TEST REPORT

Reference No.	:	WTS14S0615312E
FCC ID	:	2ACMYAWSC25
Applicant	:	Atoms Labs LLC
Address	:	2670 Firewheel Dr. Suite D Flower Mound， TX 75028 United States
Manufacturer	:	The same as above
Address	:	The same as above
Product Name	:	Digital Wireless Weather Proot Camera
Model No	:	AWSC25
Standards	:	FCC CFR47 Part 15 Section 15.247:2012
Date of Receipt sample	:	Jun.24, 2014
Date of Test	:	Jun.25~27, 2014
Date of Issue	:	Jul.10, 2014
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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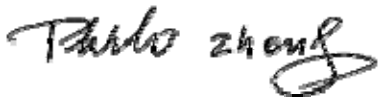
Compiled by:

Zero Zhou / Project Engineer

Approved by:



Philo Zhong / Manager

2 Test Summary

Test Items	Test Requirement	Result
Conducted Emission	15.207	PASS
Radiated Emissions	15.205(a) 15.209 15.247(d)	PASS
Band Edge Measurement	15.205(c) 15.209 15.247(d)	PASS
20dB Bandwidth	15.247(a)(1)	PASS
Maximum Peak Output Power	15.247(b)(1)	PASS
Channel Separated	15.247(a)(1)	PASS
Hopping Channel Number	15.247(a)(1)(iii)	PASS
Dwell time	15.247(a)(1)(iii)	PASS
Antenna Requirement	15.203	PASS
Maximum Permissible Exposure (Exposure of Humans to RF Fields)	1.1307(b)(1)	PASS

3 Contents

4 General Information

4.1 General Description of E.U.T.

Product Name	: Digital Wireless Weather Proot Camera
Model No.	: AWSC25
Type of Modulation	: GFSK
Operation Frequency	: 2408.625MHz ~ 2473.875MHz
Antenna Gain	: 3dBi
Oscillator	: 12MHz

4.2 Details of E.U.T.

Technical Data	: DC 5.0V, 1.0A powered by Adapter
Adapter 1	: KSAS0050500100VUD (Ktec) Input: 100– 40VAC, 50/60Hz, 0.18A Output: DC 5.0V, 1.0A
Adapter 2	: CS6D050100FU (Csec) Input: 100–240VAC, 50/60Hz, 200mA Output: DC 5.0V, 1.0A
Adapter 3	: SSA021F050100USD (KUANTEN) Input: 100–240VAC, 50/60Hz, 0.2A Output: DC 5.0V, 1.0A

4.3 Description of Support Units

The EUT has been tested as an independent unit.

4.4 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, July 12, 2012.

- **FCC – 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, Apr. 29, 2014.

4.5 Test Location

All the tests were performed at:
Waltek Services(Shenzhen) Co., Ltd. at 1/F, Fukangtai Building, West Baima Rd.,Songgang Street, Baoan District, Shenzhen, China

5 Equipment Used during Test

5.1 Equipments List

Conducted Emissions						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1.	EMI Test Receiver	R&S	ESCI	101155	Sep.18,2013	Sep.17,2014
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	Sep.18,2013	Sep.17,2014
3.	Limiter	York	MTS-IMP-136	261115-001-0024	Sep.18,2013	Sep.17,2014
4.	Cable	LARGE	RF300	-	Sep.18,2013	Sep.17,2014
3m Semi-anechoic Chamber for Radiation Emissions						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1	EMC Analyzer	Agilent	E7405A	MY45114943	Sep.18,2013	Sep.17,2014
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr.19,2014	Apr.18,2015
3	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	Sep.18,2013	Sep.17,2014
4	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Apr.19,2014	Apr.18,2015
5	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Mar.17,2014	Mar.16,2015
6	Coaxial Cable (above 1GHz)	Top	1GHz-25GHz	EW02014-7	Apr.10,2014	Apr.09,2015
Associated Equipment						
1.	Digital Wireless Monitor	JSW	UDS6	-	-	-

5.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	± 1 x 10^{-6}
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Emissions	± 5.03 dB (Bilog antenna 30M~1000MHz)
	± 5.47 dB (Horn antenna 1000M~25000MHz)
Conducted Emission	±3.64dB

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 C63.4:2003
Test Result:	PASS
Frequency Range:	150kHz to 30MHz
Limit:	66-56 dBμV between 0.15MHz & 0.5MHz
	56 dBμV between 0.5MHz & 5MHz
	60 dBμV between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth)
	Quasi-Peak & Average if maximised peak within 6dB of Average Limit

6.1 E.U.T. Operation

Operating Environment:

Temperature:	22.5 °C
Humidity:	52.1% RH
Atmospheric Pressure:	101.1 kPa

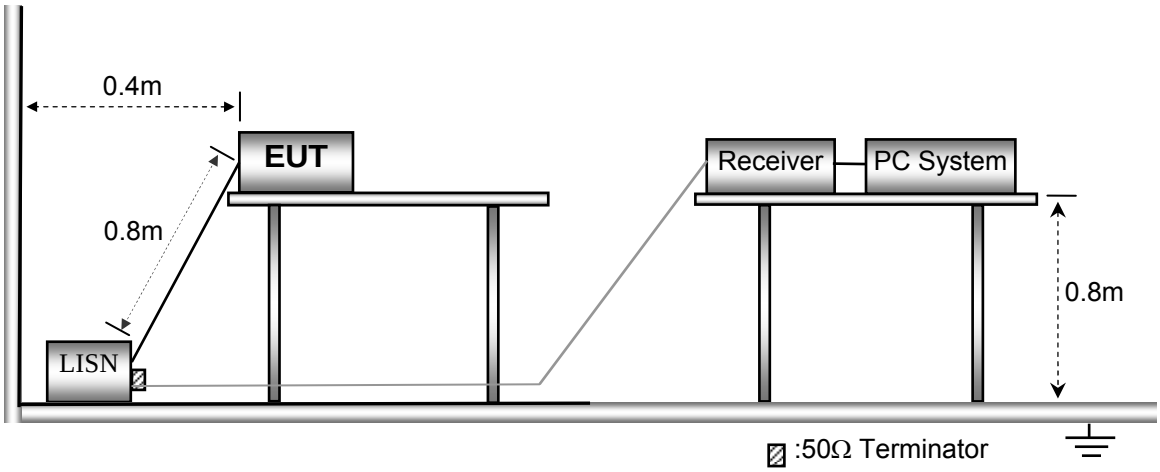
6.2 Test Procedure

(1) The EUT was tested according to ANSI C63.4:2003. The frequency spectrum from 150kHz to 30MHz was investigated.

(2) 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.

6.3 Test Setup

The EUT was placed on the test table in shielding room



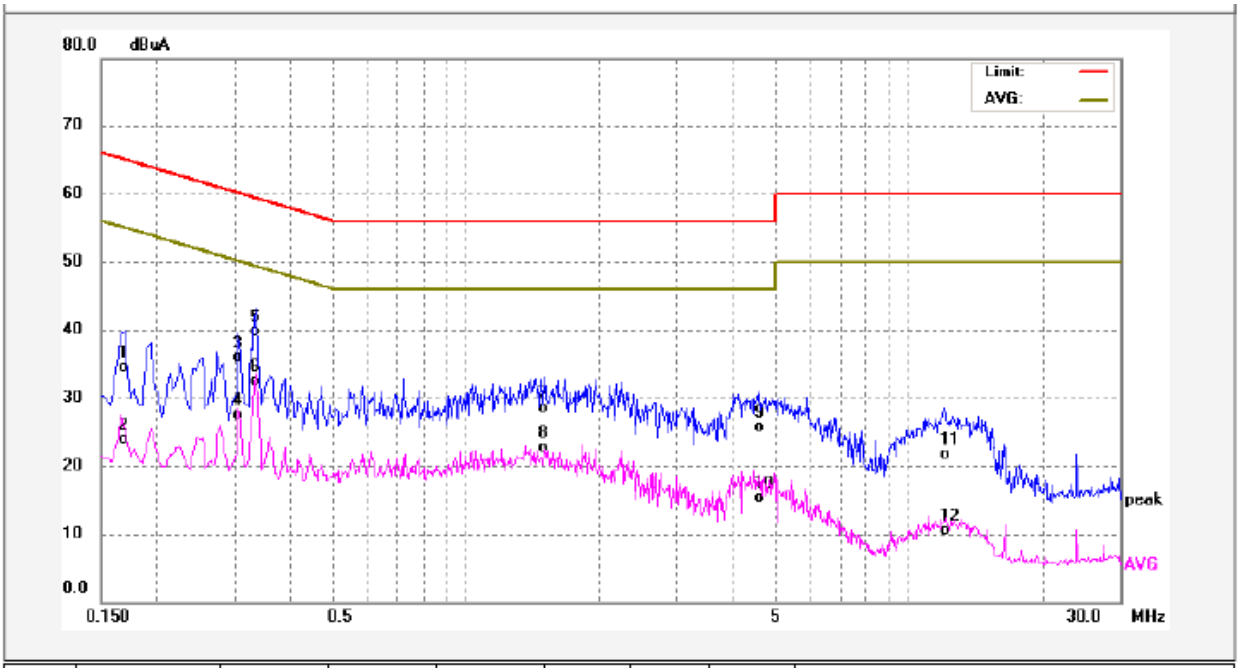
6.4 Conducted Emission Test Result

An initial pre-scan was performed on the live and neutral lines.

The EUT was tested in continuously transmit mode.

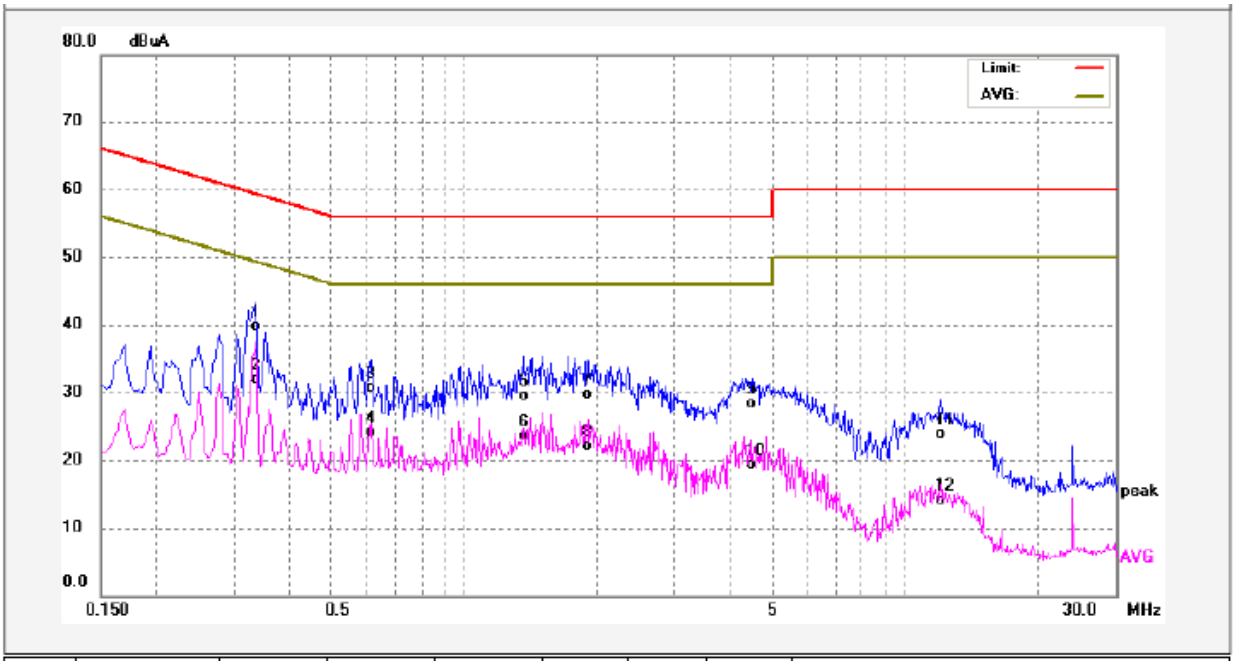
Adapter: KSAS0050500100VUD (Ktec)

Live line:



No.	Freq. (MHz)	Reading (dBuA)	Factor (dB)	Result (dBuA)	Limit dBuA	Margin (dB)	Detector	Remark
1	0.1700	23.96	10.57	34.53	64.96	-30.43	QP	
2	0.1700	13.43	10.57	24.00	54.96	-30.96	AVG	
3	0.3060	25.30	10.57	35.87	60.08	-24.21	QP	
4	0.3060	16.88	10.57	27.45	50.08	-22.63	AVG	
5	0.3339	29.23	10.57	39.80	59.35	-19.55	QP	
6	0.3339	21.92	10.57	32.49	49.35	-16.86	AVG	
7	1.4980	17.46	11.03	28.49	56.00	-27.51	QP	
8	1.4980	11.62	11.03	22.65	46.00	-23.35	AVG	
9	4.5660	14.79	10.83	25.62	56.00	-30.38	QP	
10	4.5660	4.38	10.83	15.21	46.00	-30.79	AVG	
11	12.0180	10.71	10.96	21.67	60.00	-38.33	QP	
12	12.0180	-0.42	10.96	10.54	50.00	-39.46	AVG	

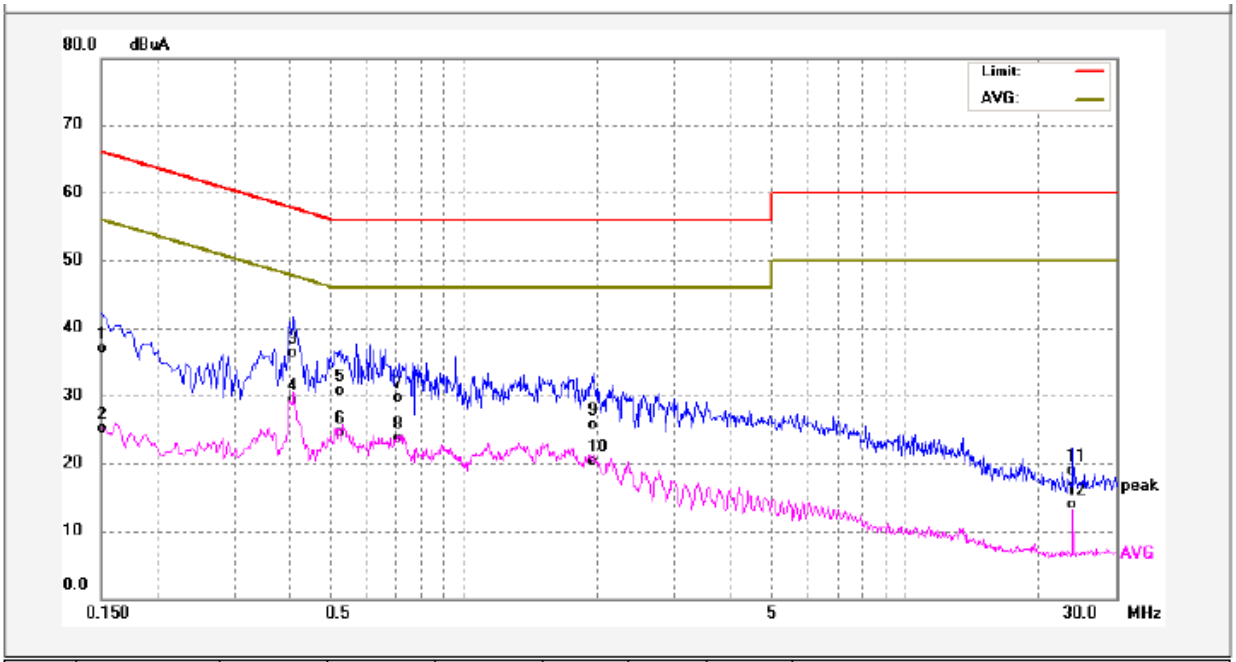
Neutral line:



No.	Freq. (MHz)	Reading (dBuA)	Factor (dB)	Result (dBuA)	Limit dBuA	Margin (dB)	Detector	Remark
1	0.3379	29.12	10.57	39.69	59.25	-19.56	QP	
2	0.3379	21.34	10.57	31.91	49.25	-17.34	AVG	
3	0.6140	19.84	10.93	30.77	56.00	-25.23	QP	
4	0.6140	13.21	10.93	24.14	46.00	-21.86	AVG	
5	1.3619	18.56	10.93	29.49	56.00	-26.51	QP	
6	1.3619	12.53	10.93	23.46	46.00	-22.54	AVG	
7	1.9020	18.28	11.33	29.61	56.00	-26.39	QP	
8	1.9020	10.87	11.33	22.20	46.00	-23.80	AVG	
9	4.5020	17.42	10.84	28.26	56.00	-27.74	QP	
10	4.5020	8.53	10.84	19.37	46.00	-26.63	AVG	
11	11.9980	12.94	10.96	23.90	60.00	-36.10	QP	
12	11.9980	3.21	10.96	14.17	50.00	-35.83	AVG	

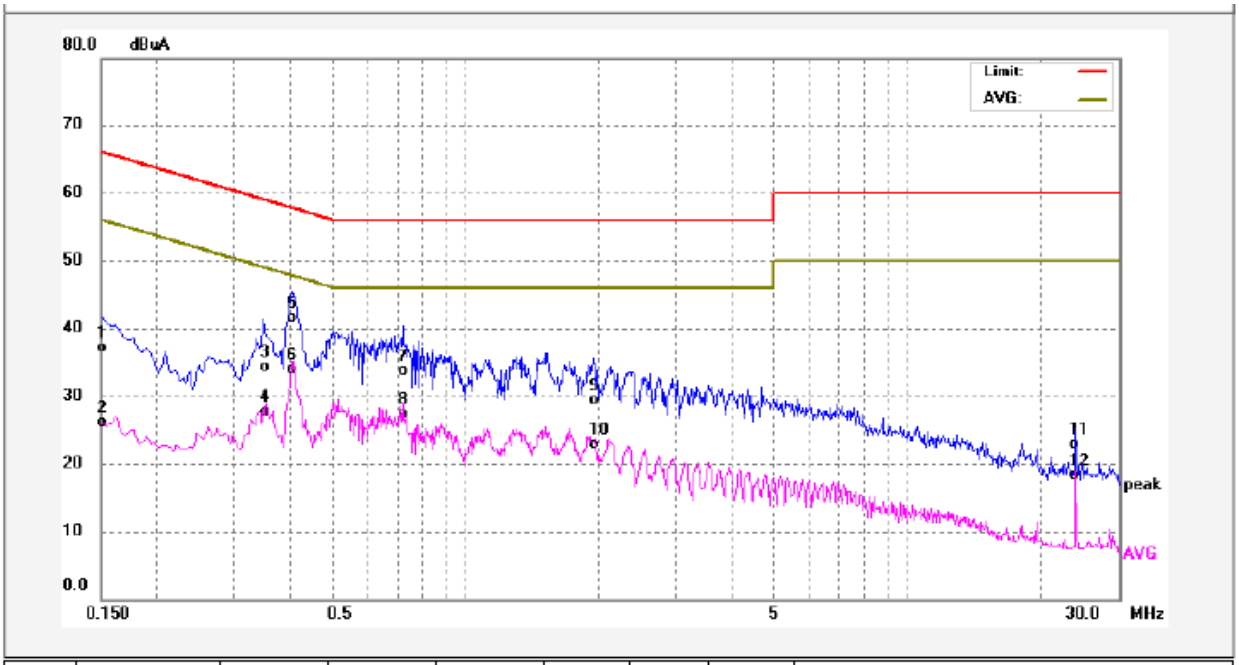
Adapter: CS6D050100FU (Csec)

Live line:



No.	Freq. (MHz)	Reading (dBuA)	Factor (dB)	Result (dBuA)	Limit dBuA	Margin (dB)	Detector	Remark
1	0.1500	26.33	10.57	36.90	65.99	-29.09	QP	
2	0.1500	14.47	10.57	25.04	55.99	-30.95	AVG	
3	0.4100	25.77	10.56	36.33	57.65	-21.32	QP	
4	0.4100	18.65	10.56	29.21	47.65	-18.44	AVG	
5	0.5220	20.06	10.63	30.69	56.00	-25.31	QP	
6	0.5220	13.94	10.63	24.57	46.00	-21.43	AVG	
7	0.7100	18.62	11.18	29.80	56.00	-26.20	QP	
8	0.7100	12.60	11.18	23.78	46.00	-22.22	AVG	
9	1.9660	14.39	11.38	25.77	56.00	-30.23	QP	
10	1.9660	8.87	11.38	20.25	46.00	-25.75	AVG	
11	23.9980	7.36	11.59	18.95	60.00	-41.05	QP	
12	23.9980	2.23	11.59	13.82	50.00	-36.18	AVG	

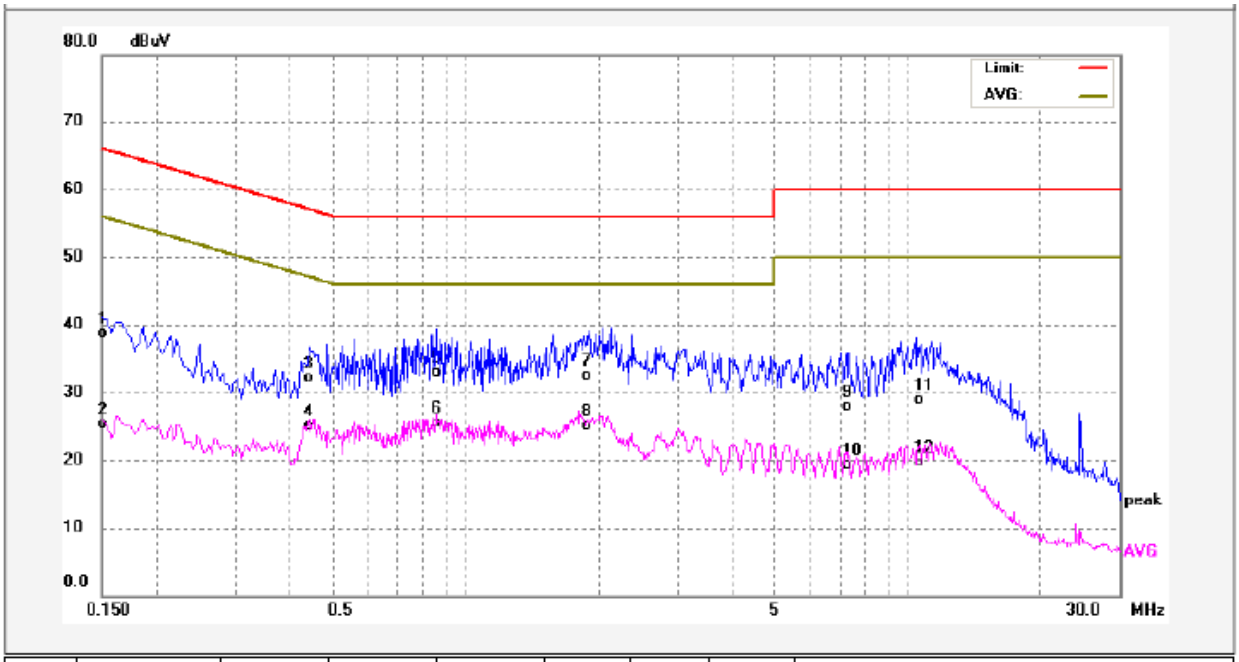
Neutral line:



No.	Freq. (MHz)	Reading (dBuA)	Factor (dB)	Result (dBuA)	Limit dBuA	Margin (dB)	Detector	Remark
1	0.1500	26.47	10.57	37.04	65.99	-28.95	QP	
2	0.1500	15.49	10.57	26.06	55.99	-29.93	AVG	
3	0.3500	23.74	10.57	34.31	58.96	-24.65	QP	
4	0.3500	17.12	10.57	27.69	48.96	-21.27	AVG	
5	0.4060	30.91	10.56	41.47	57.73	-16.26	QP	
6	0.4060	23.32	10.56	33.88	47.73	-13.85	AVG	
7	0.7220	22.48	11.16	33.64	56.00	-22.36	QP	
8	0.7220	16.08	11.16	27.24	46.00	-18.76	AVG	
9	1.9420	18.04	11.36	29.40	56.00	-26.60	QP	
10	1.9420	11.63	11.36	22.99	46.00	-23.01	AVG	
11	23.9980	11.27	11.59	22.86	60.00	-37.14	QP	
12	23.9980	6.69	11.59	18.28	50.00	-31.72	AVG	

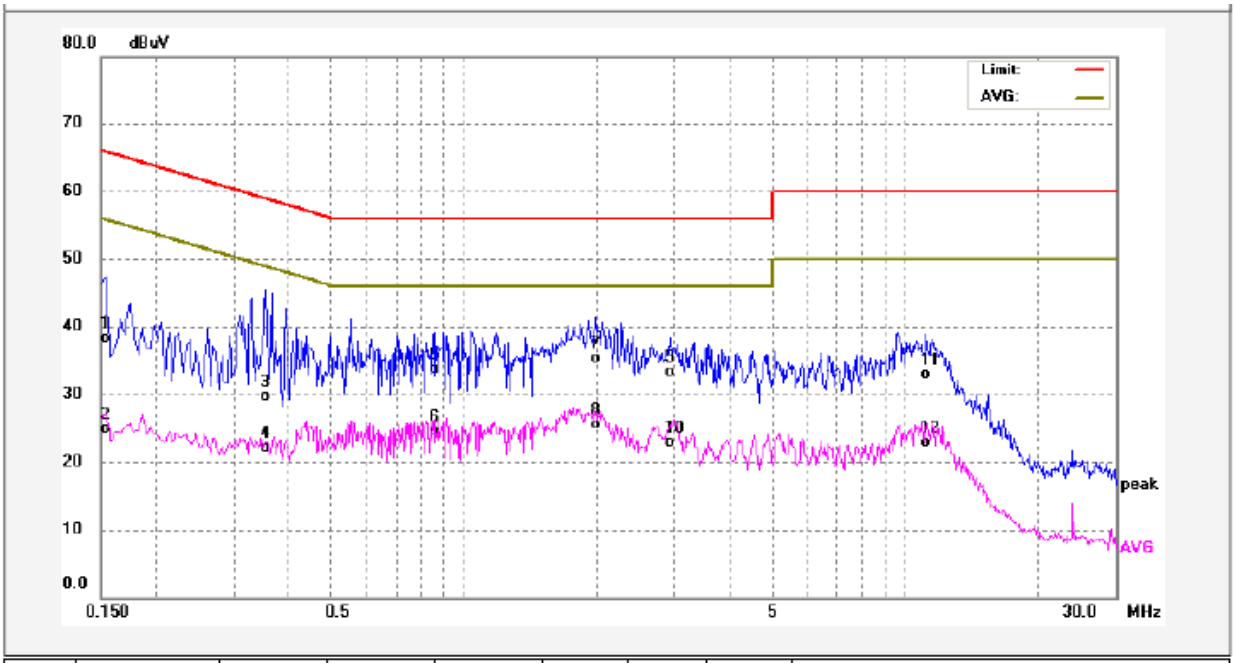
Adapter: SSA021F050100USD (KUANTEN)

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1500	28.21	10.57	38.78	65.99	-27.21	QP	
2	0.1500	14.77	10.57	25.34	55.99	-30.65	AVG	
3	0.4420	21.46	10.56	32.02	57.02	-25.00	QP	
4	0.4420	14.50	10.56	25.06	47.02	-21.96	AVG	
5	0.8540	21.98	10.93	32.91	56.00	-23.09	QP	
6	0.8540	14.67	10.93	25.60	46.00	-20.40	AVG	
7	1.9020	21.23	11.33	32.56	56.00	-23.44	QP	
8	1.9020	13.75	11.33	25.08	46.00	-20.92	AVG	
9	7.2940	17.10	10.76	27.86	60.00	-32.14	QP	
10	7.2940	8.62	10.76	19.38	50.00	-30.62	AVG	
11	10.4940	17.98	10.85	28.83	60.00	-31.17	QP	
12	10.4940	8.90	10.85	19.75	50.00	-30.25	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1539	27.73	10.57	38.30	65.78	-27.48	QP	
2	0.1539	14.36	10.57	24.93	55.78	-30.85	AVG	
3	0.3540	19.12	10.56	29.68	58.87	-29.19	QP	
4	0.3540	11.56	10.56	22.12	48.87	-26.75	AVG	
5	0.8540	22.84	10.93	33.77	56.00	-22.23	QP	
6	0.8540	13.65	10.93	24.58	46.00	-21.42	AVG	
7	1.9860	23.96	11.39	35.35	56.00	-20.65	QP	
8	1.9860	14.04	11.39	25.43	46.00	-20.57	AVG	
9	2.9300	22.11	11.19	33.30	56.00	-22.70	QP	
10	2.9300	11.72	11.19	22.91	46.00	-23.09	AVG	
11	11.1740	22.03	10.90	32.93	60.00	-27.07	QP	
12	11.1740	11.94	10.90	22.84	50.00	-27.16	AVG	

7 Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: DA 00-705

Test Result: PASS

Frequency Range: 12MHz to 25GHz

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: 101.2 kPa

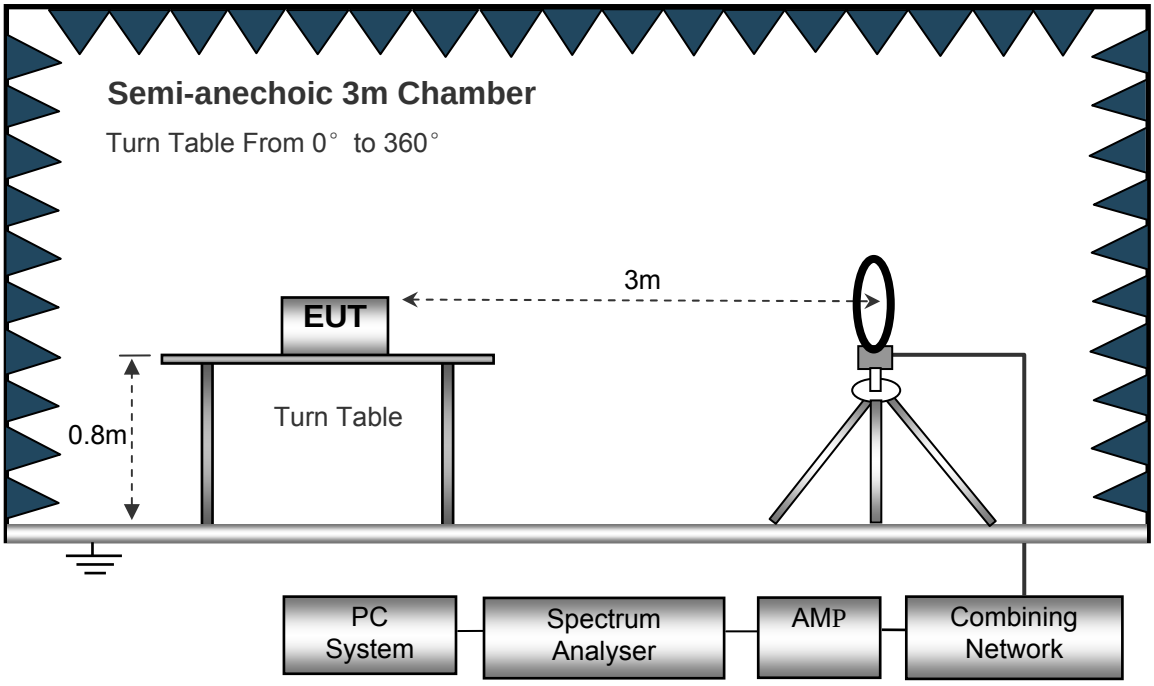
EUT Operation:

The EUT was tested in continuously transmit mode.

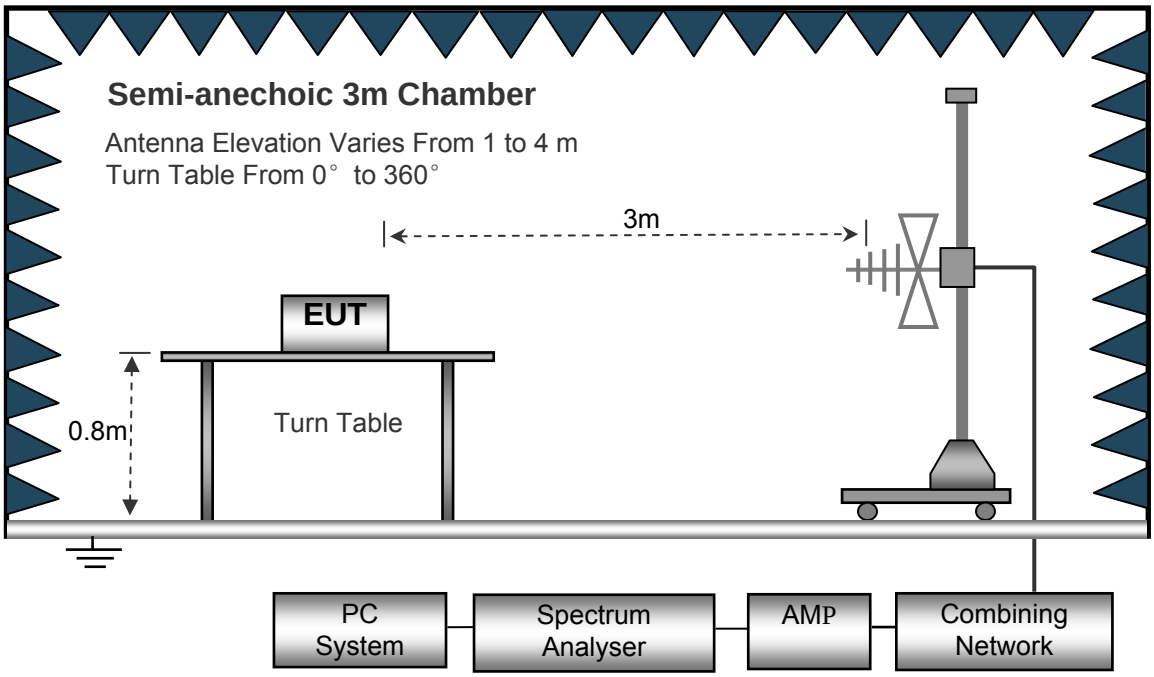
7.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4: 2003.

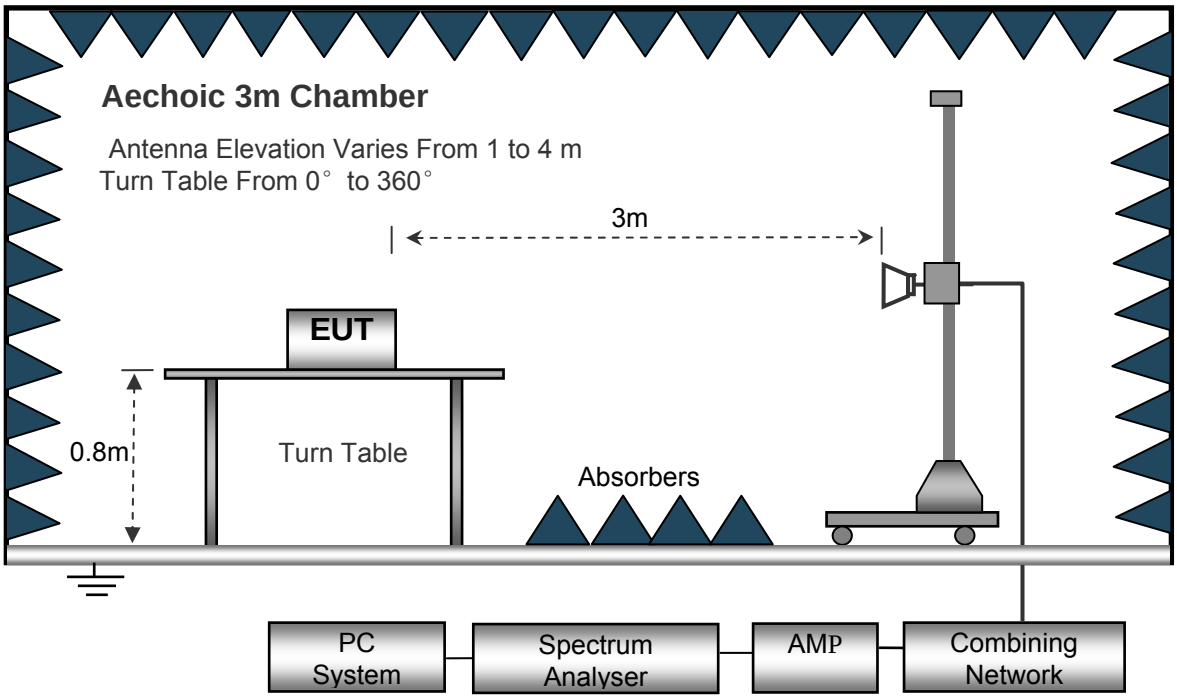
The test setup for emission measurement below 30MHz.



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

According to FCC Part15 Rules, the system was tested 12MHz to 25000MHz.

Below 30MHz

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

30MHz ~ 1GHz

Sweep Speed ..... Auto
IF Bandwidth..... 120KHz
Video Bandwidth 100KHz
Quasi-Peak Adapter Bandwidth 120KHz
Quasi-Peak Adapter Mode ..... Normal
Resolution Bandwidth..... 120KHz

Above 1GHz

Sweep Speed ..... Auto
IF Bandwidth..... 1MHz
Video Bandwidth 3MHz
Peak -Peak Adapter Bandwidth 1MHz
Average Adapter Bandwidth..... 10Hz
Resolution Bandwidth..... 1MHz

7.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
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 tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.

7.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Limit

7.6 Summary of Test Results

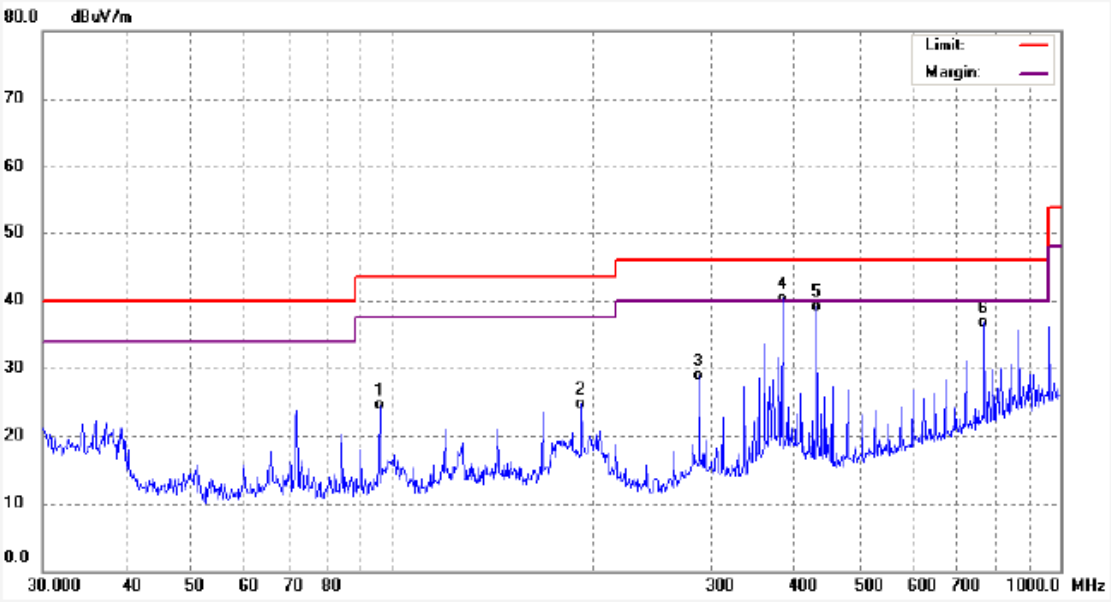
Test Frequency Range :12MHz ~ 30MHz

Remark:Because the emissions below 30MHz are more than 20dB below the limit, the data is not show in the report.

Test Frequency Range :30MHz ~ 1GHz

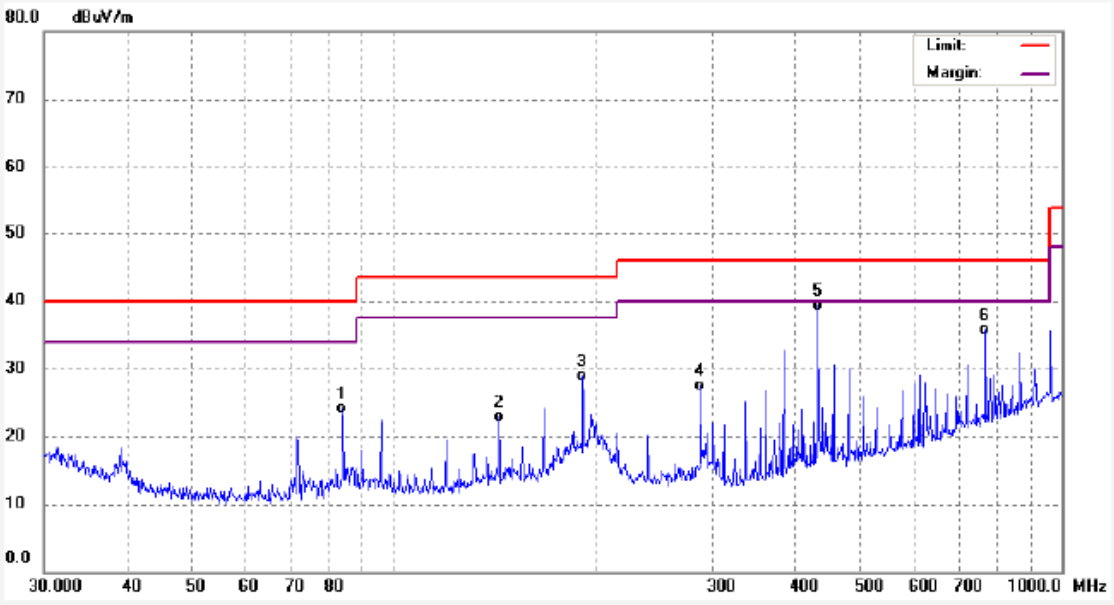
Adapter: KSAS0050500100VUD (Ktec)

Test Specification: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	95.7622	44.88	-20.28	24.60	43.50	-18.90	QP	
2	191.7450	42.90	-18.19	24.71	43.50	-18.79	QP	
3	287.9904	49.01	-20.13	28.88	46.00	-17.12	QP	
4	383.9318	57.49	-17.20	40.29	46.00	-5.71	QP	
5	432.5457	54.96	-15.93	39.03	46.00	-6.97	QP	
6	768.7481	44.68	-8.04	36.64	46.00	-9.36	QP	

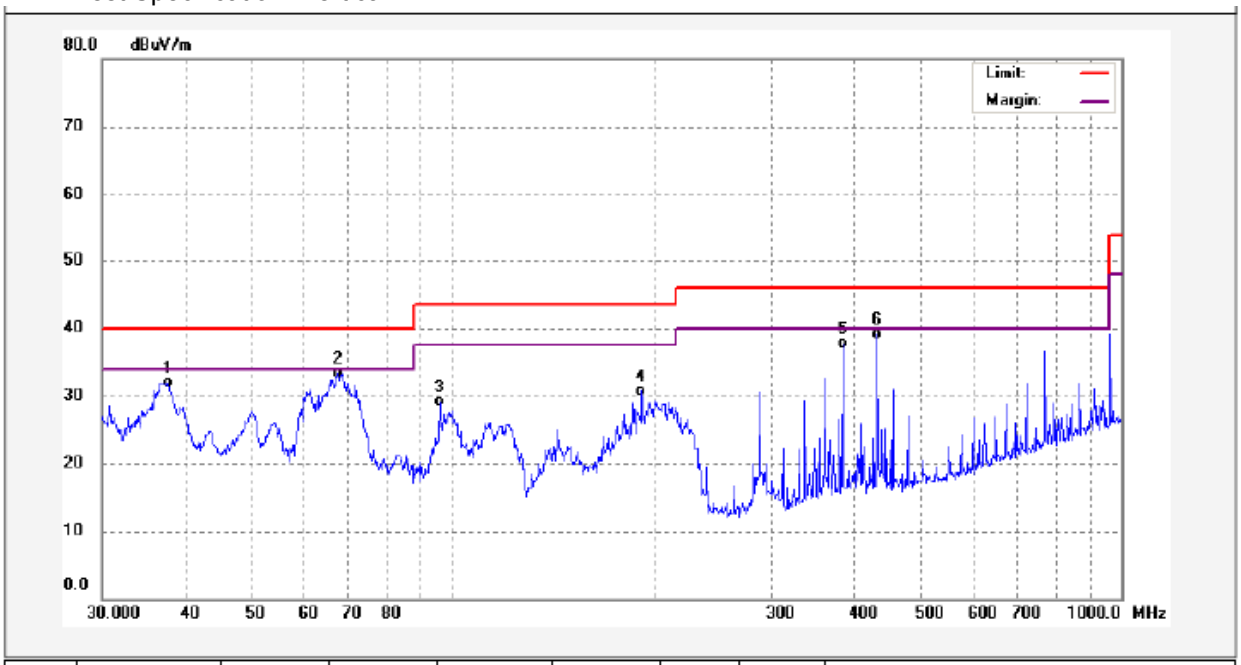
Antenna polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	83.8155	50.26	-26.09	24.17	40.00	-15.83	QP	
2	143.8295	40.83	-17.87	22.96	43.50	-20.54	QP	
3	191.7450	47.97	-18.99	28.98	43.50	-14.52	QP	
4	287.9904	47.48	-20.03	27.45	46.00	-18.55	QP	
5	432.5456	55.04	-15.79	39.25	46.00	-6.75	QP	
6	768.7481	43.70	-7.90	35.80	46.00	-10.20	QP	

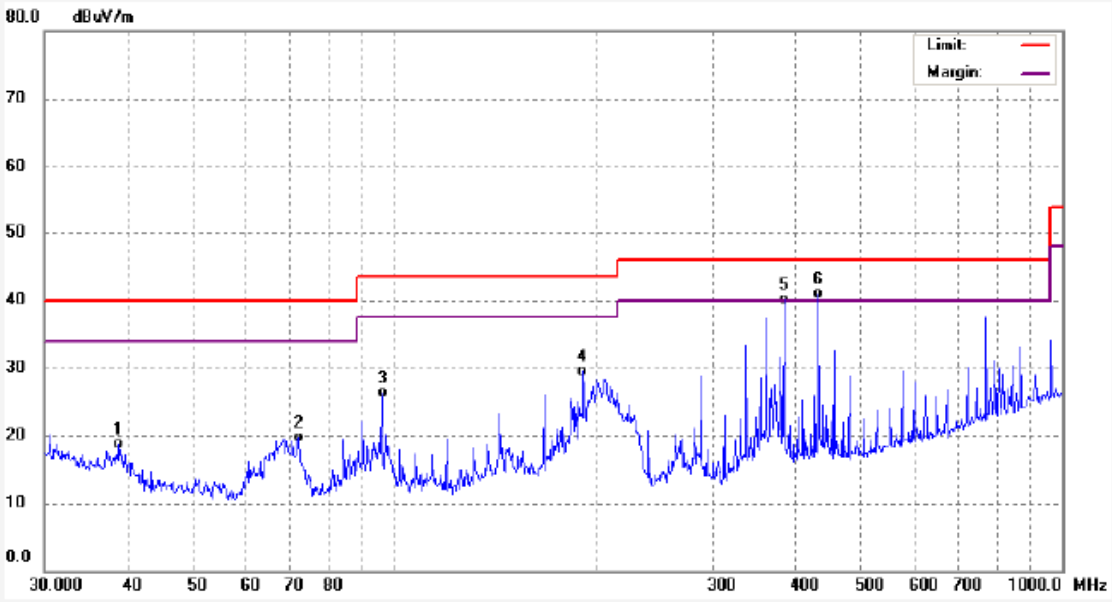
Adapter: CS6D050100FU (Csec)

Test Specification: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	37.5479	51.76	-19.76	32.00	40.00	-8.00	QP	
2	67.4382	54.54	-21.18	33.36	40.00	-6.64	QP	
3	95.7622	49.39	-20.28	29.11	43.50	-14.39	QP	
4	191.7450	48.87	-18.19	30.68	43.50	-12.82	QP	
5	383.9318	54.85	-17.20	37.65	46.00	-8.35	QP	
6	432.5457	55.06	-15.93	39.13	46.00	-6.87	QP	

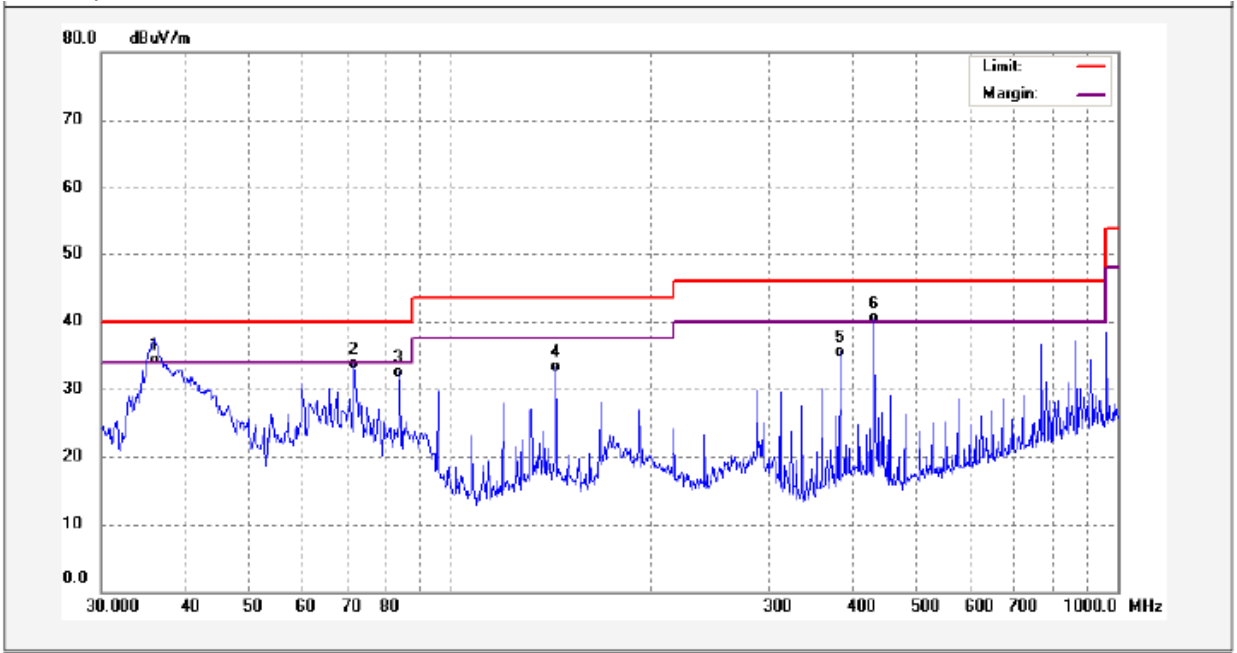
Antenna polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	38.7518	35.73	-16.95	18.78	40.00	-21.22	QP	
2	72.0843	43.96	-24.18	19.78	40.00	-20.22	QP	
3	96.0986	50.07	-23.86	26.21	43.50	-17.29	QP	
4	191.7450	48.47	-18.99	29.48	43.50	-14.02	QP	
5	383.9318	57.29	-17.20	40.09	46.00	-5.91	QP	
6	432.5457	56.67	-15.79	40.88	46.00	-5.12	QP	

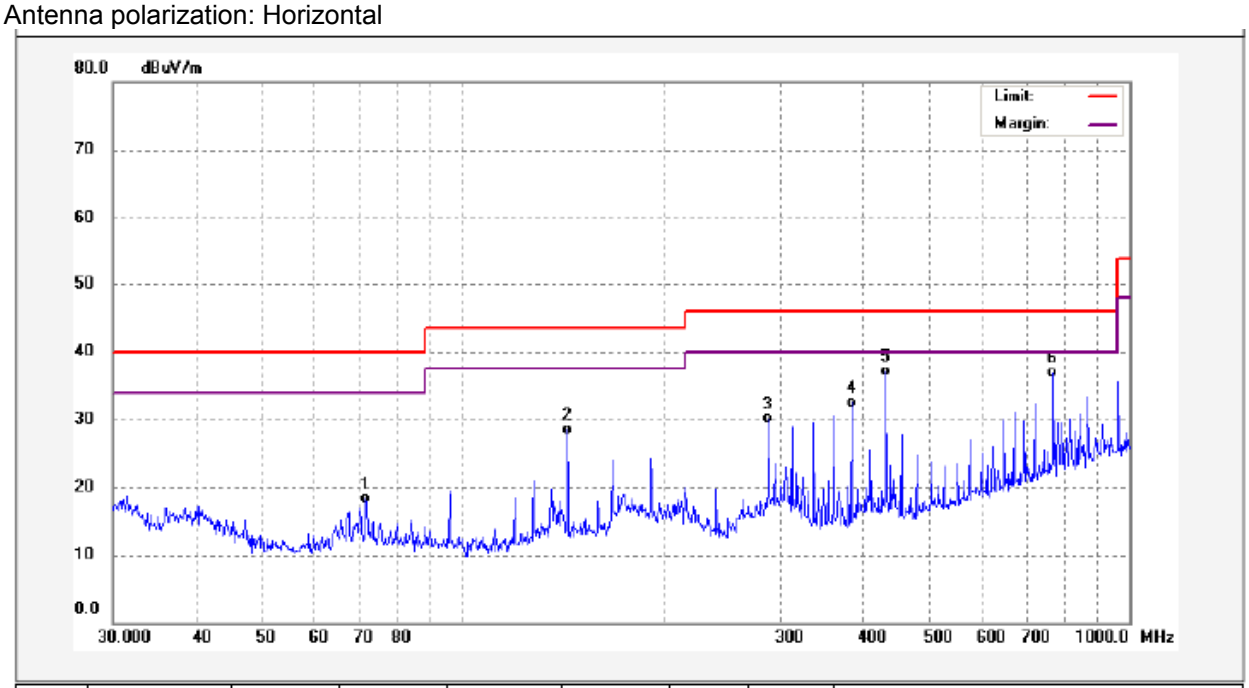
Adapter: SSA021F050100USD (KUANTEN)

Test Specification: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	36.0007	54.30	-19.90	34.40	40.00	-5.60	QP	
2	71.8320	55.23	-21.53	33.70	40.00	-6.30	QP	
3	83.8156	53.49	-20.90	32.59	40.00	-7.41	QP	
4	143.8295	51.56	-18.22	33.34	43.50	-10.16	QP	
5	383.9318	52.76	-17.20	35.56	46.00	-10.44	QP	
6	432.5457	56.42	-15.93	40.49	46.00	-5.51	QP	

Antenna polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	71.8320	42.44	-24.12	18.32	40.00	-21.68	QP	
2	143.8295	46.34	-17.87	28.47	43.50	-15.03	QP	
3	287.9904	50.11	-20.03	30.08	46.00	-15.92	QP	
4	383.9318	49.75	-17.20	32.55	46.00	-13.45	QP	
5	432.5457	52.92	-15.79	37.13	46.00	-8.87	QP	
6	768.7481	44.82	-7.90	36.92	46.00	-9.08	QP	

Test Frequency: 1GHz ~ 25GHz

And the below is the Fundamental and Harmonic

Frequency (MHz)	Detector	Antenna Polarization	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Turntable Angle (°)
Low frequency							
2408.625	AV	Vertical	102.06		(Fund.)	1.3	100
4817.25	AV	Vertical	43.61	54.00	-10.39	1.2	85
7225.875	AV	Vertical	44.55	54.00	-9.45	1.9	140
9634.5	AV	Vertical	41.28	54.00	-12.72	2.2	180
12043.13	AV	Vertical	37.64	54.00	-16.36	1.4	235
14451.75	AV	Vertical	38.93	54.00	-15.07	1.8	160
16860.38	AV	Vertical	35.74	54.00	-18.26	2.0	120
19269	AV	Vertical	34.02	54.00	-19.98	1.3	180
21677.63	AV	Vertical	31.80	54.00	-22.2	2.2	100
24086.25	AV	Vertical	32.95	54.00	-21.05	1.7	100
2408.625	AV	Horizontal	93.54		(Fund.)	2.5	20
4817.25	AV	Horizontal	42.92	54.00	-11.08	2.4	240
7225.875	AV	Horizontal	40.67	54.00	-13.33	2.3	160
9634.5	AV	Horizontal	37.78	54.00	-16.22	2.3	140
12043.13	AV	Horizontal	39.76	54.00	-14.24	2.2	80
14451.75	AV	Horizonta	34.67	54.00	-19.33	2.4	240
16860.38	AV	Horizontal	40.77	54.00	-13.23	1.7	200
19269	AV	Horizontal	32.62	54.00	-21.38	2.0	140
21677.63	AV	Horizontal	33.95	54.00	-20.05	2.8	120
24086.25	AV	Horizontal	35.72	54.00	-18.28	1.9	130
2408.625	PK	Vertical	112.09		(Fund.)	1.8	100
4817.25	PK	Vertical	56.61	74.00	-17.39	1.9	100
7225.875	PK	Vertical	57.55	74.00	-16.45	1.5	110
9634.5	PK	Vertical	54.28	74.00	-19.72	1.7	300
12043.13	PK	Vertical	50.64	74.00	-23.36	1.3	160
14451.75	PK	Vertical	51.93	74.00	-22.07	1.3	100
16860.38	PK	Vertical	48.74	74.00	-25.26	1.7	155
19269	PK	Vertical	47.02	74.00	-26.98	1.5	240
21677.63	PK	Vertical	44.80	74.00	-29.2	1.4	160
24086.25	PK	Vertical	45.95	74.00	-28.05	1.7	130
2408.625	PK	Horizontal	109.21		(Fund.)	2.2	80
4817.25	PK	Horizontal	47.92	74.00	-26.08	2.2	210
7225.875	PK	Horizontal	45.67	74.00	-28.33	2.9	160
9634.5	PK	Horizontal	42.78	74.00	-31.22	1.9	40
12043.13	PK	Horizontal	44.76	74.00	-29.24	1.7	155
14451.75	PK	Horizontal	39.67	74.00	-34.33	1.4	120
16860.38	PK	Horizontal	45.77	74.00	-28.23	2.3	280
19269	PK	Horizontal	37.62	74.00	-36.38	2.2	100
21677.63	PK	Horizontal	38.95	74.00	-35.05	2.2	140

24086.25	PK	Horizontal	40.72	74.00	-33.28	2.6	180
Middle frequency							
2439	AV	Vertical	99.94		(Fund.)	1.5	110
4878	AV	Vertical	45.87	54.00	-8.13	1.8	140
7317	AV	Vertical	43.98	54.00	-10.02	1.6	120
9756	AV	Vertical	39.84	54.00	-14.16	1.7	130
12195	AV	Vertical	43.08	54.00	-10.92	1.1	130
14634	AV	Vertical	35.75	54.00	-18.25	1.7	200
17073	AV	Vertical	39.00	54.00	-15	1.6	220
19512	AV	Vertical	33.81	54.00	-20.19	1.0	160
21951	AV	Vertical	37.80	54.00	-16.2	1.7	290
24390	AV	Vertical	30.86	54.00	-23.14	1.6	140
2439	AV	Horizontal	93.83		(Fund.)	1.8	150
4878	AV	Horizontal	40.94	54.00	-13.06	2.1	220
7317	AV	Horizontal	42.67	54.00	-11.33	2.0	200
9756	AV	Horizontal	36.78	54.00	-17.22	2.2	170
12195	AV	Horizontal	39.53	54.00	-14.47	1.9	180
14634	AV	Horizontal	34.93	54.00	-19.07	2.1	310
17073	AV	Horizontal	32.12	54.00	-21.88	1.6	245
19512	AV	Horizontal	34.81	54.00	-19.19	1.7	140
21951	AV	Horizontal	36.04	54.00	-17.96	2.5	180
24390	AV	Horizontal	30.72	54.00	-23.28	1.5	250
2439	PK	Vertical	111.67		(Fund.)	1.5	110
4878	PK	Vertical	58.87	74.00	-15.13	1.6	140
7317	PK	Vertical	56.98	74.00	-17.02	1.0	130
9756	PK	Vertical	52.84	74.00	-21.16	1.4	250
12195	PK	Vertical	56.08	74.00	-17.92	1.4	290
14634	PK	Vertical	48.75	74.00	-25.25	1.2	290
17073	PK	Vertical	52.00	74.00	-22	1.4	30
19512	PK	Vertical	46.81	74.00	-27.19	1.5	250
21951	PK	Vertical	50.80	74.00	-23.2	1.5	245
24390	PK	Vertical	43.86	74.00	-30.14	1.4	170
2439	PK	Horizontal	106.49		(Fund.)	1.9	30
4878	PK	Horizontal	53.94	74.00	-20.06	1.7	175
7317	PK	Horizontal	55.67	74.00	-18.33	2.6	200
9756	PK	Horizontal	49.78	74.00	-24.22	1.6	110
12195	PK	Horizontal	52.53	74.00	-21.47	1.4	180
14634	PK	Horizontal	47.93	74.00	-26.07	1.5	280
17073	PK	Horizontal	45.12	74.00	-28.88	2.0	230
19512	PK	Horizontal	47.81	74.00	-26.19	1.9	200
21951	PK	Horizontal	49.04	74.00	-24.96	1.9	30
24390	PK	Horizontal	43.72	74.00	-30.28	2.0	265

High frequency							
2473.875	AV	Vertical	99.18		(Fund.)	1.5	250
4947.75	AV	Vertical	44.29	54.00	-9.71	1.4	40
7421.625	AV	Vertical	40.72	54.00	-13.28	1.7	140
9895.5	AV	Vertical	43.18	54.00	-10.82	1.8	180
12369.38	AV	Vertical	38.28	54.00	-15.72	1.3	190
14843.25	AV	Vertical	44.83	54.00	-9.17	1.6	160
17317.13	AV	Vertical	38.86	54.00	-15.14	1.7	120
19791	AV	Vertical	39.73	54.00	-14.27	1.1	300
22264.88	AV	Vertical	38.05	54.00	-15.95	1.8	220
24738.75	AV	Vertical	31.67	54.00	-22.33	1.3	175
2473.875	AV	Horizontal	93.60		(Fund.)	1.9	140
4947.75	AV	Horizontal	40.68	54.00	-13.32	2.2	270
7421.625	AV	Horizontal	38.99	54.00	-15.01	2.0	220
9895.5	AV	Horizontal	39.81	54.00	-14.19	2.1	220
12369.38	AV	Horizontal	37.67	54.00	-16.33	2.0	155
14843.25	AV	Horizontal	31.86	54.00	-22.14	2.2	240
17317.13	AV	Horizontal	36.07	54.00	-17.93	1.5	280
19791	AV	Horizontal	30.74	54.00	-23.26	1.8	100
22264.88	AV	Horizontal	33.57	54.00	-20.43	2.6	110
24738.75	AV	Horizontal	28.95	54.00	-25.05	1.6	210
2473.875	PK	Vertical	111.94		(Fund.)	1.6	280
4947.75	PK	Vertical	57.29	74.00	-16.71	1.7	70
7421.625	PK	Vertical	53.72	74.00	-20.28	1.1	130
9895.5	PK	Vertical	56.18	74.00	-17.82	1.5	220
12369.38	PK	Vertical	51.28	74.00	-22.72	1.4	190
14843.25	PK	Vertical	57.83	74.00	-16.17	1.4	100
17317.13	PK	Vertical	51.86	74.00	-22.14	1.5	110
19791	PK	Vertical	52.73	74.00	-21.27	1.2	240
22264.88	PK	Vertical	51.05	74.00	-22.95	1.2	220
24738.75	PK	Vertical	44.67	74.00	-29.33	1.5	175
2473.875	PK	Horizontal	110.82		(Fund.)	2.0	200
4947.75	PK	Horizontal	53.68	74.00	-20.32	1.8	180
7421.625	PK	Horizontal	51.99	74.00	-22.01	2.7	220
9895.5	PK	Horizontal	52.81	74.00	-21.19	1.7	220
12369.38	PK	Horizontal	50.67	74.00	-23.33	1.5	110
14843.25	PK	Horizontal	44.86	74.00	-29.14	1.7	210
17317.13	PK	Horizontal	49.07	74.00	-24.93	2.1	250
19791	PK	Horizontal	43.74	74.00	-30.26	2.0	190
22264.88	PK	Horizontal	46.57	74.00	-27.43	2.1	140
24738.75	PK	Horizontal	41.95	74.00	-32.05	2.3	300

8 Band Edge Measurement

Test Requirement:	Section 15.247(d) In addition, radiated emissions which fall in the restricted bands. as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).
Test Method:	DA 00-705
Measurement Distance:	3m
Limit:	40.0 dBuV/m between 30MHz & 88MHz; 43.5 dBuV/m between 88MHz & 216MHz; 46.0 dBuV/m between 216MHz & 960MHz; 54.0 dBuV/m above 960MHz. 74.0 dBuV/m for peak above 1GHz 54.0 dBuV/m for AVG above 1GHz
Detector:	For Peak value: RBW = 1 MHz for f ≥ 1 GHz VBW ≥ RBW; Sweep = auto Detector function = peak Trace = max hold For AVG value: RBW = 1 MHz for f ≥ 1 GHz VBW = 10Hz; Sweep = auto Detector function = AVG Trace = max hold

8.1 Test Result:

Low Channel – Peak: Transmitting mode

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2310.000	52.64	-7.51	45.13	74.00	-28.87	peak	
2	2390.000	67.20	-7.34	59.86	74.00	-14.14	peak	
3	2398.000	75.26	-7.31	67.95	74.00	-6.05	peak	
4	2400.000	74.99	-7.31	67.68	74.00	-6.32	peak	
5	2409.440	118.02	-7.28	110.74	74.00	36.74	peak	

Remark:1) Mark 5 is fundamental wave.

2) Transmitting mode and hopping mode are tested, the worst case is Transmitting mode.

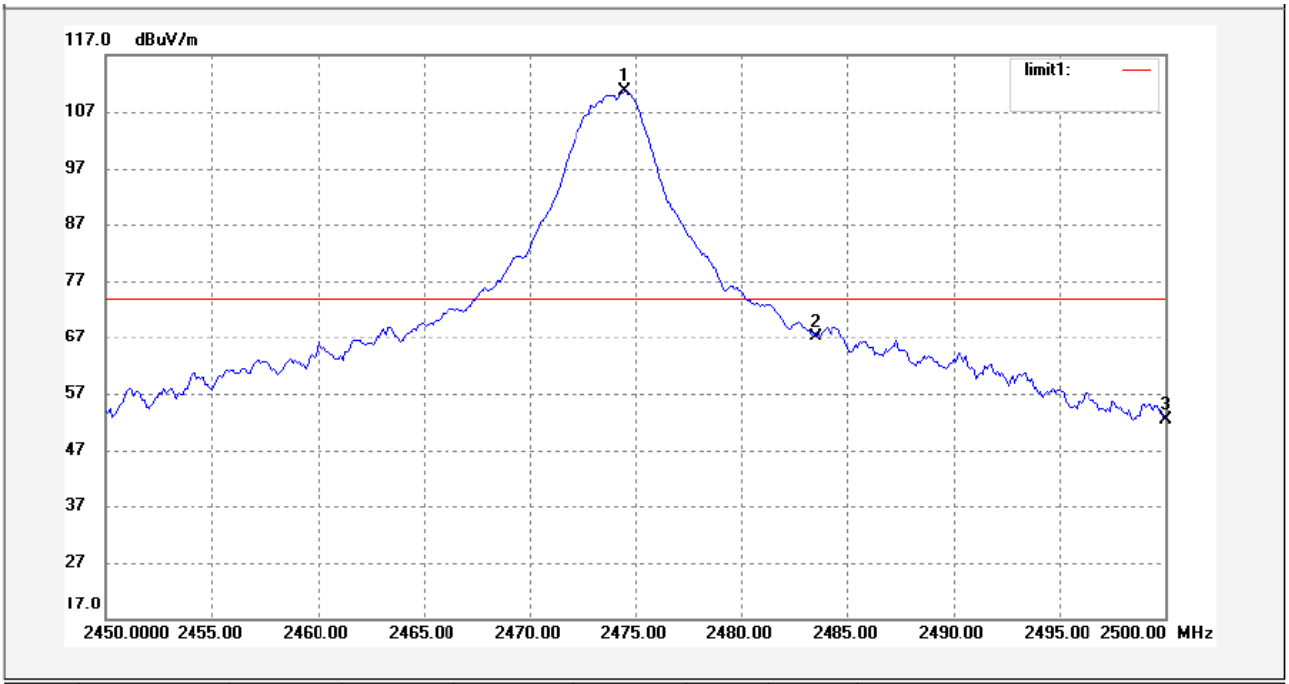
Low Channel – AV: Transmitting mode

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2310.000	39.62	-7.51	32.11	54.00	-21.89	AV	
2	2390.000	56.94	-7.34	49.60	54.00	-4.40	AV	
3	2400.000	65.53	-7.31	58.22	54.00	4.22	AV	
4	2408.780	114.30	-7.29	107.01	54.00	53.01	AV	

Remark: 1) Mark 4 is fundamental wave.

2) Transmitting mode and hopping mode are tested, the worst case is Transmitting mode.

High Channel – Peak: Transmitting mode

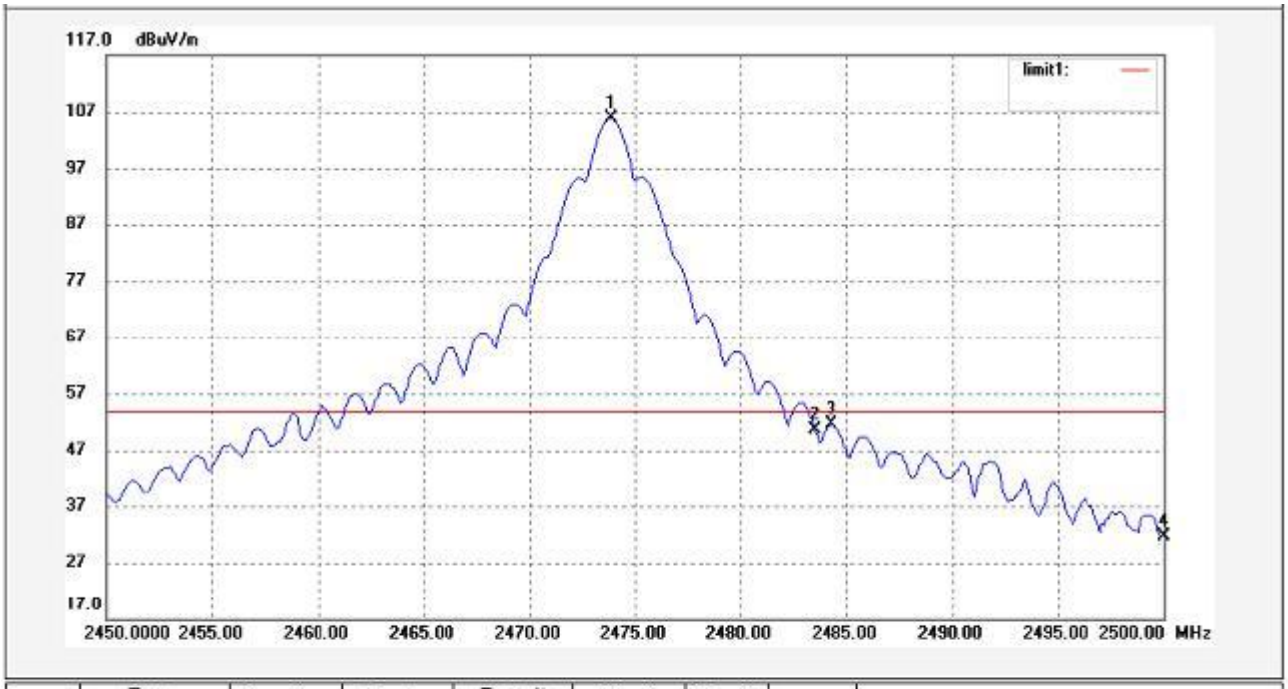


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2474.500	117.65	-7.13	110.52	74.00	36.52	peak	
2	2483.500	74.34	-7.13	67.21	74.00	-6.79	peak	
3	2500.000	59.34	-7.08	52.26	74.00	-21.74	peak	

Remark:1) Mark 1 is fundamental wave.

2) Transmitting mode and hopping mode are tested, the worst case is Transmitting mode.

High Channel – AV: Transmitting mode



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2473.900	112.95	-7.14	105.81	54.00	51.81	AV	
2	2483.500	57.85	-7.13	50.72	54.00	-3.28	AV	
3	2484.300	58.64	-7.13	51.51	54.00	-2.49	AV	
4	2500.000	38.63	-7.08	31.55	54.00	-22.45	AV	

Remark:1) Mark 1 is fundamental wave.

2) Transmitting mode and hopping mode are tested, the worst case is Transmitting mode.

9 20 dB Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: DA 00-705

Test Mode: Test in fixing operating frequency at low, Middle, high channel.

9.1 Test Procedure:

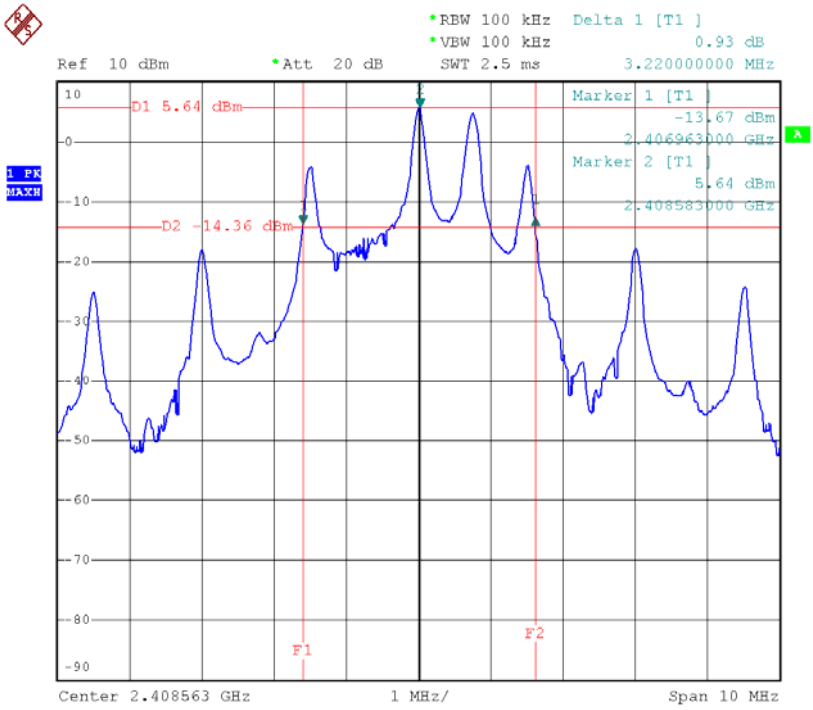
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 100kHz

9.2 Test Result:

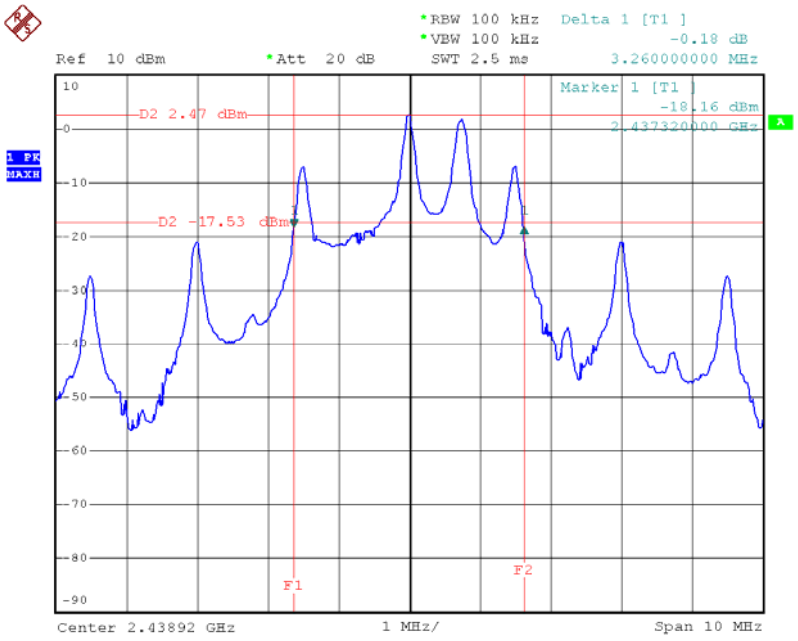
Test Channel	Bandwidth
Low	3.22MHz
Middle	3.26MHz
High	3.22MHz

Test result plot as follows:

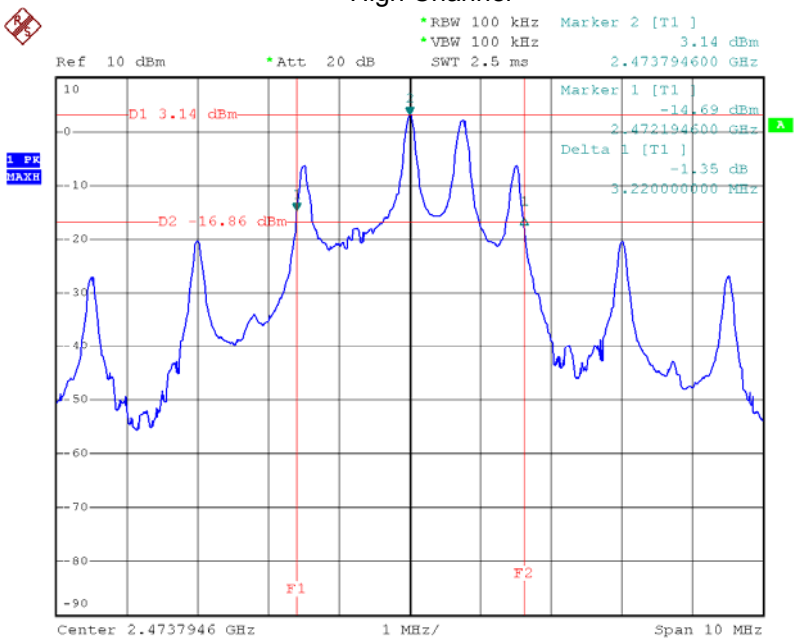
Low Channel



Middle Channel



High Channel



10 Maximum Peak Output Power

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	ANSI C63.4:2003
Test Limit:	Regulation 15.247 (b)(1), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts. Refer to the result “Number of Hopping Frequency” of this document. The 0.125watts (20.97 dBm) limit applies.
Test mode:	Test in fixing frequency transmitting mode.

10.1 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 = 1MHz. VBW = 1MHz. Sweep = auto; Detector Function = Peak.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

10.2 Test Result:

Test Channel	Output Power (dBm)	Limit (dBm)
Low	8.18	20.97
Middle	8.53	20.97
High	8.47	20.97

11 Channel Separated

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: DA 00-705

Test Limit: Regulation 15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 1W.

Test Mode: Test in hopping transmitting operating mode.

11.1 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 , Span = 5MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

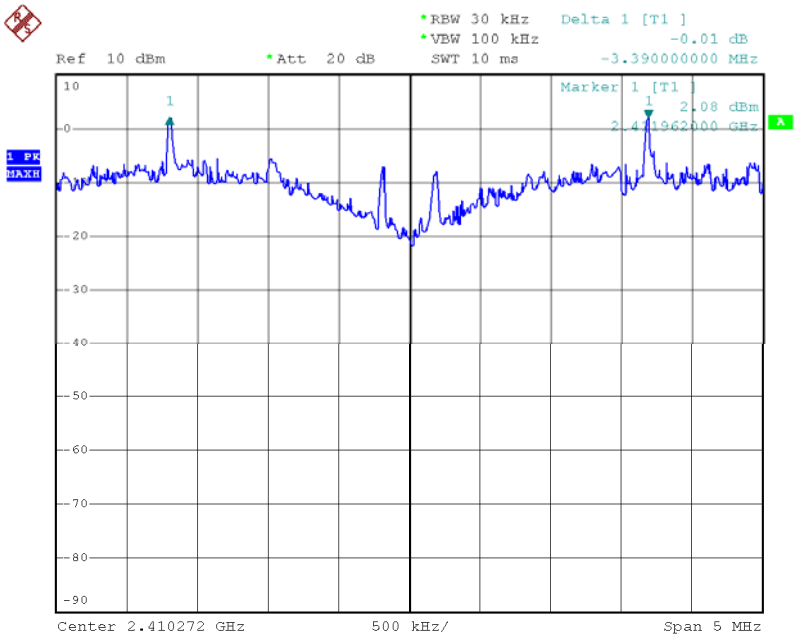
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

11.2 Test Result:

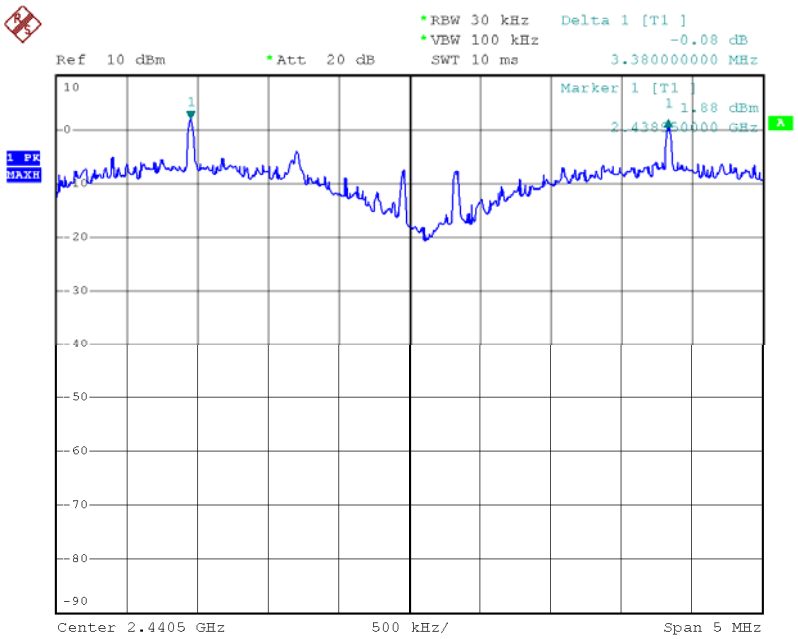
Test Channel	Separation (MHz)	Result
Low	3.39	PASS
Middle	3.38	PASS
High	3.38	PASS

Test result plot as follows:

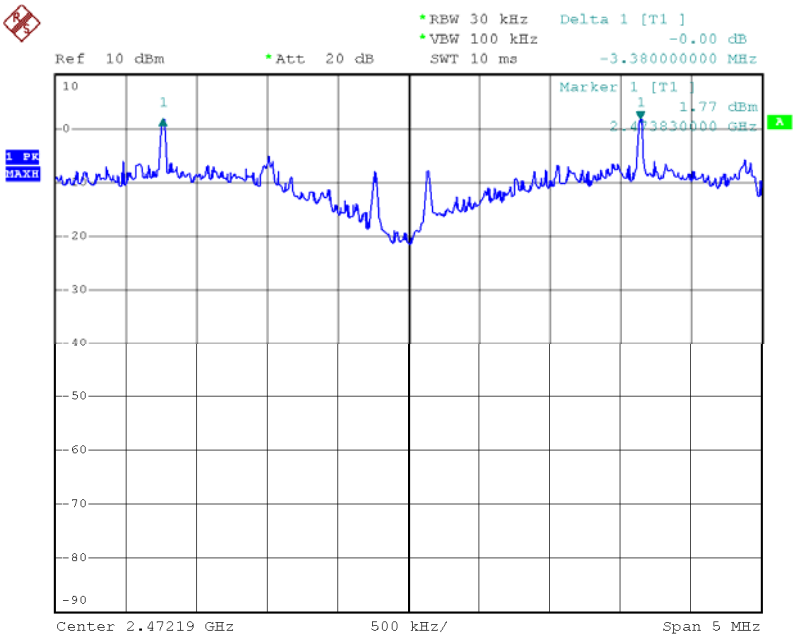
Low Channel



Middle Channel



High Channel



12 Hopping Channel number

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: DA 00-705

Test Limit: Regulation 15.247 (a)(1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

Test Mode: Test in hopping transmitting operating mode.

12.1 Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

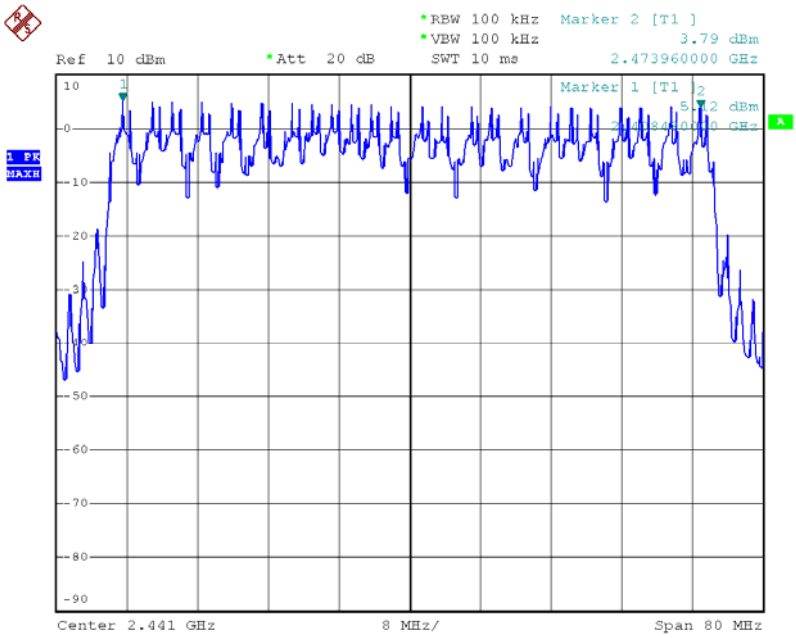
2. Set the spectrum analyzer: RBW = 100 kHz. VBW = 100 kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.

4. Set the spectrum analyzer: Center Frequency = 2441MHz, Span = 80MHz. Submit the test result graph.

12.2 Test Result

Total Channels are 24 Channels.



13 Dwell Time

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	DA 00-705
Test Limit:	Regulation 15.247(a)(1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.
Test Mode:	Test in hopping transmitting operating mode.

13.1 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 spectrum analyzer span = 0. centered on a hopping channel;

3.Set RBW = 1MHz and VBW = 1MHz.Sweep = as necessary to capture the entire dwell time per hopping channel.

4.Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g.. data rate. modulation format. etc.). repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

13.2 Test Result

Test channel	Dwell time(second)
Low channel	0.018s
Middle channel	0.019s
High channel	0.019s

Remark: Dwell time(T)=Ton-time*Ntimes/Sweep time(s)*0.4* Total Channels≤0.4s.

Ton-time:refer to follow photos

Ntimes:10

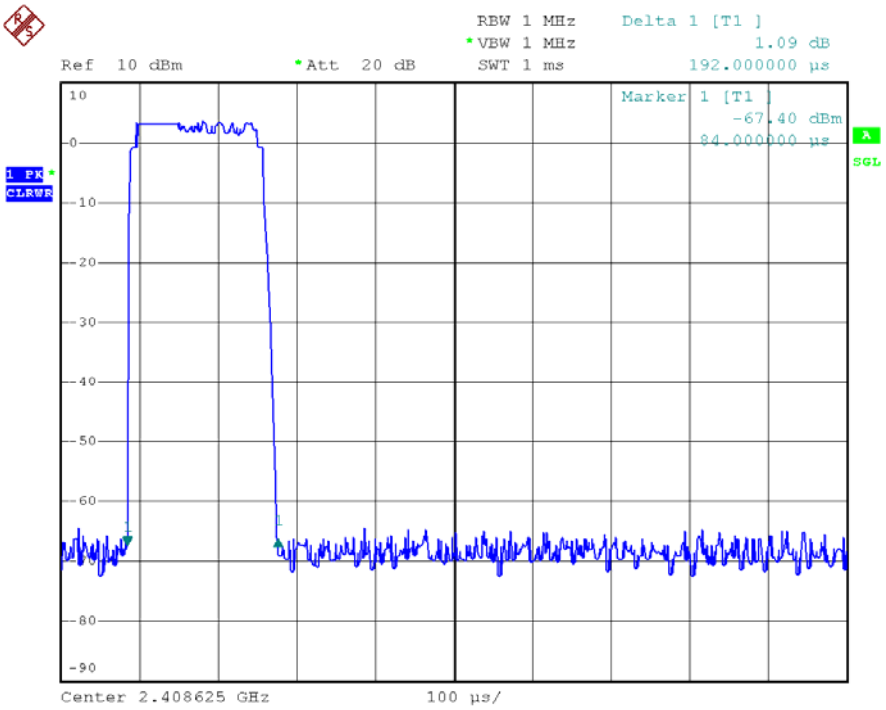
Sweep time:5s

Total channels:refer to section 12

Please refer to the below photos for more details.

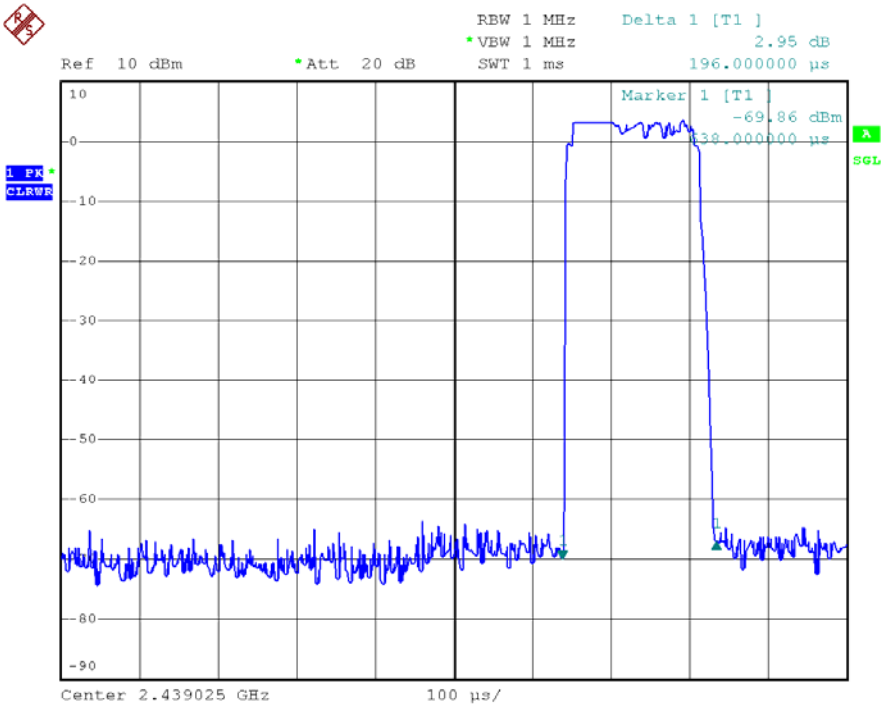
Low Channel

Ton-time=0.018s



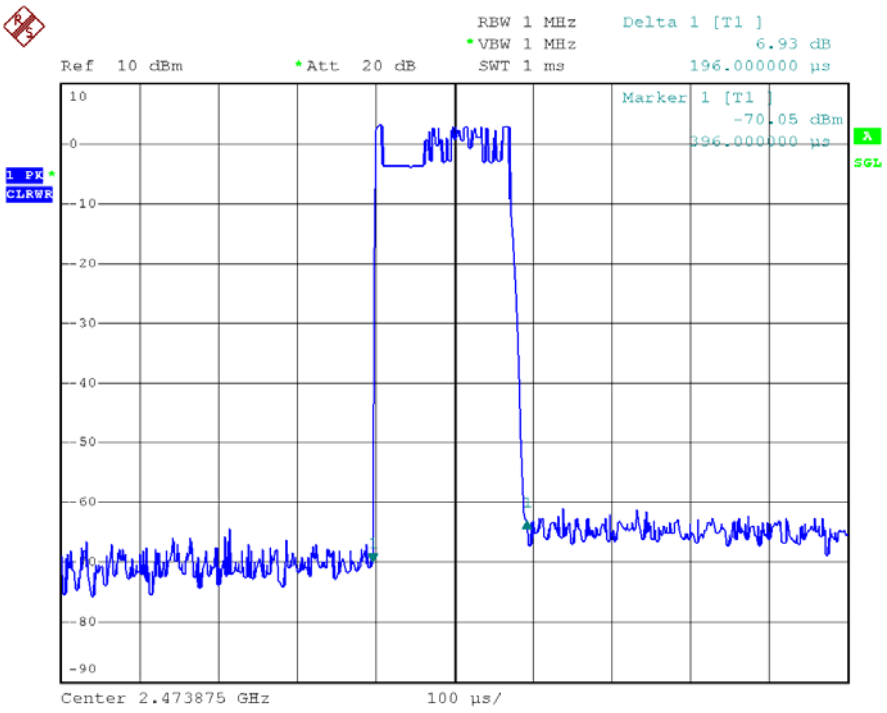
Middle Channel

Ton-time=0.019s



High Channel

Ton-time=0.019s



14 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 detachable antenna with RP SMA connector, fulfil the requirement of this section.

15 RF Exposure

Test Requirement: FCC Part 1.1307

Test Mode: The EUT work in test mode(Tx).

15.1 Requiments:

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.

15.2 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^2)	Averaging Time $\|E\|^2$,$\|H\|^2$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^2)	Averaging Time $\|E\|^2$,$\|H\|^2$ 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

15.3 MPE Calculation Method

E (V/m) $= \frac{\sqrt{30 \times P \times G}}{d}$ Power Density: *Pd* (W/m²) $= \frac{E^2}{377}$

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

dBm=10lgmW

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained

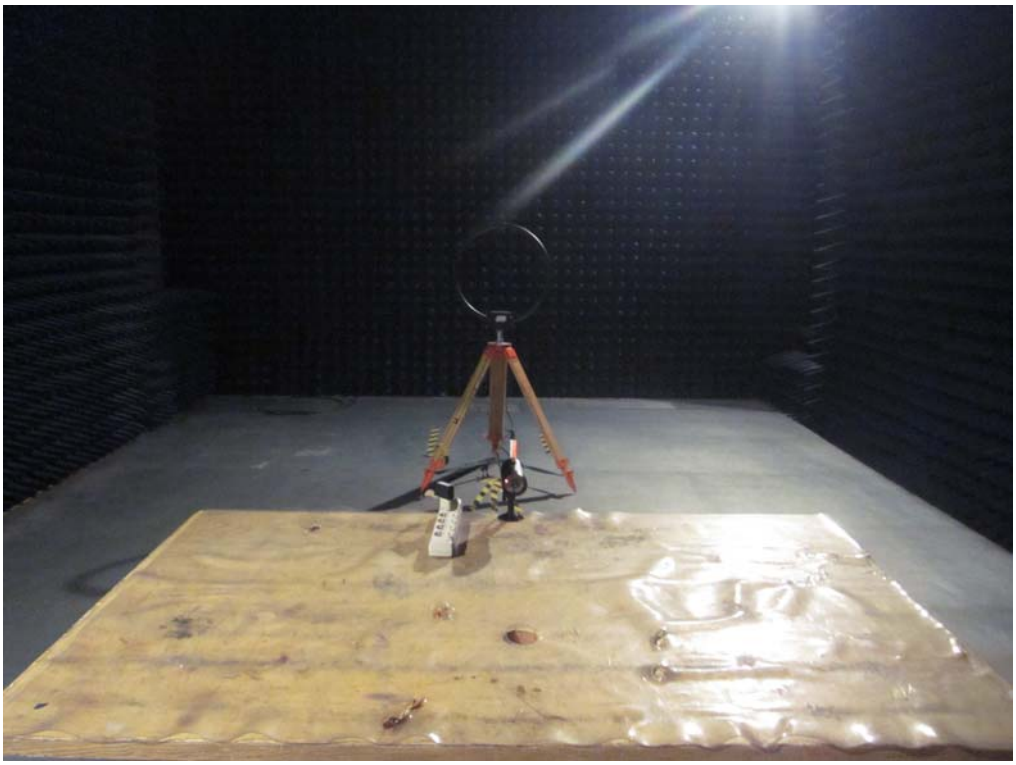
Peak Output Power (mW)	Antenna Gain (numeric)	Power Density (S) (mW/cm2)	Limit of Power Density (S) (mW/cm2)
7.13	1.995	0.002050	1

16 Photographs – Test Setup

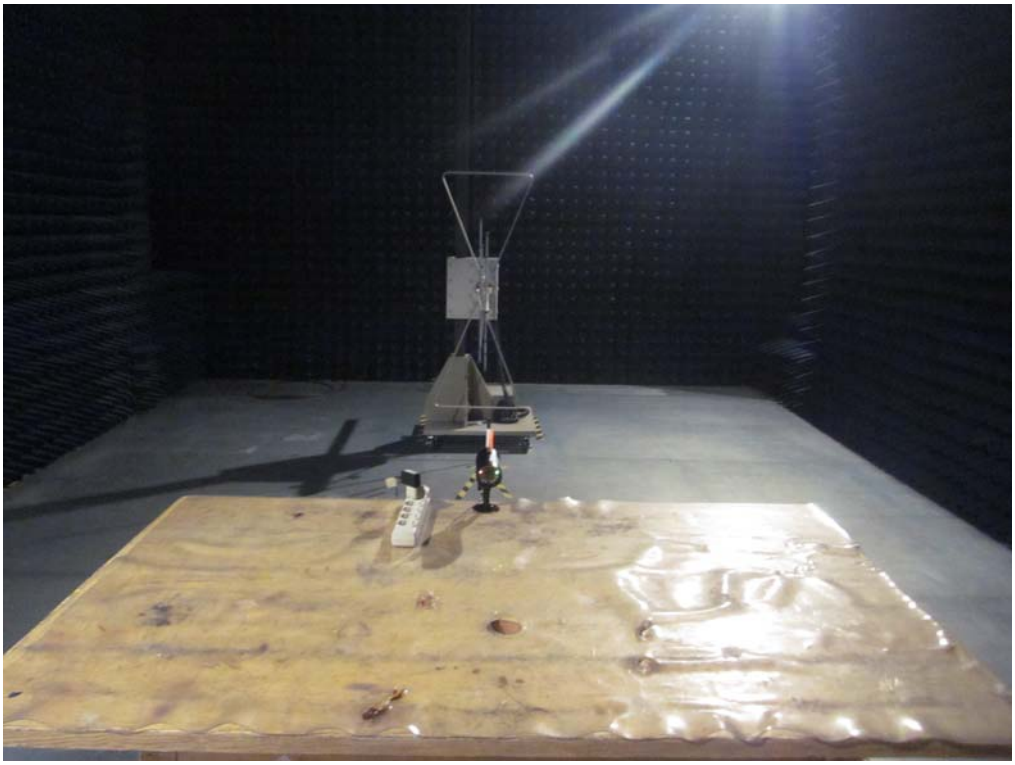
16.1 Photograph –Conducted Emission Test Setup

16.2 Photograph –Radiated Emissions Test Setup

12MHz~ 30MHz



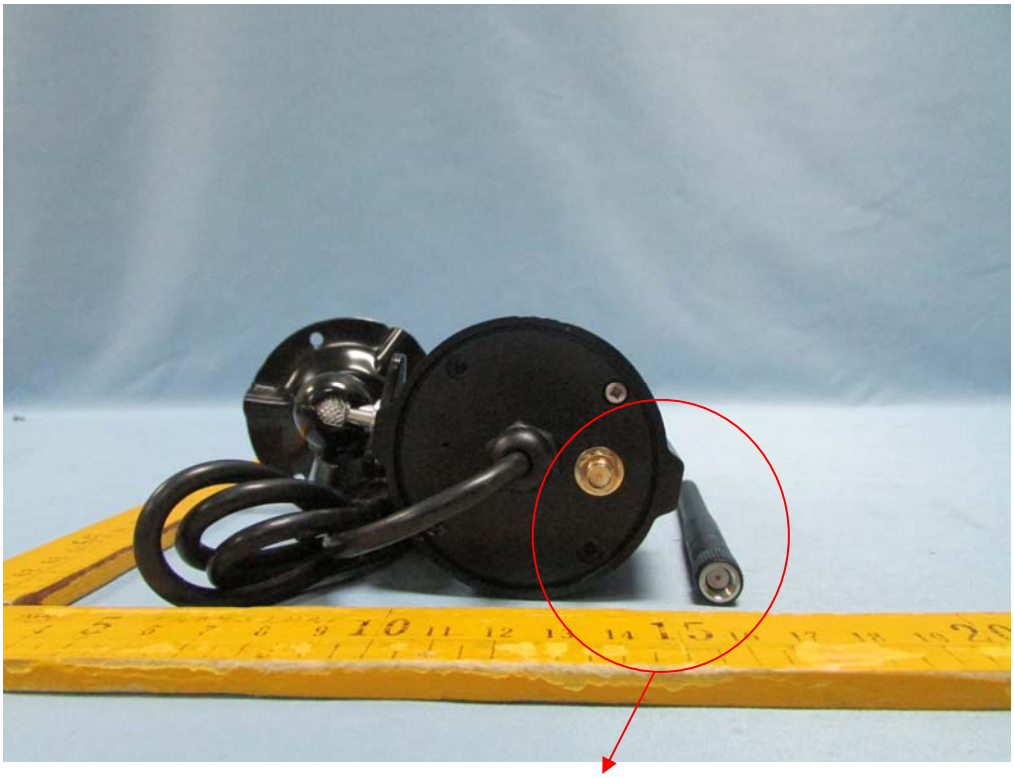
30MHz ~ 1GHz



1GHz~25GHz

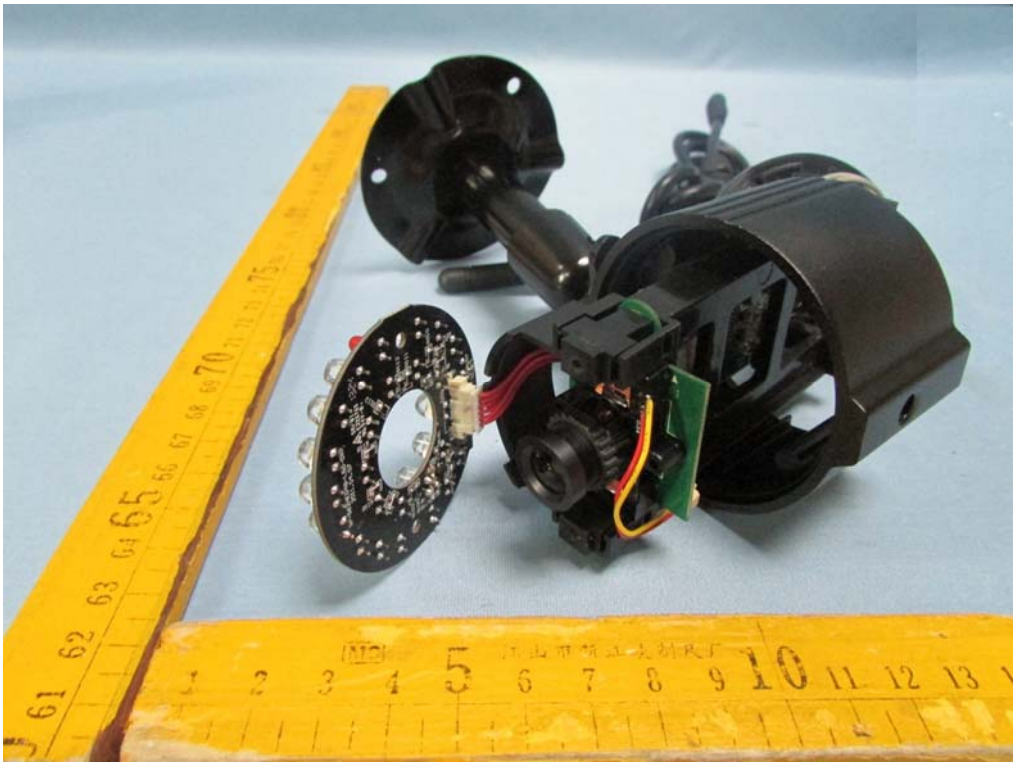
17 Photographs - Constructional Details

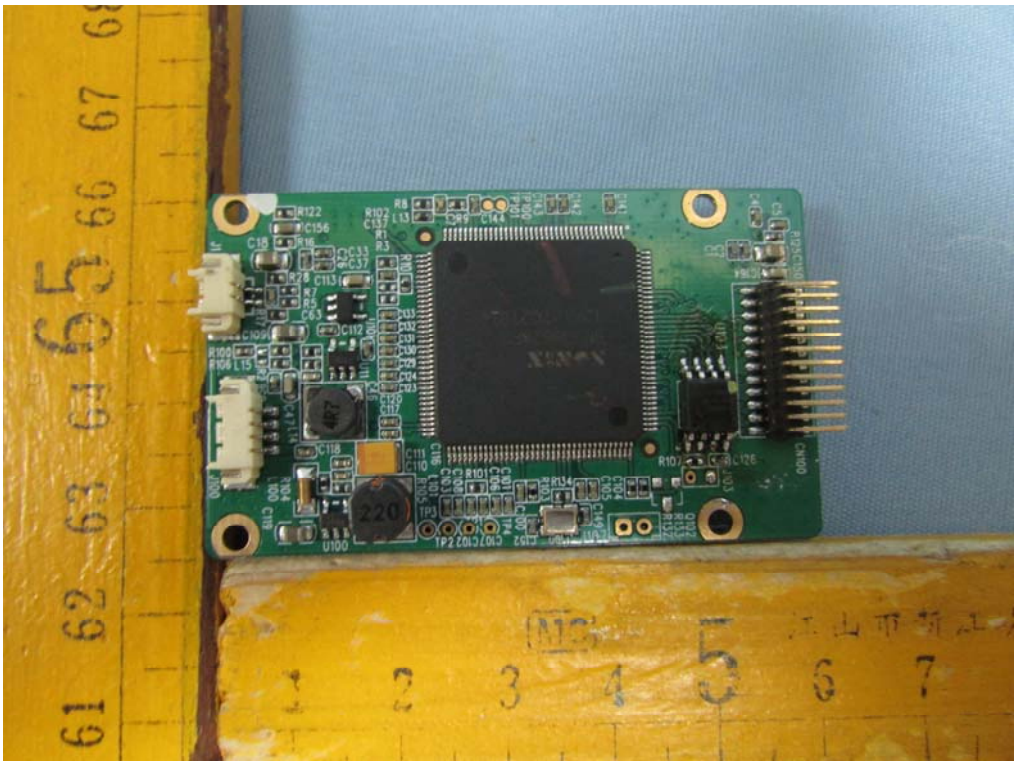
17.1 EUT –Appearance View

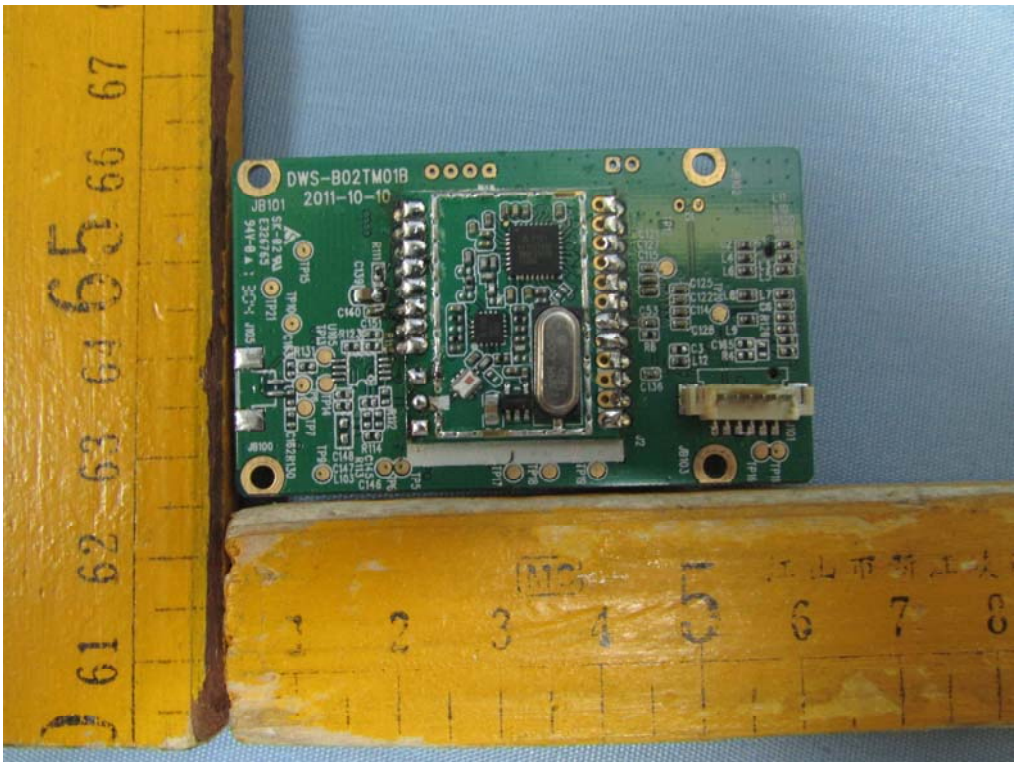


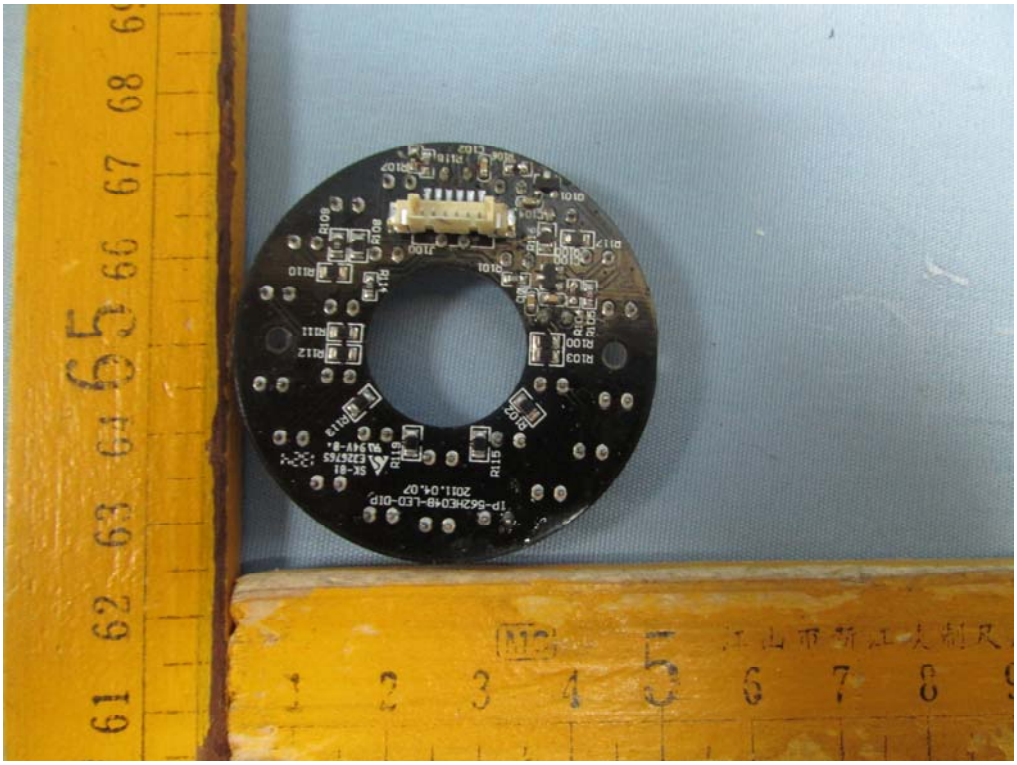
ANT. with RP-SMA connector

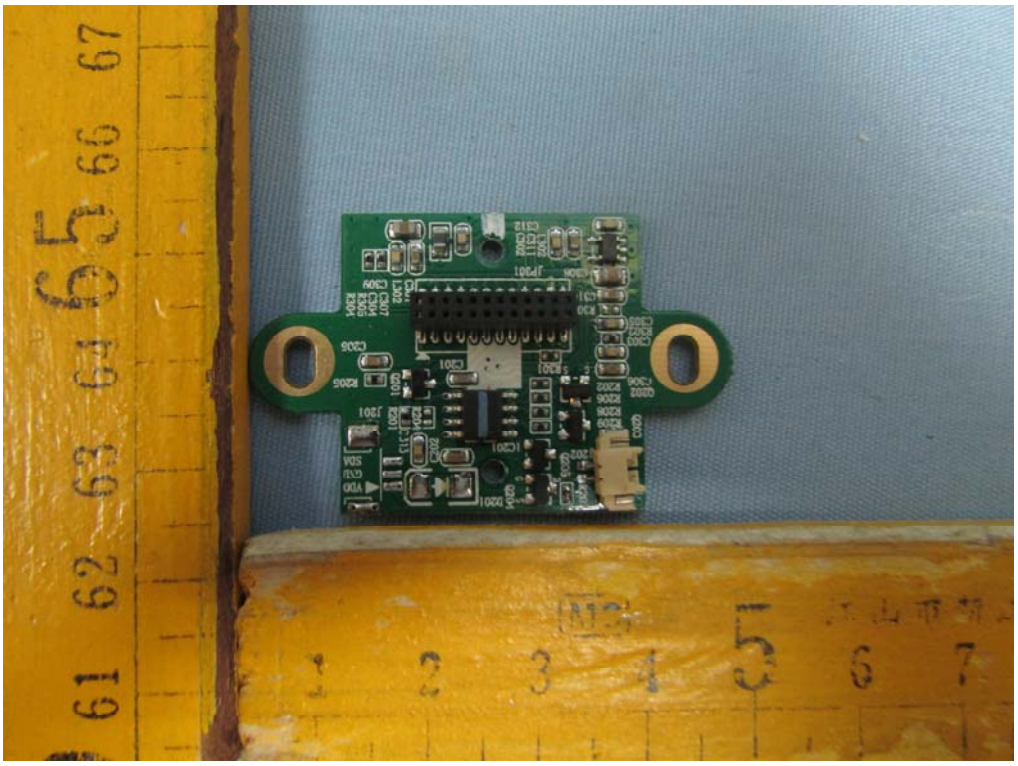
17.2 EUT – Open View

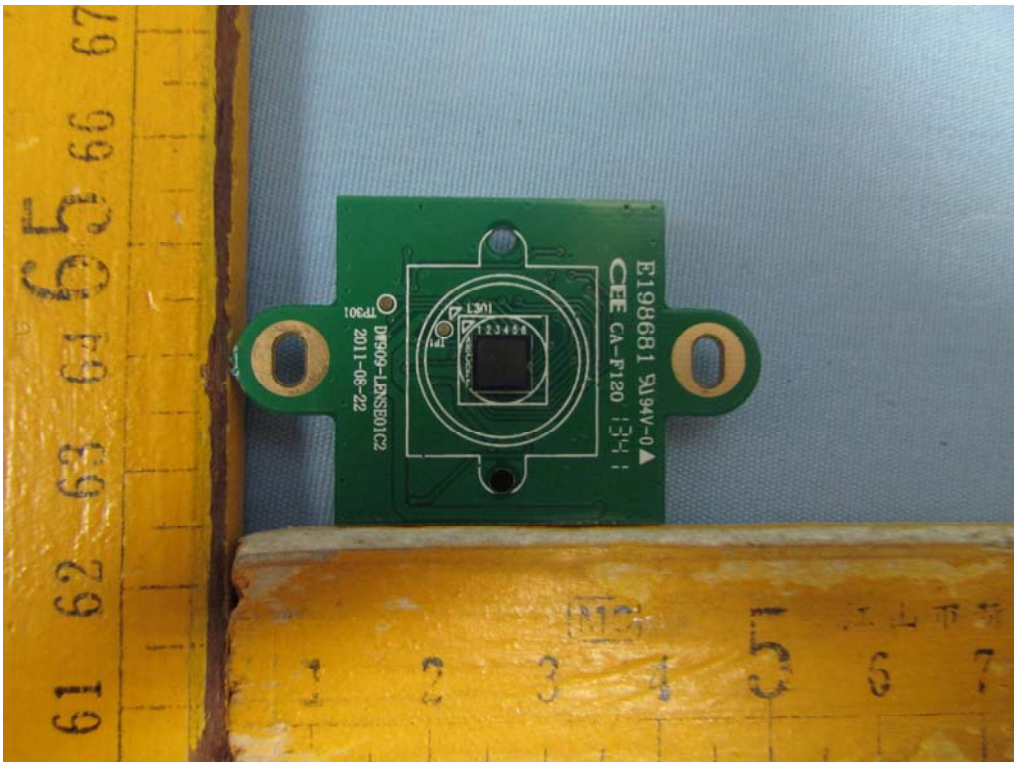




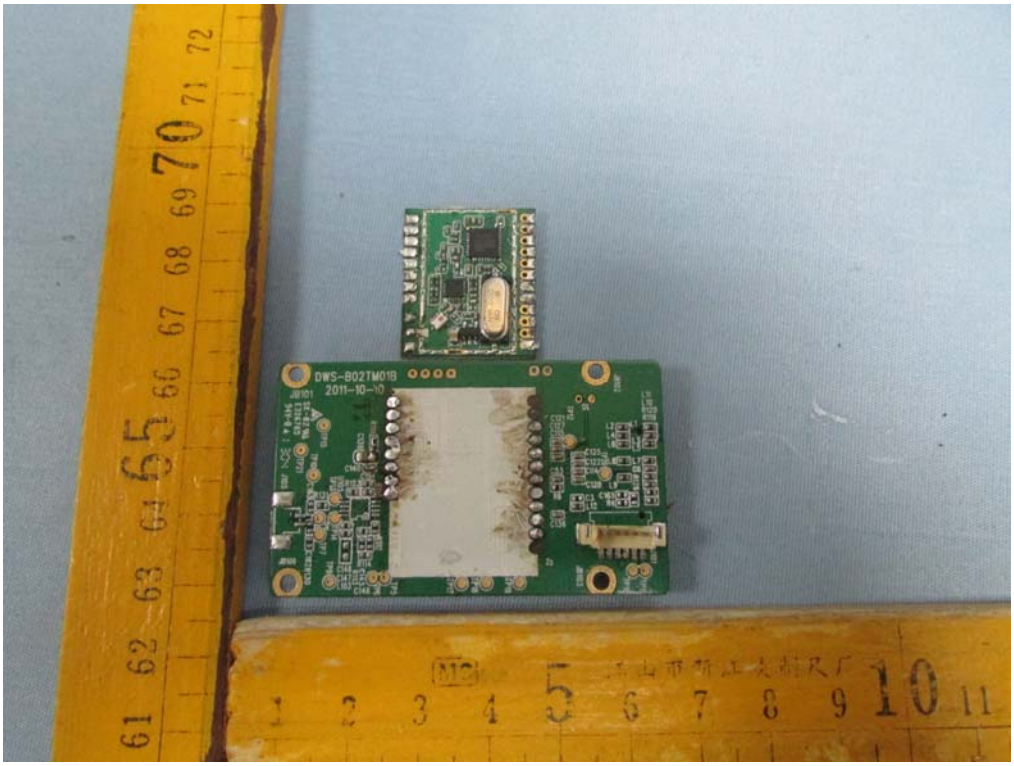

DWS-B02TM01B
2011-10-10
JB101

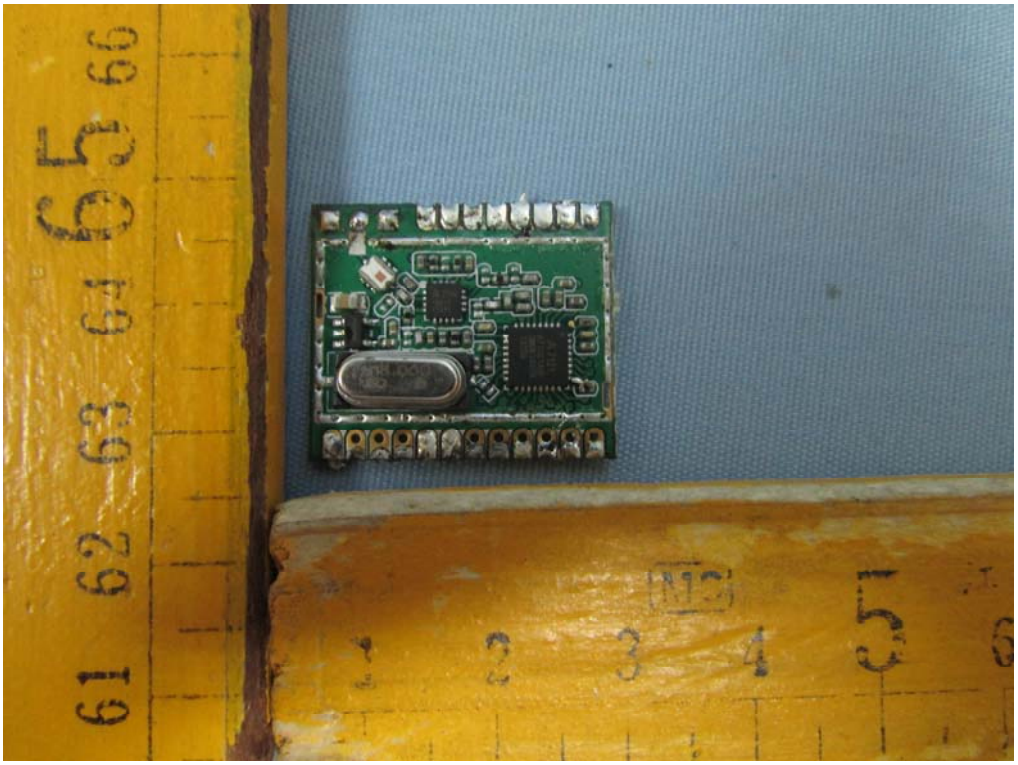


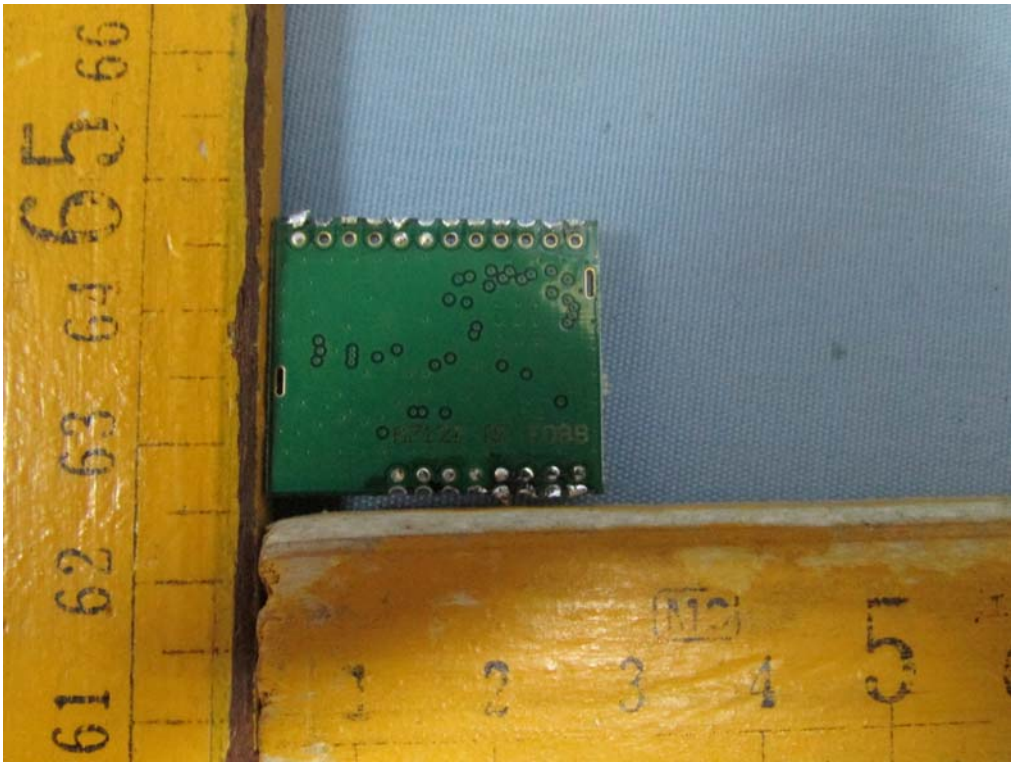



E198681 94V-0
CA-F120
2011-08-22

17.3 RF –Module View







17.4 Adapter 1–Appearance View

17.5 Adapter 2–Appearance View

17.6 Adapter 3–Appearance View

======End of Report======