

FCC CERTIFICATION TEST REPORT

FOR FCC ID:2ADHKSMARTPLUG

Report Reference No..... : 15FAS09016 11

Date of issue..... : 2015-12-15

Testing Laboratory..... : ATT Product Service Co., Ltd.

Address..... : No. 3, ChangLianShan Industrial Park, ChangAn Town,
DongGuan City, GuangDong, China.

Applicant's name : Atmel Corporation

Address..... : 1 Spectrum Pointe Dr. Suite 225 1 Spectrum Pointe Dr. Suite
225

Manufacturer..... : Atmel Semiconductor Technology (Shanghai) Ltd

Test specification:

Test item description..... : SmartPlug

Trade Mark :

Model/Type reference : ATSMARTPLUG-US

Ratings..... : I/P: 110V/240V 50/60H 10A

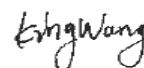
O/P: 110V/240V 50/60H 10A

Responsible Engineer



(Smile Wang/Engineer)

Approved by



(King Wang/EMC Manger)

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TEST REPORT DECLARE

Applicant	:	Atmel Corporation
Address	:	1 Spectrum Pointe Dr. Suite 225 1 Spectrum Pointe Dr. Suite 225
Equipment under Test	:	SmartPlug
Model No	:	ATSMARTPLUG-US
FCC ID	:	2ADHKSMARTPLUG
Manufacturer	:	Atmel Semiconductor Technology (Shanghai) Ltd
Address	:	18F,Block B, Hi-tech Building, No.900 Yishan Road,Shanghai,200233, PRC

Test Standard Used: FCC Rules and Regulations Part 15 Subpart C: 2012

Test procedure used: ANSI C63.10:2013, ANSI C63.4:2014

We Declare:

The equipment described above is tested by ATT Product Service Co., Ltd., Ltd and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and ATT Product Service Co., Ltd., Ltd is assumed of full responsibility for the accuracy and completeness of these tests.

After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above FCC standards.

Report No:	15FAS09016 11		
Date of Test:	2015/12/3~2015/12/12	Date of Report:	2015/12/15

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of ATT Product Service Co., Ltd.

1. Summary of test results

The EUT have been tested according to the applicable standards as referenced below.

Description of Test Item	Standard	Results
6dB Bandwidth and 99% Bandwidth	FCC Part 15: 15.247 KDB558074	PASS
Peak Output Power	FCC Part 15: 15.247 KDB558074	PASS
Power Spectral Density	FCC Part 15: 15.247 KDB558074	PASS
Band Edge	FCC Part 15: 15.247	PASS
Spurious Emission	15.205/15.209	PASS
Power Line Conducted Emission	FCC Part 15: 15.207 ANSI C63.10: 2013 ANSI C63.4:2014	PASS
Antenna requirement	FCC Part 15: 15.203	PASS

2. General test information

2.1. Description of EUT

EUT* Name	:	SmartPlug
Model Number	:	ATSMARTPLUG-US
EUT function description	:	Please reference user manual of this device
Power supply	:	AC120V
Radio Technology	:	IEEE802.11b/g/n
FCC Operation frequency	:	IEEE 802.11b: 2412MHz—2462MHz IEEE 802.11g: 2412MHz—2462MHz IEEE 802.11n HT20: 2412MHz—2462MHz
Modulation	:	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK,BPSK)
Antenna Type	:	Printed antenna, maximum PK gain:-6.16dBi
Date of Receipt	:	2015/12/02
Sample Type	:	Series production

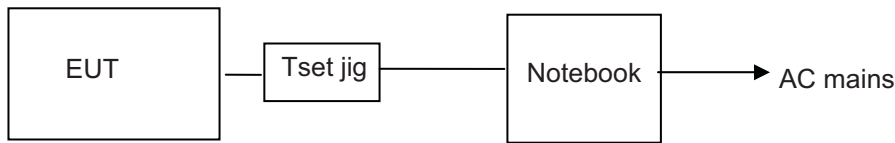
Note1: EUT is the ab.of equipment under test.

Channle information							
CH	Frequency	CH	Frequency	CH	Frequency	CH	Frequency
1	2412	5	2432	9	2452	/	/
2	2417	6	2437	10	2457	/	/
3	2422	7	2442	11	2462	/	/
4	2427	8	2447	/	/	/	/

2.2. Accessories of EUT

Description of Accessories	Manufacturer	Model number or Type	Output.
N/A	N/A	N/A	N/A

2.3. Block diagram of EUT configuration for test



EUT was connected to control to a special test jig provided by manufacturer which has a standard RSS-232 connector to connect to Notebook, and the Notebook will run a special test software “MP_Kit_RTL11n_8188EUS_USB” provided by manufacturer to control EUT work in Continuous TX mode (>98% duty cycle), and select test channel, wireless mode and data rate.

Tested mode, channel, and data rate information			
Mode	data rate (Mbps) (see Note)	Channel	Frequency (MHz)
IEEE 802.11b	1	Low :CH1	2412
	1	Middle: CH6	2437
	1	High: CH11	2462
IEEE 802.11g	6	Low :CH1	2412
	6	Middle: CH6	2437
	6	High: CH11	2462
IEEE 802.11n HT20	MCS 0	Low :CH1	2412
	MCS 0	Middle: CH6	2437
	MCS 0	High: CH11	2462

Note: According exploratory test, EUT will have maximum output power in those data rate, so those data rate were used for all test.

2.4. Test environment conditions

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

Temperature range:	21-25°C
Humidity range:	40-75%
Pressure range:	86-106kPa

2.5. Measurement uncertainty

Test Item	Uncertainty
Uncertainty for Conduction emission test	2.44dB
Uncertainty for Radiation Emission test (150KHz-30MHz)	3.21dB
Uncertainty for Radiation Emission test (30MHz-1GHz)	3.14 dB (Polarize: V)
	3.16 dB (Polarize: H)
Uncertainty for Radiation Emission test (1GHz to 25GHz)	2.08dB(Polarize: V)
	2.56dB (Polarize: H)
Uncertainty for radio frequency	1×10-9
Uncertainty for conducted RF Power	0.65dB

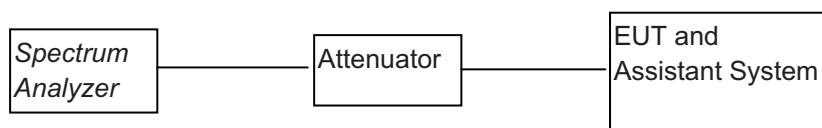
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3. 6dB Bandwidth and 99% Bandwidth

3.1. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum analyzer	R&S	FSU	1166.1660.26	2014/12/19	1 Year
2	Attenuator	Mini-Circuits	BW-S10W2	101109	2014/12/19	1 Year
3	RF Cable	Micable	C10-01-01-1	100309	2014/12/19	1 Year

3.2. Block diagram of test setup



3.3. Limits

For direct sequence systems, the minimum 6dB bandwidth shall be at least 500 KHz

3.4. Test Procedure

- (1) Configure EUT and assistant system according clause 2.4 and 3.2
- (2) Connect EUT's antenna output to spectrum analyzer by RF cable.
- (3) Configure EUT work in test mode as stated in clause 2.4.
- (4) Set the spectrum analyzer as follows:

RBW:	100KHz
VBW:	300KHz
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold

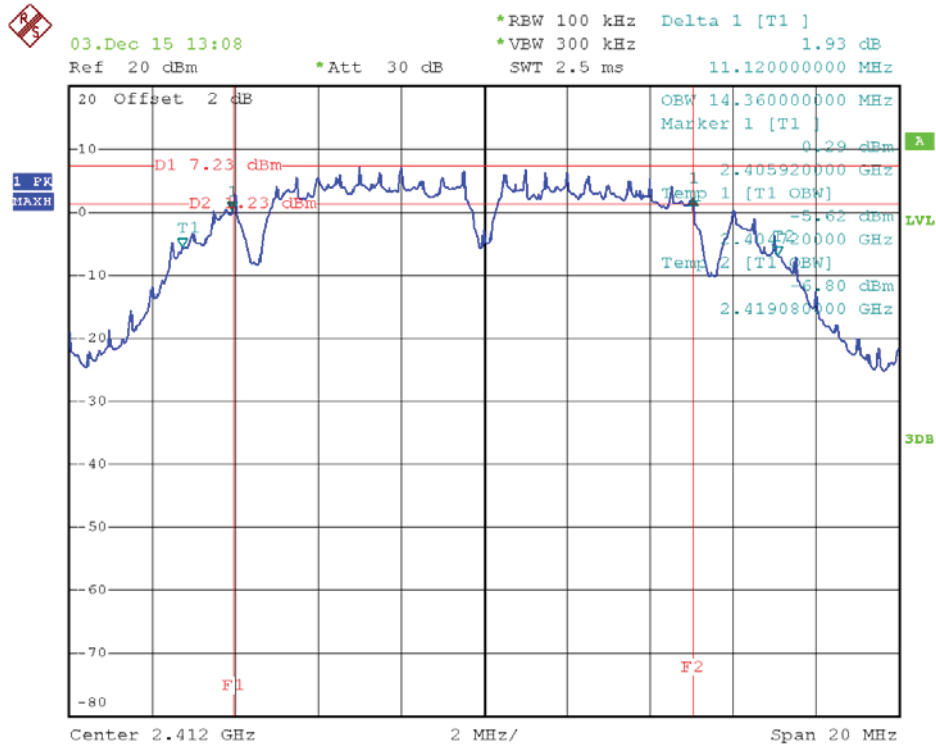
- (5) Allow the trace to stabilize, measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

3.5. Test Result

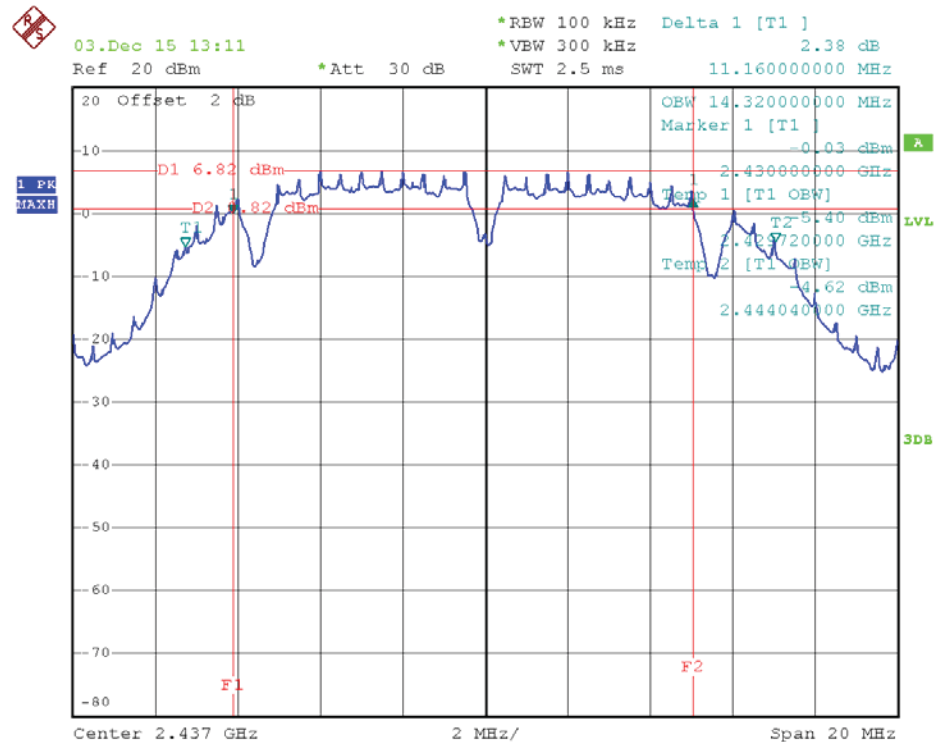
EUT: SmartPlug M/N: ATSMARTPLUG-US			
EUT Set Mode	CH or Frequency	6 dB bandwidth	99% dB bandwidth
		Result (MHz)	Result (MHz)
11b	CH1	11.12	14.36
	CH6	11.16	14.32
	CH11	11.04	14.32
11g	CH1	16.36	16.52
	CH6	16.36	16.48
	CH11	16.32	16.52
11n HT 20	CH1	16.76	17.68
	CH6	17.08	17.68
	CH11	17.2	17.72
Limit: >500KHz			Conclusion: PASS

3.6. Original test data

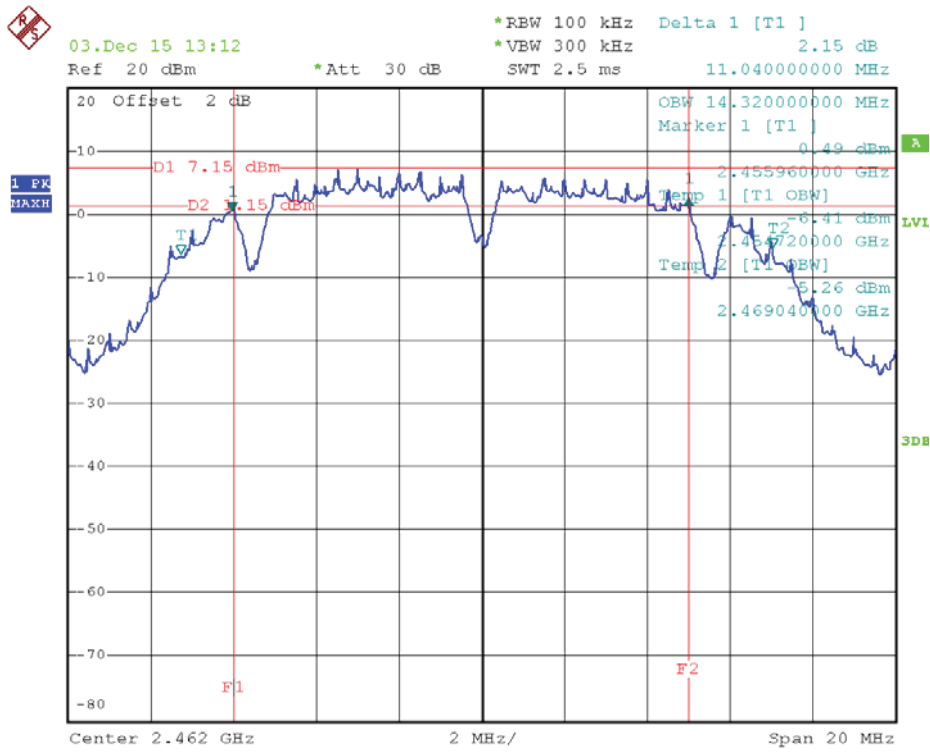
802.11B CH1



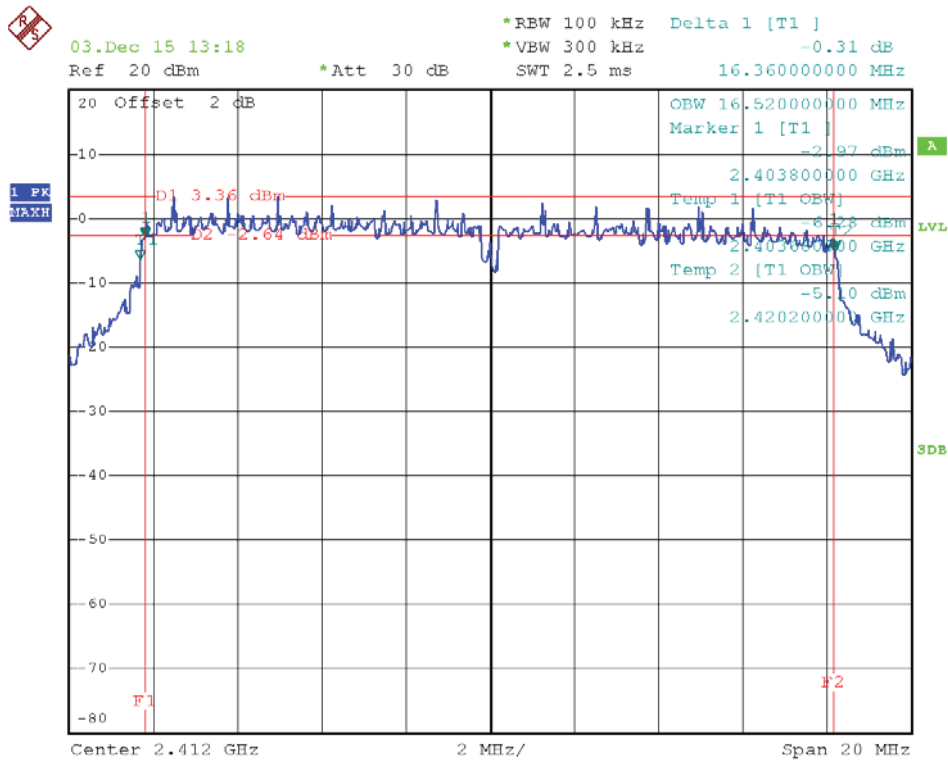
802.11B CH6



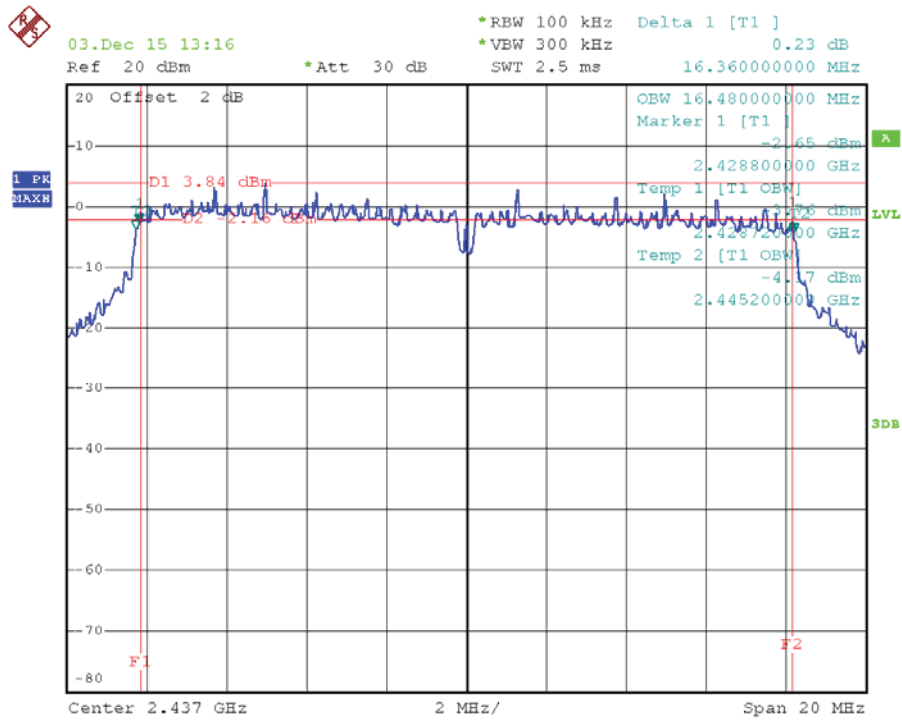
802.11B CH11



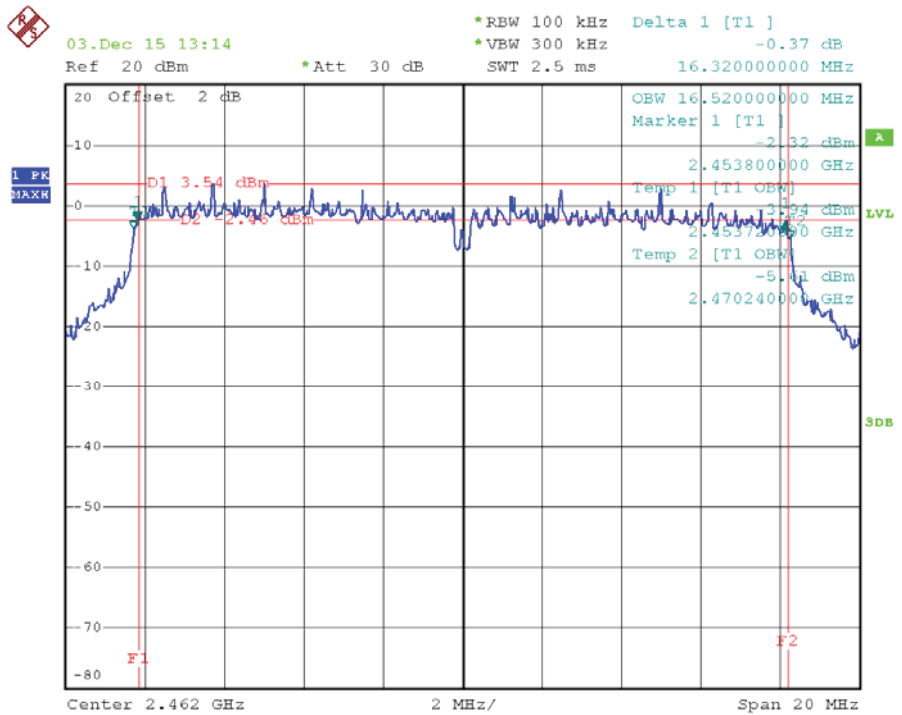
802.11G CH1



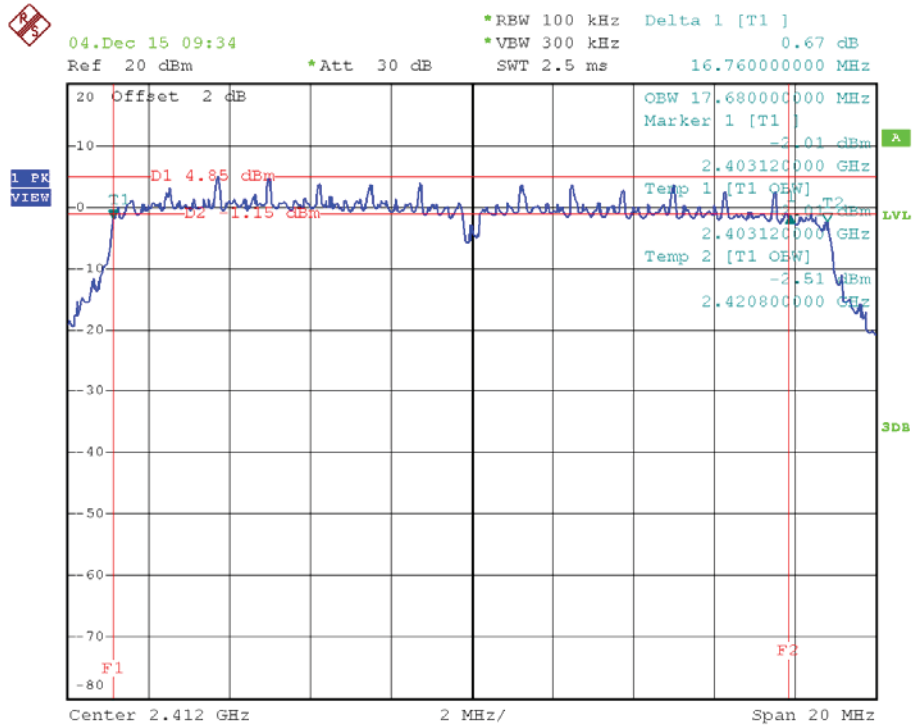
802.11G CH6



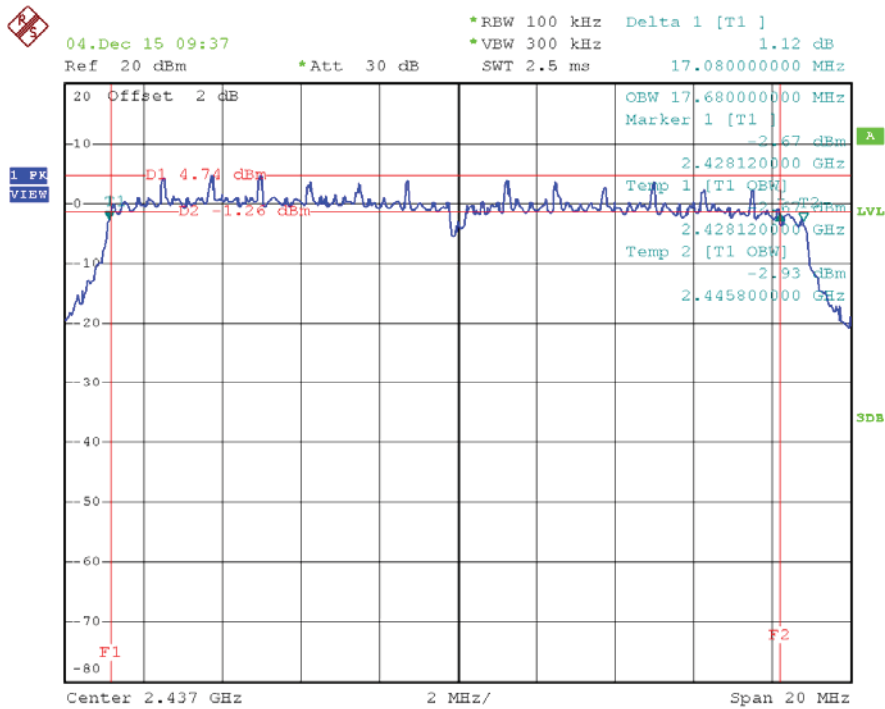
802.11G CH11



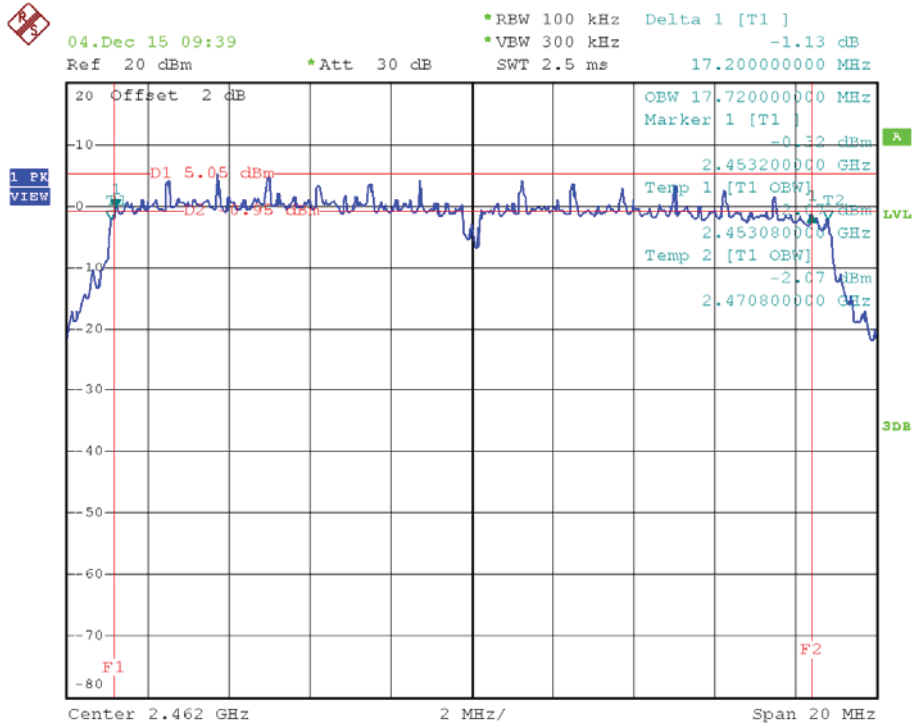
802.11N HT20 CH1



802.11N HT20 CH6



802.11N HT20 CH11

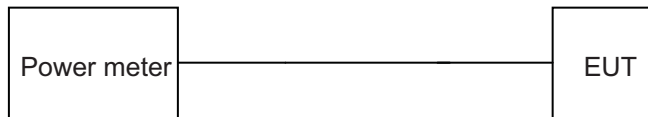


4. Conducted Peak Output Power

4.1. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Power meter	Agilent	E4417A	MY45100473	2014/12/19	1 Year
2	Wireband Power sensor	Agilent	E4427A	MY5100041	2014/12/19	1 Year

4.2. Block diagram of test setup



4.3. Limits

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz bands: 1 Watt. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.4. Test Procedure

- (1) Place the EUT on a bench and set it in transmitting mode.
- (2) A wide band power meter with a matched thermocouple detector was used to directly measure the output power from the RF output port of the EUT in continuously transmitting mode.
- (3) The measurement shall be repeated at the lowest, the middle, and the highest channel of the stated frequency range.

4.5. Test Result

EUT: SmartPlug M/N: ATSMARTPLUG-US				
EUT Set Mode	Soft power set	Data Rate (Mbps)	CH	Result(dBm)
				Peak
11b	53	1	CH1	18.26
			CH6	18.14
			CH11	18.23
11g	53	6	CH1	21.63
			CH6	22.86
			CH11	21.32
11n HT20	53	MCS 0	CH1	21.55
			CH6	21.82
			CH11	22.14
Limit: 30dBm (PK power)			Conclusion: PASS	

5. Power Spectral Density

5.1 Test equipment

Same with 3.1

5.2 Block diagram of test setup

Same with 3.2

5.3 Limits

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

5.4 Test Procedure

- (1) Configure EUT and assistant system according clause 2.4 and 5.2
- (2) Connect EUT's antenna output to spectrum analyzer by RF cable.
- (3) Configure EUT work in test mode as stated in clause 2.4.
- (4) Set the spectrum analyzer as follows:

Center frequency	DTS Channel center frequency
RBW:	$3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
VBW:	$\geq 3\text{RBW}$
Span	1.5times the DTS bandwidth
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold

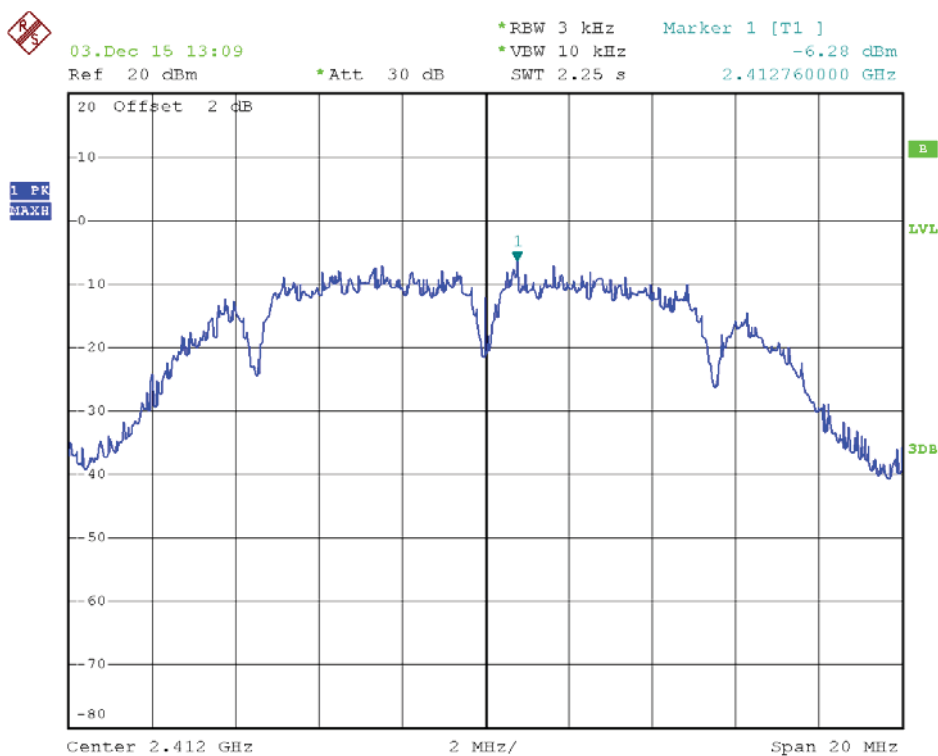
- (5) Allow the trace to stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
- (6) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

5.5 Test Result

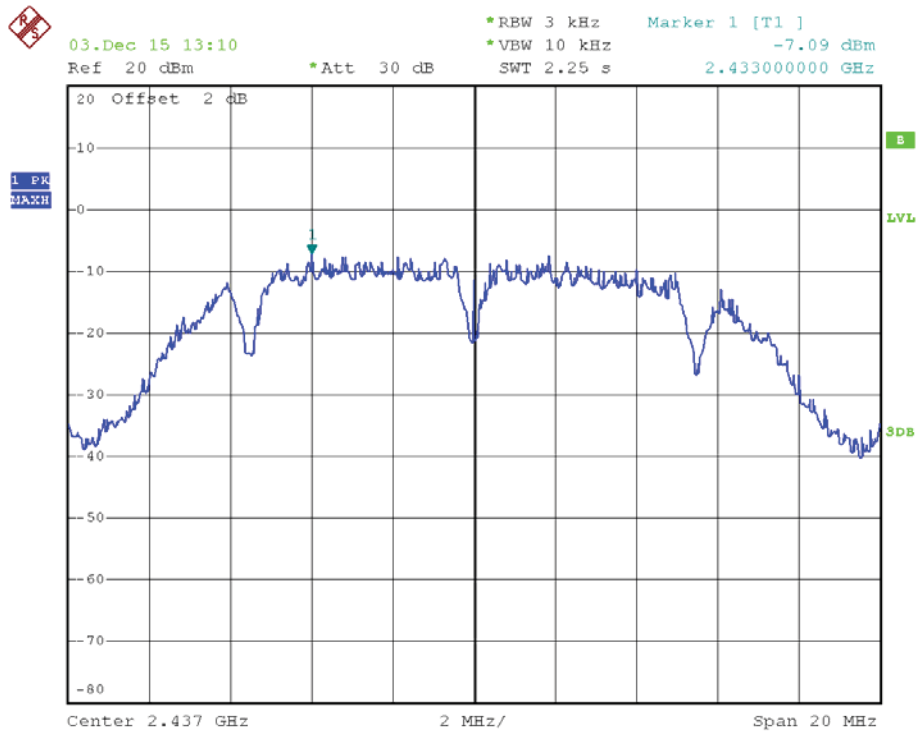
EUT: SmartPlug M/N: ATSMARTPLUG-US					
EUT Set Mode	CH or Frequency	Result	EUT Set Mode	CH or Frequency	Result
11b	CH1	-6.28dBm	11n HT 20	CH1	-9.39dBm
	CH6	-7.09dBm		CH6	-8.87dBm
	CH11	-6.67dBm		CH11	-9.40dBm
11g	CH1	-9.02dBm			
	CH6	-9.91dBm			
	CH11	-9.14dBm			
Limit: <8dBm/3KHz					

5.6 Original test data

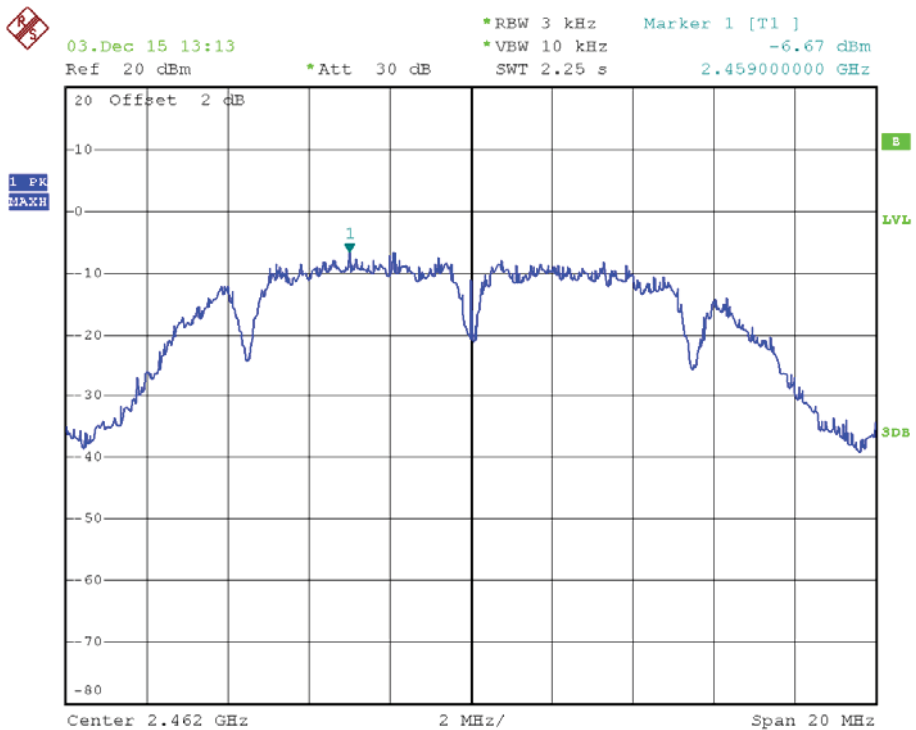
802.11B CH1



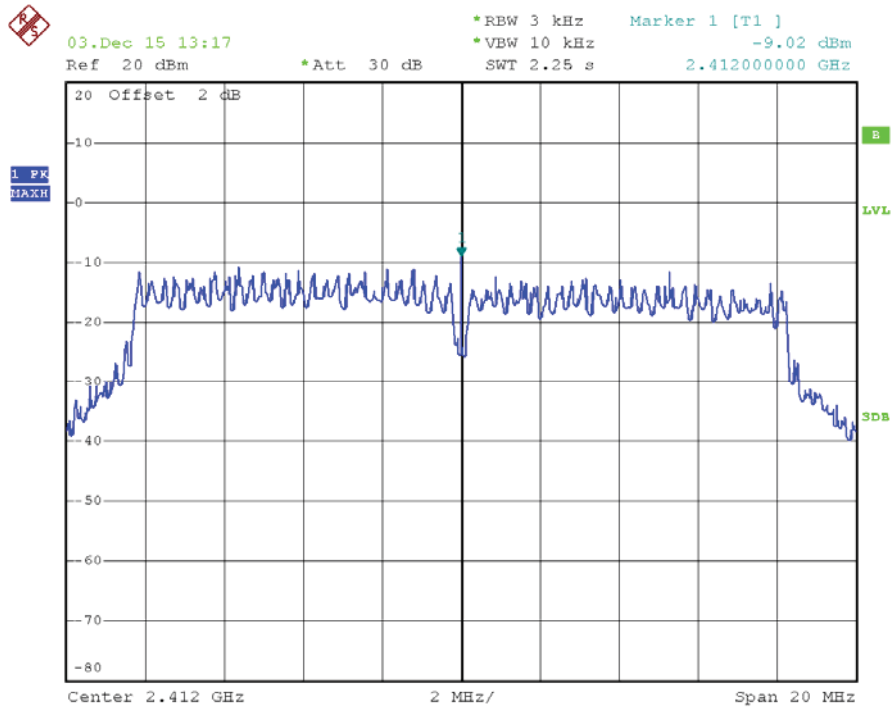
802.11B CH6



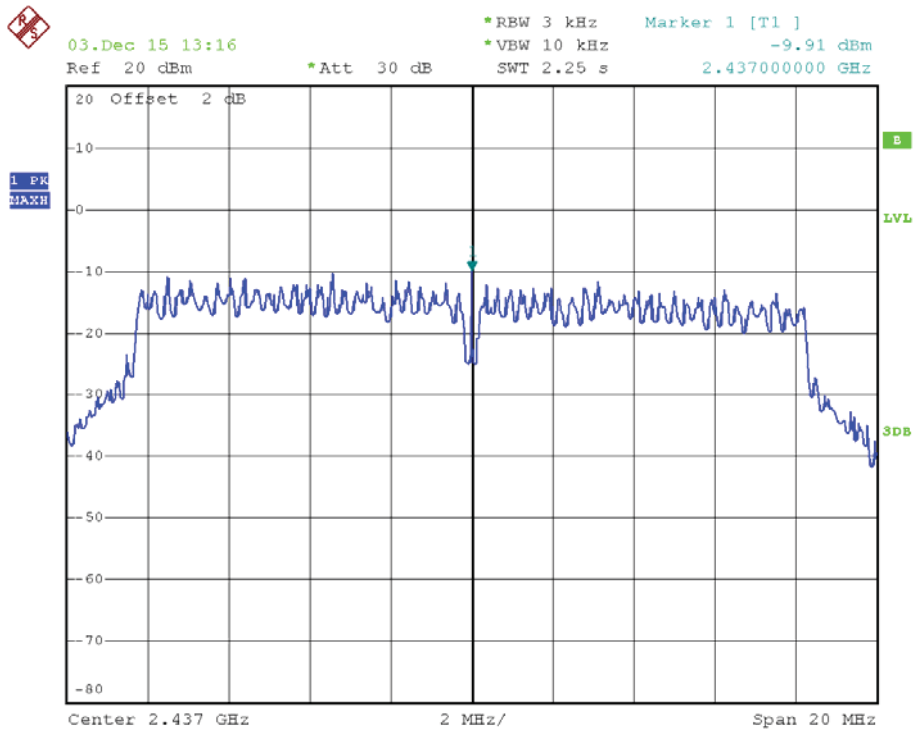
802.11B CH11



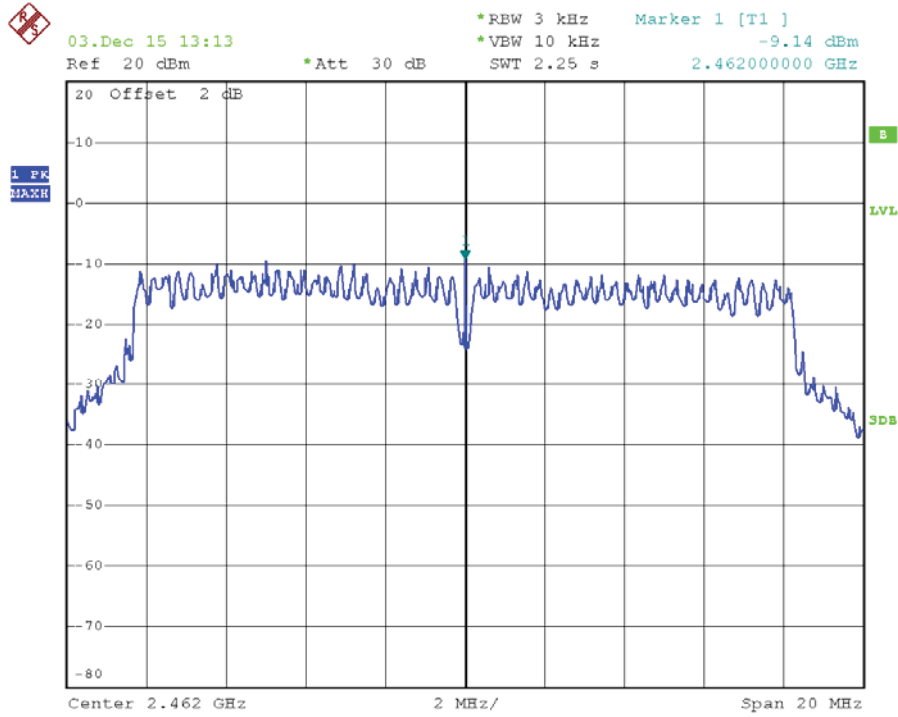
802.11G CH1



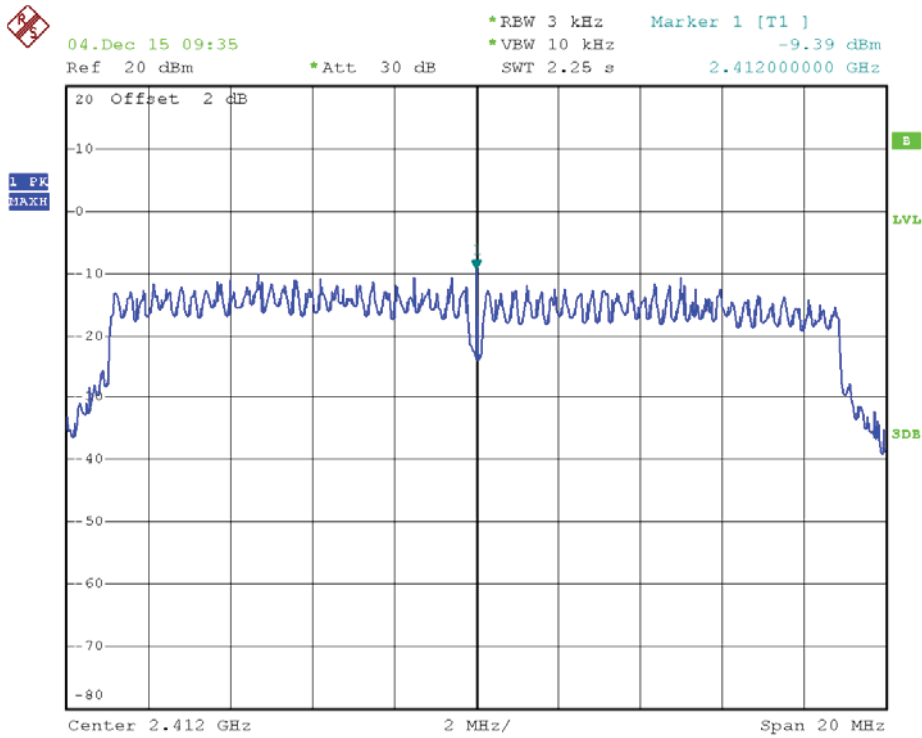
802.11G CH6



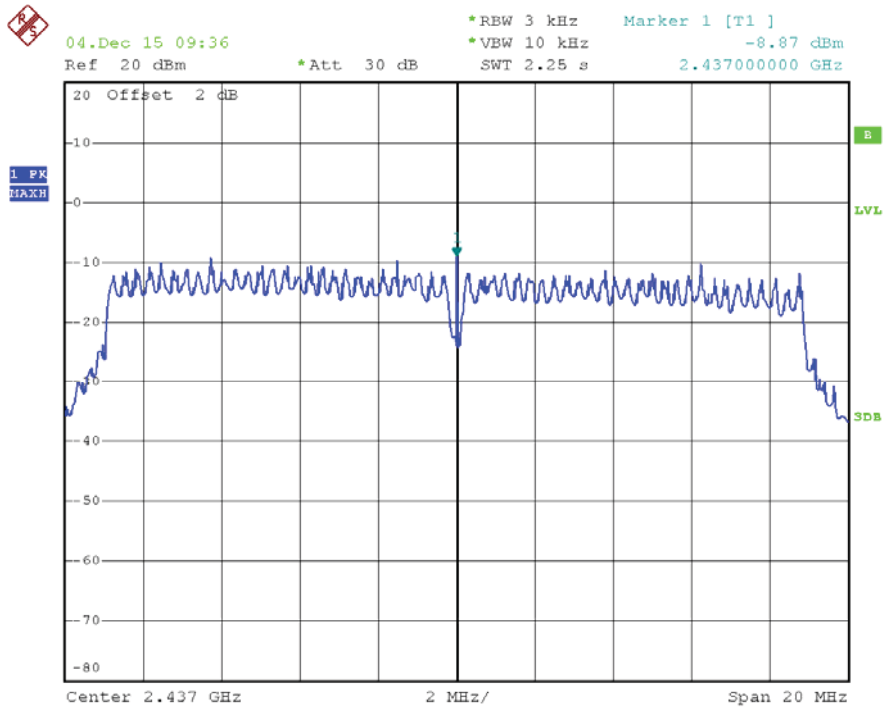
802.11G CH11



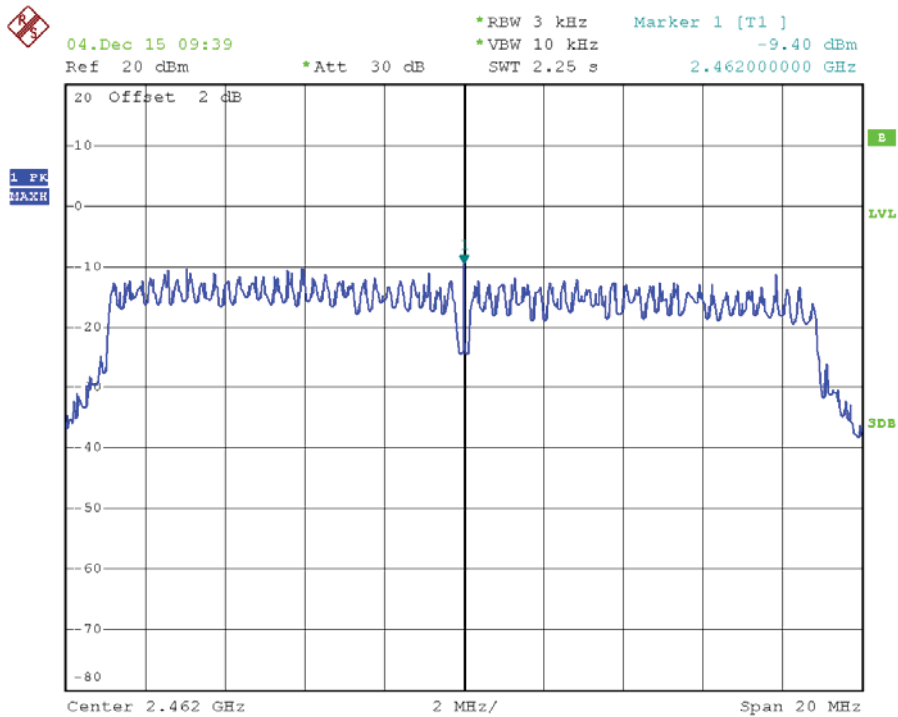
802.11N HT20 CH1



802.11N HT20 CH6



802.11N HT20 CH11



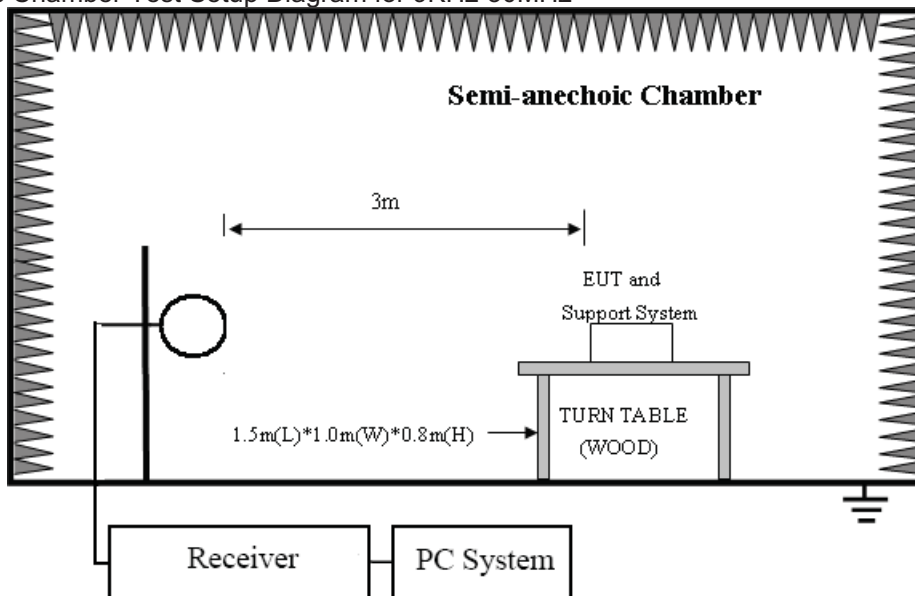
6 Emissions in restricted frequency bands

6.1 Test equipment

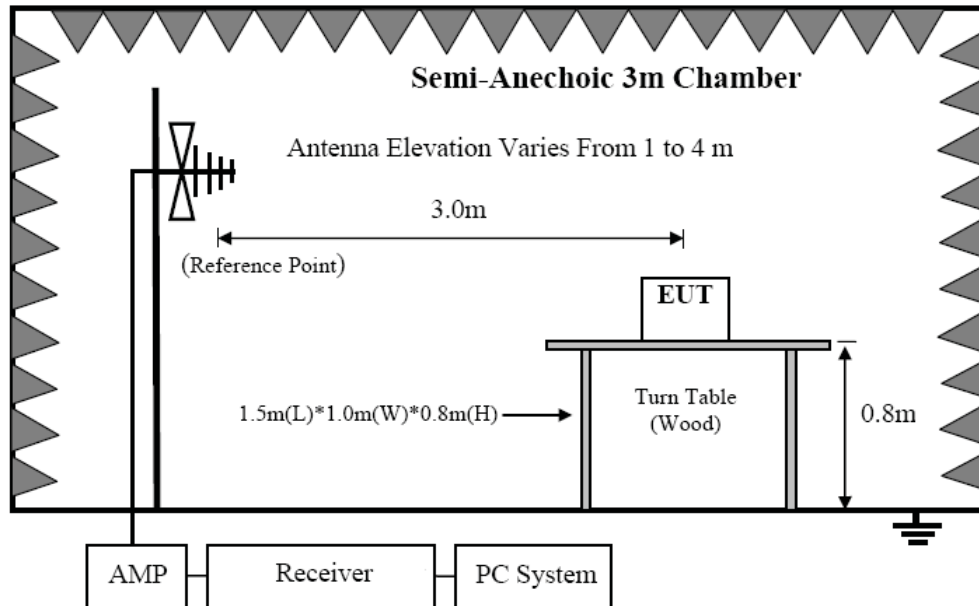
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	EMI Test Receiver	R&S	ESU8	100316	2014/12/19	1 Year
2	Spectrum analyzer	R&S	FSU	1166.1660.26	2014/12/19	1 Year
3	Loop antenna	TESEQ	HLA6120	20129	2014/12/19	1 Year
4	Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	2014/12/19	1 Year
5	Double Ridged Horn Antenna	R&S	HF907	100276	2014/12/19	1 Year
6	Horn Antenna	EMCO	3116	00060095	2014/12/19	1 Year
7	Pre-amplifier	A.H.	PAM-1840VH	562	2014/12/19	1 Year
8	RF Cable	R&S	R01	10403	2014/12/19	1 Year
9	RF Cable	R&S	R02	10512	2014/12/19	1 Year

6.2 Block diagram of test setup

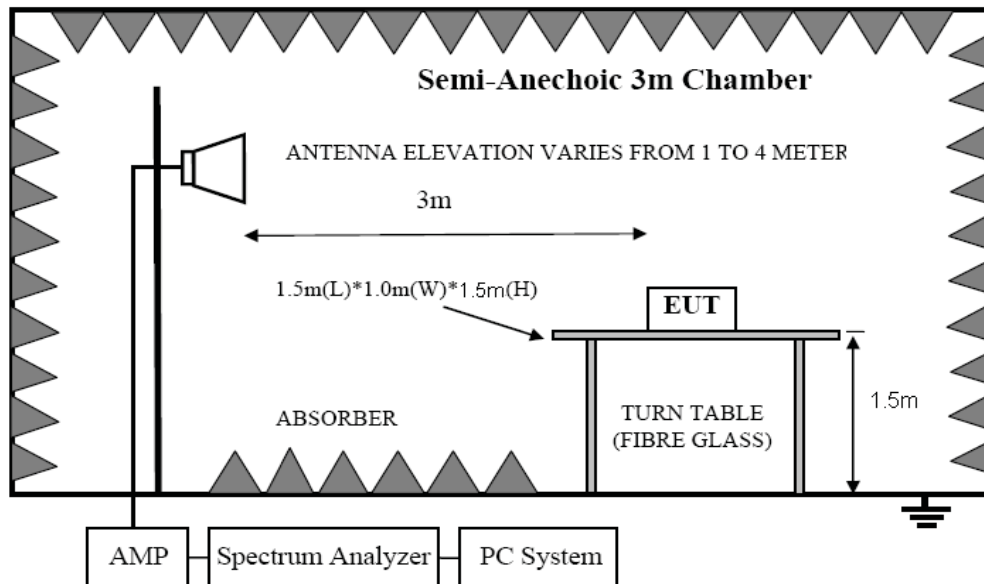
In 3m Anechoic Chamber Test Setup Diagram for 9KHz-30MHz



In 3m Anechoic Chamber Test Setup Diagram for 30MHz-1GHz



In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP.

6.3 Limit

8.3.1 FCC 15.205 Restricted frequency band

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

8.3.2 FCC 15.209 Limit.

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
0.009 ~ 0.490	300	2400/F(KHz)	67.6-20log(F)
0.490 ~ 1.705	30	24000/F(KHz)	87.6-20log(F)
1.705 ~ 30.0	30	30	29.54
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Note: (1)The emission limits shown in the above table are based on measurements employing a CISPR QP detector except for the frequency bands 9-90KHz, 110-490KHz and above 1000MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

(2) At frequencies below 30MHz, measurement may be performed at a distance closer then that specified, and the limit at closer measurement distance can be extrapolated by below formula:

$$\text{Limit}_{3m}(\text{dBuV/m}) = \text{Limit}_{30m}(\text{dBuV/m}) + 40\text{Log}(30m/3m)$$

8.3.3 Limit for this EUT

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

6.4 Test Procedure

- (1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.
- (2) Setup EUT and assistant system according clause 2.4 and 7.2
- (3) Test antenna was located 3m from the EUT on an adjustable mast, and the antenna used as below table.

Test frequency range	Test antenna used
9KHz-30MHz	Active Loop antenna
30MHz-1GHz	Trilog Broadband Antenna
1GHz-18GHz	Double Ridged Horn Antenna(1GHz-18GHz)
18GHz-40GHz	Horn Antenna(18GHz-40GHz)

According ANSI C63.10:2013 clause 6.4.4.2 and 6.5.3, for measurements below 30 MHz, the loop antenna was positioned with its plane vertical from the EUT and rotated about its vertical axis for maximum response at each azimuth position around the EUT. And the loop antenna also be positioned with its plane horizontal at the specified distance from the EUT. The center of the loop is 1 m above the ground. for measurement above 30MHz, the Trilog Broadband Antenna or Horn Antenna was located 3m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

- (4) Below pre-scan procedure was first performed in order to find prominent frequency spectrum radiated emissions from 9KHz to 25GHz:
 - (a) Scanning the peak frequency spectrum with the antenna specified in step (3), and the EUT was rotated 360 degree, the antenna height was varied from 1m to 4m(Except loop antenna, it's fixed 1m above ground.)
 - (b) Change work frequency or channel of device if practicable.
 - (c) Change modulation type of device if practicable.
 - (d) Change power supply range from 85% to 115% of the rated supply voltage
 - (e) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions.

Spectrum frequency from 9KHz to 25GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 18GHz to 25GHz, so below final test was performed with frequency range from 9KHz to 18GHz.

- (5) For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 2009 on Radiated Emission test.
- (6) The emissions from 9KHz to 1GHz were measured based on CISPR QP detector except for the frequency bands 9-90KHz, 110-490KHz, for emissions from 9KHz-90KHz,110KHz-490KHz and above 1GHz were measured based on average detector, for emissions above 1GHz, peak emissions also be measured and need comply with Peak limit.
- (7) The emissions from 9KHz to 1GHz, QP or average values were measured with EMI receiver with below RBW

Frequency band	RBW
9KHz-150KHz	200Hz
150KHz-30MHz	9KHz
30MHz-1GHz	120KHz

- (8) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RBW is set at 1MHz, VBW is set at 10Hz for Average measure(according ANSI C63.10:2013 clause 4.2.3.2.3 procedure for average measure). Peak detector is used for Peak and AV measurement both.

6.5 Test result

PASS. (See below detailed test result)

All the emissions except fundamental emission from 9KHz to 25GHz were comply with 15.209 limit.

Note1: According exploratory test no any obvious emission were detected from 9KHz to 30MHz and 18GHz to 25GHz, so the final test was performed with frequency range from 30MHz to 18GHz and recorded in below.

Note2: For emissions below 1GHz, according exploratory explorer test, when change Tx mode and channel, have no distinct influence on emissions level, so for emissions below 1GHz, the final test was only performed with EUT working in 11b, Tx CH6 mode.

Note3: For emissions above 1GHz. according exploratory explorer test, when change adapter no distinct influence on emissions level, so for emissions above 1GHz, the final test was only performed with EUT working in adapter (Ktec). If peak results comply with AV limit, AV Result is deemed to comply with AV limit.

Note4: For below test data, when the limit tabular marked "/" means this frequency point is the fundamental emission and no need comply with this limit.

Test Site : 3m Chamber
Test Date : 2015-12-08
EUT : SmartPlug
Power Supply : AC 120V
Condition : Temp:24.5'C,Humi:55%
Tested By : Smile Wang
Model Number : ATSMARTPLUG-US
Test Mode : Tx mode 802.11B
Antenna/Distance : 3m

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	FCC 15.247	
	Reading (dBµV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)				Limit (dBµV/m)	Margin (dB)
Low Channel (2412)									
2412	70.68	PK	H	28	3.65	0	102.33	N/A	N/A
2412	60.05	AV	H	28	3.65	0	91.7	N/A	N/A
2412	71.28	PK	V	28	3.65	0	102.93	N/A	N/A
2412	63.96	AV	V	28	3.65	0	95.61	N/A	N/A
2390	25.31	PK	H	28.4	3.57	0	57.28	74	-16.72
2390	15.18	AV	H	28.4	3.57	0	47.15	54	-6.85
2390	26.72	PK	V	28.4	3.57	0	58.69	74	-15.31
2390	17.25	AV	V	28.4	3.57	0	49.22	54	-4.78
4824	43.69	PK	H	32.3	5.91	31.78	50.12	74	-23.88
4824	36.93	AV	H	32.3	5.91	31.78	43.36	54	-10.64
4824	45.82	PK	V	32.3	5.91	31.78	52.25	74	-21.75
4824	38.76	AV	V	32.3	5.91	31.78	45.19	54	-8.81
7236	42.16	PK	H	36.3	6.34	30.97	53.83	74	-20.17
7236	36.58	AV	H	36.3	6.34	30.97	48.25	54	-5.75
7236	43.18	PK	V	36.3	6.34	30.97	54.85	74	-19.15
7236	35.96	AV	V	36.3	6.34	30.97	47.63	54	-6.37
9648	42.98	PK	H	37.9	8.01	30.86	58.03	74	-15.97
9648	36.47	AV	H	37.9	8.01	30.86	51.52	54	-2.48
9648	43.88	PK	V	37.9	8.01	30.86	58.93	74	-15.07
9648	37.52	AV	V	37.9	8.01	30.86	52.57	54	-1.43
520.88	40.18	QP	H	12.8	2.63	27.2	28.41	46	-17.59
199.29	45	QP	V	12.8	2.63	27.2	33.23	46	-12.77
Middle Channel (2437)									
2437	72.36	PK	H	28.7	3.74	0	104.8	N/A	N/A
2437	65.72	AV	H	28.7	3.74	0	98.16	N/A	N/A
2437	73.29	PK	V	28.7	3.74	0	105.73	N/A	N/A
2437	66.58	AV	V	28.7	3.74	0	99.02	N/A	N/A
4874	41.35	PK	H	32.6	6.15	31.78	48.32	74	-25.68
4874	36.72	AV	H	32.6	6.15	31.78	43.69	54	-10.31

4874	42.16	PK	V	32.6	6.15	31.78	49.13	74	-24.87
4874	34.57	AV	V	32.6	6.15	31.78	41.54	54	-12.46
7311	39.32	PK	H	36.7	6.22	30.97	51.27	74	-22.73
7311	32.56	AV	H	36.7	6.22	30.97	44.51	54	-9.49
7311	40.19	PK	V	36.7	6.22	30.97	52.14	74	-21.86
7311	34.96	AV	V	36.7	6.22	30.97	46.91	54	-7.09
9748	38.29	PK	H	38.2	8.11	30.86	53.74	74	-20.26
9748	32.76	AV	H	38.2	8.11	30.86	48.21	54	-5.79
9748	39.16	PK	V	38.2	8.11	30.86	54.61	74	-19.39
9748	33.98	AV	V	38.2	8.11	30.86	49.43	54	-4.57
520.88	40.22	QP	H	12.8	2.63	27.2	28.45	46	-17.55
199.29	45.19	QP	V	12.8	2.63	27.2	33.42	46	-12.58
High Channel (2462)									
2462	70.58	PK	H	29.1	3.81	0	103.49	N/A	N/A
2462	65.33	AV	H	29.1	3.81	0	98.24	N/A	N/A
2462	71.46	PK	V	29.1	3.81	0	104.37	N/A	N/A
2462	64.39	AV	V	29.1	3.81	0	97.3	N/A	N/A
2483.5	24.39	PK	H	28.7	3.62	0	56.71	74	-17.29
2483.5	17.26	AV	H	28.7	3.62	0	49.58	54	-4.42
2483.5	25.34	PK	V	28.7	3.62	0	57.66	74	-16.34
2483.5	17.98	AV	V	28.7	3.62	0	50.3	54	-3.7
4924	41.32	PK	H	32.8	6.17	31.78	48.51	74	-25.49
4924	36.57	AV	H	32.8	6.17	31.78	43.76	54	-10.24
4924	42.64	PK	V	32.8	6.17	31.78	49.83	74	-24.17
4924	36.79	AV	V	32.8	6.17	31.78	43.98	54	-10.02
7386	38.36	PK	H	36.8	6.26	30.97	50.45	74	-23.55
7386	32.09	AV	H	36.8	6.26	30.97	44.18	54	-9.82
7386	38.71	PK	V	36.8	6.26	30.97	50.8	74	-23.2
7386	31.09	AV	V	36.8	6.26	30.97	43.18	54	-10.82
9848	37.68	PK	H	38.4	8.17	30.86	53.39	74	-20.61
9848	28.16	AV	H	38.4	8.17	30.86	43.87	54	-10.13
9848	38.02	PK	V	38.4	8.17	30.86	53.73	74	-20.27
9848	28.31	AV	V	38.4	8.17	30.86	44.02	54	-9.98
520.88	40.18	QP	H	12.8	2.63	27.2	28.41	46	-17.59
199.29	45	QP	V	12.8	2.63	27.2	33.23	46	-12.77

Test Site : 3m Chamber
Test Date : 2015-12-08
EUT : SmartPlug
Power Supply : AC 120V
Condition : Temp:24.5°C,Humi:55%
Tested By : Smile Wang
Model Number : ATSMARTPLUG-US
Test Mode : Tx mode 802.11G
Antenna/Distance : 3m

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	FCC 15.247	
	Reading (dBµV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)				Limit (dBµV/m)	Margin (dB)
Low Channel (2412)									
2412	68.19	PK	H	28	3.65	0	99.84	N/A	N/A
2412	55.16	AV	H	28	3.65	0	86.81	N/A	N/A
2412	69.36	PK	V	28	3.65	0	101.01	N/A	N/A
2412	54.79	AV	V	28	3.65	0	86.44	N/A	N/A
2390	26.59	PK	H	28.4	3.57	0	58.56	74	-15.44
2390	15.97	AV	H	28.4	3.57	0	47.94	54	-6.06
2390	27.36	PK	V	28.4	3.57	0	59.33	74	-14.67
2390	16.25	AV	V	28.4	3.57	0	48.22	54	-5.78
4824	39.16	PK	H	32.3	5.91	31.78	45.59	74	-28.41
4824	26.72	AV	H	32.3	5.91	31.78	33.15	54	-20.85
4824	40.36	PK	V	32.3	5.91	31.78	46.79	74	-27.21
4824	38.76	AV	V	32.3	5.91	31.78	45.19	54	-8.81
7236	38.69	PK	H	36.3	6.34	30.97	50.36	74	-23.64
7236	26.57	AV	H	36.3	6.34	30.97	38.24	54	-15.76
7236	38.96	PK	V	36.3	6.34	30.97	50.63	74	-23.37
7236	26.08	AV	V	36.3	6.34	30.97	37.75	54	-16.25
9648	37.82	PK	H	37.9	8.01	30.86	52.87	74	-21.13
9648	25.24	AV	H	37.9	8.01	30.86	40.29	54	-13.71
9648	37.63	PK	V	37.9	8.01	30.86	52.68	74	-21.32
9648	26.16	AV	V	37.9	8.01	30.86	41.21	54	-12.79
520.88	41.26	QP	H	12.8	2.63	27.2	29.49	46	-16.51
199.29	45.03	QP	V	12.8	2.63	27.2	33.26	46	-12.74
Middle Channel (2437)									
2437	70.15	PK	H	28.7	3.74	0	102.59	N/A	N/A
2437	58.36	AV	H	28.7	3.74	0	90.8	N/A	N/A
2437	71.06	PK	V	28.7	3.74	0	103.5	N/A	N/A
2437	58.93	AV	V	28.7	3.74	0	91.37	N/A	N/A
4874	40.36	PK	H	32.6	6.15	31.78	47.33	74	-26.67
4874	29.76	AV	H	32.6	6.15	31.78	36.73	54	-17.27

4874	42.87	PK	V	32.6	6.15	31.78	49.84	74	-24.16
4874	30.16	AV	V	32.6	6.15	31.78	37.13	54	-16.87
7311	38.05	PK	H	36.7	6.22	30.97	50	74	-24
7311	26.52	AV	H	36.7	6.22	30.97	38.47	54	-15.53
7311	37.99	PK	V	36.7	6.22	30.97	49.94	74	-24.06
7311	25.13	AV	V	36.7	6.22	30.97	37.08	54	-16.92
9748	38.14	PK	H	38.2	8.11	30.86	53.59	74	-20.41
9748	25.82	AV	H	38.2	8.11	30.86	41.27	54	-12.73
9748	37.86	PK	V	38.2	8.11	30.86	53.31	74	-20.69
9748	24.33	AV	V	38.2	8.11	30.86	39.78	54	-14.22
520.88	42.96	QP	H	12.8	2.63	27.2	31.19	46	-14.81
199.29	44.58	QP	V	12.8	2.63	27.2	32.81	46	-13.19
High Channel (2462)									
2462	70.32	PK	H	29.1	3.81	0	103.23	N/A	N/A
2462	58.24	AV	H	29.1	3.81	0	91.15	N/A	N/A
2462	71.38	PK	V	29.1	3.81	0	104.29	N/A	N/A
2462	55.28	AV	V	29.1	3.81	0	88.19	N/A	N/A
2483.5	25.13	PK	H	28.7	3.62	0	57.45	74	-16.55
2483.5	13.87	AV	H	28.7	3.62	0	46.19	54	-7.81
2483.5	27.39	PK	V	28.7	3.62	0	59.71	74	-14.29
2483.5	16.89	AV	V	28.7	3.62	0	49.21	54	-4.79
4924	38.66	PK	H	32.8	6.17	31.78	45.85	74	-28.15
4924	26.18	AV	H	32.8	6.17	31.78	33.37	54	-20.63
4924	38.22	PK	V	32.8	6.17	31.78	45.41	74	-28.59
4924	26.17	AV	V	32.8	6.17	31.78	33.36	54	-20.64
7386	37.86	PK	H	36.8	6.26	30.97	49.95	74	-24.05
7386	26.58	AV	H	36.8	6.26	30.97	38.67	54	-15.33
7386	38.13	PK	V	36.8	6.26	30.97	50.22	74	-23.78
7386	25.71	AV	V	36.8	6.26	30.97	37.8	54	-16.2
9848	37.85	PK	H	38.4	8.17	30.86	53.56	74	-20.44
9848	25.61	AV	H	38.4	8.17	30.86	41.32	54	-12.68
9848	37.66	PK	V	38.4	8.17	30.86	53.37	74	-20.63
9848	25.91	AV	V	38.4	8.17	30.86	41.62	54	-12.38
520.88	41.36	QP	H	12.8	2.63	27.2	29.59	46	-16.41
199.29	45.36	QP	V	12.8	2.63	27.2	33.59	46	-12.41

Test Site : 3m Chamber
Test Date : 2015-12-08
EUT : SmartPlug
Power Supply : AC 120V
Condition : Temp:24.5'C,Humi:55%
Tested By : Smile Wang
Model Number : ATSMARTPLUG-US
Test Mode : Tx mode 802.11N HT20
Antenna/Distance : 3m

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBµV/m)	FCC 15.247	
	Reading (dBµV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)				Limit (dBµV/m)	Margin (dB)
Low Channel (2412)									
2412	69.25	PK	H	28	3.65	0	100.9	N/A	N/A
2412	55.17	AV	H	28	3.65	0	86.82	N/A	N/A
2412	70.26	PK	V	28	3.65	0	101.91	N/A	N/A
2412	55.32	AV	V	28	3.65	0	86.97	N/A	N/A
2390	25.58	PK	H	28.4	3.57	0	57.55	74	-16.45
2390	13.17	AV	H	28.4	3.57	0	45.14	54	-8.86
2390	26.39	PK	V	28.4	3.57	0	58.36	74	-15.64
2390	16.27	AV	V	28.4	3.57	0	48.24	54	-5.76
4824	38.76	PK	H	32.3	5.91	31.78	45.19	74	-28.81
4824	27.96	AV	H	32.3	5.91	31.78	34.39	54	-19.61
4824	38.32	PK	V	32.3	5.91	31.78	44.75	74	-29.25
4824	25.16	AV	V	32.3	5.91	31.78	31.59	54	-22.41
7236	37.55	PK	H	36.3	6.34	30.97	49.22	74	-24.78
7236	25.69	AV	H	36.3	6.34	30.97	37.36	54	-16.64
7236	38.02	PK	V	36.3	6.34	30.97	49.69	74	-24.31
7236	26.38	AV	V	36.3	6.34	30.97	38.05	54	-15.95
9648	37.19	PK	H	37.9	8.01	30.86	52.24	74	-21.76
9648	24.58	AV	H	37.9	8.01	30.86	39.63	54	-14.37
9648	37.68	PK	V	37.9	8.01	30.86	52.73	74	-21.27
9648	26.17	AV	V	37.9	8.01	30.86	41.22	54	-12.78
520.88	40.05	QP	H	12.8	2.63	27.2	28.28	46	-17.72
199.29	45.18	QP	V	12.8	2.63	27.2	33.41	46	-12.59
Middle Channel (2437)									
2437	68.35	PK	H	28.7	3.74	0	100.79	N/A	N/A
2437	54.28	AV	H	28.7	3.74	0	86.72	N/A	N/A
2437	70.68	PK	V	28.7	3.74	0	103.12	N/A	N/A
2437	67.82	AV	V	28.7	3.74	0	100.26	N/A	N/A
4874	39.5	PK	H	32.6	6.15	31.78	46.47	74	-27.53
4874	27.48	AV	H	32.6	6.15	31.78	34.45	54	-19.55

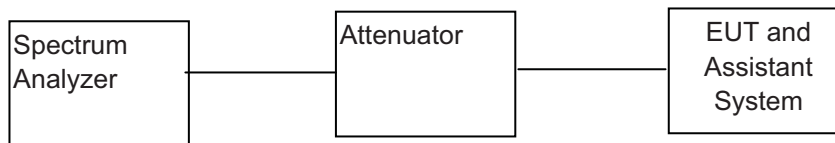
4874	40.28	PK	V	32.6	6.15	31.78	47.25	74	-26.75
4874	28.16	AV	V	32.6	6.15	31.78	35.13	54	-18.87
7311	37.88	PK	H	36.7	6.22	30.97	49.83	74	-24.17
7311	25.16	AV	H	36.7	6.22	30.97	37.11	54	-16.89
7311	38.29	PK	V	36.7	6.22	30.97	50.24	74	-23.76
7311	26.17	AV	V	36.7	6.22	30.97	38.12	54	-15.88
9748	37.82	PK	H	38.2	8.11	30.86	53.27	74	-20.73
9748	25.19	AV	H	38.2	8.11	30.86	40.64	54	-13.36
9748	38.33	PK	V	38.2	8.11	30.86	53.78	74	-20.22
9748	26.41	AV	V	38.2	8.11	30.86	41.86	54	-12.14
520.88	40.33	QP	H	12.8	2.63	27.2	28.56	46	-17.44
199.29	45	QP	V	12.8	2.63	27.2	33.23	46	-12.77
High Channel (2462)									
2462	67.13	PK	H	29.1	3.81	0	100.04	N/A	N/A
2462	54.71	AV	H	29.1	3.81	0	87.62	N/A	N/A
2462	69.82	PK	V	29.1	3.81	0	102.73	N/A	N/A
2462	56.31	AV	V	29.1	3.81	0	89.22	N/A	N/A
2483.5	27.16	PK	H	28.7	3.62	0	59.48	74	-14.52
2483.5	13.87	AV	H	28.7	3.62	0	46.19	54	-7.81
2483.5	28.72	PK	V	28.7	3.62	0	61.04	74	-12.96
2483.5	16.77	AV	V	28.7	3.62	0	49.09	54	-4.91
4924	38.85	PK	H	32.8	6.17	31.78	46.04	74	-27.96
4924	25.36	AV	H	32.8	6.17	31.78	32.55	54	-21.45
4924	38.23	PK	V	32.8	6.17	31.78	45.42	74	-28.58
4924	25.77	AV	V	32.8	6.17	31.78	32.96	54	-21.04
7386	37.85	PK	H	36.8	6.26	30.97	49.94	74	-24.06
7386	23.56	AV	H	36.8	6.26	30.97	35.65	54	-18.35
7386	37.29	PK	V	36.8	6.26	30.97	49.38	74	-24.62
7386	25.79	AV	V	36.8	6.26	30.97	37.88	54	-16.12
9848	38.02	PK	H	38.4	8.17	30.86	53.73	74	-20.27
9848	26.33	AV	H	38.4	8.17	30.86	42.04	54	-11.96
9848	37.82	PK	V	38.4	8.17	30.86	53.53	74	-20.47
9848	26.13	AV	V	38.4	8.17	30.86	41.84	54	-12.16
520.88	41.82	QP	H	12.8	2.63	27.2	30.05	46	-15.95
199.29	46.38	QP	V	12.8	2.63	27.2	34.61	46	-11.39

7 Band Edge Compliance

7.1 Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	EMI Test Receiver	R&S	ESU8	100316	2014/12/19	1 Year
2	Spectrum analyzer	R&S	FSU	1166.1660.26	2014/12/19	1 Year
3	Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	2014/12/19	1 Year
4	Double Ridged Horn Antenna	R&S	HF907	100276	2014/12/19	1 Year
5	Pre-amplifier	A.H.	PAM0-0118	360	2014/12/19	1 Year
6	RF Cable	R&S	R01	10403	2014/12/19	1 Year
7	RF Cable	R&S	R02	10512	2014/12/19	1 Year

7.2 Block diagram of test setup



7.3 Limit

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

7.4 Test Procedure

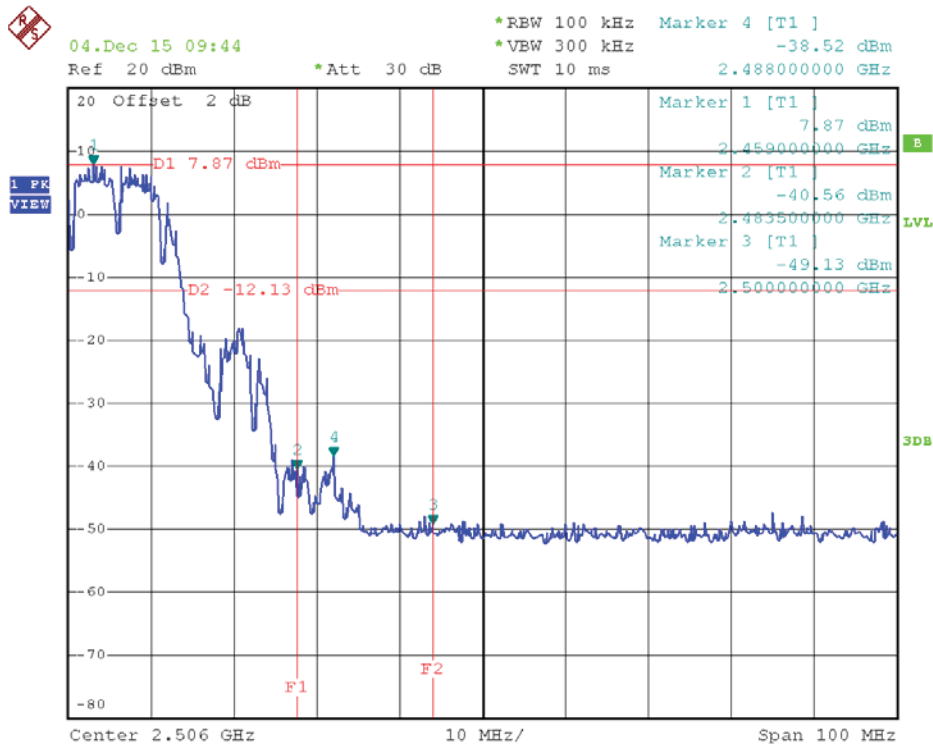
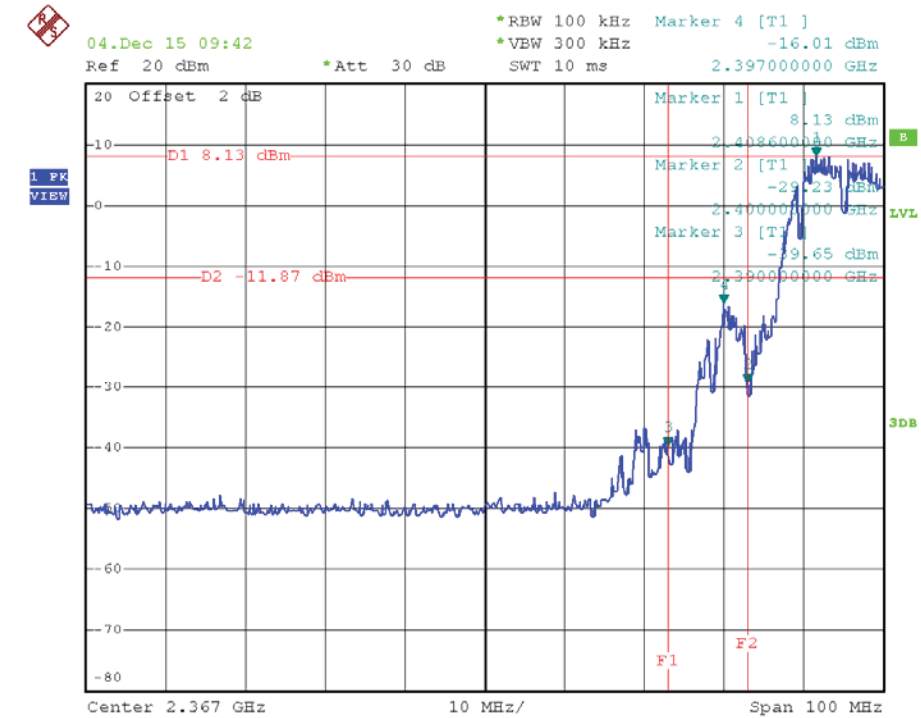
Same with clause 8.4 except change investigated frequency range from 2100MHz to 2450MHz and 2450MHz to 2500MHz.

Remark: All restriction band have been tested, and only the worse case is shown in report.

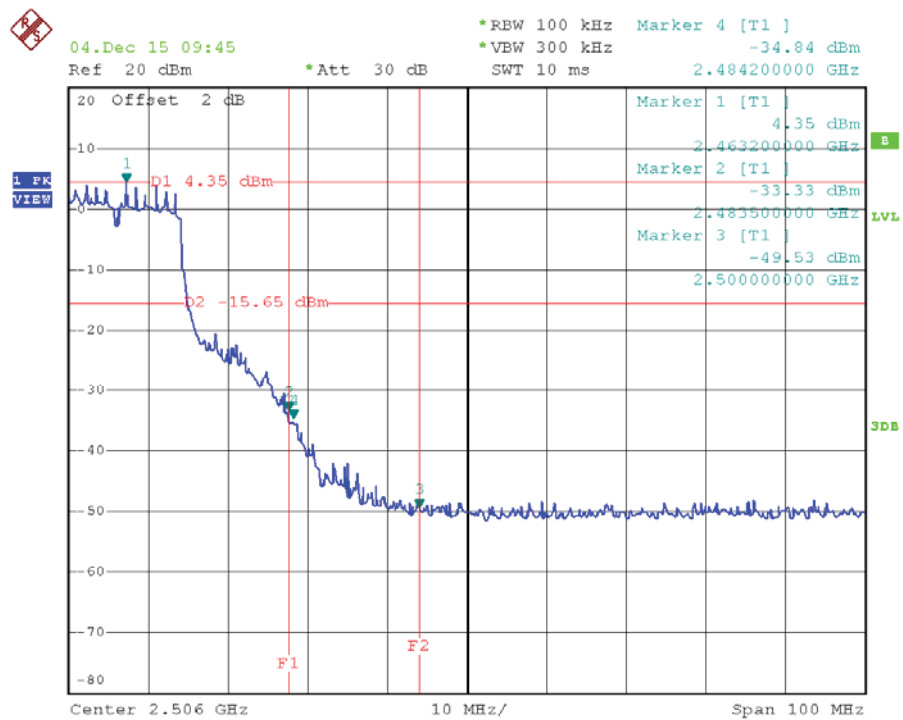
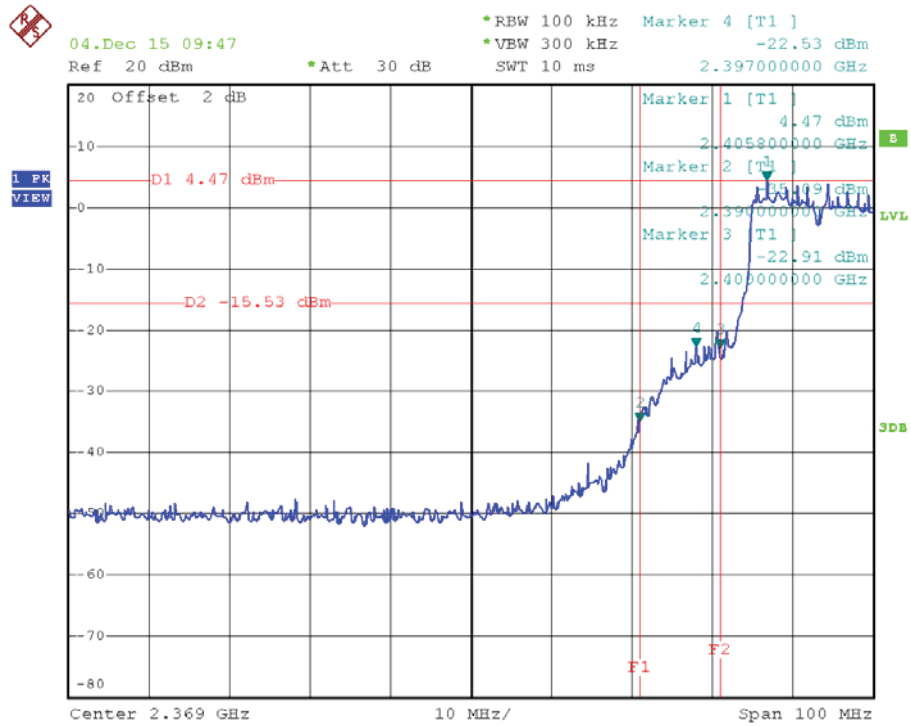
7.5 Test result

PASS. (See below detailed test result)

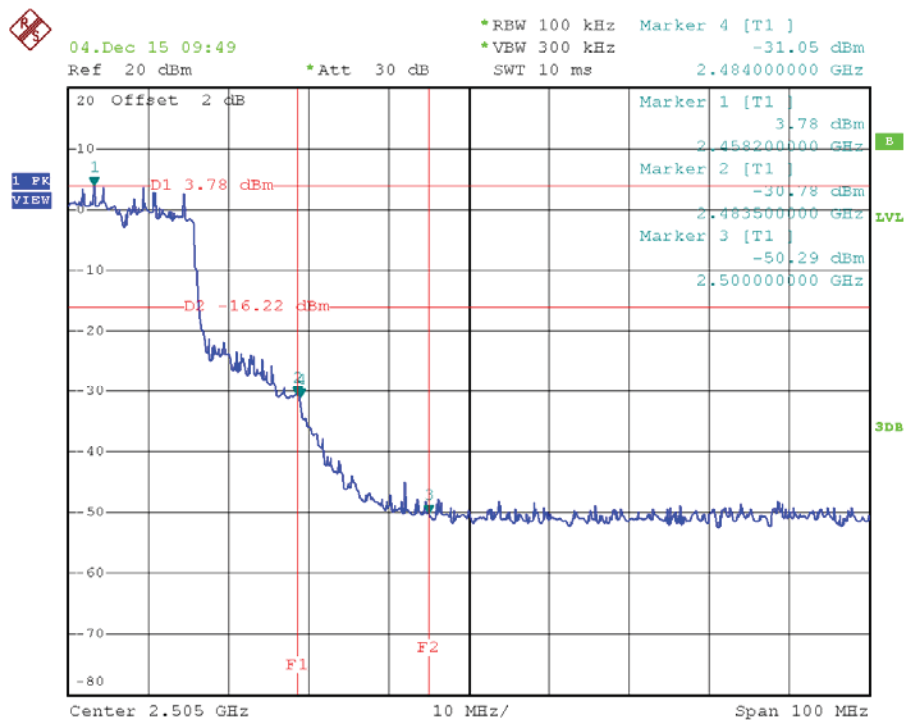
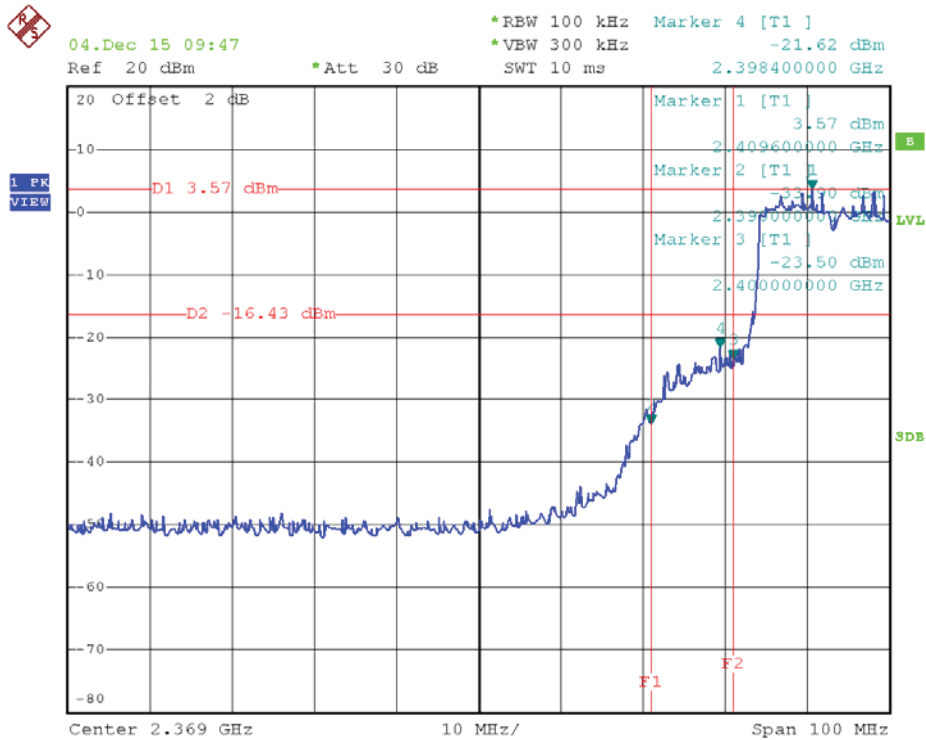
802.11B



802.11G



802.11N HT20

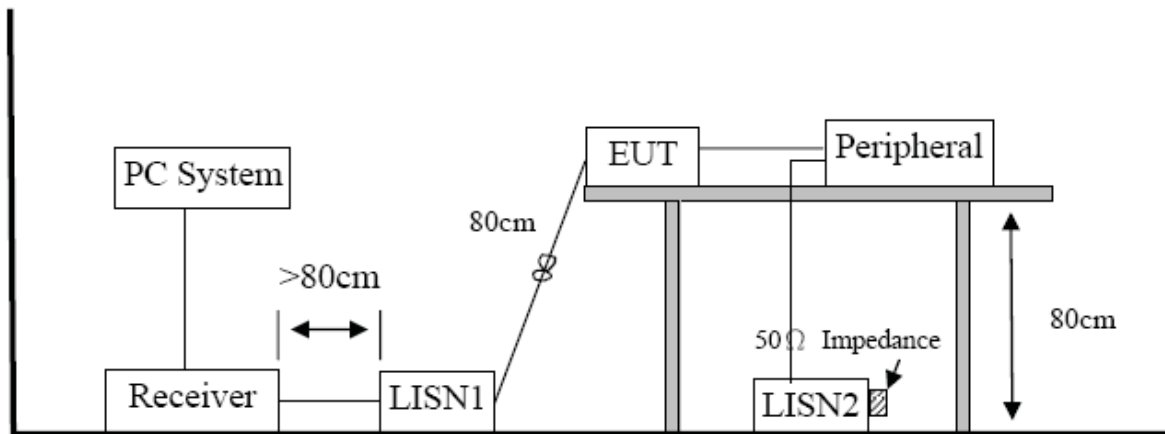


8 Power Line Conducted Emission

8.1 Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Test Receiver	R&S	ESU8	100316	2014/12/19	1 Year
2	LISN 1	R&S	ENV216	101109	2014/12/19	1 Year
3	LISN 2	R&S	ESH2-Z5	100309	2014/12/19	1 Year
4	Pulse Limiter	R&S	ESH3-Z2	101242	2014/12/19	1 Year
5	CABLE	R&S	EA033	JHW1401206 8	2014/12/19	1 Year

8.2 Block diagram of test setup



8.3 Power Line Conducted Emission Limits(Class B)

Frequency	Quasi-Peak Level dB(μ V)	Average Level dB(μ V)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Note 1: * Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

8.4 Test Procedure

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.4 and test equipment as described in clause 10.2 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.

All support equipment power received from a second LISN.

Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in clause 2.4 were scanned during the preliminary test.

After the preliminary scan, we found the test mode producing the highest emission level.

The EUT configuration and worse cable configuration of the above highest emission levels were recorded for reference of the final test.

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Neutral and Line, recording at least the six highest emissions.

Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 9 KHz.

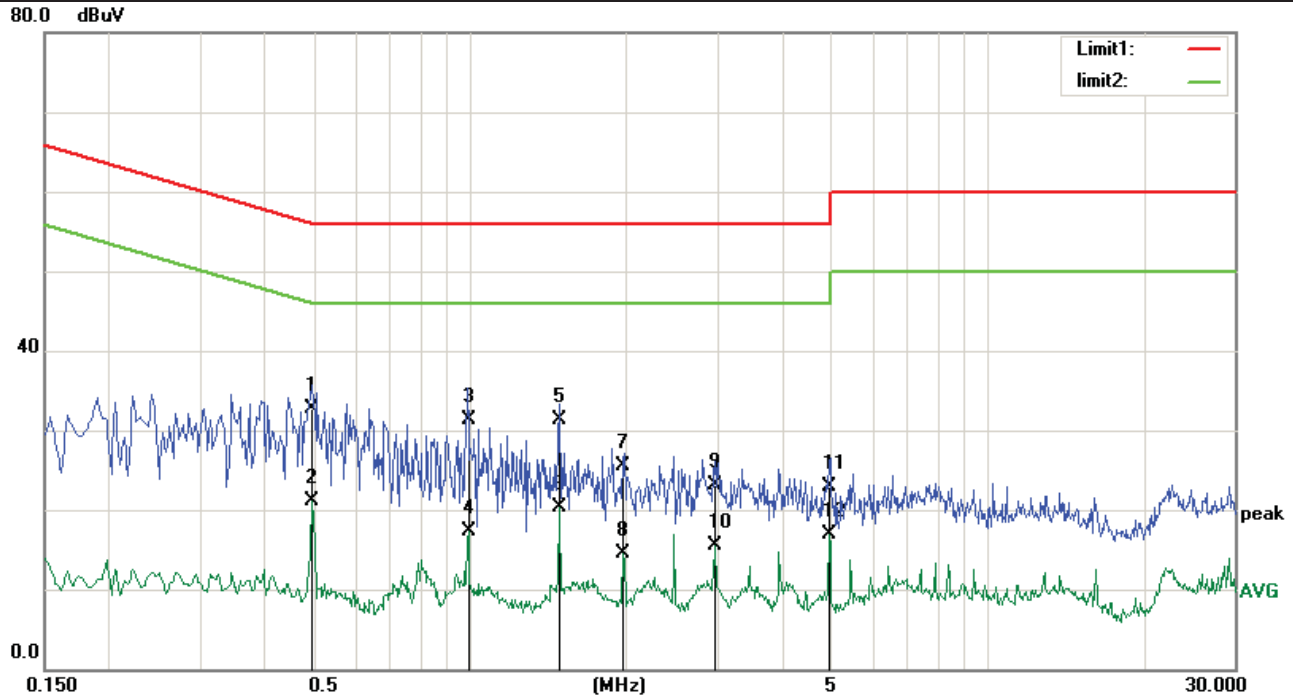
8.5 Test Result

PASS. (See below detailed test result)

Note1: All emissions not reported below are too low against the prescribed limits.

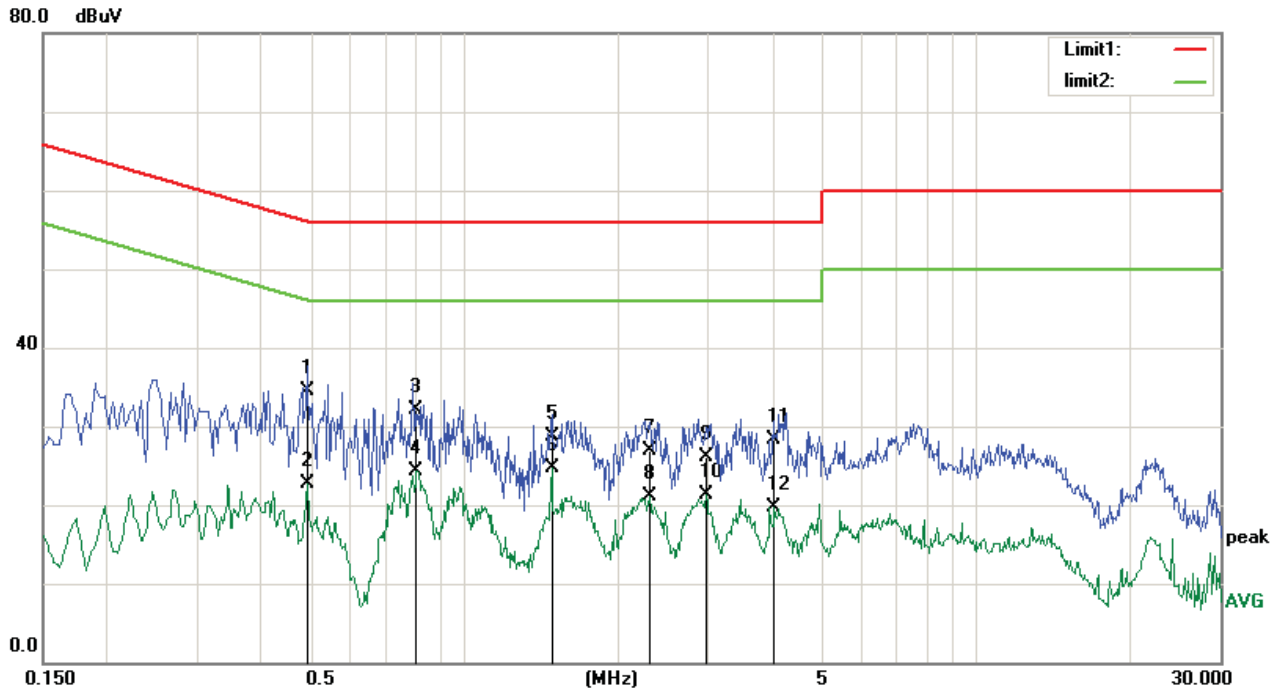
Note2: "----" means peak detection; "----" mans average detection

EUT:	Smart Plug	Model No.:	ATSMARTPLUG-US
Temperature:	24	Relative Humidity:	55%
Probe:	L1	Test Power:	AC 230V/50Hz
Standard:	(CE)FCC PART 15 class B_QP	Test Result:	Pass
Test Mode:	TX	Test By:	Smile
Note:			



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.4940	22.49	10.19	32.68	56.10	-23.42	QP
2	0.4940	10.94	10.19	21.13	46.10	-24.97	AVG
3	0.9900	21.15	10.10	31.25	56.00	-24.75	QP
4	0.9900	7.12	10.10	17.22	46.00	-28.78	AVG
5	1.4859	21.29	10.10	31.39	56.00	-24.61	QP
6	1.4859	10.20	10.10	20.30	46.00	-25.70	AVG
7	1.9778	15.32	10.11	25.43	56.00	-30.57	QP
8	1.9778	4.41	10.11	14.52	46.00	-31.48	AVG
9	2.9739	13.05	10.14	23.19	56.00	-32.81	QP
10	2.9739	5.32	10.14	15.46	46.00	-30.54	AVG
11	4.9458	12.87	10.10	22.97	56.00	-33.03	QP
12	4.9458	6.75	10.10	16.85	46.00	-29.15	AVG

EUT:	Smart Plug	Model No.:	ATSMARTPLUG-US
Temperature:	24	Relative Humidity:	55%
Probe:	N	Test Power:	AC 230V/50Hz
Standard:	(CE)FCC PART 15 class B_QP	Test Result:	Pass
Test Mode:	TX	Test By:	Smile
Note:			



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.4940	24.39	10.19	34.58	56.10	-21.52	QP
2	0.4940	12.53	10.19	22.72	46.10	-23.38	AVG
3	0.8059	21.97	10.09	32.06	56.00	-23.94	QP
4	0.8059	14.30	10.09	24.39	46.00	-21.61	AVG
5	1.4819	18.64	10.10	28.74	56.00	-27.26	QP
6	1.4819	14.61	10.10	24.71	46.00	-21.29	AVG
7	2.3020	16.80	10.12	26.92	56.00	-29.08	QP
8	2.3020	10.89	10.12	21.01	46.00	-24.99	AVG
9	2.9660	16.03	10.14	26.17	56.00	-29.83	QP
10	2.9660	11.19	10.14	21.33	46.00	-24.67	AVG
11	4.0339	18.25	10.14	28.39	56.00	-27.61	QP
12	4.0339	9.62	10.14	19.76	46.00	-26.24	AVG

9 Antenna Requirements

9.1 Limit

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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

9.2 Result

The antennas used for this product are dipole antenna and other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only -6.16dBi.

10 Test setup photograph

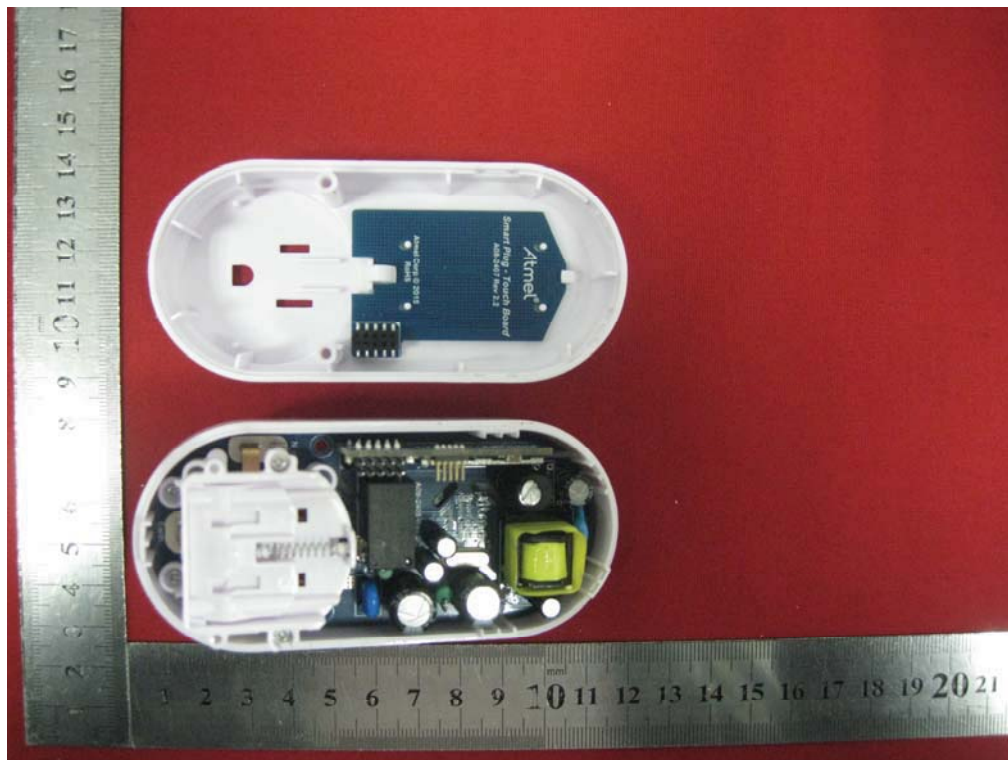


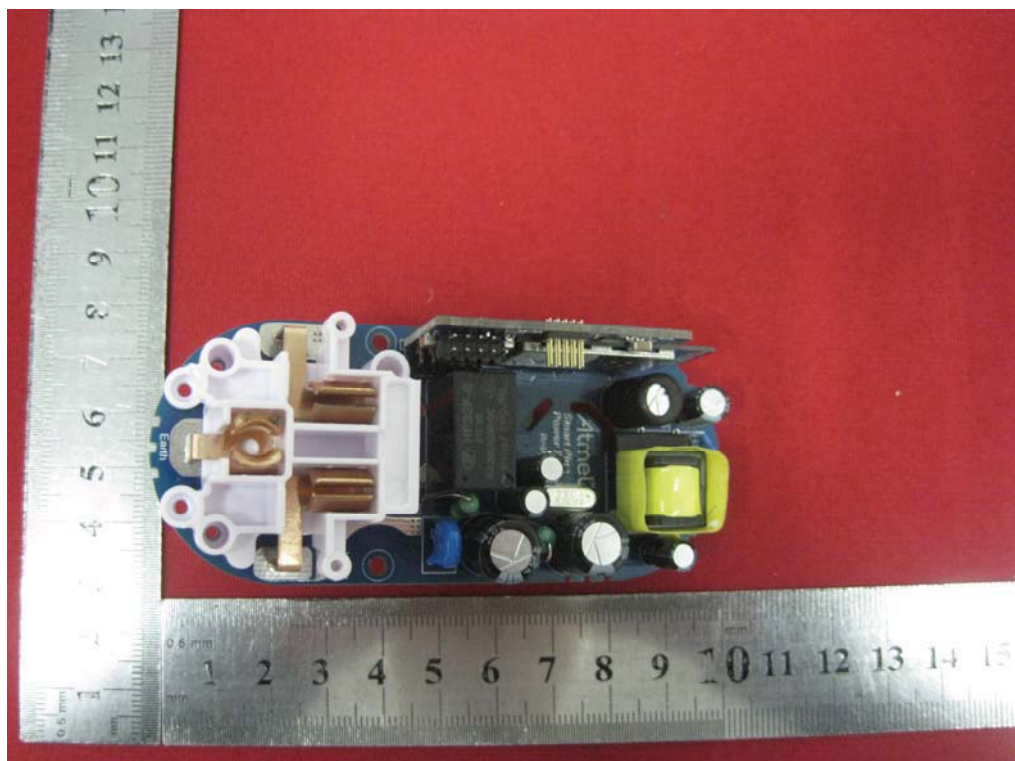
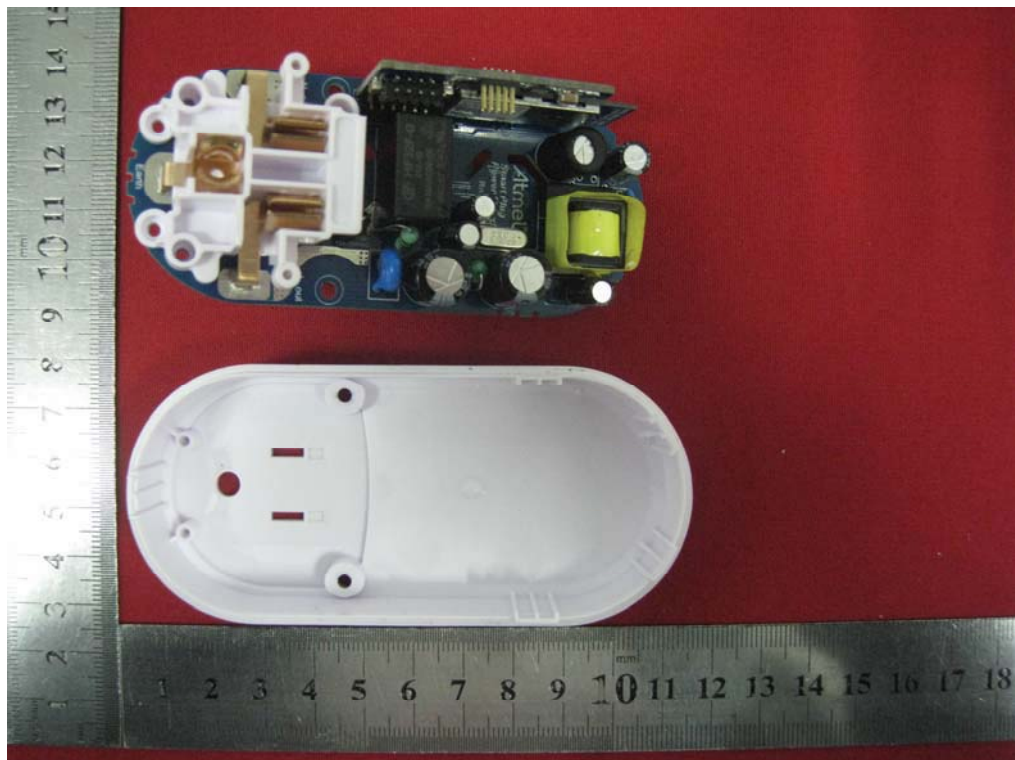


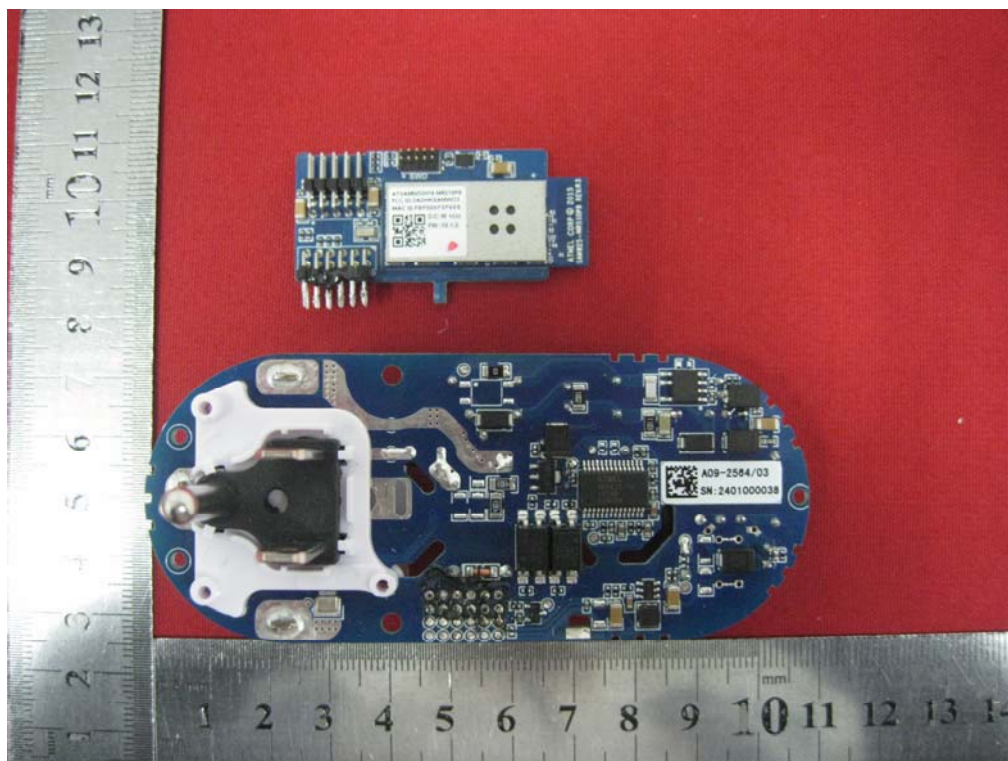
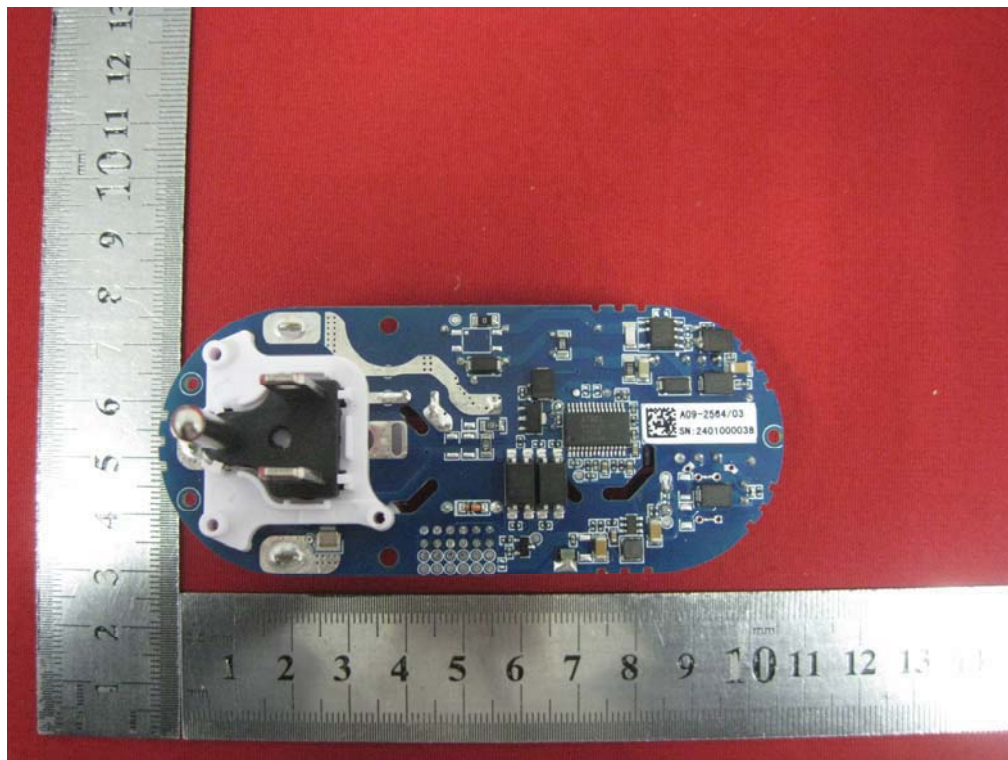
11 Photos of the EUT

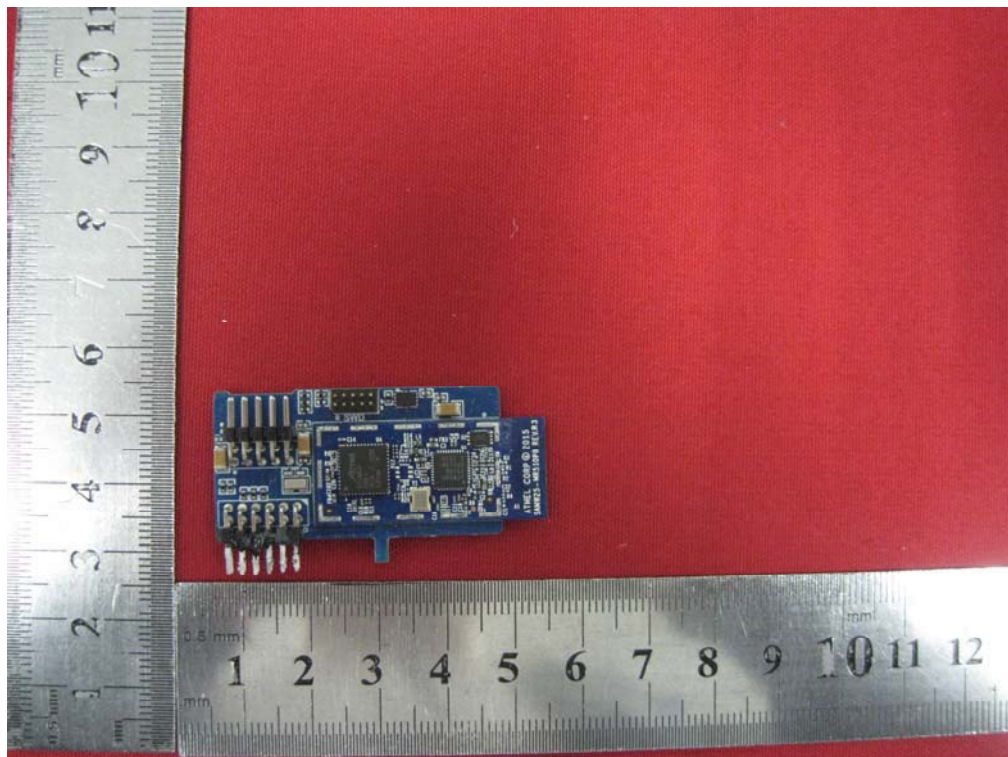
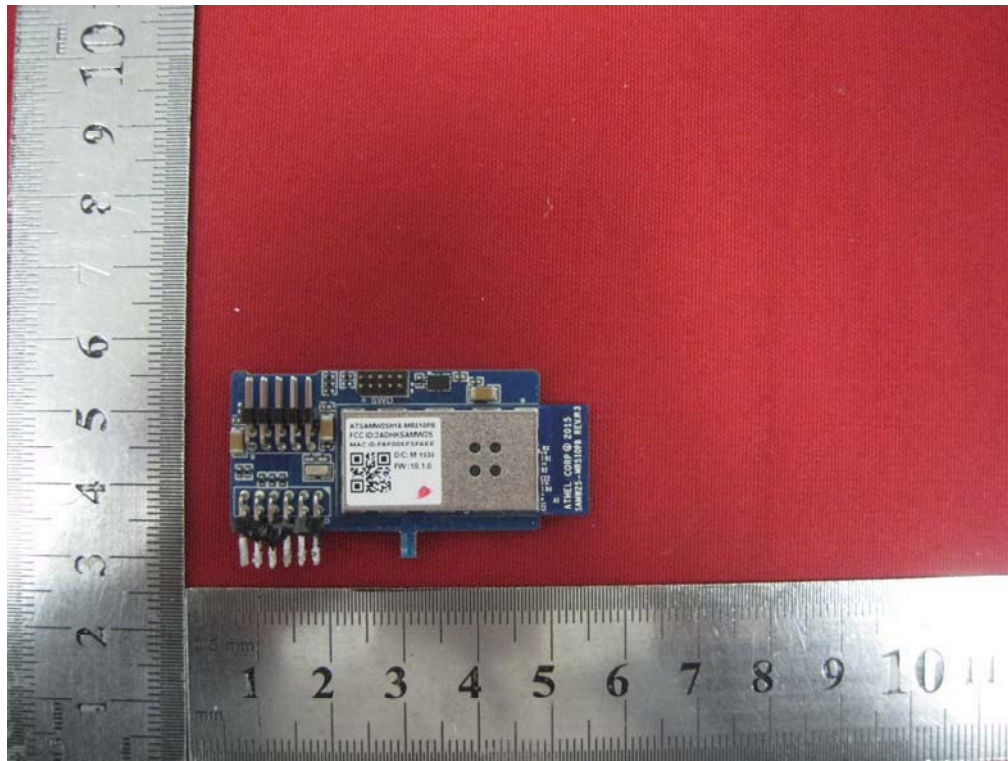


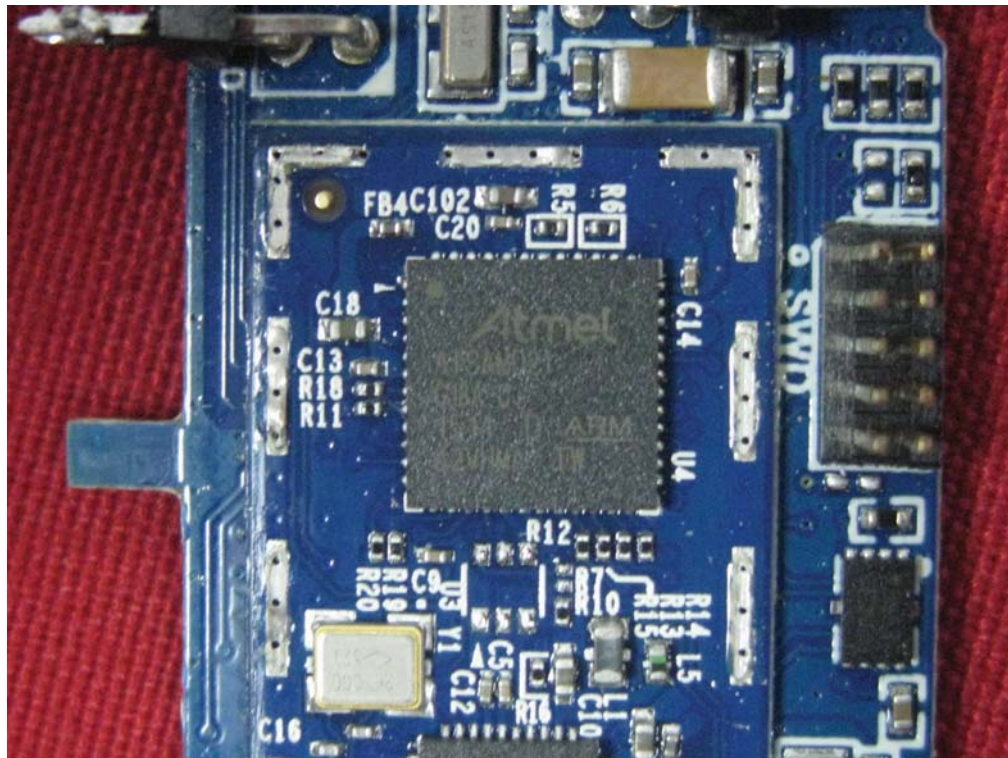
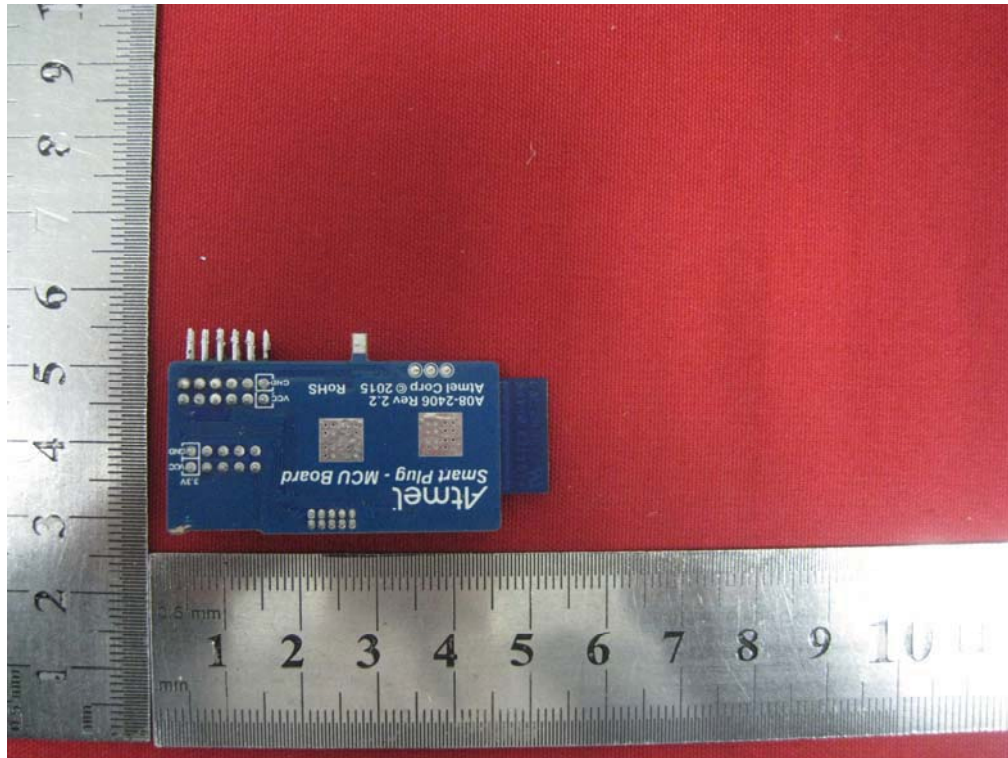


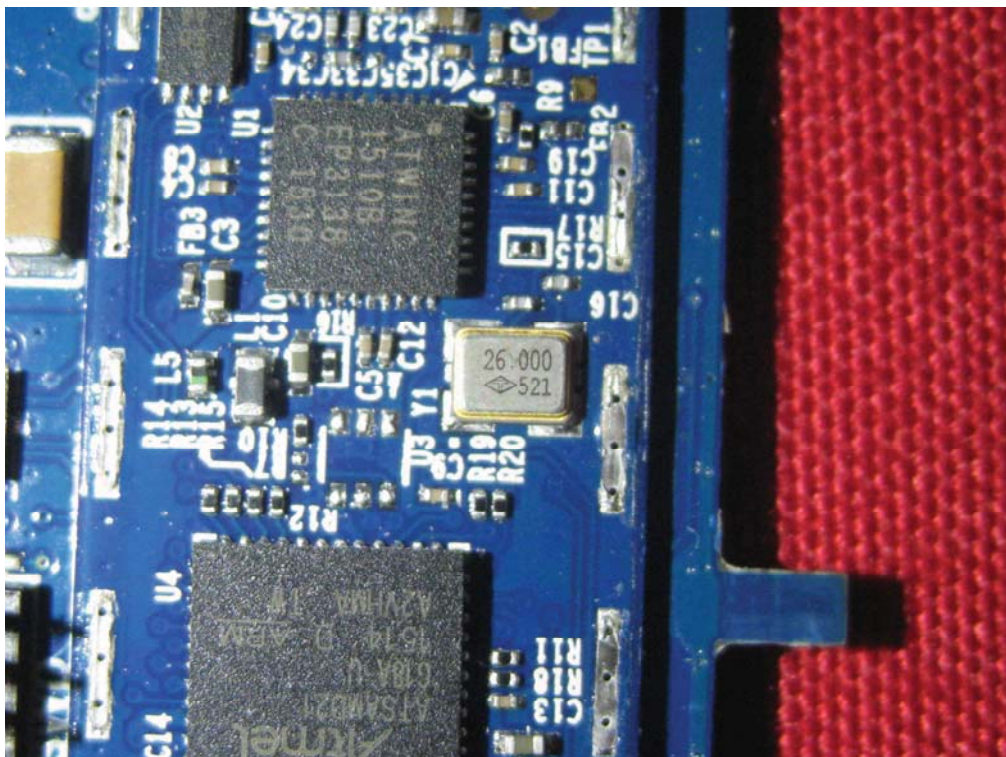
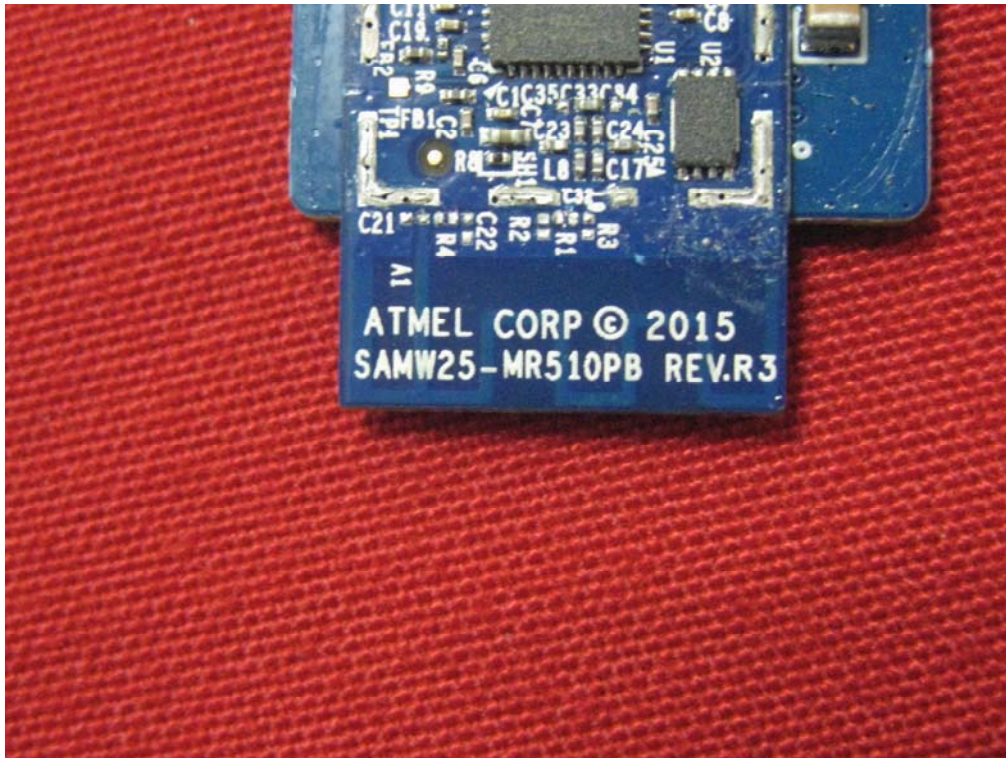


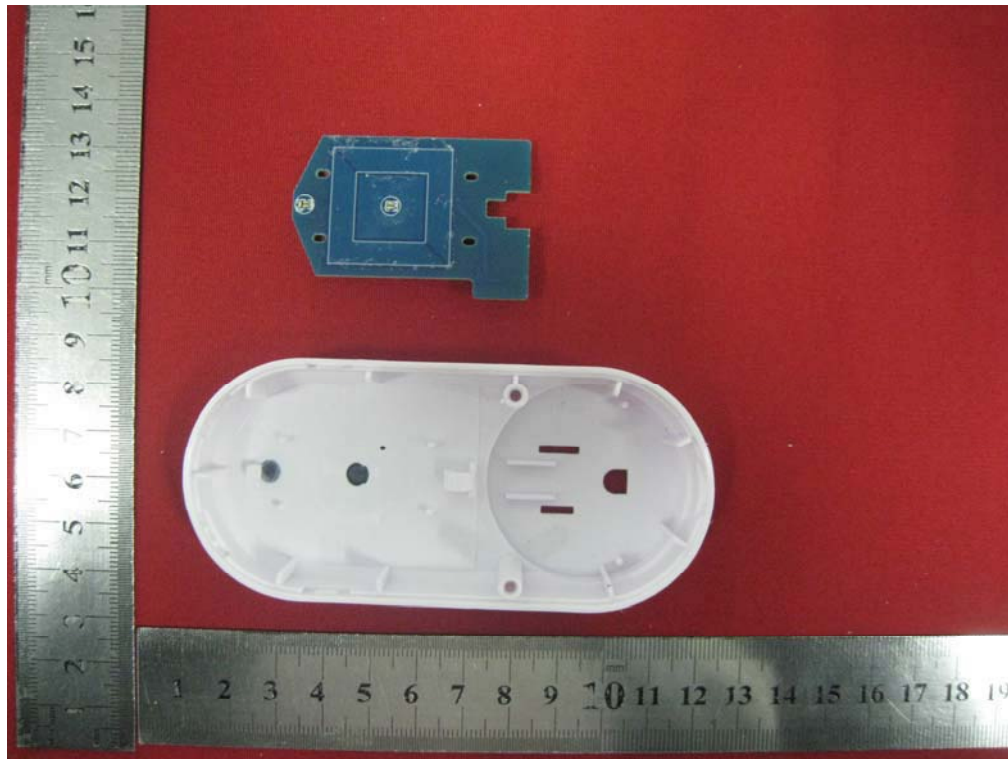
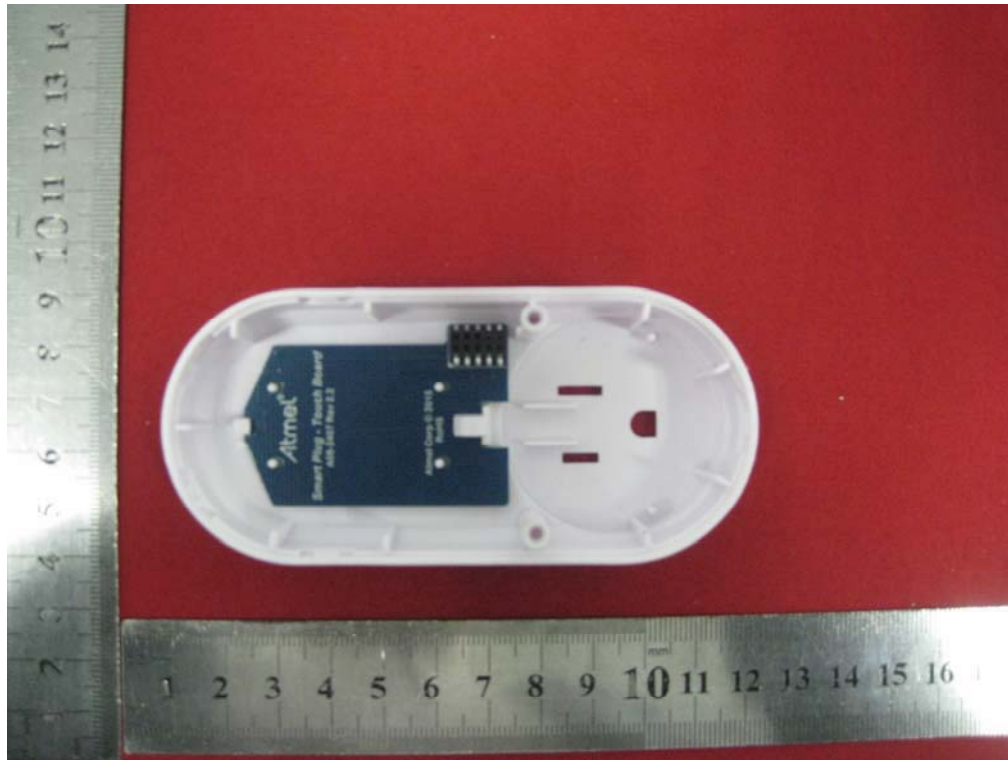


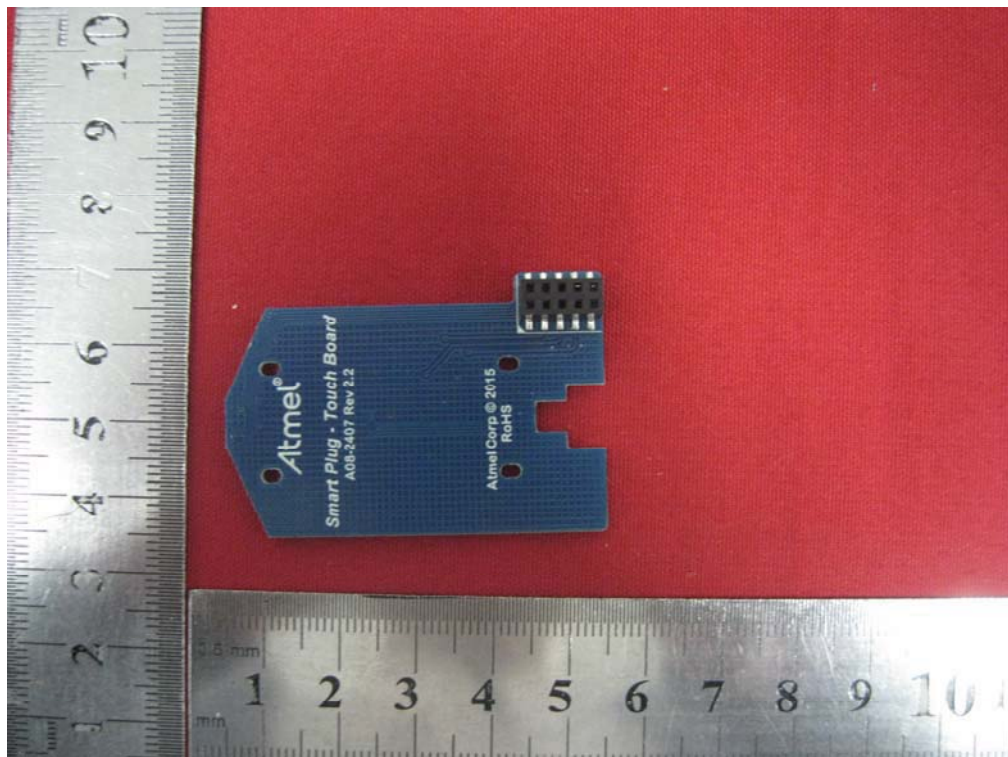
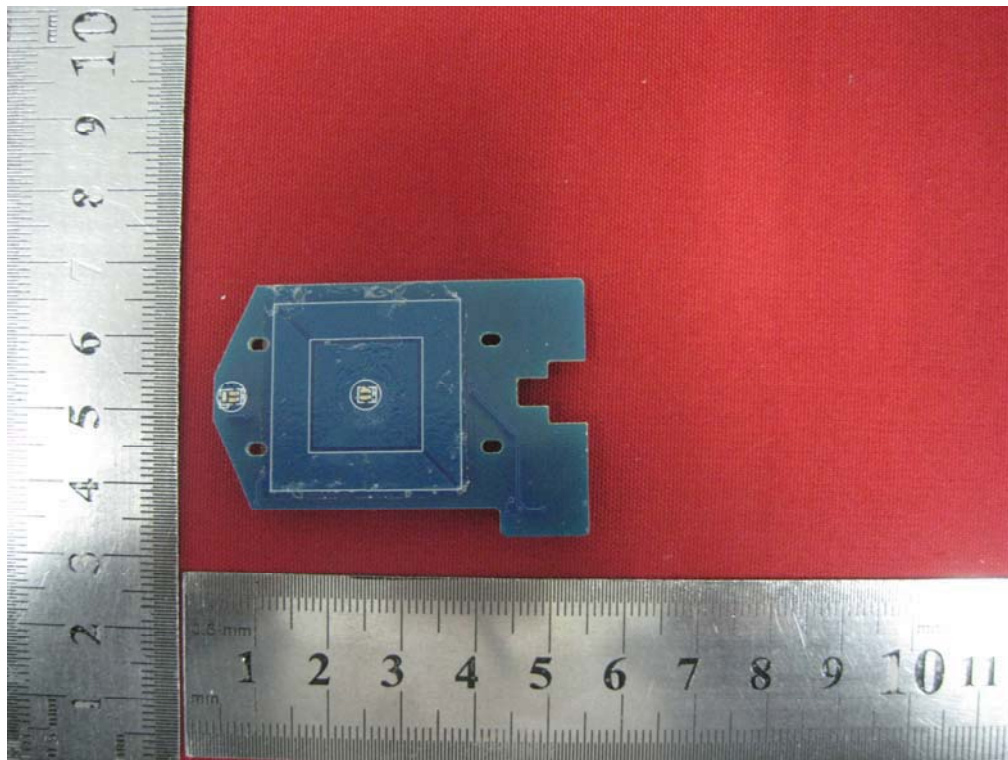












END OF REPORT