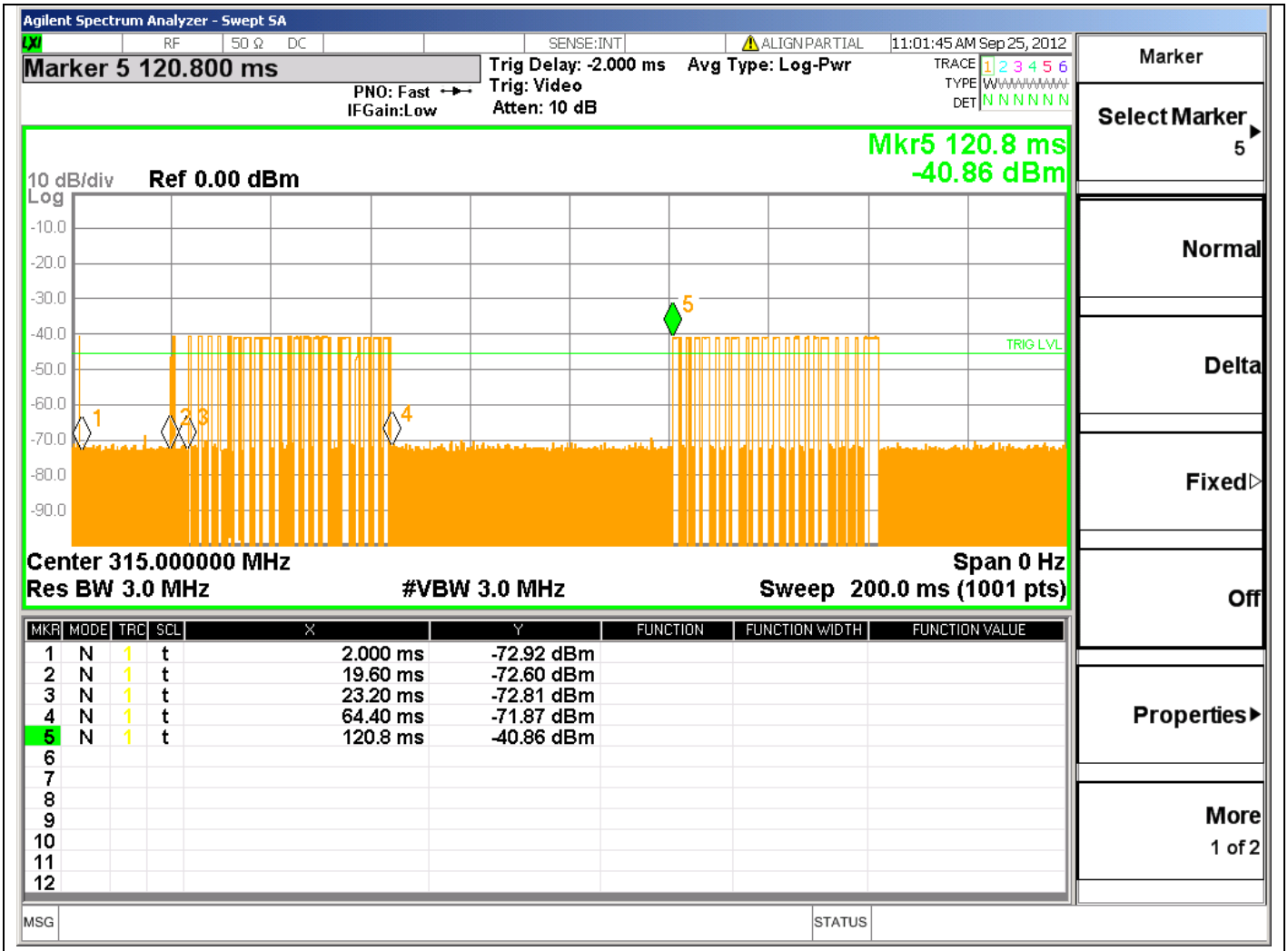
Pulse Duration: 0.51mS Short, 1.01mS Medium

Pulse Duration: 1.5mS Long

Number of message pulses: 7 Short, 4 Medium, 10 Long



Period Sweep 96.8mS

4.5.8 Test Conditions and Results – RADIATED EMISSIONS Fundamental and Spurious

Test Description	Measurements were made in a 10-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4:2003. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter as noted. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.		
Basic Standard	47 CFR Part 15 subpart C, and RSS-210		
UL LPG	80-EM-S0029		
	Frequency range	Measurement Point	
Fully configured sample scanned over the following frequency range	30MHz – 1GHz	3 meter distance	
	1GHz – 4GHz	3 meter distance	

Restricted Band Limits

Frequency (MHz)	Limit (dBµV/m)	
	Quasi-Peak	Peak
30 - 88	40.00	NA
88 - 216	43.52	NA
216 - 960	46.02	NA
960 - 1000	54	NA
Above 1000 (FCC)	NA	54 (at 3-meter)

Fundamental Frequency Limits and Non-restricted band Harmonic Limits

Frequency (MHz)	Limit (dBµV/m) @ 3m distance All harmonics except those in restricted bands must be attenuated by 20dB or more	
	Average - Fundamental	Peak - Fundamental
315	75.62	95.62

Supplementary information: See section 4.5.7 for duty cycle information.

Figure 35 Radiated Emissions Graph (Below 1GHz)

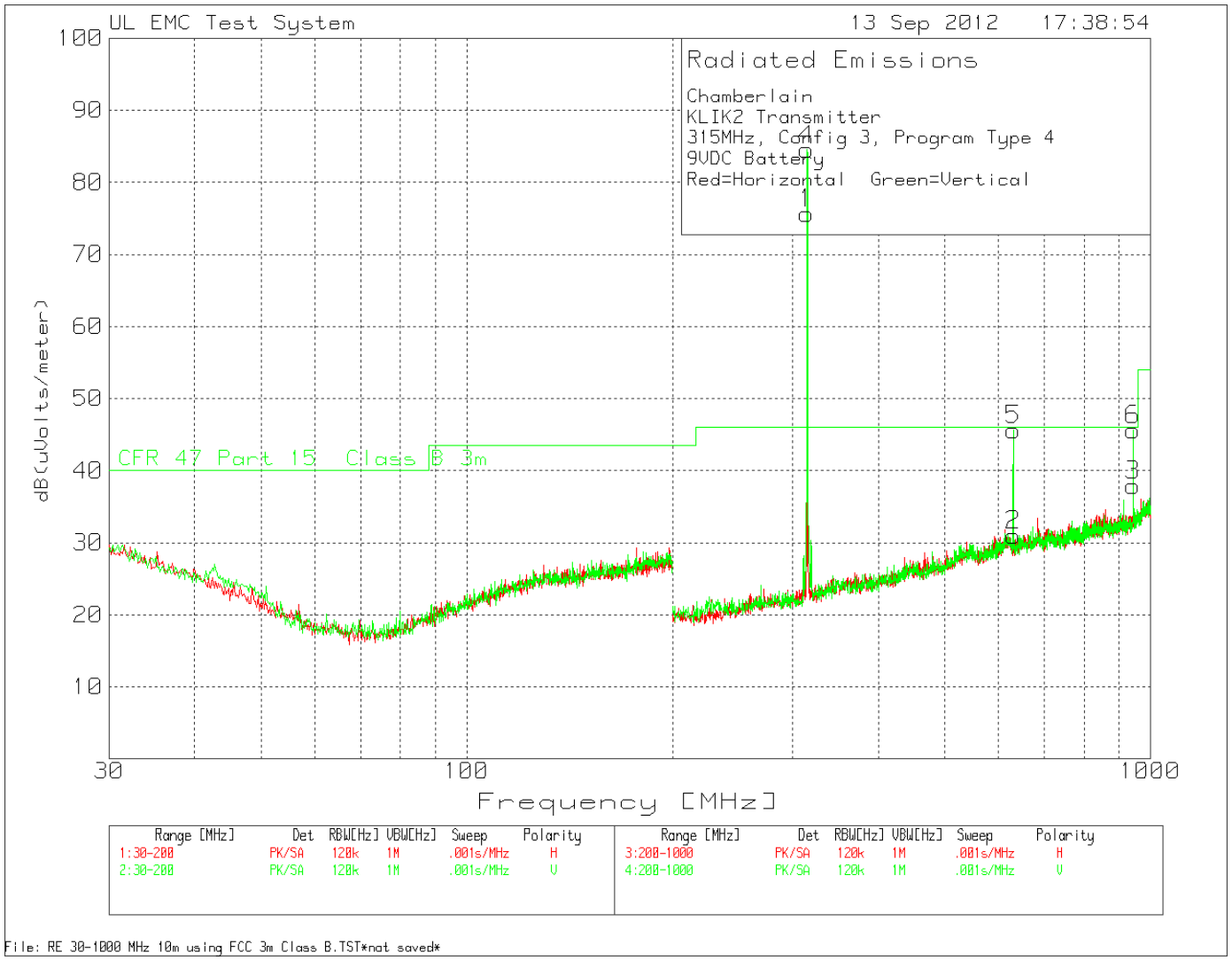


Figure 36 Radiated Emissions Graph (Above 1GHz)

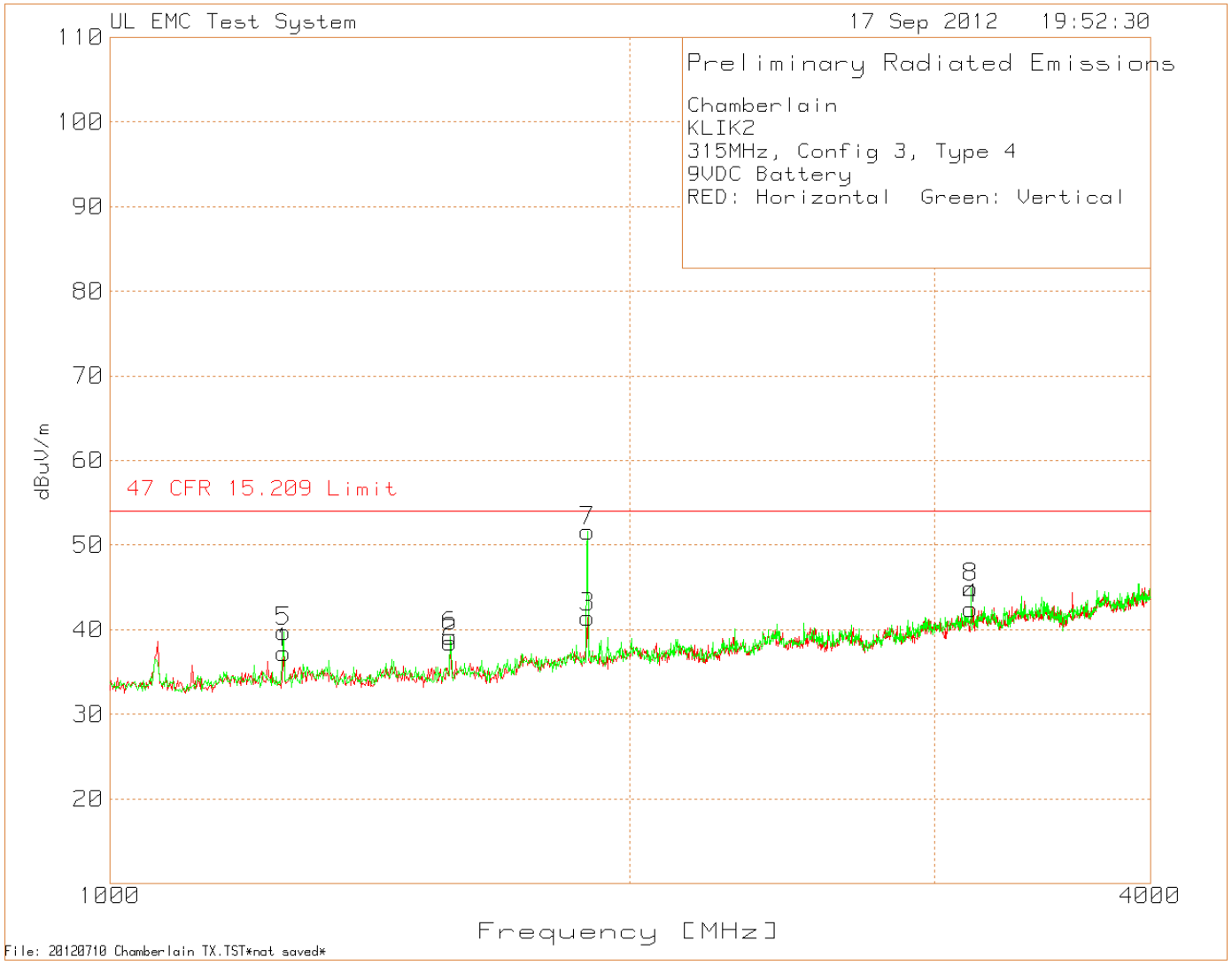


Table 44 - Radiated Emissions Data Points

Chamberlain
KLIK2C Transmitter
315MHz, Config 3, Program Type 4
9VDC Battery
Red=Horizontal Green=Vertical

Test Frequency MHz	Meter Reading dBuV	Detector	Antenna Factor dB	Path Loss Gain dB	Level dBuV/m	Duty Cycle Factor dB	Level with Duty Cycle dBuV/m	Limit @ 3m dBuV/m	Margin dB	Azimuth [Degs]	Height [cm]	Polarity
315.013603	66.71	PK	14.2	2.1	83.01	-12.63	70.38	75.62	-5.24	354	102	Horz
315.013603	67.59	PK	14.2	2.1	83.89	-12.63	71.26	75.62	-4.36	264	155	Vert
630.026769	8.71	PK	20.6	3	32.31	-12.63	19.68	46	-26.32	89	135	Horz
630.026769	12.76	PK	20.6	3	36.36	-12.63	23.73	46	-22.27	79	104	Vert
945.040792	20.21	PK	23.6	3.8	47.61	-12.63	34.98	46	-11.02	6	273	Horz
945.040792	23.39	PK	23.6	3.8	50.79	-12.63	38.16	46	-7.84	98	111	Vert
1260.173	69.12	PK	25.1	-56.92	37.3	-12.63	24.67	54	-29.33	*	103	Horz
1574.383	68.5	PK	25.3	-55.3	38.5	-12.63	25.87	54	-28.13	*	125	Horz
1890.594	68.33	PK	27.4	-54.32	41.41	-12.63	28.78	54	-25.22	*	103	Horz
3151.434	63.63	PK	30.6	-51.71	42.52	-12.63	29.89	54	-24.11	*	103	Horz
1260.173	71.57	PK	25.1	-56.92	39.75	-12.63	27.12	54	-26.88	*	125	Vert
1574.383	69.2	PK	25.3	-55.3	39.2	-12.63	26.57	54	-27.43	*	100	Vert
1890.001	79.59	PK	27.4	-54.31	52.68	-12.63	40.05	54	-13.95	189	101	Vert
3151.434	66.08	PK	30.6	-51.71	44.97	-12.63	32.34	54	-21.66	*	100	Vert

* Peak prescan data, not maximized

4.6 Configuration 5# Test Data

4.6.1 Test Conditions and Results – Occupied Bandwidth

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the spectrum analyzer resolution bandwidth set per the appropriate standard.
Basic Standard	47 CFR Part 15.231(c)
Occupied Bandwidth Limits	
0.25% of Center Frequency (315MHz: 787.5kHz)	

Table 45 Occupied Bandwidth Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

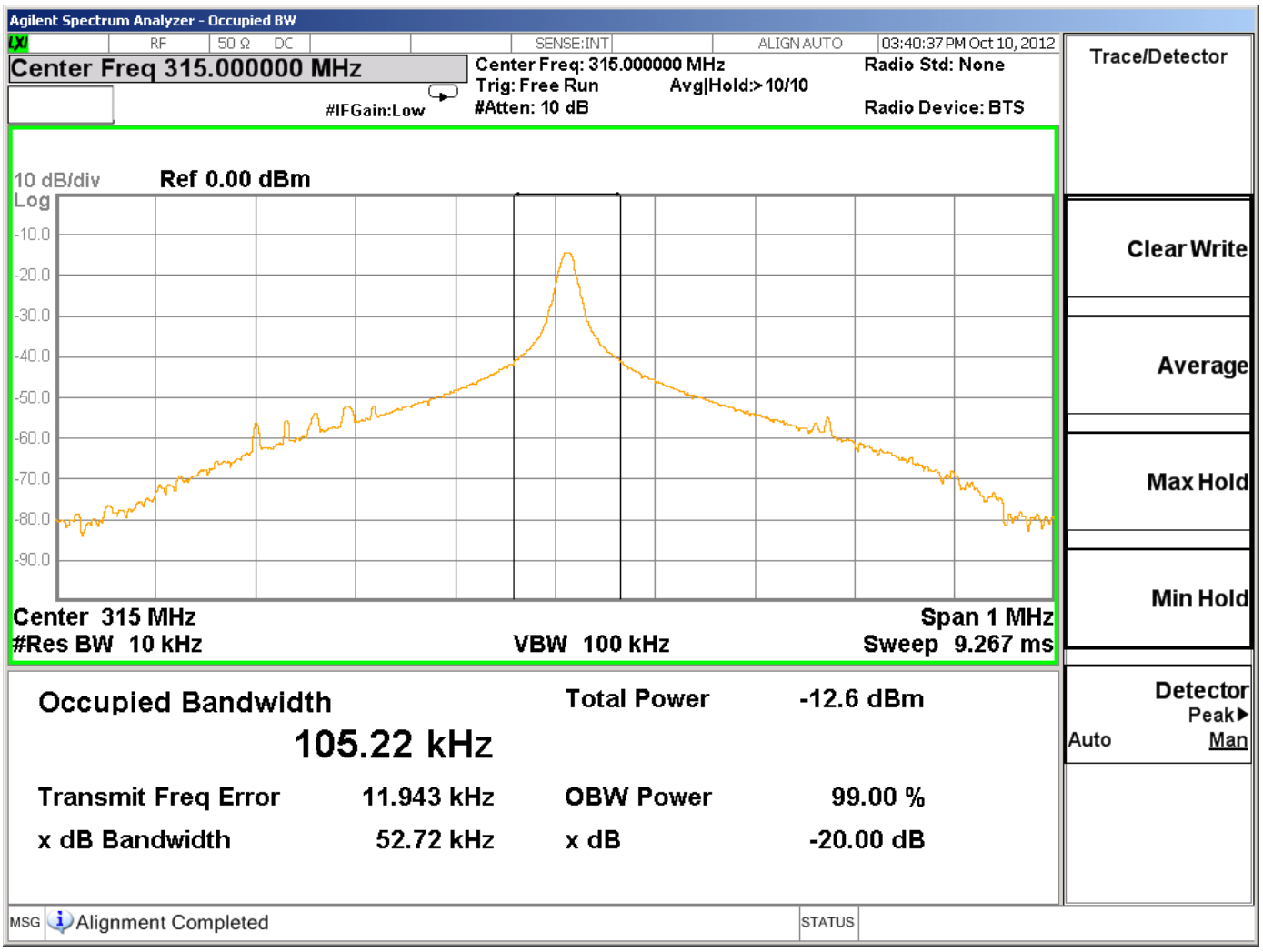
Table 46 Occupied Bandwidth Spectrum Analyzer Settings

Resolution Bandwidth	Occupied Bandwidth Requirements	
	dBc	% PWR
10kHz	-20	99
Supplementary information: None		

Table 47 Occupied Bandwidth Test Result Summary

Center Frequency	20dB BW Measured (kHz)	99% BW Measured (kHz)
315MHz	52.72	105.22

Figure 37 – Bandwidth Graph



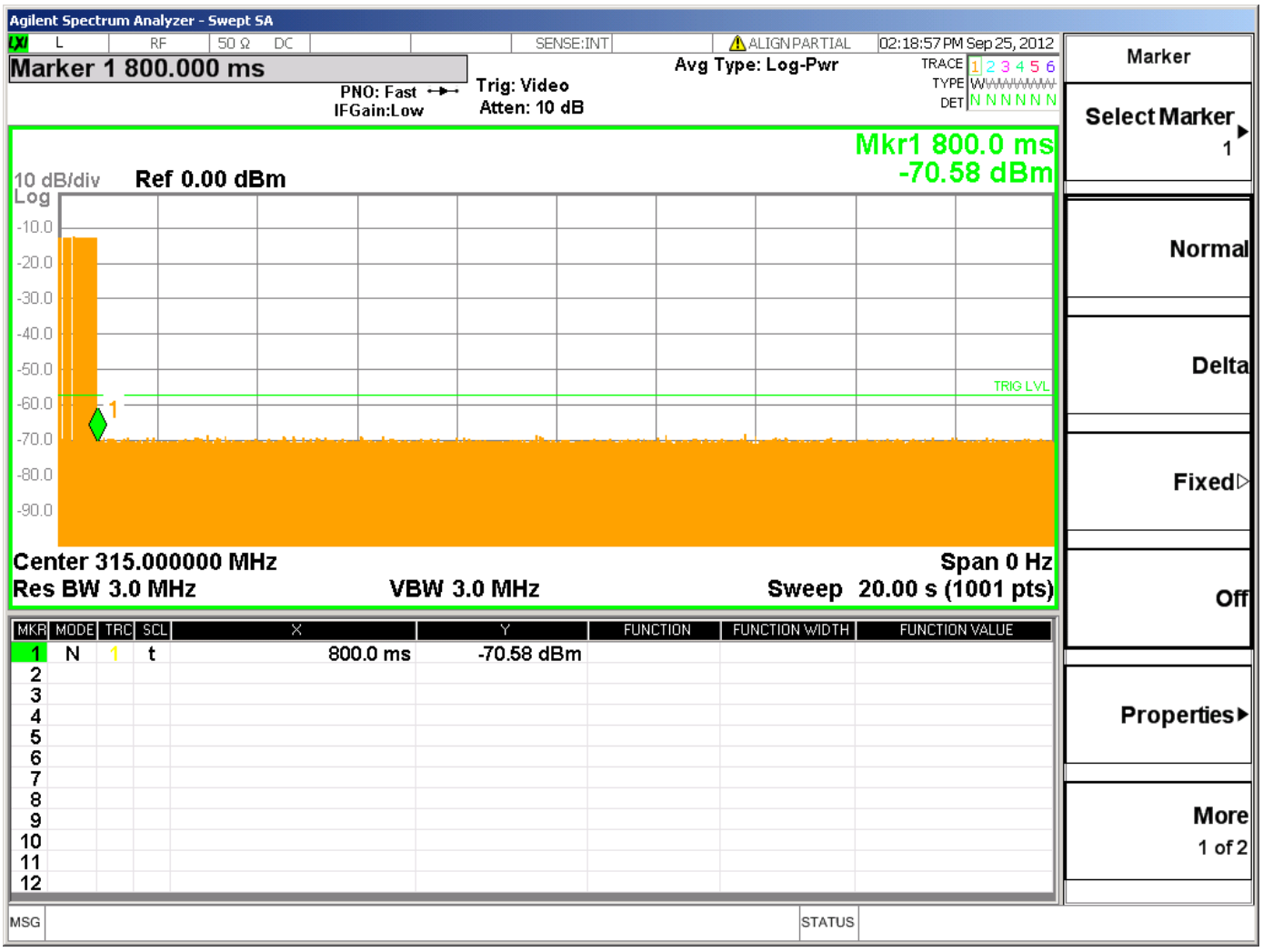
4.6.2 Test Conditions and Results – Cease Operation

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the transmission time measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	47 CFR Part 15.231(a)
Cease Operation Limits	
The transmissions shall stop within 5 seconds of either a button being released or if automatically controlled transmissions shall be stopped 5 seconds after transmissions begin.	

Table 48 Cease Operation Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

Figure 38 Cease Operation Graph



4.6.3 Test Conditions and Results – Pulse Train

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The pulse train was measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	FCC Part 15 Subpart A, 15.35
Pulse Train Limits	
There are no limits for this test. This data is used to calculate the averaging correction factor that is applied to the measured peak radiated emissions results.	

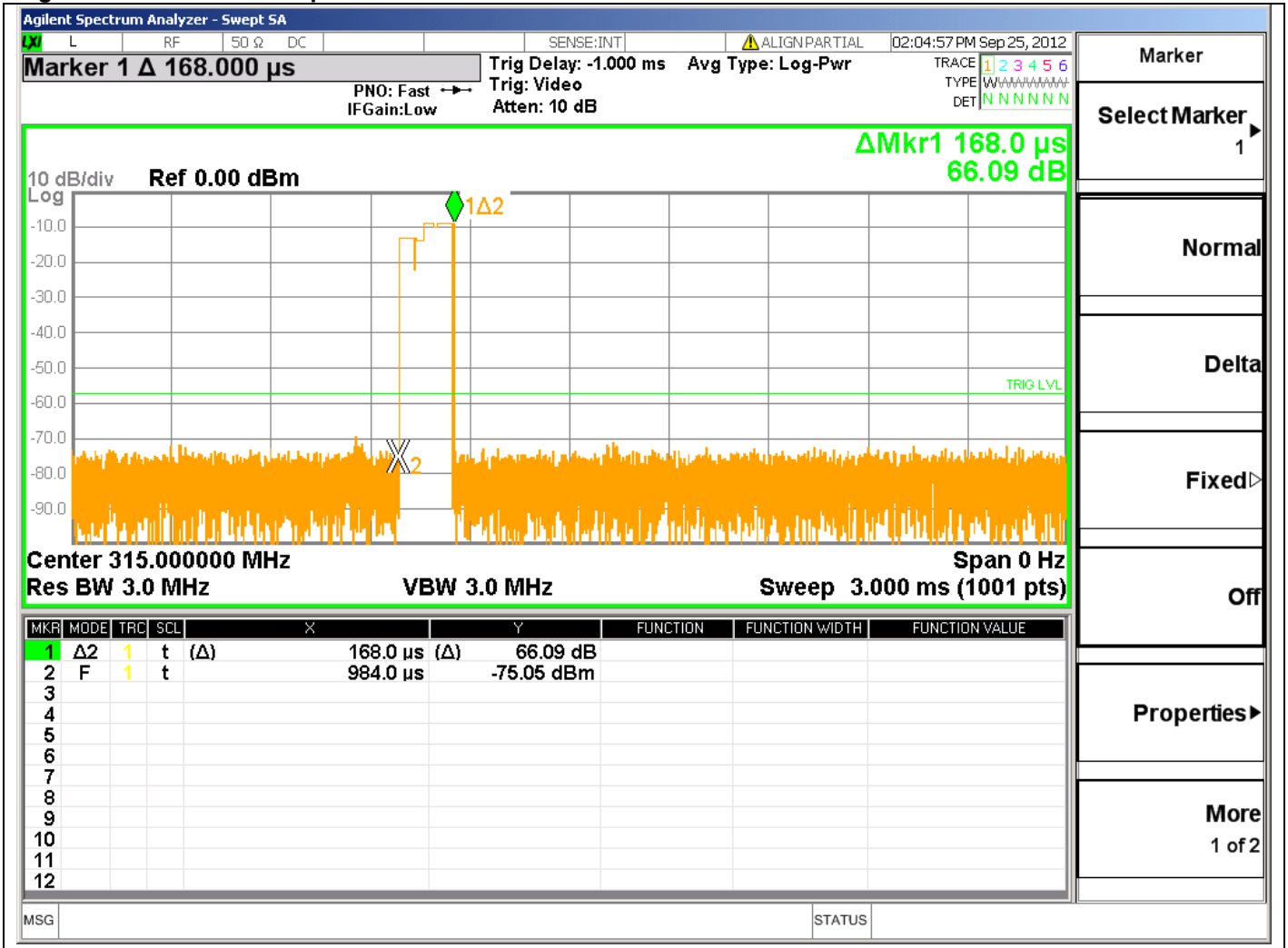
Table 49 Pulse Train Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

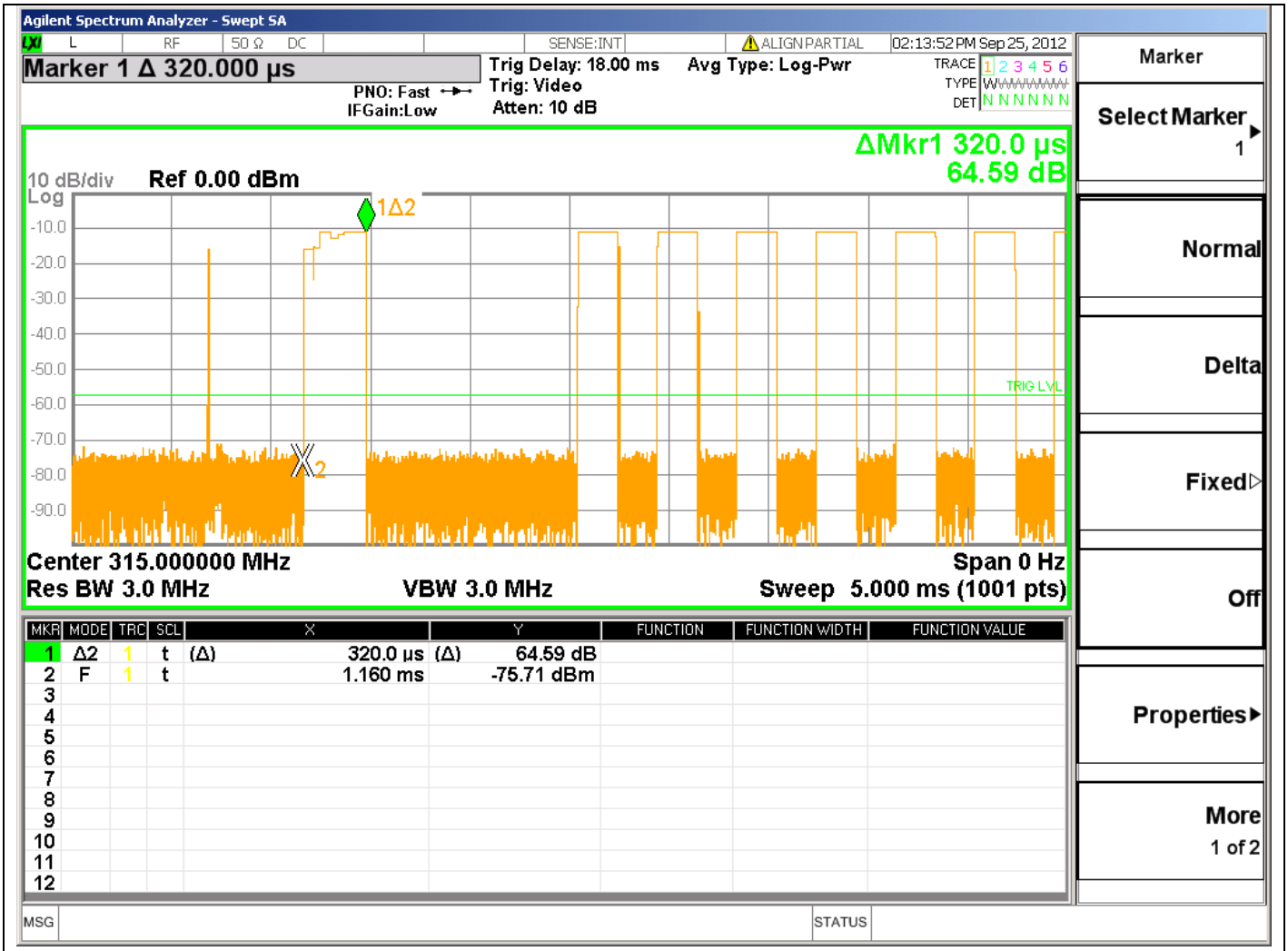
Table 50 Pulse Train Calculation

TX Frequency	Total TX time mS	Total Transmission period or 100ms whichever is lesser	DC Correction Factor (dB) $20\log\left(\frac{PulseWidth}{Period}\right)$
315MHz	(27x0.210)+(47x0.408)+0.168+0.320	100ms	-11.9
Worst Case Duty Cycle: Worst case duty cycle was calculated over 100mS and it includes the tuning pulses. Manufacturer declared the worst case duty cycle at -12.36dB. Calculated duty cycle is used for Radiated Emissions.			

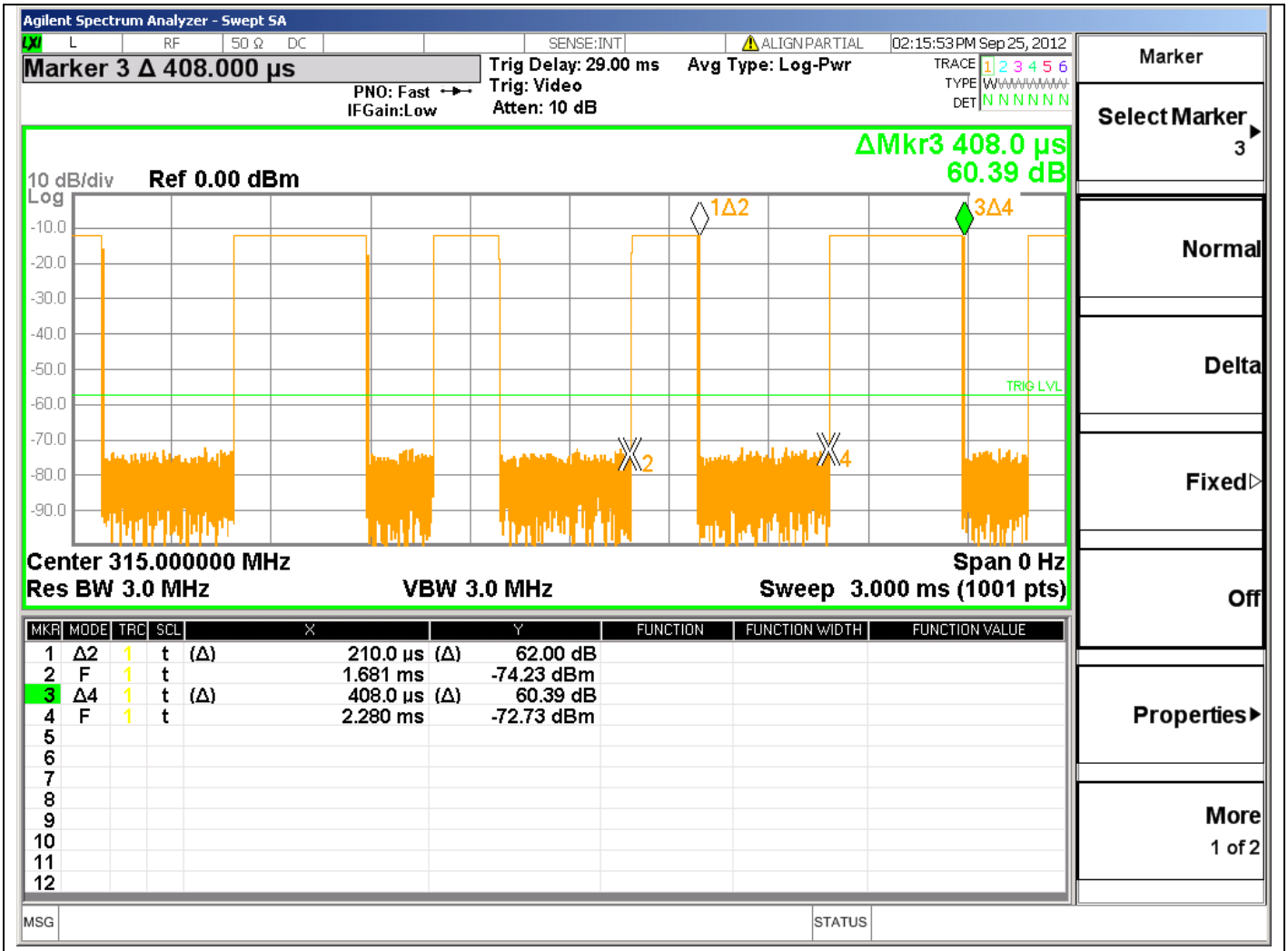
Figure 39 Pulse Train Graphs



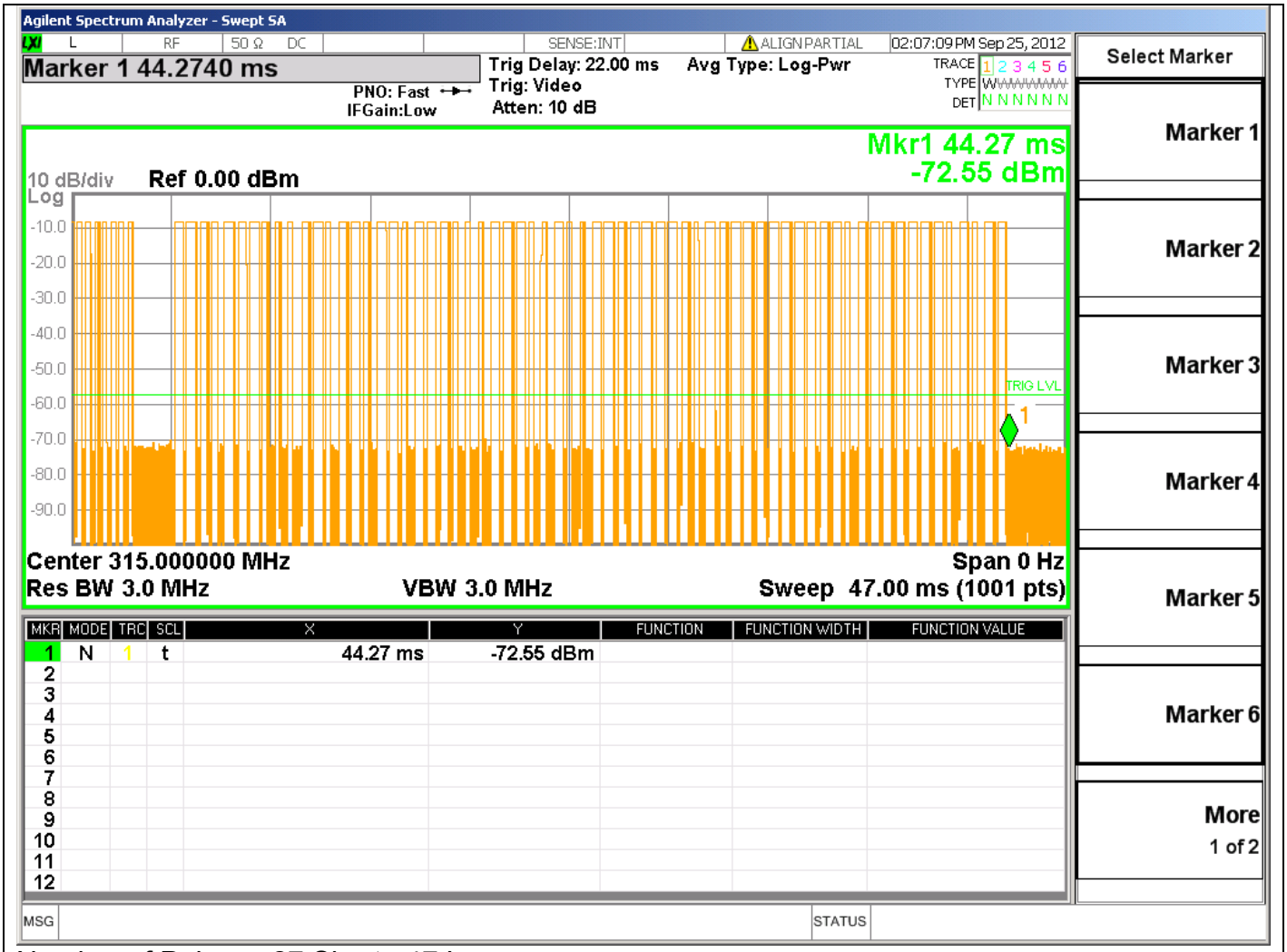
First tuning pulse duration: 0.168mS



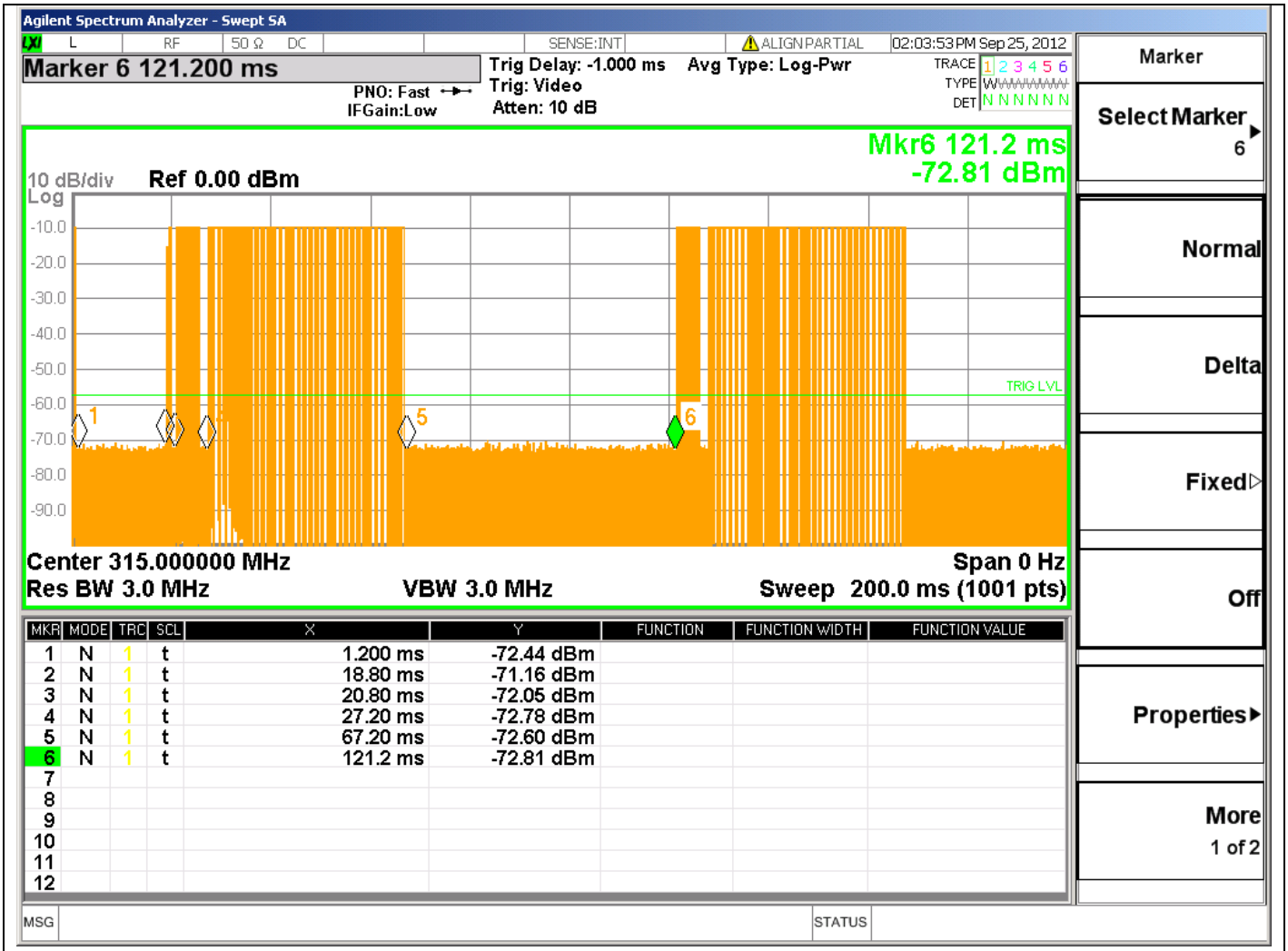
Second tuning pulse duration: 0.320mS



Pulse Duration: 0.210mS Short, 0.408mS Long



Number of Pulses: 27 Short, 47 Long



Duty cycle was calculated over 100mS including tuning pulses.

4.6.4 Test Conditions and Results – RADIATED EMISSIONS Fundamental and Spurious

Test Description	Measurements were made in a 10-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4:2003. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter as noted. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.	
Basic Standard	47 CFR Part 15 subpart C, and RSS-210	
UL LPG	80-EM-S0029	
	Frequency range	Measurement Point
Fully configured sample scanned over the following frequency range	30MHz – 1GHz	3 meter distance
	1GHz – 4GHz	3 meter distance

Restricted Band Limits

Frequency (MHz)	Limit (dBµV/m)	
	Quasi-Peak	Peak
30 - 88	40.00	NA
88 - 216	43.52	NA
216 - 960	46.02	NA
960 - 1000	54	NA
Above 1000 (FCC)	NA	54 (at 3-meter)

Fundamental Frequency Limits and Non-restricted band Harmonic Limits

Frequency (MHz)	Limit (dBµV/m) @ 3m distance All harmonics except those in restricted bands must be attenuated by 20dB or more	
	Average - Fundamental	Peak - Fundamental
315	75.62	55.62

Supplementary information: See section 4.6.3 for duty cycle information.

Figure 40 Radiated Emissions Graph (Below 1GHz)

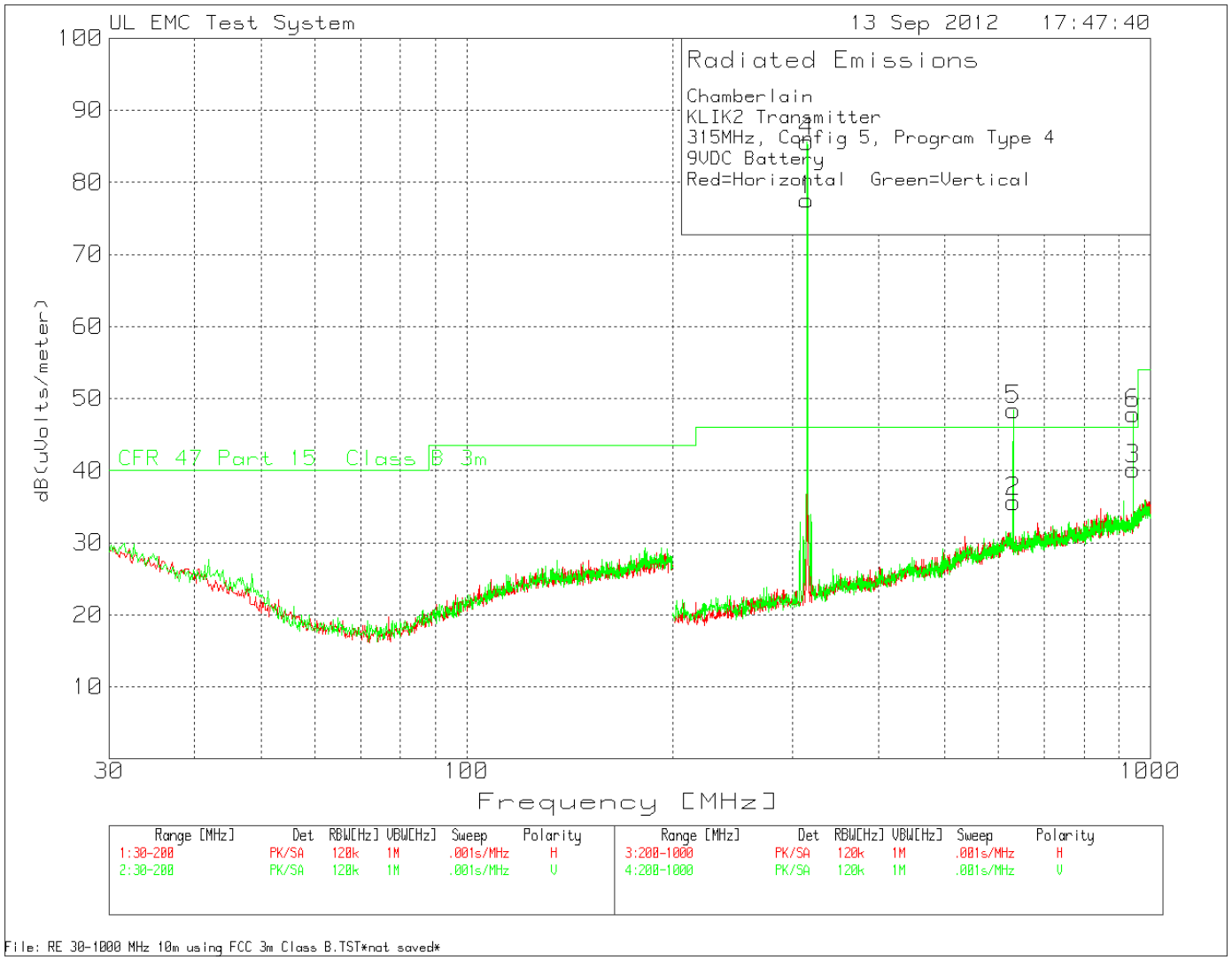


Figure 41 Radiated Emissions Graph (Above 1GHz)

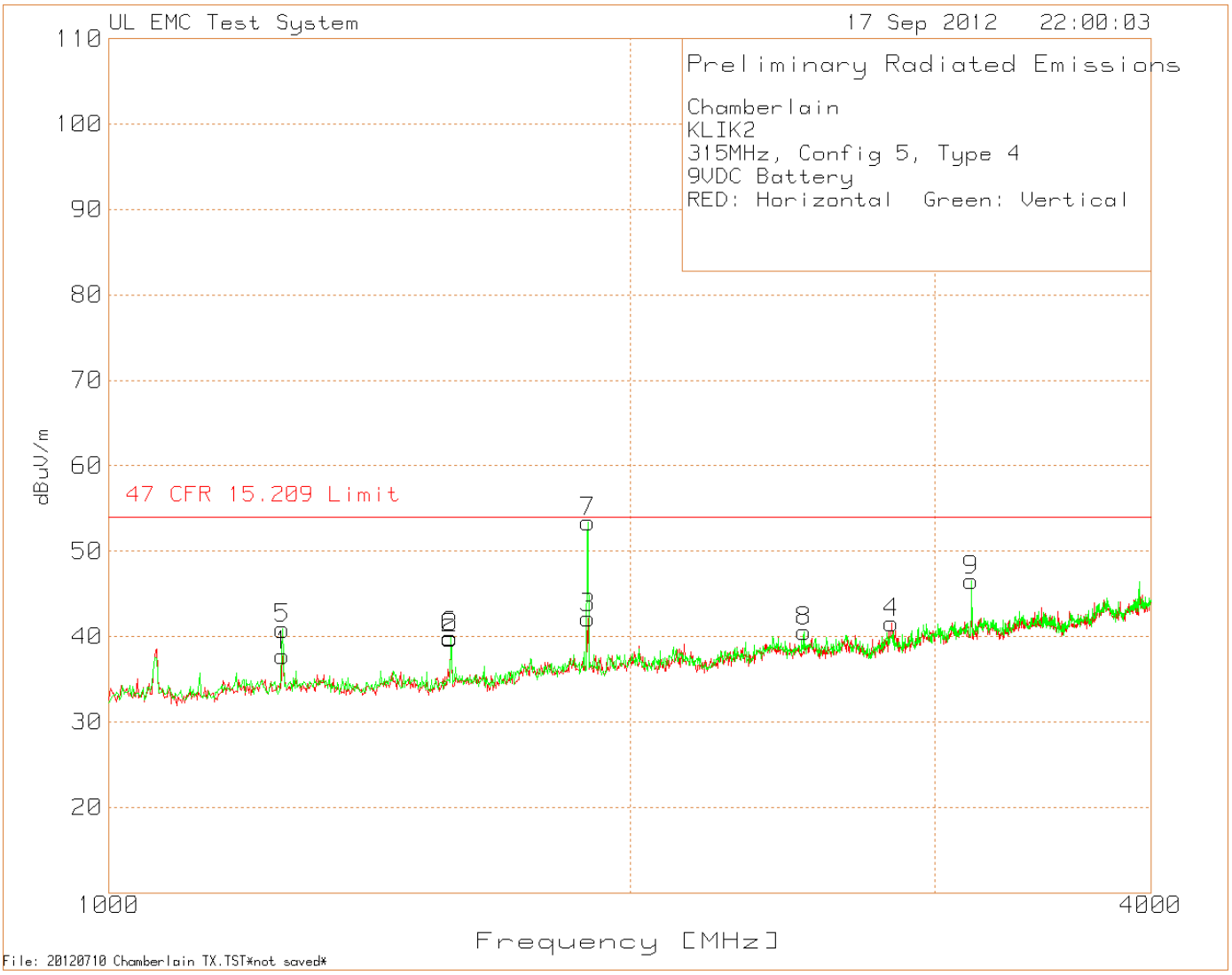


Table 51 - Radiated Emissions Data Points

Configuration #5
Chamberlain
KLIK2C
315MHz, Config 5, Type 4
9VDC Battery

Test Frequency MHz	Meter Reading dBuV	Detector	Antenna Factor dB	Path Loss Gain dB	Level dBuV/m	Duty Cycle Factor dB	Level with Duty Cycle dBuV/m	Limit @ 3m dBuV/m	Margin dB	Azimuth [Degs]	Height [cm]	Polarity
315.012	68.54	PK	14.2	2.1	84.84	-11.93	72.91	75.62	-2.71	342	103	Horz
315.012	69.13	PK	14.2	2.1	85.43	-11.93	73.5	75.62	-2.12	260	153	Vert
630.024039	18.56	PK	20.6	3	42.16	-11.93	30.23	46	-15.77	203	100	Vert
630.024039	16.06	PK	20.6	3	39.66	-11.93	27.73	46	-18.27	237	125	Horz
945.034192	23.77	PK	23.6	3.8	51.17	-11.93	39.24	46	-6.76	355	259	Horz
945.034192	26.66	PK	23.6	3.8	54.06	-11.93	42.13	46	-3.87	265	102	Vert
1260.173	69.53	PK	25.1	-56.92	37.71	-11.93	25.78	54	-28.22	*	99	Horz
1574.383	69.8	PK	25.3	-55.3	39.8	-11.93	27.87	54	-26.13	*	125	Horz
1890.594	69.07	PK	27.4	-54.32	42.15	-11.93	30.22	54	-23.78	*	125	Horz
2831.221	63.37	PK	29.1	-50.93	41.54	-11.93	29.61	54	-24.39	*	125	Horz
1260.173	72.68	PK	25.1	-56.92	40.86	-11.93	28.93	54	-25.07	*	125	Vert
1574.383	69.95	PK	25.3	-55.3	39.95	-11.93	28.02	54	-25.98	*	125	Vert
1890.0331	81.74	PK	27.4	-54.31	54.83	-11.93	42.9	54	-11.1	189	100	Vert
2521.014	63.88	PK	28.9	-52.19	40.59	-11.93	28.66	54	-25.34	*	102	Vert
3151.434	67.6	PK	30.6	-51.71	46.49	-11.93	34.56	54	-19.44	*	125	Vert

* Peak prescan data, not maximized

4.7 Configuration 12# Test Data

4.7.1 Test Conditions and Results – Occupied Bandwidth

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the spectrum analyzer resolution bandwidth set per the appropriate standard.
Basic Standard	47 CFR Part 15.231(c)
Occupied Bandwidth Limits	
0.25% of Center Frequency (315MHz: 787.5kHz)	

Table 52 Occupied Bandwidth Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

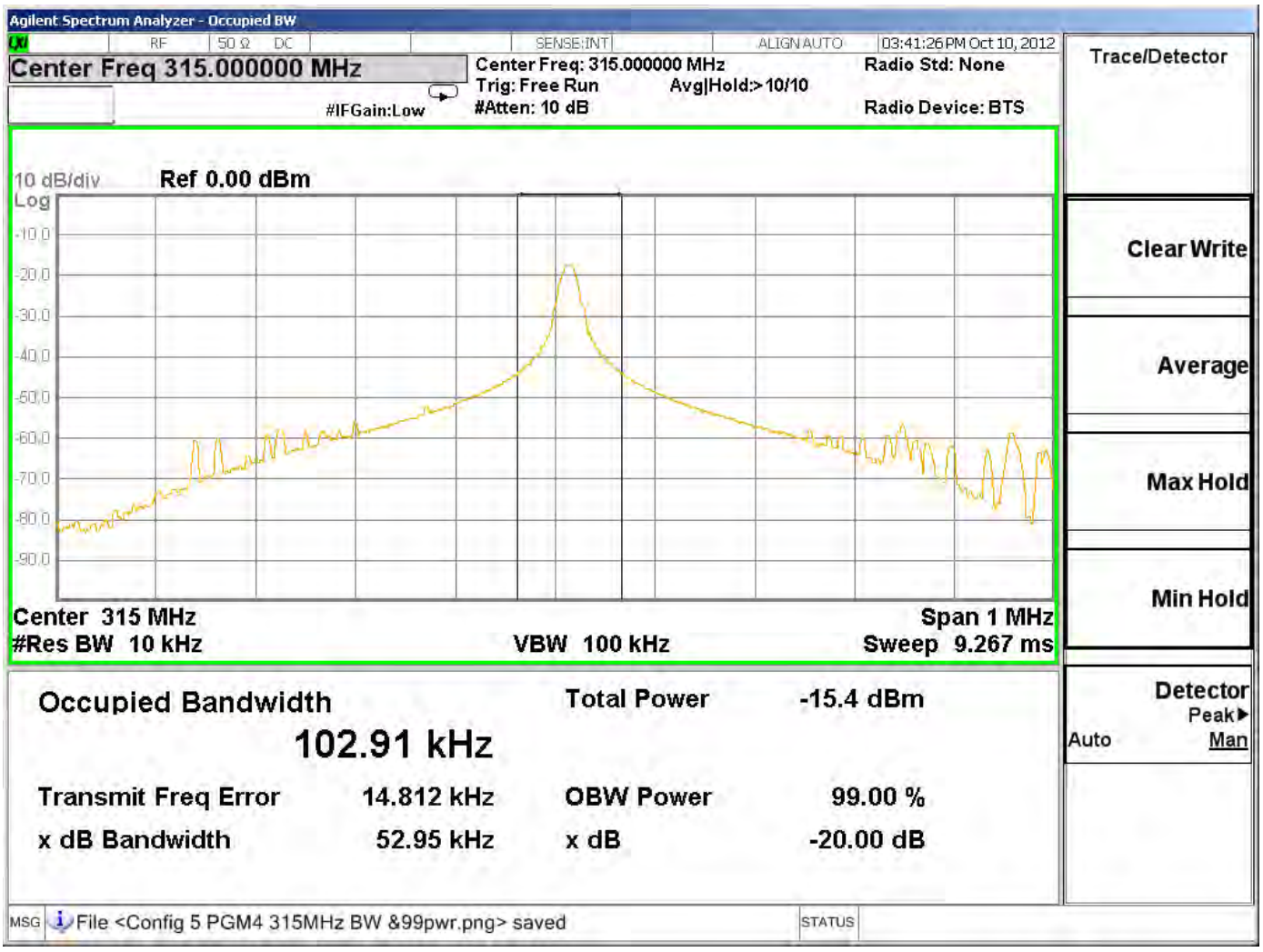
Table 53 Occupied Bandwidth Spectrum Analyzer Settings

Resolution Bandwidth	Occupied Bandwidth Requirements	
	dBc	% PWR
10kHz	-20	99
Supplementary information: None		

Table 54 Occupied Bandwidth Test Result Summary

Center Frequency	20dB BW Measured (kHz)	99% BW Measured (kHz)
315MHz	52.95	102.91

Figure 42 – Bandwidth Graph



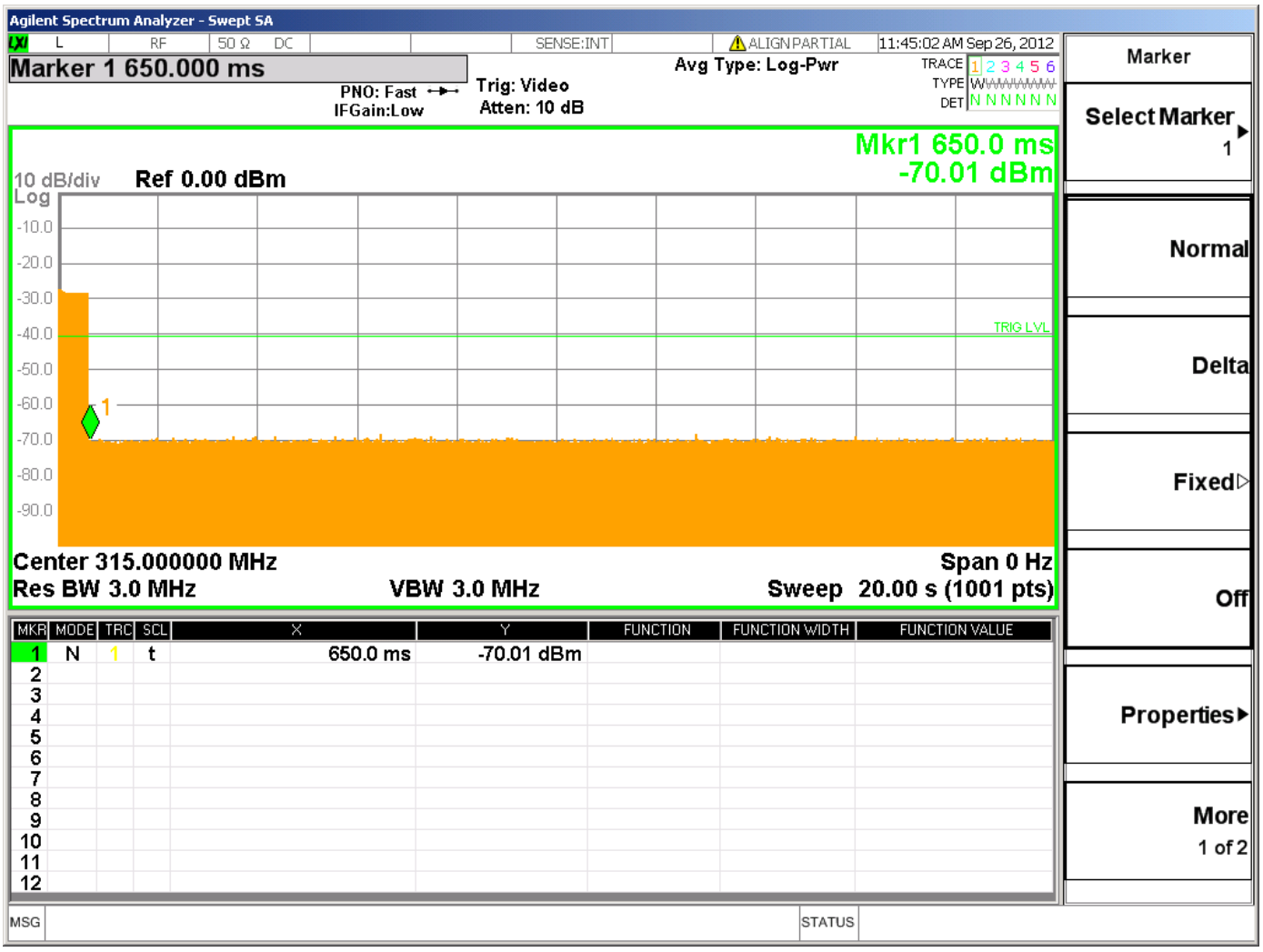
4.7.2 Test Conditions and Results – Cease Operation

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the transmission time measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	47 CFR Part 15.231(a)
Cease Operation Limits	
The transmissions shall stop within 5 seconds of either a button being released or if automatically controlled transmissions shall be stopped 5 seconds after transmissions begin.	

Table 55 Cease Operation Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

Figure 43 Cease Operation Graph



4.7.3 Test Conditions and Results – Pulse Train

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The pulse train was measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	FCC Part 15 Subpart A, 15.35
Pulse Train Limits	
There are no limits for this test. This data is used to calculate the averaging correction factor that is applied to the measured peak radiated emissions results.	

Table 56 Pulse Train Configuration Settings

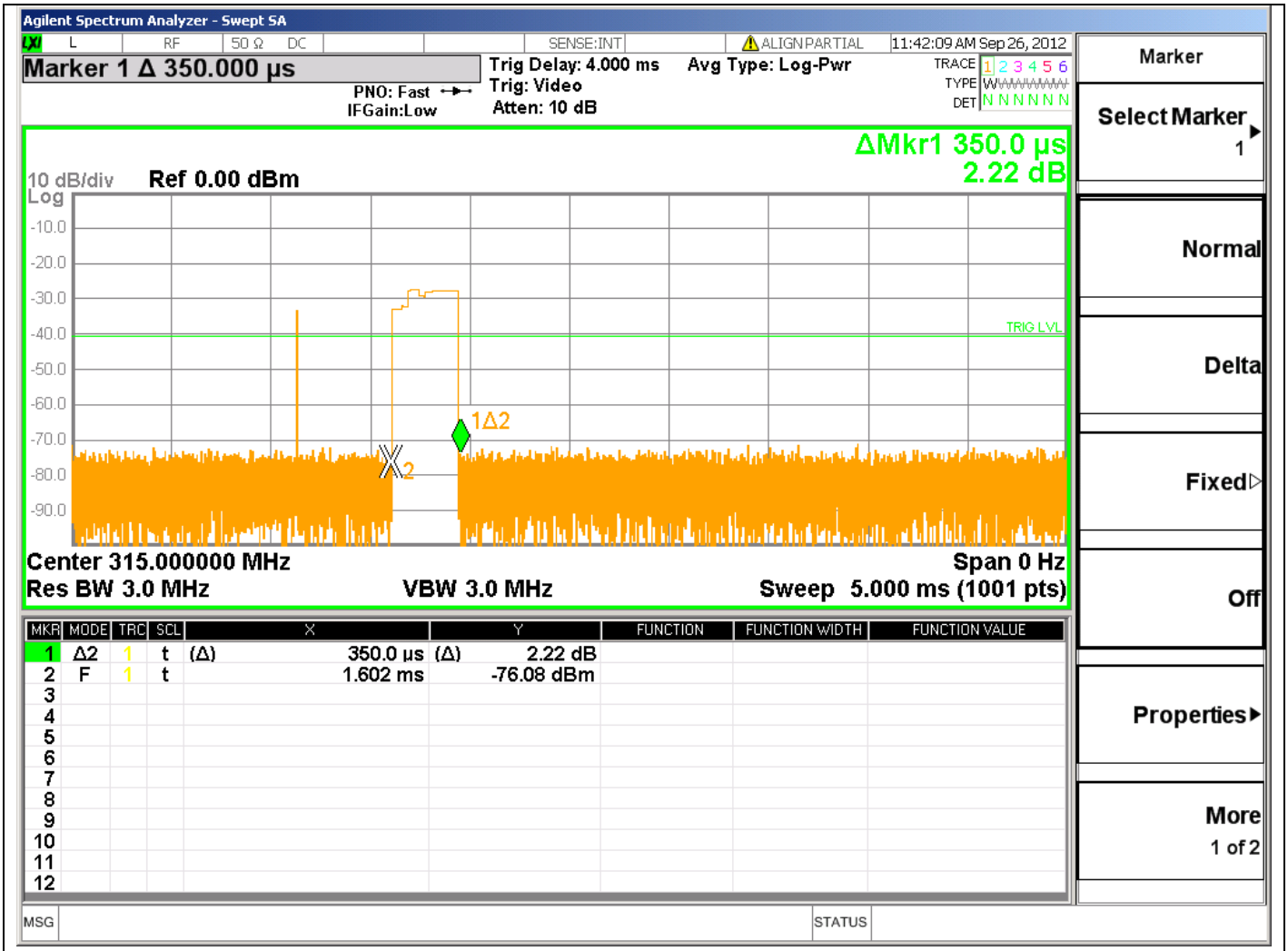
Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

Table 57 Pulse Train Calculation

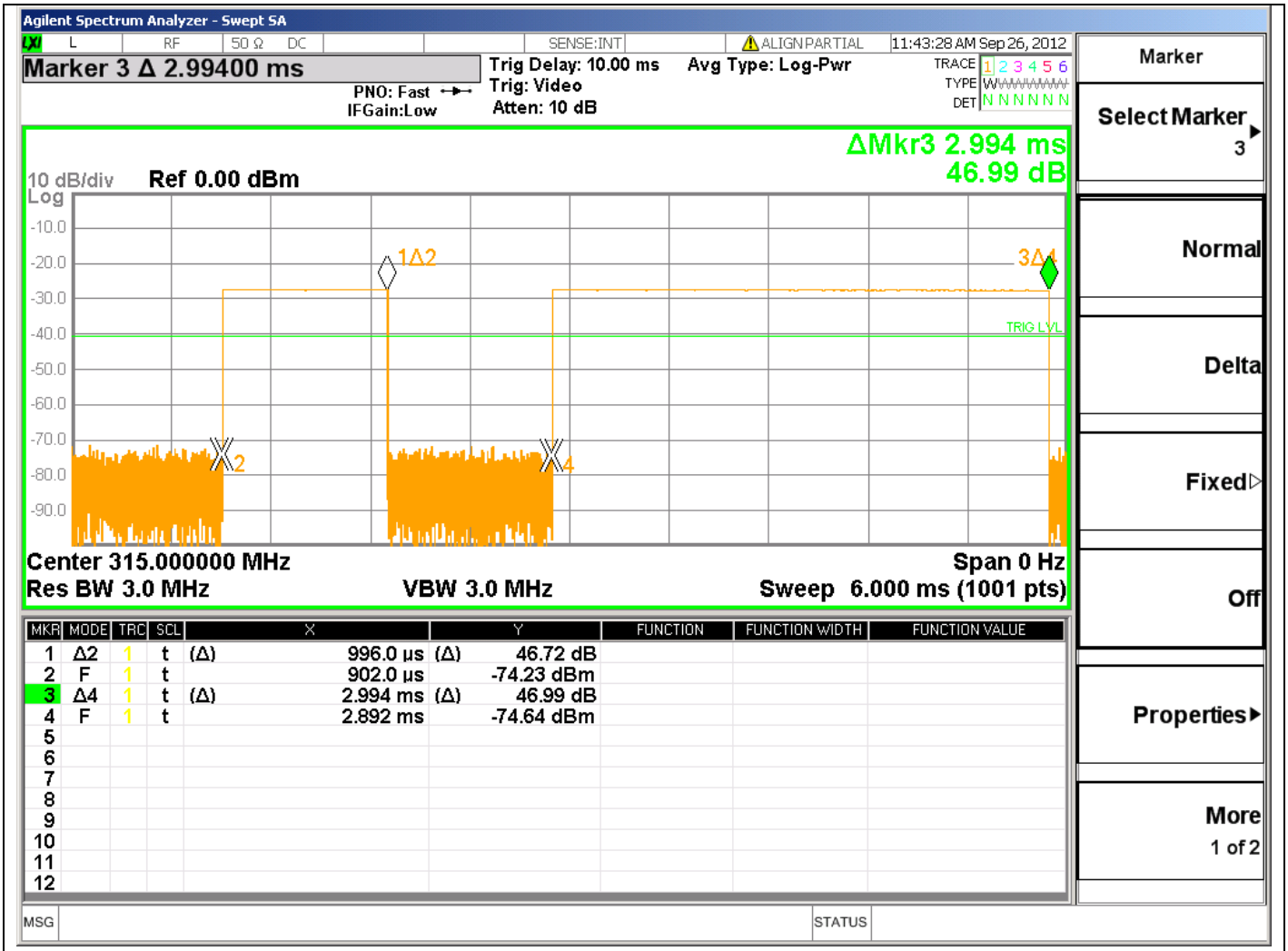
TX Frequency	Total TX time	Total Transmission period or 100ms whichever is lesser	DC Correction Factor (dB) $20\log\left(\frac{PulseWidth}{Period}\right)$
315MHz	(2x0.996)+(9x2.994)	78.6mS	-8.67
Worst Case Duty Cycle: Worst case duty cycle was calculated over single period between messages and it did not include the tuning pulses. The manufacturer declares the duty cycle at -9.13dB. The measured duty cycle was used for all radiated emissions data.			

Figure 44 Pulse Train Graphs

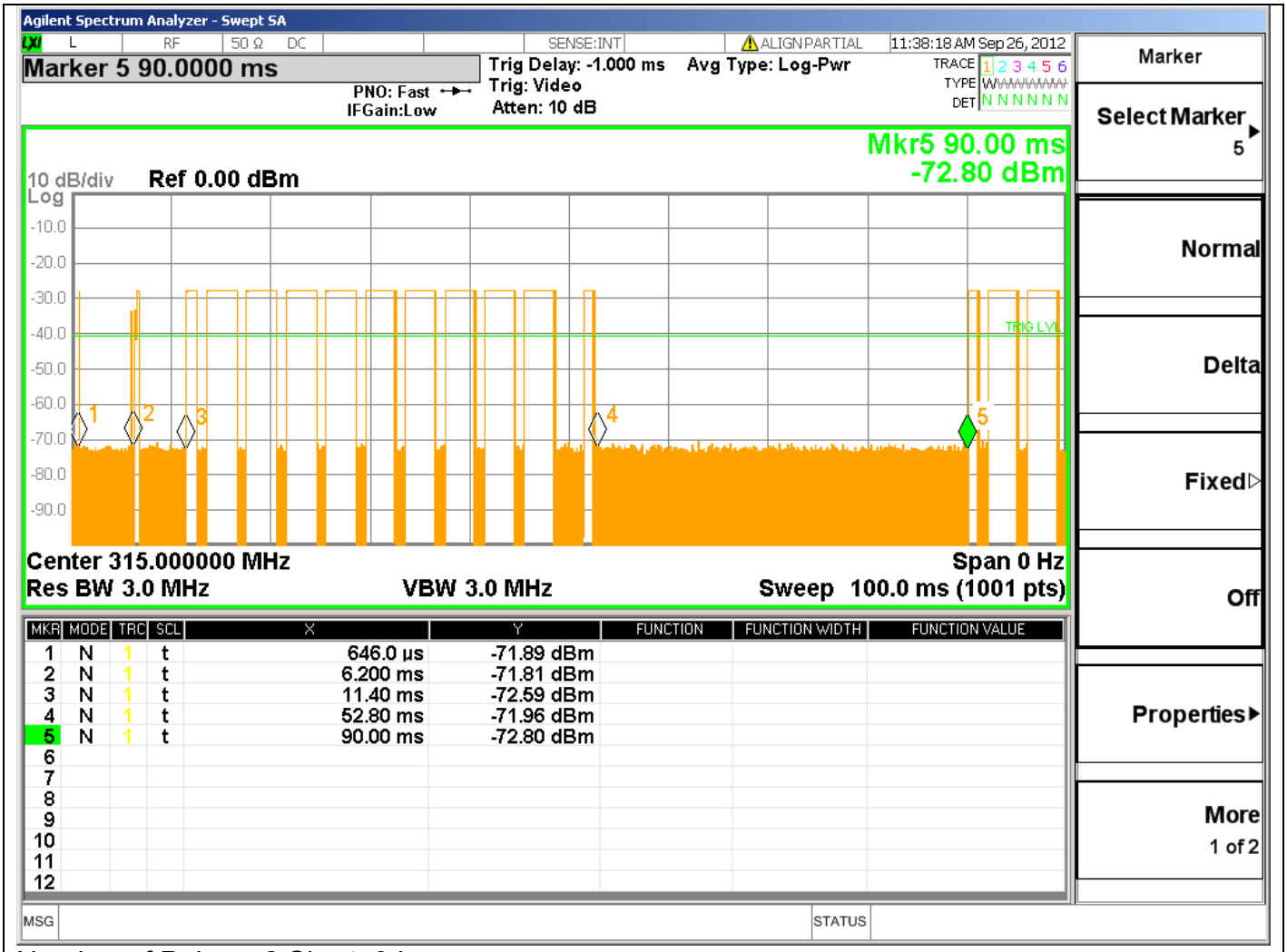
First tuning pulse duration: 0.162mS



Second tuning pulse duration: 0.350mS



Message pulse duration: Short 0.996mS, Long 2.994mS



Number of Pulses: 2 Short, 9 Long
Period: 89.35mS with tuning pulses and 78.6mS without tuning pulses

4.7.4 Test Conditions and Results – RADIATED EMISSIONS Fundamental and Spurious

Test Description	Measurements were made in a 10-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4:2003. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter as noted. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.		
Basic Standard	47 CFR Part 15 subpart C, and RSS-210		
UL LPG	80-EM-S0029		
	Frequency range	Measurement Point	
Fully configured sample scanned over the following frequency range	30MHz – 1GHz	3 meter distance	
	1GHz – 4GHz	3 meter distance	

Restricted Band Limits

Frequency (MHz)	Limit (dBµV/m)	
	Quasi-Peak	Peak
30 - 88	40.00	NA
88 - 216	43.52	NA
216 - 960	46.02	NA
960 - 1000	54	NA
Above 1000 (FCC)	NA	54 (at 3-meter)

Fundamental Frequency Limits and Non-restricted band Harmonic Limits

Frequency (MHz)	Limit (dBµV/m) @ 3m distance All harmonics except those in restricted bands must be attenuated by 20dB or more	
	Average - Fundamental	Peak - Fundamental
315	75.62	95.62

Supplementary information: See section 4.7.3 for duty cycle information.

Figure 45 Radiated Emissions Graph (Below 1GHz)

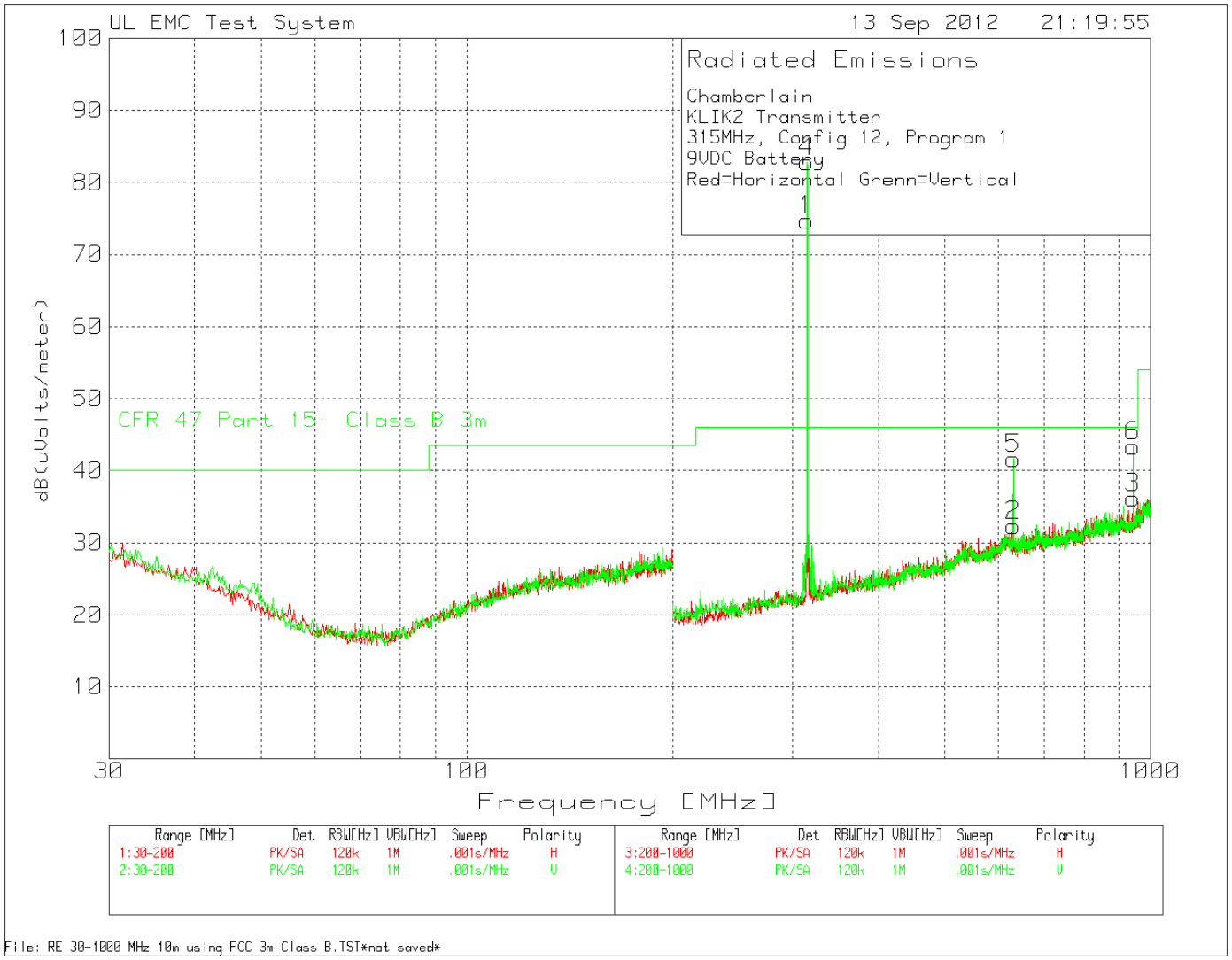


Figure 46 Radiated Emissions Graph (Above 1GHz)

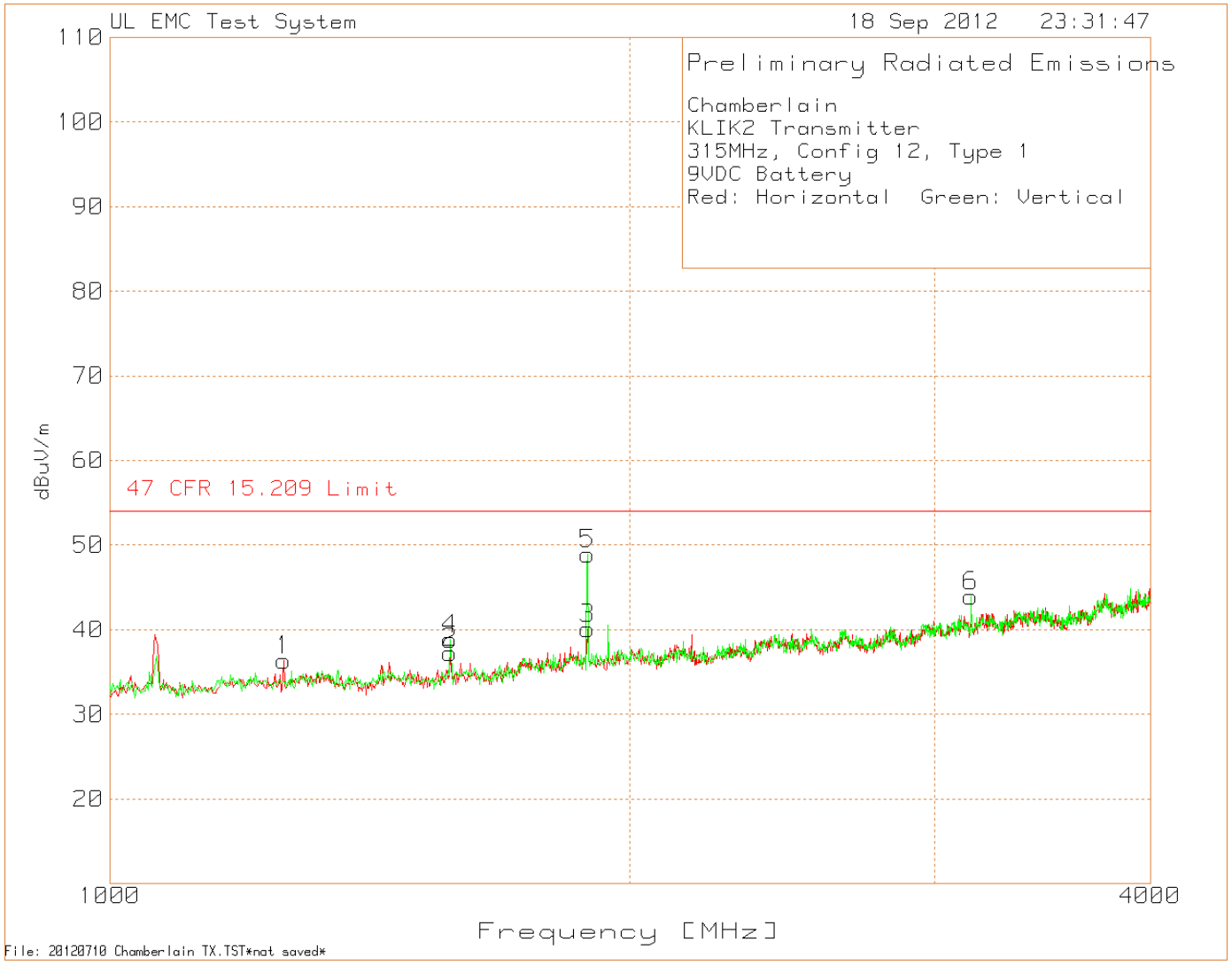


Table 58 - Radiated Emissions Data Points

Chamberlain
KLIK2C Transmitter
315MHz, Config 12, Type 1
9VDC Battery
Red: Horizontal Green: Vertical

Test Frequency MHz	Meter Reading dBuV	Detector	Antenna Factor dB	Path Loss Gain dB	Level dBuV/m	Duty Cycle Factor dB	Level with Duty Cycle dBuV/m	Limit @ 3m dBuV/m	Margin dB	Azimuth [Degs]	Height [cm]	Polarity
315.0144	65.61	PK	14.2	2.1	81.91	-8.67	73.24	75.62	-2.38	169	102	Horz
315.0144	66.55	PK	14.2	2.1	82.85	-8.67	74.18	75.62	-1.44	87	153	Vert
630.030449	7.65	PK	20.6	3	31.25	-8.67	22.58	46	-23.42	267	122	Horz
630.028846	13.59	PK	20.6	3	37.19	-8.67	28.52	46	-17.48	250	105	Vert
945.03948	19.26	PK	23.6	3.8	46.66	-8.67	37.99	46	-8.01	193	274	Horz
945.041082	22.52	PK	23.6	3.8	49.92	-8.67	41.25	46	-4.75	258	112	Vert
1260.173	68.22	PK	25.1	-56.92	36.4	-8.67	27.73	54	-26.27	*	100	Horz
1574.383	67.29	PK	25.3	-55.3	37.29	-8.67	28.62	54	-25.38	*	125	Horz
1890.594	67.04	PK	27.4	-54.32	40.12	-8.67	31.45	54	-22.55	*	125	Horz
1574.383	68.88	PK	25.3	-55.3	38.88	-8.67	30.21	54	-23.79	*	100	Vert
1889.9329	77.78	PK	27.4	-54.31	50.87	-8.67	42.2	54	-11.8	196	103	Vert
3151.434	65	PK	30.6	-51.71	43.89	-8.67	35.22	54	-18.78	*	100	Vert

* Peak prescan data, not maximized

4.8 Configuration 1# Test Data

4.8.1 Test Conditions and Results – Occupied Bandwidth

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the spectrum analyzer resolution bandwidth set per the appropriate standard.
Basic Standard	47 CFR Part 15.231(c)
Occupied Bandwidth Limits	
0.25% of Center Frequency (318MHz: 795.0kHz)	

Table 59 Occupied Bandwidth Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

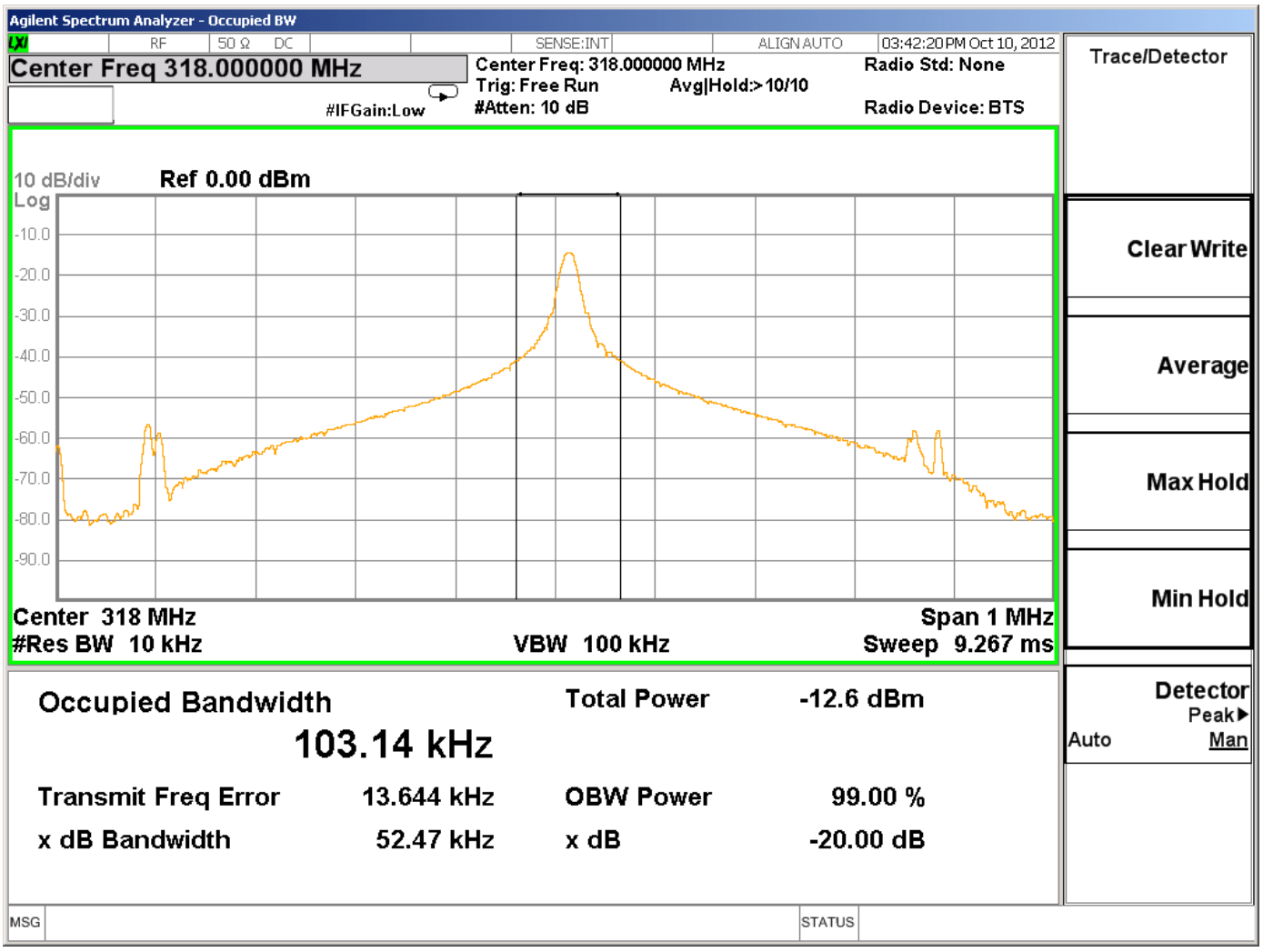
Table 60 Occupied Bandwidth Spectrum Analyzer Settings

Resolution Bandwidth	Occupied Bandwidth Requirements	
	dBc	% PWR
10kHz	-20	99
Supplementary information: None		

Table 61 Occupied Bandwidth Test Result Summary

Center Frequency	20dB BW Measured (kHz)	99% BW Measured (kHz)
318MHz	52.47	103.14

Figure 47 – Bandwidth Graph



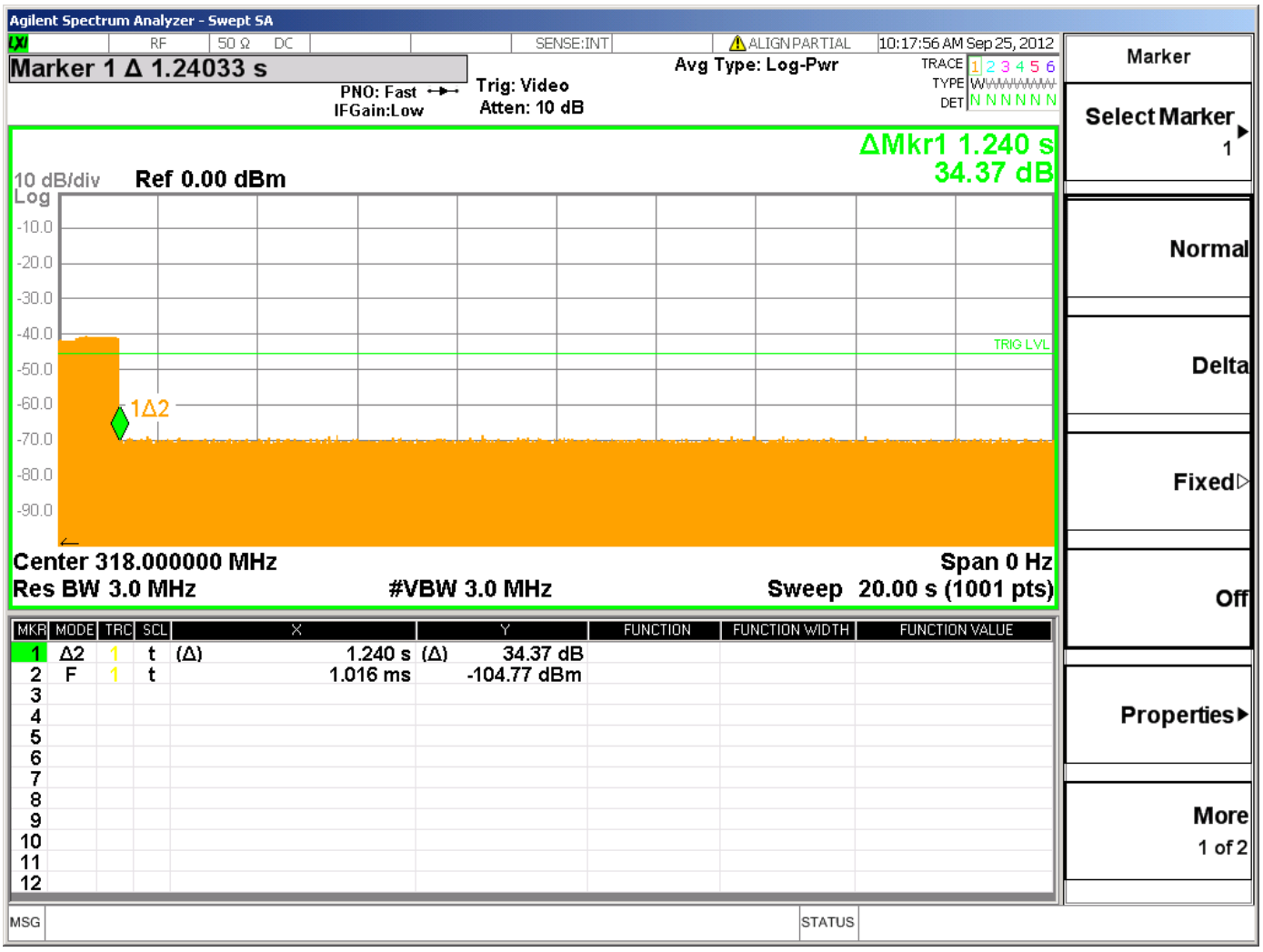
4.8.2 Test Conditions and Results – Cease Operation

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the transmission time measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	47 CFR Part 15.231(a)
Cease Operation Limits	
The transmissions shall stop within 5 seconds of either a button being released or if automatically controlled transmissions shall be stopped 5 seconds after transmissions begin.	

Table 62 Cease Operation Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

Figure 48 Cease Operation Graph



4.8.3 Test Conditions and Results – Pulse Train

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The pulse train was measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	FCC Part 15 Subpart A, 15.35
Pulse Train Limits	
There are no limits for this test. This data is used to calculate the averaging correction factor that is applied to the measured peak radiated emissions results.	

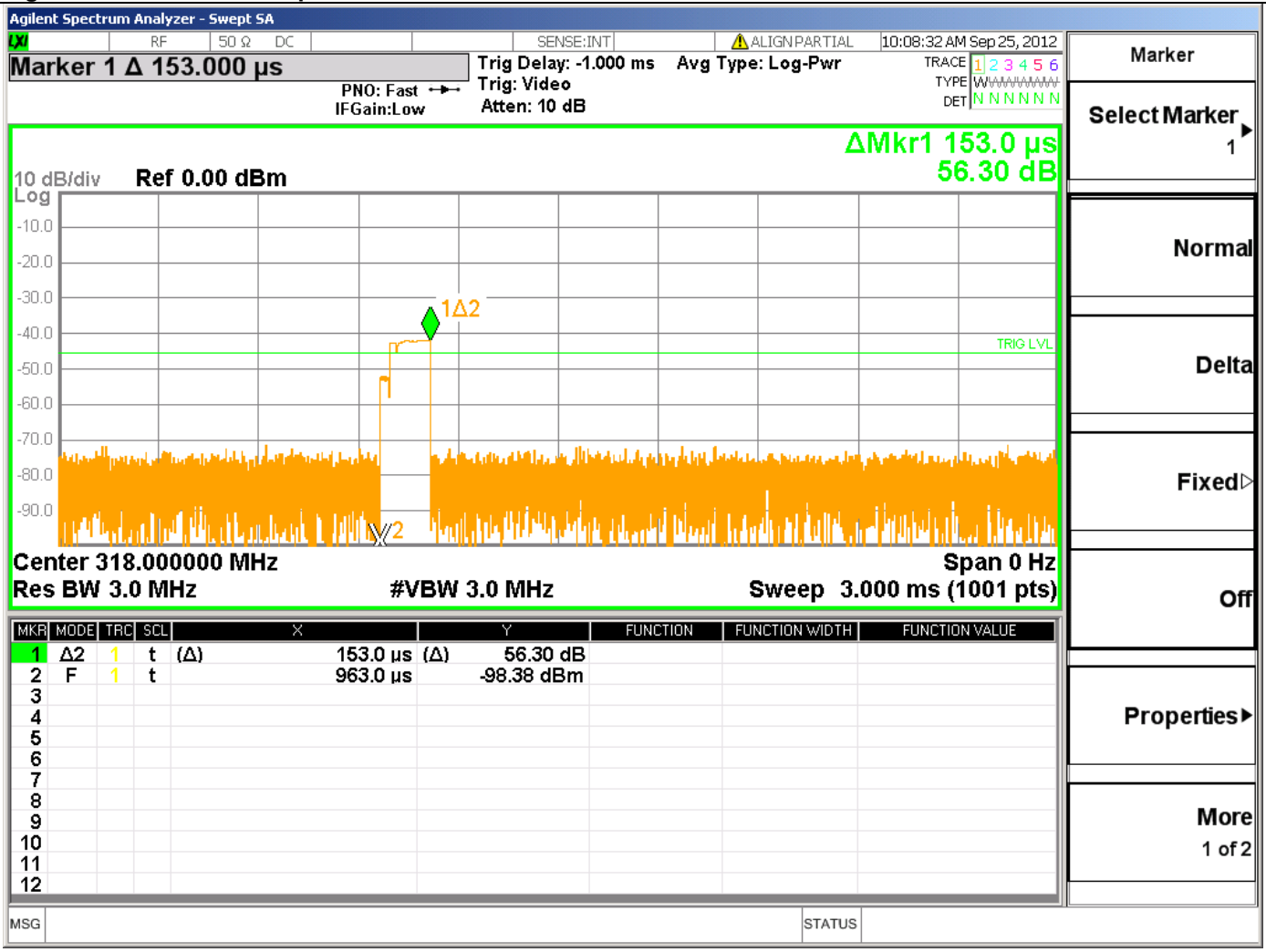
Table 63 Pulse Train Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

Table 64 Pulse Train Calculation

TX Frequency	Total TX time	Total Transmission Period or 100ms whichever is lesser	DC Correction Factor (dB) $20\log\left(\frac{PulseWidth}{Period}\right)$
318MHz	16.32mS	100ms	-15.7
Worst Case Duty Cycle: Measured worst case duty cycle was -15.7dB over message pulses, not including tuning pulses. Manufacturer declares the worst case duty cycle at -15.39dB. The declared duty cycle is used for all radiated emissions data.			

Figure 49 Pulse Train Graphs



First Tuning Pulse duration: 0.153mS

Second Tuning Pulse duration: 0.325mS

Message Pulse Duration:1.020mS

Number of Pulses in 100ms (worst case): 16

4.8.4 Test Conditions and Results – RADIATED EMISSIONS Fundamental and Spurious

Test Description	Measurements were made in a 10-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4:2003. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter as noted. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.	
Basic Standard	47 CFR Part 15 subpart C, and RSS-210	
UL LPG	80-EM-S0029	
	Frequency range	Measurement Point
Fully configured sample scanned over the following frequency range	30MHz – 1GHz	3 meter distance
	1GHz – 4GHz	3 meter distance

Restricted Band Limits

Frequency (MHz)	Limit (dBµV/m)	
	Quasi-Peak	Peak
30 - 88	40.00	NA
88 - 216	43.52	NA
216 - 960	46.02	NA
960 - 1000	54	NA
Above 1000 (FCC)	NA	54 (at 3-meter)

Fundamental Frequency Limits and Non-restricted band Harmonic Limits

Frequency (MHz)	Limit (dBµV/m) @ 3m distance All harmonics except those in restricted bands must be attenuated by 20dB or more	
	Average - Fundamental	Peak - Fundamental
318	75.80	95.80

Supplementary information: See section 4.8.3 for duty cycle information.

Figure 50 Radiated Emissions Graph (Below 1GHz)

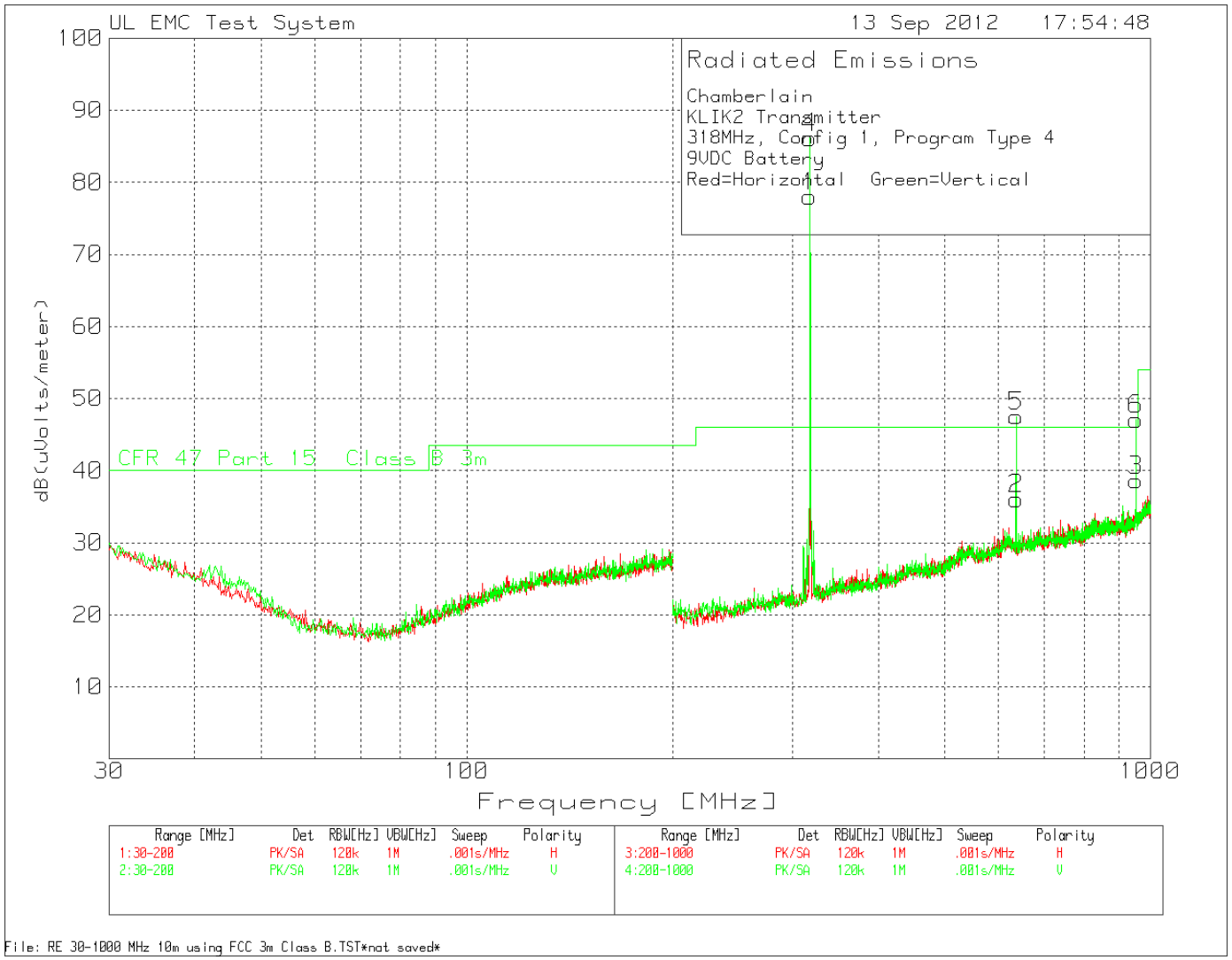


Figure 51 Radiated Emissions Graph (Above 1GHz)

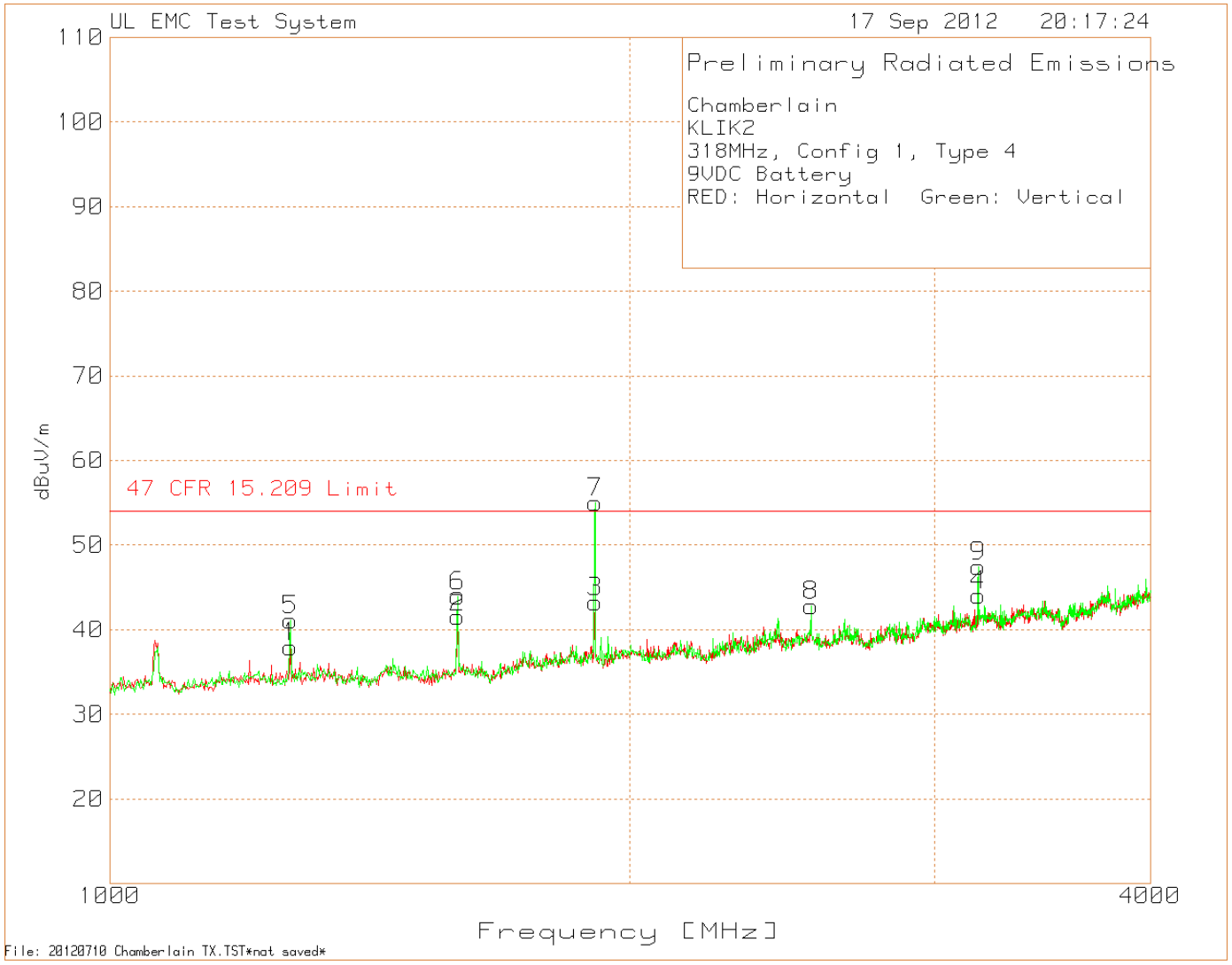


Table 65 - Radiated Emissions Data Points

Chamberlain
KLIK2C Transmitter
318MHz, Config 1, Program Type 4
9VDC Battery
Red:Horizontal, Green:Vertical

Test Frequency MHz	Meter Reading dBuV	Detector	Antenna Factor dB	Path Loss Gain dB	Level dBuV/m	Duty Cycle Factor dB	Level with Duty Cycle dBuV/m	Limit @ 3m dBuV/m	Margin dB	Azimuth [Degs]	Height [cm]	Polarity
318.0104	68.24	PK	14.4	2.1	84.74	-15.39	69.35	75.8	-6.45	25	102	Horz
318.0104	70	PK	14.4	2.1	86.5	-15.39	71.11	75.8	-4.69	118	155	Vert
636.019231	14.05	PK	20.6	3.1	37.75	-15.39	22.36	46	-23.64	186	184	Horz
636.019231	23.38	PK	20.6	3.1	47.08	-15.39	31.69	46	-14.31	290	175	Vert
954.038462	21.3	PK	24	3.9	49.2	-15.39	33.81	46	-12.19	222	280	Horz
954.035256	24.45	PK	24	3.9	52.35	-15.39	36.96	46	-9.04	286	114	Vert
1272.181	69.57	PK	25.2	-56.79	37.98	-15.39	22.59	54	-31.41	*	101	Horz
1590.394	71.11	PK	25.3	-54.9	41.51	-15.39	26.12	54	-27.88	*	125	Horz
1908.606	70.31	PK	27.4	-54.46	43.25	-15.39	27.86	54	-26.14	*	101	Horz
3181.454	65.04	PK	30.7	-51.64	44.1	-15.39	28.71	54	-25.29	*	101	Horz
1272.181	72.72	PK	25.2	-56.79	41.13	-15.39	25.74	54	-28.26	*	125	Vert
1590.394	73.57	PK	25.3	-54.9	43.97	-15.39	28.58	54	-25.42	*	125	Vert
1908.0461	82.82	PK	27.4	-54.46	55.76	-15.39	40.37	54	-13.63	192	100	Vert
2545.03	65.93	PK	28.9	-52.04	42.79	-15.39	27.4	54	-26.6	*	100	Vert
3181.454	68.36	PK	30.7	-51.64	47.42	-15.39	32.03	54	-21.97	*	125	Vert

* Peak prescan data, not maximized

4.9 Configuration 9# Test Data

4.9.1 Test Conditions and Results – Occupied Bandwidth

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the spectrum analyzer resolution bandwidth set per the appropriate standard.
Basic Standard	47 CFR Part 15.231(c)
Occupied Bandwidth Limits	
0.25% of Center Frequency (372.5MHz: 931.256kHz)	

Table 66 Occupied Bandwidth Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

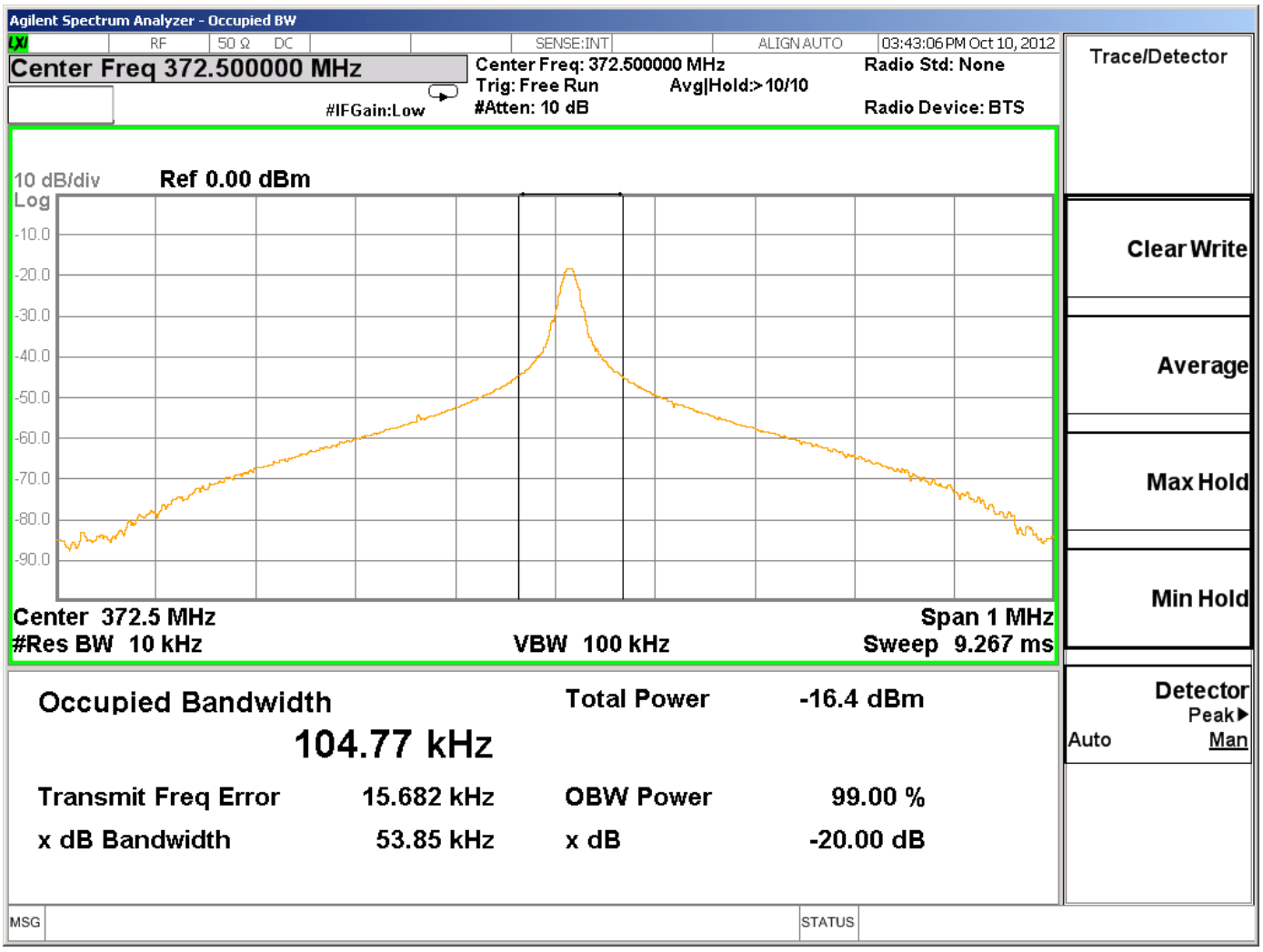
Table 67 Occupied Bandwidth Spectrum Analyzer Settings

Resolution Bandwidth	Occupied Bandwidth Requirements	
	dBc	% PWR
10kHz	-20	99
Supplementary information: None		

Table 68 Occupied Bandwidth Test Result Summary

Center Frequency	20dB BW Measured (kHz)	99% BW Measured (kHz)
372.5MHz	53.85	104.77

Figure 52 – Bandwidth Graph



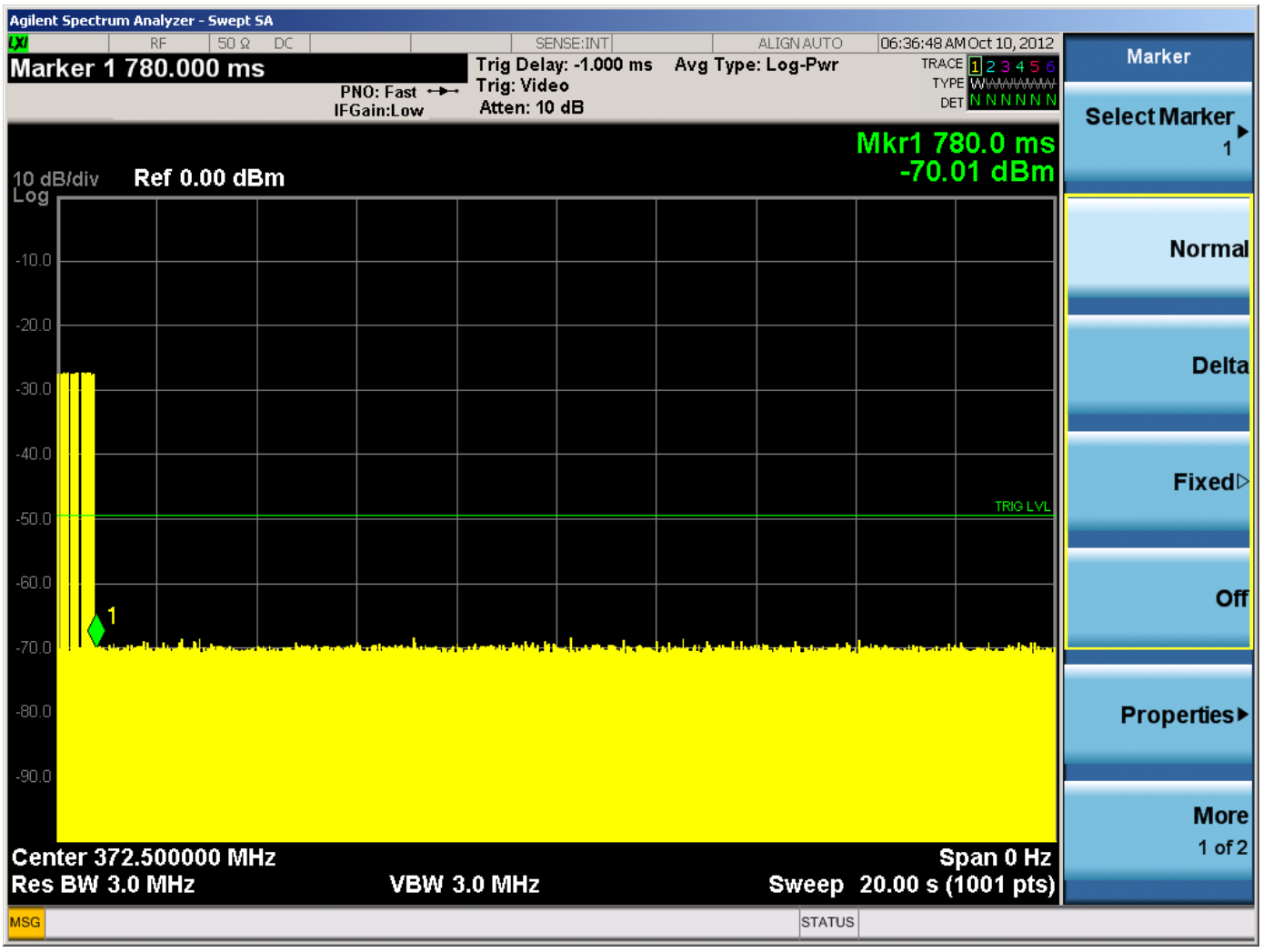
4.9.2 Test Conditions and Results – Cease Operation

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the transmission time measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	47 CFR Part 15.231(a)
Cease Operation Limits	
The transmissions shall stop within 5 seconds of either a button being released or if automatically controlled transmissions shall be stopped 5 seconds after transmissions begin.	

Table 69 Cease Operation Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

Figure 53 Cease Operation Graph



4.9.3 Test Conditions and Results – Pulse Train

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The pulse train was measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	FCC Part 15 Subpart A, 15.35
Pulse Train Limits	
There are no limits for this test. This data is used to calculate the averaging correction factor that is applied to the measured peak radiated emissions results.	

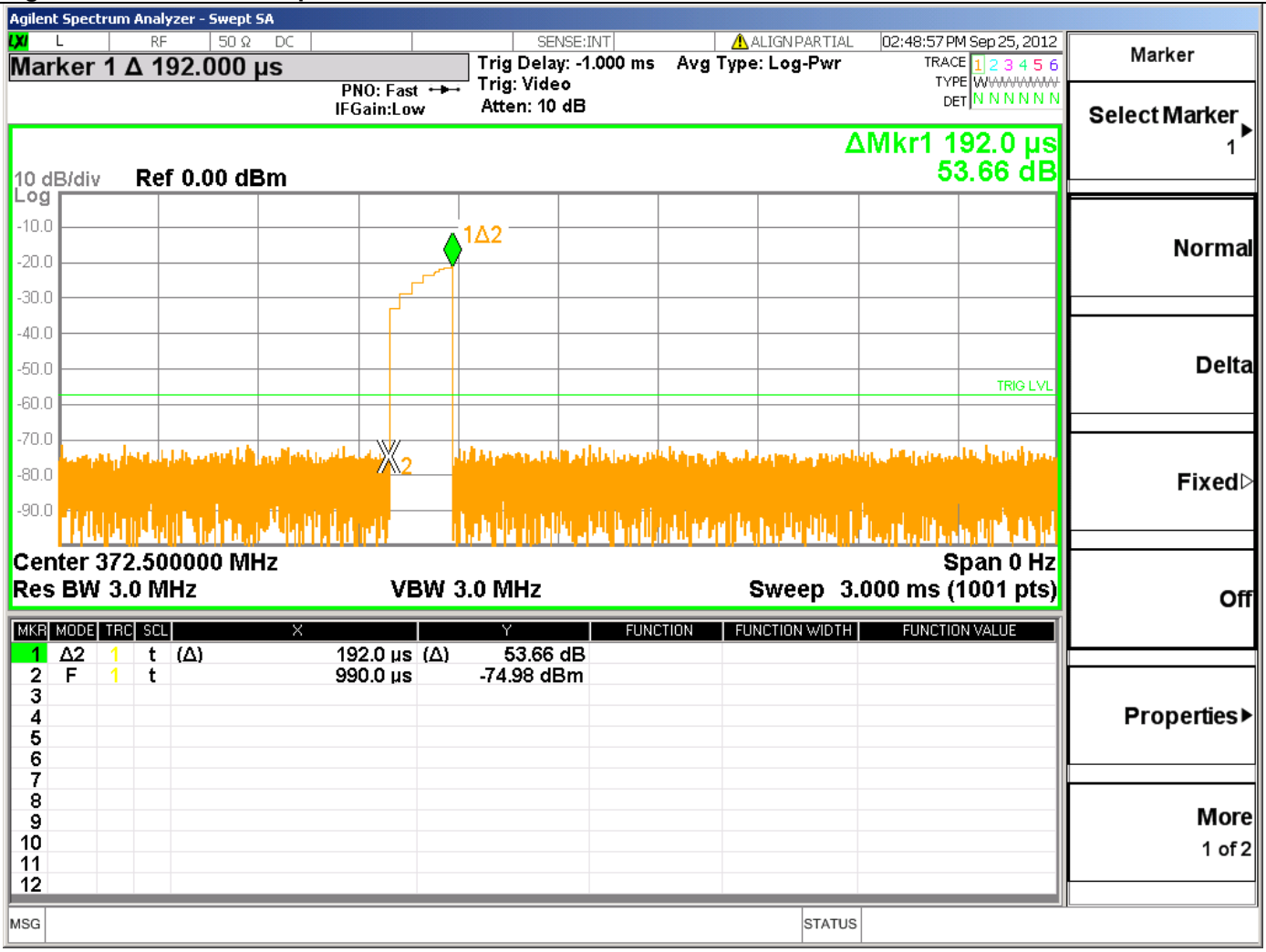
Table 70 Pulse Train Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

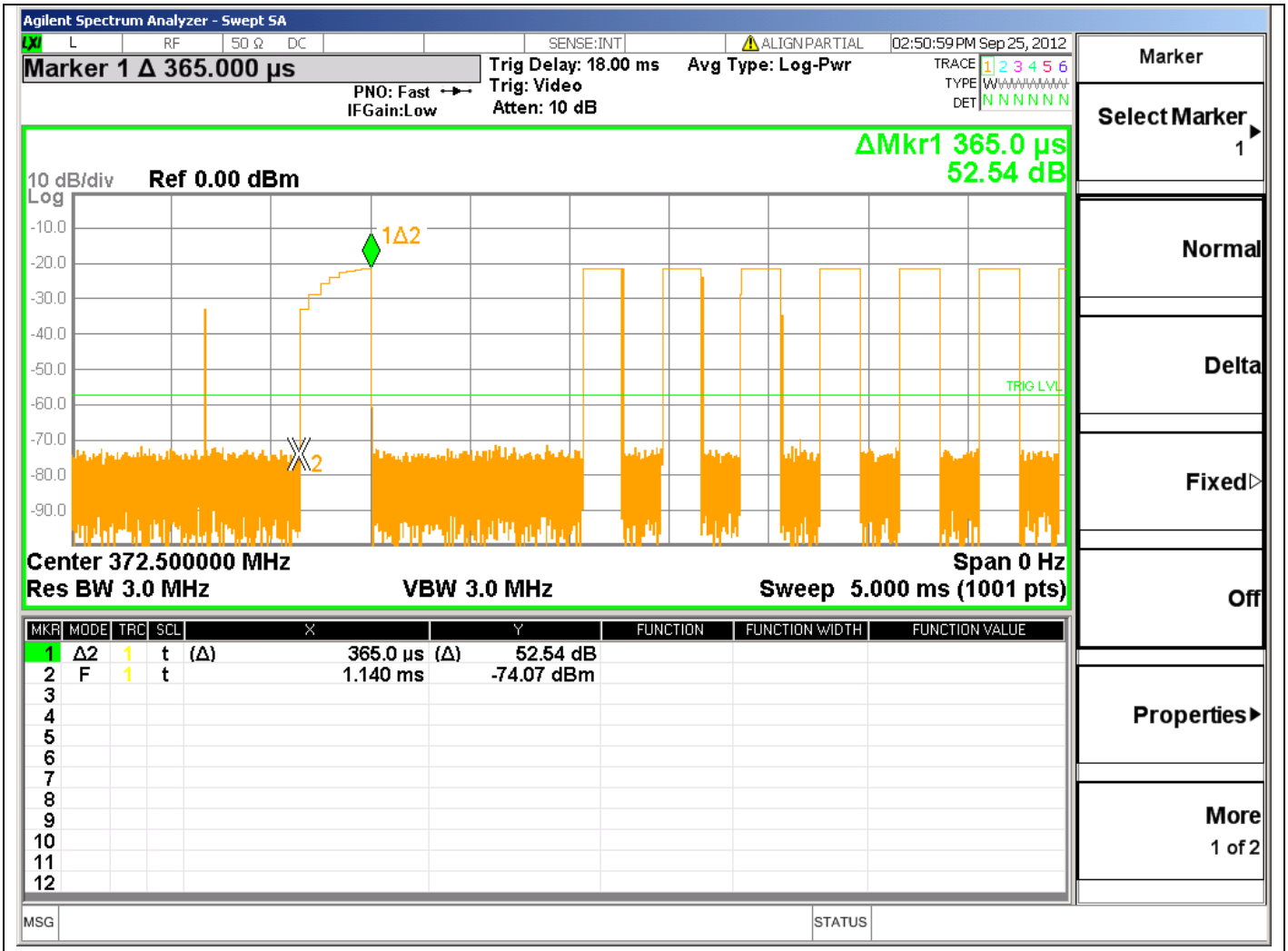
Table 71 Pulse Train Calculation

TX Frequency	Total TX time	Total Transmission period or 100ms whichever is lesser	DC Correction Factor (dB) $20\log\left(\frac{PulseWidth}{Period}\right)$
372.5MHz	(42x0.202)+(31x0.404)+0.192+0.365	100ms	-13.32
Worst Case Duty Cycle: Worst case duty cycle was calculated over 100mS including the tuning pulses. Manufacturer declared worst case duty cycle is -12.36dB and it is used for radiated emissions data.			

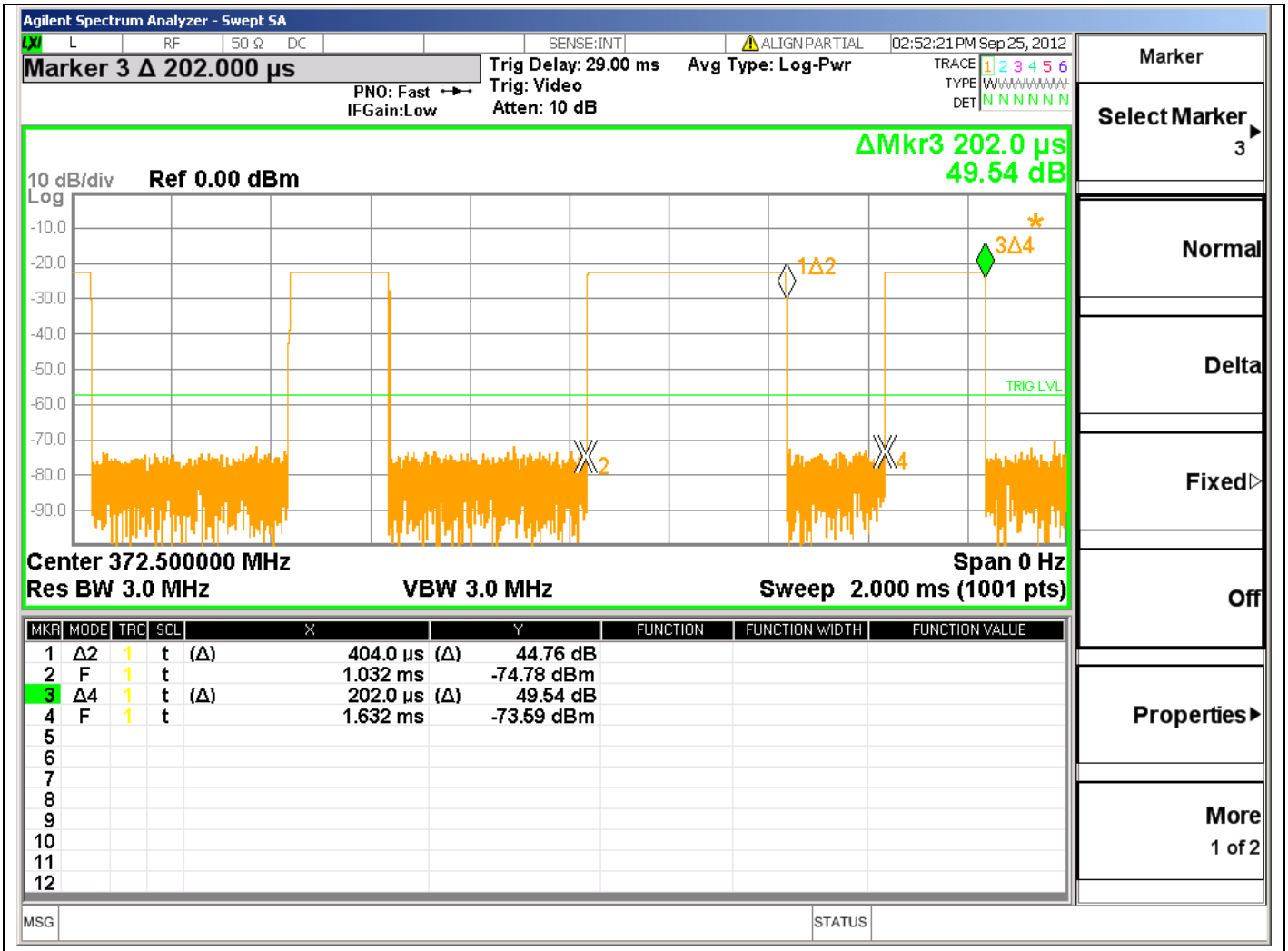
Figure 54 Pulse Train Graphs



First tuning pulse duration: 0.192mS

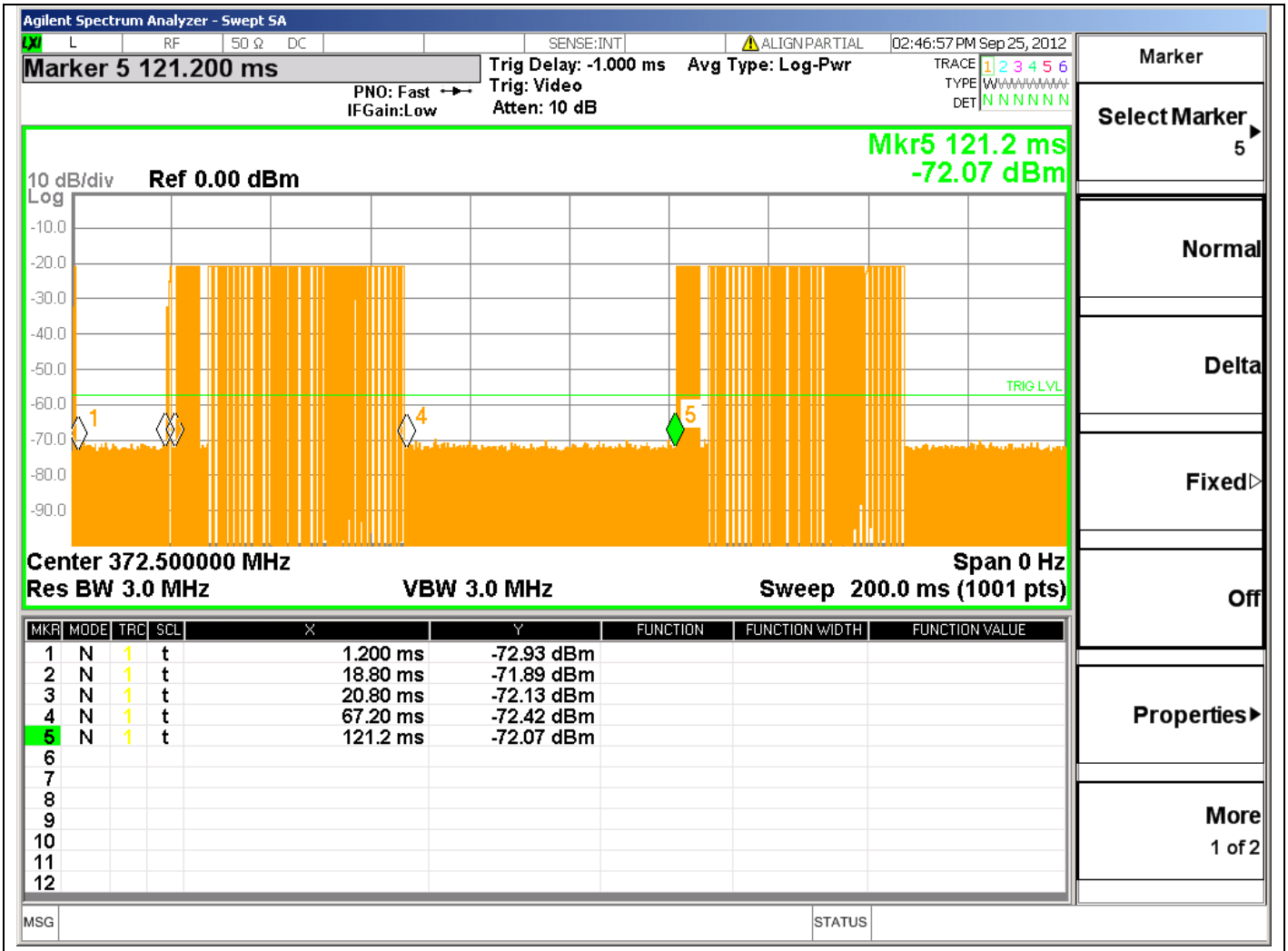


Second tuning pulse duration: 0.365mS



Message Pulse Duration: Short 0.202mS, Long 0.404mS

Number of Pulses: 42 Short, 31 Long


Agilent Spectrum Analyzer - Swept SA
L
RF
50 Ω DC
SENSE:INT
ALIGN PARTIAL
02:46:57 PM Sep 25, 2012
Marker 5 121.200 ms
PNO: Fast
IFGain:Low
Trig Delay: -1.000 ms
Trig: Video
Atten: 10 dB
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE W
DET N N N N N N
Mkr5 121.2 ms
-72.07 dBm
10 dB/div
Log
Ref 0.00 dBm
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
TRIG LVL
Center 372.500000 MHz
Res BW 3.0 MHz
VBW 3.0 MHz
Span 0 Hz
Sweep 200.0 ms (1001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 t 1.200 ms -72.93 dBm
2 N 1 t 18.80 ms -71.89 dBm
3 N 1 t 20.80 ms -72.13 dBm
4 N 1 t 67.20 ms -72.42 dBm
5 N 1 t 121.2 ms -72.07 dBm
6
7
8
9
10
11
12
Marker
Select Marker 5
Normal
Delta
Fixed
Off
Properties
More 1 of 2
MSG
STATUS

Period

4.9.4 Test Conditions and Results – RADIATED EMISSIONS Fundamental and Spurious

Test Description	Measurements were made in a 10-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4:2003. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter as noted. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.		
Basic Standard	47 CFR Part 15 subpart C, and RSS-210		
UL LPG	80-EM-S0029		
	Frequency range	Measurement Point	
Fully configured sample scanned over the following frequency range	30MHz – 1GHz	10 meter distance	
	1GHz – 4GHz	3 meter distance	

Restricted Band Limits

Frequency (MHz)	Limit (dBµV/m)	
	Quasi-Peak	Peak
30 - 88	40.00	NA
88 - 216	43.52	NA
216 - 960	46.02	NA
960 - 1000	54	NA
Above 1000 (FCC)	NA	54 (at 3-meter)

Fundamental Frequency Limits and Non-restricted band Harmonic Limits

Frequency (MHz)	Limit (dBµV/m) @ 3m distance All harmonics except those in restricted bands must be attenuated by 20dB or more	
	Average - Fundamental	Peak - Fundamental
372.5	78.52	98.52

Supplementary information: See section 4.9.3 for duty cycle information.

Figure 55 Radiated Emissions Graph (Below 1GHz)

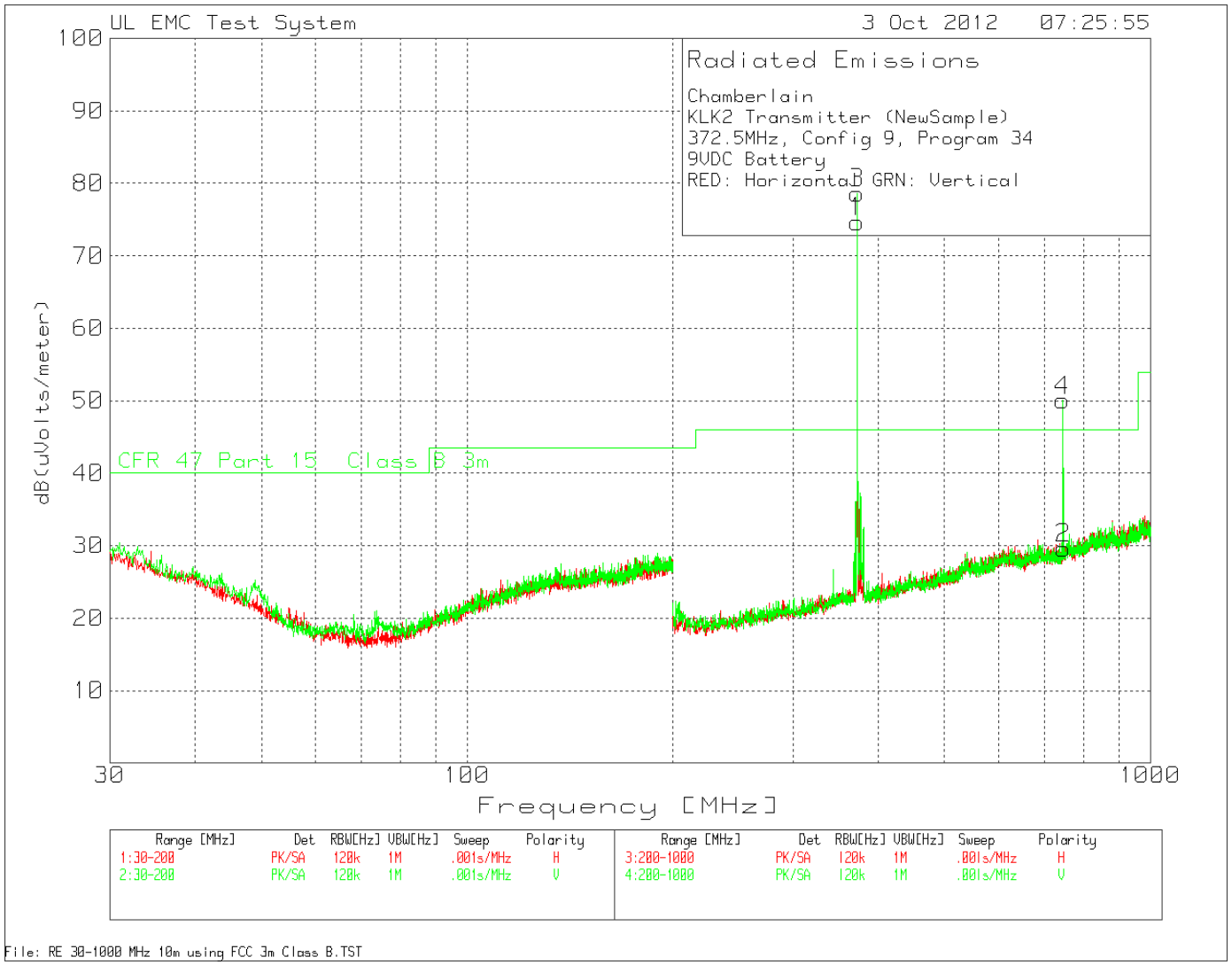


Figure 56 Radiated Emissions Graph (Above 1GHz)

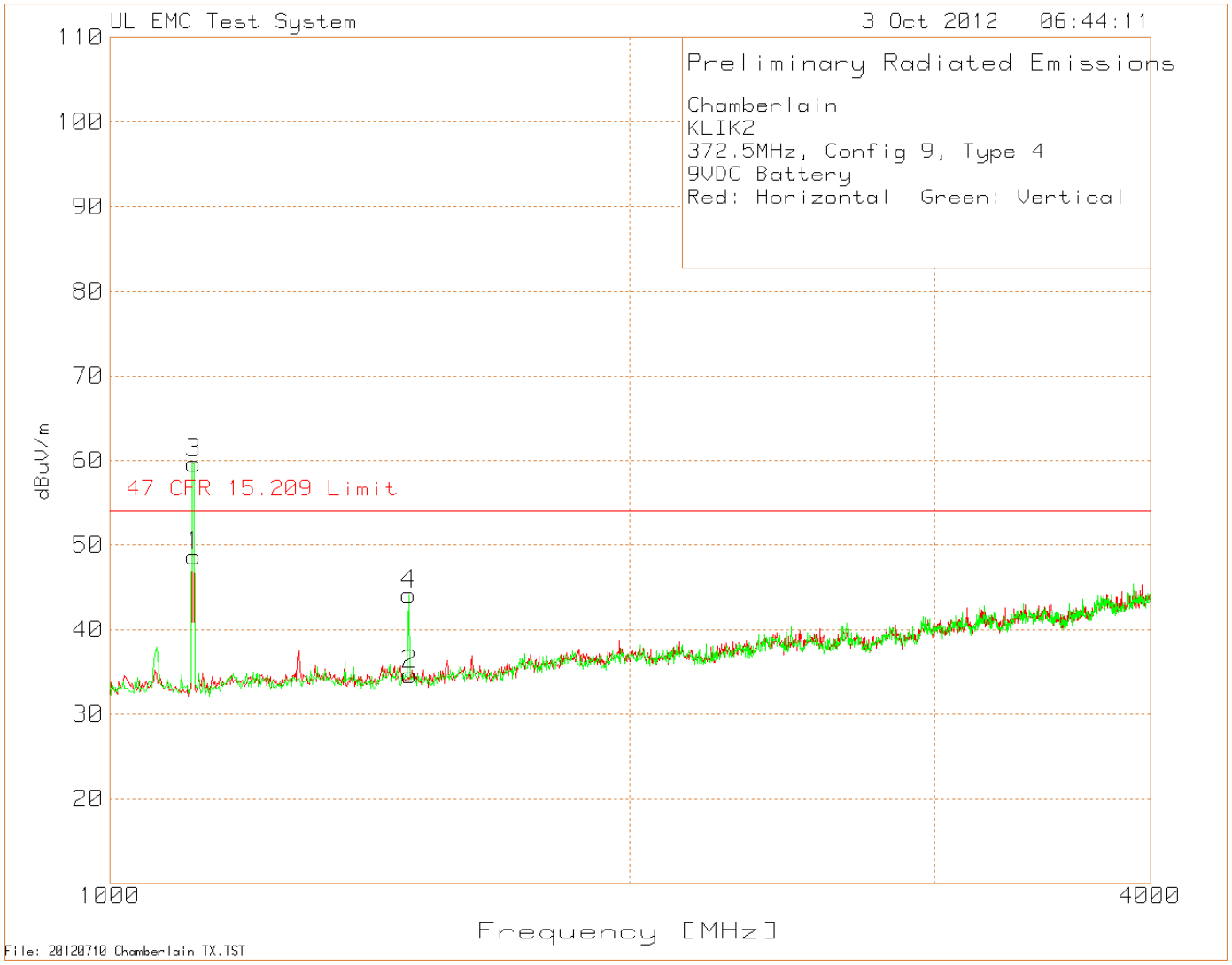


Table 72 - Radiated Emissions Data Points

Chamberlain
KLIK2C Transmitter
372.5MHz, Config 9, Program 4
9VDC Battery
Red:Horizontal, Green:Vertical

Test Frequency MHz	Meter Reading dBuV	Detector	Antenna Factor dB	Path Loss Gain dB	Distance correction 10m to 3m dB	Level dBuV/m	Duty Cycle Factor dB	Level with Duty Cycle dBuV/m	Limit @ 3m dBuV/m	Margin dB	Azimuth [Degs]	Height [cm]	Polarity
372.5216	83.8	QP	15.1	-32.4	10.5	77	-12.36	64.64	78.52	-13.88	289	327	Horz
372.5216	83.92	PK	15.1	-32.4	10.5	77.12	-12.36	64.76	78.52	-13.76	289	327	Horz
372.5216	89.06	QP	15.1	-32.4	10.5	82.26	-12.36	69.9	78.52	-8.62	202	400	Vert
372.5216	89.18	PK	15.1	-32.4	10.5	82.38	-12.36	70.02	78.52	-8.5	202	400	Vert
745.0432	36.27	QP	20.6	-31.3	10.5	36.07	-12.36	23.71	46	-22.29	339	370	Horz
745.0432	40.16	PK	20.6	-31.3	10.5	39.96	-12.36	27.6	46	-18.4	339	370	Horz
745.0432	49.82	QP	20.6	-31.3	10.5	49.62	-12.36	37.26	46	-8.74	11	193	Vert
745.0432	51.19	PK	20.6	-31.3	10.5	50.99	-12.36	38.63	46	-7.37	11	193	Vert
1118.079	81.65	PK	24.5	-57.49	N/A	48.66	-12.36	36.3	54	-17.7	*	124	Horz
1492.328	65.15	PK	25.2	-55.69	N/A	34.66	-12.36	22.3	54	-31.7	*	124	Horz
1117.5782	98	PK	24.5	-57.49	N/A	65.01	-12.36	52.65	54	-1.35	158	133	Vert
1490.327	74.63	PK	25.2	-55.64	N/A	44.19	-12.36	31.83	54	-22.17	*	102	Vert

* Peak prescan data, not maximized

Configuration 2# Test Data

4.9.5 Test Conditions and Results – Occupied Bandwidth

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the spectrum analyzer resolution bandwidth set per the appropriate standard.
Basic Standard	47 CFR Part 15.231(c)
Occupied Bandwidth Limits	
0.25% of Center Frequency (390MHz: 975.0kHz)	

Table 73 Occupied Bandwidth Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

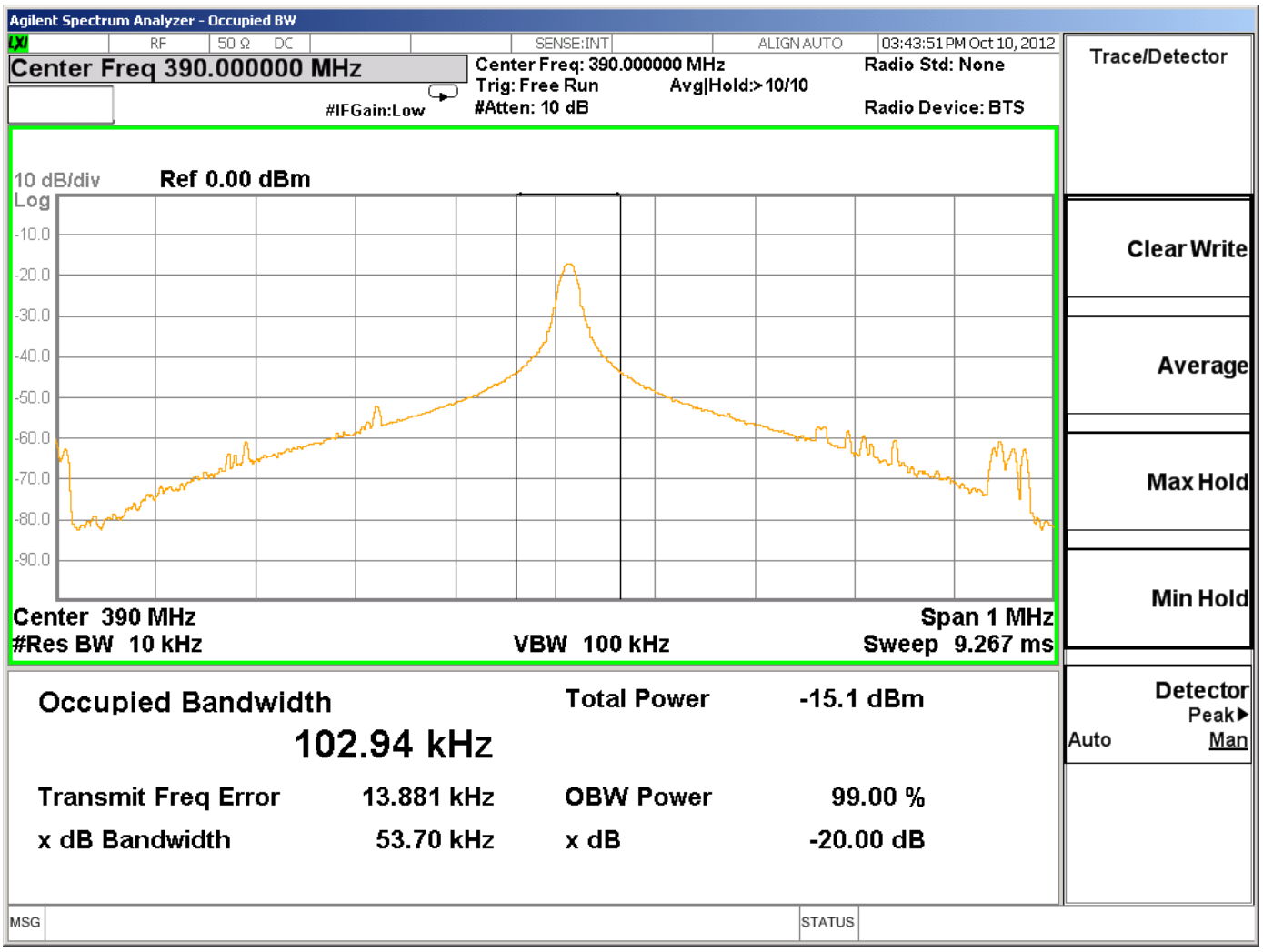
Table 74 Occupied Bandwidth Spectrum Analyzer Settings

Resolution Bandwidth	Occupied Bandwidth Requirements	
	dBc	% PWR
10kHz	-20	99
Supplementary information: None		

Table 75 Occupied Bandwidth Test Result Summary

Center Frequency	20dB BW Measured (kHz)	99% BW Measured (kHz)
390MHz	53.70	102.94

Figure 57 – Bandwidth Graph



4.9.6 Test Conditions and Results – Cease Operation

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the transmission time measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	47 CFR Part 15.231(a)
Cease Operation Limits	
The transmissions shall stop within 5 seconds of either a button being released or if automatically controlled transmissions shall be stopped 5 seconds after transmissions begin.	

Table 76 Cease Operation Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

Figure 58 Cease Operation Graph

4.9.7 Test Conditions and Results – Pulse Train

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The pulse train was measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	FCC Part 15 Subpart A, 15.35
Pulse Train Limits	
There are no limits for this test. This data is used to calculate the averaging correction factor that is applied to the measured peak radiated emissions results.	

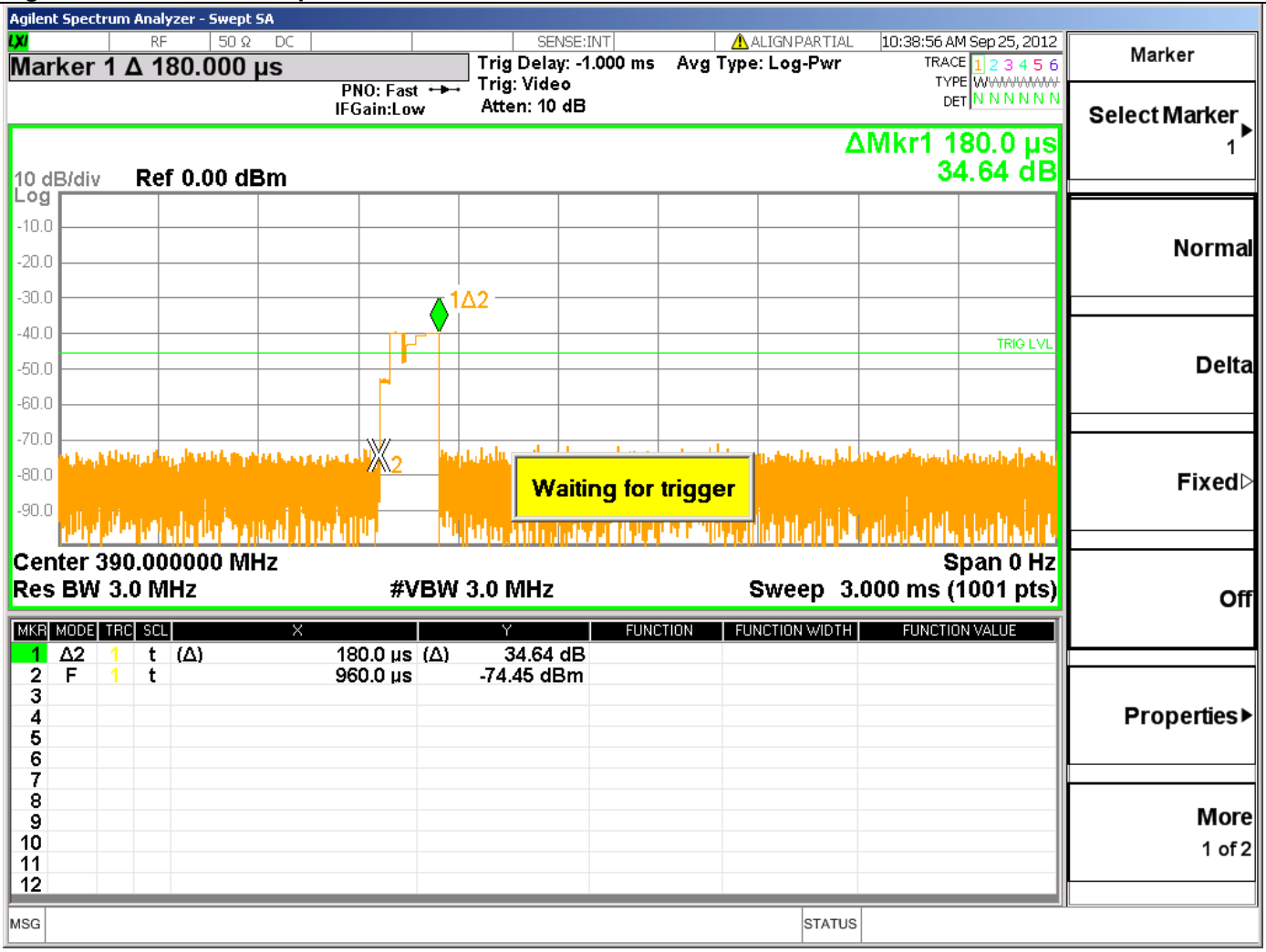
Table 77 Pulse Train Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

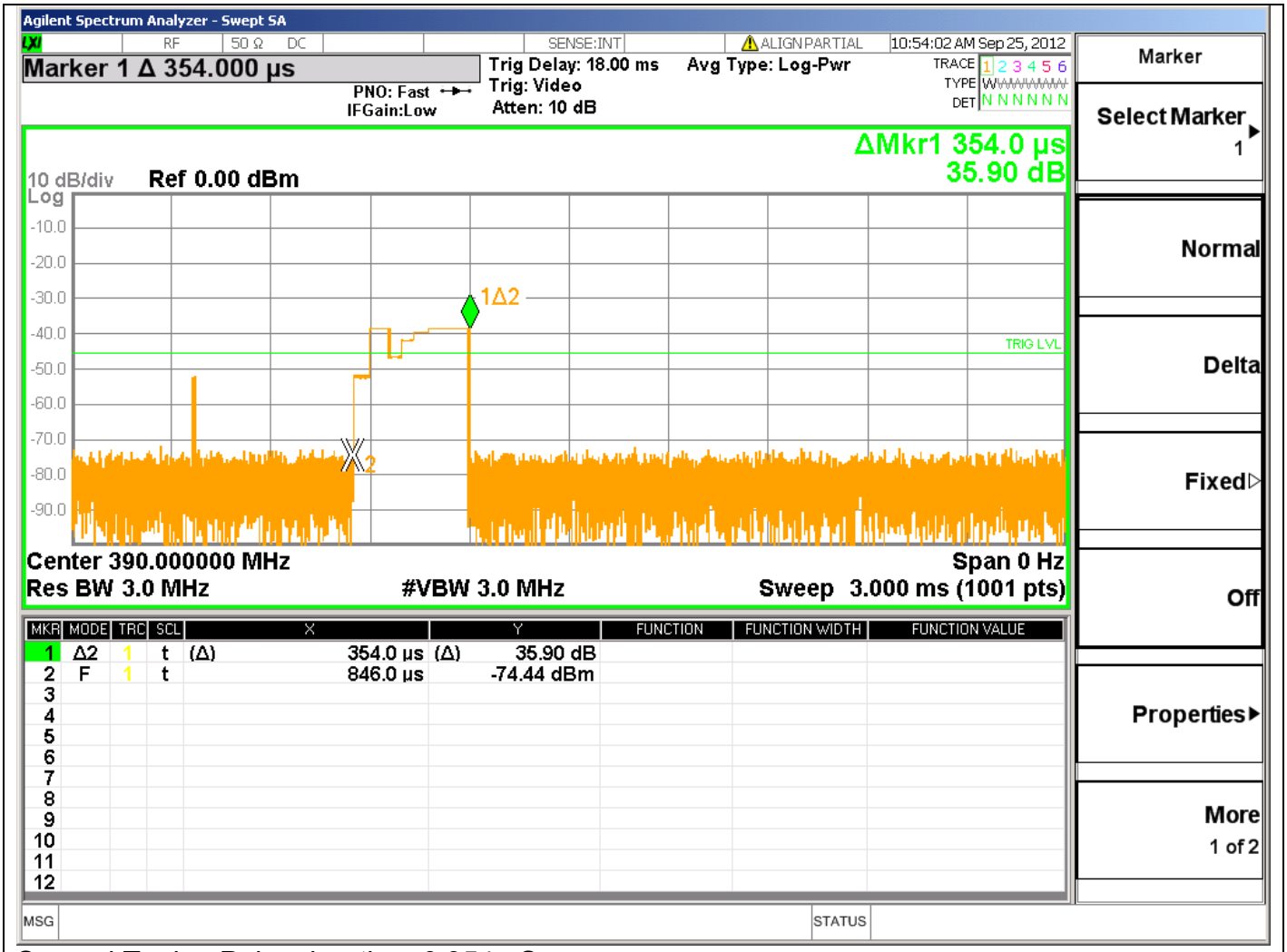
Table 78 Pulse Train Calculation

TX Frequency	Total TX time	Total Transmission Period or 100ms whichever is lesser	DC Correction Factor (dB) $20\log\left(\frac{PulseWidth}{Period}\right)$
390MHz	(7x0.510)+(8x1.0)+(6x1.51)	97.2ms	-13.46
Worst Case Duty Cycle: -13.46, Calculated over 97.2mS period that does not include the tuning pulses. Manufacturer declares worst case duty cycle as -13.55dB. Calculated duty cycle is used for all radiated emissions.			

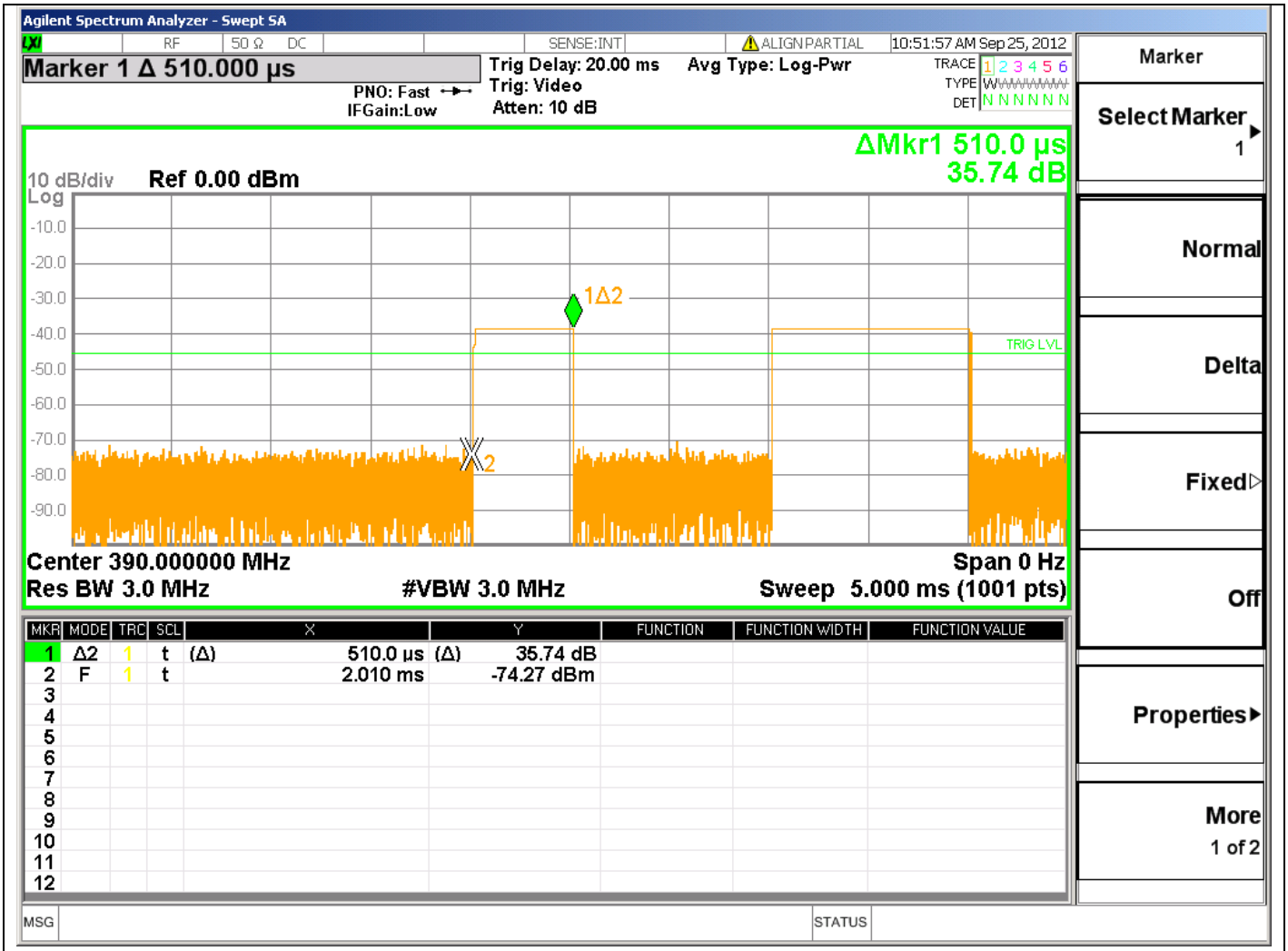
Figure 59 Pulse Train Graphs



First Tuning Pulse duration: 0.180mS

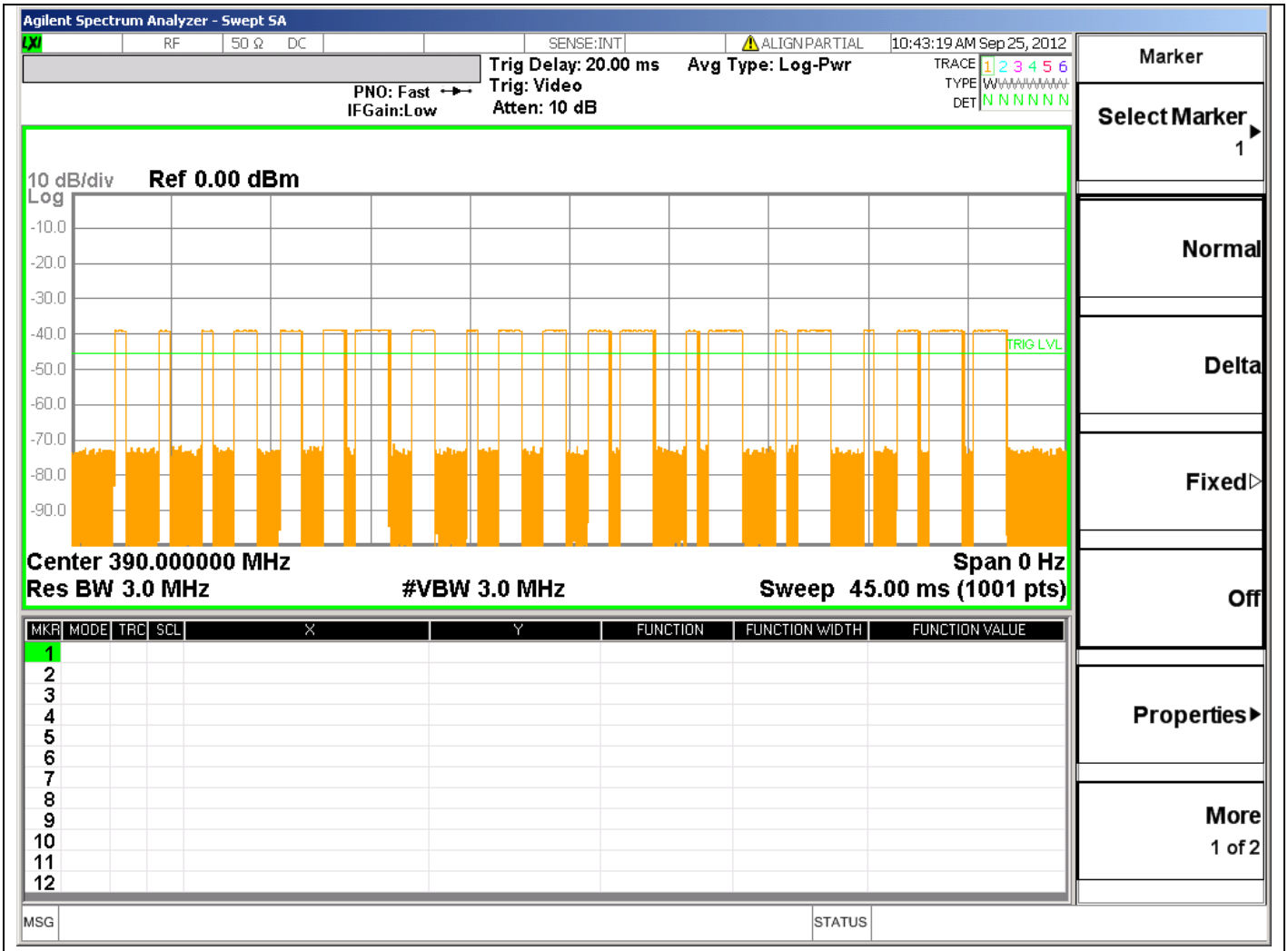


Second Tuning Pulse duration: 0.354mS

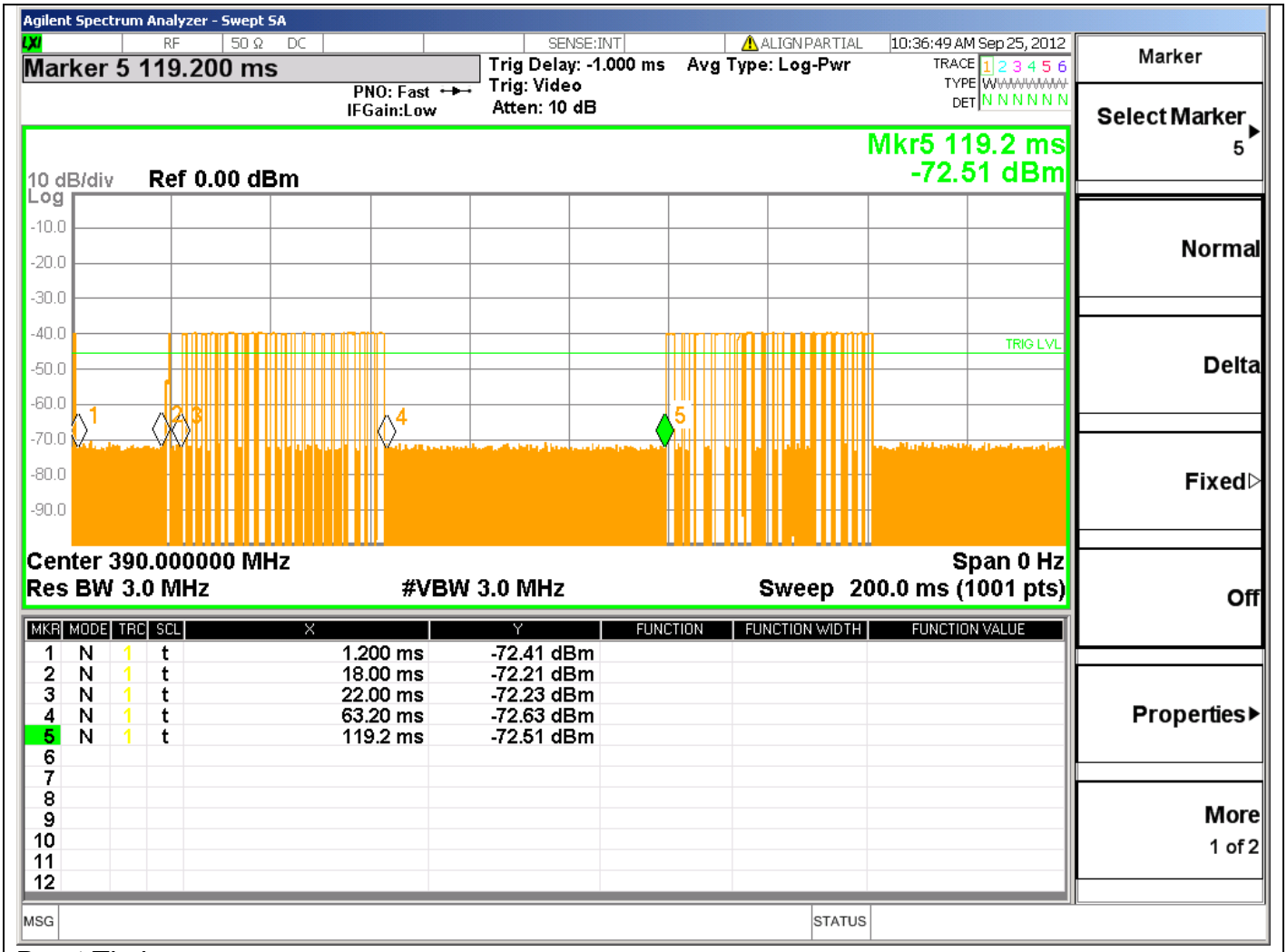


Pulse Duration: 0.510mS Short

Pulse Duration: 1.0mS Medium, 1.510mS Long



Number of message pulses in single burst: 7 Short, 8 Medium, 6 Long



Burst Timing

4.9.8 Test Conditions and Results – RADIATED EMISSIONS Fundamental and Spurious

Test Description	Measurements were made in a 10-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4:2003. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter as noted. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.		
Basic Standard	47 CFR Part 15 subpart C, and RSS-210		
UL LPG	80-EM-S0029		
	Frequency range	Measurement Point	
Fully configured sample scanned over the following frequency range	30MHz – 1GHz	3 meter distance	
	1GHz – 4GHz	3 meter distance	

Restricted Band Limits

Frequency (MHz)	Limit (dBµV/m)	
	Quasi-Peak	Peak
30 - 88	40.00	NA
88 - 216	43.52	NA
216 - 960	46.02	NA
960 - 1000	54	NA
Above 1000 (FCC)	NA	54 (at 3-meter)

Fundamental Frequency Limits and Non-restricted band Harmonic Limits

Frequency (MHz)	Limit (dBµV/m) @ 3m distance All harmonics except those in restricted bands must be attenuated by 20dB or more	
	Average - Fundamental	Peak - Fundamental
390	79.24	99.24

Supplementary information: See section 4.9.7 for duty cycle information.

Figure 60 Radiated Emissions Graph (Below 1GHz)

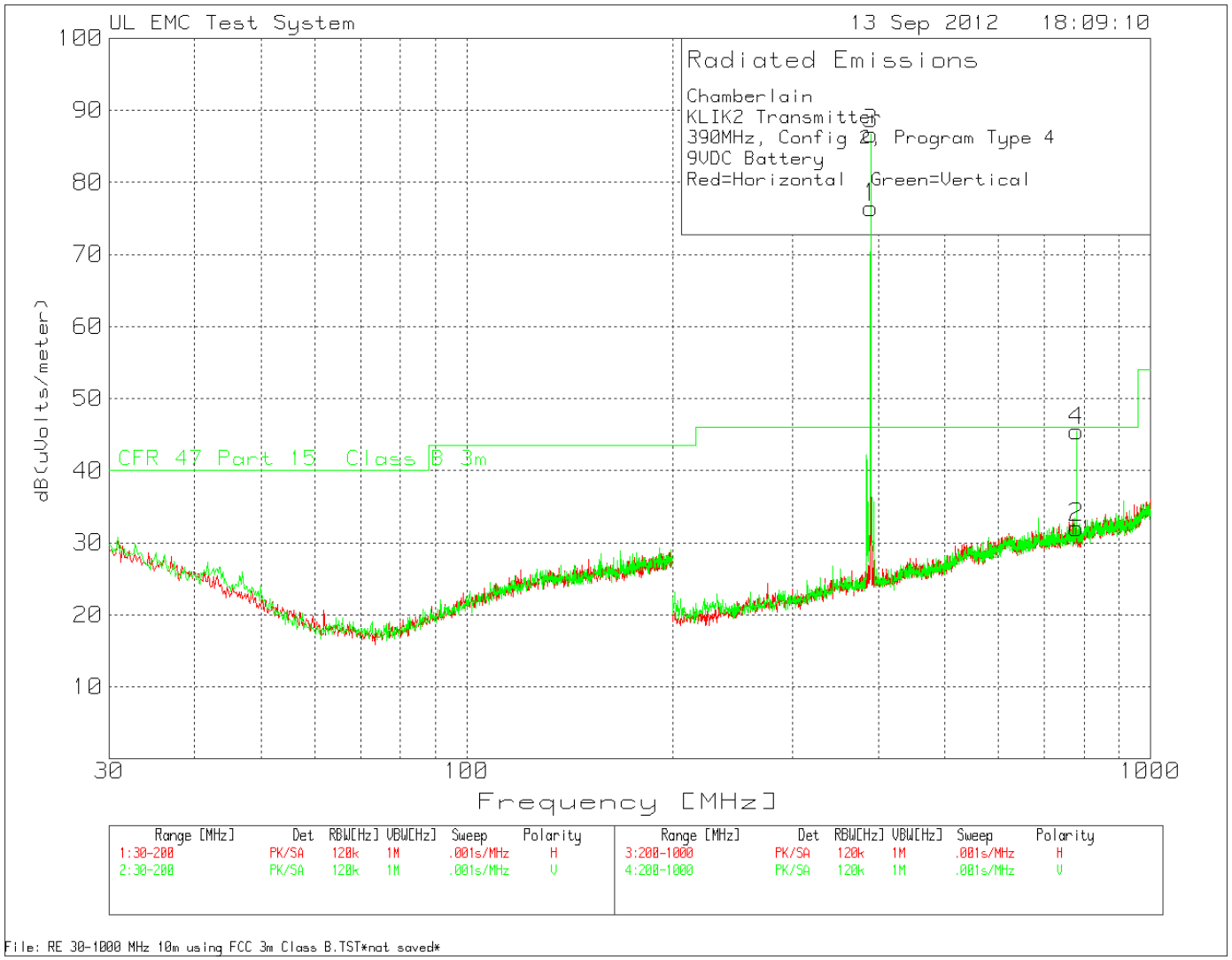


Figure 61 Radiated Emissions Graph (Above 1GHz)

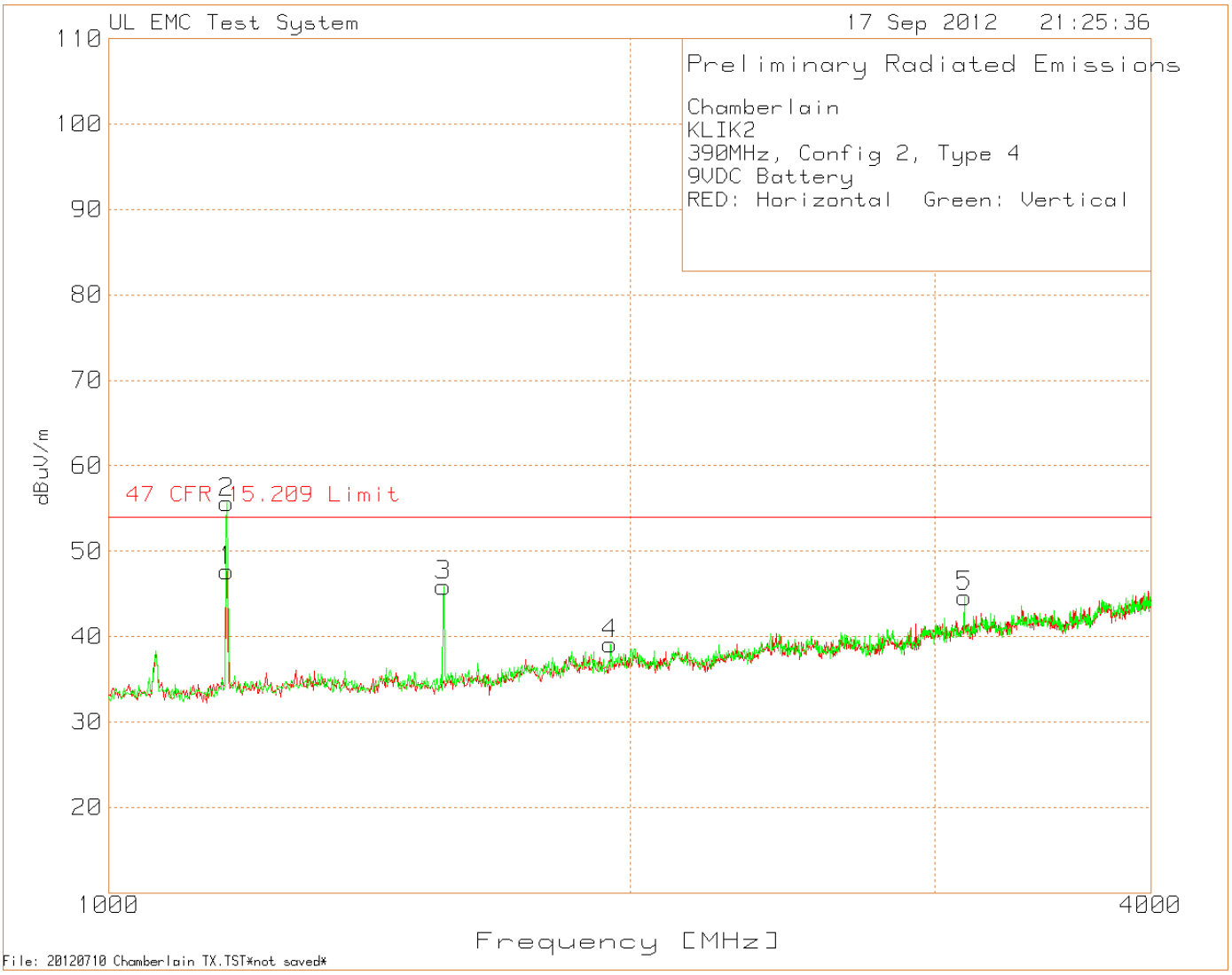


Table 79 - Radiated Emissions Data Points

Chamberlain
KLIK2C Transmitter
390MHz, Config 2, Program 4
9VDC Battery
Red:Horizontal, Green:Vertical

Test Frequency MHz	Meter Reading dBuV	Detector	Antenna Factor dB	Path Loss Gain dB	Level dBuV/m	Duty Cycle Factor dB	Level with Duty Cycle dBuV/m	Limit @ 3m dBuV/m	Margin dB	Azimuth [Degs]	Height [cm]	Polarity
390.014423	64.67	QP	16.1	2.3	83.07	-13.46	69.61	79.24	-9.63	25	102	Horz
390.014423	65.07	PK	16.1	2.3	83.47	-13.46	70.01	79.24	-9.23	25	102	Horz
390.014423	70.22	QP	16.1	2.3	88.62	-13.46	75.16	79.24	-4.08	113	128	Vert
390.014423	70.61	PK	16.1	2.3	89.01	-13.46	75.55	79.24	-3.69	113	128	Vert
780.028846	14.33	QP	21.8	3.4	39.53	-13.46	26.07	46	-19.93	61	117	Horz
780.028846	16.74	PK	21.8	3.4	41.94	-13.46	28.48	46	-17.52	61	117	Horz
780.028846	30.73	QP	21.8	3.4	55.93	-13.46	42.47	46	-3.53	83	140	Vert
780.028846	31.81	PK	21.8	3.4	57.01	-13.46	43.55	46	-2.45	83	140	Vert
1169.9649	91.28	PK	24.8	-57.24	58.84	-13.46	45.38	54	-8.62	41	218	Horz
1170.0371	94.64	PK	24.8	-57.24	62.2	-13.46	48.74	54	-5.26	41	131	Vert
1560.374	76.37	PK	25.2	-55.65	45.92	-13.46	32.46	54	-21.54	*	100	Vert
1948.632	66.11	PK	27.4	-54.39	39.12	-13.46	25.66	54	-28.34	*	125	Vert
3121.414	65.49	PK	30.6	-51.41	44.68	-13.46	31.22	54	-22.78	*	100	Vert

* Peak prescan data, not maximized

4.10 Configuration 6# Test Data

4.10.1 Test Conditions and Results – Occupied Bandwidth

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the spectrum analyzer resolution bandwidth set per the appropriate standard.
Basic Standard	47 CFR Part 15.231(c)
Occupied Bandwidth Limits	
0.25% of Center Frequency (390MHz: 975.0kHz)	

Table 80 Occupied Bandwidth Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

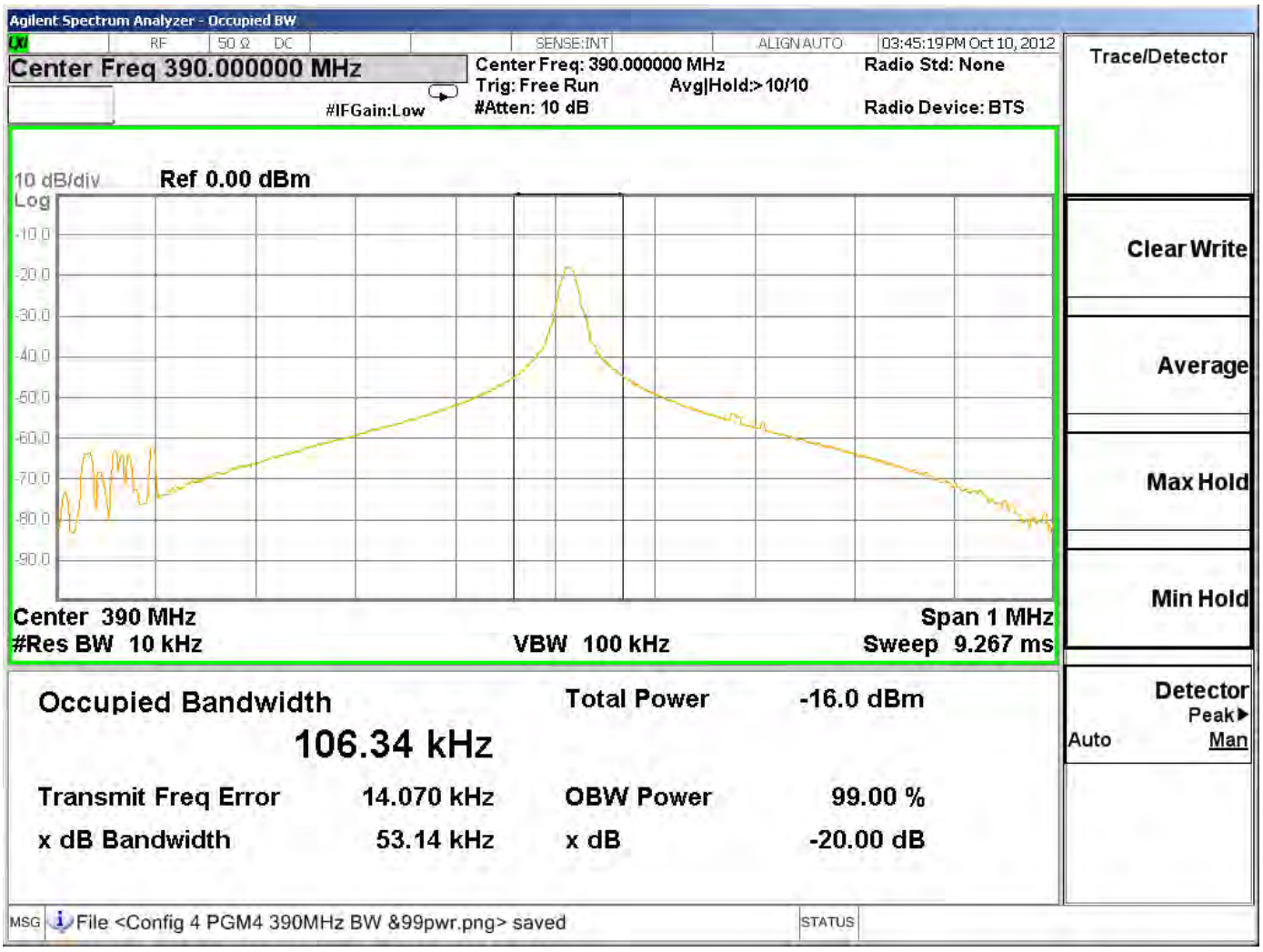
Table 81 Occupied Bandwidth Spectrum Analyzer Settings

Resolution Bandwidth	Occupied Bandwidth Requirements	
	dBc	% PWR
10kHz	-20	99
Supplementary information: None		

Table 82 Occupied Bandwidth Test Result Summary

Center Frequency	20dB BW Measured (kHz)	99% BW Measured (kHz)
390MHz	53.14	106.34

Figure 62 – Bandwidth Graph



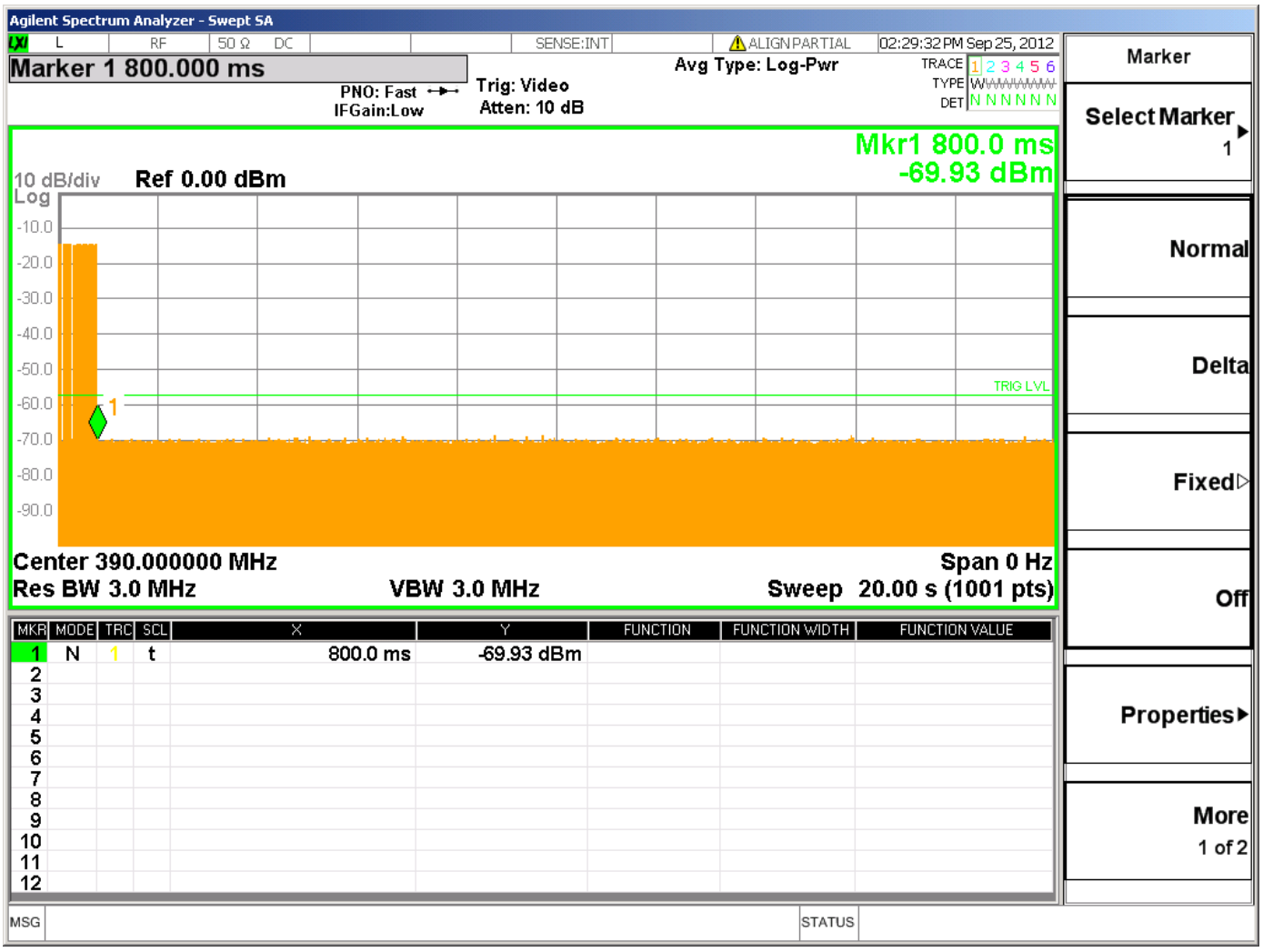
4.10.2 Test Conditions and Results – Cease Operation

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the transmission time measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	47 CFR Part 15.231(a)
Cease Operation Limits	
The transmissions shall stop within 5 seconds of either a button being released or if automatically controlled transmissions shall be stopped 5 seconds after transmissions begin.	

Table 83 Cease Operation Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

Figure 63 Cease Operation Graph



4.10.3 Test Conditions and Results – Pulse Train

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The pulse train was measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	FCC Part 15 Subpart A, 15.35
Pulse Train Limits	
There are no limits for this test. This data is used to calculate the averaging correction factor that is applied to the measured peak radiated emissions results.	

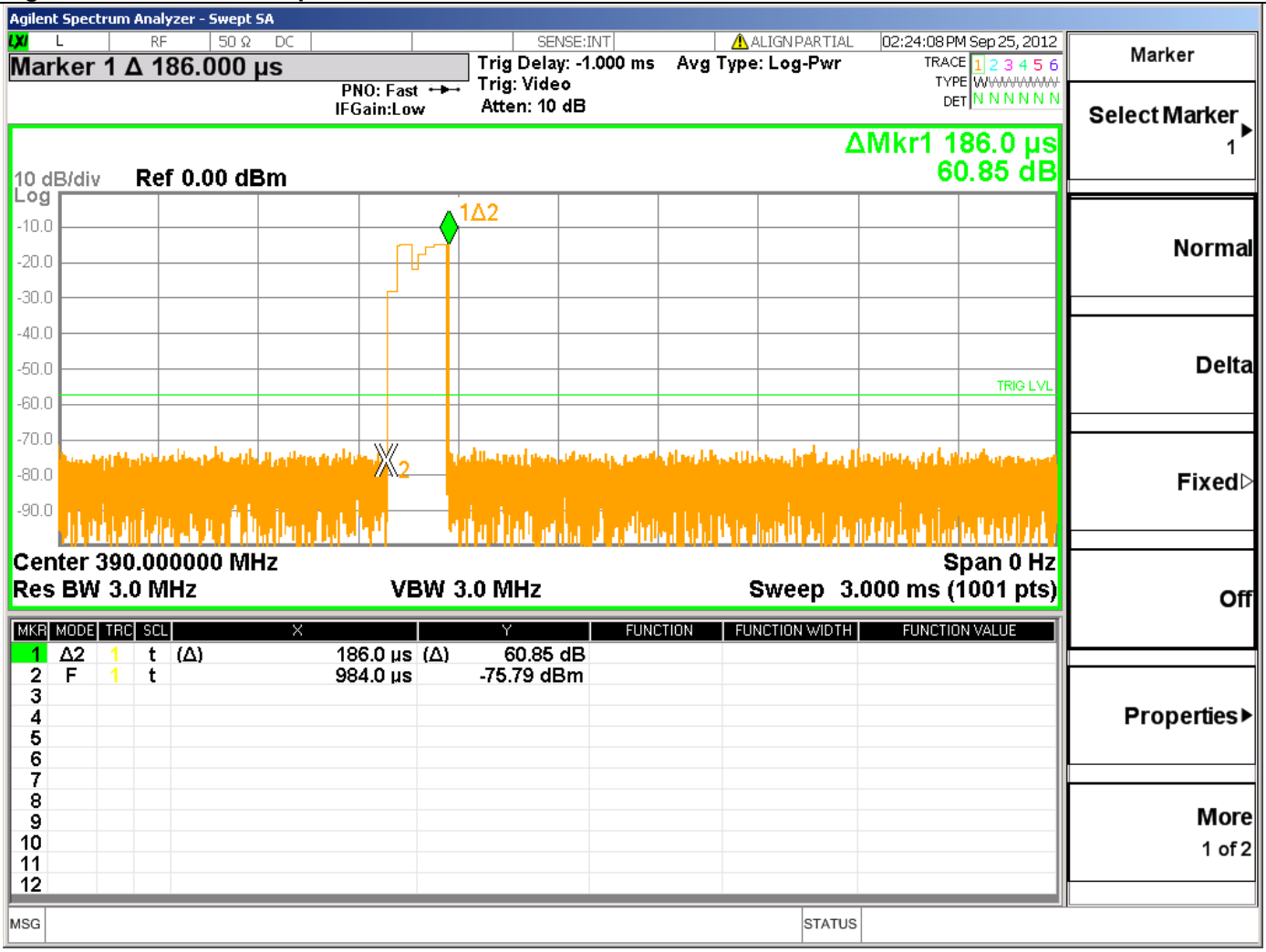
Table 84 Pulse Train Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

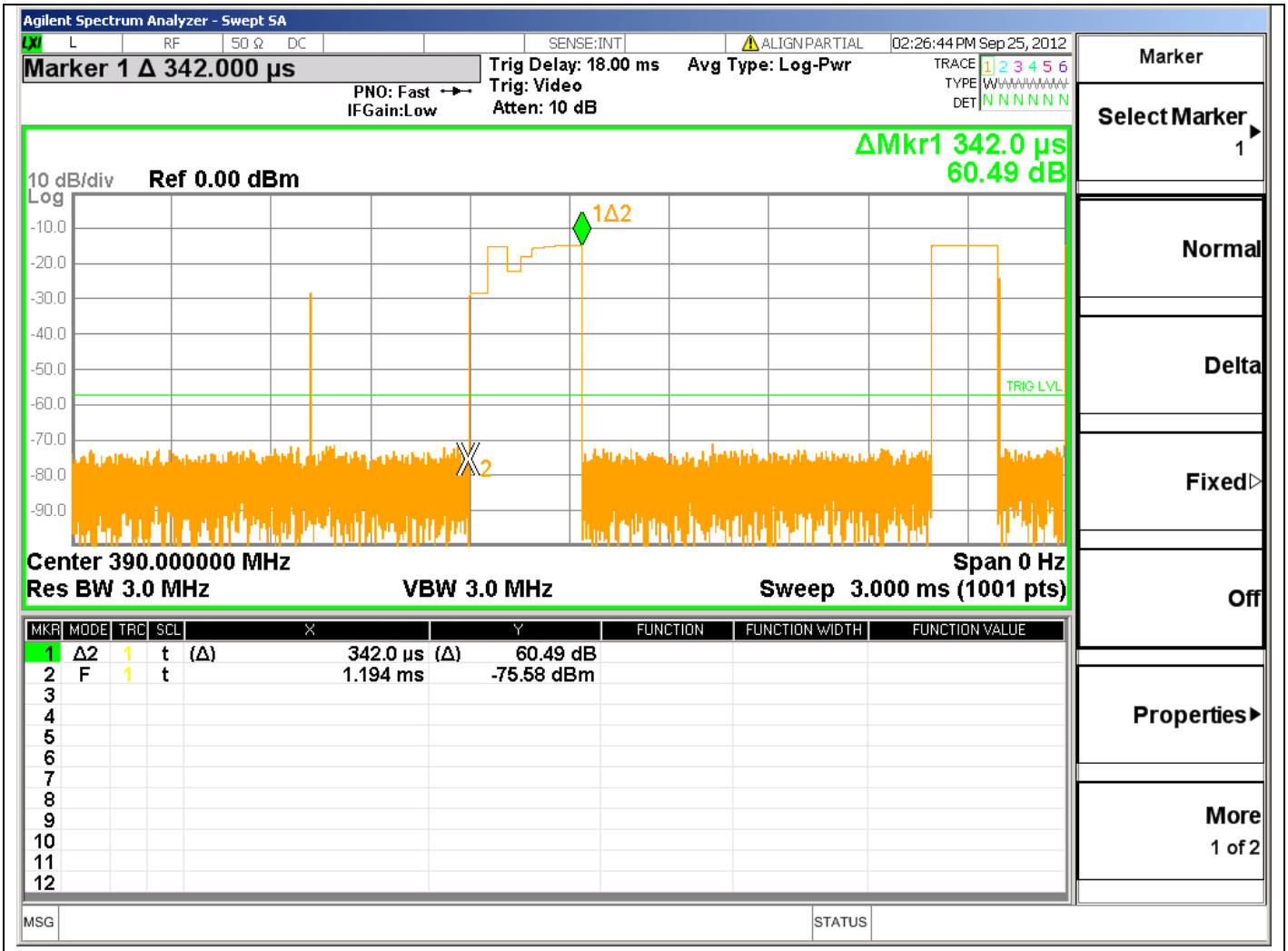
Table 85 Pulse Train Calculation

TX Frequency	Total TX time mS	Total Transmission time or 100ms whichever is lesser	DC Correction Factor (dB) $20\log\left(\frac{PulseWidth}{Period}\right)$
390MHz	(27x0.204)+(47x0.411)+0.186+0.342	100ms	-11.92
Worst Case Duty Cycle: The worst case duty cycle is calculated as worst case over 100mS. Manufacturer declared worst case duty cycle is -12.36dB and its used for all emissions data.			

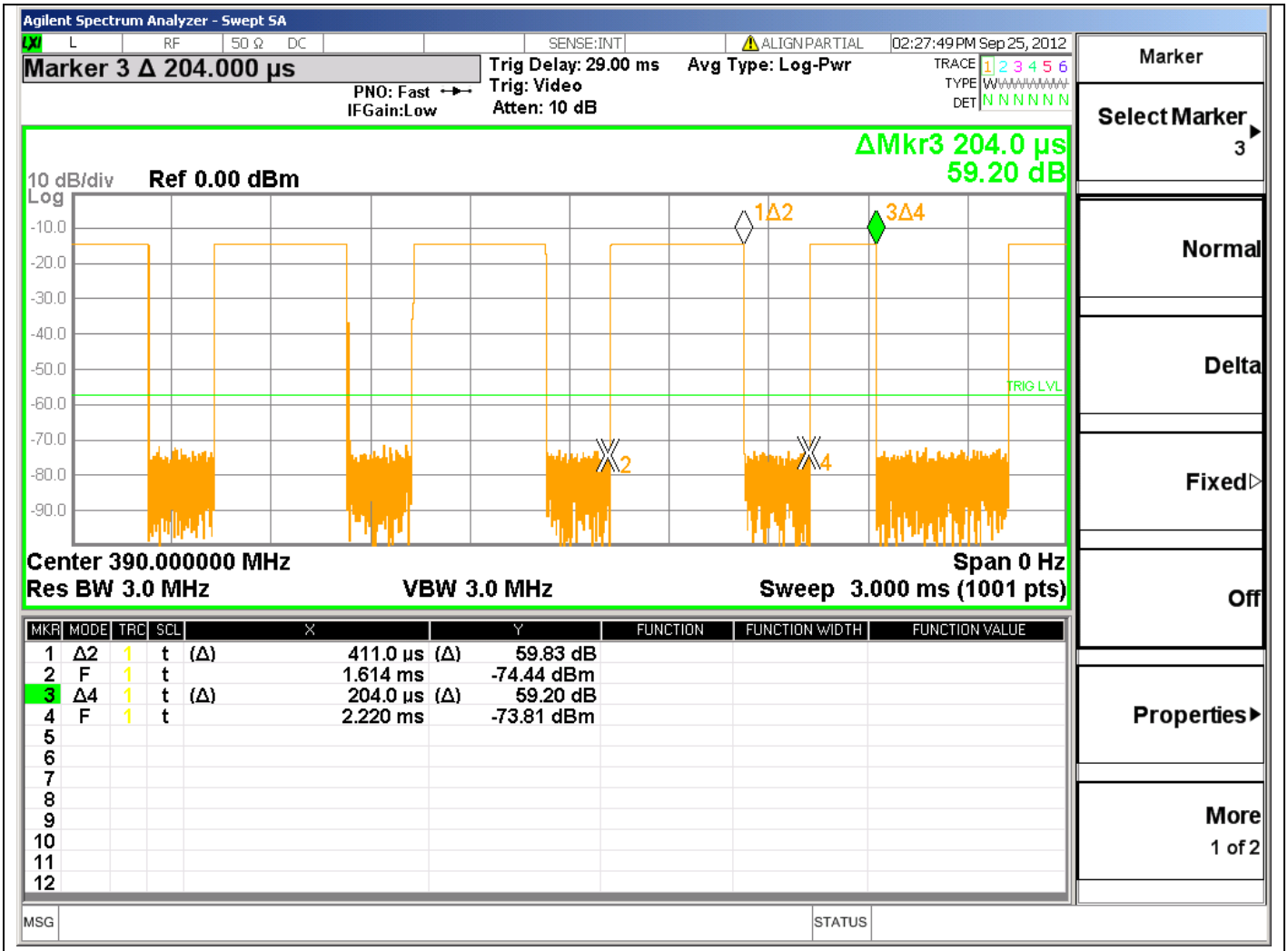
Figure 64 Pulse Train Graphs



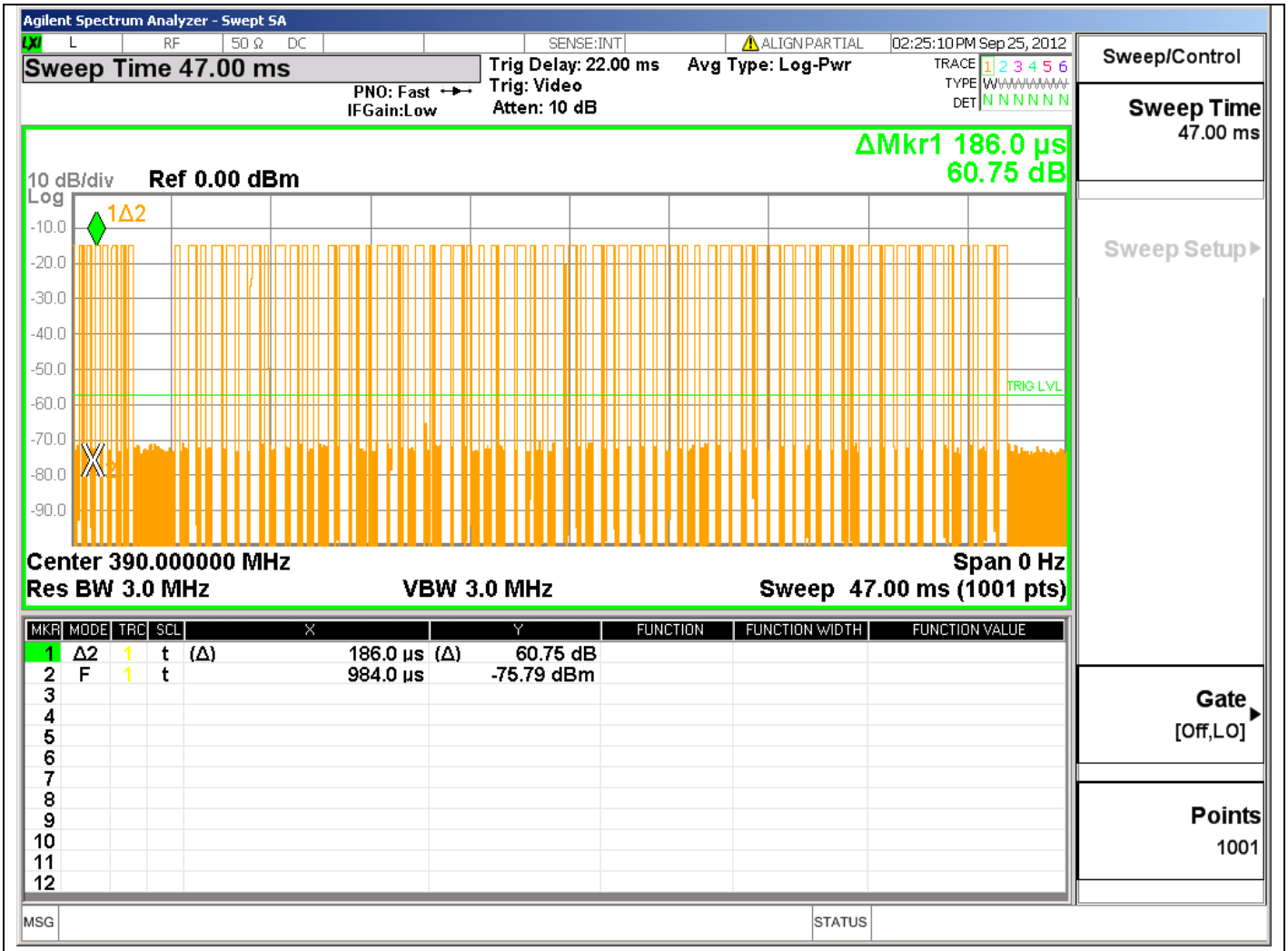
First tuning pulse duration: 0.186mS



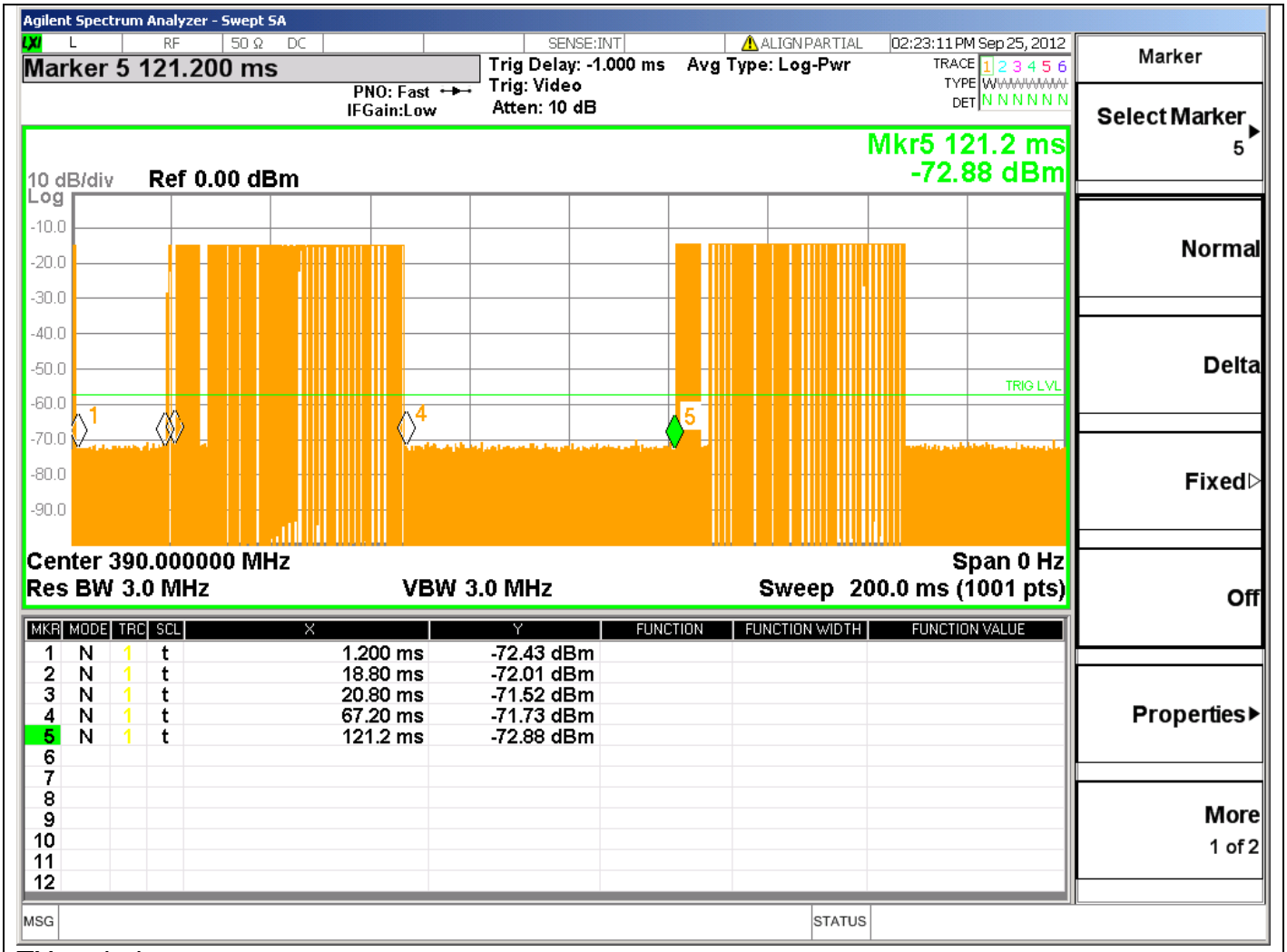
Second tuning pulse duration: 0.342mS



Pulse duration: 0.204mS Short, 0.411mS Long



Number of Pulses: 27 Short, 47 Long


Agilent Spectrum Analyzer - Swept SA
L
RF
50 Ω DC
SENSE:INT
ALIGN PARTIAL
02:23:11 PM Sep 25, 2012
Marker 5 121.200 ms
PNO: Fast
IFGain:Low
Trig Delay: -1.000 ms
Trig: Video
Atten: 10 dB
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE W
DET N N N N N N
Mkr5 121.2 ms
-72.88 dBm
10 dB/div
Log
Ref 0.00 dBm
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
TRIG LVL
Center 390.000000 MHz
Res BW 3.0 MHz
VBW 3.0 MHz
Span 0 Hz
Sweep 200.0 ms (1001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 t 1.200 ms -72.43 dBm
2 N 1 t 18.80 ms -72.01 dBm
3 N 1 t 20.80 ms -71.52 dBm
4 N 1 t 67.20 ms -71.73 dBm
5 N 1 t 121.2 ms -72.88 dBm
6
7
8
9
10
11
12
MSG
STATUS
Marker
Select Marker 5
Normal
Delta
Fixed
Off
Properties
More 1 of 2

TX period

4.10.4 Test Conditions and Results – RADIATED EMISSIONS Fundamental and Spurious

Test Description	Measurements were made in a 10-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4:2003. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter as noted. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.		
Basic Standard	47 CFR Part 15 subpart C, and RSS-210		
UL LPG	80-EM-S0029		
	Frequency range	Measurement Point	
Fully configured sample scanned over the following frequency range	30MHz – 1GHz	3 meter distance	
	1GHz – 4GHz	3 meter distance	

Restricted Band Limits

Frequency (MHz)	Limit (dBµV/m)	
	Quasi-Peak	Peak
30 - 88	40.00	NA
88 - 216	43.52	NA
216 - 960	46.02	NA
960 - 1000	54	NA
Above 1000 (FCC)	NA	54 (at 3-meter)

Fundamental Frequency Limits and Non-restricted band Harmonic Limits

Frequency (MHz)	Limit (dBµV/m) @ 3m distance All harmonics except those in restricted bands must be attenuated by 20dB or more	
	Average - Fundamental	Peak - Fundamental
390	79.24	99.24

Supplementary information: See section 4.10.3 for duty cycle information.

Figure 65 Radiated Emissions Graph (Below 1GHz)

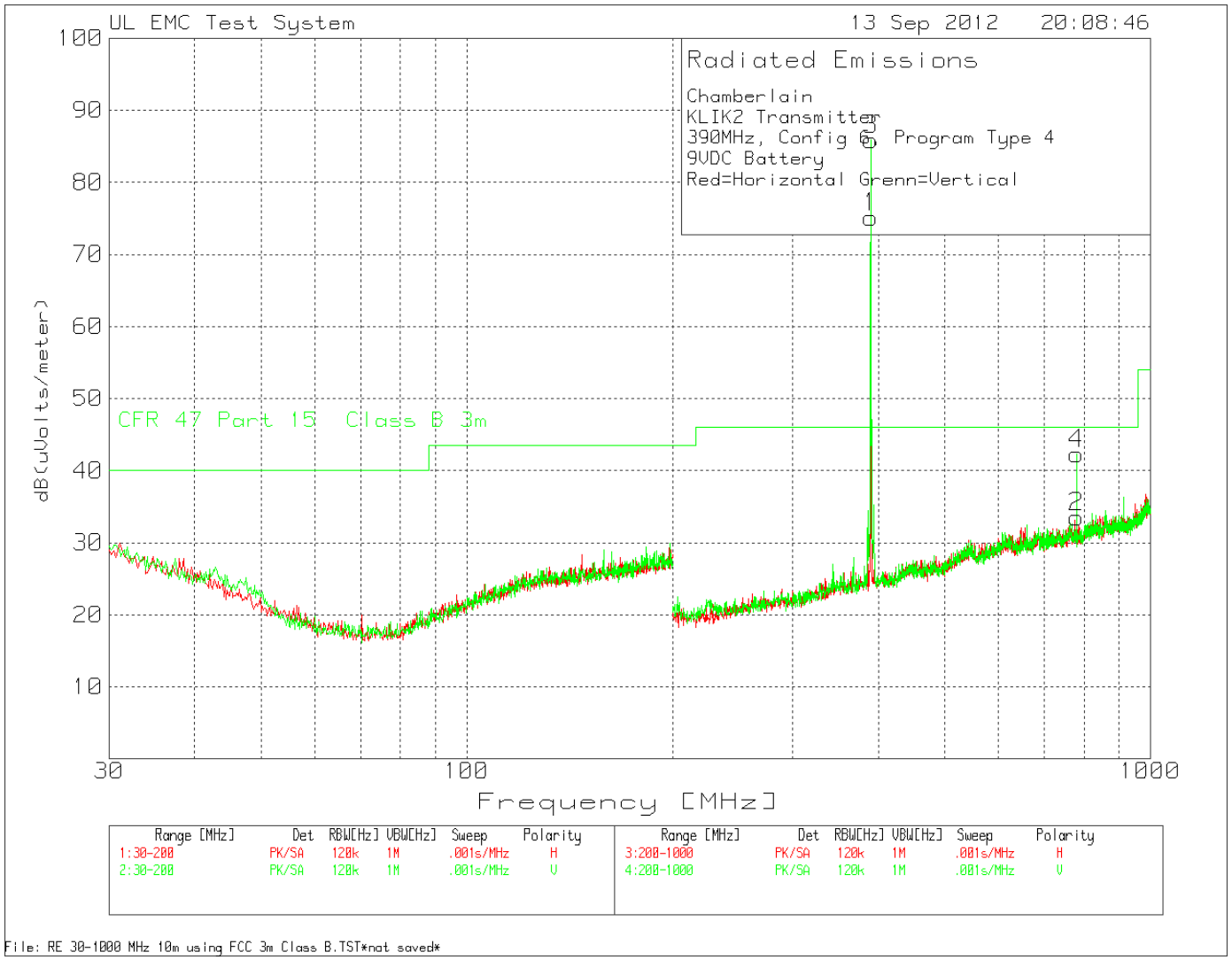


Figure 66 Radiated Emissions Graph (Above 1GHz)

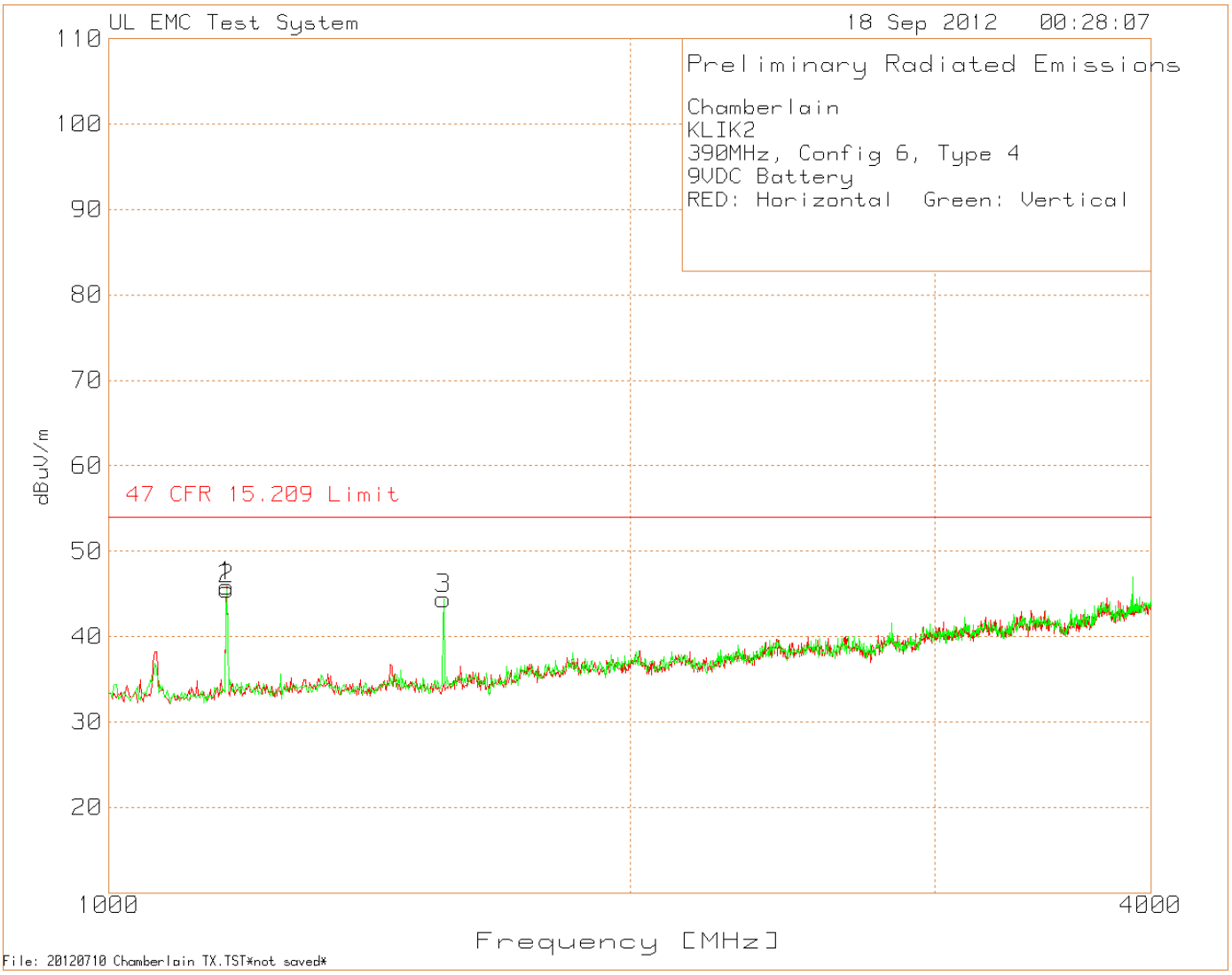


Table 86 - Radiated Emissions Data Points

Chamberlain
KLIK2C Transmitter
390MHz, Config 6, Program 4
9VDC Battery
Red:Horizontal, Green:Vertical

Test Frequency MHz	Meter Reading dBuV	Detector	Antenna Factor dB	Path Loss Gain dB	Level dBuV/m	Duty Cycle Factor dB	Level with Duty Cycle dBuV/m	Limit @ 3m dBuV/m	Margin dB	Azimuth [Degs]	Height [cm]	Polarity
390.0144	64.44	PK	16.1	2.3	82.84	-11.92	70.92	79.24	-8.32	26	347	Horz
390.0144	69.39	PK	16.1	2.3	87.79	-11.92	75.87	79.24	-3.37	114	121	Vert
780.030449	15.48	PK	21.8	3.4	40.68	-11.92	28.76	46	-17.24	79	118	Horz
780.028846	30.53	PK	21.8	3.4	55.73	-11.92	43.81	46	-2.19	85	142	Vert
1169.9549	90.59	PK	24.8	-57.24	58.15	-11.92	46.23	54	-7.77	29	225	Horz
1169.9729	93.56	PK	24.8	-57.24	61.12	-11.92	49.2	54	-4.8	43	130	Vert
1560.0752	79.64	PK	25.2	-55.66	49.18	-11.92	37.26	54	-16.74	213	100	Vert

Configuration 19# Test Data

4.10.5 Test Conditions and Results – Occupied Bandwidth

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the spectrum analyzer resolution bandwidth set per the appropriate standard.
Basic Standard	47 CFR Part 15.231(c)
Occupied Bandwidth Limits	
0.25% of Center Frequency (390MHz: 975.0kHz)	

Table 87 Occupied Bandwidth Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

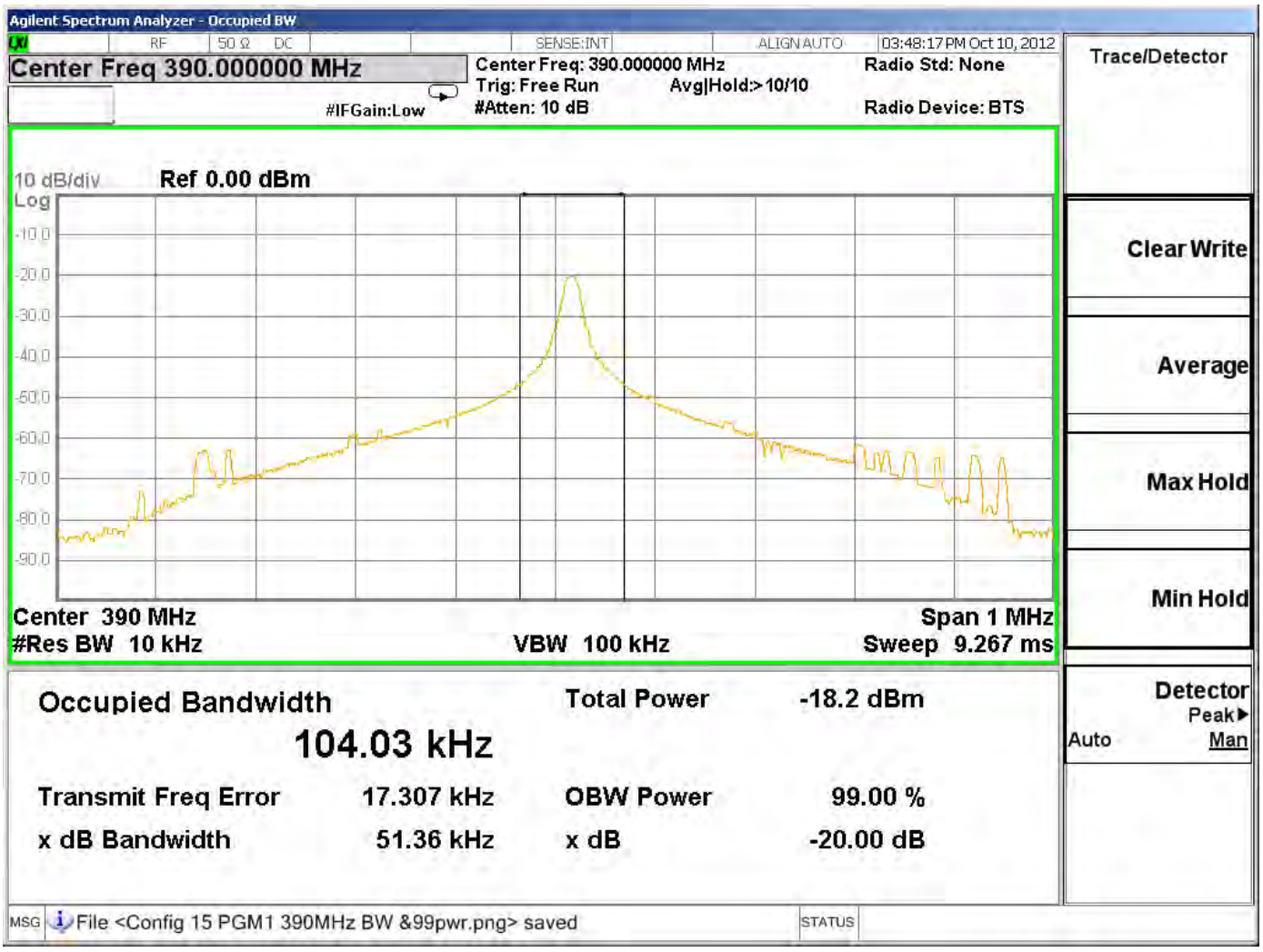
Table 88 Occupied Bandwidth Spectrum Analyzer Settings

Resolution Bandwidth	Occupied Bandwidth Requirements	
	dBc	% PWR
10kHz	-20	99
Supplementary information: None		

Table 89 Occupied Bandwidth Test Result Summary

Center Frequency	20dB BW Measured (kHz)	99% BW Measured (kHz)
390MHz	51.36	104.03

Figure 67 – Bandwidth Graph



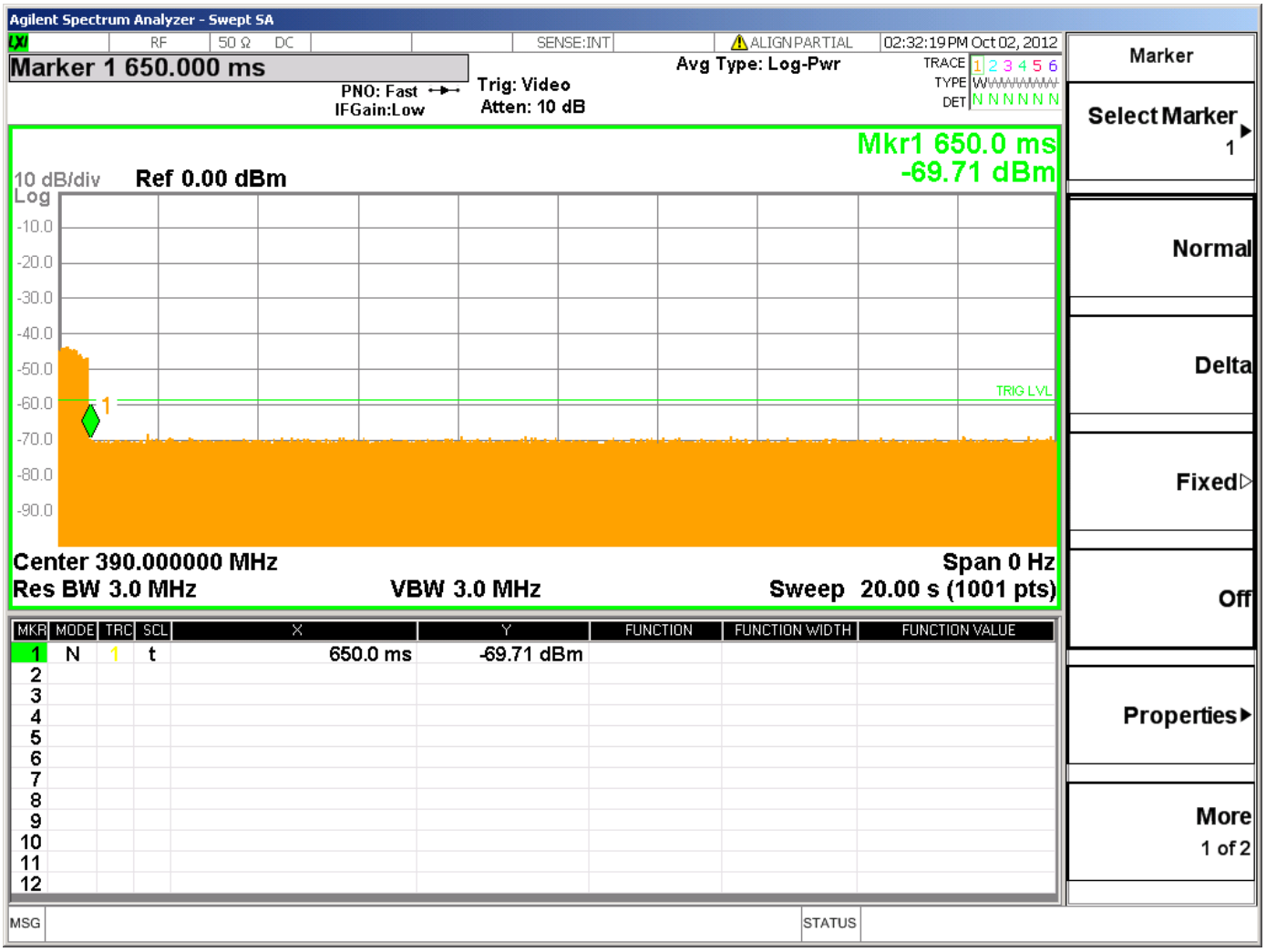
4.10.6 Test Conditions and Results – Cease Operation

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the transmission time measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	47 CFR Part 15.231(a)
Cease Operation Limits	
The transmissions shall stop within 5 seconds of either a button being released or if automatically controlled transmissions shall be stopped 5 seconds after transmissions begin.	

Table 90 Cease Operation Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

Figure 68 Cease Operation Graph



4.10.7 Test Conditions and Results – Pulse Train

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The pulse train was measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	FCC Part 15 Subpart A, 15.35
Pulse Train Limits	
There are no limits for this test. This data is used to calculate the averaging correction factor that is applied to the measured peak radiated emissions results.	

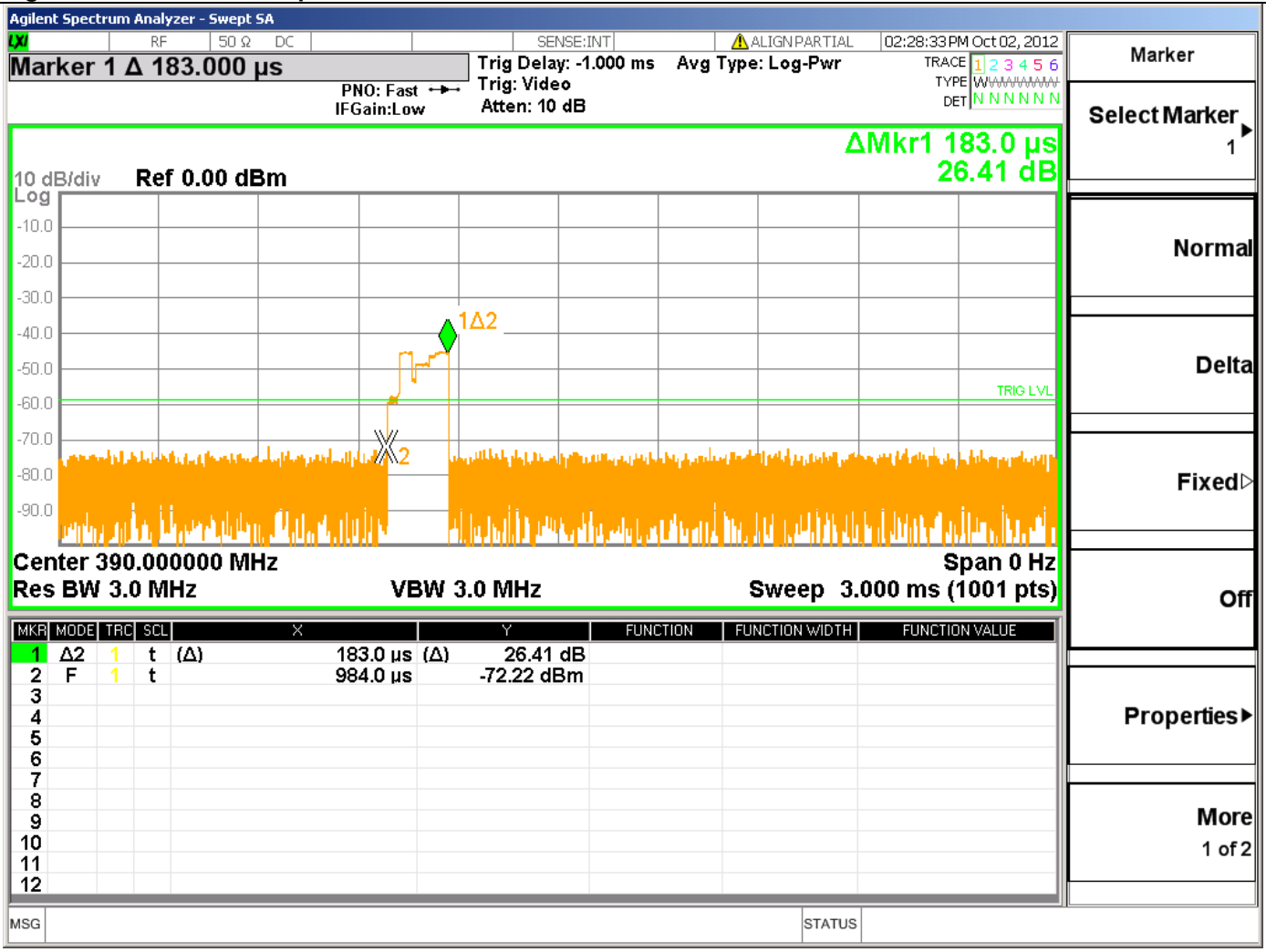
Table 91 Pulse Train Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

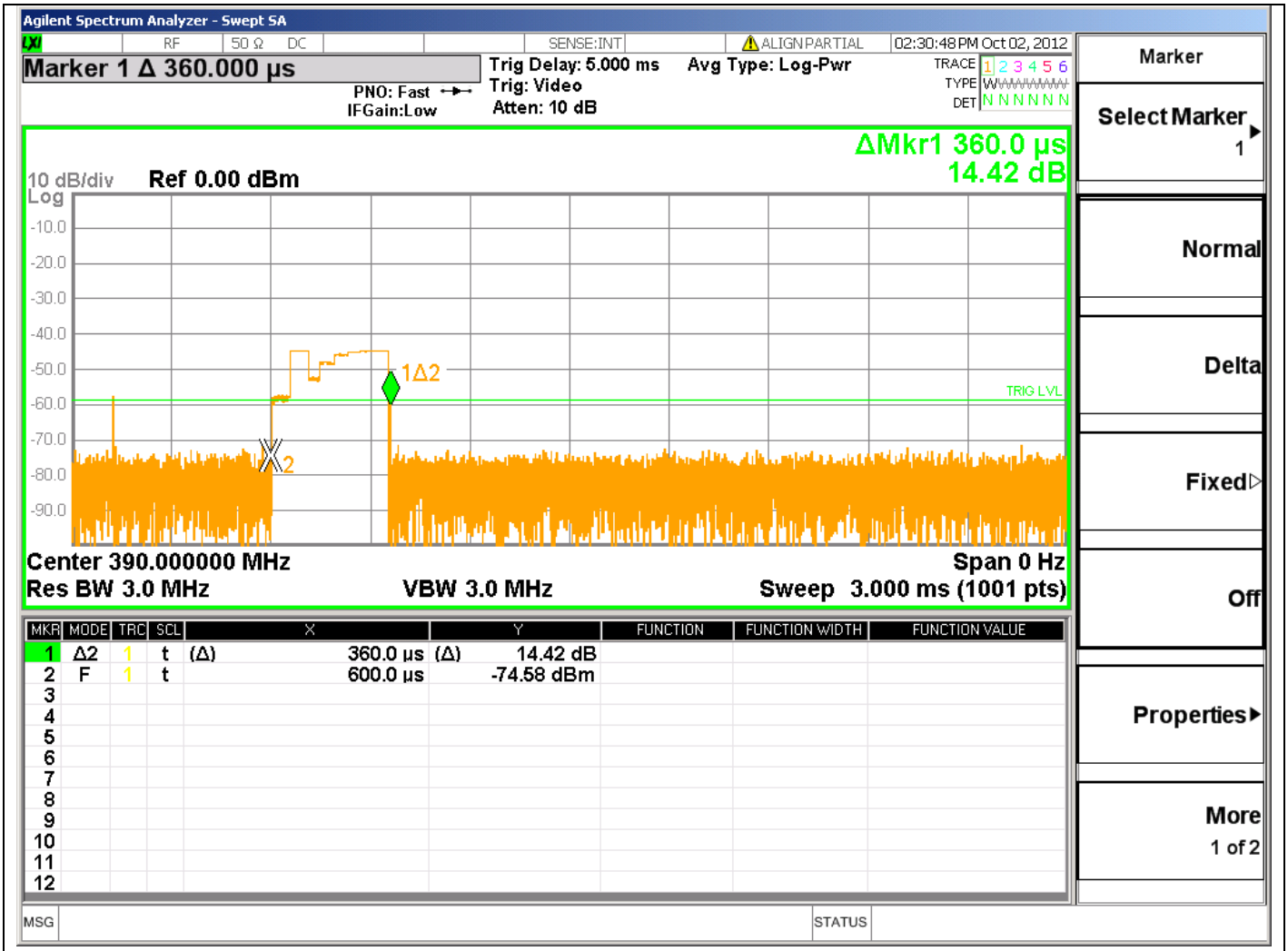
Table 92 Pulse Train Calculation

TX Frequency	Total TX time	Total Transmission period or 100ms whichever is lesser	DC Correction Factor (dB) $20\log\left(\frac{PulseWidth}{Period}\right)$
390MHz	(4x1.020)+(7x3.000)	78.4mS	-9.89
Worst Case Duty Cycle: Worst case duty cycle was calculated over one message period. Manufacturer declared worst case duty cycle is -10.4. Measured duty cycle is used for all radiated emissions data.			

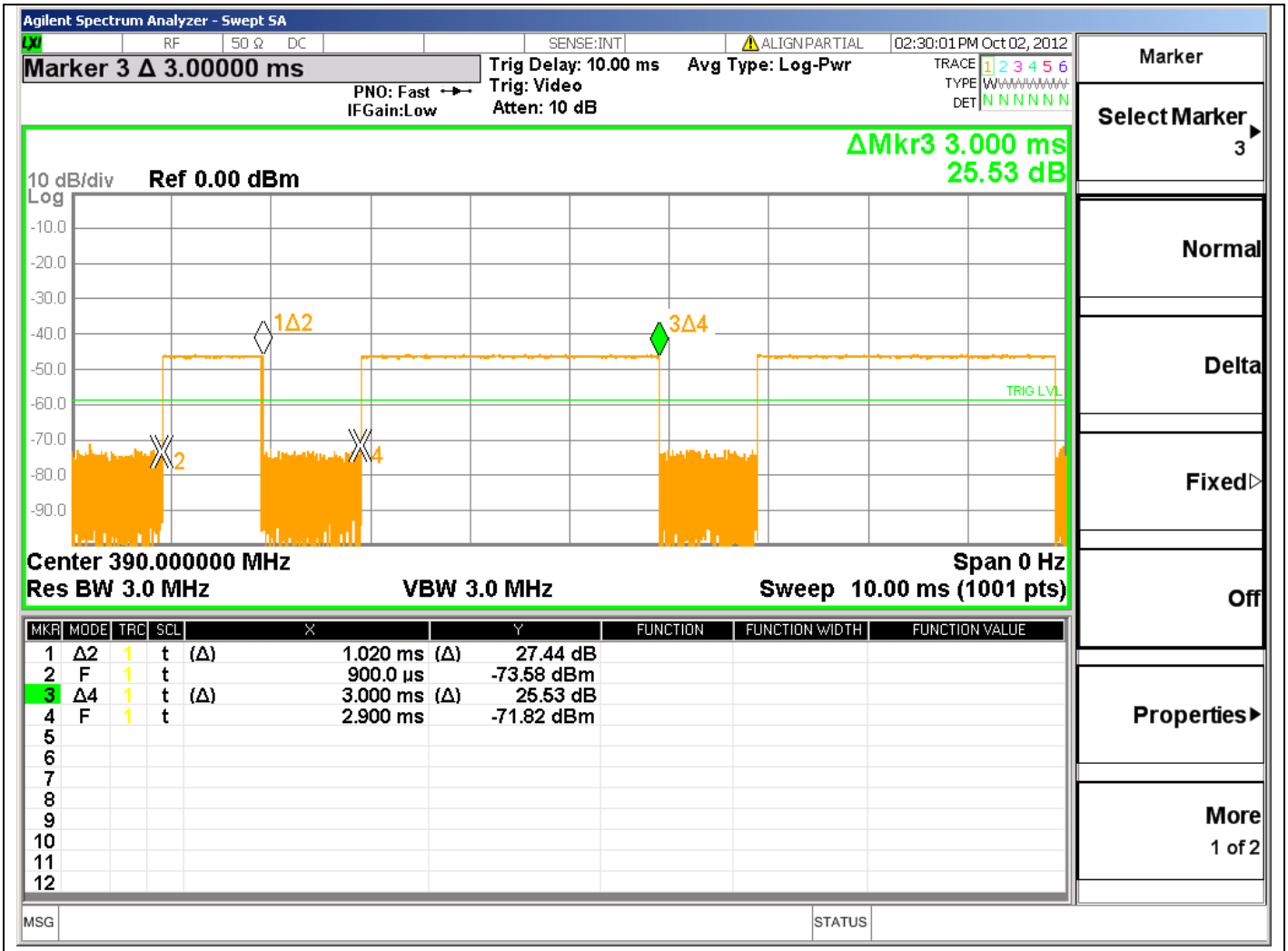
Figure 69 Pulse Train Graphs



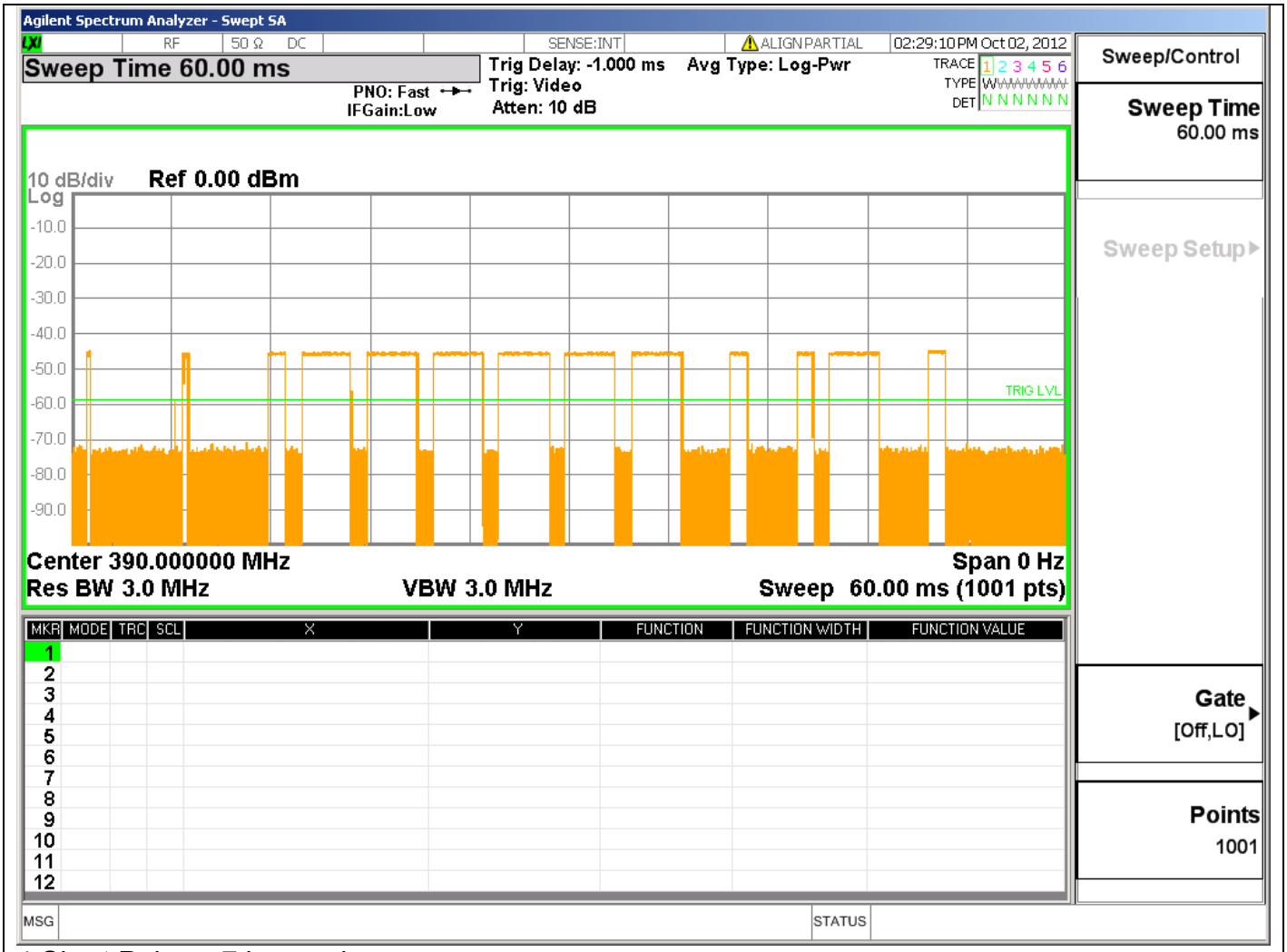
First tuning pulse duration: 0.183mS



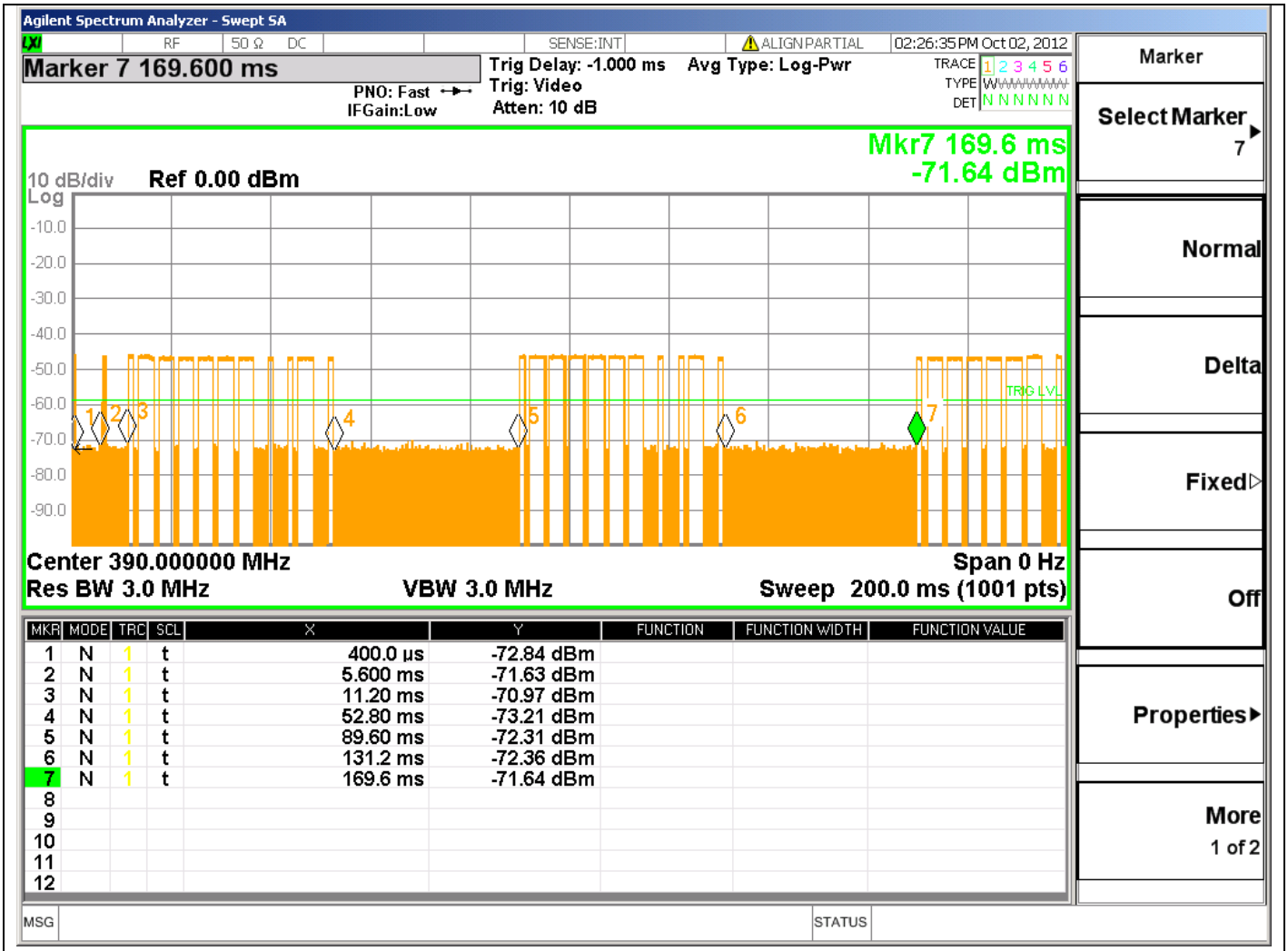
Second tuning pulse duration: 0.360mS



Short Pulse: 1.020mS, Long Pulse: 3.00mS



4 Short Pulses, 7 long pulses



Period sweep

4.10.8 Test Conditions and Results – RADIATED EMISSIONS Fundamental and Spurious

Test Description	Measurements were made in a 10-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4:2003. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter as noted. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.		
Basic Standard	47 CFR Part 15 subpart C, and RSS-210		
UL LPG	80-EM-S0029		
	Frequency range	Measurement Point	
Fully configured sample scanned over the following frequency range	30MHz – 1GHz	3 meter distance	
	1GHz – 4GHz	3 meter distance	

Restricted Band Limits

Frequency (MHz)	Limit (dBµV/m)	
	Quasi-Peak	Peak
30 - 88	40.00	NA
88 - 216	43.52	NA
216 - 960	46.02	NA
960 - 1000	54	NA
Above 1000 (FCC)	NA	54 (at 3-meter)

Fundamental Frequency Limits and Non-restricted band Harmonic Limits

Frequency (MHz)	Limit (dBµV/m) @ 3m distance All harmonics except those in restricted bands must be attenuated by 20dB or more	
	Average - Fundamental	Peak - Fundamental
390	79.24	99.24

Supplementary information: See section 4.10.7 for duty cycle information.

Figure 70 Radiated Emissions Graph (Below 1GHz)

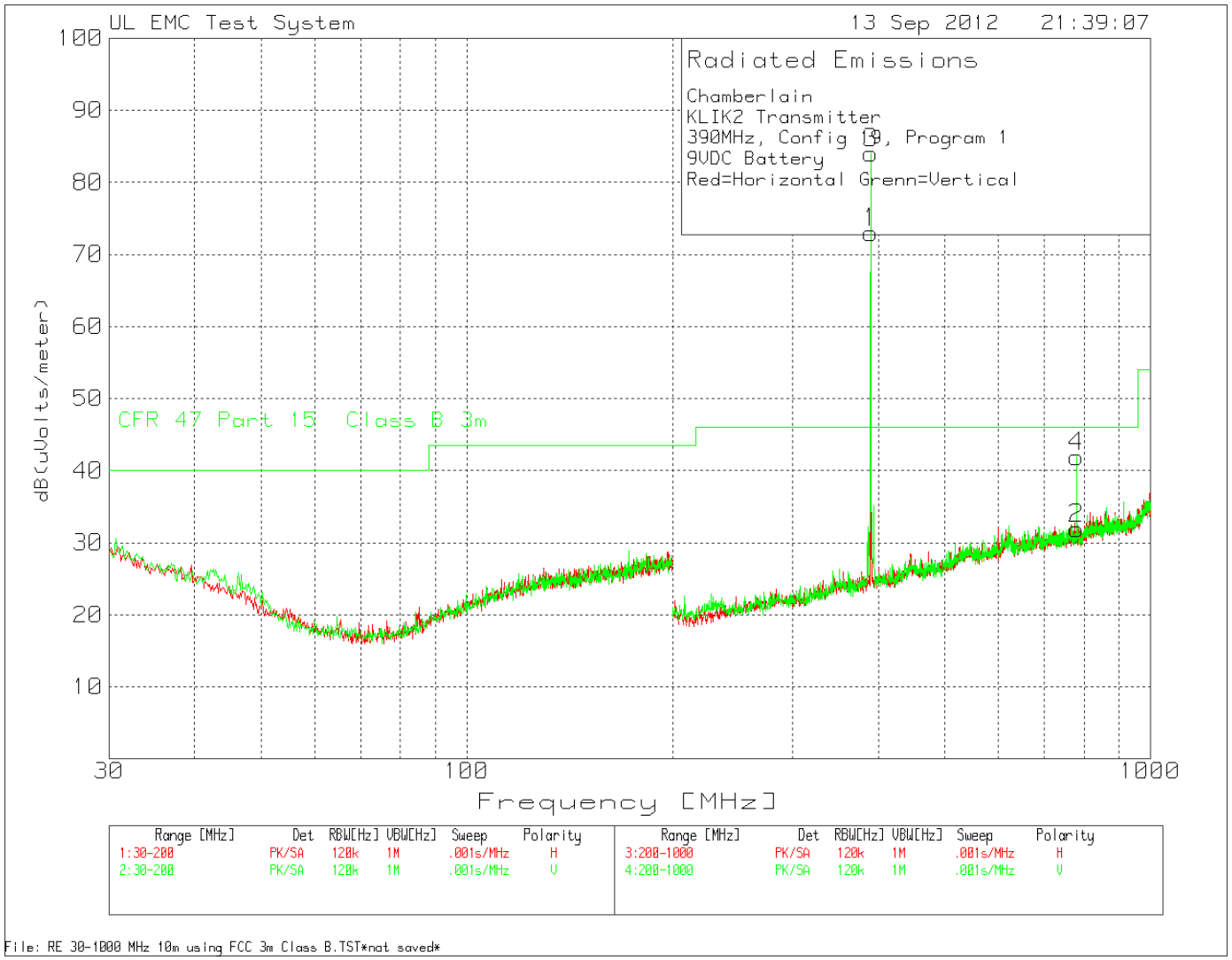


Figure 71 Radiated Emissions Graph (Above 1GHz)

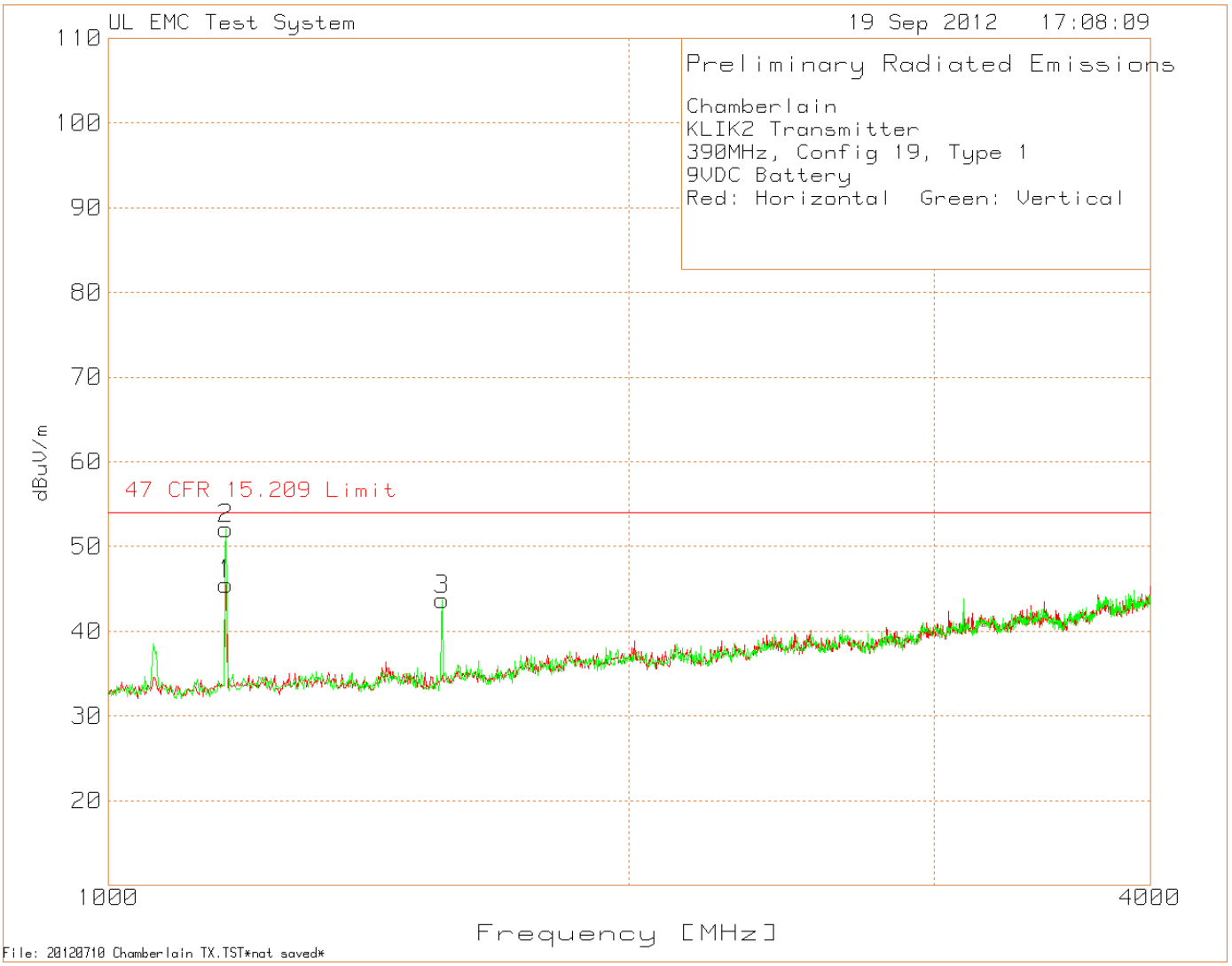


Table 93 - Radiated Emissions Data Points

Chamberlain
KLIK2C Transmitter
390MHz, Config 19, Type 1
9VDC Battery
Red: Horizontal Green: Vertical

Test Frequency MHz	Meter Reading dBuV	Detector	Antenna Factor dB	Path Loss Gain dB	Level dBuV/m	Duty Cycle Factor dB	Level with Duty Cycle dBuV/m	Limit @ 3m dBuV/m	Margin dB	Azimuth [Degs]	Height [cm]	Polarity
390.016	62.66	QP	16.1	2.3	81.06	-9.89	71.17	79.24	-8.07	265	318	Horz
390.016	63.02	PK	16.1	2.3	81.42	-9.89	71.53	79.24	-7.71	265	318	Horz
390.017628	66.78	QP	16.1	2.3	85.18	-9.89	75.29	79.24	-3.95	338	124	Vert
390.017628	67.1	PK	16.1	2.3	85.5	-9.89	75.61	79.24	-3.63	338	124	Vert
780.033654	11.47	QP	21.8	3.4	36.67	-9.89	26.78	46	-19.22	79	116	Horz
780.032051	14.32	PK	21.8	3.4	39.52	-9.89	29.63	46	-16.37	79	116	Horz
780.032051	26.33	QP	21.8	3.4	51.53	-9.89	41.64	46	-4.36	282	133	Vert
780.032051	27.42	PK	21.8	3.4	52.62	-9.89	42.73	46	-3.27	282	133	Vert
1170.1473	88.35	PK	24.8	-57.23	55.92	-9.89	46.03	54	-7.97	202	225	Horz
1170.0812	93.67	PK	24.8	-57.24	61.23	-9.89	51.34	54	-2.66	259	132	Vert
1560.374	74.17	PK	25.2	-55.65	43.72	-9.89	33.83	54	-20.17	*	100	Vert

* Peak prescan data, not maximized

4.11 Configuration 15# Test Data

4.11.1 Test Conditions and Results – Occupied Bandwidth

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the spectrum analyzer resolution bandwidth set per the appropriate standard.
Basic Standard	47 CFR Part 15.231(c)
Occupied Bandwidth Limits	
0.25% of Center Frequency (390MHz: 975.0kHz)	

Table 94 Occupied Bandwidth Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

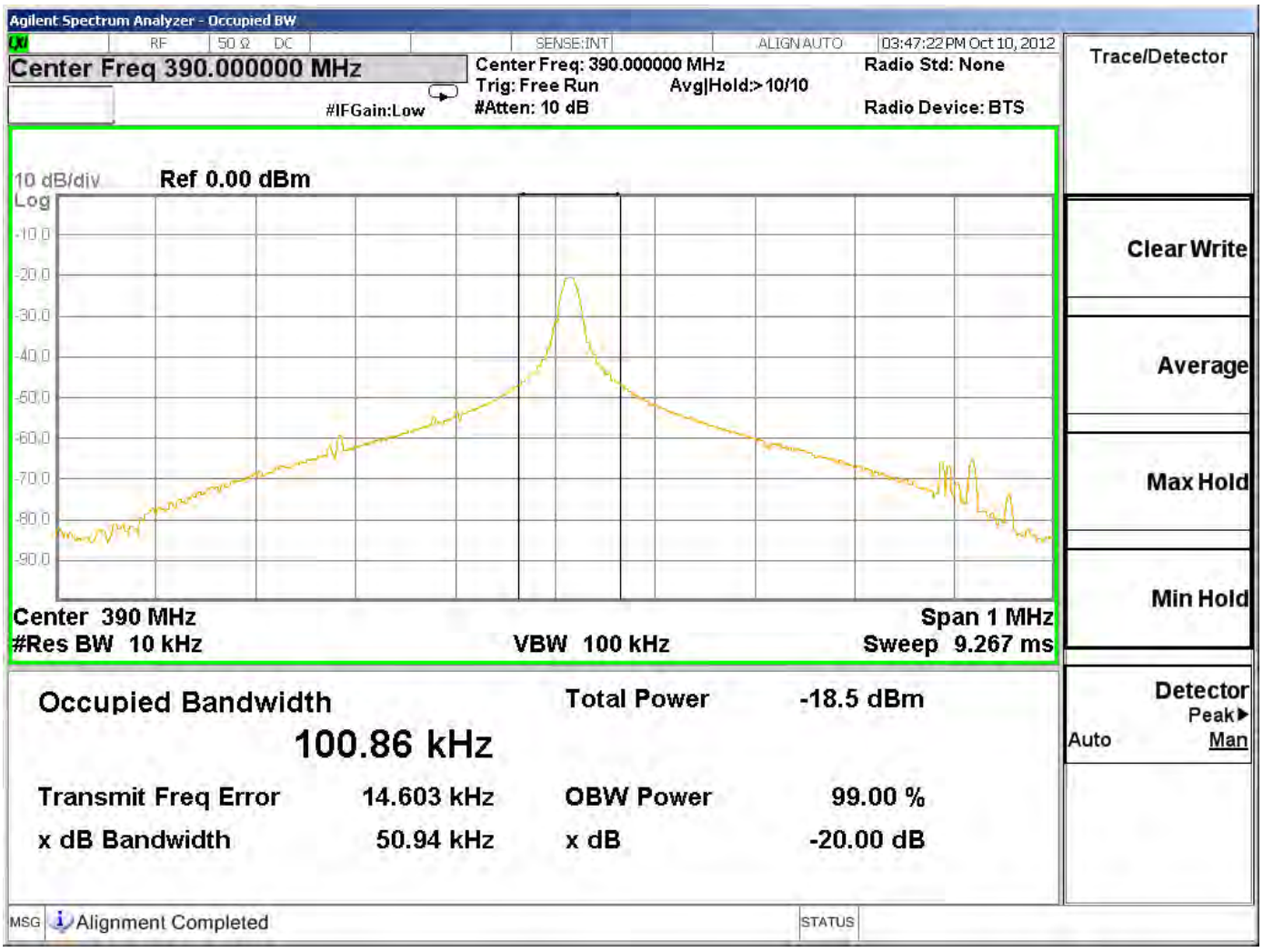
Table 95 Occupied Bandwidth Spectrum Analyzer Settings

Resolution Bandwidth	Occupied Bandwidth Requirements	
	dBc	% PWR
10kHz	-20	99
Supplementary information: None		

Table 96 Occupied Bandwidth Test Result Summary

Center Frequency	20dB BW Measured (kHz)	99% BW Measured (kHz)
390MHz	50.94	100.86

Figure 72 – Bandwidth Graph



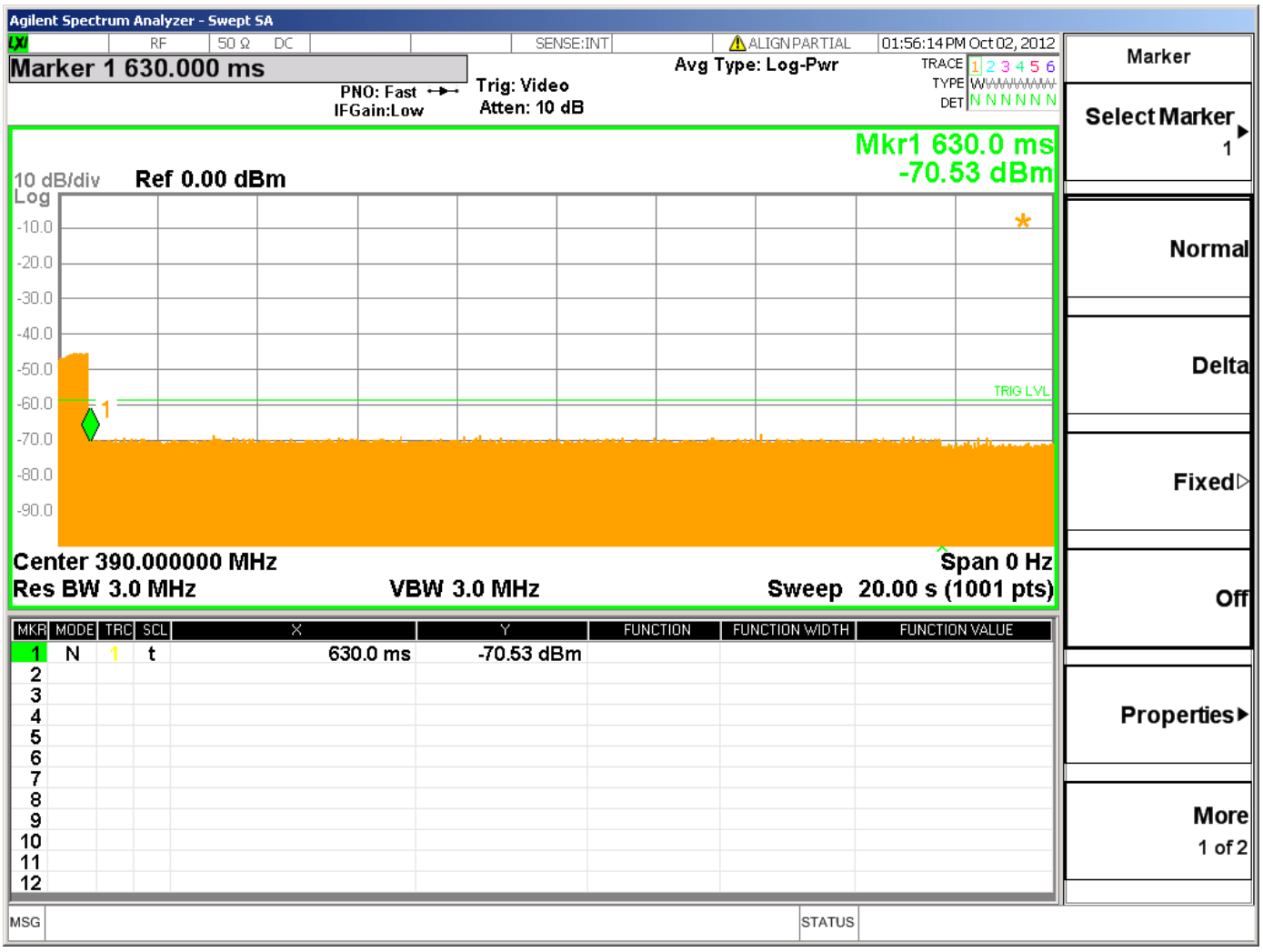
4.11.2 Test Conditions and Results – Cease Operation

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the transmission time measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	47 CFR Part 15.231(a)
Cease Operation Limits	
The transmissions shall stop within 5 seconds of either a button being released or if automatically controlled transmissions shall be stopped 5 seconds after transmissions begin.	

Table 97 Cease Operation Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

Figure 73 Cease Operation Graph



4.11.3 Test Conditions and Results – Pulse Train

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The pulse train was measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	FCC Part 15 Subpart A, 15.35
Pulse Train Limits	
There are no limits for this test. This data is used to calculate the averaging correction factor that is applied to the measured peak radiated emissions results.	

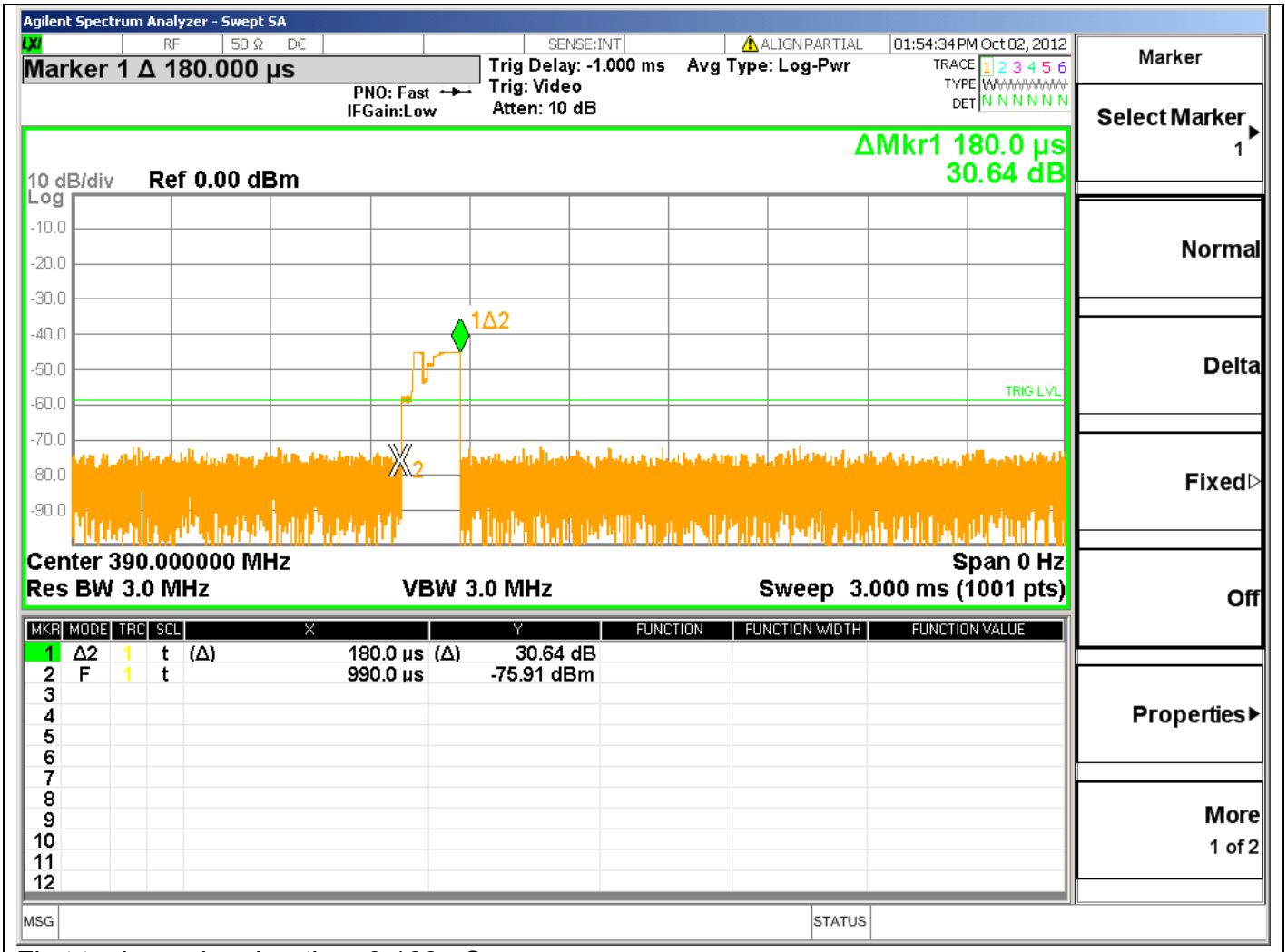
Table 98 Pulse Train Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

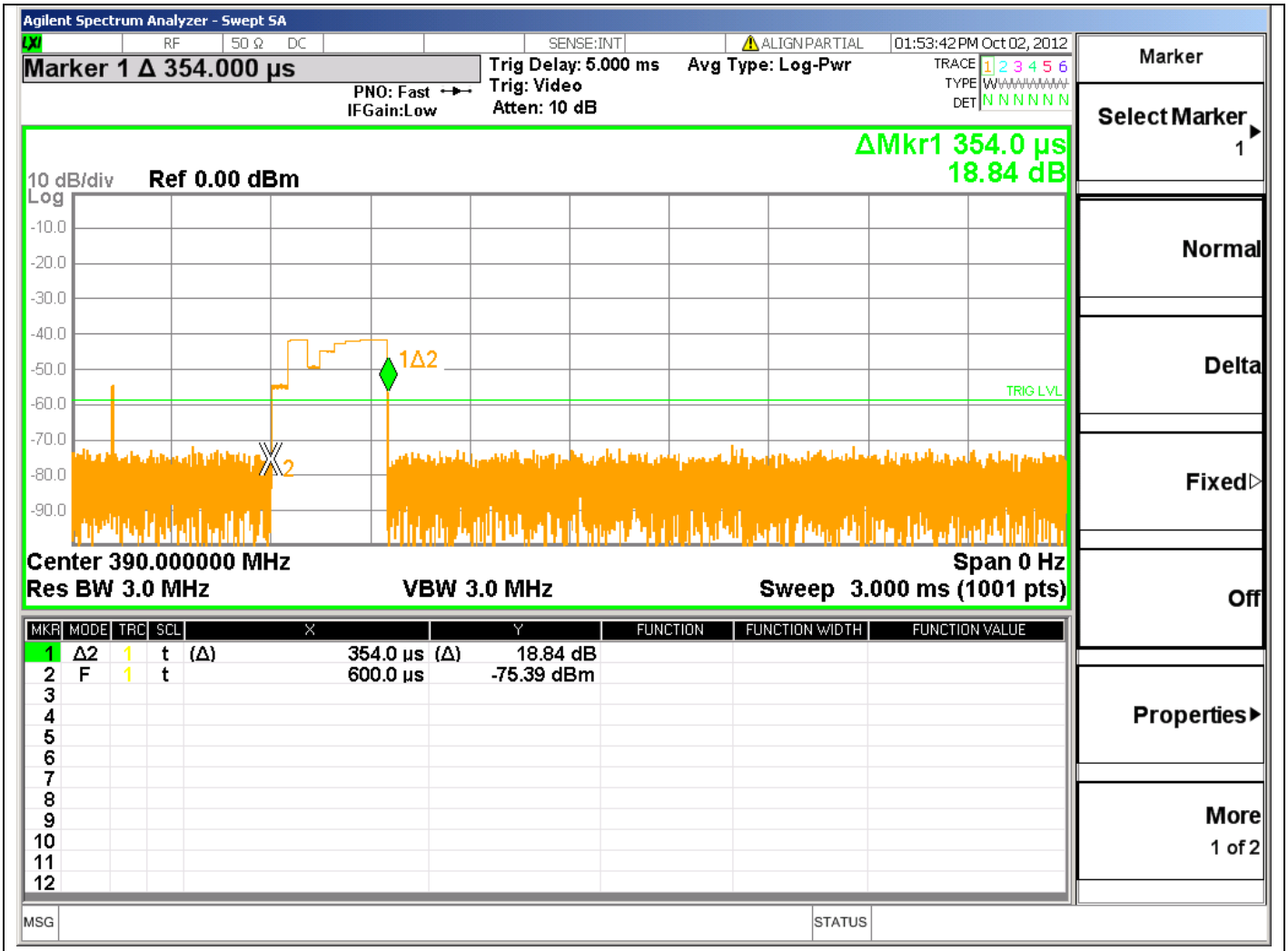
Table 99 Pulse Train Calculation

TX Frequency	Total TX time	Total Transmission period or 100ms whichever is lesser	DC Correction Factor (dB) $20\log\left(\frac{PulseWidth}{Period}\right)$
390MHz	(3x1.020)+(8x3.02)	78.2	-9.16dB
Worst Case Duty Cycle: Worst case duty cycle was calculated over normal period of 78.2mS not including the tuning pulses. The manufacturer declared duty cycle as -9.75. Calculated duty cycle is used for all radiated emissions data.			

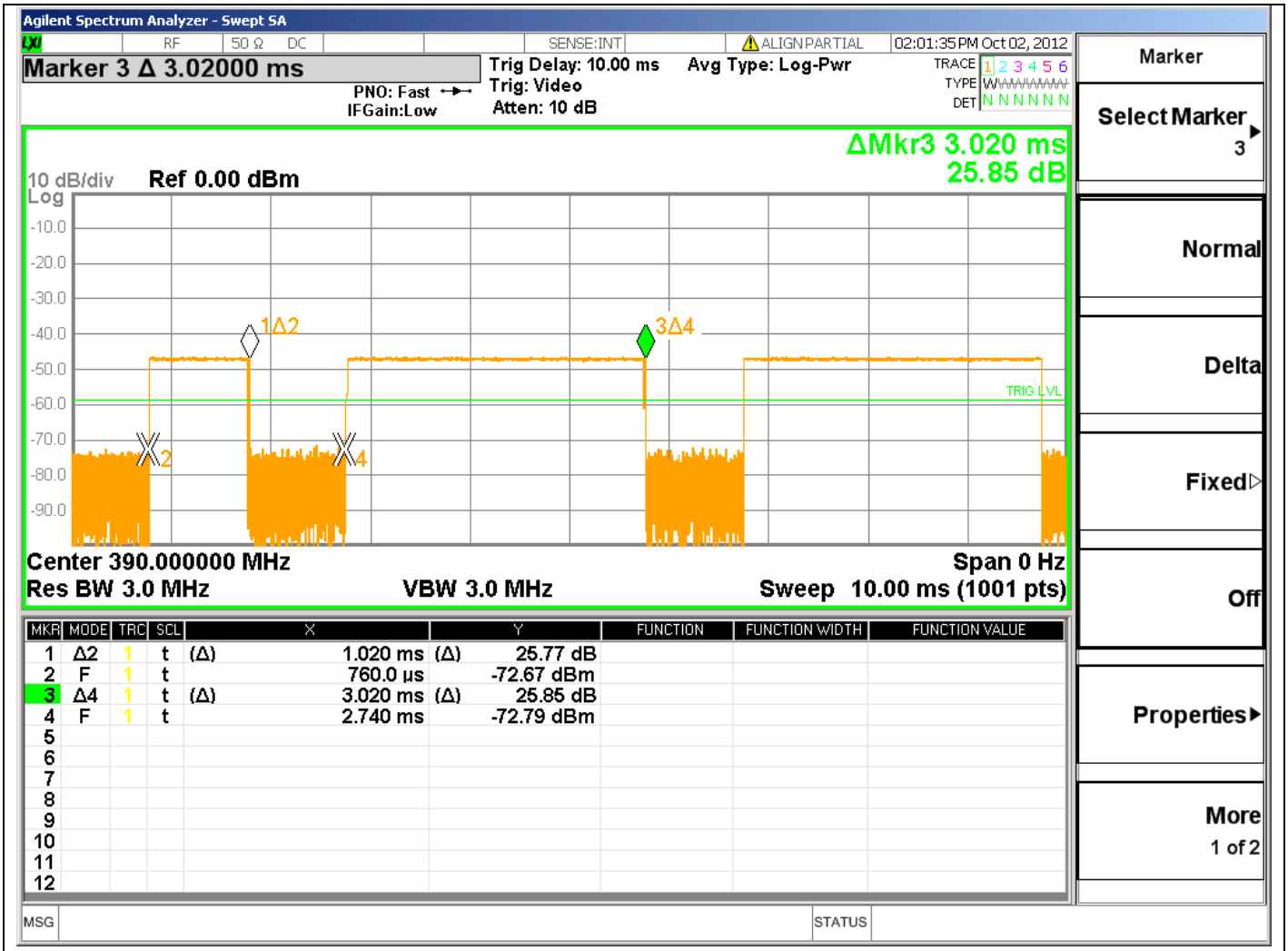
Figure 74 Pulse Train Graphs



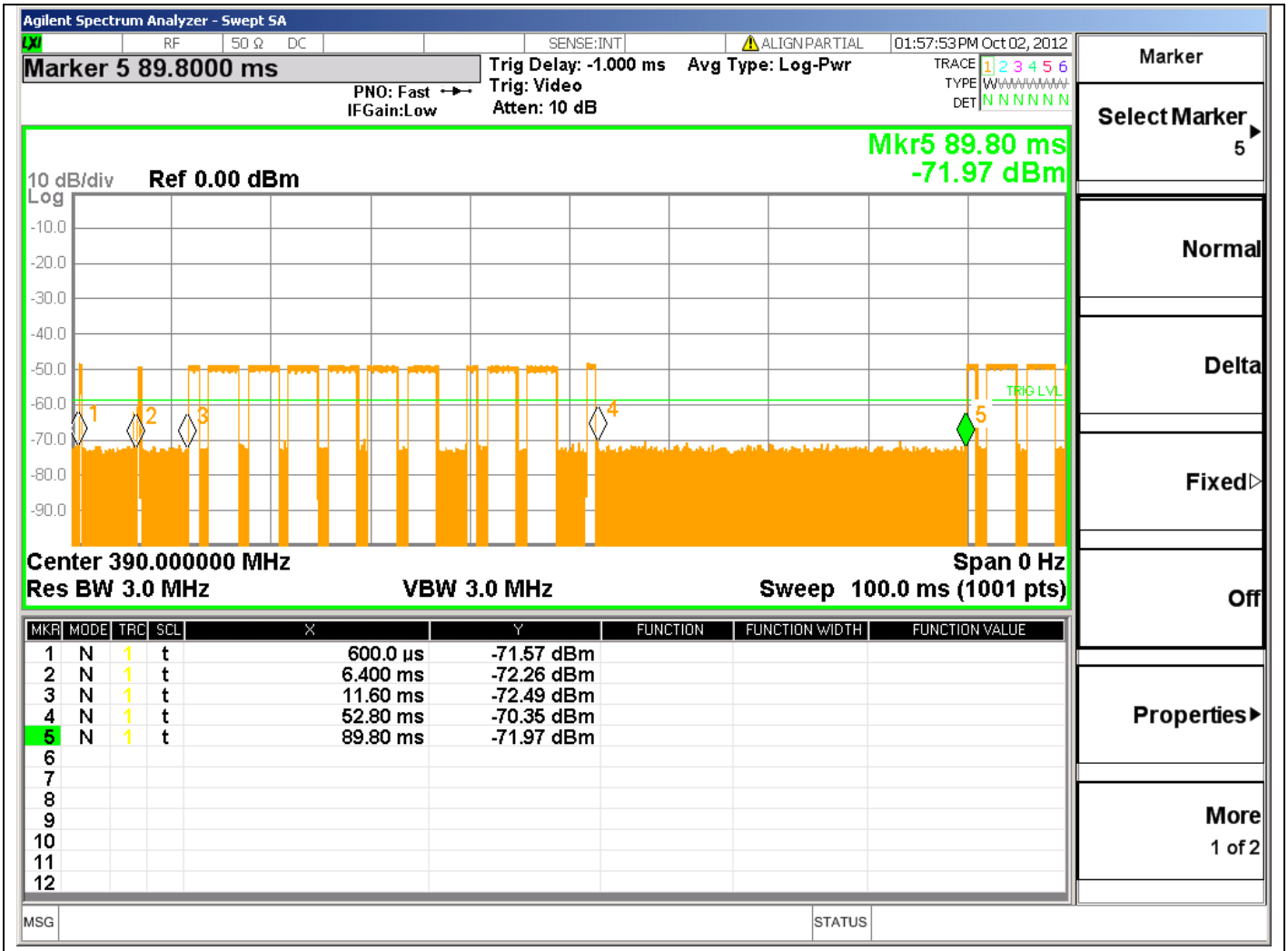
First tuning pulse duration: 0.180mS



Second tuning pulse duration: 0.354mS



Pulse Duration: Short Pulse 1.020mS, Long Pulse 3.020mS



Number of Pulses: 3 Short, 8 Long, and period scan

4.11.4 Test Conditions and Results – RADIATED EMISSIONS Fundamental and Spurious

Test Description	Measurements were made in a 10-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4:2003. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter as noted. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.		
Basic Standard	47 CFR Part 15 subpart C, and RSS-210		
UL LPG	80-EM-S0029		
	Frequency range	Measurement Point	
Fully configured sample scanned over the following frequency range	30MHz – 1GHz	3 meter distance	
	1GHz – 4GHz	3 meter distance	

Restricted Band Limits

Frequency (MHz)	Limit (dBµV/m)	
	Quasi-Peak	Peak
30 - 88	40.00	NA
88 - 216	43.52	NA
216 - 960	46.02	NA
960 - 1000	54	NA
Above 1000 (FCC)	NA	54 (at 3-meter)

Fundamental Frequency Limits and Non-restricted band Harmonic Limits

Frequency (MHz)	Limit (dBµV/m) @ 3m distance All harmonics except those in restricted bands must be attenuated by 20dB or more	
	Average - Fundamental	Peak - Fundamental
390	79.24	99.24

Supplementary information: See section 4.11.3 for duty cycle information.

Figure 75 Radiated Emissions Graph (Below 1GHz)

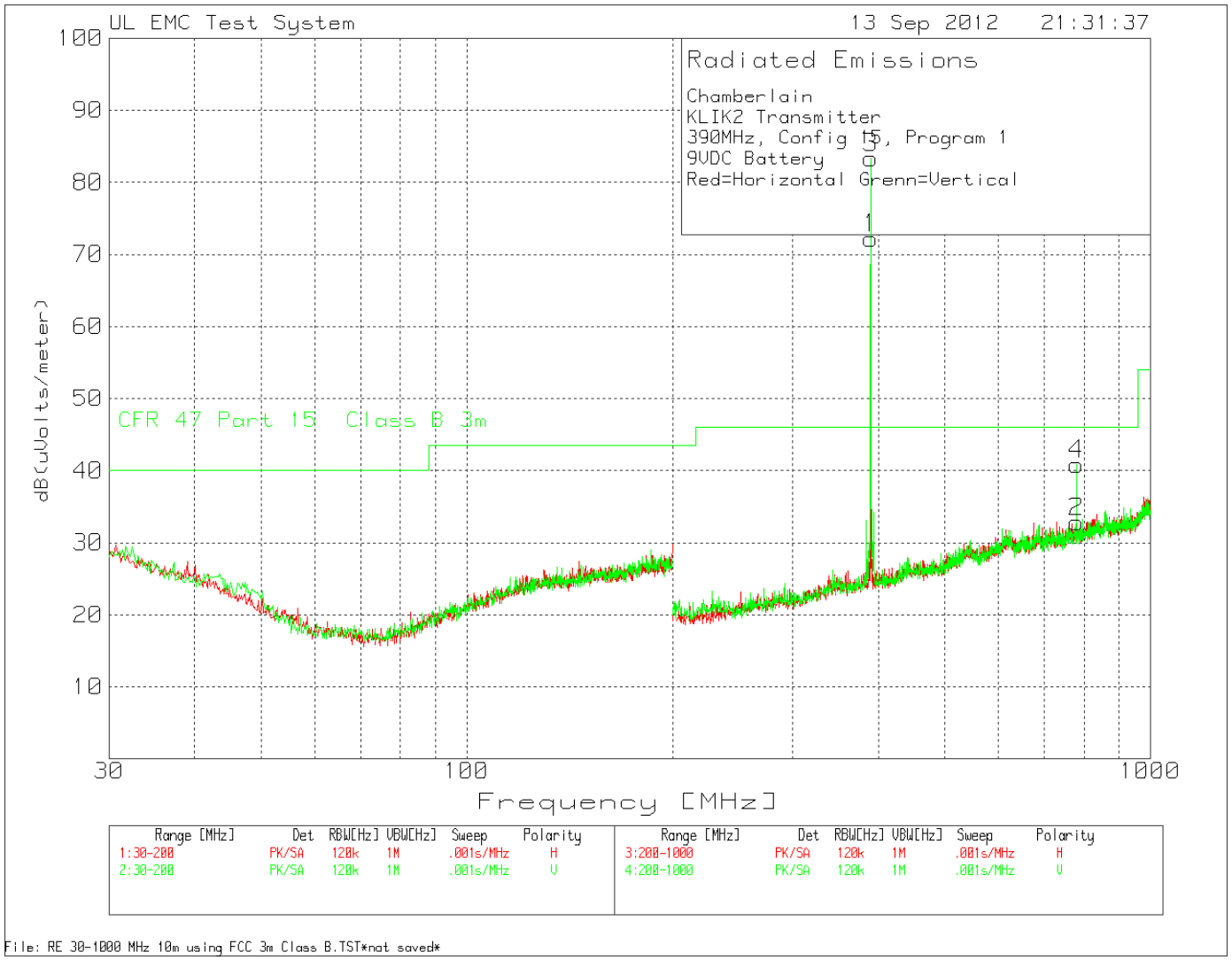


Figure 76 Radiated Emissions Graph (Above 1GHz)

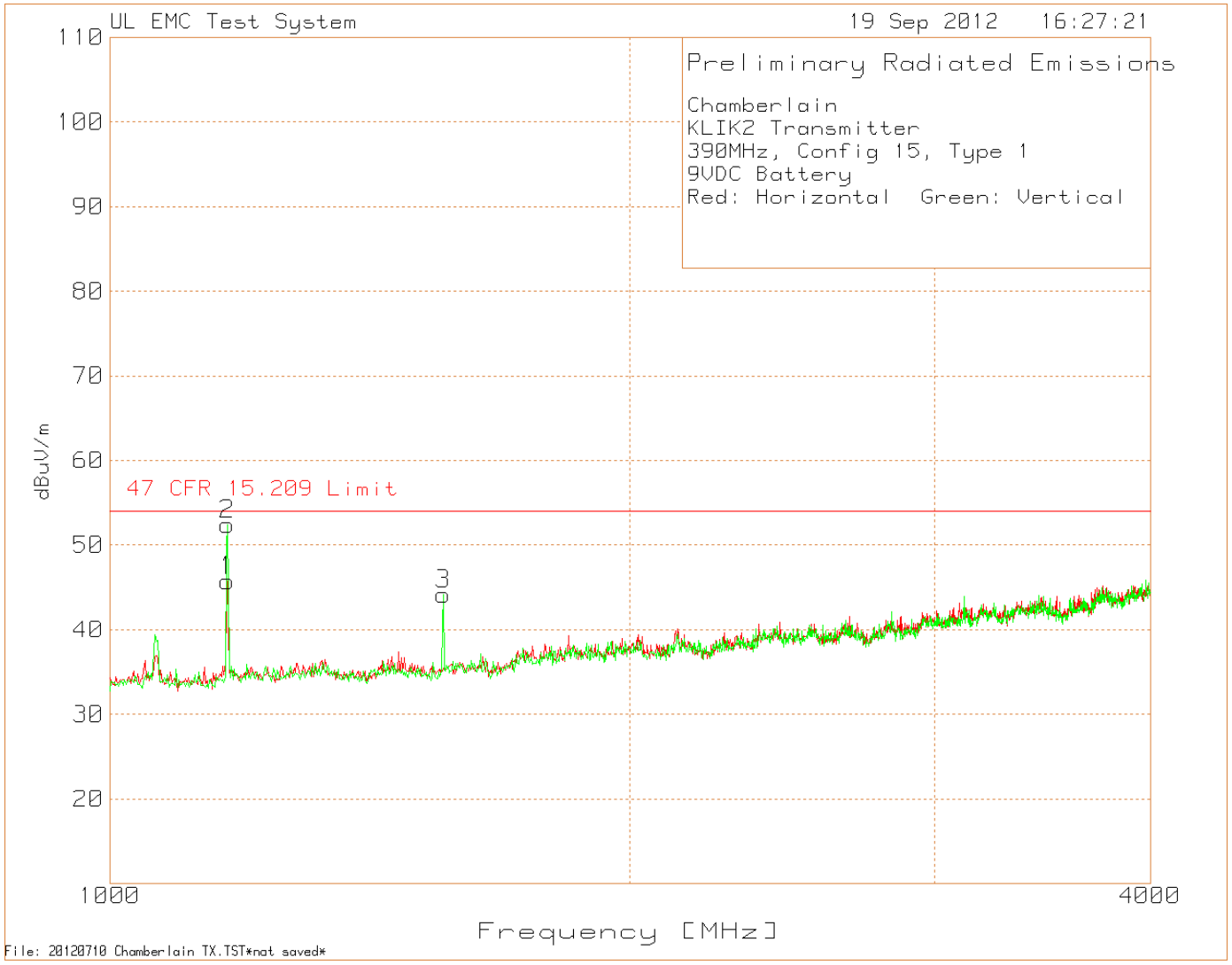


Table 100 - Radiated Emissions Data Points

Chamberlain
KLIK2C Transmitter
390MHz, Config 15, Type 1
9VDC Battery
Red: Horizontal Green: Vertical

Test Frequency MHz	Meter Reading dBuV	Detector	Antenna Factor dB	Path Loss Gain dB	Level dBuV/m	Duty Cycle Factor dB	Level with Duty Cycle dBuV/m	Limit @ 3m dBuV/m	Margin dB	Azimuth [Degs]	Height [cm]	Polarity
390.016026	62.29	PK	16.1	2.3	80.69	-9.16	71.53	79.24	-7.71	264	319	Horz
390.016026	66.97	PK	16.1	2.3	85.37	-9.16	76.21	79.24	-3.03	335	122	Vert
780.032051	13.34	PK	21.8	3.4	38.54	-9.16	29.38	46	-16.62	45	115	Horz
780.032051	26.92	PK	21.8	3.4	52.12	-9.16	42.96	46	-3.04	282	130	Vert
1170.0992	88.02	PK	24.8	-57.24	55.58	-9.16	46.42	54	-7.58	218	225	Horz
1170.0631	93.18	PK	24.8	-57.24	60.74	-9.16	51.58	54	-2.42	288	129	Vert
1560.374	74.63	PK	25.2	-55.65	44.18	-9.16	35.02	54	-18.98	*	101	Vert

* Peak prescan data, not maximized

4.12 Configuration 11# Test Data

4.12.1 Test Conditions and Results – Occupied Bandwidth

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the spectrum analyzer resolution bandwidth set per the appropriate standard.
Basic Standard	47 CFR Part 15.231(c)
Occupied Bandwidth Limits	
0.25% of Center Frequency (390MHz: 975.0kHz)	

Table 101 Occupied Bandwidth Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

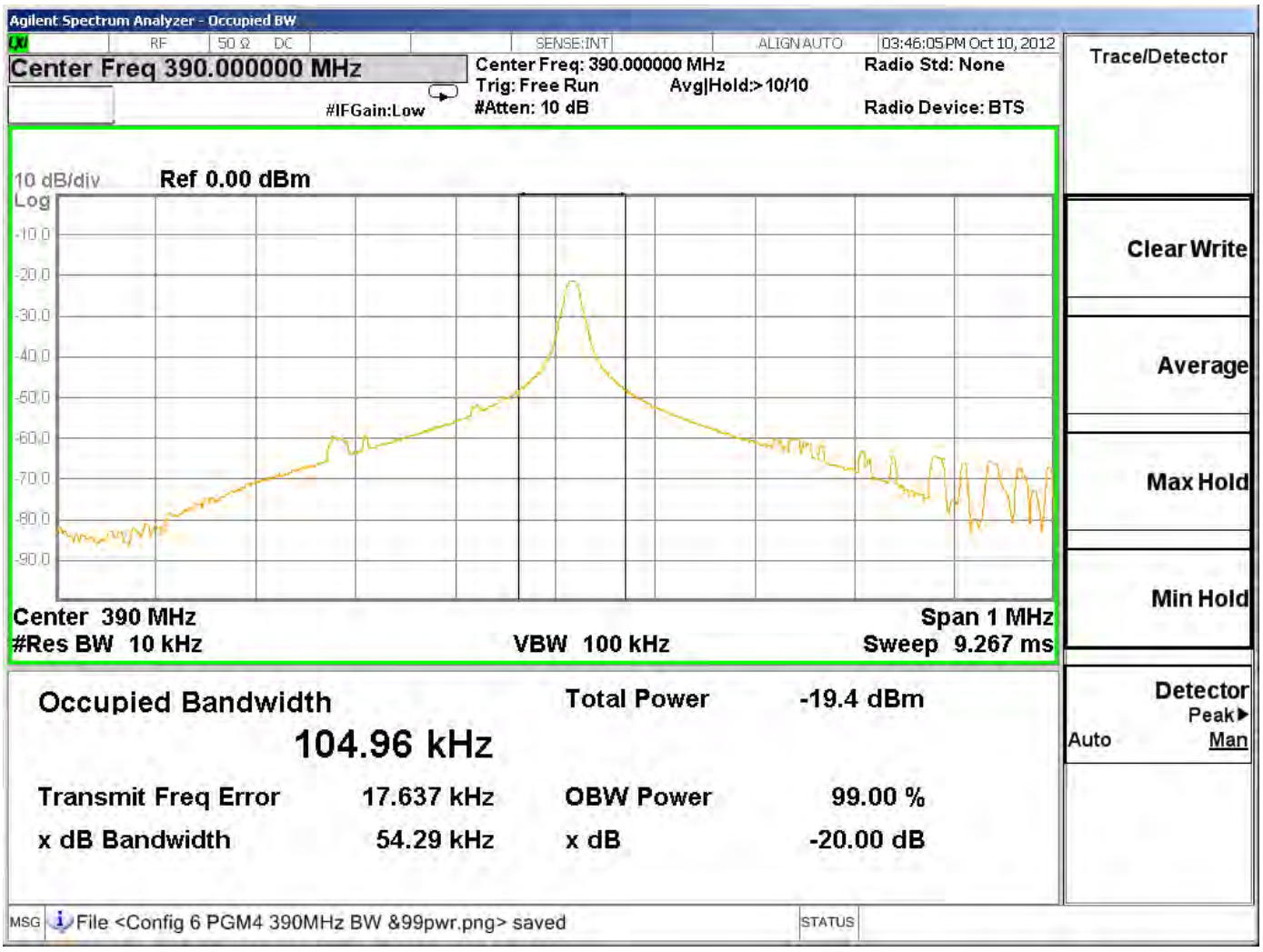
Table 102 Occupied Bandwidth Spectrum Analyzer Settings

Resolution Bandwidth	Occupied Bandwidth Requirements	
	dBc	% PWR
10kHz	-20	99
Supplementary information: None		

Table 103 Occupied Bandwidth Test Result Summary

Center Frequency	20dB BW Measured (kHz)	99% BW Measured (kHz)
390MHz	54.29	104.96

Figure 77 – Bandwidth Graph



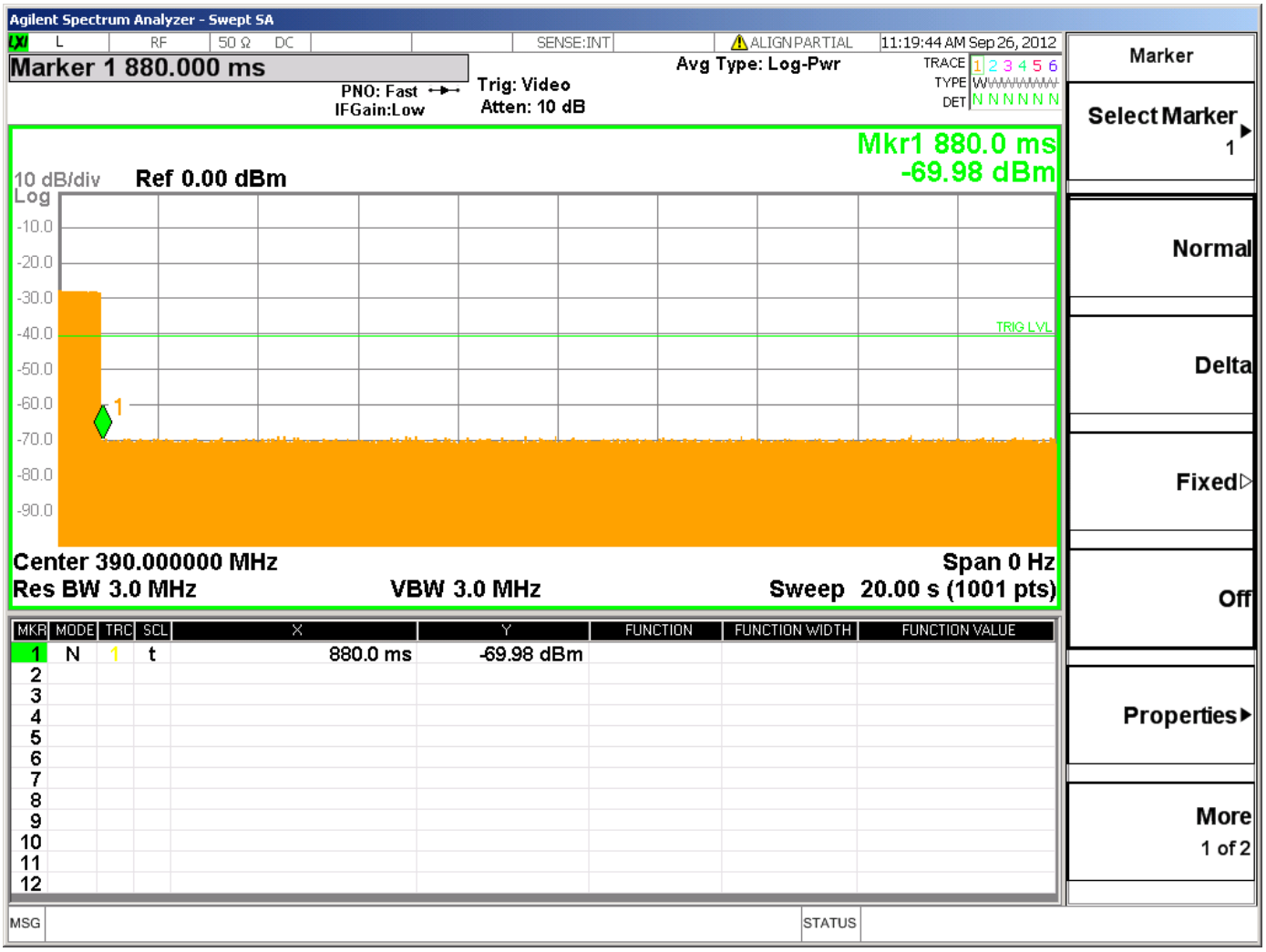
4.12.2 Test Conditions and Results – Cease Operation

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the transmission time measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	47 CFR Part 15.231(a)
Cease Operation Limits	
The transmissions shall stop within 5 seconds of either a button being released or if automatically controlled transmissions shall be stopped 5 seconds after transmissions begin.	

Table 104 Cease Operation Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

Figure 78 Cease Operation Graph



4.12.3 Test Conditions and Results – Pulse Train

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The pulse train was measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	FCC Part 15 Subpart A, 15.35
Pulse Train Limits	
There are no limits for this test. This data is used to calculate the averaging correction factor that is applied to the measured peak radiated emissions results.	

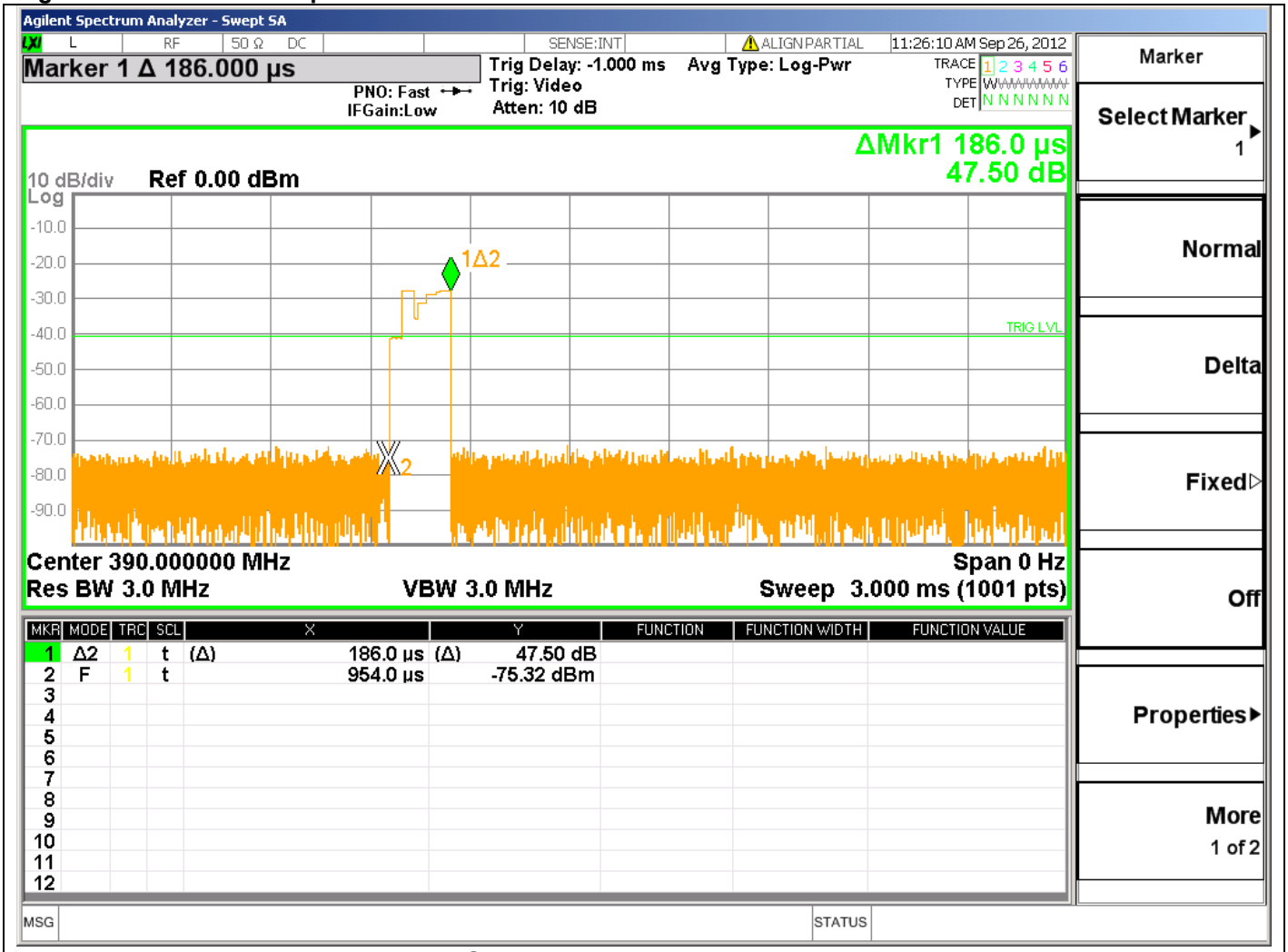
Table 105 Pulse Train Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

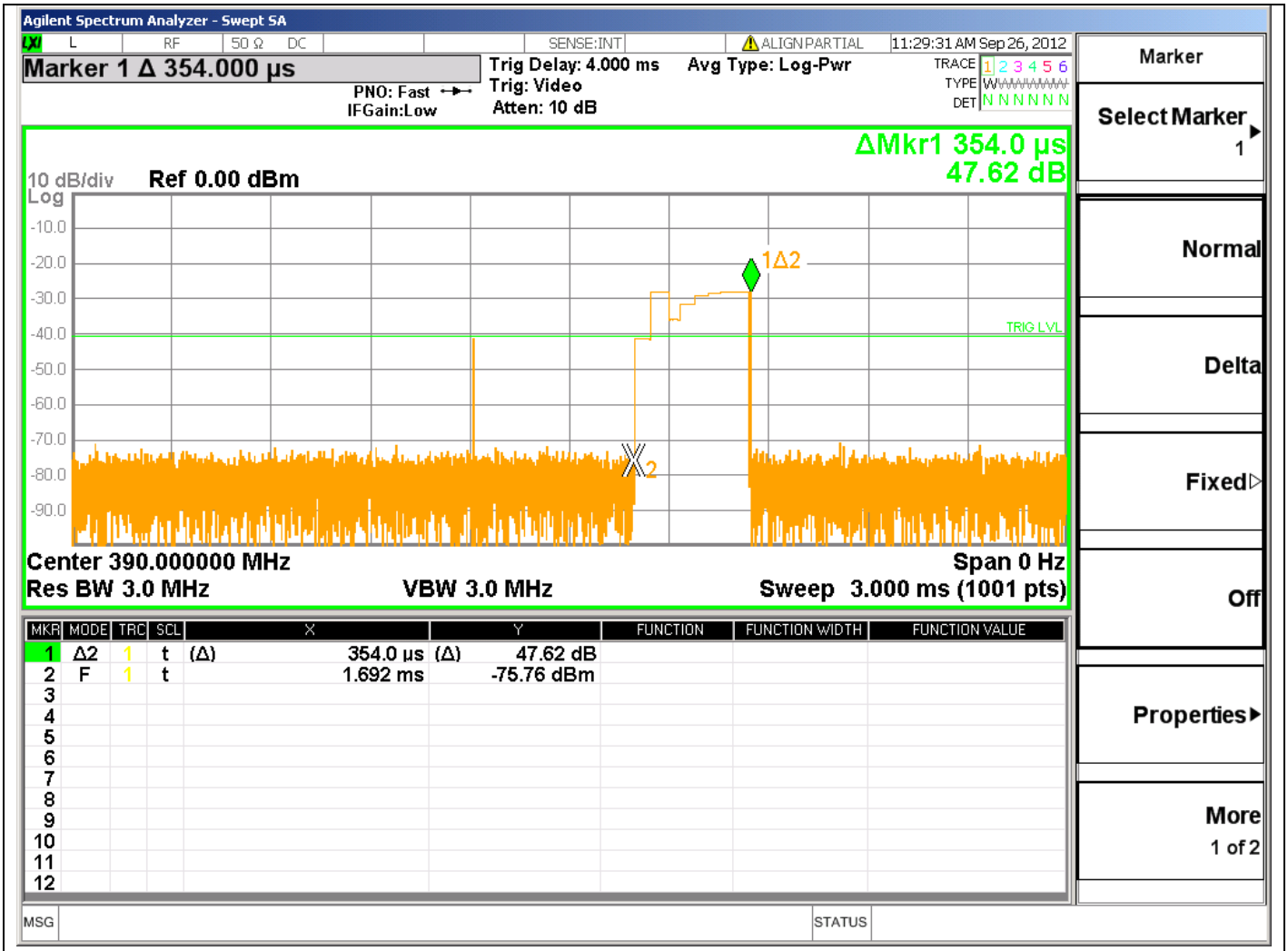
Table 106 Pulse Train Calculation

TX Frequency	Total TX time	Total Transmission period or 100ms whichever is lesser	DC Correction Factor (dB) $20\log\left(\frac{PulseWidth}{Period}\right)$
390MHz	(2x1.02)+(9x3.04)	78.6	-8.54
Worst Case Duty Cycle: Worst case duty cycle was calculated over one period of 78.6mS and it did not include the tuning pulses. Manufacturer declared duty cycle was -9.13dB. The measured duty cycle is used for all radiated emissions data.			

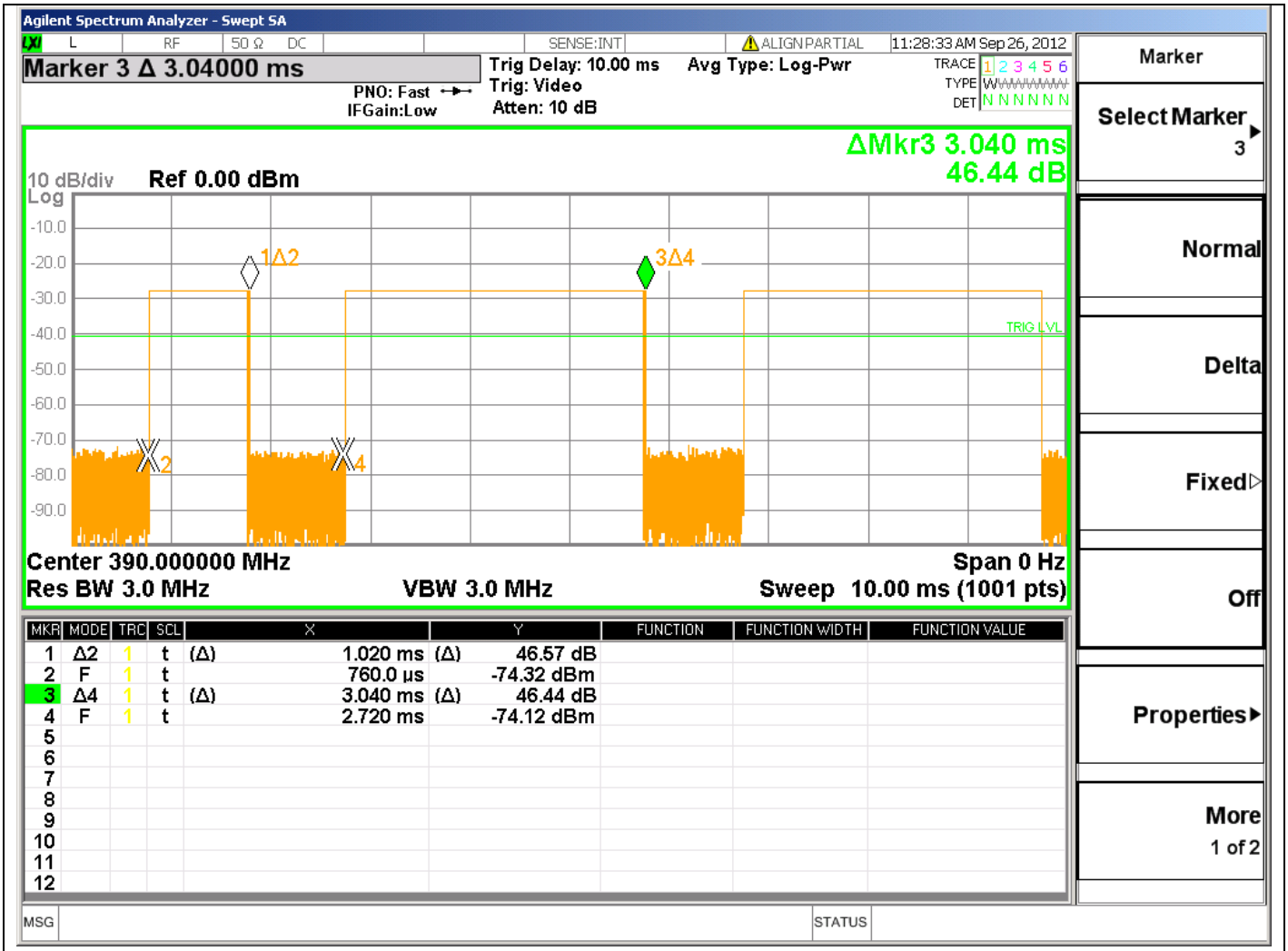
Figure 79 Pulse Train Graphs



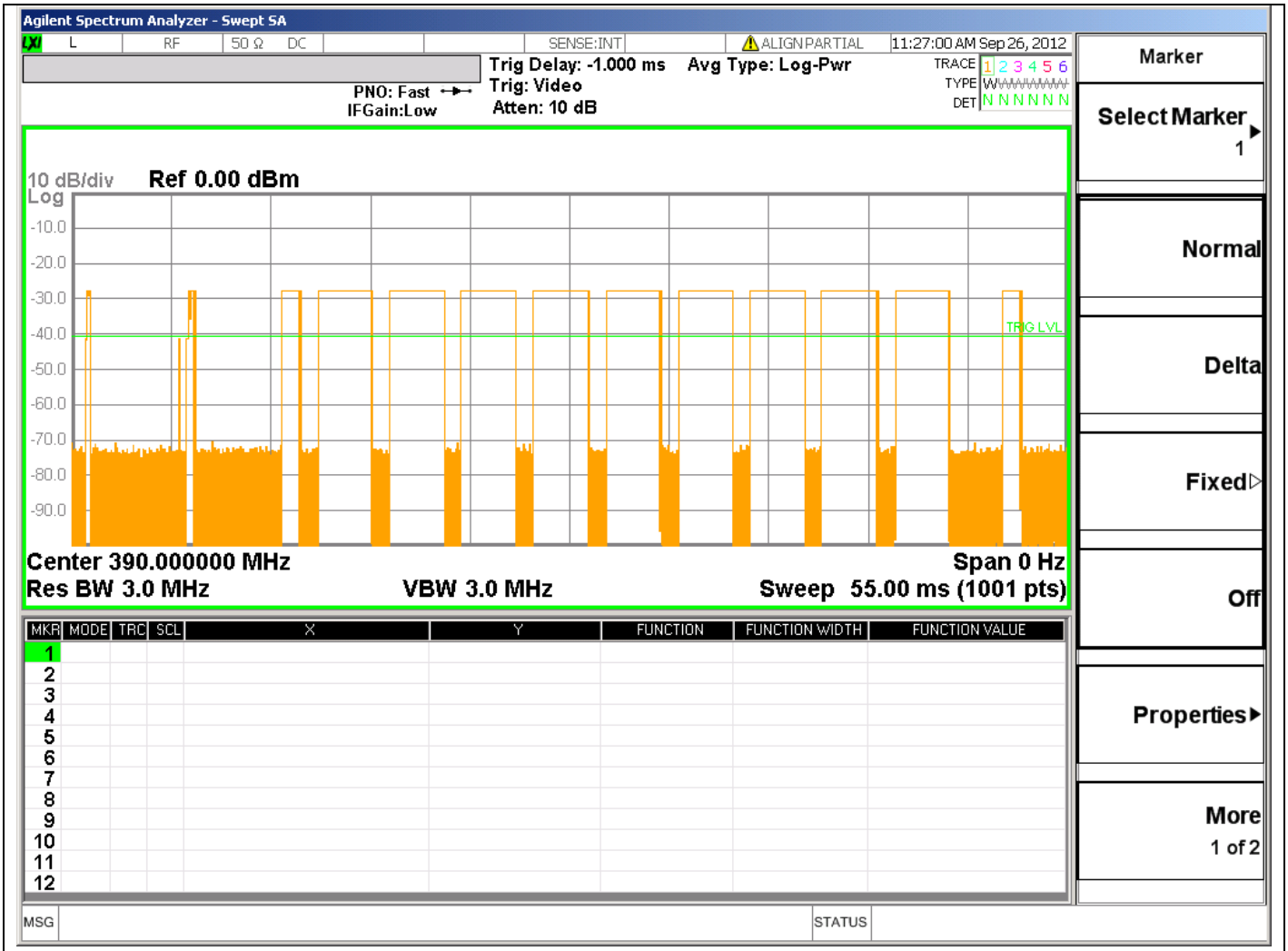
First tuning pulse duration: 0.186mS



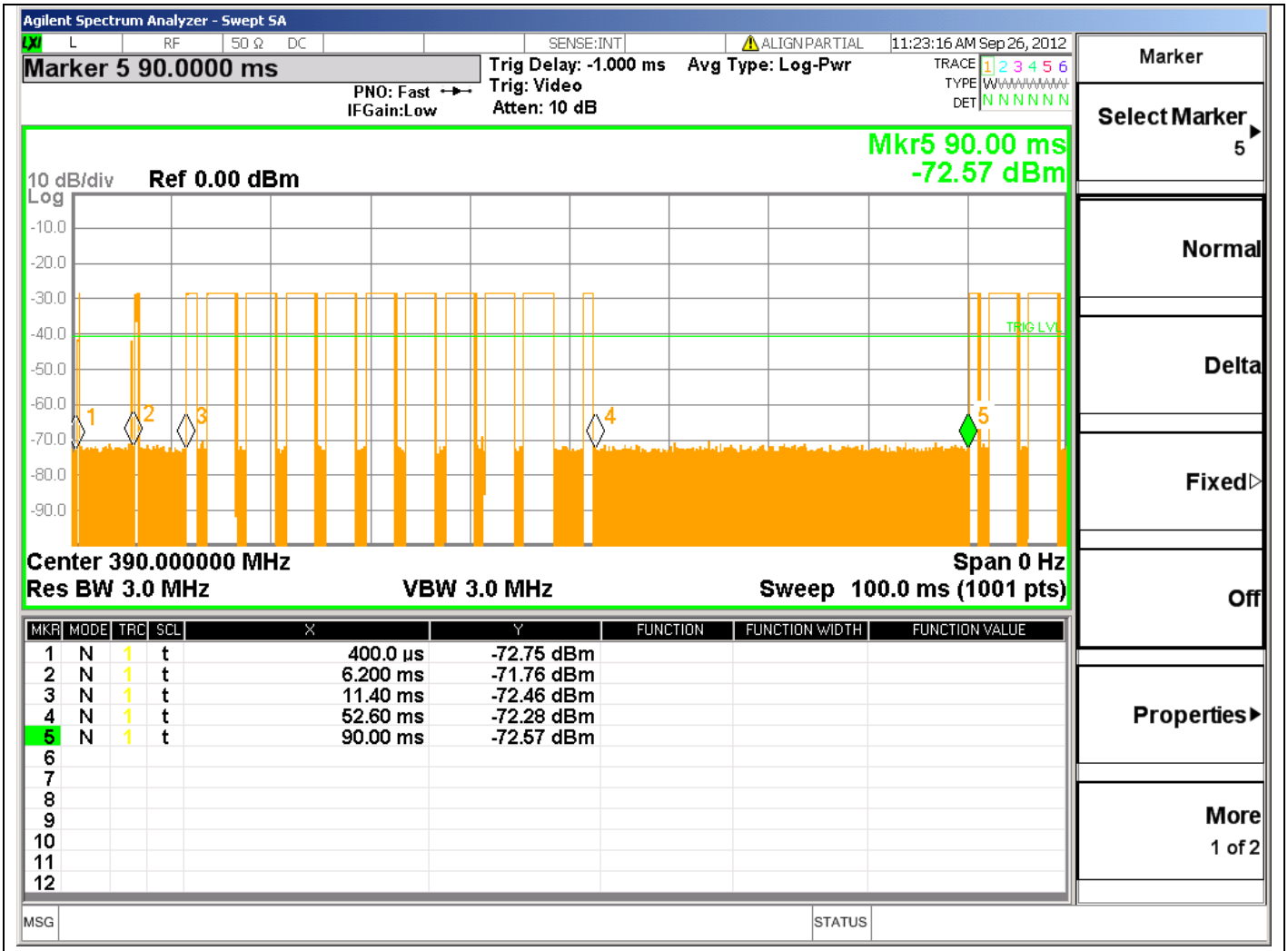
Second tuning pulse duration: 0.354mS



Message pulse duration: Short Pulse 1.020mS, Long Pulse 3.040mS



Number of Pulses: 2 Short, 9 Long


Agilent Spectrum Analyzer - Swept SA
Marker 5 90.0000 ms
PNO: Fast
IFGain:Low
Trig Delay: -1.000 ms
Trig: Video
Atten: 10 dB
Avg Type: Log-Pwr
11:23:16 AM Sep 26, 2012
Mkr5 90.00 ms
-72.57 dBm
10 dB/div
Log
Ref 0.00 dBm
Center 390.000000 MHz
Res BW 3.0 MHz
VBW 3.0 MHz
Span 0 Hz
Sweep 100.0 ms (1001 pts)
1 N 1 t 400.0 µs -72.75 dBm
2 N 1 t 6.200 ms -71.76 dBm
3 N 1 t 11.40 ms -72.46 dBm
4 N 1 t 52.60 ms -72.28 dBm
5 N 1 t 90.00 ms -72.57 dBm
Marker
Select Marker
Normal
Delta
Fixed
Off
Properties
More
1 of 2

Period scan

4.12.4 Test Conditions and Results – RADIATED EMISSIONS Fundamental and Spurious

Test Description	Measurements were made in a 10-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4:2003. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter as noted. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.		
Basic Standard	47 CFR Part 15 subpart C, and RSS-210		
UL LPG	80-EM-S0029		
	Frequency range	Measurement Point	
Fully configured sample scanned over the following frequency range	30MHz – 1GHz	3 meter distance	
	1GHz – 4GHz	3 meter distance	

Restricted Band Limits

Frequency (MHz)	Limit (dBµV/m)	
	Quasi-Peak	Peak
30 - 88	40.00	NA
88 - 216	43.52	NA
216 - 960	46.02	NA
960 - 1000	54	NA
Above 1000 (FCC)	NA	54 (at 3-meter)

Fundamental Frequency Limits and Non-restricted band Harmonic Limits

Frequency (MHz)	Limit (dBµV/m) @ 3m distance All harmonics except those in restricted bands must be attenuated by 20dB or more	
	Average - Fundamental	Peak - Fundamental
390	79.24	99.24

Supplementary information: See section 4.12.3 for duty cycle information.

Figure 80 Radiated Emissions Graph (Below 1GHz)

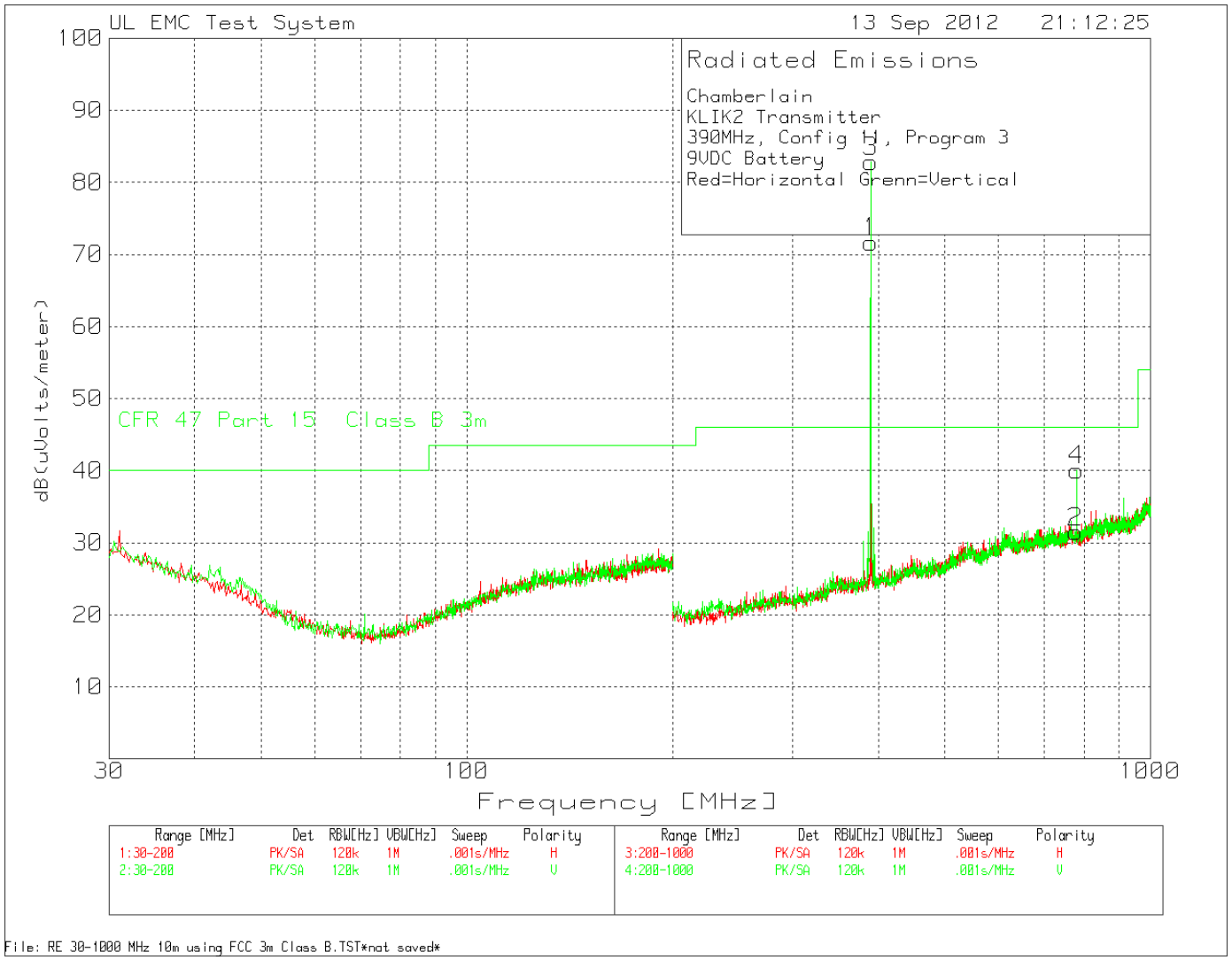


Figure 81 Radiated Emissions Graph (Above 1GHz)

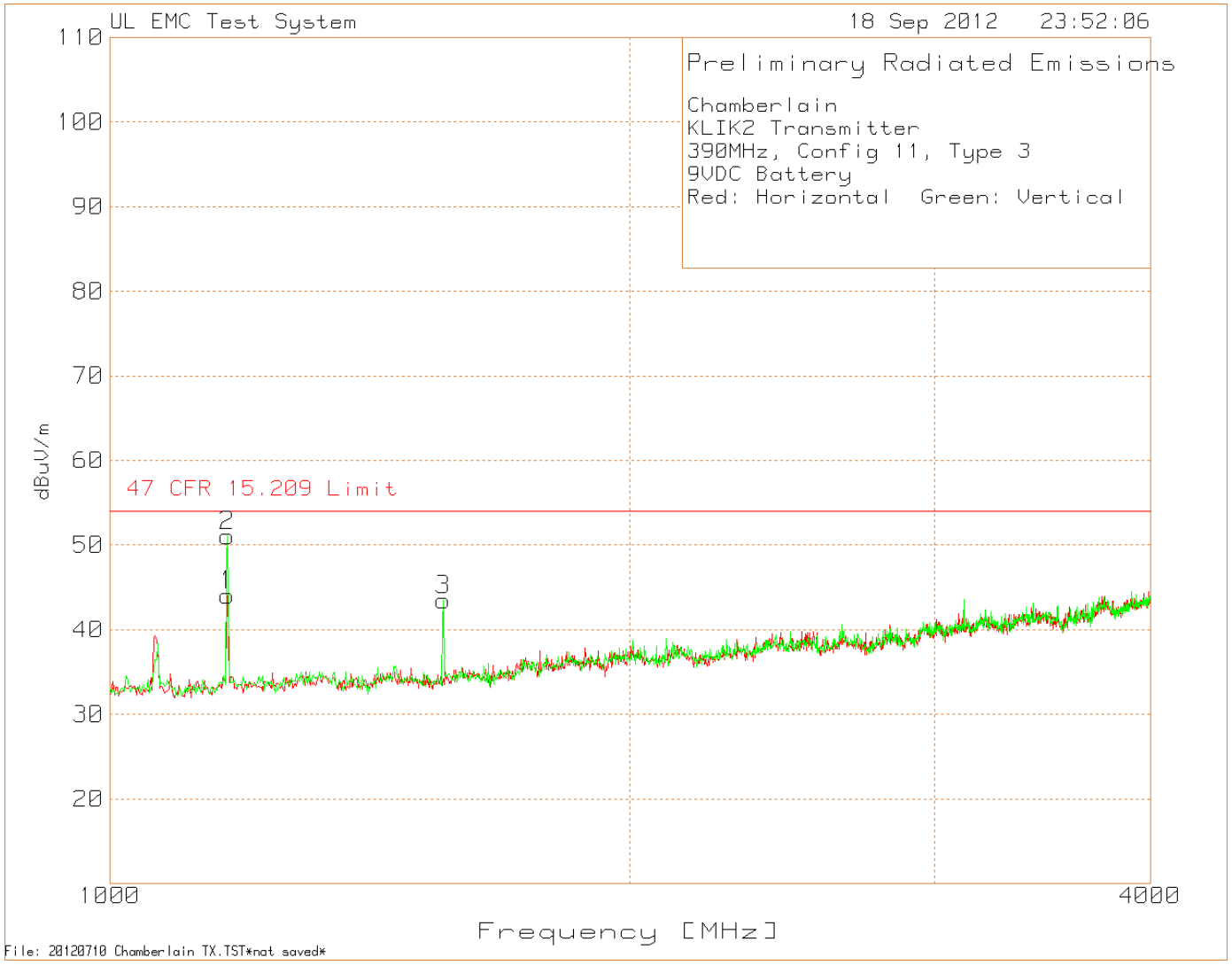


Table 107 - Radiated Emissions Data Points

Chamberlain
KLIK2C Transmitter
390MHz, Config 11, Type 3
9VDC Battery
Red: Horizontal Green: Vertical

Test Frequency MHz	Meter Reading dBuV	Detector	Antenna Factor dB	Path Loss Gain dB	Level dBuV/m	Duty Cycle Factor dB	Level with Duty Cycle dBuV/m	Limit @ 3m dBuV/m	Margin dB	Azimuth [Degs]	Height [cm]	Polarity
390.015995	61.45	QP	16.1	2.3	79.85	-8.54	71.31	79.24	-7.93	264	320	Horz
390.015995	61.77	PK	16.1	2.3	80.17	-8.54	71.63	79.24	-7.61	264	320	Horz
390.015995	65.6	QP	16.1	2.3	84	-8.54	75.46	79.24	-3.78	336	123	Vert
390.015995	65.89	PK	16.1	2.3	84.29	-8.54	75.75	79.24	-3.49	336	123	Vert
780.033654	11.02	QP	21.8	3.4	36.22	-8.54	27.68	46	-18.32	107	112	Horz
780.033654	13.86	PK	21.8	3.4	39.06	-8.54	30.52	46	-15.48	107	112	Horz
780.033654	25.28	QP	21.8	3.4	50.48	-8.54	41.94	46	-4.06	267	131	Vert
780.033654	26.53	PK	21.8	3.4	51.73	-8.54	43.19	46	-2.81	267	131	Vert
1170.0251	87.55	PK	24.8	-57.24	55.11	-8.54	46.57	54	-7.43	23	225	Horz
1169.8707	92.43	PK	24.8	-57.24	59.99	-8.54	51.45	54	-2.55	91	130	Vert
1560.374	73.95	PK	25.2	-55.65	43.5	-8.54	34.96	54	-19.04	*	100	Vert

* Peak prescan data, not maximized

4.13 Configuration 4# Test Data

4.13.1 Test Conditions and Results – Occupied Bandwidth

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the spectrum analyzer resolution bandwidth set per the appropriate standard.
Basic Standard	47 CFR Part 15.231(c)
Occupied Bandwidth Limits	
0.25% of Center Frequency (390MHz: 975.0kHz)	

Table 108 Occupied Bandwidth Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

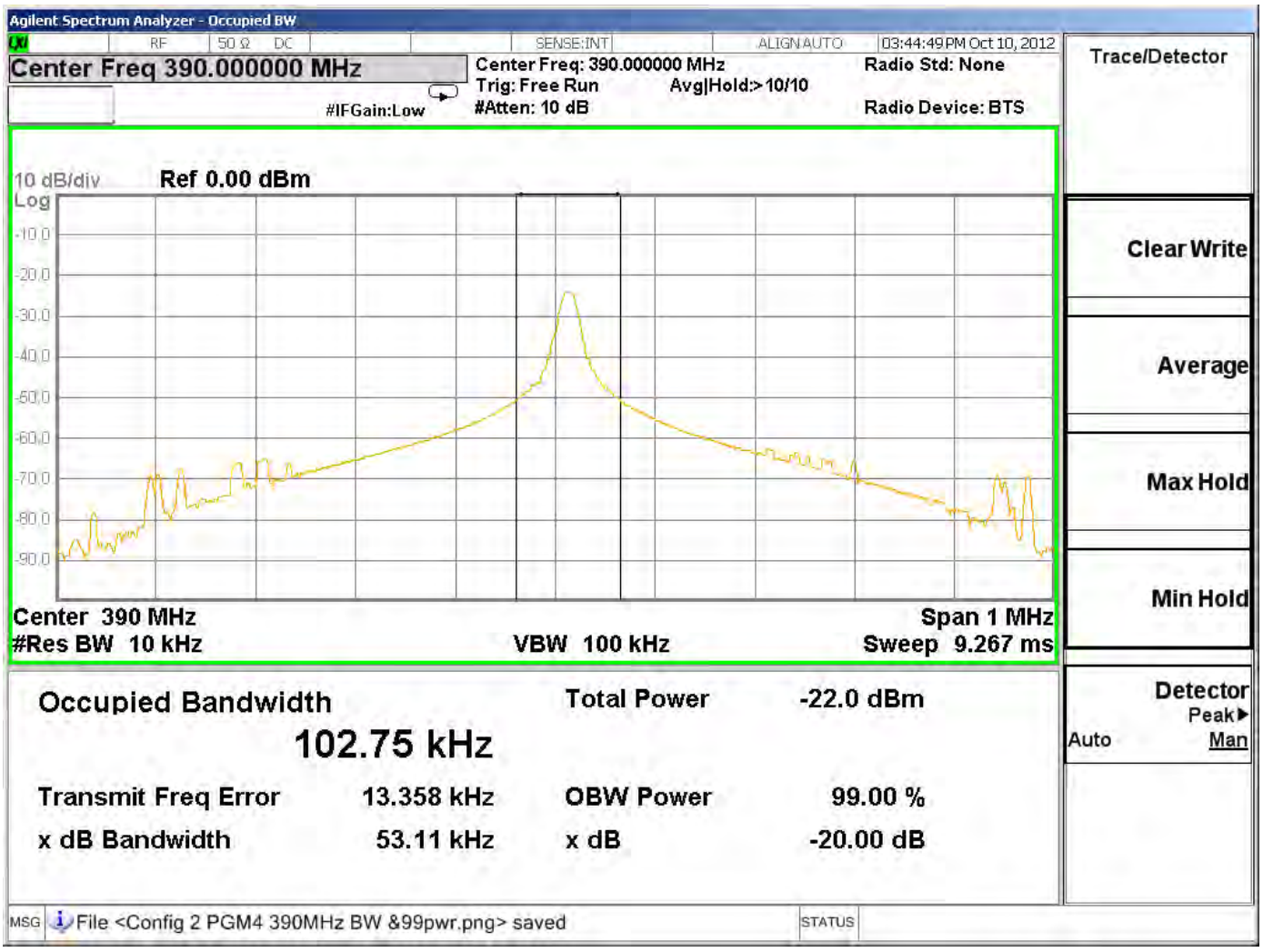
Table 109 Occupied Bandwidth Spectrum Analyzer Settings

Resolution Bandwidth	Occupied Bandwidth Requirements	
	dBc	% PWR
10kHz	-20	99
Supplementary information: None		

Table 110 Occupied Bandwidth Test Result Summary

Center Frequency	20dB BW Measured (kHz)	99% BW Measured (kHz)
390MHz	53.11	102.75

Figure 82 – Bandwidth Graph



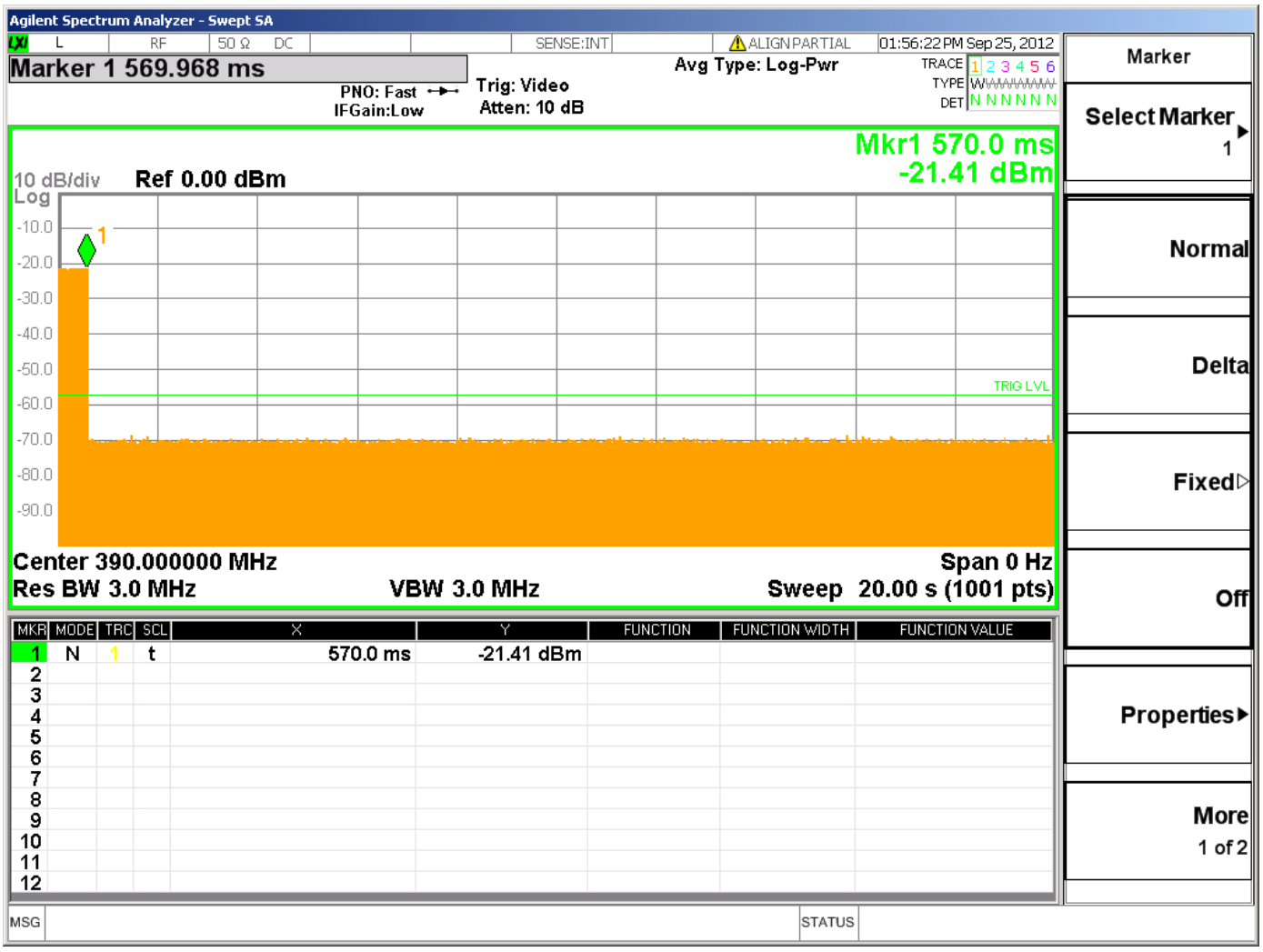
4.13.2 Test Conditions and Results – Cease Operation

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the transmission time measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	47 CFR Part 15.231(a)
Cease Operation Limits	
The transmissions shall stop within 5 seconds of either a button being released or if automatically controlled transmissions shall be stopped 5 seconds after transmissions begin.	

Table 111 Cease Operation Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

Figure 83 Cease Operation Graph



4.13.3 Test Conditions and Results – Pulse Train

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The pulse train was measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	FCC Part 15 Subpart A, 15.35
Pulse Train Limits	
There are no limits for this test. This data is used to calculate the averaging correction factor that is applied to the measured peak radiated emissions results.	

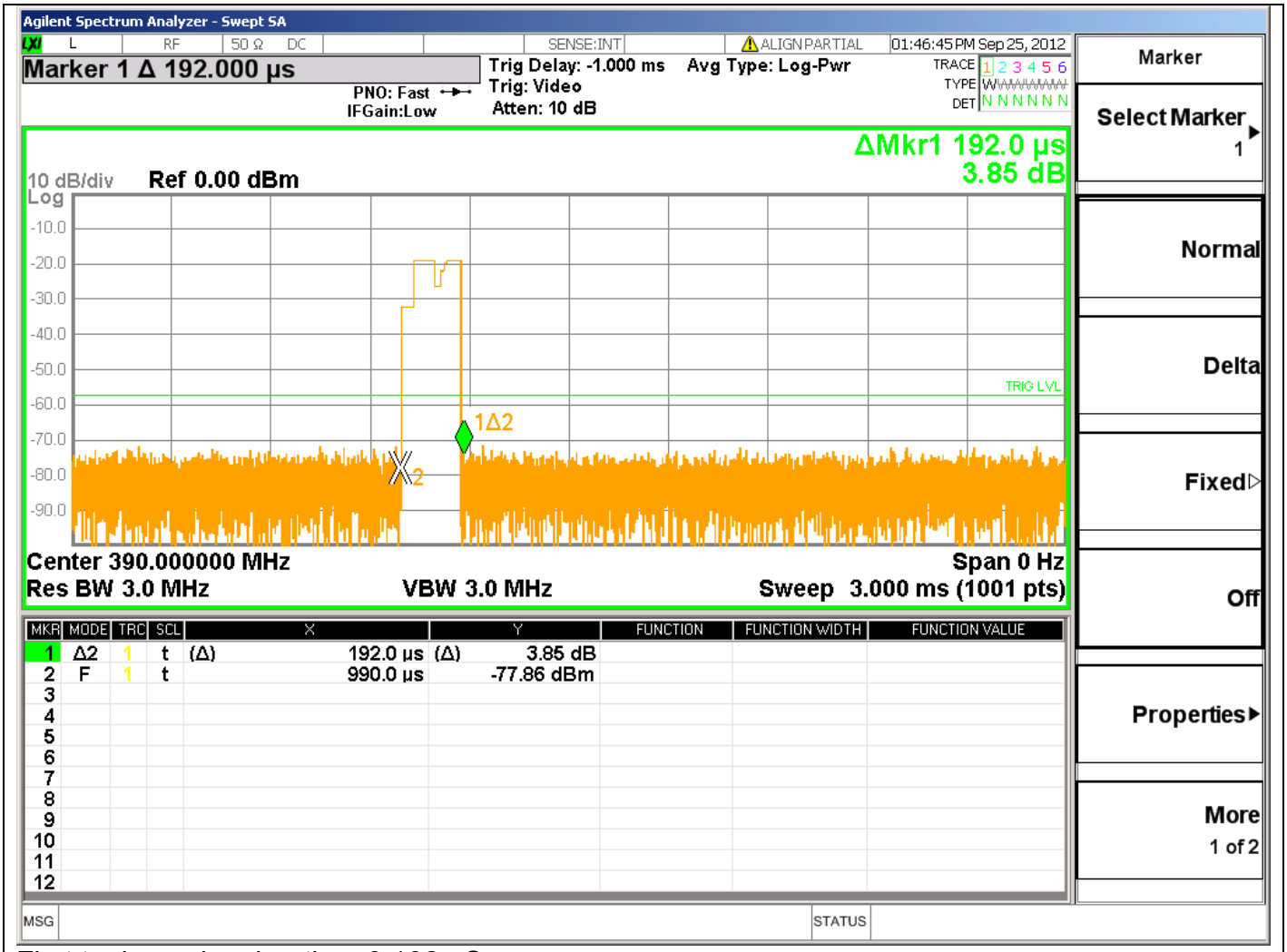
Table 112 Pulse Train Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

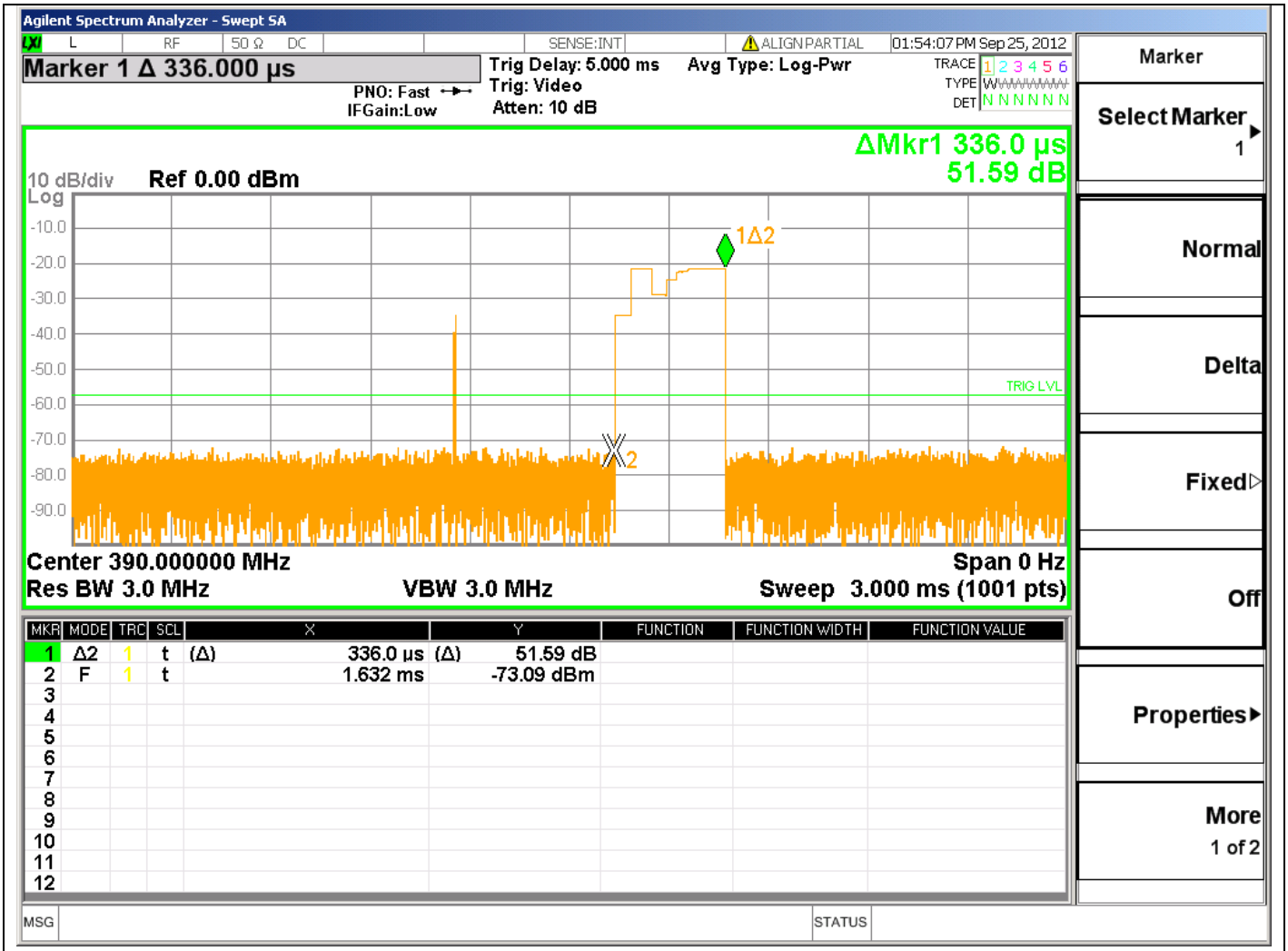
Table 113 Pulse Train Calculation

TX Frequency	Total TX time	Total Transmission Period or 100ms whichever is lesser	DC Correction Factor (dB) $20\log\left(\frac{PulseWidth}{Period}\right)$
390MHz	(7x1.02mS)+(2x2.0mS)+(2x3.00mS)	82mS	-13.5
Worst Case Duty Cycle: Worst case was calculated using transmit time over 82mS not including tuning pulses. Manufacturer declares worst case duty cycle as -6.74dB and this will be used for emission level calculation.			

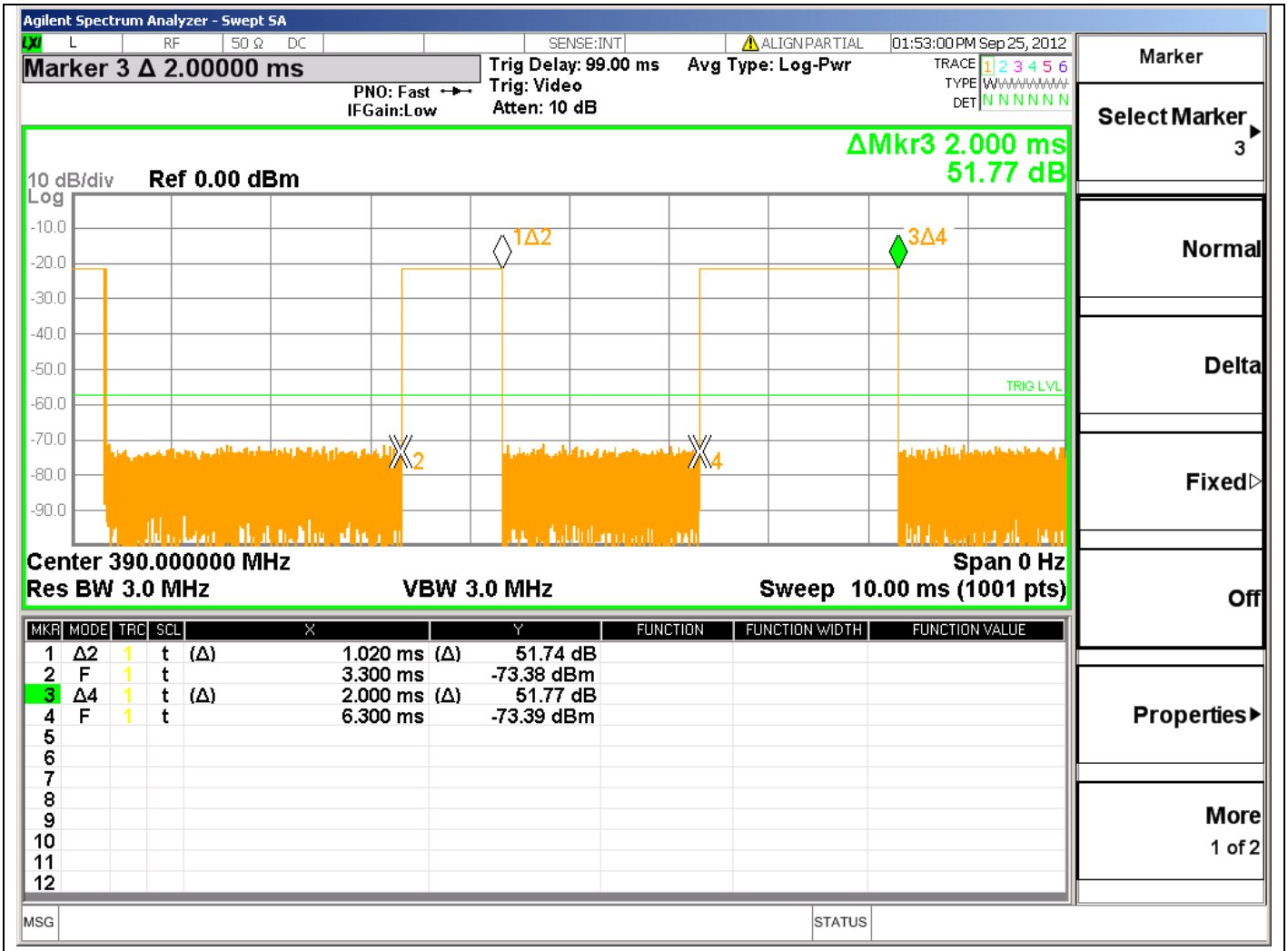
Figure 84 Pulse Train Graphs



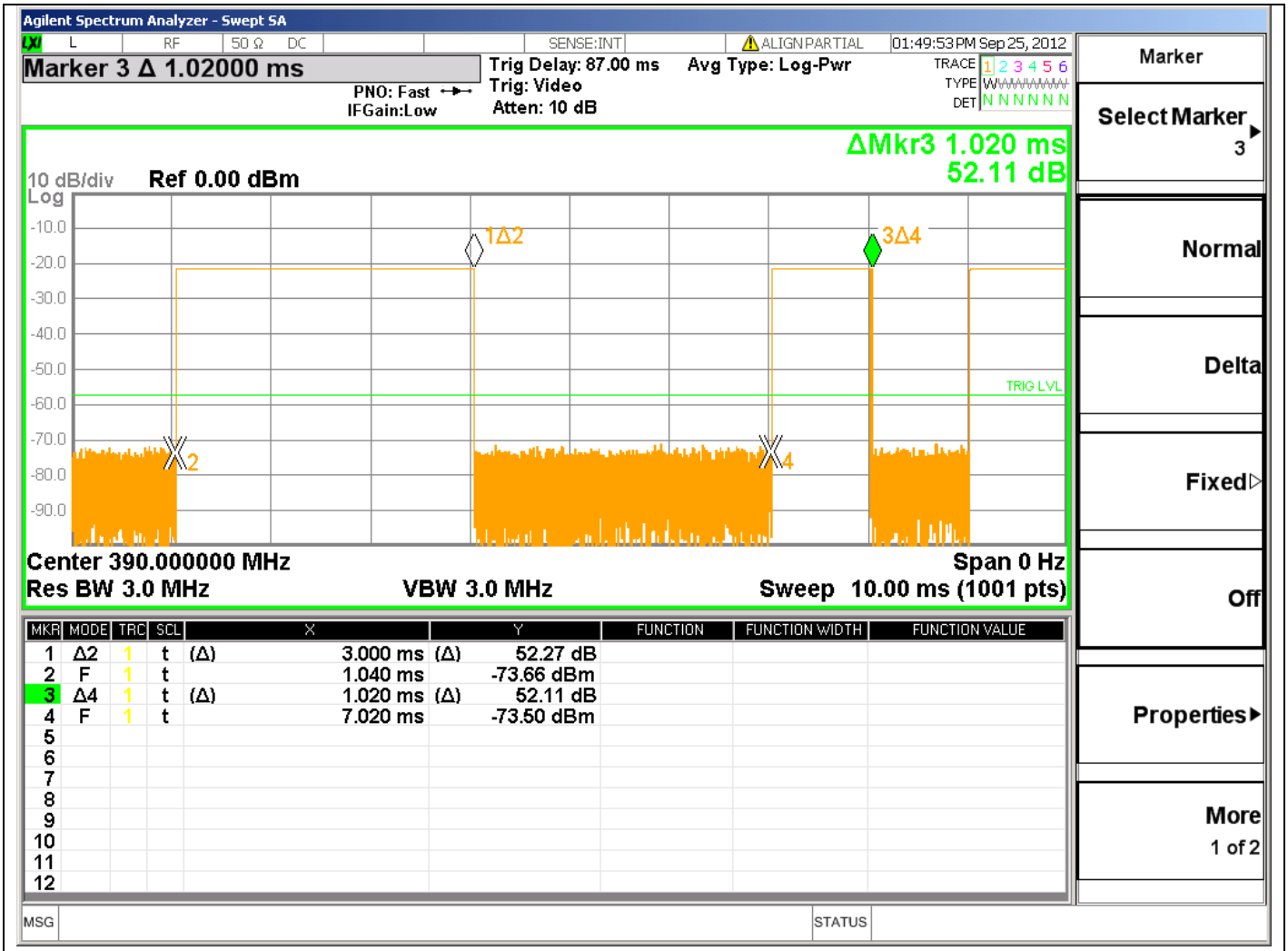
First tuning pulse duration: 0.192mS



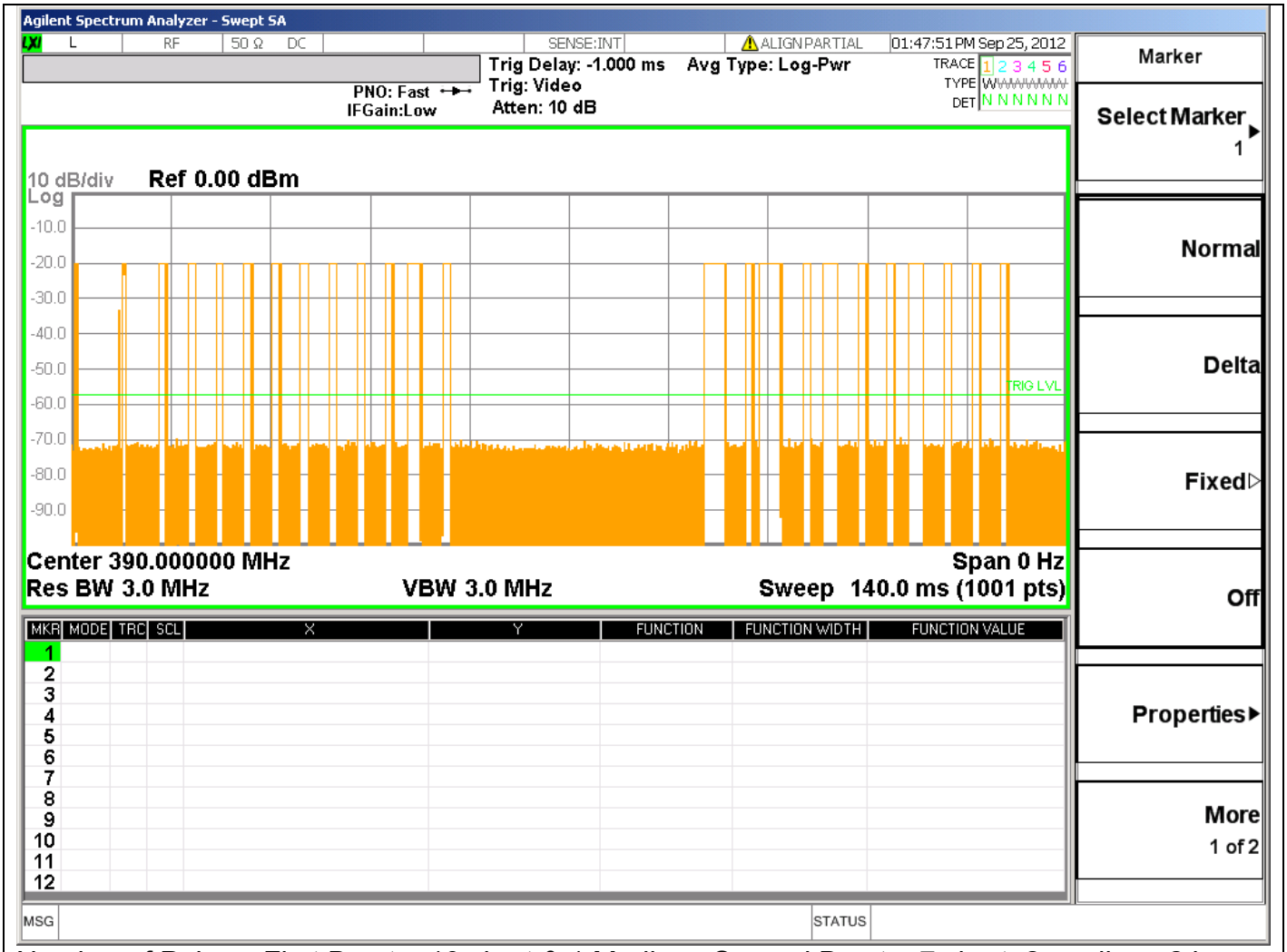
Second tuning pulse duration: 0.336mS



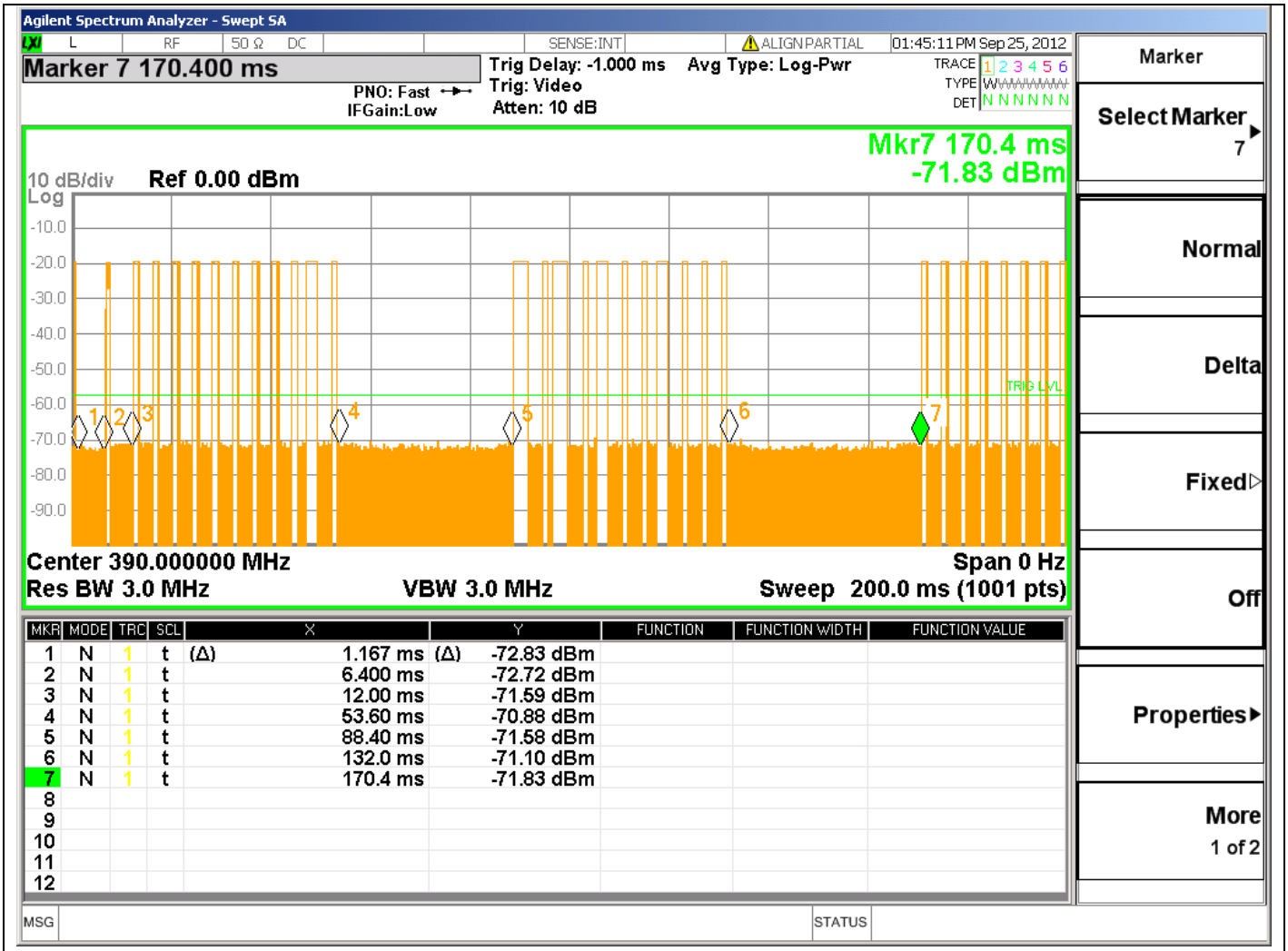
Message pulse duration: 1.020mS Short, 2.0mS Medium



Message Pulse duration: 3.000mS Long



Number of Pulses: First Burst – 10 short & 1 Medium, Second Burst – 7 short, 2 medium, 2 long
Total TX first message burst: 12.2, total TX second burst 17.14



Period Between message bursts: 82.0mS

4.13.4 Test Conditions and Results – RADIATED EMISSIONS Fundamental and Spurious

Test Description	Measurements were made in a 10-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4:2003. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter as noted. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.	
Basic Standard	47 CFR Part 15 subpart C, and RSS-210	
UL LPG	80-EM-S0029	
	Frequency range	Measurement Point
Fully configured sample scanned over the following frequency range	30MHz – 1GHz	3 meter distance
	1GHz – 4GHz	3 meter distance

Restricted Band Limits

Frequency (MHz)	Limit (dBµV/m)	
	Quasi-Peak	Peak
30 - 88	40.00	NA
88 - 216	43.52	NA
216 - 960	46.02	NA
960 - 1000	54	NA
Above 1000 (FCC)	NA	54 (at 3-meter)

Fundamental Frequency Limits and Non-restricted band Harmonic Limits

Frequency (MHz)	Limit (dBµV/m) @ 3m distance All harmonics except those in restricted bands must be attenuated by 20dB or more	
	Average - Fundamental	Peak - Fundamental
390	79.24	99.24

Supplementary information: See section 4.13.3 for duty cycle information.

Figure 85 Radiated Emissions Graph (Below 1GHz)

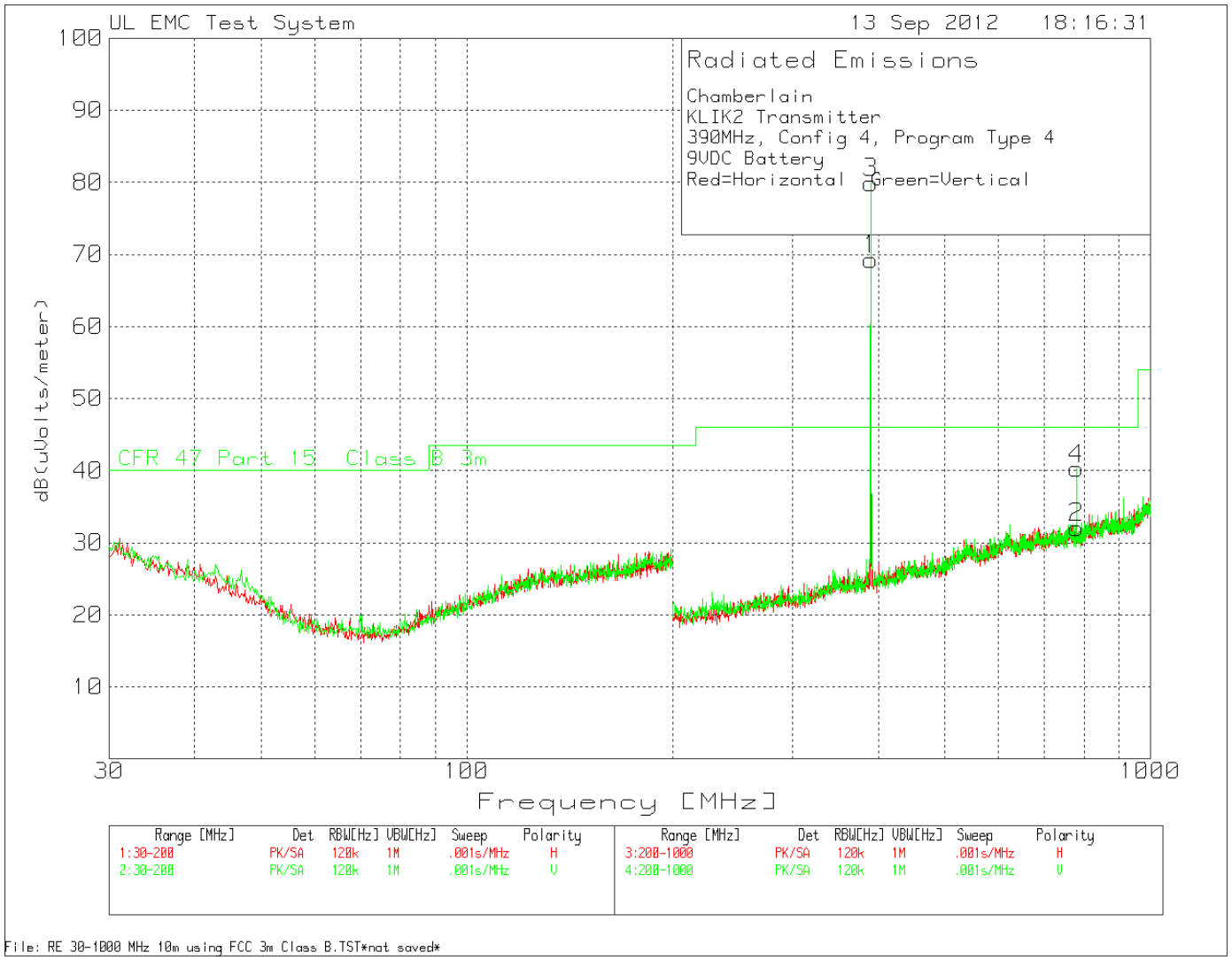


Figure 86 Radiated Emissions Graph (Above 1GHz)

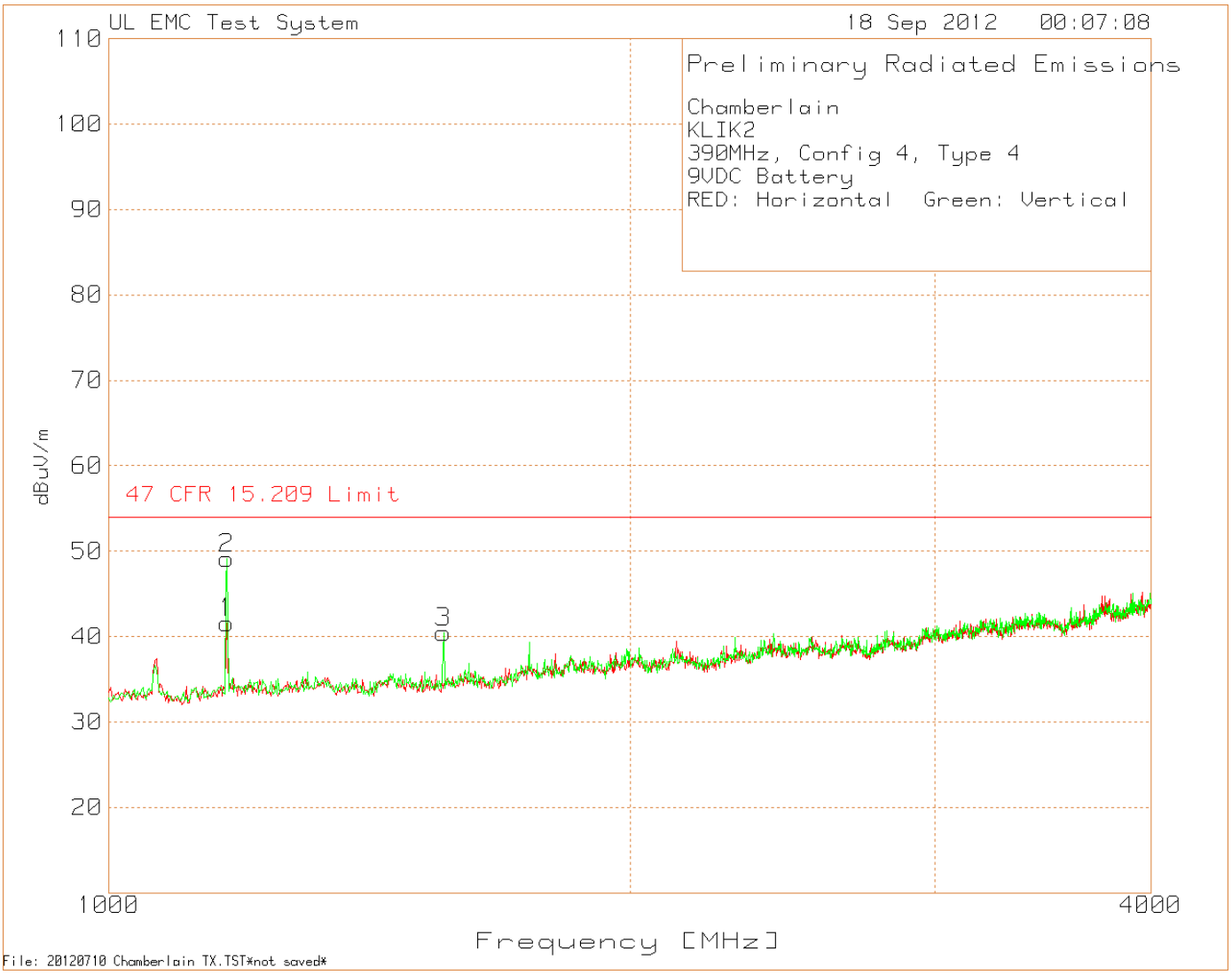


Table 114 - Radiated Emissions Data Points

Chamberlain
KLIK2C Transmitter
390MHz, Config 4, Program 4
9VDC Battery
Red:Horizontal, Green:Vertical

Test Frequency MHz	Meter Reading dBuV	Detector	Antenna Factor dB	Path Loss Gain dB	Level dBuV/m	Duty Cycle Factor dB	Level with Duty Cycle dBuV/m	Limit @ 3m dBuV/m	Margin dB	Azimuth [Degs]	Height [cm]	Polarity
390.012821	58.43	PK	16.1	2.3	76.83	-6.74	70.09	79.24	-9.15	25	348	Horz
390.012821	63.79	PK	16.1	2.3	82.19	-6.74	75.45	79.24	-3.79	113	128	Vert
780.024039	11.94	PK	21.8	3.4	37.14	-6.74	30.4	46	-15.6	81	115	Horz
780.024039	26.15	PK	21.8	3.4	51.35	-6.74	44.61	46	-1.39	74	139	Vert
1170.113	74	PK	24.8	-57.24	41.56	-6.74	34.82	54	-19.18	*	125	Horz
1169.9689	90.12	PK	24.8	-57.24	57.68	-6.74	50.94	54	-3.06	119	130	Vert
1560.374	70.9	PK	25.2	-55.65	40.45	-6.74	33.71	54	-20.29	*	100	Vert

* Peak prescan data, not maximized

4.14 Configuration 13# Test Data

4.14.1 Test Conditions and Results – Occupied Bandwidth

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the spectrum analyzer resolution bandwidth set per the appropriate standard.
Basic Standard	47 CFR Part 15.231(c)
Occupied Bandwidth Limits	
0.25% of Center Frequency (390MHz: 975.0kHz)	

Table 115 Occupied Bandwidth Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

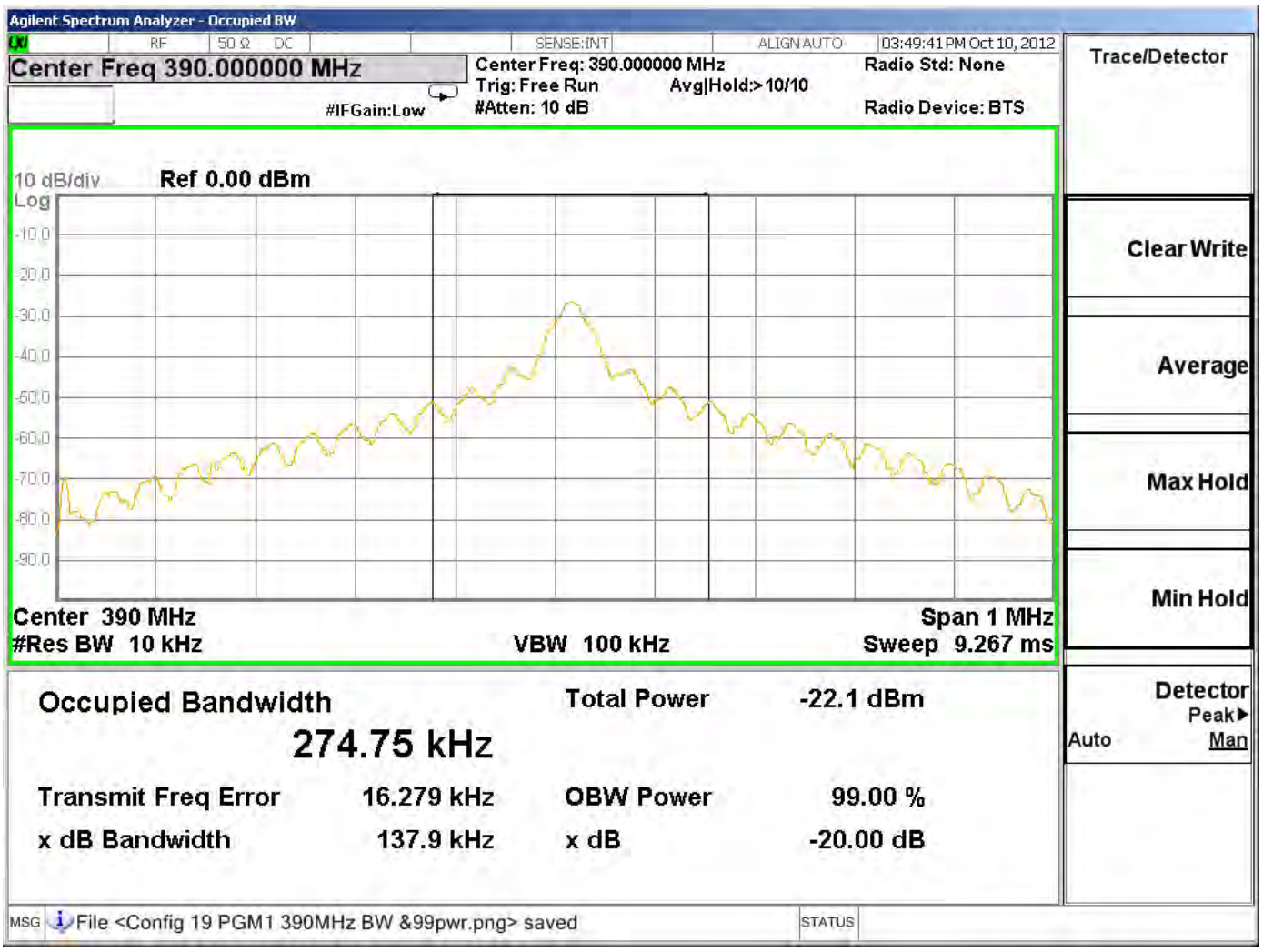
Table 116 Occupied Bandwidth Spectrum Analyzer Settings

Resolution Bandwidth	Occupied Bandwidth Requirements	
	dBc	% PWR
10kHz	-20	99
Supplementary information: None		

Table 117 Occupied Bandwidth Test Result Summary

Center Frequency	20dB BW Measured (kHz)	99% BW Measured (kHz)
390MHz	137.9	274.75

Figure 87 – Bandwidth Graph



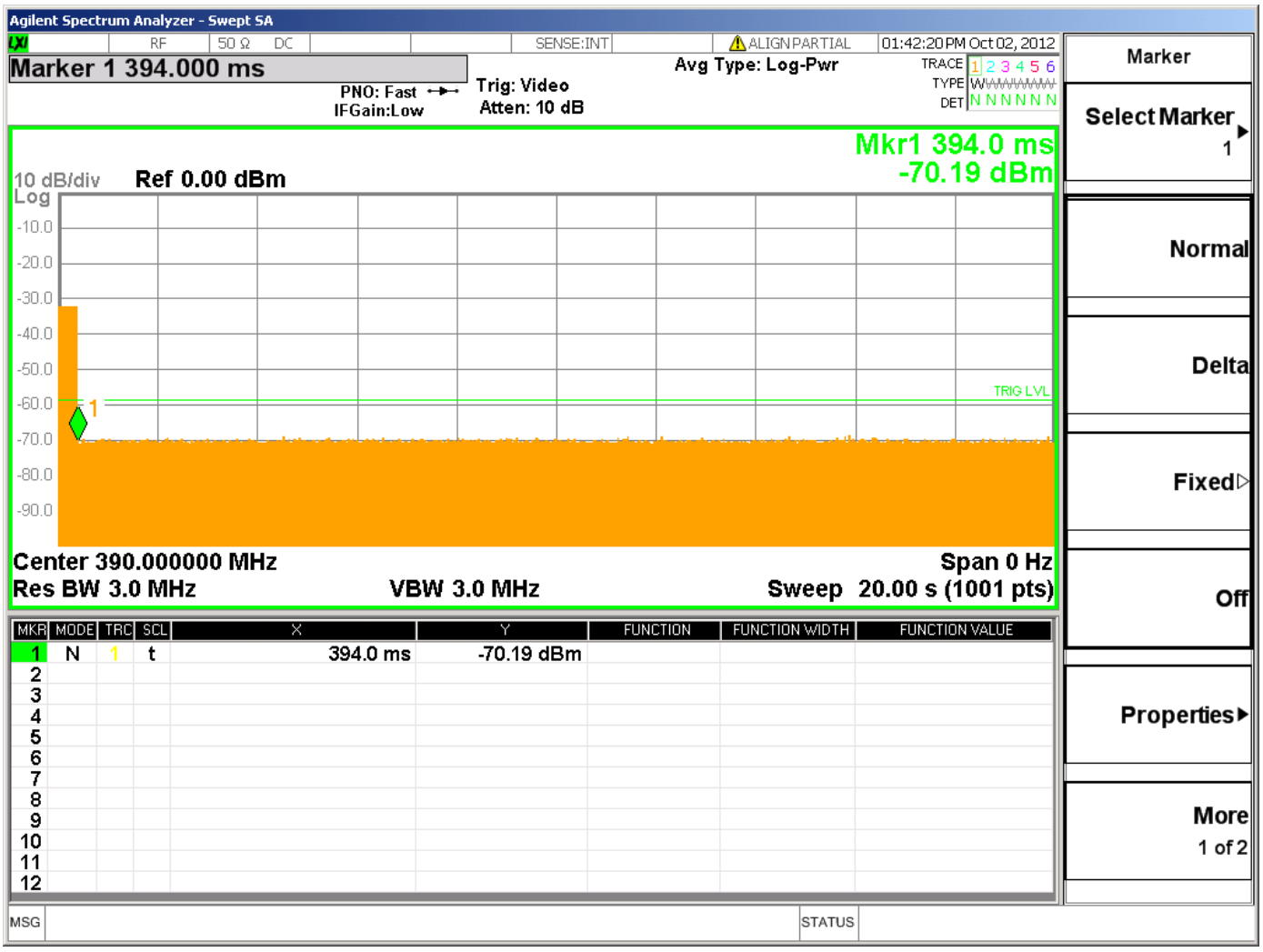
4.14.2 Test Conditions and Results – Cease Operation

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The device was operated and the transmission time measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	47 CFR Part 15.231(a)
Cease Operation Limits	
The transmissions shall stop within 5 seconds of either a button being released or if automatically controlled transmissions shall be stopped 5 seconds after transmissions begin.	

Table 118 Cease Operation Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

Figure 88 Cease Operation Graph



4.14.3 Test Conditions and Results – Pulse Train

Test Description	Measurements were made in the laboratory environment. A Dipole (or equivalent) antenna tuned to the transmit frequency was attached to the input of a spectrum analyzer. The pulse train was measured with the spectrum analyzer set to zero span at the fundamental frequency.
Basic Standard	FCC Part 15 Subpart A, 15.35
Pulse Train Limits	
There are no limits for this test. This data is used to calculate the averaging correction factor that is applied to the measured peak radiated emissions results.	

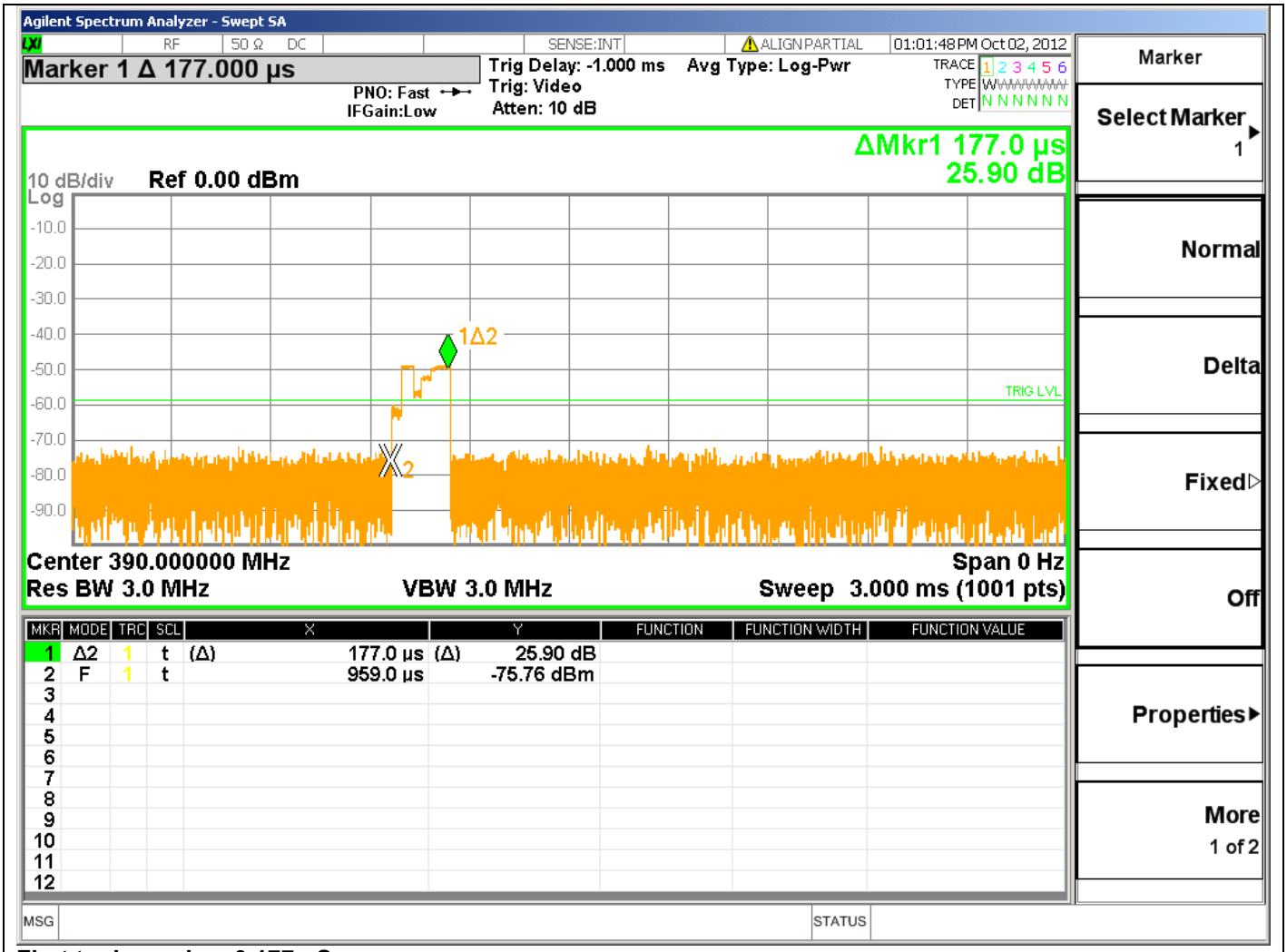
Table 119 Pulse Train Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

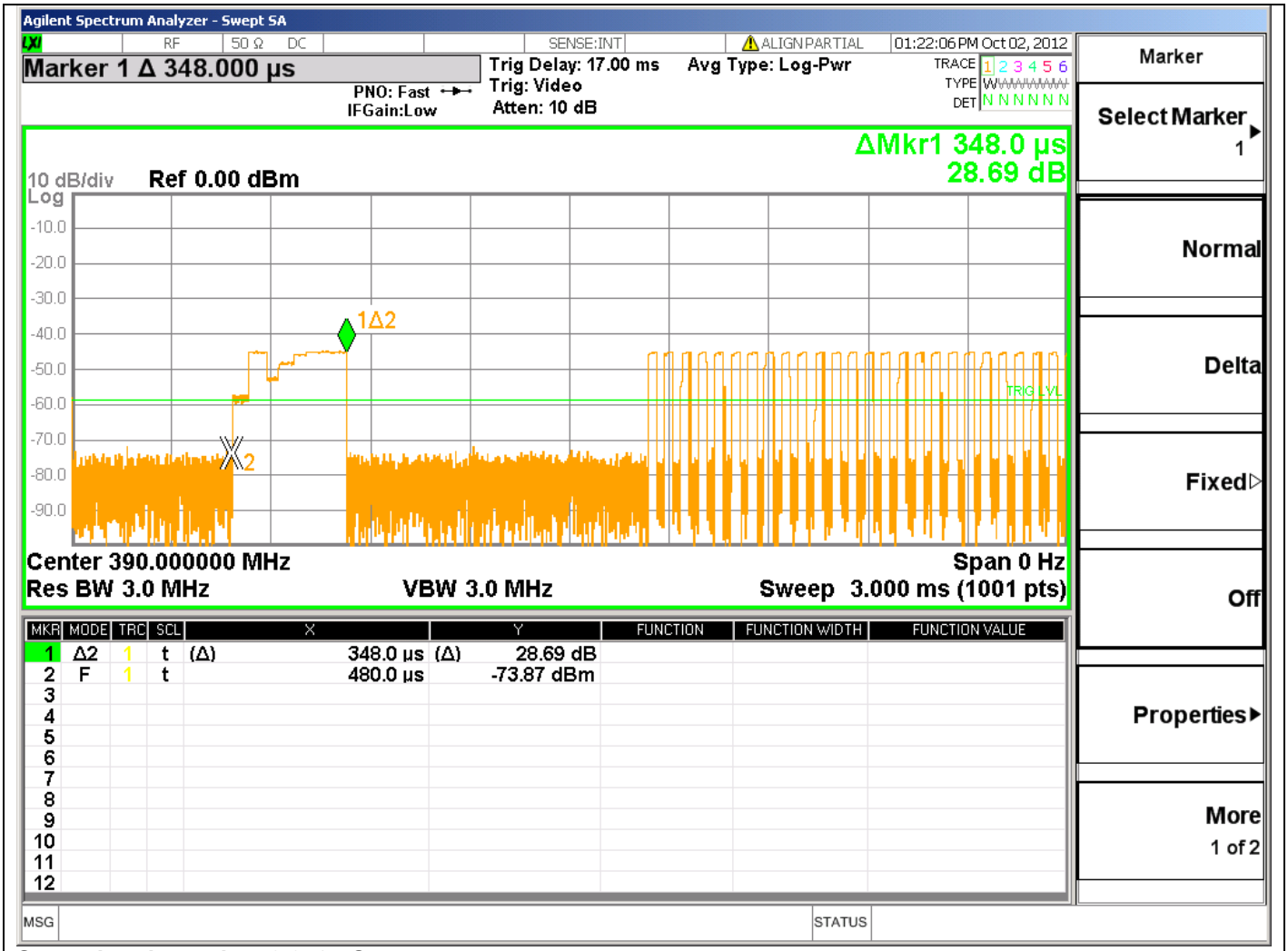
Table 120 Pulse Train Calculation

TX Frequency	Total TX time	Total Transmission time or 100ms whichever is lesser	DC Correction Factor (dB) $20\log\left(\frac{PulseWidth}{Period}\right)$
390MHz	See below	100ms	-5.16dB
Worst Case Duty Cycle: Because of design the transmitter transmits very short on and off pulses where its not possible to capture a plot showing number of pulses over 100mS. The measured individual pulses show short pulse on time of 0.0288mS and long pulse on time of 0.0540mS. Respectively the off time between the short pulses is 0.0216mS and long pulses 0.0468mS. The number of short pulses is 32 where in the same amount of time the number of long pulses is 16. The on time of short pulses in first section is 0.9216mS and on time of long pulses in first section is 0.8640mS. In the same time the off time between short pulses is 0.6912mS and off time between long pulses is 0.7584mS. The total on time of short and long pulses is 1.728mS and off time in the same section is 1.4976mS. This makes the estimated on time of 53.7% and it does not include the very short dip between series of bursts. Worst case duty cycle is calculated using the 55.2% on time over 100mS and its considered worst case and its used for all radiated emissions data. Manufacturer declared duty cycle is 6dB.			

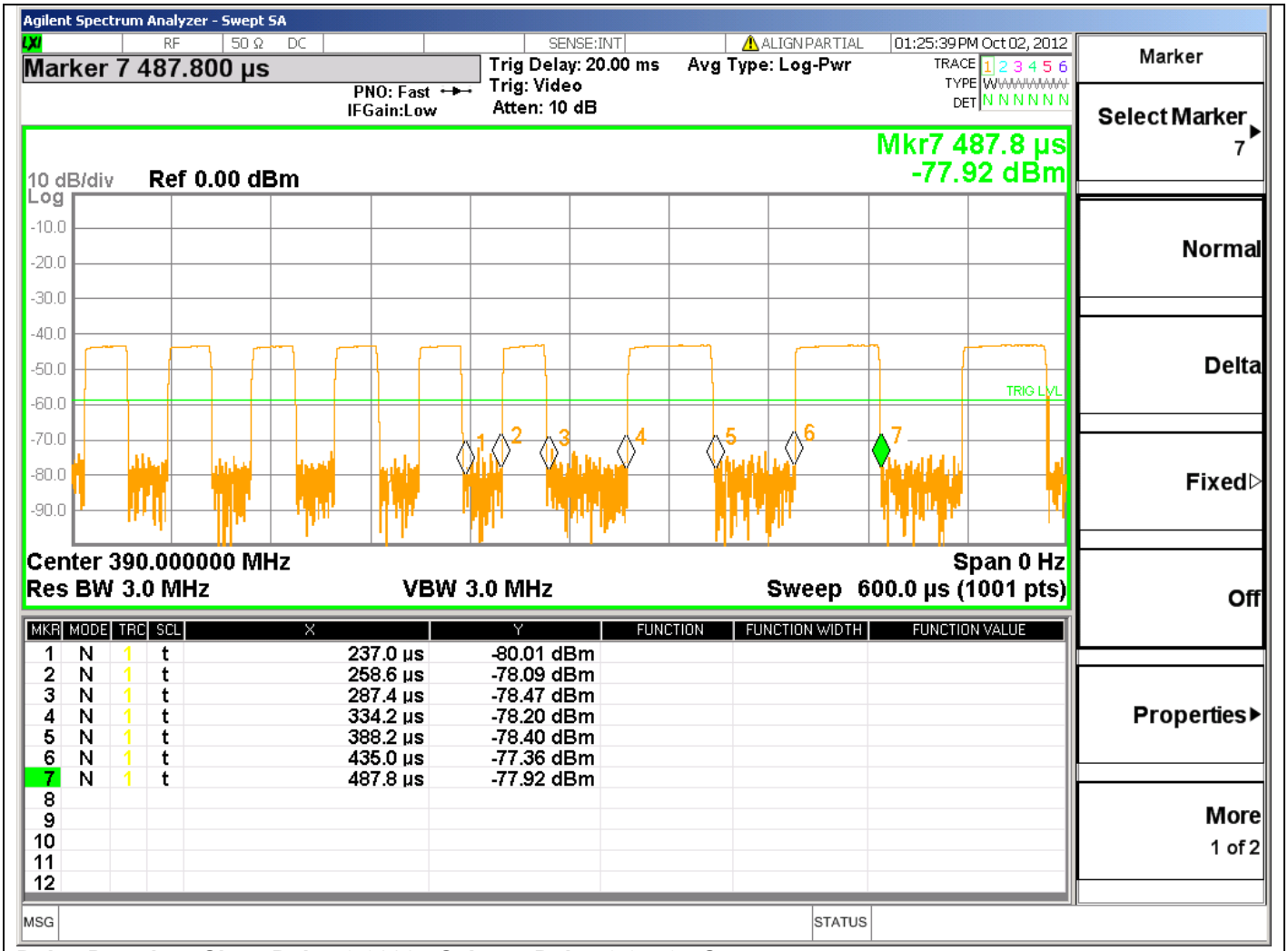
Figure 89 Pulse Train Graphs



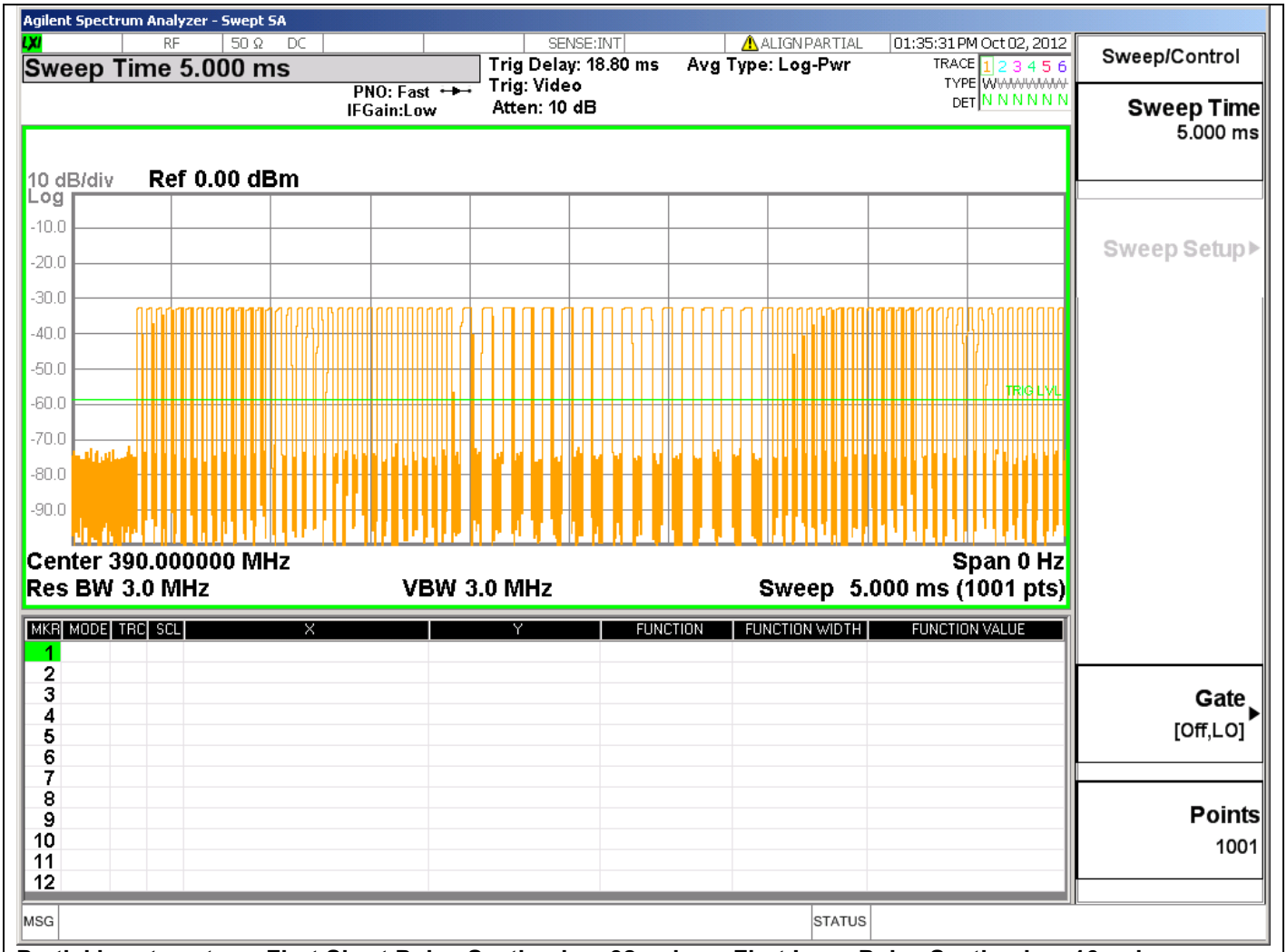
First tuning pulse: 0.177mS



Second tuning pulse: 0.348mS



Pulse Duration: Short Pulse 0.0288mS, Long Pulse 0.0540mS
Short Pulse off time: 0.0216mS, Long pulse off time: 0.0468mS



Partial burst capture: First Short Pulse Section has 32 pulses, First Long Pulse Section has 16 pulses.

4.14.4 Test Conditions and Results – RADIATED EMISSIONS Fundamental and Spurious

Test Description	Measurements were made in a 10-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4:2003. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter as noted. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.		
Basic Standard	47 CFR Part 15 subpart C, and RSS-210		
UL LPG	80-EM-S0029		
	Frequency range	Measurement Point	
Fully configured sample scanned over the following frequency range	30MHz – 1GHz	3 meter distance	
	1GHz – 4GHz	3 meter distance	

Restricted Band Limits

Frequency (MHz)	Limit (dBµV/m)	
	Quasi-Peak	Peak
30 - 88	40.00	NA
88 - 216	43.52	NA
216 - 960	46.02	NA
960 - 1000	54	NA
Above 1000 (FCC)	NA	54 (at 3-meter)

Fundamental Frequency Limits and Non-restricted band Harmonic Limits

Frequency (MHz)	Limit (dBµV/m) @ 3m distance All harmonics except those in restricted bands must be attenuated by 20dB or more	
	Average - Fundamental	Peak - Fundamental
390	79.24	99.24

Supplementary information: See section 4.14.3 for duty cycle information.

Figure 90 Radiated Emissions Graph (Below 1GHz)

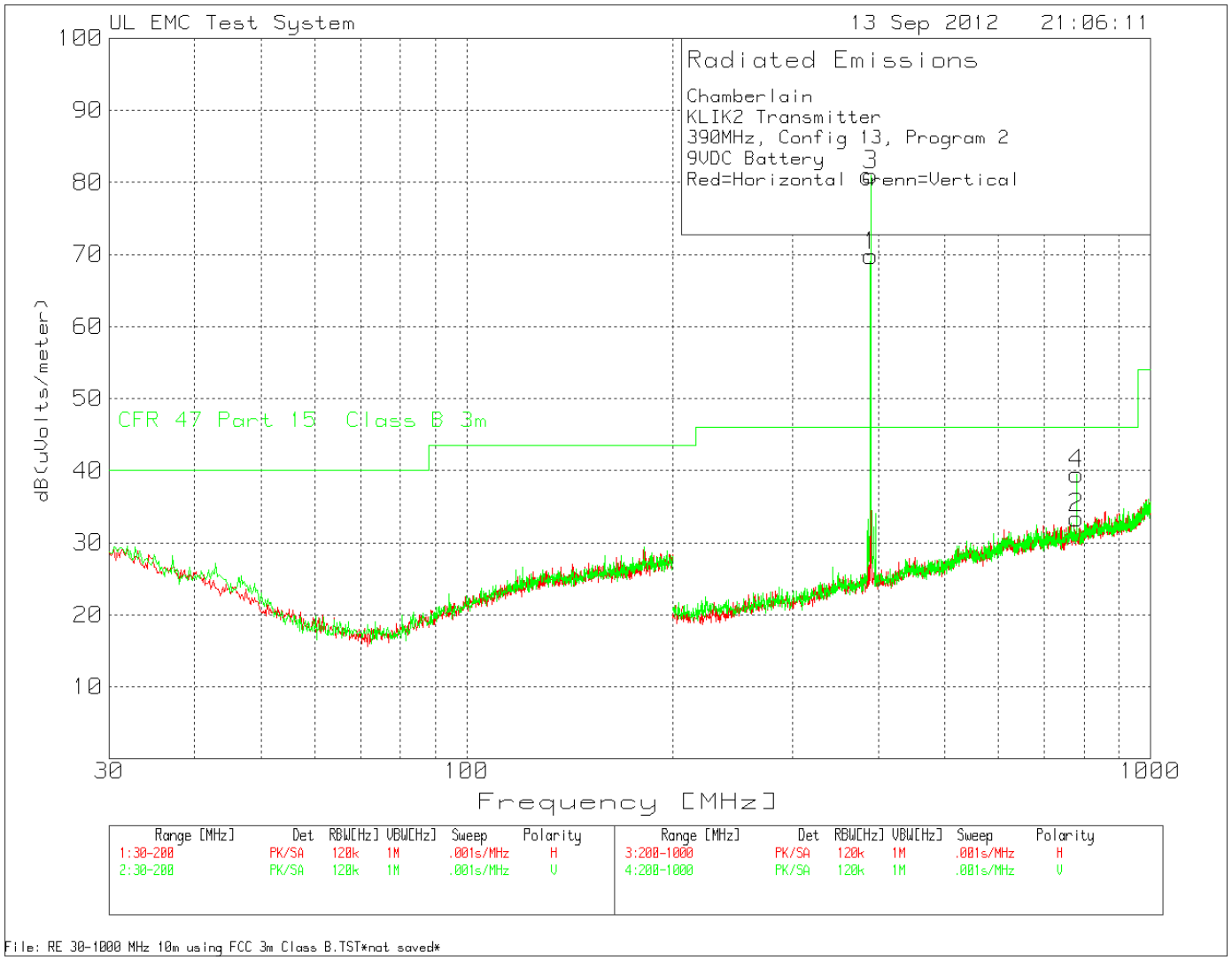


Figure 91 Radiated Emissions Graph (Above 1GHz)

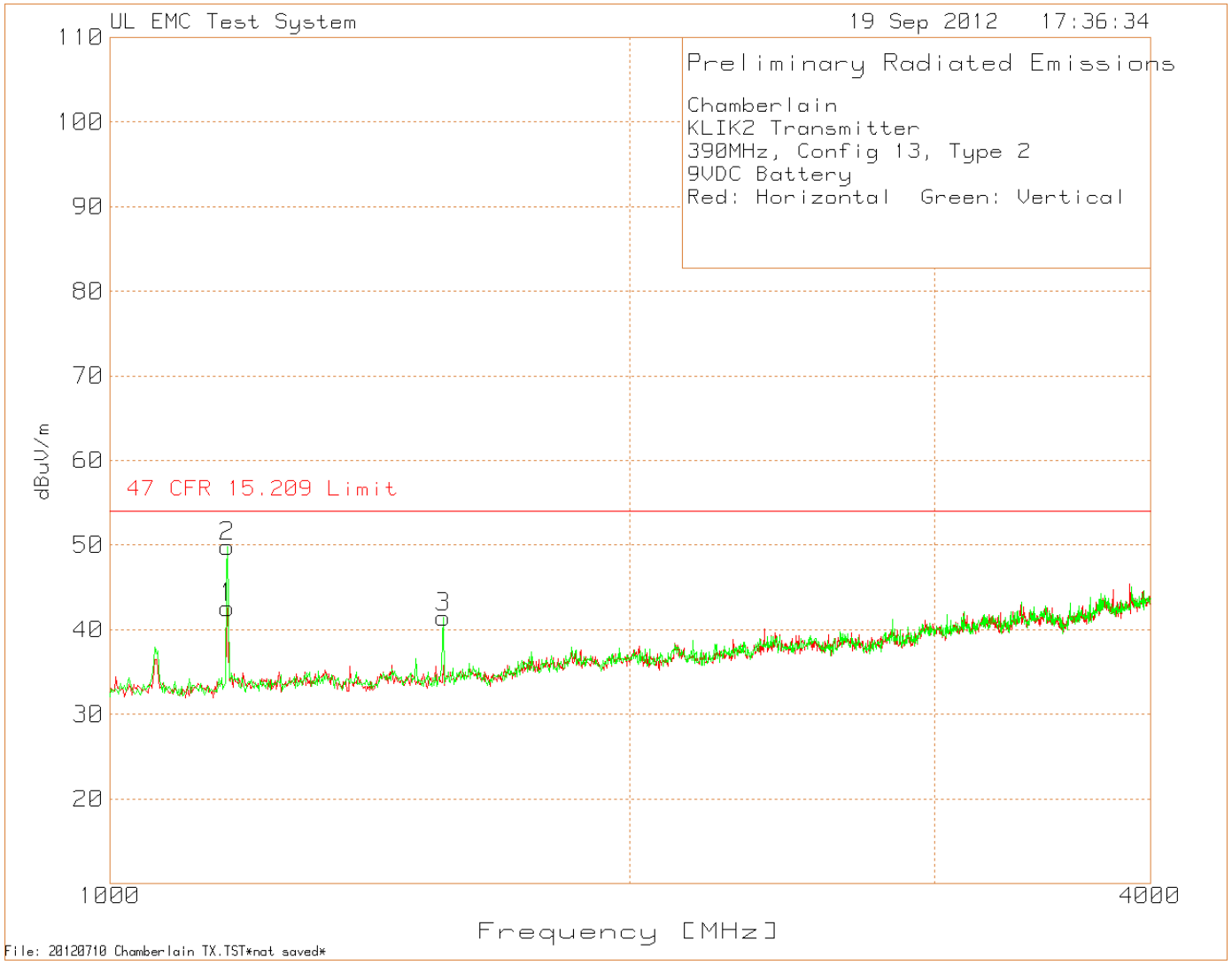


Table 121 - Radiated Emissions Data Points

Chamberlain
KLIK2C Transmitter
390MHz, Config 13, Type 2
9VDC Battery
Red: Horizontal Green: Vertical

Test Frequency MHz	Meter Reading dBuV	Detector	Antenna Factor dB	Path Loss Gain dB	Level dBuV/m	Duty Cycle Factor dB	Level with Duty Cycle dBuV/m	Limit @ 3m dBuV/m	Margin dB	Azimuth [Degs]	Height [cm]	Polarity
390.017597	60.83	QP	16.1	2.3	79.23	-5.16	74.07	79.24	-5.17	173	319	Horz
390.017597	59.96	PK	16.1	2.3	78.36	-5.16	73.2	79.24	-6.04	173	319	Horz
390.017597	64.76	QP	16.1	2.3	83.16	-5.16	78	79.24	-1.24	75	124	Vert
390.017597	63.87	PK	16.1	2.3	82.27	-5.16	77.11	79.24	-2.13	75	124	Vert
780.033623	10.62	QP	21.8	3.4	35.82	-5.16	30.66	46	-15.34	14	118	Horz
780.033623	12.79	PK	21.8	3.4	37.99	-5.16	32.83	46	-13.17	14	118	Horz
780.033623	25.59	QP	21.8	3.4	50.79	-5.16	45.63	46	-0.37	150	134	Vert
780.033623	25.65	PK	21.8	3.4	50.85	-5.16	45.69	46	-0.31	150	134	Vert
1169.9549	86.2	PK	24.8	-57.24	53.76	-5.16	48.6	54	-5.4	216	225	Horz
1170.0391	91.08	PK	24.8	-57.24	58.64	-5.16	53.48	54	-0.52	294	131	Vert
1560.374	71.93	PK	25.2	-55.65	41.48	-5.16	36.32	54	-17.68	*	102	Vert

* Peak prescan data, not maximized

Appendix A

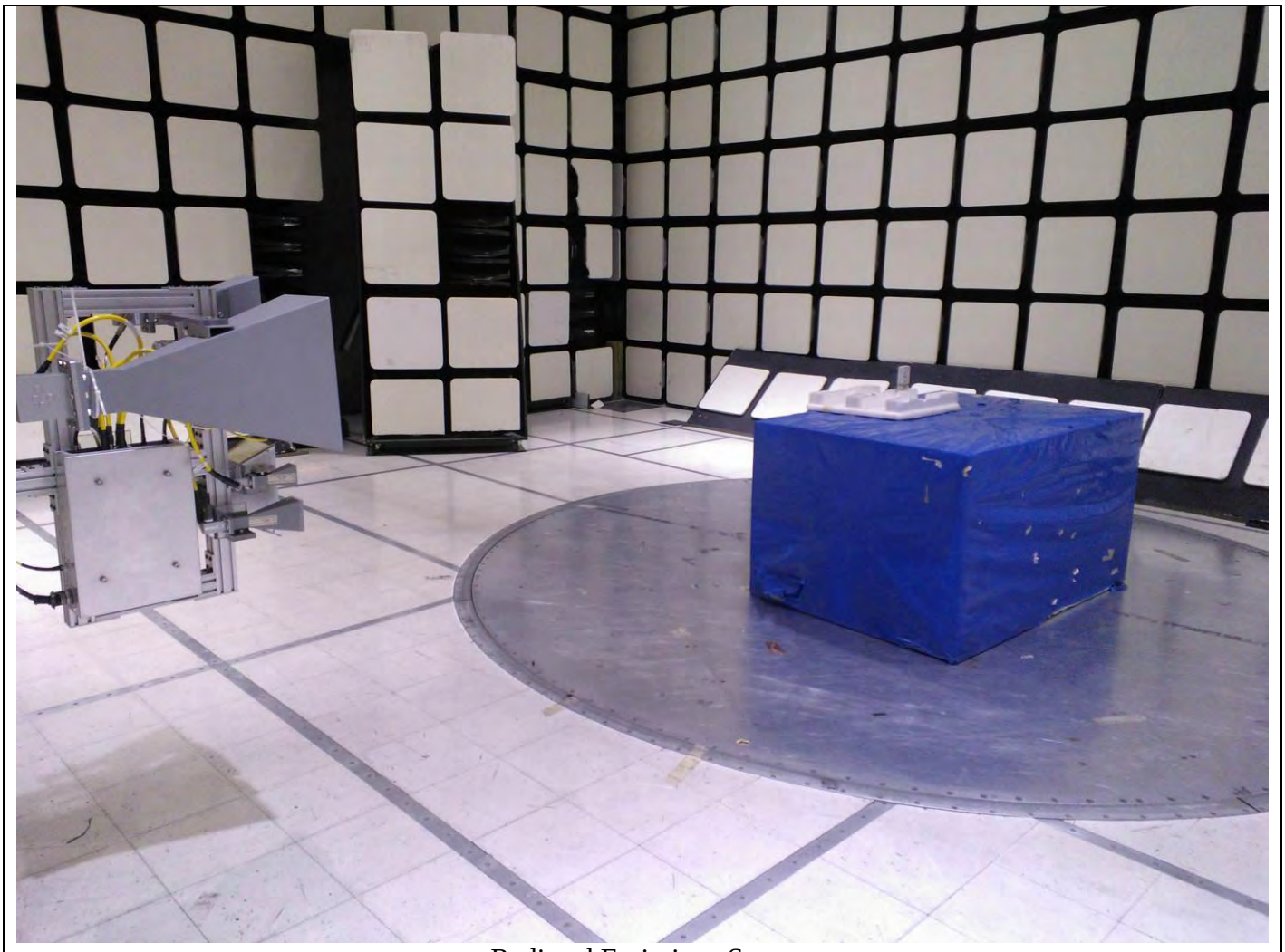
Test Equipment Used

Test Equipment Used for Near Field Measurements					
Description	Manufacturer	Model	Identifier	Cal Date	Cal Due Date
Spectrum analyzer	Agilent	PXA	EMC4360	20120515	20130515
Generic Loop Antenna	-	-	-	-	-

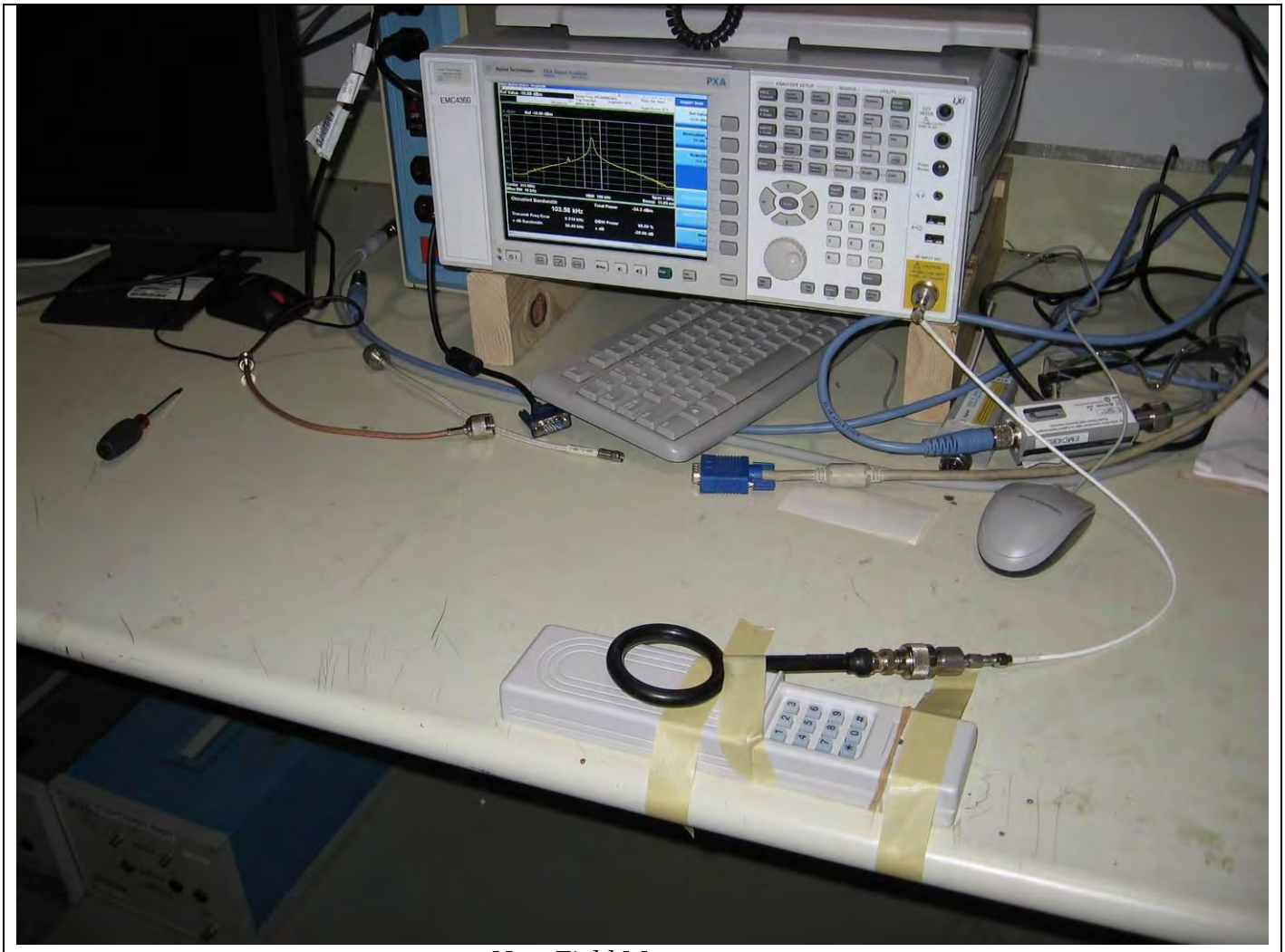
Test Equipment Used for Radiated Emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESU	EMC4323	20111228	20121231
Bicon Antenna	Chase	VBA6106A	EMC4078	20120117	20130131
Log-P Antenna	Chase	UPA6109	EMC4258	20110927	20120928
Log-P Antenna	Chase	UPA6109	EMC4313	20120807	20130831
Spectrum Analyzer	Rhode & Schwarz	FSEK	EMC4182	20111227	20121231
Antenna Array	UL	BOMS	EMC4276	20111227	20121231

Appendix B

Test Setup Photos



Radiated Emissions Setup



Near Field Measurements

Appendix C

Accreditations and Authorizations

NVLAP Lab code: 100414-0

NVLAP: The National Institute of Standards and Technology (NIST) administers the National Voluntary Laboratory Accreditation Program (NVLAP). NVLAP is comprised of laboratory accreditation programs (LAPs) which are established on the basis of requests and demonstrated need. Each LAP includes specific calibration and/or test standards and related methods and protocols assembled to satisfy the unique needs for accreditation in a field of testing or calibration. NVLAP accredits public and private laboratories based on evaluation of their technical qualifications and competence to carry out specific calibrations or tests. Accreditation criteria are established in accordance with the U.S. Code of Federal Regulations (CFR, Title 15, Part 285), NVLAP Procedures and General Requirements, and encompass the requirements of ISO/IEC 17025. For a full scope listing see http://ts.nist.gov/standards/scopes/1004140.htm

FCC: Details of the measurement facilities used for these tests have been filed with the Federal Communications Commission's Laboratory in Columbia, Maryland (Ref. No. 91044).

Industry Canada Industrie Canada

Industry of Canada: Accredited by Industry Canada for performance of radiated measurements. Our test site complies with RSP 100, Issue 7, Section 3.3. File #: IC 2180

VCCI: Accepted as an Associate Member to the VCCI. The measurement facilities detailed in this test report have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. Registration Nos.: Radiated Emissions R-621, Conducted Emissions C-642.

ICASA: ICASA (Independent Communications Authority of South Africa) has appointed UL as a Designated Test Laboratory to test Telecommunications equipment for type approval in compliance with CISPR 22 to assist in fulfilling its mandate under section 54(1) of the Telecommunications Act, 1996 (Act 103 of 1996).

NIST/CAB: Validated by the European Commission as a U.S. Conformity Assessment Body (CAB) of the U.S.-EU Mutual Recognition Agreement (MRA) for the Electromagnetic Compatibility - Council Directive 2004/108/EC, Annex III (2-3). Also validated for the Telecommunication Equipment-Council Directive 99/5/EC, Annex III and IV, Identification Number: 0983.
NIST/CAB: Provisioned to act as a U.S. Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the Asia Pacific Economic Cooperation (APEC) MRA between the American Institute in Taiwan (AIT) and the United States. Our laboratory is considered qualified to test equipment subject to the applicable EMC regulations of the Chinese Taipei Bureau of Standards, Metrology and Inspection (BSMI) which require testing to CNS 13438 (CISPR 22).
NIST/CAB: Recognized by the Infocomm Development Authority of Singapore (IDA) under the Asia Pacific Economic Cooperation Mutual Recognition Agreement (APEC MRA). Our laboratory is provisionally designated to act as a Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the APEC MRA. Our scope of designation includes IDA TS EMC (CISPR 22), IEC 61000-4-2, -4-3, -4-4, -4-5, and -4-6