APPLICANT: YDI WIRELESS

FCC ID: NM5-MR-1

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EMC Equipment List

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3-Meter OATS	TEI	N/A	N/A	Listed 1/13/03	1/13/06
Biconnical Antenna	Eaton	94455-1	1057	CAL 3/18/03	3/18/05
Biconnical Antenna	Eaton	94455-1	1096	CAL 10/1/01	10/1/03
Biconnical Antenna	Electro-Metrics	BIA-25	1171	CAL 4/26/01	4/26/03
Double-Ridged Horn Antenna	Electro-Metrics	RGA-180	2319	CAL 2/17/03	2/17/05
LISN	Electro-Metrics	ANS-25/2	2604	CAL 10/9/01	10/9/03
LISN	Electro-Metrics	EM-7820	2682	CAL 3/12/03	3/12/05
Log-Periodic Antenna	Eaton	96005	1243	CAL 5/8/03	5/8/05
Log-Periodic Antenna	Electro-Metrics	EM-6950	632	CHAR 10/15/01	10/15/03
Log-Periodic Antenna	Electro-Metrics	LPA-25	1122	CAL 10/2/01	10/2/03
Log-Periodic Antenna	Electro-Metrics	LPA-30	409	CAL 3/4/03	3/4/05
Peak Power Meter	HP	8900C	2131A00545	CAL 7/2/03	7/2/05
Power Meter	HP	432A	1141A07655	CAL 4/15/03	4/15/05
Silver Tower Preamplifier	HP	8449B	3008A01075	CHAR 1/28/02	1/28/04
Silver Tower Quasi-Peak Adapter	HP	85650A	3303A01844	CAL 10/14/02	10/14/04
Silver Tower RF Preselector	HP	85685A	2620A00294	CAL 10/14/02	10/14/04
Silver Tower Spectrum Analyzer	HP	8566B Opt 462	3552A22064 3638A08608	CAL 10/14/02	10/14/04
Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CHAR 3/4/01	3/4/03
Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 8/31/01	8/31/03
Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 8/31/01	8/31/03
Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 8/31/01	8/31/03
3/10-Meter OATS	TEI	N/A	N/A	Listed 3/26/01	3/26/04

TEST PROCEDURE

GENERAL: This report shall NOT be reproduced except in full without the written approval of TIMCO ENGINEERING, INC. Shielded interface cables were used in all cases except for cables connecting to the telephone line and the power cords. A test program was run which simulated a normal data transmission on a network.

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STANDARD C63.4-1992 using a 50uH LISN. Both lines were observed with the UUT transmitting. The bandwidth of the spectrum analyzer was 10kHz with an appropriate sweep speed. The ambient temperature of the UUT was 78°F with a humidity of 55%.

BANDWIDTH 6.0 dB: The measurements were made with the spectrum analyzer's resolution bandwidth (RBW)=1.0MHz and the video bandwidth (VBW) =3.0MHz and the span set as shown on plot.

POWER OUTPUT: The RF power output was measured at the antenna feed point using a Agilent 8900C peak power meter.

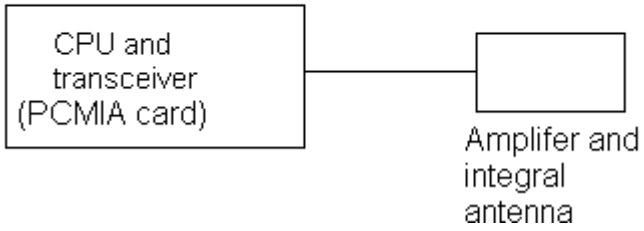
ANTENNA CONDUCTED EMISSIONS: The RBW=100 kHz, VBW=300 kHz and the span set to 20 MHz and the spectrum was scanned from 30 MHz to the 10th Harmonic of the fundamental.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-1992 using an Agilent spectrum analyzer with a pre-selector. The bandwidth (RBW) of the spectrum analyzer was 100 kHz up to 1 GHz and 1 MHz above 1GHz with an appropriate sweep speed. The VBW above 1 GHz was = 3 MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The ambient temperature of the UUT was 85°F with a humidity of 57%.

PRODUCT DESCRIPTION:

The NM5 -MR-1 is a direct sequence spread spectrum radio that operates in the 2400 to 2483.5 MHz band.

EUT



APPLICANT: YDI WIRELESS

FCC ID: NM5-MR-1

NAME OF TEST: POWER LINE CONDUCTED INTERFERENCE

RULES PART NO.: 15.107(a)

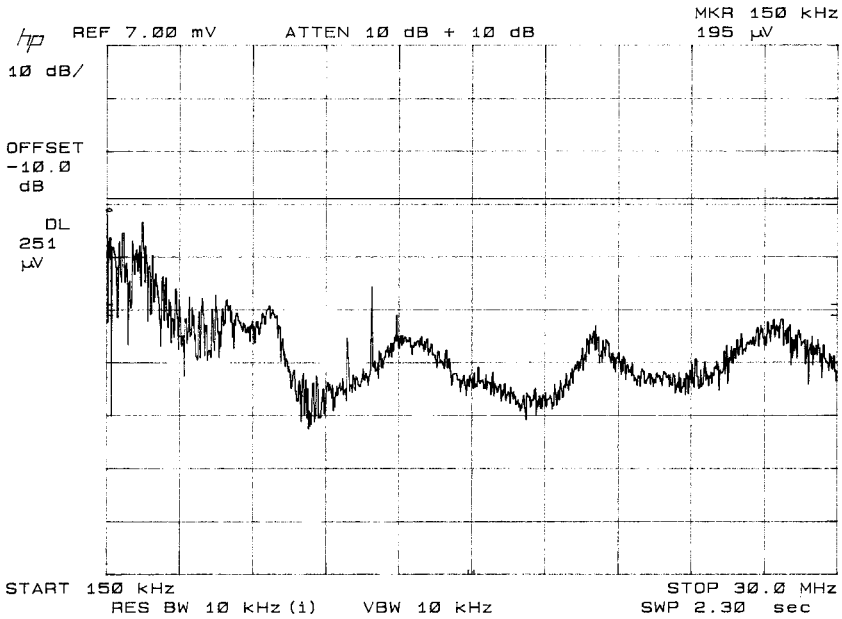
REQUIREMENTS:

	QUASI-PEAK	**AVERAGE**
.15 – 0.5 MHz	66-56 dBuV	56-46 dBuV
0.5 – 5.0	56	46
5.0 – 30.	60	50

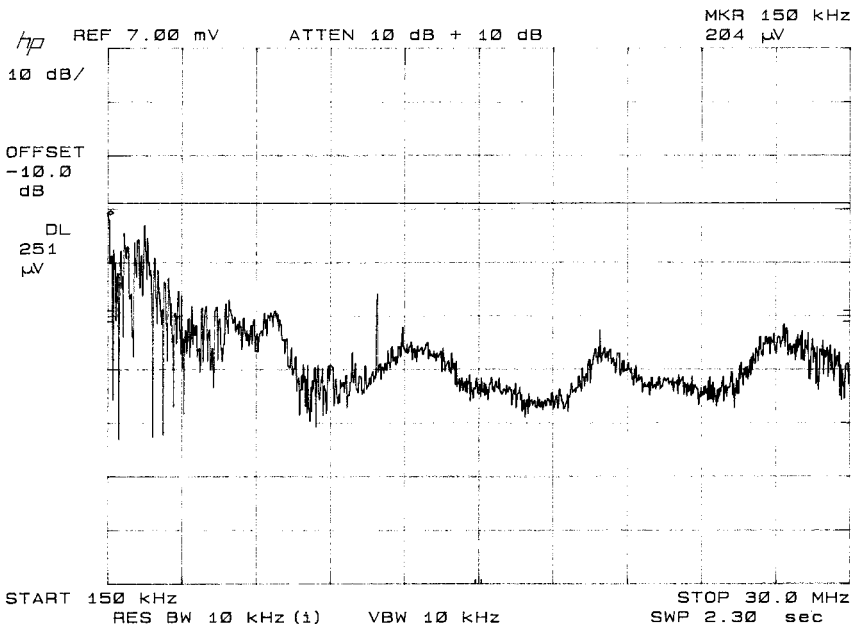
TEST PROCEDURE: ANSI STANDARD C63.4-1992. The spectrum was scanned from 0.15 to 30 MHz.

TEST DATA:

POWER LINE CONDUCTED PLOT
LINE 1



POWER LINE CONDUCTED PLOT
LINE 2



TEST RESULTS: Both lines were observed. The measurements indicate that the unit DOES appear to meet the FCC requirements for this class of equipment.

APPLICANT: YDI WIRELESS

FCC ID: NM5-MR-1

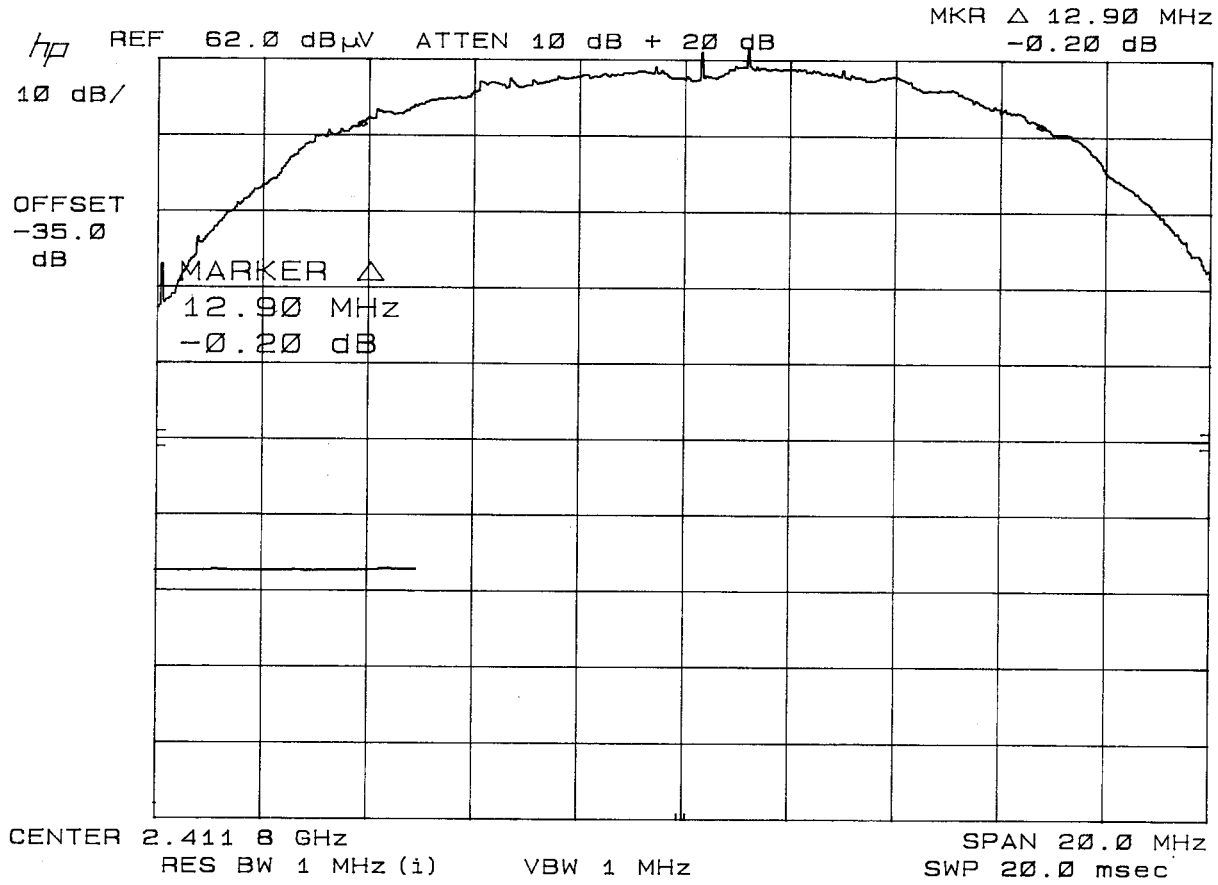
NAME OF TEST: 6.0dB BANDWIDTH

RULES PART NO.: 15.247(a)(2)

REQUIREMENTS: The 6.0 dB bandwidth must be greater than 500 kHz.

MEASUREMENT: The 6.0 dB bandwidth measured @ 2433.00MHz was 12.90 MHz.

6 dB BANDWIDTH PLOT

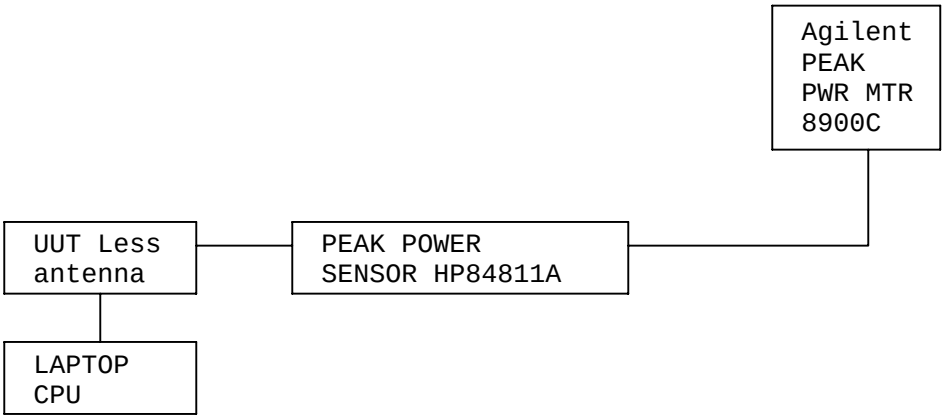


NAME OF TEST: RF POWER OUTPUT

RULES PART NO.: 15.247(b) 1.0 Watt or +30 dBm

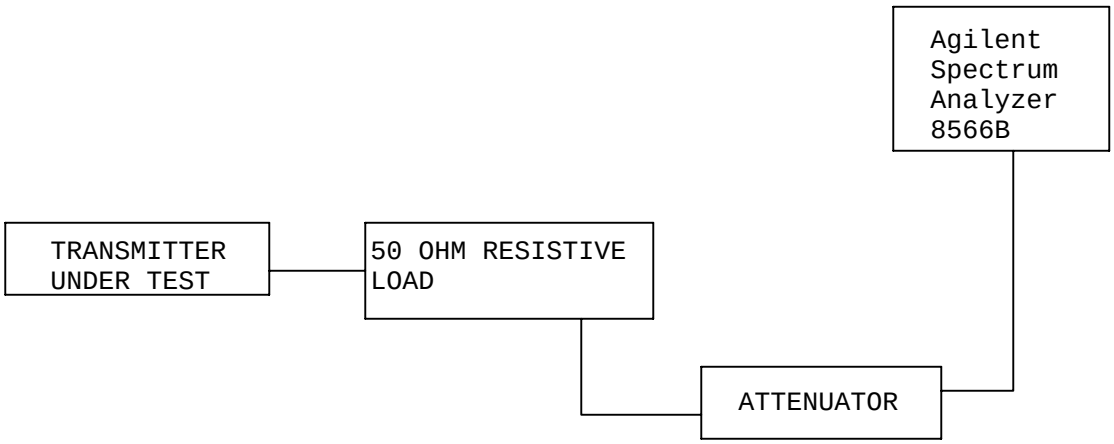
MEASUREMENT: 158.0 mWatts or 22.0 dBm @ 2433.0MHz

15.247(c) Method of Measuring RF Power output: The Peak power Sensor was connected in place of the antenna.



Note: 3 places in the band were measured and the worst case presented above.

15.247(c) Method of Measuring RF Conducted Spurious Emissions



NAME OF TEST: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

REQUIREMENTS: Emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

EMISSION FREQUENCY ___MHz___	dB BELOW CARRIER _____
2453	0
4864	-58.5
7316	-68.5
9744	-73.5
12157	-68.5

NOTE: The spectrum was scanned to the 10^{th} harmonic.
Three channels in the band were checked and the worst case presented above.

15.247(c), 15.205 &15.209(b) Field_strength_of_spurious_emissions:

REQUIREMENTS:

FIELD STRENGTH	FIELD STRENGTH	S15.209
of Fundamental:	of Harmonics	30 - 88 MHz 40 dBuV/m @3M
902-928MHz		88 -216 MHz 43.5
2.4-2.4835GHz		216 -960 MHz 46
127.38dBuV/m @3m	54 dBuV/m @3m	ABOVE 960 MHz 54dBuV/m

EMISSIONS RADIATED OUTSIDE OF THE SPECIFIED FREQUENCY BANDS, EXCEPT FOR HARMONICS, SHALL BE ATTENUATED BY AT LEAST 50 dB BELOW THE LEVEL OF THE FUNDAMENTAL OR TO THE GENERAL RADIATED EMISSION LIMITS IN 15.209, WHICHEVER IS THE LESSER ATTENUATION.

REQUIREMENTS: Emissions that fall in the restricted bands (15.205) must be less than 54dBuV/m otherwise the spurious and harmonics must be attenuated by at least 20dB.

TEST DATA:
All data taken with Peak Detector.

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	ANT. POLARITY	Coax Loss dB	Correction Factor dB	Field Strength dBuV/m	Margin dB
2,410.0	2,109.00	12.0	V	3.09	28.77	43.86	
2,410.0	2,109.00	18.1	H	3.09	28.77	49.96	
2,410.0	2,312.00	11.0	H	3.25	29.10	43.35	
2,410.0	2,389.80	26.0	H	3.31	29.22	58.53	
2,410.0	2,410.00	72.5	H	3.33	29.26	105.09	
2,410.0	2,410.00	74.5	V	3.33	29.26	107.09	
2,410.0	2,712.00	13.0	H	3.57	29.87	46.44	
2,410.0	2,806.00	9.8	V	3.64	30.07	43.51	
2,410.0	2,806.00	11.5	H	3.64	30.07	45.21	
2,410.0	4,824.00	10.8	H	5.95	34.14	50.89	
2,410.0	4,824.00	16.2	V	5.95	34.14	56.29	
2,432.0	2,130.00	17.4	H	3.10	28.81	49.31	
2,432.0	2,432.00	69.7	V	3.35	29.29	102.34	
2,432.0	2,432.00	74.1	H	3.35	29.29	106.74	
2,432.0	2,782.00	10.6	V	3.63	30.02	44.25	
2,432.0	4,864.00	13.6	H	6.01	34.26	53.87	
2,432.0	4,864.00	14.3	V	6.01	34.26	54.57	
2,463.0	2,163.00	16.8	H	3.13	28.86	48.79	
2,463.0	2,463.00	68.9	V	3.37	29.34	101.61	
2,463.0	2,463.00	74.7	H	3.37	29.34	107.41	
2,463.0	2,483.50	18.3	H	3.39	29.37	51.06	
2,463.0	4,864.00	13.1	H	6.15	34.58	53.83	
2,463.0	4,864.00	13.2	V	6.15	34.58	53.93	

Note: Spurious and harmonics were measured to the 10^{th} harmonic.

METHOD OF MEASUREMENT: The procedure used was ANSI STANDARD C63.4-1992 & the FCC/OET Guidance on Measurements for Direct Sequence Spread Spectrum Systems – Public Notice 54797 Dated July 12, 1995. Measurements were made at the open field test site of TIMCO ENGINEERING INC. located at 849 N.W. State Road 45, Newberry, FL 32669.

15.247(c), 15.205 &15.209(b) Field_strength_of_spurious_emissions:

REQUIREMENTS:

FIELD STRENGTH	FIELD STRENGTH	S15.209
of Fundamental:	of Harmonics	30 - 88 MHz 40 dBuV/m @3M
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2.4-2.4835GHz		216 -960 MHz 46
127.38dBuV/m @3m	54 dBuV/m @3m	ABOVE 960 MHz 54dBuV/m

EMISSIONS RADIATED OUTSIDE OF THE SPECIFIED FREQUENCY BANDS, EXCEPT FOR HARMONICS, SHALL BE ATTENUATED BY AT LEAST 50 dB BELOW THE LEVEL OF THE FUNDAMENTAL OR TO THE GENERAL RADIATED EMISSION LIMITS IN 15.209, WHICHEVER IS THE LESSER ATTENUATION.

REQUIREMENTS: Emissions that fall in the restricted bands (15.205) must be less than 54dBuV/m otherwise the spurious and harmonics must be attenuated by at least 20dB.

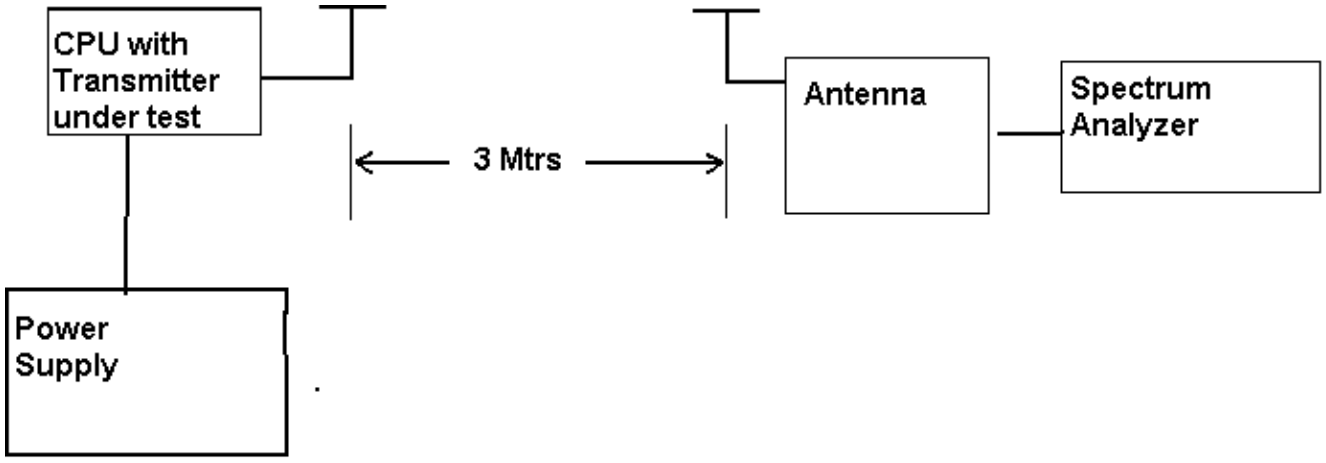
TEST DATA:
All data taken with AVERAGE Detector.

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	ANT. POLARITY	Coax Loss dB	Correction Factor dB	Field Strength dBuV/m	Margin dB
2,410.0	2,109.00	2.0	V	3.09	28.77	33.86	
2,410.0	2,109.00	7.6	H	3.09	28.77	39.46	
2,410.0	2,312.00	0.6	H	3.25	29.10	32.95	
2,410.0	2,389.80	-1.50	H	3.31	29.22	24.41	
2,410.0	2,712.00	2.8	H	3.57	29.87	36.24	
2,410.0	2,806.00	-1.0	V	3.64	30.07	32.71	
2,410.0	2,806.00	4.5	H	3.64	30.07	38.21	
2,410.0	4,824.00	10.8	H	5.95	34.14	50.89	
2,410.0	4,824.00	4.6	V	5.95	34.14	44.69	
2,432.0	2,130.00	9.6	H	3.10	28.81	41.51	
2,432.0	2,782.00	-3.6	V	3.63	30.02	30.05	
2,432.0	4,864.00	4.8	H	6.01	34.26	45.07	
2,432.0	4,864.00	6.9	V	6.01	34.26	47.17	
2,463.0	2,163.00	7.5	H	3.13	28.86	39.49	
2,463.0	2,483.50	-0.65	H	3.39	29.37	32.11	
2,463.0	4,924.00	3.4	H	6.01	34.26	44.13	
2,463.0	4,924.00	5.5	V	6.01	34.26	43.23	

Note: Spurious and harmonics were measured to the 10^{th} harmonic.

METHOD OF MEASUREMENT: The procedure used was ANSI STANDARD C63.4-1992 & the FCC/OET Guidance on Measurements for Direct Sequence Spread Spectrum Systems – Public Notice 54797 Dated July 12, 1995. Measurements were made at the open field test site of TIMCO ENGINEERING INC. located at 849 N.W. State Road 45, Newberry, FL 32669.

Method of Measuring Radiated Spurious Emissions



Equipment placed 80cm above ground on a rotatable platform.

APPLICANT: YDI WIRELESS

FCC ID: NM5-MR-1

NAME OF TEST: RADIATED SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND

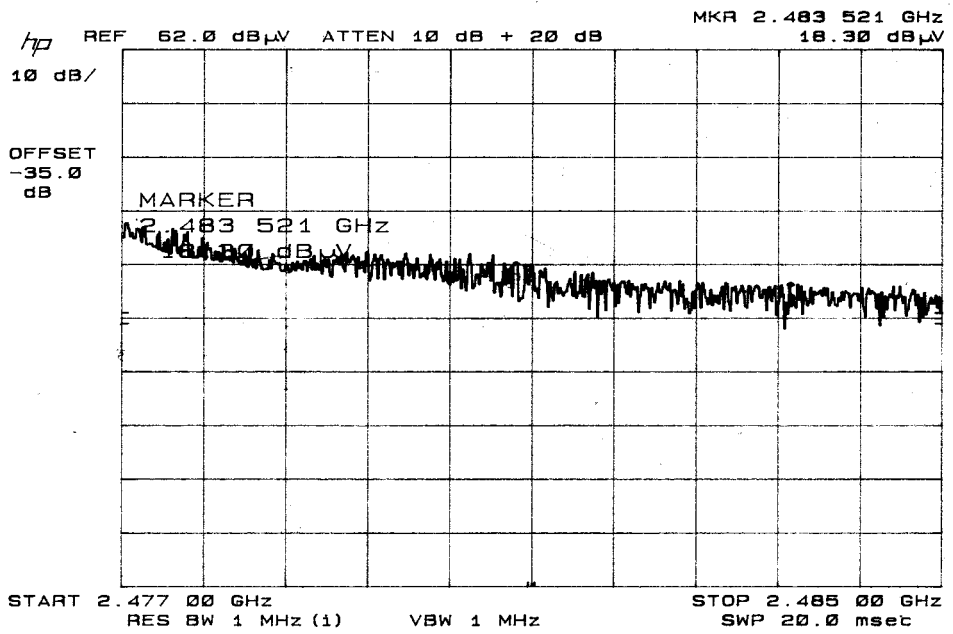
REQUIREMENTS: Emissions that fall in the restricted bands (15.205). These emissions must be less than or equal to 500 uV/m (54 dBuV/m).

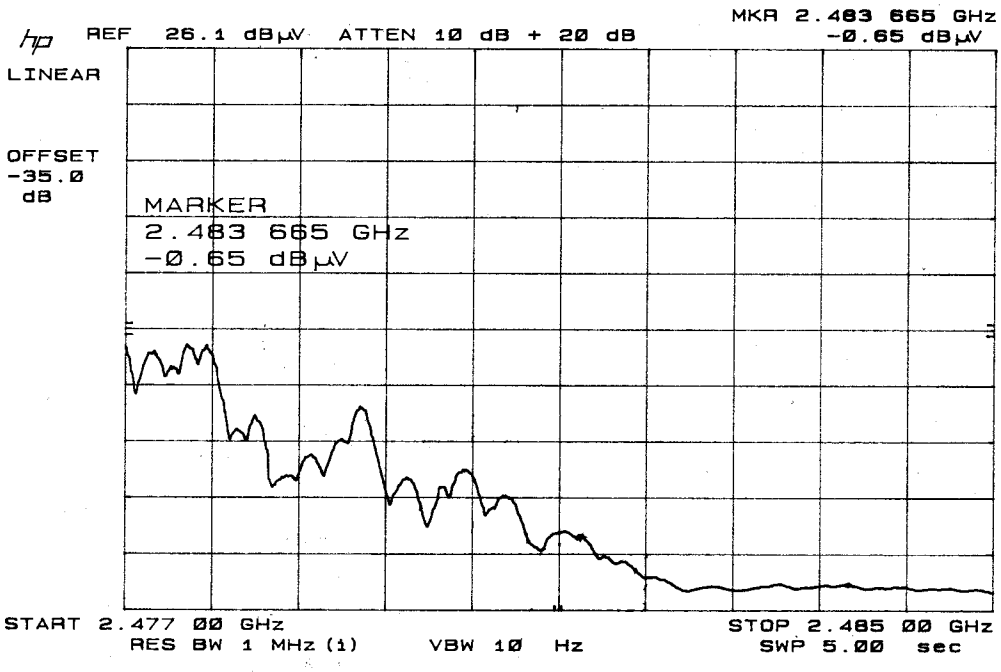
TEST PROCEDURE: An in band field strength measurement of the fundamental Emission using the RBW and detector function required by C63.4-2000 and FCC Rules. The procedure was repeated with an average detector and a plot made. The calculated field strength in the adjacent restricted band is presented below.

upper edge 2483.5 MHz

Peak	Average
18.3 dBuV	-0.65 dBuV From plots
3.39 dB Coax loss	3.39 dB Coax loss
29.37 dB ACF	29.37 dB ACF
51.06 dBuV/m	32.11 dBuV/m

Upper Band Edge





APPLICANT: YDI WIRELESS

FCC ID: NM5-MR-1

NAME OF TEST: RADIATED SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND

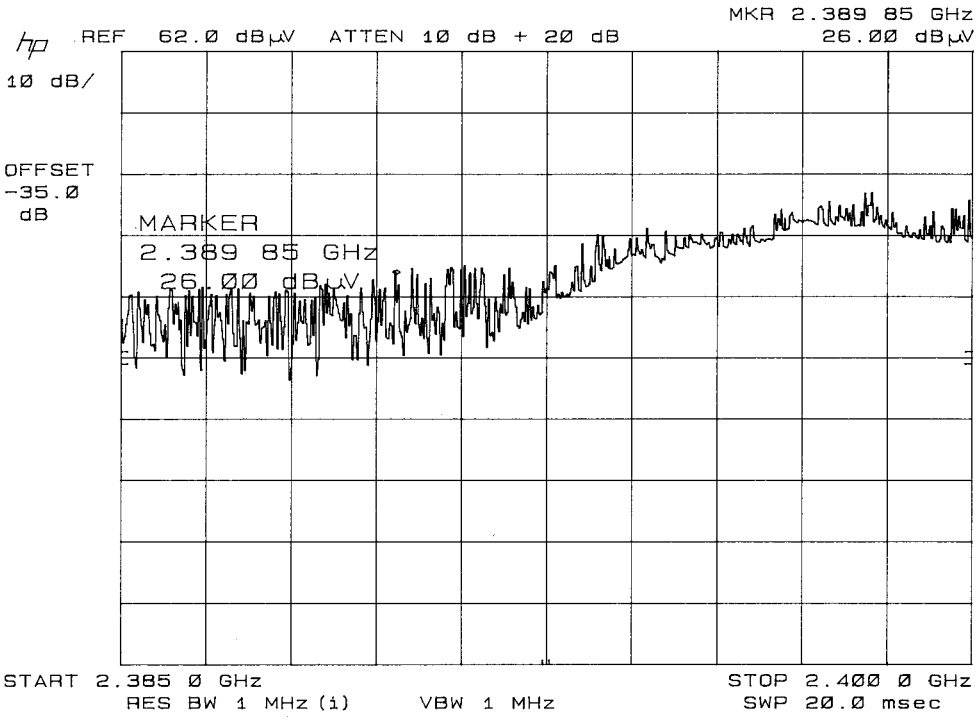
REQUIREMENTS: Emissions that fall in the restricted bands (15.205). These emissions must be less than or equal to 500 uV/m (54 dBuV/m).

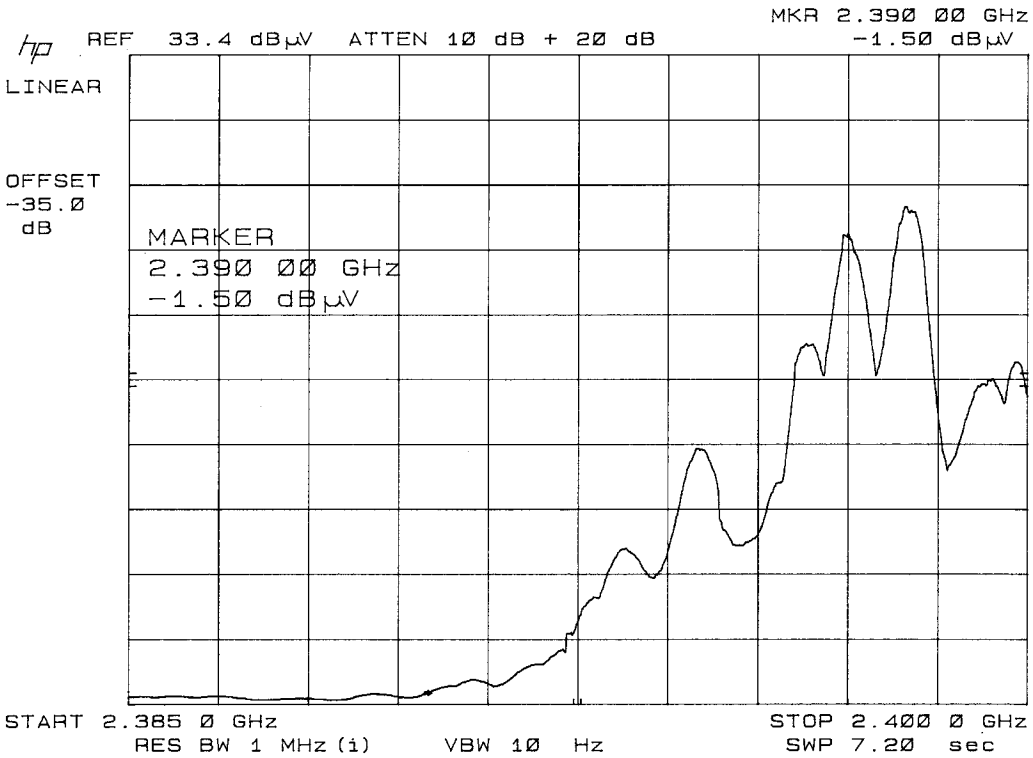
TEST PROCEDURE: An in band field strength measurement of the fundamental Emission using the RBW and detector function required by C63.4-2000 and FCC Rules. The procedure was repeated with an average detector and a plot made. The calculated field strength in the adjacent restricted band is presented below.

lower edge 2390 MHz

Peak	Average
26.00 dBuV from plot	-1.50 dBuV from plot
3.31 dB Coax loss	3.31 dB Coax loss
29.22 dB ACF	29.22 dB ACF
58.53 dBuV/m	31.03 dBuV/m

Lower Band Edge





APPLICANT: YDI WIRELESS

FCC ID: NM5-MR-1

NAME OF TEST: POWER SPECTRAL DENSITY

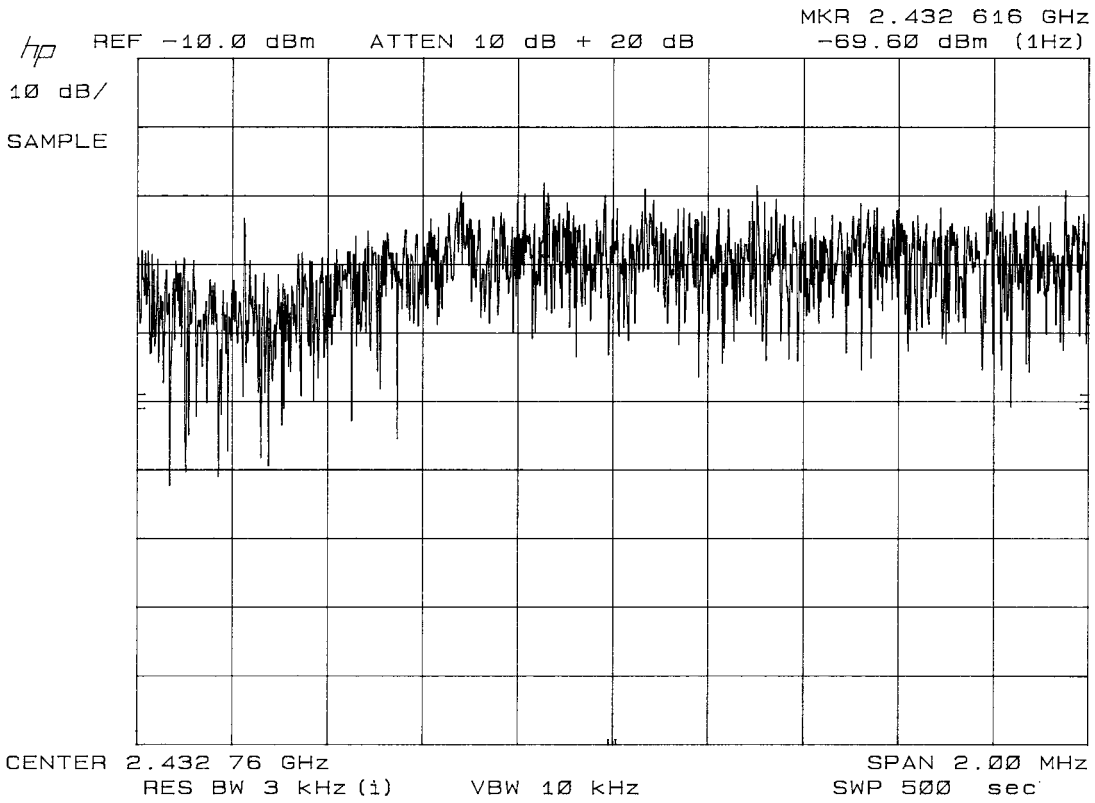
RULES PART NO.: 15.247(d)

REQUIREMENTS: The peak level measured must be no greater than +8.0 dBm.

DATA: THE PLOT IS SHOWN IN EXHIBITS #8.

The level at 2432.94 MHz was –-69.60 dBm.

-69.60 dBm	
+20 dB	Attn.
+35 dB	Correction Factor
+55 dB	
-14.6 dBm	



Note: Power Spectral Density was measured in 3 places and the worst case presented above.

MPE Calculation

Where the:
Power is 22 dBm or 158 mW.
The antenna is a dipole
S=1 represented as 1500/1500=1 (for frequencies above 1500 MHz
The transmitter on time is 100% represented as 100% duty factor and 30 minutes in 30 minutes.

$W := 0.158$ power in Watts $D := 1$ Duty Factor in decimal % (1=100%)

$E := 30.0$ exposure time in minutes $U := 30$ (use 6 for controlled and 30 for uncontrolled)

$$Wexp := W \cdot D \cdot \left(\frac{E}{U} \right) \qquad PC := \frac{E}{U}$$

$PC = 1$ percent on time

$Wexp = 0.158$ Watts

$Po := 158$ mWatts $dBd := 1$ antenna gain $f := 1500$ Frequency in MHz

$G := dBd + 2.15$ gain in dBi

$Gn := 10^{\frac{G}{10}}$ gain numeric $S := \frac{f}{1500}$ controlled exposure

300 for controlled

1500 for uncontrolled

$Gn = 2.065$ $S = 1$

$$R := \sqrt{\frac{(Po \cdot Gn)}{(4 \cdot \pi \cdot S)}} \qquad Rinches := \frac{R}{2.54}$$

$R = 5.096$ distance in centimeters required for compliance

$Rinches = 2.006$

Summery: Distance required for compliances 2 inches or 5 cm.