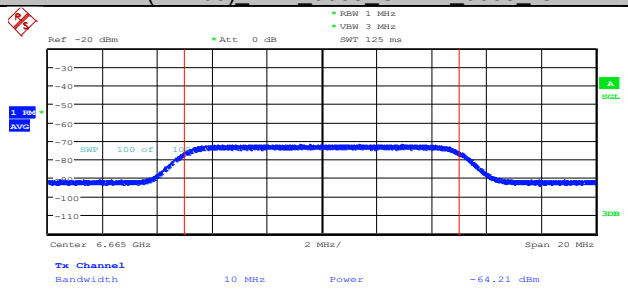
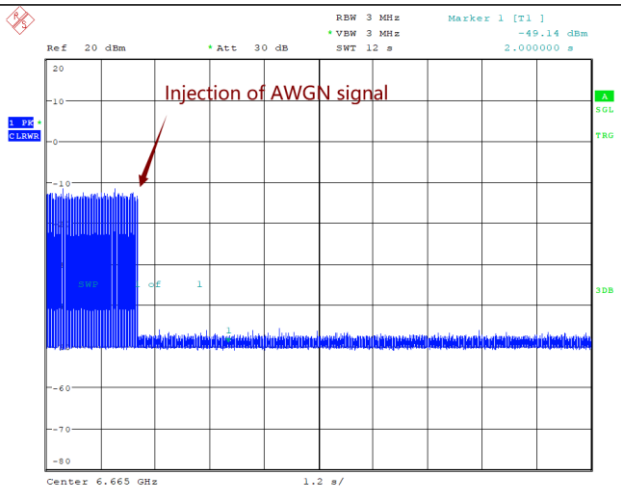
11ax(HE160)_Ant2_6665_Center_6665_ Ceased

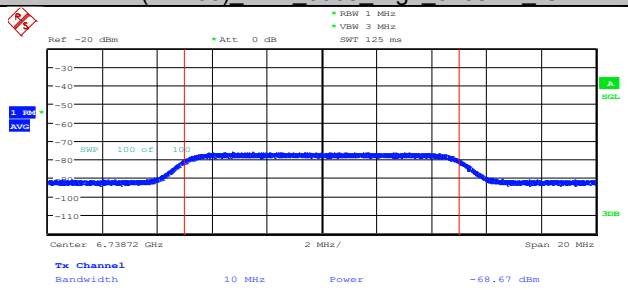


Date: 10.SEP.2023 18:13:21

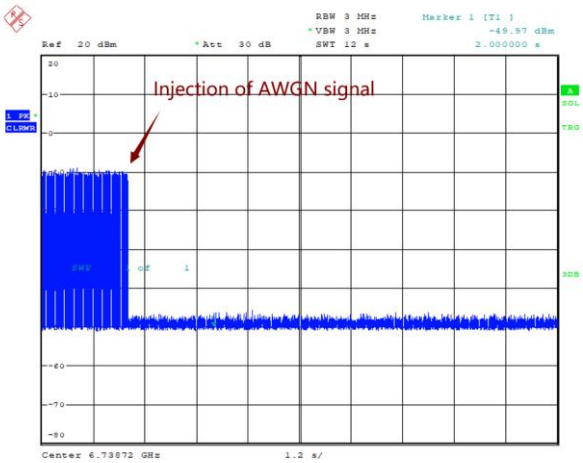


Date: 10.SEP.2023 17:43:55

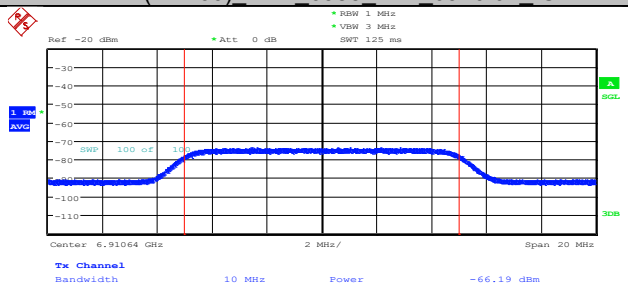
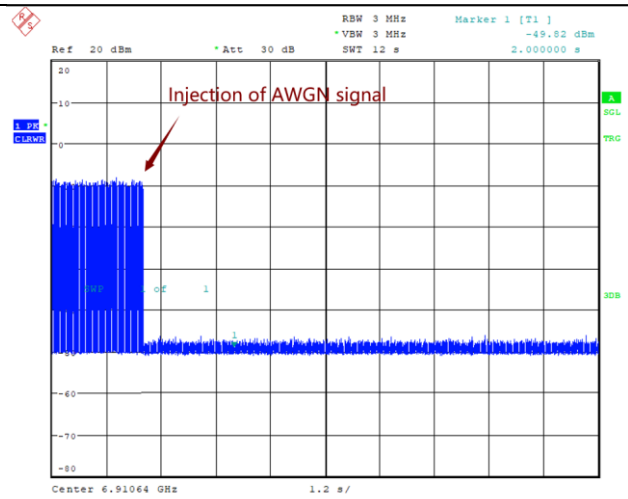
11ax(HE160)_Ant2_6665_High_6738.72_ Ceased

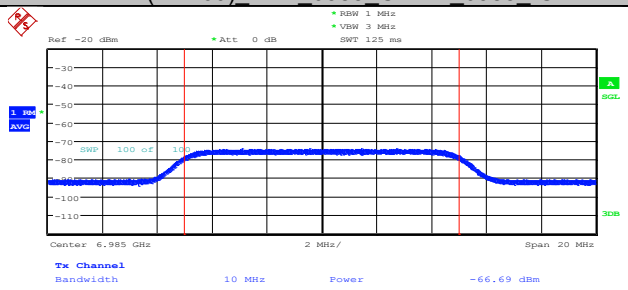
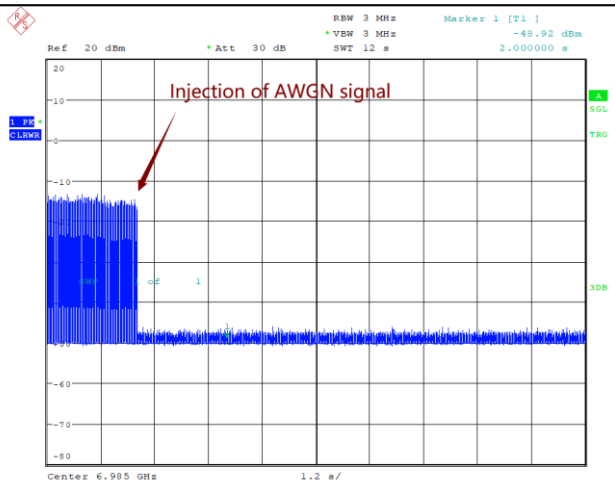


Date: 10.SEP.2023 18:27:42

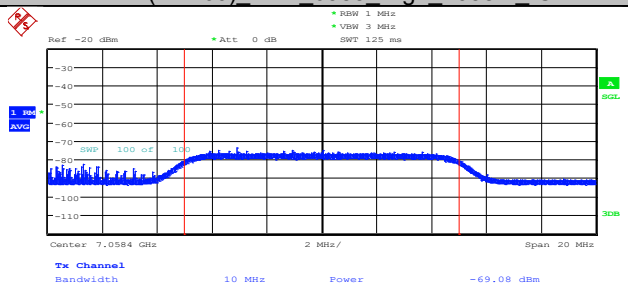


Date: 10.SEP.2023 18:21:24

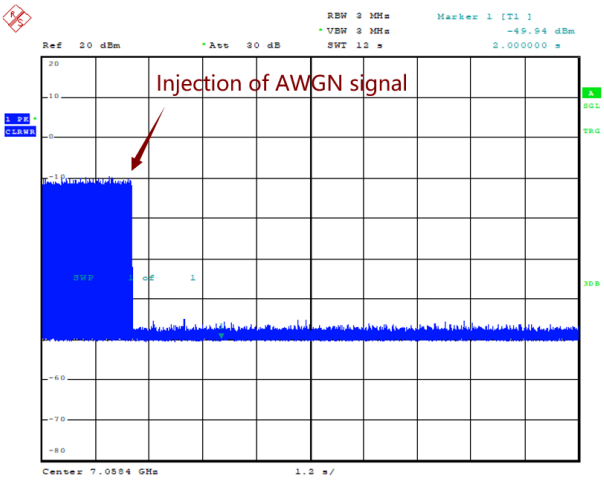
11ax(HE160)_Ant2_6985_Low_6910.64_ Ceased
 Date: 11.SEP.2023 10:16:09
 Date: 11.SEP.2023 10:09:51

11ax(HE160)_Ant2_6985_Center_6985_ Ceased
 Date: 11.SEP.2023 10:38:19
 Date: 11.SEP.2023 10:26:15

11ax(HE160)_Ant2_6985_High_7058.4_ Ceased



Date: 11.SEP.2023 10:53:06



Date: 11.SEP.2023 10:45:36

6.7. Undesirable Emissions (Radiated Band Edge)

Specifications:	FCC Part 15. 407 (b)
DUT Serial Number:	S8 S11
Test conditions:	Ambient Temperature:15℃-35℃ Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

Limit Level Construction:

Above 1G, non-restricted band

Standard	Limit
15.407(b)	EIRP < -27dBm/MHz

Above 1G, Restricted band

Standard	Limit	
15.407(b)	EIRP＜-27dBm/MHz	
15.209	Peak	74dBμV/m
	Average	54dBμV/m

EIRP[dBm] = E[dBμV/m] + 20 log (d[m]) − 104.7

E[dBμV/m] = EIRP[dBm] - 20 log (d[m]) + 104.7

E[dBμV/m] = EIRP[dBm] + 95.2 = 68.2， for d = 3m

Measurement Uncertainty:

Measurement Uncertainty	1 GHz to 6 GHz：4.84 dB (k=2).

Test procedures：

The measurement is made according to KDB 789033.

Marker-Delta Method: The marker-delta method, as described in ANSI C63.10, can be used to perform measurements of the radiated unwanted emissions level of emissions provided that the 99% occupied bandwidth of the fundamental is within 2 MHz of the authorized band-edge.

Procedure for peak unwanted emissions measurements above 1000 MHz

The procedure for peak unwanted emissions measurements above 1000 MHz is as follows:

a) Follow the requirements in 12.7.4.

b) Peak emission levels are measured by setting the instrument as follows:

1) RBW = 1 MHz.

2) VBW ≥ [3 × RBW].

3) Detector = peak.

4) Sweep time = auto.

5) Trace mode = max hold.

6) Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not continuous, then the time required for the trace to stabilize will increase by a factor of approximately 1 / D, where D is the duty cycle. For example, at 50% duty cycle, the measurement time will increase by a factor of two, relative to measurement time for continuous transmission.

Procedures for average unwanted emissions measurements above 1000 MHz

a) RBW = 1 MHz.

b) Video bandwidth:

1) If the EUT is configured to transmit with $D \geq 98\%$, then set VBW ≤ RBW / 100 (i.e., 10 kHz), but not less than 10 Hz.

2) If the EUT D is < 98%, then set VBW ≥ 1 / T, where T is defined in item a1) of 12.2.

c) Video bandwidth mode or display mode:

1) The instrument shall be set with video filtering applied in the power domain. Typically, this requires setting the detector mode to RMS (power averaging) and setting the average-VBW type to power (rms).

2) As an alternative, the instrument may be set to linear detector mode. Video filtering shall be applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode to accomplish this. Others have a setting for average-VBW type, which can be set to “voltage” regardless of the display mode.

d) Detector = peak.

e) Sweep time = auto.

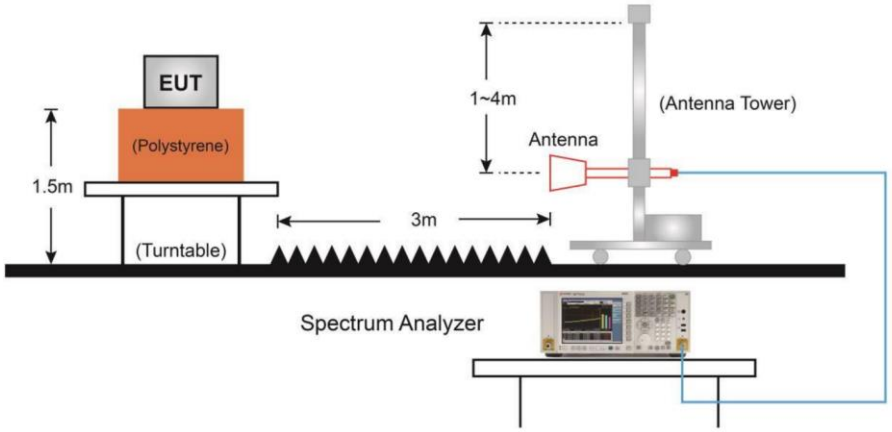
f) Trace mode = max hold.

g) Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98% duty cycle. For lower duty cycles, increase the minimum number of traces by a factor of 1/x, where D is the duty cycle. For example, use at least 200 traces if the duty cycle is 25%. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—then rather than turning ON and OFF with the transmit cycle, at least 50 traces should be averaged.)

The measurement was applied in a fully anechoic chamber. While testing for spurious emission higher than

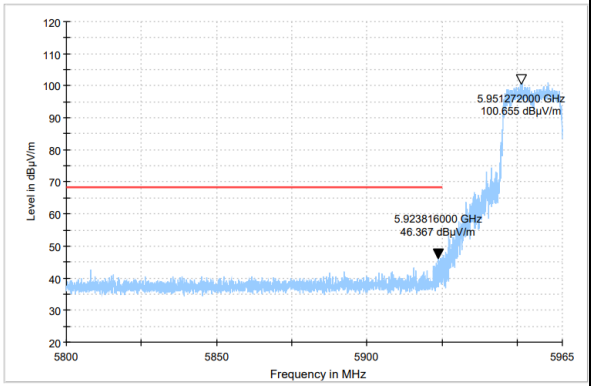
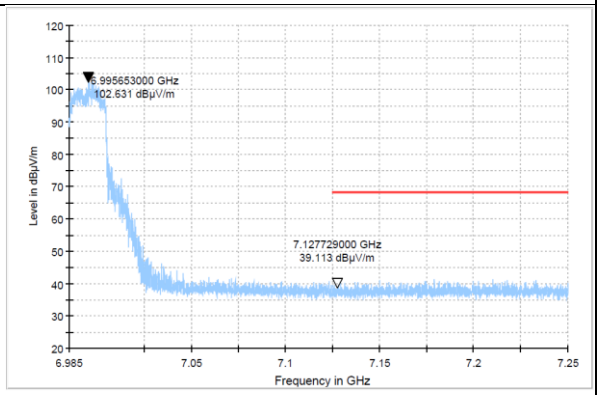
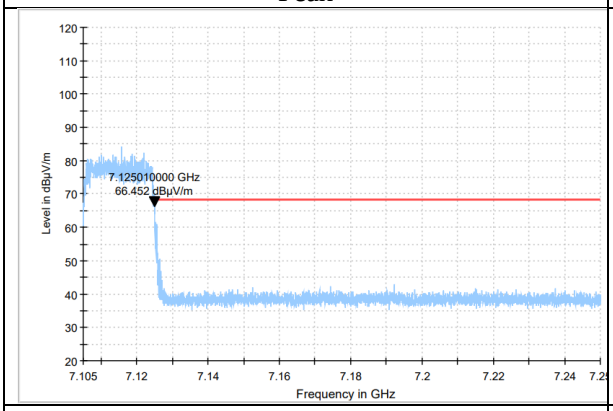
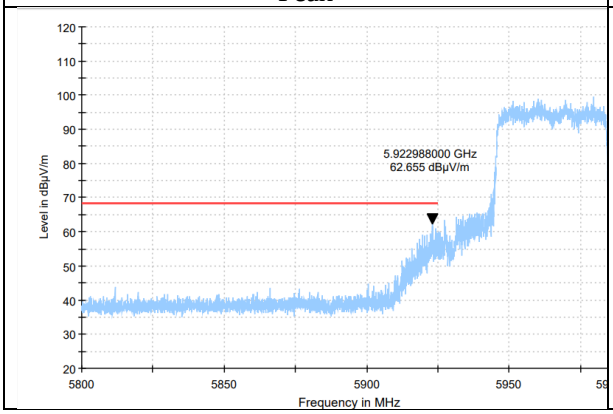
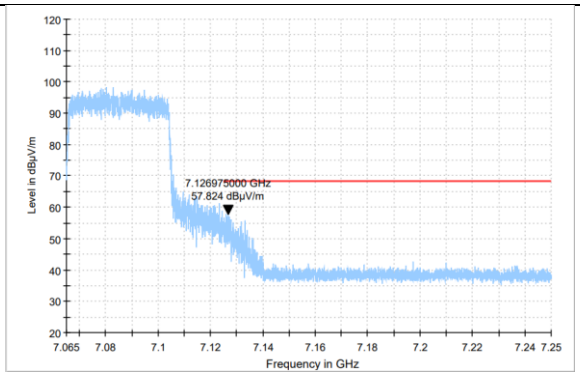
1GHz, if applied, the pre-amplifier would be equipped just at the output terminal of the antenna. Tabletop devices shall be placed on a nonconducting platform with nominal top surface dimensions 1 m by 1.5 m. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turntable rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. During the tests, the antenna height varied from 1m to 4m and the EUT azimuth were varied from 0° to 360° in order to identify the maximum level of emissions from the EUT. In making any tests involving handheld, body-worn, or ceiling-mounted equipment, it is essential to recognize that the measured levels may be dependent on the orientation (attitude) of the three orthogonal axes of the EUT. Thus, exploratory tests as specified in 8.3.1 shall be carried out for various axes orientations to determine the attitude having maximum or near-maximum emission level. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

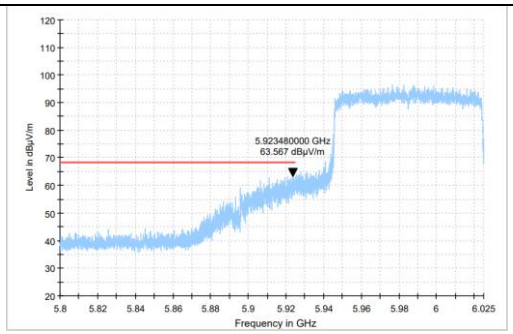
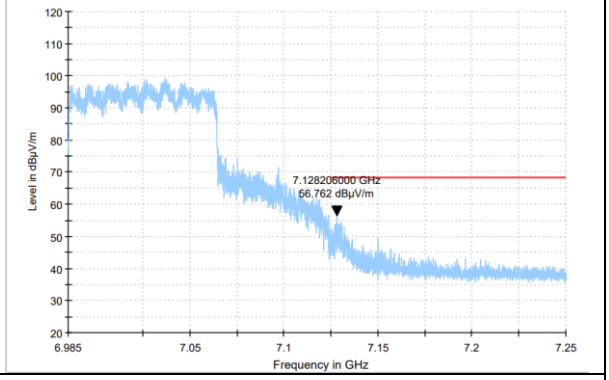
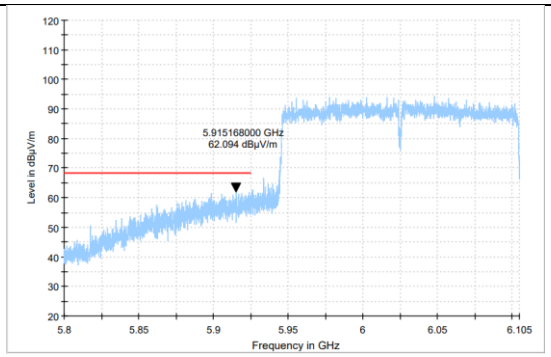
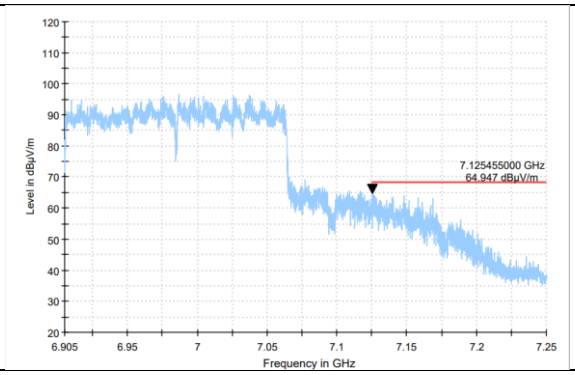
Test Setup



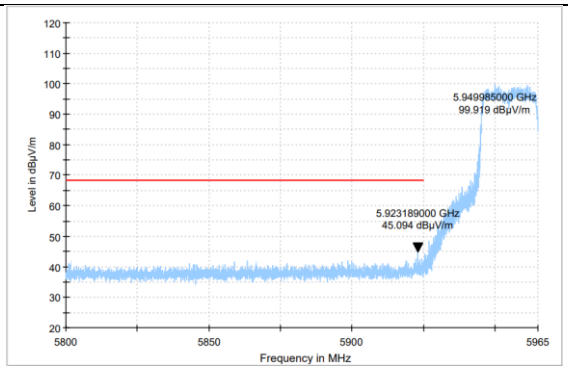
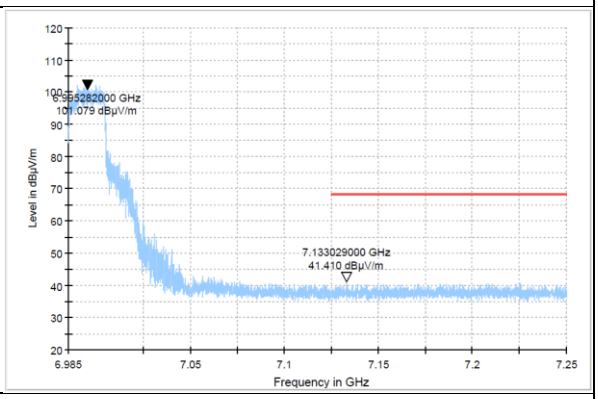
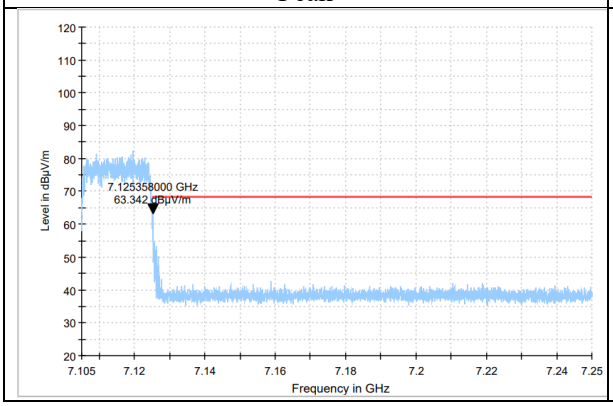
Measurement Results:

Mainly Supply (S8 L15A1):

Band Edges (802.11ax(HE20) MIMO, CH1)	Band Edges (802.11ax(HE20) MIMO, CH209)
Peak	Peak
	
Band Edges (802.11ax(HE20) MIMO, CH233)	/
Peak	/
	/
Band Edges (802.11ax(HE40) MIMO, CH3)	Band Edges (802.11ax(HE40) MIMO, CH277)
Peak	Peak
	

Band Edges (802.11ax(HE80) MIMO, CH7)	Band Edges (802.11ax(HE80) MIMO, CH215)
Peak	Peak
	
Band Edges (802.11ax(HE160) MIMO, CH15)	Band Edges (802.11ax(HE160) MIMO, CH207)
Peak	Peak
	

Secondary supply (S11 L15B1):

Band Edges (802.11ax(HE20) MIMO, CH1)	Band Edges (802.11ax(HE20) MIMO, CH229)
Peak	Peak
	
Band Edges (802.11ax(HE20) MIMO, CH233)	/
Peak	/
	/

Note:

1. Only data in worst mode is provided.

2. Horizontal and vertical polarity is all have been tested, the result of them is synthesized in the above data diagram.

6.8. General Field Strength Limits (Radiated spurious Emission)

Specifications:	FCC 47 CFR Part 15.407(b)
DUT Serial Number:	S8 S11
Test conditions:	Ambient Temperature:15℃-35℃ Relative Humidity:30%-60% Air pressure: 86-106kPa
Test Results:	Pass

Limit Level Construction:

Below 1G

Frequency of emission (MHz)	Field strength(dBμV/m)	Measurement distance(m)
0.009-0.490	129-94	3
0.490-1.705	74-63	3
1.705-30	70	3
30-88	40.0	3
88-216	43.5	3
216-960	46.0	3
Above 960	54.0	3

Above 1G, non-restricted band

Standard	EIRP Limit
15.407(b)	＜-27dBm/MHz

Above 1G, Restricted band

Standard	EIRP Limit	
15.407(b)	＜-27dBm/MHz	
15.209	Peak	74dBμV/m
	Average	54dBμV/m

EIRP[dBm] = E[dBμV/m] + 20 log (d[m]) − 104.7

E[dBμV/m] = EIRP[dBm] - 20 log (d[m]) + 104.7

E[dBμV/m] = EIRP[dBm] + 95.2 = 68.2， for d = 3m.

Measurement Uncertainty:

Frequency Range	Uncertainty
9kHz-30MHz	4.54dB
30MHz -1GHz	4.09dB
1GHz - 6GHz	4.84dB
6GHz - 18GHz	4.52dB
18GHz - 26GHz	6.19dB
26GHz - 40GHz	6.04dB

Test procedures：

The measurement is made according to KDB 789033

Set the spectrum analyzer in the following:

Procedure for Unwanted Emissions Measurements below 1000 MHz:

a) Follow the requirements in II.G.3. “General Requirements for Unwanted Emissions Measurements.”

b)Compliance shall be demonstrated using CISPR quasi-peak detection; however, peak detection is permitted as an alternative to quasi-peak detection.

Detector: Peak and Quasi-Peak

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Procedure for Unwanted Maximum Emissions Measurements above 1000 MHz:

a) Follow the requirements in II.G.3, “General Requirements for Unwanted Emissions Measurements.”

b) Maximum emission levels are measured by setting the analyzer as follows:

(i) RBW = 1 MHz.

(ii) VBW ≥ 3 MHz.

(iii) Detector = Peak.

(iv) Sweep time = auto.

(v) Trace mode = max hold.

(vi) Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle. For example, at 50% duty cycle, the measurement time will increase by a factor of two relative to measurement time for continuous transmission.

Procedures for Average Unwanted Emissions Measurements above 1000 MHz:

a) Follow the requirements in section II.G.3., "General Requirements for Unwanted Emissions Measurements."

b) Average emission levels shall be measured using one of the following two methods.

c) Method AD (Average Detection): Primary method

(i) RBW = 1 MHz.

(ii) VBW ≥ 3 MHz.

(iii) Detector = power averaging (rms), if span/(# of points in sweep) ≤ RBW/2. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, the detector mode shall be set to peak.

(iv) Averaging type = power averaging (rms)

As an alternative, the detector and averaging type may be set for linear voltage averaging. Some instruments require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.

(v) Sweep time = auto.

(vi) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, the number of traces shall be increased by a factor of 1/x, where x is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—rather than turning on and off with the transmit cycle, at least 100 traces shall be averaged.)

(vii) If tests are performed with the EUT transmitting at a duty cycle less than 98%, a correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:

If power averaging (rms) mode was used in step (iv) above, the correction factor is 10 log (1/x), where x is the duty cycle. For example, if the transmit duty cycle was 50%, then 3 dB must be added to the measured emission levels.

If linear voltage averaging mode was used in step (iv) above, the correction factor is 20 log (1/x), where x is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB must be added to the measured emission levels.

If a specific emission is demonstrated to be continuous (100% duty cycle) rather than turning on and off with the transmit cycle, no duty cycle correction is required for that emission.

Portable, small, lightweight, or modular devices that may be handheld, worn on the body, or placed on a table during operation shall be positioned on a non-conducting platform, the top of which is 80 cm above the reference ground plane. The preferred area occupied by the EUT arrangement is 1 m by 1.5 m, For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. but it may be larger or smaller to accommodate various sized EUTs. For testing purposes, ceiling- and wall-mounted devices also shall be positioned on a tabletop (see also ANSI C63.10-2013 section 6.3.4 and 6.3.5). In making any tests involving handheld, body-worn, or ceiling-mounted equipment, it is essential to recognize that the measured levels may be dependent on the orientation (attitude) of the three orthogonal axes of the EUT. Thus, exploratory tests as specified in 8.3.1 shall be carried out for various axes orientations to determine the attitude having maximum or near-maximum emission level.

The EUT was placed on a non-conductive table. Below 18GHz , the measurement antenna was placed at a distance of 3 meters from the EUT. Above 18GHz , the measurement antenna was placed at a distance of 1 meter from the EUT. During the tests, the antenna height varied from 1m to 4m and the EUT azimuth were varied from 0° to 360° in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

Remark:

1. Factor= Antenna Factor + Cable Loss (-Amplifier, is employed)

2. Measured level= Original Receiver Reading + Factor

3. Margin = Limit – Measured level

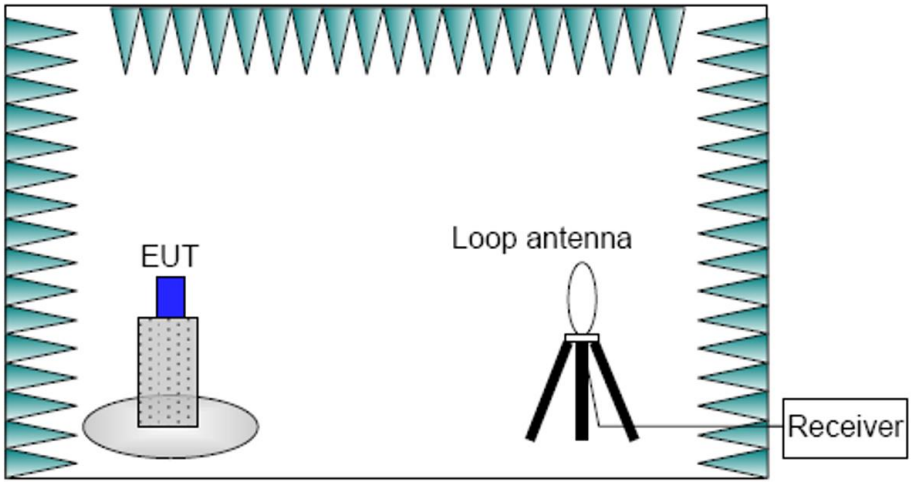
4. If the PK measured level is lower than AV limit, the AV test can be elided

Note：

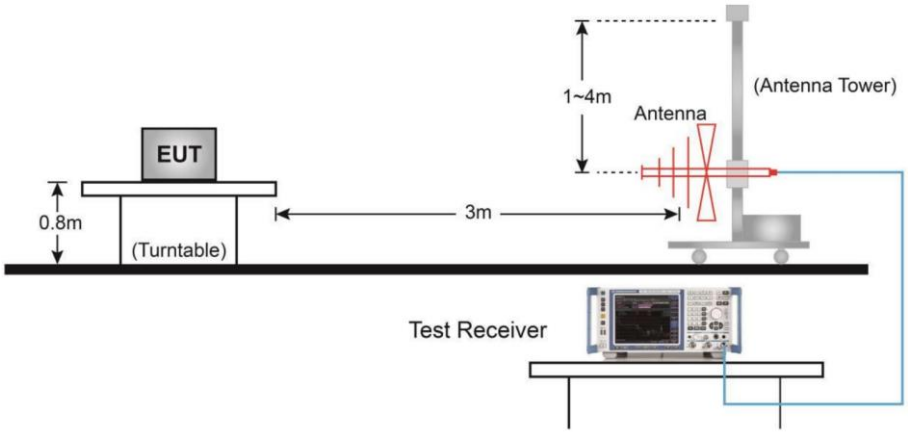
1. The out-of- limit signal in the picture is the main frequency signal.
2. Only data in worst mode is provided.
3. Sweep the whole frequency band through the range from 30MHz to the 10th harmonic of the carrier, the Emissions in the frequency band 18GHz-40GHz is more than 20dB below the limit are not report.
4. The test data below 30MHz is more than 20dB lower than the limit value, so it is not provided in the report.
5. Horizontal and vertical polarity is all have been tested, the result of them is synthesized in the above data diagram.

Test setup:

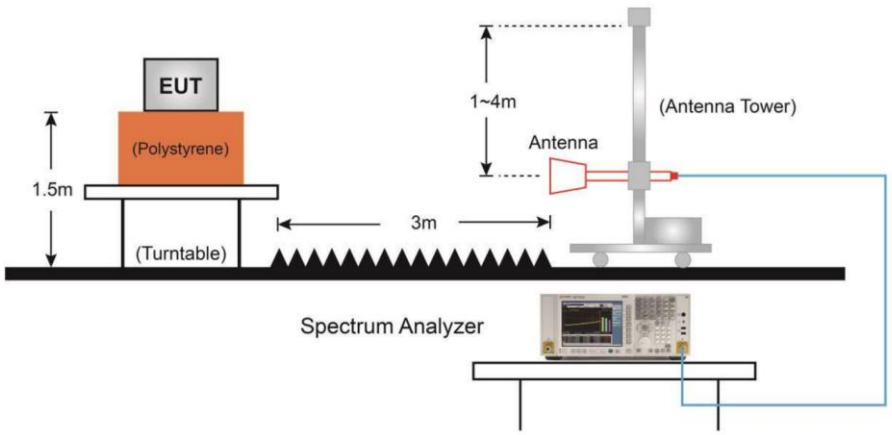
Below 30MHz Test Setup



Below 1GHz Test Setup

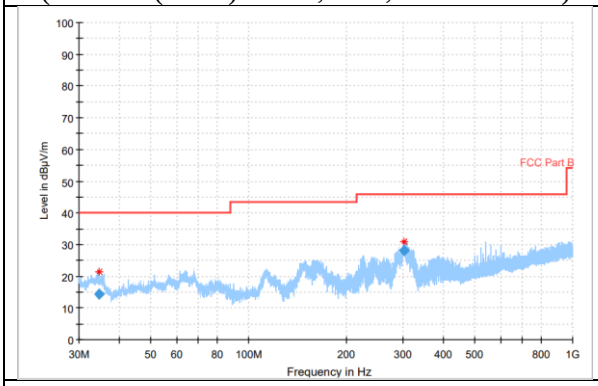
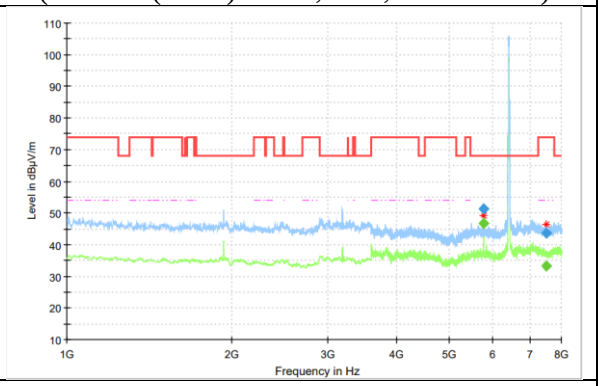
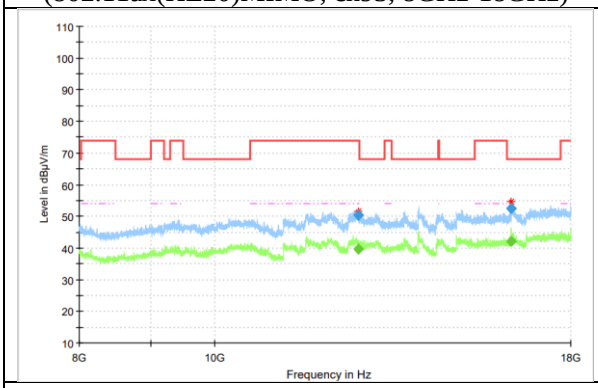
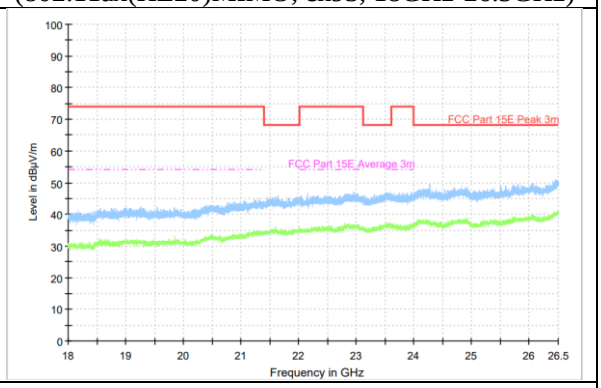
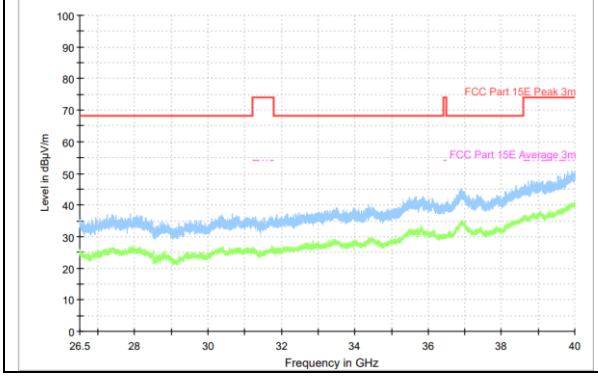
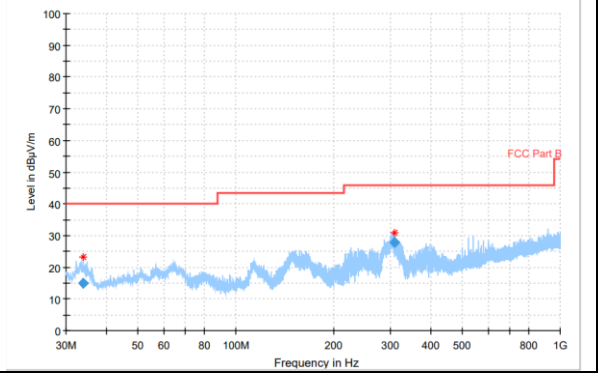


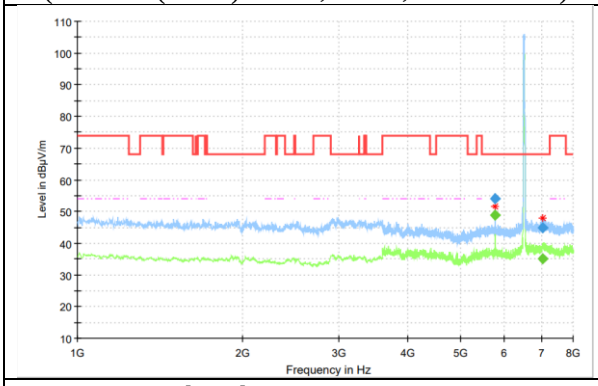
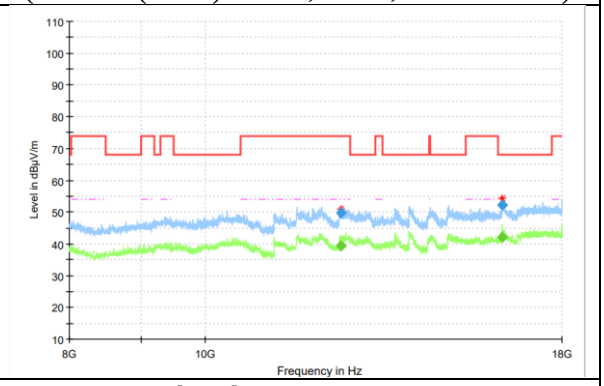
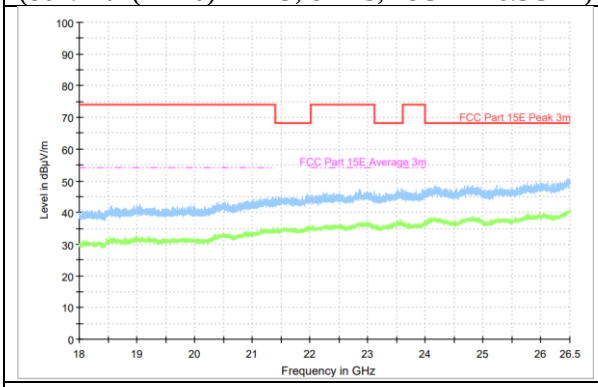
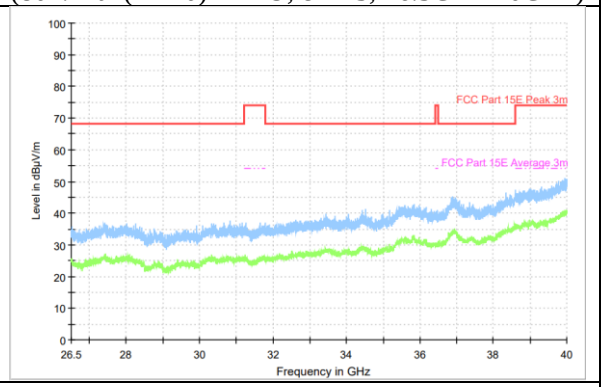
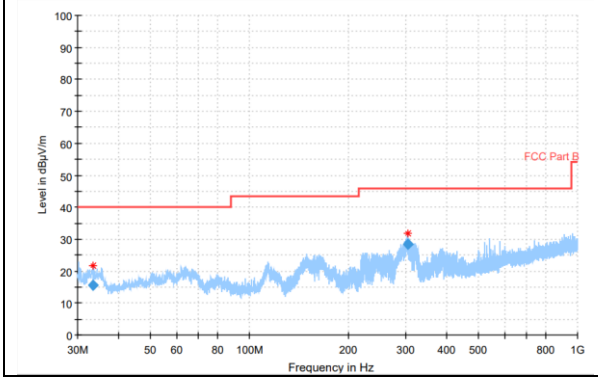
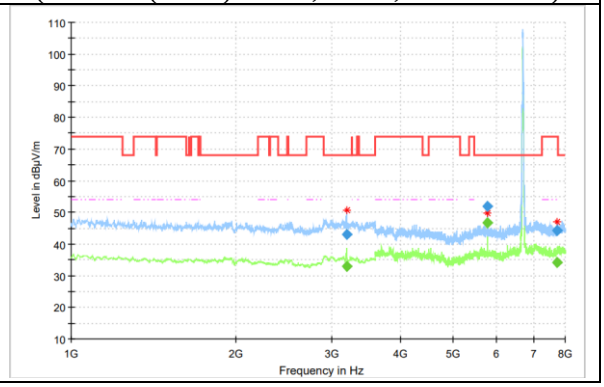
Above 1GHz Test Setup

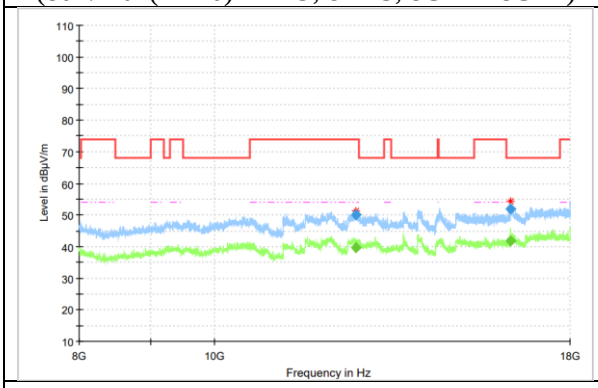
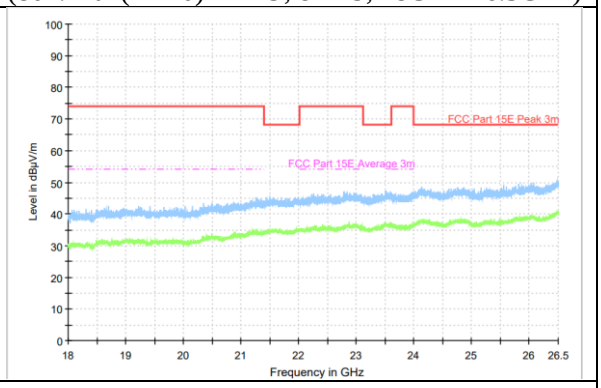
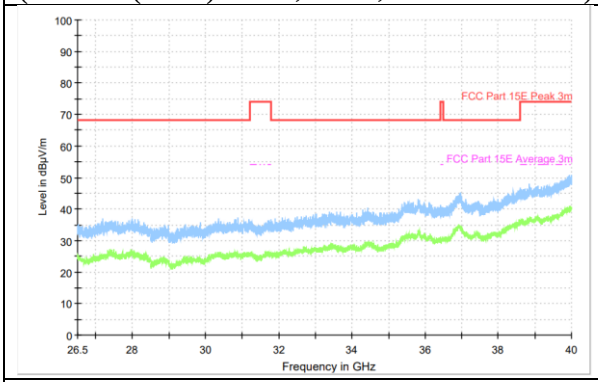
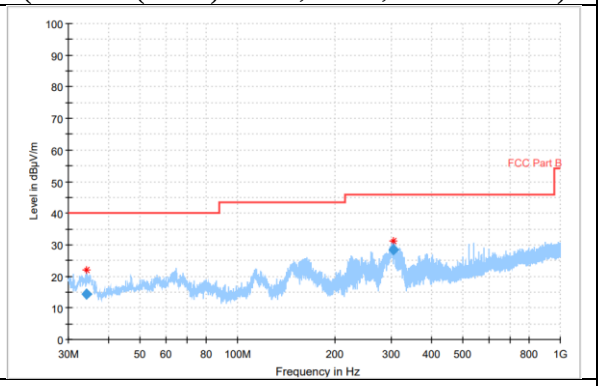
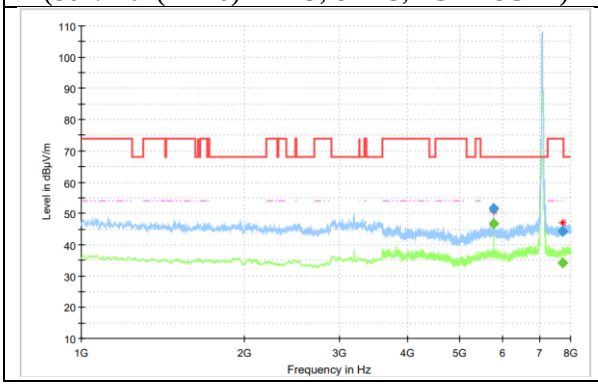
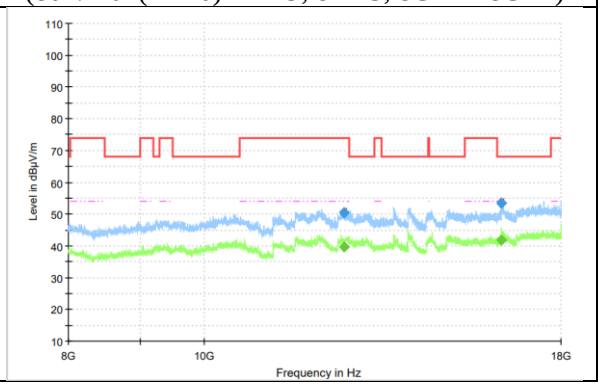


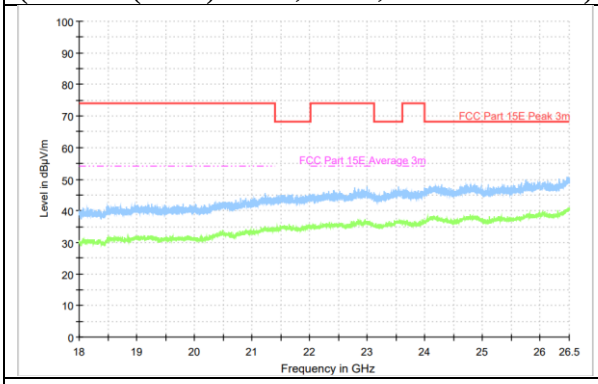
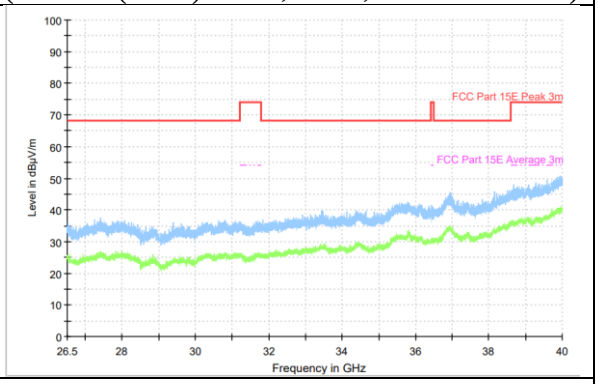
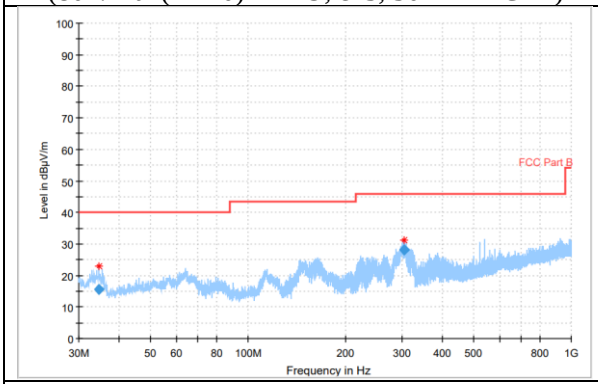
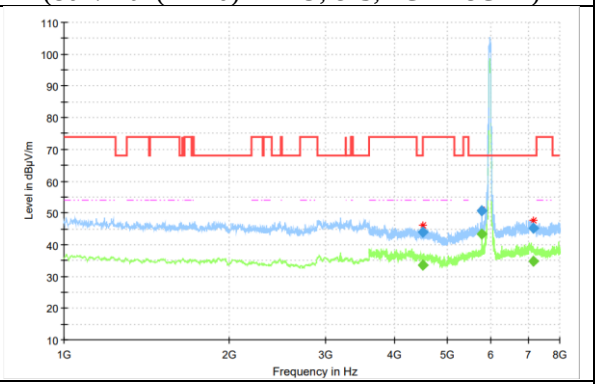
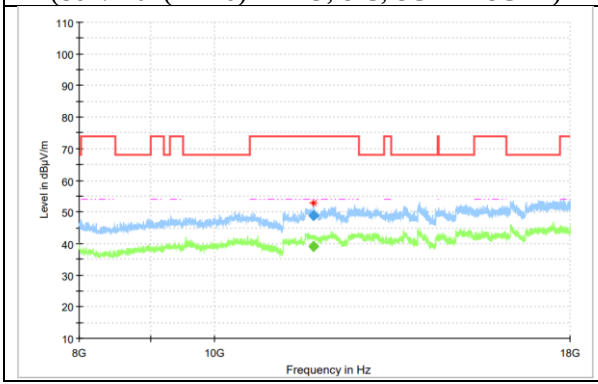
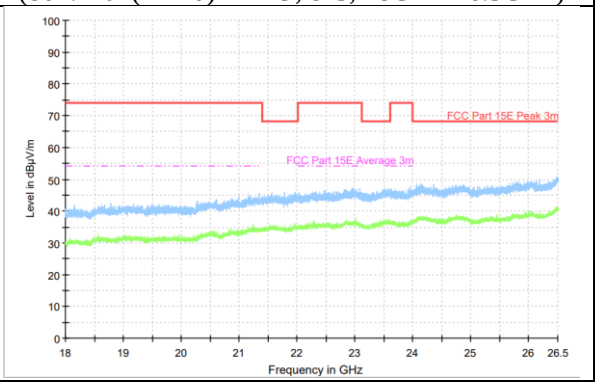
Measurement Results:

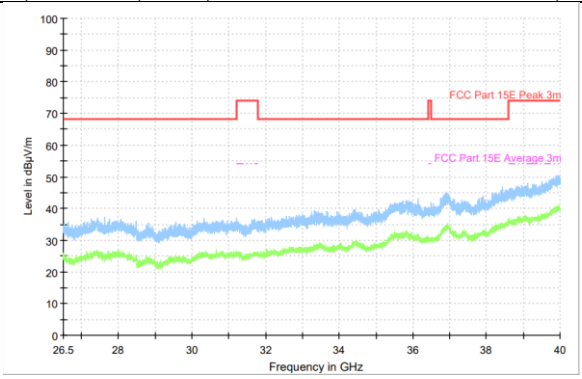
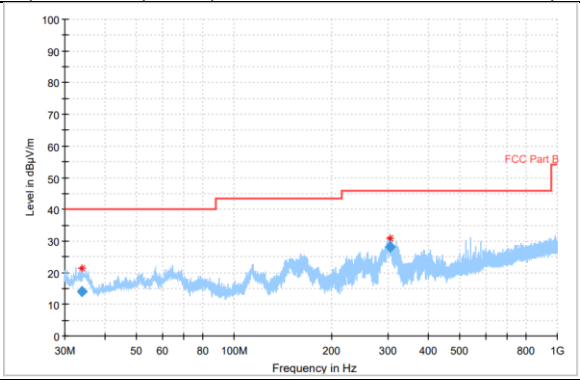
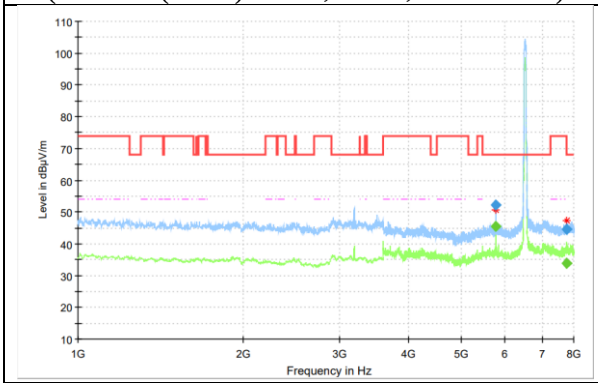
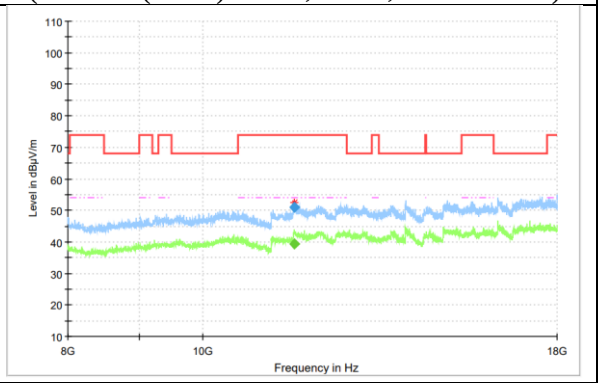
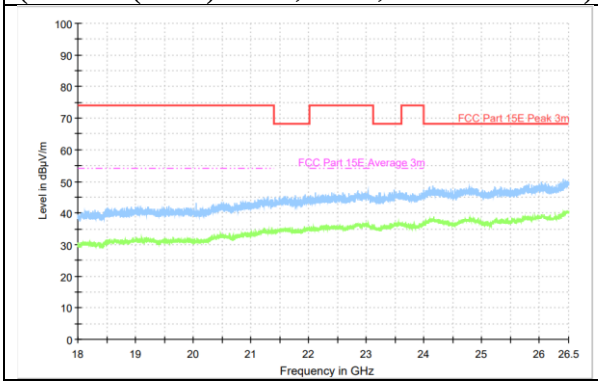
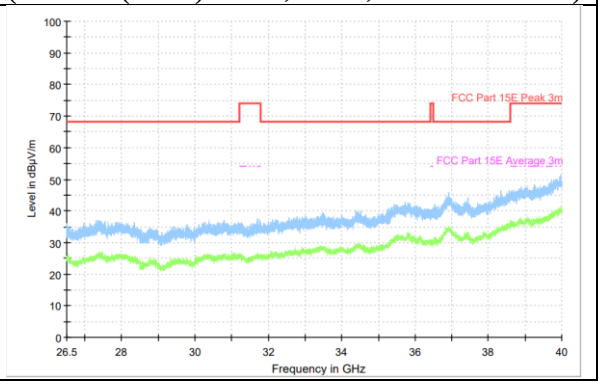
Mainly Supply (S8 L15A1)

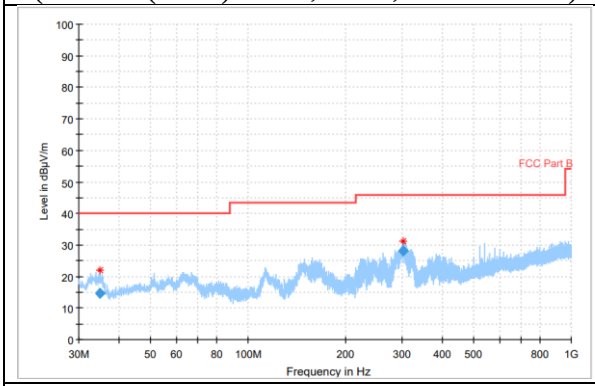
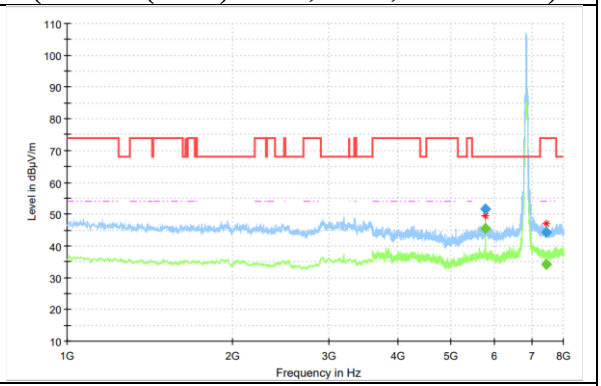
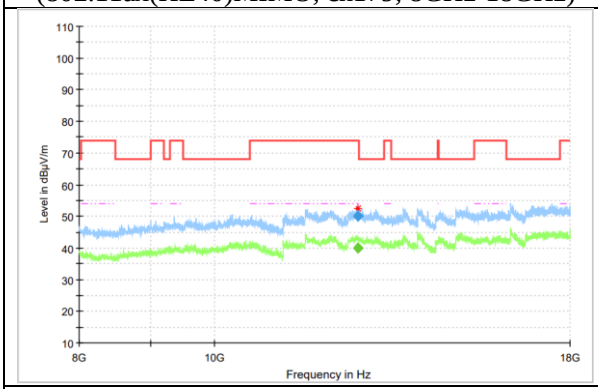
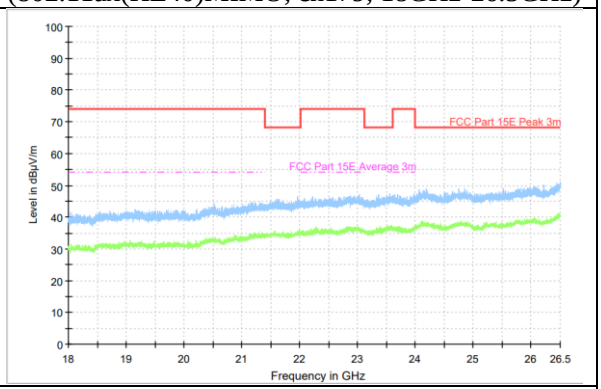
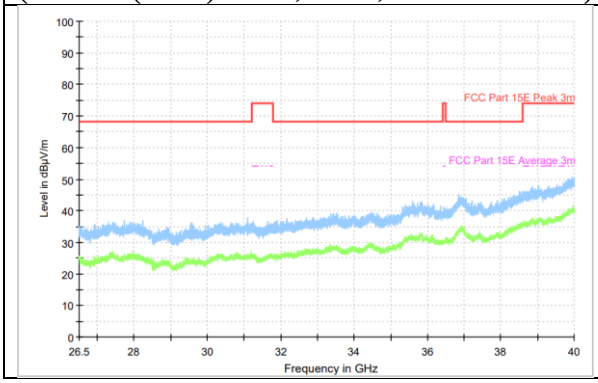
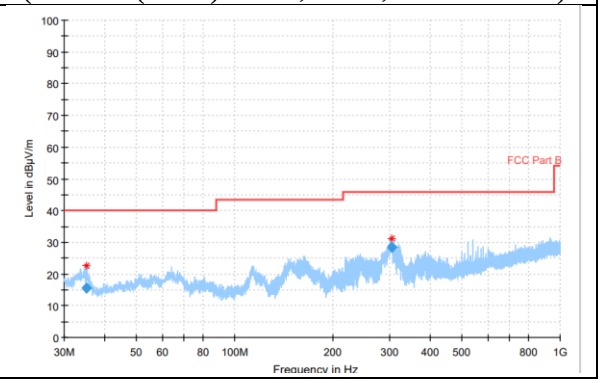
Radiated Spurious Emission (802.11ax(HE20)MIMO, ch93, 30MHz-1GHz)	Radiated Spurious Emission (802.11ax(HE20)MIMO, ch93, 1GHz-8GHz)
	
Radiated Spurious Emission (802.11ax(HE20)MIMO, ch93, 8GHz-18GHz)	**Radiated Spurious Emission (802.11ax(HE20)MIMO, ch93, 18GHz-26.5GHz)**
	
Radiated Spurious Emission (802.11ax(HE20)MIMO, ch93, 26.5GHz-40GHz)	**Radiated Spurious Emission (802.11ax(HE20)MIMO, ch113, 30MHz-1GHz)**
	

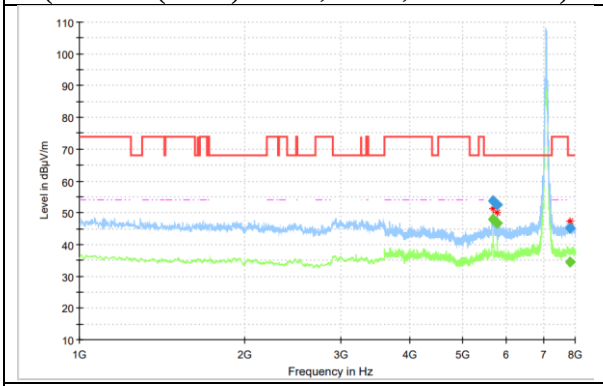
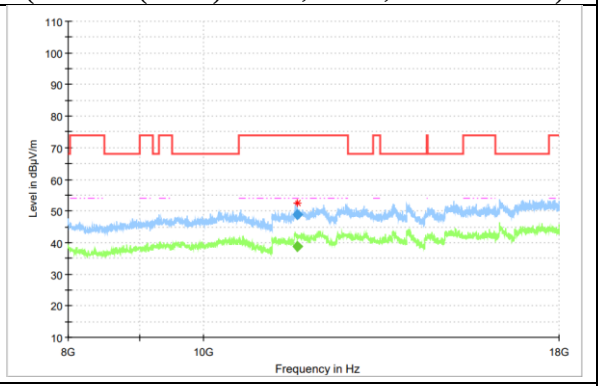
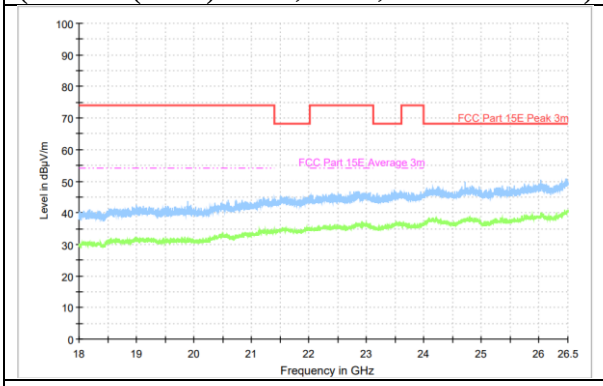
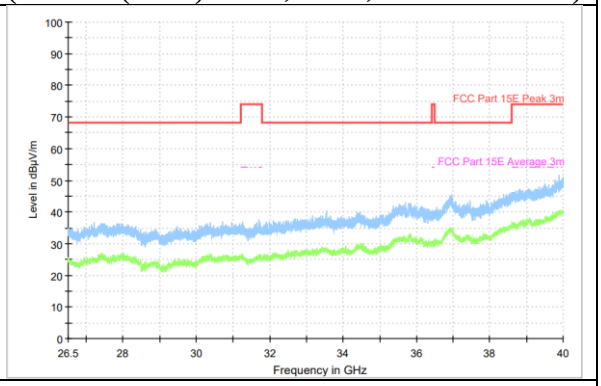
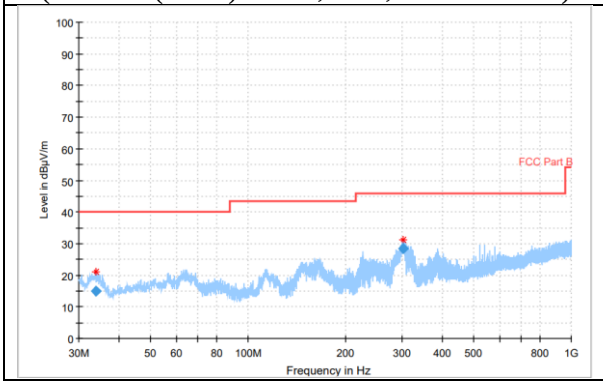
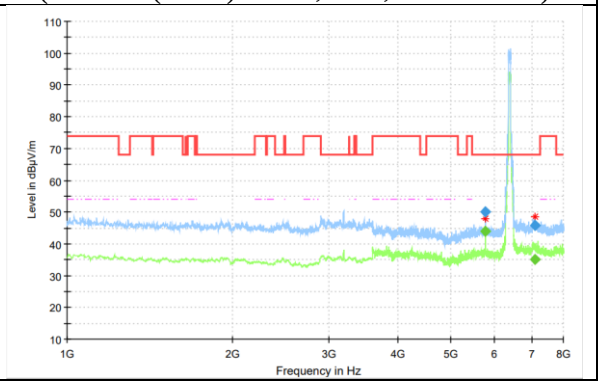
Radiated Spurious Emission (802.11ax(HE20)MIMO, ch113, 1GHz-8GHz)	Radiated Spurious Emission (802.11ax(HE20) MIMO, ch113, 8GHz-18GHz)
	
Radiated Spurious Emission (802.11ax(HE20)MIMO, ch113, 18GHz-26.5GHz)	**Radiated Spurious Emission (802.11ax(HE20)MIMO, ch113, 26.5GHz-40GHz)**
	
Radiated Spurious Emission (802.11ax(HE20)MIMO, ch149, 30MHz-1GHz)	**Radiated Spurious Emission (802.11ax(HE20)MIMO, ch149, 1GHz-8GHz)**
	

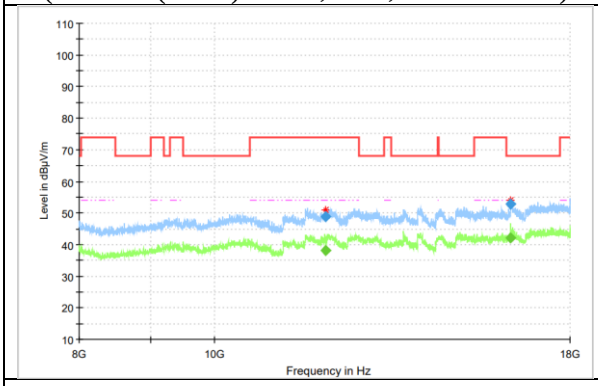
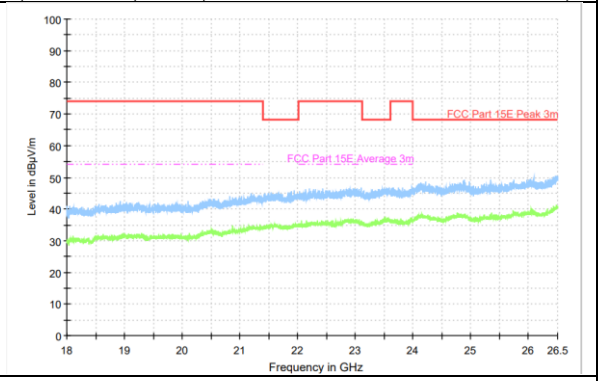
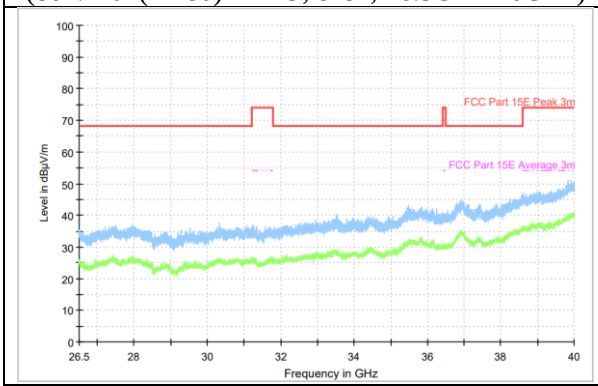
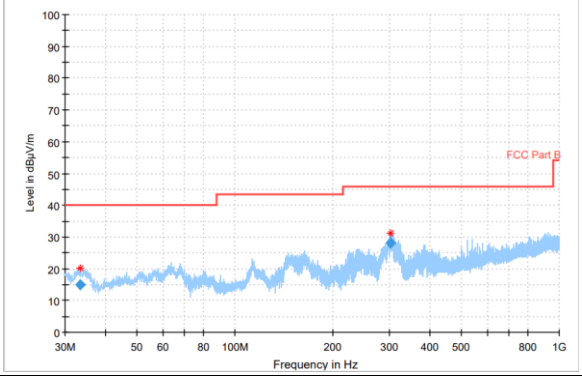
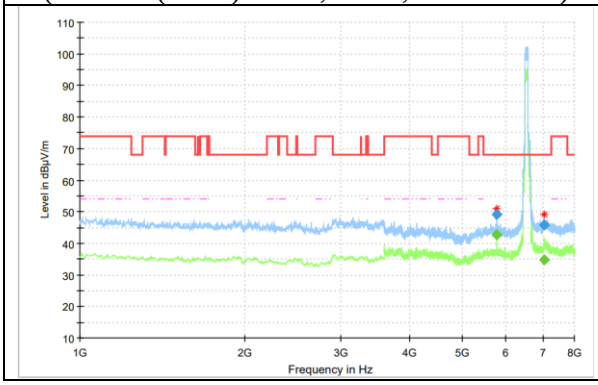
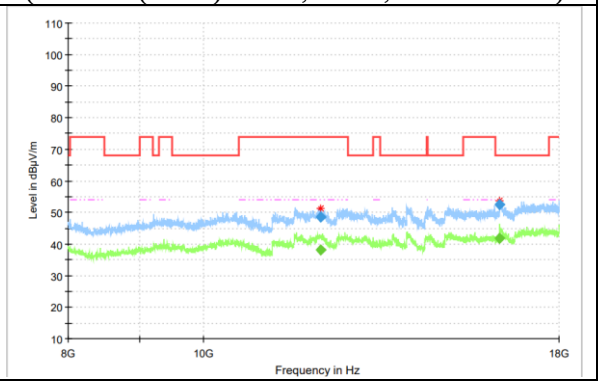
Radiated Spurious Emission (802.11ax(HE20)MIMO, ch149, 8GHz-18GHz)	Radiated Spurious Emission (802.11ax(HE20)MIMO, ch149, 18GHz-26.5GHz)
	
Radiated Spurious Emission (802.11ax(HE20)MIMO, ch149, 26.5GHz-40GHz)	Radiated Spurious Emission (802.11ax(HE20)MIMO, ch229, 30MHz-1GHz)
	
Radiated Spurious Emission (802.11ax(HE20)MIMO, ch229, 1GHz-8GHz)	Radiated Spurious Emission (802.11ax(HE20)MIMO, ch229, 8GHz-18GHz)
	

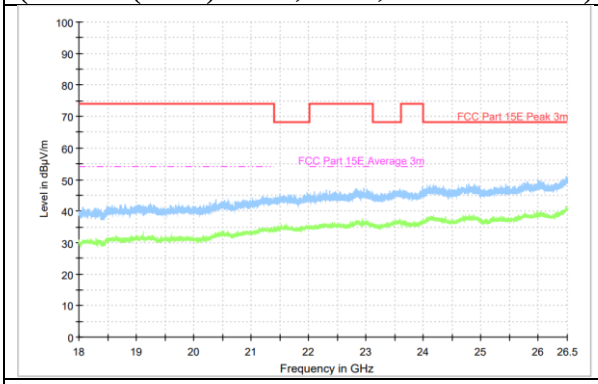
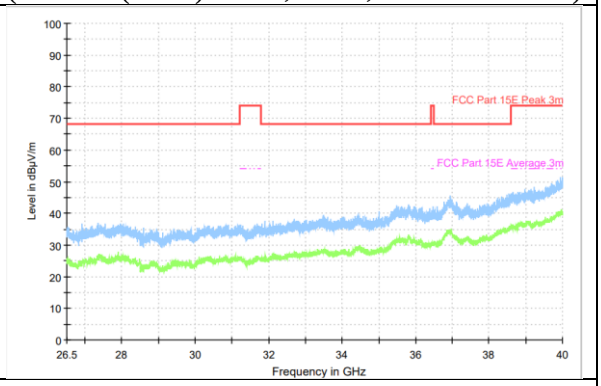
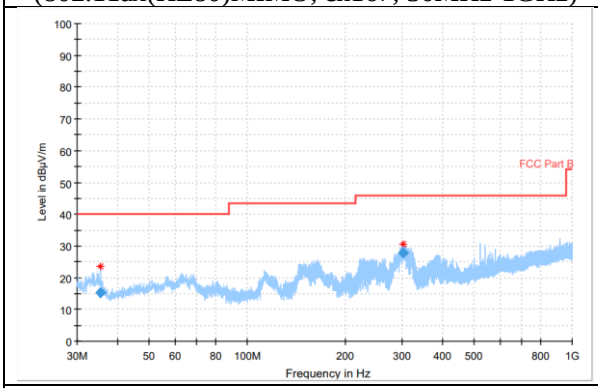
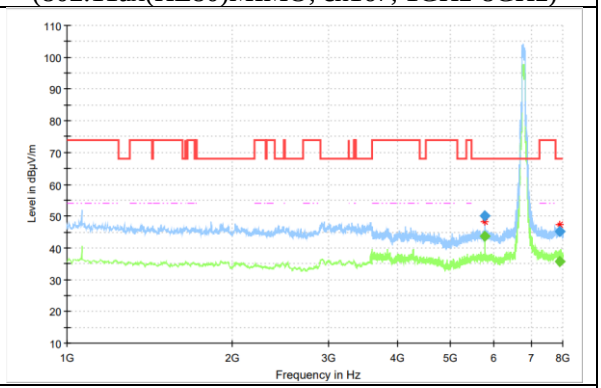
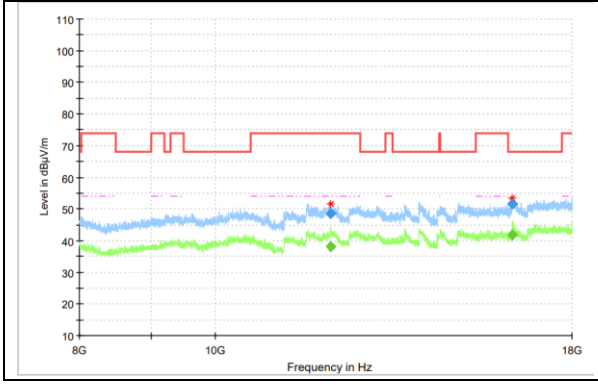
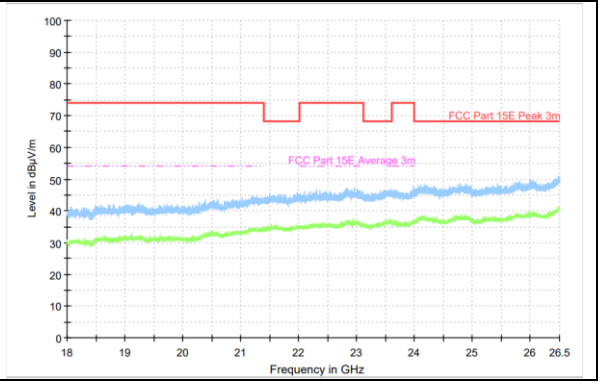
Radiated Spurious Emission (802.11ax(HE20)MIMO, ch229, 18GHz-26.5GHz)	Radiated Spurious Emission (802.11ax(HE20)MIMO, ch229, 26.5GHz-40GHz)
	
Radiated Spurious Emission (802.11ax(HE40)MIMO, ch3, 30MHz-1GHz)	Radiated Spurious Emission (802.11ax(HE40)MIMO, ch3, 1GHz-8GHz)
	
Radiated Spurious Emission (802.11ax(HE40)MIMO, ch3, 8GHz-18GHz)	Radiated Spurious Emission (802.11ax(HE40)MIMO, ch3, 18GHz-26.5GHz)
	

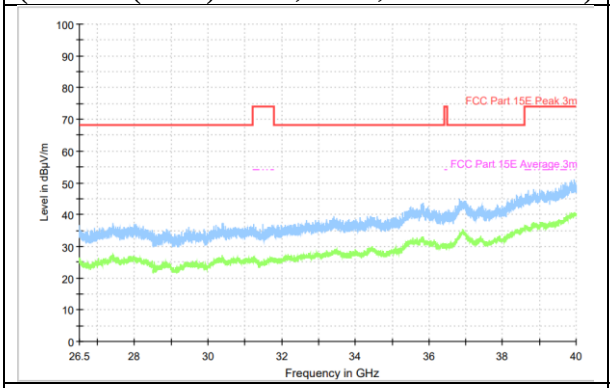
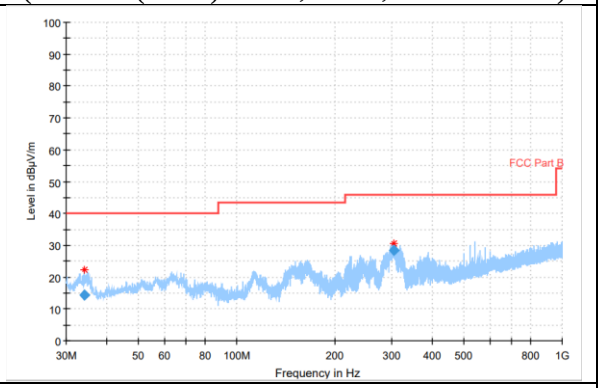
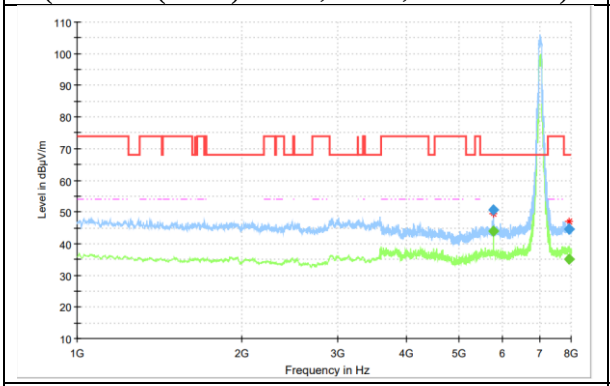
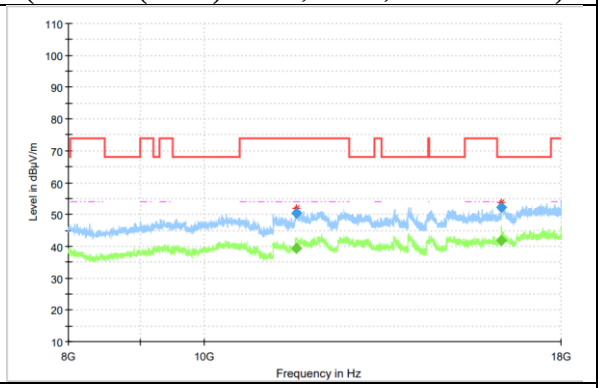
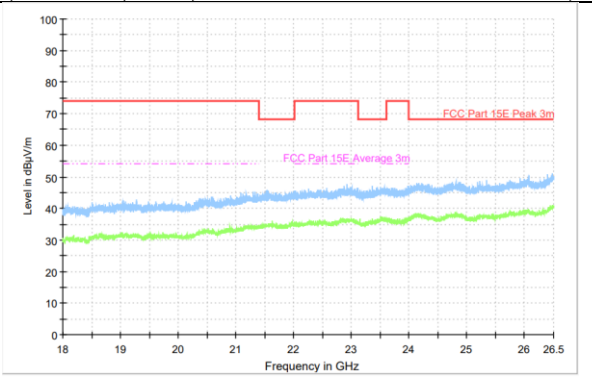
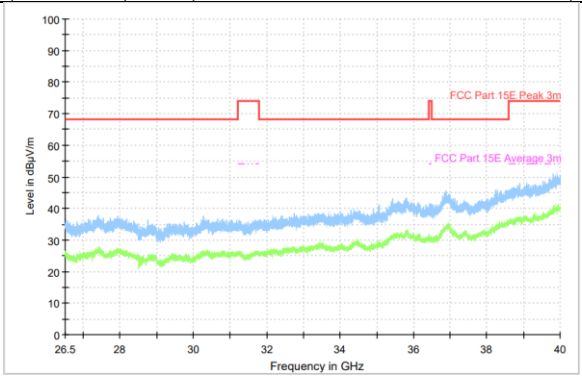
Radiated Spurious Emission (802.11ax(HE40)MIMO, ch3, 26.5GHz-40GHz)	Radiated Spurious Emission (802.11ax(HE40)MIMO, ch115,30MHz-1GHz)
	
Radiated Spurious Emission (802.11ax(HE40)MIMO, ch115,1GHz-8GHz)	Radiated Spurious Emission (802.11ax(HE40)MIMO, ch115,8GHz-18GHz)
	
Radiated Spurious Emission (802.11ax(HE40)MIMO, ch115, 18GHz-26.5GHz)	Radiated Spurious Emission (802.11ax(HE40)MIMO, ch115, 26.5GHz-40GHz)
	

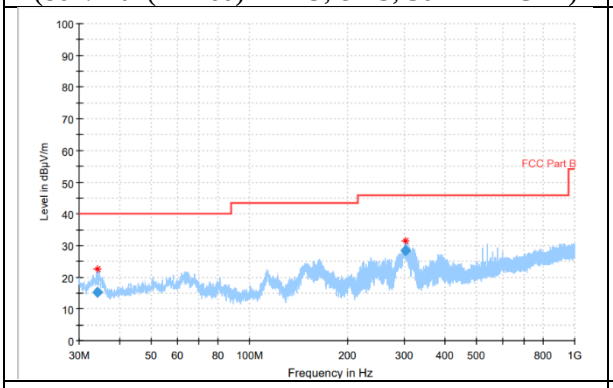
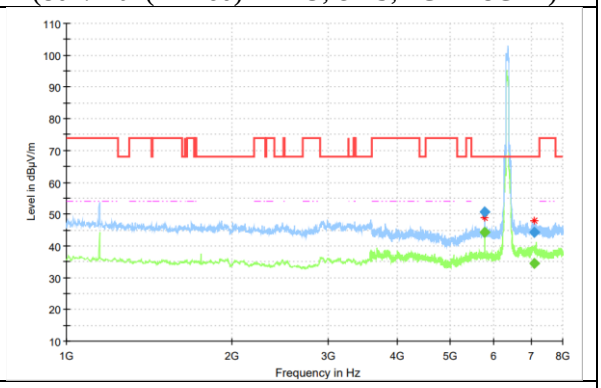
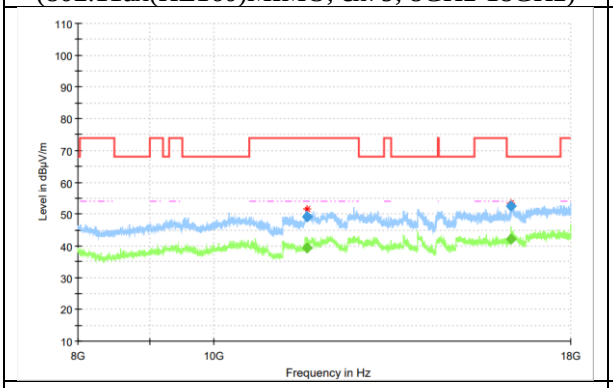
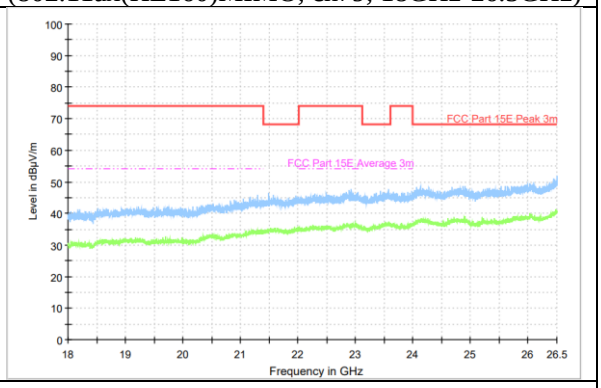
Radiated Spurious Emission (802.11ax(HE40)MIMO, ch179, 30MHz-1GHz)	Radiated Spurious Emission (802.11ax(HE40)MIMO, ch179, 1GHz-8GHz)
	
Radiated Spurious Emission (802.11ax(HE40)MIMO, ch179, 8GHz-18GHz)	**Radiated Spurious Emission (802.11ax(HE40)MIMO, ch179, 18GHz-26.5GHz)**
	
Radiated Spurious Emission (802.11ax(HE40)MIMO, ch179, 26.5GHz-40GHz)	**Radiated Spurious Emission (802.11ax(HE40)MIMO, ch227, 30MHz-1GHz)**
	

Radiated Spurious Emission (802.11ax(HE40)MIMO, ch227, 1GHz-8GHz)	Radiated Spurious Emission (802.11ax(HE40)MIMO, ch227, 8GHz-18GHz)
	
Radiated Spurious Emission (802.11ax(HE40)MIMO, ch227, 18GHz-26.5GHz)	Radiated Spurious Emission (802.11ax(HE40)MIMO, ch227, 26.5GHz-40GHz)
	
Radiated Spurious Emission (802.11ax(HE80)MIMO, ch87, 30MHz-1GHz)	Radiated Spurious Emission (802.11ax(HE80)MIMO, ch87, 1GHz-8GHz)
	

Radiated Spurious Emission (802.11ax(HE80)MIMO, ch87, 8GHz-18GHz)	Radiated Spurious Emission (802.11ax(HE80)MIMO, ch87, 18GHz-26.5GHz)
	
Radiated Spurious Emission (802.11ax(HE80)MIMO, ch87, 26.5GHz-40GHz)	**Radiated Spurious Emission (802.11ax(HE80)MIMO, ch119, 30MHz-1GHz)**
	
Radiated Spurious Emission (802.11ax(HE80)MIMO, ch119, 1GHz-8GHz)	**Radiated Spurious Emission (802.11ax(HE80)MIMO, ch119, 8GHz-18GHz)**
	

Radiated Spurious Emission (802.11ax(HE80)MIMO, ch119, 18GHz-26.5GHz)	Radiated Spurious Emission (802.11ax(HE80)MIMO, ch119, 26.5GHz-40GHz)
	
Radiated Spurious Emission (802.11ax(HE80)MIMO, ch167, 30MHz-1GHz)	Radiated Spurious Emission (802.11ax(HE80)MIMO, ch167, 1GHz-8GHz)
	
Radiated Spurious Emission (802.11ax(HE80)MIMO, ch167, 8GHz-18GHz)	Radiated Spurious Emission (802.11ax(HE80)MIMO, ch167, 18GHz-26.5GHz)
	

Radiated Spurious Emission (802.11ax(HE80)MIMO, ch167, 26.5GHz-40GHz)	Radiated Spurious Emission (802.11ax(HE80)MIMO, ch215, 30MHz-1GHz)
	
Radiated Spurious Emission (802.11ax(HE80)MIMO, ch215, 1GHz-8GHz)	Radiated Spurious Emission (802.11ax(HE80)MIMO, ch215, 8GHz-18GHz)
	
Radiated Spurious Emission (802.11ax(HE80)MIMO, ch215, 18GHz-26.5GHz)	Radiated Spurious Emission (802.11ax(HE80)MIMO, ch215, 26.5GHz-40GHz)
	

Radiated Spurious Emission (802.11ax(HE160)MIMO, ch79, 30MHz-1GHz)	Radiated Spurious Emission (802.11ax(HE160)MIMO, ch79, 1GHz-8GHz)
	
Radiated Spurious Emission (802.11ax(HE160)MIMO, ch79, 8GHz-18GHz)	**Radiated Spurious Emission (802.11ax(HE160)MIMO, ch79, 18GHz-26.5GHz)**
	
Radiated Spurious Emission (802.11ax(HE160)MIMO, ch79, 26.5GHz-40GHz)	**Radiated Spurious Emission (802.11ax(HE160)MIMO, ch111, 30MHz-1GHz)**