

FCC TEST REPORT (15.247)

REPORT NO.: RF130904E05

MODEL NO.: J20H081

FCC ID: MCLJ20H081

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TESTED: Sep. 12 to 28, 2013

ISSUED: Oct. 18, 2013

APPLICANT: Hon Hai PRECISION IND.CO.,LTD

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ISSUED BY: Bureau Veritas Consumer Products Services
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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF130904E05	Original release	Oct. 18, 2013



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1. CERTIFICATION

PRODUCT: 802.11ac/abgn/BT wireless module
BRAND NAME: FOXCONN
MODEL NO.: J20H081
TEST SAMPLE: ENGINEERING SAMPLE
APPLICANT: Hon Hai PRECISION IND.CO.,LTD
TESTED: Sep. 12 to 28, 2013
STANDARDS: FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10-2009

The above equipment (Model: J20H081) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Phoenix Huang , **DATE:** Oct. 18, 2013
(Phoenix Huang, Specialist)

APPROVED BY : May Chen , **DATE:** Oct. 18, 2013
(May Chen, Manager)

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

For 2.4GHz, 2400~2483.5MHz Band

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is - 6.28dB at 0.16562MHz
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 4874.00MHz
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted Output power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

For 5GHz, 5725~5850MHz Band

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -5.68dB at 0.16562MHz
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -6.7dB at 304.55MHz
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted Output power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

NOTE:

The EUT was operating in 2.400 ~ 2.4835GHz, 5.15~5.35GHz, 5.47~5.6GHz & 5.65~5.725GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 2.400 ~ 2.4835GHz and 5.725~5.850GHz. For the 5.15~5.35GHz and 5.47~5.6GHz & 5.65~5.725GHz 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)	5.63 dB
Radiated emissions (1GHz -6GHz)	3.73 dB
Radiated emissions (6GHz -18GHz)	3.90 dB
Radiated emissions (18GHz -40GHz)	4.11 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	802.11ac/abgn/BT wireless module
MODEL NO.	J20H081
POWER SUPPLY	DC 5V±5% from host equipment
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode only.
MODULATION TECHNOLOGY	DSSS,OFDM
TRANSFER RATE	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 150Mbps 802.11ac: up to 433.3Mbps
OPERATING FREQUENCY	For 15.407 5GHz: 5.18 ~ 5.24GHz, 5.26 ~ 5.32GHz, 5.50 ~ 5.58GHz & 5.66GHz ~ 5.70GHz
	For 15.247 2.4GHz: 2.412 ~ 2.462GHz 5GHz: 5.745 ~ 5.825GHz
NUMBER OF CHANNEL	For 15.407 16 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 7 for 802.11n (HT40), 802.11ac (VHT40) 3 for 802.11ac (VHT80)
	For 15.247 (2.4GHz) 11 for 802.11b, 802.11g, 802.11n (HT20) 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: 153.462 mW 802.11ac (VHT20): 141.579mW 802.11ac (VHT40): 99.541mW 802.11ac (VHT80): 31.189mW For 15.247 (2.4GHz) 802.11b: 205.116mW 802.11g: 245.471mW 802.11n (HT20): 244.906mW For 15.247 (5GHz) 802.11a: 157.398mW 802.11ac (VHT20): 158.855mW 802.11ac (VHT40): 153.109mW 802.11ac (VHT80): 456.037mW
ANTENNA TYPE	Please see NOTE
DATA CABLE	NA
I/O PORTS	NA
ASSOCIATED DEVICES	NA

NOTE:

- There are Bluetooth technology (BT3.0 without support HS) and WLAN (2.4GHz & 5GHz) technology used for the EUT.
- The antennas provided to the EUT, please refer to the following table:

Transmitter Circuit	Gain (dBi) (Include cable loss)	Antenna Type	Connector Type	Frequency range (MHz to MHz)
Chain (0)	-0.4	PCB	NA	2400~2483.5
	1.12			5150~5850
Chain (1)	0.28	PCB	NA	2400~2483.5
	0.9			5150~5850

3. The EUT incorporates a SISO function without beam forming.

MODULATION MODE	TX/RX FUNCTION
802.11b	1TX/1RX (Diversity)
802.11g	1TX/1RX (Diversity)
802.11n (HT20) <2.4GHz>	1TX/1RX (Diversity)
802.11a	1TX/1RX (Diversity)
802.11n (HT20) <5GHz>	1TX/1RX (Diversity)
802.11n (HT40) <5GHz>	1TX/1RX (Diversity)
802.11ac (VHT20)	1TX/1RX (Diversity)
802.11ac (VHT40)	1TX/1RX (Diversity)
802.11ac (VHT80)	1TX/1RX (Diversity)

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

4. 5GHz & BT technology can transmit at same time.

5. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 7.

6. When the EUT operating in 802.11ac, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 9.

7. 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 2400 ~ 2483.5MHz band:

11 channels are provided for 802.11b, 802.11g, 802.11n (HT20):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz		

Operated in 5725 ~ 5850MHz band:

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

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

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

CHANNEL	FREQUENCY
151	5755 MHz
159	5795 MHz

1 channel is provided for 802.11ac (VHT80):

CHANNEL	FREQUENCY
155	5775 MHz

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO					DESCRIPTION
	PLC	RE < 1G	RE ³ 1G	APCM	OB	
-	√	√	√	√	√	-

Where **PLC**: Power Line Conducted Emission **RE < 1G**: Radiated Emission below 1GHz
RE ³ 1G: Radiated Emission above 1GHz **APCM**: Antenna Port Conducted Measurement
OB: Conducted Out-Band Emission Measurement

Note: The EUT's antenna (PCB) had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane** (for 2.4GHz & 5GHz below 1GHz) and **Z-plane** (for 5GHz 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)
802.11g	1 to 11	6	OFDM	BPSK	6
For 5 GHz 802.11ac (VHT80)	155	155	OFDM	BPSK	29.3

RADIATED EMISSION TEST (BELOW 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11g	1 to 11	6	OFDM	BPSK	6
For 5 GHz 802.11ac (VHT80)	155	155	OFDM	BPSK	29.3

RADIATED EMISSION TEST (ABOVE 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
For 2.4 GHz 802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6
For 5 GHz 802.11ac (VHT20)	149 to 165	149, 157, 165	OFDM	BPSK	6.5
For 5 GHz 802.11ac (VHT40)	151 to 159	151, 159	OFDM	BPSK	13.5
For 5 GHz 802.11ac (VHT80)	155	155	OFDM	BPSK	29.3

ANTENNA PORT CONDUCTED MEASUREMENT:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
For 2.4 GHz 802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6
For 5 GHz 802.11ac (VHT20)	149 to 165	149, 157, 165	OFDM	BPSK	6.5
For 5 GHz 802.11ac (VHT40)	151 to 159	151, 159	OFDM	BPSK	13.5
For 5 GHz 802.11ac (VHT80)	155	155	OFDM	BPSK	29.3

CONDUCTED OUT-BAND EMISSION 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)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
For 2.4 GHz 802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11a	149 to 165	149, 157, 165	OFDM	BPSK	6
For 5 GHz 802.11ac (VHT20)	149 to 165	149, 157, 165	OFDM	BPSK	6.5
For 5 GHz 802.11ac (VHT40)	151 to 159	151, 159	OFDM	BPSK	13.5
For 5 GHz 802.11ac (VHT80)	155	155	OFDM	BPSK	29.3

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
PLC	27deg. C, 52%RH	120Vac, 60Hz	Sean Huang
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Tim Ho
RE ³ 1G	30deg. C, 70%RH	120Vac, 60Hz	Nelson Teng
APCM	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng
OB	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng

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 C. (15.247)
558074 D01 DTS Meas Guidance v03r01
ANSI C63.10-2009

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

3.4 DUTY CYCLE OF TEST SIGNAL

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

802.11b: Duty cycle = 0.961 ms/0.992 ms = 0.969, Duty factor = $10 * \log(1/0.969) = 0.1$

802.11g: Duty cycle = 1.437 ms/1.47 ms = 0.978, Duty factor = $10 * \log(1/0.978) = 0.1$

802.11n (HT20): Duty cycle = 1.347 ms/1.376 ms = 0.979, Duty factor = $10 * \log(1/0.979) = 0.1$



If duty cycle of test signal is > 98 %, duty factor is not required.

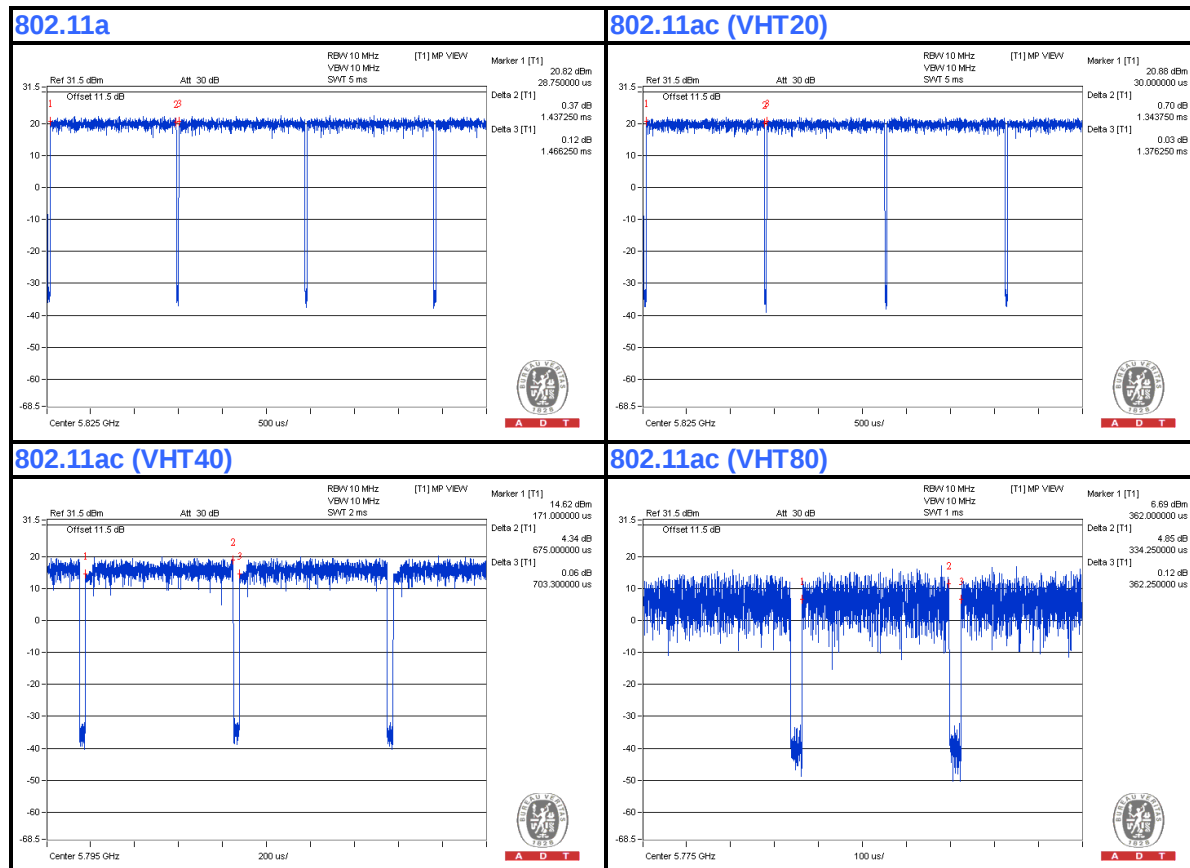
If duty cycle of test signal is < 98%, duty factor shall be considered.

802.11a: Duty cycle = 1.437 ms/1.466 ms = 0.98

802.11ac (VHT20): Duty cycle = 1.344 ms/1.376 ms = 0.977, Duty factor = $10 * \log(1/0.977) = 0.1$

802.11ac (VHT40): Duty cycle = 0.675 ms/0.703 ms = 0.96, Duty factor = $10 * \log(1/0.96) = 0.2$

802.11ac (VHT80): Duty cycle = 0.334 ms/0.362 ms = 0.923, Duty factor = $10 * \log(1/0.923) = 0.3$





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3.5 DESCRIPTION OF SUPPORT UNITS

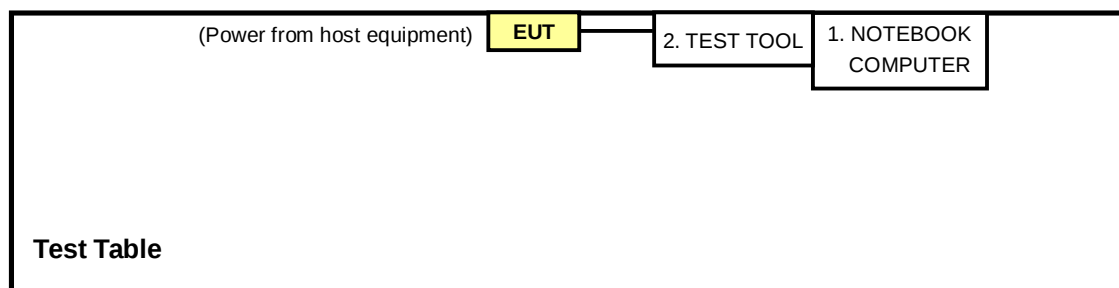
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER (for other test items)	DELL	PP32LA	FSLB32S	FCC DoC
	NOTEBOOK COMPUTER (for Conducted Emission test)	DELL	D531	CN-0XM006-48 643-86L-4472	QDS-BRCM1019
2	TEST TOOL	FOXCONN	NA	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	Data Cable, 0.1m

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

3.6 CONFIGURATION OF SYSTEM UNDER TEST



4. TEST TYPES AND RESULTS (FOR 2.4GHz, 2.400 ~ 2.4835GHz Band)

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	100287	Feb. 28, 2013	Feb. 27, 2014
Line-Impedance Stabilization Network (for EUT) ROHDE & SCHWARZ	ENV216	100071	Nov. 09, 2012	Nov. 08, 2013
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ESH3-Z5	8487731004	Oct. 29, 2012	Oct. 28, 2013
RF Cable (JYEBAO)	5DFB	COACAB-001	May 27, 2013	May 26, 2014
50 ohms Terminator	50	3	Oct. 23, 2012	Oct. 22, 2013
50 ohms Terminator	N/A	EMC-04	Oct. 16, 2012	Oct. 15, 2013
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. A.
3. The VCCI Con A Registration No. is C-817.
4. Tested Date: Sep. 24, 2013

4.1.3 TEST PROCEDURES

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

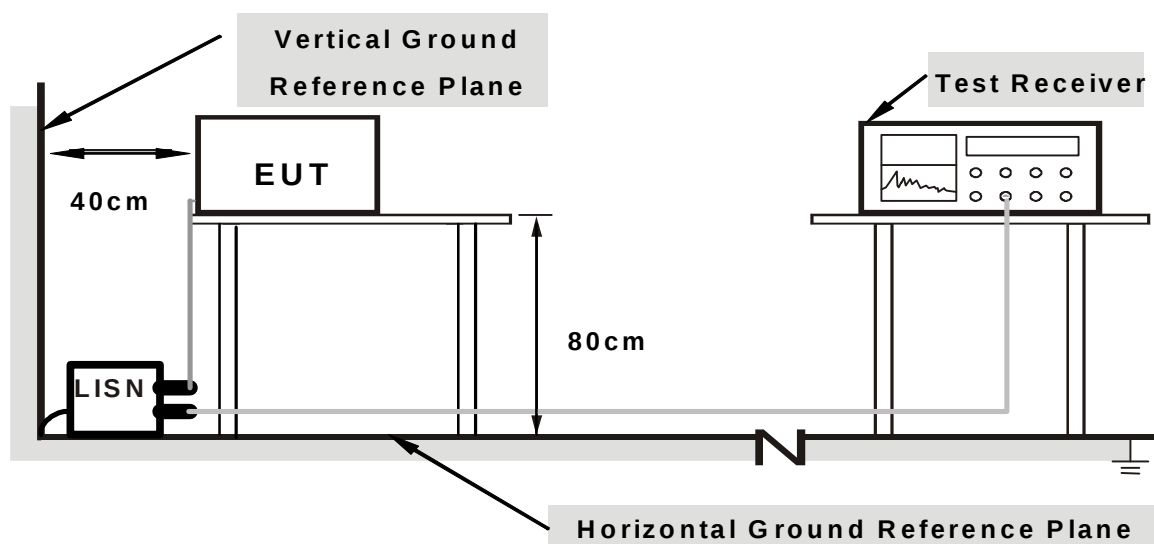
NOTE:

- 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.



A D T

4.1.6 EUT OPERATING CONDITIONS

1. Connect the EUT with the support unit 1 (Notebook Computer) which is placed on a testing table.
2. The communication partner run test program "MT76xxU.exe [Rev2.0.10.0]" to enable EUT under transmission/receiving condition continuously at specific channel frequency.

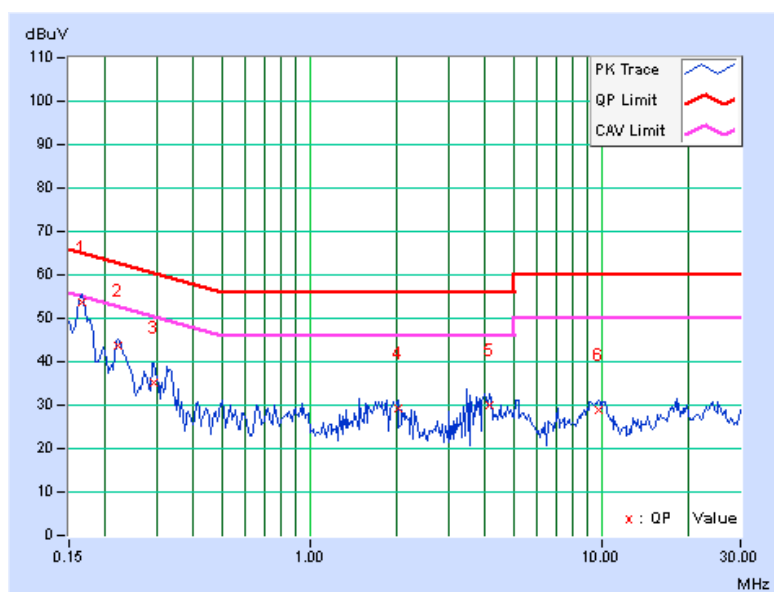
4.1.7 TEST RESULTS

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor [dB]	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16562	9.75	43.84	38.91	53.59	48.66	65.18	55.18	-11.58	-6.51
2	0.22031	9.76	34.03	26.24	43.79	36.00	62.81	52.81	-19.01	-16.80
3	0.29453	9.78	25.48	11.87	35.26	21.65	60.40	50.40	-25.14	-28.75
4	2.00781	9.85	19.45	12.98	29.30	22.83	56.00	46.00	-26.70	-23.17
5	4.12500	9.90	20.05	10.06	29.95	19.96	56.00	46.00	-26.05	-26.04
6	9.74219	10.02	18.85	13.12	28.87	23.14	60.00	50.00	-31.13	-26.86

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

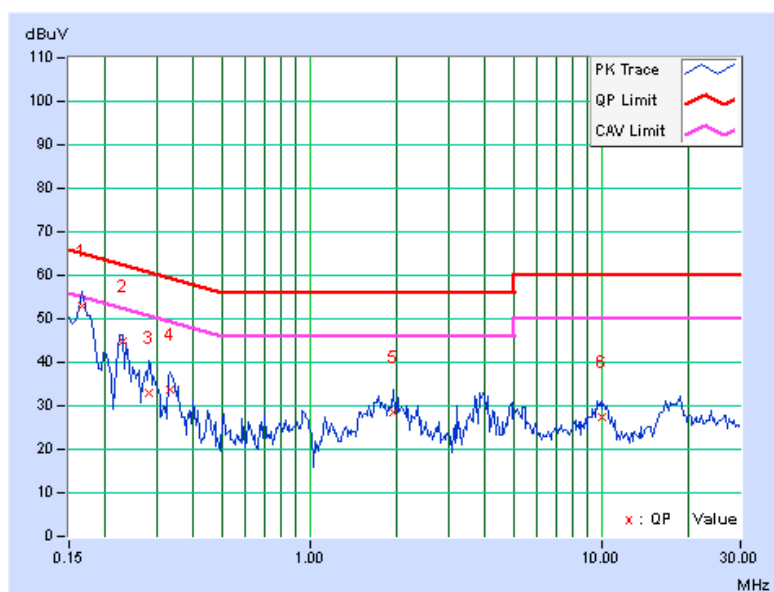


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor [dB]	Q.P. [dB (uV)]	AV. [dB (uV)]	Q.P. [dB (uV)]	AV. [dB (uV)]	Q.P. [dB (uV)]	AV. [dB (uV)]	Q.P. [dB]	AV. [dB]
1	0.16562	9.75	43.13	39.15	52.88	48.90	65.18	55.18	-12.30	-6.28
2	0.22812	9.76	35.17	25.94	44.93	35.70	62.52	52.52	-17.59	-16.82
3	0.28281	9.77	23.18	13.53	32.95	23.30	60.73	50.73	-27.78	-27.43
4	0.33359	9.78	23.87	15.44	33.65	25.22	59.36	49.36	-25.71	-24.14
5	1.94531	9.85	18.51	13.17	28.36	23.02	56.00	46.00	-27.64	-22.98
6	10.01172	10.06	17.32	11.43	27.38	21.49	60.00	50.00	-32.62	-28.51

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 BANDEGE MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION AND BANDEGE MEASUREMENT

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

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

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 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 TEST INSTRUMENTS

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. 06, 2012	Oct. 05, 2013
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. 12, 2012	Oct. 11, 2013
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: Sep. 12 to 28, 2013

4.2.3 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:

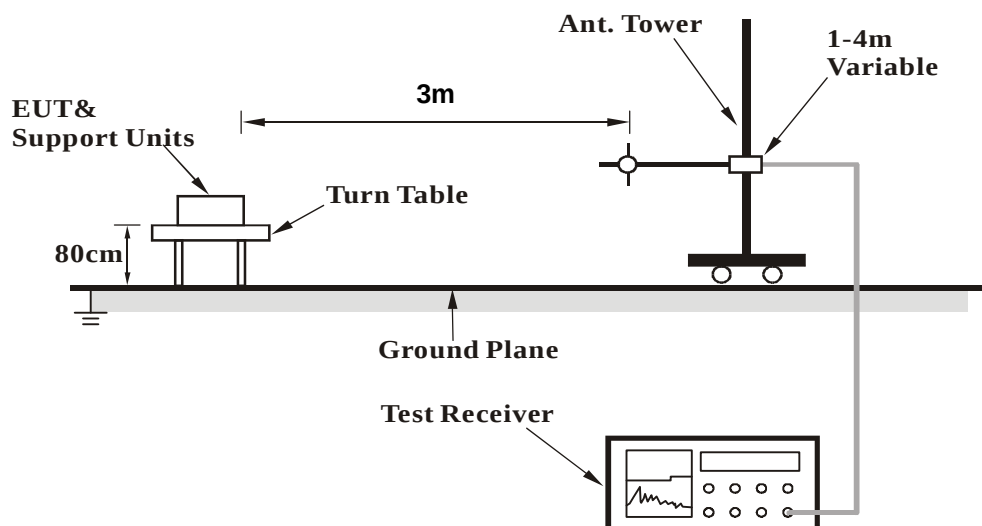
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.2.4 DEVIATION FROM TEST STANDARD

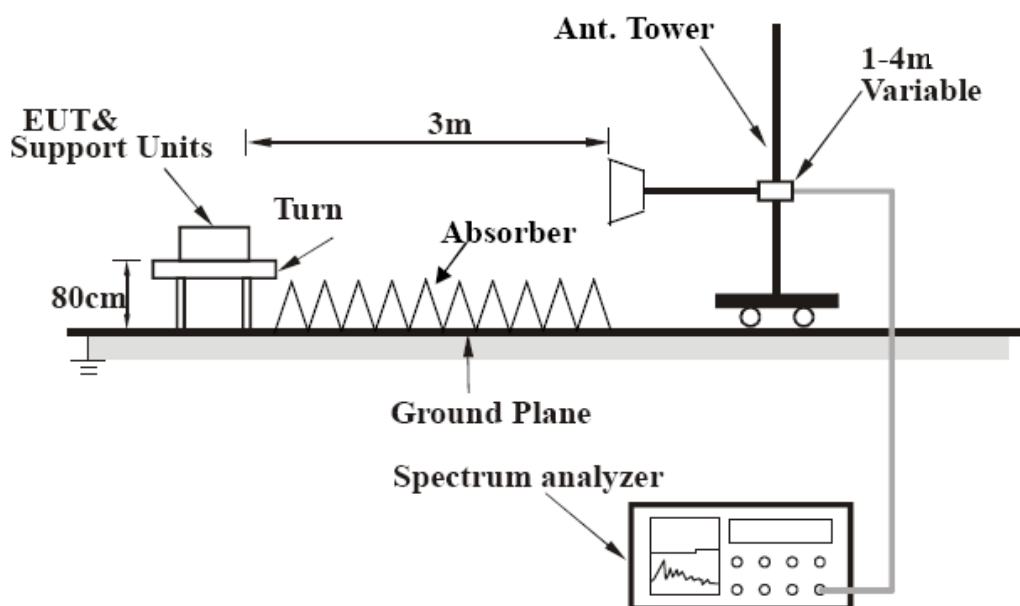
No deviation

4.2.5 TEST SETUP

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



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

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6

4.2.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

802.11g

CHANNEL	TX Channel 6	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	146.06	30.8 QP	43.5	-12.7	2.00 H	102	44.39	-13.56
2	304.56	39.4 QP	46.0	-6.6	1.00 H	100	51.97	-12.60
3	548.71	32.6 QP	46.0	-13.4	2.00 H	239	39.54	-6.94
4	609.19	37.2 QP	46.0	-8.8	1.50 H	77	42.25	-5.04
5	719.09	30.3 QP	46.0	-15.7	1.00 H	42	34.04	-3.72
6	907.56	29.6 QP	46.0	-16.4	1.50 H	65	29.72	-0.13
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	49.64	29.5 QP	40.0	-10.5	1.00 V	317	43.12	-13.60
2	132.19	28.0 QP	43.5	-15.5	1.00 V	34	42.48	-14.50
3	253.54	30.0 QP	46.0	-16.0	2.00 V	173	44.51	-14.48
4	303.01	30.0 QP	46.0	-16.0	1.50 V	299	42.60	-12.64
5	609.24	30.8 QP	46.0	-15.2	1.50 V	57	35.86	-5.04
6	948.25	31.3 QP	46.0	-14.7	1.00 V	74	30.74	0.53

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

802.11b

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	2390.00	58.5 PK	74.0	-15.5	1.10 H	33	59.69	-1.19
2	2390.00	53.1 AV	54.0	-0.9	1.10 H	33	54.29	-1.19
3	*2412.00	106.2 PK			1.10 H	33	107.29	-1.09
4	*2412.00	104.0 AV			1.10 H	33	105.09	-1.09
5	4824.00	57.1 PK	74.0	-16.9	1.02 H	94	49.51	7.59
6	4824.00	52.5 AV	54.0	-1.5	1.02 H	94	44.91	7.59

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	2390.00	54.2 PK	74.0	-19.8	1.00 V	248	55.39	-1.19
2	2390.00	48.4 AV	54.0	-5.6	1.00 V	248	49.59	-1.19
3	*2412.00	101.6 PK			1.00 V	248	102.69	-1.09
4	*2412.00	99.1 AV			1.00 V	248	100.19	-1.09
5	4824.00	56.4 PK	74.0	-17.6	1.88 V	189	48.81	7.59
6	4824.00	52.2 AV	54.0	-1.8	1.88 V	189	44.61	7.59

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.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	*2437.00	108.9 PK			1.35 H	36	109.89	-0.99
2	*2437.00	104.9 AV			1.35 H	36	105.89	-0.99
3	4874.00	58.3 PK	74.0	-15.7	1.16 H	213	50.53	7.77
4	4874.00	53.9 AV	54.0	-0.1	1.16 H	213	46.13	7.77
5	7311.00	55.7 PK	74.0	-18.3	1.00 H	29	40.21	15.49
6	7311.00	43.9 AV	54.0	-10.1	1.00 H	29	28.41	15.49
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	*2437.00	104.5 PK			1.00 V	249	105.49	-0.99
2	*2437.00	100.4 AV			1.00 V	249	101.39	-0.99
3	4874.00	55.6 PK	74.0	-18.4	1.40 V	128	47.83	7.77
4	4874.00	50.2 AV	54.0	-3.8	1.40 V	128	42.43	7.77
5	7311.00	55.4 PK	74.0	-18.6	1.16 V	169	39.91	15.49
6	7311.00	43.7 AV	54.0	-10.3	1.16 V	169	28.21	15.49

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.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	*2462.00	105.5 PK			1.07 H	37	106.39	-0.89
2	*2462.00	103.2 AV			1.07 H	37	104.09	-0.89
3	2483.50	59.3 PK	74.0	-14.7	1.07 H	37	60.10	-0.80
4	2483.50	53.4 AV	54.0	-0.6	1.07 H	37	54.20	-0.80
5	4924.00	56.4 PK	74.0	-17.6	1.15 H	220	48.46	7.94
6	4924.00	51.5 AV	54.0	-2.5	1.15 H	220	43.56	7.94
7	7386.00	55.8 PK	74.0	-18.2	1.00 H	37	40.29	15.51
8	7386.00	44.0 AV	54.0	-10.0	1.00 H	37	28.49	15.51
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	*2462.00	101.6 PK			1.04 V	239	102.49	-0.89
2	*2462.00	99.4 AV			1.04 V	239	100.29	-0.89
3	2483.50	54.9 PK	74.0	-19.1	1.04 V	243	55.70	-0.80
4	2483.50	49.2 AV	54.0	-4.8	1.04 V	243	50.00	-0.80
5	4924.00	55.1 PK	74.0	-18.9	1.35 V	140	47.16	7.94
6	4924.00	49.7 AV	54.0	-4.3	1.35 V	140	41.76	7.94
7	7386.00	56.1 PK	74.0	-17.9	1.13 V	157	40.59	15.51
8	7386.00	44.1 AV	54.0	-9.9	1.13 V	157	28.59	15.51

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.

802.11g

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	2390.00	70.4 PK	74.0	-3.6	1.10 H	35	71.59	-1.19
2	2390.00	53.4 AV	54.0	-0.6	1.10 H	35	54.59	-1.19
3	*2412.00	106.2 PK			1.10 H	35	107.29	-1.09
4	*2412.00	95.7 AV			1.10 H	35	96.79	-1.09
5	4824.00	48.3 PK	74.0	-25.7	1.15 H	220	40.71	7.59
6	4824.00	36.1 AV	54.0	-17.9	1.15 H	220	28.51	7.59
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	2390.00	66.2 PK	74.0	-7.8	1.09 V	227	67.39	-1.19
2	2390.00	49.4 AV	54.0	-4.6	1.09 V	227	50.59	-1.19
3	*2412.00	101.6 PK			1.09 V	227	102.69	-1.09
4	*2412.00	91.3 AV			1.09 V	227	92.39	-1.09
5	4824.00	47.7 PK	74.0	-26.3	1.37 V	112	40.11	7.59
6	4824.00	35.7 AV	54.0	-18.3	1.37 V	112	28.11	7.59

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.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	2390.00	59.4 PK	74.0	-14.6	1.08 H	35	60.59	-1.19
2	2390.00	47.1 AV	54.0	-6.9	1.08 H	35	48.29	-1.19
3	*2437.00	108.3 PK			1.08 H	35	109.29	-0.99
4	*2437.00	97.7 AV			1.08 H	35	98.69	-0.99
5	2483.50	61.4 PK	74.0	-12.6	1.08 H	35	62.20	-0.80
6	2483.50	47.7 AV	54.0	-6.3	1.08 H	35	48.50	-0.80
7	4874.00	50.1 PK	74.0	-23.9	1.12 H	220	42.33	7.77
8	4874.00	37.5 AV	54.0	-16.5	1.12 H	220	29.73	7.77
9	7311.00	55.5 PK	74.0	-18.5	1.03 H	31	40.01	15.49
10	7311.00	43.8 AV	54.0	-10.2	1.03 H	31	28.31	15.49
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	2390.00	55.3 PK	74.0	-18.7	1.10 V	235	56.49	-1.19
2	2390.00	43.2 AV	54.0	-10.8	1.10 V	235	44.39	-1.19
3	*2437.00	104.5 PK			1.10 V	235	105.49	-0.99
4	*2437.00	93.7 AV			1.10 V	235	94.69	-0.99
5	2483.50	57.4 PK	74.0	-16.6	1.10 V	235	58.20	-0.80
6	2483.50	43.7 AV	54.0	-10.3	1.10 V	235	44.50	-0.80
7	4874.00	46.9 PK	74.0	-27.1	1.38 V	96	39.13	7.77
8	4874.00	35.2 AV	54.0	-18.8	1.38 V	96	27.43	7.77
9	7311.00	55.7 PK	74.0	-18.3	1.22 V	159	40.21	15.49
10	7311.00	43.9 AV	54.0	-10.1	1.22 V	159	28.41	15.49

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.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	*2462.00	106.1 PK			1.07 H	37	106.99	-0.89
2	*2462.00	95.5 AV			1.07 H	37	96.39	-0.89
3	2483.50	73.0 PK	74.0	-1.0	1.07 H	37	73.80	-0.80
4	2483.50	53.1 AV	54.0	-0.9	1.07 H	37	53.90	-0.80
5	4924.00	48.4 PK	74.0	-25.6	1.19 H	234	40.46	7.94
6	4924.00	36.3 AV	54.0	-17.7	1.19 H	234	28.36	7.94
7	7386.00	56.1 PK	74.0	-17.9	1.05 H	40	40.59	15.51
8	7386.00	44.0 AV	54.0	-10.0	1.05 H	40	28.49	15.51
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	*2462.00	102.0 PK			1.14 V	237	102.89	-0.89
2	*2462.00	91.6 AV			1.14 V	237	92.49	-0.89
3	2483.50	68.6 PK	74.0	-5.4	1.14 V	237	69.40	-0.80
4	2483.50	48.9 AV	54.0	-5.1	1.14 V	237	49.70	-0.80
5	4924.00	47.9 PK	74.0	-26.1	1.38 V	96	39.96	7.94
6	4924.00	36.1 AV	54.0	-17.9	1.38 V	96	28.16	7.94
7	7386.00	55.8 PK	74.0	-18.2	1.22 V	159	40.29	15.51
8	7386.00	43.8 AV	54.0	-10.2	1.22 V	159	28.29	15.51

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.

802.11n (HT20)

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	2390.00	70.1 PK	74.0	-3.9	1.10 H	38	71.29	-1.19
2	2390.00	52.2 AV	54.0	-1.8	1.10 H	38	53.39	-1.19
3	*2412.00	104.6 PK			1.10 H	38	105.69	-1.09
4	*2412.00	94.2 AV			1.10 H	38	95.29	-1.09
5	4824.00	48.0 PK	74.0	-26.0	1.15 H	225	40.41	7.59
6	4824.00	35.9 AV	54.0	-18.1	1.15 H	225	28.31	7.59
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	2390.00	66.4 PK	74.0	-7.6	1.17 V	236	67.59	-1.19
2	2390.00	48.4 AV	54.0	-5.6	1.17 V	236	49.59	-1.19
3	*2412.00	100.6 PK			1.17 V	236	101.69	-1.09
4	*2412.00	90.0 AV			1.17 V	236	91.09	-1.09
5	4824.00	47.6 PK	74.0	-26.4	1.44 V	86	40.01	7.59
6	4824.00	35.9 AV	54.0	-18.1	1.44 V	86	28.31	7.59

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.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	2390.00	59.7 PK	74.0	-14.3	1.13 H	31	60.89	-1.19
2	2390.00	47.3 AV	54.0	-6.7	1.13 H	31	48.49	-1.19
3	*2437.00	108.4 PK			1.13 H	31	109.39	-0.99
4	*2437.00	98.0 AV			1.13 H	31	98.99	-0.99
5	2483.50	61.2 PK	74.0	-12.8	1.13 H	31	62.00	-0.80
6	2483.50	47.8 AV	54.0	-6.2	1.13 H	31	48.60	-0.80
7	4874.00	50.1 PK	74.0	-23.9	1.17 H	215	42.33	7.77
8	4874.00	37.2 AV	54.0	-16.8	1.17 H	215	29.43	7.77
9	7311.00	56.0 PK	74.0	-18.0	1.00 H	19	40.51	15.49
10	7311.00	44.1 AV	54.0	-9.9	1.00 H	19	28.61	15.49
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	2390.00	56.1 PK	74.0	-17.9	1.13 V	233	57.29	-1.19
2	2390.00	43.7 AV	54.0	-10.3	1.13 V	233	44.89	-1.19
3	*2437.00	104.7 PK			1.13 V	233	105.69	-0.99
4	*2437.00	94.3 AV			1.13 V	233	95.29	-0.99
5	2483.50	57.4 PK	74.0	-16.6	1.13 V	233	58.20	-0.80
6	2483.50	44.2 AV	54.0	-9.8	1.13 V	233	45.00	-0.80
7	4874.00	48.1 PK	74.0	-25.9	1.35 V	90	40.33	7.77
8	4874.00	36.4 AV	54.0	-17.6	1.35 V	90	28.63	7.77
9	7311.00	56.6 PK	74.0	-17.4	1.19 V	172	41.11	15.49
10	7311.00	44.5 AV	54.0	-9.5	1.19 V	172	29.01	15.49

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.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	*2462.00	105.6 PK			1.07 H	36	106.49	-0.89
2	*2462.00	94.6 AV			1.07 H	36	95.49	-0.89
3	2483.50	73.6 PK	74.0	-0.4	1.07 H	36	74.40	-0.80
4	2483.50	53.5 AV	54.0	-0.5	1.07 H	36	54.30	-0.80
5	4924.00	49.9 PK	74.0	-24.1	1.20 H	222	41.96	7.94
6	4924.00	37.1 AV	54.0	-16.9	1.20 H	222	29.16	7.94
7	7386.00	55.8 PK	74.0	-18.2	1.02 H	30	40.29	15.51
8	7386.00	44.0 AV	54.0	-10.0	1.02 H	30	28.49	15.51
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	*2462.00	101.1 PK			1.13 V	227	101.99	-0.89
2	*2462.00	90.2 AV			1.13 V	227	91.09	-0.89
3	2483.50	69.8 PK	74.0	-4.2	1.13 V	227	70.60	-0.80
4	2483.50	49.7 AV	54.0	-4.3	1.13 V	227	50.50	-0.80
5	4924.00	47.3 PK	74.0	-26.7	1.35 V	84	39.36	7.94
6	4924.00	35.9 AV	54.0	-18.1	1.35 V	84	27.96	7.94
7	7386.00	56.8 PK	74.0	-17.2	1.23 V	180	41.29	15.51
8	7386.00	44.9 AV	54.0	-9.1	1.23 V	180	29.39	15.51

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.

4.3 6dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 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 : Sep. 16, 2013

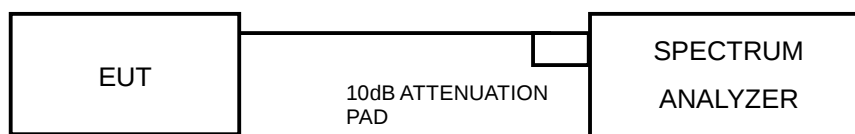
4.3.3 TEST PROCEDURE

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

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



4.3.6 EUT OPERATING CONDITIONS

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

4.3.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	8.41	0.5	PASS
6	2437	9.11	0.5	PASS
11	2462	8.52	0.5	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.38	0.5	PASS
6	2437	16.01	0.5	PASS
11	2462	16.35	0.5	PASS

802.11n (HT20)

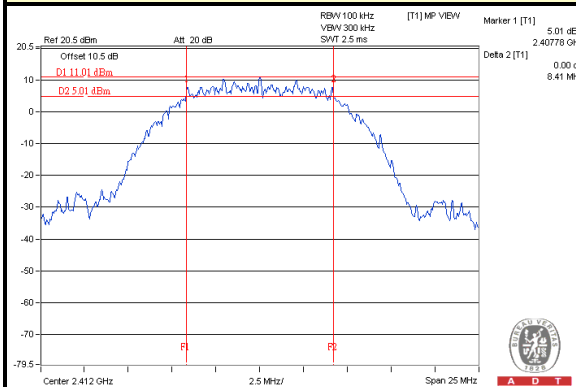
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.32	0.5	PASS
6	2437	17.03	0.5	PASS
11	2462	17.00	0.5	PASS



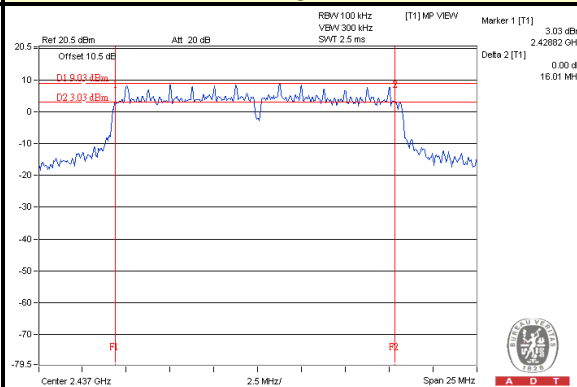
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SPECTRUM PLOT OF WORST VALUE

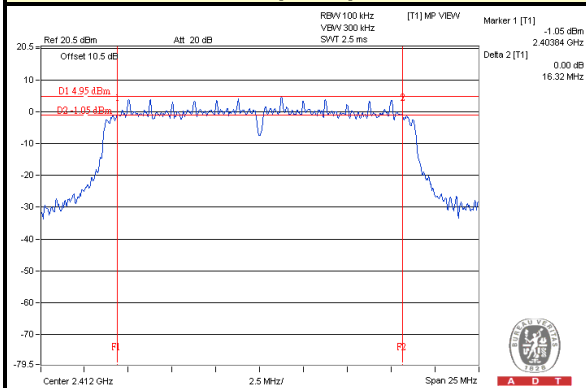
802.11b / CH1



802.11g / CH6



802.11n (HT20) / CH1



4.4 CONDUCTED OUTPUT POWER MEASUREMENT

4.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

4.4.2 INSTRUMENTS

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 : Sep. 16, 2013

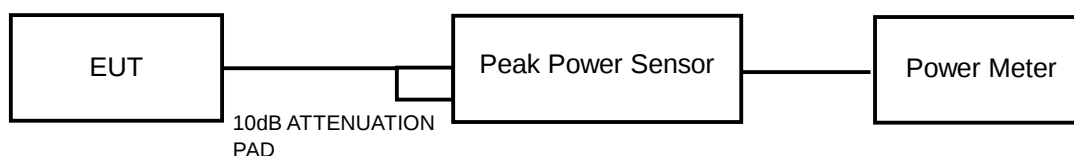
4.4.3 TEST PROCEDURES

The peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the peak power level.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6

4.4.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	138.995	21.43	30	PASS
6	2437	205.116	23.12	30	PASS
11	2462	192.752	22.85	30	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	205.116	23.12	30	PASS
6	2437	245.471	23.90	30	PASS
11	2462	201.372	23.04	30	PASS

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	186.638	22.71	30	PASS
6	2437	244.906	23.89	30	PASS
11	2462	192.309	22.84	30	PASS

4.5 AVERAGE OUTPUT POWER

4.5.1 FOR REFERENCE.

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter	ML2495A	0824006	May 20, 2013	May 19, 2014
Power Sensor	MA2411B	0738172	May 20, 2013	May 19, 2014

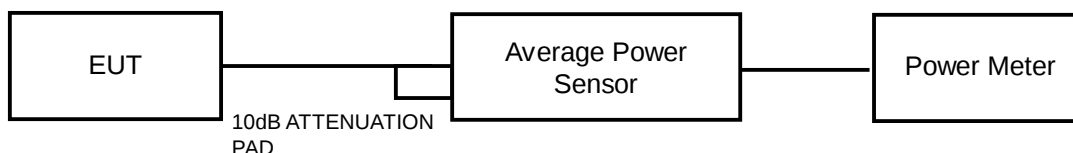
Note:

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 : Sep. 16, 2013

4.5.3 TEST PROCEDURES

The average power sensor was used on the output port of the EUT. A power meter was used to read the response of the power sensor. Record the power level.

4.5.4 TEST SETUP



4.5.5 EUT OPERATING CONDITIONS

Same as Item 4.3.6

TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	66.681	18.24
6	2437	125.314	20.98
11	2462	113.763	20.56

802.11g

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	45.290	16.56
6	2437	99.541	19.98
11	2462	46.238	16.65

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	38.815	15.89
6	2437	99.541	19.98
11	2462	39.902	16.01

4.6 POWER SPECTRAL DENSITY MEASUREMENT

4.6.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

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

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 : Sep. 16, 2013

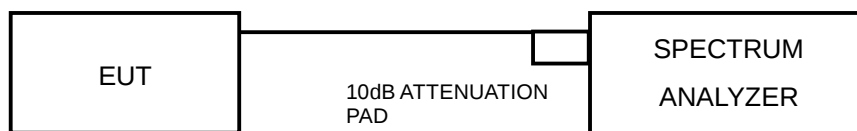
4.6.3 TEST PROCEDURE

1. Set the RBW = 3 kHz, VBW = 10 kHz, Detector = peak.
2. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
3. Use the peak marker function to determine the maximum amplitude level.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.6.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
1	2412	-4.56	8	PASS
6	2437	-3.09	8	PASS
11	2462	-3.36	8	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
1	2412	-11.56	8	PASS
6	2437	-7.30	8	PASS
11	2462	-10.89	8	PASS

802.11n (HT20)

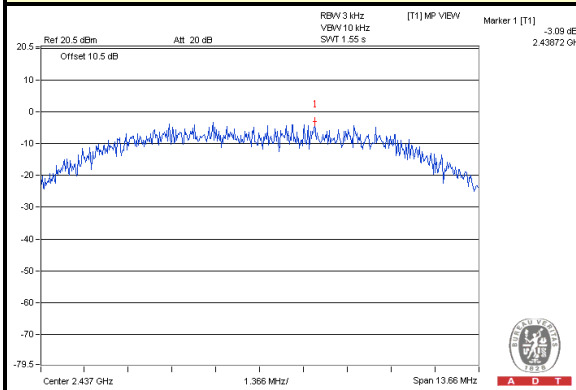
CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
1	2412	-10.90	8	PASS
6	2437	-7.70	8	PASS
11	2462	-11.61	8	PASS



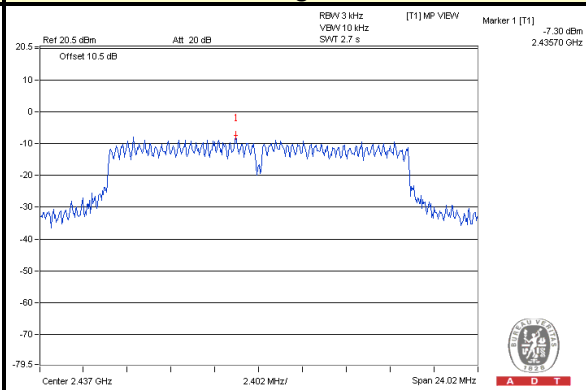
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SPECTRUM PLOT OF WORST VALUE

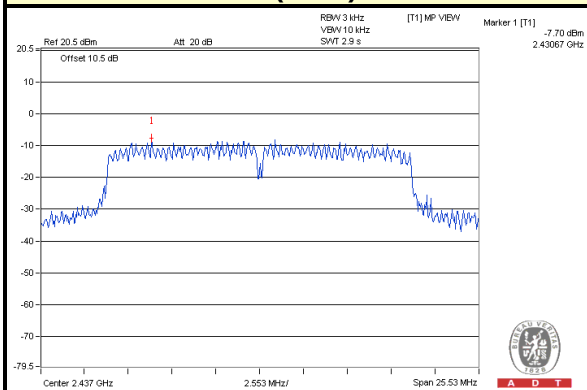
802.11b / CH6



802.11g / CH6



802.11n (HT20) / CH6





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4.7 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.7.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

Below 20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.7.2 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 : Sep. 16, 2013

4.7.3 TEST PROCEDURE

Measurement Procedure - Reference Level

1. Set the RBW = 100 kHz.
2. Set the VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

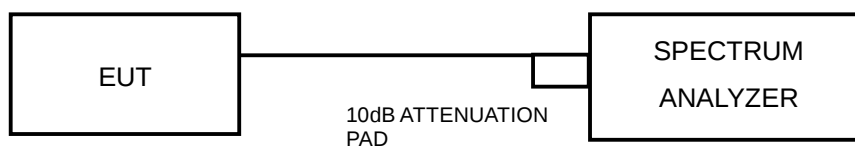
Measurement Procedure –Unwanted Emission Level

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 300 kHz.
3. Set span to encompass the spectrum to be examined
4. Detector = peak.
5. Trace Mode = max hold.
6. Sweep = auto couple.

4.7.4 DEVIATION FROM TEST STANDARD

No deviation

4.7.5 TEST SETUP



4.7.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.7.7 TEST RESULTS

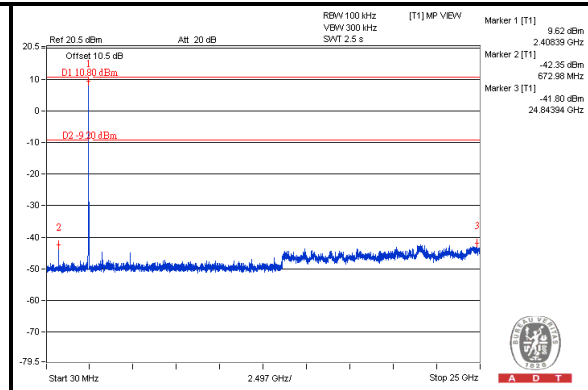
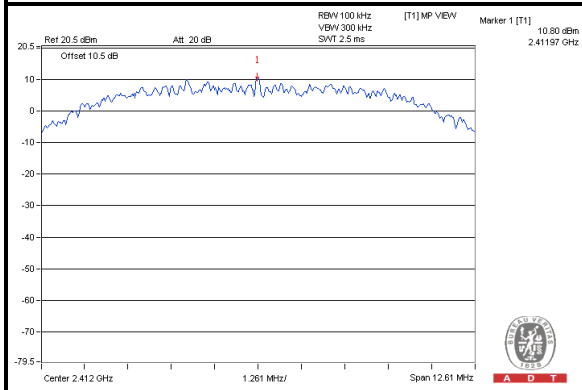
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



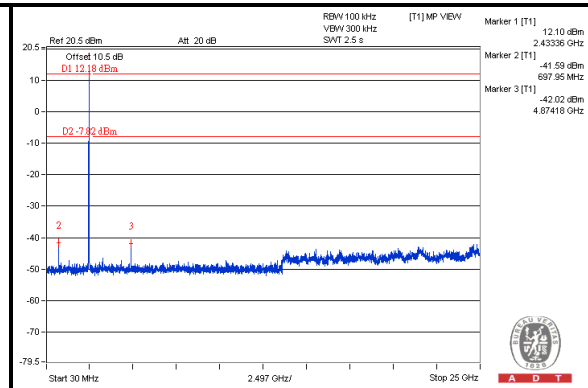
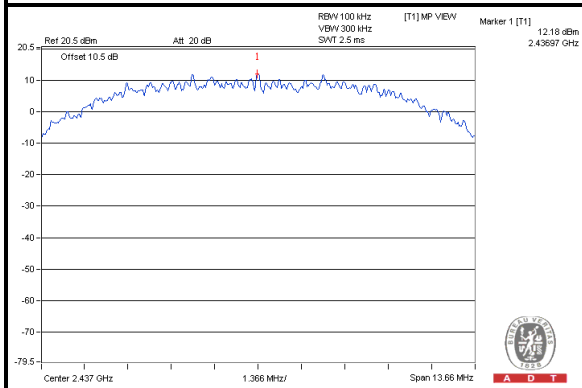
A D T

802.11b

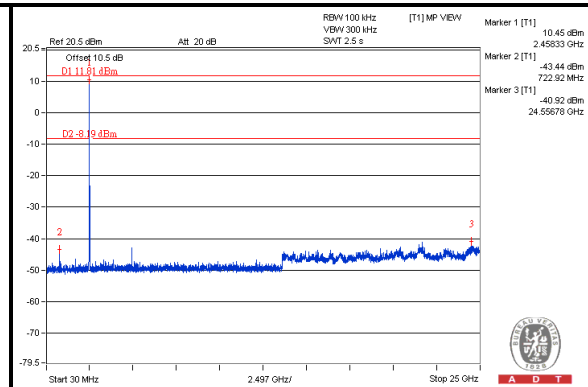
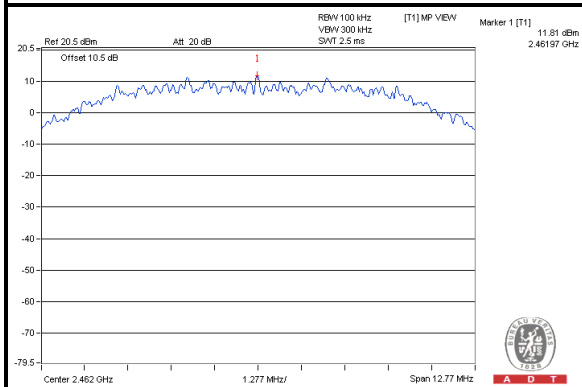
CH 1



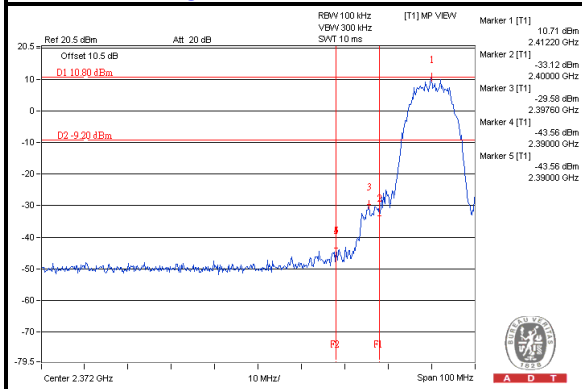
CH 6



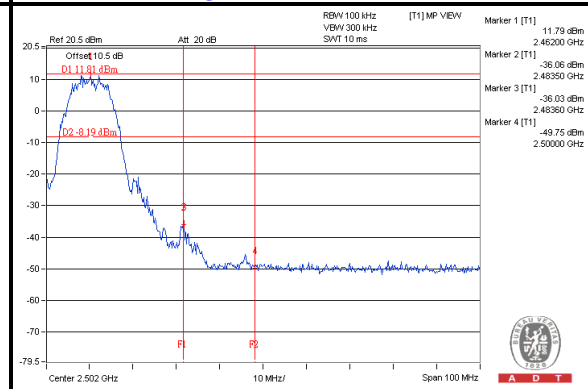
CH 11



CH 1 Band edge



CH 11 Band edge

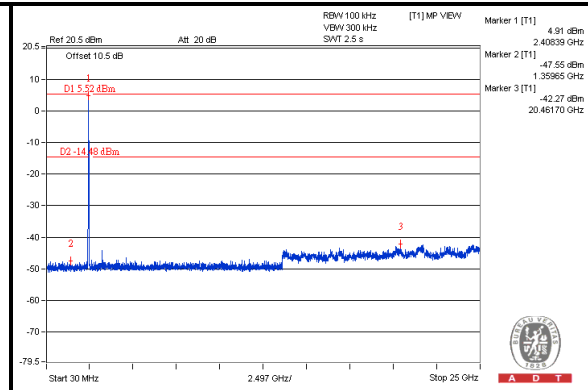
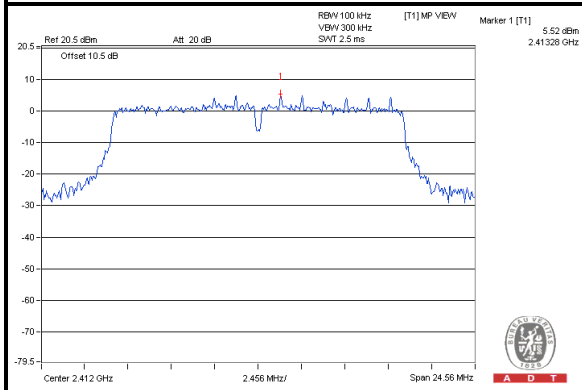




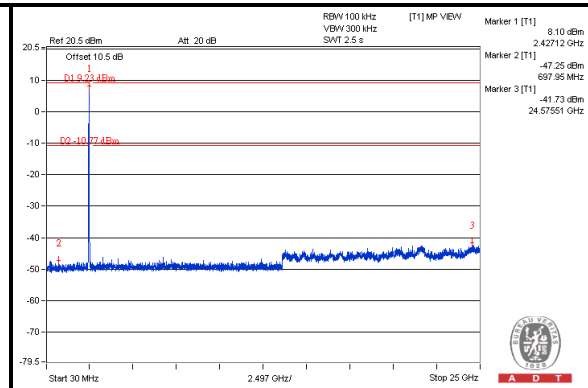
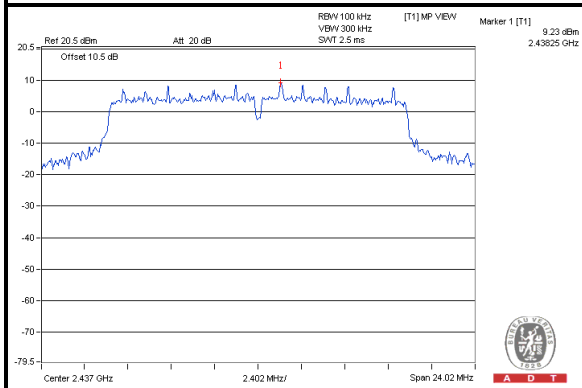
A D T

802.11g

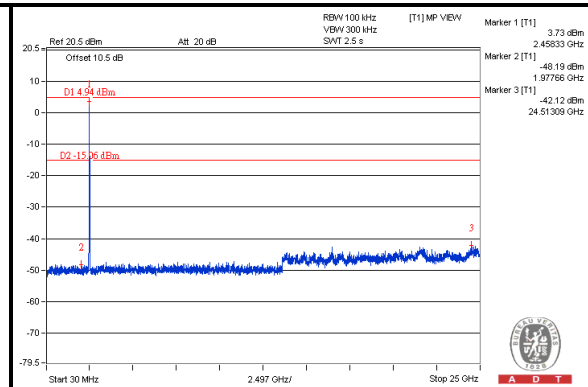
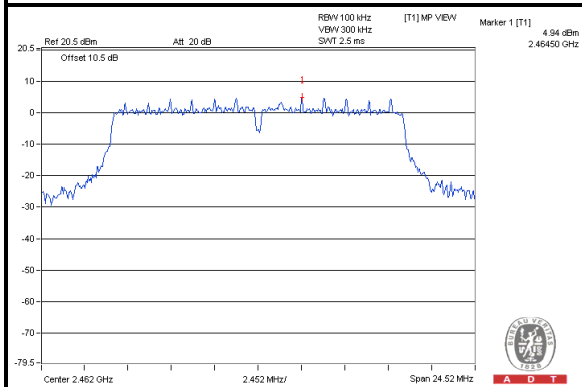
CH 1



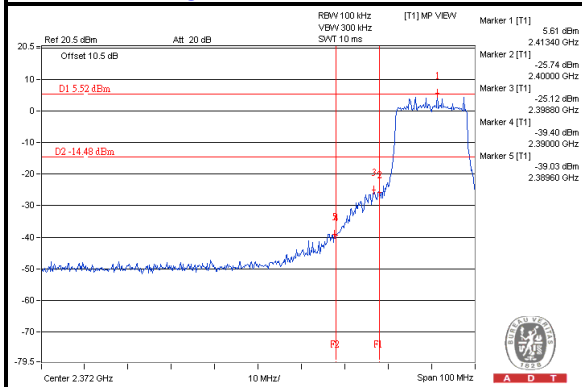
CH 6



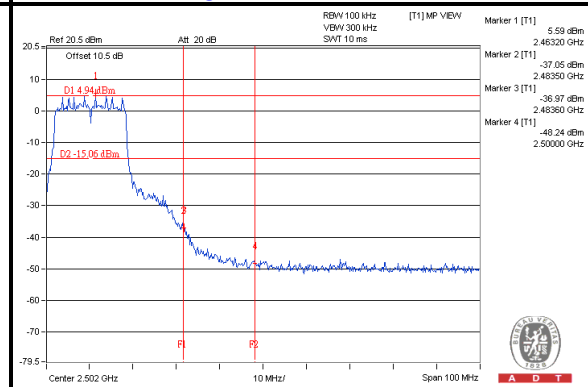
CH 11



CH 1 Band edge



CH 11 Band edge

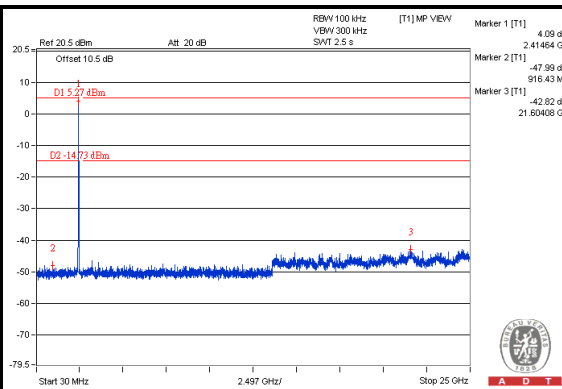
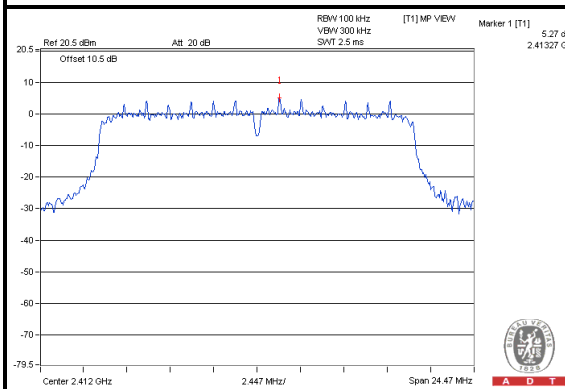




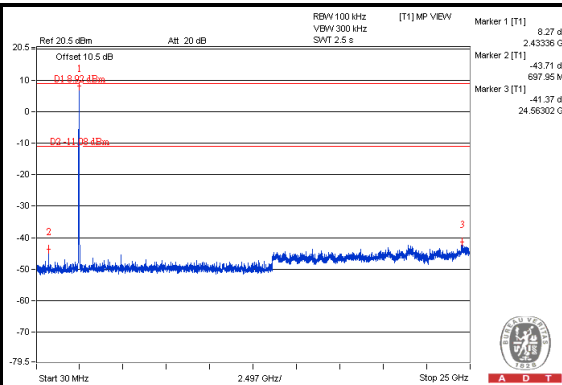
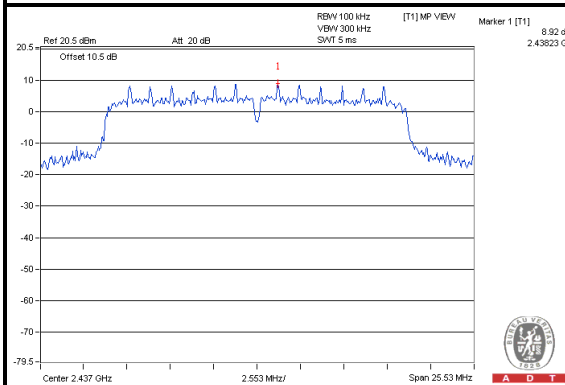
A D T

802.11n (HT20)

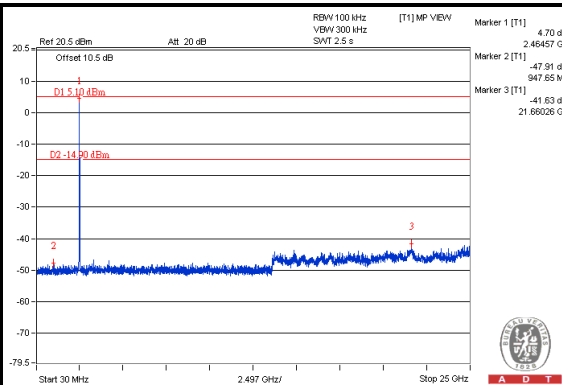
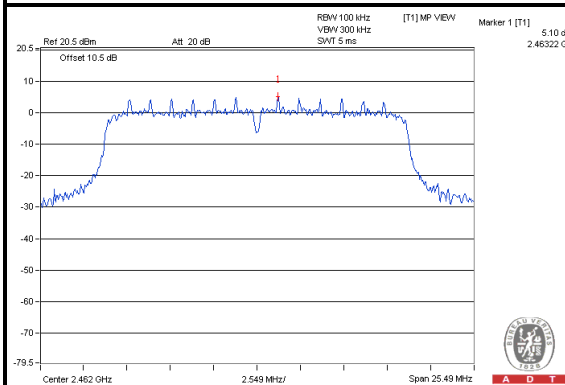
CH 1



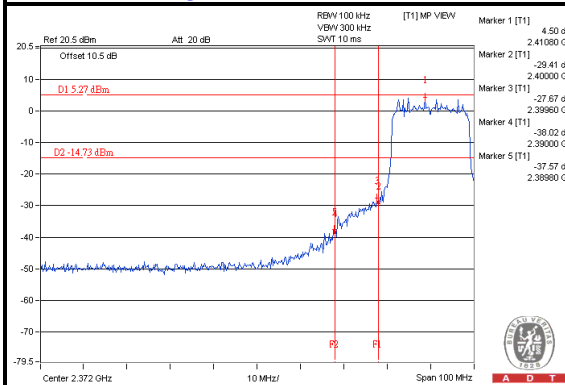
CH 6



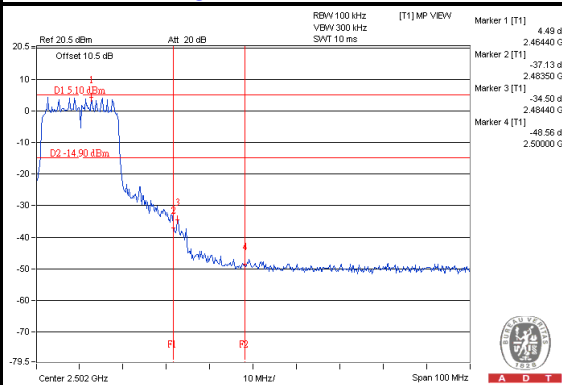
CH 11



CH 1 Band edge



CH 11 Band edge



5. TEST TYPES AND RESULTS (FOR 5GHz, 5.725~5.850GHz Band)

5.1 CONDUCTED EMISSION MEASUREMENT

5.1.1 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.

5.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100287	Feb. 28, 2013	Feb. 27, 2014
Line-Impedance Stabilization Network (for EUT) ROHDE & SCHWARZ	ENV216	100071	Nov. 09, 2012	Nov. 08, 2013
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ESH3-Z5	8487731004	Oct. 29, 2012	Oct. 28, 2013
RF Cable (JYEBAO)	5DFB	COACAB-001	May 27, 2013	May 26, 2014
50 ohms Terminator	50	3	Oct. 23, 2012	Oct. 22, 2013
50 ohms Terminator	N/A	EMC-04	Oct. 16, 2012	Oct. 15, 2013
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. A.
3. The VCCI Con A Registration No. is C-817.
4. Tested Date: Sep. 24, 2013

5.1.3 TEST PROCEDURES

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

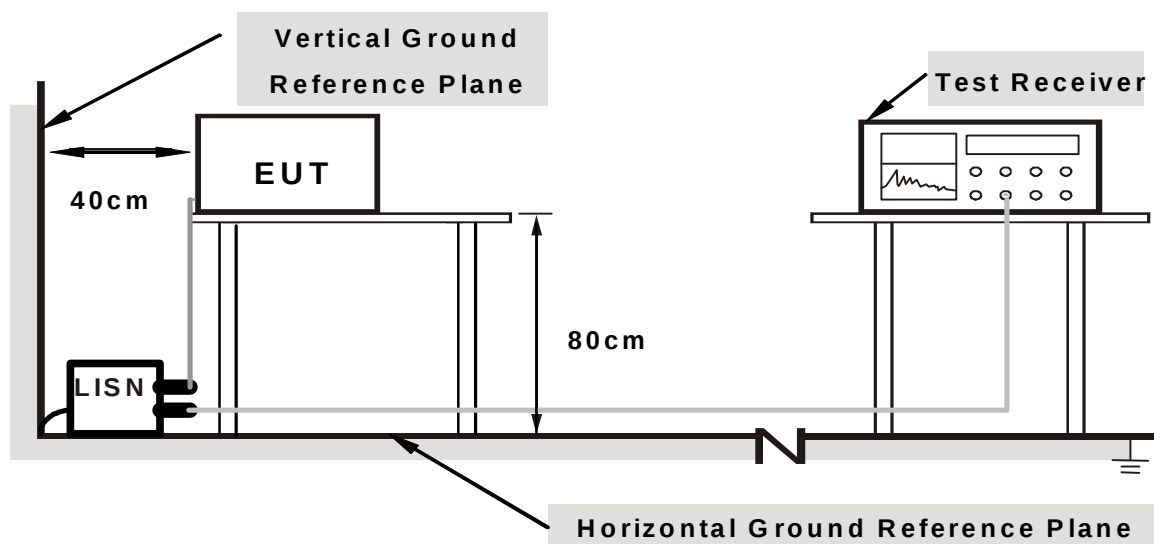
NOTE:

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

5.1.4 DEVIATION FROM TEST STANDARD

No deviation

5.1.5 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.

5.1.6 EUT OPERATING CONDITIONS

Same as the 4.1.6

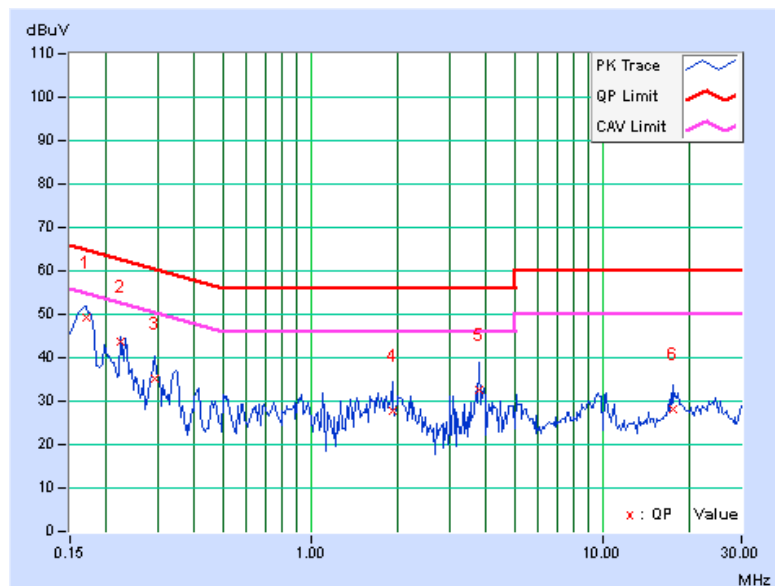
5.1.7 TEST RESULTS

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor [dB]	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16953	9.75	39.60	32.37	49.35	42.12	64.98	54.98	-15.63	-12.86
2	0.22422	9.76	33.77	25.03	43.53	34.79	62.66	52.66	-19.13	-17.87
3	0.29453	9.78	25.52	12.23	35.30	22.01	60.40	50.40	-25.10	-28.39
4	1.90625	9.85	17.85	12.47	27.70	22.32	56.00	46.00	-28.30	-23.68
5	3.78516	9.89	22.75	11.24	32.64	21.13	56.00	46.00	-23.36	-24.87
6	17.42578	10.11	18.01	13.65	28.12	23.76	60.00	50.00	-31.88	-26.24

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

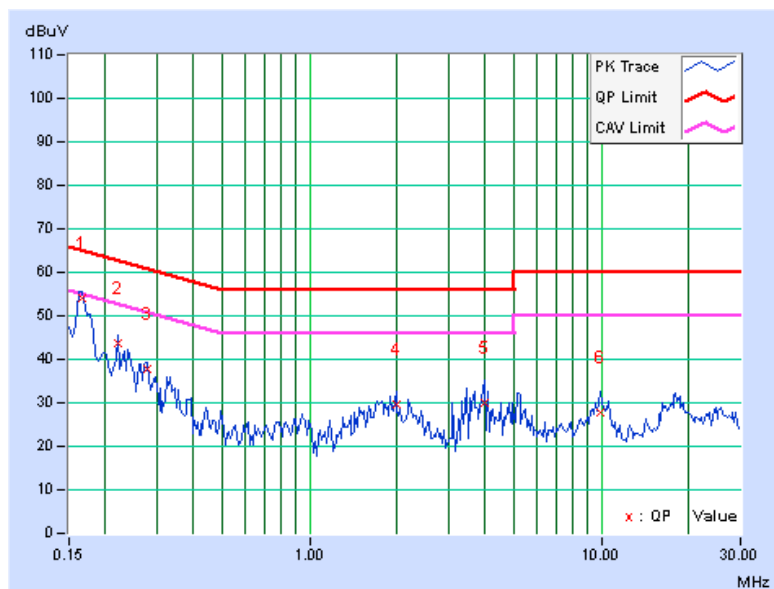


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16562	9.75	44.27	39.75	54.02	49.50	65.18	55.18	-11.16	-5.68
2	0.22031	9.76	33.95	24.83	43.71	34.59	62.81	52.81	-19.10	-18.22
3	0.27891	9.77	28.13	21.52	37.90	31.29	60.85	50.85	-22.95	-19.56
4	1.98438	9.85	19.65	13.36	29.50	23.21	56.00	46.00	-26.50	-22.79
5	3.97266	9.91	19.95	9.91	29.86	19.82	56.00	46.00	-26.14	-26.18
6	9.87500	10.06	17.65	11.81	27.71	21.87	60.00	50.00	-32.29	-28.13

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



5.2 RADIATED AND BANDEGE EMISSION MEASUREMENT

5.2.1 LIMITS OF RADIATED AND BANDEGE EMISSION MEASUREMENT

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

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

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 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.



A D T

5.2.2 TEST INSTRUMENTS

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. 06, 2012	Oct. 05, 2013
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. 12, 2012	Oct. 11, 2013
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: Sep. 12 to 28, 2013

5.2.3 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:

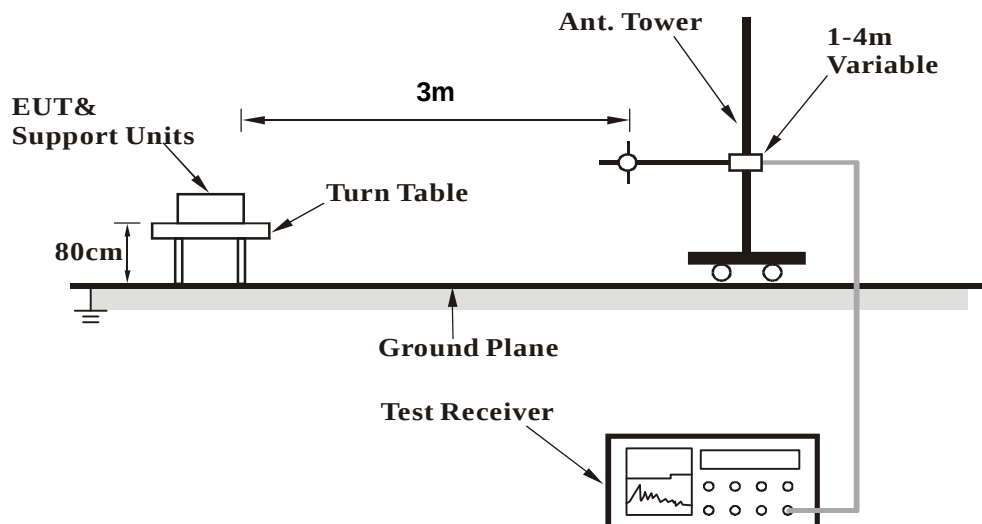
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

5.2.4 DEVIATION FROM TEST STANDARD

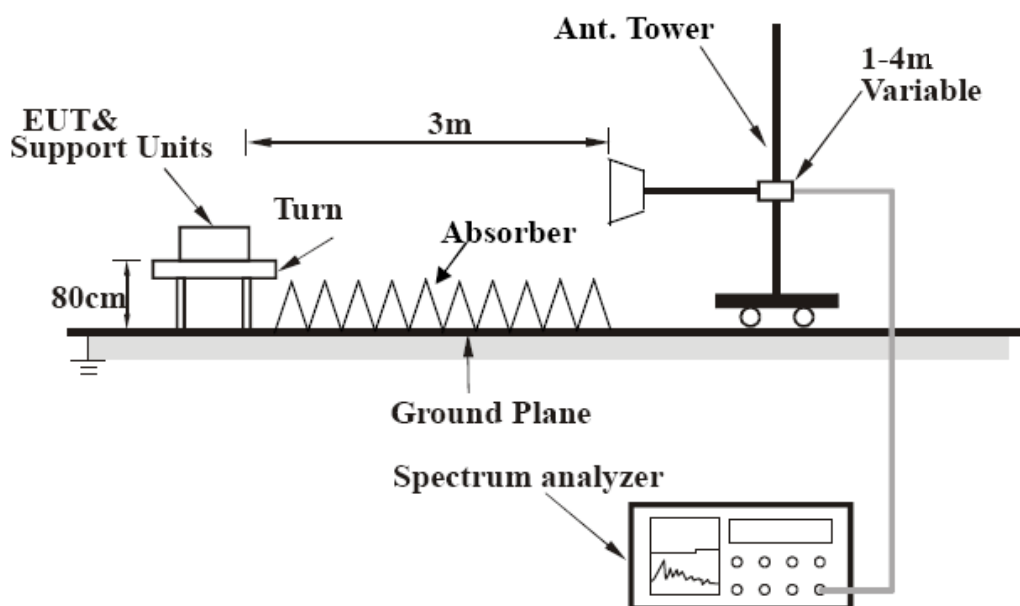
No deviation

5.2.5 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.

5.2.6 EUT OPERATING CONDITIONS

Same as the 4.1.6

5.2.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

802.11ac (VHT80)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	146.10	30.8 QP	43.5	-12.7	2.00 H	102	44.35	-13.56
2	304.55	39.3 QP	46.0	-6.7	1.00 H	100	51.90	-12.60
3	548.70	32.7 QP	46.0	-13.4	2.00 H	239	39.59	-6.94
4	609.20	37.2 QP	46.0	-8.8	1.50 H	77	42.24	-5.04
5	719.10	30.3 QP	46.0	-15.7	1.00 H	42	34.02	-3.72
6	907.55	29.6 QP	46.0	-16.4	1.50 H	65	29.73	-0.13
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	49.65	29.5 QP	40.0	-10.5	1.00 V	317	43.10	-13.60
2	132.20	27.9 QP	43.5	-15.6	1.00 V	34	42.44	-14.50
3	253.50	30.0 QP	46.0	-16.0	2.00 V	173	44.48	-14.48
4	303.10	29.9 QP	46.0	-16.1	1.50 V	299	42.54	-12.64
5	609.25	30.8 QP	46.0	-15.2	1.50 V	57	35.84	-5.04
6	948.26	31.3 QP	46.0	-14.7	1.00 V	74	30.79	0.53

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	56.6 PK	74.0	-17.4	1.61 H	299	46.95	9.65
2	5460.00	43.7 AV	54.0	-10.3	1.61 H	299	34.05	9.65
3	*5745.00	110.9 PK			1.61 H	299	100.48	10.42
4	*5745.00	100.7 AV			1.61 H	299	90.28	10.42
5	11490.00	50.1 PK	74.0	-23.9	1.00 H	124	32.84	17.26
6	11490.00	35.7 AV	54.0	-18.3	1.00 H	124	18.44	17.26

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	5460.00	54.7 PK	74.0	-19.3	1.04 V	307	45.05	9.65
2	5460.00	41.7 AV	54.0	-12.3	1.04 V	307	32.05	9.65
3	*5745.00	109.6 PK			1.04 V	307	99.18	10.42
4	*5745.00	99.5 AV			1.04 V	307	89.08	10.42
5	11490.00	49.4 PK	74.0	-24.6	1.00 V	106	32.14	17.26
6	11490.00	36.4 AV	54.0	-17.6	1.00 V	106	19.14	17.26

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.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	56.5 PK	74.0	-17.5	1.56 H	298	46.85	9.65
2	5460.00	43.6 AV	54.0	-10.4	1.56 H	298	33.95	9.65
3	*5785.00	110.9 PK			1.56 H	298	100.41	10.49
4	*5785.00	100.8 AV			1.56 H	298	90.31	10.49
5	11570.00	50.5 PK	74.0	-23.5	1.00 H	125	33.21	17.29
6	11570.00	36.0 AV	54.0	-18.0	1.00 H	125	18.71	17.29
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	5460.00	54.6 PK	74.0	-19.4	1.09 V	321	44.95	9.65
2	5460.00	41.3 AV	54.0	-12.7	1.09 V	321	31.65	9.65
3	*5785.00	109.6 PK			1.09 V	321	99.11	10.49
4	*5785.00	99.4 AV			1.09 V	321	88.91	10.49
5	11570.00	49.6 PK	74.0	-24.4	1.12 V	111	32.31	17.29
6	11570.00	36.7 AV	54.0	-17.3	1.12 V	111	19.41	17.29

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.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	57.0 PK	74.0	-17.0	1.58 H	302	47.35	9.65
2	5460.00	44.1 AV	54.0	-9.9	1.58 H	302	34.45	9.65
3	*5825.00	111.3 PK			1.58 H	302	100.65	10.65
4	*5825.00	100.9 AV			1.58 H	302	90.25	10.65
5	11650.00	50.5 PK	74.0	-23.5	1.06 H	109	32.84	17.66
6	11650.00	36.2 AV	54.0	-17.8	1.06 H	109	18.54	17.66
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	5460.00	55.0 PK	74.0	-19.0	1.07 V	297	45.35	9.65
2	5460.00	42.0 AV	54.0	-12.0	1.07 V	297	32.35	9.65
3	*5825.00	109.2 PK			1.07 V	297	98.55	10.65
4	*5825.00	99.3 AV			1.07 V	297	88.65	10.65
5	11650.00	49.8 PK	74.0	-24.2	1.12 V	108	32.14	17.66
6	11650.00	37.1 AV	54.0	-16.9	1.12 V	108	19.44	17.66

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.

802.11ac (VHT20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	56.0 PK	74.0	-18.0	1.59 H	298	46.35	9.65
2	5460.00	43.3 AV	54.0	-10.7	1.59 H	298	33.65	9.65
3	*5745.00	111.7 PK			1.59 H	298	101.28	10.42
4	*5745.00	101.4 AV			1.59 H	298	90.98	10.42
5	11490.00	50.5 PK	74.0	-23.5	1.04 H	97	33.24	17.26
6	11490.00	36.3 AV	54.0	-17.7	1.04 H	97	19.04	17.26
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	5460.00	54.9 PK	74.0	-19.1	1.03 V	308	45.25	9.65
2	5460.00	42.2 AV	54.0	-11.8	1.03 V	308	32.55	9.65
3	*5745.00	109.1 PK			1.03 V	308	98.68	10.42
4	*5745.00	99.1 AV			1.03 V	308	88.68	10.42
5	11490.00	49.7 PK	74.0	-24.3	1.04 V	111	32.44	17.26
6	11490.00	36.6 AV	54.0	-17.4	1.04 V	111	19.34	17.26

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.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	55.8 PK	74.0	-18.2	1.56 H	310	46.15	9.65
2	5460.00	43.2 AV	54.0	-10.8	1.56 H	310	33.55	9.65
3	*5785.00	111.8 PK			1.56 H	310	101.31	10.49
4	*5785.00	101.3 AV			1.56 H	310	90.81	10.49
5	11570.00	50.3 PK	74.0	-23.7	1.07 H	112	33.01	17.29
6	11570.00	36.1 AV	54.0	-17.9	1.07 H	112	18.81	17.29
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	5460.00	54.2 PK	74.0	-19.8	1.08 V	311	44.55	9.65
2	5460.00	41.4 AV	54.0	-12.6	1.08 V	311	31.75	9.65
3	*5785.00	108.9 PK			1.08 V	311	98.41	10.49
4	*5785.00	99.0 AV			1.08 V	311	88.51	10.49
5	11570.00	49.7 PK	74.0	-24.3	1.09 V	110	32.41	17.29
6	11570.00	37.0 AV	54.0	-17.0	1.09 V	110	19.71	17.29

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.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	56.5 PK	74.0	-17.5	1.61 H	311	46.85	9.65
2	5460.00	43.8 AV	54.0	-10.2	1.61 H	311	34.15	9.65
3	*5825.00	110.8 PK			1.61 H	311	100.15	10.65
4	*5825.00	100.6 AV			1.61 H	311	89.95	10.65
5	11650.00	50.1 PK	74.0	-23.9	1.01 H	122	32.44	17.66
6	11650.00	36.0 AV	54.0	-18.0	1.01 H	122	18.34	17.66
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	5460.00	54.5 PK	74.0	-19.5	1.07 V	299	44.85	9.65
2	5460.00	41.3 AV	54.0	-12.7	1.07 V	299	31.65	9.65
3	*5825.00	109.2 PK			1.07 V	299	98.55	10.65
4	*5825.00	99.3 AV			1.07 V	299	88.65	10.65
5	11650.00	49.9 PK	74.0	-24.1	1.03 V	112	32.24	17.66
6	11650.00	36.8 AV	54.0	-17.2	1.03 V	112	19.14	17.66

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.

802.11ac (VHT40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	56.4 PK	74.0	-17.6	1.60 H	298	46.75	9.65
2	5460.00	43.7 AV	54.0	-10.3	1.60 H	298	34.05	9.65
3	*5755.00	106.6 PK			1.60 H	298	96.17	10.43
4	*5755.00	96.3 AV			1.60 H	298	85.87	10.43
5	11510.00	50.5 PK	74.0	-23.5	1.11 H	100	33.27	17.23
6	11510.00	36.2 AV	54.0	-17.8	1.11 H	100	18.97	17.23
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	5460.00	54.4 PK	74.0	-19.6	1.02 V	314	44.75	9.65
2	5460.00	41.4 AV	54.0	-12.6	1.02 V	314	31.75	9.65
3	*5755.00	105.7 PK			1.02 V	314	95.27	10.43
4	*5755.00	95.5 AV			1.02 V	314	85.07	10.43
5	11510.00	49.4 PK	74.0	-24.6	1.06 V	111	32.17	17.23
6	11510.00	36.4 AV	54.0	-17.6	1.06 V	111	19.17	17.23

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.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	56.6 PK	74.0	-17.4	1.62 H	303	46.95	9.65
2	5460.00	43.5 AV	54.0	-10.5	1.62 H	303	33.85	9.65
3	*5795.00	106.7 PK			1.62 H	303	96.20	10.50
4	*5795.00	96.1 AV			1.62 H	303	85.60	10.50
5	11590.00	50.7 PK	74.0	-23.3	1.15 H	110	33.39	17.31
6	11590.00	36.6 AV	54.0	-17.4	1.15 H	110	19.29	17.31
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	5460.00	54.1 PK	74.0	-19.9	1.01 V	315	44.45	9.65
2	5460.00	41.3 AV	54.0	-12.7	1.01 V	315	31.65	9.65
3	*5795.00	105.4 PK			1.01 V	315	94.90	10.50
4	*5795.00	95.4 AV			1.01 V	315	84.90	10.50
5	11590.00	49.6 PK	74.0	-24.4	1.07 V	112	32.29	17.31
6	11590.00	36.7 AV	54.0	-17.3	1.07 V	112	19.39	17.31

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.

802.11ac (VHT80)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	56.7 PK	74.0	-17.3	1.59 H	294	47.05	9.65
2	5460.00	44.5 AV	54.0	-9.5	1.59 H	294	34.85	9.65
3	*5775.00	104.9 PK			1.59 H	294	94.43	10.47
4	*5775.00	93.4 AV			1.59 H	294	82.93	10.47
5	11550.00	50.3 PK	74.0	-23.7	1.06 H	103	33.03	17.27
6	11550.00	36.3 AV	54.0	-17.7	1.06 H	103	19.03	17.27
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	5460.00	54.1 PK	74.0	-19.9	1.02 V	328	44.45	9.65
2	5460.00	41.4 AV	54.0	-12.6	1.02 V	328	31.75	9.65
3	*5775.00	103.4 PK			1.02 V	328	92.93	10.47
4	*5775.00	91.9 AV			1.02 V	328	81.43	10.47
5	11550.00	49.6 PK	74.0	-24.4	1.05 V	97	32.33	17.27
6	11550.00	36.5 AV	54.0	-17.5	1.05 V	97	19.23	17.27

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.

5.3 6dB BANDWIDTH MEASUREMENT

5.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

5.3.2 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 : Sep. 16, 2013

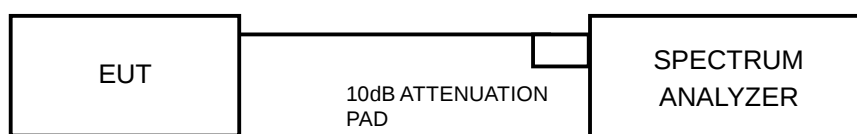
5.3.3 TEST PROCEDURE

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

5.3.4 DEVIATION FROM TEST STANDARD

No deviation

5.3.5 TEST SETUP



5.3.6 EUT OPERATING CONDITIONS

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

5.3.7 TEST RESULTS

802.11a

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
149	5745	16.37	0.5	PASS
157	5785	16.36	0.5	PASS
165	5825	16.45	0.5	PASS

802.11ac (VHT20)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
149	5745	16.37	0.5	PASS
157	5785	16.95	0.5	PASS
165	5825	16.62	0.5	PASS

802.11ac (VHT40)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
151	5755	35.85	0.5	PASS
159	5795	35.79	0.5	PASS

802.11ac (VHT80)

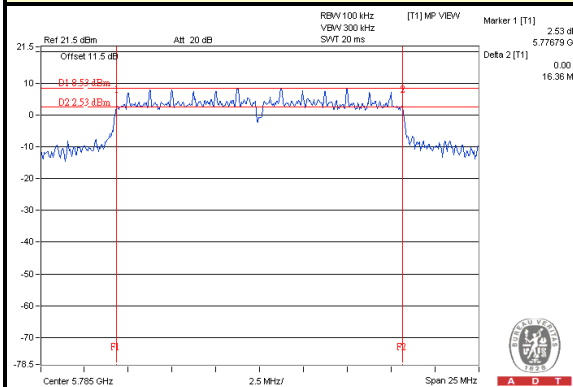
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
155	5775	75.79	0.5	PASS



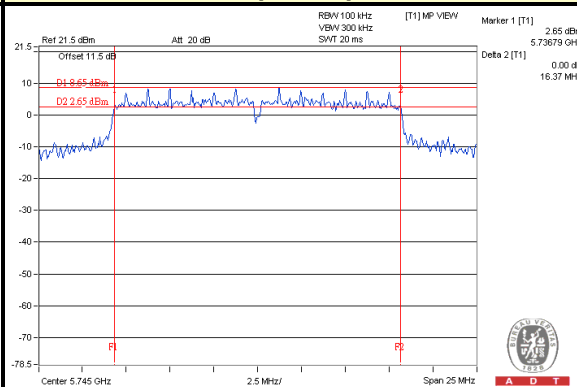
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SPECTRUM PLOT OF WORST VALUE

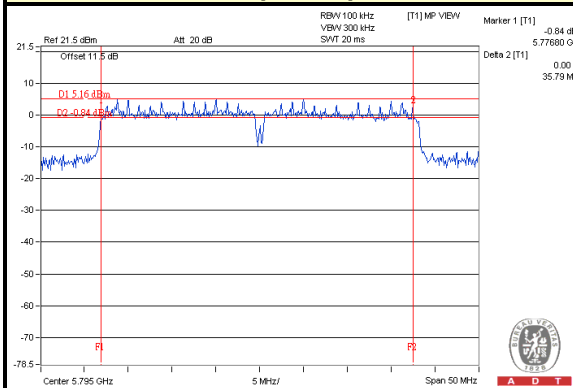
802.11a / CH157



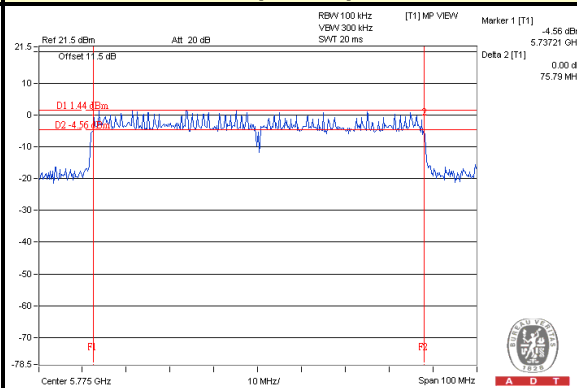
802.11ac (VHT20) / CH149



802.11ac (VHT40) / CH159



802.11ac (VHT80) / CH155



5.4 CONDUCTED OUTPUT POWER MEASUREMENT

5.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 5725 –5850 MHz band: 1 Watt (30dBm)

5.4.2 INSTRUMENTS

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 : Sep. 16, 2013

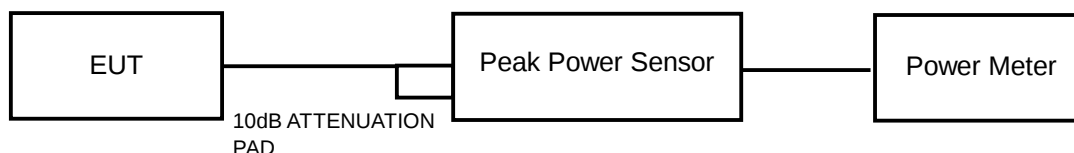
5.4.3 TEST PROCEDURES

The peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the peak power level.

5.4.4 DEVIATION FROM TEST STANDARD

No deviation.

5.4.5 TEST SETUP



5.4.6 EUT OPERATING CONDITIONS

Same as Item 5.3.6

5.4.7 TEST RESULTS

802.11a

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
149	5745	157.398	21.97	30	PASS
157	5785	154.525	21.89	30	PASS
165	5825	153.109	21.85	30	PASS

802.11ac (VHT20)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
149	5745	158.855	22.01	30	PASS
157	5785	157.398	21.97	30	PASS
165	5825	154.170	21.88	30	PASS

802.11ac (VHT40)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
151	5755	119.674	20.78	30	PASS
159	5795	153.109	21.85	30	PASS

802.11ac (VHT80)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
155	5775	456.037	26.59	30	PASS

5.5 AVERAGE OUTPUT POWER

5.5.1 FOR REFERENCE.

5.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter	ML2495A	0824006	May 20, 2013	May 19, 2014
Power Sensor	MA2411B	0738172	May 20, 2013	May 19, 2014

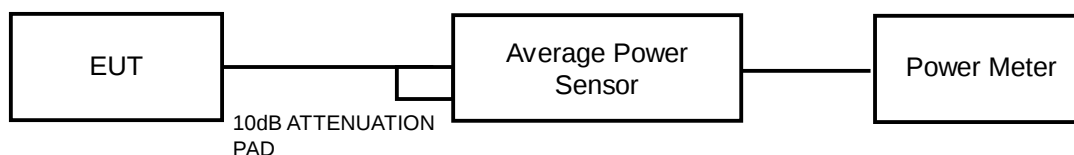
Note:

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 : Sep. 16, 2013

5.5.3 TEST PROCEDURES

The average power sensor was used on the output port of the EUT. A power meter was used to read the response of the power sensor. Record the power level.

5.5.4 TEST SETUP



5.5.5 EUT OPERATING CONDITIONS

Same as Item 4.3.6

5.5.6 TEST RESULTS

802.11a

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
149	5745	90.573	19.57
157	5785	87.498	19.42
165	5825	82.035	19.14

802.11ac (VHT20)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
149	5745	91.411	19.61
157	5785	89.536	19.52
165	5825	83.753	19.23

802.11ac (VHT40)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
151	5755	69.663	18.43
159	5795	85.507	19.32

802.11ac (VHT80)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
155	5775	66.222	18.21

5.6 POWER SPECTRAL DENSITY MEASUREMENT

5.6.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

5.6.2 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

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 : Sep. 16, 2013

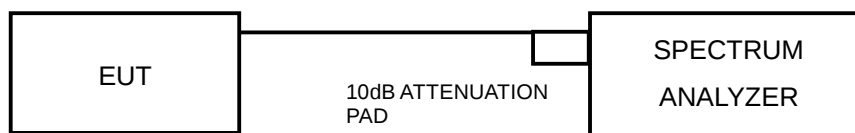
5.6.3 TEST PROCEDURE

1. Set the RBW = 3 kHz, VBW =10 kHz, Detector = peak.
2. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
3. Use the peak marker function to determine the maximum amplitude level.

5.6.4 DEVIATION FROM TEST STANDARD

No deviation

5.6.5 TEST SETUP



5.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

5.6.7 TEST RESULTS

802.11a

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
149	5745	-8.11	8	PASS
157	5785	-7.46	8	PASS
165	5825	-10.22	8	PASS

802.11ac (VHT20)

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
149	5745	-8.01	8	PASS
157	5785	-7.93	8	PASS
165	5825	-8.85	8	PASS

802.11ac (VHT40)

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
151	5755	-10.08	8	PASS
159	5795	-11.68	8	PASS

802.11ac (VHT80)

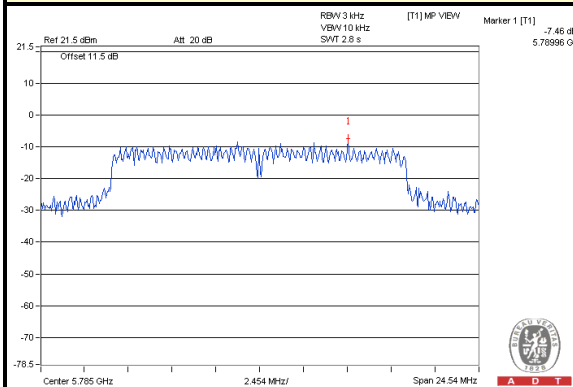
CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
155	5775	-10.35	8	PASS



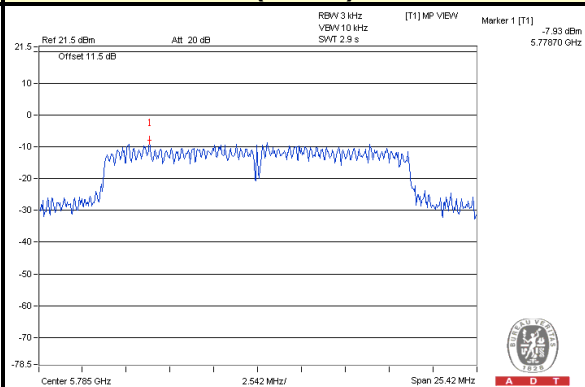
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SPECTRUM PLOT OF WORST VALUE

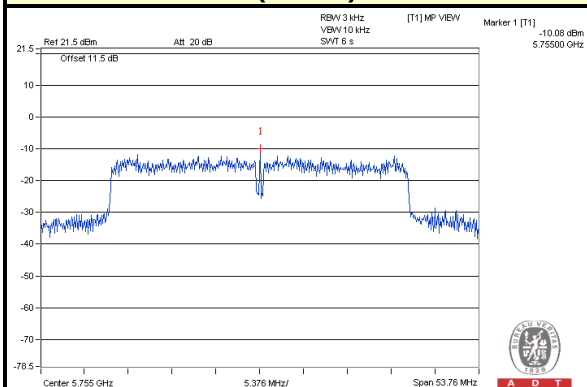
802.11a / CH157



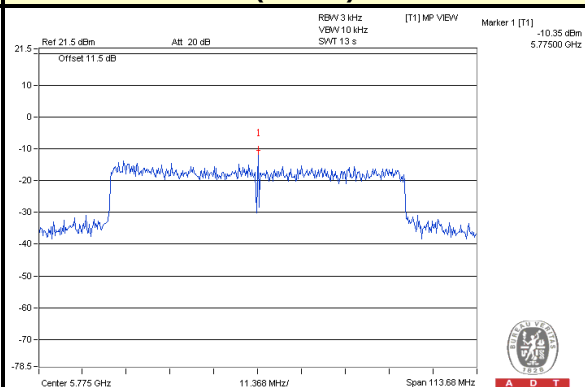
802.11ac (VHT20) / CH157



802.11ac (VHT40) / CH151



802.11ac (VHT80) / CH155





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5.7 CONDUCTED OUT-BAND EMISSION MEASUREMENT

5.7.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

Below 20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

5.7.2 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 : Sep. 16, 2013

5.7.3 TEST PROCEDURE

Measurement Procedure - Reference Level

1. Set the RBW = 100 kHz.
2. Set the VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

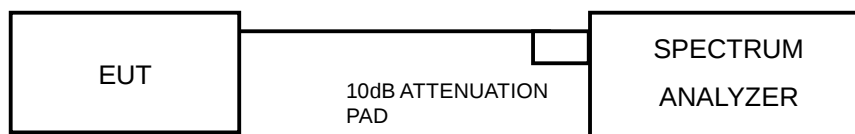
Measurement Procedure –Unwanted Emission Level

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 300 kHz.
3. Set span to encompass the spectrum to be examined
4. Detector = peak.
5. Trace Mode = max hold.
6. Sweep = auto couple.

5.7.4 DEVIATION FROM TEST STANDARD

No deviation

5.7.5 TEST SETUP



5.7.6 EUT OPERATING CONDITION

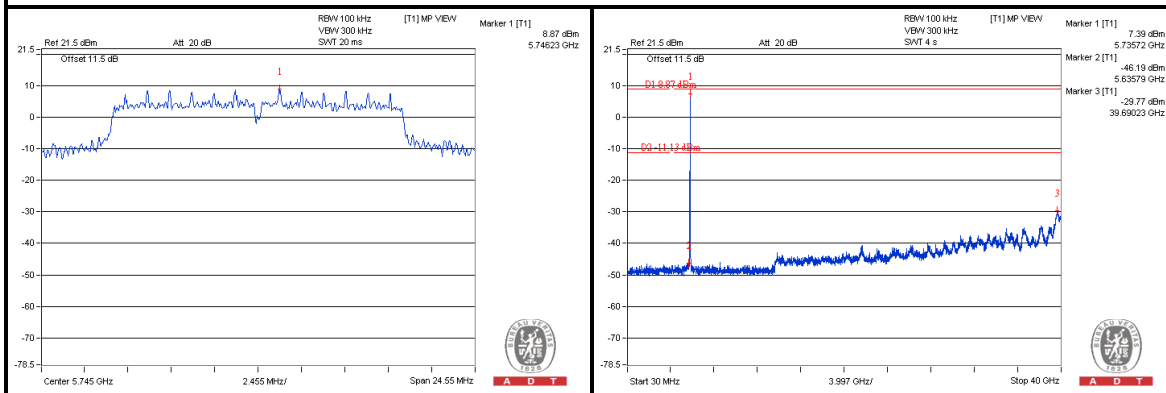
Same as Item 4.3.6

5.7.7 TEST RESULTS

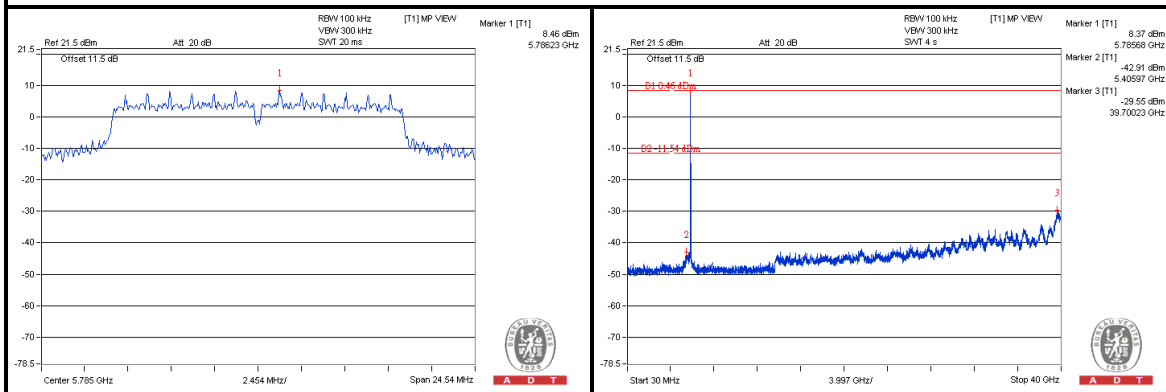
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

802.11a

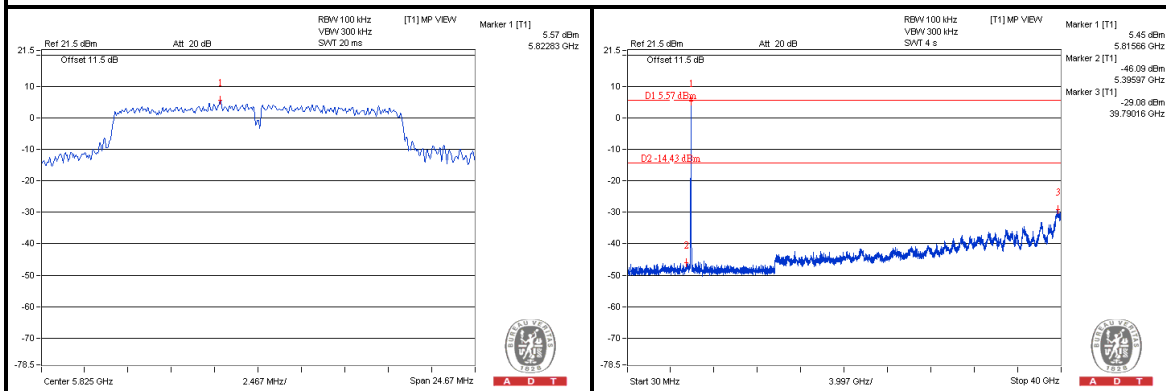
CH 149



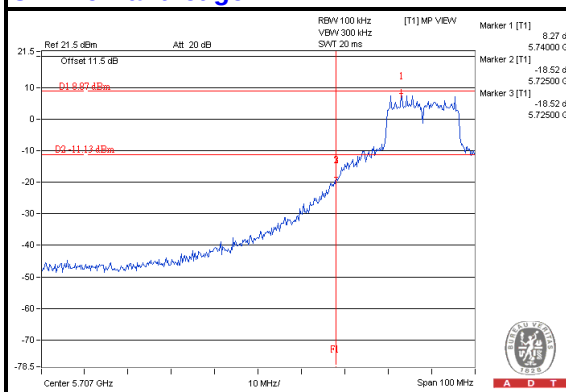
CH 157



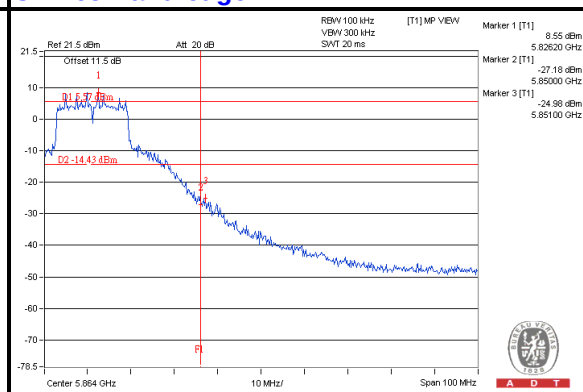
CH 165



CH 149 Band edge

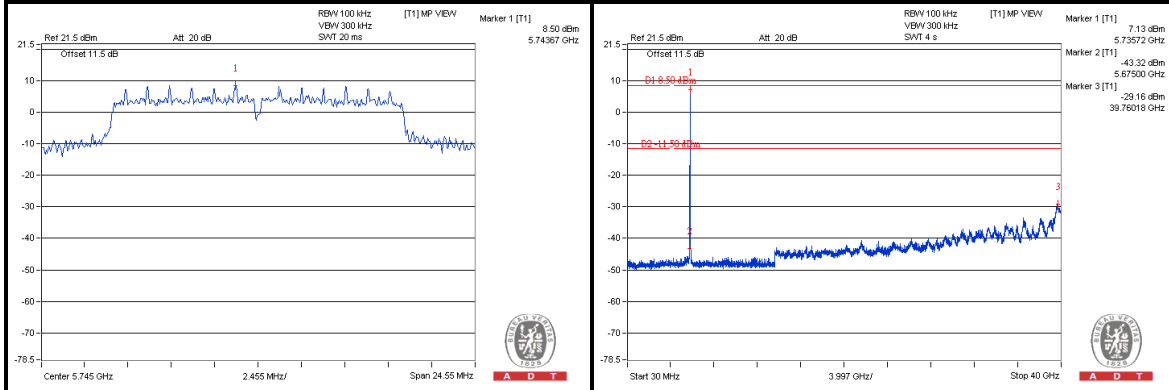


CH 165 Band edge

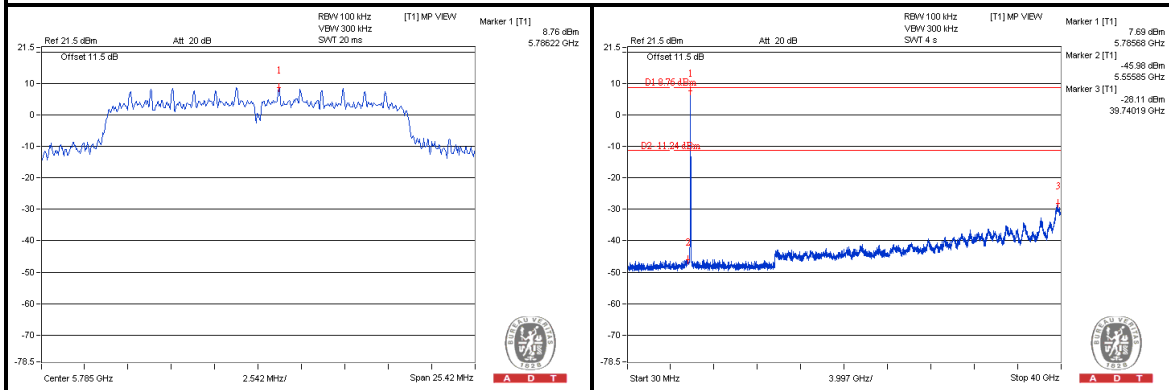


802.11ac (VHT20)

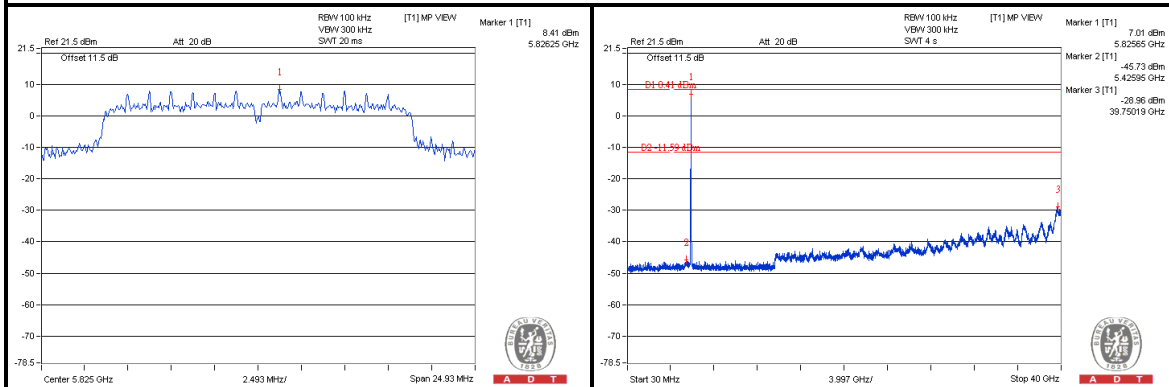
CH 149



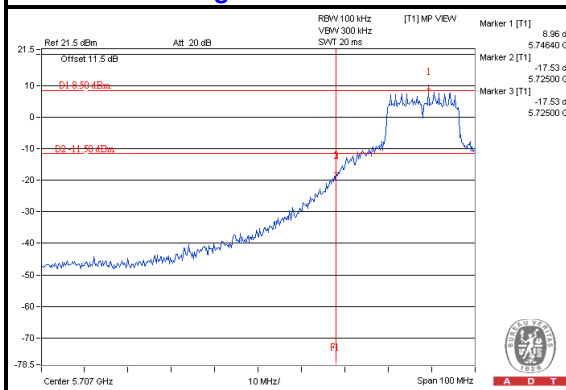
CH 157



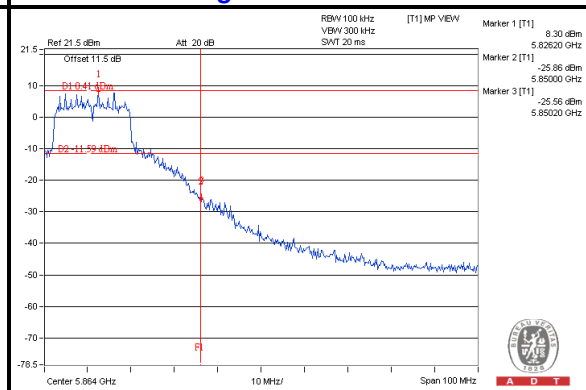
CH 165



CH 149 Band edge



CH 165 Band edge

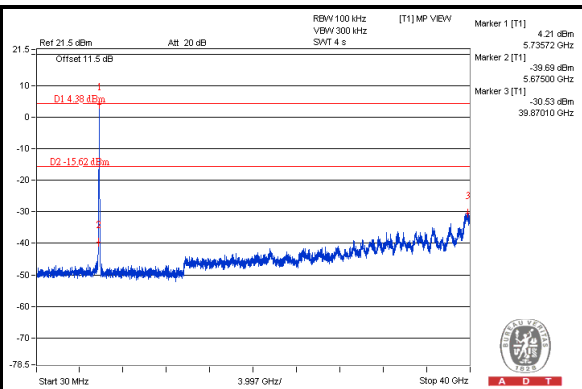
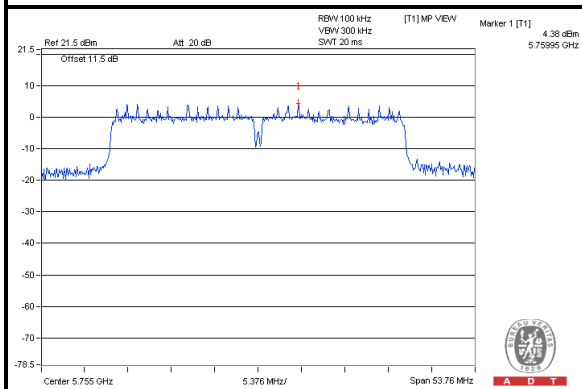




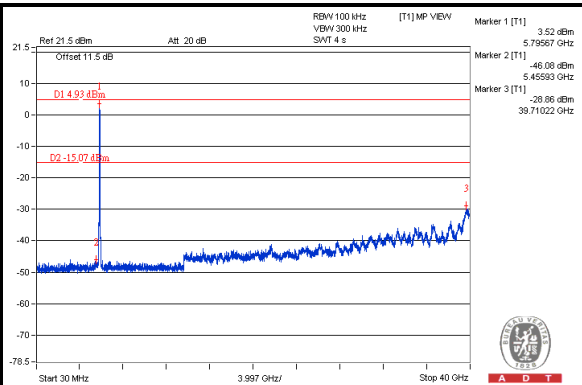
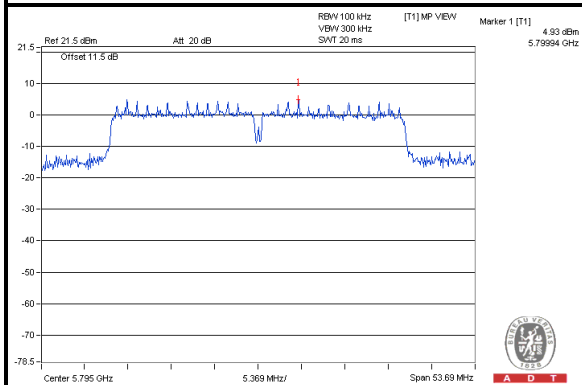
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802.11ac (VHT40)

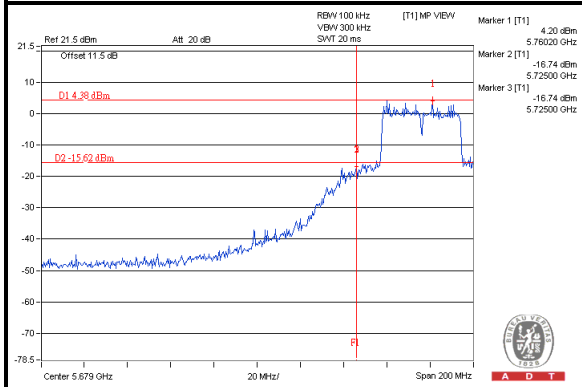
CH 151



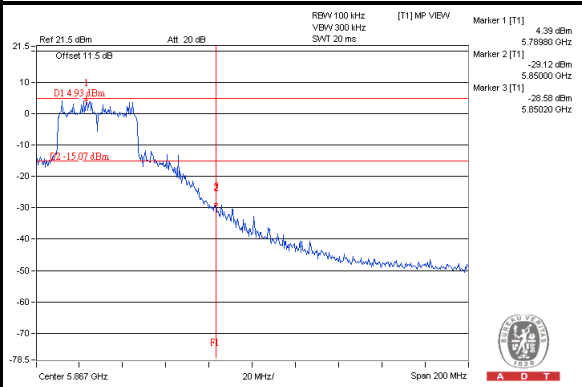
CH 159



CH 151 Band edge

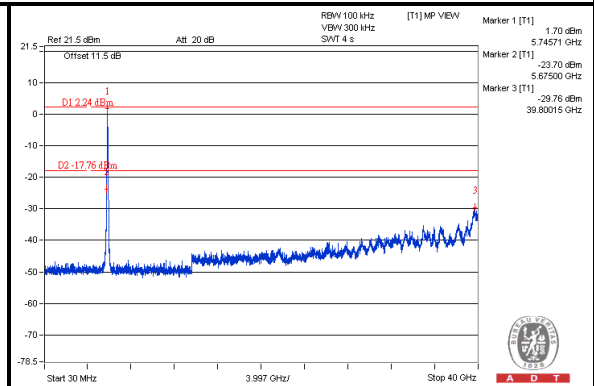
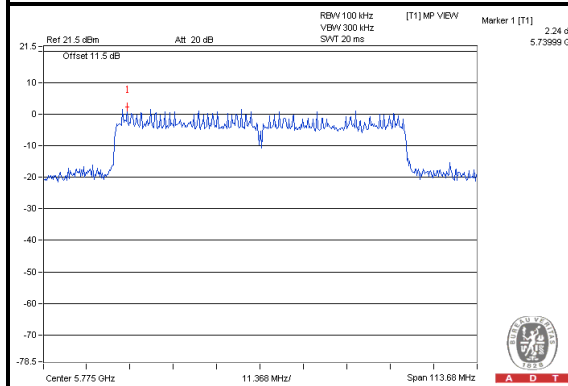


CH 159 Band edge

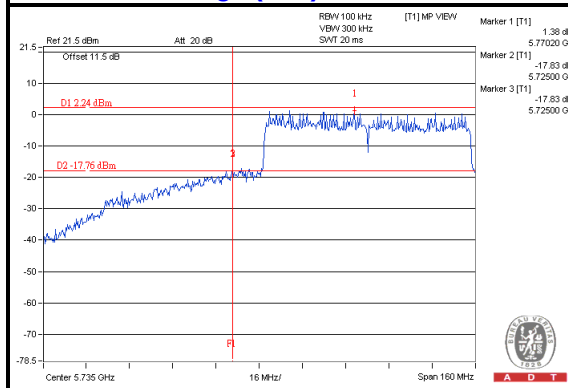


802.11ac (VHT80)

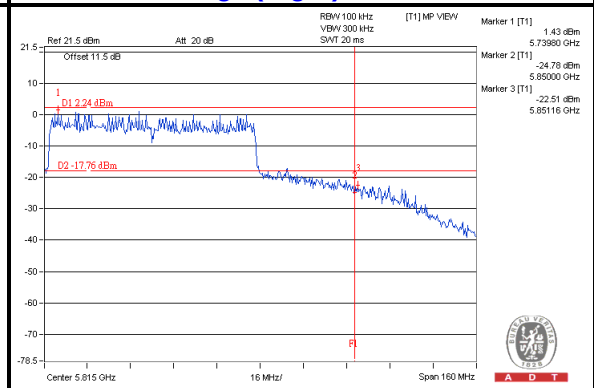
CH 155



CH 155 Band edge (Left)



CH 155 Band edge (Right)



6. PHOTOGRAPHS OF THE TEST CONFIGURATION

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

7. INFORMATION ON THE TESTING LABORATORIES

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

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

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Fax: 886-2-26052943

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Tel: 886-3-3183232

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Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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



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8. 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.

--- END ---