

# SUPPLEMENTARY FCC TEST REPORT (15.407)

**REPORT NO.:** RF980313L03E

**MODEL NO.:** MC9598

**FCC ID:** UZ7MC9598

**RECEIVED:** Feb. 03, 2015

**TESTED:** Mar. 26, 2015 ~ Apr. 29, 2015

**ISSUED:** May 12, 2015

**APPLICANT:** Zebra Technologies Corporation

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**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.,  
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**TEST LOCATION:** No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei  
Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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## REPORT ISSUE HISTORY RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
1	Original release.	Apr. 02, 2009
2	1. Update applicant and brand name 2. Update the standard to the latest version for WLAN 5G band 4	Apr. 29, 2015
3	1. Update applicant address 2. Update the Wireless Fusion, OS version, OEM version	May 12, 2015



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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF980313L03E	Original release	May 12, 2015

## 1. CERTIFICATION

**PRODUCT:** Mobile Computer

**MODEL NO.:** MC9598

**BRAND:** Zebra

**APPLICANT:** Zebra Technologies Corporation

**TESTED:** Mar. 26, 2015 ~ Apr. 29, 2015

**TEST SAMPLE:** ENGINEERING SAMPLE

**STANDARDS:** FCC Part 15, Subpart E (Section 15.407)

ANSI C63.10-2009

The above equipment (model: MC9598) 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** : Evonne Liu , **DATE** : May 12, 2015  
Evonne Liu / Specialist

**APPROVED BY** : Sam chen , **DATE** : May 12, 2015  
Sam Chen / Senior Project Engineer

## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART E (SECTION 15.407)			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
15.407(b)(6)	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -10.37dB at 0.72084MHz.
15.407(b/1/2/3)(b)(6)	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -2.93dB at 5714MHz.
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)	6dB bandwidth	PASS	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	NA	Refer to Note
15.203	Antenna Requirement	NA	Refer to Note

**NOTE:** Only conducted & radiated emission, Max Average Transmit Power, Peak Power Spectral Density and 6dB bandwidth tests were performed for this addendum. Refer to original report for other test data.

### 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	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	2.93 dB
	200MHz ~1000MHz	2.95 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

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

### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

EUT	Mobile Computer
MODEL NO.	MC9598
POWER SUPPLY	12.0Vdc (adapter) 3.7Vdc (battery)
MODULATION TYPE	64QAM, 16QAM, QPSK, BPSK
MODULATION TECHNOLOGY	OFDM
TRANSFER RATE	802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps
OPERATING FREQUENCY	5745 ~ 5825MHz
NUMBER OF CHANNEL	5745 ~ 5825MHz: 5 for 802.11a
OUTPUT POWER	30.90mW
ANTENNA TYPE	Main: PIFA antenna with 3.52dBi gain Aux.: PIFA antenna with 4.0dBi gain
ANTENNA CONNECTOR	NA
DATA CABLE	Refer to Note as below
ACCESSORY DEVICES	Refer to Note as below
WIRELESS FUSION	3.00.2.0.031R
OS VERSION	05.02.29217
OEM VERSION	05.47.0002

#### NOTE:

1. This report is issued as a supplementary report of BV ADT report no.: RF980313L03. The difference compared with original report is update the standard to the latest version for WLAN 5G band 4.
2. The models as identified below are identical to each other except of the following options:
3. - Barcode reader: 1D laser scanner / 2D Imager

Brand	Model	Description
Motorola	MC9598	EVDO 1D Calculator Numeric
Motorola	MC9598	EVDO 2D Calculator Numeric
Motorola	MC9598	EVDO 1D Alpha Primary
<b>Motorola</b>	<b>MC9598</b>	<b>EVDO 2D Alpha Primary</b>
Motorola	MC9598	EVDO 1D Telephony Numeric
Motorola	MC9598	EVDO 2D Telephony Numeric
Motorola	MC9598	EVDO 1D Alpha Numeric Wide
Motorola	MC9598	EVDO 2D Alpha Numeric Wide

\*\*The worst case had been marked by boldface.



4. The EUT contains following accessory devices.

ITEM	BRAND	MODEL	SPECIFICATION
Adapter	HIPRO	HP-O2040D43	I/P: 100-240Vac, 50-60Hz, 1.5A O/P: 12Vdc, 3.33A AC 1.7m cable w/o core DC 1.8m cable w/ one core
Battery	Motorola	82-111636-01	3.7Vdc, 4800mAh, 17.7Wh
Earphone	Motorola	NA	0.8m w/ one core
USB charging Y cable	Motorola	NA	1.8m w/ one core

5. The EUT provides one completed transmitter and two receivers.

MODULATION MODE	TX FUNCTION
802.11a	1TX

6. The above EUT information is declared by the 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 5.0GHz (5745 ~ 5825MHz):**

5 channels are provided for 802.11a:

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz		

### 3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE $\geq$ 1G	RE<1G	PLC	APCM	
A	√	√	√	√	Main Ant.
B	√	√	-	-	Aux Ant.

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

**RE<1G**: Radiated Emission below 1GHz

**PLC**: Power Line Conducted Emission

**APCM**: Antenna Port Conducted Measurement

**NOTE:** The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane** for **MODE A** and **Z-plane** for **MODE B**.

#### RADIATED EMISSION TEST (ABOVE 1GHz):

- ☒ 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	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A, B	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0

#### RADIATED EMISSION TEST (BELOW 1GHz):

- ☒ 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	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A, B	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0

#### POWER LINE CONDUCTED EMISSION TEST:

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11a	5745-5825	149 to 165	149	OFDM	BPSK	6.0

#### BANDEDGE MEASUREMENT:

- ☒ 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	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0

### 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	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0

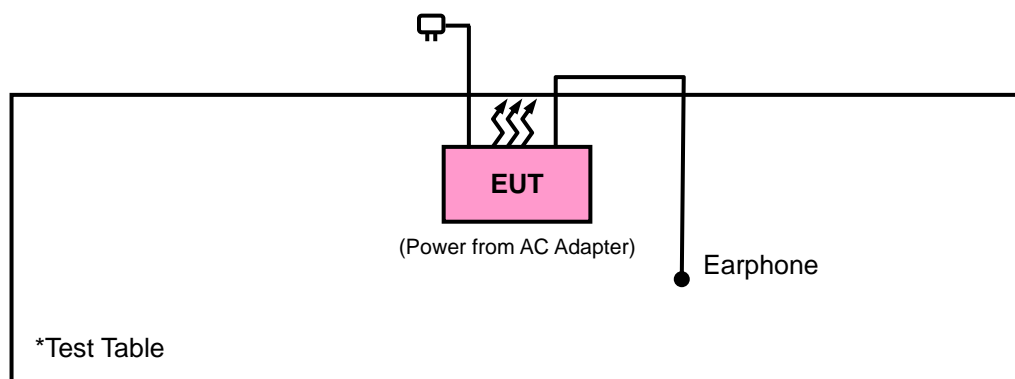
### TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	25deg. C, 65%RH	120Vac, 60Hz	Gavin Wu
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Gavin Wu
PLC	25deg. C, 65%RH	120Vac, 60Hz	Toby Tian
APCM	25deg. C, 65%RH	120Vac, 60Hz	Luke Chen

## 3.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units.

### 3.3.1 CONFIGURATION OF SYSTEM UNDER TEST

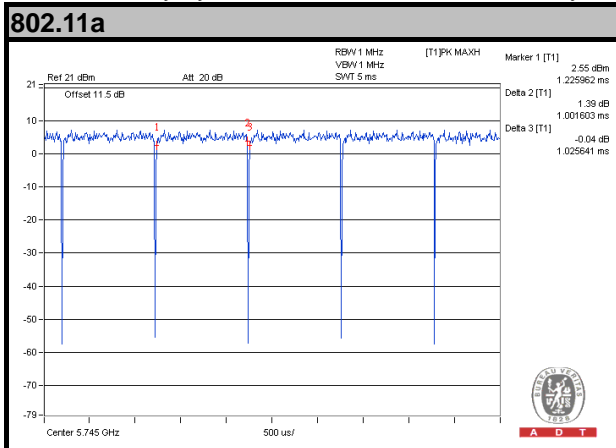


### 3.4 DUTY CYCLE TEST SIGNAL

#### MODULATION TYPE: BPSK

If duty cycle is < 98%, duty factor shall be considered.

**802.11a:** Duty cycle =  $1.001/1.025 = 0.976$ , Duty factor =  $10 * \log(1/0.976) = 0.10$



### 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**

**v01 ANSI C63.10-2009**

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

## 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:

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 1000MHz, 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 20dB 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 v01	FIELD STRENGTH AT 3m	
	PK: 74 (dBuV/m)	AV: 54 (dBuV/m)
APPLICABLE TO	EIRP LIMIT	EQUIVALENT FIELD STRENGTH AT 3m
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) <sup>*1</sup> PK: -17 (dBm/MHz) <sup>*2</sup>	PK: 68.2 (dBuV/m) <sup>*1</sup> PK: 78.2 (dBuV/m) <sup>*2</sup>

**NOTE:** <sup>\*1</sup> beyond 10MHz of the band edge <sup>\*2</sup> within 10 MHz of band edge

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

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

#### 4.1.3 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Oct. 06, 2014	Oct. 05, 2015
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 10, 2014	Dec. 09, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Feb. 04, 2015	Feb. 04, 2016
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Feb. 09, 2015	Feb. 09, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Feb. 04, 2015	Feb. 04, 2016
Preamplifier EMCI	EMC 012645	980115	Dec. 12, 2014	Dec. 11, 2015
Preamplifier EMCI	EMC 184045	980116	Jan. 09, 2015	Jan. 08, 2016
Preamplifier EMCI	EMC 330H	980112	Dec. 25, 2014	Dec. 24, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4 2950114	Oct. 18, 2014	Oct. 17, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Oct. 18, 2014	Oct. 17, 2015
RF signal cable Worken	RG-213	NA	Nov. 07, 2014	Nov. 06, 2015
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
Power Meter	ML2495A	1232002	Sep. 17, 2014	Sep. 16, 2015
Power Sensor	MA2411B	1207325	Sep. 17, 2014	Sep. 16, 2015

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The calibration interval of the loop antenna is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in HwaYa Chamber 10.
4. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
5. The FCC Site Registration No. is 690701.
6. The IC Site Registration No. is IC 7450F-10.

#### 4.1.4 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) 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 antenna is a broadband antenna, and its 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 rotatable 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 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.

#### NOTE:

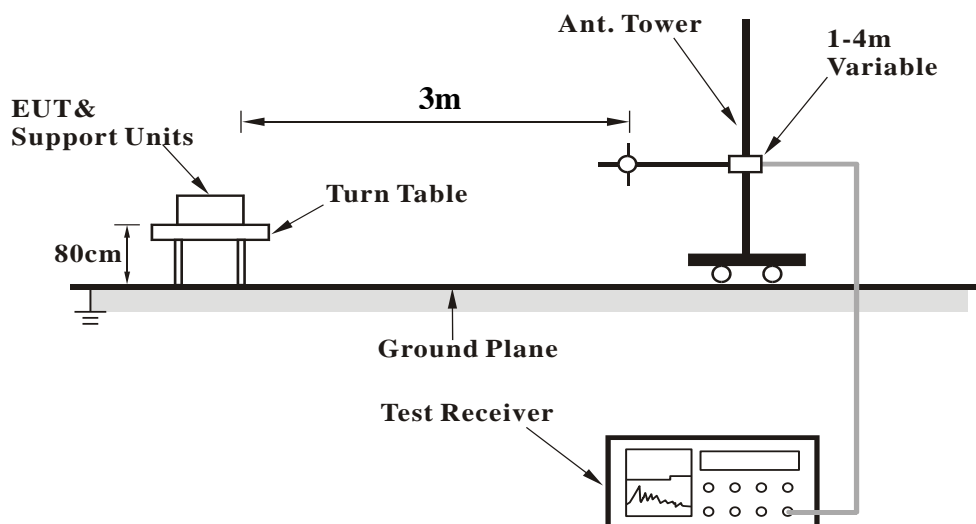
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency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

#### 4.1.5 DEVIATION FROM TEST STANDARD

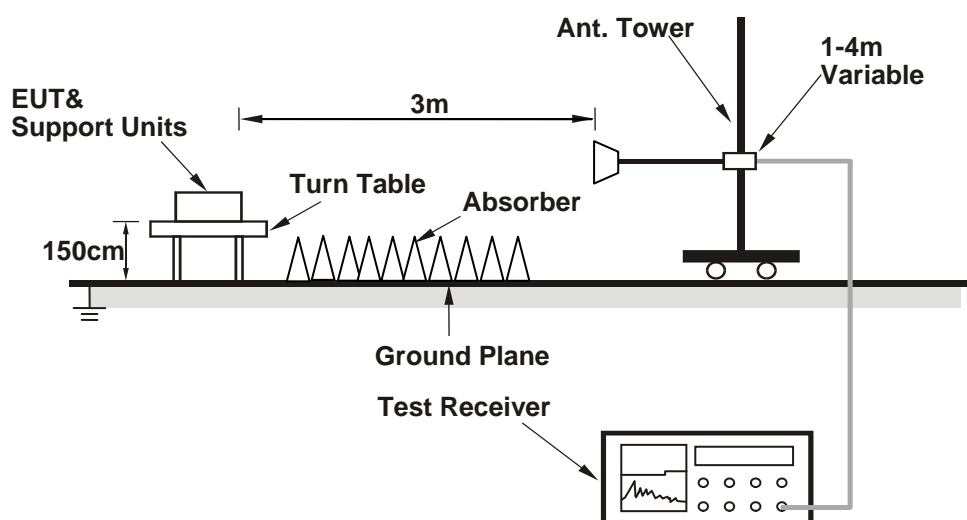
No deviation.

#### 4.1.6 TEST SETUP

<Frequency Range 30MHz ~ 1GHz>



<Frequency Range above 1GHz>



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 1GHz WORST-CASE DATA

802.11a

##### MODE A

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1GHz ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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	59.34	59.25	68.2	-8.86	31.93	5.59	37.43	100	160	Peak
5725	66.53	66.41	78.2	-11.67	31.96	5.59	37.43	100	160	Peak
5745	90.43	90.31			31.99	5.6	37.47	100	160	Average
5745	99.85	99.73			31.99	5.6	37.47	100	160	Peak
5850	58.09	57.79	78.2	-20.11	32.15	5.66	37.51	100	160	Peak
5861	58.75	58.41	68.2	-9.45	32.18	5.66	37.5	100	160	Peak
11490	43.21	47.08	54	-10.79	39.91	9.05	52.83	110	205	Average
11490	53.3	57.17	74	-20.7	39.91	9.05	52.83	110	205	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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	61.07	60.98	68.2	-7.13	31.93	5.59	37.43	113	306	Peak
5725	68.23	68.11	78.2	-9.97	31.96	5.59	37.43	113	306	Peak
5745	93.23	93.11			31.99	5.6	37.47	113	306	Average
5745	102.82	102.7			31.99	5.6	37.47	113	306	Peak
5850	57.42	57.12	78.2	-20.78	32.15	5.66	37.51	113	306	Peak
5861	59.57	59.23	68.2	-8.63	32.18	5.66	37.5	113	306	Peak
11490	45.37	49.24	54	-8.63	39.91	9.05	52.83	100	172	Average
11490	53.89	57.76	74	-20.11	39.91	9.05	52.83	100	172	Peak

##### REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 5745MHz: Fundamental frequency.
- 5714MHz & 5725MHz & 5850MHz & 5861MHz: Out of restricted band

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	1GHz ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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	59.86	59.77	68.2	-8.34	31.93	5.59	37.43	100	166	Peak
5725	59.56	59.44	78.2	-18.64	31.96	5.59	37.43	100	166	Peak
5785	91.65	91.53			32.04	5.62	37.54	100	166	Average
5785	101.01	100.89			32.04	5.62	37.54	100	166	Peak
5850	59.74	59.44	78.2	-18.46	32.15	5.66	37.51	100	166	Peak
5861	58.4	58.06	68.2	-9.8	32.18	5.66	37.5	100	166	Peak
11570	42.45	46.91	54	-11.55	39.78	9.09	53.33	100	15	Average
11570	53.56	58.02	74	-20.44	39.78	9.09	53.33	100	15	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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	59.06	58.97	68.2	-9.14	31.93	5.59	37.43	121	308	Peak
5725	60.1	59.98	78.2	-18.1	31.96	5.59	37.43	121	308	Peak
5785	94.8	94.68			32.04	5.62	37.54	121	308	Average
5785	103.68	103.56			32.04	5.62	37.54	121	308	Peak
5850	58.49	58.19	78.2	-19.71	32.15	5.66	37.51	121	308	Peak
5861	59.11	58.77	68.2	-9.09	32.18	5.66	37.5	121	308	Peak
11570	44.4	48.86	54	-9.6	39.78	9.09	53.33	100	37	Average
11570	53.39	57.85	74	-20.61	39.78	9.09	53.33	100	37	Peak

#### REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 5785MHz: Fundamental frequency.
- 5714MHz & 5725MHz & 5850MHz & 5861MHz: Out of restricted band

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	1GHz ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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	58.03	57.94	68.2	-10.17	31.93	5.59	37.43	100	167	Peak
5725	58.06	57.94	78.2	-20.14	31.96	5.59	37.43	100	167	Peak
5825	92.35	92.12			32.12	5.64	37.53	100	167	Average
5825	101.58	101.35			32.12	5.64	37.53	100	167	Peak
5850	62.08	61.78	78.2	-16.12	32.15	5.66	37.51	100	167	Peak
5861	60.89	60.55	68.2	-7.31	32.18	5.66	37.5	100	167	Peak
11650	43.18	47.76	54	-10.82	39.65	9.12	53.35	102	62	Average
11650	52.41	56.99	74	-21.59	39.65	9.12	53.35	102	62	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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	60.14	60.05	68.2	-8.06	31.93	5.59	37.43	100	310	Peak
5725	58.86	58.74	78.2	-19.34	31.96	5.59	37.43	100	310	Peak
5825	94.09	93.86			32.12	5.64	37.53	100	310	Average
5825	103.76	103.53			32.12	5.64	37.53	100	310	Peak
5850	64.26	63.96	78.2	-13.94	32.15	5.66	37.51	100	310	Peak
5861	61.19	60.85	68.2	-7.01	32.18	5.66	37.5	100	310	Peak
11650	46.46	51.04	54	-7.54	39.65	9.12	53.35	124	170	Average
11650	53.26	57.84	74	-20.74	39.65	9.12	53.35	124	170	Peak

#### REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 5825MHz: Fundamental frequency.
- 5714MHz & 5725MHz & 5850MHz & 5861MHz: Out of restricted band

**BELOW 1GHz WORST-CASE DATA:**

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	30MHz ~ 1GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Quasi-peak (QP)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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
118.56	20.94	40.82	43.5	-22.56	10.83	1.18	31.89	101	38	Peak
154.2	31.57	49.21	43.5	-11.93	12.72	1.36	31.72	123	32	Peak
202.53	24.55	45.18	43.5	-18.95	9.48	1.61	31.72	124	326	Peak
314.7	28.22	44.72	46	-17.78	13.31	2.11	31.92	134	133	Peak
360.9	26.08	41.38	46	-19.92	14.4	2.27	31.97	101	260	Peak
631.1	25.1	34.06	46	-20.9	19.99	3.18	32.13	118	133	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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
76.98	27.29	48.87	40	-12.71	9.09	0.95	31.62	122	148	Peak
148.8	26.73	44.38	43.5	-16.77	12.64	1.33	31.62	114	61	Peak
194.43	23.52	43.97	43.5	-19.98	9.7	1.57	31.72	127	161	Peak
324.5	23.49	39.66	46	-22.51	13.54	2.14	31.85	129	69	Peak
422.5	22.61	36.35	46	-23.39	15.79	2.51	32.04	119	170	Peak
594.7	24.14	33.78	46	-21.86	19.48	3.07	32.19	116	221	Peak

**REMARKS:** Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin value = Emission level – Limit value

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	30MHz ~ 1GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Quasi-peak (QP)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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
124.77	21.22	40.55	43.5	-22.28	11.35	1.21	31.89	103	130	Peak
154.47	31.99	49.63	43.5	-11.51	12.72	1.36	31.72	124	287	Peak
227.91	23.3	42.86	46	-22.7	10.54	1.73	31.83	113	350	Peak
318.9	28.19	44.57	46	-17.81	13.4	2.12	31.9	134	306	Peak
424.6	24.18	37.86	46	-21.82	15.83	2.52	32.03	135	216	Peak
631.8	24.2	33.16	46	-21.8	19.99	3.18	32.13	104	105	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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
78.06	27.44	49.44	40	-12.56	8.61	0.96	31.57	116	169	Peak
152.31	27.74	45.34	43.5	-15.76	12.71	1.35	31.66	128	44	Peak
221.16	23.78	43.54	46	-22.22	10.26	1.7	31.72	126	176	Peak
325.2	23.97	40.14	46	-22.03	13.54	2.14	31.85	105	313	Peak
430.9	22.65	36.17	46	-23.35	15.95	2.54	32.01	105	213	Peak
554.8	23.64	34.12	46	-22.36	18.57	2.96	32.01	106	10	Peak

**REMARKS:** Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin value = Emission level – Limit value

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	30MHz ~ 1GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Quasi-peak (QP)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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
119.37	21.37	41.15	43.5	-22.13	10.93	1.18	31.89	130	307	Peak
153.39	31.89	49.5	43.5	-11.61	12.72	1.36	31.69	128	245	Peak
200.37	24.12	44.87	43.5	-19.38	9.4	1.6	31.75	100	149	Peak
316.1	28.19	44.66	46	-17.81	13.33	2.11	31.91	101	103	Peak
397.3	24.05	38.46	46	-21.95	15.28	2.42	32.11	107	265	Peak
605.2	24.13	33.53	46	-21.87	19.67	3.1	32.17	128	6	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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
83.73	28.1	50.58	40	-11.9	8.18	0.99	31.65	112	120	Peak
153.66	28.27	45.88	43.5	-15.23	12.72	1.36	31.69	137	24	Peak
194.97	24.07	44.52	43.5	-19.43	9.7	1.57	31.72	119	265	Peak
326.6	23.76	39.85	46	-22.24	13.59	2.15	31.83	115	220	Peak
426	23.45	37.11	46	-22.55	15.85	2.52	32.03	136	55	Peak
577.9	24.15	34.13	46	-21.85	19.1	3.03	32.11	115	97	Peak

**REMARKS:** Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin value = Emission level – Limit value

# ABOVE 1GHz WORST-CASE DATA

## MODE B

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1GHz ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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	65.27	65.18	68.2	-2.93	31.93	5.59	37.43	132	90	Peak
5725	70.9	70.78	78.2	-7.3	31.96	5.59	37.43	132	90	Peak
5745	95.75	95.63			31.99	5.6	37.47	132	90	Average
5745	104.85	104.73			31.99	5.6	37.47	132	90	Peak
5850	59.64	59.34	78.2	-18.56	32.15	5.66	37.51	132	90	Peak
5861	58.04	57.7	68.2	-10.16	32.18	5.66	37.5	132	90	Peak
11490	44.48	48.35	54	-9.52	39.91	9.05	52.83	104	32	Average
11490	55.37	59.24	74	-18.63	39.91	9.05	52.83	104	32	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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	65.14	65.05	68.2	-3.06	31.93	5.59	37.43	121	158	Peak
5725	74.19	74.07	78.2	-4.01	31.96	5.59	37.43	121	158	Peak
5745	97.31	97.19			31.99	5.6	37.47	121	158	Average
5745	106.88	106.76			31.99	5.6	37.47	121	158	Peak
5850	59.22	58.92	78.2	-18.98	32.15	5.66	37.51	121	158	Peak
5861	59.01	58.67	68.2	-9.19	32.18	5.66	37.5	121	158	Peak
11490	44.97	48.84	54	-9.03	39.91	9.05	52.83	100	218	Average
11490	56.03	59.9	74	-17.97	39.91	9.05	52.83	100	218	Peak

### REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 5745MHz: Fundamental frequency.
- 5714MHz & 5725MHz & 5850MHz & 5861MHz: Out of restricted band



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	1GHz ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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	58.44	58.35	68.2	-9.76	31.93	5.59	37.43	112	91	Peak
5725	58.74	58.62	78.2	-19.46	31.96	5.59	37.43	112	91	Peak
5785	97.87	97.75			32.04	5.62	37.54	112	91	Average
5785	106.85	106.73			32.04	5.62	37.54	112	91	Peak
5850	59.06	58.76	78.2	-19.14	32.15	5.66	37.51	112	91	Peak
5861	59	58.66	68.2	-9.2	32.18	5.66	37.5	112	91	Peak
11570	46.51	50.97	54	-7.49	39.78	9.09	53.33	157	147	Average
11570	56.71	61.17	74	-17.29	39.78	9.09	53.33	157	147	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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	59.57	59.48	68.2	-8.63	31.93	5.59	37.43	120	159	Peak
5725	58.66	58.54	78.2	-19.54	31.96	5.59	37.43	120	159	Peak
5785	98.78	98.66			32.04	5.62	37.54	120	159	Average
5785	108.06	107.94			32.04	5.62	37.54	120	159	Peak
5850	59.44	59.14	78.2	-18.76	32.15	5.66	37.51	120	159	Peak
5861	58.08	57.74	68.2	-10.12	32.18	5.66	37.5	120	159	Peak
11570	46.65	51.11	54	-7.35	39.78	9.09	53.33	114	130	Average
11570	56.69	61.15	74	-17.31	39.78	9.09	53.33	114	130	Peak

**REMARKS:**

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 5785MHz: Fundamental frequency.
- 5714MHz & 5725MHz & 5850MHz & 5861MHz: Out of restricted band



EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	1GHz ~ 40GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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	57.65	57.56	68.2	-10.55	31.93	5.59	37.43	100	88	Peak
5725	59.05	58.93	78.2	-19.15	31.96	5.59	37.43	100	88	Peak
5825	97.36	97.13			32.12	5.64	37.53	100	88	Average
5825	107.18	106.95			32.12	5.64	37.53	100	88	Peak
5850	69.48	69.18	78.2	-8.72	32.15	5.66	37.51	100	88	Peak
5861	62.77	62.43	68.2	-5.43	32.18	5.66	37.5	100	88	Peak
11650	45.2	49.78	54	-8.8	39.65	9.12	53.35	107	33	Average
11650	55.23	59.81	74	-18.77	39.65	9.12	53.35	107	33	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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	58.07	57.98	68.2	-10.13	31.93	5.59	37.43	120	159	Peak
5725	60.03	59.91	78.2	-18.17	31.96	5.59	37.43	120	159	Peak
5825	98.65	98.42			32.12	5.64	37.53	120	159	Average
5825	108.01	107.78			32.12	5.64	37.53	120	159	Peak
5850	70.19	69.89	78.2	-8.01	32.15	5.66	37.51	120	159	Peak
5861	62.42	62.08	68.2	-5.78	32.18	5.66	37.5	120	159	Peak
11650	46.9	51.48	54	-7.1	39.65	9.12	53.35	100	139	Average
11650	55.13	59.71	74	-18.87	39.65	9.12	53.35	100	139	Peak

#### REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor  
Margin value = Emission level – Limit value
- 5825MHz: Fundamental frequency.
- 5714MHz & 5725MHz & 5850MHz & 5861MHz: Out of restricted band

**BELOW 1GHz WORST-CASE DATA:**

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	30MHz ~ 1GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Quasi-peak (QP)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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
57	20.37	38.66	40	-19.63	12.25	0.81	31.35	117	251	Peak
153.66	32.27	49.88	43.5	-11.23	12.72	1.36	31.69	107	105	Peak
201.72	24.51	45.21	43.5	-18.99	9.44	1.6	31.74	140	188	Peak
316.8	28.58	45.02	46	-17.42	13.36	2.11	31.91	128	80	Peak
360.9	24.51	39.81	46	-21.49	14.4	2.27	31.97	113	4	Peak
414.8	24.6	38.5	46	-21.4	15.64	2.48	32.02	114	280	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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
85.35	28.91	51.43	40	-11.09	8.22	1	31.74	135	287	Peak
153.39	28.41	46.02	43.5	-15.09	12.72	1.36	31.69	120	264	Peak
194.7	24.09	44.54	43.5	-19.41	9.7	1.57	31.72	107	49	Peak
326.6	23.97	40.06	46	-22.03	13.59	2.15	31.83	134	346	Peak
425.3	23.36	37.02	46	-22.64	15.85	2.52	32.03	140	6	Peak
550.6	23.41	33.94	46	-22.59	18.48	2.95	31.96	118	85	Peak

**REMARKS:** Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin value = Emission level – Limit value

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	30MHz ~ 1GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Quasi-peak (QP)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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
121.26	21.72	41.34	43.5	-21.78	11.09	1.19	31.9	131	60	Peak
153.12	31.94	49.55	43.5	-11.56	12.72	1.36	31.69	121	117	Peak
200.1	24.74	45.56	43.5	-18.76	9.36	1.59	31.77	133	72	Peak
317.5	28.61	45.05	46	-17.39	13.36	2.11	31.91	106	33	Peak
418.3	25.54	39.39	46	-20.46	15.7	2.49	32.04	118	279	Peak
614.3	25.34	34.56	46	-20.66	19.77	3.13	32.12	121	285	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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
85.08	28.89	51.41	40	-11.11	8.22	1	31.74	111	348	Peak
153.66	28.22	45.83	43.5	-15.28	12.72	1.36	31.69	112	0	Peak
194.16	24.31	44.69	43.5	-19.19	9.77	1.56	31.71	132	324	Peak
330.1	23.72	39.71	46	-22.28	13.66	2.16	31.81	122	16	Peak
423.2	23.89	37.63	46	-22.11	15.79	2.51	32.04	138	80	Peak
527.5	22.93	33.78	46	-23.07	17.95	2.87	31.67	180	268	Peak

**REMARKS:** Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin value = Emission level – Limit value

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 165	FREQUENCY RANGE	30MHz ~ 1GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Quasi-peak (QP)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Gavin Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (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
124.23	21.58	40.98	43.5	-21.92	11.28	1.21	31.89	120	168	Peak
152.85	31.52	49.13	43.5	-11.98	12.72	1.36	31.69	137	300	Peak
201.99	25.19	45.89	43.5	-18.31	9.44	1.6	31.74	134	304	Peak
318.9	28.43	44.81	46	-17.57	13.4	2.12	31.9	122	11	Peak
418.3	25.66	39.51	46	-20.34	15.7	2.49	32.04	131	166	Peak
620.6	24.36	33.52	46	-21.64	19.86	3.15	32.17	113	253	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (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
82.38	28.11	50.57	40	-11.89	8.16	0.98	31.6	137	32	Peak
153.93	28.08	45.72	43.5	-15.42	12.72	1.36	31.72	117	112	Peak
196.05	24.11	44.63	43.5	-19.39	9.64	1.57	31.73	106	350	Peak
327.3	24.12	40.21	46	-21.88	13.59	2.15	31.83	123	305	Peak
420.4	23.32	37.14	46	-22.68	15.73	2.5	32.05	124	207	Peak
559.7	23.31	33.72	46	-22.69	18.68	2.97	32.06	101	189	Peak

**REMARKS:** Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin value = Emission level – Limit value

## 4.2 CONDUCTED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB $\mu$ V)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.
3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

### 4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 11, 2014	Nov. 10, 2015
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 26, 2014	Dec. 25, 2015
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Mar. 02, 2015	Mar. 01, 2016
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 21, 2014	Jul. 20, 2015
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Shielded Room 1.
3. The VCCI Site Registration No. is C-2040.



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#### 4.2.3 TEST PROCEDURES

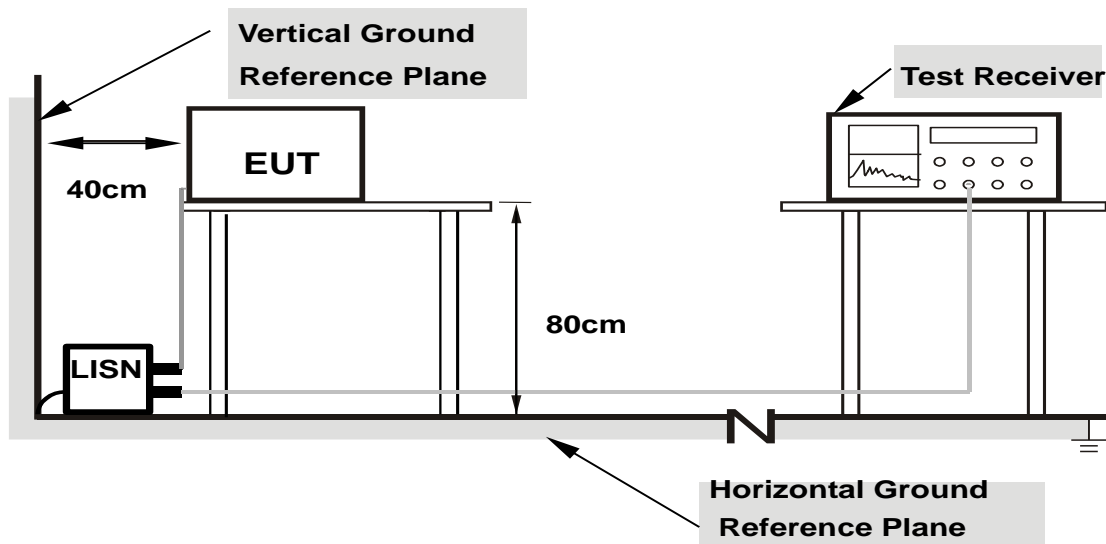
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

**NOTE:** All modes of operation were investigated and the worst-case emissions are reported.

#### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.2.5 TEST SETUP



- Note:**
1. Support units were connected to second LISN.
  2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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

#### 4.2.6 EUT OPERATING CONDITIONS

Same as section 4.1.6.

#### 4.2.7 TEST RESULTS

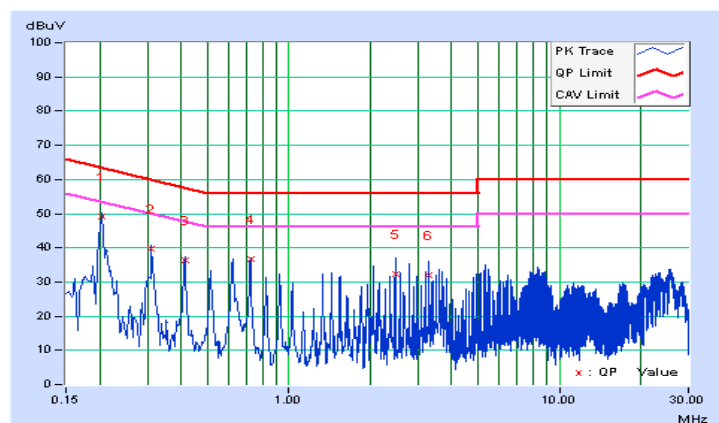
##### CONDUCTED WORST-CASE DATA :

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Toby Tian	Test Date	2015/4/29

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.20458	0.06	49.21	39.74	49.27	39.80	63.42	53.42	-14.15	-13.62
2	0.31031	0.06	39.53	31.04	39.59	31.10	59.96	49.96	-20.37	-18.86
3	0.41197	0.06	36.24	32.02	36.30	32.08	57.61	47.61	-21.31	-15.53
4	0.72084	0.07	36.59	34.32	36.66	34.39	56.00	46.00	-19.34	-11.61
5	2.47254	0.14	32.19	21.57	32.33	21.71	56.00	46.00	-23.67	-24.29
6	3.29755	0.17	31.79	20.56	31.96	20.73	56.00	46.00	-24.04	-25.27

##### Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



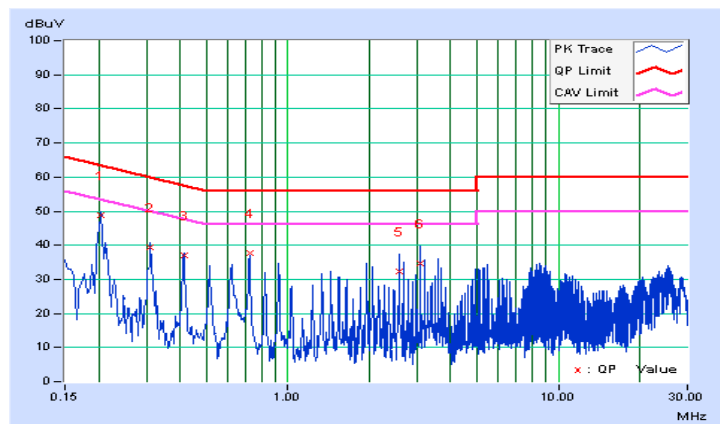


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Toby Tian	Test Date	2015/4/29

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.20474	0.05	48.82	39.88	48.87	39.93	63.42	53.42	-14.55	-13.49
2	0.31031	0.06	39.38	32.03	39.44	32.09	59.96	49.96	-20.53	-17.88
3	0.41197	0.06	36.84	32.71	36.90	32.77	57.61	47.61	-20.71	-14.84
<b>4</b>	<b>0.72084</b>	<b>0.07</b>	<b>37.52</b>	<b>35.56</b>	<b>37.59</b>	<b>35.63</b>	<b>56.00</b>	<b>46.00</b>	<b>-18.41</b>	<b>-10.37</b>
5	2.57029	0.13	32.05	24.37	32.18	24.50	56.00	46.00	-23.82	-21.50
6	3.08641	0.15	34.68	22.76	34.83	22.91	56.00	46.00	-21.17	-23.09

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



### 4.3 TRANSMIT POWER MEASUREMENT

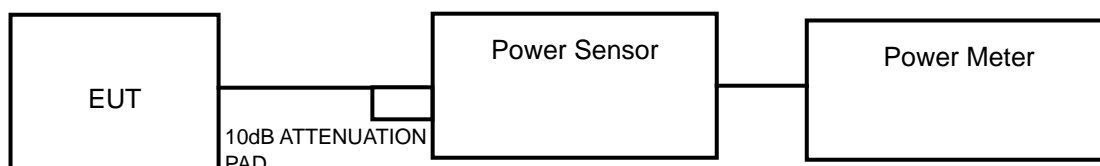
#### 4.3.1 LIMITS OF TRANSMIT POWER MEASUREMENT

OPERATION BAND	EUT CATEGORY		LIMIT
U-NII-1		Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p $\leq$ 125mW(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	250mW (24 dBm)
U-NII-2A		---	250mW (24 dBm) or 11 dBm+10 log B*
U-NII-2C		---	250mW (24 dBm) or 11 dBm+10 log B*
U-NII-3	√	---	1 Watt (30 dBm)

**NOTE:** Where B is the 26dB emission bandwidth in MHz.

#### 4.3.2 TEST SETUP

##### FOR POWER OUTPUT MEASUREMENT



#### 4.3.3 TEST INSTRUMENTS

Refer to section 4.1.3 to get information of above instrument.

#### 4.3.4 TEST PROCEDURE

##### FOR 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.

#### 4.3.5 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 specific channel frequencies individually.

#### 4.3.7 TEST RESULTS

##### POWER OUTPUT

802.11a

Main Ant.

CHANNEL	FREQUENCY (MHz)	DATA RATE							
		6M bps	9M bps	12M bps	18M bps	24M bps	36M bps	48M bps	54M bps
149	5745	14.14	14.04	14.06	14.12	12.87	12.91	10.10	10.00
157	5785	13.78	13.74	13.49	13.55	12.28	12.31	9.35	8.32
165	5825	13.45	13.40	13.17	13.23	11.90	11.89	9.12	9.11

Aux Ant.

CHANNEL	FREQUENCY (MHz)	DATA RATE							
		6M bps	9M bps	12M bps	18M bps	24M bps	36M bps	48M bps	54M bps
149	5745	11.50	11.45	11.37	11.43	11.33	11.32	10.89	10.90
157	5785	11.06	11.05	11.00	11.01	10.98	10.91	10.44	10.41
165	5825	11.46	11.42	11.41	11.42	10.41	10.35	10.36	10.33

802.11a

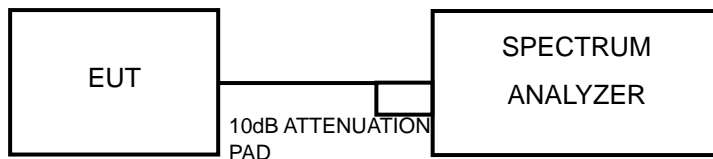
CHANNEL	CHANNEL FREQUENCY (MHz)	MAX. CONDUCTED POWER (mW)	MAX. CONDUCTED POWER (dBm)	POWER LIMIT (dBm)	PASS/FAIL
149	5745	30.90	14.9	30	PASS
157	5785	29.44	14.69	30	PASS
165	5825	28.64	14.57	30	PASS

## 4.4 PEAK POWER SPECTRAL DENSITY MEASUREMENT

### 4.4.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

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

### 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 PROCEDURES

**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  $\geq$  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)

### 4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

### 4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.



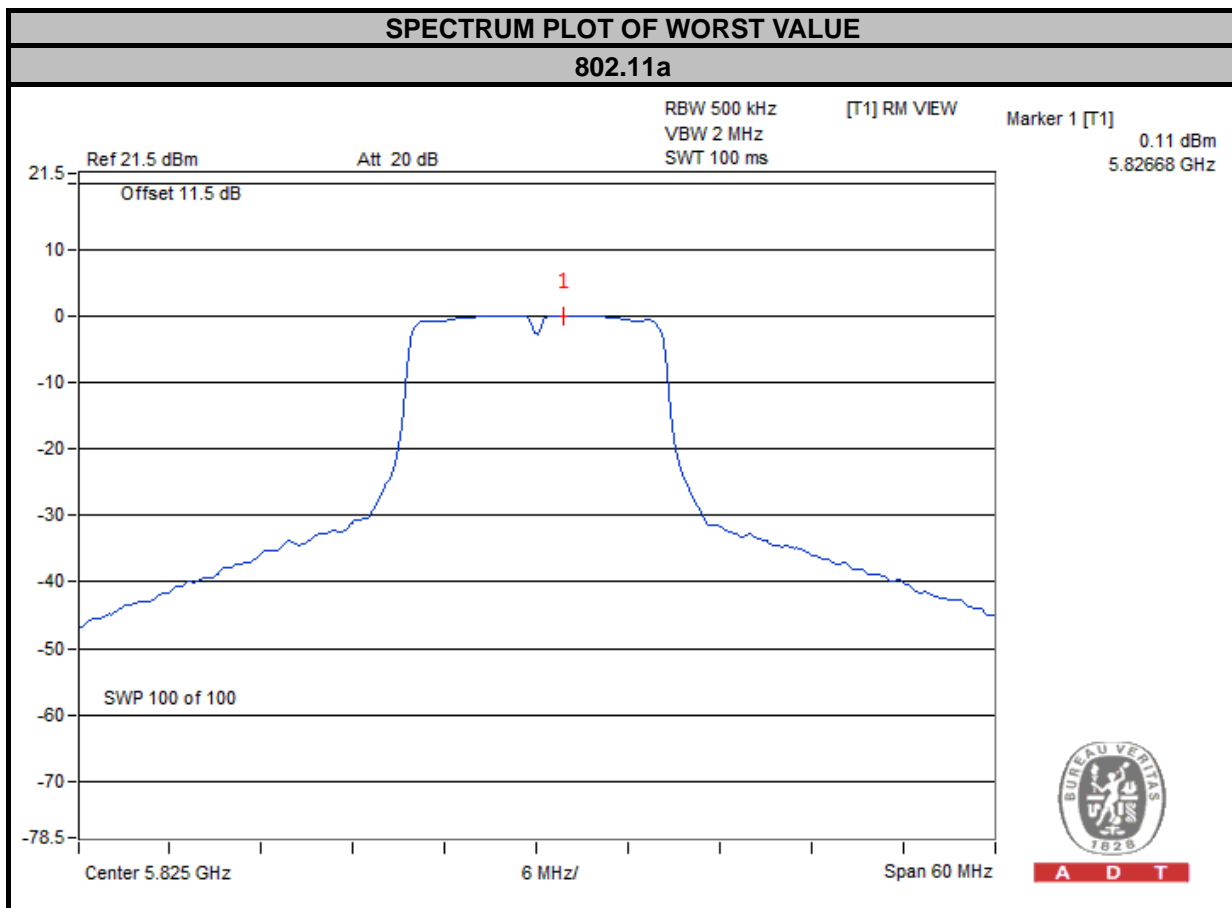
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#### 4.4.7 TEST RESULTS

##### For U-NII-3 Band

##### 802.11a

CHANNEL	FREQUENCY (MHz)	PSD W/O DUTY FACTOR (dBm)	DUTY FACTOR	PSD WITH DUTY FACTOR (dBm)	LIMIT (dBm/500kHz)	PASS/FAIL
149	5745	-0.14	0.10	-0.04	30	PASS
157	5785	-0.18	0.10	-0.08	30	PASS
165	5825	0.11	0.10	0.21	30	PASS



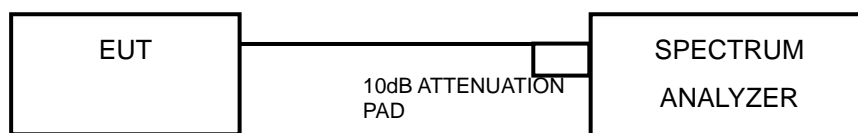
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## 4.5 6dB BANDWIDTH MEASUREMENT

### 4.5.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

### 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

- Set resolution bandwidth (RBW) = 100kHz
- 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.

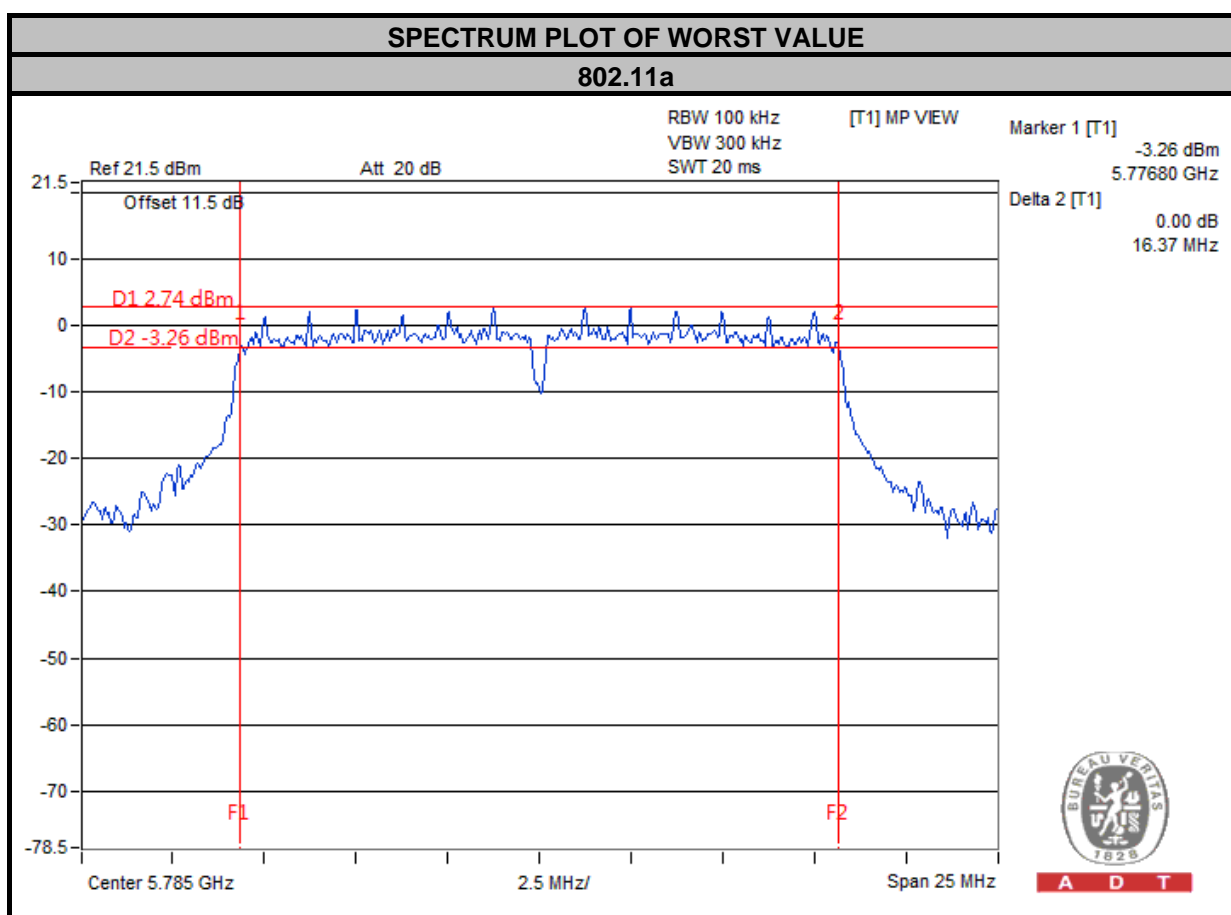
### 4.5.6 EUT OPERATING CONDITIONS

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

### 802.11a

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
149	5745	16.36	0.5	PASS
157	5785	16.37	0.5	PASS
165	5825	16.37	0.5	PASS



## 5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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



## 6. 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:

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Fax: 886-2-26051924

**Hsin Chu EMC/RF/Telecom Lab:**

Tel: 886-3-5935343

Fax: 886-3-5935342

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**Web Site:** [www.bureauveritas-adt.com](http://www.bureauveritas-adt.com)

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



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## **7. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications are made to the EUT by the lab during the test.

**---END---**