



849 NW State Road 45
Newberry, FL 32669 USA
Ph: 888.472.2424 or 352.472.5500
Fax: 352.472.2030
Email: info@timcoengr.com
Website: www.timcoengr.com

FCC PART 15.247 AND IC RSS-210 TEST REPORT

DIGITAL SPREAD SPECTRUM

Applicant	SABINE, INC.
Address	13301 US HIGHWAY 441
	ALACHUA FL 32615 USA
FCC ID	RBODS80T
IC	8240A-DS80T
Model Number	DS80T
Product Description	WIRELESS MICROPHONE TRANSMITTER
Date Sample Received	06/04/2013
Date Tested	06/05/2013
Tested By	John A. Day
Approved By	Mario R. de Aranzeta
Report Number	2464YUT12TestReport.doc
Test Results	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL

**THE ATTACHED REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL
WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.**



Testing Certificate # 0955-01

TABLE OF CONTENT

GENERAL REMARKS.....	3
GENERAL INFORMATION.....	4
EMC EQUIPMENT LIST	5
TEST PROCEDURES	6
RADIATION INTERFERENCE	7
POWER LINE CONDUCTED INTERFERENCE.....	10
OCCUPIED BANDWIDTH.....	11
POWER OUTPUT	13
SPURIOUS EMISSIONS AT ANTENNA TERMINALS.....	14
POWER SPECTRAL DENSITY.....	17

APPLICANT: SABINE, INC.

FCC ID: RBODS80T

IC: 8240A-DS80T

REPORT: V:\S\SABINE_RBO\2464YUT12\Extra2464YUT12\2464YUT12TestReport.docx

Page 2 of 17

Mdea 3.14.2008

GENERAL REMARKS

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

The test results relate only to the items tested.

Summary

The device under test does:

- ☒ fulfill the general approval requirements as identified in this test report
☐ not fulfill the general approval requirements as identified in this test report

Attestations

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025: 2005 requirements.



Testing Certificate # 0955-01

I attest that the necessary measurements were made, under my supervision, at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, FL 32669



Authorized Signatory Name:

John A. Day
Engineering Project Manager

Date: June 11, 2013

APPLICANT: SABINE, INC.

FCC ID: RBODS80T

IC: 8240A-DS80T

REPORT: V:\S\SABINE_RBO\2464YUT12\Extra2464YUT12\2464YUT12TestReport.docx

GENERAL INFORMATION

DUT Specification

Applicable Standard	Part 15.247		
DUT Description	WIRELESS MICROPHONE TRANSMITTER		
FCC ID	RBODS80T		
IC	8240T-DS80T		
Operating Frequency	TX: 902.8125 to 927.1875 MHz		
Number of channels	16		
DUT Power Source	<input type="checkbox"/> 110-120Vac/50- 60Hz <input type="checkbox"/> DC Power <input checked="" type="checkbox"/> Battery Operated Exclusively		
Test Item	<input type="checkbox"/> Prototype	<input checked="" type="checkbox"/> Pre-Production	<input type="checkbox"/> Production
Type of Equipment	<input type="checkbox"/> Fixed	<input type="checkbox"/> Mobile	<input checked="" type="checkbox"/> Portable
Antenna Connector	none		
Antenna	Detachable monopole		
Test Facility	Timco Engineering Inc. located at 849 NW State Road 45 Newberry, FL 32669 USA.		
Test Conditions	Temperature: 26°C Relative humidity: 50%		
Test Exercise	The DUT was placed in continuous transmit mode of operation.		

Test Supporting Equipment

Supporting Device	Manufacturer	Model / FCC ID	Serial Number
N/A			

APPLICANT: SABINE, INC.

FCC ID: RBODS80T

IC: 8240A-DS80T

REPORT: V:\S\SABINE_RBO\2464YUT12\Extra2464YUT12\2464YUT12TestReport.docx

EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	Listed 12/31/11	12/31/13
AC Voltmeter	HP	400FL	2213A14499	CAL 6/12/11	6/12/13
Antenna: Active Loop	ETS-Lindgren	6502	00062529	CAL 9/23/10	9/23/13
Frequency Counter	HP	5385A	2730A03025	CAL 8/17/11	8/17/13
Hygro-Thermometer	Extech	445703	0602	CAL 6/15/11	6/15/13
Modulation Analyzer	HP	8901A	3435A06868	CAL 7/18/11	7/18/13
Digital Multimeter	Fluke	FLUKE-77	35053830	CAL 9/9/11	9/9/13
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CAL 10/28/11	10/28/13
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 10/28/11	10/28/13
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 10/28/11	10/28/13
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 10/28/11	10/28/13
Temperature Chamber	Tenney Engineering	TTRC	11717-7	CHAR 7/03/12	7/03/14
Antenna	ETS	3117	41534	10/5/12	10/5/14
Antenna	Electro metrics	LPA-25	1122	5/09/2013	5/09/2015
Antenna	Electro metrics	BIA-25	1171	6/13/12	6/13/14

APPLICANT: SABINE, INC.

FCC ID: RBODS80T

IC: 8240A-DS80T

REPORT: V:\S\SABINE_RBO\2464YUT12\Extra2464YUT12\2464YUT12TestReport.docx

TEST PROCEDURES

Radiation Interference: ANSI C63.4-2003 using a spectrum analyzer, a preselector, a quasi-peak adapter, and an appropriate antenna. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100 kHz with an appropriate sweep speed and the video bandwidth was 300 kHz up to 1 GHz and 1 MHz with a video BW of 3 MHz above 1 GHz. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported. The spectrum was searched to at least the tenth (10) harmonic of the fundamental.

Formula Of Conversion Factors: The field strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBμV) to the antenna correction factor supplied by the antenna manufacturer plus the coax loss. The antenna correction factors are stated in terms of dB. The gain of the preselector was accounted for in the spectrum analyzer meter reading.

Example:

Freq (MHz)	Meter Reading	+ ACF	+ CL = FS
33	20 dBμV	+ 10.36 dB	+ 0.5 = 30.86 dBμV/m @ 3m

Power Line Conducted Interference: The procedure used was ANSI C63.4-2003 using a 50uH LISN. Both lines were observed. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed. The spectrum was scanned from 0.15 to 30 MHz.

Occupied Bandwidth: A small sample of the transmitter output was fed into the spectrum analyzer and the attached plot was printed. The vertical scale is set to -10 dBm per division.

Bandwidth 6.0dB: The measurements were made with the spectrum analyzer's resolution bandwidth (RBW)=1 MHz and the video bandwidth (VBW) =3 MHz and the span set as shown on plot.

Power Output: The RF power output was measured at the antenna feed point using a peak power meter.

Antenna Conducted Emissions: The RBW=100 kHz, VBW=300 kHz and the span set to 10 MHz and the spectrum was scanned from 30 MHz to the 10th Harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = 3 MHz and the span to 50 MHz.

ANSI C63.4-2003 10.1 Measurement Procedures: The DUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The DUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes. Emissions attenuated more than 20 dB below the permissible value are not reported.

APPLICANT: SABINE, INC.

FCC ID: RBODS80T

IC: 8240A-DS80T

REPORT: V:\S\SABINE_RBO\2464YUT12\Extra2464YUT12\2464YUT12TestReport.docx

Page 6 of 17

Mdea 3.14.2008

RADIATION INTERFERENCE

Rules Part No.: 15.247, 15.209, RSS-210

Requirements:

Frequency	Limits
Part 15.209, RSS-210	
9 to 490 kHz	2400/F (kHz) $\mu\text{V/m}$ @ 300 meters
490 to 1705 kHz	24000/F (kHz) $\mu\text{V/m}$ @ 30 meters
1705 kHz to 30 MHz	29.54 dB $\mu\text{V/m}$ @ 30 meters
30 – 88	40.0 dB $\mu\text{V/m}$ @ 3 meters
80 – 216	43.5 dB $\mu\text{V/m}$ @ 3 meters
216 – 960	46.0 dB $\mu\text{V/m}$ @ 3 meters
Above 960	54.0 dB $\mu\text{V/m}$ @ 3 meters
Part 15.247, RSS-210	
Fundamental 902 – 928 MHz	127.37 dB $\mu\text{V/m}$ @ 3 meters
Fundamental 2.4 – 2.4835 MHz	127.37 dB $\mu\text{V/m}$ @ 3 meters
Harmonics	54.0 dB $\mu\text{V/m}$ @ 3 meters

Any emissions that fall in the restricted bands (15.205) must be less than or equal to 54 dB $\mu\text{V/m}$. Spurious emissions not in a restricted band must be 20 dBc. Emissions were measured from the lowest frequency generated or 9 kHz to the 10th harmonic.

Test Data: All values are peak unless noted.
Items mark with an * designate a frequency in a restricted band.

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity	Coax Loss dB	Correction Factor dB/m	Field Strength dBuV/m	Margin dB
902.8	902.80	71.8	H	1.95	23.80	97.55	29.82
902.8	902.80	81.1	V	1.95	23.80	106.85	20.52
902.8	1,805.60	12.7	V	2.74	30.47	45.91	40.94
902.8	1,805.60	14.1	H	2.74	30.47	47.31	39.54
902.8	2,708.40 *	14.2	H	3.40	32.77	50.37	3.63
902.8	2,708.40 *	14.1	V	3.40	32.77	50.27	3.73 av
902.8	3,611.20 *	10.3	V	4.15	33.21	47.66	6.34
902.8	3,611.20 *	11.6	H	4.15	33.21	48.96	5.04
902.8	4,514.00 *	11.0	H	4.76	34.21	49.97	4.03
902.8	4,514.00 *	14.2	V	4.76	34.21	53.17	0.83
902.8	5,416.80 *	6.9	H	5.13	34.75	46.78	7.22
902.8	5,416.80 *	11.6	V	5.13	34.75	51.48	2.52
902.8	6,319.60	9.1	H	5.40	35.79	50.29	36.56
902.8	6,319.60	10.4	V	5.40	35.79	51.59	35.26

APPLICANT: SABINE, INC.

FCC ID: RBODS80T

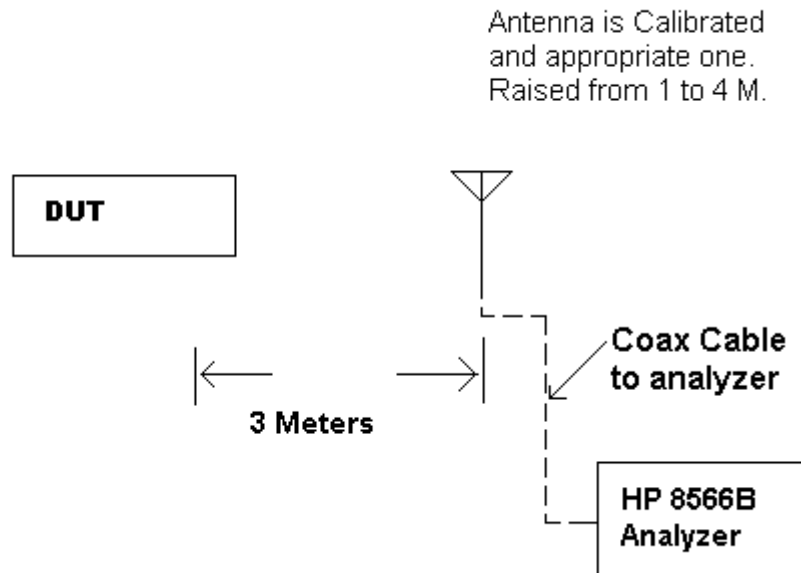
IC: 8240A-DS80T

REPORT: V:\S\SABINE_RBO\2464YUT12\Extra2464YUT12\2464YUT12TestReport.docx

Tuned Frequency MHz	Emission Frequency MHz	Meter Reading dBuV	Ant. Polarity	Coax Loss dB	Correction Factor dB/m	Field Strength dBuV/m	Margin dB
914.2	914.20	70.1	H	1.97	23.80	95.87	31.50
914.2	914.20	80.7	V	1.97	23.80	106.47	20.90
914.2	1,828.40	10.9	V	2.76	30.60	44.26	9.74
914.2	1,828.40	13.1	H	2.76	30.60	46.46	7.54
914.2	2,742.60 *	16.7	H	3.42	32.79	52.91	1.09
914.2	2,742.60 *	15.4	V	3.42	32.79	51.61	2.39av
914.2	3,656.80 *	11.3	V	4.19	33.26	48.75	5.25
914.2	3,656.80 *	11.6	H	4.19	33.26	49.05	4.95
914.2	4,571.00 *	11.3	H	4.79	34.24	50.33	3.67
914.2	4,571.00 *	13.0	V	4.79	34.24	52.03	1.97
914.2	5,485.20	8.3	H	5.15	34.79	48.24	38.23
914.2	5,485.20	9.5	V	5.15	34.79	49.44	37.03
914.2	6,399.40	9.7	H	5.42	35.84	50.96	3.04
914.2	6,399.40	10.5	V	5.42	35.84	51.76	2.24
927.2	927.20	67.4	H	1.99	23.94	93.33	34.04
927.2	927.20	76.8	V	1.99	23.94	102.73	24.64
927.2	1,854.40	9.1	V	2.78	30.76	42.64	11.36
927.2	1,854.40	12.6	H	2.78	30.76	46.14	7.86
927.2	2,781.60 *	16.3	H	3.45	32.83	52.58	1.42
927.2	2,781.60 *	14.8	V	3.45	32.83	51.08	2.92 av
927.2	3,708.80 *	11.5	H	4.24	33.31	49.05	33.68
927.2	3,708.80 *	13.1	V	4.24	33.31	50.65	32.08
927.2	4,636.00 *	11.3	H	4.82	34.28	50.40	3.60
927.2	4,636.00 *	14.1	V	4.82	34.28	53.20	0.80
927.2	5,563.20	8.9	H	5.17	34.90	48.97	33.76
927.2	5,563.20	11.3	V	5.17	34.90	51.37	31.36
927.2	6,490.40	7.9	H	5.45	35.89	49.24	4.76
927.2	6,490.40	9.9	V	5.45	35.89	51.24	2.76

QP - Quasi-Peak
AV is average

Method of Measuring Radiated Spurious Emissions



METHOD OF MEASUREMENT: The procedure used was ANSI standard C63.4-2003 & the FCC/OET Guidance on Measurements for Spread Spectrum Systems – KDB 558074 D01

APPLICANT: SABINE, INC.

FCC ID: RBODS80T

IC: 8240A-DS80T

REPORT: V:\S\SABINE_RBO\2464YUT12\Extra2464YUT12\2464YUT12TestReport.docx

Page 9 of 17

Mdea 3.14.2008

POWER LINE CONDUCTED INTERFERENCE

Rules Part No.: Part 15.207, RSS-210, RSS-GEN

Requirements:

Frequency (MHz)	Quasi Peak Limits (dB μ V)	Average Limits (dB μ V)
0.15 – 0.5	66 – 56 *	56 – 46 *
0.5 – 5.0	56	46
5.0 – 30	60	50
* Decrease with logarithm of frequency		

Test Data: The following plots represent the emissions read for power line conducted. Both lines were observed.

NOTE DUT BATTERY OPERATED ONLY

APPLICANT: SABINE, INC.

FCC ID: RBODS80T

IC: 8240A-DS80T

REPORT: V:\S\SABINE_RBO\2464YUT12\Extra2464YUT12\2464YUT12TestReport.docx

OCCUPIED BANDWIDTH

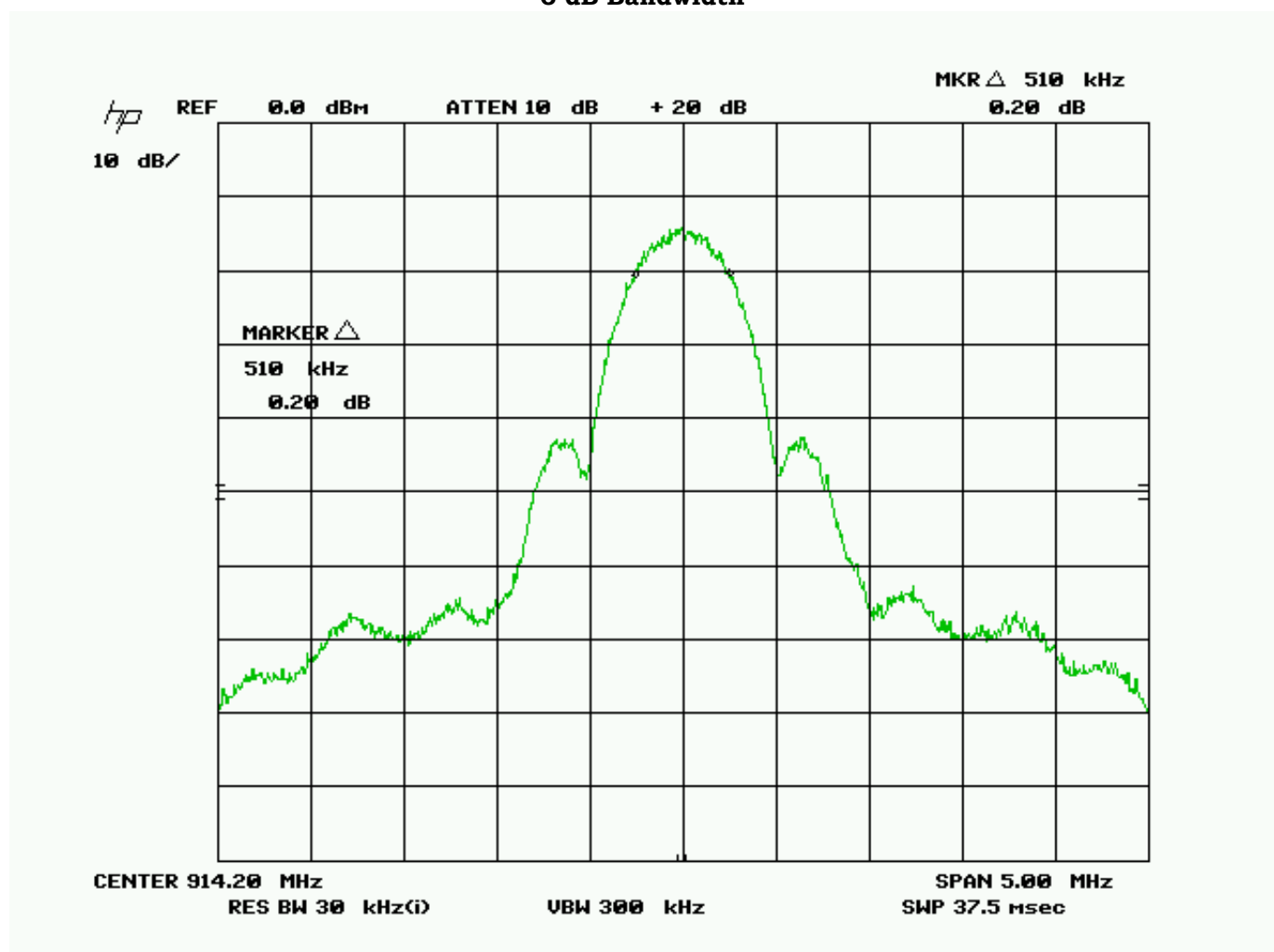
Rules Part No.: 15.247(a)(2), RSS-210, RSS-GEN

Requirements: The 6 dB bandwidth must be greater than 500 kHz.

Test Data:

Three places in the band were measured and the worst case reported.

6 dB Bandwidth



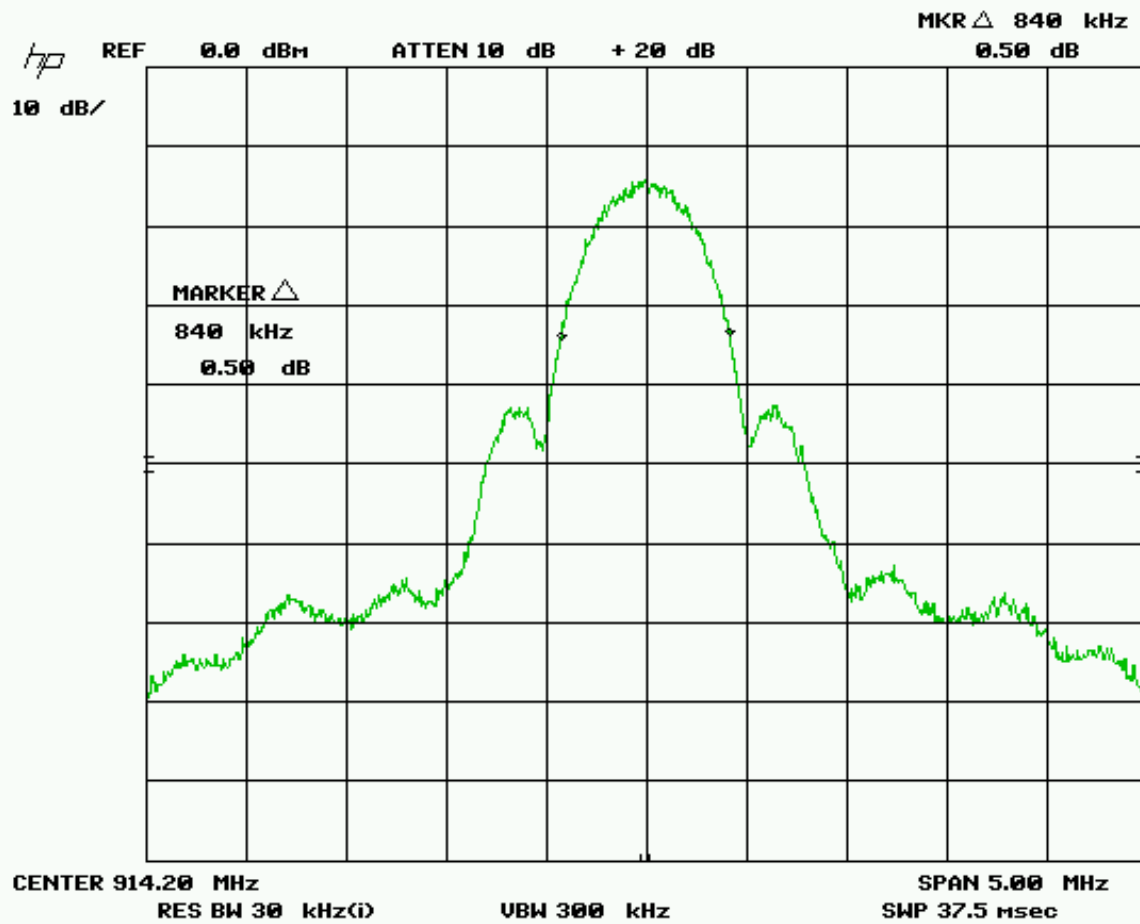
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FCC ID: RBODS80T

IC: 8240A-DS80T

REPORT: V:\S\SABINE_RBO\2464YUT12\Extra2464YUT12\2464YUT12TestReport.docx

20 dB Bandwidth



APPLICANT: SABINE, INC.

FCC ID: RBODS80T

IC: 8240A-DS80T

REPORT: V:\S\SABINE_RBO\2464YUT12\Extra2464YUT12\2464YUT12TestReport.docx

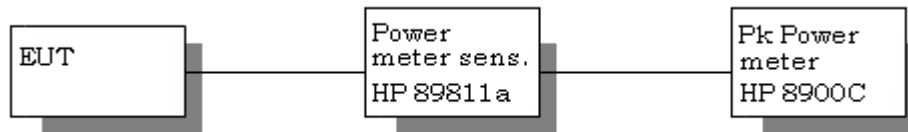
Page 12 of 17

Mdea 3.14.2008

POWER OUTPUT

Rules Part #: 15.247(b), RSS-210, RSS-GEN - 1 Watt conducted, 4W ERP

TEST SET UP:



Test Results:

Frequency MHz	Po Watts
902.80	0.010
914.20	0.0095
927.20	0.0075

APPLICANT: SABINE, INC.

FCC ID: RBODS80T

IC: 8240A-DS80T

REPORT: V:\S\SABINE_RBO\2464YUT12\Extra2464YUT12\2464YUT12TestReport.docx

Page 13 of 17

Mdea 3.14.2008

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

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

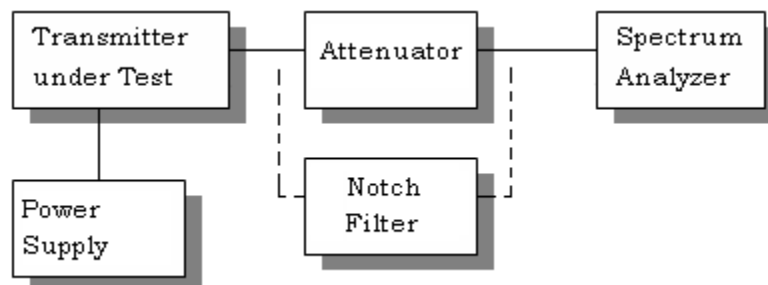
Test Data:

902.8		
1805.5	-54.1	61.0
2708.4	-63.1	70.0
3611.2	-64.8	71.7
4514.0	-65.9	72.8
5416.8	-60.8	67.7
6319.6	-58.5	65.4
7222.4	-58.7	65.6
8125.2	-57.8	64.7
9028.0	-61.8	68.7

914.2		
1828.4	-51.9	58.5
2742.6	-64.2	70.8
3656.8	-66.7	73.3
4571.0	-66.3	72.9
5485.2	-59.4	66.0
6399.4	-57.4	64.0
7313.6	-60.1	66.7
8227.8	-57.4	64.0
9142.0	-60.9	67.5

927.2		
1854.4	-49.6	55.6
2781.6	-64.3	70.3
3708.8	-64.0	70.0
4636.0	-64.2	70.2
5563.2	-59.6	65.6
6490.4	-55.8	61.8
7417.6	-59.6	65.6
8344.8	-58.8	64.8
9272.0	-62.0	68.0

15.247(c) Method of Measuring RF Conducted Spurious Emissions



APPLICANT: SABINE, INC.

FCC ID: RBODS80T

IC: 8240A-DS80T

REPORT: V:\S\SABINE_RBO\2464YUT12\Extra2464YUT12\2464YUT12TestReport.docx

Page 14 of 17

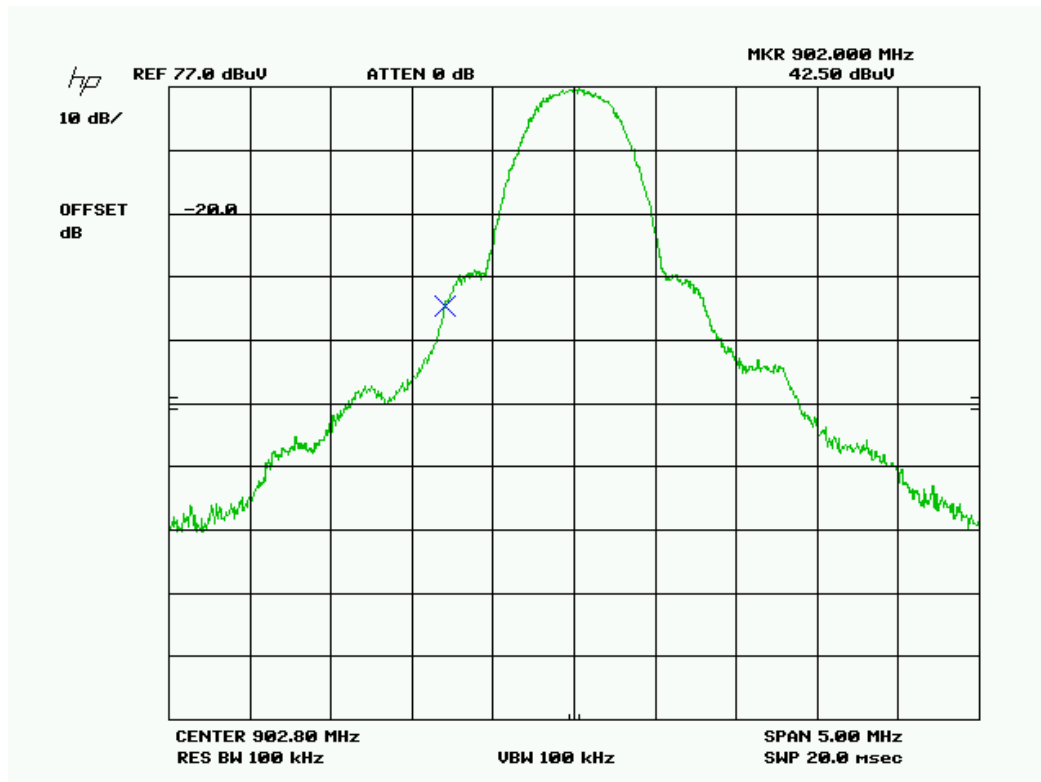
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RADIATED SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND

REQUIREMENTS: Emissions that fall in the restricted bands (15.205). These emissions must be less than or equal to 500 uV/m (54dBuV/m). Emissions not in the restricted band must be 20 dBc.

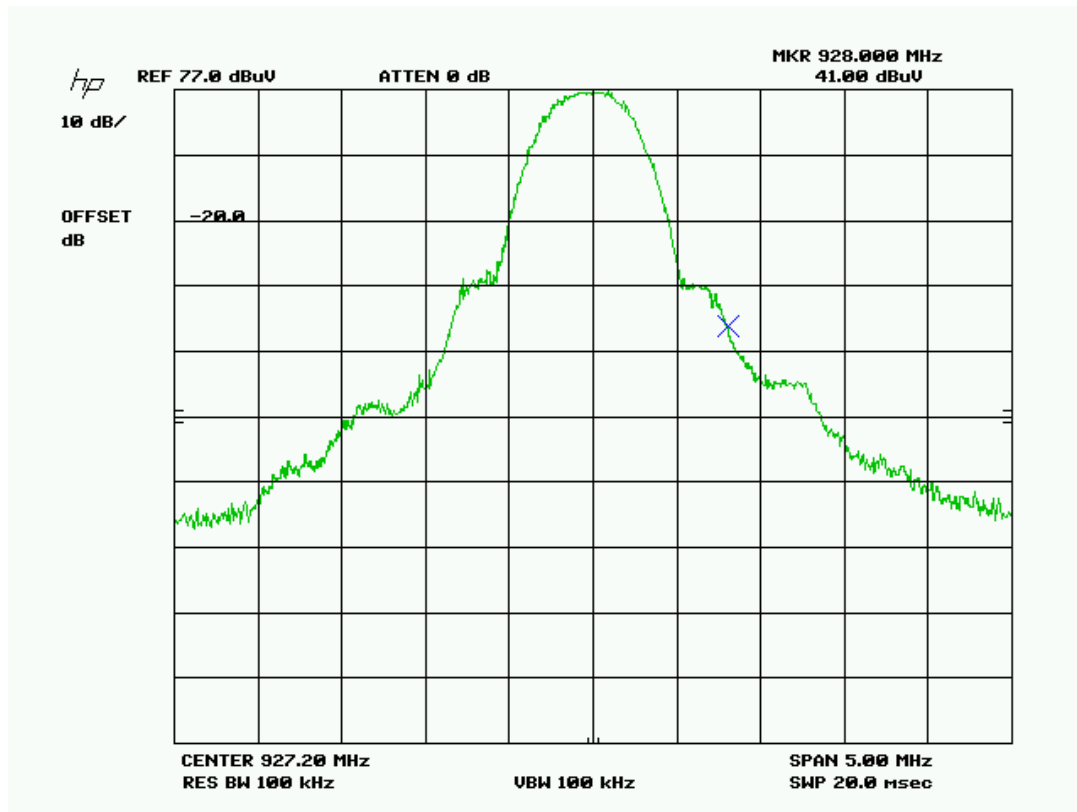
TEST DATA: The plots are presented below.

Lower bandedge
Meets 20 dBc



APPLICANT: SABINE, INC.
FCC ID: RBODS80T
IC: 8240A-DS80T
REPORT: V:\S\SABINE_RBO\2464YUT12\Extra2464YUT12\2464YUT12TestReport.docx

Upper Bandedge
Meets 20 dBc



APPLICANT: SABINE, INC.

FCC ID: RBODS80T

IC: 8240A-DS80T

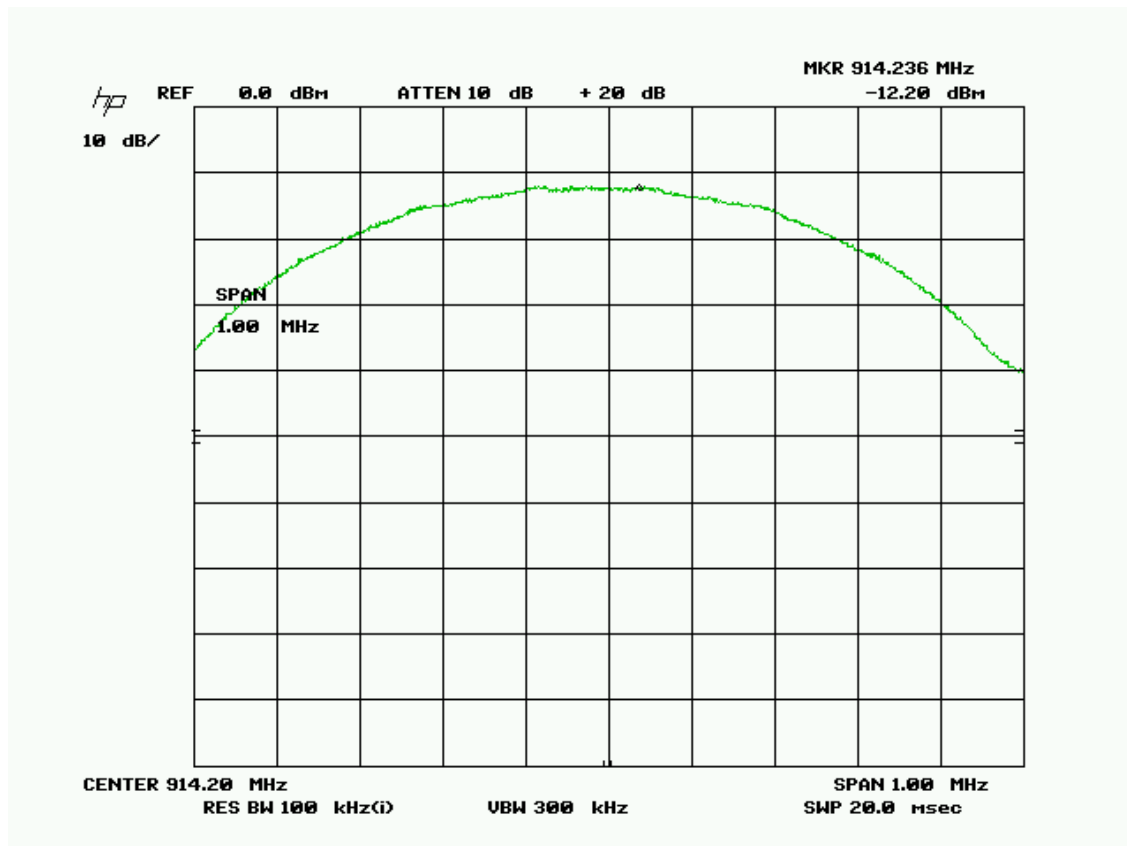
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POWER SPECTRAL DENSITY

Rules Part No.: 15.247(d), RSS-210, RSS-GEN

Requirements: The peak level measured must be less than +8.0 dBm.

Test Data: SEE THE FOLLOWING PLOTS



$$-12.2 \text{ dBm} + 30 \text{ dB (attn)} - 15.2 \text{ dB} = \text{PSD } 2.6 \text{ dB}$$

Three places in the band were measured and the worst case reported.

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FCC ID: RBODS80T

IC: 8240A-DS80T

REPORT: V:\S\SABINE_RBO\2464YUT12\Extra2464YUT12\2464YUT12TestReport.docx