FCC TEST REPORT (15.407)

REPORT NO.:	RF140707E06-1
MODEL NO.:	IBR1100LPE
FCC ID:	UXX-S3A438A
RECEIVED:	July 07, 2014
TESTED:	July 17 to Aug. 07, 2014
ISSUED:	Aug. 15, 2014

APPLICANT:	Cradlepoint, Inc.
ADDRESS:	805W. Franklin Street, Boise, ID 83702-5560 USA

ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
LAB ADDRESS :	No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (1):	No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

This report should not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

Table of Contents

RELEASE CONTROL RECORD 4
1. CERTIFICATION 5
2. SUMMARY OF TEST RESULTS 6
2.1 MEASUREMENT UNCERTAINTY 7
3. GENERAL INFORMATION 8
3.1 GENERAL DESCRIPTION OF EUT 8
3.2 DESCRIPTION OF TEST MODES 11
3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL 12
3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS 15
3.4 DUTY CYCLE OF TEST SIGNAL 16
3.5 DESCRIPTION OF SUPPORT UNITS 17
3.6 CONFIGURATION OF SYSTEM UNDER TEST 18
4. TEST TYPES AND RESULTS 19
4.1 CONDUCTED EMISSION MEASUREMENT 19
4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT 19
4.1.2 TEST INSTRUMENTS 19
4.1.3 TEST PROCEDURES 20
4.1.4 DEVIATION FROM TEST STANDARD 20
4.1.5 TEST SETUP 20
4.1.6 EUT OPERATING CONDITIONS 21
4.1.7 TEST RESULTS 22
4.2 RADIATED EMISSION AND BANDEDGE MEASUREMENT 24
4.2.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT 24
4.2.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS 25
4.2.3 TEST INSTRUMENTS 26
4.2.4 TEST PROCEDURES 28
4.2.5 DEVIATION FROM TEST STANDARD 28
4.2.6 TEST SETUP 29
4.2.7 EUT OPERATING CONDITION 29
4.2.8 TEST RESULTS 30
4.3 TRANSMIT POWER MEASUREMENT 49
4.3.1 LIMITS OF TRANSMIT POWER MEASUREMENT 49
4.3.2 TEST INSTRUMENTS 50
4.3.3 TEST PROCEDURE 50
4.3.4 DEVIATION FROM TEST STANDARD 51
4.3.5 TEST SETUP 51
4.3.6 EUT OPERATING CONDITIONS 51
4.3.7 TEST RESULTS 52

4.4 PEAK POWER SPECTRAL DENSITY MEASUREMENT 58
4.4.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT 58
4.4.2 TEST INSTRUMENTS 58
4.4.3 TEST PROCEDURES 59
4.4.4 DEVIATION FROM TEST STANDARD 59
4.4.5 TEST SETUP 60
4.4.6 EUT OPERATING CONDITIONS 60
4.4.7 TEST RESULTS 61
4.5 FREQUENCY STABILITY 67
4.5.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT 67
4.5.2 TEST INSTRUMENTS 67
4.5.3 TEST PROCEDURE 67
4.5.4 DEVIATION FROM TEST STANDARD 68
4.5.5 TEST SETUP 68
4.5.6 EUT OPERATING CONDITION 68
4.5.7 TEST RESULTS 69
4.6 6dB BANDWIDTH MEASUREMENT 70
4.6.1 LIMITS OF 6DB BANDWIDTH MEASUREMENT 70
4.6.2 TEST INSTRUMENTS 70
4.6.3 TEST PROCEDURE 70
4.6.4 DEVIATION FROM TEST STANDARD 70
4.6.5 TEST SETUP 71
4.6.6 EUT OPERATING CONDITIONS 71
4.6.7 TEST RESULTS 72
5. PHOTOGRAPHS OF THE TEST CONFIGURATION 74
6. INFORMATION ON THE TESTING LABORATORIES 75
7. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB 76

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140707E06-1	Original release	Aug. 15, 2014

1. CERTIFICATION

PRODUCT:	Industrial Broadband Router
BRAND NAME:	cradlepoint
MODEL NO.:	IBR1100LPE
TEST SAMPLE:	ENGINEERING SAMPLE
APPLICANT:	Cradlepoint, Inc.
TESTED:	July 17 to Aug. 07, 2014
STANDARDS:	**FCC Part 15, Subpart E (Section 15.407)**
	ANSI C63.10-2009

The above equipment (Model: IBR1100LPE) 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 : Phoenix Huang , **DATE:** *Aug. 15, 2014*

(Phoenix Huang, Specialist)

APPROVED BY : , **DATE:** *Aug. 15, 2014*

(May Chen, Manager)

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 -4.86dB at 0.50019MHz
15.407 (b)(1/2/3/4/6)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 5150.00MHz & 5725.00MHz.
15.407(a/1/2/3)	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	Antenna connector is R-SMA not a standard connector.

NOTE: 1. The EUT was operating in 2.400 ~ 2.4835GHz, 5.15~5.25GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 5.15~5.25GHz and 5.725~5.850GHz. For the 2.400 ~ 2.4835GHz RF parameters was recorded in another test report.

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:

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

Measurement	Value
Conducted emissions	2.86 dB
Radiated emissions (30MHz-1GHz)	5.37 dB
Radiated emissions (1GHz -6GHz)	3.65 dB
Radiated emissions (6GHz -18GHz)	3.88 dB
Radiated emissions (18GHz -40GHz)	4.11 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Industrial Broadband Router
MODEL NO.	IBR1100LPE
POWER SUPPLY	DC 12V from power adapter or DC 9-36V (with DC cable)
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode only
MODULATION TECHNOLOGY	DSSS,OFDM
TRANSFER RATE	802.11b: up to 11Mbps 802.11a / g: up to 54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.7Mbps
OPERATING FREQUENCY	**For 15.407** 5.18 ~ 5.24GHz, 5.745 ~ 5.825GHz
	For 15.247 2.412 ~ 2.462GHz
NUMBER OF CHANNEL	**For 15.407** 9 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 4 for 802.11n (HT40), 802.11ac (VHT40) 2 for 802.11ac (VHT80)
	For 15.247 11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
MAXIMUM OUTPUT POWER	**For 15.407** 802.11a: 184.927mW 802.11ac (VHT20): 355.379mW 802.11ac (VHT40): 226.793mW 802.11ac (VHT80): 45.869mW **For 15.247** 802.11b: 206.538mW 802.11g: 203.236mW 802.11n (HT20): 482.098mW 802.11n (HT40): 323.3mW

ANTENNA TYPE	Please see NOTE
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	Adapter x 1 DC cable (2m) x 1

Note:

1. There are WLAN, WWAN(2G/3G), LTE(4G) and GPS technology used for the EUT.
2. The EUT inside has one Cellular Modem which FCC ID: N7NMC7355.
3. WLAN/WWAN(2/3G)/LTE(4G) coexistence mode:

Condition	Technology		
1	WLAN(2.4GHz)	WLAN(5GHz)	WWAN(2/3G)
2	WLAN(2.4GHz)	WLAN(5GHz)	LTE(4G)
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.			

4. The EUT must be supplied with a power adapter as following table:

Brand	Model No.	Spec.
Cincon	TRG70E120	Input: 100-240V, 1.5A, 47~63Hz AC input cable(1.9m, unshielded) Output: 12.0V, 5.5A DC output cable(0.72m, unshielded)

5. The antennas provided to the EUT, please refer to the following table:

For WLAN used								
Ant. No.	Transmitter Circuit	Ant. Gain (dBi) <Excluding cable loss>	Cable Loss (dB)	Net. Gain (dBi)	Frequency range (MHz to MHz)	Ant. Type	Connecter Type	Cable Length (mm)
1 (beside DC Jack)	Chain (0)	4.5	1.1	3.4	2400~2500	Dipole	R-SMA	125
		5.0	1.7	3.3	5150~5900			
2 (beside RJ45)	Chain (1)	4.5	0.9	3.6	2400~2500	Dipole	R-SMA	70
		5.0	1.5	3.5	5150~5900			
For LTE used								
Ant. No.	Transmitter Circuit	Ant. Gain (dBi) <Excluding cable loss>	Cable Loss (dB)	Net. Gain (dBi)	Frequency range (MHz to MHz)	Ant. Type	Connecter Type	Cable Length (mm)
1	Main	3	1.0	2	700~2700	Dipole	SMA	135
2	Aux							85
3	Main	2	1.0	1	700~2700	Dipole	SMA	135
4	Aux							85
Note: 1. For WLAN: 1TX configuration mode will fix transmission on Chain (0). 2. For LTE: Antenna No.: 1~2 was selected as representative antenna for the test.								

6. The EUT incorporates a MIMO function without beamforming.

MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11a	6 ~ 54Mbps	1TX Fixed Chain 0	2RX
802.11b	1 ~ 11Mbps	1TX Fixed Chain 0	2RX
802.11g	6 ~ 54Mbps	1TX Fixed Chain 0	2RX
802.11n (HT20) & 802.11n (HT40)	MCS 0~7	2TX (CDD)	2RX
	MCS 8~15	2TX	2RX
802.11ac (VHT20)	MCS0~8 (256QAM) Nss= 1	2TX (CDD)	2RX
	MCS0~8 (256QAM) Nss= 2	2TX	2RX
802.11ac (VHT40) & 802.11ac (VHT80)	MCS0~9 (256QAM) Nss= 1	2TX (CDD)	2RX
	MCS0~9 (256QAM) Nss= 2	2TX	2RX

Note: The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz) and 802.11ac mode for 20MHz (40MHz), therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

7. EUT has been pre-tested under following pre-test modes.

Pre-test Mode	Power
A	Adapter
B	DC 9V (with DC cable)
C	DC 36V (with DC cable)
Note: From the above modes, the radiated emission worse case was found in **Mode A**. Therefore only the test data of the mode was recorded in this report.	

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

3.2 DESCRIPTION OF TEST MODES

Operated in 5150 ~ 5250MHz band:

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (VHT80):

CHANNEL	FREQUENCY
42	5210 MHz

Operated in 5725 ~ 5850MHz band:

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

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

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

CHANNEL	FREQUENCY
151	5755 MHz
159	5795 MHz

1 channel is provided for 802.11ac (VHT80):

CHANNEL	FREQUENCY
155	5775 MHz

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	PLC	RE < 1G	RE ≥ 1G	APCM	
-	√	√	√	√	-

Where **PLC:** Power Line Conducted Emission **RE < 1G:** Radiated Emission below 1GHz
RE ≥ 1G: Radiated Emission above 1GHz **APCM:** Antenna Port Conducted Measurement

NOTE: The EUT had been pre-tested on the positioned of each 2 axis. The worst case was found when positioned on **X-plane**.

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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (MBPS)
802.11ac (VHT80)	42 & 155	155	OFDM	BPSK	29.3

RADIATED EMISSION TEST (BELOW 1 GHz):

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

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (MBPS)
802.11ac (VHT80)	42 & 155	155	OFDM	BPSK	29.3

RADIATED EMISSION TEST (ABOVE 1 GHz):

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

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (MBPS)
802.11a	36 to 48 & 149 to 165	36, 40, 48, 149, 157, 165	OFDM	BPSK	6
802.11ac (VHT20)	36 to 48 & 149 to 165	36, 40, 48, 149, 157, 165	OFDM	BPSK	6.5
802.11ac (VHT40)	38 to 46 & 151 to 159	38, 46, 151, 159	OFDM	BPSK	13.5
802.11ac (VHT80)	42 & 155	42, 155	OFDM	BPSK	29.3

ANTENNA PORT CONDUCTED 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (MBPS)
802.11a	36 to 48 & 149 to 165	36, 40, 48, 149, 157, 165	OFDM	BPSK	6
802.11ac (VHT20)	36 to 48 & 149 to 165	36, 40, 48, 149, 157, 165	OFDM	BPSK	6.5
802.11ac (VHT40)	38 to 46 & 151 to 159	38, 46, 151, 159	OFDM	BPSK	13.5
802.11ac (VHT80)	42 & 155	42, 155	OFDM	BPSK	29.3

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	30deg. C, 70%RH	120Vac, 60Hz	Mike Hsieh
RE<1G	22deg. C, 62%RH	120Vac, 60Hz	Andy Ho
RE≥1G	25deg. C, 67%RH	120Vac, 60Hz	Gary Cheng
APCM	25deg. C, 60%RH	120Vac, 60Hz	James Chan

3.3 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

662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10-2009

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

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

3.4 DUTY CYCLE OF TEST SIGNAL

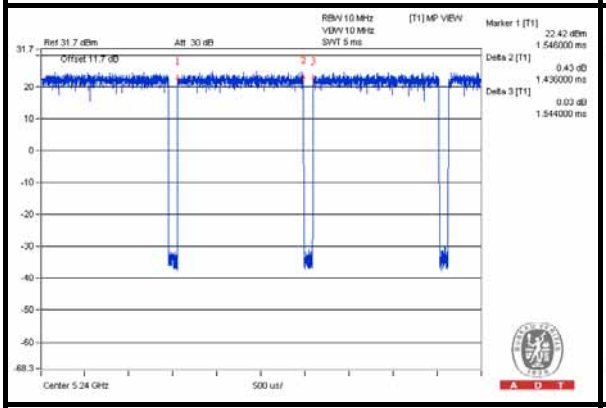
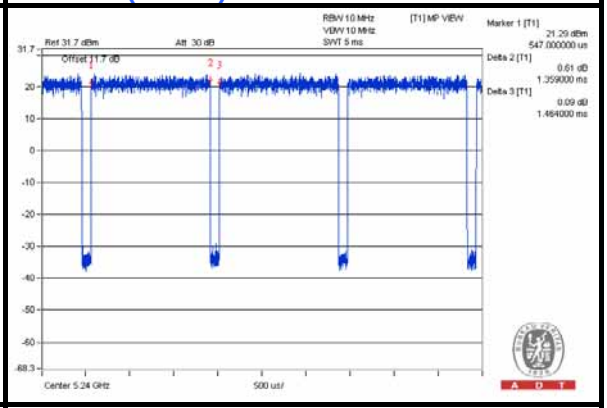
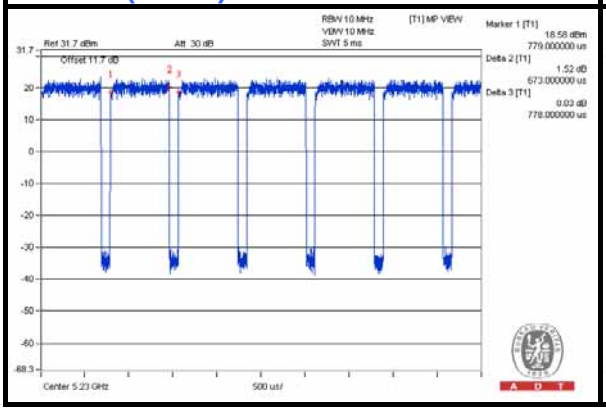
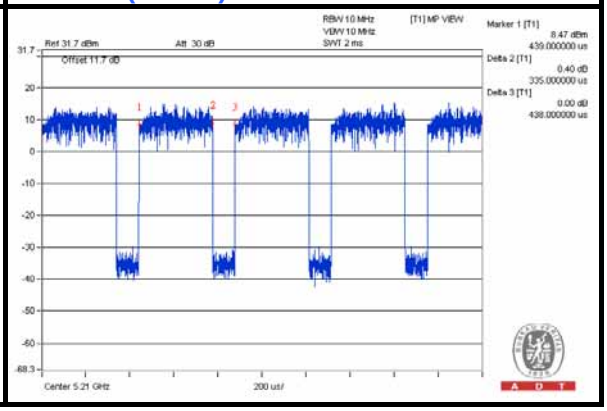
Duty cycle of test signal is < 98 %, duty factor shall be considered.

802.11a: Duty cycle = 1.436 ms/1.544 ms = 0.93, Duty factor = 10 * log(1/0.93) = 0.3

802.11ac (VHT20): Duty cycle = 1.359 ms/1.464 ms = 0.928, Duty factor = 10 * log(1/0.928) = 0.3

802.11ac (VHT40): Duty cycle = 0.673 ms/0.778 ms = 0.865, Duty factor = 10 * log(1/0.865) = 0.6

802.11ac (VHT80): Duty cycle = 0.335 ms/0.438 ms = 0.765, Duty factor = 10 * log(1/0.765) = 1.2

802.11a	802.11ac (VHT20)
	
802.11ac (VHT40)	**802.11ac (VHT80)**
	

3.5 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.

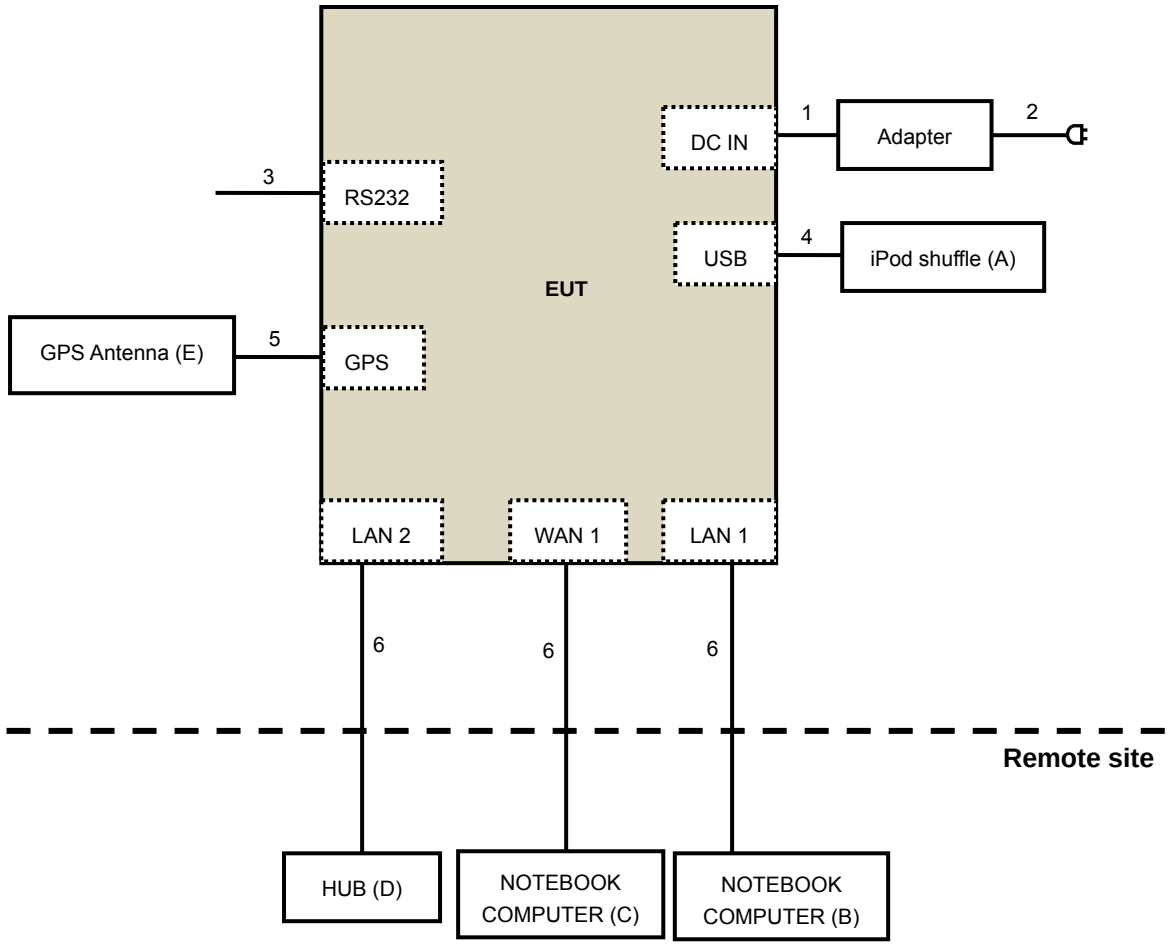
No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	iPod shuffle	Apple	MC749TA/A	CC4DN29UDFDM	NA	Provided by Lab
B	NOTEBOOK COMPUTER	DELL	E6420	B92T3R1	FCC DoC	Provided by Lab
C	NOTEBOOK COMPUTER	DELL	E5420	CHHYLQ1	FCC DoC	Provided by Lab
D	HUB	ZyXEL	ES-116P	S060H02000215	FCC Doc	Provided by Lab
E	GPS Antenna	taoglas	AA.107.301111	AA107WT13120092	NA	Supplied by client

NOTE:

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

No.	Cable	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Number)	Remark
1.	DC	1	0.72	Yes	0	Provided by Lab
2.	AC	1	1.9	Yes	0	Provided by Lab
3.	RS232	1	1.8	Yes	0	Provided by Lab
4.	USB	1	0.1	Yes	0	Provided by Lab
5.	GPS	1	0.3	Yes	0	Supplied by client
6.	RJ-45	1	10	No	0	Provided by Lab

3.6 CONFIGURATION OF SYSTEM UNDER TEST



4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	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 0.50 MHz.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100375	Apr. 29, 2014	Apr. 28, 2015
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK8127	8127-522	Sep. 12, 2013	Sep. 11, 2014
Line-Impedance Stabilization Network (for Peripheral)	ENV216	100071	Nov. 13, 2013	Nov. 12, 2014
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 10 , 2014	Mar. 09, 2015
50 ohms Terminator	N/A	EMC-03	Sep. 24, 2013	Sep. 23, 2014
50 ohms Terminator	N/A	EMC-02	Oct. 01, 2013	Sep. 30, 2014
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 Shielded Room No. C.
3. The VCCI Con C Registration No. is C-3611.
4. Tested Date: Aug. 04, 2014

4.1.3 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.

b. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

c. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

d. The frequency range from 150kHz to 30MHz was searched. Emission level under (Limit – 20dB) was not recorded.

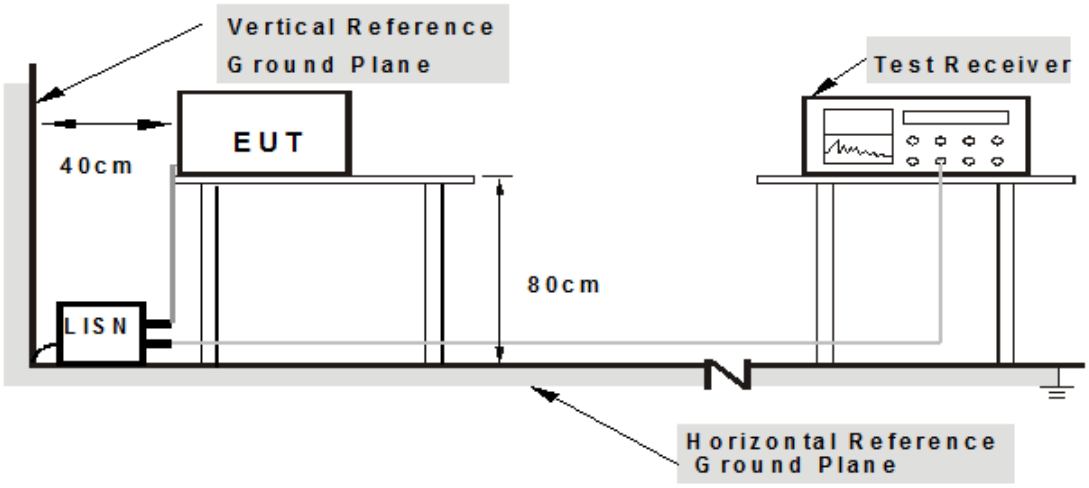
NOTE:

1. The resolution bandwidth of test receiver is 9kHz for Quasi-peak detection (QP) & Average detection (AV).

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.1.6 EUT OPERATING CONDITIONS

1. Connect the EUT with the support units B-C (Notebook Computer) which is placed on table in remote site.
2. The communication partner run test program “MT76xxE AP Version:0.0.2.3” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

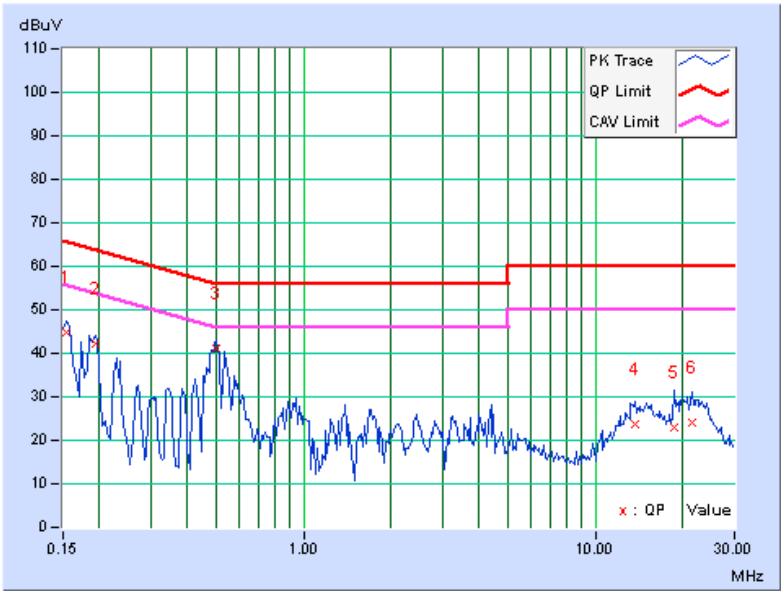
4.1.7 TEST RESULTS

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	0.07	44.81	39.66	44.88	39.73	65.79	55.79	-20.91	-16.06
2	0.19297	0.07	42.31	36.95	42.38	37.02	63.91	53.91	-21.53	-16.89
3	0.50156	0.10	41.15	39.98	41.25	40.08	56.00	46.00	-14.75	-5.92
4	13.69922	0.55	23.28	16.94	23.83	17.49	60.00	50.00	-36.17	-32.51
5	18.67969	0.68	22.13	16.29	22.81	16.97	60.00	50.00	-37.19	-33.03
6	21.49219	0.75	23.21	17.48	23.96	18.23	60.00	50.00	-36.04	-31.77

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

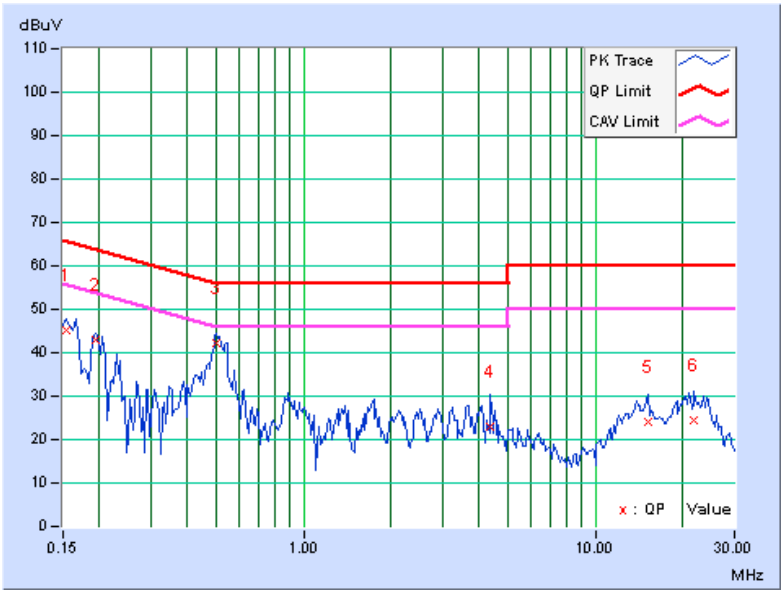


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	0.07	45.28	40.62	45.35	40.69	65.79	55.79	-20.43	-15.09
2	0.19297	0.07	42.79	38.09	42.86	38.16	63.91	53.91	-21.05	-15.75
3	**0.50019**	**0.10**	**42.10**	**41.04**	**42.20**	**41.14**	**56.00**	**46.00**	**-13.80**	**-4.86**
4	4.34375	0.27	22.51	15.85	22.78	16.12	56.00	46.00	-33.22	-29.88
5	15.16406	0.59	23.65	18.06	24.24	18.65	60.00	50.00	-35.76	-31.35
6	21.85156	0.75	23.52	17.70	24.27	18.45	60.00	50.00	-35.73	-31.55

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



4.2 RADIATED EMISSION AND BANDEDGE MEASUREMENT

4.2.1 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.

4.2.2 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 (dBμV/m)	AV:54 (dBμV/m)
APPLICABLE TO	**EIRP LIMIT**	**EQUIVALENT FIELD STRENGTH AT 3m**
15.407(b)(1)	PK:-27 (dBm/MHz)	PK:68.2(dBμV/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)	PK:-27 (dBm/MHz) *1 PK:-17 (dBm/MHz) *2	PK: 68.2(dBμV/m) *1 PK:78.2 (dBμV/m) *2

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

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

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

4.2.3 TEST INSTRUMENTS

For Below 1GHz:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY51210105	Jan. 21,2014	Jan. 20,2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 13, 2013	Nov. 12, 2014
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Feb. 26, 2014	Feb. 25, 2015
RF Cable	NA	CHGCAB_001	Oct. 05, 2013	Oct. 04, 2014
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Horn_Antenna AISI	AIH.8018	0000320091110	Nov. 18, 2013	Nov. 17, 2014
Pre-Amplifier Agilent	8449B	3008A02578	June 24, 2014	June 23, 2015
RF Cable	NA	RF104-201 RF104-203 RF104-204	Dec. 12, 2013	Dec. 11, 2014
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 28, 2013	Aug. 27, 2014
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 13, 2013	Nov. 12, 2014
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 08, 2013	Oct. 07, 2014
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	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 horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3 The test was performed in 966 Chamber No. G.
4. The FCC Site Registration No. is 966073.
5 The VCCI Site Registration No. is G-137.
6 The CANADA Site Registration No. is IC 7450H-2.
7 Tested Date: July 17, 2014

For Above 1GHz:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY50010156	Jan. 15, 2014	Jan. 14, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 13, 2013	Nov. 12, 2014
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Feb. 27, 2014	Feb. 26, 2015
RF Cable	NA	CHHCAB_001	Oct. 06, 2013	Oct. 05, 2014
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Horn_Antenna AISI	AIH.8018	0000220091110	Dec. 06, 2013	Dec. 05, 2014
Pre-Amplifier Agilent	8449B	3008A01923	Oct. 29, 2013	Oct. 28, 2014
RF Cable	NA	RF104-205 RF104-207 RF104-202	Dec. 12, 2013	Dec. 11, 2014
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 28, 2013	Aug. 27, 2014
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 13, 2013	Nov. 12, 2014
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 08, 2013	Oct. 07, 2014
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	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 horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in 966 Chamber No. H.
4. The FCC Site Registration No. is 797305.
5. The CANADA Site Registration No. is IC 7450H-3.
6. Tested Date: Aug. 05, 2014

4.2.4 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters 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:

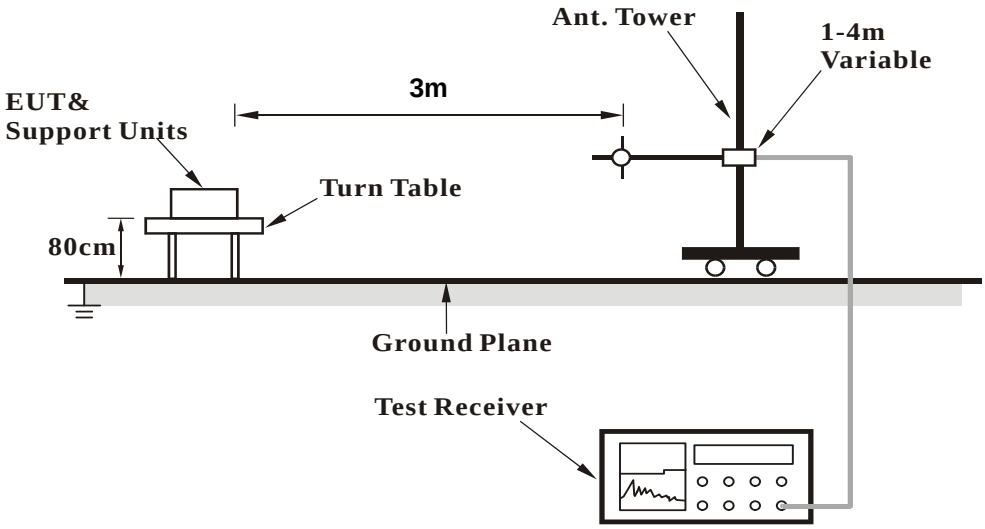
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.2.5 DEVIATION FROM TEST STANDARD

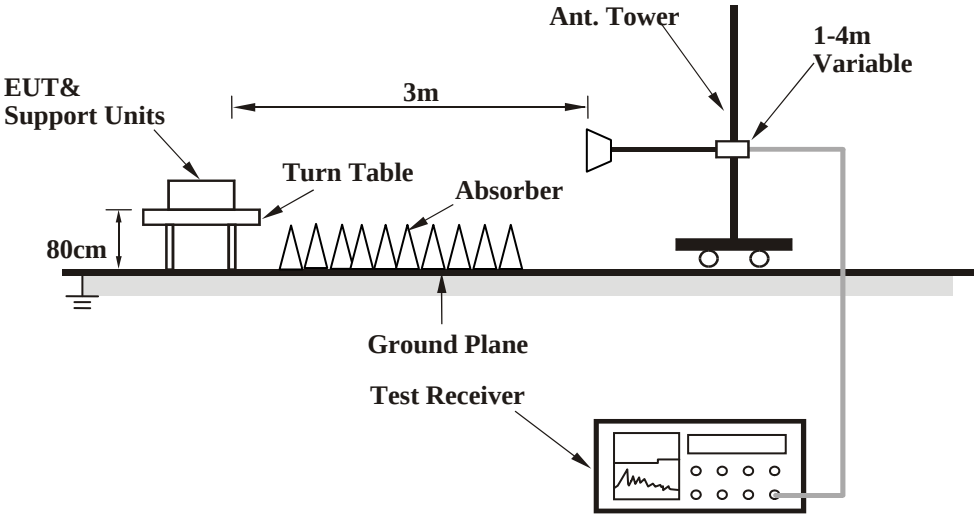
No deviation

4.2.6 TEST SETUP

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.2.7 EUT OPERATING CONDITION

Same as 4.1.6

4.2.8 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

802.11ac (VHT80)

CHANNEL	TX Channel 155	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	Below 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	81.17	31.8 QP	40.0	-8.2	2.00 H	212	50.27	-18.48
2	101.93	32.9 QP	43.5	-10.6	2.00 H	65	50.27	-17.41
3	152.41	35.3 QP	43.5	-8.2	2.00 H	293	48.45	-13.11
4	272.45	37.2 QP	46.0	-8.8	1.00 H	15	50.53	-13.32
5	772.83	38.8 QP	46.0	-7.2	2.00 H	145	40.34	-1.57
6	959.99	35.3 QP	46.0	-10.7	2.00 H	302	34.22	1.06
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	39.02	35.0 QP	40.0	-5.0	2.00 V	181	48.82	-13.84
2	50.47	37.0 QP	40.0	-3.0	1.00 V	188	50.53	-13.56
3	119.48	35.5 QP	43.5	-8.0	1.50 V	4	50.73	-15.26
4	263.29	36.4 QP	46.0	-9.6	1.00 V	143	50.19	-13.79
5	815.17	35.5 QP	46.0	-10.5	1.00 V	70	36.68	-1.18
6	959.99	39.8 QP	46.0	-6.3	1.00 V	42	38.69	1.06

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

ABOVE 1GHz DATA

802.11a

CHANNEL	TX Channel 36	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	5150.00	65.5 PK	74.0	-8.5	1.48 H	23	61.66	3.84
2	5150.00	44.7 AV	54.0	-9.3	1.48 H	23	40.86	3.84
3	*5180.00	103.9 PK			1.48 H	23	99.98	3.92
4	*5180.00	92.7 AV			1.48 H	23	88.78	3.92
5	#10360.00	55.8 PK	74.0	-18.2	1.24 H	222	46.37	9.43
6	#10360.00	42.4 AV	54.0	-11.6	1.24 H	222	32.97	9.43
7	15540.00	62.6 PK	74.0	-11.4	1.55 H	233	48.57	14.03
8	15540.00	48.4 AV	54.0	-5.6	1.55 H	233	34.37	14.03
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	5150.00	70.7 PK	74.0	-3.3	1.38 V	30	66.86	3.84
2	5150.00	53.1 AV	54.0	-0.9	1.38 V	30	49.26	3.84
3	*5180.00	113.9 PK			1.38 V	30	109.98	3.92
4	*5180.00	102.4 AV			1.38 V	30	98.48	3.92
5	#10360.00	60.1 PK	74.0	-13.9	1.47 V	214	50.67	9.43
6	#10360.00	47.1 AV	54.0	-6.9	1.47 V	214	37.67	9.43
7	15540.00	65.5 PK	74.0	-8.5	1.22 V	243	51.47	14.03
8	15540.00	52.1 AV	54.0	-1.9	1.22 V	243	38.07	14.03

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 40	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	105.6 PK			1.47 H	26	101.64	3.96
2	*5200.00	93.8 AV			1.47 H	26	89.84	3.96
3	#10400.00	55.9 PK	74.0	-18.1	1.30 H	223	46.45	9.45
4	#10400.00	42.5 AV	54.0	-11.5	1.30 H	223	33.05	9.45
5	15600.00	62.5 PK	74.0	-11.5	1.55 H	236	48.32	14.18
6	15600.00	48.7 AV	54.0	-5.3	1.55 H	236	34.52	14.18
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	114.3 PK			1.37 V	28	110.34	3.96
2	*5200.00	102.4 AV			1.37 V	28	98.44	3.96
3	#10400.00	60.6 PK	74.0	-13.4	1.47 V	202	51.15	9.45
4	#10400.00	47.3 AV	54.0	-6.7	1.47 V	202	37.85	9.45
5	15600.00	66.6 PK	74.0	-7.4	1.23 V	242	52.42	14.18
6	15600.00	53.0 AV	54.0	-1.0	1.23 V	242	38.82	14.18

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	107.4 PK			1.50 H	24	103.45	3.95
2	*5240.00	95.2 AV			1.50 H	24	91.25	3.95
3	5350.00	54.2 PK	74.0	-19.8	1.50 H	24	50.13	4.07
4	5350.00	40.9 AV	54.0	-13.1	1.50 H	24	36.83	4.07
5	#10480.00	56.2 PK	74.0	-17.8	1.21 H	232	46.53	9.67
6	#10480.00	42.7 AV	54.0	-11.3	1.21 H	232	33.03	9.67
7	15720.00	61.5 PK	74.0	-12.5	1.45 H	225	47.61	13.89
8	15720.00	48.0 AV	54.0	-6.0	1.45 H	225	34.11	13.89
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	116.0 PK			1.20 V	88	112.05	3.95
2	*5240.00	103.7 AV			1.20 V	88	99.75	3.95
3	5350.00	53.9 PK	74.0	-20.1	1.20 V	88	49.83	4.07
4	5350.00	40.9 AV	54.0	-13.1	1.20 V	88	36.83	4.07
5	#10480.00	60.1 PK	74.0	-13.9	1.46 V	215	50.43	9.67
6	#10480.00	46.9 AV	54.0	-7.1	1.46 V	215	37.23	9.67
7	15720.00	65.3 PK	74.0	-8.7	1.23 V	224	51.41	13.89
8	15720.00	52.0 AV	54.0	-2.0	1.23 V	224	38.11	13.89

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	58.4 PK	74.0	-15.6	1.07 H	360	53.92	4.48
2	#5715.00	42.4 AV	54.0	-11.6	1.07 H	360	37.92	4.48
3	#5725.00	66.1 PK	78.2	-12.1	1.07 H	360	61.60	4.50
4	*5745.00	99.0 PK			1.07 H	360	94.51	4.49
5	*5745.00	88.2 AV			1.07 H	360	83.71	4.49
6	11490.00	55.4 PK	74.0	-18.6	1.07 H	316	45.36	10.04
7	11490.00	43.7 AV	54.0	-10.3	1.07 H	316	33.66	10.04
8	#17235.00	60.9 PK	74.0	-13.1	1.42 H	234	42.34	18.56
9	#17235.00	47.3 AV	54.0	-6.7	1.42 H	234	28.74	18.56
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	59.3 PK	74.0	-14.7	1.09 V	136	54.82	4.48
2	#5715.00	43.1 AV	54.0	-10.9	1.09 V	136	38.62	4.48
3	#5725.00	75.7 PK	78.2	-2.5	1.09 V	136	71.20	4.50
4	*5745.00	108.9 PK			1.09 V	136	104.41	4.49
5	*5745.00	98.1 AV			1.09 V	136	93.61	4.49
6	11490.00	55.8 PK	74.0	-18.2	1.71 V	111	45.76	10.04
7	11490.00	42.8 AV	54.0	-11.2	1.71 V	111	32.76	10.04
8	#17235.00	64.1 PK	74.0	-9.9	1.25 V	241	45.54	18.56
9	#17235.00	51.1 AV	54.0	-2.9	1.25 V	241	32.54	18.56

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	57.6 PK	74.0	-16.4	1.11 H	360	53.12	4.48
2	#5715.00	42.0 AV	54.0	-12.0	1.11 H	360	37.52	4.48
3	#5725.00	54.3 PK	78.2	-23.9	1.11 H	360	49.80	4.50
4	*5785.00	104.4 PK			1.11 H	360	99.90	4.50
5	*5785.00	92.4 AV			1.11 H	360	87.90	4.50
6	#5850.00	51.3 PK	78.2	-26.9	1.11 H	360	46.73	4.57
7	#5860.00	57.6 PK	74.0	-16.4	1.11 H	360	53.01	4.59
8	#5860.00	44.2 AV	54.0	-9.8	1.11 H	360	39.61	4.59
9	11570.00	55.0 PK	74.0	-19.0	1.03 H	320	44.92	10.08
10	11570.00	43.5 AV	54.0	-10.5	1.03 H	320	33.42	10.08
11	#17355.00	61.4 PK	74.0	-12.6	1.37 H	236	42.50	18.90
12	#17355.00	47.6 AV	54.0	-6.4	1.37 H	236	28.70	18.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	58.2 PK	74.0	-15.8	1.07 V	135	53.72	4.48
2	#5715.00	42.6 AV	54.0	-11.4	1.07 V	135	38.12	4.48
3	#5725.00	64.1 PK	78.2	-14.1	1.07 V	135	59.60	4.50
4	*5785.00	114.9 PK			1.07 V	135	110.40	4.50
5	*5785.00	102.8 AV			1.07 V	135	98.30	4.50
6	#5850.00	61.8 PK	78.2	-16.4	1.07 V	135	57.23	4.57
7	#5860.00	58.0 PK	74.0	-16.0	1.07 V	135	53.41	4.59
8	#5860.00	44.3 AV	54.0	-9.7	1.07 V	135	39.71	4.59
9	11570.00	56.2 PK	74.0	-17.8	1.67 V	122	46.12	10.08
10	11570.00	43.2 AV	54.0	-10.8	1.67 V	122	33.12	10.08
11	#17355.00	64.2 PK	74.0	-9.8	1.28 V	231	45.30	18.90
12	#17355.00	51.4 AV	54.0	-2.6	1.28 V	231	32.50	18.90

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	101.2 PK			1.03 H	360	96.67	4.53
2	*5825.00	89.9 AV			1.03 H	360	85.37	4.53
3	#5850.00	67.9 PK	78.2	-10.3	1.03 H	360	63.33	4.57
4	#5860.00	57.8 PK	74.0	-16.2	1.03 H	360	53.21	4.59
5	#5860.00	42.7 AV	54.0	-11.3	1.03 H	360	38.11	4.59
6	11650.00	54.7 PK	74.0	-19.3	1.01 H	310	44.73	9.97
7	11650.00	43.4 AV	54.0	-10.6	1.01 H	310	33.43	9.97
8	#17475.00	61.2 PK	74.0	-12.8	1.33 H	233	42.09	19.11
9	#17475.00	47.5 AV	54.0	-6.5	1.33 H	233	28.39	19.11
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	111.4 PK			1.08 V	135	106.87	4.53
2	*5825.00	100.3 AV			1.08 V	135	95.77	4.53
3	#5850.00	77.5 PK	78.2	-0.7	1.08 V	135	72.93	4.57
4	#5860.00	61.5 PK	74.0	-12.5	1.08 V	135	56.91	4.59
5	#5860.00	47.6 AV	54.0	-6.4	1.08 V	135	43.01	4.59
6	11650.00	56.0 PK	74.0	-18.0	1.70 V	110	46.03	9.97
7	11650.00	42.8 AV	54.0	-11.2	1.70 V	110	32.83	9.97
8	#17475.00	64.0 PK	74.0	-10.0	1.23 V	217	44.89	19.11
9	#17475.00	51.0 AV	54.0	-3.0	1.23 V	217	31.89	19.11

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

802.11ac (VHT20)

CHANNEL	TX Channel 36	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	5150.00	69.5 PK	74.0	-4.5	1.45 H	27	65.66	3.84
2	5150.00	47.6 AV	54.0	-6.4	1.45 H	27	43.76	3.84
3	*5180.00	107.5 PK			1.45 H	27	103.58	3.92
4	*5180.00	95.6 AV			1.45 H	27	91.68	3.92
5	#10360.00	56.4 PK	74.0	-17.6	1.17 H	223	46.97	9.43
6	#10360.00	42.6 AV	54.0	-11.4	1.17 H	223	33.17	9.43
7	15540.00	61.9 PK	74.0	-12.1	1.44 H	224	47.87	14.03
8	15540.00	48.4 AV	54.0	-5.6	1.44 H	224	34.37	14.03
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	5150.00	73.2 PK	74.0	-0.8	1.44 V	64	69.36	3.84
2	5150.00	51.1 AV	54.0	-2.9	1.44 V	64	47.26	3.84
3	*5180.00	116.3 PK			1.44 V	64	112.38	3.92
4	*5180.00	104.2 AV			1.44 V	64	100.28	3.92
5	#10360.00	60.1 PK	74.0	-13.9	1.41 V	219	50.67	9.43
6	#10360.00	46.9 AV	54.0	-7.1	1.41 V	219	37.47	9.43
7	15540.00	65.2 PK	74.0	-8.8	1.18 V	216	51.17	14.03
8	15540.00	52.1 AV	54.0	-1.9	1.18 V	216	38.07	14.03

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 40	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	53.9 PK	74.0	-20.1	1.48 H	19	50.06	3.84
2	5150.00	41.1 AV	54.0	-12.9	1.48 H	19	37.26	3.84
3	*5200.00	110.4 PK			1.48 H	19	106.44	3.96
4	*5200.00	98.0 AV			1.48 H	19	94.04	3.96
5	#10400.00	56.4 PK	74.0	-17.6	1.26 H	229	46.95	9.45
6	#10400.00	42.8 AV	54.0	-11.2	1.26 H	229	33.35	9.45
7	15600.00	61.4 PK	74.0	-12.6	1.40 H	226	47.22	14.18
8	15600.00	47.6 AV	54.0	-6.4	1.40 H	226	33.42	14.18
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	53.3 PK	74.0	-20.7	1.42 V	82	49.46	3.84
2	5150.00	40.7 AV	54.0	-13.3	1.42 V	82	36.86	3.84
3	*5200.00	119.5 PK			1.42 V	82	115.54	3.96
4	*5200.00	107.3 AV			1.42 V	82	103.34	3.96
5	#10400.00	60.4 PK	74.0	-13.6	1.42 V	216	50.95	9.45
6	#10400.00	47.1 AV	54.0	-6.9	1.42 V	216	37.65	9.45
7	15600.00	68.6 PK	74.0	-5.4	1.21 V	200	54.42	14.18
8	15600.00	53.8 AV	54.0	-0.2	1.21 V	200	39.62	14.18

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	110.4 PK			1.47 H	35	106.45	3.95
2	*5240.00	97.9 AV			1.47 H	35	93.95	3.95
3	5350.00	52.7 PK	74.0	-21.3	1.47 H	35	48.63	4.07
4	5350.00	40.3 AV	54.0	-13.7	1.47 H	35	36.23	4.07
5	#10480.00	55.9 PK	74.0	-18.1	1.25 H	225	46.23	9.67
6	#10480.00	42.4 AV	54.0	-11.6	1.25 H	225	32.73	9.67
7	15720.00	61.2 PK	74.0	-12.8	1.48 H	220	47.31	13.89
8	15720.00	47.5 AV	54.0	-6.5	1.48 H	220	33.61	13.89
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	119.7 PK			1.44 V	70	115.75	3.95
2	*5240.00	107.4 AV			1.44 V	70	103.45	3.95
3	5350.00	53.6 PK	74.0	-20.4	1.44 V	70	49.53	4.07
4	5350.00	40.9 AV	54.0	-13.1	1.44 V	70	36.83	4.07
5	#10480.00	57.9 PK	74.0	-16.1	1.25 V	227	48.23	9.67
6	#10480.00	45.1 AV	54.0	-8.9	1.25 V	227	35.43	9.67
7	15720.00	64.6 PK	74.0	-9.4	1.21 V	200	50.71	13.89
8	15720.00	50.9 AV	54.0	-3.1	1.21 V	200	37.01	13.89

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	57.5 PK	74.0	-16.5	1.09 H	359	53.02	4.48
2	#5715.00	42.1 AV	54.0	-11.9	1.09 H	359	37.62	4.48
3	#5725.00	67.6 PK	78.2	-10.6	1.09 H	359	63.10	4.50
4	*5745.00	102.9 PK			1.09 H	359	98.41	4.49
5	*5745.00	91.2 AV			1.09 H	359	86.71	4.49
6	11490.00	55.2 PK	74.0	-18.8	1.00 H	307	45.16	10.04
7	11490.00	43.4 AV	54.0	-10.6	1.00 H	307	33.36	10.04
8	#17235.00	60.9 PK	74.0	-13.1	1.36 H	243	42.34	18.56
9	#17235.00	47.1 AV	54.0	-6.9	1.36 H	243	28.54	18.56
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	58.4 PK	74.0	-15.6	1.32 V	50	53.92	4.48
2	#5715.00	44.0 AV	54.0	-10.0	1.32 V	50	39.52	4.48
3	#5725.00	77.8 PK	78.2	-0.4	1.32 V	50	73.30	4.50
4	*5745.00	112.5 PK			1.32 V	50	108.01	4.49
5	*5745.00	100.8 AV			1.32 V	50	96.31	4.49
6	11490.00	56.2 PK	74.0	-17.8	1.69 V	126	46.16	10.04
7	11490.00	43.1 AV	54.0	-10.9	1.69 V	126	33.06	10.04
8	#17235.00	63.8 PK	74.0	-10.2	1.24 V	228	45.24	18.56
9	#17235.00	51.3 AV	54.0	-2.7	1.24 V	228	32.74	18.56

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	57.5 PK	74.0	-16.5	1.11 H	360	53.02	4.48
2	#5715.00	41.6 AV	54.0	-12.4	1.11 H	360	37.12	4.48
3	#5725.00	59.3 PK	78.2	-18.9	1.11 H	360	54.80	4.50
4	*5785.00	109.0 PK			1.11 H	360	104.50	4.50
5	*5785.00	96.9 AV			1.11 H	360	92.40	4.50
6	#5850.00	59.0 PK	78.2	-19.2	1.11 H	360	54.43	4.57
7	#5860.00	57.7 PK	74.0	-16.3	1.11 H	360	53.11	4.59
8	#5860.00	42.5 AV	54.0	-11.5	1.11 H	360	37.91	4.59
9	11570.00	55.4 PK	74.0	-18.6	1.04 H	327	45.32	10.08
10	11570.00	43.8 AV	54.0	-10.2	1.04 H	327	33.72	10.08
11	#17355.00	61.4 PK	74.0	-12.6	1.33 H	226	42.50	18.90
12	#17355.00	47.8 AV	54.0	-6.2	1.33 H	226	28.90	18.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	63.7 PK	74.0	-10.3	1.31 V	79	59.22	4.48
2	#5715.00	44.2 AV	54.0	-9.8	1.31 V	79	39.72	4.48
3	#5725.00	69.7 PK	78.2	-8.5	1.31 V	79	65.20	4.50
4	*5785.00	118.9 PK			1.31 V	79	114.40	4.50
5	*5785.00	107.0 AV			1.31 V	79	102.50	4.50
6	#5850.00	68.6 PK	78.2	-9.6	1.31 V	79	64.03	4.57
7	#5860.00	62.5 PK	74.0	-11.5	1.31 V	79	57.91	4.59
8	#5860.00	46.7 AV	54.0	-7.3	1.31 V	79	42.11	4.59
9	11570.00	56.5 PK	74.0	-17.5	1.64 V	116	46.42	10.08
10	11570.00	43.3 AV	54.0	-10.7	1.64 V	116	33.22	10.08
11	#17355.00	64.0 PK	74.0	-10.0	1.22 V	238	45.10	18.90
12	#17355.00	51.1 AV	54.0	-2.9	1.22 V	238	32.20	18.90

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	105.5 PK			1.06 H	360	100.97	4.53
2	*5825.00	94.2 AV			1.06 H	360	89.67	4.53
3	#5850.00	67.5 PK	78.2	-10.7	1.06 H	360	62.93	4.57
4	#5860.00	57.5 PK	74.0	-16.5	1.06 H	360	52.91	4.59
5	#5860.00	42.0 AV	54.0	-12.0	1.06 H	360	37.41	4.59
6	11650.00	54.6 PK	74.0	-19.4	1.03 H	310	44.63	9.97
7	11650.00	43.1 AV	54.0	-10.9	1.03 H	310	33.13	9.97
8	#17475.00	61.9 PK	74.0	-12.1	1.40 H	233	42.79	19.11
9	#17475.00	48.0 AV	54.0	-6.0	1.40 H	233	28.89	19.11
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	115.7 PK			1.30 V	47	111.17	4.53
2	*5825.00	104.3 AV			1.30 V	47	99.77	4.53
3	#5850.00	77.5 PK	78.2	-0.7	1.30 V	47	72.93	4.57
4	#5860.00	67.4 PK	74.0	-6.6	1.30 V	47	62.81	4.59
5	#5860.00	48.2 AV	54.0	-5.8	1.30 V	47	43.61	4.59
6	11650.00	55.8 PK	74.0	-18.2	1.62 V	108	45.83	9.97
7	11650.00	43.1 AV	54.0	-10.9	1.62 V	108	33.13	9.97
8	#17475.00	63.8 PK	74.0	-10.2	1.31 V	232	44.69	19.11
9	#17475.00	51.2 AV	54.0	-2.8	1.31 V	232	32.09	19.11

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

802.11ac (VHT40)

CHANNEL	TX Channel 38	**DETECTOR FUNCTION**	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	5150.00	66.5 PK	74.0	-7.5	1.50 H	12	62.66	3.84
2	5150.00	49.1 AV	54.0	-4.9	1.50 H	12	45.26	3.84
3	*5190.00	98.6 PK			1.50 H	12	94.66	3.94
4	*5190.00	88.0 AV			1.50 H	12	84.06	3.94
5	#10380.00	56.7 PK	74.0	-17.3	1.20 H	225	47.26	9.44
6	#10380.00	43.0 AV	54.0	-11.0	1.20 H	225	33.56	9.44
7	15570.00	61.9 PK	74.0	-12.1	1.41 H	233	47.79	14.11
8	15570.00	48.5 AV	54.0	-5.5	1.41 H	233	34.39	14.11
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	5150.00	70.5 PK	74.0	-3.5	1.00 V	356	66.66	3.84
2	5150.00	53.4 AV	54.0	-0.6	1.00 V	356	49.56	3.84
3	*5190.00	108.8 PK			1.00 V	356	104.86	3.94
4	*5190.00	98.2 AV			1.00 V	356	94.26	3.94
5	#10380.00	58.4 PK	74.0	-15.6	1.19 V	240	48.96	9.44
6	#10380.00	45.4 AV	54.0	-8.6	1.19 V	240	35.96	9.44
7	15570.00	64.2 PK	74.0	-9.8	1.19 V	197	50.09	14.11
8	15570.00	50.5 AV	54.0	-3.5	1.19 V	197	36.39	14.11

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	4767.00	56.0 PK	74.0	-18.0	1.44 H	16	52.61	3.39
2	4767.00	44.8 AV	54.0	-9.2	1.44 H	16	41.41	3.39
3	5150.00	69.2 PK	74.0	-4.8	1.44 H	16	65.36	3.84
4	5150.00	44.7 AV	54.0	-9.3	1.44 H	16	40.86	3.84
5	*5230.00	100.6 PK			1.44 H	16	96.64	3.96
6	*5230.00	89.8 AV			1.44 H	16	85.84	3.96
7	5350.00	59.9 PK	74.0	-14.1	1.44 H	16	55.83	4.07
8	5350.00	42.7 AV	54.0	-11.3	1.44 H	16	38.63	4.07
9	#10460.00	56.8 PK	74.0	-17.2	1.25 H	224	47.19	9.61
10	#10460.00	43.0 AV	54.0	-11.0	1.25 H	224	33.39	9.61
11	15690.00	61.1 PK	74.0	-12.9	1.46 H	236	47.20	13.90
12	15690.00	47.9 AV	54.0	-6.1	1.46 H	236	34.00	13.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	4767.00	59.8 PK	74.0	-14.2	1.08 V	47	56.41	3.39
2	4767.00	48.5 AV	54.0	-5.5	1.08 V	47	45.11	3.39
3	5150.00	73.0 PK	74.0	-1.0	1.32 V	278	69.16	3.84
4	5150.00	48.6 AV	54.0	-5.4	1.32 V	278	44.76	3.84
5	*5230.00	110.8 PK			1.32 V	278	106.84	3.96
6	*5230.00	100.0 AV			1.32 V	278	96.04	3.96
7	5350.00	63.4 PK	74.0	-10.6	1.32 V	278	59.33	4.07
8	5350.00	46.2 AV	54.0	-7.8	1.32 V	278	42.13	4.07
9	#10460.00	57.8 PK	74.0	-16.2	1.27 V	215	48.19	9.61
10	#10460.00	44.9 AV	54.0	-9.1	1.27 V	215	35.29	9.61
11	15690.00	64.1 PK	74.0	-9.9	1.25 V	207	50.20	13.90
12	15690.00	50.4 AV	54.0	-3.6	1.25 V	207	36.50	13.90

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	65.6 PK	74.0	-8.4	1.10 H	357	61.12	4.48
2	#5715.00	49.3 AV	54.0	-4.7	1.10 H	357	44.82	4.48
3	#5725.00	68.3 PK	78.2	-9.9	1.10 H	357	63.80	4.50
4	*5755.00	98.8 PK			1.10 H	357	94.31	4.49
5	*5755.00	85.1 AV			1.10 H	357	80.61	4.49
6	11510.00	54.5 PK	74.0	-19.5	1.00 H	333	44.45	10.05
7	11510.00	43.0 AV	54.0	-11.0	1.00 H	333	32.95	10.05
8	#17265.00	61.6 PK	74.0	-12.4	1.37 H	230	42.96	18.64
9	#17265.00	47.9 AV	54.0	-6.1	1.37 H	230	29.26	18.64
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	69.0 PK	74.0	-5.0	1.00 V	50	64.52	4.48
2	#5715.00	53.0 AV	54.0	-1.0	1.00 V	50	48.52	4.48
3	**#5725.00**	**78.1 PK**	**78.2**	**-0.1**	**1.00 V**	**50**	**73.60**	**4.50**
4	*5755.00	108.8 PK			1.00 V	50	104.31	4.49
5	*5755.00	95.0 AV			1.00 V	50	90.51	4.49
6	11510.00	56.3 PK	74.0	-17.7	1.65 V	114	46.25	10.05
7	11510.00	43.3 AV	54.0	-10.7	1.65 V	114	33.25	10.05
8	#17265.00	64.2 PK	74.0	-9.8	1.27 V	228	45.56	18.64
9	#17265.00	51.6 AV	54.0	-2.4	1.27 V	228	32.96	18.64

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	104.6 PK			1.06 H	360	100.09	4.51
2	*5795.00	90.8 AV			1.06 H	360	86.29	4.51
3	#5850.00	67.3 PK	78.2	-10.9	1.06 H	360	62.73	4.57
4	#5860.00	66.8 PK	74.0	-7.2	1.06 H	360	62.21	4.59
5	#5860.00	49.8 AV	54.0	-4.2	1.06 H	360	45.21	4.59
6	11590.00	55.3 PK	74.0	-18.7	1.04 H	312	45.21	10.09
7	11590.00	43.5 AV	54.0	-10.5	1.04 H	312	33.41	10.09
8	#17385.00	61.6 PK	74.0	-12.4	1.33 H	238	42.60	19.00
9	#17385.00	47.9 AV	54.0	-6.1	1.33 H	238	28.90	19.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	114.3 PK			1.30 V	84	109.79	4.51
2	*5795.00	100.6 AV			1.30 V	84	96.09	4.51
3	#5850.00	77.5 PK	78.2	-0.7	1.30 V	84	72.93	4.57
4	#5860.00	70.8 PK	74.0	-3.2	1.30 V	84	66.21	4.59
5	#5860.00	53.8 AV	54.0	-0.2	1.30 V	84	49.21	4.59
6	11590.00	55.9 PK	74.0	-18.1	1.62 V	118	45.81	10.09
7	11590.00	43.2 AV	54.0	-10.8	1.62 V	118	33.11	10.09
8	#17385.00	64.0 PK	74.0	-10.0	1.28 V	242	45.00	19.00
9	#17385.00	51.1 AV	54.0	-2.9	1.28 V	242	32.10	19.00

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

802.11ac (VHT80)

CHANNEL	TX Channel 42	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	70.4 PK	74.0	-3.6	1.54 H	18	66.56	3.84
2	5150.00	47.7 AV	54.0	-6.3	1.54 H	18	43.86	3.84
3	*5210.00	96.8 PK			1.54 H	18	92.84	3.96
4	*5210.00	81.3 AV			1.54 H	18	77.34	3.96
5	5350.00	53.7 PK	74.0	-20.3	1.54 H	18	49.63	4.07
6	5350.00	41.5 AV	54.0	-12.5	1.54 H	18	37.43	4.07
7	#10420.00	55.5 PK	74.0	-18.5	1.20 H	235	46.00	9.50
8	#10420.00	42.3 AV	54.0	-11.7	1.20 H	235	32.80	9.50
9	15630.00	61.5 PK	74.0	-12.5	1.41 H	218	47.41	14.09
10	15630.00	48.0 AV	54.0	-6.0	1.41 H	218	33.91	14.09
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	**5150.00**	**73.9 PK**	**74.0**	**-0.1**	**1.04 V**	**351**	**70.06**	**3.84**
2	5150.00	51.3 AV	54.0	-2.7	1.04 V	351	47.46	3.84
3	*5210.00	107.5 PK			1.04 V	351	103.54	3.96
4	*5210.00	91.7 AV			1.04 V	351	87.74	3.96
5	5350.00	53.2 PK	74.0	-20.8	1.04 V	351	49.13	4.07
6	5350.00	40.7 AV	54.0	-13.3	1.04 V	351	36.63	4.07
7	#10420.00	57.7 PK	74.0	-16.3	1.23 V	222	48.20	9.50
8	#10420.00	45.1 AV	54.0	-8.9	1.23 V	222	35.60	9.50
9	15630.00	64.2 PK	74.0	-9.8	1.24 V	203	50.11	14.09
10	15630.00	50.7 AV	54.0	-3.3	1.24 V	203	36.61	14.09

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 155	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	63.1 PK	74.0	-10.9	1.00 H	360	58.62	4.48
2	#5715.00	43.7 AV	54.0	-10.3	1.00 H	360	39.22	4.48
3	#5725.00	63.7 PK	78.2	-14.5	1.00 H	360	59.20	4.50
4	*5775.00	95.2 PK			1.00 H	360	90.71	4.49
5	*5775.00	81.9 AV			1.00 H	360	77.41	4.49
6	#5850.00	54.5 PK	78.2	-23.7	1.00 H	360	49.93	4.57
7	#5860.00	57.9 PK	74.0	-16.1	1.00 H	360	53.31	4.59
8	#5860.00	42.7 AV	54.0	-11.3	1.00 H	360	38.11	4.59
9	11550.00	55.2 PK	74.0	-18.8	1.00 H	313	45.13	10.07
10	11550.00	43.7 AV	54.0	-10.3	1.00 H	313	33.63	10.07
11	#17325.00	61.0 PK	74.0	-13.0	1.37 H	246	42.18	18.82
12	#17325.00	47.3 AV	54.0	-6.7	1.37 H	246	28.48	18.82
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	72.6 PK	74.0	-1.4	1.31 V	85	68.12	4.48
2	#5715.00	53.2 AV	54.0	-0.8	1.31 V	85	48.72	4.48
3	#5725.00	74.0 PK	78.2	-4.2	1.31 V	85	69.50	4.50
4	*5775.00	106.3 PK			1.31 V	85	101.81	4.49
5	*5775.00	91.1 AV			1.31 V	85	86.61	4.49
6	#5850.00	64.4 PK	78.2	-13.8	1.31 V	85	59.83	4.57
7	#5860.00	63.6 PK	74.0	-10.4	1.31 V	85	59.01	4.59
8	#5860.00	47.7 AV	54.0	-6.3	1.31 V	85	43.11	4.59
9	11550.00	55.8 PK	74.0	-18.2	1.71 V	129	45.73	10.07
10	11550.00	42.7 AV	54.0	-11.3	1.71 V	129	32.63	10.07
11	#17325.00	63.6 PK	74.0	-10.4	1.27 V	226	44.78	18.82
12	#17325.00	51.0 AV	54.0	-3.0	1.27 V	226	32.18	18.82

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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 ≦ 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.

Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;

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

Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20-MHz channel widths with NANT ≥ 5.

For power measurements on all other devices: Array Gain = 10 log(NANT/NSS) dB.

4.3.2 TEST INSTRUMENTS

FOR POWER OUTPUT MEASUREMENT

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power meter Anritsu	ML2495A	1014008	Apr. 30, 2014	Apr. 29, 2015
Power sensor Anritsu	MA2411B	0917122	Apr. 30, 2014	Apr. 29, 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. Tested date : Aug. 06, 2014

FOR 26dB OCCUPIED BANDWIDTH

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSV 40	100964	July 05, 2014	July 04, 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. Tested date : Aug. 06, 2014

4.3.3 TEST PROCEDURE

FOR POWER OUTPUT 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 26dB OCCUPIED BANDWIDTH

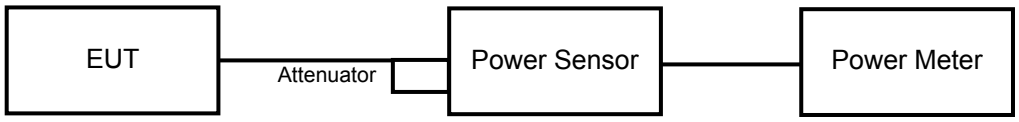
1. Set RBW = approximately 1% of the emission bandwidth.
2. Set the VBW > RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement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

4.3.4 DEVIATION FROM TEST STANDARD

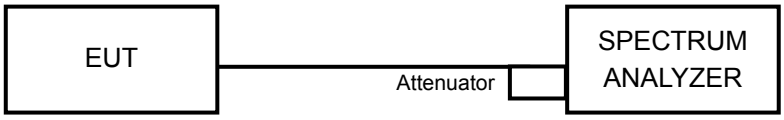
No deviation

4.3.5 TEST SETUP

FOR POWER OUTPUT MEASUREMENT



FOR 26dB OCCUPIED BANDWIDTH



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

802.11a

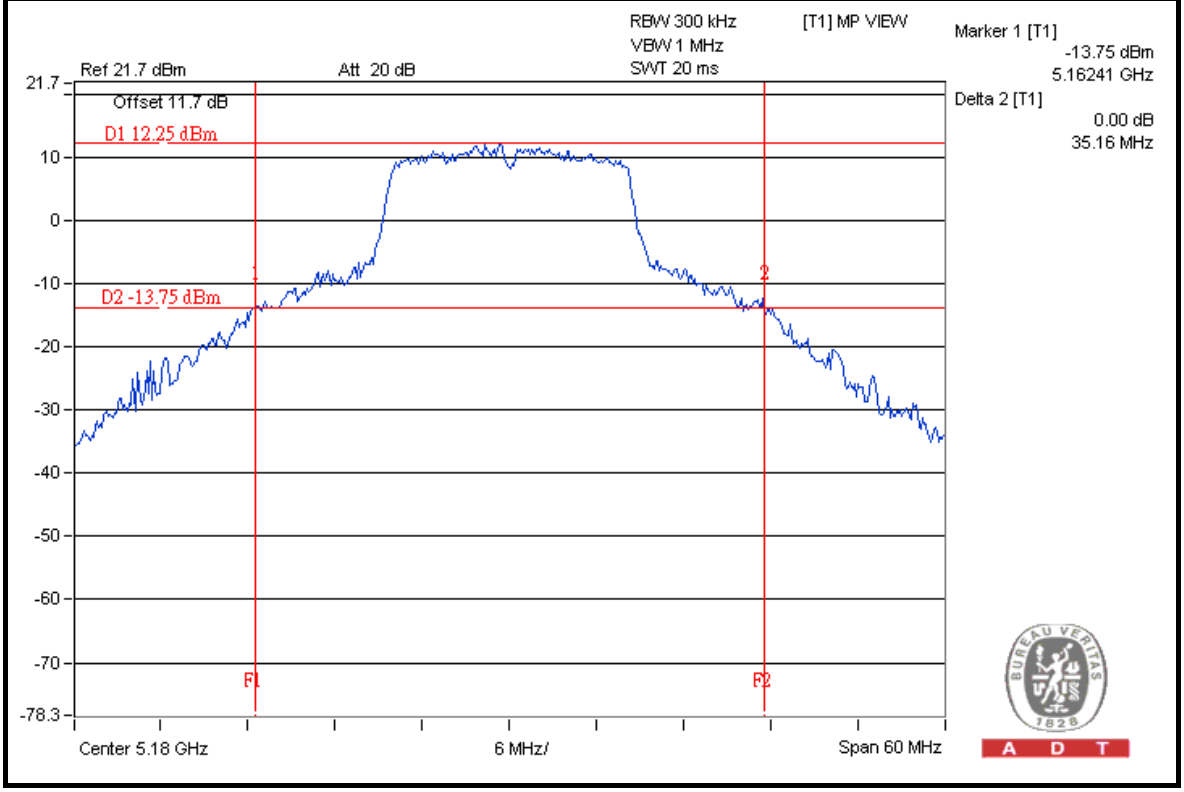
CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)	POWER LIMIT (dBm)	PASS/FAIL
36	5180	134.896	21.30	30	PASS
40	5200	162.555	22.11	30	PASS
48	5240	138.995	21.43	30	PASS
149	5745	41.21	16.15	30	PASS
157	5785	184.927	22.67	30	PASS
165	5825	101.859	20.08	30	PASS

26dB OCCUPIED BANDWIDTH:

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)
36	5180	35.16
40	5200	41.11
48	5240	35.31

SPECTRUM PLOT OF WORST VALUE

802.11a : CH36



802.11ac (VHT20)

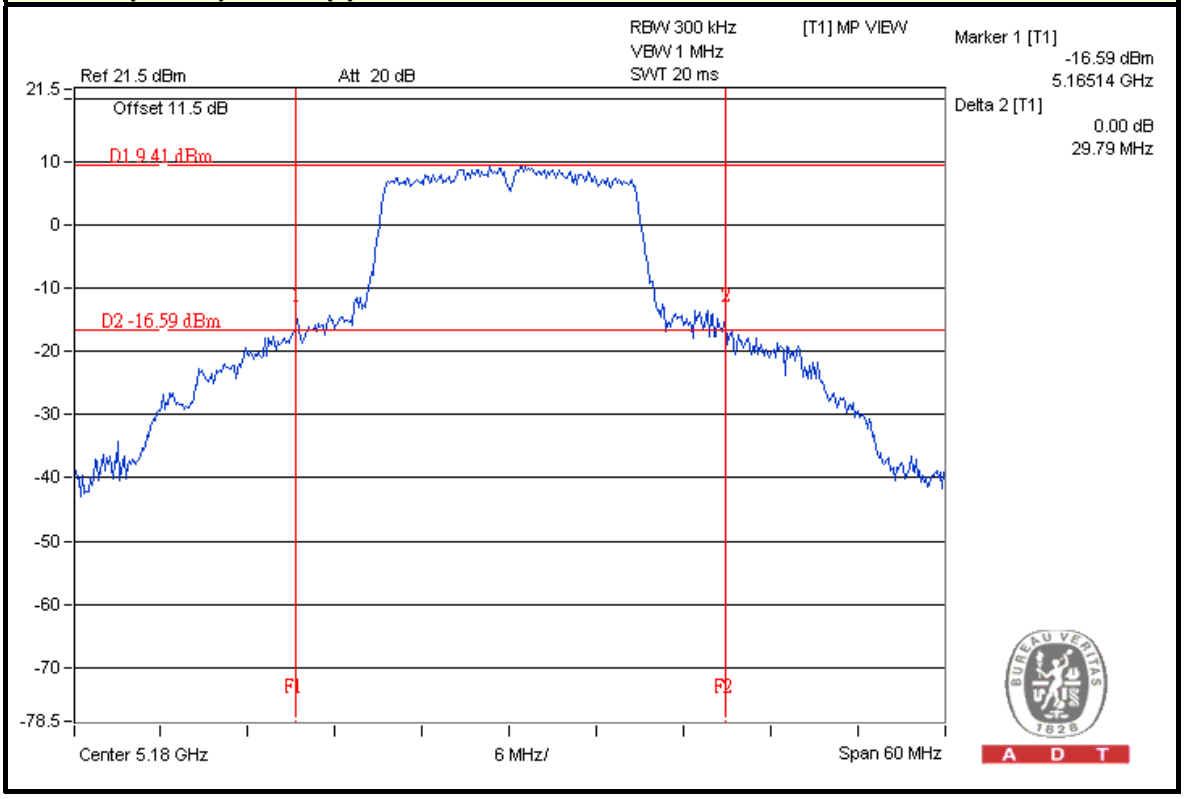
CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
36	5180	19.28	18.16	150.187	21.77	30	PASS
40	5200	22.73	22.25	355.379	25.51	30	PASS
48	5240	20.61	20.32	222.727	23.48	30	PASS
149	5745	14.08	14.59	54.36	17.35	30	PASS
157	5785	22.26	22.58	349.401	25.43	30	PASS
165	5825	19.21	18.85	160.104	22.04	30	PASS

26dB OCCUPIED BANDWIDTH:

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)	
		CHAIN 0	CHAIN 1
36	5180	30.06	29.79
40	5200	49.81	47.77
48	5240	33.36	30.05

SPECTRUM PLOT OF WORST VALUE

802.11ac (VHT20) / Chain(1) : CH36



802.11ac (VHT40)

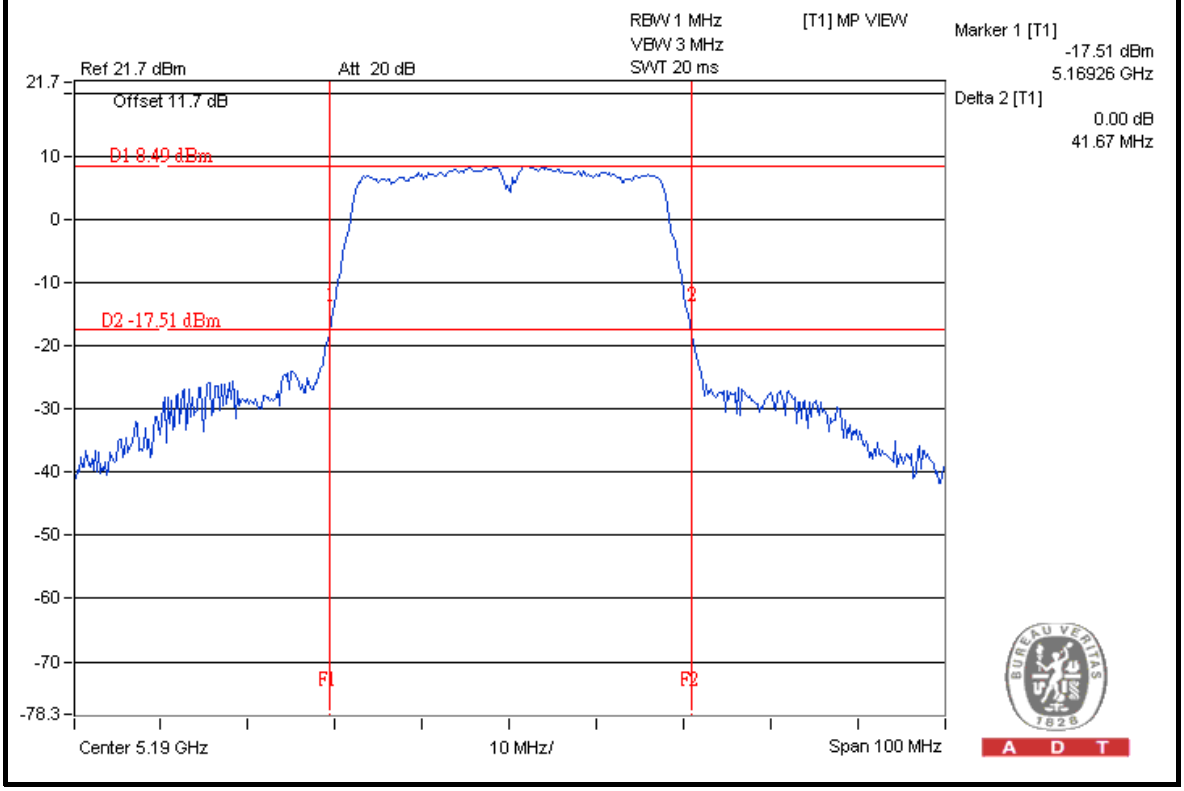
CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
38	5190	13.51	13.46	44.621	16.50	30	PASS
46	5230	21.07	19.95	226.793	23.56	30	PASS
151	5755	13.76	13.56	46.467	16.67	30	PASS
159	5795	19.31	19.19	168.295	22.26	30	PASS

26dB OCCUPIED BANDWIDTH:

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)	
		CHAIN 0	CHAIN 1
38	5190	41.67	41.71
46	5230	90.92	76.58

SPECTRUM PLOT OF WORST VALUE

802.11ac (VHT40) / Chain(0) : CH38



802.11ac (VHT80)

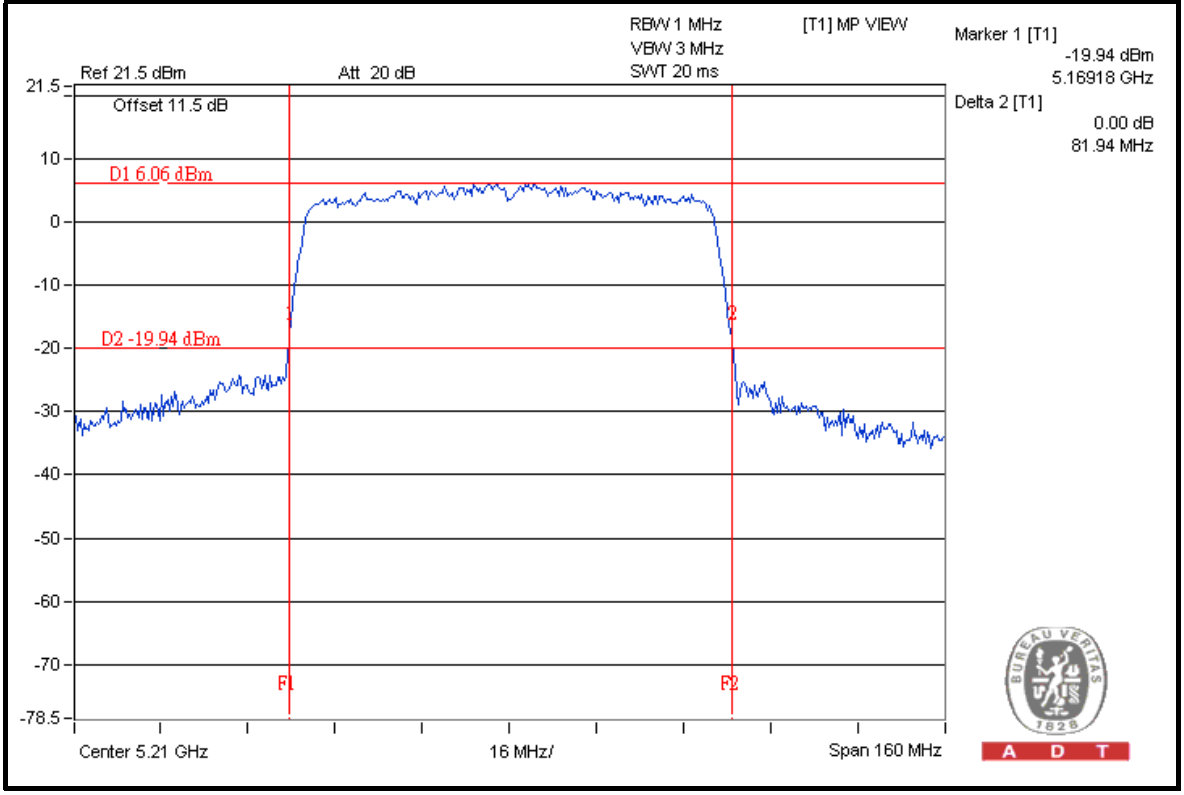
CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
42	5210	13.64	13.43	45.15	16.55	30	PASS
155	5775	13.23	13.95	45.869	16.62	30	PASS

26dB OCCUPIED BANDWIDTH:

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)	
		CHAIN 0	CHAIN 1
42	5210	82.13	81.94

SPECTRUM PLOT OF WORST VALUE

802.11ac (VHT80) / Chain(1) : CH42



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 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSV 40	100964	July 05, 2014	July 04, 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. Tested date : Aug. 06, 2014

4.4.3 TEST PROCEDURES

Using method SA-2

For U-NII-1:

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

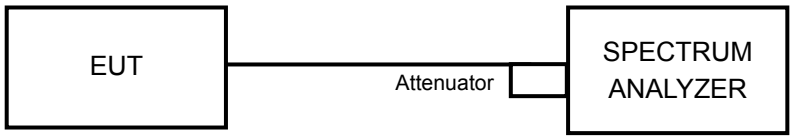
For U-NII-3:

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 300 kHz, Set VBW ≥ 1 MHz, Detector = RMS
3. Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
4. Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log(500 kHz/300kHz)
5. Sweep time = auto, trigger set to “free run”.
6. Trace average at least 100 traces in power averaging mode.
7. Record the max value and add 10 log (1/duty cycle)

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

Same as 4.3.6

4.4.7 TEST RESULTS

For U-NII-1:

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	PSD W/O DUTY FACTOR (dBm)	DUTY FACTOR (dB)	TOTAL PSD WITH DUTY FACTOR (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
36	5180	7.07	0.31	7.39	17	PASS
40	5200	8.55	0.31	8.87	17	PASS
48	5240	7.21	0.31	7.53	17	PASS

NOTE: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

802.11ac (VHT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	PSD W/O DUTY FACTOR (dBm)		DUTY FACTOR (dB)	TOTAL PSD WITH DUTY FACTOR (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
36	5180	4.91	4.47	0.32	8.03	16.59	PASS
40	5200	8.59	8.63	0.32	11.94	16.59	PASS
48	5240	5.65	5.17	0.32	8.75	16.59	PASS

NOTE: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

2. **5150~5250MHz:** Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 6.41dBi > 6dBi , so the power density limit shall be reduced to 17-(6.41-6) = 16.59dBm.

802.11ac (VHT40)

CHANNEL	CHANNEL FREQUENCY (MHz)	PSD W/O DUTY FACTOR (dBm)		DUTY FACTOR (dB)	TOTAL PSD WITH DUTY FACTOR (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
38	5190	-3.13	-3.39	0.63	0.38	16.59	PASS
46	5230	4.12	3.09	0.63	7.28	16.59	PASS

NOTE: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

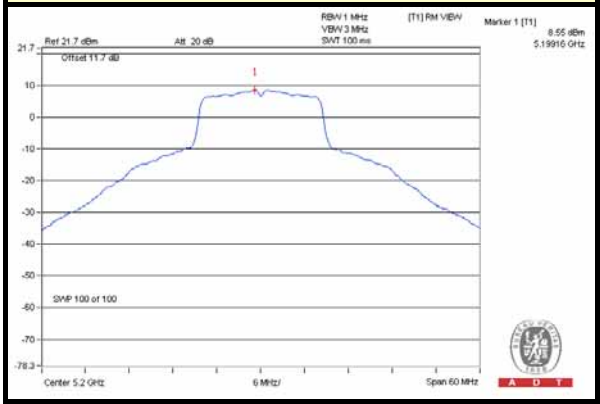
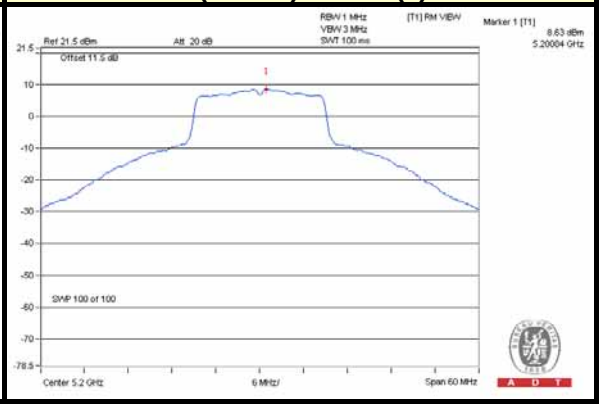
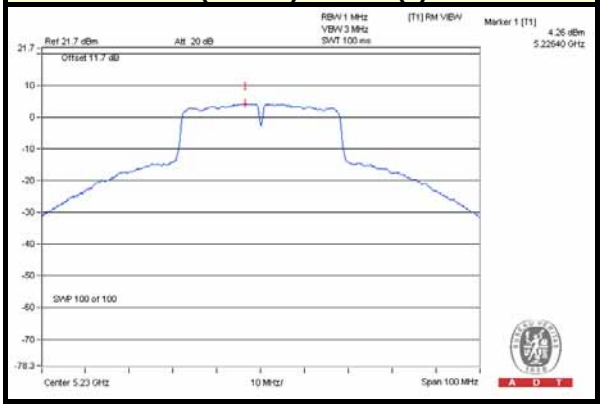
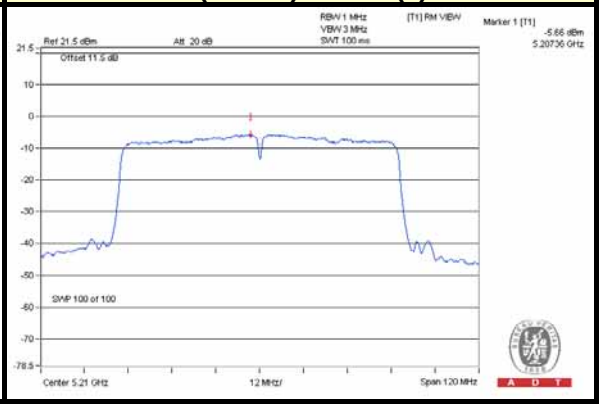
2. **5150~5250MHz:** Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 6.41dBi > 6dBi , so the power density limit shall be reduced to 17-(6.41-6) = 16.59dBm.

802.11ac (VHT80)

CHANNEL	CHANNEL FREQUENCY (MHz)	PSD W/O DUTY FACTOR (dBm)		DUTY FACTOR (dB)	TOTAL PSD WITH DUTY FACTOR (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
42	5210	-6.71	-5.67	1.16	-1.99	16.59	PASS

NOTE: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

2. **5150~5250MHz:** Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 6.41dBi > 6dBi , so the power density limit shall be reduced to 17-(6.41-6) = 16.59dBm.

SPECTRUM PLOT OF WORST VALUE	
802.11a : CH40	**802.11ac (VHT20) / Chain(1) : CH40**
	
802.11ac (VHT40) / Chain(0) : CH46	**802.11ac (VHT80) / Chain(1) : CH42**
	

For U-NII-3:

802.11a

CHANNEL	FREQUENCY (MHz)	PSD W/O DUTY FACTOR		DUTY FACTOR (dB)	TOTAL PSD WITH DUTY FACTOR (dBm/500kHz)	LIMIT (dBm/500kHz)	PASS /FAIL
		(dBm/300kHz)	(dBm/500kHz)				
149	5745	-5.52	-3.30	0.31	-2.99	30	PASS
157	5785	0.12	2.34	0.31	2.65	30	PASS
165	5825	-1.01	1.21	0.31	1.52	30	PASS

802.11ac (VHT20)

TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD W/O DUTY FACTOR		10 log (N=2) dB	DUTY FACTOR (dB)	TOTAL PSD WITH DUTY FACTOR (dBm/500kHz)	LIMIT (dBm/500kHz)	PASS /FAIL
			(dBm/300kHz)	(dBm/500kHz)					
0	149	5745	-7.78	-5.56	3.01	0.32	-2.23	29.59	PASS
	157	5785	-0.38	1.84	3.01	0.32	5.17	29.59	PASS
	165	5825	-3.18	-0.96	3.01	0.32	2.37	29.59	PASS
1	149	5745	-7.03	-4.81	3.01	0.32	-1.48	29.59	PASS
	157	5785	0.03	2.25	3.01	0.32	5.58	29.59	PASS
	165	5825	-2.85	-0.63	3.01	0.32	2.70	29.59	PASS

NOTE: 1. **5725~5850MHz:** Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 6.41dBi > 6dBi , so the power density limit shall be reduced to 30-(6.41-6) = 29.59dBm.

802.11ac (VHT40)

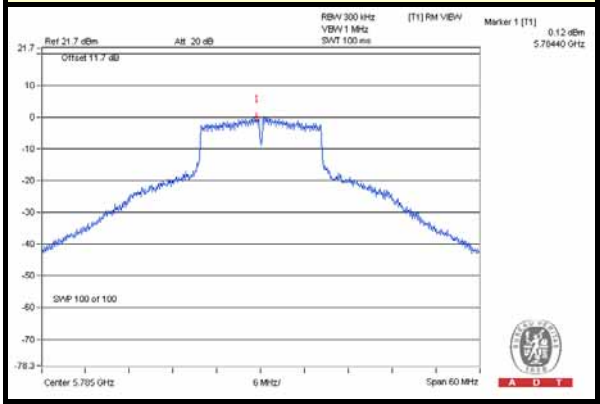
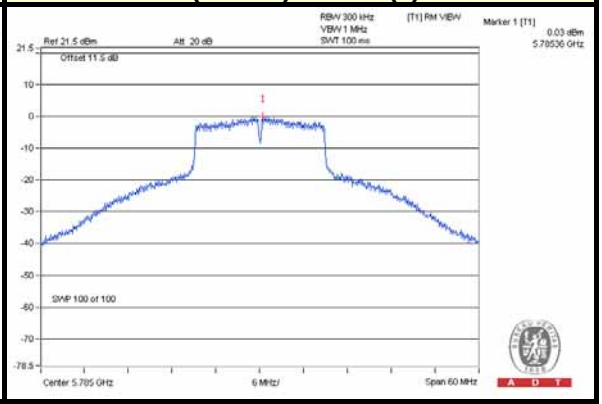
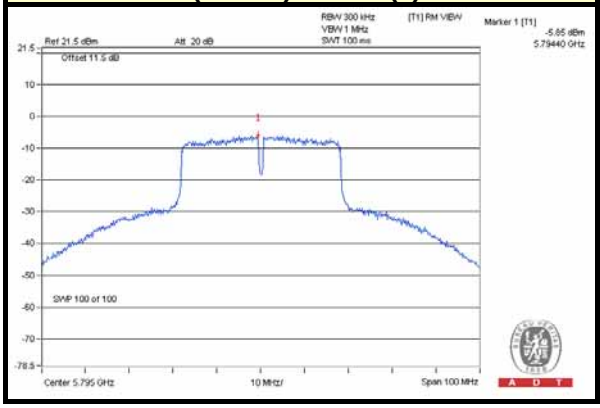
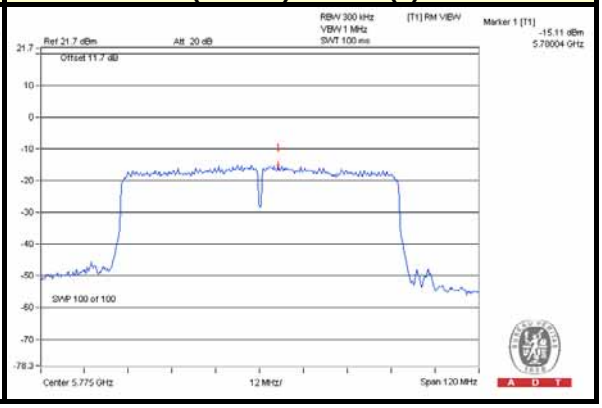
TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD W/O DUTY FACTOR		10 log (N=2) dB	DUTY FACTOR (dB)	TOTAL PSD WITH DUTY FACTOR (dBm/500kHz)	LIMIT (dBm/500kHz)	PASS /FAIL
			(dBm/300kHz)	(dBm/500kHz)					
0	151	5755	-11.61	-9.39	3.01	0.63	-5.75	29.59	PASS
	159	5795	-6.12	-3.90	3.01	0.63	-0.26	29.59	PASS
1	151	5755	-11.82	-9.60	3.01	0.63	-5.96	29.59	PASS
	159	5795	-5.85	-3.63	3.01	0.63	0.01	29.59	PASS

NOTE: 1. **5725~5850MHz:** Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 6.41dBi > 6dBi , so the power density limit shall be reduced to 30-(6.41-6) = 29.59dBm.

802.11ac (VHT80)

TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD W/O DUTY FACTOR		10 log (N=2) dB	DUTY FACTOR (dB)	TOTAL PSD WITH DUTY FACTOR (dBm/500kHz)	LIMIT (dBm/500kHz)	PASS /FAIL
			(dBm/300kHz)	(dBm/500kHz)					
0	155	5775	-15.11	-12.89	3.01	1.16	-8.72	29.59	PASS
1	155	5775	-14.71	-12.49	3.01	1.16	-9.48	29.59	PASS

NOTE: 1. **5725~5850MHz:** Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 6.41dBi > 6dBi , so the power density limit shall be reduced to 30-(6.41-6) = 29.59dBm.

SPECTRUM PLOT OF WORST VALUE	
802.11a : CH157	802.11ac (VHT20) / Chain(1) : CH157
	
802.11ac (VHT40) / Chain(1) : CH159	802.11ac (VHT80) / Chain(0) : CH155
	

4.5 FREQUENCY STABILITY

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 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSV 40	100964	July 05, 2014	July 04, 2015
Temperature & Humidity Chamber GIANTFORCE	GTH-150-40-SP-AR	MAA0812-008	Jan. 13, 2014	Jan. 12, 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. Tested date : Aug. 06, 2014

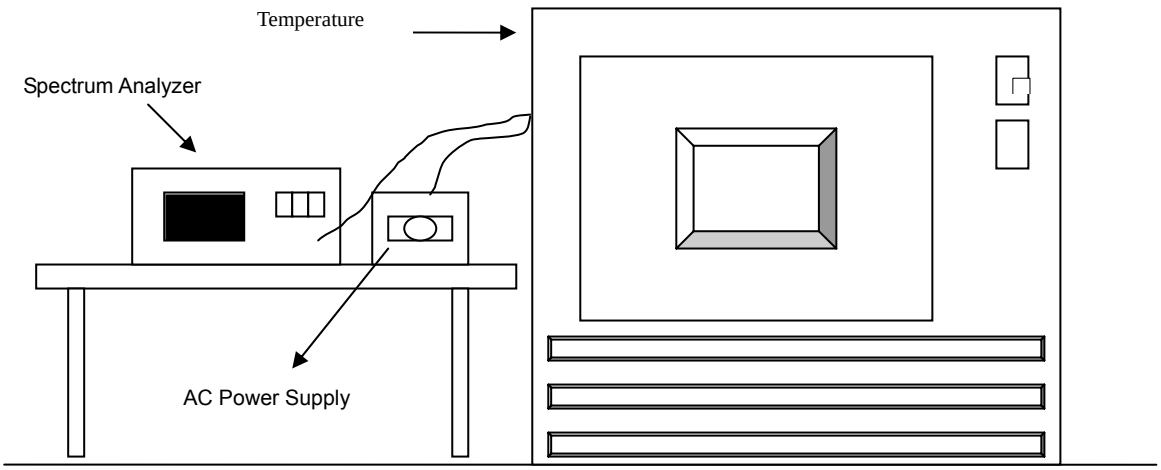
4.5.3 TEST PROCEDURE

1. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
2. Turn the EUT on and couple its output to a spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. 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.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. 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.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITION

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

4.5.7 TEST RESULTS

FREQUEMCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5240MHz									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	%	(MHz)	%	(MHz)	%	(MHz)	%
50	120	5240.0263	0.00050	5240.0274	0.00052	5240.0242	0.00046	5240.0264	0.00050
40	120	5240.0107	0.00020	5240.0138	0.00026	5240.0136	0.00026	5240.0127	0.00024
30	120	5239.9874	-0.00024	5239.9858	-0.00027	5239.9905	-0.00018	5239.9885	-0.00022
20	120	5239.9867	-0.00025	5239.9896	-0.00020	5239.9881	-0.00023	5239.9888	-0.00021
10	120	5239.9788	-0.00040	5239.9818	-0.00035	5239.981	-0.00036	5239.9777	-0.00043
0	120	5239.9805	-0.00037	5239.9788	-0.00040	5239.9794	-0.00039	5239.9807	-0.00037
-10	120	5239.9987	-0.00002	5239.9976	-0.00005	5239.9975	-0.00005	5239.9983	-0.00003
-20	120	5240.0052	0.00010	5240.0068	0.00013	5240.0076	0.00015	5240.0067	0.00013
-30	120	5240.01	0.00019	5240.008	0.00015	5240.0062	0.00012	5240.0065	0.00012

FREQUEMCY STABILITY VERSUS VOLTAGE									
OPERATING FREQUENCY: 5240MHz									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	%	(MHz)	%	(MHz)	%	(MHz)	%
20	138	5239.9877	-0.00023	5239.9895	-0.00020	5239.989	-0.00021	5239.9892	-0.00021
	120	5239.9867	-0.00025	5239.9896	-0.00020	5239.9881	-0.00023	5239.9888	-0.00021
	102	5239.986	-0.00027	5239.9899	-0.00019	5239.9882	-0.00023	5239.9896	-0.00020

4.6 6dB BANDWIDTH MEASUREMENT

4.6.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSV 40	100964	July 05, 2014	July 04, 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. Tested date : Aug. 01, 2014

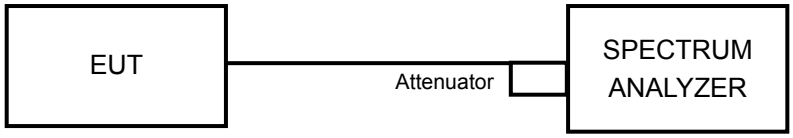
4.6.3 TEST PROCEDURE

1. Set resolution bandwidth (RBW) = 100kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
3. Trace mode = max hold.
4. Sweep = auto couple.
5. 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

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



4.6.6 EUT OPERATING CONDITIONS

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

4.6.7 TEST RESULTS

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
149	5745	16.04	0.5	PASS
157	5785	15.96	0.5	PASS
165	5825	16.09	0.5	PASS

802.11ac (VHT20)

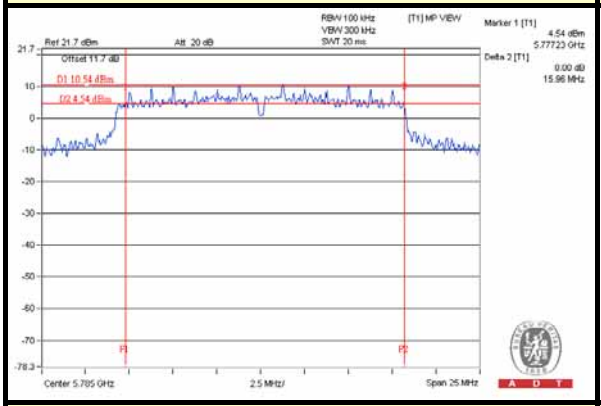
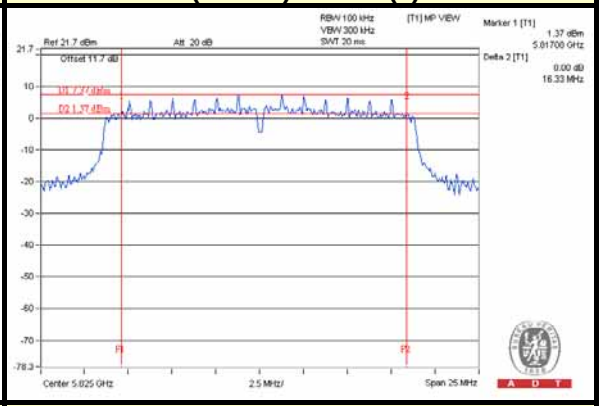
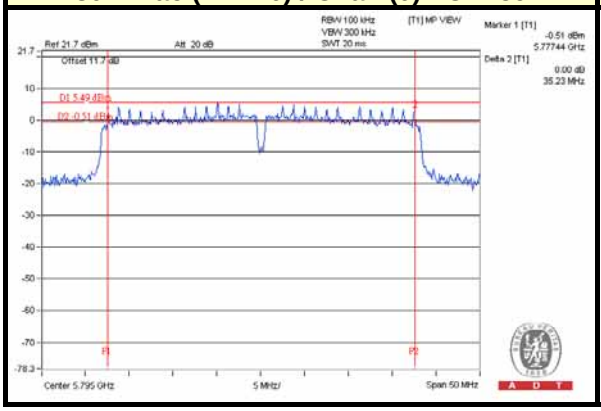
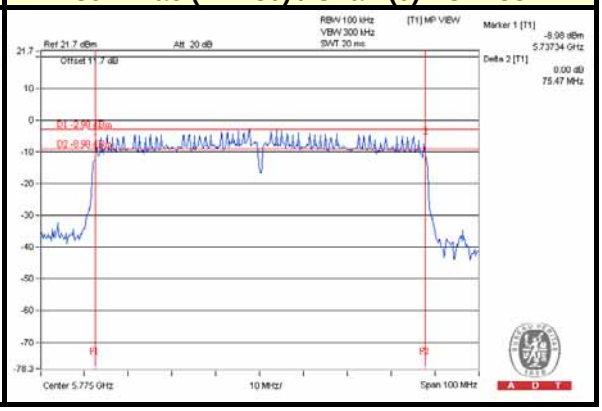
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
149	5745	16.42	16.42	0.5	PASS
157	5785	17.02	16.73	0.5	PASS
165	5825	16.33	16.93	0.5	PASS

802.11ac (VHT40)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
151	5755	35.33	35.28	0.5	PASS
159	5795	35.23	35.23	0.5	PASS

802.11ac (VHT80)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
155	5775	75.47	75.51	0.5	PASS

SPECTRUM PLOT OF WORST VALUE	
802.11a : CH157	**802.11ac (VHT20) / Chain(0) : CH165**
	
802.11ac (VHT40) / Chain(0) : CH159	**802.11ac (VHT80) / Chain(0) : CH155**
	

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

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

No modifications were made to the EUT by the lab during the test.

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