FCC TEST REPORT(15.247)

REPORT NO.:	RF130911E03 R1
MODEL NO.:	S4A340A
FCC ID:	UXX-S4A340A
RECEIVED:	Sep. 11, 2013
TESTED:	Sep. 16 to Oct. 21, 2013
ISSUED:	Nov. 04, 2013
APPLICANT:	Cradlepoint, Inc
ADDRESS:	805W. Franklin Street, Boise, ID 83702
ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
LAB ADDRESS :	No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (1):	No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

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

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF130911E03	Original release	Oct. 24, 2013
RF130911E03 R1	Revise Antenna Spec (Set 3) for report typo.	Nov. 04, 2013

1. CERTIFICATION

PRODUCT:	Integrated Mobile Broadband Router
BRAND NAME:	cradlepoint
MODEL NO.:	S4A340A
TEST SAMPLE:	ENGINEERING SAMPLE
APPLICANT:	Cradlepoint, Inc
TESTED:	Sep. 16 to Oct. 21, 2013
STANDARDS:	**FCC Part 15, Subpart C (Section 15.247)** ANSI C63.10-2009

The above equipment (Model: S4A340A) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : _____ , **DATE:** *Nov. 04, 2013*
(Midoli Peng, Specialist)

APPROVED BY : _____ , **DATE:** *Nov. 04, 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 -2.28dB at 0.46841MHz
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -0.2dB at 2390.00MHz & 2483.50MHz
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	Antenna connector is R-SMA not a standard connector.

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 -1.85dB at 0.47031MHz
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -2.6dB at 62.54MHz
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	Antenna connector is R-SMA not a standard connector.

NOTE: 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 2.400 ~ 2.4835GHz and 5.725~5.850GHz. For the 5.15~5.25GHz 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)	5.46 dB
Radiated emissions (1GHz -6GHz)	3.54 dB
Radiated emissions (6GHz -18GHz)	4.08 dB
Radiated emissions (18GHz -40GHz)	4.11 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Integrated Mobile Broadband Router
MODEL NO.	S4A340A
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 only
MODULATION TECHNOLOGY	DSSS,OFDM
TRANSFER RATE	802.11b: up to 11Mbps 802.11a / g: up to 54Mbps 802.11n: up to 450Mbps 802.11ac: up to 1300Mbps
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) 7 for 802.11n (HT40) **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 (5GHz)** 802.11a: 48.195mW 802.11ac (VHT20): 28.658mW 802.11ac (VHT40): 48.870mW 802.11ac (VHT80): 48.557mW **For 15.247 (2.4GHz)** 802.11b: 437.522mW 802.11g: 251.768mW 802.11n (HT20): 557.816mW 802.11n (HT40): 99.349mW **For 15.247 (5GHz)** 802.11a: 274.157mW 802.11ac (VHT20): 747.107mW 802.11ac (VHT40): 599.259mW 802.11ac (VHT80): 306.036mW
ANTENNA TYPE	Please see NOTE
DATA CABLE	RJ-45 Cable (unshielded, 1.5m) x1
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	Adapter x1

NOTE:

1. 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	HON-KWANG	HK-PH36-A12	Input: 100-240V, 1.5A, 50/60Hz AC input cable: 1.9m, unshielded Output: 12V, 3A DC output cable: 1.8m, unshielded
2	HON-KWANG	HK-AH-120A400-DH	Input: 100-240V, 1.6A, 50/60Hz AC input cable: 1.9m, unshielded Output: 12V, 4A DC output cable: 1.8m, unshielded
From the above adapters, the worst radiated emission was found in **Adapter 1**. Therefore only the test data of the modes were recorded in this report.			

2. The EUT incorporates a MIMO function without beam forming.

MODULATION MODE	Tx/Rx FUNCTION
802.11a	1Tx(Diversity)/3Rx
802.11b	1Tx(Fixed chain 0)/3Rx
802.11g	1Tx(Diversity)/3Rx
802.11n (HT20)	3Tx/3Rx
802.11n (HT40)	3Tx/3Rx
802.11ac (VHT20)	3Tx/3Rx
802.11ac (VHT40)	3Tx/3Rx
802.11ac (VHT80)	3Tx/3Rx

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)

3. The EUT could be applied with one USB Cellular Modem, therefore emission tests are added for simultaneously transmit between WLAN and USB Cellular Modem. The emission tests have been performed at the worst channel of both WLAN and USB Cellular Modem, the spurious emission of the simultaneous operation (WLAN & USB Cellular Modem) has been evaluated and no non-compliance found. < USB Cellular Modem only for test, not for sale >

Brand name	Model name	FCC ID	Spec.	Testing mode
SIERRA WIRELESS	MC7750	N7NMC7750	3G/LTE USB Dongle (Support LTE band 13 and WCDMA)	GPRS ch128, 824.2MHz

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

Set 1									
Transmitter Circuit	Antenna Type	Gain(dBi) (Excludes cable loss)		Cable Loss (dB)		Net Gain (dBi)		Connecter Type	Cable Length (cm)
		2.4GHz	5GHz	2.4GHz	5GHz	2.4GHz	5GHz		
Right Side Chain (0)	Dipole	5.03	5.59	1.2	2	3.83	3.59	R-SMA	18
In center Chain (1)	Dipole	5.03	5.59	1	1	4.03	4.59	R-SMA	11
Left Side Chain (2)	Dipole	5.03	5.59	1.2	2	3.83	3.59	R-SMA	18
Set 2									
Transmitter Circuit	Antenna Type	Gain(dBi) (Excludes cable loss)		Cable Loss (dB)		Net Gain (dBi)		Connecter Type	Cable Length (cm)
		2.4GHz	5GHz	2.4GHz	5GHz	2.4GHz	5GHz		
Right Side Chain (0)	Dipole	4.7	4.7	1.2	2	3.5	2.7	R-SMA	18
In center Chain (1)	Dipole	4.7	4.7	1	1	3.7	3.7	R-SMA	11
Left Side Chain (2)	Dipole	4.7	4.7	1.2	2	3.5	2.7	R-SMA	18
Set 3									
Transmitter Circuit	Antenna Type	Gain(dBi) (Excludes cable loss)		Cable Loss (dB)		Net Gain (dBi)		Connecter Type	Cable Length (cm)
		2.4GHz	5GHz	2.4GHz	5GHz	2.4GHz	5GHz		
Right Side Chain (0)	Dipole	3.8	5.5	1.2	2	2.6	3.5	R-SMA	18
In center Chain (1)	Dipole	3.8	5.5	1	1	2.8	4.5	R-SMA	11
Left Side Chain (2)	Dipole	3.8	5.5	1.2	2	2.6	3.5	R-SMA	18

Set 1 was chosen for final test.

5. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 23.

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		

7 channels are provided for 802.11n (HT40):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
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	
1	√	√	√	√	√	With adapter 1
2	√	-	-	-	-	With adapter 2

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: 1. "-"means no effect.

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

POWER LINE CONDUCTED EMISSION TEST:

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

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
For 2.4 GHz 802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5
For 5 GHz 802.11ac (VHT20)	149 to 165	157	OFDM	BPSK	6.5

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)
For 2.4 GHz 802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5
For 5 GHz 802.11ac (VHT20)	149 to 165	157	OFDM	BPSK	6.5

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)
802.11b	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
For 2.4 GHz 802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5
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
For 2.4 GHz 802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5
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
For 2.4 GHz 802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5
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	TESTED BY
PLC	27deg. C,56%RH	120Vac, 60Hz	Sean Huang
	28deg. C,54%RH		
RE<1G	24deg. C, 66%RH	120Vac, 60Hz	Andy Ho
RE≥1G	30deg. C, 70%RH	120Vac, 60Hz	Gary Cheng
APCM	25deg. C, 60%RH	120Vac, 60Hz	Chilin Lee
OB	25deg. C, 60%RH	120Vac, 60Hz	Chilin Lee

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

662911 D01 Multiple Transmitter Output v01 r02

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

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.

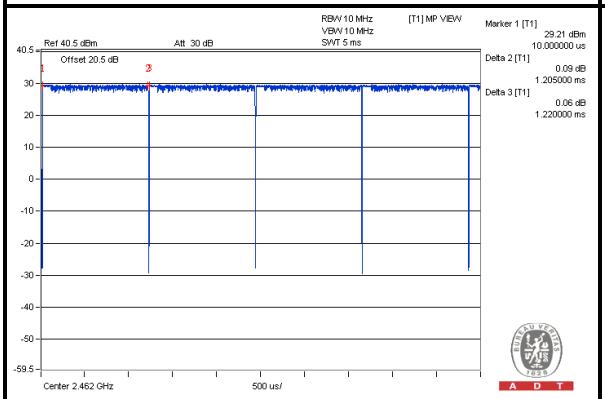
802.11b: Duty cycle = 1.205 ms/1.22 ms = 0.988

802.11g: Duty cycle = 2.06 ms/2.08 ms = 0.99

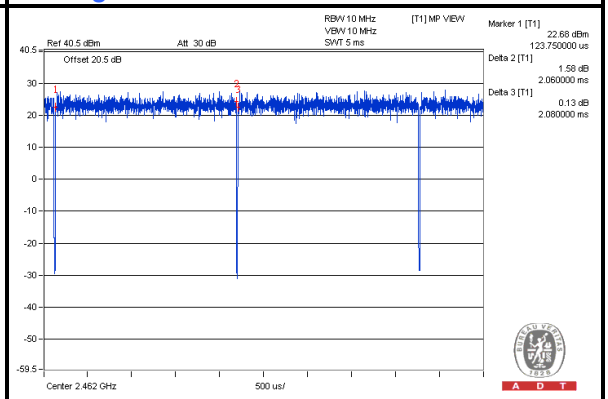
802.11n (HT20): Duty cycle = 1.917 ms/1.94 ms = 0.988

802.11n (HT40): Duty cycle = 0.94 ms/0.96 ms = 0.979, Duty factor = 10 * log(1/0.979) = 0.09

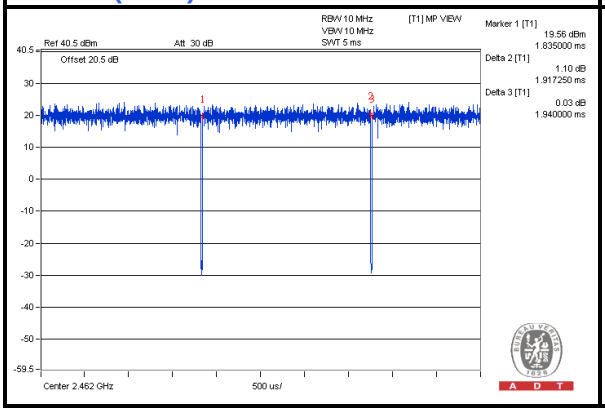
802.11b



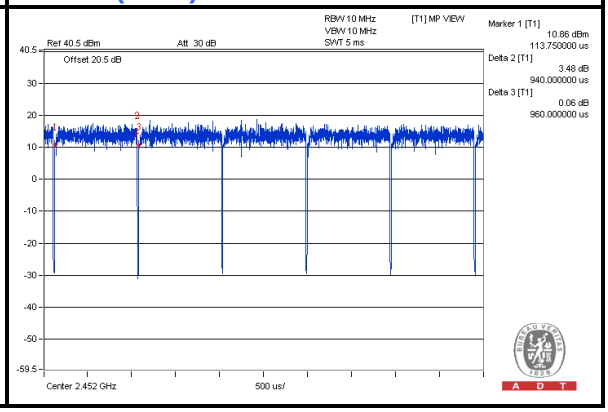
802.11g



802.11n (HT20)



802.11n (HT40)



For 5G

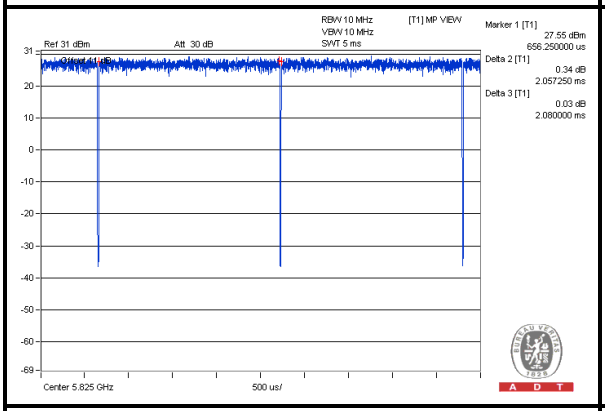
802.11a: Duty cycle = 2.057 ms/2.08 ms = 0.989

802.11ac (VHT20): Duty cycle = 1.92 ms/1.937 ms = 0.991

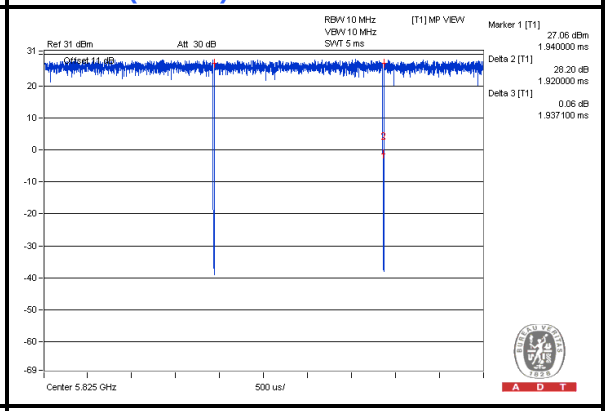
802.11ac (VHT40): Duty cycle = 0.942 ms/0.961 ms = 0.98

802.11ac (VHT80): Duty cycle = 0.458 ms/0.477 ms = 0.96, Duty factor = 10 * log(1/0.96) = 0.18

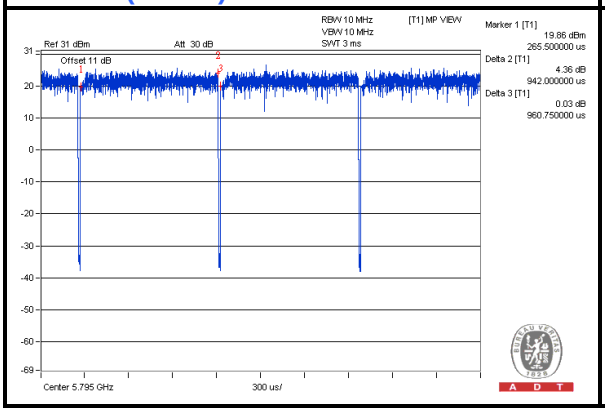
802.11a



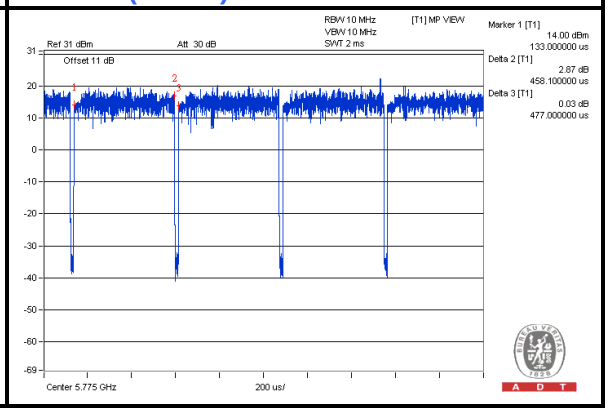
802.11ac (VHT20)



802.11ac (VHT40)



802.11ac (VHT80)



3.5 DESCRIPTION OF SUPPORT UNITS

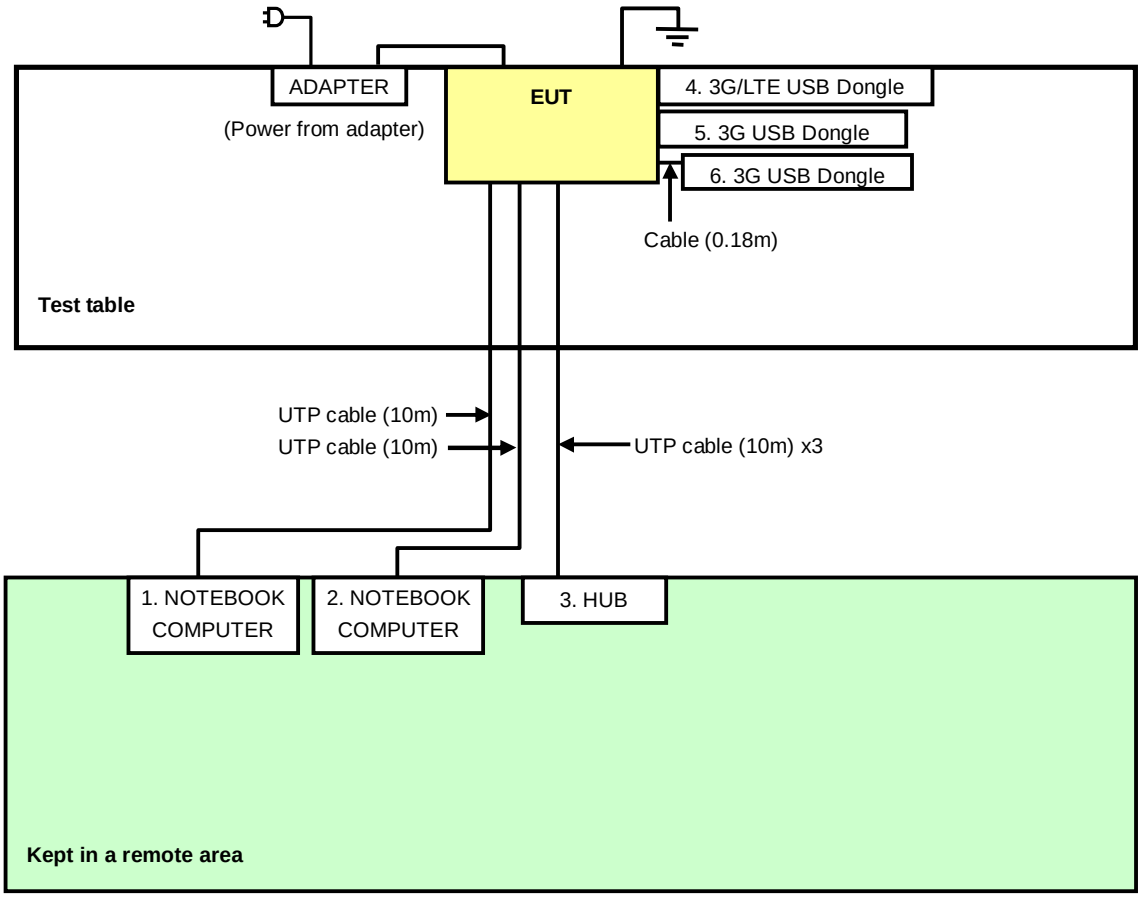
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP27L	7YLB32S	FCC DoC
2	NOTEBOOK COMPUTER	DELL	E6420	482T3R1	FCC DoC
3	HUB	ZyXEL	ES-116P	S060H02000215	FCC DoC
4	3G/LTE USB Dongle	SIERRA WIRELESS	MC7750	NA	N7NMC7750
5	3G USB Dongle	SIERRA WIRELESS	AirCard 595U	NA	N7N-MC5725U
6	3G USB Dongle	HUAWEI	E219	NA	QISE219

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	UTP cable (10m)
2	UTP cable (10m)
3	UTP cable (10m)
4	NA
5	NA
6	3G USB Dongle cable(0.18m)

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

For test mode 1

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. 16, 2013

For test mode 2

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. 21, 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 levels under (Limit - 20dB) were not recorded.

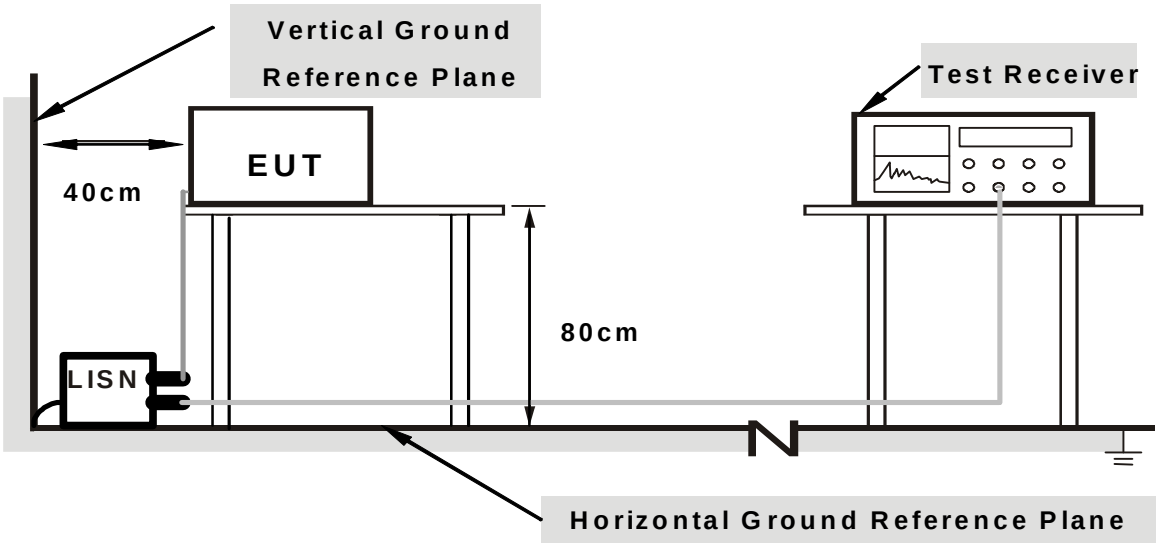
NOTE:

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. Placed the EUT on testing table.
2. Prepared computer system (support units 1 ~ 2) to act as communication partner.
3. The communication partner ran test program “Mtool” to enable EUT under transmission/receiving condition continuously.

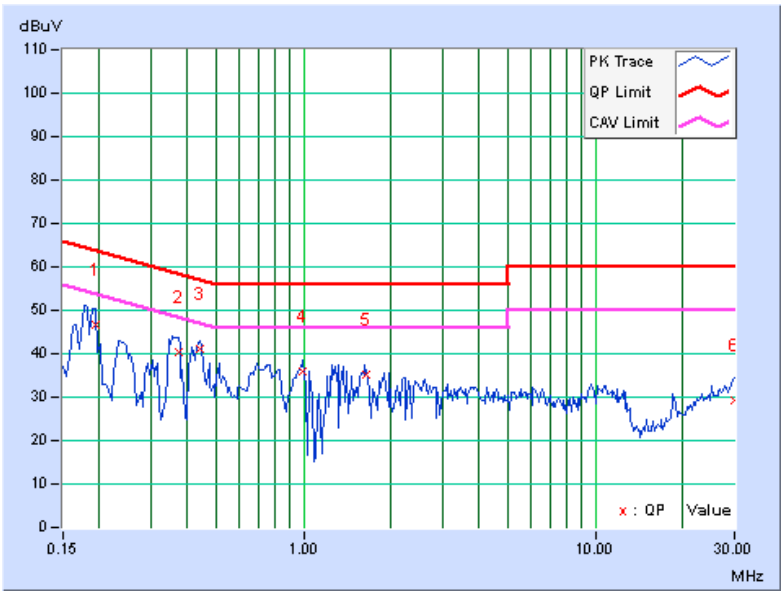
4.1.7 TEST RESULTS (Mode 1)

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	0.19297	9.76	36.80	24.63	46.56	34.39	63.91	53.91	-17.35	-19.52
2	0.37266	9.79	30.40	17.17	40.19	26.96	58.44	48.44	-18.25	-21.48
3	0.43906	9.80	31.41	17.92	41.21	27.72	57.08	47.08	-15.87	-19.36
4	0.99766	9.82	26.01	14.27	35.83	24.09	56.00	46.00	-20.17	-21.91
5	1.64216	9.84	25.48	12.33	35.32	22.17	56.00	46.00	-20.68	-23.83
6	29.85547	10.19	19.09	13.46	29.28	23.65	60.00	50.00	-30.72	-26.35

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

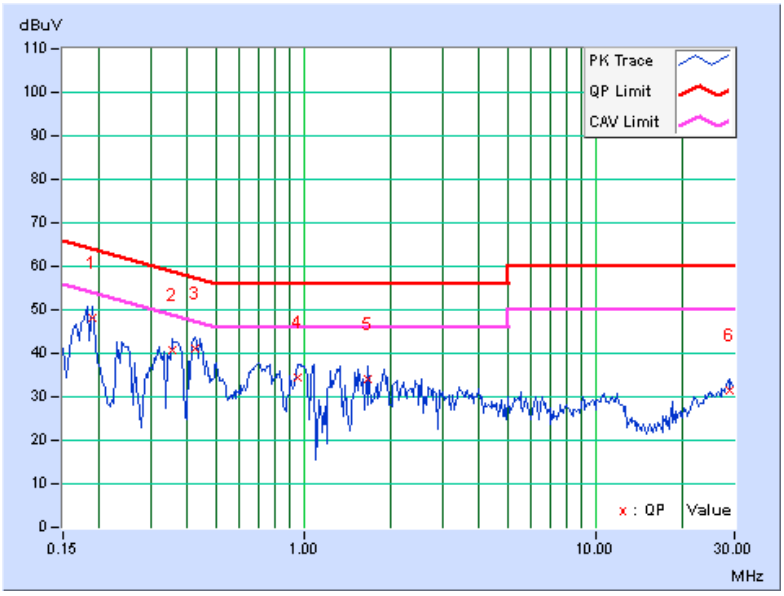


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	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	0.18906	9.75	38.38	25.52	48.13	35.27	64.08	54.08	-15.95	-18.81
2	0.35703	9.79	30.79	18.49	40.58	28.28	58.80	48.80	-18.22	-20.52
3	0.42344	9.80	31.38	17.55	41.18	27.35	57.38	47.38	-16.20	-20.03
4	0.95469	9.82	24.55	11.76	34.37	21.58	56.00	46.00	-21.63	-24.42
5	1.67188	9.84	24.37	9.02	34.21	18.86	56.00	46.00	-21.79	-27.14
6	28.75781	10.40	21.16	15.26	31.56	25.66	60.00	50.00	-28.44	-24.34

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



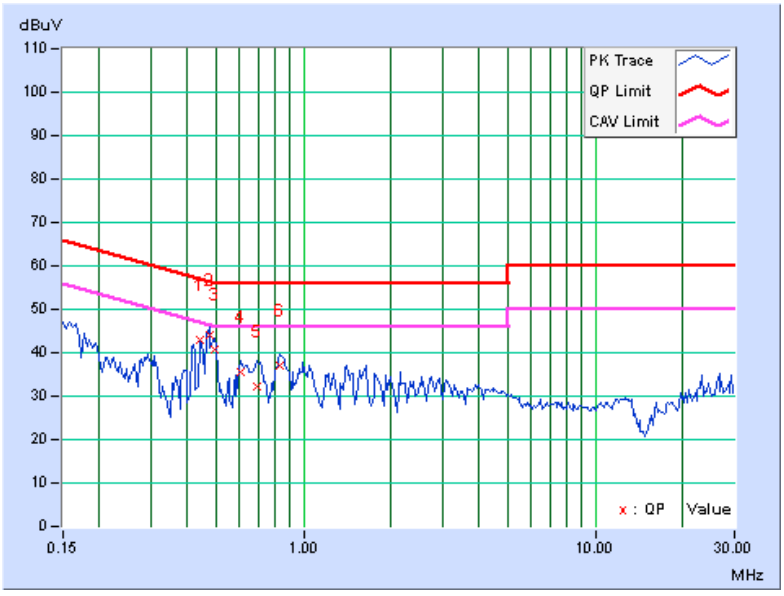
4.1.8 TEST RESULTS (Mode 2)

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	0.44297	0.14	42.92	42.06	43.06	42.20	57.01	47.01	-13.94	-4.80
2	0.47422	0.14	43.98	43.54	44.12	43.68	56.44	46.44	-12.32	-2.76
3	0.49375	0.14	40.68	38.82	40.82	38.96	56.10	46.10	-15.28	-7.14
4	0.60703	0.15	35.59	33.63	35.74	33.78	56.00	46.00	-20.26	-12.22
5	0.69688	0.15	32.17	28.54	32.32	28.69	56.00	46.00	-23.68	-17.31
6	0.83359	0.16	36.82	34.04	36.98	34.20	56.00	46.00	-19.02	-11.80

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

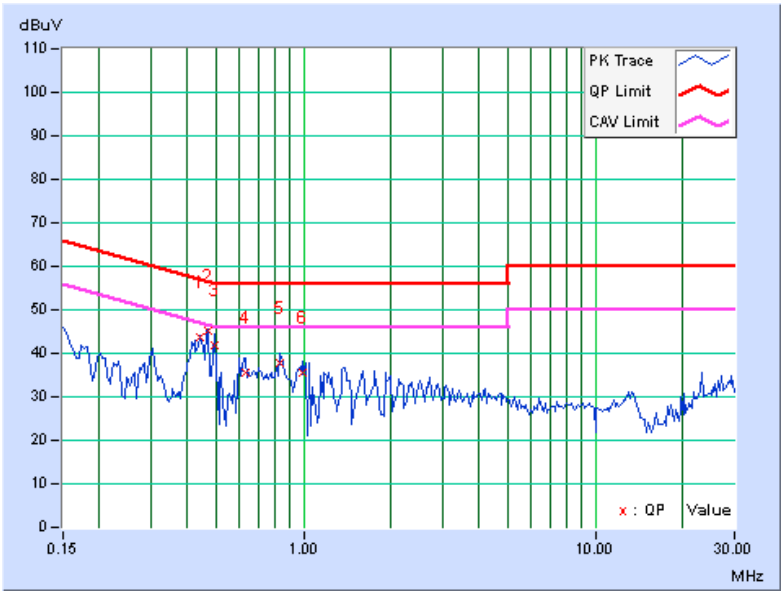


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	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	0.44297	0.14	43.51	42.55	43.65	42.69	57.01	47.01	-13.35	-4.31
2	**0.46841**	**0.14**	**44.96**	**44.12**	**45.10**	**44.26**	**56.54**	**46.54**	**-11.44**	**-2.28**
3	0.49412	0.14	41.80	41.78	41.94	41.92	56.10	46.10	-14.15	-4.17
4	0.63047	0.15	35.48	31.06	35.63	31.21	56.00	46.00	-20.37	-14.79
5	0.83359	0.16	37.57	34.80	37.73	34.96	56.00	46.00	-18.27	-11.04
6	0.98984	0.17	35.38	33.00	35.55	33.17	56.00	46.00	-20.45	-12.83

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. Other emissions shall be at least 30dB 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.

4.2.2 TEST INSTRUMENTS

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. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Mar. 25, 2013	Mar. 24, 2014
RF Cable	NA	CHHCAB_001	Oct. 07, 2012	Oct. 06, 2013
Horn_Antenna AISI	AIH.8018	0000220091110	Nov. 27, 2012	Nov. 26, 2013
Pre-Amplifier Agilent	8449B	3008A01923	Oct. 30, 2012	Oct. 29, 2013
RF Cable	NA	RF104-205 RF104-207 RF104-202	Dec. 26, 2012	Dec. 25, 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. H.
4. The FCC Site Registration No. is 797305.
5 The CANADA Site Registration No. is IC 7450H-3.
6 Tested Date: Sep. 23 to 25, 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:

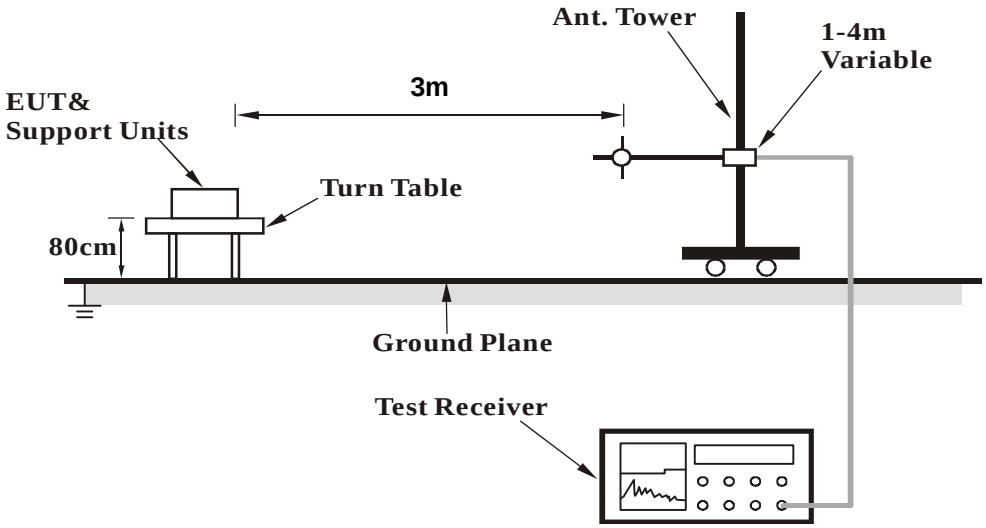
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

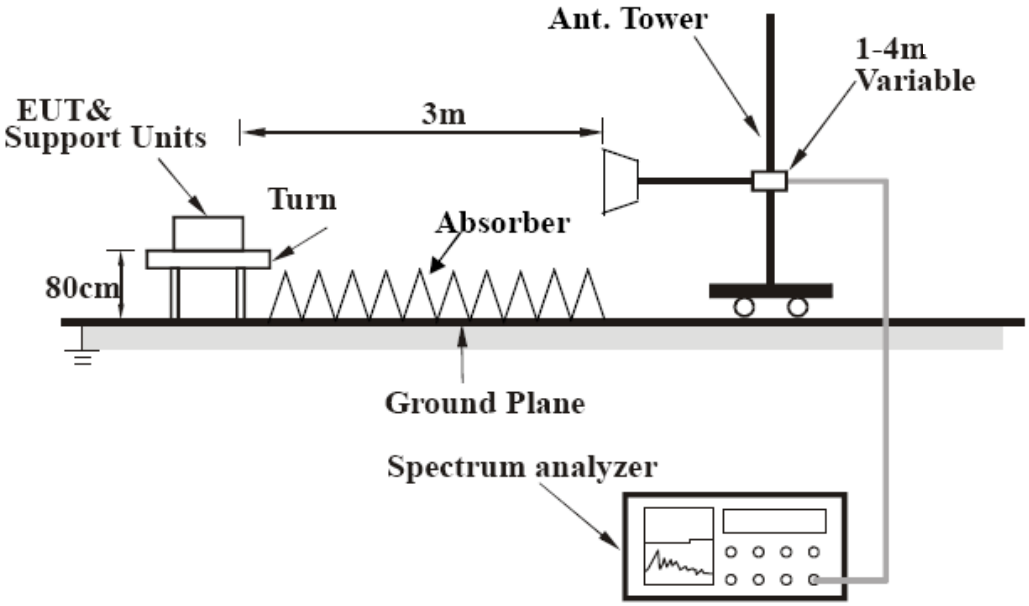
No deviation

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

802.11n (HT20)

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	54.35	27.9 QP	40.0	-12.1	1.50 H	254	40.74	-12.86
2	85.00	30.1 QP	40.0	-9.9	2.00 H	76	49.15	-19.03
3	151.54	33.4 QP	43.5	-10.1	2.00 H	273	46.39	-12.96
4	199.31	34.0 QP	43.5	-9.5	1.50 H	268	50.31	-16.34
5	297.04	30.2 QP	46.0	-15.8	1.00 H	109	42.51	-12.31
6	480.03	38.8 QP	46.0	-7.2	2.00 H	360	46.86	-8.03
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	37.78	31.1 QP	40.0	-8.9	1.01 V	280	44.83	-13.72
2	62.54	37.1 QP	40.0	-2.9	1.00 V	252	50.97	-13.85
3	85.53	36.5 QP	40.0	-3.5	1.50 V	360	55.52	-19.06
4	197.86	33.5 QP	43.5	-10.0	1.00 V	356	49.72	-16.19
5	480.03	34.3 QP	46.0	-11.8	1.00 V	329	42.28	-8.03
6	500.01	30.7 QP	46.0	-15.3	1.00 V	173	38.20	-7.53

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
5. " * ": Fundamental frequency.

ABOVE 1GHz DATA

802.11b

CHANNEL	TX Channel 1	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	53.2 PK	74.0	-20.8	1.00 H	139	20.61	32.59
2	2390.00	43.6 AV	54.0	-10.4	1.00 H	139	11.01	32.59
3	*2412.00	101.1 PK			1.00 H	139	68.45	32.65
4	*2412.00	98.2 AV			1.00 H	139	65.55	32.65
5	4824.00	46.9 PK	74.0	-27.1	1.00 H	360	4.99	41.91
6	4824.00	34.8 AV	54.0	-19.2	1.00 H	360	-7.11	41.91
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	64.8 PK	74.0	-9.2	1.21 V	271	32.21	32.59
2	2390.00	53.4 AV	54.0	-0.6	1.21 V	271	20.81	32.59
3	*2412.00	115.5 PK			1.21 V	271	82.85	32.65
4	*2412.00	112.9 AV			1.21 V	271	80.25	32.65
5	4824.00	46.9 PK	74.0	-27.1	1.00 V	200	4.99	41.91
6	4824.00	34.7 AV	54.0	-19.3	1.00 V	200	-7.21	41.91

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	106.5 PK			1.00 H	30	73.79	32.71
2	*2437.00	104.0 AV			1.00 H	30	71.29	32.71
3	4874.00	47.5 PK	74.0	-26.5	1.00 H	350	5.51	41.99
4	4874.00	35.2 AV	54.0	-18.8	1.00 H	350	-6.79	41.99
5	7311.00	55.5 PK	74.0	-18.5	1.00 H	235	8.94	46.56
6	7311.00	42.9 AV	54.0	-11.1	1.00 H	235	-3.66	46.56
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	65.7 PK	74.0	-8.3	1.18 V	261	33.11	32.59
2	2390.00	52.0 AV	54.0	-2.0	1.18 V	261	19.41	32.59
3	*2437.00	118.4 PK			1.18 V	261	85.69	32.71
4	*2437.00	116.1 AV			1.18 V	261	83.39	32.71
5	2483.50	54.1 PK	74.0	-19.9	1.18 V	261	21.27	32.83
6	2483.50	40.8 AV	54.0	-13.2	1.18 V	261	7.97	32.83
7	4874.00	47.0 PK	74.0	-27.0	1.00 V	214	5.01	41.99
8	4874.00	34.8 AV	54.0	-19.2	1.00 V	214	-7.19	41.99
9	7311.00	56.1 PK	74.0	-17.9	1.00 V	200	9.54	46.56
10	7311.00	42.9 AV	54.0	-11.1	1.00 V	200	-3.66	46.56

REMARKS:

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

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	106.8 PK			1.00 H	351	74.03	32.77
2	*2462.00	104.3 AV			1.00 H	351	71.53	32.77
3	2483.50	51.1 PK	74.0	-22.9	1.00 H	351	18.27	32.83
4	2483.50	41.2 AV	54.0	-12.8	1.00 H	351	8.37	32.83
5	4924.00	47.8 PK	74.0	-26.2	1.04 H	342	5.78	42.02
6	4924.00	35.3 AV	54.0	-18.7	1.04 H	342	-6.72	42.02
7	7386.00	55.8 PK	74.0	-18.2	1.00 H	226	9.01	46.79
8	7386.00	43.0 AV	54.0	-11.0	1.00 H	226	-3.79	46.79
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	117.8 PK			1.18 V	271	85.03	32.77
2	*2462.00	115.4 AV			1.18 V	271	82.63	32.77
3	2483.50	58.8 PK	74.0	-15.2	1.18 V	271	25.97	32.83
4	2483.50	50.6 AV	54.0	-3.4	1.18 V	271	17.77	32.83
5	4924.00	47.2 PK	74.0	-26.8	1.00 V	215	5.18	42.02
6	4924.00	34.8 AV	54.0	-19.2	1.00 V	215	-7.22	42.02
7	7386.00	55.9 PK	74.0	-18.1	1.03 V	186	9.11	46.79
8	7386.00	43.0 AV	54.0	-11.0	1.03 V	186	-3.79	46.79

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	60.8 PK	74.0	-13.2	1.10 H	209	28.21	32.59
2	2390.00	46.7 AV	54.0	-7.3	1.10 H	209	14.11	32.59
3	*2412.00	113.8 PK			1.10 H	209	81.15	32.65
4	*2412.00	92.8 AV			1.10 H	209	60.15	32.65
5	4824.00	48.2 PK	74.0	-25.8	1.07 H	348	6.29	41.91
6	4824.00	35.6 AV	54.0	-18.4	1.07 H	348	-6.31	41.91
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	69.1 PK	74.0	-4.9	1.22 V	263	36.55	32.59
2	2390.00	53.4 AV	54.0	-0.6	1.22 V	263	20.81	32.59
3	*2412.00	111.9 PK			1.22 V	263	79.25	32.65
4	*2412.00	100.8 AV			1.22 V	263	68.15	32.65
5	4824.00	47.0 PK	74.0	-27.0	1.01 V	215	5.09	41.91
6	4824.00	34.8 AV	54.0	-19.2	1.01 V	215	-7.11	41.91

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	109.4 PK			1.00 H	353	76.69	32.71
2	*2437.00	98.4 AV			1.00 H	353	65.69	32.71
3	4874.00	47.6 PK	74.0	-26.4	1.07 H	329	5.61	41.99
4	4874.00	35.1 AV	54.0	-18.9	1.07 H	329	-6.89	41.99
5	7311.00	56.0 PK	74.0	-18.0	1.00 H	241	9.44	46.56
6	7311.00	42.9 AV	54.0	-11.1	1.00 H	241	-3.66	46.56
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.2 PK	74.0	-7.8	1.17 V	263	33.61	32.59
2	2390.00	53.1 AV	54.0	-0.9	1.17 V	263	20.51	32.59
3	*2437.00	121.2 PK			1.17 V	263	88.49	32.71
4	*2437.00	110.4 AV			1.17 V	263	77.69	32.71
5	2483.50	62.7 PK	74.0	-11.3	1.17 V	263	29.87	32.83
6	2483.50	44.3 AV	54.0	-9.7	1.17 V	263	11.47	32.83
7	4874.00	46.4 PK	74.0	-27.6	1.01 V	214	4.41	41.99
8	4874.00	34.4 AV	54.0	-19.6	1.01 V	214	-7.59	41.99
9	7311.00	56.0 PK	74.0	-18.0	1.00 V	204	9.44	46.56
10	7311.00	42.6 AV	54.0	-11.4	1.00 V	204	-3.96	46.56

REMARKS:

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

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	104.8 PK			1.00 H	355	72.03	32.77
2	*2462.00	94.0 AV			1.00 H	355	61.23	32.77
3	2483.50	60.1 PK	74.0	-13.9	1.00 H	355	27.27	32.83
4	2483.50	40.7 AV	54.0	-13.3	1.00 H	355	7.87	32.83
5	4924.00	48.2 PK	74.0	-25.8	1.07 H	358	6.18	42.02
6	4924.00	35.7 AV	54.0	-18.3	1.07 H	358	-6.32	42.02
7	7386.00	55.3 PK	74.0	-18.7	1.05 H	227	8.51	46.79
8	7386.00	42.6 AV	54.0	-11.4	1.05 H	227	-4.19	46.79
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	117.7 PK			1.20 V	263	84.93	32.77
2	*2462.00	106.3 AV			1.20 V	263	73.53	32.77
3	2483.50	72.4 PK	74.0	-1.6	1.20 V	263	39.57	32.83
4	2483.50	53.1 AV	54.0	-0.9	1.20 V	263	20.27	32.83
5	4924.00	46.7 PK	74.0	-27.3	1.04 V	219	4.68	42.02
6	4924.00	34.3 AV	54.0	-19.7	1.04 V	219	-7.72	42.02
7	7386.00	56.2 PK	74.0	-17.8	1.02 V	190	9.41	46.79
8	7386.00	42.8 AV	54.0	-11.2	1.02 V	190	-3.99	46.79

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	57.9 PK	74.0	-16.1	1.03 H	353	25.31	32.59
2	2390.00	41.0 AV	54.0	-13.0	1.03 H	353	8.41	32.59
3	*2412.00	103.3 PK			1.03 H	353	70.65	32.65
4	*2412.00	92.4 AV			1.03 H	353	59.75	32.65
5	4824.00	48.6 PK	74.0	-25.4	1.01 H	360	6.69	41.91
6	4824.00	34.6 AV	54.0	-19.4	1.01 H	360	-7.31	41.91
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	70.1 PK	74.0	-3.9	1.23 V	278	37.51	32.59
2	2390.00	53.7 AV	54.0	-0.3	1.23 V	278	21.11	32.59
3	*2412.00	116.1 PK			1.23 V	278	83.45	32.65
4	*2412.00	104.5 AV			1.23 V	278	71.85	32.65
5	4824.00	50.2 PK	74.0	-23.8	1.18 V	169	8.29	41.91
6	4824.00	39.3 AV	54.0	-14.7	1.18 V	169	-2.61	41.91

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	112.8 PK			1.01 H	352	80.09	32.71
2	*2437.00	102.7 AV			1.01 H	352	69.99	32.71
3	4874.00	48.6 PK	74.0	-25.4	1.05 H	360	6.61	41.99
4	4874.00	34.7 AV	54.0	-19.3	1.05 H	360	-7.29	41.99
5	7311.00	55.5 PK	74.0	-18.5	1.02 H	208	8.94	46.56
6	7311.00	42.5 AV	54.0	-11.5	1.02 H	208	-4.06	46.56
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	67.3 PK	74.0	-6.7	1.22 V	278	34.71	32.59
2	**2390.00**	**53.8 AV**	**54.0**	**-0.2**	**1.22 V**	**278**	**21.21**	**32.59**
3	*2437.00	125.3 PK			1.22 V	278	92.59	32.71
4	*2437.00	113.3 AV			1.22 V	278	80.59	32.71
5	2483.50	64.6 PK	74.0	-9.4	1.22 V	278	31.77	32.83
6	2483.50	44.1 AV	54.0	-9.9	1.22 V	278	11.27	32.83
7	4874.00	49.7 PK	74.0	-24.3	1.11 V	178	7.71	41.99
8	4874.00	38.3 AV	54.0	-15.7	1.11 V	178	-3.69	41.99
9	7311.00	54.5 PK	74.0	-19.5	1.00 V	341	7.94	46.56
10	7311.00	43.6 AV	54.0	-10.4	1.00 V	341	-2.96	46.56

REMARKS:

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

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	107.8 PK			1.00 H	355	75.03	32.77
2	*2462.00	97.7 AV			1.00 H	355	64.93	32.77
3	2483.50	56.7 PK	74.0	-17.3	1.00 H	355	23.87	32.83
4	2483.50	39.8 AV	54.0	-14.2	1.00 H	355	6.97	32.83
5	4924.00	48.8 PK	74.0	-25.2	1.00 H	360	6.78	42.02
6	4924.00	34.7 AV	54.0	-19.3	1.00 H	360	-7.32	42.02
7	7386.00	55.6 PK	74.0	-18.4	1.00 H	212	8.81	46.79
8	7386.00	42.9 AV	54.0	-11.1	1.00 H	212	-3.89	46.79
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	121.3 PK			1.17 V	261	88.53	32.77
2	*2462.00	109.0 AV			1.17 V	261	76.23	32.77
3	2483.50	73.5 PK	74.0	-0.5	1.17 V	261	40.67	32.83
4	2483.50	53.6 AV	54.0	-0.4	1.17 V	261	20.77	32.83
5	4924.00	50.0 PK	74.0	-24.0	1.14 V	178	7.98	42.02
6	4924.00	38.8 AV	54.0	-15.2	1.14 V	178	-3.22	42.02
7	7386.00	55.0 PK	74.0	-19.0	1.00 V	328	8.21	46.79
8	7386.00	43.8 AV	54.0	-10.2	1.00 V	328	-2.99	46.79

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 (HT40)

CHANNEL	TX Channel 3	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	54.2 PK	74.0	-19.8	1.00 H	353	21.61	32.59
2	2390.00	39.0 AV	54.0	-15.0	1.00 H	353	6.41	32.59
3	*2422.00	96.3 PK			1.00 H	353	63.63	32.67
4	*2422.00	85.2 AV			1.00 H	353	52.53	32.67
5	4844.00	48.9 PK	74.0	-25.1	1.00 H	347	6.96	41.94
6	4844.00	34.8 AV	54.0	-19.2	1.00 H	347	-7.14	41.94
7	7266.00	55.9 PK	74.0	-18.1	1.00 H	198	9.47	46.43
8	7266.00	43.0 AV	54.0	-11.0	1.00 H	198	-3.43	46.43
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	70.6 PK	74.0	-3.4	1.20 V	264	38.01	32.59
2	2390.00	53.7 AV	54.0	-0.3	1.20 V	264	21.11	32.59
3	*2422.00	109.4 PK			1.20 V	264	76.73	32.67
4	*2422.00	96.2 AV			1.20 V	264	63.53	32.67
5	4844.00	49.9 PK	74.0	-24.1	1.08 V	166	7.96	41.94
6	4844.00	38.7 AV	54.0	-15.3	1.08 V	166	-3.24	41.94
7	7266.00	54.6 PK	74.0	-19.4	1.03 V	332	8.17	46.43
8	7266.00	43.6 AV	54.0	-10.4	1.03 V	332	-2.83	46.43

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	101.0 PK			1.00 H	349	68.29	32.71
2	*2437.00	90.0 AV			1.00 H	349	57.29	32.71
3	4874.00	48.7 PK	74.0	-25.3	1.04 H	348	6.71	41.99
4	4874.00	34.4 AV	54.0	-19.6	1.04 H	348	-7.59	41.99
5	7311.00	56.3 PK	74.0	-17.7	1.04 H	201	9.74	46.56
6	7311.00	43.3 AV	54.0	-10.7	1.04 H	201	-3.26	46.56
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	71.0 PK	74.0	-3.0	1.20 V	265	38.41	32.59
2	**2390.00**	**53.8 AV**	**54.0**	**-0.2**	**1.20 V**	**265**	**21.21**	**32.59**
3	*2437.00	113.4 PK			1.20 V	265	80.69	32.71
4	*2437.00	100.0 AV			1.20 V	265	67.29	32.71
5	2483.50	54.6 PK	74.0	-19.4	1.20 V	265	21.77	32.83
6	2483.50	41.8 AV	54.0	-12.2	1.20 V	265	8.97	32.83
7	4874.00	49.9 PK	74.0	-24.1	1.17 V	183	7.91	41.99
8	4874.00	39.0 AV	54.0	-15.0	1.17 V	183	-2.99	41.99
9	7311.00	55.0 PK	74.0	-19.0	1.04 V	342	8.44	46.56
10	7311.00	43.6 AV	54.0	-10.4	1.04 V	342	-2.96	46.56

REMARKS:

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

CHANNEL	TX Channel 9	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	*2452.00	102.1 PK			1.00 H	347	69.35	32.75
2	*2452.00	91.7 AV			1.00 H	347	58.95	32.75
3	2483.50	54.1 PK	74.0	-19.9	1.00 H	347	21.27	32.83
4	2483.50	39.9 AV	54.0	-14.1	1.00 H	347	7.07	32.83
5	4904.00	48.9 PK	74.0	-25.1	1.06 H	360	6.87	42.03
6	4904.00	34.9 AV	54.0	-19.1	1.06 H	360	-7.13	42.03
7	7356.00	55.1 PK	74.0	-18.9	1.01 H	217	8.41	46.69
8	7356.00	42.5 AV	54.0	-11.5	1.01 H	217	-4.19	46.69
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	*2452.00	114.8 PK			1.19 V	259	82.05	32.75
2	*2452.00	101.8 AV			1.19 V	259	69.05	32.75
3	2483.50	69.8 PK	74.0	-4.2	1.19 V	259	36.97	32.83
4	**2483.50**	**53.8 AV**	**54.0**	**-0.2**	**1.19 V**	**259**	**20.97**	**32.83**
5	4904.00	49.5 PK	74.0	-24.5	1.15 V	190	7.47	42.03
6	4904.00	38.5 AV	54.0	-15.5	1.15 V	190	-3.53	42.03
7	7356.00	55.3 PK	74.0	-18.7	1.05 V	336	8.61	46.69
8	7356.00	44.0 AV	54.0	-10.0	1.05 V	336	-2.69	46.69

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	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. 25, 2013

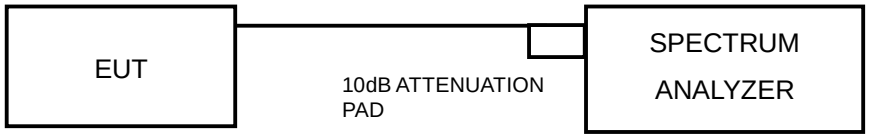
4.3.3 TEST PROCEDURE

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

4.3.4 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	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	8.49	0.5	PASS
6	2437	8.30	0.5	PASS
11	2462	7.85	0.5	PASS

802.11g

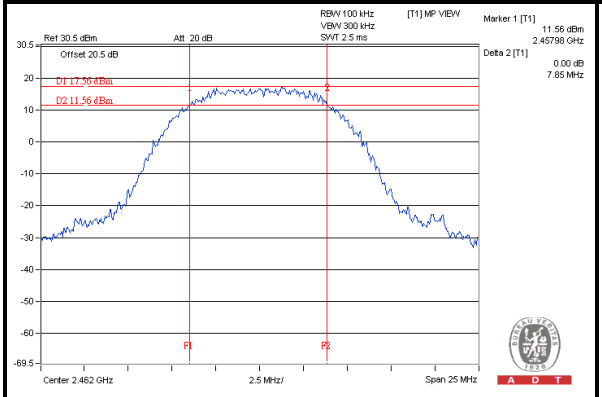
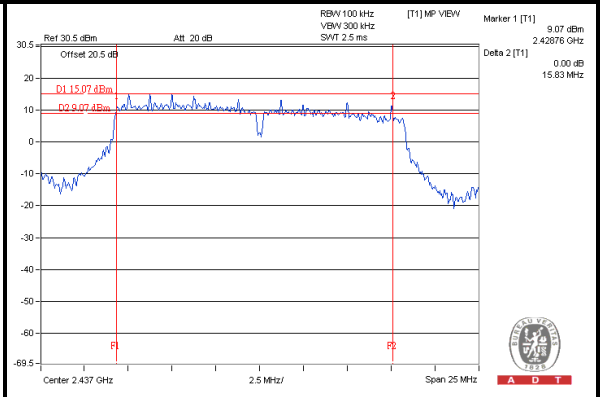
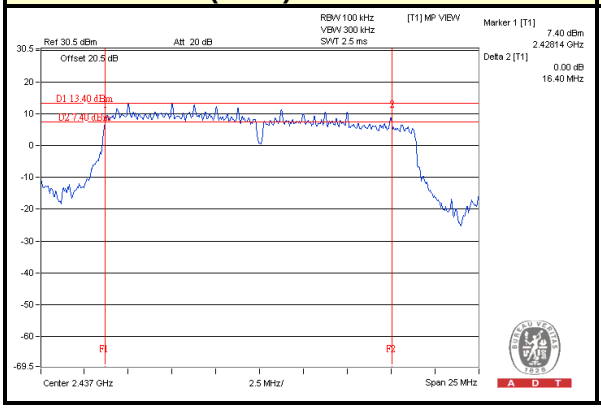
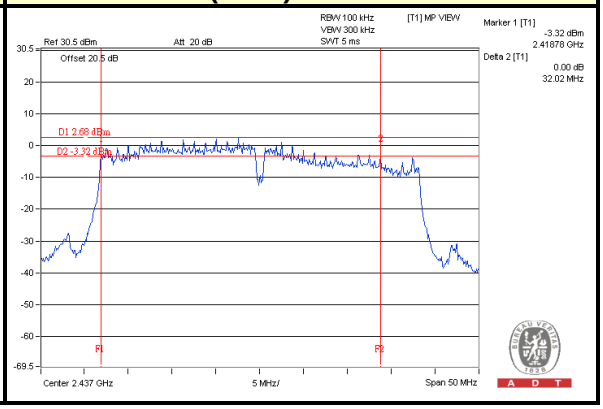
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.45	0.5	PASS
6	2437	15.83	0.5	PASS
11	2462	16.41	0.5	PASS

802.11n (HT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	17.66	17.74	17.67	0.5	PASS
6	2437	16.45	16.40	16.45	0.5	PASS
11	2462	16.48	17.41	17.04	0.5	PASS

802.11n (HT40)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
3	2422	35.84	34.54	35.25	0.5	PASS
6	2437	35.81	32.02	35.80	0.5	PASS
9	2452	35.96	35.90	35.97	0.5	PASS

SPECTRUM PLOT OF WORST VALUE	
802.11b / CH11	**802.11g / CH6**
	
802.11n (HT20) / CH6 <chain 1>	**802.11n (HT40) / CH6 <chain 1>**
	

4.4 CONDUCTED OUTPUT POWER MEASUREMENT

4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

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

Per KDB 662911 D01 Multiple Transmitter Output v01r02 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.

4.4.2 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. 25, 2013

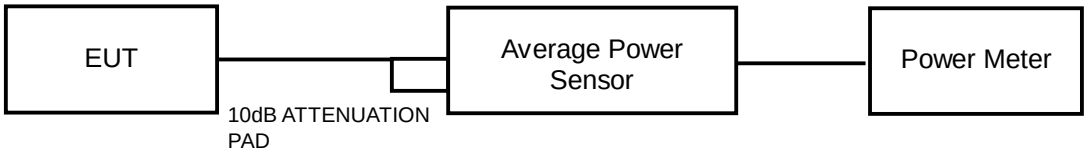
4.4.3 TEST PROCEDURES

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

4.4.4 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)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	206.538	23.15	30	PASS
6	2437	437.522	26.41	30	PASS
11	2462	423.643	26.27	30	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	38.194	15.82	30	PASS
6	2437	251.768	24.01	30	PASS
11	2462	112.460	20.51	30	PASS

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	13.85	14.55	14.97	84.181	19.25	30	PASS
6	2437	22.96	22.74	22.36	557.816	27.46	30	PASS
11	2462	17.96	18.71	18.12	201.682	23.05	30	PASS

802.11n (HT40)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
3	2422	7.88	10.54	9.01	25.424	14.05	30	PASS
6	2437	12.77	14.22	13.51	67.786	18.31	30	PASS
9	2452	14.90	15.81	14.82	99.349	19.97	30	PASS

4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

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 : Sep. 25, 2013

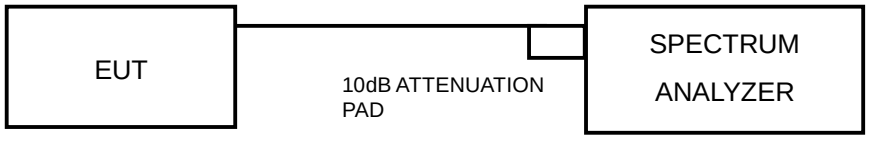
4.5.3 TEST PROCEDURE

1. Set the RBW = 30 kHz, VBW =100 kHz, Detector = power averaging (RMS).
2. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW
3. Sweep time = auto couple,
4. Employ trace averaging (RMS) mode over a minimum of 100 traces.
5. Use the peak marker function to determine the maximum amplitude level.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.5.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
1	2412	-0.76	8	PASS
6	2437	2.30	8	PASS
11	2462	2.29	8	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
1	2412	-9.45	8	PASS
6	2437	0.14	8	PASS
11	2462	-4.39	8	PASS

802.11n (HT20)

TX chain	Channel	FREQ. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	1	2412	-11.69	4.77	-6.92	5.33	PASS
	6	2437	-2.50	4.77	2.27	5.33	PASS
	11	2462	-8.01	4.77	-3.24	5.33	PASS
1	1	2412	-10.76	4.77	-5.99	5.33	PASS
	6	2437	-1.57	4.77	3.20	5.33	PASS
	11	2462	-7.34	4.77	-2.57	5.33	PASS
2	1	2412	-11.11	4.77	-6.34	5.33	PASS
	6	2437	-2.30	4.77	2.47	5.33	PASS
	11	2462	-7.42	4.77	-2.65	5.33	PASS

NOTE: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 8.67dBi > 6dBi , so the power density limit shall be reduced to 8-(8.67-6) = 5.33dBm.

802.11n (HT40)

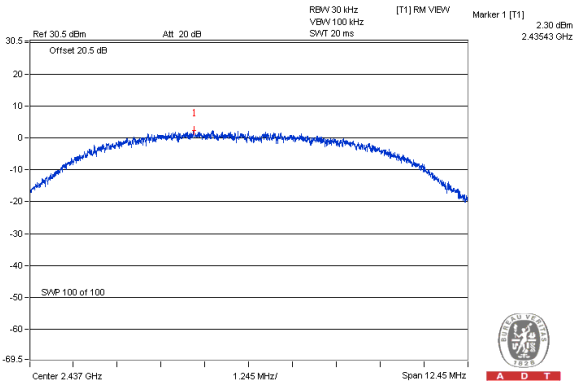
TX chain	Channel	FREQ. (MHz)	PSD W/O DUTY FACTOR (dBm)	10 log (N=3) dB	DUTY FACTOR (dB)	Total PSD WITH DUTY FACTOR (dBm)	Limit (dBm)	PASS /FAIL
0	3	2422	-20.24	4.77	0.09	-15.38	5.33	PASS
	6	2437	-15.06	4.77	0.09	-10.20	5.33	PASS
	9	2452	-14.14	4.77	0.09	-9.28	5.33	PASS
1	3	2422	-17.23	4.77	0.09	-12.37	5.33	PASS
	6	2437	-14.61	4.77	0.09	-9.75	5.33	PASS
	9	2452	-11.91	4.77	0.09	-7.05	5.33	PASS
2	3	2422	-18.81	4.77	0.09	-13.95	5.33	PASS
	6	2437	-14.78	4.77	0.09	-9.92	5.33	PASS
	9	2452	-15.16	4.77	0.09	-10.30	5.33	PASS

NOTE: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 8.67dBi > 6dBi , so the power density limit shall be reduced to 8-(8.67-6) = 5.33dBm.

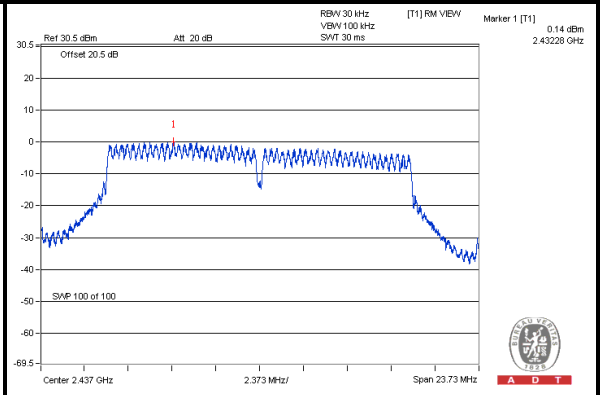
2. Refer to section 3.4 for duty cycle spectrum plot.

SPECTRUM PLOT OF WORST VALUE

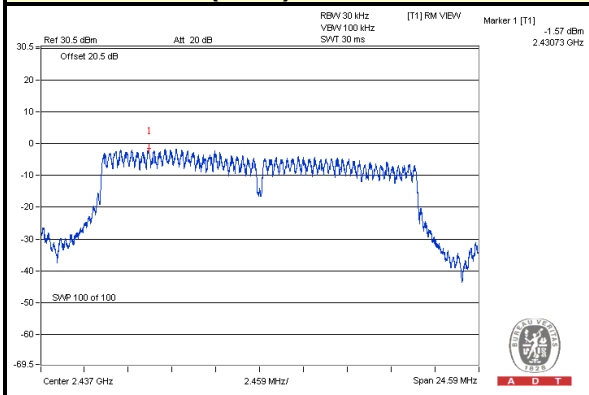
802.11b / CH6



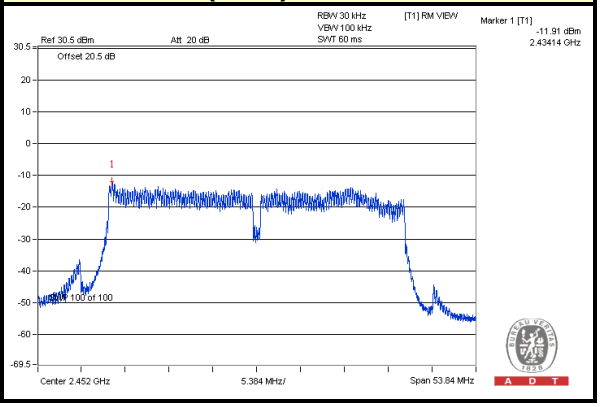
802.11g / CH6



802.11n (HT20) / CH6 <chain 1>



802.11n (HT40) / CH9 <chain 1>



4.6 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.6.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

Below 30dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

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. 25, 2013

4.6.3 TEST PROCEDURE

Measurement Procedure - Reference Level

1. Set the RBW = 100 kHz.
2. Set the VBW ≥ 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.

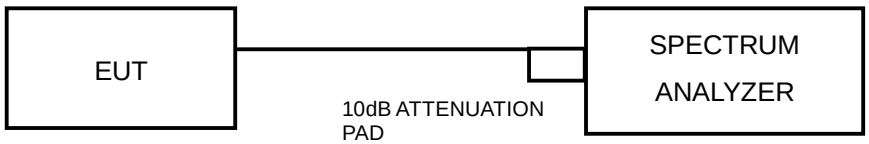
Measurement Procedure –Unwanted Emission Level

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

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



4.6.6 EUT OPERATING CONDITION

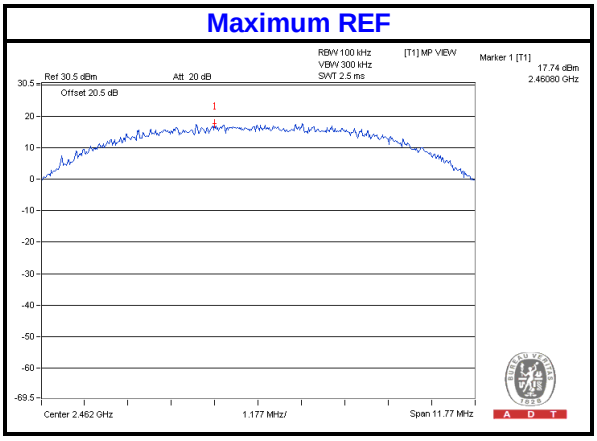
Same as Item 4.3.6

4.6.7 TEST RESULTS

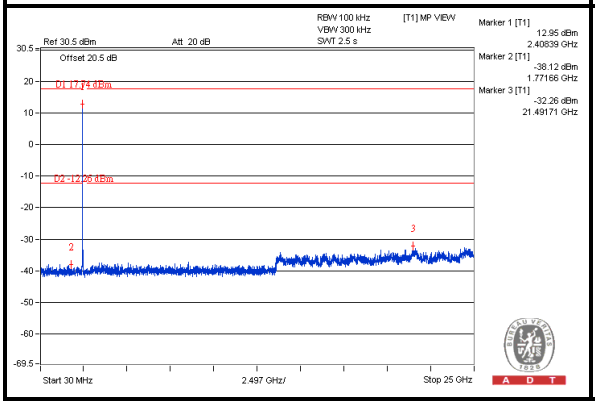
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

802.11b

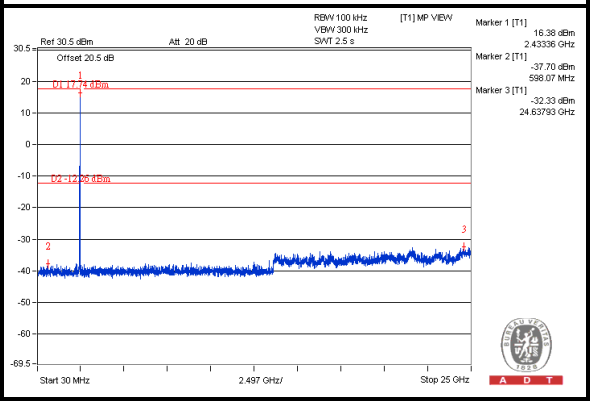
Maximum REF



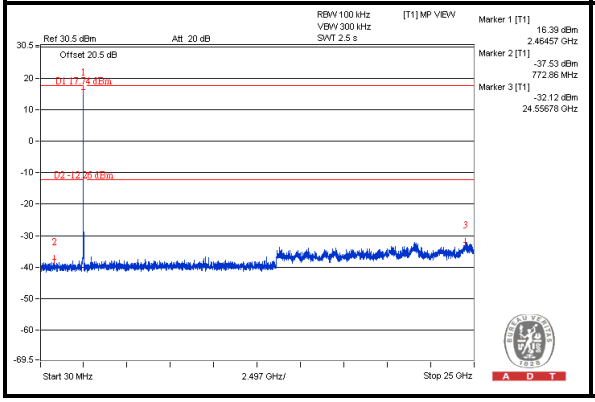
CH 1

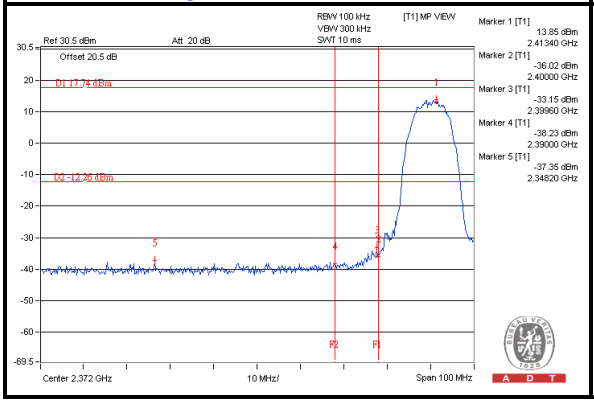
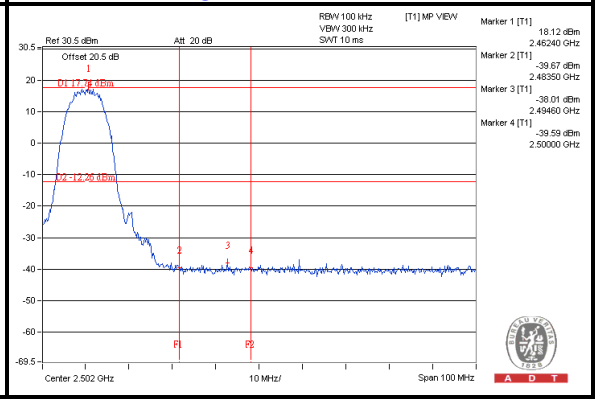


CH 6



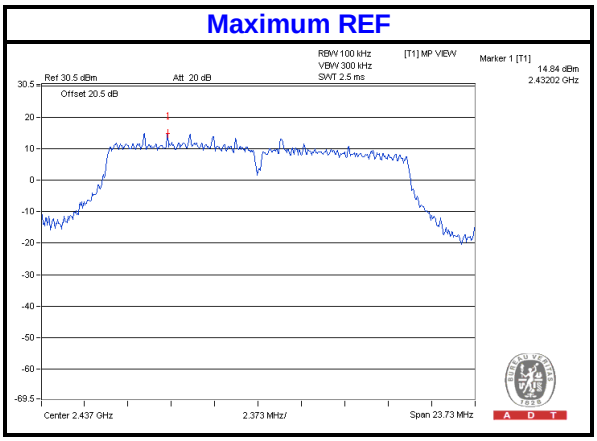
CH 11



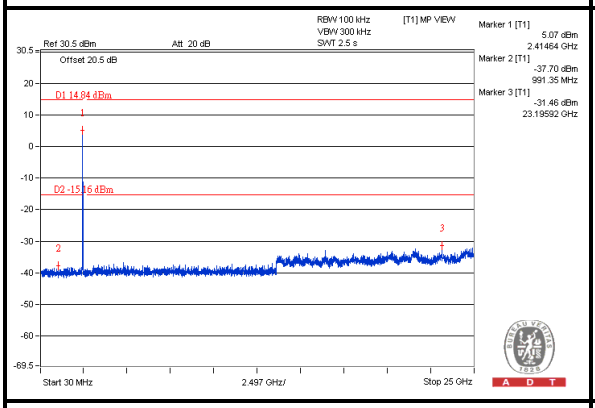
CH 1 Band edge	CH 11 Band edge
	

802.11g

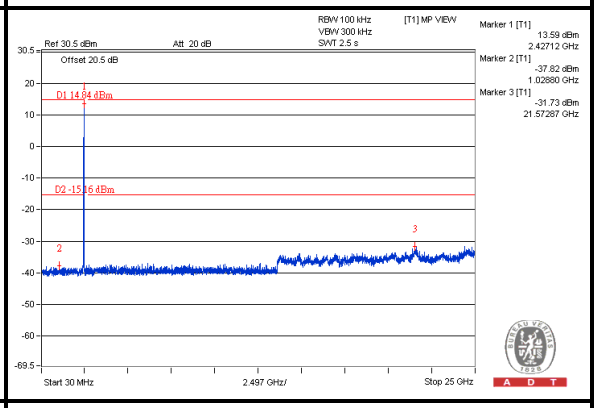
Maximum REF



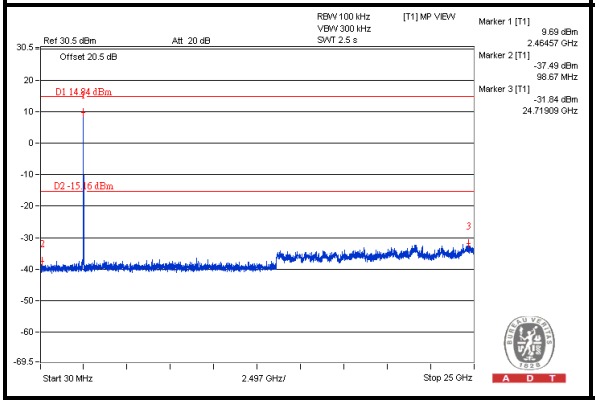
CH 1



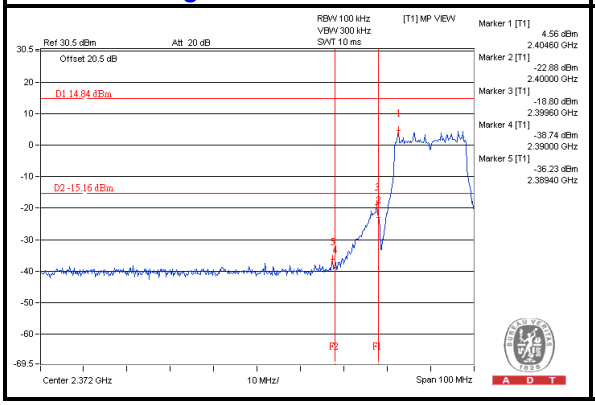
CH 6



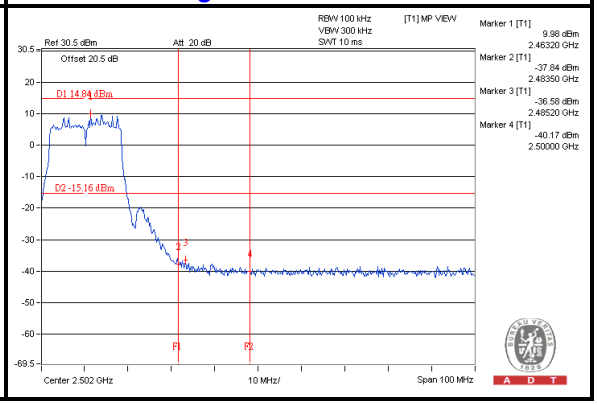
CH 11



CH 1 Band edge

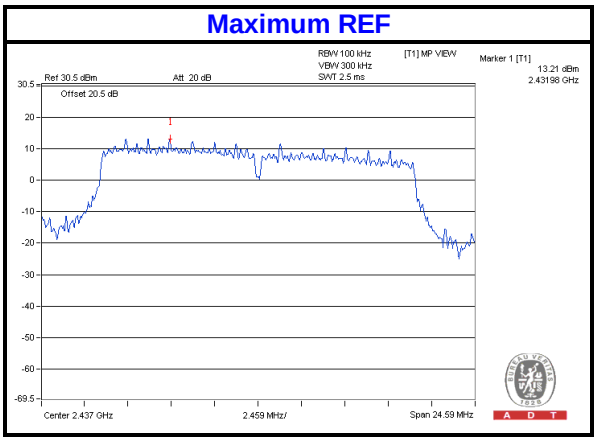


CH 11 Band edge



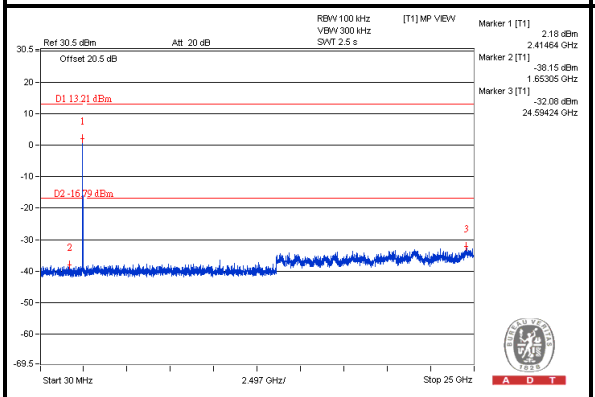
802.11n (HT20)

Maximum REF

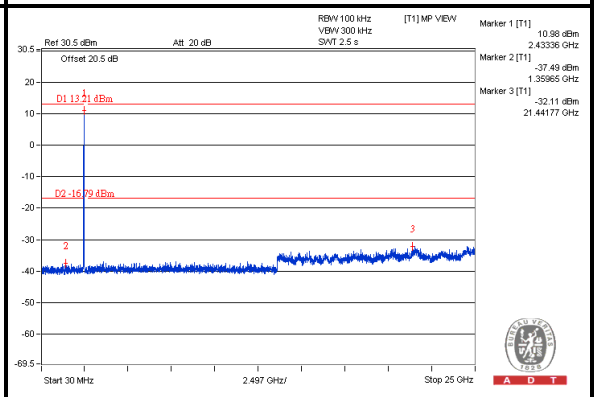


CHAIN (0)

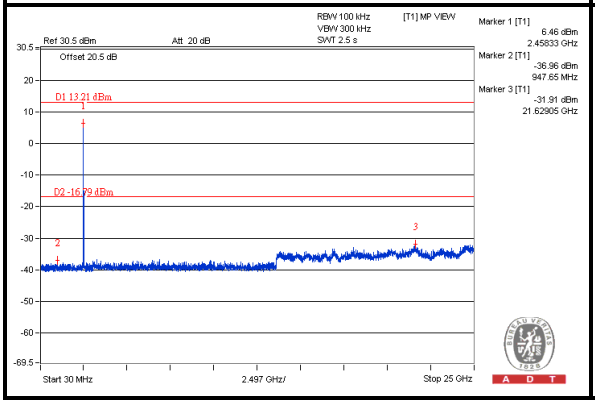
CH 1



CH 6

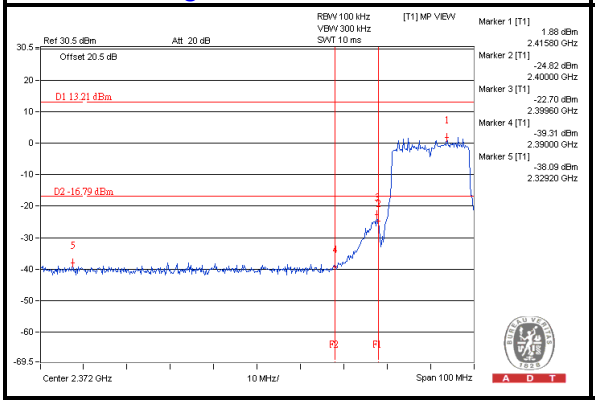


CH 11

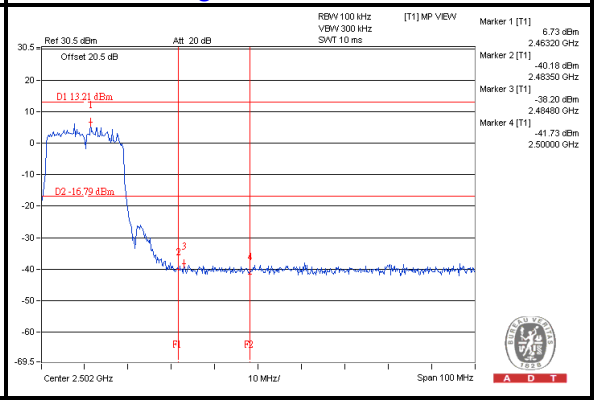


CHAIN (0)

CH 1 Band edge

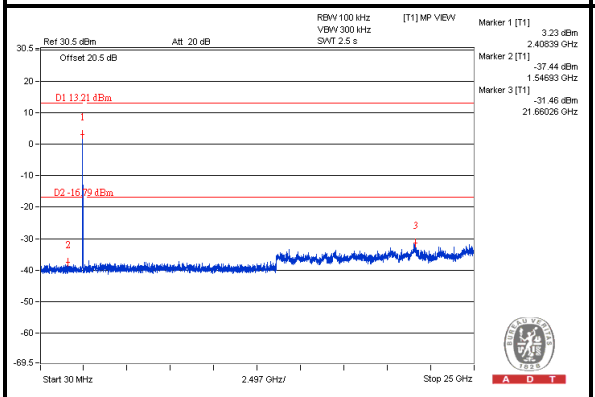


CH 11 Band edge

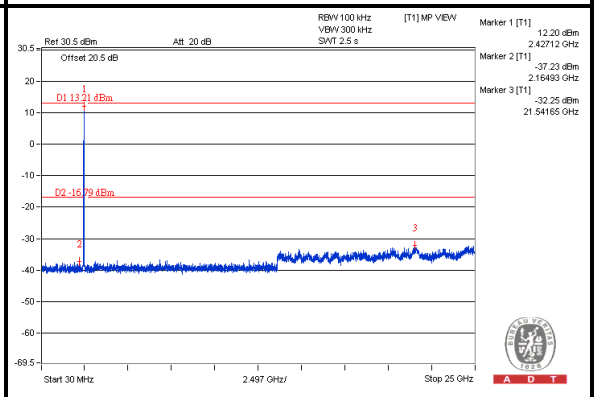


CHAIN (1)

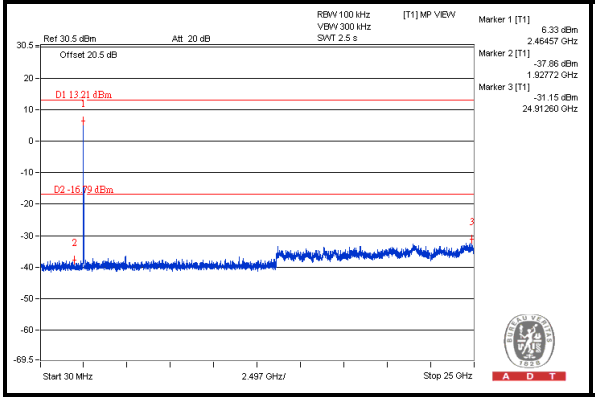
CH 1



CH 6

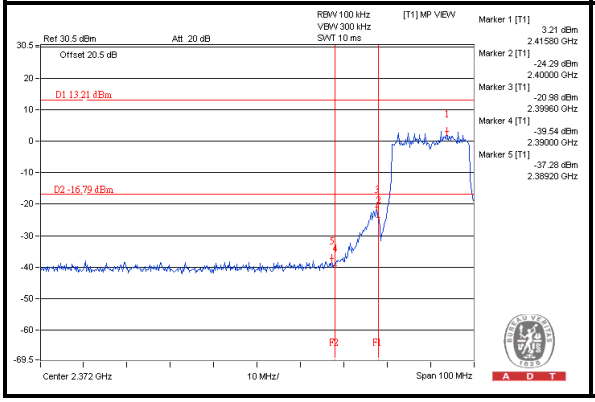


CH 11

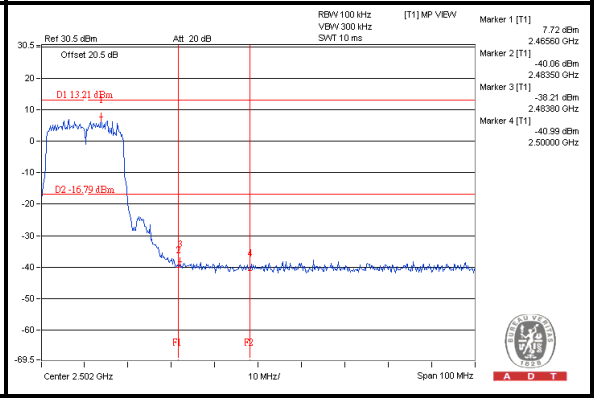


CHAIN (1)

CH 1 Band edge



CH 11 Band edge



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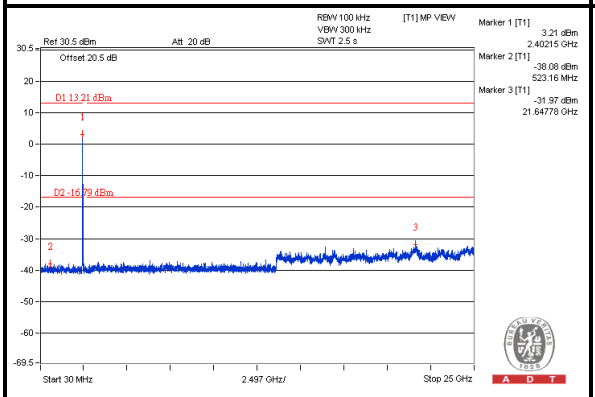
CH 1



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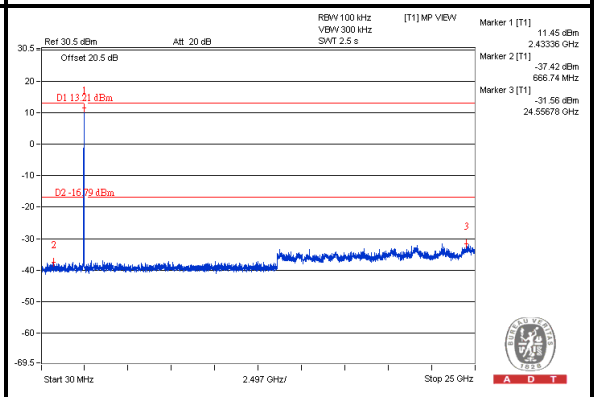
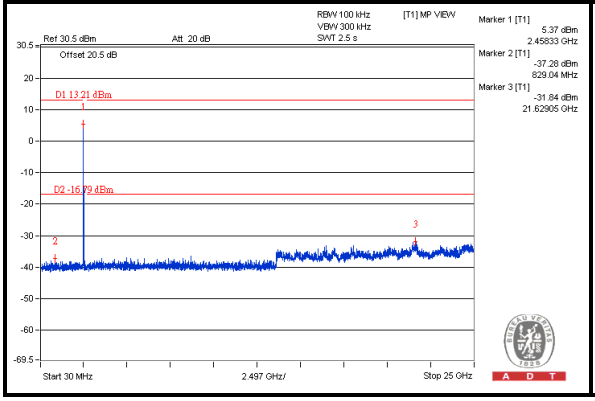


CH 11



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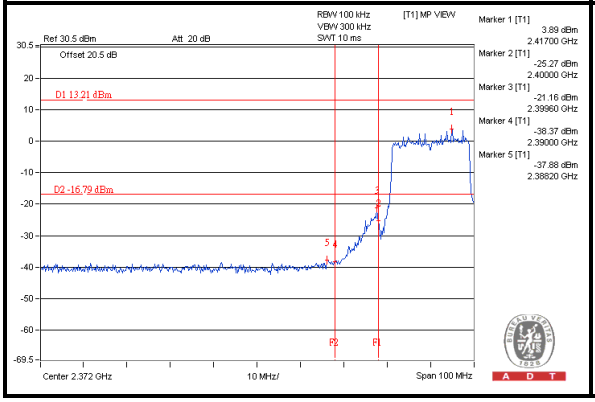
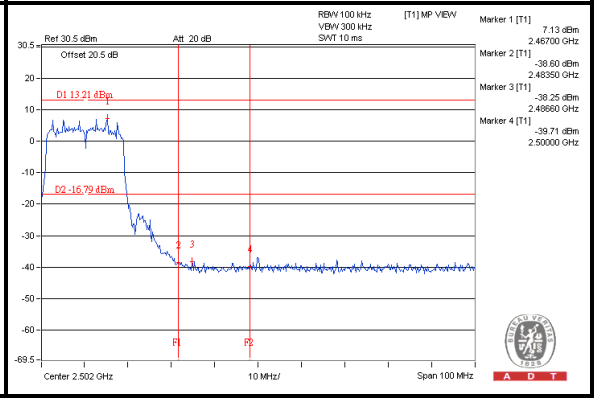
CH 1 Band edge

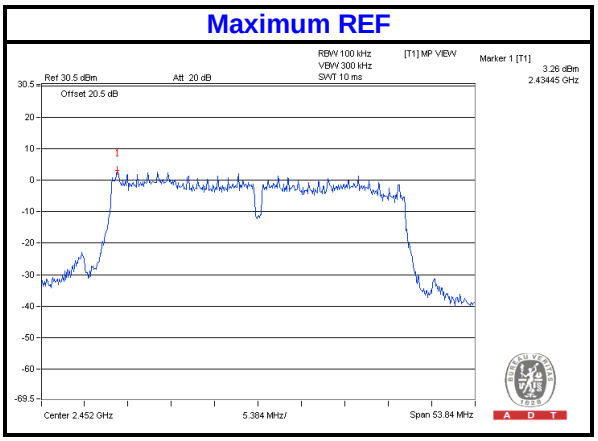


CH 11 Band edge



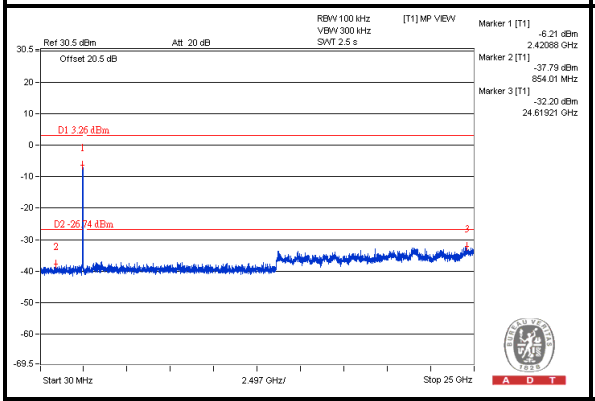
802.11n (HT40)

Maximum REF



CHAIN (0)

CH 3



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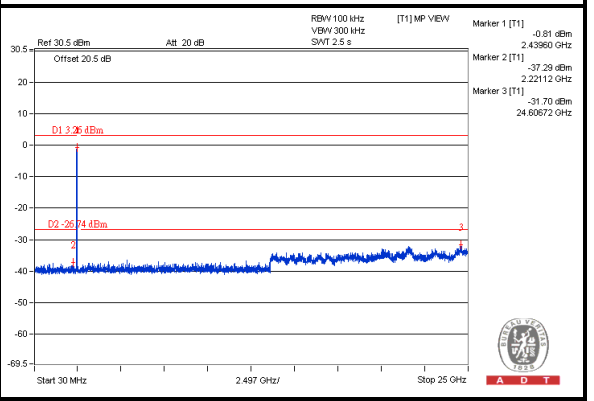

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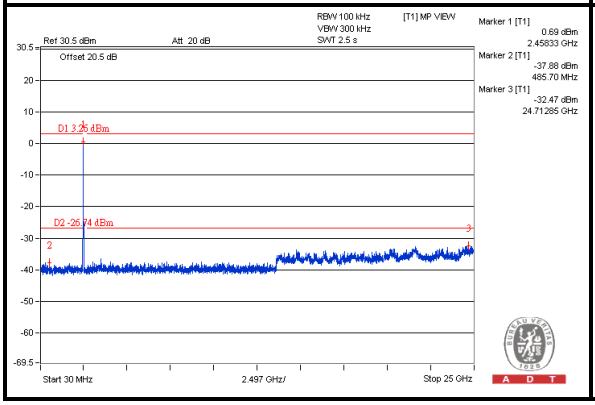

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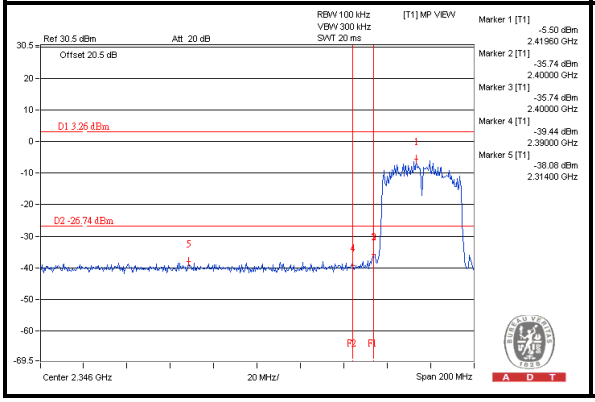
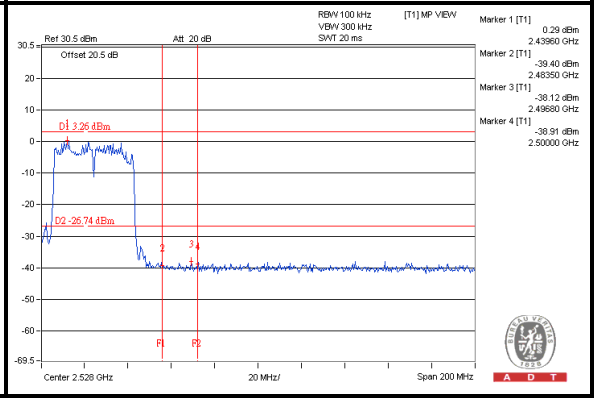
CH 3 Band edge



CH 9 Band edge



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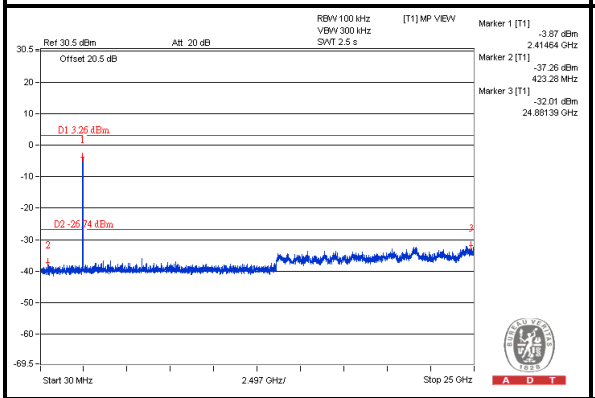
CH 3



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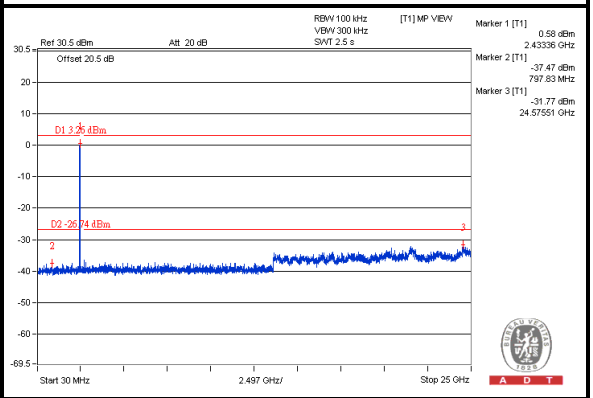

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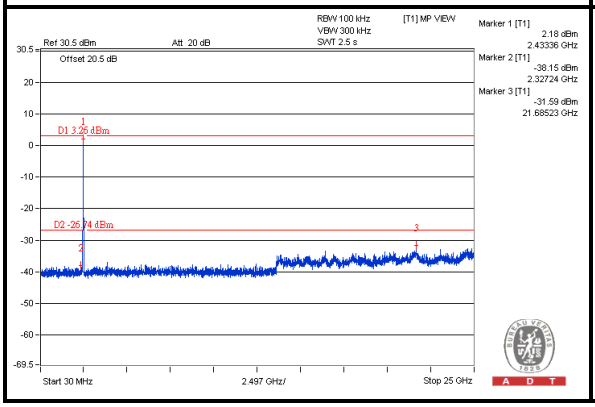
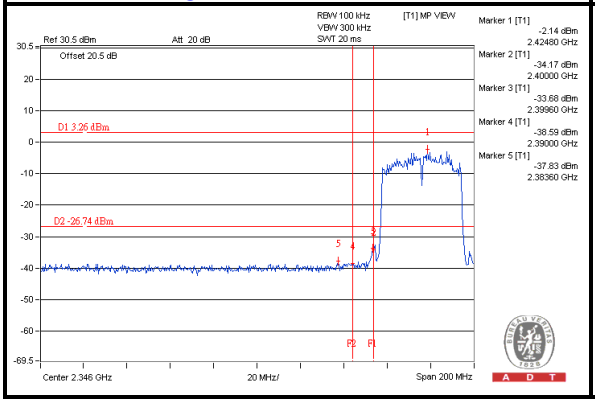
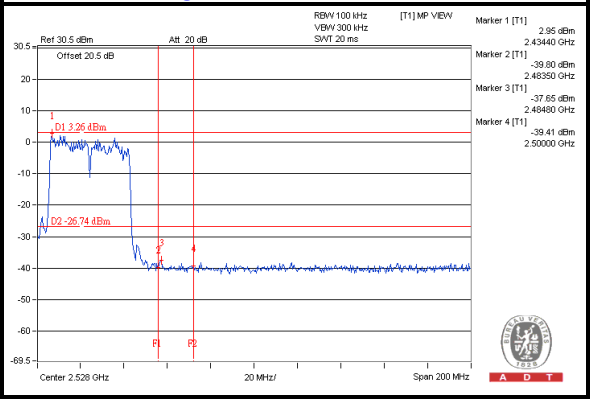


CHAIN (1)

CH 3 Band edge

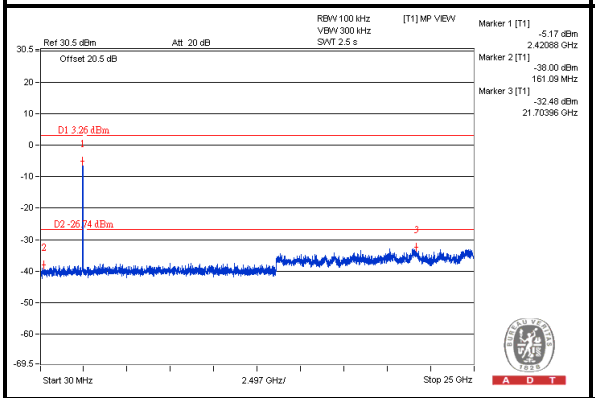


CH 9 Band edge

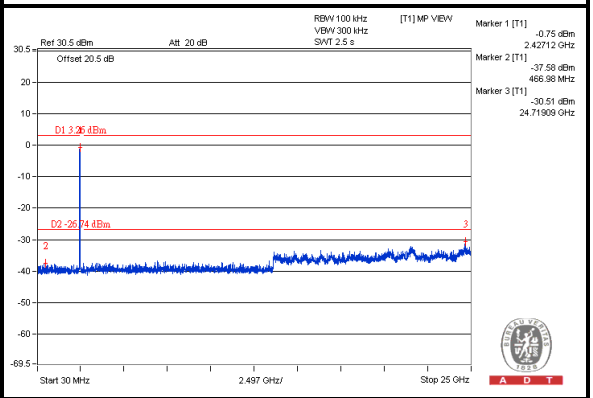


CHAIN (2)

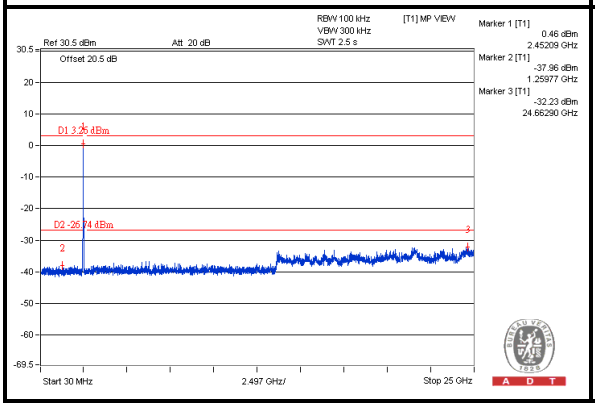
CH 3



CH 6

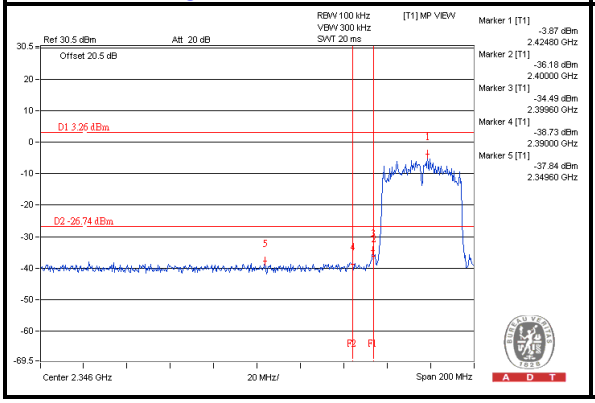


CH 9

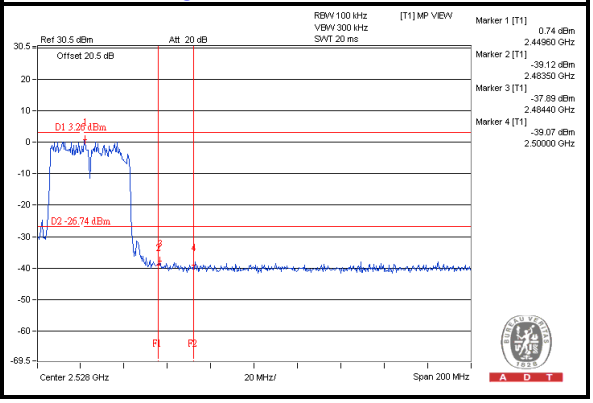


CHAIN (2)

CH 3 Band edge



CH 9 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

For test mode 1

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. 16, 2013

For test mode 2

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. 21, 2013

5.1.3 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 levels under (Limit – 20dB) were not recorded.

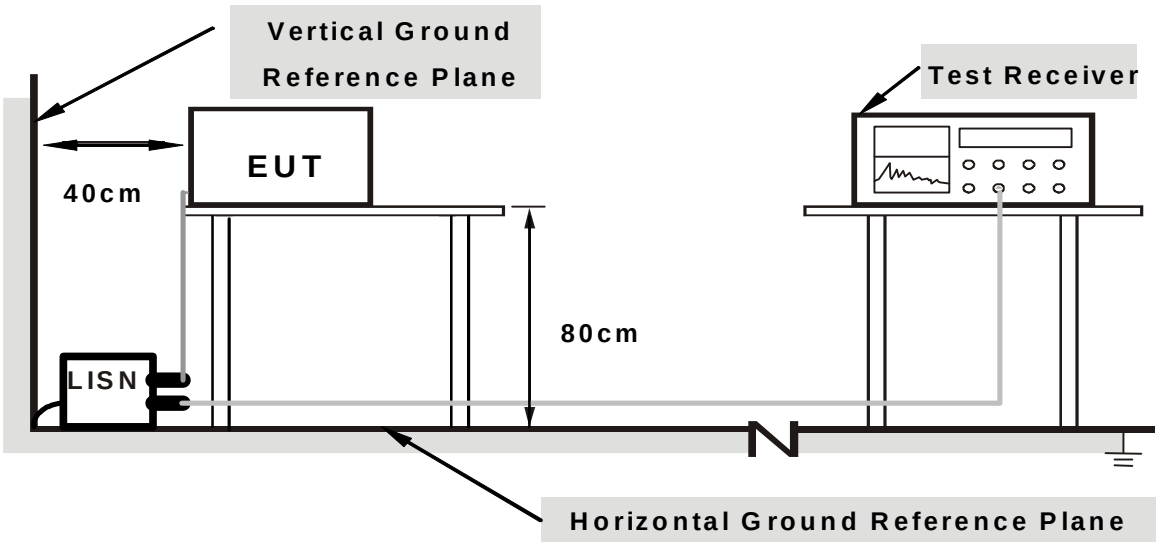
NOTE:

1. 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

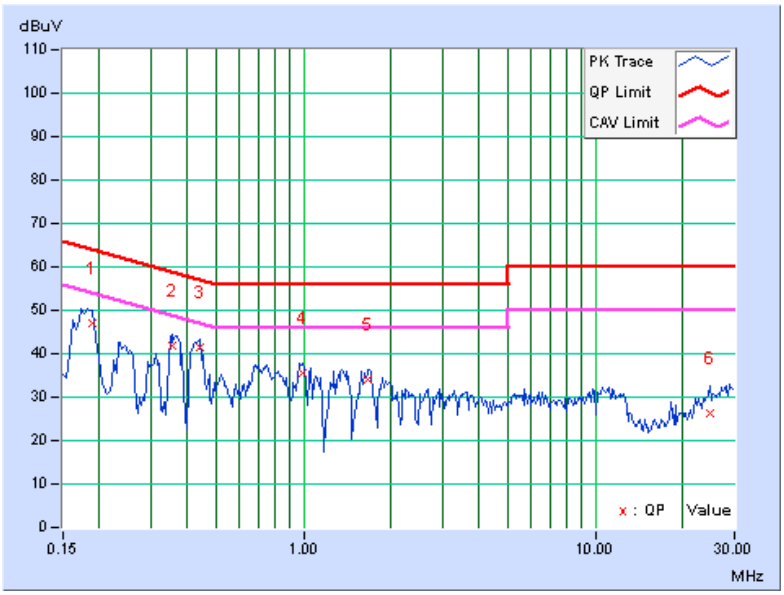
5.1.7 TEST RESULTS(Mode 1)

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	0.18906	9.76	37.32	22.76	47.08	32.52	64.08	54.08	-17.00	-21.56
2	0.35313	9.79	31.98	19.25	41.77	29.04	58.89	48.89	-17.12	-19.85
3	0.43906	9.80	31.62	17.98	41.42	27.78	57.08	47.08	-15.66	-19.30
4	0.99375	9.82	25.73	13.38	35.55	23.20	56.00	46.00	-20.45	-22.80
5	1.67188	9.84	24.11	11.13	33.95	20.97	56.00	46.00	-22.05	-25.03
6	24.64453	10.16	16.25	10.63	26.41	20.79	60.00	50.00	-33.59	-29.21

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

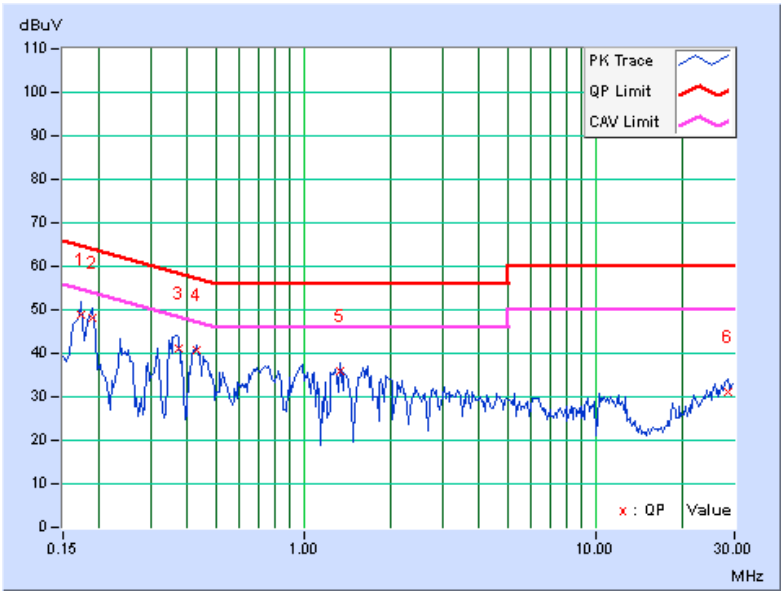


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	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	0.17344	9.75	39.26	26.26	49.01	36.01	64.79	54.79	-15.78	-18.78
2	0.18906	9.75	38.50	25.52	48.25	35.27	64.08	54.08	-15.83	-18.81
3	0.37266	9.79	31.22	17.27	41.01	27.06	58.44	48.44	-17.43	-21.38
4	0.43125	9.80	30.99	17.82	40.79	27.62	57.23	47.23	-16.44	-19.61
5	1.33984	9.83	25.95	13.02	35.78	22.85	56.00	46.00	-20.22	-23.15
6	28.36719	10.40	20.56	13.97	30.96	24.37	60.00	50.00	-29.04	-25.63

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



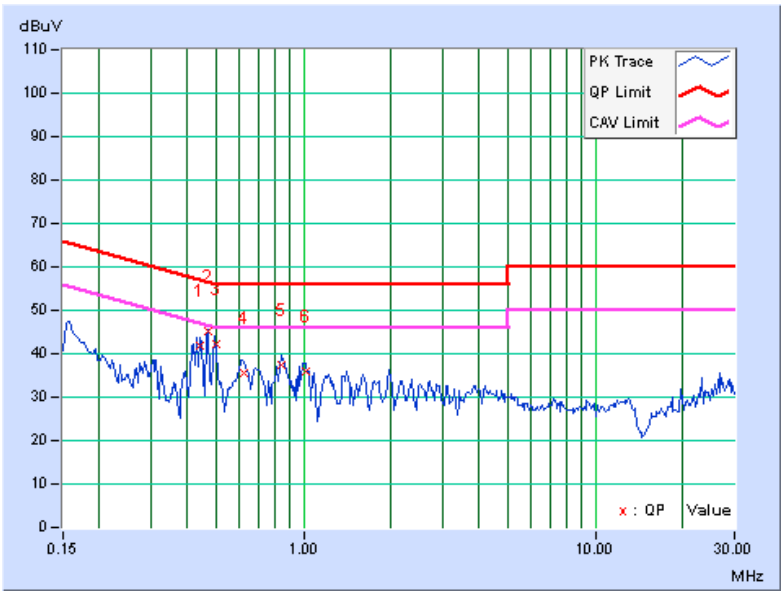
5.1.8 TEST RESULTS (Mode 2)

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	0.44297	0.14	41.80	41.76	41.94	41.90	57.01	47.01	-15.06	-5.10
2	**0.47031**	**0.14**	**45.16**	**44.51**	**45.30**	**44.65**	**56.51**	**46.51**	**-11.20**	**-1.85**
3	0.50000	0.15	41.96	41.46	42.11	41.61	56.00	46.00	-13.89	-4.39
4	0.62656	0.15	35.37	34.11	35.52	34.26	56.00	46.00	-20.48	-11.74
5	0.83750	0.16	37.12	34.19	37.28	34.35	56.00	46.00	-18.72	-11.65
6	1.02344	0.17	35.85	33.12	36.02	33.29	56.00	46.00	-19.98	-12.71

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

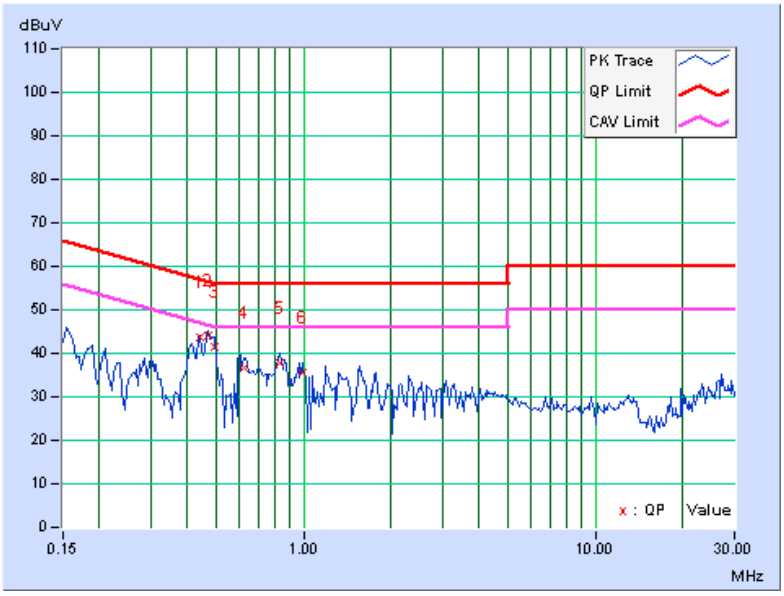


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	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	0.44191	0.14	43.59	42.61	43.73	42.75	57.03	47.03	-13.29	-4.27
2	0.47031	0.14	43.94	43.78	44.08	43.92	56.51	46.51	-12.42	-2.58
3	0.49766	0.14	41.23	41.17	41.37	41.31	56.04	46.04	-14.66	-4.72
4	0.62250	0.15	36.56	35.63	36.71	35.78	56.00	46.00	-19.29	-10.22
5	0.83359	0.16	37.45	34.04	37.61	34.20	56.00	46.00	-18.39	-11.80
6	0.98984	0.17	35.40	32.84	35.57	33.01	56.00	46.00	-20.43	-12.99

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 BANDEDGE EMISSION MEASUREMENT

5.2.1 LIMITS OF RADIATED AND BANDEDGE 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 30dB 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.

5.2.2 TEST INSTRUMENTS

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. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Mar. 25, 2013	Mar. 24, 2014
RF Cable	NA	CHHCAB_001	Oct. 07, 2012	Oct. 06, 2013
Horn_Antenna AISI	AIH.8018	0000220091110	Nov. 27, 2012	Nov. 26, 2013
Pre-Amplifier Agilent	8449B	3008A01923	Oct. 30, 2012	Oct. 29, 2013
RF Cable	NA	RF104-205 RF104-207 RF104-202	Dec. 26, 2012	Dec. 25, 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. H.
4. The FCC Site Registration No. is 797305.
5 The CANADA Site Registration No. is IC 7450H-3.
6 Tested Date: Sep. 23 to 25, 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:

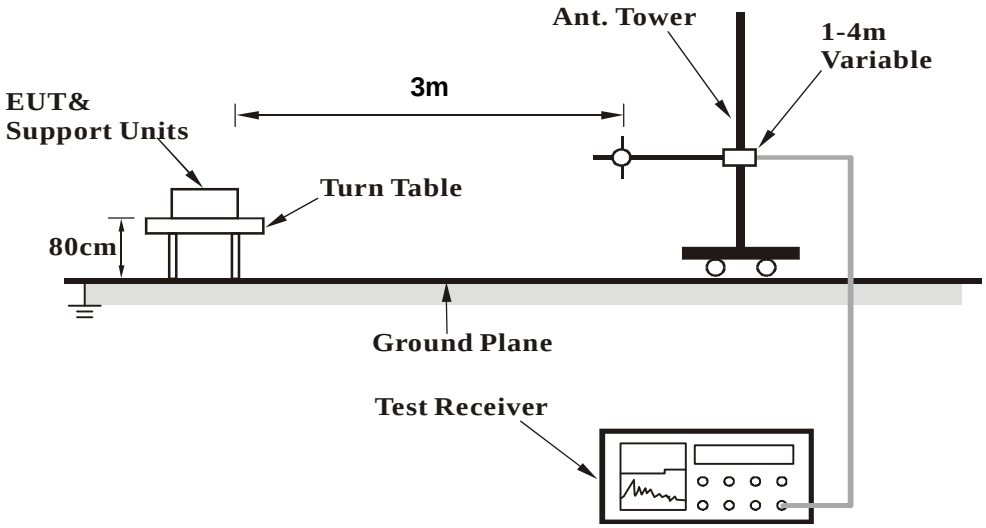
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

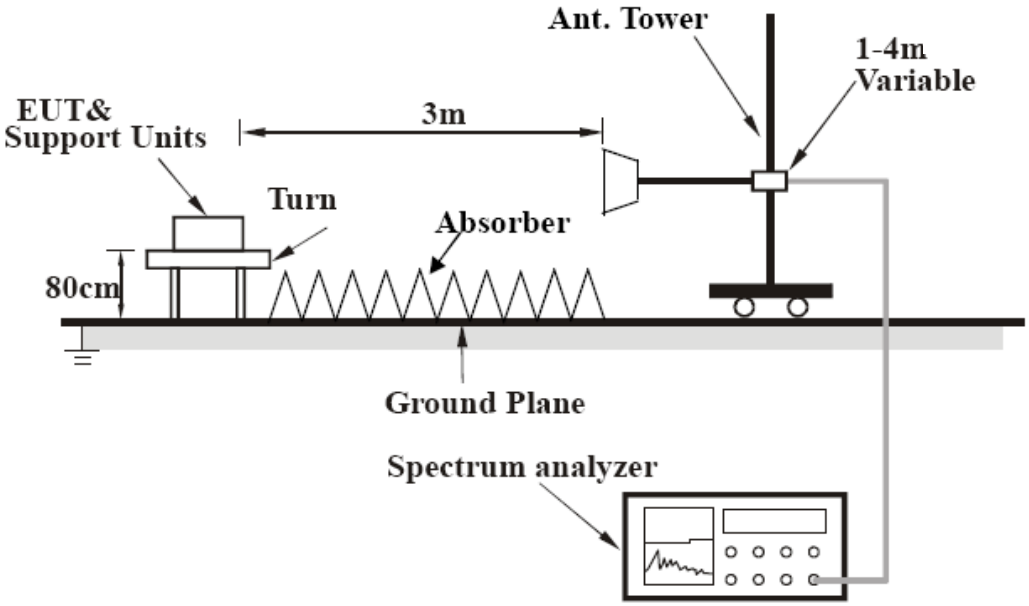
No deviation

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 (VHT20)

CHANNEL	TX Channel 157	**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	54.35	27.9 QP	40.0	-12.1	1.50 H	246	40.79	-12.87
2	85.00	31.2 QP	40.0	-8.8	2.00 H	115	50.27	-19.03
3	151.54	34.5 QP	43.5	-9.0	2.00 H	148	47.48	-12.96
4	199.31	34.2 QP	43.5	-9.3	1.50 H	247	50.54	-16.34
5	297.04	30.5 QP	46.0	-15.5	1.00 H	122	42.77	-12.31
6	480.03	38.9 QP	46.0	-7.2	2.00 H	114	46.88	-8.03
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	37.78	31.1 QP	40.0	-8.9	1.01 V	245	44.80	-13.72
2	**62.54**	**37.4 QP**	**40.0**	**-2.6**	**1.00 V**	**214**	**51.26**	**-13.84**
3	85.53	36.5 QP	40.0	-3.5	1.50 V	112	55.60	-19.06
4	197.86	34.2 QP	43.5	-9.3	1.00 V	145	50.42	-16.19
5	480.03	34.7 QP	46.0	-11.3	1.00 V	241	42.71	-8.03
6	500.01	32.0 QP	46.0	-14.0	1.00 V	128	39.55	-7.53

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	*5745.00	108.5 PK			1.55 H	220	65.39	43.11
2	*5745.00	99.8 AV			1.55 H	220	56.69	43.11
3	11490.00	59.3 PK	74.0	-14.7	1.51 H	224	9.65	49.65
4	11490.00	46.3 AV	54.0	-7.7	1.51 H	224	-3.35	49.65
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	*5745.00	112.9 PK			1.00 V	179	69.79	43.11
2	*5745.00	103.3 AV			1.00 V	179	60.19	43.11
3	7660.00	58.2 PK	74.0	-15.8	1.28 V	32	10.56	47.64
4	7660.00	43.9 AV	54.0	-10.1	1.28 V	32	-3.74	47.64
5	11490.00	58.2 PK	74.0	-15.8	1.44 V	341	8.55	49.65
6	11490.00	46.5 AV	54.0	-7.5	1.44 V	341	-3.15	49.65

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	*5785.00	108.4 PK			1.53 H	207	65.26	43.14
2	*5785.00	99.5 AV			1.53 H	207	56.36	43.14
3	11570.00	59.0 PK	74.0	-15.0	1.52 H	223	9.35	49.65
4	11570.00	46.2 AV	54.0	-7.8	1.52 H	223	-3.45	49.65
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	*5785.00	112.5 PK			1.02 V	179	69.36	43.14
2	*5785.00	102.9 AV			1.02 V	179	59.76	43.14
3	11570.00	57.8 PK	74.0	-16.2	1.49 V	349	8.15	49.65
4	11570.00	46.3 AV	54.0	-7.7	1.49 V	349	-3.35	49.65

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	*5825.00	109.2 PK			1.51 H	197	65.96	43.24
2	*5825.00	100.0 AV			1.51 H	197	56.76	43.24
3	11650.00	59.6 PK	74.0	-14.4	1.54 H	196	9.72	49.88
4	11650.00	46.4 AV	54.0	-7.6	1.54 H	196	-3.48	49.88
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	113.0 PK			1.04 V	193	69.76	43.24
2	*5825.00	103.4 AV			1.04 V	193	60.16	43.24
3	11650.00	58.4 PK	74.0	-15.6	1.50 V	337	8.52	49.88
4	11650.00	46.7 AV	54.0	-7.3	1.50 V	337	-3.18	49.88

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) 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	*5745.00	108.9 PK			1.53 H	213	65.79	43.11
2	*5745.00	99.7 AV			1.53 H	213	56.59	43.11
3	11490.00	59.7 PK	74.0	-14.3	1.53 H	211	10.05	49.65
4	11490.00	46.7 AV	54.0	-7.3	1.53 H	211	-2.95	49.65
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	*5745.00	120.1 PK			1.22 V	220	76.99	43.11
2	*5745.00	110.5 AV			1.22 V	220	67.39	43.11
3	11490.00	57.8 PK	74.0	-16.2	1.42 V	331	8.15	49.65
4	11490.00	46.3 AV	54.0	-7.7	1.42 V	331	-3.35	49.65

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	*5785.00	109.4 PK			1.56 H	226	66.26	43.14
2	*5785.00	100.1 AV			1.56 H	226	56.96	43.14
3	11570.00	60.4 PK	74.0	-13.6	1.53 H	222	10.75	49.65
4	11570.00	47.1 AV	54.0	-6.9	1.53 H	222	-2.55	49.65
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	*5785.00	119.6 PK			1.26 V	210	76.46	43.14
2	*5785.00	110.1 AV			1.26 V	210	66.96	43.14
3	11570.00	57.7 PK	74.0	-16.3	1.40 V	334	8.05	49.65
4	11570.00	46.2 AV	54.0	-7.8	1.40 V	334	-3.45	49.65

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	*5825.00	108.9 PK			1.55 H	224	65.66	43.24
2	*5825.00	99.5 AV			1.55 H	224	56.26	43.24
3	11650.00	60.1 PK	74.0	-13.9	1.49 H	205	10.22	49.88
4	11650.00	47.0 AV	54.0	-7.0	1.49 H	205	-2.88	49.88
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	120.7 PK			1.20 V	235	77.46	43.24
2	*5825.00	110.8 AV			1.20 V	235	67.56	43.24
3	11650.00	58.5 PK	74.0	-15.5	1.42 V	329	8.62	49.88
4	11650.00	46.8 AV	54.0	-7.2	1.42 V	329	-3.08	49.88

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	*5755.00	95.8 PK			1.57 H	219	52.69	43.11
2	*5755.00	86.6 AV			1.57 H	219	43.49	43.11
3	11510.00	59.6 PK	74.0	-14.4	1.44 H	200	9.96	49.64
4	11510.00	46.7 AV	54.0	-7.3	1.44 H	200	-2.94	49.64
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5755.00	107.1 PK			1.25 V	232	63.99	43.11
2	*5755.00	96.5 AV			1.25 V	232	53.39	43.11
3	11510.00	58.2 PK	74.0	-15.8	1.42 V	313	8.56	49.64
4	11510.00	46.6 AV	54.0	-7.4	1.42 V	313	-3.04	49.64

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	95.5 PK			1.58 H	223	52.34	43.16
2	*5795.00	86.5 AV			1.58 H	223	43.34	43.16
3	11590.00	59.8 PK	74.0	-14.2	1.39 H	197	10.15	49.65
4	11590.00	46.9 AV	54.0	-7.1	1.39 H	197	-2.75	49.65
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	107.5 PK			1.26 V	224	64.34	43.16
2	*5795.00	96.7 AV			1.26 V	224	53.54	43.16
3	11590.00	58.3 PK	74.0	-15.7	1.47 V	320	8.65	49.65
4	11590.00	46.7 AV	54.0	-7.3	1.47 V	320	-2.95	49.65

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) 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	*5775.00	104.6 PK			1.00 H	214	61.46	43.14
2	*5775.00	91.2 AV			1.00 H	214	48.06	43.14
3	11550.00	59.5 PK	74.0	-14.5	1.45 H	206	9.86	49.64
4	11550.00	46.6 AV	54.0	-7.4	1.45 H	206	-3.04	49.64
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	5133.43	57.1 PK	74.0	-16.9	1.73 V	199	14.90	42.20
2	5133.43	51.1 AV	54.0	-2.9	1.73 V	199	8.90	42.20
3	*5775.00	113.4 PK			1.00 V	322	70.26	43.14
4	*5775.00	100.2 AV			1.00 V	322	57.06	43.14
5	11550.00	58.5 PK	74.0	-15.5	1.48 V	327	8.86	49.64
6	11550.00	46.6 AV	54.0	-7.4	1.48 V	327	-3.04	49.64

REMARKS:

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

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	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. 25, 2013

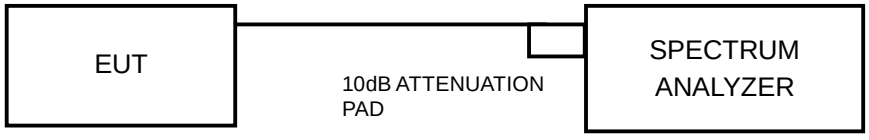
5.3.3 TEST PROCEDURE

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

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	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
149	5745	16.42	0.5	PASS
157	5785	16.39	0.5	PASS
165	5825	16.39	0.5	PASS

802.11ac (VHT20)

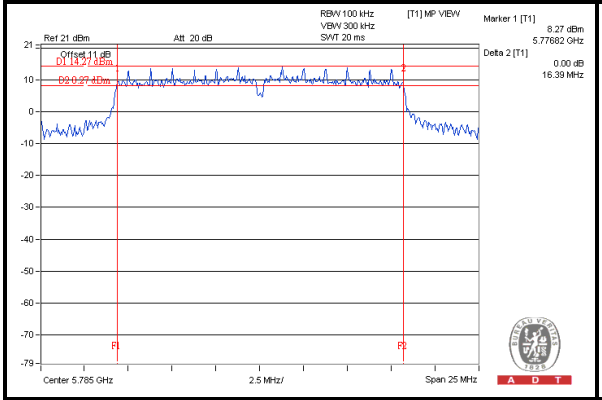
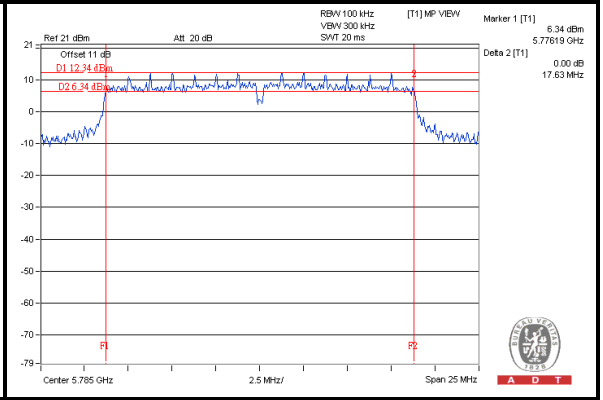
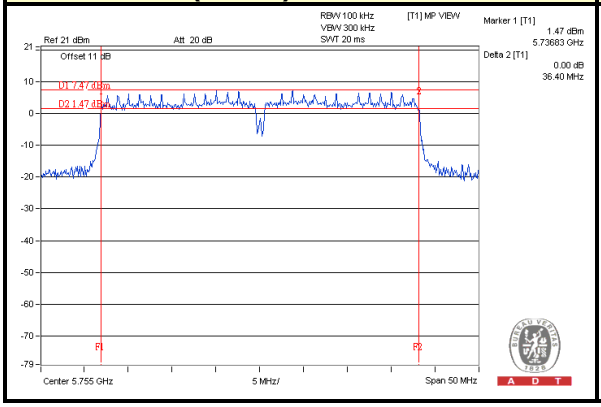
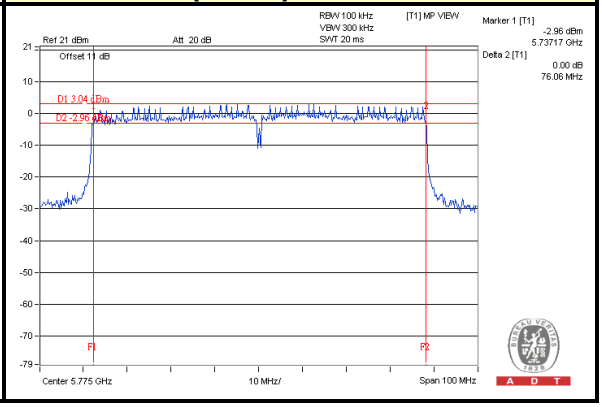
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	17.65	17.69	17.66	0.5	PASS
157	5785	17.63	17.65	17.65	0.5	PASS
165	5825	17.67	17.65	17.65	0.5	PASS

802.11ac (VHT40)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
151	5755	36.40	36.49	36.50	0.5	PASS
159	5795	36.42	36.47	36.47	0.5	PASS

802.11ac (VHT80)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
155	5775	76.42	76.44	76.06	0.5	PASS

SPECTRUM PLOT OF WORST VALUE	
802.11a / CH157	802.11ac (VHT20) / CH157 <chain 0>
	
802.11ac (VHT40) / CH151 <chain 0>	802.11ac (VHT80) / CH155 <chain 2>
	

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)

Per KDB 662911 D01 Multiple Transmitter Output v01r02 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.

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. 25, 2013

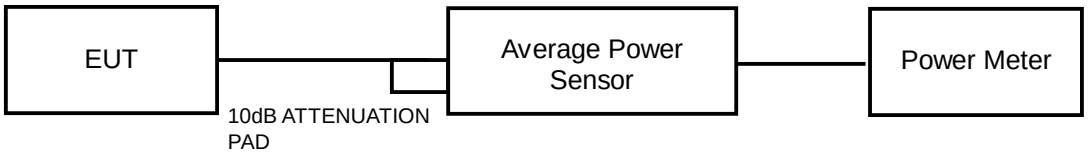
5.4.3 TEST PROCEDURES

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.

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)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)	LIMIT (dBm)	PASS/FAIL
149	5745	177.419	22.49	30	PASS
157	5785	237.137	23.75	30	PASS
165	5825	274.157	24.38	30	PASS

802.11ac (VHT20)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
149	5745	21.68	22.24	21.49	455.654	26.59	30.00	PASS
157	5785	23.59	23.91	22.63	657.828	28.18	30.00	PASS
165	5825	24.19	24.32	23.31	747.107	28.73	30.00	PASS

802.11ac (VHT40)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
151	5755	21.04	21.01	20.62	368.585	25.67	30.00	PASS
159	5795	23.09	23.27	22.63	599.259	27.78	30.00	PASS

802.11ac (VHT80)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
155	5775	19.52	19.81	20.82	306.036	24.86	30.00	PASS

5.5 POWER SPECTRAL DENSITY MEASUREMENT

5.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

5.5.2 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 : Sep. 25, 2013

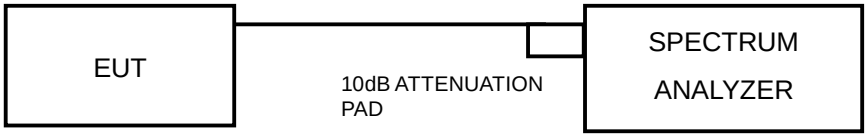
5.5.3 TEST PROCEDURE

1. Set the RBW = 30 kHz, VBW =100 kHz, Detector = power averaging (RMS).
2. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW
3. Sweep time = auto couple,
4. Employ trace averaging (RMS) mode over a minimum of 100 traces.
5. Use the peak marker function to determine the maximum amplitude level.

5.5.4 DEVIATION FROM TEST STANDARD

No deviation

5.5.5 TEST SETUP



5.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

5.5.7 TEST RESULTS

802.11a

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
149	5745	-1.77	8	PASS
157	5785	-0.69	8	PASS
165	5825	-0.24	8	PASS

802.11ac (VHT20)

TX chain	Channel	FREQ. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	149	5745	-4.25	4.77	0.52	5.29	PASS
	157	5785	-3.07	4.77	1.70	5.29	PASS
	165	5825	-2.70	4.77	2.07	5.29	PASS
1	149	5745	-3.40	4.77	1.37	5.29	PASS
	157	5785	-1.34	4.77	3.43	5.29	PASS
	165	5825	-0.63	4.77	4.14	5.29	PASS
2	149	5745	-2.98	4.77	1.79	5.29	PASS
	157	5785	-2.70	4.77	2.07	5.29	PASS
	165	5825	-2.10	4.77	2.67	5.29	PASS

NOTE: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 8.71dBi > 6dBi , so the power density limit shall be reduced to 8-(8.71-6) = 5.29dBm.

802.11ac (VHT40)

TX chain	Channel	FREQ. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	151	5755	-7.13	4.77	-2.36	5.29	PASS
	159	5795	-5.10	4.77	-0.33	5.29	PASS
1	151	5755	-7.03	4.77	-2.26	5.29	PASS
	159	5795	-4.56	4.77	0.21	5.29	PASS
2	151	5755	-7.58	4.77	-2.81	5.29	PASS
	159	5795	-4.98	4.77	-0.21	5.29	PASS

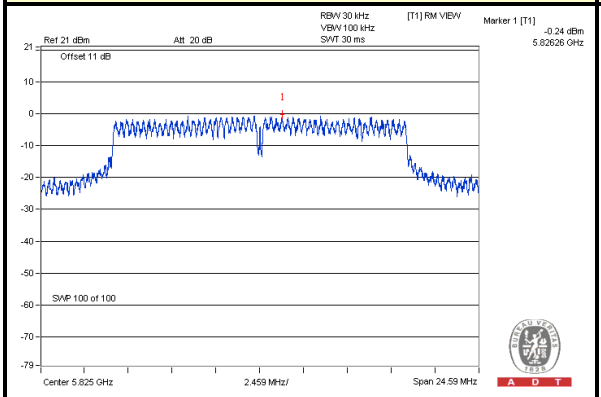
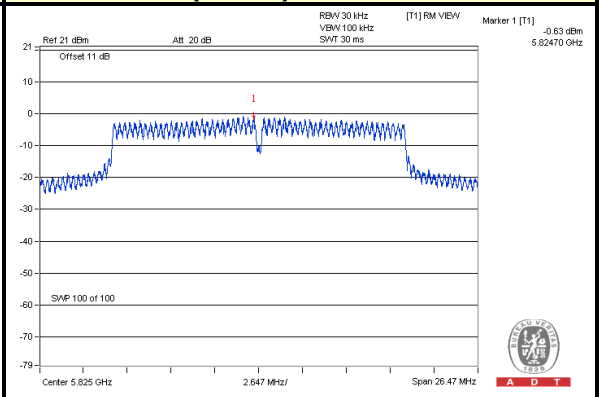
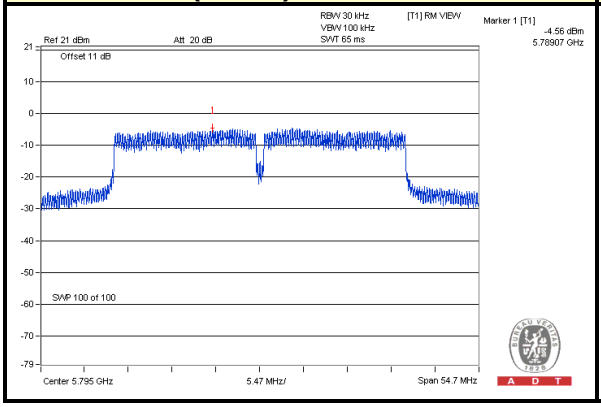
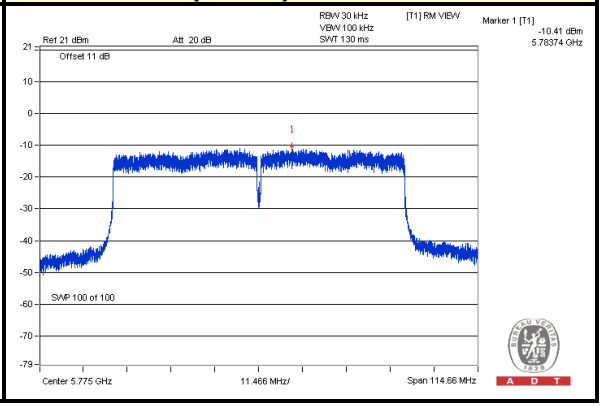
NOTE: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 8.71dBi > 6dBi , so the power density limit shall be reduced to 8-(8.71-6) = 5.29dBm.

802.11ac (VHT80)

TX chain	Channel	FREQ. (MHz)	PSD W/O DUTY FACTOR (dBm)	10 log (N=3) dB	DUTY FACTOR (dB)	Total PSD WITH DUTY FACTOR (dBm)	Limit (dBm)	PASS /FAIL
0	155	5775	-11.43	4.77	0.18	-6.48	5.33	PASS
1	155	5775	-10.41	4.77	0.18	-5.46	5.33	PASS
2	155	5775	-10.93	4.77	0.18	-5.98	5.33	PASS

NOTE: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 8.71dBi > 6dBi , so the power density limit shall be reduced to 8-(8.67-6) = 5.33dBm.

2. Refer to section 3.4 for duty cycle spectrum plot.

SPECTRUM PLOT OF WORST VALUE	
802.11a / CH165	**802.11ac (VHT20) / CH165 <chain 1>**
	
802.11ac (VHT40) / CH159 <chain 1>	**802.11ac (VHT80) / CH155 <chain 1>**
	

5.6 CONDUCTED OUT-BAND EMISSION MEASUREMENT

5.6.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

Below 30dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

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. 25, 2013

5.6.3 TEST PROCEDURE

Measurement Procedure - Reference Level

1. Set the RBW = 100 kHz.
2. Set the VBW ≥ 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.

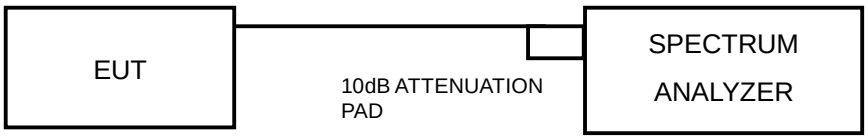
Measurement Procedure –Unwanted Emission Level

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

5.6.4 DEVIATION FROM TEST STANDARD

No deviation

5.6.5 TEST SETUP



5.6.6 EUT OPERATING CONDITION

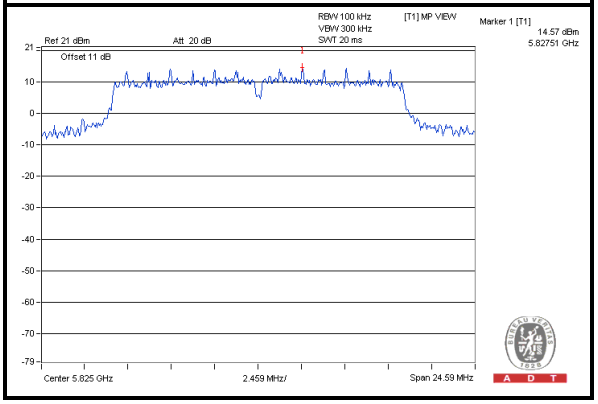
Same as Item 4.3.6

5.6.7 TEST RESULTS

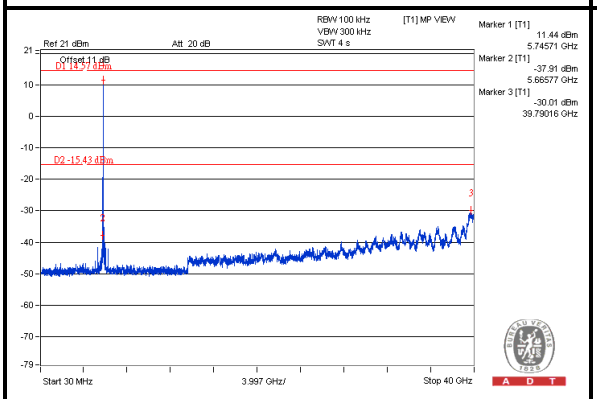
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

802.11a

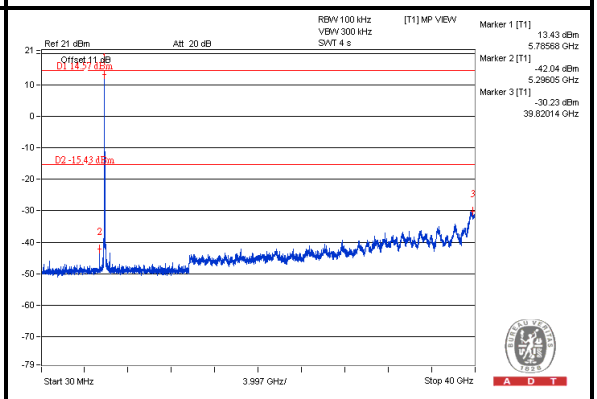
Maximum REF



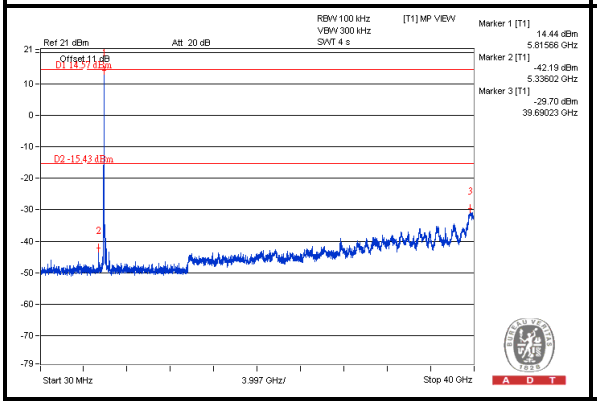
CH 149



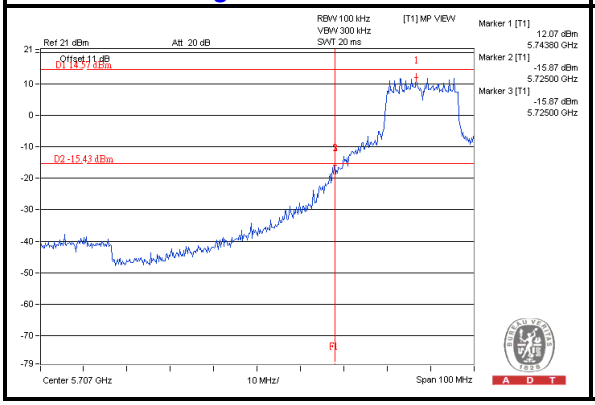
CH 157



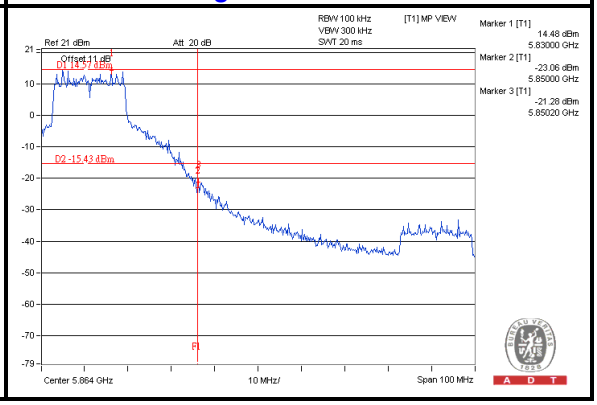
CH 165



CH 149 Band edge

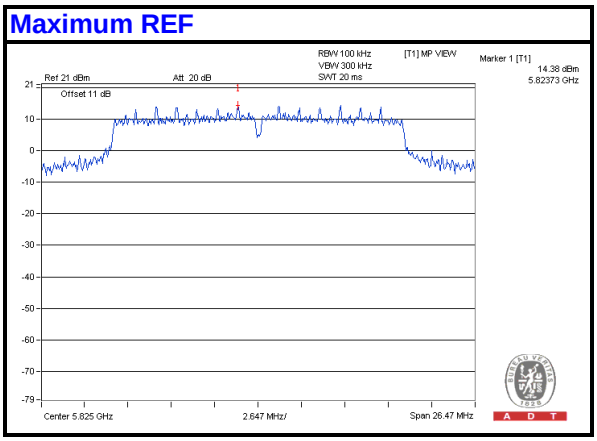


CH 165 Band edge



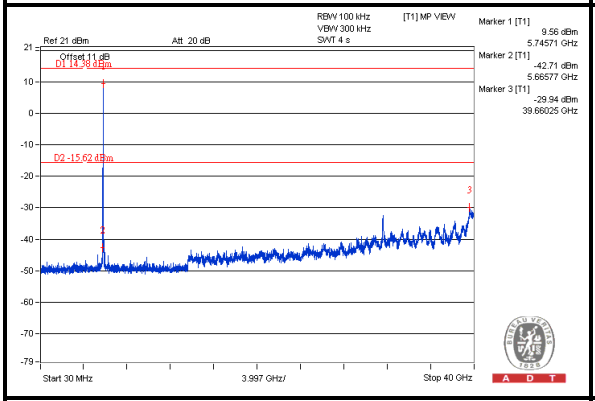
802.11ac (VHT20)

Maximum REF

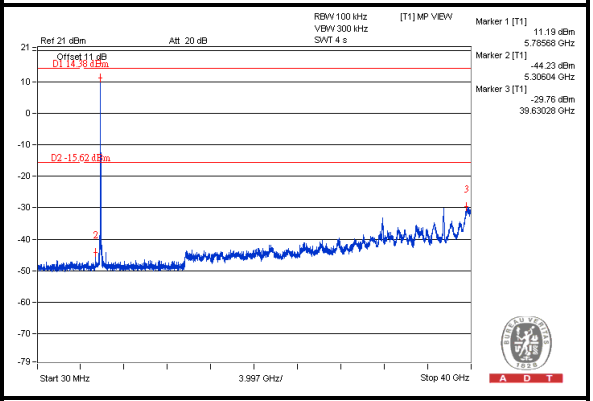


CHAIN (0)

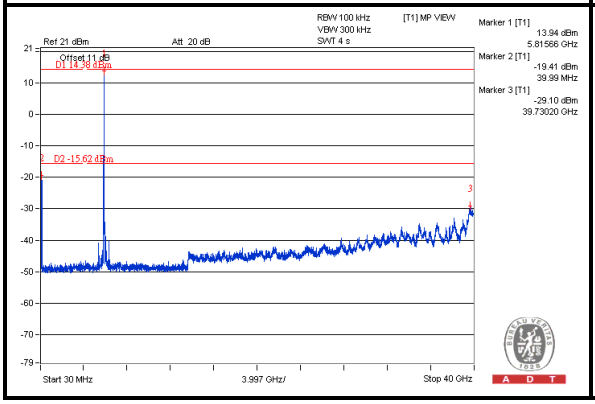
CH 149



CH 157

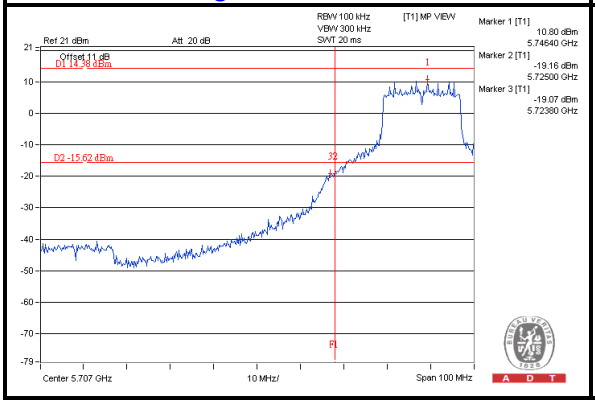


CH 165

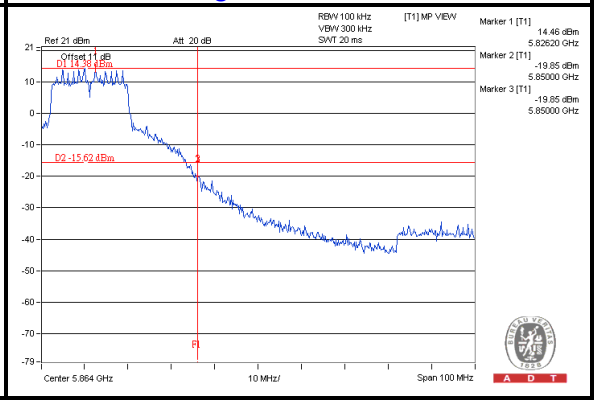


CHAIN (0)

CH 149 Band edge

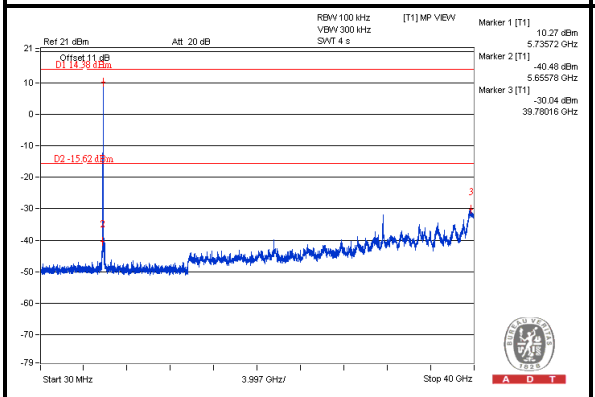


CH 165 Band edge

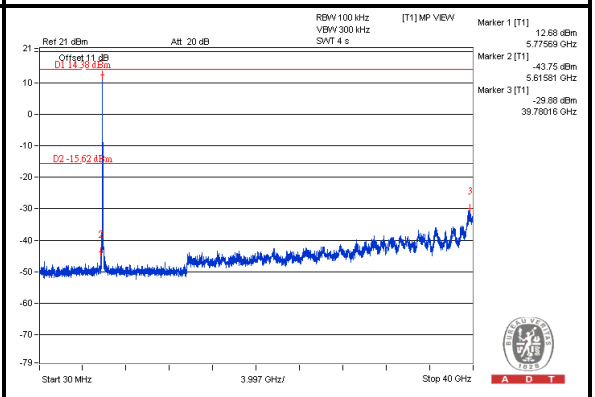


CHAIN (1)

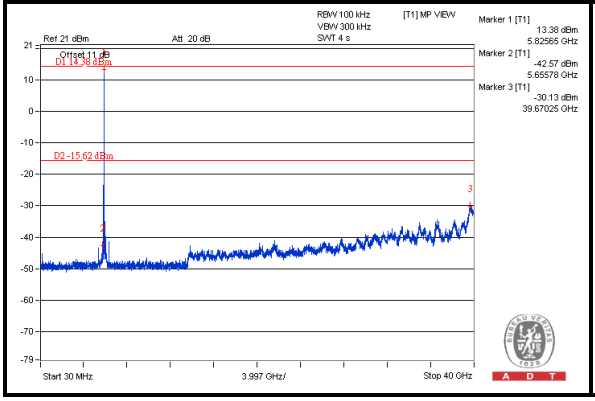
CH 149



CH 157

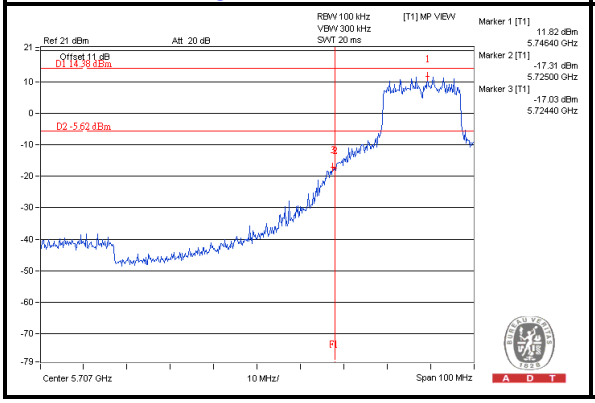


CH 165

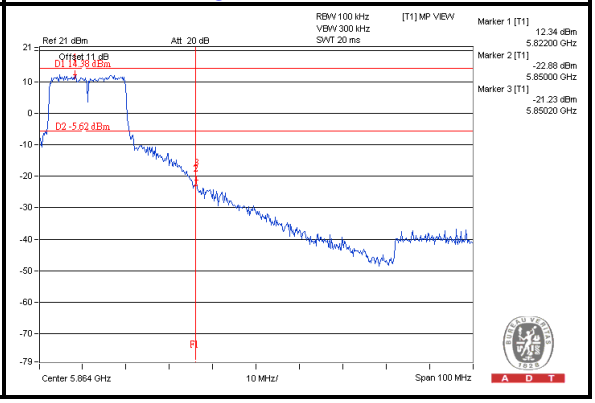


CHAIN (1)

CH 149 Band edge

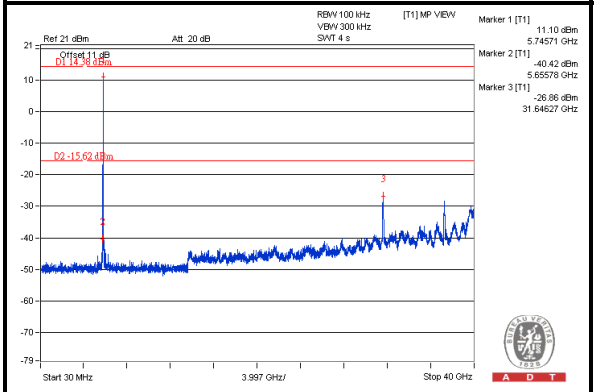


CH 165 Band edge

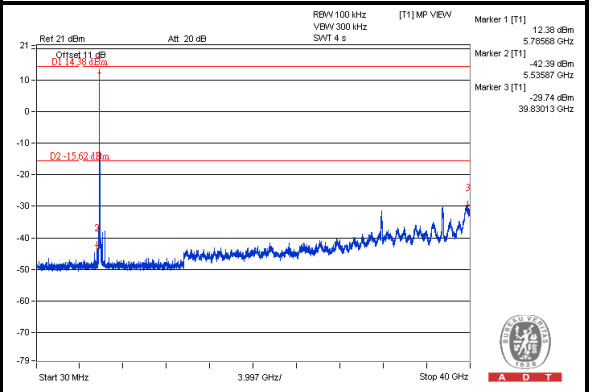


CHAIN (2)

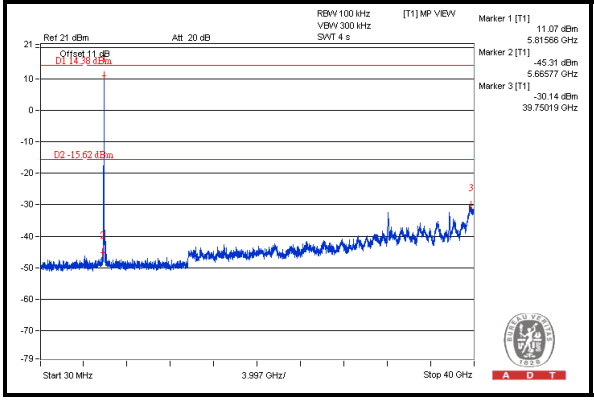
CH 149



CH 157

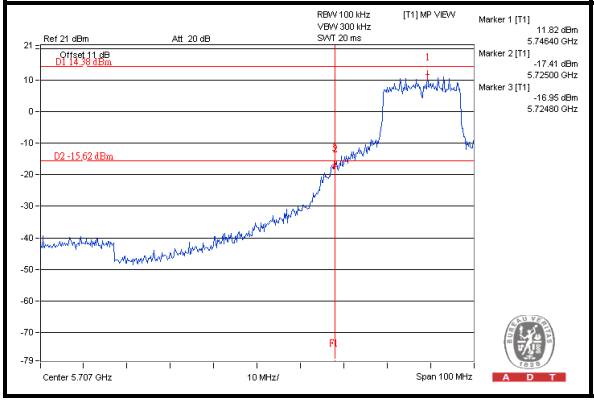


CH 165

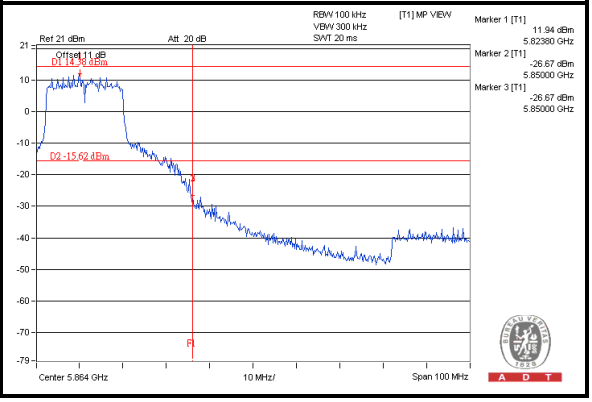


CHAIN (2)

CH 149 Band edge

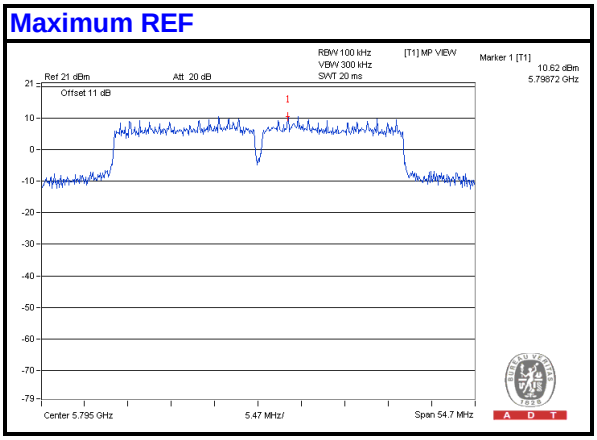


CH 165 Band edge



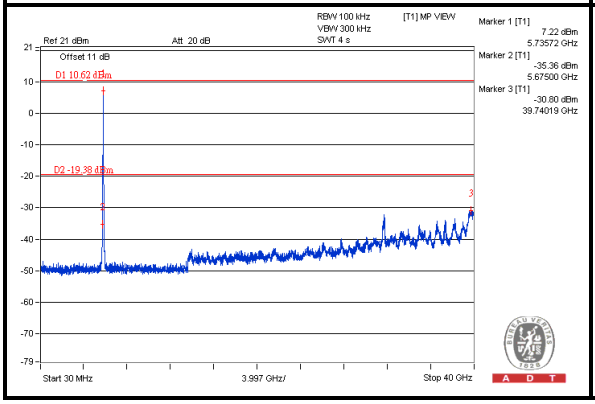
802.11ac (VHT40)

Maximum REF

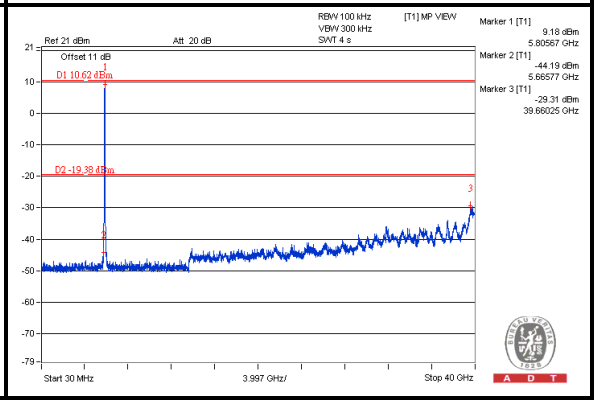


CHAIN (0)

CH 151

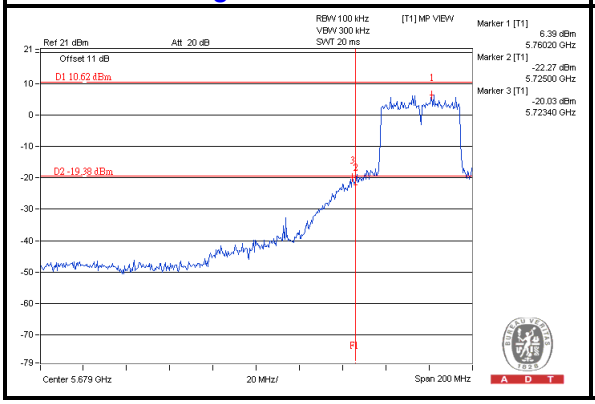


CH 159

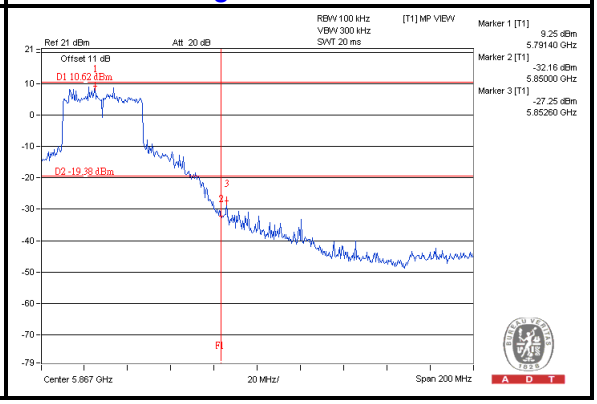


CHAIN (0)

CH 151 Band edge

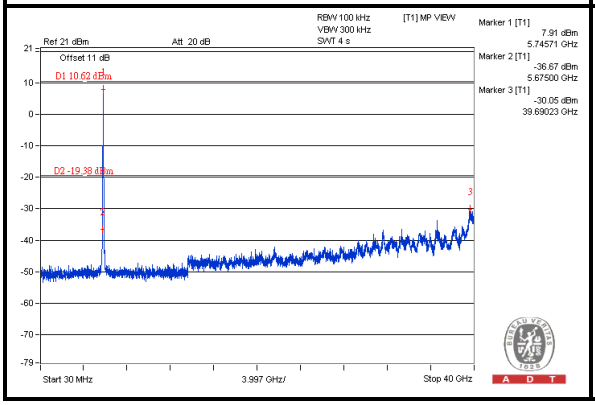


CH 159 Band edge

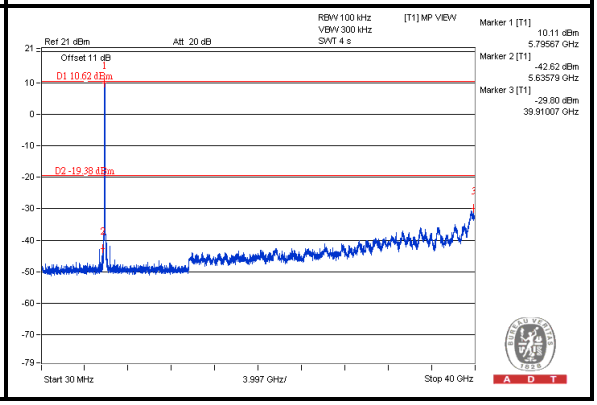


CHAIN (1)

CH 151

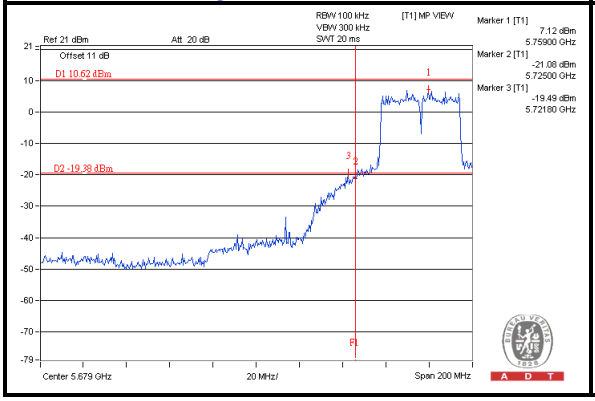


CH 159

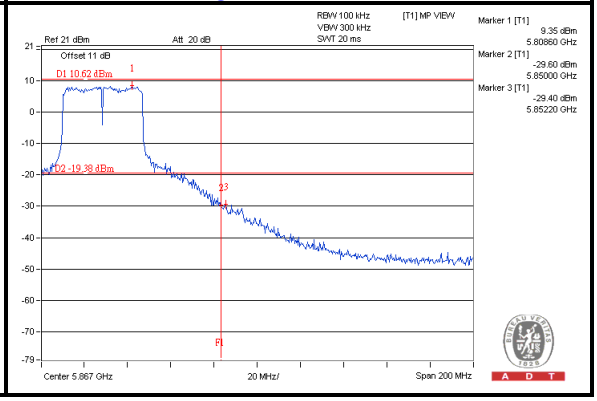


CHAIN (1)

CH 151 Band edge

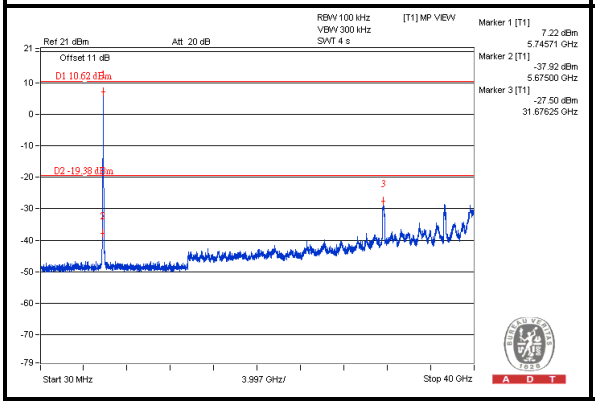


CH 159 Band edge

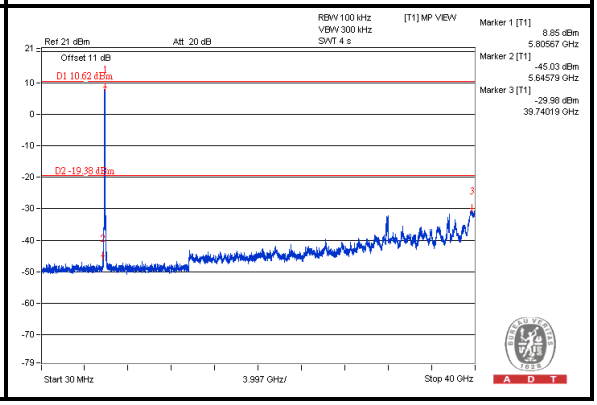


CHAIN (2)

CH 151

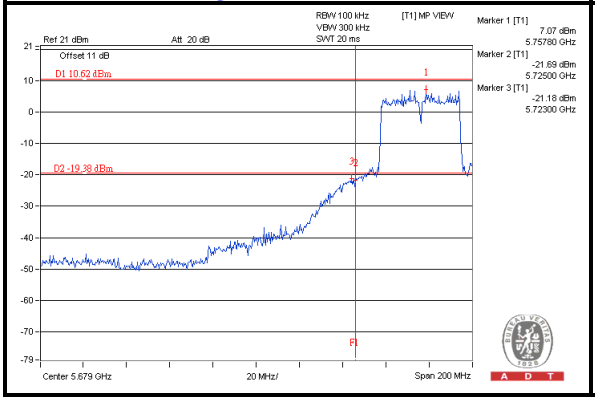


CH 159

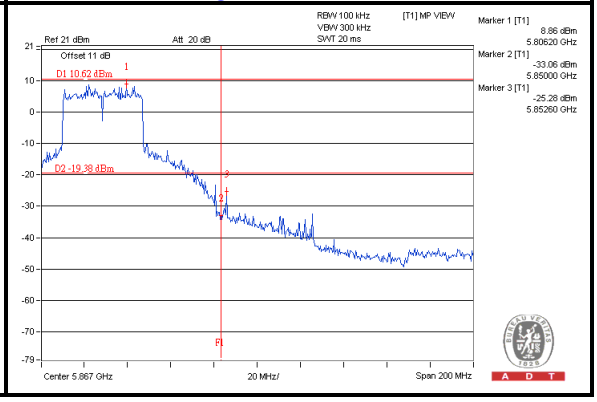


CHAIN (2)

CH 151 Band edge

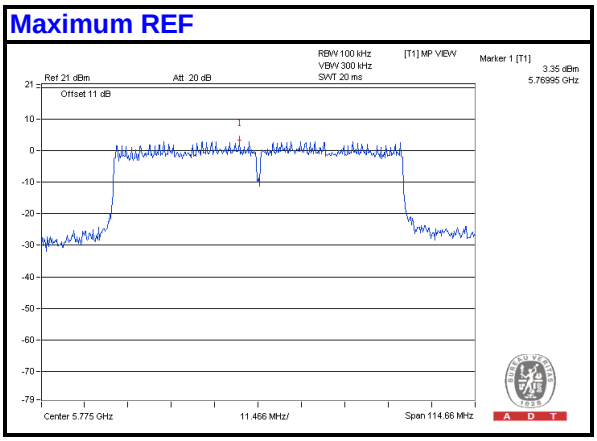


CH 159 Band edge



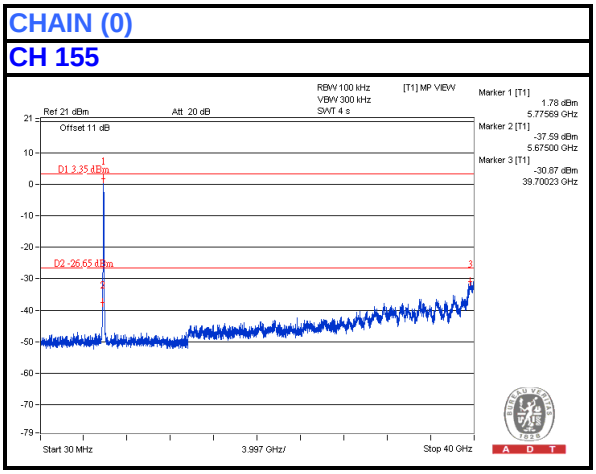
802.11ac (VHT80)

Maximum REF



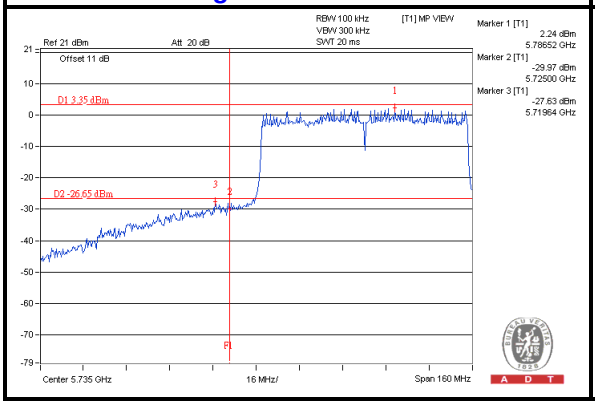
CHAIN (0)

CH 155

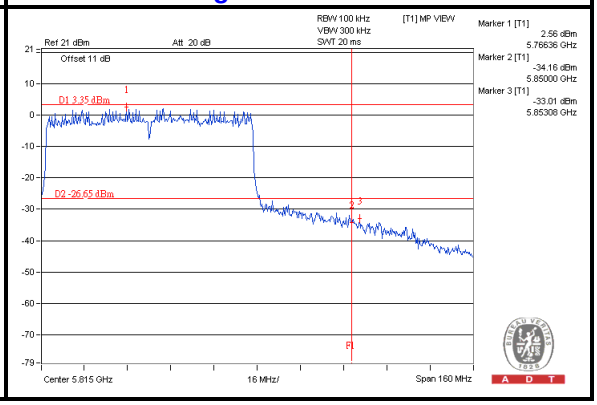


CHAIN (0)

CH 155 Band edge

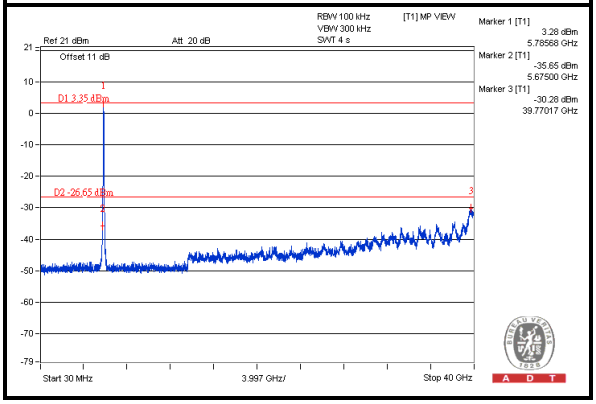


CH 155 Band edge



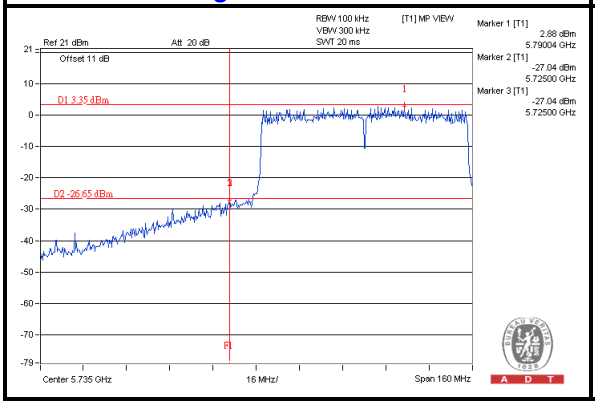
CHAIN (1)

CH 155

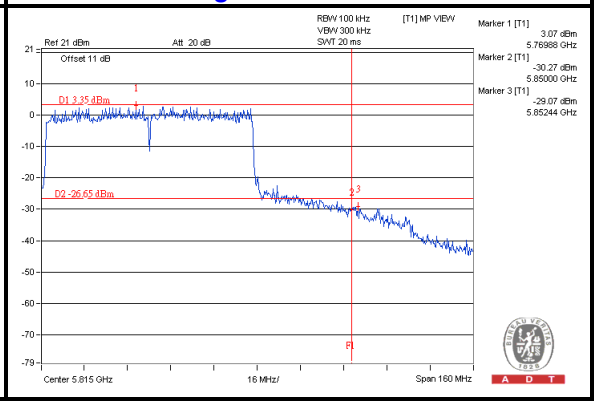


CHAIN (1)

CH 155 Band edge

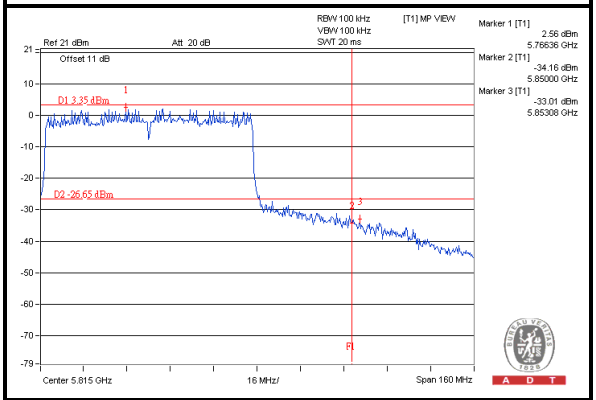


CH 155 Band edge



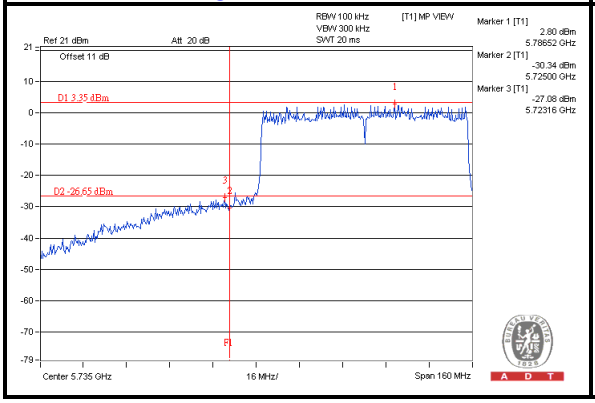
CHAIN (2)

CH 155

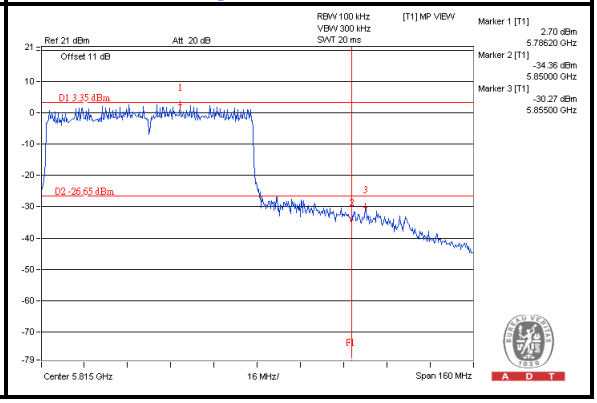


CHAIN (2)

CH 155 Band edge



CH 155 Band edge



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:

Linko EMC/RF Lab:
Tel: 886-2-26052180
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Hwa Ya EMC/RF/Safety/Telecom Lab:
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Fax: 886-3-3270892

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.

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 ---