



FCC TEST REPORT (WLAN 15.247)

REPORT NO.: RF140808E04

MODEL NO.: QCNFA324

FCC ID: PPD-QCNFA324

RECEIVED: Aug. 08, 2014

TESTED: Aug. 27 to Oct. 15, 2014

ISSUED: Oct. 23, 2014

APPLICANT: Qualcomm Atheros, Inc.

ADDRESS: 1700 Technology Drive, San Jose, CA 95110

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.

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Table of Contents

RELEASE CONTROL RECORD	4
1. CERTIFICATION	5
2. SUMMARY OF TEST RESULTS	6
2.1 MEASUREMENT UNCERTAINTY	7
3. GENERAL INFORMATION.....	8
3.1 GENERAL DESCRIPTION OF EUT	8
3.2 DESCRIPTION OF ANTENNA	11
3.3 DESCRIPTION OF TEST MODES	12
3.3.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL	13
3.4 DUTY CYCLE OF TEST SIGNAL.....	16
3.5 GENERAL DESCRIPTION OF APPLIED STANDARDS	17
3.6 DESCRIPTION OF SUPPORT UNITS	18
3.7 CONFIGURATION OF SYSTEM UNDER TEST	18
4. TEST TYPES AND RESULTS (FOR 2.4GHZ, 2400 ~ 2483.5MHZ BAND)	19
4.1 CONDUCTED OUTPUT POWER MEASUREMENT.....	19
4.1.1 LIMITS OF MAXIMUM OUTPUT POWER MEASUREMENT	19
4.1.2 INSTRUMENTS	19
4.1.3 TEST PROCEDURES.....	19
4.1.4 DEVIATION FROM TEST STANDARD	20
4.1.5 TEST SETUP	20
4.1.6 EUT OPERATING CONDITIONS.....	20
4.1.7 TEST RESULTS.....	21
4.2 POWER SPECTRAL DENSITY MEASUREMENT	24
4.2.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT	24
4.2.2 TEST INSTRUMENTS	24
4.2.3 TEST PROCEDURE	24
4.2.4 DEVIATION FROM TEST STANDARD	24
4.2.5 TEST SETUP	24
4.2.6 EUT OPERATING CONDITION	24
4.2.7 TEST RESULTS.....	25
4.3 6DB BANDWIDTH MEASUREMENT	33
4.3.1 LIMITS OF 6DB BANDWIDTH MEASUREMENT	33
4.3.2 TEST INSTRUMENTS	33
4.3.3 TEST PROCEDURE	33
4.3.4 DEVIATION FROM TEST STANDARD	33
4.3.5 TEST SETUP	33
4.3.6 EUT OPERATING CONDITIONS.....	34



A D T

4.3.7 TEST RESULTS.....	35
4.4 CONDUCTED OUT-BAND EMISSION MEASUREMENT.....	43
4.4.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT	43
4.4.2 TEST INSTRUMENTS	43
4.4.3 TEST PROCEDURE	43
4.4.4 DEVIATION FROM TEST STANDARD	44
4.4.5 EUT OPERATING CONDITION	44
4.4.6 TEST RESULTS.....	44
4.5 UNWANTED EMISSION MEASUREMENT(RADIATED VERSUS CONDUCTED)	53
4.5.1 LIMITS OF UNWANTED EMISSION MEASUREMENT	53
4.5.2 TEST INSTRUMENTS	54
4.5.3 TEST PROCEDURES.....	56
4.5.4 DEVIATION FROM TEST STANDARD	57
4.5.5 TEST SETUP	58
4.5.6 EUT OPERATING CONDITIONS.....	59
4.5.7 TEST RESULTS (RADIATED MEASUREMENT).....	60
4.5.8 TEST RESULTS (CONDUCTED MEASUREMENT).....	74
4.6 AC POWER LINE CONDUCTED EMISSION MEASUREMENT.....	112
4.6.1 LIMITS OF AC POWER LINE CONDUCTED EMISSION MEASUREMENT	112
4.6.2 TEST INSTRUMENTS	112
4.6.3 TEST PROCEDURES.....	113
4.6.4 DEVIATION FROM TEST STANDARD	113
4.6.5 TEST SETUP	114
4.6.6 EUT OPERATING CONDITIONS.....	114
4.6.7 TEST RESULTS	115
5. PHOTOGRAPHS OF THE TEST CONFIGURATION	117
6. INFORMATION ON THE TESTING LABORATORIES	118
7. APPENDIX A - RADIATED EMISSION MEASUREMENT	119
7.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT	119
7.1.2 TEST INSTRUMENTS	120
7.1.3 TEST PROCEDURES.....	121
7.1.4 DEVIATION FROM TEST STANDARD	121
7.1.5 TEST SETUP	122
7.1.6 EUT OPERATING CONDITIONS.....	122
7.1.7 TEST RESULTS (MODE 1).....	123
7.1.1 TEST RESULTS (MODE 2).....	129
8. APPENDIX B - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB	135



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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140808E04	Original release	Oct. 23, 2014



1. CERTIFICATION

PRODUCT: 2x2 802.11A/B/G/N/AC WiFi + Bluetooth Module
BRAND NAME: Qualcomm Atheros
MODEL NO.: QCNFA324
TEST SAMPLE: R&D SAMPLE
APPLICANT: Qualcomm Atheros, Inc.
TESTED: Aug. 27 to Oct. 15, 2014
STANDARDS: **FCC Part 15, Subpart C (Section 15.247)**
 ANSI C63.10-2009

The above equipment (Model: QCNFA324) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and was in compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : _____ , **DATE:** _____
 (Elsie Hsu, Specialist)

APPROVED BY : _____ , **DATE:** _____
 (May Chen, Manager)



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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 -16.78dB at 0.15000MHz
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -6.3dB at 32.96MHz
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted Output power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is IPEX not a standard connector.

NOTE: 1. For WLAN: The EUT was operating in 2400 ~ 2483.5MHz, 5.15~5.35GHz, 5.47~5.6GHz & 5.65~5.725GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 2400 ~ 2483.5MHz. For the 5.15~5.35GHz, 5.47~5.6GHz, 5.65~5.725GHz & 5.725~5.850GHz RF parameters was recorded in another test report.

2. The DFS report was recorded in another test report.



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2.1 MEASUREMENT UNCERTAINTY

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

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

Measurement	Value
Conducted emissions	2.86 dB
Radiated emissions (30MHz-1GHz)	5.37 dB
Radiated emissions (1GHz -6GHz)	3.72 dB
Radiated emissions (6GHz -18GHz)	4.00 dB
Radiated emissions (18GHz -40GHz)	4.11 dB



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3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	2x2 802.11A/B/G/N/AC WiFi + Bluetooth Module
MODEL NO.	QCNFA324
POWER SUPPLY	DC 3.3V from host equipment
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 400Mbps 802.11ac: up to 866.7Mbps
OPERATING FREQUENCY	For 15.407 802.11a: 5.18 ~ 5.24GHz, 5.26 ~ 5.32GHz, 5.5~5.72GHz, 5.745 ~ 5.825GHz For 15.247 2.4GHz: 2.412 ~ 2.462GHz
NUMBER OF CHANNEL	For 15.407 25 for 802.11a, 802.11n (HT20), VHT20 12 for 802.11n (HT40), VHT40 6 for 802.11ac (VHT80) For 15.247 11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)



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MAXIMUM OUTPUT POWER	For 15.407 802.11a: 80.808 mW 802.11ac (VHT20): 65.326mW 802.11ac (VHT40): 50.052mW 802.11ac (VHT80): 44.691mW For 15.247 802.11b: 250.042mW 802.11g: 485.327mW VHT20: 482.537mW VHT40: 205.692mW
ANTENNA TYPE	See item 3.2
ANTENNA CONNECTOR	See item 3.2
DATA CABLE	NA
I/O PORTS	NA
ASSOCIATED DEVICES	NA

NOTE:

1. There are Bluetooth technology and WLAN technology used for the EUT.
2. QCNFA324 supports two digital interfaces (USB and UART) for Bluetooth digital end data communication. The Bluetooth RF end is exactly same in both implementations.

Variant No.	Interface
SKU #1	USB interface for BT
SKU #2	UART interface for BT

From the above Variants, SKU #1 was selected as representative model for the test and its data was recorded in this report.

3. The EUT incorporates a 2T2R function.

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

4. The EUT was pre-tested under the following modes:

Test Mode	Data rate
Mode A	400ns GI
Mode B	800ns GI

From the above modes, the worst case was found in **Mode B**. Therefore only the test data of the mode was recorded in this report.

5. Spurious Emission (conducted & radiated emission) of the simultaneous operation (WiFi <5GHz> & Bluetooth) have been evaluated and no non-compliance found. The detail combinations of transmitters / frequencies / modes as below table

Mode	Available Channel	Tested Channel	Modulation Technology
5 GHz (802.11a) + Bluetooth (GFSK)	149 to 165	165	OFDM
	0 to 78	0	FHSS

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



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3.2 DESCRIPTION OF ANTENNA

The antenna gain was declared by client; please refer to the following table:

Antenna set 1									
Transmitter Circuit	Brand	Model	Antenna Type	2.4GHz Gain with cable loss (dBi)	5GHz Gain with cable loss (dBi)	2.4GHz Cable Loss (dBi)	5G Cable Loss (dBi)	Connector Type	Cable Length (mm)
Chain (0)	WNC	81-EBJ15.005	PIFA	3.62	Band 1&2: 3.08 Band 3: 4.76 Band 4: 4.76	1.15	Band 1&2: 1.70 Band 3: 1.74 Band 4: 1.79	IPEX	300
Chain (1)	WNC	81-EBJ15.005	PIFA	3.62	Band 1&2: 3.08 Band 3: 4.76 Band 4: 4.76	1.15	Band 1&2: 1.70 Band 3: 1.74 Band 4: 1.79	IPEX	300
Antenna set 2									
Transmitter Circuit	Brand	Model	Antenna Type	2.4GHz Gain with cable loss (dBi)	5GHz Gain with cable loss (dBi)	Cable Loss (dBi)	Connector Type	Cable Length (mm)	
Chain (0)	Tongda	T-543-8201044-A (Ant 1)	PIFA	3.572	Band 1&2: 3.002 Band 3: 4.546 Band 4: 4.416	NA	IPEX	77	
Chain (1)	Tongda	T-543-8201044-A (Ant 2)	PIFA	3.325	Band 1&2: 2.942 Band 3: 4.622 Band 4: 4.586	NA	IPEX	71	

- Note: 1. Above antenna gains of antenna are Total (H+V).
 2. All of antenna can be application for WLAN and Bluetooth.



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3.3 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 (HT 40), VHT40:

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
6	2437MHz		

3.3.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO					DESCRIPTION
	PLC	UE < 1G	UE ≥ 1G	APCM	OB	
1	√	√	√	√	√	Antenna set 1
2	-	√	√	-	-	Antenna set 2

Where **PLC**: Power Line Conducted Emission **UE < 1G**: Unwanted Emission below 1GHz
UE ≥ 1G: Unwanted Emission above 1GHz **APCM**: Antenna Port Conducted Measurement
OB: Conducted Out-Band Emission Measurement

Note 1. "-" means no effect.

AC 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	DATA RATE (Mbps)
802.11g	1 to 11	6	OFDM	6

UNWANTED EMISSION TEST (BELOW 1 GHz):

- Radiated versus Conducted Measurements
- 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	DATA RATE (Mbps)
802.11g	1 to 11	6	OFDM	6



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UNWANTED EMISSION TEST (ABOVE 1 GHz):

- Radiated versus Conducted Measurements
- 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	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	1
802.11g	1 to 11	1, 6, 11	OFDM	6
VHT20	1 to 11	1, 6, 11	OFDM	6.5
VHT40	3 to 9	3, 6, 9	OFDM	13.5

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	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	1
802.11g	1 to 11	1, 6, 11	OFDM	6
VHT20	1 to 11	1, 6, 11	OFDM	6.5
VHT40	3 to 9	3, 6, 9	OFDM	13.5

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	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	1
802.11g	1 to 11	1, 6, 11	OFDM	6
VHT20	1 to 11	1, 6, 11	OFDM	6.5
VHT40	3 to 9	3, 6, 9	OFDM	13.5



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TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
PLC	30deg. C, 70%RH	120Vac, 60Hz	Mike Hsieh
RE<1G	19deg. C, 65%RH	120Vac, 60Hz	Andy Ho
RE≥1G	23deg. C, 69%RH	120Vac, 60Hz	Robert Cheng
APCM	25deg. C, 60%RH	120Vac, 60Hz	James Chan
OB	25deg. C, 60%RH	120Vac, 60Hz	James Chan



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3.4 DUTY CYCLE OF TEST SIGNAL

For 2.4GHz

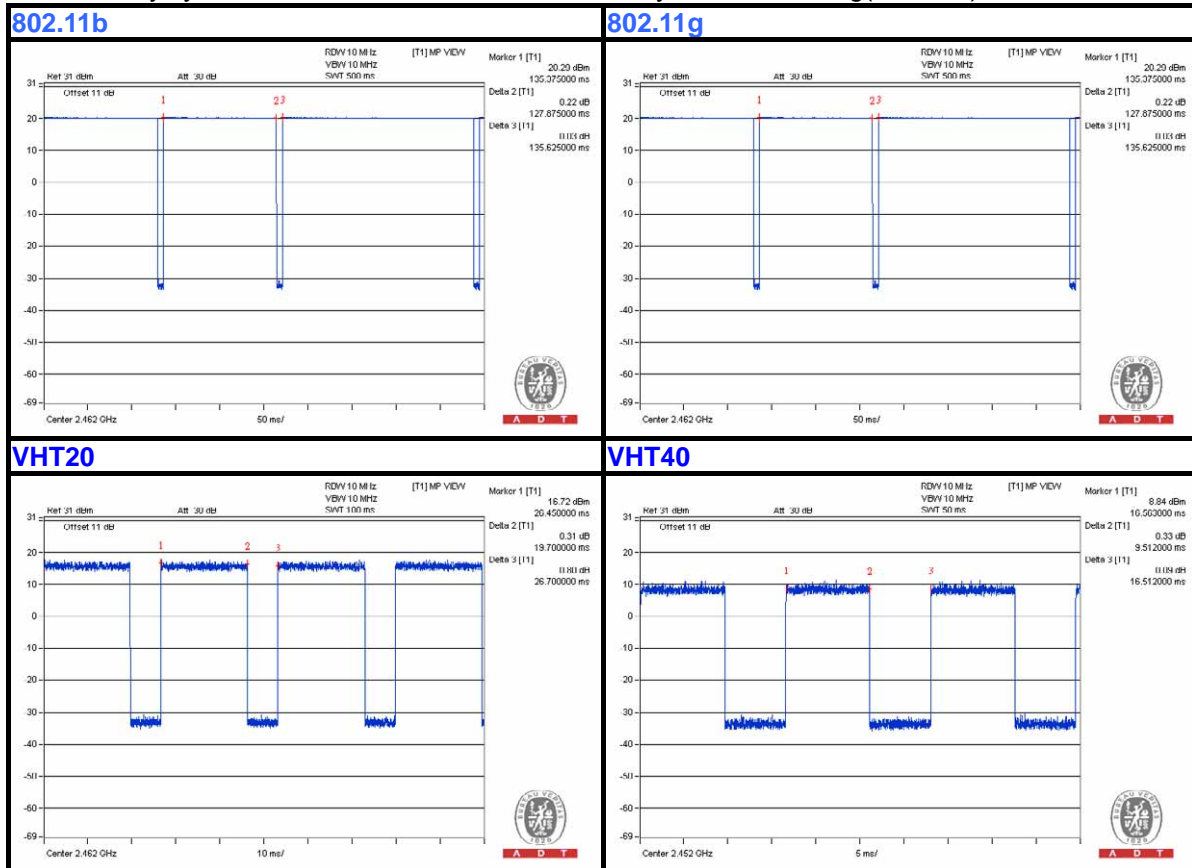
Duty cycle of test signal is < 98%, duty factor shall be considered.

802.11b: Duty cycle = 127.875 ms/135.625 ms = 0.943, Duty factor = $10 * \log(1/0.943) = 0.25$

802.11g: Duty cycle = 21.4 ms/28.4 ms = 0.754, Duty factor = $10 * \log(1/0.754) = 1.2$

VHT20: Duty cycle = 19.7 ms/26.7 ms = 0.738, Duty factor = $10 * \log(1/0.738) = 1.3$

VHT40: Duty cycle = 9.512 ms/16.512 ms = 0.576, Duty factor = $10 * \log(1/0.576) = 2.4$





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3.5 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.

3.6 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.

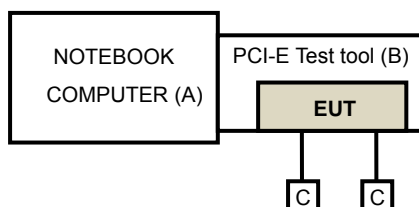
No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	NOTEBOOK COMPUTER	DELL	E6420	H62T3R1	FCC DoC	Provided by Lab
B	PCI-E Test tool	Qualcomm Atheros	NA	NA	NA	Supplied by Client
C	50ohm terminal resistor	NA	NA	NA	NA	Provided by Lab
		NA	NA	NA	NA	Provided by Lab

NOTE: 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	RF cable	1	0.1	No	0	Provided by Lab
2	RF cable	1	0.2	No	0	Provided by Lab

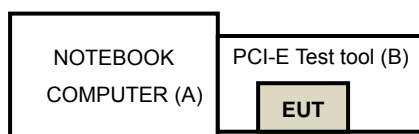
3.7 CONFIGURATION OF SYSTEM UNDER TEST

For Unwanted Emission test (Radiated Measurement)



Note: Support unit C is 50ohm terminal resistor.

For other test items:





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4. TEST TYPES AND RESULTS (FOR 2.4GHz, 2400 ~ 2483.5MHz Band)

4.1 CONDUCTED OUTPUT POWER MEASUREMENT

4.1.1 LIMITS OF MAXIMUM OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 2400–2483.5 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 $NANT \leq 4$;

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 $NANT \geq 5$.

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

4.1.2 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. 10, 2014

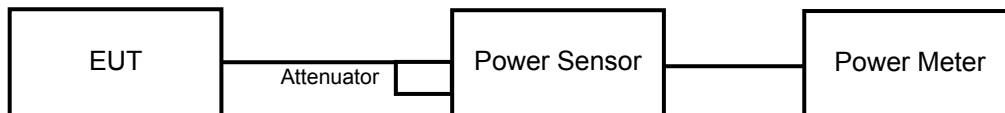
4.1.3 TEST PROCEDURES

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

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



4.1.6 EUT OPERATING CONDITIONS

The software (QCRT Version: 3.0.29.0) provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



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4.1.7 TEST RESULTS

FOR PEAK POWER

802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN(0)	CHAIN(1)				
1	2412	20.21	20.29	211.859	23.26	29.37	PASS
6	2437	20.62	20.72	233.377	23.68	29.37	PASS
11	2462	20.76	21.17	250.042	23.98	29.37	PASS

NOTE: Directional gain = $3.62\text{dBi} + 10\log(2) = 6.63\text{dBi} > 6\text{dBi}$, therefore the limit needs to reduce, so the power limit shall be reduced to $30 - (6.63 - 6) = 29.37\text{dBm}$.

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN(0)	CHAIN(1)				
1	2412	19.87	19.31	182.361	22.61	29.37	PASS
6	2437	23.83	23.87	485.327	26.86	29.37	PASS
11	2462	19.59	19.75	185.397	22.68	29.37	PASS

NOTE: Directional gain = $3.62\text{dBi} + 10\log(2) = 6.63\text{dBi} > 6\text{dBi}$, therefore the limit needs to reduce, so the power limit shall be reduced to $30 - (6.63 - 6) = 29.37\text{dBm}$.

**VHT20**

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN(0)	CHAIN(1)				
1	2412	19.28	19.03	164.706	22.17	29.37	PASS
6	2437	23.82	23.83	482.537	26.84	29.37	PASS
11	2462	18.86	19.03	156.896	21.96	29.37	PASS

NOTE: Directional gain = $3.62\text{dBi} + 10\log(2) = 6.63\text{dBi} > 6\text{dBi}$, therefore the limit needs to reduce, so the power limit shall be reduced to $30 - (6.63 - 6) = 29.37\text{dBm}$.

VHT40

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN(0)	CHAIN(1)				
3	2422	17.43	17.18	107.575	29.37	29.37	PASS
6	2437	19.02	21.00	205.692	29.37	29.37	PASS
9	2452	15.03	15.22	65.108	29.37	29.37	PASS

NOTE: Directional gain = $3.62\text{dBi} + 10\log(2) = 6.63\text{dBi} > 6\text{dBi}$, therefore the limit needs to reduce, so the power limit shall be reduced to $30 - (6.63 - 6) = 29.37\text{dBm}$.

**A D T****FOR AVERAGE POWER****802.11b**

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
1	2412	17.92	18.02	125.331	20.98
6	2437	18.40	18.57	141.128	21.50
11	2462	18.28	18.88	144.566	21.60

802.11g

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
1	2412	13.88	13.45	46.565	16.68
6	2437	18.04	18.11	128.394	21.09
11	2462	13.62	13.62	46.028	16.63

VHT20

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
1	2412	13.32	12.43	38.976	15.91
6	2437	18.01	18.04	126.921	21.04
11	2462	12.42	12.34	34.598	15.39

VHT40

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
3	2422	11.07	10.68	24.489	13.89
6	2437	14.30	14.78	56.976	17.56
9	2452	8.50	8.31	13.855	11.42

4.2 POWER SPECTRAL DENSITY MEASUREMENT

4.2.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSP 40	100060	May 08, 2014	May 07, 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. 07, 2014

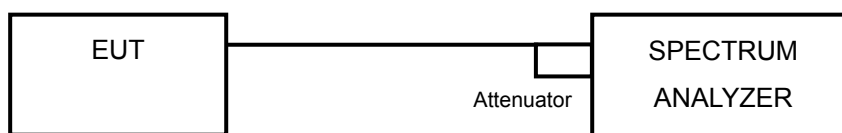
4.2.3 TEST PROCEDURE

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

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



4.2.6 EUT OPERATING CONDITION

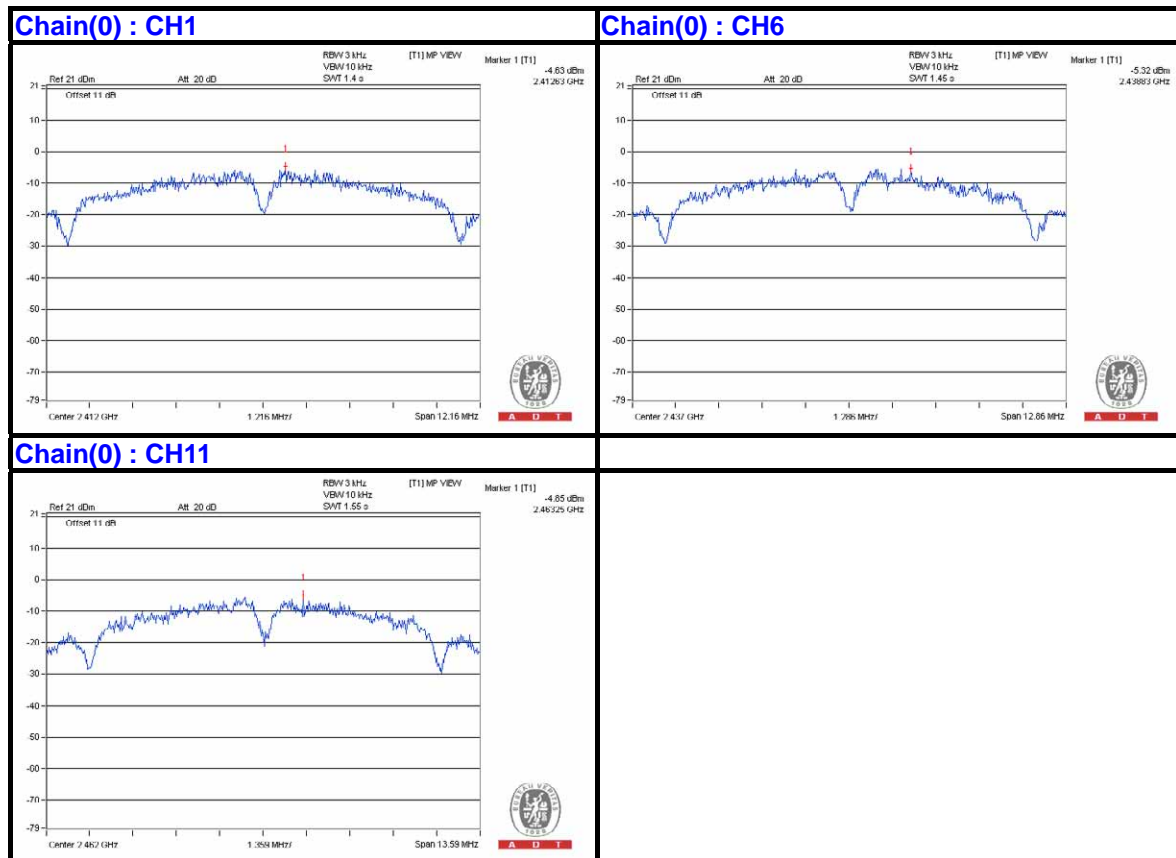
Same as Item 4.1.6

4.2.7 TEST RESULTS

802.11b

TX chain	Channel	FREQ. (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	1	2412	-4.63	3.01	-1.62	7.37	PASS
	6	2437	-5.32	3.01	-2.31	7.37	PASS
	11	2462	-4.85	3.01	-1.84	7.37	PASS
1	1	2412	-4.03	3.01	-1.02	7.37	PASS
	6	2437	-5.41	3.01	-2.40	7.37	PASS
	11	2462	-3.87	3.01	-0.86	7.37	PASS

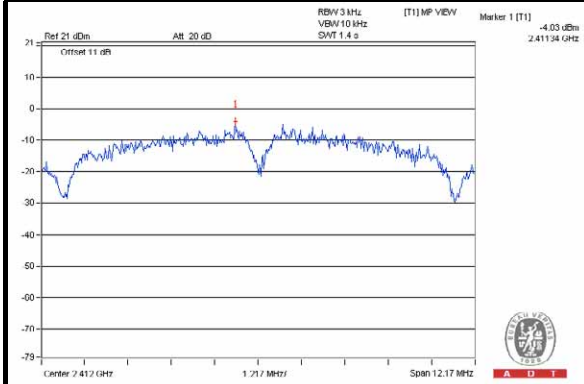
NOTE: Directional gain = 3.62dBi + 10log(2) = 6.63dBi > 6dBi , so the power density limit shall be reduced to 8-(6.63-6) = 7.37dBm.



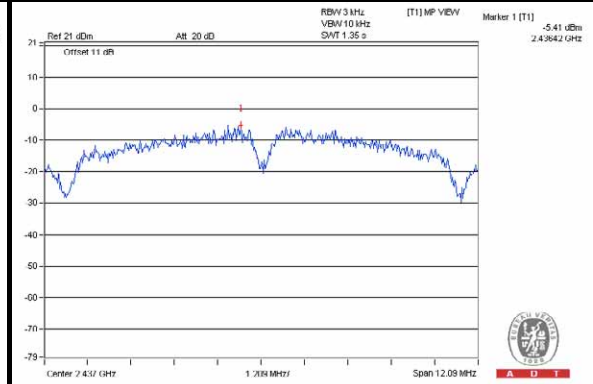


A D T

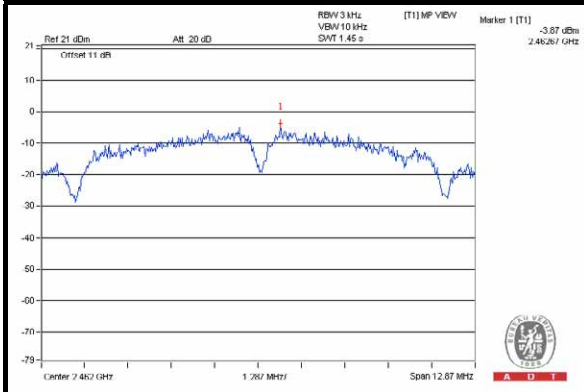
Chain(1) : CH1



Chain(1) : CH6



Chain(1) : CH11





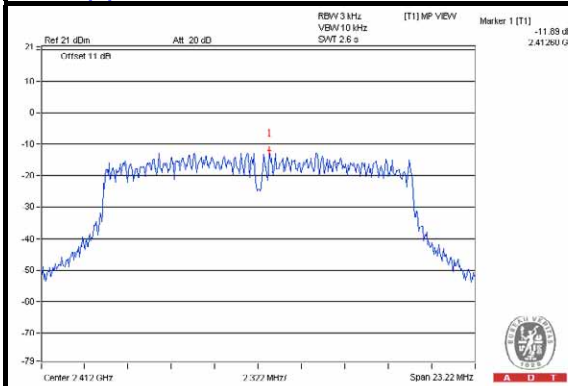
A D T

802.11g

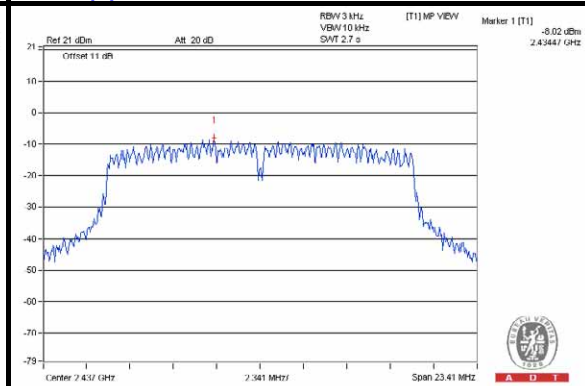
TX chain	Channel	FREQ. (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	1	2412	-11.89	3.01	-8.88	7.37	PASS
	6	2437	-8.02	3.01	-5.01	7.37	PASS
	11	2462	-13.22	3.01	-10.21	7.37	PASS
1	1	2412	-10.90	3.01	-7.89	7.37	PASS
	6	2437	-8.72	3.01	-5.71	7.37	PASS
	11	2462	-13.54	3.01	-10.53	7.37	PASS

NOTE: Directional gain = 3.62dBi + 10log(2) = 6.63dBi > 6dBi , so the power density limit shall be reduced to 8-(6.63-6) = 7.37dBm.

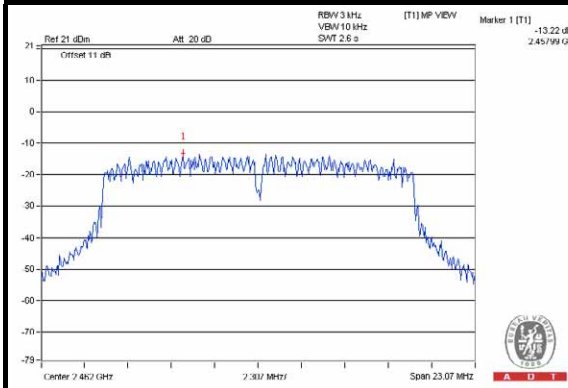
Chain(0) : CH1



Chain(0) : CH6



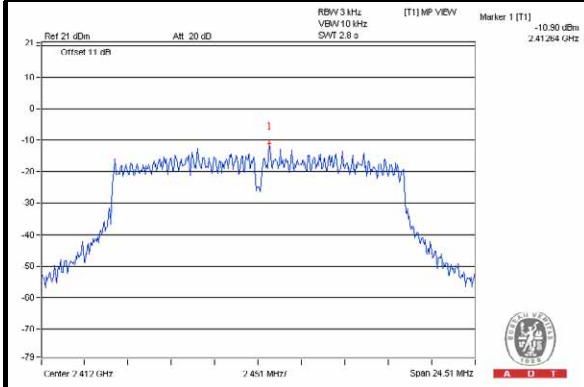
Chain(0) : CH11



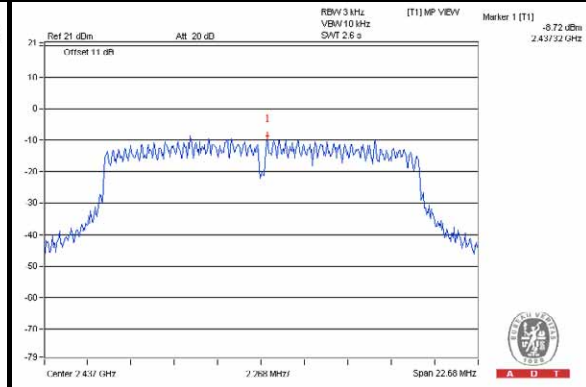


A D T

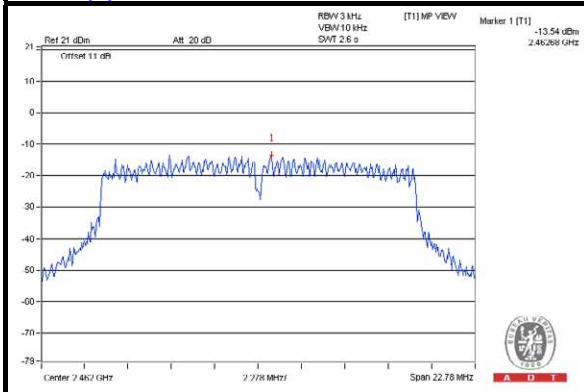
Chain(1) : CH1



Chain(1) : CH6



Chain(1) : CH11



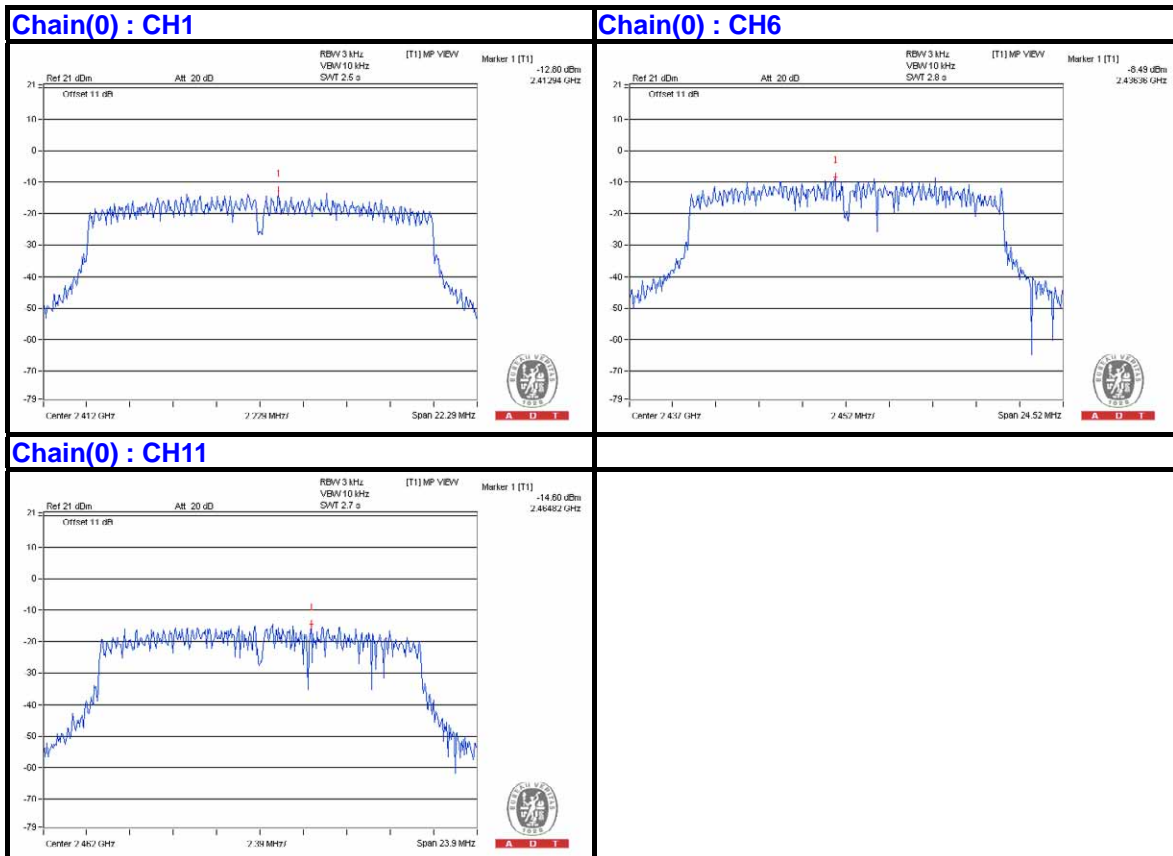


A D T

VHT20

TX chain	Channel	FREQ. (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	1	2412	-12.80	3.01	-9.79	7.37	PASS
	6	2437	-8.49	3.01	-5.48	7.37	PASS
	11	2462	-14.60	3.01	-11.59	7.37	PASS
1	1	2412	-14.42	3.01	-11.41	7.37	PASS
	6	2437	-8.99	3.01	-5.98	7.37	PASS
	11	2462	-14.80	3.01	-11.79	7.37	PASS

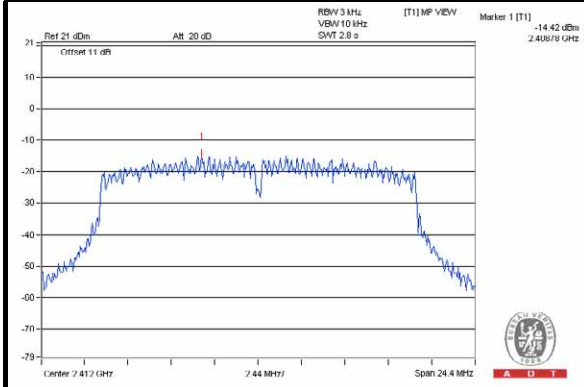
NOTE: Directional gain = 3.62dBi + 10log(2) = 6.63dBi > 6dBi , so the power density limit shall be reduced to 8-(6.63-6) = 7.37dBm.



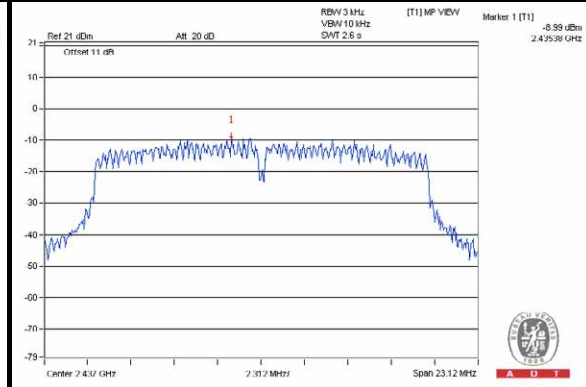


A D T

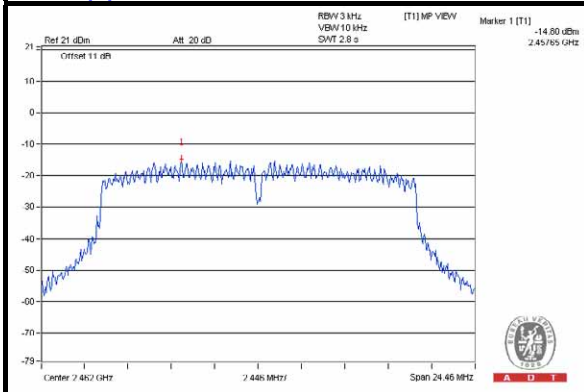
Chain(1) : CH1



Chain(1) : CH6



Chain(1) : CH11



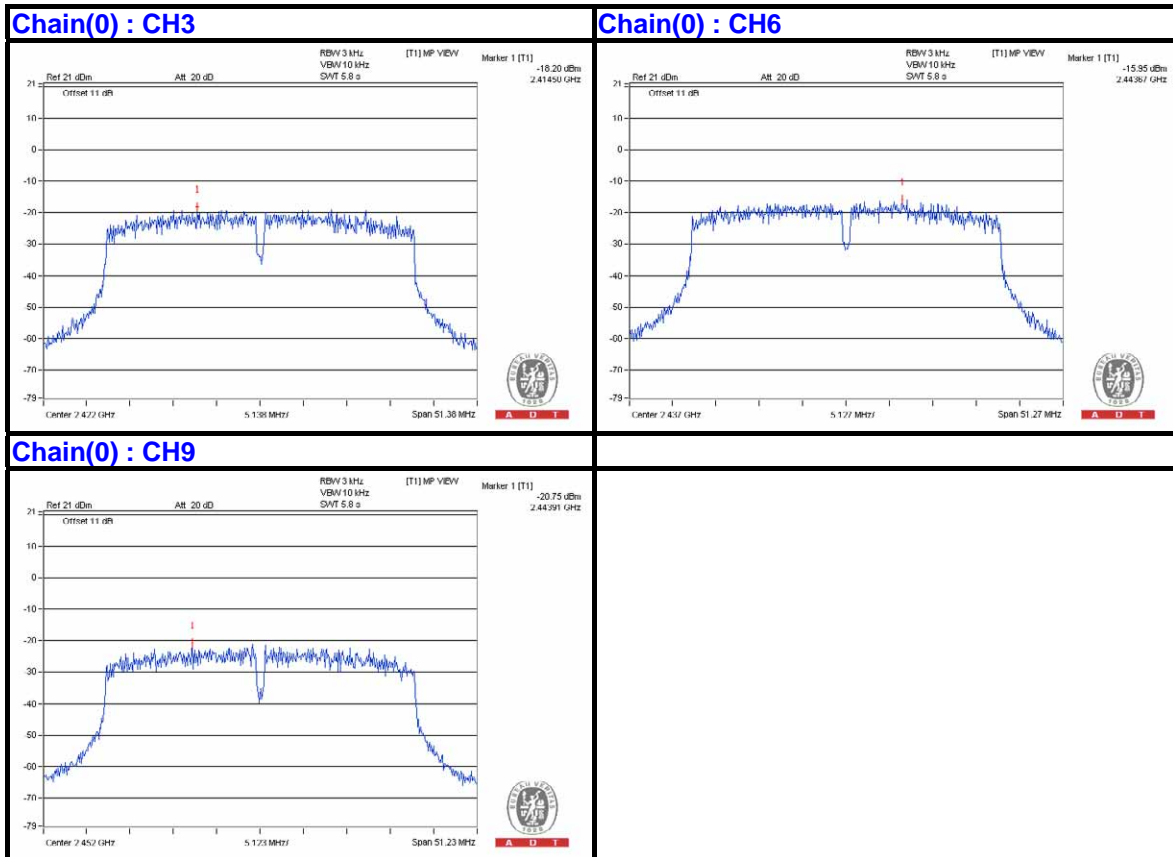


A D T

VHT40

TX chain	Channel	FREQ. (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	3	2422	-18.20	3.01	-15.19	7.37	PASS
	6	2437	-15.95	3.01	-12.94	7.37	PASS
	9	2452	-20.75	3.01	-17.74	7.37	PASS
1	3	2422	-18.18	3.01	-15.17	7.37	PASS
	6	2437	-15.77	3.01	-12.76	7.37	PASS
	9	2452	-21.89	3.01	-18.88	7.37	PASS

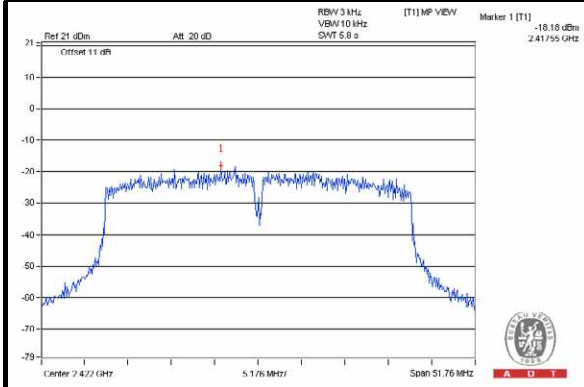
NOTE: Directional gain = 3.62dBi + 10log(2) = 6.63dBi > 6dBi , so the power density limit shall be reduced to 8-(6.63-6) = 7.37dBm.



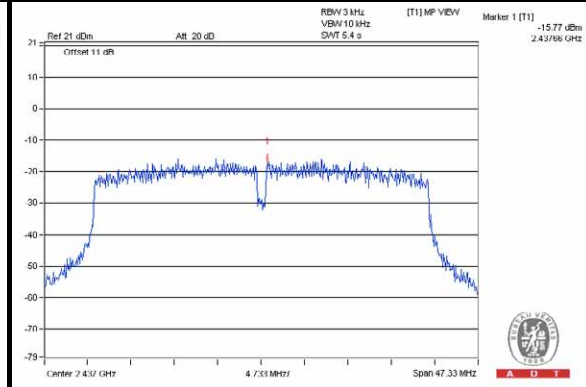


A D T

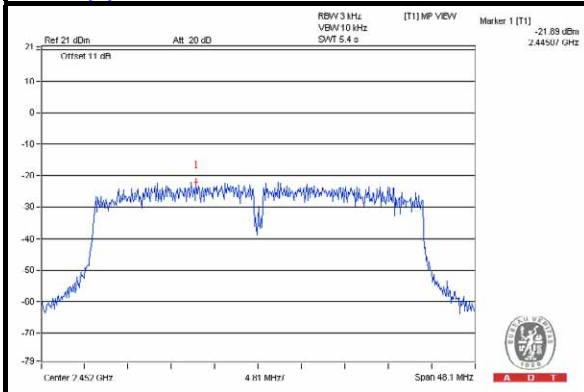
Chain(1) : CH3



Chain(1) : CH6



Chain(1) : CH9



4.3 6dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSP 40	100060	May 08, 2014	May 07, 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. 07, 2014

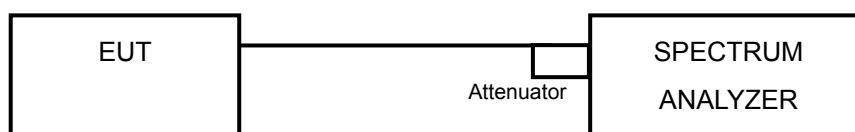
4.3.3 TEST PROCEDURE

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

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



4.3.6 EUT OPERATING CONDITIONS

Same as Item 4.1.6

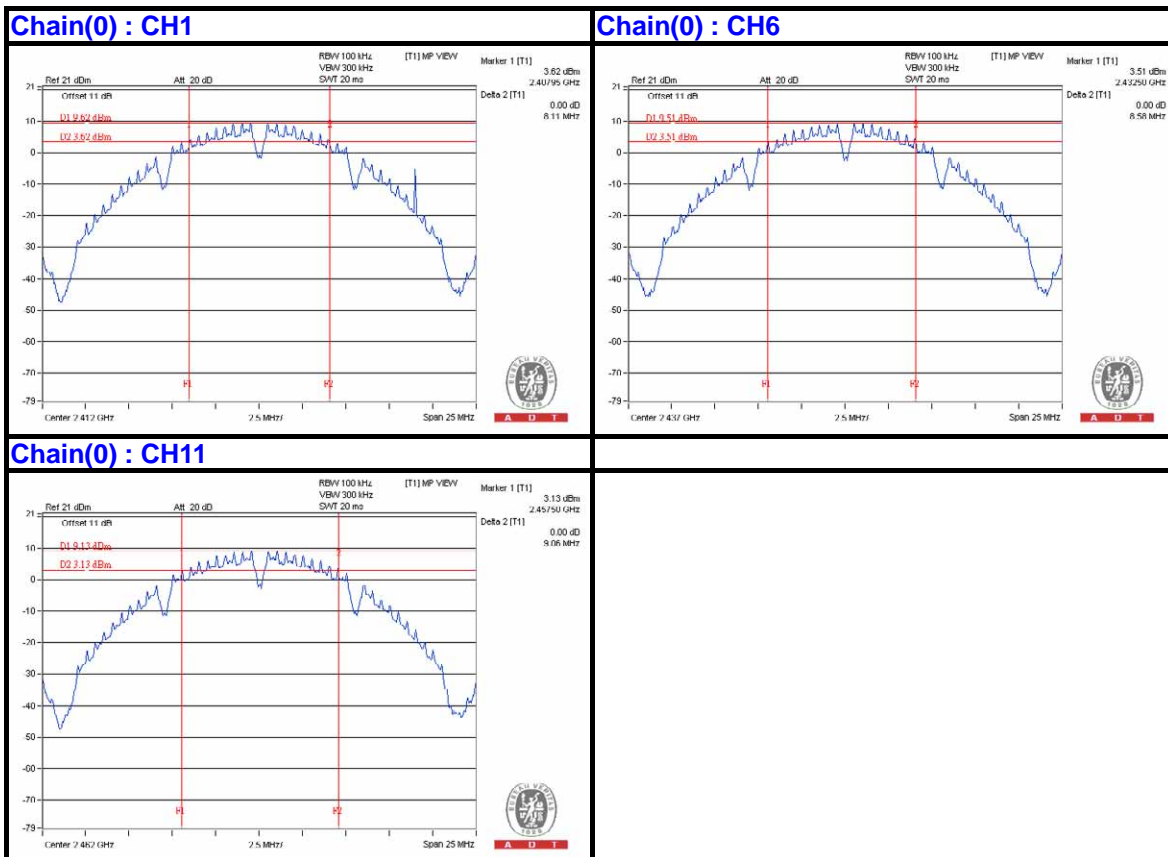


A D T

4.3.7 TEST RESULTS

802.11b

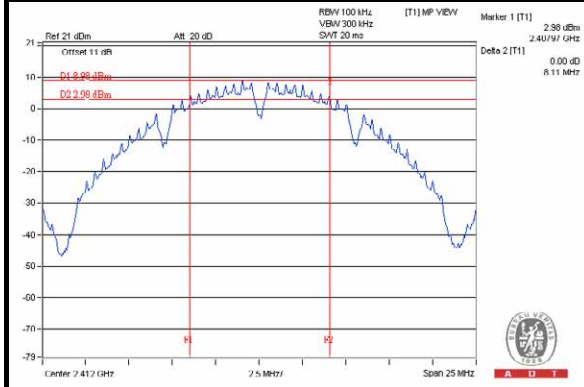
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN(0)	CHAIN(1)		
1	2412	8.11	8.11	0.5	PASS
6	2437	8.58	8.06	0.5	PASS
11	2462	9.06	8.58	0.5	PASS



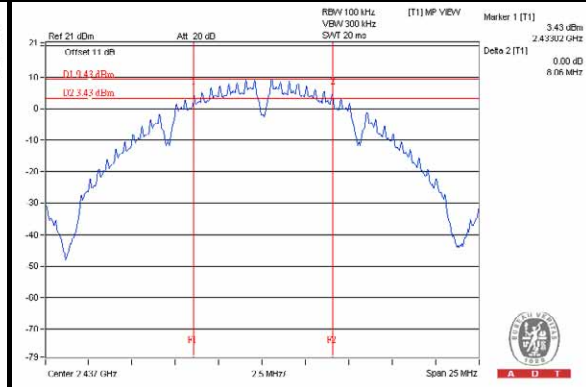


A D T

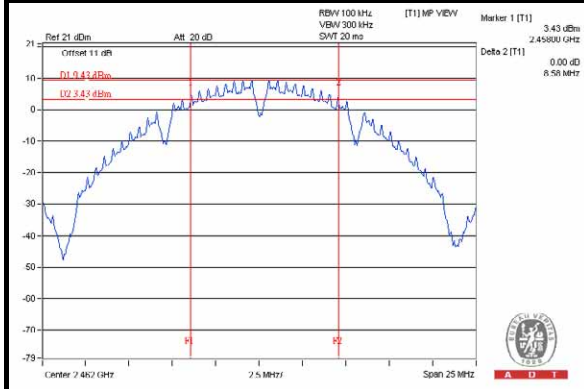
Chain(1) : CH1



Chain(1) : CH6



Chain(1) : CH11

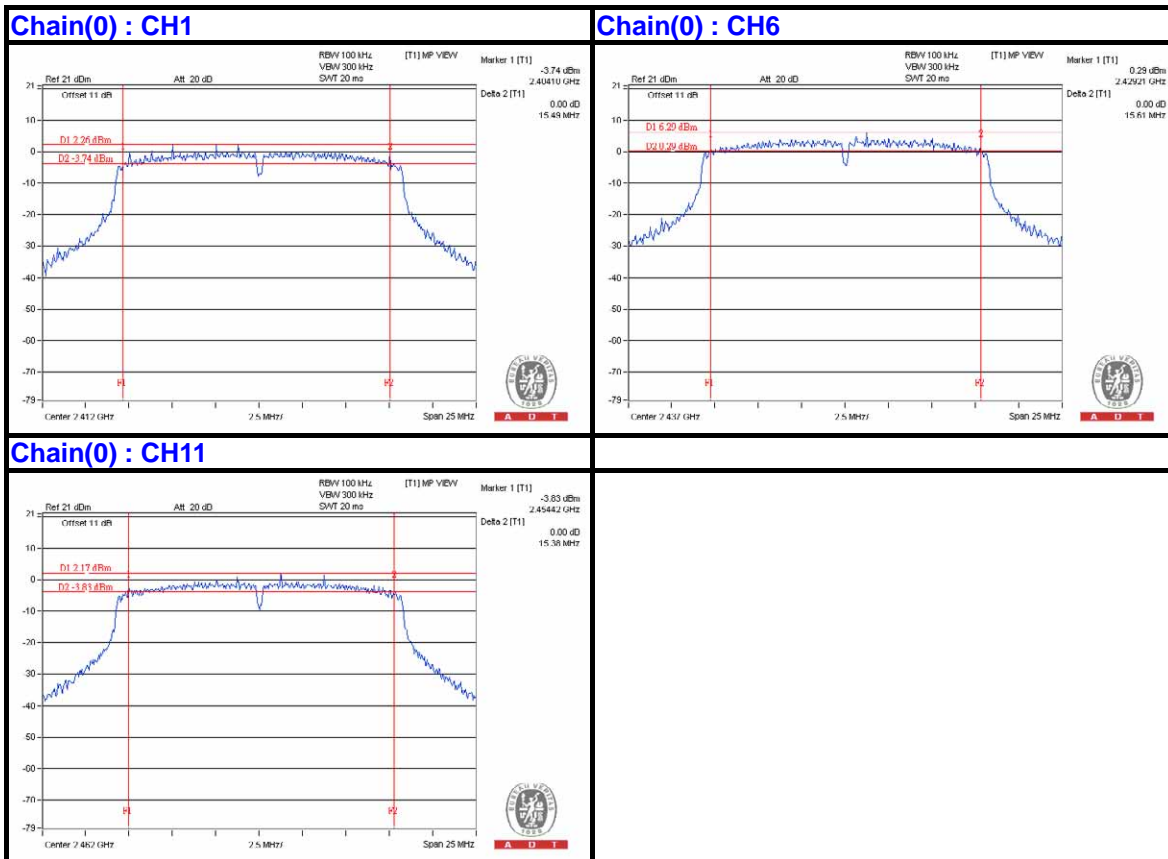




A D T

802.11g

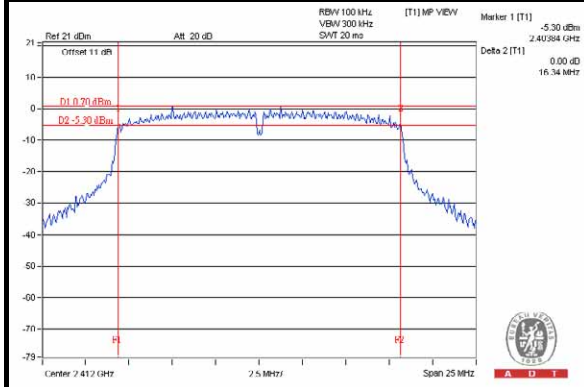
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN(0)	CHAIN(1)		
1	2412	15.49	16.34	0.5	PASS
6	2437	15.61	15.12	0.5	PASS
11	2462	15.38	15.19	0.5	PASS



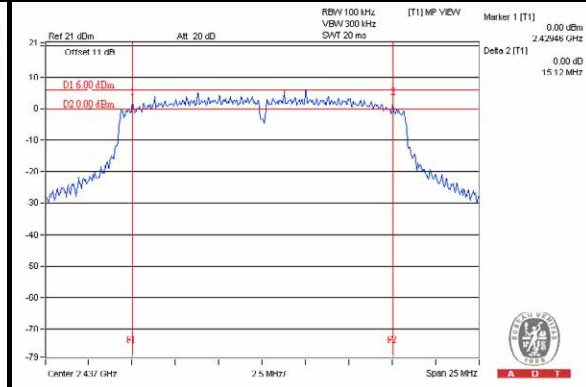


A D T

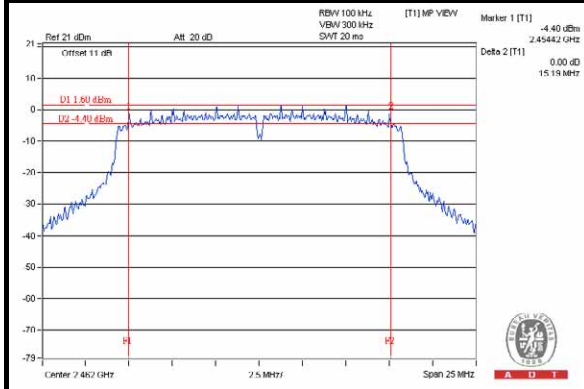
Chain(1) : CH1



Chain(1) : CH6



Chain(1) : CH11



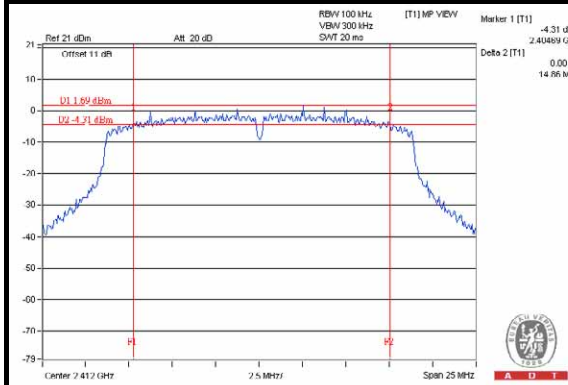


A D T

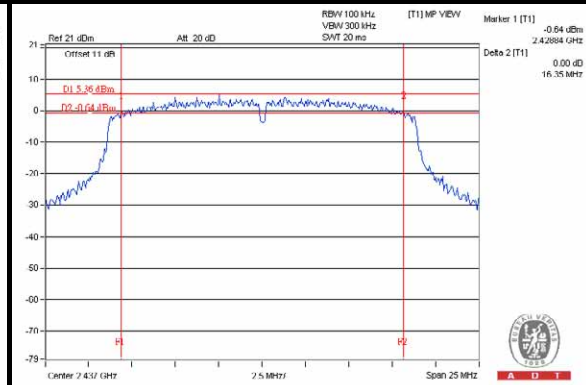
VHT20

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN(0)	CHAIN(1)		
1	2412	14.86	16.27	0.5	PASS
6	2437	16.35	15.42	0.5	PASS
11	2462	15.94	16.31	0.5	PASS

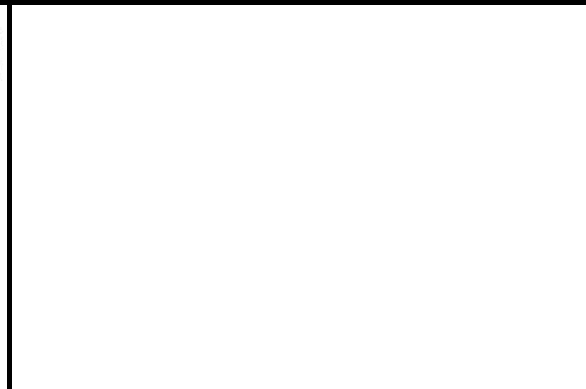
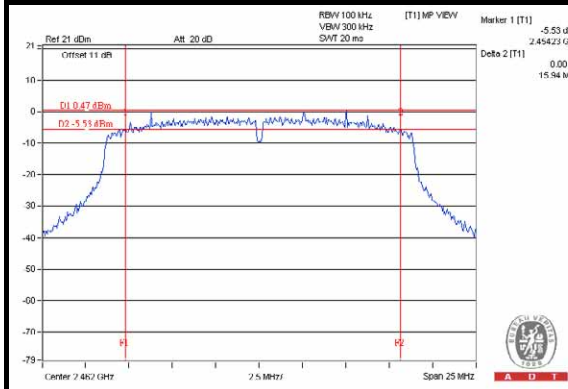
Chain(0) : CH1



Chain(0) : CH6



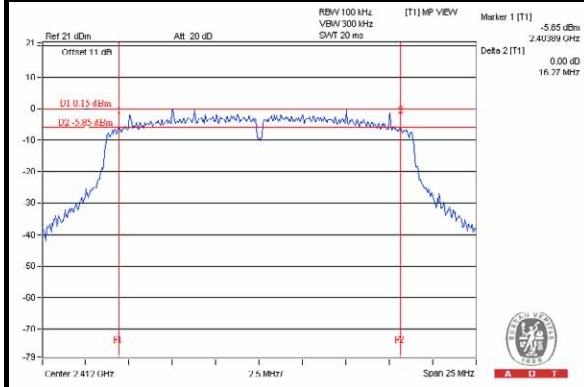
Chain(0) : CH11



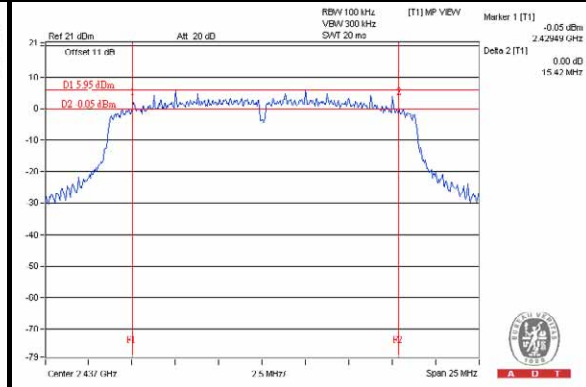


A D T

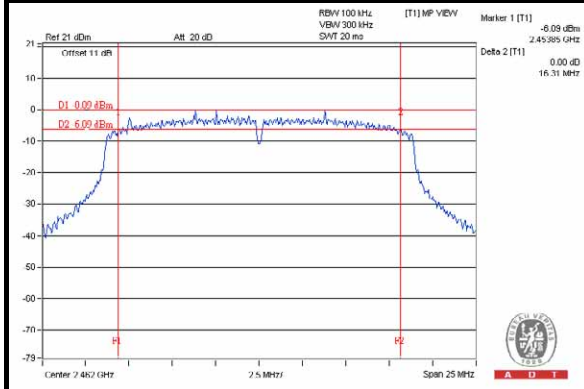
Chain(1) : CH1



Chain(1) : CH6



Chain(1) : CH11



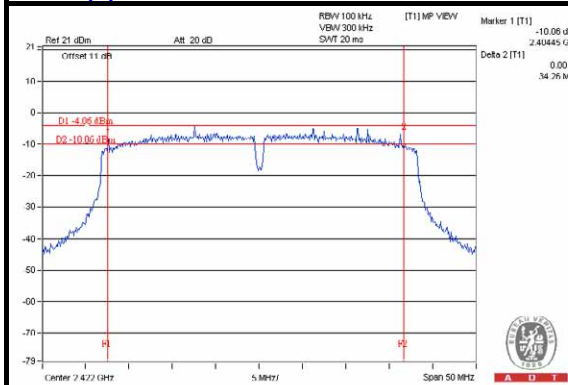


A D T

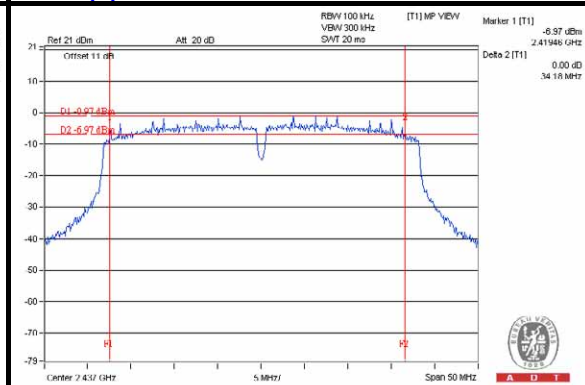
VHT40

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN(0)	CHAIN(1)		
3	2422	34.26	34.51	0.5	PASS
6	2437	34.18	31.55	0.5	PASS
9	2452	34.15	32.07	0.5	PASS

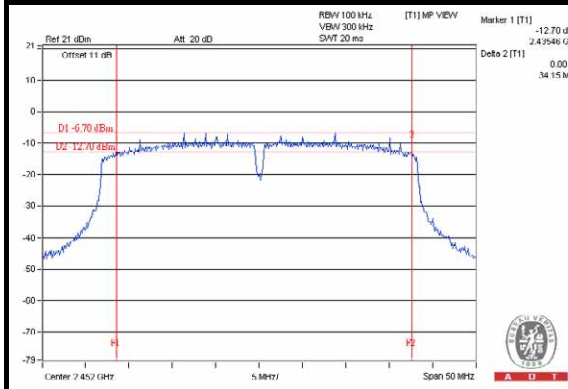
Chain(0) : CH3



Chain(0) : CH6



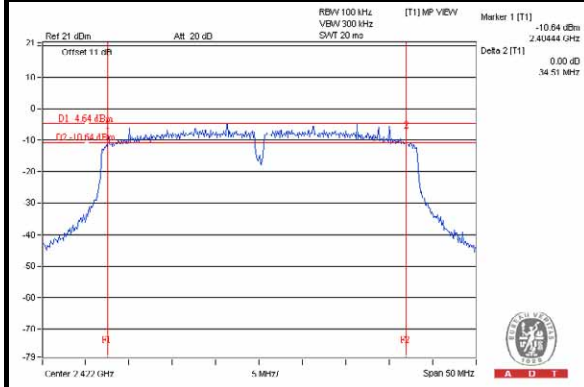
Chain(0) : CH9



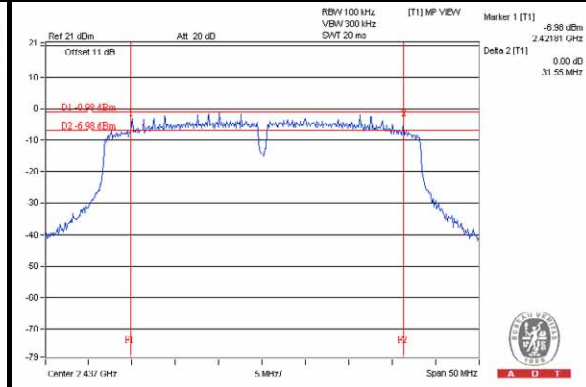


A D T

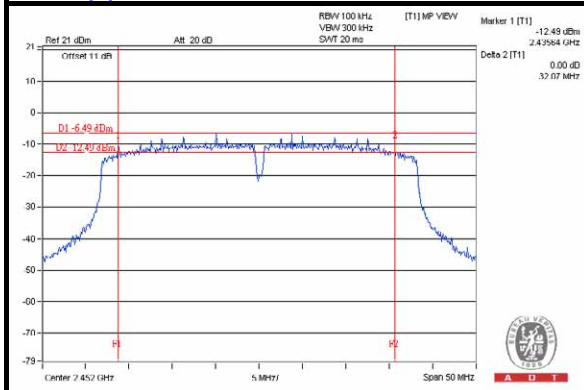
Chain(1) : CH3



Chain(1) : CH6



Chain(1) : CH9





A D T

4.4 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.4.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSP 40	100060	May 08, 2014	May 07, 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. 07, 2014

4.4.3 TEST PROCEDURE

Measurement Procedure - Reference Level

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

Measurement Procedure –Unwanted Emission Level

1. Set RBW = 100 kHz.
2. Set VBW \geq 300 kHz.
3. 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.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 EUT OPERATING CONDITION



4.4.6 TEST RESULTS

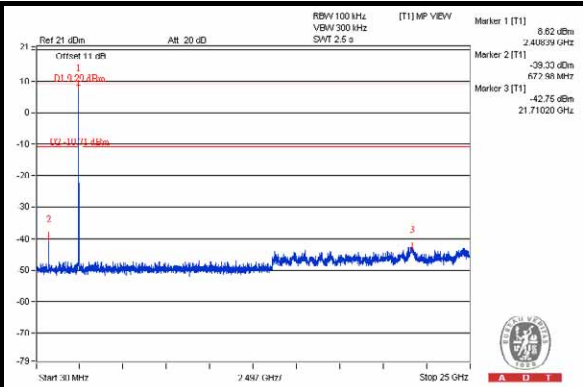
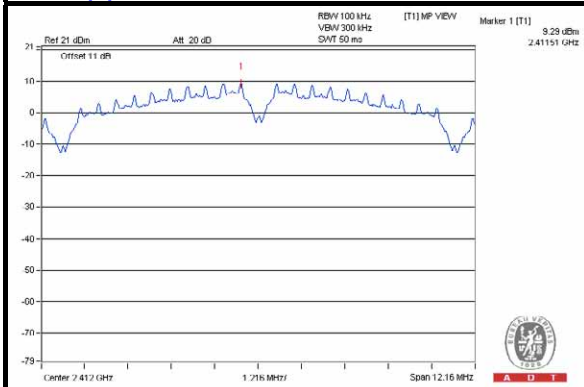
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



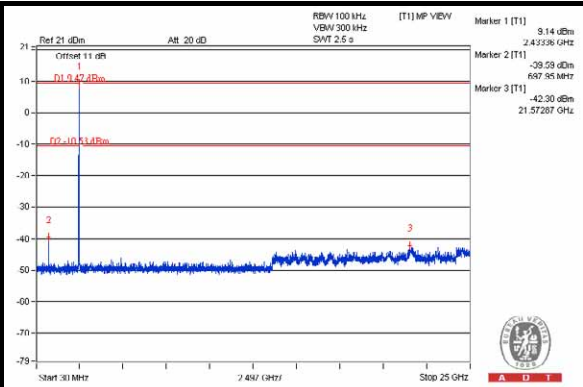
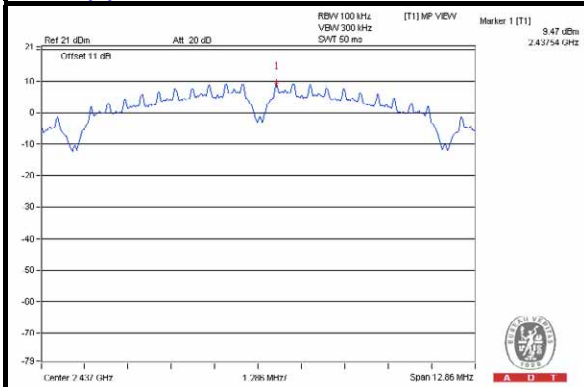
A D T

802.11b

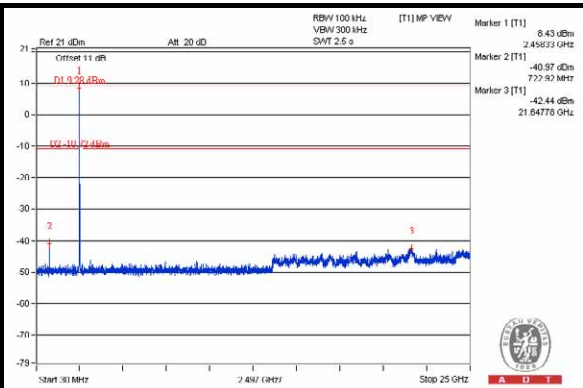
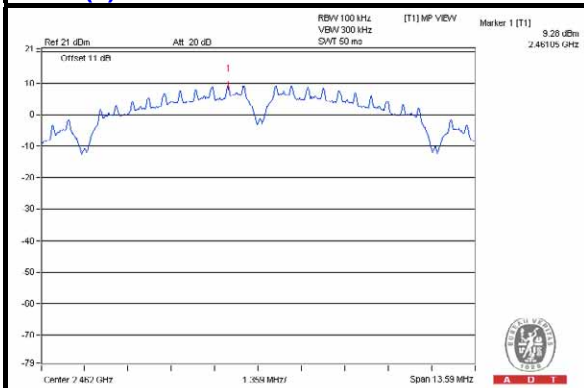
Chain(0) : CH 1



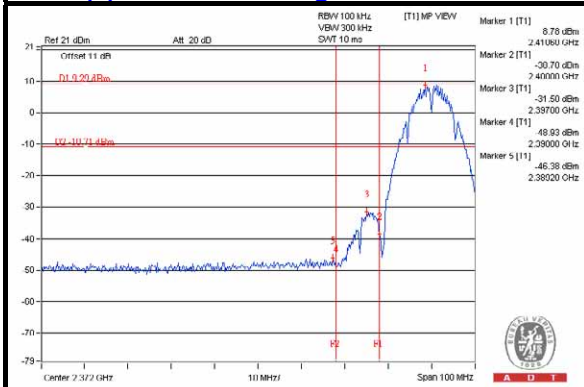
Chain(0) : CH 6



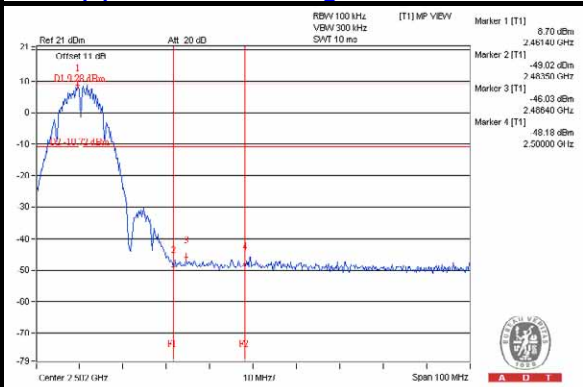
Chain(0) : CH 11



Chain(0) : CH 1 Band edge



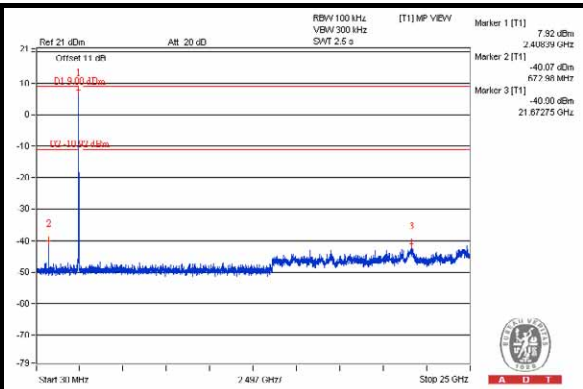
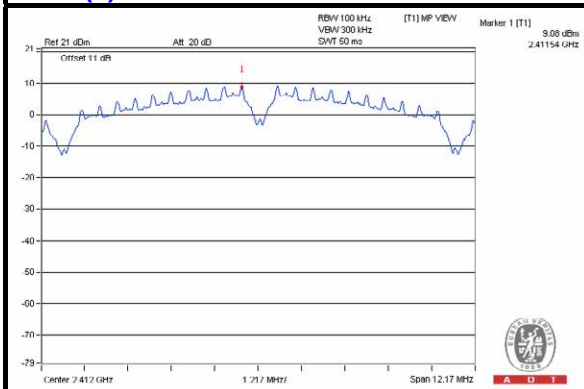
Chain(0) : CH 11 Band edge



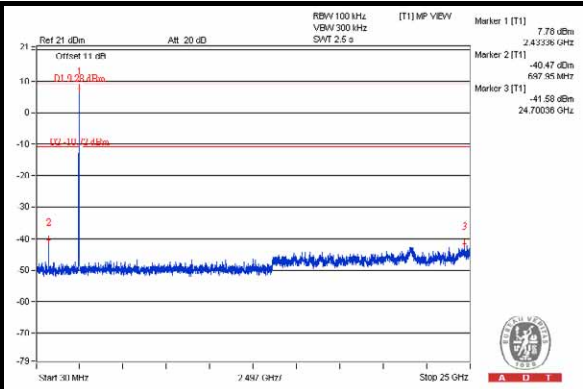
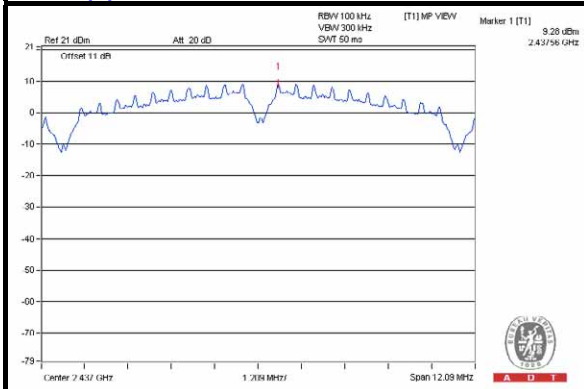


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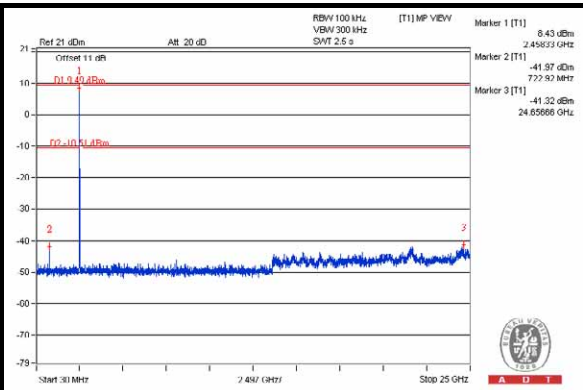
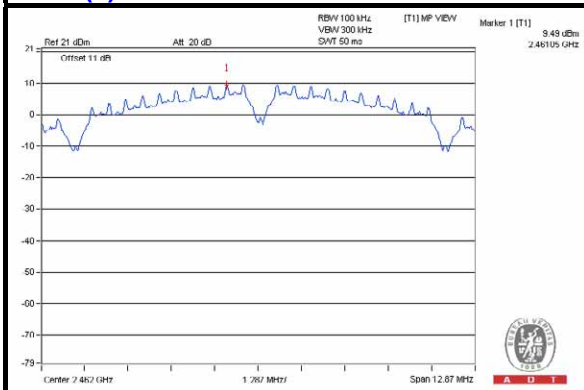
Chain(1) : CH 1



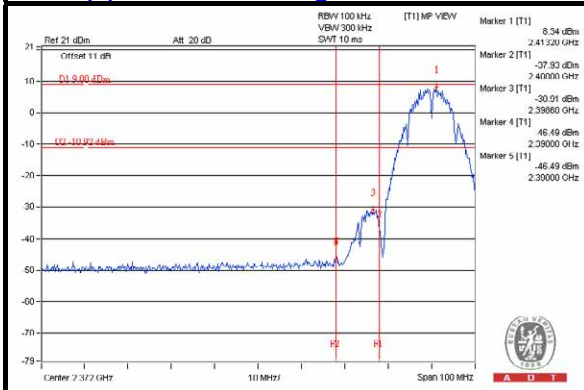
Chain(1) : CH 6



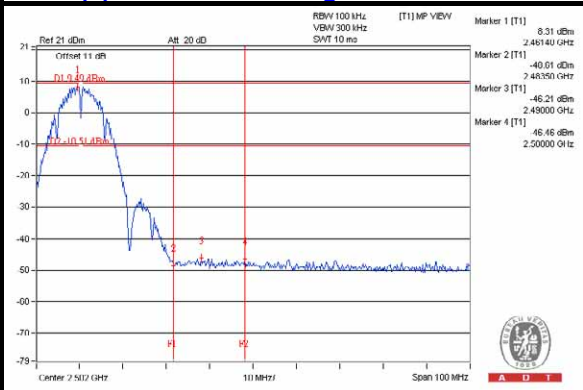
Chain(1) : CH 11



Chain(1) : CH 1 Band edge



Chain(1) : CH 11 Band edge

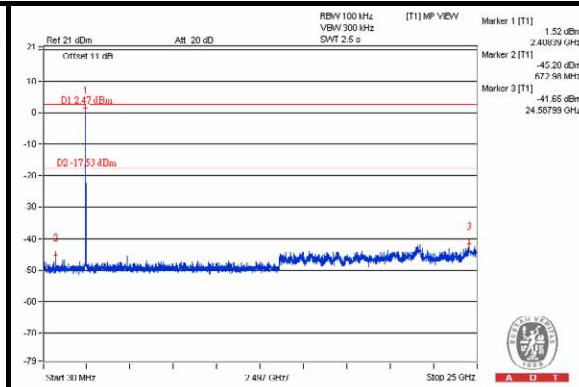
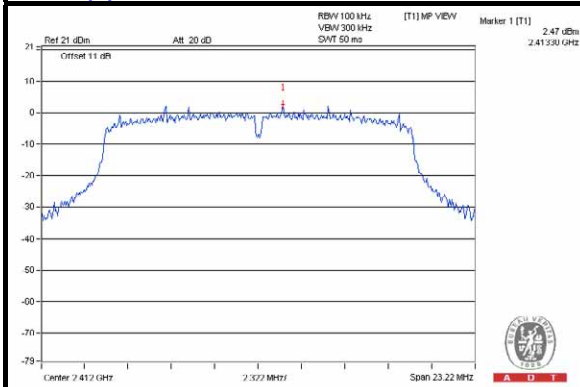




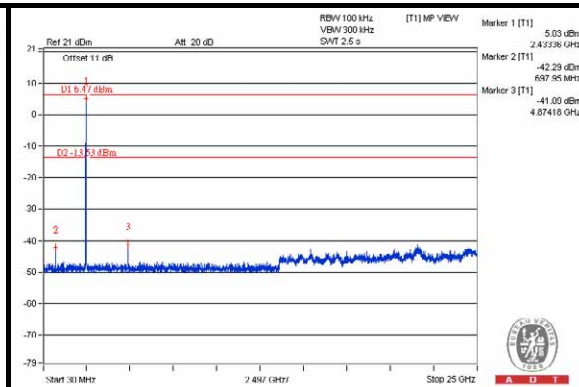
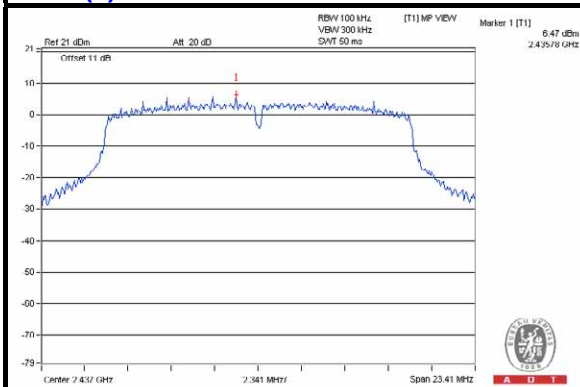
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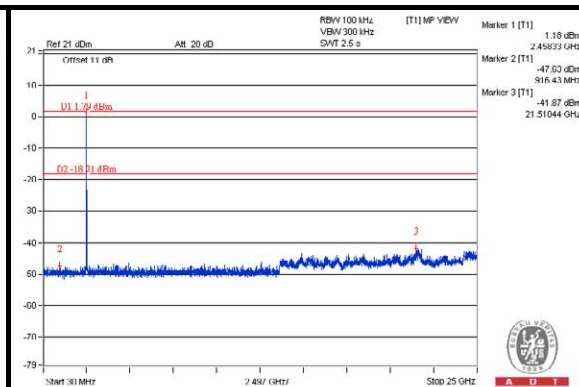
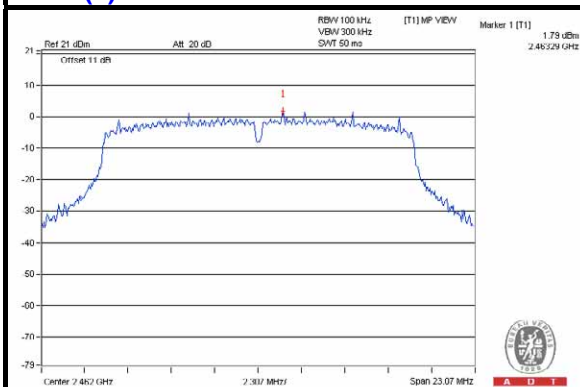
Chain(0) : CH 1



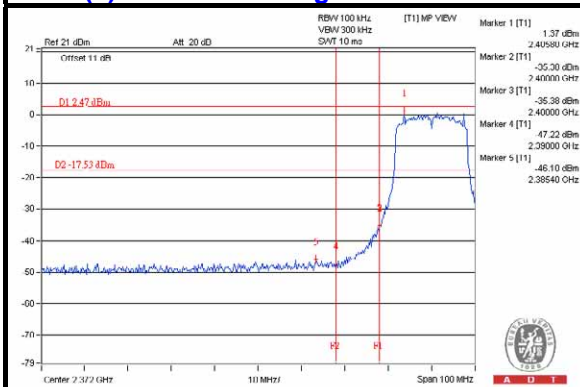
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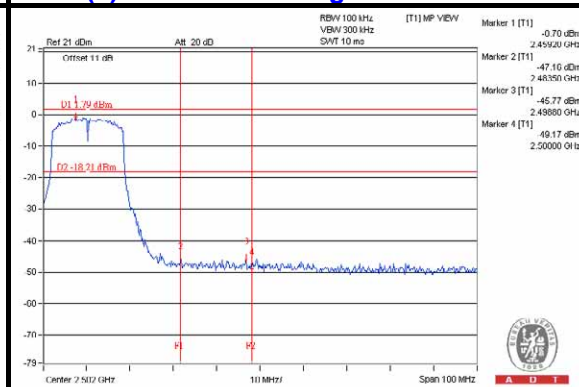
Chain(0) : CH 11



Chain(0) : CH 1 Band edge



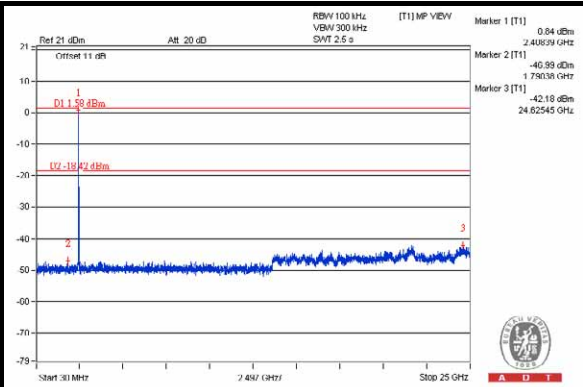
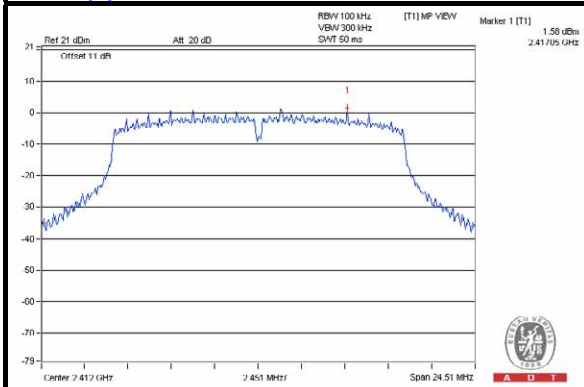
Chain(0) : CH 11 Band edge



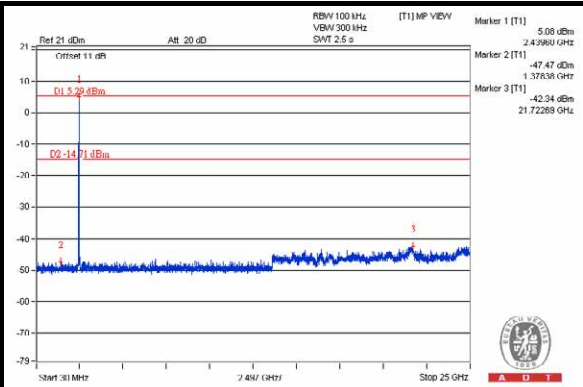
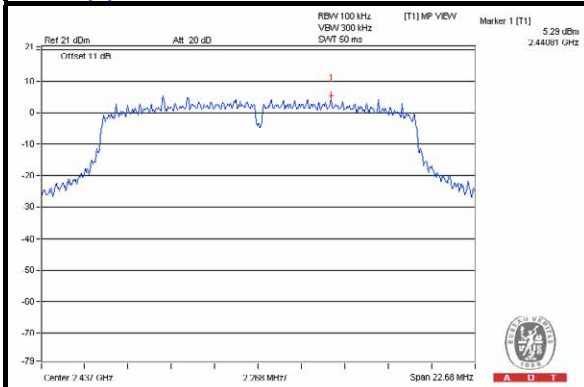


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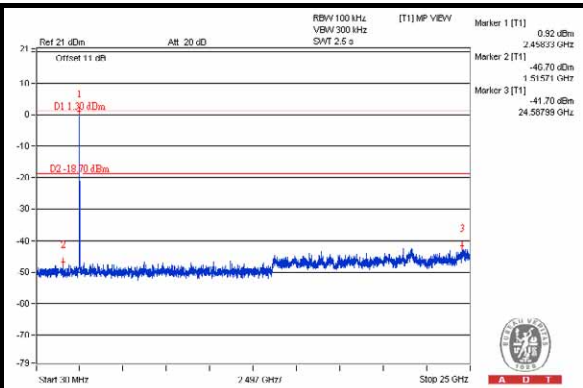
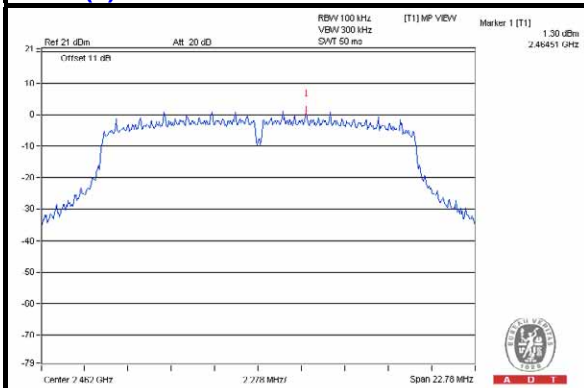
Chain(1) : CH 1



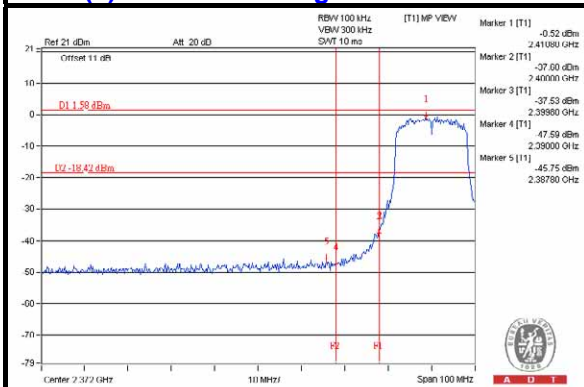
Chain(1) : CH 6



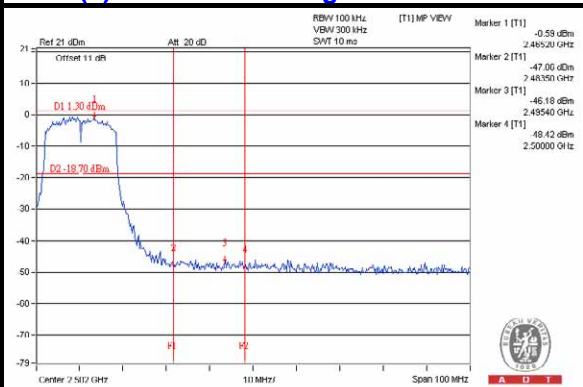
Chain(1) : CH 11



Chain(1) : CH 1 Band edge



Chain(1) : CH 11 Band edge

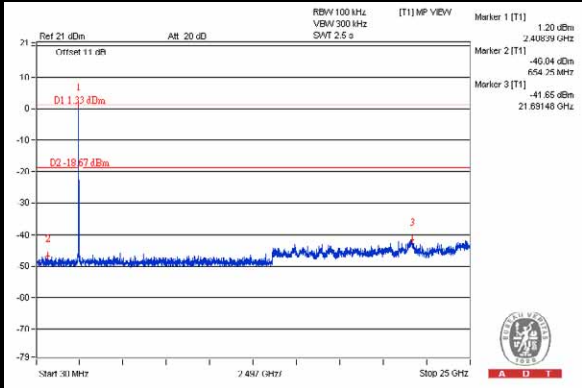
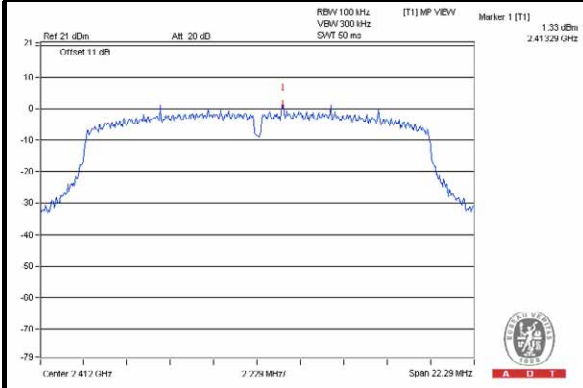




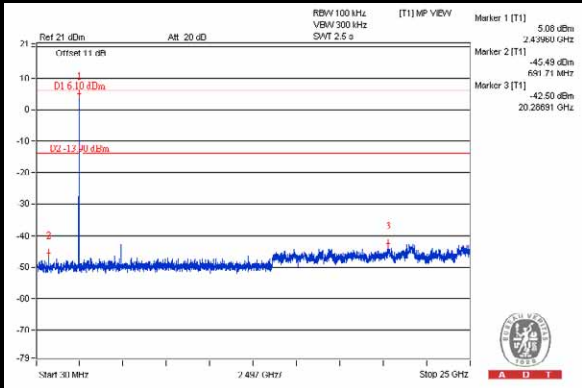
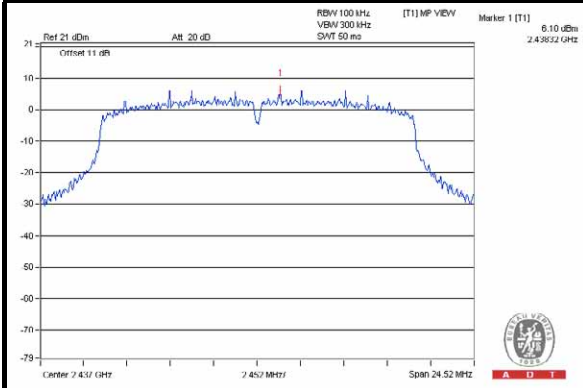
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VHT20

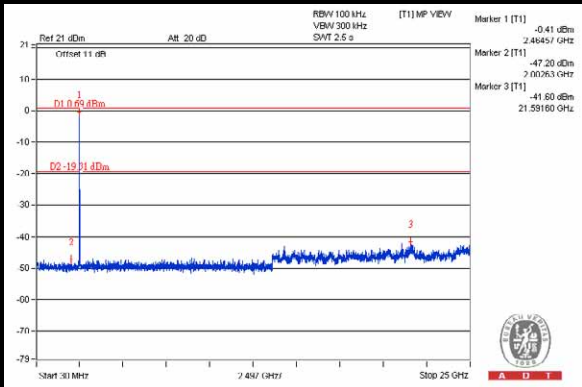
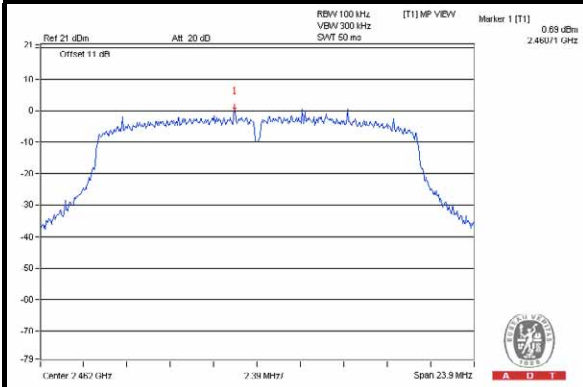
Chain(0) : CH 1



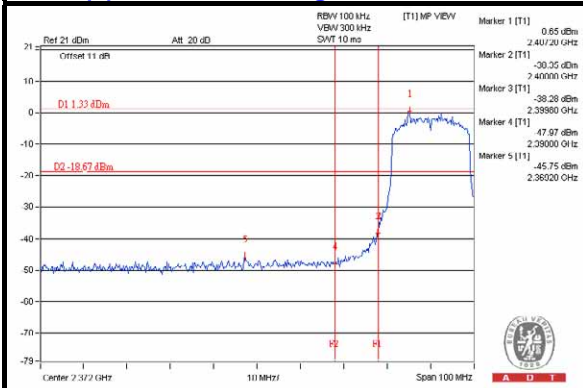
Chain(0) : CH 6



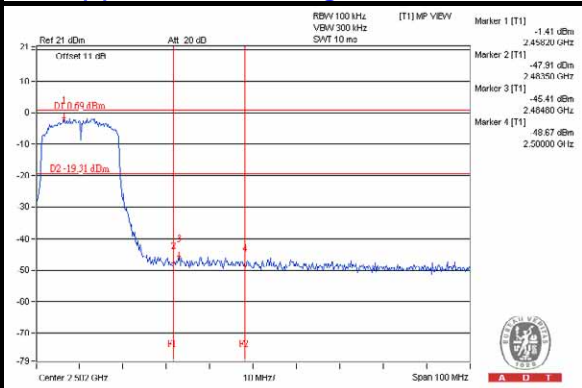
Chain(0) : CH 11



Chain(0) : CH 1 Band edge



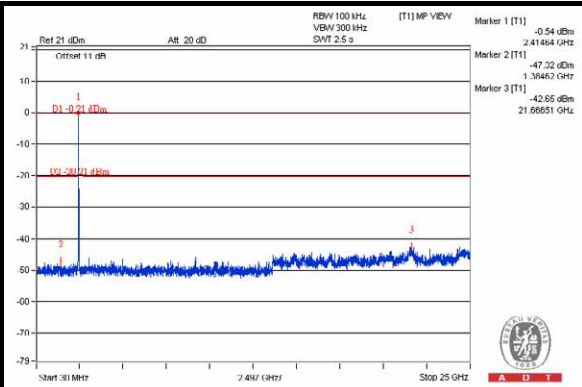
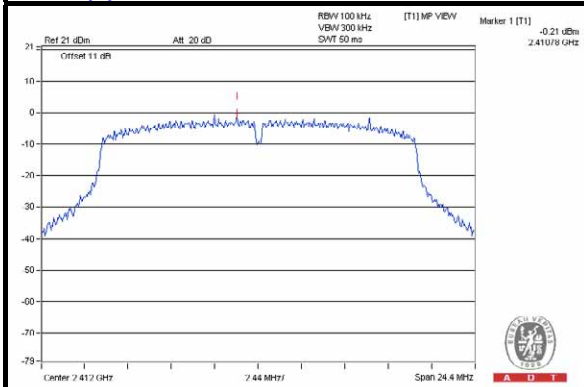
Chain(0) : CH 11 Band edge



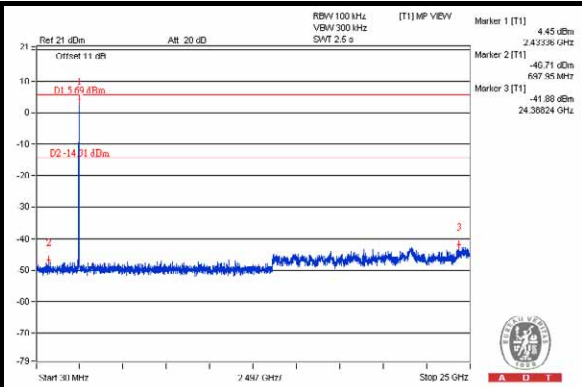
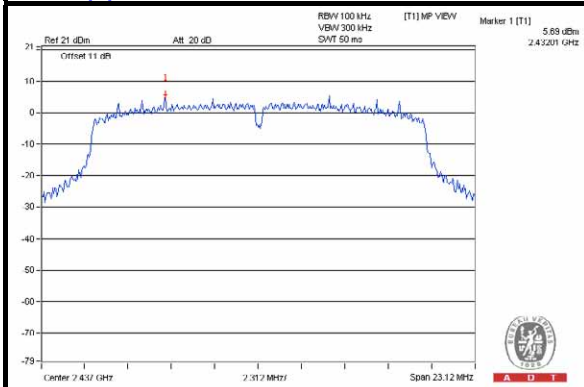


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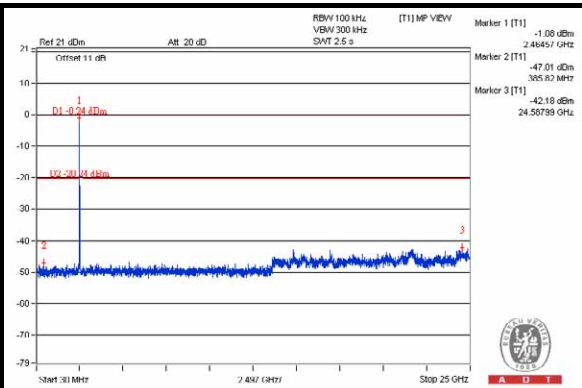
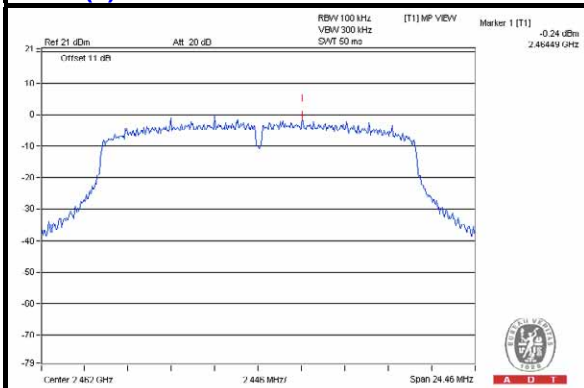
Chain(1) : CH 1



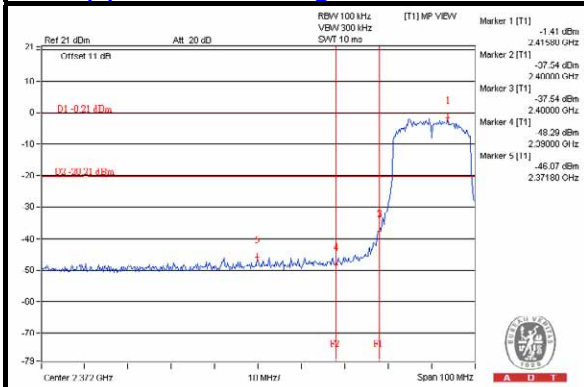
Chain(1) : CH 6



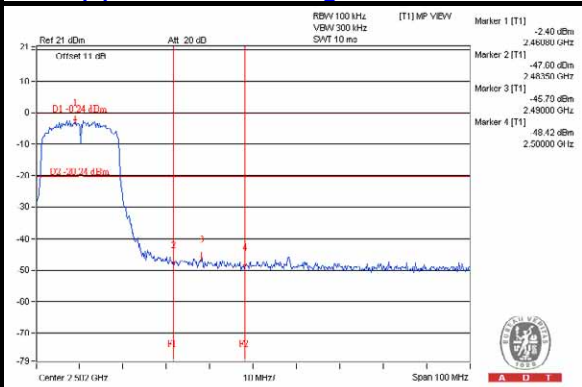
Chain(1) : CH 11



Chain(1) : CH 1 Band edge



Chain(1) : CH 11 Band edge

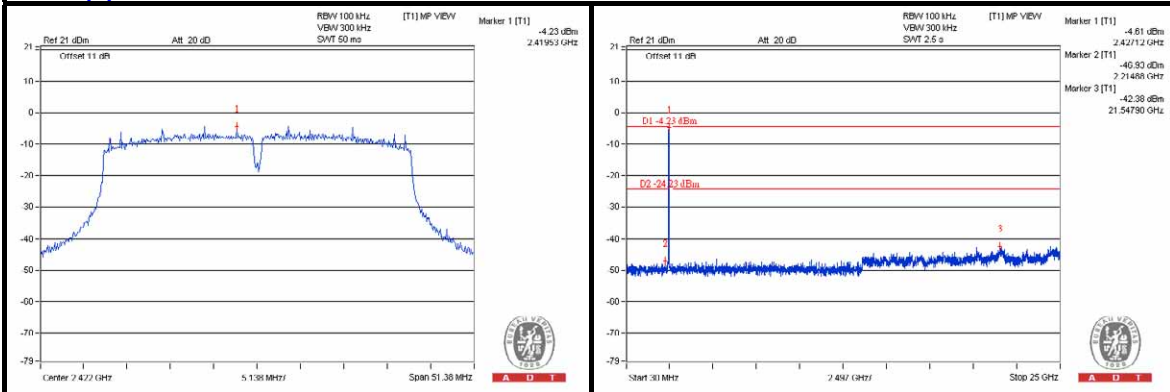




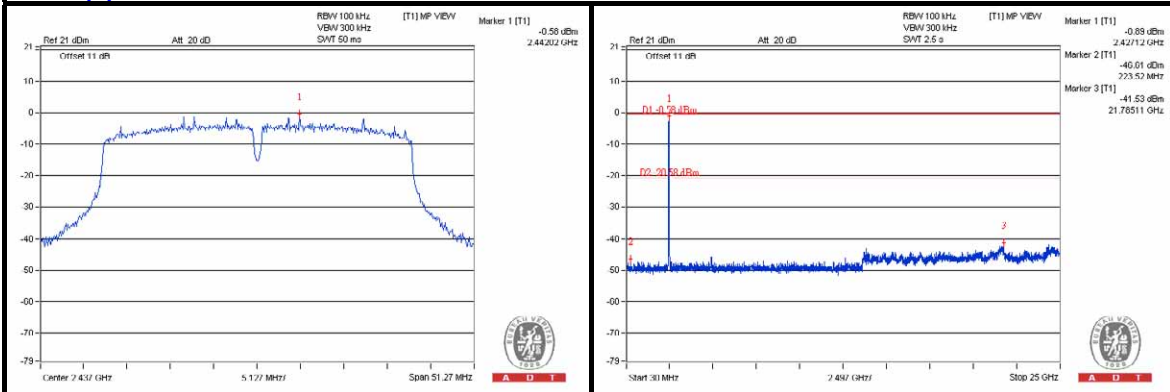
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VHT40

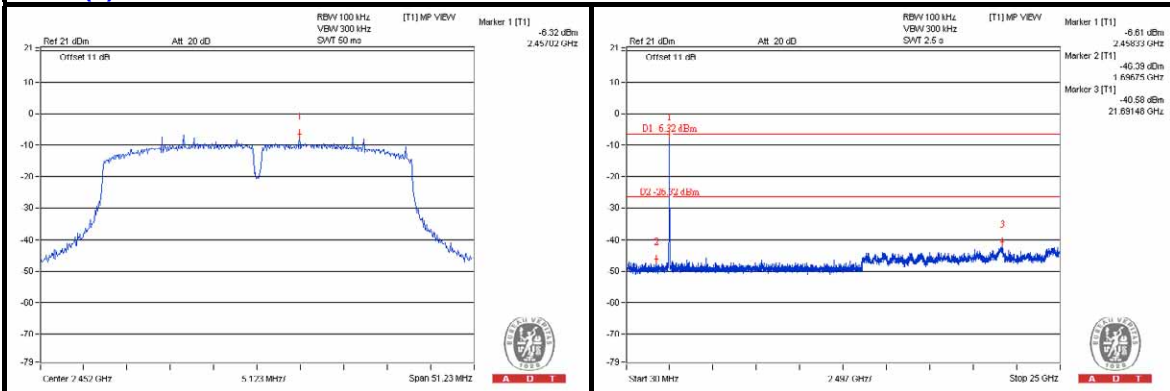
Chain(0) : CH 3



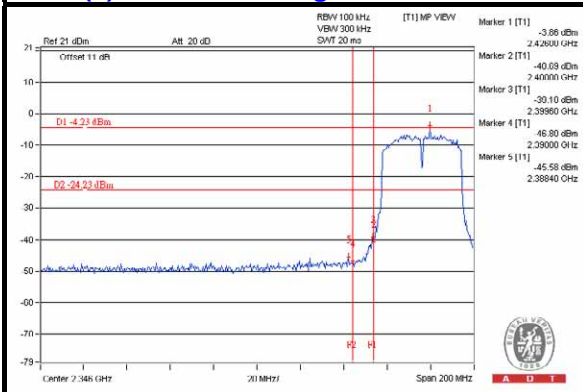
Chain(0) : CH 6



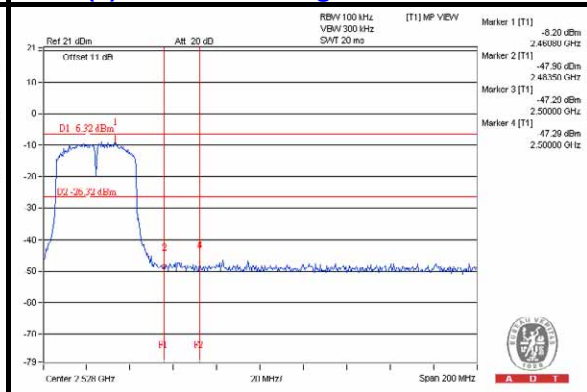
Chain(0) : CH 9



Chain(0) : CH 3 Band edge



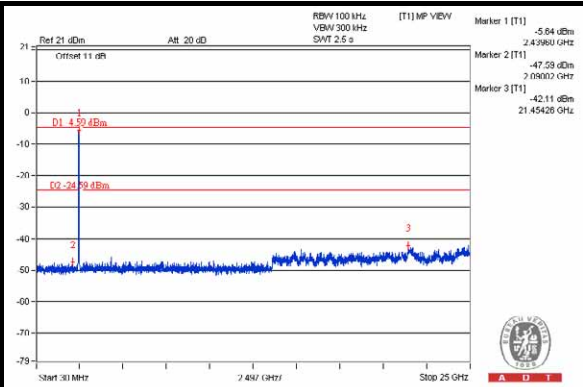
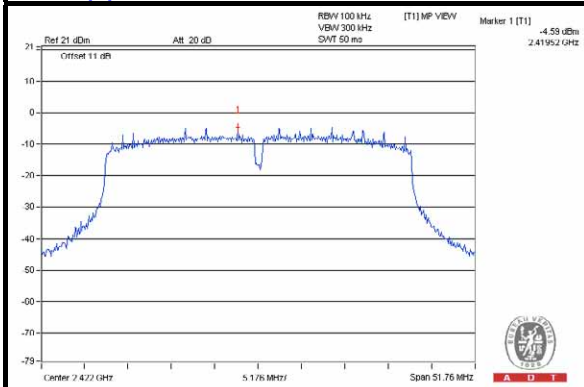
Chain(0) : CH 9 Band edge



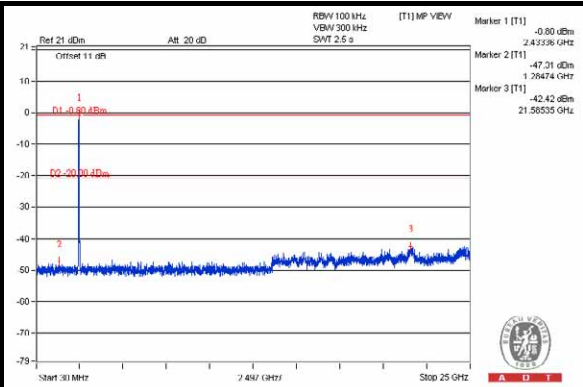
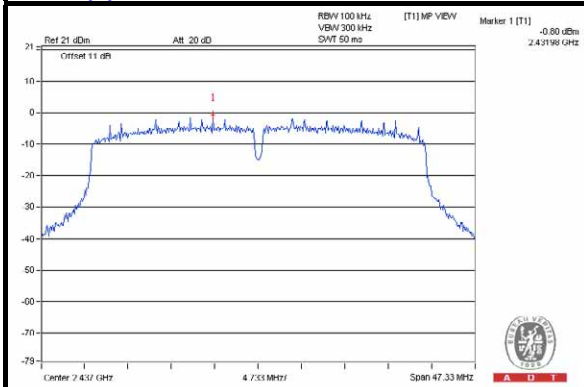


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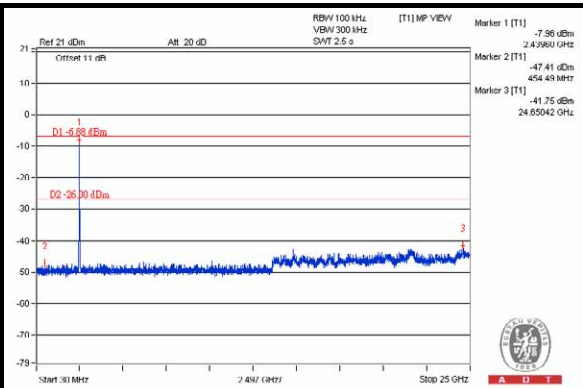
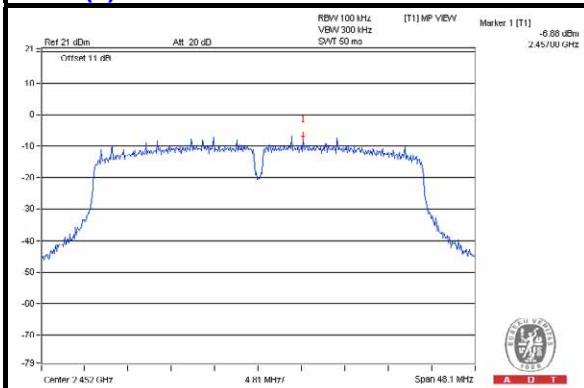
Chain(1) : CH 3



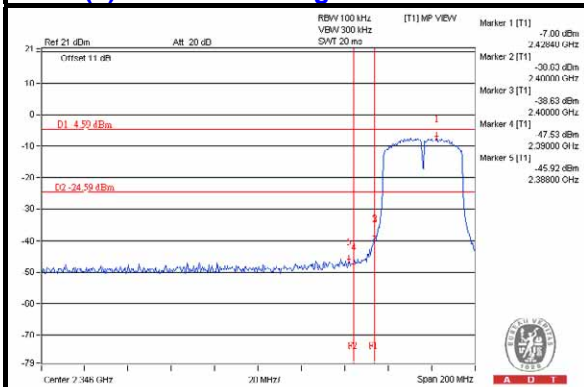
Chain(1) : CH 6



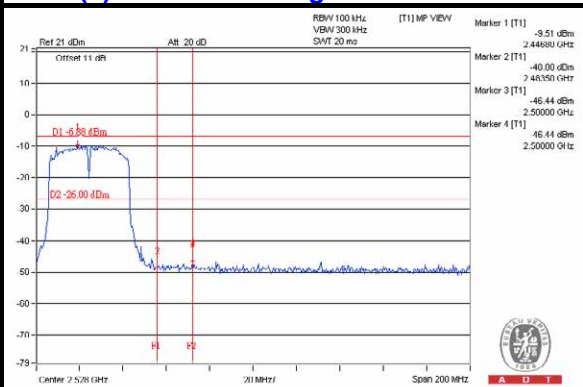
Chain(1) : CH 9



Chain(1) : CH 3 Band edge



Chain(1) : CH 9 Band edge





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4.5 UNWANTED EMISSION MEASUREMENT(RADIATED VERSUS CONDUCTED)

4.5.1 LIMITS OF UNWANTED EMISSION MEASUREMENT

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

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

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



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4.5.2 TEST INSTRUMENTS

Below 1GHz test

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: Aug. 27, 2014



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Above 1GHz test

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 AISL	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: Aug. 28, 2014

4.5.3 TEST PROCEDURES

Following FCC KDB 558074 D01 DTS Meas. Guidance :
Radiated versus Conducted Measurements.

The unwanted emission limits in both the restricted and non-restricted bands are based on antenna-port conducted measurements in conjunction with cabinet emissions tests are permitted to demonstrate compliance.

The following steps was performed:

- a. Cabinet emissions measurements. Radiated measurement was performed to ensure that cabinet emissions are below the emission limits. For the cabinet-emission measurements the antenna was replaced by a termination matching the nominal impedance of the antenna.
- b. Conducted tests was performed using equipment that matches the nominal impedance of the antenna assembly used with the EUT
- c. EIRP calculation. A value representative of an upper bound on out-of-band antenna gain (in dBi) shall be added to the measured antenna-port conducted emission power to compute EIRP within the specified measurement bandwidth. (For emissions in the restricted bands, additional calculations are required to convert EIRP to field strength at the specified distance.) The upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands or 2 dBi, whichever is greater
- d. EIRP adjustments for multiple outputs. (Follow the procedures specified in FCC KDB Publication 662911)
- e. For all of Radiation emission test
 - e-1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
 - e-2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
 - e-3. 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.
 - e-4. 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-5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
 - e-6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.



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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 $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

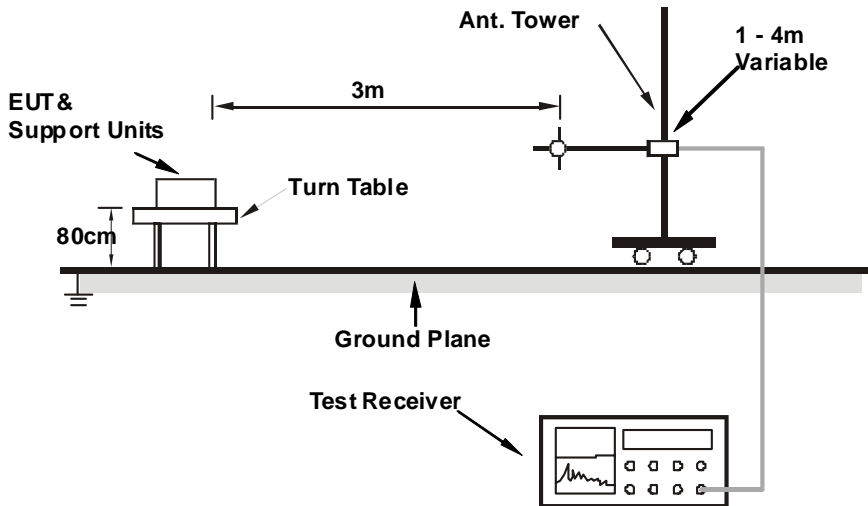
4.5.4 DEVIATION FROM TEST STANDARD

No deviation

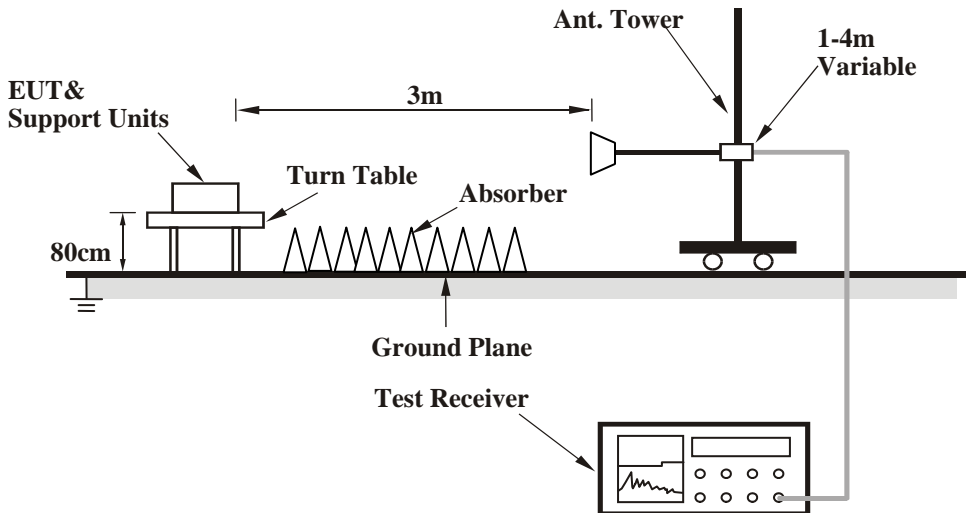
4.5.5 TEST SETUP

For radiated configuration:

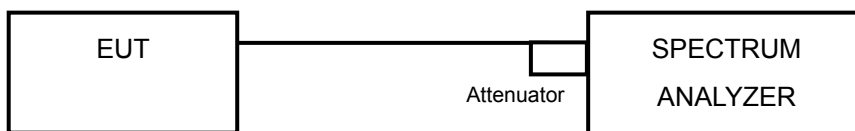
<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



For conducted configuration:



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

4.5.6 EUT OPERATING CONDITIONS

1. Connect the EUT with the support unit A (Notebook Computer) which is placed on a testing table.
2. The communication partner run test program “QCRT Version: 3.0.29.0” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

4.5.7 TEST RESULTS (RADIATED MEASUREMENT)

Radiated versus Conducted Measurement	
<input type="checkbox"/> Conducted measurement	<input checked="" type="checkbox"/> Radiated measurement
<p><u>For Radiated measurement:</u> The level of unwanted emissions was measured when radiated by the cabinet or structure of the equipment with the antenna connector(s) terminated by a specified load (cabinet radiation)</p> <p><u>For Conducted measurement:</u> The level of unwanted emissions was measured as their power in a specified load (conducted spurious emissions).</p>	



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Radiated test was done with 50ohm terminator on antenna port

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	89.41	33.3 QP	43.5	-10.2	2.00 H	115	52.46	-19.12
2	166.00	30.8 QP	43.5	-12.7	1.50 H	223	44.28	-13.49
3	255.09	38.0 QP	46.0	-8.0	1.00 H	115	52.08	-14.12
4	328.43	37.4 QP	46.0	-8.6	1.00 H	145	48.91	-11.49
5	666.51	36.1 QP	46.0	-9.9	1.00 H	131	40.11	-3.99
6	945.83	35.7 QP	46.0	-10.3	1.50 H	306	34.72	0.96

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	32.96	33.7 QP	40.0	-6.3	1.00 V	345	48.13	-14.41
2	85.73	32.6 QP	40.0	-7.4	1.00 V	89	51.56	-19.00
3	166.04	33.1 QP	43.5	-10.4	1.00 V	247	46.58	-13.49
4	335.70	34.8 QP	46.0	-11.2	1.50 V	156	46.11	-11.35
5	666.47	34.8 QP	46.0	-11.2	1.00 V	289	38.83	-3.99
6	940.68	30.9 QP	46.0	-15.1	1.50 V	354	30.03	0.86

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	4824.00	53.1 PK	74.0	-20.9	1.53 H	276	49.68	3.42
2	4824.00	47.0 AV	54.0	-7.0	1.53 H	276	43.58	3.42
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	4824.00	52.2 PK	74.0	-21.8	1.19 V	303	48.78	3.42
2	4824.00	47.3 AV	54.0	-6.7	1.19 V	303	43.88	3.42

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



A D T

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	4874.00	53.5 PK	74.0	-20.5	1.52 H	258	50.10	3.40
2	4874.00	47.3 AV	54.0	-6.7	1.52 H	258	43.90	3.40
3	7311.00	54.8 PK	74.0	-19.2	1.04 H	281	47.04	7.76
4	7311.00	40.8 AV	54.0	-13.2	1.04 H	281	33.04	7.76

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	4874.00	52.0 PK	74.0	-22.0	1.22 V	311	48.60	3.40
2	4874.00	47.5 AV	54.0	-6.5	1.22 V	311	44.10	3.40
3	7311.00	54.6 PK	74.0	-19.4	1.07 V	47	46.84	7.76
4	7311.00	41.0 AV	54.0	-13.0	1.07 V	47	33.24	7.76

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



A D T

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	4924.00	53.3 PK	74.0	-20.7	1.49 H	261	49.91	3.39
2	4924.00	47.1 AV	54.0	-6.9	1.49 H	261	43.71	3.39
3	7386.00	54.5 PK	74.0	-19.5	1.03 H	286	46.45	8.05
4	7386.00	40.7 AV	54.0	-13.3	1.03 H	286	32.65	8.05

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	4924.00	51.1 PK	74.0	-22.9	1.27 V	306	47.71	3.39
2	4924.00	46.7 AV	54.0	-7.3	1.27 V	306	43.31	3.39
3	7386.00	54.8 PK	74.0	-19.2	1.04 V	23	46.75	8.05
4	7386.00	41.5 AV	54.0	-12.5	1.04 V	23	33.45	8.05

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



A D T

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	4824.00	45.9 PK	74.0	-28.1	1.02 H	233	42.48	3.42
2	4824.00	32.6 AV	54.0	-21.4	1.02 H	233	29.18	3.42

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	4824.00	47.0 PK	74.0	-27.0	1.00 V	49	43.58	3.42
2	4824.00	33.6 AV	54.0	-20.4	1.00 V	49	30.18	3.42

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



A D T

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	4874.00	46.2 PK	74.0	-27.8	1.00 H	241	42.80	3.40
2	4874.00	33.0 AV	54.0	-21.0	1.00 H	241	29.60	3.40
3	7311.00	54.3 PK	74.0	-19.7	1.04 H	297	46.54	7.76
4	7311.00	40.3 AV	54.0	-13.7	1.04 H	297	32.54	7.76

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	4874.00	47.0 PK	74.0	-27.0	1.00 V	48	43.60	3.40
2	4874.00	33.5 AV	54.0	-20.5	1.00 V	48	30.10	3.40
3	7311.00	54.0 PK	74.0	-20.0	1.00 V	53	46.24	7.76
4	7311.00	40.2 AV	54.0	-13.8	1.00 V	53	32.44	7.76

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



A D T

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	4924.00	46.1 PK	74.0	-27.9	1.00 H	258	42.71	3.39
2	4924.00	32.7 AV	54.0	-21.3	1.00 H	258	29.31	3.39
3	7386.00	54.4 PK	74.0	-19.6	1.00 H	305	46.35	8.05
4	7386.00	40.4 AV	54.0	-13.6	1.00 H	305	32.35	8.05

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	4924.00	47.2 PK	74.0	-26.8	1.04 V	30	43.81	3.39
2	4924.00	33.6 AV	54.0	-20.4	1.04 V	30	30.21	3.39
3	7386.00	54.3 PK	74.0	-19.7	1.00 V	64	46.25	8.05
4	7386.00	40.7 AV	54.0	-13.3	1.00 V	64	32.65	8.05

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



A D T

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	4824.00	46.1 PK	74.0	-27.9	1.05 H	254	42.68	3.42
2	4824.00	32.8 AV	54.0	-21.2	1.05 H	254	29.38	3.42

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	4824.00	47.7 PK	74.0	-26.3	1.01 V	41	44.28	3.42
2	4824.00	34.2 AV	54.0	-19.8	1.01 V	41	30.78	3.42

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



A D T

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	4874.00	46.3 PK	74.0	-27.7	1.00 H	243	42.90	3.40
2	4874.00	32.6 AV	54.0	-21.4	1.00 H	243	29.20	3.40
3	7311.00	54.5 PK	74.0	-19.5	1.01 H	301	46.74	7.76
4	7311.00	40.5 AV	54.0	-13.5	1.01 H	301	32.74	7.76

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	4874.00	47.8 PK	74.0	-26.2	1.04 V	38	44.40	3.40
2	4874.00	34.2 AV	54.0	-19.8	1.04 V	38	30.80	3.40
3	7311.00	54.5 PK	74.0	-19.5	1.04 V	42	46.74	7.76
4	7311.00	40.8 AV	54.0	-13.2	1.04 V	42	33.04	7.76

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



A D T

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	4924.00	46.2 PK	74.0	-27.8	1.02 H	254	42.81	3.39
2	4924.00	32.9 AV	54.0	-21.1	1.02 H	254	29.51	3.39
3	7386.00	54.7 PK	74.0	-19.3	1.03 H	288	46.65	8.05
4	7386.00	40.7 AV	54.0	-13.3	1.03 H	288	32.65	8.05

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	4924.00	47.8 PK	74.0	-26.2	1.02 V	31	44.41	3.39
2	4924.00	33.9 AV	54.0	-20.1	1.02 V	31	30.51	3.39
3	7386.00	54.6 PK	74.0	-19.4	1.00 V	46	46.55	8.05
4	7386.00	40.9 AV	54.0	-13.1	1.00 V	46	32.85	8.05

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



A D T

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	4844.00	46.2 PK	74.0	-27.8	1.00 H	246	42.79	3.41
2	4844.00	32.9 AV	54.0	-21.1	1.00 H	246	29.49	3.41
3	7266.00	54.5 PK	74.0	-19.5	1.00 H	301	46.92	7.58
4	7266.00	40.3 AV	54.0	-13.7	1.00 H	301	32.72	7.58
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	4844.00	47.2 PK	74.0	-26.8	1.00 V	46	43.79	3.41
2	4844.00	33.4 AV	54.0	-20.6	1.00 V	46	29.99	3.41
3	7266.00	54.4 PK	74.0	-19.6	1.00 V	42	46.82	7.58
4	7266.00	40.5 AV	54.0	-13.5	1.00 V	42	32.92	7.58

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



A D T

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	4874.00	46.3 PK	74.0	-27.7	1.00 H	238	42.90	3.40
2	4874.00	32.9 AV	54.0	-21.1	1.00 H	238	29.50	3.40
3	7311.00	54.5 PK	74.0	-19.5	1.00 H	308	46.74	7.76
4	7311.00	40.7 AV	54.0	-13.3	1.00 H	308	32.94	7.76

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	4874.00	47.4 PK	74.0	-26.6	1.06 V	37	44.00	3.40
2	4874.00	33.9 AV	54.0	-20.1	1.06 V	37	30.50	3.40
3	7311.00	54.4 PK	74.0	-19.6	1.00 V	45	46.64	7.76
4	7311.00	40.7 AV	54.0	-13.3	1.00 V	45	32.94	7.76

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



A D T

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	4904.00	46.1 PK	74.0	-27.9	1.02 H	252	42.71	3.39
2	4904.00	32.6 AV	54.0	-21.4	1.02 H	252	29.21	3.39
3	7356.00	54.0 PK	74.0	-20.0	1.02 H	299	46.06	7.94
4	7356.00	39.9 AV	54.0	-14.1	1.02 H	299	31.96	7.94

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	4904.00	47.4 PK	74.0	-26.6	1.00 V	37	44.01	3.39
2	4904.00	33.5 AV	54.0	-20.5	1.00 V	37	30.11	3.39
3	7356.00	54.3 PK	74.0	-19.7	1.06 V	65	46.36	7.94
4	7356.00	40.8 AV	54.0	-13.2	1.06 V	65	32.86	7.94

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