

Advanced
Compliance Laboratory

6 Randolph Way
Hillsborough, NJ 08844
Tel: (908) 927 9288
Fax: (908) 927 0728

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT of

MULTI-MODE STAFF TAG

MODEL: ITD-763

FCC ID: ST2-DM763

September 17, 2012

This report concerns (check one): Original grant ☒ Class II change ☐
Equipment type: Low Power Intentional Radiator

Deferred grant requested per 47 CF 0.457(d)(1)(ii)? yes ☐ no ☒
If yes, defer until: _____ (date)
Company 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 ☒
If no, assumed Part 15, Subpart B for unintentional radiators - the new 47 CFR
[10-1-90 Edition] provision.

Report prepared for: CENTRAK, INC.
Report prepared by: Advanced Compliance Lab
Report number: 0048-120904-02



Lab Code: 200101

The test result in this report IS supported and covered by the NVLAP accreditation

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1. GENERAL INFORMATION

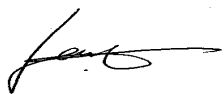
1.1 Verification of Compliance

EUT: MULTI-MODE STAFF TAG
 Model: ITD-763
 Applicant: CENTRAK, INC.
 Test Type: FCC Part 15C Sec. 15.249 CERTIFICATION
 Result: PASS
 Tested by: ADVANCED COMPLIANCE LABORATORY
 Test Date: September 17, 2012
 Report Number: 0048-120904-02

The above equipment was tested by Compliance Laboratory, Advanced Technologies, Inc. for compliance with the requirement set forth in the FCC rules and regulations Part 15 subpart C. This said equipment in the configuration described in the report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

The estimated uncertainty of the test result is given as following. The method of uncertainty calculation is provided in Advanced Compliance Lab. Doc. No. 0048-01-01.

	Prob. Dist.	Uncertainty(dB)	Uncertainty(dB)	Uncertainty(dB)
		30-1000MHz	1-6.5GHz	Conducted
Combined Std. Uncertainty u_c	norm.	± 2.36	± 2.99	± 1.83



Wei Li
 Lab Manager
 Advanced Compliance Lab

Date September 17, 2012

1.2 Equipment Modifications

N/A

1.3 Product Information

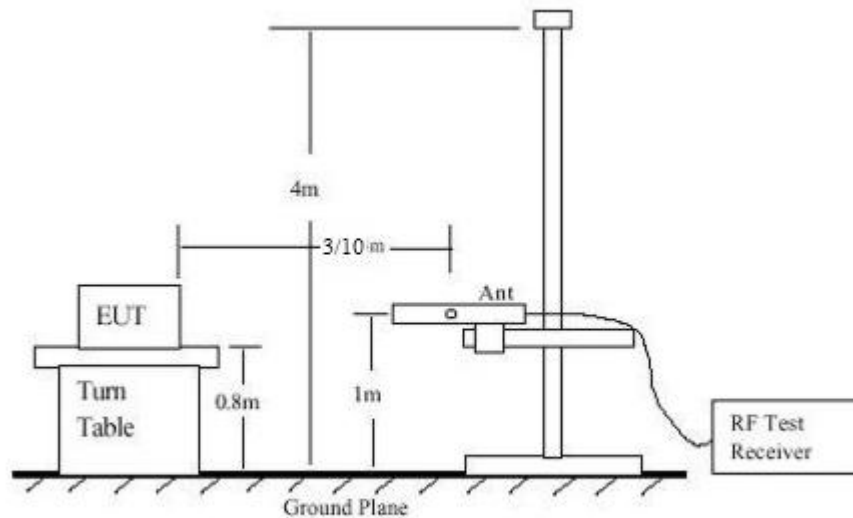
System Configuration

ITEM	DESCRIPTION	FCC ID	CABLE
Product	MULTI-MODE STAFF TAG (1)	ST2-DM763	
Housing	PLASTICS		
Power Supply	3V DC Battery		
Operation Freq.	904MHz ~ 926MHz , 2412MHz ~ 2462MHz		
Receiver	2X76Y(RX)	Verification	

(1) EUT submitted for grant.

1.4 Test Methodology

Radiated tests were performed according to the procedures in ANSI C63.4-2003 at an antenna to EUT distance of 3/10 meters.



Radiated Emission Measurement

1.5 Test Facility

The open area test site and conducted measurement facility used to collect the radiated and conducted data are located at Hillsborough, New Jersey. This site has been accepted by FCC to perform measurements under Part 15 or 18 in a letter dated May 19, 1997 (Refer to: 31040/PRV 1300F2). The NVLAP Lab code for accreditation of FCC EMC Test Method is: 200101-0.

1.6 Test Equipment

Manufacture	Model	Serial No.	Description	Cal Due dd/mm/yy
Hewlett-Packard	HP8546A	3448A00290	EMI Receiver	15/10/12
Agilent	E4440A	US40420700	3Hz-26.5GHz Spectrum Analyzer	25/8/13
EMCO	3104C	9307-4396	20-300MHz Biconical Antenna	15/01/13
EMCO	3146	9008-2860	200-1000MHz Log-Periodic Antenna	15/01/13
ARA	MWH-1826/B	1013	18-26GHZ Horn Antena	10/2/2013
EMCO	3115	4945	Double Ridge Guide Horn Antenna	22/01/13
Electro-Meterics	ALR-25M/30	289	10KHz-30MHz Active Loop Antenna	28/05/13
Fischer Custom	LISN-1	900-4-0008	Line Impedance Stabilization Networks	18/03/13
Fischer Custom	LISN-2	900-4-0009	Line Impedance Stabilization Networks	24/03/13

All Test Equipment Used are Calibrated Traceable to NIST Standards.

1.7 Statement for the Document Use

This report shall not be reproduced except in full, without the written approval of the laboratory. And this report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

2. PRODUCT LABELING

FCC ID: ST2-DM763

This device complies with part 15 of the FCC Rules. Operating is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

**Figure 2.1 FCC ID Label
(Only FCC ID shown on EUT)**



Figure 2.2 FCC Label Location

3. SYSTEM TEST CONFIGURATION

3.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it). And its antenna was permanently attached to the EUT: wire type (max length 3”) for 900MHz band & stripe line antenna for 2.4GHz Band.

Testing was performed as EUT was continuously operated at the following frequency channels:

Low=904MHz, Middle= 915MHz, High=926MHz and
Low=2412MHz, Middle= 2437MHz, High=2462MHz

Fresh external battery was used for extended operating time.

3.2 Special Accessories

N/A

3.3 Configuration of Tested System

Figure 3.1 to Figure 3.4 illustrate this system, which is tested standing along.



Figure 3.1 Radiated Test Setup, position 1



Figure 3.2 Radiated Test Setup, position 2



Figure 3.3 Radiated Test Setup, position 3





Figure 3.4 Radiated Test Setup

4. SYSTEM SCHEMATICS

See Attachment.

Figure 4.1 System Schematics

5. RADIATED EMISSION DATA

5.1 Field Strength Calculation

The corrected field strength is automatically calculated by EMI Receiver using following:

$$FS = RA + AF + CF + AG$$

where FS: Corrected Field Strength in dB μ V/m

RA: Amplitude of EMI Receiver before correction in dB μ V

AF: Antenna Factor in dB/m

CF: Cable Attenuation Factor in dB

AG: Built-in Preamplifier Gain in dB (Stored in receiver as part of the calibration data)

THE "DUTY CYCLE CORRECTION FACTOR" FOR SPURIOUS RADIATED EMISSIONS IS;
 $20 \log * (4 \text{ ms} / 100 \text{ ms}) = -28 \text{ dB}$, WHICH WAS USED TO CORRECT THE AVERAGE RADIATED EMISSION READINGS.

5.2 Test Methods and Conditions

The initial step in collecting radiated data is a EMI Receiver scan of the measurement range below 30MHz using peak detector and 9KHz IF bandwidth / 30KHz video bandwidth. For the range 30MHz - 1GHz, 100KHz IF bandwidth / 100KHz video bandwidth are used. Both bandwidths are 1MHz for above 1GHz measurement. The radio spectrum was investigated from the lowest frequency generated within the device (without going below 9 kHz) up to the 10th harmonic of the rated transmitted emission.

5.3 Test Data

The following data lists the significant emission frequencies, polarity and position, peak reading of the EMI Receiver, the FCC limit, and the difference between the peak reading and the limit. Explanation of the correction and calculation are given in section 5.1.

Test Personnel: 

Typed/Printed Name: Edward Lee

Date: September 17, 2012

Radiated Test Data (CH-904MHz/915MHz/926MHz & Harmonics)

Frequency (MHz)	Polarity (V,H) Position (X,Y,Z)	Antenna Height (m)	Azimuth (Degree)	Peak Reading at 3m (2) (dBuV/m)	Reading After Correction (dBuV/m)	FCC 3m Limit (1) (dBuV/m)	Difference (dBuV/m)
904	V/X	1.1	090	81.1	53.1	94	-40.9
1808	V/X	1.1	180	59.3	31.3	54	-22.7
2712	V/X	1.1	180	62.9	34.9	54	-19.1
904	H/X	1.0	180	87.7	59.7	94	-34.3
1808	H/X	1.1	200	54.7	26.7	54	-27.3
2712	H/X	1.1	330	58.7	30.7	54	-23.3
915	V/X	1.1	135	81.0	53.0	94	-41.0
1830	V/X	1.1	000	54.9	26.9	54	-27.1
2745	V/X	1.1	000	62.5	34.5	54	-19.5
915	H/X	1.0	045	87.2	59.2	94	-34.8
1830	H/X	1.1	000	55.5	27.5	54	-26.5
2745	H/X	1.1	045	60.1	32.1	54	-21.9
926	V/X	1.1	180	80.1	52.1	94	-41.9
1852	V/X	1.1	180	56.9	28.9	54	-25.1
2778	V/X	1.1	180	61.3	33.3	54	-20.7
926	H/X	1.0	235	85.8	57.8	94	-36.2
1852	H/X	1.1	330	54.9	26.9	54	-27.1
2778	H/X	1.1	180	60.5	32.5	54	-21.5
904	V/Y	1.1	090	86.5	58.5	94	-35.5
1808	V/Y	1.1	180	52.5	24.5	54	-29.5
2712	V/Y	1.1	045	61.5	33.5	54	-20.5
904	H/Y	1.0	180	89.0	61.0	94	-33.0
1808	H/Y	1.1	000	48.3	20.3	54	-33.7
2712	H/Y	1.1	180	58.3	30.3	54	-23.7
915	V/Y	1.1	090	85.1	57.1	94	-36.9
1830	V/Y	1.1	270	56.4	28.4	54	-25.6
2745	V/Y	1.1	090	63.2	35.2	54	-18.8
915	H/Y	1.0	180	87.6	59.6	94	-34.4
1830	H/Y	1.1	180	52.4	24.4	54	-29.6
2745	H/Y	1.1	135	60.4	32.4	54	-21.6

926	V/Y	1.1	090	83.8	55.8	94	-38.2
1852	V/Y	1.1	090	58.9	30.9	54	-23.1
2778	V/Y	1.1	270	61.0	33.0	54	-21.0
926	H/Y	1.0	180	86.1	58.1	94	-35.9
1852	H/Y	1.1	180	53.7	25.7	54	-28.3
2778	H/Y	1.1	180	59.2	31.2	54	-22.8
904	V/Z	1.1	315	90.9	62.9	94	-31.1
1808	V/Z	1.1	235	49.2	21.2	54	-32.8
2712	V/Z	1.1	180	62.5	34.5	54	-19.5
904	H/Z	1.0	135	83.4	55.4	94	-38.6
1808	H/Z	1.1	180	52.7	24.7	54	-29.3
2712	H/Z	1.1	180	61.2	33.2	54	-20.8
915	V/Z	1.1	270	88.6	60.6	94	-33.4
1830	V/Z	1.1	180	52.3	24.3	54	-29.7
2745	V/Z	1.1	270	63.4	35.4	54	-18.6
915	H/Z	1.0	045	82.3	54.3	94	-39.7
1830	H/Z	1.1	180	54.8	26.8	54	-27.2
2745	H/Z	1.1	180	61.2	33.2	54	-20.8
926	V/Z	1.1	235	87.5	59.5	94	-34.5
1852	V/Z	1.1	090	54.8	26.8	54	-27.2
2778	V/Z	1.1	135	61.6	33.6	54	-20.4
926	H/Z	1.0	135	80.1	52.1	94	-41.9
1852	H/Z	1.1	180	61.6	33.6	54	-20.4
2778	H/Z	1.1	180	55.0	27.0	54	-27.0

(1) The limit for emissions within the 902-928MHz band is 50mV(94dB) per Sec. 15.249. The limit for its harmonics is 500uV (54dB). Other spurious emissions shall be lower than either its fundamental by 50dB or the limit defined in Sec. 15.209, whichever is higher.

(2) If each peak reading is less than the FCC average limit, it'll be not necessary to show the measured/ calculated average reading.

Radiated Test Data (CH-2412MHz/2437MHz/2462MHz & Harmonics)

Frequency (MHz)	Polarity (V,H) Position (X,Y,Z)	Antenna Height (m)	Azimuth (Degree)	Peak Reading at 3m (2) (dBuV/m)	Reading After Correction (dBuV/m)	FCC 3m Limit (1) (dBuV/m)	Difference (dBuV/m)
2412	V/X	1.1	090	95.8	67.8	94	-26.2
4824	V/X	1.1	000	67.3	39.3	54	-14.7
7236	V/X	1.0	090	55.5	27.5	54	-26.5
2412	H/X	1.1	000	96.7	68.7	94	-25.3
4824	H/X	1.0	045	63.7	35.7	54	-18.3
7236	H/X	1.0	045	51.8	23.8	54	-30.2
2437	V/X	1.1	045	96.4	68.4	94	-25.6
4874	V/X	1.0	090	65.6	37.6	54	-16.4
7310	VX	1.0	090	55.2	27.2	54	-26.8
2437	H/X	1.0	000	93.7	65.7	94	-28.3
4874	H/X	1.0	000	62.7	34.7	54	-19.3
7310	H/X	1.0	045	51.2	23.2	54	-30.8
2462	V/X	1.1	090	95.3	67.3	94	-26.7
4924	V/X	1.0	045	63.2	35.2	54	-18.8
7386	V/X	1.0	045	56.7	28.7	54	-25.3
2462	H/X	1.1	000	94.9	66.9	94	-27.1
4924	H/X	1.0	000	63.8	35.8	54	-18.2
7386	H/X	1.0	000	51.6	23.6	54	-30.4
2412	V/Y	1.1	000	97.0	69	94	-25.0
4824	V/Y	1.1	045	67.9	39.9	54	-14.1
7236	V/Y	1.0	000	59.0	31	54	-23.0
2412	H/Y	1.1	000	92.1	64.1	94	-29.9
4824	H/Y	1.1	000	61.5	33.5	54	-20.5
7236	H/Y	1.0	000	51.4	23.4	54	-30.6
2437	V/Y	1.1	135	97.9	69.9	94	-24.1
4874	V/Y	1.1	180	66.7	38.7	54	-15.3
7310	V/Y	1.0	135	57.6	29.6	54	-24.4
2437	H/Y	1.1	090	92.8	64.8	94	-29.2
4874	H/Y	1.0	135	61.5	33.5	54	-20.5
7310	H/Y	1.0	135	51.1	23.1	54	-30.9

2462	V/Y	1.1	000	96.3	68.3	94	-25.7
4924	V/Y	1.0	000	65.3	37.3	54	-16.7
7386	V/Y	1.0	045	54.1	26.1	54	-27.9
2462	H/Y	1.1	180	90.5	62.5	94	-31.5
4924	H/Y	1.0	225	61.0	33	54	-21.0
7386	H/Y	1.0	225	50.8	22.8	54	-31.2
2412	V/Z	1.1	045	97.2	69.2	94	-24.8
4824	V/Z	1.1	000	68.6	40.6	54	-13.4
7236	V/Z	1.0	045	57.6	29.6	54	-24.4
2412	H/Z	1.1	180	97.4	69.4	94	-24.6
4824	H/Z	1.0	135	65.9	37.9	54	-16.1
7236	H/Z	1.0	135	53.2	25.2	54	-28.8
2437	V/Z	1.1	090	97.7	69.7	94	-24.3
4874	V/Z	1.1	090	69.7	41.7	54	-12.3
7310	V/Z	1.0	135	58.6	30.6	54	-23.4
2437	H/Z	1.1	270	96.4	68.4	94	-25.6
4874	H/Z	1.1	235	63.6	35.6	54	-18.4
7310	H/Z	1.0	270	50.2	22.2	54	-31.8
2462	V/Z	1.1	000	99.6	71.6	94	-22.4
4924	V/Z	1.0	180	69.9	41.9	54	-12.1
7386	V/Z	1.0	180	58.9	30.9	54	-23.1
2462	H/Z	1.1	000	93.5	65.5	94	-28.5
4924	H/Z	1.0	180	62.9	34.9	54	-19.1
7386	H/Z	1.0	180	51.7	23.7	54	-30.3

The limit for emissions within the 2400-2483.5MHz band is 50mV(94dB) per Sec. 15.249.

The limit for its harmonics is 500uV (54dB). Other spurious emissions shall be lower than either its fundamental by 50dB or the limit defined in Sec. 15.209, whichever is higher.

(2) If each peak reading is less than the FCC average limit, it'll be not necessary to show the measured/ calculated average reading.

Other Spurious outside of the band 902-928MHz

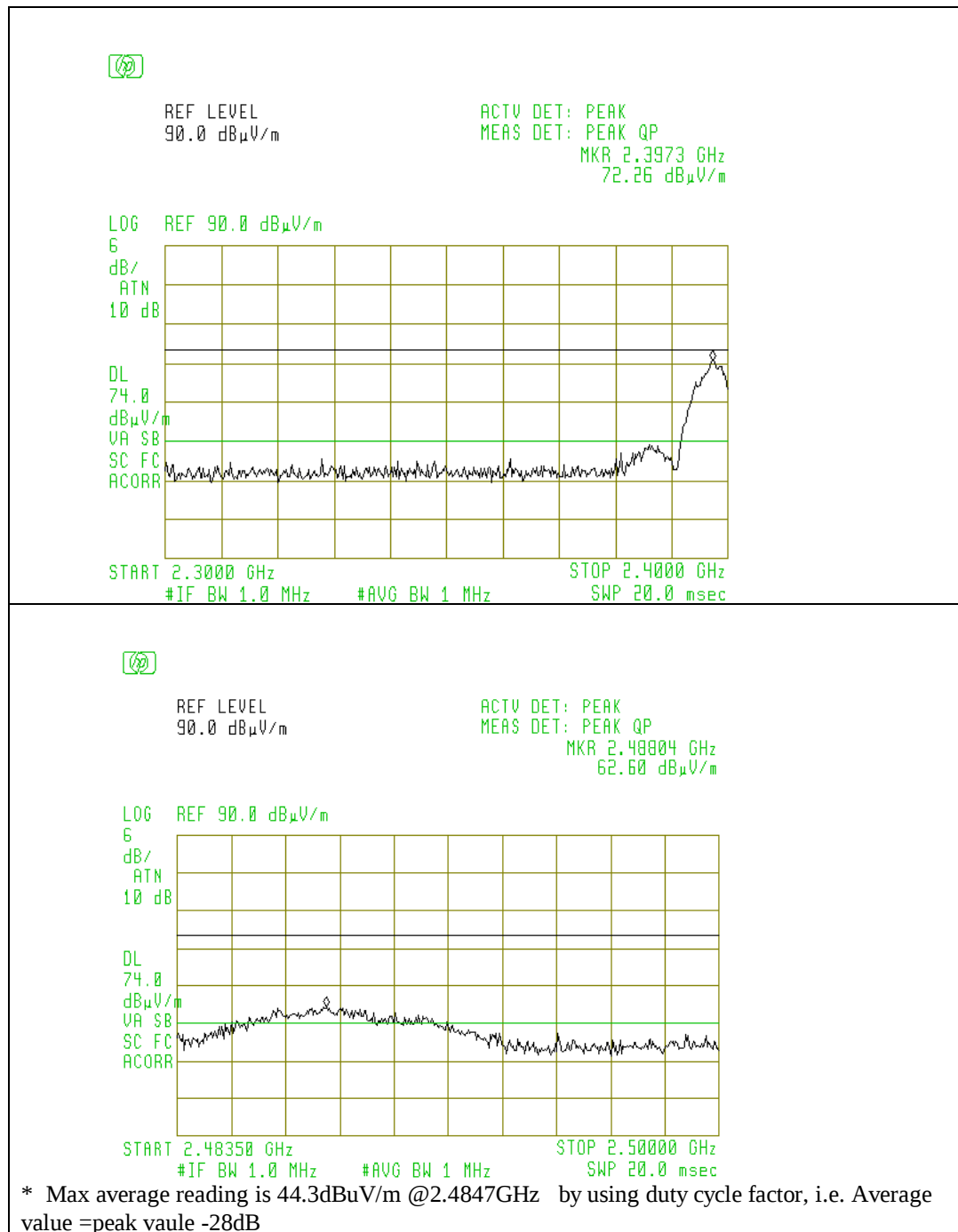
Frequency (MHz)	Polarity (V,H) Position (X,Y,Z)	Antenna Height (m)	Azimuth (Degree)	Peak Reading at 3m (2) (dBuV/m)	FCC 3m Limit (1) (dBuV/m)	Difference (dBuV/m)
578.3	V	1.1	270	36.7	46.5	-9.8
890.4	V	1.1	190	36.9	46.5	-9.6
928.6	V	1.0	180	37.7	46.5	-8.8
327.3	H	1.0	090	36.5	46.5	-10.0
475.0	H	1.0	010	35.0	46.5	-11.5

Other Spurious outside of the band 2400-2483.5MHz

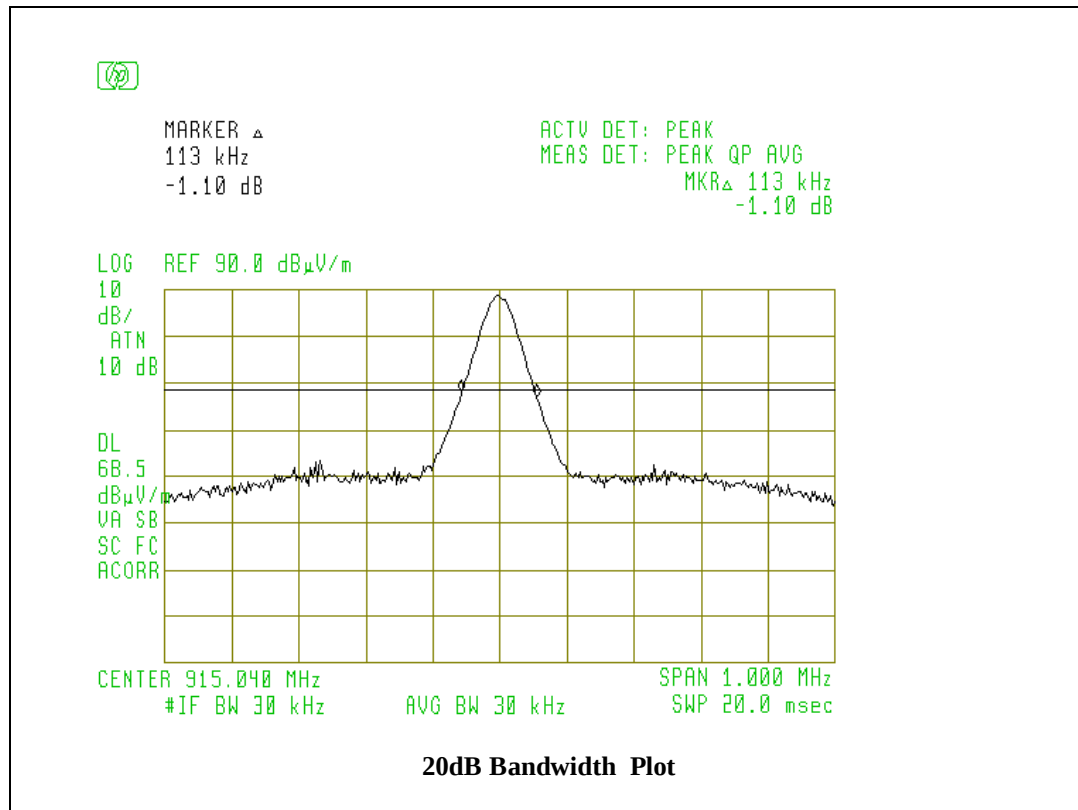
Frequency (MHz)	Polarity (V,H) Position (X,Y,Z)	Antenna Height (m)	Azimuth (Degree)	Peak Reading at 3m (2) (dBuV/m)	FCC 3m Limit (1) (dBuV/m)	Difference (dBuV/m)
1456.0	V	1.1	080	42.5	54.0	-11.5
1692.4	V	1.1	045	41.4	54.0	-12.6
1909.8	V	1.1	090	44.9	54.0	-9.1
1457.0	H	1.0	020	44.8	54.0	-9.2
1909.0	H	1.0	200	45.9	54.0	-8.1

Comparing to the limit defined in Sec. 15.209, emissions below the limit by 20dB were not recorded.

Band-edge Spurious (meet Peak limit)



20 dB Bandwidth : 900MHz Band



20 dB Bandwidth : 2400MHz Band

