FCC TEST REPORT (15.407)

REPORT NO.: RF130930E04-1

MODEL NO.: WRT1900AC

FCC ID: Q87-WRT1900AC

RECEIVED: Sep. 30, 2013

TESTED: Oct. 08, 2013 to Jan. 27, 2014

ISSUED: Feb. 27, 2014

APPLICANT: Linksys LLC

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United States

ISSUED BY: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF130930E04-1	Original release	Feb. 27, 2014

1. CERTIFICATION

PRODUCT:	Linksys Smart Wi-Fi Router
BRAND NAME:	Linksys
MODEL NO.:	WRT1900AC
TEST SAMPLE:	ENGINEERING SAMPLE
APPLICANT:	Linksys LLC
TESTED:	Oct. 08, 2013 to Jan. 27, 2014
STANDARDS:	FCC Part 15, Subpart E (Section 15.407) ANSI C63.10-2009

The above equipment (Model: WRT1900AC) 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 cha racteristics under the conditions specified in this report.

PREPARED BY : _____, **DATE:** *Feb. 27, 2014*
(Lori Chung, Specialist)

APPROVED BY : _____, **DATE:** *Feb. 27, 2014*
(May Chen, Manager)

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

For 5GHz, 5150~5250MHz Band

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 -13.04 dB at 0.15391 MHz
15.407(b/1/2/3)(b)(6)	Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -0.7 dB at 5148.00 MHz
15.407(a/1/2)	Transmit Power	PASS	Meet the requirement of limit.
15.407(a)(6)	Peak Power Excursion	PASS	Meet the requirement of limit.
15.407(a/1/2)	Peak Power Spectral Density	PASS	Meet the requirement of limit.
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. For WLAN: 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. For the 2.400 ~ 2.4835GHz and 5.725~5.850GHz 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	2.98 dB
Radiated emissions (30MHz-1GHz)	5.43 dB
Radiated emissions (1GHz -6GHz) – Chamber G	3.65 dB
Radiated emissions (1GHz -6GHz) – Chamber H	3.72 dB
Radiated emissions (6GHz -18GHz) – Chamber G	3.88 dB
Radiated emissions (6GHz -18GHz) – Chamber H	4.00 dB
Radiated emissions (18GHz -40GHz)	4.11 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Linksys Smart Wi-Fi Router
MODEL NO.	WRT1900AC
POWER SUPPLY	DC 12V from power adapter
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode and VHT20 and VHT40 mode of 2.4GHz Band.
MODULATION TECHNOLOGY	DSSS,OFDM
TRANSFER RATE	**2.4GHz:** 802.11b: up to 11Mbps 802.11g: up to 54Mbps 802.11n: up to 600Mbps 802.11ac: up to 800Mbps **5GHz:** 802.11a: up to 54Mbps 802.11n: up to 600Mbps 802.11ac: up to 3466.7Mbps
OPERATING FREQUENCY	**For 15.407** **5GHz:**5.18 ~ 5.24GHz
	For 15.247 **2.4GHz:** 2.412 ~ 2.462GHz **5GHz:** 5.745 ~ 5.825GHz
NUMBER OF CHANNEL	**For 15.407** 4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80)
	For 15.247 (2.4GHz) 11 for 802.11b, 802.11g, 802.11n (HT20), 802.11ac (VHT20) 7 for 802.11n (HT40), 802.11ac (VHT40) **For 15.247 (5GHz)** 5 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80)

MAXIMUM OUTPUT POWER	**For 15.407** 802.11a: 38.122mW 802.11ac (VHT20): 39.293mW 802.11ac (VHT40): 46.905mW 802.11ac (VHT80): 45.611mW **For 15.247(2.4GHz)** 802.11b: 838.786mW 802.11g: 664.545mW 802.11n (HT20): 622.703mW 802.11n (HT40): 162.982mW **For 15.247(5GHz)** 802.11a: 487.878mW 802.11ac (VHT20): 608.021mW 802.11ac (VHT40): 416.829mW 802.11ac (VHT80): 460.019mW
ANTENNA TYPE	Please see NOTE
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	Adapter x1

NOTE:

1. 2.4GHz and 5GHz technology can transmit at same time.
2. The EUT must be supplied with a power adapter and following two different models could be chosen as following table:

No	Brand	Model No.	Spec.
1	Linksys	KSAH1200400T1M2	Input: 100-240V, 1.2A, 50-60Hz AC input cable: 0.5m, unshielded Output: 12V, 4A DC output cable: 1.5m, unshielded with 1 core
2	CWT	KPL-050F	Input: 100-240V, 1.7A, 50-60Hz AC input cable: 0.5m, unshielded Output: 12V, 4.17A DC output cable: 1.5m, unshielded with 1 core
Note: For radiated emissions test, the EUT was pre-tested with above adapters 1 & 2, the worst case was found in adapter 1. Therefore only the test data of the adapter was recorded in this report.			

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

Transmitter Circuit	Brand	Gain (dBi)	Cable Loss (dB)	Net Gain (dBi)	Frequency Range (GHz to GHz)	Antenna Type	Connecter Type
Chain (0)	LINKSYS	2.5	1	1.5	2.4 ~ 2.4835	DIPOLE	R-SMA
		2.6	1.6	1	5.15 ~ 5.25		
		3.8	1.9	1.9	5.725 ~ 5.85		
Chain (1)	LINKSYS	2.5	1	1.5	2.4 ~ 2.4835	DIPOLE	R-SMA
		2.6	1.5	1.1	5.15 ~ 5.25		
		3.8	2.1	1.7	5.725 ~ 5.85		
Chain (2)	LINKSYS	2.5	1	1.5	2.4 ~ 2.4835	DIPOLE	R-SMA
		2.6	1.5	1.1	5.15 ~ 5.25		
		3.8	2.1	1.7	5.725 ~ 5.85		
Chain (3)	LINKSYS	2.5	0.5	2	2.4 ~ 2.4835	DIPOLE	R-SMA
		2.6	0.9	1.7	5.15 ~ 5.25		
		3.8	1.6	2.2	5.725 ~ 5.85		

4. The EUT has two different Transformer types could be chosen and please refer the below table:

Type 1 (Vendor: MINGTEK)		
Vendor P/N	**Vendor**	**Location**
HN1878CG	MINGTEK	T1
HN3678CG	MINGTEK	T2, T3
Type 2 (Vendor: MYJWD)		
Vendor P/N	**Vendor**	**Location**
DG18107-1G	MYJWD	T1
DG36005-1G	MYJWD	T2, T3

From the above types, the worst case was found in **Type 2 (Vendor: MYJWD)**. Therefore only the test data of the type were recorded in this report.

5. The EUT incorporates a MIMO function with beam forming except 802.11b.

MODULATION MODE	Tx/Rx FUNCTION
802.11a	3TX / 4TX / 4RX
802.11b	4TX / 4RX
802.11g	4TX / 4RX
802.11n (HT20) <2.4GHz>	4TX / 4RX
802.11n (HT40) <2.4GHz>	4TX / 4RX
802.11n (HT20) <5GHz>	3TX / 4TX / 4RX
802.11n (HT40) <5GHz>	3TX / 4TX / 4RX
802.11ac (VHT20)	3TX / 4TX / 4RX
802.11ac (VHT40)	3TX / 4TX / 4RX
802.11ac (VHT80)	3TX / 4TX / 4RX

Note: 1. 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)

6. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 31.

7. When the EUT operating in 802.11ac and support 256QAM of VHT20 and VHT40 for 2.4GHz band, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 9.

8. The emission of the simultaneous operation (2.4GHz & 5GHz) has been evaluated and no non-compliance was found.

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

3.2 DESCRIPTION OF TEST MODES

Operated in 5150 ~ 5350MHz 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
38	5190 MHz
46	5230 MHz

1 channel is provided for 802.11ac (VHT80):

CHANNEL	FREQUENCY
42	5210 MHz

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	PLC	RE < 1G	RE ≥ 1G	APCM	
1	-	-	√	√	Adapter 1 (3TX)
2	√	√	√	√	Adapter 1 (4TX)
3	√	-	-	-	Adapter 2 (4TX)

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 **Y-plane** (for below 1GHz) and **X-plane** (for above 1GHz)**.**

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 (VHT40)	38 to 46	46	OFDM	BPSK	13.5

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 (VHT40)	38 to 46	46	OFDM	BPSK	13.5

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	36, 40, 48	OFDM	BPSK	6
802.11ac (VHT20)	36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11ac (VHT40)	38 to 46	38, 46	OFDM	BPSK	13.5
802.11ac (VHT80)	42	42	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	36, 40, 48	OFDM	BPSK	6
802.11ac (VHT20)	36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11ac (VHT40)	38 to 46	38, 46	OFDM	BPSK	13.5
802.11ac (VHT80)	42	42	OFDM	BPSK	29.3

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	26deg. C, 67%RH	120Vac, 60Hz	Sean Huang
RE<1G	21deg. C, 63%RH	120Vac, 60Hz	Andy Ho
RE≥1G	24deg. C, 65%RH 22deg. C, 64%RH	120Vac, 60Hz	Nelson Teng
APCM	25deg. C, 60%RH	120Vac, 60Hz	Chilin Lee Nelson Teng

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 D01 General UNII Test Procedures v01 r03
662911 D01 Multiple Transmitter Output v02
ANSI C63.10-2009

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

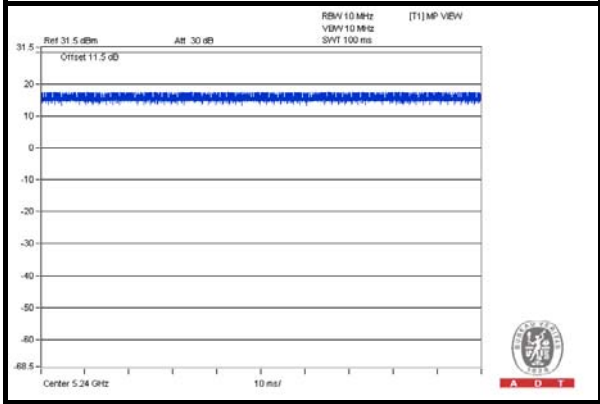
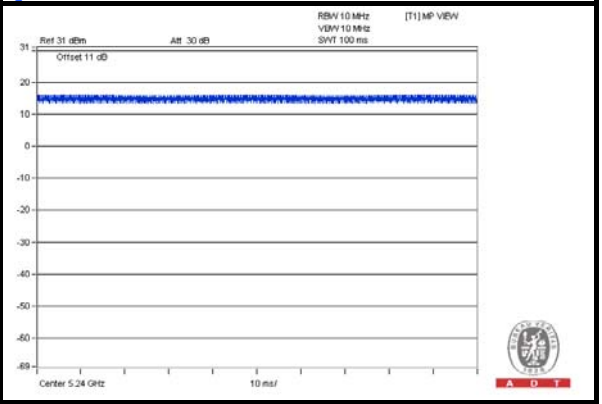
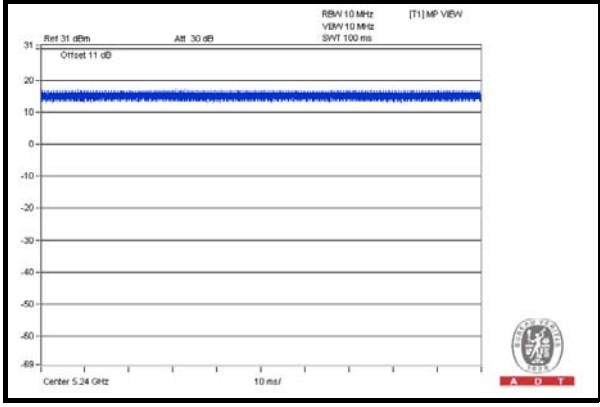
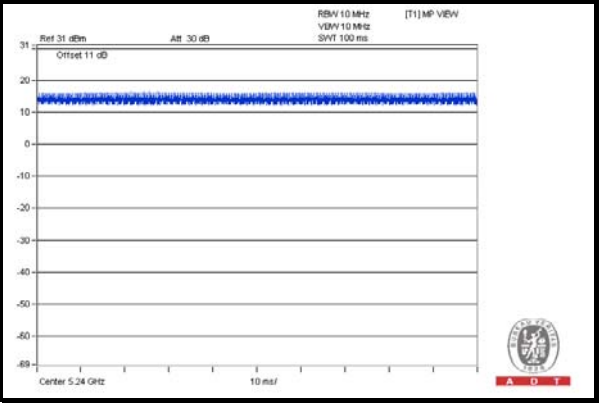
Note: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

3.4 DUTY CYCLE OF TEST SIGNAL

For 3Tx

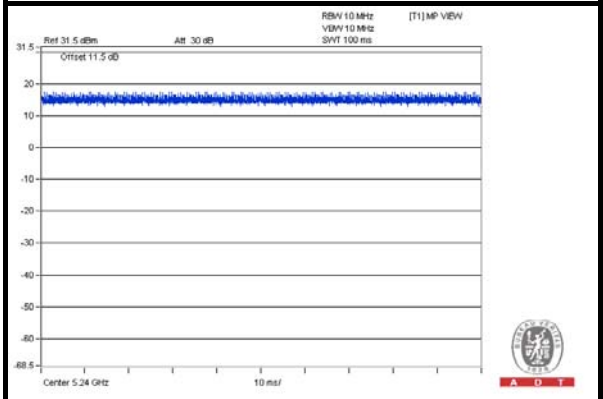
Duty cycle of test signal is 100 %, duty factor is not required.

802.11a

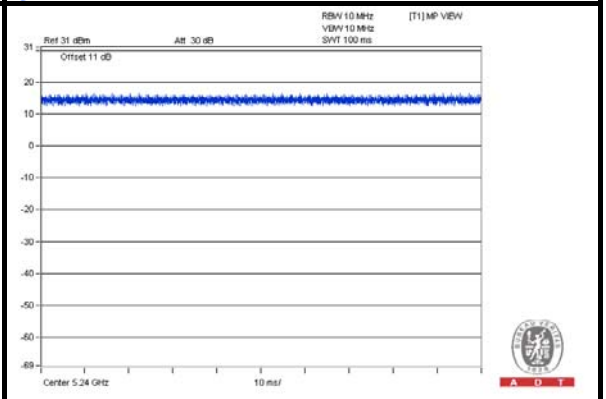
BPSK	QPSK
	
16QAM	**64QAM**
	

802.11ac (VHT20)

BPSK



QPSK



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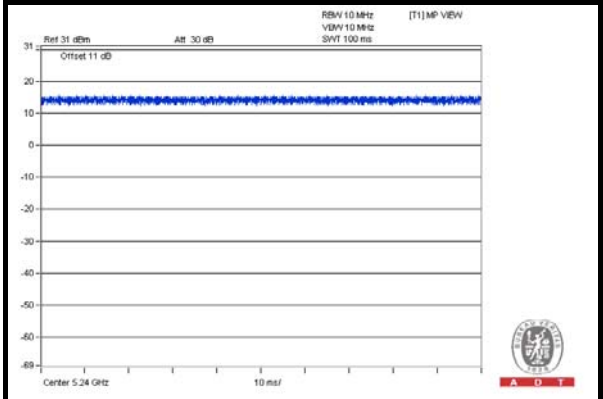

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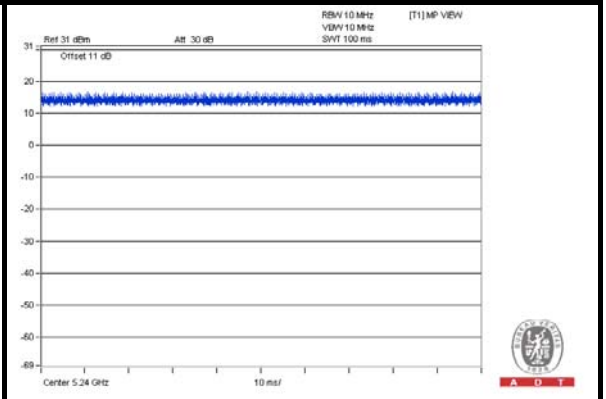

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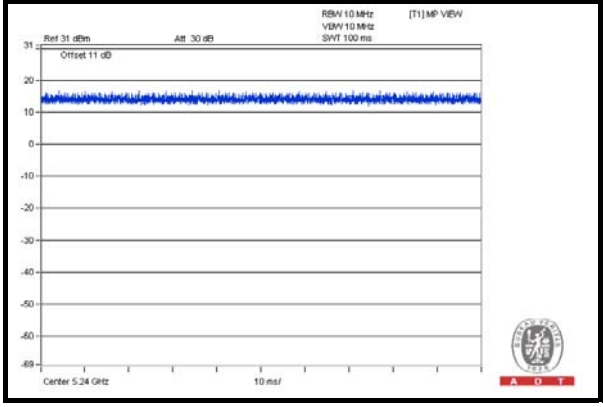
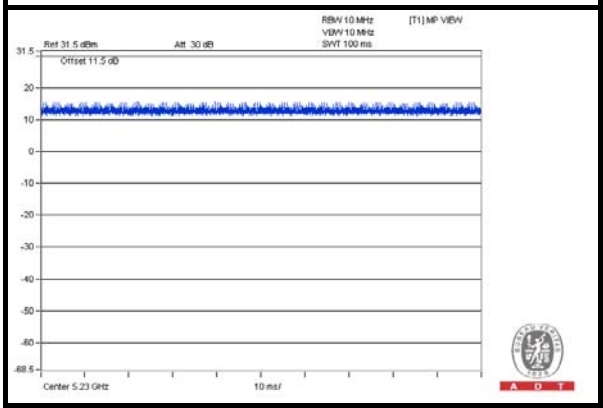
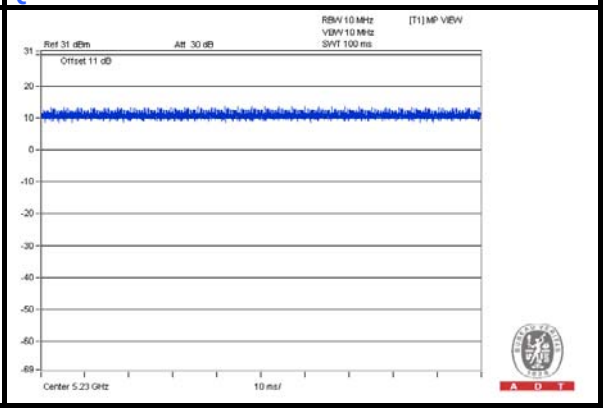


802.11ac (VHT40)

BPSK



QPSK



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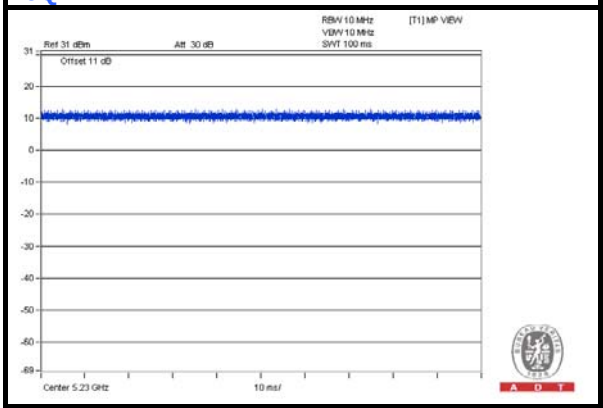

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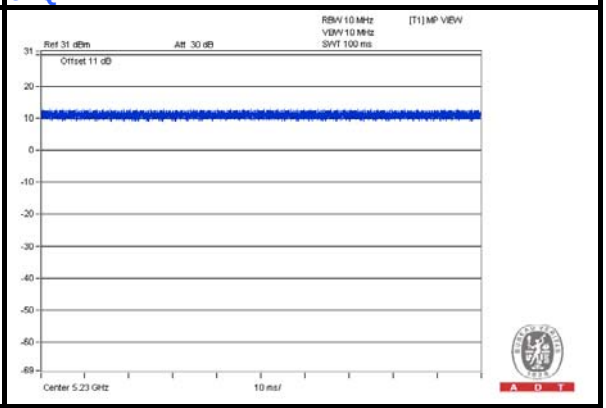
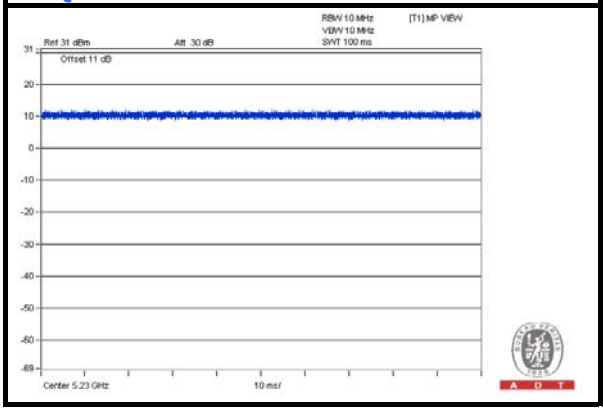
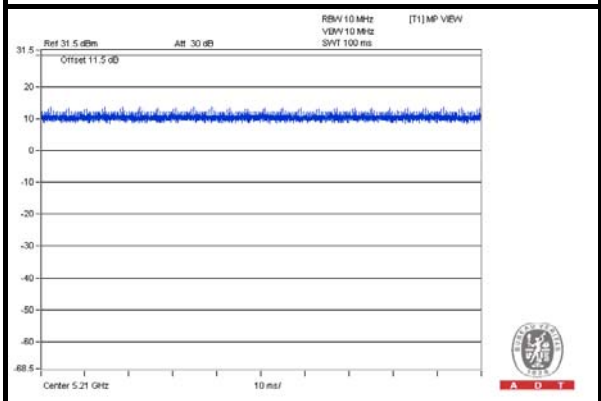
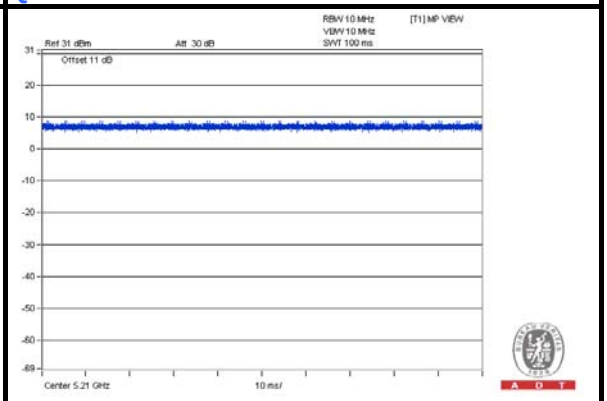


256QAM



802.11ac (VHT80)

BPSK	QPSK
	
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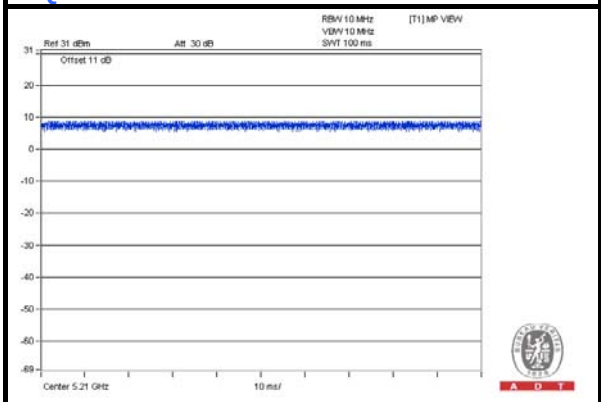
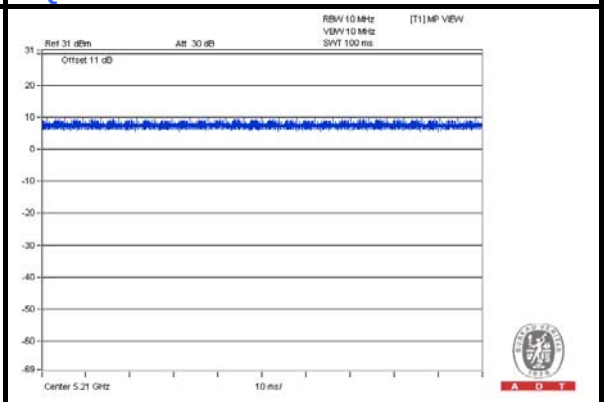
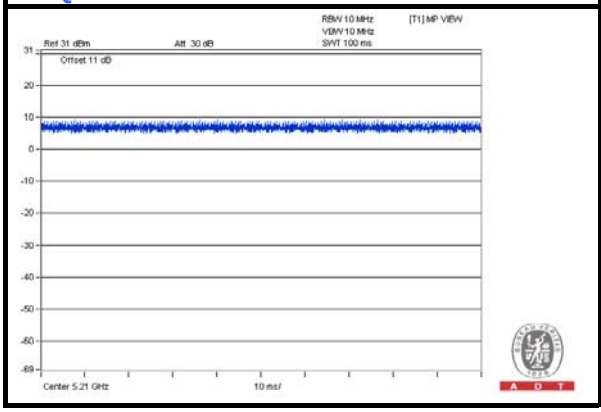
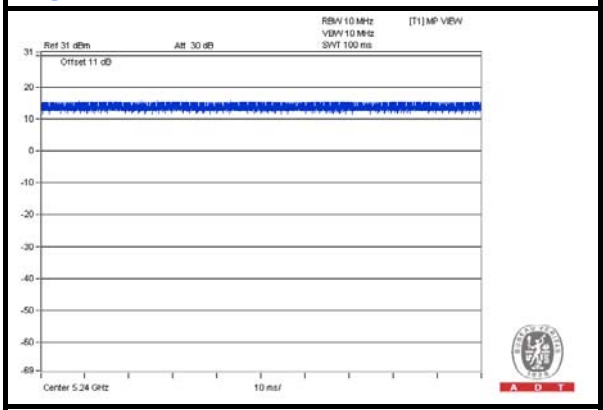
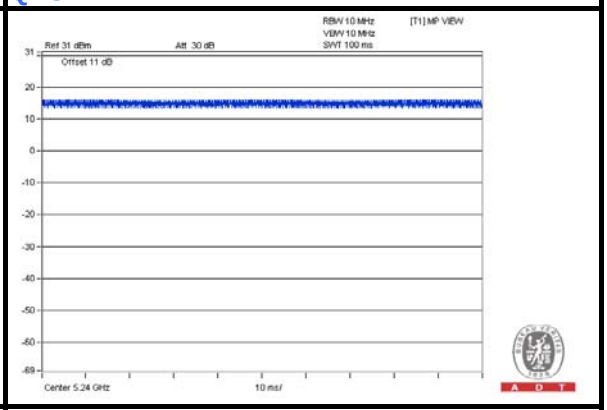
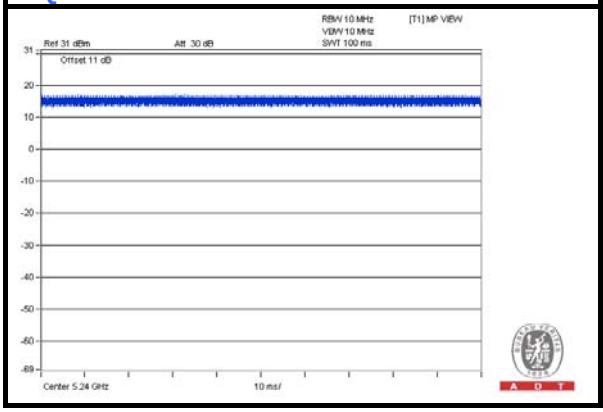
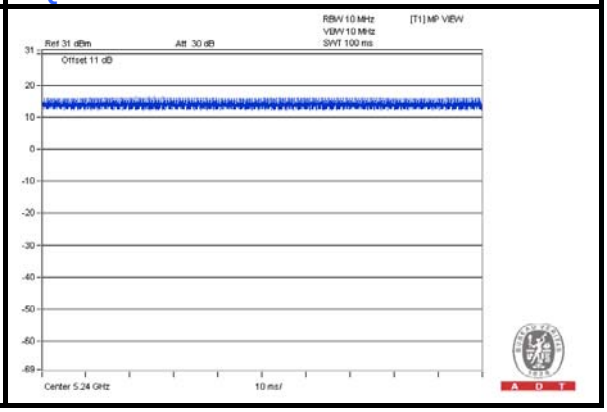
	
256QAM	
	

For 4Tx

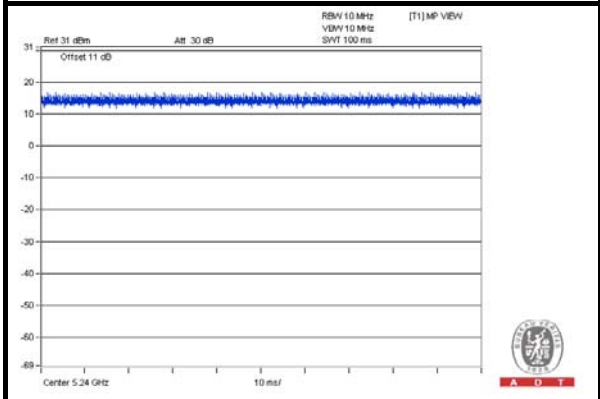
Duty cycle of test signal is 100 %, duty factor is not required.

802.11a

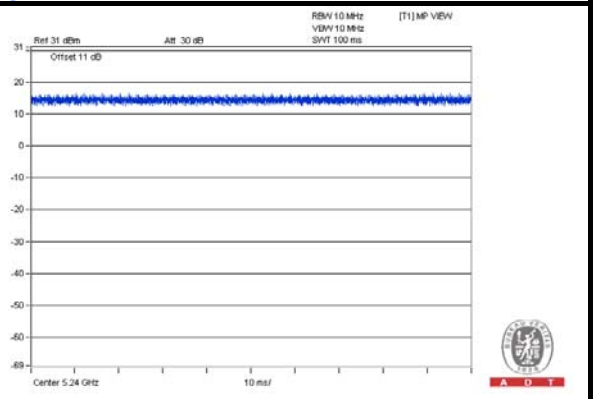
BPSK	QPSK
	
16QAM	**64QAM**
	

802.11ac (VHT20)

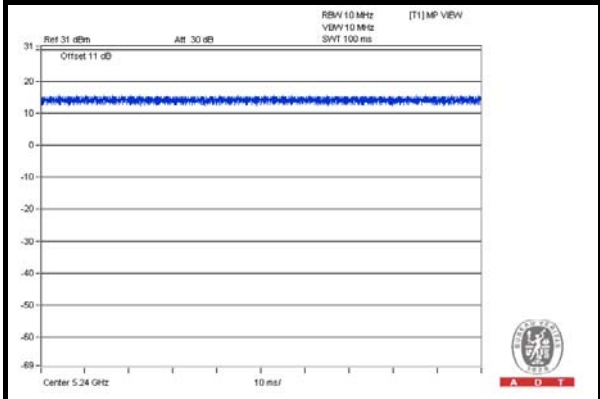
BPSK



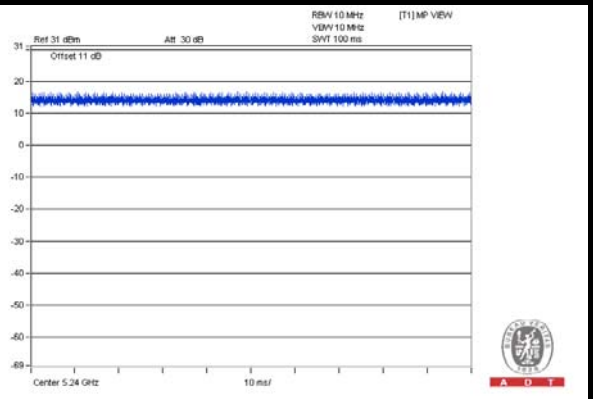
QPSK



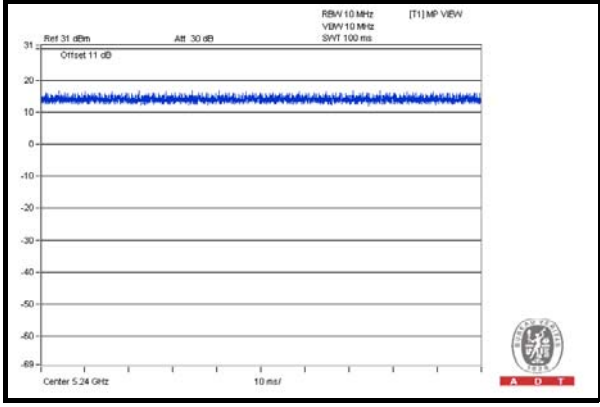
16QAM



64QAM

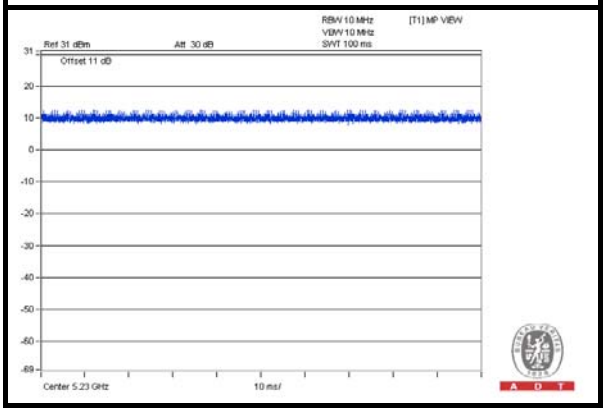


256QAM

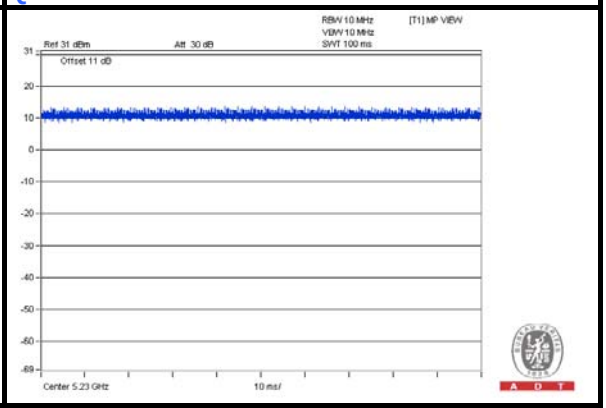


802.11ac (VHT40)

BPSK



QPSK



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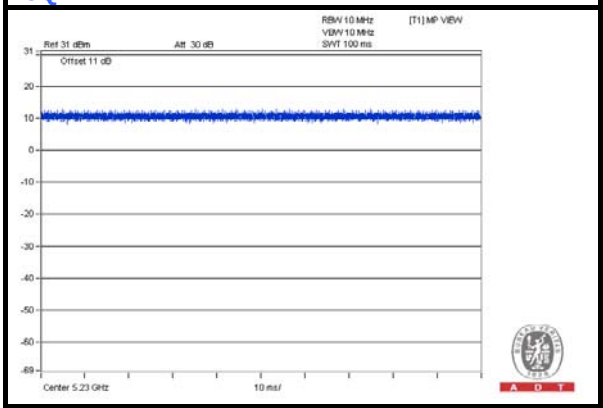

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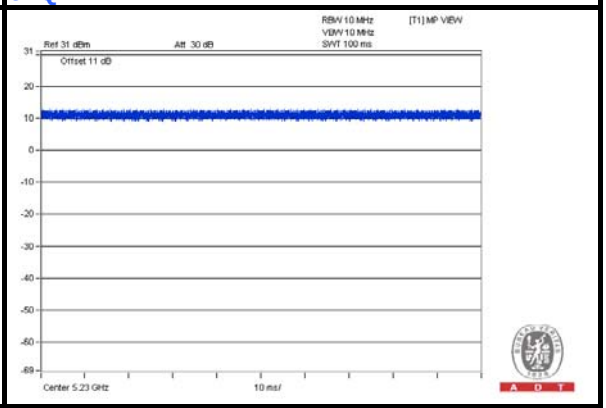
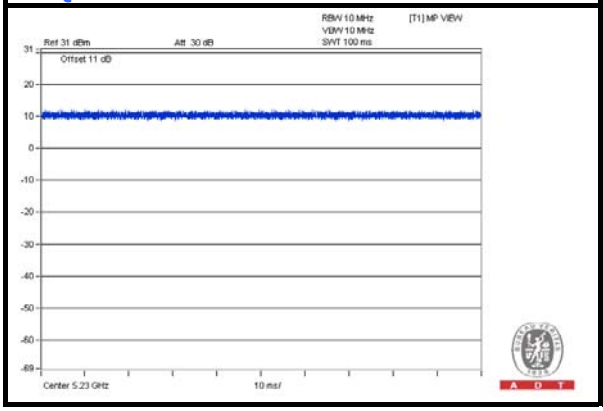
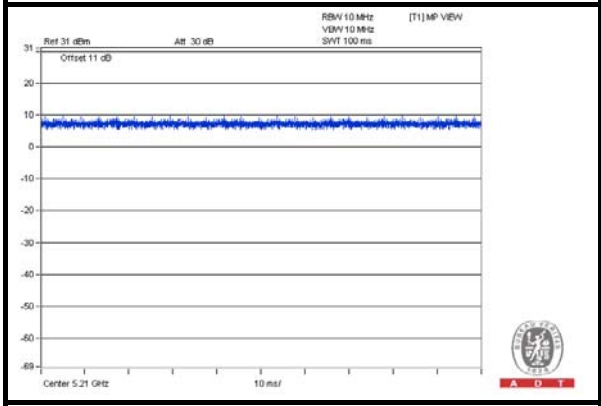


256QAM

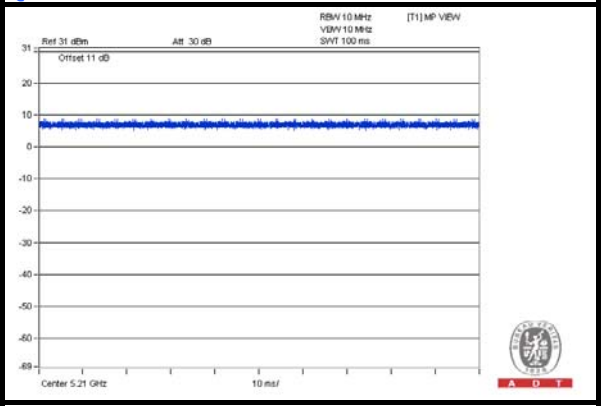


802.11ac (VHT80)

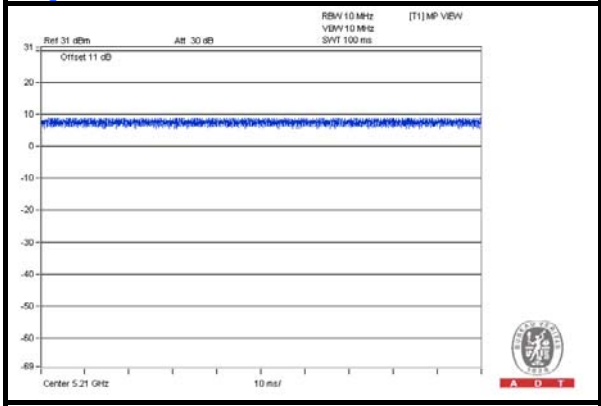
BPSK



QPSK



16QAM



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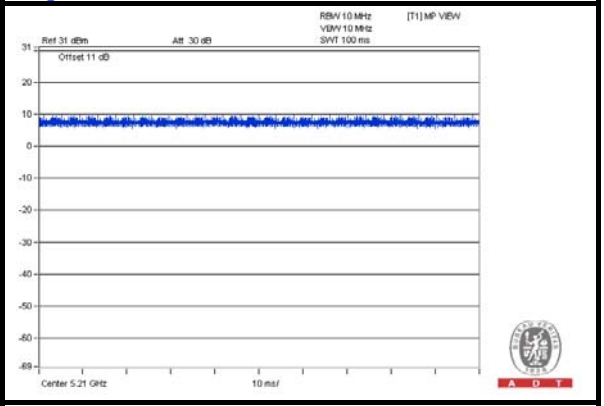

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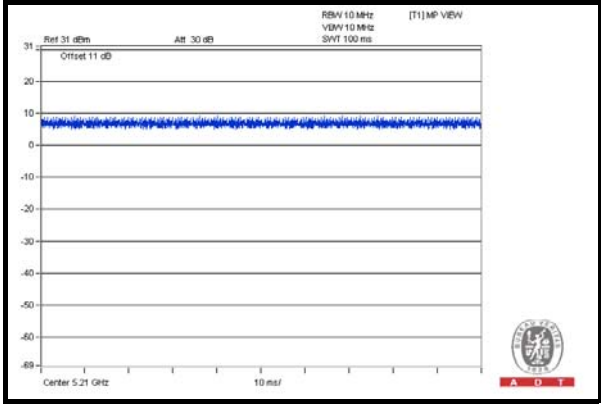


3.5 DESCRIPTION OF SUPPORT UNITS

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.

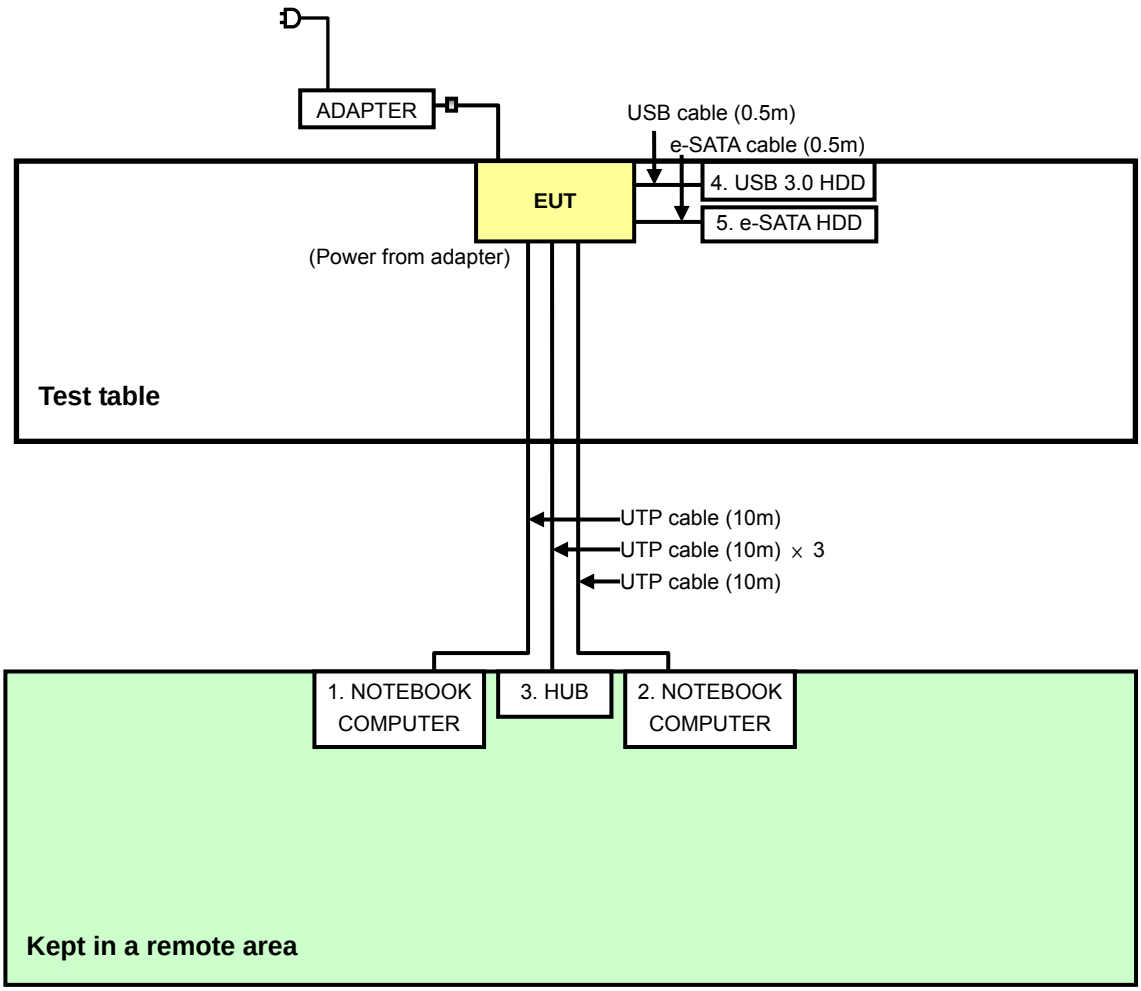
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP32LA	FSLB32S	FCC DoC
2	NOTEBOOK COMPUTER	DELL	PP32LA	GSLB32S	FCC DoC
3	HUB	ZyXEL	ES-116P	S060H02000215	FCC DoC
4	USB 3.0 HDD	WD	WDBACW0010HBK-SESN	WCAZAL625787	NA
5	e-SATA HDD	HITACHI	HTS541680J9SA00	SGCZ35SE	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	UTP cable (10m)
2	UTP cable (10m)
3	UTP cable (10m)
4	USB cable (0.5m)
5	e-SATA cable (0.5m)

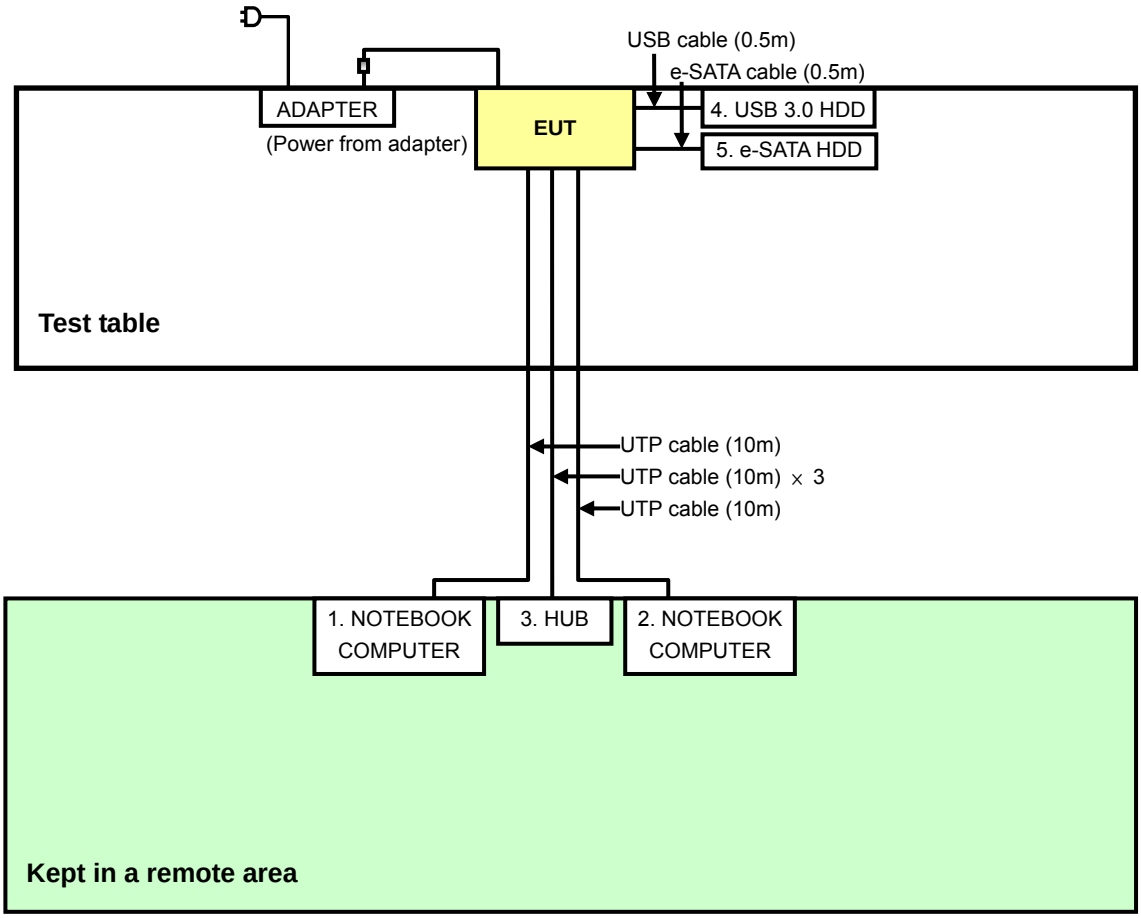
NOTE: All power cords of the above support units are non shielded (1.8m).

3.6 CONFIGURATION OF SYSTEM UNDER TEST

For conducted emission MODE 2 test:



For other test items:



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	Mar. 08, 2013	Mar. 07, 2014
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK8127	8127-522	Sep. 05, 2013	Sep. 04, 2014
Line-Impedance Stabilization Network (for Peripheral)	ENV216	100072	June 06, 2013	June 05, 2014
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 11, 2013	Mar. 10, 2014
50 ohms Terminator	50	EMC-03	Sep. 24, 2013	Sep. 23, 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: Oct. 08, 2013

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.

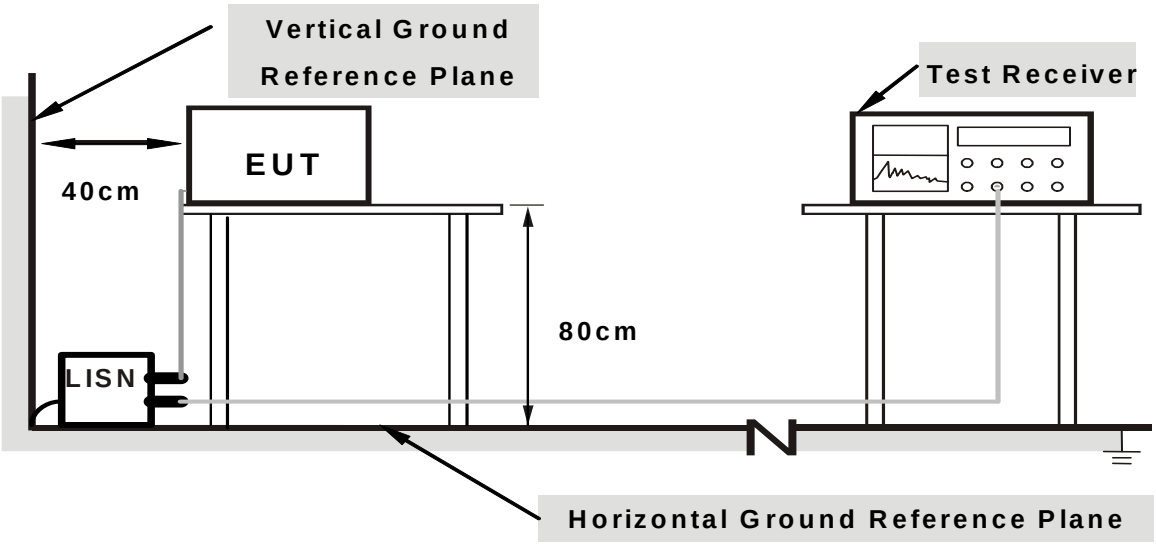
NOTE:

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. Place the EUT on testing table.
2. Prepare computer system (support unit 1) to act as communication partner.
3. The communication partner runs test program “DupApiMimoApApp.exex [ver.2.0.0.22]” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

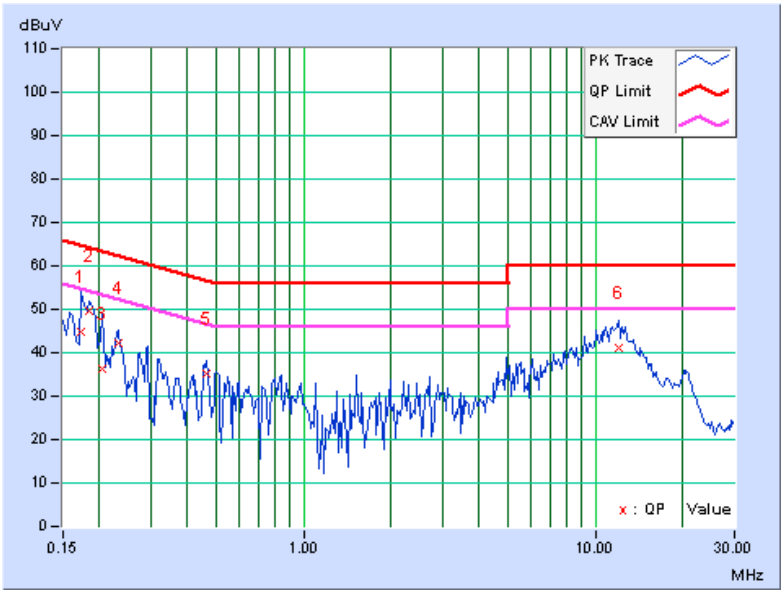
4.1.7 TEST RESULTS (MODE 2)

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	0.17344	0.09	44.74	20.18	44.83	20.27	64.79	54.79	-19.96	-34.52
2	0.18516	0.09	49.45	37.26	49.54	37.35	64.25	54.25	-14.71	-16.90
3	0.20469	0.10	36.08	11.85	36.18	11.95	63.42	53.42	-27.24	-41.47
4	0.23203	0.11	42.15	30.59	42.26	30.70	62.38	52.38	-20.12	-21.68
5	0.46641	0.14	35.10	29.55	35.24	29.69	56.58	46.58	-21.33	-16.88
6	11.96875	0.53	40.43	33.84	40.96	34.37	60.00	50.00	-19.04	-15.63

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

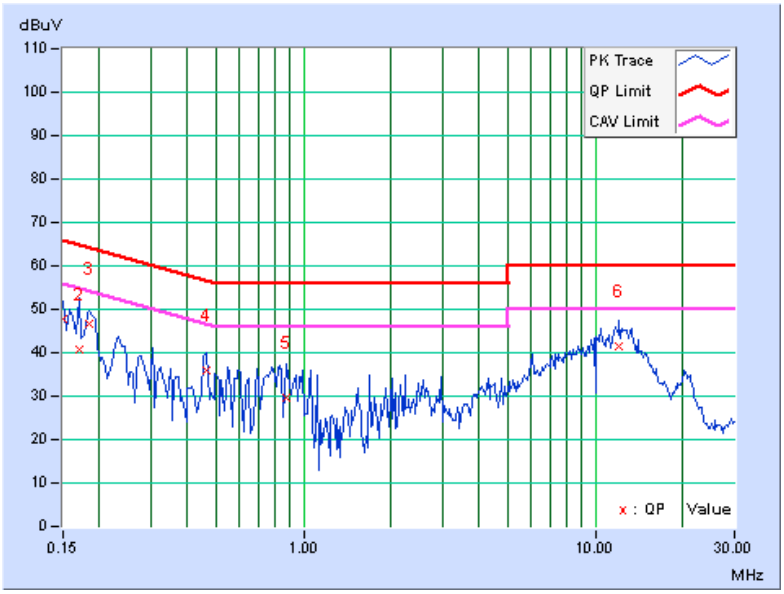


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	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	0.15000	0.09	47.82	26.24	47.91	26.33	66.00	56.00	-18.09	-29.67
2	0.16953	0.09	40.78	18.40	40.87	18.49	64.98	54.98	-24.11	-36.49
3	0.18516	0.10	46.62	34.42	46.72	34.52	64.25	54.25	-17.53	-19.73
4	0.46641	0.14	35.68	29.77	35.82	29.91	56.58	46.58	-20.75	-16.66
5	0.87266	0.16	29.61	16.90	29.77	17.06	56.00	46.00	-26.23	-28.94
6	12.04688	0.53	40.92	33.86	41.45	34.39	60.00	50.00	-18.55	-15.61

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



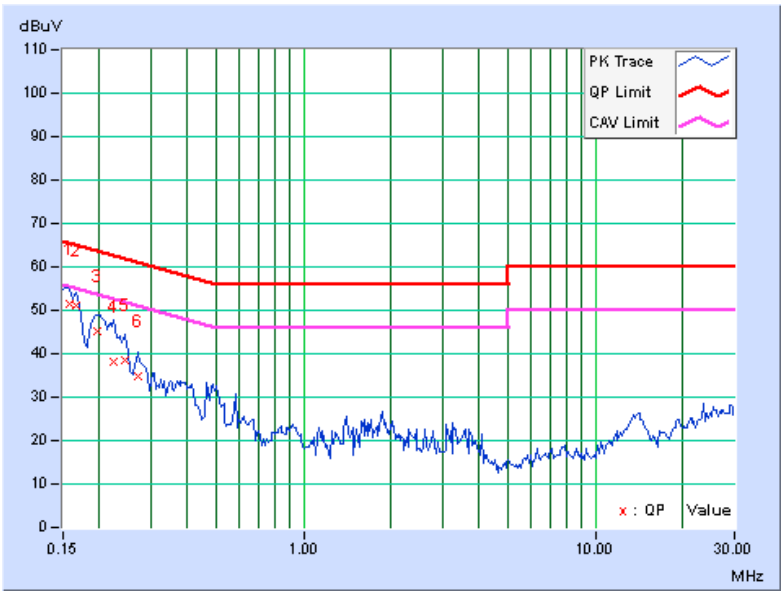
4.1.8 TEST RESULTS (MODE 3)

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	0.15781	0.08	51.44	34.42	51.52	34.50	65.58	55.58	-14.06	-21.08
2	0.16562	0.09	50.84	33.53	50.93	33.62	65.18	55.18	-14.25	-21.56
3	0.19687	0.10	45.07	26.50	45.17	26.60	63.74	53.74	-18.57	-27.14
4	0.22422	0.10	38.20	16.09	38.30	16.19	62.66	52.66	-24.36	-36.47
5	0.24375	0.11	38.35	20.58	38.46	20.69	61.97	51.97	-23.51	-31.28
6	0.27109	0.11	34.86	16.66	34.97	16.77	61.08	51.08	-26.11	-34.31

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

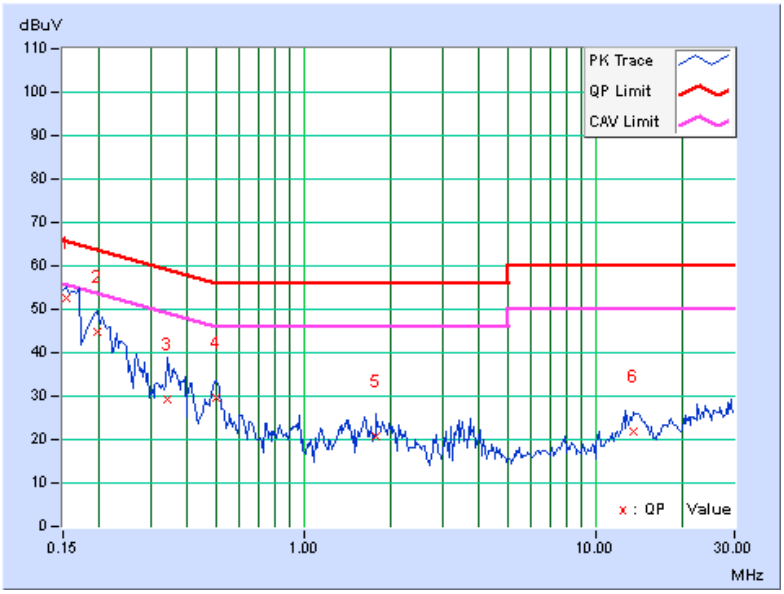


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	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**	**0.09**	**52.66**	**35.97**	**52.75**	**36.06**	**65.79**	**55.79**	**-13.04**	**-19.73**
2	0.19687	0.10	44.72	28.37	44.82	28.47	63.74	53.74	-18.92	-25.27
3	0.34141	0.13	28.99	12.82	29.12	12.95	59.17	49.17	-30.05	-36.22
4	0.50156	0.15	29.31	20.51	29.46	20.66	56.00	46.00	-26.54	-25.34
5	1.76953	0.21	20.46	13.86	20.67	14.07	56.00	46.00	-35.33	-31.93
6	13.57422	0.57	21.17	16.89	21.74	17.46	60.00	50.00	-38.26	-32.54

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	
	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:

1. 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 test

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY50010156	Jan. 16, 2013	Jan. 15, 2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 13, 2013	Nov. 12, 2014
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Mar. 25, 2013	Mar. 24, 2014
RF Cable	NA	CHHCAB_001	Oct. 06, 2013	Oct. 05, 2014
Spectrum Analyzer R&S	FSV40	100964	July 15, 2013	July 14, 2014
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: Jan. 09, 2014

For MODE 2 above 1GHz test

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY51210105	Jan. 29, 2013	Jan. 28, 2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Mar. 19, 2013	Mar. 18, 2014
RF Cable	NA	CHGCAB_001	Oct. 05, 2013	Oct. 04, 2014
Spectrum Analyzer R&S	FSV40	100964	July 15, 2013	July 14, 2014
Horn_Antenna AISI	AIH.8018	0000320091110	Nov. 19, 2012	Nov. 18, 2013
Pre-Amplifier Agilent	8449B	3008A02578	June 25, 2013	June 24, 2014
RF Cable	NA	RF104-201 RF104-203 RF104-204	Dec. 25, 2012	Dec. 24, 2013
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 28, 2013	Aug. 27, 2014
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
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: Oct. 11, 2013

For MODE 1 above 1GHz test

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	Mar. 25, 2013	Mar. 24, 2014
RF Cable	NA	CHHCAB_001	Oct. 06, 2013	Oct. 05, 2014
Spectrum Analyzer R&S	FSV40	100964	July 15, 2013	July 14, 2014
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: Jan. 24, 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:

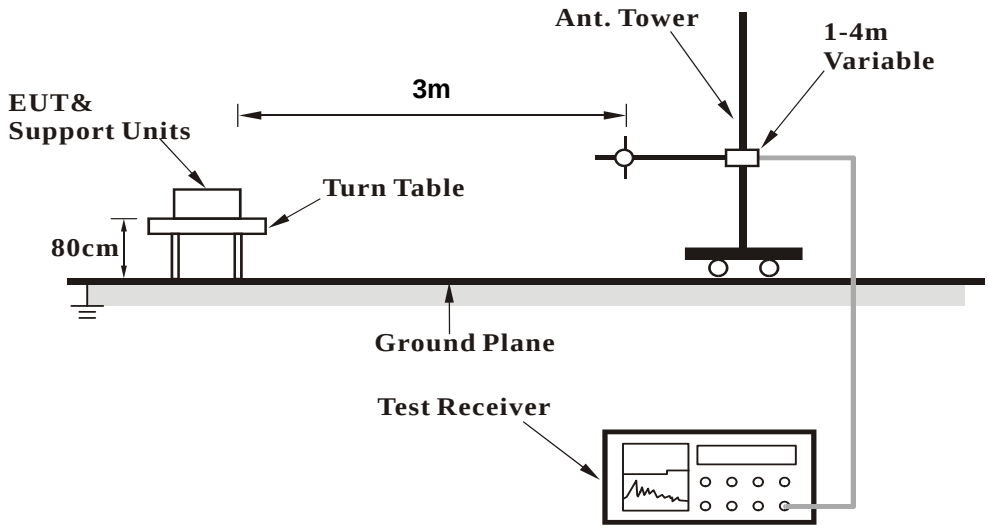
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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

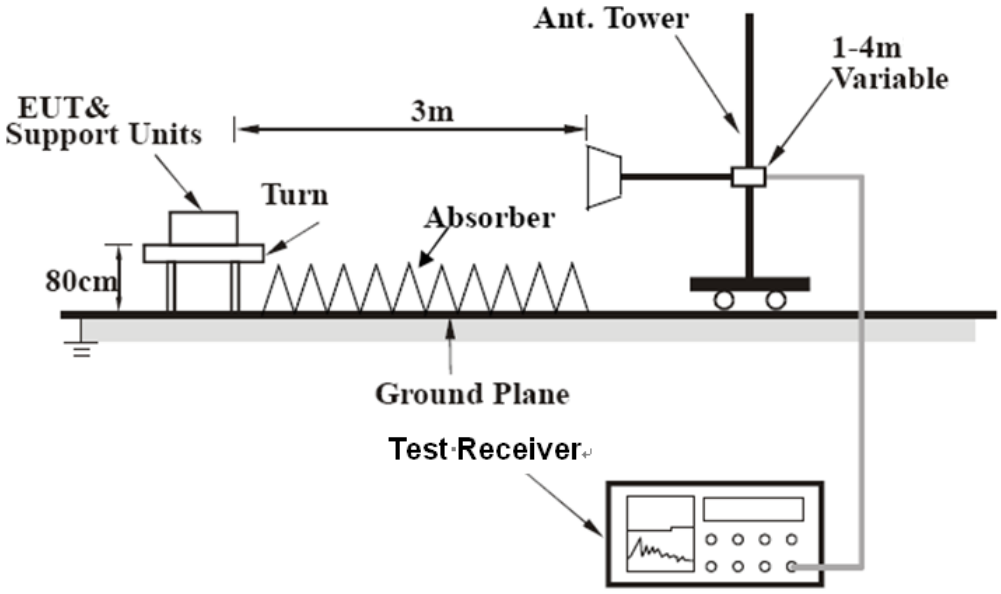
No deviation

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 (MODE 1)

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	54.5 PK	74.0	-19.5	1.02 H	30	48.10	6.40
2	5150.00	43.4 AV	54.0	-10.6	1.02 H	30	37.00	6.40
3	*5180.00	103.8 PK			1.00 H	24	97.30	6.50
4	*5180.00	94.2 AV			1.00 H	24	87.70	6.50
5	#10360.00	51.4 PK	74.0	-22.6	1.00 H	263	38.10	13.30
6	#10360.00	39.7 AV	54.0	-14.3	1.00 H	263	26.40	13.30
7	15540.00	57.3 PK	74.0	-16.7	1.01 H	269	38.70	18.60
8	15540.00	44.7 AV	54.0	-9.3	1.01 H	269	26.10	18.60
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	64.9 PK	74.0	-9.1	1.10 V	325	58.50	6.40
2	5150.00	51.1 AV	54.0	-2.9	1.10 V	325	44.70	6.40
3	*5180.00	116.8 PK			1.08 V	18	110.30	6.50
4	*5180.00	107.8 AV			1.08 V	18	101.30	6.50
5	#10360.00	51.2 PK	74.0	-22.8	1.00 V	166	37.90	13.30
6	#10360.00	41.7 AV	54.0	-12.3	1.00 V	166	28.40	13.30
7	15540.00	56.4 PK	74.0	-17.6	1.00 V	174	37.80	18.60
8	15540.00	45.3 AV	54.0	-8.7	1.00 V	174	26.70	18.60

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	103.4 PK			1.00 H	18	96.80	6.60
2	*5200.00	93.9 AV			1.00 H	18	87.30	6.60
3	#10400.00	50.5 PK	74.0	-23.5	1.00 H	253	37.20	13.30
4	#10400.00	39.0 AV	54.0	-15.0	1.00 H	253	25.70	13.30
5	15600.00	57.2 PK	74.0	-16.8	1.00 H	253	38.80	18.40
6	15600.00	44.8 AV	54.0	-9.2	1.00 H	253	26.40	18.40
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	116.7 PK			1.02 V	5	110.10	6.60
2	*5200.00	107.7 AV			1.02 V	5	101.10	6.60
3	#10400.00	51.1 PK	74.0	-22.9	1.00 V	177	37.80	13.30
4	#10400.00	41.3 AV	54.0	-12.7	1.00 V	177	28.00	13.30
5	15600.00	57.4 PK	74.0	-16.6	1.00 V	189	39.00	18.40
6	15600.00	45.9 AV	54.0	-8.1	1.00 V	189	27.50	18.40

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	103.8 PK			1.00 H	4	97.20	6.60
2	*5240.00	93.9 AV			1.00 H	4	87.30	6.60
3	5350.00	53.6 PK	74.0	-20.4	1.00 H	27	46.80	6.80
4	5350.00	43.0 AV	54.0	-11.0	1.00 H	27	36.20	6.80
5	#10480.00	50.5 PK	74.0	-23.5	1.00 H	259	36.90	13.60
6	#10480.00	38.8 AV	54.0	-15.2	1.00 H	259	25.20	13.60
7	15720.00	58.3 PK	74.0	-15.7	1.02 H	266	40.00	18.30
8	15720.00	45.7 AV	54.0	-8.3	1.02 H	266	27.40	18.30
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	116.9 PK			1.00 V	16	110.30	6.60
2	*5240.00	108.1 AV			1.00 V	16	101.50	6.60
3	5350.00	57.3 PK	74.0	-16.7	1.00 V	11	50.50	6.80
4	5350.00	44.2 AV	54.0	-9.8	1.00 V	11	37.40	6.80
5	#10480.00	51.4 PK	74.0	-22.6	1.00 V	167	37.80	13.60
6	#10480.00	41.3 AV	54.0	-12.7	1.00 V	167	27.70	13.60
7	15720.00	56.4 PK	74.0	-17.6	1.02 V	198	38.10	18.30
8	15720.00	44.9 AV	54.0	-9.1	1.02 V	198	26.60	18.30

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	53.9 PK	74.0	-20.1	1.00 H	15	47.50	6.40
2	5150.00	42.8 AV	54.0	-11.2	1.00 H	15	36.40	6.40
3	*5180.00	100.7 PK			1.00 H	15	94.20	6.50
4	*5180.00	91.7 AV			1.00 H	15	85.20	6.50
5	#10360.00	51.4 PK	74.0	-22.6	1.06 H	275	38.10	13.30
6	#10360.00	39.6 AV	54.0	-14.4	1.06 H	275	26.30	13.30
7	15540.00	57.7 PK	74.0	-16.3	1.05 H	242	39.10	18.60
8	15540.00	45.0 AV	54.0	-9.0	1.05 H	242	26.40	18.60
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	54.6 PK	74.0	-19.4	1.24 V	313	48.20	6.40
2	5150.00	44.2 AV	54.0	-9.8	1.24 V	313	37.80	6.40
3	*5180.00	113.7 PK			1.24 V	313	107.20	6.50
4	*5180.00	105.3 AV			1.24 V	313	98.80	6.50
5	#10360.00	51.7 PK	74.0	-22.3	1.02 V	176	38.40	13.30
6	#10360.00	41.6 AV	54.0	-12.4	1.02 V	176	28.30	13.30
7	15540.00	56.4 PK	74.0	-17.6	1.02 V	197	37.80	18.60
8	15540.00	44.9 AV	54.0	-9.1	1.02 V	197	26.30	18.60

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	100.1 PK			1.04 H	10	93.50	6.60
2	*5200.00	91.0 AV			1.04 H	10	84.40	6.60
3	#10400.00	50.9 PK	74.0	-23.1	1.02 H	273	37.60	13.30
4	#10400.00	39.1 AV	54.0	-14.9	1.02 H	273	25.80	13.30
5	15600.00	57.4 PK	74.0	-16.6	1.03 H	234	39.00	18.40
6	15600.00	44.8 AV	54.0	-9.2	1.03 H	234	26.40	18.40
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	112.5 PK			1.25 V	301	105.90	6.60
2	*5200.00	105.5 AV			1.25 V	301	98.90	6.60
3	#10400.00	51.4 PK	74.0	-22.6	1.10 V	201	38.10	13.30
4	#10400.00	41.6 AV	54.0	-12.4	1.10 V	201	28.30	13.30
5	15600.00	55.7 PK	74.0	-18.3	1.01 V	191	37.30	18.40
6	15600.00	44.3 AV	54.0	-9.7	1.01 V	191	25.90	18.40

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	99.3 PK			1.01 H	6	92.70	6.60
2	*5240.00	90.0 AV			1.01 H	6	83.40	6.60
3	5350.00	55.2 PK	74.0	-18.8	1.01 H	30	48.40	6.80
4	5350.00	43.5 AV	54.0	-10.5	1.01 H	30	36.70	6.80
5	#10480.00	51.2 PK	74.0	-22.8	1.00 H	260	37.60	13.60
6	#10480.00	39.4 AV	54.0	-14.6	1.00 H	260	25.80	13.60
7	15720.00	58.5 PK	74.0	-15.5	1.00 H	241	40.20	18.30
8	15720.00	45.6 AV	54.0	-8.4	1.00 H	241	27.30	18.30
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	115.4 PK			1.00 V	0	108.80	6.60
2	*5240.00	107.2 AV			1.00 V	0	100.60	6.60
3	5350.00	57.9 PK	74.0	-16.1	1.01 V	9	51.10	6.80
4	5350.00	44.6 AV	54.0	-9.4	1.01 V	9	37.80	6.80
5	#10480.00	51.2 PK	74.0	-22.8	1.12 V	192	37.60	13.60
6	#10480.00	41.4 AV	54.0	-12.6	1.12 V	192	27.80	13.60
7	15720.00	55.6 PK	74.0	-18.4	1.10 V	219	37.30	18.30
8	15720.00	44.2 AV	54.0	-9.8	1.10 V	219	25.90	18.30

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	5148.35	54.1 PK	74.0	-19.9	1.58 H	219	47.80	6.30
2	5148.35	43.0 AV	54.0	-11.0	1.58 H	219	36.70	6.30
3	*5190.00	101.8 PK			1.62 H	208	95.20	6.60
4	*5190.00	90.8 AV			1.62 H	208	84.20	6.60
5	#10380.00	51.8 PK	74.0	-22.2	1.11 H	261	38.60	13.20
6	#10380.00	40.1 AV	54.0	-13.9	1.11 H	261	26.90	13.20
7	15570.00	58.1 PK	74.0	-15.9	1.00 H	260	39.60	18.50
8	15570.00	45.1 AV	54.0	-8.9	1.00 H	260	26.60	18.50
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	5148.35	62.5 PK	74.0	-11.5	1.02 V	0	56.20	6.30
2	5148.35	50.1 AV	54.0	-3.9	1.02 V	0	43.80	6.30
3	*5190.00	112.6 PK			1.05 V	10	106.00	6.60
4	*5190.00	104.4 AV			1.05 V	10	97.80	6.60
5	#10380.00	51.7 PK	74.0	-22.3	1.12 V	213	38.50	13.20
6	#10380.00	41.5 AV	54.0	-12.5	1.12 V	213	28.30	13.20
7	15570.00	55.2 PK	74.0	-18.8	1.06 V	226	36.70	18.50
8	15570.00	43.8 AV	54.0	-10.2	1.06 V	226	25.30	18.50

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	*5230.00	99.5 PK			1.54 H	216	92.90	6.60
2	*5230.00	91.1 AV			1.54 H	216	84.50	6.60
3	5350.00	54.4 PK	74.0	-19.6	1.58 H	227	47.60	6.80
4	5350.00	42.6 AV	54.0	-11.4	1.58 H	227	35.80	6.80
5	#10460.00	51.7 PK	74.0	-22.3	1.01 H	250	38.20	13.50
6	#10460.00	39.8 AV	54.0	-14.2	1.01 H	250	26.30	13.50
7	15690.00	58.0 PK	74.0	-16.0	1.04 H	240	39.70	18.30
8	15690.00	45.3 AV	54.0	-8.7	1.04 H	240	27.00	18.30
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	*5230.00	113.2 PK			1.03 V	26	106.60	6.60
2	*5230.00	104.6 AV			1.03 V	26	98.00	6.60
3	5350.00	57.0 PK	74.0	-17.0	1.06 V	13	50.20	6.80
4	5350.00	44.5 AV	54.0	-9.5	1.06 V	13	37.70	6.80
5	#10460.00	51.7 PK	74.0	-22.3	1.04 V	192	38.20	13.50
6	#10460.00	41.3 AV	54.0	-12.7	1.04 V	192	27.80	13.50
7	15690.00	56.0 PK	74.0	-18.0	1.06 V	213	37.70	18.30
8	15690.00	44.0 AV	54.0	-10.0	1.06 V	213	25.70	18.30

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)
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	5148.00	54.0 PK	74.0	-20.0	1.05 H	27	47.70	6.30
2	5148.00	44.4 AV	54.0	-9.6	1.05 H	27	38.10	6.30
3	*5210.00	94.1 PK			1.05 H	11	87.50	6.60
4	*5210.00	84.4 AV			1.05 H	11	77.80	6.60
5	5350.00	54.1 PK	74.0	-19.9	1.04 H	3	47.30	6.80
6	5350.00	42.6 AV	54.0	-11.4	1.04 H	3	35.80	6.80
7	#10420.00	51.6 PK	74.0	-22.4	1.02 H	210	38.20	13.40
8	#10420.00	39.5 AV	54.0	-14.5	1.02 H	210	26.10	13.40
9	15630.00	58.2 PK	74.0	-15.8	1.01 H	210	39.80	18.40
10	15630.00	44.8 AV	54.0	-9.2	1.01 H	210	26.40	18.40
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	5148.00	65.2 PK	74.0	-8.8	1.25 V	300	58.90	6.30
2	**5148.00**	**53.3 AV**	**54.0**	**-0.7**	**1.25 V**	**300**	**47.00**	**6.30**
3	*5210.00	106.3 PK			1.17 V	322	99.70	6.60
4	*5210.00	97.4 AV			1.17 V	322	90.80	6.60
5	5350.00	56.0 PK	74.0	-18.0	1.17 V	314	49.20	6.80
6	5350.00	43.0 AV	54.0	-11.0	1.17 V	314	36.20	6.80
7	#10420.00	51.9 PK	74.0	-22.1	1.02 V	196	38.50	13.40
8	#10420.00	39.2 AV	54.0	-14.8	1.02 V	196	25.80	13.40
9	15630.00	57.1 PK	74.0	-16.9	1.04 V	215	38.70	18.40
10	15630.00	44.7 AV	54.0	-9.3	1.04 V	215	26.30	18.40

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.

4.2.9 TEST RESULTS (MODE 2)

BELOW 1GHz WORST-CASE DATA

802.11ac (VHT40)

CHANNEL	TX Channel 46	**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	62.11	26.8 QP	40.0	-13.3	1.08 H	156	40.06	-13.31
2	194.76	34.8 QP	43.5	-8.7	1.43 H	187	50.49	-15.72
3	279.64	41.6 QP	46.0	-4.5	1.00 H	171	53.90	-12.35
4	555.69	36.5 QP	46.0	-9.5	1.49 H	233	42.44	-5.95
5	600.02	37.7 QP	46.0	-8.3	1.47 H	221	42.36	-4.63
6	625.00	38.4 QP	46.0	-7.6	1.50 H	306	42.42	-4.06
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	35.63	35.8 QP	40.0	-4.2	1.50 V	0	49.19	-13.43
2	60.02	34.4 QP	40.0	-5.6	1.00 V	115	47.87	-13.44
3	228.46	42.2 QP	46.0	-3.9	1.50 V	126	57.38	-15.23
4	281.52	36.2 QP	46.0	-9.8	1.00 V	225	48.44	-12.20
5	551.13	37.2 QP	46.0	-8.9	1.00 V	288	43.20	-6.05
6	599.97	34.2 QP	46.0	-11.8	1.00 V	228	38.82	-4.63

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	54.1 PK	74.0	-19.9	1.00 H	15	45.50	8.60
2	5150.00	43.2 AV	54.0	-10.8	1.00 H	15	34.60	8.60
3	*5180.00	108.5 PK			1.00 H	15	99.74	8.76
4	*5180.00	98.8 AV			1.00 H	15	90.04	8.76
5	#10360.00	51.0 PK	74.0	-23.0	1.00 H	266	35.46	15.54
6	#10360.00	39.4 AV	54.0	-14.6	1.00 H	266	23.86	15.54
7	15540.00	57.8 PK	74.0	-16.2	1.00 H	258	35.43	22.37
8	15540.00	45.2 AV	54.0	-8.8	1.00 H	258	22.83	22.37
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	66.7 PK	74.0	-7.3	1.05 V	340	58.10	8.60
2	5150.00	51.9 AV	54.0	-2.1	1.05 V	340	43.30	8.60
3	*5180.00	121.1 PK			1.05 V	360	112.34	8.76
4	*5180.00	112.3 AV			1.05 V	360	103.54	8.76
5	#10360.00	51.0 PK	74.0	-23.0	1.00 V	175	35.46	15.54
6	#10360.00	41.3 AV	54.0	-12.7	1.00 V	175	25.76	15.54
7	15540.00	56.5 PK	74.0	-17.5	1.00 V	181	34.13	22.37
8	15540.00	45.3 AV	54.0	-8.7	1.00 V	181	22.93	22.37

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	104.7 PK			1.00 H	16	95.83	8.87
2	*5200.00	95.1 AV			1.00 H	16	86.23	8.87
3	#10400.00	51.2 PK	74.0	-22.8	1.00 H	267	36.02	15.18
4	#10400.00	39.4 AV	54.0	-14.6	1.00 H	267	24.22	15.18
5	15600.00	57.9 PK	74.0	-16.1	1.00 H	263	35.78	22.12
6	15600.00	45.3 AV	54.0	-8.7	1.00 H	263	23.18	22.12
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	117.2 PK			1.04 V	13	108.33	8.87
2	*5200.00	108.5 AV			1.04 V	13	99.63	8.87
3	#10400.00	51.2 PK	74.0	-22.8	1.00 V	163	36.02	15.18
4	#10400.00	41.5 AV	54.0	-12.5	1.00 V	163	26.32	15.18
5	15600.00	56.7 PK	74.0	-17.3	1.01 V	183	34.58	22.12
6	15600.00	45.4 AV	54.0	-8.6	1.01 V	183	23.28	22.12

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	104.4 PK			1.00 H	16	95.39	9.01
2	*5240.00	94.7 AV			1.00 H	16	85.69	9.01
3	5350.00	53.6 PK	74.0	-20.4	1.00 H	16	44.29	9.31
4	5350.00	42.8 AV	54.0	-11.2	1.00 H	16	33.49	9.31
5	#10480.00	51.0 PK	74.0	-23.0	1.01 H	275	35.20	15.80
6	#10480.00	39.3 AV	54.0	-14.7	1.01 H	275	23.50	15.80
7	15720.00	58.1 PK	74.0	-15.9	1.00 H	251	36.30	21.80
8	15720.00	45.4 AV	54.0	-8.6	1.00 H	251	23.60	21.80
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	117.5 PK			1.03 V	0	108.49	9.01
2	*5240.00	108.8 AV			1.03 V	0	99.79	9.01
3	5350.00	57.1 PK	74.0	-16.9	1.03 V	0	47.79	9.31
4	5350.00	44.2 AV	54.0	-9.8	1.03 V	0	34.89	9.31
5	#10480.00	51.3 PK	74.0	-22.7	1.00 V	166	35.50	15.80
6	#10480.00	41.4 AV	54.0	-12.6	1.00 V	166	25.60	15.80
7	15720.00	56.9 PK	74.0	-17.1	1.03 V	186	35.10	21.80
8	15720.00	45.3 AV	54.0	-8.7	1.03 V	186	23.50	21.80

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)
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	1.00 H	15	45.30	8.60
2	5150.00	42.8 AV	54.0	-11.2	1.00 H	15	34.20	8.60
3	*5180.00	100.7 PK			1.00 H	15	91.94	8.76
4	*5180.00	91.7 AV			1.00 H	15	82.94	8.76
5	#10360.00	51.4 PK	74.0	-22.6	1.06 H	275	35.86	15.54
6	#10360.00	39.6 AV	54.0	-14.4	1.06 H	275	24.06	15.54
7	15540.00	57.7 PK	74.0	-16.3	1.05 H	242	35.33	22.37
8	15540.00	45.0 AV	54.0	-9.0	1.05 H	242	22.63	22.37
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	54.6 PK	74.0	-19.4	1.24 V	313	46.00	8.60
2	5150.00	44.2 AV	54.0	-9.8	1.24 V	313	35.60	8.60
3	*5180.00	113.7 PK			1.24 V	313	104.94	8.76
4	*5180.00	105.3 AV			1.24 V	313	96.54	8.76
5	#10360.00	51.7 PK	74.0	-22.3	1.02 V	176	36.16	15.54
6	#10360.00	41.6 AV	54.0	-12.4	1.02 V	176	26.06	15.54
7	15540.00	56.4 PK	74.0	-17.6	1.02 V	197	34.03	22.37
8	15540.00	44.9 AV	54.0	-9.1	1.02 V	197	22.53	22.37

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	100.9 PK			1.03 H	17	92.03	8.87
2	*5200.00	91.8 AV			1.03 H	17	82.93	8.87
3	#10400.00	50.9 PK	74.0	-23.1	1.02 H	272	35.72	15.18
4	#10400.00	39.4 AV	54.0	-14.6	1.02 H	272	24.22	15.18
5	15600.00	57.6 PK	74.0	-16.4	1.02 H	245	35.48	22.12
6	15600.00	44.8 AV	54.0	-9.2	1.02 H	245	22.68	22.12
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	113.3 PK			1.20 V	299	104.43	8.87
2	*5200.00	106.2 AV			1.20 V	299	97.33	8.87
3	#10400.00	51.4 PK	74.0	-22.6	1.06 V	189	36.22	15.18
4	#10400.00	41.4 AV	54.0	-12.6	1.06 V	189	26.22	15.18
5	15600.00	55.8 PK	74.0	-18.2	1.00 V	205	33.68	22.12
6	15600.00	44.5 AV	54.0	-9.5	1.00 V	205	22.38	22.12

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	100.2 PK			1.00 H	16	91.19	9.01
2	*5240.00	91.2 AV			1.00 H	16	82.19	9.01
3	5350.00	54.4 PK	74.0	-19.6	1.00 H	16	45.09	9.31
4	5350.00	43.0 AV	54.0	-11.0	1.00 H	16	33.69	9.31
5	#10480.00	51.2 PK	74.0	-22.8	1.02 H	264	35.40	15.80
6	#10480.00	39.6 AV	54.0	-14.4	1.02 H	264	23.80	15.80
7	15720.00	58.0 PK	74.0	-16.0	1.00 H	242	36.20	21.80
8	15720.00	45.2 AV	54.0	-8.8	1.00 H	242	23.40	21.80
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	116.9 PK			1.02 V	13	107.89	9.01
2	*5240.00	108.5 AV			1.02 V	13	99.49	9.01
3	5350.00	57.5 PK	74.0	-16.5	1.02 V	13	48.19	9.31
4	5350.00	44.4 AV	54.0	-9.6	1.02 V	13	35.09	9.31
5	#10480.00	51.2 PK	74.0	-22.8	1.10 V	202	35.40	15.80
6	#10480.00	41.2 AV	54.0	-12.8	1.10 V	202	25.40	15.80
7	15720.00	55.9 PK	74.0	-18.1	1.04 V	209	34.10	21.80
8	15720.00	44.4 AV	54.0	-9.6	1.04 V	209	22.60	21.80

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	5148.35	54.2 PK	74.0	-19.8	1.59 H	216	45.61	8.59
2	5148.35	42.8 AV	54.0	-11.2	1.59 H	216	34.21	8.59
3	*5190.00	102.9 PK			1.59 H	216	94.08	8.82
4	*5190.00	91.9 AV			1.59 H	216	83.08	8.82
5	#10380.00	51.1 PK	74.0	-22.9	1.07 H	269	35.73	15.37
6	#10380.00	39.7 AV	54.0	-14.3	1.07 H	269	24.33	15.37
7	15570.00	57.7 PK	74.0	-16.3	1.00 H	251	35.46	22.24
8	15570.00	44.8 AV	54.0	-9.2	1.00 H	251	22.56	22.24
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	5148.35	63.6 PK	74.0	-10.4	1.04 V	13	55.01	8.59
2	5148.35	50.8 AV	54.0	-3.2	1.04 V	13	42.21	8.59
3	*5190.00	113.4 PK			1.04 V	13	104.58	8.82
4	*5190.00	105.0 AV			1.04 V	13	96.18	8.82
5	#10380.00	51.9 PK	74.0	-22.1	1.06 V	201	36.53	15.37
6	#10380.00	41.6 AV	54.0	-12.4	1.06 V	201	26.23	15.37
7	15570.00	55.6 PK	74.0	-18.4	1.06 V	213	33.36	22.24
8	15570.00	44.0 AV	54.0	-10.0	1.06 V	213	21.76	22.24

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	*5230.00	100.4 PK			1.59 H	216	91.43	8.97
2	*5230.00	91.7 AV			1.59 H	216	82.73	8.97
3	5350.00	54.5 PK	74.0	-19.5	1.59 H	216	45.19	9.31
4	5350.00	42.9 AV	54.0	-11.1	1.59 H	216	33.59	9.31
5	#10460.00	50.9 PK	74.0	-23.1	1.04 H	264	35.26	15.64
6	#10460.00	39.3 AV	54.0	-14.7	1.04 H	264	23.66	15.64
7	15690.00	57.6 PK	74.0	-16.4	1.01 H	247	35.82	21.78
8	15690.00	44.9 AV	54.0	-9.1	1.01 H	247	23.12	21.78
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	*5230.00	113.8 PK			1.03 V	11	104.83	8.97
2	*5230.00	105.4 AV			1.03 V	11	96.43	8.97
3	5350.00	56.6 PK	74.0	-17.4	1.03 V	11	47.29	9.31
4	5350.00	44.0 AV	54.0	-10.0	1.03 V	11	34.69	9.31
5	#10460.00	52.1 PK	74.0	-21.9	1.04 V	208	36.46	15.64
6	#10460.00	41.6 AV	54.0	-12.4	1.04 V	208	25.96	15.64
7	15690.00	56.2 PK	74.0	-17.8	1.03 V	214	34.42	21.78
8	15690.00	44.4 AV	54.0	-9.6	1.03 V	214	22.62	21.78

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)
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	5148.00	53.7 PK	74.0	-20.3	1.00 H	15	45.11	8.59
2	5148.00	44.0 AV	54.0	-10.0	1.00 H	15	35.41	8.59
3	*5210.00	95.1 PK			1.00 H	15	86.20	8.90
4	*5210.00	85.5 AV			1.00 H	15	76.60	8.90
5	5350.00	54.6 PK	74.0	-19.4	1.00 H	15	45.29	9.31
6	5350.00	42.8 AV	54.0	-11.2	1.00 H	15	33.49	9.31
7	#10420.00	51.4 PK	74.0	-22.6	1.00 H	216	36.07	15.33
8	#10420.00	39.4 AV	54.0	-14.6	1.00 H	216	24.07	15.33
9	15630.00	58.1 PK	74.0	-15.9	1.00 H	211	36.09	22.01
10	15630.00	44.7 AV	54.0	-9.3	1.00 H	211	22.69	22.01
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	5148.00	65.1 PK	74.0	-8.9	1.21 V	313	56.51	8.59
2	5148.00	53.0 AV	54.0	-1.0	1.21 V	313	44.41	8.59
3	*5210.00	107.3 PK			1.21 V	313	98.40	8.90
4	*5210.00	98.6 AV			1.21 V	313	89.70	8.90
5	5350.00	56.6 PK	74.0	-17.4	1.21 V	313	47.29	9.31
6	5350.00	43.4 AV	54.0	-10.6	1.21 V	313	34.09	9.31
7	#10420.00	51.9 PK	74.0	-22.1	1.00 V	210	36.57	15.33
8	#10420.00	39.4 AV	54.0	-14.6	1.00 V	210	24.07	15.33
9	15630.00	57.2 PK	74.0	-16.8	1.00 V	218	35.19	22.01
10	15630.00	44.9 AV	54.0	-9.1	1.00 V	218	22.89	22.01

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

FREQUENCY BAND	LIMIT
5.150 ~ 5.250GHz	The lesser of 50mW (17dBm) or 4dBm + 10logB
5.250 ~ 5.350GHz	The lesser of 250mW (24dBm) or 11dBm + 10logB
5.470 ~ 5.725GHz	The lesser of 250mW (24dBm) or 11dBm + 10logB

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	0824006	May 20, 2013	May 19, 2014
Power sensor Anritsu	MA2411B	0738172	May 20, 2013	May 19, 2014

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 : Jan. 17 to 27, 2014

FOR 26dB OCCUPIED BANDWIDTH

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP 40	100036	Jan. 21, 2013	Jan. 20, 2014

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 : Jan. 17 to 27, 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

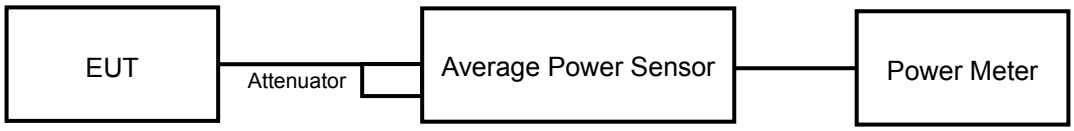
1. Set RBW = approximately 1% of the emission bandwidth.
2. Set the VBW > RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement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

4.3.4 DEVIATION FROM TEST STANDARD

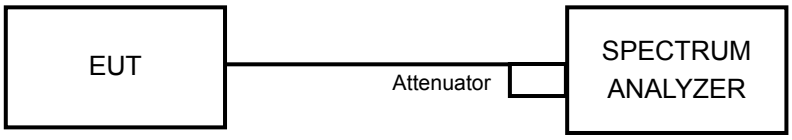
No deviation

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 (MODE 1)

802.11a

POWER OUTPUT:

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 1	CHAIN 2	CHAIN 3				
36	5180	11.01	10.85	11.03	37.457	15.74	16.89	PASS
40	5200	10.88	11.15	11.05	38.013	15.80	16.90	PASS
48	5240	11.03	10.97	11.12	38.122	15.81	16.90	PASS

NOTE: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 6.08dBi > 6dBi , so the power limit shall be reduced to "Determined Conducted Limit-(6.08-6)"

26dB OCCUPIED BANDWIDTH:

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)		
		CHAIN 1	CHAIN 2	CHAIN 3
36	5180	19.91	19.99	19.84
40	5200	20.07	19.96	19.89
48	5240	19.91	20.00	19.87

Note: For FCC output power limitation is determined based on 26dBc bandwidth.

Power Limit = 4dBm + 10logB < UNII Band 1>			
Channel Number	Freq.(MHz)	Min. B(MHz)	Determined Conducted Limit (dBm)
36	5180	19.84	16.97 < 17
40	5200	19.89	16.98 < 17
48	5240	19.87	16.98 < 17

802.11ac (VHT20)

POWER OUTPUT:

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 1	CHAIN 2	CHAIN 3				
36	5180	10.76	11.14	11.51	39.072	15.92	16.92	PASS
40	5200	10.96	10.91	11.61	39.293	15.94	16.92	PASS
48	5240	10.86	10.92	10.84	36.683	15.64	16.92	PASS

NOTE: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 6.08dBi > 6dBi , so the power limit shall be reduced to "Determined Conducted Limit-(6.08-6)"

26dB OCCUPIED BANDWIDTH:

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)		
		CHAIN 1	CHAIN 2	CHAIN 3
36	5180	20.33	20.14	20.34
40	5200	20.31	20.22	20.43
48	5240	20.39	20.22	20.43

Note: For FCC output power limitation is determined based on 26dBc bandwidth.

Power Limit = 4dBm + 10logB < UNII Band 1>			
Channel Number	Freq.(MHz)	Min. B(MHz)	Determined Conducted Limit (dBm)
36	5180	20.14	17.04 > 17
40	5200	20.22	17.05 > 17
48	5240	20.22	17.05 > 17

802.11ac (VHT40)

POWER OUTPUT:

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 1	CHAIN 2	CHAIN 3				
38	5190	11.92	11.31	12.51	46.905	16.71	16.92	PASS
46	5230	11.77	11.59	11.73	44.346	16.47	16.92	PASS

NOTE: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 6.08dBi > 6dBi , so the power limit shall be reduced to "Determined Conducted Limit-(6.08-6)"

26dB OCCUPIED BANDWIDTH:

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)		
		CHAIN 1	CHAIN 2	CHAIN 3
38	5190	41.83	41.76	41.77
46	5230	41.78	41.86	41.84

Note: For FCC output power limitation is determined based on 26dBc bandwidth.

Power Limit = 4dBm + 10logB < UNII Band 1>			
Channel Number	Freq.(MHz)	Min. B(MHz)	Determined Conducted Limit (dBm)
38	5190	41.76	20.2 > 17
46	5230	41.78	20.2 > 17

802.11ac (VHT80)

POWER OUTPUT:

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 1	CHAIN 2	CHAIN 3				
42	5210	11.82	11.62	12.01	45.611	16.59	16.92	PASS

NOTE: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 6.08dBi > 6dBi , so the power limit shall be reduced to "Determined Conducted Limit-(6.08-6)"

26dB OCCUPIED BANDWIDTH:

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)		
		CHAIN 1	CHAIN 2	CHAIN 3
42	5210	82.12	82.53	82.42

Note: For FCC output power limitation is determined based on 26dBc bandwidth.

Power Limit = 4dBm + 10logB < UNII Band 1>			
Channel Number	Freq.(MHz)	Min. B(MHz)	Determined Conducted Limit (dBm)
42	5210	82.12	23.14 > 17

4.3.8 TEST RESULTS (MODE 2)

802.11a

POWER OUTPUT:

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)				TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3				
36	5180	8.92	8.61	8.24	8.96	29.597	14.71	15.67	PASS
40	5200	8.81	8.05	7.93	8.62	27.473	14.39	15.68	PASS
48	5240	8.83	8.24	8.21	8.71	28.358	14.53	15.69	PASS

NOTE: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 7.25dBi > 6dBi , so the power limit shall be reduced to "Determined Conducted Limit-(7.25-6)"

26dB OCCUPIED BANDWIDTH:

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)			
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3
36	5180	19.87	19.64	19.63	19.84
40	5200	19.84	19.77	19.66	19.89
48	5240	19.90	19.72	19.73	19.87

Note: For FCC output power limitation is determined based on 26dBc bandwidth.

Power Limit = 4dBm + 10logB < UNII Band 1>			
Channel Number	Freq.(MHz)	Min. B(MHz)	Determined Conducted Limit (dBm)
36	5180	19.63	16.92 < 17
40	5200	19.66	16.93 < 17
48	5240	19.72	16.94 < 17

802.11ac (VHT20)

POWER OUTPUT:

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)				TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3				
36	5180	8.94	9.12	8.31	8.25	29.459	14.69	15.75	PASS
40	5200	9.11	8.74	8.52	8.72	30.188	14.80	15.75	PASS
48	5240	9.36	8.34	8.98	8.92	31.158	14.94	15.75	PASS

NOTE: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 7.25dBi > 6dBi , so the power limit shall be reduced to "Determined Conducted Limit-(7.25-6)"

26dB OCCUPIED BANDWIDTH:

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)			
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3
36	5180	20.25	20.42	20.47	20.34
40	5200	20.23	20.48	20.48	20.43
48	5240	20.30	20.44	20.51	20.43

Note: For FCC output power limitation is determined based on 26dBc bandwidth.

Power Limit = 4dBm + 10logB < UNII Band 1>			
Channel Number	Freq.(MHz)	Min. B(MHz)	Determined Conducted Limit (dBm)
36	5180	20.25	17.06 > 17
40	5200	20.23	17.05 > 17
48	5240	20.30	17.07 > 17

802.11ac (VHT40)

POWER OUTPUT:

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)				TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3				
38	5190	10.02	9.50	8.55	9.26	34.553	15.38	15.75	PASS
46	5230	10.19	9.69	8.90	9.45	36.330	15.60	15.75	PASS

NOTE: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 7.25dBi > 6dBi , so the power limit shall be reduced to "Determined Conducted Limit-(7.25-6)"

26dB OCCUPIED BANDWIDTH:

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)			
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3
38	5190	41.70	42.00	41.62	41.77
46	5230	41.80	42.11	41.62	41.84

Note: For FCC output power limitation is determined based on 26dBc bandwidth.

Power Limit = 4dBm + 10logB < UNII Band 1>			
Channel Number	Freq.(MHz)	Min. B(MHz)	Determined Conducted Limit (dBm)
38	5190	41.62	20.19 > 17
46	5230	41.62	20.19 > 17

802.11ac (VHT80)

POWER OUTPUT:

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)				TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3				
42	5210	10.23	9.70	7.96	8.91	33.909	15.30	15.75	PASS

NOTE: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2$ / 4] = 7.25dBi > 6dBi , so the power limit shall be reduced to "Determined Conducted Limit-(7.25-6)"

26dB OCCUPIED BANDWIDTH:

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)			
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3
42	5210	82.81	82.05	81.71	82.42

Note: For FCC output power limitation is determined based on 26dBc bandwidth.

Power Limit = 4dBm + 10logB < UNII Band 1>			
Channel Number	Freq.(MHz)	Min. B(MHz)	Determined Conducted Limit (dBm)
42	5210	81.71	23.12 > 17

4.4 PEAK POWER SPECTRAL DENSITY MEASUREMENT

4.4.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

FREQUENCY BAND	LIMIT
5.15 ~ 5.25GHz	4dBm
5.25 ~ 5.35GHz	11dBm
5.47 – 5.725GHz	11dBm
5.725 ~ 5.825GHz	17dBm

4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP40	100036	Jan. 21, 2013	Jan. 20, 2014

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 : Jan. 17 to 27, 2014

4.4.3 TEST PROCEDURES

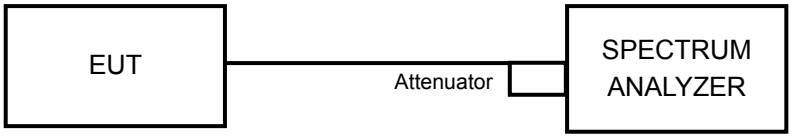
Using method SA-1

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

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 (MODE 1)

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	PSD (dBm)			TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS/FAIL
		CHAIN 1	CHAIN 2	CHAIN 3			
36	5180	-2.49	-1.09	-3.40	2.55	3.92	PASS
40	5200	-2.11	-0.83	-4.27	2.59	3.92	PASS
48	5240	-1.80	-0.56	-4.22	2.83	3.92	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. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 6.08dBi > 6dBi , so the power density limit shall be reduced to 4-(6.08-6) = 3.92dBm.

802.11ac (VHT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	PSD (dBm)			TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS/FAIL
		CHAIN 1	CHAIN 2	CHAIN 3			
36	5180	-3.01	-1.59	-2.49	2.45	3.92	PASS
40	5200	-1.56	-1.39	-2.44	3.00	3.92	PASS
48	5240	-2.71	-1.69	-3.32	2.25	3.92	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. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 6.08dBi > 6dBi , so the power density limit shall be reduced to 4-(6.08-6) = 3.92dBm.

802.11ac (VHT40)

CHANNEL	CHANNEL FREQUENCY (MHz)	PSD (dBm)			TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS/FAIL
		CHAIN 1	CHAIN 2	CHAIN 3			
38	5190	-4.32	-3.83	-7.09	-0.09	3.92	PASS
46	5230	-4.46	-4.02	-6.60	-0.12	3.92	PASS

NOTE:

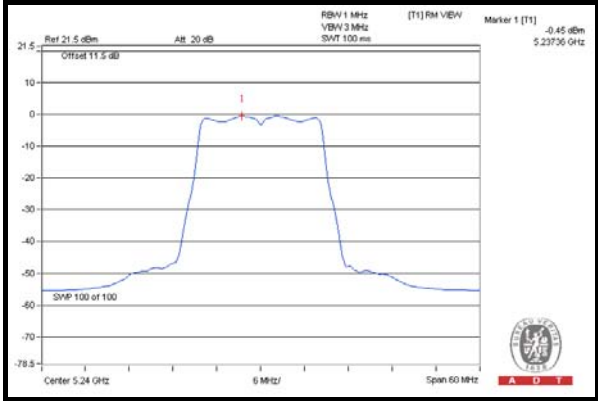
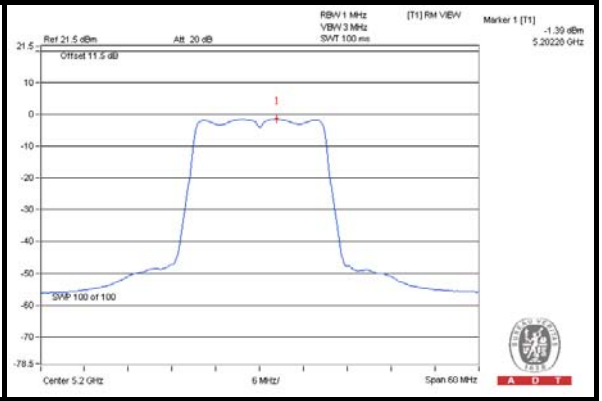
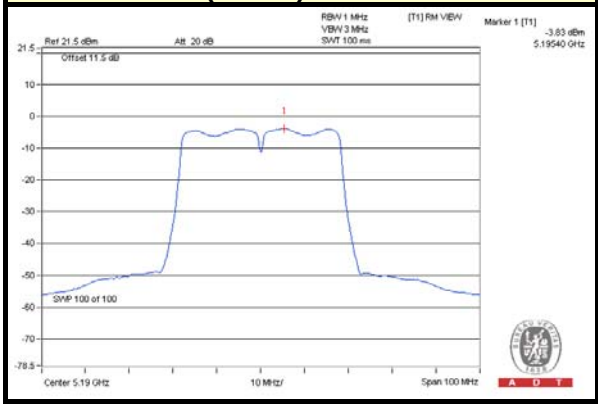
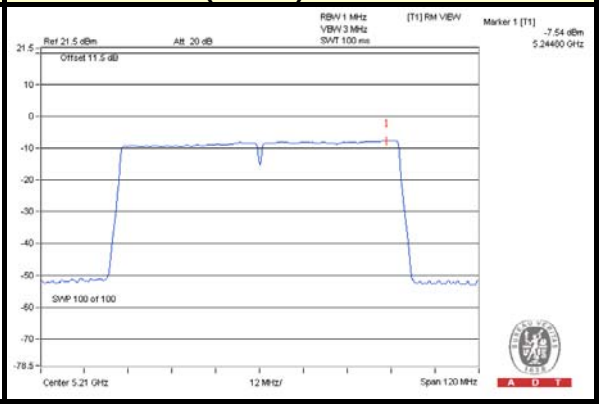
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 6.08dBi > 6dBi , so the power density limit shall be reduced to 4-(6.08-6) = 3.92dBm.

802.11ac (VHT80)

CHANNEL	CHANNEL FREQUENCY (MHz)	PSD (dBm)			TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS/FAIL
		CHAIN 1	CHAIN 2	CHAIN 3			
42	5210	-7.58	-8.45	-10.80	-3.97	3.92	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. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 6.08dBi > 6dBi , so the power density limit shall be reduced to 4-(6.08-6) = 3.92dBm.

SPECTRUM PLOT OF WORST VALUE	
802.11a / Chain 2 / CH48	**802.11ac (VHT20) / Chain 2 / CH40**
	
802.11ac (VHT40) / Chain 2 / CH38	**802.11ac (VHT80) / Chain 1 / CH42**
	

4.4.8 TEST RESULTS (MODE 2)

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	PSD (dBm)				TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS/ FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3			
36	5180	-4.06	-4.04	-4.61	-3.40	2.01	2.75	PASS
40	5200	-4.55	-4.48	-4.81	-4.26	1.50	2.75	PASS
48	5240	-4.02	-3.95	-4.21	-4.23	1.92	2.75	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. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G3/20})^2$ / 4] = 7.25dBi > 6dBi , so the power density limit shall be reduced to 4-(7.25-6) = 2.75dBm.

802.11ac (VHT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	PSD (dBm)				TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS/ FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3			
36	5180	-4.07	-4.42	-4.07	-2.44	2.34	2.75	PASS
40	5200	-3.86	-3.92	-3.21	-2.47	2.70	2.75	PASS
48	5240	-3.70	-3.51	-3.51	-3.32	2.51	2.75	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. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G3/20})^2$ / 4] = 7.25dBi > 6dBi , so the power density limit shall be reduced to 4-(7.25-6) = 2.75dBm.

802.11ac (VHT40)

CHANNEL	CHANNEL FREQUENCY (MHz)	PSD (dBm)				TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS/ FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3			
38	5190	-7.52	-7.83	-7.18	-7.09	-1.38	2.75	PASS
46	5230	-7.06	-6.72	-6.48	-6.56	-0.68	2.75	PASS

NOTE:

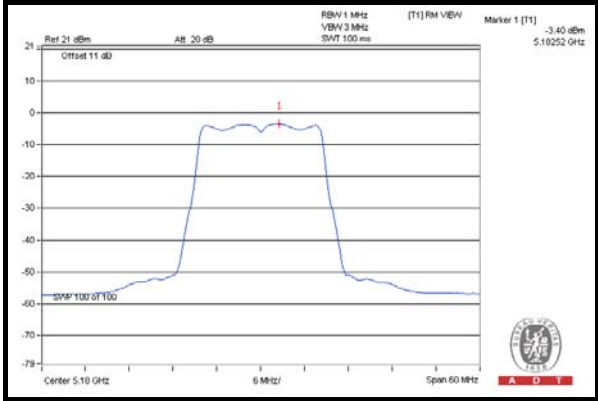
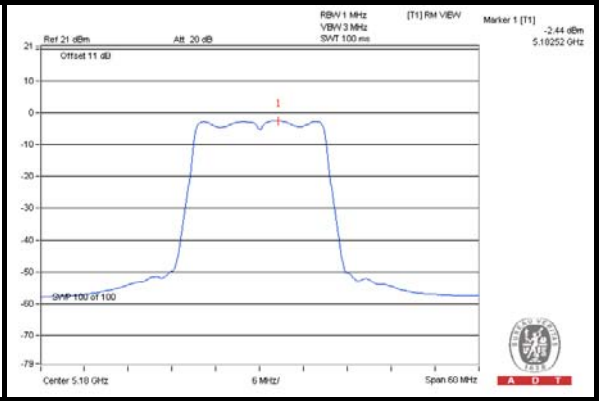
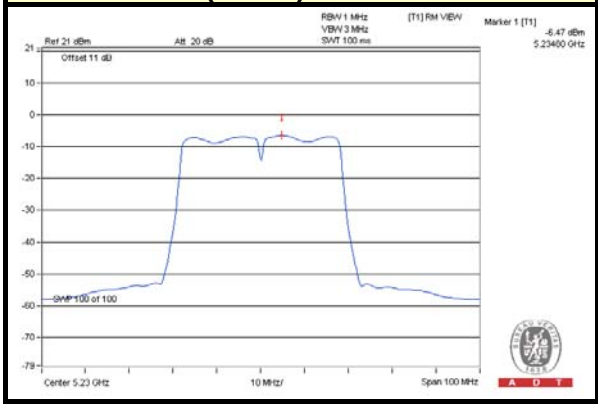
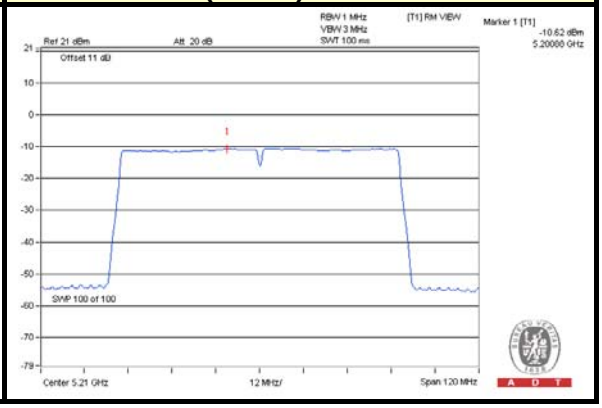
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G3/20})^2$ / 4] = 7.25dBi > 6dBi , so the power density limit shall be reduced to 4-(7.25-6) = 2.75dBm.

802.11ac (VHT80)

CHANNEL	CHANNEL FREQUENCY (MHz)	PSD (dBm)				TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS/ FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3			
42	5210	-11.01	-11.17	-11.09	-10.80	-4.99	2.75	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. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G3/20})^2 / 4]$ = 7.25dBi > 6dBi , so the power density limit shall be reduced to 4-(7.25-6) = 2.75dBm.

SPECTRUM PLOT OF WORST VALUE	
802.11a / Chain 3 / CH36	**802.11ac (VHT20) / Chain 3 / CH36**
	
802.11ac (VHT40) / Chain 2 / CH46	**802.11ac (VHT80) / Chain 3 / CH42**
	

4.5 PEAK POWER EXCURSION MEASUREMENT

4.5.1 LIMITS OF PEAK POWER EXCURSION MEASUREMENT

Shall not exceed 13 dB

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP 40	100036	Jan. 21, 2013	Jan. 20, 2014

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 : Jan. 17, 2014

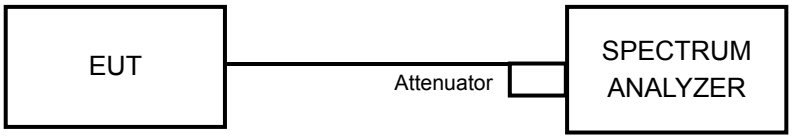
4.5.3 TEST PROCEDURE

1. Set RBW = 1 MHz, VBW ≥ 3 MHz, Detector = peak.
2. Trace mode = max-hold. Allow the sweeps to continue until the trace stabilizes.
3. Use the peak search function to find the peak of the spectrum.
4. Measure the PPSD.
5. Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITIONS

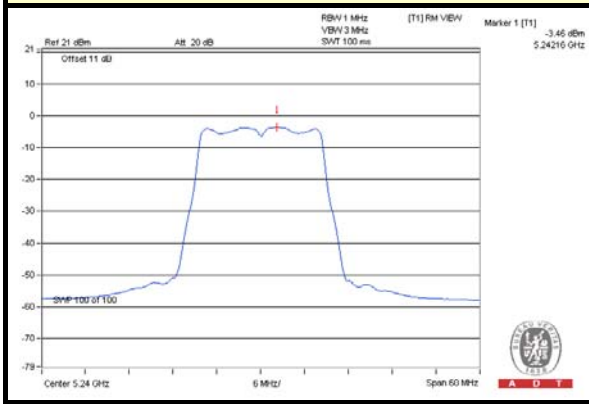
The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

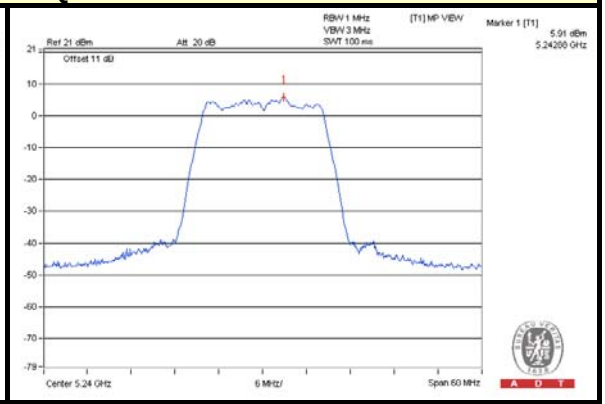
4.5.7 TEST RESULTS

MODULATION MODE	MODULATION TYPE	CHANNEL FREQUENCY (MHz)	PEAK VALUE (dBm)	PPSD (dBm)	PEAK EXCURSION (dB)	LIMIT (dB)	PASS/ FAIL
802.11a	BPSK	5240	3.66	-3.78	7.44	13	PASS
	QPSK		4.88	-3.25	8.13	13	PASS
	16QAM		5.5	-3.02	8.52	13	PASS
	64QAM		5.91	-3.46	9.37	13	PASS
802.11ac (VHT20)	BPSK	5240	4.59	-3.51	8.1	13	PASS
	QPSK		5.68	-3.65	9.33	13	PASS
	16QAM		5.18	-3.56	8.74	13	PASS
	64QAM		6.54	-3.62	10.16	13	PASS
	256QAM		5.72	-3.56	9.28	13	PASS
802.11ac (VHT40)	BPSK	5230	0.55	-6.99	7.54	13	PASS
	QPSK		1.34	-6.74	8.08	13	PASS
	16QAM		1.62	-6.84	8.46	13	PASS
	64QAM		3.98	-6.56	10.54	13	PASS
	256QAM		2.81	-6.73	9.54	13	PASS
802.11ac (VHT80)	BPSK	5210	-2.43	-11.01	8.58	13	PASS
	QPSK		-2.47	-11.31	8.84	13	PASS
	16QAM		-1.97	-10.9	8.93	13	PASS
	64QAM		-2.32	-10.77	8.45	13	PASS
	256QAM		-1.02	-10.79	9.77	13	PASS

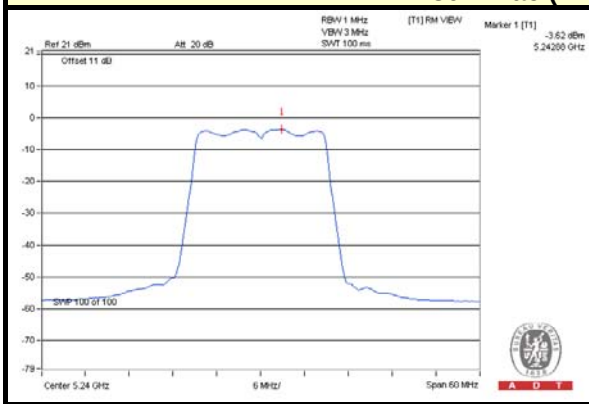
SPECTRUM PLOT OF WORST VALUE

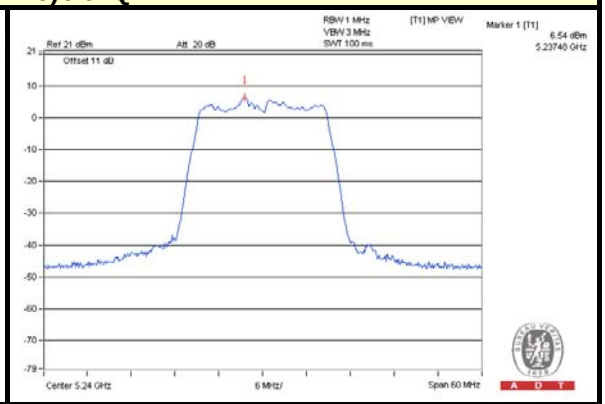
802.11a / 64QAM



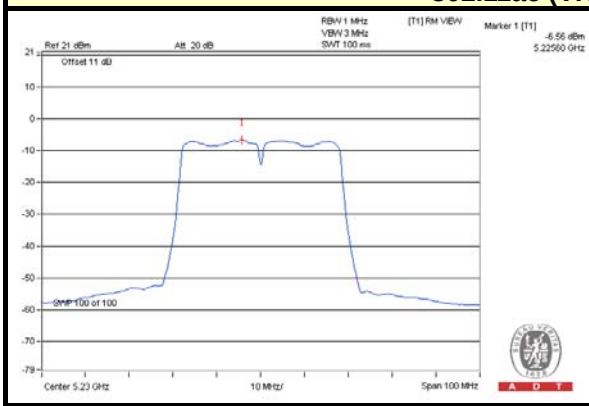


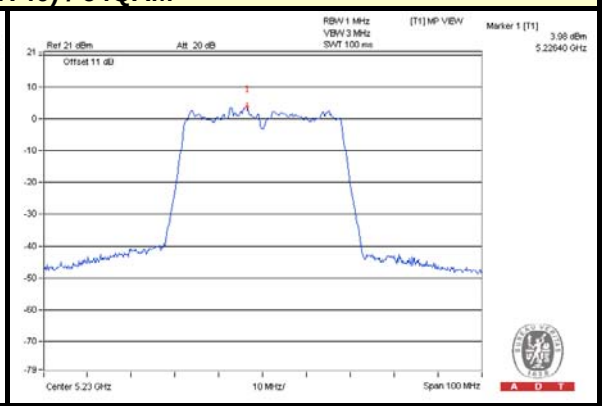
802.11ac (VHT20) / 64QAM



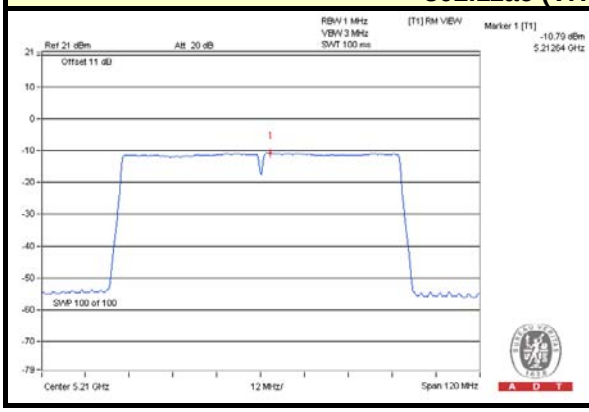


802.11ac (VHT40) / 64QAM





802.11ac (VHT80) / 256QAM



4.6 FREQUENCY STABILITY

4.6.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

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

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP 40	100036	Jan. 21, 2013	Jan. 20, 2014
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 : Jan. 17, 2014

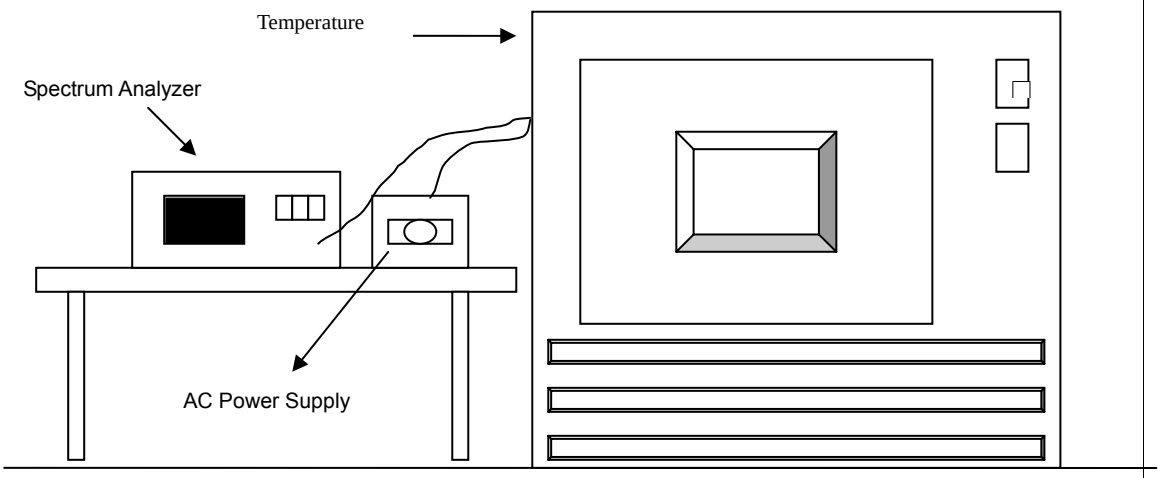
4.6.3 TEST PROCEDURE

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.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



4.6.6 EUT OPERATING CONDITION

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

4.6.7 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	5240.0176	0.00034	5240.021	0.00040	5240.0113	0.00022	5240.019	0.00036
40	120	5240.0291	0.00056	5240.0244	0.00047	5240.0292	0.00056	5240.0242	0.00046
30	120	5239.9991	-0.00002	5239.9983	-0.00003	5239.9978	-0.00004	5240.0002	0.00000
20	120	5239.9847	-0.00029	5239.9835	-0.00031	5239.975	-0.00048	5239.9785	-0.00041
10	120	5240.0008	0.00002	5239.995	-0.00010	5240.0028	0.00005	5240.0029	0.00006
0	120	5240.0058	0.00011	5240.0062	0.00012	5240.0073	0.00014	5240.0058	0.00011
-10	120	5240.0232	0.00044	5240.0245	0.00047	5240.0164	0.00031	5240.0229	0.00044
-20	120	5240.0014	0.00003	5240.0054	0.00010	5240.0038	0.00007	5240.0066	0.00013
-30	120	5239.9982	-0.00003	5239.9918	-0.00016	5239.9989	-0.00002	5239.9928	-0.00014

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	5239.9843	-0.00030	5239.9829	-0.00033	5239.976	-0.00046	5239.9782	-0.00042
	120	5239.9847	-0.00029	5239.9835	-0.00031	5239.975	-0.00048	5239.9785	-0.00041
	102	5239.9853	-0.00028	5239.9828	-0.00033	5239.976	-0.00046	5239.9793	-0.00040

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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Tel: 886-2-26052180
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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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