FCC REPORT

Applicant:	Shanghai Sunmi Technology Co.,Ltd.
Address of Applicant:	Room 605, Block 7, KIC Plaza, No.388 Song Hu Road Yang Pu District, Shanghai 200433, China

Equipment Under Test (EUT)

Product Name:	POS System
Model No.:	W1403
FCC ID:	2AH25W1403
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.407:2015
Date of sample receipt:	September 19, 2016
Date of Test:	September 20-October 13, 2016
Date of report issued:	October 17, 2016
Test Result :	PASS *

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

Authorized Signature:

Robinson Lo
Laboratory Manager

2 Version

Version No.	Date	Description
00	*October 17, 2016*	*Original*

Prepared By: Edward.Pan ***Date:*** *October 17, 2016*

Project Engineer

Check By: Andy.wu ***Date:*** *October 17, 2016*

Reviewer

3 Contents

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Peak Output Power	15.407(a)(3)	Pass
Channel Bandwidth	15.407(e)	Pass
Power Spectral Density	15.407(a)(3)	Pass
Band Edge	15.407(b)(4)	Pass
Spurious Emission	15.205/15.209/15.407(b)(4)	Pass

Pass: The EUT complies with the essential requirements in the standard.

Remark: Test according to ANSI C63.10:2013 and ANSI C63.4:2014.

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	± 4.34dB	(1)
Radiated Emission	30MHz ~ 1000MHz	± 4.24dB	(1)
Radiated Emission	1GHz ~ 40GHz	± 4.68dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	± 3.45dB	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

5 General Information

5.1 Client Information

Applicant:	Shanghai Sunmi Technology Co.,Ltd.
Address of Applicant:	Room 605, Block 7, KIC Plaza, No.388 Song Hu Road Yang Pu District, Shanghai 200433, China
Manufacturer:	Shanghai Sunmi Technology Co.,Ltd.
Address of Manufacturer:	Room 605, Block 7, KIC Plaza, No.388 Song Hu Road Yang Pu District, Shanghai 200433, China
Factory:	Huizhou BYD Electronics Co.,Ltd.
Address of Factory:	Xiangshui River,Economic Development Zone,Daya Bay, Huizhou,Guangdong,P.R.China

5.2 General Description of EUT

Product Name:	POS System
Model No.:	W1403
Operation Frequency:	802.11a/802.11n(HT20)@5.8G Band: 5745MHz ~ 5825MHz 802.11n(HT40)@ 5.8G Band: 5755MHz ~ 5795MHz
Channel numbers:	802.11a/802.11n(HT20)@5.8G Band: 5 802.11n(HT40)@ 5.8G Band: 2
Channel bandwidth:	802.11a/802.11n(HT20):20MHz 802.11n(HT40):40MHz
Modulation technology:	Orthogonal Frequency Division Multiplexing (OFDM)
Antenna Type:	Integral antenna
Antenna gain:	-5.1dBi
Power supply:	AC Adaptor Model No.:EA10681P-240 Input: AC 100-240V, 50/60Hz, 2.0A Output: DC 24V, 2.5A

Operation Frequency each of channel @ 5.8G Band							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
149	5745MHz	153	5765MHz	155	5775MHz	157	5785MHz
161	5805MHz	165	5825MHz				

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Test channel	**Frequency (MHz)**		
	5.8G Band		
	802.11a 802.11n(HT20)	802.11n(HT40)	
Lowest channel	5745	5755	
Middle channel	5785		
Highest channel	5825	5795	

5.3 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode

Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Per-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.

Mode	Data rate
802.11a	6Mbps
802.11n(HT20)	6.5Mbps
802.11n(HT40)	13Mbps

5.4 Description of Support Units

None.

5.5 Test Facility

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

● **FCC —Registration No.: 600491**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fuly described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 600491, June 22, 2016.

● **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. Has been

Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, August 15, 2016.

5.6 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone,

Xixiang Road, Baoan District, Shenzhen, Guangdong, China

Tel: 0755-27798480

Fax: 0755-27798960

6 Test Instruments list

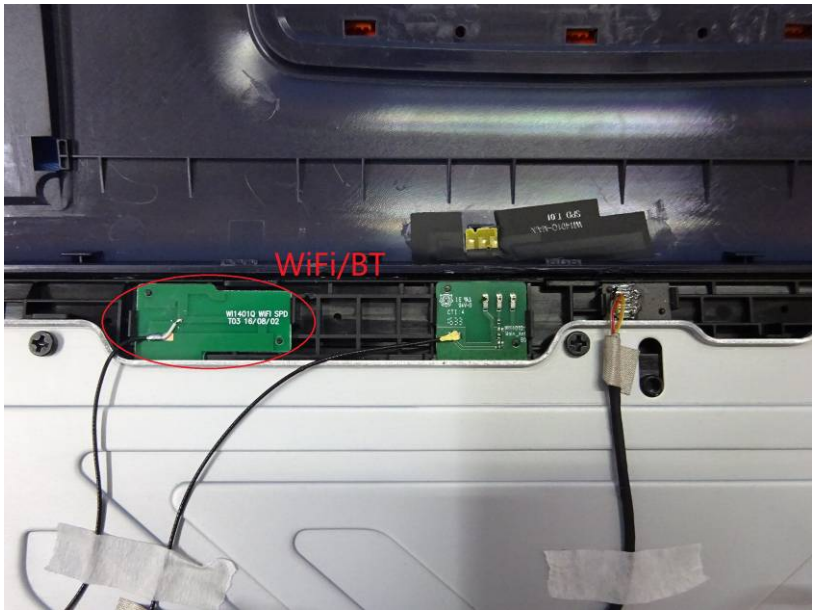
Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July 03 2015	July 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June 29 2016	June 28 2017
4	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June 29 2016	June 28 2017
5	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June 29 2016	June 28 2017
6	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June 29 2016	June 28 2017
7	Horn Antenna	ETS-LINDGREN	3160	GTS217	June 29 2016	June 28 2017
8	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
9	Coaxial Cable	GTS	N/A	GTS213	June 29 2016	June 28 2017
10	Coaxial Cable	GTS	N/A	GTS211	June 29 2016	June 28 2017
11	Coaxial cable	GTS	N/A	GTS210	June 29 2016	June 28 2017
12	Coaxial Cable	GTS	N/A	GTS212	June 29 2016	June 28 2017
13	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June 29 2016	June 28 2017
14	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	June 29 2016	June 28 2017
15	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 29 2016	June 28 2017
16	Band filter	Amindeon	82346	GTS219	June 29 2016	June 28 2017
17	Power Meter	Anritsu	ML2495A	GTS540	June 29 2016	June 28 2017
18	Power Sensor	Anritsu	MA2411B	GTS541	June 29 2016	June 28 2017

Conducted Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Shielding Room	ZhongYu Electron	7.0(L)x3.0(W)x3.0(H)	GTS264	May.16 2014	May.15 2019
2	EMI Test Receiver	Rohde & Schwarz	ESCS30	GTS223	June 29 2016	June 28 2017
3	10dB Pulse Limita	Rohde & Schwarz	N/A	GTS224	June 29 2016	June 28 2017
4	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June 29 2016	June 28 2017
5	LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	GTS226	June 29 2016	June 28 2017
6	Coaxial Cable	GTS	N/A	GTS227	June 29 2016	June 28 2017
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

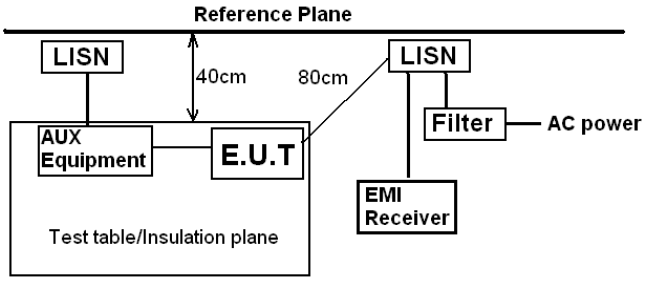
General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Barometer	ChangChun	DYM3	GTS257	June 29 2016	June 28 2017

7 Test results and Measurement Data

7.1 Antenna requirement

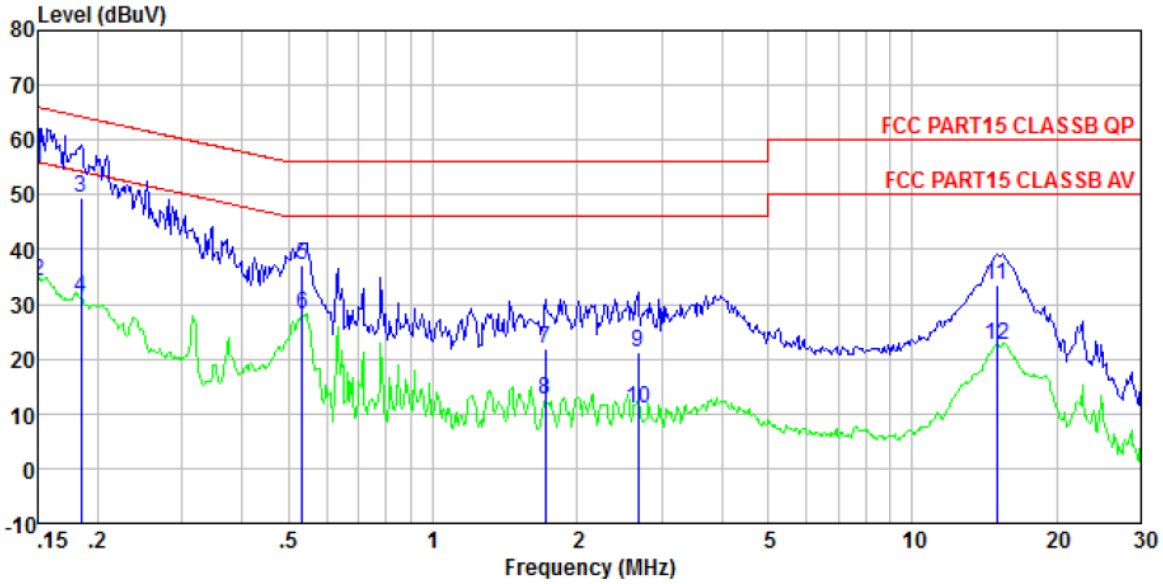
Standard requirement:	FCC Part15 C Section 15.203
15.203 requirement: *An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling 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.*	
E.U.T Antenna:	
The antenna is integral antenna. The best case gain of the antenna is -5.1dBi. 	

7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10:2013
Test Frequency Range:	150KHz to 30MHz
Class / Severity:	Class B
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto
Limit:	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 setup:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*
Test procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement data

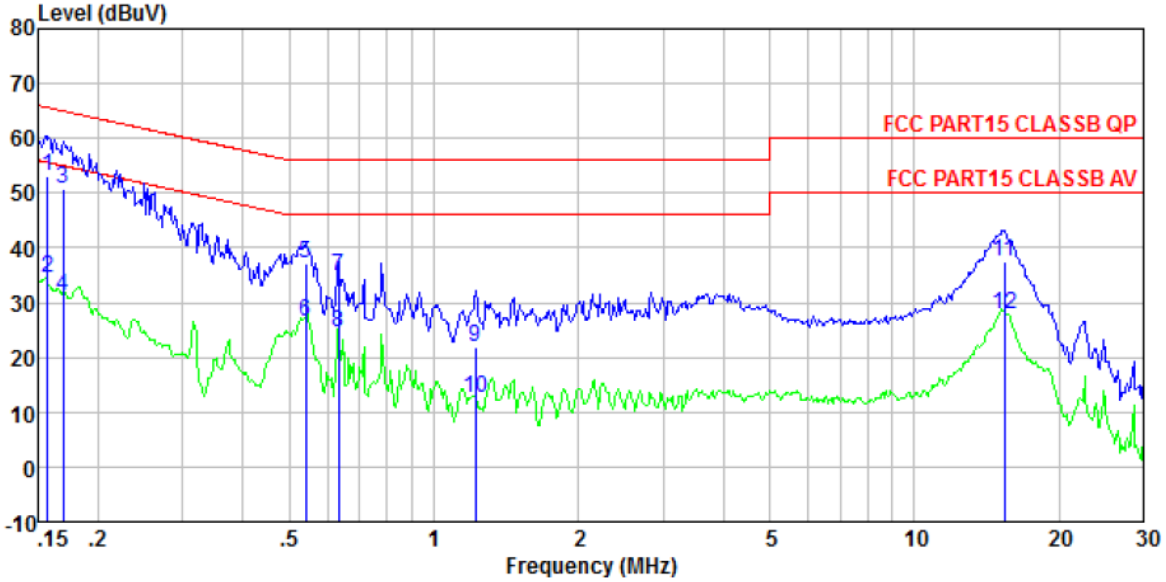
Line:



Site : Shielded room
Condition : FCC PART15 CLASSB QP LISN-2016 LINE
Job No. : 0124
Test mode : WiFi mode
Test Engineer: Boy

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.150	54.22	0.42	0.12	54.76	66.00	-11.24	QP
2	0.150	33.63	0.42	0.12	34.17	56.00	-21.83	Average
3	0.184	49.06	0.42	0.13	49.61	64.28	-14.67	QP
4	0.184	30.73	0.42	0.13	31.28	54.28	-23.00	Average
5	0.535	36.80	0.35	0.11	37.26	56.00	-18.74	QP
6	0.535	27.62	0.35	0.11	28.08	46.00	-17.92	Average
7	1.716	21.38	0.21	0.14	21.73	56.00	-34.27	QP
8	1.716	12.16	0.21	0.14	12.51	46.00	-33.49	Average
9	2.678	20.87	0.20	0.15	21.22	56.00	-34.78	QP
10	2.678	10.66	0.20	0.15	11.01	46.00	-34.99	Average
11	14.986	32.95	0.22	0.22	33.39	60.00	-26.61	QP
12	14.986	22.20	0.22	0.22	22.64	50.00	-27.36	Average

Neutral:



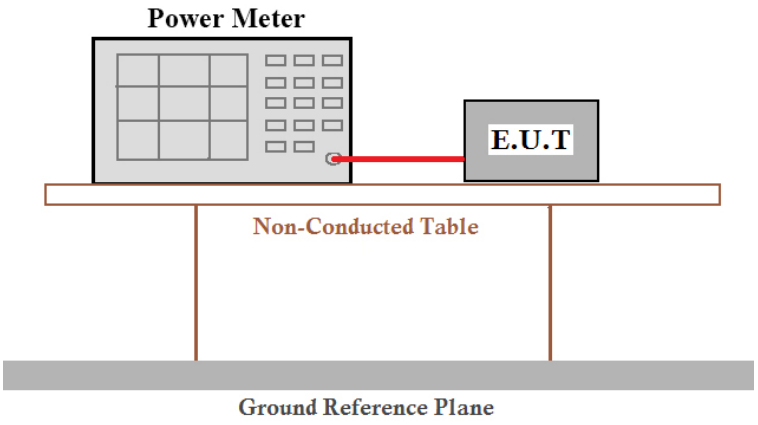
Site : Shielded room
Condition : FCC PART15 CLASSB QP LISN-2016 NEUTRAL
Job No. : 0124
Test mode : WiFi mode
Test Engineer: Boy

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.157	52.51	0.41	0.12	53.04	65.60	-12.56	QP
2	0.157	34.05	0.41	0.12	34.58	55.60	-21.02	Average
3	0.169	50.25	0.41	0.12	50.78	64.99	-14.21	QP
4	0.169	30.80	0.41	0.12	31.33	54.99	-23.66	Average
5	0.541	36.61	0.32	0.11	37.04	56.00	-18.96	QP
6	0.541	26.11	0.32	0.11	26.54	46.00	-19.46	Average
7	0.634	34.46	0.26	0.13	34.85	56.00	-21.15	QP
8	0.634	24.23	0.26	0.13	24.62	46.00	-21.38	Average
9	1.223	21.50	0.21	0.13	21.84	56.00	-34.16	QP
10	1.223	12.20	0.21	0.13	12.54	46.00	-33.46	Average
11	15.388	37.09	0.23	0.22	37.54	60.00	-22.46	QP
12	15.388	27.35	0.23	0.22	27.80	50.00	-22.20	Average

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level =Receiver Read level + LISN Factor + Cable Loss
4. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both *limits and measurement with the average detector receiver is unnecessary.*

7.3 Conducted Peak Output Power

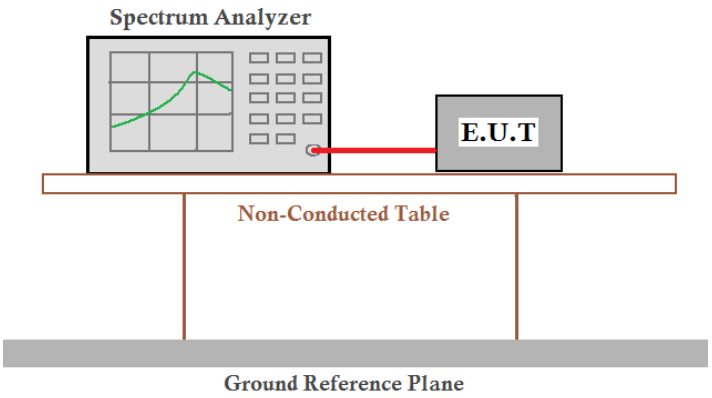
Test Requirement:	FCC Part15 E Section 15.407(a)(3)
Test Method:	ANSI C63.10:2013 and KDB789033 D02 General UNII Test Procedures New Rules v01
Limit:	30dBm
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data

Test CH	Peak Output Power (dBm)			Limit(dBm)	Result
	802.11a	802.11n(HT20)	802.11n(HT40)		
Lowest	14.17	12.41	12.88	30.00	Pass
Middle	14.15	12.77	---		
Highest	14.19	12.96	12.26		

Remark: “---“ is not applicable

7.4 Channel Bandwidth

Test Requirement:	FCC Part15 E Section 15.407(e)
Test Method:	ANSI C63.10:2013 and KDB789033 D02 General UNII Test Procedures New Rules v01
Limit:	>500KHz
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

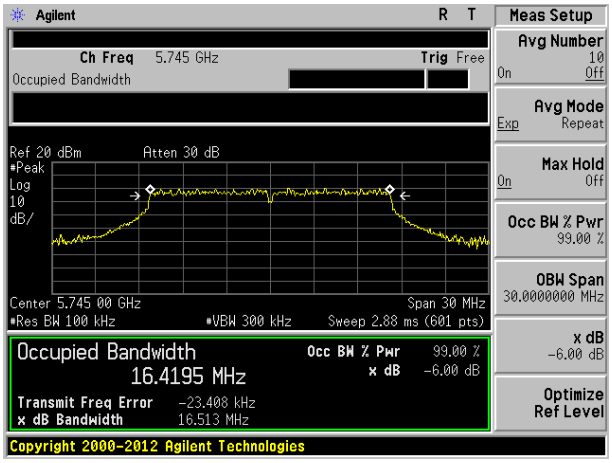
Measurement Data

Test CH	Channel Bandwidth (MHz)			Limit(KHz)	Result
	802.11a	802.11n(HT20)	802.11n(HT40)		
Lowest	16.513	17.770	35.205	>500KHz	Pass
Middle	16.475	17.732	---		
Highest	16.513	17.740	35.182		

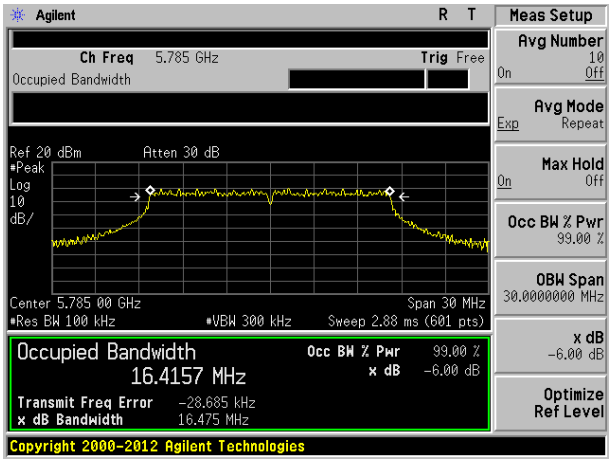
Remark: “---“ is not applicable

Test plot as follows:

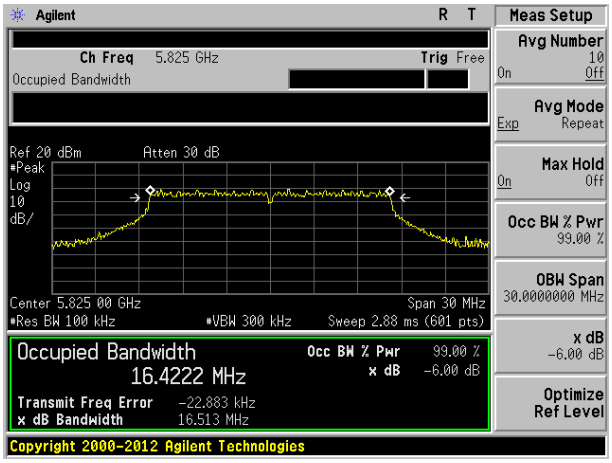
Test mode: 802.11a



Lowest channel

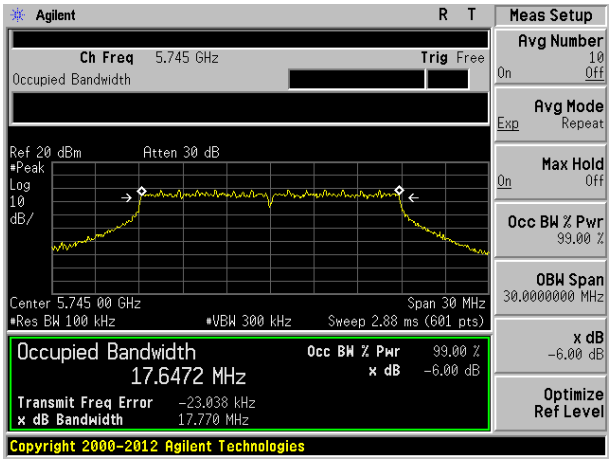


Middle channel

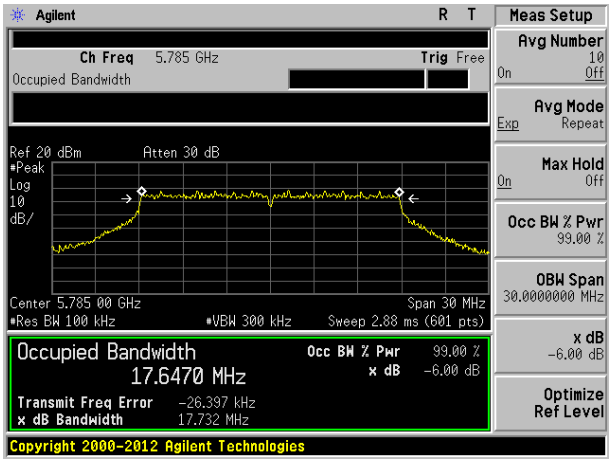


Highest channel

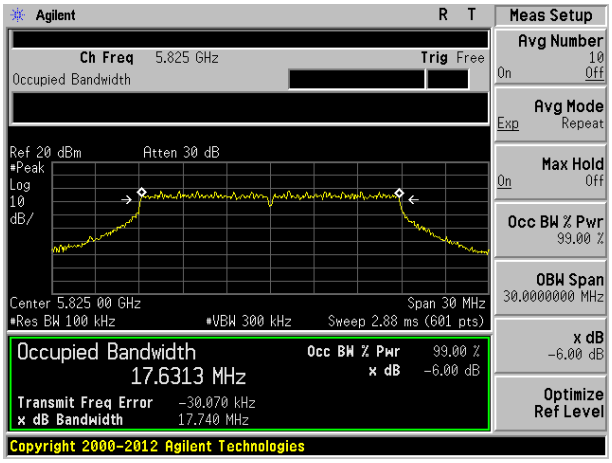
Test mode: 802.11n(HT20) @ 5.8G Band



Lowest channel

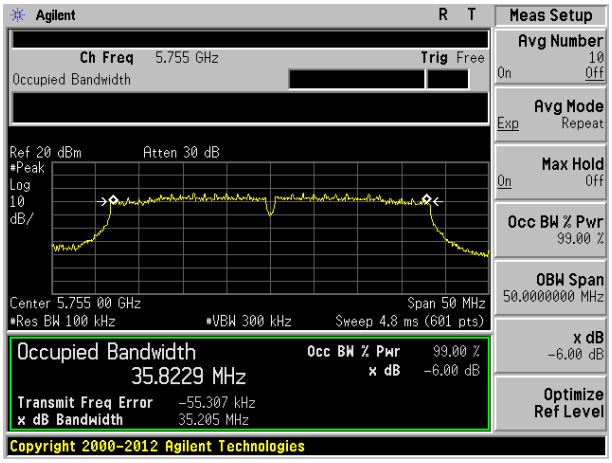


Middle channel

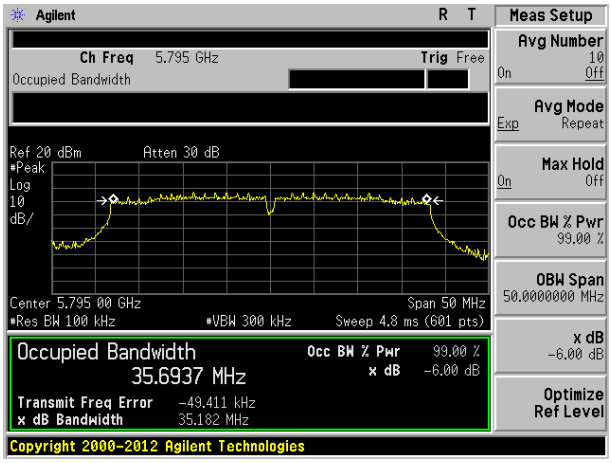


Highest channel

Test mode: 802.11n(HT40) @ 5.8G Band

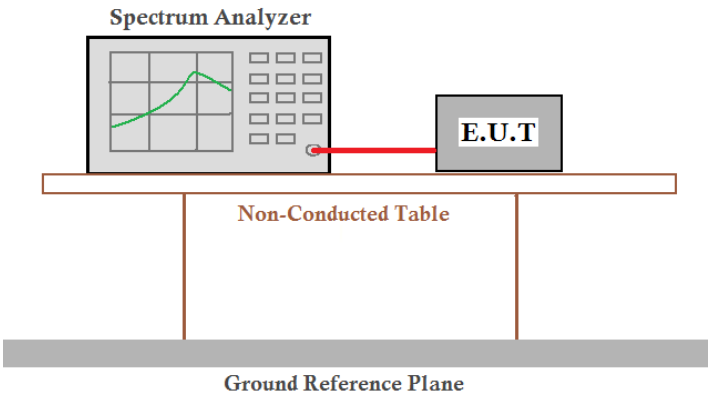


Lowest channel



Highest channel

7.5 Power Spectral Density

Test Requirement:	FCC Part15 E Section 15.407(a)(3)
Test Method:	ANSI C63.10:2013 and KDB789033 D02 General UNII Test Procedures New Rules v01
Limit:	30dBm
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

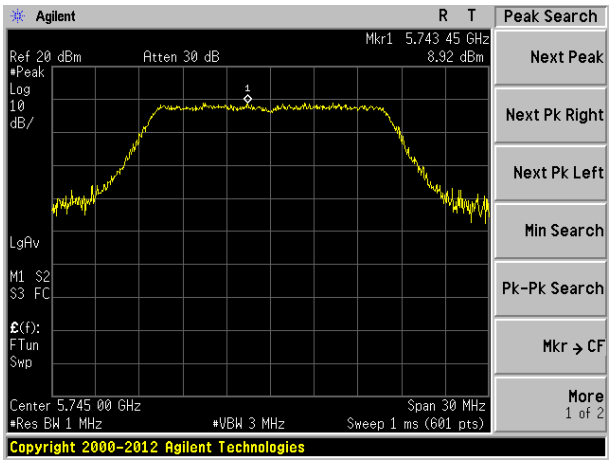
Measurement Data

Test CH	Channel Bandwidth (MHz)			Limit(dBm)	Result
	802.11a	802.11n(HT20)	802.11n(HT40)		
Lowest	8.92	6.85	4.49	30.00	Pass
Middle	8.81	6.69	---		
Highest	8.80	6.10	4.52		

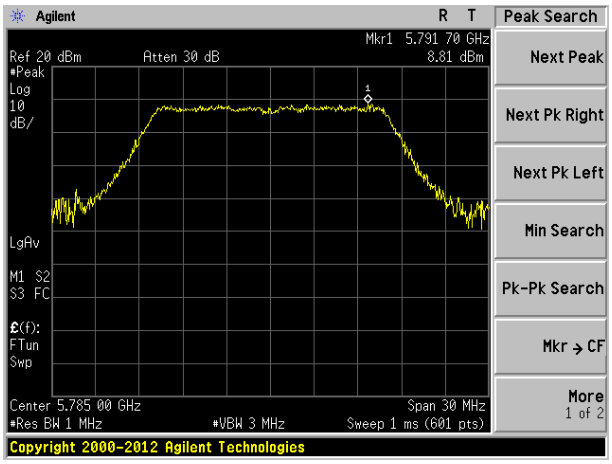
Remark: “---“ is not applicable

Test plot as follows:

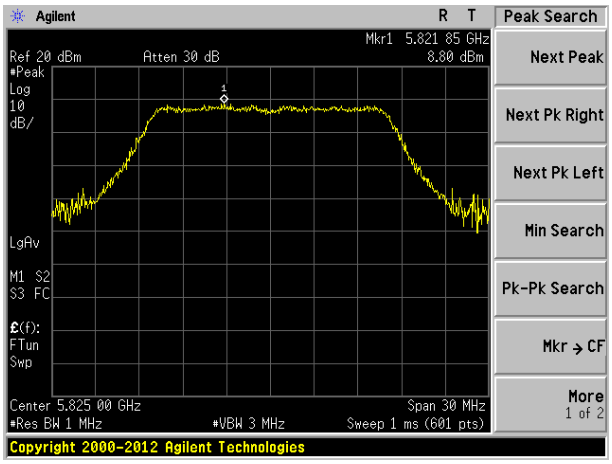
Test mode: 802.11a



Lowest channel

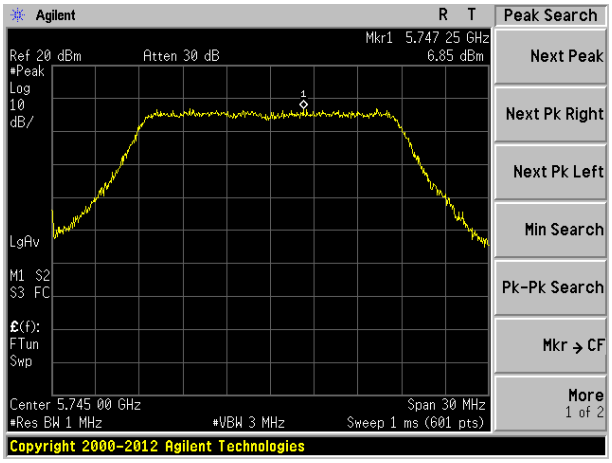


Middle channel

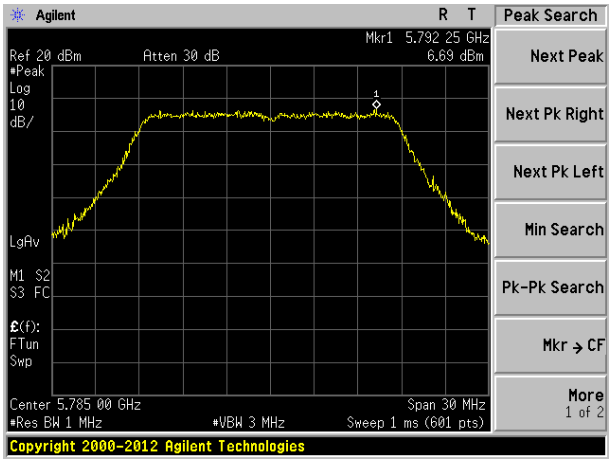


Highest channel

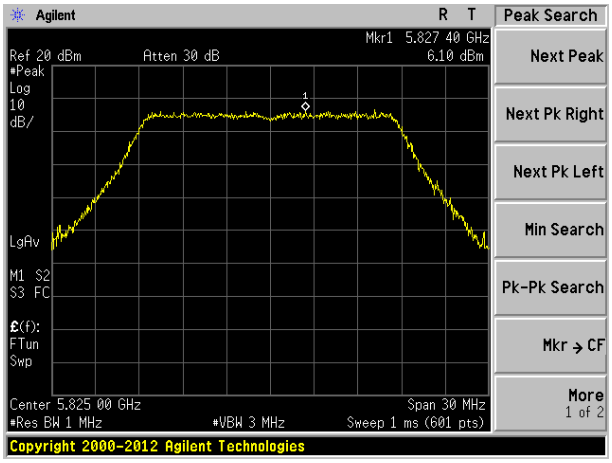
Test mode: 802.11n(HT20) @ 5.8G Band



Lowest channel

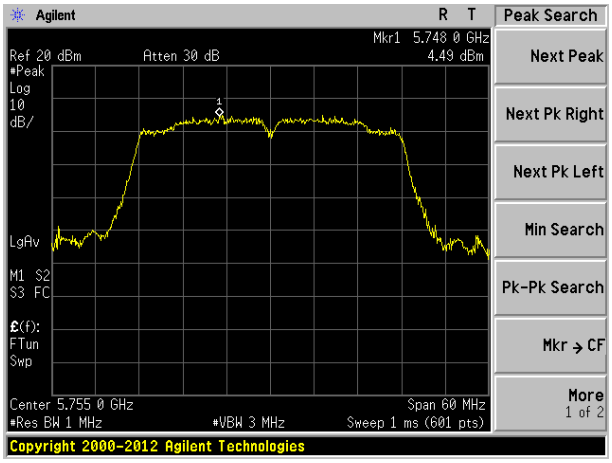


Middle channel

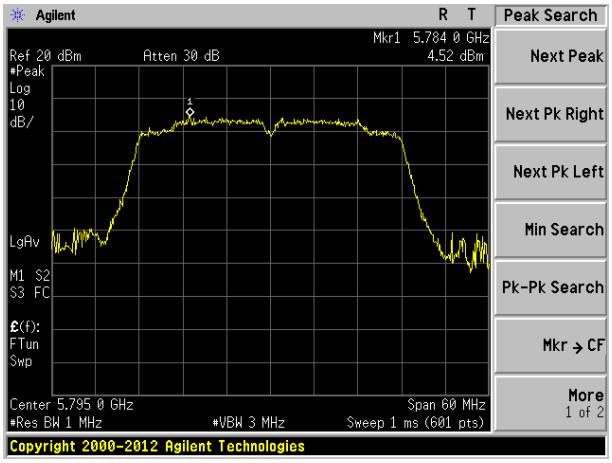


Highest channel

Test mode: 802.11n(HT40) @ 5.8G Band



Lowest channel



Highest channel

7.6 Band edges

7.6.1 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209 and 15.205
Test Method:	ANSI C63.10: 2013
Test Frequency Range:	30MHz to 40GHz, only worse case is reported
Test site:	Measurement Distance: 3m

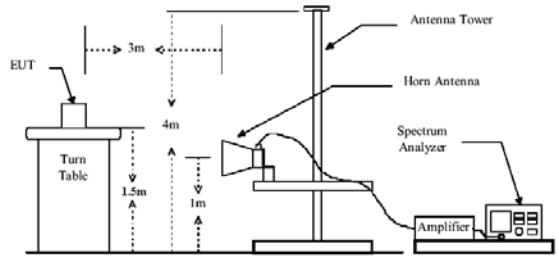
Receiver setup:

Frequency	Detector	RBW	VBW	Value
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Limit:

Frequency	Limit (dBuV/m @3m)	Value
Above 1GHz	54.00	Average
	74.00	Peak

Test setup:



Test Procedure:

1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement data:

Remark: The pre-test were performed on lowest, middle and highest frequencies, only the worst case's (lowest and highest frequencies) data was showed.

Test mode:	802.11a	Test channel:	Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	40.52	32.68	9.97	23.86	59.31	74.00	-14.69	Horizontal
5741.35	82.41	32.56	9.86	23.85	100.98	N/A	N/A	Horizontal
5725.00	41.08	32.68	9.97	23.86	59.87	74.00	-14.13	Vertical
5741.35	84.97	32.56	9.86	23.85	103.54	N/A	N/A	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	30.15	32.68	9.97	23.86	48.94	54.00	-5.06	Horizontal
5741.35	72.33	32.56	9.86	23.85	90.9	N/A	N/A	Horizontal
5725.00	30.56	32.68	9.97	23.86	49.35	54.00	-4.65	Vertical
5741.35	75.98	32.56	9.86	23.85	94.55	N/A	N/A	Vertical

Test mode:	802.11a	Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5826.20	78.38	32.68	9.97	23.86	97.17	N/A	N/A	Horizontal
5850.00	38.21	32.7	9.99	23.87	57.03	74.00	-16.97	Horizontal
5826.20	85.39	32.68	9.97	23.86	104.18	N/A	N/A	Vertical
5850.00	40.04	32.7	9.99	23.87	58.86	74.00	-15.14	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5826.20	70.48	32.68	9.97	23.86	89.27	N/A	N/A	Horizontal
5850.00	28.77	32.7	9.99	23.87	47.59	54.00	-6.41	Horizontal
5826.20	76.24	32.68	9.97	23.86	95.03	N/A	N/A	Vertical
5850.00	28.86	32.7	9.99	23.87	47.68	54.00	-6.32	Vertical

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Test mode:	802.11n(HT20) @ 5.8G Band	Test channel:	Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	37.77	32.68	9.97	23.86	56.56	74.00	-17.44	Horizontal
5742.19	77.34	32.56	9.86	23.85	95.91	N/A	N/A	Horizontal
5725.00	40.03	32.68	9.97	23.86	58.82	74.00	-15.18	Vertical
5742.19	84.15	32.56	9.86	23.85	102.72	N/A	N/A	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	28.25	32.68	9.97	23.86	47.04	54.00	-6.96	Horizontal
5742.19	69.14	32.56	9.86	23.85	87.71	N/A	N/A	Horizontal
5725.00	29.57	32.68	9.97	23.86	48.36	54.00	-5.64	Vertical
5742.19	75.84	32.56	9.86	23.85	94.41	N/A	N/A	Vertical

Test mode:	802.11n(HT20) @ 5.8G Band	Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5826.20	77.84	32.68	9.97	23.86	96.63	N/A	N/A	Horizontal
5850.00	38.48	32.70	9.99	23.87	57.30	74.00	-16.70	Horizontal
5826.20	85.72	32.68	9.97	23.86	104.51	N/A	N/A	Vertical
5850.00	40.25	32.70	9.99	23.87	59.07	74.00	-14.93	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5826.20	68.71	32.68	9.97	23.86	87.5	N/A	N/A	Horizontal
5850.00	28.06	32.7	9.99	23.87	46.88	54.00	-7.12	Horizontal
5826.20	74.33	32.68	9.97	23.86	93.12	N/A	N/A	Vertical
5850.00	29.15	32.7	9.99	23.87	47.97	54.00	-6.03	Vertical

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Test mode:	802.11n(HT40) @ 5.8G Band	Test channel:	Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	38.79	32.53	9.83	23.84	57.31	74.00	-16.69	Horizontal
5745.00	75.04	32.56	9.86	23.85	93.61	N/A	N/A	Horizontal
5725.00	37.86	32.53	9.83	23.84	56.38	74.00	-17.62	Vertical
5745.00	84.53	32.56	9.86	23.85	103.10	N/A	N/A	Vertical

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.00	30.25	32.53	9.83	23.84	48.77	54.00	-5.23	Horizontal
5745.00	68.98	32.56	9.86	23.85	87.55	N/A	N/A	Horizontal
5725.00	28.33	32.53	9.83	23.84	46.85	54.00	-7.15	Vertical
5745.00	75.04	32.56	9.86	23.85	93.61	N/A	N/A	Vertical

Test mode:	802.11n(HT40) @ 5.8G Band	Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5784.88	79.88	32.63	9.90	23.85	98.56	N/A	N/A	Horizontal
5850.00	38.96	32.70	9.99	23.87	57.78	74.00	-16.22	Horizontal
5784.88	84.57	32.63	9.90	23.85	103.25	N/A	N/A	Vertical
5850.00	42.65	32.70	9.99	23.87	61.47	74.00	-12.53	Vertical

Average value:

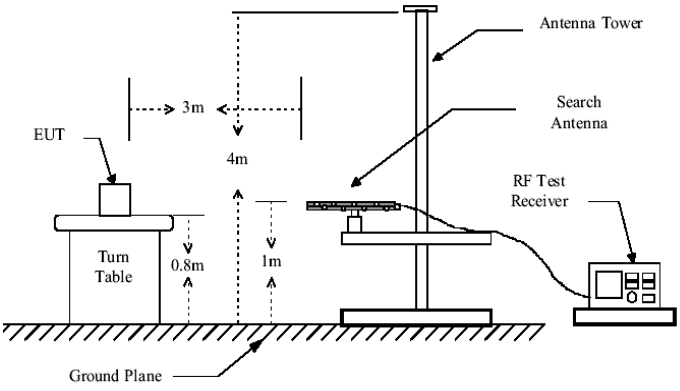
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5784.88	71.59	32.63	9.90	23.85	90.27	N/A	N/A	Horizontal
5850.00	28.15	32.70	9.99	23.87	46.97	54.00	-7.03	Horizontal
5784.88	74.07	32.63	9.90	23.85	92.75	N/A	N/A	Vertical
5850.00	27.64	32.70	9.99	23.87	46.46	54.00	-7.54	Vertical

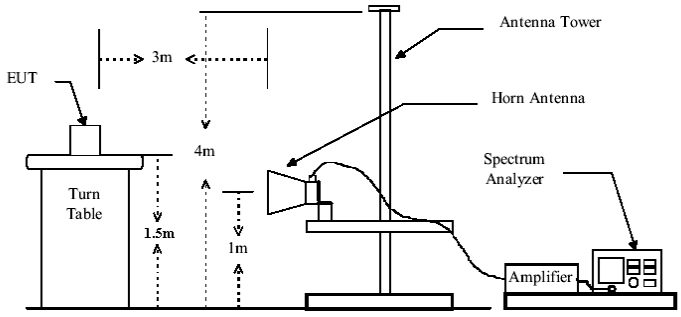
Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

7.7 Spurious Emission

7.7.1 Radiated Emission Method

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 C Section 15.209, Part 15E Section 15.407(b)(4)</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Test Frequency Range:</td><td>30MHz to 40GHz</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Value</th></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>120KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><th>Frequency</th><th>Limit (dBuV/m @3m)</th><th>Remark</th></tr>
<tr><td>30MHz-88MHz</td><td>40.0</td><td>Quasi-peak Value</td></tr>
<tr><td>88MHz-216MHz</td><td>43.5</td><td>Quasi-peak Value</td></tr>
<tr><td>216MHz-960MHz</td><td>46.0</td><td>Quasi-peak Value</td></tr>
<tr><td>960MHz-1GHz</td><td>54.0</td><td>Quasi-peak Value</td></tr>
<tr><td>Frequency</td><td>Limit (dBm/MHz)</td><td>Remark</td></tr>
<tr><td>Above 1GHz</td><td>-27.0</td><td>Peak Value</td></tr>
</table>
</td></tr>
<tr><td>Test setup:</td><td>Below 1GHz
 

Above 1GHz
 
</td></tr>
<tr><td>Test Procedure:</td><td>1. The EUT was placed on the top of a rotating table (0.8m for below</td></tr>
</table>

	1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. 7. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Remark:
According to KDB 789033 D02V01 section G) 1) (d), for For measurements above 1000 MHz @ 3m distance, the limit of field strength is computed as follows:
E[dBuV/m] = EIRP[dBm] + 95.2;
For example, if EIRP = -27dBm
E[dBuV/m] = -27 + 95.2 = 68.2dBuV/m.

Measurement Data

■ **Below 1GHz**

Only the data of worst case at each channel plan (nominal bandwidth =20MHz, 40MHz, 80MHz) is reported.

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
36.77	38.36	14.77	0.63	30.06	23.70	40.00	-16.30	Vertical
84.41	35.67	12.16	1.07	29.77	19.13	40.00	-20.87	Vertical
137.42	56.68	10.35	1.49	29.47	39.05	43.50	-4.45	Vertical
325.60	50.98	15.59	2.49	29.85	39.21	46.00	-6.79	Vertical
340.78	45.10	16.15	2.57	29.77	34.05	46.00	-11.95	Vertical
962.16	36.23	23.49	5.09	29.10	35.71	54.00	-18.29	Vertical
38.21	25.54	15.15	0.64	30.05	11.28	40.00	-28.72	Horizontal
78.14	30.23	10.31	1.01	29.81	11.74	40.00	-28.26	Horizontal
135.51	56.51	10.51	1.47	29.48	39.01	43.50	-4.49	Horizontal
143.83	54.76	10.22	1.53	29.44	37.07	43.50	-6.43	Horizontal
337.22	43.37	16.05	2.56	29.79	32.19	46.00	-13.81	Horizontal
958.79	30.08	23.49	5.08	29.10	29.55	46.00	-16.45	Horizontal

■ **Above 1GHz**

Test mode:	802.11a			Test channel:	lowest		
Antenna Pol.	Frequency (MHz)	Reading Level	Factor	Measure Level	Limit (dBuV/m)	Over limit(dB)	Detector
V	11510.00	26.52	21.64	48.16	54(Note3)	-5.84	PK
V	17265.00	24.25	21.80	46.05	54(Note3)	-7.95	PK
H	11510.00	24.32	21.83	46.15	54(Note3)	-7.85	PK
H	17265.00	23.20	21.67	44.87	54(Note3)	-9.13	PK

Test mode:	802.11a			Test channel:	Middle		
Antenna Pol.	Frequency (MHz)	Reading Level	Factor	Measure Level	Limit (dBuV/m)	Over limit(dB)	Detector
V	11570.00	25.68	21.64	47.32	54(Note3)	-6.68	PK
V	17355.00	24.05	21.80	45.85	54(Note3)	-8.15	PK
H	11570.00	22.71	21.83	44.54	54(Note3)	-9.46	PK
H	17355.00	23.45	21.67	45.12	54(Note3)	-8.88	PK

Test mode:	802.11a			Test channel:	Highest		
Antenna Pol.	Frequency (MHz)	Reading Level	Factor	Measure Level	Limit (dBuV/m)	Over limit(dB)	Detector
V	11650.00	25.92	21.64	47.56	54(Note3)	-6.44	PK
V	17475.00	23.60	21.80	45.40	54(Note3)	-8.60	PK
H	11650.00	23.47	21.83	45.30	54(Note3)	-8.70	PK
H	17475.00	22.05	21.67	43.72	54(Note3)	-10.28	PK

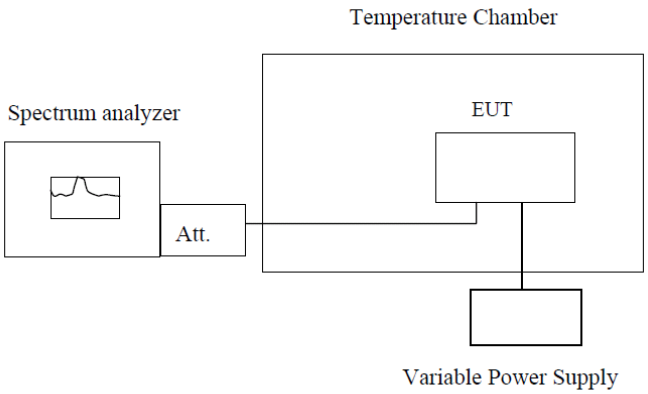
Note:

1. Measure Level = Reading Level + Factor.

2. The test trace is same as the ambient noise (the test frequency range: 18GHz~40GHz), therefore no data appear in the report.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

7.8 Frequency stability

Test Requirement:	FCC Part15 C Section 15.407(g)
Test Method:	ANSI C63.10:2013, FCC Part 2.1055
Limit:	Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified
Test Procedure:	The EUT was setup to ANSI C63.4, 2003; tested to 2.1055 for compliance to FCC Part 15.407(g) requirements.
Test setup:	 **Note :** Measurement setup for testing on Antenna connector
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement data:

802.11a					
Frequency stability versus Temp.					
Power Supply: DC 3.7V					
Temp. (°C)	Operating Frequency (MHz)	0 minute	2 minute	5 minute	10 minute
		Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)
-30	5745	5744.9831	5744.9839	5744.9852	5744.9859
	5785	5784.9836	5784.9844	5784.9856	5784.9864
	5825	5824.9841	5824.9849	5824.9860	5824.9868
-20	5745	5744.9850	5744.9857	5744.9868	5744.9875
	5785	5784.9854	5784.9861	5784.9872	5784.9879
	5825	5824.9859	5824.9865	5824.9876	5824.9882
-10	5745	5744.9867	5744.9873	5744.9883	5744.9889
	5785	5784.9871	5784.9877	5784.9887	5784.9892
	5825	5824.9874	5824.9880	5824.9890	5824.9895
0	5745	5744.9836	5744.9844	5744.9856	5744.9863
	5785	5784.9841	5784.9848	5784.9860	5784.9867
	5825	5824.9845	5824.9853	5824.9864	5824.9871
10	5745	5744.9854	5744.9861	5744.9872	5744.9879
	5785	5784.9859	5784.9865	5784.9876	5784.9882
	5825	5824.9863	5824.9869	5824.9880	5824.9886
20	5745	5744.9871	5744.9877	5744.9886	5744.9892
	5785	5784.9874	5784.9880	5784.9890	5784.9895
	5825	5824.9878	5824.9884	5824.9893	5824.9898
30	5745	5744.9830	5744.9838	5744.9851	5744.9858
	5785	5784.9835	5784.9842	5784.9855	5784.9862
	5825	5824.9839	5824.9847	5824.9859	5824.9866
40	5745	5744.9849	5744.9856	5744.9867	5744.9874
	5785	5784.9853	5784.9860	5784.9871	5784.9878
	5825	5824.9857	5824.9864	5824.9875	5824.9881
50	5745	5744.9865	5744.9872	5744.9882	5744.9888
	5785	5784.9869	5784.9876	5784.9885	5784.9891
	5825	5824.9873	5824.9879	5824.9889	5824.9894

Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (VDC)	Operating Frequency (MHz)	0 minute	2 minute	5 minute	10 minute
		Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)
3.3	5745	5744.9849	5744.9856	5744.9868	5744.9874
	5785	5784.9854	5784.9861	5784.9872	5784.9878
	5825	5824.9858	5824.9865	5824.9875	5824.9882
3.7	5745	5744.9866	5744.9872	5744.9882	5744.9888
	5785	5784.9870	5784.9876	5784.9886	5784.9892
	5825	5824.9874	5824.9880	5824.9889	5824.9895
4.1	5745	5744.9881	5744.9887	5744.9896	5744.9901
	5785	5784.9884	5784.9890	5784.9899	5784.9904
	5825	5824.9888	5824.9893	5824.9902	5824.9907

802.11n(HT20)					
Frequency stability versus Temp.					
Power Supply: DC 3.7V					
Temp. (°C)	Operating Frequency (MHz)	0 minute	2 minute	5 minute	10 minute
		Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)
-30	5745	5744.9864	5744.9871	5744.9881	5744.9887
	5785	5784.9868	5784.9875	5784.9884	5784.9890
	5825	5824.9872	5824.9878	5824.9888	5824.9893
-20	5745	5744.9879	5744.9885	5744.9894	5744.9900
	5785	5784.9883	5784.9889	5784.9897	5784.9903
	5825	5824.9886	5824.9892	5824.9900	5824.9905
-10	5745	5744.9893	5744.9898	5744.9906	5744.9911
	5785	5784.9896	5784.9901	5784.9909	5784.9913
	5825	5824.9899	5824.9904	5824.9911	5824.9916
0	5745	5744.9868	5744.9874	5744.9884	5744.9890
	5785	5784.9872	5784.9878	5784.9888	5784.9893
	5825	5824.9876	5824.9882	5824.9891	5824.9896
10	5745	5744.9883	5744.9888	5744.9897	5744.9902
	5785	5784.9886	5784.9892	5784.9900	5784.9905
	5825	5824.9890	5824.9895	5824.9903	5824.9908
20	5745	5744.9896	5744.9901	5744.9909	5744.9913
	5785	5784.9899	5784.9904	5784.9911	5784.9916
	5825	5824.9902	5824.9907	5824.9914	5824.9918
30	5745	5744.9863	5744.9870	5744.9880	5744.9886
	5785	5784.9867	5784.9873	5784.9883	5784.9889
	5825	5824.9871	5824.9877	5824.9887	5824.9892
40	5745	5744.9878	5744.9884	5744.9893	5744.9899
	5785	5784.9882	5784.9887	5784.9896	5784.9902
	5825	5824.9885	5824.9891	5824.9899	5824.9904
50	5745	5744.9892	5744.9897	5744.9905	5744.9910
	5785	5784.9895	5784.9900	5784.9908	5784.9913
	5825	5824.9898	5824.9903	5824.9911	5824.9915

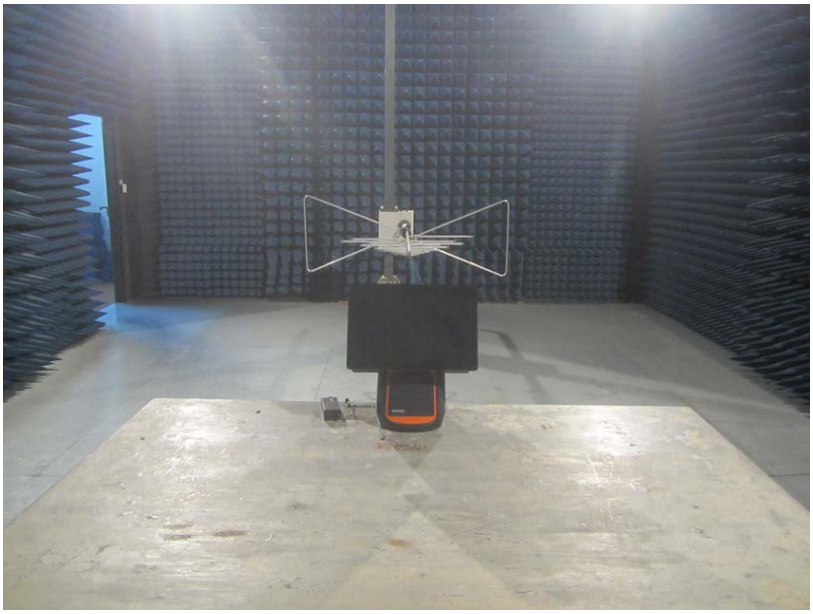
Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (VDC)	Operating Frequency (MHz)	0 minute	2 minute	5 minute	10 minute
		Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)
3.3	5745	5744.9853	5744.9860	5744.9871	5744.9878
	5785	5784.9858	5784.9865	5784.9875	5784.9882
	5825	5824.9862	5824.9868	5824.9879	5824.9885
3.7	5745	5744.9870	5744.9876	5744.9886	5744.9892
	5785	5784.9874	5784.9880	5784.9889	5784.9895
	5825	5824.9877	5824.9883	5824.9892	5824.9898
4.1	5745	5744.9884	5744.9890	5744.9899	5744.9904
	5785	5784.9888	5784.9893	5784.9901	5784.9906
	5825	5824.9891	5824.9896	5824.9904	5824.9909

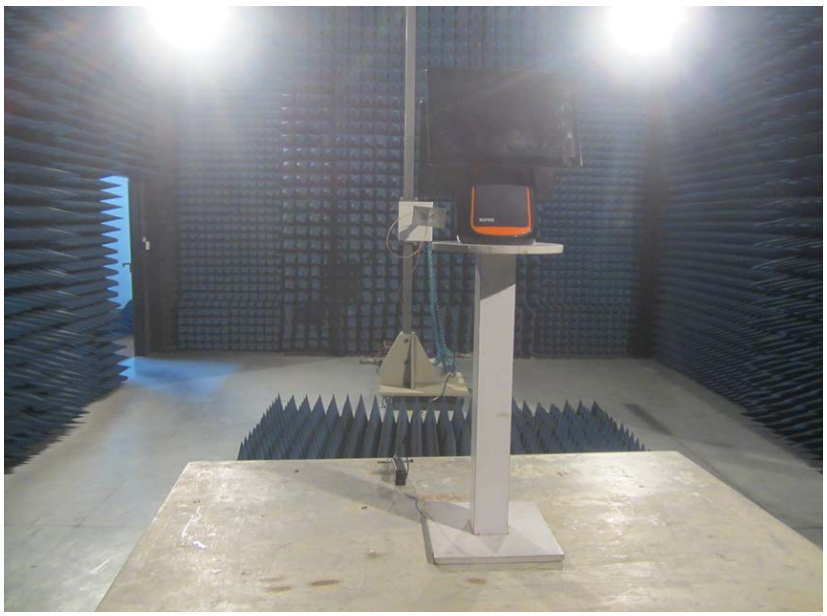
802.11n(HT40)					
Frequency stability versus Temp.					
Power Supply: DC 3.7V					
Temp. (°C)	Operating Frequency (MHz)	0 minute	2 minute	5 minute	10 minute
		Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)
-30	5755	5754.9849	5754.9856	5754.9868	5754.9874
	5795	5794.9853	5794.9860	5794.9871	5794.9878
-20	5755	5754.9858	5754.9864	5754.9875	5754.9881
	5795	5794.9862	5794.9868	5794.9879	5794.9885
-10	5755	5754.9866	5754.9872	5754.9882	5754.9888
	5795	5794.9870	5794.9876	5794.9886	5794.9892
0	5755	5754.9874	5754.9880	5754.9889	5754.9895
	5795	5794.9877	5794.9883	5794.9892	5794.9898
10	5755	5754.9881	5754.9886	5754.9895	5754.9901
	5795	5794.9884	5794.9890	5794.9898	5794.9904
20	5755	5754.9888	5754.9893	5754.9901	5754.9906
	5795	5794.9891	5794.9896	5794.9904	5794.9909
30	5755	5754.9853	5754.9860	5754.9871	5754.9878
	5795	5794.9858	5794.9864	5794.9875	5794.9881
40	5755	5754.9862	5754.9868	5754.9879	5754.9885
	5795	5794.9866	5794.9872	5794.9882	5794.9888
50	5755	5754.9870	5754.9876	5754.9886	5754.9891
	5795	5794.9884	5794.9890	5794.9898	5794.9904

Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (VDC)	Operating Frequency (MHz)	0 minute	2 minute	5 minute	10 minute
		Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)
3.3	5755	5754.9894	5754.9899	5754.9907	5754.9912
	5795	5794.9847	5794.9855	5794.9866	5794.9873
3.7	5755	5754.9852	5754.9859	5754.9870	5754.9877
	5795	5794.9856	5794.9863	5794.9874	5794.9880
4.1	5755	5754.9860	5754.9867	5754.9878	5754.9884
	5795	5794.9864	5794.9871	5794.9881	5794.9887

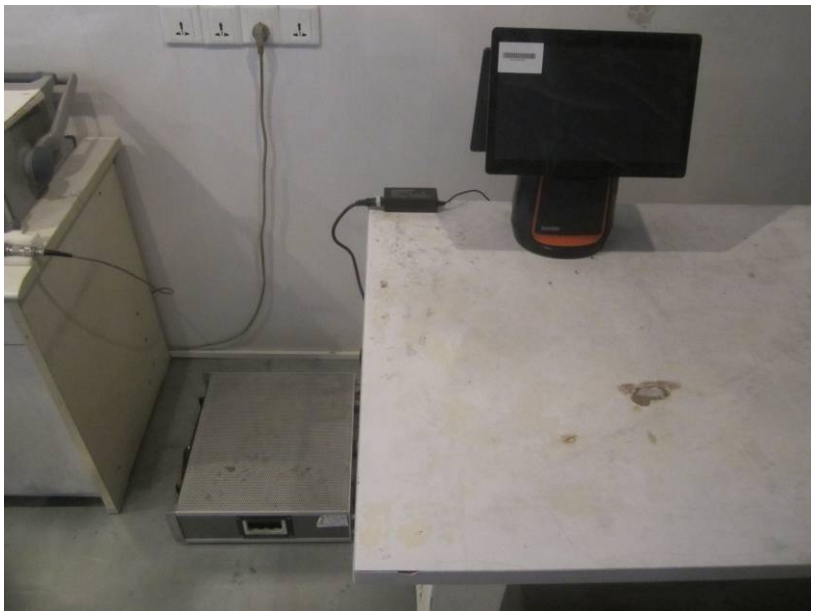
8 Test Setup Photo

Radiated Emission





Conducted Emission



9 EUT Constructional Details

Reference to the test report No. GTS201609000124E01

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