

# TEST REPORT

**Reference No.**..... : WTS16S0449305E  
**FCC ID** ..... : SJ8-UDR777HD  
**Applicant**..... : RDI Technology (Shenzhen) Co., Ltd.  
**Address**..... : Building C1, Xintang Industrial Park East Baishixia, Fuyong, Baoan, Shenzhen, PRC.  
**Manufacturer** ..... : RDI Technology (Shenzhen) Co., Ltd.  
**Address**..... : Building C1, Xintang Industrial Park East Baishixia, Fuyong, Baoan, Shenzhen, PRC.  
**Product Name**..... : Guardian UDR777HD Wireless System  
**Model No.**..... : UDR777HD  
**Standards**..... : FCC CFR47 Part 15 Section 15.247:2015  
**Date of Receipt sample** .... : Apr. 29, 2016  
**Date of Test** ..... : May. 04 – 06, 2016  
**Date of Issue**..... : May. 16, 2016  
**Test Result**..... : **Pass**

**Remarks:**

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

**Prepared By:**

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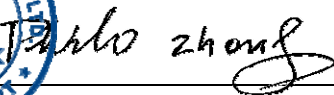
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Compiled by:



Zero Zhou / Test Engineer

Approved by:



Jialuo Zhong / Manager

## 2 Test Summary

Test Items	Test Requirement	Result
Radiated Emissions	15.205(a) 15.209(a)	PASS
Conducted Emissions	15.207(a)	PASS
6dB Bandwidth	15.247(a)(2)	PASS
Maximum Peak Output Power	15.247(b)(3),(4)	PASS
Power Spectral Density	15.247(e)	PASS
Band Edge	15.247(d)	PASS
Antenna Requirement	15.203	PASS
Maximum Permissible Exposure (Exposure of Humans to RF Fields)	1.1307(b)(1)	PASS

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## 4 General Information

### 4.1 General Description of E.U.T.

Product Name:	Guardian UDR777HD Wireless System
Model No.:	UDR777HD
Model Difference:	N/A
Operation Frequency:	2408MHz ~ 2468MHz, 16 channels in total
The lowest oscillator:	32.768KHz
Type of modulation:	GFSK

### 4.2 Details of E.U.T.

Technical Data:	Battery DC 3.7V 2000mAH DC 5V, 2.0A, charging from adapter (Adapter Input: 100-240V~50/60Hz, 500mA)
-----------------	---

Number of transmitter chains: GFSK:2\*1

The two RF modules do not transmit at the same time, if RF module 1 used for Ant0 to transmit, the RF module 2 is shutdown, not to transmit.

### 4.3 Channel List

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	2408	1	2412	2	2416	3	2420
4	2424	5	2428	6	2432	7	2436
8	2440	9	2444	10	2448	11	2452
12	2456	13	2460	14	2464	15	2468

### 4.4 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Table 1 Tests Carried Out Under FCC part 15.247

Test mode	Low channel	Middle channel	High channel
Transmitting	2408MHz	2440MHz	2468MHz

Table 2 Tests Carried Out Under FCC part 15.209

Test Item	Test Mode
Conducted Emissions	Communication
Radiated Emissions	Communication

### 4.5 Test Facility

The test facility has a test site registered with the following organizations:

- **IC – Registration No.: 7760A-1**

Waltek Services(Shenzhen) Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files.

Registration number 7760A-1, October 15, 2015.

- **FCC Test Site 1#– Registration No.: 880581**

Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory `has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 880581, April 29, 2014.

- **FCC Test Site 2#– Registration No.: 328995**

Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory `has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 328995, December 3, 2014.

## 5 Equipment Used during Test

### 5.1 Equipments List

<b>Conducted Emissions Test Site 1#</b>						
<b>Item</b>	<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Last Calibration Date</b>	<b>Calibration Due Date</b>
1.	EMI Test Receiver	R&S	ESCI	100947	Sep.15,2015	Sep.14,2016
2.	LISN	R&S	ENV216	101215	Sep.15,2015	Sep.14,2016
3.	Cable	Top	TYPE16(3.5M)	-	Sep.15,2015	Sep.14,2016
<b>Conducted Emissions Test Site 2#</b>						
<b>Item</b>	<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Last Calibration Date</b>	<b>Calibration Due Date</b>
1.	EMI Test Receiver	R&S	ESCI	101155	Sep.15,2015	Sep.14,2016
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	Sep.15,2015	Sep.14,2016
3.	Limiter	York	MTS-IMP-136	261115-001-0024	Sep.15,2015	Sep.14,2016
4.	Cable	LARGE	RF300	-	Sep.15,2015	Sep.14,2016
<b>3m Semi-anechoic Chamber for Radiation Emissions Test site 1#</b>						
<b>Item</b>	<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Last Calibration Date</b>	<b>Calibration Due Date</b>
1	EMC Analyzer	Agilent	E7405A	MY45114943	Sep.15,2015	Sep.14,2016
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Sep.15,2015	Sep.14,2016
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr.18,2016	Apr.17,2017
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	Sep.15,2015	Sep.14,2016
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Apr.18,2016	Apr.17,2017
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	Apr.18,2016	Apr.17,2017
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Mar.16,2016	Mar.15,2017
8	Coaxial Cable (above 1GHz)	Top	1GHz-25GHz	EW02014-7	Apr.09,2016	Apr.08,2017
<b>3m Semi-anechoic Chamber for Radiation Emissions Test site 2#</b>						
<b>Item</b>	<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No</b>	<b>Last Calibration Date</b>	<b>Calibration Due Date</b>
1	Test Receiver	R&S	ESCI	101296	Sep.15,2015	Sep.14,2016
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	Sep.15,2015	Sep.14,2016
3	Amplifier	Compliance pirection systems inc	PAP-0203	22024	Sep.15,2015	Sep.14,2016
4	Cable	HUBER+SUHNER	CBL2	525178	Sep.15,2015	Sep.14,2016

RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMC Analyzer (9k~26.5GHz)	Agilent	E7405A	MY45114943	Sep.15,2015	Sep.14,2016
2.	Spectrum Analyzer (9k-6GHz)	R&S	FSL6	100959	Sep.15,2015	Sep.14,2016
3.	Signal Analyzer (9k~26.5GHz)	Agilent	N9010A	MY50520207	Sep.15,2015	Sep.14,2016

## 5.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
RF Power	$\pm 1.0$ dB
RF Power Density	$\pm 2.2$ dB
Radiated Spurious Emissions test	$\pm 5.03$ dB (Bilog antenna 30M~1000MHz)
	$\pm 4.74$ dB (Horn antenna 1000M~25000MHz)
Conducted Spurious Emissions test	$\pm 3.64$ dB (AC mains 150KHz~30MHz)

## 5.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.



## 6 Conducted Emissions

Test Requirement:	FCC CFR 47 Part 15 Section 15.207
Test Method:	ANSI C63.10:2013
Test Result:	PASS
Frequency Range:	150kHz to 30MHz
Class/Severity:	Class B
Limit:	66-56 dB $\mu$ V between 0.15MHz & 0.5MHz 56 dB $\mu$ V between 0.5MHz & 5MHz 60 dB $\mu$ V between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth)

### 6.1 E.U.T. Operation

Operating Environment :

Temperature:	25.5 °C
Humidity:	51.9 % RH
Atmospheric Pressure:	101.2kPa

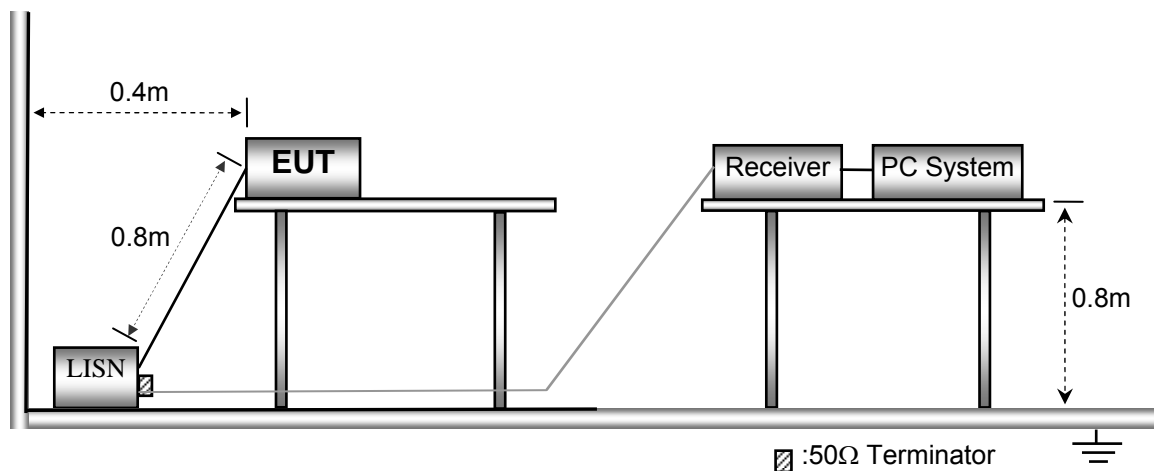
EUT Operation :

The test was performed in Transmitting mode.

Remark:

### 6.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10.

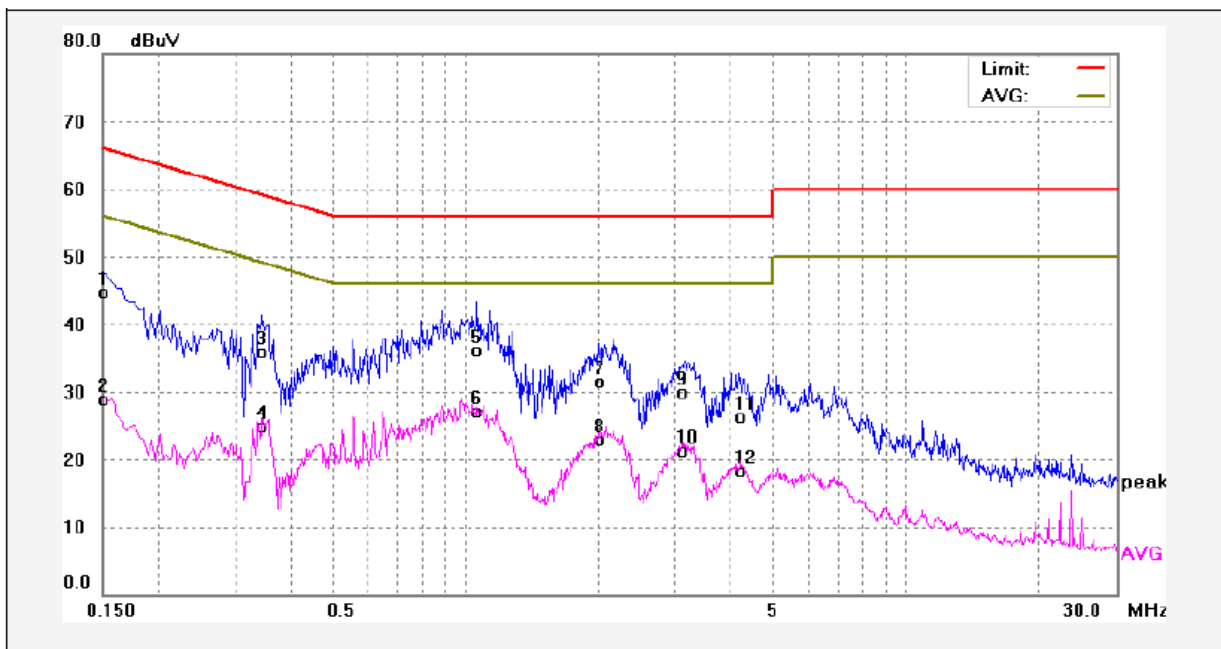


### 6.3 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

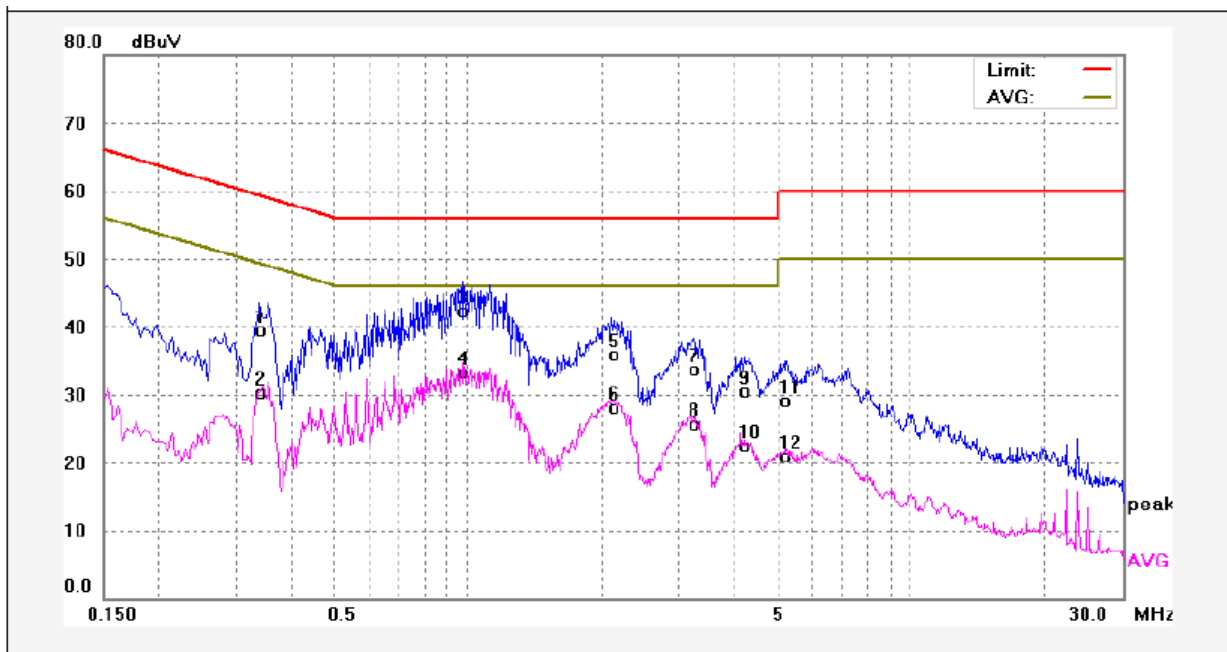
### 6.4 Conducted Emission Test Result

Ant0 Live line:



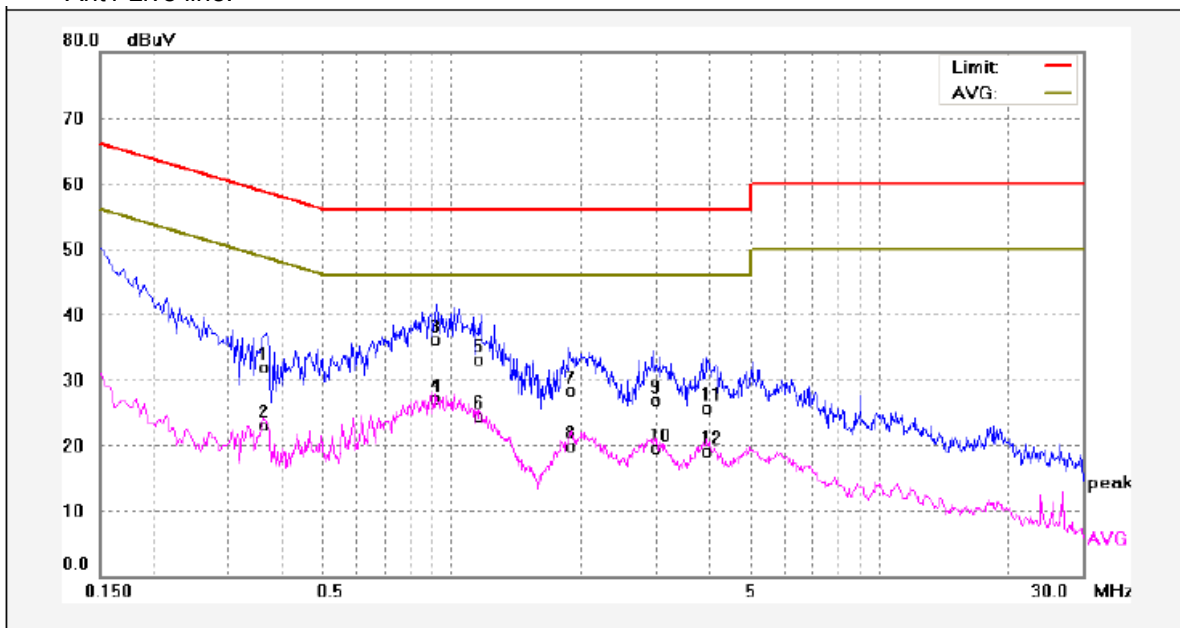
No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1500	34.90	9.75	44.65	65.99	-21.34	QP	
2	0.1500	19.16	9.75	28.91	55.99	-27.08	AVG	
3	0.3460	26.07	9.75	35.82	59.06	-23.24	QP	
4	0.3460	15.07	9.75	24.82	49.06	-24.24	AVG	
5	1.0620	26.24	9.81	36.05	56.00	-19.95	QP	
6	1.0620	17.26	9.81	27.07	46.00	-18.93	AVG	
7	1.9940	21.69	9.89	31.58	56.00	-24.42	QP	
8	1.9940	13.08	9.89	22.97	46.00	-23.03	AVG	
9	3.1420	19.90	9.91	29.81	56.00	-26.19	QP	
10	3.1420	11.44	9.91	21.35	46.00	-24.65	AVG	
11	4.1660	16.37	9.92	26.29	56.00	-29.71	QP	
12	4.1660	8.36	9.92	18.28	46.00	-27.72	AVG	

Neutral line:



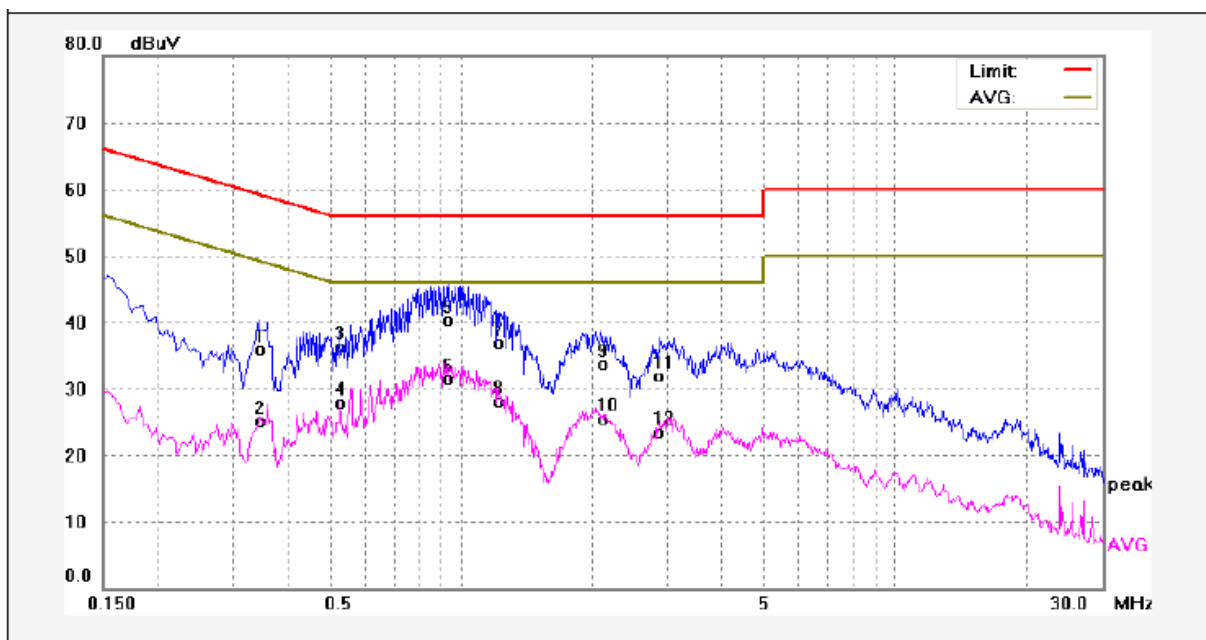
No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.3379	29.73	9.75	39.48	59.25	-19.77	QP	
2	0.3379	20.56	9.75	30.31	49.25	-18.94	AVG	
3	0.9740	32.57	9.81	42.38	56.00	-13.62	QP	
4	0.9740	23.41	9.81	33.22	46.00	-12.78	AVG	
5	2.1020	26.00	9.89	35.89	56.00	-20.11	QP	
6	2.1020	18.23	9.89	28.12	46.00	-17.88	AVG	
7	3.2380	23.78	9.91	33.69	56.00	-22.31	QP	
8	3.2380	15.86	9.91	25.77	46.00	-20.23	AVG	
9	4.2020	20.50	9.93	30.43	56.00	-25.57	QP	
10	4.2020	12.54	9.93	22.47	46.00	-23.53	AVG	
11	5.2420	19.06	10.00	29.06	60.00	-30.94	QP	
12	5.2420	10.97	10.00	20.97	50.00	-29.03	AVG	

Ant1 Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.3660	22.19	9.75	31.94	58.59	-26.65	QP	
2	0.3660	13.38	9.75	23.13	48.59	-25.46	AVG	
3	0.9220	26.38	9.80	36.18	56.00	-19.82	QP	
4	0.9220	17.25	9.80	27.05	46.00	-18.95	AVG	
5	1.1700	23.31	9.82	33.13	56.00	-22.87	QP	
6	1.1700	14.65	9.82	24.47	46.00	-21.53	AVG	
7	1.8780	18.40	9.88	28.28	56.00	-27.72	QP	
8	1.8780	10.05	9.88	19.93	46.00	-26.07	AVG	
9	2.9539	17.01	9.91	26.92	56.00	-29.08	QP	
10	2.9539	9.59	9.91	19.50	46.00	-26.50	AVG	
11	3.9540	15.84	9.91	25.75	56.00	-30.25	QP	
12	3.9540	9.28	9.91	19.19	46.00	-26.81	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.3420	26.18	9.75	35.93	59.15	-23.22	QP	
2	0.3420	15.33	9.75	25.08	49.15	-24.07	AVG	
3	0.5260	26.47	9.76	36.23	56.00	-19.77	QP	
4	0.5260	18.24	9.76	28.00	46.00	-18.00	AVG	
5	0.9340	30.60	9.80	40.40	56.00	-15.60	QP	
6	0.9340	21.78	9.80	31.58	46.00	-14.42	AVG	
7	1.2340	27.13	9.82	36.95	56.00	-19.05	QP	
8	1.2340	18.35	9.82	28.17	46.00	-17.83	AVG	
9	2.1020	23.80	9.89	33.69	56.00	-22.31	QP	
10	2.1020	15.68	9.89	25.57	46.00	-20.43	AVG	
11	2.8780	22.00	9.91	31.91	56.00	-24.09	QP	
12	2.8780	13.67	9.91	23.58	46.00	-22.42	AVG	

## 7 Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: ANSI C63.10:2013

Test Result: PASS

Measurement Distance: 3m

Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

### 7.1 EUT Operation

Operating Environment:

Temperature: 25.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 1016 mbar

EUT Operation:

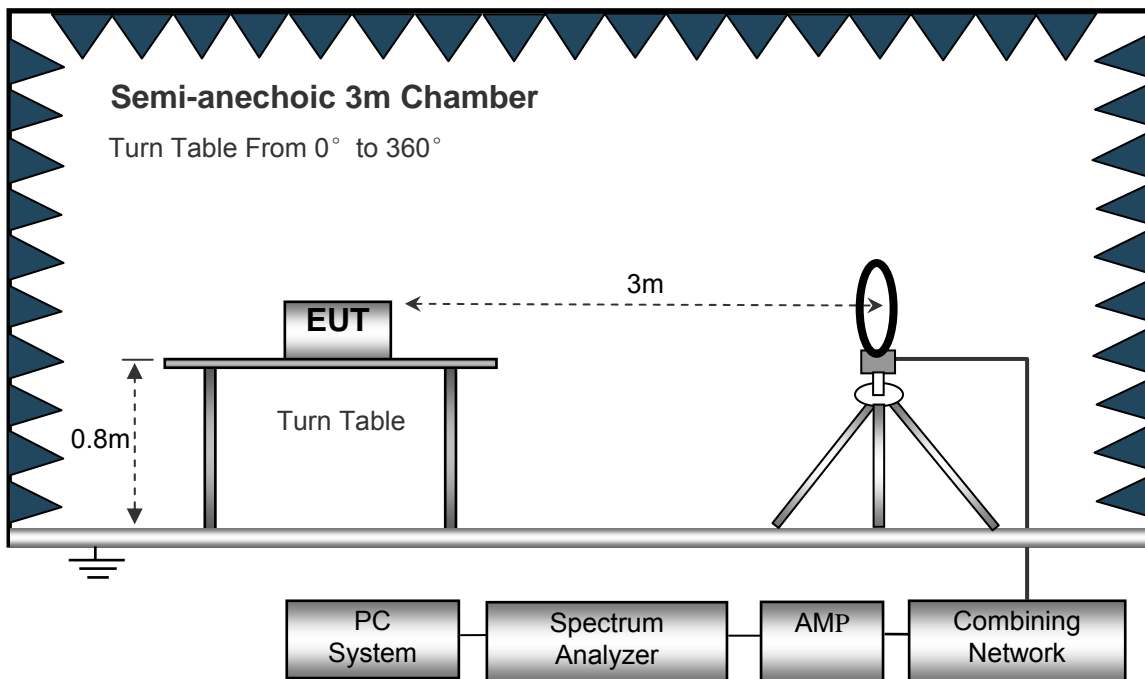
The test was performed in transmitting mode

Remark: The model 2AF309901002 is the worst case tested sample, and the data were shown in the report.

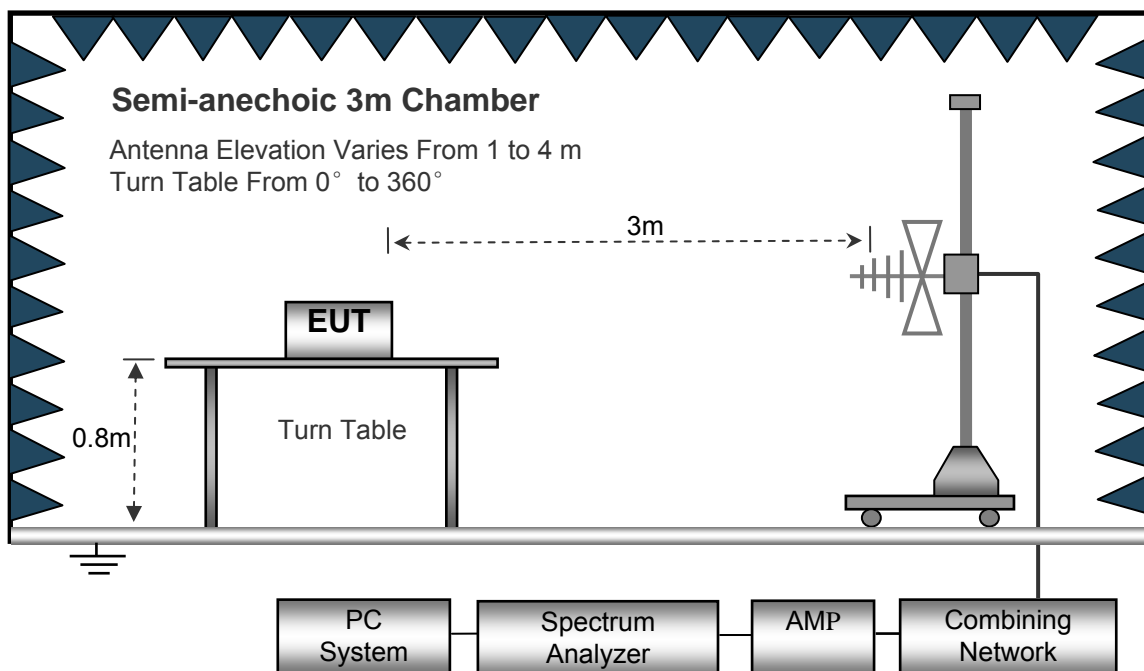
### 7.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10.

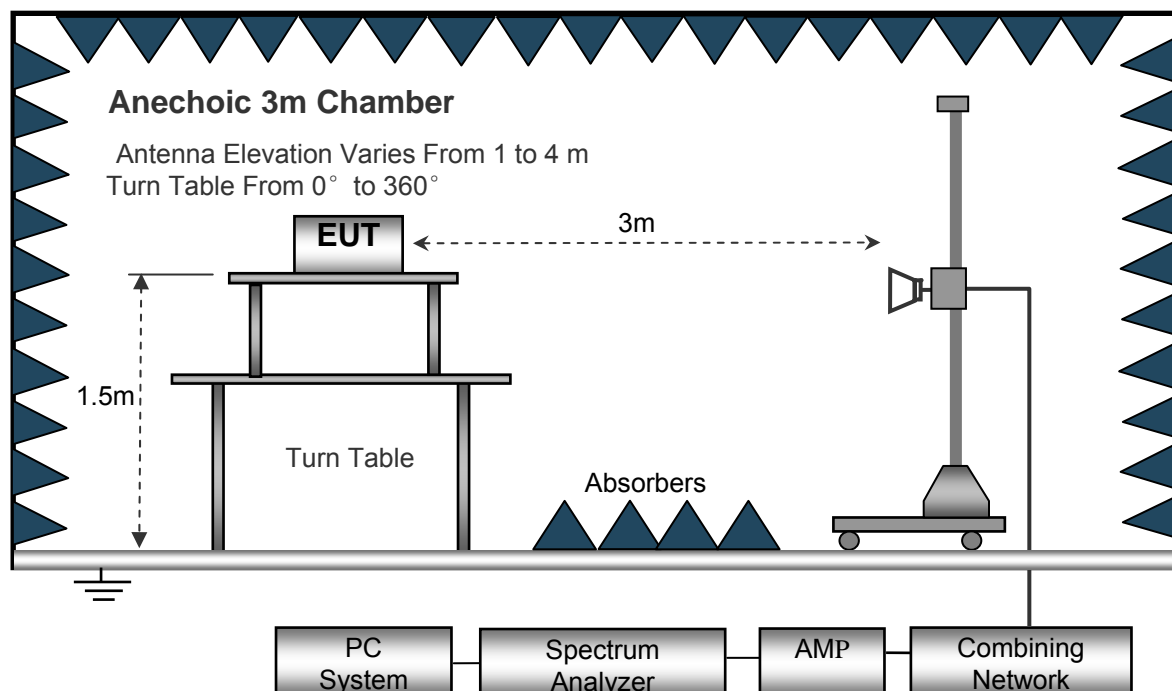
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



### 7.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed ..... Auto  
 IF Bandwidth..... 10kHz  
 Video Bandwidth..... 10kHz  
 Resolution Bandwidth..... 10kHz

30MHz ~ 1GHz

Sweep Speed ..... Auto  
 Detector ..... PK  
 Resolution Bandwidth..... 100kHz  
 Video Bandwidth..... 300kHz

Above 1GHz

Sweep Speed ..... Auto  
 Detector ..... PK  
 Resolution Bandwidth..... 1MHz  
 Video Bandwidth..... 3MHz  
 Detector ..... Ave.  
 Resolution Bandwidth..... 1MHz  
 Video Bandwidth..... 10Hz



#### 7.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane for below 1GHz and 1.5m for above 1GHz.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X,Y and Z axis positioning(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),the worst condition was tested putting the eut in X axis,so the worst data were shown as follow.

## 7.5 Summary of Test Results

**Test Frequency: 32.768KHz ~ 30MHz**

The measurements were more than 20 dB below the limit and not reported.

**Test Frequency: 30MHz ~ 18GHz**

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dB $\mu$ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
ANT0 GFSK Low Channel									
225.45	42.15	QP	207	1.1	H	-11.62	30.53	46.00	-15.47
225.45	37.01	QP	281	2.0	V	-11.62	25.39	46.00	-20.61
4824.00	50.14	PK	340	1.4	V	-1.06	49.08	74.00	-24.92
4824.00	47.25	Ave	340	1.4	V	-1.06	46.19	54.00	-7.81
7236.00	42.11	PK	326	1.9	H	1.33	43.44	74.00	-30.56
7236.00	42.37	Ave	326	1.9	H	1.33	43.70	54.00	-10.30
2318.17	45.22	PK	266	1.9	V	-13.19	32.03	74.00	-41.97
2318.17	39.54	Ave	266	1.9	V	-13.19	26.35	54.00	-27.65
2362.27	44.44	PK	38	1.6	H	-13.14	31.30	74.00	-42.70
2362.27	37.68	Ave	38	1.6	H	-13.14	24.54	54.00	-29.46
2487.93	42.14	PK	329	1.4	V	-13.08	29.06	74.00	-44.94
2487.93	37.82	Ave	329	1.4	V	-13.08	24.74	54.00	-29.26

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dB $\mu$ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
ANT0 GFSK Middle Channel									
225.45	41.15	QP	253	1.7	H	-11.62	29.53	46.00	-16.47
225.45	35.76	QP	68	1.8	V	-11.62	24.14	46.00	-21.86
4874.00	51.48	PK	318	1.6	V	-0.62	50.86	74.00	-23.14
4874.00	46.58	Ave	318	1.6	V	-0.62	45.96	54.00	-8.04
7311.00	42.54	PK	297	1.8	H	2.21	44.75	74.00	-29.25
7311.00	41.86	Ave	297	1.8	H	2.21	44.07	54.00	-9.93
2310.10	46.24	PK	9	1.6	V	-13.19	33.05	74.00	-40.95
2310.10	37.91	Ave	9	1.6	V	-13.19	24.72	54.00	-29.28
2370.64	44.31	PK	193	1.6	H	-13.14	31.17	74.00	-42.83
2370.64	36.04	Ave	193	1.6	H	-13.14	22.90	54.00	-31.10
2499.91	43.53	PK	333	1.7	V	-13.08	30.45	74.00	-43.55
2499.91	38.07	Ave	333	1.7	V	-13.08	24.99	54.00	-29.01

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dB $\mu$ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
ANT0 GFSK High Channel									
225.45	42.57	QP	154	1.8	H	-11.62	30.95	46.00	-15.05
225.45	36.14	QP	247	1.7	V	-11.62	24.52	46.00	-21.48
4924.00	51.16	PK	117	1.6	V	-0.24	50.92	74.00	-23.08
4924.00	45.38	Ave	117	1.6	V	-0.24	45.14	54.00	-8.86
7386.00	42.76	PK	45	1.6	H	2.84	45.60	74.00	-28.40
7386.00	40.49	Ave	45	1.6	H	2.84	43.33	54.00	-10.67
2347.02	45.23	PK	303	1.2	V	-13.19	32.04	74.00	-41.96
2347.02	37.88	Ave	303	1.2	V	-13.19	24.69	54.00	-29.31
2364.88	42.64	PK	231	2.0	H	-13.14	29.50	74.00	-44.50
2364.88	38.09	Ave	231	2.0	H	-13.14	24.95	54.00	-29.05
2488.38	44.67	PK	102	1.9	V	-13.08	31.59	74.00	-42.41
2488.38	38.47	Ave	102	1.9	V	-13.08	25.39	54.00	-28.61

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dB $\mu$ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
ANT1 GFSK Low Channel									
224.12	43.01	QP	339	1.4	H	-11.62	31.39	46.00	-14.61
224.12	36.96	QP	23	1.6	V	-11.62	25.34	46.00	-20.66
4824.00	49.75	PK	164	1.4	V	-1.06	48.69	74.00	-25.31
4824.00	48.01	Ave	164	1.4	V	-1.06	46.95	54.00	-7.05
7236.00	43.02	PK	260	1.3	H	1.33	44.35	74.00	-29.65
7236.00	43.98	Ave	260	1.3	H	1.33	45.31	54.00	-8.69
2332.67	45.46	PK	227	1.9	V	-13.19	32.27	74.00	-41.73
2332.67	38.52	Ave	227	1.9	V	-13.19	25.33	54.00	-28.67
2361.89	44.29	PK	236	1.8	H	-13.14	31.15	74.00	-42.85
2361.89	38.62	Ave	236	1.8	H	-13.14	25.48	54.00	-28.52
2493.14	43.65	PK	137	1.7	V	-13.08	30.57	74.00	-43.43
2493.14	38.50	Ave	137	1.7	V	-13.08	25.42	54.00	-28.58

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dB $\mu$ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
ANT1 GFSK Middle Channel									
224.12	44.27	QP	51	1.3	H	-11.62	32.65	46.00	-13.35
224.12	38.23	QP	168	1.8	V	-11.62	26.61	46.00	-19.39
4874.00	50.07	PK	83	1.2	V	-0.62	49.45	74.00	-24.55
4874.00	47.90	Ave	83	1.2	V	-0.62	47.28	54.00	-6.72
7311.00	44.20	PK	164	1.4	H	2.21	46.41	74.00	-27.59
7311.00	45.35	Ave	164	1.4	H	2.21	47.56	54.00	-6.44
2320.46	45.35	PK	43	1.3	V	-13.19	32.16	74.00	-41.84
2320.46	37.22	Ave	43	1.3	V	-13.19	24.03	54.00	-29.97
2372.54	42.78	PK	0	1.2	H	-13.14	29.64	74.00	-44.36
2372.54	38.69	Ave	0	1.2	H	-13.14	25.55	54.00	-28.45
2492.90	43.36	PK	258	1.3	V	-13.08	30.28	74.00	-43.72
2492.90	36.95	Ave	258	1.3	V	-13.08	23.87	54.00	-30.13

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	Limit	Margin
				Height	Polar				
(MHz)	(dB $\mu$ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)
ANT1 GFSK High Channel									
224.12	44.39	QP	18	1.5	H	-11.62	32.77	46.00	-13.23
224.12	37.62	QP	219	1.6	V	-11.62	26.00	46.00	-20.00
4924.00	49.24	PK	107	1.4	V	-0.24	49.00	74.00	-25.00
4924.00	46.90	Ave	107	1.4	V	-0.24	46.66	54.00	-7.34
7386.00	44.59	PK	275	1.1	H	2.84	47.43	74.00	-26.57
7386.00	45.67	Ave	275	1.1	H	2.84	48.51	54.00	-5.49
2342.92	45.83	PK	150	1.1	V	-13.19	32.64	74.00	-41.36
2342.92	37.06	Ave	150	1.1	V	-13.19	23.87	54.00	-30.13
2358.34	44.24	PK	343	1.5	H	-13.14	31.10	74.00	-42.90
2358.34	38.73	Ave	343	1.5	H	-13.14	25.59	54.00	-28.41
2491.24	43.38	PK	203	1.3	V	-13.08	30.30	74.00	-43.70
2491.24	36.60	Ave	203	1.3	V	-13.08	23.52	54.00	-30.48

**Test Frequency: 18GHz~25GHz**

The measurements were more than 20 dB below the limit and not reported.

## 8 Band Edge Measurement

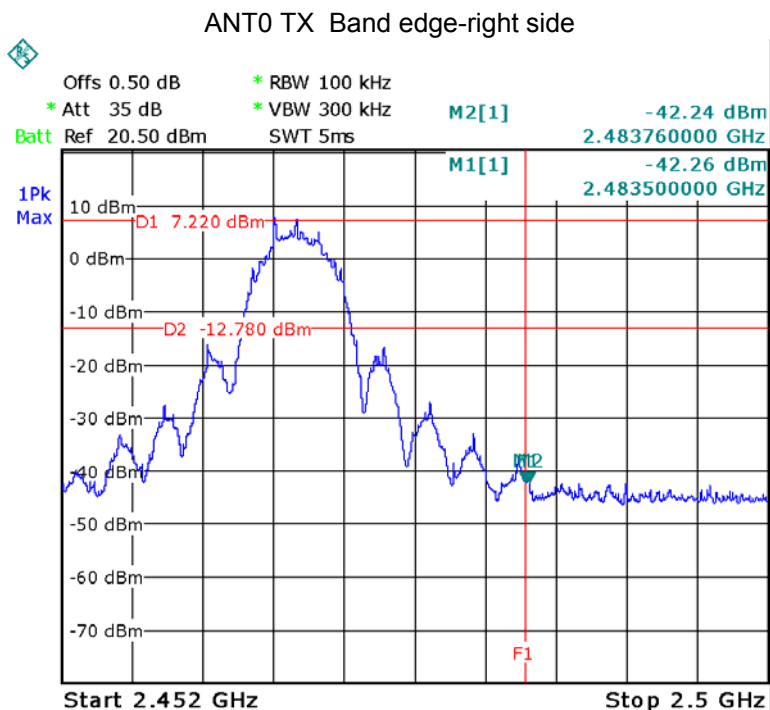
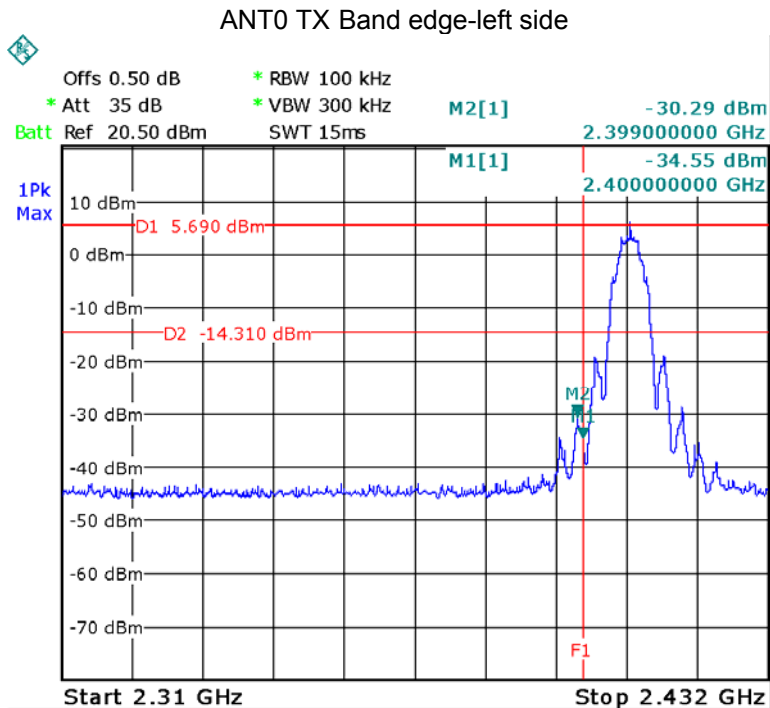
Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	KDB 558074 D01 DTS Meas Guidance v03r04 January 7, 2016
Test Limit:	Regulation 15.247 (d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
Test Mode:	Transmitting

### 8.1 Test Produce

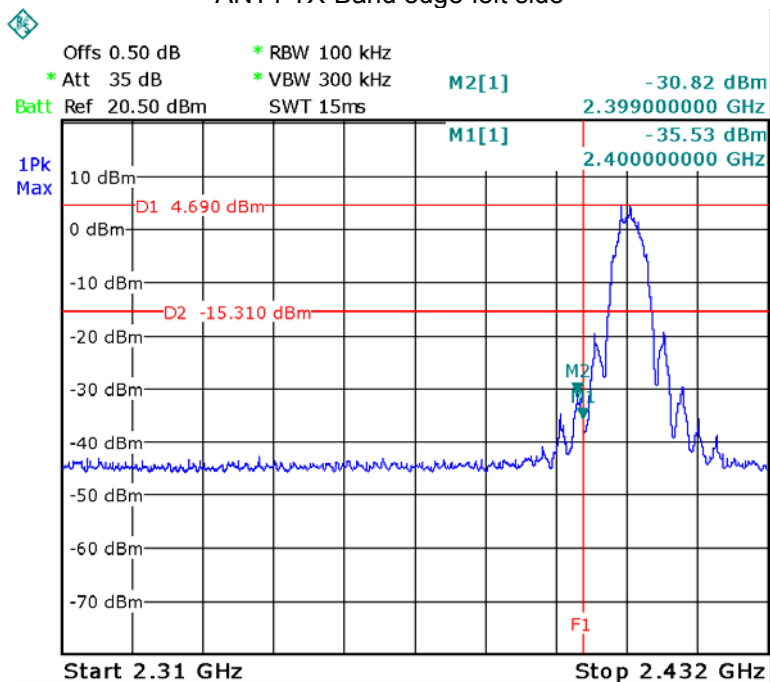
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz, Sweep = auto  
Detector function = peak, Trace = max hold
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.



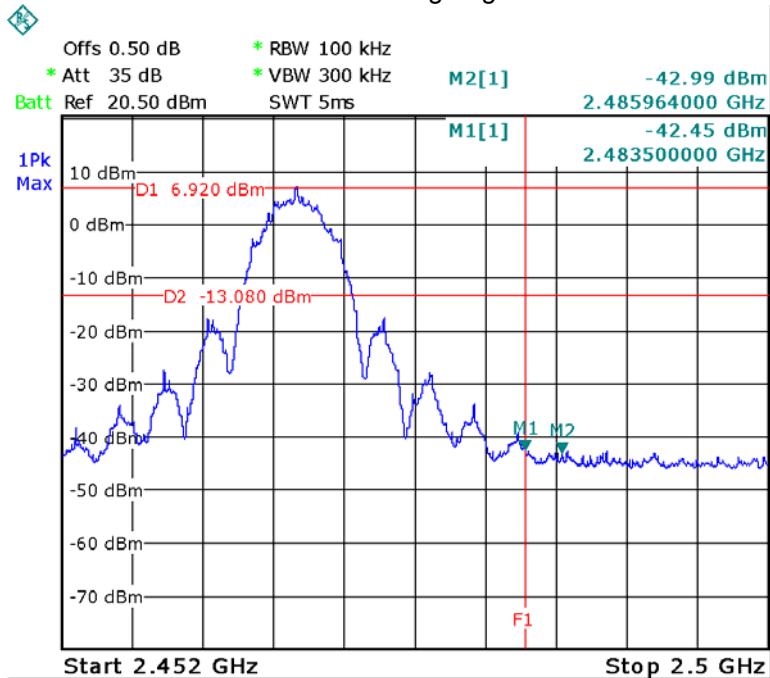
### 8.2 Test Result



### ANT1 TX Band edge-left side



### ANT1 TX Band edge-right side



## 9 6 dB Bandwidth Measurement

Test Requirement:

FCC CFR47 Part 15 Section 15.247

Test Method:

KDB 558074 D01 DTS Meas Guidance v03r04 January 7, 2016

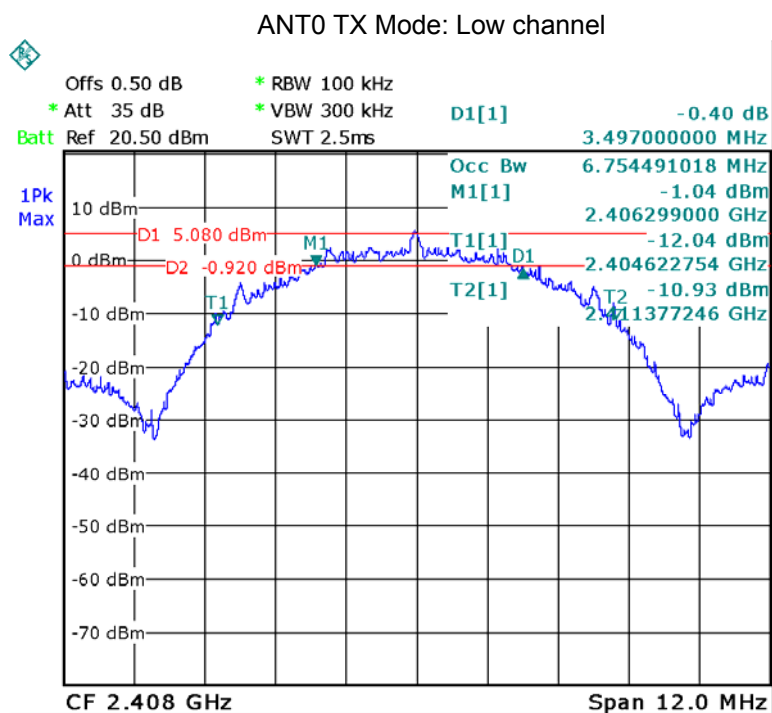
### 9.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 30kHz, VBW =100kHz

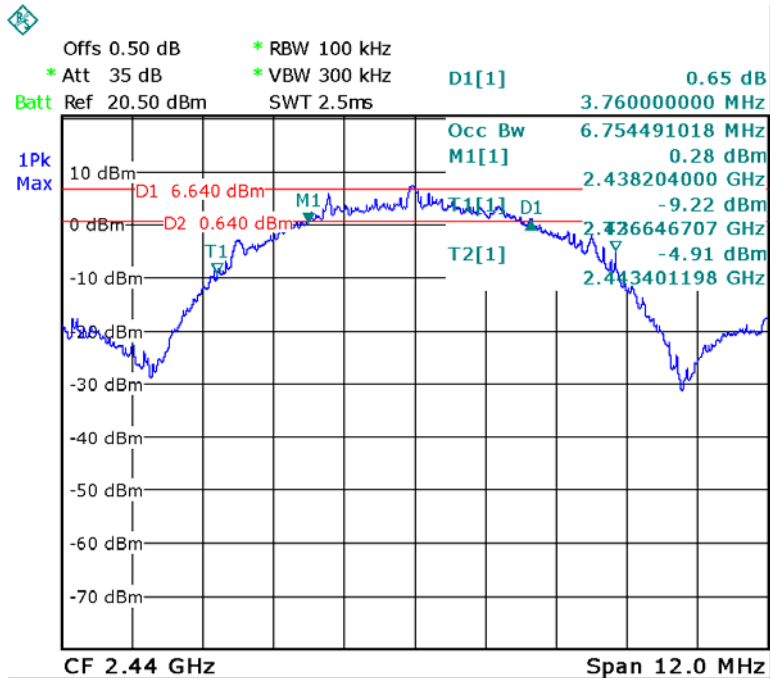
### 9.2 Test Result

ANT	Operation mode	Bandwidth (MHz)
ANT0	Low channel	3.497
	Middle channel	3.760
	High channel	3.832
ANT1	Low channel	3.593
	Middle channel	3.760
	High channel	3.617

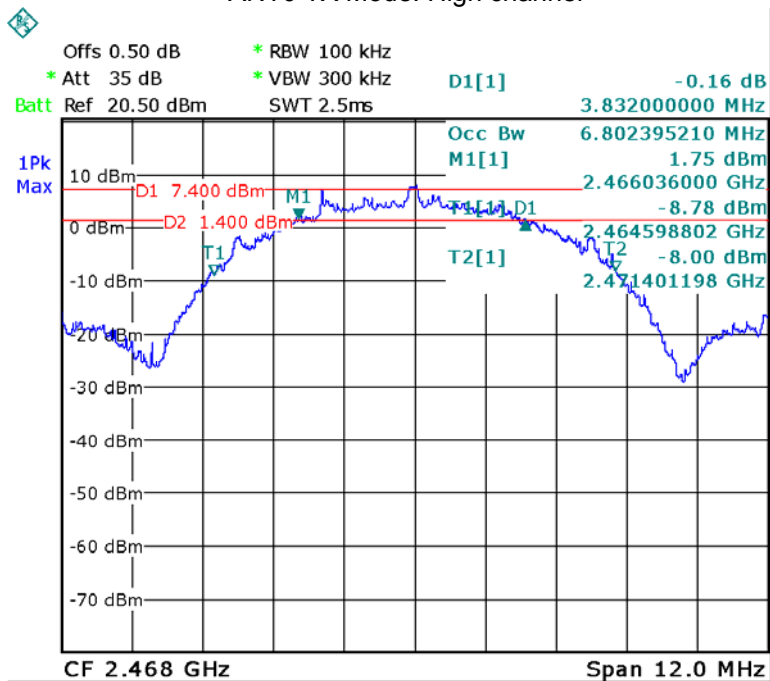
Test result plot as follows:



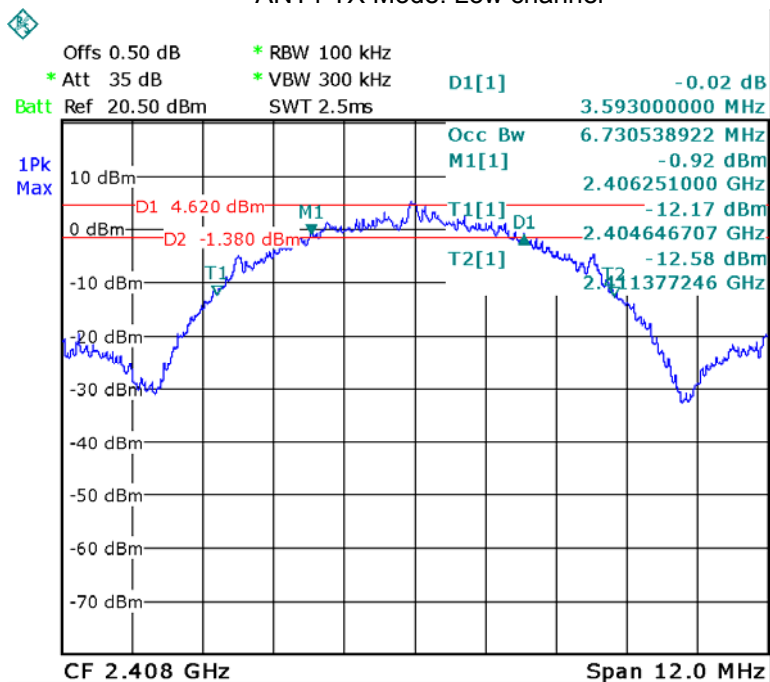
ANT0 TX Mode: Middle channel



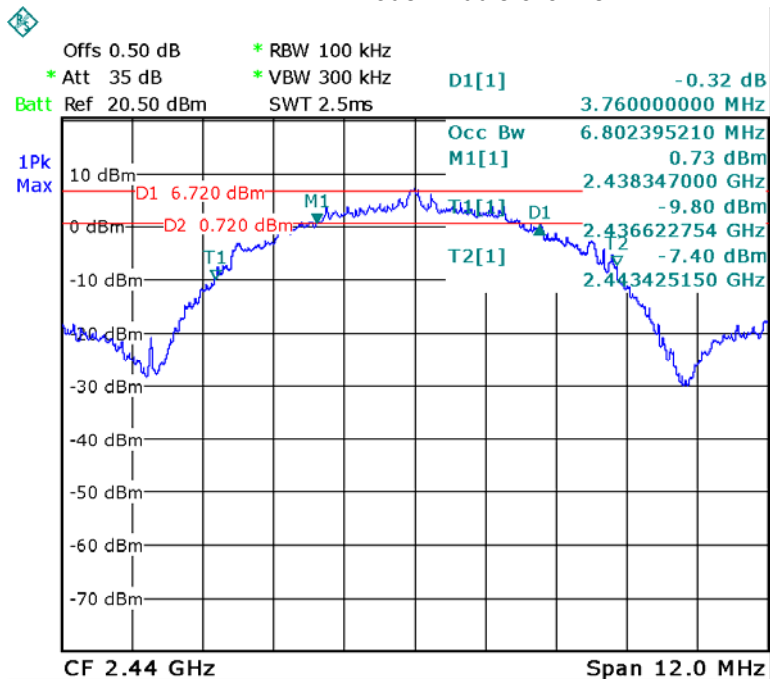
ANT0 TX Mode: High channel

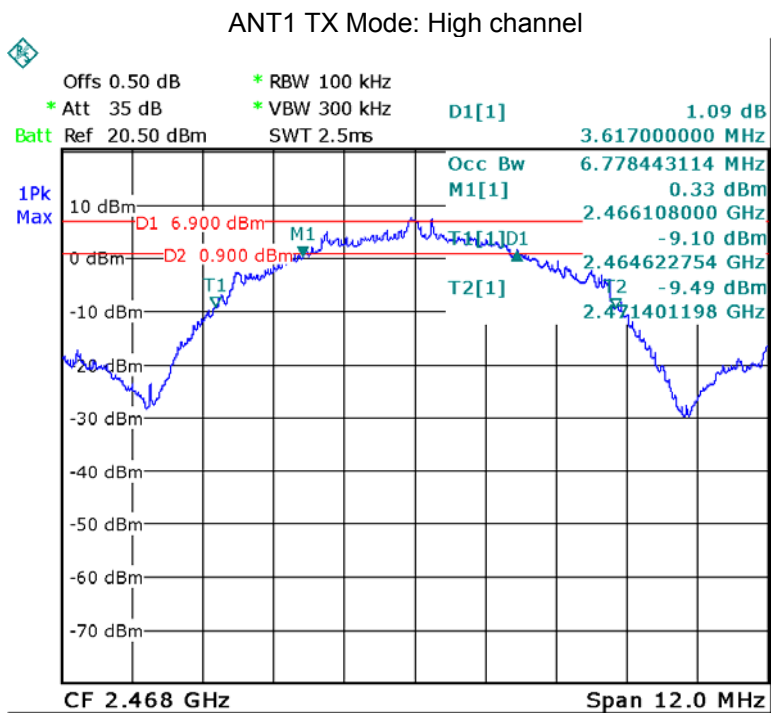


ANT1 TX Mode: Low channel



ANT1 TX Mode: Middle channel





## 10 Maximum Peak Output Power

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 DTS Meas Guidance v03r04 January 7, 2016

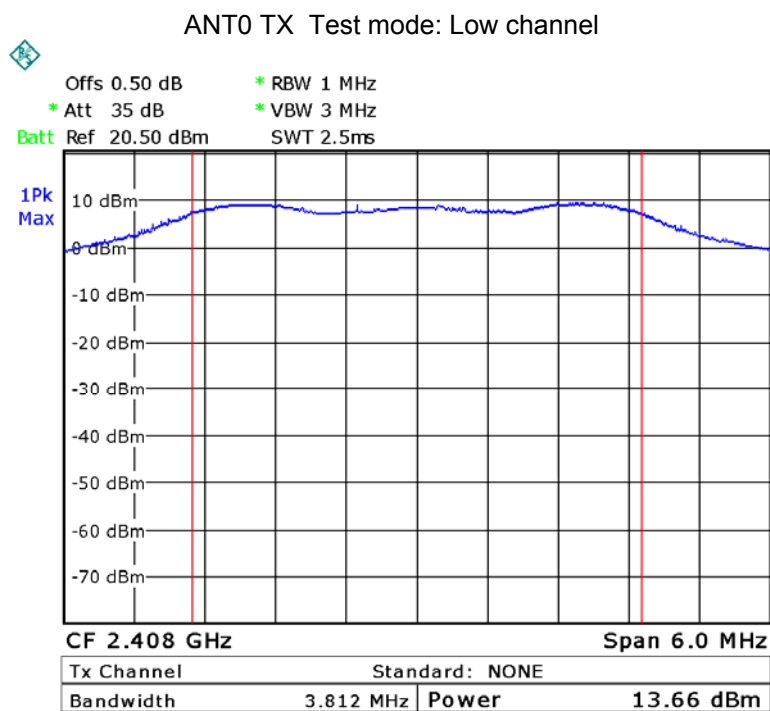
### 10.1 Test Procedure

KDB 558074 D01 DTS Meas Guidance v03r04 section 9.1.2

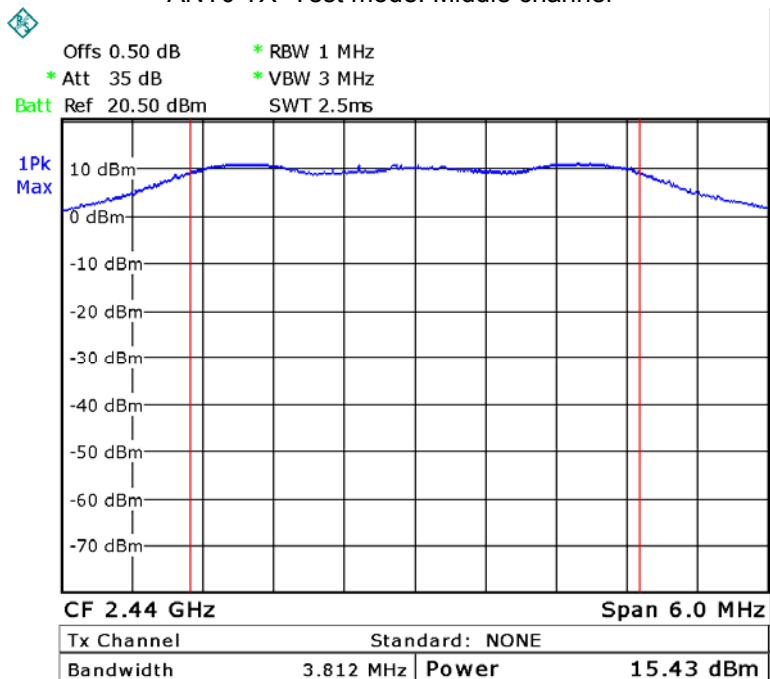
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 1MHz. VBW = 3MHz. Sweep = auto; Detector Function = Peak, Set the span to fully encompass the DTS bandwidth.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

### 10.2 Test Result

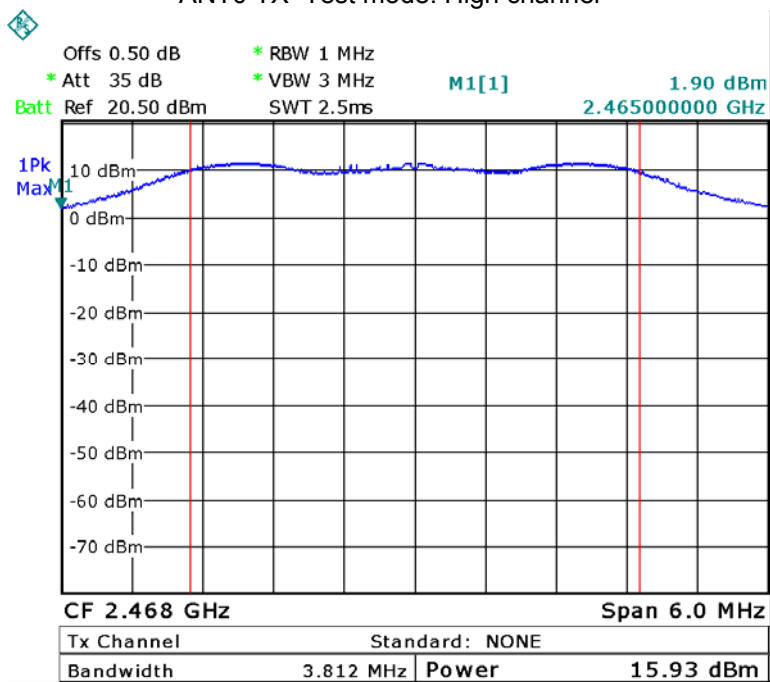
ANT	Maximum Peak Output Power (dBm)		
	Low	Middle	High
ANT0	13.66	15.43	15.93
ANT1	12.97	14.66	15.26
Limit			
1W/30dBm			



ANT0 TX Test mode: Middle channel

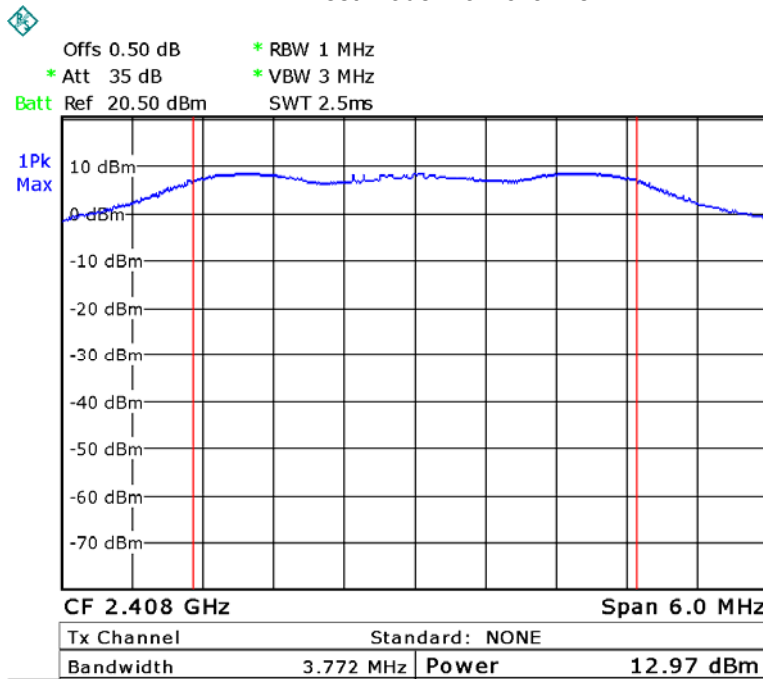


ANT0 TX Test mode: High channel

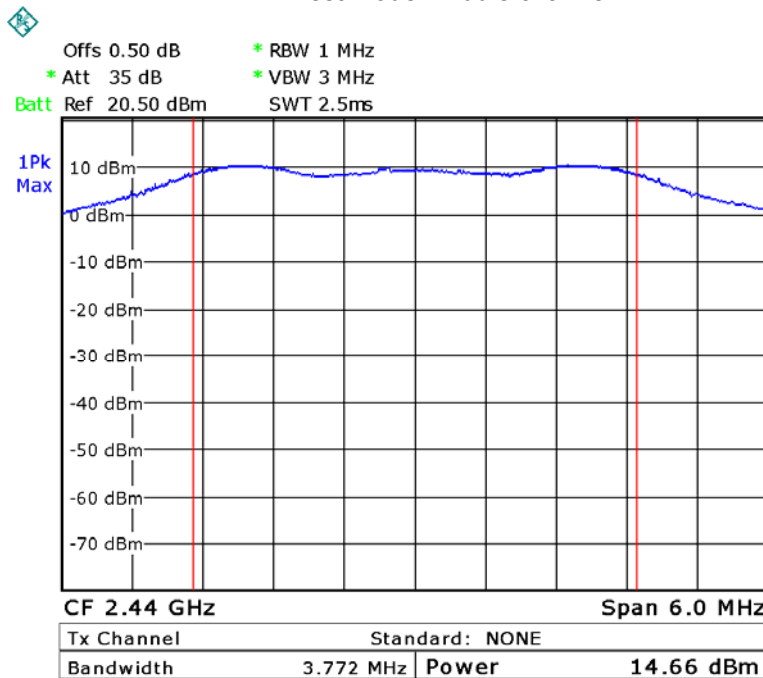


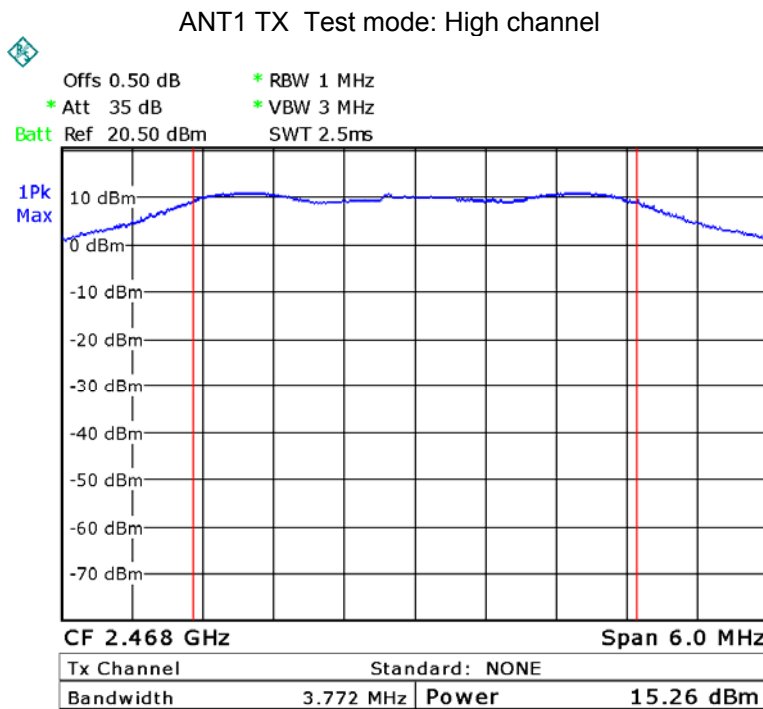


ANT1 TX Test mode: Low channel



ANT1 TX Test mode: Middle channel





## 11 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: KDB 558074 D01 DTS Meas Guidance v03r04 January 7, 2016

### 11.1 Test Procedure

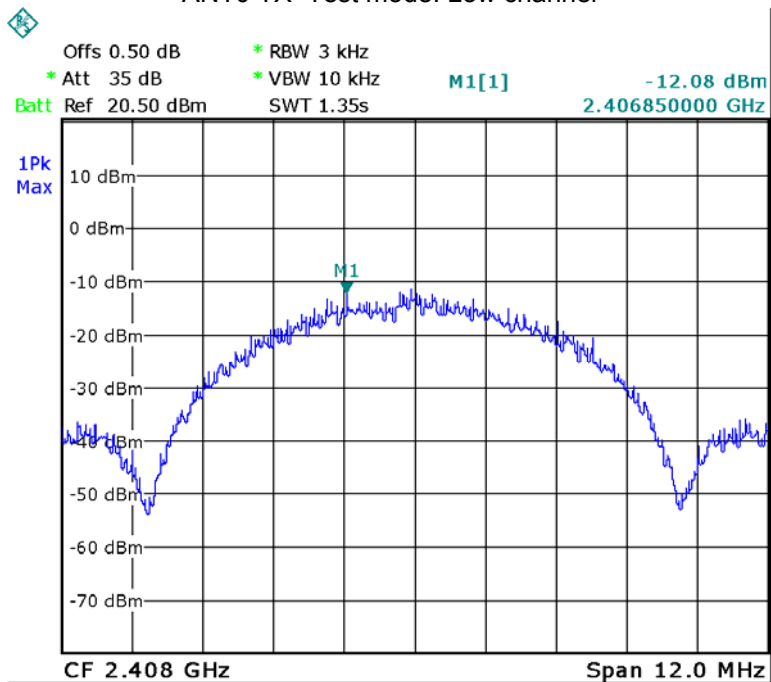
KDB558074 D01 DTS Meas Guidance v03r03 section 9.1 Option 1

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section  
Submit this plot.

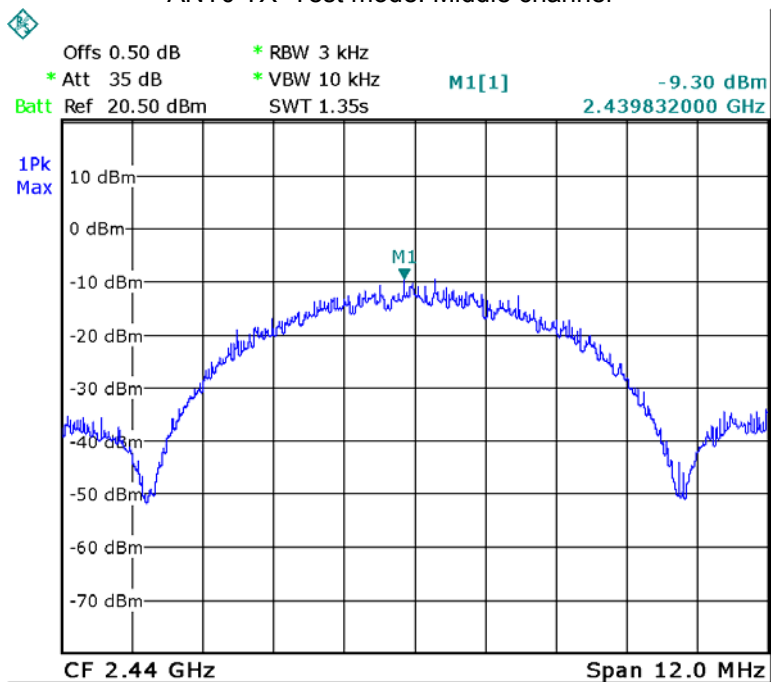
### 11.2 Test Result

ANT	Power Spectral Density		
	Low channel	Middle channel	High channel
ANT0	-12.08	-9.30	-7.14
ANT1	-10.18	-11.01	-9.58
Limit	8dBm per 3kHz		

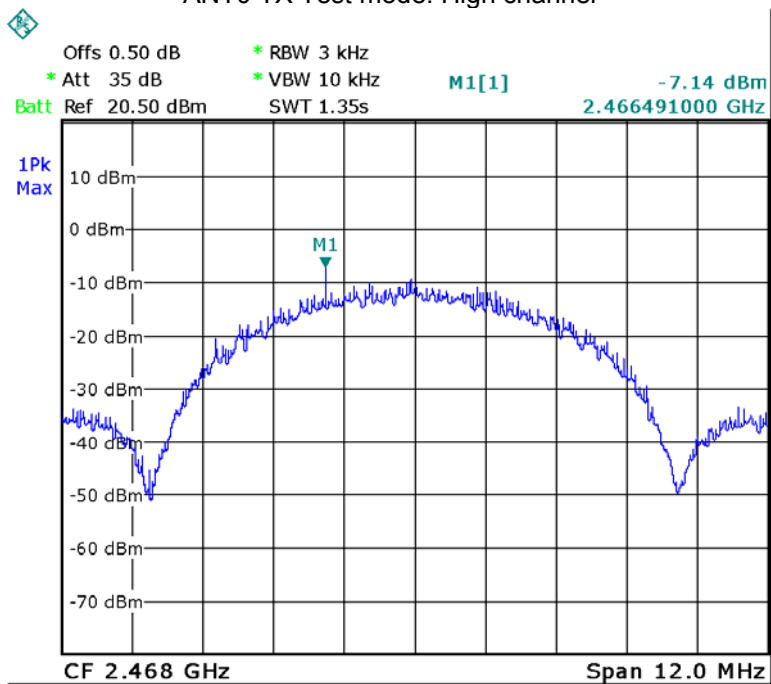
### ANT0 TX Test mode: Low channel



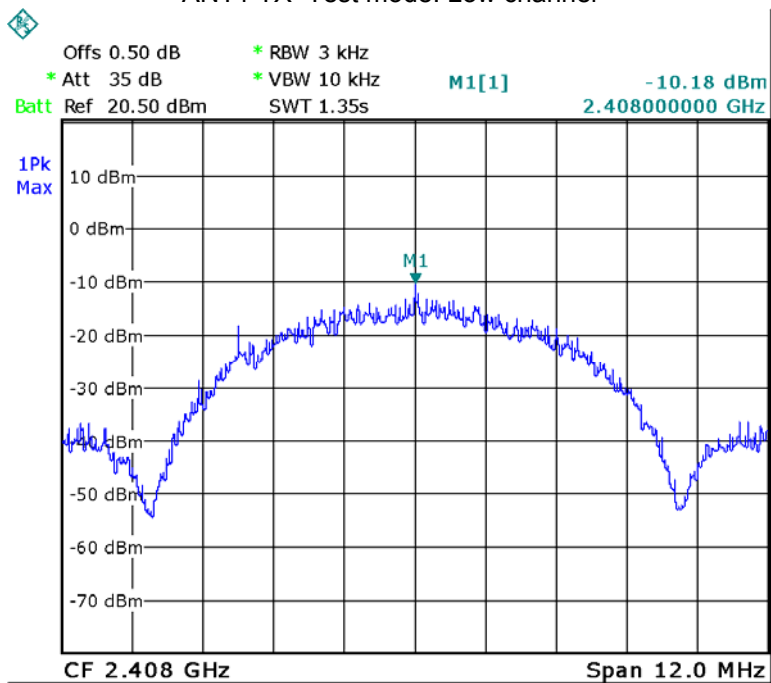
### ANT0 TX Test mode: Middle channel



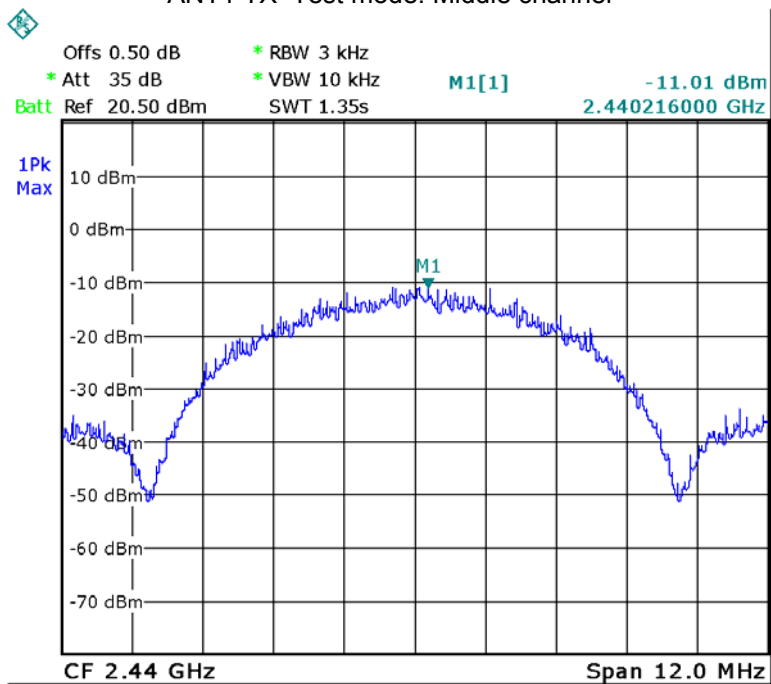
### ANT0 TX Test mode: High channel



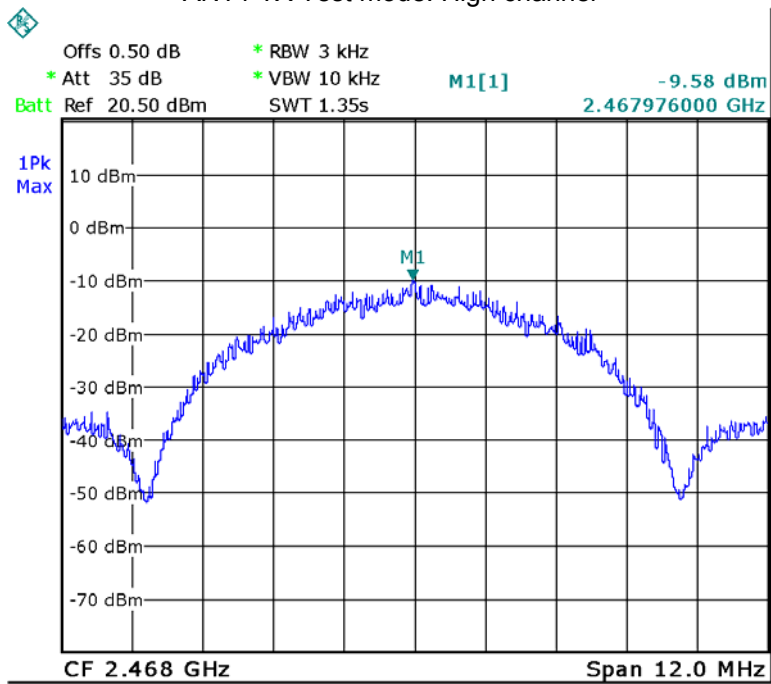
### ANT1 TX Test mode: Low channel



### ANT1 TX Test mode: Middle channel



### ANT1 TX Test mode: High channel



## **12 Antenna Requirement**

According to the FCC Part 15 Paragraph 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. This product has a internal permanent antenna, fulfill the requirement of this section.

## 13 RF Exposure

Test Requirement: FCC Part 1.1307

Evaluation Method: FCC Part 2.1091

### Requirements

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

### 13.1 The procedures / limit

#### (A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

#### (B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; \*Plane-wave equivalent power density



### 13.2 MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

**E** = Electric field (V/m)

**P** = Peak RF output power (W)

**G** = EUT Antenna numeric gain (numeric)

**d** = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

From the peak EUT RF output power, the minimum mobile separation distance,  $d=0.2\text{m}$ , as well as the gain of the used antenna, the RF power density can be obtained, this device cannot be used in a portable condition.

Antenna	Antenna Gain (dBi)	Antenna Gain (numeric)	Max. Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (mW/cm <sup>2</sup> )	Limit of Power Density (mW/cm <sup>2</sup> )
Ant0	2.00	1.585	15.93	39.17	0.012352	1
Ant1	2.00	1.585	15.26	33.57	0.006679	1

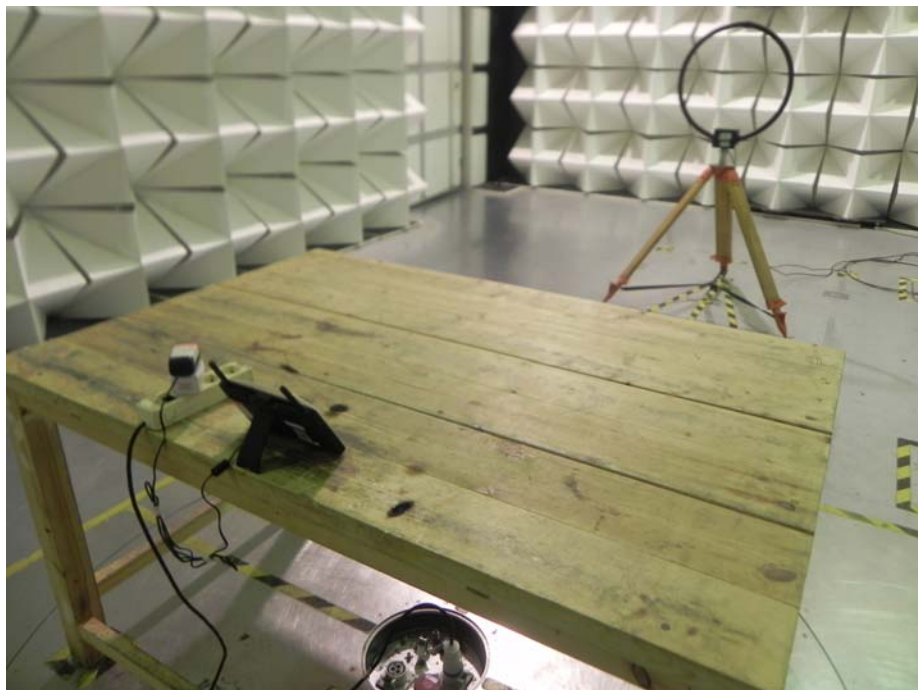
## 14 Photographs – Model UDR777HD Test Setup

### 14.1 Photograph – Conducted Emission Test Setup at Test Site 1#

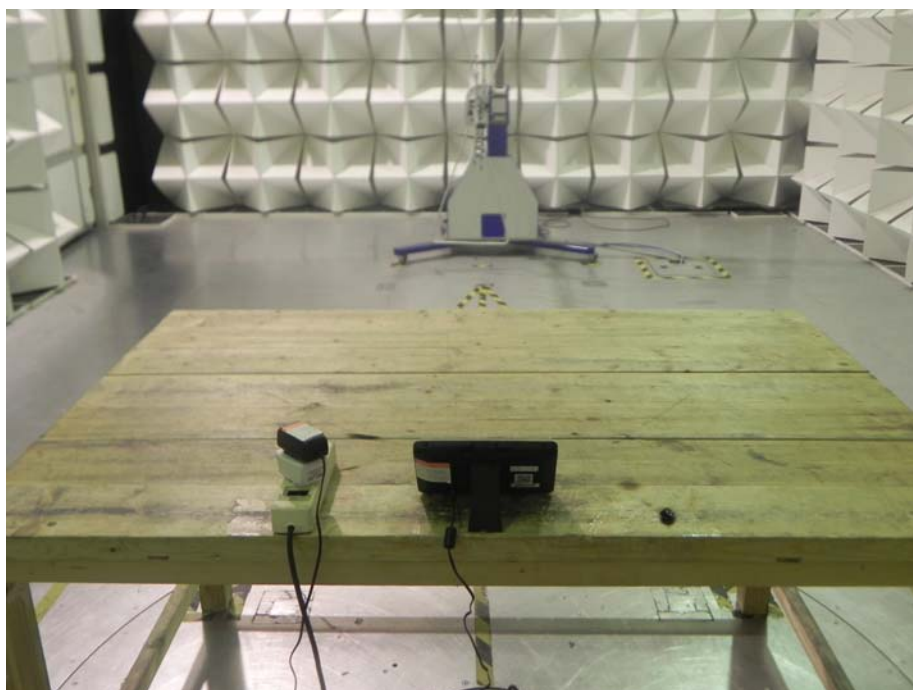


### 14.2 Radiated Emission

Test frequency below 30MHz at test site 2#



Test frequency from 30MHz to 1GHz at test site 2#



Test frequency above 1GHz at test site 1#



## 15 Photographs - Constructional Details

### 15.1 Model UDR777HD – External View





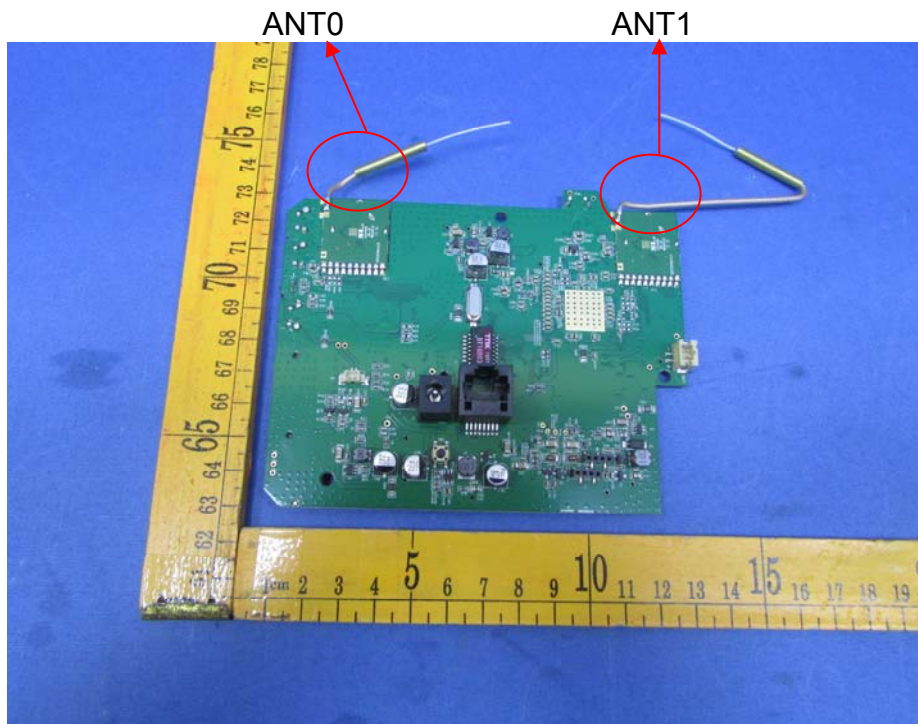


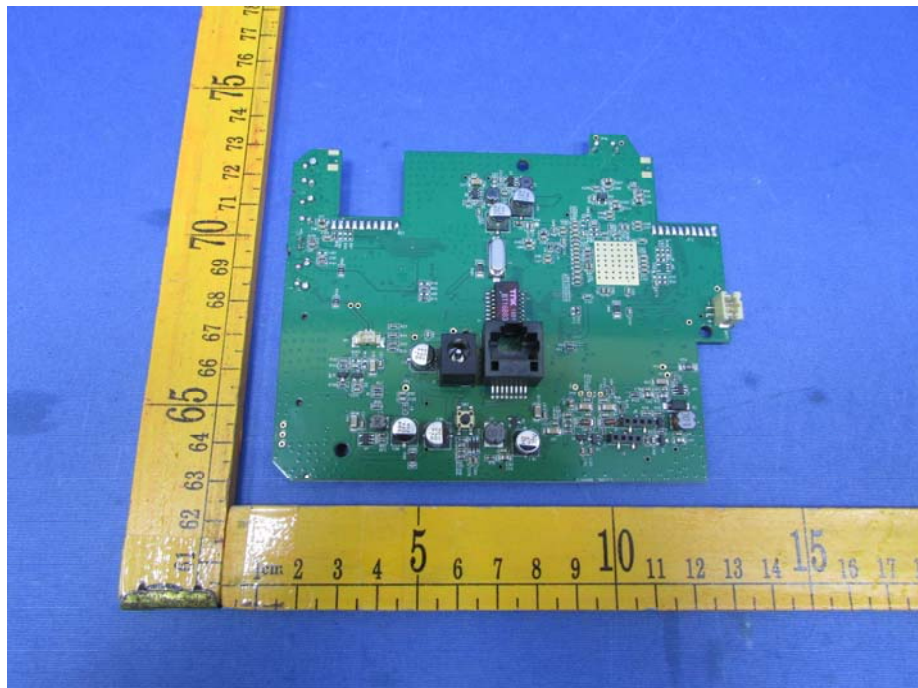
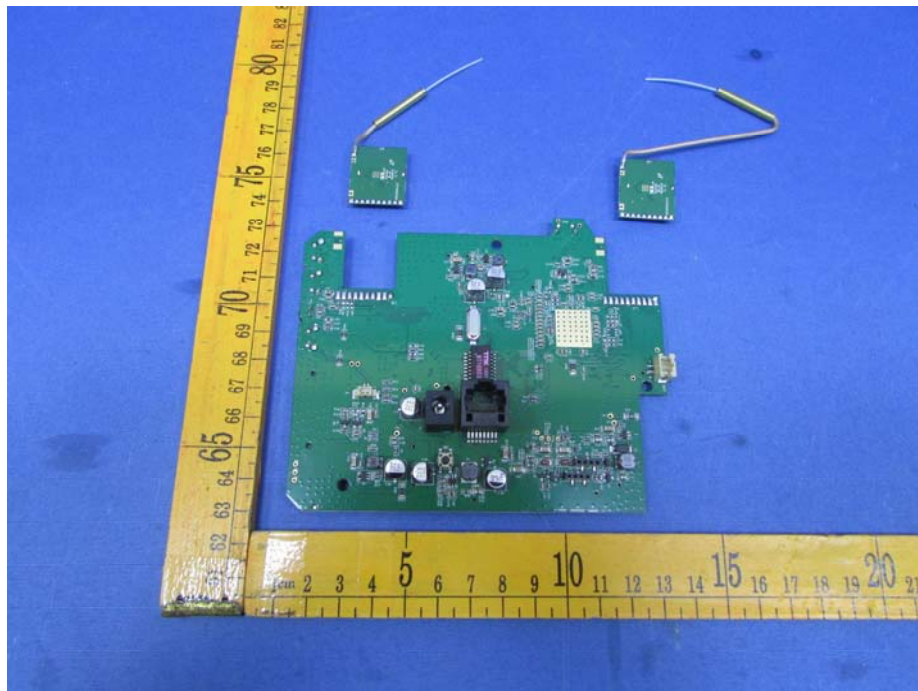


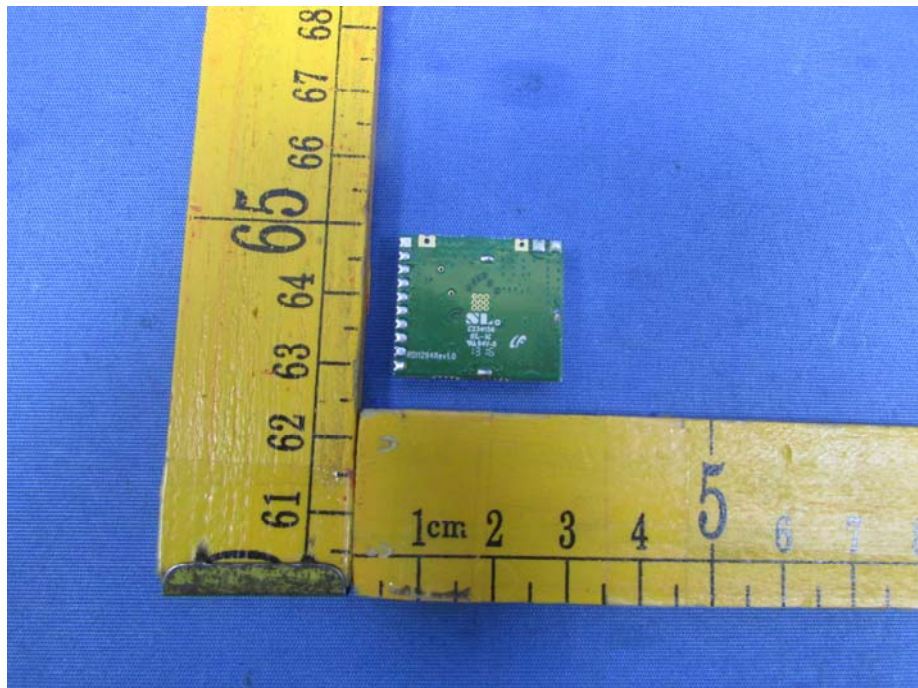
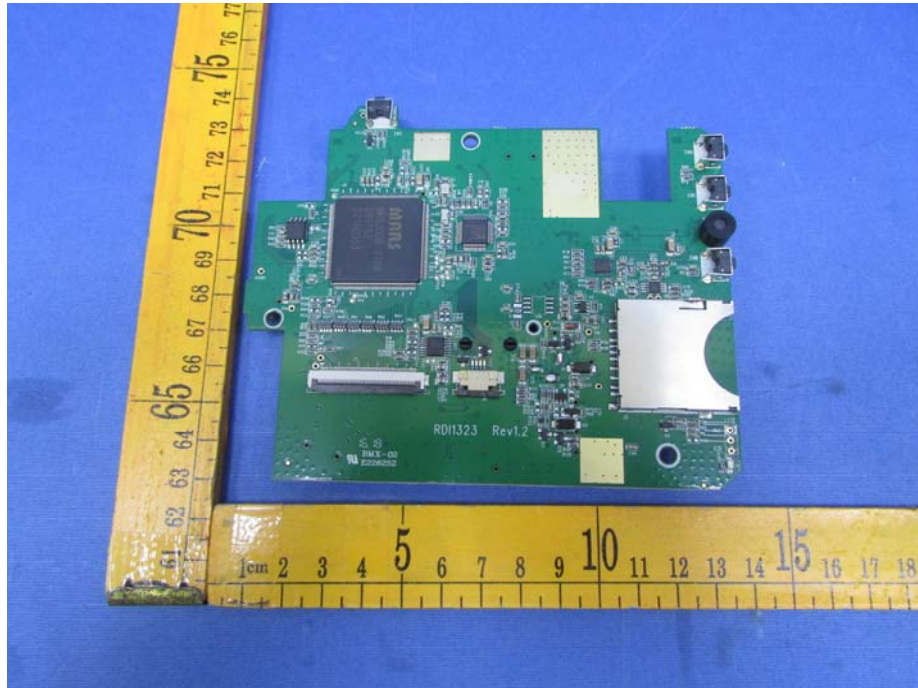


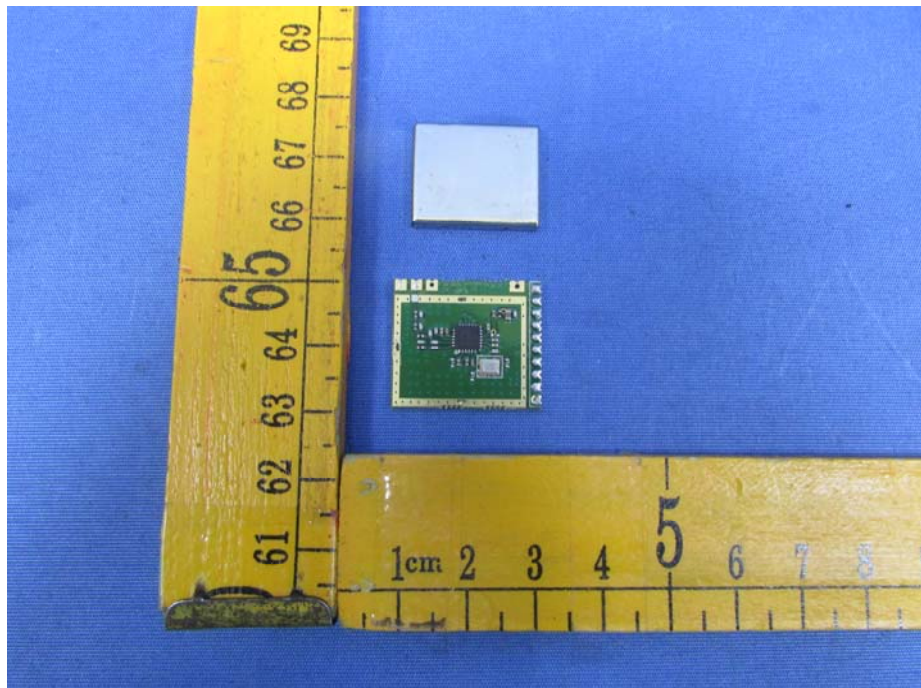
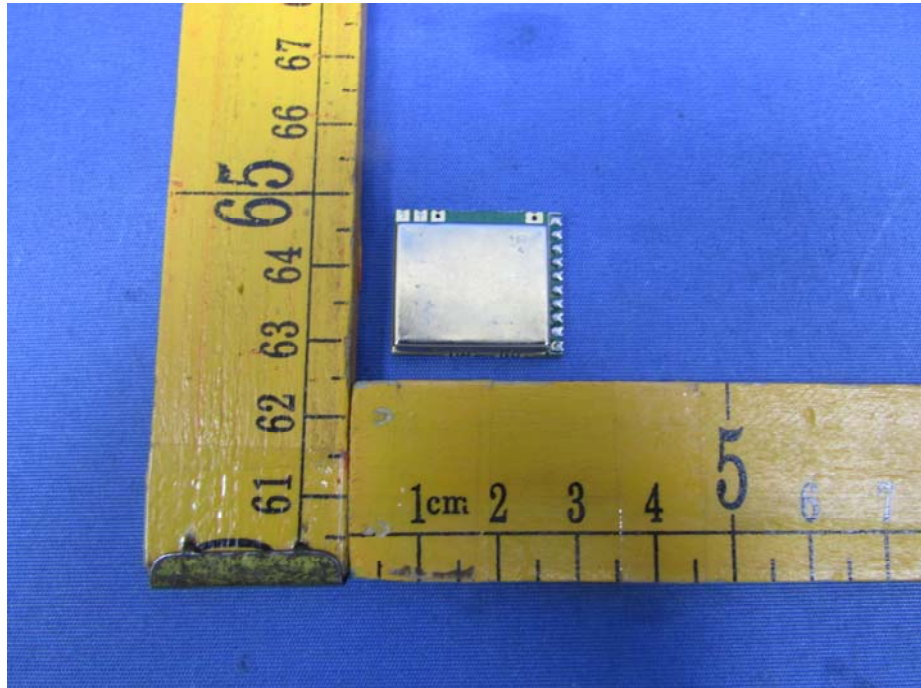


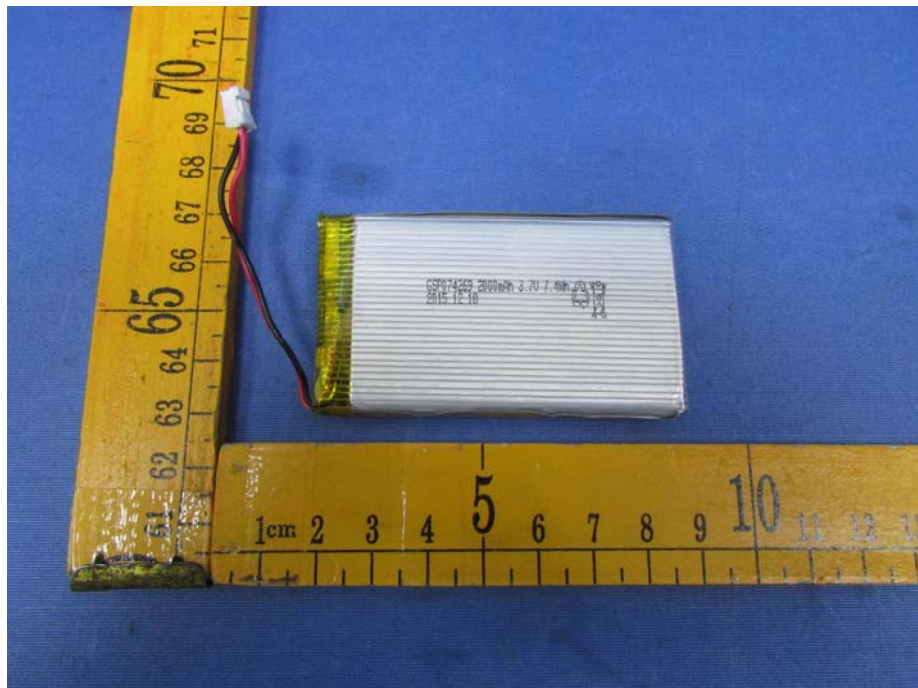
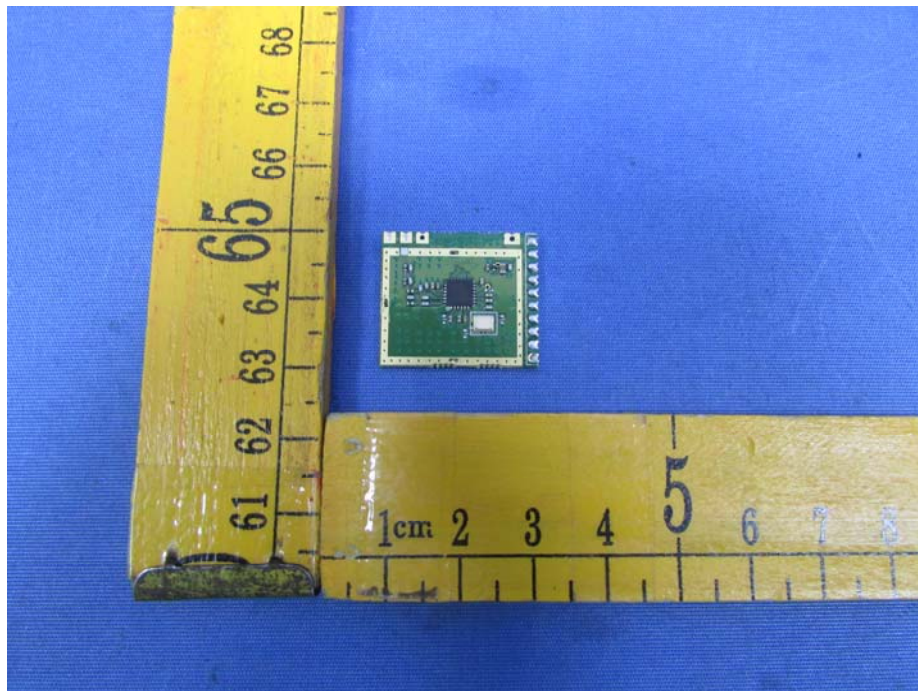
### 15.2 Model UDR777HD - Internal View

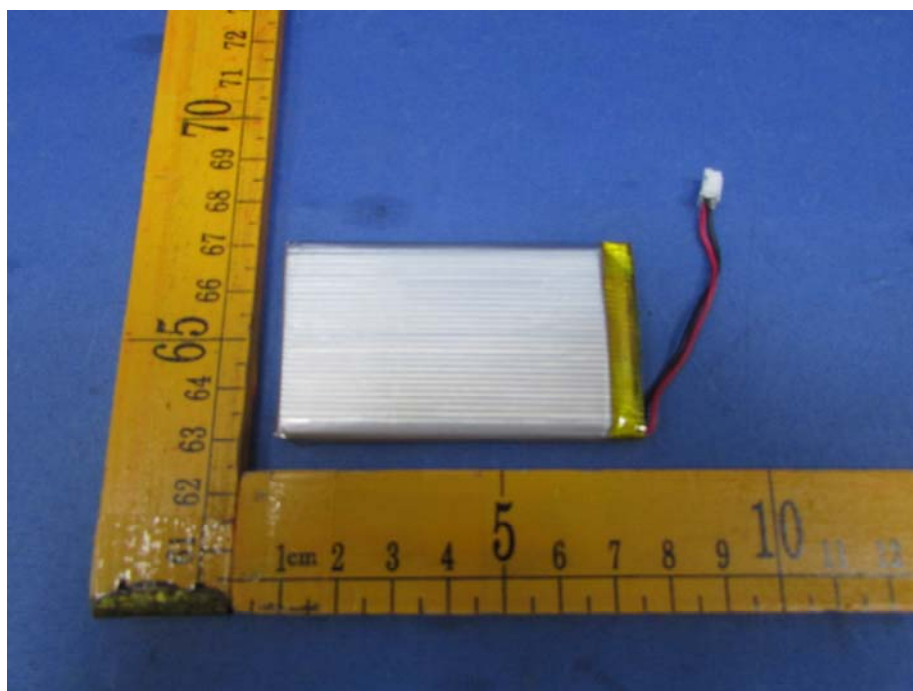












====End of Report====