

FCC TEST REPORT (WLAN 15.407)

REPORT NO.: RF140808E04-1

MODEL NO.: QCNFA324

FCC ID: PPD-QCNFA324

RECEIVED: Aug. 08, 2014

TESTED: Aug. 27 to Oct. 17, 2014

ISSUED: Oct. 24, 2014

APPLICANT: Qualcomm Atheros, Inc.

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ISSUED BY: Bureau Veritas Consumer Products Services (H.K.)
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RELEASE CONTROL RECORD

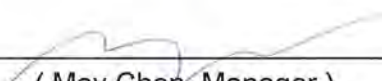
ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140808E04-1	Original release	Oct. 24, 2014

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. 17, 2014
STANDARDS: FCC Part 15, Subpart E (Section 15.407)
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:** Oct. 24, 2014
(Claire Kuan, Specialist)

APPROVED BY : , **DATE:** Oct. 24, 2014
(May Chen, Manager)

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART E (SECTION 15.407)			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
15.407(b)(6)	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -16.78dB at 0.15000MHz
15.407 (b)(1/2/3/4/6)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -3.1dB at 15960.00MHz & 17160.00MHz
15.407(a/1/2/3)	Transmit Power	PASS	Meet the requirement of limit.
15.407(a/1/2/3)	Peak Power Spectral Density	PASS	Meet the requirement of limit.
15.407(e)	6dB bandwidth	PASS	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	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, 5.47~5.725GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 5.15~5.35GHz, 5.47~5.725GHz and 5.725~5.850GHz. For the 2400 ~ 2483.5MHz RF parameters was recorded in another test report.
2. The DFS report 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 (WLAN)

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 5.18 ~ 5.24GHz, 5.26 ~ 5.32GHz, 5.5~5.72GHz, 5.745 ~ 5.825GHz For 15.247 2.412 ~ 2.462GHz
NUMBER OF CHANNEL	For 15.407 25 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 12 for 802.11n (HT40), 802.11ac (VHT40) 6 for 802.11ac (VHT80) For 15.247 11 for 802.11b, 802.11g, 802.11n (HT20),VHT20 7 for 802.11n (HT40), VHT40
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 802.11n (HT20): 482.537mW 802.11n (HT40): 205.692mW 802.11a: 236.375mW 802.11ac (VHT20): 212.131mW 802.11ac (VHT40): 183.279mW 802.11ac (VHT80): 117.83mW

ANTENNA TYPE	See item 3.2
DATA CABLE	NA
I/O PORTS	Refer to user's manual
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.

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.

3.3 DESCRIPTION OF TEST MODES

Operated in 5150MHz ~ 5350MHz bands:

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
36	5180 MHz	52	5260 MHz
40	5200 MHz	56	5280 MHz
44	5220 MHz	60	5300 MHz
48	5240 MHz	64	5320 MHz

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

CHANNEL	FREQUENCY
38	5190 MHz
46	5230 MHz
54	5270 MHz
62	5310 MHz

2 channels are provided for 802.11ac (VHT80):

CHANNEL	FREQUENCY
42	5210 MHz
58	5290 MHz

Operated in 5470MHz ~ 5725MHz bands:

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

CHANNEL	FREQUENCY
100	5500 MHz
104	5520 MHz
108	5540 MHz
112	5560 MHz
116	5580 MHz
120	5600 MHz
124	5620 MHz
128	5640 MHz
132	5660 MHz
136	5680 MHz
140	5700 MHz
144	5720 MHz

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

CHANNEL	FREQUENCY
102	5510 MHz
110	5550 MHz
118	5590 MHz
126	5630 MHz
134	5670 MHz
142	5710 MHz

3 channels are provided for 802.11ac (VHT80):

CHANNEL	FREQUENCY
106	5530 MHz
122	5610 MHz
138	5690 MHz

Note : The listed channels in the DFS band (5250~5350MHz and 5470~5725MHz) are passive scan only.

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

3.3.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	PLC	UE < 1G	UE ≥ 1G	APCM	
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

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)
802.11a	36 to 165	157	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)
802.11a	36 to 165	157	OFDM	6

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)
802.11a	36 to 165	36, 40, 48, 52, 60, 64, 100, 120, 140, 144, 149, 157, 165	OFDM	6
802.11ac (VHT20)	36 to 165	36, 40, 48, 52, 60, 64, 100, 120, 140, 144, 149, 157, 165	OFDM	6.5
802.11ac (VHT40)	38 to 159	38, 46, 54, 62, 102, 118, 134, 142, 151, 159	OFDM	13.5
802.11ac (VHT80)	42 to 155	42, 58, 106, 122, 138, 155	OFDM	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	DATA RATE (Mbps)
802.11a	36 to 144	36, 40, 48, 52, 60, 64, 100, 120, 140, 144, 149, 157, 165	OFDM	6
802.11ac (VHT20)	36 to 144	36, 40, 48, 52, 60, 64, 100, 120, 140, 144, 149, 157, 165	OFDM	6.5
802.11ac (VHT40)	38 to 142	38, 46, 54, 62, 102, 118, 134, 142, 151, 159	OFDM	13.5
802.11ac (VHT80)	42 to 138	42, 58, 106, 122, 138, 155	OFDM	29.3

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

3.4 DUTY CYCLE OF TEST SIGNAL

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

802.11a: Duty cycle = 21.325 ms/28.35 ms = 0.752, Duty factor = $10 * \log(1/0.752) = 1.24$

802.11ac (VHT20): Duty cycle = 19.75 ms/26.7 ms = 0.74, Duty factor = $10 * \log(1/0.74) = 1.31$

802.11ac (VHT40): Duty cycle = 9.501 ms/16.557 ms = 0.574, Duty factor = $10 * \log(1/0.574) = 2.41$

802.11ac (VHT80): Duty cycle = 4.361 ms/6.567 ms = 0.664, Duty factor = $10 * \log(1/0.664) = 1.8$



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 E (Section 15.407)

789033 D02 General UNII Test Procedures New Rules v01

662911 D01 Multiple Transmitter Output v02r01

644545 D03 Guidance for IEEE 802.11ac v01

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.

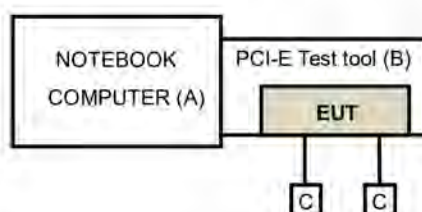
No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	NOTEBOOK COMPUTER	DELL	E6420	H62T3R1	FCC DoC	Provided by Lab
B	PCI-E Test tool	Qualcomm Atheros	NA	NA	NA	Supplied by Client
C	50ohm terminal resistor	NA	NA	NA	NA	Provided by Lab
		NA	NA	NA	NA	Provided by Lab

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

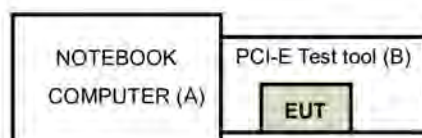
3.7 CONFIGURATION OF SYSTEM UNDER TEST

For Unwanted Emission test (Radiated Measurement)



Note: Support unit C is 50ohm terminal resistor.

For other test items:



4. TEST TYPES AND RESULTS

4.1 TRANSMIT POWER MEASUREMENT

4.1.1 LIMITS OF OUTPUT TRANSMIT POWER MEASUREMENT

Operation Band	EUT Category		LIMIT
U-NII-1		Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p $\leq$ 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
		Fixed point-to-point Access Point	1 Watt (30 dBm)
		Indoor Access Point	1 Watt (30 dBm)
	√	Mobile and Portable client device	250mW (24 dBm)
U-NII-2A	---		250mW (24 dBm) or 11 dBm+10 log B*
U-NII-2C	---		250mW (24 dBm) or 11 dBm+10 log B*
U-NII-3	---		1 Watt (30 dBm)

Note: Where B is the 26dB emission bandwidth in MHz.

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

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

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 TEST INSTRUMENTS

FOR POWER OUTPUT MEASUREMENT

For channel straddling 5725MHz:

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. 17, 2014

For other channels:

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. 17, 2014

FOR 26dB OCCUPIED BANDWIDTH

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. 17, 2014

4.1.3 TEST PROCEDURE

FOR AVERAGE POWER MEASUREMENT

For channel straddling 5725MHz:

Follow FCC KDB 789033 UNII test procedure:

Method SA-1

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 1MHz.
3. Set the VBW $\geq 3 \times$ RBW.
4. Number of points in sweep ≥ 2 Span / RBW.
5. Sweep time = auto.
6. Set trigger to free run (duty cycle ≥ 98 percent) ; Set video trigger (duty cycle < 98 percent)
7. Detector = RMS.
8. Trace average at least 100 traces in power averaging mode
9. Compute power by integrating the spectrum across the 26 dB EBW of the signal.

For other channels:

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

FOR 26dB BANDWIDTH

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

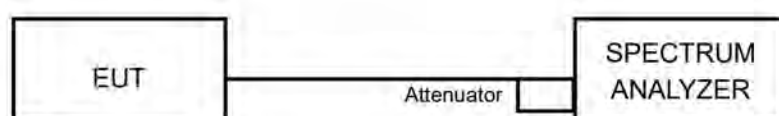
4.1.4 DEVIATION FROM TEST STANDARD

No deviation

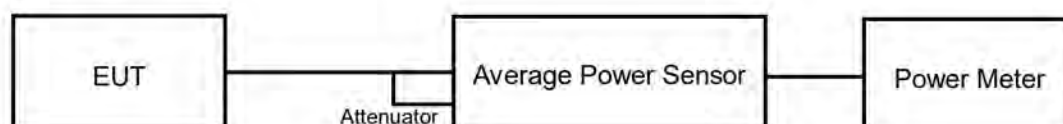
4.1.5 TEST SETUP

FOR POWER OUTPUT MEASUREMENT

For channel straddling 5725MHz:



For other channels:



FOR 26dB OCCUPIED BANDWIDTH



4.1.6 EUT OPERATING CONDITIONS

The software (QCRT Version3.0 29.0) provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

4.1.7 TEST RESULTS

802.11a

POWER OUTPUT

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
36	5180	14.02	14.65	54.409	17.36	23.91	PASS
40	5200	15.11	16.50	77.102	18.87	23.91	PASS
48	5240	15.36	16.67	80.808	19.07	23.91	PASS
52	5260	15.20	16.21	74.896	18.74	23.80	PASS
60	5300	15.39	15.87	73.231	18.65	23.80	PASS
64	5320	13.69	13.74	47.047	16.73	23.66	PASS
100	5500	14.01	13.55	47.823	16.80	21.97	PASS
120	5600	15.02	15.50	67.25	18.28	22.15	PASS
140	5700	13.35	13.35	43.254	16.36	21.99	PASS
144 (UNII-2c Band)	5720	10.52	11.08	32.041	15.06	20.81	PASS
144 (UNII-3 Band)	5720	3.97	4.30	6.898	8.39	28.23	PASS
149	5745	13.95	13.75	48.545	16.86	28.23	PASS
157	5785	15.03	15.51	67.405	18.29	28.23	PASS
165	5825	15.02	15.14	64.428	18.09	28.23	PASS

Note:

- 5150~5250MHz: The directional gain is 6.09dBi > 6dBi, therefore the limit needs to reduce, so the power limit shall be reduced to $24 - (6.09 - 6) = 23.91\text{dBm}$.
- 5250~5350MHz: The directional gain is 6.09dBi > 6dBi, therefore the limit needs to reduce, so the power limit shall be reduced to "Determined Conducted Limit-(6.09-6)".
- 5470~5725MHz: The directional gain is 7.77dBi > 6dBi, therefore the limit needs to reduce, so the power limit shall be reduced to "Determined Conducted Limit-(7.77-6)".
- 5725~5825MHz: The directional gain is 7.77dBi > 6dBi, , therefore the limit needs to reduce, so the power limit shall be reduced to $30 - (7.77 - 6) = 28.23\text{dBm}$.
- For CH144: Total power (dBm)= Average power <Chain 0 +1>(dBm) + Duty Factor (1.24dB)

802.11a

26dB OCCUPIED BANDWIDTH

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)	
		CHAIN 0	CHAIN 1
36	5180	21.62	20.07
40	5200	37.36	35.06
48	5240	33.73	23.95
52	5260	37.10	28.92
60	5300	36.61	22.43
64	5320	21.65	19.95
100	5500	20.89	19.14
120	5600	26.03	20.16
140	5700	19.66	19.10
144 (UNII-2c Band)	5720	19.28	16.57

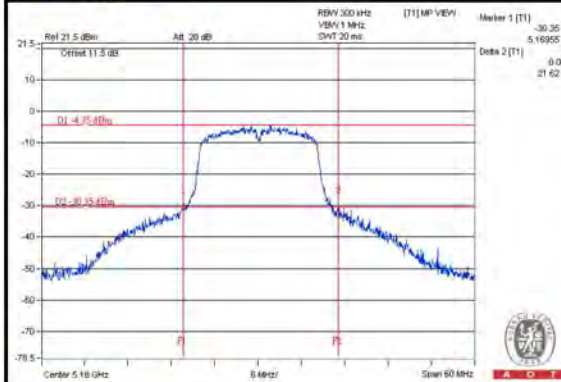
Note: For U-NII-2A, U-NII-2C, U-NII-3 Band output power limitation is determined based on 26dBc bandwidth.

Power Limit = 11dBm + 10logB < U-NII-2A, U-NII-2C >			
Channel Number	Freq.(MHz)	Min. B(MHz)	Determined Conducted Limit (dBm)
52	5260	28.92	25.61 > 24
60	5300	22.43	24.5 > 24
64	5320	19.95	23.99 < 24
100	5500	19.14	23.81 < 24
120	5600	20.16	24.04 > 24
140	5700	19.10	23.81 < 24
144 (UNII-2c Band)	5720	16.57	23.19 < 24

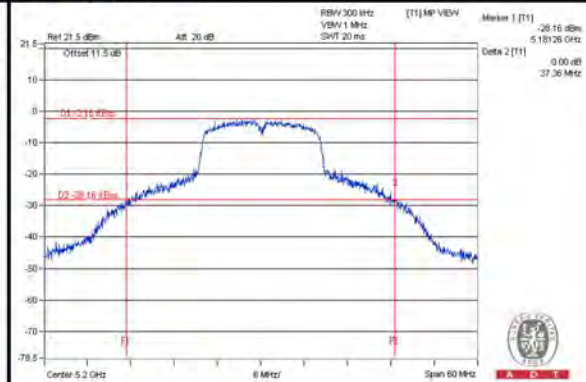


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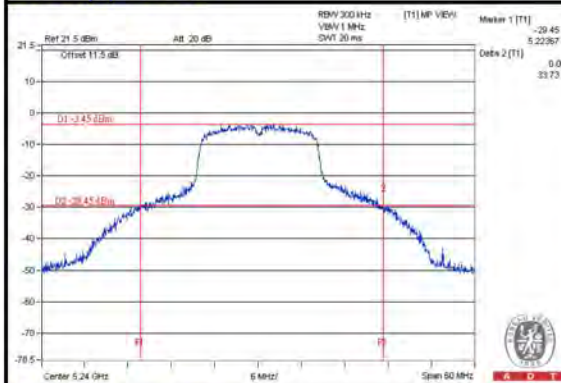
Chain(0) : CH36



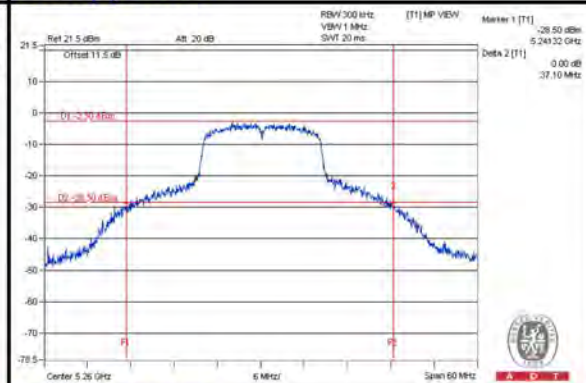
Chain(0) : CH40



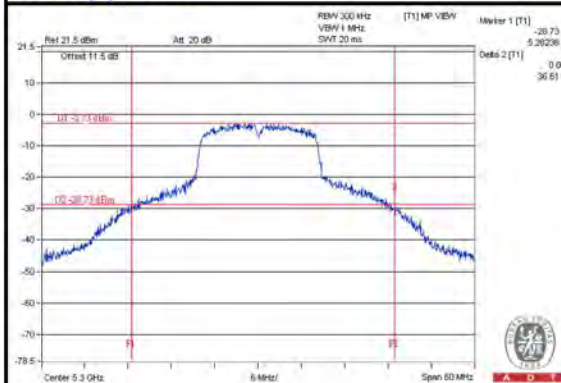
Chain(0) : CH48



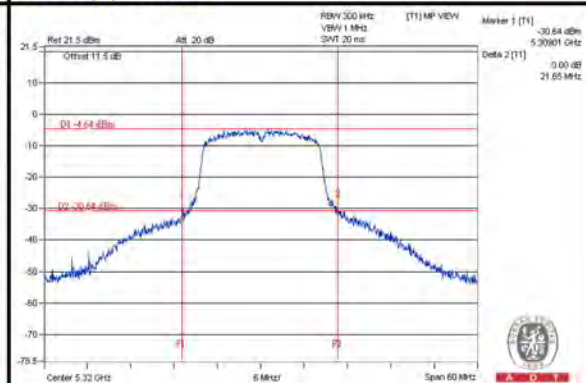
Chain(0) : CH52



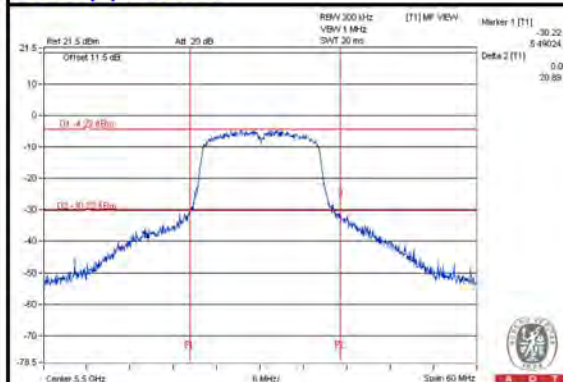
Chain(0) : CH60



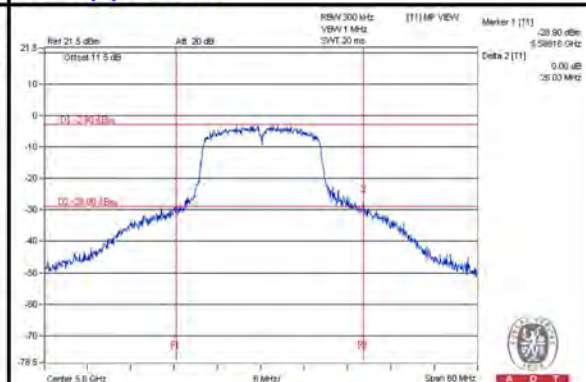
Chain(0) : CH64



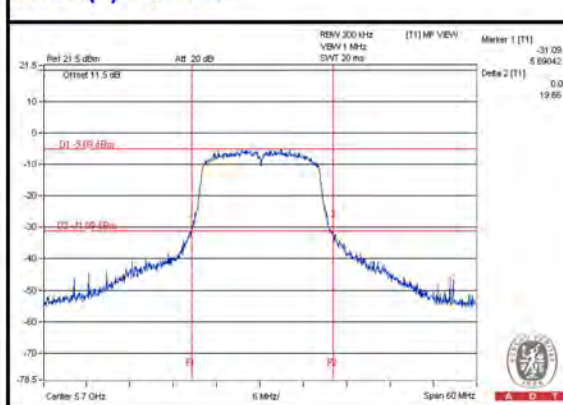
Chain(0) : CH100



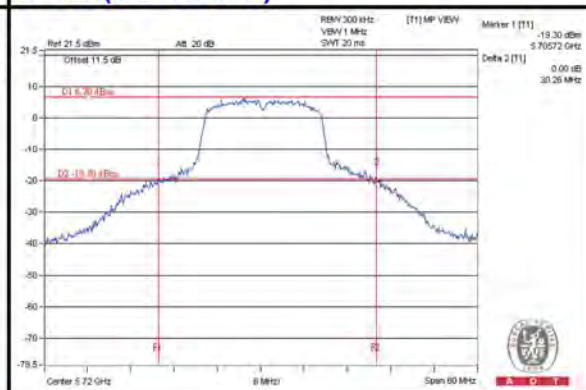
Chain(0) : CH120



Chain(0) : CH140



Chain(0) : CH144 (UNII-2c Band) / Chain(0) : CH144 (UNII-3 Band)



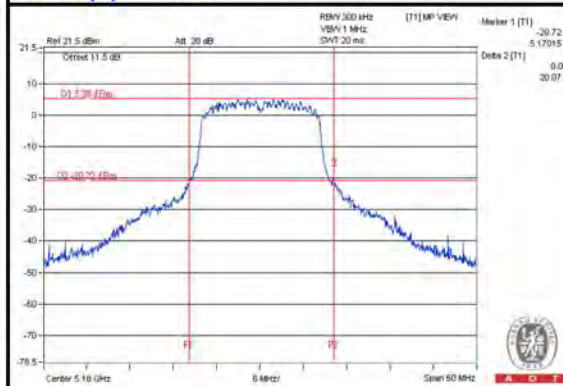
NOTE:

For CH144 (UNII-2c Band) = 5725 - Marker 1

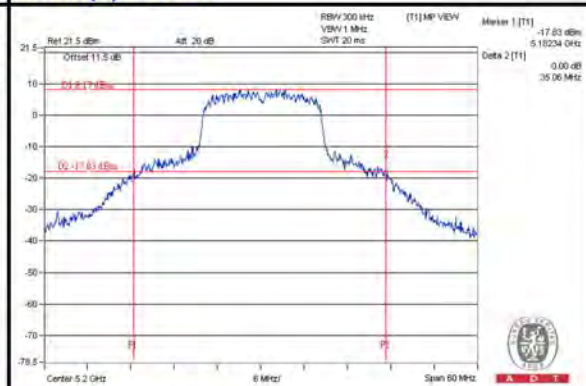


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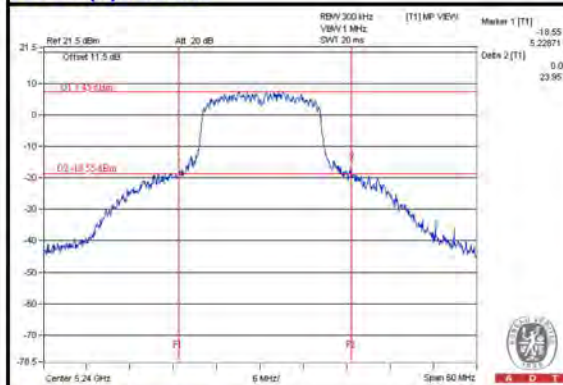
Chain(1) : CH36



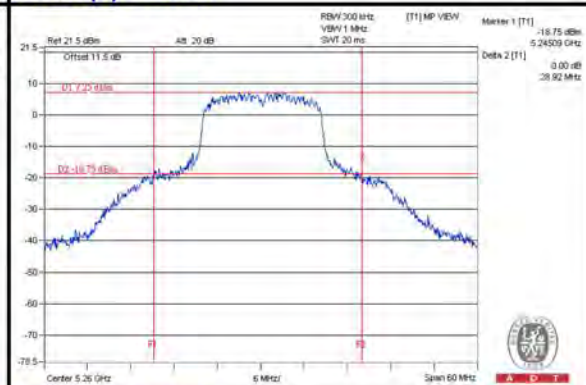
Chain(1) : CH40



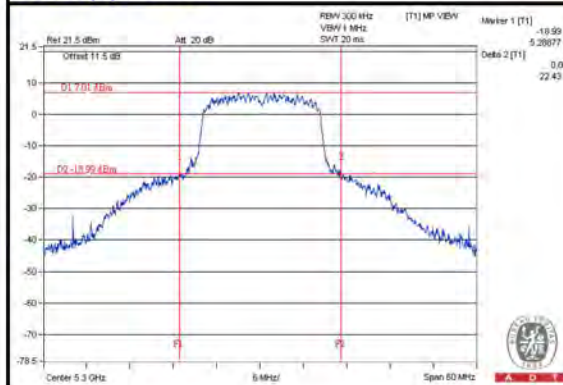
Chain(1) : CH48



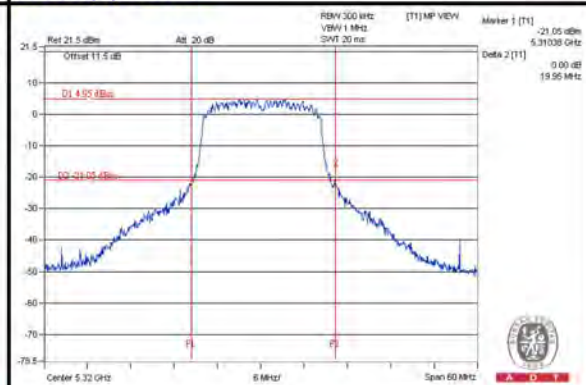
Chain(1) : CH52



Chain(1) : CH60



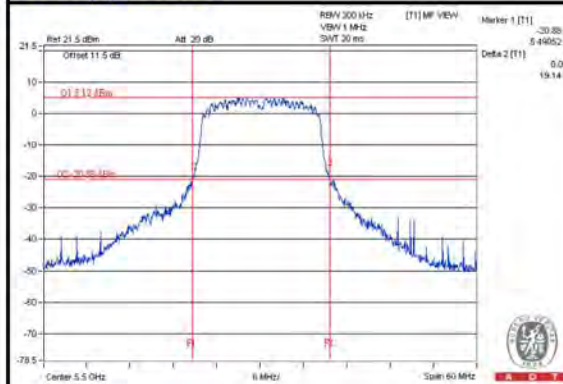
Chain(1) : CH64



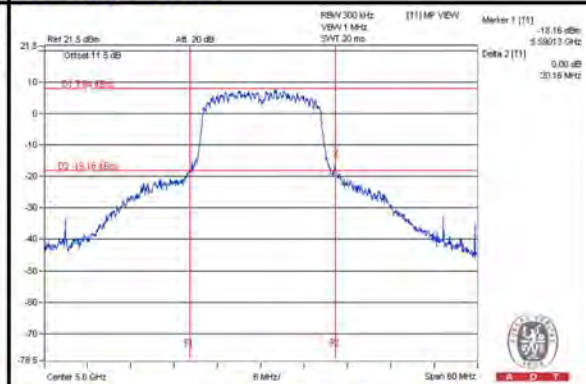


A D T

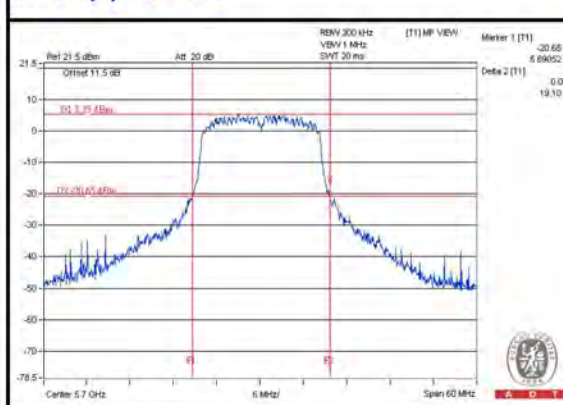
Chain(1) : CH100



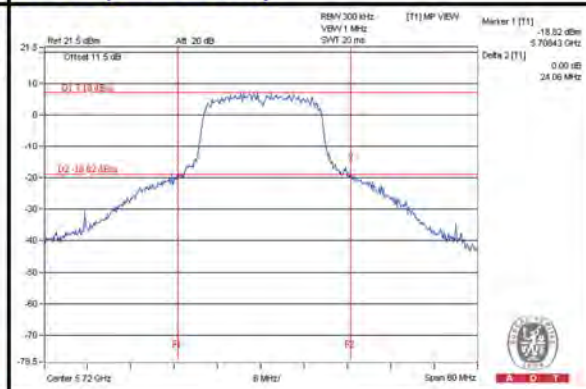
Chain(1) : CH120



Chain(1) : CH140



Chain(1) : CH144 (UNII-2c Band) / Chain(1) : CH144 (UNII-3 Band)



NOTE:

For CH144 (UNII-2c Band) = 5725 - Marker 1

802.11ac (VHT20)

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
36	5180	14.02	14.45	53.096	17.25	23.91	PASS
40	5200	14.13	15.02	57.651	17.61	23.91	PASS
48	5240	14.19	15.92	65.326	18.15	23.91	PASS
52	5260	14.53	15.44	63.374	18.02	23.91	PASS
60	5300	14.38	14.93	58.533	17.67	23.91	PASS
64	5320	14.28	14.07	52.319	17.19	23.91	PASS
100	5500	13.98	13.02	45.048	16.54	22.23	PASS
120	5600	14.14	14.29	52.795	17.23	22.23	PASS
140	5700	13.10	13.04	40.554	16.08	22.23	PASS
144 (UNII-2c Band)	5720	9.67	9.91	25.761	14.11	21.02	PASS
144 (UNII-3 Band)	5720	3.35	3.45	5.914	7.72	28.23	PASS
149	5745	13.81	13.58	46.847	16.71	28.23	PASS
157	5785	14.14	14.32	52.982	17.24	28.23	PASS
165	5825	14.56	14.63	57.616	17.61	28.23	PASS

Note:

5150~5250MHz: The directional gain is 6.09dBi > 6dBi, therefore the limit needs to reduce, so the power limit shall be reduced to $24 - (6.09 - 6) = 23.91\text{dBm}$.

5250~5350MHz: The directional gain is 6.09dBi > 6dBi, therefore the limit needs to reduce, so the power limit shall be reduced to "Determined Conducted Limit-(6.09-6)".

5470~5725MHz: The directional gain is 7.77dBi > 6dBi, therefore the limit needs to reduce, so the power limit shall be reduced to "Determined Conducted Limit-(7.77-6)".

5725~5825MHz: The directional gain is 7.77dBi > 6dBi, , therefore the limit needs to reduce, so the power limit shall be reduced to $30 - (7.77 - 6) = 28.23\text{dBm}$.

For CH144: Total power (dBm)= Average power <Chain 0 +1>(dBm) + Duty Factor (1.31dB)

802.11ac (VHT20)

26dB OCCUPIED BANDWIDTH

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)	
		CHAIN 0	CHAIN 1
36	5180	20.78	20.67
40	5200	28.96	21.54
48	5240	36.99	22.48
52	5260	32.41	21.43
60	5300	32.34	21.27
64	5320	27.43	20.74
100	5500	20.91	20.21
120	5600	20.72	20.50
140	5700	20.51	20.25
144 (UNII-2c Band)	5720	15.78	15.12

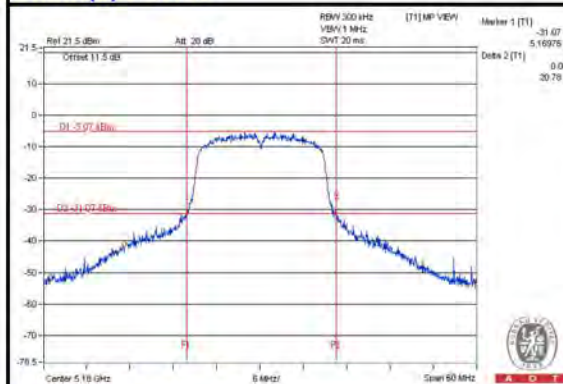
Note: For U-NII-2A, U-NII-2C Band output power limitation is determined based on 26dBc bandwidth.

Power Limit = 11dBm + 10logB < U-NII-2A, U-NII-2C >			
Channel Number	Freq.(MHz)	Min. B(MHz)	Determined Conducted Limit (dBm)
52	5260	21.43	24.31 > 24
60	5300	21.27	24.27 > 24
64	5320	20.74	24.16 > 24
100	5500	20.21	24.05 < 24
120	5600	20.50	24.11 > 24
140	5700	20.25	24.06 > 24
144 (UNII-2c Band)	5720	15.12	22.79 < 24

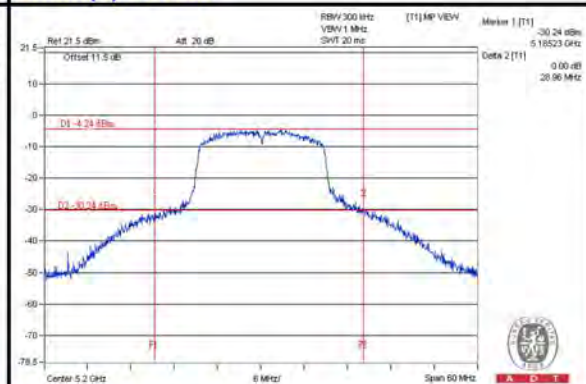


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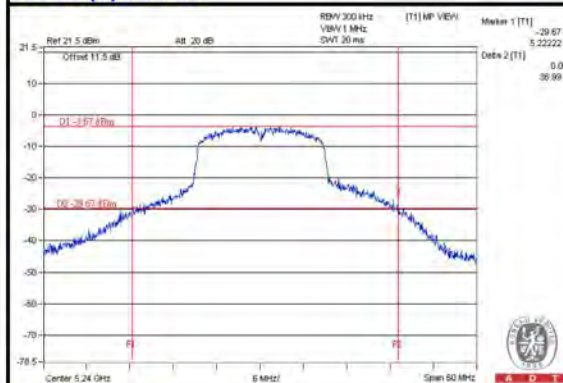
Chain(0) : CH36



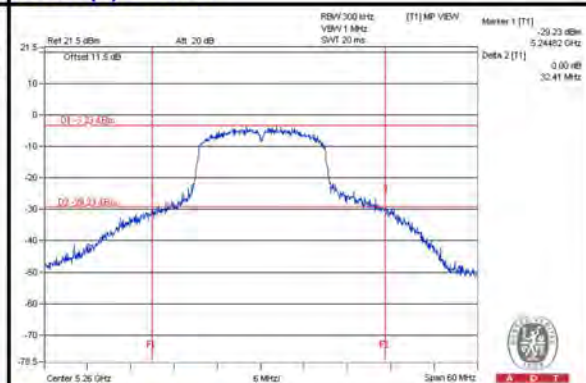
Chain(0) : CH40



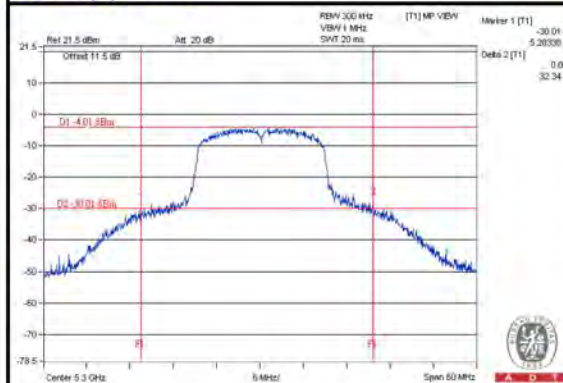
Chain(0) : CH48



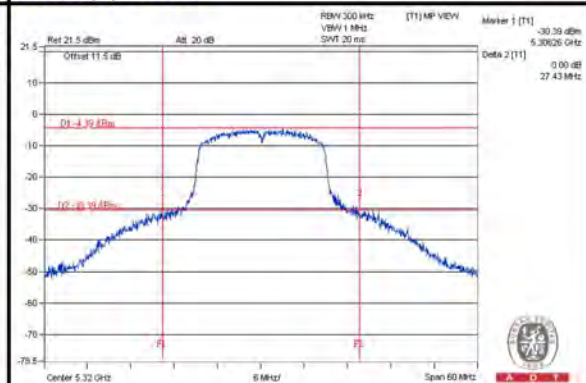
Chain(0) : CH52



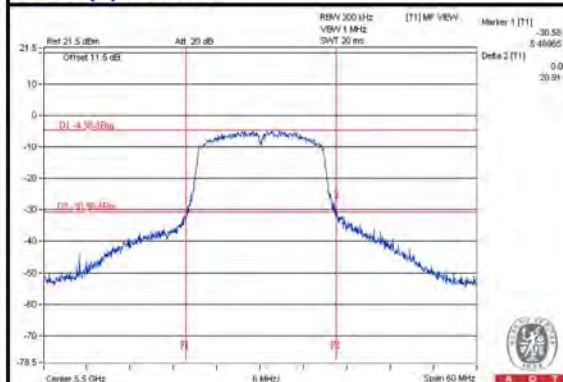
Chain(0) : CH60



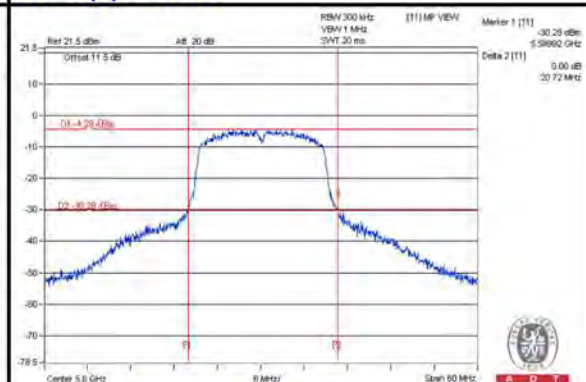
Chain(0) : CH64



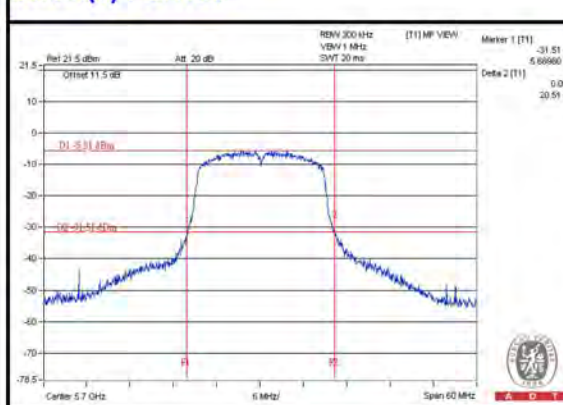
Chain(0) : CH100



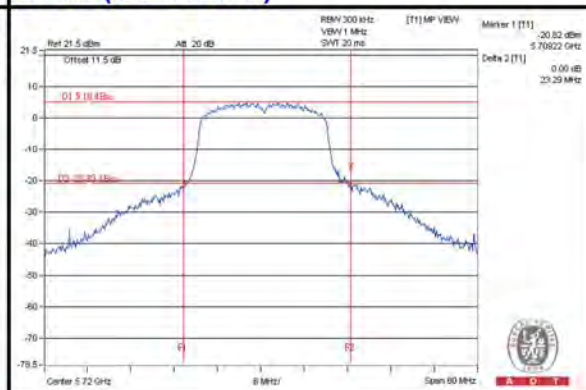
Chain(0) : CH120



Chain(0) : CH140



Chain(0) : CH144 (UNII-2c Band) / Chain(0) : CH144 (UNII-3 Band)



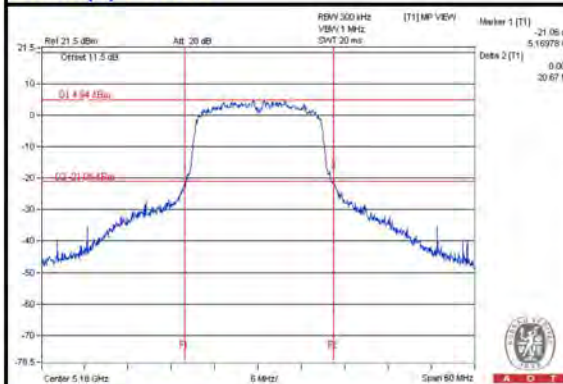
NOTE:

For CH144 (UNII-2c Band) = 5725 - Marker 1

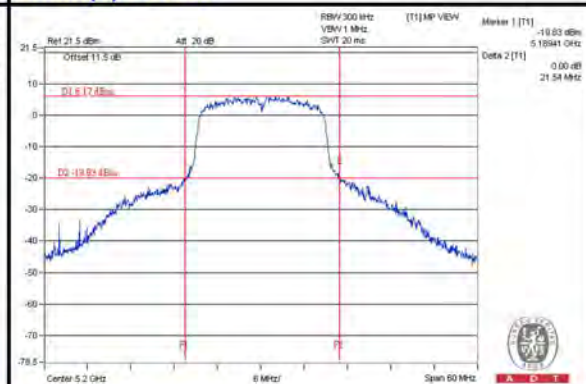


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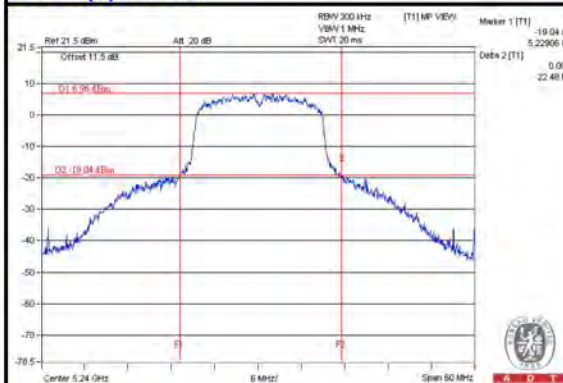
Chain(1) : CH36



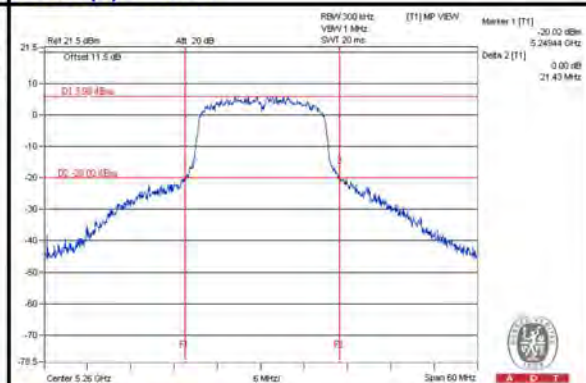
Chain(1) : CH40



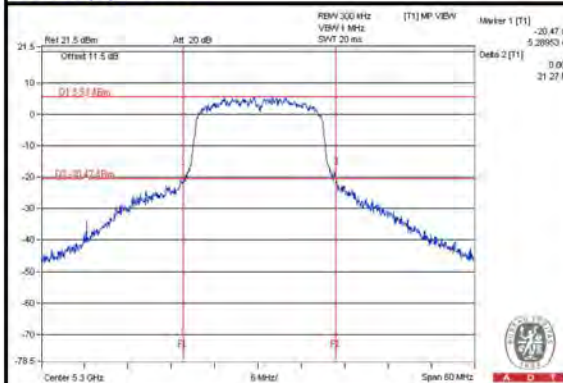
Chain(1) : CH48



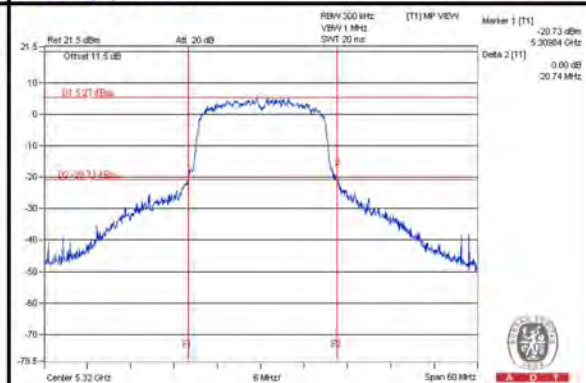
Chain(1) : CH52



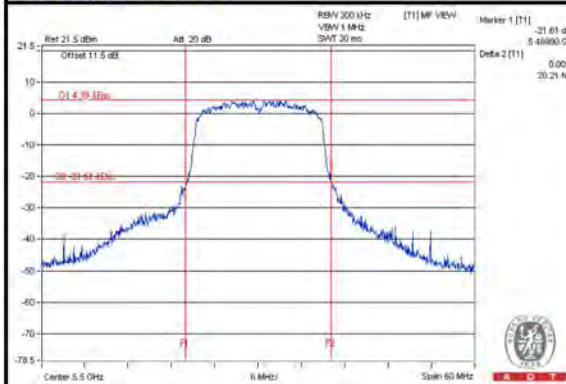
Chain(1) : CH60



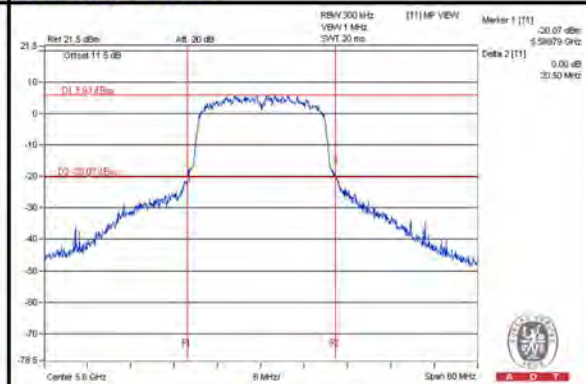
Chain(1) : CH64



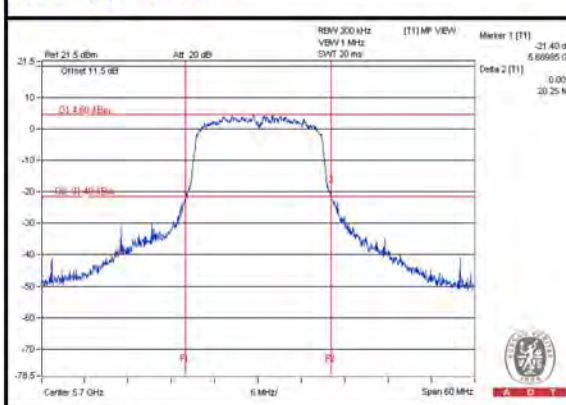
Chain(1) : CH100



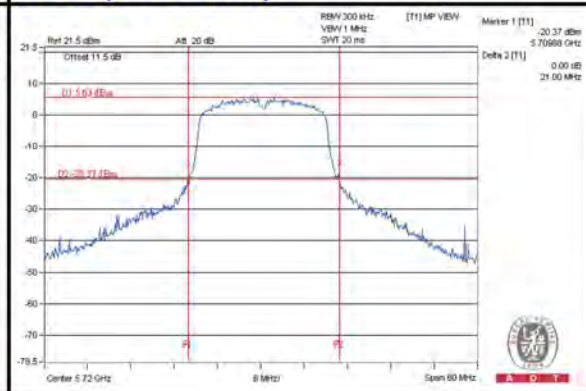
Chain(1) : CH120



Chain(1) : CH140



Chain(1) : CH144 (UNII-2c Band) / Chain(1) : CH144 (UNII-3 Band)



NOTE:

For CH144 (UNII-2c Band) = 5725 - Marker 1

802.11ac (VHT40)

POWER OUTPUT

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
38	5190	10.26	10.28	21.283	13.28	23.91	PASS
46	5230	13.46	14.08	47.768	16.79	23.91	PASS
54	5270	13.62	13.62	46.028	16.63	23.91	PASS
62	5310	10.97	10.45	23.595	13.73	23.91	PASS
102	5510	11.23	10.83	25.38	14.04	22.23	PASS
118	5590	13.34	13.66	44.804	16.51	22.23	PASS
134	5670	13.56	14.37	50.052	16.99	22.23	PASS
142 (UNII-2c Band)	5710	9.30	9.56	30.57	14.85	22.23	PASS
142 (UNII-3 Band)	5710	-2.41	-2.29	2.0284	3.07	28.23	PASS
151	5755	11.77	11.66	29.686	14.73	28.23	PASS
159	5795	13.12	13.21	41.453	16.18	28.23	PASS

Note:

- 5150~5250MHz: The directional gain is 6.09dBi > 6dBi, therefore the limit needs to reduce, so the power limit shall be reduced to $24 - (6.09 - 6) = 23.91\text{dBm}$.
- 5250~5350MHz: The directional gain is 6.09dBi > 6dBi, therefore the limit needs to reduce, so the power limit shall be reduced to "Determined Conducted Limit-(6.09-6)".
- 5470~5725MHz: The directional gain is 7.77dBi > 6dBi, therefore the limit needs to reduce, so the power limit shall be reduced to "Determined Conducted Limit-(7.77-6)".
- 5725~5825MHz: The directional gain is 7.77dBi > 6dBi, therefore the limit needs to reduce, so the power limit shall be reduced to $30 - (7.77 - 6) = 28.23\text{dBm}$.
- For CH142: Total power (dBm)= Average power <Chain 0 +1>(dBm) + Duty Factor (2.41dB)

802.11ac (VHT40)

26dB OCCUPIED BANDWIDTH

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)	
		CHAIN 0	CHAIN 1
38	5190	43.67	48.20
46	5230	46.16	41.71
54	5270	56.07	41.65
62	5310	45.35	42.85
102	5510	41.50	41.58
118	5590	41.90	42.73
134	5670	44.17	42.27
142 (UNII-2c Band)	5710	36.27	35.78

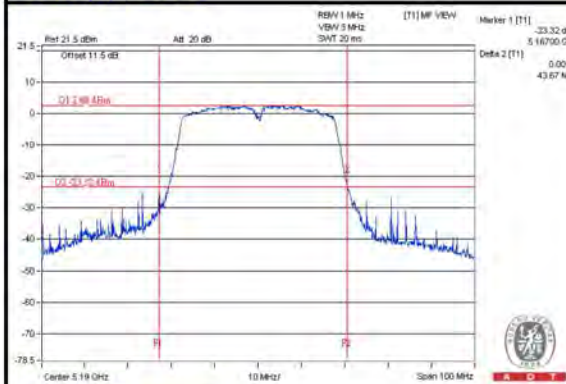
Note: For FCC output power limitation is determined based on 26dB bandwidth.

Power Limit = 11dBm + 10logB < U-NII-2A, U-NII-2C >			
Channel Number	Freq.(MHz)	Min. B(MHz)	Determined Conducted Limit (dBm)
54	5270	41.65	27.19 > 24
62	5310	42.85	27.31 > 24
102	5510	41.50	27.18 > 24
110	5550	41.90	27.22 > 24
134	5670	42.27	27.26 > 24
142 (UNII-2c Band)	5710	35.78	26.53 > 24

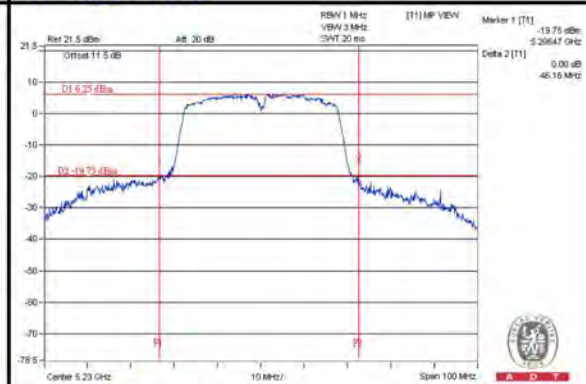


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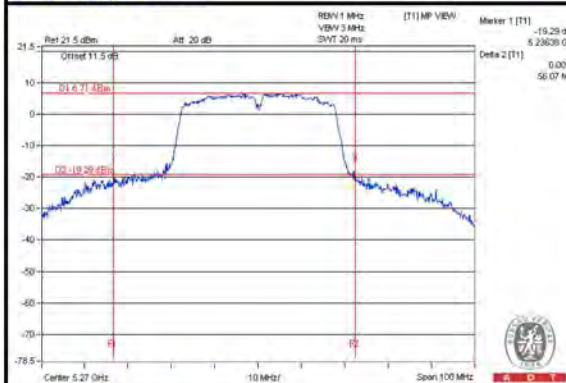
Chain(0) : CH38



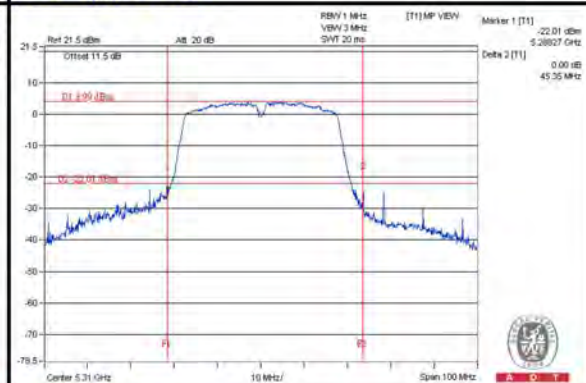
Chain(0) : CH46



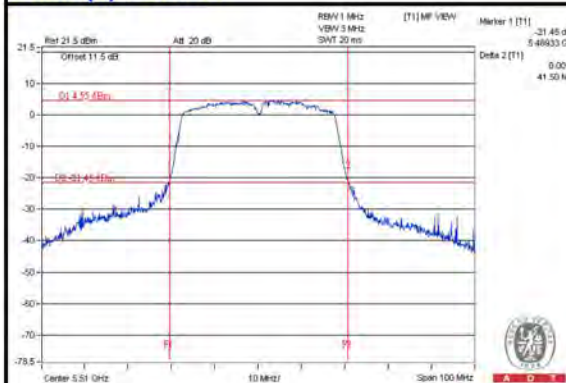
Chain(0) : CH54



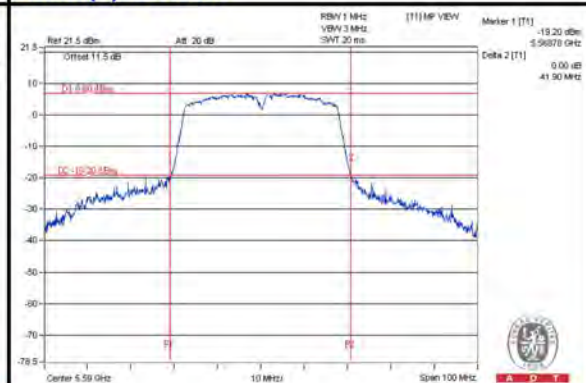
Chain(0) : CH62



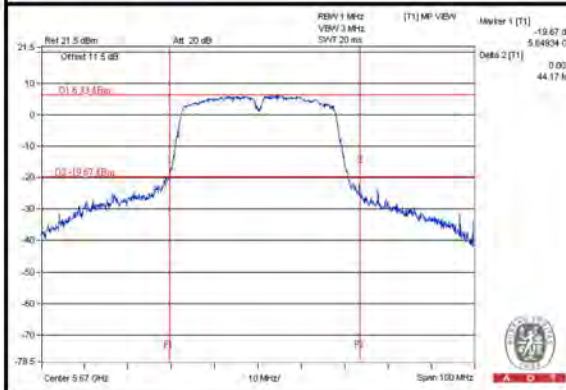
Chain(0) : CH102



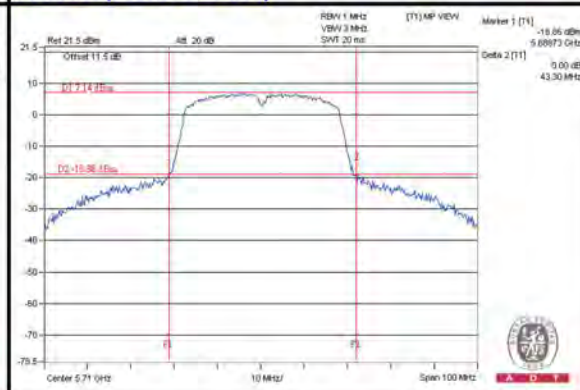
Chain(0) : CH118



Chain(0) : CH134



Chain(0) : CH142 (UNII-2c Band) / Chain(0) : CH142 (UNII-3 Band)



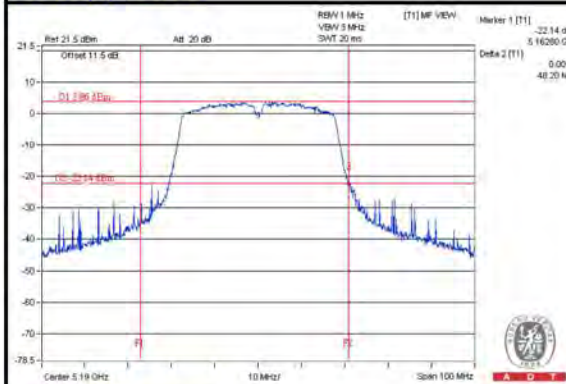
NOTE:

For CH142 (UNII-2c Band) = 5725 - Marker 1

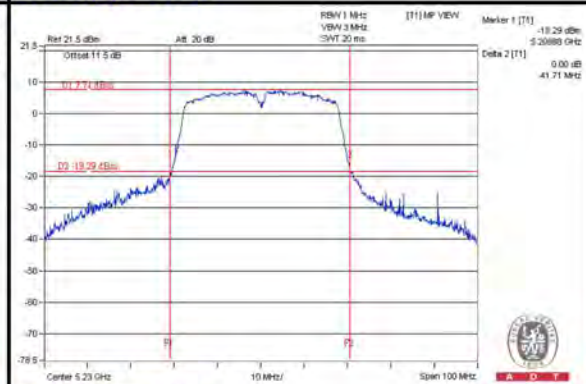


A D T

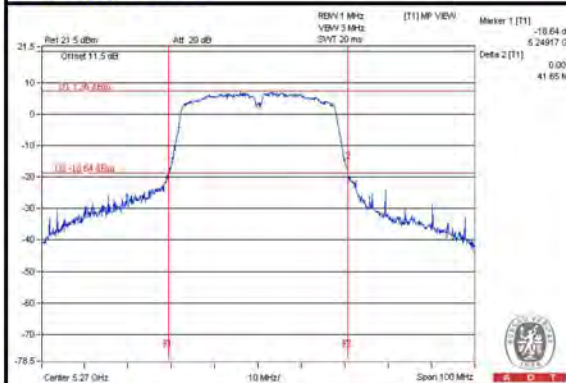
Chain(1) : CH38



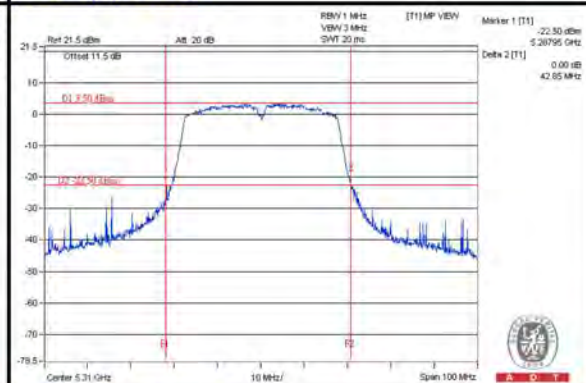
Chain(1) : CH46



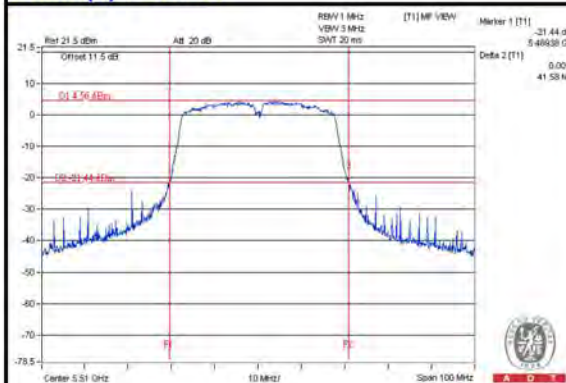
Chain(1) : CH54



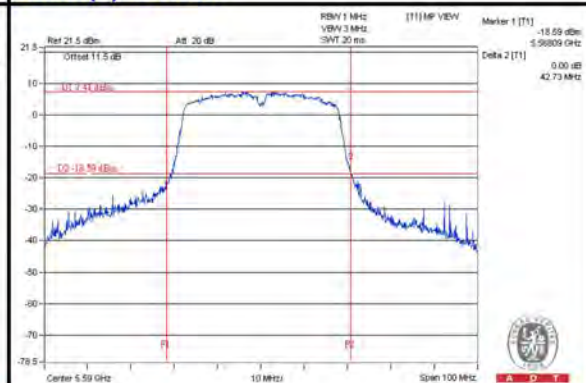
Chain(1) : CH62



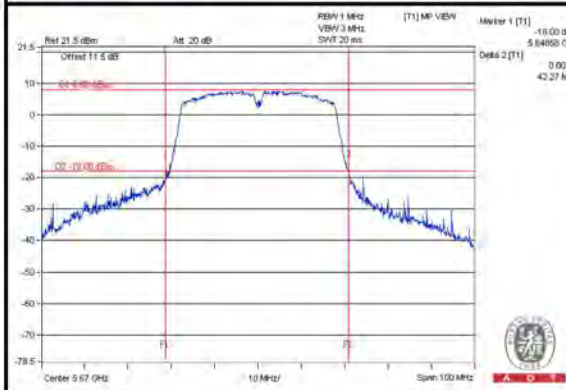
Chain(1) : CH102



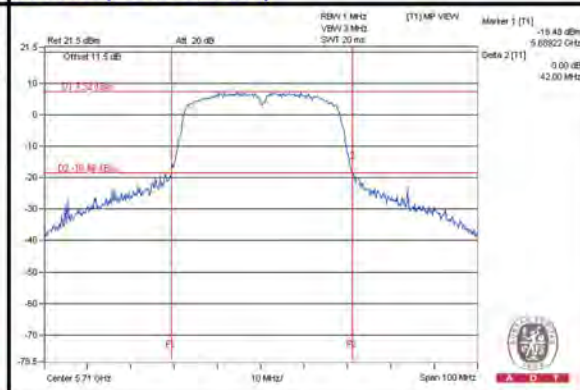
Chain(1) : CH118



Chain(1) : CH134



Chain(1) : CH142 (UNII-2c Band) / Chain(1) : CH142 (UNII-3 Band)



NOTE:

For CH142 (UNII-2c Band) = 5725 - Marker 1

802.11ac (VHT80)
POWER OUTPUT

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
42	5210	9.64	9.84	18.842	12.75	23.91	PASS
58	5290	9.34	9.28	17.062	12.32	23.91	PASS
106	5530	10.62	10.18	21.958	13.42	22.23	PASS
122	5610	13.24	13.73	44.691	16.50	22.23	PASS
138 (UNII-2c Band)	5690	8.67	8.68	22.2	13.46	22.23	PASS
138 (UNII-3 Band)	5690	-7.37	-7.47	0.5456	-2.63	28.23	PASS
155	5775	10.85	10.58	23.591	13.73	28.23	PASS

Note:

- 5150~5250MHz: The directional gain is 6.09dBi > 6dBi, therefore the limit needs to reduce, so the power limit shall be reduced to $24 - (6.09 - 6) = 23.91\text{dBm}$.
- 5250~5350MHz: The directional gain is 6.09dBi > 6dBi, therefore the limit needs to reduce, so the power limit shall be reduced to "Determined Conducted Limit-(6.09-6)".
- 5470~5725MHz: The directional gain is 7.77dBi > 6dBi, therefore the limit needs to reduce, so the power limit shall be reduced to "Determined Conducted Limit-(7.77-6)".
- 5725~5825MHz: The directional gain is 7.77dBi > 6dBi, , therefore the limit needs to reduce, so the power limit shall be reduced to $30 - (7.77 - 6) = 28.23\text{dBm}$.
- For CH138: Total power (dBm)= Average power <Chain 0 +1>(dBm) + Duty Factor (1.78dB)

802.11ac (VHT80)

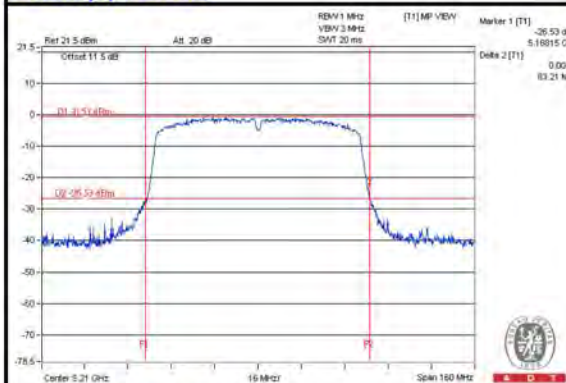
26dB OCCUPIED BANDWIDTH

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)	
		CHAIN 0	CHAIN 1
42	5210	83.21	82.64
58	5290	83.44	82.49
106	5530	82.20	82.85
122	5610	89.46	84.35
138 (UNII-2c Band)	5690	93.89	75.53

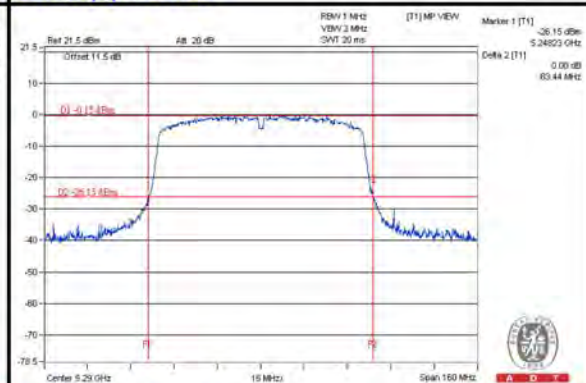
Note: For U-NII-2A, U-NII-2C Band output power limitation is determined based on 26dBc bandwidth.

Power Limit = 11dBm + 10logB < U-NII-2A, U-NII-2C >			
Channel Number	Freq.(MHz)	Min. B(MHz)	Determined Conducted Limit (dBm)
58	5290	82.49	30.16 > 24
106	5530	82.20	30.14 > 24
122	5610	84.35	30.26 > 24
138 (UNII-2c Band)	5690	75.53	29.78 > 24

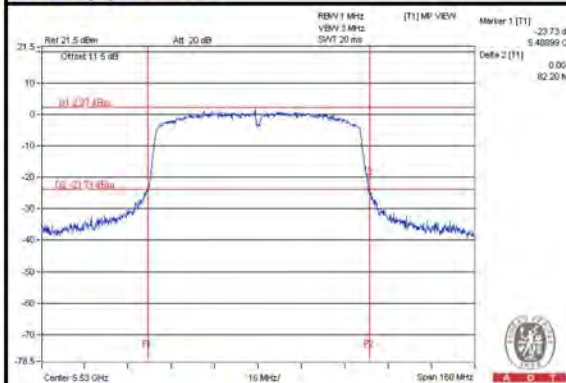
Chain(0) : CH42



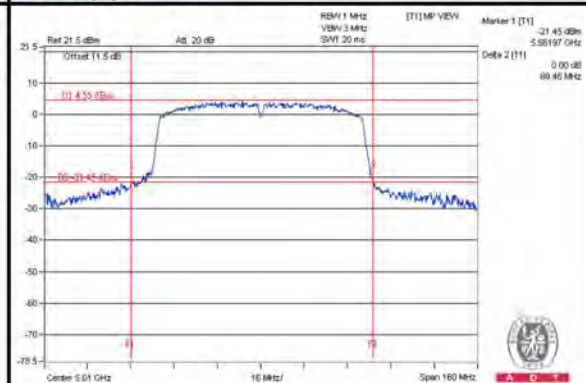
Chain(0) : CH58



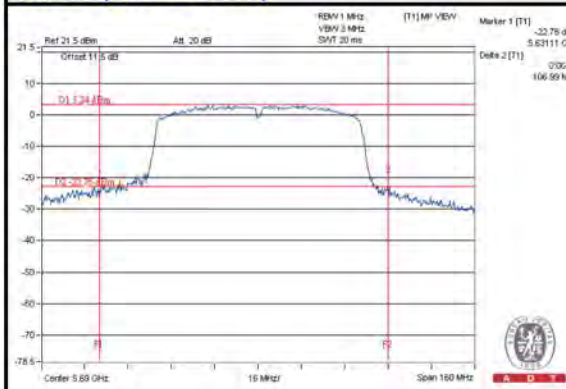
Chain(0) : CH106



Chain(0) : CH122



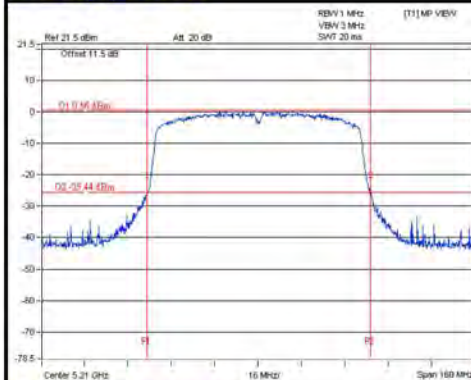
Chain(0) : CH138 (UNII-2c Band) / Chain(0) : CH138 (UNII-3 Band)



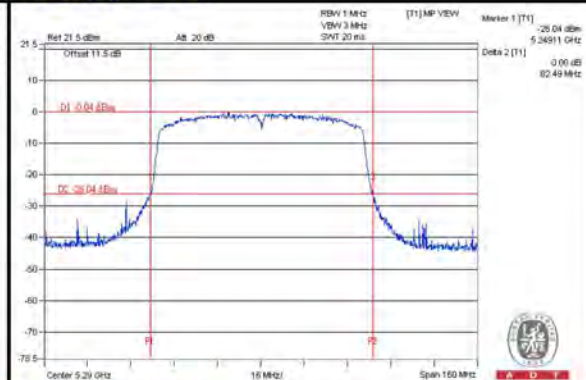
NOTE:

For CH138 (UNII-2c Band) = 5725 - Marker 1

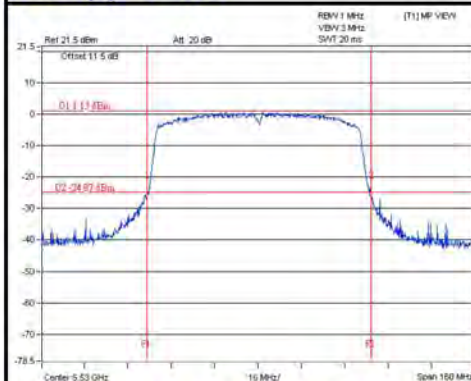
Chain(1) : CH42



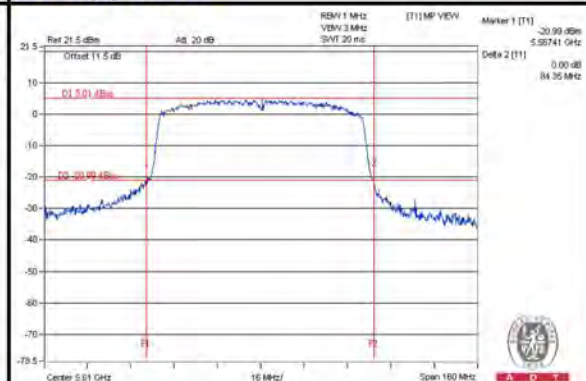
Chain(1) : CH58



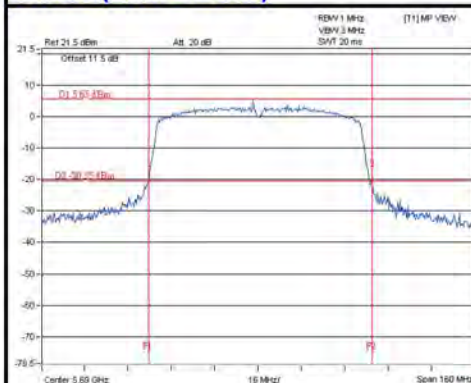
Chain(1) : CH106



Chain(1) : CH122



Chain(1) : CH138 (UNII-2c Band) / Chain(1) : CH138 (UNII-3 Band)



NOTE:

For CH138 (UNII-2c Band) = 5725 - Marker 1

4.2 PEAK POWER SPECTRAL DENSITY MEASUREMENT

4.2.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

Operation Band	EUT Category		LIMIT
U-NII-1		Outdoor Access Point	17dBm/ MHz
		Fixed point-to-point Access Point	
		Indoor Access Point	
	√	Mobile and Portable client device	11dBm/ MHz
U-NII-2A	---		11dBm/ MHz
U-NII-2C	---		11dBm/ MHz
U-NII-3	---		30dBm/ 500kHz

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. 17, 2014

4.2.3 TEST PROCEDURES

For U-NII-1, U-NII-2A & U-NII-2C:

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 1 MHz, Set VBW $\geq$ 3 MHz, Detector = RMS
3. Sweep time = auto, trigger set to "free run".
4. Trace average at least 100 traces in power averaging mode.
5. Record the max value and for duty cycle of test signal is $< 98\%$ add $10 \log (1/\text{duty cycle})$

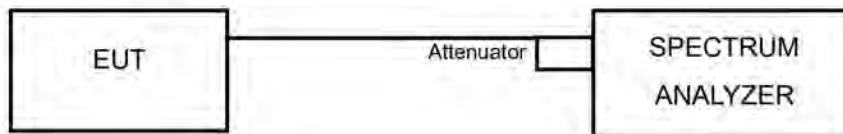
For U-NII-3:

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 300 kHz, Set VBW $\geq$ 1 MHz, Detector = RMS
3. Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
4. Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where $\text{BWCF} = 10\log(500 \text{ kHz}/300\text{kHz})$
5. Sweep time = auto, trigger set to "free run".
6. Trace average at least 100 traces in power averaging mode.
7. Record the max value and for duty cycle of test signal is $< 98\%$ add $10 \log (1/\text{duty cycle})$

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



4.2.6 EUT OPERATING CONDITIONS

Same as the 4.1.6

4.2.7 TEST RESULTS

For U-NII-1, U-NII-2A & U-NII-2C:

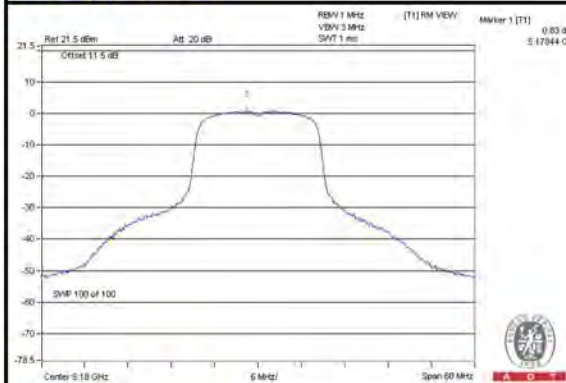
802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	PSD W/O DUTY FACTOR (dBm)		DUTY FACTOR (dB)	TOTAL PSD WITH DUTY FACTOR (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
36	5180	0.67	1.08	1.24	5.13	10.91	PASS
40	5200	2.56	3.87	1.24	7.51	10.91	PASS
48	5240	2.05	3.26	1.24	6.95	10.91	PASS
52	5260	2.29	2.76	1.24	6.78	10.91	PASS
60	5300	2.52	2.65	1.24	6.83	10.91	PASS
64	5320	0.92	0.63	1.24	5.03	10.91	PASS
100	5500	1.32	1.14	1.24	5.48	9.23	PASS
120	5600	2.46	3.21	1.24	7.10	9.23	PASS
140	5700	0.90	1.45	1.24	5.43	9.23	PASS
144 (UNII-2c Band)	5720	1.04	1.47	1.24	5.51	9.23	PASS

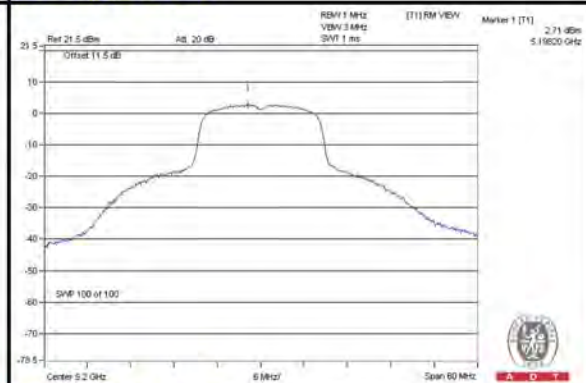
NOTE:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. 5150~5250MHz: Directional gain = $3.08\text{dBi} + 10\log(2) = 6.09\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $11-(6.09-6) = 10.91\text{dBm}$.
3. 5250~5350MHz: Directional gain = $3.08\text{dBi} + 10\log(2) = 6.09\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $11-(6.09-6) = 10.91\text{dBm}$.
4. 5470~5725MHz: Directional gain = $4.76\text{dBi} + 10\log(2) = 7.77\text{dBi} > 6\text{dB}$, so the power density limit shall be reduced to $11-(7.77-6) = 9.23\text{dBm}$.
5. Refer to section 3.4 for duty cycle spectrum plot.

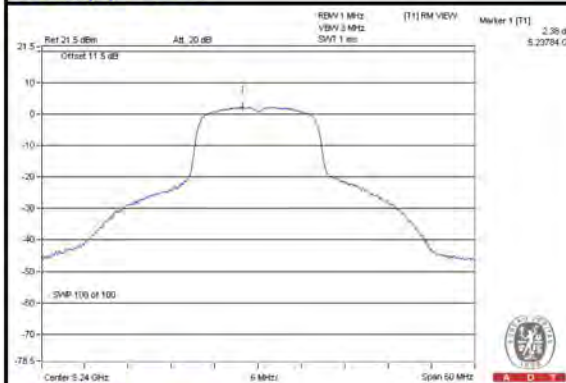
Chain(0) : CH36



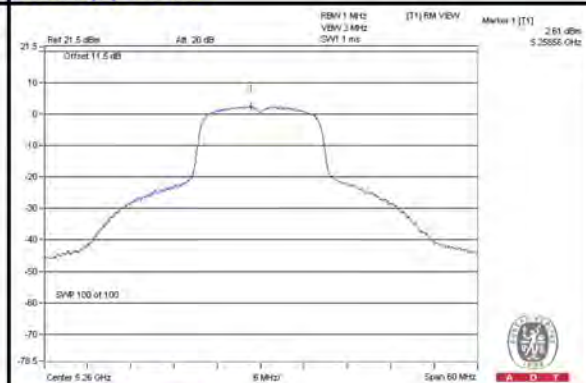
Chain(0) : CH40



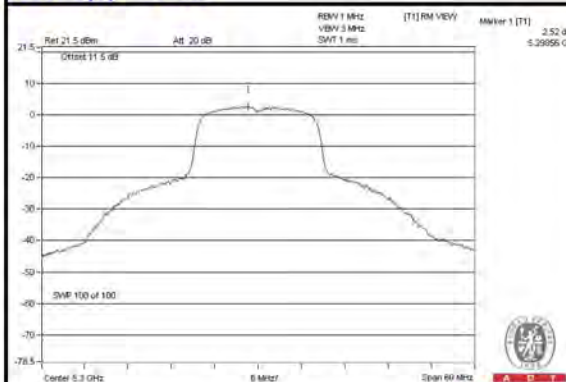
Chain(0) : CH48



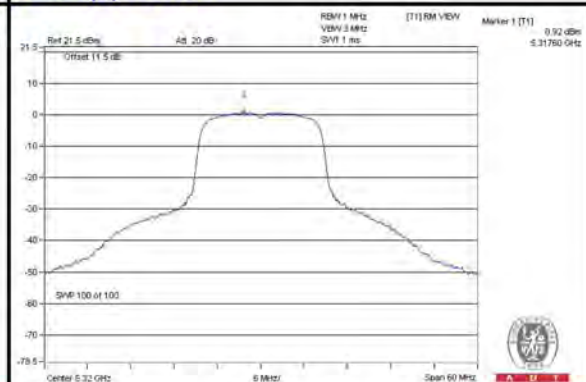
Chain(0) : CH52



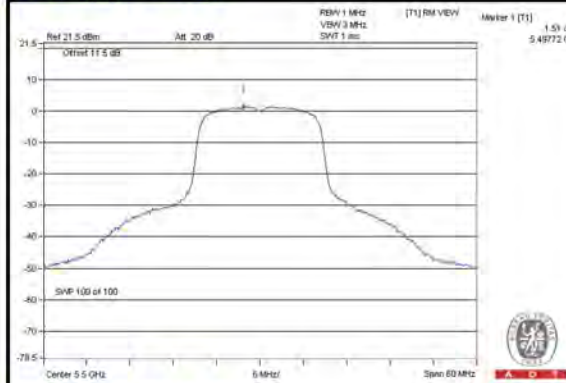
Chain(0) : CH60



Chain(0) : CH64



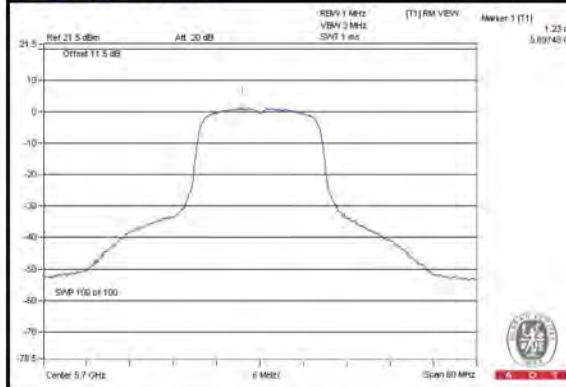
Chain(0) : CH100



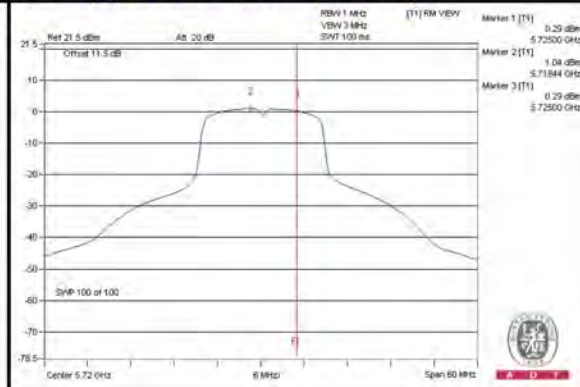
Chain(0) : CH120



Chain(0) : CH140



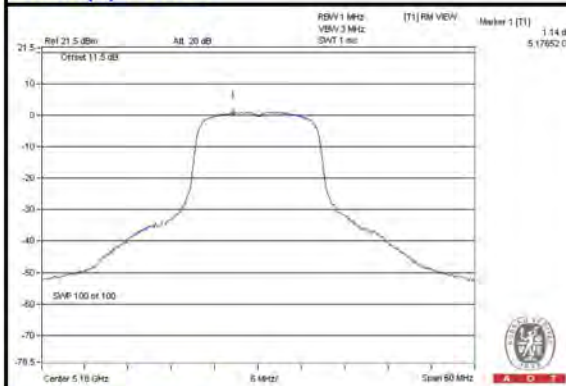
Chain(0) : CH144 (UNII-2c Band)



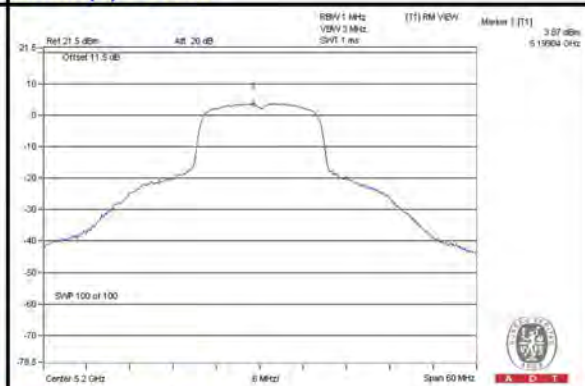


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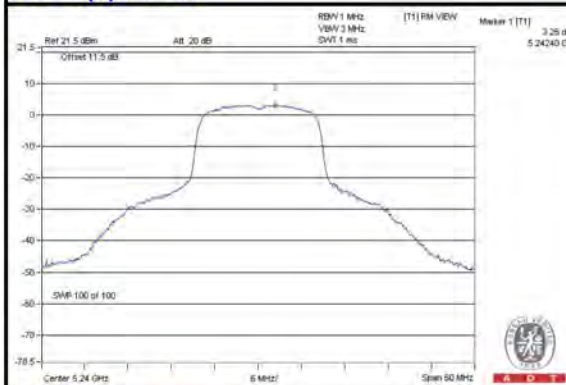
Chain(1) : CH36



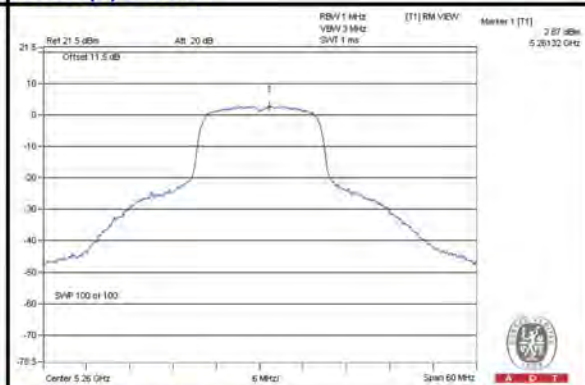
Chain(1) : CH40



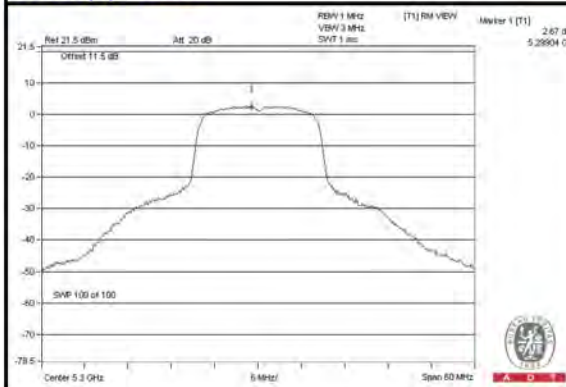
Chain(1) : CH48



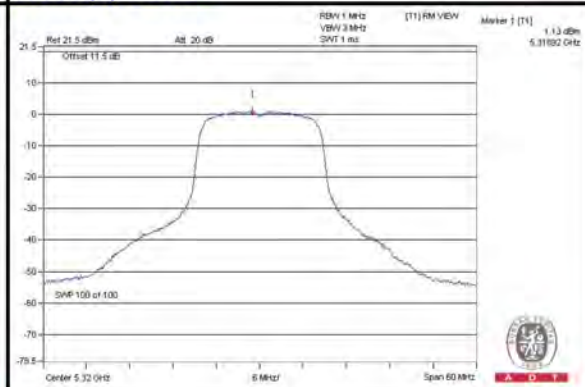
Chain(1) : CH52



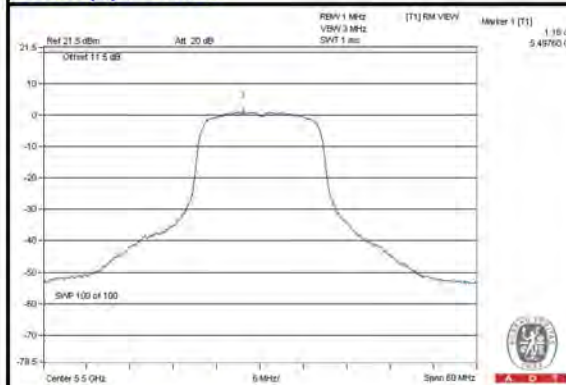
Chain(1) : CH60



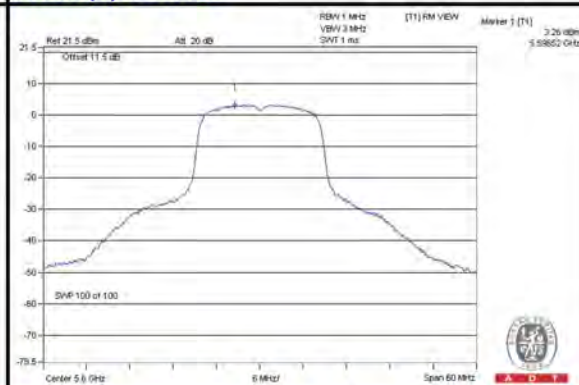
Chain(1) : CH64



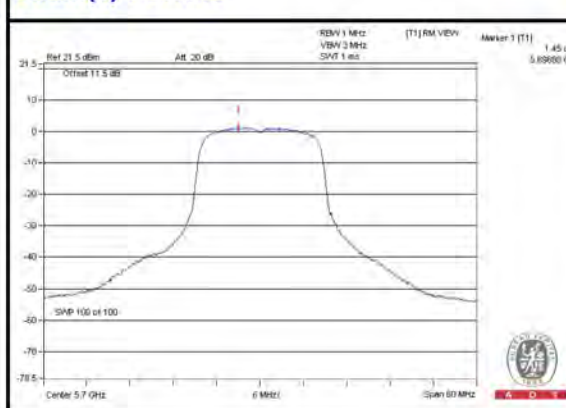
Chain(1) : CH100



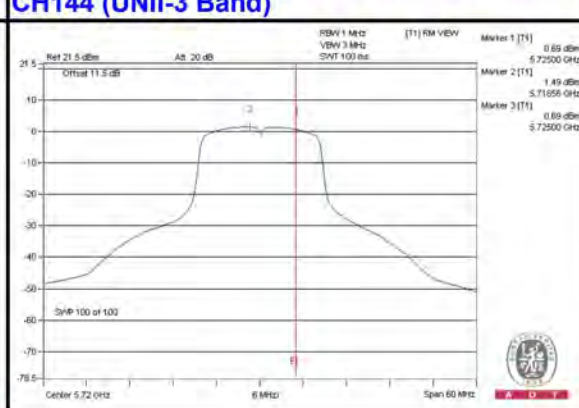
Chain(1) : CH120



Chain(1) : CH140



Chain(1) : CH144 (UNII-2c Band) / Chain(1) : CH144 (UNII-3 Band)





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802.11ac (VHT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	PSD W/O DUTY FACTOR (dBm)		DUTY FACTOR (dB)	TOTAL PSD WITH DUTY FACTOR (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
36	5180	0.55	0.96	1.31	5.08	10.91	PASS
40	5200	0.72	2.45	1.31	5.99	10.91	PASS
48	5240	1.89	2.98	1.31	6.79	10.91	PASS
52	5260	1.02	2.01	1.31	5.86	10.91	PASS
60	5300	1.68	1.45	1.31	5.88	10.91	PASS
64	5320	0.97	1.14	1.31	5.37	10.91	PASS
100	5500	0.72	0.43	1.31	4.90	9.23	PASS
120	5600	1.58	1.25	1.31	5.74	9.23	PASS
140	5700	0.74	0.54	1.31	4.96	9.23	PASS
144 (UNII-2c Band)	5720	0.03	0.25	1.31	4.46	9.23	PASS

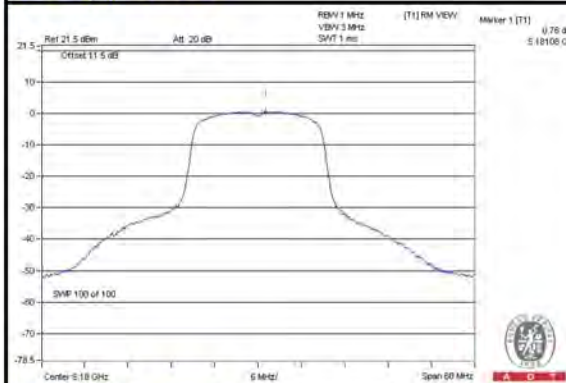
NOTE:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. 5150~5250MHz: Directional gain = $3.08\text{dBi} + 10\log(2) = 6.09\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $11 - (6.09 - 6) = 10.91\text{dBm}$.
3. 5250~5350MHz: Directional gain = $3.08\text{dBi} + 10\log(2) = 6.09\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $11 - (6.09 - 6) = 10.91\text{dBm}$.
4. 5470~5725MHz: Directional gain = $4.76\text{dBi} + 10\log(2) = 7.77\text{dBi} > 6\text{dB}$, so the power density limit shall be reduced to $11 - (7.77 - 6) = 9.23\text{dBm}$.
5. Refer to section 3.4 for duty cycle spectrum plot.

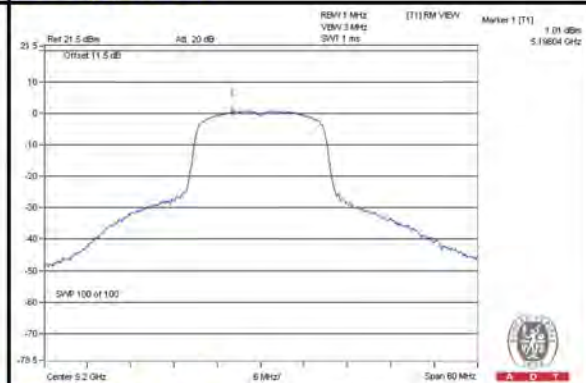


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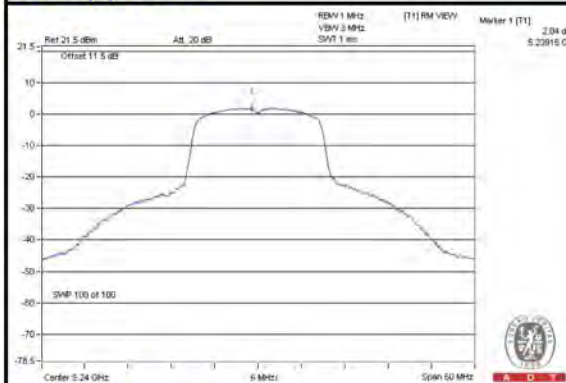
Chain(0) : CH36



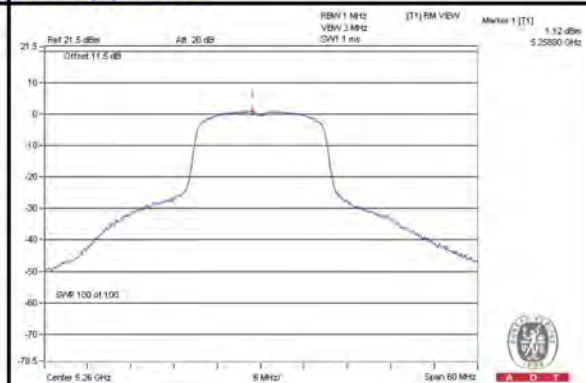
Chain(0) : CH40



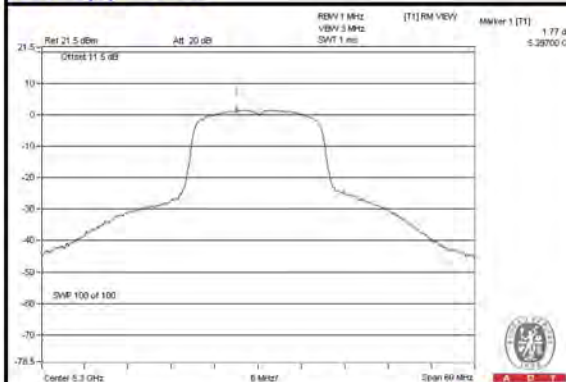
Chain(0) : CH48



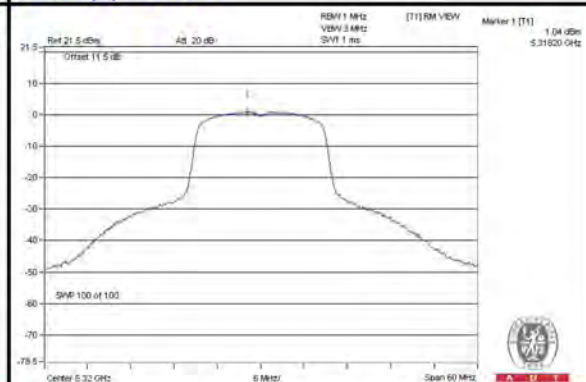
Chain(0) : CH52



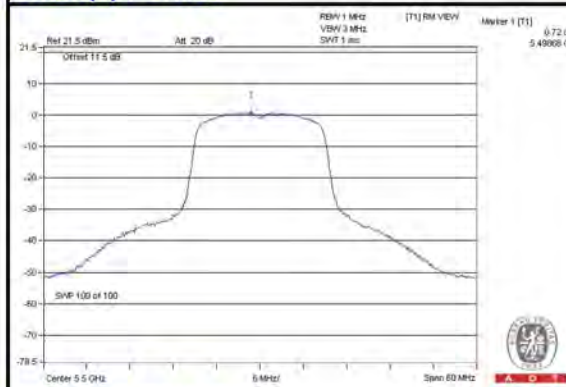
Chain(0) : CH60



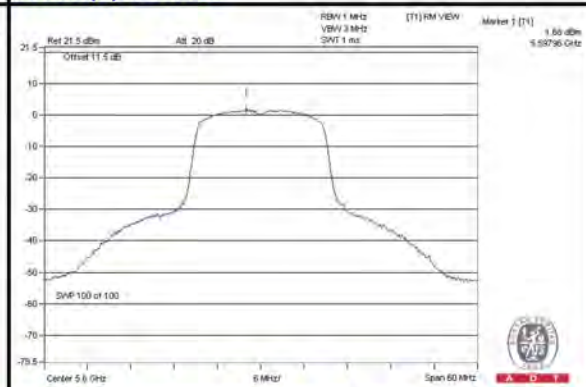
Chain(0) : CH64



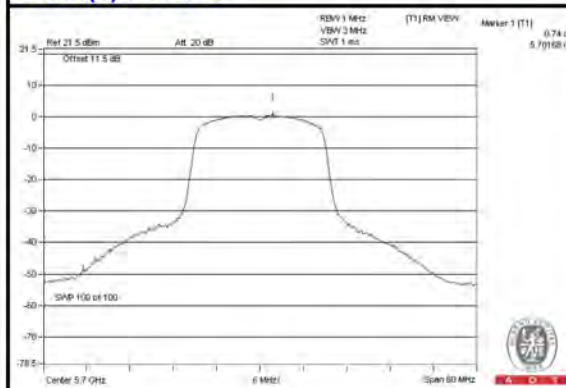
Chain(0) : CH100



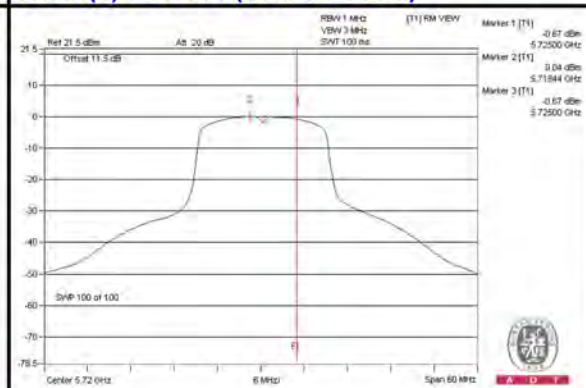
Chain(0) : CH120



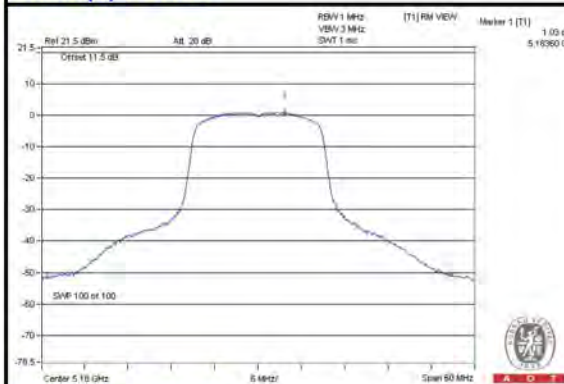
Chain(0) : CH140



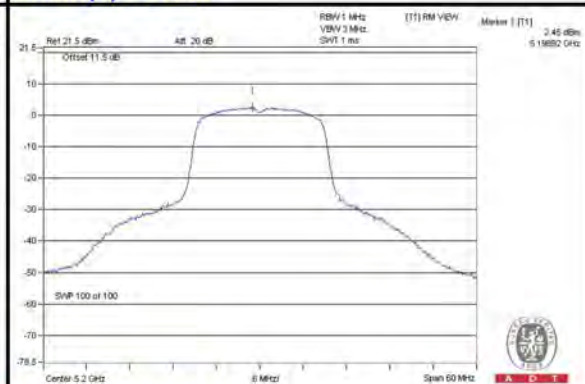
Chain(0) : CH144 (UNII-2c Band)



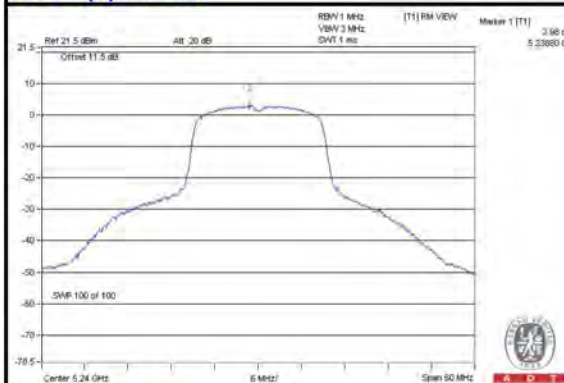
Chain(1) : CH36



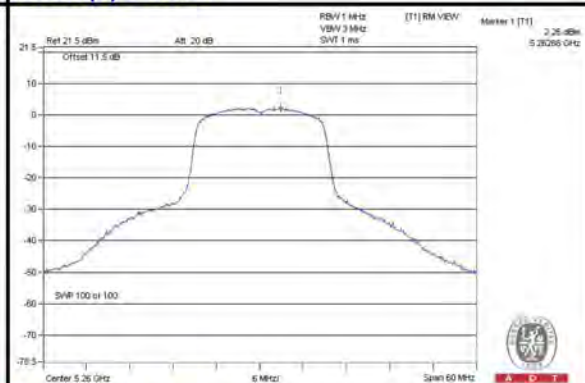
Chain(1) : CH40



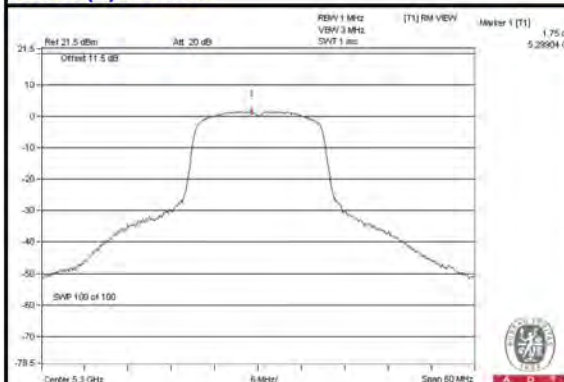
Chain(1) : CH48



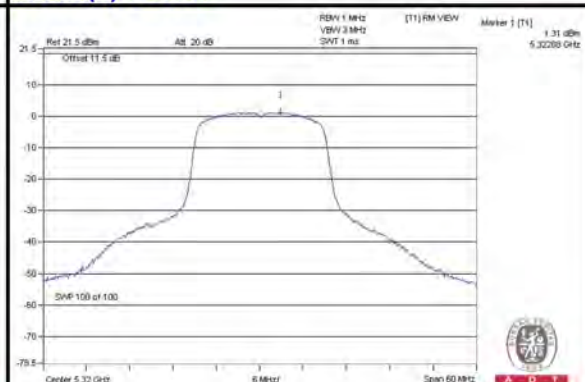
Chain(1) : CH52



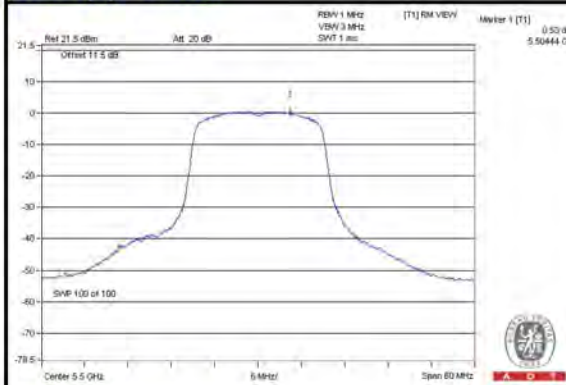
Chain(1) : CH60



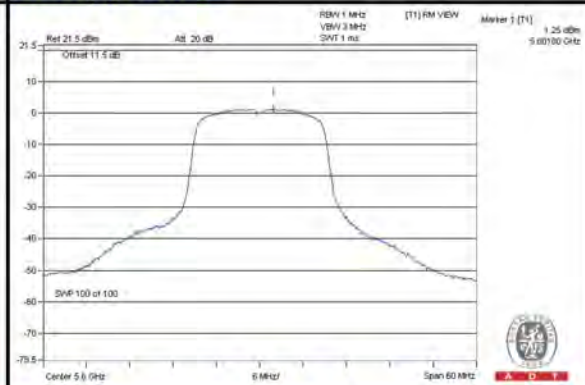
Chain(1) : CH64



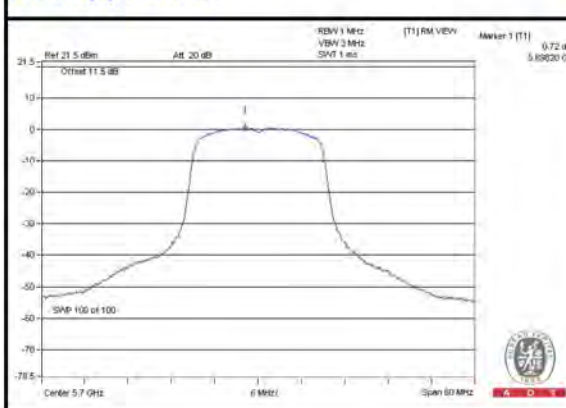
Chain(1) : CH100



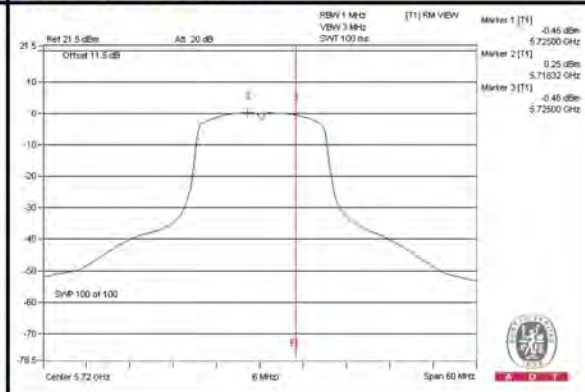
Chain(1) : CH120



Chain(1) : CH140



Chain(1) : CH144 (UNII-2c Band) / Chain(1) : CH144 (UNII-3 Band)





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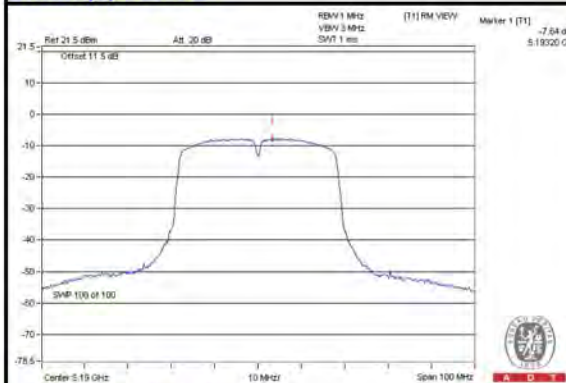
802.11ac (VHT40)

CHANNEL	CHANNEL FREQUENCY (MHz)	PSD W/O DUTY FACTOR (dBm)		DUTY FACTOR (dB)	TOTAL PSD WITH DUTY FACTOR (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
38	5190	-7.81	-7.14	2.41	-2.04	10.91	PASS
46	5230	-4.02	-3.23	2.41	1.81	10.91	PASS
54	5270	-3.89	-3.73	2.41	1.61	10.91	PASS
62	5310	-6.54	-7.26	2.41	-1.46	10.91	PASS
102	5510	-5.96	-6.60	2.41	-0.85	9.23	PASS
118	5590	-4.20	-3.56	2.41	1.55	9.23	PASS
134	5670	-4.39	-3.19	2.41	1.67	9.23	PASS
142 (UNII-2c Band)	5710	-3.96	-3.80	2.41	1.54	9.23	PASS

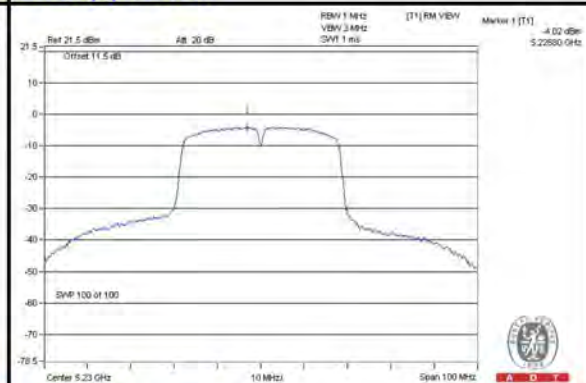
NOTE:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. 5150~5250MHz: Directional gain = $3.08\text{dBi} + 10\log(2) = 6.09\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $11-(6.09-6) = 10.91\text{dBm}$.
3. 5250~5350MHz: Directional gain = $3.08\text{dBi} + 10\log(2) = 6.09\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $11-(6.09-6) = 10.91\text{dBm}$.
4. 5470~5725MHz: Directional gain = $4.76\text{dBi} + 10\log(2) = 7.77\text{dBi} > 6\text{dB}$, so the power density limit shall be reduced to $11-(7.77-6) = 9.23\text{dBm}$.
5. Refer to section 3.4 for duty cycle spectrum plot.

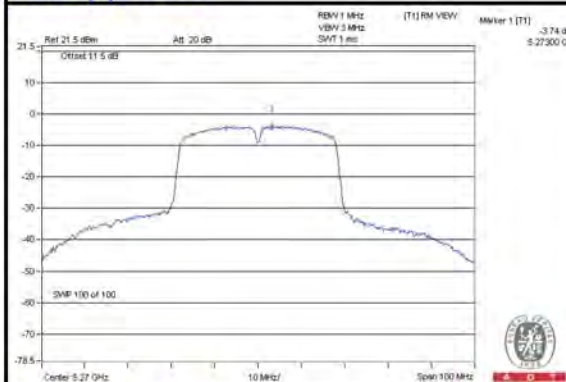
Chain(0) : CH38



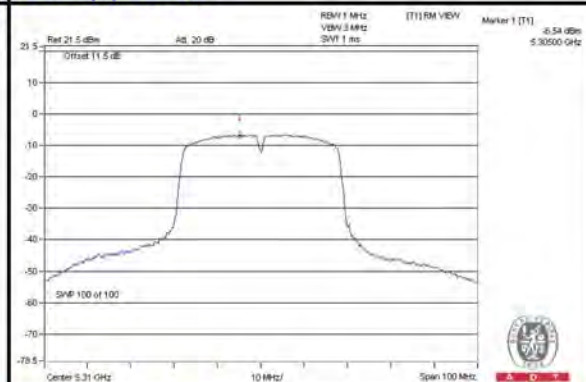
Chain(0) : CH46



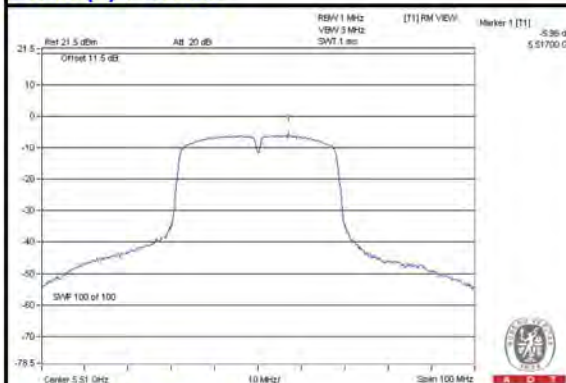
Chain(0) : CH54



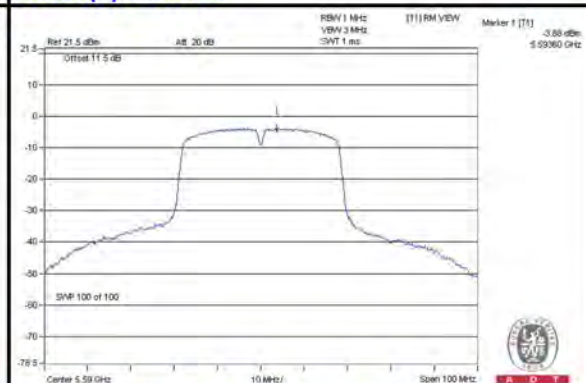
Chain(0) : CH62



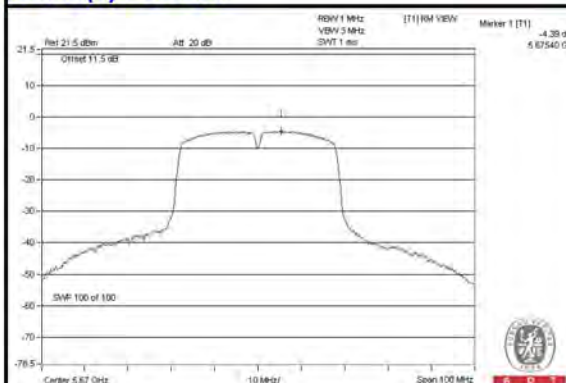
Chain(0) : CH102



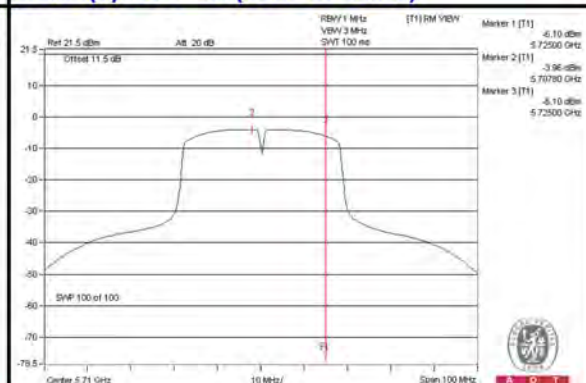
Chain(0) : CH118



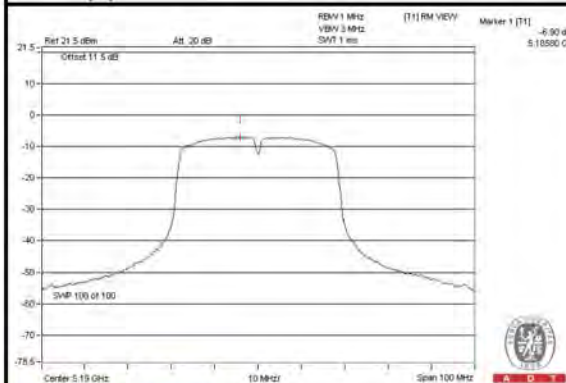
Chain(0) : CH134



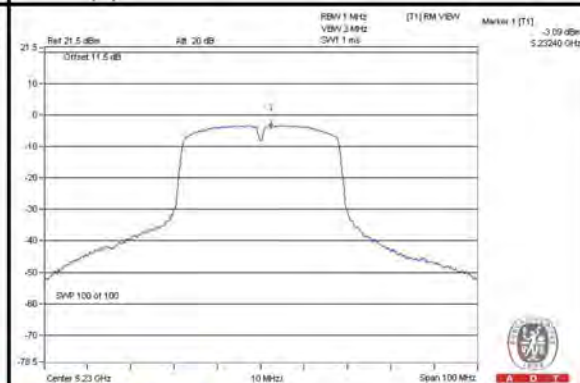
Chain(0) : CH142 (UNII-2c Band)



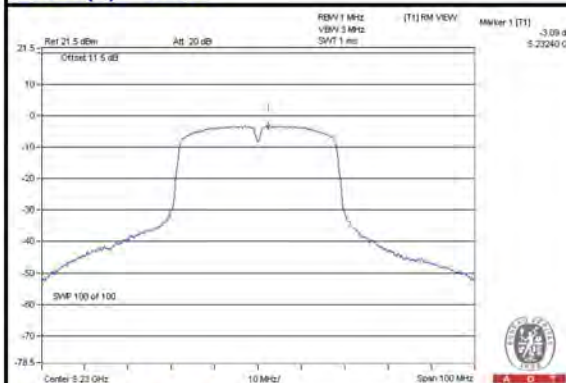
Chain(1) : CH38



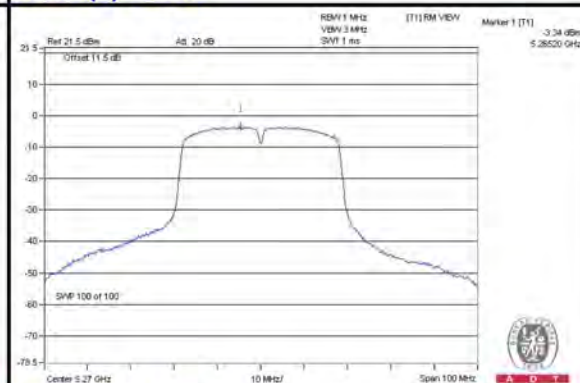
Chain(1) : CH46



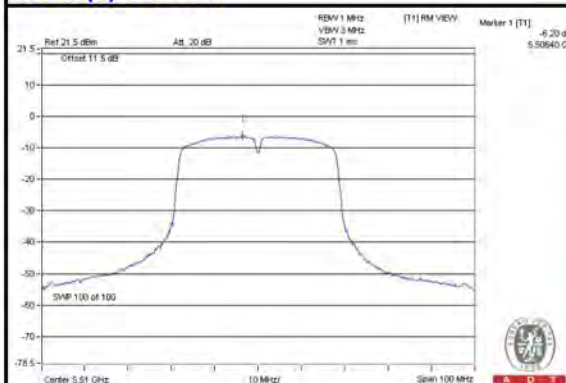
Chain(1) : CH54



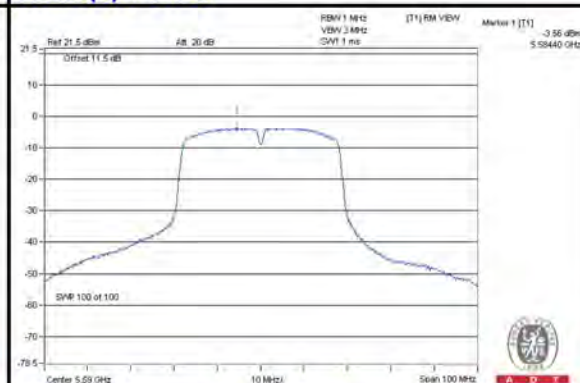
Chain(1) : CH62



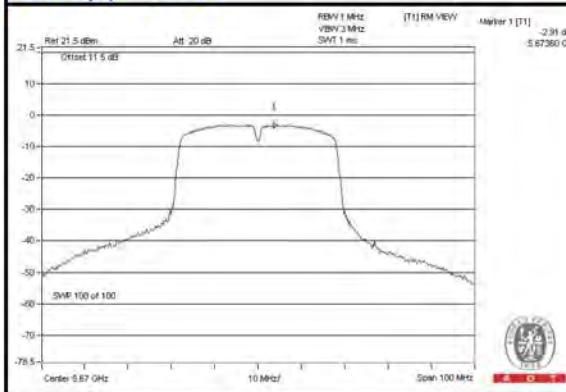
Chain(1) : CH102



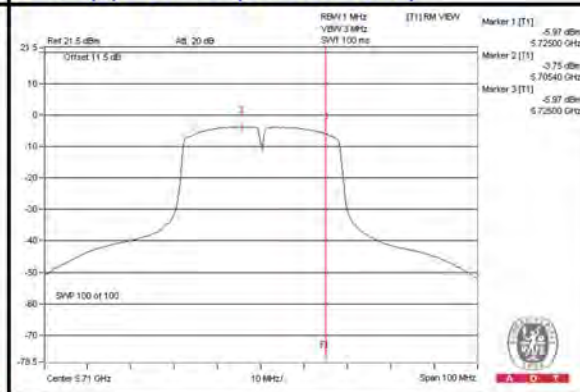
Chain(1) : CH46



Chain(0) : CH134



Chain(0) : CH142 (UNII-2c Band)





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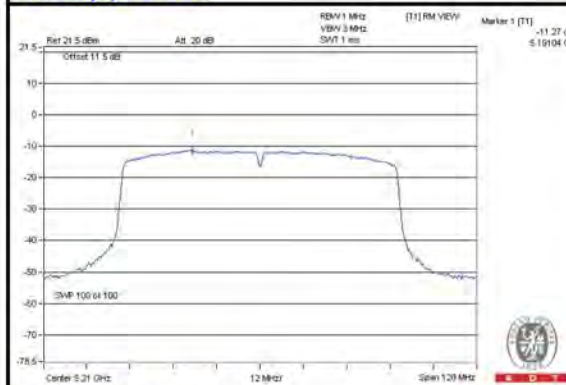
802.11ac (VHT80)

CHANNEL	CHANNEL FREQUENCY (MHz)	PSD W/O DUTY FACTOR (dBm)		DUTY FACTOR (dB)	TOTAL PSD WITH DUTY FACTOR (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
42	5210	-11.27	-11.10	1.78	-6.40	10.91	PASS
58	5290	-11.01	-11.34	1.78	-6.38	10.91	PASS
106	5530	-9.74	-10.85	1.78	-5.47	9.23	PASS
122	5610	-7.01	-6.71	1.78	-2.07	9.23	PASS
138 (UNII-2c Band)	5690	-7.90	-7.87	1.78	-3.10	9.23	PASS

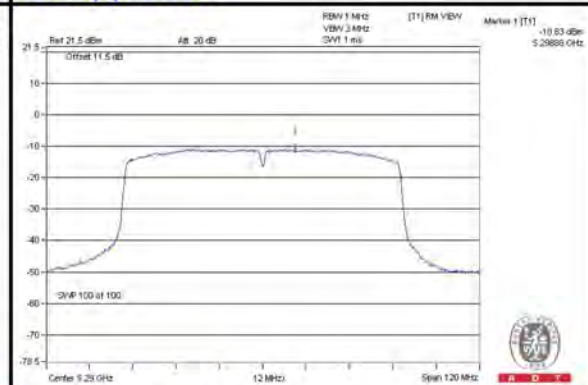
NOTE:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. 5150~5250MHz: Directional gain = $3.08\text{dBi} + 10\log(2) = 6.09\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $11-(6.09-6) = 10.91\text{dBm}$.
3. 5250~5350MHz: Directional gain = $3.08\text{dBi} + 10\log(2) = 6.09\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $11-(6.09-6) = 10.91\text{dBm}$.
4. 5470~5725MHz: Directional gain = $4.76\text{dBi} + 10\log(2) = 7.77\text{dBi} > 6\text{dB}$, so the power density limit shall be reduced to $11-(7.77-6) = 9.23\text{dBm}$.
5. Refer to section 3.4 for duty cycle spectrum plot.

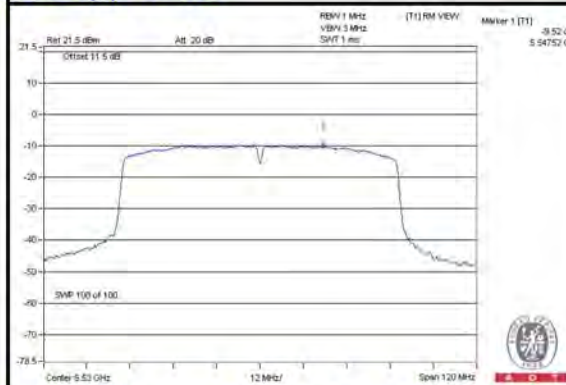
Chain(0) : CH42



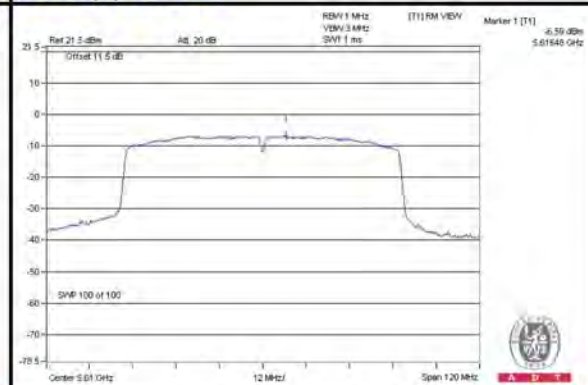
Chain(0) : CH58



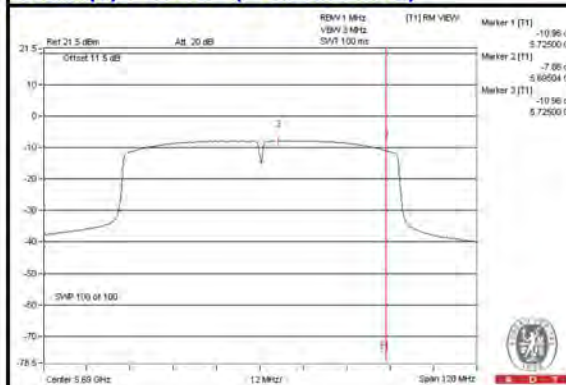
Chain(0) : CH106



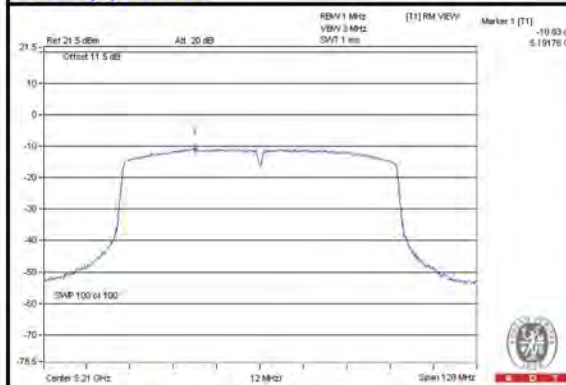
Chain(0) : CH122



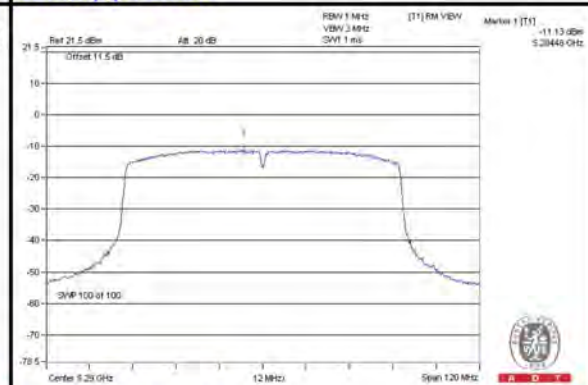
Chain(0) : CH138 (UNII-2c Band)



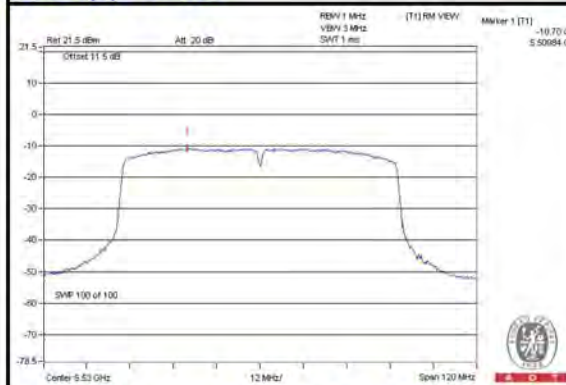
Chain(1) : CH42



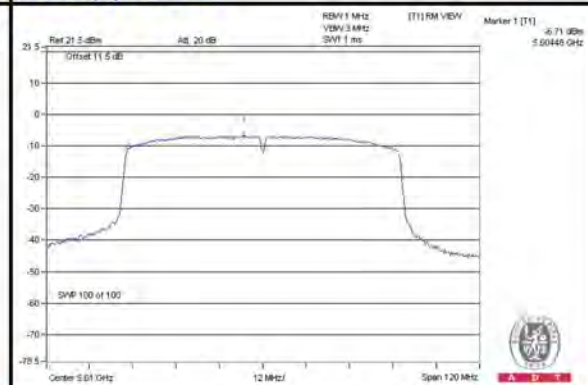
Chain(1) : CH58



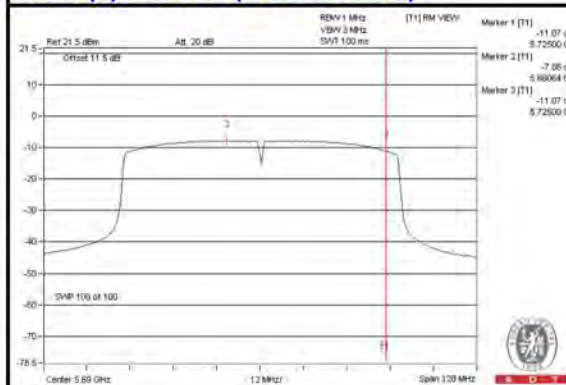
Chain(1) : CH106



Chain(1) : CH122



Chain(1) : CH138 (UNII-2c Band)





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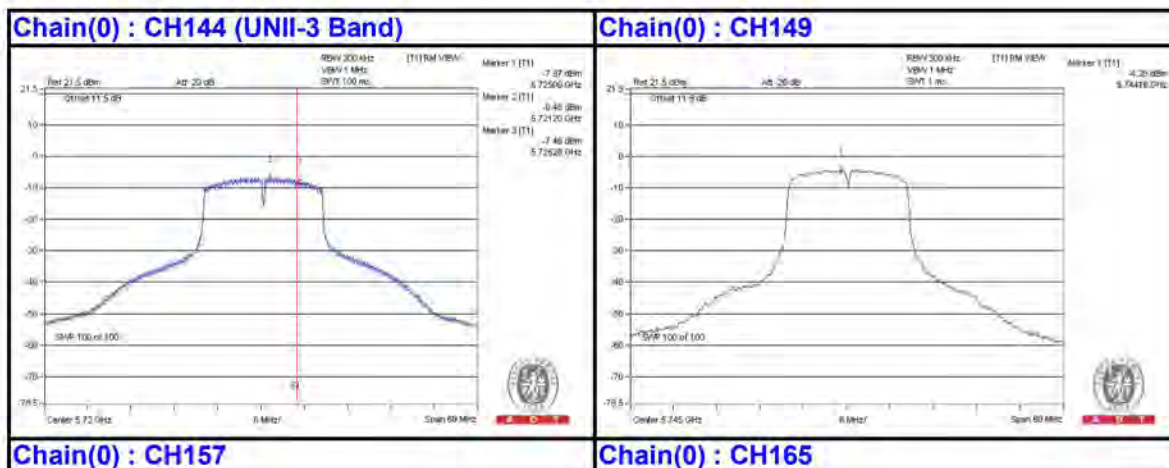
For U-NII-3:

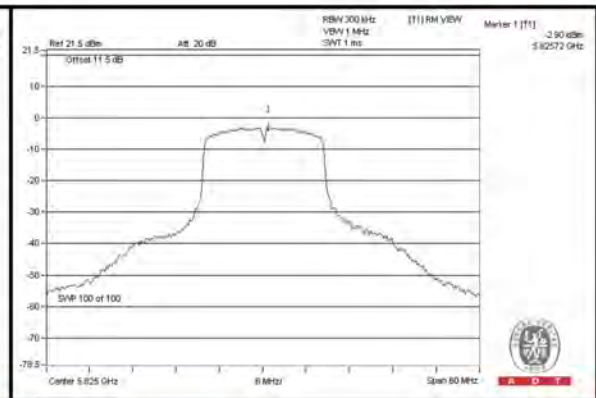
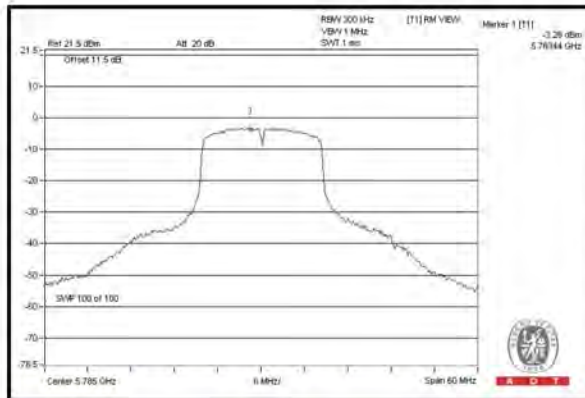
802.11a

TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD W/O DUTY FACTOR		10 log (N=2) dB	DUTY FACTOR (dB)	TOTAL PSD WITH DUTY FACTOR (dBm/500kHz)	LIMIT (dBm/500kHz)	PASS /FAIL
			(dBm/300kHz)	(dBm/500kHz)					
0	144 (UNII-3 Band)	5720	-7.97	-5.75	3.01	1.24	-1.50	28.23	PASS
	149	5745	-4.28	-2.06	3.01	1.24	2.19	28.23	PASS
	157	5785	-3.28	-1.06	3.01	1.24	3.19	28.23	PASS
	165	5825	-2.90	-0.68	3.01	1.24	3.57	28.23	PASS
1	144 (UNII-3 Band)	5720	-8.04	-5.82	3.01	1.24	-1.57	28.23	PASS
	149	5745	-4.19	-1.97	3.01	1.24	2.28	28.23	PASS
	157	5785	-2.72	-0.50	3.01	1.24	3.75	28.23	PASS
	165	5825	-2.73	-0.51	3.01	1.24	3.74	28.23	PASS

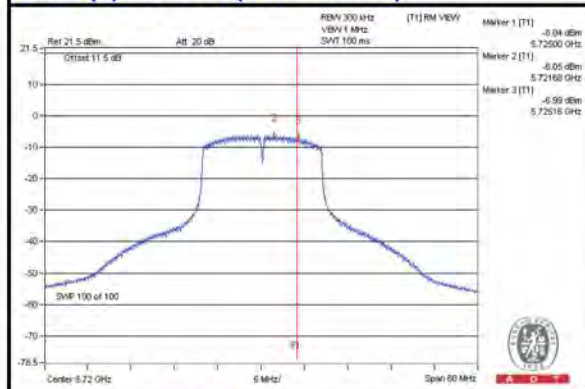
NOTE: 1. **5725~5825MHz:** Directional gain = 4.76dBi + 10log(2) = 7.77dBi > 6dB, so the power density limit shall be reduced to 30-(7.77-6) = 28.23dBm.

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

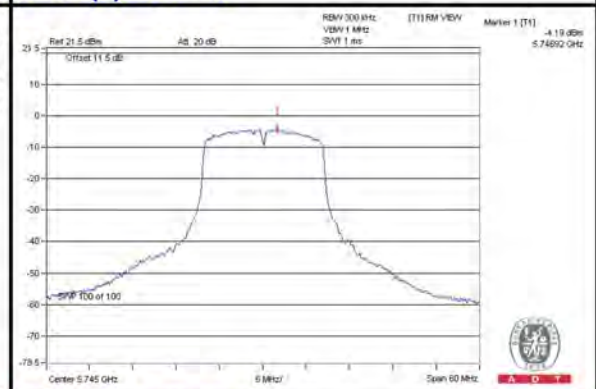




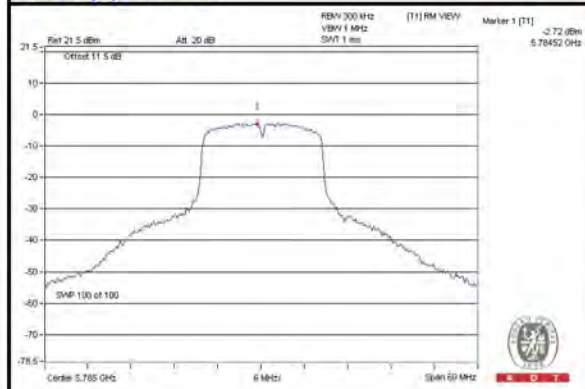
Chain(1) : CH144 (UNII-3 Band)



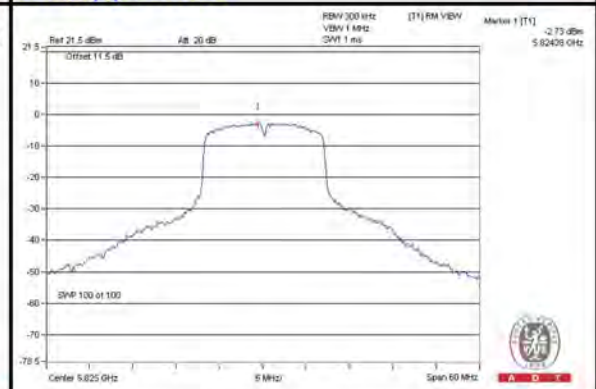
Chain(1) : CH149



Chain(1) : CH157



Chain(1) : CH165



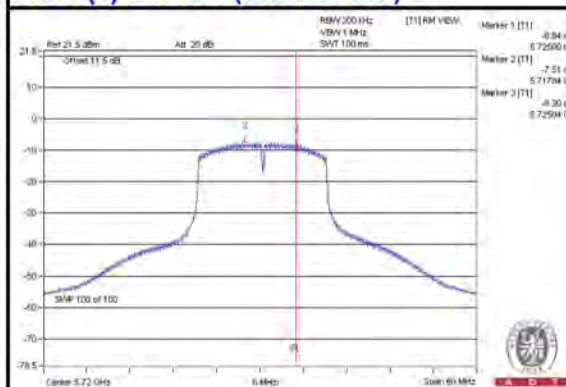
802.11ac (VHT20)

TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD W/O DUTY FACTOR		10 log (N=2) dB	DUTY FACTOR (dB)	TOTAL PSD WITH DUTY FACTOR (dBm/500kHz)	LIMIT (dBm/500kHz)	PASS /FAIL
			(dBm/300kHz)	(dBm/500kHz)					
0	144 (UNII-3 Band)	5720	-8.84	-6.62	3.01	1.31	-2.30	28.23	PASS
	149	5745	-4.56	-2.34	3.01	1.31	1.98	28.23	PASS
	157	5785	-4.29	-2.07	3.01	1.31	2.25	28.23	PASS
	165	5825	-3.44	-1.22	3.01	1.31	3.10	28.23	PASS
1	144 (UNII-3 Band)	5720	-8.76	-6.54	3.01	1.31	-2.22	28.23	PASS
	149	5745	-4.43	-2.21	3.01	1.31	2.11	28.23	PASS
	157	5785	-3.67	-1.45	3.01	1.31	2.87	28.23	PASS
	165	5825	-3.15	-0.93	3.01	1.31	3.39	28.23	PASS

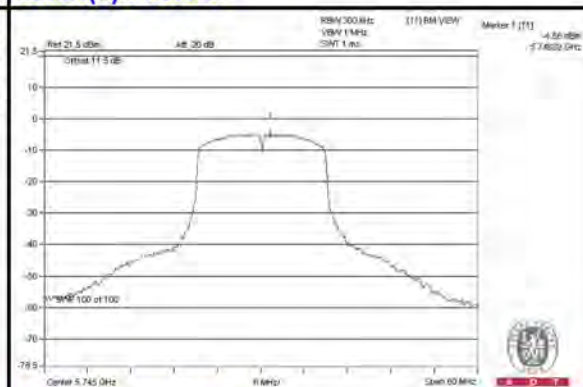
NOTE: 1. **5725~5825MHz:** Directional gain = 4.76dBi + 10log(2) = 7.77dBi > 6dB, so the power density limit shall be reduced to 30-(7.77-6) = 28.23dBm.

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

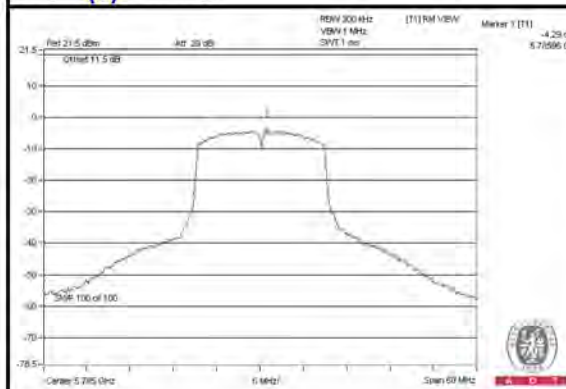
Chain(0) : CH144 (UNII-3 Band)



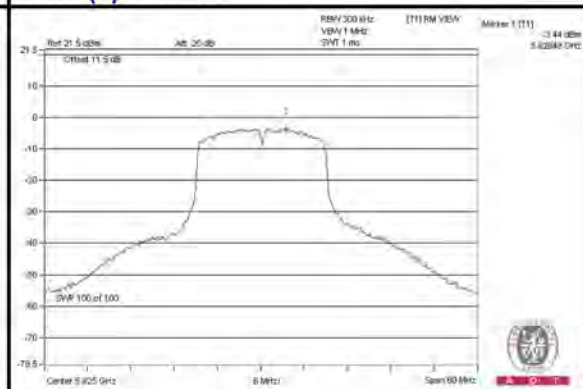
Chain(0) : CH149



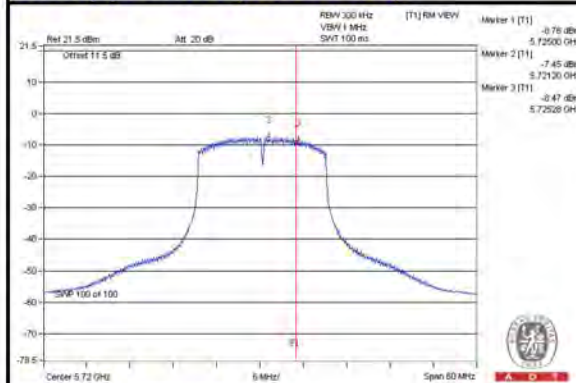
Chain(0) : CH157



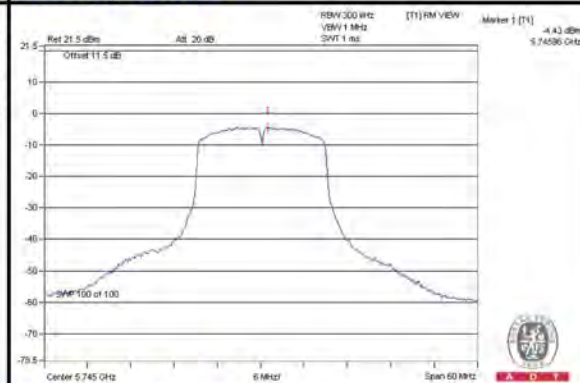
Chain(0) : CH165



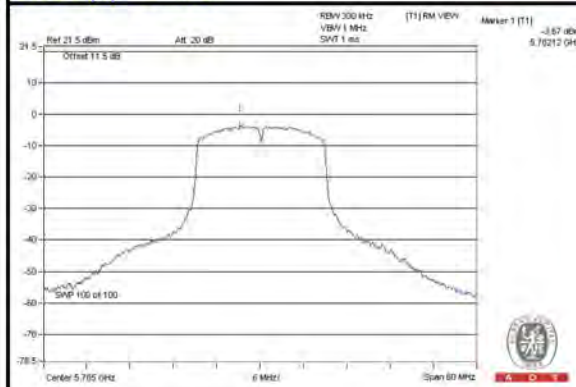
Chain(1) : CH144 (UNII-3 Band)



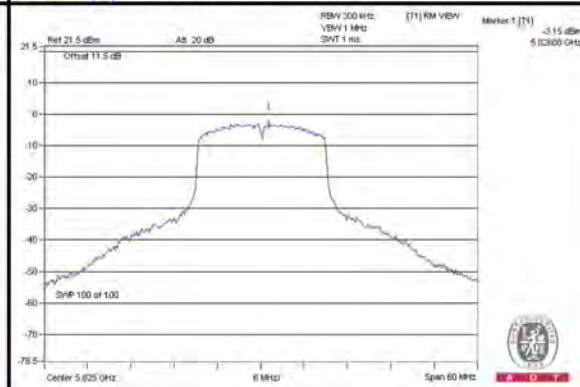
Chain(1) : CH149



Chain(1) : CH157



Chain(1) : CH165



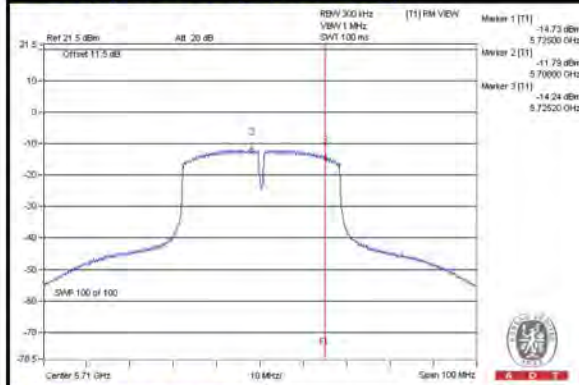
802.11ac (VHT40)

TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD W/O DUTY FACTOR		10 log (N=2) dB	DUTY FACTOR (dB)	TOTAL PSD WITH DUTY FACTOR (dBm/500kHz)	LIMIT (dBm/500kHz)	PASS /FAIL
			(dBm/300kHz)	(dBm/500kHz)					
0	142 (UNII-3 Band)	5710	-14.73	-12.51	3.01	2.41	-7.09	28.23	PASS
	151	5755	-10.65	-8.43	3.01	2.41	-3.01	28.23	PASS
	159	5795	-9.45	-7.23	3.01	2.41	-1.81	28.23	PASS
1	142 (UNII-3 Band)	5710	-14.66	-12.44	3.01	2.41	-7.02	28.23	PASS
	151	5755	-11.09	-8.87	3.01	2.41	-3.45	28.23	PASS
	159	5795	-9.34	-7.12	3.01	2.41	-1.70	28.23	PASS

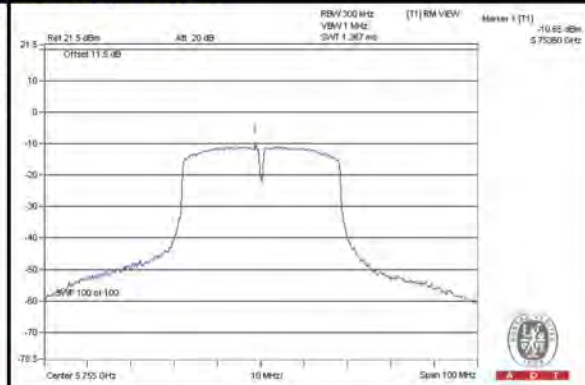
NOTE: 1. **5725~5825MHz:** Directional gain = $4.76\text{dBi} + 10\log(2) = 7.77\text{dBi} > 6\text{dB}$, so the power density limit shall be reduced to $30 - (7.77 - 6) = 28.23\text{dBm}$.

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

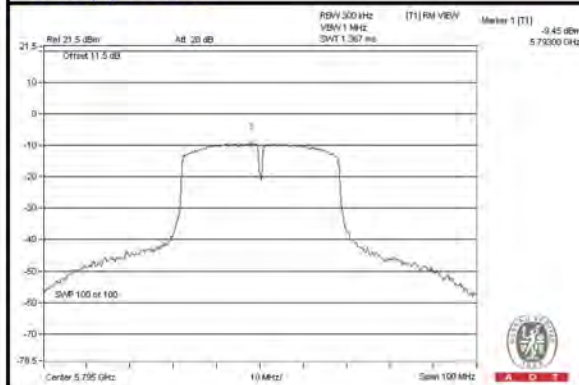
Chain(0) : CH142 (UNII-3 Band)



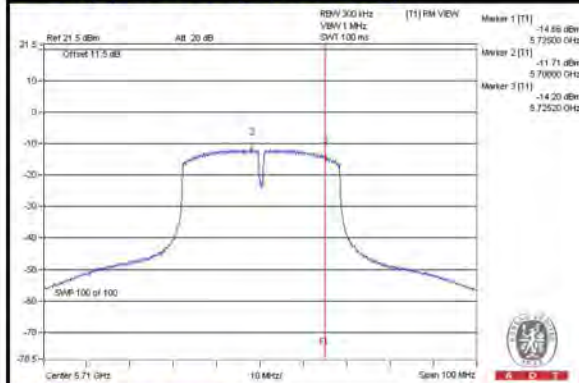
Chain(0) : CH151



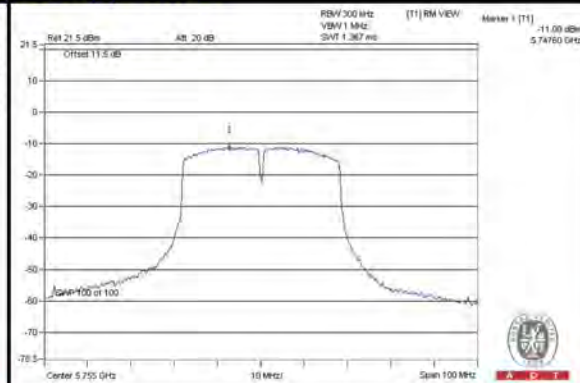
Chain(0) : CH159



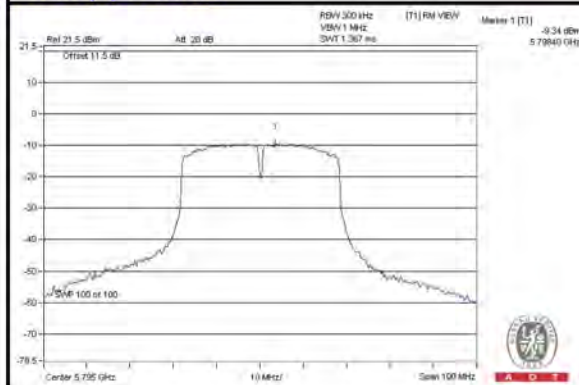
Chain(1) : CH142 (UNII-3 Band)



Chain(1) : CH151



Chain(1) : CH159



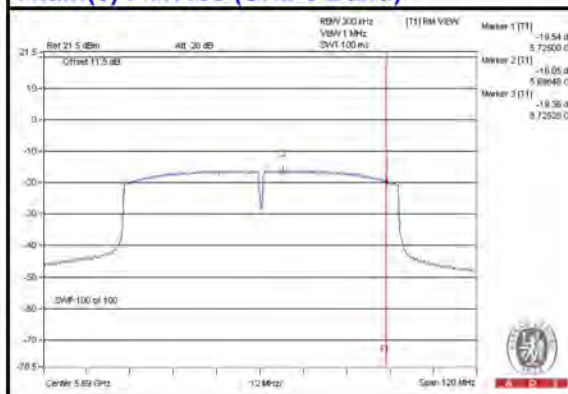
802.11ac (VHT80)

TX CHAIN	CHANNEL	FREQUENCY (MHz)	PSD W/O DUTY FACTOR		10 log (N=2) dB	DUTY FACTOR (dB)	TOTAL PSD WITH DUTY FACTOR (dBm/500kHz)	LIMIT (dBm/500kHz)	PASS /FAIL
			(dBm/300kHz)	(dBm/500kHz)					
0	138 (UNII-3 Band)	5690	-19.54	-17.32	3.01	1.78	-12.53	28.23	PASS
	155	5775	-15.18	-12.96	3.01	1.78	-8.17	28.23	PASS
1	138 (UNII-3 Band)	5690	-19.60	-17.38	3.01	1.78	-12.59	28.23	PASS
	155	5775	-14.47	-12.25	3.01	1.78	-7.46	28.23	PASS

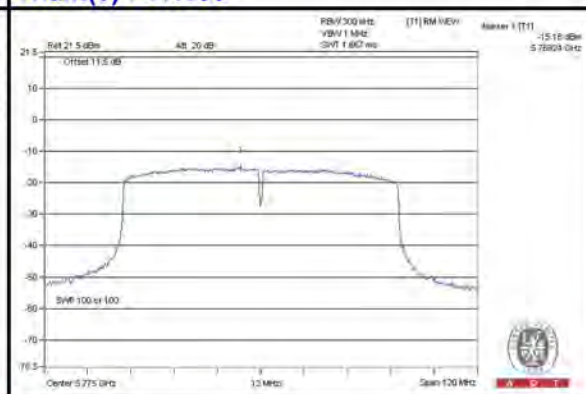
NOTE: 1. **5725~5825MHz:** Directional gain = 4.76dBi + 10log(2) = 7.77dBi > 6dB, so the power density limit shall be reduced to 30-(7.77-6) = 28.23dBm.

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

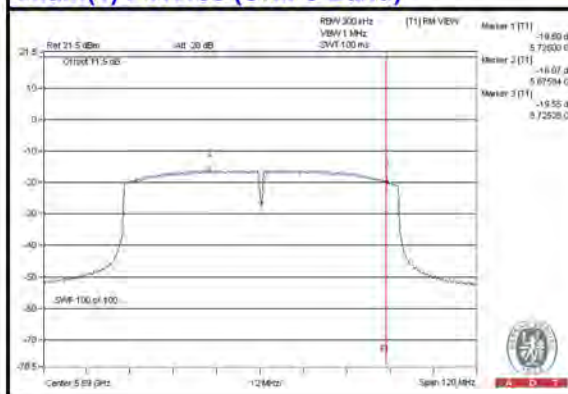
Chain(0) : CH138 (UNII-3 Band)



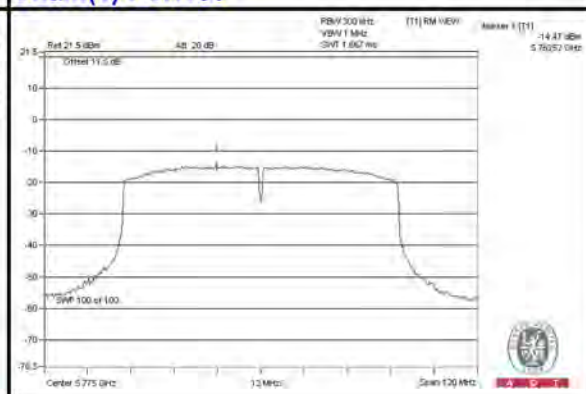
Chain(0) : CH155



Chain(1) : CH138 (UNII-3 Band)



Chain(1) : CH155



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. 17, 2014

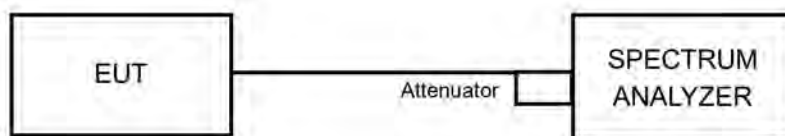
4.3.3 TEST PROCEDURE

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

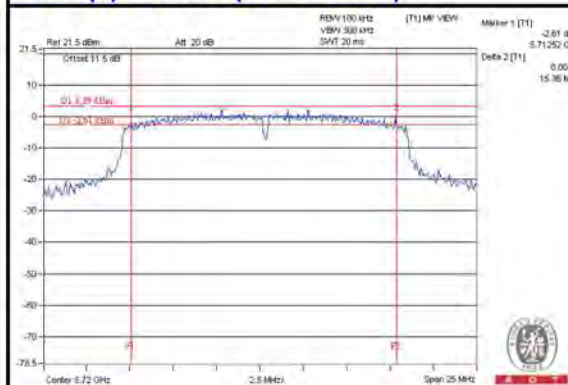
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.7 TEST RESULTS

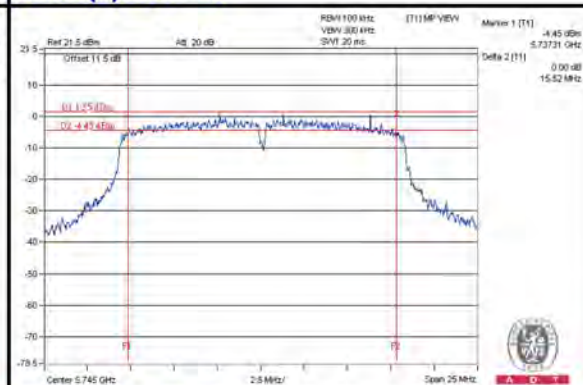
802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
144 (UNII-3 Band)	5720	15.36	15.12	0.5	PASS
149	5745	15.52	15.29	0.5	PASS
157	5785	16.31	14.20	0.5	PASS
165	5825	14.40	14.40	0.5	PASS

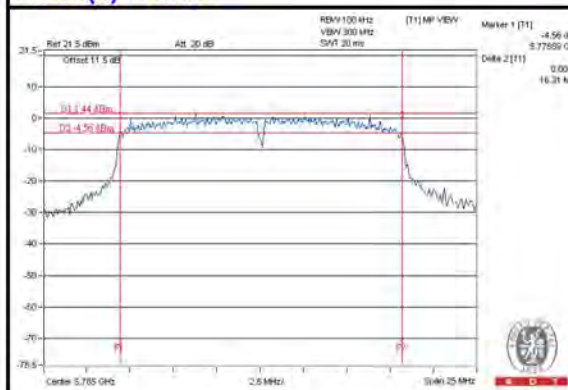
Chain(0) : CH144 (UNII-3 Band)



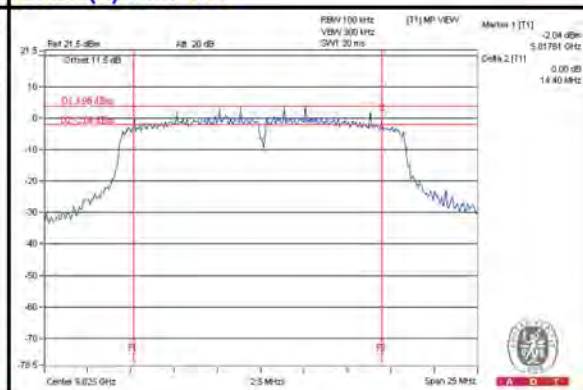
Chain(0) : CH149



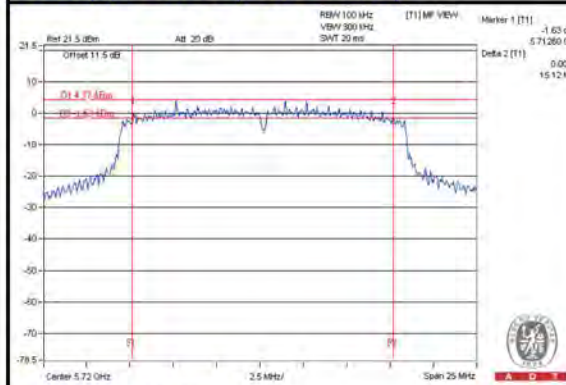
Chain(0) : CH157



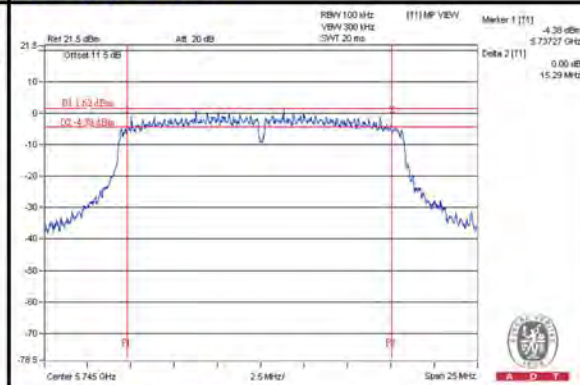
Chain(0) : CH165



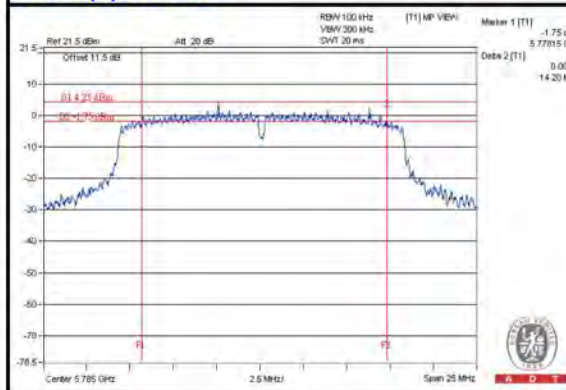
Chain(1) : CH144 (UNII-3 Band)



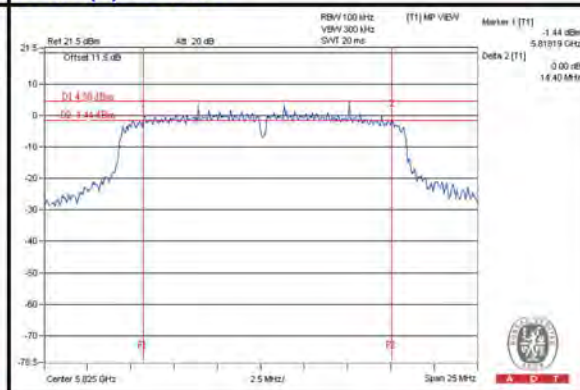
Chain(1) : CH149



Chain(1) : CH157



Chain(1) : CH165



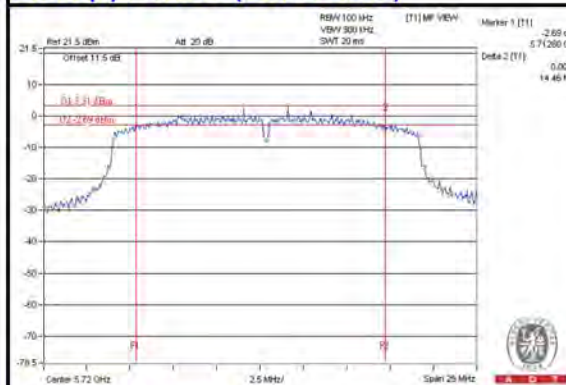


A D T

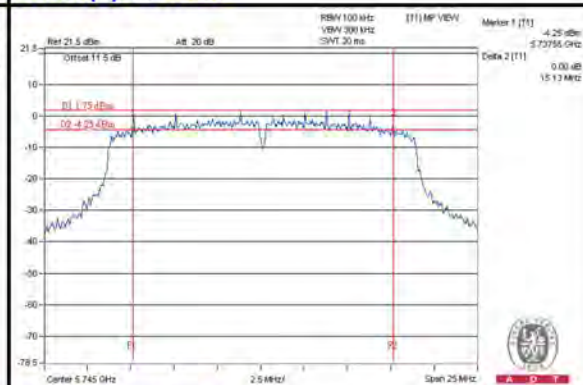
802.11ac (VHT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
144 (UNII-3 Band)	5720	14.46	15.71	0.5	PASS
149	5745	15.13	15.04	0.5	PASS
157	5785	15.13	15.45	0.5	PASS
165	5825	15.05	14.75	0.5	PASS

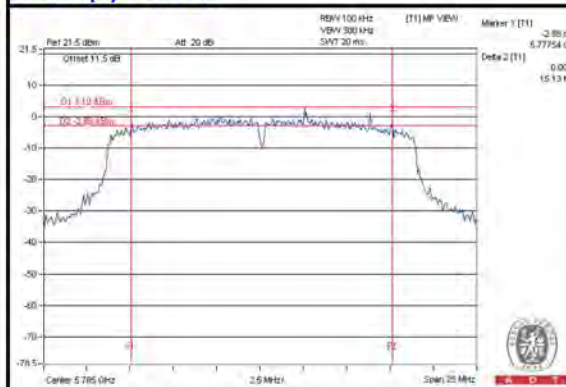
Chain(0) : CH144 (UNII-3 Band)



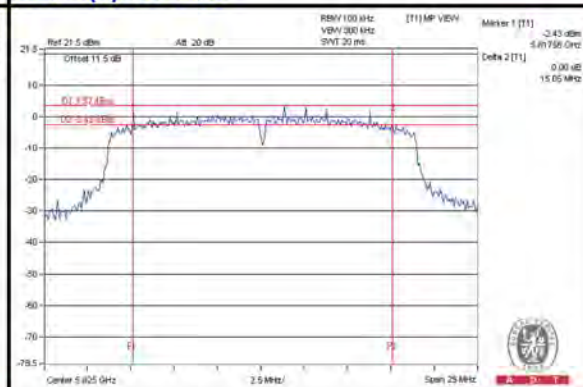
Chain(0) : CH149



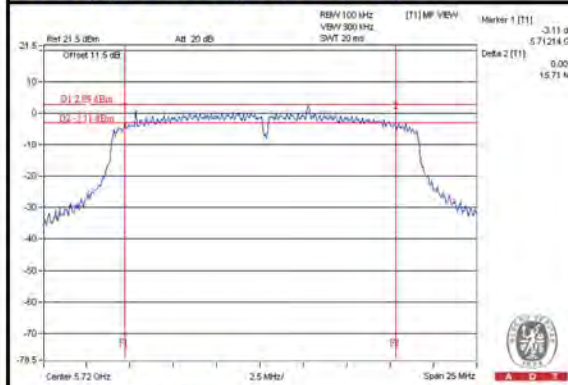
Chain(0) : CH157



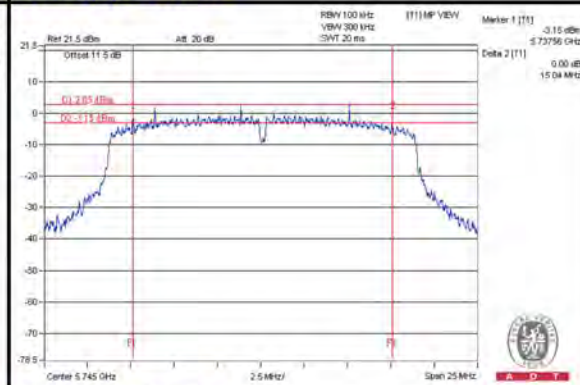
Chain(0) : CH165



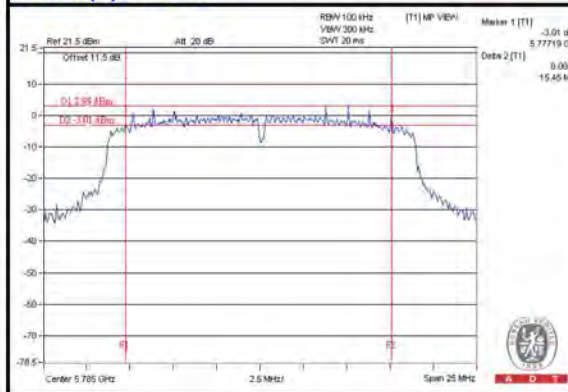
Chain(1) : CH144 (UNII-3 Band)



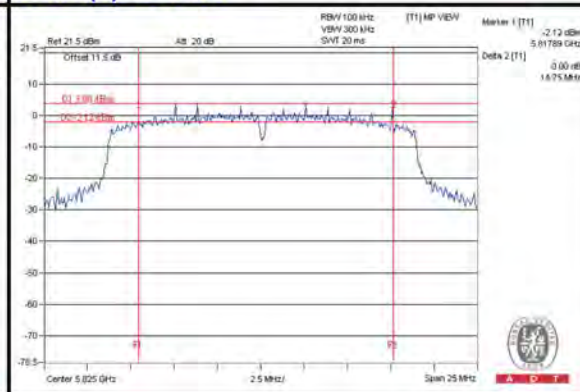
Chain(1) : CH149



Chain(1) : CH157



Chain(1) : CH165



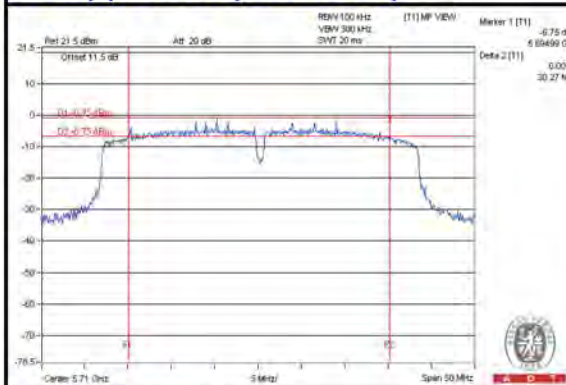


A D T

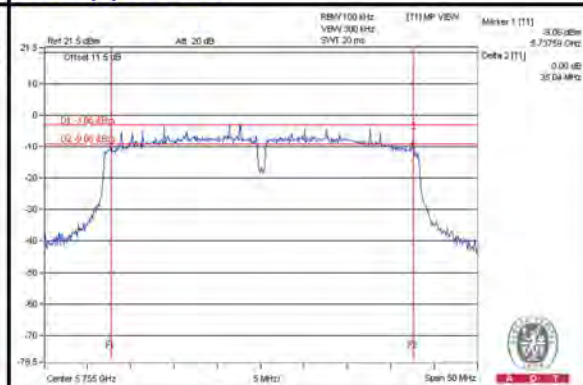
802.11ac (VHT40)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
142 (UNII-3 Band)	5710	30.27	33.14	0.5	PASS
151	5755	35.04	35.16	0.5	PASS
159	5795	30.61	33.83	0.5	PASS

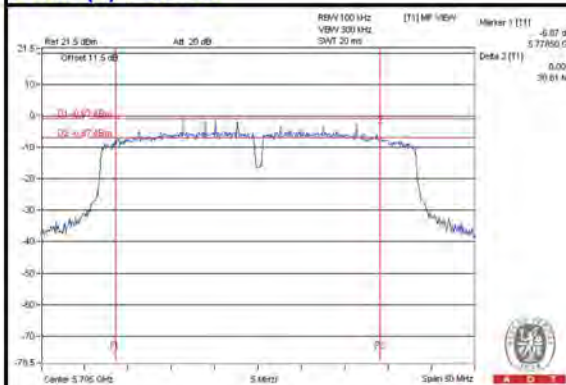
Chain(0) : CH142 (UNII-3 Band)



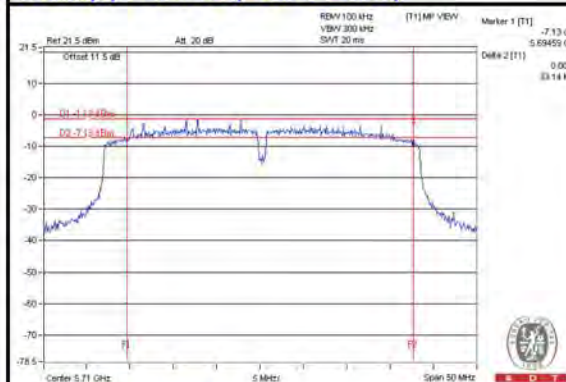
Chain(0) : CH151



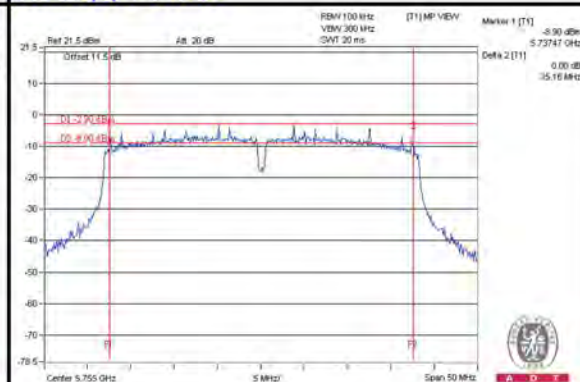
Chain(0) : CH159



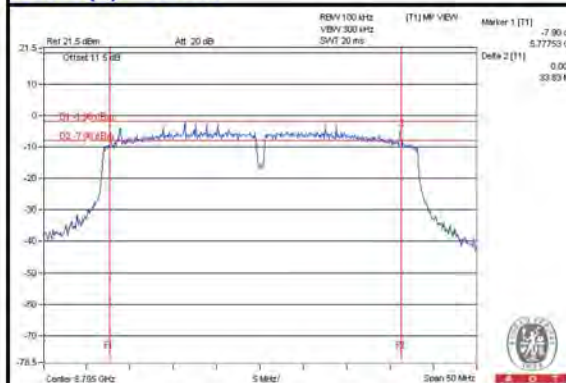
Chain(1) : CH142 (UNII-3 Band)



Chain(1) : CH151



Chain(1) : CH159



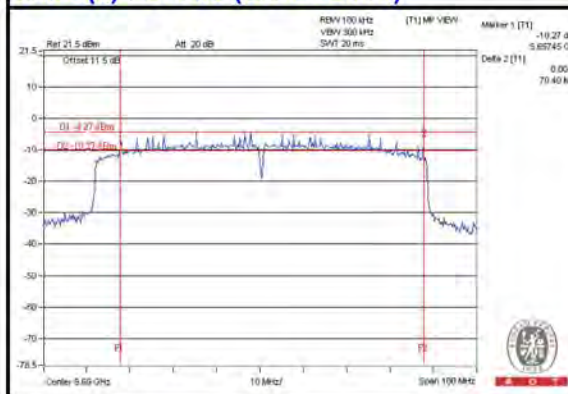


A D T

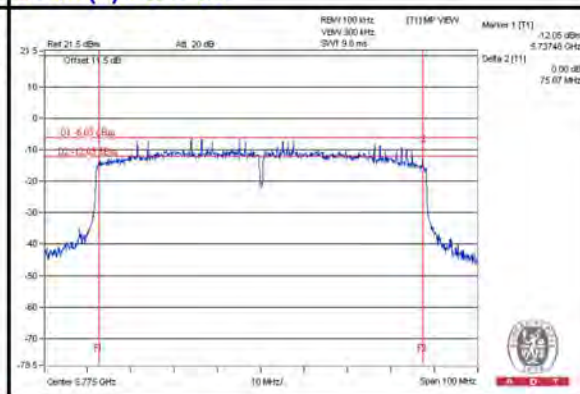
802.11ac (VHT80)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
138 (UNII-3 Band)	5690	70.40	66.68	0.5	PASS
155	5775	75.07	70.45	0.5	PASS

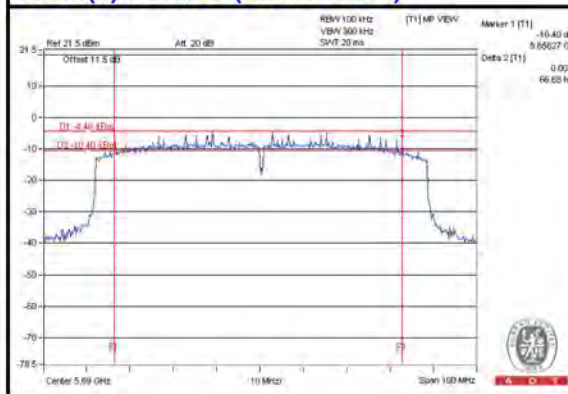
Chain(0) : CH138 (UNII-3 Band)



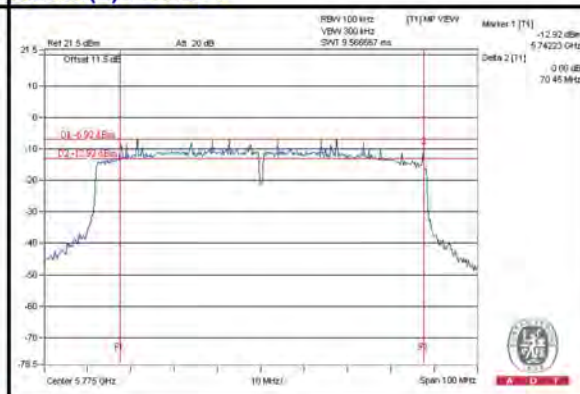
Chain(0) : CH155



Chain(1) : CH138 (UNII-3 Band)



Chain(1) : CH155



4.4 UNWANTED EMISSION MEASUREMENT(RADIATED VERSUS CONDUCTED)

4.4.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table:

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

NOTE:

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

4.4.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

APPLICABLE TO	LIMIT	
789033 D02 General UNII Test Procedures New Rules v01	FIELD STRENGTH AT 3m	
	PK:74 (dBμV/m)	AV:54 (dBμV/m)
APPLICABLE TO	EIRP LIMIT	EQUIVALENT FIELD STRENGTH AT 3m
15.407(b)(1)	PK:-27 (dBm/MHz)	PK:68.2(dBμV/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)	PK:-27 (dBm/MHz) ^{*1} PK:-17 (dBm/MHz) ^{*2}	PK: 68.2(dBμV/m) ^{*1} PK:78.2 (dBμV/m) ^{*2}

NOTE: ^{*1} beyond 10MHz of the band edge ^{*2} within 10 MHz of band edge

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts).}$$

4.4.3 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

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 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: Aug. 28, 2014

4.4.4 TEST PROCEDURES

Following FCC KDB 789033 D02 General UNII Test Procedures:

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.

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.

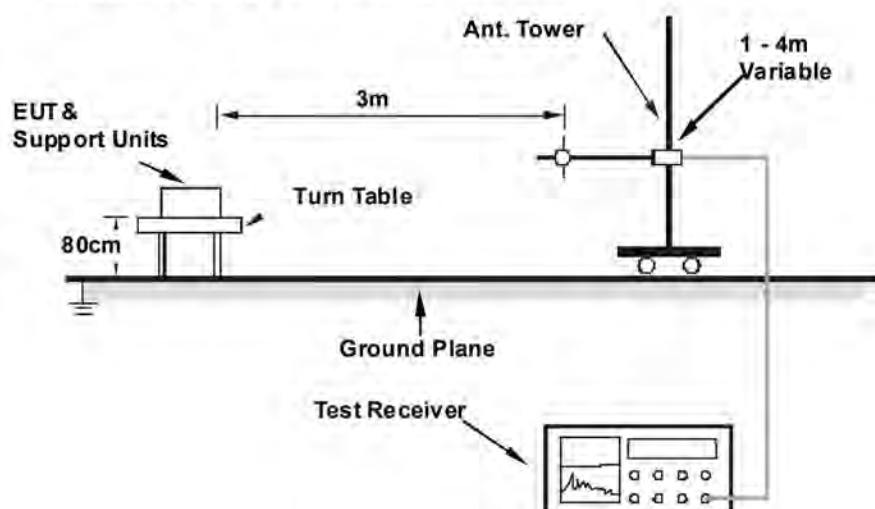
4.4.5 DEVIATION FROM TEST STANDARD

No deviation

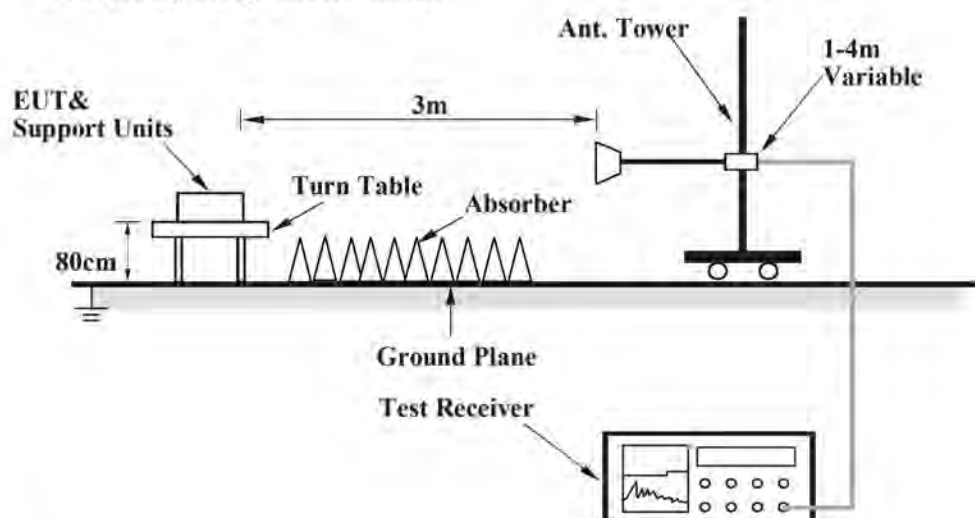
4.4.6 TEST SETUP

For radiated configuration:

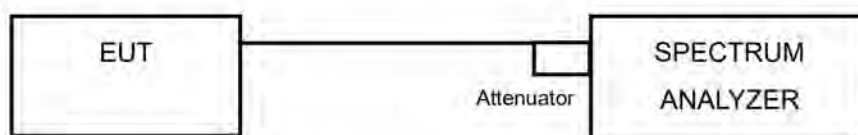
<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



For conducted configuration:



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

4.4.7 EUT OPERATING CONDITION

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 Version3.0 29.0" to enable EUT under transmission/receiving condition continuously at specific channel frequency.

4.4.8 TEST RESULTS (RADIATED MEASUREMENT)

Radiated versus Conducted Measurement	
☐ Conducted measurement	☒ Radiated measurement
<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) <u>For Conducted measurement:</u> The level of unwanted emissions was measured as their power in a specified load (conducted spurious emissions).	

Radiated test was done with 50ohm terminator on antenna port

BELOW 1GHz WORST-CASE DATA

802.11a

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	Below 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	89.41	33.3 QP	43.5	-10.2	1.50 H	236	52.41	-19.12
2	166.00	30.7 QP	43.5	-12.8	1.50 H	215	44.17	-13.49
3	255.09	37.9 QP	46.0	-8.1	1.00 H	126	51.99	-14.12
4	328.43	37.4 QP	46.0	-8.6	1.00 H	139	48.89	-11.49
5	666.51	36.1 QP	46.0	-9.9	1.00 H	196	40.09	-3.99
6	945.82	35.7 QP	46.0	-10.3	1.50 H	256	34.71	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	249	48.15	-14.41
2	85.73	32.4 QP	40.0	-7.6	1.00 V	263	51.44	-19.00
3	166.04	33.0 QP	43.5	-10.5	1.00 V	318	46.51	-13.49
4	335.70	34.6 QP	46.0	-11.4	1.50 V	129	45.97	-11.35
5	666.46	34.8 QP	46.0	-11.2	1.00 V	174	38.78	-3.99
6	940.68	30.7 QP	46.0	-15.3	1.00 V	322	29.87	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

802.11a

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#10360.00	57.6 PK	74.0	-16.4	1.10 H	40	48.17	9.43
2	#10360.00	45.1 AV	54.0	-8.9	1.10 H	40	35.67	9.43
3	15540.00	63.3 PK	74.0	-10.7	1.22 H	297	49.27	14.03
4	15540.00	50.2 AV	54.0	-3.8	1.22 H	297	36.17	14.03
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	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
5. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#10400.00	57.1 PK	74.0	-16.9	1.12 H	43	47.65	9.45
2	#10400.00	44.7 AV	54.0	-9.3	1.12 H	43	35.25	9.45
3	15600.00	63.3 PK	74.0	-10.7	1.26 H	310	49.12	14.18
4	15600.00	50.3 AV	54.0	-3.7	1.26 H	310	36.12	14.18
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	#10400.00	59.1 PK	74.0	-14.9	1.56 V	290	49.65	9.45
2	#10400.00	45.5 AV	54.0	-8.5	1.56 V	290	36.05	9.45
3	15600.00	63.5 PK	74.0	-10.5	1.22 V	176	49.32	14.18
4	15600.00	50.6 AV	54.0	-3.4	1.22 V	176	36.42	14.18

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. " # ": The radiated frequency is out of the restricted band.