

# FCC Test Report (WIFI 5G)

**Report No.:** RF150723C09-7

**FCC ID:** O57PB1750M

**Test Model:** Lenovo PB1-750M

**Received Date:** Jul. 23, 2015

**Test Date:** Jul. 23, 2015 ~ Aug. 12, 2015

**Issued Date:** Aug. 13, 2015

**Applicant:** Lenovo (Shanghai) Electronics Technology Co., Ltd.

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Shanghai , China

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

**Lab Address:** No. 47-2, 14th Ling, Chia Cau Vil., Lin Kou Dist., New Taipei  
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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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## TABLE OF CONTENTS

<b>RELEASE CONTROL RECORD .....</b>	<b>4</b>
<b>1 Certificate of Conformity.....</b>	<b>5</b>
<b>2 Summary of Test Results .....</b>	<b>6</b>
2.1 Measurement Uncertainty .....	6
<b>3 General Information.....</b>	<b>7</b>
3.1 General Description of EUT .....	7
3.2 Description of Test Modes .....	9
3.2.1 Test Mode Applicability and Tested Channel Detail.....	10
3.3 Duty Cycle of Test Signal .....	13
3.4 Description of Support Units .....	14
3.4.1 Configuration of System under Test .....	14
3.5 General Description of Applied Standard.....	15
<b>4 Test Types and Results .....</b>	<b>16</b>
4.1 Radiated Emission and Bandedge Measurement.....	16
4.1.1 Limits of Radiated Emission and Bandedge Measurement .....	16
4.1.2 Test Instruments .....	17
4.1.3 Test Procedure .....	18
4.1.4 Deviation from Test Standard .....	18
4.1.5 Test Setup.....	19
4.1.6 EUT Operating Condition .....	19
4.1.7 Test Results .....	20
4.2 Conducted Emission Measurement .....	38
4.2.1 Limits of Conducted Emission Measurement.....	38
4.2.2 Test Instruments .....	38
4.2.3 Test Procedure .....	39
4.2.4 Deviation from Test Standard .....	39
4.2.5 Test Setup.....	39
4.2.6 EUT Operating Condition .....	39
4.2.7 Test Results .....	40
4.3 Transmit Power Measurement .....	42
4.3.1 Limits of Transmit Power Measurement .....	42
4.3.2 Test Setup.....	42
4.3.3 Test Instruments .....	42
4.3.4 Test Procedure .....	43
4.3.5 Deviation from Test Standard .....	43
4.3.6 EUT Operating Condition .....	43
4.3.7 Test Result.....	44
4.4 Peak Power Spectral Density Measurement .....	50
4.4.1 Limits of Peak Power Spectral Density Measurement .....	50
4.4.2 Test Setup.....	50
4.4.3 Test Instruments .....	50
4.4.4 Test Procedure .....	50
4.4.5 Deviation from Test Standard .....	50
4.4.6 EUT Operating Condition .....	50
4.4.7 Test Results .....	51
4.5 Frequency Stability Measurement.....	55
4.5.1 Limits of Frequency Stability Measurement .....	55
4.5.2 Test Setup.....	55
4.5.3 Test Instruments .....	55
4.5.4 Test Procedure .....	55
4.5.5 Deviation from Test Standard .....	55
4.5.6 EUT Operating Condition .....	55
4.5.7 Test Results .....	56



**5 Pictures of Test Arrangements..... 58**  
**Appendix – Information on the Testing Laboratories ..... 59**



### RELEASE CONTROL RECORD

Issue No.	Description	Date Issued
RF150723C09-7	Original release	Aug. 13, 2015

## 1 Certificate of Conformity

**Product:** Portable Tablet Computer

**Brand:** Lenovo

**Test Model:** Lenovo PB1-750M


**Sample Status:** Production unit

**Applicant:** Lenovo (Shanghai) Electronics Technology Co., Ltd.


**Test Date:** Jul. 23, 2015 ~ Aug. 12, 2015

**Standard:** 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 :**  \_\_\_\_\_, **Date:** Aug. 13, 2015

Amyee Qian / Engineer

**Approved by :**  \_\_\_\_\_, **Date:** Aug. 13, 2015

William Chung / 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)(5)	AC Power Conducted Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -14.13dB at 0.55096MHz.
15.407(b)(1/2/3) (b)(5)	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -3.52dB at 47.55MHz.
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	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	150kHz ~ 30MHz	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	2.93 dB
	200MHz ~ 1000MHz	2.95 dB
Radiated Emissions above 1 GHz	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

<b>PRODUCT</b>	Portable Tablet Computer
<b>BRAND</b>	Lenovo
<b>MODEL NAME</b>	Lenovo PB1-750M
<b>POWER SUPPLY</b>	5.0Vdc (adapter or host equipment) 3.8Vdc (battery)
<b>MODULATION TYPE</b>	64QAM, 16QAM, QPSK, BPSK
<b>MODULATION TECHNOLOGY</b>	OFDM
<b>TRANSFER RATE</b>	802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to MCS7
<b>OPERATING FREQUENCY</b>	5180 ~ 5240MHz, 5745 ~ 5805MHz
<b>NUMBER OF CHANNEL</b>	5180 ~ 5240MHz: 4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz) 5745 ~ 5805MHz: 4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
<b>AVERAGE POWER</b>	9.506mW for 5180 ~ 5240MHz 10.139mW for 5745 ~ 5805MHz
<b>ANTENNA TYPE</b>	5180 ~ 5240MHz: PIFA Antenna with 1dBi gain 5745 ~ 5805MHz: PIFA Antenna with 1dBi gain
<b>ACCESSORY DEVICE</b>	Refer to note as below
<b>DATA CABLE</b>	USB cable: Unshielded, detachable, 1.0m Earphone cable: Unshielded, detachable, 1.1m

Note:

- 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.
- The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

Modulation Mode	TX FUNCTION
<b>802.11a</b>	1TX/1RX
<b>802.11n (20MHz)</b>	1TX/1RX
<b>802.11n (40MHz)</b>	1TX/1RX

- The EUT was powered by the following adapters:

ADAPTER 1	
<b>BRAND:</b>	Lenovo
<b>MODEL:</b>	C-P62
<b>INPUT:</b>	AC 100-240V, 300mA
<b>OUTPUT:</b>	DC 5V, 1500mA
<b>MANUFACTURER:</b>	Acbel
ADAPTER 2	
<b>BRAND:</b>	Lenovo
<b>MODEL:</b>	C-P62
<b>INPUT:</b>	AC 100-240V, 300mA
<b>OUTPUT:</b>	DC 5V, 1500mA
<b>MANUFACTURER:</b>	Huntkey

4. The EUT matched the following USB Cable and Earphone.

USB CABLE	
BRAND:	Lenovo
MODEL:	0154-117
SIGNAL LINE:	1.0 METER

EARPHONE	
BRAND:	Lenovo
MODEL:	LS-118M-09
SIGNAL LINE:	1.1 METER

5. Sample A and Sample B were tested for this project and the differences are as below:

Parts	Sample A		Sample B	
	Brand	Model Name	Brand	Model Name
Battery	Lenovo(Sunwoda)	L15D1P32	Lenovo (SCUD)	L15D1P32
LCD Panel	BOE	TV070HDM	DSBJ	DO0700HHF00
Front Camera	O-film	L545F00	AVC	CPLBF05003
Rear Camera	Sunny	F13V01L	Qtech	ECM13M0166QF
Main Broad	Chinabuilder	08B05112C	js-huashen	82AD005A0
eMCP	Samsung	KMR820001M-B609 (2G+16G) KMQ82000SM-B418 (1G+16G)	Hynix	H9TQ17A8GTMCUR-KUM(1G+16G)
CPU	Qualcomm	MSM8916	Qualcomm	MSM8916

6. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.



### 3.2 Description of Test Modes

#### FOR 5180 ~ 5240MHz

4 channels are provided for 802.11a, 802.11n (20MHz), 802.11ac (20MHz):

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

2 channels are provided for 802.11n (40MHz), 802.11ac (40MHz):

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (80MHz):

Channel	Frequency
42	5210MHz

#### FOR 5745 ~ 5825MHz:

5 channels are provided for 802.11a, 802.11n (20MHz), 802.11ac (20MHz):

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

2 channels are provided for 802.11n (40MHz), 802.11ac (40MHz):

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (80MHz):

Channel	Frequency
155	5775MHz

### 3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
A	√	√	√	-	Powered by Adapter with wifi(5G) link
B	-	-	-	√	Powered by Battery with wifi(5G) link
C	-	-	-	-	Powered by USB with wifi(5G) link

Where **RE≥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 **X-plane**.  
**NOTE:** “-” means no effect.

#### **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	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.0
A	802.11n (20MHz)		36 to 48	36, 40, 48	OFDM	BPSK	MCS0
A	802.11n (40MHz)		38 to 46	38, 46	OFDM	BPSK	MCS0
A	802.11a	5725-5805	149 to 161	149, 157, 161	OFDM	BPSK	6.0
A	802.11n (20MHz)		149 to 161	149, 157, 161	OFDM	BPSK	MCS0
A	802.11n (40MHz)		151 to 159	151, 159	OFDM	BPSK	MCS0

#### **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	802.11a	5180-5320	36 to 64	36	OFDM	BPSK	6.0

**POWER LINE CONDUCTED EMISSION TEST:**

- 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	5180-5320	36 to 64	36	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	5180-5240	36 to 48	36, 48	OFDM	BPSK	6.0
A	802.11n (20MHz)		36 to 48	36, 48	OFDM	BPSK	MCS0
A	802.11n (40MHz)		38 to 46	38, 46	OFDM	BPSK	MCS0
A	802.11a	5725-5805	149 to 161	149, 161	OFDM	BPSK	6.0
A	802.11n (20MHz)		149 to 161	149, 161	OFDM	BPSK	MCS0
A	802.11n (40MHz)		151 to 159	151, 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	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
B	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.0
B	802.11n (20MHz)		36 to 48	36, 40, 48	OFDM	BPSK	MCS0
B	802.11n (40MHz)		38 to 46	38, 46	OFDM	BPSK	MCS0
B	802.11a	5725-5805	149 to 161	149, 157, 161	OFDM	BPSK	6.0
B	802.11n (20MHz)		149 to 161	149, 157, 161	OFDM	BPSK	MCS0
B	802.11n (40MHz)		151 to 159	151, 159	OFDM	BPSK	MCS0



**Test Condition:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	25deg. C, 65%RH	120Vac, 60Hz	Chris Lin
RE $<$ 1G	25deg. C, 65%RH	120Vac, 60Hz	Chris Lin
PLC	25deg. C, 68%RH	120Vac, 60Hz	Sun Lin
APCM	21deg. C, 60%RH	120Vac, 60Hz	Nick Chen

### 3.3 Duty Cycle of Test Signal

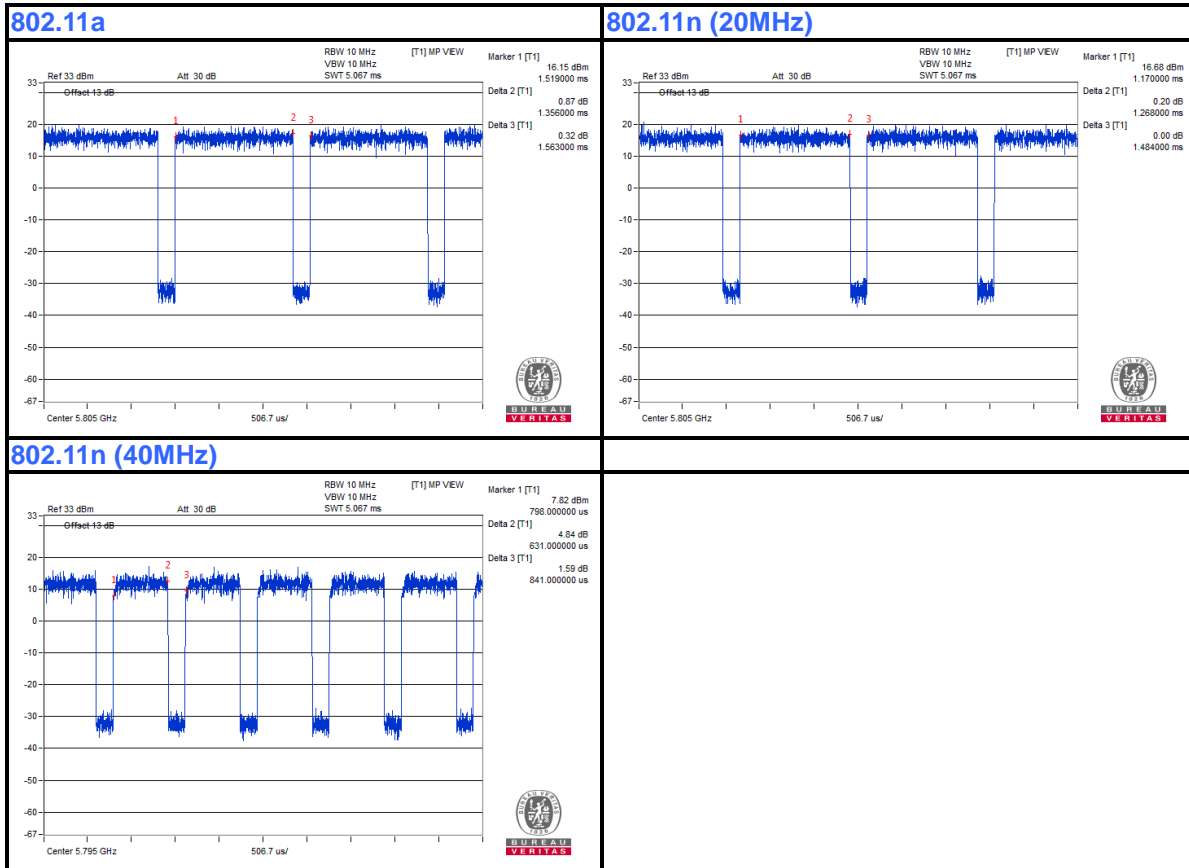
#### MODULATION TYPE: BPSK

Duty cycle of test signal is < 98 %, duty factor is required

**802.11a:** Duty cycle =  $1.356/1.563 = 0.868$ , Duty factor =  $10 * \log(1/0.868) = 0.62$

**802.11n (20MHz):** Duty cycle =  $1.268/1.484 = 0.854$ , Duty factor =  $10 * \log(1/0.854) = 0.69$

**802.11n (40MHz):** Duty cycle =  $0.631/0.841 = 0.750$ , Duty factor =  $10 * \log(1/0.750) = 1.25$



### 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.

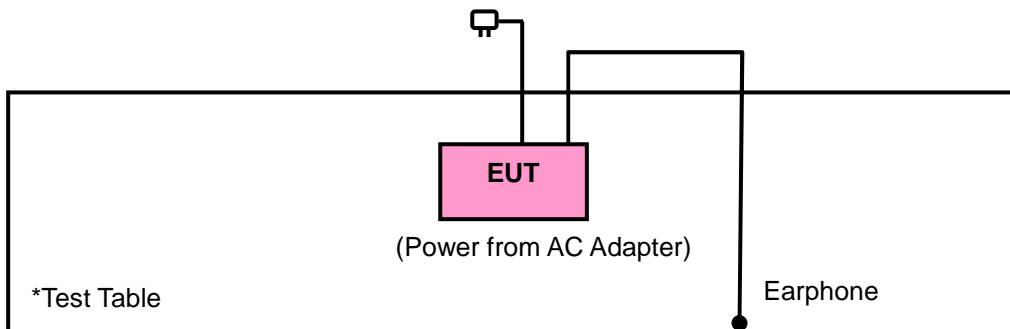
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	DC source	LONG WEI	PS-6403D	010934269	N/A
2	PC	HP	A6608CN	3CR83825X3	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	DC Line: Unshielded, Detachable 1.0m
2	AC Line: Unshielded, Detachable 1.5m

**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 Standard

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 Procedure New Rules v01**  
ANSI C63.10-2013

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

**NOTE:** The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It 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.

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.

#### LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

APPLICABLE TO	LIMIT	
	FIELD STRENGTH AT 3m (dBµV/m)	
	PK	AV
	74	54
√	EIRP LIMIT (dBm)	EQUIVALENT FIELD STRENGTH AT 3m (dBµV/m)
	PK	PK
	-27	68.3

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:

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



**4.1.2 Test Instruments**

<b>DESCRIPTION &amp; MANUFACTURER</b>	<b>MODEL NO.</b>	<b>SERIAL NO.</b>	<b>DATE OF CALIBRATION</b>	<b>DUE DATE OF CALIBRATION</b>
Spectrum Analyzer Agilent Technologies	N9038A	MY52260177	May 19, 2015	May 18, 2016
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 10, 2014	Dec. 09, 2015
BILOG Antenna ETS-Lindgren	3142E	117536	Feb. 24, 2014	Feb. 23, 2015
HORN Antenna ETS-Lindgren	3117	00143293	Aug. 28, 2014	Aug. 27, 2015
Bluetooth Tester	CBT	100980	Apr. 27, 2015	Apr. 26, 2016
Agilent Communications Tester-Wireless	8960 Series 10	MY53201073	Jul. 06, 2015	Jul. 05, 2017
Preamplifier Agilent	310N	187226	Jun. 29, 2015	Jun. 28, 2016
Preamplifier Agilent	83017A	980116	Jan. 09, 2015	Jan. 08, 2016
Power Meter Anritsu	ML2495A	1232002	Sep. 17, 2014	Sep. 16, 2015
Power Sensor Anritsu	MA2411B	1207325	Sep. 17, 2014	Sep. 16, 2015
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(RFC-SM S-100-SMS-120+RFC-S MS-100-SMS-400)	Jun. 27, 2015	Jun. 26, 2016
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(RFC-SM S-100-SMS-24)	Jun. 27, 2015	Jun. 26, 2016
Software BV ADT	E38.130425b	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA
High Speed Power Meter	ML2495A	0842014	Apr. 28, 2012	Apr. 27, 2013

**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 4.

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 460141.

6. The IC Site Registration No. is IC7450F-4.

#### 4.1.3 Test Procedure

- 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 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 detect 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:**

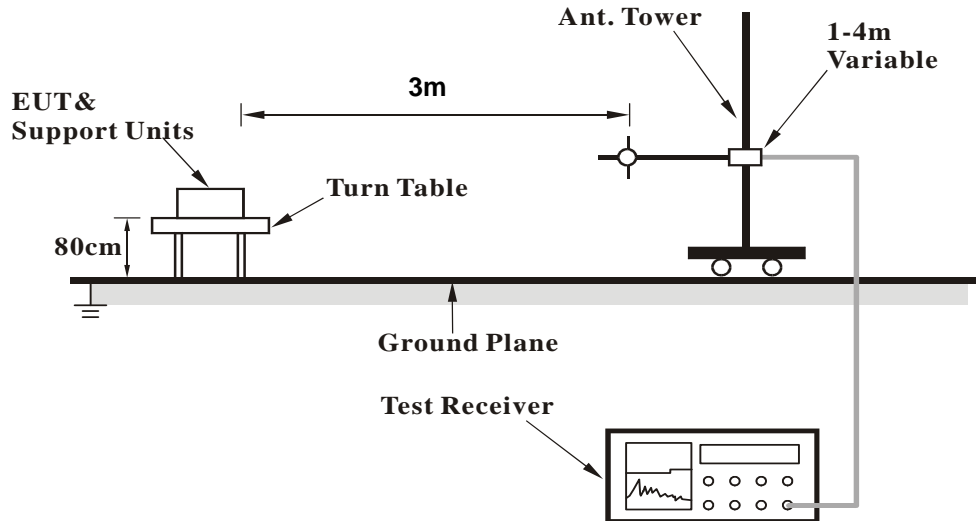
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ( $10 \log(1/\text{duty cycle})$ ).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle  $\geq$  98%) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 Deviation from Test Standard

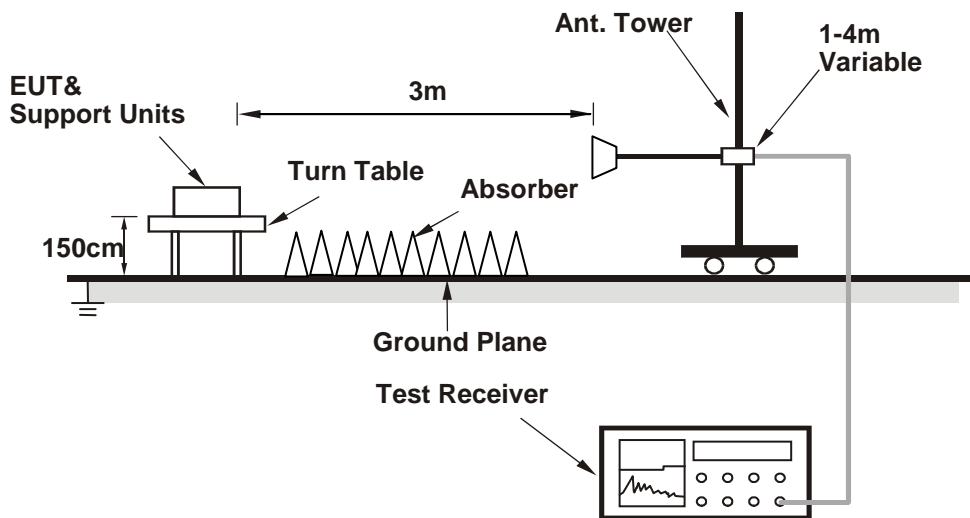
No deviation.

#### 4.1.5 Test Setup

##### <Frequency Range below 1GHz>



##### <Frequency Range above 1GHz>



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

#### 4.1.6 EUT Operating Condition

- Set the EUT under full load condition and placed them on a testing table.
- Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.
- The necessary accessories enable the EUT in full functions.

## 4.1.7 Test Results

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

<b>CHANNEL</b>	TX Channel 0	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	30MHz ~ 1GHz		

**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 (m)	TABLE ANGLE (Degree)	REMARK
117.48	33.86	55.95	43.50	-9.64	8.88	1.28	32.25	147	40	Peak
147.99	23.15	43.92	43.50	-20.35	9.98	1.52	32.27	125	20	Peak
233.31	10.78	28.84	46.00	-35.22	12.25	1.85	32.16	132	50	Peak
373.5	22.46	36.04	46.00	-23.54	16.30	2.26	32.14	135	350	Peak
559.7	28.72	37.93	46.00	-17.28	20.23	2.76	32.20	157	258	Peak
848.8	24.29	28.85	46.00	-21.71	23.80	3.44	31.80	184	88	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 (m)	TABLE ANGLE (Degree)	REMARK
48.36	34.17	57.18	40.00	-5.83	8.31	0.90	32.22	110	248	Peak
54.3	34.04	58.01	40.00	-5.96	7.36	0.90	32.23	109	295	Peak
94.8	24.03	45.61	43.50	-19.47	9.30	1.11	31.99	130	30	Peak
373.5	25.49	39.07	46.00	-20.51	16.30	2.26	32.14	130	30	Peak
707.4	24.38	30.18	46.00	-21.62	23.19	3.11	32.10	170	70	Peak
866.3	24.70	28.55	46.00	-21.30	24.40	3.44	31.69	188	66	Peak

**REMARKS:**

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

**ABOVE 1GHz WORST-CASE DATA: BAND 1**

**802.11a**

<b>CHANNEL</b>	TX Channel 36	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

**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 (m)	TABLE ANGLE (Degree)	REMARK
5146	45.54	37.29	54.00	-8.46	34.12	8.13	34.00	217	57	Average
5146	58.42	50.17	74.00	-15.58	34.12	8.13	34.00	217	57	Peak
5180	103.16	94.85			34.15	8.16	34.00	217	57	Average
5180	111.67	103.36			34.15	8.16	34.00	217	57	Peak
5366	43.56	34.92	54.00	-10.44	34.29	8.38	34.03	217	57	Average
5366	57.52	48.88	74.00	-16.48	34.29	8.38	34.03	217	57	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 (m)	TABLE ANGLE (Degree)	REMARK
5056	43.35	35.25	54.00	-10.65	34.05	8.03	33.98	100	358	Average
5056	57.36	49.26	74.00	-16.64	34.05	8.03	33.98	100	358	Peak
5180	99.67	91.36			34.15	8.16	34.00	100	358	Average
5180	107.00	98.69			34.15	8.16	34.00	100	358	Peak
5428	43.06	34.29	54.00	-10.94	34.33	8.48	34.04	100	358	Average
5428	57.76	48.99	74.00	-16.24	34.33	8.48	34.04	100	358	Peak

**REMARKS:**

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
2. 5180MHz: Fundamental frequency.

<b>CHANNEL</b>	TX Channel 44	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

**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 (m)	TABLE ANGLE (Degree)	REMARK
5034	44.08	36.02	54.00	-9.92	34.03	8.00	33.97	217	57	Average
5034	57.24	49.18	74.00	-16.76	34.03	8.00	33.97	217	57	Peak
5220	103.49	95.10			34.17	8.22	34.00	217	57	Average
5220	111.94	103.55			34.17	8.22	34.00	217	57	Peak
5400	43.71	34.99	54.00	-10.29	34.32	8.44	34.04	217	57	Average
5400	57.89	49.17	74.00	-16.11	34.32	8.44	34.04	217	57	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 (m)	TABLE ANGLE (Degree)	REMARK
5028	42.59	34.56	54.00	-11.41	34.03	7.97	33.97	100	358	Average
5028	56.82	48.79	74.00	-17.18	34.03	7.97	33.97	100	358	Peak
5220	99.85	91.46			34.17	8.22	34.00	100	358	Average
5220	107.66	99.27			34.17	8.22	34.00	100	358	Peak
5456	43.03	34.21	54.00	-10.97	34.36	8.51	34.05	100	358	Average
5456	57.81	48.99	74.00	-16.19	34.36	8.51	34.05	100	358	Peak

**REMARKS:**

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
2. 5220MHz: Fundamental frequency.

<b>CHANNEL</b>	TX Channel 48	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

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 (m)	TABLE ANGLE (Degree)	REMARK
5136	43.35	35.10	54.00	-10.65	34.11	8.13	33.99	217	57	Average
5136	57.97	49.72	74.00	-16.03	34.11	8.13	33.99	217	57	Peak
5240	103.93	95.49			34.19	8.26	34.01	217	57	Average
5240	111.48	103.04			34.19	8.26	34.01	217	57	Peak
5442	43.49	34.70	54.00	-10.51	34.35	8.48	34.04	217	57	Average
5442	57.15	48.36	74.00	-16.85	34.35	8.48	34.04	217	57	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 (m)	TABLE ANGLE (Degree)	REMARK
5092	42.79	34.62	54.00	-11.21	34.08	8.07	33.98	105	358	Average
5092	57.78	49.61	74.00	-16.22	34.08	8.07	33.98	105	358	Peak
5240	99.24	90.80			34.19	8.26	34.01	105	358	Average
5240	107.57	99.13			34.19	8.26	34.01	105	358	Peak
5374	42.87	34.21	54.00	-11.13	34.29	8.41	34.04	105	358	Average
5374	57.84	49.18	74.00	-16.16	34.29	8.41	34.04	105	358	Peak

**REMARKS:**

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
2. 5240MHz: Fundamental frequency.

**802.11n (20MHz)**

<b>CHANNEL</b>	TX Channel 36	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

**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 (m)	TABLE ANGLE (Degree)	REMARK
5134	44.49	36.24	54.00	-9.51	34.11	8.13	33.99	217	57	Average
5134	57.34	49.09	74.00	-16.66	34.11	8.13	33.99	217	57	Peak
5180	102.82	94.51			34.15	8.16	34.00	217	57	Average
5180	110.79	102.48			34.15	8.16	34.00	217	57	Peak
5456	43.84	35.02	54.00	-10.16	34.36	8.51	34.05	217	57	Average
5456	58.67	49.85	74.00	-15.33	34.36	8.51	34.05	217	57	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 (m)	TABLE ANGLE (Degree)	REMARK
5036	43.16	35.10	54.00	-10.84	34.03	8.00	33.97	100	358	Average
5036	56.97	48.91	74.00	-17.03	34.03	8.00	33.97	100	358	Peak
5180	98.59	90.28			34.15	8.16	34.00	100	358	Average
5180	106.44	98.13			34.15	8.16	34.00	100	358	Peak
5454	43.09	34.27	54.00	-10.91	34.36	8.51	34.05	100	358	Average
5454	57.12	48.30	74.00	-16.88	34.36	8.51	34.05	100	358	Peak

**REMARKS:**

- Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
- 5180MHz: Fundamental frequency.



<b>CHANNEL</b>	TX Channel 44	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>										
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 (m)	TABLE ANGLE (Degree)	REMARK
5018	42.99	34.98	54.00	-11.01	34.01	7.97	33.97	217	57	Average
5018	56.89	48.88	74.00	-17.11	34.01	7.97	33.97	217	57	Peak
5220	102.54	94.15			34.17	8.22	34.00	217	57	Average
5220	110.42	102.03			34.17	8.22	34.00	217	57	Peak
5358	43.12	34.49	54.00	-10.88	34.28	8.38	34.03	217	57	Average
5358	57.51	48.88	74.00	-16.49	34.28	8.38	34.03	217	57	Peak
<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>										
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 (m)	TABLE ANGLE (Degree)	REMARK
5050	42.56	34.50	54.00	-11.44	34.04	8.00	33.98	106	357	Average
5050	58.00	49.94	74.00	-16.00	34.04	8.00	33.98	106	357	Peak
5220	98.17	89.78			34.17	8.22	34.00	106	357	Average
5220	106.20	97.81			34.17	8.22	34.00	106	357	Peak
5354	42.90	34.27	54.00	-11.10	34.28	8.38	34.03	106	357	Average
5354	58.69	50.06	74.00	-15.31	34.28	8.38	34.03	106	357	Peak

**REMARKS:**

- Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
- 5220MHz: Fundamental frequency.

<b>CHANNEL</b>	TX Channel 48	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>										
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 (m)	TABLE ANGLE (Degree)	REMARK
5076	43.03	34.91	54.00	-10.97	34.07	8.03	33.98	217	57	Average
5076	56.89	48.77	74.00	-17.11	34.07	8.03	33.98	217	57	Peak
5240	102.86	94.42			34.19	8.26	34.01	217	57	Average
5240	110.84	102.40			34.19	8.26	34.01	217	57	Peak
5460	43.46	34.64	54.00	-10.54	34.36	8.51	34.05	217	57	Average
5460	57.92	49.10	74.00	-16.08	34.36	8.51	34.05	217	57	Peak
<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>										
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 (m)	TABLE ANGLE (Degree)	REMARK
5050	42.75	34.69	54.00	-11.25	34.04	8.00	33.98	105	358	Average
5050	57.50	49.44	74.00	-16.50	34.04	8.00	33.98	105	358	Peak
5240	98.05	89.61			34.19	8.26	34.01	105	358	Average
5240	106.20	97.76			34.19	8.26	34.01	105	358	Peak
5444	42.96	34.17	54.00	-11.04	34.35	8.48	34.04	105	358	Average
5444	57.65	48.86	74.00	-16.35	34.35	8.48	34.04	105	358	Peak

**REMARKS:**

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
2. 5240MHz: Fundamental frequency.

**802.11n (40MHz)**

<b>CHANNEL</b>	TX Channel 38	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

**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 (m)	TABLE ANGLE (Degree)	REMARK
<b>5148</b>	<b>47.02</b>	<b>38.77</b>	<b>54.00</b>	<b>-6.98</b>	<b>34.12</b>	<b>8.13</b>	<b>34.00</b>	<b>217</b>	<b>57</b>	<b>Average</b>
5148	60.12	51.87	74.00	-13.88	34.12	8.13	34.00	217	57	Peak
5190	99.90	91.56			34.15	8.19	34.00	217	57	Average
5190	107.10	98.76			34.15	8.19	34.00	217	57	Peak
5440	43.79	35.00	54.00	-10.21	34.35	8.48	34.04	217	57	Average
5440	57.90	49.11	74.00	-16.10	34.35	8.48	34.04	217	57	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 (m)	TABLE ANGLE (Degree)	REMARK
5138	44.74	36.49	54.00	-9.26	34.11	8.13	33.99	100	358	Average
5138	57.74	49.49	74.00	-16.26	34.11	8.13	33.99	100	358	Peak
5190	95.50	87.16			34.15	8.19	34.00	100	358	Average
5190	103.63	95.29			34.15	8.19	34.00	100	358	Peak
5430	43.38	34.59	54.00	-10.62	34.35	8.48	34.04	100	358	Average
5430	58.20	49.41	74.00	-15.80	34.35	8.48	34.04	100	358	Peak

**REMARKS:**

- Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
- 5190MHz: Fundamental frequency.

<b>CHANNEL</b>	TX Channel 46	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>										
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 (m)	TABLE ANGLE (Degree)	REMARK
5148	45.47	37.22	54.00	-8.53	34.12	8.13	34.00	217	57	Average
5148	57.30	49.05	74.00	-16.70	34.12	8.13	34.00	217	57	Peak
5230	99.77	91.37			34.19	8.22	34.01	217	57	Average
5230	107.22	98.82			34.19	8.22	34.01	217	57	Peak
5406	45.50	36.78	54.00	-8.50	34.32	8.44	34.04	217	57	Average
5406	56.91	48.19	74.00	-17.09	34.32	8.44	34.04	217	57	Peak
<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>										
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 (m)	TABLE ANGLE (Degree)	REMARK
5070	43.11	35.01	54.00	-10.89	34.05	8.03	33.98	105	358	Average
5070	57.16	49.06	74.00	-16.84	34.05	8.03	33.98	105	358	Peak
5230	95.91	87.51			34.19	8.22	34.01	105	358	Average
5230	102.93	94.53			34.19	8.22	34.01	105	358	Peak
5352	43.25	34.62	54.00	-10.75	34.28	8.38	34.03	105	358	Average
5352	58.13	49.50	74.00	-15.87	34.28	8.38	34.03	105	358	Peak

**REMARKS:**

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
2. 5230MHz: Fundamental frequency.

**BELOW 1GHz WORST-CASE DATA: BAND 4**

<b>CHANNEL</b>	TX Channel 0	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	30MHz ~ 1GHz		

**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 (m)	TABLE ANGLE (Degree)	REMARK
103.71	31.94	53.33	43.50	-11.56	9.59	1.28	32.26	171	302	Peak
162.57	22.97	43.13	43.50	-20.53	10.58	1.52	32.26	125	70	Peak
186.6	19.82	40.06	43.50	-23.68	10.40	1.61	32.25	165	60	Peak
475	17.71	28.37	46.00	-28.29	18.90	2.56	32.12	171	111	Peak
746.6	24.10	29.79	46.00	-21.90	23.23	3.22	32.14	174	266	Peak
956.6	27.40	28.69	46.00	-18.60	26.04	3.67	31.00	195	55	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 (m)	TABLE ANGLE (Degree)	REMARK
32.16	31.33	46.64	40.00	-8.67	16.21	0.74	32.26	132	260	Peak
<b>47.55</b>	<b>36.48</b>	<b>59.23</b>	<b>40.00</b>	<b>-3.52</b>	<b>8.57</b>	<b>0.90</b>	<b>32.22</b>	<b>111</b>	<b>287</b>	<b>Peak</b>
160.41	17.00	36.95	43.50	-26.50	10.80	1.52	32.27	116	99	Peak
559.7	33.00	42.21	46.00	-13.00	20.23	2.76	32.20	155	97	Peak
860	24.60	28.69	46.00	-21.40	24.20	3.44	31.73	190	86	Peak
933.5	33.43	34.85	46.00	-12.57	26.20	3.62	31.24	130	166	Peak

**REMARKS:**

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

**ABOVE 1GHz WORST-CASE DATA: BAND 4**

**802.11a**

<b>CHANNEL</b>	TX Channel 149	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

**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 (m)	TABLE ANGLE (Degree)	REMARK
*5714	57.83	48.68	68.20	-10.37	34.61	8.65	34.11	196	15	Average
<b>*5724</b>	<b>69.26</b>	<b>60.10</b>	<b>78.20</b>	<b>-8.94</b>	<b>34.62</b>	<b>8.65</b>	<b>34.11</b>	<b>196</b>	<b>15</b>	<b>Peak</b>
5745	103.6	94.41			34.64	8.66	34.11	196	15	Average
5745	111.59	102.40			34.64	8.66	34.11	196	15	Peak
*5860	59.57	50.25	78.20	-18.63	34.76	8.70	34.14	196	15	Average
*5864	56.29	46.96	68.20	-11.91	34.76	8.71	34.14	196	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 (m)	TABLE ANGLE (Degree)	REMARK
*5706	57.7	48.55	68.20	-10.50	34.61	8.65	34.11	304	350	Average
*5722	63.01	53.85	78.20	-15.19	34.62	8.65	34.11	304	350	Peak
5745	99.55	90.36			34.64	8.66	34.11	304	350	Average
5745	107.34	98.15			34.64	8.66	34.11	304	350	Peak
*5860	57.94	48.62	78.20	-20.26	34.76	8.70	34.14	304	350	Average
*5866	58.67	49.34	68.20	-9.53	34.76	8.71	34.14	304	350	Peak

**REMARKS:**

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
2. 5745MHz: Fundamental frequency.
3. \*: Out of restricted band.

<b>CHANNEL</b>	TX Channel 157	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>										
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 (m)	TABLE ANGLE (Degree)	REMARK
*5714	57.03	47.88	68.20	-11.17	34.61	8.65	34.11	196	13	Average
*5720	57.25	48.09	78.20	-20.95	34.62	8.65	34.11	196	13	Peak
5785	104.09	94.86			34.68	8.68	34.13	196	13	Average
5785	111.61	102.38			34.68	8.68	34.13	196	13	Peak
*5856	57.45	48.13	78.20	-20.75	34.76	8.70	34.14	196	13	Average
*5862	57.08	47.75	68.20	-11.12	34.76	8.71	34.14	196	13	Peak
<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>										
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 (m)	TABLE ANGLE (Degree)	REMARK
*5712	56.88	47.73	68.20	-11.32	34.61	8.65	34.11	304	344	Average
*5718	57.37	48.21	78.20	-20.83	34.62	8.65	34.11	304	344	Peak
5785	99.46	90.23			34.68	8.68	34.13	304	344	Average
5785	107.90	98.67			34.68	8.68	34.13	304	344	Peak
*5854	57.48	48.16	78.20	-20.72	34.76	8.70	34.14	304	344	Average
*5868	57.73	48.40	68.20	-10.47	34.76	8.71	34.14	304	344	Peak

**REMARKS:**

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
2. 5785MHz: Fundamental frequency.
3. \*: Out of restricted band.

<b>CHANNEL</b>	TX Channel 161	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

**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 (m)	TABLE ANGLE (Degree)	REMARK
*5714	58.06	48.91	68.20	-10.14	34.61	8.65	34.11	196	13	Average
*5724	57.26	48.10	78.20	-20.94	34.62	8.65	34.11	196	13	Peak
5805	103.49	94.23			34.71	8.68	34.13	196	13	Average
5805	111.73	102.47			34.71	8.68	34.13	196	13	Peak
*5860	57.96	48.64	78.20	-20.24	34.76	8.70	34.14	196	13	Average
*5866	57.17	47.84	68.20	-11.03	34.76	8.71	34.14	196	13	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 (m)	TABLE ANGLE (Degree)	REMARK
*5714	57.31	48.16	68.20	-10.89	34.61	8.65	34.11	290	344	Average
*5716	56.65	47.50	78.20	-21.55	34.61	8.65	34.11	290	344	Peak
5805	99.20	89.94			34.71	8.68	34.13	290	344	Average
5805	107.84	98.58			34.71	8.68	34.13	290	344	Peak
*5856	56.78	47.46	78.20	-21.42	34.76	8.70	34.14	290	344	Average
*5866	57.28	47.95	68.20	-10.92	34.76	8.71	34.14	290	344	Peak

**REMARKS:**

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
2. 5805MHz: Fundamental frequency.
3. \*: Out of restricted band.



802.11n (20MHz)

<b>CHANNEL</b>	TX Channel 149	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

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 (m)	TABLE ANGLE (Degree)	REMARK
*5714	58.65	49.50	68.20	-9.55	34.61	8.65	34.11	196	13	Average
*5724	65.01	55.85	78.20	-13.19	34.62	8.65	34.11	196	13	Peak
5745	102.27	93.08			34.64	8.66	34.11	196	13	Average
5745	110.23	101.04			34.64	8.66	34.11	196	13	Peak
*5852	57.47	48.17	78.20	-20.73	34.74	8.70	34.14	196	13	Average
*5862	57.05	47.72	68.20	-11.15	34.76	8.71	34.14	196	13	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 (m)	TABLE ANGLE (Degree)	REMARK
*5710	56.93	47.78	68.20	-11.27	34.61	8.65	34.11	304	349	Average
*5724	62.64	53.48	78.20	-15.56	34.62	8.65	34.11	304	349	Peak
5745	98.29	89.10			34.64	8.66	34.11	304	349	Average
5745	106.31	97.12			34.64	8.66	34.11	304	349	Peak
*5856	57.82	48.50	78.20	-20.38	34.76	8.70	34.14	304	349	Average
*5862	56.83	47.50	68.20	-11.37	34.76	8.71	34.14	304	349	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
2. 5745MHz: Fundamental frequency.
3. \*: Out of restricted band.

<b>CHANNEL</b>	TX Channel 157	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

**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 (m)	TABLE ANGLE (Degree)	REMARK
*5708	56.60	47.45	68.20	-11.60	34.61	8.65	34.11	196	13	Average
*5724	56.59	47.43	78.20	-21.61	34.62	8.65	34.11	196	13	Peak
5785	102.50	93.27			34.68	8.68	34.13	196	13	Average
5785	110.56	101.33			34.68	8.68	34.13	196	13	Peak
*5858	58.43	49.11	78.20	-19.77	34.76	8.70	34.14	196	13	Average
*5870	56.52	47.19	68.20	-11.68	34.76	8.71	34.14	196	13	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 (m)	TABLE ANGLE (Degree)	REMARK
*5714	56.86	47.71	68.20	-11.34	34.61	8.65	34.11	290	344	Average
*5724	56.16	47.00	78.20	-22.04	34.62	8.65	34.11	290	344	Peak
5785	98.93	89.70			34.68	8.68	34.13	290	344	Average
5785	106.95	97.72			34.68	8.68	34.13	290	344	Peak
*5852	56.85	47.55	78.20	-21.35	34.74	8.70	34.14	290	344	Average
*5870	57.01	47.68	68.20	-11.19	34.76	8.71	34.14	290	344	Peak

**REMARKS:**

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
2. 5785MHz: Fundamental frequency.
3. \*: Out of restricted band.

<b>CHANNEL</b>	TX Channel 161	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

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 (m)	TABLE ANGLE (Degree)	REMARK
*5714	57.53	48.38	68.20	-10.67	34.61	8.65	34.11	196	13	Average
*5716	56.96	47.81	78.20	-21.24	34.61	8.65	34.11	196	13	Peak
5805	102.69	93.43			34.71	8.68	34.13	196	13	Average
5805	110.06	100.80			34.71	8.68	34.13	196	13	Peak
*5856	57.86	48.54	78.20	-20.34	34.76	8.70	34.14	196	13	Average
*5870	57.79	48.46	68.20	-10.41	34.76	8.71	34.14	196	13	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 (m)	TABLE ANGLE (Degree)	REMARK
*5708	56.56	47.41	68.20	-11.64	34.61	8.65	34.11	290	344	Average
*5720	57.70	48.54	78.20	-20.50	34.62	8.65	34.11	290	344	Peak
5805	98.98	89.72			34.71	8.68	34.13	290	344	Average
5805	106.80	97.54			34.71	8.68	34.13	290	344	Peak
*5858	56.70	47.38	78.20	-21.50	34.76	8.70	34.14	290	344	Average
*5868	57.28	47.95	68.20	-10.92	34.76	8.71	34.14	290	344	Peak

**REMARKS:**

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
2. 5805MHz: Fundamental frequency.
3. \*: Out of restricted band.

802.11n (40MHz)

<b>CHANNEL</b>	TX Channel 151	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

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 (m)	TABLE ANGLE (Degree)	REMARK
*5712	58.03	48.88	68.20	-10.17	34.61	8.65	34.11	196	13	Average
*5724	63.79	54.63	78.20	-14.41	34.62	8.65	34.11	196	13	Peak
5755	99.77	90.56			34.66	8.66	34.11	196	13	Average
5755	107.64	98.43			34.66	8.66	34.11	196	13	Peak
*5858	57.37	48.05	78.20	-20.83	34.76	8.70	34.14	196	13	Average
*5864	57.84	48.51	68.20	-10.36	34.76	8.71	34.14	196	13	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 (m)	TABLE ANGLE (Degree)	REMARK
*5714	57.80	48.65	68.20	-10.40	34.61	8.65	34.11	304	349	Average
*5724	59.45	50.29	78.20	-18.75	34.62	8.65	34.11	304	349	Peak
5755	95.76	86.55			34.66	8.66	34.11	304	349	Average
5755	103.94	94.73			34.66	8.66	34.11	304	349	Peak
*5856	57.69	48.37	78.20	-20.51	34.76	8.70	34.14	304	349	Average
*5866	57.44	48.11	68.20	-10.76	34.76	8.71	34.14	304	349	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
2. 5755MHz: Fundamental frequency.
3. \*: Out of restricted band.

<b>CHANNEL</b>	TX Channel 159	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	1GHz ~ 40GHz		Average (AV)

**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 (m)	TABLE ANGLE (Degree)	REMARK
*5712	57.64	48.49	68.20	-10.56	34.61	8.65	34.11	196	13	Average
*5716	57.34	48.19	78.20	-20.86	34.61	8.65	34.11	196	13	Peak
5795	99.20	89.96			34.69	8.68	34.13	196	13	Average
5795	107.02	97.78			34.69	8.68	34.13	196	13	Peak
*5856	57.47	48.15	78.20	-20.73	34.76	8.70	34.14	196	13	Average
*5864	57.55	48.22	68.20	-10.65	34.76	8.71	34.14	196	13	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 (m)	TABLE ANGLE (Degree)	REMARK
*5710	57.17	48.02	68.20	-11.03	34.61	8.65	34.11	290	344	Average
*5718	56.43	47.27	78.20	-21.77	34.62	8.65	34.11	290	344	Peak
5795	95.83	86.59			34.69	8.68	34.13	290	344	Average
5795	103.72	94.48			34.69	8.68	34.13	290	344	Peak
*5856	58.28	48.96	78.20	-19.92	34.76	8.70	34.14	290	344	Average
*5868	57.47	48.14	68.20	-10.73	34.76	8.71	34.14	290	344	Peak

**REMARKS:**

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor  
Margin value = Emission level – Limit value.
2. 5795MHz: Fundamental frequency.
3. \*: Out of restricted band.

## 4.2 Conducted Emission Measurement

### 4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	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.

### 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	Feb. 26, 2015	Feb. 25, 2016
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 24, 2015	Jul. 23, 2016
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.

#### 4.2.3 Test Procedure

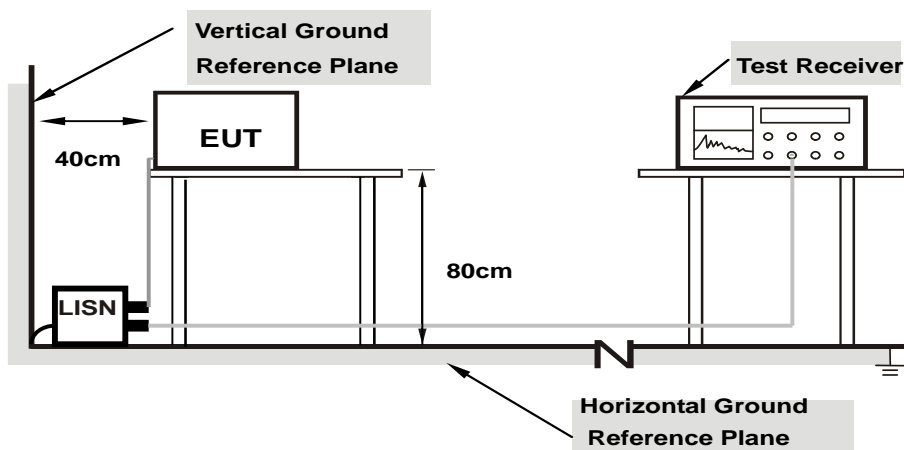
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- 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:**
- Support units were connected to second LISN.
  - 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 Condition

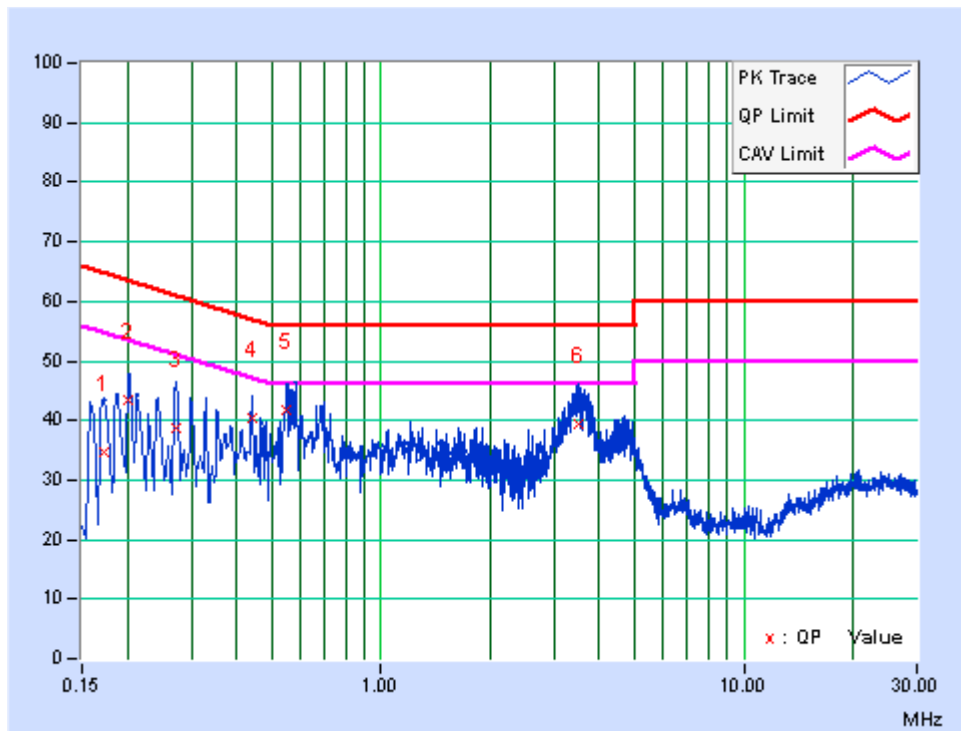
Same as 4.1.6.

4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	
1	0.17237	10.74	23.96	11.13	34.70	21.87	64.85	54.85	-30.14	-32.97
2	0.20084	10.63	32.85	19.85	43.48	30.48	63.58	53.58	-20.10	-23.10
3	0.27120	10.60	28.28	15.21	38.88	25.81	61.08	51.08	-22.20	-25.27
4	0.44273	10.56	29.80	17.62	40.36	28.18	57.01	47.01	-16.65	-18.83
<b>5</b>	<b>0.55096</b>	<b>10.52</b>	<b>31.35</b>	<b>20.37</b>	<b>41.87</b>	<b>30.89</b>	<b>56.00</b>	<b>46.00</b>	<b>-14.13</b>	<b>-15.11</b>
6	3.49305	10.19	29.15	16.98	39.34	27.17	56.00	46.00	-16.66	-18.83

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.

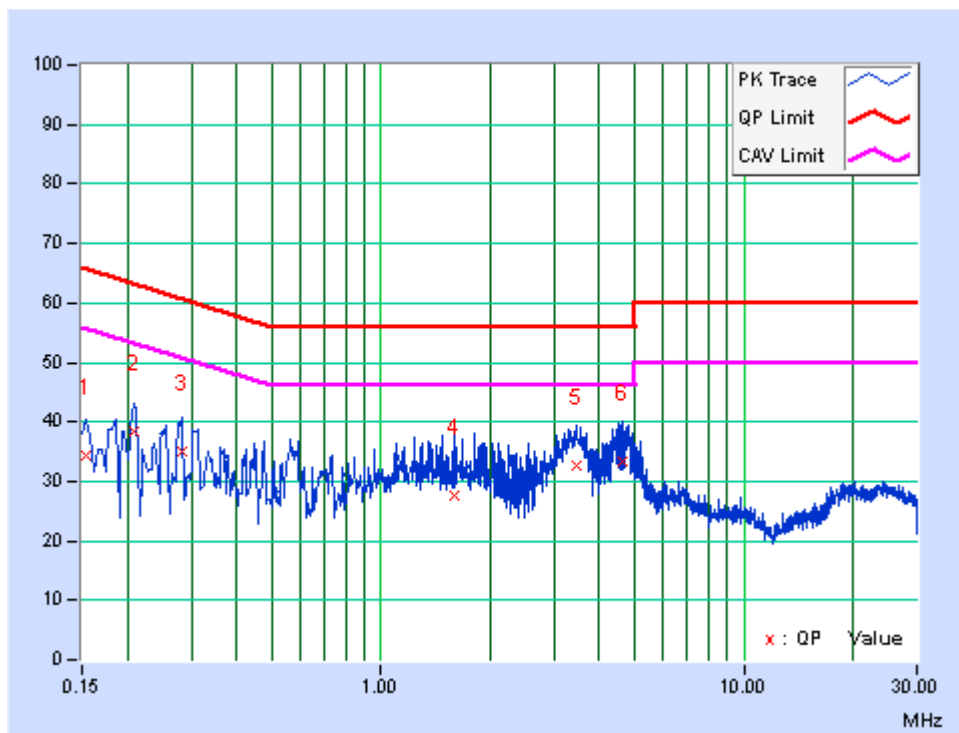




Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	
1	0.15391	10.62	23.69	9.96	34.31	20.58	65.79	55.79	-31.47	-35.20
2	0.20893	10.52	27.86	12.32	38.38	22.84	63.25	53.25	-24.87	-30.41
3	0.28288	10.52	24.43	11.04	34.95	21.56	60.73	50.73	-25.78	-29.17
4	1.58888	10.04	17.65	10.85	27.69	20.89	56.00	46.00	-28.31	-25.11
5	3.45786	9.94	22.76	16.50	32.70	26.44	56.00	46.00	-23.30	-19.56
6	4.62695	9.96	23.25	13.41	33.21	23.37	56.00	46.00	-22.79	-22.63

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. 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)

\*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  $N_{ANT} \leq 4$ ;

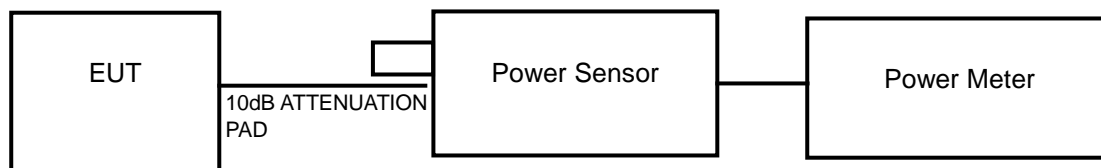
Array Gain = 0 dB (i.e., no array gain) for channel widths  $\geq 40$  MHz for any  $N_{ANT}$ ;

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

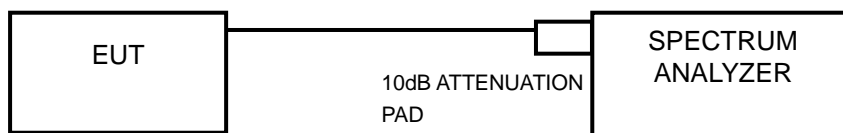
For power measurements on all other devices: Array Gain =  $10 \log(N_{ANT}/N_{SS})$  dB.

#### 4.3.2 Test Setup

##### FOR POWER OUTPUT MEASUREMENT



##### FOR 26dB BANDWIDTH



#### 4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

#### 4.3.4 Test Procedure

##### FOR 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.

##### FOR 99 PERCENT OCCUPIED BANDWIDTH

The following procedure shall be used for measuring (99 %) power bandwidth:

1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW  $\geq 3 \cdot$  RBW
5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
6. Use the 99 % power bandwidth function of the instrument (if available).
7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

##### FOR 26dB BANDWIDTH

- 1) Set RBW = approximately 1% of the emission bandwidth.
- 2) Set the VBW > RBW.
- 3) Detector = Peak.
- 4) Trace mode = max hold.
- 5) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

##### FOR 6dB BANDWIDTH

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

#### 4.3.5 Deviation from Test Standard

No deviation.

#### 4.3.6 EUT Operating Condition

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

4.3.7 Test Result

**OUTPUT POWER:**

**802.11a**

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)	POWER LIMIT (dBm)	PASS/FAIL
36	5180	9.016	9.55	24	PASS
40	5200	9.506	9.78	24	PASS
48	5240	9.226	9.65	24	PASS
149	5745	9.750	9.89	30	PASS
157	5785	<b>10.139</b>	10.06	30	PASS
161	5805	9.931	9.97	30	PASS

**802.11n (20MHz)**

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)	POWER LIMIT (dBm)	PASS/FAIL
36	5180	8.750	9.42	24	PASS
40	5200	8.974	9.53	24	PASS
48	5240	9.162	9.62	24	PASS
149	5745	9.616	9.83	30	PASS
157	5785	9.908	9.96	30	PASS
161	5805	9.683	9.86	30	PASS

**802.11n (40MHz)**

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)	POWER LIMIT (dBm)	PASS/FAIL
38	5190	8.222	9.15	24	PASS
46	5230	8.433	9.26	24	PASS
151	5755	8.551	9.32	30	PASS
159	5795	9.078	9.58	30	PASS

**99% OCCUPIED BANDWIDTH & 26dB BANDWIDTH/6dB BANDWIDTH:**

**802.11a**

CHANNEL	CHANNEL FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH	26dB BANDWIDTH (MHz)	PASS/FAIL
36	5180	18.12	23.53	PASS
40	5200	17.40	21.79	PASS
48	5240	17.58	23.25	PASS
CHANNEL	CHANNEL FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH	6dB BANDWIDTH (MHz)	PASS/FAIL
149	5745	17.16	16.37	PASS
157	5785	17.52	16.34	PASS
161	5805	16.98	16.34	PASS

**802.11n (20MHz)**

CHANNEL	CHANNEL FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH	26dB BANDWIDTH (MHz)	PASS/FAIL
36	5180	18.72	23.44	PASS
40	5200	18.42	23.16	PASS
48	5240	18.36	25.96	PASS
CHANNEL	CHANNEL FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH	6dB BANDWIDTH (MHz)	PASS/FAIL
149	5745	18.30	17.59	PASS
157	5785	18.42	17.59	PASS
161	5805	18.30	17.57	PASS

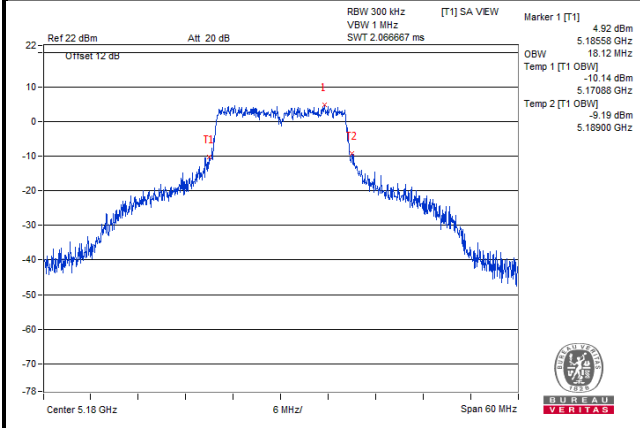
**802.11n (40MHz)**

CHANNEL	CHANNEL FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH	26dB BANDWIDTH (MHz)	PASS/FAIL
38	5190	36.36	69.83	PASS
46	5230	36.30	65.80	PASS
CHANNEL	CHANNEL FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH	6dB BANDWIDTH (MHz)	PASS/FAIL
151	5755	36.54	35.16	PASS
159	5795	36.42	35.12	PASS

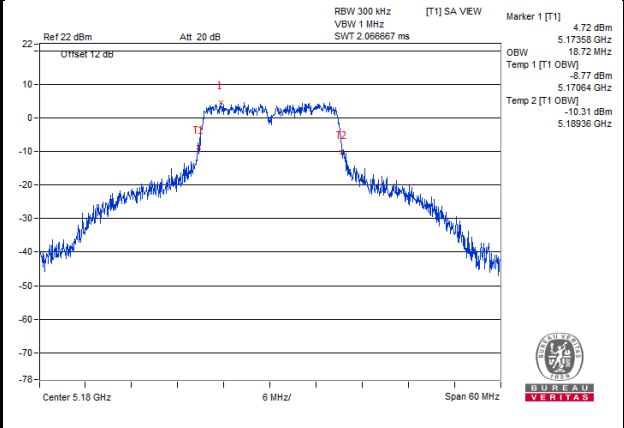
For U-NII-1:

**SPECTRUM PLOT OF WORST VALUE of 99% OCCUPIED BANDWIDTH**

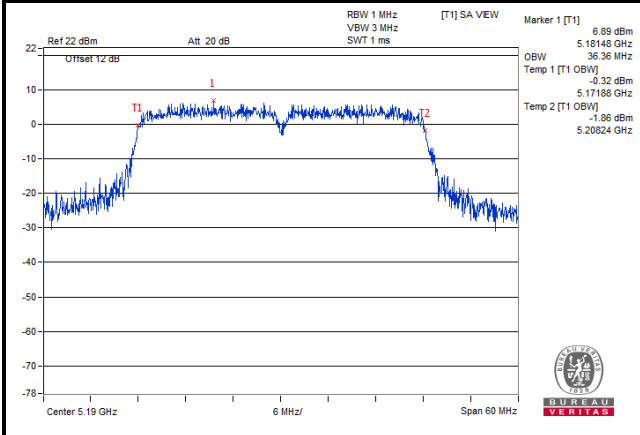
**802.11a**



**802.11n (20MHz)**

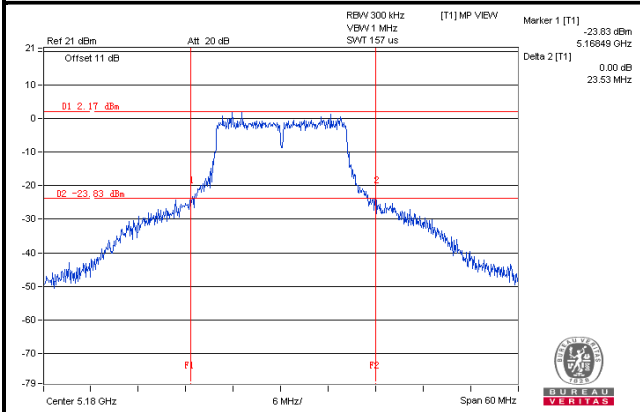


**802.11n (40MHz)**

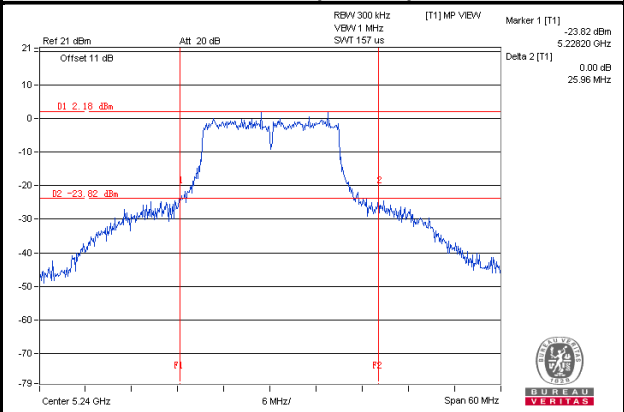


**SPECTRUM PLOT OF WORST VALUE of 26dB Bandwidth**

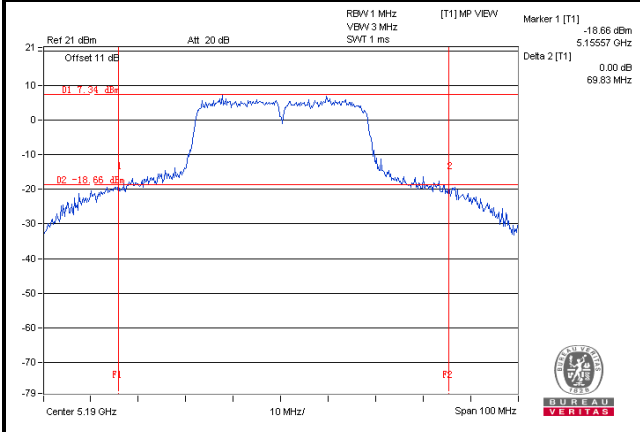
**802.11a**



**802.11n (20MHz)**



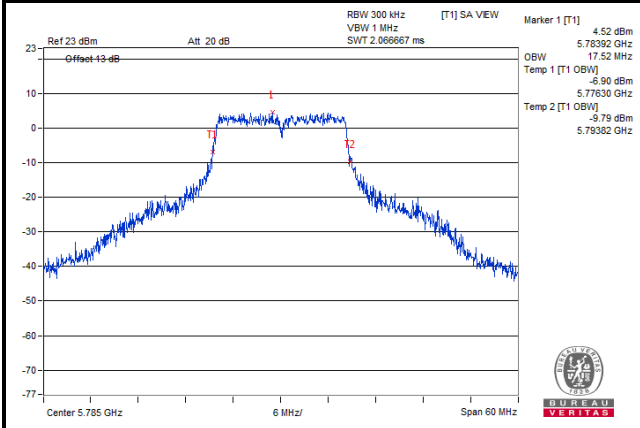
**802.11n (40MHz)**



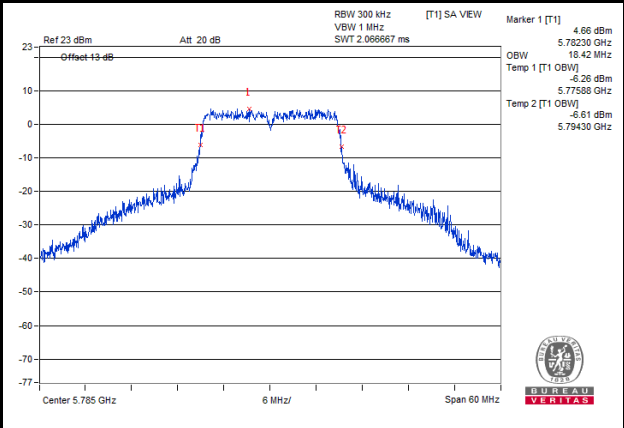
For U-NII-3:

**SPECTRUM PLOT OF WORST VALUE of 99% OCCUPIED BANDWIDTH**

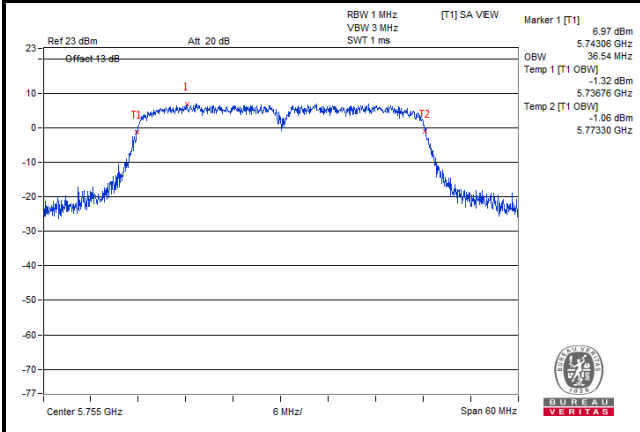
**802.11a**



**802.11n (20MHz)**



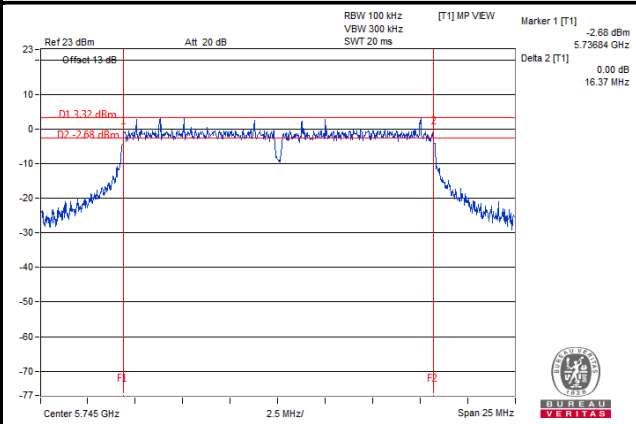
**802.11n (40MHz)**



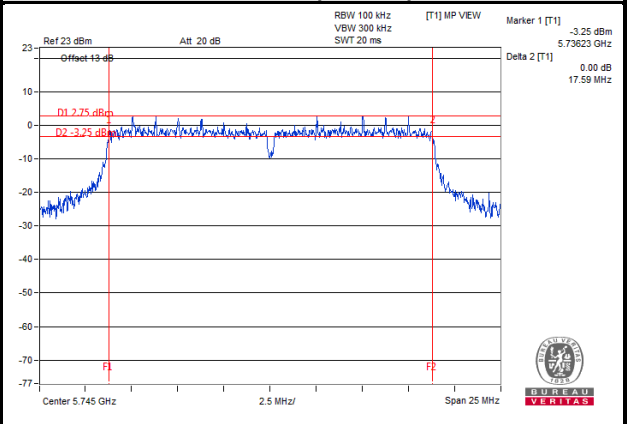


**SPECTRUM PLOT OF WORST VALUE of 6dB Bandwidth**

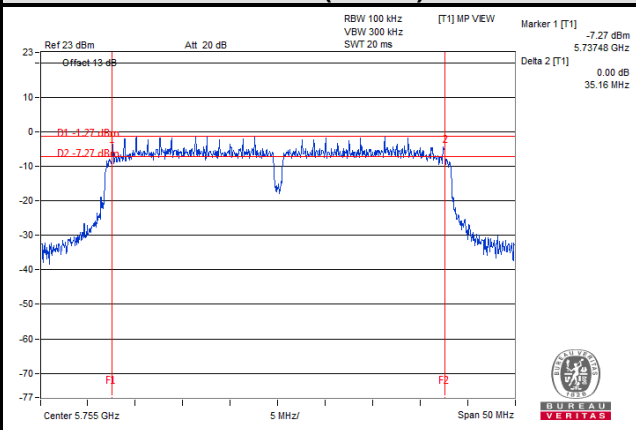
**802.11a**



**802.11n (20MHz)**



**802.11n (40MHz)**

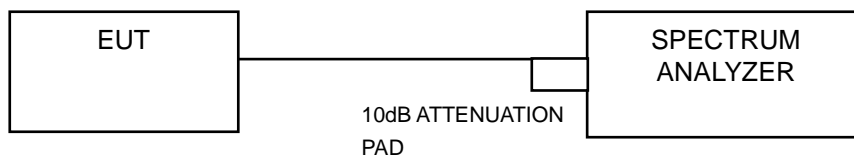


#### 4.4 Peak Power Spectral Density Measurement

##### 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 4.1.2 to get information of above instrument.

##### 4.4.4 Test Procedure

Using method SA-1

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 1MHz, Set VBW ≥ 3 MHz, Detector = RMS
- 3) Set Channel power measure = 1MHz
- 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

##### 4.4.5 Deviation from Test Standard

No deviation.

##### 4.4.6 EUT Operating Condition

Same as Item 4.1.6.

#### 4.4.7 Test Results

For U-NII-1:

##### 802.11a

CHANNEL	FREQUENCY (MHz)	PSD w/o Duty Factor (dBm/MHz)	Duty Factor	PSD with Duty Factor (dBm/MHz)	MAXIMUM LIMIT (dBm/MHz)	PASS/FAIL
36	5180	7.91	0.62	8.53	11	PASS
40	5200	7.38	0.62	8.00	11	PASS
48	5240	7.03	0.62	7.65	11	PASS

##### 802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	PSD w/o Duty Factor (dBm/MHz)	Duty Factor	PSD with Duty Factor (dBm/MHz)	MAXIMUM LIMIT (dBm/MHz)	PASS/FAIL
36	5180	7.26	0.69	7.95	11	PASS
40	5200	7.14	0.69	7.83	11	PASS
48	5240	6.85	0.69	7.54	11	PASS

##### 802.11n (40MHz)

CHANNEL	FREQUENCY (MHz)	PSD w/o Duty Factor (dBm/MHz)	Duty Factor	PSD with Duty Factor (dBm/MHz)	MAXIMUM LIMIT (dBm/MHz)	PASS/FAIL
38	5190	3.01	1.25	4.26	11	PASS
46	5230	2.76	1.25	4.01	11	PASS

For U-NII-3:

**802.11a**

CHANNEL	FREQUENCY (MHz)	PSD w/o Duty Factor (dBm/MHz)	PSD w/o Duty Factor (dBm/500kHz)	Duty Factor	PSD with Duty Factor (dBm/500kHz)	LIMIT (dBm/500kHz)	PASS /FAIL
149	5745	11.83	8.82	0.62	9.44	30	PASS
157	5785	11.56	8.55	0.62	9.17	30	PASS
161	5805	11.43	8.42	0.62	9.04	30	PASS

**802.11n (20MHz)**

CHANNEL	FREQUENCY (MHz)	PSD w/o Duty Factor (dBm/MHz)	PSD w/o Duty Factor (dBm/500kHz)	Duty Factor	PSD with Duty Factor (dBm/500kHz)	LIMIT (dBm/500kHz)	PASS /FAIL
149	5745	11.97	8.96	0.69	9.65	30	PASS
157	5785	11.79	8.78	0.69	9.47	30	PASS
161	5805	11.54	8.53	0.69	9.22	30	PASS

**802.11n (40MHz)**

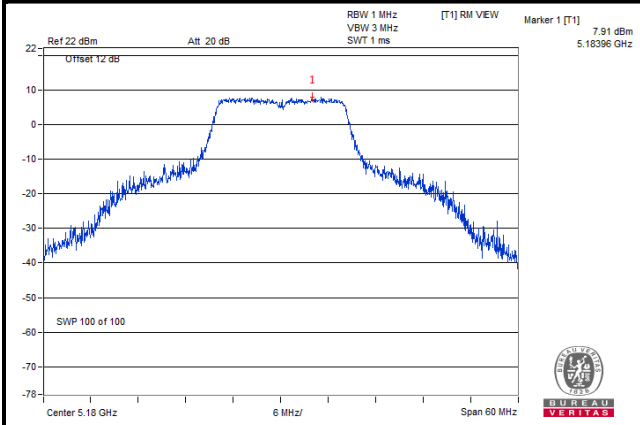
CHANNEL	FREQUENCY (MHz)	PSD w/o Duty Factor (dBm/MHz)	PSD w/o Duty Factor (dBm/500kHz)	Duty Factor	PSD with Duty Factor (dBm/500kHz)	LIMIT (dBm/500kHz)	PASS /FAIL
151	5755	7.69	4.68	1.25	5.93	30	PASS
159	5795	8.05	5.04	1.25	6.29	30	PASS

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

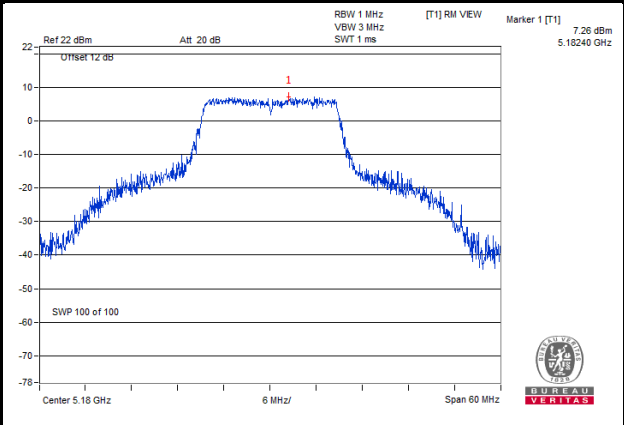
For U-NII-1:

### SPECTRUM PLOT OF WORST VALUE

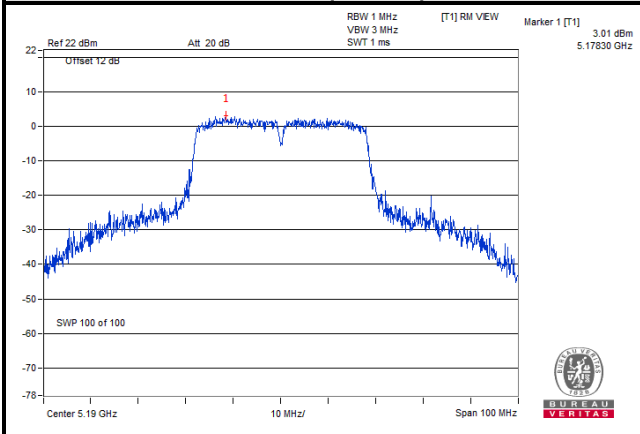
#### 802.11a



#### 802.11n (20MHz)



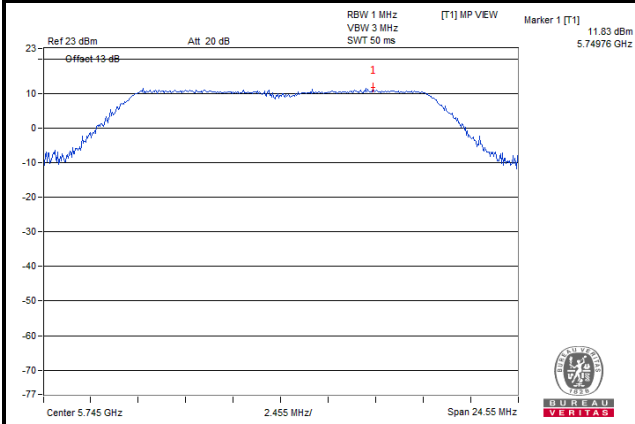
#### 802.11n (40MHz)



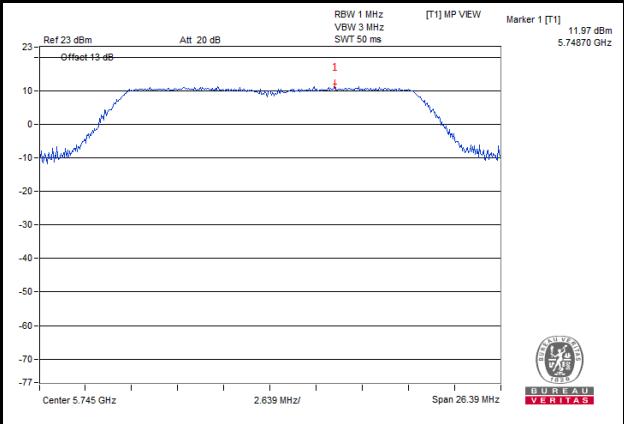
For U-NII-3:

**SPECTRUM PLOT OF WORST VALUE**

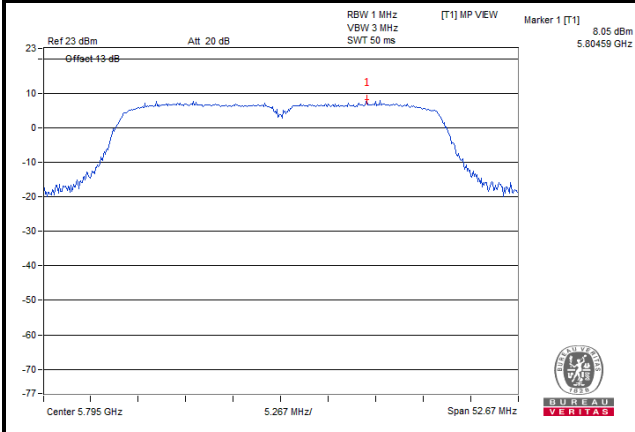
**802.11a**



**802.11n (20MHz)**



**802.11n (40MHz)**

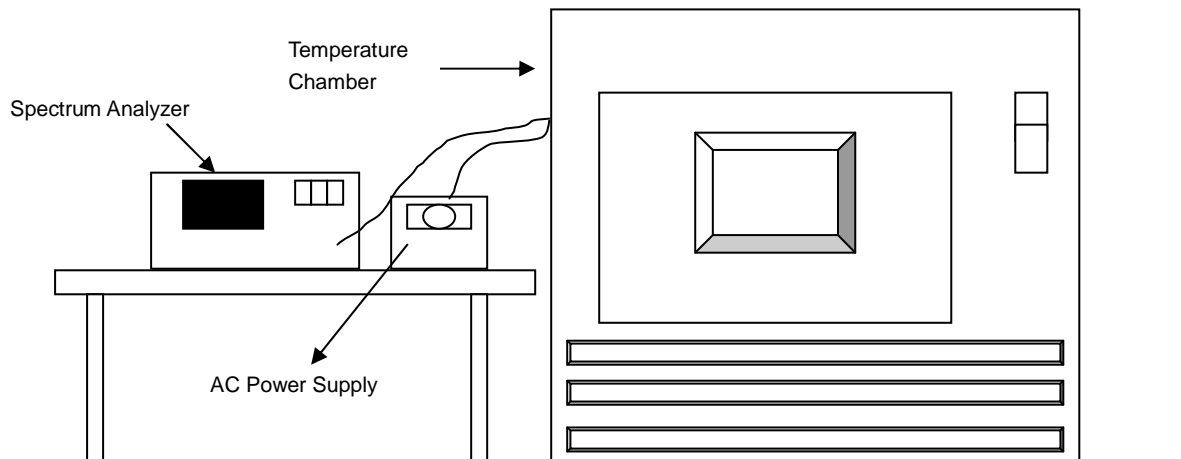


## 4.5 Frequency Stability Measurement

### 4.5.1 Limits of Frequency Stability Measurement

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

### 4.5.2 Test Setup



### 4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.5.4 Test Procedure

- The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
- Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

### 4.5.5 Deviation from Test Standard

No deviation.

### 4.5.6 EUT Operating Condition

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

**4.5.7 Test Results**

<b>FREQUENCY STABILITY VERSUS TEMP.</b>									
<b>OPERATING FREQUENCY: 5220MHz</b>									
<b>TEMP. (°C)</b>	<b>POWER SUPPLY (Vdc)</b>	<b>0 MINUTE</b>		<b>2 MINUTES</b>		<b>5 MINUTES</b>		<b>10 MINUTE</b>	
		<b>Measured Frequency (MHz)</b>	<b>Frequency Drift (%)</b>	<b>Measured Frequency (MHz)</b>	<b>Frequency Drift (%)</b>	<b>Measured Frequency (MHz)</b>	<b>Frequency Drift (%)</b>	<b>Measured Frequency (MHz)</b>	<b>Frequency Drift (%)</b>
50	5.0	5219.9853	-2.8161	5219.9815	-3.5441	5219.9873	-2.4330	5219.9855	-2.7778
40	5.0	5219.9847	-2.9310	5219.9815	-3.5441	5219.9856	-2.7586	5219.9842	-3.0268
30	5.0	5219.9852	-2.8352	5219.9809	-3.6590	5219.987	-2.4904	5219.985	-2.8736
20	5.0	5219.9939	-1.1686	5219.9968	-0.6130	5219.9985	-0.2874	5219.9956	-0.8429
10	5.0	5220.0172	3.2950	5220.0257	4.9234	5220.0169	3.2375	5220.0161	3.0843
0	5.0	5220.0158	3.0268	5220.024	4.5977	5220.0165	3.1609	5220.0166	3.1801
-10	5.0	5219.9894	-2.0307	5219.9884	-2.2222	5219.9842	-3.0268	5219.9811	-3.6207
-20	5.0	5219.9894	-2.0307	5219.9873	-2.4330	5219.9853	-2.8161	5219.9804	-3.7548
-30	5.0	5219.9889	-2.1264	5219.9885	-2.2031	5219.9839	-3.0843	5219.9806	-3.7165

<b>FREQUENCY STABILITY VERSUS VOLTAGE</b>									
<b>OPERATING FREQUENCY: 5220MHz</b>									
<b>TEMP. (°C)</b>	<b>POWER SUPPLY (Vdc)</b>	<b>0 MINUTE</b>		<b>2 MINUTE</b>		<b>5 MINUTE</b>		<b>10 MINUTE</b>	
		<b>Measured Frequency (MHz)</b>	<b>Frequency Drift (%)</b>	<b>Measured Frequency (MHz)</b>	<b>Frequency Drift (%)</b>	<b>Measured Frequency (MHz)</b>	<b>Frequency Drift (%)</b>	<b>Measured Frequency (MHz)</b>	<b>Frequency Drift (%)</b>
20	5.25	5219.9938	-1.1877	5219.9974	-0.4981	5219.9986	-0.2682	5219.9951	-0.9387
	5.0	5219.9939	-1.1686	5219.9968	-0.6130	5219.9985	-0.2874	5219.9956	-0.8429
	4.75	5219.9951	-0.9387	5219.996	-0.7663	5219.999	-0.1916	5219.9955	-0.8621



**FREQUENCY STABILITY VERSUS TEMP.**
**OPERATING FREQUENCY: 5785MHz**

TEMP. (°C)	POWER SUPPLY (Vdc)	0 MINUTE		2 MINUTES		5 MINUTES		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
50	5.0	5785.0013	0.2247	5785.0018	0.3111	5785.0071	1.2273	5785.0041	0.7087
40	5.0	5785.002	0.3457	5785.0021	0.3630	5785.0059	1.0199	5785.0032	0.5532
30	5.0	5785.001	0.1729	5785.0027	0.4667	5785.007	1.2100	5785.0035	0.6050
20	5.0	5784.9833	-2.8868	5784.9806	-3.3535	5784.9748	-4.3561	5784.9776	-3.8721
10	5.0	5784.9839	-2.7831	5784.9799	-3.4745	5784.9755	-4.2351	5784.9793	-3.5782
0	5.0	5784.984	-2.7658	5784.9809	-3.3016	5784.9755	-4.2351	5784.9782	-3.7684
-10	5.0	5785.0129	2.2299	5785.0133	2.2990	5785.0158	2.7312	5785.0113	1.9533
-20	5.0	5785.0122	2.1089	5785.0131	2.2645	5785.0151	2.6102	5785.0112	1.9360
-30	5.0	5785.0118	2.0398	5785.0118	2.0398	5785.0157	2.7139	5785.0101	1.7459

**FREQUENCY STABILITY VERSUS VOLTAGE**
**OPERATING FREQUENCY: 5785MHz**

TEMP. (°C)	POWER SUPPLY (Vdc)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	5.25	5784.9861	-2.4028	5784.9793	-3.5782	5784.9759	-4.1659	5784.974	-4.4944
	5.0	5784.9863	-2.3682	5784.9812	-3.2498	5784.9762	-4.1141	5784.9748	-4.3561
	4.75	5784.9861	-2.4028	5784.9804	-3.3881	5784.9754	-4.2524	5784.9743	-4.4425

## 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:

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

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