

FCC Test Report

Report No.: RF161012C04-4

FCC ID: ZOQVT-400

Test Model: VT-400

Received Date: Oct. 12, 2016

Test Date: Oct. 20, 2016 ~ Oct. 31, 2016

Issued Date: Nov. 04, 2016

Applicant: Verizon Telematics Inc.

Address: 2002 Summit Blvd, Suite 1800 Atlanta, GA 30319

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
(R.O.C)

Test Location: No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City
33383, Taiwan, R.O.C.



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

Table of Contents

Release Control Record	4
1 Certificate of Conformity	5
2 Summary of Test Results.....	6
2.1 Measurement Uncertainty.....	6
2.2 Modification Record	6
3 General Information	7
3.1 General Description of EUT	7
3.2 Description of Test Modes.....	8
3.2.1 Test Mode Applicability and Tested Channel Detail.....	9
3.3 Duty Cycle of Test Signal	10
3.4 Description of Support Units	11
3.4.1 Configuration of System under Test	11
3.5 General Description of Applied Standards.....	11
4 Test Types and Results	12
4.1 Radiated Emission and Bandedge Measurement	12
4.1.1 Limits of Radiated Emission and Bandedge Measurement	12
4.1.2 Limits of Unwanted Emission Out of the Restricted Bands	12
4.1.3 Test Instruments	13
4.1.4 Test Procedures.....	14
4.1.5 Deviation from Test Standard	14
4.1.6 Test Set Up	15
4.1.7 EUT Operating Conditions.....	15
4.1.8 Test Results	16
4.2 Transmit Power Measurement.....	26
4.2.1 Limits of Transmit Power Measurement	26
4.2.2 Test Setup.....	26
4.2.3 Test Instruments	26
4.2.4 Test Procedure	27
4.2.5 Deviation from Test Standard	27
4.2.6 EUT Operating Conditions.....	27
4.2.7 Test Result	27
4.3 Peak Power Spectral Density Measurement	28
4.3.1 Limits of Peak Power Spectral Density Measurement	28
4.3.2 Test Setup.....	28
4.3.3 Test Instruments	28
4.3.4 Test Procedures.....	28
4.3.5 Deviation from Test Standard	29
4.3.6 EUT Operating Conditions.....	29
4.3.7 Test Results	30
4.4 Frequency Stability	32
4.4.1 Limit of Frequency Stability Measurement	32
4.4.2 Test Setup.....	32
4.4.3 Test Instruments	32
4.4.4 Test Procedure	32
4.4.5 Deviation from Test Standard	32
4.4.6 EUT Operating Condition	32
4.4.7 Test Results	33
4.5 6 dB Bandwidth Measurement.....	34
4.5.1 Limits of 6 dB Bandwidth Measurement.....	34
4.5.2 Test Setup.....	34
4.5.3 Test Instruments	34
4.5.4 Test Procedure	34
4.5.5 Deviation from Test Standard	34

4.5.6 EUT Operating Condition	34
4.5.7 Test Results	35
5 Pictures of Test Arrangements.....	36
Appendix – Information on the Testing Laboratories	37

Release Control Record

Issue No.	Description	Date Issued
RF161012C04-4	Original Release	Nov. 04, 2016

1 Certificate of Conformity

Product: OBD2 LTE/3G/GPS/WIFI/BT tracker

Brand: Verizon Telematics Inc.

Test Model: VT-400

Sample Status: Identical Prototype

Applicant: Verizon Telematics Inc.

Test Date: Oct. 20, 2016 ~ Oct. 31, 2016

Standards: 47 CFR FCC Part 15, Subpart E (Section 15.407)
ANSI C63.10:2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : Rona Chen, **Date:** Nov. 04, 2016
Rona Chen / Specialist

Approved by : Stanley Wu, **Date:** Nov. 04, 2016
Stanley Wu / Assistant Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (Section 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(b)(6)	AC Power Conducted Emissions	N/A	Without AC power port of the EUT.
15.407(b) (1/2/3/4/6)	Radiated Emissions & Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -6.05 dB at 5714 MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.407(e)	6 dB Bandwidth	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	No antenna connector is used.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.44 dB
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	OBD2 LTE/3G/GPS/WIFI/BT tracker
Brand	Verizon Telematics Inc.
Test Model	VT-400
Status of EUT	Identical Prototype
Power Supply Rating	12.0 Vdc (DC Power Supply)
Modulation Type	64QAM, 16QAM, QPSK, BPSK
Modulation Technology	OFDM
Transfer Rate	802.11n: up to MCS7
Operating Frequency	5180 ~ 5240 MHz, 5745 ~ 5825 MHz
Number of Channel	5180 ~ 5240 MHz: 4 for 802.11n (HT20) 5745 ~ 5825 MHz: 5 for 802.11n (HT20) 2 for 802.11n (HT40)
Output Power	6.82 mW for 5180 ~ 5240 MHz 6.40 mW for 5745 ~ 5825 MHz
Antenna Type	Chip antenna with 3.5 dBi gain (5180 ~ 5240 MHz) Chip antenna with 3.5 dBi gain (5745 ~ 5825 MHz)
Antenna Connector	N/A
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

1. The EUT provides 1 completed transmitter and 1 receiver.

Modulation Mode	Tx Function
802.11n (HT20)	1TX
802.11n (HT40)	1TX

2. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

FOR 5180 ~ 5240 MHz

4 channels are provided for 802.11n (HT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
40	5200	48	5240

FOR 5745 ~ 5825 MHz:

5 channels are provided for 802.11n (HT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	161	5805
153	5765	165	5825
157	5785		

2 channels are provided for 802.11n (HT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755	159	5795

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE \geq 1G	RE<1G	PLC	APCM	
-	√	√	-	√	-

Where **RE \geq 1G**: Radiated Emission above 1 GHz

RE<1G: Radiated Emission below 1 GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

NOTE: 1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

2. "-" means no effect.

Radiated Emission Test (Above 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Frequency Band (MHz)	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	5180-5240	802.11n (HT20)	36 to 48	36, 44, 48	OFDM	BPSK	MCS0
-	5745-5825	802.11n (HT20)	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-		802.11n (HT40)	151 to 159	151, 159	OFDM	BPSK	MCS0

Radiated Emission Test (Below 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Frequency Band (MHz)	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	5180-5240	802.11n (HT20)	36 to 48	36	OFDM	BPSK	MCS0
-	5745-5825	802.11n (HT40)	151 to 159	159	OFDM	BPSK	MCS0

Antenna Port Conducted Measurement:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Frequency Band (MHz)	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	5180-5240	802.11n (HT20)	36 to 48	36, 44, 48	OFDM	BPSK	MCS0
-	5745-5825	802.11n (HT20)	149 to 165	149, 157, 165	OFDM	BPSK	MCS0
-		802.11n (HT40)	151 to 159	151, 159	OFDM	BPSK	MCS0

Test Condition:

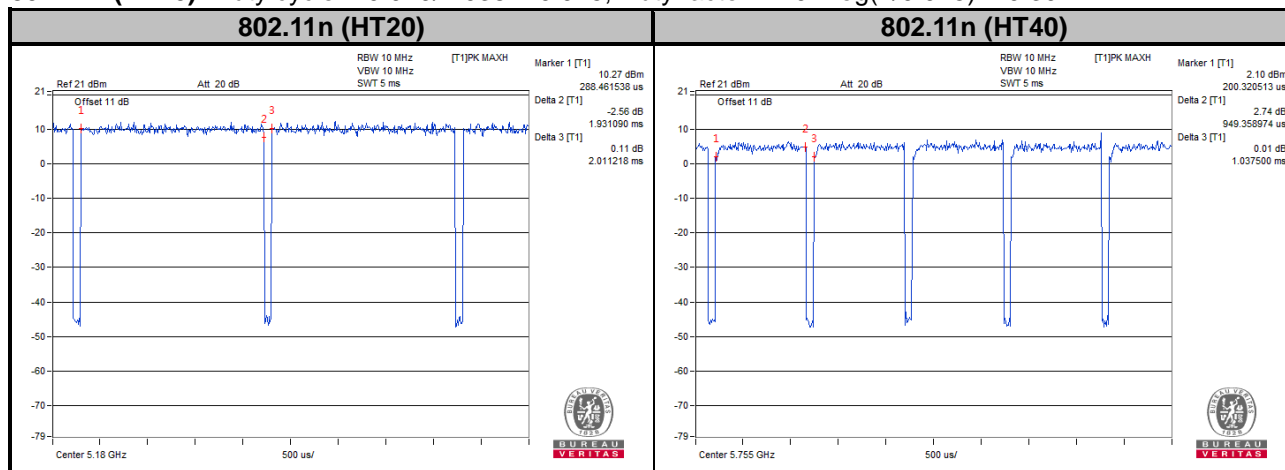
Applicable To	Environmental Conditions	Input Power	Tested by
RE \geq 1G	25 deg. C, 65 % RH	12 Vdc	Getaz Yang
RE<1G	25 deg. C, 65 % RH	12 Vdc	Getaz Yang
APCM	25 deg. C, 65 % RH	12 Vdc	Carlos Chen

3.3 Duty Cycle of Test Signal

MODULATION TYPE: BPSK

802.11n (HT20): Duty cycle = $1.931/2.011 = 0.960$, Duty factor = $10 * \log(1/0.960) = 0.18$

802.11n (HT40): Duty cycle = $0.949/1.038 = 0.915$, Duty factor = $10 * \log(1/0.915) = 0.39$



3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

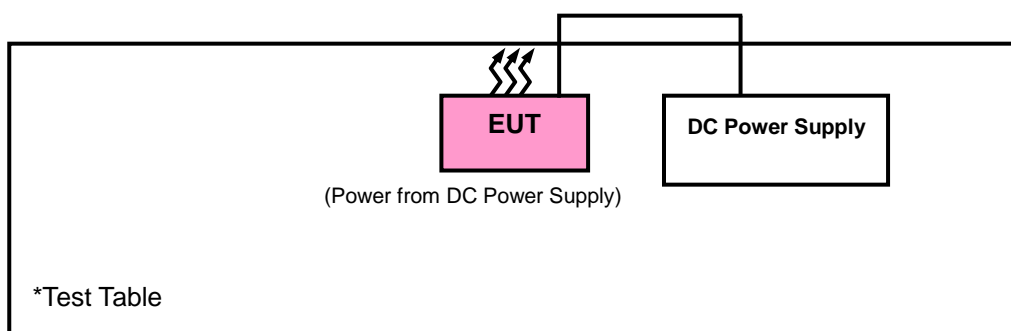
No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	DC Power Supply	Topward	33010D	807748	N/A

No.	Signal Cable Description Of The Above Support Units
1.	N/A

Note:

1. All power cords of the above support units are non-shielded (1.8m).

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart E (15.407)

789033 D02 General UNII Test Procedures New Rules v01r03

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20 dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1.705	24000/F (kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

4.1.2 Limits of Unwanted Emission Out of the Restricted Bands

Applicable To	Limit	
789033 D02 General UNII Test Procedures New Rules v01r03	Field Strength at 3 m	
	PK: 74 (dBuV/m)	AV: 54 (dBuV/m)
Applicable To	EIRP Limit	Equivalent Field Strength at 3 m
15.407(b)(1)	PK: -27 (dBm/MHz)	PK: 68.2 (dBuV/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)	PK: -27 (dBm/MHz) ^{*1} PK: -17 (dBm/MHz) ^{*2}	PK: 68.2 (dBuV/m) ^{*1} PK: 78.2 (dBuV/m) ^{*2}

NOTE: ^{*1} beyond 10 MHz of the band edge ^{*2} within 10 MHz of band edge

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts).}$$

4.1.3 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Jan. 21, 2016	Jan. 20, 2017
Test Receiver Agilent	N9038A	MY52260177	Jan. 21, 2016	Jan. 20, 2017
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 17, 2015	Dec. 16, 2016
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Jan. 07, 2016	Jan. 06, 2017
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Jan. 04, 2016	Jan. 03, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Jan. 08, 2016	Jan. 07, 2017
Loop Antenna	EM-6879	269	Aug. 11, 2016	Aug. 10, 2017
Agilent Communications Tester-Wireless	8960 Series 10	MY53201073	Jul. 03, 2015	Jul. 02, 2017
Preamplifier EMCI	EMC 012645	980115	Dec. 21, 2015	Dec. 20, 2016
Preamplifier EMCI	EMC 184045	980116	Dec. 21, 2015	Dec. 20, 2016
Preamplifier EMCI	EMC 330H	980112	Dec. 28, 2015	Dec. 27, 2016
Power Meter Anritsu	ML2495A	1232002	Sep. 08, 2016	Sep. 07, 2017
Power Sensor Anritsu	MA2411B	1207325	Sep. 08, 2016	Sep. 07, 2017
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4 2950114	Oct. 11, 2016	Oct. 10, 2017
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Oct. 11, 2016	Oct. 10, 2017
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 11, 2016	Oct. 10, 2017
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA
Temperature & Humidity Chamber	GTH-120-40-CP-AR	MAA1306-019	Sep. 02, 2016	Sep. 01, 2017
DC Power Supply Topward	33010D	807748	Oct. 20, 2016	Oct. 19, 2018
Digital Multimeter Fluke	87-III	70360742	Jul. 01, 2016	Jun. 30, 2017
Fixed Attenuator Mini-Circuits	BW-N10W5+	N/A	Jul. 08, 2016	Jul. 07, 2017

- Note:
1. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Chamber 10.
 3. The horn antenna and preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1 GHz if tested.
 4. The FCC Site Registration No. is 690701.
 5. The IC Site Registration No. is IC7450F-10.

4.1.4 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. 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 height of antenna 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 rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

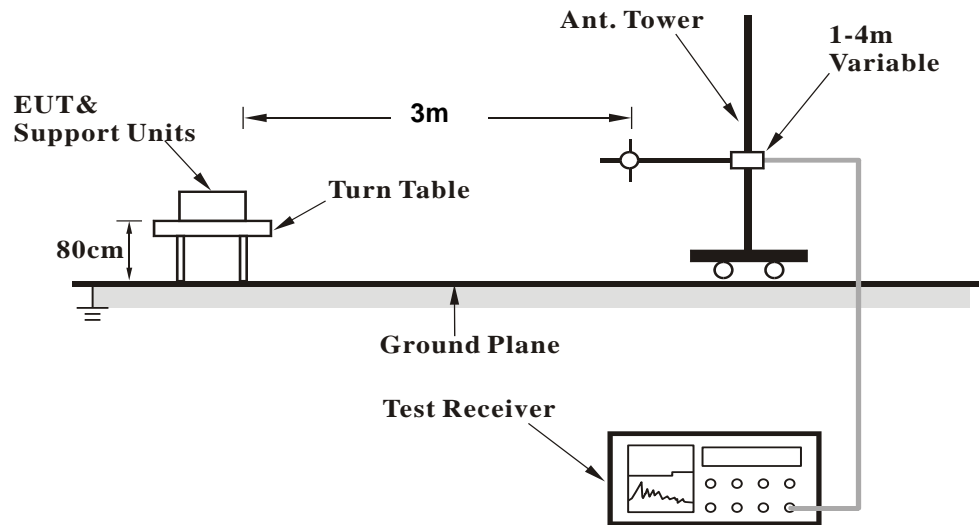
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz & 360 KHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1/T for RMS Average (Duty cycle < 98 %) for Peak detection at frequency above 1 GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz (Duty cycle ≥ 98 %) for Average detection (AV) at frequency above 1 GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.5 Deviation from Test Standard

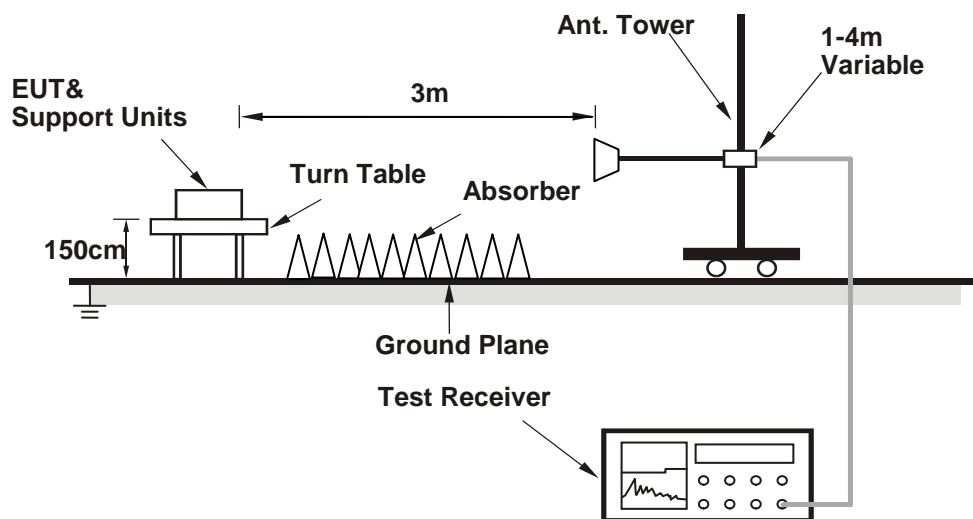
No deviation.

4.1.6 Test Set Up

<Frequency Range below 1 GHz>



<Frequency Range above 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.7 EUT Operating Conditions

- Placed the EUT on a testing table.
- Use the software to control the EUT under transmission condition continuously at specific channel frequency.

4.1.8 Test Results

Above 1 GHz Data :

802.11n (HT20)

EUT Test Condition		Measurement Detail	
Channel	Channel 36	Frequency Range	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Getaz Yang

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5147.6	42.47	42.27	54	-11.53	31.32	6.2	37.32	199	58	Average
5148.05	60.59	60.39	74	-13.41	31.32	6.2	37.32	199	58	Peak
5180	91.8	91.57			31.35	6.22	37.34	199	58	Average
5180	99.93	99.7			31.35	6.22	37.34	199	58	Peak
*10360	54.77	58.67	68.2	-13.43	39.19	9.05	52.14	189	201	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5130.8	40.54	40.33	54	-13.46	31.31	6.2	37.3	200	77	Average
5134.7	51.53	51.32	74	-22.47	31.31	6.2	37.3	200	77	Peak
5180	84.28	84.05			31.35	6.22	37.34	200	77	Average
5180	91.62	91.39			31.35	6.22	37.34	200	77	Peak
*10360	55.03	58.93	68.2	-13.17	39.19	9.05	52.14	202	346	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 5180 MHz: Fundamental Frequency
- *: Out of Restricted Band

EUT Test Condition		Measurement Detail	
Channel	Channel 44	Frequency Range	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Getaz Yang

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5127.5	50.52	50.31	74	-23.48	31.31	6.2	37.3	200	56	Peak
5127.8	40.59	40.38	54	-13.41	31.31	6.2	37.3	200	56	Average
5220	91.9	91.65			31.37	6.24	37.36	200	56	Average
5220	99.77	99.52			31.37	6.24	37.36	200	56	Peak
5407.09	50.62	49.96	74	-23.38	31.52	6.32	37.18	200	56	Peak
5440.42	40.9	40.14	54	-13.1	31.55	6.34	37.13	200	56	Average
*10440	54.79	58.89	68.2	-13.41	39.29	9.09	52.48	172	234	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5037.8	50.39	50.24	74	-23.61	31.24	6.15	37.24	200	71	Peak
5107.4	40.42	40.22	54	-13.58	31.29	6.19	37.28	200	71	Average
5220	84.26	84.01			31.37	6.24	37.36	200	71	Average
5220	91.47	91.22			31.37	6.24	37.36	200	71	Peak
5438.99	50.95	50.19	74	-23.05	31.55	6.34	37.13	200	71	Peak
5443.94	40.7	39.94	54	-13.3	31.55	6.34	37.13	200	71	Average
*10440	56.22	60.32	68.2	-11.98	39.29	9.09	52.48	205	322	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 5220 MHz: Fundamental Frequency
- *: Out of Restricted Band

EUT Test Condition		Measurement Detail	
Channel	Channel 48	Frequency Range	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Getaz Yang

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5109.8	49.34	49.14	74	-24.66	31.29	6.19	37.28	200	56	Peak
5132.3	40.4	40.19	54	-13.6	31.31	6.2	37.3	200	56	Average
5240	91.83	91.51			31.39	6.25	37.32	198	60	Average
5240	99.91	99.59			31.39	6.25	37.32	198	60	Peak
5411.6	50.27	49.6	74	-23.73	31.53	6.32	37.18	198	60	Peak
5454.39	40.72	39.9	54	-13.28	31.56	6.34	37.08	198	60	Average
*10480	55.92	60.17	68.2	-12.28	39.37	9.09	52.71	178	223	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5083.4	50.05	49.88	74	-23.95	31.27	6.17	37.27	200	71	Peak
5126.6	40.42	40.21	54	-13.58	31.31	6.2	37.3	200	71	Average
5240	84.36	84.04			31.39	6.25	37.32	200	74	Average
5240	91.75	91.43			31.39	6.25	37.32	200	74	Peak
5386.19	51.1	50.46	74	-22.9	31.51	6.31	37.18	200	74	Peak
5440.42	40.73	39.97	54	-13.27	31.55	6.34	37.13	200	74	Average
*10480	55.58	59.83	68.2	-12.62	39.37	9.09	52.71	203	331	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 5240 MHz: Fundamental Frequency
- *: Out of Restricted Band

EUT Test Condition		Measurement Detail	
Channel	Channel 149	Frequency Range	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Getaz Yang

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emissino Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*5714	59.25	58.06	68.2	-8.95	31.93	6.69	37.43	208	292	Peak
*5725	59.77	58.49	78.2	-18.43	31.96	6.75	37.43	208	292	Peak
5745	94.81	93.54			31.99	6.75	37.47	208	292	Average
5745	102.8	101.53			31.99	6.75	37.47	208	292	Peak
*5850	59.72	58.2	78.2	-18.48	32.15	6.88	37.51	208	292	Peak
*5861	59.07	57.44	68.2	-9.13	32.18	6.95	37.5	208	292	Peak
11490	47.33	50.22	54	-6.67	39.91	10.03	52.83	142	359	Average
11490	56.48	59.37	74	-17.52	39.91	10.03	52.83	142	359	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emissino Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*5714	58.33	57.14	68.2	-9.87	31.93	6.69	37.43	188	34	Peak
*5725	59.51	58.23	78.2	-18.69	31.96	6.75	37.43	188	34	Peak
5745	87.02	85.75			31.99	6.75	37.47	188	34	Average
5745	94.5	93.23			31.99	6.75	37.47	188	34	Peak
*5850	59.47	57.95	78.2	-18.73	32.15	6.88	37.51	188	34	Peak
*5861	59.9	58.27	68.2	-8.3	32.18	6.95	37.5	188	34	Peak
11490	47.62	50.51	54	-6.38	39.91	10.03	52.83	158	214	Average
11490	56.74	59.63	74	-17.26	39.91	10.03	52.83	158	214	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 5745 MHz: Fundamental Frequency
- *: Out of Restricted Band

EUT Test Condition		Measurement Detail	
Channel	Channel 157	Frequency Range	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Getaz Yang

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emissino Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*5714	59.49	58.3	68.2	-8.71	31.93	6.69	37.43	209	291	Peak
*5725	59.96	58.68	78.2	-18.24	31.96	6.75	37.43	209	291	Peak
5785	94.93	93.61			32.04	6.82	37.54	209	291	Average
5785	102.51	101.19			32.04	6.82	37.54	209	291	Peak
*5850	58.54	57.02	78.2	-19.66	32.15	6.88	37.51	209	291	Peak
*5861	59.84	58.21	68.2	-8.36	32.18	6.95	37.5	209	291	Peak
11570	46.61	50.07	54	-7.39	39.78	10.09	53.33	140	360	Average
11570	53.67	57.13	74	-20.33	39.78	10.09	53.33	140	360	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emissino Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*5714	59.13	57.94	68.2	-9.07	31.93	6.69	37.43	187	36	Peak
*5725	59.98	58.7	78.2	-18.22	31.96	6.75	37.43	187	36	Peak
5785	86.84	85.52			32.04	6.82	37.54	187	36	Average
5785	94.4	93.08			32.04	6.82	37.54	187	36	Peak
*5850	59.64	58.12	78.2	-18.56	32.15	6.88	37.51	187	36	Peak
*5861	59.71	58.08	68.2	-8.49	32.18	6.95	37.5	187	36	Peak
11570	47.26	50.72	54	-6.74	39.78	10.09	53.33	156	213	Average
11570	53.78	57.24	74	-20.22	39.78	10.09	53.33	156	213	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 5785 MHz: Fundamental Frequency
- *: Out of Restricted Band

EUT Test Condition		Measurement Detail	
Channel	Channel 165	Frequency Range	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Getaz Yang

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emissino Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*5714	60.04	58.85	68.2	-8.16	31.93	6.69	37.43	211	287	Peak
*5725	60.28	59	78.2	-17.92	31.96	6.75	37.43	211	287	Peak
5825	95.08	93.61			32.12	6.88	37.53	211	287	Average
5825	102.69	101.22			32.12	6.88	37.53	211	287	Peak
*5850	59.46	57.94	78.2	-18.74	32.15	6.88	37.51	211	287	Peak
*5861	60.75	59.12	68.2	-7.45	32.18	6.95	37.5	211	287	Peak
11650	46.69	50.24	54	-7.31	39.65	10.15	53.35	143	356	Average
11650	54.19	57.74	74	-19.81	39.65	10.15	53.35	143	356	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emissino Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*5714	59.71	58.52	68.2	-8.49	31.93	6.69	37.43	185	32	Peak
*5725	59.56	58.28	78.2	-18.64	31.96	6.75	37.43	185	32	Peak
5825	87.06	85.59			32.12	6.88	37.53	185	32	Average
5825	94.53	93.06			32.12	6.88	37.53	185	32	Peak
*5850	59.32	57.8	78.2	-18.88	32.15	6.88	37.51	185	32	Peak
*5861	59.3	57.67	68.2	-8.9	32.18	6.95	37.5	185	32	Peak
11650	46.74	50.29	54	-7.26	39.65	10.15	53.35	158	215	Average
11650	53.58	57.13	74	-20.42	39.65	10.15	53.35	158	215	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 5825 MHz: Fundamental Frequency
- *: Out of Restricted Band

802.11n (HT40)

EUT Test Condition		Measurement Detail	
Channel	Channel 151	Frequency Range	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Getaz Yang

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*5714	59.09	57.9	68.2	-9.11	31.93	6.69	37.43	211	292	Peak
*5725	60.15	58.87	78.2	-18.05	31.96	6.75	37.43	211	292	Peak
5755	92.46	91.17			32.01	6.75	37.47	211	292	Average
5755	100.36	99.07			32.01	6.75	37.47	211	292	Peak
*5850	58.22	56.7	78.2	-19.98	32.15	6.88	37.51	211	292	Peak
*5861	59.88	58.25	68.2	-8.32	32.18	6.95	37.5	211	292	Peak
11510	47.43	50.57	54	-6.57	39.9	10.03	53.07	140	358	Average
11510	54.62	57.76	74	-19.38	39.9	10.03	53.07	140	358	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*5714	59.74	58.55	68.2	-8.46	31.93	6.69	37.43	195	42	Peak
*5725	60.34	59.06	78.2	-17.86	31.96	6.75	37.43	195	42	Peak
5755	84.98	83.69			32.01	6.75	37.47	195	42	Average
5755	92.38	91.09			32.01	6.75	37.47	195	42	Peak
*5850	60.63	59.11	78.2	-17.57	32.15	6.88	37.51	195	42	Peak
*5861	59.79	58.16	68.2	-8.41	32.18	6.95	37.5	195	42	Peak
11510	47.59	50.73	54	-6.41	39.9	10.03	53.07	155	212	Average
11510	55.04	58.18	74	-18.96	39.9	10.03	53.07	155	212	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 5755 MHz: Fundamental Frequency
- *: Out of Restricted Band

EUT Test Condition		Measurement Detail	
Channel	Channel 159	Frequency Range	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Getaz Yang

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emissino Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*5714	62.15	60.96	68.2	-6.05	31.93	6.69	37.43	209	299	Peak
*5725	59.42	58.14	78.2	-18.78	31.96	6.75	37.43	209	299	Peak
5795	92.35	91			32.07	6.82	37.54	209	299	Average
5795	100.31	98.96			32.07	6.82	37.54	209	299	Peak
*5850	60.57	59.05	78.2	-17.63	32.15	6.88	37.51	209	299	Peak
*5861	60.55	58.92	68.2	-7.65	32.18	6.95	37.5	209	299	Peak
11590	46.18	49.68	54	-7.82	39.74	10.09	53.33	142	358	Average
11590	52.93	56.43	74	-21.07	39.74	10.09	53.33	142	358	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emissino Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
*5714	60.1	58.91	68.2	-8.1	31.93	6.69	37.43	195	28	Peak
*5725	59.07	57.79	78.2	-19.13	31.96	6.75	37.43	195	28	Peak
5795	84.98	83.63	54	30.98	32.07	6.82	37.54	195	28	Average
5795	92.27	90.92			32.07	6.82	37.54	195	28	Peak
*5850	60.56	59.04			32.15	6.88	37.51	195	28	Peak
*5861	60.18	58.55	68.2	-8.02	32.18	6.95	37.5	195	28	Peak
11590	46.47	49.97	54	-7.53	39.74	10.09	53.33	152	210	Average
11590	54.21	57.71	74	-19.79	39.74	10.09	53.33	152	210	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 5795 MHz: Fundamental Frequency
- *: Out of Restricted Band

9 kHz ~ 30 MHz DATA:

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz WORST-CASE DATA:

802.11n (HT20)

EUT Test Condition		Measurement Detail	
Channel	Channel 36	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Getaz Yang

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
43.58	18.45	35.3	40	-21.55	13.59	0.67	31.11	101	321	Peak
114.39	18.44	38.73	43.5	-25.06	10.46	1.12	31.87	111	252	Peak
148.34	15.63	33.47	43.5	-27.87	12.64	1.14	31.62	107	95	Peak
328.76	18.46	34.93	46	-27.54	13.64	1.71	31.82	117	175	Peak
498.51	20.82	33.09	46	-25.18	17.29	2.09	31.65	114	79	Peak
619.76	24.14	34.18	46	-21.86	19.84	2.29	32.17	104	172	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
34.85	27.8	45.47	40	-12.2	12.79	0.6	31.06	116	232	Peak
64.92	18.38	37.78	40	-21.62	11.35	0.84	31.59	132	57	Peak
120.21	20.7	40.42	43.5	-22.8	11.02	1.16	31.9	124	315	Peak
417.03	18.92	33.33	46	-27.08	15.68	1.94	32.03	118	161	Peak
508.21	21.83	33.81	46	-24.17	17.51	2.11	31.6	127	144	Peak
613.94	24.13	34.19	46	-21.87	19.77	2.29	32.12	108	147	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value

802.11n (HT40)

EUT Test Condition		Measurement Detail	
Channel	Channel 159	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Getaz Yang

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
36.79	17.4	34.72	40	-22.6	13.09	0.62	31.03	112	132	Peak
113.42	19.67	40.04	43.5	-23.83	10.37	1.12	31.86	116	284	Peak
192.96	14.12	34.71	43.5	-29.38	9.84	1.27	31.7	128	269	Peak
330.7	16.64	33.05	46	-29.36	13.68	1.72	31.81	138	74	Peak
426.73	18.94	33.14	46	-27.06	15.87	1.95	32.02	124	51	Peak
584.84	23.68	34.32	46	-22.32	19.26	2.23	32.13	140	101	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
34.85	28.79	46.46	40	-11.21	12.79	0.6	31.06	113	156	Peak
111.48	19.06	39.62	43.5	-24.44	10.18	1.11	31.85	128	252	Peak
158.04	16.12	34.09	43.5	-27.38	12.73	1.13	31.83	137	262	Peak
377.26	17.65	32.94	46	-28.35	14.8	1.85	31.94	135	251	Peak
464.56	20.13	33.43	46	-25.87	16.62	2.02	31.94	133	147	Peak
636.25	23.71	33.45	46	-22.29	20.04	2.33	32.11	126	354	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value

4.2 Transmit Power Measurement

4.2.1 Limits of Transmit Power Measurement

Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p \leq 125 mW (21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
		Fixed point-to-point Access Point	1 Watt (30 dBm)
		Indoor Access Point	1 Watt (30 dBm)
	✓	Mobile and Portable client device	250 mW (24 dBm)
U-NII-2A	--		250 mW (24 dBm) or 11 dBm+10 log B*
U-NII-2C	--		250 mW (24 dBm) or 11 dBm+10 log B*
U-NII-3	✓		1 Watt (30 dBm)

*B is the 26 dB emission bandwidth in megahertz

Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

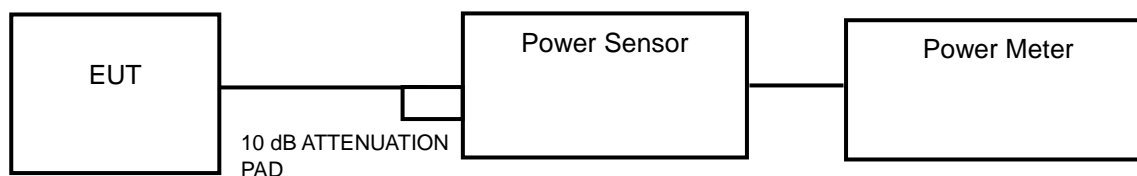
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT} ;

Array Gain = $5 \log(N_{ANT}/N_{SS})$ dB or 3 dB, whichever is less for 20 MHz channel widths with $N_{ANT} \geq 5$.

For power measurements on all other devices: Array Gain = $10 \log(N_{ANT}/N_{SS})$ dB.

4.2.2 Test Setup

<Power Output Measurement>



4.2.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.2.4 Test Procedure

Average Power Measurement

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

4.2.5 Deviation from Test Standard

No deviation.

4.2.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.2.7 Test Result

802.11n (HT20)

Channel	Frequency (MHz)	Maximum Conducted Power (mW)	Maximum Conducted Power (dBm)	Power Limit (dBm)	Pass / Fail
36	5180	6.82	8.34	24	Pass
44	5220	6.73	8.28	24	Pass
48	5240	6.70	8.26	24	Pass
149	5745	6.40	8.06	30	Pass
157	5785	6.22	7.94	30	Pass
165	5825	6.14	7.88	30	Pass

802.11n (HT40)

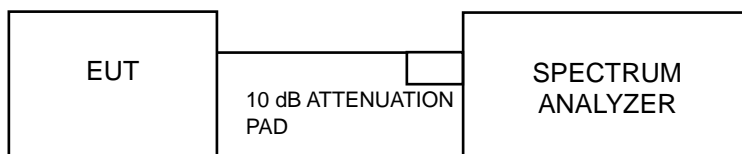
Channel	Frequency (MHz)	Maximum Conducted Power (mW)	Maximum Conducted Power (dBm)	Power Limit (dBm)	Pass / Fail
151	5755	4.41	6.44	30	Pass
159	5795	4.31	6.34	30	Pass

4.3 Peak Power Spectral Density Measurement

4.3.1 Limits of Peak Power Spectral Density Measurement

Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	17 dBm/MHz
		Fixed point-to-point Access Point	
		Indoor Access Point	
	√	Mobile and Portable client device	11 dBm/MHz
U-NII-2A	--		11 dBm/MHz
U-NII-2C	--		11 dBm/MHz
U-NII-3	√		30 dBm/500 kHz

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

4.3.4 Test Procedures

For U-NII-1 band:

Using method SA-2

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 1 MHz, Set VBW ≥ 3 RBW, Detector = RMS
3. Sweep time = auto, trigger set to "free run".
4. Trace average at least 100 traces in power averaging mode.
5. Record the max value and add 10 log (1/duty cycle)

※For U-NII-3 band:

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 500 kHz, Set VBW ≥ 3 RBW, Detector = RMS
3. Use the peak marker function to determine the maximum power level in any 500 kHz band segment within the fundamental EBW.
4. Sweep time = auto, trigger set to "free run".
5. Trace average at least 100 traces in power averaging mode.
6. Record the max value and add 10 log (1/duty cycle)

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

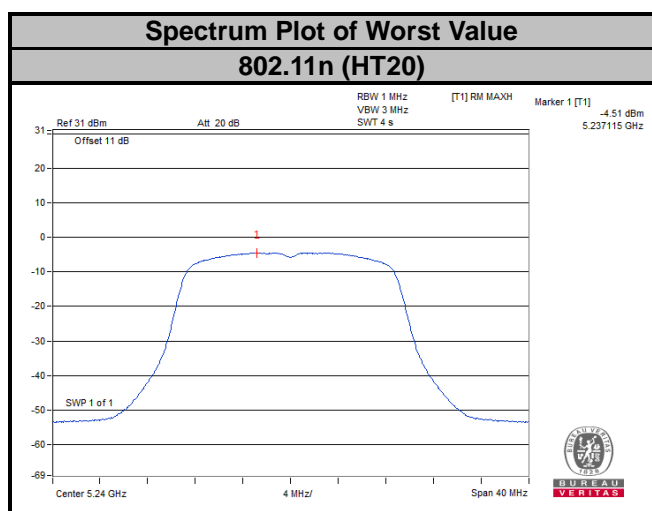
4.3.7 Test Results

For U-NII-1 band:

802.11n (HT20)

Channel	Frequency (MHz)	PSD w/o Duty Factor (dBm)	Duty Factor	PSD with Duty Factor (dBm)	Maximum Limit (dBm)	Pass / Fail
36	5180	-4.70	0.18	-4.52	11	Pass
44	5220	-4.60	0.18	-4.42	11	Pass
48	5240	-4.51	0.18	-4.33	11	Pass

Note: Refer to section 3.3 for duty cycle spectrum plot.



For U-NII-3 band:

802.11n (HT20)

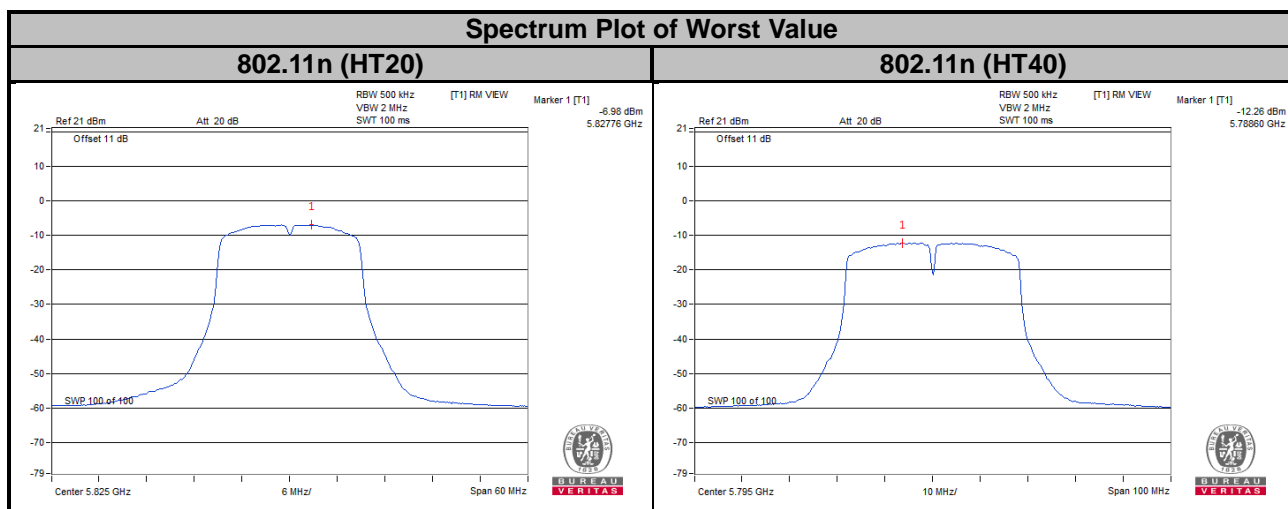
Channel	Frequency (MHz)	PSD w/o Duty Factor (dBm)	Duty Factor	PSD with Duty Factor (dBm)	Limit (dBm/500 kHz)	Pass / Fail
149	5745	-7.51	0.18	-7.33	30	Pass
157	5785	-7.40	0.18	-7.22	30	Pass
165	5825	-6.98	0.18	-6.80	30	Pass

Note: Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

Channel	Frequency (MHz)	PSD w/o Duty Factor (dBm)	Duty Factor	PSD with Duty Factor (dBm)	Limit (dBm/500 kHz)	Pass / Fail
151	5755	-12.64	0.39	-12.25	30	Pass
159	5795	-12.26	0.39	-11.87	30	Pass

Note: Refer to section 3.3 for duty cycle spectrum plot.

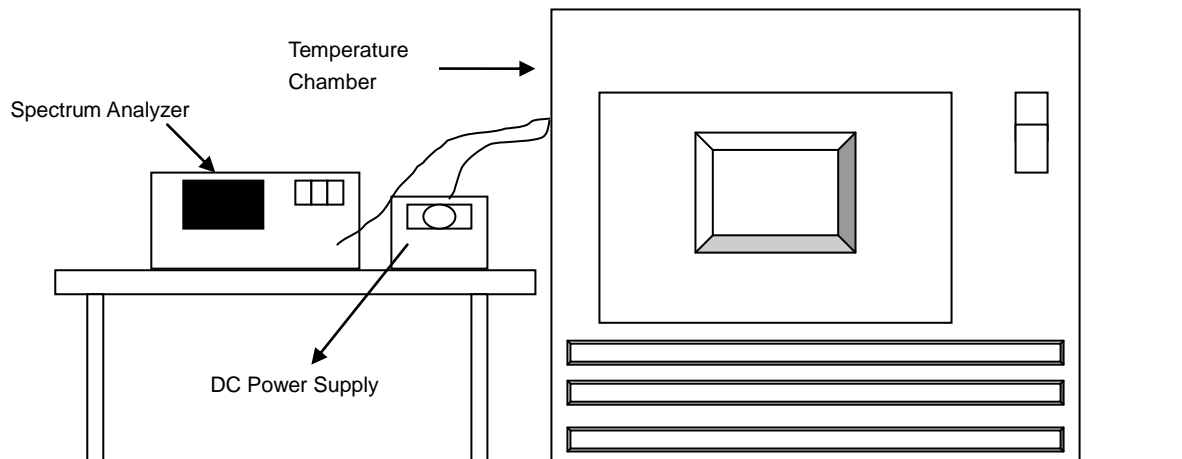


4.4 Frequency Stability

4.4.1 Limit of Frequency Stability Measurement

The frequency of the carrier signal shall be maintained within band of operation.

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

4.4.4 Test Procedure

- To ensure emission at the band edge is maintained within the authorized band, those values shall be measured by radiation emissions at upper and lower frequency points, and finally compensated by frequency deviation as procedures below.
- The EUT was operated at the maximum output power, and connected to the spectrum analyzer, which is set to maximum hold function and peak detector. The peak value of the power envelope was measured and noted. The upper and lower frequency points were respectively measured relatively 10 dB lower than the measured peak value.
- The frequency deviation was calculated by adding the upper frequency point and the lower frequency point divided by two. Those detailed values of frequency deviation are provided in table below.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Condition

Set the EUT transmit at un-modulation mode to test frequency stability.

4.4.7 Test Results

Frequency Stability Versus Temp.									
Operating Frequency: 5180 MHz									
Temp. (°C)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)
50	12.0	5180.022713	4.385	5180.022442	4.332	5180.022484	4.341	5180.022485	4.341
40	12.0	5180.022646	4.372	5180.022474	4.339	5180.022984	4.437	5180.022297	4.304
30	12.0	5180.024089	4.650	5180.023507	4.538	5180.024016	4.636	5180.023829	4.600
20	12.0	5180.024528	4.735	5180.024774	4.783	5180.024708	4.770	5180.024698	4.768
10	12.0	5180.026617	5.138	5180.026184	5.055	5180.026356	5.088	5180.026536	5.123
0	12.0	5180.024791	4.786	5180.024780	4.784	5180.024595	4.748	5180.024680	4.764
-10	12.0	5180.023442	4.525	5180.023261	4.491	5180.023240	4.486	5180.023313	4.501
-20	12.0	5180.022913	4.423	5180.022943	4.429	5180.022695	4.381	5180.022510	4.346
-30	12.0	5180.021485	4.148	5180.021733	4.196	5180.021488	4.148	5180.021545	4.159

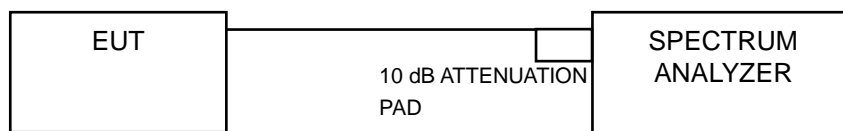
Frequency Stability Versus Temp.									
Operating Frequency: 5180 MHz									
Temp. (°C)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)
20	6.0	5180.034810	6.720	5180.034441	6.649	5180.034929	6.743	5180.034634	6.686
	12.0	5180.024528	4.735	5180.024774	4.783	5180.024708	4.770	5180.024698	4.768
	18.0	5180.036341	7.016	5180.036364	7.020	5180.036328	7.013	5180.036397	7.026

4.5 6 dB Bandwidth Measurement

4.5.1 Limits of 6 dB Bandwidth Measurement

The minimum of 6 dB Bandwidth Measurement is 0.5 MHz.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

4.5.4 Test Procedure

MEASUREMENT PROCEDURE REF

- Set resolution bandwidth (RBW) = 100 kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

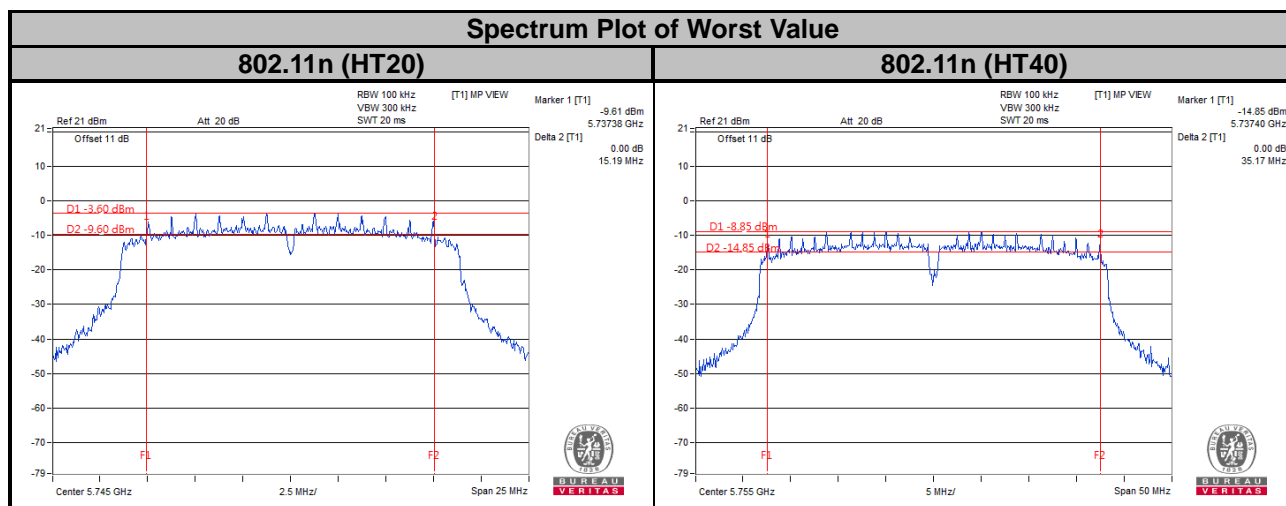
4.5.7 Test Results

802.11n (HT20)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
149	5745	15.19	0.5	Pass
157	5785	15.15	0.5	Pass
165	5825	15.15	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
151	5755	35.17	0.5	Pass
159	5795	35.16	0.5	Pass



5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

--- END ---