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FCC PART 15 SUBPART C TEST REPORT

FCC PART 15.247

Report Reference No.: **CTL1506031492-WF-01**

Compiled by: (position+printed name+signature)	Jacky Chen (File administrators)	Jackychen
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Approved by: (position+printed name+signature)	Tracy Qi (Manager)	Tracy Qi

Product Name.....:	Android POS
Model/Type reference.....:	T-5
List Model(s).....:	/
Trade Mark.......:	/
FCC ID.....:	**2AFC9-T-5**
Applicant's name.....:	**Abetree Electronics Hong Kong Limited**
Address of applicant......:	Unit D, 16/F., Cheuk Nang Plaza 250 Hennessy Road, Wanchai HongKong.
Test Firm.....:	**Shenzhen CTL Testing Technology Co., Ltd.**
Address of Test Firm.....:	Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055
Test specification.....:	
Standard.....:	**FCC Part 15.247:** Operation within the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz.
TRF Originator……..:	Shenzhen CTL Testing Technology Co., Ltd.
Master TRF……:	Dated 2011-01
Date of Receipt.....:	Jun. 20, 2015
Date of Test Date.....:	Jun. 21, 2015 – July 09, 2015
Data of Issue.....:	July 10, 2015
Result.......:	Positive

TEST REPORT

Test Report No. :	CTL1506031492-WF-01	July, 10, 2015 Date of issue

Equipment under Test	:	Android POS
Model /Type	:	T-5
Listed Models	:	/
Applicant	:	**Abetree Electronics Hong Kong Limited**
Address	:	Unit D, 16/F., Cheuk Nang Plaza 250 Hennessy Road, Wanchai HongKong.
Manufacturer	:	**Abetree Electronics (Shenzhen) Limited**
Address	:	A Wealth Plaza B# 13M, Xianglin Road, Futian District, Shenzhen Guangdong China

Test result	Pass *

* In the configuration tested, the EUT complied with the standards specified page 5.

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

** Modifited History **

Version	Description	Issued Data	Report No.	Remark
Version 1.0	Initial Test Report Release	2015-07-10	CTL1506031492-WF-01	Tracy Qi

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1. SUMMARY

1.1. TEST STANDARDS

The tests were performed according to following standards:
FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

ANSI C63.10: American National Standard for Testing Unlicensed Wireless Devices

KDB558074 D01 V03r03: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

1.2. Test Description

FCC PART 15.247		
FCC Part 15.207	AC Power Conducted Emission	PASS
FCC Part 15.247(a)(2)	6dB Bandwidth	PASS
FCC Part 15.247(d)	Spurious RF Conducted Emission	PASS
FCC Part 15.247(b)	Maximum Conducted Output Power	PASS
FCC Part 15.247(e)	Power Spectral Density	PASS
FCC Part 15.109/ 15.205/ 15.209	Radiated Emissions	PASS
FCC Part 15.247(d)	Band Edge	PASS
FCC Part 15.203/15.247 (b)	Antenna Requirement	PASS

1.3. Test Facility

1.3.1 Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd.
Floor 1-A, Baisha Technology Park, No. 3011, Shahexi Road, Nanshan, Shenzhen 518055 China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 22/EN 55022 requirements.

1.3.2 Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

IC Registration No.: 9618B

The 3m alternate test site of Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 9618B on November 13, 2013.

FCC-Registration No.: 970318

Shenzhen CTL Testing Technology 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 970318, December 19, 2013.

1.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Shenzhen CTL Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

Test	Measurement Uncertainty	Notes
Transmitter power conducted	±0.57 dB	(1)
Transmitter power Radiated	±2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	±2.20 dB	(1)
Occupied Bandwidth	±0.01ppm	(1)
Radiated Emission 30~1000MHz	±4.10dB	(1)
Radiated Emission Above 1GHz	±4.32dB	(1)
Conducted Disturbance0.15~30MHz	±3.20dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2. GENERAL INFORMATION

2.1. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2.2. General Description of EUT

Product Name:	Android POS
Model/Type reference:	T-5
Power supply:	DC 24V from adapter
Adapter information :	Model No.:GM601-240250 Input: AC 100~240V, 50/60Hz, 0.2A Output: 24V⎓2.5A
Hardware version:	ABE100-ME-V1.1
Software version:	RK3188_ABE100_G7660_GC2155_S5K4EC_AXP228-AP6212_0525_V1.1
WIFI :	
Supported type:	802.11b/802.11g/802.11n(H20)
Modulation:	802.11b: DSSS 802.11g/802.11n(H20): OFDM
Operation frequency:	802.11b/802.11g/802.11n(H20): 2412MHz~2462MHz
Channel number:	802.11b/802.11g/802.11n(H20): 11
Channel separation:	5MHz
Antenna type:	FPC Antenna
Antenna gain:	-0.5dBi
Bluetooth BLE	
Supported type:	Version 4.0 for low Energy
Modulation:	GFSK
Operation frequency:	2402MHz to 2480MHz
Channel number:	40
Channel separation:	2 MHz
Antenna type:	FPC Antenna
Antenna gain:	-0.5dBi

Note: For more details, please refer to the user's manual of the EUT.

2.3. Description of Test Modes and Test Frequency

The Applicant provides communication tools software to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) and receiving mode for testing .

There are 11 channels provided to the EUT and Channel 01/06/11 were selected for WIFI test.

There are 39 channels provided to the EUT and Channel 00/19/39 were selected for BT4.0 test.

Operation Frequency WIFI：

Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	**2412**	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	**11**	**2462**
5	2432		
6	**2437**		
7	2442		

Operation Frequency List BT4.0：

Channel	Frequency (MHz)
00	**2402**
02	2404
03	2406
⋮	⋮
19	**2440**
⋮	⋮
37	2476
38	2478
39	**2480**

Note: The line display in grey were the channel selected for testing

Data Rate Used:

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel
Maximum Conducted Output Power Power Spectral Density 6dB Bandwidth Spurious RF conducted emission Radiated Emission 9kHz~1GHz& Radiated Emission 1GHz~10th Harmonic	11b/DSSS	1 Mbps	1/6/11
	11g/OFDM	6 Mbps	1/6/11
	11n(20MHz)/OFDM	6.5Mbps	1/6/11
Band Edge	11b/DSSS	1 Mbps	1/11
	11g/OFDM	6 Mbps	1/11
	11n(20MHz)/OFDM	6.5Mbps	1/11

2.4. Equipments Used during the Test

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
Bilog Antenna	Sunol Sciences Corp.	JB1	A061713	2015/06/02	2016/06/01
EMI Test Receiver	R&S	ESCI	103710	2015/06/02	2016/06/01
Spectrum Analyzer	Agilent	E4407B	MY41440676	2015/05/21	2016/05/20
Power Meter	Anritsu	ML2487B	110553	2015/06/02	2016/06/01
Power Sensor	Anritsu	MA2411B	100345	2015/05/21	2016/05/20
Controller	EM Electronics	Controller EM 1000	N/A	2015/05/21	2016/05/20
Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013	2015/05/19	2016/05/18
Active Loop Antenna	SCHWARZBECK	FMZB1519	1519-037	2015/05/19	2016/05/18
LISN	R&S	ENV216	3560.6550.12	2015/06/02	2016/06/01
LISN	R&S	ESH2-Z5	860014/010	2015/06/02	2016/06/01
Amplifier	Agilent	8349B	3008A02306	2015/05/19	2016/05/18
Amplifier	Agilent	8447D	2944A10176	2015/05/19	2016/05/18
Transient Limiter	SCHWARZCECK	VTSD 9561F	9666	2015/06/02	2016/06/01
Temperature/Humidity Meter	Gangxing	CTH-608	02	2015/05/20	2016/05/19

The calibration interval was one year

2.5. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2AFC9-T-5 filing to comply with Section 15.249 of the FCC Part 15, Subpart C Rules.

2.6. Modifications

No modifications were implemented to meet testing criteria.

3. TEST CONDITIONS AND RESULTS

3.1. Conducted Emissions Test

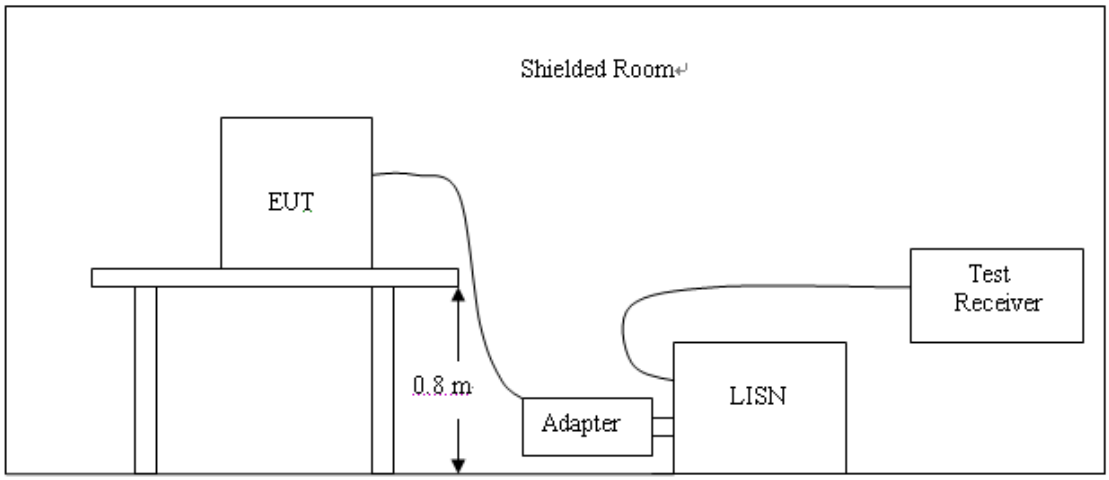
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



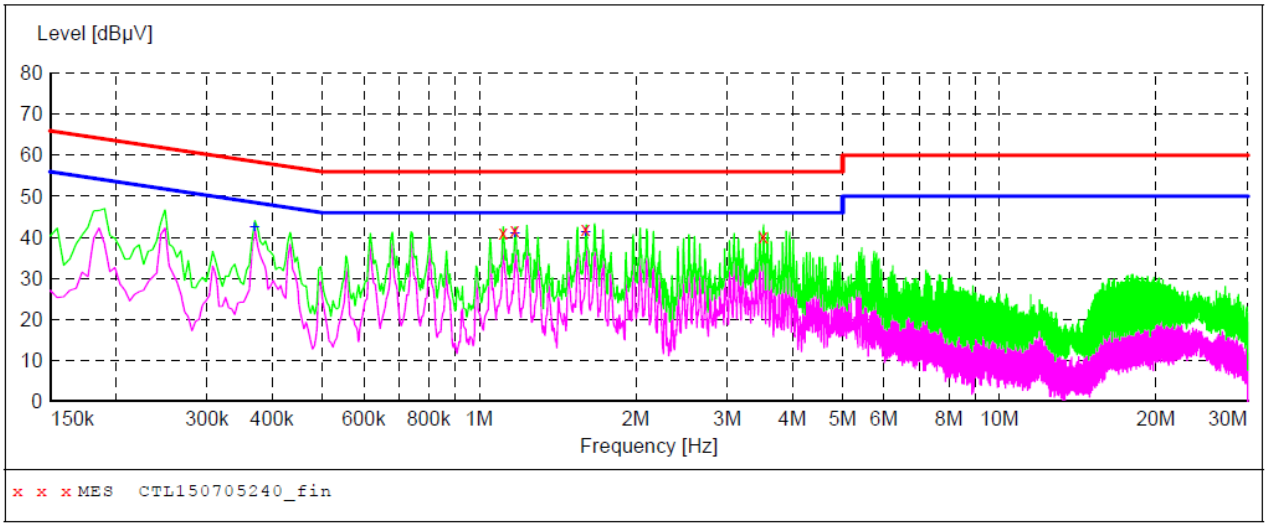
TEST PROCEDURE

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4.
2. Support equipment, if needed, was placed as per ANSI C63.4.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
4. The adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST RESULTS

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL150705240_fin"

7/5/2015 4:27PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
1.112000	41.10	10.2	56	14.9	QP	L1	GND
1.172000	41.60	10.2	56	14.4	QP	L1	GND
1.604000	42.00	10.3	56	14.0	QP	L1	GND
3.518000	40.30	10.5	56	15.7	QP	L1	GND

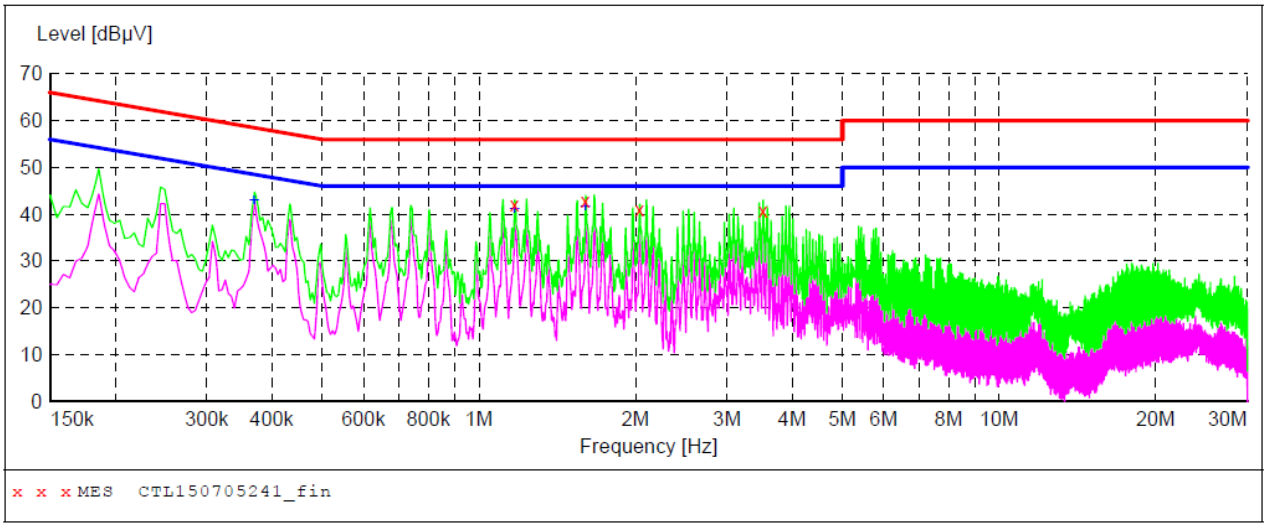
MEASUREMENT RESULT: "CTL150705240_fin2"

7/5/2015 4:27PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.370000	42.60	9.9	49	5.9	AV	L1	GND
1.172000	41.00	10.2	46	5.0	AV	L1	GND
1.604000	41.30	10.3	46	4.7	AV	L1	GND

SCAN TABLE: "Voltage (9K-30M)FIN"

Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL150705241_fin"

7/5/2015 4:29PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
1.172000	42.00	10.2	56	14.0	QP	N	GND
1.604000	42.80	10.3	56	13.2	QP	N	GND
2.036000	41.10	10.4	56	14.9	QP	N	GND
3.518000	40.60	10.5	56	15.4	QP	N	GND

MEASUREMENT RESULT: "CTL150705241_fin2"

7/5/2015 4:29PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.370000	43.20	9.9	49	5.3	AV	N	GND
1.172000	41.40	10.2	46	4.6	AV	N	GND
1.604000	41.80	10.3	46	4.2	AV	N	GND

3.2. Radiated Emissions and Band Edge

Limit

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission out of authorized band shall not exceed the following table at a 3 meters measurement distance.

FCC PART 15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

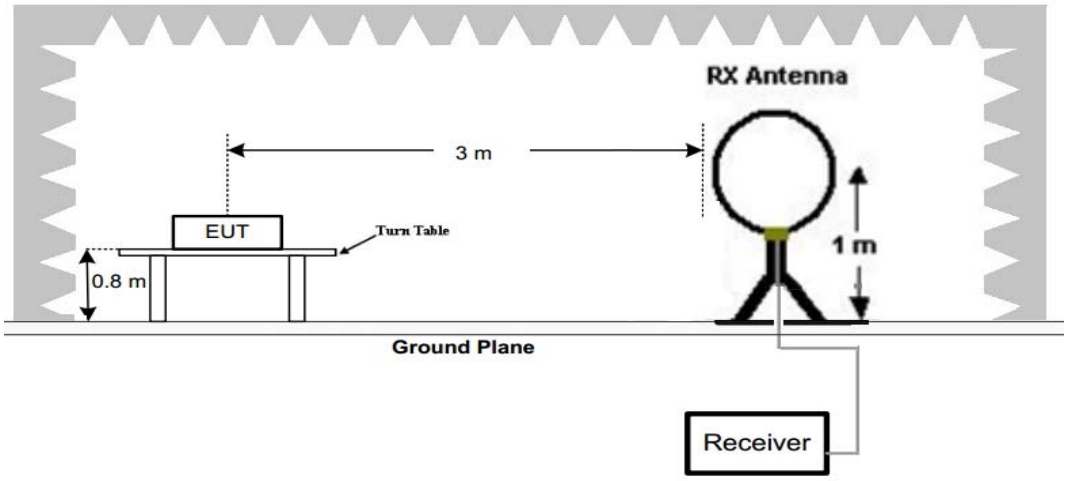
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a)

Radiated emission limits

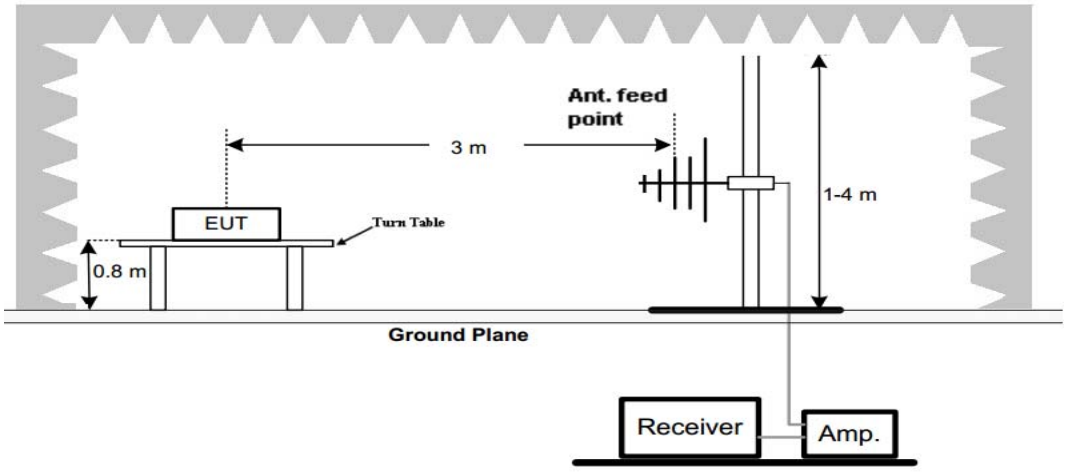
Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST CONFIGURATION

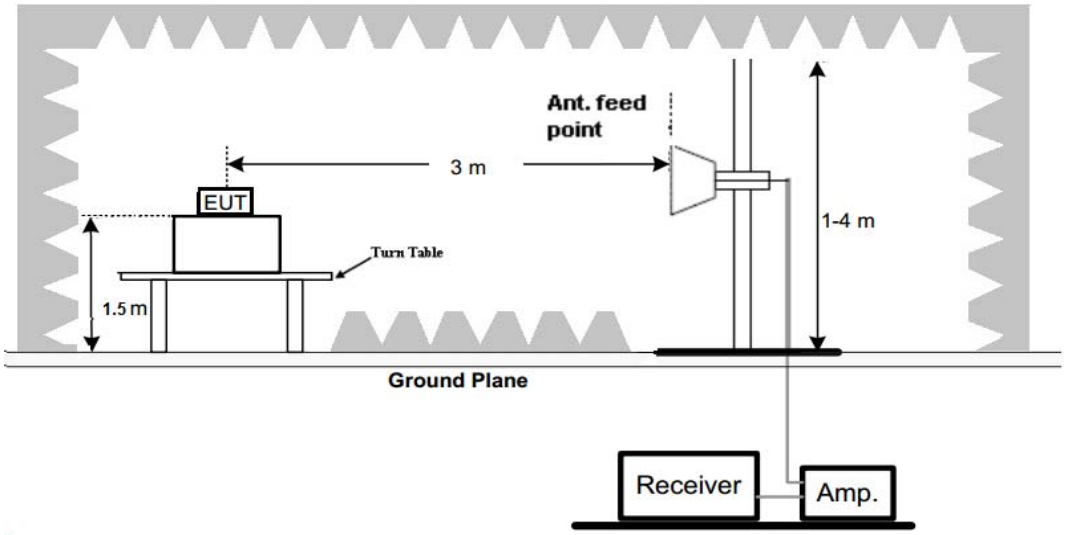
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



Test Procedure

1. The EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.

TEST RESULTS

Remark:
1. We tested three channels (lowest/middle/highest) of each mode and recorded worst case at 802.11b low channel for measurement below 1GHz.
2. We tested three channels (lowest/middle/highest) of each mode and recorded worst case at 802.11b mode above 1GHz.

For 9 KHz-30MHz

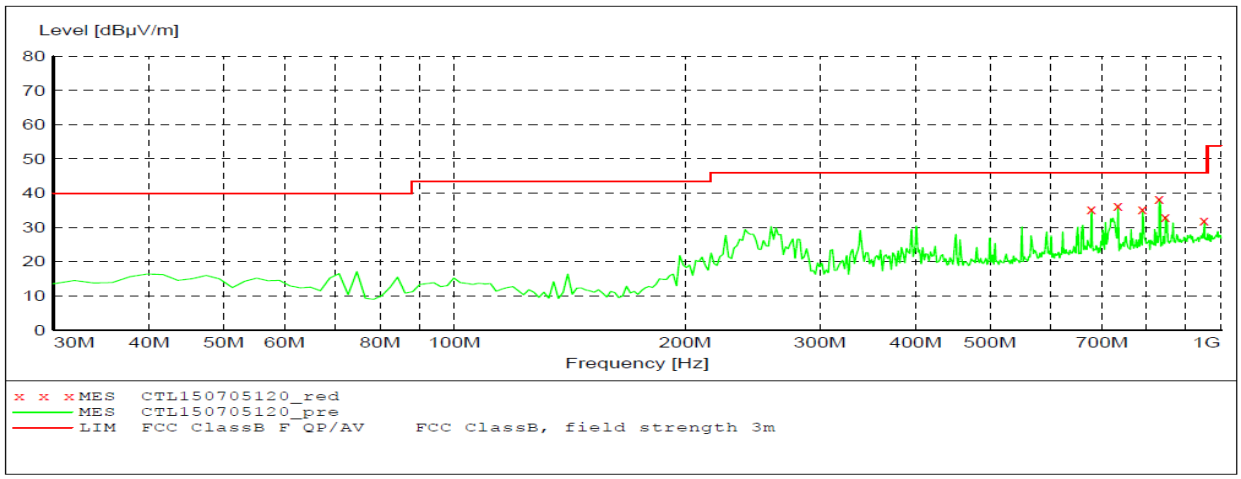
Frequency (MHz)	Corrected Reading (dBuV/m)@3m	FCC Limit (dBuV/m) @3m	Margin (dB)	Detector	Result
0.15	48.95	104.08	55.13	QP	PASS
1.26	54.26	65.60	11.34	QP	PASS
15.26	56.59	69.54	12.95	QP	PASS
25.26	50.26	69.54	19.28	QP	PASS

For 30MHz-1GHz

Horizontal

SWEEP TABLE: "test (30M-1G)"

Short Description:			Field Strength		
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.1 GHz	MaxPeak	Coupled	100 kHz	JB1



MEASUREMENT RESULT: "CTL150705120_red"

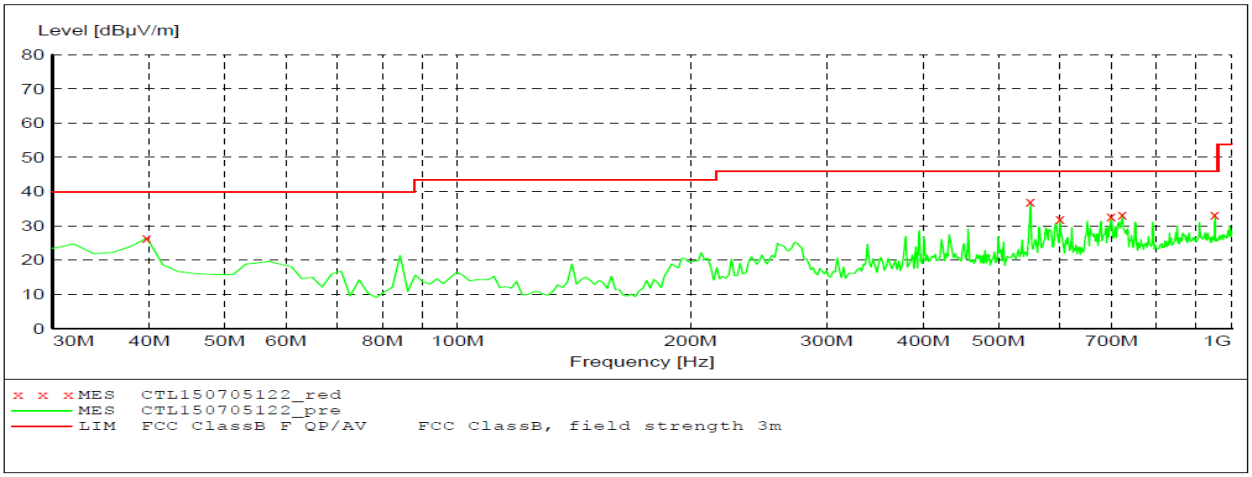
7/5/2015 3:14PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
677.960000	35.40	-7.4	46.0	10.6	---	100.0	145.00	HORIZONTAL
734.220000	36.40	-6.3	46.0	9.6	---	300.0	161.00	HORIZONTAL
790.480000	35.30	-5.8	46.0	10.7	---	100.0	158.00	HORIZONTAL
831.220000	38.30	-5.4	46.0	7.7	---	100.0	70.00	HORIZONTAL
846.740000	33.10	-5.1	46.0	12.9	---	100.0	166.00	HORIZONTAL
951.500000	32.00	-4.2	46.0	14.0	---	100.0	328.00	HORIZONTAL

Vertical

SWEEP TABLE: "test (30M-1G)"

Short Description:			Field Strength		
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.1 GHz	MaxPeak	Coupled	100 kHz	JB1



MEASUREMENT RESULT: "CTL150705122_red"

7/5/2015 3:23PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
39.700000	26.40	-16.1	40.0	13.6	---	100.0	36.00	VERTICAL
549.920000	37.00	-9.5	46.0	9.0	---	100.0	65.00	VERTICAL
600.360000	32.00	-7.9	46.0	14.0	---	100.0	94.00	VERTICAL
699.300000	32.60	-7.3	46.0	13.4	---	100.0	283.00	VERTICAL
722.580000	33.30	-6.7	46.0	12.7	---	100.0	161.00	VERTICAL
951.500000	33.30	-4.2	46.0	12.7	---	100.0	0.00	VERTICAL

For 1GHz to 25GHz

802.11b Mode (above 1GHz)

Frequency(MHz):				2412		Polarity:			HORIZONTAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	2402.00	99.52	PK	--	--	66.12	28.78	4.61	0.00	33.40
1	2402.00	89.47	AV	--	--	56.07	28.78	4.61	0.00	33.40
2	2390.00	35.64	PK	74	38.36	2.32	28.72	4.60	0.00	33.32
2	2390.00	--	AV	54	--	--	--	--	--	--
3	2400.00	43.45	PK	74	30.55	10.06	28.78	4.61	0.00	33.39
3	2400.00	--	AV	54	14.48	66.12	28.78	4.61	0.00	33.40
4	4824.00	59.25	PK	74	14.75	54.70	33.52	6.92	35.89	4.55
4	4824.00	46.54	AV	54	7.46	41.99	33.52	6.92	35.89	4.55
5	5264.80	48.26	PK	74	25.74	40.80	34.60	7.18	34.33	7.46
5	5264.80	--	AV	54	--	--	--	--	--	--
6	7236.00	51.20	PK	74	22.8	39.93	37.10	9.19	35.02	11.27
6	7236.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):				2412		Polarity:			VERTICAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	2402.00	100.25	PK	--	--	66.85	28.78	4.61	0.00	33.40
1	2402.00	91.25	AV	--	--	57.85	28.78	4.61	0.00	33.40
2	2390.00	36.25	PK	74	37.75	2.93	28.72	4.60	0.00	33.32
2	2390.00	--	AV	54	--	--	--	--	--	--
3	2400.00	42.56	PK	74	31.44	9.17	28.78	4.61	0.00	33.39
3	2400.00	--	AV	54	--	--	--	--	--	--
4	4824.00	56.25	PK	74	17.75	51.70	33.52	6.92	35.89	4.55
4	4824.00	48.51	AV	54	5.49	43.96	33.52	6.92	35.89	4.55
5	5205.50	48.90	PK	74	25.1	41.52	34.55	7.14	34.30	7.38
5	5205.50	--	AV	54	--	--	--	--	--	--
6	7236.00	50.47	PK	74	23.53	39.20	37.10	9.19	35.02	11.27
6	7236.00	--	AV	54	--	--	--	--	--	--

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.

Frequency(MHz):				2437		Polarity:			HORIZONTAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	2437.00	99.25	PK	--	--	65.75	28.85	4.65	0.00	33.50
1	2437.00	89.47	AV	--	--	55.97	28.85	4.65	0.00	33.50
2	4233.60	43.65	PK	74	30.35	38.95	32.82	6.54	34.67	4.70
2	4233.60	--	AV	54	--	--	--	--	--	--
3	4874.00	57.62	PK	74	16.38	51.38	33.59	6.95	34.30	6.24
3	4874.00	49.26	AV	54	4.74	43.02	33.59	6.95	34.30	6.24
4	6256.50	47.20	PK	74	26.8	37.54	35.19	7.98	33.51	9.66
4	6256.50	--	AV	54	--	--	--	--	--	--
5	7311.00	48.63	PK	74	25.37	36.97	37.44	9.22	35.00	11.66
5	7311.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):				2437		Polarity:			VERTICAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	2437.00	101.98	PK	--	--	68.48	28.85	4.65	0.00	33.50
1	2437.00	90.25	AV	--	--	56.75	28.85	4.65	0.00	33.50
2	4250.25	43.68	PK	74	30.32	38.96	32.83	6.56	34.66	4.72
2	4250.25	--	AV	54	--	--	--	--	--	--
3	4874.00	56.50	PK	74	17.5	50.26	33.59	6.95	34.30	6.24
3	4874.00	49.14	AV	54	4.86	42.90	33.59	6.95	34.30	6.24
4	5585.90	46.56	PK	74	27.44	38.33	34.77	7.36	33.90	8.23
4	5585.90	--	AV	54	--	--	--	--	--	--
5	7311.00	48.54	PK	74	25.46	36.88	37.44	9.22	35.00	11.66
5	7311.00	--	AV	54	--	--	--	--	--	--

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.

Frequency(MHz):				2462		Polarity:			HORIZONTAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	2480.00	100.25	PK	--	--	66.63	28.92	4.70	0.00	33.62
1	2480.00	90.25	AV	--	--	56.63	28.92	4.70	0.00	33.62
2	2483.50	45.48	PK	74	28.52	11.85	28.93	4.70	0.00	33.63
2	2483.50	--	AV	54	--	--	--	--	--	--
3	2500.00	43.26	PK	74	30.74	9.58	28.96	4.72	0.00	33.68
3	2500.00	--	AV	54	--	--	--	--	--	--
4	4924.00	59.15	PK	74	14.85	54.37	33.71	6.98	35.91	4.78
4	4924.00	46.57	AV	54	7.43	41.79	33.71	6.98	35.91	4.78
5	5235.20	47.80	PK	74	26.2	40.38	34.58	7.16	34.31	7.42
5	5235.20	--	AV	54	--	--	--	--	--	--
6	7386.00	50.21	PK	74	23.79	38.33	37.61	9.25	34.98	11.88
6	7386.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):				2462		Polarity:			VERTICAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	2480.00	101.85	PK	--	--	68.23	28.92	4.70	0.00	33.62
1	2480.00	90.98	AV	--	--	57.36	28.92	4.70	0.00	33.62
2	2483.50	47.20	PK	74	26.8	13.57	28.93	4.70	0.00	33.63
2	2483.50	--	AV	54	--	--	--	--	--	--
3	2500.00	43.24	PK	74	30.76	9.56	28.96	4.72	0.00	33.68
3	2500.00	--	AV	54	--	--	--	--	--	--
4	4924.00	56.25	PK	74	17.75	51.47	33.71	6.98	35.91	4.78
4	4924.00	47.30	AV	54	6.7	42.52	33.71	6.98	35.91	4.78
5	5235.20	45.26	PK	74	28.74	37.84	34.58	7.16	34.31	7.42
5	5235.20	--	AV	54	--	--	--	--	--	--
6	7386.00	50.30	PK	74	23.7	38.42	37.61	9.25	34.98	11.88
6	7386.00	--	AV	54	--	--	--	--	--	--

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.

BT4.0 Mode (above 1GHz)

Frequency(MHz):				2402		Polarity:			HORIZONTAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	2402.00	85.47	PK	--	--	52.07	28.78	4.61	0.00	33.40
1	2402.00	78.26	AV	--	--	44.86	28.78	4.61	0.00	33.40
2	2390.00	35.56	PK	74	38.44	2.24	28.72	4.60	0.00	33.32
2	2390.00	--	AV	54	--	--	--	--	--	--
3	2400.00	40.15	PK	74	33.85	6.76	28.78	4.61	0.00	33.39
3	2400.00	--	AV	54	--	--	--	--	--	--
4	4804.00	49.15	PK	74	24.85	44.64	33.49	6.91	35.89	4.51
4	4804.00	--	AV	54	--	--	--	--	--	--
5	5324.50	37.54	PK	74	36.46	30.01	34.66	7.21	34.35	7.53
5	5324.50	--	AV	54	--	--	--	--	--	--
6	7206.00	38.61	PK	74	35.39	27.50	36.95	9.18	35.03	11.11
6	7206.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):				2402		Polarity:			VERTICAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	2402.00	86.25	PK	--	--	52.85	28.78	4.61	0.00	33.40
1	2402.00	78.34	AV	--	--	44.94	28.78	4.61	0.00	33.40
2	2390.00	36.85	PK	74	37.15	3.53	28.72	4.60	0.00	33.32
2	2390.00	--	AV	54	--	--	--	--	--	--
3	2400.00	39.74	PK	74	34.26	6.35	28.78	4.61	0.00	33.39
3	2400.00	--	AV	54	--	--	--	--	--	--
4	4804.00	48.56	PK	74	25.44	44.05	33.49	6.91	35.89	4.51
4	4804.00	--	AV	54	--	--	--	--	--	--
5	5525.75	37.65	PK	74	36.35	29.99	34.76	7.33	34.42	7.66
5	5525.75	--	AV	54	--	--	--	--	--	--
6	7206.00	38.87	PK	74	35.13	27.76	36.95	9.18	35.03	11.11
6	7206.00	--	AV	54	--	--	--	--	--	--

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.

Frequency(MHz):				2440		Polarity:			HORIZONTAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	2437.00	86.85	PK	--	--	53.35	28.85	4.65	0.00	33.50
1	2437.00	79.25	AV	--	--	45.75	28.85	4.65	0.00	33.50
2	4233.60	37.47	PK	74	36.53	32.77	32.82	6.54	34.67	4.70
2	4233.60	--	AV	54	--	--	--	--	--	--
3	4874.00	45.20	PK	74	28.8	38.96	33.59	6.95	34.30	6.24
3	4874.00	--	AV	54	--	--	--	--	--	--
4	5475.50	38.14	PK	74	35.86	30.05	34.75	7.30	33.96	8.09
4	5475.50	--	AV	54	--	--	--	--	--	--
5	7311.00	38.86	PK	74	35.14	27.20	37.44	9.22	35.00	11.66
5	7311.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):				2440		Polarity:			VERTICAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	2437.00	87.63	PK	--	--	54.13	28.85	4.65	0.00	33.50
1	2437.00	79.84	AV	--	--	46.34	28.85	4.65	0.00	33.50
2	4250.25	37.48	PK	74	36.52	32.76	32.83	6.56	34.66	4.72
2	4250.25	--	AV	54	--	--	--	--	--	--
3	4874.00	45.25	PK	74	28.75	39.01	33.59	6.95	34.30	6.24
3	4874.00	--	AV	54	--	--	--	--	--	--
4	5362.50	38.61	PK	74	35.39	30.69	34.70	7.24	34.02	7.92
4	5362.50	--	AV	54	--	--	--	--	--	--
5	7311.00	37.87	PK	74	36.13	26.21	37.44	9.22	35.00	11.66
5	7311.00	--	AV	54	--	--	--	--	--	--

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.

Frequency(MHz):				2480		Polarity:			HORIZONTAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	2480.00	85.62	PK	--	--	52.00	28.92	4.70	0.00	33.62
1	2480.00	79.20	AV	--	--	45.58	28.92	4.70	0.00	33.62
2	2483.50	45.54	PK	74	28.46	11.91	28.93	4.70	0.00	33.63
2	2483.50	--	AV	54	--	--	--	--	--	--
3	2500.00	38.61	PK	74	35.39	4.93	28.96	4.72	0.00	33.68
3	2500.00	--	AV	54	--	--	--	--	--	--
4	4960.00	42.51	PK	74	14.85	31.49	37.59	33.84	7.00	35.92
4	4960.00	--	AV	54	--	--	--	--	--	--
5	5115.75	38.41	PK	74	26.2	35.59	31.22	34.36	7.10	34.27
5	5115.75	--	AV	54	--	--	--	--	--	--
6	7440.00	37.65	PK	74	23.79	36.35	25.70	37.64	9.28	34.97
6	7440.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):				2480		Polarity:			VERTICAL	
No.	Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
1	2480.00	87.26	PK	--	--	53.64	28.92	4.70	0.00	33.62
1	2480.00	78.44	AV	--	--	44.82	28.92	4.70	0.00	33.62
2	2483.50	46.54	PK	74	27.46	12.91	28.93	4.70	0.00	33.63
2	2483.50	--	AV	54	--	--	--	--	--	--
3	2500.00	38.74	PK	74	35.26	5.06	28.96	4.72	0.00	33.68
3	2500.00	--	AV	54	--	--	--	--	--	--
4	4960.00	43.45	PK	74	30.55	38.53	33.84	7.00	35.92	4.92
4	4960.00	--	AV	54	--	--	--	--	--	--
5	5110.75	38.52	PK	74	35.48	31.34	34.35	7.10	34.27	7.18
5	5110.75	--	AV	54	--	--	--	--	--	--
6	7440.00	38.20	PK	74	35.8	26.25	37.64	9.28	34.97	11.95
6	7440.00	--	AV	54	--	--	--	--	--	--

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.

3.3. Maximum Conducted Output Power

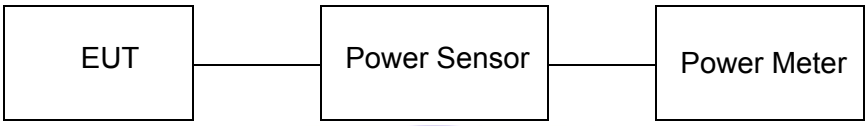
Limit

The Maximum Peak Output Power Measurement is 30dBm.

Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power sensor.

Test Configuration



Test Results

WIFI

Type	Channel	Output power PK (dBm)	Output power AV (dBm)	Limit (dBm)	Result
802.11b	01	12.62	9.26	30.00	Pass
	06	12.75	9.38		
	11	12.46	9.15		
802.11g	01	14.75	8.65	30.00	Pass
	06	14.65	8.74		
	11	14.75	8.63		
802.11n(H20)	01	12.98	8.15	30.00	Pass
	06	13.15	8.42		
	11	13.20	8.37		

Note: 1.The test results including the cable lose.

BT4.0

Type	Channel	Output power PK (dBm)	Output power AV (dBm)	Limit (dBm)	Result
GFSK	00	-4.26	-6.25	30.00	Pass
	19	-4.15	-6.10		
	39	-4.42	-6.71		

Note: 1.The test results including the cable lose.

3.4. Power Spectral Density

Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW ≥ 3 kHz.
3. Set the VBW ≥ 3× RBW.
4. Set the span to 1.5 times the DTS channel bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
11. The resulting peak PSD level must be 8dBm.

Test Configuration

Test Results

WIFI

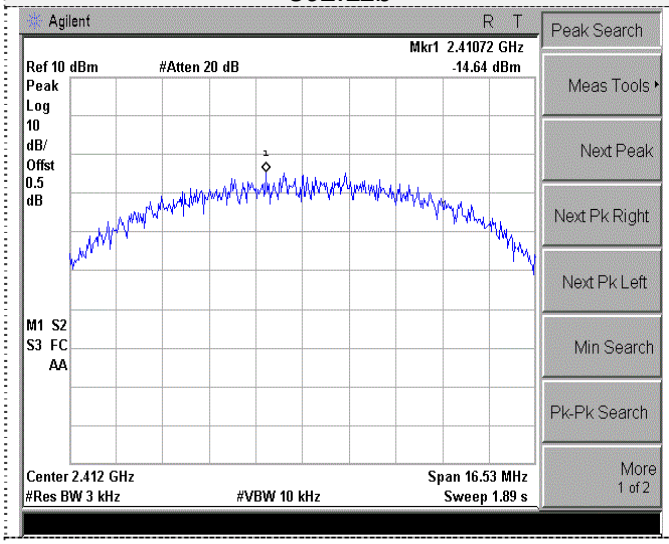
Type	Channel	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
802.11b	01	-14.64	8.00	Pass
	06	-13.40		
	11	-12.45		
802.11g	01	-16.16	8.00	Pass
	06	-14.96		
	11	-13.76		
802.11n(HT20)	01	-20.62	8.00	Pass
	06	-19.41		
	11	-18.39		

BT4.0

Type	Channel	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
GFSK	00	-19.66	8.00	Pass
	19	-19.30		
	39	-19.78		

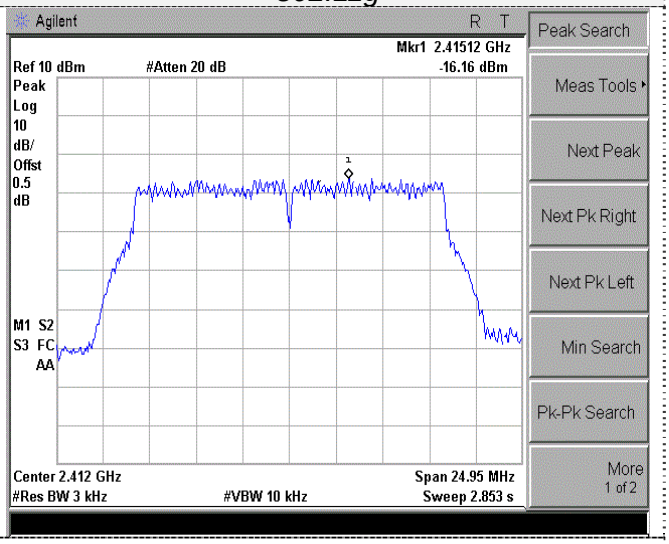
Test plot as follows:

802.11b

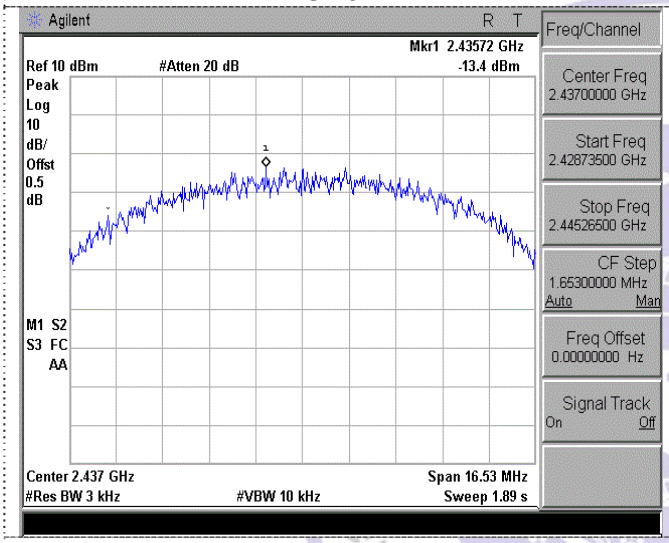


CH01

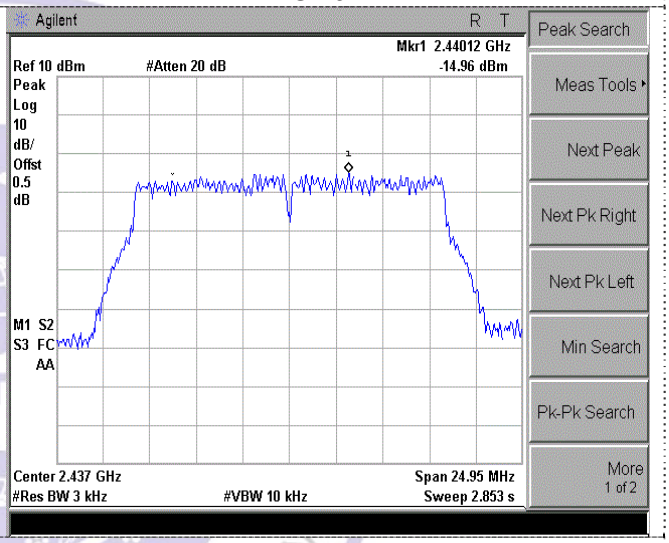
802.11g



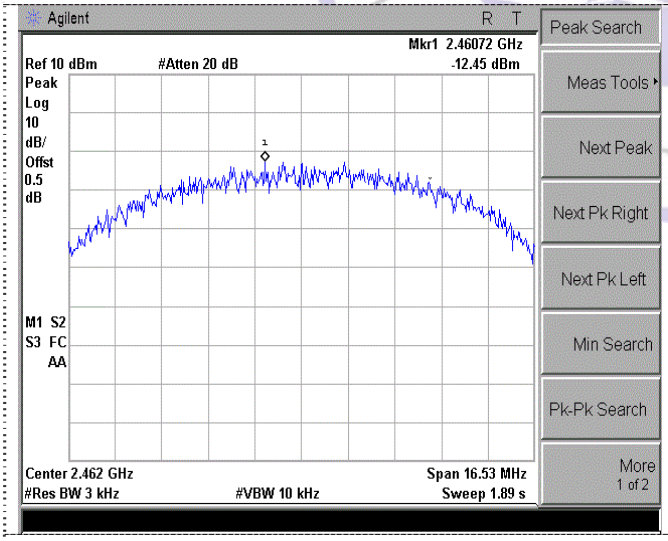
CH01



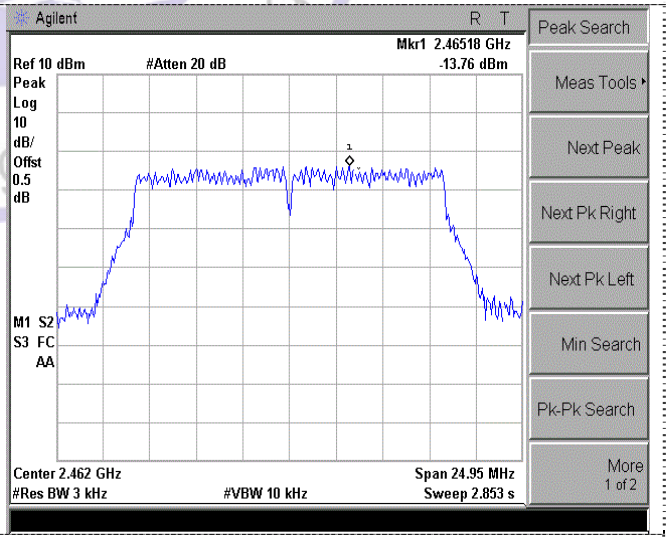
CH06



CH06

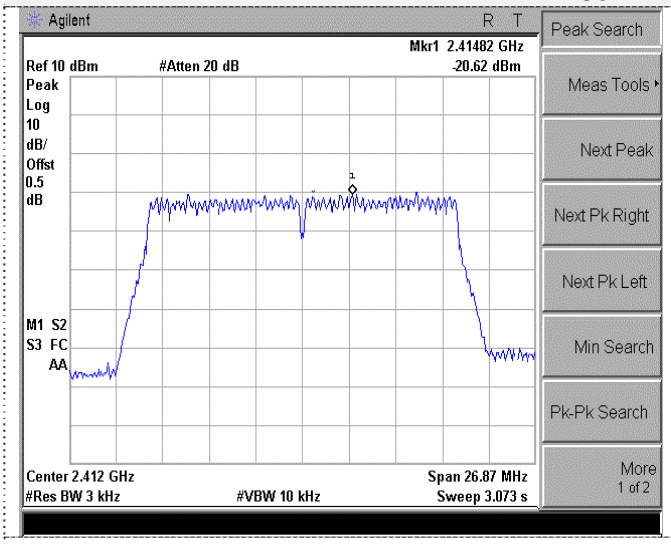


CH11

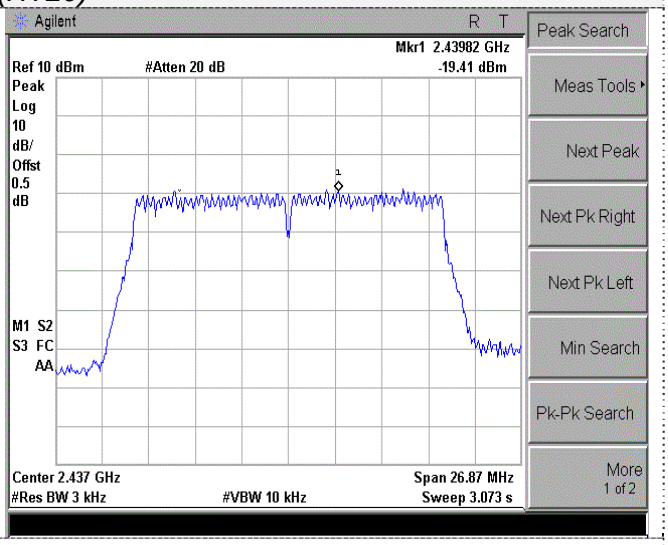


CH11

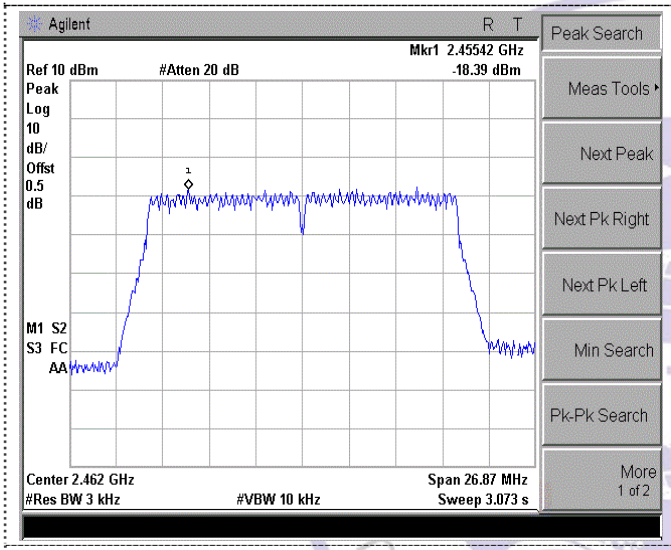
802.11n(HT20)



CH01

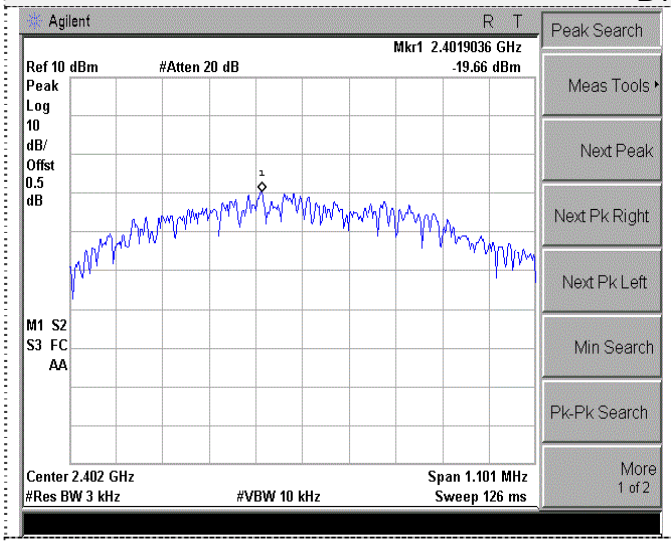


CH06

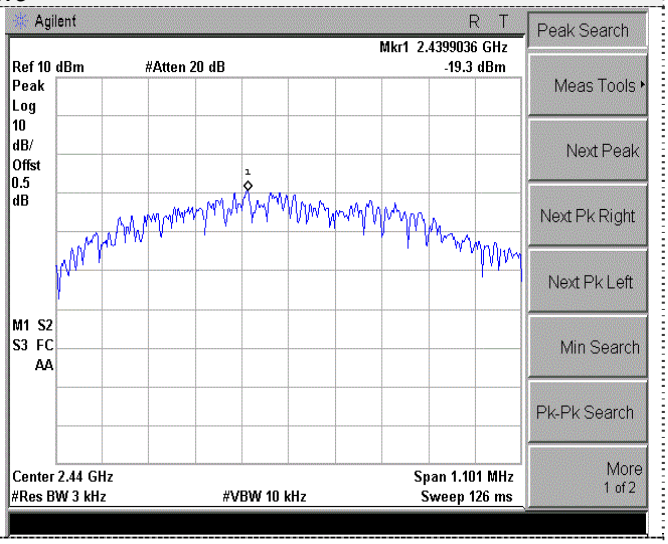


CH11

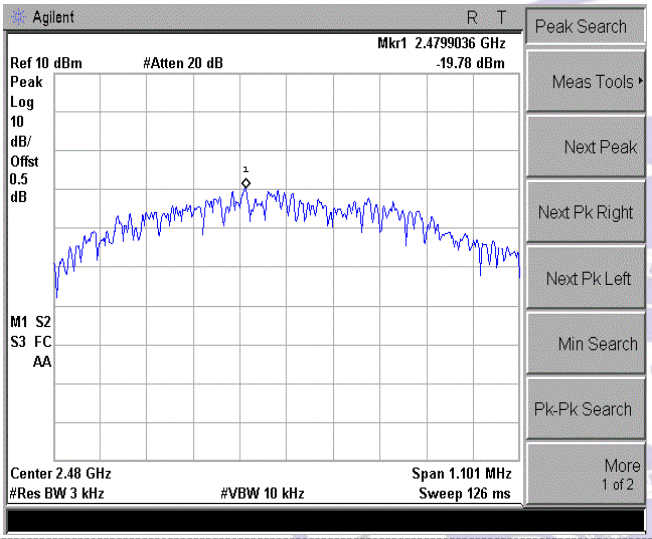
BT4.0



CH00



CH19



CH39

3.5. 6dB Bandwidth

Limit

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz

Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 KHz RBW and 300 KHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

Test Configuration

Test Results

WIFI

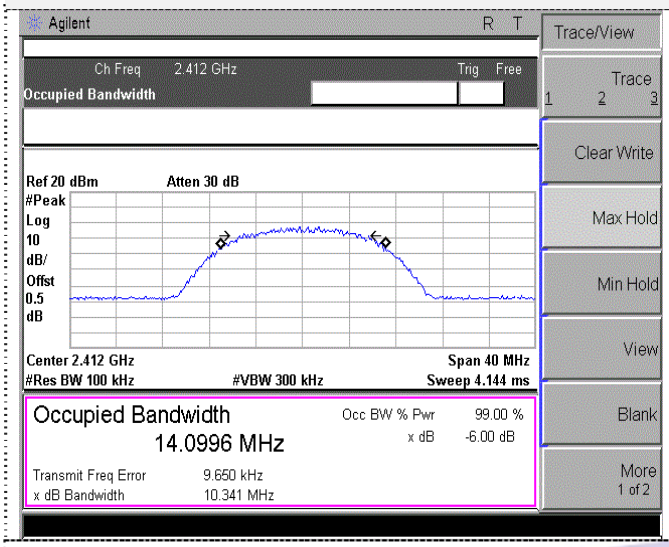
Type	Channel	6dB Bandwidth (MHz)	99% OBW (MHz)	Limit (KHz)	Result
802.11b	01	10.34	14.10	≥500	Pass
	06	11.02	14.62		
	11	10.39	14.08		
802.11g	01	16.62	16.48	≥500	Pass
	06	16.61	16.47		
	11	16.63	16.49		
802.11n(HT20)	01	17.91	17.68	≥500	Pass
	06	17.70	17.67		
	11	17.88	17.66		

BT4.0

Type	Channel	6dB Bandwidth (MHz)	99% OBW (MHz)	Limit (KHz)	Result
GFSK	00	0.7334	1.0412	≥500	Pass
	19	0.7343	1.0425		
	39	0.7337	1.0394		

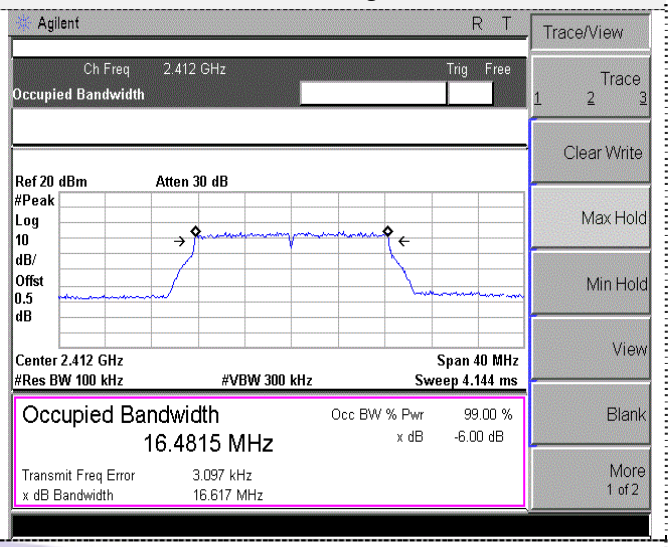
Test plot as follows:

802.11b

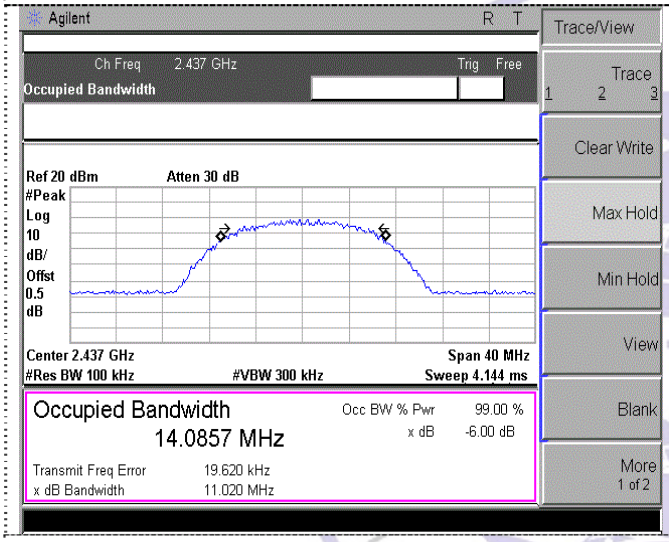


CH01

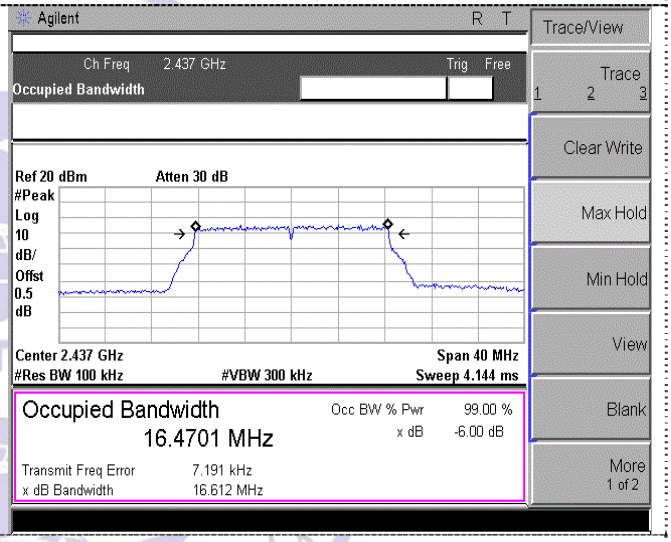
802.11g



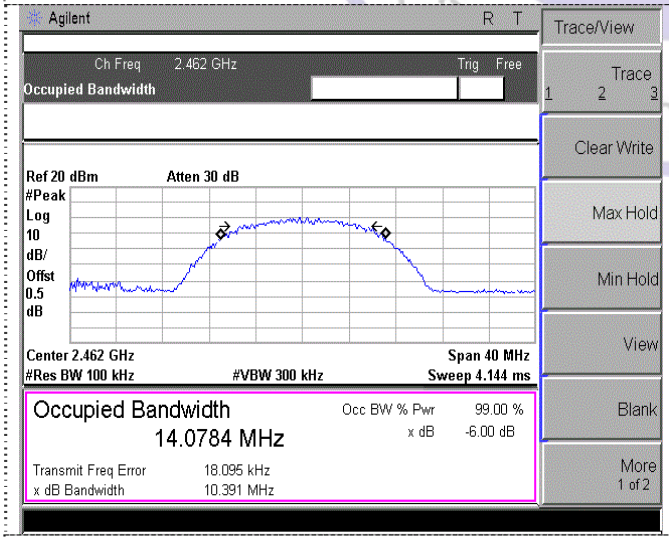
CH01



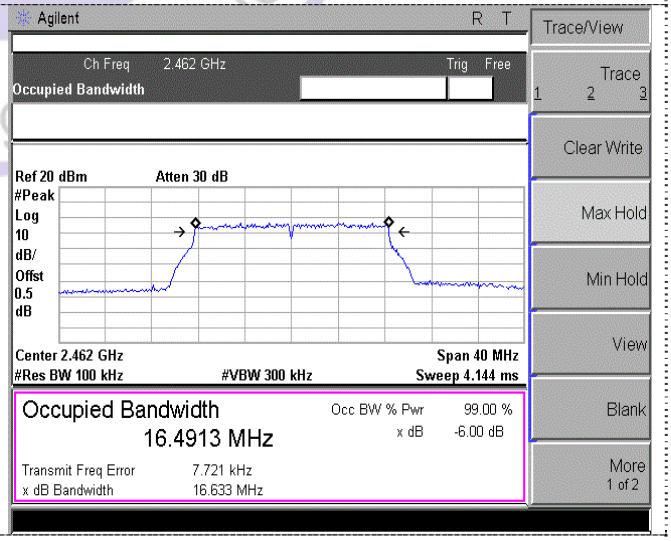
CH06



CH06

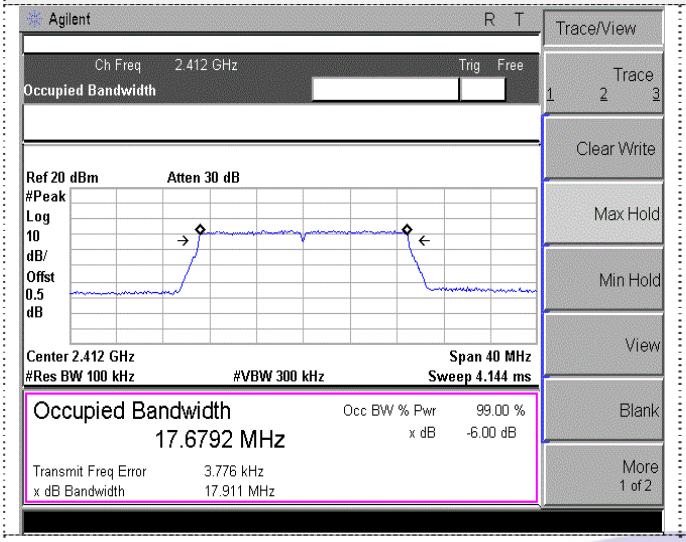


CH11

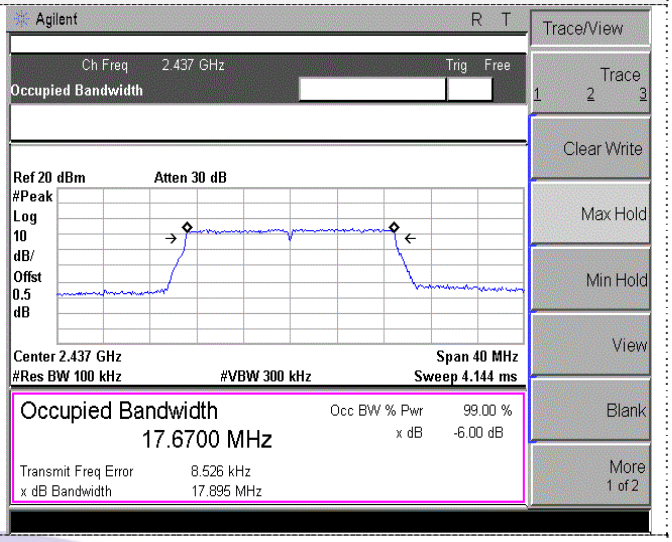


CH11

802.11n(HT20)



CH01



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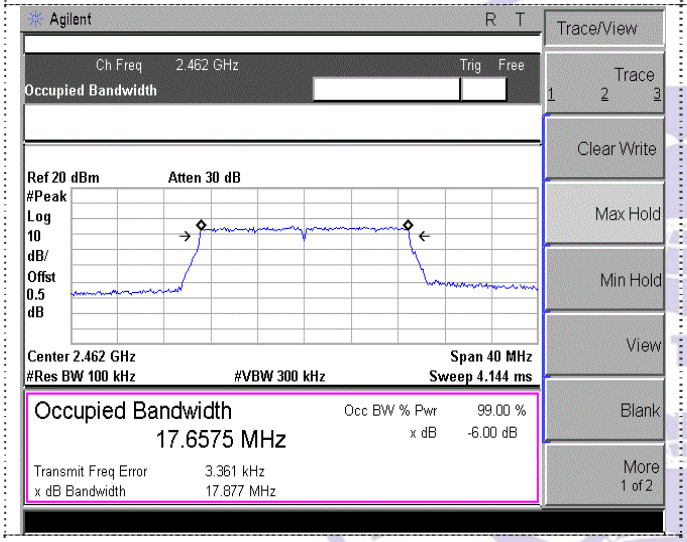
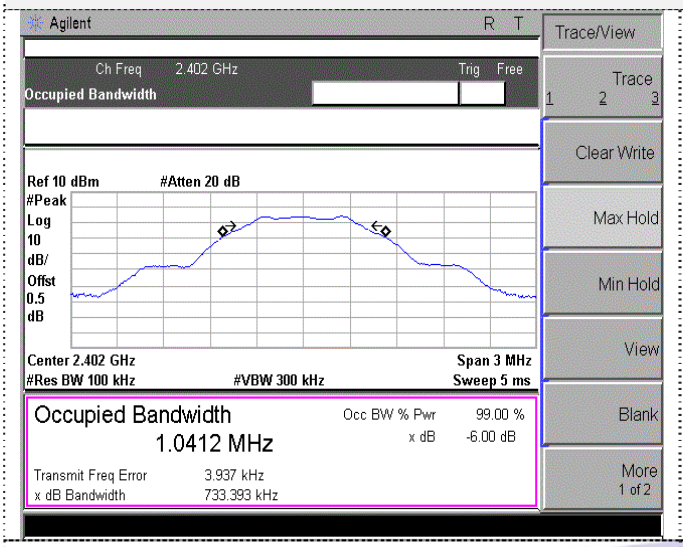
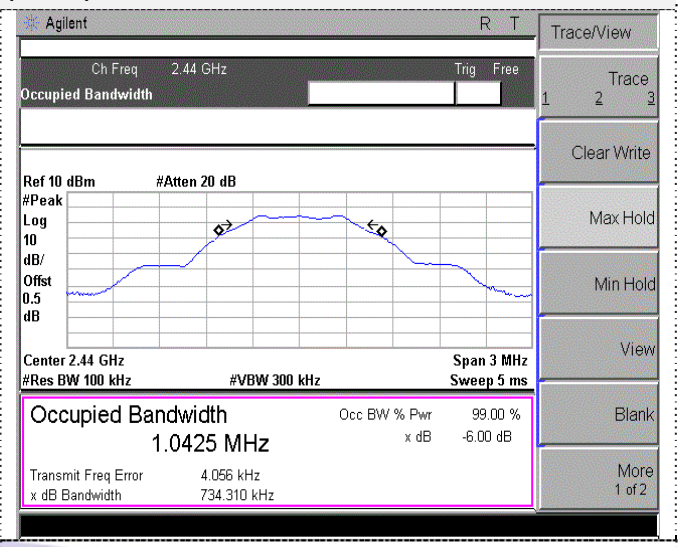


CH11

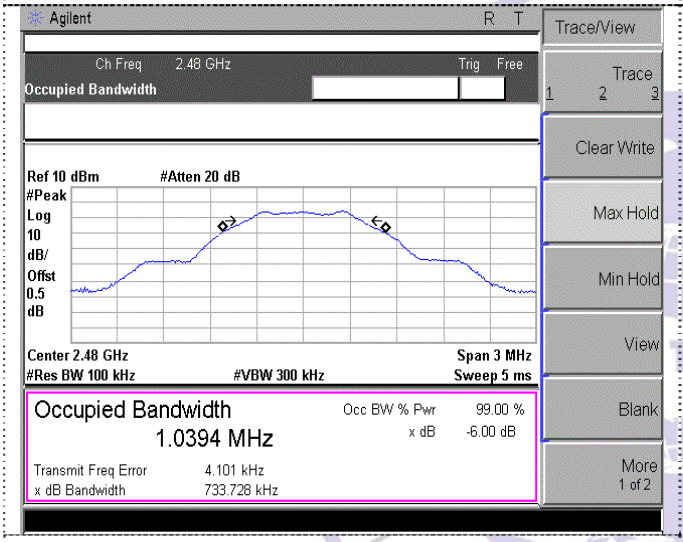
802.11n(HT20)



CH00



CH19



CH39

3.6. Out-of-band Emissions

Limit

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 con-ducted or a radiated measurement, pro-vided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter com-plies 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.

Test Procedure

Connect the transmitter output to spectrum analyzer using a low loss RF cable, and set the spectrum analyzer to RBW=100 kHz, VBW= 300 kHz, peak detector , and max hold. Measurements utilizing these setting are made of the in-band reference level, bandedge and out-of-band emissions.

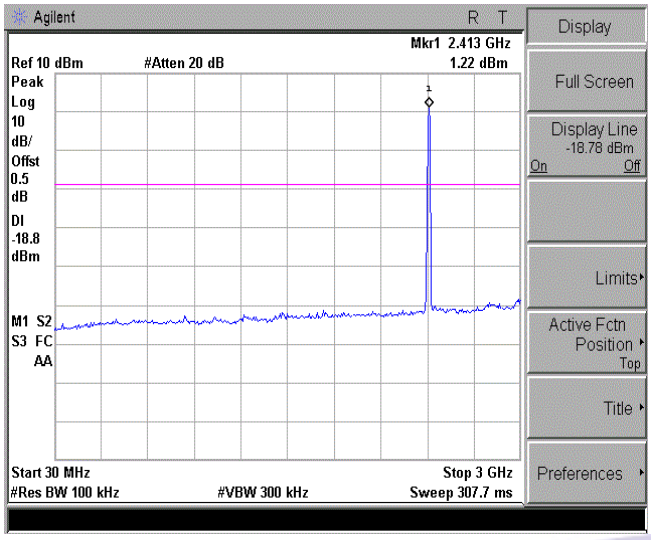
Test Configuration

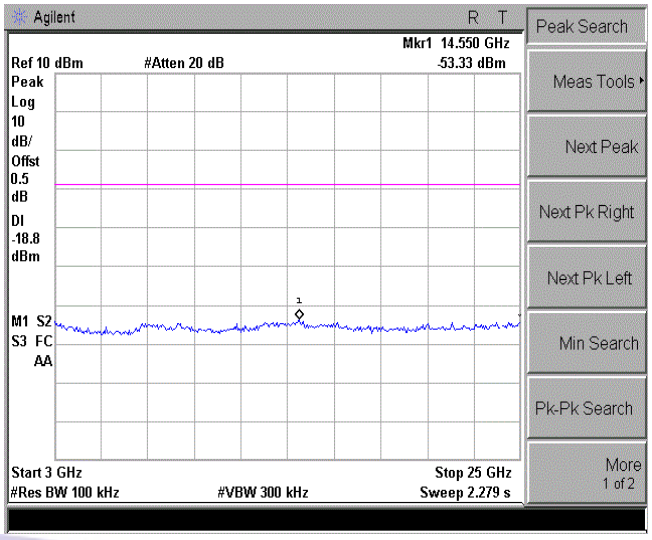
Test Results

Remark: The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandage measurement data.

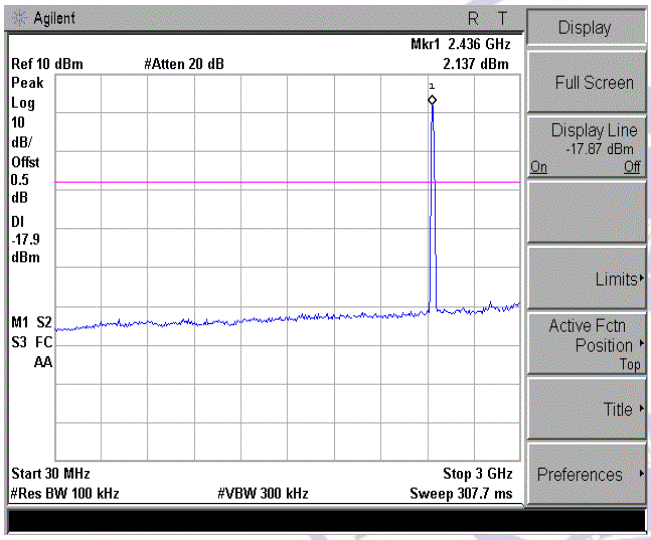
Test plot as follows:

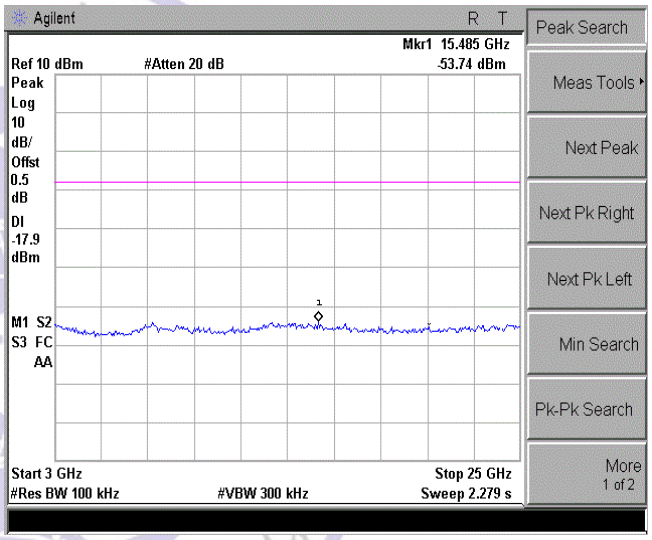
802.11b



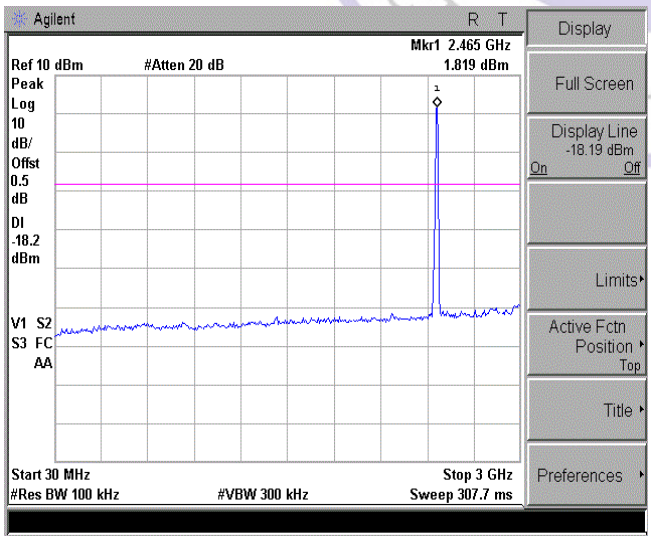


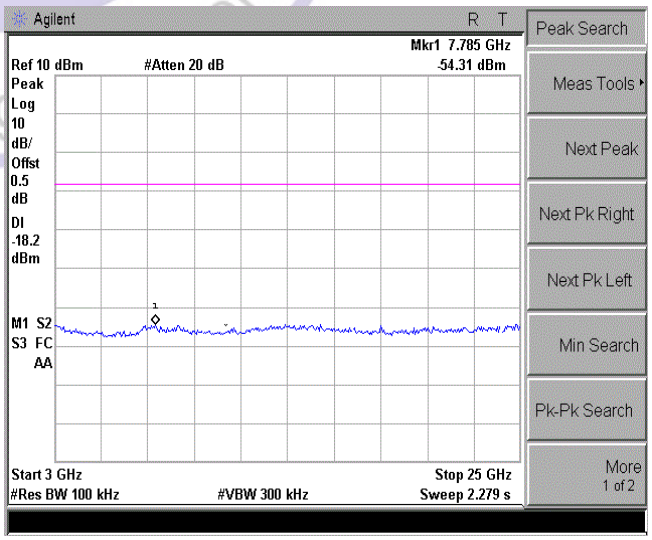
CH01



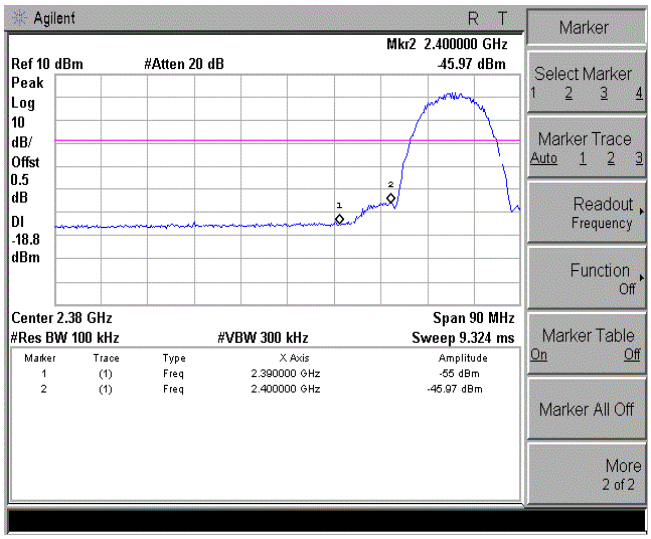


CH06

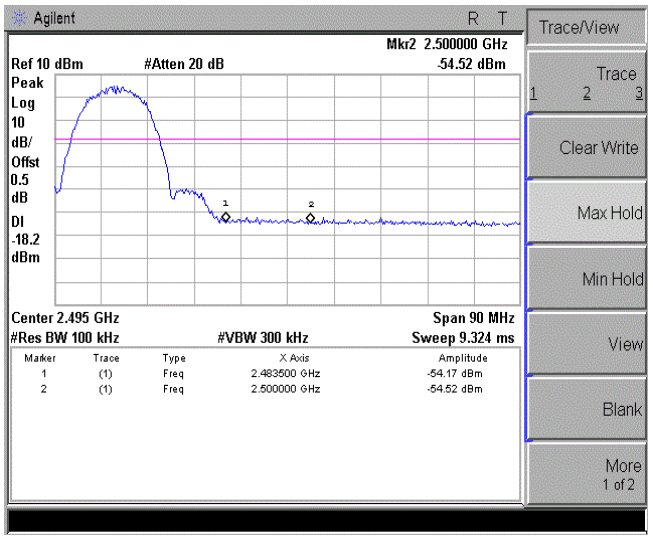




CH11

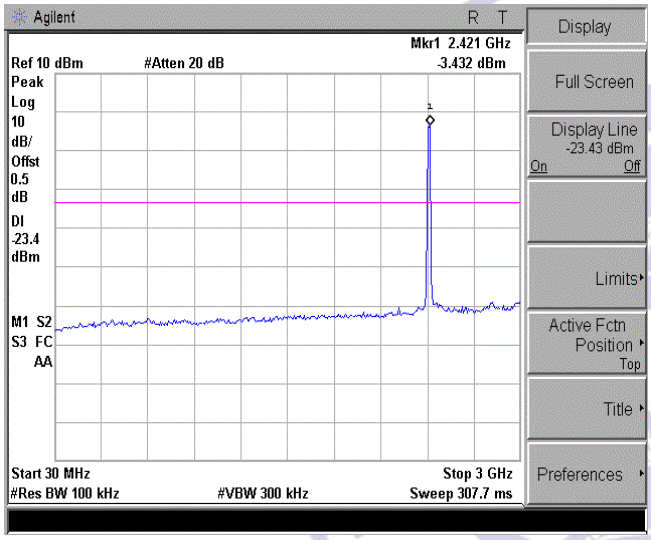


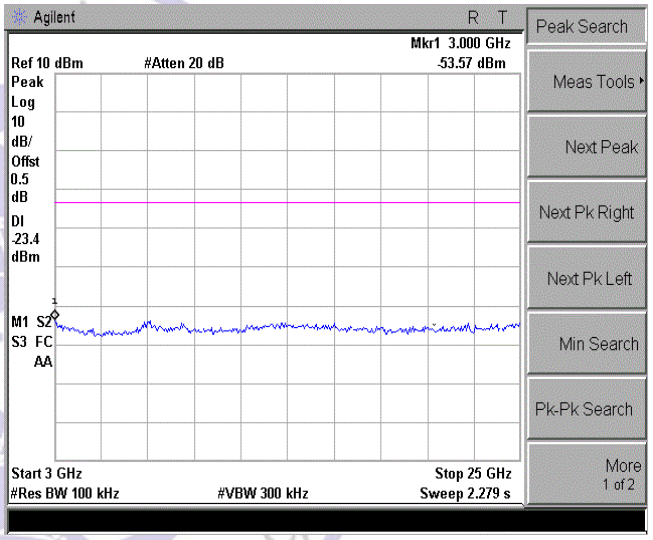
Left Band edge



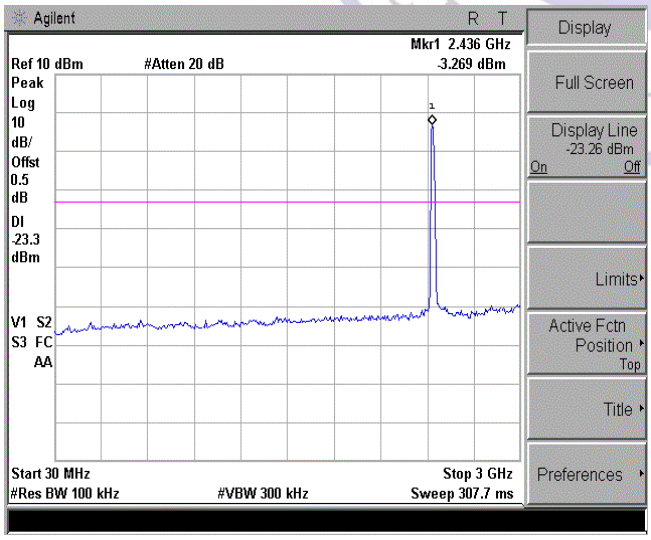
Right Band edge

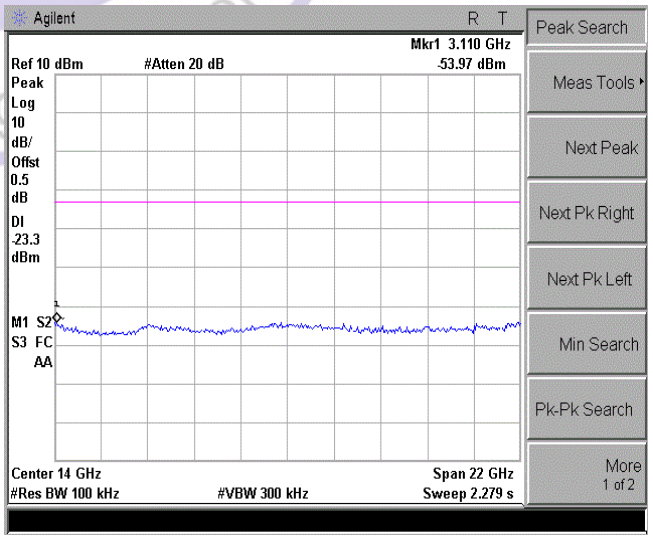
802.11g



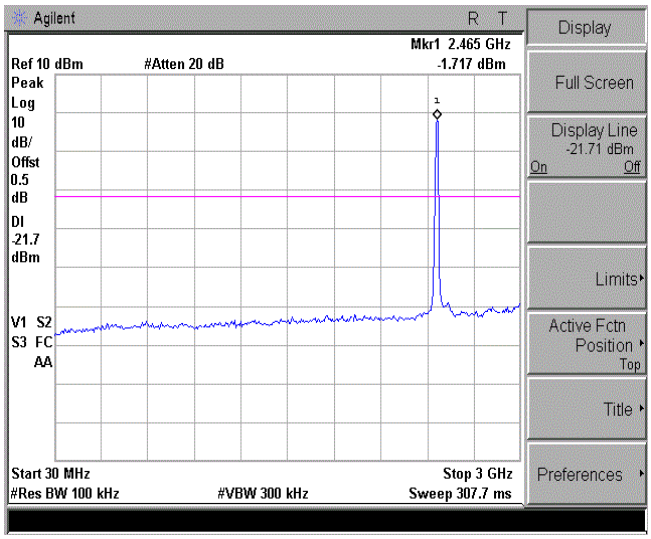


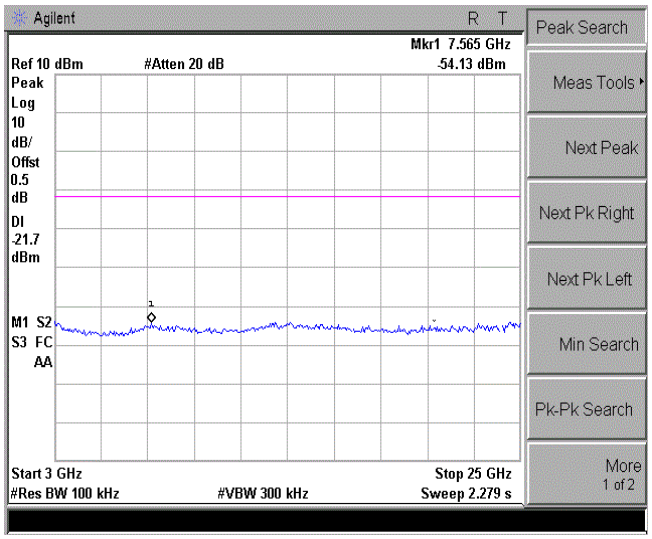
CH01



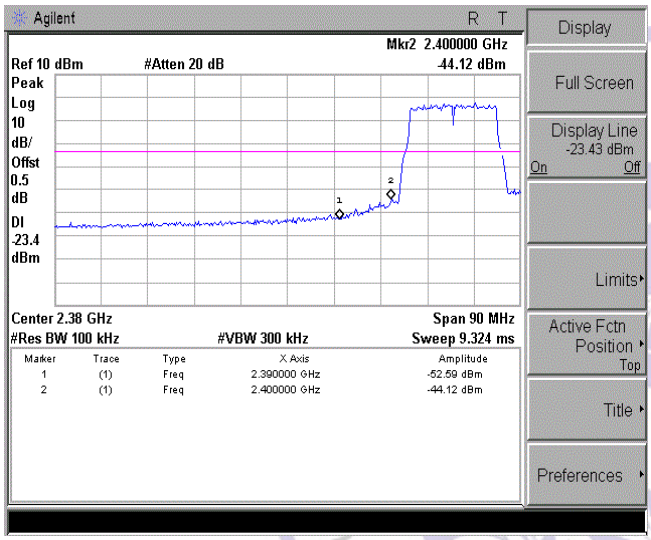


CH06

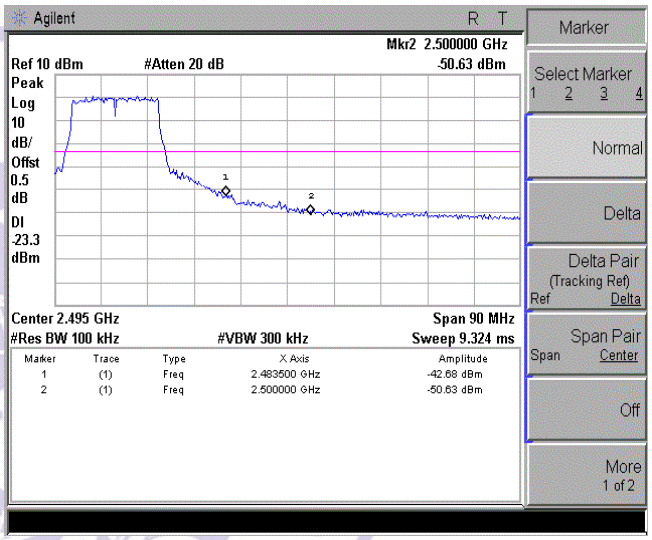




CH11

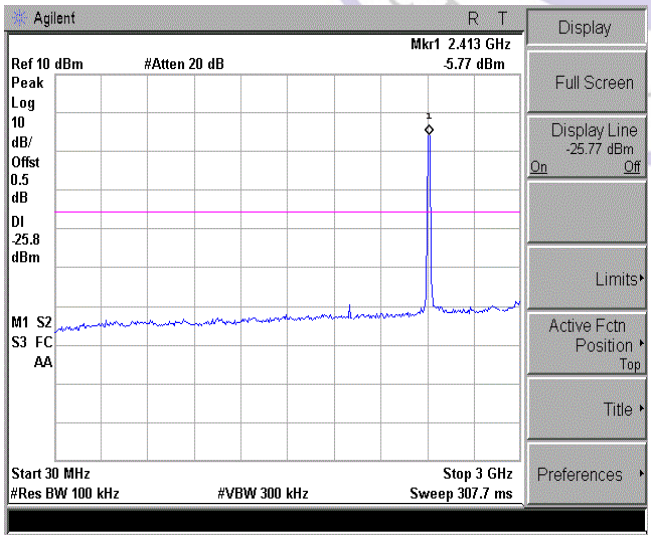


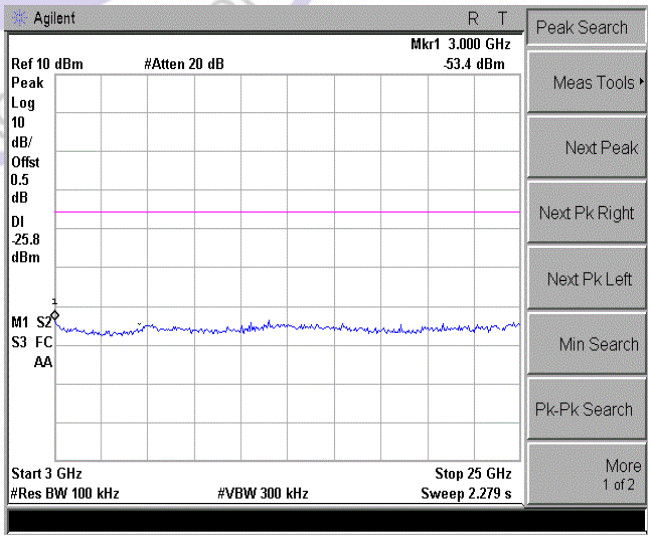
Left Band edge



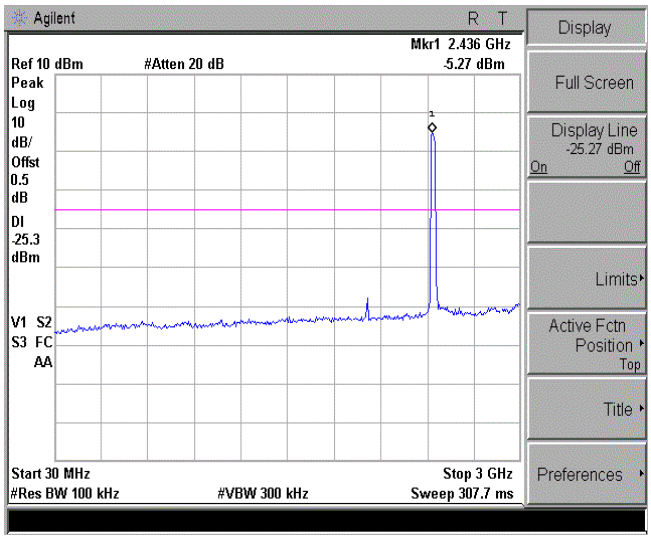
Right Band edge

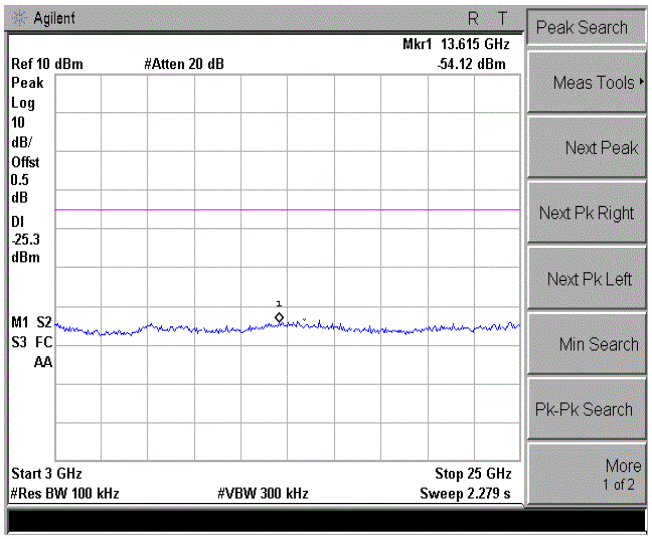
802.11n(HT20)





CH01





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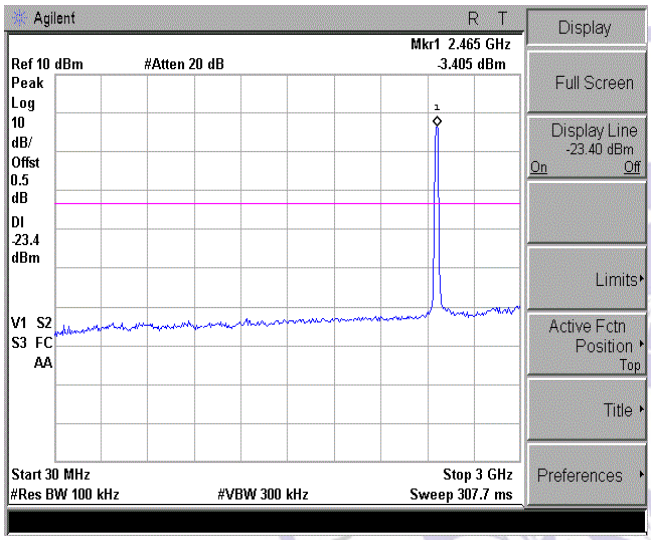
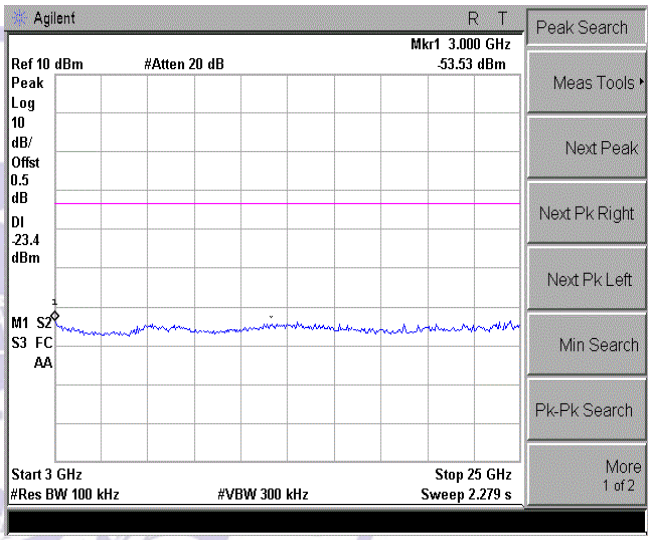
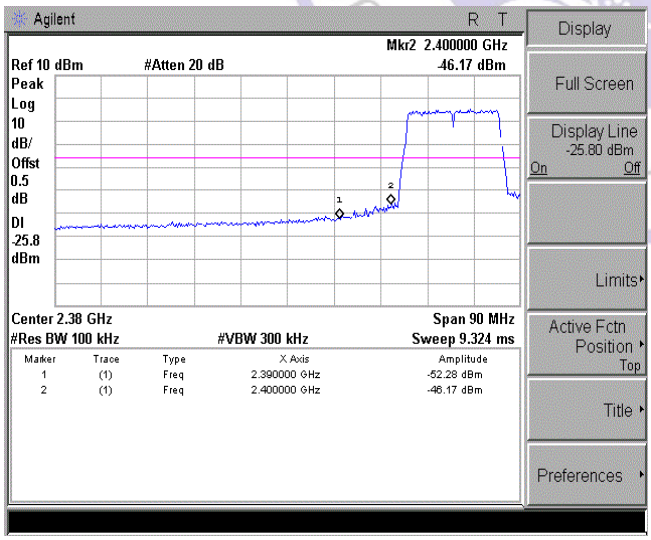
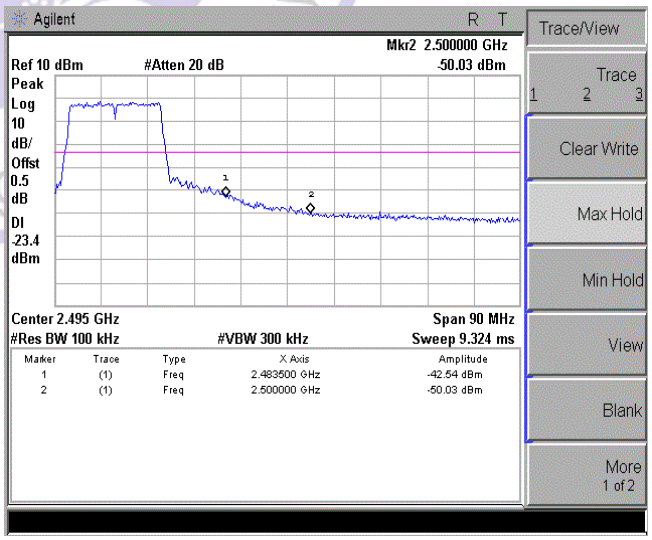




CH11

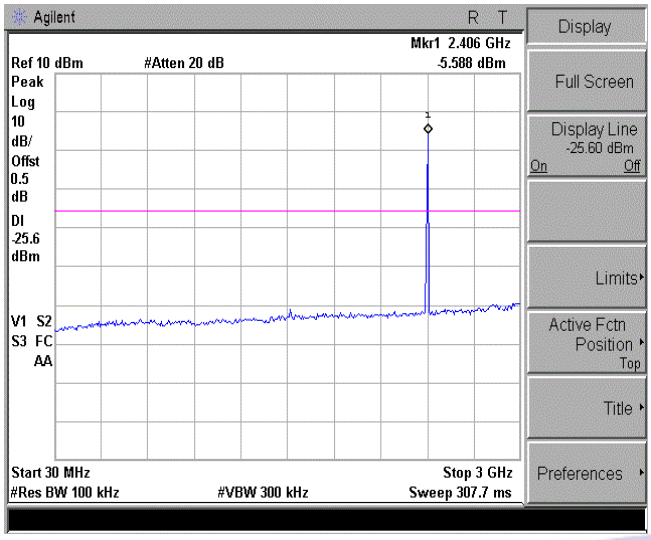


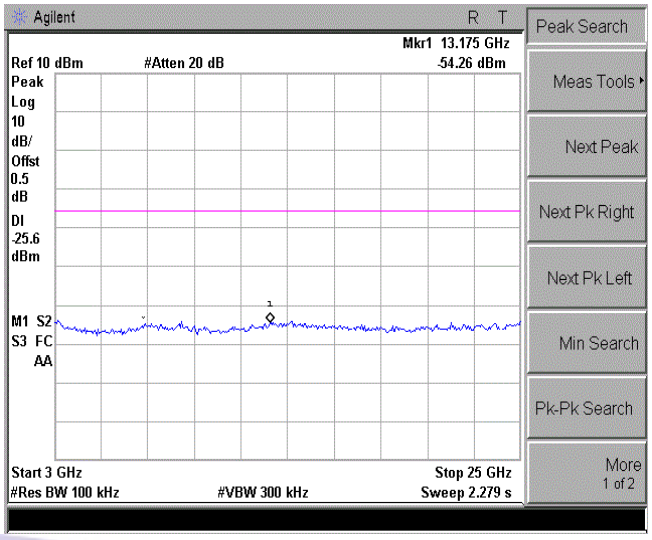
Left Band edge



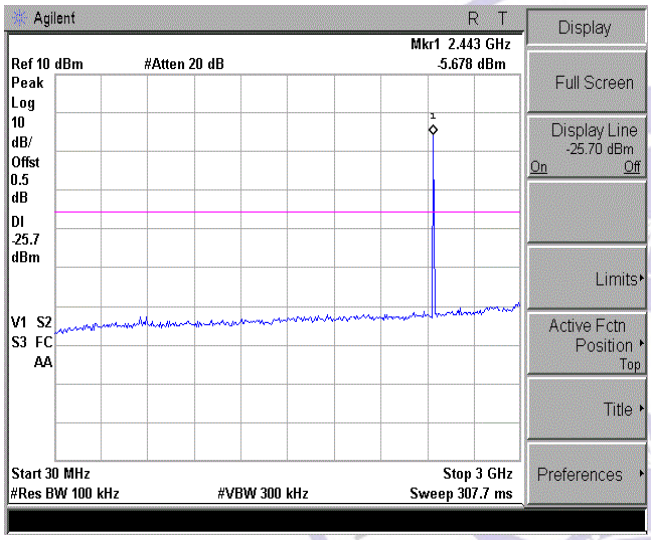
Right Band edge

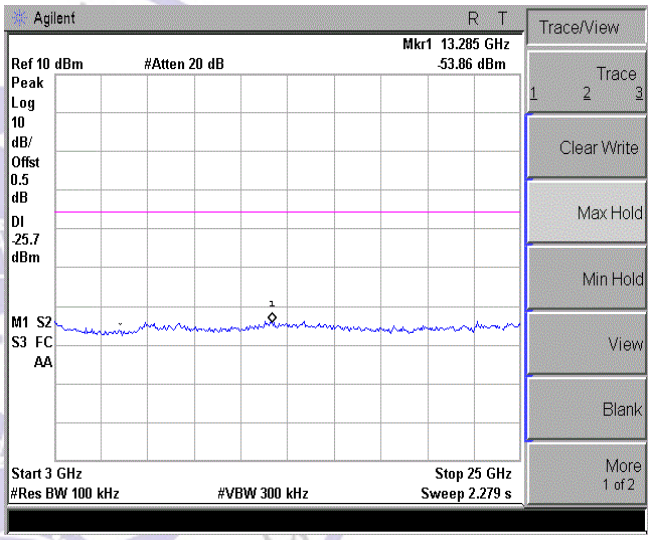
BT4.0



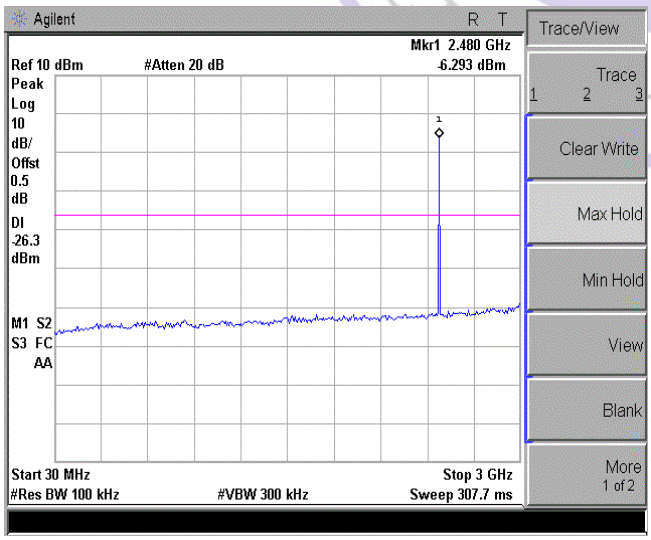


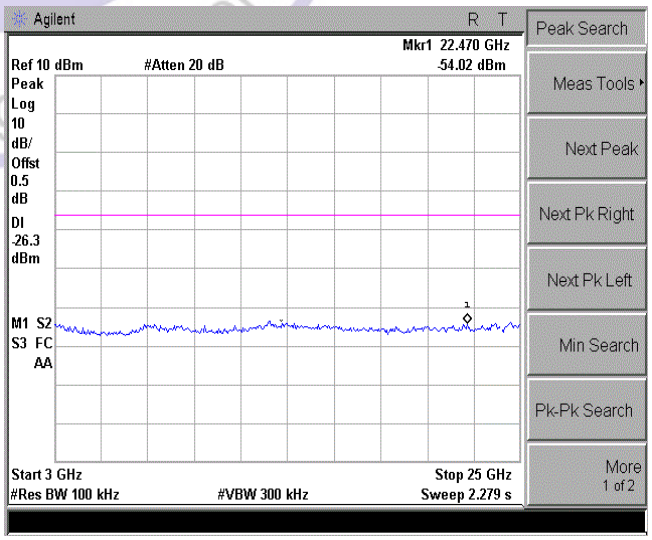
CH00



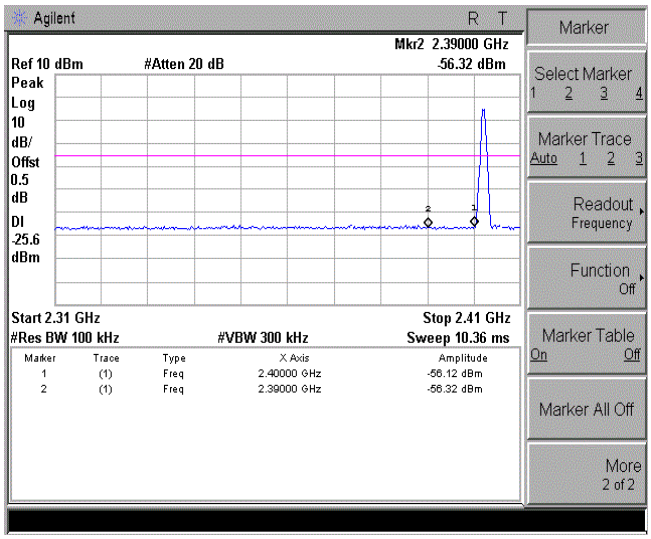


CH19

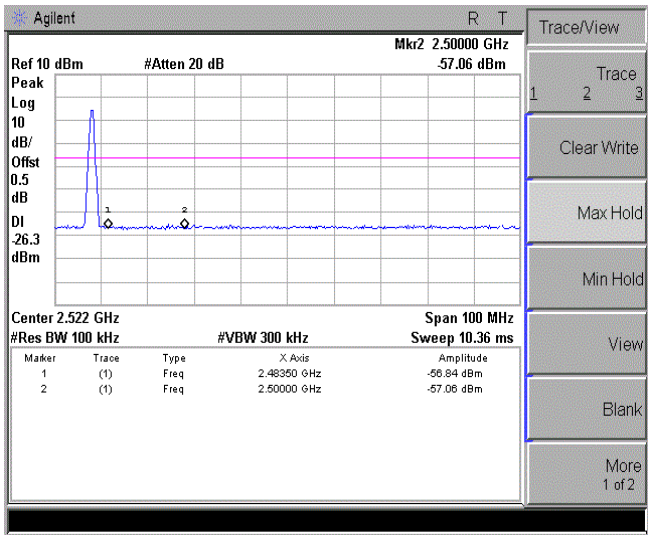




CH39



Left Band edge



Right Band edge

3.7. Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203:

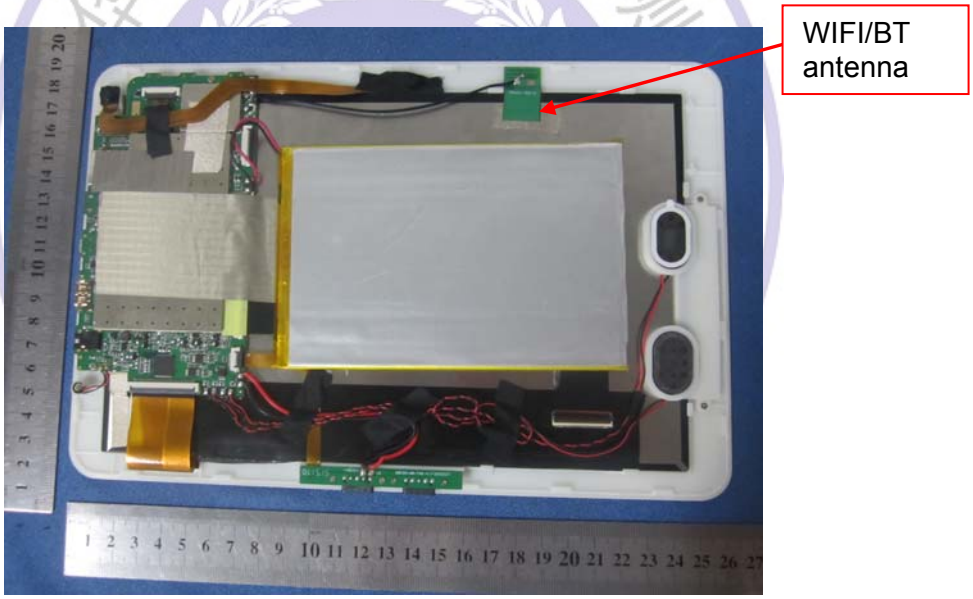
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited

FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1) (I):

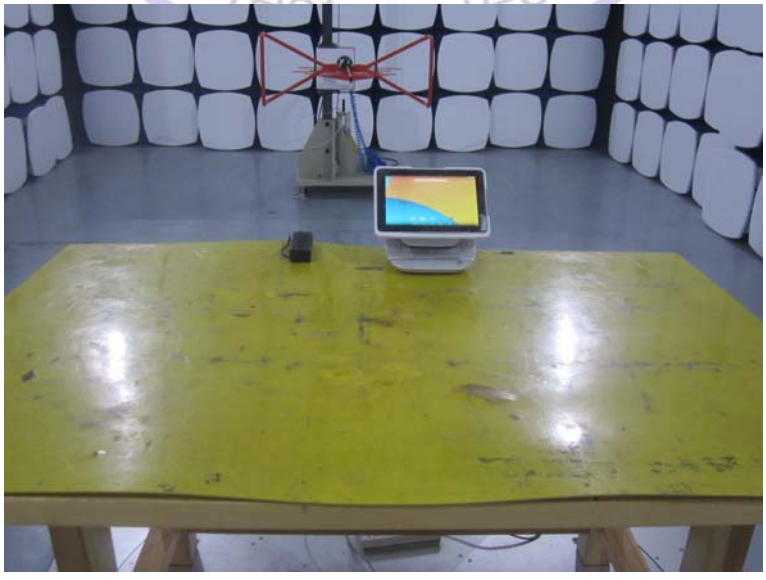
(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

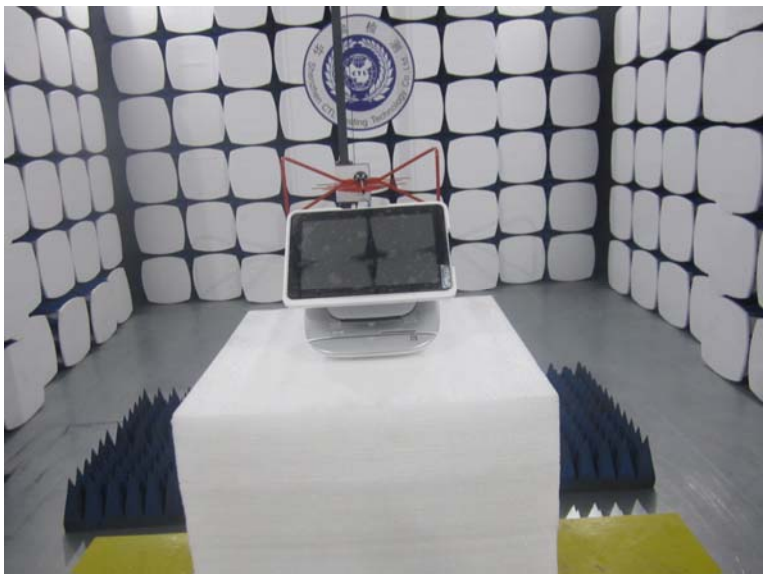
Test Result:

The maximum gain of WIFI antenna was -0.5dBi.



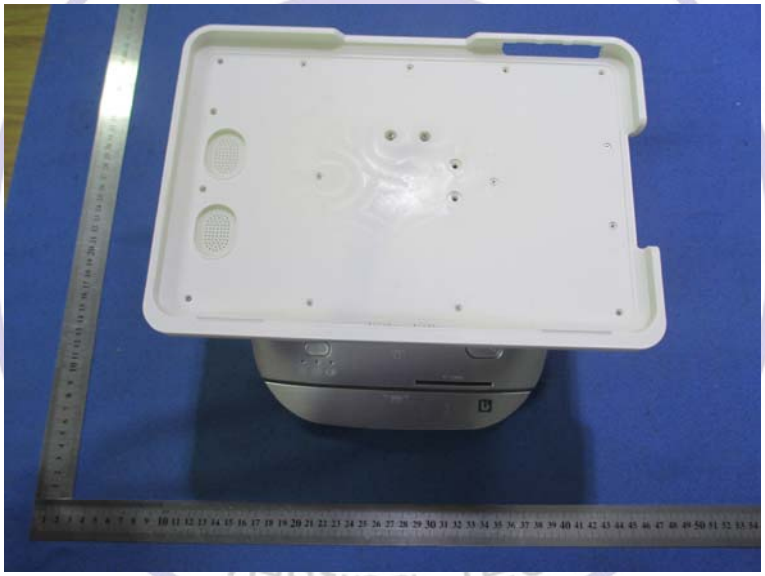
4. Test Setup Photos of the EUT

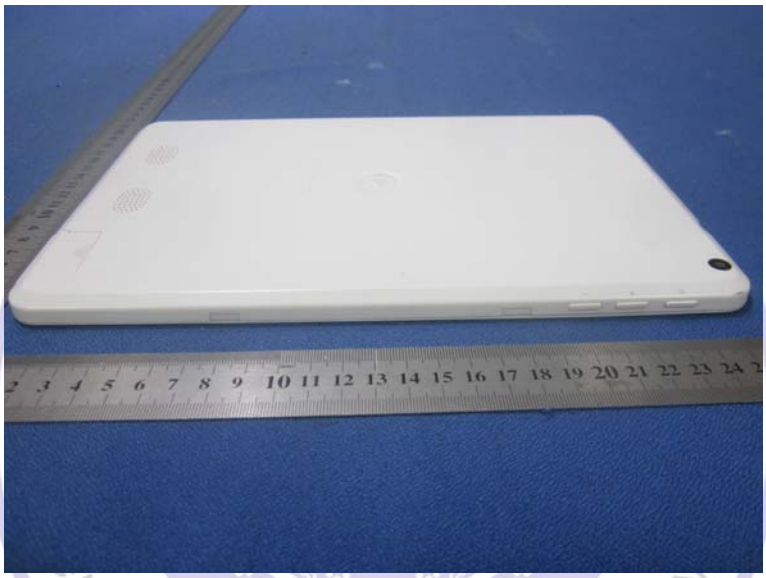




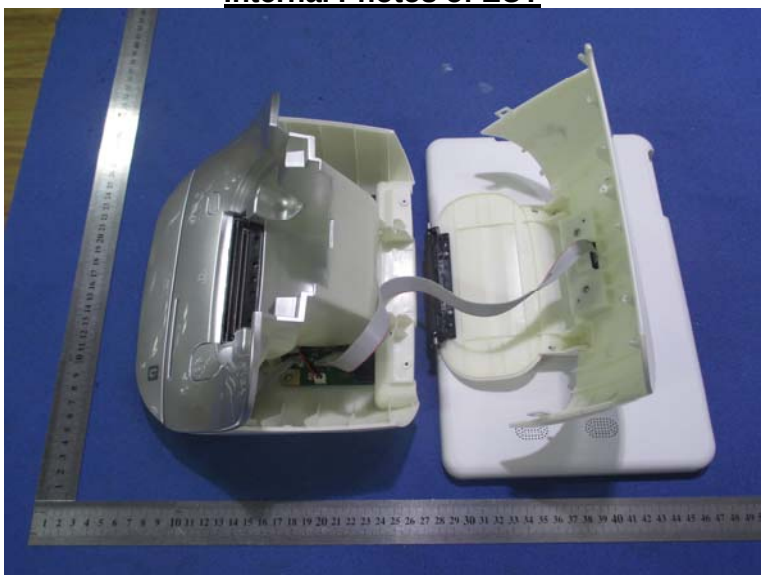
5. External and Internal Photos of the EUT

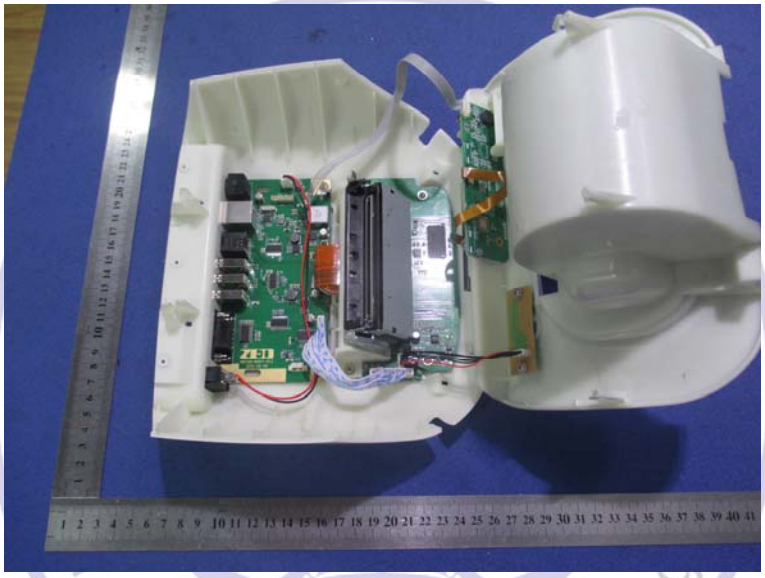
External Photos of EUT

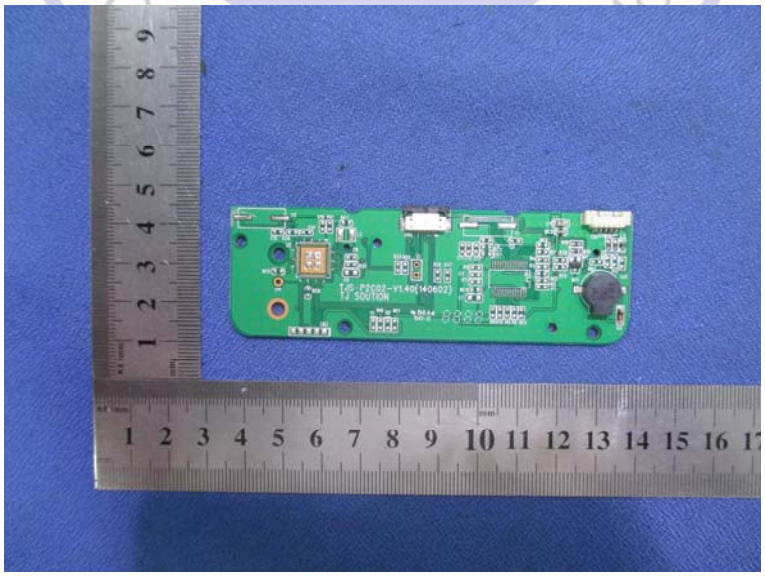


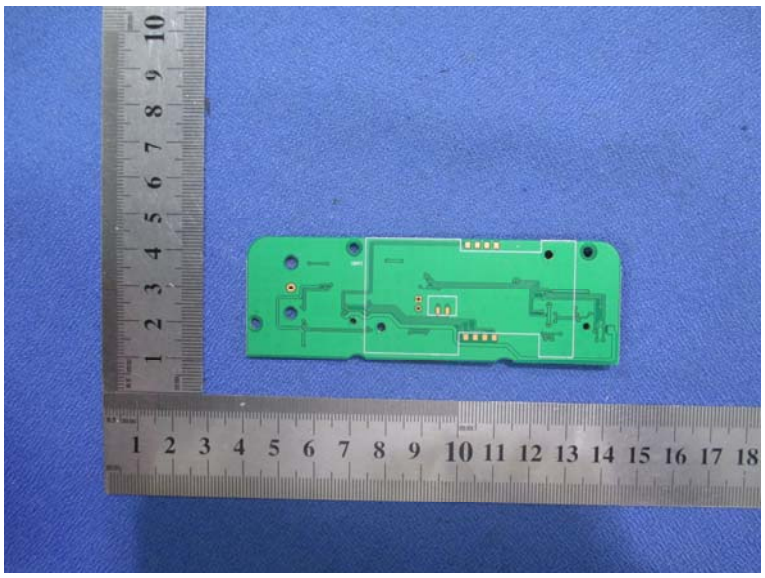


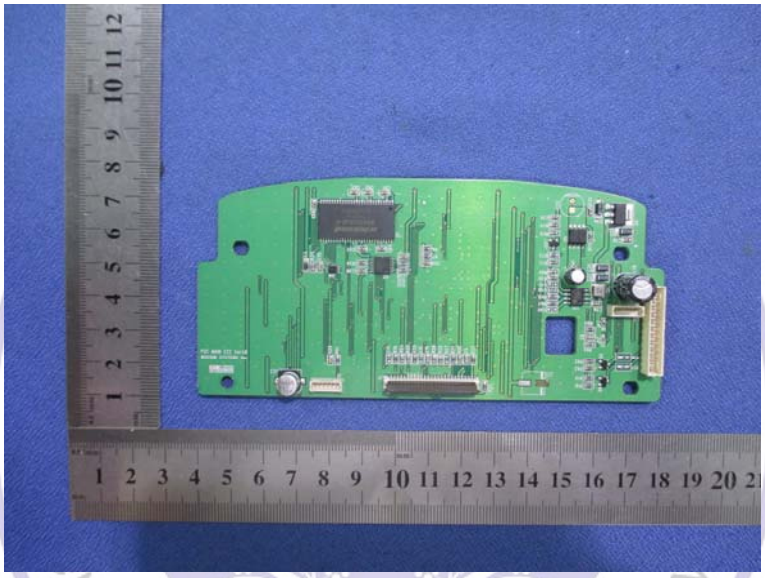
Internal Photos of EUT

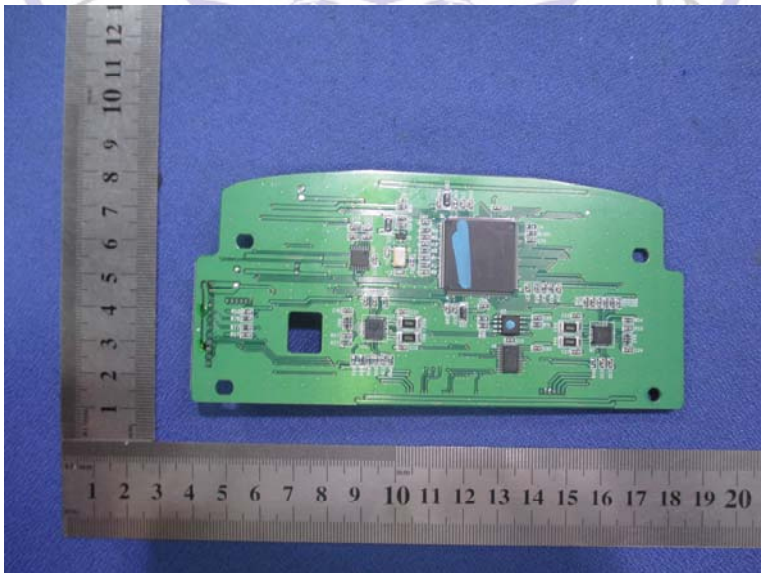


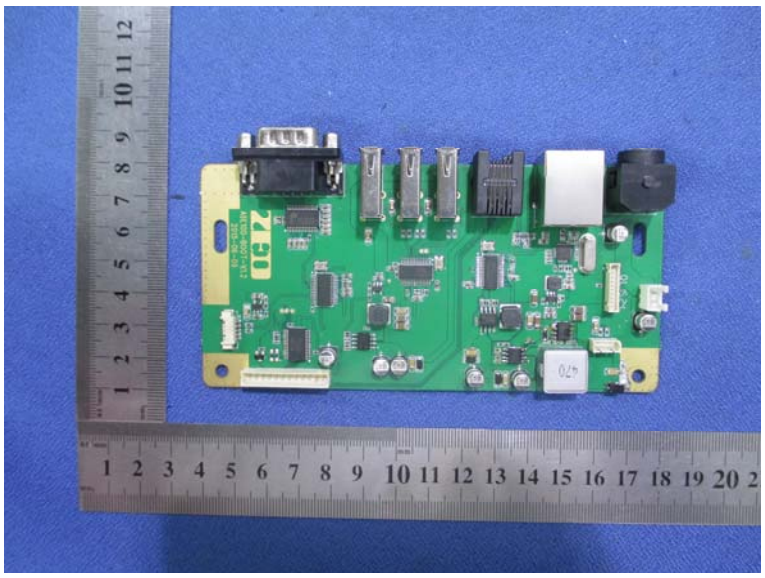


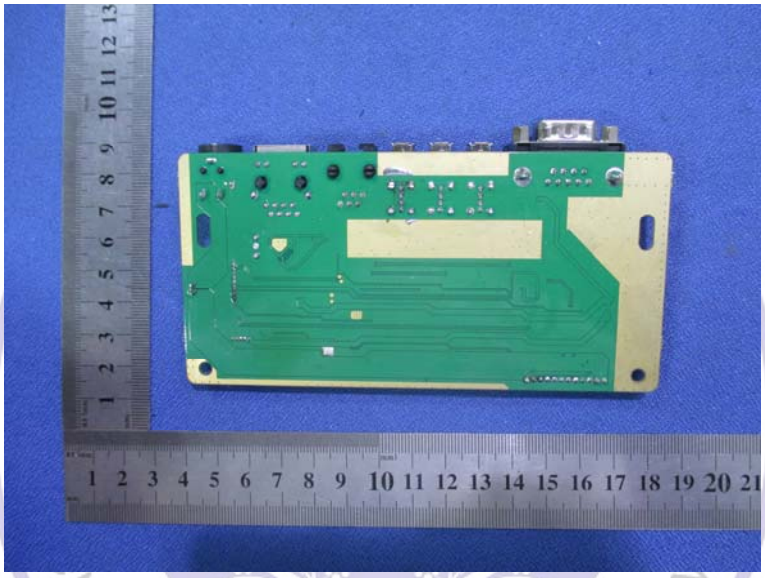


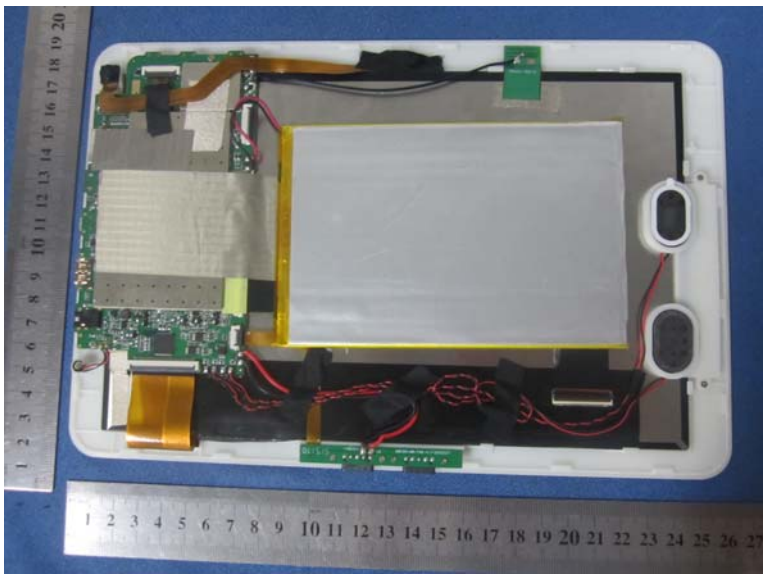


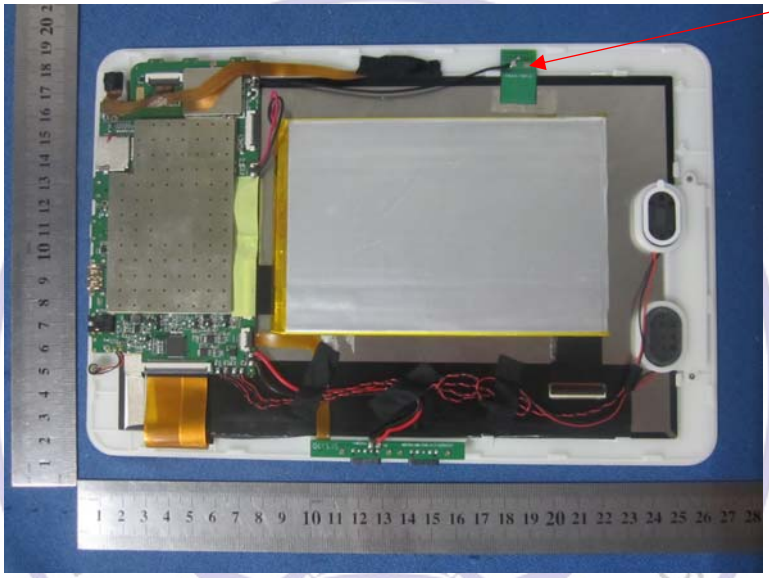


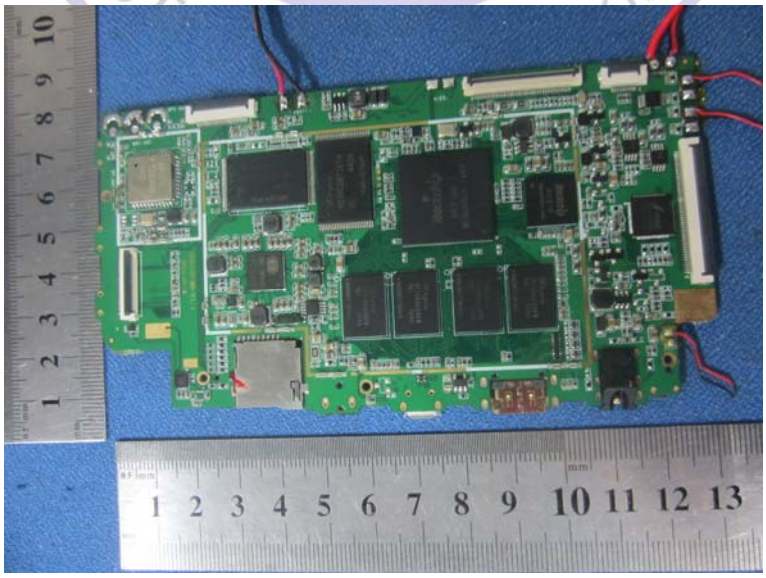


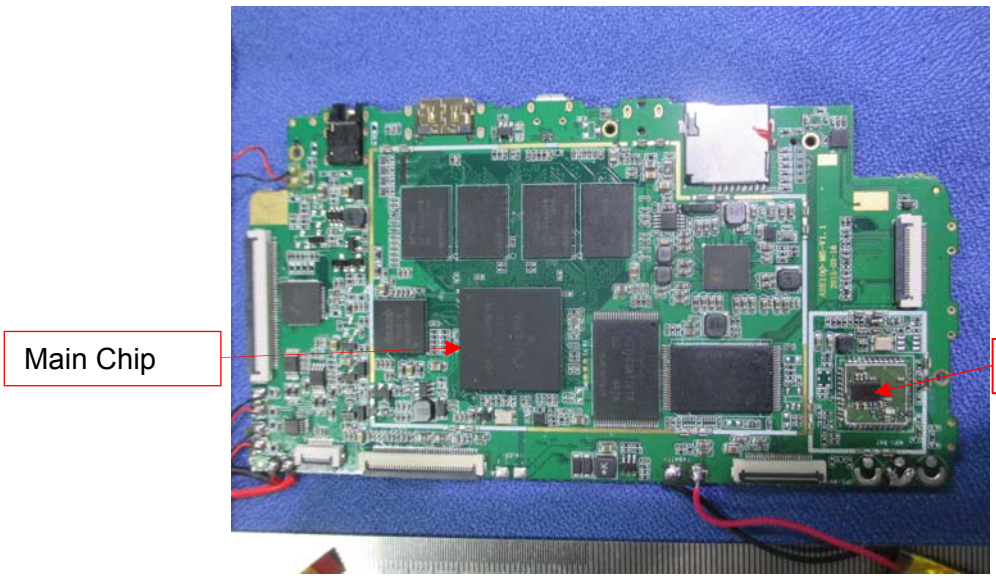


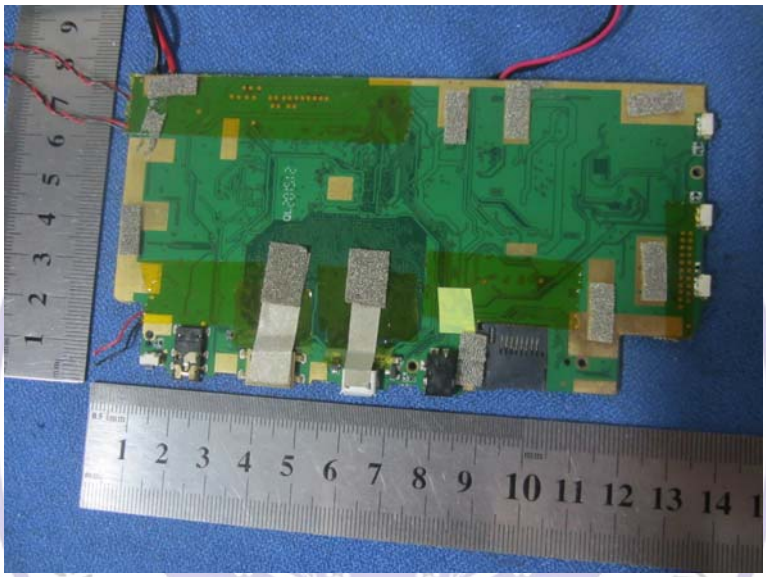


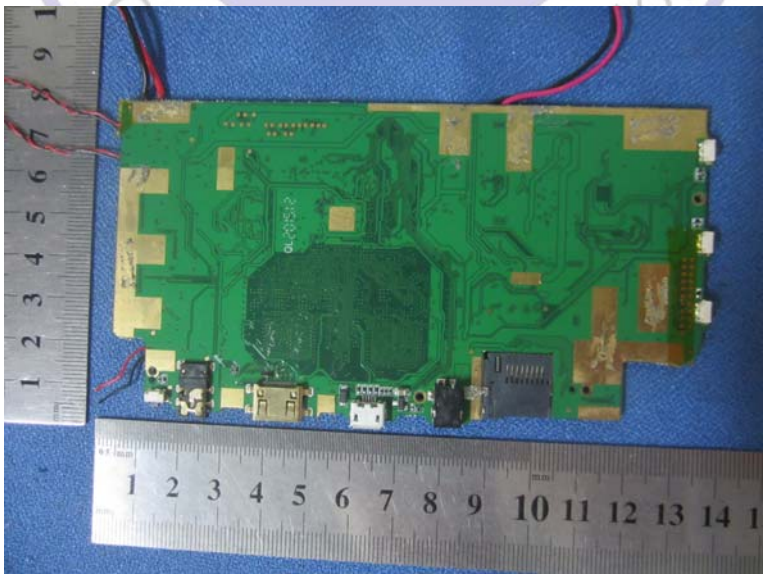


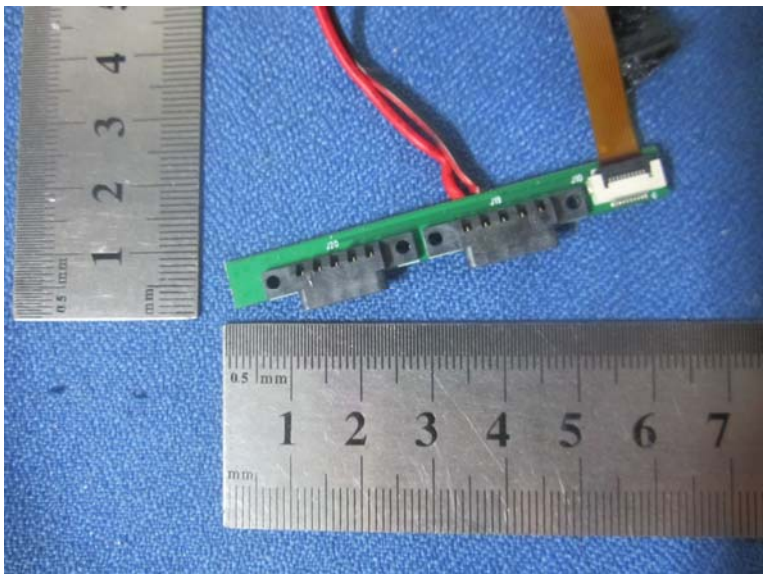

BT/WIFI antenna

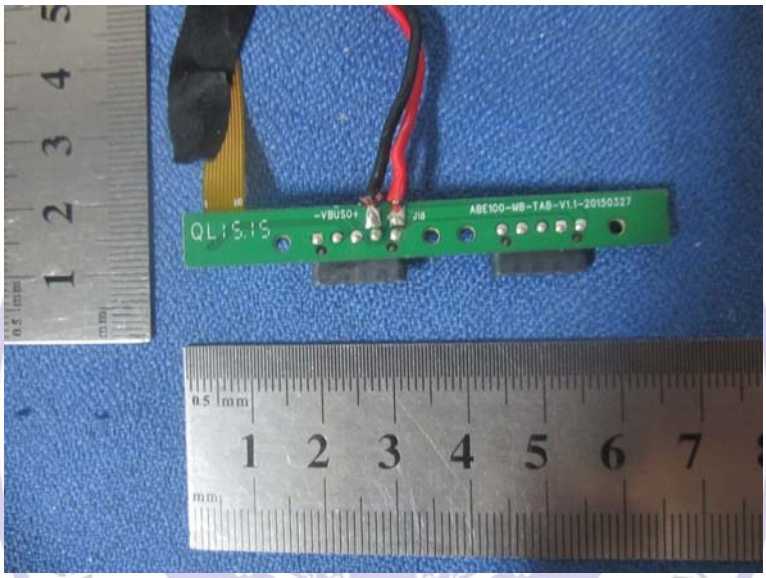


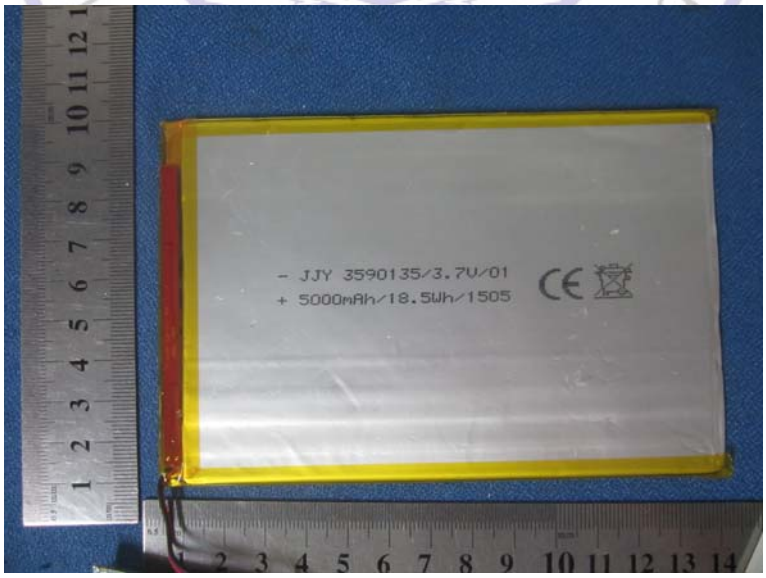

Main Chip
WIFI/BT Chip











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