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FCC Test Report

Company:	TDPRO, LLC 4760 Preston Rd. Suite 244 #195 Fresno, TX 75034
Contact:	Gene House
Product:	TDPRO
FCC ID:	WEQ-PDB
Test Report No:	R041808-01-01A
APPROVED BY:	Doug Kramer Senior Test Engineer
DATE:	16 September 2008
Total Pages:	38

ACCREDITED
Certificate Number 1953-01

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	Unique Antenna Requirement	Pass	PCB Antenna
15.207	Conducted Emissions	NA	No connection to AC mains
15.209	Radiated Emissions	Pass	Meets the requirement of the limit.
15.247(a)(2)	Minimum Bandwidth, Limit: min. 500kHz	Pass	Meets the requirement of the limit.
15.247(b)	Maximum Peak Output Power, Limit: Max. 23.9dBm	Pass	Meets the requirement of the limit.
15.247(e)	Power Spectral Density, Limit: Max. 8dBm	Pass	Meets the requirement of the limit.
15.247(d)	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 AC Emissions

The EUT was battery powered and had to provisions for connection to the AC mains network. Conducted emissions are therefore not applicable according to FCC 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 and KDB558074:2005. 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. The EUT was tested while sitting both vertically and horizontally. The horizontal configuration produced the highest emissions, and that position was used for all radiated testing. 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.

1.3 Reason for Amendment

Page 4 was modified to reference KDB558074.
Page 10 has been modified to list the video bandwidth used for peak and average measurements. Average measurements were verified on 9/16/08 per KDB558074. The average limits have been modified to show the requirement for measurements outside of restricted bands to be at least 20dB below the highest emission level on the carrier frequency. Spurious radiated emissions average measurements were re-tested on 16 September 2008 and verified to be with 0.5dB of the original measurements.

2.0 Description

2.1 Equipment under test

The TDPRO device is used to manage poker games by providing a timer, status display, and dealer management logic. The devices can be networked to coordinate poker tournaments. The controlling circuit is comprised of a USB interface, a power supply, a wireless transceiver, a display, various LEDs and switches, and a microcontroller. The USB interface is only used for configuring the device and is never used when the wireless transceiver is enabled.

EUT Received Date: 22 May 2008
EUT Tested Dates: 29 May 2008: All testing
16 September 2008: (Average measurements above 1Ghz were verified with 1MHz RBW, 10Hz VBW. All measurements were with 0.5dB of measurements from 29 May 2008 and the original data is presented in this report)

PRODUCT	TDPRO
POWER SUPPLY	4 AAA Batteries, 6VDC
MODULATION TYPE	FSK
RADIO TECHNOLOGY	Half-duplex RF Link
TRANSFER RATE	152.34 Kbit/sec, maximum data rate
FREQUENCY RANGE	903.50 – 926.75 MHz
NUMBER OF CHANNELS	32
MAX OUTPUT POWER	13.62dBm (23.014mW)
ANTENNA TYPE	Internal
DATA CABLE	USB interface, programming only
ASSOCIATED DEVICES	None

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

The EUT was tested at the frequencies below:

Channel	Frequency
1	903.50
16	914.43
32	926.75

2.4 Applied standards

The EUT uses digital modulation and operates between 902 MHz and 928 MHz. It has no AC mains connection. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.247)
FCC Part 15, Subpart C (15.209)

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

2.5 Description of support units

None

2.6 Configuration of system under test

This EUT was set to transmit in a worse-case scenario with modulation on. The manufacturer modified the unit to transmit continuously and a switch was added to change between channel 1, 16 and 32.

The EUT was tested while laying flat on a non-conducting table as it is meant to be operated.

3.0 Test equipment used

DESCRIPTION AND MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CALIBRATION DATE
Rohde & Schwarz Test Receiver	ESIB26	100037	14 August 2007
EMCO Biconilog Antenna	3142B	1647	8 Feb 2008
EMCO Horn Antenna	3115	6416	5 Feb 2008
Rohde & Schwarz LISN	ESH3-Z5	100023	6 Feb 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 is internal to the EUT and not replaceable.

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 (μV/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.

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 and video bandwidth of test receiver/spectrum analyzer is 1 MHz for peak and average measurements at frequencies above 1GHz. The video bandwidth for peak measurements was 3MHz and 10Hz for average measurements

4.2.3 Deviations from test standard

No deviation.

4.2.4 Test setup

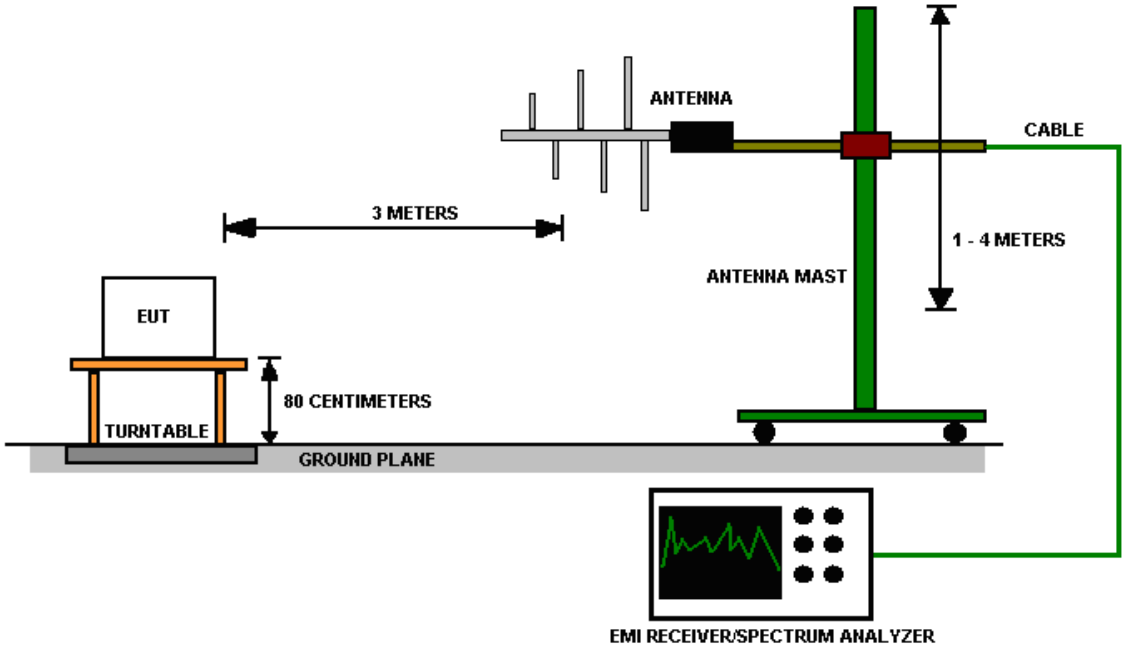


Figure 1 - Radiated Emissions Test Setup

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 4 AAA batteries and set to transmit continuously on the lowest frequency channel, highest frequency channel and one in the middle of its operating range.

4.2.6 Test results

EUT	TDPRO	MODE	Channel 1
INPUT POWER	$6V_{DC}$ 4 AAA Batteries	FREQUENCY RANGE	30MHz – 1GHz
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.	
31.440000	15.01	40.0	25.0	105.0	0	VERT
54.840000	10.61	40.0	29.4	355.0	32	HORI
462.840000	18.67	46.0	27.3	263.0	28	HORI
477.240000	34.32	46.0	11.7	99.0	108	HORI
495.240000	26.44	46.0	19.6	332.0	347	HORI
549.240000	37.61	46.0	8.4	296.0	169	HORI
597.240000	37.20	46.0	8.8	100.0	107	HORI
639.240000	35.01	46.0	11.0	377.0	196	VERT
693.240000	29.57	46.0	16.4	276.0	308	HORI
717.300000	32.37	46.0	13.6	99.0	242	HORI
825.180000	38.82	46.0	7.2	101.0	342	HORI
883.740000	42.12	46.0	3.9	99.0	281	HORI
902.880000	79.97	NA*	NA*	101.0	291	HORI
903.240000	107.82	NA*	NA*	98.0	291	HORI
903.780000	107.76	NA*	NA*	99.0	291	HORI
904.920000	59.52	NA*	NA*	98.0	290	HORI
905.760000	52.91	NA*	NA*	99.0	290	HORI
922.740000	39.68	NA*	NA*	101.0	290	HORI
931.920000	36.96	46.0	9.0	400.0	0	HORI

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 do not apply within the 902MHz to 928MHz band.
6. ** Radiated emissions outside of the 902MHz to 928MHz band must be at least 20dB below the highest emission

EUT	TDPRO	MODE	Channel 16
INPUT POWER	$6V_{DC}$ 4 AAA Batteries	FREQUENCY RANGE	30MHz – 1GHz
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.	
30.420000	15.40	40.0	24.6	251.0	210	HORI
162.480000	17.54	44.0	26.5	217.0	139	HORI
477.240000	31.62	46.0	14.4	167.0	229	VERT
549.240000	46.41	46.0	-0.4	100.0	210	VERT
639.240000	34.93	46.0	11.1	130.0	238	HORI
697.740000	41.97	46.0	4.0	399.0	51	HORI
876.060000	42.57	46.0	3.4	100.0	290	HORI
913.320000	55.70	NA*	NA*	99.0	275	HORI
914.460000	107.98	NA*	NA*	100.0	285	HORI
915.060000	107.90	NA*	NA*	99.0	286	HORI
916.860000	53.29	NA*	NA*	99.0	290	HORI
924.060000	40.85	NA*	NA*	101.0	291	HORI
954.060000	37.35	46.0	8.6	104.0	284	HORI

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 do not apply within the 902MHz to 928MHz band.
6. ** Radiated emissions outside of the 902MHz to 928MHz band must be at least 20dB below the highest emission

EUT	TDPRO	MODE	Channel 32
INPUT POWER	$6V_{DC}$ 4 AAA Batteries	FREQUENCY RANGE	30MHz – 1GHz
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.	
30.300000	15.44	40.0	24.6	222.0	159	HORI
31.020000	15.23	40.0	24.8	214.0	358	VERT
31.500000	19.82	40.0	20.2	370.0	244	HORI
32.340000	14.35	40.0	25.6	223.0	295	HORI
462.480000	18.71	46.0	27.3	263.0	0	HORI
477.240000	33.24	46.0	12.8	376.0	50	HORI
477.300000	29.69	46.0	16.3	309.0	299	HORI
495.240000	32.11	46.0	13.9	309.0	332	HORI
495.300000	27.74	46.0	18.3	315.0	281	HORI
499.740000	23.90	46.0	22.1	225.0	289	VERT
693.240000	43.88	87.67**	43.79	289.0	3	HORI
926.460000	107.67	NA*	NA*	99.0	285	HORI
926.520000	103.14	NA*	NA*	98.0	284	HORI
927.120000	107.61	NA*	NA*	98.0	290	HORI
927.780000	52.11	NA*	NA*	98.0	289	HORI
928.800000	50.61	87.67**	37.06	101.0	290	HORI

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 do not apply within the 902MHz to 928MHz band.
6. **All emissions outside of the 902MHZ to 928MHZ bands are required to be 20dB below the highest emission

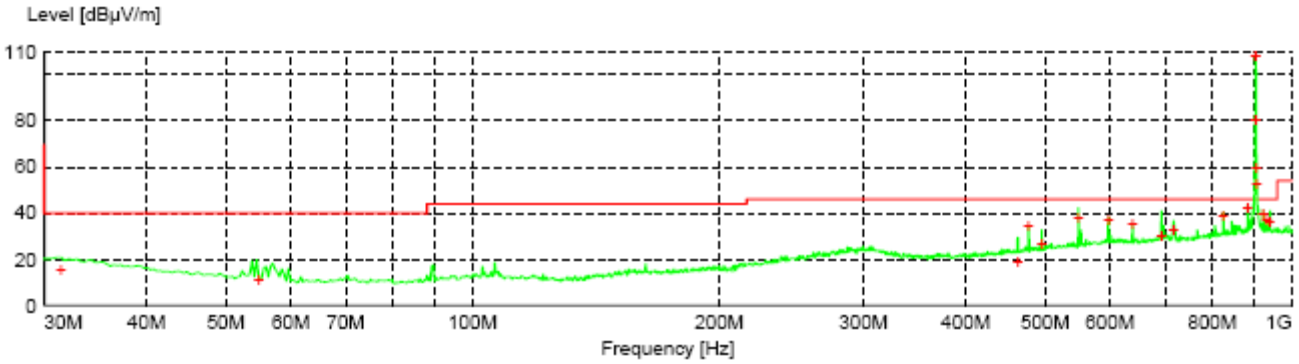


Figure 2 - Radiated Emissions Plot, Channel 1

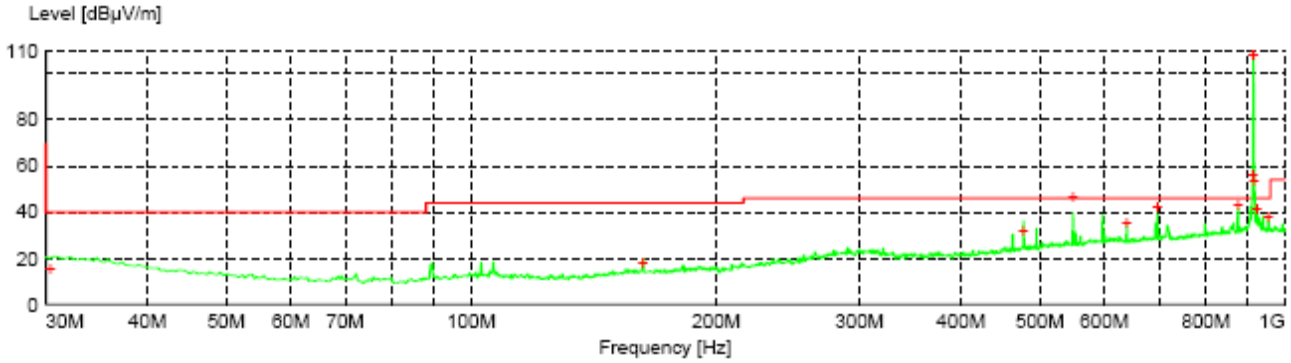


Figure 3 - Radiated Emissions Plot, Channel 16

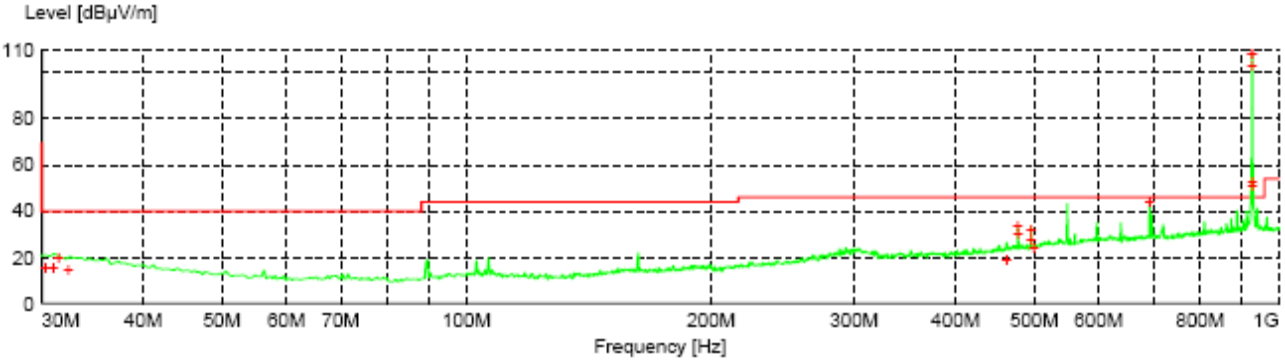


Figure 4 - Radiated Emissions Plot, Channel 32

EUT	TDPRO	MODE	Channel 1
INPUT POWER	$6V_{DC}$ 4 AAA Batteries	FREQUENCY RANGE	1GHz – 10GHz
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	NJohnson

Average Measurements (1MHz RBW, 10Hz VBW)

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm.	deg.	
1807.55	53.60	87.67**	34.07	154	285	HOR
2711.49	39.75	54.00	14.25	182	285	HOR
3615.00	30.35	54.00	23.65	123	285	HOR
4519.00	29.35	54.00	24.65	145	285	HOR

Peak Measurements (1MHz RBW, 3MHz VBW)

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm.	deg.	
1807.55	62.89	74.00	11.11	166	285	HOR
2711.49	51.52	74.00	22.48	174	285	HOR
3615.00	40.66	74.00	33.34	122	285	HOR
4519.00	40.13	74.00	33.87	131	285	HOR

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. **All emissions outside of the 902MHZ to 928MHZ bands are required to be 20dB below the highest emission if they are not in a restricted band.

EUT	TDPRO	MODE	Channel 16
INPUT POWER	$6V_{DC}$ 4 AAA Batteries	FREQUENCY RANGE	1GHz – 10GHz
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	Njohnson

Average Measurements (1MHz RBW, 10Hz VBW)

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm.	deg.	
1829.11	52.85	87.98**	35.4	101	285	HOR
2743.42	39.89	54.00	14.11	140	285	HOR
3660.23	30.39	54.00	23.61	99	285	HOR
4575.45	25.95	54.00	28.05	174	285	HOR

Peak Measurements (1MHz RBW, 3MHz VBW)

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm.	deg.	
1829.11	62.22	74.00	11.78	108	285	HOR
2743.42	51.29	74.00	22.71	104	285	HOR
3660.23	40.30	74.00	33.70	113	285	HOR
4575.45	36.62	74.00	37.38	138	285	HOR

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. **All emissions outside of the 902MHZ to 928MHZ bands are required to be 20dB below the highest emission if they are not in a restricted band.

EUT	TDPRO	MODE	Channel 32
INPUT POWER	$6V_{DC}$ 4 AAA Batteries	FREQUENCY RANGE	1GHz – 10GHz
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	Njohnson

Average Measurements (1MHz RBW, 10Hz VBW)

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm.	deg.	
1854.12	53.42	57.67**	34.25	142	285	HOR
2779.69	38.90	54.00	15.10	187	285	HOR
3706.20	30.54	54.00	23.46	103	285	HOR
4633.26	32.27	54.00	21.73	110	285	HOR

Peak Measurements (1MHz RBW, 3MHz VBW)

Frequency	Level	Limit	Margin	Height	Angle	Pol.
MHz	dBµV/m	dBµV/m	dB	cm.	deg.	
1854.12	60.68	74.00	13.32	107	285	HOR
2779.69	50.56	74.00	23.44	196	285	HOR
3706.20	40.76	74.00	33.24	105	285	HOR
4633.26	40.93	74.00	33.07	99	285	HOR

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. **All emissions outside of the 902MHZ to 928MHZ bands are required to be 20dB below the highest emission if they are not in a restricted band.

4.3 Bandwidth

4.3.1 Limits of bandwidth measurements

The minimum 6dB bandwidth shall be at least 500kHz.

4.3.2 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 10 kHz RBW and 10 MHz VBW. The 20 dB bandwidth is defined as the bandwidth of which is higher than peak power minus 20dB.

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.

4.3.3 Deviations from test standard

No deviation.

4.3.4 Test setup

4.3.5 EUT operating conditions

The EUT was powered by 4 AAA batteries and set to transmit continuously on the lowest frequency channel, highest frequency channel and one in the middle of its operating range.

4.3.6 Test results

EUT	TDPRO	MODE	Channel 1, 16, 32
INPUT POWER	$6V_{DC}$ 4 AAA Batteries	FREQUENCY RANGE	30MHz – 1GHz
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	NJohnson

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BW (kHz)	6dB LIMIT Min (kHz)	RESULT
1	903.50	837.715	500.00	PASS
16	914.43	871.743	500.00	PASS
32	926.75	877.756	500.00	PASS

REMARKS:

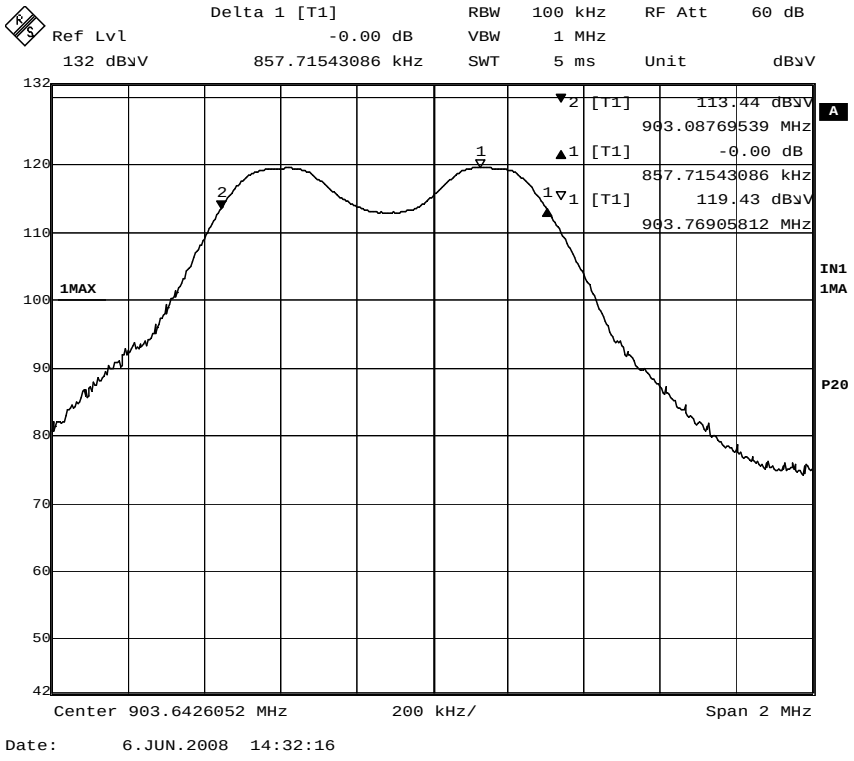


Figure 5 - 6dB Bandwidth, Channel 1

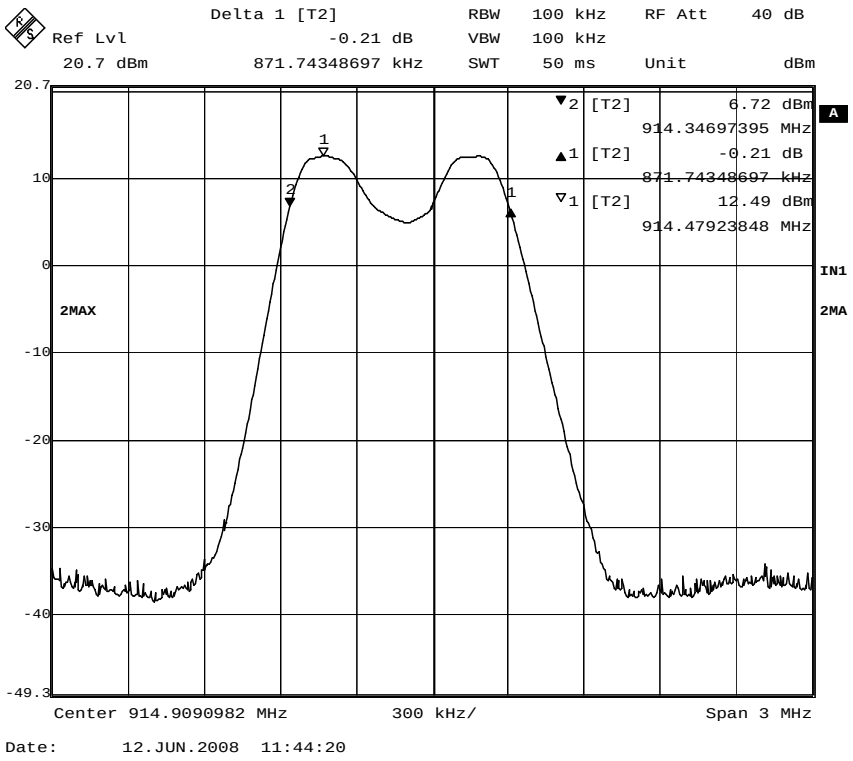


Figure 6 - 6dB Bandwidth, Channel 16

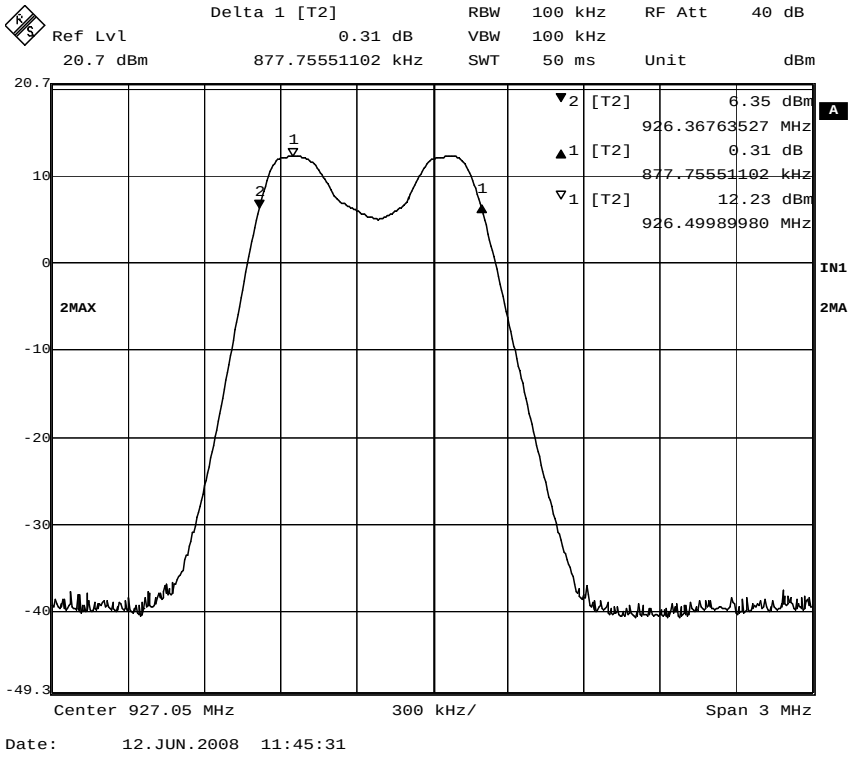


Figure 7 - 6dB Bandwidth, Channel 32

4.4 Maximum peak output power

4.4.1 Limits of power measurements

The maximum peak output power allowed is 30dBm (1000mW).

4.4.2 Test procedures

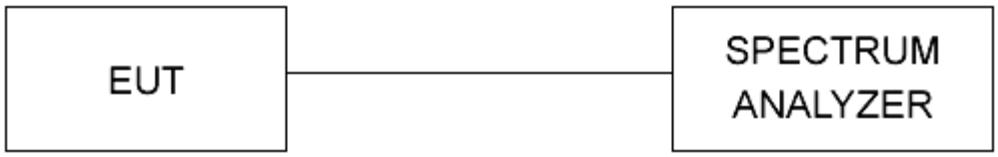
1. The EUT was connected to the spectrum analyzer directly with a low-loss shielded coaxial cable.

2. 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.

4.4.3 Deviations from test standard

No deviation.

4.4.4 Test setup



4.4.5 EUT operating conditions

The EUT was powered by 4 AAA batteries and set to transmit continuously on the lowest frequency channel, highest frequency channel and one in the middle of its operating range.

4.4.6 Test results

EUT	TDPRO	MODE	Channel 1, 16, 32
INPUT POWER	$6V_{DC}$ 4 AAA Batteries	FREQUENCY RANGE	1GHz – 10GHz
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	NJohnson

Maximum peak output power

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	RESULT
1	902.50	13.53	30	PASS
16	914.43	13.62	30	PASS
32	926.75	13.32	30	PASS

REMARKS:
None

4.5 Bandedges

4.5.1 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.

4.5.2 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.

4.5.3 Deviations from test standard

No deviation.

4.5.4 Test setup

See 4.2.4

4.5.5 EUT operating conditions

The EUT was powered by 4 AAA batteries and set to transmit continuously on the lowest frequency channel, highest frequency channel.

4.5.6 Test results

EUT	TDPRO	MODE	Channel 1, 16, 32
INPUT POWER	$6V_{DC}$ 4 AAA Batteries	FREQUENCY RANGE	1GHz – 10GHz
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	NJohnson

Highest Out of Band Emissions

CHANNEL	Band edge /Measurement Frequency (MHz)	Highest out of band level dBµV/m	Highest in band level dBµV/m	Delta	Limit (dBc)	Result
0 (903.24MHZ)	902.88 MHz	79.97	107.82	-27.85	-20.00	PASS
32(926.46MHz)	928.80 MHz	50.61	107.67	-57.05	-20.00	PASS

NOTE:
EUT was tested as described in section 4.2. All measurements above were taken from section 4.2. The highest out of band measurement was maximized in a 5MHz frequency band, so the frequency may be slightly within the frequency band, but represents a worse-case scenario for all out of band measurements. The plots on the following page shows the peak measurements in green and quasi-peak in red.

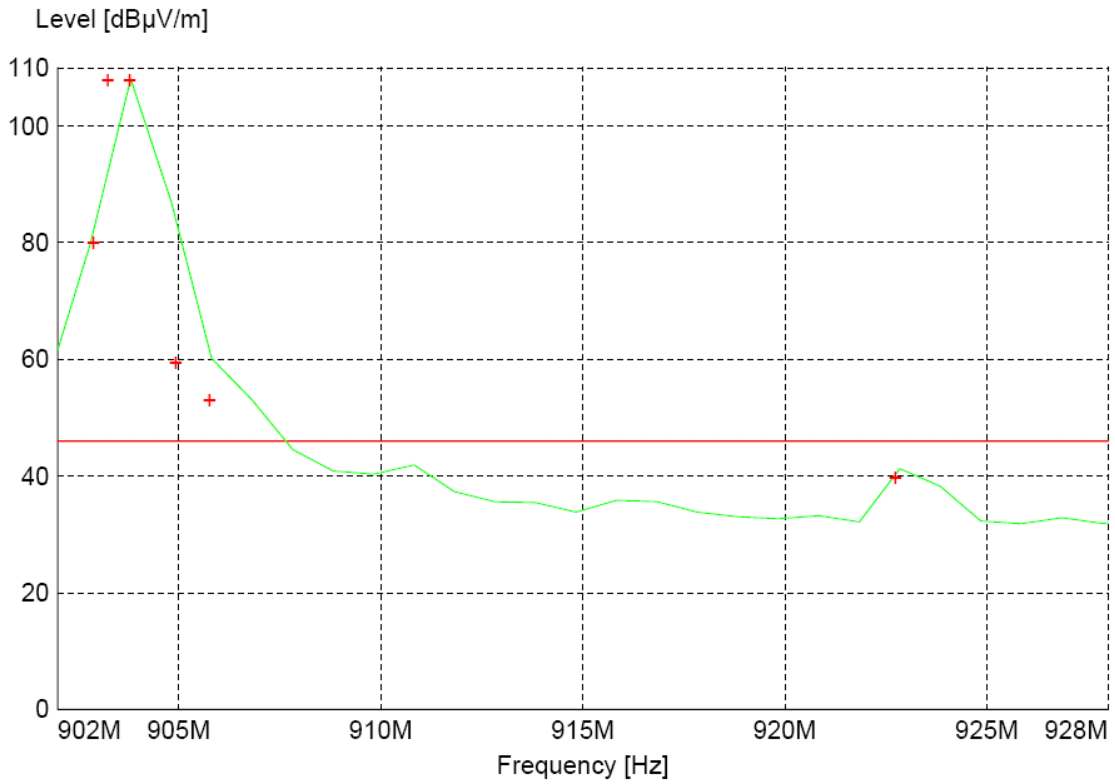


Figure 8 - Bandedge Peak/Quasi-peak Measurements, Channel 1

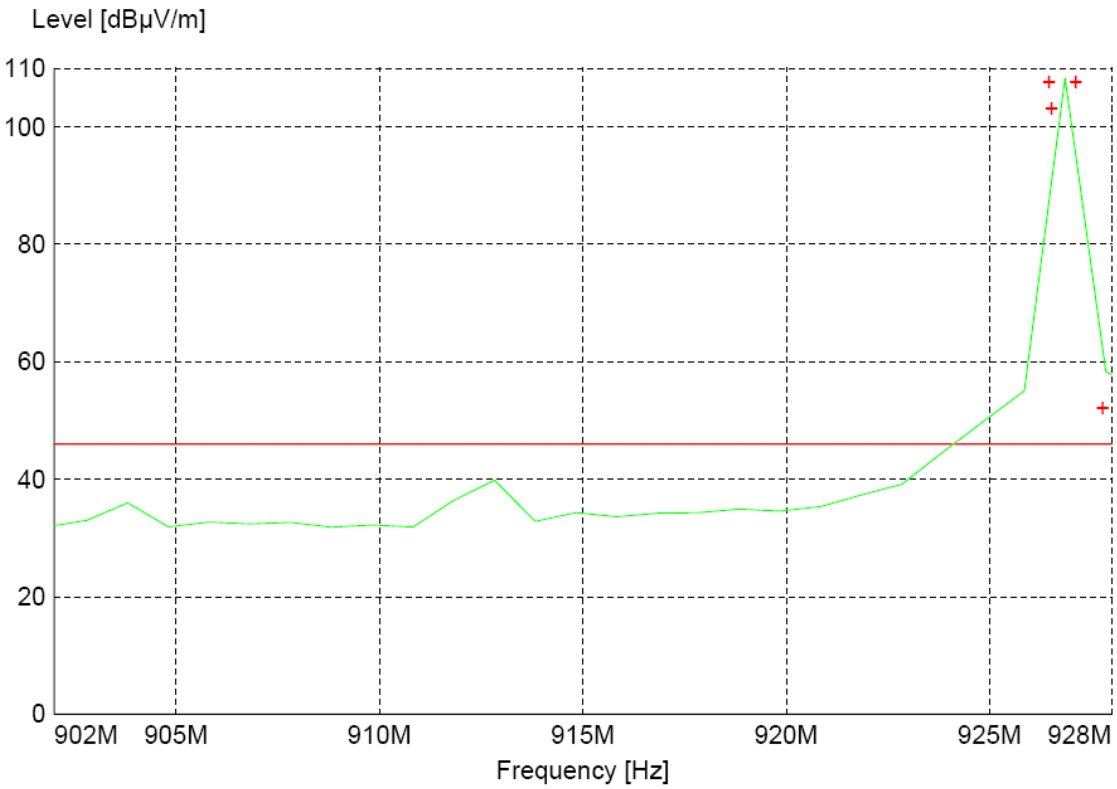


Figure 9 - Bandedge Peak/Quasi-peak Measurements Channel 32

4.6 Power Spectral Density

4.6.1 Power spectral density measurements

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

4.6.2 Test procedures

Because the EUT contained no means for direct connection to the antenna port, measurements were made at a 3m distance and the output power was calculated using 0dBi as the gain of the transmitting antenna. The spectrum analyzer was set to 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

See section 4.4

4.6.5 EUT operating conditions

The EUT was powered by 4 AAA batteries and set to transmit continuously on the lowest frequency channel, highest frequency channel and one in the middle of its operating range.

EUT	TDPRO	MODE	Channel 1, 16, 32
INPUT POWER	$6V_{DC}$ 4 AAA Batteries	FREQUENCY RANGE	1GHz – 10GHz
ENVIRONMENTAL CONDITIONS	45% ± 5% RH 20 ± 3ºC	TECHNICIAN	NJohnson

Power Spectral Density

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN # KHz BW (dBm)	MAXIMUM POWER LIMIT (dBm)	RESULT
1	903.5	4.79	8.00	PASS
16	914.43	2.43	8.00	PASS
32	926.75	2.86	8.00	PASS

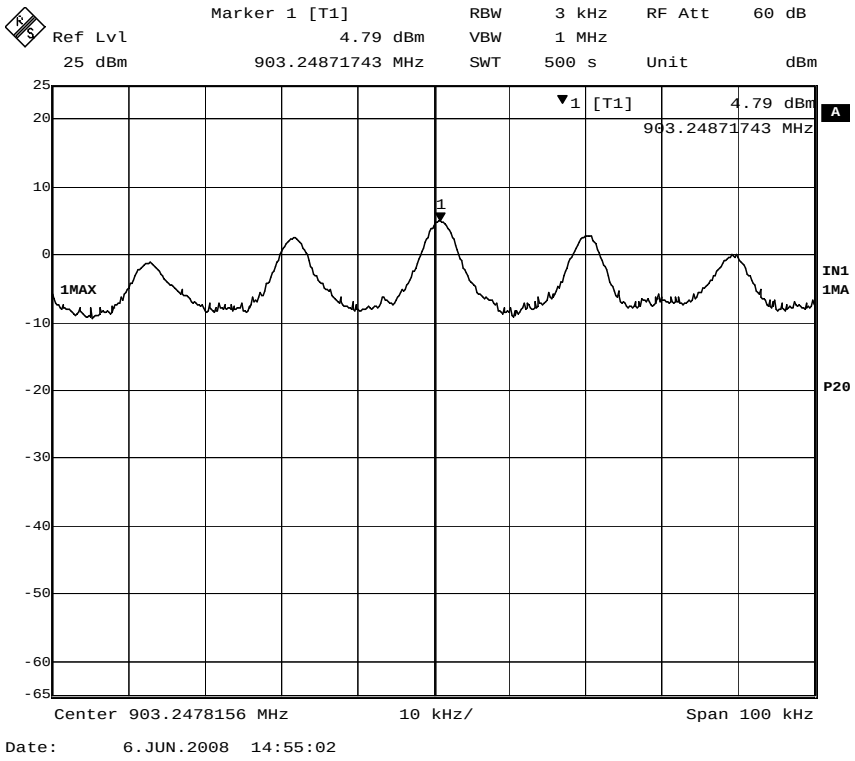


Figure 10 - PSD, Channel 1

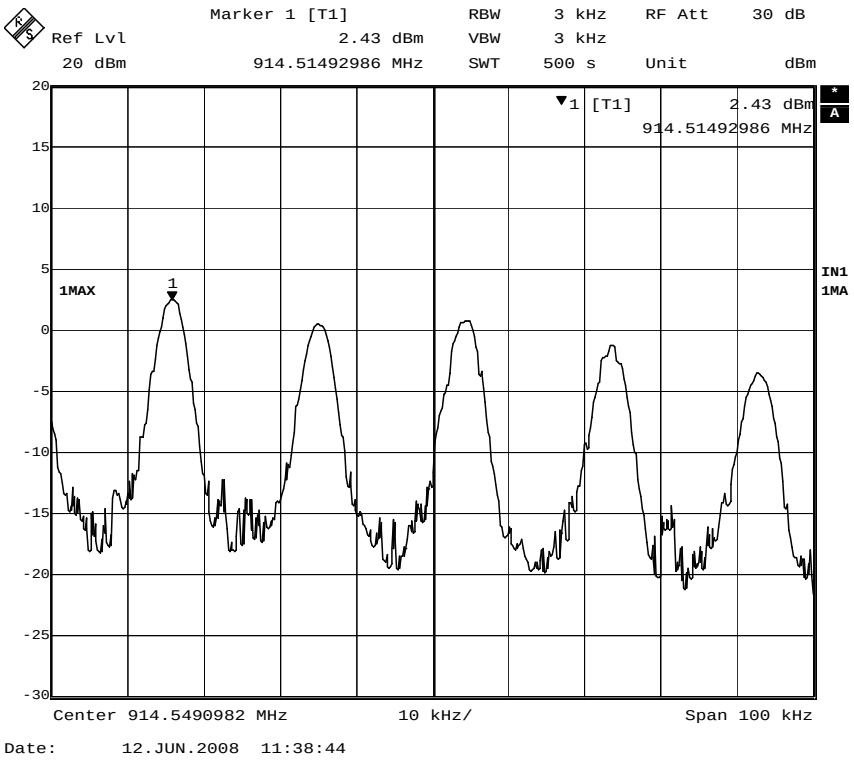


Figure 11 - PSD, Channel 16

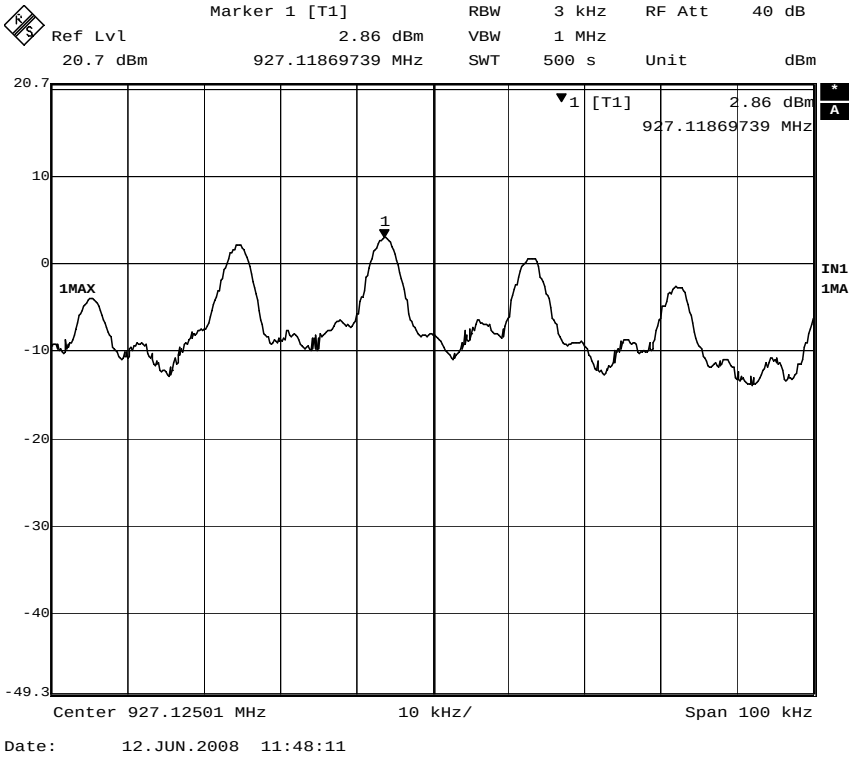


Figure 12 - PSD, Channel 32

Appendix A: Test Photos

Figure 13 - Radiated Emissions Test Setup

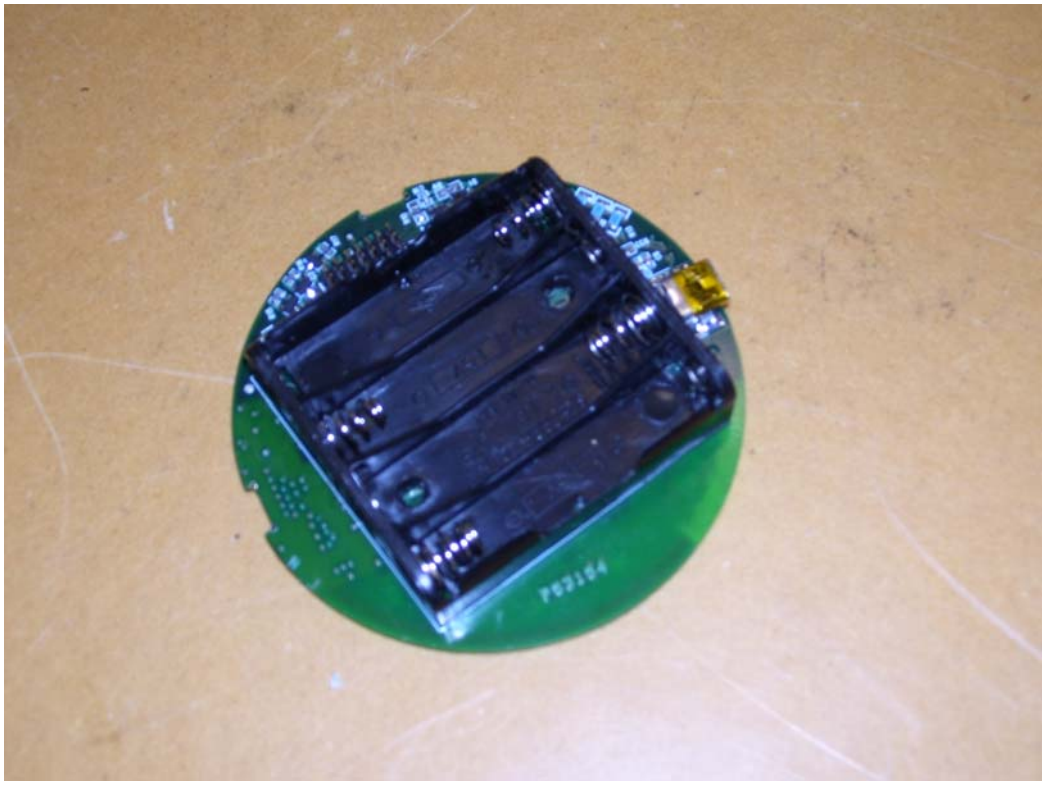


Figure 14 - EUT, Bottom Side

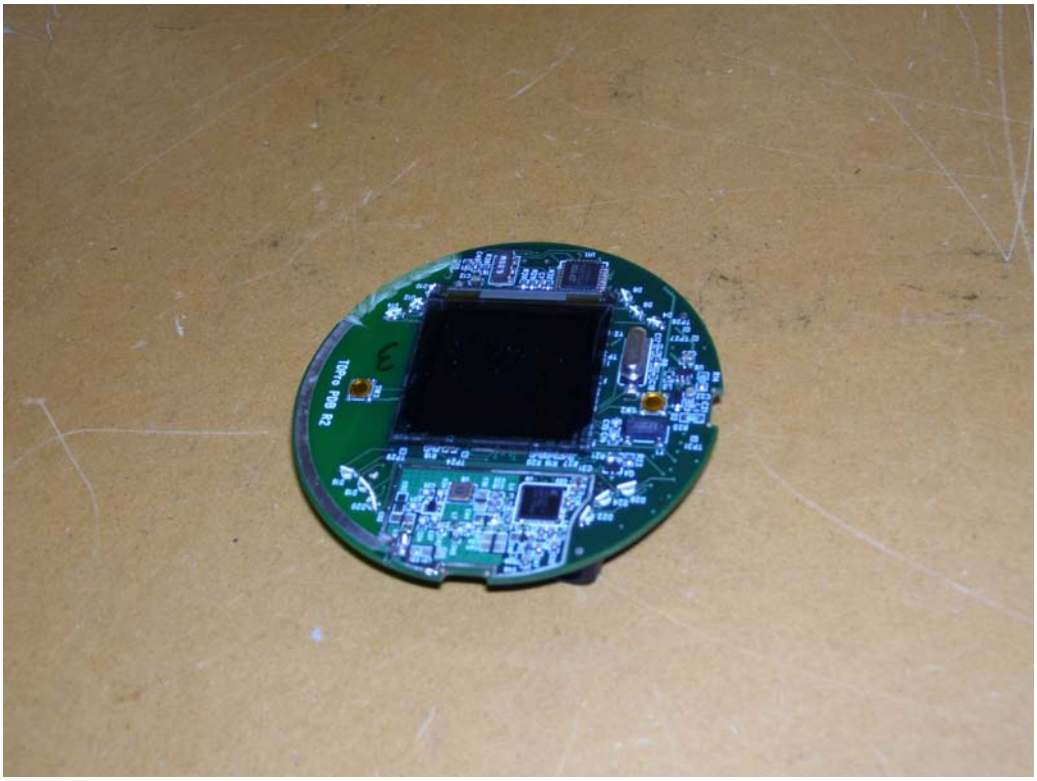


Figure 15 - EUT, Top Side

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: WED-PDB
RF Exposure Statement for WED-PDB:

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 1.9cm (0.748 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 2.4dBi 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 926.27 MHz is found in mW/cm^2 using the equations f/1200. Since the operating frequency for channel 0 produced the lowest limit, that limit will be used in calculation. (902.971/1200 = 0.75mW/cm^2)

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

Where S = 0.762 mW/cm^2 for 914.43 MHz
Where Po = 23.014 mW (Peak RF, 13.62dBm)
Where G = 1.5 (numeric equivalent to 2.4dBi antenna gain with 0.0 dB cable loss)
Where r = Minimum Safe Distance from antenna (cm)

For Po = 23.014mW, r = 1.90cm (0.748 inches)

For a distance [r] of 20cm from this antenna, the field density S = 0.0068 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 0.75 mW/cm^2 for the frequency 915 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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