Zodiac Pool Systems LLC

TEST REPORT

SCOPE OF WORK
FCC TESTING – 400121

REPORT NUMBER
221021001SZN-002

ISSUE DATE **[REVISED DATE]**
10 April 2023 [----------]

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TEST REPORT

Intertek Report No.: 221021001SZN-002

Zodiac Pool Systems LLC

Application
For
Certification

FCC ID: RIRB0324100

J-BOX

Model: 400121

902 MHz - 928MHz **Transceiver**

Report No.: 221021001SZN-002

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, mention 47 CFR [10-1-21]

Prepared and Checked by:

Allen Qin
Engineer

Approved by:

Ryan Chen
Project Engineer
Date: 10 April 2023

MEASUREMENT/TECHNICAL REPORT

This report concerns (check one) Original Grant ___X___ Class II Change _____

Equipment Type: DTS - Part 15 Digital Transmission Systems (Wi-Fi transmitter portion)

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes _____ No ___X___

If yes, defer until: _____
date

Company Name agrees to notify the Commission by: _____
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes _____ No ___X___

If no, assumed Part 15, Subpart C for intentional radiator - the new 47 CFR [10-01-21] Edition] provision.

Report prepared by:

Allen Qin
Intertek Testing Services Shenzhen Ltd. Longhua Branch
101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, Shenzhen, P.R. China.
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1.0 Summary of Test results

Applicant: Zodiac Pool Systems LLC
Applicant Address: 2882 Whiptail Loop # 100, Carlsbad, California, 92010, United States
Manufacturer: Zodiac Pool Systems LLC
Manufacturer Address: 2882 Whiptail Loop # 100, Carlsbad, California, 92010, United States

Model: 400121

FCC ID: RIRB0324100

TEST ITEM	REFERENCE	RESULTS
Max. Output power	15.247(b)(3)	Pass
6 dB Bandwidth	15.247(a)(2)	Pass
Max. Power Density	15.247(e)	Pass
Out of Band Antenna Conducted Emission	15.247(d)	Pass
Radiated Emission in Restricted Bands	15.247(d), 15.209, FCC 15.205	Pass
AC Conducted Emission	15.207	Pass
Antenna Requirement	15.203	Pass (See Notes)

Notes: The EUT uses an Integral Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.

2.0 General Description

2.1 Product Description

The equipment under test (EUT) is a J-BOX with operating in 915.95 MHz - 927MHz. The EUT is powered by DC 10V from the control board. For more detail information pls. refer to the user manual. For more detail information pls. refer to the user manual.

Type of Modulation: FSK.
Antenna Type: Integral Antenna
Antenna Gain: 1.81 dBi

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

2.2 Related Submittal(s) Grants

This is an application for certification of controller unit for the J-BOX, and the corresponding Control unit which associated with this EUT is subjected to FCC certification with FCC ID: RIRB0324300

2.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013) and KDB 558074 D01 v05r02. Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

2.4 Test Facility

The Semi-anechoic chamber and shielded room used to collect the radiated data and conducted data are **Intertek Testing Services Shenzhen Ltd. Longhua Branch** and located at 101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, Shenzhen, P.R. China. This test facility and site measurement data have been fully placed on file with File Number: CN1188.

3.0 System Test Configuration

3.1 Justification

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables were manipulated to produce worst case emissions. The EUT was powered by AC 120V/60Hz during the test.

For maximizing emissions, the EUT was rotated through 360°, the EUT was placed on the styrene turntable with 0.8m up to 1GHz and 1.5 m above 1GHz. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

The EUT and transmitting antenna was centered on the turntable.

Radiated emission measurement were performed the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

3.2 EUT Exercising Software

N/A

3.3 Special Accessories

N/A.

3.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

3.5 Equipment Modification

Any modifications installed previous to testing by Zodiac Pool Systems LLC will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Longhua Branch.

3.6 Support Equipment List and Description

Description	Manufacturer	Remark
Control Board (Provided By applicant)	N/A	N/A
DC power (Provided By Intertek)	Keysight	Model: E3648A
AC Mains (Provided By Intertek)	N/A	1.8m length, unshielded
DC lines * 2 (Provided By Intertek)	N/A	20cm length, unshielded
DC lines * 2 (Provided By Intertek)	N/A	120cm length, unshielded

Applicant: Zodiac Pool Systems LLC
Date of Test: October 28, 2022 Model: 400121

4.0 Measurement Results

4.1 Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b)(3):

The antenna power of the EUT was connected to the input of a broadband peak RF power meter. The power meter has a video bandwidth that is greater than DTS bandwidth and utilize a fast-responding diode detector. Power was read directly at the EUT antenna terminals with cable loss added.

For antennas with gains of 6 dBi or less, maximum allowed Transmitter output is 1 watt (+30 dBm).

Frequency (MHz)	Output in dBm (Peak Reading)	Output in mWatt
Low Channel: 915.95	7.40	5.50
Middle Channel: 921.80	7.59	5.74
High Channel: 927.00	7.55	5.69

Cable loss:0.5 dB External Attenuation: 0 dB

Cable loss, external attenuation has been included in OFFSET function

EUT max. output level = 7.59dBm
EUT max. E.I.R.P = 7.59dBm + 1.81dBi = 9.40dBm = 8.71mW

For RF Exposure, the information is saved with filename: RF exposure.pdf.

Applicant: Zodiac Pool Systems LLC
Date of Test: October 28, 2022 Model: 400121

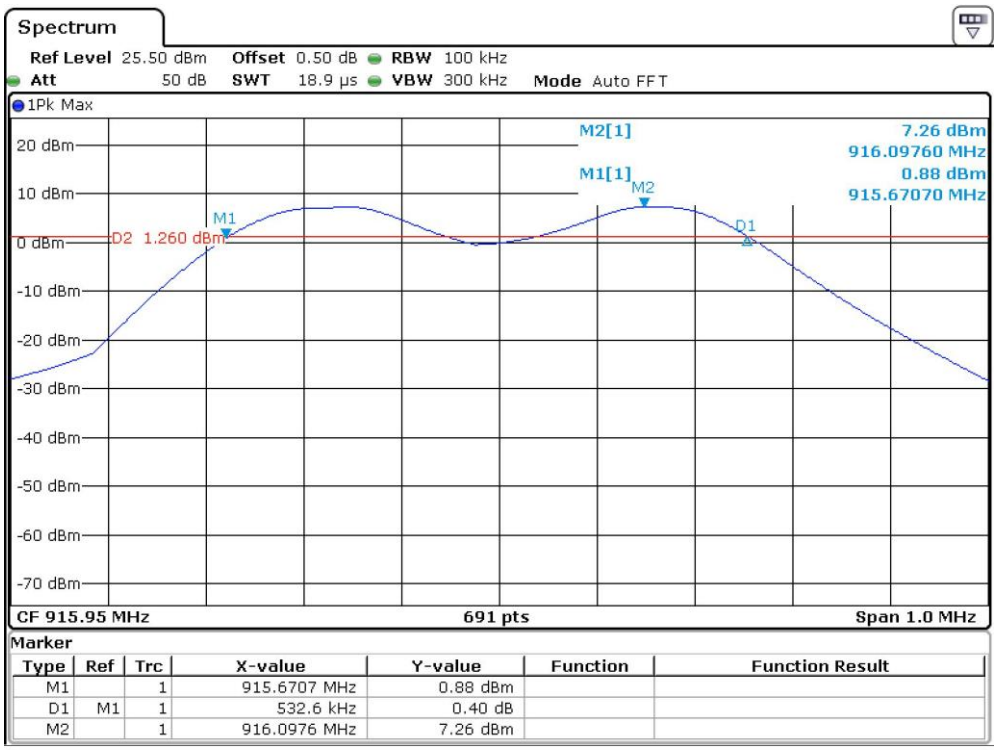
4.2 Minimum 6 dB RF Bandwidth, FCC Rule 15.247(a) (2):

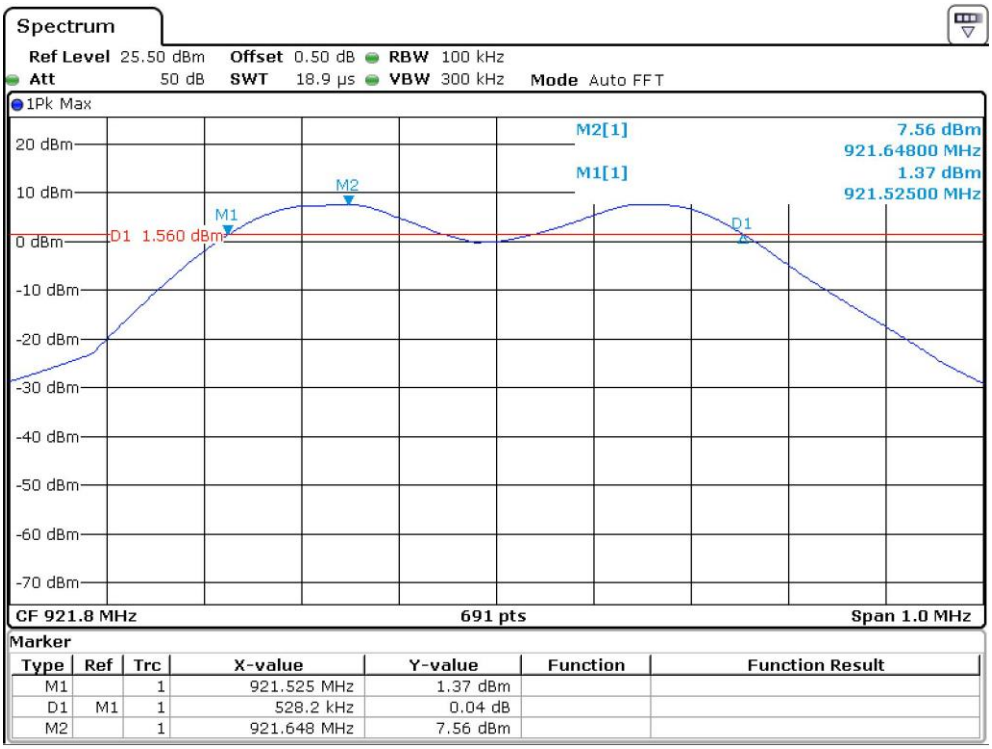
The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was set to 100 KHz according to FCC KDB 558074 D01 v05r02. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 6 dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

Limit: The 6 dB Bandwidth is at least 500 kHz.

Frequency (MHz)	6 dB Bandwidth (kHz)
Low Channel: 915.95	532.6
Middle Channel: 921.80	528.2
High Channel: 927.00	525.3

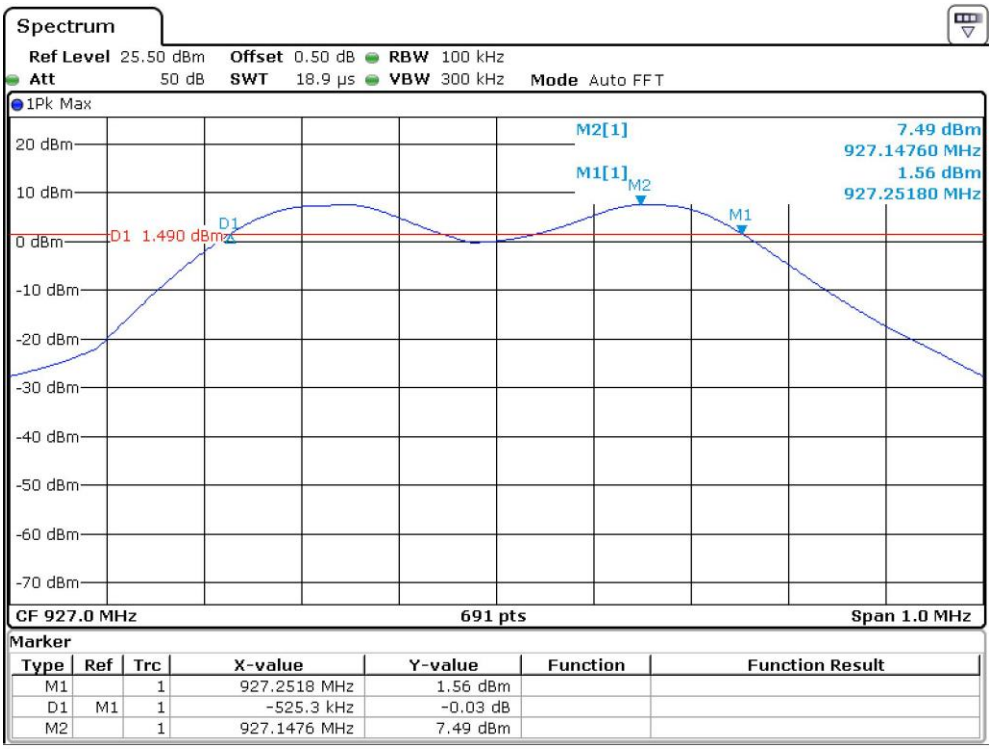
The test plots are attached as below.





Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	921.525 MHz	1.37 dBm		
D1	M1	1	528.2 kHz	0.04 dB		
M2		1	921.648 MHz	7.56 dBm		



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	927.2518 MHz	1.56 dBm		
D1	M1	1	-525.3 kHz	-0.03 dB		
M2		1	927.1476 MHz	7.49 dBm		

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4.3 Maximum Power Density Reading, FCC Rule 15.247(e):

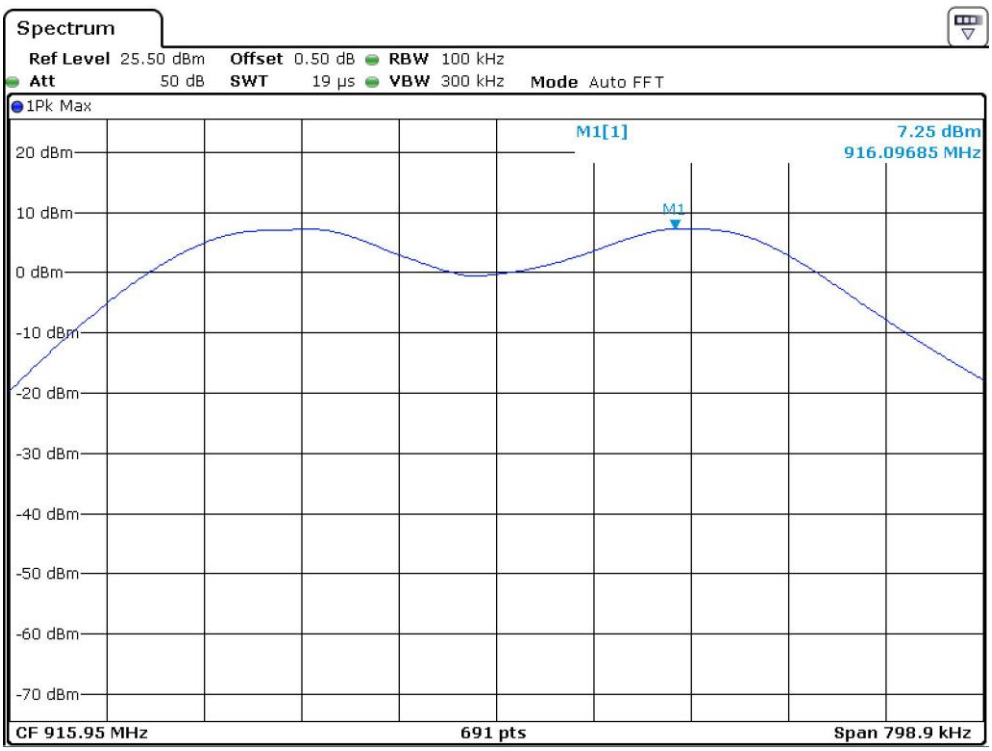
The Measurement Procedure PKPSD was set according to the FCC KDB 558074 D01 v05r02.

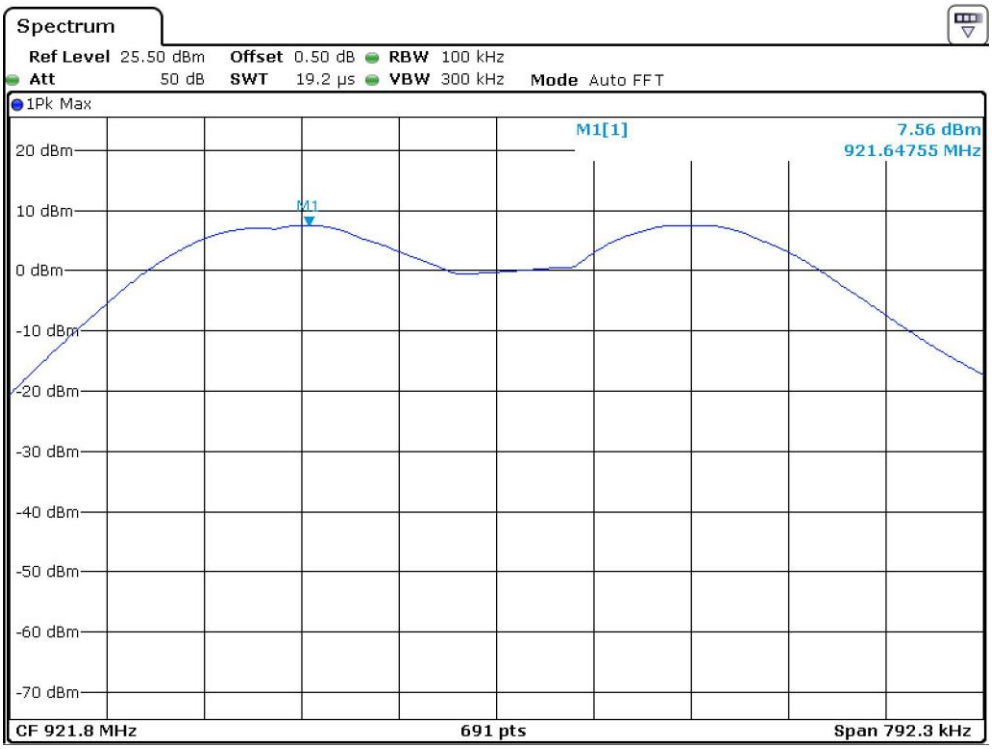
Antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function.

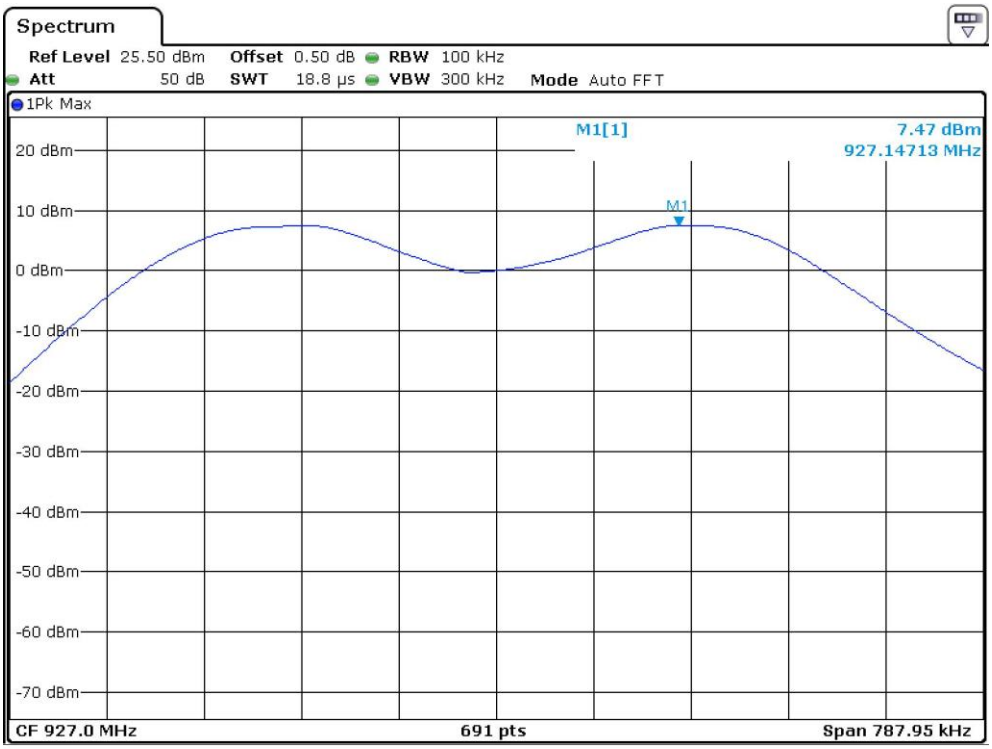
Limit: The Power Density does not exceed 8dBm/100 kHz.

Frequency (MHz)	Power Density with RBW 100KHz
Low Channel: 915.95	7.25
Middle Channel: 921.80	7.56
High Channel: 927.00	7.47

The test plots are attached as below.




Spectrum
Ref Level 25.50 dBm Offset 0.50 dB RBW 100 kHz
Att 50 dB SWT 19.2 µs VBW 300 kHz Mode Auto FFT
1Pk Max
M1[1] 7.56 dBm
921.64755 MHz
M1
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 921.8 MHz
691 pts
Span 792.3 kHz


Spectrum
Ref Level 25.50 dBm Offset 0.50 dB RBW 100 kHz
Att 50 dB SWT 18.8 µs VBW 300 kHz Mode Auto FFT
1Pk Max
M1[1] 7.47 dBm
927.14713 MHz
M1
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 927.0 MHz
691 pts
Span 787.95 kHz

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4.4 Out of Band Conducted Emissions, FCC Rule 15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. The Measurement Procedure was set according to the FCC KDB 558074 D01 v05r02.

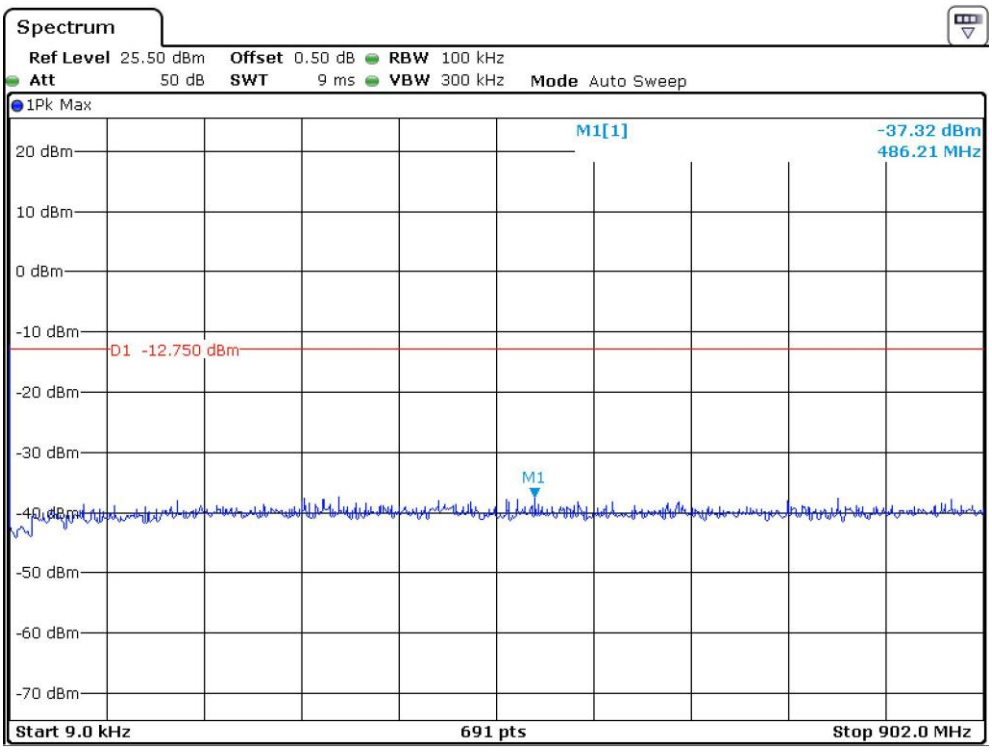
All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the passband.

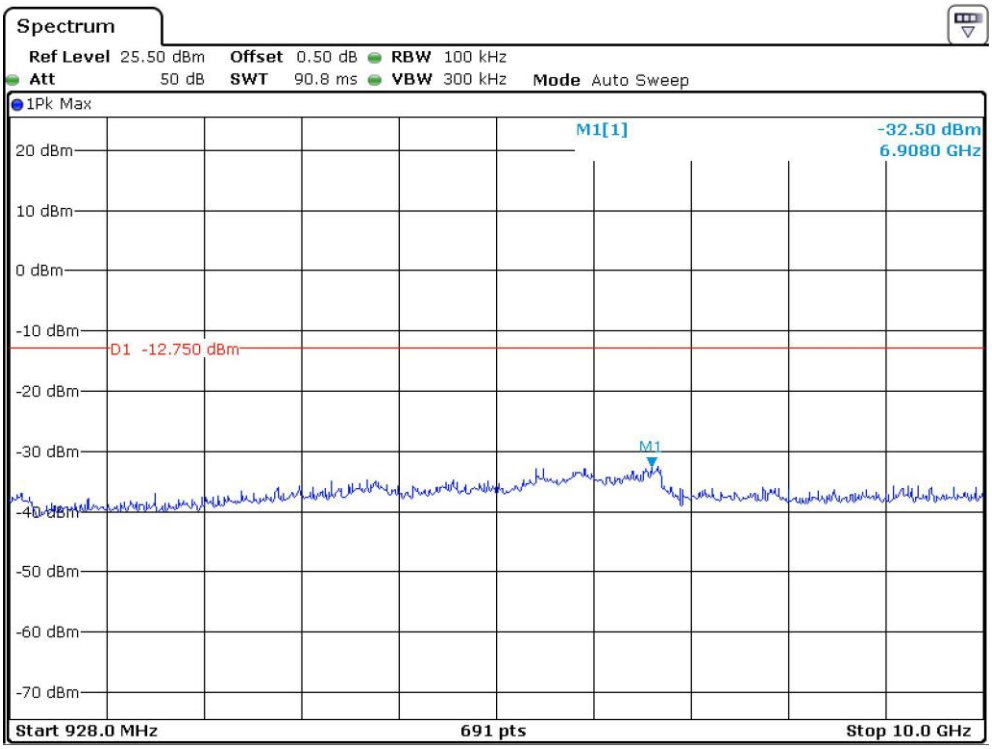
Refer to the attached test plots for out of band conducted emissions data with rate of 1Mbps for BLE.

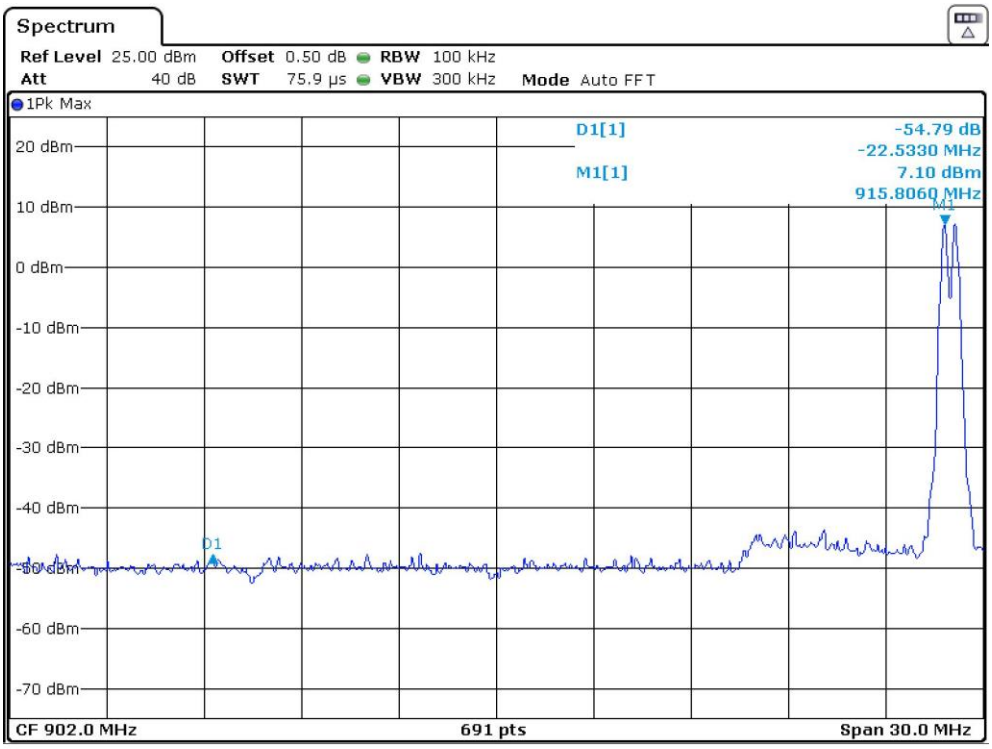
The test plots showed all spurious emission up to the tenth harmonic were measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

The test plots are attached as below.

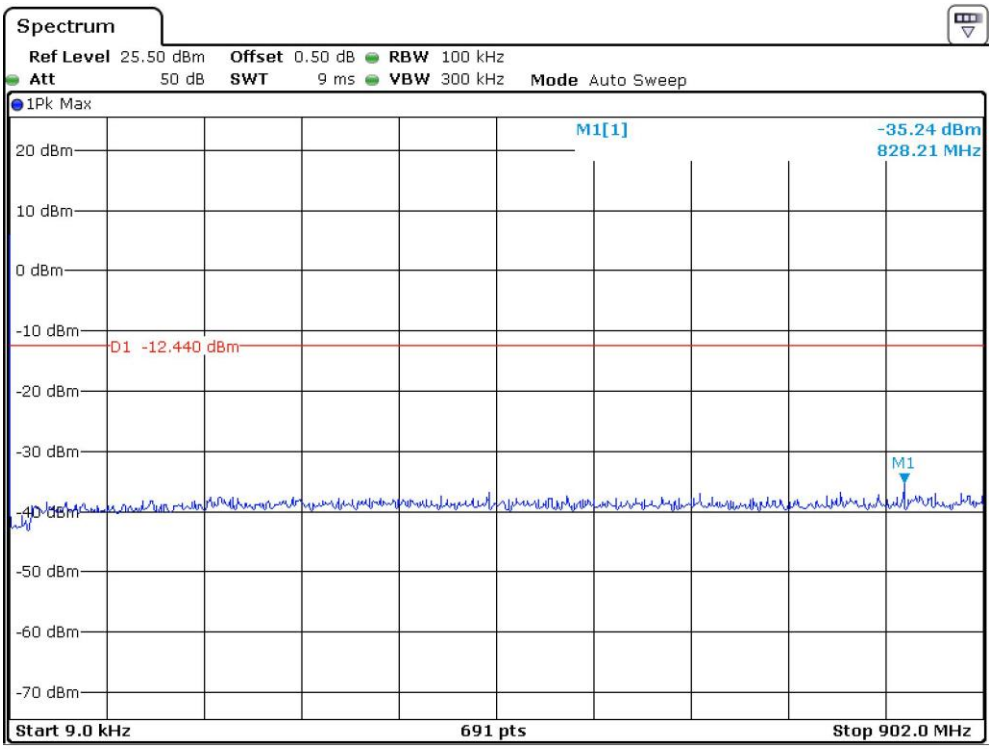
Channel 1 (915.95MHz) Reference Level: 7.25dBm

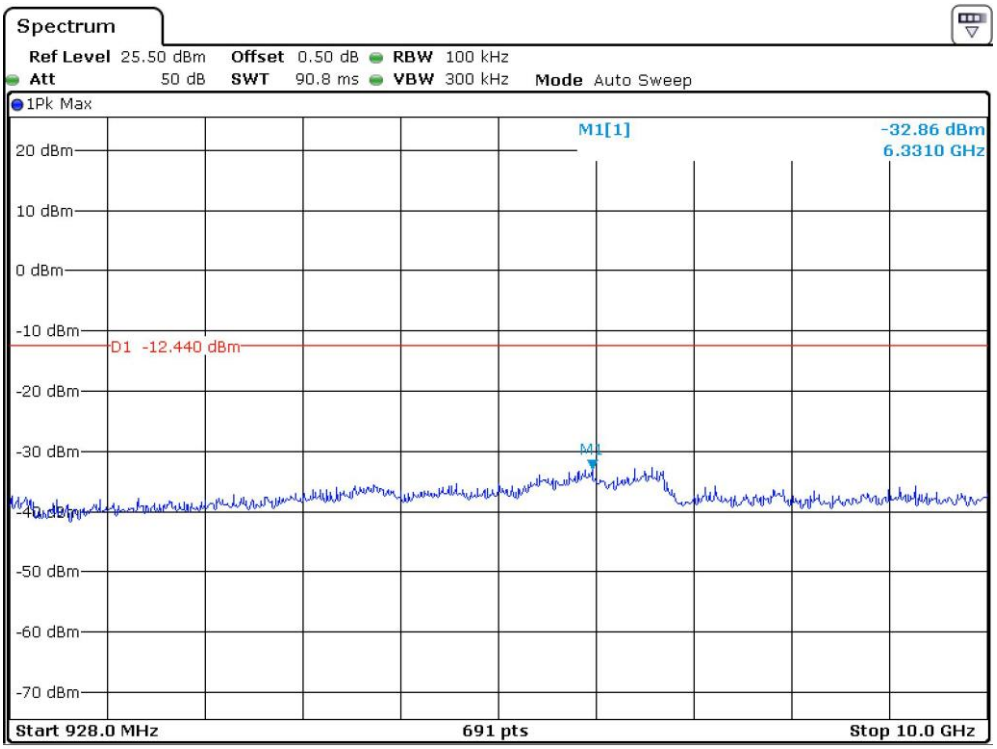



Spectrum
Ref Level 25.50 dBm Offset 0.50 dB RBW 100 kHz
Att 50 dB SWT 90.8 ms VBW 300 kHz Mode Auto Sweep
1Pk Max
M1[1] -32.50 dBm
6.9080 GHz
D1 -12.750 dBm
M1
Start 928.0 MHz 691 pts Stop 10.0 GHz

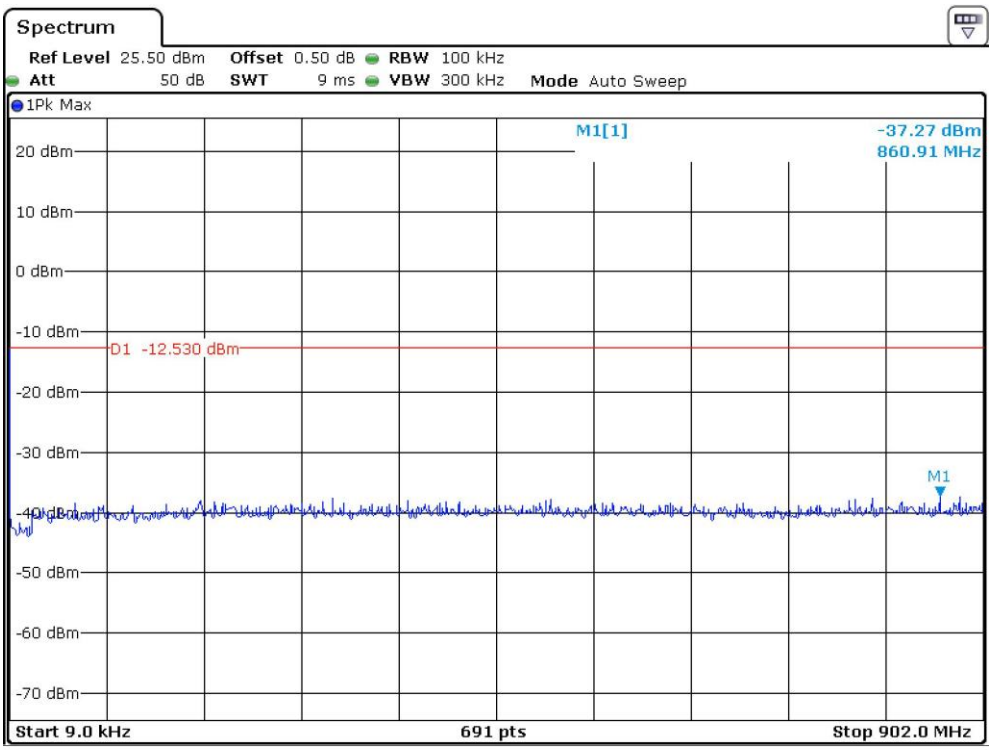

Spectrum
Ref Level 25.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 75.9 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] -54.79 dB
-22.5330 MHz
M1[1] 7.10 dBm
915.8060 MHz
M1
D1
CF 902.0 MHz 691 pts Span 30.0 MHz

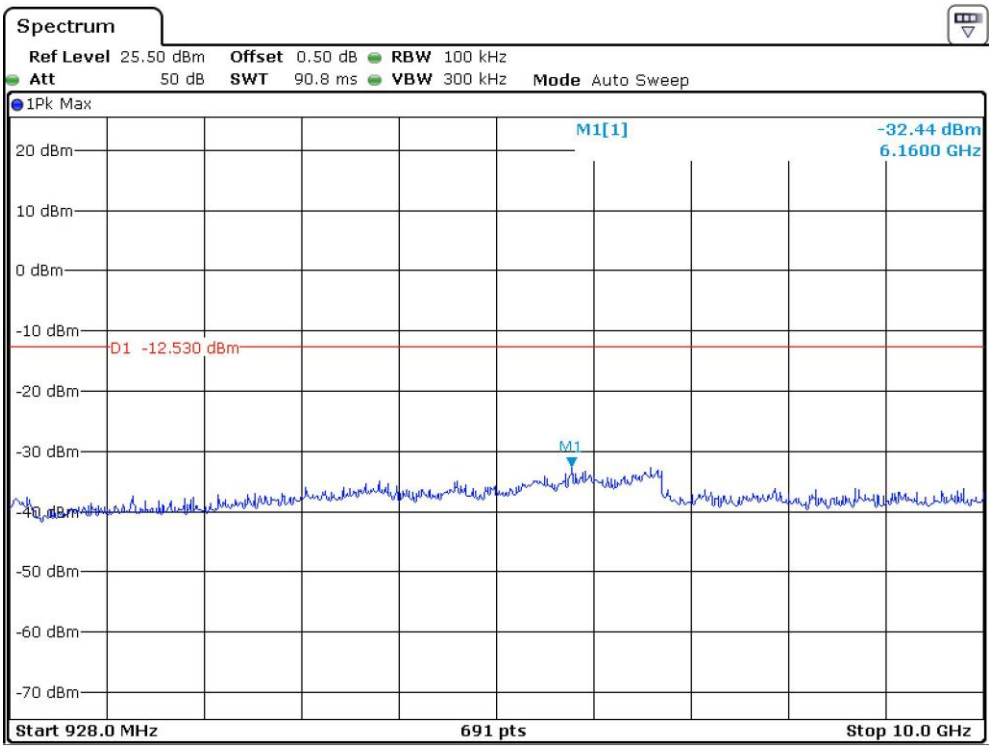
Channel 10 (921.8MHz) Reference Level: 7.56dBm

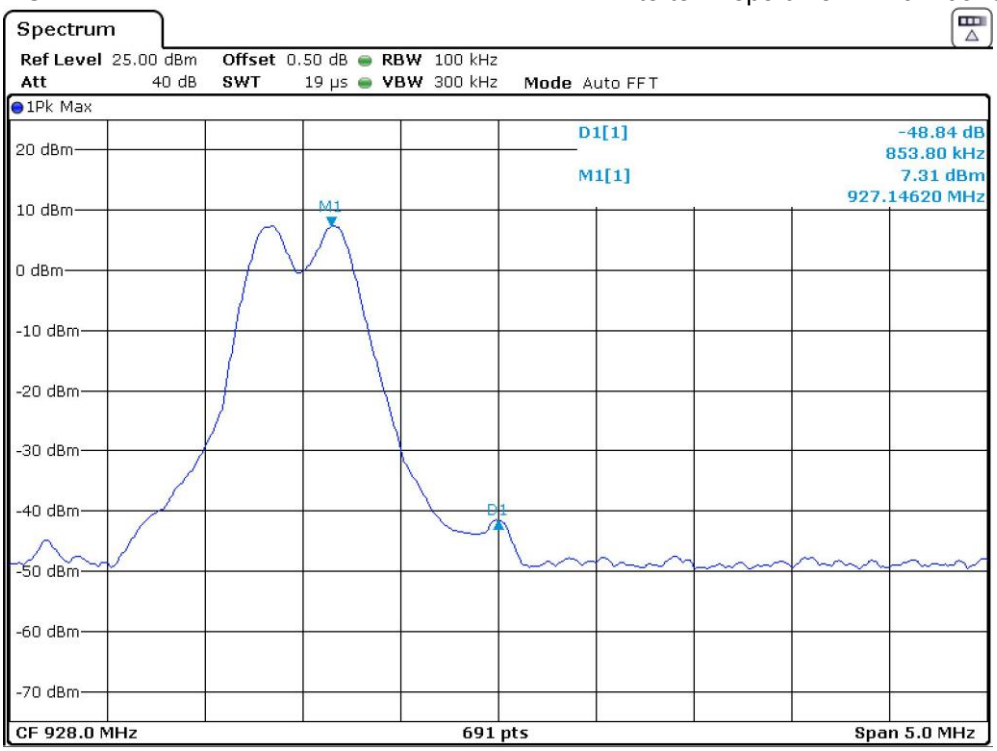




Channel 18 (927MHz) Reference Level: 7.47dBm






Spectrum
Ref Level 25.00 dBm Offset 0.50 dB RBW 100 kHz
Att 40 dB SWT 19 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D1[1] -48.84 dB
853.80 kHz
M1[1] 7.31 dBm
927.14620 MHz
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
D1
CF 928.0 MHz
691 pts
Span 5.0 MHz

4.5 Out of Band Radiated Emissions (for emissions in 4.4 above that are less than 20dB below carrier), FCC Rule 15.247(d):

For out of band emissions that are close to or that exceed the 20dB attenuation requirement described in the specification, radiated measurements were performed at a 3m separation distance to determine whether these emissions complied with the general radiated emission requirement.

[×] Not required, since all emissions are more than 20dB below fundamental
[ ] See attached data sheet

4.6 Transmitter Radiated Emissions in Restricted Bands, FCC Rule 15.35(b) (c):

Data is included of the worst-case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included. All measurements were performed with peak detection unless otherwise specified.

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

4.7 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD

Where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD

Example

Assume a receiver reading of 62.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB. The net field strength for comparison to the appropriate emission limit is 42 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 62.0 dBμV
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
PD = 0 dB
FS = 62 + 7.4 + 1.6 - 29 + 0 = 42 dBμV/m

Level in mV/m = Common Antilogarithm [(42 dBμV/m)/20] = 125.9 μV/m

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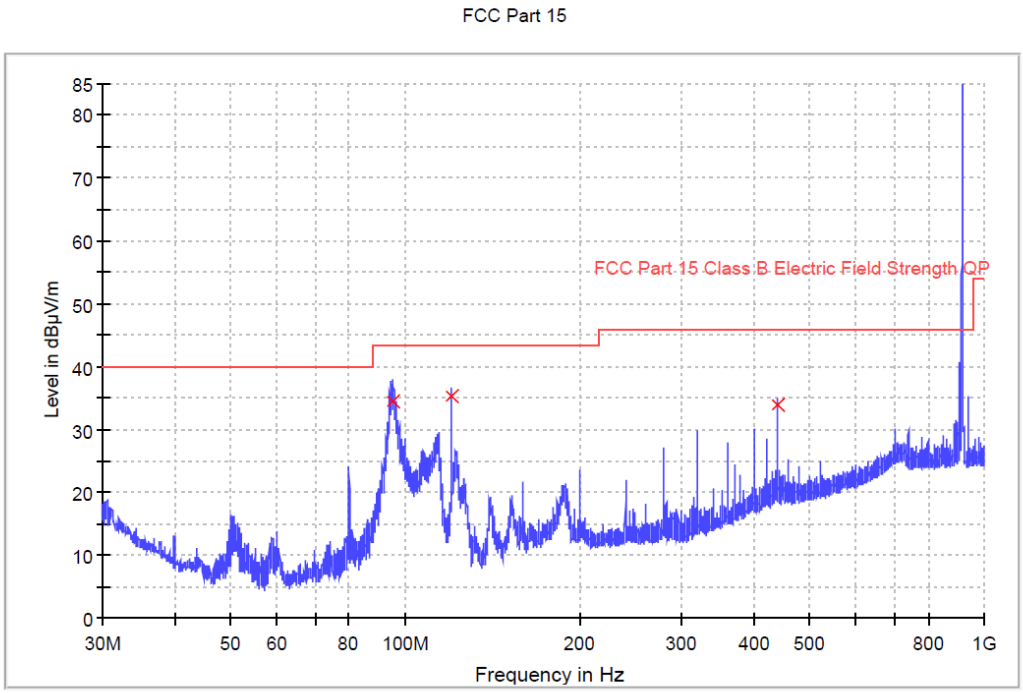
4.8 Radiated Spurious Emission

Worst Case Radiated Spurious Emission
at 94.99MHz
is passed by 7.1dB margin.

For the electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated photos.pdf.

Applicant: Zodiac Pool Systems LLC
Date of Test: October 28, 2022 Model: 400121
Worst Case Operating Mode: Transmitting Channel 1

ANT Polarity: Horizontal



Frequency (MHz)	Quasi Peak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
94.920000	34.5	1000.0	120.000	H	8.5	9.0	43.5
119.983667	35.2	1000.0	120.000	H	8.4	8.3	43.5
440.019000	33.8	1000.0	120.000	H	19.9	12.2	46.0

Remark:
1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. Quasi Peak (dBµV/m) = Corr. (dB/m) + Read Level (dBµV)
3. Margin (dB) = Limit Line (dBµV/m) – Level (dBµV/m)

Applicant: Zodiac Pool Systems LLC
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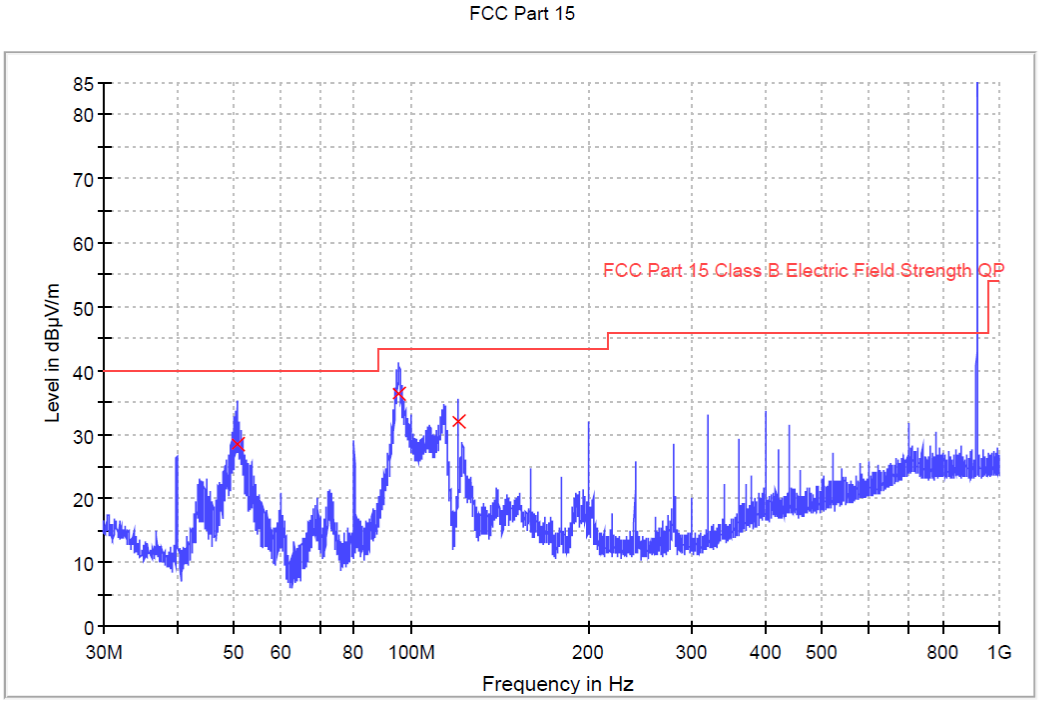
Worst Case Operating Mode: Transmitting Channel 1

ANT Polarity: Vertical



Frequency (MHz)	Quasi Peak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
50.531667	28.5	1000.0	120.000	V	7.2	11.5	40.0
94.990000	36.4	1000.0	120.000	V	8.5	7.1	43.5
119.983667	32.1	1000.0	120.000	V	8.4	11.4	43.5

Remark:
1. Corr. = Antenna Factor (dB/m) + Cable Loss (dB)
2. Quasi Peak (dBµV/m) = Corr. (dB/m) + Read Level (dBµV)
3. Margin (dB) = Limit Line (dBµV/m) – Level (dBµV/m)

Applicant: Zodiac Pool Systems LLC
Date of Test: October 28, 2022 Model: 400121
Worst Case Operating Mode: Transmitting (Channel 1)

Radiated Emissions (above 1GHz)

Worst case data

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Vertical	*1831.312	60.0	35.7	27.4	51.7	74.0	-22.3
Vertical	*5496.725	50.1	33.1	33.6	50.6	74.0	-23.4
Vertical	*7326.000	57.6	33.1	36.8	61.3	74.0	-12.7

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Vertical	*1831.312	40.9	35.7	27.4	32.6	54.0	-21.4
Vertical	*5496.725	37.3	33.1	33.6	37.8	54.0	-16.2
Vertical	*7326.000	42.6	33.1	36.8	46.3	54.0	-7.7

NOTES:

1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz/VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Zodiac Pool Systems LLC
Date of Test: October 28, 2022 Model: 400121
Worst Case Operating Mode: Transmitting (Channel 10)

Radiated Emissions (above 1GHz)

Worst case data

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Vertical	*1842.475	62.1	35.7	27.5	53.9	74.0	-20.1
Vertical	*4604.900	51.5	33.7	32.1	49.9	74.0	-24.1
Vertical	*5526.100	52.8	33.1	33.7	53.4	74.0	-20.6

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Vertical	*1842.475	48.0	35.7	27.5	39.8	54.0	-14.2
Vertical	*4604.900	38.4	33.7	32.1	36.8	54.0	-17.2
Vertical	*5526.100	40.6	33.1	33.7	41.2	54.0	-12.8

NOTES:

1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Zodiac Pool Systems LLC
Date of Test: October 28, 2022 Model: 400121
Worst Case Operating Mode: Transmitting (Channel 18)

Radiated Emissions (above 1GHz)

Worst case data

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Vertical	*1853.638	60.6	35.6	27.6	52.6	74.0	-21.4
Vertical	*2781.300	51.7	35.0	28.9	45.6	74.0	-28.4
Vertical	*7417.263	47.7	33.0	36.9	51.6	74.0	-22.4

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB/m)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Vertical	*1853.638	41.9	35.6	27.6	33.9	54.0	-20.1
Vertical	*2781.300	46.0	35.0	28.9	39.9	54.0	-14.1
Vertical	*7417.263	38.2	33.0	36.9	42.1	54.0	-11.9

NOTES:

1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Applicant: Zodiac Pool Systems LLC
Date of Test: October 28, 2022
Model: 400121

4.9 Conducted Emission

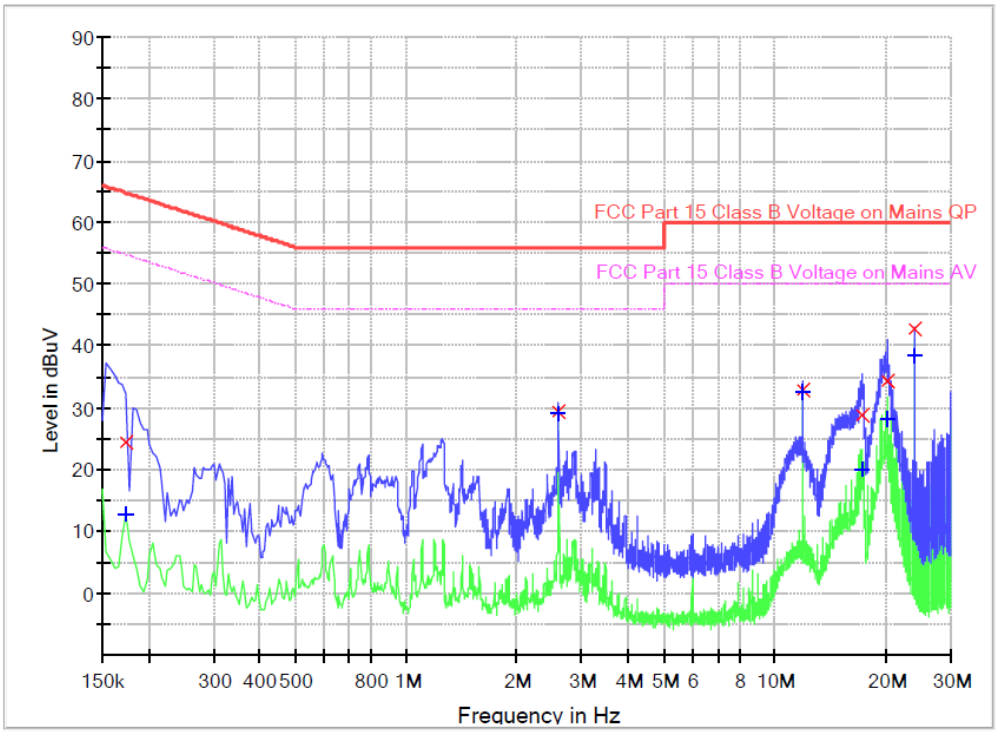
Worst Case Conducted Emission (802.11b-Channel 01)
at 23.946000MHz
is passed by 11.7dB margin.

For the electronic filing, the worst case radiated emission configuration photographs are saved with filename: conducted photos.pdf.

Applicant: Zodiac Pool Systems LLC
Date of Test: October 28, 2022
Model: 400121
Worst Case Operating Mode: Transmitting (Channel 01)
Phase: Live

Graphic / Data Table

Conducted Emissions
Pursuant to FCC 15.207: Emissions Requirement



Limit and Margin QP

Frequency (MHz)	Quasi Peak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.174000	24.5	9.000	L1	9.6	40.2	64.8
2.590000	29.4	9.000	L1	9.7	26.6	56.0
11.974000	32.9	9.000	L1	10.0	27.2	60.0
17.278000	28.9	9.000	L1	10.3	31.1	60.0
20.198000	34.3	9.000	L1	10.4	25.8	60.0
23.946000	42.7	9.000	L1	10.7	17.3	60.0

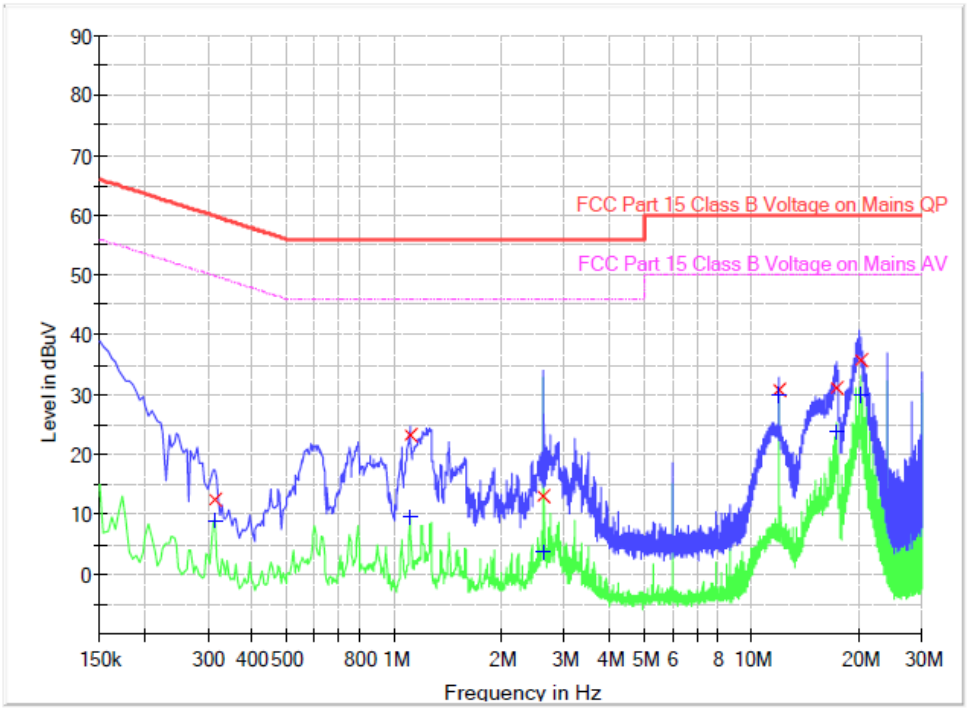
Limit and Margin AV

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.174000	12.7	9.000	L1	9.6	42.1	54.8
2.590000	28.9	9.000	L1	9.7	17.1	46.0
11.974000	32.6	9.000	L1	10.0	17.4	50.0
17.278000	20.1	9.000	L1	10.3	29.9	50.0
20.198000	28.2	9.000	L1	10.4	21.8	50.0
23.946000	38.3	9.000	L1	10.7	11.7	50.0

Applicant: Zodiac Pool Systems LLC
Date of Test: October 28, 2022
Model: 400121
Worst Case Operating Mode: Transmitting (Channel 01)
Phase: Neutral

Graphic / Data Table

Conducted Emissions
Pursuant to FCC 15.207: Emissions Requirement



Limit and Margin QP

Frequency (MHz)	Quasi Peak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.314000	12.3	9.000	N	9.6	47.5	59.9
1.106000	23.1	9.000	N	9.6	32.9	56.0
2.618000	13.2	9.000	N	9.7	42.8	56.0
11.974000	30.7	9.000	N	10.0	29.3	60.0
17.274000	31.1	9.000	N	10.3	28.9	60.0
20.194000	35.9	9.000	N	10.5	24.1	60.0

Limit and Margin AV

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.314000	8.9	9.000	N	9.6	41.0	49.9
1.106000	9.4	9.000	N	9.6	36.6	46.0
2.618000	3.7	9.000	N	9.7	42.3	46.0
11.974000	30.0	9.000	N	10.0	20.0	50.0
17.274000	23.8	9.000	N	10.3	26.2	50.0
20.194000	29.8	9.000	N	10.5	20.2	50.0

Applicant: Zodiac Pool Systems LLC
Date of Test: October 28, 2022
Model: 400121

4.10 Radiated Emissions from Digital Section of Transceiver, FCC Ref: 15.109

[ ] Not required - No digital part

[ ] Test results are attached

[x] Included in the separated report.

Applicant: Zodiac Pool Systems LLC
Date of Test: October 28, 2022
Model: 400121

4.11 Transmitter Duty Cycle Calculation and Measurements, FCC Rule 15.35(b), (c)

The EUT antenna output port was connected to the input of the spectrum analyzer. The analyzer center frequency was set to EUT RF channel carrier. The SWEP function on the analyzer was set to ZERO SPAN. The Transmitter ON time was determined from the resultant time-amplitude display:

	See attached spectrum analyzer chart (s) for Transmitter timing
	See Transmitter timing diagram provided by manufacturer
x	Not applicable, duty cycle was not used.

5.0 Equipment Photographs

For electronic filing, the photographs are saved with filename: external photos.pdf & internal photos.pdf.

6.0 Product Labeling

For electronic filing, the FCC ID label artwork and location is saved with filename: label.pdf.

7.0 Technical Specifications

For electronic filing, the block diagram and circuit diagram are saved with filename: block.pdf and circuit.pdf respectively.

8.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.

9.0 Confidentiality Request

For electronic filing, the confidentiality request of the tested EUT is saved with filename: request.pdf.

10.0 Discussion of Pulse Desensitization

The determination of pulse desensitivity was made in accordance with Hewlett Packard Application Note 150-2, *Spectrum Analysis ... Pulsed RF.*

Pulse desensitivity is not applicable for this device since the transmitter transmits the RF signal continuously.

11.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ182-02	RF Power Meter	Anritsu	ML2496A	1302005	2022-05-16	2023-05-16
SZ182-02-01	Power Sensor	Anritsu	MA2411B	1207429	2022-05-16	2023-05-16
SZ061-12	BiConiLog Antenna	ETS	3142E	00166158	2021-08-04	2024-08-04
SZ185-03	EMI Receiver	R&S	ESCI	100547	2021-12-20	2022-12-20
SZ061-07	Pyramidal Horn Antenna	ETS	3160-09	00083067	2022-08-31	2024-08-31
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	2021-05-18	2023-05-18
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	2022-05-16	2023-05-16
SZ056-06	Signal Analyzer	R&S	FSV 40	101101	2021-12-20	2022-12-20
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	2022-05-16	2023-05-16
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	2021-12-12	2024-12-12
SZ062-02	RF Cable	RADIALL	RG 213U	--	2022-05-20	2022-11-20
SZ062-05	RF Cable	RADIALL	0.04-26.5GHz	--	2022-05-20	2022-11-20
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	2022-05-20	2022-11-20
SZ067-04	Notch Filter	Micro-Tronics	BRM50702-02	--	2022-05-17	2023-05-17
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	2022-07-08	2023-07-08
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	2022-10-24	2023-10-24
SZ188-03	Shielding Room	ETS	RFD-100	4100	2019-12-20	2022-12-20
SZ006-27	DC Power Supply	Keysight	E3648A	MY56096119	2021-12-21	2022-12-21

********** End of Report**********