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 MT9100-BM RMS Mini- Base Unit
FCC ID: IC:	RWB-MT9100-BM 115A-MT9100-BM
Test Report No:	R090809-01
APPROVED BY:	Nic Johnson Test Engineer
DATE:	5 October 2009
Total Pages:	42

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. 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 EUT is a Wesroc Remote Monitoring System Mini-Base Unit is a reduced cost Base Unit that is used to receive transmissions from a Wesroc® RMS Tank Transmitter, both from Independent Technologies, Inc. It also uses the Public Switched Telephone Network to then communicate with the Wesroc® RMS Host Computer system.

EUT Received Date: 22 September 2009
EUT Tested Date: 22, 30 September 2009

PRODUCT	WESROC RMS Mini-Base Unit
MODEL	MT9100-BM
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	8.22dBm (6.64mW)
ANTENNA TYPE	Internal PCB antenna
SERIAL NUMBER OF TEST UNIT	NCEE Test 1R, NCEE Test 2C

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
KDB Publication No. 558074: 2005

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. M/N D9300, 120VAC/60Hz input, 9VDC, 300mA output.

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. The telecom cable was bundled 40cm above the ground plane and was terminated by a 600 ohm resistor.

3.0 Test equipment used

DESCRIPTION AND MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CALIBRATION DATE
Rohde & Schwarz Test Receiver	ESI7	100007	9 June 2009
Rohde & Schwarz Test Receiver	ESI26	100021	11 September 2009*
EMCO Biconilog Antenna	3142B	1654	2/6/2009
EMCO Horn Antenna	3115	6416	2/6/2009
Rohde & Schwarz Preamplifier	TS-PR18	082001/003	12/15/2008
Trilithic Inc. High Pass Filter	6HC6600-1.5-KK	200332488	12/15/2008

*Used for measurements from 7 – 10GHz. These measurements were made on 9/30/2009. All other measurements were made with ESI7 on 9/22/2009.

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 trace 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

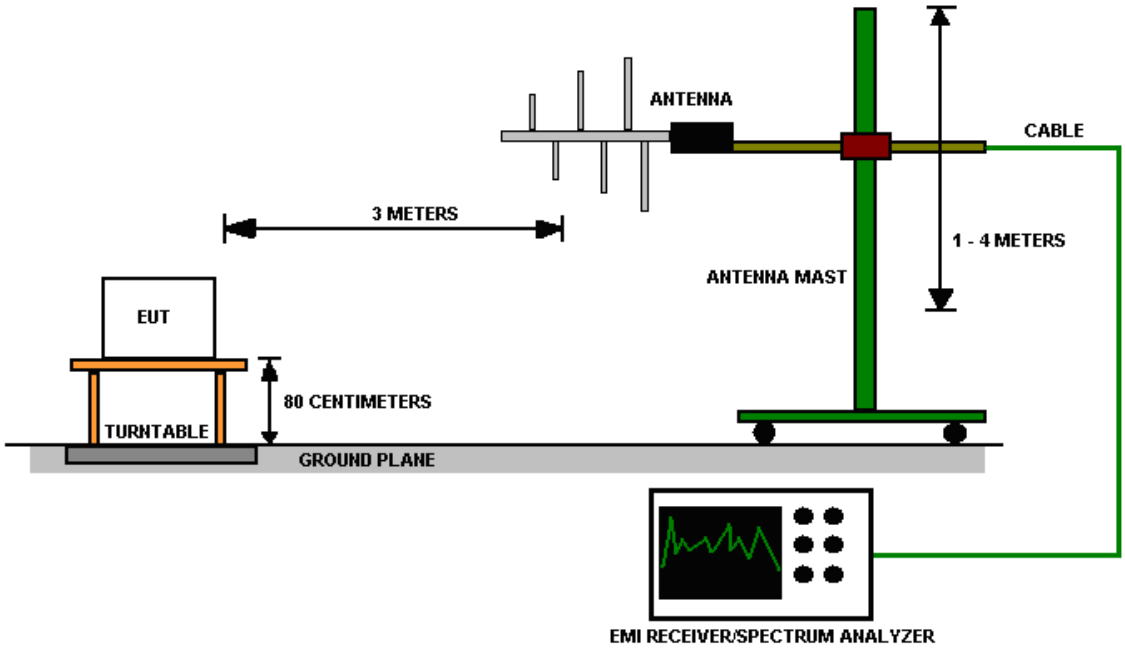


Figure 1 - Radiated Emissions Test Setup

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; it was tested by itself. The EUT was programmed by the manufacturer to transmit continually for testing purposes only. The telecom cable was bundled 40cm above the ground plane and was terminated by a 600 ohm resistor.

The EUT was programmed by the manufacturer to transmit continuously on either the highest or lowest channel by frequency.

4.2.6 Test results

EUT	WESROC RMS Mini-Base Unit	Model	MT9100-BM
MODE	Transmit, Ch. 1	FREQUENCY RANGE	30MHz – 10GHz
INPUT POWER (SYSTEM)	9VDC	ORIENTATION	Vertical/Horizontal
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	NJohnson

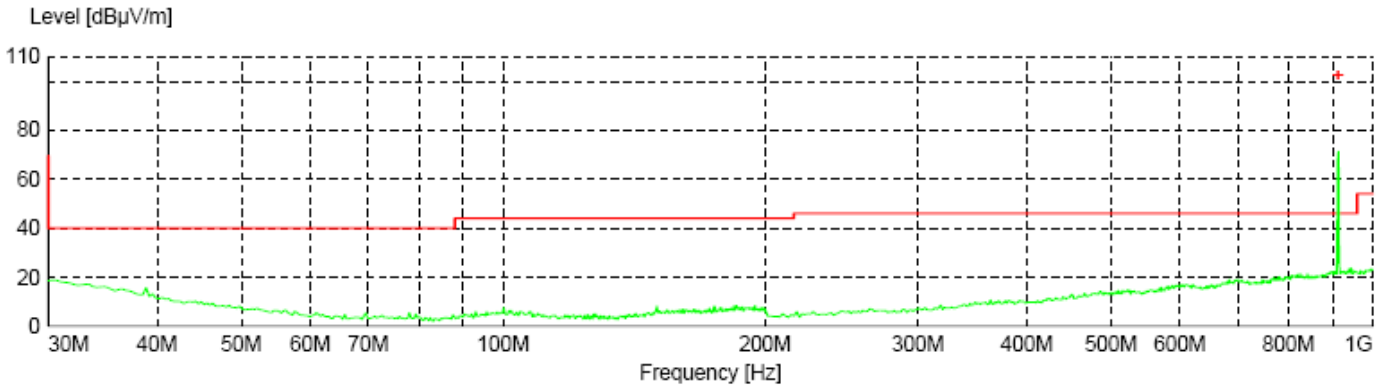


Figure 2 - Radiated Emissions Plot, Channel 1, Transmit

Table 1- Radiated Emissions Quasi-peak Measurements, Channel 1, Transmit

Frequency	Level	Height	Angle	Pol.
MHz	dBµV/m	cm	deg	
911.94	102.30	149	174	HORI
912.24	102.14	151	178	HORI

Table 2 - Radiated Emissions Peak Measurements, Channel 1, Transmit

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm	deg	
1823.50	56.23	82.30*	26.07	106	358	VERT
2736.00	41.52	54.00	12.50	358	180	VERT
3645.50	39.47	54.00	14.50	166	203	HORI
4712.00	42.12	54.00	11.90	130	266	HORI
5531.00	47.32	54.00	6.70	313	179	VERT
7315.50	33.19	54.00	20.80	176	326	HORI
8226.00	34.53	54.00	19.50	129	5	HORI
9096.50	35.28	54.00	18.70	400	345	VERT

*Note: 1722.2MHz-2200.0MHz is an unrestricted band. Measurements are required to be 20dB below the emissions level of the fundamental frequency. The limit was adjusted accordingly.

Table 3 - Radiated Emissions Average Measurements, Channel 1, Transmit

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm	deg	
1823.50	62.97	82.30*	19.33	106	358	VERT
2736.00	52.81	74.00	21.19	358	180	VERT
3645.50	52.75	74.00	21.25	166	203	HORI
4712.00	55.30	74.00	18.70	130	266	HORI
5531.00	60.69	74.00	13.31	313	179	VERT
7315.50	47.05	74.00	26.95	176	326	HORI
8226.00	48.16	74.00	25.84	129	5	HORI
9096.50	48.72	74.00	25.28	400	345	VERT

*Note: 1722.2MHz-2200.0MHz is an unrestricted band. Measurements are required to be 20dB below the emissions level of the fundamental frequency. The limit was adjusted accordingly.

EUT	WESROC RMS Mini-Base Unit	Model	MT9100-BM
MODE	Transmit, Ch. 19	FREQUENCY RANGE	30MHz – 10GHz
INPUT POWER (SYSTEM)	9VDC	ORIENTATION	Vertical/Horizontal
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	NJohnson

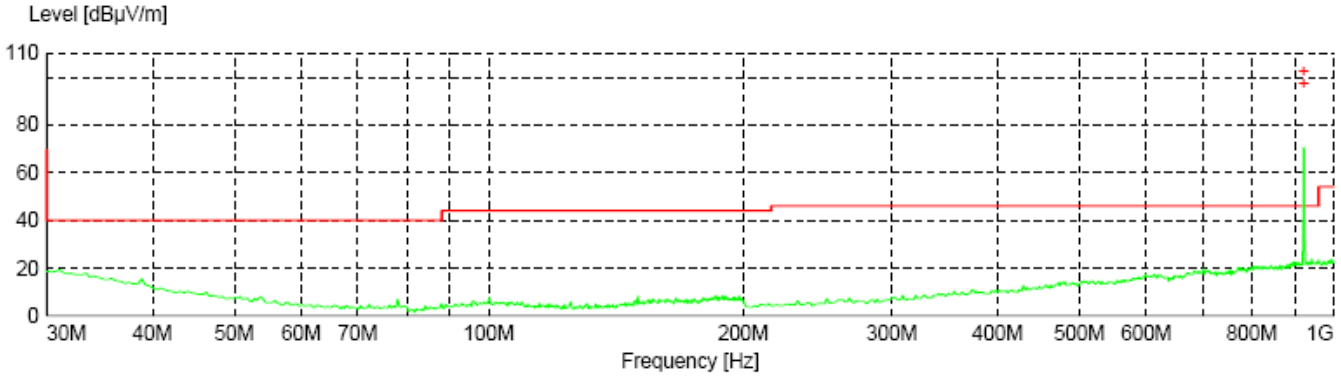


Figure 3 - Radiated Emissions Plot, Channel 19, Transmit

Table 4 - Radiated Emissions Quasi-peak Measurements, Channel 19, Transmit

Frequency	Level	Height	Angle	Pol.
MHz	dBµV/m	cm	deg	
921.24	102.47	146	177	HORI
921.30	96.89	149	179	HORI

Table 5 - Radiated Emissions Peak Measurements, Channel 19, Transmit

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm	deg	
1842.50	48.66	82.47*	33.81	100	358	VERT
2763.00	47.59	54.00	6.40	100	159	HORI
3642.50	39.44	54.00	14.60	250	289	HORI
4618.50	41.73	54.00	12.30	180	177	VERT
5542.00	47.38	54.00	6.60	149	105	VERT
6435.50	48.44	54.00	5.60	350	0	HORI
7356.00	33.30	54.00	20.70	200	0	HORI
8300.50	34.49	54.00	19.50	343	320	VERT
9201.00	35.17	54.00	18.80	106	209	HORI

*Note: 1722.2MHz-2200.0MHz is an unrestricted band. Measurements are required to be 20dB below the emissions level of the fundamental frequency. The limit was adjusted accordingly.

Table 6 - Radiated Emissions Average Measurements, Channel 19, Transmit

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm	deg	
1842.50	57.01	82.47*	25.46	100	358	VERT
2763.00	56.45	74.00	17.55	100	159	HORI
3642.50	52.33	74.00	21.67	250	289	HORI
4618.50	55.39	74.00	18.61	180	177	VERT
5542.00	60.78	74.00	13.22	149	105	VERT
6435.50	62.52	74.00	11.48	350	0	HORI
7356.00	47.39	74.00	26.61	200	0	HORI
8300.50	48.30	74.00	25.70	343	320	VERT
9201.00	49.34	74.00	24.66	106	209	HORI

*Note: 1722.2MHz-2200.0MHz is an unrestricted band. Measurements are required to be 20dB below the emissions level of the fundamental frequency. The limit was adjusted accordingly.

EUT	WESROC RMS Mini-Base Unit	Model	MT9100-BM
MODE	Receive, Ch. 1	FREQUENCY RANGE	30MHz – 10GHz
INPUT POWER (SYSTEM)	9VDC	ORIENTATION	Vertical/Horizontal
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	NJohnson

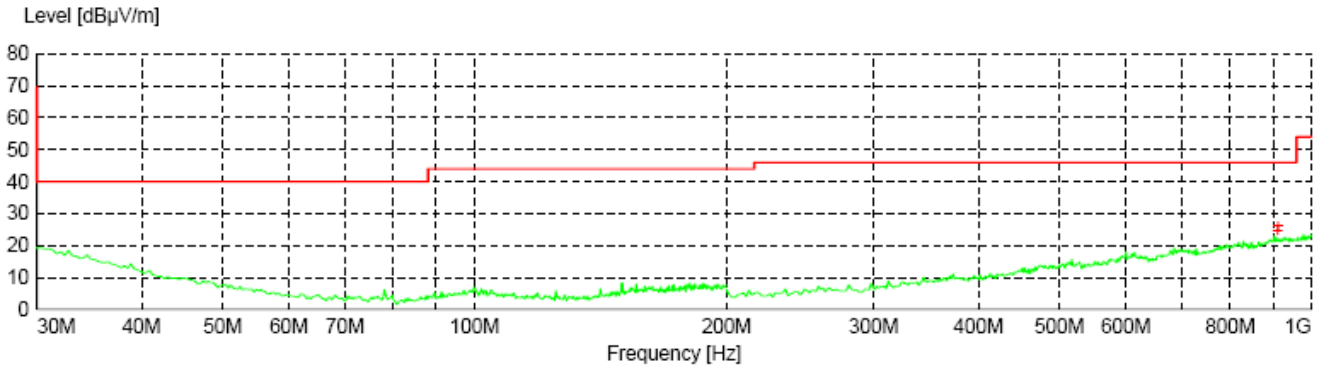


Figure 4 - Radiated Emissions Plot, Channel 1, Receive

Table 7 - Radiated Emissions Quasi-peak Data, Channel 1, Receive

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm	deg	
911.22	24.58	46.00	21.40	173	323	VERT
912.12	26.06	46.00	19.90	176	266	VERT

Table 8 - Radiated Emissions Peak Measurements, Channel 1, Receive

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm	deg	
1840.50	32.85	54.00	21.20	117	340	VERT
2775.50	36.60	54.00	17.40	378	18	VERT
6154.50	50.69	54.00	3.30	256	360	HORI

Table 9 - Radiated Emissions Average Measurements, Channel 1, Receive

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm	deg	
1840.50	46.25	74.00	27.75	117	340	VERT
2775.50	49.79	74.00	24.21	378	18	VERT
6154.50	64.22	74.00	9.78	256	360	HORI

EUT	WESROC RMS Mini-Base Unit	Model	MT9100-BM
MODE	Receive, Ch. 19	FREQUENCY RANGE	30MHz – 10GHz
INPUT POWER (SYSTEM)	9VDC	ORIENTATION	Vertical/Horizontal
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	NJohnson

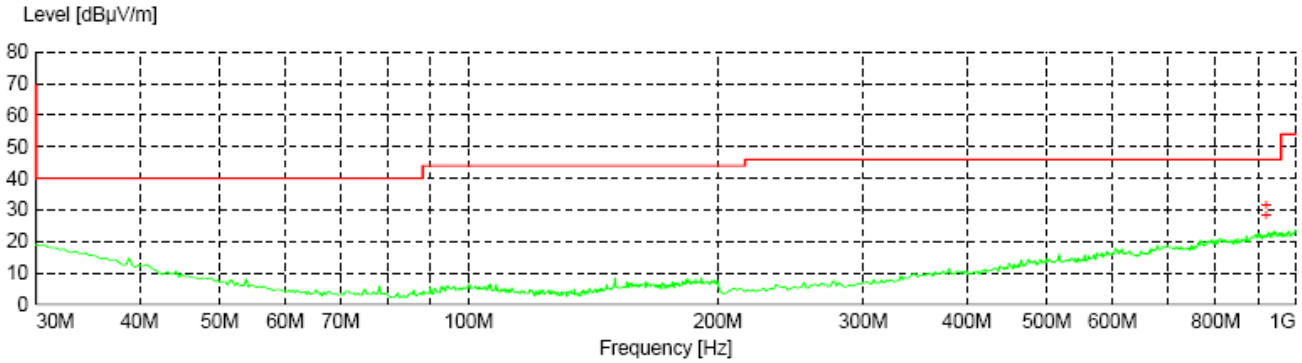


Figure 5 - Radiated Emissions Plot, Channel 19, Receive

Table 10 - Radiated Emissions Quasi-peak Measurements, Channel 19, Receive

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm	deg	
920.88	31.17	46.00	14.80	100	95	VERT
920.94	27.90	46.00	18.10	150	85	HORI

Table 11 - Radiated Emissions Peak Measurements, Channel 19, Receive

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm	deg	
1848.5	32.97	54	21	250	354	HORI
2780	36.62	54	17.4	115	14	VERT
6199.5	50.57	54	3.4	176	353	VERT

Table 12 - Radiated Emissions Average Measurements, Channel 19, Receive

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm	deg	
1848.5	46.43	54	7.6	250	354	HORI
2780	49.79	54	4.2	115	14	VERT
6199.5	63.89	54	-9.9	176	353	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

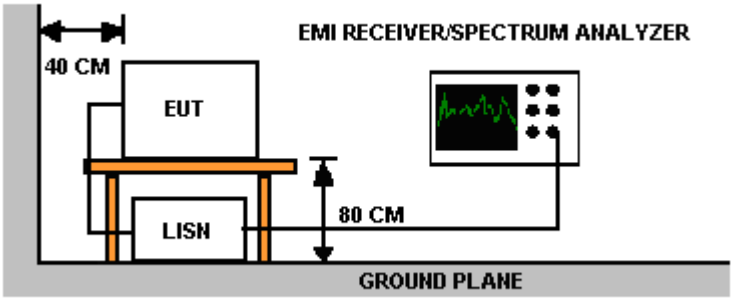


Figure 6 - Conducted Emissions Test Setup

For actual test configuration, see photographs in Appendix A

4.3.5 EUT operating conditions

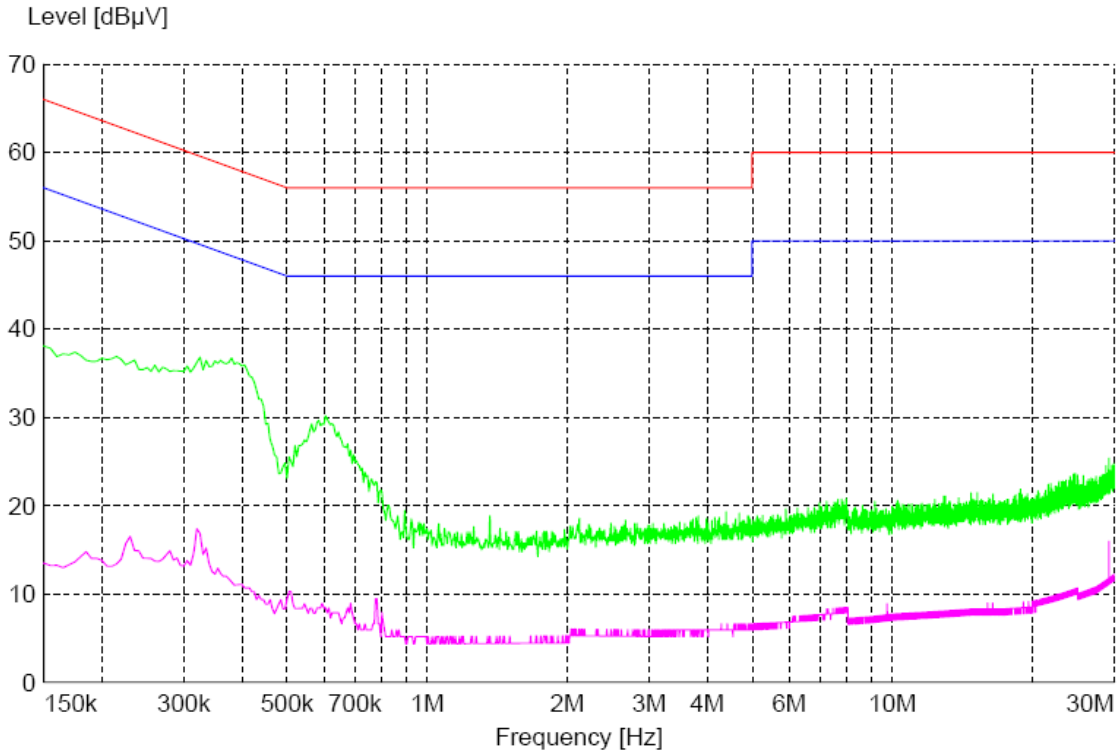
The EUT was powered by a 9VDC power supply and had no auxiliary devices; it was tested by itself. The EUT was programmed by the manufacturer to transmit continually for testing purposes only. The telecom cable was bundled 40cm above the ground plane and was terminated by a 600 ohm resistor.

The EUT was programmed by the manufacturer to transmit continuously on either the highest or lowest channel by frequency.

4.3.6 Test Results

EUT	WESROC RMS Mini-Base Unit	Model	MT9100-BM
MODE	AC Adapter, 9V	FREQUENCY RANGE	150kHz – 30MHz
INPUT POWER (SYSTEM)	120VAC/60Hz 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 Mini-Base Unit	MODEL	MT9100-BM
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 (kHz)	99% Occupied BW (kHz)	RESULT
1	911.980	667.34	500.00	879.74	PASS
19	920.980	666.70	500.00	873.73	PASS

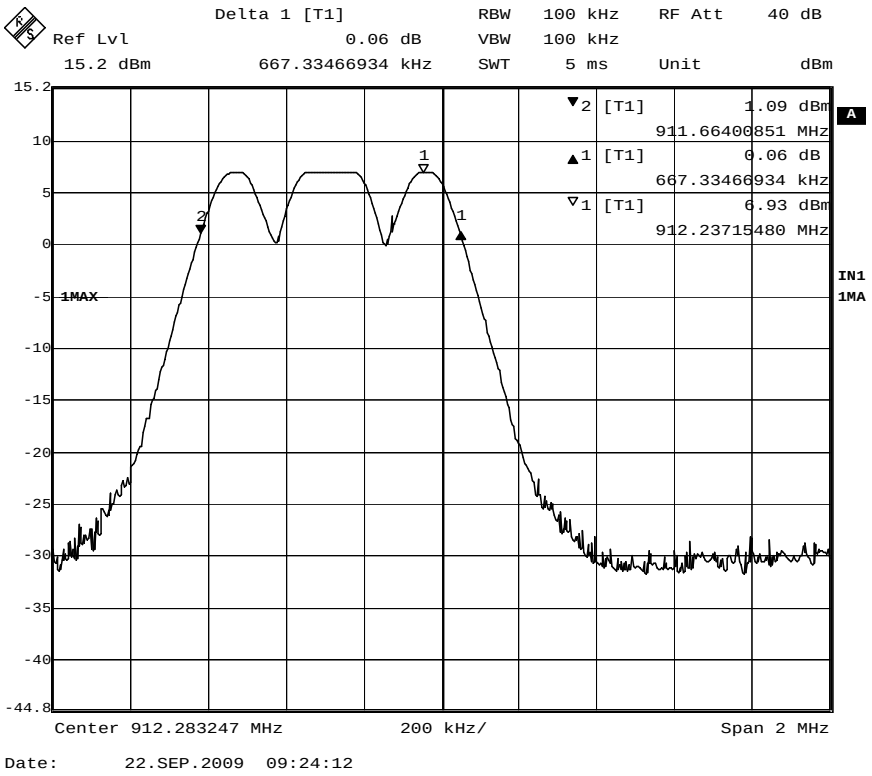


Figure 7 - Channel 1, 6dB Bandwidth, 667.33kHz

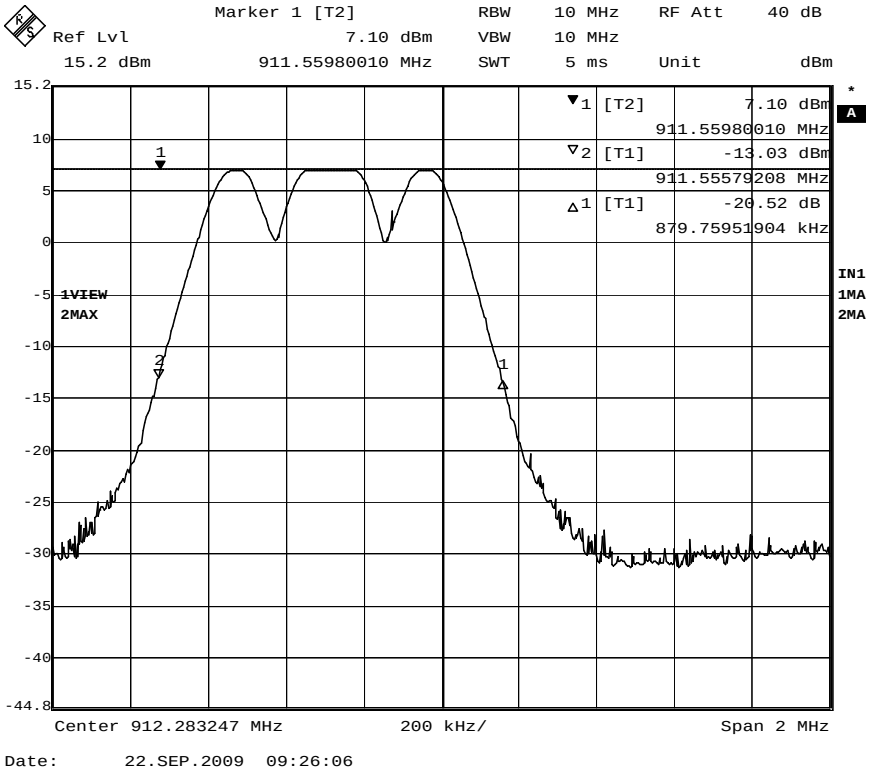


Figure 8 - Channel 1, 99% Occupied Bandwidth, 879.74kHz

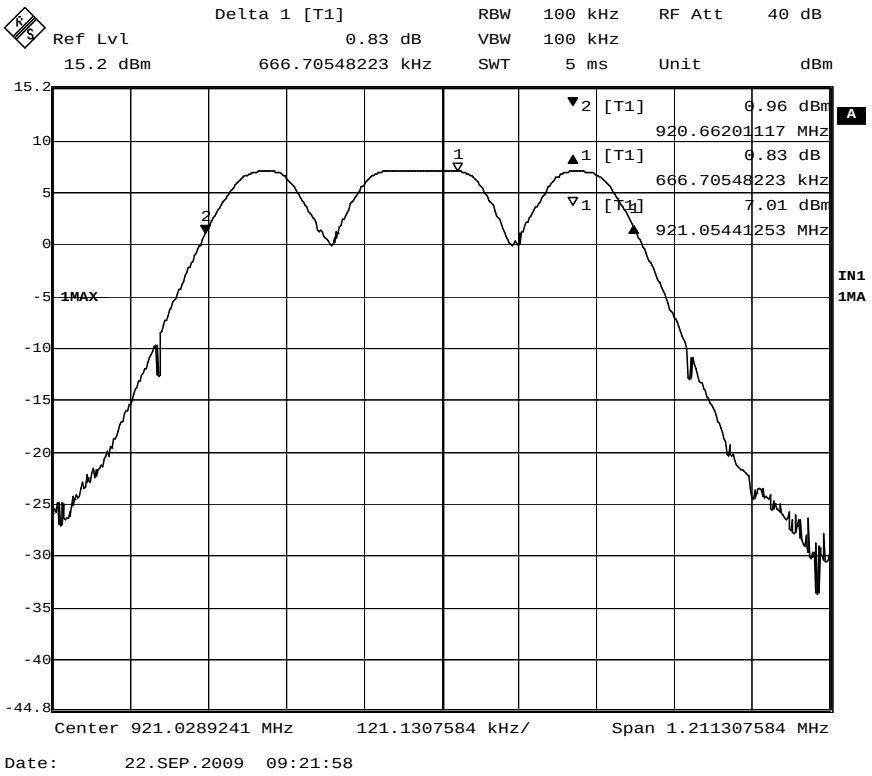


Figure 9 - Channel 19, 6dB Bandwidth, 666.70kHz

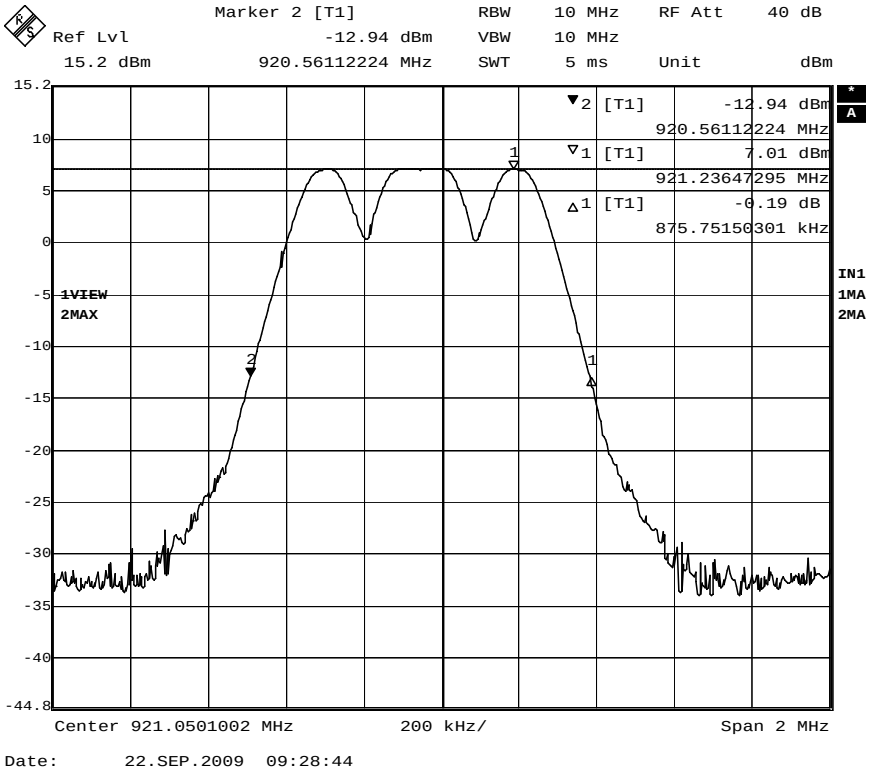


Figure 10 - Channel 19, 99% Occupied Bandwidth, 873.73kHz

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 Mini-Base Unit	MODEL	MT9100-BM
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	8.05dBm (6.43mW)	30	PASS
2	920.980	8.22dBm (6.64mW)	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 Mini-Base Unit	MODEL	MT9100-BM
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	7.04	8.0	PASS
19	920.980	6.89	8.0	PASS

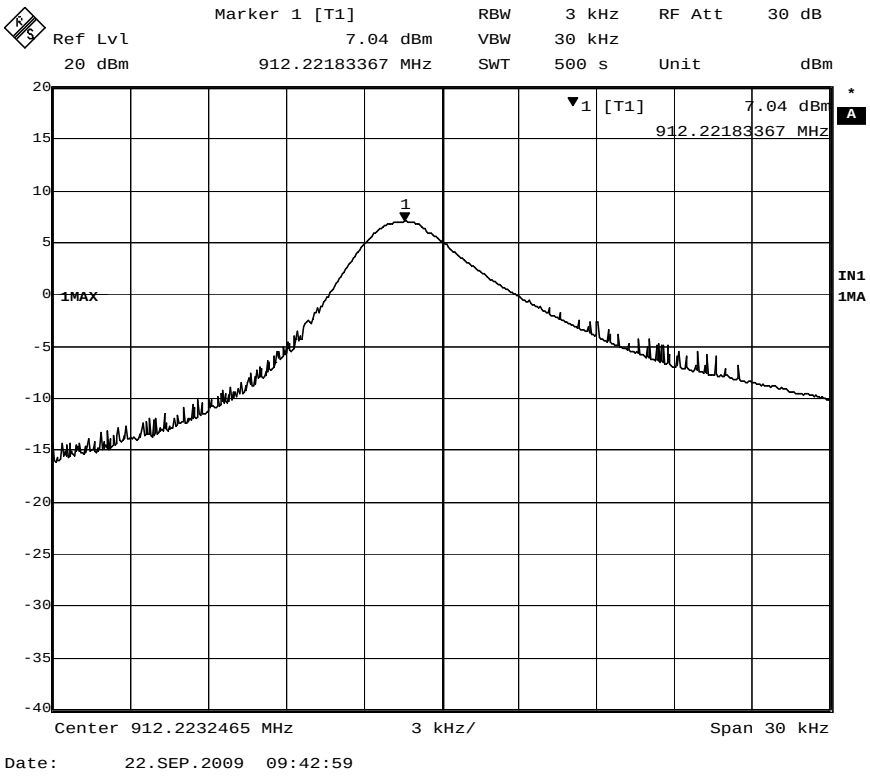


Figure 11 - Channel 1, PSD, 7.04dBm

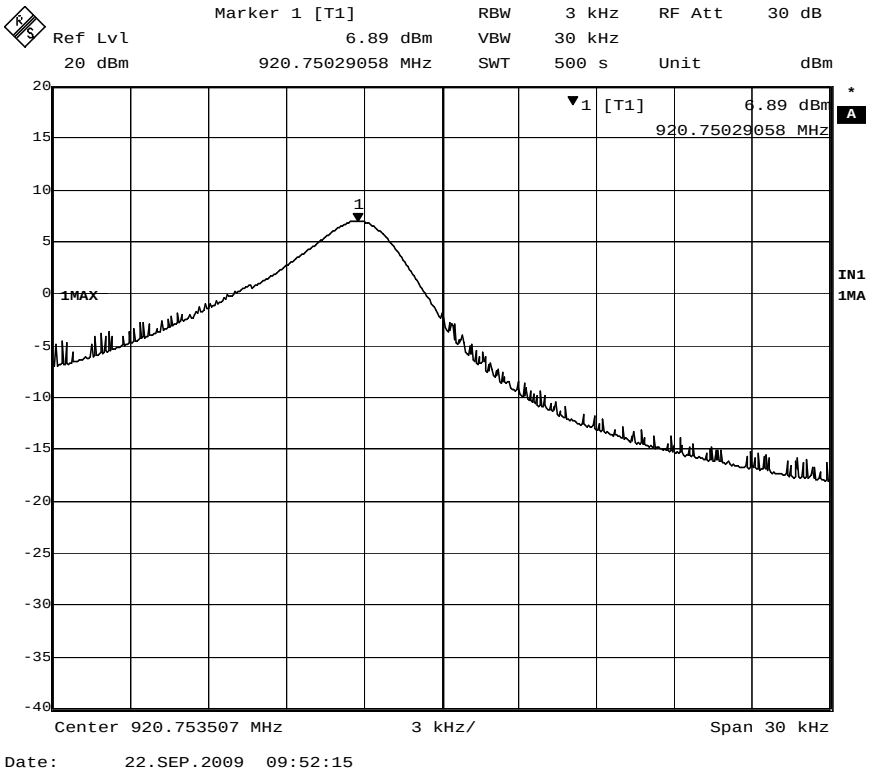


Figure 12 - Channel 19, PSD, 6.89dBm

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 100kHz and the EMI receiver was used to scan from the bandedge to the fundamental frequency with a 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.

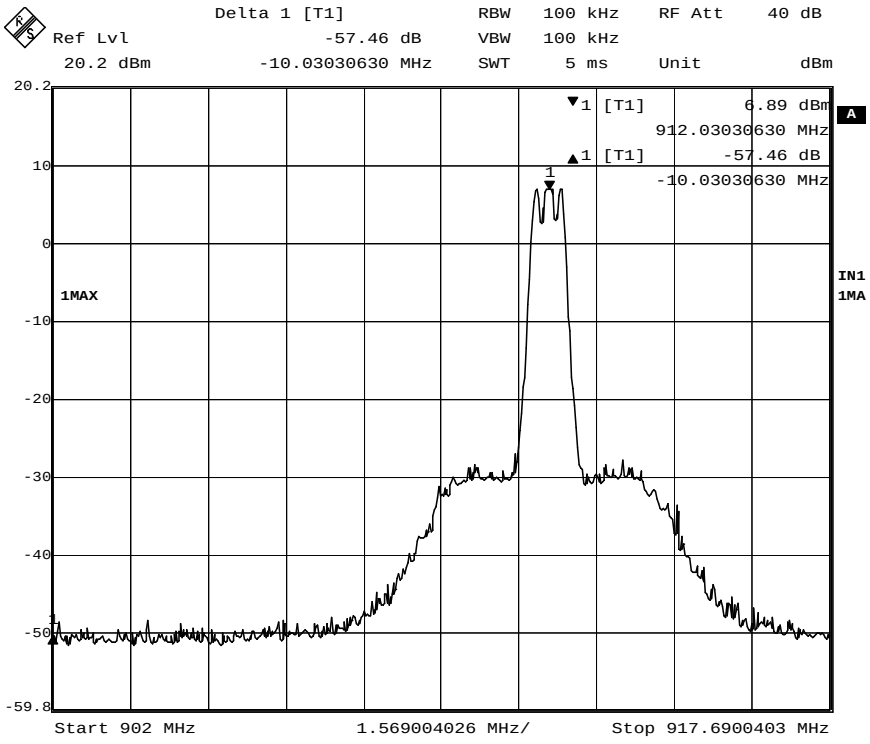
4.7.6 Test results

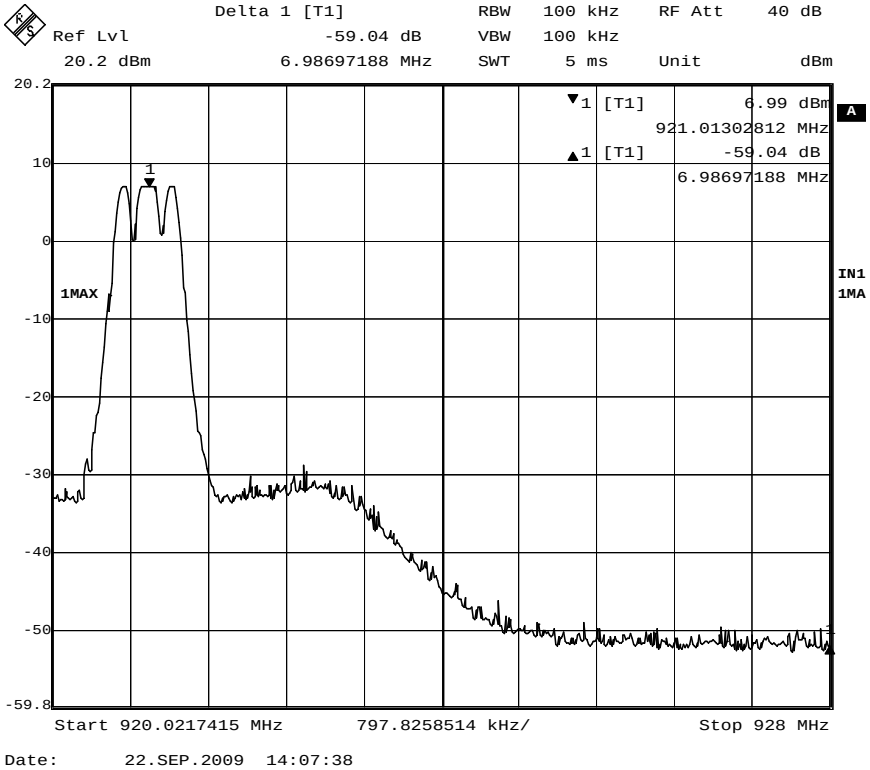
EUT	WESROC RMS Mini-Base Unit	MODEL	MT9100-BM
INPUT POWER (SYSTEM)	AC adapter, 9VDC	ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC
TECHNICIAN	NJohnson	MODE	Continuous transmit

Highest Out of Band Emissions

CHANNEL	Bandedge/Measurement Frequency (MHz)	Pk Level (dBm)	Fund. Pk Level (dBm)	Delta	Minimum Delta
1	902 MHz	6.89	-37.46	44.35	20
19	928 MHz	6.99	-39.04	46.03	20

NOTE:
All values listed include all transducer and cable loss factors.


Delta 1 [T1]
RBW 100 kHz
RF Att 40 dB
Ref Lvl
-57.46 dB
VBW 100 kHz
20.2 dBm
-10.03030630 MHz
SWT 5 ms
Unit dBm
1 [T1] 6.89 dBm
912.03030630 MHz
1 [T1] -57.46 dB
-10.03030630 MHz
1MAX
IN1
1MA
Start 902 MHz
1.569004026 MHz/
Stop 917.6900403 MHz
Date: 22.SEP.2009 14:06:37


Delta 1 [T1]
RBW 100 kHz
RF Att 40 dB
Ref Lvl
-59.04 dB
VBW 100 kHz
20.2 dBm
6.98697188 MHz
SWT 5 ms
Unit dBm
1 [T1] 6.99 dBm
921.01302812 MHz
1 [T1] -59.04 dB
6.98697188 MHz
1MAX
IN1
1MA
Start 920.0217415 MHz
797.8258514 kHz/
Stop 928 MHz
Date: 22.SEP.2009 14:07:38

Appendix A: Test Photos

Figure 13 - Radiated Emissions Test Setup

Figure 14 - Radiated Emissions Test Setup

Figure 15 - Radiated Emissions Test Setup

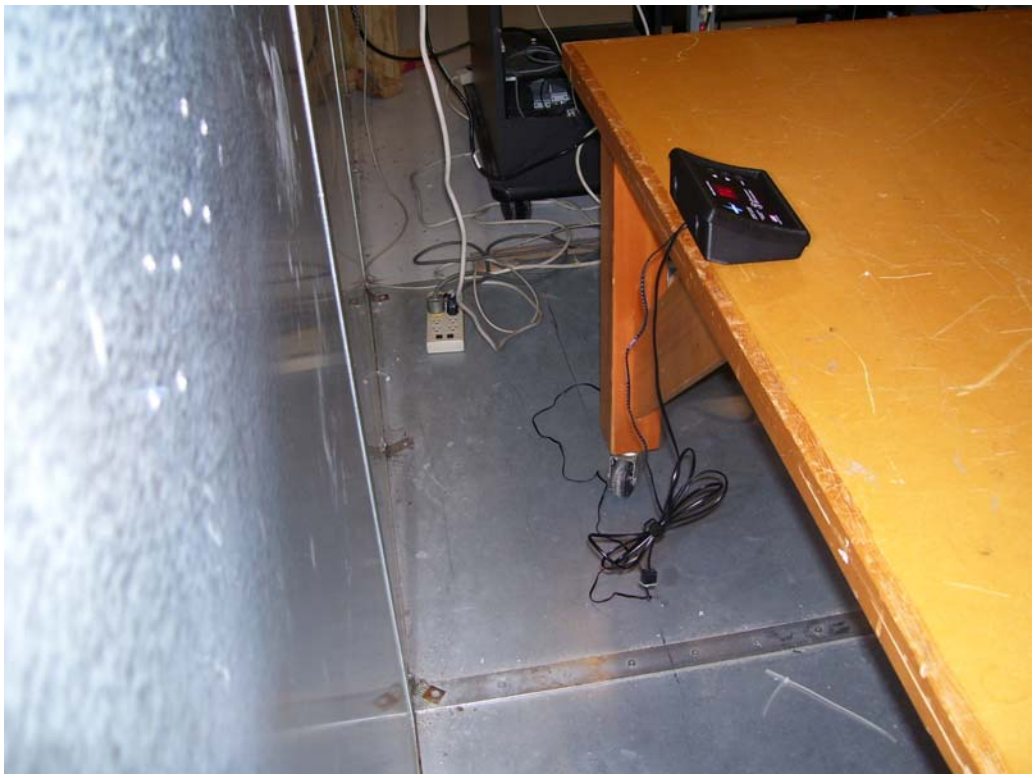


Figure 16 - Conducted Emissions Test Setup

Figure 17 - 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: Table of Figures

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