FCC REPORT

Applicant:	Autel Intelligent Tech. Corp., Ltd.
Address of Applicant:	6th - 10th Floor, Bldg. B1, Zhiyuan, Xueyuan Rd., Xili, Nanshan, Shenzhen, China
Manufacturer/ Factory:	Autel Intelligent Tech. Corp., Ltd.
Address of Manufacturer/ Factory:	6th - 10th Floor, Bldg. B1, Zhiyuan, Xueyuan Rd., Xili, Nanshan, Shenzhen, China

Equipment Under Test (EUT)

Product Name:	AUTOMOTIVE DIAGNOSTIC & ANALYSIS SYSTEM
Model No.:	MaxiSys, MaxiSys Pro
Trade Mark:	AUTEL
FCC ID:	WQ8MAXISYSMY908
Applicable standards:	FCC CFR Title 47 Part 15 Subpart E Section 15.407:2016
Date of sample receipt:	January 08, 2017
Date of Test:	January 09-16, 2017
Date of report issue:	January 17, 2017
Test Result :	PASS *

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

Authorized Signature:

Robinson Lo
Laboratory Manager

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

2 Version

Version No.	Date	Description
01	*January 17, 2017*	*Original*

Prepared By: Tiger. Chen ***Date:*** *January 17, 2017*

Project Engineer

Check By: Andy. wu ***Date:*** *January 17, 2017*

Reviewer

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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
Peak Transmit Power	15.407(a)(1)	PASS
Power Spectral Density	15.407(a)(1)	PASS
Undesirable Emission	15.407(b)(6), 15.205/15.209	PASS
Radiated Emission	15.205/15.209	PASS
Band Edge	15.205	PASS
Frequency Stability	15.407(f)	PASS

Remark:

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

Fail: The EUT does not comply with the essential requirements in the standard.

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

5 General Information

5.1 General Description of EUT

Product Name:	AUTOMOTIVE DIAGNOSTIC & ANALYSIS SYSTEM
Model No.:	MaxiSys, MaxiSys Pro
Test Model:	MaxiSys
Remark:	*Remark: All above models are identical in the same PCB layout, interior structure and electrical circuits. The only difference is the model name for commercial purpose.*
Operation Frequency:	802.11a/802.11n(HT20): 5180MHz ~ 5240MHz; 802.11n(HT40): 5190MHz ~ 5230MHz
Channel numbers:	802.11a/802.11n(HT20): 4; 802.11n(HT40): 2
Channel separation:	802.11a/802.11n(HT20): 20MHz; 802.11n(HT40): 40MHz
Modulation technology:	OFDM
Antenna Type:	Integral Antenna
Antenna gain:	0.85dBi (declare by Applicant)
Power supply:	Model No.:GFP361DA-1230-1 Input: AC 100~240V~50/60Hz 1.2A Output: DC 12.0V 3.0A DC 3.7V Li-ion Battery

5.2 Test mode

Transmitting mode	Keep the EUT in transmitting with modulation. EUT was test with 98% duty cycle at its maximum power control level.
Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, the duty cycle is 98% and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.	

5.3 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 fully 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.

5.4 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.
Address: 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

5.5 Description of Support Units

None.

5.6 Deviation from Standards

None.

5.7 Abnormalities from Standard Conditions

None.

5.8 Other Information Requested by the Customer

None.

5.9 Test Instruments list

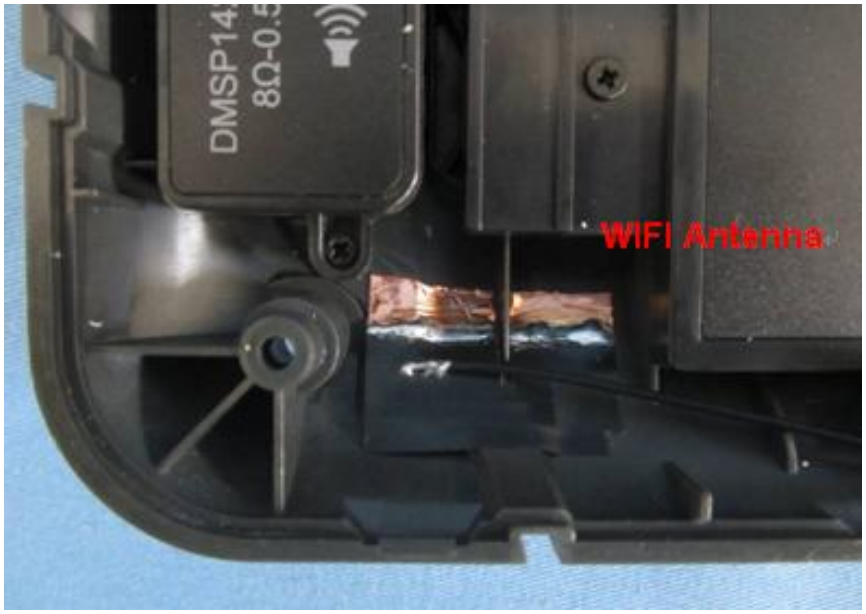
Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 29 2016	June. 28 2017
4	Spectrum analyzer	Agilent	E4447A	GTS516	June. 29 2016	June. 28 2017
5	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 29 2016	June. 28 2017
6	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 29 2016	June. 28 2017
7	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June. 29 2016	June. 28 2017
8	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 29 2016	June. 28 2017
9	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
10	Coaxial Cable	GTS	N/A	GTS213	June. 29 2016	June. 28 2017
11	Coaxial Cable	GTS	N/A	GTS211	June. 29 2016	June. 28 2017
12	Coaxial cable	GTS	N/A	GTS210	June. 29 2016	June. 28 2017
13	Coaxial Cable	GTS	N/A	GTS212	June. 29 2016	June. 28 2017
14	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 29 2016	June. 28 2017
15	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	June. 29 2016	June. 28 2017
16	Amplifier (18-40GHz)	MITEQ	AMF-6F-18004000-29-8P	GTS534	June. 29 2016	June. 28 2017
17	Band filter	Amindeon	82346	GTS219	June. 29 2016	June. 28 2017
18	Constant temperature and humidity box	Oregon Scientific	BA-888	GTS248	June. 29 2016	June. 28 2017
19	D.C. Power Supply	Instek	PS-3030	GTS232	June. 29 2016	June. 28 2017
20	Universal radio communication tester	Rohde & Schwarz	CMU200	GTS235	June. 29 2016	June. 28 2017
21	Splitter	Agilent	11636B	GTS237	June. 29 2016	June. 28 2017
22	Power Meter	Anritsu	ML2495A	GTS540	June. 29 2016	June. 28 2017
23	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	7.3(L)x3.1(W)x2.9(H)	GTS252	May 16 2014	May 15 2019
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June 29 2016	June 28 2017
3	Pulse Limiter	R&S	ESH3-Z2	GTS224	June 29 2016	June 28 2017
4	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June 29 2016	June 28 2017
5	Artificial Mains Network	SCHWARZBECK MESS	NSLK8127	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
8	Thermo meter	KTJ	TA328	GTS233	June 29 2016	June 28 2017

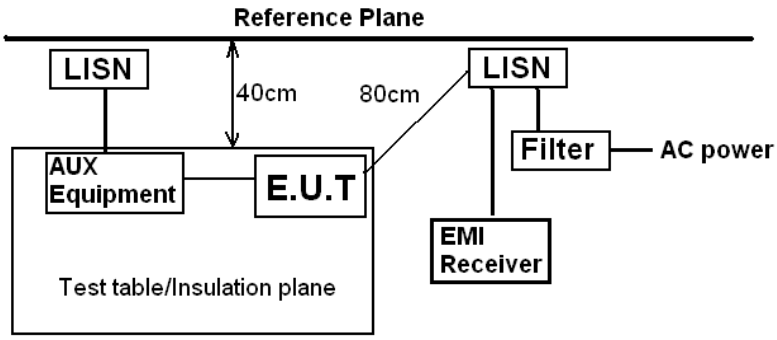
General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Barometer	ChangChun	DYM3	GTS257	June 29 2016	June 28 2017

5 Test results and Measurement Data

5.1 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 PCB antenna. The best case gain of the antenna is0.85Bi. 	

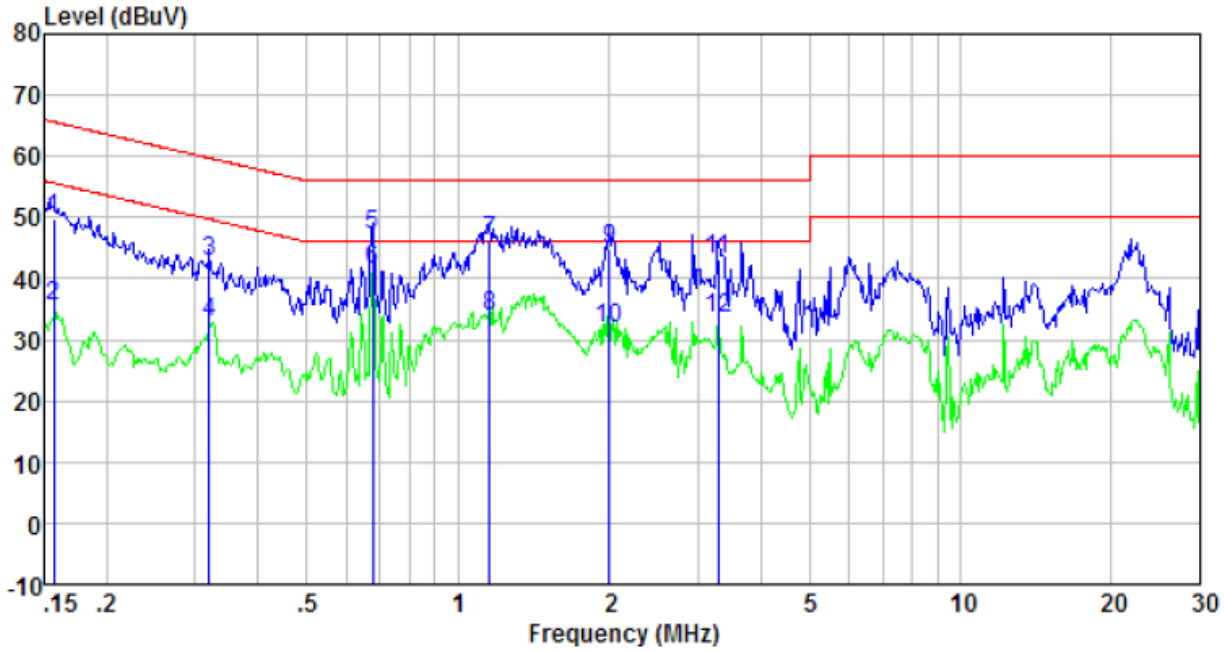
5.2 Conducted Emissions

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
Limit:	<table><tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBuV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></tr><tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr><tr><td>0.5-5</td><td>56</td><td>46</td></tr><tr><td>5-30</td><td>60</td><td>50</td></tr></table> * Decreases with the logarithm of the frequency.
Test procedure	The E.U.T and simulators are connected to the main power through a line impedance stabilization network(L.I.S.N.). The provide a 50ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs). 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 setup:	 *Remark:* *E.U.T: Equipment Under Test* *LISN: Line Impedence Stabilization Network* *Test table height=0.8m*
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.2 for details. All of list mode were tested, Only the data of worst case is reported.
Test results:	Pass

Measurement Data

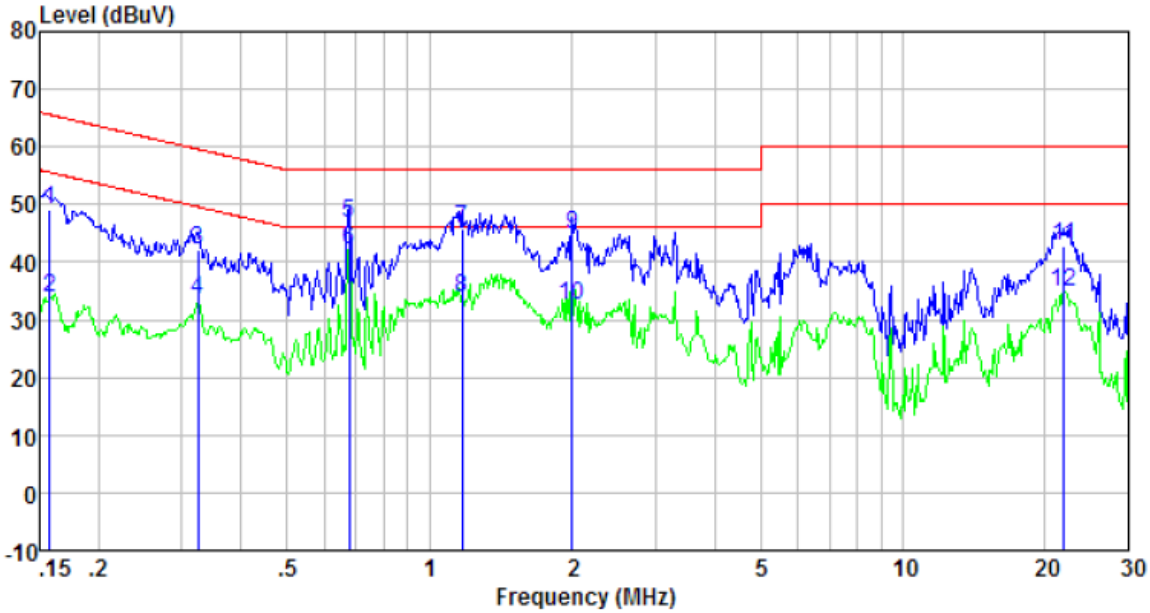
An initial pre-scan was performed on the live and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

Line:



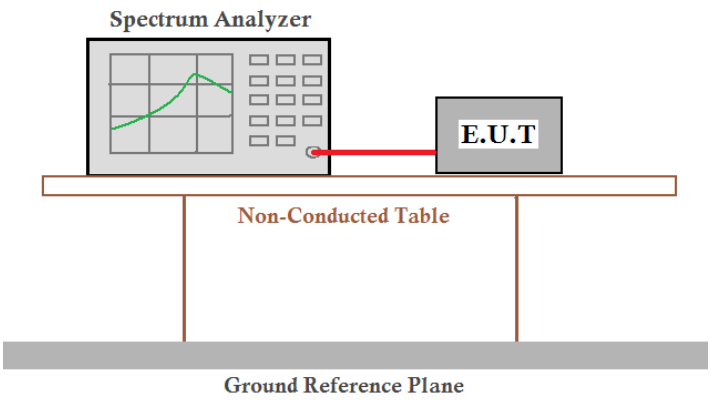
Freq MHz	Reading level dBuV	lISN/ISN factor dB	Cable loss dB	level dBuV	Limit level dBuV	Over limit dB	Remark
0.156	49.21	0.41	0.10	49.72	65.65	-15.93	QP
0.156	34.89	0.41	0.10	35.40	55.65	-20.25	Average
0.320	42.18	0.42	0.10	42.70	59.71	-17.01	QP
0.320	32.48	0.42	0.10	33.00	49.71	-16.71	Average
0.675	46.73	0.25	0.10	47.08	56.00	-8.92	QP
0.675	41.24	0.25	0.10	41.59	46.00	-4.41	Average
1.153	45.77	0.21	0.10	46.08	56.00	-9.92	QP
1.153	33.42	0.21	0.10	33.73	46.00	-12.27	Average
2.001	44.45	0.20	0.10	44.75	56.00	-11.25	QP
2.001	31.67	0.20	0.10	31.97	46.00	-14.03	Average
3.293	42.92	0.21	0.10	43.23	56.00	-12.77	QP
3.293	33.19	0.21	0.10	33.50	46.00	-12.50	Average

Neutral:



Freq MHz	Reading level dBuV	lISN/ISN factor dB	Cable loss dB	level dBuV	Limit level dBuV	Over limit dB	Remark
0.157	48.65	0.42	0.10	49.17	65.60	-16.43	QP
0.157	33.28	0.42	0.10	33.80	55.60	-21.80	Average
0.323	41.68	0.43	0.10	42.21	59.62	-17.41	QP
0.323	32.90	0.43	0.10	33.43	49.62	-16.19	Average
0.675	46.43	0.29	0.10	46.82	56.00	-9.18	QP
0.675	41.61	0.29	0.10	42.00	46.00	-4.00	Average
1.172	45.46	0.24	0.10	45.80	56.00	-10.20	QP
1.172	33.40	0.24	0.10	33.74	46.00	-12.26	Average
2.001	44.44	0.20	0.10	44.74	56.00	-11.26	QP
2.001	32.37	0.20	0.10	32.67	46.00	-13.33	Average
21.946	42.31	0.32	0.21	42.84	60.00	-17.16	QP
21.946	34.30	0.32	0.21	34.83	50.00	-15.17	Average

5.3 Emission Bandwidth and 99% Occupied Bandwidth

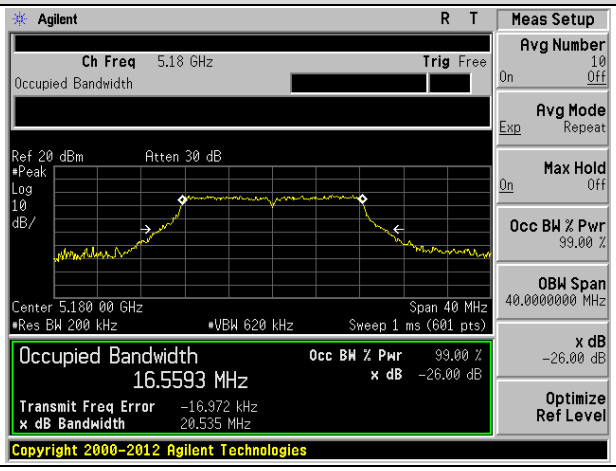
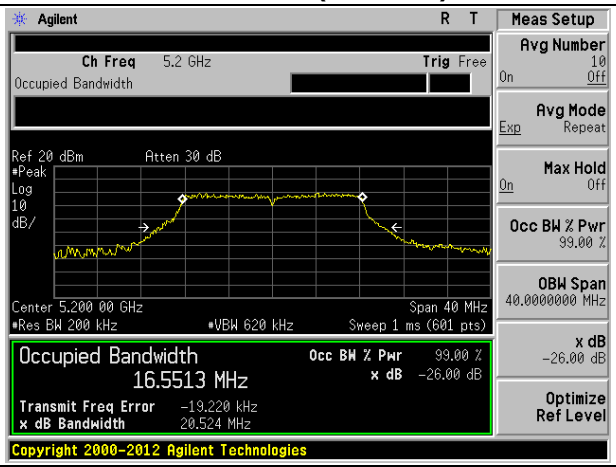
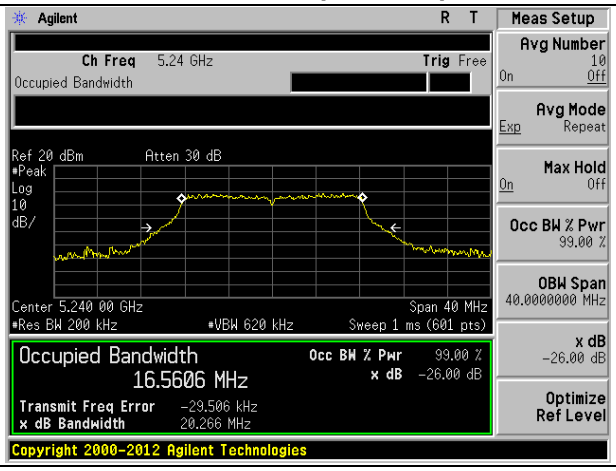
Test Requirement:	FCC Part15 E Section 15.407
Test Method:	KDB 789033 D02 General UNII Test Procedures New Rules v01
Limit:	N/A
Test setup:	
Test procedure:	According to KDB 789033 D02 General UNII Test Procedures New Rules v01.
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data:

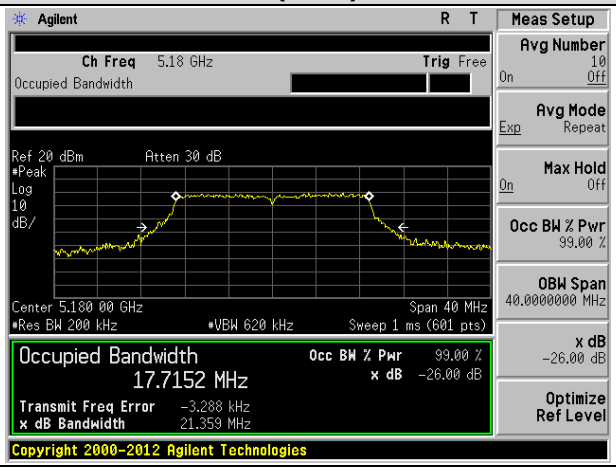
CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)		26dB Occupied Bandwidth (MHz)	
		802.11a	802.11n(HT20)	802.11a	802.11n(HT20)
36	5180.00	16.5593	17.7152	20.535	21.359
40	5200.00	16.5513	17.6879	20.524	21.295
48	5240.00	16.5606	17.7003	20.266	21.081

CH. No.	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26dB Occupied Bandwidth (MHz)
		802.11n(HT40)	802.11n(HT40)
38	5190.00	36.3147	43.023
46	5230.00	36.3031	42.527

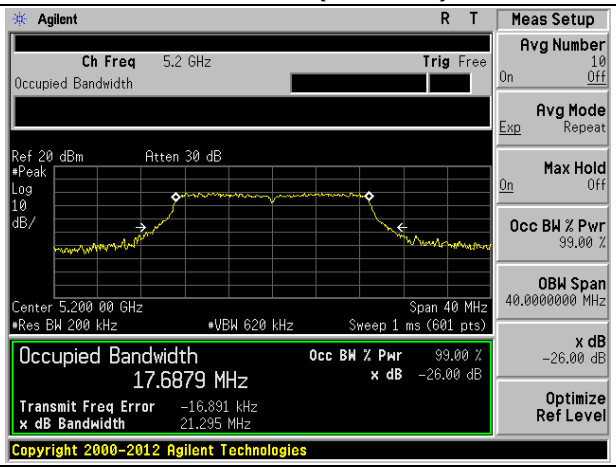
Test plots as followed:

802.11a mode

Channel 36 (5180MHz)

Channel 40 (5200MHz)

Channel 48 (5240MHz)

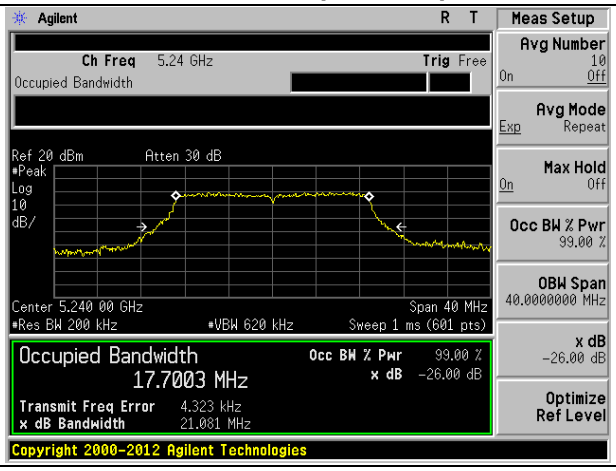
802.11n(HT20) mode



Channel 36 (5180MHz)

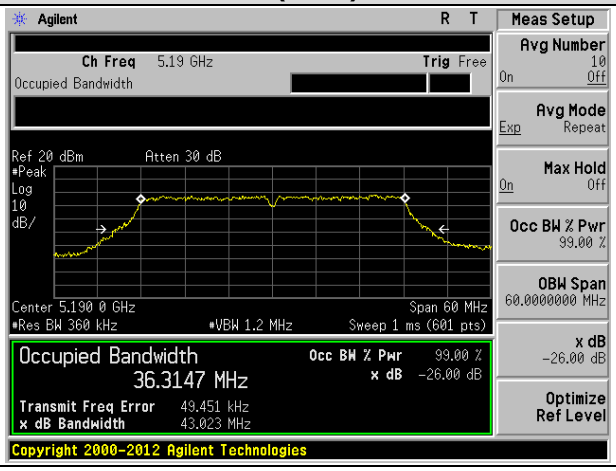


Channel 40 (5200MHz)

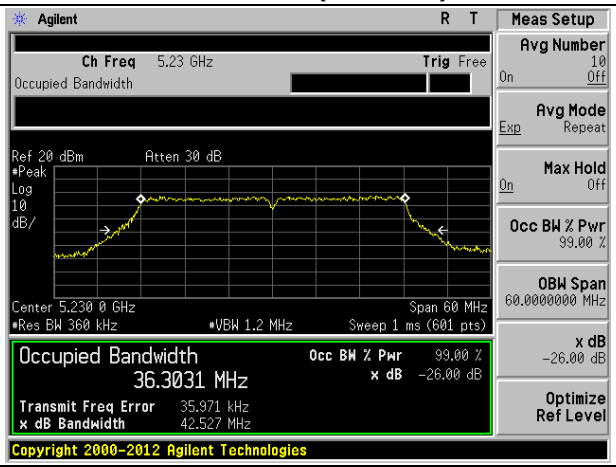


Channel 48 (5240MHz)

802.11n(HT40) mode

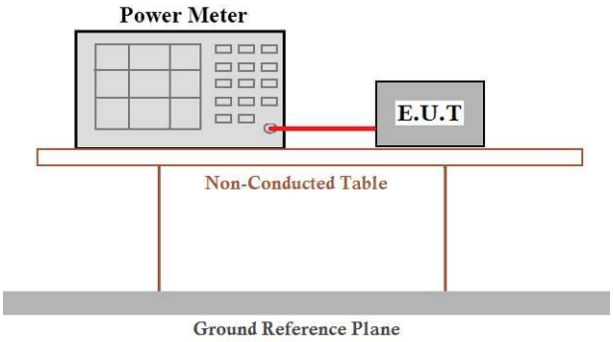


Channel 38 (5190MHz)



Channel 46 (5230MHz)

5.4 Peak Transmit Power

Test Requirement:	FCC Part15 E Section 15.407
Test Method:	KDB 789033 D02 General UNII Test Procedures New Rules v01
Limit:	24dBm
Test setup:	
Test procedure:	**Measurement using an RF average power meter** (i) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied a) The EUT is configured to transmit continuously or to transmit with a constant duty cycle. b) At all times when the EUT is transmitting, it must be transmitting at its maximum power control level. c) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five. (ii) If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in section B). (iii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter. (iv) Adjust the measurement in dBm by adding 10 log(1/x) where x is the duty cycle (e.g., 10log(1/0.25) if the duty cycle is 25 percent).
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Note: Output Power = Measured Power + Duty Factor

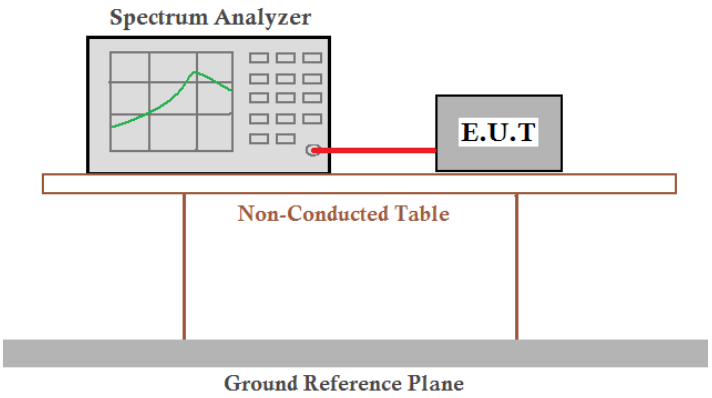
Duty Factor = 10 log (1/Duty Cycle)

802.11a mode						
CH No.	Frequency (MHz)	Measured Power (dBm)			Limit (dBm)	Result
		Measured	Duty Factor	Total Output Power (dBm)		
36	5180.00	12.40	0.08	12.48	24	Pass
40	5200.00	13.08	0.08	13.16	24	Pass
48	5240.00	12.38	0.08	12.46	24	Pass

802.11n(HT20) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)			Limit (dBm)	Result
		Measured	Duty Factor	Total Output Power (dBm)		
36	5180.00	12.85	0.08	12.93	24	Pass
40	5200.00	12.79	0.08	12.87	24	Pass
48	5240.00	12.68	0.08	12.76	24	Pass

802.11n(HT40) mode						
CH No.	Frequency (MHz)	Measured Power (dBm)			Limit (dBm)	Result
		Measured	Duty Factor	Total Output Power (dBm)		
38	5190.00	12.56	0.08	12.64	24	Pass
46	5230.00	11.91	0.08	11.99	24	Pass

5.5 Peak Power Spectral Density

Test Requirement:	FCC Part15 E Section 15.407
Test Method:	ANSI C63.10:2013 and KDB 789033 D02 General UNII Test Procedures New Rules v01
Limit:	11dBm/MHz
Test setup:	
Test procedure:	1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, “Compute power”. 2) Use the peak search function on the instrument to find the peak of the spectrum. 3) Make the following adjustments to the peak value of the spectrum, if applicable: a) If Method SA-2 or SA-2 Alternative was used, add 10 log(1/x), where x is the duty cycle, to the peak of the spectrum. b) If Method SA-3 Alternative was used and the linear mode was used in step E)2)g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging. 4) The result is the PPSD.
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

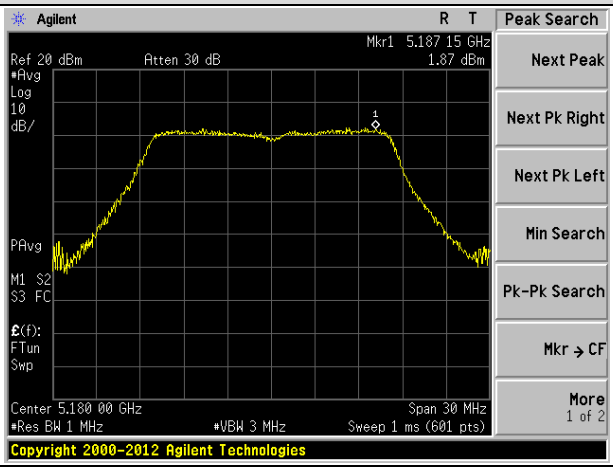
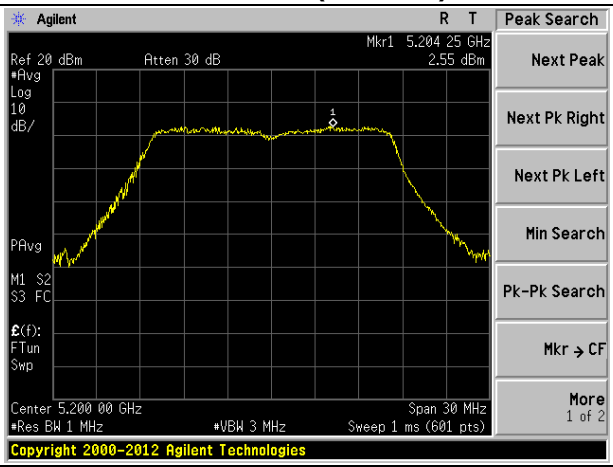
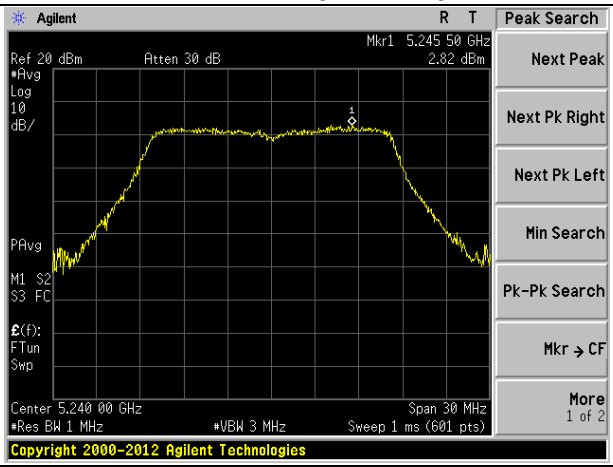
802.11a mode					
Channel No.	Frequency (MHz)	Measured PPSD (dBm/MHz)	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Result
36	5180.00	1.87	1.95	11.00	Pass
40	5200.00	2.55	2.63	11.00	Pass
48	5240.00	2.82	2.88	11.00	Pass

802.11n(HT20) mode					
Channel No.	Frequency (MHz)	Measured PPSD (dBm/MHz)	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Result
36	5180.00	3.63	3.71	11.00	Pass
40	5200.00	4.35	4.43	11.00	Pass
48	5240.00	3.56	3.64	11.00	Pass

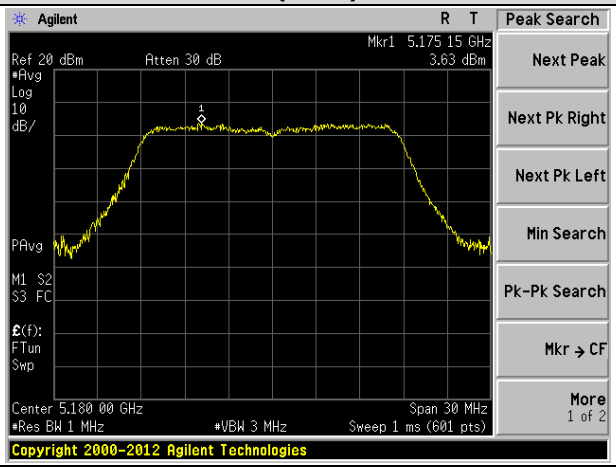
802.11n(HT40) mode					
Channel No.	Frequency (MHz)	Measured PPSD (dBm/MHz)	Total PPSD (dBm/MHz)	Limit (dBm/MHz)	Result
38	5190.00	-0.87	-0.79	11.00	Pass
46	5230.00	-1.20	-1.14	11.00	Pass

Note: Total PPSD = Measured PPSD + 10 log (1/Duty Cycle)

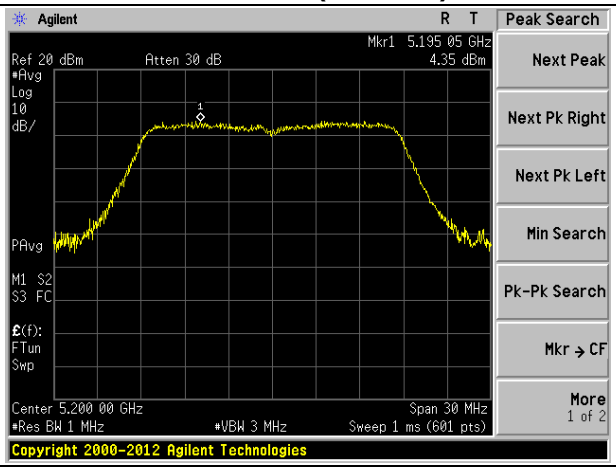
Test plots as followed:

802.11a mode

Channel 36 (5180MHz)

Channel 40 (5200MHz)

Channel 48 (5240MHz)

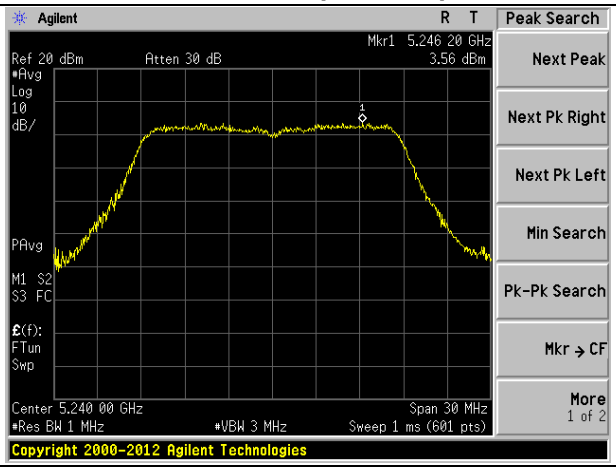
802.11n(HT20) mode



Channel 36 (5180MHz)

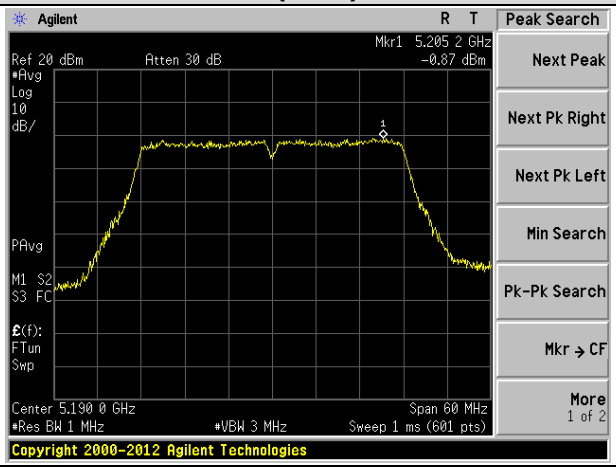


Channel 40 (5200MHz)

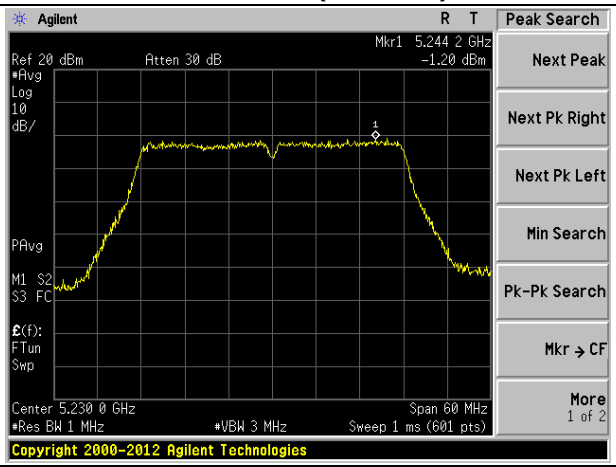


Channel 48 (5240MHz)

802.11n(HT40) mode



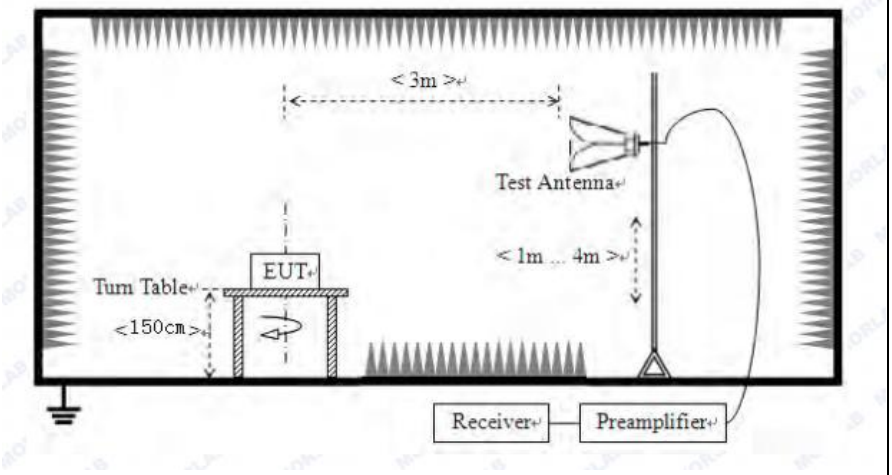
Channel 38 (5190MHz)



Channel 46 (5230MHz)

5.6 Band Edge

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 E Section 15.407 and 5.205</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m (Semi-Anechoic Chamber)</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>100KHz</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>AV</td><td>1MHz</td><td>3MHz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><td>Frequency</td><td>Limit (dBuV/m @3m)</td><td>Remark</td></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 rowspan="2">Above 1GHz</td><td>54.0</td><td>Average Value</td></tr>
<tr><td>74.0</td><td>Peak Value</td></tr>
</table>
Undesirable emission limits:
(1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.
(2) For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.
(3) For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of −27 dBm/MHz.
</td></tr>
<tr><td>Test Procedure:</td><td>
a. The EUT was placed on the top of a rotating table 1.5 m above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. 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.
d. 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 rotable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. 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
</td></tr>
</table>

	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.
Test setup:	Above 1GHz 
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.2 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:

802.11a(HT20)					Lowest			
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
5150.00	48.53	32.07	8.99	37.49	52.10	68.20	-16.10	Vertical
5150.00	35.77	32.07	8.99	37.49	39.34	54.00	-14.66	Vertical
5150.00	50.44	32.07	8.99	37.49	54.01	68.20	-14.19	Horizontal
5150.00	37.86	32.07	8.99	37.49	41.43	54.00	-12.57	Horizontal

802.11a(HT20)					Highest			
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
5350.00	45.56	31.75	9.29	37.20	49.40	68.20	-18.80	Vertical
5350.00	36.79	31.75	9.29	37.20	40.63	54.00	-13.37	Vertical
5350.00	48.02	31.75	9.29	37.20	51.86	68.20	-16.34	Horizontal
5350.00	34.45	31.75	9.29	37.20	38.29	54.00	-15.71	Horizontal

802.11n(HT20)					Lowest			
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
5150.00	50.51	32.07	8.99	37.49	54.08	68.20	-14.12	Vertical
5150.00	38.46	32.07	8.99	37.49	42.03	54.00	-11.97	Vertical
5150.00	49.79	32.07	8.99	37.49	53.36	68.20	-14.84	Horizontal
5150.00	38.03	32.07	8.99	37.49	41.60	54.00	-12.40	Horizontal

802.11n(HT20)					Highest			
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
5350.00	46.63	31.75	9.29	37.20	50.47	68.20	-17.73	Vertical
5350.00	35.22	31.75	9.29	37.20	39.06	54.00	-14.94	Vertical
5350.00	47.54	31.75	9.29	37.20	51.38	68.20	-16.82	Horizontal
5350.00	34.04	31.75	9.29	37.20	37.88	54.00	-16.12	Horizontal

802.11n(HT40)					Lowest			
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
5150.00	47.56	32.07	8.99	37.49	51.13	68.20	-17.07	Vertical
5150.00	34.02	32.07	8.99	37.49	37.59	54.00	-16.41	Vertical
5150.00	46.87	32.07	8.99	37.49	50.44	68.20	-17.76	Horizontal
5150.00	33.89	32.07	8.99	37.49	37.46	54.00	-16.54	Horizontal

802.11n(HT40)					Highest			
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
5350.00	48.06	31.75	9.29	37.20	51.90	68.20	-16.30	Vertical
5350.00	33.44	31.75	9.29	37.20	37.28	54.00	-16.72	Vertical
5350.00	46.57	31.75	9.29	37.20	50.41	68.20	-17.79	Horizontal
5350.00	32.73	31.75	9.29	37.20	36.57	54.00	-17.43	Horizontal

5.7 Radiated Emission

Test Requirement:	FCC Part15 C Section 15.209 and 15.205
Test Method:	ANSI C63.10:2013
Test Frequency Range:	30MHz to 40GHz
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)
Receiver setup:	

Frequency	Detector	RBW	VBW	Value
30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak Value
Above 1GHz	Peak	1MHz	3MHz	Peak Value
	AV	1MHz	3MHz	Average Value

Limit:

Frequency	Limit (dBuV/m @3m)	Remark
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
	74.0	Peak Value

Test Procedure:

Substitution method was performed to determine the actual ERP emission levels of the EUT.
The following test procedure as below:

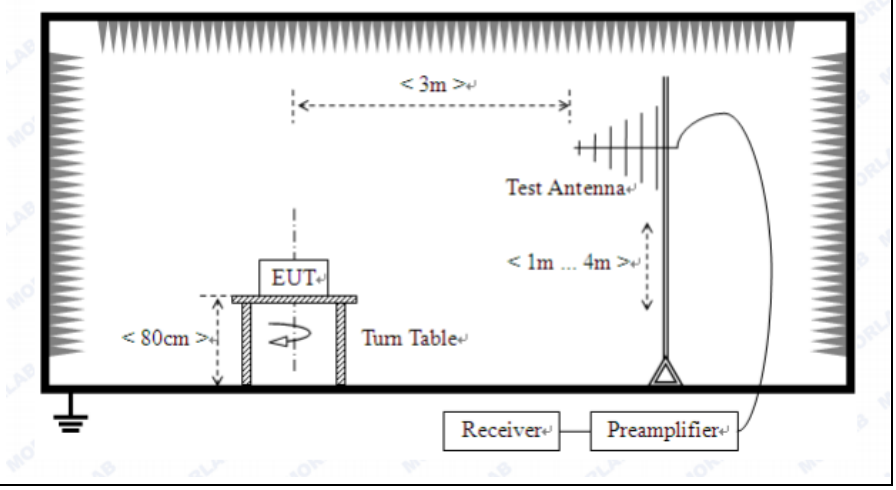
1>.Below 1GHz test procedure:

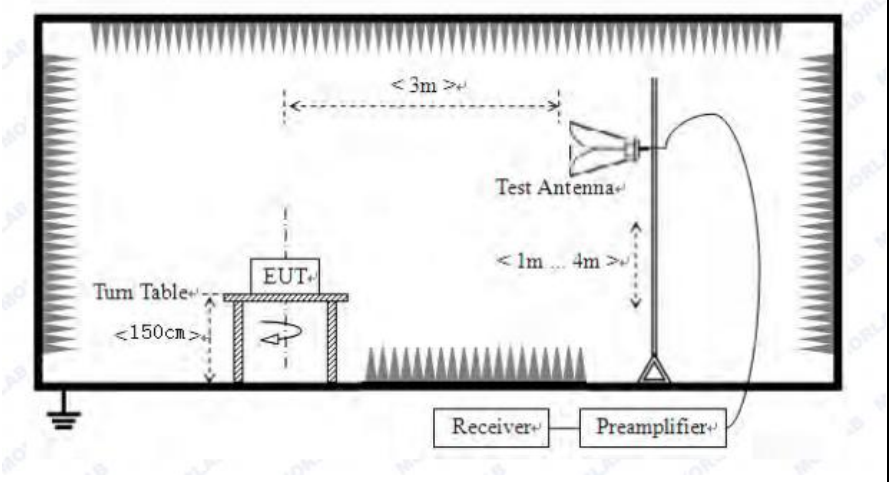
1. The EUT was placed on the top of a rotating table (0.8m for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, 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 rotable 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.

2>.Above 1GHz test procedure:

1. On the test site as test setup graph above,the EUT shall be placed at the 0.8m support on the turntable and in the position closest to normal use as declared by the provider.

2. The test antenna shall be oriented initially for vertical polarization and

	shall be chosen to correspond to the frequency of the transmitter.The output of the test antenna shall be connected to the measuring receiver. 3. The transmitter shall be switched on, if possible, without modulation and the measuring receiver shall be tuned to the frequency of the transmitter under test. 4. The test antenna shall be raised and lowered from 1m to 4m until a maximum signal level is detected by the measuring receiver. Then the turntable should be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver. 5. Repeat step 4 for test frequency with the test antenna polarized horizontally. 6. Remove the transmitter and replace it with a substitution antenna 7. Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a nonradiating cable. With the antennas at both ends vertically polarized, and with the signal generator tuned to a particular test frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output. 8. Repeat step 7 with both antennas horizontally polarized for each test frequency. 9. Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps 7 and 8 by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula: EIRP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi) where: Pg is the generator output power into the substitution antenna.
Test setup:	Below 1GHz 

	Above 1GHz 
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data:

Below 1GHz

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
194.45	49.79	12.56	1.81	32.12	32.04	43.50	-11.46	Vertical
197.89	51.77	12.57	1.83	32.13	34.04	43.50	-9.46	Vertical
199.99	54.32	12.57	1.84	32.14	36.59	43.50	-6.91	Vertical
204.24	50.68	12.70	1.86	32.14	33.10	43.50	-10.40	Vertical
276.12	40.98	14.55	2.25	32.17	25.61	46.00	-20.39	Vertical
292.06	42.45	14.89	2.32	32.18	27.48	46.00	-18.52	Vertical
139.36	54.82	10.19	1.50	31.94	34.57	43.50	-8.93	Horizontal
143.83	55.55	10.22	1.53	31.96	35.34	43.50	-8.16	Horizontal
147.92	54.42	10.24	1.56	31.97	34.25	43.50	-9.25	Horizontal
150.01	52.69	10.26	1.57	31.98	32.54	43.50	-10.96	Horizontal
196.51	48.93	12.57	1.82	32.13	31.19	43.50	-12.31	Horizontal
198.59	49.16	12.57	1.83	32.14	31.42	43.50	-12.08	Horizontal

Above 1GHz: 802.11a(HT20) 5180MHz

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
10360	28.36	39.67	14.62	32.65	50.00	74	-24.00	Vertical
15540	29.41	38.6	17.66	34.46	51.21	74	-22.79	Vertical
10360	29.64	39.67	14.62	32.65	51.28	74	-22.72	Horizontal
15540	30.43	38.6	17.66	34.46	52.23	74	-21.77	Horizontal

802.11a(HT20) 5200MHz

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
10400	27.68	39.75	14.63	32.71	49.35	74	-24.65	Vertical
15600	26.83	38.33	17.67	34.17	48.66	74	-25.34	Vertical
10400	28.96	39.75	14.63	32.71	50.63	74	-23.37	Horizontal
15600	29.72	38.33	17.67	34.17	51.55	74	-22.45	Horizontal

802.11a(HT20) 5240MHz

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
10480	26.39	39.82	14.68	32.86	48.03	74	-25.97	Vertical
15720	28.98	38.09	17.73	33.66	51.14	74	-22.86	Vertical
10480	28.85	39.82	14.68	32.86	50.49	74	-23.51	Horizontal
15720	27.36	38.09	17.73	33.66	49.52	74	-24.48	Horizontal

802.11n(HT20) 5180MHz

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
10360	29.33	39.67	14.62	32.65	50.97	74	-23.03	Vertical
15540	27.52	38.60	17.66	34.46	49.32	74	-24.68	Vertical
10360	27.81	39.67	14.62	32.65	49.45	74	-24.55	Horizontal
15540	29.63	38.60	17.66	34.46	51.43	74	-22.57	Horizontal

802.11n(HT20) 5200MHz

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
10400	27.64	39.75	14.63	32.71	49.31	74	-24.69	Vertical
15600	26.53	38.33	17.67	34.17	48.36	74	-25.64	Vertical
10400	25.82	39.75	14.63	32.71	47.49	74	-26.51	Horizontal
15600	26.71	38.33	17.67	34.17	48.54	74	-25.46	Horizontal

802.11n(HT20) 5240MHz

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
10480	26.67	39.82	14.68	32.86	48.31	74	-25.69	Vertical
15720	25.83	38.09	17.73	33.66	47.99	74	-26.01	Vertical
10480	26.05	39.82	14.68	32.86	47.69	74	-26.31	Horizontal
15720	27.13	38.09	17.73	33.66	49.29	74	-24.71	Horizontal

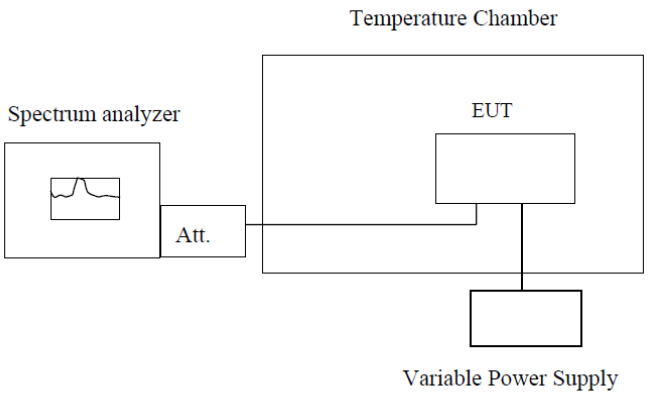
802.11n(HT40) 5190MHz

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
10380	25.33	39.71	14.63	32.68	46.99	74	-27.01	Vertical
15570	26.04	38.46	17.67	34.32	47.85	74	-26.15	Vertical
10380	26.28	39.71	14.63	32.68	47.94	74	-26.06	Horizontal
15570	27.83	38.46	17.67	34.32	49.64	74	-24.36	Horizontal

802.11n(HT40) 5230MHz

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
10460	26.73	39.82	14.66	32.80	48.41	74	-25.59	Vertical
15690	26.42	38.09	17.71	33.81	48.41	74	-25.59	Vertical
10460	27.15	39.82	14.66	32.80	48.83	74	-25.17	Horizontal
15690	28.43	38.09	17.71	33.81	50.42	74	-23.58	Horizontal

5.8 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 5.2 for details
Test results:	Pass

Measurement data:

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	5180	5179.9833	5179.9841	5179.9853	5179.9861
	5200	5199.9838	5199.9845	5199.9858	5199.9865
	5220	5219.9842	5219.9850	5219.9862	5219.9869
	5240	5239.9847	5239.9854	5239.9866	5239.9873
-20	5180	5179.9851	5179.9859	5179.9870	5179.9876
	5200	5199.9856	5199.9863	5199.9874	5199.9880
	5220	5219.9860	5219.9867	5219.9877	5219.9883
	5240	5239.9864	5239.9871	5239.9881	5239.9887
-10	5180	5179.9868	5179.9874	5179.9884	5179.9890
	5200	5199.9872	5199.9878	5199.9888	5199.9893
	5220	5219.9876	5219.9882	5219.9891	5219.9896
	5240	5239.9879	5239.9885	5239.9894	5239.9899
0	5180	5179.9838	5179.9845	5179.9858	5179.9865
	5200	5199.9842	5199.9850	5199.9862	5199.9869
	5220	5219.9847	5219.9854	5219.9866	5219.9873
	5240	5239.9851	5239.9858	5239.9870	5239.9876
10	5180	5179.9856	5179.9863	5179.9873	5179.9880
	5200	5199.9860	5199.9867	5199.9877	5199.9883
	5220	5219.9864	5219.9870	5219.9881	5219.9887
	5240	5239.9868	5239.9874	5239.9884	5239.9890
20	5180	5179.9872	5179.9878	5179.9888	5179.9893
	5200	5199.9876	5199.9881	5199.9891	5199.9896
	5220	5219.9879	5219.9885	5219.9894	5219.9899
	5240	5239.9883	5239.9888	5239.9897	5239.9902
30	5180	5179.9831	5179.9839	5179.9852	5179.9859
	5200	5199.9836	5199.9844	5199.9856	5199.9864
	5220	5219.9841	5219.9849	5219.9860	5219.9868
	5240	5239.9846	5239.9853	5239.9865	5239.9871
40	5180	5179.9850	5179.9857	5179.9868	5179.9875
	5200	5199.9854	5199.9861	5199.9872	5199.9879
	5220	5219.9859	5219.9865	5219.9876	5219.9882
	5240	5239.9863	5239.9869	5239.9880	5239.9886
50	5180	5179.9867	5179.9873	5179.9883	5179.9889
	5200	5199.9871	5199.9877	5199.9887	5199.9892
	5220	5219.9874	5219.9880	5219.9890	5219.9895
	5240	5239.9878	5239.9884	5239.9893	5239.9898

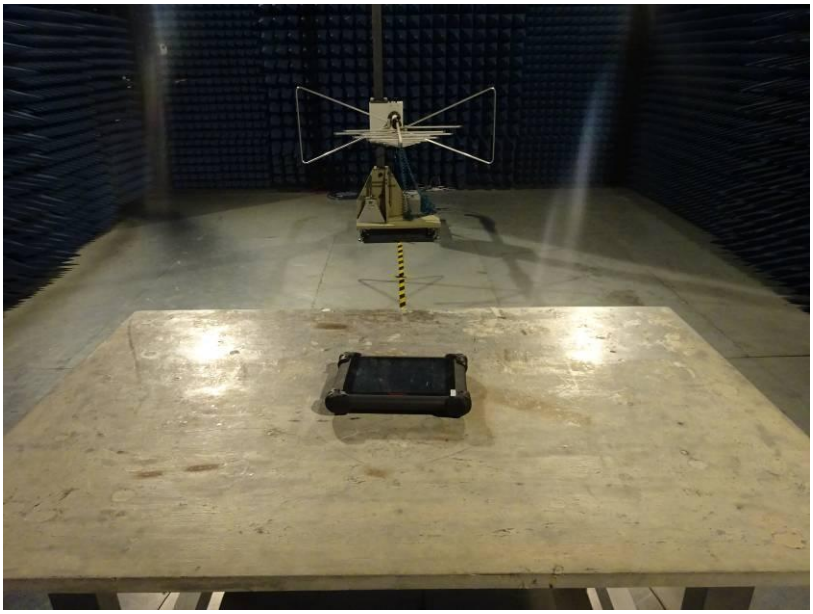
F_L=5179.9833MHz; F_H=5239.9902MHz

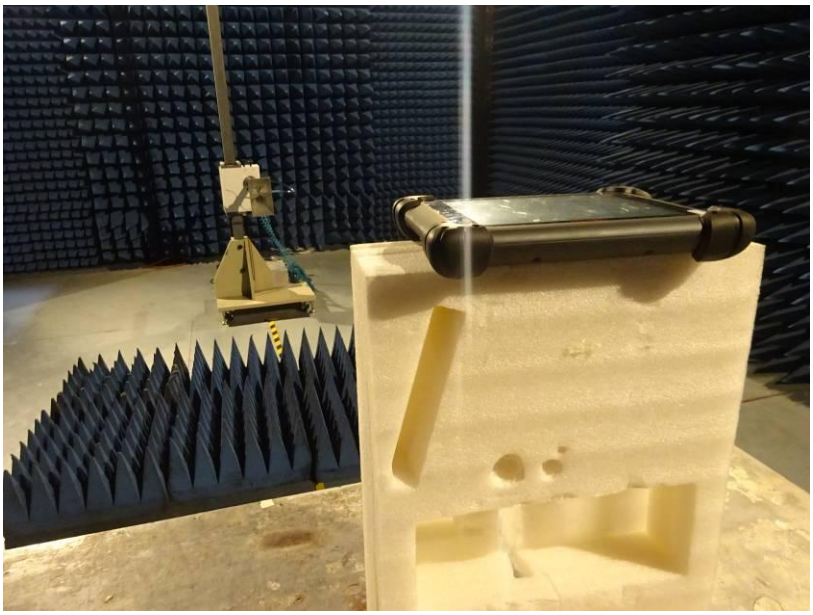
Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (VDC)	Operating Frequency (MHz)	0 minute	2 minute	5 minute	10 minute
		Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)	Measured Frequency (MHz)
3.3	5180	5179.9843	5179.9851	5179.9863	5179.9869
	5200	5199.9846	5199.9854	5199.9865	5199.9872
	5220	5219.9849	5219.9857	5219.9868	5219.9875
	5240	5239.9852	5239.9859	5239.9870	5239.9877
3.7	5180	5179.9855	5179.9862	5179.9873	5179.9879
	5200	5199.9858	5199.9865	5199.9875	5199.9882
	5220	5219.9861	5219.9867	5219.9878	5219.9884
	5240	5239.9864	5239.9870	5239.9880	5239.9886
4.1	5180	5179.9866	5179.9873	5179.9883	5179.9889
	5200	5199.9869	5199.9875	5199.9885	5199.9891
	5220	5219.9871	5219.9878	5219.9887	5219.9893
	5240	5239.9874	5239.9880	5239.9889	5239.9895

F_L=5179.9843MHz;F_H=5239.9895MHz

6 Test Setup Photo

Radiated Emission





Conducted Emission

7 EUT Constructional Details

Reference to the test report No. GTS201612000141F01

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