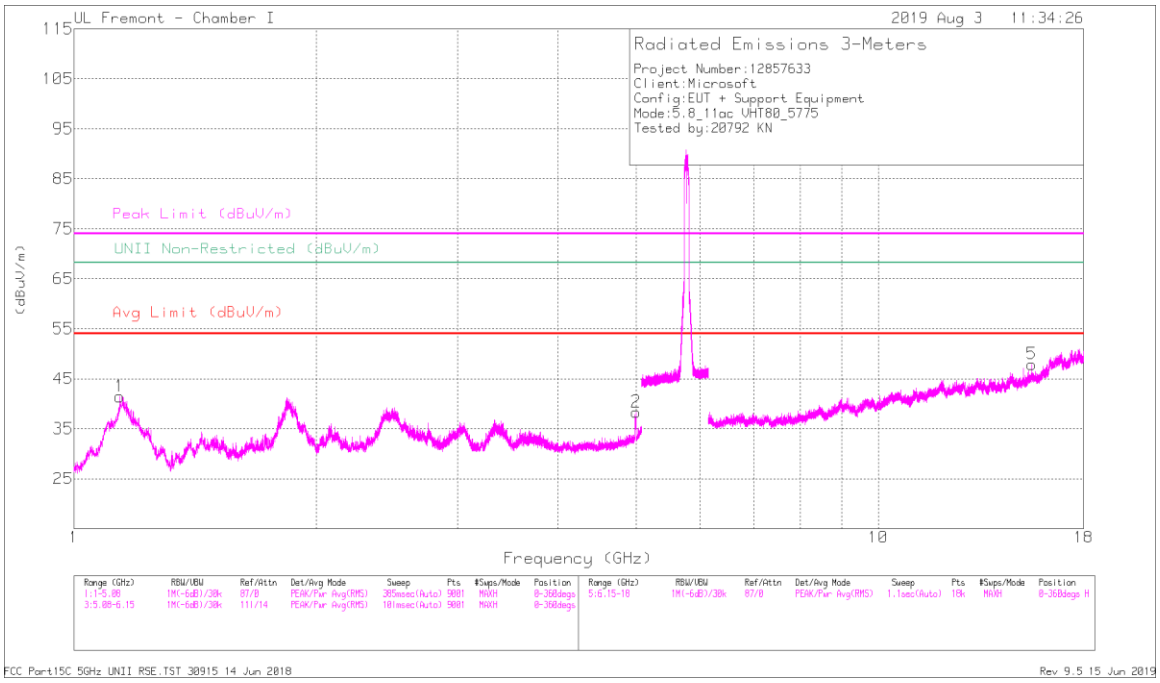
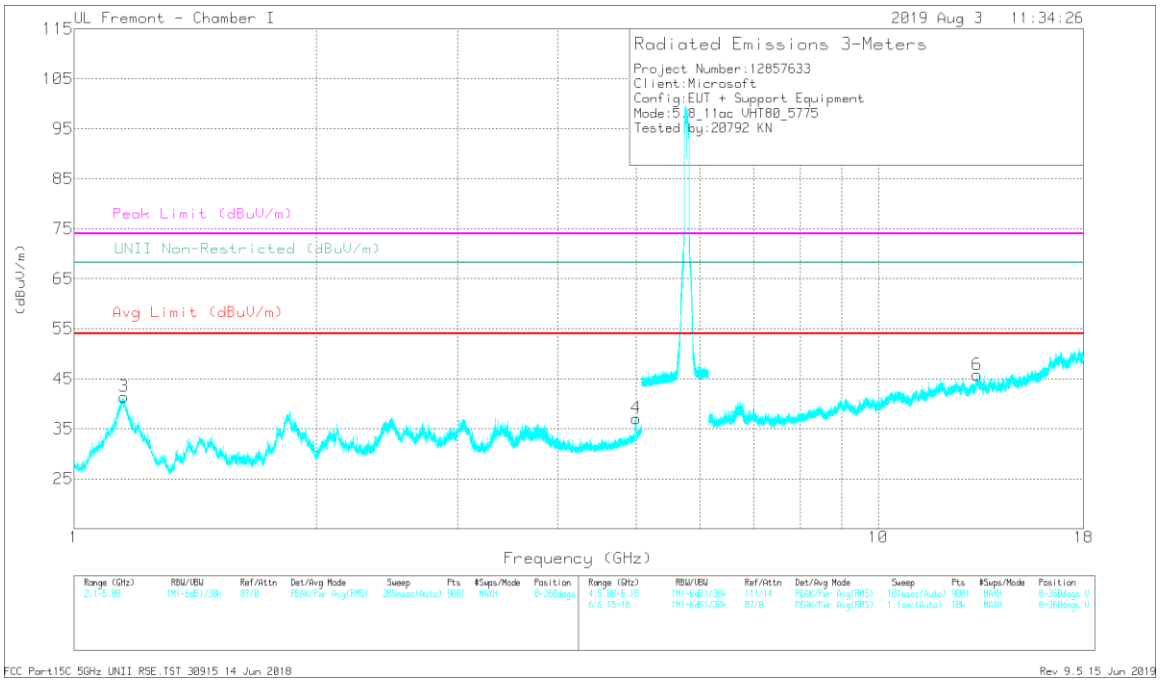
HARMONICS AND SPURIOUS EMISSIONS

MID CHANNEL RESULTS



HORIZONTAL



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RADIATED EMISSIONS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 1.14157	47.44	PK-U	27.6	-34	0	41.04	-	-	74	-32.96	-	-	136	182	H
* 1.14005	37.88	ADR	27.6	-34	.82	32.3	54	-21.7	-	-	-	-	136	182	H
* 4.99967	43.2	PK-U	34.3	-27.1	0	50.4	-	-	74	-23.6	-	-	97	176	H
* 4.99823	25.93	ADR	34.3	-27.1	.82	33.95	54	-20.05	-	-	-	-	97	176	H
* 1.15287	56.81	PK-U	27.6	-34	0	50.41	-	-	74	-23.59	-	-	261	197	V
* 1.15259	46.13	ADR	27.6	-34	.82	40.55	54	-13.45	-	-	-	-	261	197	V
* 4.99958	41.55	PK-U	34.3	-27.1	0	48.75	-	-	74	-25.25	-	-	276	244	V
* 4.99801	27.49	ADR	34.3	-27.1	.82	35.51	54	-18.49	-	-	-	-	276	244	V
* 15.52035	27.2	PK-U	40.1	-13.6	0	53.7	-	-	74	-20.3	-	-	352	207	H
* 15.52131	17.31	ADR	40.1	-13.6	.82	44.63	54	-9.37	-	-	-	-	352	207	H
* 13.26825	29.17	PK-U	39.6	-16.2	0	52.57	-	-	74	-21.43	-	-	64	167	V
* 13.27016	18.96	ADR	39.6	-16.2	.82	43.18	54	-10.82	-	-	-	-	64	167	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK-U - U-NII: Maximum Peak
ADR - U-NII AD primary method, RMS average

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9.2. SPURIOUS EMISSIONS FOR COLLOCATION

TEST-CASE CONDITIONS

Test Case #	Antenna	Mode	Frequency (MHz)
1	**Antenna 1**	BT, 8PSK & WLAN 5GHz, 11n HT20	2441 & 5500
2	**Antenna 1**	BLE & WLAN 5GHz, 11n HT20	2440 & 5500
3	**Antenna 1**	BT, 8PSK	2441
	Antenna 2	WLAN 5GHz, 11n HT20	5500
4	**Antenna 1**	BLE	2440
	Antenna 2	WLAN 5GHz, 11n HT20	5500

For simultaneous transmission of any BLE (2.4GHz) and WLAN (5 GHz) bands, and BT 8PSK (2.4GHz) and WLAN (5GHz) bands on different antennas, investigation has been performed and no noticeable new emission was found.

See report number 12857633-E2 for data on test case 1, BT 8PSK (2.4 GHz) and WLAN (5 GHz).

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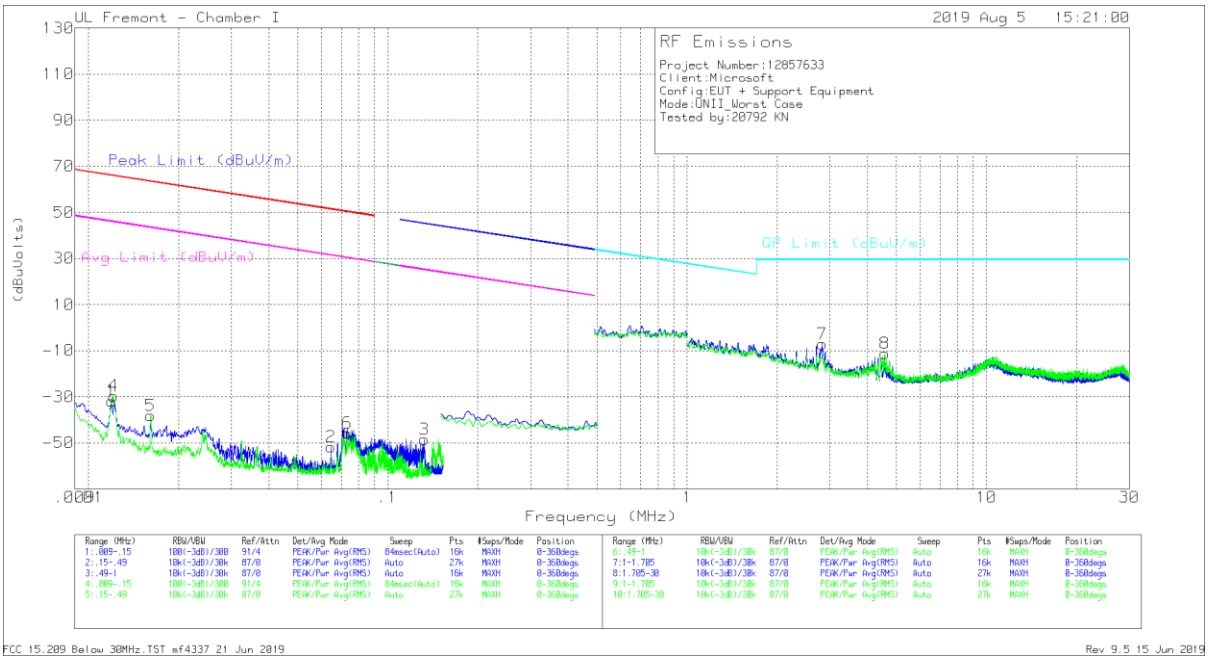
9.3. WORST CASE BELOW 30MHZ

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)



ANTENNA- TWO ORIENTATIONS FACE ON/FACE OFF

Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (ACF)	Cables w/ PRE018 0175 (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.01193	20.62	Pk	59.9	-32.4	-80	-31.88	66.05	-97.93	46.05	-77.93	-	-	-	-	0-360
2	.06467	4.39	Pk	55.9	-32	-80	-51.71	51.37	-103.08	31.37	-83.08	-	-	-	-	0-360
3	.13246	7.87	Pk	55.6	-31.9	-80	-48.43	-	-	-	-	45.18	-93.61	25.18	-73.61	0-360
4	.01212	22.96	Pk	59.9	-32.4	-80	-29.54	65.91	-95.45	45.91	-75.45	-	-	-	-	0-360
5	.01615	15.1	Pk	59.3	-32.4	-80	-38	63.42	-101.42	43.42	-81.42	-	-	-	-	0-360
6	.07338	10.53	Pk	55.7	-32	-80	-45.77	50.27	-96.04	30.27	-76.04	-	-	-	-	0-360

Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (ACF)	Cables w/ PRE0180175 (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
7	2.82426	25.29	Pk	39.3	-31.7	-40	-7.11	29.5	-36.61	0-360
8	4.56918	24.04	Pk	36.5	-31.7	-40	-11.16	29.5	-40.66	0-360

Pk - Peak detector

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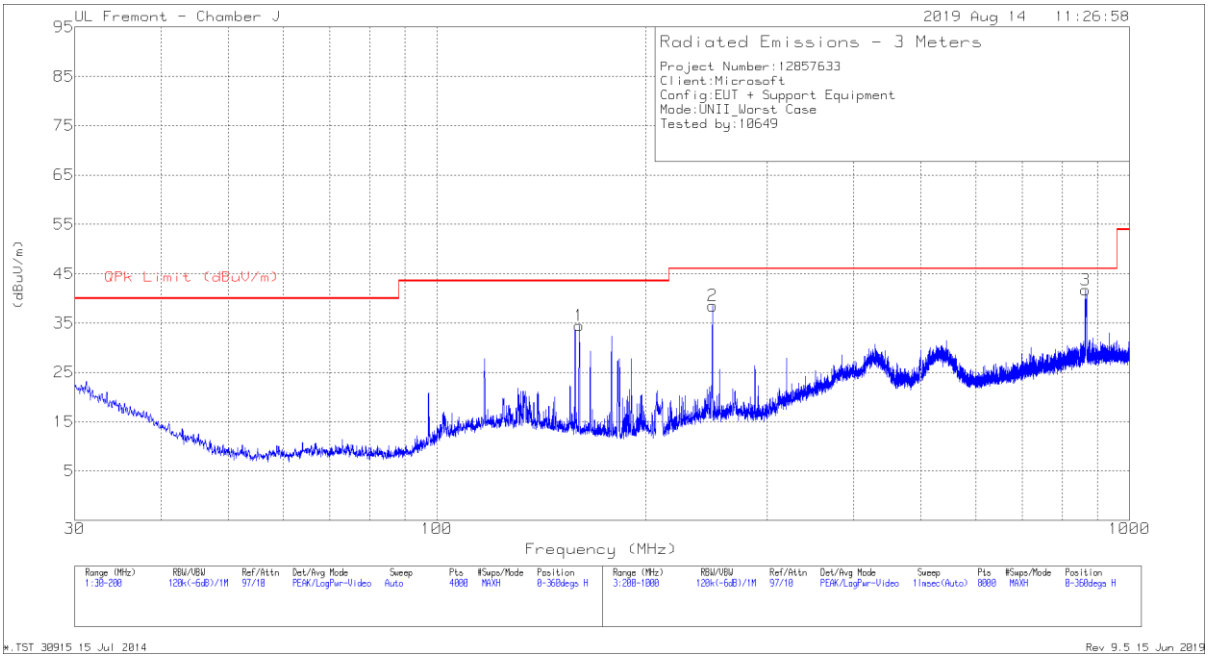
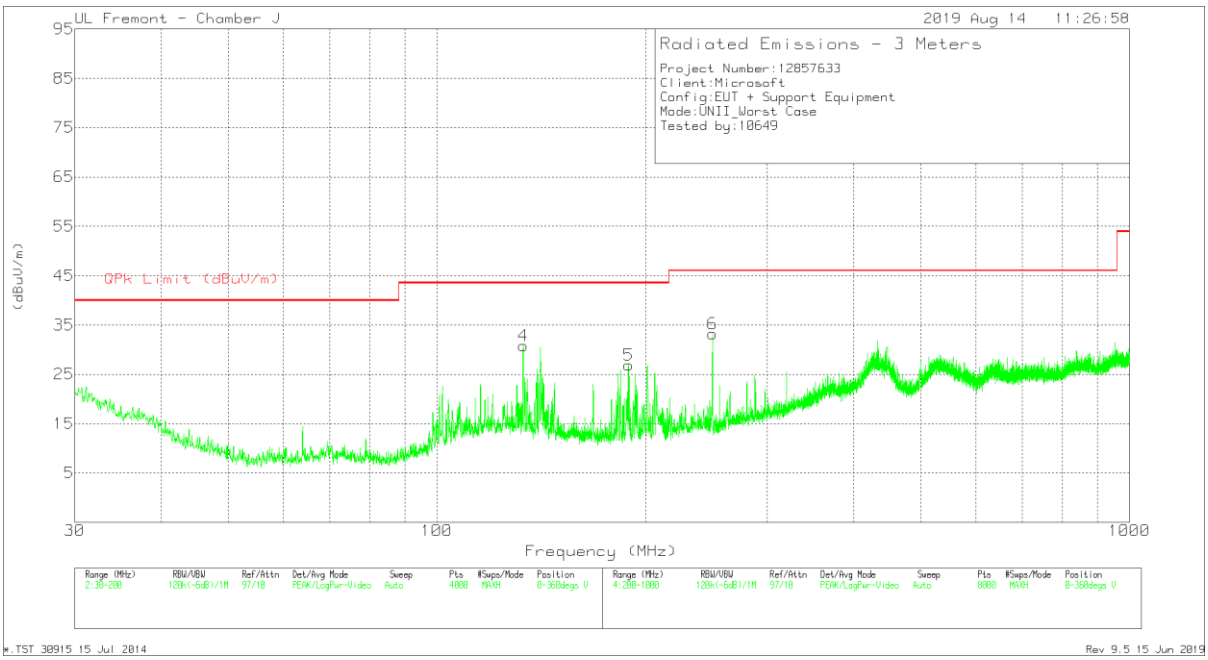
9.4. WORST CASE BELOW 1 GHZ



HORIZONTAL



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Below 1GHz DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF PRE0184971 (dB/m)	Amp Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	160.5088	46.96	Pk	18.2	-30.7	34.46	43.52	-9.06	0-360	398	H
4	* 133.2592	42.18	Pk	19.4	-30.8	30.78	43.52	-12.74	0-360	101	V
5	189.0337	40.23	Pk	17.1	-30.5	26.83	43.52	-16.69	0-360	101	V
2	* 249.9065	51.39	Pk	17.4	-30.3	38.49	46.02	-7.53	0-360	101	H
3	863.4862	41.61	Pk	27.8	-27.7	41.71	46.02	-4.31	0-360	101	H
	865.1146	34.77	Qp	27.8	-27.7	34.87	46.02	-11.15	98	112	H
6	* 249.9065	46.14	Pk	17.4	-30.3	33.24	46.02	-12.78	0-360	101	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
Qp - Quasi-Peak detector

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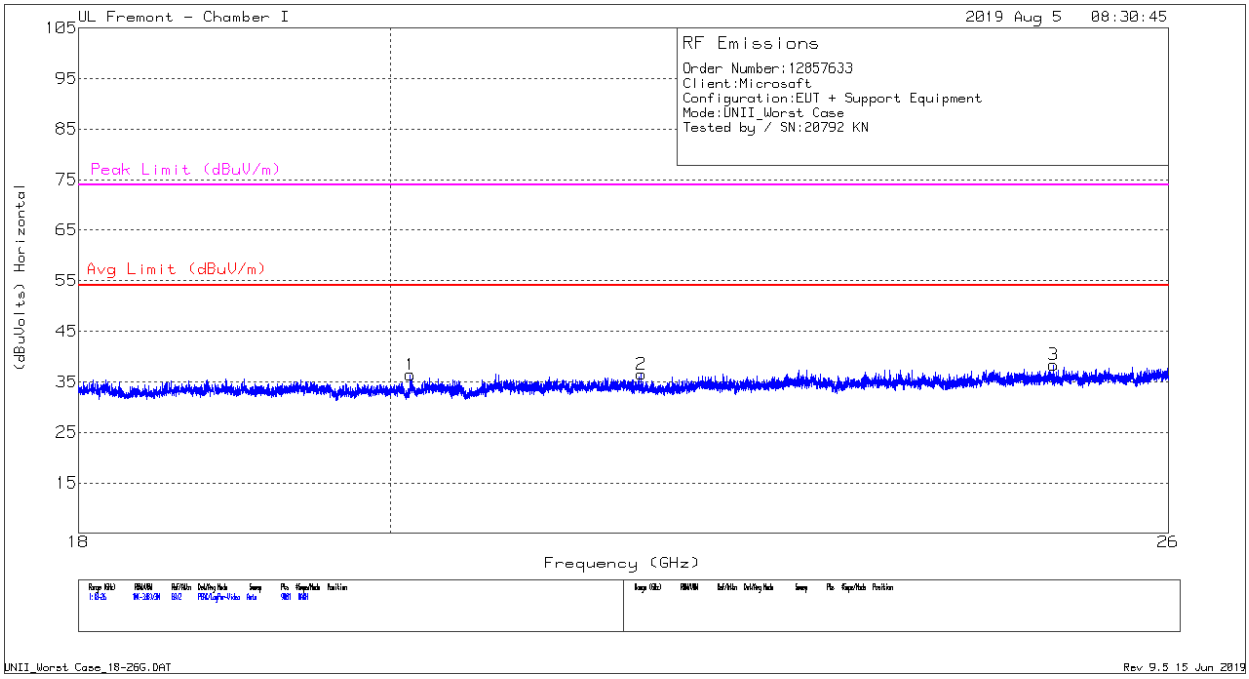
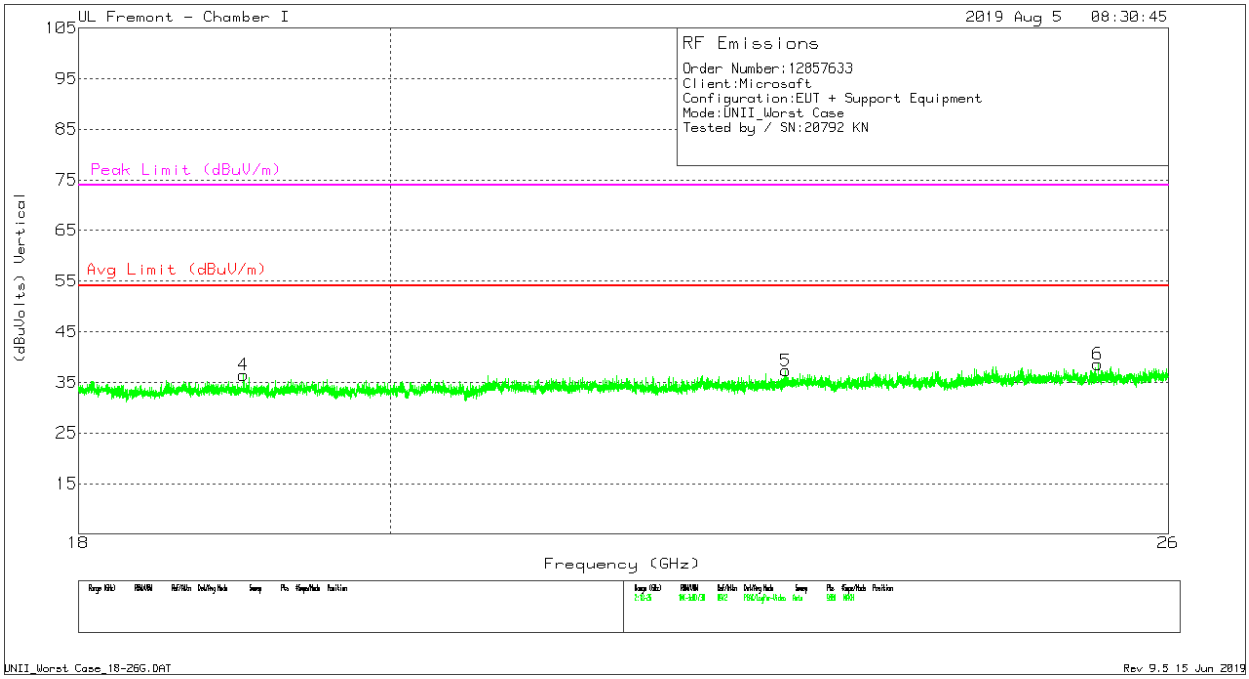
9.5. WORST CASE 18-26 GHZ



HORIZONTAL



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18 – 26GHz DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF PRE018218 8 (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	20.13511	69.26	Pk	33.5	-56.9	-9.5	36.36	54	-17.64	74	-37.64
2	21.768	69.73	Pk	33.9	-57.6	-9.5	36.53	54	-17.47	74	-37.47
3	25.01333	68.43	Pk	34.9	-55.5	-9.5	38.33	54	-15.67	74	-35.67
4	19.032	70.05	Pk	33.3	-57.4	-9.5	36.45	54	-17.55	74	-37.55
5	22.85422	70.22	Pk	34.2	-57.6	-9.5	37.32	54	-16.68	74	-36.68
6	25.392	68.29	Pk	34.9	-55.1	-9.5	38.59	54	-15.41	74	-35.41

Pk - Peak detector

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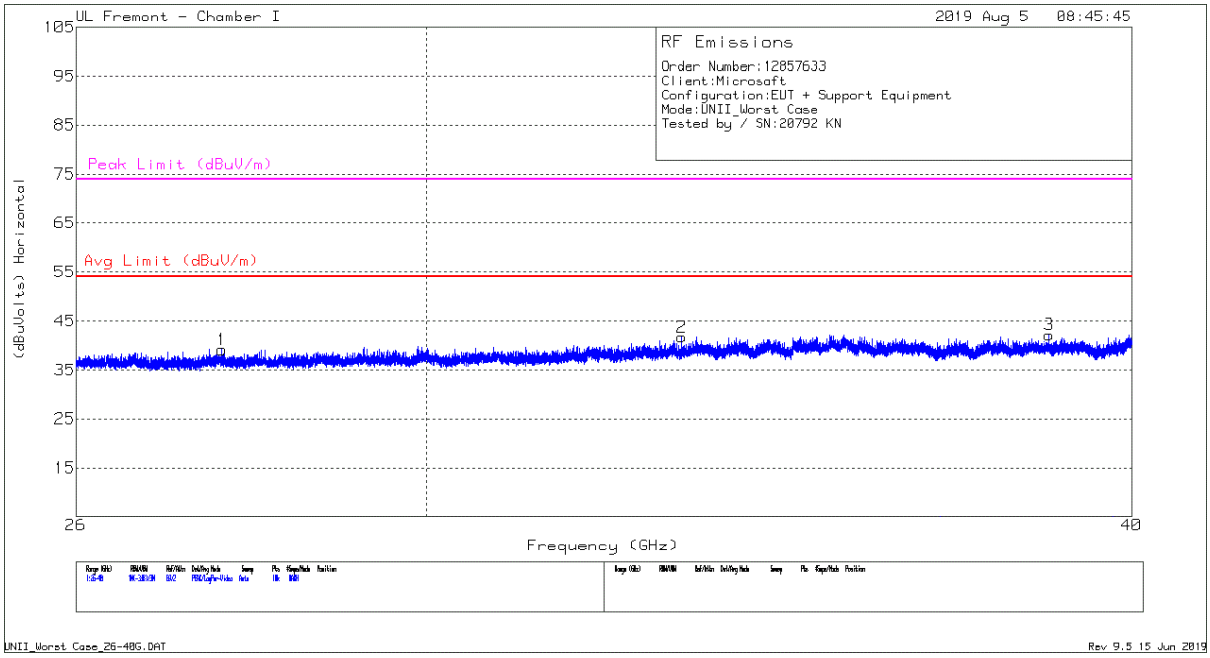
9.6. WORST CASE 26-40 GHZ



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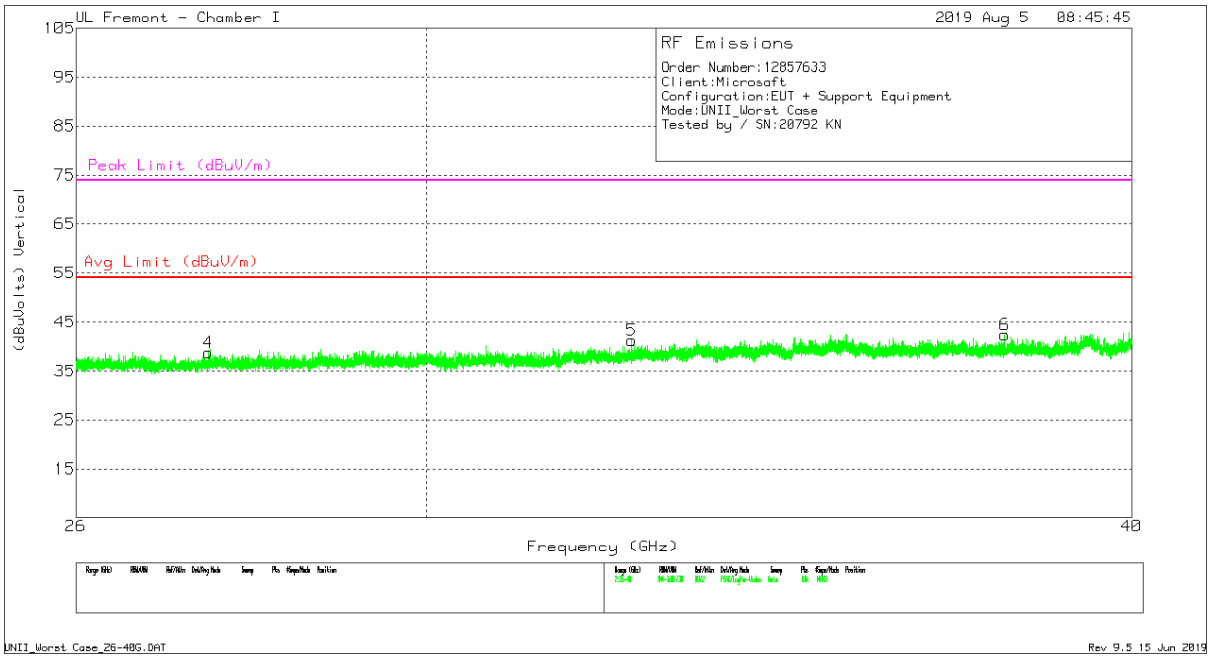

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26 – 40GHz DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T90 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	27.59833	68.04	Pk	35.8	-55.2	-9.5	39.14	54	-14.86	74	-34.86
2	33.28778	68.24	Pk	37	-54	-9.5	41.74	54	-12.26	74	-32.26
3	38.68089	70.31	Pk	36.7	-55.3	-9.5	42.21	54	-11.79	74	-31.79
4	27.44433	68.29	Pk	35.7	-55.7	-9.5	38.79	54	-15.21	74	-35.21
5	32.62045	68.18	Pk	36.3	-53.7	-9.5	41.28	54	-12.72	74	-32.72
6	37.98245	70.06	Pk	37.2	-55.4	-9.5	42.36	54	-11.64	74	-31.64

Pk - Peak detector

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10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

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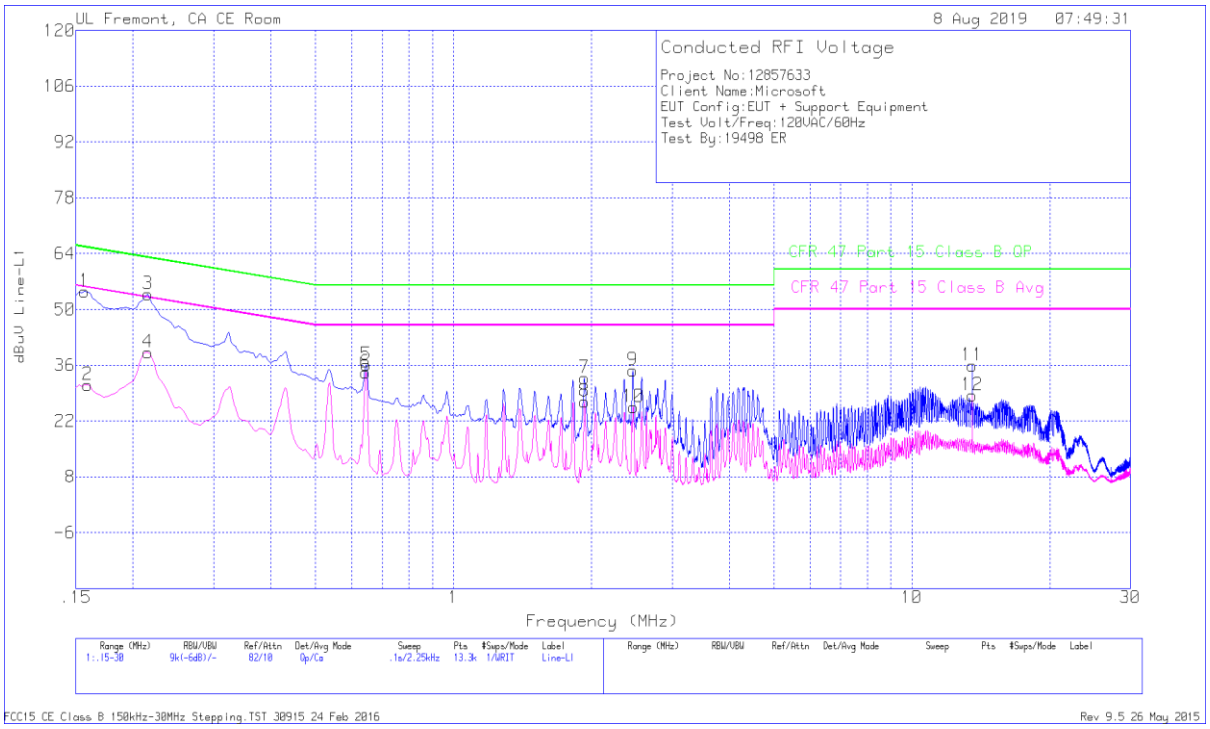
10.1.1. AC Power Line Norm

LINE 1 RESULTS



Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
1	.15675	44.28	Qp	.1	0	10.1	54.48	65.63	-11.15	-	-
2	.159	20.89	Ca	.1	0	10.1	31.09	-	-	55.52	-24.43
3	.21525	43.8	Qp	0	0	10.1	53.9	63	-9.1	-	-
4	.21525	29.19	Ca	0	0	10.1	39.29	-	-	53	-13.71
5	.645	25.93	Qp	0	0	10.1	36.03	56	-19.97	-	-
6	.64275	24.06	Ca	0	0	10.1	34.16	-	-	46	-11.84
7	1.932	22.58	Qp	0	.1	10.1	32.78	56	-23.22	-	-
8	1.932	16.73	Ca	0	.1	10.1	26.93	-	-	46	-19.07
9	2.46075	24.43	Qp	0	.1	10.1	34.63	56	-21.37	-	-
10	2.4675	15.25	Ca	0	.1	10.1	25.45	-	-	46	-20.55
11	13.56	25.34	Qp	.1	.2	10.2	35.84	60	-24.16	-	-
12	13.56	17.95	Ca	.1	.2	10.2	28.45	-	-	50	-21.55

Qp - Quasi-Peak detector
Ca - CISPR average detection
NOTE: Markers 11 and 12, 13.56MHz is an external NFC signal unrelated to the EUT.

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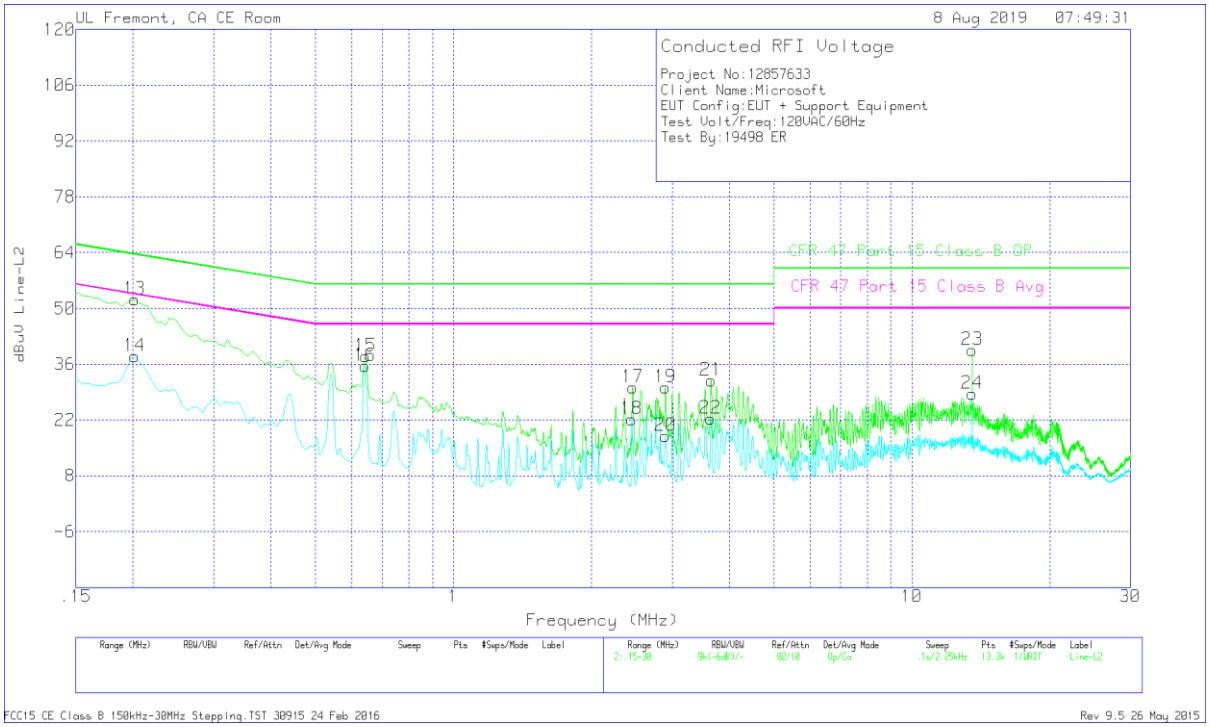
LINE 2 RESULTS



Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR)Margin (dB)
13	.20175	42.17	Qp	0	0	10.1	52.27	63.54	-11.27	-	-
14	.20175	27.89	Ca	0	0	10.1	37.99	-	-	53.54	-15.55
15	.64275	27.84	Qp	0	0	10.1	37.94	56	-18.06	-	-
16	.6405	25.43	Ca	0	0	10.1	35.53	-	-	46	-10.47
17	2.46075	19.93	Qp	0	.1	10.1	30.13	56	-25.87	-	-
18	2.4495	11.92	Ca	0	.1	10.1	22.12	-	-	46	-23.88
19	2.89725	19.99	Qp	0	.1	10.1	30.19	56	-25.81	-	-
20	2.8995	7.74	Ca	0	.1	10.1	17.94	-	-	46	-28.06
21	3.6465	21.71	Qp	0	.1	10.1	31.91	56	-24.09	-	-
22	3.64425	12.09	Ca	0	.1	10.1	22.29	-	-	46	-23.71
23	13.56	29.03	Qp	.1	.2	10.2	39.53	60	-20.47	-	-
24	13.56	18.08	Ca	.1	.2	10.2	28.58	-	-	50	-21.42

Qp - Quasi-Peak detector
Ca - CISPR average detection
NOTE: Markers 23 and 24, 13.56MHz is an external NFC signal unrelated to the EUT.

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