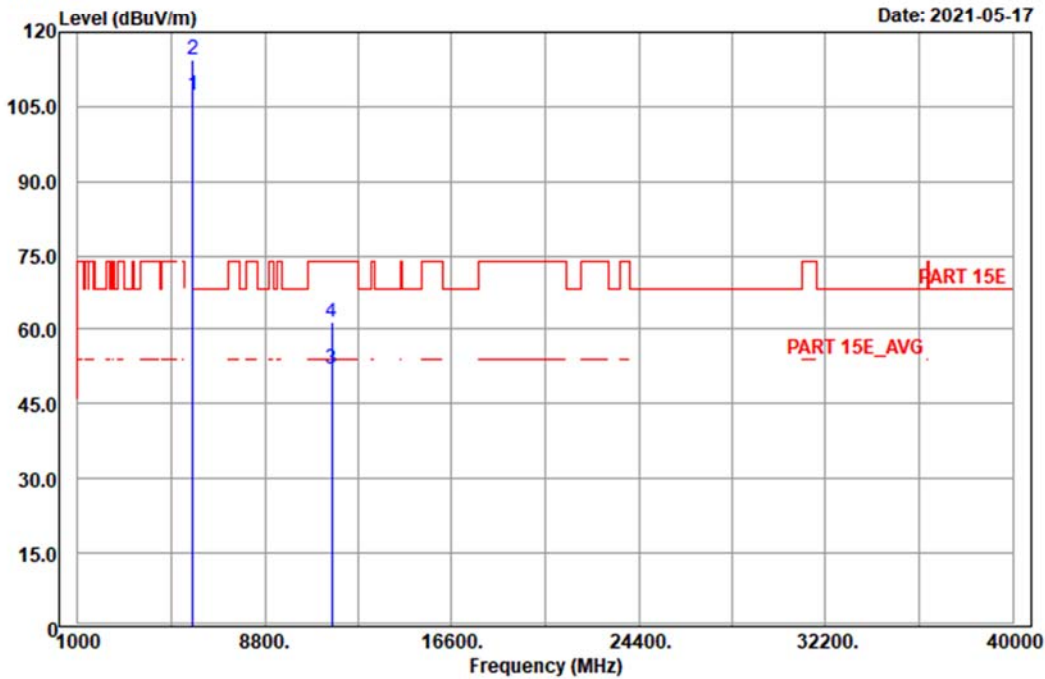




Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 9



Site : 966 chamber 1
 Condition: PART 15E 3m Vertical
 Remark : 11AX_HE40_TX_CH159
 Tested by: Karl Lee
 Rate : MCS0
 Power : 25/25
 RB/VB : 1 MHz / 1 KHz

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg	
1	5795.00	107.14	96.32	10.82	-----	-----	197	0	Average
2	5795.00	114.44	103.62	10.82	-----	-----	197	0	Peak
3 pp	11590.00	51.98	35.47	16.51	54.00	-2.02	247	252	Average
4 pk	11590.00	61.53	45.02	16.51	74.00	-12.47	247	252	Peak

Remarks:

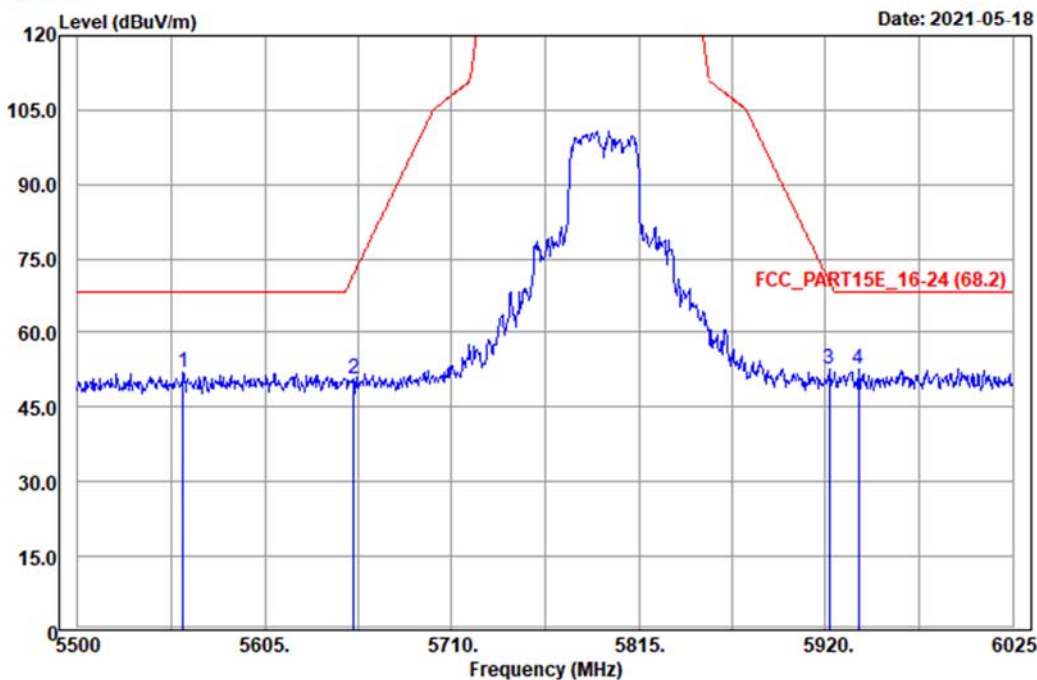
1. Level(dBuV/m) = Read Level(dBuV) + Factor(dB/m)
2. Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Over limit = Level – Limit value
5. The emission levels of other frequencies were very low against the limit.



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6



Site : 966 chamber 1
Condition: FCC_PART15E_16-24 (68.2) 3m Horizontal
Remark : 11AX_HE40_TX_CH159
Tested by: Karl Lee
Rate : MCS0
Power : 25/25
RB/VB : 1 MHz / 1 KHz

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg	
1	5559.33	51.94	41.26	10.68	68.20	-16.26	100	108	Peak
2	5654.88	50.83	39.96	10.87	71.81	-20.98	100	108	Peak
3	5922.10	52.52	41.41	11.11	70.35	-17.83	100	108	Peak
4 pp	5938.38	52.62	41.46	11.16	68.20	-15.58	100	108	Peak

Remarks:

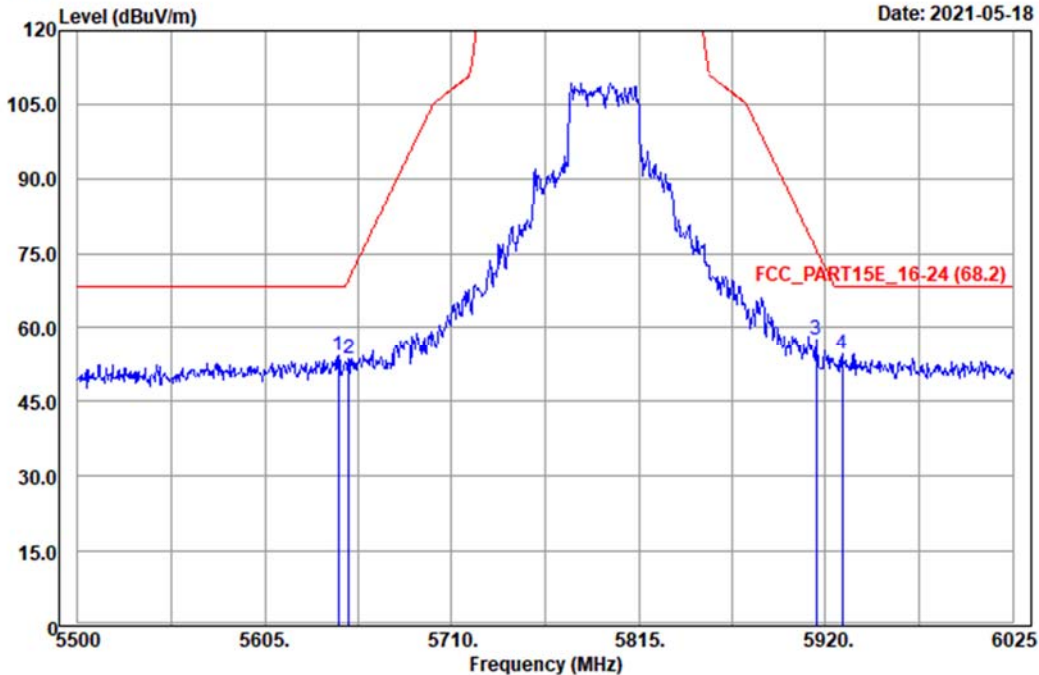
1. Level(dBuV/m) = Read Level(dBuV) + Factor(dB/m)
2. Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Over limit = Level – Limit value
5. The emission levels of other frequencies were very low against the limit.



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 7



Site : 966 chamber 1
 Condition: FCC_PART15E_16-24 (68.2) 3m Vertical
 Remark : 11AX_HE40_TX_CH159
 Tested by: Karl Lee
 Rate : MCS0
 Power : 25/25
 RB/VB : 1 MHz / 1 KHz

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg	
1	5646.48	54.26	43.41	10.85	68.20	-13.94	197	0	Peak
2	5652.25	53.60	42.73	10.87	69.86	-16.26	197	0	Peak
3	5914.75	57.50	46.43	11.07	75.78	-18.28	197	0	Peak
4 pp	5929.45	54.73	43.62	11.11	68.20	-13.47	197	0	Peak

Remarks:

1. Level(dBuV/m) = Read Level(dBuV) + Factor(dB/m)
2. 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. Over limit = Level – Limit value
5. The emission levels of other frequencies were very low against the limit.

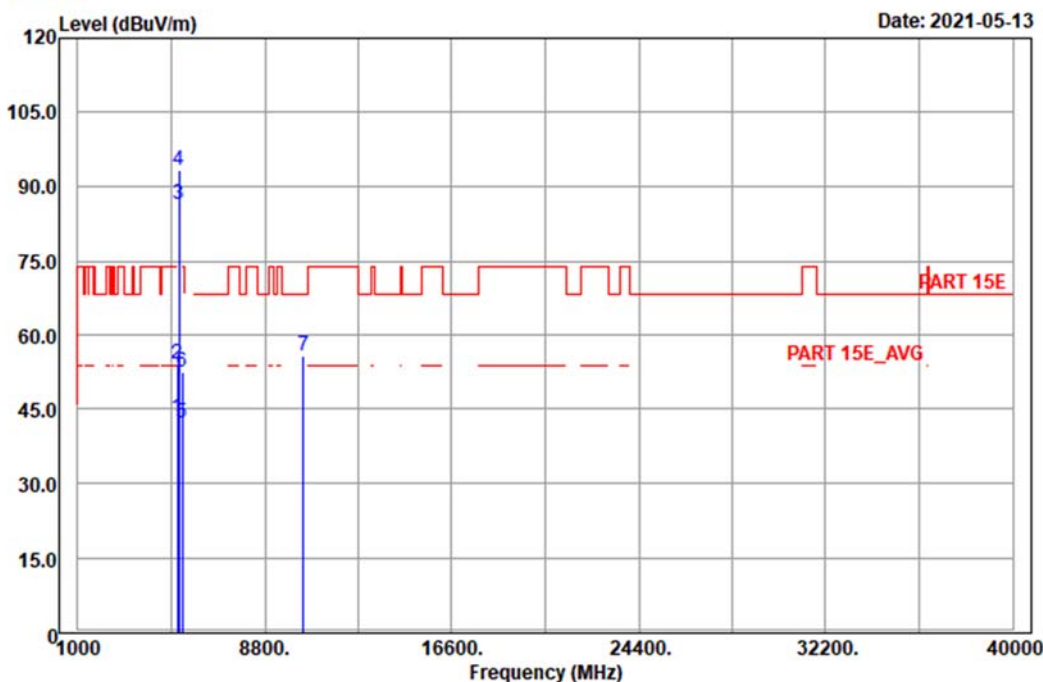
802.11ax (HE80)



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 17



Site : 966 chamber 1
Condition: PART 15E 3m Horizontal
Remark : 11AX_HE80_TX_CH42
Tested by: Charles Hsiao
Rate : MCS0
Power : 15/15
RB/VB : 1 MHz / 1 KHz

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg	
1 pp	5150.00	43.24	33.19	10.05	54.00	-10.76	108	116	Average
2	5150.00	54.16	44.11	10.05	74.00	-19.84	108	116	Peak
3	5210.00	86.44	76.27	10.17	-----	-----	108	116	Average
4	5210.00	93.08	82.91	10.17	-----	-----	108	116	Peak
5	5350.00	42.20	31.97	10.23	54.00	-11.80	108	116	Average
6	5350.00	52.58	42.35	10.23	74.00	-21.42	108	116	Peak
7 pk	10420.00	55.82	39.66	16.16	68.20	-12.38	199	10	Peak

Remarks:

1. Level(dBuV/m) = Read Level(dBuV) + Factor(dB/m)
2. 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. Over limit = Level – Limit value
5. The emission levels of other frequencies were very low against the limit.

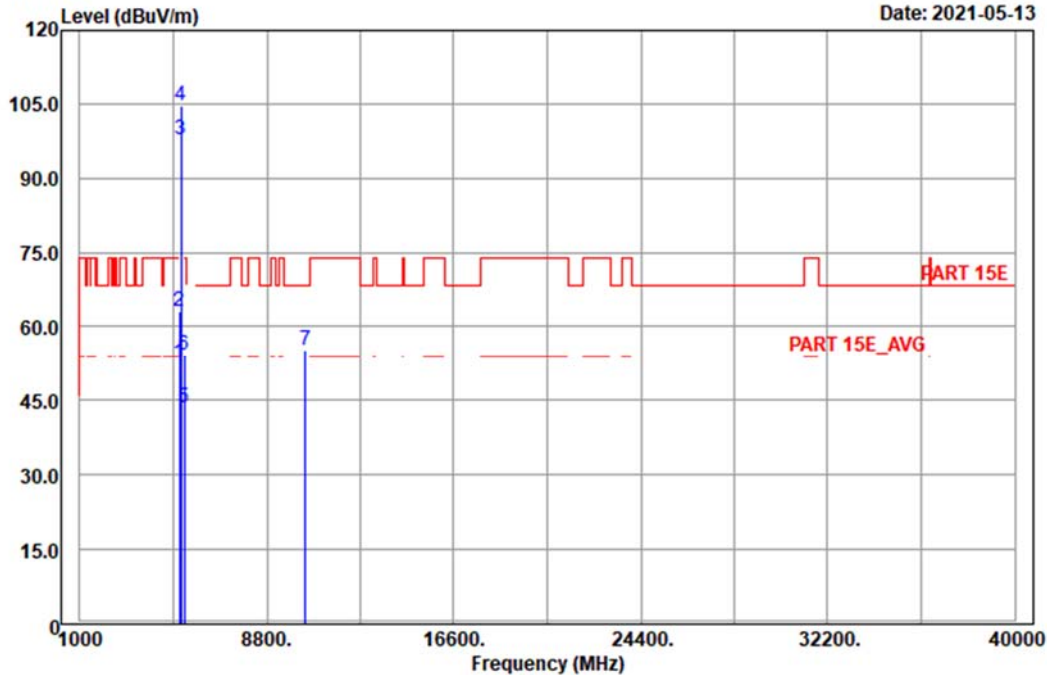


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 18

Date: 2021-05-13



Site : 966 chamber 1
 Condition: PART 15E 3m Vertical
 Remark : 11AX_HE80_TX_CH42
 Tested by: Charles Hsiao
 Rate : MCS0
 Power : 15/15
 RB/VB : 1 MHz / 1 KHz

	Freq	Level	Read	Limit	Over	APos	TPos	Remark
	MHz	dBuV/m	Level	Line	Limit			
			dBuV	dB/m	dBuV/m	dB	cm	deg
1 pp	5150.00	52.80	42.75	10.05	54.00	-1.20	182	18 Average
2 pk	5150.00	63.07	53.02	10.05	74.00	-10.93	182	18 Peak
3	5210.00	97.74	87.57	10.17	-----	-----	181	0 Average
4	5210.00	104.66	94.49	10.17	-----	-----	181	0 Peak
5	5350.00	43.50	33.27	10.23	54.00	-10.50	181	0 Average
6	5350.00	54.27	44.04	10.23	74.00	-19.73	181	0 Peak
7	10420.00	55.13	38.97	16.16	68.20	-13.07	198	277 Peak

Remarks:

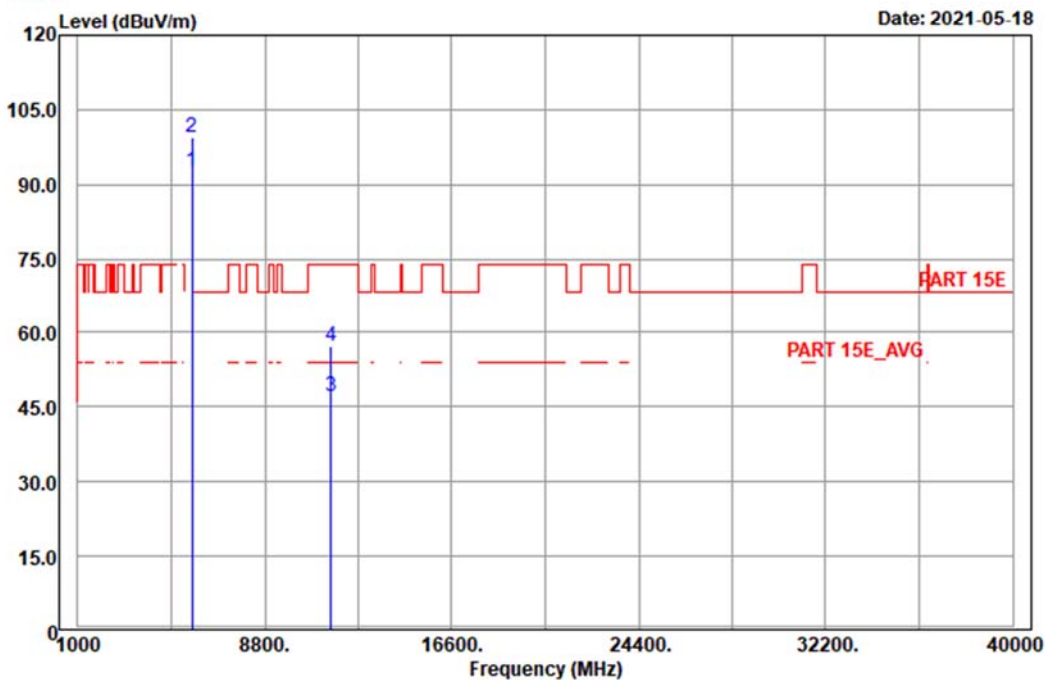
1. Level(dBuV/m) = Read Level(dBuV) + Factor(dB/m)
2. Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Over limit = Level – Limit value
5. The emission levels of other frequencies were very low against the limit.



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 7



Site : 966 chamber 1
Condition: PART 15E 3m Horizontal
Remark : 11AX_HE80_TX_CH155
Tested by: Karl Lee
Rate : MCS0
Power : 20/20
RB/VB : 1 MHz / 1 KHz

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg	
1	5775.00	92.55	81.68	10.87	-----	-----	100	108	Average
2	5775.00	99.36	88.49	10.87	-----	-----	100	108	Peak
3 pp	11550.00	47.02	30.52	16.50	54.00	-6.98	199	208	Average
4 pk	11550.00	57.13	40.63	16.50	74.00	-16.87	199	208	Peak

Remarks:

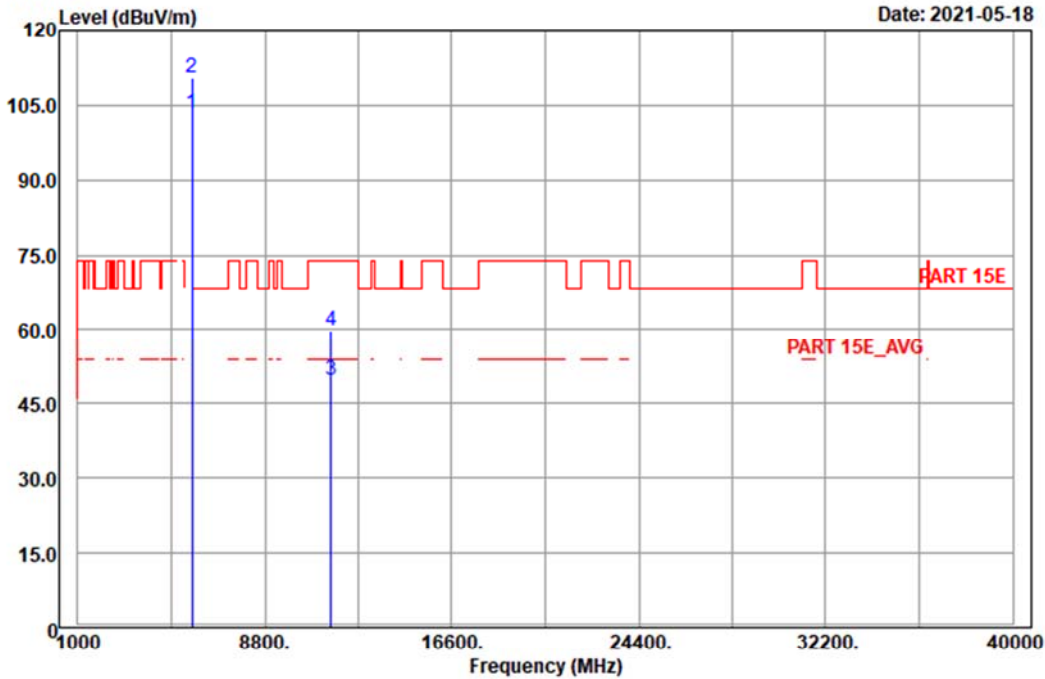
1. Level(dBuV/m) = Read Level(dBuV) + Factor(dB/m)
2. Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Over limit = Level – Limit value
5. The emission levels of other frequencies were very low against the limit.



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 8



Site : 966 chamber 1
Condition: PART 15E 3m Vertical
Remark : 11AX_HE80_TX_CH155
Tested by: Karl Lee
Rate : MCS0
Power : 20/20
RB/VB : 1 MHz / 1 KHz

	Freq	Level	Read	Limit	Over	APos	TPos	Remark
	MHz	dBuV/m	Level	Factor	Line	Limit		
			dBuV	dB/m	dBuV/m	dB	cm	deg
1	5775.00	103.25	92.38	10.87	-----	-----	197	355 Average
2	5775.00	110.49	99.62	10.87	-----	-----	197	355 Peak
3 pp	11550.00	49.74	33.24	16.50	54.00	-4.26	243	252 Average
4 pk	11550.00	59.89	43.39	16.50	74.00	-14.11	243	252 Peak

Remarks:

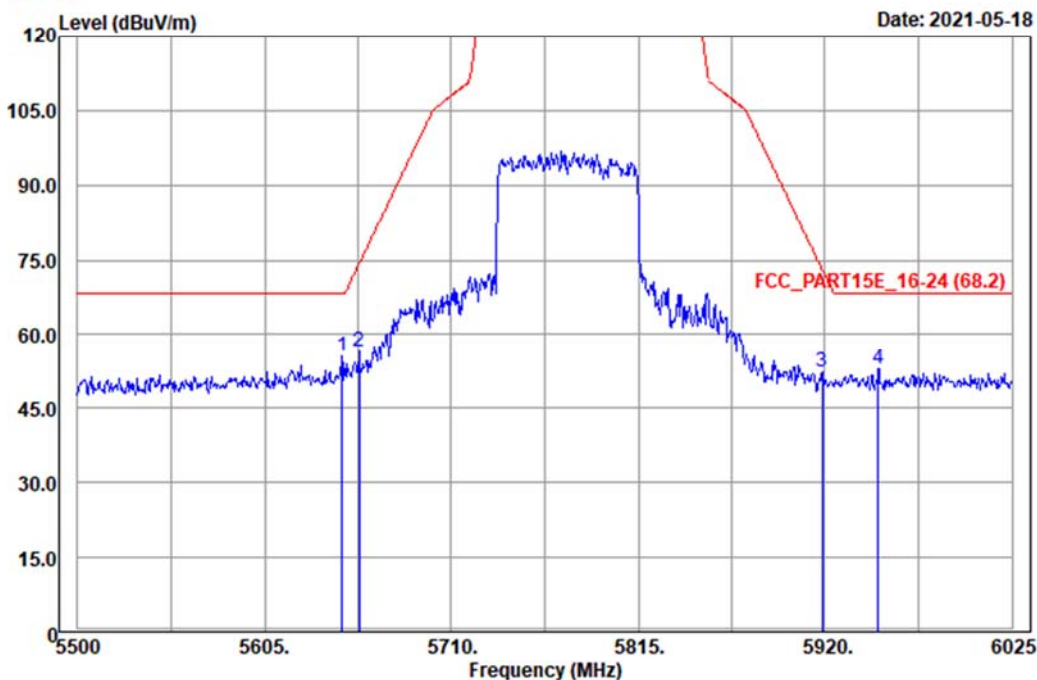
1. Level(dBuV/m) = Read Level(dBuV) + Factor(dB/m)
2. Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Over limit = Level – Limit value
5. The emission levels of other frequencies were very low against the limit.



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 5



Site : 966 chamber 1
Condition: FCC PART15E_16-24 (68.2) 3m Horizontal
Remark : 11AX_HE80_TX_CH155
Tested by: Karl Lee
Rate : MCS0
Power : 20/20
RB/VB : 1 MHz / 1 KHz

	Freq	Level	Read	Limit	Over	Apos	TPos	Remark
	MHz	dBuV/m	Level	Factor	Line	Limit		
			dBuV	dB/m	dBuV/m	dB	cm	deg
1 pp	5648.58	55.69	44.84	10.85	68.20	-12.51	100	108 Peak
2	5658.03	56.64	45.77	10.87	74.14	-17.50	100	108 Peak
3	5918.43	52.48	41.39	11.09	73.07	-20.59	100	108 Peak
4	5949.93	52.98	41.80	11.18	68.20	-15.22	100	108 Peak

Remarks:

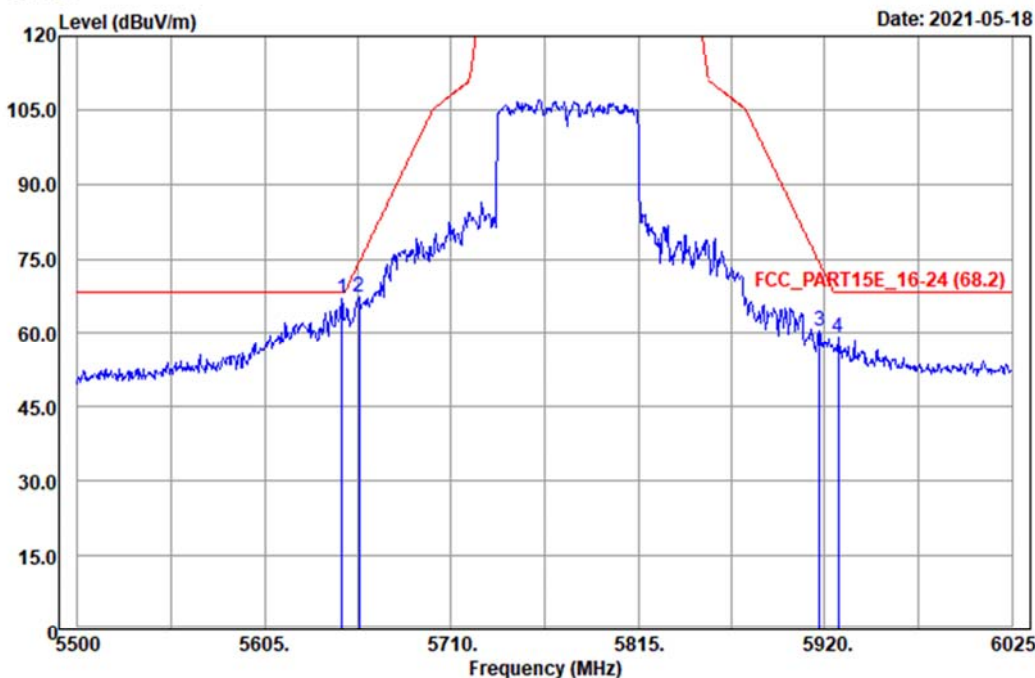
1. Level(dBuV/m) = Read Level(dBuV) + Factor(dB/m)
2. Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Over limit = Level – Limit value
5. The emission levels of other frequencies were very low against the limit.



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6



Site : 966 chamber 1
Condition: FCC_PART15E_16-24 (68.2) 3m Vertical
Remark : 11AX_HE80_TX_CH155
Tested by: Karl Lee
Rate : MCS0
Power : 20/20
RB/VB : 1 MHz / 1 KHz

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg	
1 pp	5648.58	66.95	56.10	10.85	68.20	-1.25	197	355	Peak
2	5658.03	67.28	56.41	10.87	74.14	-6.86	197	355	Peak
3	5916.85	60.43	49.34	11.09	74.23	-13.80	197	355	Peak
4	5927.35	59.10	47.99	11.11	68.20	-9.10	197	355	Peak

Remarks:

1. Level(dBuV/m) = Read Level(dBuV) + Factor(dB/m)
2. 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. Over limit = Level – Limit value
5. The emission levels of other frequencies were very low against the limit.

Below 1GHz Worst-Case:

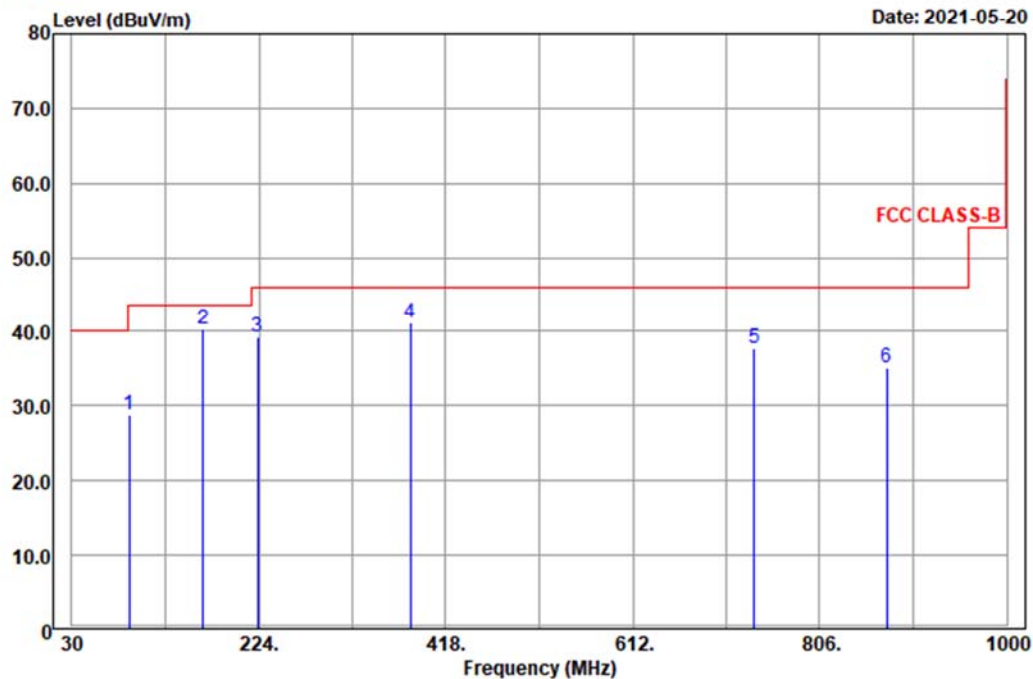
802.11a



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 5



Site : 966 chamber 1
 Condition: FCC CLASS-B 3m Horizontal
 Remark : WIFI_5G_TX_LF
 Tested by: Karl Lee

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg	
1	89.13	28.76	48.05	-19.29	43.50	-14.74	199	61	Peak
2	pp 166.08	40.39	60.82	-20.43	43.50	-3.11	154	76	Peak
3	223.05	39.29	57.00	-17.71	46.00	-6.71	162	241	Peak
4	381.20	41.22	55.44	-14.22	46.00	-4.78	216	87	Peak
5	738.20	37.81	46.41	-8.60	46.00	-8.19	226	31	Peak
6	875.40	35.04	41.30	-6.26	46.00	-10.96	162	194	Peak

Remarks:

1. Level = Read Level + Factor

Margin value = level – Limit value.

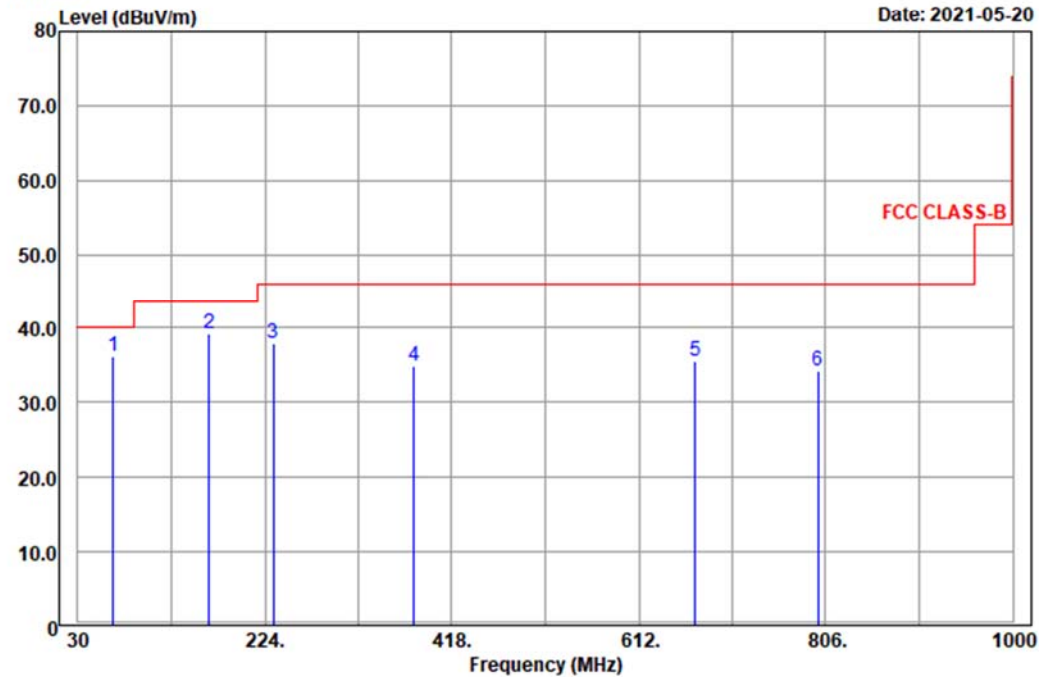
2. The emission levels of other frequencies were very low against the limit.



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6



Site : 966 chamber 1
 Condition: FCC CLASS-B 3m Vertical
 Remark : WIFI_5G_TX_LF
 Tested by: Karl Lee

	Freq	Level	Read Level	Factor	Limit Line	Over Limit	APos	TPos	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg	
1 pp	66.99	36.21	54.54	-18.33	40.00	-3.79	149	214	Peak
2	166.08	39.31	59.74	-20.43	43.50	-4.19	188	64	Peak
3	232.77	37.98	55.28	-17.30	46.00	-8.02	152	340	Peak
4	378.40	34.85	49.13	-14.28	46.00	-11.15	148	172	Peak
5	671.00	35.55	45.16	-9.61	46.00	-10.45	293	104	Peak
6	798.40	34.12	41.75	-7.63	46.00	-11.88	228	173	Peak

Remarks:

1. Level = Read Level + Factor

Margin value = level – Limit value.

2. The emission levels of other frequencies were very low against the limit.

4.2 Conducted Emission Measurement

4.2.1 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.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESR3	102783	Dec. 21, 2020	Dec. 20, 2021
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Sep. 04, 2020	Sep. 03, 2021
V-LISN SCHWARZBECK (EUT)	NNBL 8226-2	8226-142	Jul. 31, 2020	Jul. 30, 2021
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Aug. 18, 2020	Aug. 17, 2021
Software ADT	BV ADT_Cond_ V7.3.7.4	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 HwaYa Shielded Room 2 (Conduction 2).

3. The VCCI Site Registration No. is C-12047.

4.2.3 Test Procedures

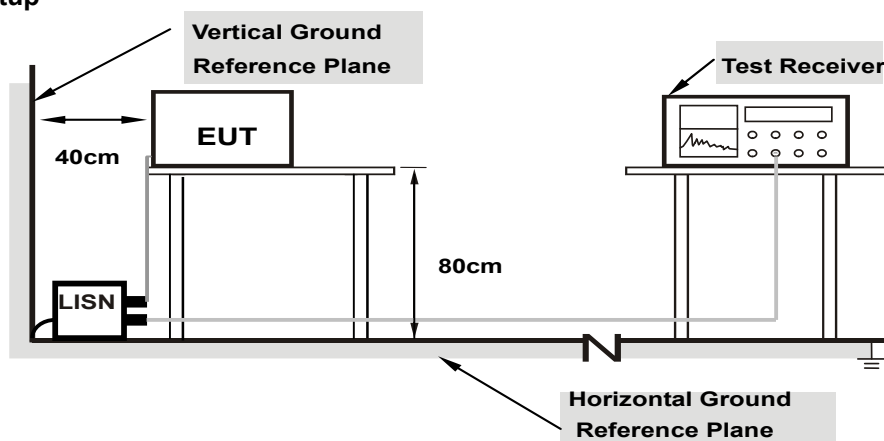
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance 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.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 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).

4.2.6 EUT Operating Conditions

Same as 4.1.6.

4.2.7 Test Results

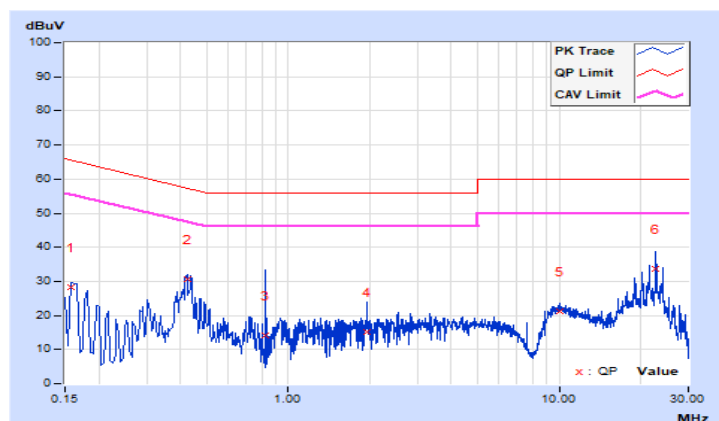
Worst-case data: 802.11a

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	TX Channel 40		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
	[MHz]		[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15782	0.11	28.21	14.47	28.32	14.58	65.58	55.58	-37.26	-41.00
2	0.42334	0.14	30.47	21.52	30.61	21.66	57.38	47.38	-26.77	-25.72
3	0.82643	0.17	14.01	2.33	14.18	2.50	56.00	46.00	-41.82	-43.50
4	1.94860	0.22	14.85	6.04	15.07	6.26	56.00	46.00	-40.93	-39.74
5	10.10095	0.36	20.74	8.41	21.10	8.77	60.00	50.00	-38.90	-41.23
6	22.81236	0.43	33.33	19.78	33.76	20.21	60.00	50.00	-26.24	-29.79

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.

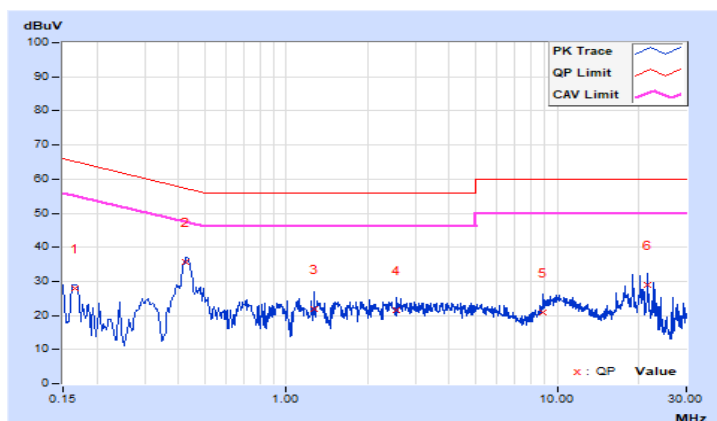


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	TX Channel 40		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16564	0.12	27.70	18.16	27.82	18.28	65.18	55.18	-37.36	-36.90
2	0.42761	0.15	35.41	30.33	35.56	30.48	57.30	47.30	-21.74	-16.82
3	1.27217	0.20	21.75	15.03	21.95	15.23	56.00	46.00	-34.05	-30.77
4	2.54292	0.25	21.33	14.40	21.58	14.65	56.00	46.00	-34.42	-31.35
5	8.89276	0.42	20.52	12.81	20.94	13.23	60.00	50.00	-39.06	-36.77
6	21.55725	0.66	28.15	17.18	28.81	17.84	60.00	50.00	-31.19	-32.16

REMARKS:

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



4.3 Transmit Power Measurement

4.3.1 Limits of 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)

*B is the 26 dB emission bandwidth in megahertz

Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

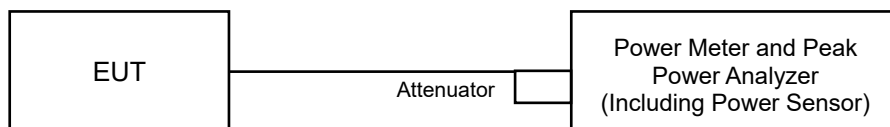
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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

Array Gain = $5 \log(N_{ANT}/N_{SS})$ dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

For power measurements on all other devices: Array Gain = $10 \log(N_{ANT}/N_{SS})$ dB.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

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 and set the detector to average. Duty factor is not added to measured value.

4.3.5 Deviation from Test Standard

No deviation.

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 Result

Power Output:

CDD Mode

802.11a

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	18.92	18.82	154.191	21.88	30.00	Pass
40	5200	21.42	21.51	280.255	24.48	30.00	Pass
48	5240	21.43	21.46	278.954	24.46	30.00	Pass
149	5745	20.29	20.73	225.210	23.53	30.00	Pass
157	5785	18.79	18.39	144.707	21.60	30.00	Pass
165	5825	19.96	19.53	188.826	22.76	30.00	Pass

Note:

For 5180~5240MHz: Max. gain = 2.51dBi < 6dBi, so the power limit is not reduced.

For 5745~5825MHz: Max. gain = 2.77dBi < 6dBi, so the power limit is not reduced.

802.11ax (HE20)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	17.14	17.26	104.972	20.21	30.00	Pass
40	5200	21.12	21.34	265.564	24.24	30.00	Pass
48	5240	21.13	21.26	263.377	24.21	30.00	Pass
149	5745	20.56	20.16	217.516	23.37	30.00	Pass
157	5785	20.19	19.63	196.305	22.93	30.00	Pass
165	5825	20.17	19.82	199.932	23.01	30.00	Pass

Note:

For 5180~5240MHz: Max. gain = 2.51dBi < 6dBi, so the power limit is not reduced.

For 5745~5825MHz: Max. gain = 2.77dBi < 6dBi, so the power limit is not reduced.

802.11ax (HE40)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	13.73	13.64	46.725	16.70	30.00	Pass
46	5230	20.83	20.53	234.039	23.69	30.00	Pass
151	5755	20.32	20.51	220.107	23.43	30.00	Pass
159	5795	20.86	20.93	245.779	23.91	30.00	Pass

Note:

For 5180~5240MHz: Max. gain = 2.51dBi < 6dBi, so the power limit is not reduced.

For 5745~5825MHz: Max. gain = 2.77dBi < 6dBi, so the power limit is not reduced.

802.11ax (HE80)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	13.72	13.76	47.319	16.75	30.00	Pass
155	5775	18.83	18.08	140.652	21.48	30.00	Pass

Note:

For 5180~5240MHz: Max. gain = 2.51dBi < 6dBi, so the power limit is not reduced.

For 5745~5825MHz: Max. gain = 2.77dBi < 6dBi, so the power limit is not reduced.

Beamforming Mode

802.11ax (HE20)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	14.13	14.25	52.489	17.20	30.00	Pass
40	5200	18.11	18.33	132.791	21.23	30.00	Pass
48	5240	18.12	18.25	131.698	21.20	30.00	Pass
149	5745	17.55	17.15	108.765	20.36	30.00	Pass
157	5785	17.18	16.62	98.159	19.92	30.00	Pass
165	5825	17.16	16.81	99.973	20.00	30.00	Pass

Note:

For 5180~5240MHz: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 5.45\text{dBi} < 6\text{dBi}$, so the limit no need to reduced.

For 5745~5825MHz: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 5.58\text{dBi} < 6\text{dBi}$, so the limit no need to reduced.

802.11ax (HE40)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	10.72	10.63	23.364	13.69	30.00	Pass
46	5230	17.82	17.52	117.028	20.68	30.00	Pass
151	5755	17.31	17.50	110.061	20.42	30.00	Pass
159	5795	17.85	17.92	122.898	20.90	30.00	Pass

Note:

For 5180~5240MHz: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 5.45\text{dBi} < 6\text{dBi}$, so the limit no need to reduced.

For 5745~5825MHz: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 5.58\text{dBi} < 6\text{dBi}$, so the limit no need to reduced.

802.11ax (HE80)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	10.71	10.75	23.661	13.74	30.00	Pass
155	5775	15.82	15.07	70.331	18.47	30.00	Pass

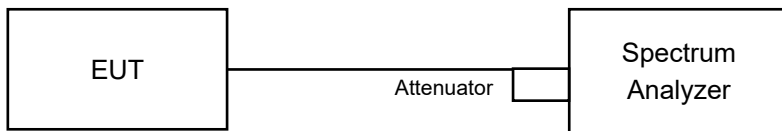
Note:

For 5180~5240MHz: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 5.45\text{dBi} < 6\text{dBi}$, so the limit no need to reduced.

For 5745~5825MHz: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 5.58\text{dBi} < 6\text{dBi}$, so the limit no need to reduced.

4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.3 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to sampling. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

4.4.4 Test Result

802.11a

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	16.68	16.56
40	5200	16.80	16.92
48	5240	16.86	16.80
149	5745	16.92	16.80
157	5785	16.68	16.44
165	5825	16.80	16.56

802.11ax (HE20)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	19.08	18.84
40	5200	19.50	19.08
48	5240	19.38	19.20
149	5745	19.56	19.08
157	5785	19.56	19.08
165	5825	19.32	18.96

802.11ax (HE40)

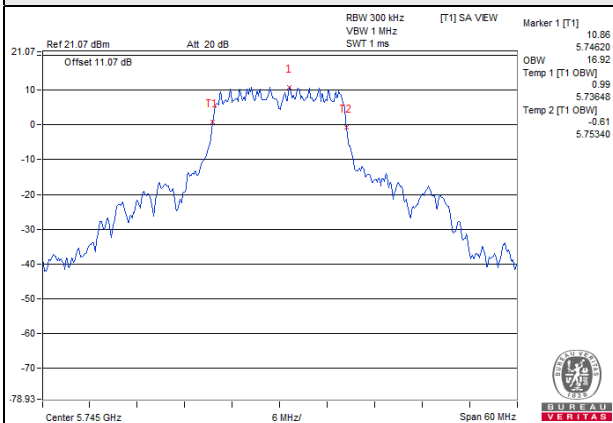
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	38.16	38.16
46	5230	39.36	39.60
151	5755	40.32	39.60
159	5795	42.00	39.84

802.11ax (HE80)

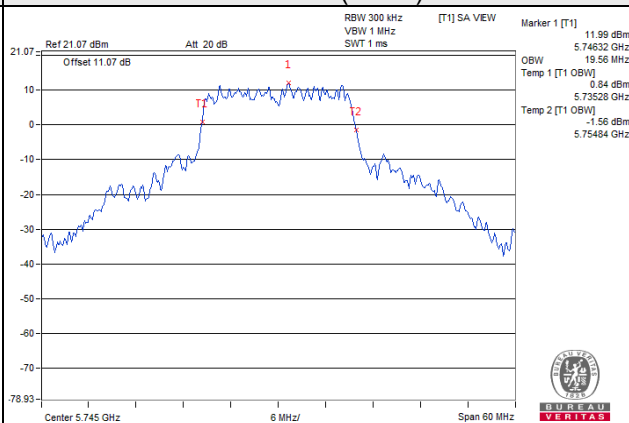
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	76.80	77.28
155	5775	78.24	77.76

Spectrum Plot of Worst Value

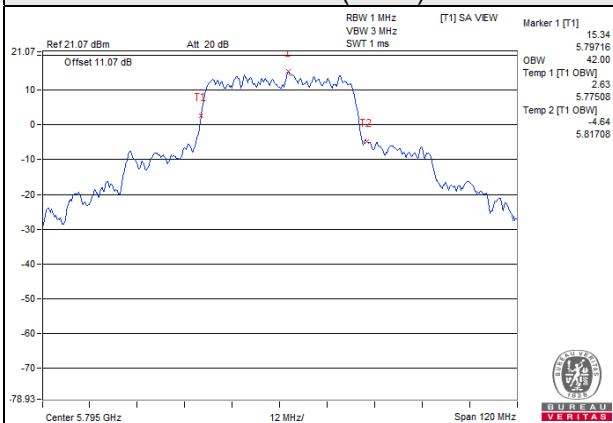
802.11a



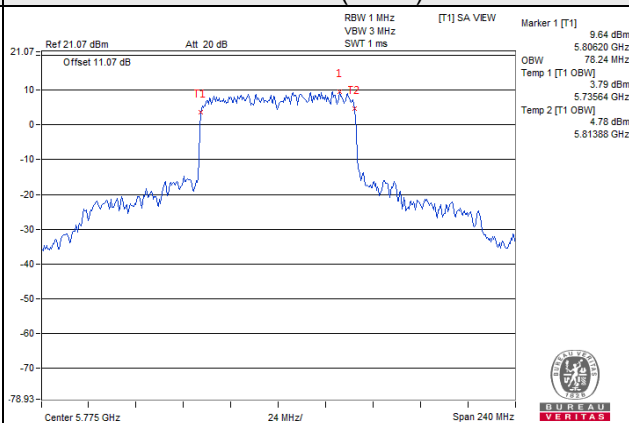
802.11ax (HE20)



802.11ax (HE40)

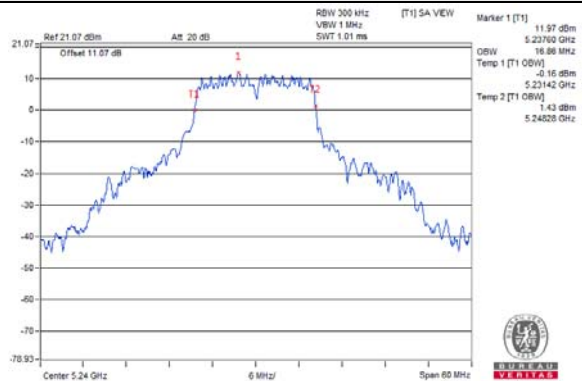


802.11ax (HE80)

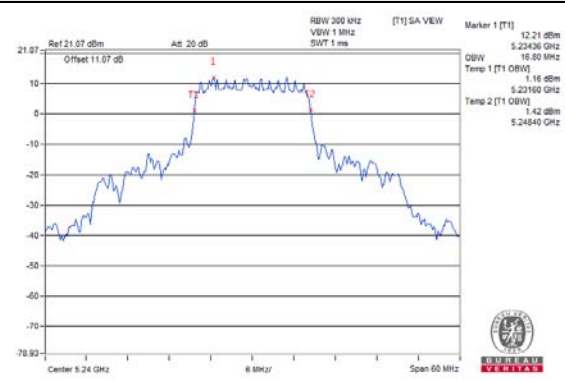


Spectrum Plot for near By DFS Band

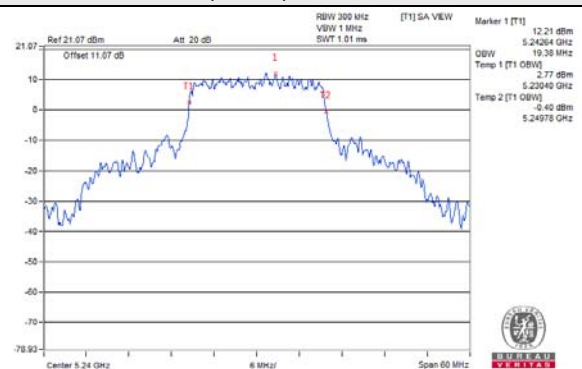
802.11a / Chain 0 / CH 48



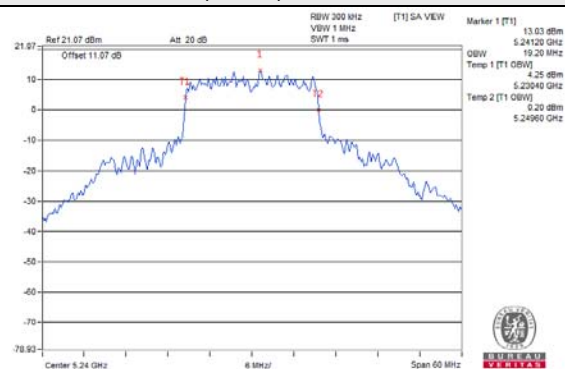
802.11a / Chain 1 / CH 48



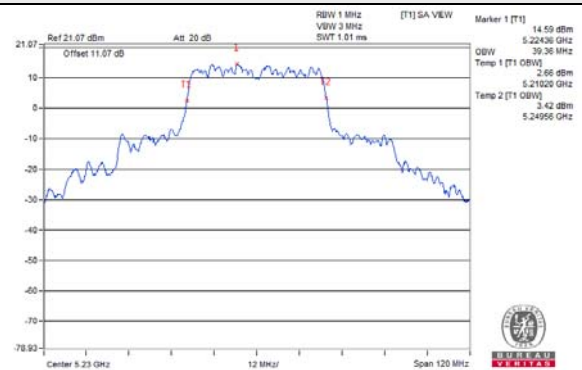
802.11ax (HE20) / Chain 0 / CH 48



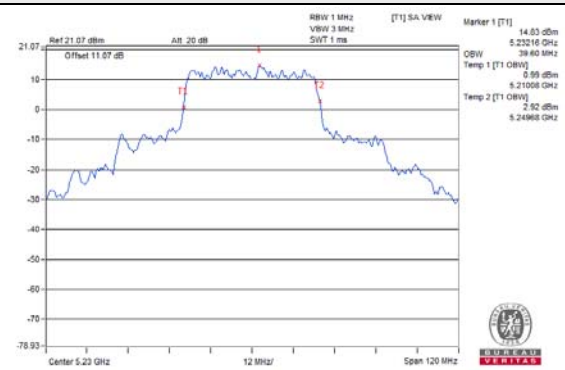
802.11ax (HE20) / Chain 1 / CH 48



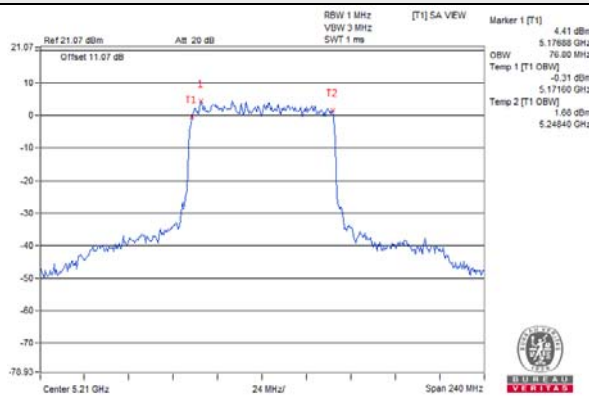
802.11ax (HE40) / Chain 0 / CH 46



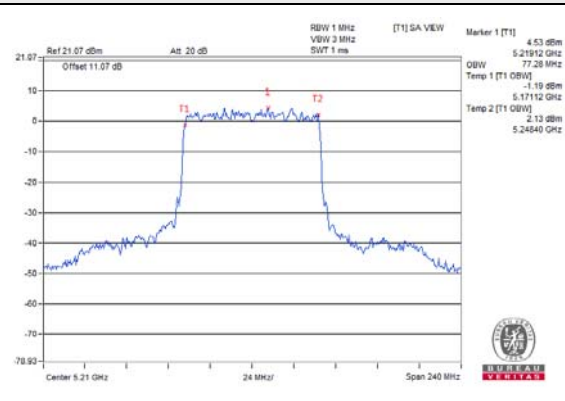
802.11ax (HE40) / Chain 1 / CH 46



802.11ax (HE80) / Chain 0 / CH 42

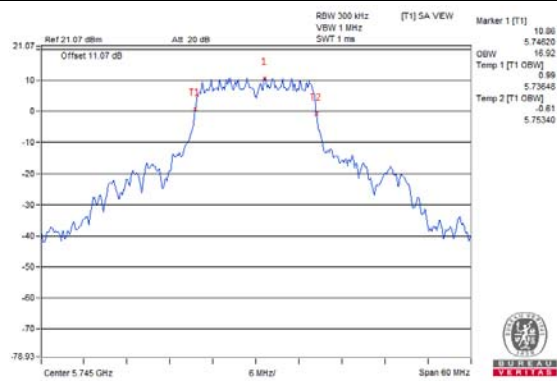


802.11ax (HE80) / Chain 1 / CH 42

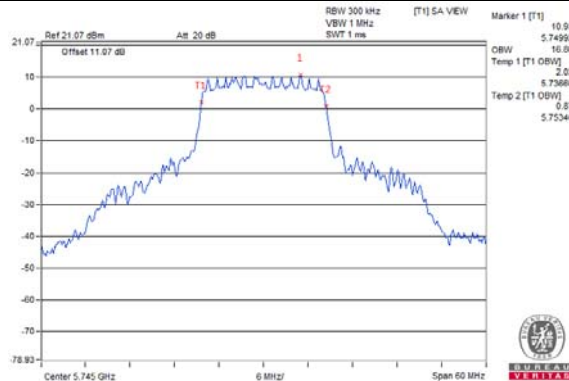


Spectrum Plot for near By DFS Band

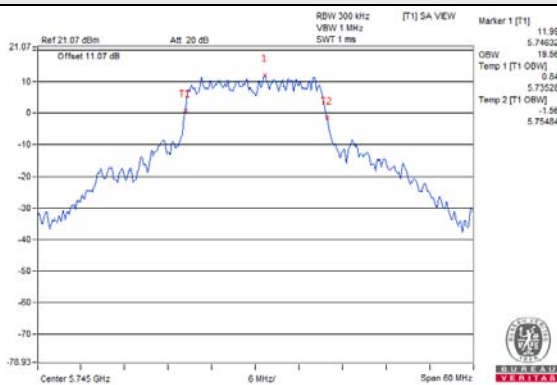
802.11a / Chain 0 / CH 149



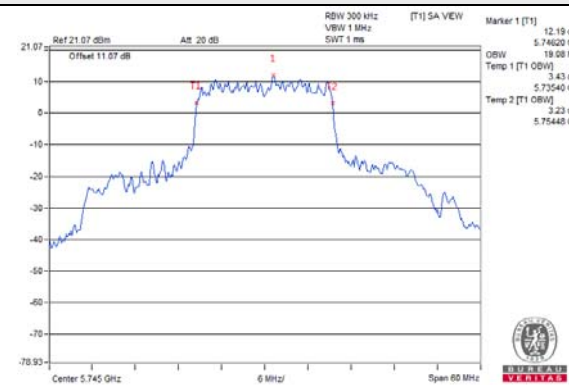
802.11a / Chain 1 / CH 149



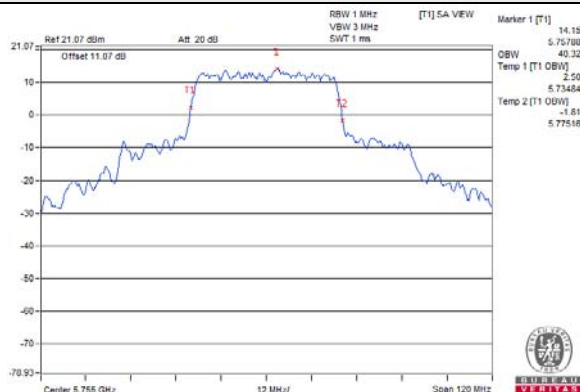
802.11ax (HE20) / Chain 0 / CH 149



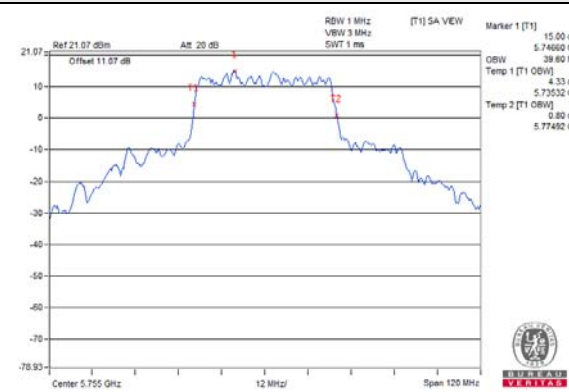
802.11ax (HE20) / Chain 1 / CH 149



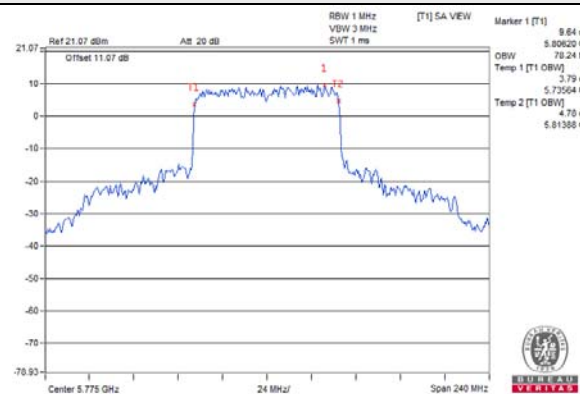
802.11ax (HE40) / Chain 0 / CH 151



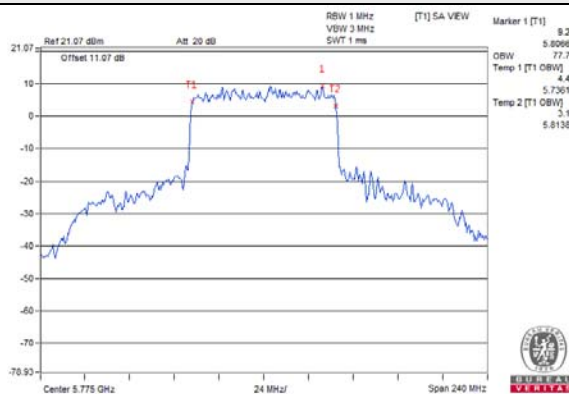
802.11ax (HE40) / Chain 1 / CH 151



802.11ax (HE80) / Chain 0 / CH 155



802.11ax (HE80) / Chain 1 / CH 155

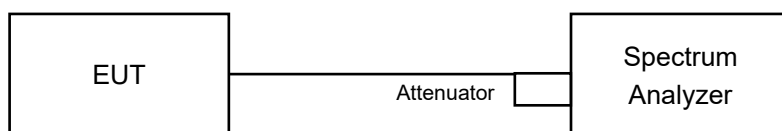


4.5 Peak Power Spectral Density Measurement

4.5.1 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	11dBm/ MHz
		Mobile and Portable client device	
U-NII-2A	-		11dBm/ MHz
U-NII-2C	-		11dBm/ MHz
U-NII-3	√		30dBm/ 500kHz

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedures

For U-NII-1 band:

Duty cycle of test signal is < 98%

Using method SA-2

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 1MHz, Set VBW ≥ 3 MHz, Detector = RMS.
- 3) Set Channel power measure = 1MHz.
- 4) Sweep time = auto, trigger set to “free run”.
- 5) Trace average at least 100 traces in power averaging mode.
- 6) Record the max value and add 10 log (1/duty cycle).

For U-NII-3 band:

Duty cycle of test signal is < 98%

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 300 kHz, Set VBW ≥ 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 (Increasing) the measured power by a bandwidth correction factor (BWCF) where $BWCF = 10\log(500 \text{ kHz} / 300 \text{ kHz})$.
- 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 add 10 log (1/duty cycle).

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Conditions

Same as 4.3.6.

4.5.7 Test Results

For U-NII-1 band:

802.11a

Chan.	Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
36	5180	7.88	8.29	0.14	11.24	17.00	Pass
40	5200	10.25	10.41	0.14	13.48	17.00	Pass
48	5240	10.20	10.06	0.14	13.28	17.00	Pass

Note:

1. Method E) 2) a) 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. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 5.45\text{dBi} < 6\text{dBi}$, so the limit no need to reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ax (HE20)

Chan.	Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
36	5180	6.22	6.68	0.10	9.57	17.00	Pass
40	5200	10.21	10.73	0.10	13.59	17.00	Pass
48	5240	9.81	10.67	0.10	13.37	17.00	Pass

Note:

1. Method E) 2) a) 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. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 5.45\text{dBi} < 6\text{dBi}$, so the limit no need to reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ax (HE40)

Chan.	Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
38	5190	-0.72	-0.79	0.10	2.36	17.00	Pass
46	5230	6.68	6.30	0.10	9.60	17.00	Pass

Note:

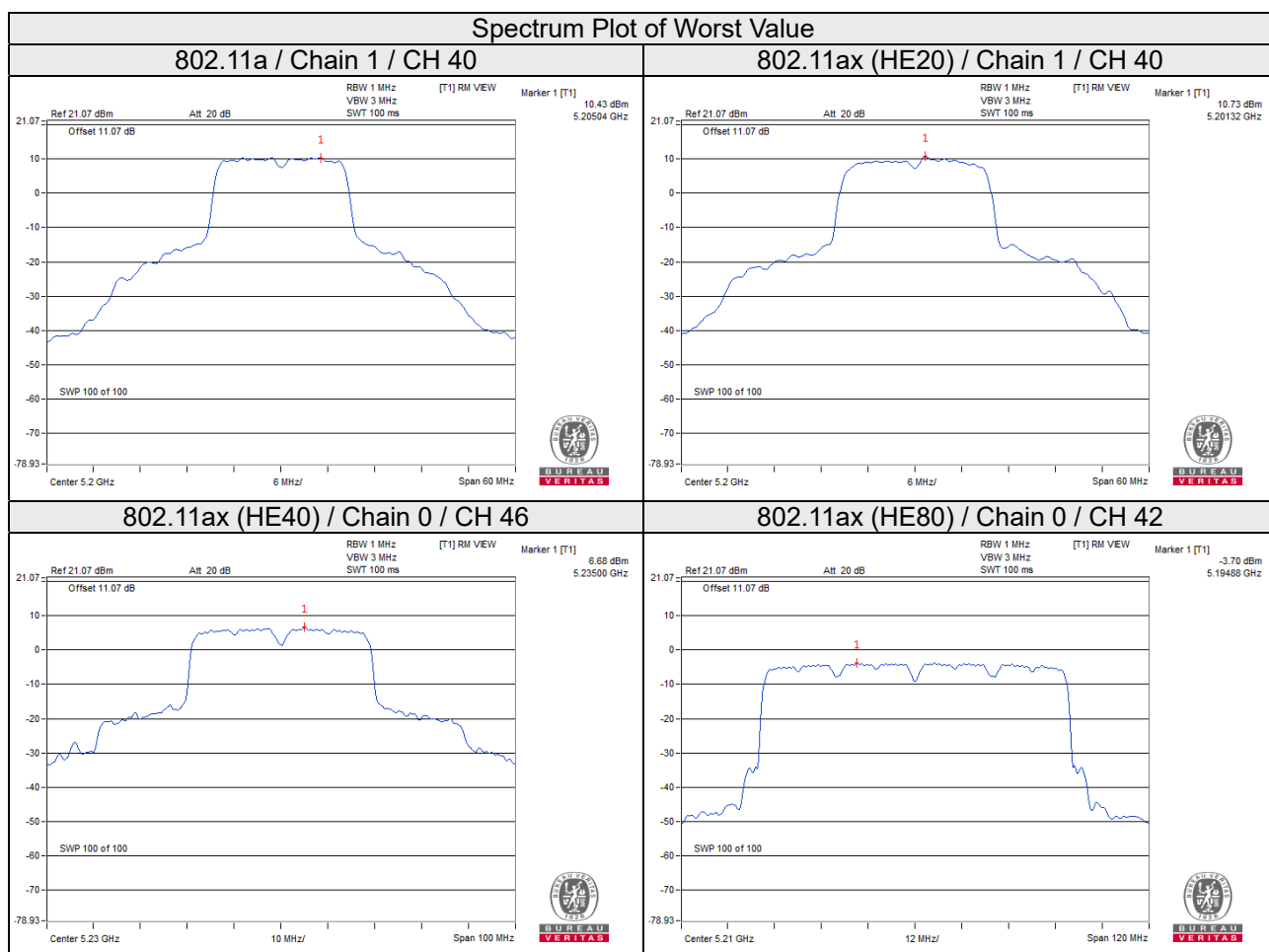
1. Method E) 2) a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 5.45\text{dBi} < 6\text{dBi}$, so the limit no need to reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ax (HE80)

Chan.	Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
42	5210	-3.72	-3.72	0.17	-0.54	17.00	Pass

Note:

- Method E) 2) a) 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.
- Directional gain = $10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2/2] = 5.45 \text{ dBi} < 6 \text{ dBi}$, so the limit no need to reduced.
- Refer to section 3.3 for duty cycle spectrum plot.



For U-NII-3 band:

802.11a

TX chain	Chan.	Freq. (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	149	5745	6.26	8.48	3.01	0.14	11.63	30.00	Pass
	157	5785	4.85	7.07	3.01	0.14	10.22	30.00	Pass
	165	5825	5.15	7.37	3.01	0.14	10.52	30.00	Pass
1	149	5745	5.92	8.14	3.01	0.14	11.29	30.00	Pass
	157	5785	4.64	6.86	3.01	0.14	10.01	30.00	Pass
	165	5825	6.60	8.82	3.01	0.14	11.97	30.00	Pass

Note:

1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 5.58\text{dBi} < 6\text{dBi}$, so the limit no need to reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ax (HE20)

TX chain	Chan.	Freq. (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	149	5745	6.59	8.81	3.01	0.10	11.92	30.00	Pass
	157	5785	6.15	8.37	3.01	0.10	11.48	30.00	Pass
	165	5825	5.86	8.08	3.01	0.10	11.19	30.00	Pass
1	149	5745	6.46	8.68	3.01	0.10	11.79	30.00	Pass
	157	5785	6.01	8.23	3.01	0.10	11.34	30.00	Pass
	165	5825	6.53	8.75	3.01	0.10	11.86	30.00	Pass

Note:

1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 5.58\text{dBi} < 6\text{dBi}$, so the limit no need to reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ax (HE40)

TX chain	Chan.	Freq. (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	151	5755	3.19	5.41	3.01	0.10	8.52	30.00	Pass
	159	5795	3.55	5.77	3.01	0.10	8.88	30.00	Pass
1	151	5755	2.98	5.20	3.01	0.10	8.31	30.00	Pass
	159	5795	3.13	5.35	3.01	0.10	8.46	30.00	Pass

Note:

1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 5.58\text{dBi} < 6\text{dBi}$, so the limit no need to reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ax (HE80)

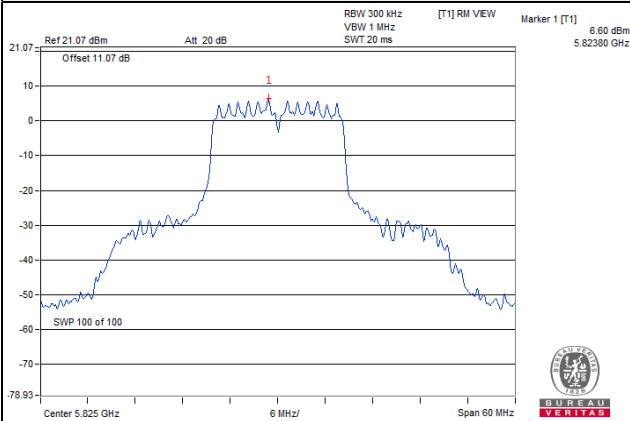
TX chain	Chan.	Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass / Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	155	5775	-2.06	0.16	3.01	0.17	3.34	30.00	Pass
1	155	5775	-2.96	-0.74	3.01	0.17	2.44	30.00	Pass

Note:

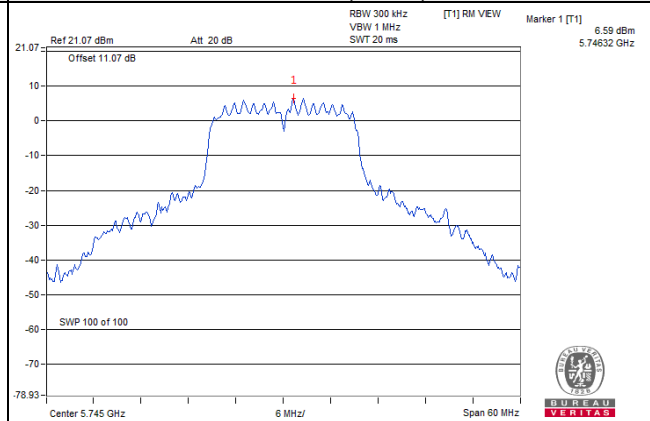
1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/2] = 5.58\text{dBi} < 6\text{dBi}$, so the limit no need to reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

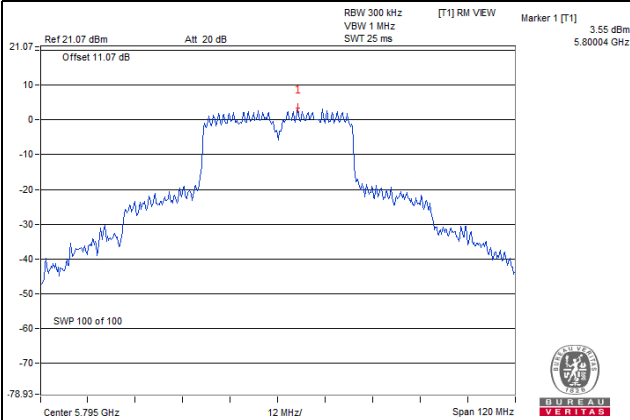
802.11a



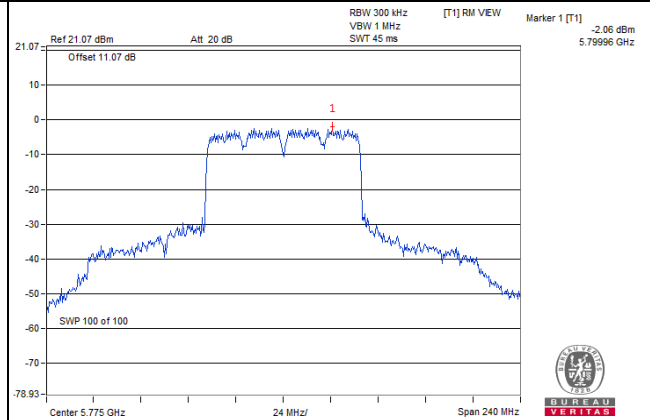
802.11ax (HE20)



802.11ax (HE40)



802.11ax (HE80)

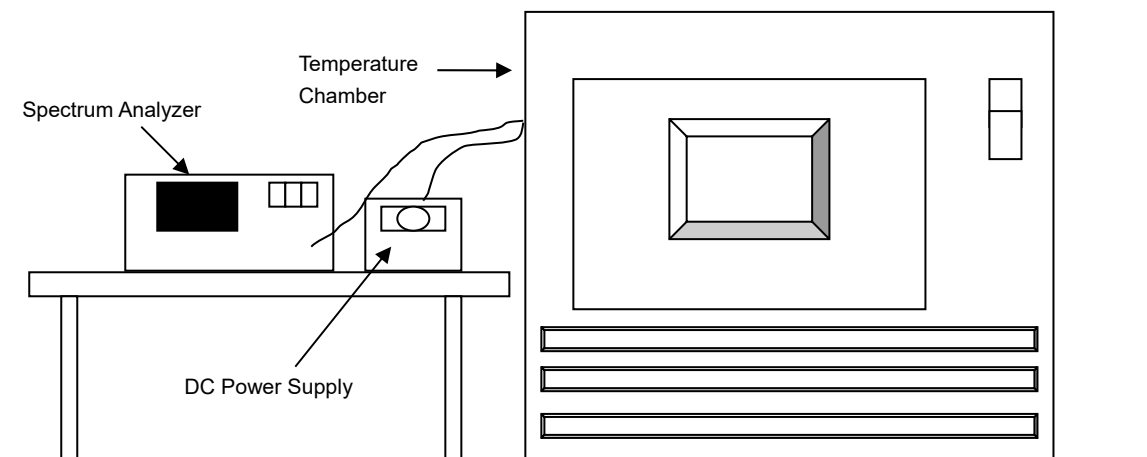


4.6 Frequency Stability

4.6.1 Limits of Frequency Stability Measurement

The frequency of the carrier signal shall be maintained within band of operation

4.6.2 Test Setup



4.6.3 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Sep. 16, 2020	Sep. 15, 2021
Standard Temperature And Humidity Chamber	MHU-225AU	920842	May 28, 2020	May 27, 2021
Digital Multimeter Fluke	87-III	70360742	Jun. 23, 2020	Jun. 22, 2021
DC Power Supply Topward	6306A	727263	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.

4.6.4 Test Procedure

- The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
- Repeat step (d) with the temperature chamber set to the next desired temperature until measurements down to the lowest specified temperature have been completed.
- The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

Set the EUT transmit at un-modulation mode to test frequency stability.

4.6.7 Test Results

Frequency Stability Versus Temp.									
Operating Frequency: 5180MHz									
Temp. (°C)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
40	12	5179.9946	Pass	5179.9961	Pass	5179.9933	Pass	5179.9946	Pass
30	12	5180.0201	Pass	5180.0206	Pass	5180.0233	Pass	5180.0232	Pass
20	12	5179.9939	Pass	5179.9914	Pass	5179.9923	Pass	5179.9942	Pass
10	12	5179.9913	Pass	5179.9936	Pass	5179.9915	Pass	5179.9903	Pass
0	12	5180.0121	Pass	5180.0137	Pass	5180.0135	Pass	5180.0139	Pass

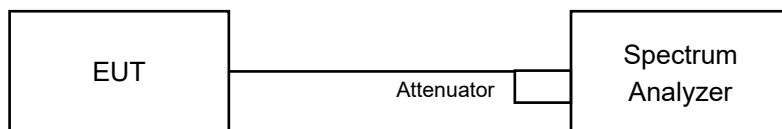
Frequency Stability Versus Voltage									
Operating Frequency: 5180MHz									
Temp. (°C)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	13.8	5179.9934	Pass	5179.9919	Pass	5179.9918	Pass	5179.9948	Pass
	12	5179.9939	Pass	5179.9914	Pass	5179.9923	Pass	5179.9942	Pass
	10.2	5179.9935	Pass	5179.9917	Pass	5179.9924	Pass	5179.9939	Pass

4.7 6dB Bandwidth Measurement

4.7.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

Measurement Procedure REF

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- 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

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

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

4.7.7 Test Results

802.11a

Chan.	Freq. (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	15.34	15.24	0.5	Pass
157	5785	15.78	15.25	0.5	Pass
165	5825	15.24	15.23	0.5	Pass

802.11ax (HE20)

Chan.	Freq. (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	17.78	17.91	0.5	Pass
157	5785	17.78	17.91	0.5	Pass
165	5825	18.17	17.91	0.5	Pass

802.11ax (HE40)

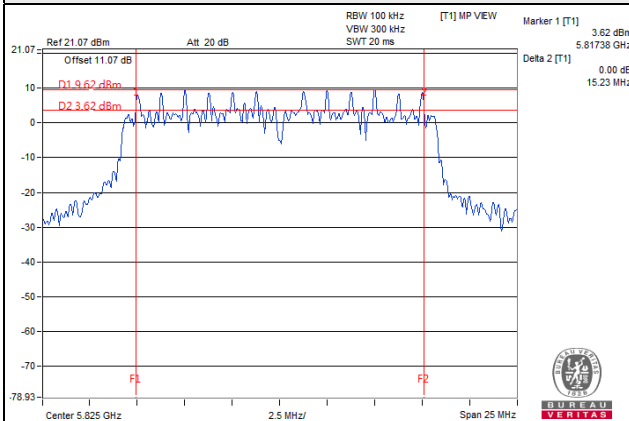
Chan.	Freq. (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	37.52	37.27	0.5	Pass
159	5795	36.61	36.49	0.5	Pass

802.11ax (HE80)

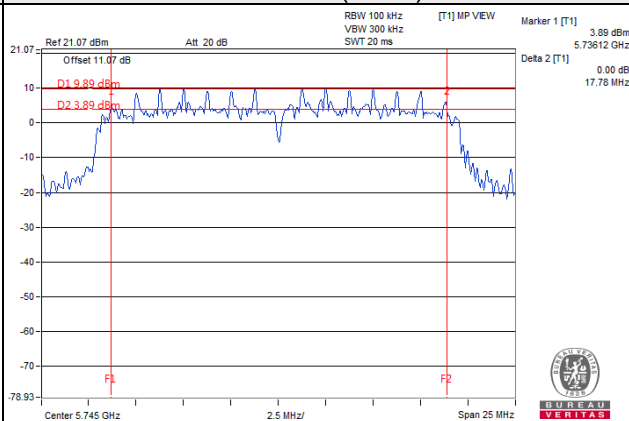
Chan.	Freq. (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	75.49	75.68	0.5	Pass

Spectrum Plot of Worst Value

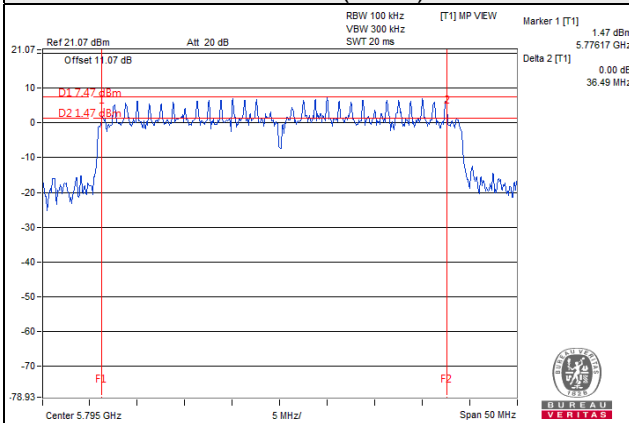
802.11a



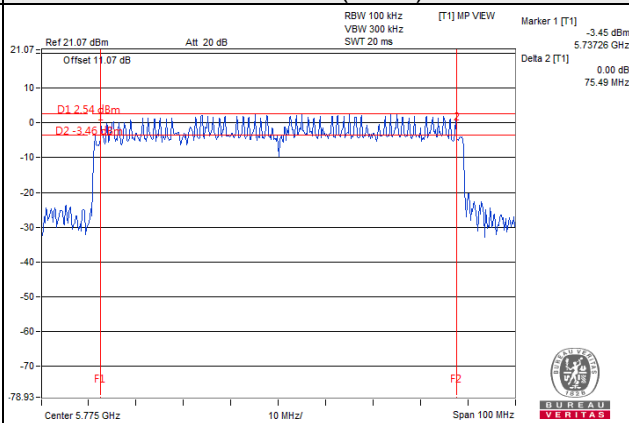
802.11ax (HE20)



802.11ax (HE40)



802.11ax (HE80)

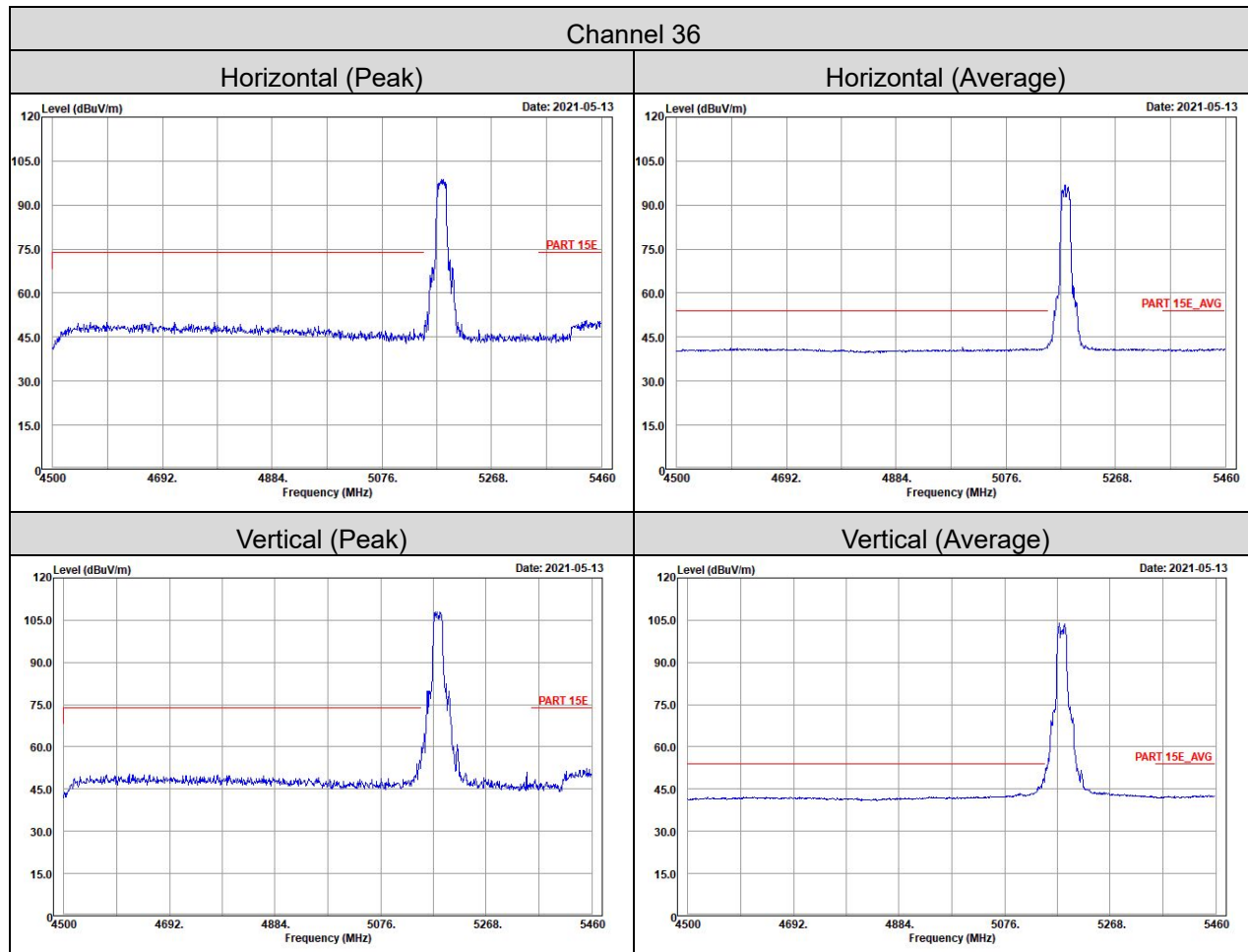


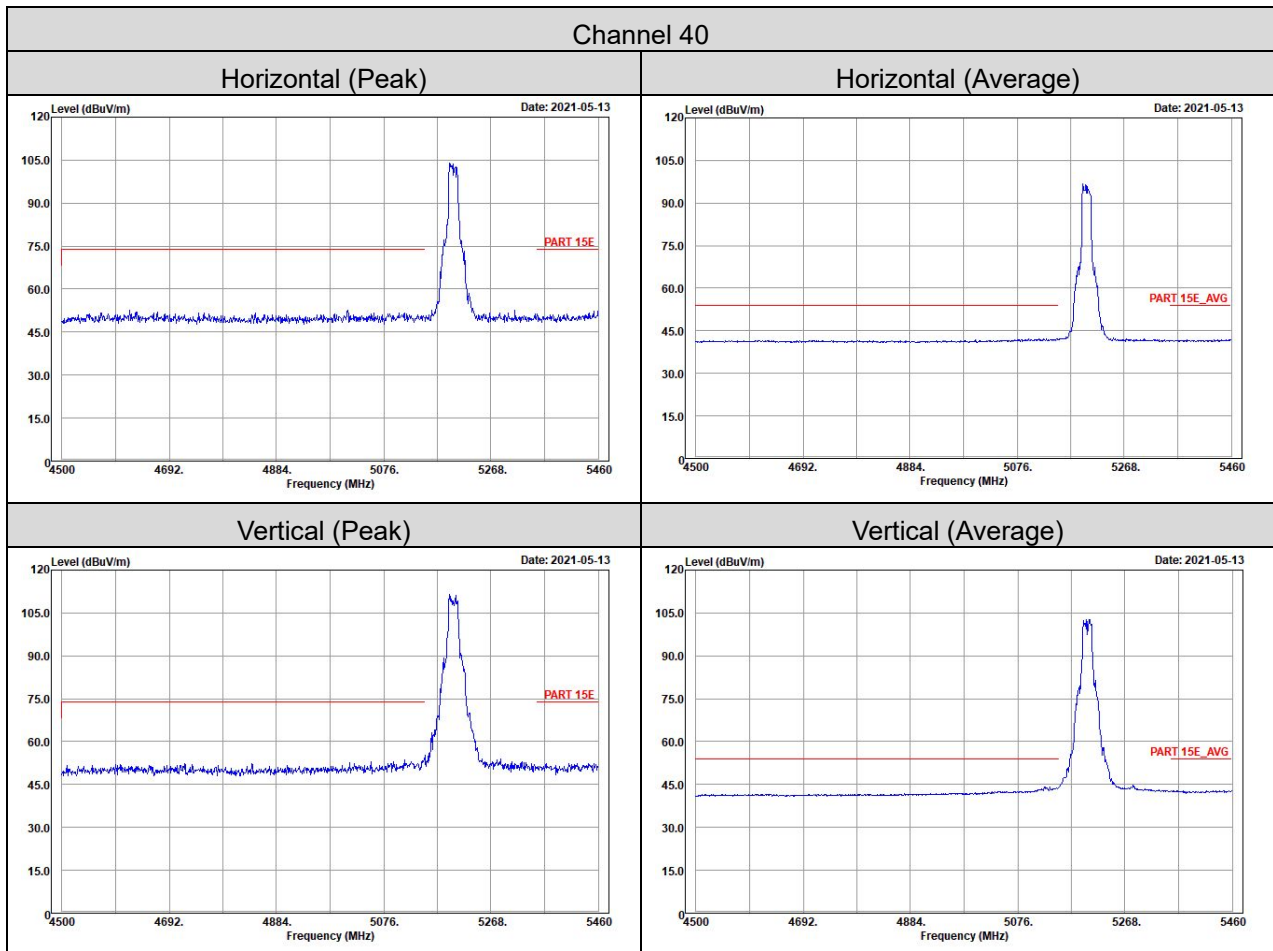
5 Pictures of Test Arrangements

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

Annex A- Band Edge Measurement

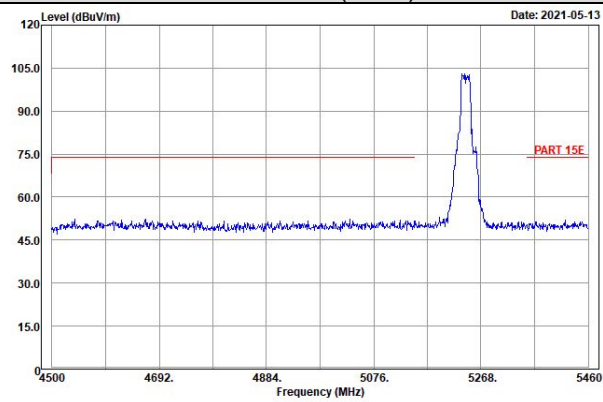
802.11a



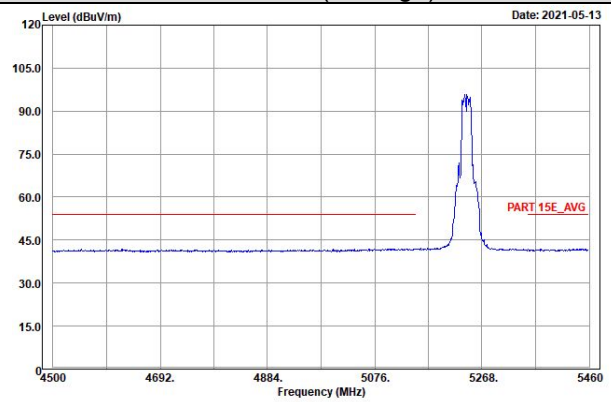


Channel 48

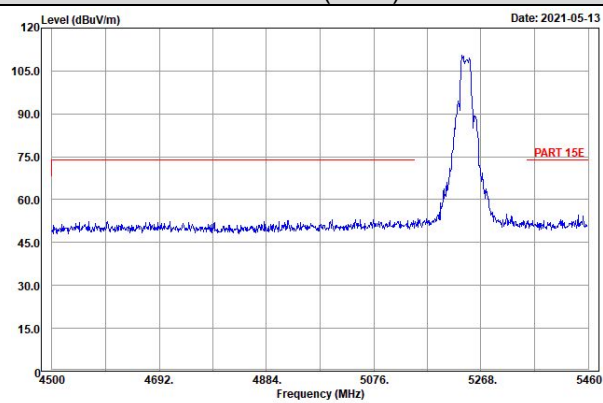
Horizontal (Peak)



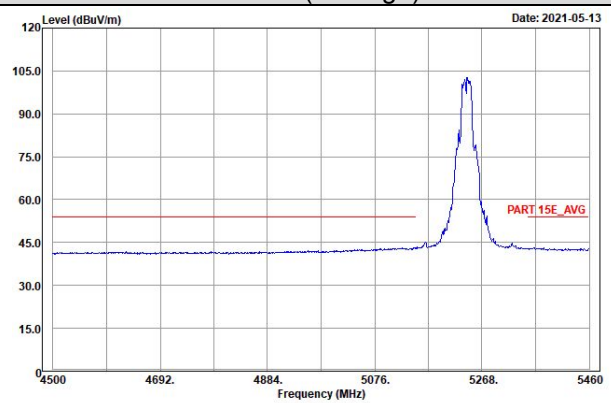
Horizontal (Average)



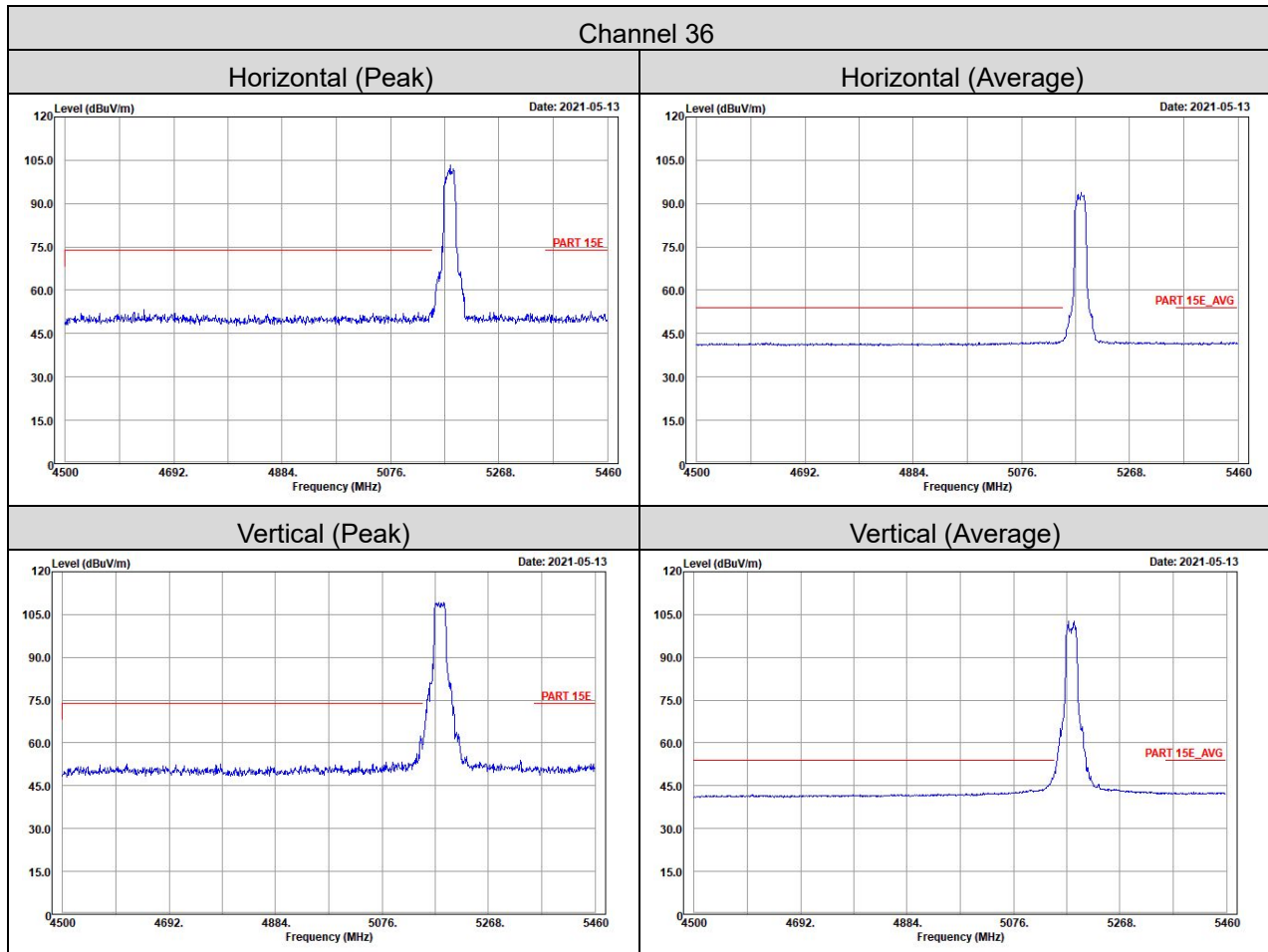
Vertical (Peak)

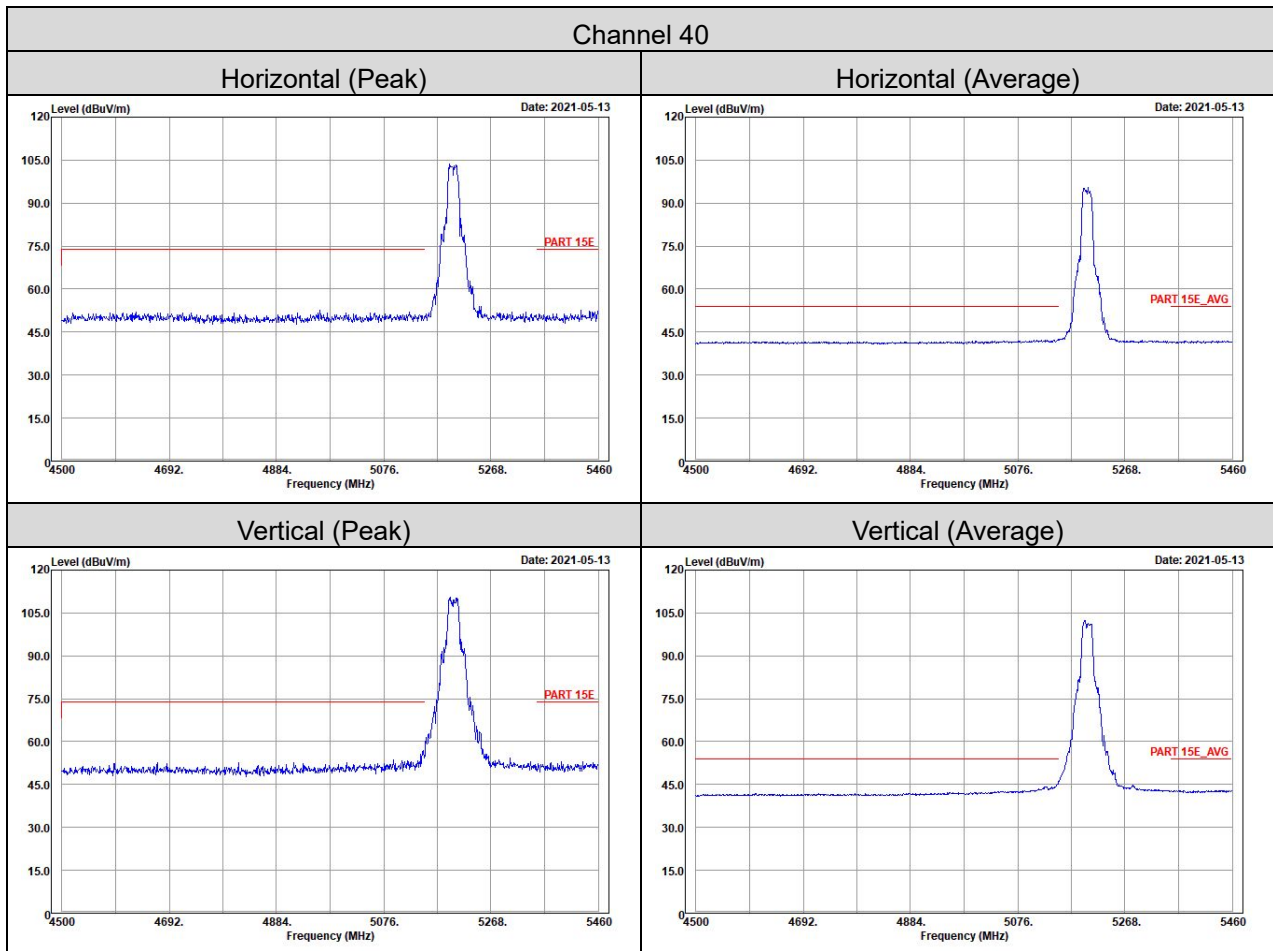


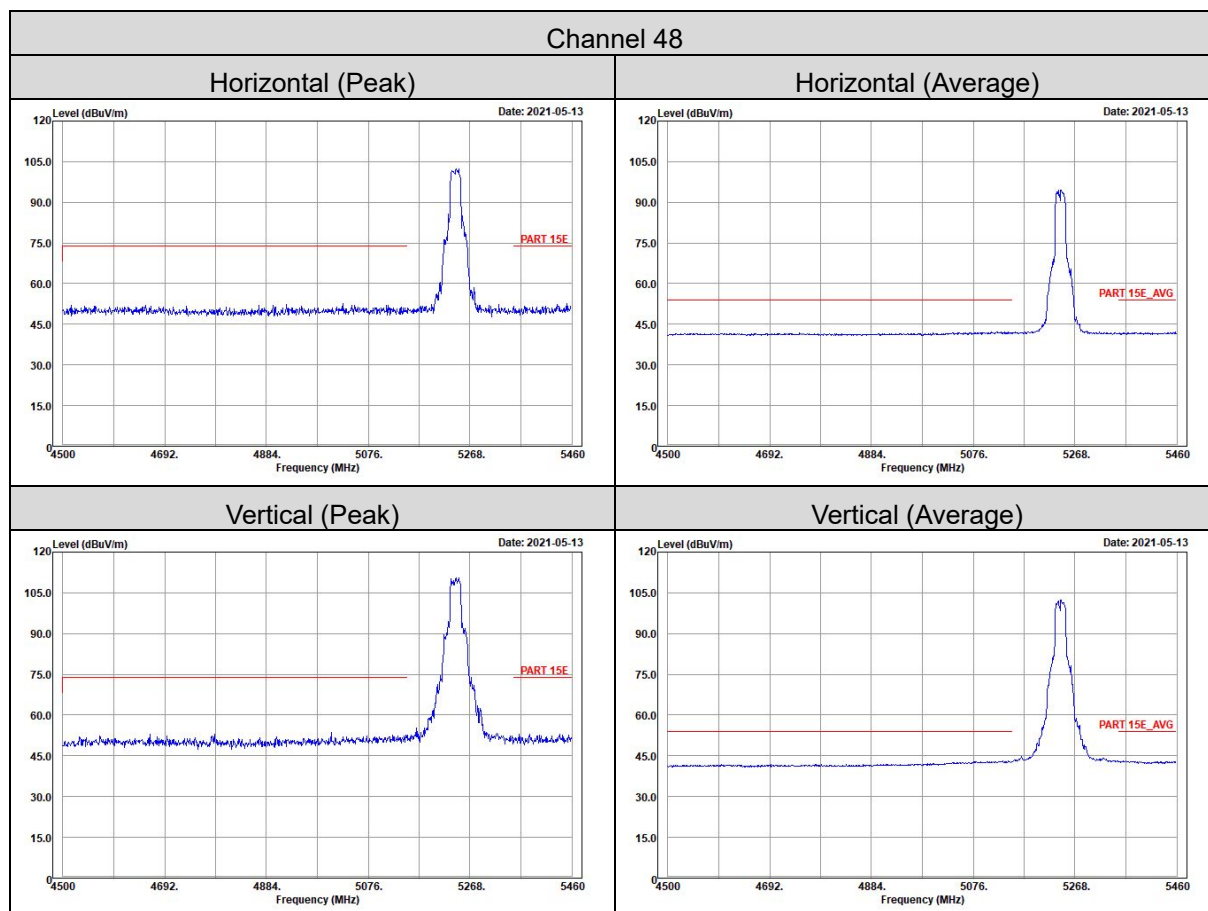
Vertical (Average)



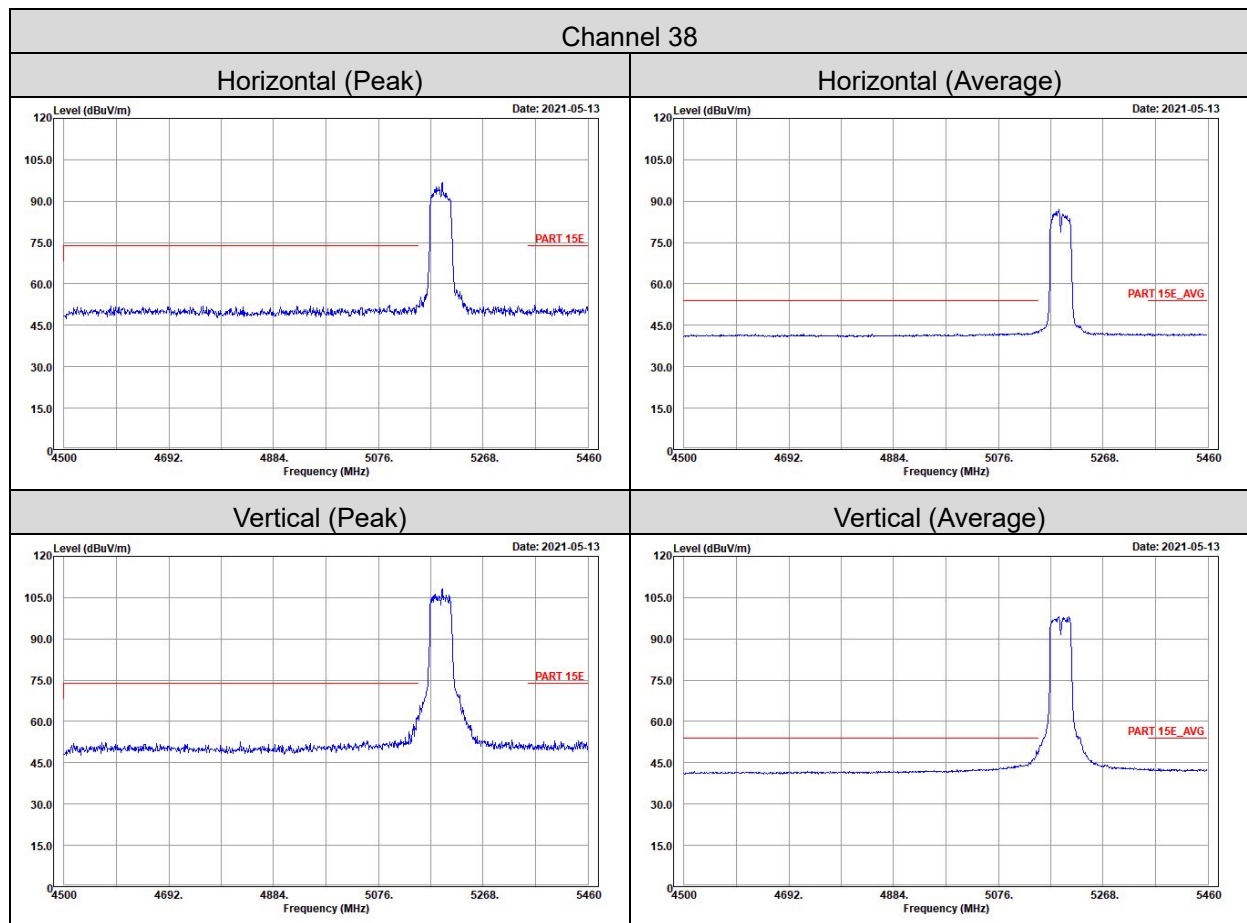
802.11ax (HE20)

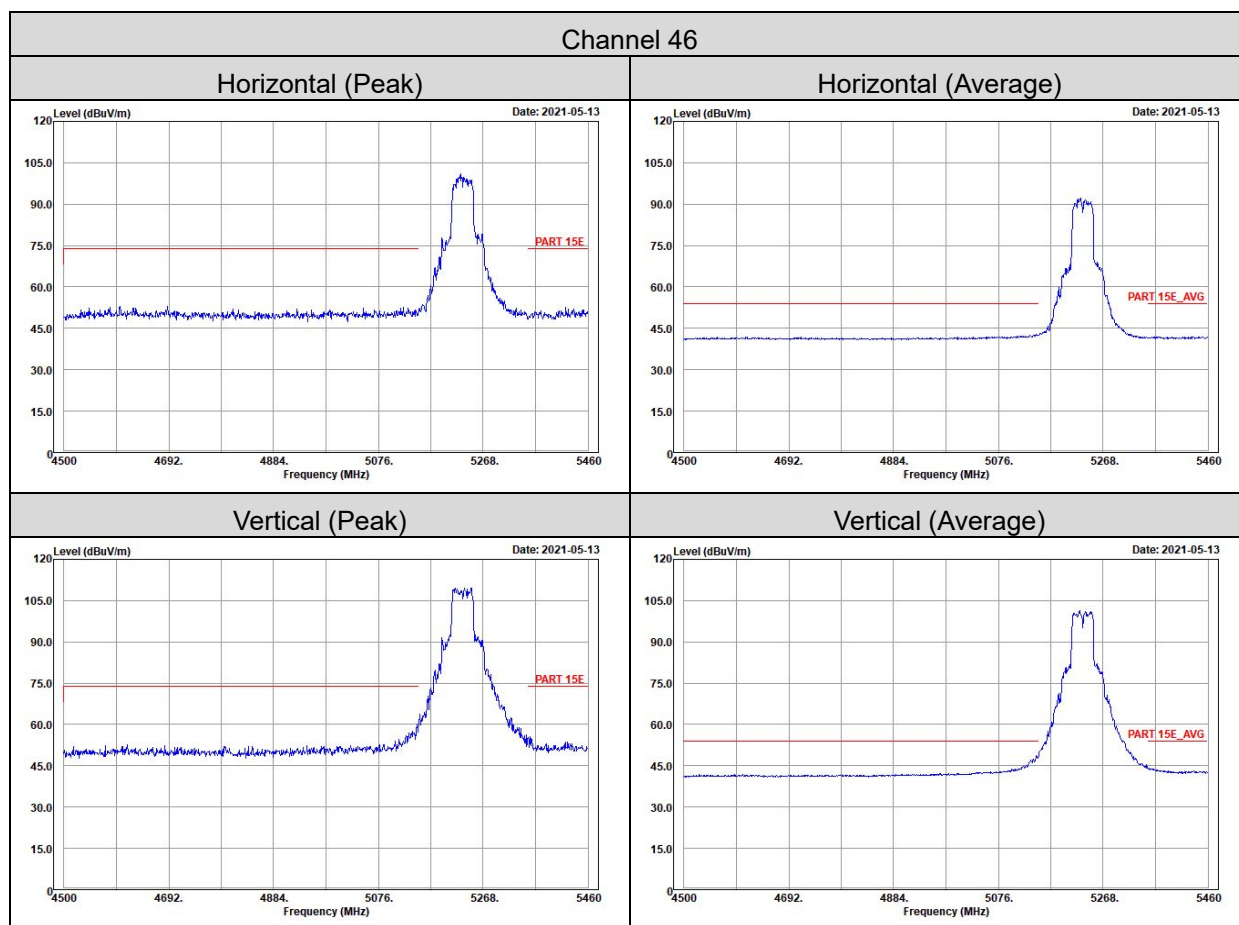




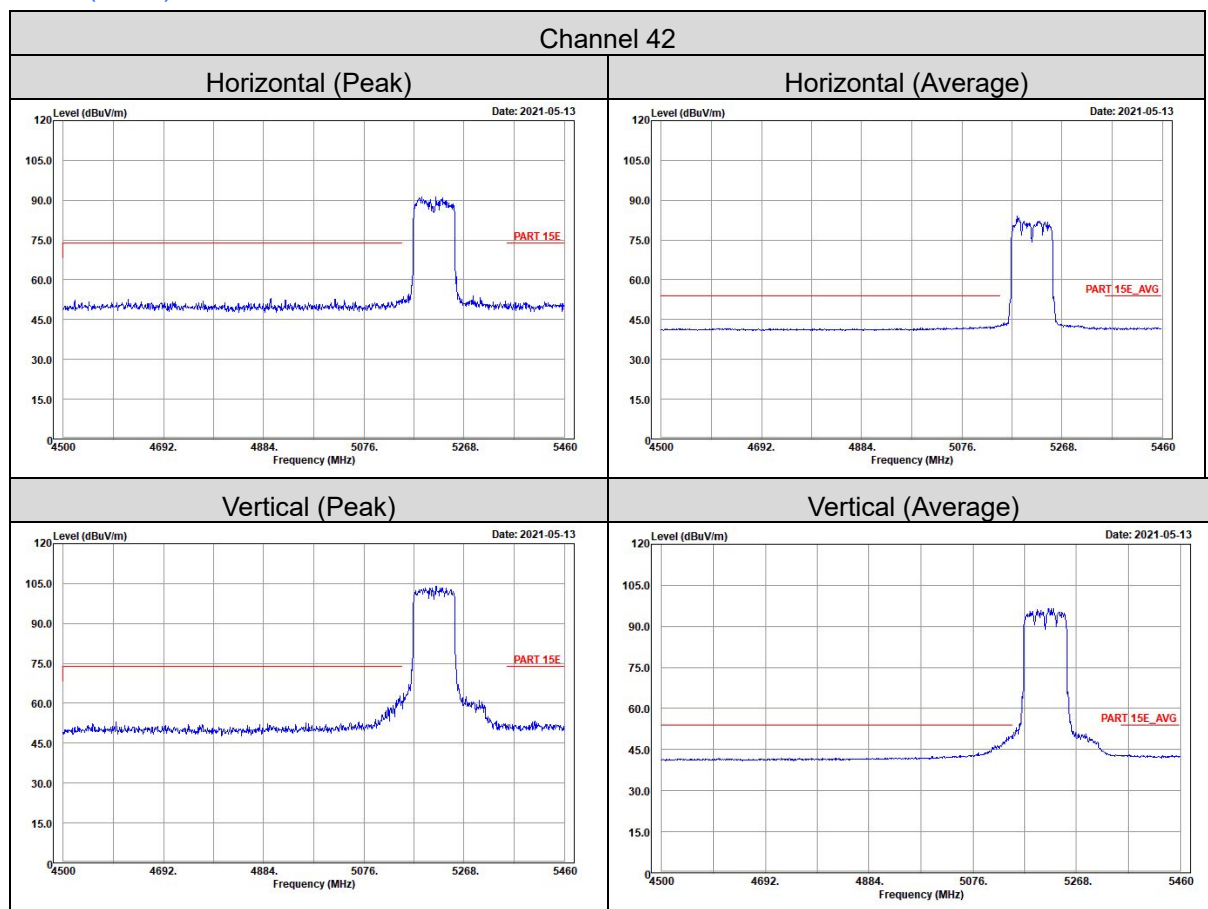


802.11ax (HE40)





802.11ax (HE80)



Appendix – Information of 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 FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

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

Lin Kou EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

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.

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