





FCC Test Report

FCC EVALUATION REPORT FOR CERTIFICATION	
Project Reference No.	268417
Product	Remote Training System
Brand Name	
Model	SCOUTTRAINER100
Alternate Model	N/A
Tested according to	FCC Rules and Regulations Part 15 Subpart C 2014 15.249, ANSI C63.4-2009

Tested in period	2014.08.28 to 2014.10.17	
Issued date	2014.09.15	
Name and address of the Test House	 Nemko Shanghai Ltd. Shenzhen Branch Unit CD, Floor 10, Tower 2, Kefa Road 8#, Hi-Technology Park, Nanshan District, Shenzhen, China Phone : +86 755 8221 0420 Fax : +86 755 8221 3363	
Tested by		
	2014-10-17	<hr/> Zone Peng <hr/> date
Verified by		
	2014-10-17	<hr/> Daria Liu <hr/> date

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1. Client Information

1.1 Applicant

Company Name: **Binatone Electronics International Ltd.**
Company Address: **Floor 23A, 9 Des Voeux Road West, Sheung Wan, Hong Kong**

1.2 Manufacturer

Company Name: **Foshan Shunde Alford Electronics Co., Ltd.**
Company Address: **Xinjiao Industrial Park, DaLiang, ShunDe, Foshan City, Guangdong Province, China**

1.3 Scope

- Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC part 15.

2. Equipment under Test (EUT)

2.1 Identification of EUT

Category: Remote Training System

Model Name: SCOUTTRAINER100

Alternate model: N/A

Brand name:



Technical data
(Rating, etc.): As below

2.2 Detail spec:

Carrier Frequency: : 915.5MHz-921.26MHz

Number of Channel: 25

Channel step: 240kHz

Channels List :

1. 915.5
2. 915.74
3. 915.98
4. 916.22
5. 916.46
6. 916.70
7. 916.94
8. 917.18
9. 917.42
10. 917.66
11. 917.90
12. 918.14
13. 918.38
14. 918.62
15. 918.86
16. 919.10
17. 919.34
18. 919.58
19. 919.82
20. 920.06
21. 920.30
22. 920.54
23. 920.78
24. 921.02
25. 921.26

Modulation Type: MSK

Mode of operation (duplex, simplex, half duplex) : duplex

Antenna Type: Integral Antenna

Antenna gain: 0 dBi

Remote control unit:

Input: 3Vdc, by 2 x AAA 1.5V alkaline batteries

2.3 Additional Information Related to Testing

CHL : 915.5MHz

CHM : 918.38MHz

CHH : 921.26MHz

3. General Test Conditions

3.1 Location

Global United Technology Services Co., Ltd. -- Nemko ELA 632

2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China

FCC Registration No.:600491

IC Registration No.9079A-1

Note: all test are witnessed by NEMKO engineer

3.2 Operating Environment

All tests and measurements were performed in a shielded enclosure or a controlled environment suitable for the tests conducted. The climatic conditions in the test area are automatically controlled and recorded continuously.

Parameters	Recording during test	Accepted deviation
Ambient temperature	20-25°C	15 – 35 °C
Relative humidity	45-55%	30 - 60%
Atmospheric pressure	101.2 kPa -101.3kPa	86-106kPa

3.2 Operating During Testing

TM1: CHL keeping TX mode

TM2: CHM keeping TX mode

TM3: CHH keeping TX mode

TM4: Keeping TX mode

Remark : X,Y,Z 3 axis of EUT all have been tested , only the worse case is reported

Only choose the worse mode to be the representative test mode

NEW BATTERY IS USED DURING ALL TEST.

3.4 Test Equipment

The test equipments used in testing are calibrated on a regular basis. For most of the testing equipments accredited calibration is conducted once a year. For certain equipment the calibration

interval is longer. Between the calibrations all test equipment are controlled and verified on a regular basis. The test equipments used are defined in each test section of this report.

4. Measurement Uncertainty

The Measurement Uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 with the confidence level of 95 %.

Radiated Emission:	30MHz~1000MHz	4.50dB
	1GHz-18GHz	4.70dB

5. Radiated Electromagnetic Disturbances

5.1 Test Procedure

The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber. An antenna was located 3m from the EUT on an adjustable mast.

The EUT were rotated 0 to 360 degree and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. The test result are reported as below.

For below 1GHz

RBW=100kHz; VBW=300KHz. The frequency range from 30MHz to 1000MHz is checked using PK detector .

For above 1GHz. The frequency range from 1GHz to 10GHz(10th harmonics) is checked.

RBW=1MHz ; VBW=1MHz,PK detector for peak emissions measurement above 1GHz

Duty cycle correction factor is used for average evaluation by peak measurement.

5.2 Measurement Equipment

Equipment	Model No.	Serial No.	Cal. Due	Manufacturer
EMI Test Receiver	ESU26	GTS203	Jul. 04 2015	R&S
BiConiLog Antenna	VULB9163	GTS214	Feb. 26 2015	SCHWARZBECK
Horn Antenna	BBHA9120D	GTS215	Feb. 26 2015	SCHWARZBECK
Horn Antenna	BBHA9170	GTS216	Feb. 26 2015	SCHWARZBECK
Coaxial Cable	N/A	GTS213	Apr. 01 2015	GTS
Coaxial Cable	N/A	GTS211	Apr. 01 2015	GTS
Coaxial cable	N/A	GTS210	Apr. 01 2015	GTS
Coaxial Cable	N/A	GTS212	Apr. 01 2015	GTS
Amplifier	8347A	GTS204	Jul. 04 2015	HP

5.3 Test Result

Harmonics emission:

Center Frequency	Connect mode	Antenna Polarity	Remark	Test Data	Test Result
921.26MHz	TX mode	Vertical	1-10GHz	Diagram 5-1	Pass
		Horizontal	1-10GHz	Diagram 5-2	Pass
915.5MHz	TX mode	Horizontal	1-10GHz	Diagram 5-3	Pass
		Vertical	1-10GHz	Diagram 5-4	Pass
918.38MHz	TX mode	Vertical	1-10GHz	Diagram 5-5	Pass
		Horizontal	1-10GHz	Diagram 5-6	Pass

Fundamental emission:

Center Frequency	Connect mode	Antenna Polarity	Test Data	Test Result
915.5MHz	TX mode	Vertical	Diagram 5-7	Pass
		Horizontal	Diagram 5-8	Pass
918.38MHz	TX mode	Vertical	Diagram 5-9	Pass
		Horizontal	Diagram 5-10	Pass
921.26MHz	TX mode	Horizontal	Diagram 5-11	Pass
		Vertical	Diagram 5-12	Pass

Spurious emission:

Center Frequency	Connect mode	Antenna Polarity	Remark	Test Data	Test Result
915.5MHz	TX mode	Vertical	30 – 1000MHz	Diagram 5-13	Pass
		Horizontal	30 - 1000MHz	Diagram 5-14	Pass
918.38MHz	TX mode	Vertical	30 – 1000MHz	Diagram 5-15	Pass
		Horizontal	30 – 1000MHz	Diagram 5-16	Pass
921.26MHz	TX mode	Vertical	30 – 1000MHz	Diagram 5-17	Pass
		Horizontal	30 – 1000MHz	Diagram 5-18	Pass

Remark:

If PK value is lower than QP/AV limit , then PK, QP and AV deem to comply their own limit .

- 1) All modes of operation were investigated and the worst -case emission mode are reported.

Band Edge :

Frequency	Connect mode	Antenna Polarity	Test Data	Test Result
915.5MHz	TX mode	Vertical	Diagram 5-19	Pass
		Horizontal	Diagram 5-20	Pass
921.26MHz	TX mode	Horizontal	Diagram 5-21	Pass
		Vertical	Diagram 5-22	Pass

Remark:

- 1) All restriction band have been tested.Only worst caseis reported.

NOTES:

- 1.All modes were measured and the worst case emission was reported.
2. H =Horizontal V=Vertical
3. Emission = Reading +Antenna Factor + Cable Loss –Amp Factor(if exist)
4. Emission level dBμV = 20 log Emission level μV/m
5. The lower limit shall apply at the transition frequencies
6. All the emissions outside of band should comply with 15.209 limits.

Remark :

The limit of 15.209 of 3 meter distance is

Frequency MHz	Distance m	Field strength		Distance m	Field strength dB μ V/m(QP)
		μ V/m	dB μ V/m(QP)		
30-88	3	100	40.0	10	30.0
88-216	3	150	43.5	10	33.5
216-960	3	200	46.0	10	36.0
960-1000	3	500	54.0	10	44.0
Above 1000	3	74.0 dB μ V/m (PK) 54.0 dB μ V/m (AV)		/	/

15.205 Restricted bands of operation:

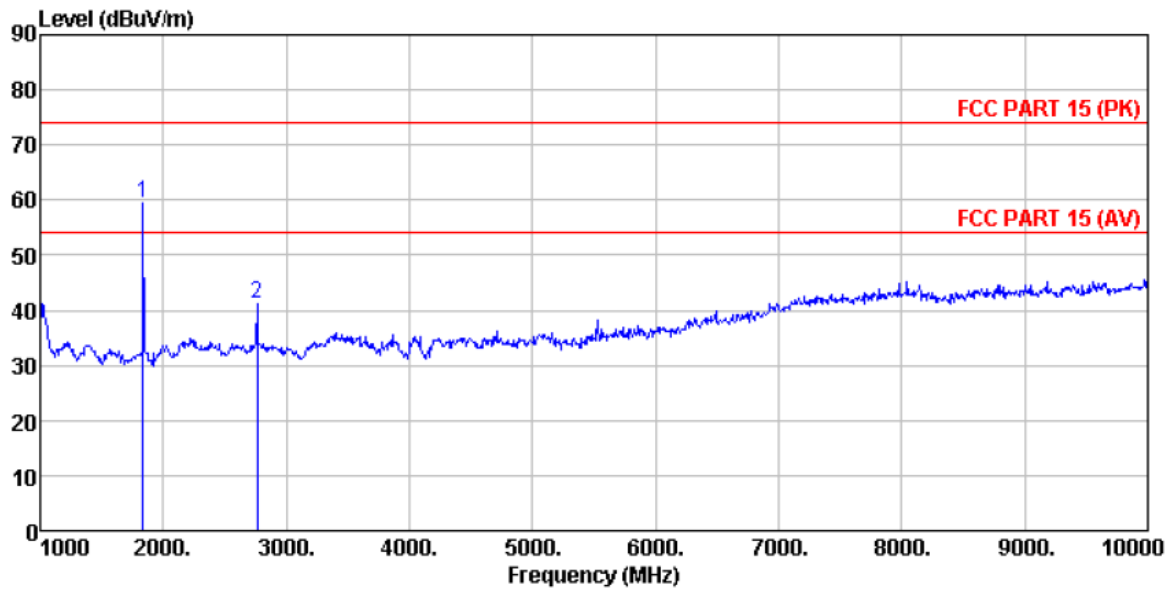
MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)

5.3.1 Diagram 5-1

CF: 921.26MHz

Ant. : Vertical

Harmonics Emission



	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1837.000	67.59	25.45	4.88	38.45	59.47	74.00	-14.53	Peak
2	2764.000	46.47	28.28	5.73	39.36	41.12	74.00	-32.88	Peak

Remark: The AV result is = Peak – [dutycycle factor].

AV value of 1837MHz :

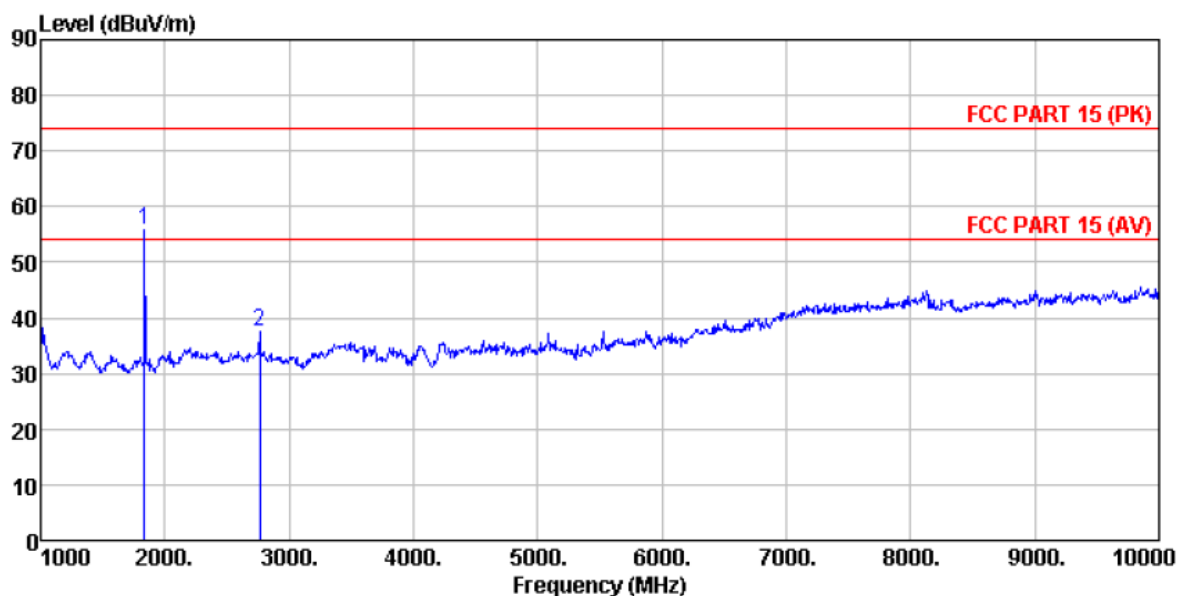
$59.47 - 10.34 = 49.13 \text{ dBuV/m} < 54 \text{ dBuV/m}$

5.3.2 Diagram 5-2

CF: 921.26MHz

Ant. : Horizontal

Harmonics Emission



	Read Freq	Antenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1837.000	63.77	25.45	4.88	38.45	55.65	74.00	-18.35	Peak
2	2764.000	42.95	28.28	5.73	39.36	37.60	74.00	-36.40	Peak

Remark: The AV result is = Peak – |dutycycle factor|.

AV value of 1837MHz :

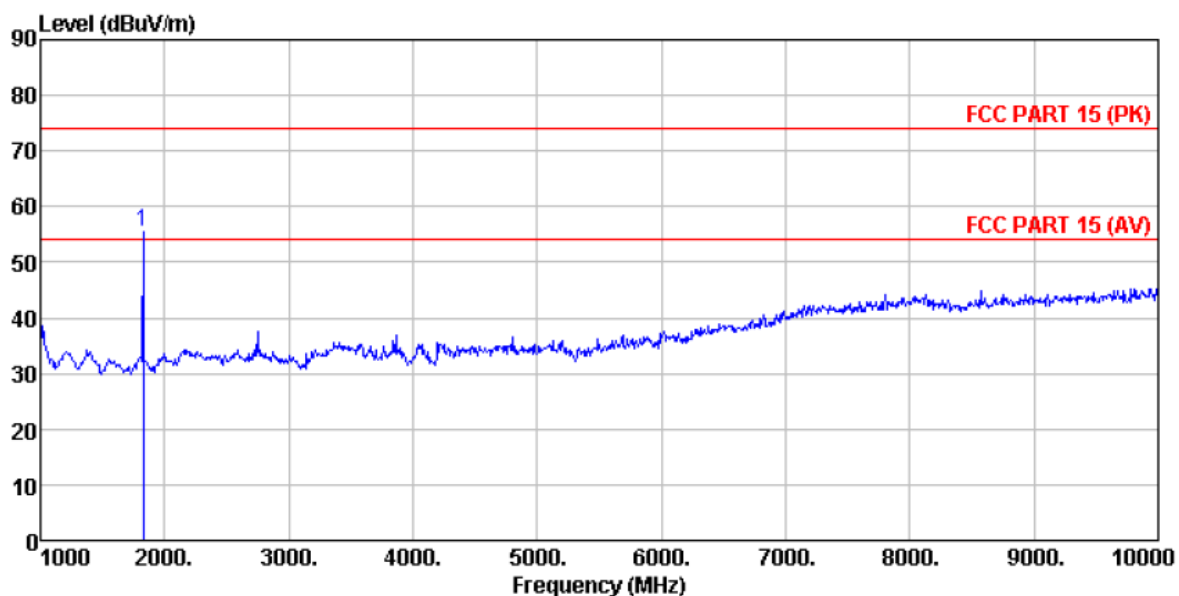
$55.65 - 10.34 = 45.31 \text{ dBuV/m} < 54 \text{ dBuV/m}$

5.3.3 Diagram 5-3

CF: 915.5MHz

Ant. : Horizontal

Harmonics Emission



	Read	Antenna	Cable	Preamp	Limit	Over			
	Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1828.000	63.52	25.42	4.87	38.45	55.36	74.00	-18.64	Peak

Remark: The AV result is = Peak – |dutycycle factor|.

AV value of 1828MHz :

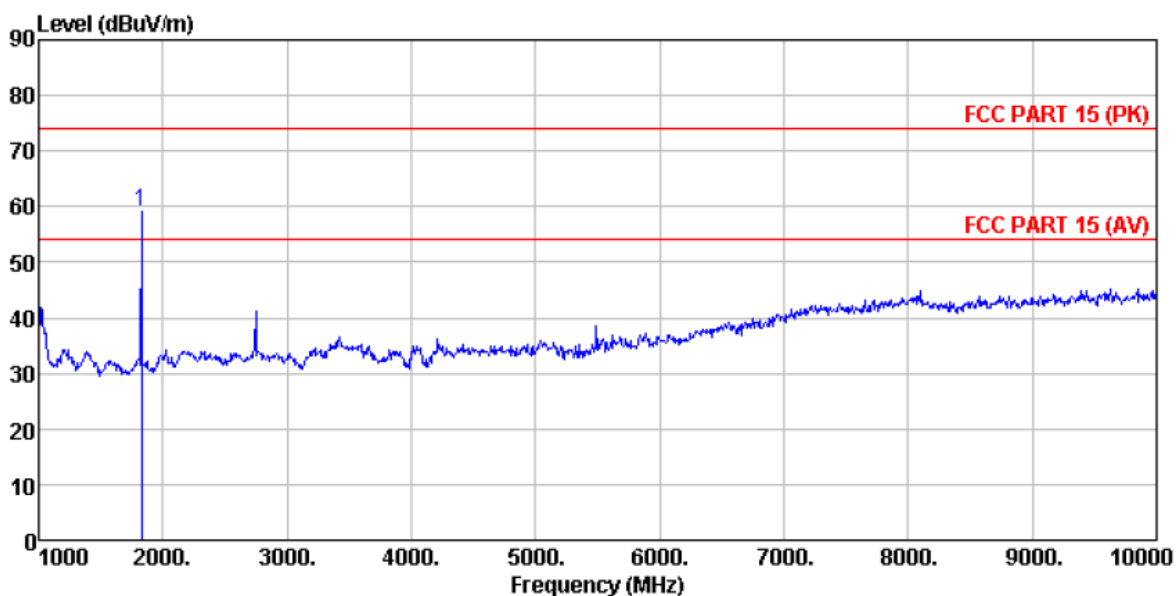
$55.36 - 10.34 = 45.02 \text{ dBuV/m} < 54 \text{ dBuV/m}$

5.3.4 Diagram 5-4

CF: 915.5MHz

Ant. : Vertical

Harmonics Emission



	Read	Antenna	Cable	Preamp	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit
-----	-----	-----	-----	-----	-----	-----	-----
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1 1828.000	67.28	25.42	4.87	38.45	59.12	74.00	-14.88 Peak

Remark: The AV result is = Peak – |dutycycle factor|.

AV value of 1828MHz :

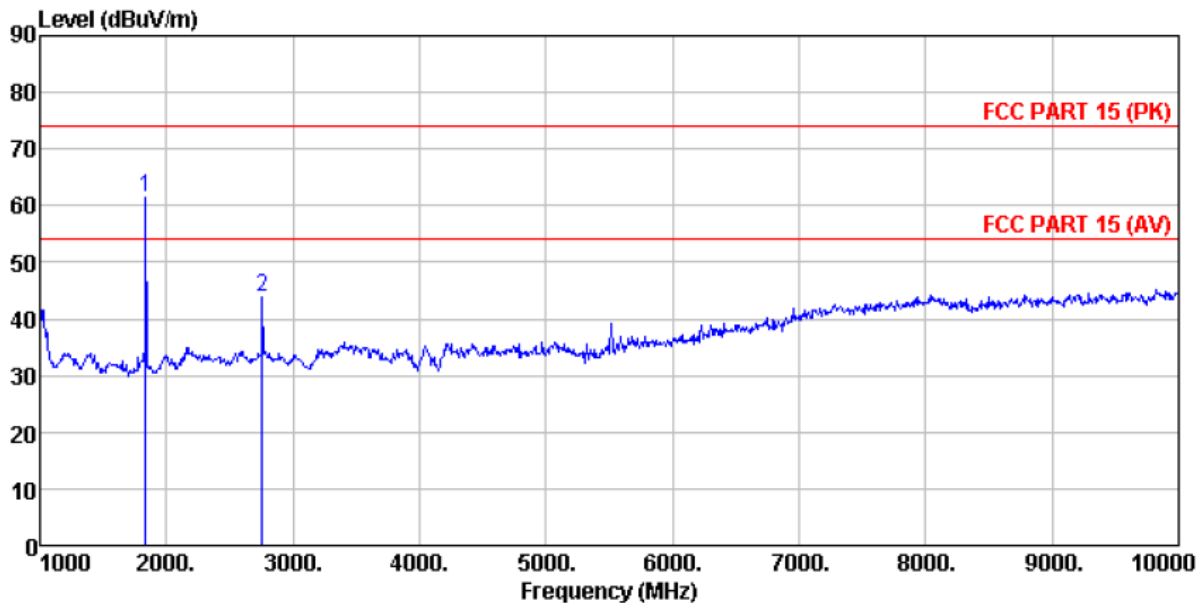
$59.12 - 10.34 = 48.78 \text{ dBuV/m} < 54 \text{ dBuV/m}$

5.3.5 Diagram 5-5

CF: 918.38MHz

Ant. : Vertical

Harmonics Emission



	ReadAntenna	Cable	Preamp	Limit	Over				
Freq	Level	Factor	Loss	Factor	Level	Line			
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m			
1	1837.000	69.69	25.45	4.88	38.45	61.57	74.00	-12.43	Peak
2	2755.000	49.24	28.26	5.72	39.35	43.87	74.00	-30.13	Peak

Remark: The AV result is = Peak – |dutycycle factor|.

AV value of 1837MHz :

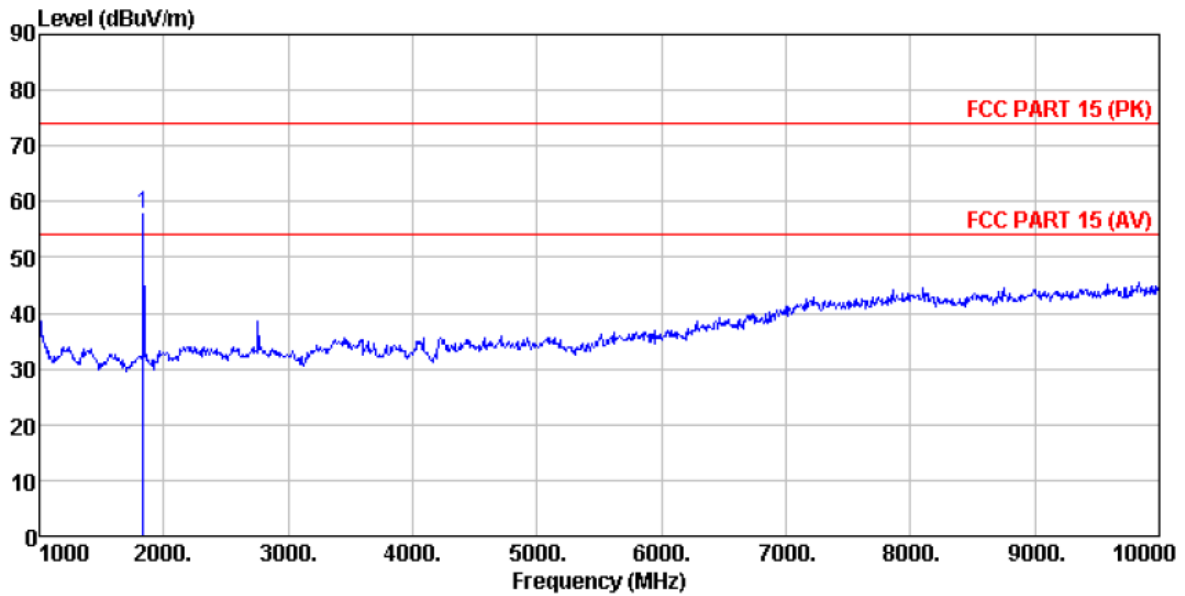
$61.57 - 10.34 = 51.23 \text{ dBuV/m} < 54 \text{ dBuV/m}$

5.3.6 Diagram 5-6

CF: 918.38MHz

Ant. : Horizontal

Harmonics Emission



	Read	Antenna	Cable	Preamp	Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	1837.000	65.78	25.45	4.88	38.45	57.66	74.00	-16.34 Peak

Remark: The AV result is = Peak – |duty cycle factor|.

AV value of 1837MHz :

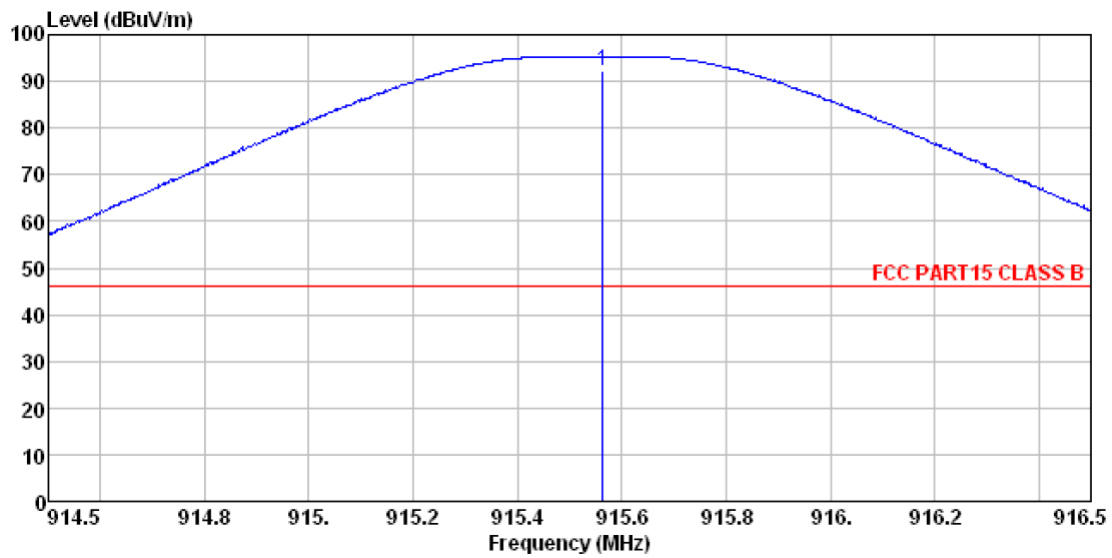
$57.66 - 10.34 = 47.32 \text{ dBuV/m} < 54 \text{ dBuV/m}$

5.3.7 Diagram 5-7

CF: 915.5MHz

Ant. : Vertical

Fundamental Emission



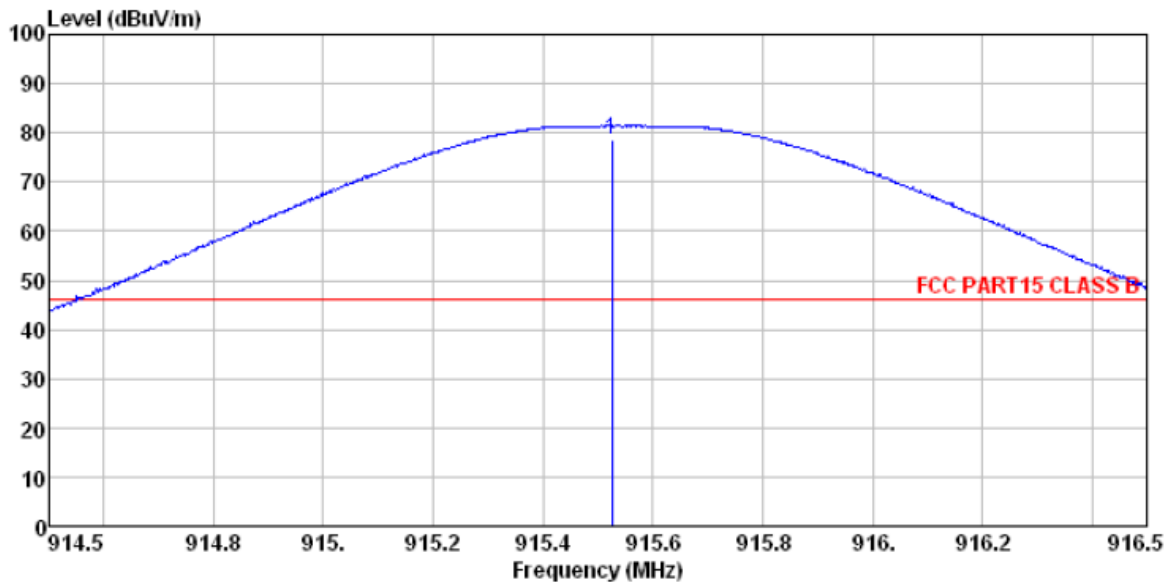
	ReadAntenna	Cable	Preamp		Limit	Over	
Freq	Level	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1 *	915.564	95.41	23.18	4.91	31.19	92.31	QP

5.3.8 Diagram 5-8

CF: 915.5MHz

Ant. : Horizontal

Fundamental Emission



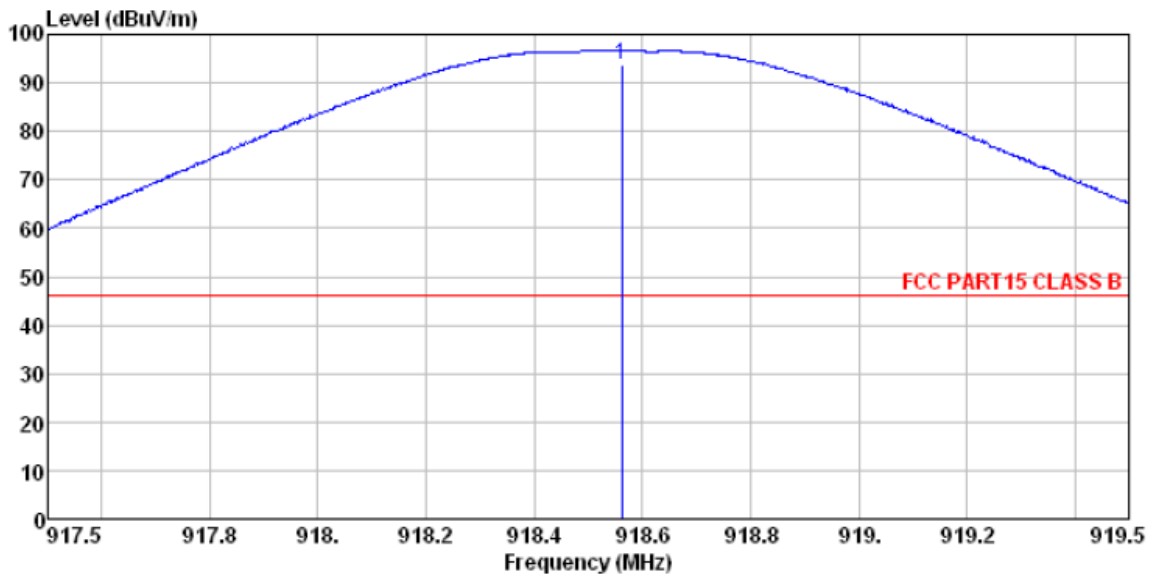
	ReadAntenna	Cable	Preamp	Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	
1 *	915.526	81.84	23.18	4.91	31.19	78.74	QP

5.3.9 Diagram 5-9

CF: 918.38MHz

Ant. : Vertical

Fundamental Emission



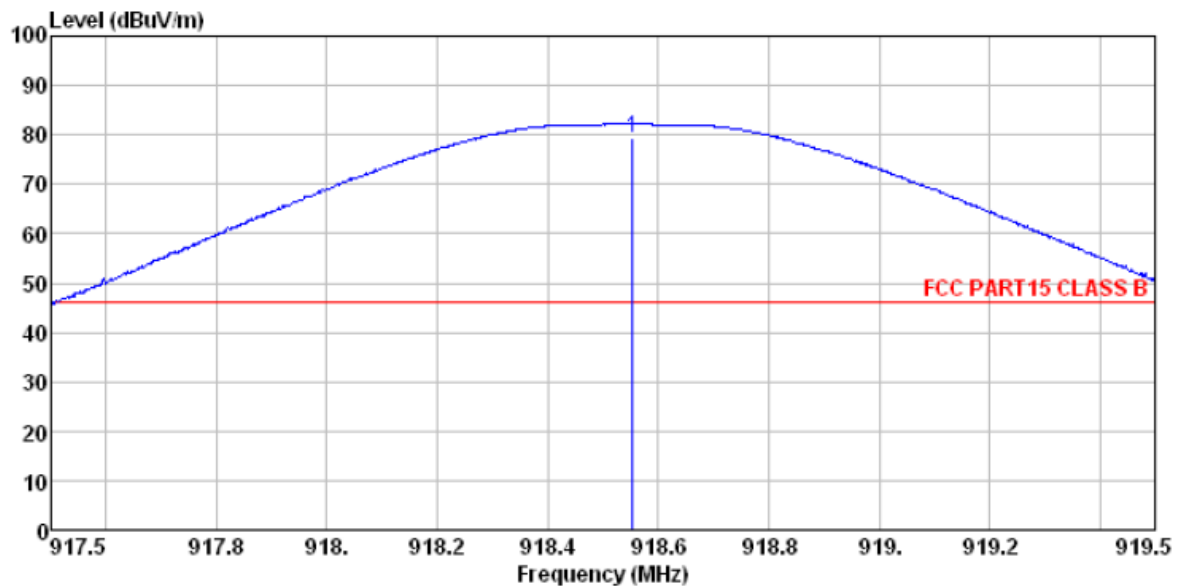
	ReadAntenna	Cable	Preamp	Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	
1 *	918.562	96.88	23.21	4.93	31.19	93.83	QP

5.3.10 Diagram 5-10

CF: 918.38MHz

Ant. : Horizontal

Fundamental Emission



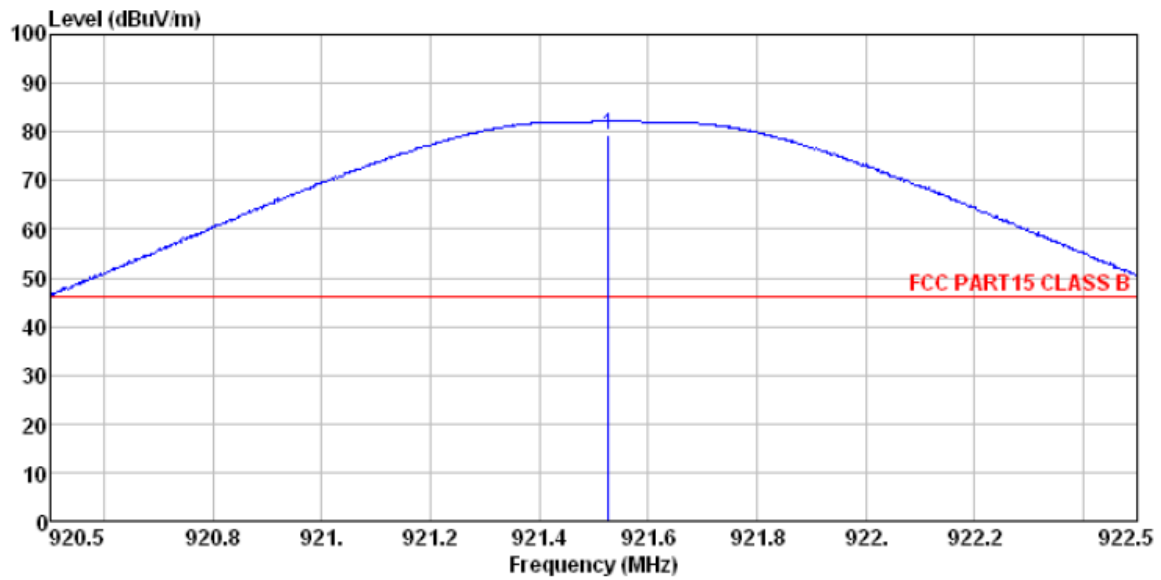
	ReadAntenna	Cable	Preamp	Limit	Over			
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 *	918.554	82.23	23.21	4.93	31.19	79.18		QP

5.3.11 Diagram 5-11

CF: 921.26MHz

Ant. : Horizontal

Fundamental Emission



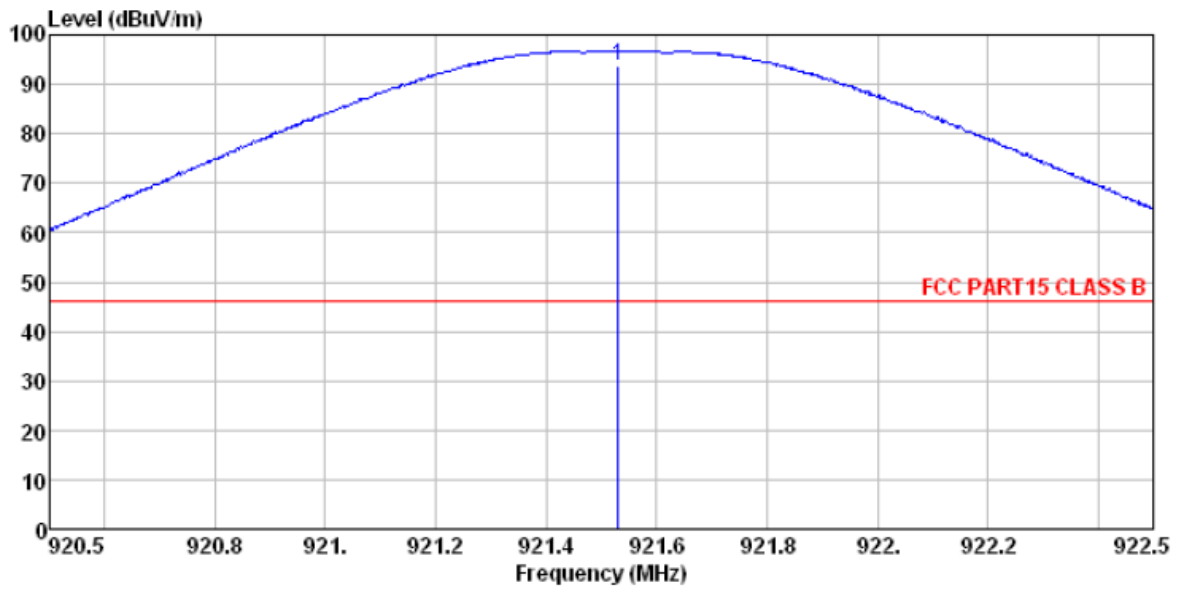
	ReadAntenna	Cable	Preamp	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line
-----	-----	-----	-----	-----	-----	-----
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m
1 * 921.528	82.21	23.24	4.93	31.19	79.19	
						QP

5.3.12 Diagram 5-12

CF: 921.26MHz

Ant. : Vertical

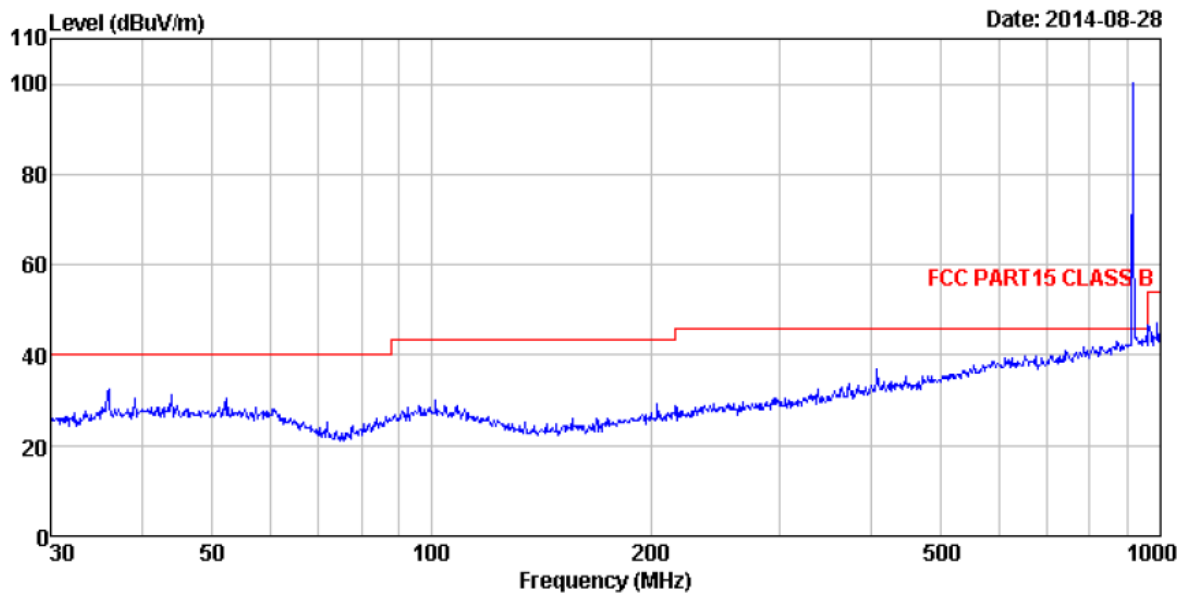
Fundamental Emission



	ReadAntenna	Cable	Preamp	Limit	Over		
Freq	Level	Loss	Factor	Line	Limit	Remark	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dB	
1 *	921.530	96.70	23.24	4.93	31.19	93.68	QP

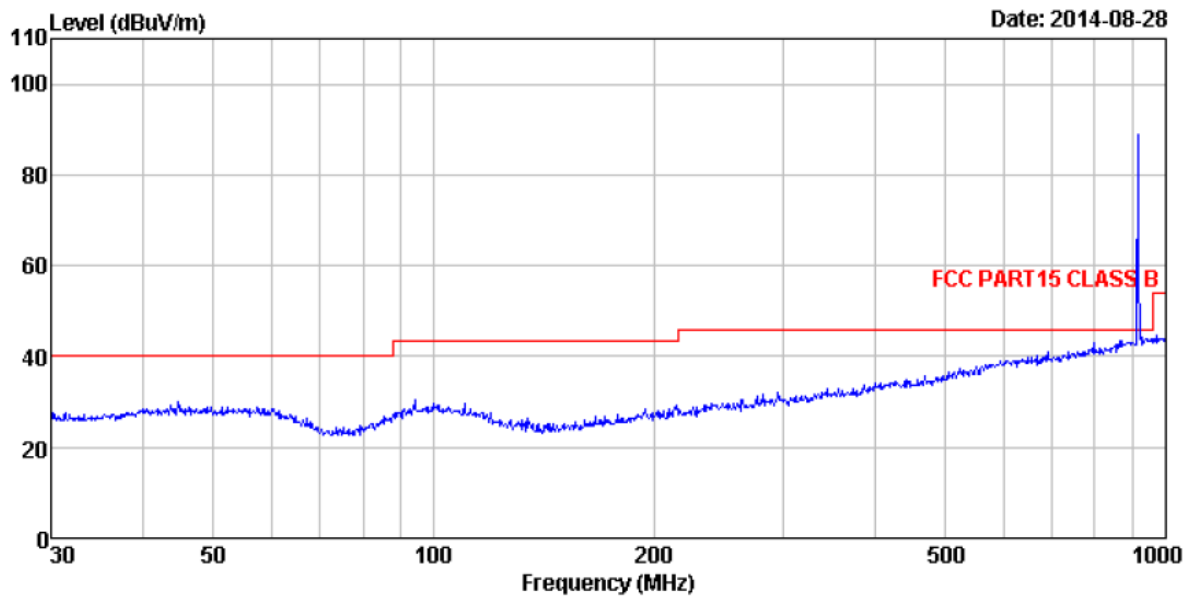
5.3.13 Diagram 5-13

CF: 915.5MHz
Ant. : Vertical
Spurious Emission



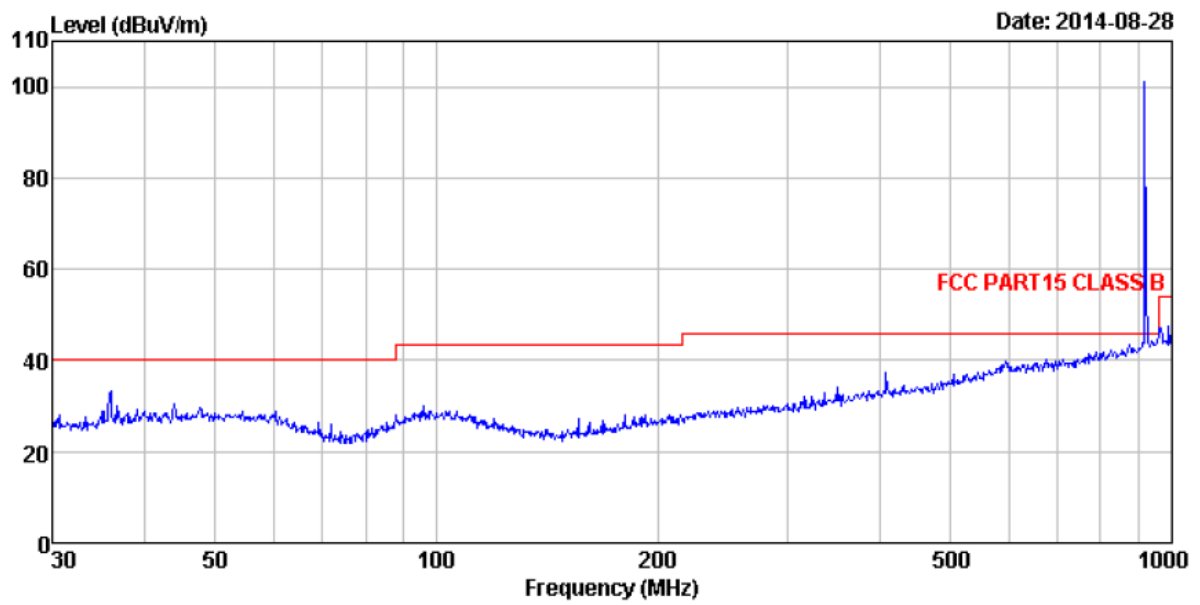
5.3.14 Diagram 5-14

CF: 915.5MHz
Ant. : Horizontal
Spurious Emission



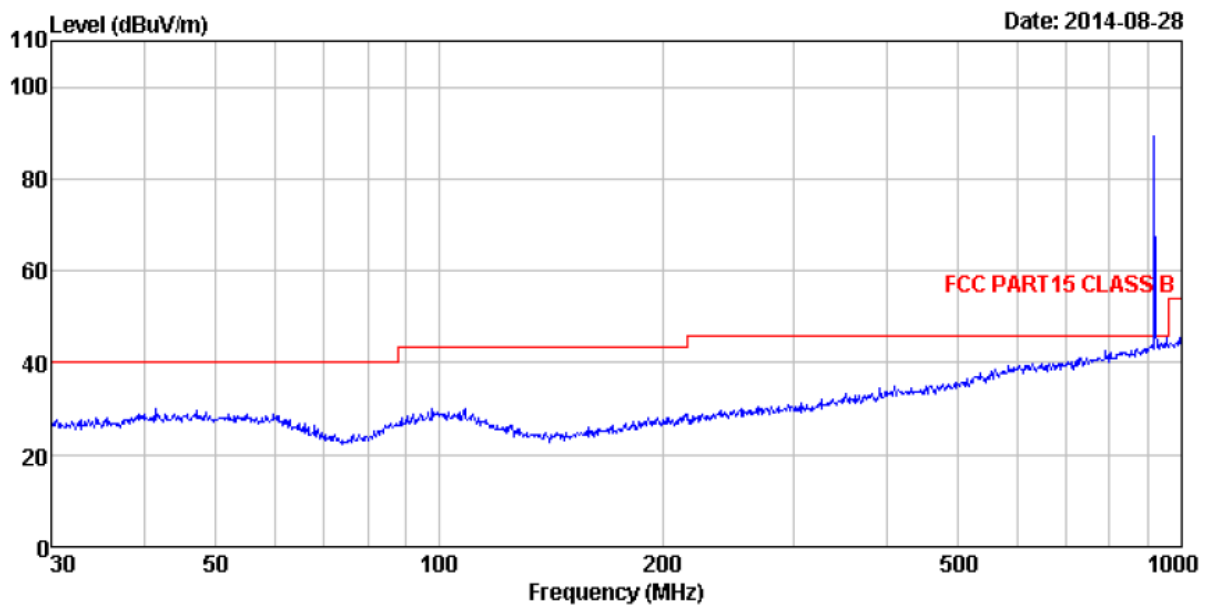
5.3.15 Diagram 5-15

CF: 918.38MHz
Ant. : Vertical
Spurious Emission



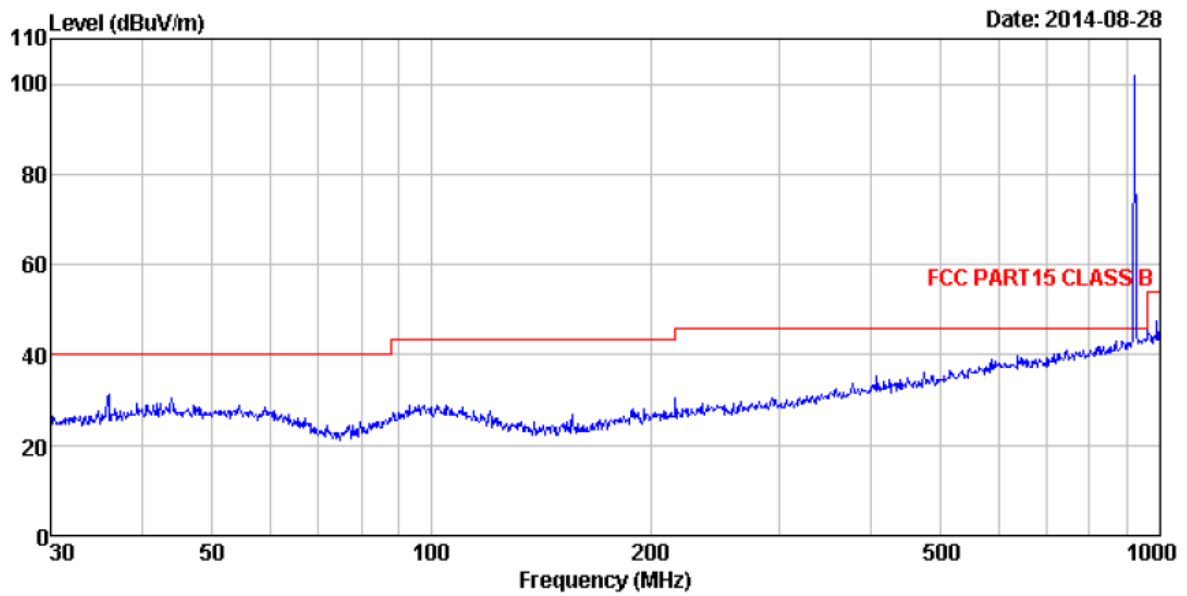
5.3.16 Diagram 5-16

CF: 918.38MHz
Ant. : Horizontal
Spurious Emission



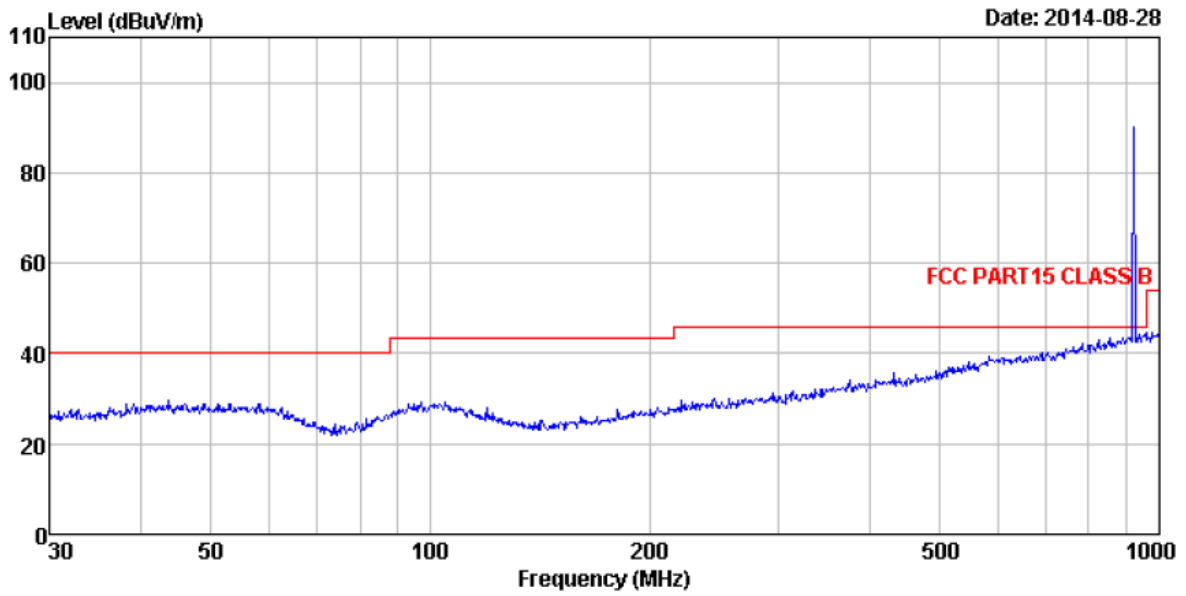
5.3.17 Diagram 5-17

CF: 921.26MHz
Ant. : Vertical
Spurious Emission



5.3.18 Diagram 5-18

CF: 921.26MHz
Ant. : Horizontal
Spurious Emission

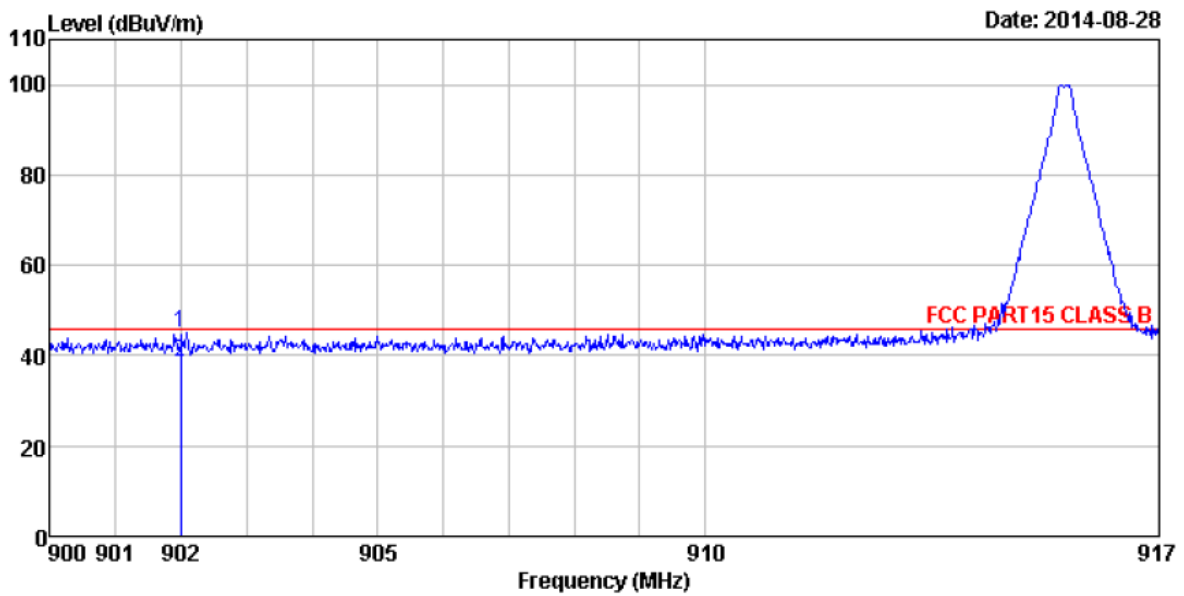


5.3.19 Diagram 5-19

915.5MHz

Ant. : Vertical

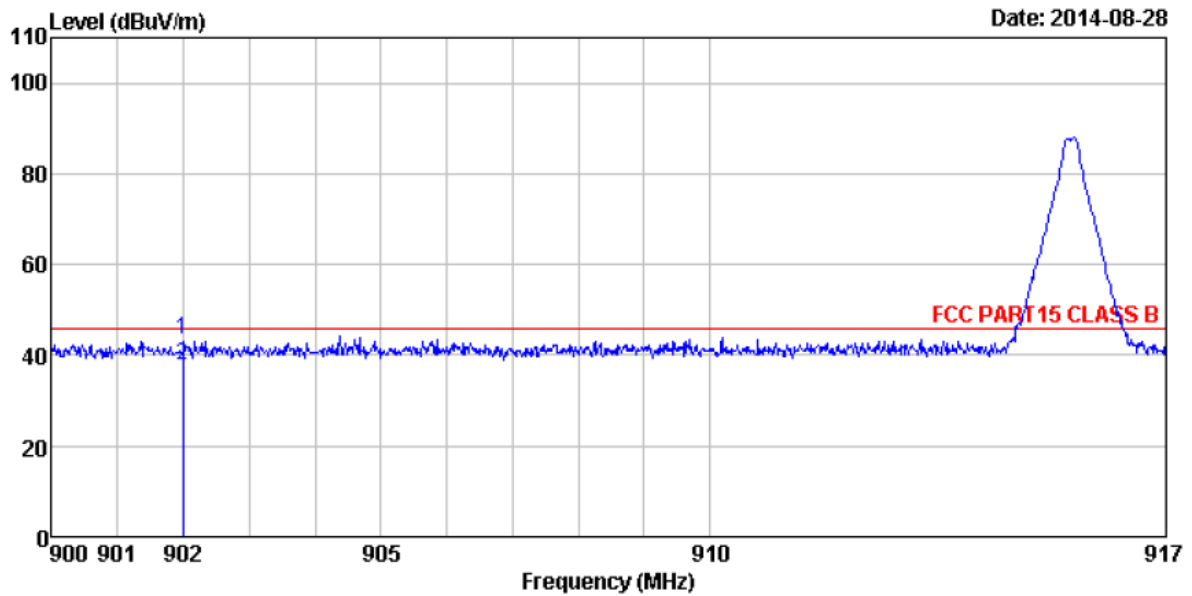
Band Edge



	ReadAntenna	Cable	Preamp		Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	
-----MHz	-----dBuV	-----dB/m	-----dB	-----dB	-----dBuV/m	-----dBuV/m	-----dB	
1	902.000	48.40	23.12	4.87	31.18	45.21	46.00	-0.79 Peak

5.3.20 Diagram 5-20

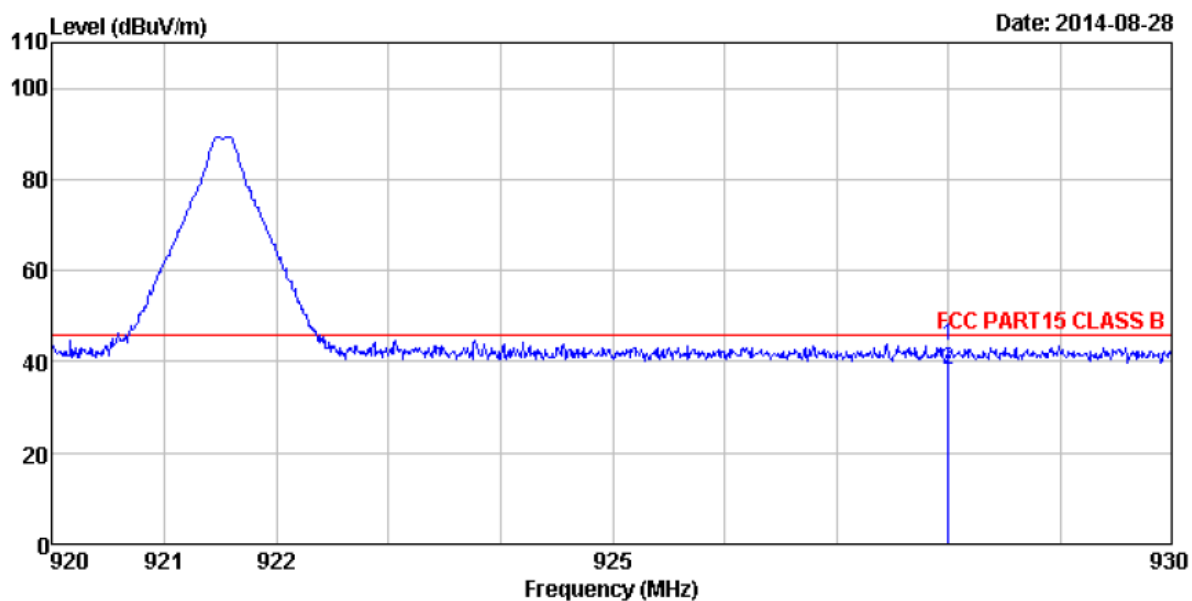
915.5MHz
Ant. : Horizontal
Band Edge



	Read	Antenna	Cable	Preamp	Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 902.000	46.70	23.12	4.87	31.18	43.51	46.00	-2.49	Peak

5.3.21 Diagram 5-21

921.26MHz
Ant. : Horizontal
Band Edge



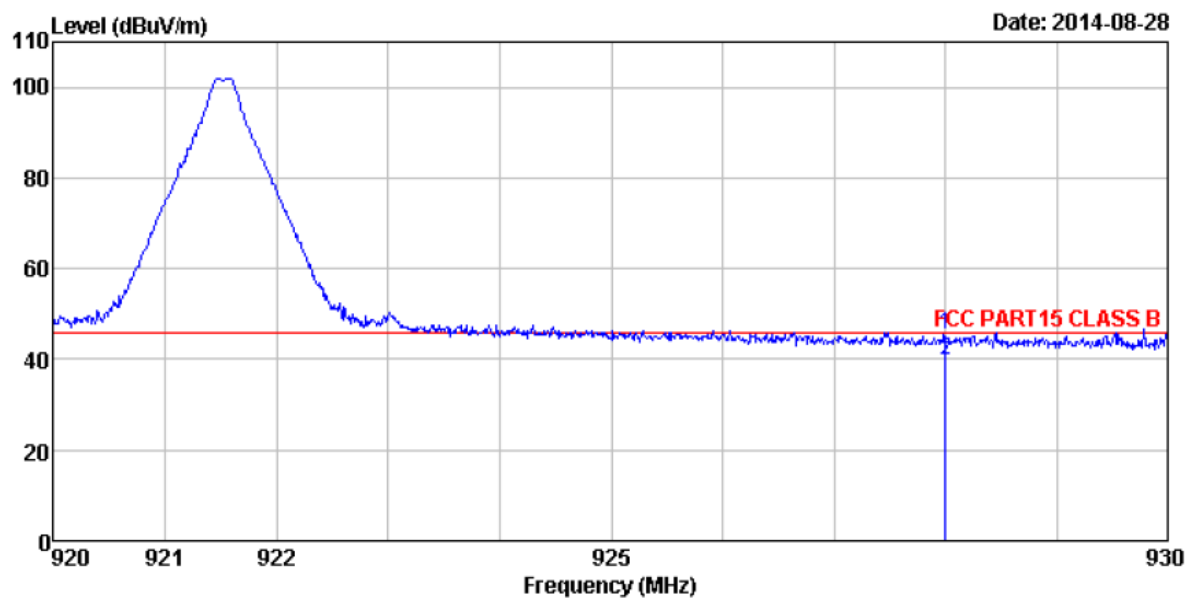
	Read	Antenna	Cable	Preamp	Limit	Over	
Freq	Level	Factor	Loss	Factor	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1 928.000	46.50	23.28	4.96	31.20	43.54	46.00	-2.46 Peak

5.3.22 Diagram 5-22

921.26MHz

Ant. : Vertical

Band Edge



	Read	Antenna	Cable	Preamp	Limit	Over	
Freq	Level	Factor	Loss	Factor	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1 928.000	48.60	23.28	4.96	31.20	45.64	46.00	-0.36 Peak

Remark : only worse case is reported

6. 20 dB bandwidth Test

6.1 Test Procedure

Clause 15.215(c) 20dB Bandwidth:

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

6.2 Measurement Equipment

	Equipment	Last Calibration	Type	Serial No.	Manufacturer
<input checked="" type="checkbox"/>	Spectrum	Jul. 04 2015	FSP30	GTS208	RS

6.3 Test Result:

Modulation	Channel	20dB bandwidth
MSK	CHL	840.000KHz
	CHM	780.000KHz
	CHH	840.000KHz

MSK diagrams are as below:

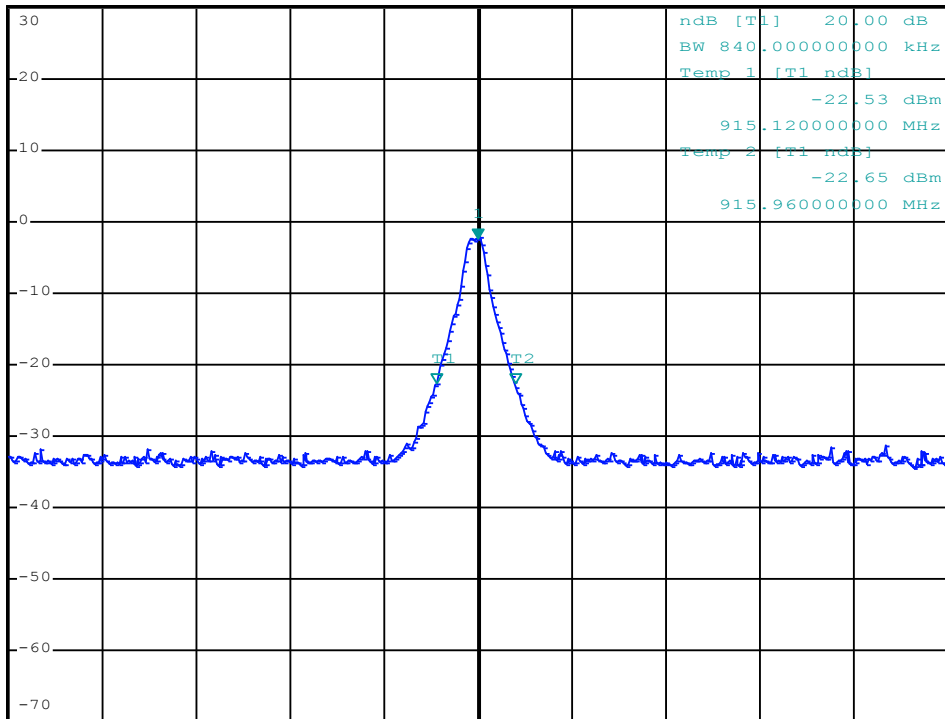


*RBW 100 kHz Marker 1 [T1]
VBW 300 kHz -2.32 dBm
SWT 2.5 ms 915.560000000 MHz

Ref 30 dBm

Att 60 dB

1 PK
MAXH



Center 915.56 MHz

1 MHz/

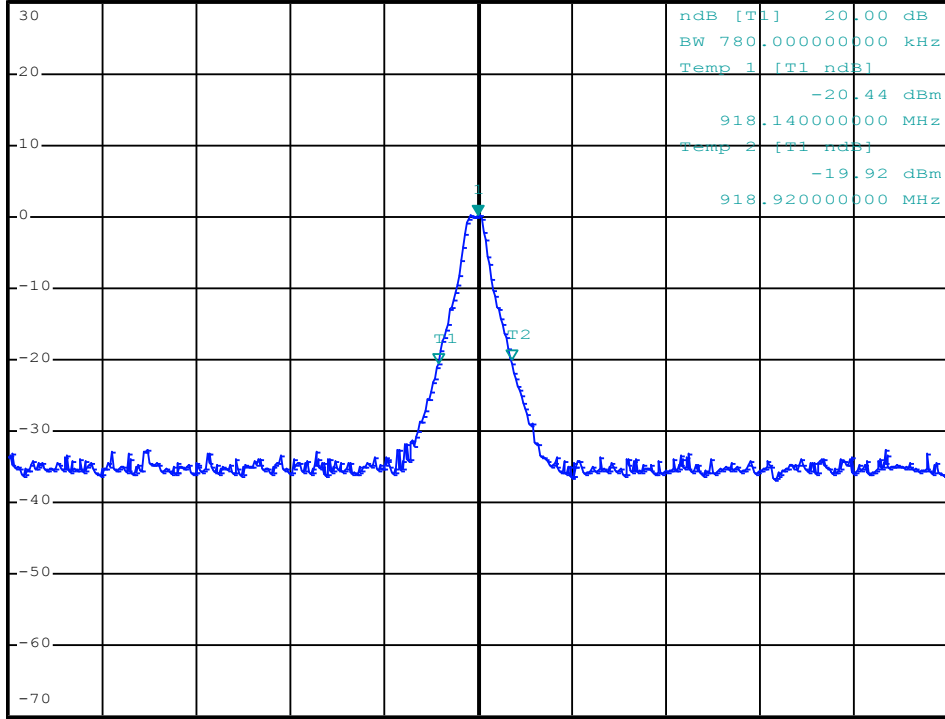
Span 10 MHz



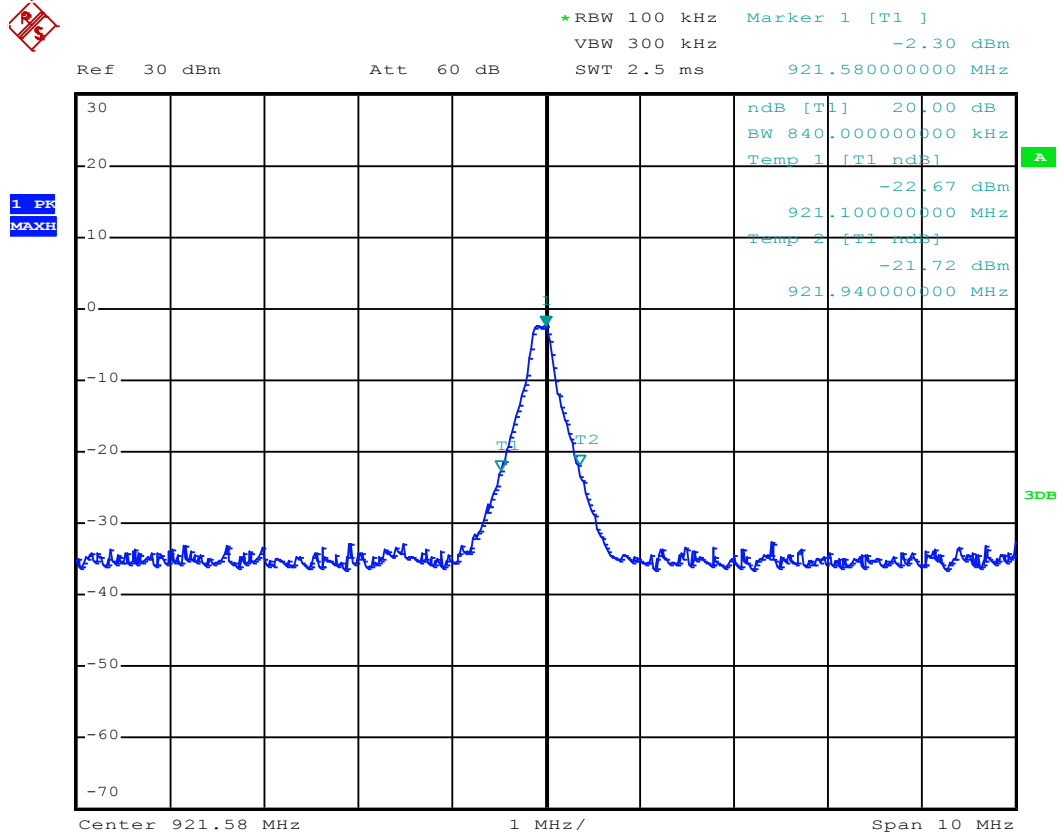
*RBW 100 kHz Marker 1 [T1]
VBW 300 kHz 0.09 dBm
SWT 2.5 ms 918.56000000 MHz

Ref 30 dBm Att 60 dB

1 PK
MAXH



Center 918.56 MHz 1 MHz/ Span 10 MHz



7. Ducty Cycle Correction factor TEST

7.1 Test Procedure

The measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 s. As an alternative (provided the unlicensed wireless device operates for longer than 0.1 s) or in cases where the pulse train exceeds 0.1 s, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval while the field strength is at its maximum value.

When the average value of the pulsed emissions from an EUT must be determined, the average can be found by measuring the peak pulse amplitude and determining the duty cycle correction factor of the pulse modulation.

7.2 Measurement Equipment

	Equipment	Last Calibration	Type	Serial No.	Manufacturer
<input checked="" type="checkbox"/>	Spectrum	Jul. 04 2015	FSP30	GTS208	RS

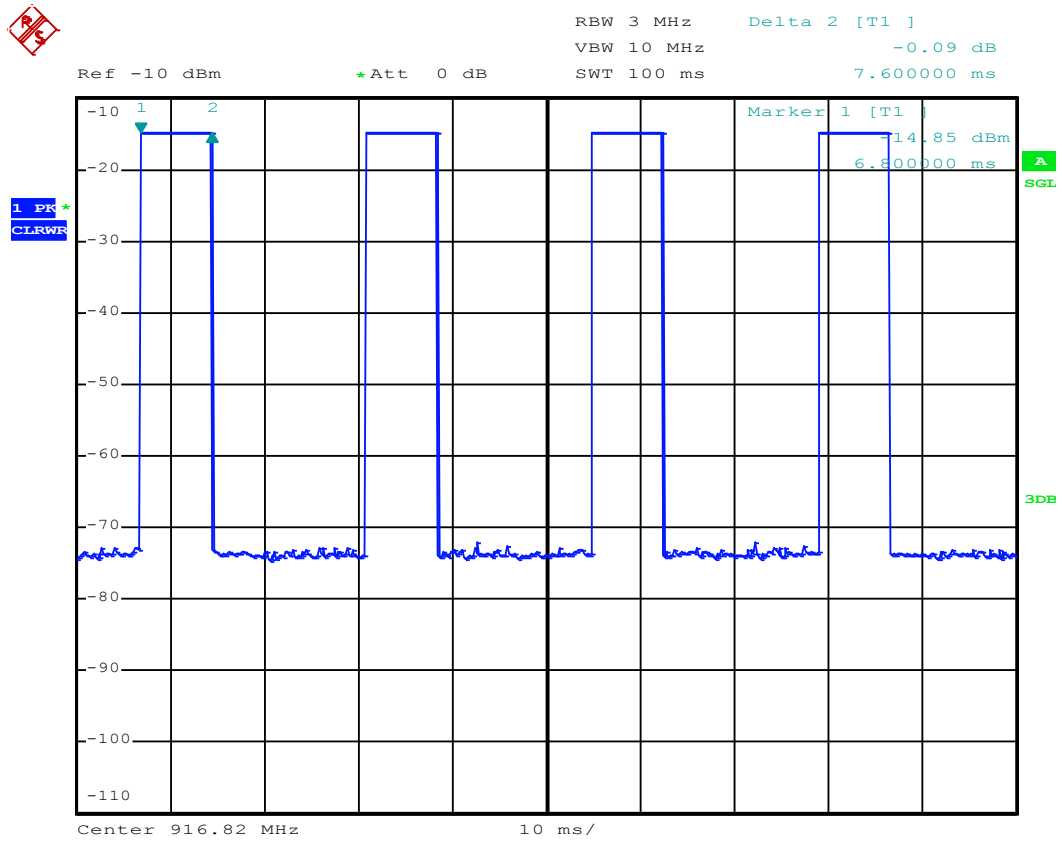
7.3 Test Result

Duty Cycle factor correction factor = $20 \log (\text{dwell time} / 100\text{ms})$

Ducy Cycle correction factor = $20 \log (4 \times 7.6\text{ms} / 100\text{ms}) = -10.34 \text{ dB}$

Refer to below results for detail.

7.3.1 Diagram 7-1



$$\text{Duty cycle correction factor} = 20 \log (4 \times 7.6 \text{ms} / 100 \text{ms}) = -10.34 \text{dB}$$

8 Antenna requirement

8.1 Requirement

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.

8.2 Result

The antenna used for this product is Internal Patch antenna that no antenna other than that furnished by the responsible party shall be used with the device, The maximum peak gain of this antenna is 0dBi.

Appendix A Sample Label

Labelling Requirements

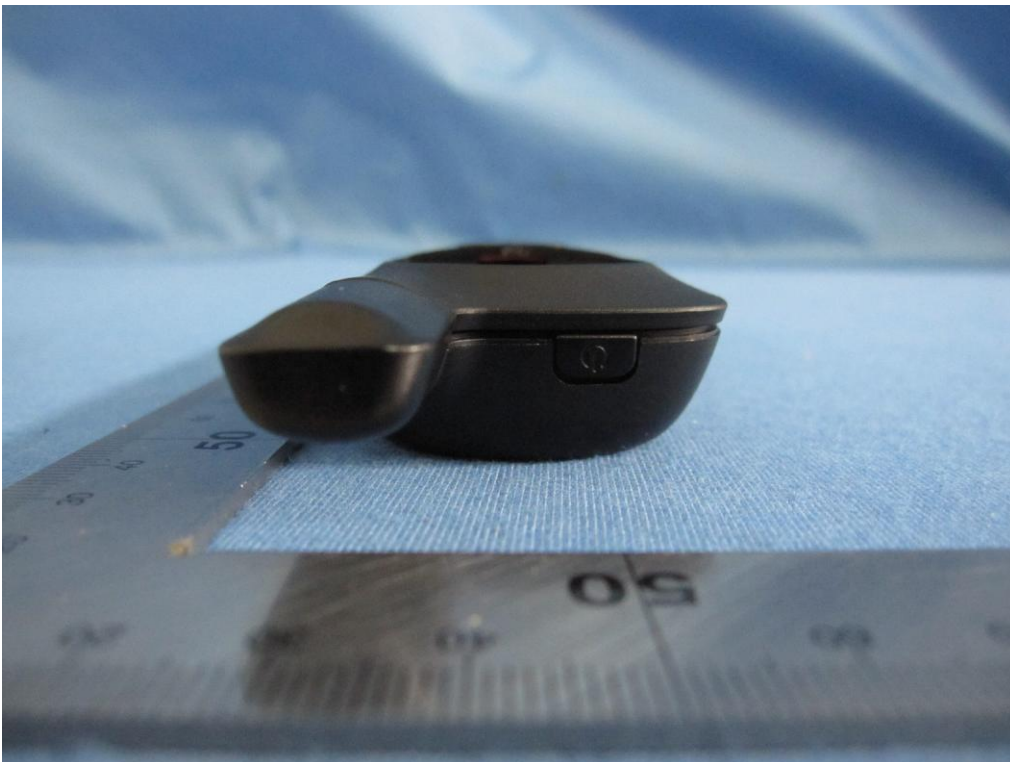
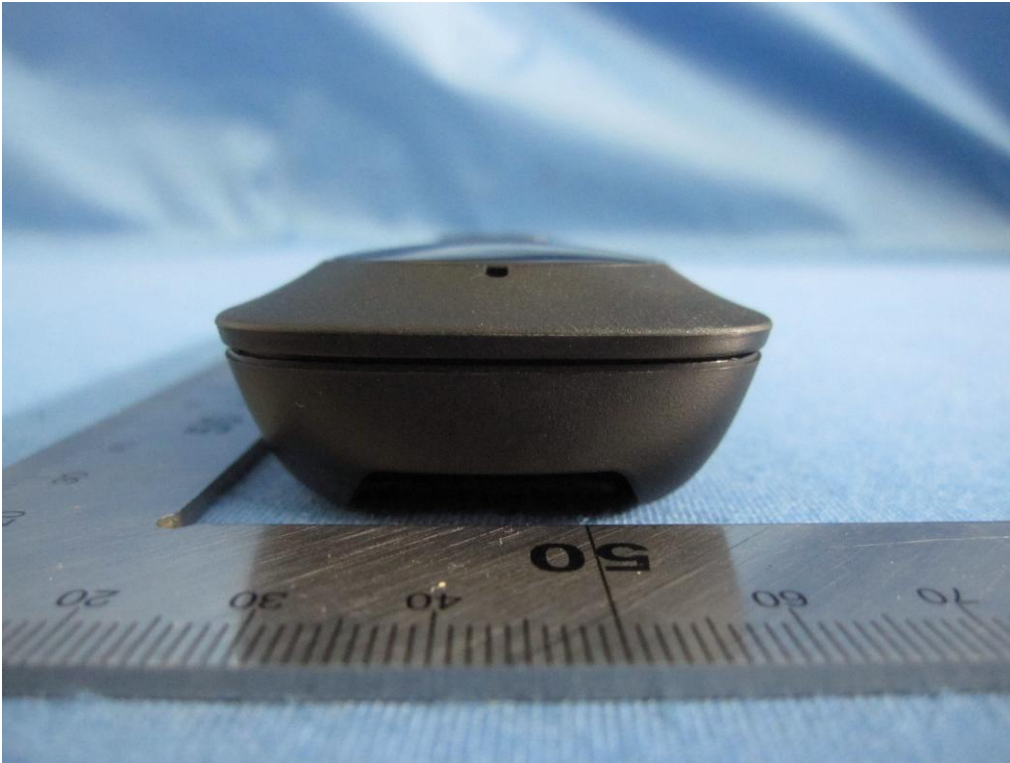
The sample label shown shall be permanently affixed at a conspicuous location on the device and be readily visible to the user at the time of purchase.

*** The following paragraph specified in the label.
FCC ID: VLJ-T100T

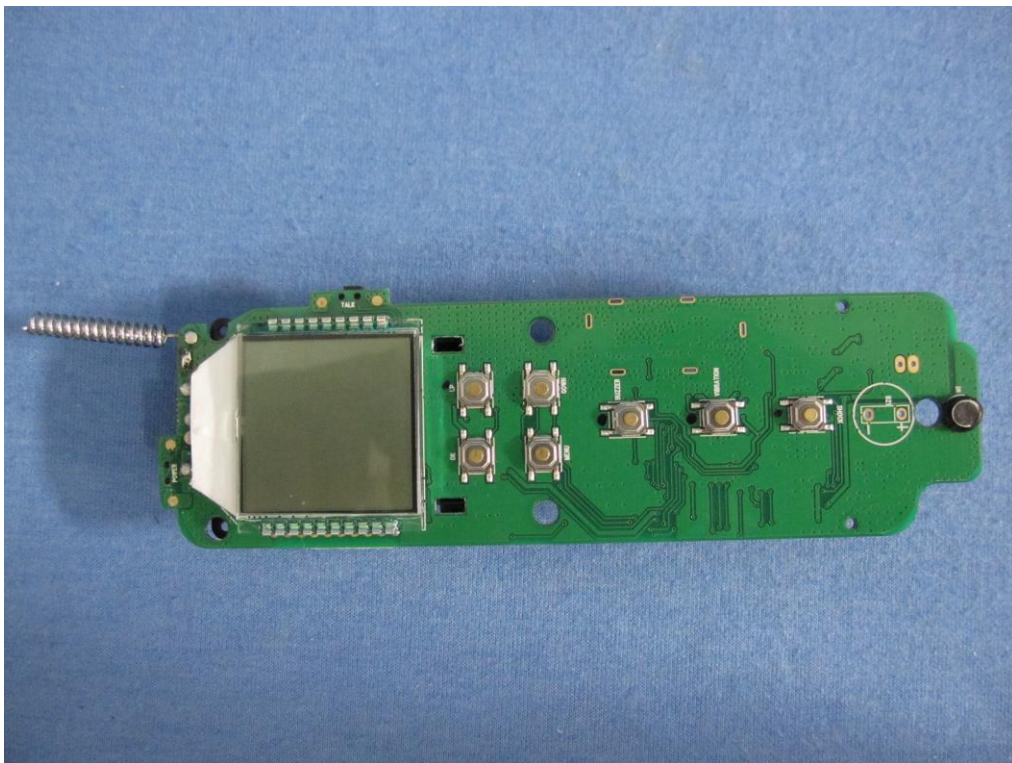
Appendix B EUT external photo

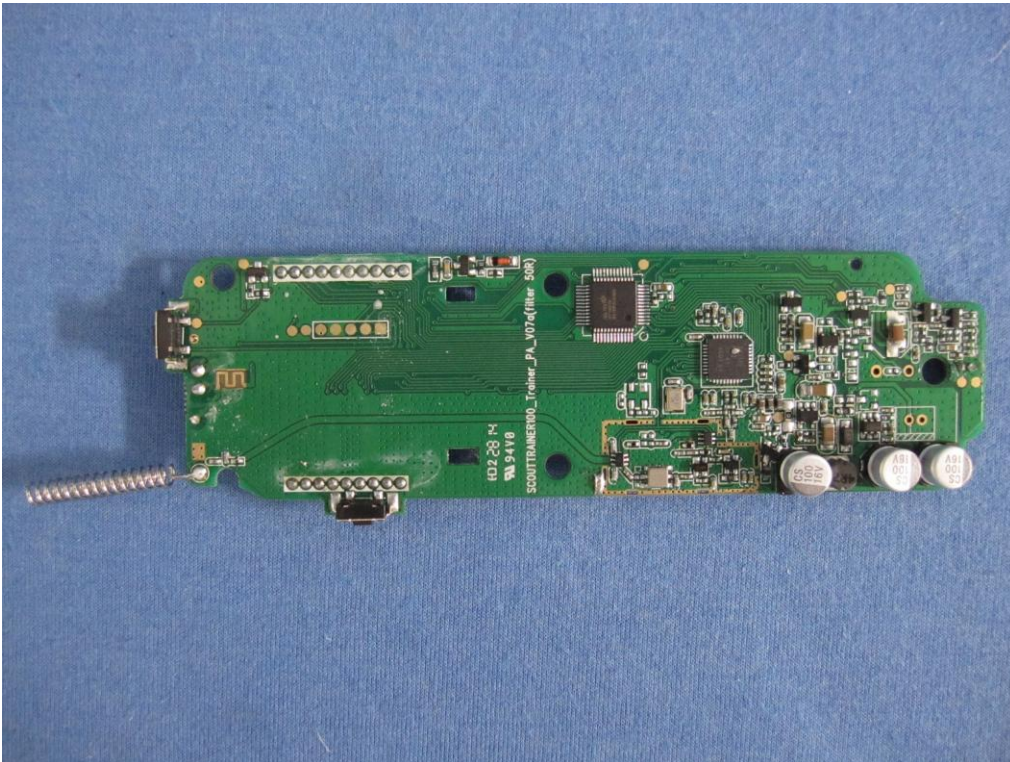
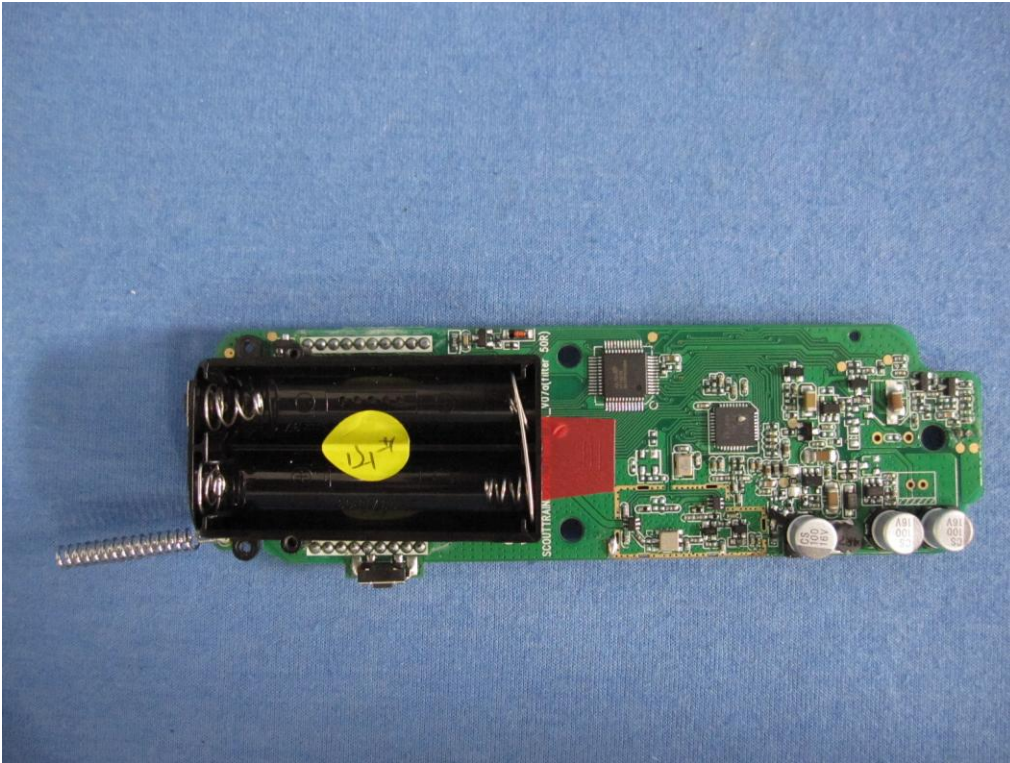


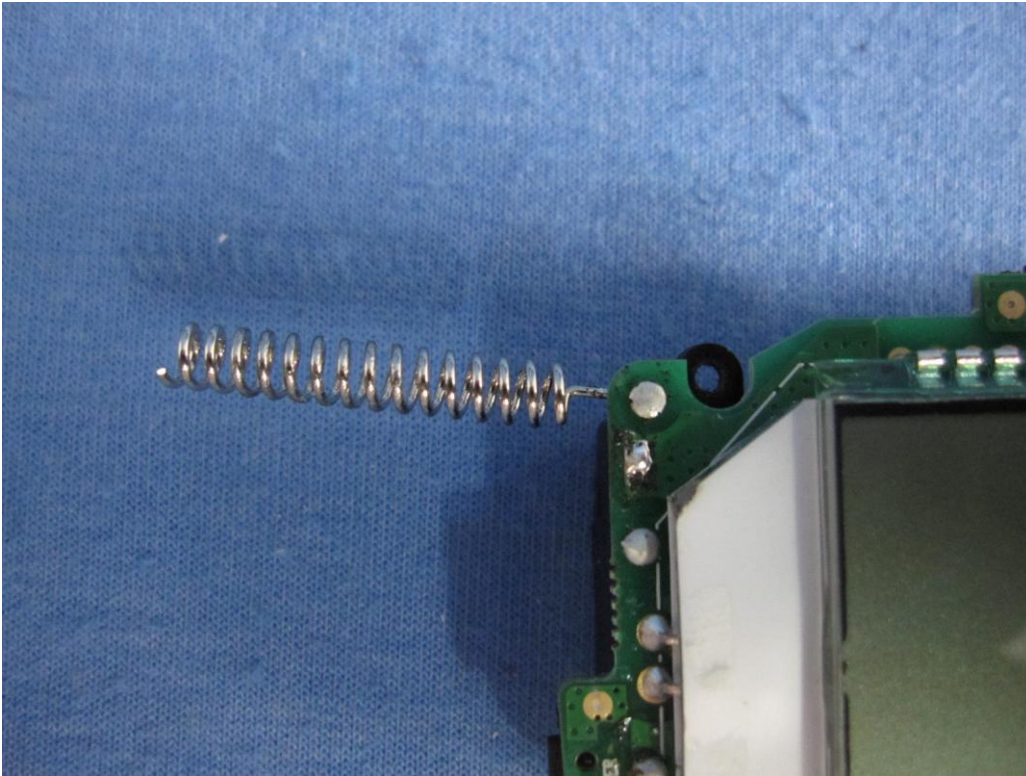




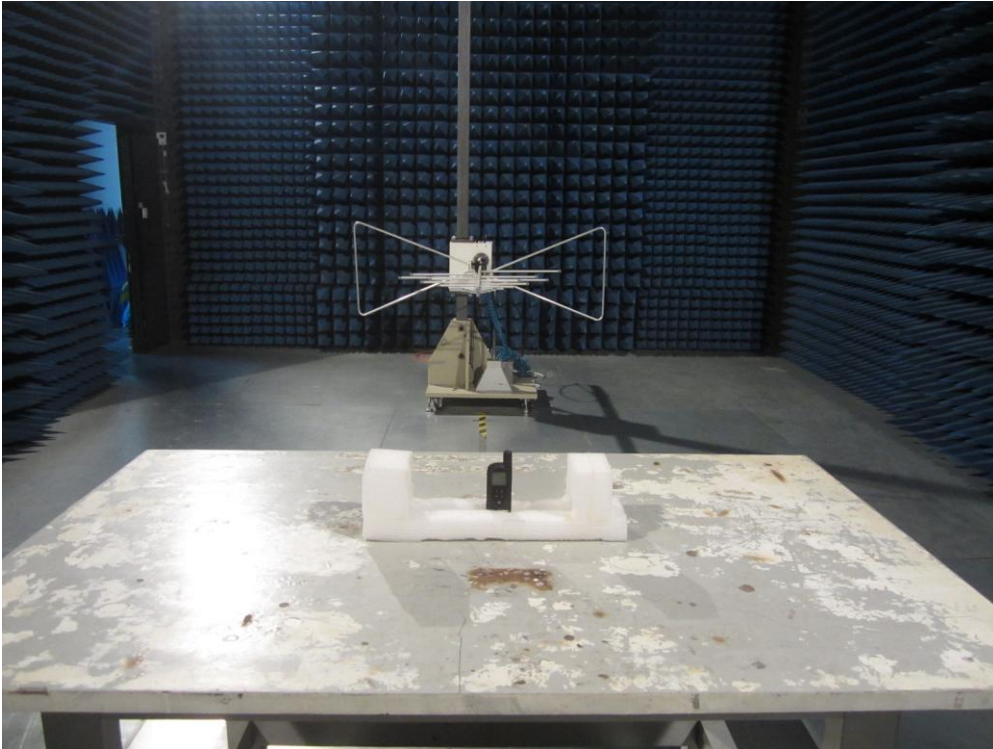
Appendix C EUT internal photo



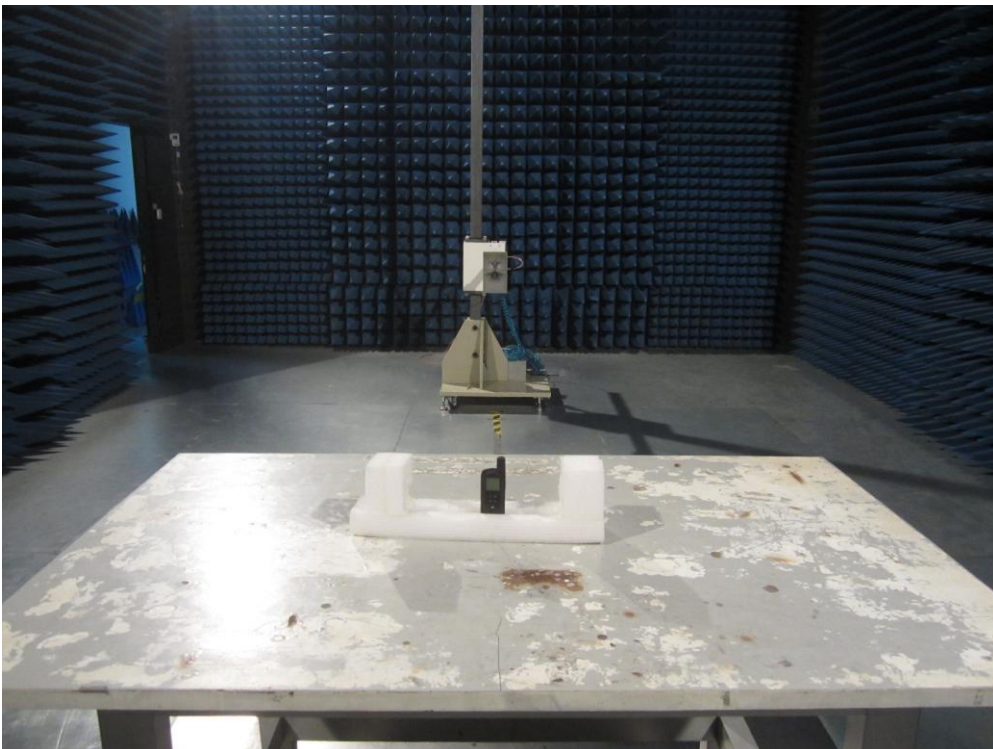




Appendix D setup photo



Radiated emission



Radiated emission

*****END OF REPORT*****