FCC TEST REPORT (15.247)

REPORT NO.: RF140901E08

MODEL NO.: EX7000

FCC ID: PY314200280

RECEIVED: Sep. 01, 2014

TESTED: Sep. 09 to Oct. 30, 2014

ISSUED: Dec. 04, 2014

APPLICANT: NETGEAR, Inc.

ADDRESS: 350 East Plumeria Drive San Jose, CA 95134

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.

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification

Table of Contents

RELEASE CONTROL RECORD 5
1. CERTIFICATION 6
2. SUMMARY OF TEST RESULTS 7
2.1 MEASUREMENT UNCERTAINTY 8
3. GENERAL INFORMATION 9
3.1 GENERAL DESCRIPTION OF EUT 9
3.2 DESCRIPTION OF TEST MODES 13
3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL 14
3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS 18
3.4 DUTY CYCLE OF TEST SIGNAL 19
3.5 DESCRIPTION OF SUPPORT UNITS 21
3.6 CONFIGURATION OF SYSTEM UNDER TEST 22
4. TEST TYPES AND RESULTS (FOR 2.4GHz, 2.400 ~ 2.4835GHz BAND) 23
4.1 CONDUCTED EMISSION MEASUREMENT 23
4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT 23
4.1.2 TEST INSTRUMENTS 23
4.1.3 TEST PROCEDURES 25
4.1.4 DEVIATION FROM TEST STANDARD 25
4.1.5 TEST SETUP 25
4.1.6 EUT OPERATING CONDITIONS 26
4.1.7 TEST RESULTS 27
4.2 RADIATED EMISSION AND BANDEDGE MEASUREMENT 31
4.2.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT 31
4.2.2 TEST INSTRUMENTS 32
4.2.3 TEST PROCEDURES 34
4.2.4 DEVIATION FROM TEST STANDARD 35
4.2.5 TEST SETUP 35
4.2.6 EUT OPERATING CONDITIONS 35
4.2.7 TEST RESULTS 36
4.3 6DB BANDWIDTH MEASUREMENT 49
4.3.1 LIMITS OF 6DB BANDWIDTH MEASUREMENT 49
4.3.2 TEST INSTRUMENTS 49
4.3.3 TEST PROCEDURE 49
4.3.4 DEVIATION FROM TEST STANDARD 49
4.3.5 TEST SETUP 49
4.3.6 EUT OPERATING CONDITIONS 49
4.3.7 TEST RESULTS (MODE 1) 50
4.3.8 TEST RESULTS (MODE 2) 52
4.4 CONDUCTED OUTPUT POWER MEASUREMENT 53
4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT 53
4.4.2 TEST INSTRUMENTS 53
4.4.3 TEST PROCEDURES 53
4.4.4 DEVIATION FROM TEST STANDARD 54
4.4.5 TEST SETUP 54
4.4.6 EUT OPERATING CONDITIONS 54
4.4.7 TEST RESULTS (MODE 1) 55
4.4.8 TEST RESULTS (MODE 2) 56
4.5 POWER SPECTRAL DENSITY MEASUREMENT 57
4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT 57
4.5.2 TEST INSTRUMENTS 57
4.5.3 TEST PROCEDURE 57

4.5.4 DEVIATION FROM TEST STANDARD 58
4.5.5 TEST SETUP 58
4.5.6 EUT OPERATING CONDITION 58
4.5.7 TEST RESULTS (MODE 1) 59
4.5.8 TEST RESULTS (MODE 2) 62
4.6 CONDUCTED OUT-BAND EMISSION MEASUREMENT 64
4.6.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT 64
4.6.2 TEST INSTRUMENTS 64
4.6.3 TEST PROCEDURE 64
4.6.4 DEVIATION FROM TEST STANDARD 65
4.6.5 TEST SETUP 65
4.6.6 EUT OPERATING CONDITION 65
4.6.7 TEST RESULTS (MODE 1) 65
4.6.8 TEST RESULTS (MODE 2) 78
5. TEST TYPES AND RESULTS (FOR 5GHz, 5.725~5.850GHz BAND) 85
5.1 CONDUCTED EMISSION MEASUREMENT 85
5.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT 85
5.1.2 TEST INSTRUMENTS 85
5.1.3 TEST PROCEDURES 87
5.1.4 DEVIATION FROM TEST STANDARD 87
5.1.5 TEST SETUP 87
5.1.6 EUT OPERATING CONDITIONS 88
5.1.7 TEST RESULTS 89
5.2 RADIATED AND BANDEDGE EMISSION MEASUREMENT 93
5.2.1 LIMITS OF RADIATED AND BANDEDGE EMISSION MEASUREMENT 93
5.2.2 TEST INSTRUMENTS 94
5.2.3 TEST PROCEDURES 96
5.2.4 DEVIATION FROM TEST STANDARD 96
5.2.5 TEST SETUP 97
5.2.6 EUT OPERATING CONDITIONS 97
5.2.7 TEST RESULTS 98
5.3 6DB BANDWIDTH MEASUREMENT 108
5.3.1 LIMITS OF 6DB BANDWIDTH MEASUREMENT 108
5.3.2 TEST INSTRUMENTS 108
5.3.3 TEST PROCEDURE 108
5.3.4 DEVIATION FROM TEST STANDARD 108
5.3.5 TEST SETUP 108
5.3.6 EUT OPERATING CONDITIONS 108
5.3.7 TEST RESULTS (MODE 1) 109
5.3.8 TEST RESULTS (MODE 2) 111
5.4 CONDUCTED OUTPUT POWER MEASUREMENT 113
5.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT 113
5.4.2 INSTRUMENTS 113
5.4.3 TEST PROCEDURES 114
5.4.4 DEVIATION FROM TEST STANDARD 114
5.4.5 TEST SETUP 114
5.4.6 EUT OPERATING CONDITIONS 114
5.4.7 TEST RESULTS (MODE 1) 115
5.4.8 TEST RESULTS (MODE 2) 116
5.5 POWER SPECTRAL DENSITY MEASUREMENT 117
5.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT 117
5.5.2 TEST INSTRUMENTS 117
5.5.3 TEST PROCEDURE 117

5.5.4 DEVIATION FROM TEST STANDARD 118
5.5.5 TEST SETUP 118
5.5.6 EUT OPERATING CONDITION 118
5.5.7 TEST RESULTS (MODE 1) 119
5.5.8 TEST RESULTS (MODE 2) 122
5.6 CONDUCTED OUT-BAND EMISSION MEASUREMENT 124
5.6.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT 124
5.6.2 TEST INSTRUMENTS 124
5.6.3 TEST PROCEDURE 124
5.6.4 DEVIATION FROM TEST STANDARD 125
5.6.5 TEST SETUP 125
5.6.6 EUT OPERATING CONDITION 125
5.6.7 TEST RESULTS (MODE 1) 125
5.6.8 TEST RESULTS (MODE 2) 138
6. PHOTOGRAPHS OF THE TEST CONFIGURATION 148
7. INFORMATION ON THE TESTING LABORATORIES 149
8. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB 150

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140901E08	Original release	Dec. 04, 2014

1. CERTIFICATION

PRODUCT:	AC1900 WiFi Range Extender
BRAND NAME:	NETGEAR
MODEL NO.:	EX7000
TEST SAMPLE:	ENGINEERING SAMPLE
APPLICANT:	NETGEAR, Inc.
TESTED:	Sep. 09 to Oct. 30, 2014
STANDARDS:	**FCC Part 15, Subpart C (Section 15.247)** ANSI C63.10-2009

The above equipment (Model: EX7000) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared By : Phoenix Huang , **Date:** Dec. 04, 2014
(Phoenix Huang, Specialist)

Approved By : , **Date:** Dec. 04, 2014
(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 -8.55dB at 0.38828MHz.
15.205 15.209 15.247(d)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.2dB at 2483.5MHz.
15.247(d)	Antenna Port Emission	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 Re-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 -6.56dB at 0.39375MHz.
15.205 15.209 15.247(d)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.2dB at 11650.0MHz.
15.247(d)	Antenna Port Emission	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 Re-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 5.15~5.25GHzGHz RF parameters was recorded in another test report.

2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

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

Measurement	Value
Conducted emissions	2.86 dB
Radiated emissions (30MHz-1GHz)	5.43 dB
Radiated emissions (1GHz -6GHz)	3.65 dB
Radiated emissions (6GHz -18GHz)	3.88 dB
Radiated emissions (18GHz -40GHz)	4.11 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	AC1900 WiFi Range Extender
MODEL NO.	EX7000
POWER SUPPLY	DC 12V from adapter power
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode and VHT (20/40) mode in 2.4GHz
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). VHT20 7 for 802.11n (HT40), VHT40 **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** **CDD Mode:** 802.11a: 432.426mW 802.11ac (VHT20): 432.772mW 802.11ac (VHT40): 208.518mW 802.11ac (VHT80): 90.311mW **Beamforming Mode:** 802.11ac (VHT20): 432.772mW 802.11ac (VHT40): 208.518mW 802.11ac (VHT80): 90.311mW **For 15.247 (2.4GHz)** **CDD Mode:** 802.11b: 970.44mW 802.11g: 836.767mW VHT20: 911.213mW VHT40: 151.299mW **Beamforming Mode:** VHT20: 827.261mW VHT40: 151.299mW **For 15.247 (5GHz)** **CDD Mode:** 802.11a: 748.103mW 802.11ac (VHT20): 771.017mW 802.11ac (VHT40): 858.132mW 802.11ac (VHT80): 377.16mW **Beamforming Mode:** 802.11ac (VHT20): 771.017mW 802.11ac (VHT40): 819.794mW 802.11ac (VHT80): 377.16mW
ANTENNA TYPE	Refer to note as below
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	Adapter x 1

Note:

1. The EUT must be supplied with a power adapter and the following different models could be chosen:

No.	Brand	Model No.	Spec.
1	Netgear	SAS030F1 NA	AC I/P: 100-120V, 47~63Hz, 0.9A AC Input cable: 1.8m, unshielded DC O/P: 12V, 2.5A
2	Netgear	P030WF120B	AC I/P: 100-240V, 50~60Hz, 1.0A AC Input cable: 1.8m, unshielded DC O/P: 12V, 2.5A

※For radiated emission test, the EUT was pre-tested with above adapters, the worse case was found in **adapter 2**. Therefore only the test data of the adapter was recorded in this report.

※For power line conducted emission test, the EUT was tested with each adapter individually. Therefore the test data of both adapters were recorded in this report.

2. There are three antennas provided to this EUT, please refer to the following table:

Antenna No.	Brand	Model	Antenna Gain(dBi)	Frequency range (MHz ~ MHz)	Antenna Type	Connecter Type
Antenna L	Netgear	NA	2	2412~2477 5150~5250 5250~5350 5470~5725 5725~5850	Dipole	Re-SMA
Antenna M	Netgear	NA	2	2412~2477 5150~5250 5250~5350 5470~5725 5725~5850	Dipole	Re-SMA
Antenna R	Netgear	NA	2	2412~2477 5150~5250 5250~5350 5470~5725 5725~5850	Dipole	Re-SMA

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

4. The EUT incorporates a MIMO function.

MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11b	1 ~ 11Mbps	3TX CDD	3RX
802.11g	6 ~ 54Mbps	3TX CDD	3RX
802.11n (HT20) (2.4GHz)	MCS 0~7	3TX CDD	3RX
	MCS 8~15	3TX CDD	3RX
	MCS 16~23	3TX	3RX
802.11n (HT40) (2.4GHz)	MCS 0~7	3TX CDD	3RX
	MCS 8~15	3TX CDD	3RX
	MCS 16~23	3TX	3RX
VHT20 (2.4GHz)	MCS 0~8, Nss=1	3TX CDD / Beamforming	3RX
	MCS 0~8, Nss=2	3TX CDD / Beamforming	3RX
	MCS 0~9, Nss=3	3TX / Beamforming	3RX
VHT40 (2.4GHz)	MCS 0~9, Nss=1	3TX CDD / Beamforming	3RX
	MCS 0~9, Nss=2	3TX CDD / Beamforming	3RX
	MCS 0~9, Nss=3	3TX / Beamforming	3RX
802.11a	6 ~ 54Mbps	3TX CDD	3RX
802.11n (HT20) (5GHz)	MCS 0~7	3TX CDD / Beamforming	3RX
	MCS 8~15	3TX CDD / Beamforming	3RX
	MCS 16~23	3TX / Beamforming	3RX
802.11n (HT40) (5GHz)	MCS 0~7	3TX CDD / Beamforming	3RX
	MCS 8~15	3TX CDD / Beamforming	3RX
	MCS 16~23	3TX / Beamforming	3RX
802.11ac (VHT20) (5GHz)	MCS 0~8, Nss=1	3TX CDD / Beamforming	3RX
	MCS 0~8, Nss=2	3TX CDD / Beamforming	3RX
	MCS 0~9, Nss=3	3TX Beamforming	3RX
802.11ac (VHT40) (5GHz)	MCS 0~9, Nss=1	3TX CDD / Beamforming	3RX
	MCS 0~9, Nss=2	3TX CDD / Beamforming	3RX
	MCS 0~9, Nss=3	3TX / Beamforming	3RX
802.11ac (VHT80) (5GHz)	MCS 0~9, Nss=1	3TX CDD / Beamforming	3RX
	MCS 0~9, Nss=2	3TX CDD / Beamforming	3RX
	MCS 0~9, Nss=3	3TX / Beamforming	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)

5. 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), VHT20:

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), VHT40:

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 ≥ 1G	APCM	OB	
1	√	√	√	√	√	CDD Mode
2	-	-	-	√	√	Beamforming Mode

Where **PLC:** Power Line Conducted Emission **RE < 1G:** Radiated Emission below 1GHz

RE ≥ 1G: Radiated Emission above 1GHz **APCM:** Antenna Port Conducted Measurement

OB: Conducted Out-Band Emission Measurement

NOTE: 1. The EUT's antenna had been pre-tested on the positioned of each 2 axis. The worst case was found when positioned on **Y-plane** (for below 1GHz) and **X-plane** (for above 1GHz).

2. For radiated emissions test, the Beam forming mode and CDD mode had been pre-tested. The worst case was found when CDD mode. Therefore only the test data was recorded in this report.

POWER LINE CONDUCTED EMISSION TEST:

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

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	6	DSSS	DBPSK	1
For 5 GHz 802.11ac (VHT40)	151 to 159	159	OFDM	BPSK	13.5

RADIATED EMISSION TEST (BELOW 1 GHz):

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

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	6	DSSS	DBPSK	1
For 5 GHz 802.11ac (VHT40)	151 to 159	159	OFDM	BPSK	13.5

RADIATED EMISSION TEST (ABOVE 1 GHz):

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

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
For 2.4 GHz VHT20	1 to 11	1, 6, 11	OFDM	BPSK	6.5
For 2.4 GHz VHT40	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 VHT20	1 to 11	1, 6, 11	OFDM	BPSK	6.5
For 2.4 GHz VHT40	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 VHT20	1 to 11	1, 6, 11	OFDM	BPSK	6.5
For 2.4 GHz VHT40	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	30deg. C, 70,%RH	120Vac, 60Hz	Mike Hsieh
RE<1G	28deg. C, 74%RH	120Vac, 60Hz	Gary Cheng
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	Gary Cheng
APCM	25deg. C, 60%RH	120Vac, 60Hz	James Chan
OB	25deg. C, 60%RH	120Vac, 60Hz	James Chan

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.247)

558074 D01 DTS Meas Guidance v03r02

662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10-2009

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

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

3.4 DUTY CYCLE OF TEST SIGNAL

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.

For 2.4GHz

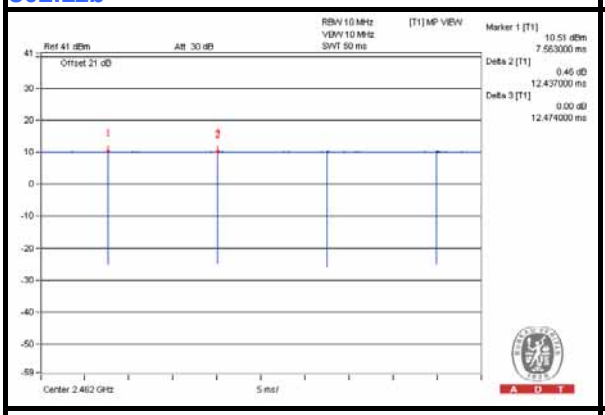
802.11b: Duty cycle = 12.437 ms/12.474 ms = 0.997

802.11g: Duty cycle = 2.06 ms/2.081 ms = 0.99

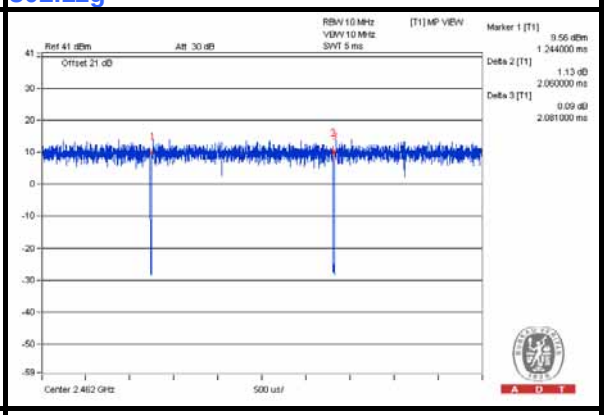
VHT20: Duty cycle = 1.909 ms/1.932 ms = 0.988

VHT40: Duty cycle = 0.94 ms/0.964 ms = 0.975, Duty factor = 10 * log(1/0.975) = 0.11

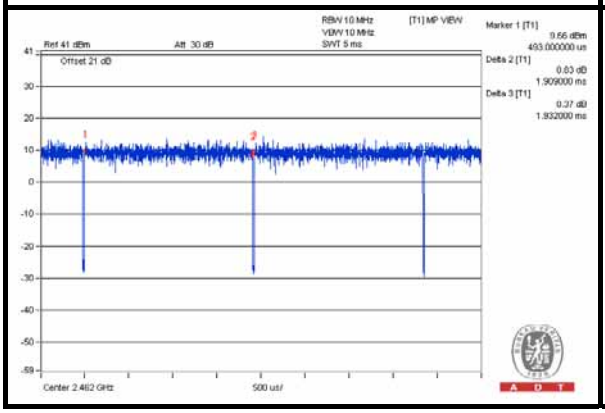
802.11b



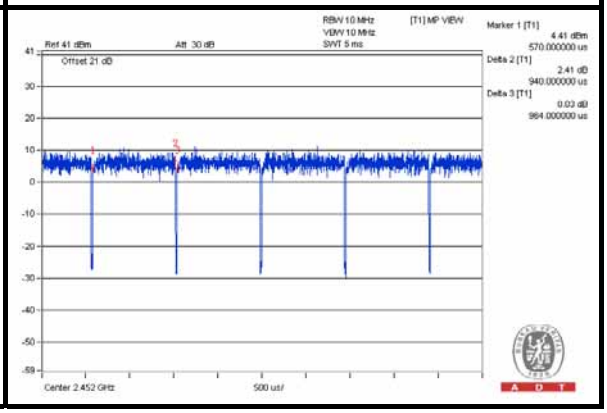
802.11g



VHT20



VHT40



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.

For 5GHz

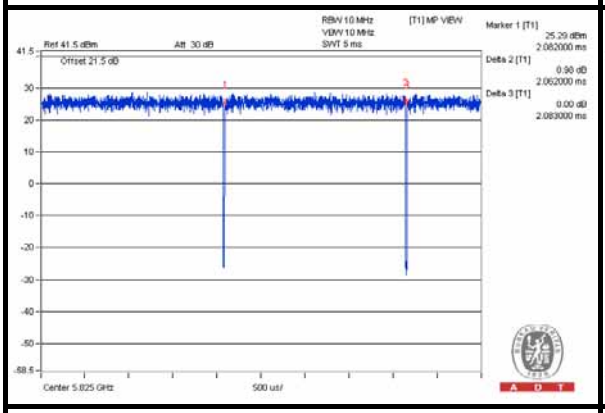
802.11a: Duty cycle = 2.062 ms/2.083 ms = 0.99

802.11ac (VHT20): Duty cycle = 1.912 ms/1.937 ms = 0.987

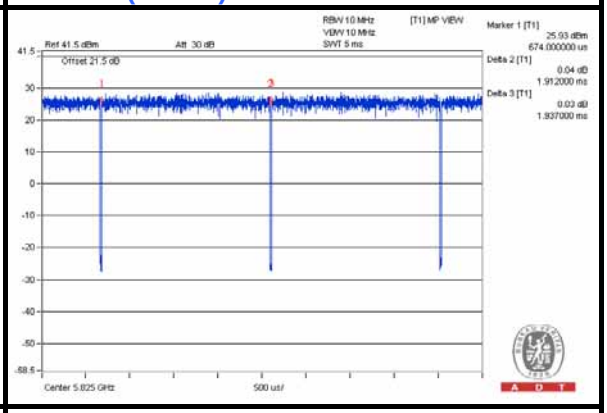
802.11ac (VHT40): Duty cycle = 0.942 ms/0.965 ms = 0.976, Duty factor = 10 * log(1/0.976) = 0.1

802.11ac (VHT80): Duty cycle = 0.456 ms/0.48 ms = 0.95, Duty factor = 10 * log(1/0.95) = 0.22

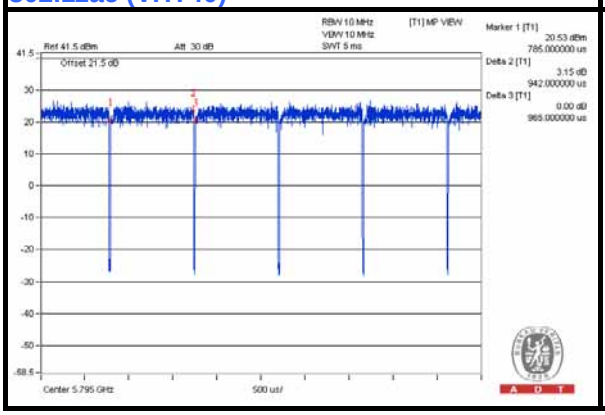
802.11a



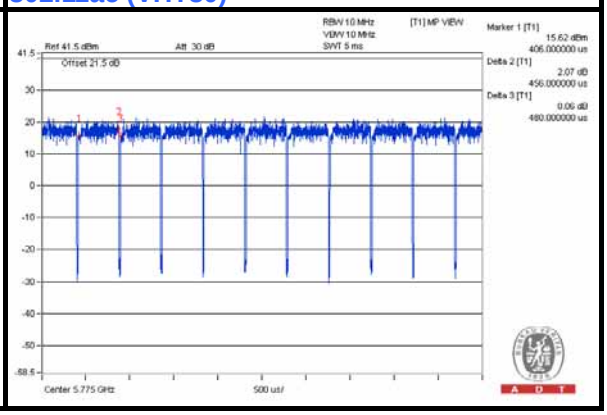
802.11ac (VHT20)



802.11ac (VHT40)



802.11ac (VHT80)



3.5 DESCRIPTION OF SUPPORT UNITS

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

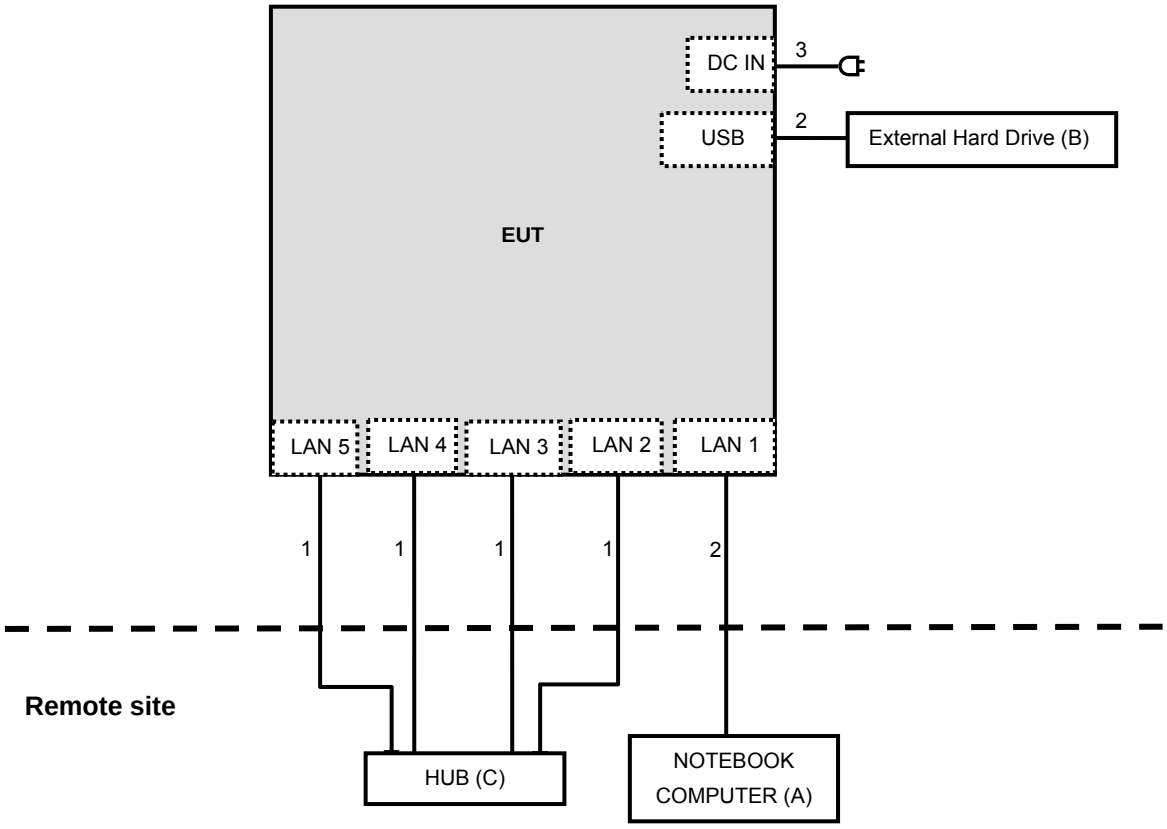
No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	NOTEBOOK COMPUTER	DELL	E6400	D814C A00 APCC	N/A	Provided by Lab
B	External Hard Drive	WD	WDBACW0010HBK-SESN	WCAZAL625787	FCC DoC	Provided by Lab
C	HUB	ZyXEL	ES-116P	S060H02000215	FCC DoC	Provided by Lab

NOTE:

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

No.	Cable	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Number)	Remark
1.	RJ-45	1	10	No	0	Provided by Lab
2.	USB	1	0.45	Yes	0	Provided by Lab
3.	DC	1	1.8	No	0	Supplied by client

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 Adapter 1:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100375	Apr. 29, 2014	Apr. 28, 2015
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-523	Oct. 02, 2013	Oct. 01, 2014
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ENV216	100071	Nov. 13, 2013	Nov. 12, 2014
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 10 , 2014	Mar. 09, 2015
50 ohms Terminator	N/A	EMC-03	Sep. 24, 2013	Sep. 23, 2014
50 ohms Terminator	N/A	EMC-02	Oct. 01, 2013	Sep. 30, 2014
Software ADT	BV ADT_Cond_V7.3.7.3	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3 The VCCI Con C Registration No. is C-3611.
4 Tested Date: Sep. 11, 2014

For Adapter 2:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100375	Apr. 29, 2014	Apr. 28, 2015
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Sep. 15, 2014	Sep. 14, 2015
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ENV216	100071	Nov. 13, 2013	Nov. 12, 2014
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 10 , 2014	Mar. 09, 2015
50 ohms Terminator	N/A	EMC-03	Sep. 22, 2014	Sep. 21, 2015
50 ohms Terminator	N/A	EMC-02	Sep. 30, 2014	Sep. 29, 2015
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: Sep. 22, 2014

4.1.3 TEST PROCEDURES

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

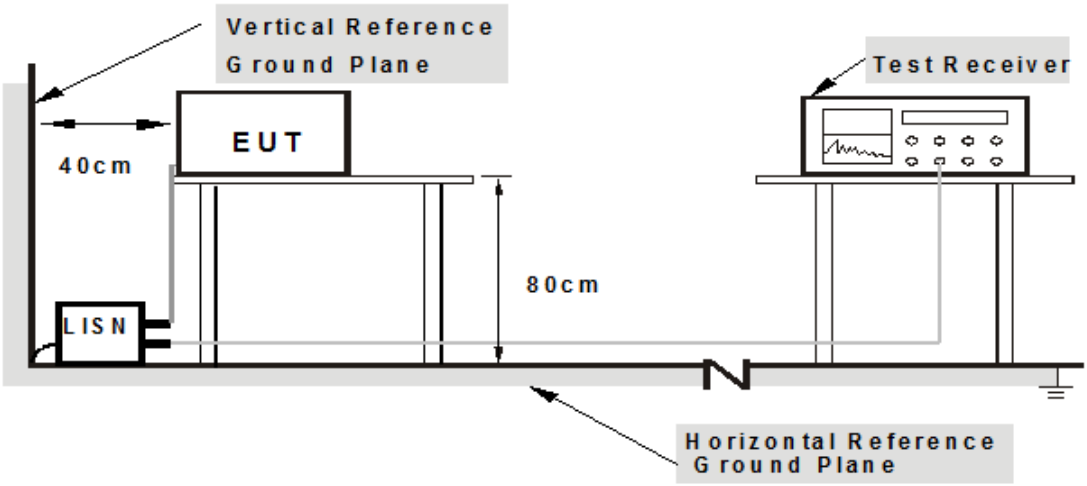
NOTE:

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. Connect the EUT with the support unit A (Notebook Computer) which is placed on a testing table.
2. Controlling software (MTool.exe [2.0.1.8]) has been activated to set the EUT on specific status.

4.1.7 TEST RESULTS

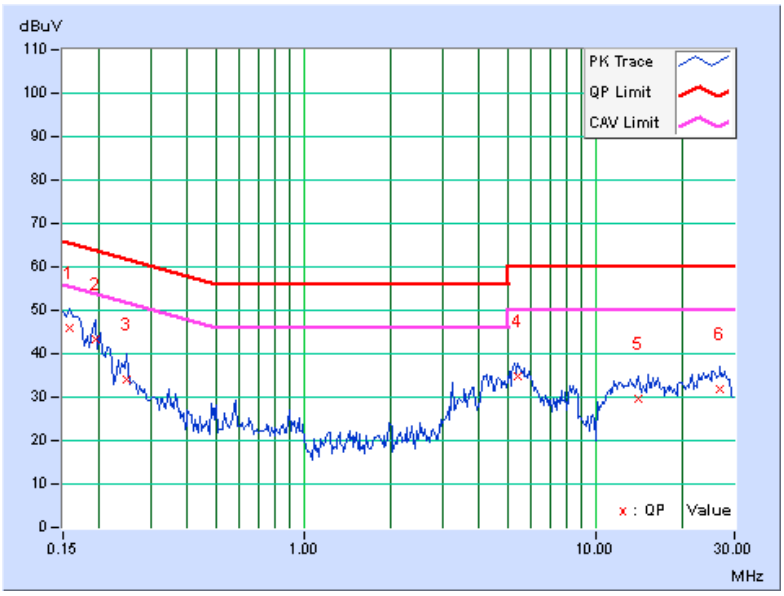
For Adapter 1:

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	0.15781	0.07	45.94	34.17	46.01	34.24	65.58	55.58	-19.57	-21.34
2	0.19297	0.07	43.39	29.38	43.46	29.45	63.91	53.91	-20.45	-24.46
3	0.24766	0.07	34.00	23.15	34.07	23.22	61.84	51.84	-27.76	-28.61
4	5.45313	0.31	34.44	28.80	34.75	29.11	60.00	50.00	-25.25	-20.89
5	14.01953	0.56	29.05	23.90	29.61	24.46	60.00	50.00	-30.39	-25.54
6	26.65625	0.90	31.02	25.68	31.92	26.58	60.00	50.00	-28.08	-23.42

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission Level – Limit value
4. Correction Factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

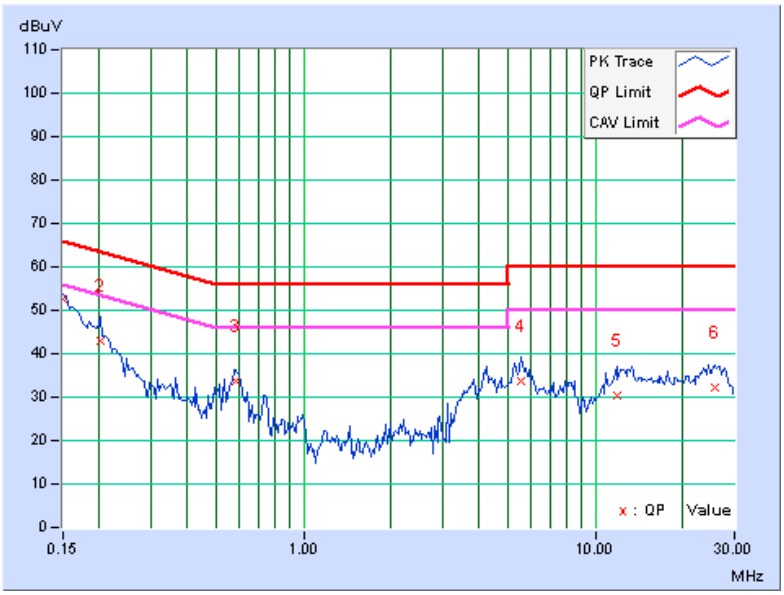


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.08	52.49	38.38	52.57	38.46	66.00	56.00	-13.43	-17.54
2	0.20078	0.07	42.97	31.17	43.04	31.24	63.58	53.58	-20.54	-22.34
3	0.58750	0.10	33.72	26.74	33.82	26.84	56.00	46.00	-22.18	-19.16
4	5.59375	0.31	33.25	27.36	33.56	27.67	60.00	50.00	-26.44	-22.33
5	11.81641	0.50	30.00	24.67	30.50	25.17	60.00	50.00	-29.50	-24.83
6	25.64844	0.86	31.19	25.97	32.05	26.83	60.00	50.00	-27.95	-23.17

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



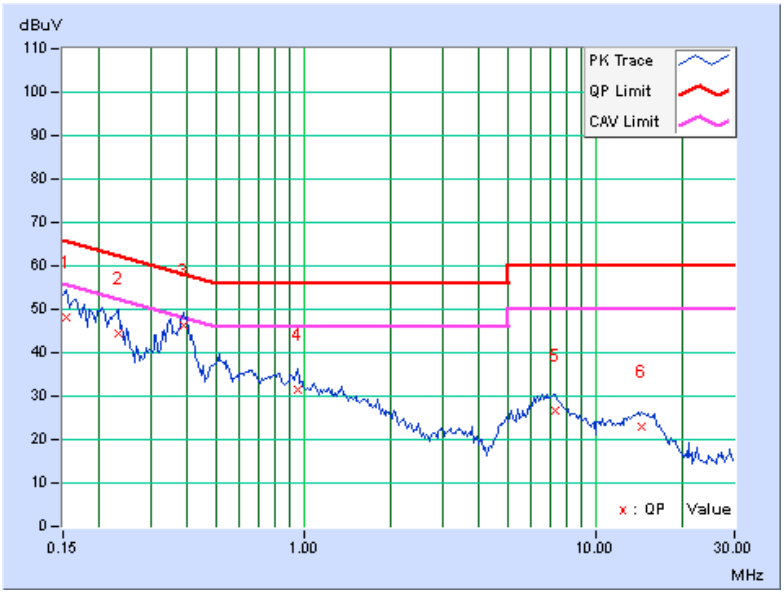
For Adapter 2:

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	0.15391	0.07	48.10	32.65	48.17	32.72	65.79	55.79	-17.62	-23.07
2	0.23203	0.07	44.51	35.77	44.58	35.84	62.38	52.38	-17.79	-16.53
3	**0.38828**	**0.09**	**46.22**	**39.46**	**46.31**	**39.55**	**58.10**	**48.10**	**-11.79**	**-8.55**
4	0.95078	0.13	31.17	25.14	31.30	25.27	56.00	46.00	-24.70	-20.73
5	7.26172	0.36	26.49	22.34	26.85	22.70	60.00	50.00	-33.15	-27.30
6	14.42578	0.57	22.52	17.58	23.09	18.15	60.00	50.00	-36.91	-31.85

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

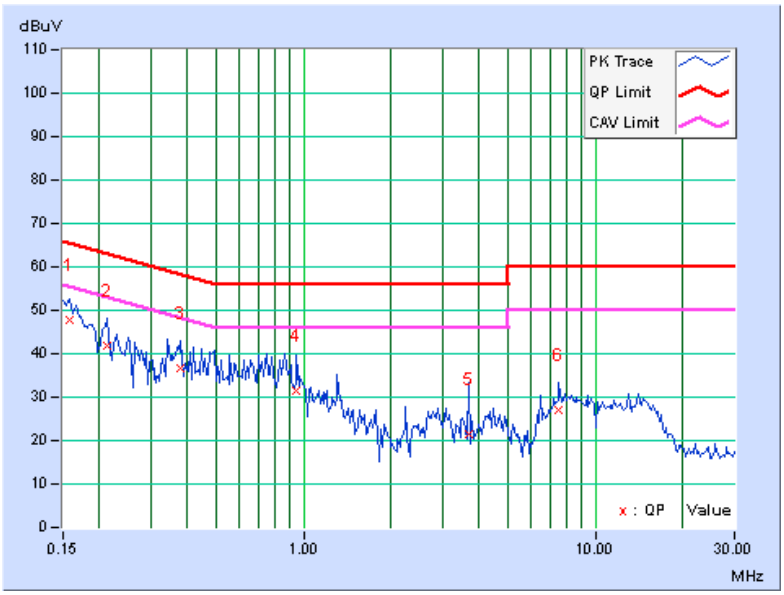


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	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	0.15781	0.07	47.75	31.89	47.82	31.96	65.58	55.58	-17.75	-23.61
2	0.21250	0.07	41.75	30.60	41.82	30.67	63.11	53.11	-21.29	-22.44
3	0.38047	0.09	36.59	28.11	36.68	28.20	58.27	48.27	-21.59	-20.07
4	0.94688	0.13	31.45	23.75	31.58	23.88	56.00	46.00	-24.42	-22.12
5	3.68359	0.25	21.30	13.52	21.55	13.77	56.00	46.00	-34.45	-32.23
6	7.50391	0.37	26.52	21.60	26.89	21.97	60.00	50.00	-33.11	-28.03

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 under any condition of modulation.

4.2.2 TEST INSTRUMENTS

For Below 1GHz:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY50010156	Aug. 11, 2014	Aug. 10, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 13, 2013	Nov. 12, 2014
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Feb. 27, 2014	Feb. 26, 2015
RF Cable	NA	CHHCAB_001	Oct. 06, 2013	Oct. 05, 2014
Horn_Antenna AISI	AIH.8018	0000220091110	Aug. 26, 2014	Aug. 25, 2015
Pre-Amplifier Agilent	8449B	3008A01923	Oct. 29, 2013	Oct. 28, 2014
RF Cable	NA	131206 131215 SNMY23685/4	Jan. 17, 2014	Jan. 16, 2015
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 13, 2013	Nov. 12, 2014
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Aug. 26, 2014	Aug. 25, 2015
RF Cable	NA	RF104-121 RF104-204	Dec. 12, 2013	Dec. 11, 2014
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3 The test was performed in 966 Chamber No. H.
4. The FCC Site Registration No. is 797305.
5 The CANADA Site Registration No. is IC 7450H-3.
6 Tested Date: Sep. 09, 2014

For Above 1GHz:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY51210105	July 21, 2014	July 20, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 13, 2013	Nov. 12, 2014
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Feb. 26, 2014	Feb. 25, 2015
RF Cable	NA	CHGCAB_001	Oct. 05, 2013	Oct. 04, 2014
Horn_Antenna AISI	AIH.8018	0000320091110	Aug. 27, 2014	Aug. 26, 2015
Pre-Amplifier Agilent	8449B	3008A02578	June 24, 2014	June 23, 2015
RF Cable	NA	131205 131214 SNMY23684/4	Jan. 17, 2014	Jan. 16, 2015
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 13, 2013	Nov. 12, 2014
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Aug. 26, 2014	Aug. 25, 2015
RF Cable	NA	RF104-121 RF104-204	Dec. 12, 2013	Dec. 11, 2014
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3 The test was performed in 966 Chamber No. G.
4. The FCC Site Registration No. is 966073.
5 The VCCI Site Registration No. is G-137.
6 The CANADA Site Registration No. is IC 7450H-2.
7 Tested Date: Sep. 29, 2014

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:

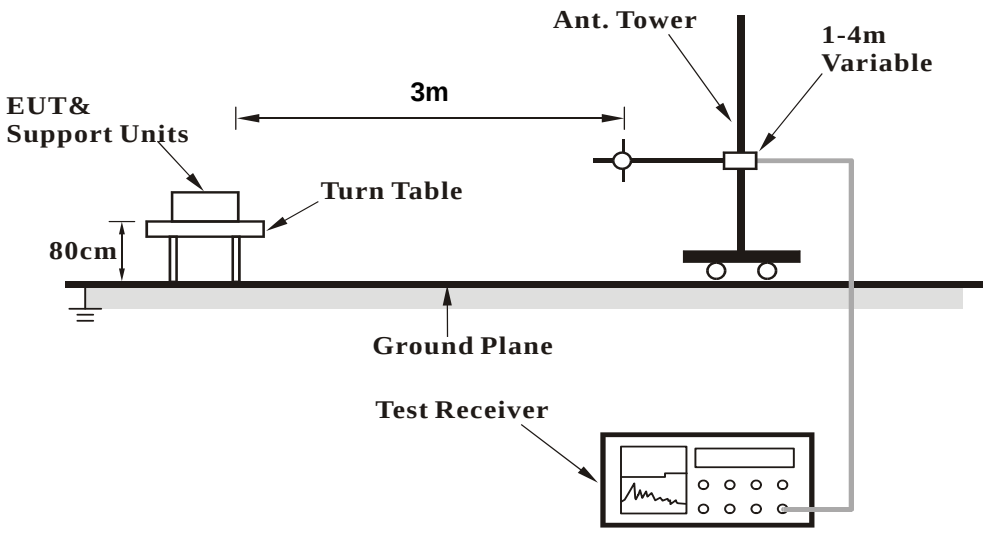
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.2.4 DEVIATION FROM TEST STANDARD

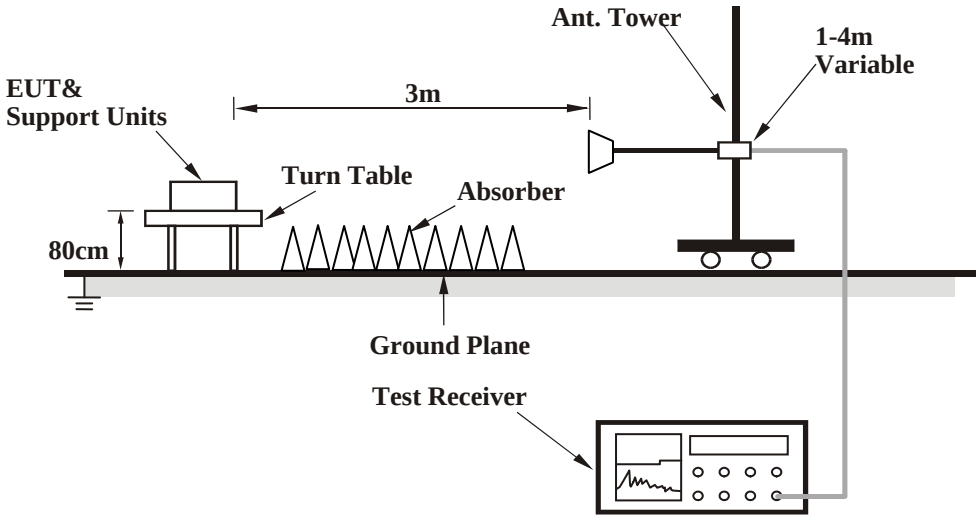
No deviation

4.2.5 TEST SETUP

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



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

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6

4.2.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

802.11g

CHANNEL	TX Channel 6	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	Below 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	89.75	36.1 QP	43.5	-7.4	2.00 H	76	54.59	-18.49
2	124.96	30.9 QP	43.5	-12.6	2.00 H	75	45.20	-14.26
3	160.47	35.4 QP	43.5	-8.1	1.00 H	262	47.89	-12.51
4	199.99	26.5 QP	43.5	-17.0	1.50 H	90	42.20	-15.73
5	474.99	26.3 QP	46.0	-19.7	2.00 H	0	33.74	-7.45
6	940.59	30.3 QP	46.0	-15.7	2.00 H	360	28.90	1.37
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	47.22	33.6 QP	40.0	-6.5	1.00 V	53	46.51	-12.96
2	82.01	34.1 QP	40.0	-6.0	1.00 V	90	52.05	-18.00
3	88.49	39.3 QP	43.5	-4.2	1.50 V	91	57.76	-18.45
4	89.89	37.2 QP	43.5	-6.3	1.00 V	111	55.73	-18.50
5	159.83	29.6 QP	43.5	-13.9	1.00 V	277	42.07	-12.44
6	956.98	34.6 QP	46.0	-11.5	1.00 V	257	32.98	1.57

REMARKS:

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

ABOVE 1GHz DATA

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2373.00	45.1 PK	74.0	-28.9	1.00 H	188	47.65	-2.55
2	2373.00	32.7 AV	54.0	-21.3	1.00 H	188	35.25	-2.55
3	*2412.00	103.1 PK			1.00 H	187	105.47	-2.37
4	*2412.00	100.2 AV			1.00 H	187	102.57	-2.37
5	2491.00	52.2 PK	74.0	-21.8	1.03 H	145	54.21	-2.01
6	2491.00	44.4 AV	54.0	-9.6	1.03 H	145	46.41	-2.01
7	4824.00	44.0 PK	74.0	-30.0	1.00 H	144	38.29	5.71
8	4824.00	31.8 AV	54.0	-22.2	1.00 H	144	26.09	5.71
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	2373.00	54.2 PK	74.0	-19.8	1.11 V	96	56.75	-2.55
2	2373.00	44.5 AV	54.0	-9.5	1.11 V	96	47.05	-2.55
3	*2412.00	116.7 PK			1.13 V	340	119.07	-2.37
4	*2412.00	114.2 AV			1.13 V	340	116.57	-2.37
5	2491.00	60.7 PK	74.0	-13.3	1.13 V	340	62.71	-2.01
6	2491.00	53.2 AV	54.0	-0.8	1.13 V	340	55.21	-2.01
7	4824.00	47.6 PK	74.0	-26.4	1.00 V	98	41.89	5.71
8	4824.00	41.1 AV	54.0	-12.9	1.00 V	98	35.39	5.71

REMARKS:

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

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	51.4 PK	74.0	-22.6	1.33 H	314	53.87	-2.47
2	2390.00	40.3 AV	54.0	-13.7	1.33 H	314	42.77	-2.47
3	*2437.00	112.8 PK			1.33 H	314	115.05	-2.25
4	*2437.00	110.1 AV			1.33 H	314	112.35	-2.25
5	2500.00	51.5 PK	74.0	-22.5	1.33 H	314	53.46	-1.96
6	2500.00	39.4 AV	54.0	-14.6	1.33 H	314	41.36	-1.96
7	4874.00	43.9 PK	74.0	-30.1	1.02 H	159	38.00	5.90
8	4874.00	31.5 AV	54.0	-22.5	1.02 H	159	25.60	5.90
9	7311.00	49.4 PK	74.0	-24.6	1.00 H	336	36.23	13.17
10	7311.00	37.7 AV	54.0	-16.3	1.00 H	336	24.53	13.17

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	2385.00	57.6 PK	74.0	-16.4	1.12 V	98	60.09	-2.49
2	2385.00	50.4 AV	54.0	-3.6	1.12 V	98	52.89	-2.49
3	*2437.00	122.8 PK			1.12 V	98	125.05	-2.25
4	*2437.00	119.4 AV			1.12 V	98	121.65	-2.25
5	2500.00	60.2 PK	74.0	-13.8	1.12 V	98	62.16	-1.96
6	2500.00	49.7 AV	54.0	-4.3	1.12 V	98	51.66	-1.96
7	4874.00	47.2 PK	74.0	-26.8	1.00 V	96	41.30	5.90
8	4874.00	38.5 AV	54.0	-15.5	1.00 V	96	32.60	5.90
9	7311.00	54.4 PK	74.0	-19.6	1.22 V	283	41.23	13.17
10	7311.00	46.9 AV	54.0	-7.1	1.22 V	283	33.73	13.17

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	2381.00	51.6 PK	74.0	-22.4	1.33 H	314	54.10	-2.50
2	2381.00	44.4 AV	54.0	-9.6	1.33 H	314	46.90	-2.50
3	*2462.00	108.2 PK			1.33 H	314	110.34	-2.14
4	*2462.00	105.5 AV			1.33 H	314	107.64	-2.14
5	4924.00	43.8 PK	74.0	-30.2	1.08 H	146	37.69	6.11
6	4924.00	31.3 AV	54.0	-22.7	1.08 H	146	25.19	6.11
7	7386.00	49.0 PK	74.0	-25.0	1.02 H	351	35.82	13.18
8	7386.00	37.4 AV	54.0	-16.6	1.02 H	351	24.22	13.18
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2381.00	61.0 PK	74.0	-13.0	1.15 V	95	63.50	-2.50
2	2381.00	53.7 AV	54.0	-0.3	1.15 V	95	56.20	-2.50
3	*2462.00	118.8 PK			1.11 V	98	120.94	-2.14
4	*2462.00	116.1 AV			1.11 V	98	118.24	-2.14
5	4924.00	46.9 PK	74.0	-27.1	1.04 V	103	40.79	6.11
6	4924.00	38.4 AV	54.0	-15.6	1.04 V	103	32.29	6.11
7	7386.00	54.9 PK	74.0	-19.1	1.19 V	279	41.72	13.18
8	7386.00	47.3 AV	54.0	-6.7	1.19 V	279	34.12	13.18

REMARKS:

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

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	58.2 PK	74.0	-15.8	1.36 H	314	60.67	-2.47
2	2390.00	41.7 AV	54.0	-12.3	1.36 H	314	44.17	-2.47
3	*2412.00	108.8 PK			1.36 H	314	111.17	-2.37
4	*2412.00	99.1 AV			1.36 H	314	101.47	-2.37
5	2483.50	51.4 PK	74.0	-22.6	1.36 H	314	53.43	-2.03
6	2483.50	39.5 AV	54.0	-14.5	1.36 H	314	41.53	-2.03
7	4824.00	44.3 PK	74.0	-29.7	1.09 H	156	38.59	5.71
8	4824.00	31.6 AV	54.0	-22.4	1.09 H	156	25.89	5.71
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	71.4 PK	74.0	-2.6	1.17 V	360	73.87	-2.47
2	2390.00	53.7 AV	54.0	-0.3	1.17 V	360	56.17	-2.47
3	*2412.00	118.4 PK			1.17 V	360	120.77	-2.37
4	*2412.00	107.9 AV			1.17 V	360	110.27	-2.37
5	2483.50	61.9 PK	74.0	-12.1	1.17 V	360	63.93	-2.03
6	2483.50	49.6 AV	54.0	-4.4	1.17 V	360	51.63	-2.03
7	4824.00	46.9 PK	74.0	-27.1	1.00 V	78	41.19	5.71
8	4824.00	38.1 AV	54.0	-15.9	1.00 V	78	32.39	5.71

REMARKS:

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

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	54.6 PK	74.0	-19.4	1.32 H	314	57.07	-2.47
2	2390.00	40.6 AV	54.0	-13.4	1.32 H	314	43.07	-2.47
3	*2437.00	114.6 PK			1.32 H	314	116.85	-2.25
4	*2437.00	105.2 AV			1.32 H	314	107.45	-2.25
5	2483.50	57.0 PK	74.0	-17.0	1.32 H	314	59.03	-2.03
6	2483.50	42.9 AV	54.0	-11.1	1.32 H	314	44.93	-2.03
7	4874.00	43.9 PK	74.0	-30.1	1.09 H	148	38.00	5.90
8	4874.00	31.4 AV	54.0	-22.6	1.09 H	148	25.50	5.90
9	7311.00	49.4 PK	74.0	-24.6	1.05 H	351	36.23	13.17
10	7311.00	37.7 AV	54.0	-16.3	1.05 H	351	24.53	13.17
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	63.8 PK	74.0	-10.2	1.15 V	360	66.27	-2.47
2	2390.00	47.5 AV	54.0	-6.5	1.15 V	360	49.97	-2.47
3	*2437.00	124.1 PK			1.15 V	360	126.35	-2.25
4	*2437.00	113.8 AV			1.15 V	360	116.05	-2.25
5	2483.50	69.0 PK	74.0	-5.0	1.15 V	360	71.03	-2.03
6	2483.50	53.5 AV	54.0	-0.5	1.15 V	360	55.53	-2.03
7	4874.00	47.1 PK	74.0	-26.9	1.00 V	83	41.20	5.90
8	4874.00	38.2 AV	54.0	-15.8	1.00 V	83	32.30	5.90
9	7311.00	54.8 PK	74.0	-19.2	1.27 V	291	41.63	13.17
10	7311.00	47.2 AV	54.0	-6.8	1.27 V	291	34.03	13.17

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	108.3 PK			1.30 H	314	110.44	-2.14
2	*2462.00	98.6 AV			1.30 H	314	100.74	-2.14
3	2483.50	64.4 PK	74.0	-9.6	1.30 H	314	66.43	-2.03
4	2483.50	45.7 AV	54.0	-8.3	1.30 H	314	47.73	-2.03
5	4924.00	43.7 PK	74.0	-30.3	1.05 H	141	37.59	6.11
6	4924.00	31.4 AV	54.0	-22.6	1.05 H	141	25.29	6.11
7	7386.00	48.9 PK	74.0	-25.1	1.05 H	344	35.72	13.18
8	7386.00	37.2 AV	54.0	-16.8	1.05 H	344	24.02	13.18
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	118.5 PK			1.13 V	358	120.64	-2.14
2	*2462.00	108.4 AV			1.13 V	358	110.54	-2.14
3	2483.50	73.1 PK	74.0	-0.9	1.13 V	360	75.13	-2.03
4	2483.50	53.2 AV	54.0	-0.8	1.13 V	360	55.23	-2.03
5	4924.00	46.8 PK	74.0	-27.2	1.04 V	101	40.69	6.11
6	4924.00	38.1 AV	54.0	-15.9	1.04 V	101	31.99	6.11
7	7386.00	54.6 PK	74.0	-19.4	1.19 V	298	41.42	13.18
8	7386.00	47.3 AV	54.0	-6.7	1.19 V	298	34.12	13.18

REMARKS:

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

VHT20

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	55.1 PK	74.0	-18.9	1.35 H	313	57.57	-2.47
2	2390.00	37.6 AV	54.0	-16.4	1.35 H	313	40.07	-2.47
3	*2412.00	106.7 PK			1.35 H	313	109.07	-2.37
4	*2412.00	96.1 AV			1.35 H	313	98.47	-2.37
5	4824.00	44.3 PK	74.0	-29.7	1.07 H	148	38.59	5.71
6	4824.00	31.8 AV	54.0	-22.2	1.07 H	148	26.09	5.71
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	73.7 PK	74.0	-0.3	1.14 V	41	76.17	-2.47
2	2390.00	51.8 AV	54.0	-2.2	1.14 V	41	54.27	-2.47
3	*2412.00	116.2 PK			1.13 V	41	118.57	-2.37
4	*2412.00	105.1 AV			1.13 V	41	107.47	-2.37
5	4824.00	47.0 PK	74.0	-27.0	1.06 V	101	41.29	5.71
6	4824.00	38.0 AV	54.0	-16.0	1.06 V	101	32.29	5.71

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) 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	1.33 H	313	56.67	-2.47
2	2390.00	41.8 AV	54.0	-12.2	1.33 H	313	44.27	-2.47
3	*2437.00	115.3 PK			1.33 H	313	117.55	-2.25
4	*2437.00	104.7 AV			1.33 H	313	106.95	-2.25
5	2483.50	57.1 PK	74.0	-16.9	1.33 H	313	59.13	-2.03
6	2483.50	43.6 AV	54.0	-10.4	1.33 H	313	45.63	-2.03
7	4874.00	43.3 PK	74.0	-30.7	1.03 H	136	37.40	5.90
8	4874.00	30.9 AV	54.0	-23.1	1.03 H	136	25.00	5.90
9	7311.00	49.2 PK	74.0	-24.8	1.05 H	356	36.03	13.17
10	7311.00	37.3 AV	54.0	-16.7	1.05 H	356	24.13	13.17
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	70.9 PK	74.0	-3.1	1.16 V	351	73.37	-2.47
2	2390.00	52.4 AV	54.0	-1.6	1.16 V	351	54.87	-2.47
3	*2437.00	124.8 PK			1.16 V	360	127.05	-2.25
4	*2437.00	114.0 AV			1.16 V	360	116.25	-2.25
5	2483.50	68.1 PK	74.0	-5.9	1.15 V	360	70.13	-2.03
6	2483.50	53.6 AV	54.0	-0.4	1.15 V	360	55.63	-2.03
7	4874.00	46.5 PK	74.0	-27.5	1.09 V	106	40.60	5.90
8	4874.00	38.0 AV	54.0	-16.0	1.09 V	106	32.10	5.90
9	7311.00	54.3 PK	74.0	-19.7	1.17 V	291	41.13	13.17
10	7311.00	47.0 AV	54.0	-7.0	1.17 V	291	33.83	13.17

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	107.1 PK			1.35 H	314	109.24	-2.14
2	*2462.00	96.4 AV			1.35 H	314	98.54	-2.14
3	2483.50	61.2 PK	74.0	-12.8	1.35 H	314	63.23	-2.03
4	2483.50	43.8 AV	54.0	-10.2	1.35 H	314	45.83	-2.03
5	4924.00	44.0 PK	74.0	-30.0	1.03 H	137	37.89	6.11
6	4924.00	31.8 AV	54.0	-22.2	1.03 H	137	25.69	6.11
7	7386.00	48.6 PK	74.0	-25.4	1.07 H	354	35.42	13.18
8	7386.00	36.8 AV	54.0	-17.2	1.07 H	354	23.62	13.18
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	115.5 PK			1.14 V	360	117.64	-2.14
2	*2462.00	104.6 AV			1.14 V	360	106.74	-2.14
3	2483.50	73.4 PK	74.0	-0.6	1.13 V	360	75.43	-2.03
4	2483.50	52.8 AV	54.0	-1.2	1.13 V	360	54.83	-2.03
5	4924.00	47.0 PK	74.0	-27.0	1.09 V	108	40.89	6.11
6	4924.00	38.3 AV	54.0	-15.7	1.09 V	108	32.19	6.11
7	7386.00	54.2 PK	74.0	-19.8	1.21 V	291	41.02	13.18
8	7386.00	47.1 AV	54.0	-6.9	1.21 V	291	33.92	13.18

REMARKS:

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

VHT40

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	58.7 PK	74.0	-15.3	1.35 H	314	61.17	-2.47
2	2390.00	43.5 AV	54.0	-10.5	1.35 H	314	45.97	-2.47
3	*2422.00	104.4 PK			1.35 H	314	106.72	-2.32
4	*2422.00	92.9 AV			1.35 H	314	95.22	-2.32
5	4844.00	44.3 PK	74.0	-29.7	1.07 H	127	38.52	5.78
6	4844.00	32.2 AV	54.0	-21.8	1.07 H	127	26.42	5.78
7	7266.00	48.5 PK	74.0	-25.5	1.12 H	352	35.30	13.20
8	7266.00	36.9 AV	54.0	-17.1	1.12 H	352	23.70	13.20
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	69.0 PK	74.0	-5.0	1.19 V	0	71.47	-2.47
2	2390.00	53.2 AV	54.0	-0.8	1.19 V	0	55.67	-2.47
3	*2422.00	111.7 PK			1.12 V	360	114.02	-2.32
4	*2422.00	100.8 AV			1.12 V	360	103.12	-2.32
5	4844.00	46.2 PK	74.0	-27.8	1.14 V	103	40.42	5.78
6	4844.00	37.8 AV	54.0	-16.2	1.14 V	103	32.02	5.78
7	7266.00	54.7 PK	74.0	-19.3	1.12 V	294	41.50	13.20
8	7266.00	47.2 AV	54.0	-6.8	1.12 V	294	34.00	13.20

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	2388.00	60.1 PK	74.0	-13.9	1.37 H	314	62.58	-2.48
2	2388.00	40.5 AV	54.0	-13.5	1.37 H	314	42.98	-2.48
3	*2437.00	105.3 PK			1.37 H	314	107.55	-2.25
4	*2437.00	94.1 AV			1.37 H	314	96.35	-2.25
5	2483.50	58.1 PK	74.0	-15.9	1.37 H	314	60.13	-2.03
6	2483.50	41.9 AV	54.0	-12.1	1.37 H	314	43.93	-2.03
7	4874.00	44.1 PK	74.0	-29.9	1.09 H	123	38.20	5.90
8	4874.00	31.9 AV	54.0	-22.1	1.09 H	123	26.00	5.90
9	7311.00	48.9 PK	74.0	-25.1	1.07 H	360	35.73	13.17
10	7311.00	37.1 AV	54.0	-16.9	1.07 H	360	23.93	13.17

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	2388.00	68.5 PK	74.0	-5.5	1.14 V	0	70.98	-2.48
2	2388.00	48.4 AV	54.0	-5.6	1.14 V	0	50.88	-2.48
3	*2437.00	113.6 PK			1.14 V	360	115.85	-2.25
4	*2437.00	102.3 AV			1.14 V	360	104.55	-2.25
5	2483.50	73.5 PK	74.0	-0.5	1.14 V	0	75.53	-2.03
6	2483.50	53.0 AV	54.0	-1.0	1.14 V	0	55.03	-2.03
7	4874.00	46.5 PK	74.0	-27.5	1.13 V	119	40.60	5.90
8	4874.00	38.2 AV	54.0	-15.8	1.13 V	119	32.30	5.90
9	7311.00	54.1 PK	74.0	-19.9	1.11 V	304	40.93	13.17
10	7311.00	46.6 AV	54.0	-7.4	1.11 V	304	33.43	13.17

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	104.7 PK			1.40 H	320	106.88	-2.18
2	*2452.00	93.2 AV			1.40 H	320	95.38	-2.18
3	2483.50	59.2 PK	74.0	-14.8	1.40 H	320	61.23	-2.03
4	2483.50	43.9 AV	54.0	-10.1	1.40 H	320	45.93	-2.03
5	4904.00	44.7 PK	74.0	-29.3	1.06 H	114	38.68	6.02
6	4904.00	32.5 AV	54.0	-21.5	1.06 H	114	26.48	6.02
7	7356.00	49.1 PK	74.0	-24.9	1.08 H	360	35.92	13.18
8	7356.00	37.4 AV	54.0	-16.6	1.08 H	360	24.22	13.18
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	110.3 PK			1.17 V	360	112.48	-2.18
2	*2452.00	100.2 AV			1.17 V	360	102.38	-2.18
3	2483.50	71.6 PK	74.0	-2.4	1.17 V	360	73.63	-2.03
4	**2483.50**	**53.8 AV**	**54.0**	**-0.2**	**1.17 V**	**360**	**55.83**	**-2.03**
5	4904.00	46.1 PK	74.0	-27.9	1.12 V	113	40.08	6.02
6	4904.00	37.7 AV	54.0	-16.3	1.12 V	113	31.68	6.02
7	7356.00	53.7 PK	74.0	-20.3	1.20 V	293	40.52	13.18
8	7356.00	46.6 AV	54.0	-7.4	1.20 V	293	33.42	13.18

REMARKS:

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

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	FSV 40	100964	July 05, 2014	July 04, 2015

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Oct. 30, 2014

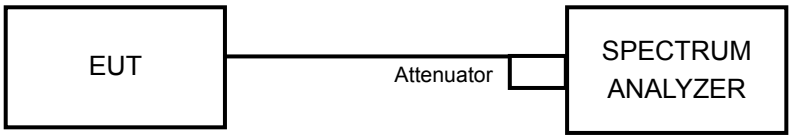
4.3.3 TEST PROCEDURE

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 (MODE 1)

802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	8.58	8.12	9.02	0.5	PASS
6	2437	9.05	8.62	9.08	0.5	PASS
11	2462	8.61	8.59	8.61	0.5	PASS

802.11g

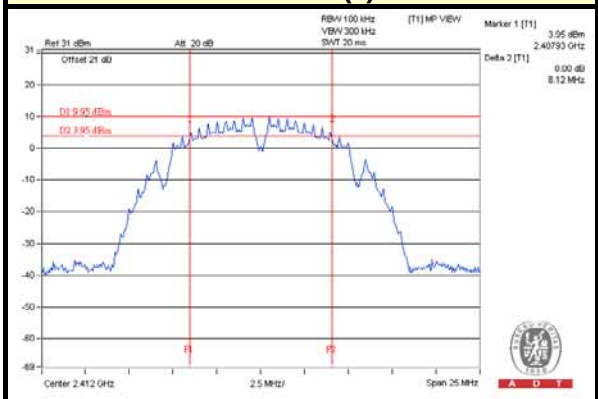
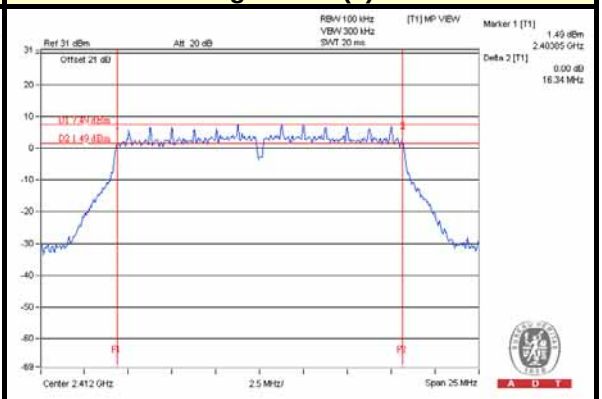
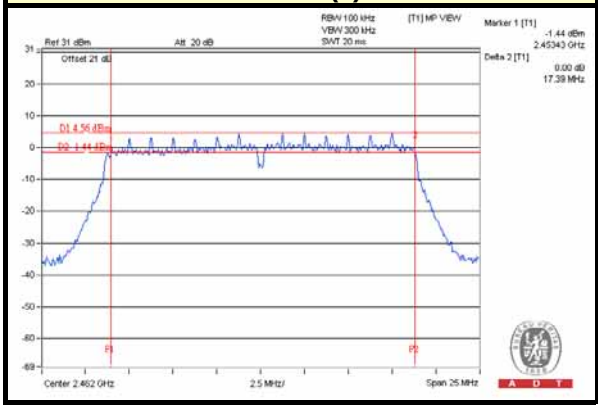
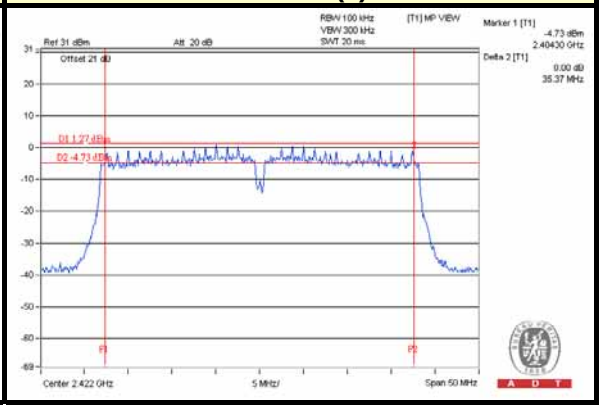
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	16.34	16.37	16.40	0.5	PASS
6	2437	16.37	16.40	16.40	0.5	PASS
11	2462	16.36	16.40	16.39	0.5	PASS

VHT20

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	17.61	17.64	17.64	0.5	PASS
6	2437	17.61	17.65	17.60	0.5	PASS
11	2462	17.39	17.64	17.60	0.5	PASS

VHT40

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
3	2422	35.60	35.37	35.81	0.5	PASS
6	2437	36.25	36.47	36.42	0.5	PASS
9	2452	36.44	35.94	36.12	0.5	PASS

SPECTRUM PLOT OF WORST VALUE	
802.11b / Chain(1) : CH1	**802.11g / Chain(0) : CH1**
	
VHT20 / Chain(0) : CH11	**VHT40 / Chain(1) : CH3**
	

4.3.8 TEST RESULTS (MODE 2)

VHT20

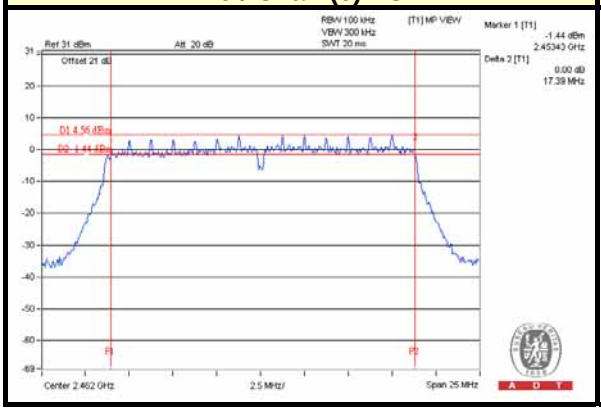
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	17.61	17.64	17.64	0.5	PASS
6	2437	17.59	17.64	17.64	0.5	PASS
11	2462	17.39	17.64	17.60	0.5	PASS

VHT40

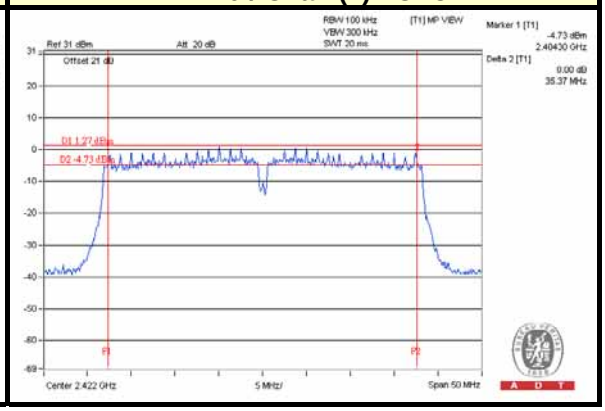
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
3	2422	35.60	35.37	35.81	0.5	PASS
6	2437	36.25	36.47	36.42	0.5	PASS
9	2452	36.44	35.94	36.12	0.5	PASS

SPECTRUM PLOT OF WORST VALUE

VHT20 / Chain(0) : CH11



VHT40 / Chain(1) : CH3



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 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 TEST INSTRUMENTS

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

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Oct. 30, 2014

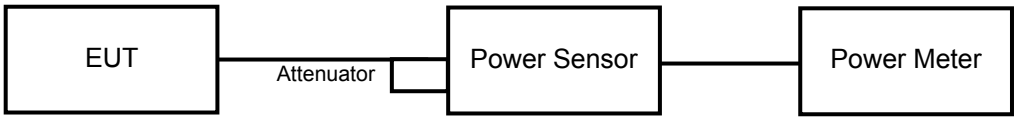
4.4.3 TEST PROCEDURES

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

4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6

4.4.7 TEST RESULTS (MODE 1)

802.11b

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	18.71	18.51	19.21	228.628	23.59	30	PASS
6	2437	25.22	24.71	25.34	970.44	29.87	30	PASS
11	2462	19.75	19.31	20.17	283.708	24.53	30	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	18.43	18.03	18.96	211.901	23.26	30	PASS
6	2437	24.21	24.01	25.07	836.767	29.23	30	PASS
11	2462	17.91	17.58	18.34	187.316	22.73	30	PASS

VHT20

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	16.17	15.75	16.61	124.798	20.96	30	PASS
6	2437	24.61	24.31	25.47	911.213	29.60	30	PASS
11	2462	15.74	15.43	16.17	113.811	20.56	30	PASS

VHT40

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
3	2422	14.56	14.42	15.42	91.079	19.59	30	PASS
6	2437	16.97	16.51	17.54	151.299	21.80	30	PASS
9	2452	13.61	13.01	13.96	67.849	18.32	30	PASS

4.4.8 TEST RESULTS (MODE 2)

VHT20

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	16.17	15.75	16.61	124.798	20.96	29.23	PASS
6	2437	24.20	23.97	24.98	827.261	29.18	29.23	PASS
11	2462	15.74	15.43	16.17	113.811	20.56	29.23	PASS
NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power limit shall be reduced to 30-(6.77-6) = 29.23dBm.								

VHT40

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
3	2422	14.56	14.42	15.42	91.079	19.59	29.23	PASS
6	2437	16.97	16.51	17.54	151.299	21.80	29.23	PASS
9	2452	13.61	13.01	13.96	67.849	18.32	29.23	PASS
NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power limit shall be reduced to 30-(6.77-6) = 29.23dBm.								

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	FSV 40	100964	July 05, 2014	July 04, 2015

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Oct. 30, 2014

4.5.3 TEST PROCEDURE

For 802.11b / g, VHT20:

1. Set the RBW = 10 kHz, VBW = 30 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.

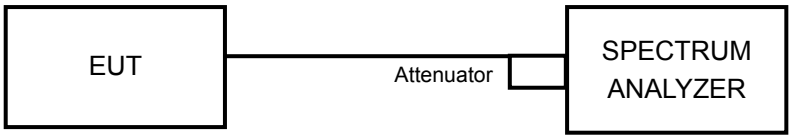
For VHT40:

1. Set the RBW = 10 kHz, VBW = 30 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.
6. Add 10 log (1/x), where x is the duty cycle, to the measured PSD to compute the average PSD during the actual transmission time.

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 (MODE 1)

802.11b

TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD (dBm)	10 log (N=3) dB	TOTAL PSD (dBm)	LIMIT (dBm)	PASS /FAIL
0	1	2412	-9.04	4.77	-4.27	7.23	PASS
	6	2437	-3.87	4.77	0.90	7.23	PASS
	11	2462	-8.51	4.77	-3.74	7.23	PASS
1	1	2412	-9.75	4.77	-4.98	7.23	PASS
	6	2437	-4.54	4.77	0.23	7.23	PASS
	11	2462	-8.75	4.77	-3.98	7.23	PASS
2	1	2412	-9.78	4.77	-5.01	7.23	PASS
	6	2437	-3.72	4.77	1.05	7.23	PASS
	11	2462	-8.57	4.77	-3.80	7.23	PASS

NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 8-(6.77-6) = 7.23dBm.

802.11g

TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD (dBm)	10 log (N=3) dB	TOTAL PSD (dBm)	LIMIT (dBm)	PASS /FAIL
0	1	2412	-10.90	4.77	-6.13	7.23	PASS
	6	2437	-5.14	4.77	-0.37	7.23	PASS
	11	2462	-11.53	4.77	-6.76	7.23	PASS
1	1	2412	-11.46	4.77	-6.69	7.23	PASS
	6	2437	-5.43	4.77	-0.66	7.23	PASS
	11	2462	-12.12	4.77	-7.35	7.23	PASS
2	1	2412	-10.57	4.77	-5.80	7.23	PASS
	6	2437	-3.96	4.77	0.81	7.23	PASS
	11	2462	-11.01	4.77	-6.24	7.23	PASS

NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 8-(6.77-6) = 7.23dBm.

VHT20

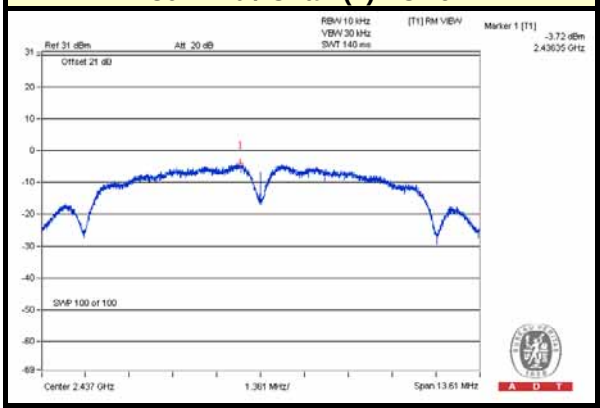
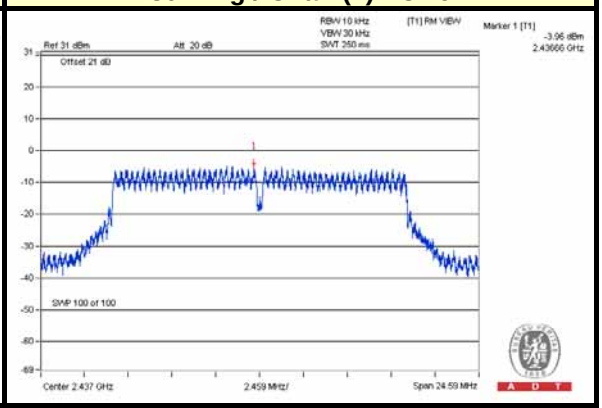
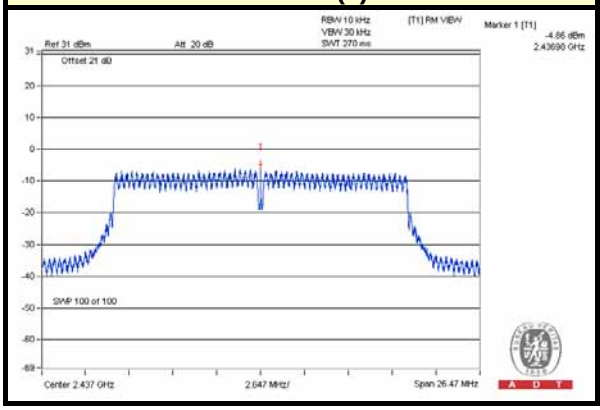
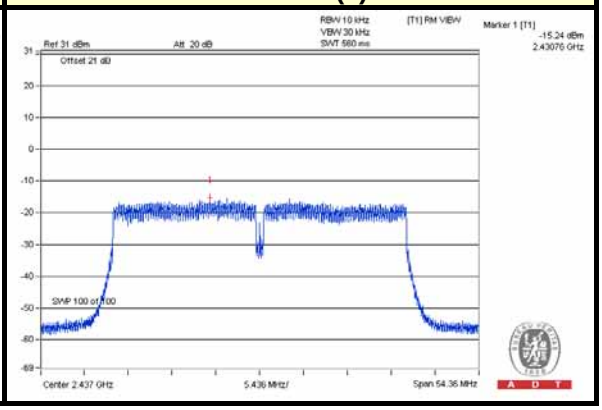
TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD (dBm)	10 log (N=3) dB	TOTAL PSD (dBm)	LIMIT (dBm)	PASS /FAIL
0	1	2412	-14.11	4.77	-9.34	7.23	PASS
	6	2437	-6.26	4.77	-1.49	7.23	PASS
	11	2462	-14.92	4.77	-10.15	7.23	PASS
1	1	2412	-14.76	4.77	-9.99	7.23	PASS
	6	2437	-4.86	4.77	-0.09	7.23	PASS
	11	2462	-15.31	4.77	-10.54	7.23	PASS
2	1	2412	-14.35	4.77	-9.58	7.23	PASS
	6	2437	-5.89	4.77	-1.12	7.23	PASS
	11	2462	-14.96	4.77	-10.19	7.23	PASS

NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 8-(6.77-6) = 7.23dBm.

VHT40

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	-17.91	4.77	0.11	-13.03	7.23	PASS
	6	2437	-15.24	4.77	0.11	-10.36	7.23	PASS
	9	2452	-18.54	4.77	0.11	-13.66	7.23	PASS
1	3	2422	-18.40	4.77	0.11	-13.52	7.23	PASS
	6	2437	-16.23	4.77	0.11	-11.35	7.23	PASS
	9	2452	-18.96	4.77	0.11	-14.08	7.23	PASS
2	3	2422	-17.85	4.77	0.11	-12.97	7.23	PASS
	6	2437	-15.62	4.77	0.11	-10.74	7.23	PASS
	9	2452	-18.94	4.77	0.11	-14.06	7.23	PASS

NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 8-(6.77-6) = 7.23dBm.

SPECTRUM PLOT OF WORST VALUE	
802.11b / Chain(2) : CH6	**802.11g / Chain(2) : CH6**
	
VHT20 / Chain(1) : CH6	**VHT40 / Chain(0) : CH6**
	

4.5.8 TEST RESULTS (MODE 2)

VHT20

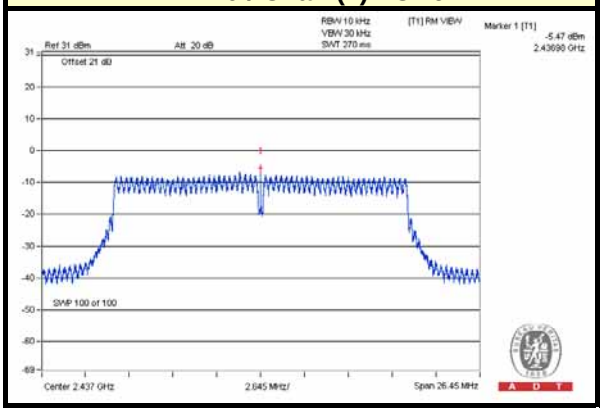
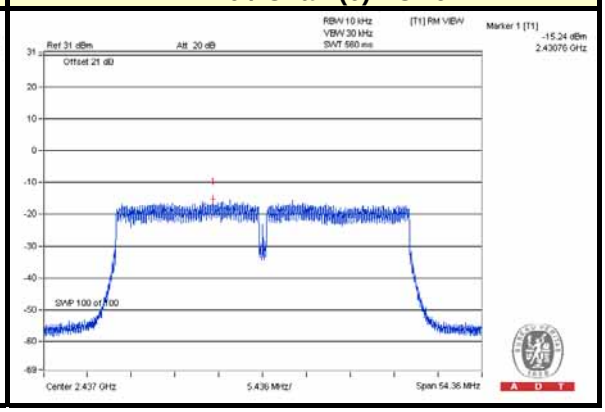
TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD (dBm)	10 log (N=3) dB	TOTAL PSD (dBm)	LIMIT (dBm)	PASS /FAIL
0	1	2412	-14.11	4.77	-9.34	7.23	PASS
	6	2437	-6.50	4.77	-1.73	7.23	PASS
	11	2462	-14.92	4.77	-10.15	7.23	PASS
1	1	2412	-14.76	4.77	-9.99	7.23	PASS
	6	2437	-5.47	4.77	-0.70	7.23	PASS
	11	2462	-15.31	4.77	-10.54	7.23	PASS
2	1	2412	-14.35	4.77	-9.58	7.23	PASS
	6	2437	-6.02	4.77	-1.25	7.23	PASS
	11	2462	-14.96	4.77	-10.19	7.23	PASS

NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 8-(6.77-6) = 7.23dBm.

VHT40

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	-17.91	4.77	0.11	-13.03	7.23	PASS
	6	2437	-15.24	4.77	0.11	-10.36	7.23	PASS
	9	2452	-18.54	4.77	0.11	-13.66	7.23	PASS
1	3	2422	-18.40	4.77	0.11	-13.52	7.23	PASS
	6	2437	-16.23	4.77	0.11	-11.35	7.23	PASS
	9	2452	-18.96	4.77	0.11	-14.08	7.23	PASS
2	3	2422	-17.85	4.77	0.11	-12.97	7.23	PASS
	6	2437	-15.62	4.77	0.11	-10.74	7.23	PASS
	9	2452	-18.94	4.77	0.11	-14.06	7.23	PASS

NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 8-(6.77-6) = 7.23dBm.

SPECTRUM PLOT OF WORST VALUE	
VHT20 / Chain(1) : CH6	VHT40 / Chain(0) : CH6
	

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	FSV 40	100964	July 05, 2014	July 04, 2015

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Oct. 30, 2014

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.

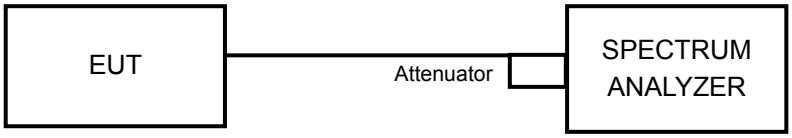
Measurement Procedure –Unwanted Emission Level

1. Set RBW = 100 kHz.
2. Set VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



4.6.6 EUT OPERATING CONDITION

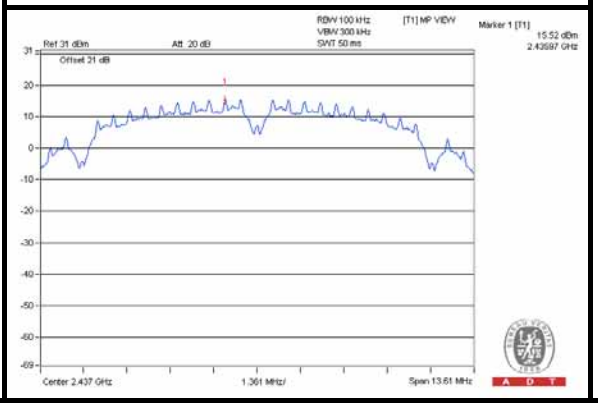
Same as Item 4.3.6

4.6.7 TEST RESULTS (MODE 1)

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.

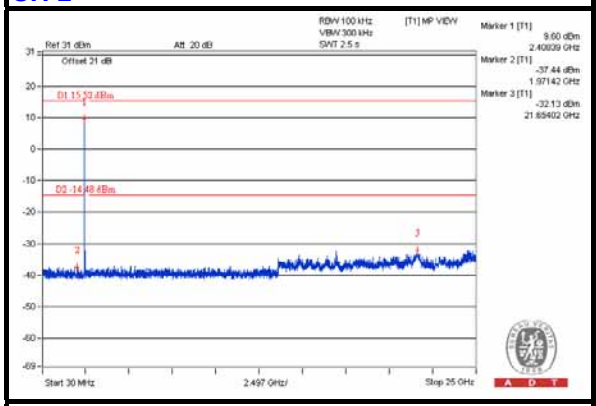
802.11b

Maximum REF

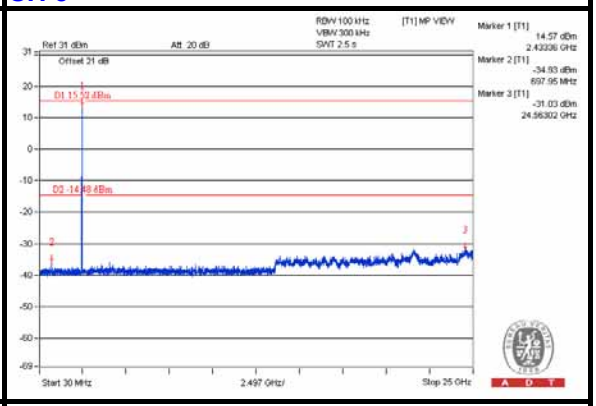


Chain(0)

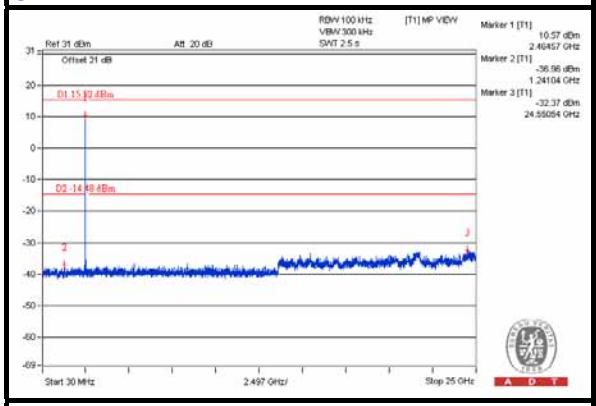
CH 1



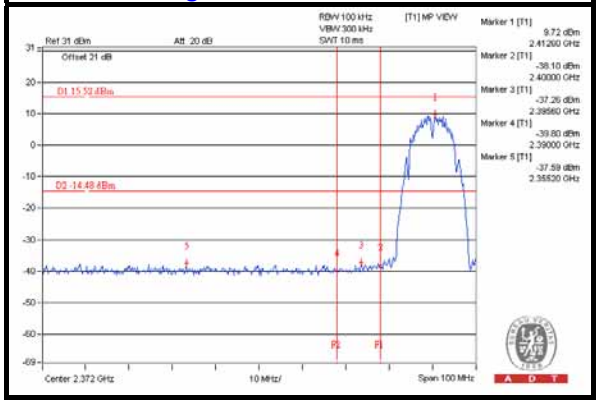
CH 6



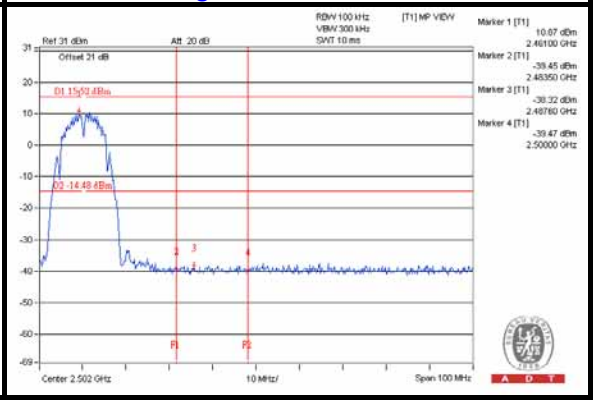
CH 11



CH 1 Band edge

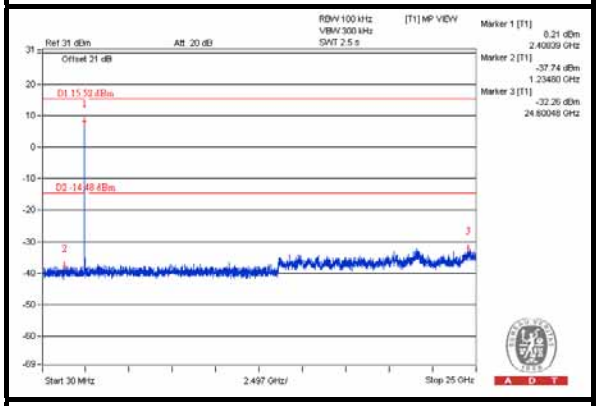


CH 11 Band edge

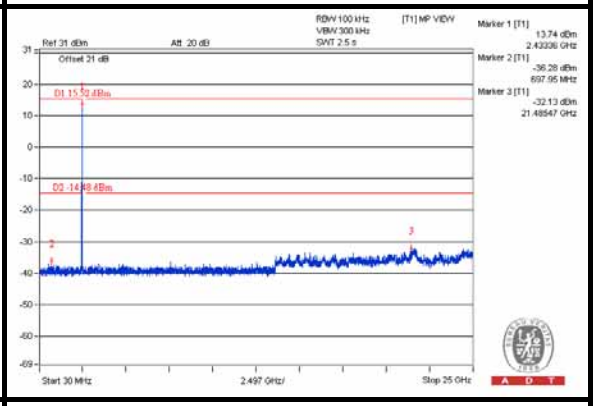


Chain(1)

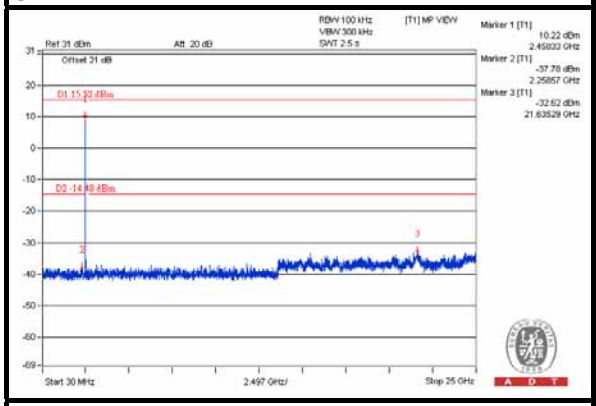
CH 1



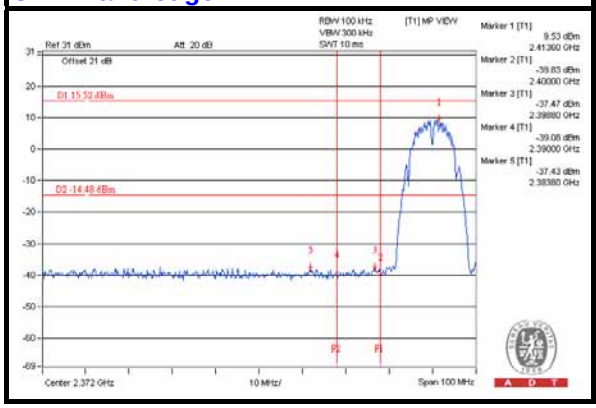
CH 6



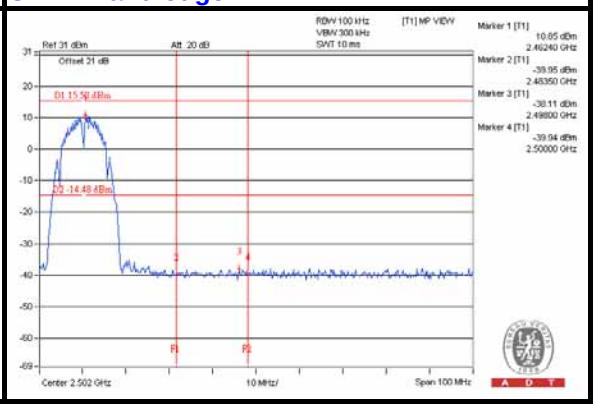
CH 11



CH 1 Band edge

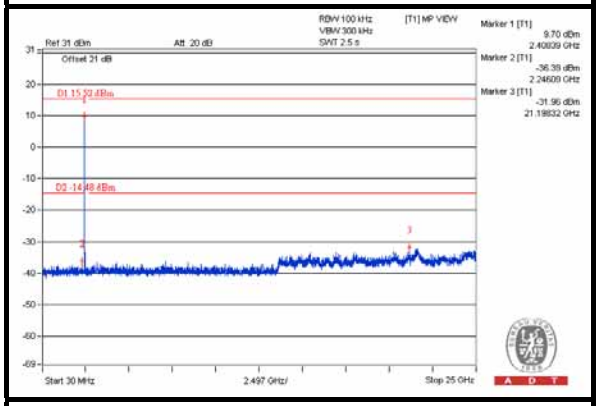


CH 11 Band edge

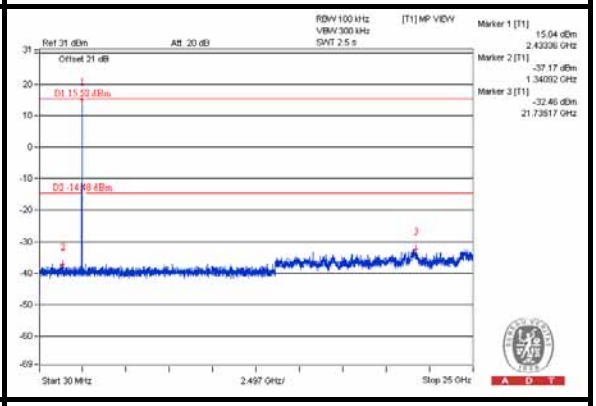


Chain(2)

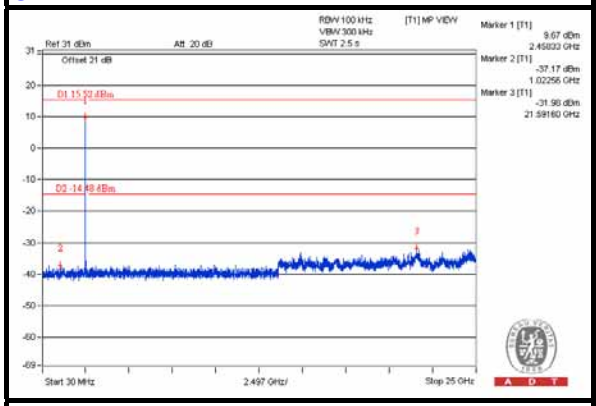
CH 1



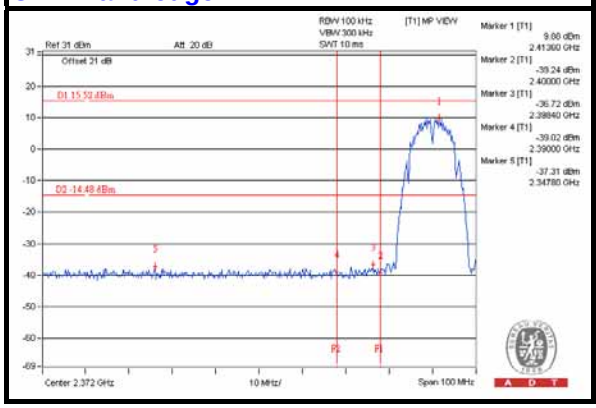
CH 6



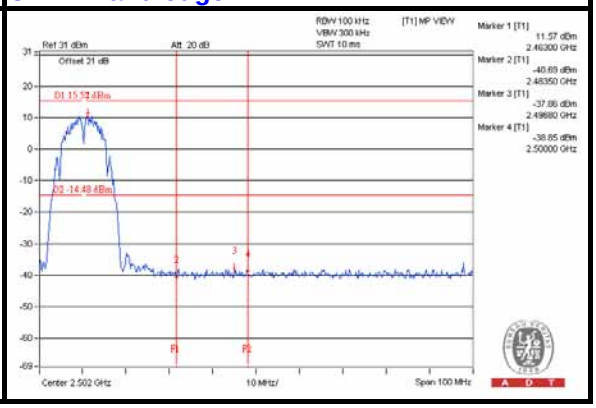
CH 11



CH 1 Band edge

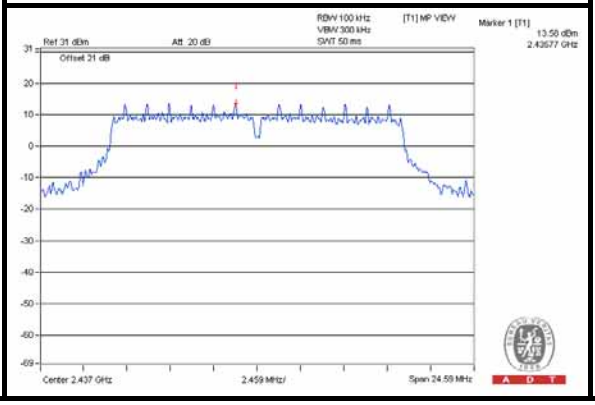


CH 11 Band edge



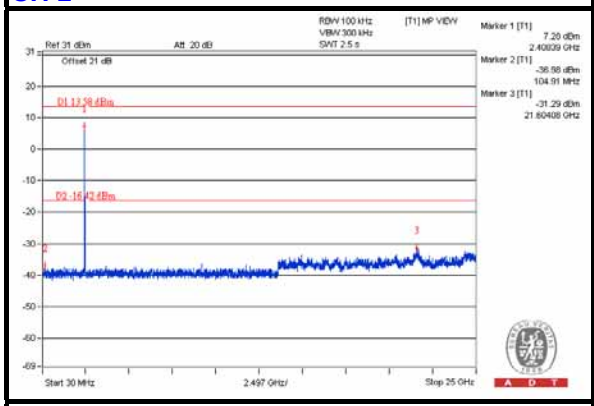
802.11g

Maximum REF

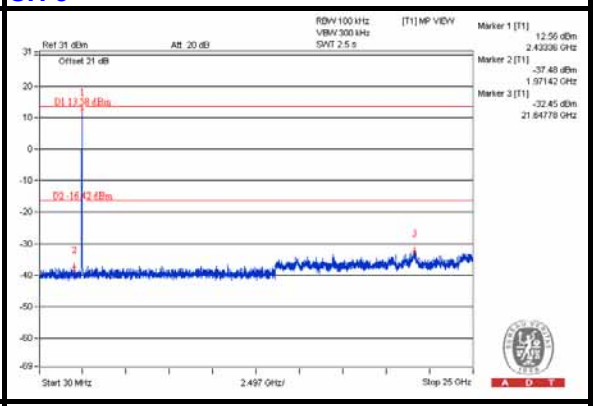


Chain(0)

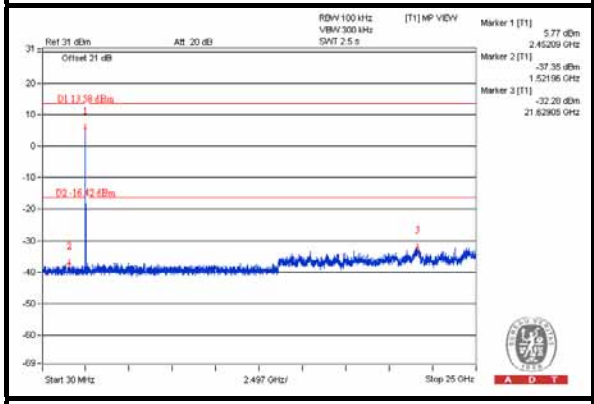
CH 1



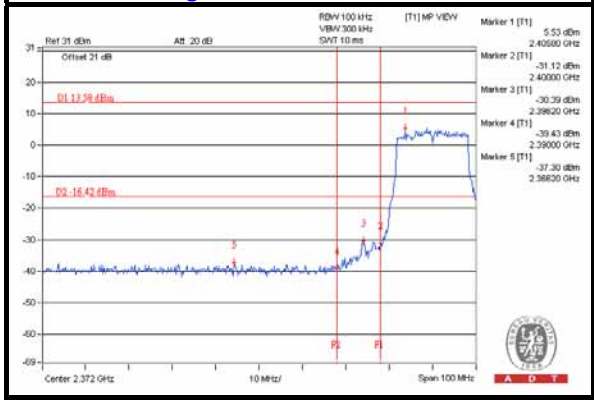
CH 6



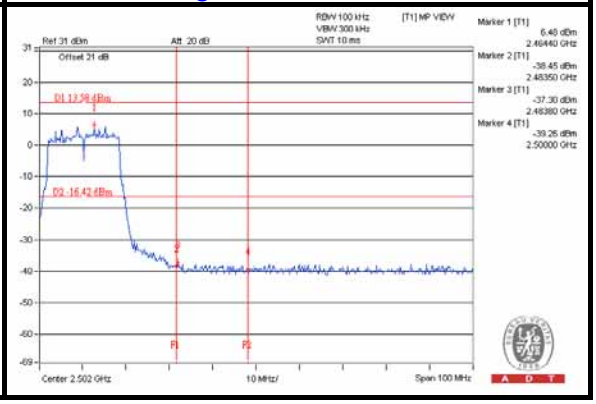
CH 11



CH 1 Band edge

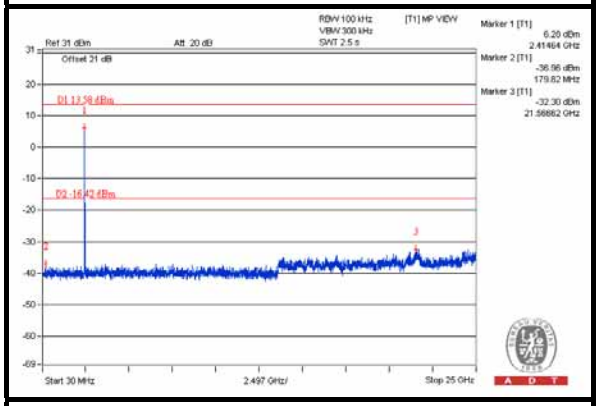


CH 11 Band edge

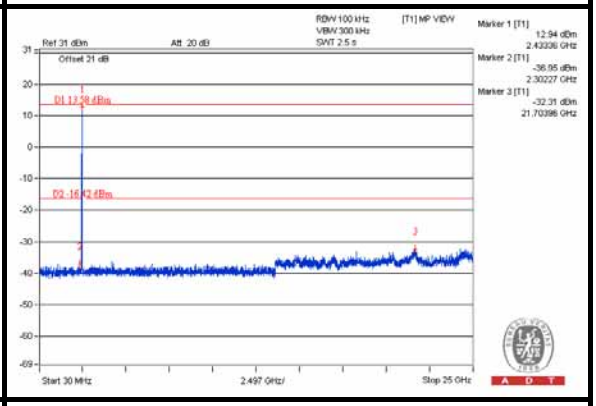


Chain(1)

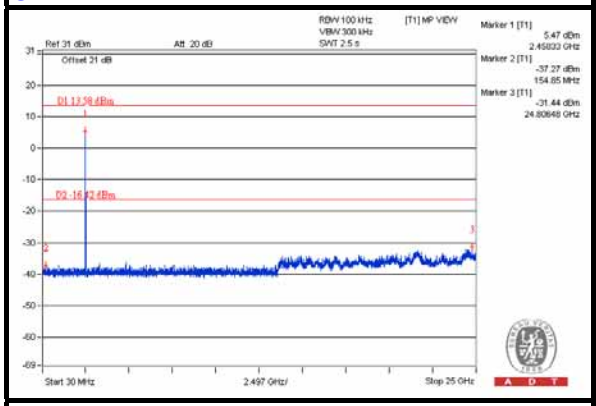
CH 1



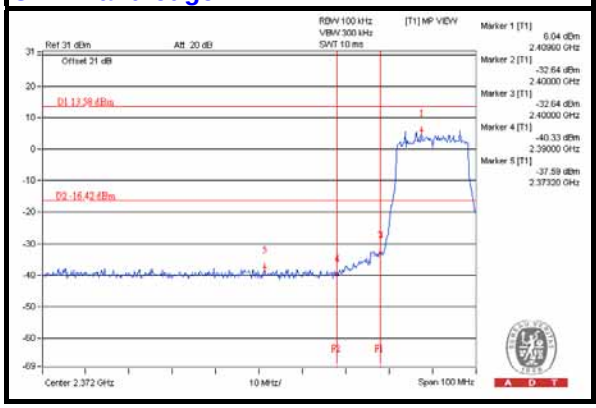
CH 6



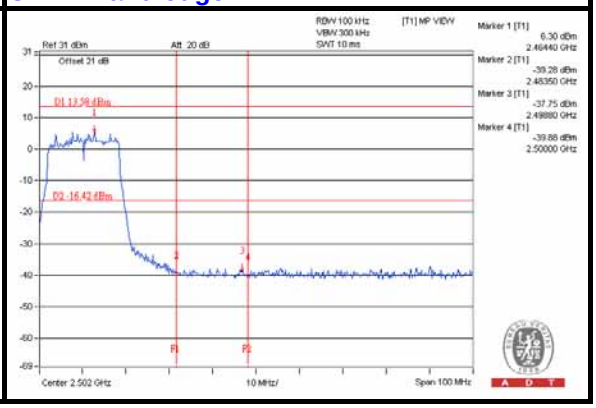
CH 11



CH 1 Band edge

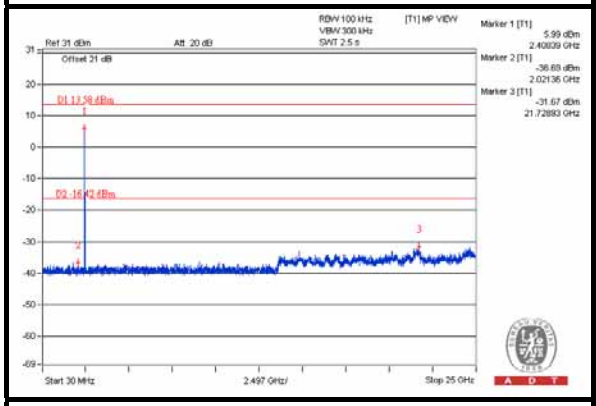


CH 11 Band edge

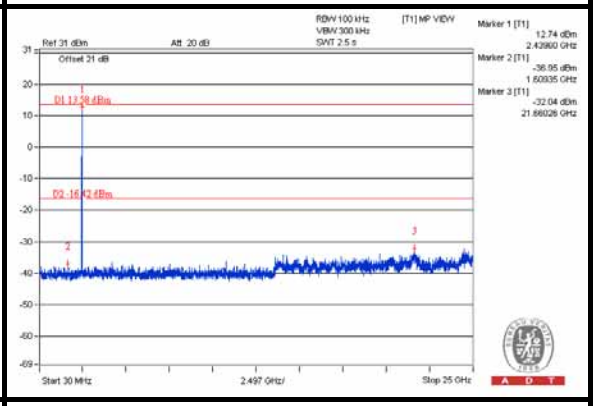


Chain(2)

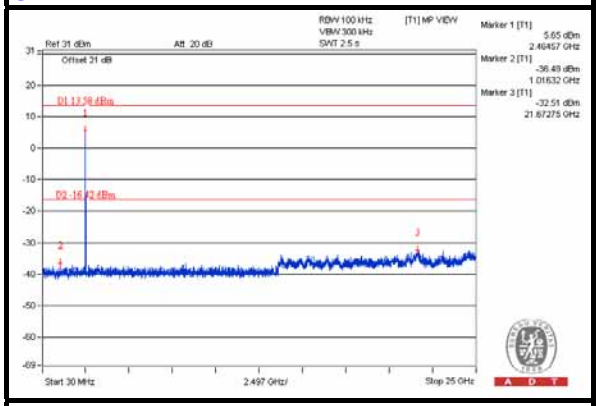
CH 1



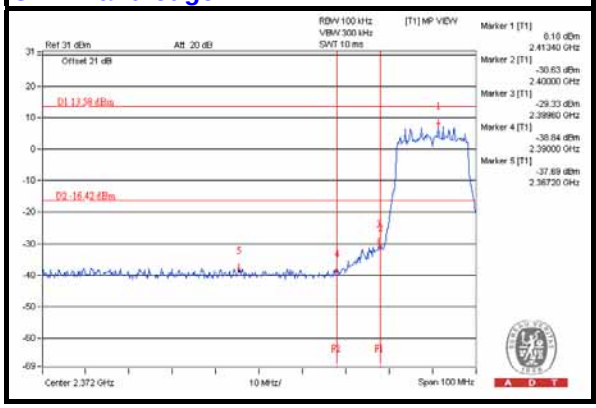
CH 6



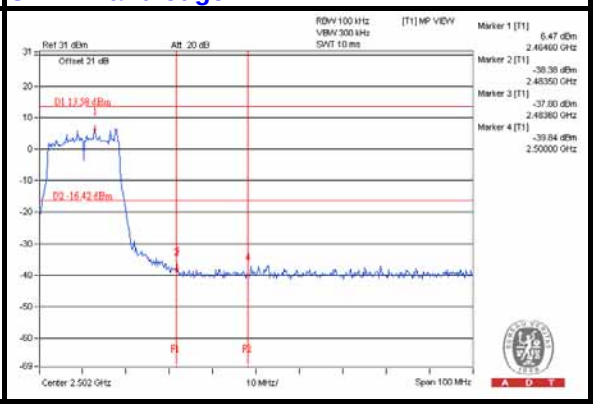
CH 11



CH 1 Band edge

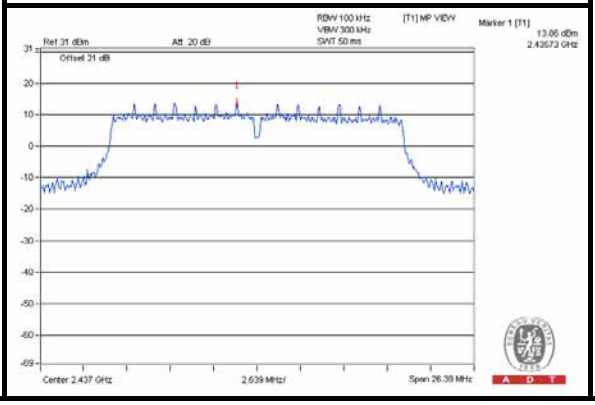


CH 11 Band edge



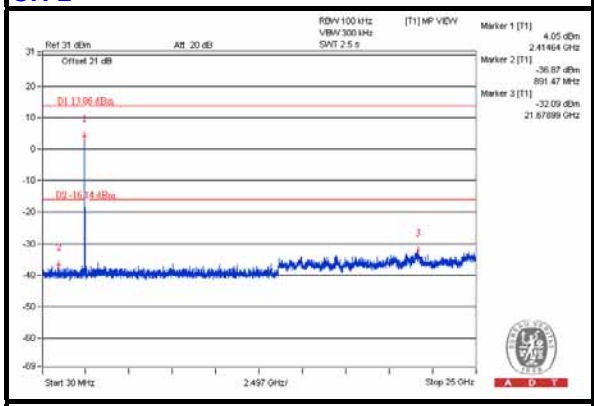
VHT20

Maximum REF

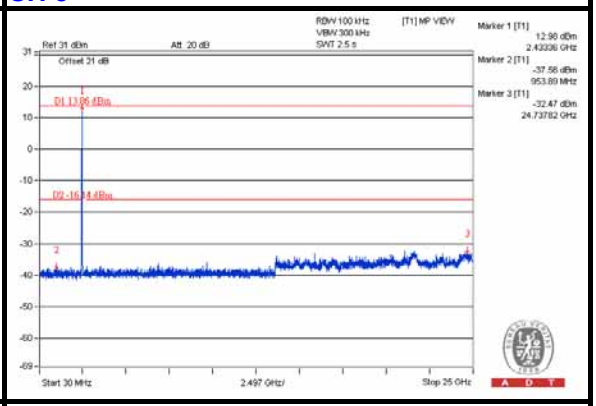


Chain(0)

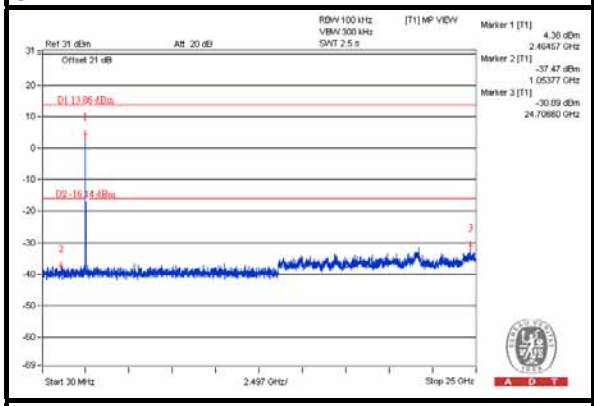
CH 1



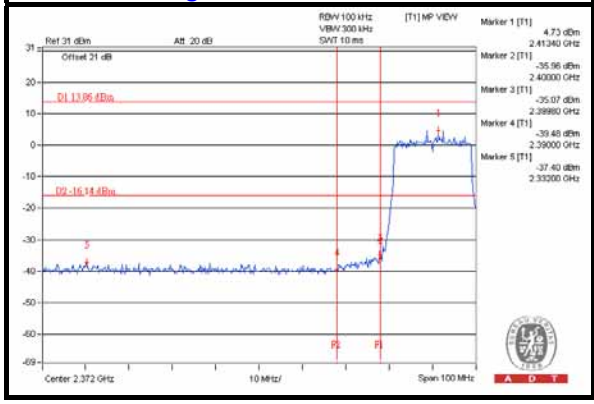
CH 6



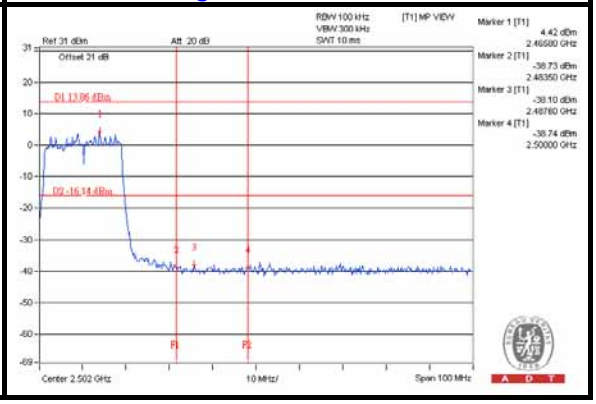
CH 11



CH 1 Band edge

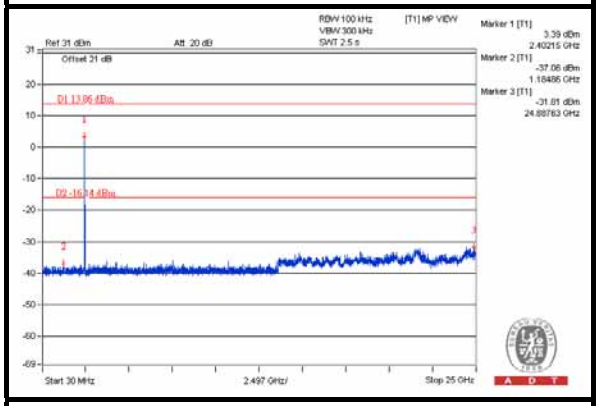


CH 11 Band edge

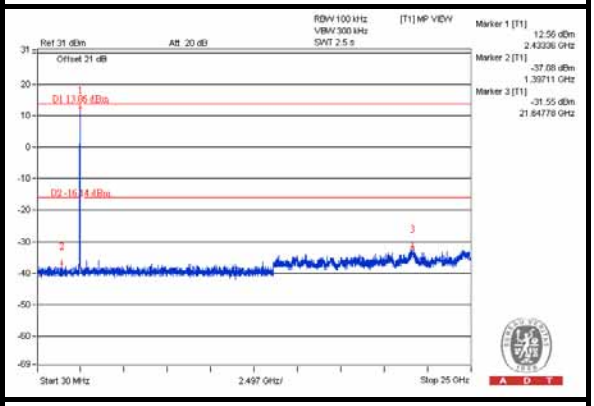


Chain(1)

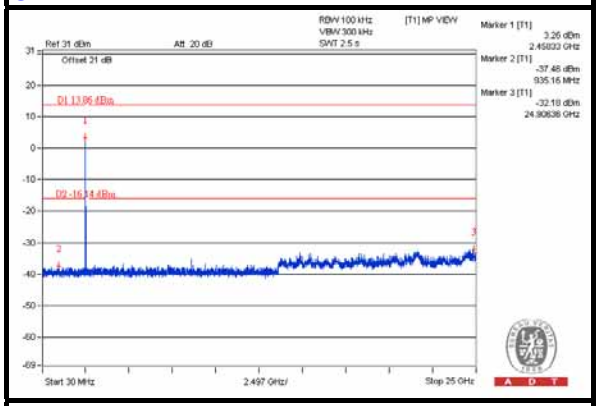
CH 1



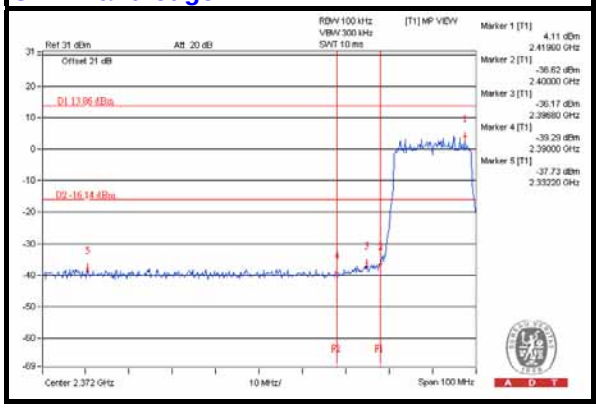
CH 6



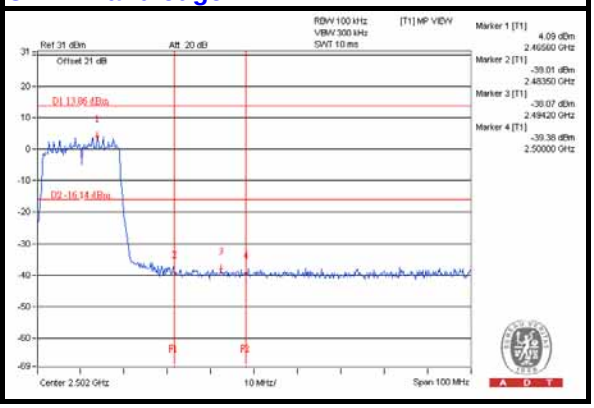
CH 11



CH 1 Band edge

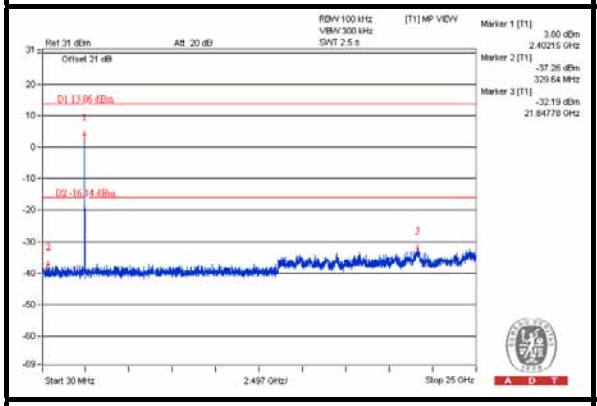


CH 11 Band edge

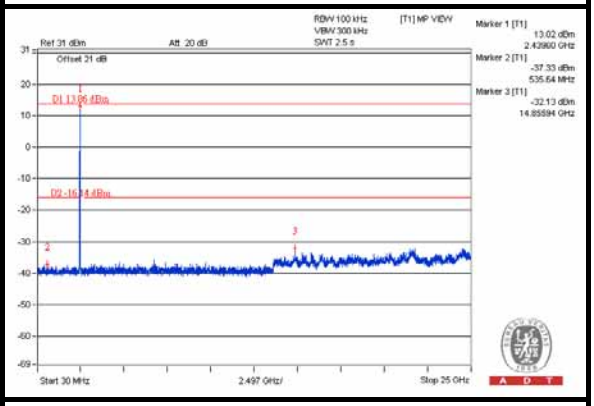


Chain(2)

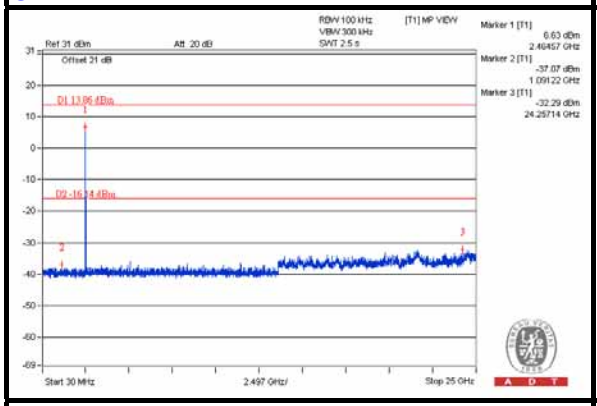
CH 1



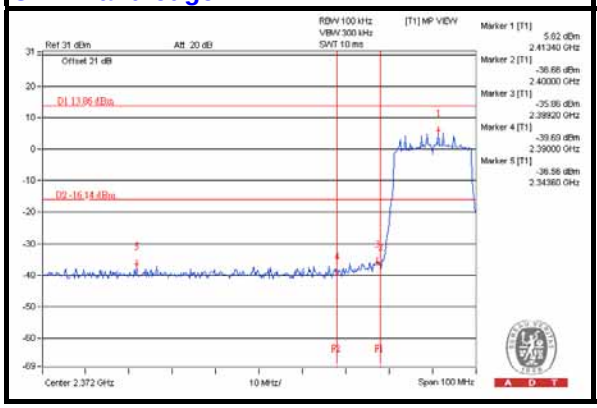
CH 6



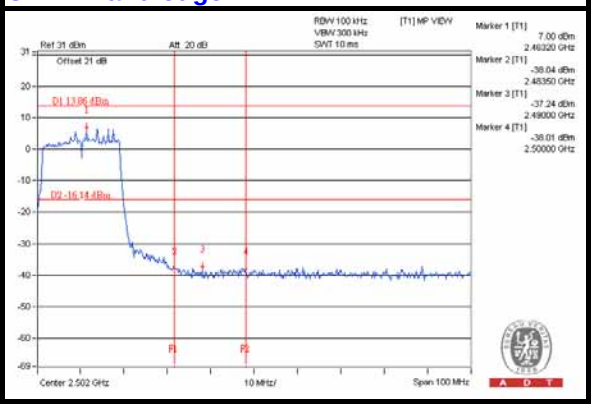
CH 11



CH 1 Band edge

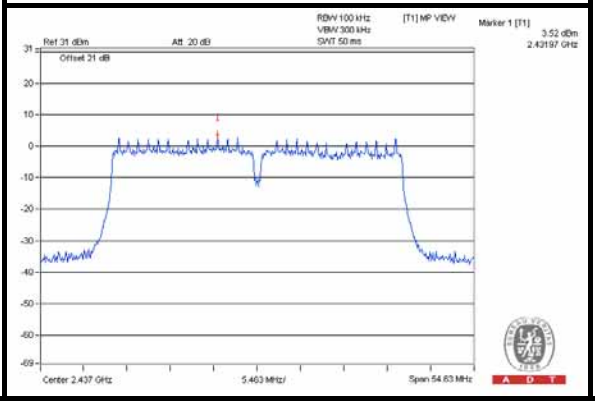


CH 11 Band edge



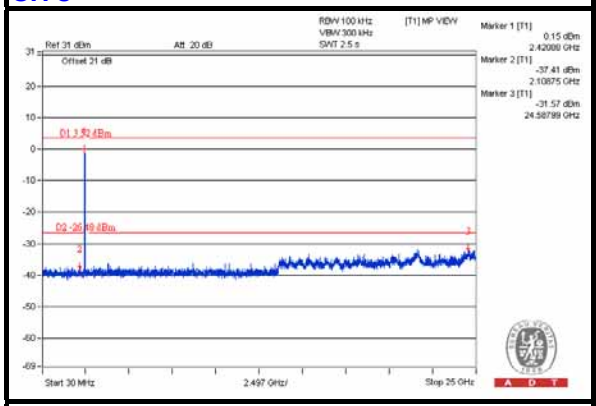
VHT40

Maximum REF

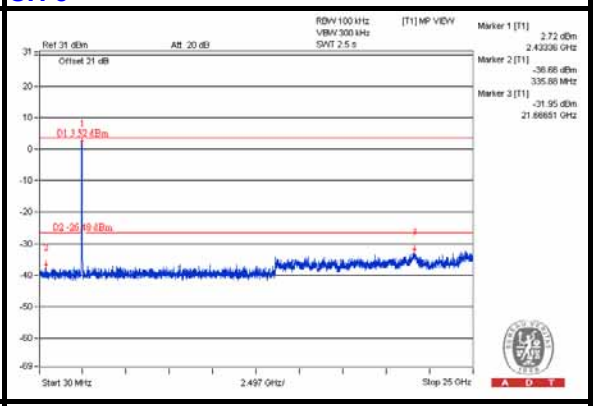


Chain(0)

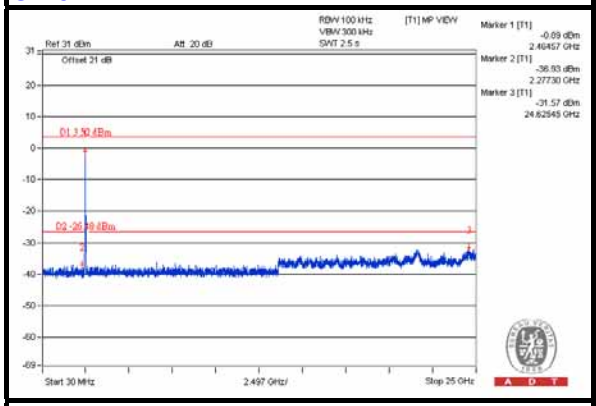
CH 3



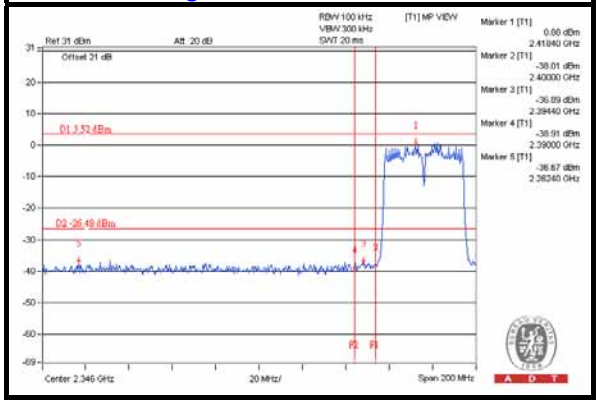
CH 6



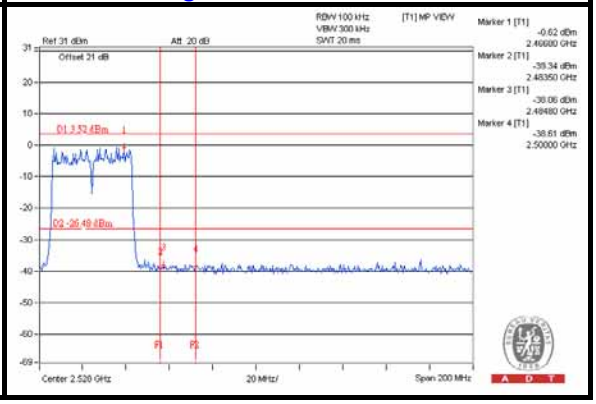
CH 9



CH 3 Band edge

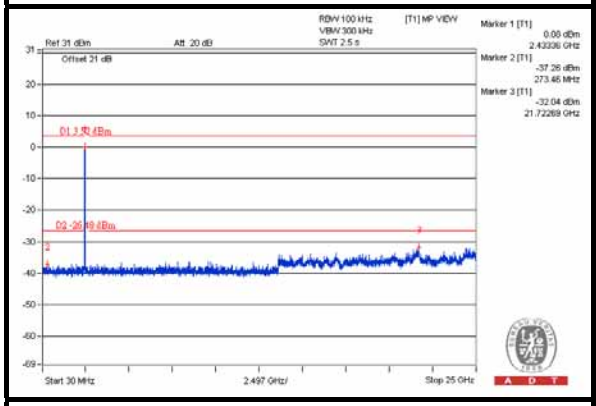


CH 9 Band edge

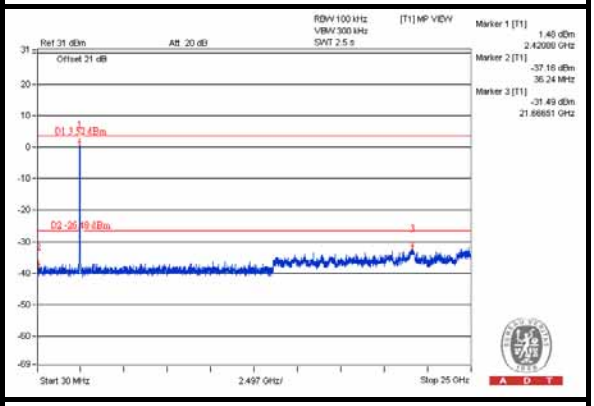


Chain(1)

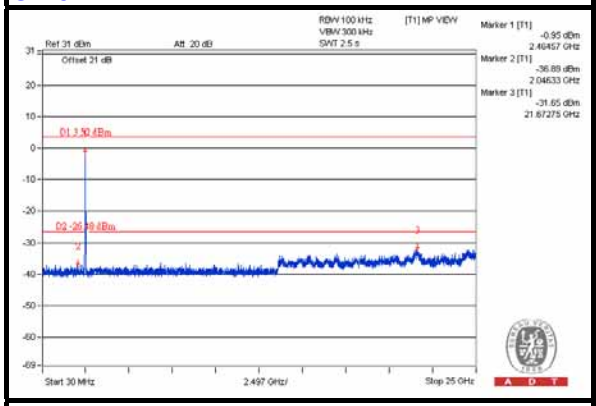
CH 3



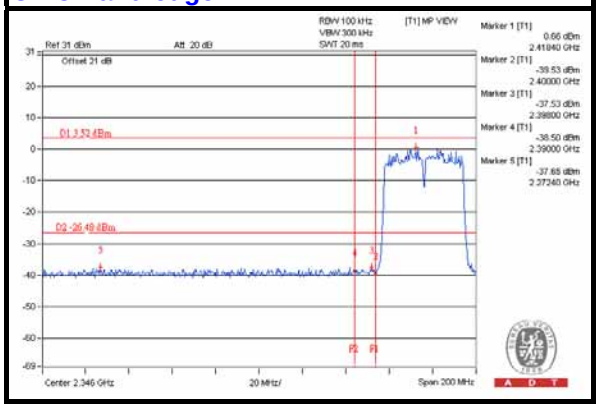
CH 6



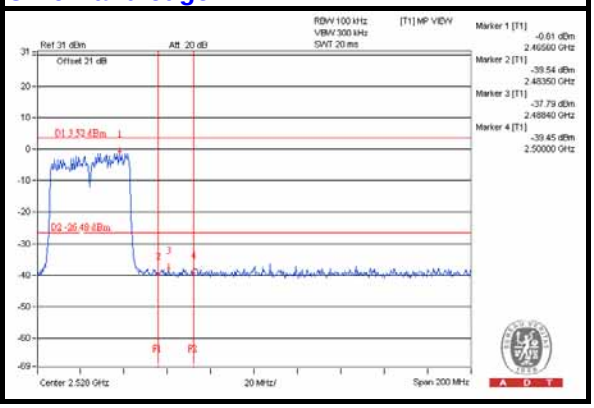
CH 9



CH 3 Band edge

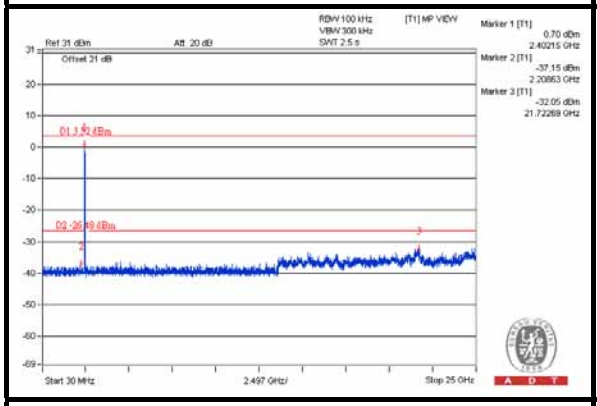


CH 9 Band edge

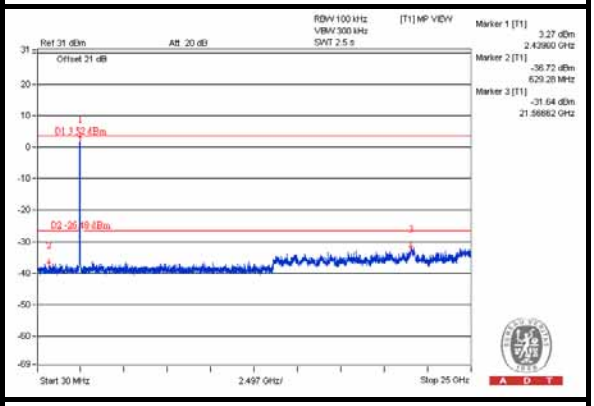


Chain(2)

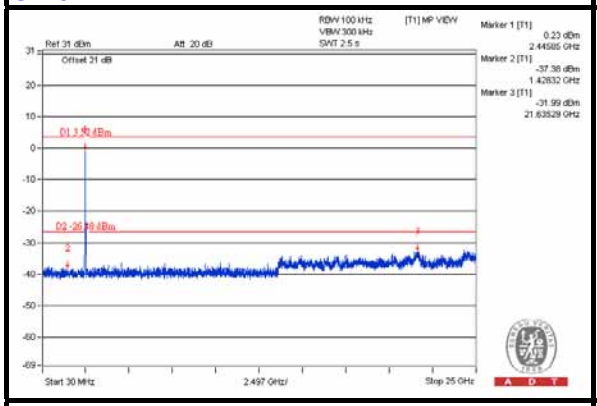
CH 3



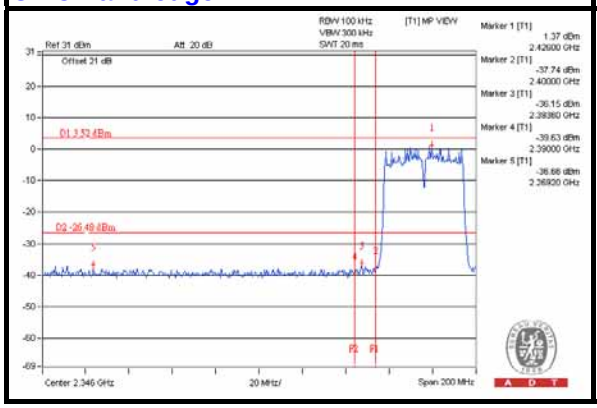
CH 6



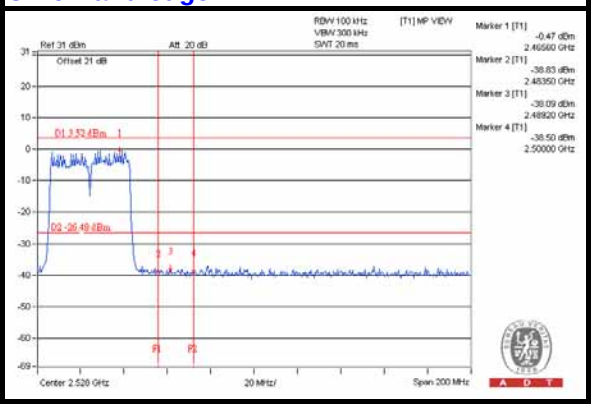
CH 9



CH 3 Band edge



CH 9 Band edge

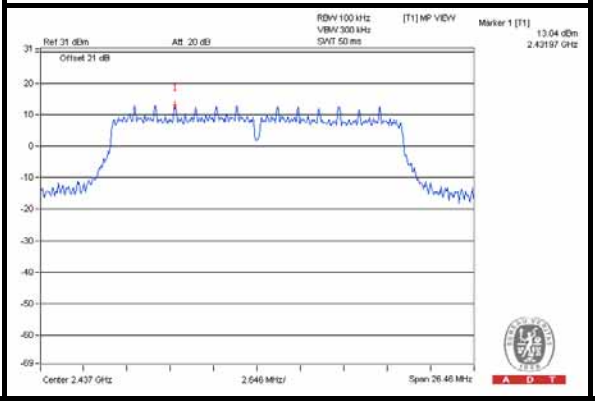


4.6.8 TEST RESULTS (MODE 2)

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.

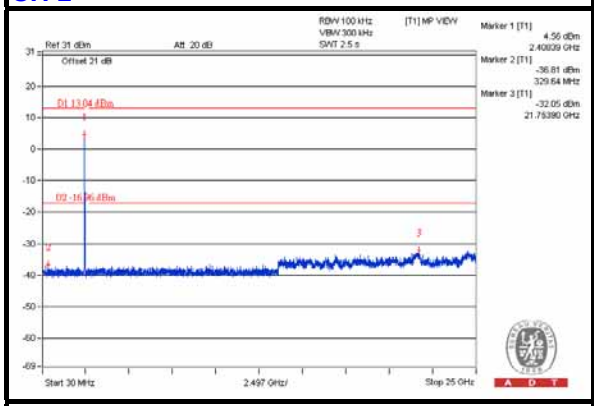
VHT20

Maximum REF

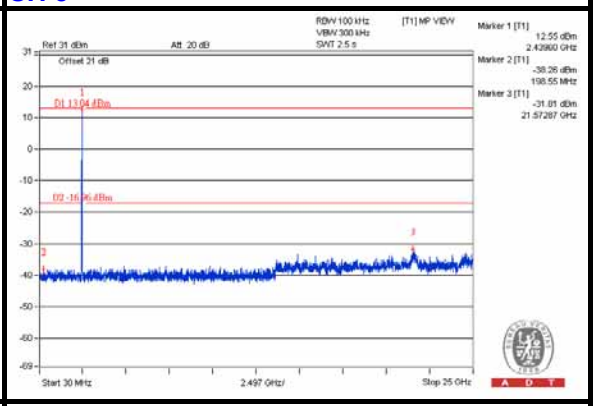


Chain(0)

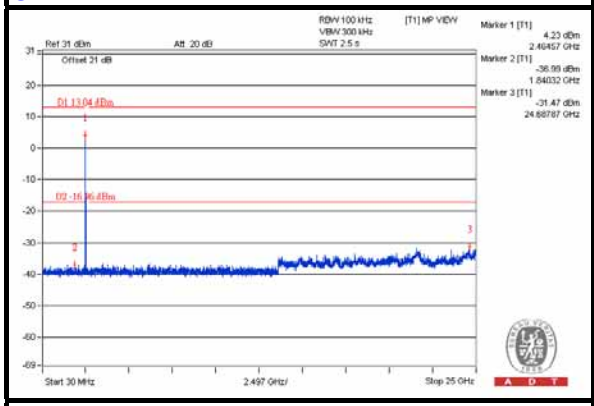
CH 1



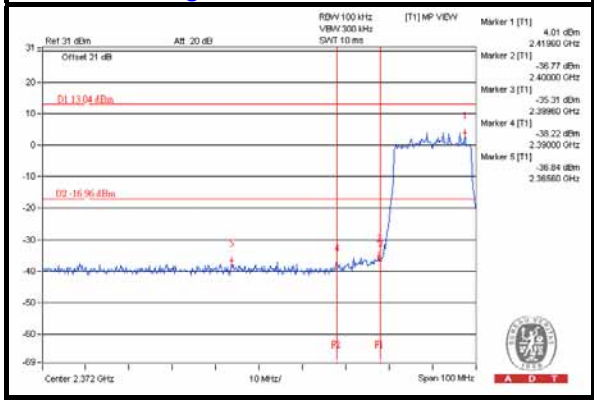
CH 6



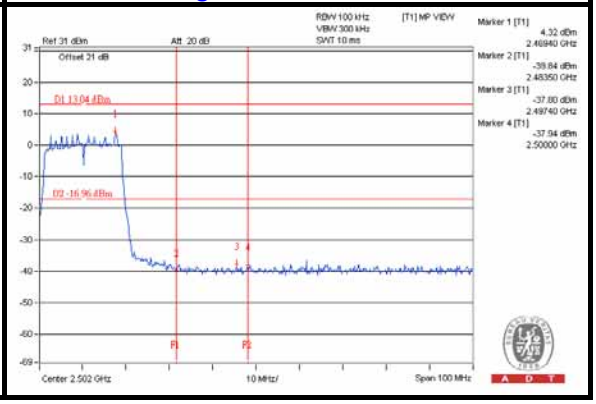
CH 11



CH 1 Band edge

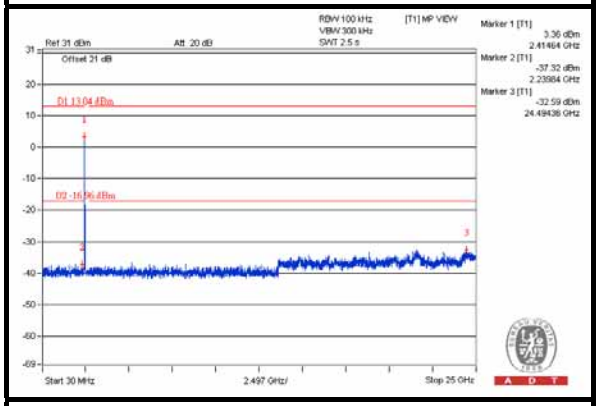


CH 11 Band edge

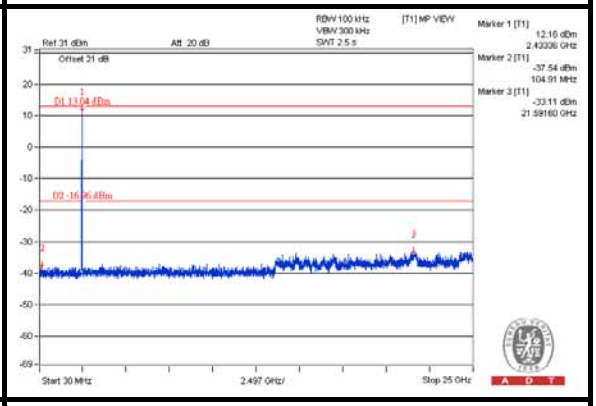


Chain(1)

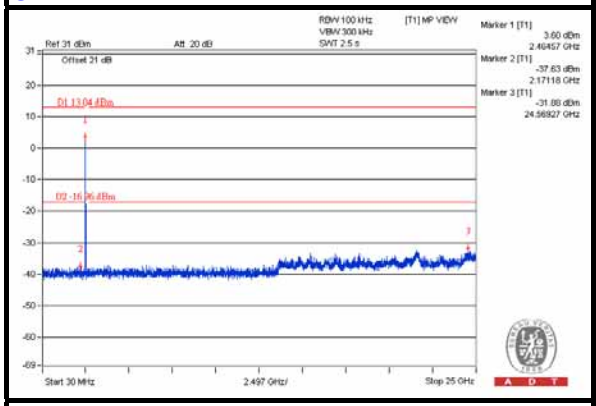
CH 1



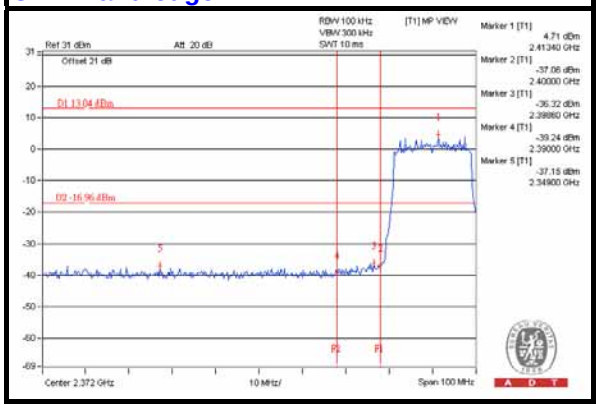
CH 6



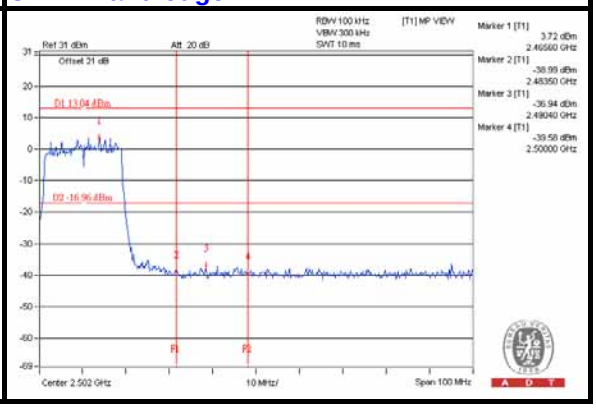
CH 11



CH 1 Band edge

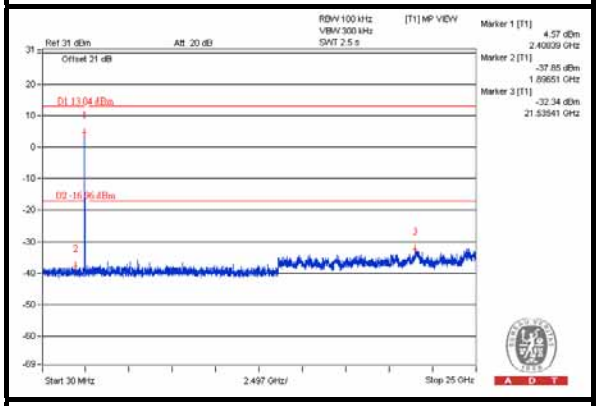


CH 11 Band edge

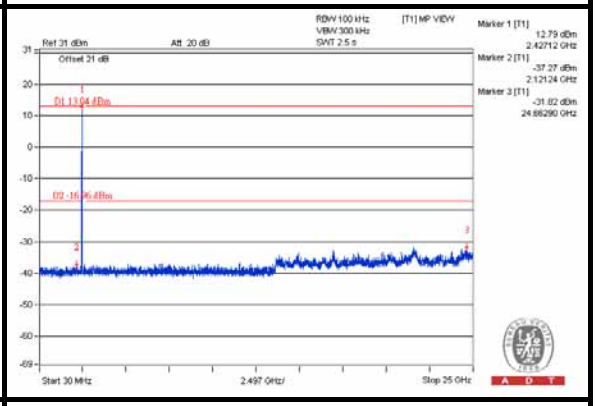


Chain(2)

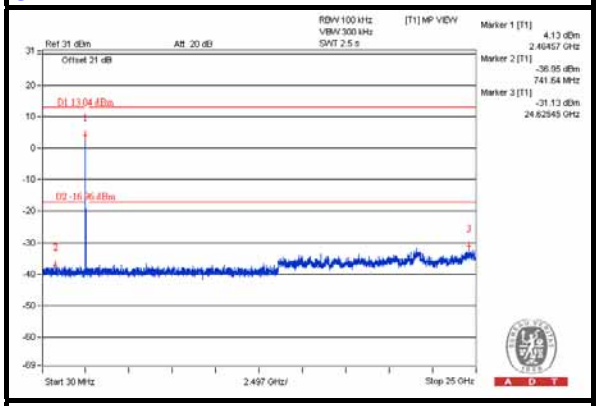
CH 1



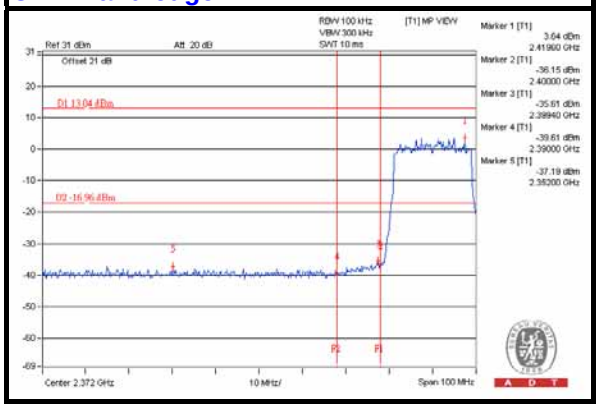
CH 6



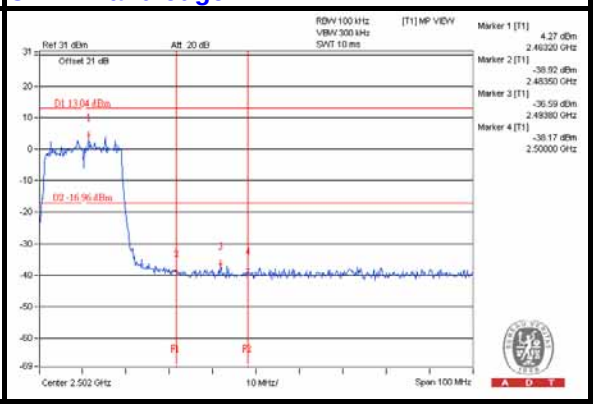
CH 11



CH 1 Band edge

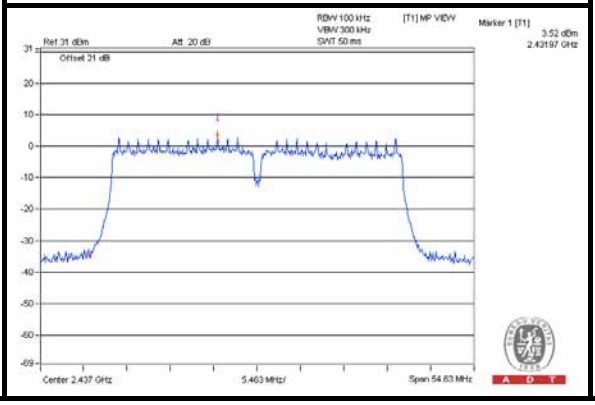


CH 11 Band edge



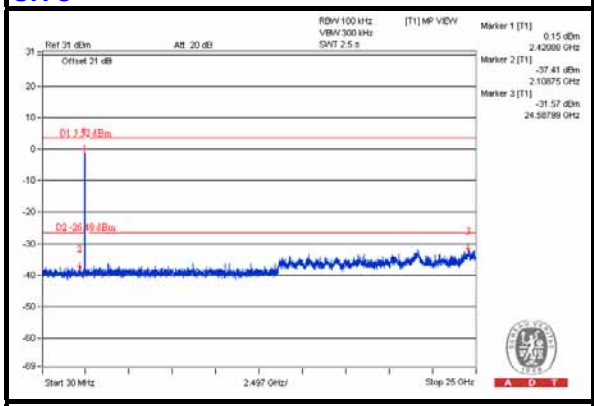
VHT40

Maximum REF

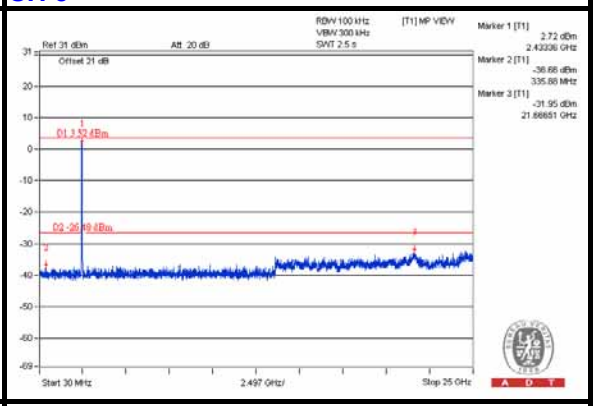


Chain(0)

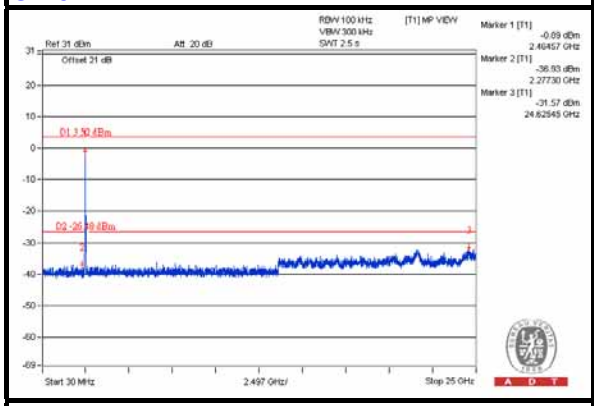
CH 3



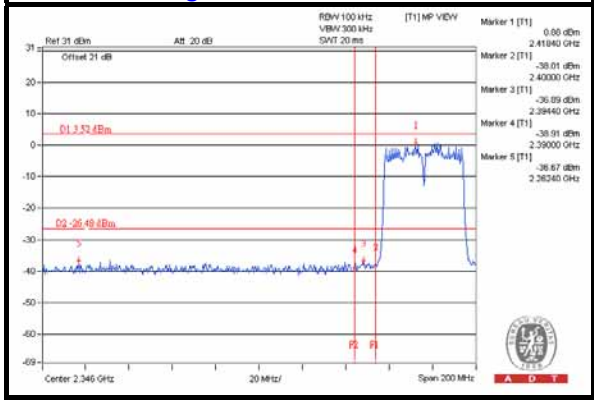
CH 6



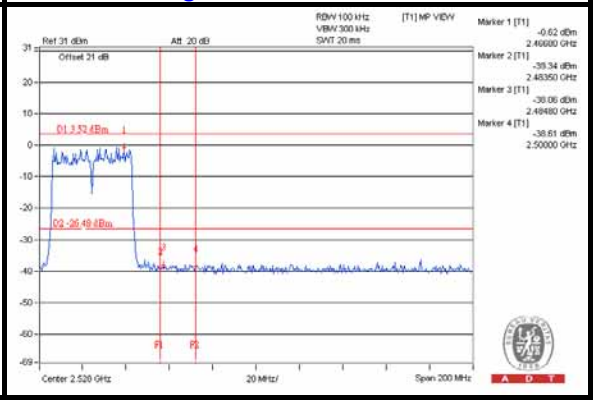
CH 9



CH 3 Band edge

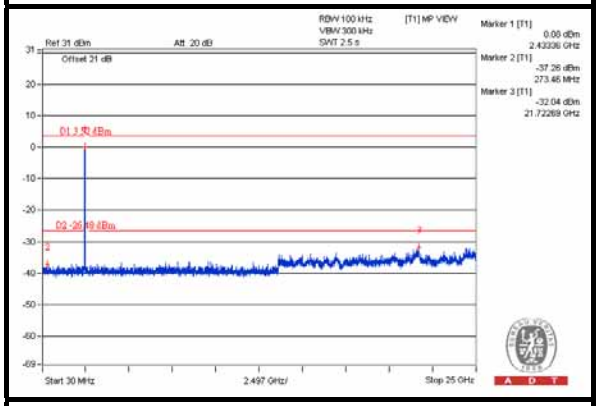


CH 9 Band edge

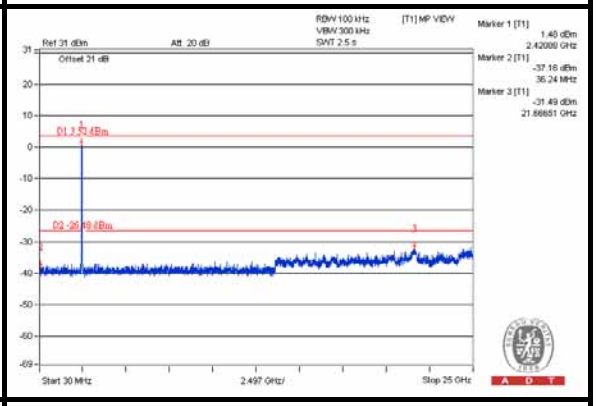


Chain(1)

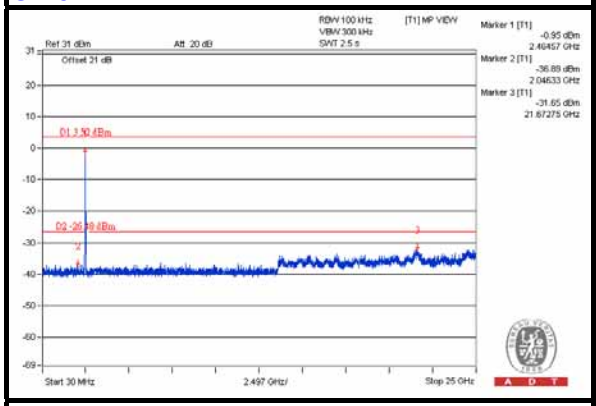
CH 3



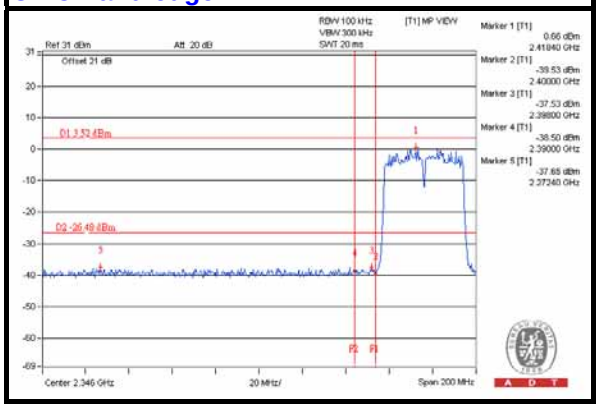
CH 6



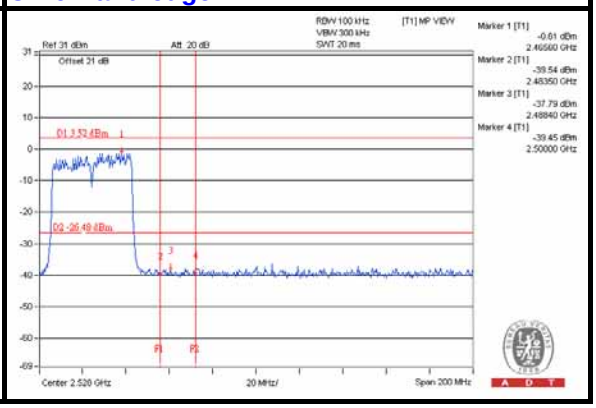
CH 9



CH 3 Band edge

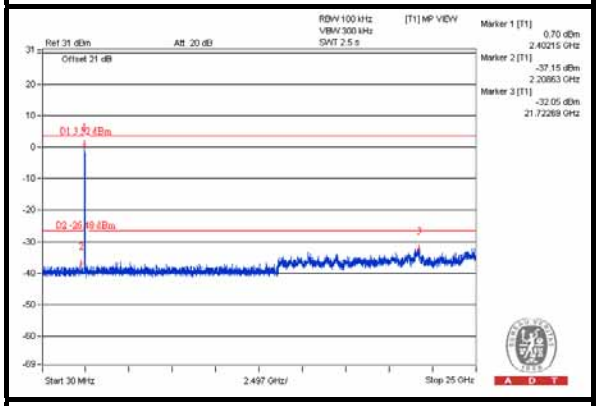


CH 9 Band edge

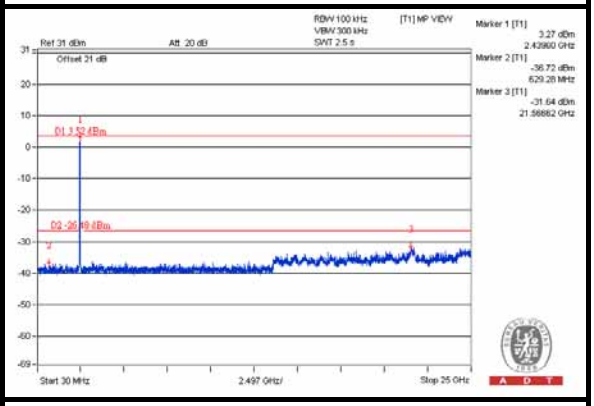


Chain(2)

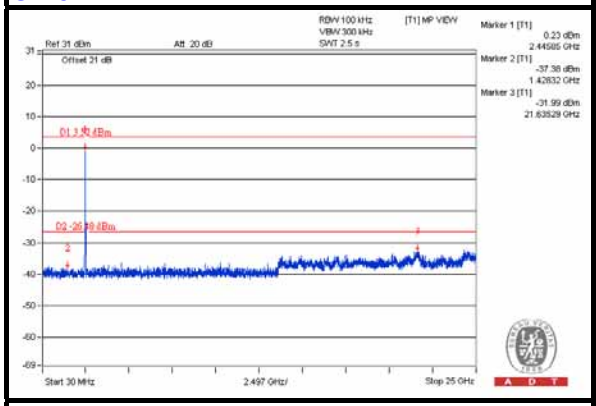
CH 3



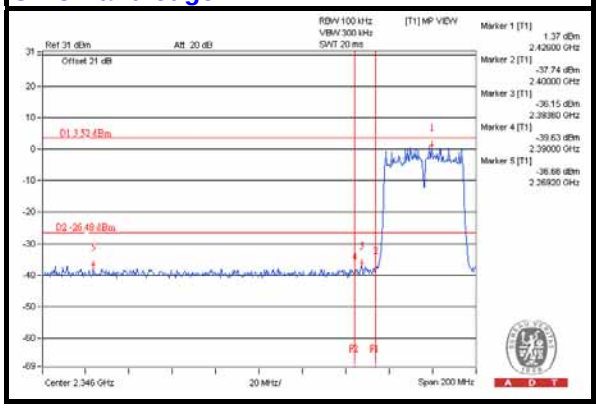
CH 6



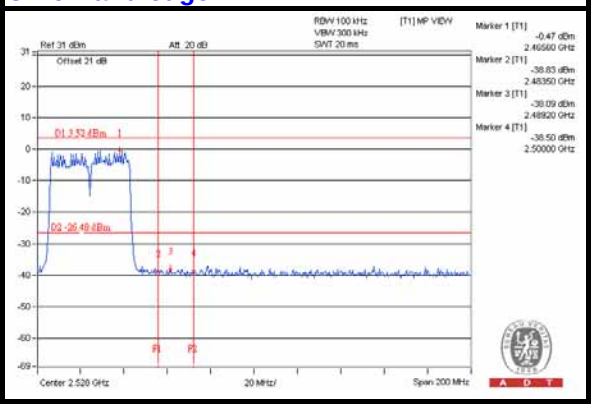
CH 9



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 Adapter 1:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100375	Apr. 29, 2014	Apr. 28, 2015
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-523	Oct. 02, 2013	Oct. 01, 2014
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ENV216	100071	Nov. 13, 2013	Nov. 12, 2014
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 10 , 2014	Mar. 09, 2015
50 ohms Terminator	N/A	EMC-03	Sep. 24, 2013	Sep. 23, 2014
50 ohms Terminator	N/A	EMC-02	Oct. 01, 2013	Sep. 30, 2014
Software ADT	BV ADT_Cond_V7.3.7.3	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3 The VCCI Con C Registration No. is C-3611.
4 Tested Date: Sep. 19, 2014

For Adapter 2:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100375	Apr. 29, 2014	Apr. 28, 2015
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Sep. 15, 2014	Sep. 14, 2015
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ENV216	100071	Nov. 13, 2013	Nov. 12, 2014
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 10 , 2014	Mar. 09, 2015
50 ohms Terminator	N/A	EMC-03	Sep. 22, 2014	Sep. 21, 2015
50 ohms Terminator	N/A	EMC-02	Oct. 01, 2013	Sep. 30, 2014
Software ADT	BV ADT_Cond_V7.3.7.3	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3 The VCCI Con C Registration No. is C-3611.
4 Tested Date: Sep. 22, 2014

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.

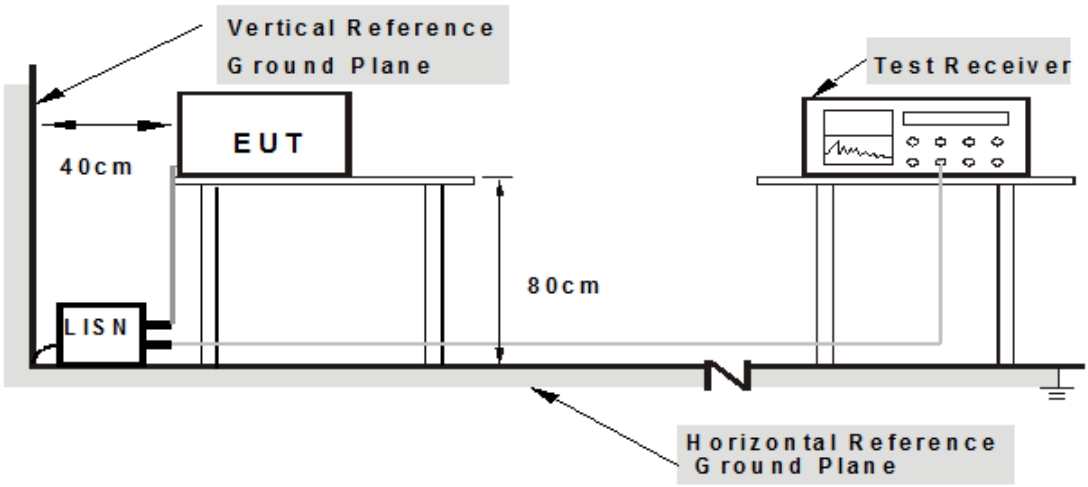
NOTE:

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

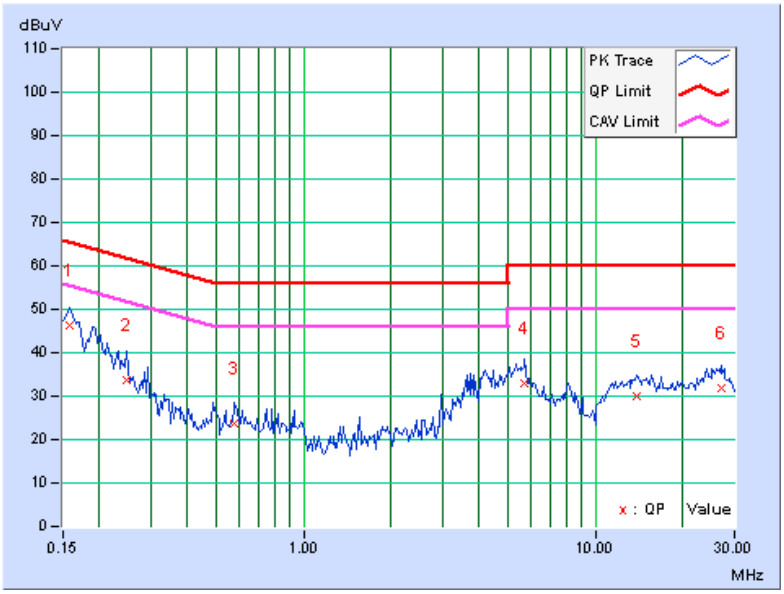
For Adapter 1:

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	0.15781	0.07	46.12	34.53	46.19	34.60	65.58	55.58	-19.39	-20.98
2	0.24766	0.07	33.54	22.12	33.61	22.19	61.84	51.84	-28.22	-29.64
3	0.57969	0.10	23.57	15.09	23.67	15.19	56.00	46.00	-32.33	-30.81
4	5.74219	0.32	32.81	27.99	33.13	28.31	60.00	50.00	-26.87	-21.69
5	13.93359	0.56	29.37	24.10	29.93	24.66	60.00	50.00	-30.07	-25.34
6	26.92969	0.91	30.85	25.65	31.76	26.56	60.00	50.00	-28.24	-23.44

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission Level – Limit value
4. Correction Factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

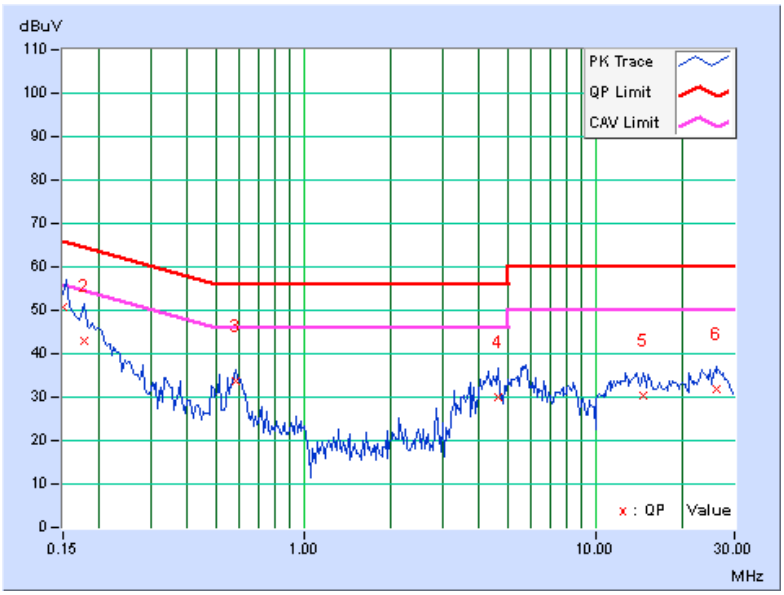


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.08	50.57	35.84	50.65	35.92	66.00	56.00	-15.35	-20.08
2	0.17734	0.07	42.99	29.02	43.06	29.09	64.61	54.61	-21.55	-25.52
3	0.58359	0.10	33.78	26.72	33.88	26.82	56.00	46.00	-22.12	-19.18
4	4.66797	0.28	29.68	21.32	29.96	21.60	56.00	46.00	-26.04	-24.40
5	14.60547	0.57	29.78	24.59	30.35	25.16	60.00	50.00	-29.65	-24.84
6	25.92188	0.87	30.95	25.69	31.82	26.56	60.00	50.00	-28.18	-23.44

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



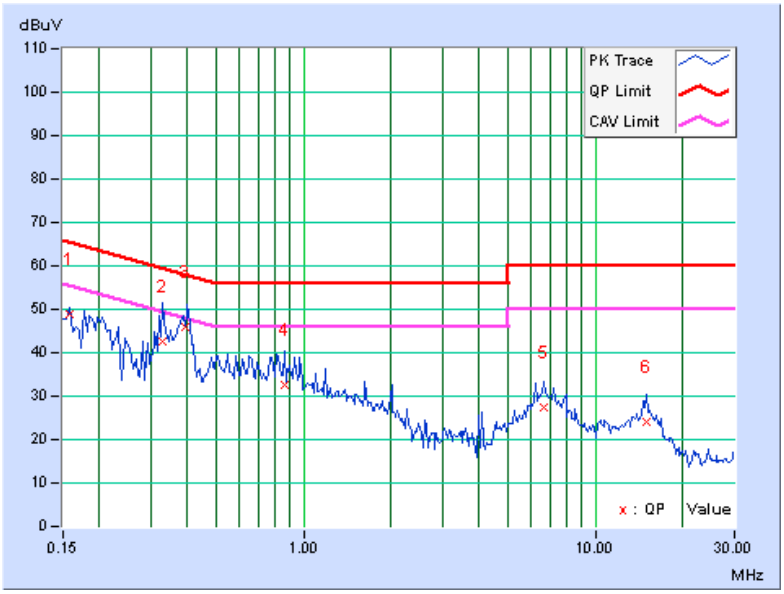
For Adapter 2:

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	0.15781	0.07	48.85	31.62	48.92	31.69	65.58	55.58	-16.66	-23.89
2	0.32969	0.08	42.50	37.51	42.58	37.59	59.46	49.46	-16.88	-11.87
3	**0.39375**	**0.09**	**45.97**	**41.33**	**46.06**	**41.42**	**57.98**	**47.98**	**-11.92**	**-6.56**
4	0.85703	0.12	32.37	27.79	32.49	27.91	56.00	46.00	-23.51	-18.09
5	6.69141	0.35	27.21	23.03	27.56	23.38	60.00	50.00	-32.44	-26.62
6	14.97656	0.59	23.60	18.27	24.19	18.86	60.00	50.00	-35.81	-31.14

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

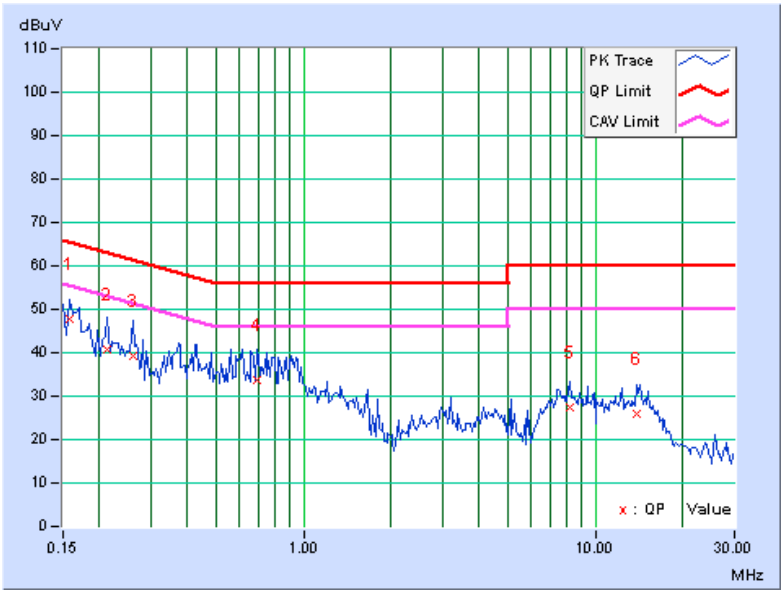


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	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	0.15781	0.07	47.79	31.85	47.86	31.92	65.58	55.58	-17.71	-23.65
2	0.21250	0.07	40.80	30.73	40.87	30.80	63.11	53.11	-22.24	-22.31
3	0.25938	0.08	39.24	26.91	39.32	26.99	61.45	51.45	-22.14	-24.47
4	0.69297	0.11	33.51	26.67	33.62	26.78	56.00	46.00	-22.38	-19.22
5	8.16016	0.39	26.85	21.74	27.24	22.13	60.00	50.00	-32.76	-27.87
6	13.89063	0.56	25.44	20.43	26.00	20.99	60.00	50.00	-34.00	-29.01

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 under any condition of modulation.

5.2.2 TEST INSTRUMENTS

For Below 1GHz:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY50010156	Aug. 11, 2014	Aug. 10, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 13, 2013	Nov. 12, 2014
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Feb. 27, 2014	Feb. 26, 2015
RF Cable	NA	CHHCAB_001	Oct. 06, 2013	Oct. 05, 2014
Horn_Antenna AISI	AIH.8018	0000220091110	Aug. 26, 2014	Aug. 25, 2015
Pre-Amplifier Agilent	8449B	3008A01923	Oct. 29, 2013	Oct. 28, 2014
RF Cable	NA	131206 131215 SNMY23685/4	Jan. 17, 2014	Jan. 16, 2015
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 13, 2013	Nov. 12, 2014
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Aug. 26, 2014	Aug. 25, 2015
RF Cable	NA	RF104-121 RF104-204	Dec. 12, 2013	Dec. 11, 2014
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3 The test was performed in 966 Chamber No. H.
4. The FCC Site Registration No. is 797305.
5 The CANADA Site Registration No. is IC 7450H-3.
6 Tested Date: Sep. 09, 2014

For Above 1GHz:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY51210105	July 21,2014	July 20,2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 13, 2013	Nov. 12, 2014
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Feb. 26, 2014	Feb. 25, 2015
RF Cable	NA	CHGCAB_001	Oct. 04, 2014	Oct. 03, 2015
Horn_Antenna AISI	AIH.8018	0000320091110	Aug. 27, 2014	Aug. 26, 2015
Pre-Amplifier Agilent	8449B	3008A02578	June 24, 2014	June 23, 2015
RF Cable	NA	131205 131214 SNMY23684/4	Jan. 17, 2014	Jan. 16, 2015
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 13, 2013	Nov. 12, 2014
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Aug. 26, 2014	Aug. 25, 2015
RF Cable	NA	RF104-121 RF104-204	Dec. 12, 2013	Dec. 11, 2014
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3 The test was performed in 966 Chamber No. G.
4. The FCC Site Registration No. is 966073.
5 The VCCI Site Registration No. is G-137.
6 The CANADA Site Registration No. is IC 7450H-2.
7 Tested Date: Oct. 30, 2014

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:

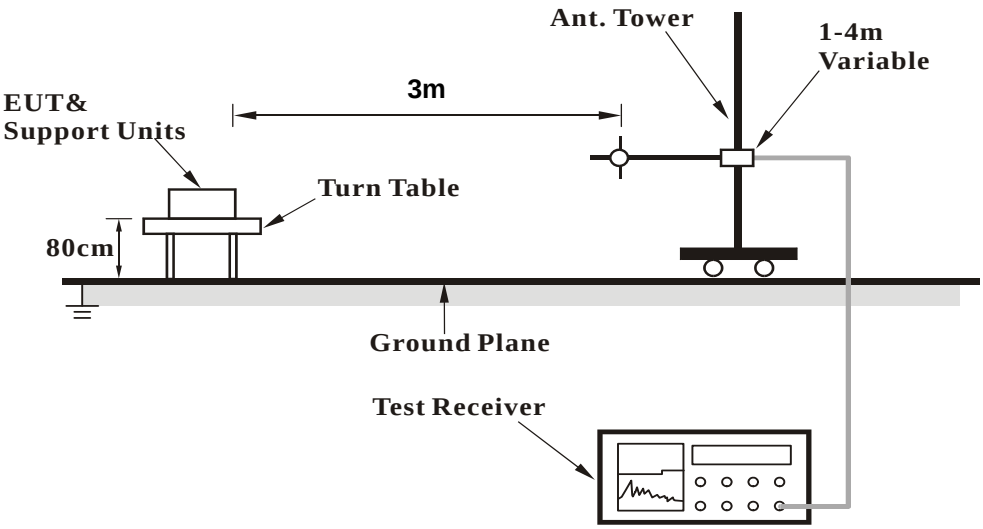
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

5.2.4 DEVIATION FROM TEST STANDARD

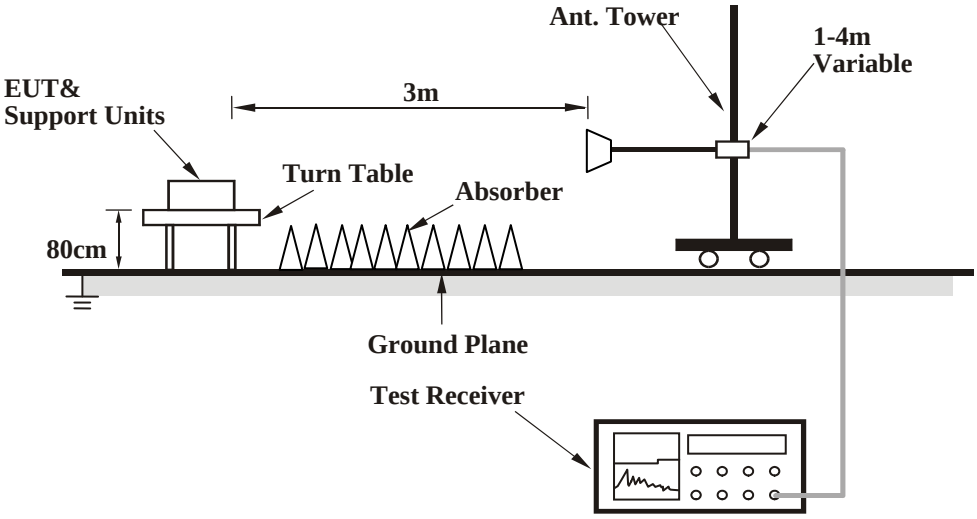
No deviation

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 (VHT40)

CHANNEL	TX Channel 159	**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	89.75	36.2 QP	43.5	-7.3	2.00 H	76	54.71	-18.49
2	124.96	30.9 QP	43.5	-12.6	2.00 H	75	45.16	-14.26
3	160.47	35.4 QP	43.5	-8.1	1.00 H	262	47.89	-12.51
4	199.99	26.5 QP	43.5	-17.0	1.50 H	90	42.25	-15.73
5	474.99	26.3 QP	46.0	-19.7	2.00 H	0	33.77	-7.45
6	940.59	30.3 QP	46.0	-15.7	2.00 H	360	28.94	1.37
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	47.22	33.4 QP	40.0	-6.6	1.00 V	53	46.36	-12.96
2	82.01	34.1 QP	40.0	-6.0	1.00 V	90	52.05	-18.00
3	88.49	39.3 QP	43.5	-4.2	1.50 V	91	57.77	-18.45
4	89.89	37.3 QP	43.5	-6.2	1.00 V	111	55.80	-18.50
5	159.82	29.6 QP	43.5	-13.9	1.00 V	277	42.04	-12.44
6	956.98	34.7 QP	46.0	-11.4	1.00 V	257	33.08	1.57

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) 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	114.9 PK			1.00 H	268	106.48	8.42
2	*5745.00	105.7 AV			1.00 H	268	97.28	8.42
3	11490.00	61.8 PK	74.0	-12.2	1.14 H	94	47.45	14.35
4	11490.00	49.5 AV	54.0	-4.5	1.14 H	94	35.15	14.35
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	124.8 PK			1.11 V	281	116.38	8.42
2	*5745.00	115.3 AV			1.11 V	281	106.88	8.42
3	11490.00	67.1 PK	74.0	-6.9	1.06 V	261	52.75	14.35
4	11490.00	53.3 AV	54.0	-0.7	1.06 V	261	38.95	14.35

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	115.5 PK			1.01 H	281	107.01	8.49
2	*5785.00	106.0 AV			1.01 H	281	97.51	8.49
3	11570.00	61.5 PK	74.0	-12.5	1.17 H	94	47.19	14.31
4	11570.00	49.3 AV	54.0	-4.7	1.17 H	94	34.99	14.31
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	124.6 PK			1.15 V	266	116.11	8.49
2	*5785.00	115.2 AV			1.15 V	266	106.71	8.49
3	11570.00	65.6 PK	74.0	-8.4	1.06 V	281	51.29	14.31
4	11570.00	53.4 AV	54.0	-0.6	1.06 V	281	39.09	14.31

REMARKS:

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

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	115.1 PK			1.00 H	253	106.51	8.59
2	*5825.00	105.7 AV			1.00 H	253	97.11	8.59
3	11650.00	61.3 PK	74.0	-12.7	1.12 H	109	46.92	14.38
4	11650.00	49.0 AV	54.0	-5.0	1.12 H	109	34.62	14.38
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	124.4 PK			1.18 V	267	115.81	8.59
2	*5825.00	115.0 AV			1.18 V	267	106.41	8.59
3	11650.00	66.3 PK	74.0	-7.7	1.05 V	271	51.92	14.38
4	**11650.00**	**53.8 AV**	**54.0**	**-0.2**	**1.05 V**	**271**	**39.42**	**14.38**

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	114.5 PK			1.00 H	262	106.08	8.42
2	*5745.00	105.5 AV			1.00 H	262	97.08	8.42
3	11490.00	61.5 PK	74.0	-12.5	1.18 H	83	47.15	14.35
4	11490.00	49.1 AV	54.0	-4.9	1.18 H	83	34.75	14.35
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	124.8 PK			1.19 V	258	116.38	8.42
2	*5745.00	115.3 AV			1.19 V	258	106.88	8.42
3	11490.00	64.1 PK	74.0	-9.9	1.05 V	260	49.75	14.35
4	11490.00	51.9 AV	54.0	-2.1	1.05 V	260	37.55	14.35

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	114.4 PK			1.00 H	258	105.91	8.49
2	*5785.00	105.4 AV			1.00 H	258	96.91	8.49
3	11570.00	62.5 PK	74.0	-11.5	1.10 H	87	48.19	14.31
4	11570.00	49.9 AV	54.0	-4.1	1.10 H	87	35.59	14.31
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	124.6 PK			1.18 V	272	116.11	8.49
2	*5785.00	115.1 AV			1.18 V	272	106.61	8.49
3	11570.00	66.8 PK	74.0	-7.2	1.06 V	279	52.49	14.31
4	11570.00	53.2 AV	54.0	-0.8	1.06 V	279	38.89	14.31

REMARKS:

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

CHANNEL	TX Channel 165	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	*5825.00	115.1 PK			1.05 H	253	106.51	8.59
2	*5825.00	105.8 AV			1.05 H	253	97.21	8.59
3	11650.00	61.7 PK	74.0	-12.3	1.12 H	94	47.32	14.38
4	11650.00	49.6 AV	54.0	-4.4	1.12 H	94	35.22	14.38
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	124.3 PK			1.21 V	276	115.71	8.59
2	*5825.00	114.7 AV			1.21 V	276	106.11	8.59
3	11650.00	67.2 PK	74.0	-6.8	1.05 V	281	52.82	14.38
4	11650.00	53.4 AV	54.0	-0.6	1.05 V	281	39.02	14.38

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) 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	*5755.00	110.2 PK			1.00 H	280	101.76	8.44
2	*5755.00	101.5 AV			1.00 H	280	93.06	8.44
3	11510.00	60.5 PK	74.0	-13.5	1.15 H	81	46.16	14.34
4	11510.00	45.8 AV	54.0	-8.2	1.15 H	81	31.46	14.34
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	120.8 PK			1.19 V	258	112.36	8.44
2	*5755.00	110.4 AV			1.19 V	258	101.96	8.44
3	11510.00	61.2 PK	74.0	-12.8	1.01 V	257	46.86	14.34
4	11510.00	47.3 AV	54.0	-6.7	1.01 V	257	32.96	14.34

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	113.4 PK			1.02 H	265	104.90	8.50
2	*5795.00	103.2 AV			1.02 H	265	94.70	8.50
3	11590.00	60.9 PK	74.0	-13.1	1.12 H	97	46.60	14.30
4	11590.00	45.8 AV	54.0	-8.2	1.12 H	97	31.50	14.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	122.3 PK			1.18 V	254	113.80	8.50
2	*5795.00	112.1 AV			1.18 V	254	103.60	8.50
3	11590.00	60.9 PK	74.0	-13.1	1.07 V	250	46.60	14.30
4	11590.00	47.3 AV	54.0	-6.7	1.07 V	250	33.00	14.30

REMARKS:

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

802.11ac (VHT80)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5133.00	52.1 PK	74.0	-21.9	1.00 H	265	45.38	6.72
2	5133.00	46.5 AV	54.0	-7.5	1.00 H	265	39.78	6.72
3	*5775.00	106.0 PK			1.00 H	275	97.53	8.47
4	*5775.00	96.5 AV			1.00 H	275	88.03	8.47
5	11550.00	59.2 PK	74.0	-14.8	1.17 H	105	44.88	14.32
6	11550.00	44.9 AV	54.0	-9.1	1.17 H	105	30.58	14.32
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	5133.00	58.4 PK	74.0	-15.6	1.18 V	360	51.68	6.72
2	5133.00	53.2 AV	54.0	-0.8	1.18 V	360	46.48	6.72
3	*5775.00	115.9 PK			1.18 V	270	107.43	8.47
4	*5775.00	105.0 AV			1.18 V	270	96.53	8.47
5	11550.00	59.4 PK	74.0	-14.6	1.05 V	254	45.08	14.32
6	11550.00	45.1 AV	54.0	-8.9	1.05 V	254	30.78	14.32

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	FSV 40	100964	July 05, 2014	July 04, 2015

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : July 24, 2014

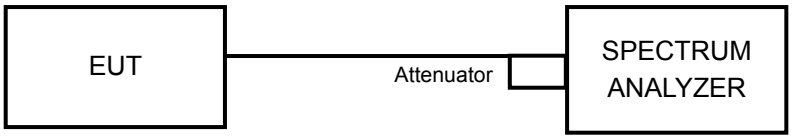
5.3.3 TEST PROCEDURE

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 (MODE 1)

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	16.39	16.42	16.42	0.5	PASS
157	5785	16.40	16.41	16.43	0.5	PASS
165	5825	16.39	16.41	16.43	0.5	PASS

802.11ac (VHT20)

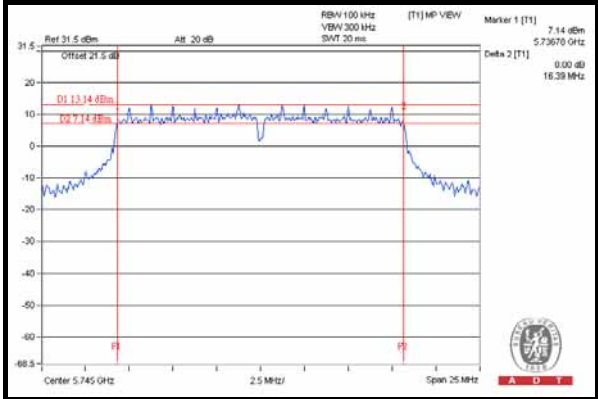
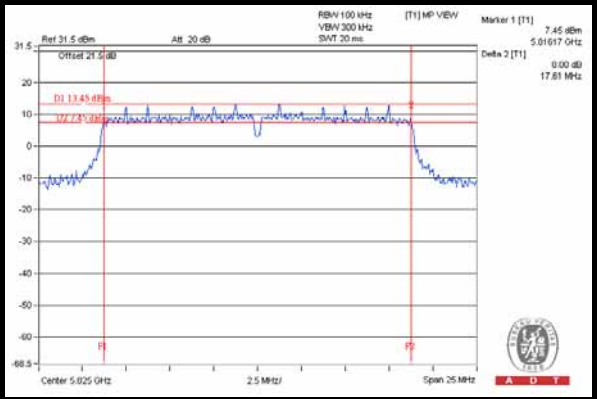
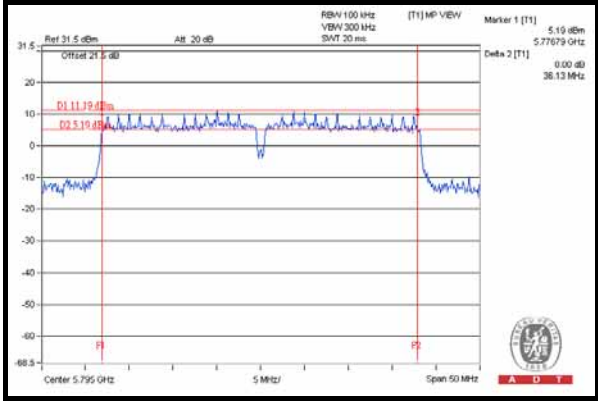
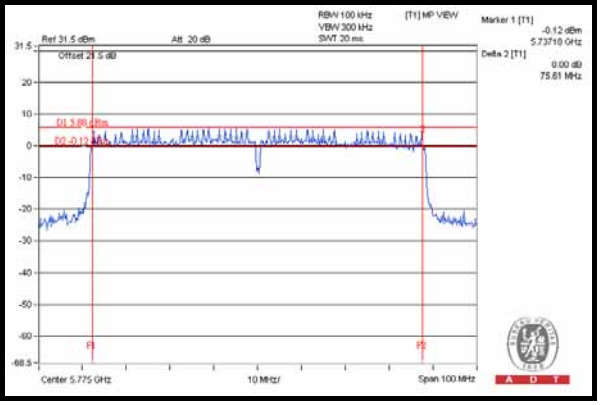
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	17.64	17.70	17.65	0.5	PASS
157	5785	17.65	17.67	17.65	0.5	PASS
165	5825	17.61	17.64	17.63	0.5	PASS

802.11ac (VHT40)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
151	5755	36.15	36.47	36.44	0.5	PASS
159	5795	36.13	36.44	36.42	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	76.00	76.02	75.61	0.5	PASS

SPECTRUM PLOT OF WORST VALUE	
802.11a / Chain(0) : CH149	**802.11ac (VHT20) / Chain(0) : CH165**
	
802.11ac (VHT40) / Chain(0) : CH159	**802.11ac (VHT80) / Chain(2) : CH155**
	

5.3.8 TEST RESULTS (MODE 2)

802.11ac (VHT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
149	5745	17.64	17.70	17.65	0.5	PASS
157	5785	17.65	17.67	17.65	0.5	PASS
165	5825	17.61	17.64	17.63	0.5	PASS

802.11ac (VHT40)

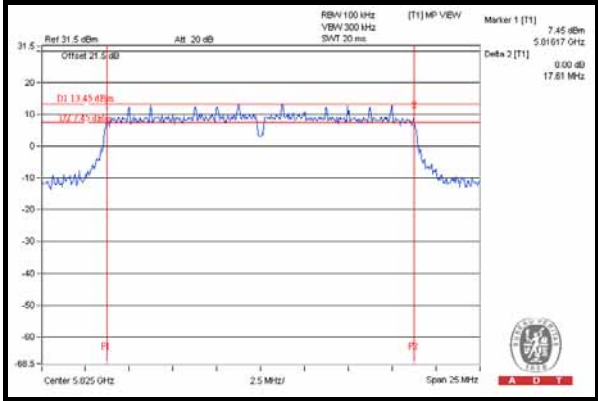
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
151	5755	36.15	36.47	36.44	0.5	PASS
159	5795	36.41	36.36	36.43	0.5	PASS

802.11ac (VHT80)

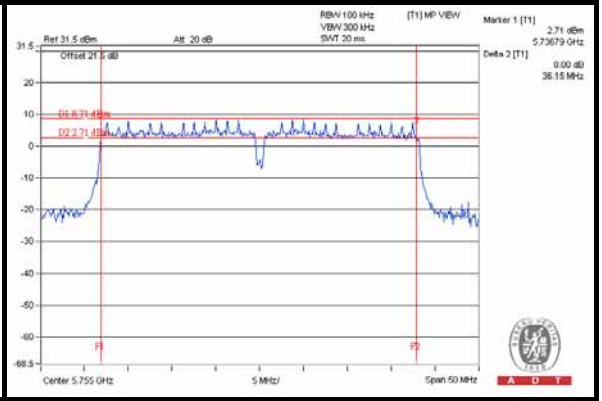
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
155	5775	76.00	76.02	75.61	0.5	PASS

SPECTRUM PLOT OF WORST VALUE

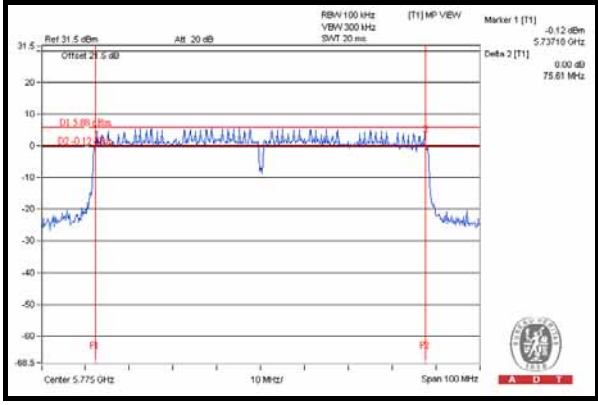
802.11ac (VHT20) / Chain(0) : CH165



802.11ac (VHT40) / Chain(0) : CH151



802.11ac (VHT80) / Chain(2) : CH155



5.4 CONDUCTED OUTPUT POWER MEASUREMENT

5.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

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

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

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

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

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

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

5.4.2 INSTRUMENTS

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

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Oct. 30, 2014

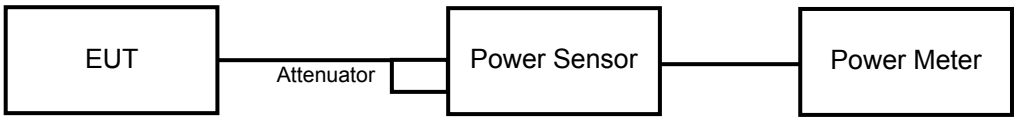
5.4.3 TEST PROCEDURES

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

5.4.4 DEVIATION FROM TEST STANDARD

No deviation.

5.4.5 TEST SETUP



5.4.6 EUT OPERATING CONDITIONS

Same as Item 5.3.6

5.4.7 TEST RESULTS (MODE 1)

802.11a

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
149	5745	23.98	23.81	24.11	748.103	28.74	30	PASS
157	5785	23.76	23.61	23.95	715.612	28.55	30	PASS
165	5825	22.71	22.63	22.96	567.566	27.54	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	23.41	23.17	23.47	649.102	28.12	30	PASS
157	5785	24.03	23.95	24.31	771.017	28.87	30	PASS
165	5825	23.85	23.71	24.11	735.256	28.66	30	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	21.51	21.34	21.68	424.954	26.28	30	PASS
159	5795	24.39	24.46	24.83	858.132	29.34	30	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	21.01	20.89	21.08	377.16	25.77	30	PASS

5.4.8 TEST RESULTS (MODE 2)

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	23.41	23.17	23.47	649.102	28.12	29.23	PASS
157	5785	24.03	23.95	24.31	771.017	28.87	29.23	PASS
165	5825	23.85	23.71	24.11	735.256	28.66	29.23	PASS
NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power limit shall be reduced to 30-(6.77-6) = 29.23dBm.								

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	21.51	21.34	21.68	424.954	26.28	29.23	PASS
159	5795	24.12	24.30	24.66	819.794	29.14	29.23	PASS
NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power limit shall be reduced to 30-(6.77-6) = 29.23dBm.								

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	21.01	20.89	21.08	377.16	25.77	29.23	PASS
NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power limit shall be reduced to 30-(6.77-6) = 29.23dBm.								

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	FSV 40	100964	July 05, 2014	July 04, 2015

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Oct. 30, 2014

5.5.3 TEST PROCEDURE

For 802.11a / 802.11ac (VHT20):

1. Set the RBW = 10 kHz, VBW = 30 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.

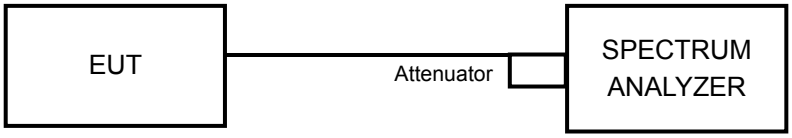
For 802.11ac (VHT40) / 802.11ac (VHT80):

1. Set the RBW = 10 kHz, VBW = 30 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.
6. Add 10 log (1/x), where x is the duty cycle, to the measured PSD to compute the average PSD during the actual transmission time.

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 (MODE 1)

802.11a

TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD (dBm)	10 log (N=3) dB	TOTAL PSD (dBm)	LIMIT (dBm)	PASS /FAIL
0	149	5745	-5.59	4.77	-0.82	7.23	PASS
	157	5785	-4.74	4.77	0.03	7.23	PASS
	165	5825	-5.66	4.77	-0.89	7.23	PASS
1	149	5745	-4.79	4.77	-0.02	7.23	PASS
	157	5785	-5.04	4.77	-0.27	7.23	PASS
	165	5825	-4.71	4.77	0.06	7.23	PASS
2	149	5745	-4.21	4.77	0.56	7.23	PASS
	157	5785	-5.01	4.77	-0.24	7.23	PASS
	165	5825	-5.74	4.77	-0.97	7.23	PASS
NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 8-(6.77-6) = 7.23dBm.							

802.11ac (VHT20)

TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD (dBm)	10 log (N=3) dB	TOTAL PSD (dBm)	LIMIT (dBm)	PASS /FAIL
0	149	5745	-6.14	4.77	-1.37	7.23	PASS
	157	5785	-6.37	4.77	-1.60	7.23	PASS
	165	5825	-6.23	4.77	-1.46	7.23	PASS
1	149	5745	-6.02	4.77	-1.25	7.23	PASS
	157	5785	-5.95	4.77	-1.18	7.23	PASS
	165	5825	-5.99	4.77	-1.22	7.23	PASS
2	149	5745	-6.47	4.77	-1.70	7.23	PASS
	157	5785	-6.16	4.77	-1.39	7.23	PASS
	165	5825	-6.24	4.77	-1.47	7.23	PASS
NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 8-(6.77-6) = 7.23dBm.							

802.11ac (VHT40)

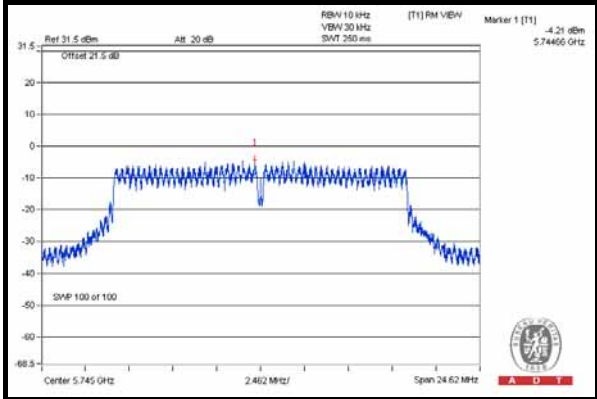
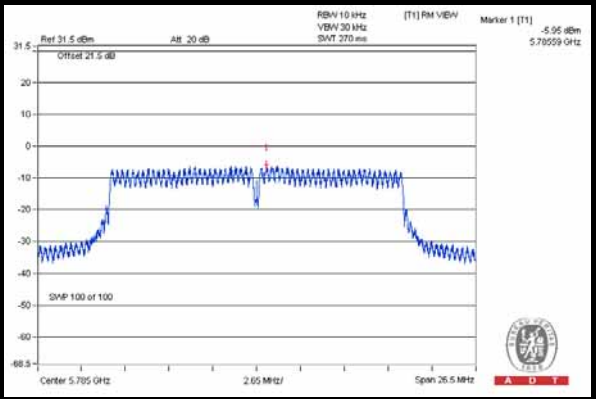
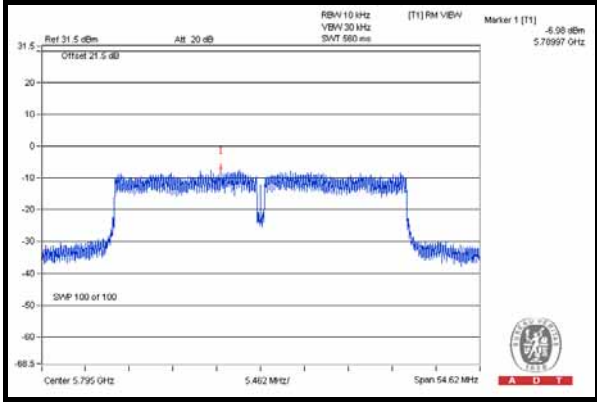
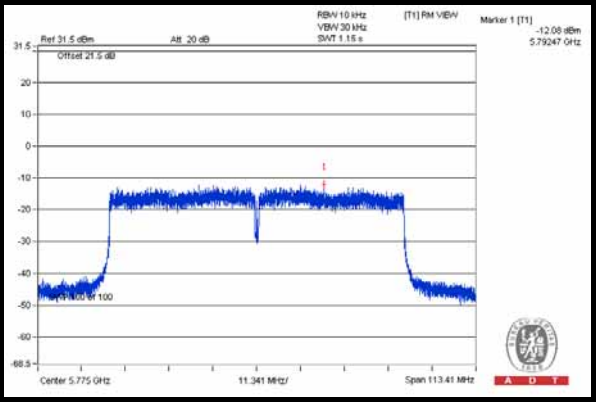
TX CHAIN	CHANNEL	FREQ. (MHz)	PSD W/O DUTY FACTOR (dBm)	10 log (N=3) dB	DUTY FACTOR (dB)	TOTAL PSD WITH DUTY FACTOR (dBm)	LIMIT (dBm)	PASS /FAIL
0	151	5755	-10.13	4.77	0.1	-5.26	7.23	PASS
	159	5795	-7.71	4.77	0.1	-2.84	7.23	PASS
1	151	5755	-10.44	4.77	0.1	-5.57	7.23	PASS
	159	5795	-7.87	4.77	0.1	-3.00	7.23	PASS
2	151	5755	-10.25	4.77	0.1	-5.38	7.23	PASS
	159	5795	-6.98	4.77	0.1	-2.11	7.23	PASS

NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 8-(6.77-6) = 7.23dBm.

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	-12.56	4.77	0.22	-7.57	7.23	PASS
1	155	5775	-12.95	4.77	0.22	-7.96	7.23	PASS
2	155	5775	-12.08	4.77	0.22	-7.09	7.23	PASS

NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 8-(6.77-6) = 7.23dBm.

SPECTRUM PLOT OF WORST VALUE	
802.11a / Chain(2) : CH149	**802.11ac (VHT20) / Chain(1) : CH157**
	
802.11ac (VHT40) / Chain(2) : CH159	**802.11ac (VHT80) / Chain(2) : CH155**
	

5.5.8 TEST RESULTS (MODE 2)

802.11ac (VHT20)

TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD (dBm)	10 log (N=3) dB	TOTAL PSD (dBm)	LIMIT (dBm)	PASS /FAIL
0	149	5745	-6.14	4.77	-1.37	7.23	PASS
	157	5785	-6.37	4.77	-1.60	7.23	PASS
	165	5825	-6.23	4.77	-1.46	7.23	PASS
1	149	5745	-6.02	4.77	-1.25	7.23	PASS
	157	5785	-5.95	4.77	-1.18	7.23	PASS
	165	5825	-5.99	4.77	-1.22	7.23	PASS
2	149	5745	-6.47	4.77	-1.70	7.23	PASS
	157	5785	-6.16	4.77	-1.39	7.23	PASS
	165	5825	-6.24	4.77	-1.47	7.23	PASS

NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 8-(6.77-6) = 7.23dBm.

802.11ac (VHT40)

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	151	5755	-10.13	4.77	0.1	-5.26	7.23	PASS
	159	5795	-8.60	4.77	0.1	-3.73	7.23	PASS
1	151	5755	-10.44	4.77	0.1	-5.57	7.23	PASS
	159	5795	-8.59	4.77	0.1	-3.72	7.23	PASS
2	151	5755	-10.25	4.77	0.1	-5.38	7.23	PASS
	159	5795	-8.40	4.77	0.1	-3.53	7.23	PASS

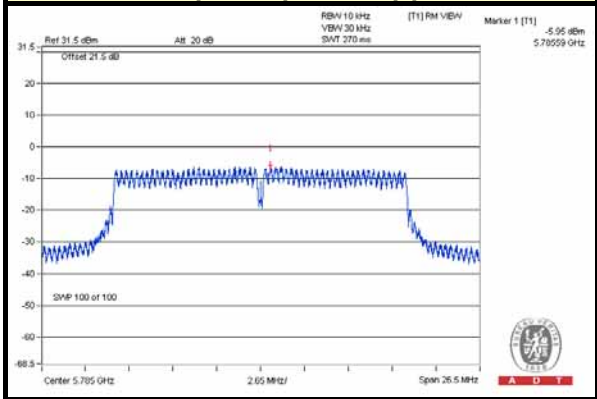
NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 8-(6.77-6) = 7.23dBm.

802.11ac (VHT80)

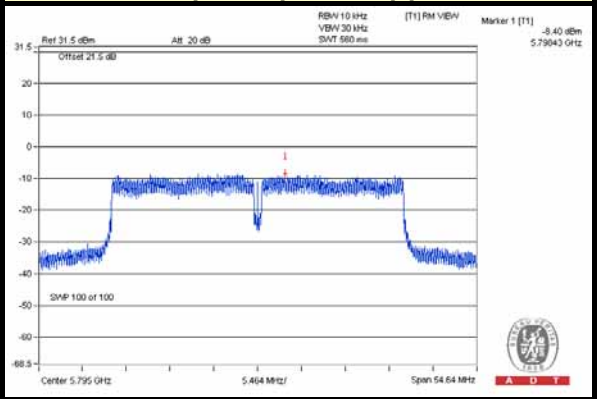
TX CHAIN	CHANNEL	FREQ. (MHz)	PSD W/O DUTY FACTOR (dBm)	10 log (N=3) dB	DUTY FACTOR (dB)	TOTAL PSD WITH DUTY FACTOR (dBm)	LIMIT (dBm)	PASS /FAIL
0	155	5775	-12.56	4.77	0.22	-7.57	7.23	PASS
1	155	5775	-12.95	4.77	0.22	-7.96	7.23	PASS
2	155	5775	-12.08	4.77	0.22	-7.09	7.23	PASS
NOTE: Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 8-(6.77-6) = 7.23dBm.								

SPECTRUM PLOT OF WORST VALUE

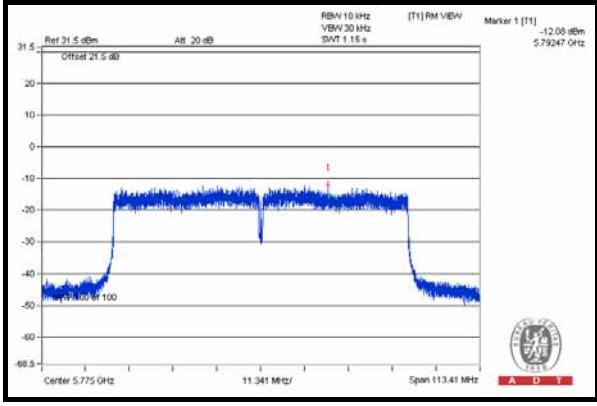
802.11ac (VHT20) / Chain(1) : CH157



802.11ac (VHT40) / Chain(2) : CH159



802.11ac (VHT80) / Chain(2) : CH155



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	FSV 40	100964	July 05, 2014	July 04, 2015

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Oct. 30, 2014

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.

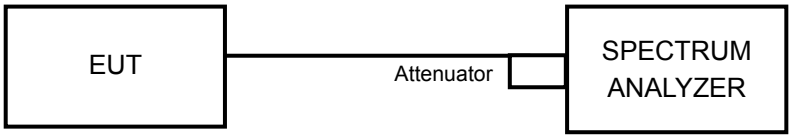
Measurement Procedure –Unwanted Emission Level

1. Set RBW = 100 kHz.
2. Set VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

5.6.4 DEVIATION FROM TEST STANDARD

No deviation

5.6.5 TEST SETUP



5.6.6 EUT OPERATING CONDITION

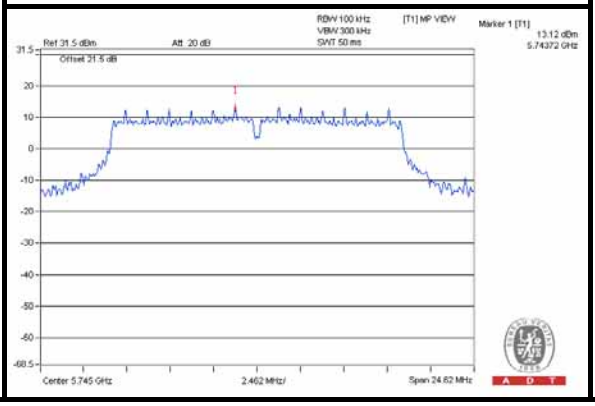
Same as Item 4.3.6

5.6.7 TEST RESULTS (MODE 1)

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.

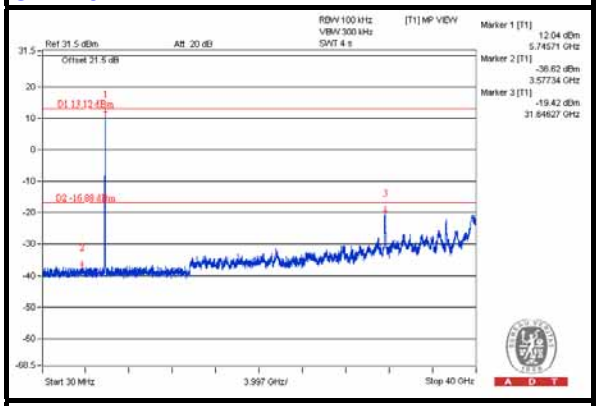
802.11a

Maximum REF

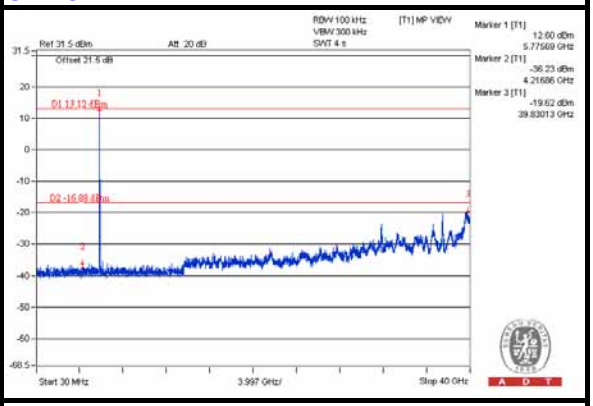


Chain(0)

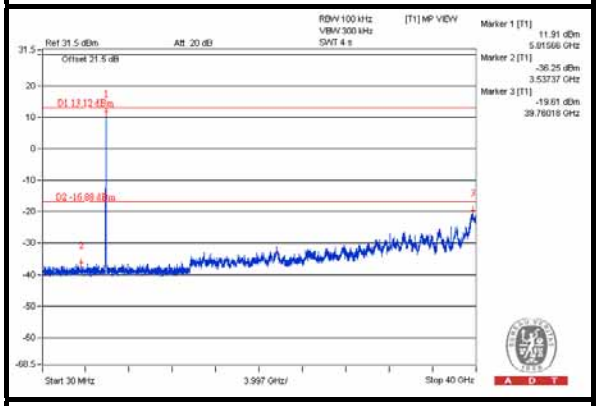
CH 149



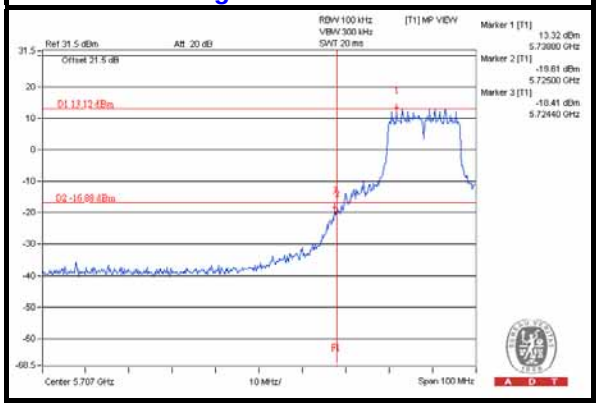
CH 157



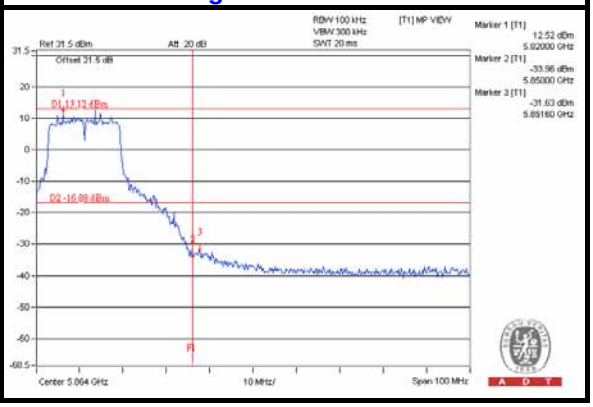
CH 165



CH 149 Band edge

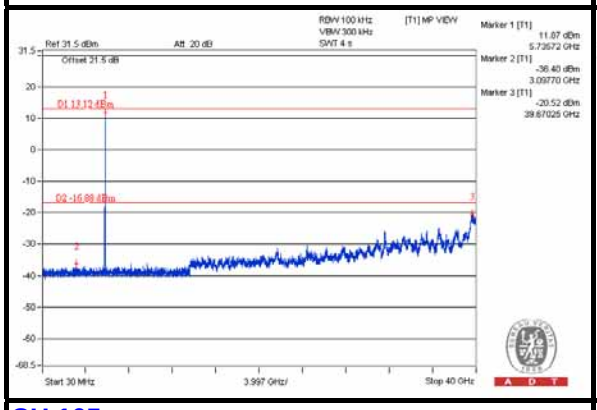


CH 165 Band edge

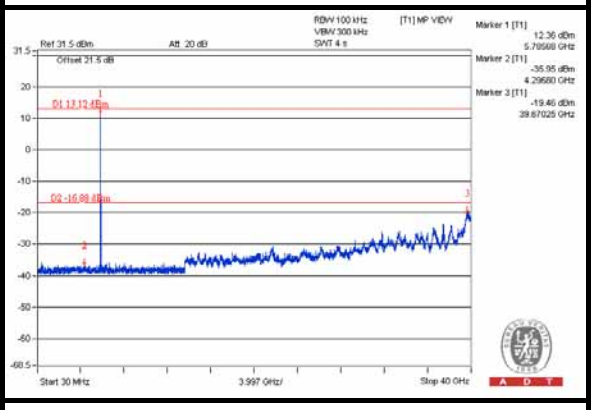


Chain(1)

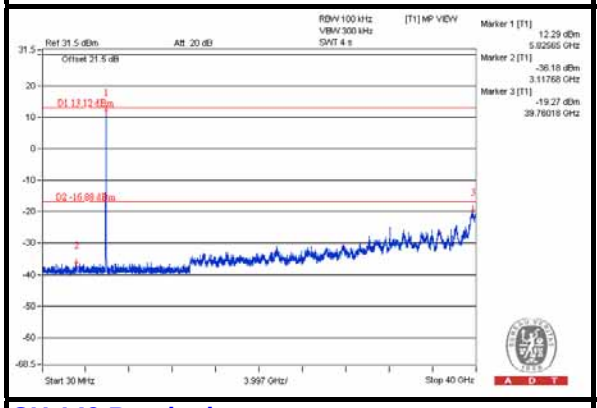
CH 149



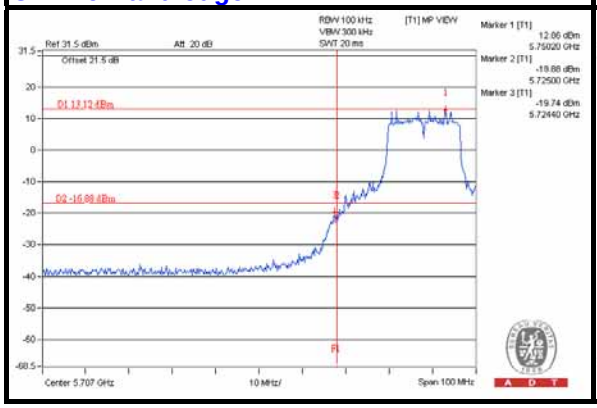
CH 157



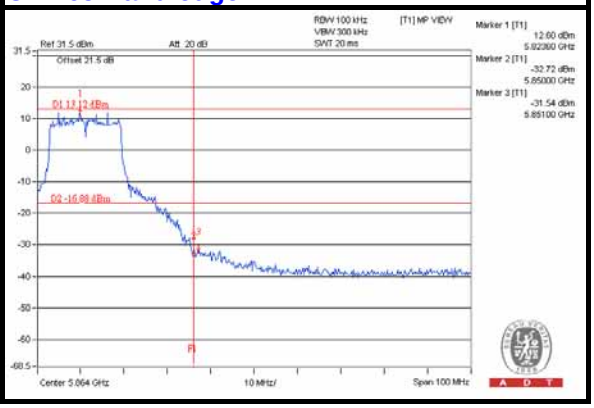
CH 165



CH 149 Band edge

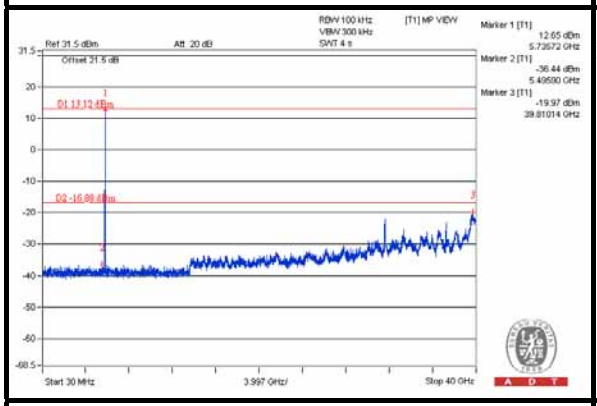


CH 165 Band edge

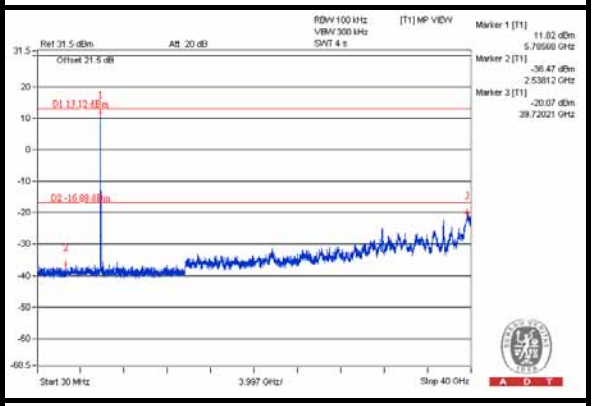


Chain(2)

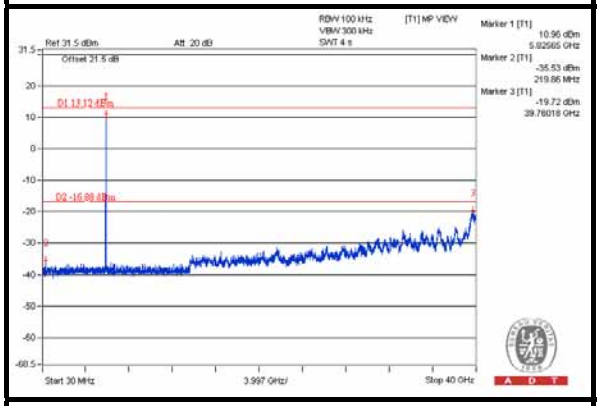
CH 149



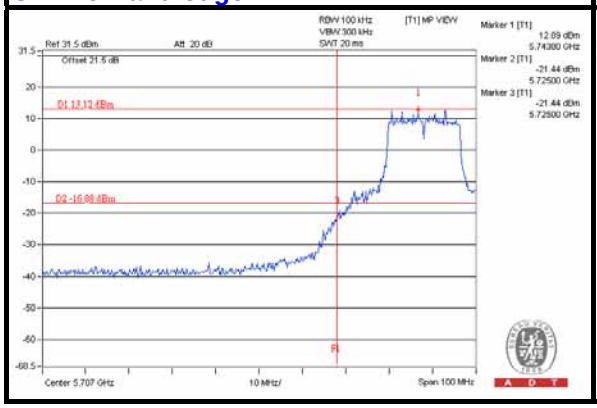
CH 157



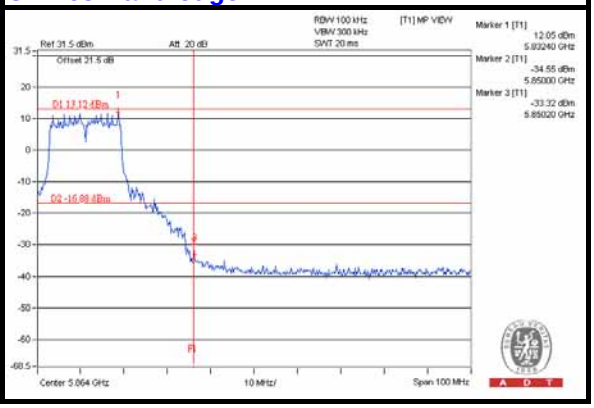
CH 165



CH 149 Band edge

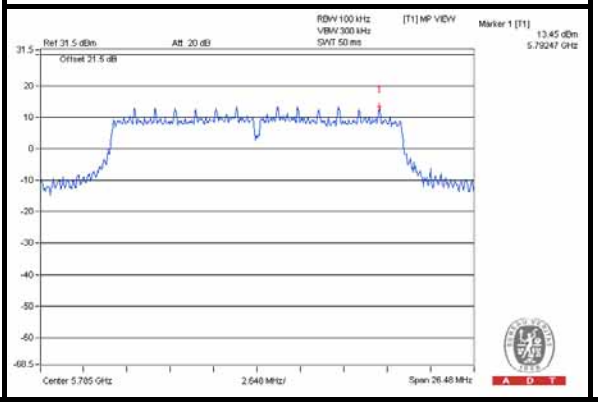


CH 165 Band edge



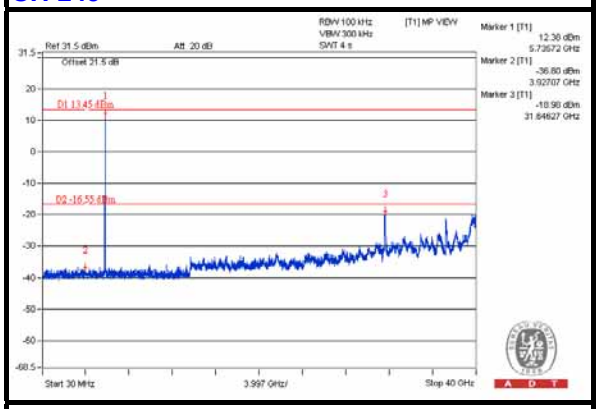
802.11ac (VHT20)

Maximum REF

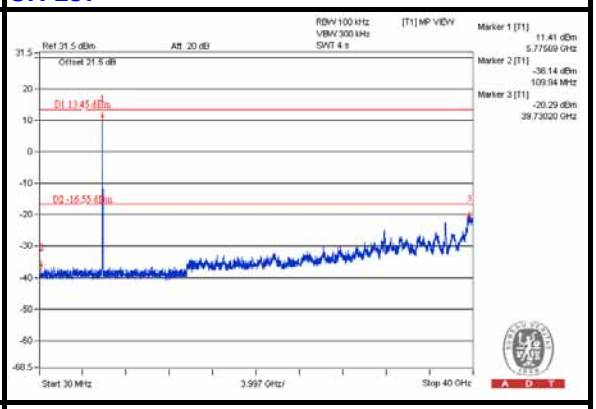


Chain(0)

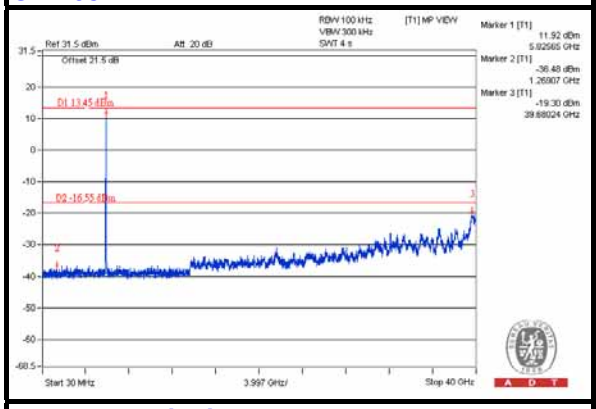
CH 149



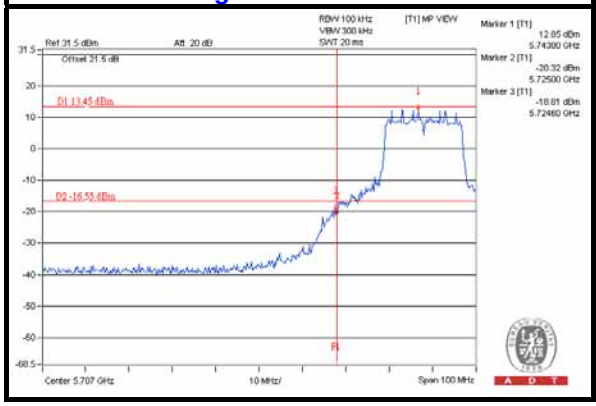
CH 157



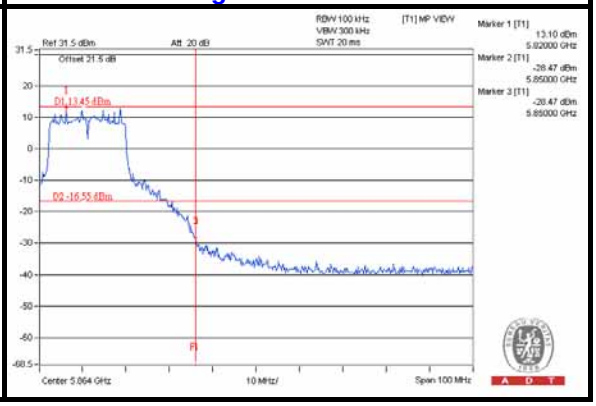
CH 165



CH 149 Band edge

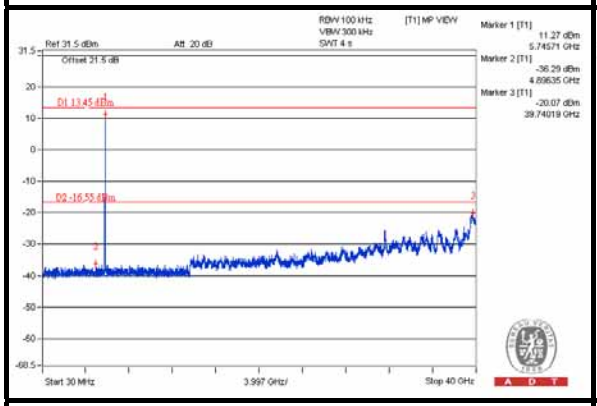


CH 165 Band edge

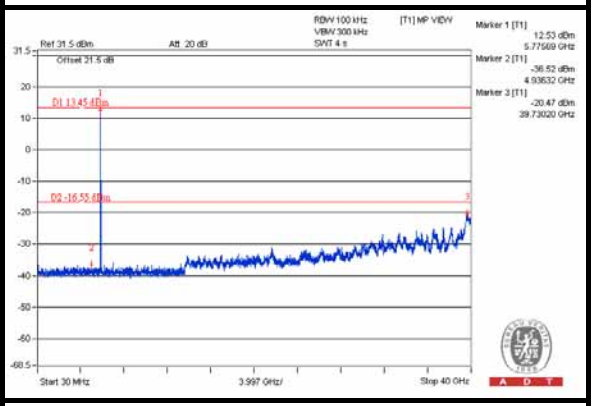


Chain(1)

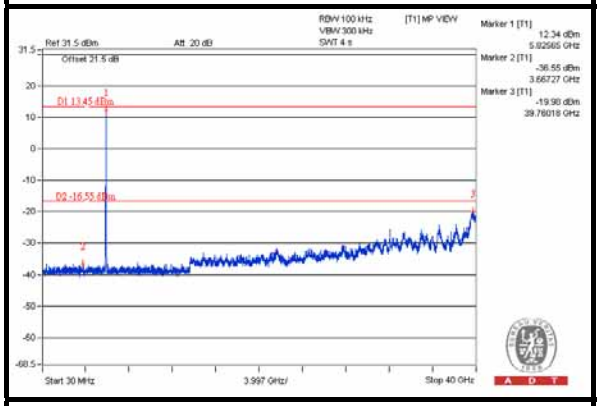
CH 149



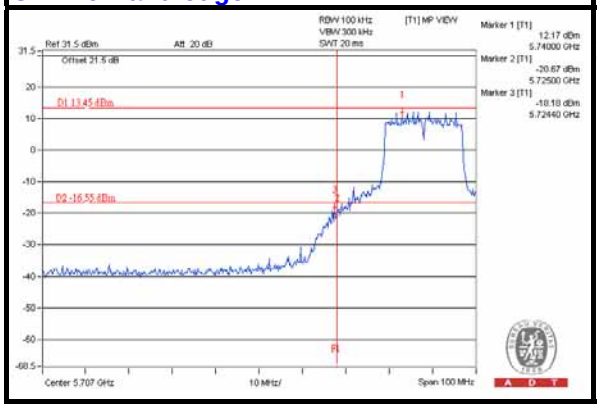
CH 157



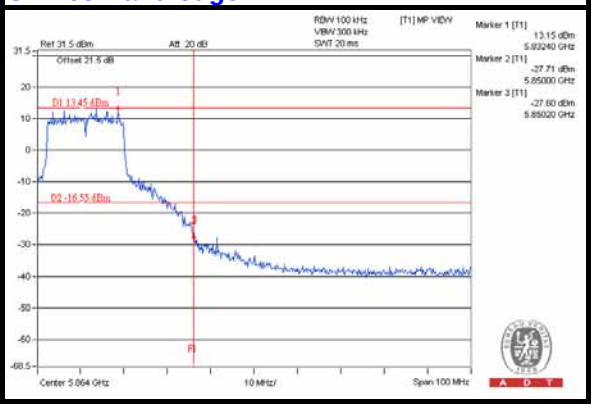
CH 165



CH 149 Band edge

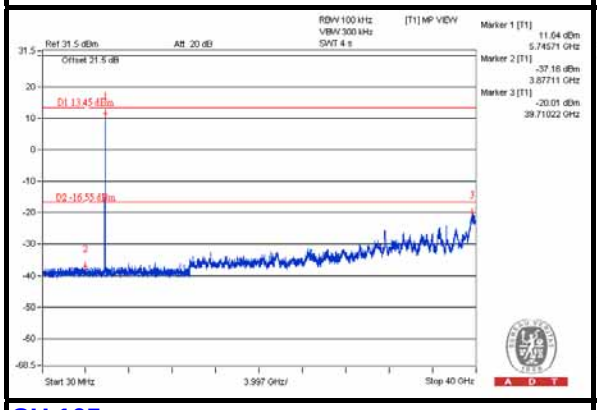


CH 165 Band edge

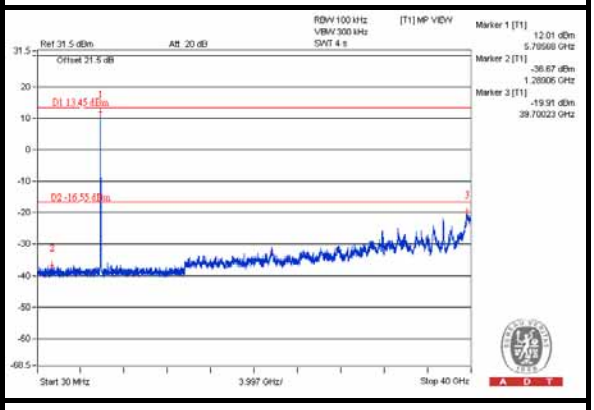


Chain(2)

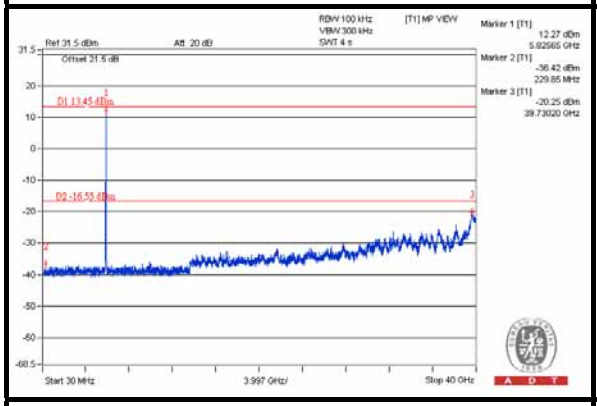
CH 149



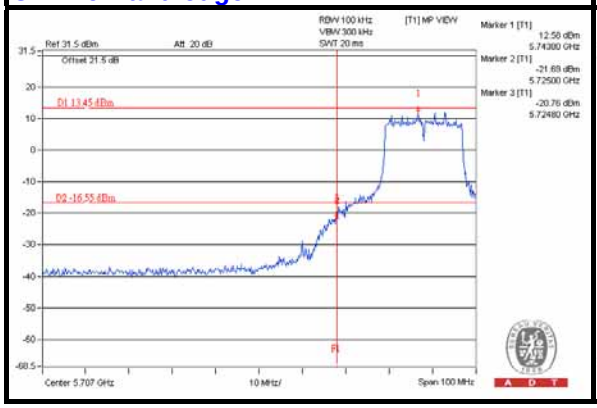
CH 157



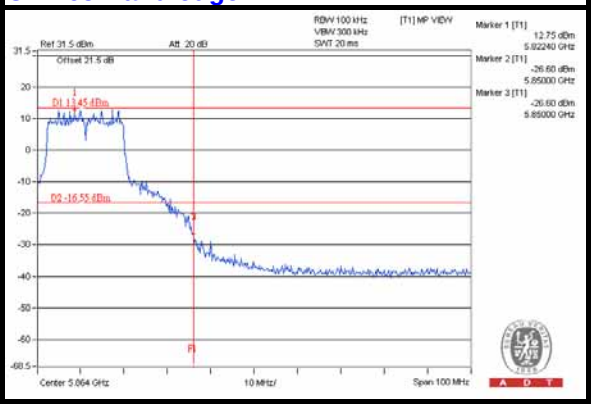
CH 165



CH 149 Band edge

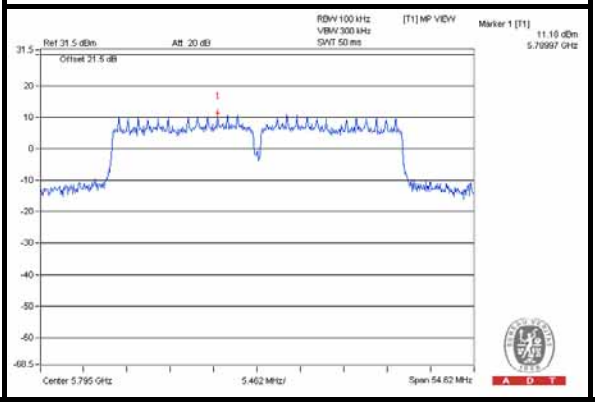


CH 165 Band edge



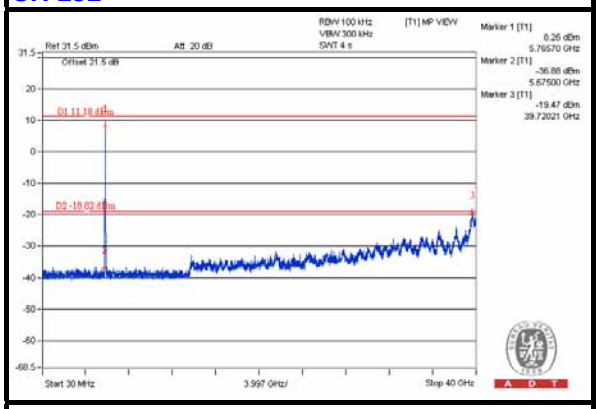
802.11ac (VHT40)

Maximum REF

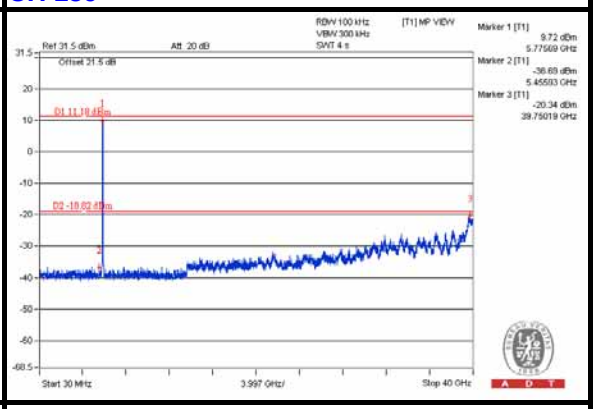


Chain(0)

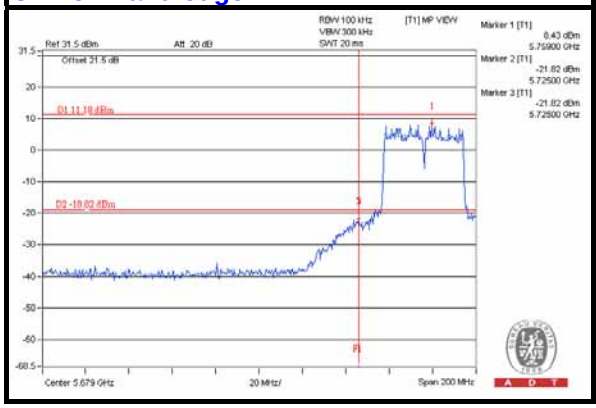
CH 151



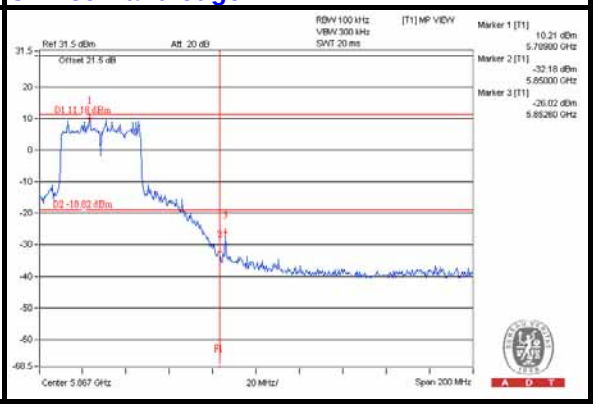
CH 159



CH 151 Band edge

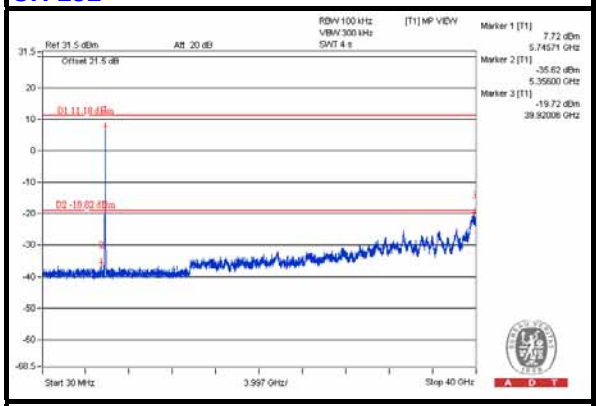


CH 159 Band edge

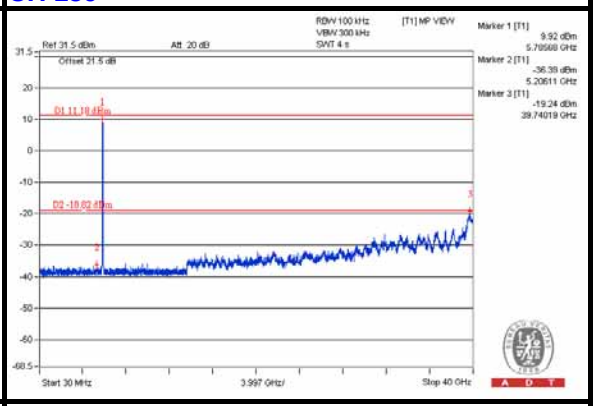


Chain(1)

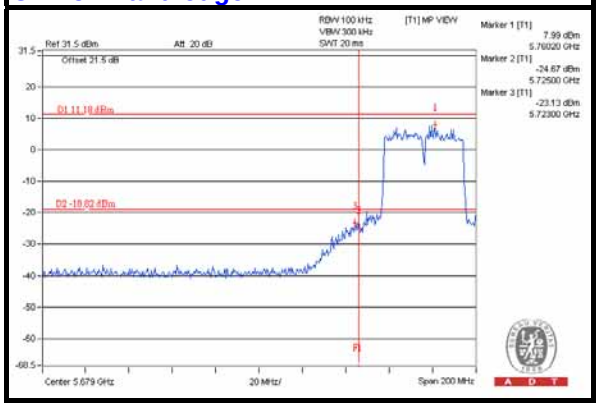
CH 151



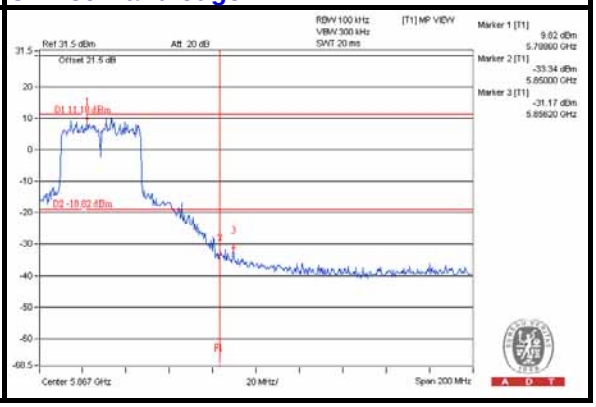
CH 159



CH 151 Band edge

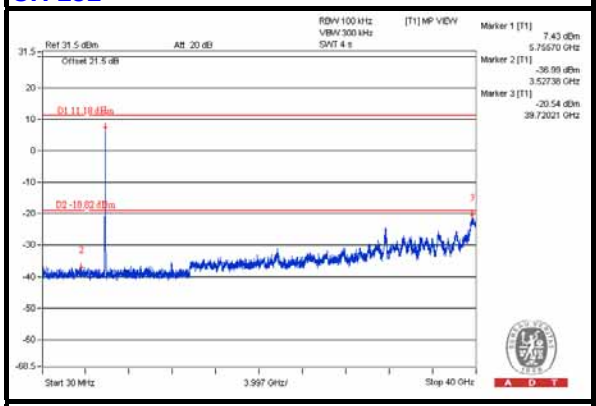


CH 159 Band edge

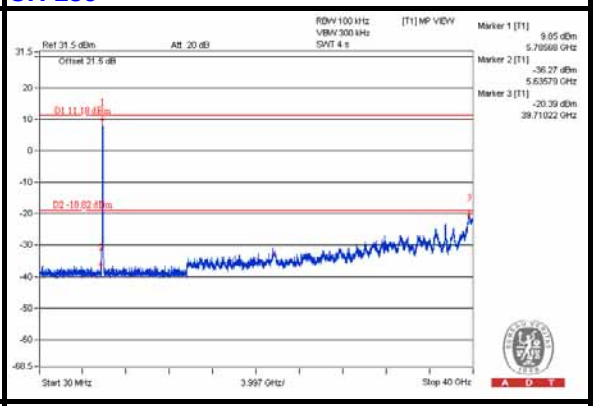


Chain(2)

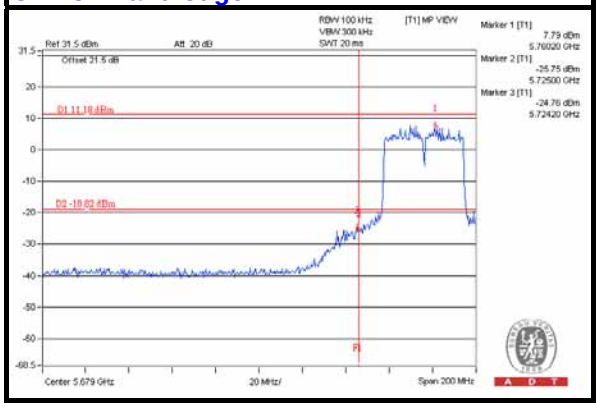
CH 151



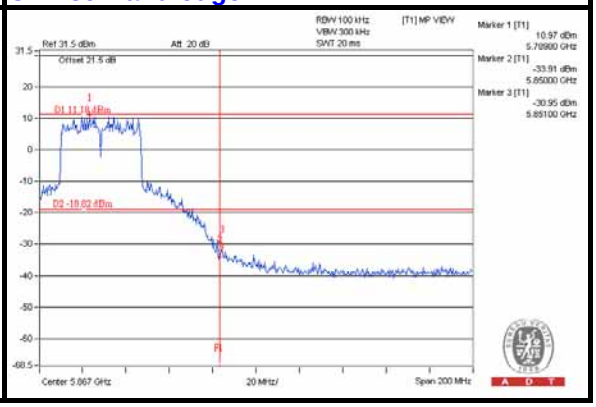
CH 159



CH 151 Band edge

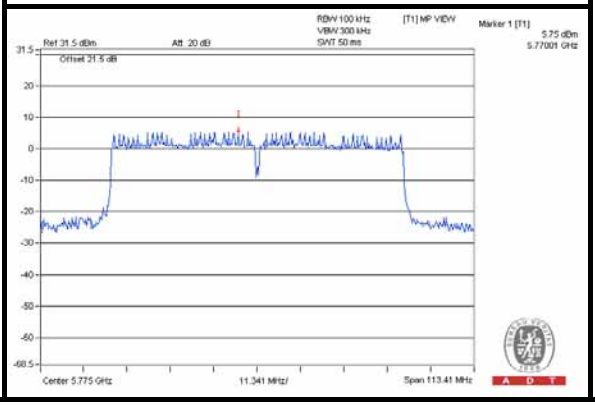


CH 159 Band edge



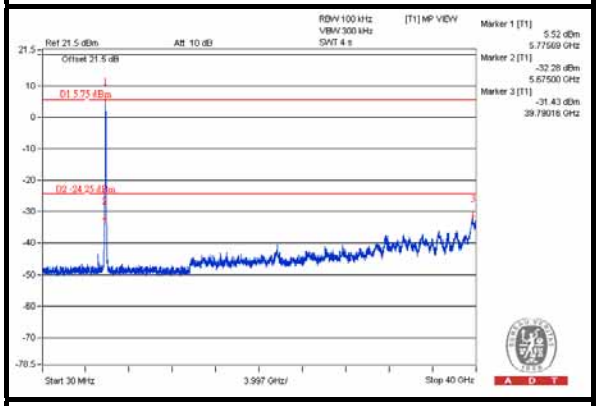
802.11ac (VHT80)

Maximum REF

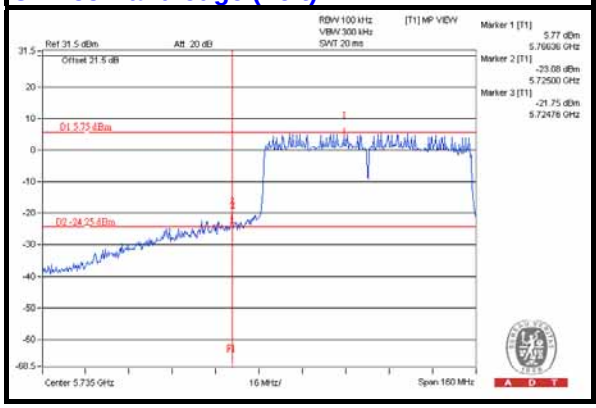


Chain(0)

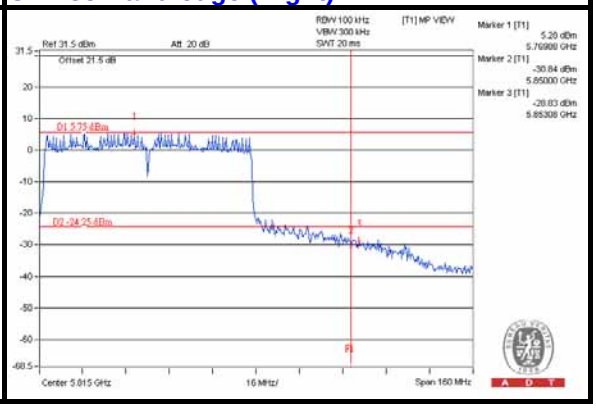
CH 155



CH 155 Band edge (Left)

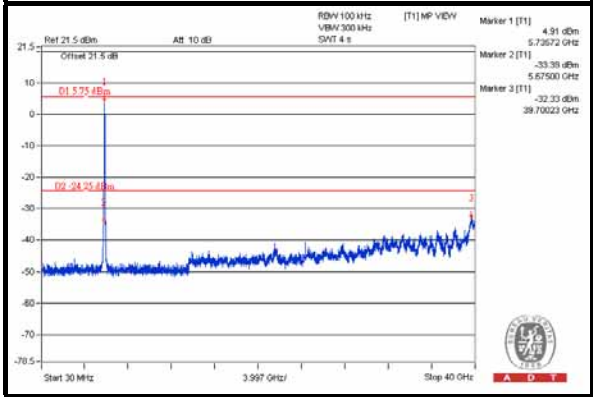


CH 155 Band edge (Right)

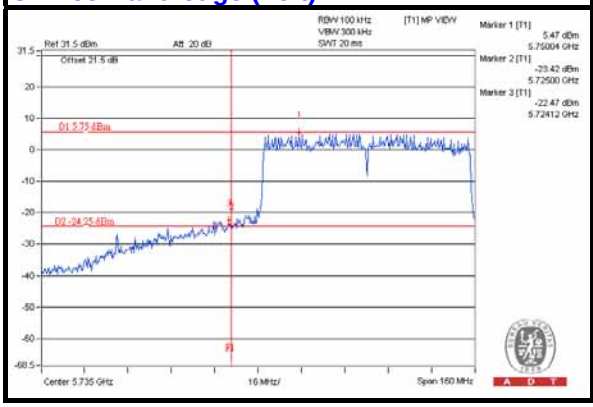


Chain(1)

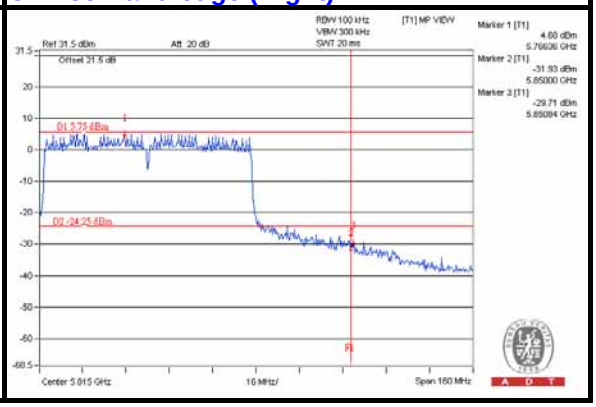
CH 155



CH 155 Band edge (Left)

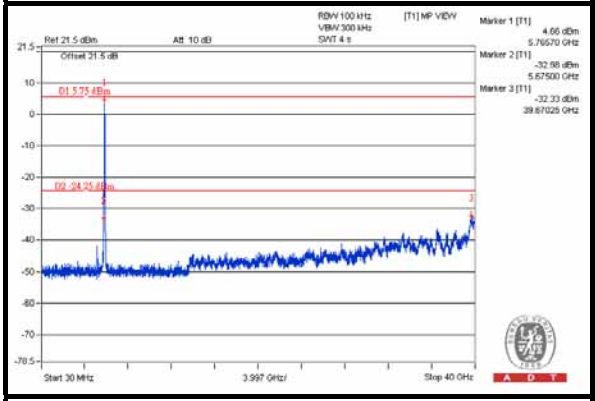


CH 155 Band edge (Right)

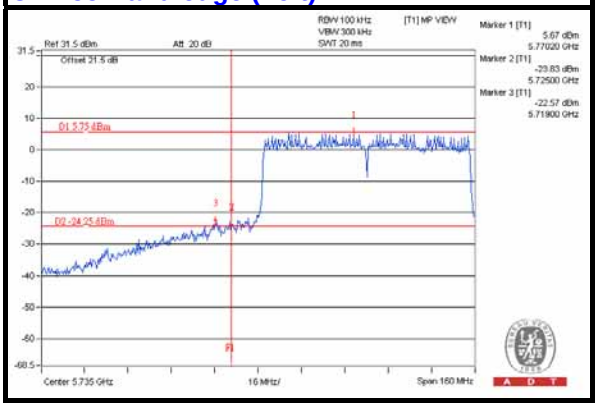


Chain(2)

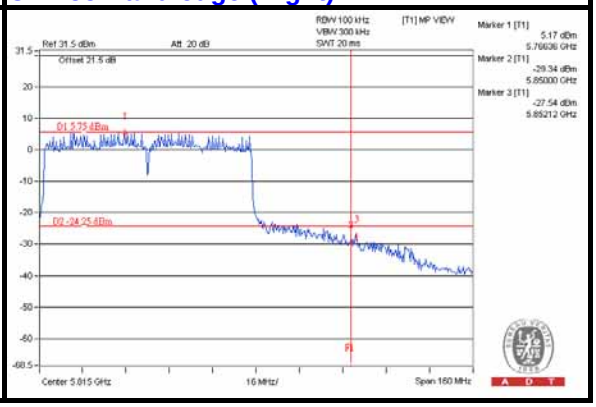
CH 155



CH 155 Band edge (Left)



CH 155 Band edge (Right)

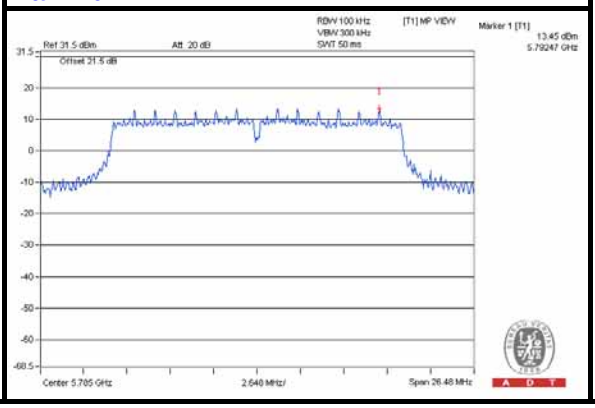


5.6.8 TEST RESULTS (MODE 2)

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.

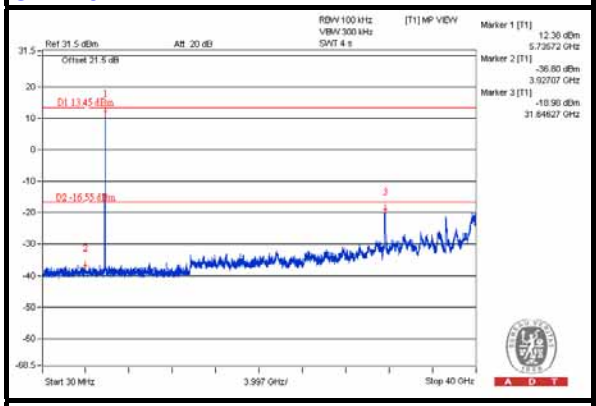
802.11ac (VHT20)

Maximum REF

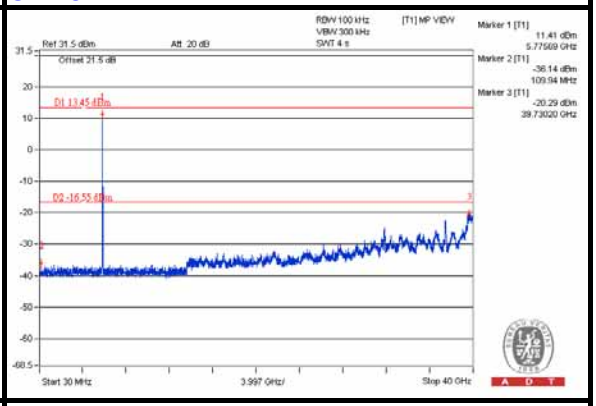


Chain(0)

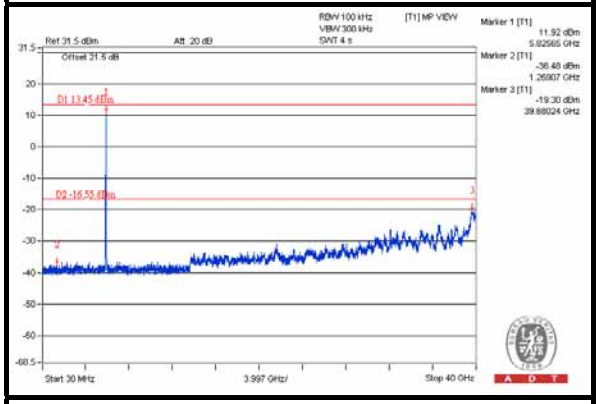
CH 149



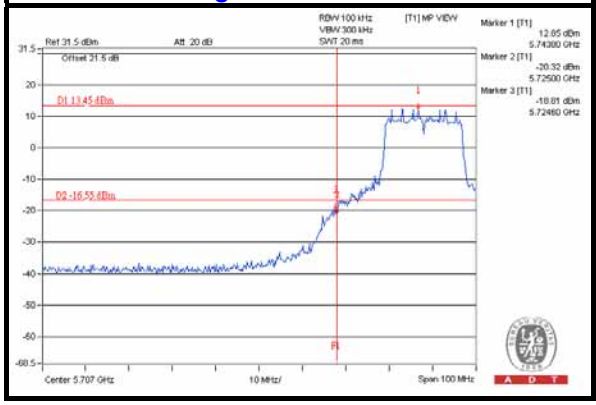
CH 157



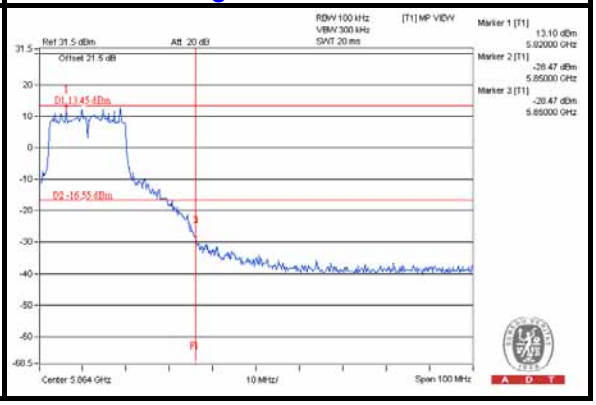
CH 165



CH 149 Band edge

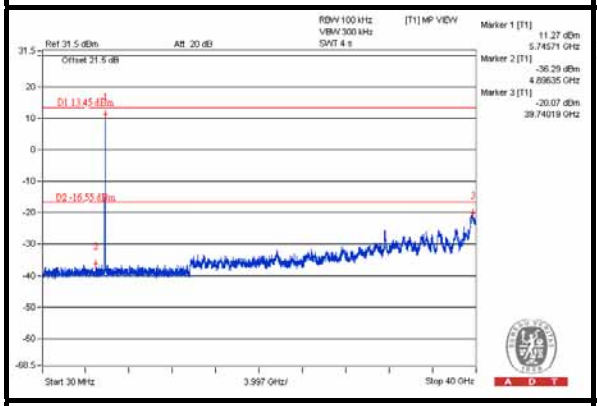


CH 165 Band edge

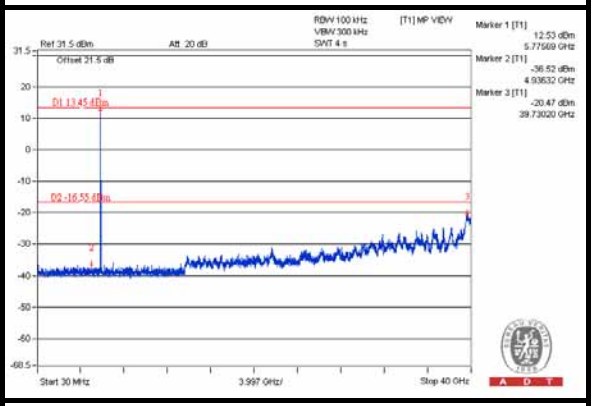


Chain(1)

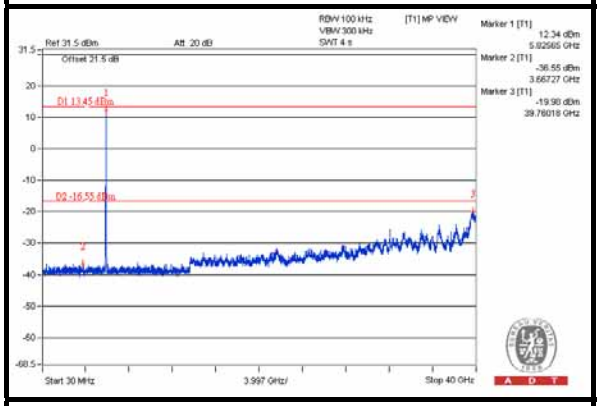
CH 149



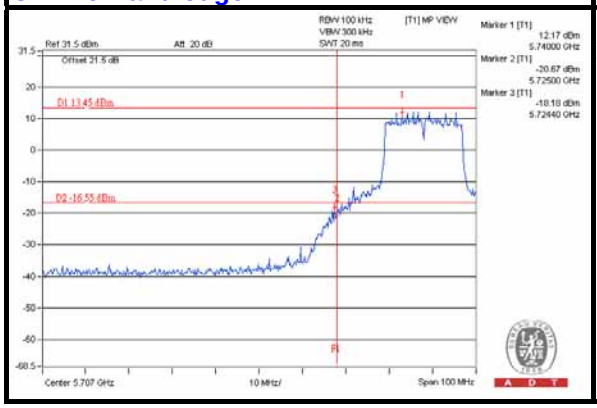
CH 157



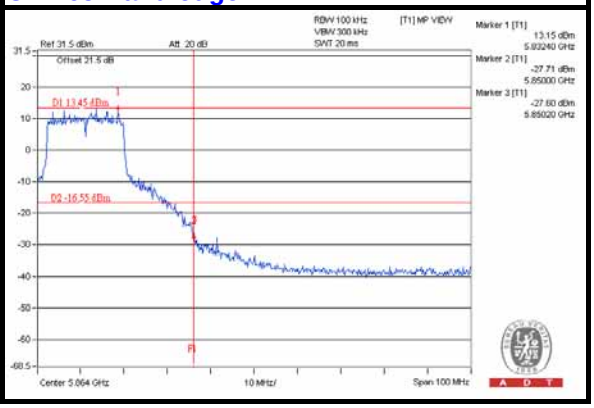
CH 165



CH 149 Band edge

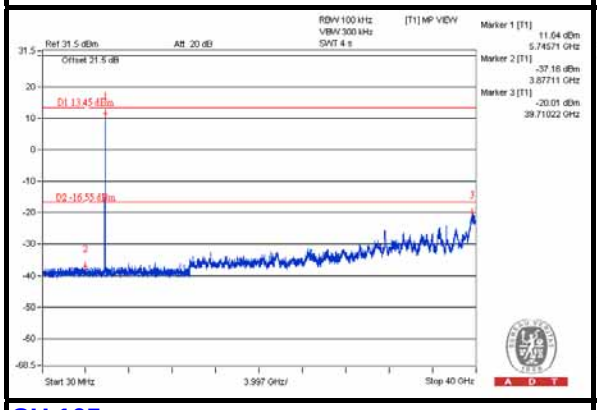


CH 165 Band edge

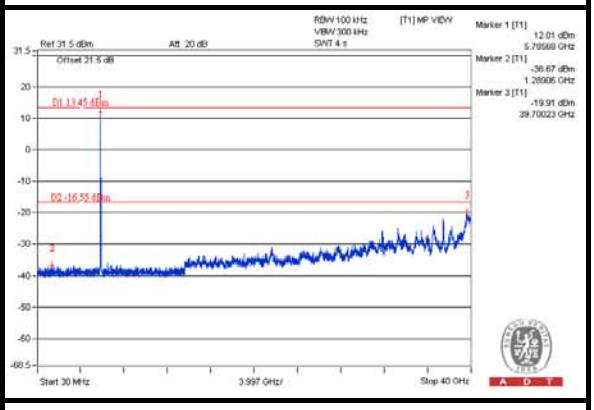


Chain(2)

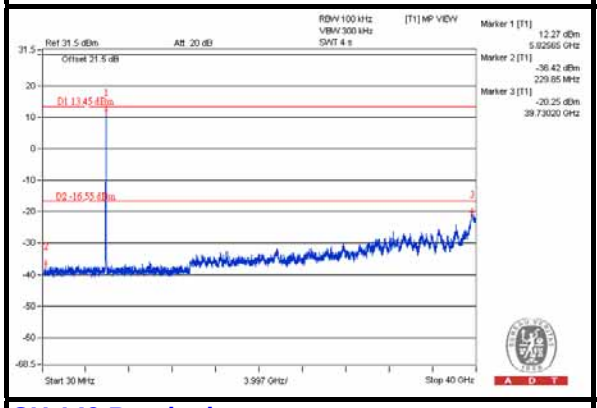
CH 149



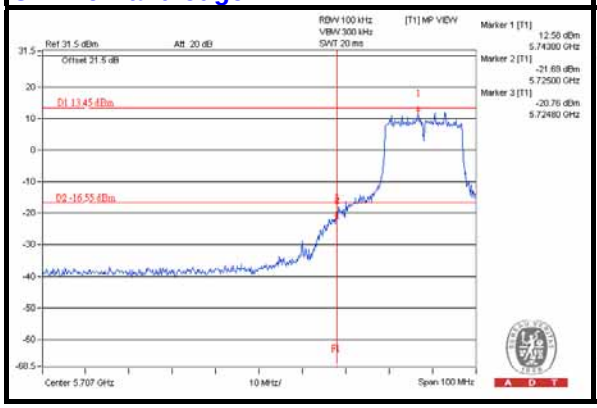
CH 157



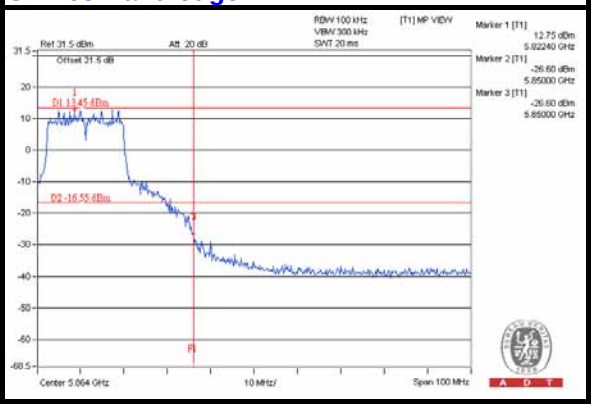
CH 165



CH 149 Band edge

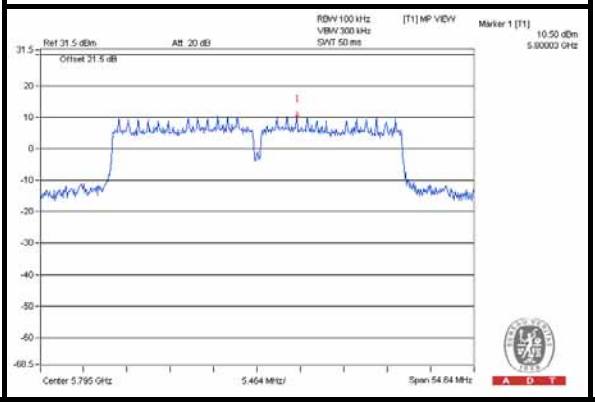


CH 165 Band edge



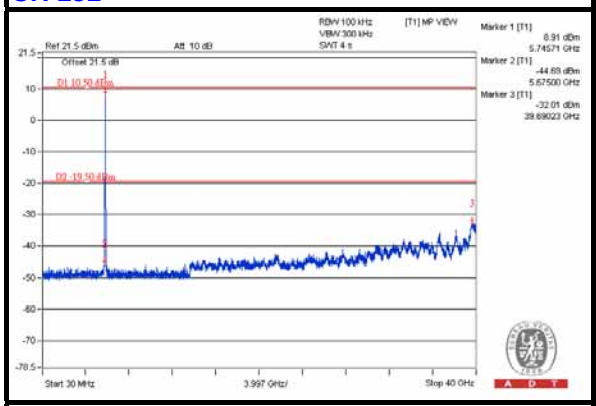
802.11ac (VHT40)

Maximum REF

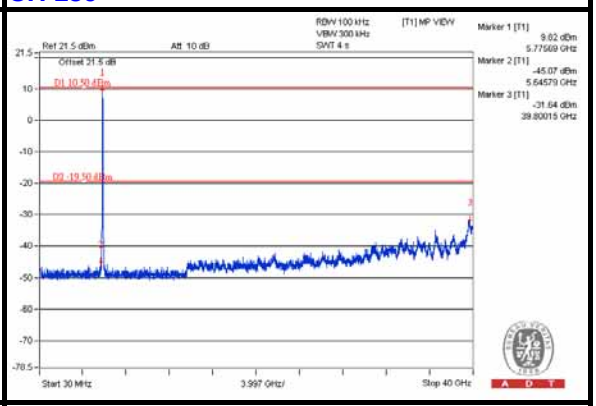


Chain(0)

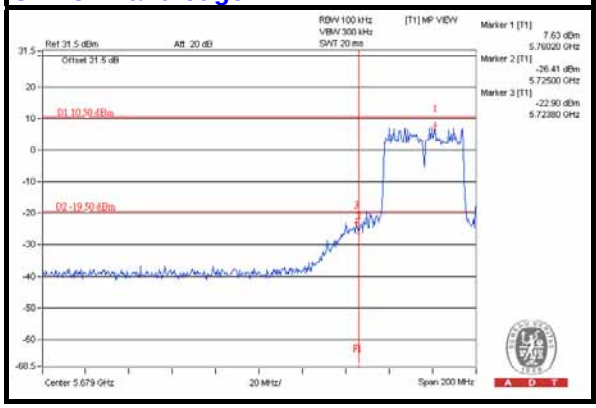
CH 151



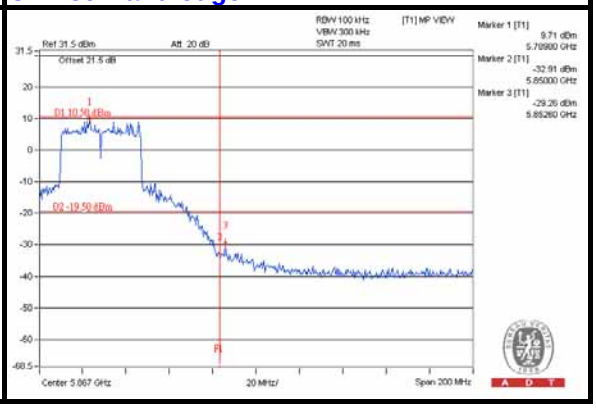
CH 159



CH 151 Band edge

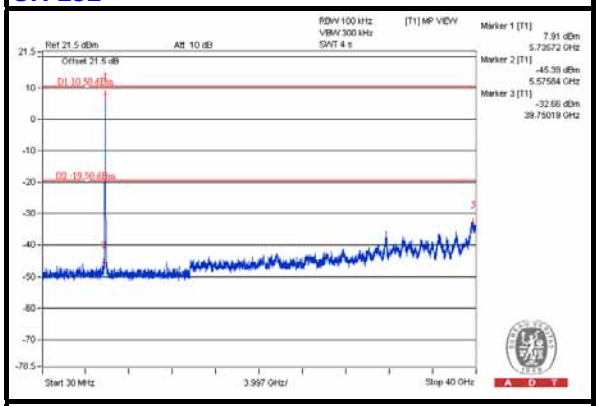


CH 159 Band edge

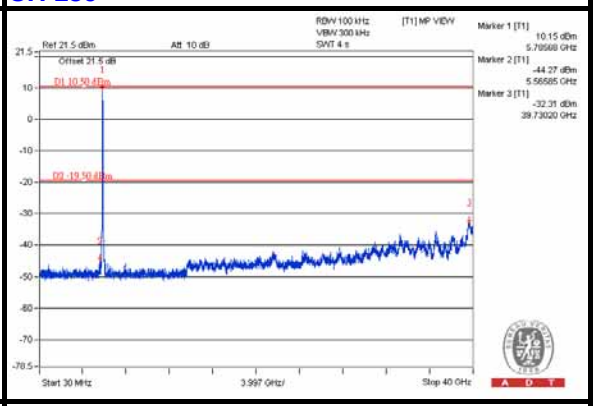


Chain(1)

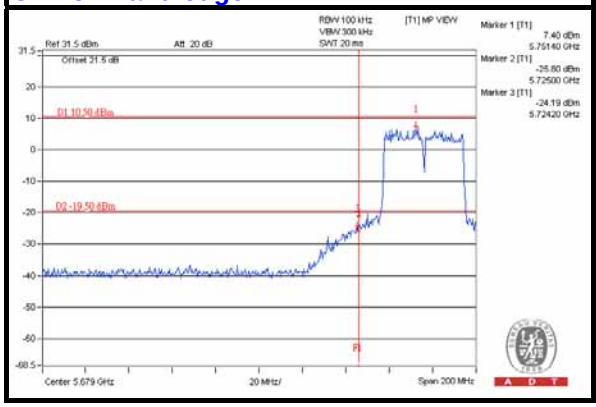
CH 151



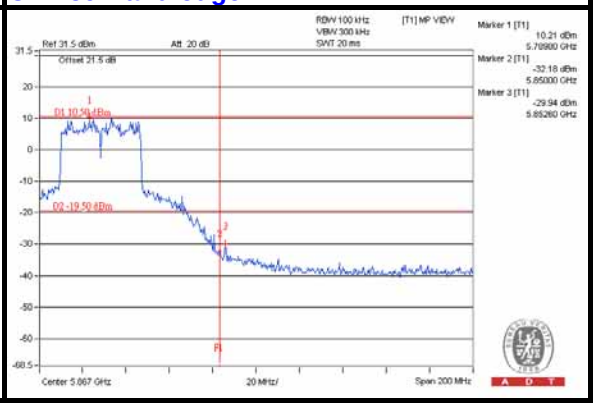
CH 159



CH 151 Band edge

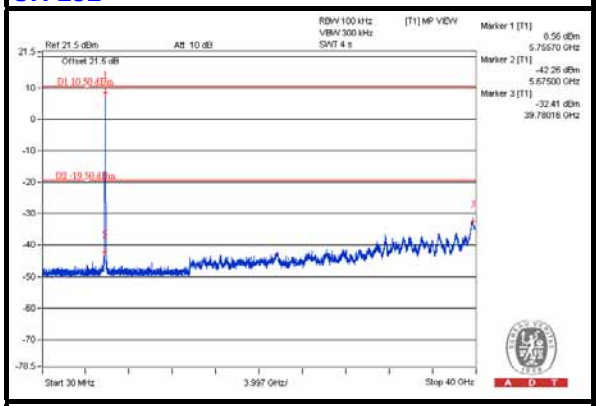


CH 159 Band edge

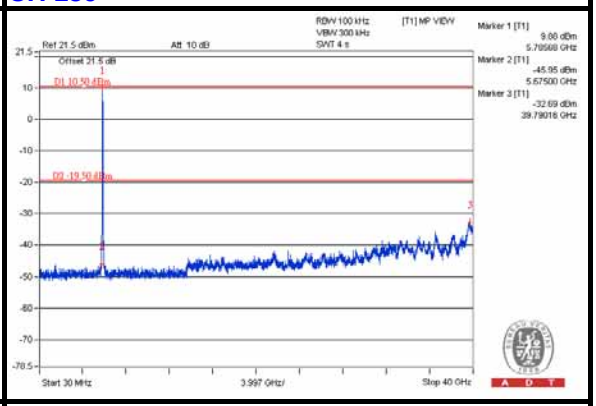


Chain(2)

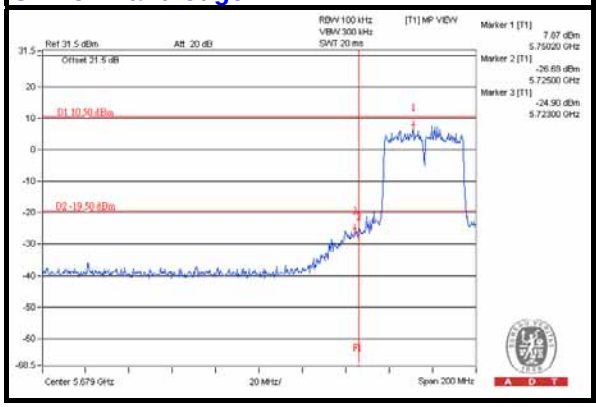
CH 151



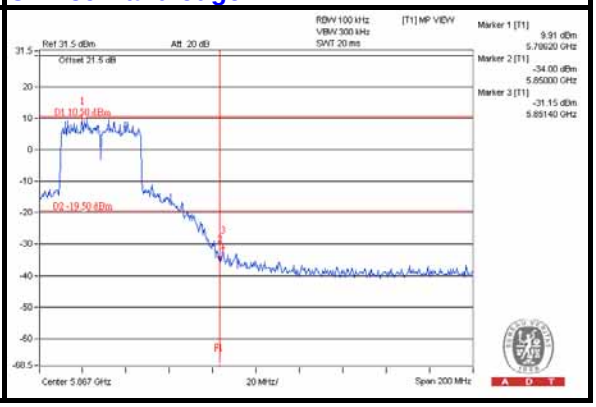
CH 159



CH 151 Band edge

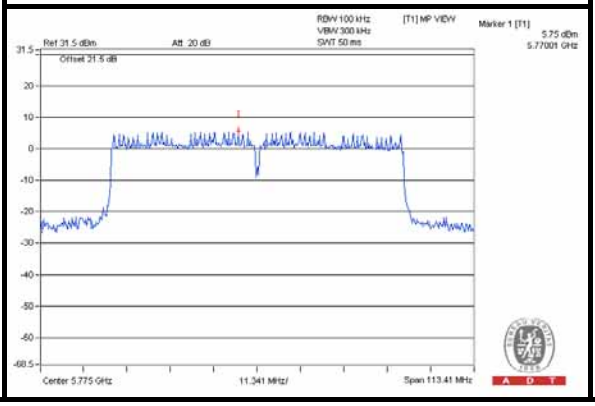


CH 159 Band edge



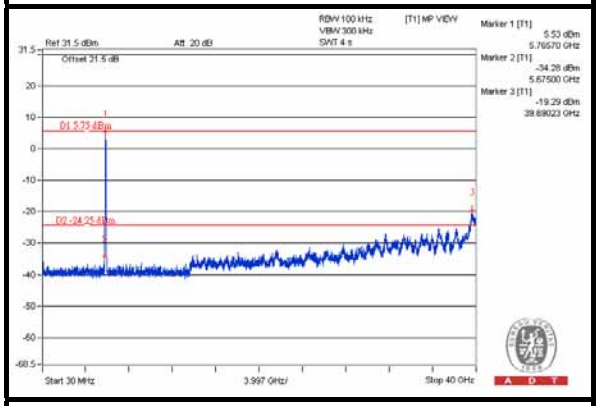
802.11ac (VHT80)

Maximum REF

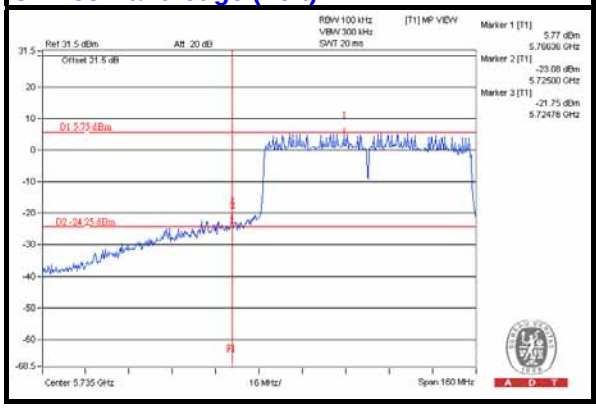


Chain(0)

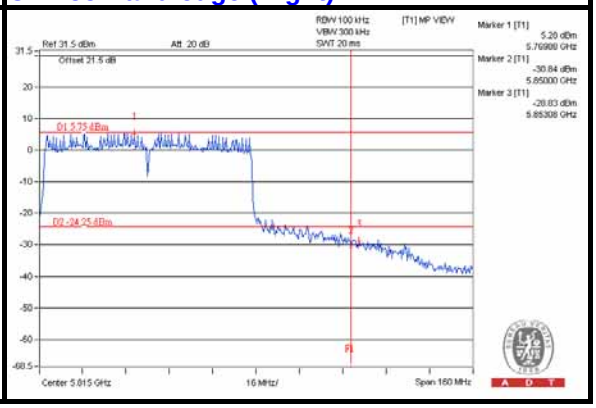
CH 155



CH 155 Band edge (Left)

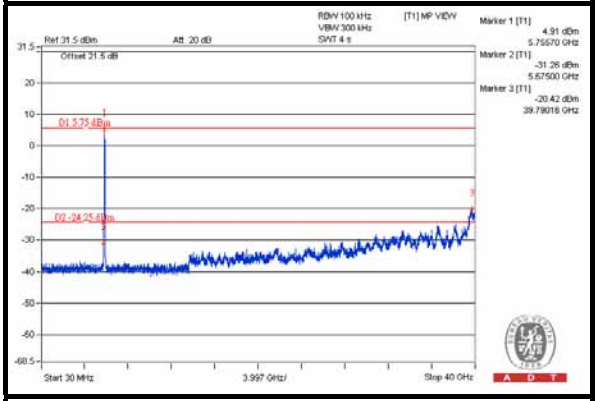


CH 155 Band edge (Right)

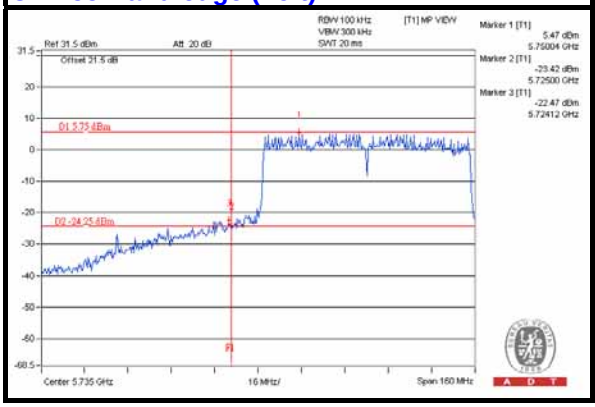


Chain(1)

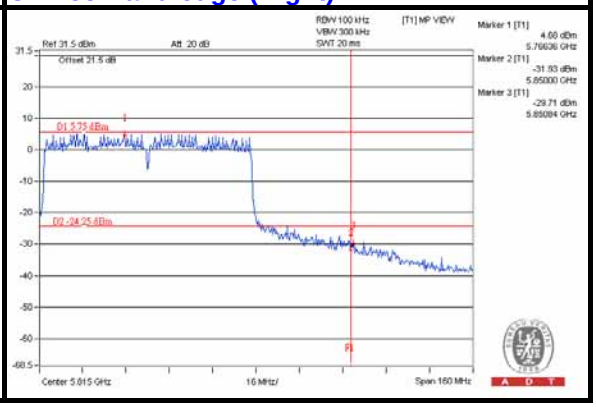
CH 155



CH 155 Band edge (Left)

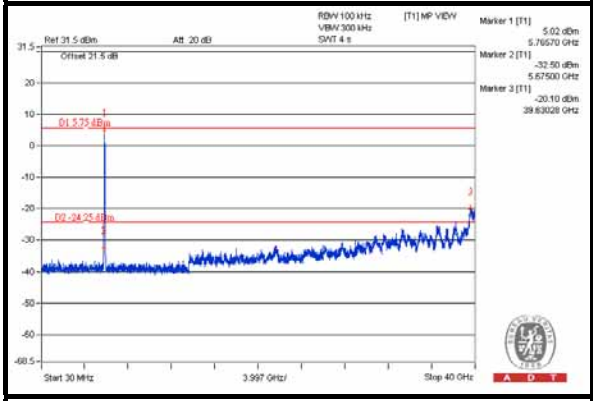


CH 155 Band edge (Right)

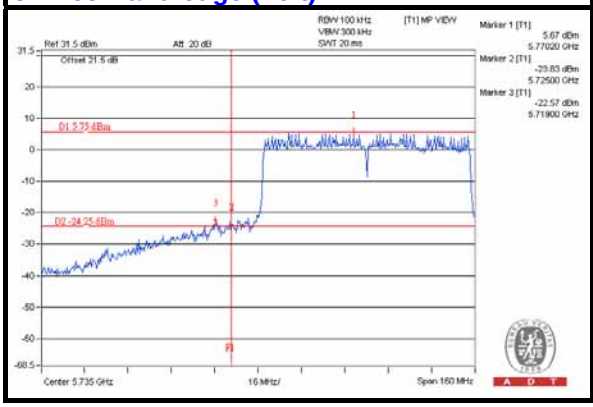


Chain(2)

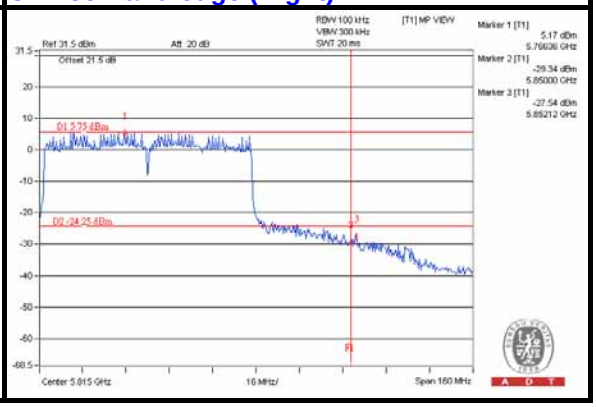
CH 155



CH 155 Band edge (Left)



CH 155 Band edge (Right)



6. PHOTOGRAPHS OF THE TEST CONFIGURATION

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

7. INFORMATION ON THE TESTING LABORATORIES

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

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

Linko EMC/RF Lab:
Tel: 886-2-26052180
Fax: 886-2-26052943

Hsin Chu EMC/RF/Telecom Lab:
Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Lab:
Tel: 886-3-3183232
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 ---