

4.6 Conducted Emission Measurement

4.6.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.6.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100375	Apr. 29, 2014	Apr. 28, 2015
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Sep. 15, 2014	Sep. 14, 2015
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ENV216	100071	Nov. 10, 2014	Nov. 09, 2015
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 10, 2014	Mar. 09, 2015
50 ohms Terminator	N/A	EMC-03	Sep. 22, 2014	Sep. 21, 2015
50 ohms Terminator	N/A	EMC-02	Sep. 30, 2014	Sep. 29, 2015
Software ADT	BV ADT_Cond_V7.3.7. 3	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3. The VCCI Con C Registration No. is C-3611.
4. Tested Date: Feb. 11, 2015

4.6.3 Test Procedures

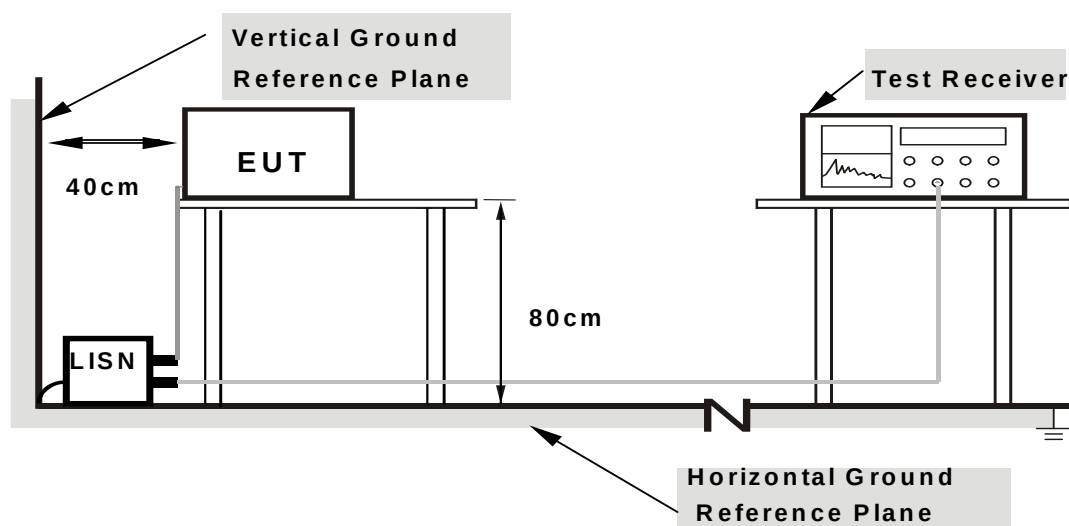
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.6.4 Deviation from Test Standard

No deviation.

4.6.5 Test Setup



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.6.6 EUT Operating Conditions

Same as 4.5.6.

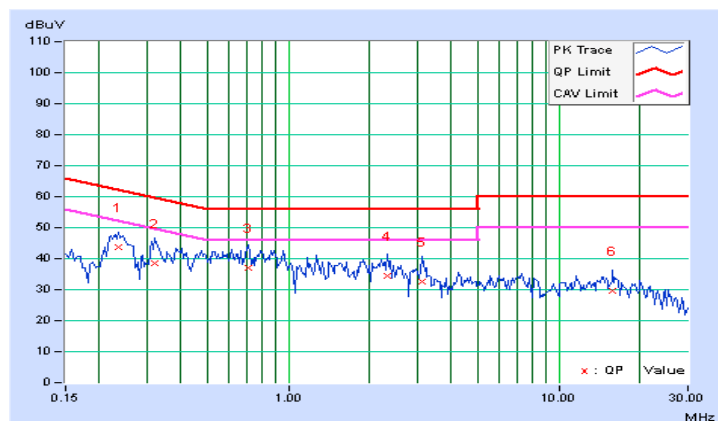
4.6.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.23594	0.07	43.46	35.02	43.53	35.09	62.24	52.24	-18.70	-17.14
2	0.32188	0.08	38.62	29.00	38.70	29.08	59.66	49.66	-20.96	-20.58
3	0.71250	0.11	36.92	29.08	37.03	29.19	56.00	46.00	-18.97	-16.81
4	2.32422	0.19	34.28	26.76	34.47	26.95	56.00	46.00	-21.53	-19.05
5	3.12500	0.22	32.46	24.14	32.68	24.36	56.00	46.00	-23.32	-21.64
6	15.73047	0.60	28.96	20.38	29.56	20.98	60.00	50.00	-30.44	-29.02

Remarks:

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

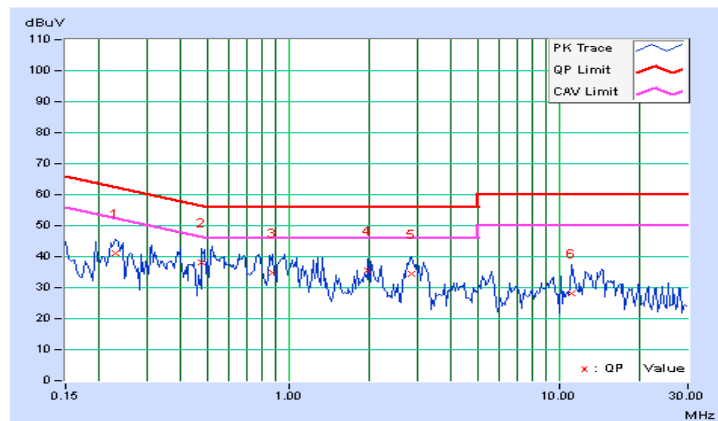


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.22812	0.06	41.12	31.54	41.18	31.60	62.52	52.52	-21.33	-20.91
2	0.47813	0.10	37.96	28.78	38.06	28.88	56.37	46.37	-18.32	-17.50
3	0.87266	0.12	34.76	27.54	34.88	27.66	56.00	46.00	-21.12	-18.34
4	1.96875	0.18	35.34	29.68	35.52	29.86	56.00	46.00	-20.48	-16.14
5	2.86719	0.21	34.34	26.00	34.55	26.21	56.00	46.00	-21.45	-19.79
6	11.18359	0.50	27.70	18.96	28.20	19.46	60.00	50.00	-31.80	-30.54

Remarks:

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



5 Test Types and Results (FOR 5GHz BAND)

5.1 Conducted Output Power Measurement

5.1.1 Limits of Conducted Output Power Measurement

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

Per KDB 662911 D01 Multiple Transmitter Output v02r01 Method of conducted output power measurement on IEEE 802.11 devices,

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

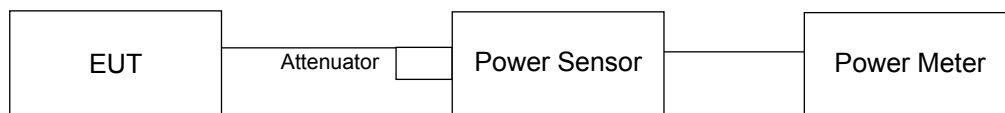
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;

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

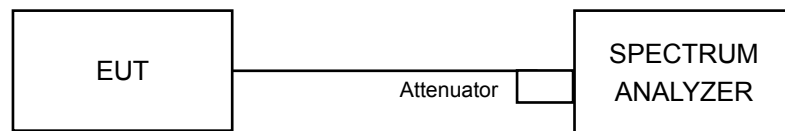
For power measurements on all other devices: Array Gain = $10 \log(NANT/NSS)$ dB.

5.1.2 Test Setup

For 802.11a / 802.11ac (VHT20) / 802.11ac (VHT40):



For 802.11ac (VHT80):



5.1.3 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter Anritsu	ML2495A	1014008	Apr. 28, 2015	Apr. 27, 2016
Power Sensor Anritsu	MA2411B	0917122	Apr. 28, 2015	Apr. 27, 2016
SPECTRUM ANALYZER R&S	FSP 40	100037	Oct. 30, 2014	Oct. 29, 2015

Note:

- The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
- Tested date : May 07, 2015

5.1.4 Test Procedures

For 802.11a / 802.11ac (VHT20) / 802.11ac (VHT40):

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 power level.

For 802.11ac (VHT80):

Follow FCC KDB 558074 DTS test procedure:

Measurement Procedure Peak 2

1. Set the RBW = 1 MHz.
2. Set the VBW ≥ 3 RBW.
3. Set the span $\geq 1.5 \times$ DTS bandwidth.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the spectrum analyzer's integrated band power measurement function with band limits set equal to the DTS bandwidth edges.

5.1.5 Deviation from Test Standard

No deviation.

5.1.6 EUT Operating Conditions

Same as Item 4.1.6

5.1.7 Test Results

FOR PEAK POWER

802.11a

Chan.	Chan. Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
149	5745	22.31	22.58	351.35	25.46	28.23	Pass
157	5785	22.47	22.55	356.491	25.52	28.23	Pass
165	5825	22.16	22.46	340.635	25.32	28.23	Pass

NOTE: Directional gain = $4.76\text{dBi} + 10\log(2) = 7.77\text{dBi} > 6\text{dBi}$, therefore the limit needs to reduce, so the power limit shall be reduced to $30-(7.77-6) = 28.23\text{dBm}$.

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
149	5745	22.47	22.89	371.14	25.70	28.23	Pass
157	5785	22.50	22.48	354.839	25.50	28.23	Pass
165	5825	22.52	22.37	351.233	25.46	28.23	Pass

NOTE: Directional gain = $4.76\text{dBi} + 10\log(2) = 7.77\text{dBi} > 6\text{dBi}$, therefore the limit needs to reduce, so the power limit shall be reduced to $30-(7.77-6) = 28.23\text{dBm}$.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
151	5755	23.09	22.95	400.946	26.03	28.23	Pass
159	5795	22.78	23.18	397.641	25.99	28.23	Pass

NOTE: Directional gain = $4.76\text{dBi} + 10\log(2) = 7.77\text{dBi} > 6\text{dBi}$, therefore the limit needs to reduce, so the power limit shall be reduced to $30-(7.77-6) = 28.23\text{dBm}$.

802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
155	5775	24.10	24.94	568.929	27.55	28.23	Pass

NOTE: Directional gain = $4.76\text{dBi} + 10\log(2) = 7.77\text{dBi} > 6\text{dBi}$, therefore the limit needs to reduce, so the power limit shall be reduced to $30-(7.77-6) = 28.23\text{dBm}$.

FOR AVERAGE POWER

802.11a

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
149	5745	18.40	18.03	132.716	21.23
157	5785	18.52	18.02	134.508	21.29
165	5825	18.45	18.03	133.517	21.26

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
149	5745	18.34	18.10	132.799	21.23
157	5785	18.55	18.05	135.44	21.32
165	5825	18.41	18.02	132.73	21.23

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
151	5755	18.53	18.05	135.111	21.31
159	5795	18.57	18.14	137.108	21.37

802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
155	5775	18.44	17.74	129.252	21.11

5.2 Power Spectral Density Measurement

5.2.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

5.2.2 Test Setup

Same as item 4.2.2

5.2.3 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSP 40	100037	Oct. 30, 2014	Oct. 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 : May 07, 2015

5.2.4 Test Procedures

Same as item 4.2.4

5.2.5 Deviation from Test Standard

No deviation.

5.2.6 EUT Operating Conditions

Same as Item 4.2.6

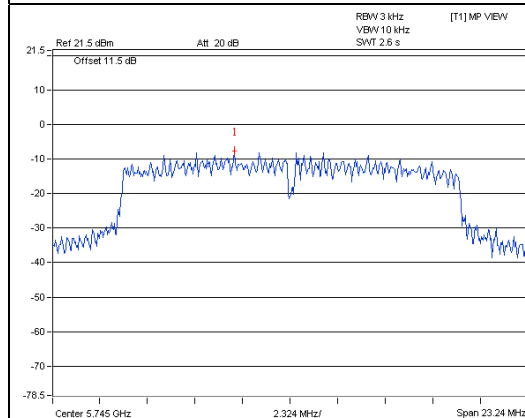
5.2.7 Test Results

802.11a

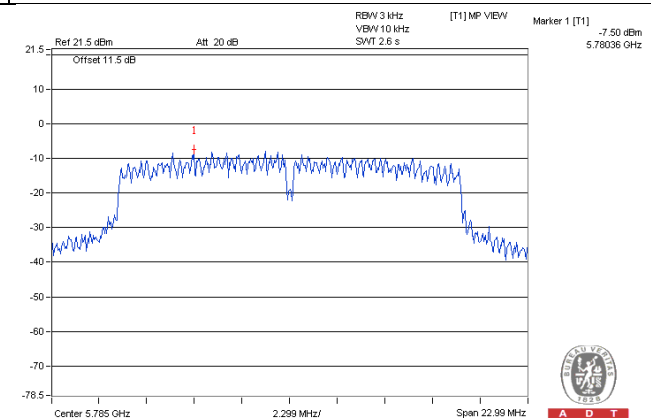
TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	Pass /Fail
0	149	5745	-7.70	3.01	-4.69	6.23	Pass
	157	5785	-7.50	3.01	-4.49	6.23	Pass
	165	5825	-8.11	3.01	-5.10	6.23	Pass
1	149	5745	-7.33	3.01	-4.32	6.23	Pass
	157	5785	-10.19	3.01	-7.18	6.23	Pass
	165	5825	-9.02	3.01	-6.01	6.23	Pass

NOTE: Directional gain = 4.76dBi + 10log(2) = 7.77dBi > 6dBi , so the power density limit shall be reduced to 8-(7.77-6) = 6.23dBm.

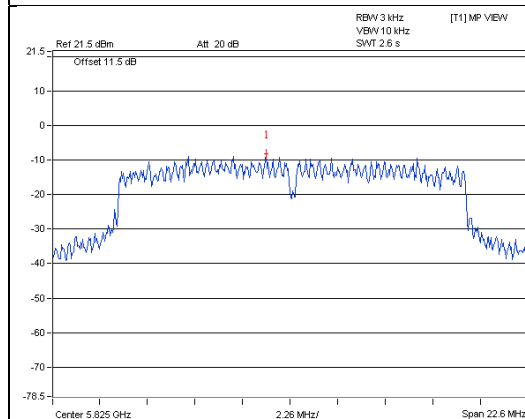
Chain 0 / CH149



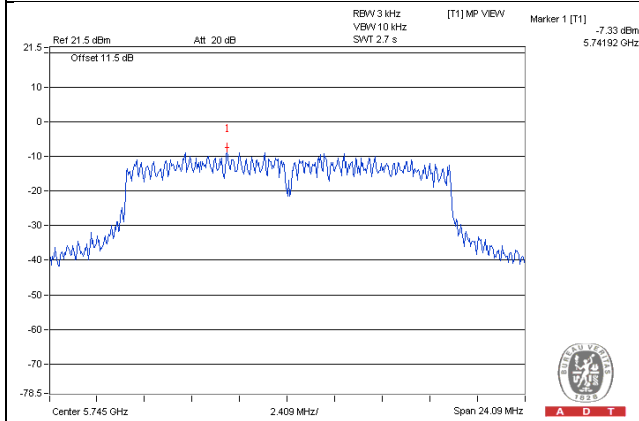
Chain 0 / CH157



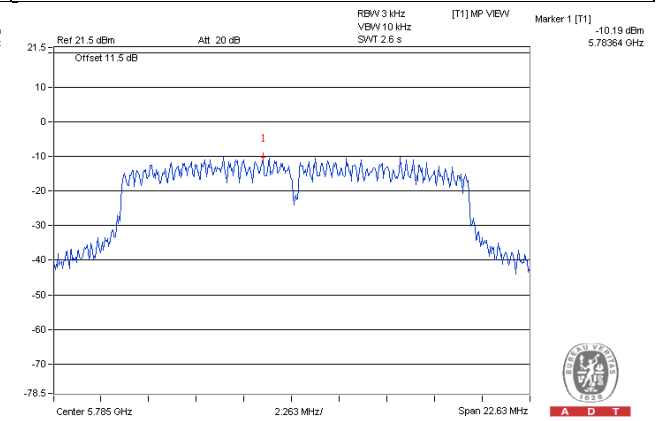
Chain 0 / CH165



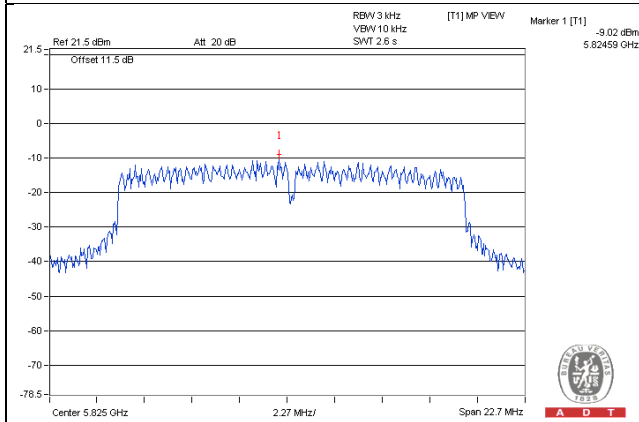
Chain 1/ CH149



Chain 1/ CH157



Chain 1/ CH165

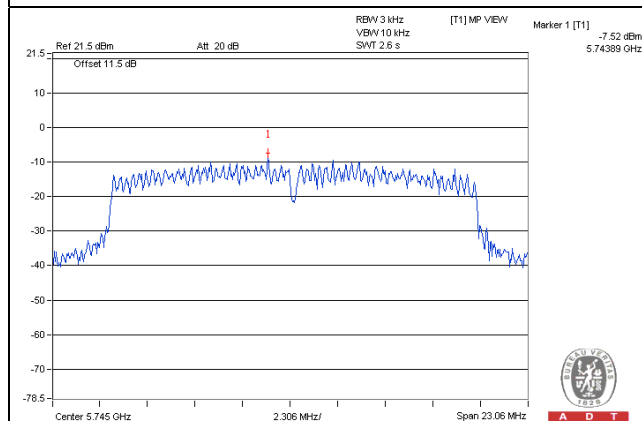


802.11ac (VHT20)

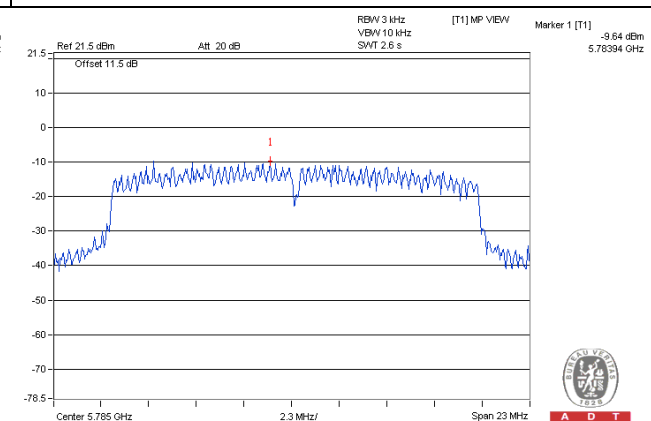
TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	Pass /Fail
0	149	5745	-7.52	3.01	-4.51	6.23	Pass
	157	5785	-9.64	3.01	-6.63	6.23	Pass
	165	5825	-9.62	3.01	-6.61	6.23	Pass
1	149	5745	-7.50	3.01	-4.49	6.23	Pass
	157	5785	-8.24	3.01	-5.23	6.23	Pass
	165	5825	-10.02	3.01	-7.01	6.23	Pass

NOTE: Directional gain = 4.76dBi + 10log(2) = 7.77dBi > 6dBi , so the power density limit shall be reduced to 8-(7.77-6) = 6.23dBm.

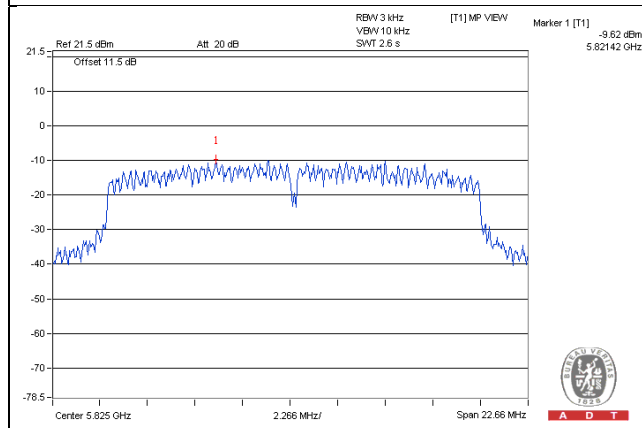
Chain 0 / CH149



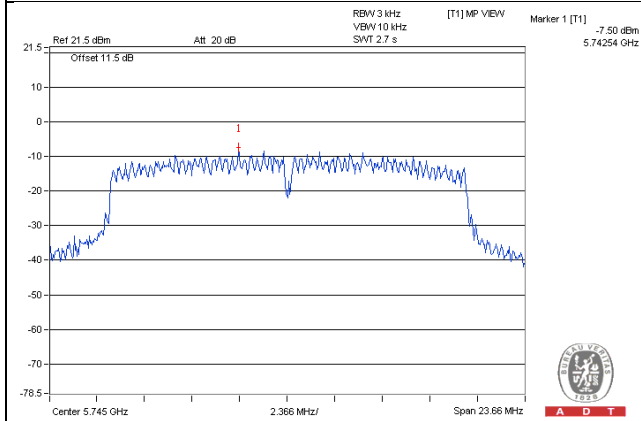
Chain 0 / CH157



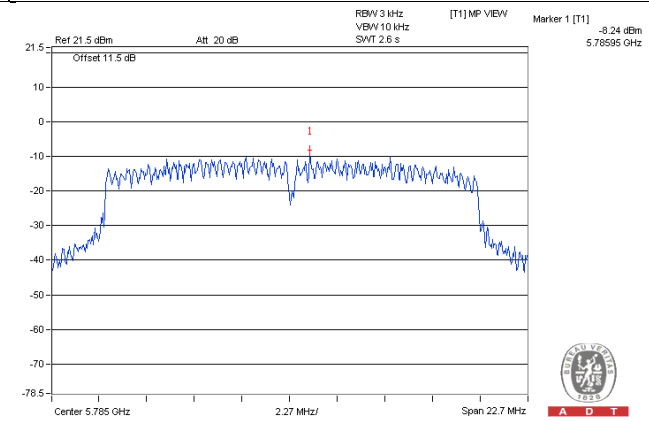
Chain 0 / CH165



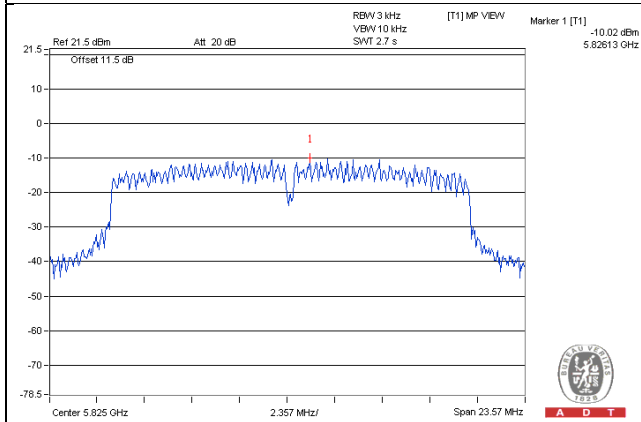
Chain 1/ CH149



Chain 1/ CH157



Chain 1/ CH165

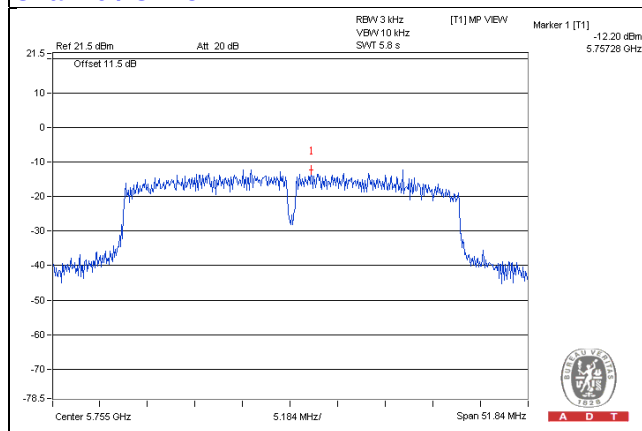


802.11ac (VHT40)

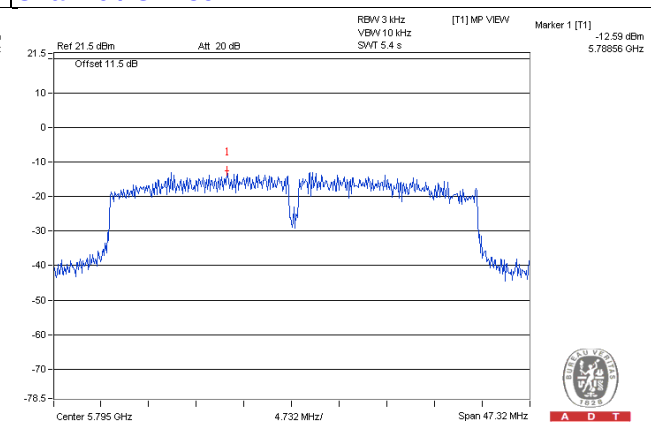
TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	Pass /Fail
0	151	5755	-12.20	3.01	-9.19	6.23	Pass
	159	5795	-12.59	3.01	-9.58	6.23	Pass
1	151	5755	-11.55	3.01	-8.54	6.23	Pass
	159	5795	-12.15	3.01	-9.14	6.23	Pass

NOTE: Directional gain = 4.76dBi + 10log(2) = 7.77dBi > 6dBi , so the power density limit shall be reduced to 8-(7.77-6) = 6.23dBm.

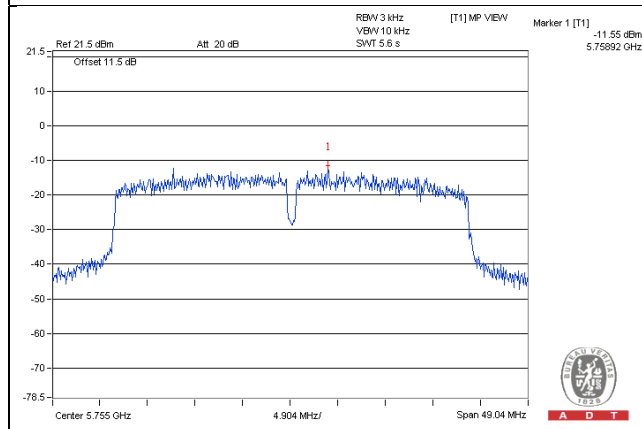
Chain 0 / CH151



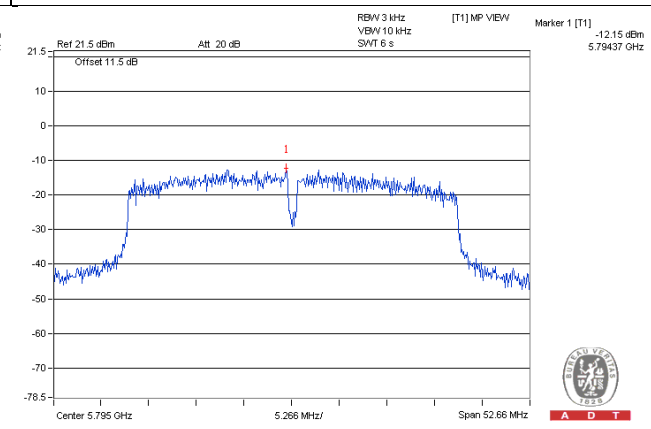
Chain 0 / CH159



Chain 1 / CH151



Chain 1 / CH159

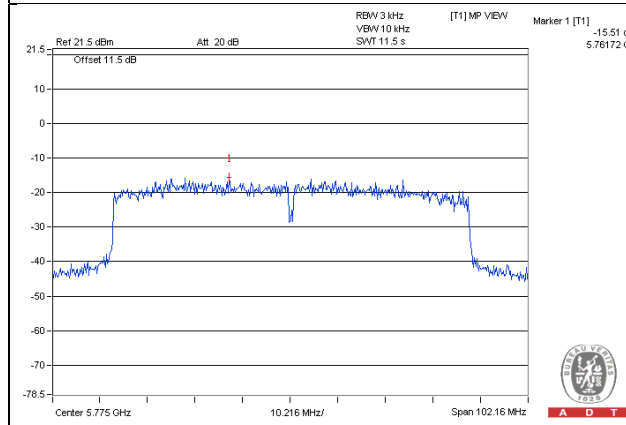


802.11ac (VHT80)

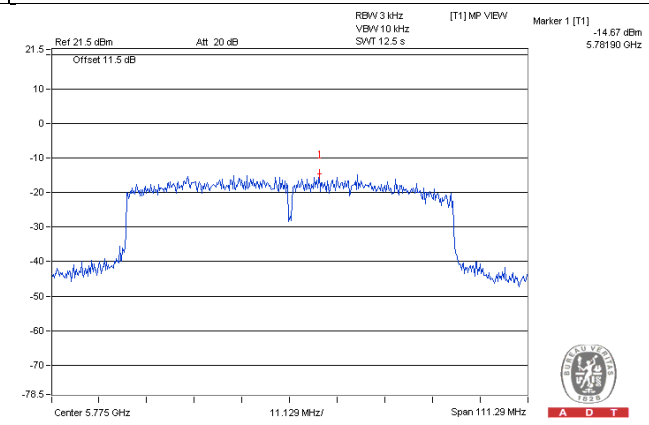
TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	Pass /Fail
0	155	5775	-15.51	3.01	-12.50	6.23	Pass
1	155	5775	-14.67	3.01	-11.66	6.23	Pass

NOTE: Directional gain = $4.76\text{dBi} + 10\log(2) = 7.77\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $8-(7.77-6) = 6.23\text{dBm}$.

Chain 0 / CH155



Chain 1 / CH155



5.3 6dB Bandwidth Measurement

5.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

5.3.2 Test Setup

Same as item 4.3.2

5.3.3 Test Instruments

Same as item 5.2.3

5.3.4 Test Procedures

Same as item 4.3.4

5.3.5 Deviation from Test Standard

No deviation.

5.3.6 EUT Operating Conditions

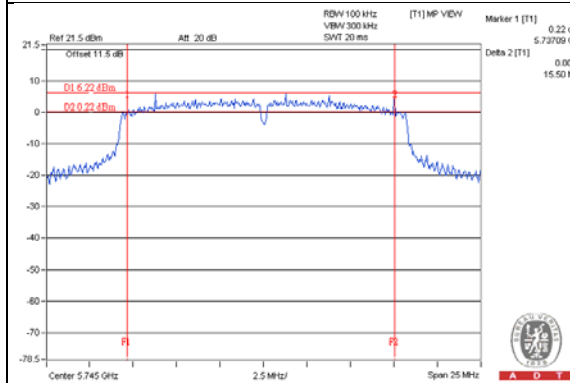
Same as item 4.3.6

5.3.7 Test Results

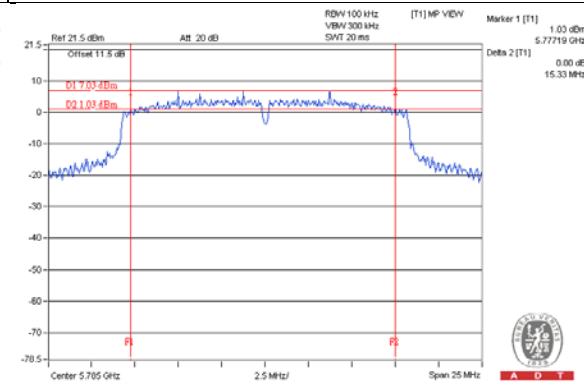
802.11a

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	15.50	16.06	0.5	Pass
157	5785	15.33	15.09	0.5	Pass
165	5825	15.07	15.14	0.5	Pass

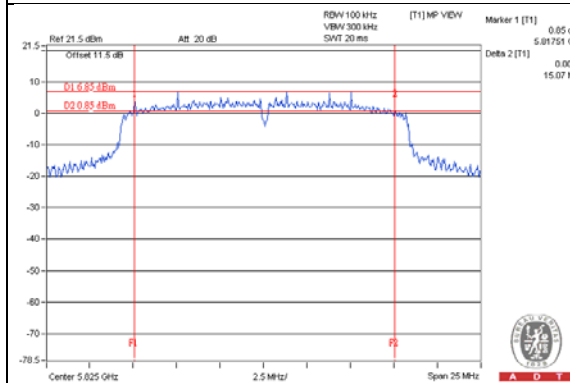
Chain 0 / CH149



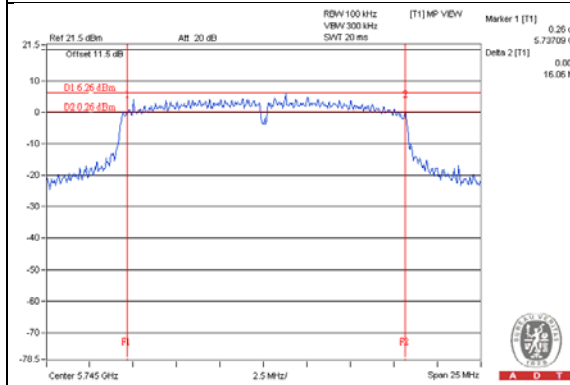
Chain 0 / CH157



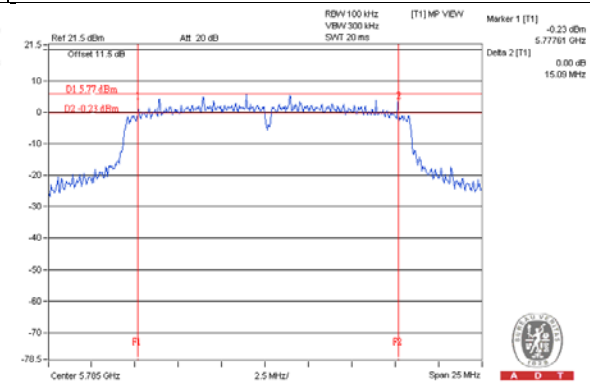
Chain 0 / CH165



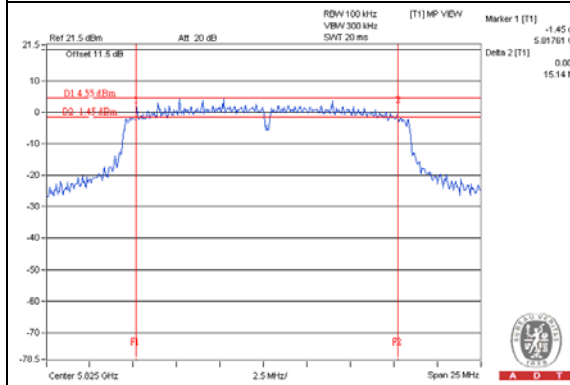
Chain 1 / CH149



Chain 1 / CH157



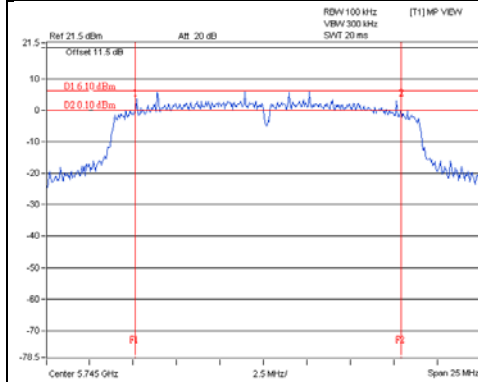
Chain 1 / CH165



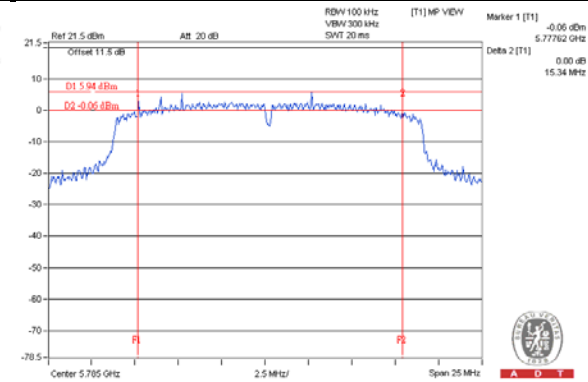
802.11ac (VHT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	15.38	15.78	0.5	Pass
157	5785	15.34	15.14	0.5	Pass
165	5825	15.11	15.72	0.5	Pass

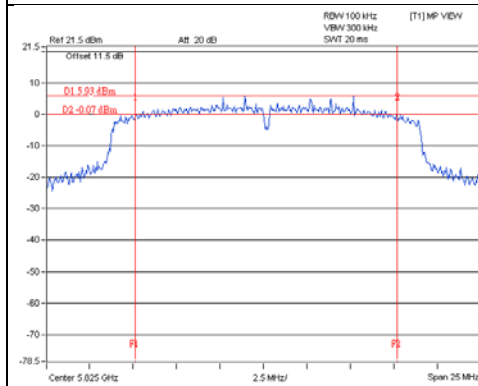
Chain 0 / CH149



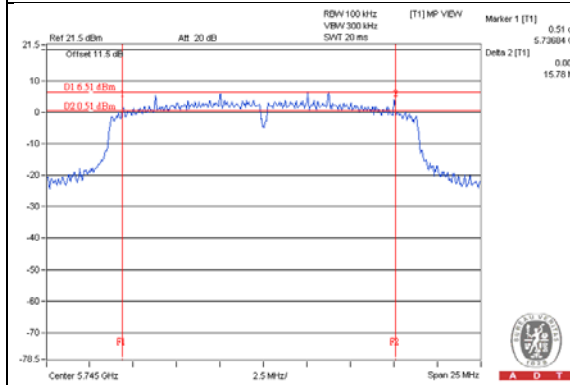
Chain 0 / CH157



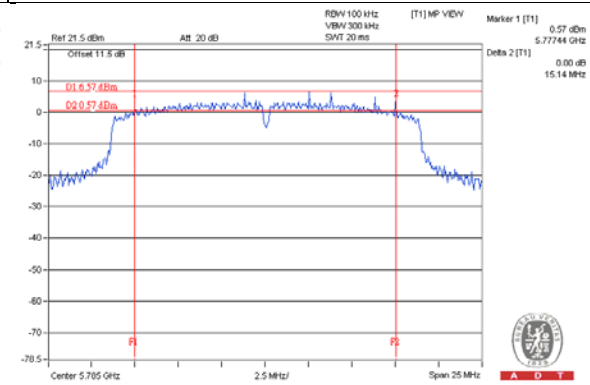
Chain 0 / CH165



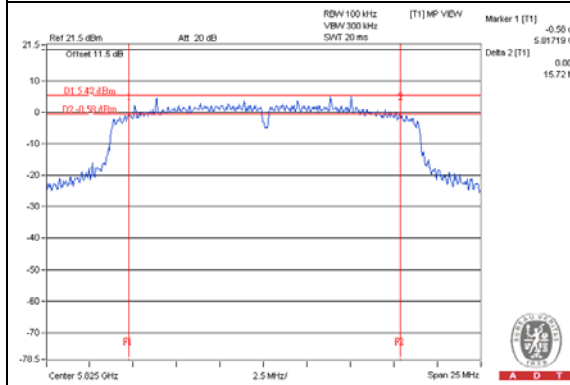
Chain 1 / CH149



Chain 1 / CH157



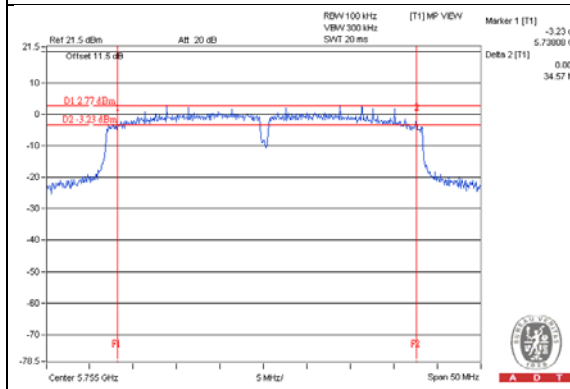
Chain 1 / CH165



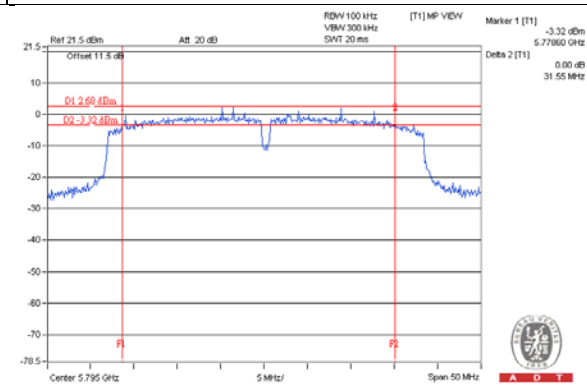
802.11ac (VHT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	34.57	32.70	0.5	Pass
159	5795	31.55	35.11	0.5	Pass

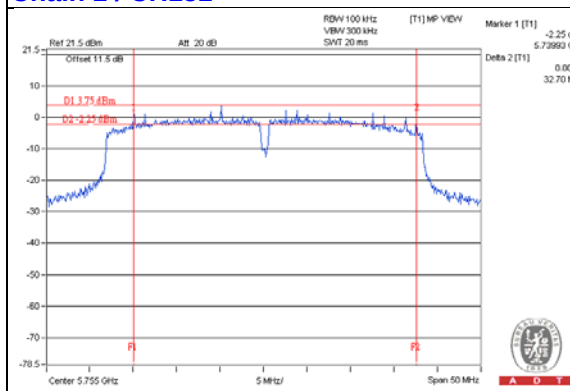
Chain 0 / CH151



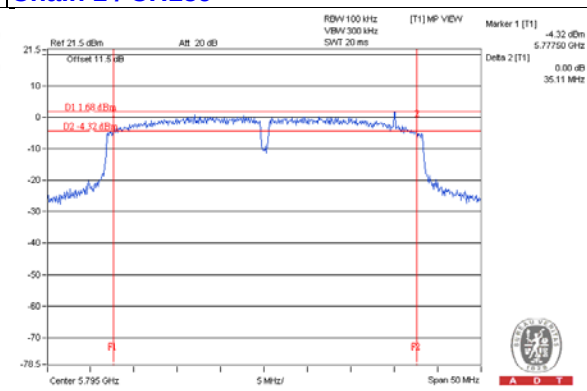
Chain 0 / CH159



Chain 1 / CH151



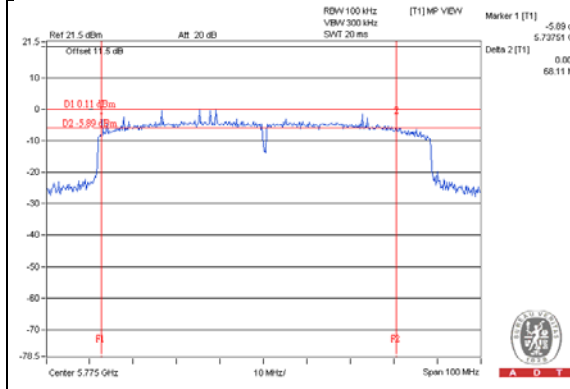
Chain 1 / CH159



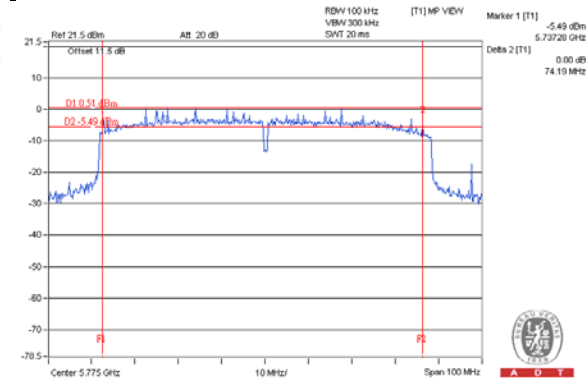
802.11ac (VHT80)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	68.11	74.19	0.5	Pass

Chain 0 / CH155



Chain 1 / CH155



5.4 Conducted Out of Band Emission Measurement

5.4.1 Limits of Conducted Out of Band Emission Measurement

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

5.4.2 Test Setup

Same as Item 4.4.2

5.4.3 Test Instruments

Same as Item 5.2.3

5.4.4 Test Procedures

Same as Item 4.4.4

5.4.5 Deviation from Test Standard

No deviation.

5.4.6 EUT Operating Conditions

Same as Item 4.4.6

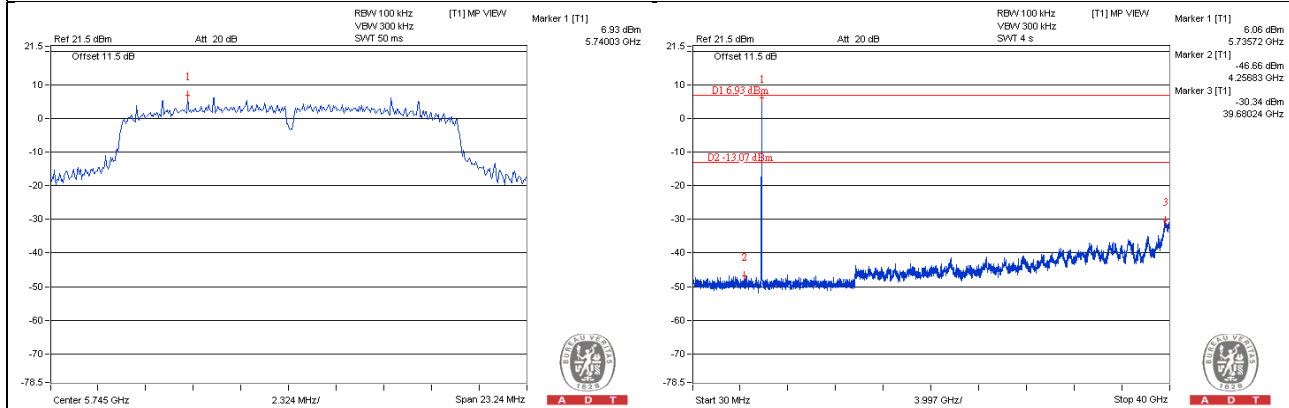
5.4.7 Test Results

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

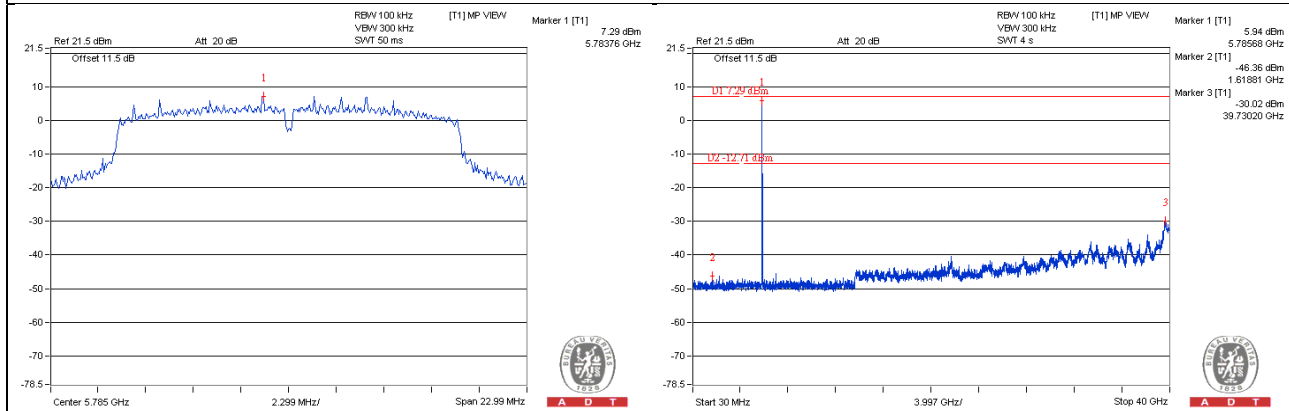
802.11a

Chain 0

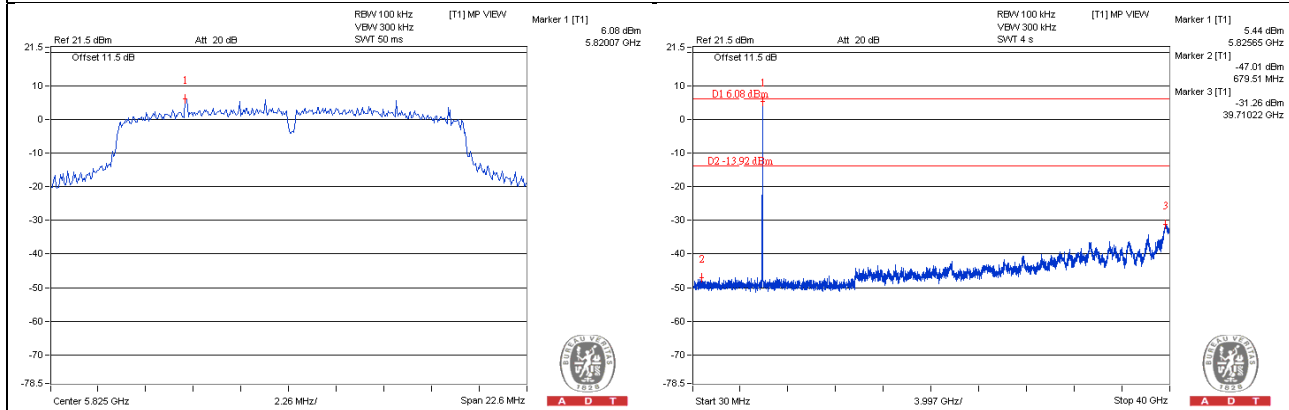
CH 149



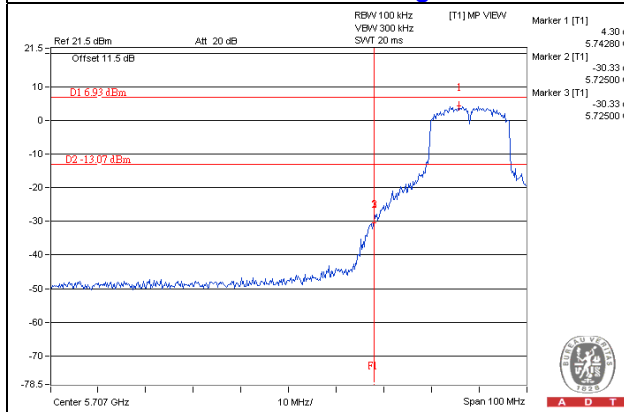
CH 157



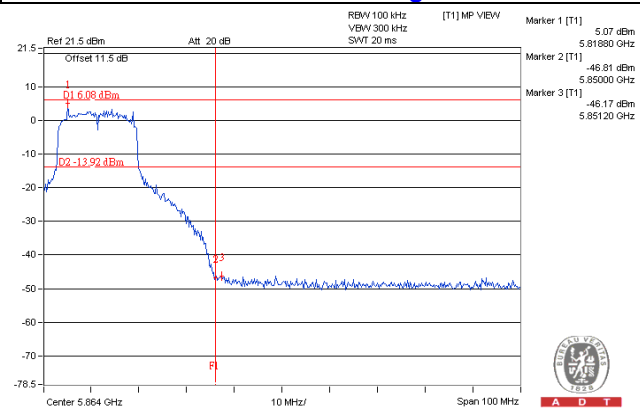
CH 165



CH 149 Band edge

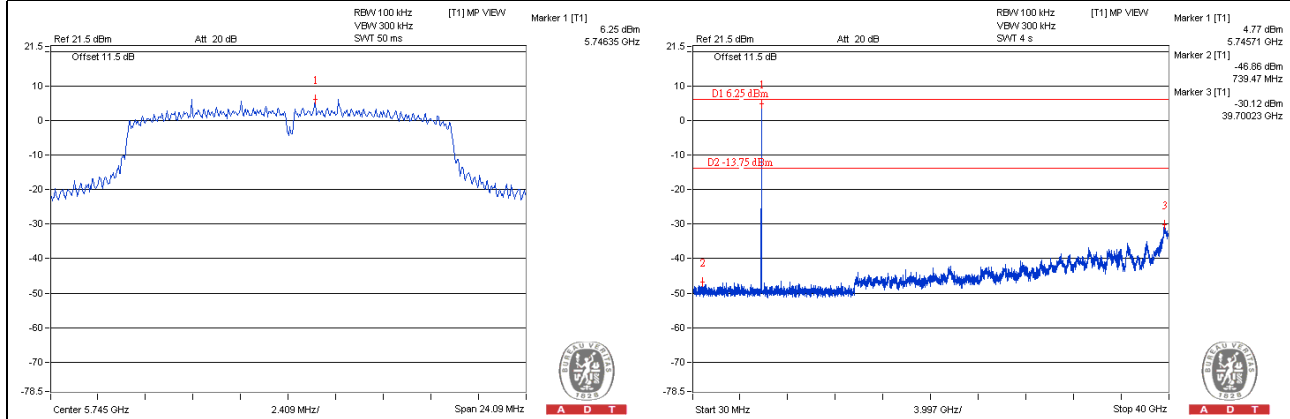


CH 165 Band edge

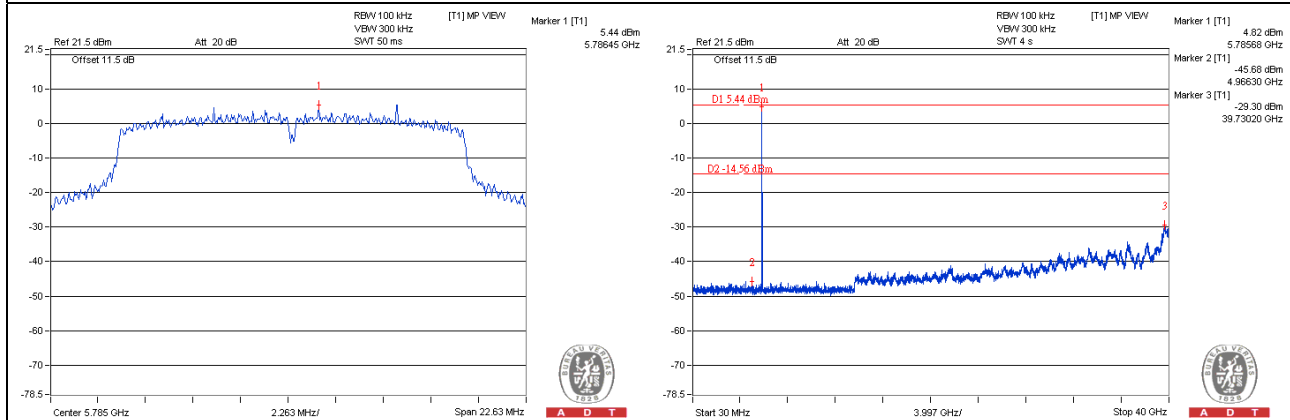


Chain 1

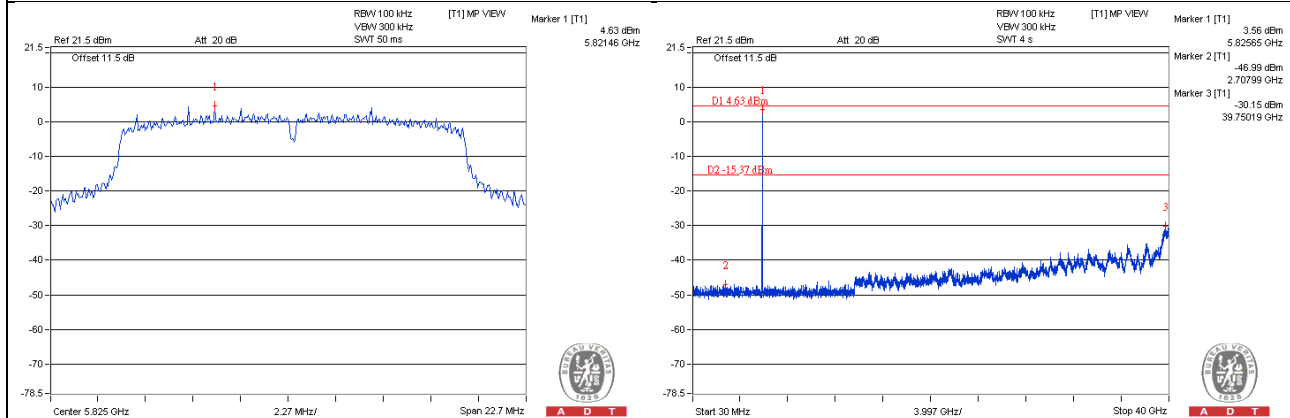
CH 149



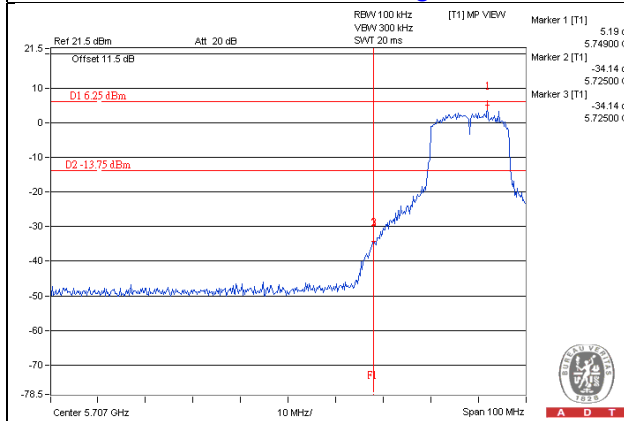
CH 157



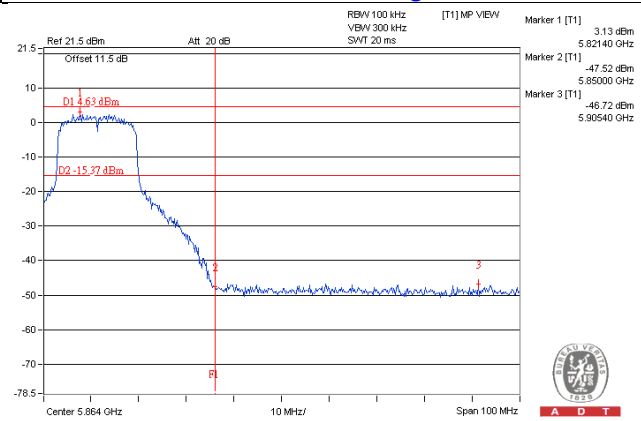
CH 165



CH 149 Band edge



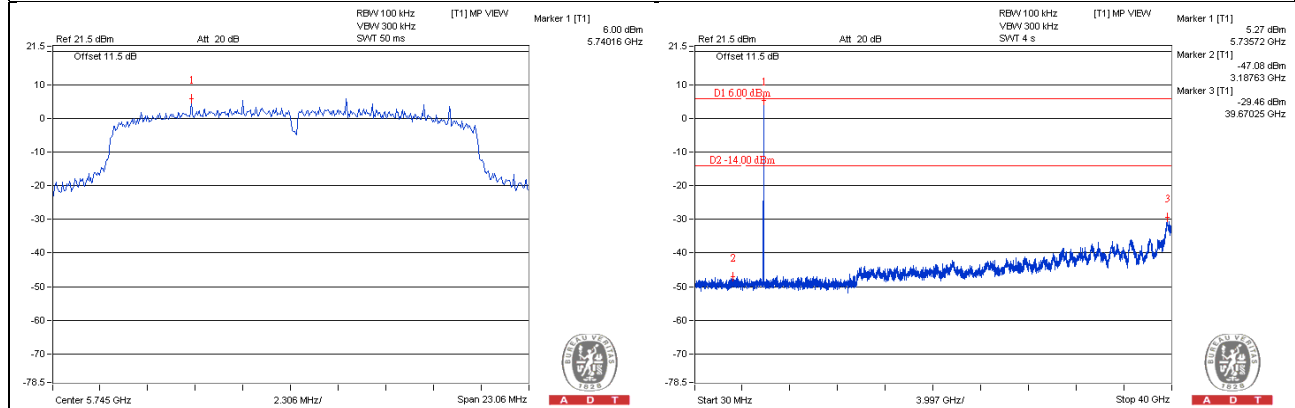
CH 165 Band edge



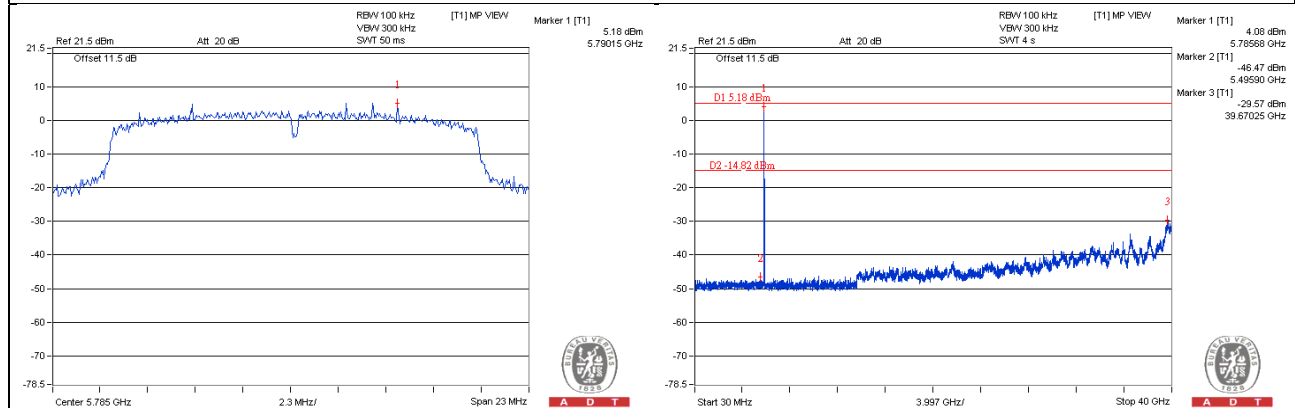
802.11ac (VHT20)

Chain 0

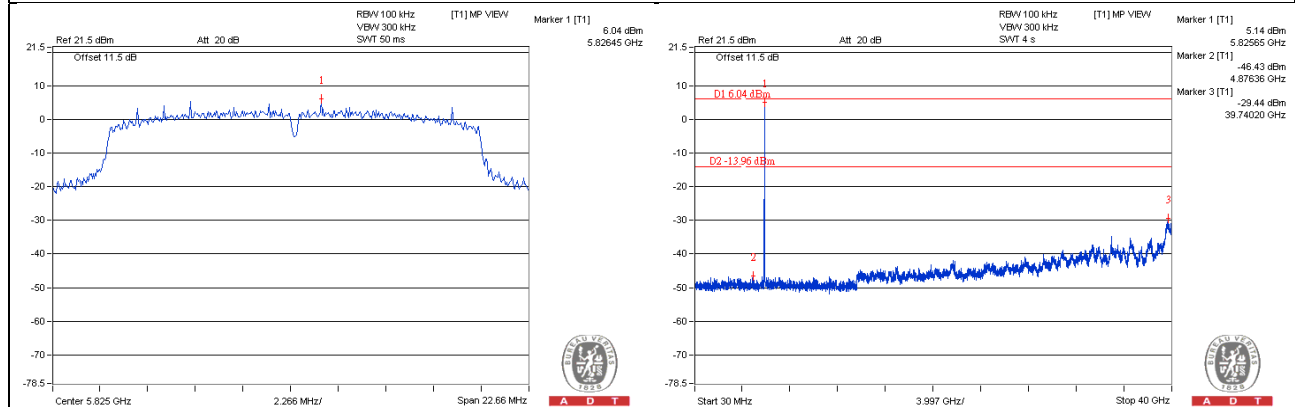
CH 149



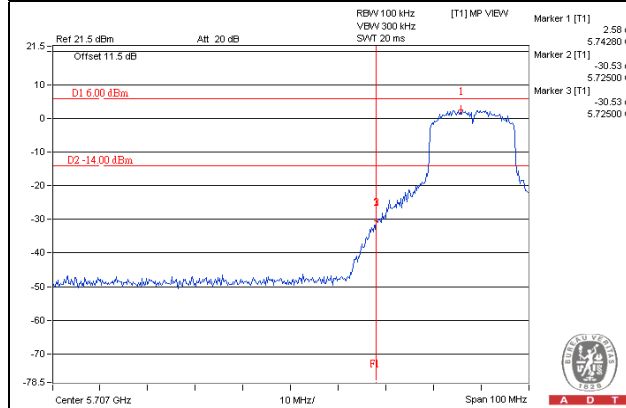
CH 157



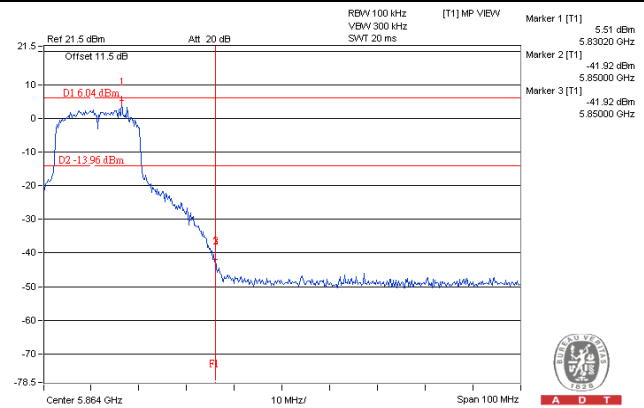
CH 165



CH 149 Band edge

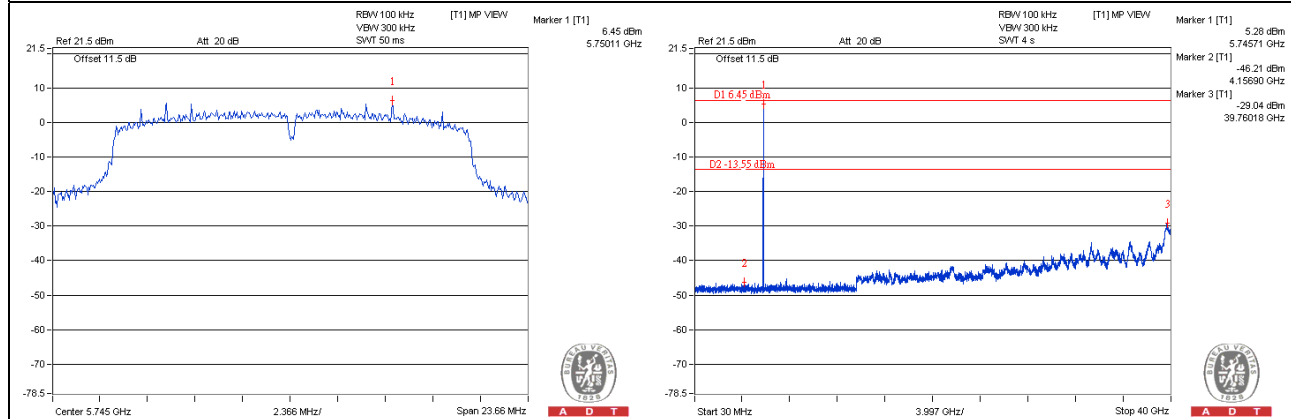


CH 165 Band edge

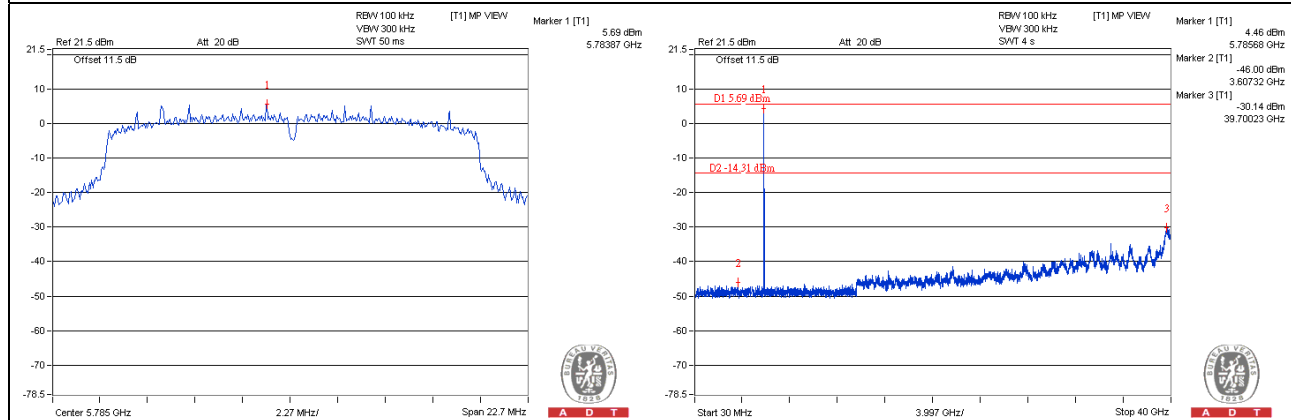


Chain 1

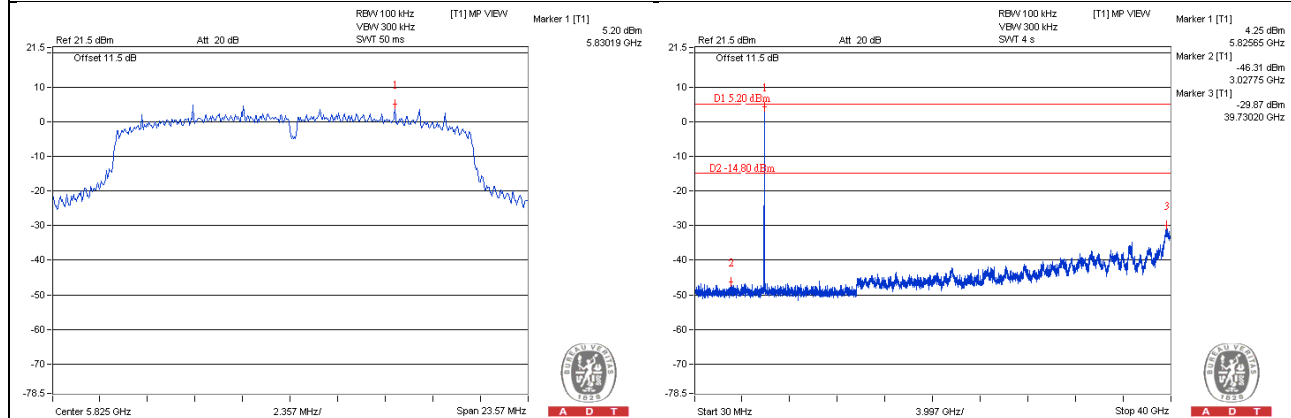
CH 149



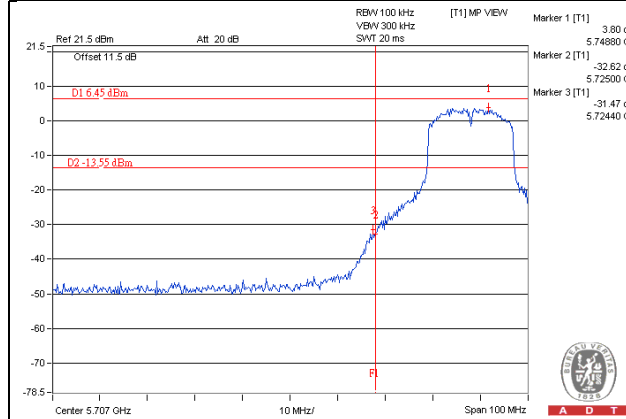
CH 157



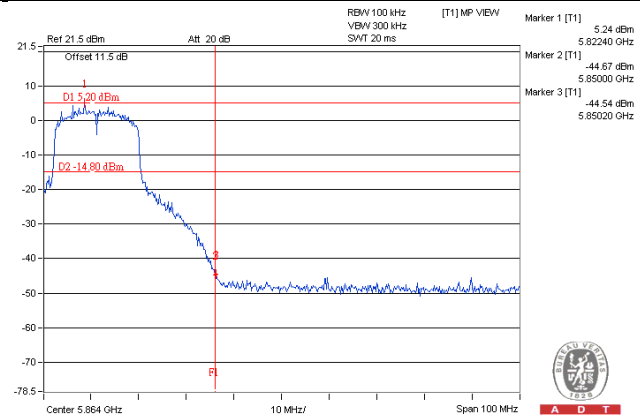
CH 165



CH 149 Band edge

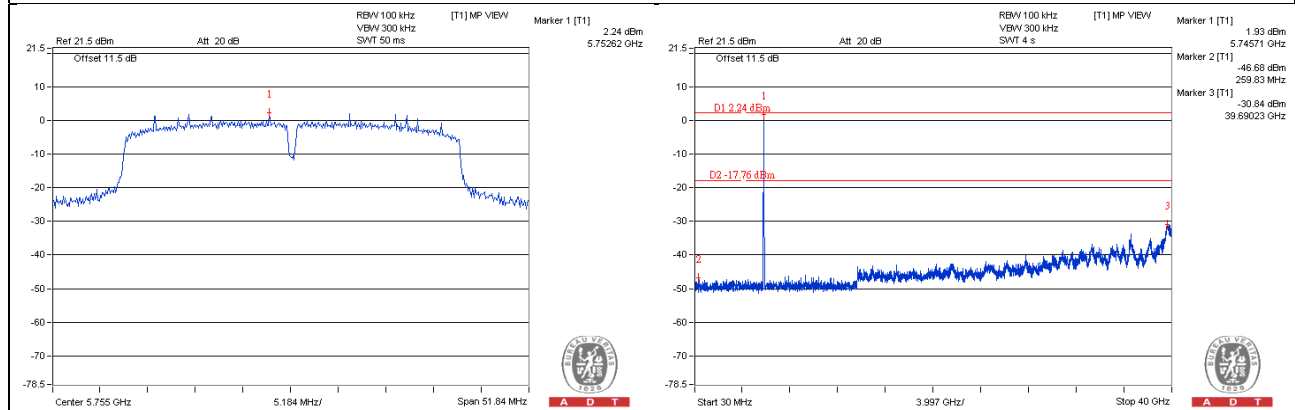


CH 165 Band edge

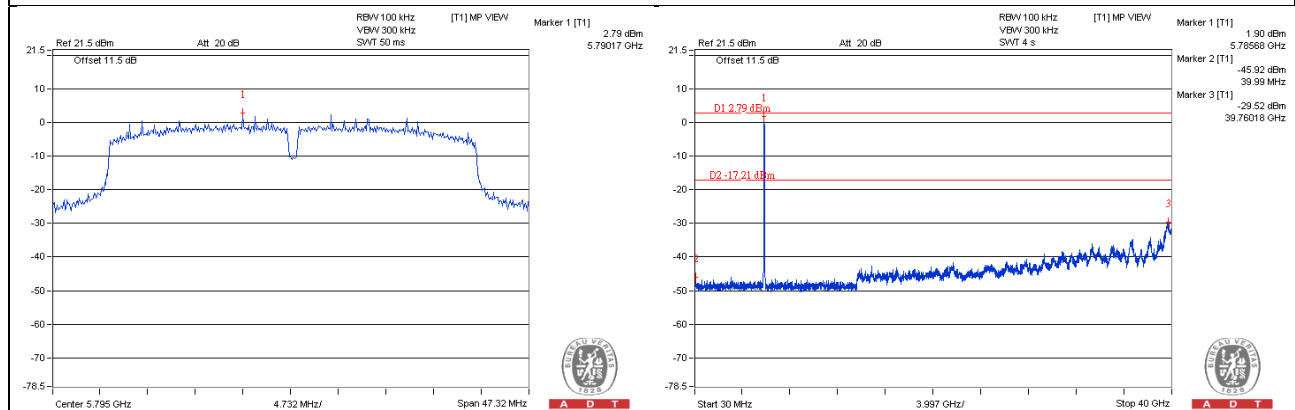


802.11ac (VHT40) Chain 0

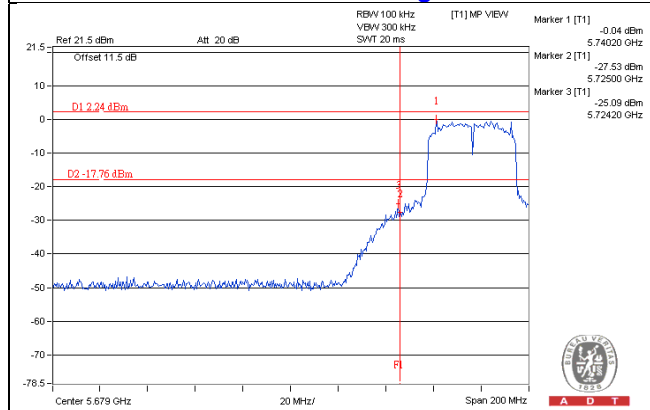
CH 151



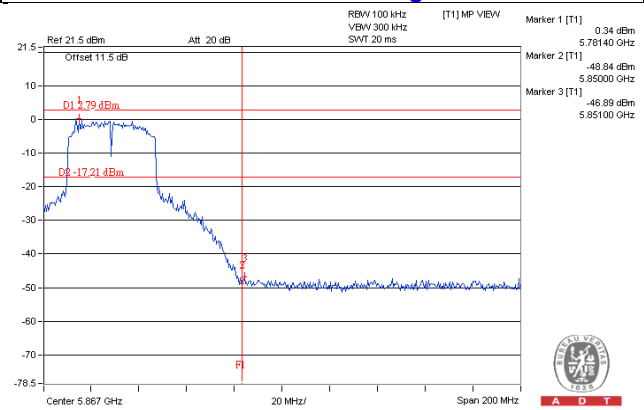
CH 159



CH 151 Band edge

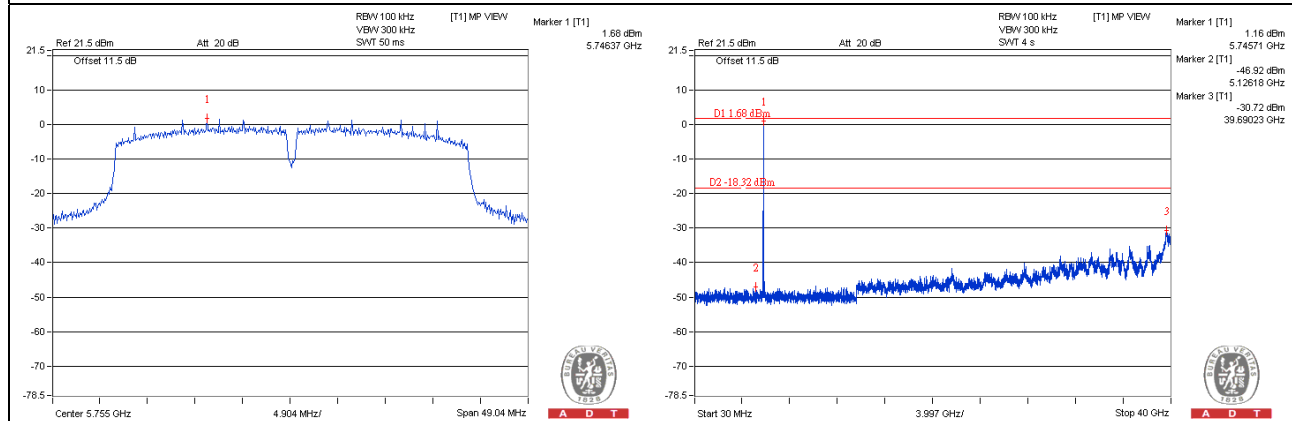


CH 159 Band edge

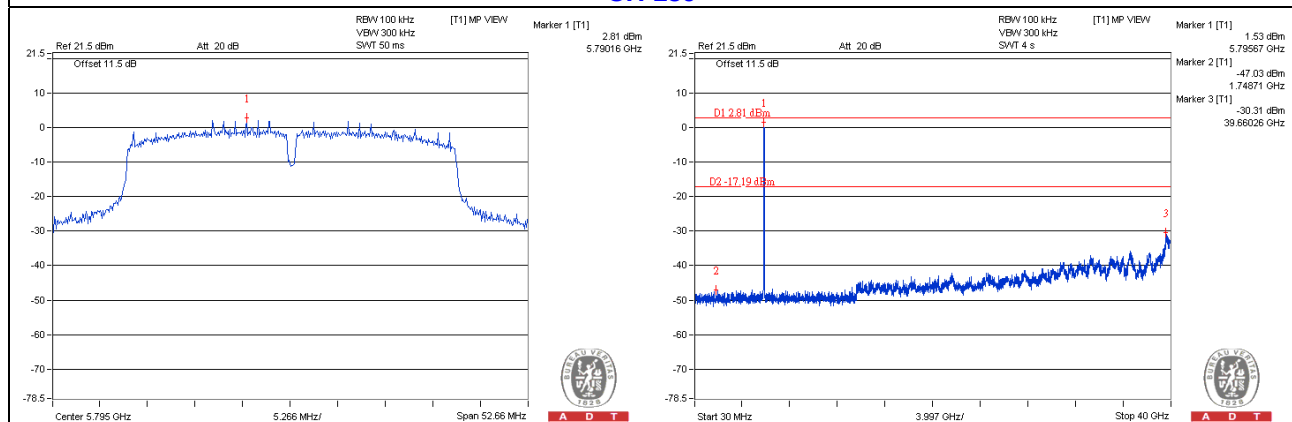


Chain 1

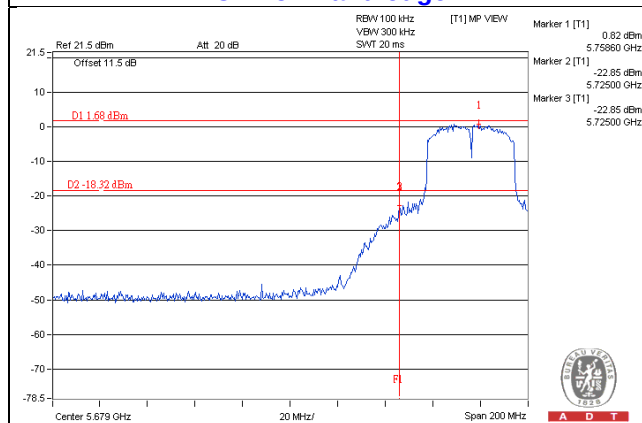
CH 151



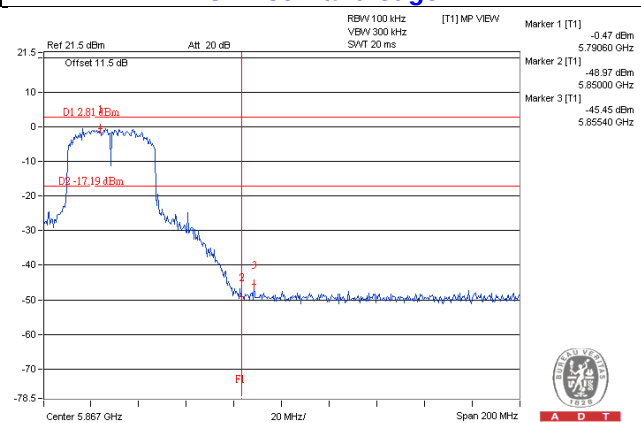
CH 159



CH 151 Band edge

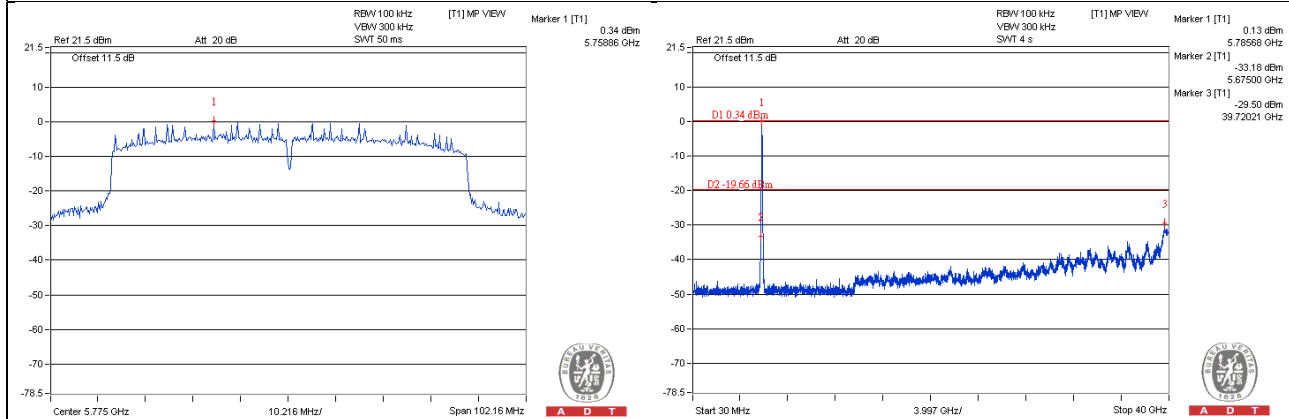


CH 159 Band edge

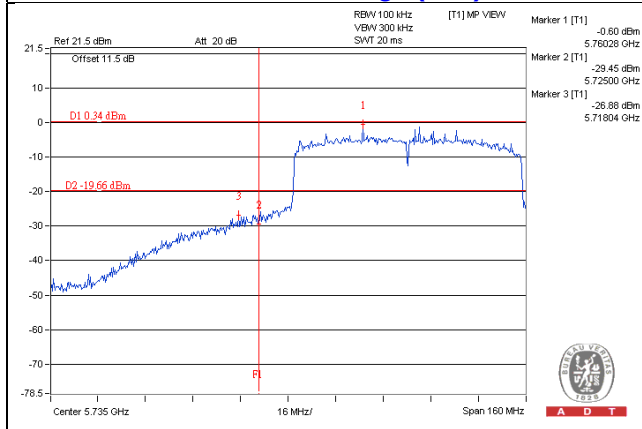


802.11ac (VHT80) Chain 0

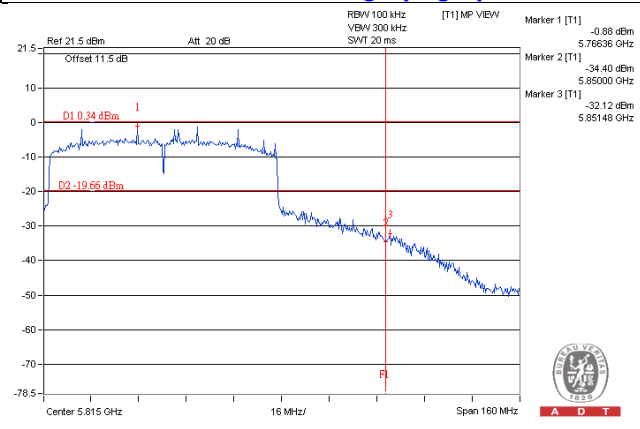
CH 155



CH 155 Band edge (Left)

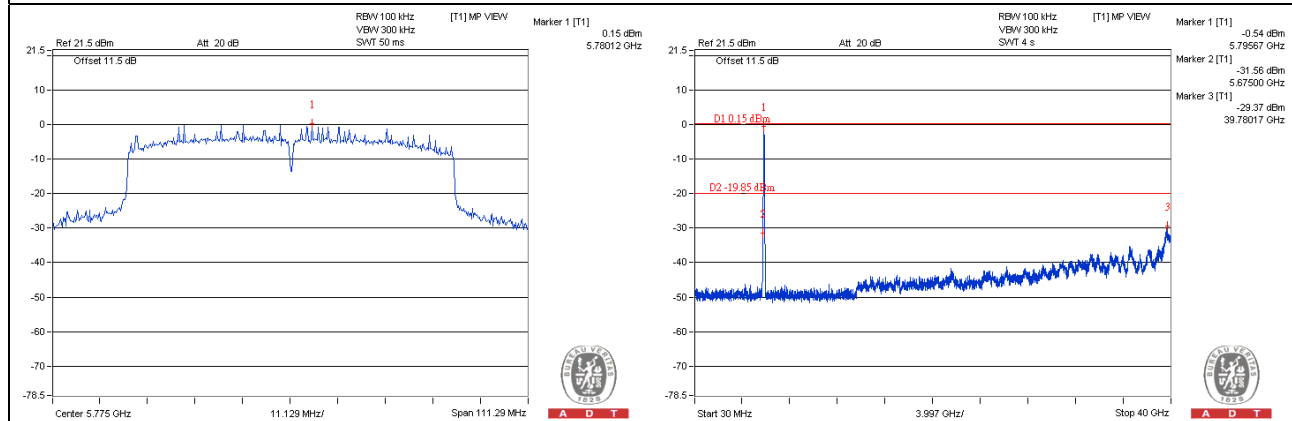


CH 155 Band edge (Right)



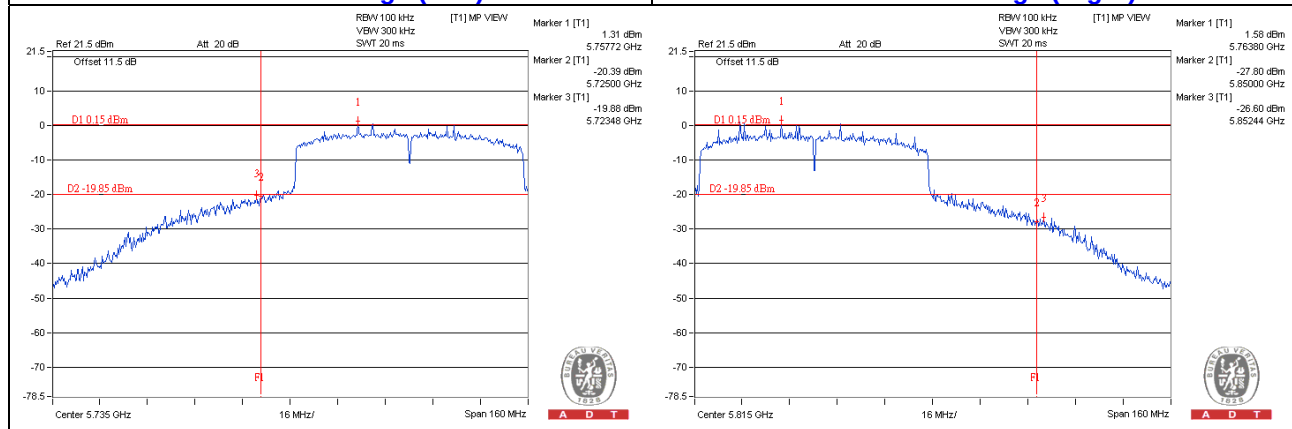
Chain 1

CH 155



CH 155 Band edge (Left)

CH 155 Band edge (Right)



5.5 Unwanted Emission Measurement (Radiated Versus Conducted)

5.5.1 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.

5.5.2 Test Instruments

For Above 1GHz:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY50010156	Aug. 11, 2014	Aug. 10, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 12, 2014	Nov. 11, 2015
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Feb. 06, 2015	Feb. 05, 2016
RF Cable	NA	CHHCAB_001	Oct. 05, 2014	Oct. 04, 2015
Horn_Antenna AISI	AIH.8018	0000220091110	Feb. 06, 2015	Feb. 05, 2016
Pre-Amplifier Agilent	8449B	300801923	Oct. 28, 2014	Oct. 27, 2015
RF Cable	NA	131206 131213 131215 SNMY23685/4	Jan. 16, 2015	Jan. 15, 2016
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Dec. 12, 2014	Dec. 11, 2015
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Feb. 05, 2015	Feb. 04, 2016
RF Cable	NA	329751/4 RF104-204	Dec. 11, 2014	Dec. 10, 2015
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: May 07, 2015

For Below 1GHz:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY50010156	Aug. 11, 2014	Aug. 10, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 12, 2014	Nov. 11, 2015
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Feb. 27, 2014	Feb. 26, 2015
RF Cable	NA	CHHCAB_001	Oct. 05, 2014	Oct. 04, 2015
Horn_Antenna AISI	AIH.8018	0000220091110	Aug. 26, 2014	Aug. 25, 2015
Pre-Amplifier Agilent	8449B	300801923	Oct. 28, 2014	Oct. 27, 2015
RF Cable	NA	131206 131215 SNMY23685/4	Jan. 16, 2015	Jan. 15, 2016
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier EMCI	EMC184045	980143	Jan. 16, 2015	Jan. 15, 2016
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Aug. 26, 2014	Aug. 25, 2015
RF Cable	NA	RF104-121 RF104-204	Dec. 11, 2014	Dec. 10, 2015
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: Feb. 09, 2015

5.5.3 Test Procedures

Same as item 4.5.3

5.5.4 Deviation from Test Standard

C63.10:2009 requires a 0.8m EUT height above 1GHz, but in accordance with the FCC December 2014 TCB Conference call, a 1.5m EUT height is allowed.

5.5.5 Test Setup

Same as item 4.5.5

5.5.6 EUT Operating Conditions

Same as item 4.5.6

5.5.7 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

Above 1GHz Data :

802.11a

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	11490.00	54.5 PK	74.0	-19.5	1.14 H	86	44.46	10.04
2	11490.00	43.8 AV	54.0	-10.2	1.14 H	86	33.76	10.04
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	11490.00	53.8 PK	74.0	-20.2	1.27 V	145	81.86	-28.06
2	11490.00	43.3 AV	54.0	-10.7	1.27 V	145	71.36	-28.06

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	11570.00	54.2 PK	74.0	-19.8	1.19 H	96	44.12	10.08
2	11570.00	43.6 AV	54.0	-10.4	1.19 H	96	33.52	10.08
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	11570.00	53.2 PK	74.0	-20.8	1.24 V	143	81.25	-28.05
2	11570.00	43.0 AV	54.0	-11.0	1.24 V	143	71.05	-28.05

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	11650.00	54.6 PK	74.0	-19.4	1.13 H	71	44.63	9.97
2	11650.00	44.0 AV	54.0	-10.0	1.13 H	71	34.03	9.97
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	11650.00	54.2 PK	74.0	-19.8	1.21 V	133	82.39	-28.19
2	11650.00	43.8 AV	54.0	-10.2	1.21 V	133	71.99	-28.19

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

802.11ac (VHT20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	11490.00	55.1 PK	74.0	-18.9	1.15 H	82	45.06	10.04
2	11490.00	44.1 AV	54.0	-9.9	1.15 H	82	34.06	10.04
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	11490.00	54.1 PK	74.0	-19.9	1.32 V	146	82.16	-28.06
2	11490.00	43.4 AV	54.0	-10.6	1.32 V	146	71.46	-28.06

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	11570.00	54.1 PK	74.0	-19.9	1.12 H	84	44.02	10.08
2	11570.00	43.6 AV	54.0	-10.4	1.12 H	84	33.52	10.08
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	11570.00	54.6 PK	74.0	-19.4	1.22 V	149	82.65	-28.05
2	11570.00	43.8 AV	54.0	-10.2	1.22 V	149	71.85	-28.05

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	11650.00	54.8 PK	74.0	-19.2	1.15 H	93	44.83	9.97
2	11650.00	44.3 AV	54.0	-9.7	1.15 H	93	34.33	9.97
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	11650.00	53.6 PK	74.0	-20.4	1.25 V	134	81.79	-28.19
2	11650.00	43.3 AV	54.0	-10.7	1.25 V	134	71.49	-28.19

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

802.11ac (VHT40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	11510.00	54.8 PK	74.0	-19.2	1.14 H	86	44.75	10.05
2	11510.00	44.3 AV	54.0	-9.7	1.14 H	86	34.25	10.05
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	11510.00	53.8 PK	74.0	-20.2	1.26 V	136	81.85	-28.05
2	11510.00	43.2 AV	54.0	-10.8	1.26 V	136	71.25	-28.05

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	11590.00	54.3 PK	74.0	-19.7	1.15 H	101	44.21	10.09
2	11590.00	43.3 AV	54.0	-10.7	1.15 H	101	33.21	10.09

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	11590.00	54.1 PK	74.0	-19.9	1.29 V	138	82.15	-28.05
2	11590.00	43.3 AV	54.0	-10.7	1.29 V	138	71.35	-28.05

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

802.11ac (VHT80)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	11550.00	55.1 PK	74.0	-18.9	1.15 H	88	45.03	10.07
2	11550.00	44.2 AV	54.0	-9.8	1.15 H	88	34.13	10.07

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	11550.00	53.9 PK	74.0	-20.1	1.30 V	153	81.95	-28.05
2	11550.00	43.6 AV	54.0	-10.4	1.30 V	153	71.65	-28.05

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

Below 1GHz Data

802.11ac (VHT40)

CHANNEL	TX Channel 159	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	Below 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	166.29	38.5 QP	43.5	-5.0	2.00 H	201	51.75	-13.23
2	199.51	34.2 QP	43.5	-9.3	1.50 H	207	50.29	-16.13
3	336.04	39.3 QP	46.0	-6.7	1.00 H	221	50.43	-11.17
4	432.02	37.4 QP	46.0	-8.6	2.00 H	266	45.93	-8.50
5	798.19	40.3 QP	46.0	-5.7	1.50 H	259	41.71	-1.43
6	896.21	36.1 QP	46.0	-9.9	1.00 H	162	36.04	0.08
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	122.78	38.2 QP	43.5	-5.3	1.00 V	276	52.96	-14.73
2	299.76	35.1 QP	46.0	-10.9	1.50 V	290	47.15	-12.09
3	499.53	41.4 QP	46.0	-4.6	1.00 V	179	48.57	-7.20
4	599.44	35.7 QP	46.0	-10.4	1.00 V	289	40.37	-4.72
5	697.07	35.3 QP	46.0	-10.7	1.00 V	290	38.69	-3.36
6	902.66	40.0 QP	46.0	-6.0	1.50 V	295	39.74	0.22

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

5.5.8 Test Results (Conducted 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).	

Conducted Measurement Factor
a. The composite gain will be used when signal support the correlated signal. (Composite gain = $4.76\text{dBi} + 10\log(2) = 7.77\text{dBi}$) b. For the out of band spurious the gain for the specific band may have been used rather than the highest gain across all bands. c. For the band edge the gain for the specific band may have been used. d. In restricted bands below 1000 MHz, add upper bound on ground plane reflection: For $f = 30 - 1000$ MHz, add 4.7 dB. Note: The conducted emission test was considered some factor to compute test result.

Above 1GHz Data
802.11a - Channel 149

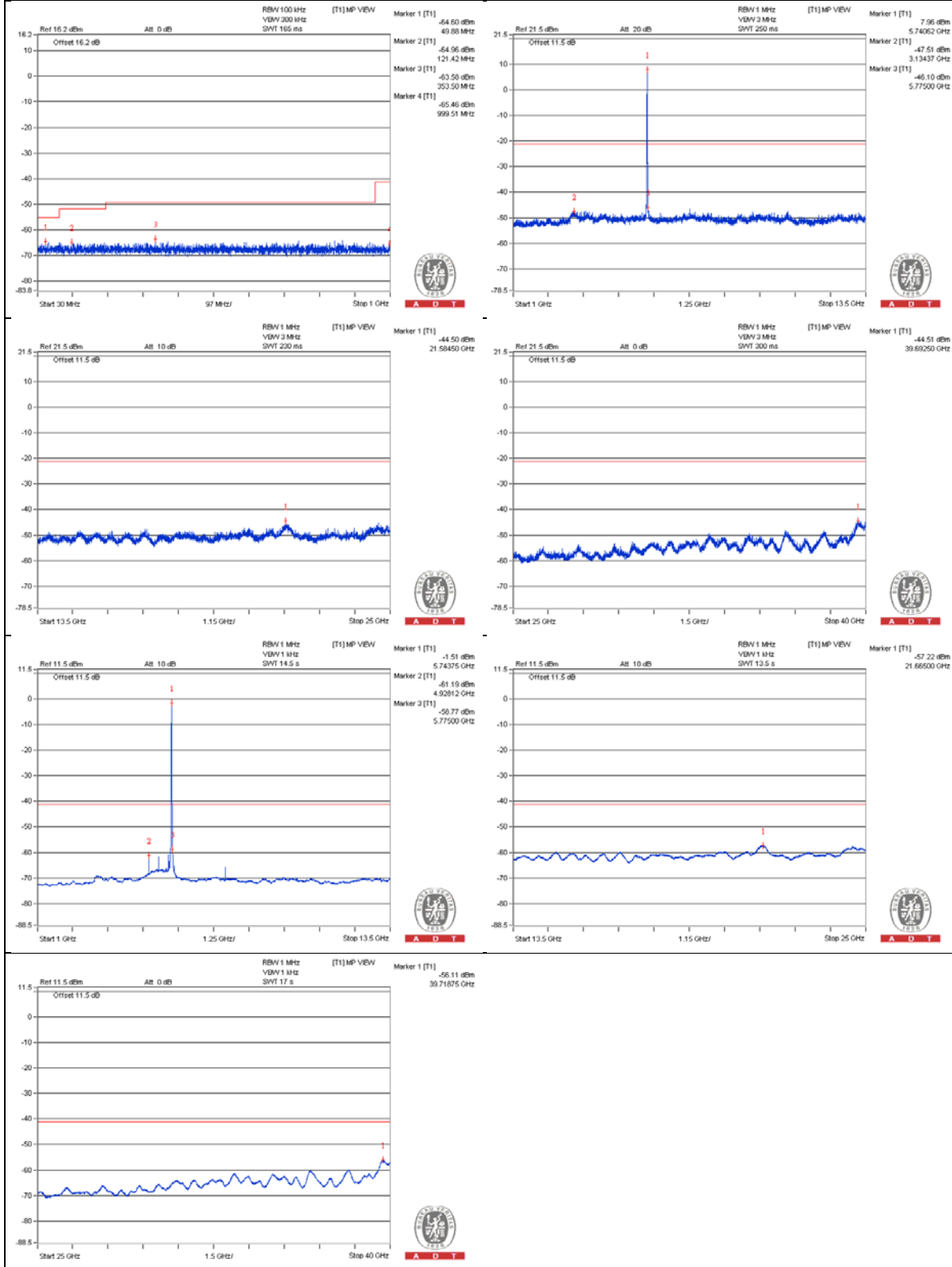
Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)		Correction Factor (dB)	EIRP Level (dBm)
					Chain0	Chain1		
1	3834.375 PK	56	74	-18	-49.77	-50.33	7.77	-39.26
2	3812.5 AV	34.82	54	-19.18	-71.18	-71.26	7.77	-60.44
3	7662.5 PK	55.93	74	-18.07	-50.57	-49.69	7.77	-39.33
4	7659.375 AV	38.45	54	-15.55	-65.77	-70.78	7.77	-56.81
5	11500 PK	55.17	74	-18.83	-50.63	-51.13	7.77	-40.09
6	11490.625 AV	34.25	54	-19.75	-71.94	-71.65	7.77	-61.01
7	17228.875 PK	53.52	74	-20.48	-52.01	-53.11	7.77	-41.74
8	17220.25 AV	42.42	54	-11.58	-63.52	-63.73	7.77	-52.84

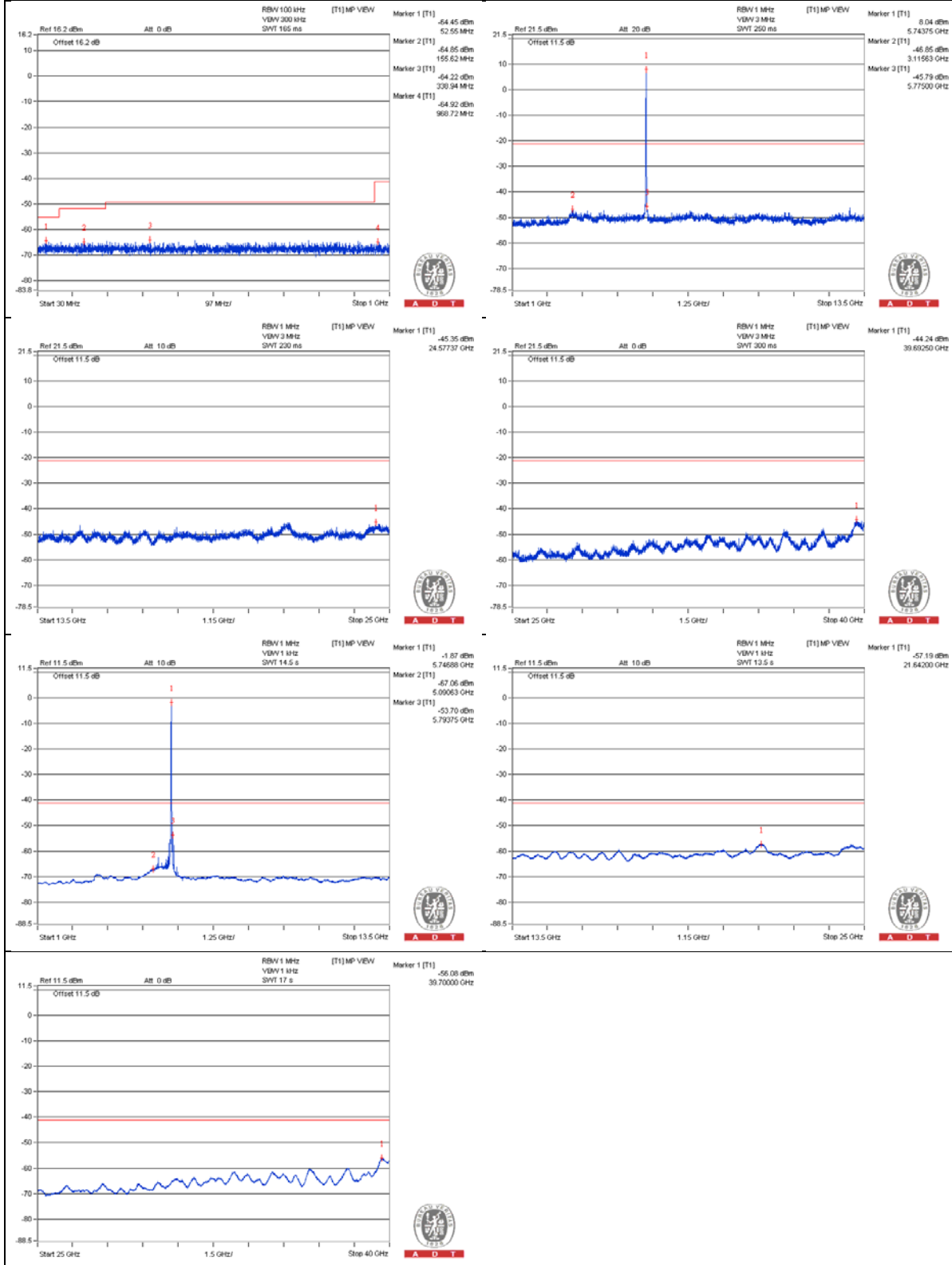
Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.

Chain 0



Chain 1



802.11a - Channel 157

Conducted spurious emission table

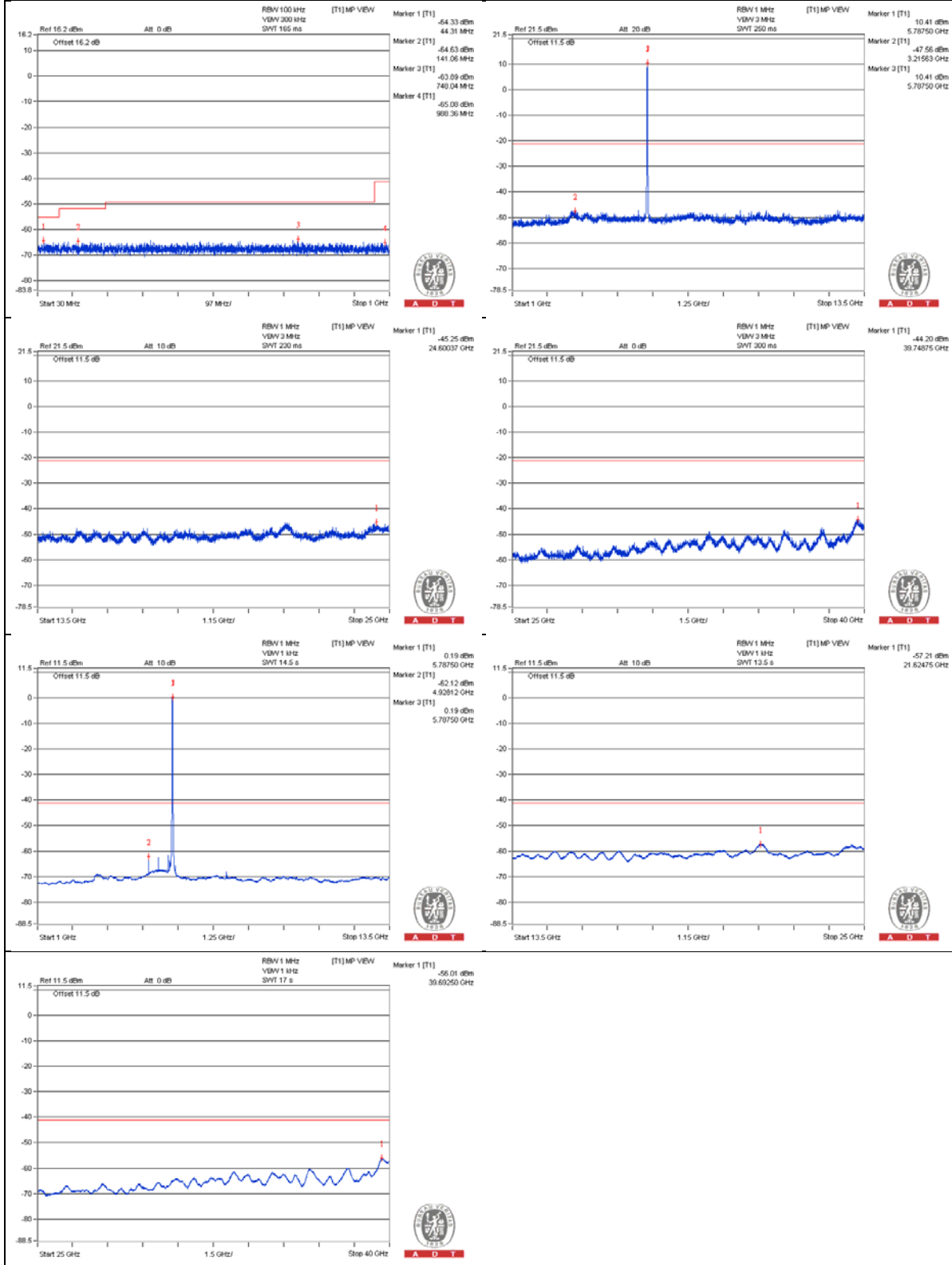
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)		Correction Factor (dB)	EIRP Level (dBm)
					Chain0	Chain1		
1	3856.25 PK	55.83	74	-18.17	-50.3	-50.13	7.77	-39.43
2	3862.5 AV	34.68	54	-19.32	-71.18	-71.55	7.77	-60.58
3	7728.125 PK	56.76	74	-17.24	-48.38	-50.41	7.77	-38.5
4	7712.5 AV	37	54	-17	-67.95	-70.51	7.77	-58.26
5	11584.375 PK	54.42	74	-19.58	-50.87	-52.52	7.77	-40.84
6	11568.75 AV	34.08	54	-19.92	-72.37	-71.59	7.77	-61.18
7	17352.5 PK	55.35	74	-18.65	-51.67	-49.89	7.77	-39.91
8	17355.375 AV	43.02	54	-10.98	-62.9	-63.15	7.77	-52.24

Note :

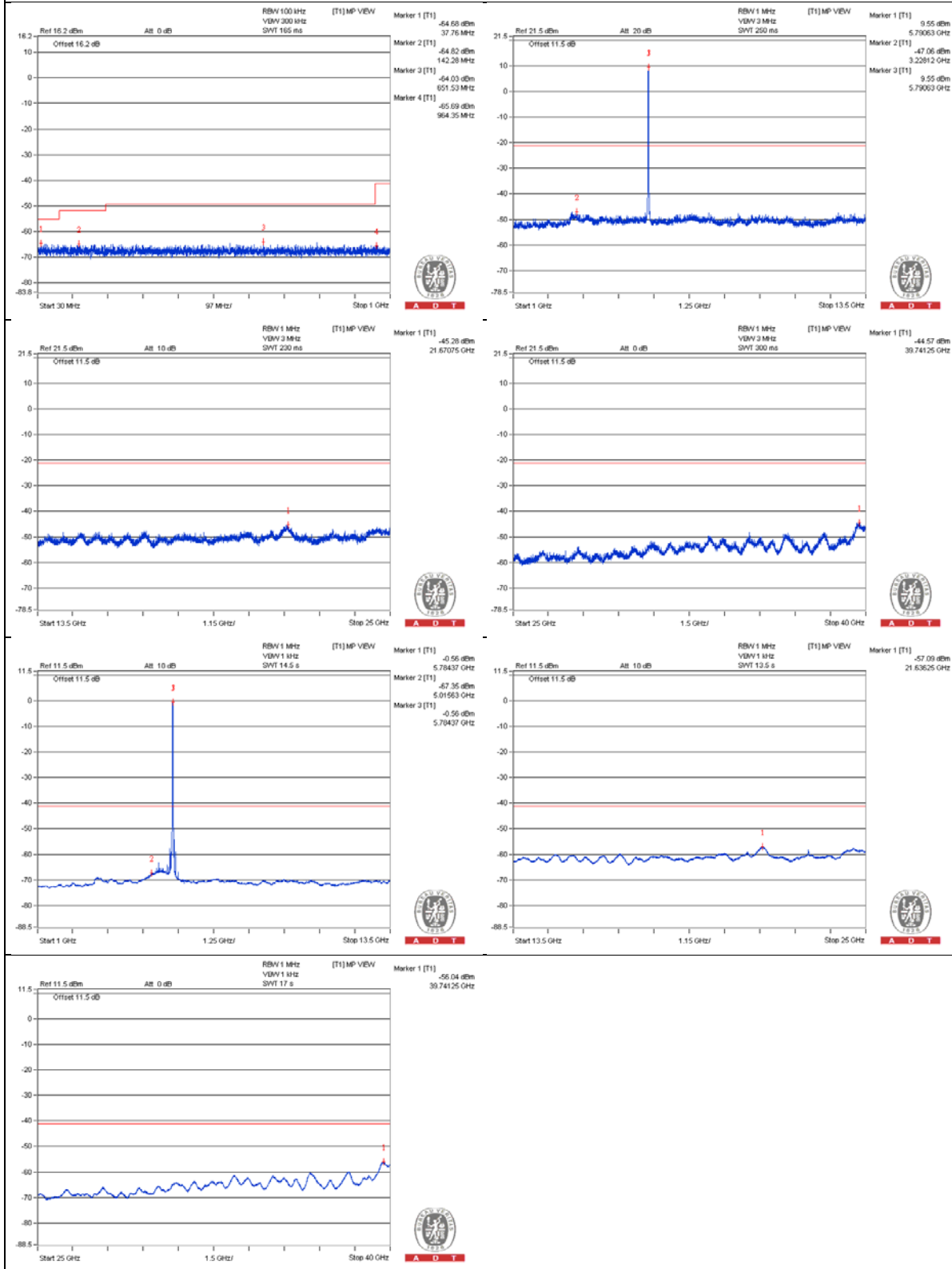
Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.

Chain 0



Chain 1



802.11a - Channel 165

Conducted spurious emission table

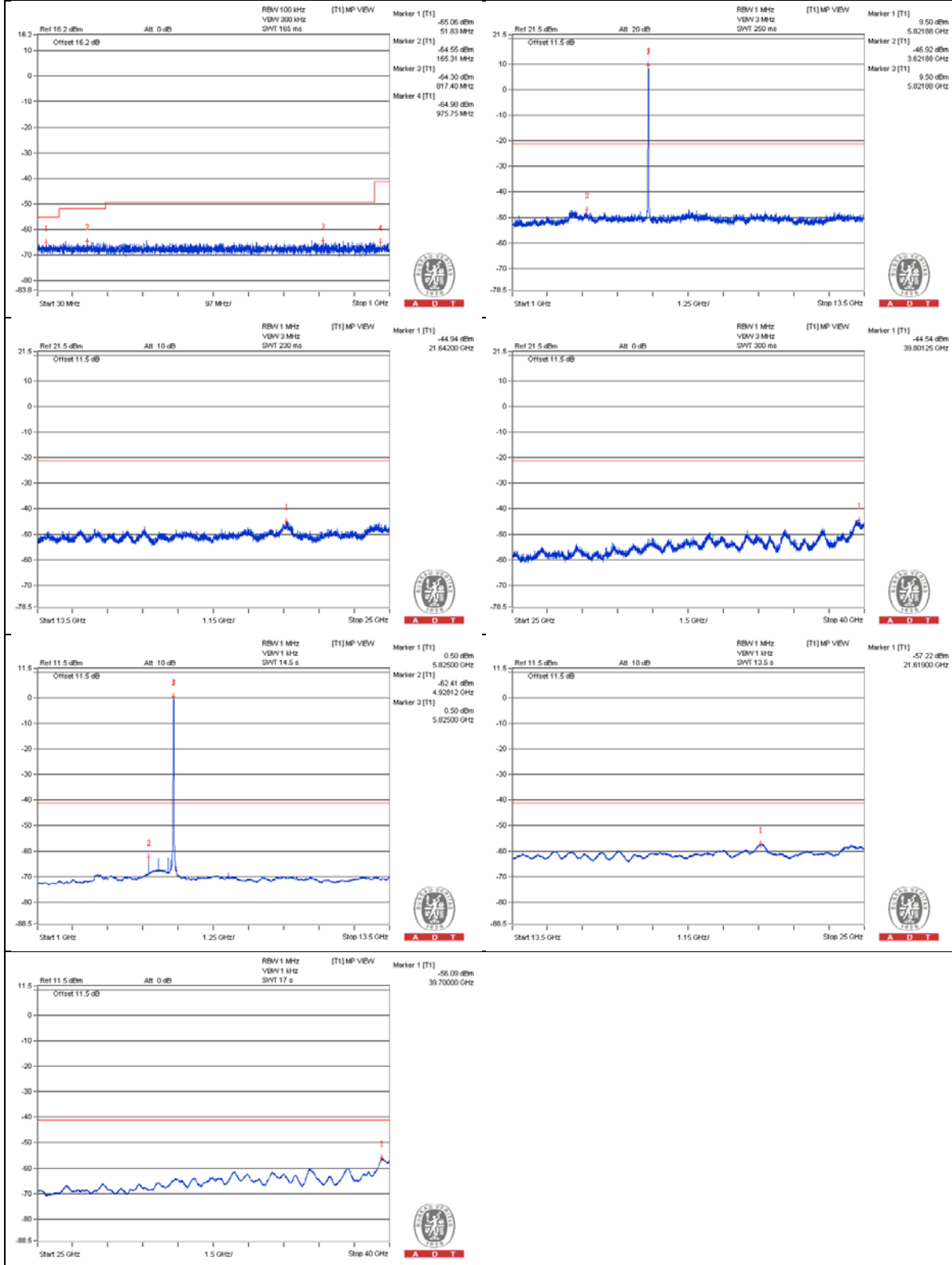
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)		Correction Factor (dB)	EIRP Level (dBm)
					Chain0	Chain1		
1	3868.75 PK	56.17	74	-17.83	-50.46	-49.35	7.77	-39.09
2	3887.5 AV	34.81	54	-19.19	-71.29	-71.18	7.77	-60.45
3	7784.375 PK	56.73	74	-17.27	-49.27	-49.36	7.77	-38.53
4	7765.625 AV	36.51	54	-17.49	-68.61	-70.71	7.77	-58.75
5	11665.625 PK	54.88	74	-19.12	-50.65	-51.74	7.77	-40.38
6	11659.375 AV	34.28	54	-19.72	-71.92	-71.6	7.77	-60.98
7	17473.25 PK	55.77	74	-18.23	-52	-49.03	7.77	-39.49
8	17487.625 AV	44.71	54	-9.29	-61.41	-61.26	7.77	-50.55

Note :

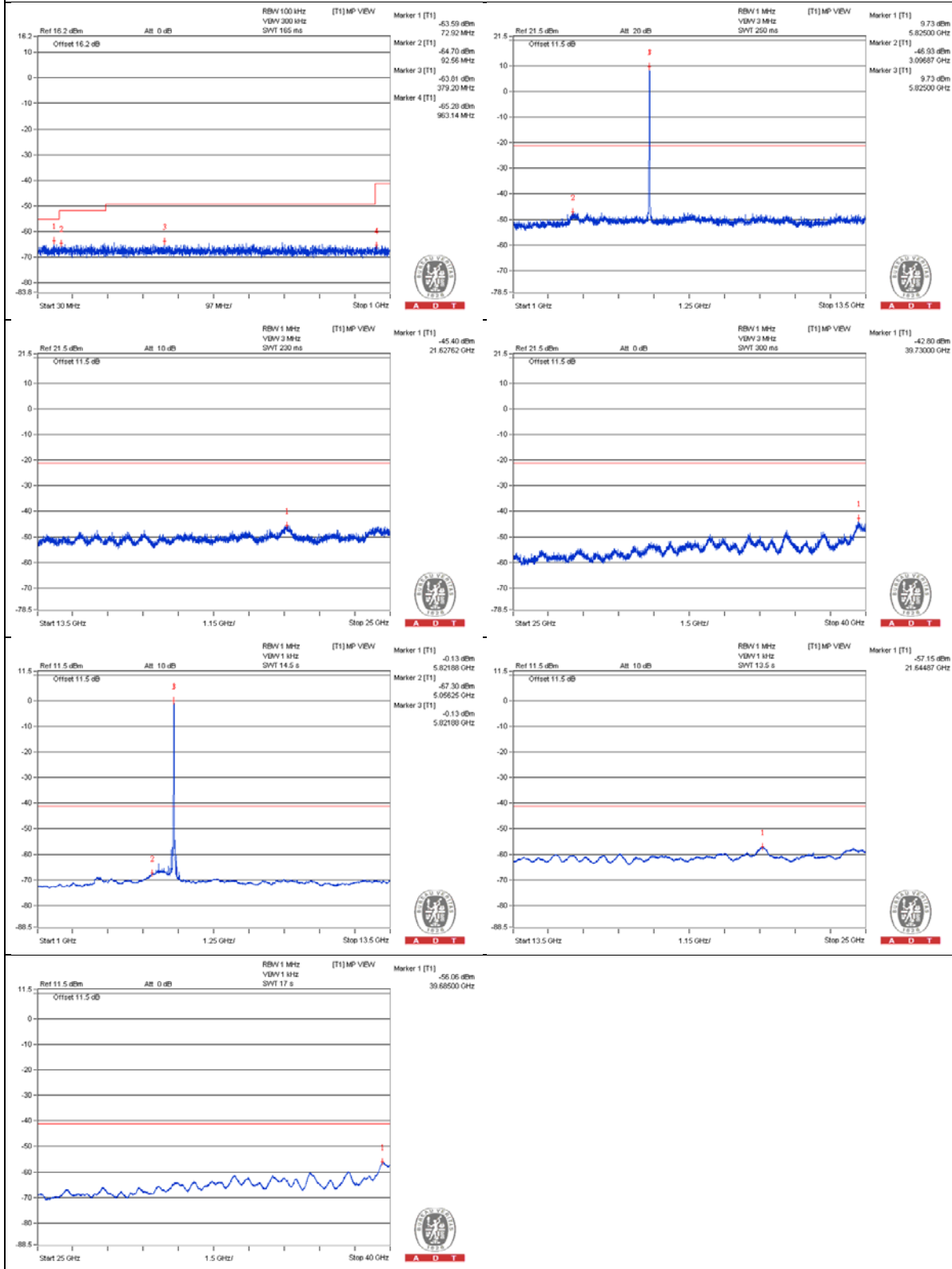
Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.

Chain 0



Chain 1



802.11ac (VHT20) - Channel 149

Conducted spurious emission table

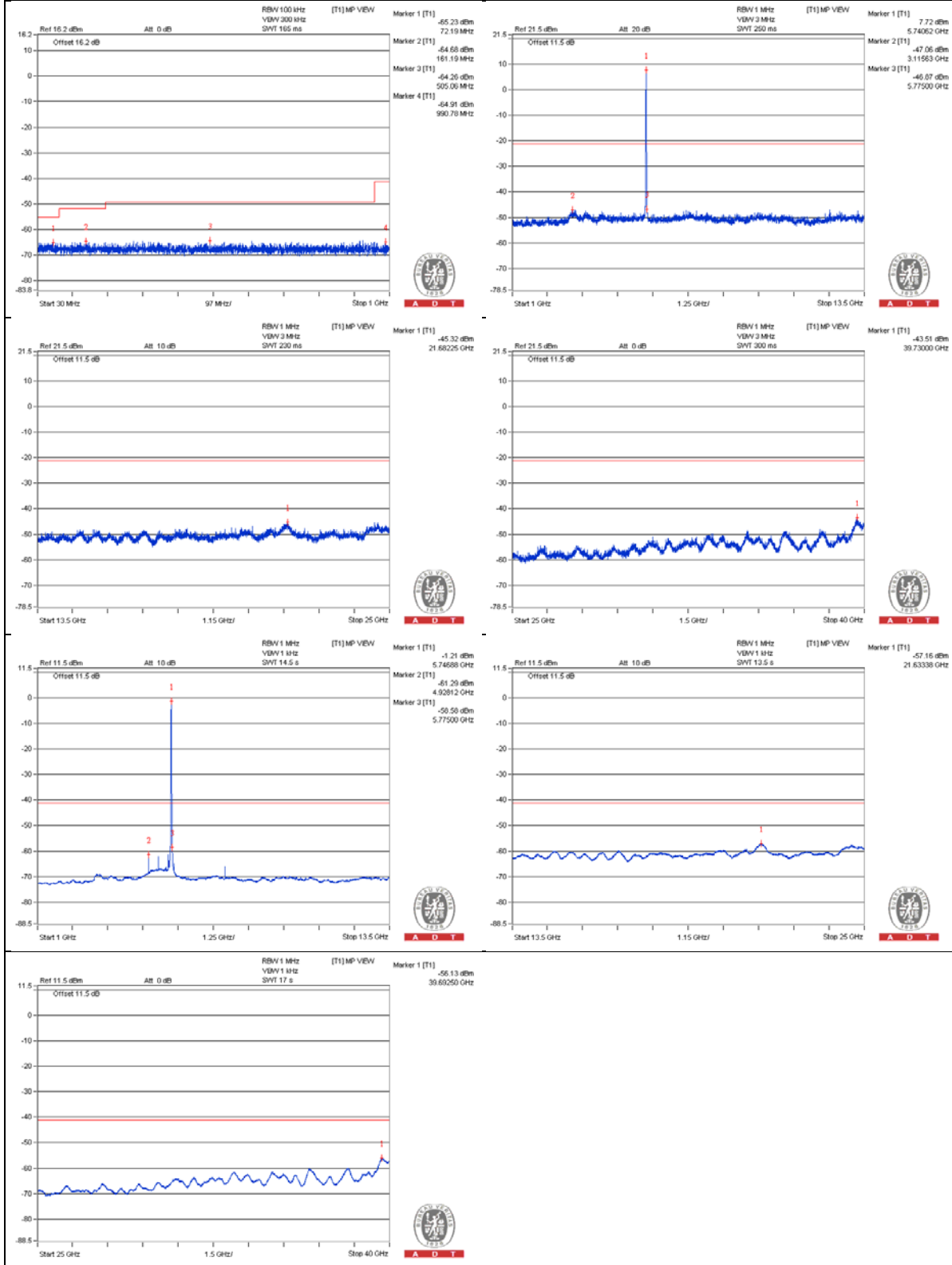
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)		Correction Factor (dB)	EIRP Level (dBm)
					Chain0	Chain1		
1	3834.375 PK	56.36	74	-17.64	-49.74	-49.63	7.77	-38.9
2	3812.5 AV	34.88	54	-19.12	-71.12	-71.2	7.77	-60.38
3	7662.5 PK	56.42	74	-17.58	-49.55	-49.7	7.77	-38.84
4	7659.375 AV	38.23	54	-15.77	-66.05	-70.83	7.77	-57.03
5	11475 PK	55.28	74	-18.72	-49.71	-52.15	7.77	-39.98
6	11484.375 AV	34.32	54	-19.68	-71.73	-71.71	7.77	-60.94
7	17237.5 PK	53.69	74	-20.31	-51.91	-52.85	7.77	-41.57
8	17217.375 AV	42.57	54	-11.43	-63.47	-63.47	7.77	-52.69

Note :

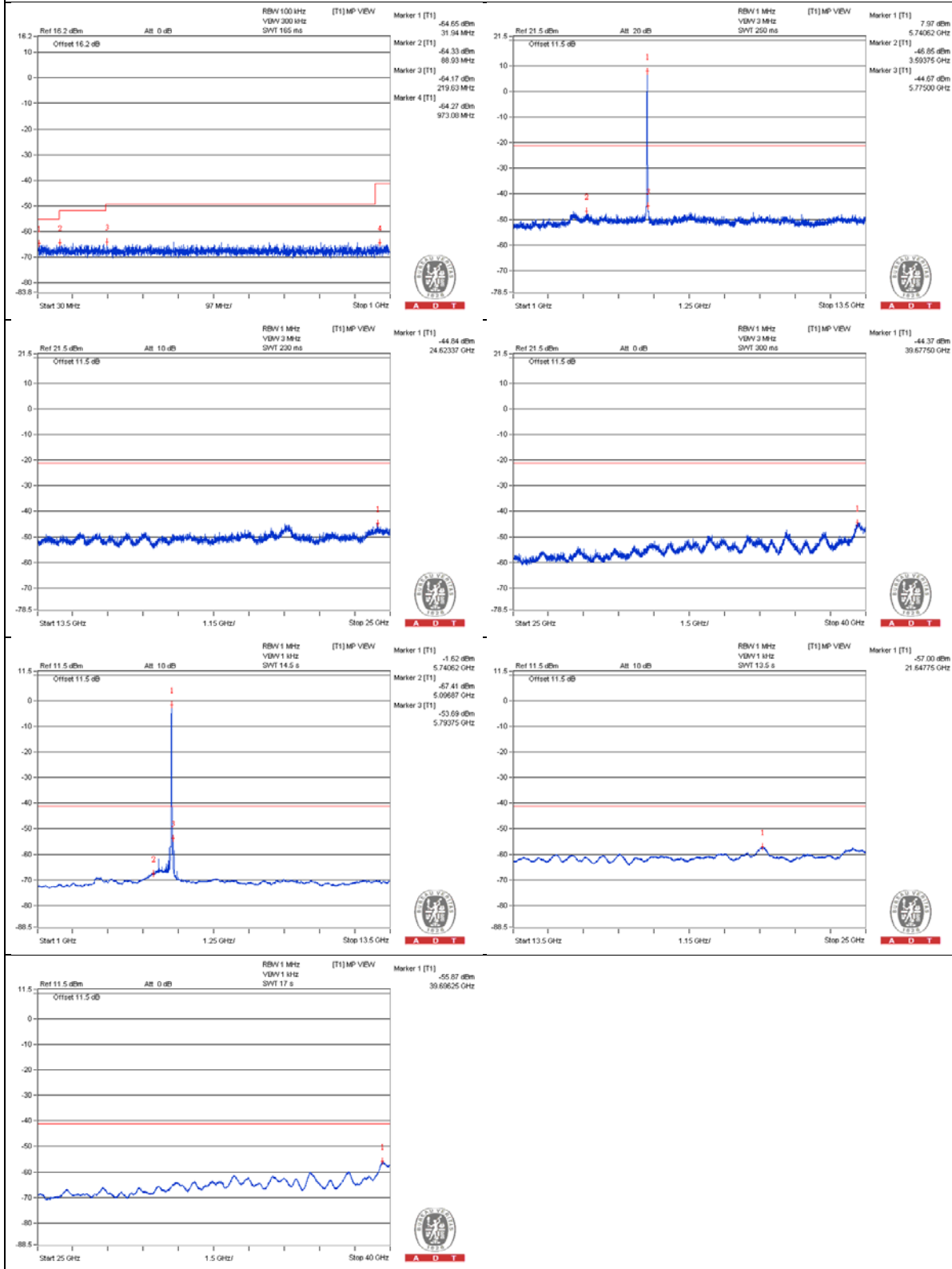
Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.

Chain 0



Chain 1



802.11ac (VHT20) - Channel 157

Conducted spurious emission table

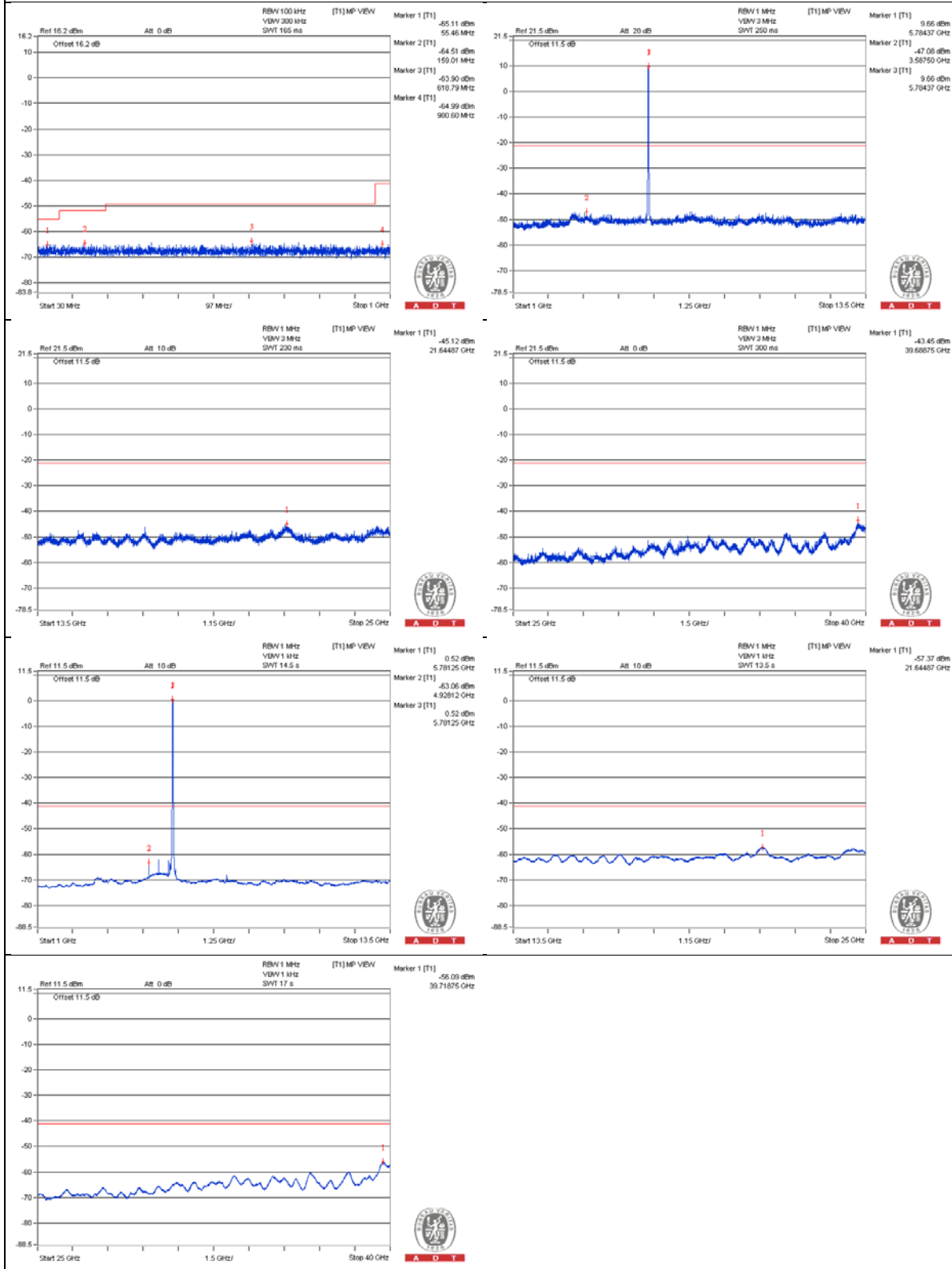
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)		Correction Factor (dB)	EIRP Level (dBm)
					Chain0	Chain1		
1	3859.375 PK	55.84	74	-18.16	-49.54	-50.98	7.77	-39.42
2	3843.75 AV	34.79	54	-19.21	-71.1	-71.4	7.77	-60.47
3	7718.75 PK	56.37	74	-17.63	-50.29	-49.12	7.77	-38.89
4	7712.5 AV	36.96	54	-17.04	-67.95	-70.61	7.77	-58.3
5	11553.125 PK	54.79	74	-19.21	-51.69	-50.85	7.77	-40.47
6	11571.875 AV	34.26	54	-19.74	-72.2	-71.39	7.77	-61
7	17364 PK	54.24	74	-19.76	-51.43	-52.2	7.77	-41.02
8	17372.625 AV	43.13	54	-10.87	-62.89	-62.94	7.77	-52.13

Note :

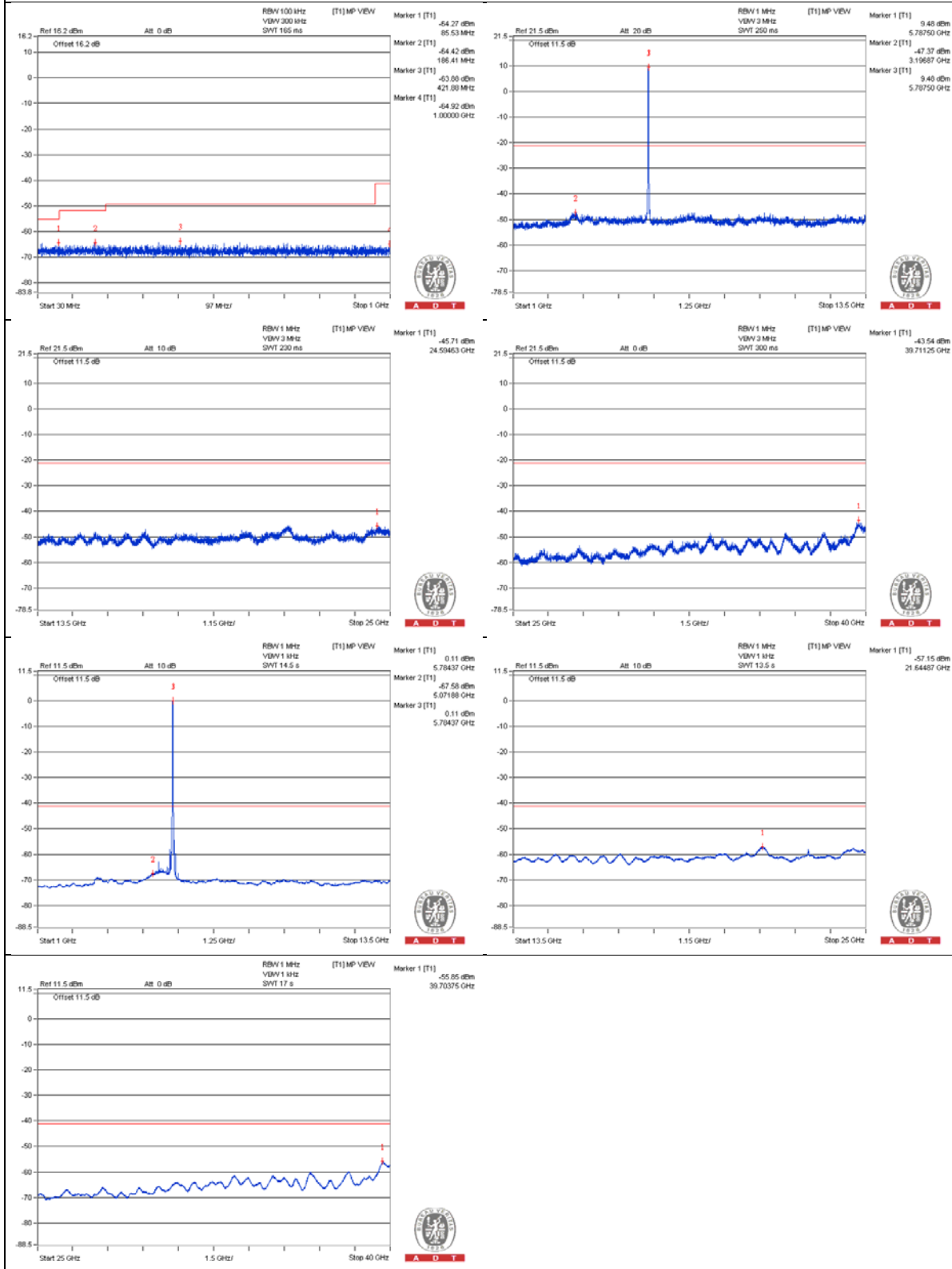
Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.

Chain 0



Chain 1



802.11ac (VHT20) - Channel 165

Conducted spurious emission table

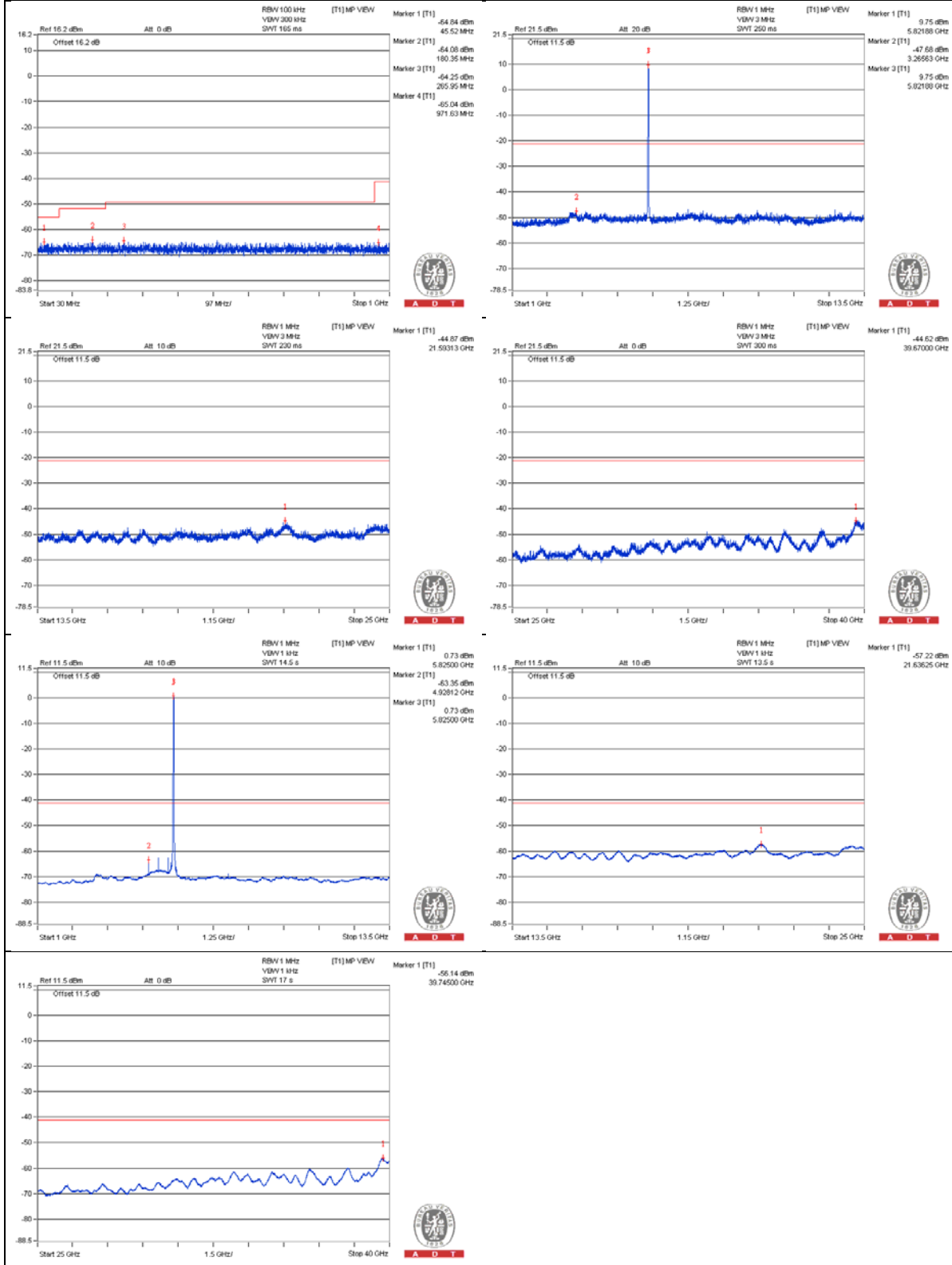
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)		Correction Factor (dB)	EIRP Level (dBm)
					Chain0	Chain1		
1	3900 PK	56.26	74	-17.74	-50.54	-49.14	7.77	-39
2	3890.625 AV	34.76	54	-19.24	-71.29	-71.28	7.77	-60.5
3	7762.5 PK	57.49	74	-16.51	-47.51	-49.93	7.77	-37.77
4	7765.625 AV	36.39	54	-17.61	-68.92	-70.53	7.77	-58.87
5	11656.25 PK	54.85	74	-19.15	-50.9	-51.5	7.77	-40.41
6	11650 AV	34.45	54	-19.55	-72.01	-71.2	7.77	-60.81
7	17479 PK	56.2	74	-17.8	-49.47	-50.24	7.77	-39.06
8	17487.625 AV	44.62	54	-9.38	-61.49	-61.36	7.77	-50.64

Note :

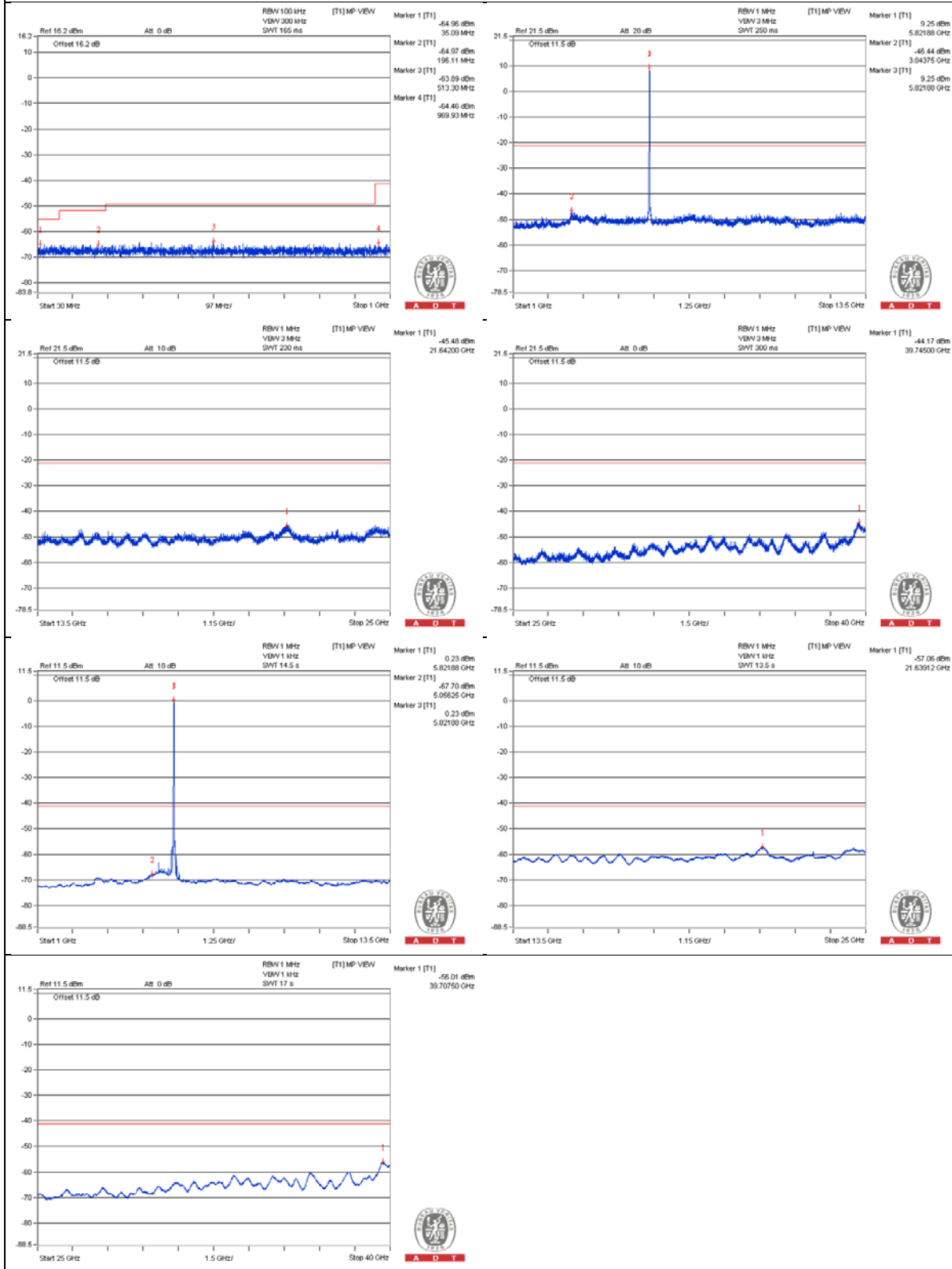
Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.

Chain 0



Chain 1



802.11ac (VHT40) - Channel 151

Conducted spurious emission table

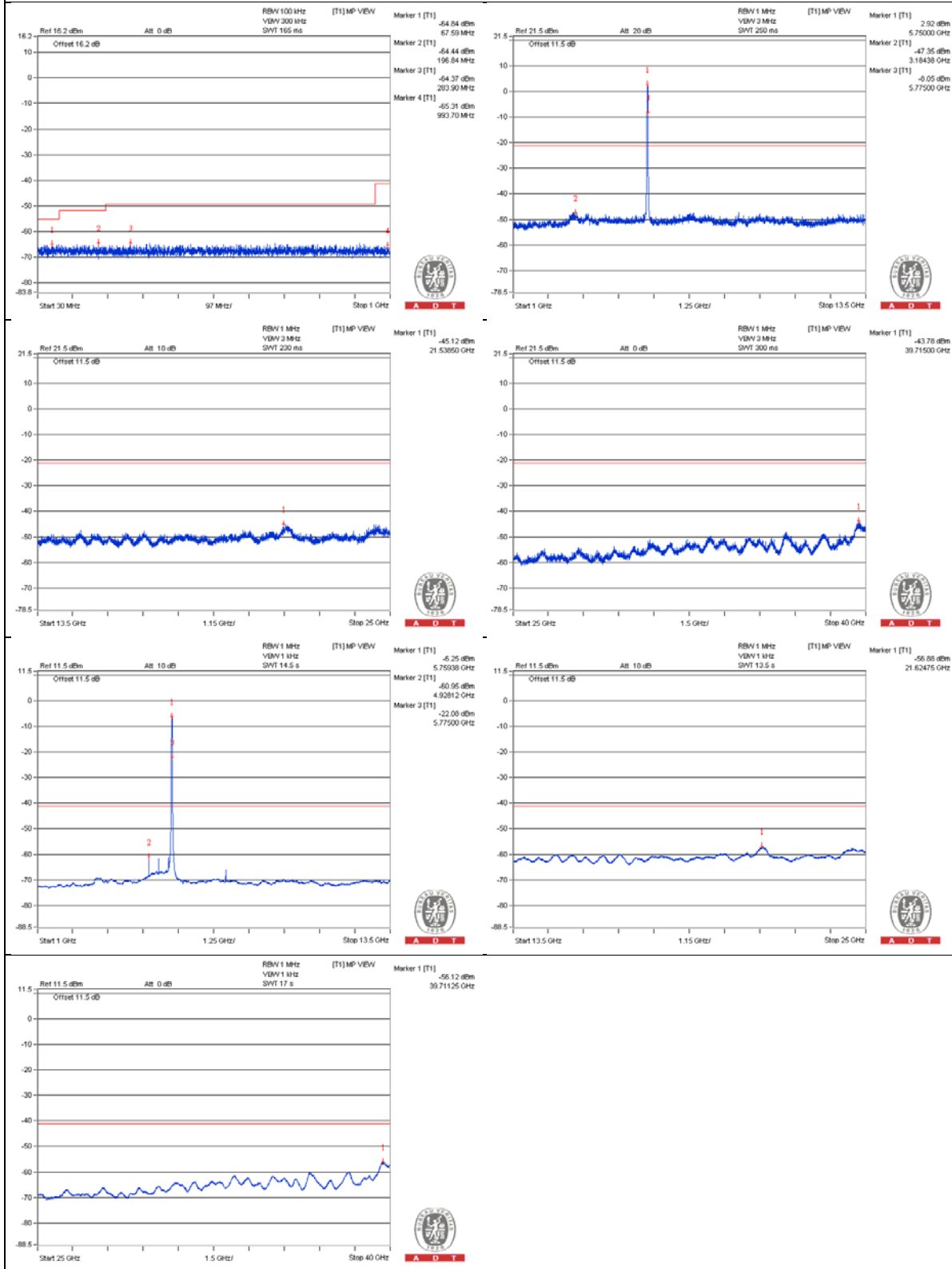
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)		Correction Factor (dB)	EIRP Level (dBm)
					Chain0	Chain1		
1	3828.125 PK	55.54	74	-18.46	-50.51	-50.5	7.77	-39.72
2	3828.125 AV	34.75	54	-19.25	-71.23	-71.36	7.77	-60.51
3	7675 PK	56.01	74	-17.99	-50.29	-49.78	7.77	-39.25
4	7675 AV	38.17	54	-15.83	-66.05	-71.05	7.77	-57.09
5	11512.5 PK	55	74	-19	-52.3	-50.06	7.77	-40.26
6	11515.625 AV	34.17	54	-19.83	-71.93	-71.81	7.77	-61.09

Note :

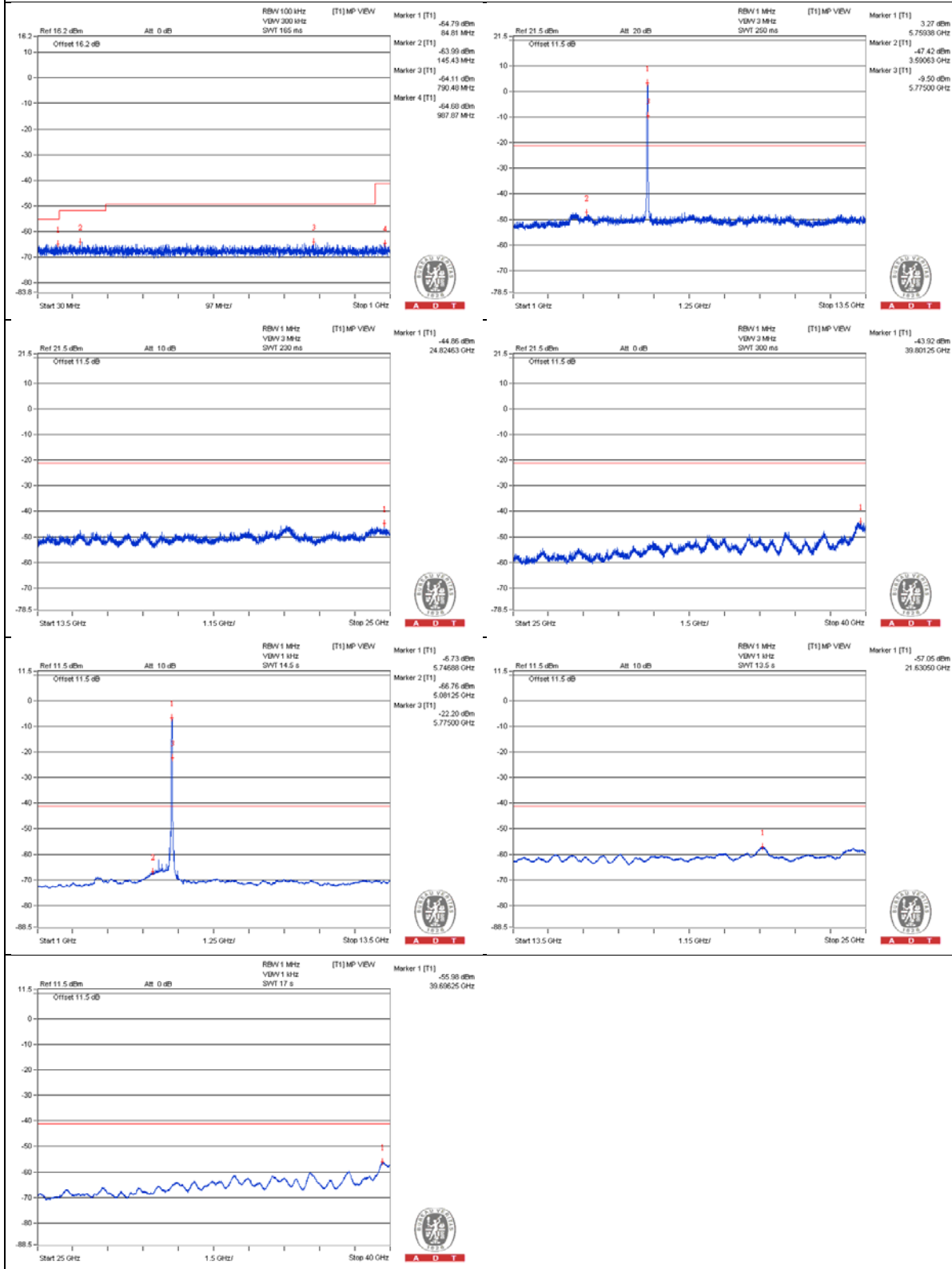
Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.

Chain 0



Chain 1



802.11ac (VHT40) - Channel 159

Conducted spurious emission table

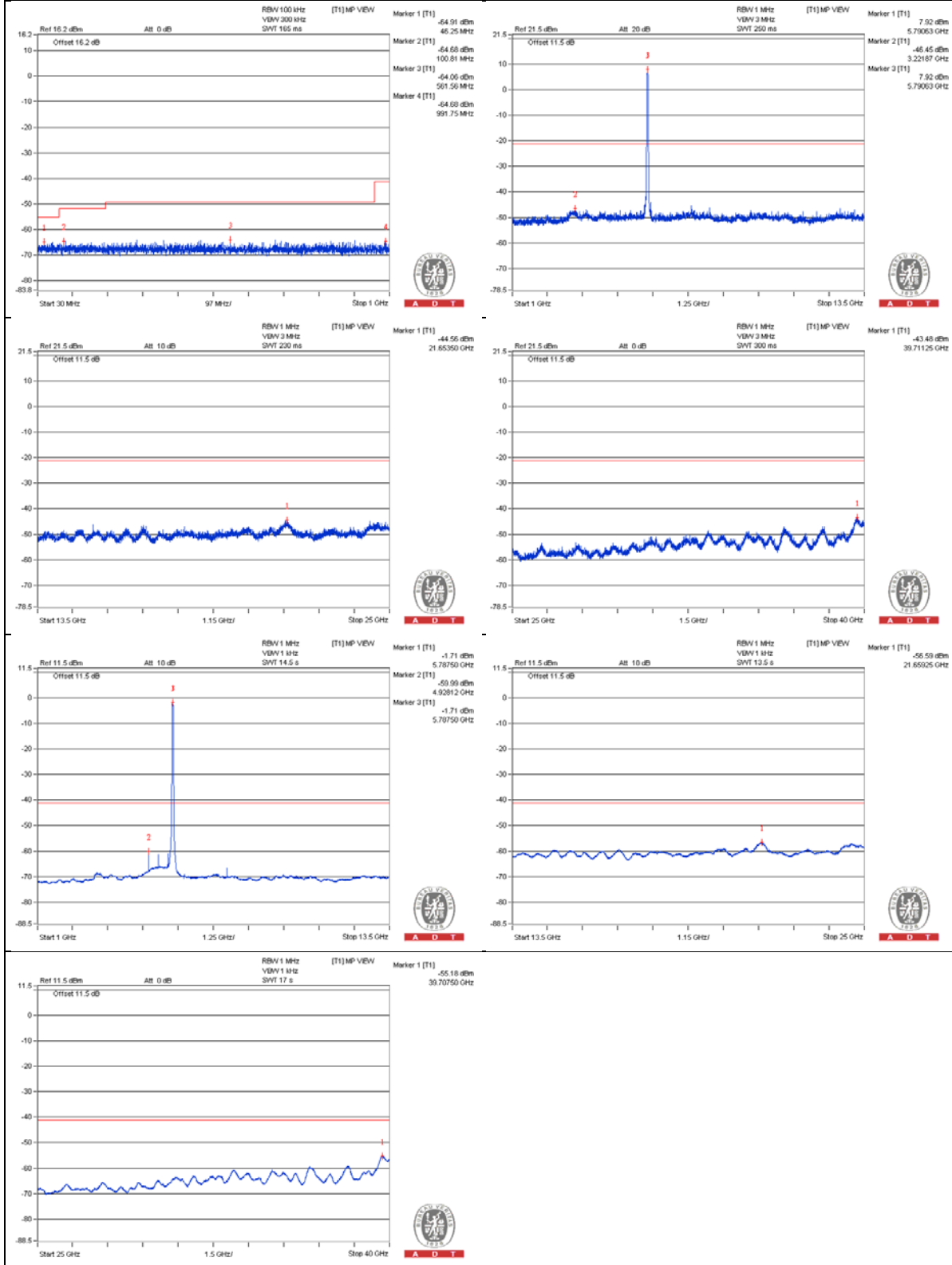
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)		Correction Factor (dB)	EIRP Level (dBm)
					Chain0	Chain1		
1	3868.75 PK	55.9	74	-18.1	-50.4	-49.89	7.77	-39.36
2	3862.5 AV	34.95	54	-19.05	-70.79	-71.42	7.77	-60.31
3	7721.875 PK	56.66	74	-17.34	-50.09	-48.77	7.77	-38.6
4	7728.125 AV	37.79	54	-16.21	-66.72	-70.64	7.77	-57.47
5	11571.875 PK	54.95	74	-19.05	-50.24	-52.14	7.77	-40.31
6	11590.625 AV	34.23	54	-19.77	-71.84	-71.78	7.77	-61.03
7	17369.75 PK	54.49	74	-19.51	-51.87	-51.25	7.77	-40.77
8	17404.25 AV	43.91	54	-10.09	-61.99	-62.28	7.77	-51.35

Note :

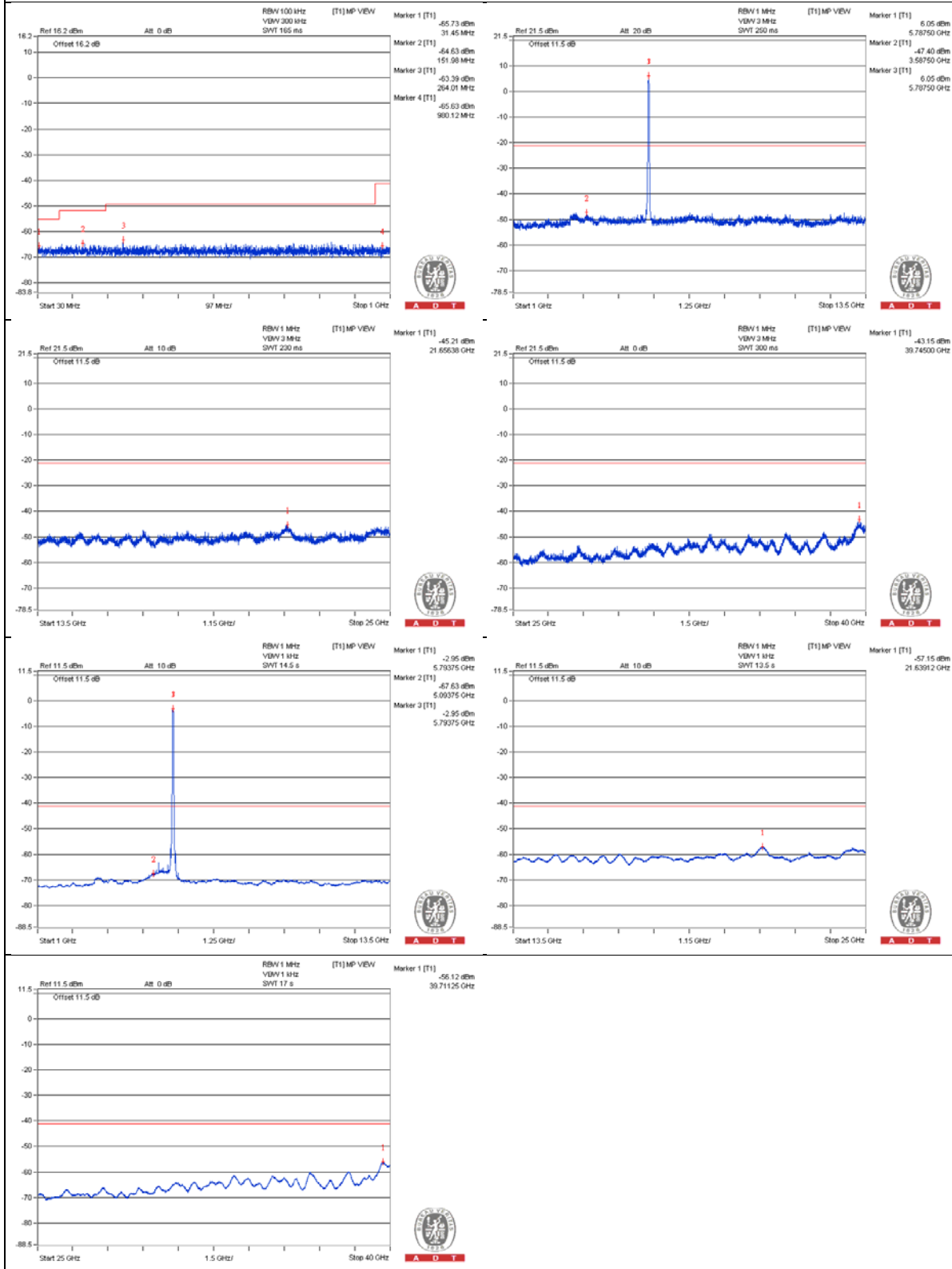
Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.

Chain 0



Chain 1



802.11ac (VHT80) - Channel 155

Conducted spurious emission table

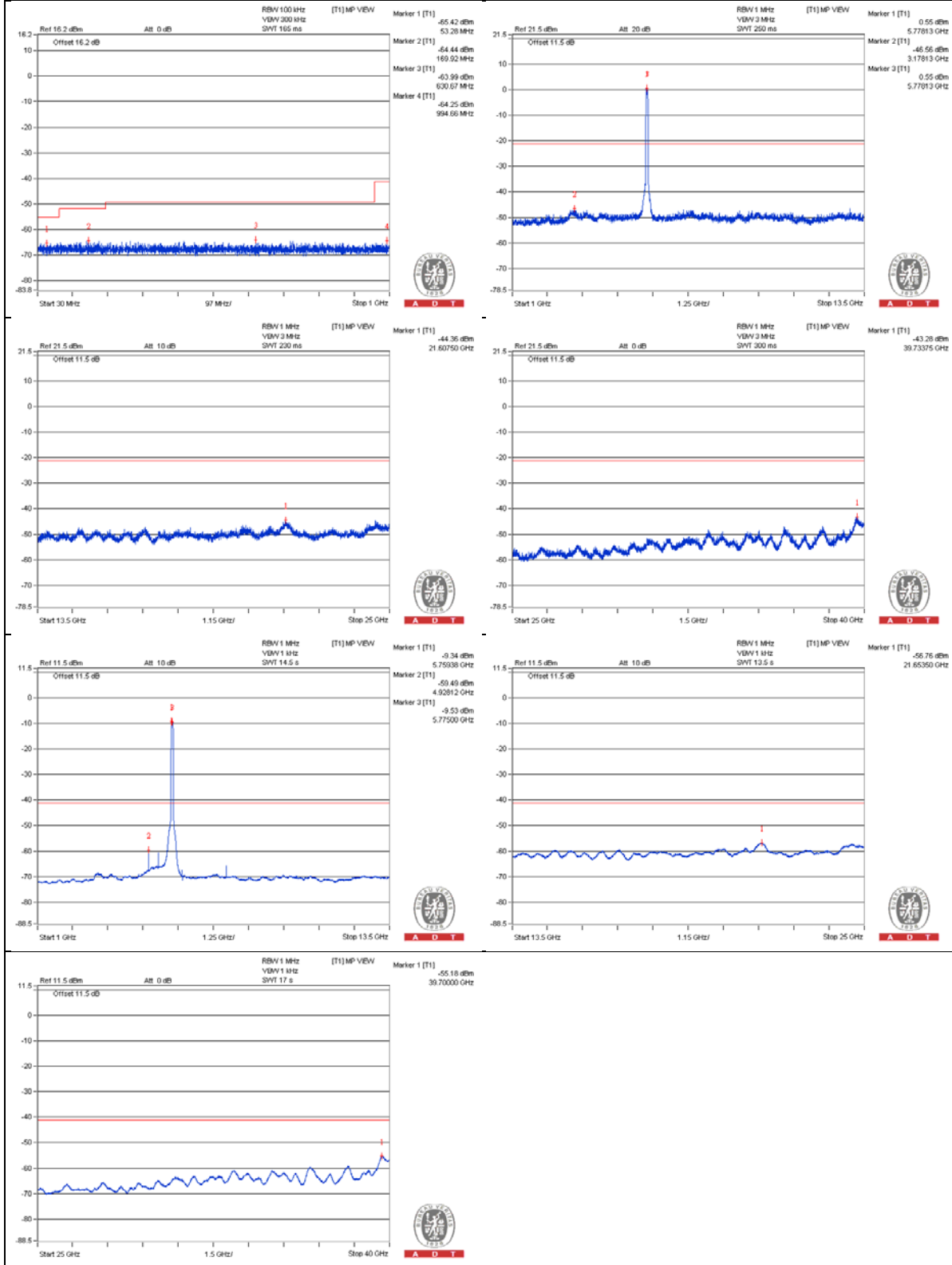
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)		Correction Factor (dB)	EIRP Level (dBm)
					Chain0	Chain1		
1	3831.25 PK	56.16	74	-17.84	-49.41	-50.4	7.77	-39.1
2	3837.5 AV	34.9	54	-19.1	-70.94	-71.35	7.77	-60.36
3	7681.25 PK	57.02	74	-16.98	-49.55	-48.54	7.77	-38.24
4	7700 AV	38.45	54	-15.55	-65.84	-70.56	7.77	-56.81
5	11534.375 PK	55.22	74	-18.78	-50.26	-51.47	7.77	-40.04
6	11550 AV	34.15	54	-19.85	-72.01	-71.78	7.77	-61.11

Note :

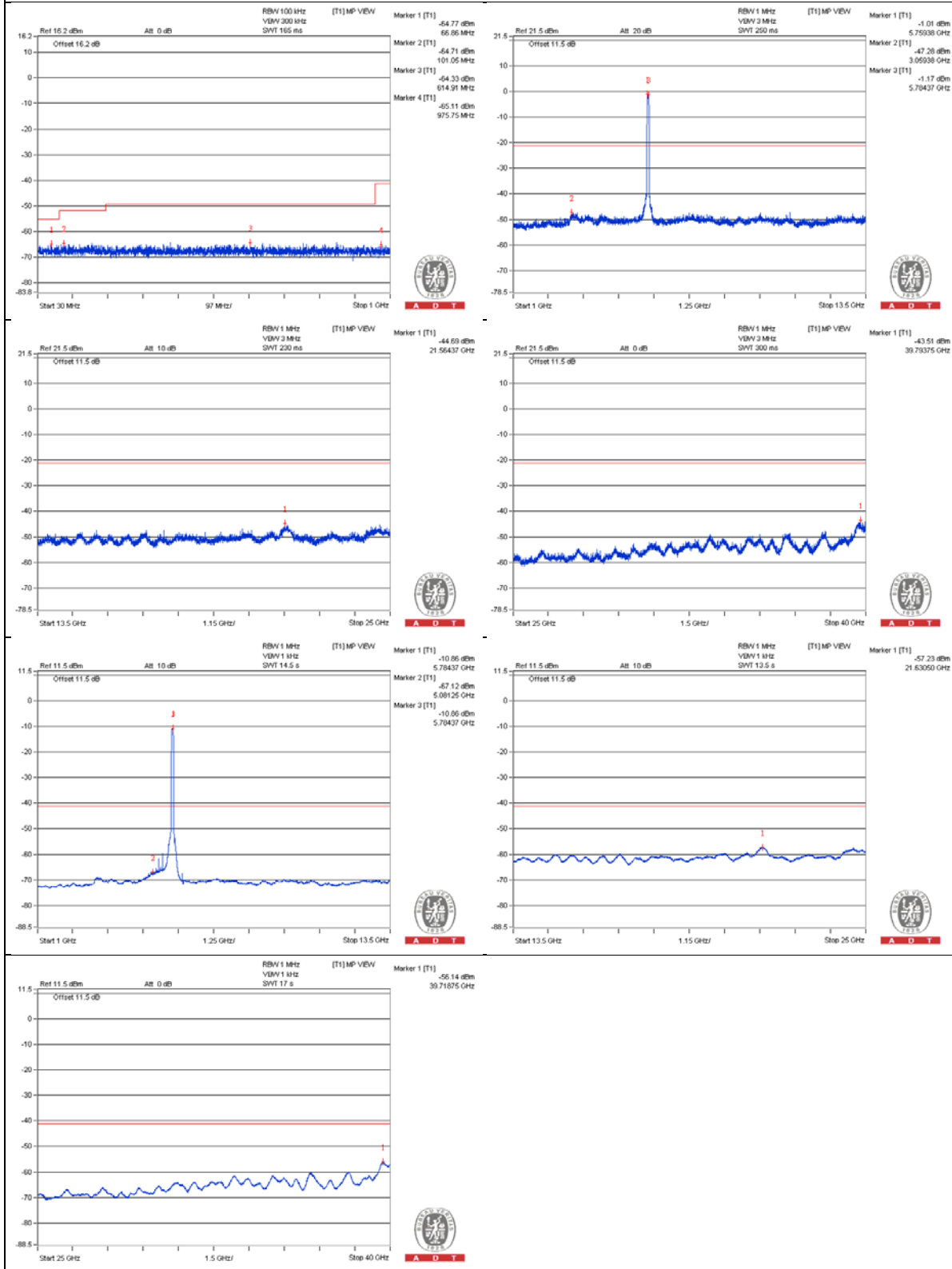
Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.

Chain 0



Chain 1



Below 1GHz Data

802.11ac (VHT40) - Channel 159

Conducted spurious emission table

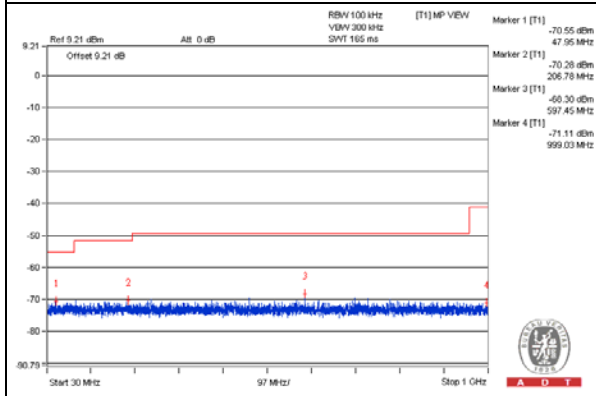
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)		Correction Factor (dB)	EIRP Level (dBm)
					Chain0	Chain1		
1	47.945	34.43	40	-5.57	-70.55	-73.02	7.77	-60.83
2	90.8675	35.69	43.5	-7.81	-70.34	-70.37	7.77	-59.57
3	327.5475	34.82	46	-11.18	-70.98	-71.48	7.77	-60.44
4	597.45	35.98	46	-10.02	-68.3	-73.06	7.77	-59.28
5	707.3025	35.1	46	-10.9	-69.62	-72.84	7.77	-60.16
6	999.03	34.84	54	-19.16	-71.11	-71.29	7.77	-60.42

Note :

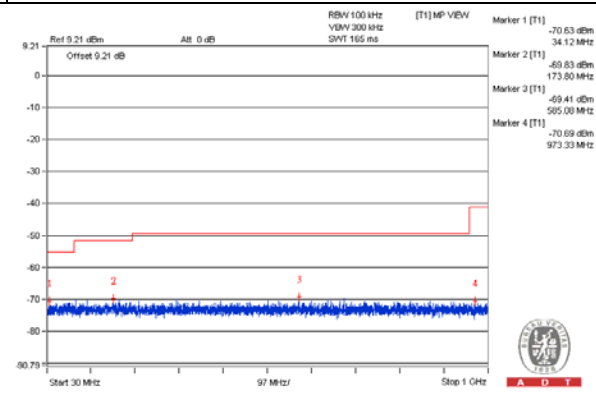
Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.

Chain 0



Chain 1



5.6 Conducted Emission Measurement

5.6.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

5.6.2 Test Instruments

Same as item 4.7.2

5.6.3 Test Procedures

Same as item 4.7.3

5.6.4 Deviation from Test Standard

No deviation.

5.6.5 Test Setup

Same as item 4.7.5

5.6.6 EUT Operating Conditions

Same as item 4.5.6

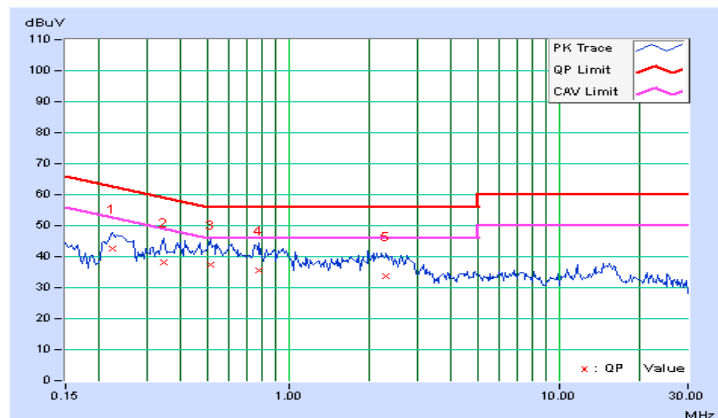
5.6.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.22422	0.07	42.46	31.08	42.53	31.15	62.66	52.66	-20.13	-21.51
2	0.34531	0.08	38.02	28.32	38.10	28.40	59.07	49.07	-20.97	-20.67
3	0.51328	0.10	37.20	26.08	37.30	26.18	56.00	46.00	-18.70	-19.82
4	0.78281	0.12	35.36	26.64	35.48	26.76	56.00	46.00	-20.52	-19.24
5	2.30469	0.19	33.38	25.94	33.57	26.13	56.00	46.00	-22.43	-19.87

Remarks:

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

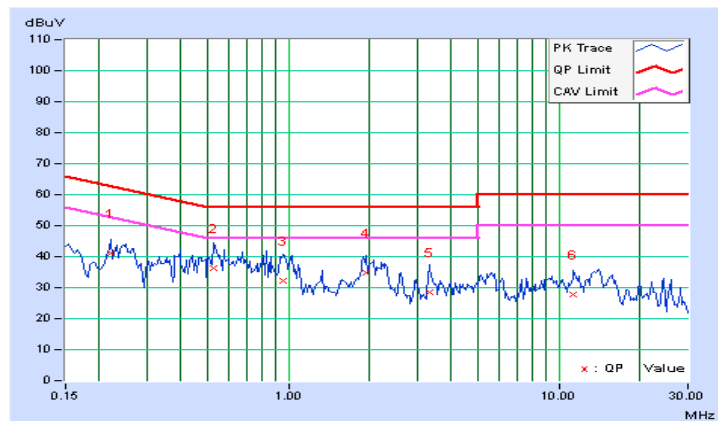


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.22031	0.06	41.04	30.74	41.10	30.80	62.81	52.81	-21.70	-22.00
2	0.52891	0.10	36.20	25.48	36.30	25.58	56.00	46.00	-19.70	-20.42
3	0.95469	0.13	32.22	24.32	32.35	24.45	56.00	46.00	-23.65	-21.55
4	1.94141	0.18	34.64	28.92	34.82	29.10	56.00	46.00	-21.18	-16.90
5	3.30859	0.23	28.20	20.78	28.43	21.01	56.00	46.00	-27.57	-24.99
6	11.28906	0.50	27.12	18.24	27.62	18.74	60.00	50.00	-32.38	-31.26

Remarks:

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



6 Pictures of Test Arrangements

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

7 Appendix A – Information on the Testing Laboratories

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

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

Linko EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-5935343

Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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

8 Appendix B – Radiated Emission Measurement (FOR 2.4GHz BAND)

8.1.1 Limits of Radiated 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	$2400/F(\text{kHz})$	300
0.490-1.705	$24000/F(\text{kHz})$	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.

8.1.2 Test Instruments

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. 12, 2014	Nov. 11, 2015
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Feb. 26, 2014	Feb. 25, 2015
RF Cable	NA	CHGCAB_001	Oct. 04, 2014	Oct. 03, 2015
Horn_Antenna AISI	AIH.8018	0000320091110	Aug. 27, 2014	Aug. 26, 2015
Pre-Amplifier Agilent	8449B	3008A02578	June 24, 2014	June 23, 2015
RF Cable	NA	131205 131214 SNMY23684/4	Jan. 16, 2015	Jan. 15, 2016
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier EMCI	EMC184045	980143	Jan. 16, 2015	Jan. 15, 2016
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Aug. 26, 2014	Aug. 25, 2015
RF Cable	NA	RF104-121 RF104-204	Dec. 11, 2014	Dec. 10, 2015
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: Feb. 06 to May 07, 2015

8.1.3 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

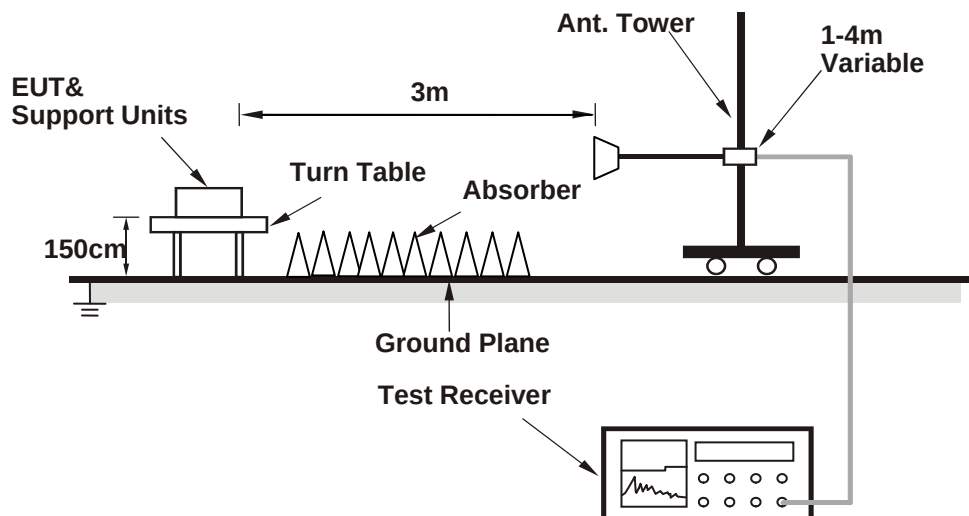
NOTE:

1. For emission measurements above 1 GHz, the EUT shall be placed at a height of 1.5 m above the ground at 3 meter chamber room for test
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ($10 \log(1/\text{duty cycle})$).
4. 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.
5. All modes of operation were investigated and the worst-case emissions are reported.

8.1.4 Deviation from Test Standard

No deviation

8.1.5 Test Setup



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

8.1.6 EUT Operating Conditions

Same as 4.5.6.

8.1.7 Test Results

The EUT's antenna had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.

VHT40

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	2485.00	65.3 PK	74.0	-8.7	1.06 H	205	67.32	-2.02
2	2485.00	46.2 AV	54.0	-7.8	1.06 H	205	48.22	-2.02
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	2485.00	66.9 PK	74.0	-7.1	1.06 V	301	68.92	-2.02
2	2485.00	47.3 AV	54.0	-6.7	1.06 V	301	49.32	-2.02

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. Margin value = Emission Level – Limit value

--- END ---