

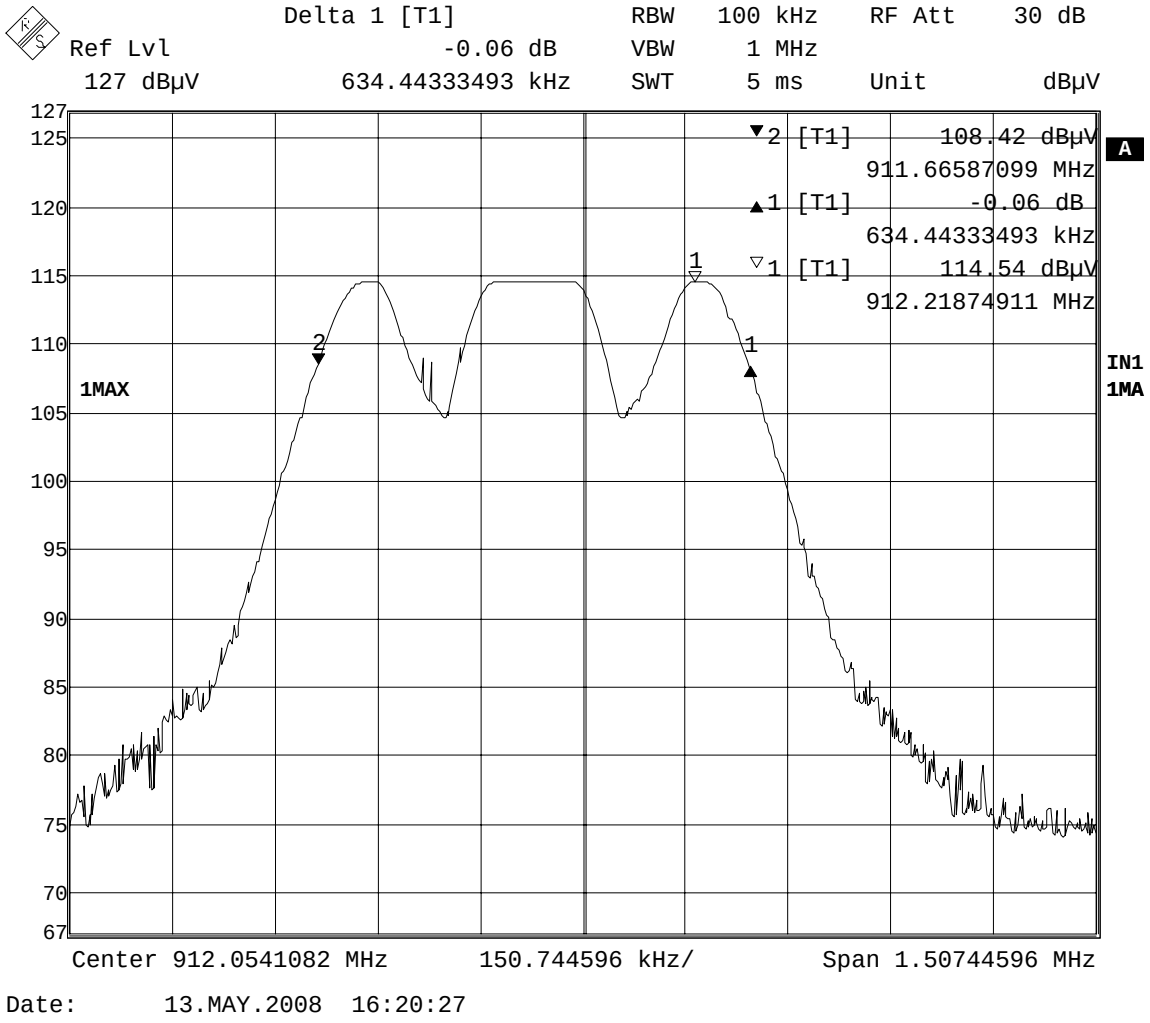


Figure 3 - Channel 1, 6dB Bandwidth, 634.44kHz

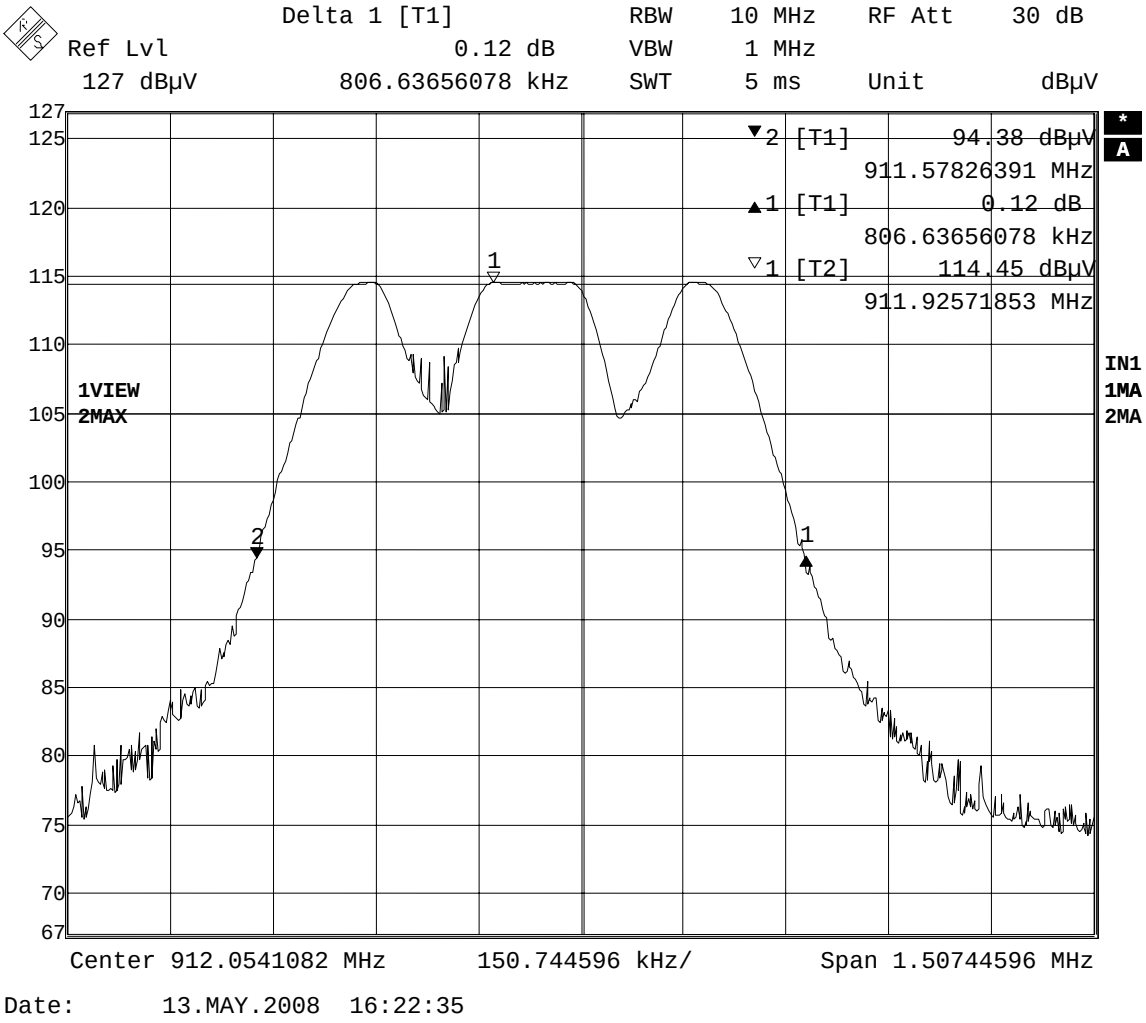


Figure 4 - Channel 1, 99% Occupied Bandwidth, 806.64kHz

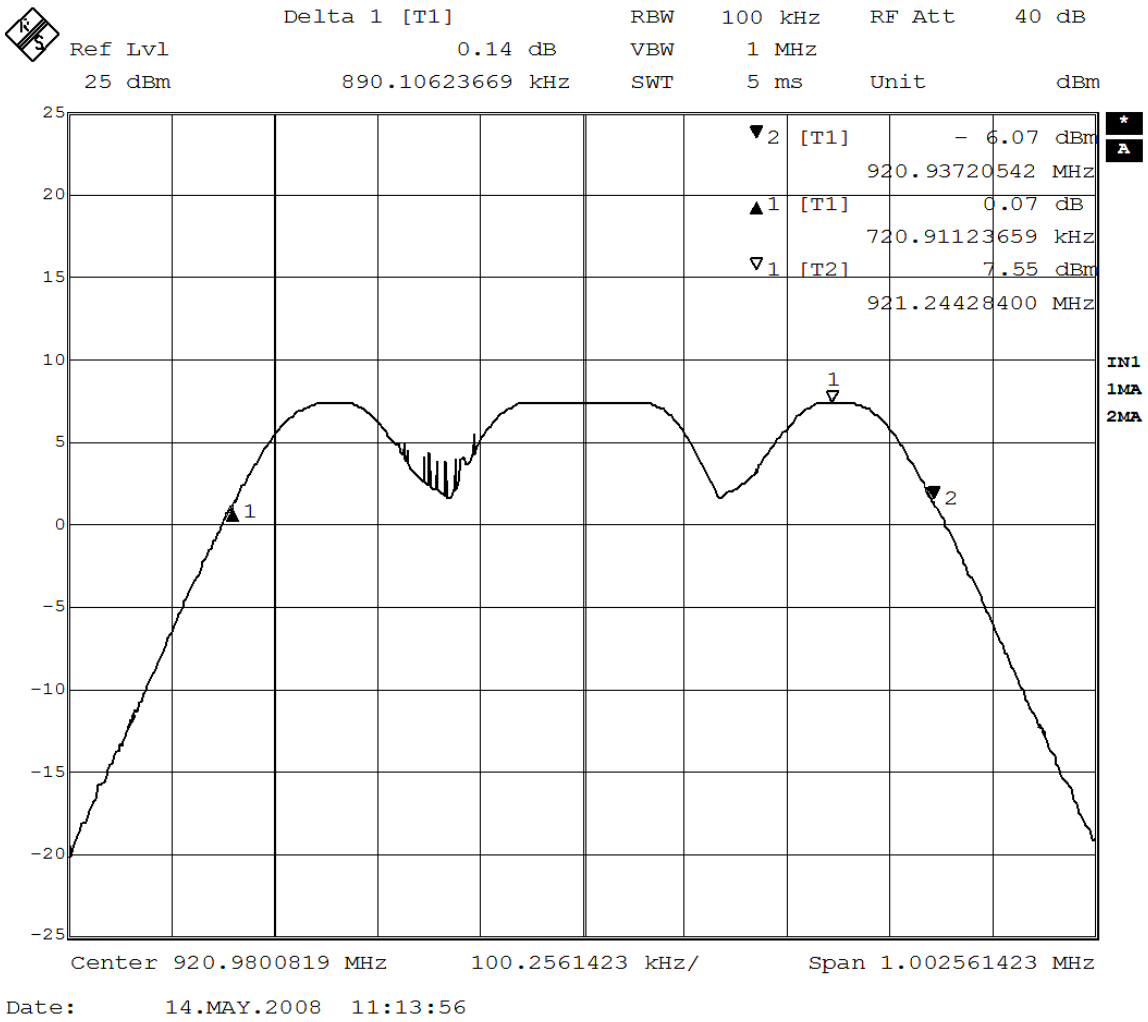


Figure 5 - Channl 19, 6dB Bandwidth, 720.911kHz

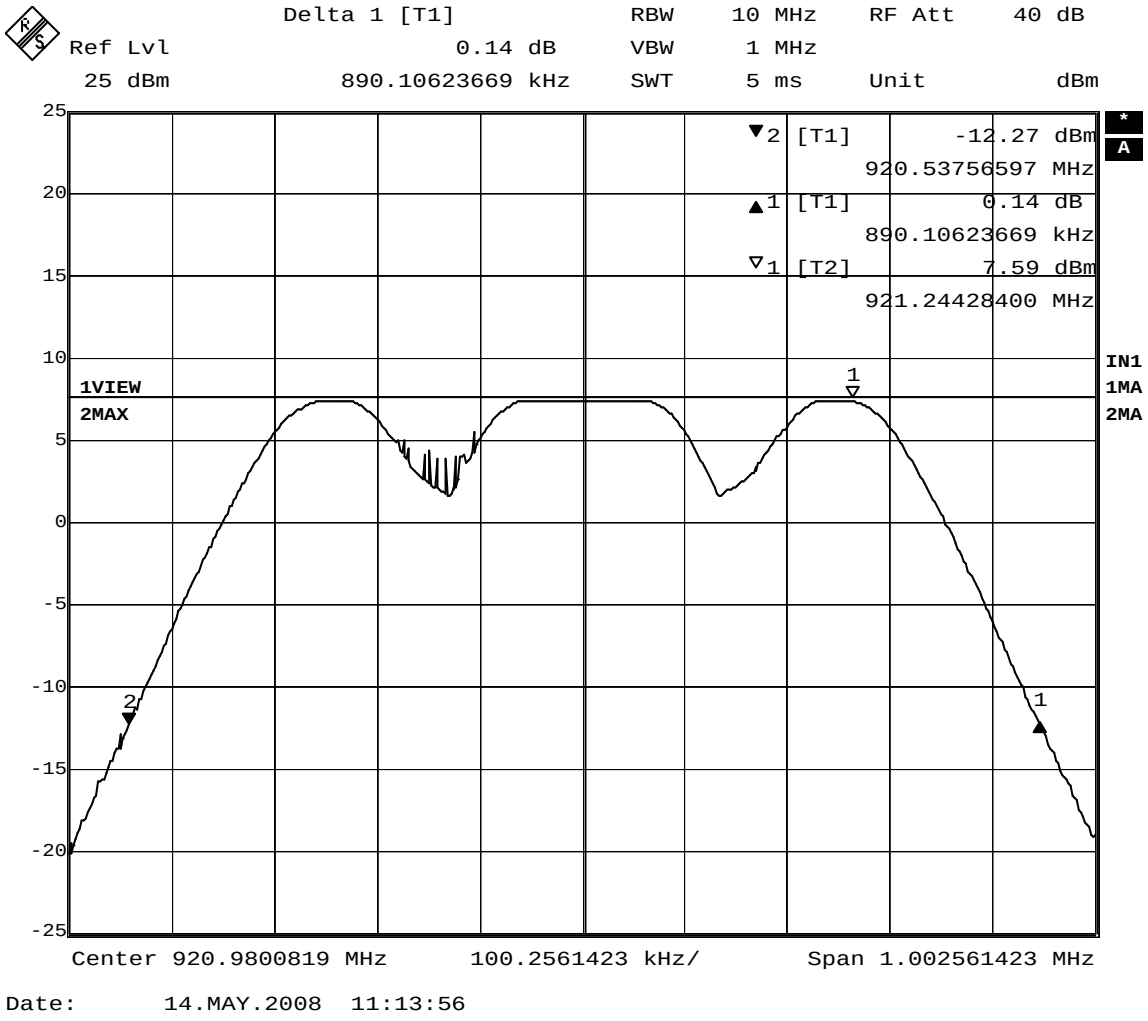


Figure 6 - Channel 19, 99% Occupied Bandwidth, 890.11kHz

4.5 Maximum peak output power

4.5.1 Limits of power measurements

The maximum peak output power allowed is 30dBm.

4.5.2 Test procedures

1. The EUT was connected to the spectrum analyzer directly with a low-loss shielded coaxial cable.

2. The channel power function of the spectrum analyzer was used to calculate the cumulative power output per MHz over the range of the set channel bandwidth. The channel bandwidth was set to 30MHz.

3. The resolution bandwidth was set to 10MHz and the video bandwidth was set to 10MHz to capture the maximum amount of signal. The analyzer used a peak detector in max hold mode. This represented the maximum output power.

4.5.3 Deviations from test standard

No deviation.

4.5.4 Test setup

4.5.5 EUT operating conditions

The EUT was powered by a 9VDC power supply and had no auxiliary devices, so it was tested by itself. The EUT was programmed by the manufacturer to transmit continually for testing purposes only.

4.5.6 Test results

Maximum peak output power

EUT	WESROC RMS Satellite Repeater	MODEL	MT-9100R-SAT
INPUT POWER (SYSTEM)	AC adapter, 9VDC	ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC
TECHNICIAN	NJohnson	MODE	Continuous transmit

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	RESULT
1	911.980	7.44	30	PASS
2	920.980	7.52	30	PASS

4.6 Power spectral density (PSD)

4.6.1 Limits of PSD measurements

The maximum power spectral density allowed is 8dBm.

4.6.2 Test procedures

The transmitter output was connected directly to the spectrum analyzer. the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3 kHz RBW and 30 kHz VBW, the sweep time was 500s. The power spectral density was measured and recorded at the frequency with the highest emission. The sweep time is allowed to be longer than span/3KHz for a full response of the mixer in the spectrum analyzer.

4.6.3 Deviations from test standard

No deviation.

4.6.4 Test setup

4.6.5 EUT operating conditions

The EUT was powered by a 9VDC power supply and had no auxiliary devices, so it was tested by itself. The EUT was programmed by the manufacturer to transmit continually for testing purposes only.

4.6.6 Test results

Power Spectral Density

EUT	WESROC RMS Satellite Repeater	MODEL	MT-9100R-SAT
INPUT POWER (SYSTEM)	AC adapter, 9VDC	ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC
TECHNICIAN	NJohnson	MODE	Continuous transmit

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN # KHz BW (dBm)	MAXIMUM POWER LIMIT (dBm)	RESULT
1	911.980	7.15	8.0	PASS
19	920.980	7.13	8.0	PASS

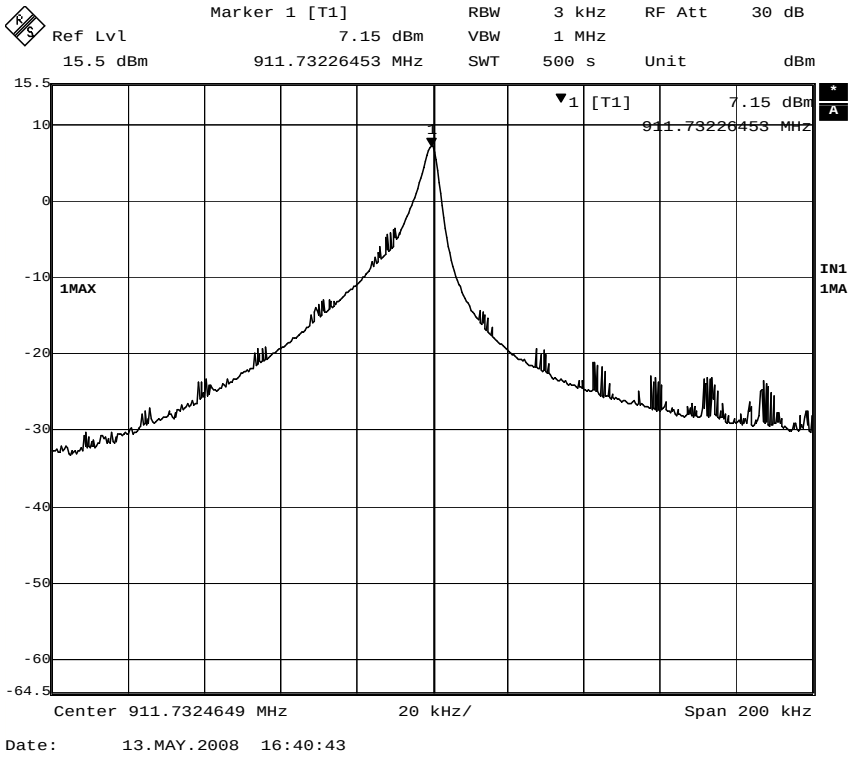


Figure 7 - Channel 1, PSD, 7.15dBm

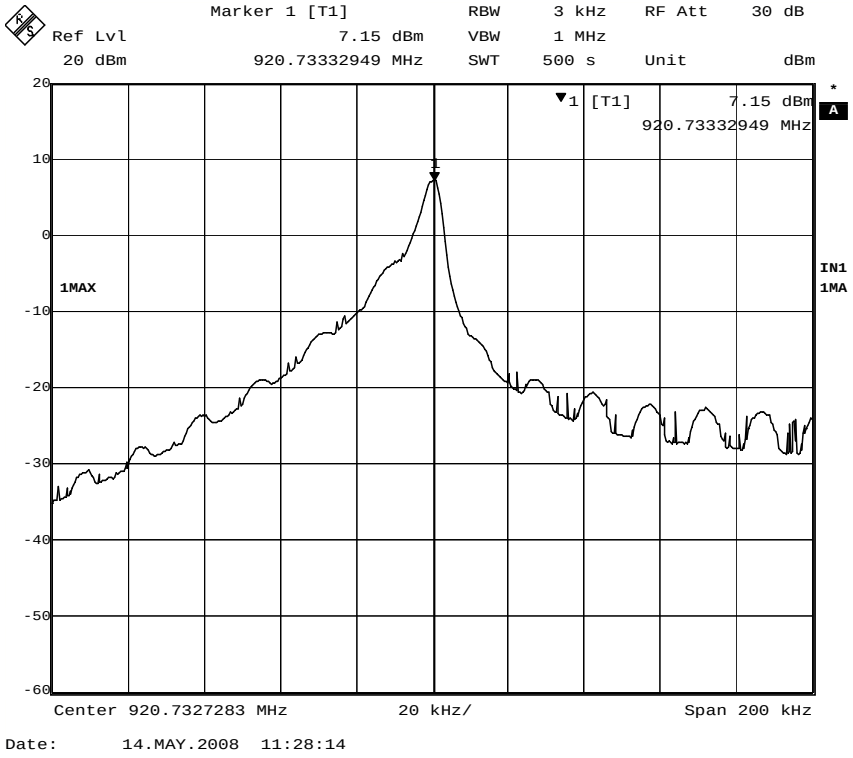


Figure 8 - Channel 19, PSD, 7.13dBm

4.7 Bandedges

4.7.1 Limits of bandedge measurements

For emissions outside of the allowed band of operation (902MHz – 928MHz), the emission level needs to be 20dB under the maximum fundamental field strength. However, if the emissions fall within one of the restricted bands from 15.205 the field strength levels need to be under that of the limits in 15.209.

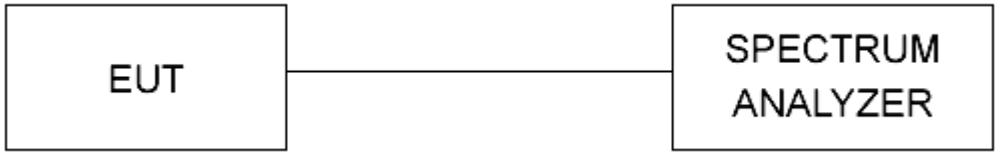
4.7.2 Test procedures

The EUT was tested in the same method as described in section *4.2 - Radiated emissions*. The EUT was oriented as to produce the maximum emission levels. The resolution bandwidth was set to 120kHz and the EMI receiver was used to scan from the bandedge to the fundamental frequency with a quasi-peak detector. The highest emissions level beyond the bandedge was measured and recorded. If the out of band emissions do not fall within a restricted band from 15.205, then it is required that the out of band emission be 20dB below that of the fundamental emission level. If the out of band emission falls with a restricted band from 15.205, then it is required that the emission be below the limits from 15.209.

4.7.3 Deviations from test standard

No deviation.

4.7.4 Test setup



4.7.5 EUT operating conditions

The EUT was powered by a 9VDC power supply and had no auxiliary devices, so it was tested by itself. The EUT was programmed by the manufacturer to transmit continually for testing purposes only.

4.7.6 Test results

EUT	WESROC RMS Satellite Repeater	MODEL	MT-9100R-SAT
INPUT POWER (SYSTEM)	AC adapter, 9VDC	ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC
TECHNICIAN	NJohnson	MODE	Continuous transmit

Highest Out of Band Emissions

CHANNEL	Bandedge/Measurement Frequency (MHz)	QP Level (dBµV/m)	Fund. QP Level	Delta
1	902 MHz	32.57	106.61	74.04
19	928 MHz	34.11	105.78	70.67

NOTE:
The plots show corrected measurements. All values listed include all transducer and cable loss factors and reflect actual field strength levels.

Appendix A: Test Photos

Figure 9 - Radiated Emissions Test Setup

Figure 10 - Radiated Emissions Test Setup

Figure 11 - Conducted Emissions Test Setup

Appendix B: 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

AV is calculated by the taking the 20*log(T_{on}/100) where T_{on} is the maximum transmission time in any 100ms window.

Appendix C: RF Exposure Evaluation

FCC ID: RWB-MT9100R-SAT
RF Exposure Statement for MT9100R-SAT:

Notice in Installation Manual:
FCC Radiation Exposure Statement
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 1.88cm (0.75 inches) between the radiator and your body.

RF Exposure Calculations:

The following information provides the minimum separation distances for the two major antenna types used in this system.

Directional Antenna:
The 2.14dBi antenna is the maximum gain antenna certified for use with the product. The minimum separation distance is calculated from **FCC OET 65 Appendix B, Table 1B** Guidelines for General Population/Uncontrolled Exposure. This calculation is based on the highest EIRP possible from the system, considering maximum power and antenna gain. The exposure limit for a transmitter operating at 911.98MHz is found in mW/cm^2 using the equations f/1200. Since the operating frequency in channel DA produced the lowest limit, that limit will be used in calculation. (911.98/1200 = 0.76mW/cm^2)

S = (Po * G) / (4 * Pi * r^2) or r = SQRT [(Po * G) / (4 * Pi * S)]

Where S = 0.76 mW/cm^2 for 911.98 MHz
Where Po = 5.65 mW (Peak RF, 7.52dBm)
Where G = 1.637 (numeric equivalent to 2.14dBi for ¼ wave dipole)
Where r = Minimum Safe Distance from antenna (cm)

For Po = 5.65mW, r = 0.98cm (0.39 inches)

For a distance [r] of 20cm from this antenna, the field density S = 0.0018 mW/cm^2

Notes:
1. The minimum safe distance is based on a conservative “worst case” prediction, i.e. using the formula shown above and no duty factor. In practice the minimum distance will be much shorter. (Ref. 2)
2. The minimum safe distance has been calculated for the maximum allowed Power Density (S) limit of 0.76 mW/cm^2 for the frequency 911.98 MHz for uncontrolled environments (Ref. 2).

References:
1. FCC Part 15, sub-clause 15.247 (b) (4) (i)
2. FCC OET Bulletin 65, Edition 97-01
3. FCC Supplement C to OET Bulletin 65, edition 01-01

Appendix D: Table of Figures

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