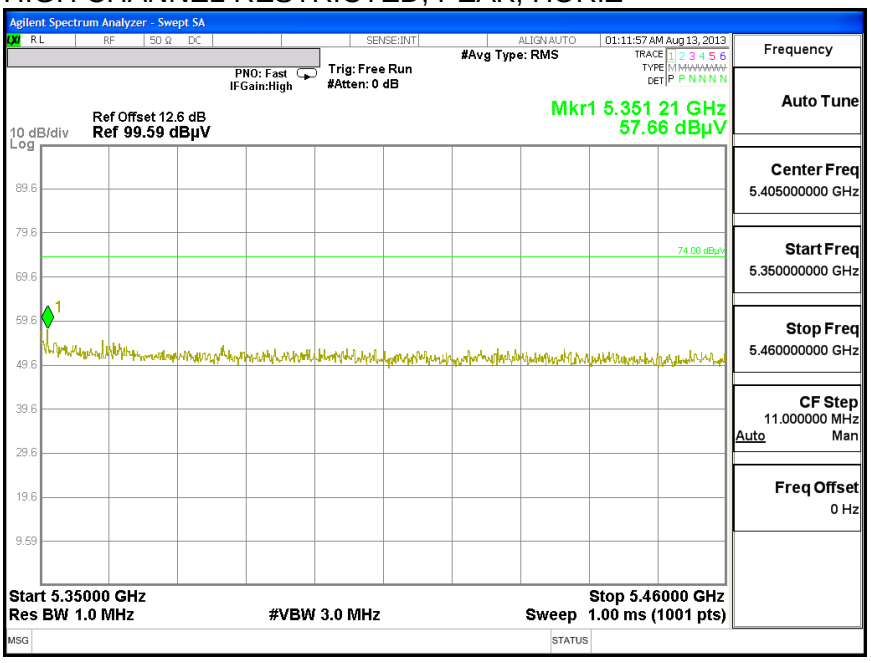
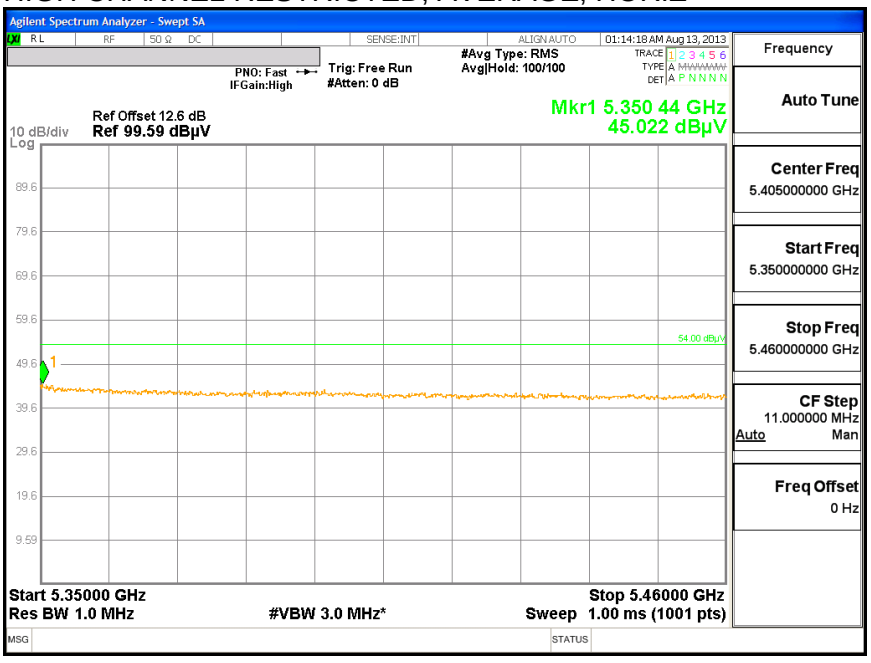
9.2.8. 802.11n HT20 2TX CDD MODE IN THE 5.3 GHz BAND

RESTRICTED BANDEDGE (HIGH CHANNEL)

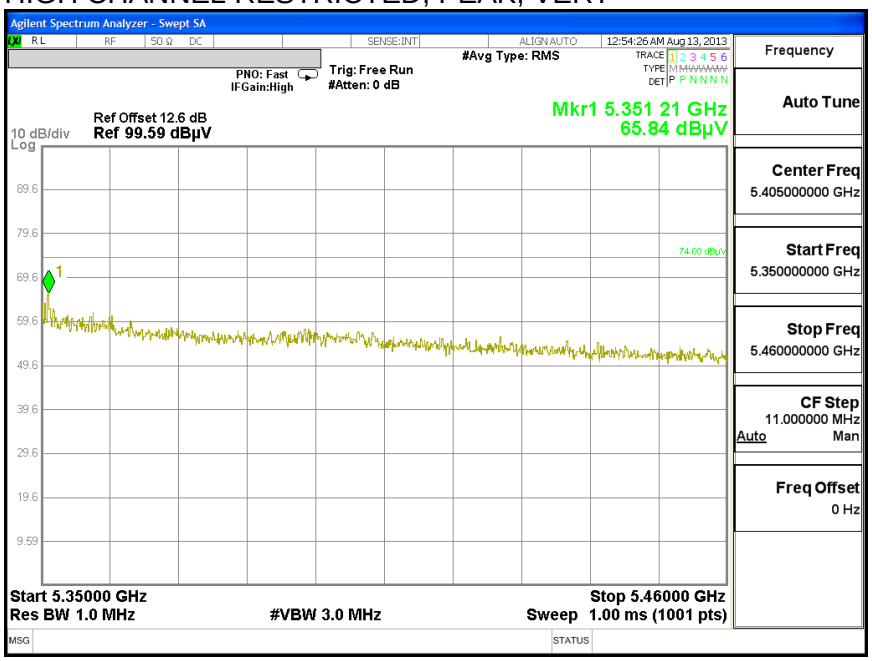
HIGH CHANNEL RESTRICTED, PEAK, HORIZ



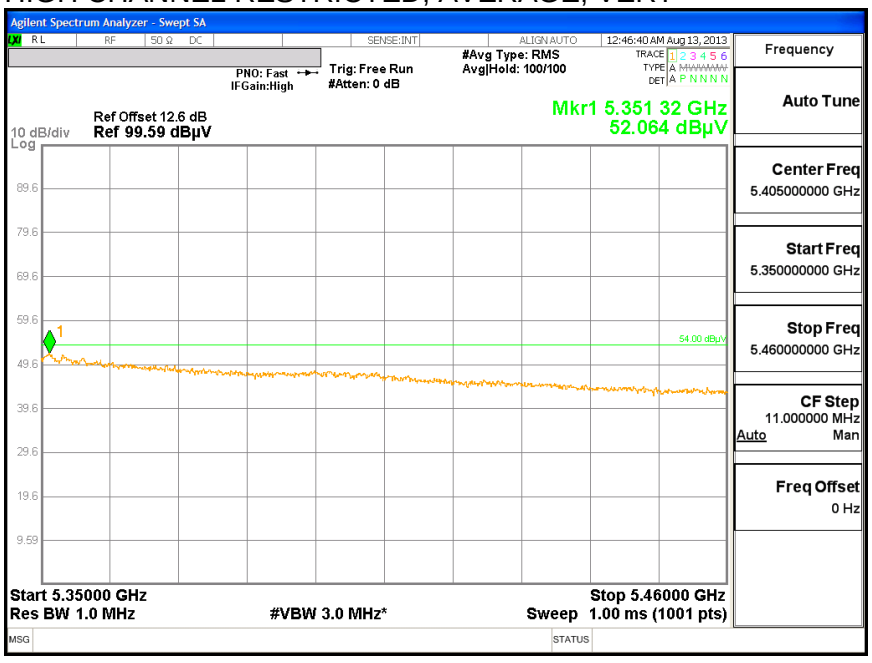
HIGH CHANNEL RESTRICTED, AVERAGE, HORIZ



HIGH CHANNEL RESTRICTED, PEAK, VERT

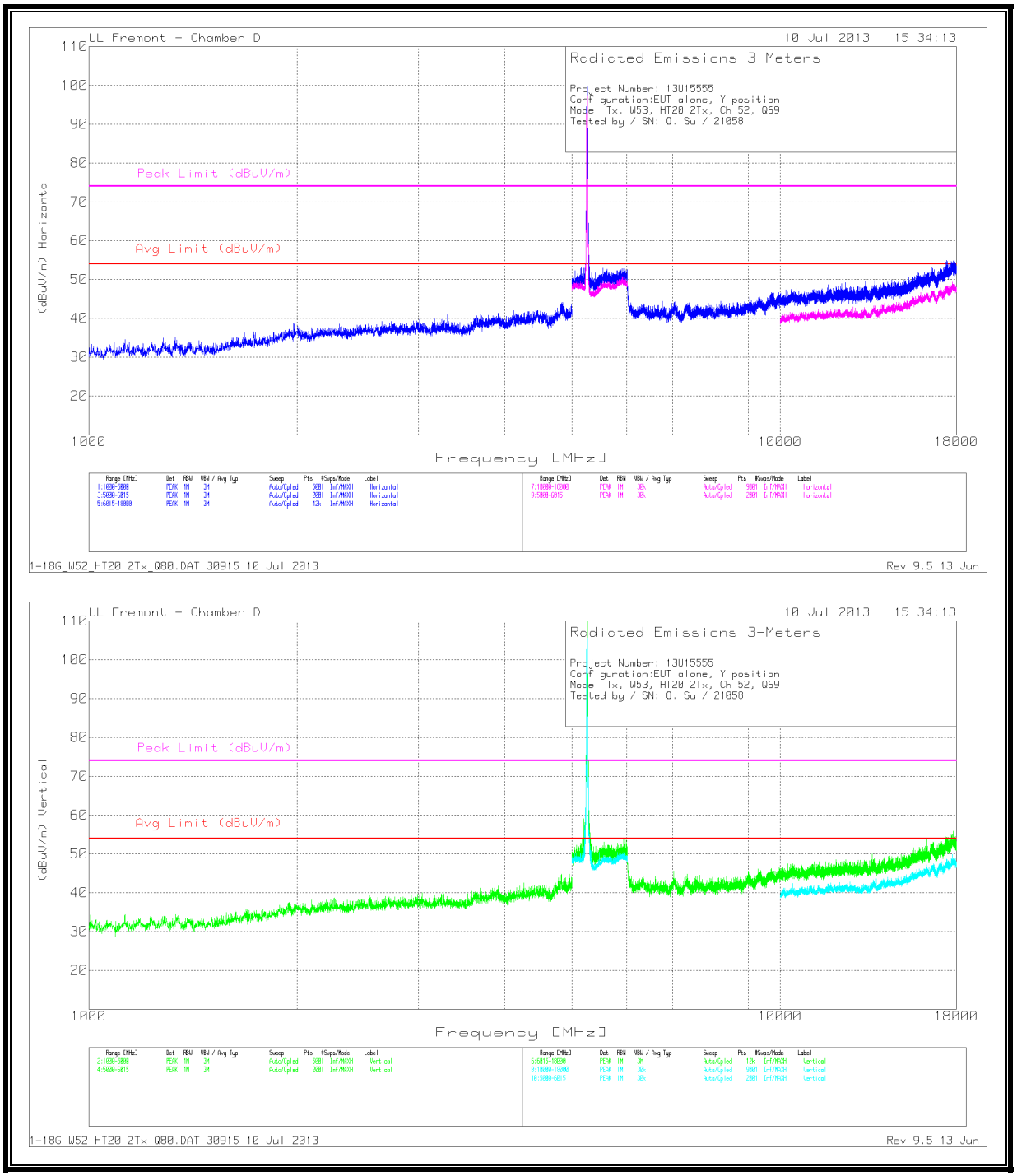


HIGH CHANNEL RESTRICTED, AVERAGE, VERT



HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL



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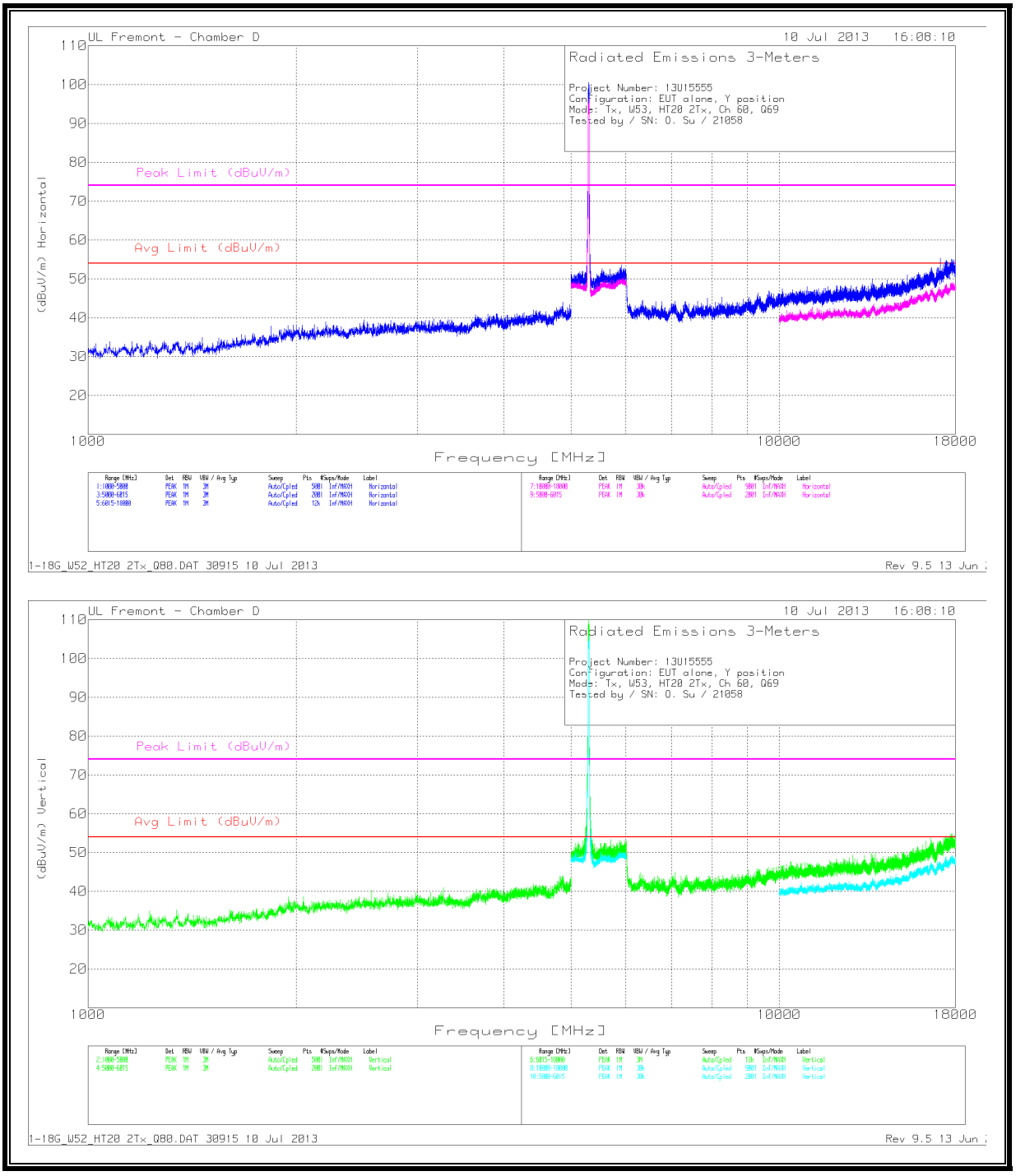
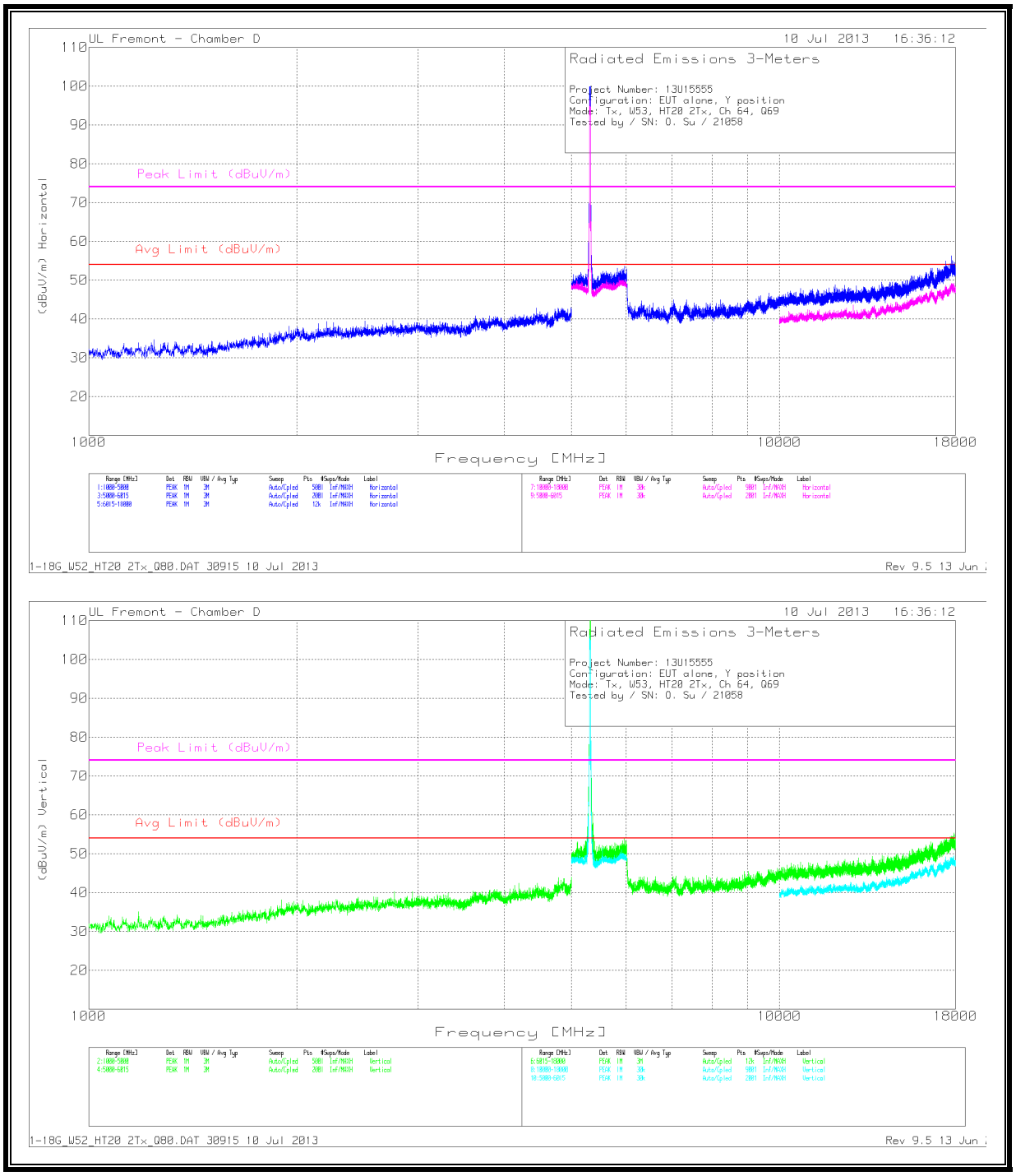
MID CHANNEL



1-18G_W52_HT20 2Tx_Q80.DAT 30915 10 Jul 2013Rev 9.5 13 Jun 2013

HIGH CHANNEL

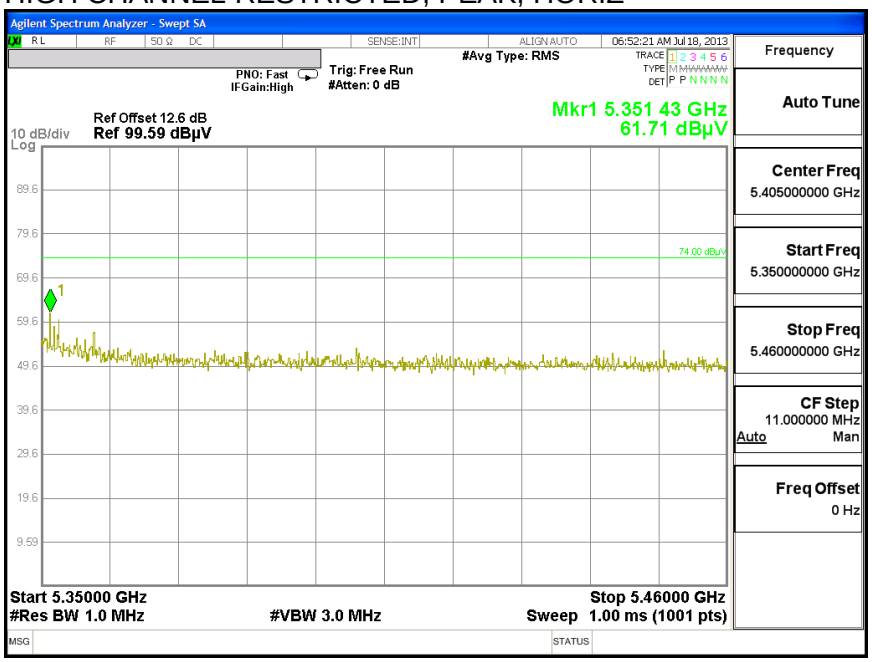


1-18G_W53_HT20 2Tx_Q69.DAT 30915 10 Jul 2013Rev 9.5 13 Jun 2013

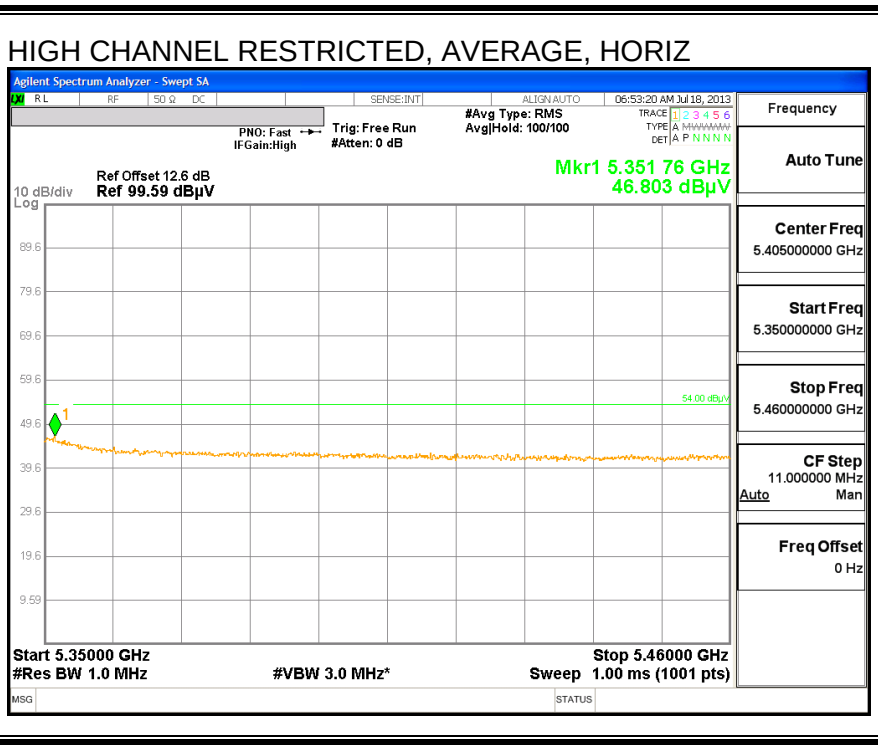
9.2.9. 802.11n HT40 SISO MODE IN THE 5.3 GHz BAND

RESTRICTED BANDEDGE (HIGH CHANNEL)

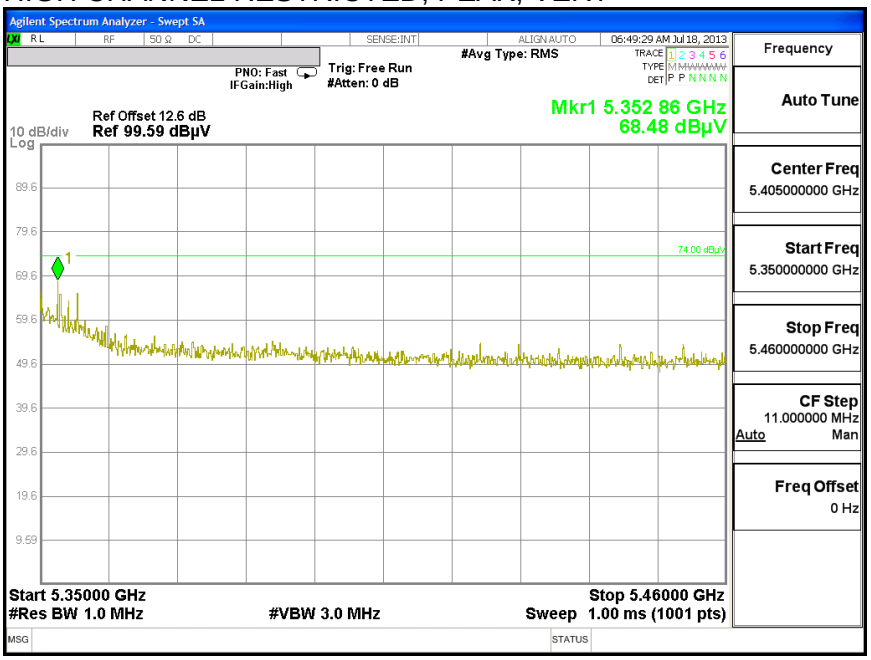
HIGH CHANNEL RESTRICTED, PEAK, HORIZ



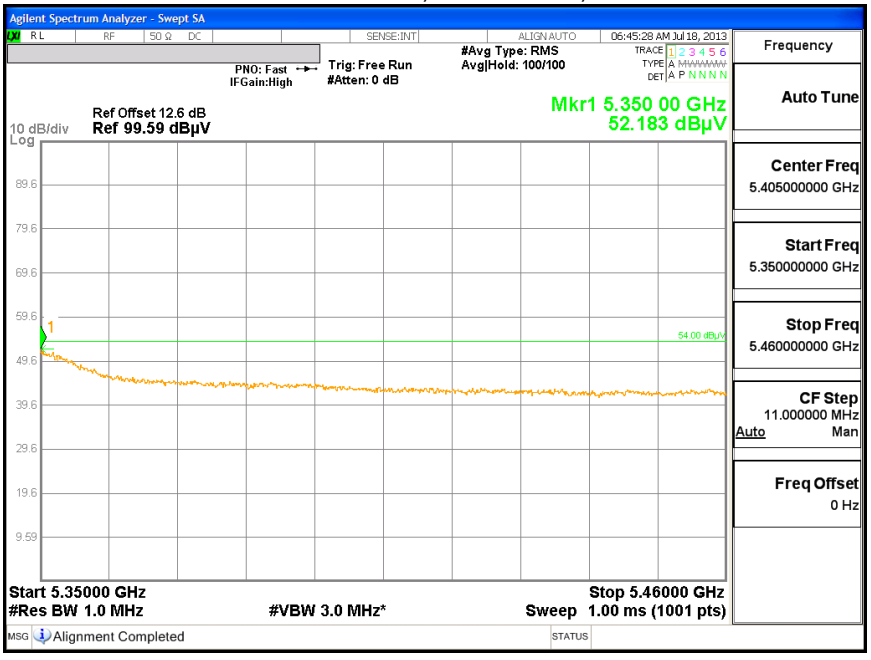
HIGH CHANNEL RESTRICTED, AVERAGE, HORIZ



HIGH CHANNEL RESTRICTED, PEAK, VERT

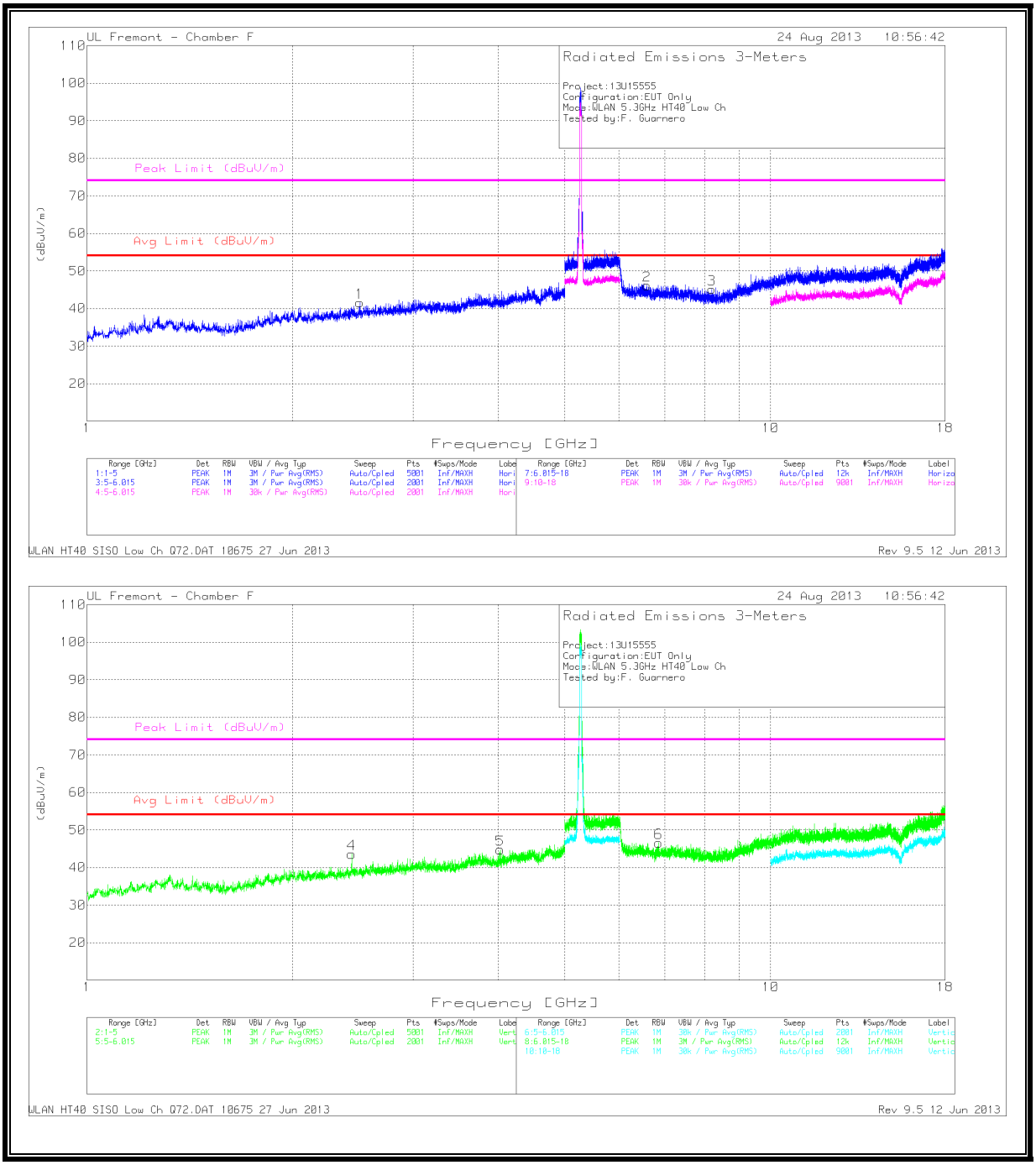


HIGH CHANNEL RESTRICTED, AVERAGE, VERT



HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL

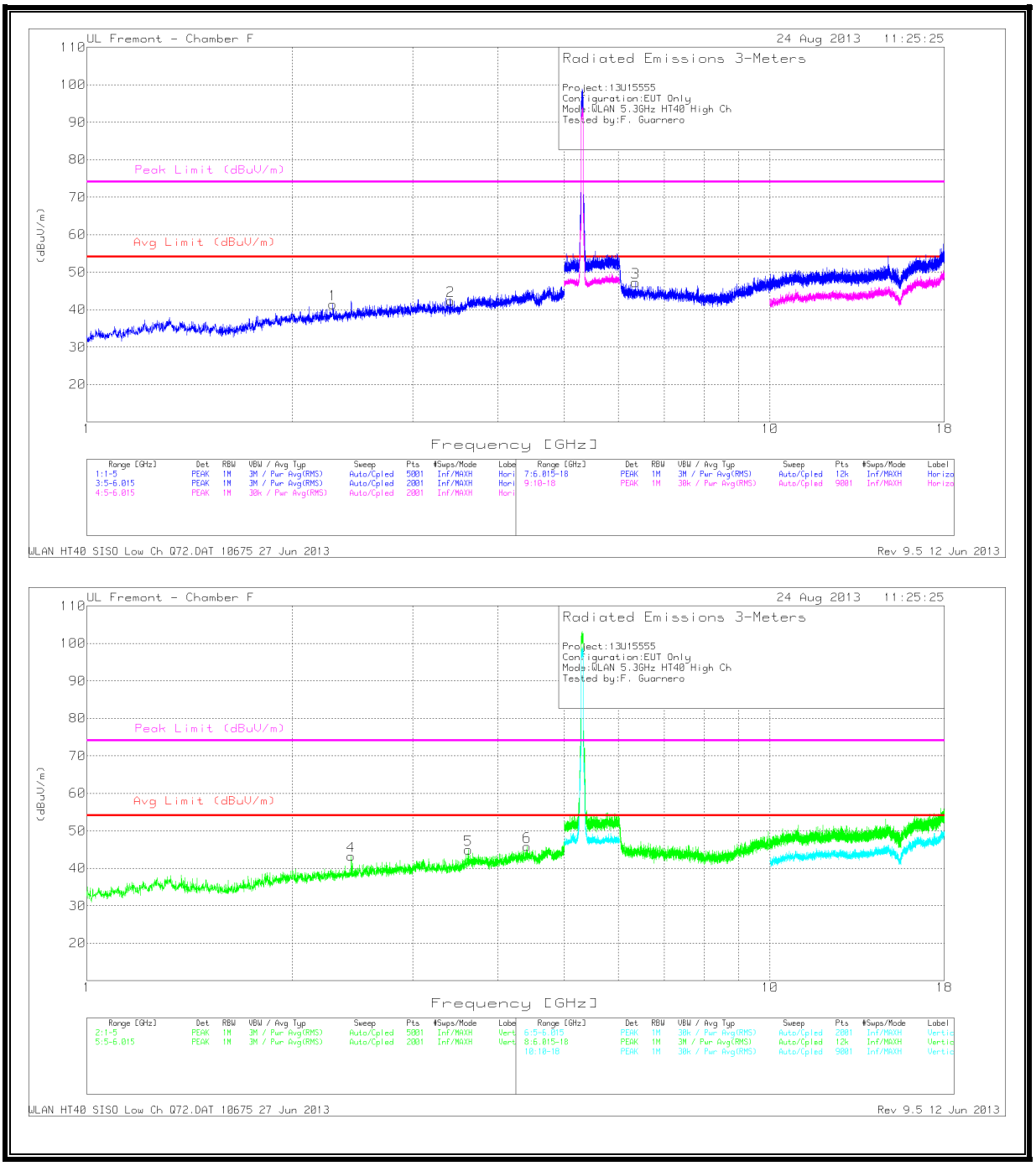


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.506	39.81	PK	32.5	-30.7	41.61	53.97	-12.36	74	-32.39	0-360	200	H
2	6.593	36.76	PK	35.8	-26.4	46.16	53.97	-7.81	74	-27.84	0-360	100	H
3	8.201	36.53	PK	36	-27.4	45.13	53.97	-8.84	74	-28.87	0-360	100	H
4	2.439	42.28	PK	32.3	-31	43.58	53.97	-10.39	74	-30.42	0-360	100	V
5	4.022	39.69	PK	33.5	-28.4	44.79	53.97	-9.18	74	-29.21	0-360	199	V
6	6.859	37.69	PK	35.7	-26.8	46.59	53.97	-7.38	74	-27.41	0-360	100	V

PK - Peak detector

HIGH CHANNEL



Trace Markers

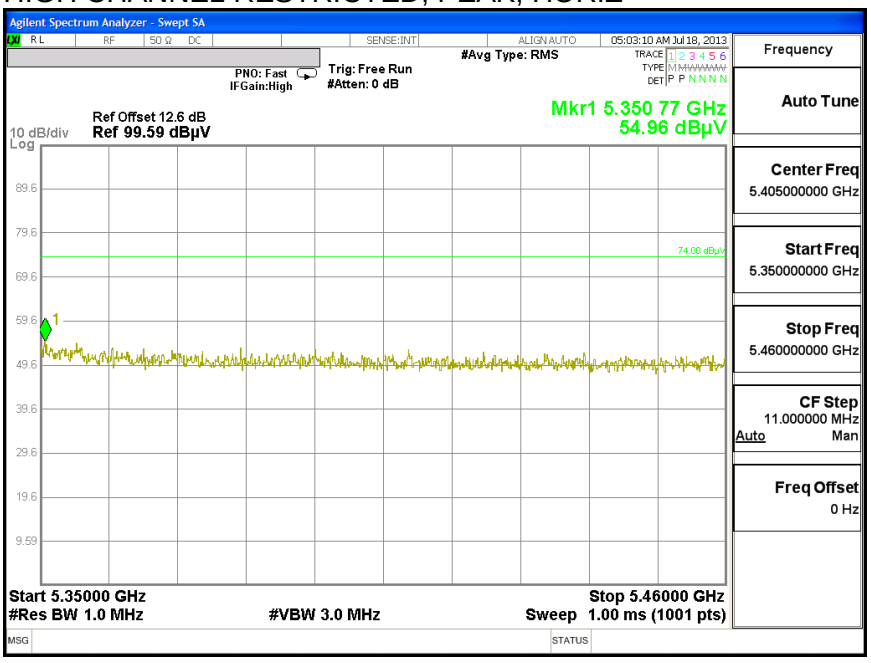
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	2.291	40.03	PK	32	-30.6	41.43	53.97	-12.54	74	-32.57	0-360	199	H
2	3.406	38.97	PK	33	-29.6	42.37	53.97	-11.6	74	-31.63	0-360	98	H
3	6.355	38.57	PK	35.6	-26.9	47.27	53.97	-6.7	74	-26.73	0-360	100	H
4	2.437	42.06	PK	32.3	-31.1	43.26	53.97	-10.71	74	-30.74	0-360	201	V
5	3.62	40.85	PK	33.7	-29.6	44.95	53.97	-9.02	74	-29.05	0-360	101	V
6	4.41	40.14	PK	33.7	-28	45.84	53.97	-8.13	74	-28.16	0-360	101	V

PK - Peak detector

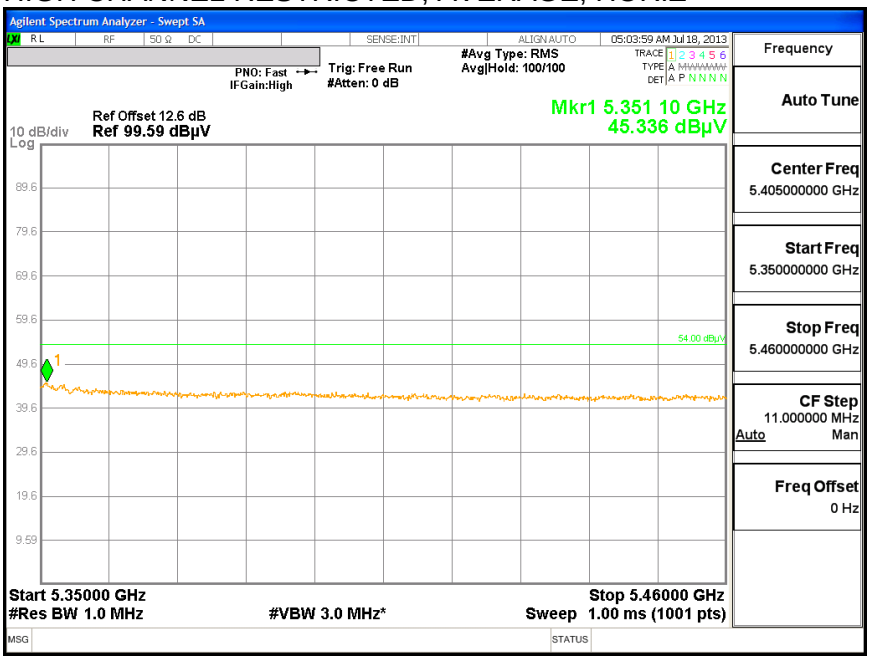
9.2.10. 802.11n HT40 2TX CDD MODE IN THE 5.3 GHz BAND

RESTRICTED BANDEDGE (HIGH CHANNEL)

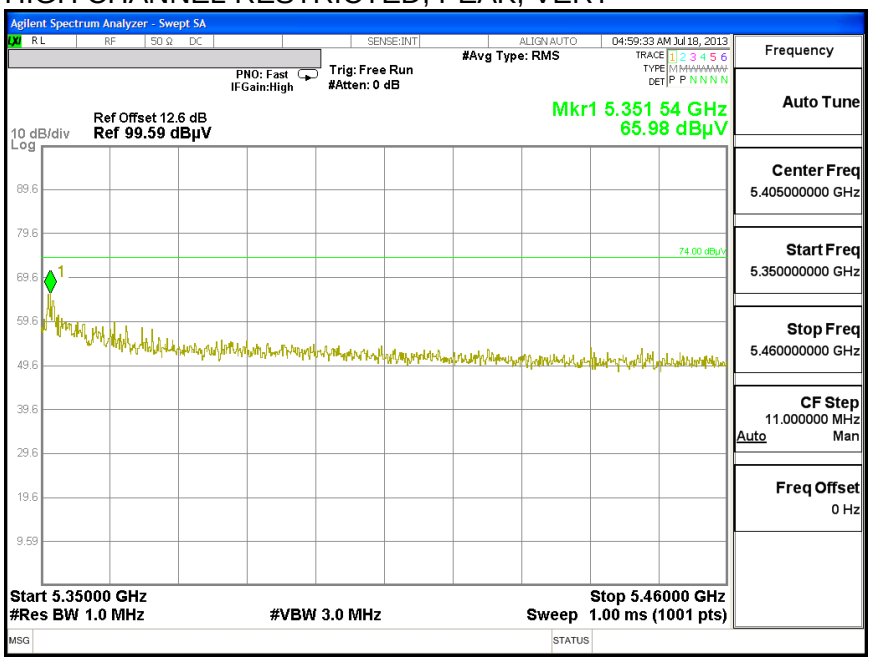
HIGH CHANNEL RESTRICTED, PEAK, HORIZ



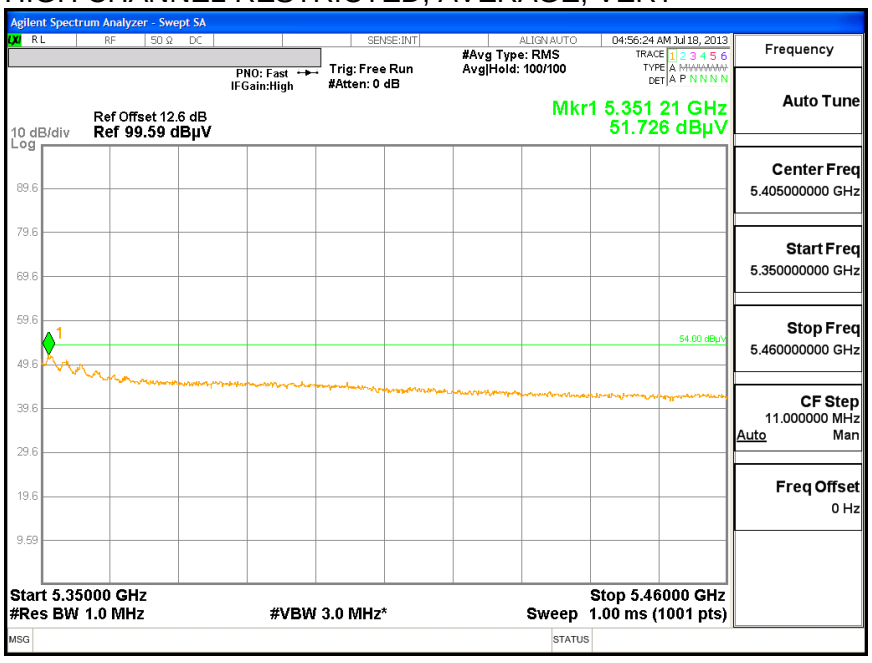
HIGH CHANNEL RESTRICTED, AVERAGE, HORIZ



HIGH CHANNEL RESTRICTED, PEAK, VERT

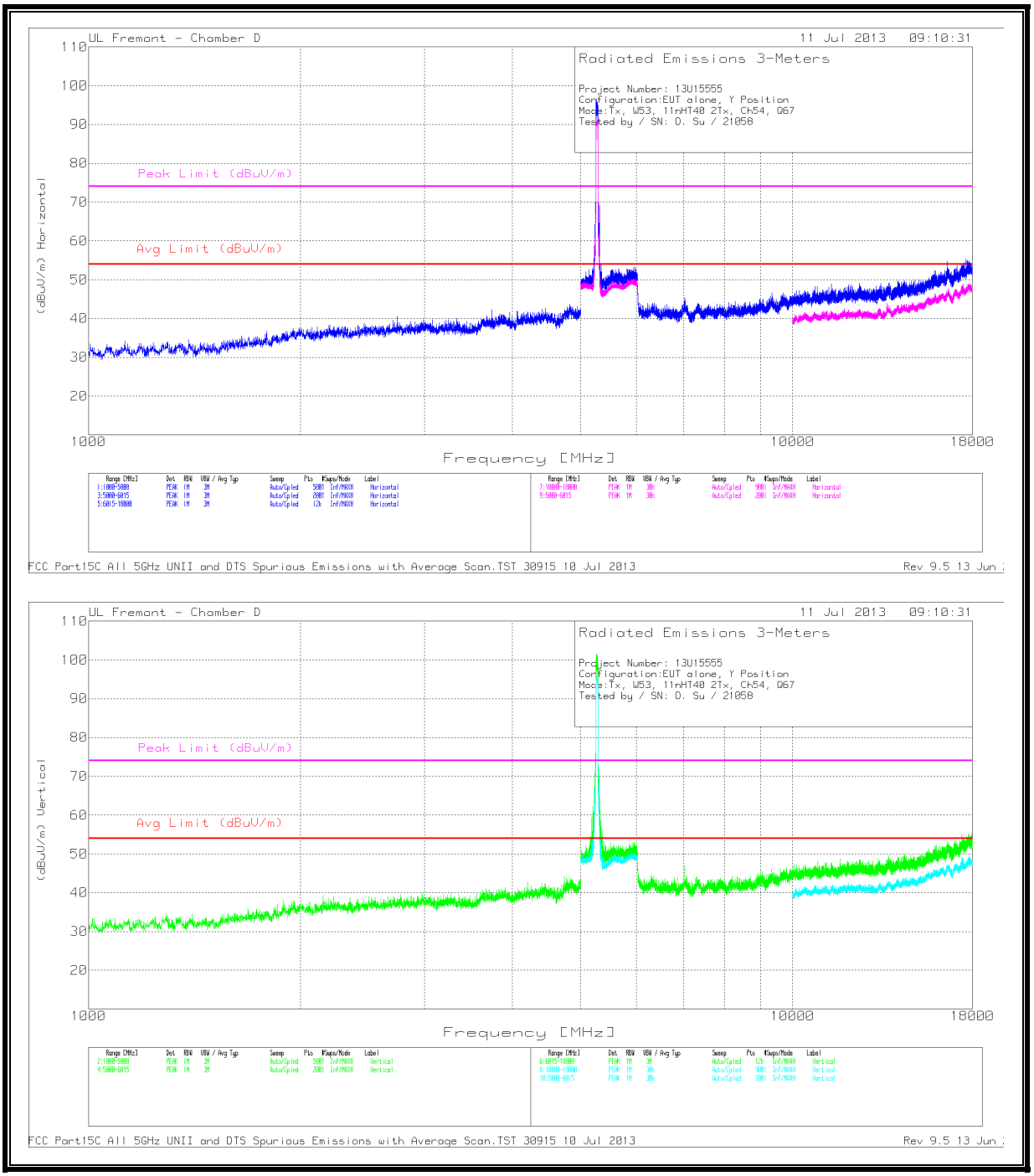


HIGH CHANNEL RESTRICTED, AVERAGE, VERT



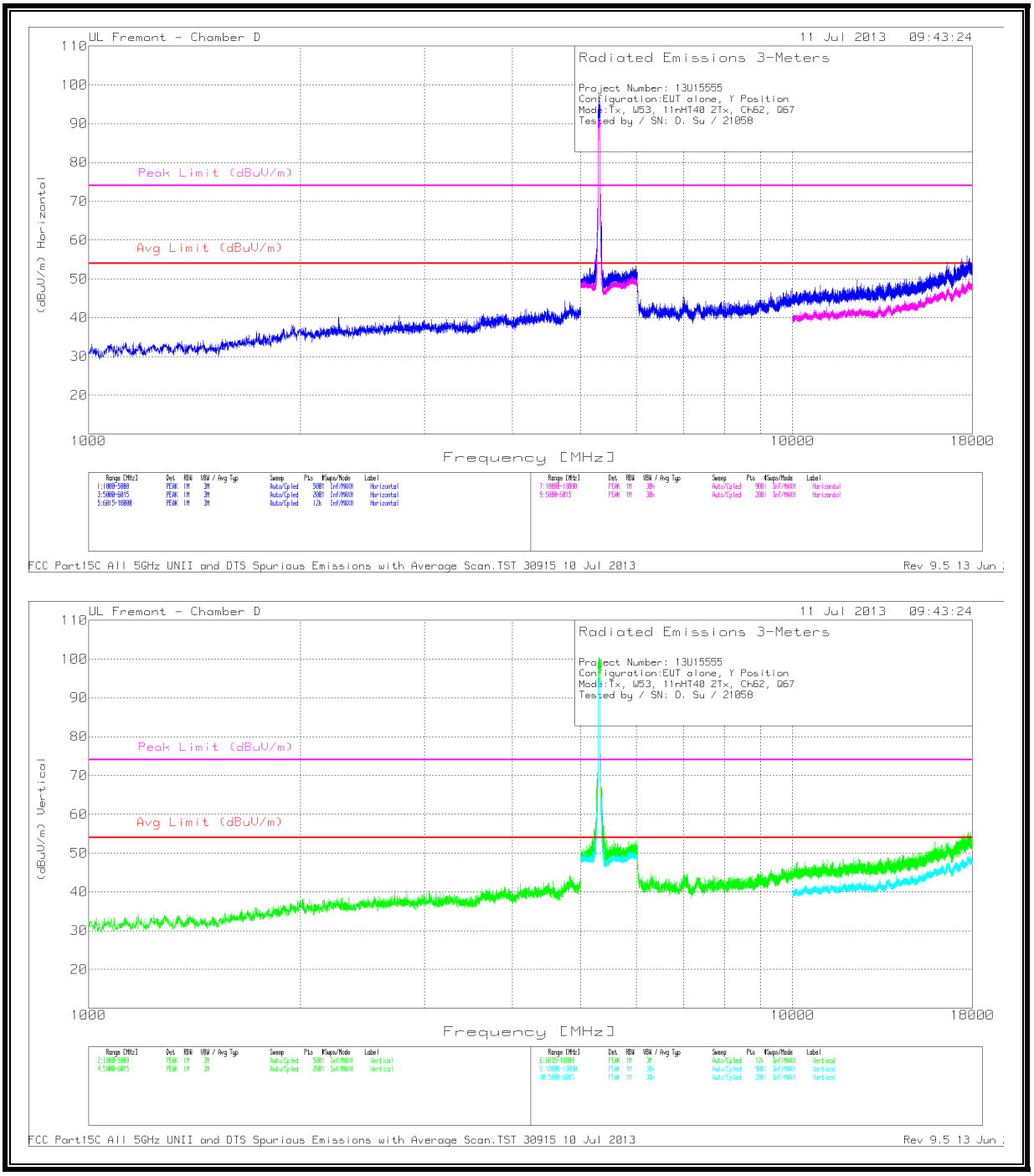
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL



FCC Part15C All 5GHz UNII and DTS Spurious Emissions with Average Scan.TST 30915 10 Jul 2013Rev 9.5 13 Jun 2013

HIGH CHANNEL

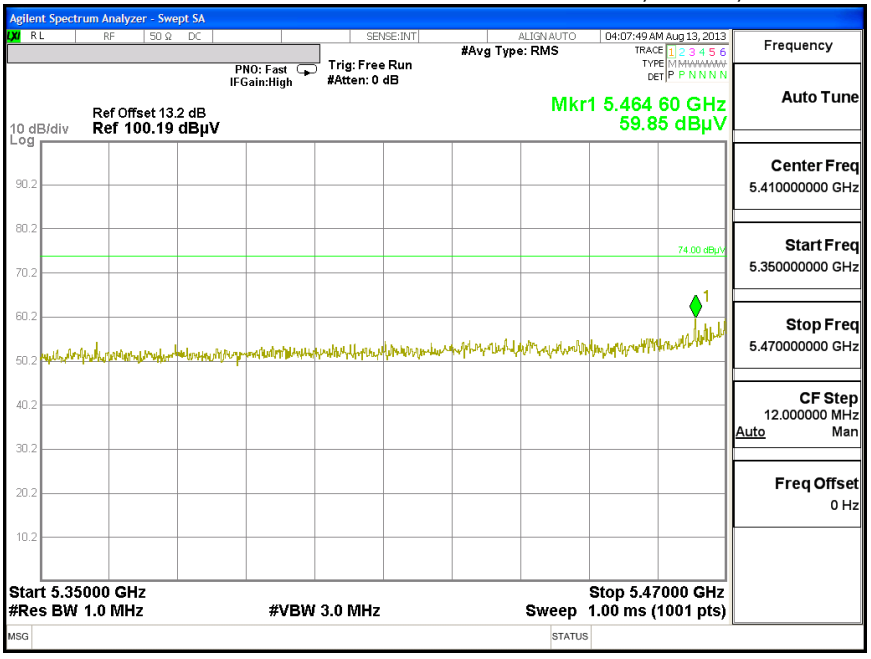


FCC Part15C All 5GHz UNII and DTS Spurious Emissions with Average Scan.TST 30915 10 Jul 2013Rev 9.5 13 Jun 2013

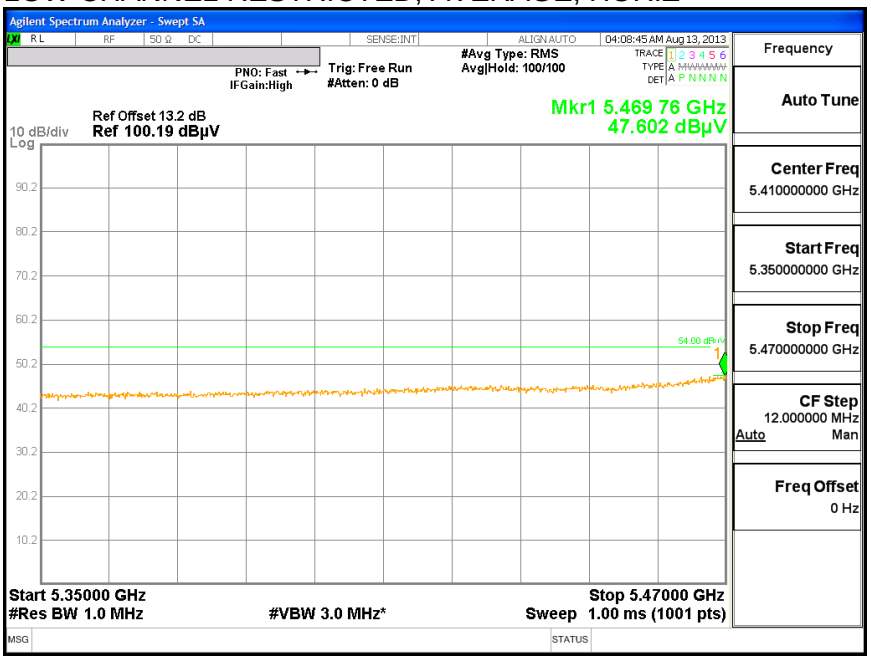
9.2.11. 802.11a SISO MODE IN THE 5.6 GHz BAND

RESTRICTED & AUTHORIZED BANDEDGE (LOW CHANNEL)

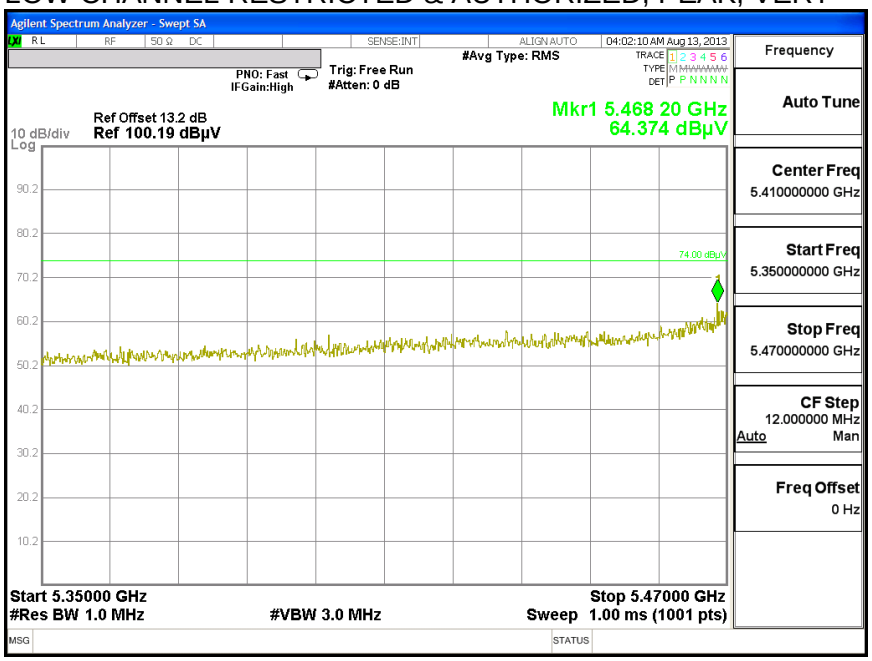
LOW CHANNEL RESTRICTED & AUTHORIZED, PEAK, HORIZ



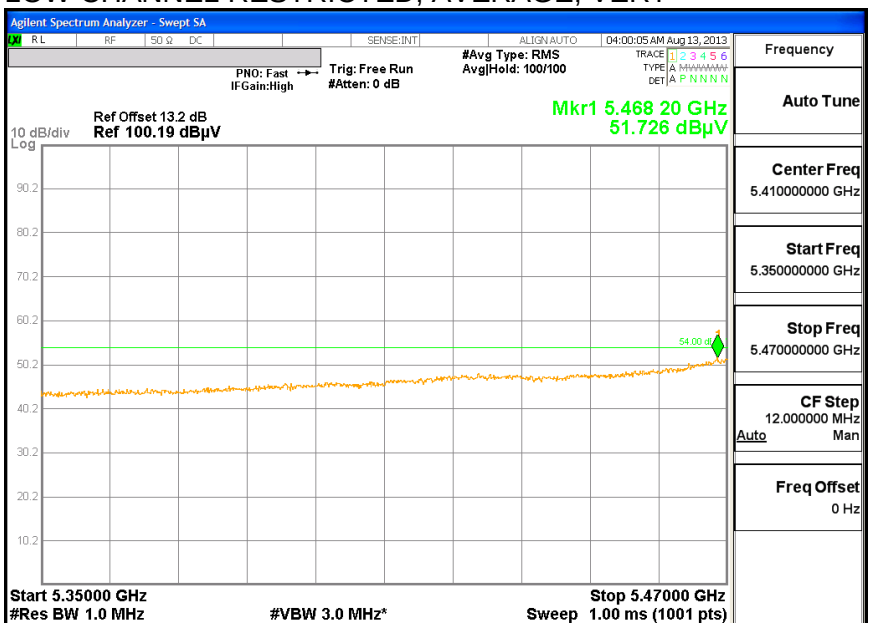
LOW CHANNEL RESTRICTED, AVERAGE, HORIZ



LOW CHANNEL RESTRICTED & AUTHORIZED, PEAK, VERT

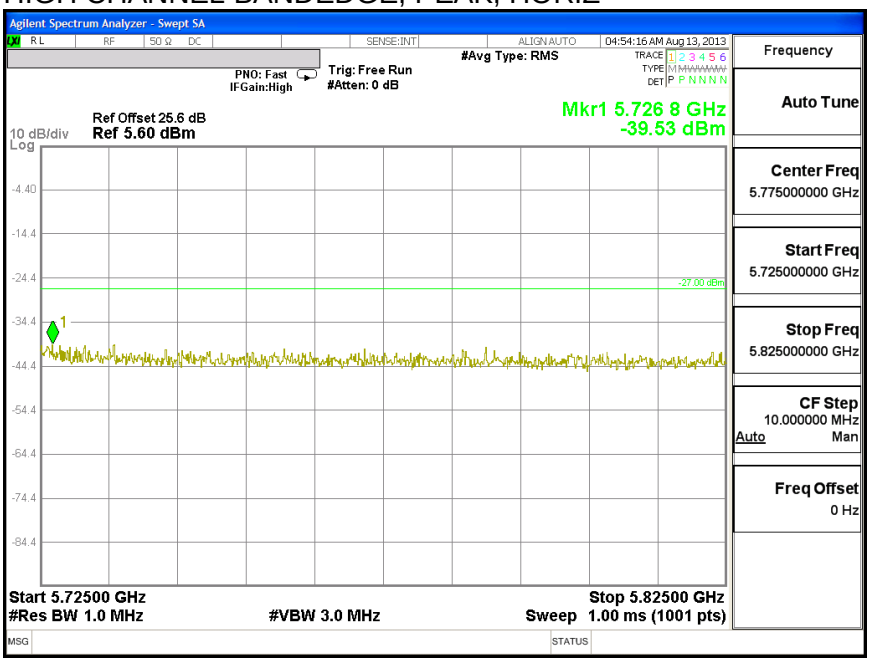


LOW CHANNEL RESTRICTED, AVERAGE, VERT

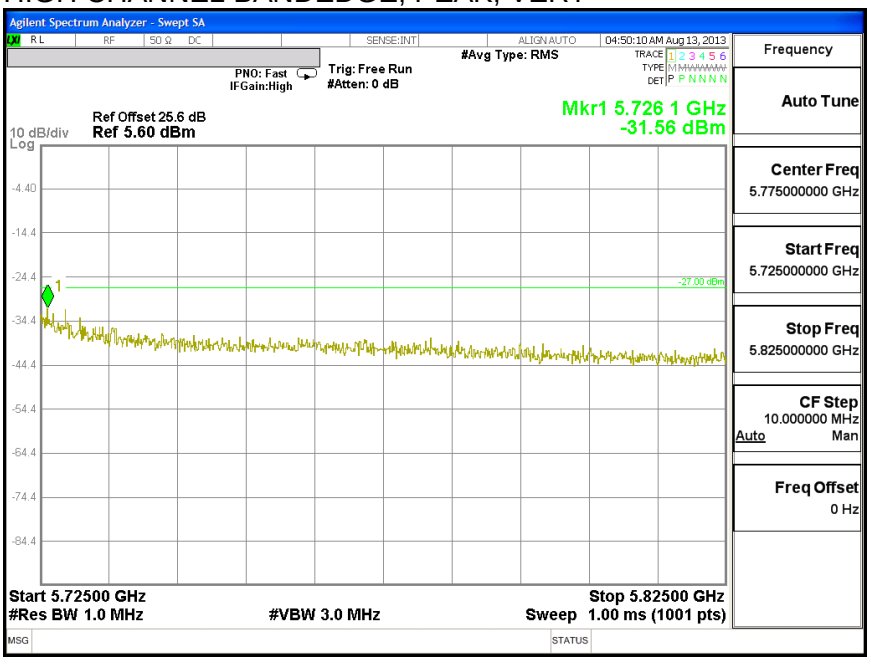


AUTHORIZED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL BANDEDGE, PEAK, HORIZ

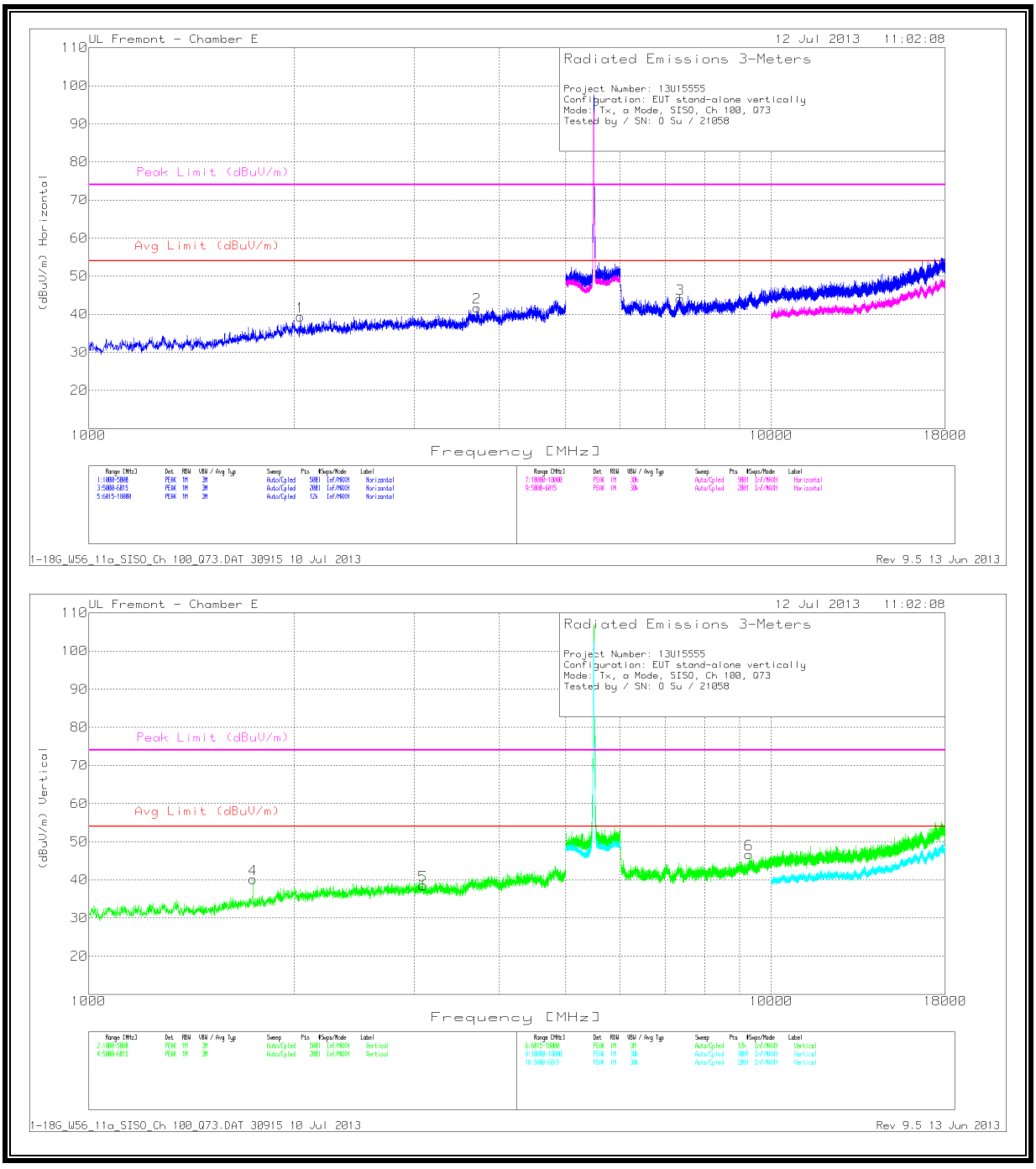


HIGH CHANNEL BANDEDGE, PEAK, VERT



HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	2.044	41.07	PK	32.2	-33.9	39.37	53.97	-14.6	74	-34.63	100	H
2	3.706	40.45	PK	33.6	-32.3	41.75	53.97	-12.22	74	-32.25	200	H
4	1.741	44.26	PK	30.4	-34.5	40.16	53.97	-13.81	74	-33.84	201	V
5	3.09	38.24	PK	33.3	-33	38.54	53.97	-15.43	74	-35.46	201	V
3	7.359	36.66	PK	36	-28.6	44.06	53.97	-9.91	74	-29.94	201	H
6	9.285	35.77	PK	37.2	-26.3	46.67	53.97	-7.3	74	-27.33	100	V

PK - Peak detector

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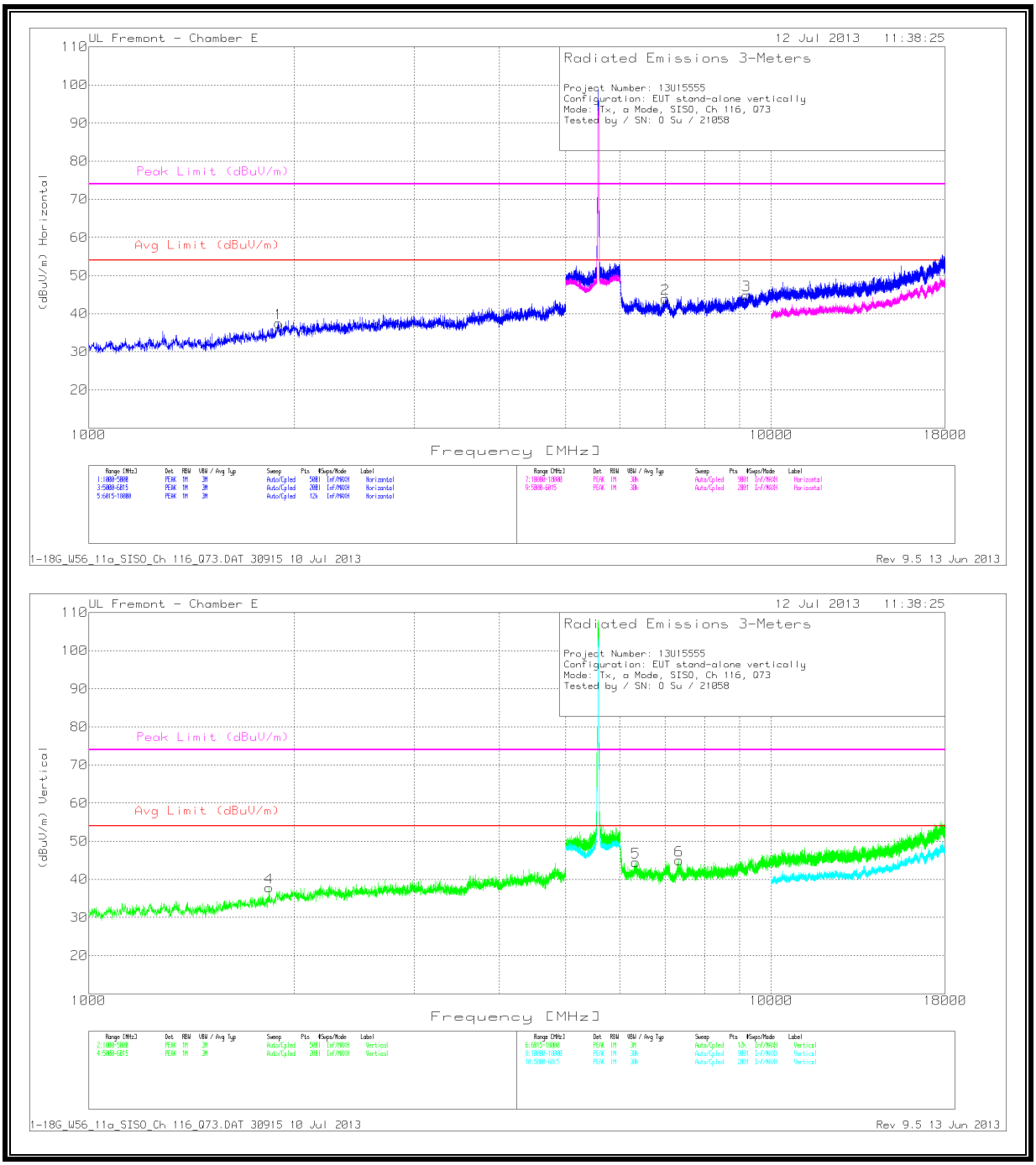
MID CHANNEL



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	1.898	39.88	PK	31.4	-33.8	37.48	53.97	-16.49	74	-36.52	100	H
2	7.001	36.94	PK	36	-29	43.94	53.97	-10.03	74	-30.06	100	H
3	9.206	34.78	PK	37	-26.9	44.88	53.97	-9.09	74	-29.12	100	H
4	1.838	41.23	PK	31.1	-34.5	37.83	53.97	-16.14	74	-36.17	201	V
5	6.339	37.9	PK	35.9	-29.3	44.5	53.97	-9.47	74	-29.5	201	V
6	7.333	37.52	PK	36	-28.5	45.02	53.97	-8.95	74	-28.98	201	V

PK - Peak detector

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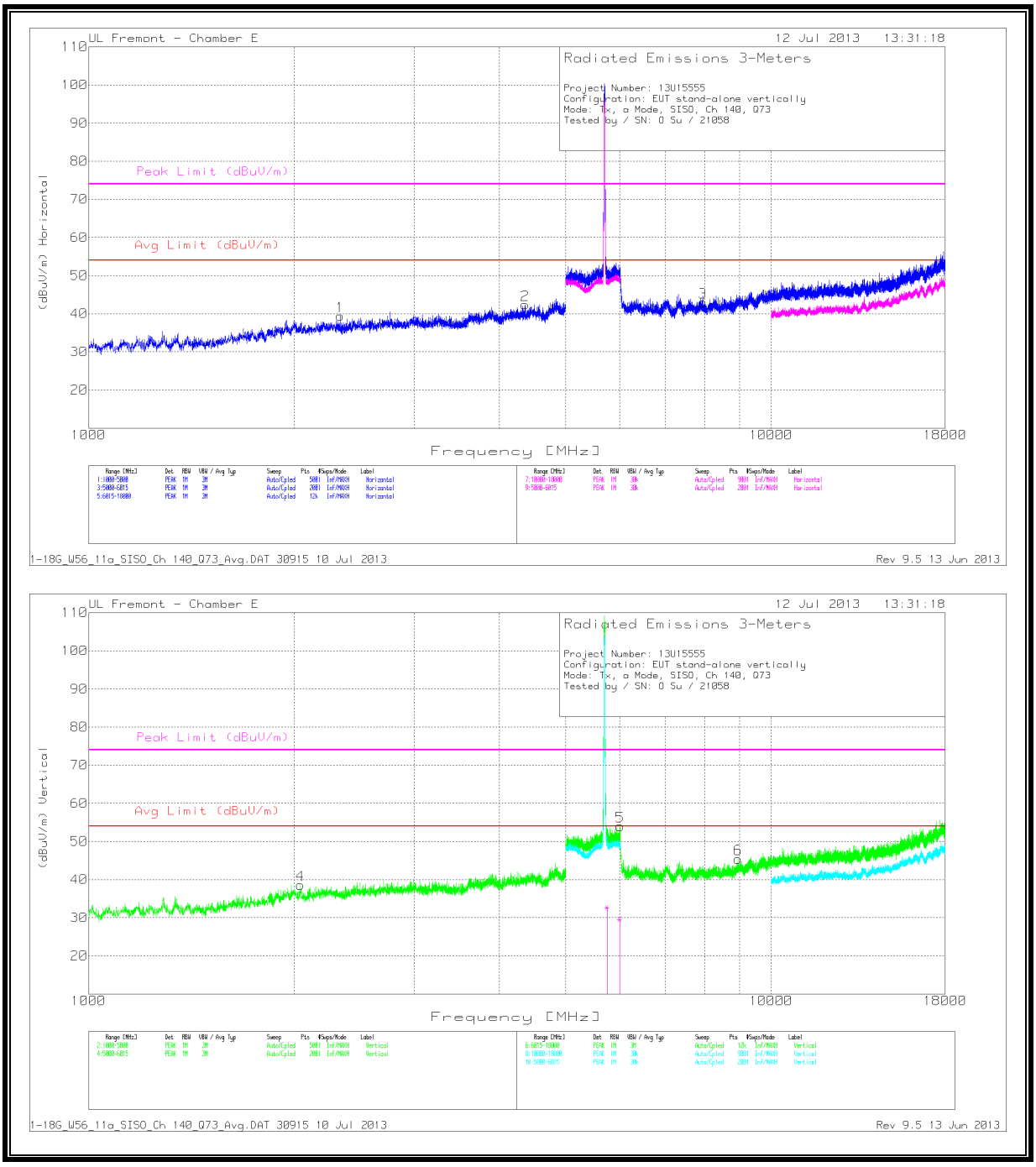
HIGH CHANNEL



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	2.337	40.9	PK	32.5	-34	39.4	53.97	-14.57	74	-34.6	100	H
2	4.363	40.07	PK	34.1	-31.8	42.37	53.97	-11.6	74	-31.63	100	H
3	7.946	35.06	PK	36.2	-28.3	42.96	53.97	-11.01	74	-31.04	100	H
4	2.043	40.3	PK	32.2	-33.9	38.6	53.97	-15.37	74	-35.4	200	V
5	6.007	39.29	PK	35.8	-21.1	53.99	--	--	74	-20.01	100	V
	6.006	14.86	Av	35.8	-21.1	29.56	53.97	-24.41	---	---	154	V
6	8.95	35.82	PK	36.8	-27.2	45.42	53.97	-8.55	74	-28.58	100	V

Radiated Emissions

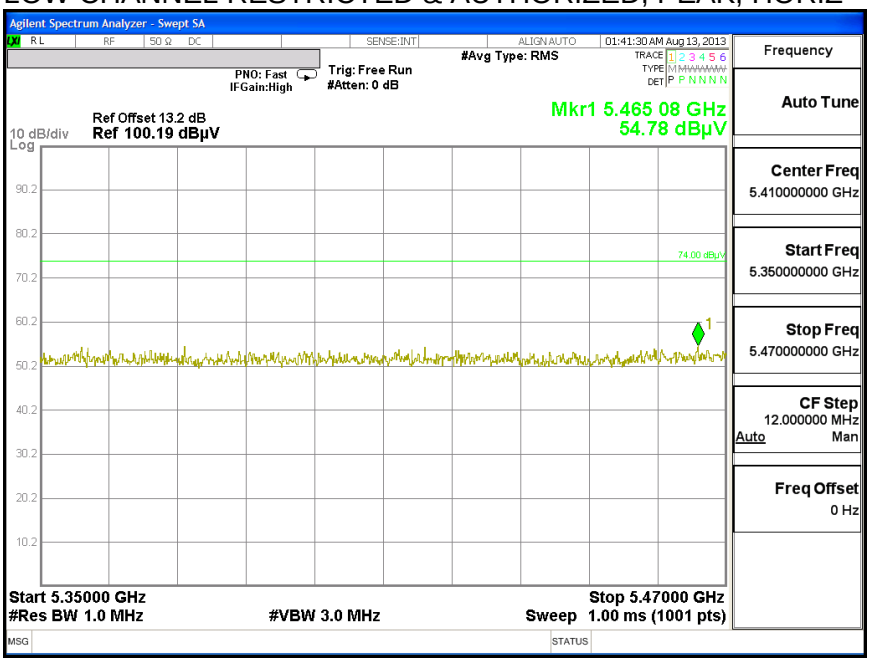
Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5.757	18.87	Av	35.4	-21.7	32.57	53.97	-21.4	74	-41.43	289	382	V

PK - Peak detector
Av - average detection
1-18G_W56_11a_SISO_Ch 140_Q73_Avg.DAT 30915 10 Jul 2013Rev 9.5 13 Jun 2013

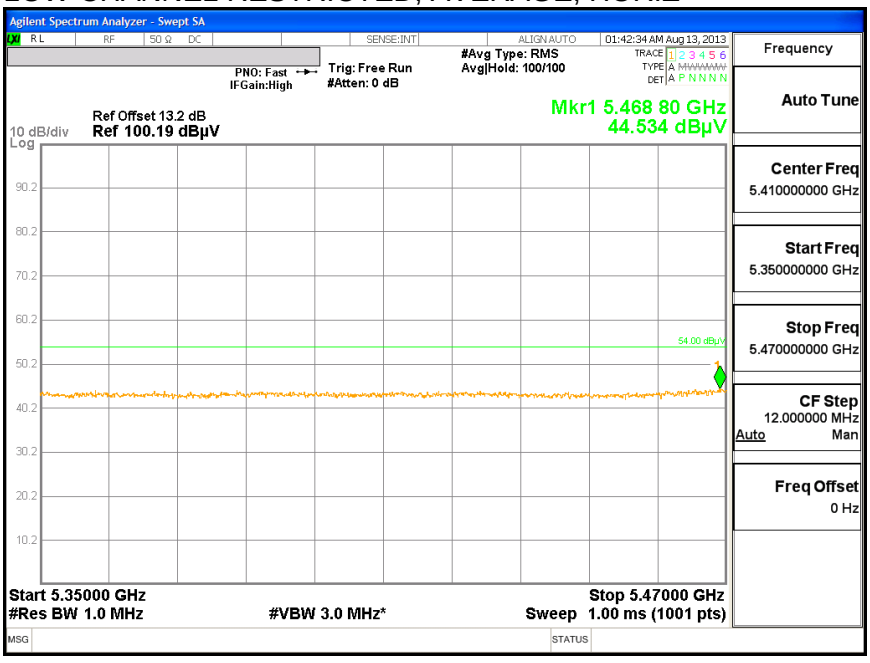
9.2.12. 802.11n HT20 2TX CDD MODE IN THE 5.6 GHz BAND

RESTRICTED & AUTHORIZED BANDEDGE (LOW CHANNEL)

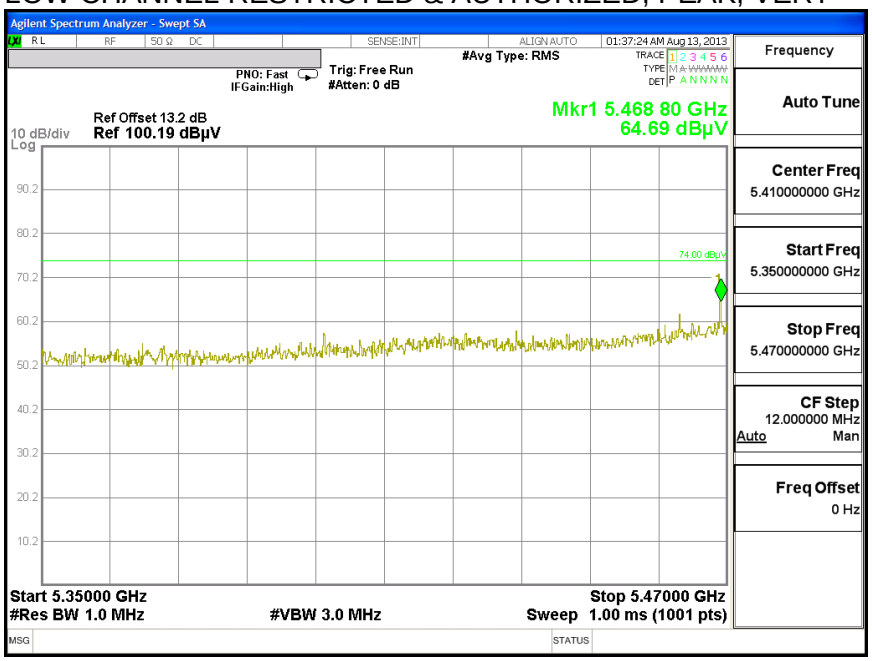
LOW CHANNEL RESTRICTED & AUTHORIZED, PEAK, HORIZ



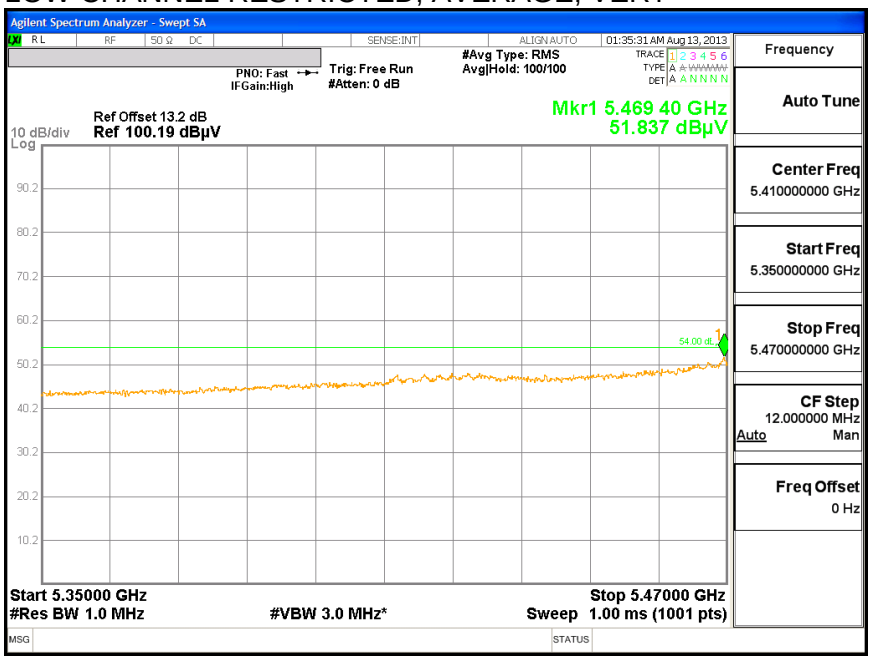
LOW CHANNEL RESTRICTED, AVERAGE, HORIZ



LOW CHANNEL RESTRICTED & AUTHORIZED, PEAK, VERT

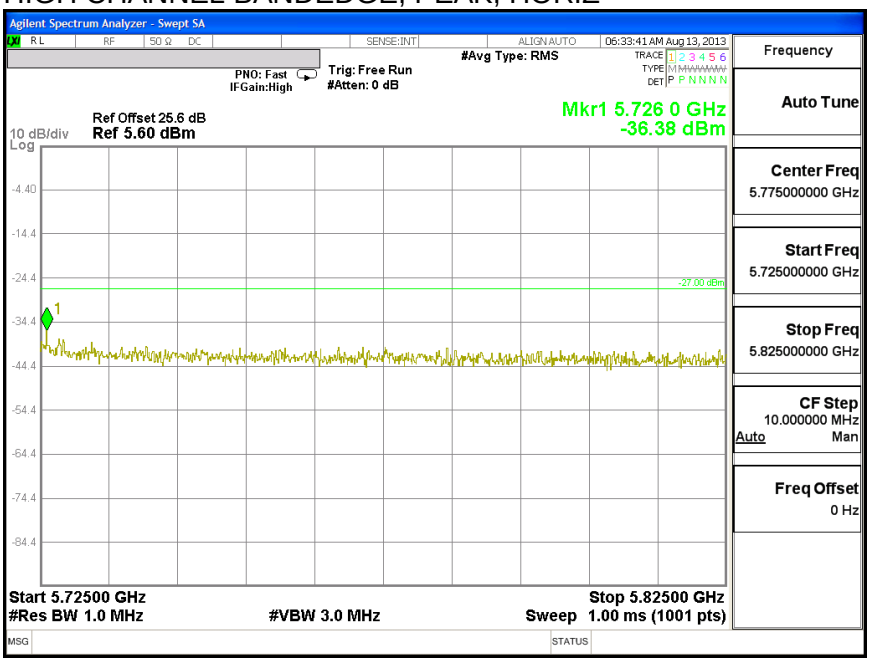


LOW CHANNEL RESTRICTED, AVERAGE, VERT

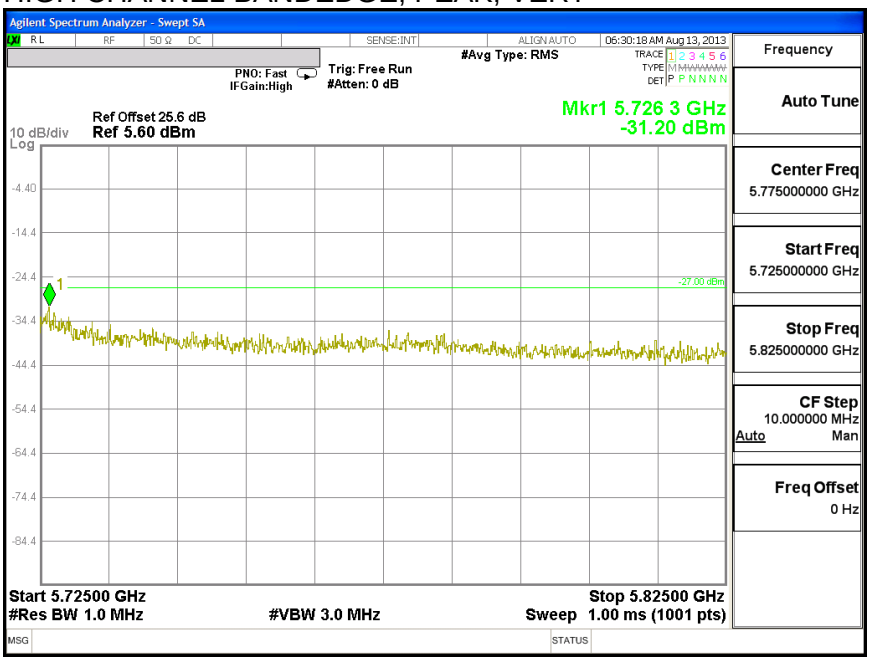


AUTHORIZED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL BANDEDGE, PEAK, HORIZ

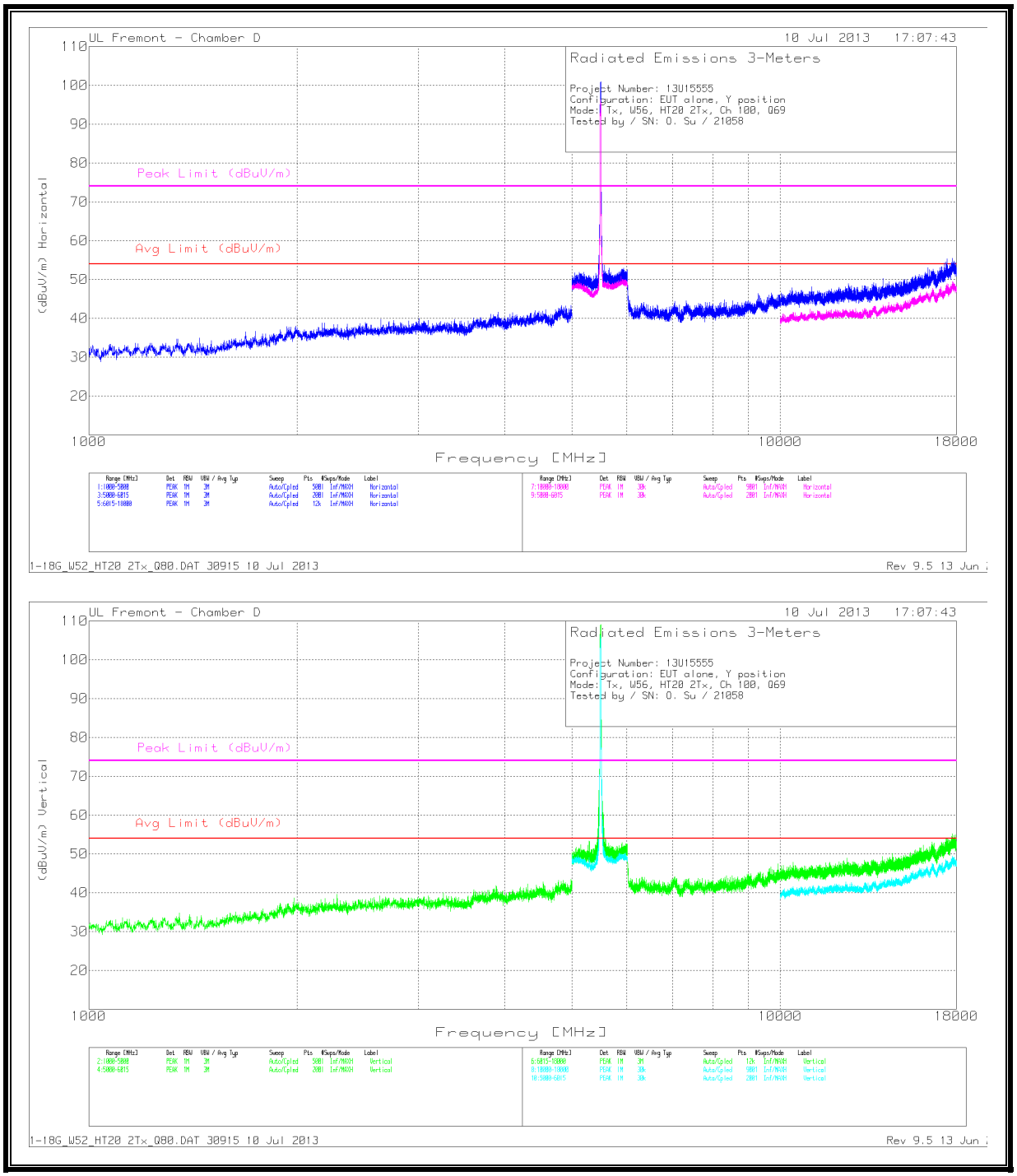


HIGH CHANNEL BANDEDGE, PEAK, VERT



HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL



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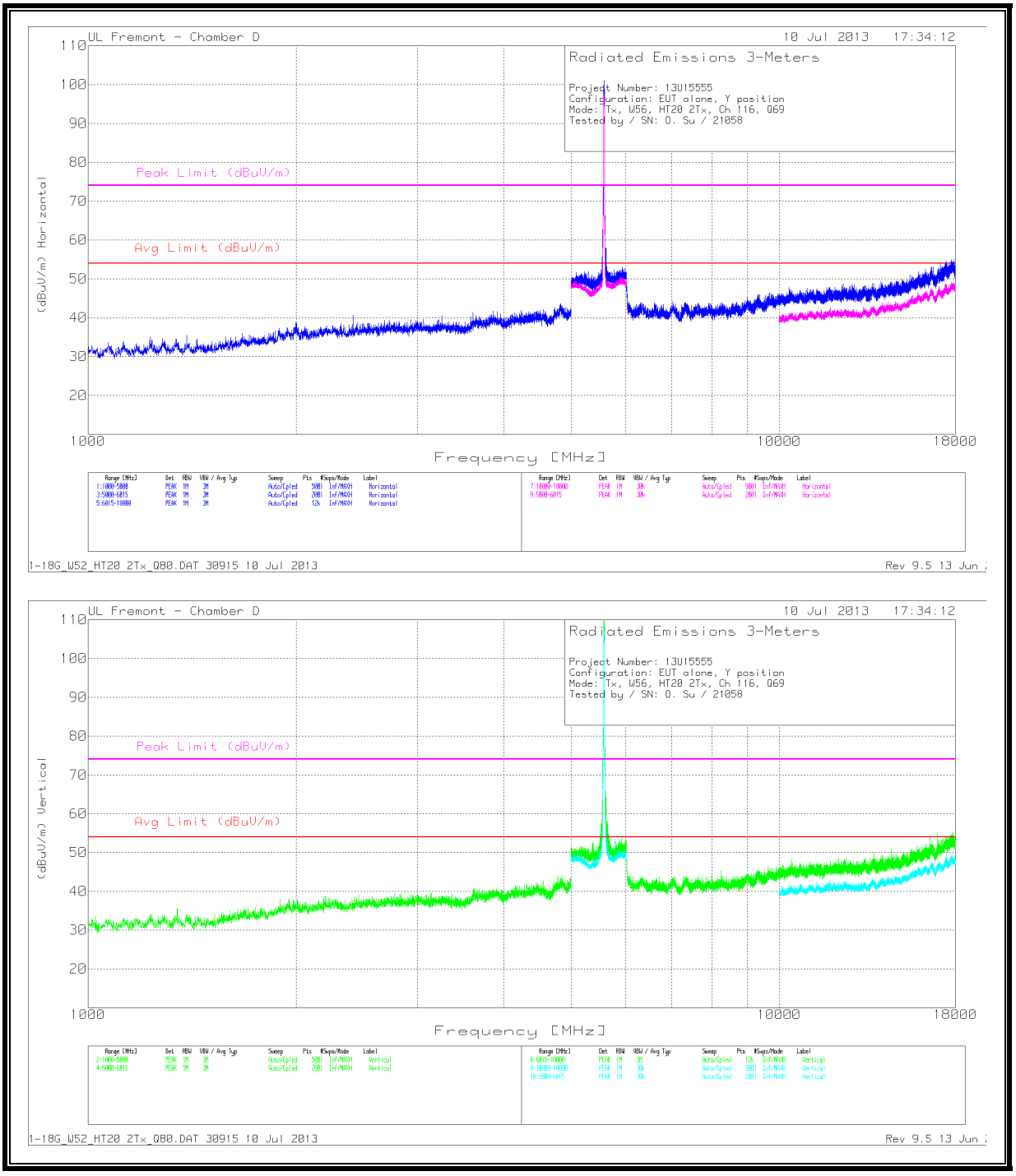
MID CHANNEL



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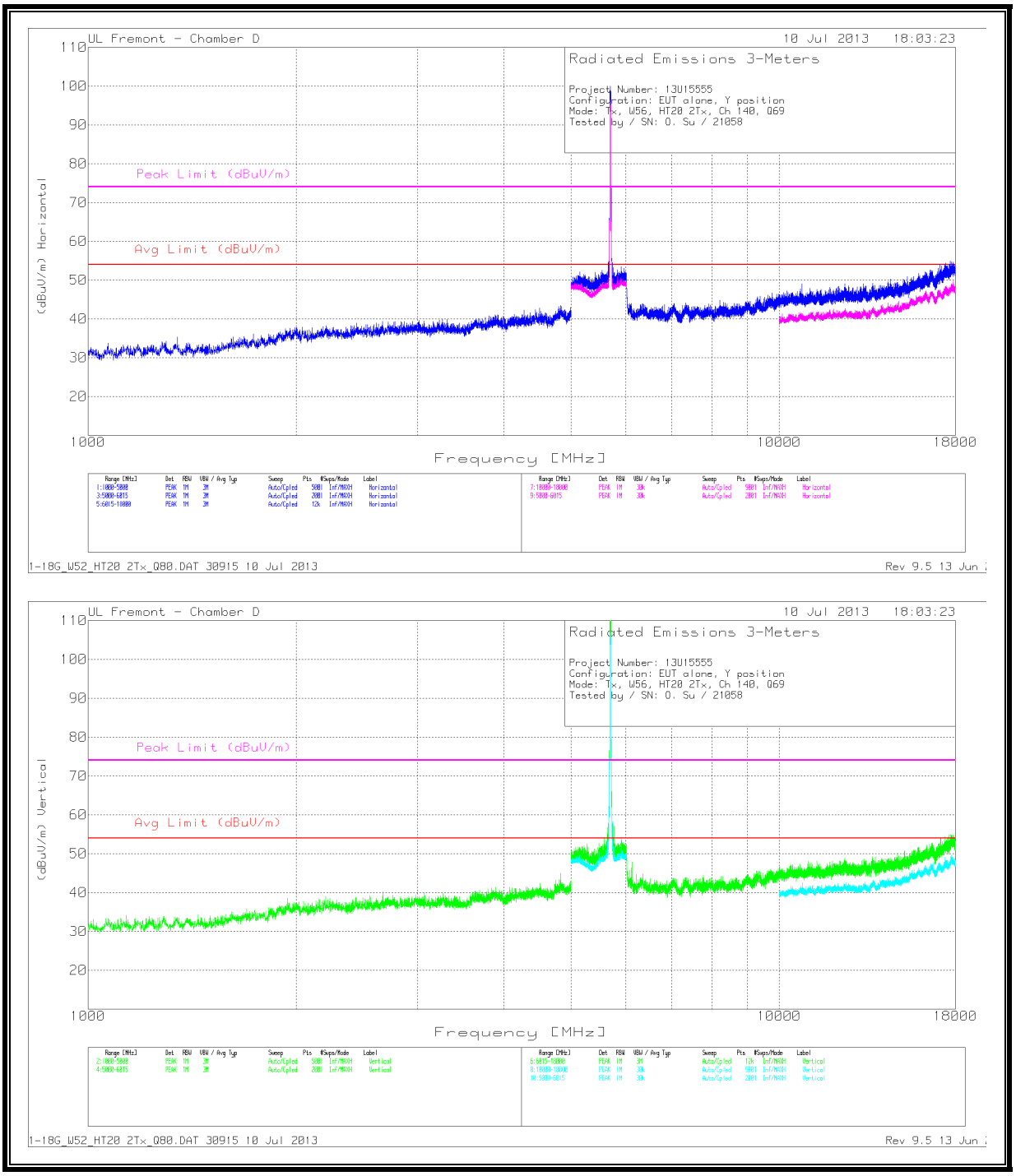
HIGH CHANNEL



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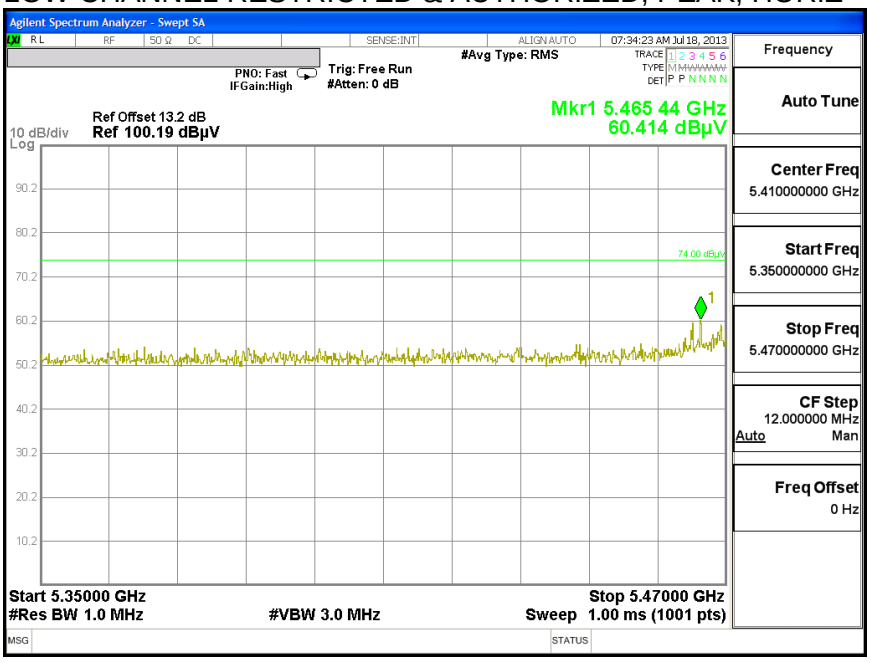
9.2.13. 802.11n HT20 2TX STBC MODE IN THE 5.6 GHz BAND

Covered by testing 11n HT20 CDD 2TX in the 5.6GHz band, total power across the two chains is higher than the power level the device will operate at.

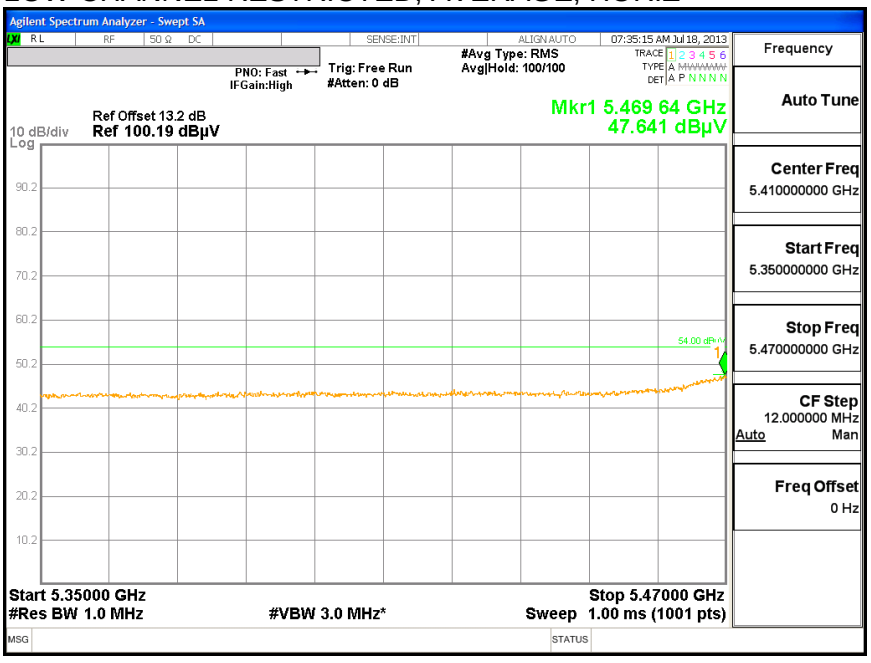
9.2.14. 802.11n HT40 SISO MODE IN THE 5.6 GHz BAND

RESTRICTED & AUTHORIZED BANDEDGE (LOW CHANNEL)

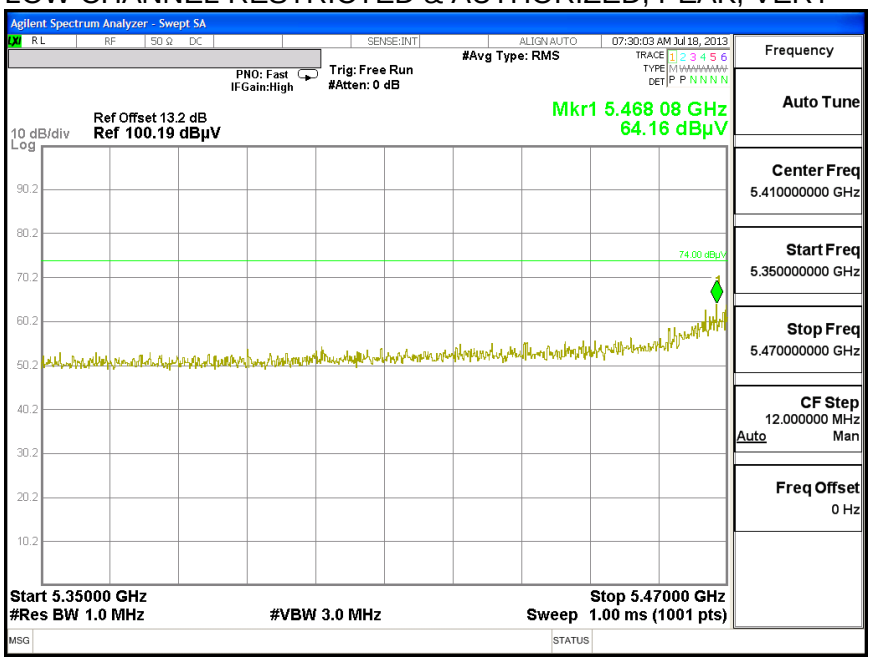
LOW CHANNEL RESTRICTED & AUTHORIZED, PEAK, HORIZ



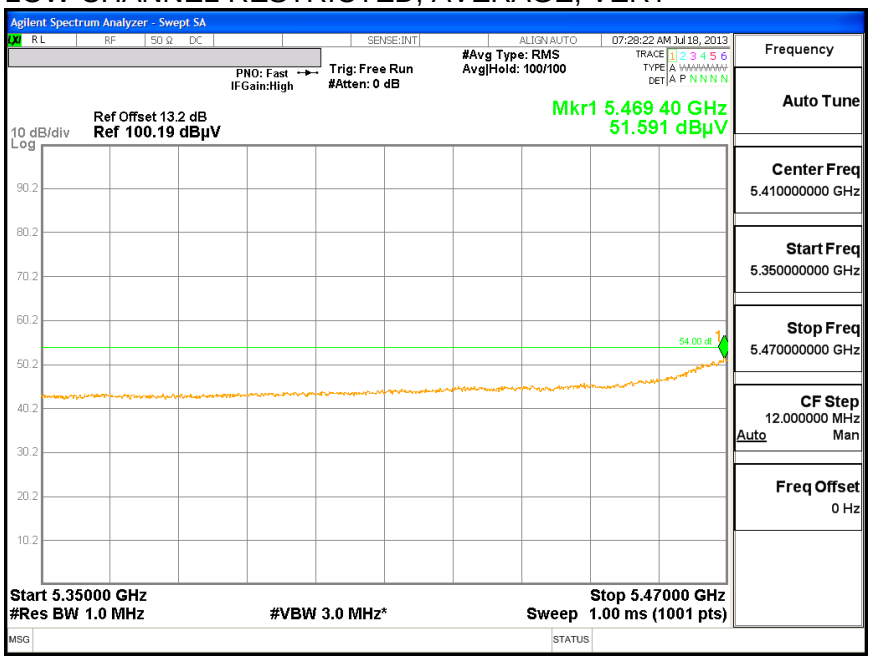
LOW CHANNEL RESTRICTED, AVERAGE, HORIZ



LOW CHANNEL RESTRICTED & AUTHORIZED, PEAK, VERT

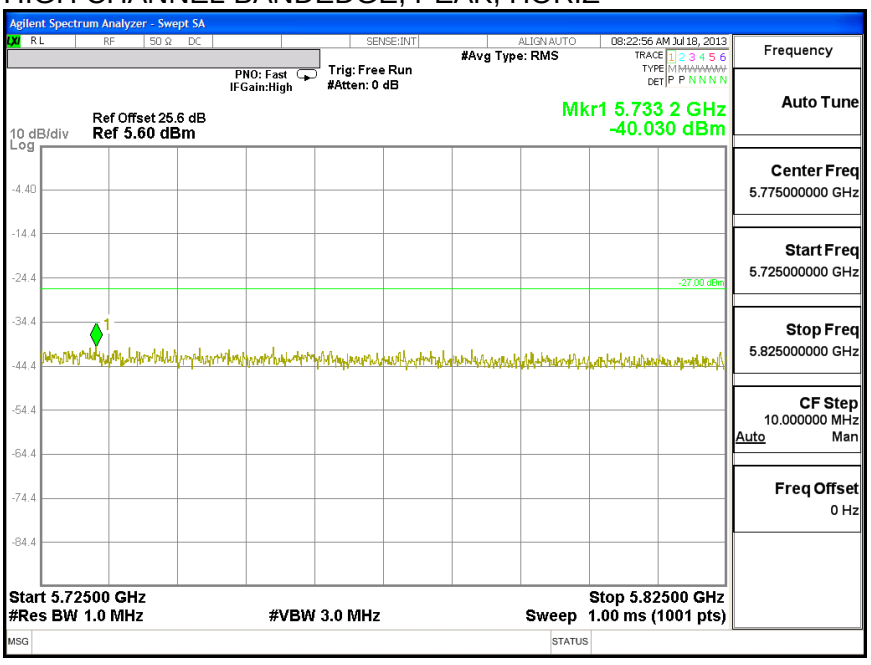


LOW CHANNEL RESTRICTED, AVERAGE, VERT

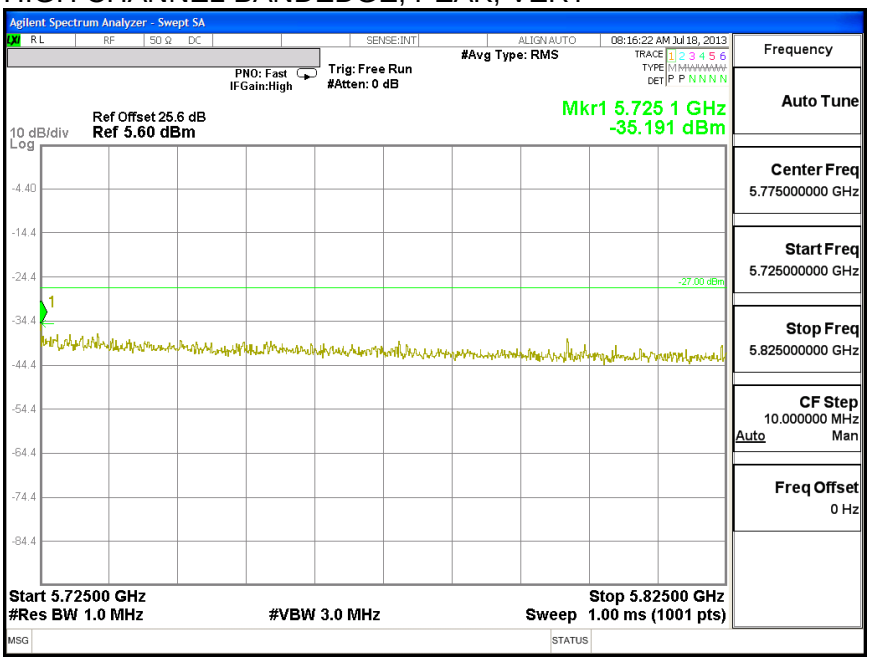


AUTHORIZED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL BANDEDGE, PEAK, HORIZ

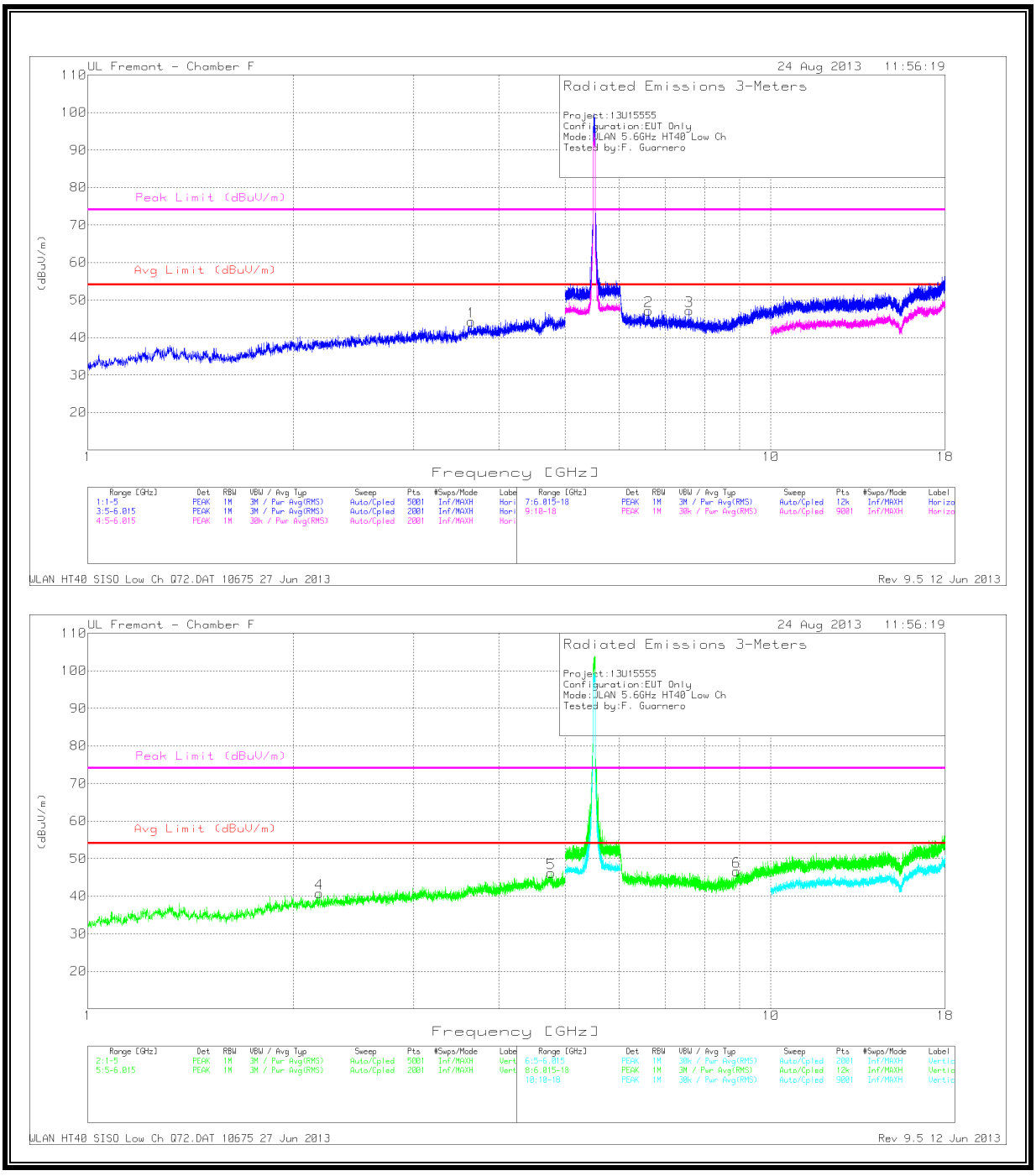


HIGH CHANNEL BANDEDGE, PEAK, VERT



HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL

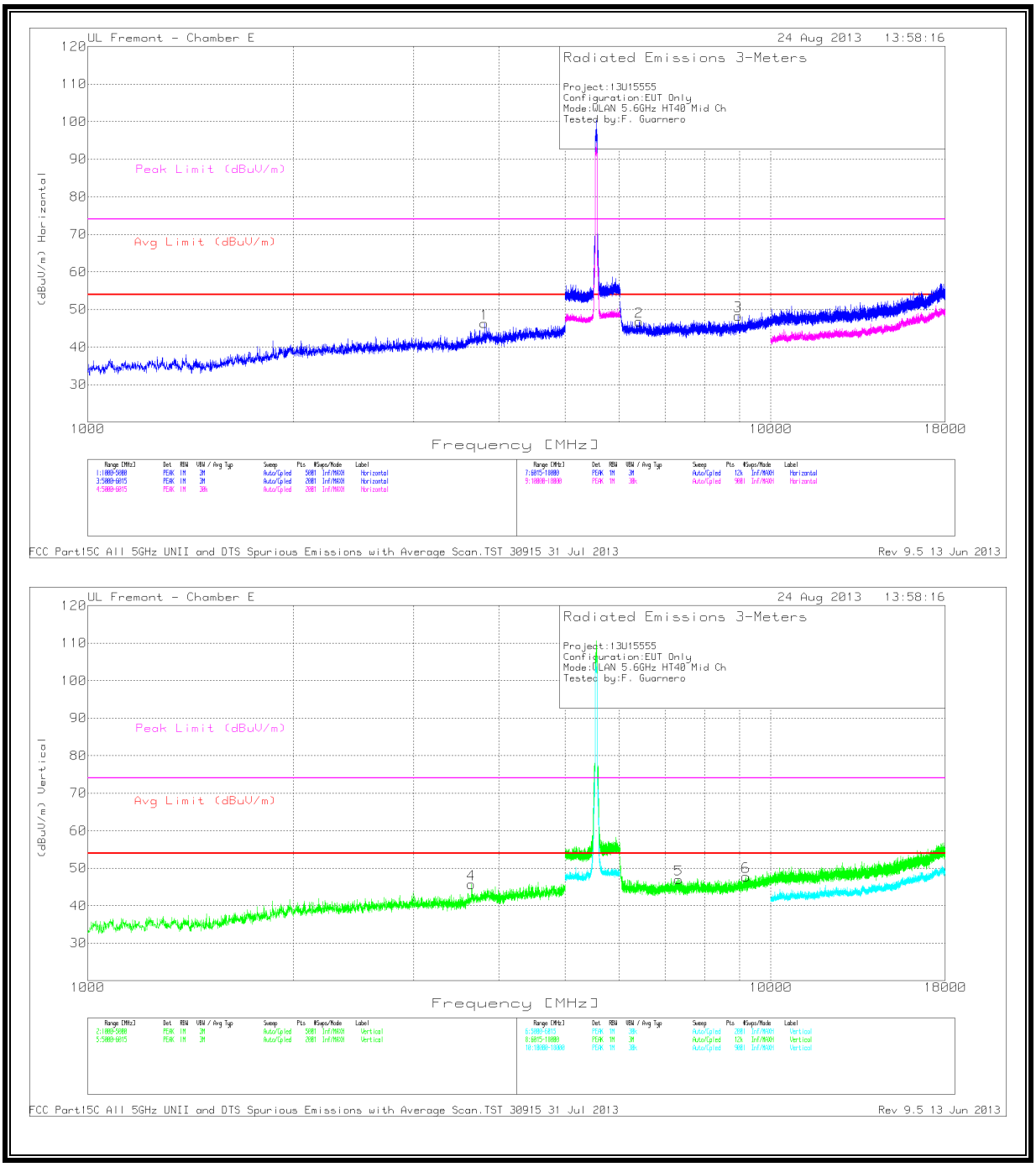


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/ Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	3.644	40.36	PK	33.6	-29.7	44.26	53.97	-9.71	74	-29.74	0-360	100	H
2	6.621	37.24	PK	35.8	-25.9	47.14	53.97	-6.83	74	-26.86	0-360	100	H
3	7.596	37.55	PK	35.9	-26.3	47.15	53.97	-6.82	74	-26.85	0-360	199	H
4	2.183	39.94	PK	31.8	-31	40.74	53.97	-13.23	74	-33.26	0-360	100	V
5	4.768	39.79	PK	34.1	-27.7	46.19	53.97	-7.78	74	-27.81	0-360	200	V
6	8.911	35.78	PK	36.3	-25.5	46.58	53.97	-7.39	74	-27.42	0-360	100	V

PK - Peak detector

MID CHANNEL



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ 5GHz LPF	DC Corr [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/ m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	3.808	44.49	PK	33.7	-31.9	0	46.29	53.97	-7.68	74	-27.71	99	H
2	6.416	40.37	PK	35.8	-29.4	0	46.77	53.97	-7.2	74	-27.23	199	H
3	8.957	37.98	PK	36.8	-26.5	0	48.28	53.97	-5.69	74	-25.72	100	H

PK - Peak detector

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ 6GHz HPF	DC Corr [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/ m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
4	3.643	43.61	PK	33.4	-31.3	0	45.71	53.97	-8.26	74	-28.29	100	V
5	7.327	39.1	PK	36	-28.1	0	47	53.97	-6.97	74	-27	100	V
6	9.194	37.13	PK	37	-26.4	0	47.73	53.97	-6.24	74	-26.27	199	V

PK - Peak detector

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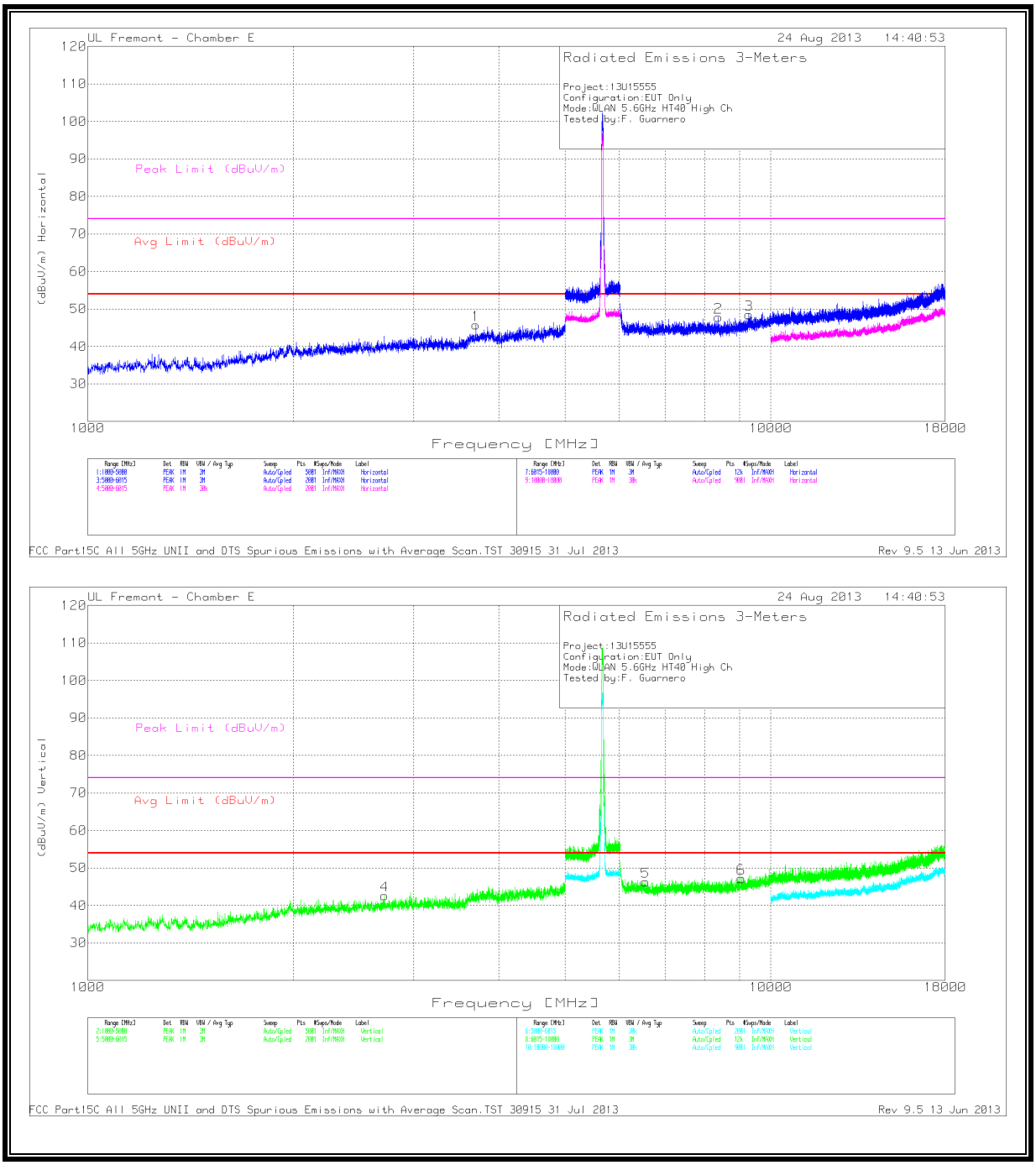
HIGH CHANNEL



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ 5GHz LPF	DC Corr [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	3.7	43.83	PK	33.6	-31.7	0	45.73	53.97	-8.24	74	-28.27	199	H
2	8.378	39.09	PK	36.2	-27.5	0	47.79	53.97	-6.18	74	-26.21	100	H
3	9.29	36.72	PK	37.2	-25.4	0	48.52	53.97	-5.45	74	-25.48	100	H

PK - Peak detector

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/ 6GHz HPF	DC Corr [dB]	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
5	6.556	38.74	PK	35.8	-28.2	0	46.34	53.97	-7.63	74	-27.66	199	V
4	2.719	42.05	PK	33.1	-32.5	0	42.65	53.97	-11.32	74	-31.35	200	V
6	9.052	36.91	PK	36.9	-26.6	0	47.21	53.97	-6.76	74	-26.79	199	V

PK - Peak detector

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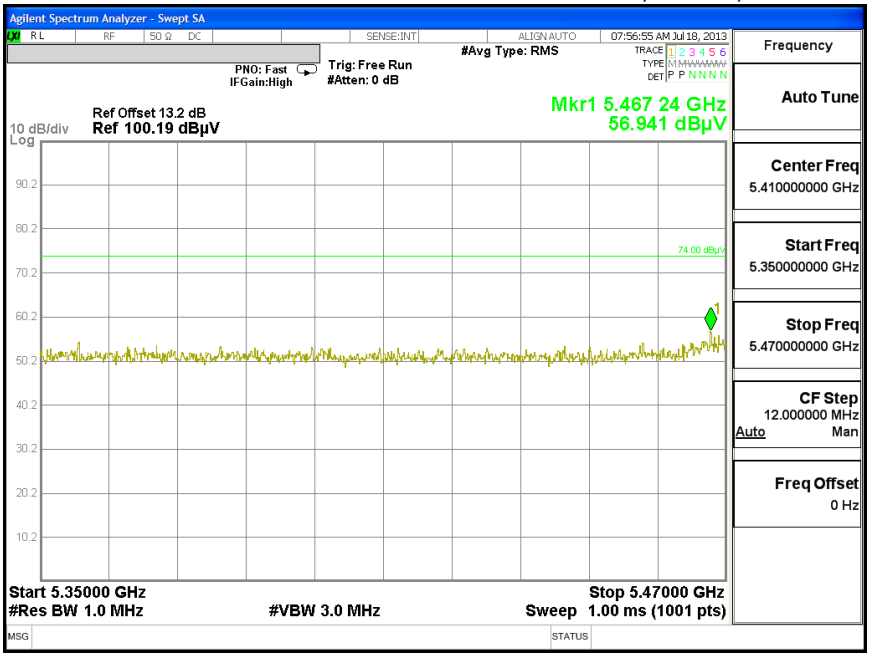
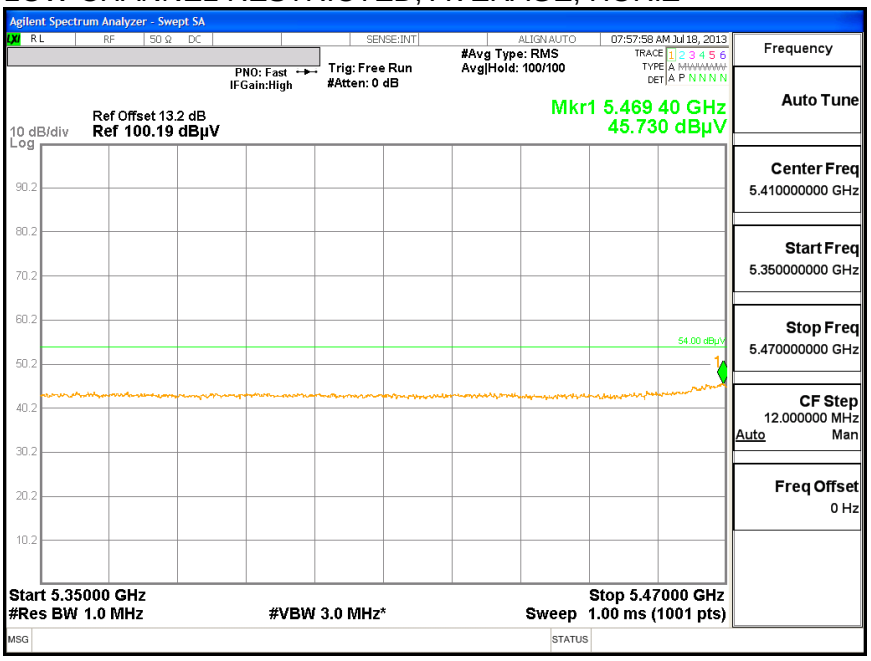
9.2.15. 802.11n HT40 2TX MODE IN THE 5.6 GHz BAND

RESTRICTED & AUTHORIZED BANDEDGE (LOW CHANNEL)

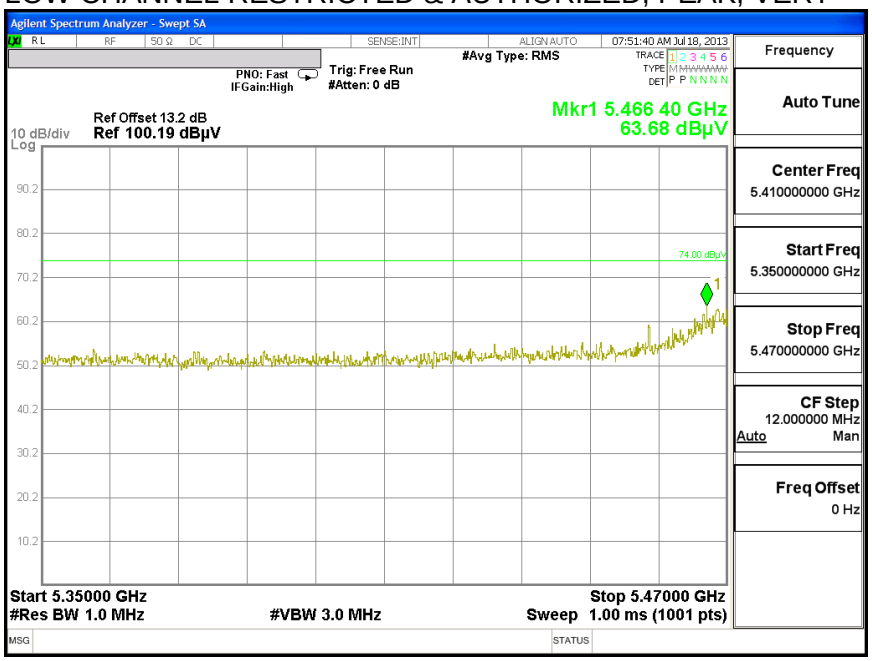
LOW CHANNEL RESTRICTED & AUTHORIZED, PEAK, HORIZ



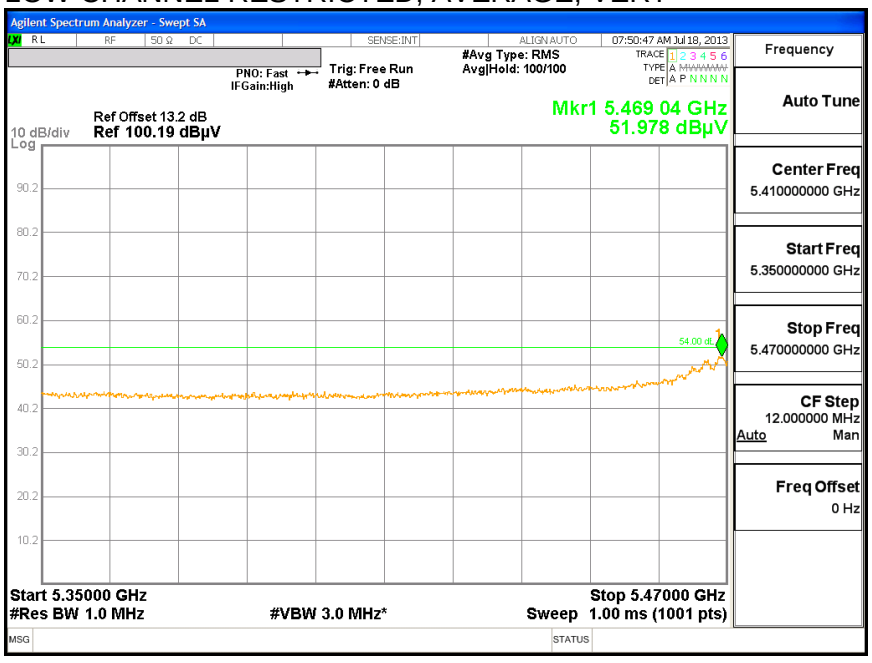
LOW CHANNEL RESTRICTED, AVERAGE, HORIZ



LOW CHANNEL RESTRICTED & AUTHORIZED, PEAK, VERT

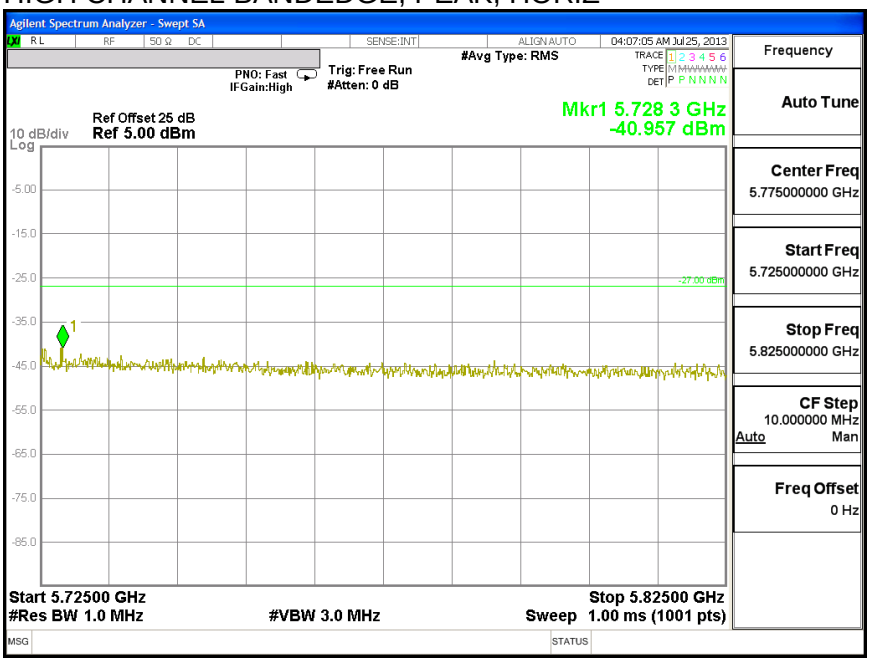


LOW CHANNEL RESTRICTED, AVERAGE, VERT

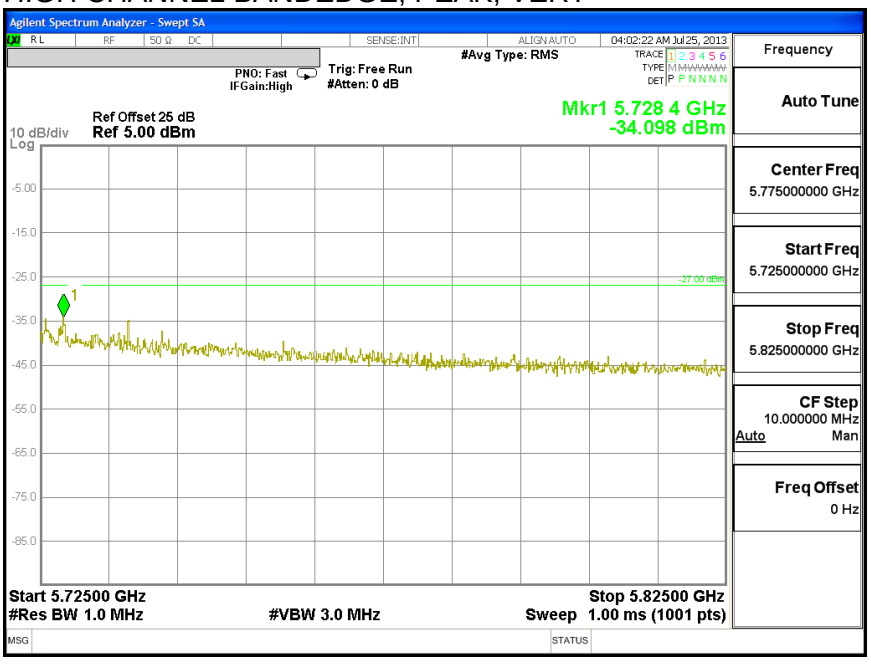


AUTHORIZED BANDEDGE (HIGH CHANNEL)

HIGH CHANNEL BANDEDGE, PEAK, HORIZ

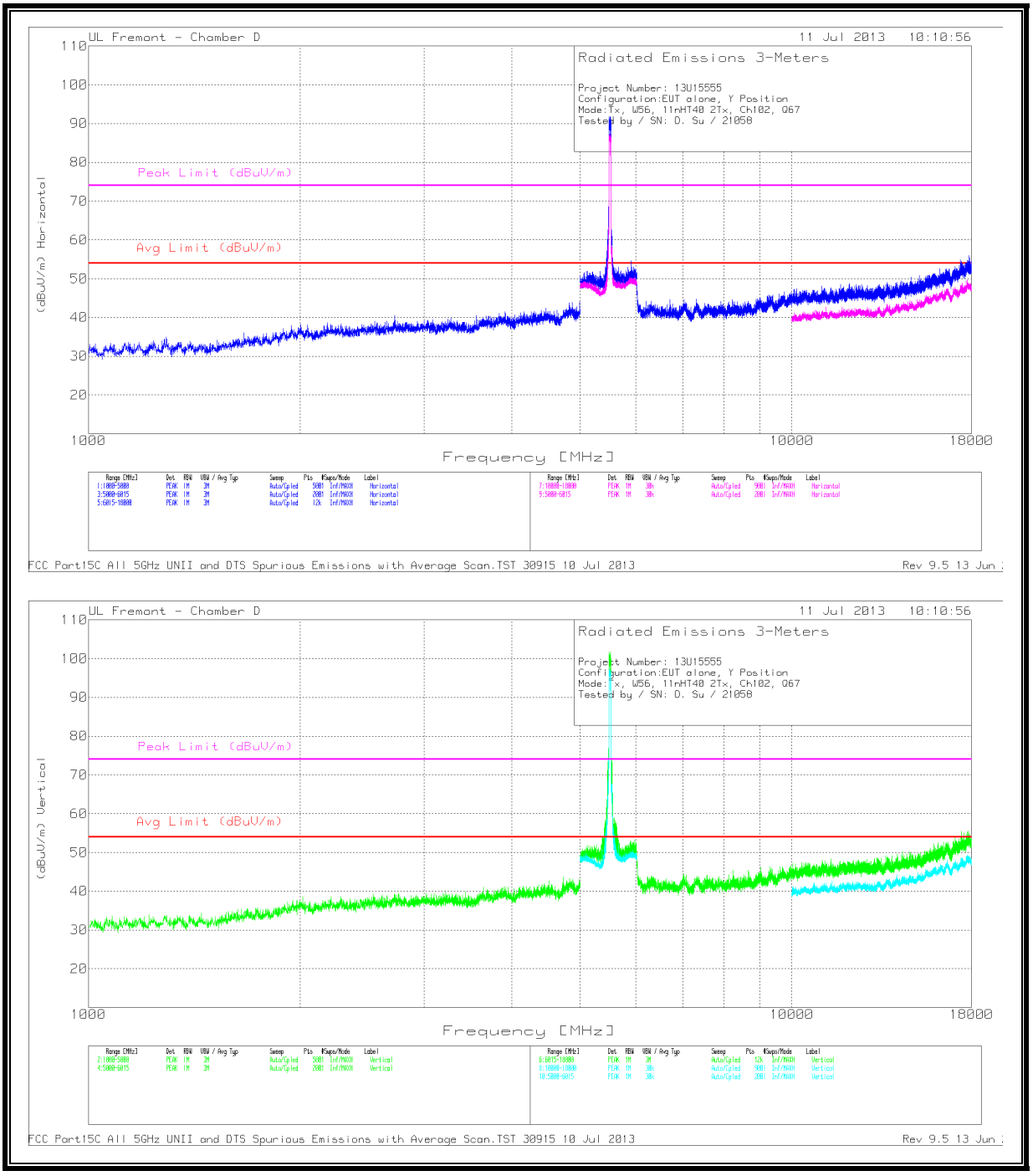


HIGH CHANNEL BANDEDGE, PEAK, VERT



HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL



Trace Markers

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr /Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
5.905	39.86	PK	35.6	-20.9	54.56	-	-	74	-19.44	201	H

PK - Peak detector

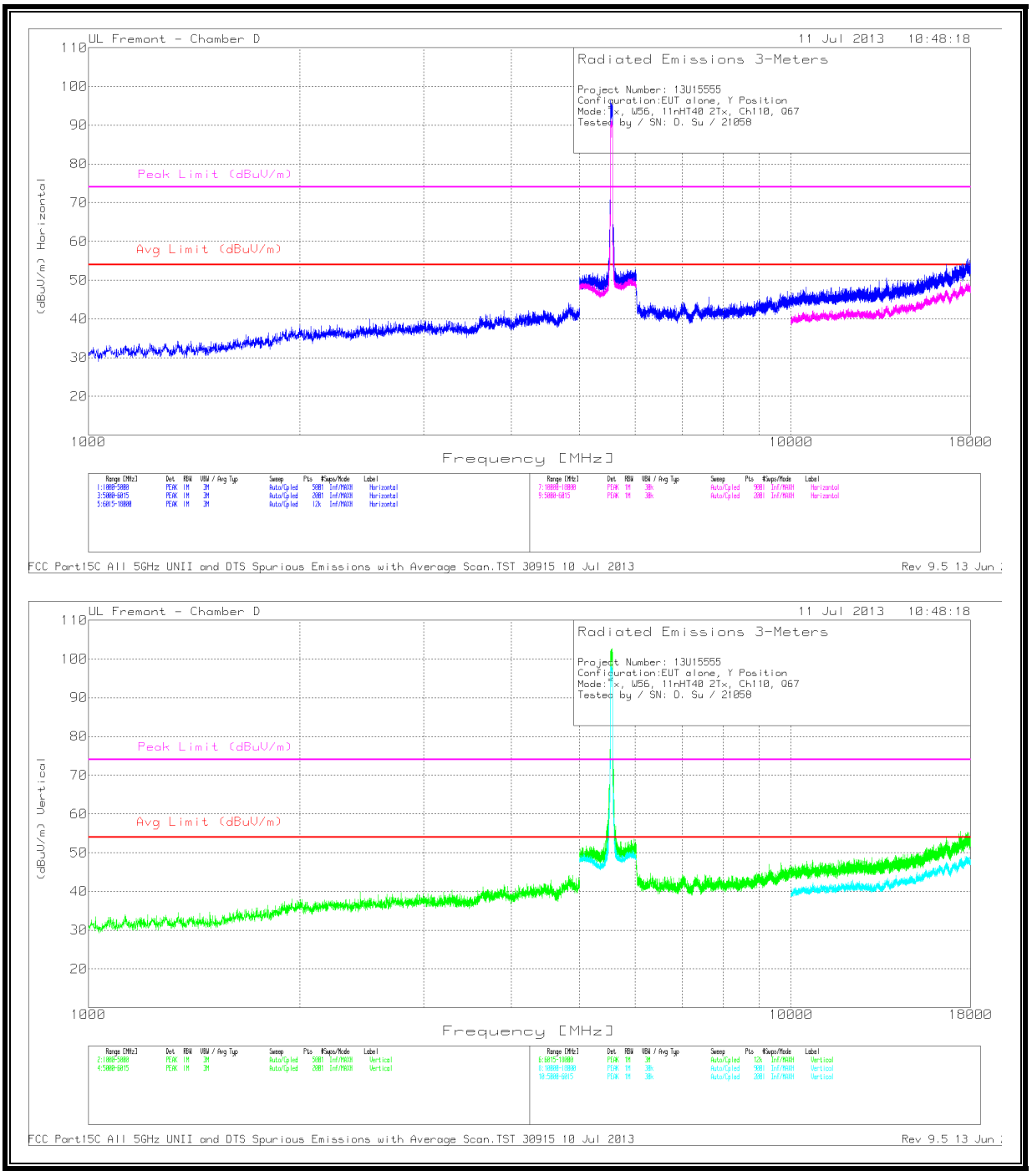
Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
5.906	15.17	Av	35.6	-20.9	29.87	53.97	-24.1	74	--	285	145	H

Av - average detection

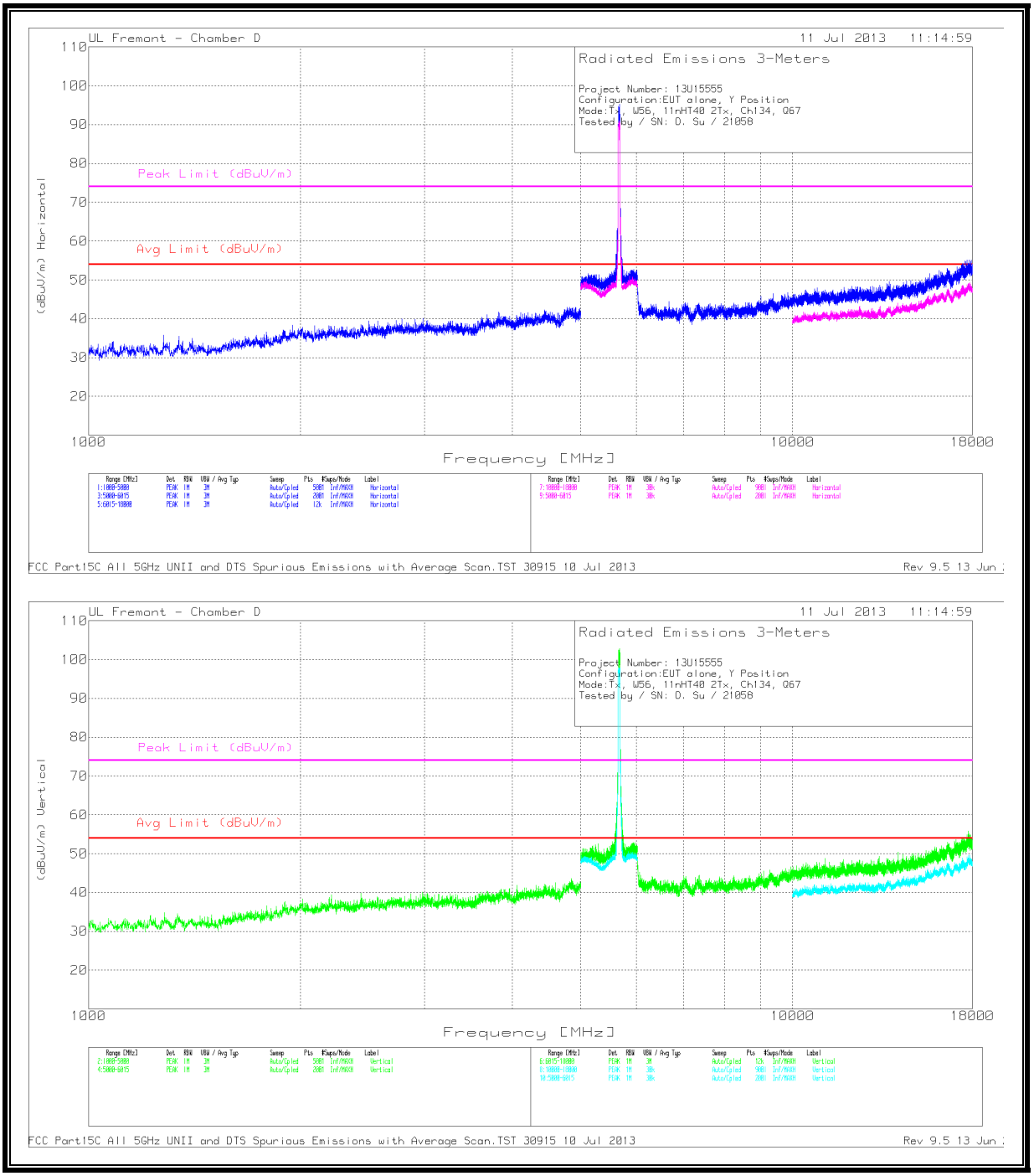
FCC Part15C All 5GHz UNII and DTS Spurious Emissions with Average Scan.TST 30915 10 Jul 2013Rev 9.5 13 Jun 2013

MID CHANNEL



FCC Part15C All 5GHz UNII and DTS Spurious Emissions with Average Scan.TST 30915 10 Jul 2013Rev 9.5 13 Jun 2013

HIGH CHANNEL



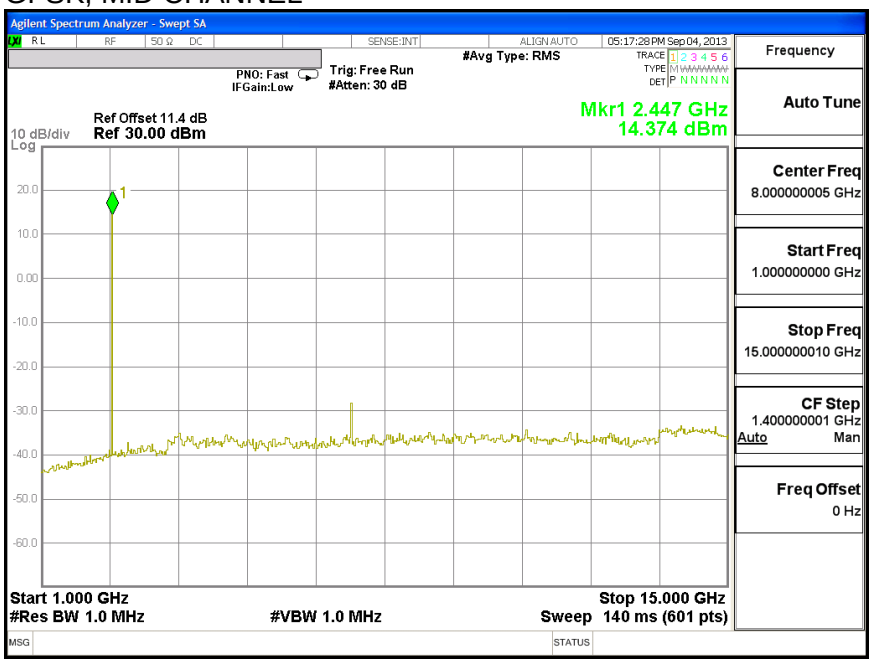
FCC Part15C All 5GHz UNII and DTS Spurious Emissions with Average Scan.TST 30915 10 Jul 2013Rev 9.5 13 Jun 2013

9.2.16. WORST-CASE 2.4GHZ & 5GHZ BAND CO-LOCATION

ANTENNA PORT:

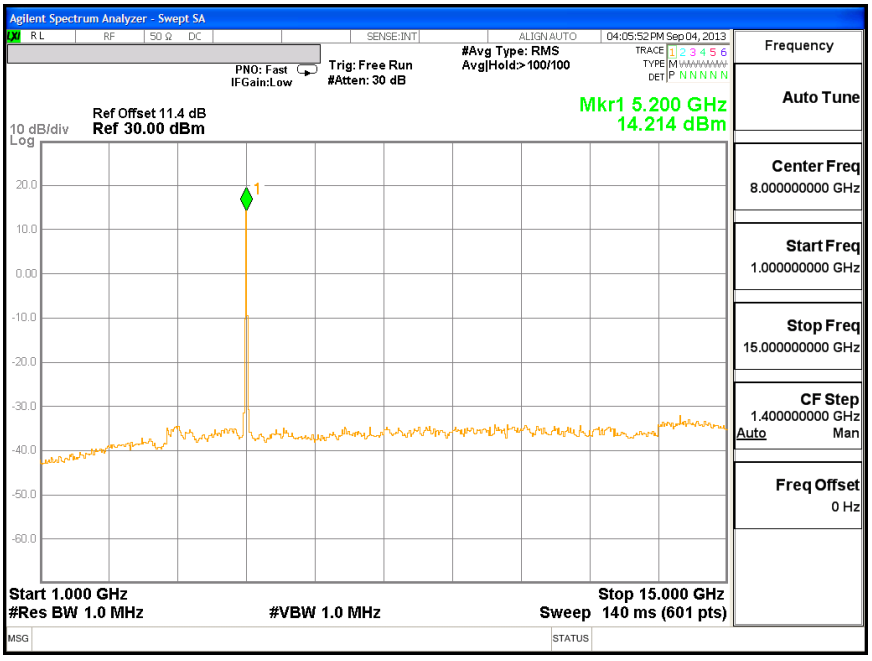
BLUETOOTH ON

GFSK, MID CHANNEL



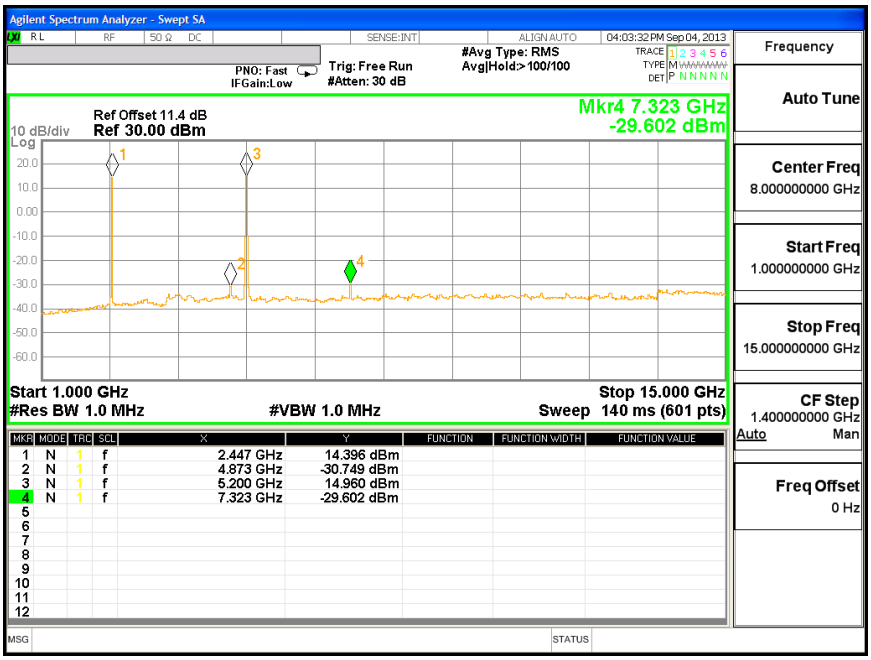
BLUETOOTH OFF WiFi ON

GFSK OFF WiFi CHANNEL 40



BLUETOOTH AND WiFi CO-LOCATION

BLUETOOTH AND WiFi 5GHz



RADIATED HARMONICS AND SPURIOUS EMISSIONS

RESULTS

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (db/m)	Amp/Cbl /Pad	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Class B Avg Limit (dBuV/m)	Margin (dB)	Polarity
4.882	52.921	PK	34.3	-27.3	45.921	74	-28.079	-	-	H
7.325	55.157	PK	35.9	-26.4	45.657	74	-28.343	-	-	H

PK - Peak detector

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (db/m)	Amp/Cbl /Fltr/Pad	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Class B Avg Limit (dBuV/m)	Margin (dB)	Polarity
4.883	45.533	AV	34.3	-27.3	38.533	-	-	54	-15.467	H
7.325	46.811	AV	35.9	-26.4	37.311	-	-	54	-16.689	H

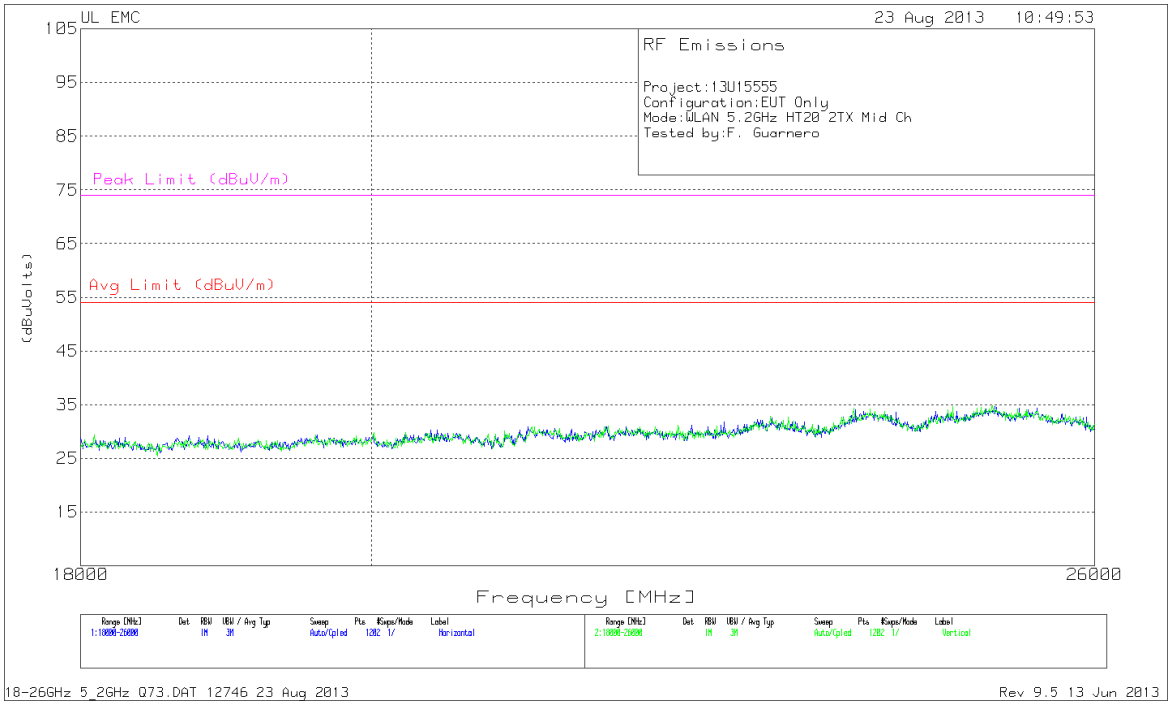
AV – Average RMS detector

Measurements were taken using the worst case polarity.

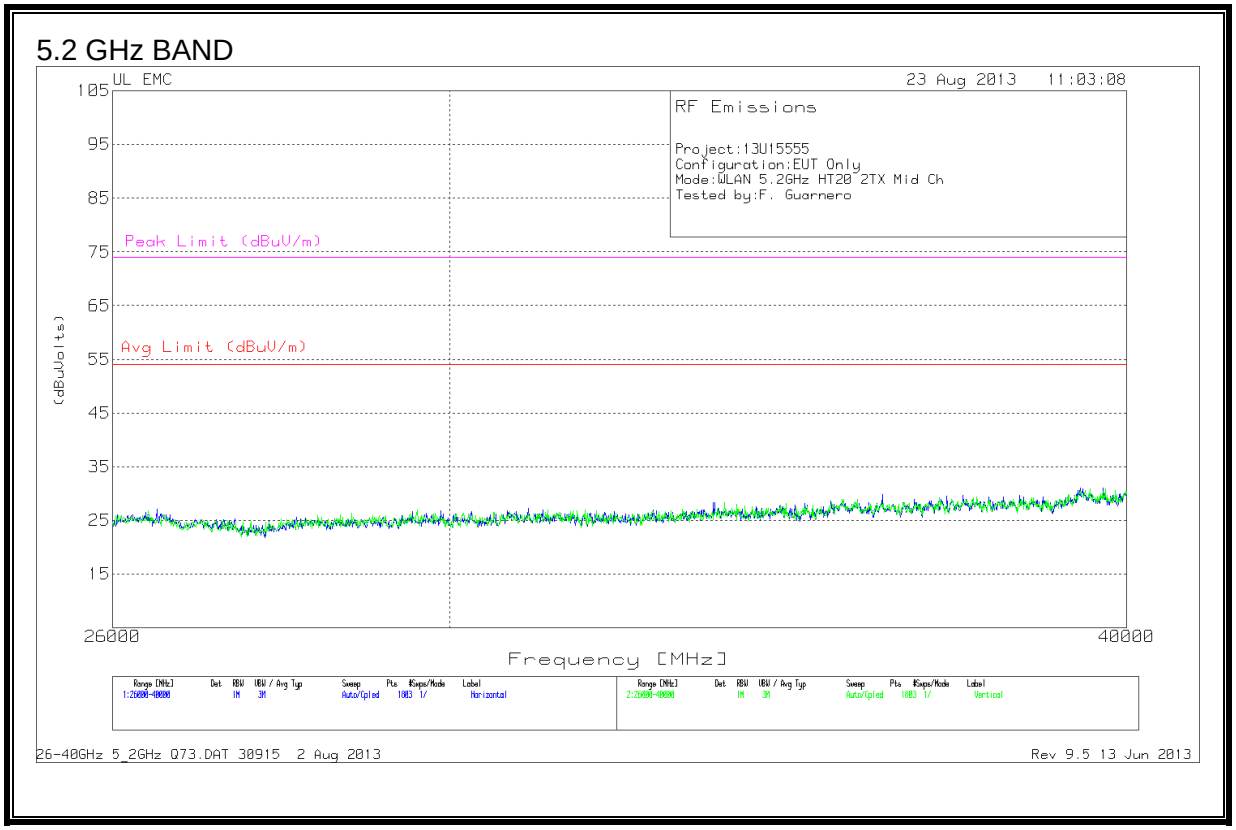
9.3. WORST-CASE ABOVE 18 GHz

SPURIOUS EMISSIONS 18 TO 26 GHz (WORST-CASE CONFIGURATION, HORIZONTAL & VERTICAL)

5.2 GHz BAND

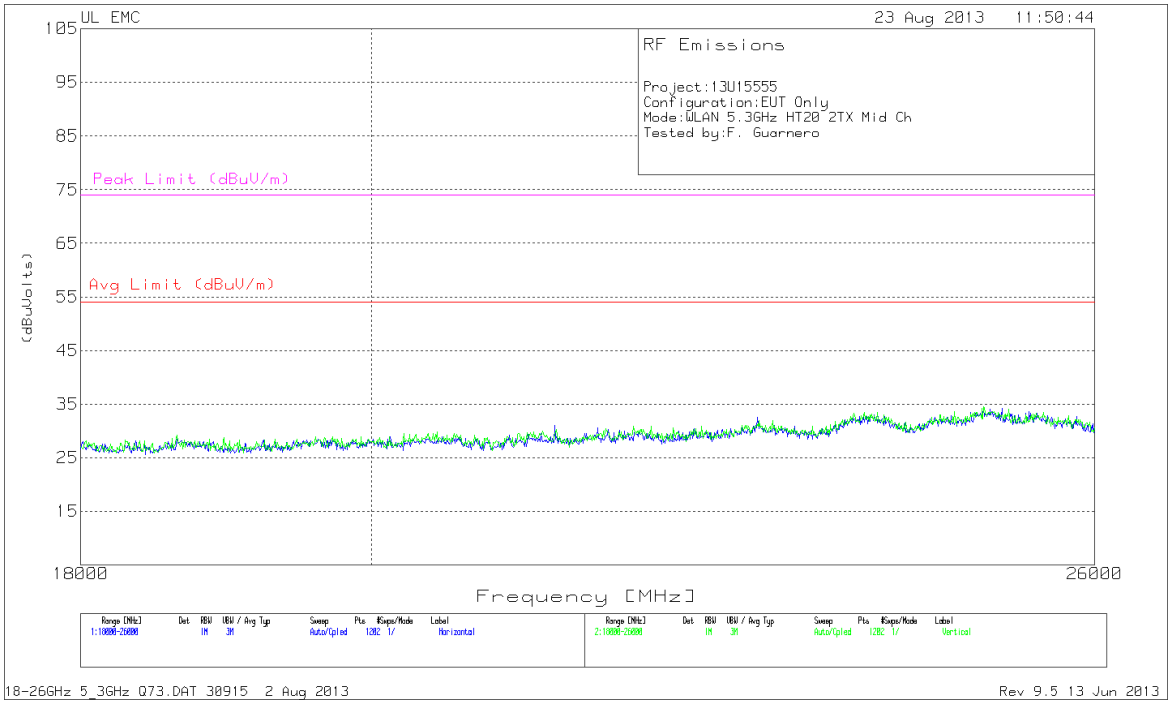


SPURIOUS EMISSIONS 26 TO 40 GHz (WORST-CASE CONFIGURATION, HORIZONTAL & VERTICAL)



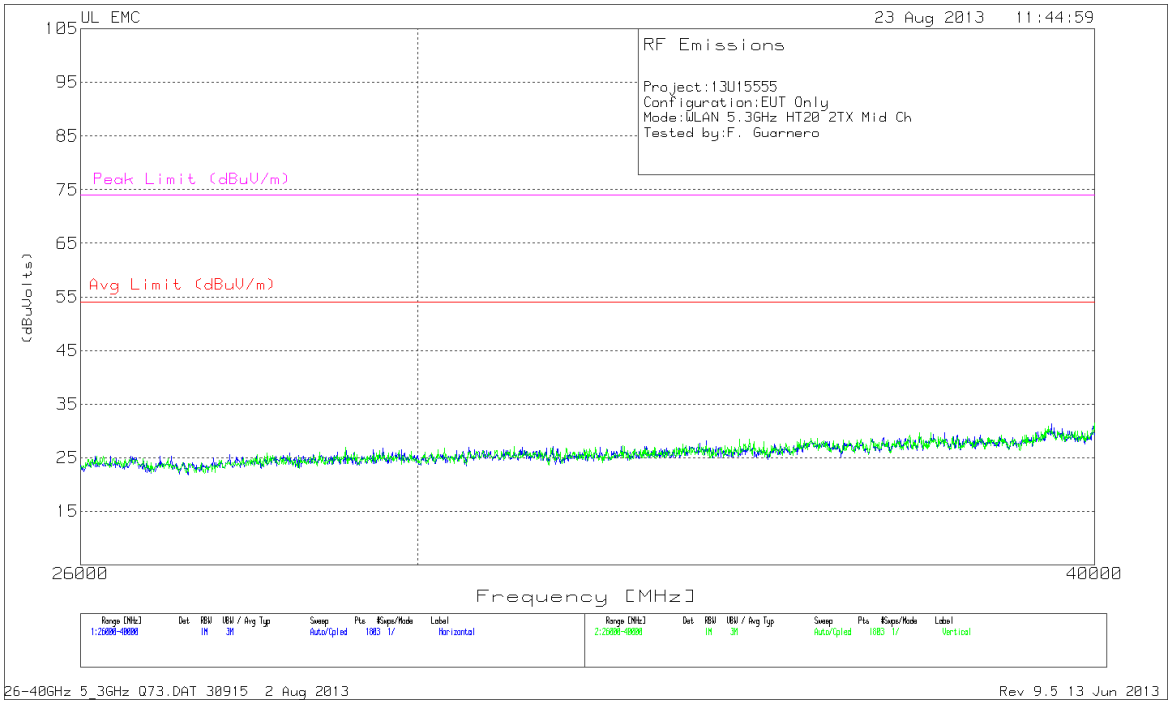
SPURIOUS EMISSIONS 18 TO 26 GHz (WORST-CASE CONFIGURATION, HORIZONTAL & VERTICAL)

5.3 GHz BAND



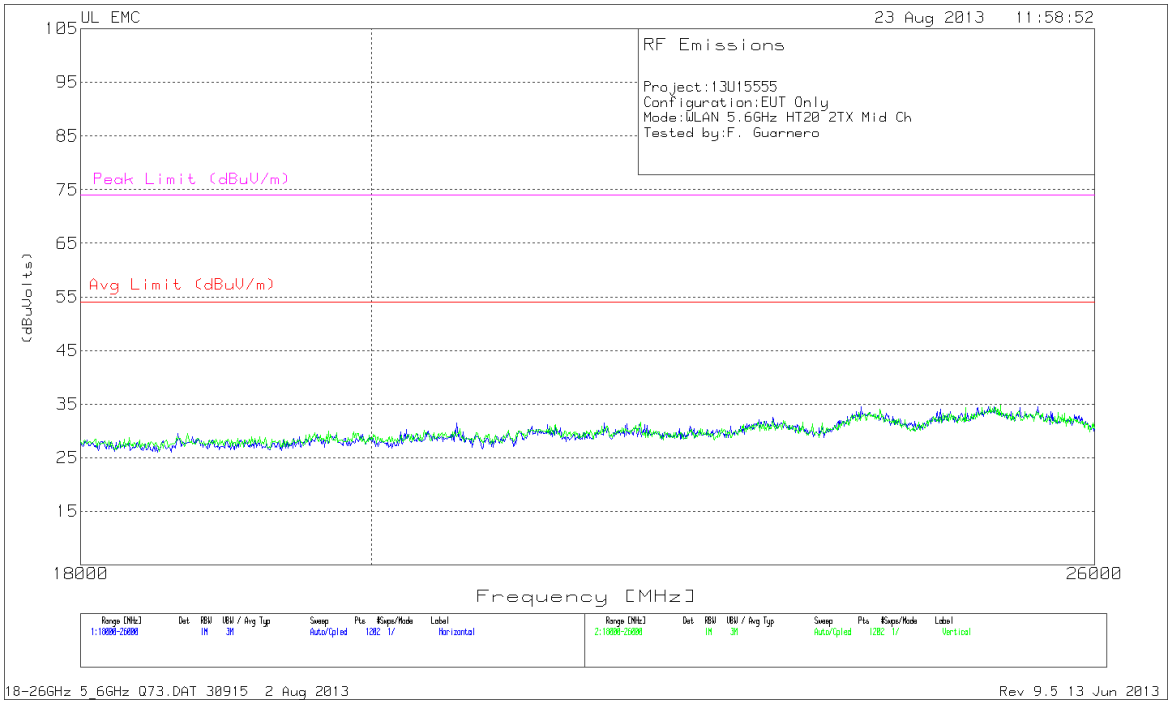
SPURIOUS EMISSIONS 26 TO 40 GHz (WORST-CASE CONFIGURATION, HORIZONTAL & VERTICAL)

5.3 GHz BAND



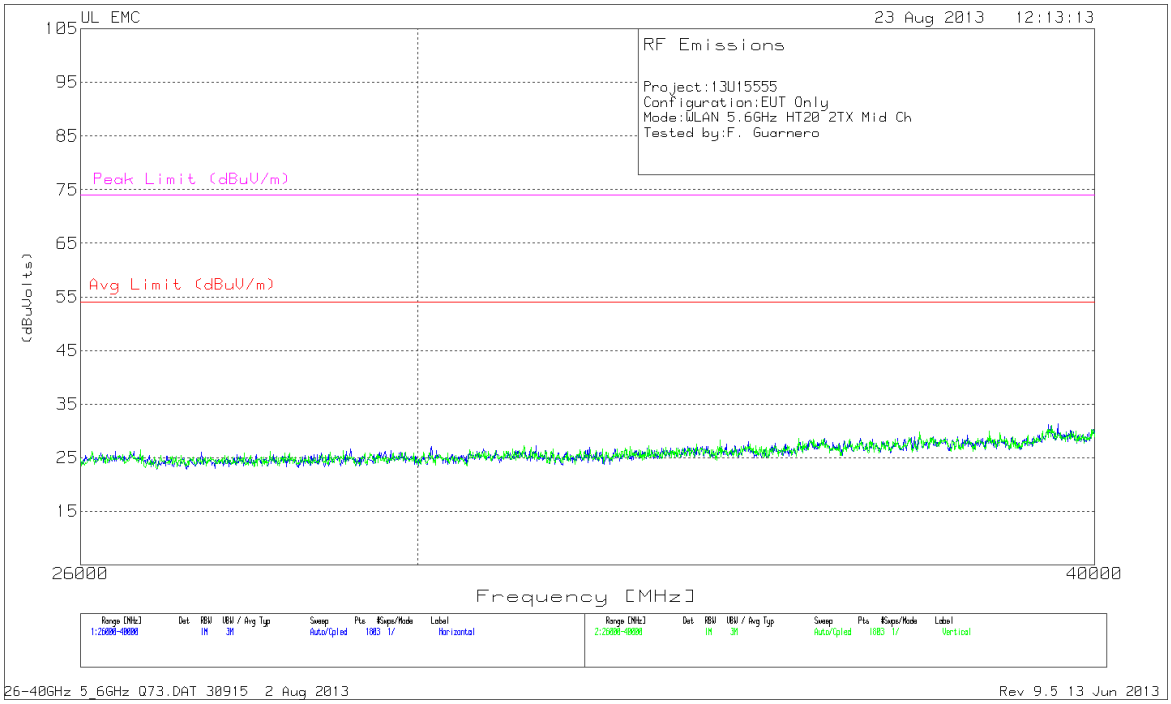
SPURIOUS EMISSIONS 18 TO 26 GHz (WORST-CASE CONFIGURATION, HORIZONTAL & VERTICAL)

5.6 GHz BAND



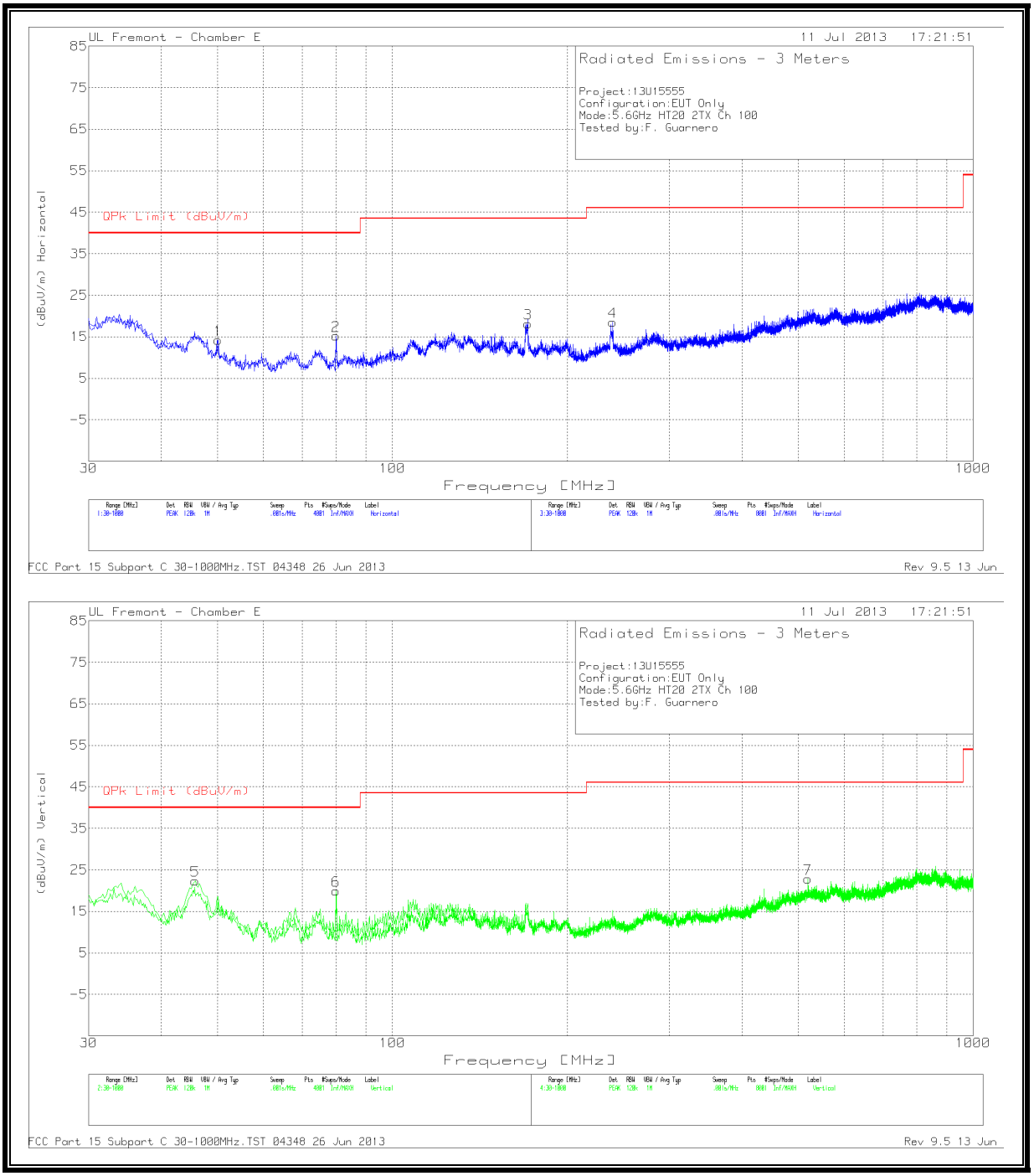
SPURIOUS EMISSIONS 26 TO 40 GHz (WORST-CASE CONFIGURATION, HORIZONTAL & VERTICAL)

5.6 GHz BAND



9.4. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T408 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	50.1275	34.03	PK	7.9	-27.7	14.23	40	-25.77	400	H
2	79.955	35.24	PK	7.7	-27.7	15.24	40	-24.76	400	H
3	171.135	33.78	PK	11.7	-27.3	18.18	43.52	-25.34	98	H
4	239.52	33.37	PK	11.5	-26.3	18.57	46.02	-27.45	98	H
5	45.7625	39.87	PK	10	-27.5	22.37	40	-17.63	100	V
6	79.955	39.96	PK	7.7	-27.7	19.96	40	-20.04	100	V
7	519.1225	30.65	PK	18.1	-25.9	22.85	46.02	-23.17	100	V

PK - Peak detector

FCC Part 15 Subpart C 30-1000MHz.TST 04348 26 Jun 2013Rev 9.5 13 Jun 2013

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	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 C63.4.

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

WORST EMISSIONS

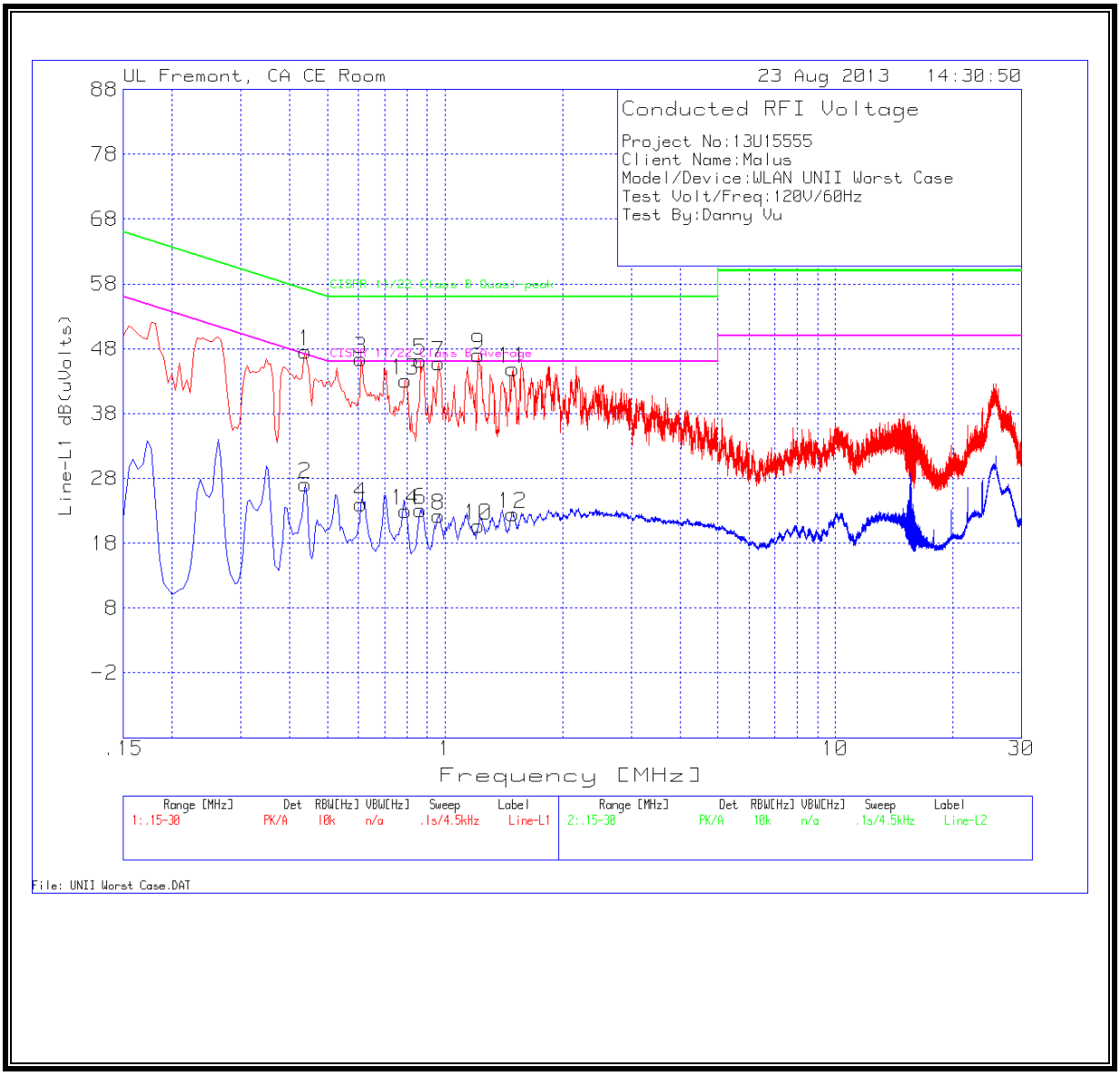
Line-L1 .15 - 30MHz

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin to Limit (dB)	CISPR 11/22 Class B Average	Margin to Limit (dB)
1	.438	47.5	PK	.1	0	47.6	57.1	-9.5	-	-
2	.438	27.06	Av	.1	0	27.16	-	-	47.1	-19.94
3	.609	46.28	PK	.1	0	46.38	56	-9.62	-	-
4	.609	23.97	Av	.1	0	24.07	-	-	46	-21.93
13	.7935	43.02	PK	.1	0	43.12	56	-12.88	-	-
14	.7935	22.9	Av	.1	0	23	-	-	46	-23
5	.8655	46.03	PK	.1	0	46.13	56	-9.87	-	-
6	.8655	23.03	Av	.1	0	23.13	-	-	46	-22.87
7	.9645	45.67	PK	.1	0	45.77	56	-10.23	-	-
8	.9645	22.15	Av	.1	0	22.25	-	-	46	-23.75
9	1.2165	46.86	PK	.1	.1	47.06	56	-8.94	-	-
10	1.2165	20.54	Av	.1	.1	20.74	-	-	46	-25.26
11	1.491	44.68	PK	.1	.1	44.88	56	-11.12	-	-
12	1.491	22.25	Av	.1	.1	22.45	-	-	46	-23.55

PK - Peak detector
Av - average detection

LINE 1 RESULTS



WORST EMISSIONS

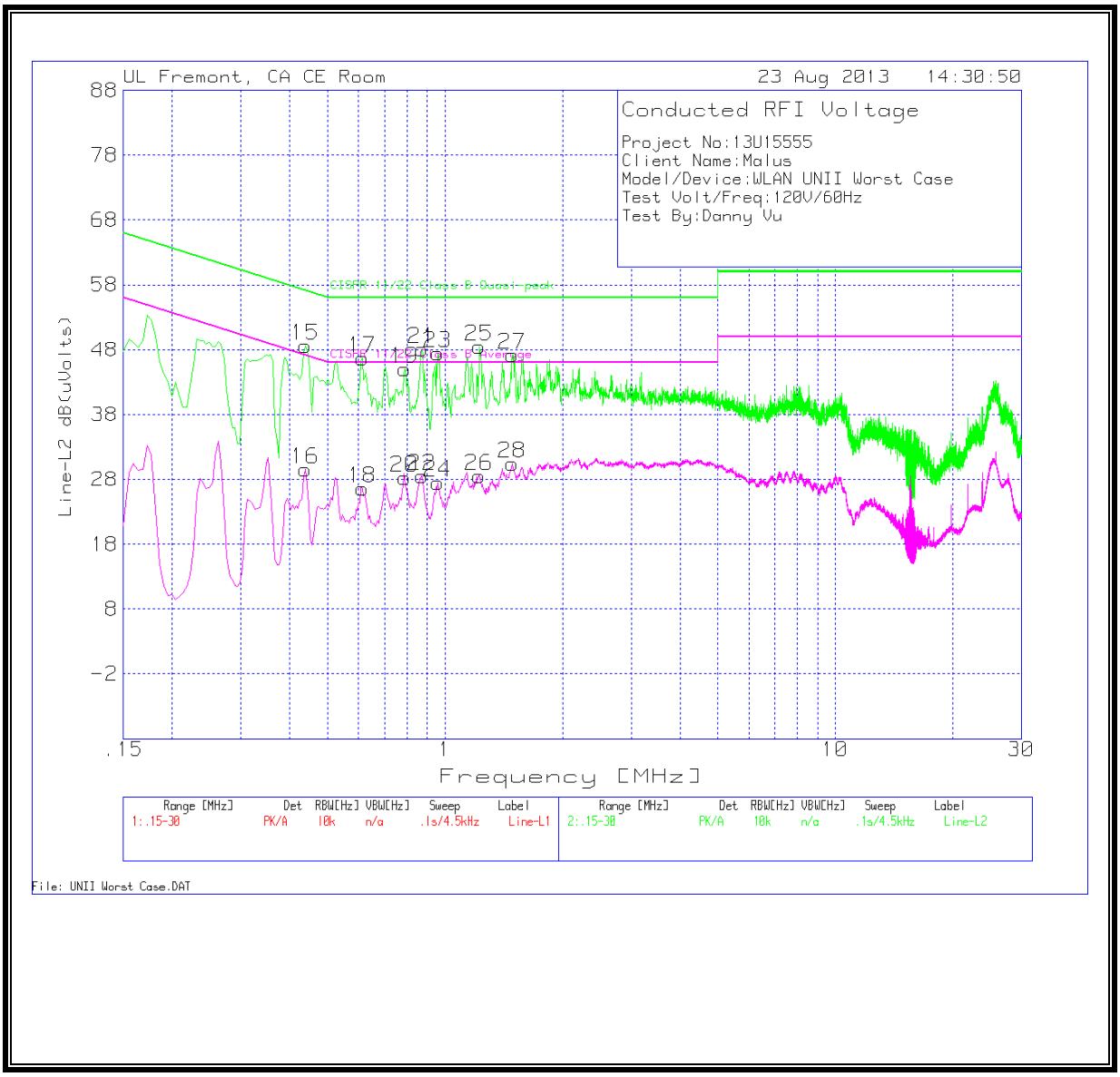
Line-L2 .15 - 30MHz

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin to Limit (dB)	CISPR 11/22 Class B Average	Margin to Limit (dB)
15	.438	48.5	PK	.1	0	48.6	57.1	-8.5	-	-
16	.438	29.49	Av	.1	0	29.59	-	-	47.1	-17.51
17	.6135	46.56	PK	.1	0	46.66	56	-9.34	-	-
18	.6135	26.46	Av	.1	0	26.56	-	-	46	-19.44
19	.789	44.87	PK	.1	0	44.97	56	-11.03	-	-
20	.789	28.11	Av	.1	0	28.21	-	-	46	-17.79
21	.8745	48	PK	.1	0	48.1	56	-7.9	-	-
22	.8745	28.46	Av	.1	0	28.56	-	-	46	-17.44
23	.96	47.4	PK	.1	0	47.5	56	-8.5	-	-
24	.96	27.45	Av	.1	0	27.55	-	-	46	-18.45
25	1.2255	48.3	PK	.1	.1	48.5	56	-7.5	-	-
26	1.2255	28.35	Av	.1	.1	28.55	-	-	46	-17.45
27	1.4865	46.96	PK	.1	.1	47.16	56	-8.84	-	-
28	1.4865	30.2	Av	.1	.1	30.4	-	-	46	-15.6

PK - Peak detector
Av - average detection

LINE 2 RESULTS



11. DYNAMIC FREQUENCY SELECTION

11.1. OVERVIEW

11.1.1. LIMITS

FCC

§15.407 (h) and FCC 06-96 APPENDIX “COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVCIES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION”.

Table 1: Applicability of DFS requirements prior to use of a channel

Requirement	Operational Mode		
	Master	Client (without radar detection)	Client (with radar detection)
Non-Occupancy Period	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
Uniform Spreading	Yes	Not required	Not required

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode		
	Master	Client **(without DFS)**	Client **(with DFS)**
DFS Detection Threshold	Yes	Not required	Yes
Channel Closing Transmission Time	Yes	Yes	Yes
Channel Move Time	Yes	Yes	Yes

Table 3: Interference Threshold values, Master or Client incorporating In-Service Monitoring

Maximum Transmit Power	Value (see note)
≥ 200 milliwatt	-64 dBm
< 200 milliwatt	-62 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.		

Table 4: DFS Response requirement values

Parameter	Value
Non-occupancy period	30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds
Channel Closing Transmission Time	200 milliseconds + approx. 60 milliseconds over remaining 10 second period
The instant that the *Channel Move Time* and the *Channel Closing Transmission Time* begins is as follows: For the Short pulse radar Test Signals this instant is the end of the *Burst*. For the Frequency Hopping radar Test Signal, this instant is the end of the last radar burst generated. For the Long Pulse radar Test Signal this instant is the end of the 12 second period defining the radar transmission. The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate channel changes (an aggregate of approximately 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.	

Table 5 – Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (Microseconds)	PRI (Microseconds)	Pulses	Minimum Percentage of Successful Detection	Minimum Trials
1	1	1428	18	60%	30
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

Table 6 – Long Pulse Radar Test Signal

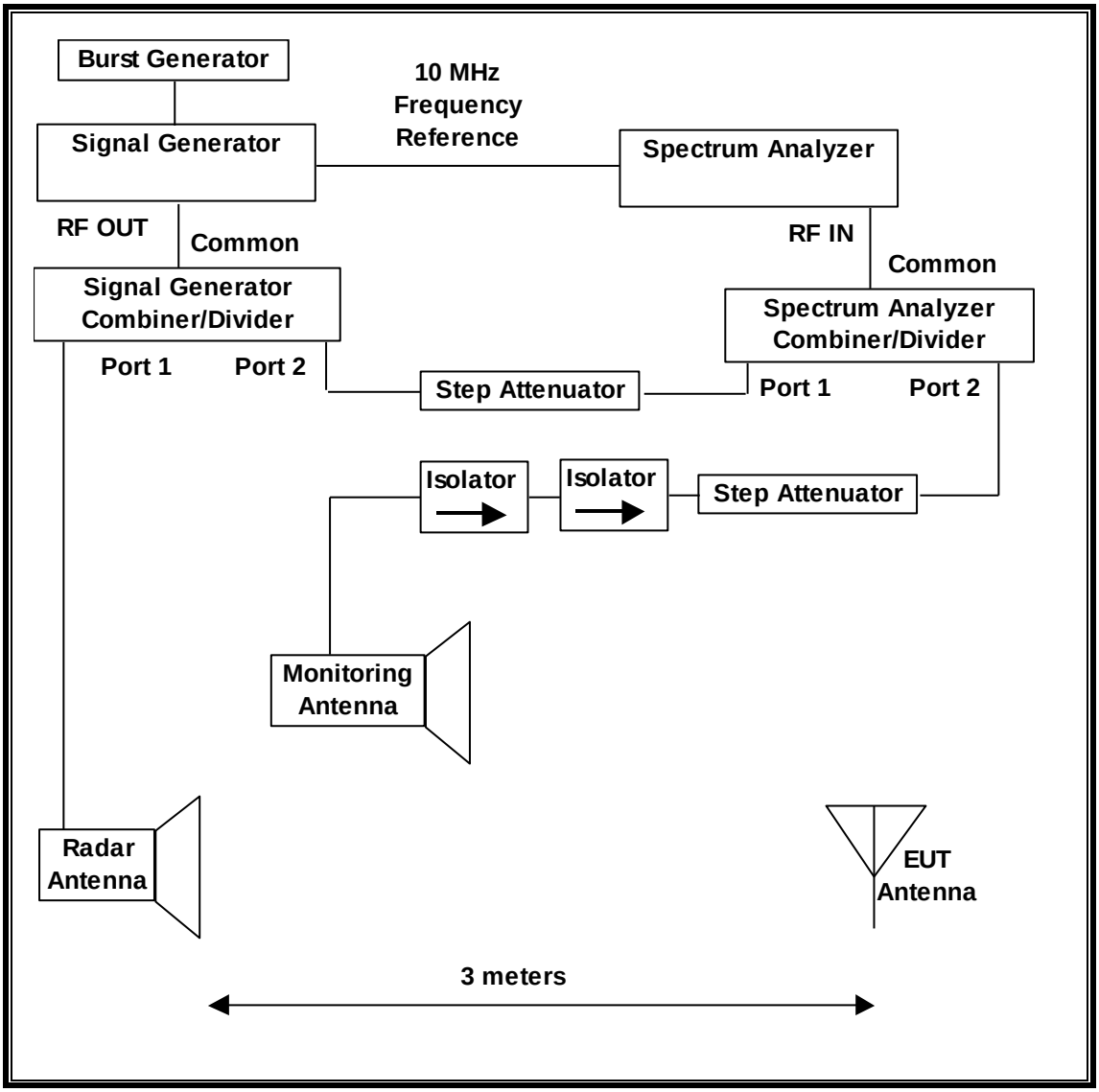
Radar Waveform	Bursts	Pulses per Burst	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Minimum Percentage of Successful Detection	Minimum Trials
5	8-20	1-3	50-100	5-20	1000-2000	80%	30

Table 7 – Frequency Hopping Radar Test Signal

Radar Waveform	Pulse Width (µsec)	PRI (µsec)	Burst Length (ms)	Pulses per Hop	Hopping Rate (kHz)	Minimum Percentage of Successful Detection	Minimum Trials
6	1	333	300	9	.333	70%	30

11.1.2. TEST AND MEASUREMENT SYSTEM

RADIATED METHOD SYSTEM BLOCK DIAGRAM



SYSTEM OVERVIEW

The short pulse and long pulse signal generating system utilizes the NTIA software. The Vector Signal Generator has been validated by the NTIA. The hopping signal generating system utilizes the CCS simulated hopping method and system, which has been validated by the DoD, FCC and NTIA. The software selects waveform parameters from within the bounds of the signal type on a random basis using uniform distribution.

The short pulse types 2, 3 and 4, and the long pulse type 5 parameters are randomized at run-time.

The hopping type 6 pulse parameters are fixed while the hopping sequence is based on the August 2005 NTIA Hopping Frequency List. The initial starting point randomized at run-time and each subsequent starting point is incremented by 475. Each frequency in the 100-length segment is compared to the boundaries of the EUT Detection Bandwidth and the software creates a hopping burst pattern in accordance with Section 7.4.1.3 Method #2 Simulated Freqeuncy Hopping Radar Waveform Generating Subsystem of FCC 06-96 APPENDIX. The frequency of the signal generator is incremented in 1 MHz steps from F_L to F_H for each successive trial. This incremental sequence is repeated as required to generate a minimum of 30 total trials and to maintain a uniform frequency distribution over the entire Detection Bandwidth.

The signal monitoring equipment consists of a spectrum analyzer. The aggregate ON time is calculated by multiplying the number of bins above a threshold during a particular observation period by the dwell time per bin, with the analyzer set to peak detection and max hold.

SYSTEM CALIBRATION

A 50-ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to a horn antenna via a coaxial cable, with the reference level offset set to (horn antenna gain – coaxial cable loss). The signal generator is set to CW mode. The amplitude of the signal generator is adjusted to yield a level of –64 dBm as measured on the spectrum analyzer.

Without changing any of the instrument settings, the spectrum analyzer is reconnected to the Common port of the Spectrum Analyzer Combiner/Divider. The Reference Level Offset of the spectrum analyzer is adjusted so that the displayed amplitude of the signal is –64 dBm.

The spectrum analyzer displays the level of the signal generator as received at the antenna ports of the Master Device. The interference detection threshold may be varied from the calibrated value of –64 dBm and the spectrum analyzer will still indicate the level as received by the Master Device.

ADJUSTMENT OF DISPLAYED TRAFFIC LEVEL

A link is established between the Master and Slave and the distance between the units is adjusted as needed to provide a suitable received level at the Master and Slave devices. The video test file is streamed to generate WLAN traffic. The monitoring antenna is adjusted so that the WLAN traffic level, as displayed on the spectrum analyzer, is at lower amplitude than the radar detection threshold.

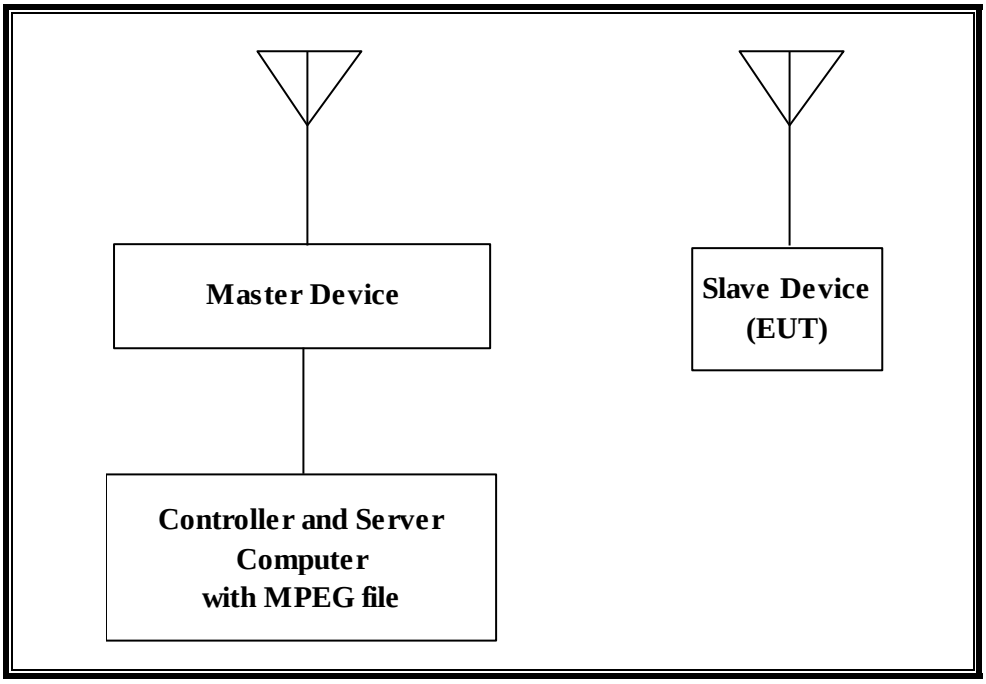
TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the DFS tests documented in this report:

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset Number**	**Cal Due**
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01178	09/18/13
Vector Signal Generator, 20GHz	Agilent / HP	E8267C	C01066	11/20/13

11.1.3. SETUP OF EUT

RADIATED METHOD EUT TEST SETUP



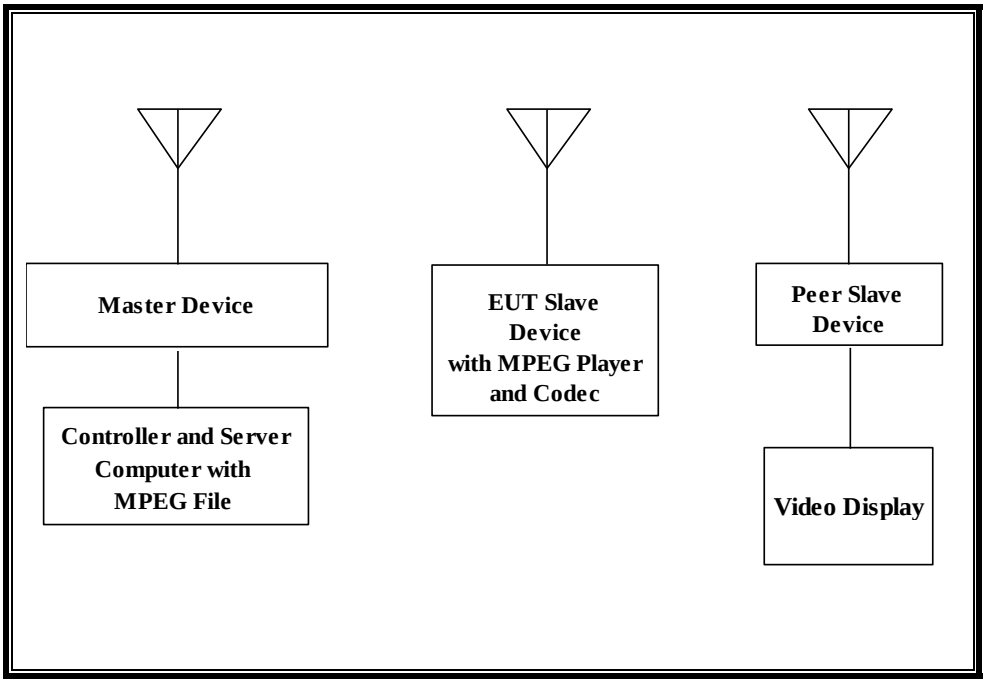
SUPPORT EQUIPMENT

The following support equipment was utilized for the DFS tests documented in this report:

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Wireless Access Point (Master Device)	Cisco	AIR-AP1252AG-A-K9	FTX130390D9	LDK102061
AC Adapter (AP)	Delta Electronics	EADP-45BB B	DTH1049902N	DoC
Notebook PC (Controller/Server)	Apple	MacBook Pro A1150	AOU257941	DoC
AC Adapter (Controller/Server PC)	Delta Electronics	A1330	MV952157KAGKA	DoC

11.1.4. SETUP OF EUT (CLIENT-TO-CLIENT COMMUNICATIONS MODE)

RADIATED METHOD EUT TEST SETUP



SUPPORT EQUIPMENT

The following support equipment was utilized for the DFS tests documented in this report:

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Wireless Access Point (Master Device)	Cisco	AIR-AP1252AG-A-K9	FTX130390D9	LDK102061
AC Adapter (AP)	Delta Electronics	EADP-45BB B	DTH1049902N	DoC
Notebook PC (Controller/Server)	Apple	MacBook Pro A1150	AOU257941	DoC
AC Adapter (Controller/Server PC)	Delta Electronics	A1330	MV952157KAGKA	DoC
Apple TV (Peer Slave Device)	Apple	A1469	V07JV1Z7FF54	BCGA1469
Video Display	Dell	U2410f	CN-0FJ525N-72872-1B5-AGAL	DoC

11.1.5. DESCRIPTION OF EUT

The EUT operates over the 5250-5350 MHz and 5470-5725 MHz ranges.

The EUT is a Slave Device without Radar Detection.

The highest power level within these bands is 22.18 dBm EIRP in the 5250-5350 MHz band and 23.57 dBm EIRP in the 5470-5725 MHz band.

The only gain antenna assembly consists of 2 antennas with individual gains of 2.60 dBi, and 2.11 dBi in the 5250-5350 MHz band and 3.66 dBi and 3.99 dBi in the 5470-5725 MHz band.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is –64 dBm. After correction for procedural adjustments, the required radiated threshold at the antenna port is –64 + 1 = -63 dBm.

The calibrated radiated DFS Detection Threshold level is set to –64 dBm. The tested level is lower than the required level hence it provides margin to the limit.

The EUT uses one transmitter/receiver chain connected to an antenna to perform radiated tests.

WLAN traffic is generated by streaming the video file TestFile.mp2 “6 ½ Magic Hours” from the Master to the Slave in full motion video mode using the media Safari web browser.

TPC is not required since the maximum EIRP is less than 500 mW (27 dBm).

The EUT utilizes the 802.11a/n architecture. Two nominal channel bandwidths are implemented: 20 MHz and 40 MHz.

The software installed in the EUT is 11B451.

UNIFORM CHANNEL SPREADING

This requirement is not applicable to Slave radio devices

OVERVIEW OF MASTER DEVICE WITH RESPECT TO §15.407 (h) REQUIREMENTS

The Master Device is a Cisco Access Point, FCC ID: LDK102061. The minimum antenna gain for the Master Device is 3.5 dBi.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is –64 dBm. After correction for procedural adjustments, the required radiated threshold at the antenna port is –64 + 1 = -63 dBm.

The calibrated radiated DFS Detection Threshold level is set to –64 dBm. The tested level is lower than the required level hence it provides margin to the limit.

The software installed in the access point is 12.4(25d)JA1.

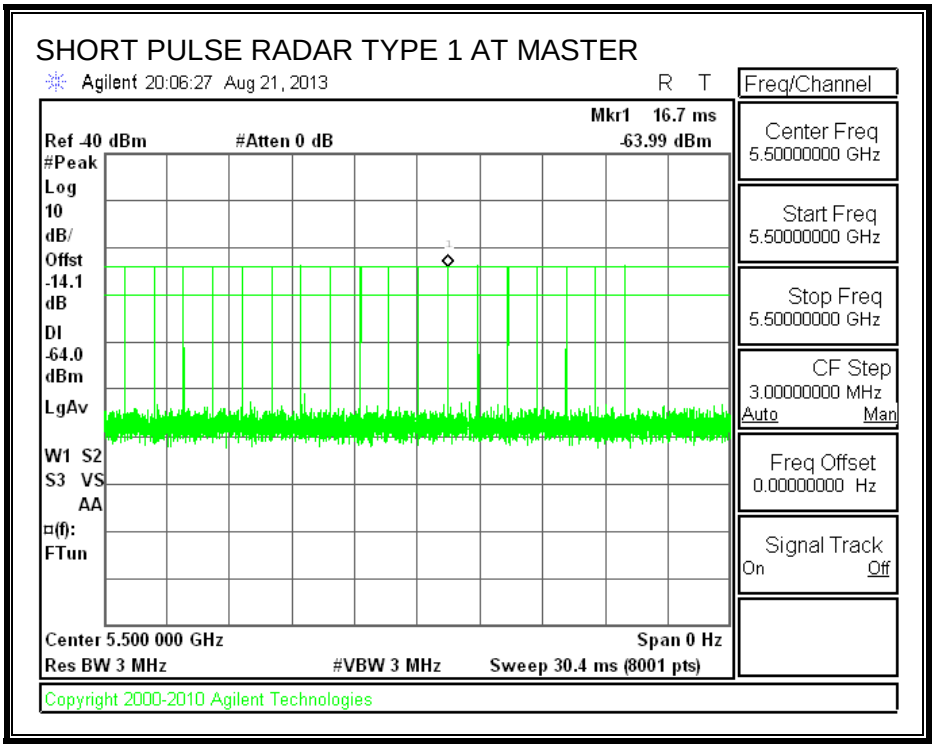
11.2. RESULTS FOR 20 MHz BANDWIDTH

11.2.1. TEST CHANNEL

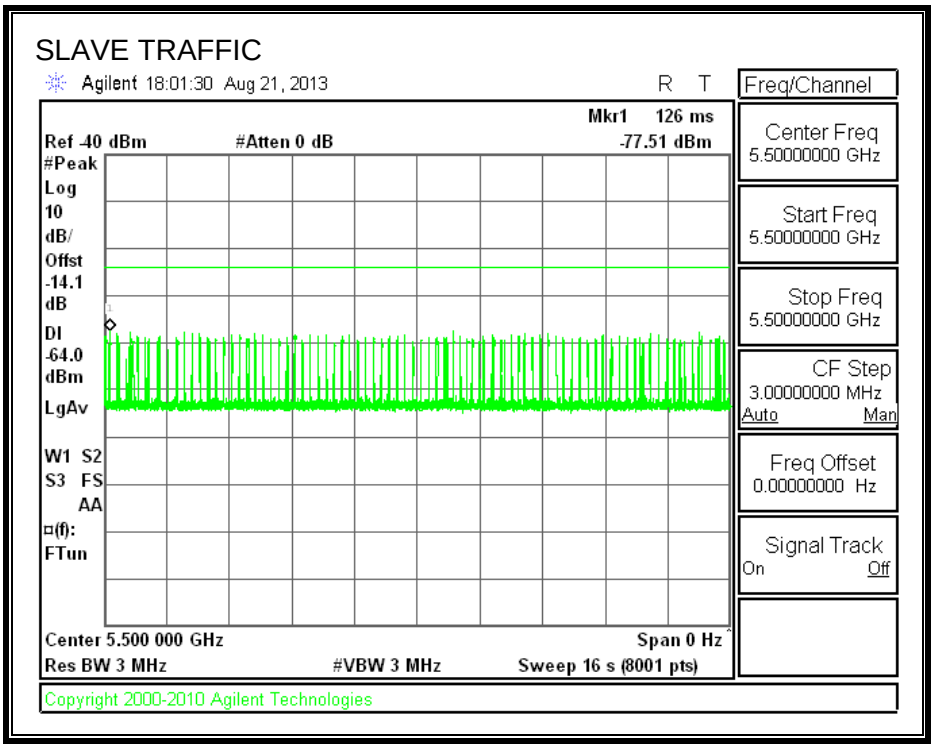
All tests were performed at a channel center frequency of 5500 MHz.

11.2.2. RADAR WAVEFORM AND TRAFFIC

RADAR WAVEFORM



TRAFFIC



11.2.3. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

11.2.4. MOVE AND CLOSING TIME

REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time =
(Number of analyzer bins showing transmission) * (dwell time per bin)

The observation period over which the FCC aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

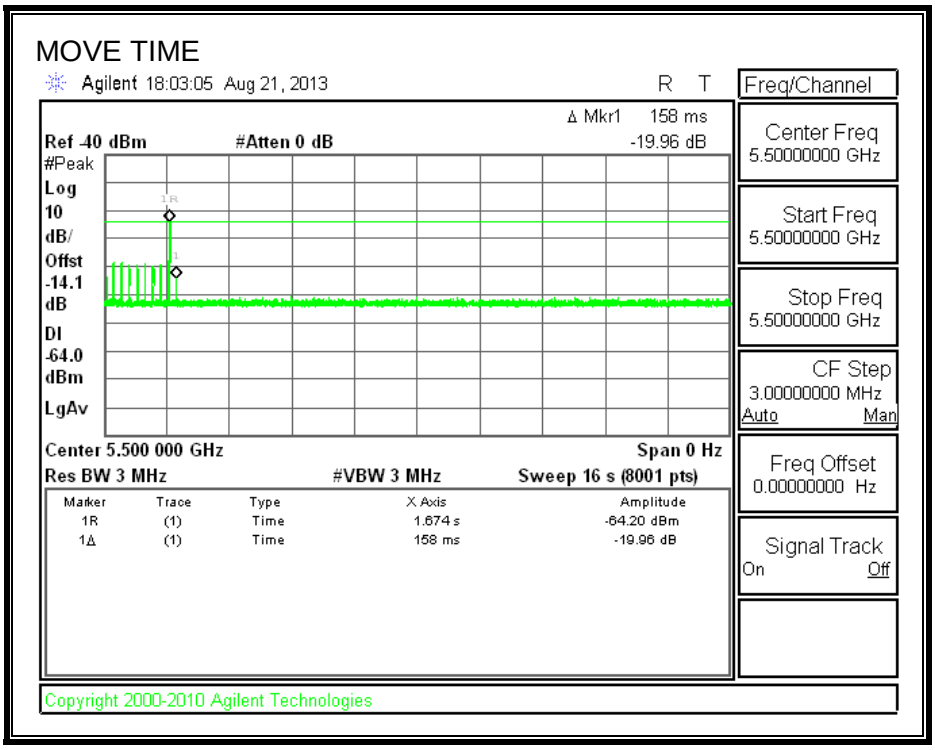
The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

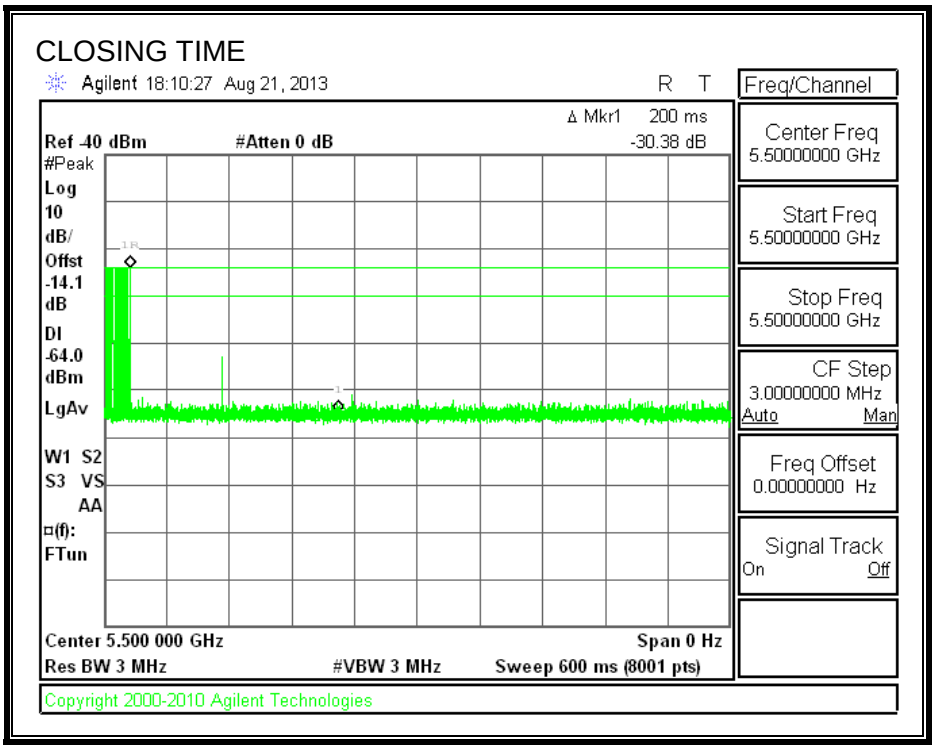
Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	0.158	10

Agency	Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
FCC	0.0	60
IC	4.0	260

MOVE TIME



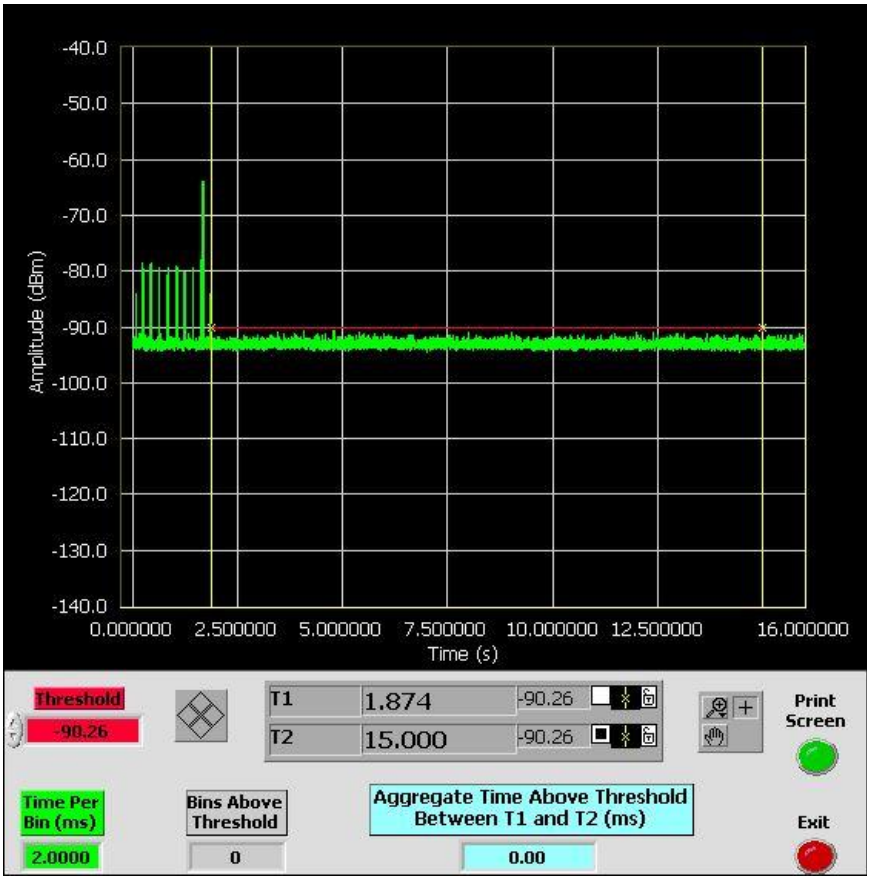
CHANNEL CLOSING TIME



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

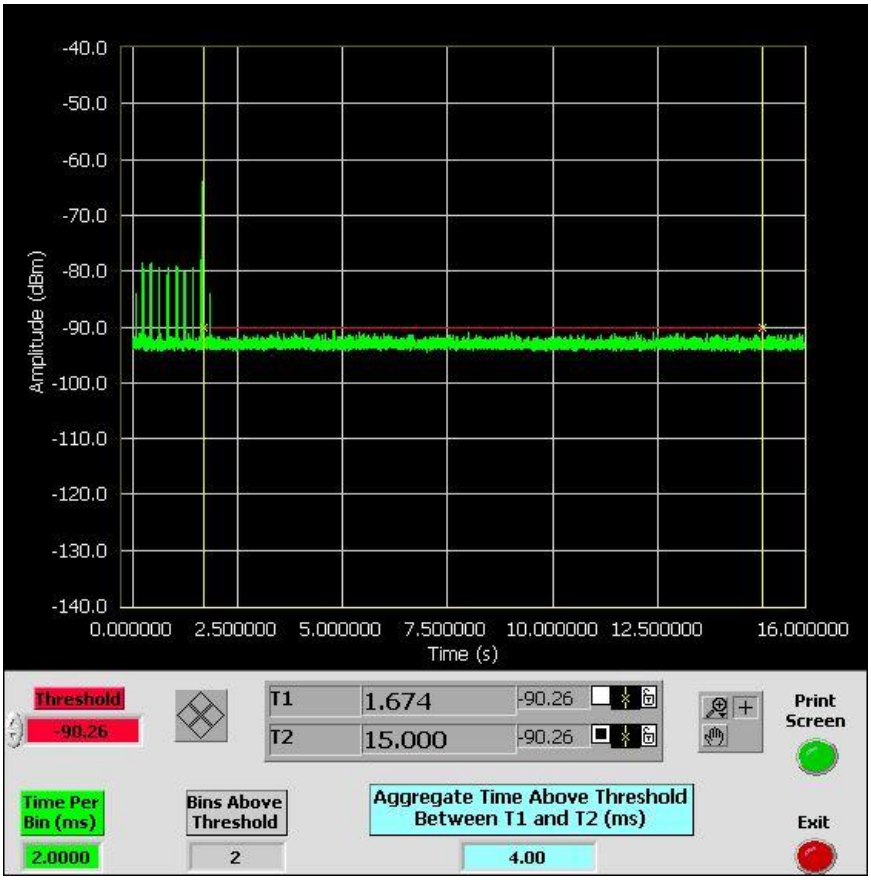
No transmission was observed during the FCC aggregate monitoring period.

FCC AGGREGATE CLOSING TIME



Only intermittent transmissions are observed during the IC aggregate monitoring period.

IC AGGREGATE CLOSING TIME



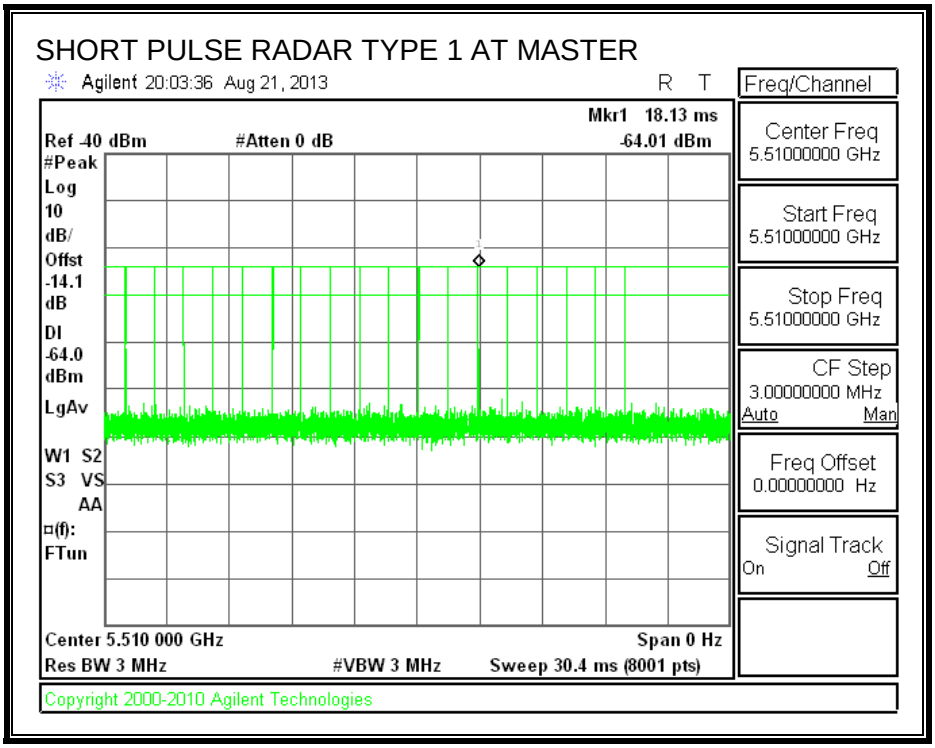
11.3. RESULTS FOR 40 MHz BANDWIDTH

11.3.1. TEST CHANNEL

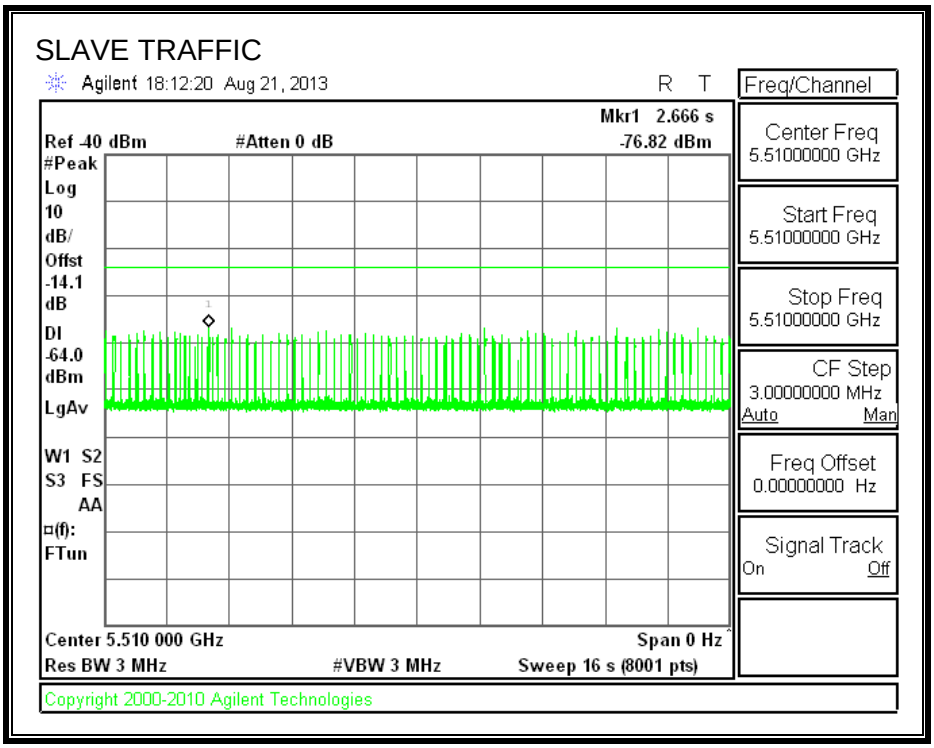
All tests were performed at a channel center frequency of 5510 MHz.

11.3.2. RADAR WAVEFORM AND TRAFFIC

RADAR WAVEFORM



TRAFFIC



11.3.3. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

11.3.4. MOVE AND CLOSING TIME

REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time =
(Number of analyzer bins showing transmission) * (dwell time per bin)

The observation period over which the FCC aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

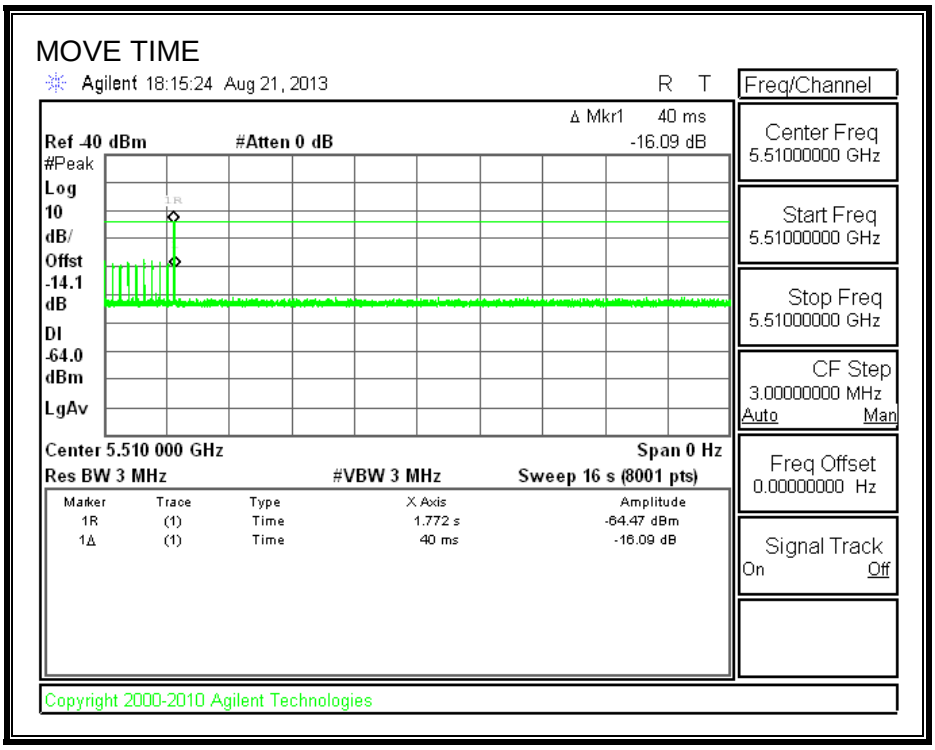
The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

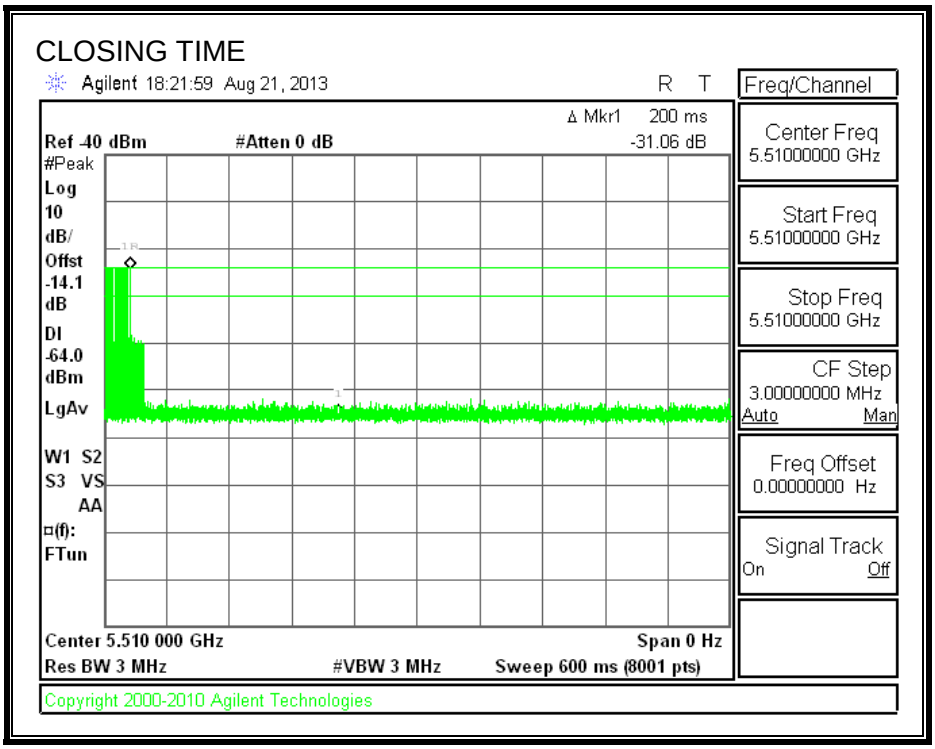
Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	0.040	10

Agency	Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
FCC	0.0	60
IC	8.0	260

MOVE TIME



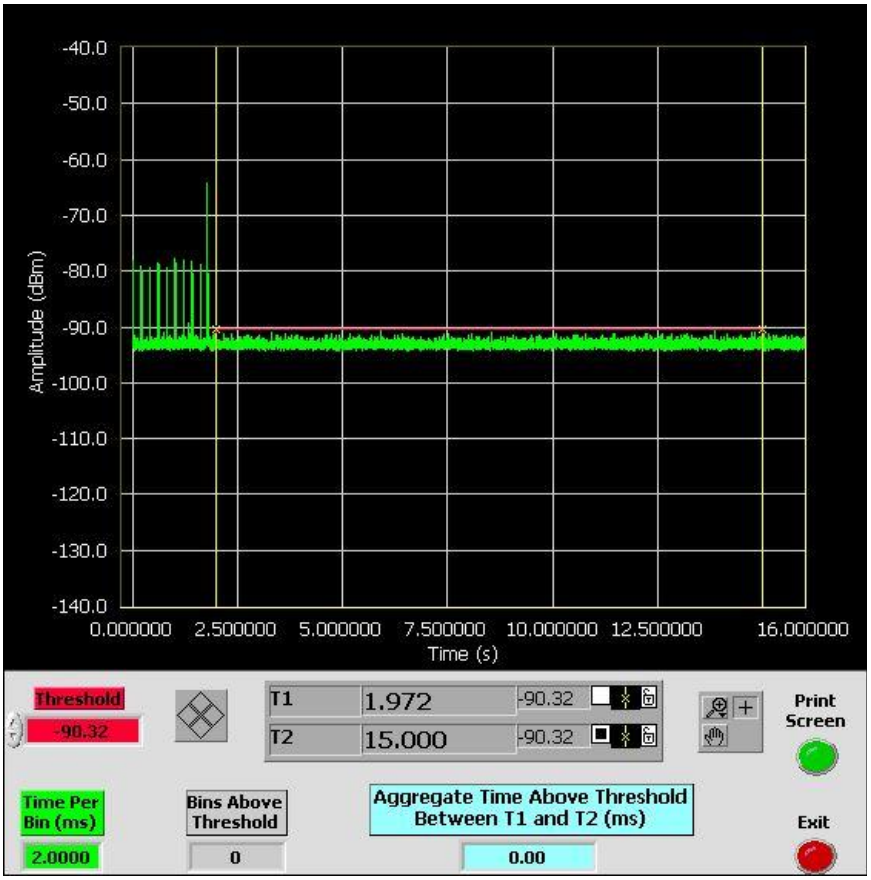
CHANNEL CLOSING TIME



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

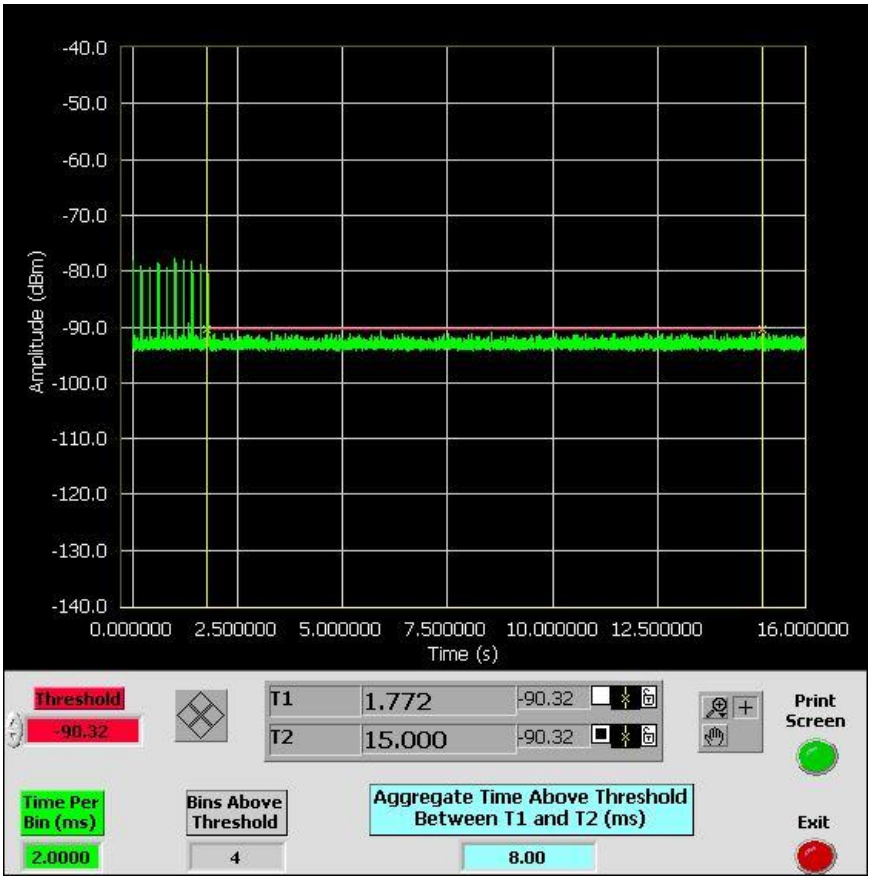
No transmission is observed during the FCC aggregate monitoring period.

FCC AGGREGATE CLOSING TIME



Only intermittent transmissions are observed during the IC aggregate monitoring period.

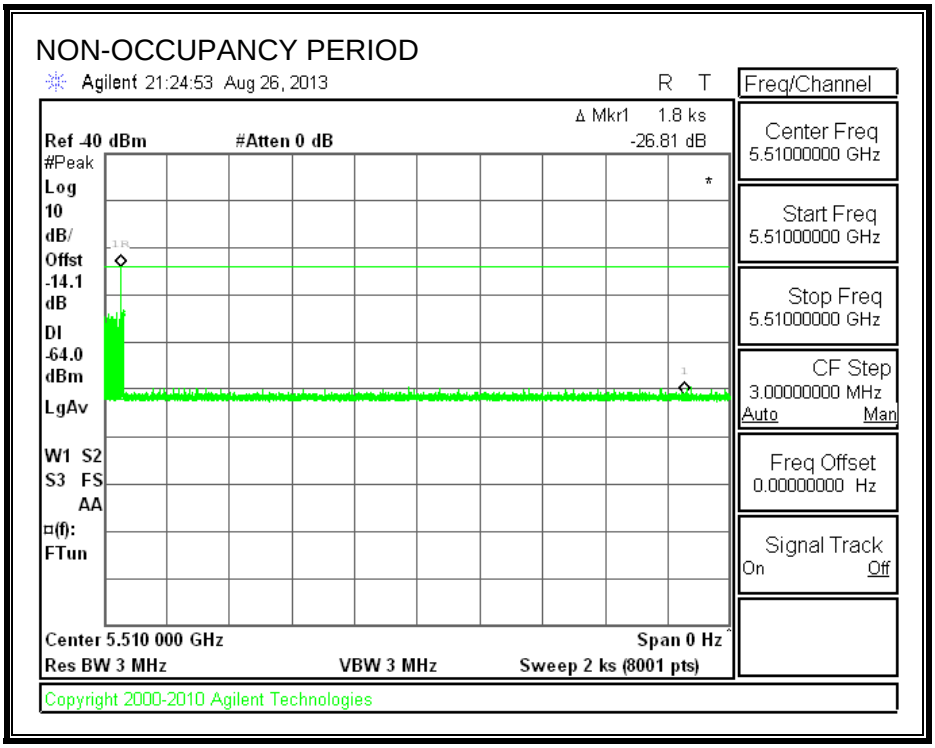
IC AGGREGATE CLOSING TIME



11.3.5. NON-OCCUPANCY PERIOD

RESULTS

No EUT transmissions were observed on the test channel during the 30-minute observation time.



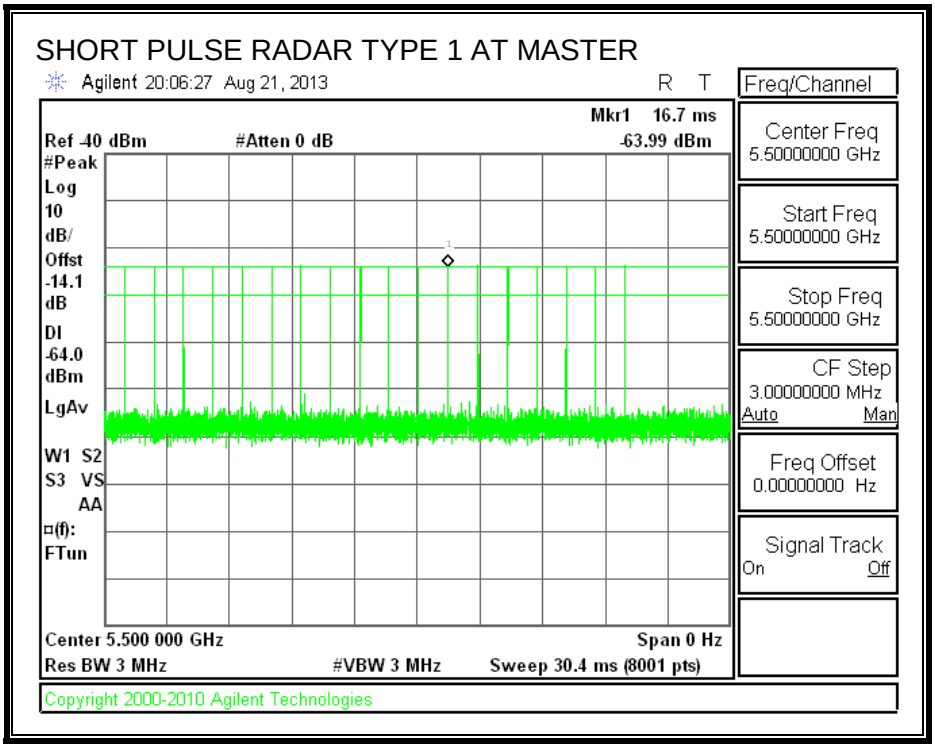
11.4. CLIENT-TO-CLIENT COMMUNICATIONS MODE RESULTS FOR 20 MHz BANDWIDTH

11.4.1. TEST CHANNEL

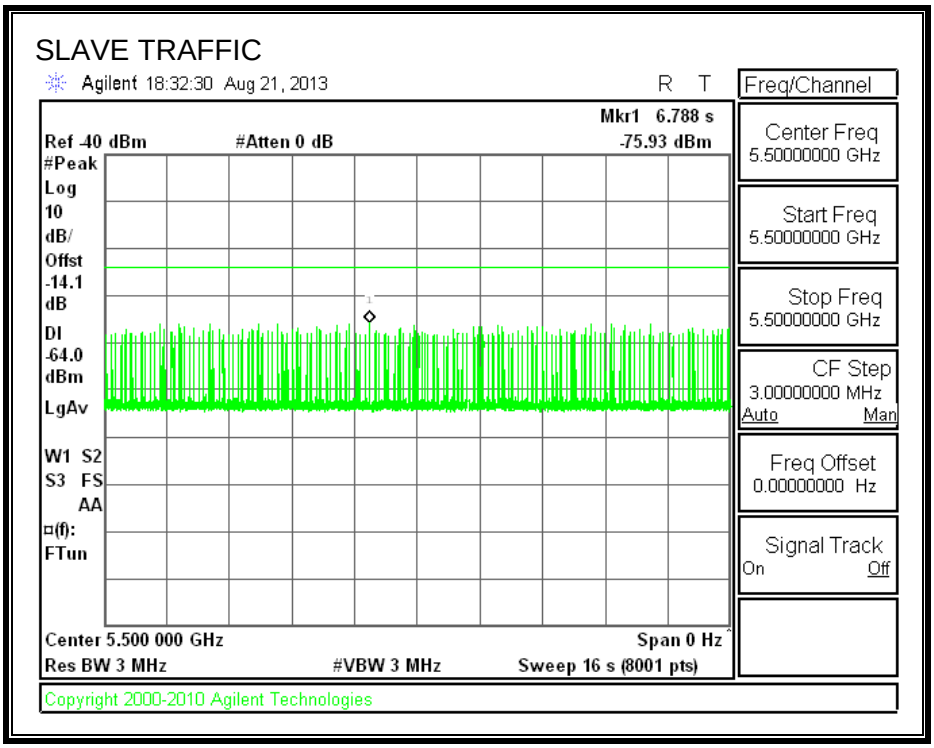
All tests were performed at a channel center frequency of 5500 MHz.

11.4.2. RADAR WAVEFORM AND TRAFFIC

RADAR WAVEFORM



TRAFFIC



11.4.3. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

11.4.4. MOVE AND CLOSING TIME

REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time =
(Number of analyzer bins showing transmission) * (dwell time per bin)

The observation period over which the FCC aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

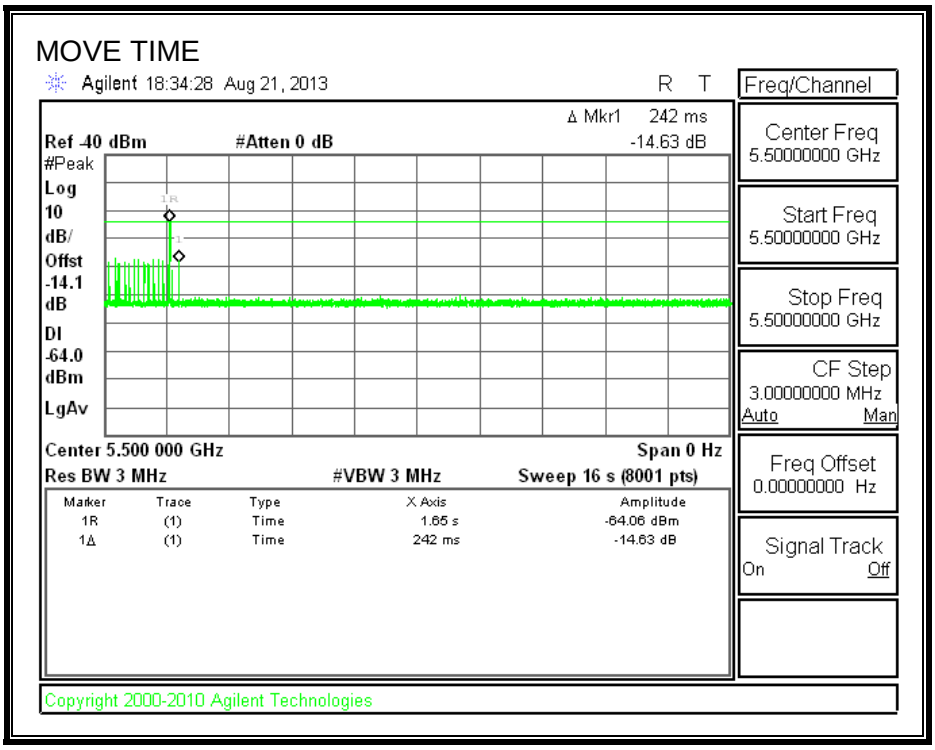
The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

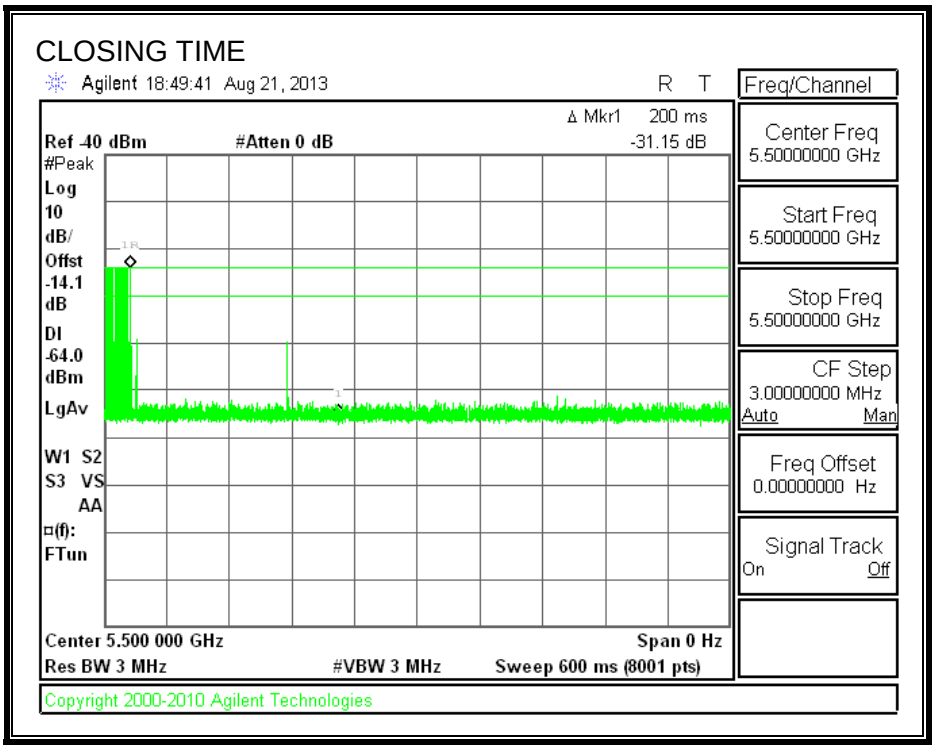
Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	0.242	10

Agency	Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
FCC	6.0	60
IC	32.0	260

MOVE TIME



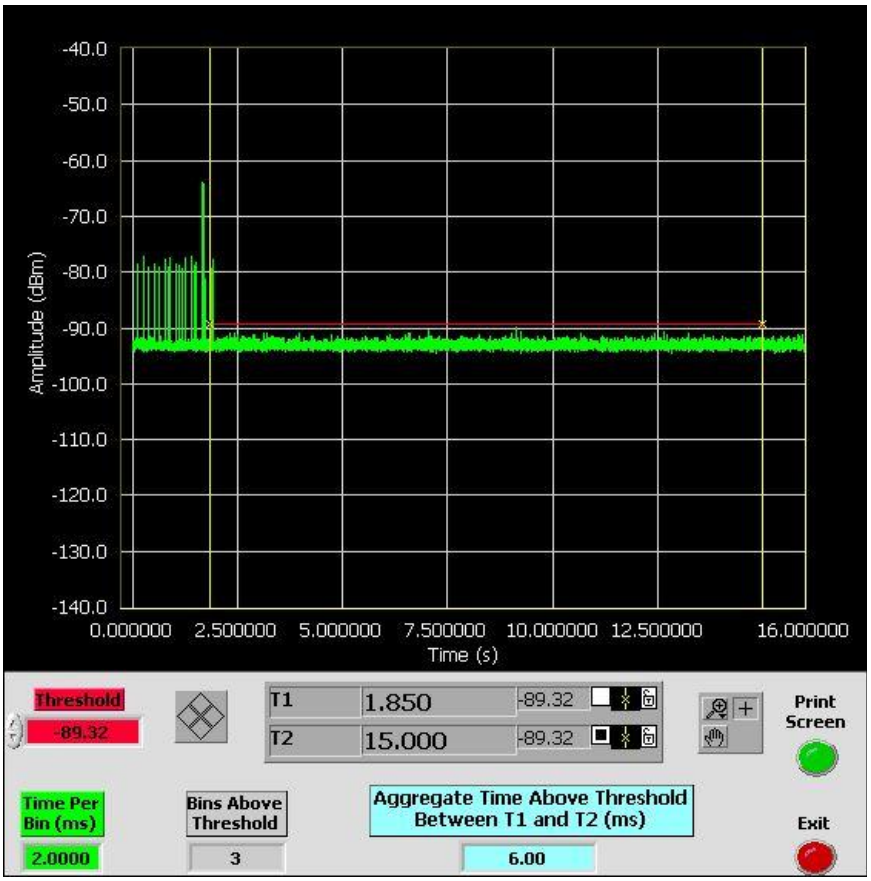
CHANNEL CLOSING TIME



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

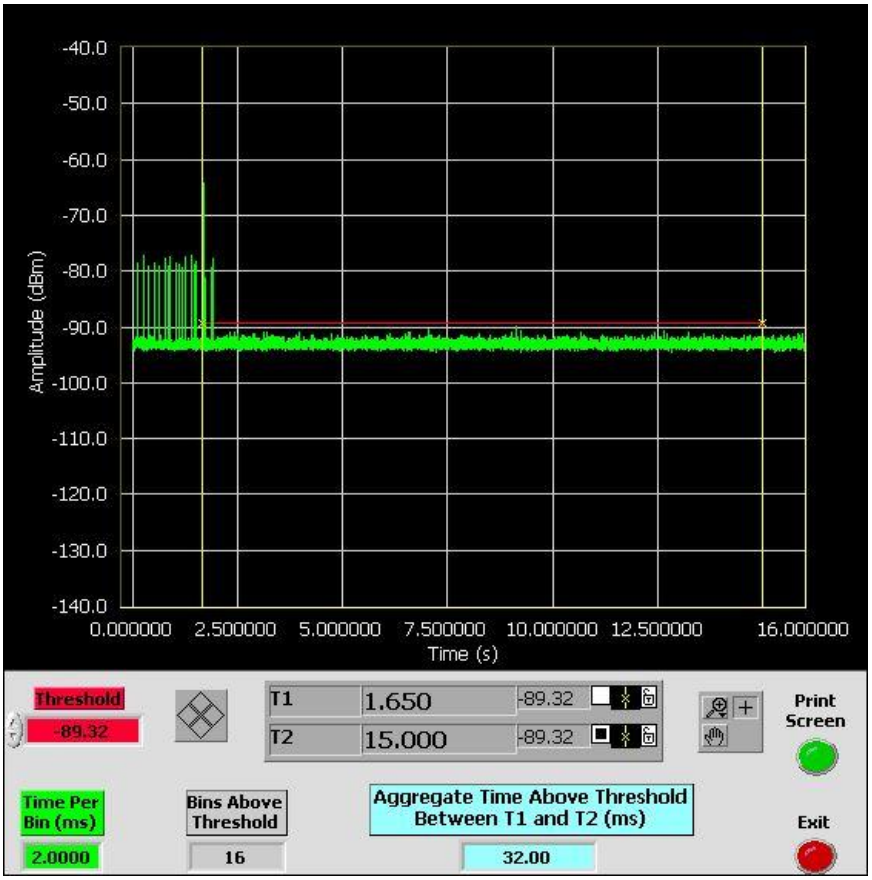
No transmissions are observed during the FCC aggregate monitoring period.

FCC AGGREGATE CLOSING TIME



Only intermittent transmissions are observed during the IC aggregate monitoring period.

IC AGGREGATE CLOSING TIME



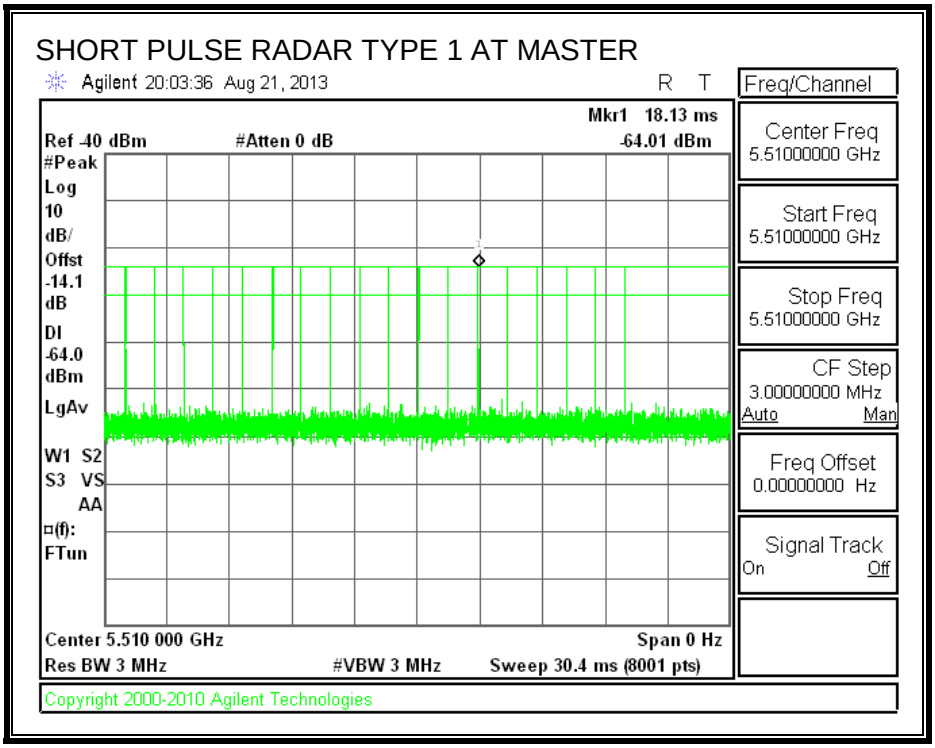
11.5. CLIENT-TO-CLIENT COMMUNICATIONS MODE RESULTS FOR 40 MHz BANDWIDTH

11.5.1. TEST CHANNEL

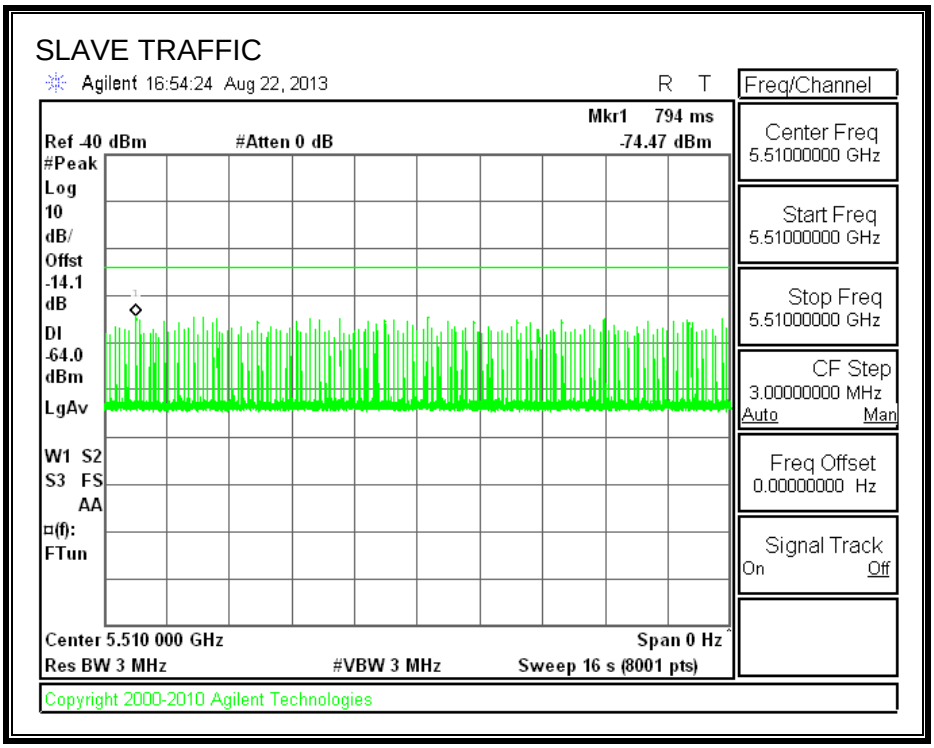
All tests were performed at a channel center frequency of 5510 MHz.

11.5.2. RADAR WAVEFORM AND TRAFFIC

RADAR WAVEFORM



TRAFFIC



11.5.3. OVERLAPPING CHANNEL TESTS

RESULTS

These tests are not applicable.

11.5.4. MOVE AND CLOSING TIME

REPORTING NOTES

The reference marker is set at the end of last radar pulse.

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time =
(Number of analyzer bins showing transmission) * (dwell time per bin)

The observation period over which the FCC aggregate time is calculated begins at (Reference Marker + 200 msec) and ends no earlier than (Reference Marker + 10 sec).

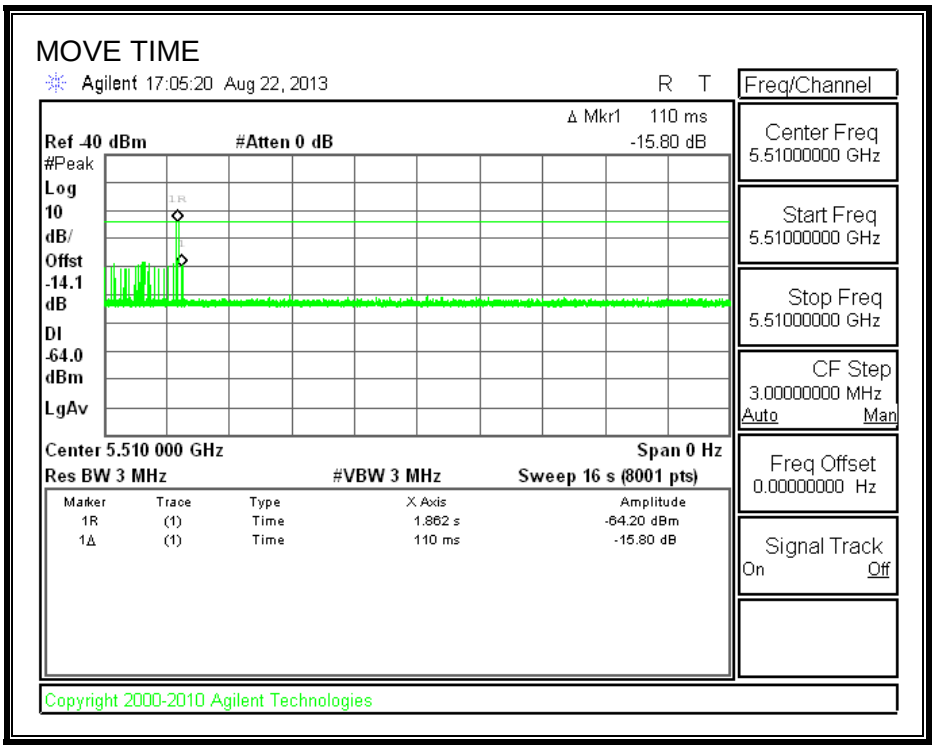
The observation period over which the IC aggregate time is calculated begins at (Reference Marker) and ends no earlier than (Reference Marker + 10 sec).

RESULTS

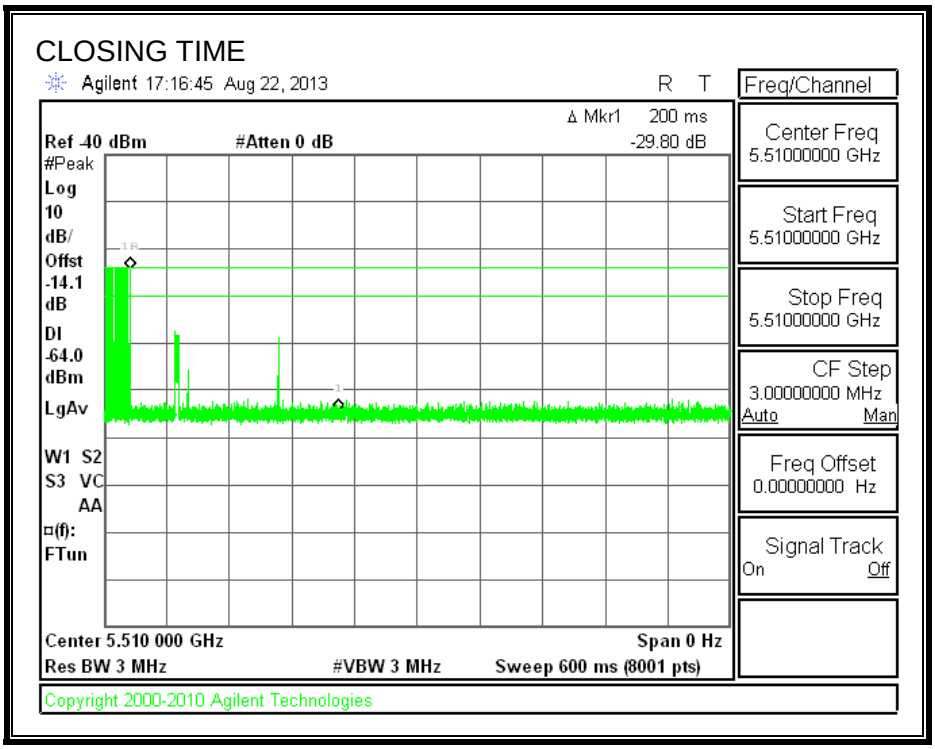
Agency	Channel Move Time (sec)	Limit (sec)
FCC / IC	0.110	10

Agency	Aggregate Channel Closing Transmission Time (msec)	Limit (msec)
FCC	0.0	60
IC	10.0	260

MOVE TIME



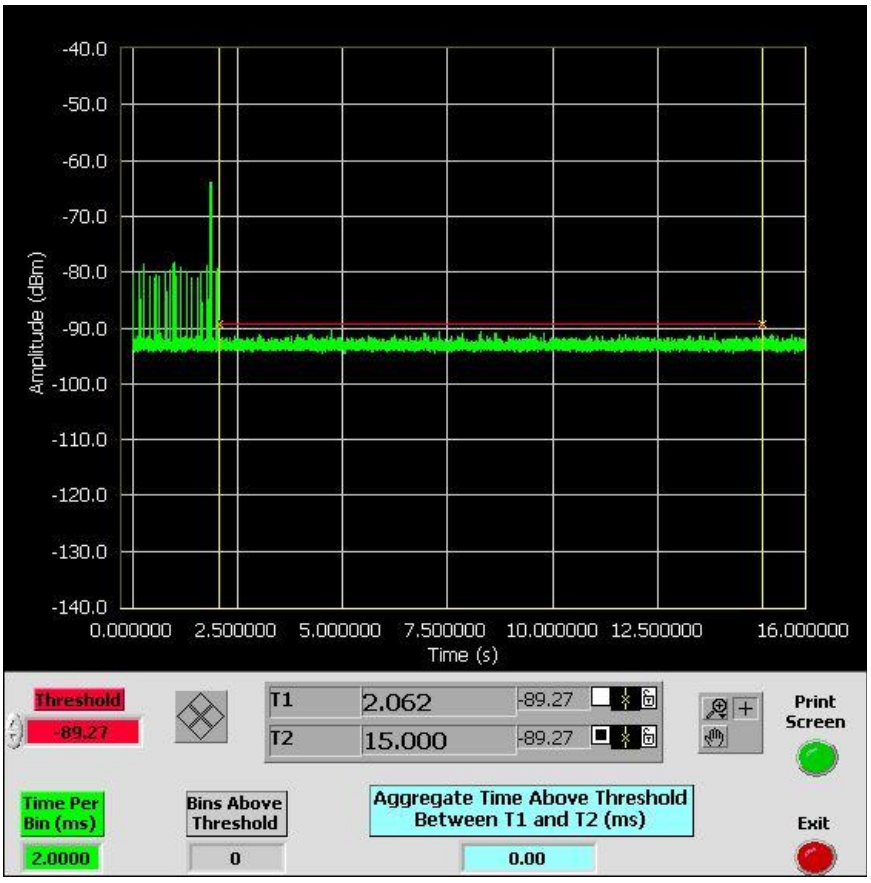
CHANNEL CLOSING TIME



AGGREGATE CHANNEL CLOSING TRANSMISSION TIME

No transmissions are observed during the FCC aggregate monitoring period.

FCC AGGREGATE CLOSING TIME



Only intermittent transmissions are observed during the IC aggregate monitoring period.

IC AGGREGATE CLOSING TIME