FCC PART 90 SUBPART F

CERTIFICATION TEST REPORT

FOR

COUNTERBOMBER RADAR

MODEL NUMBER: CB3

FCC ID: 2AIY5CB3

REPORT NUMBER: 16M23386-E1V3

ISSUE DATE: NOVEMBER 8, 2016

Prepared for

LOCKER, LLC
12525 CHARDON AVENUE
HAWTHORNE, CALIFORNIA 90250 U.S.A.

Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	08/12/2016	Initial Issue	M. Heckrotte
V2	10/14/2016	Revised TOC Numbering, section 7.6.1	M. Heckrotte
V3	11/08/2016	Revised “Prepared By” company on cover, removed RF Exposure section	M. Heckrotte

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: LOCKER, LLC
12525 CHARDON AVENUE
HAWTHORNE, CALIFORNIA 90250 U.S.A.

EUT DESCRIPTION: FM/CW RADAR

MODEL: CounterBomber 3 (CB3)
SYSTEM NUMBER: SET-A139412-00.00.00 REV 0.2
SERIAL NUMBER: JOE

DATE TESTED: May 23 to July 28, 2016

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC Part 90 Subpart F	Pass
FCC Part 2 Subpart J	Pass

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL VS By:

MICHAEL HECKROTTE
PRINCIPAL ENGINEER
UL Verification Services Inc.

Tested By:

STEVE AGUILAR
EMC ENGINEER
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 90, NTIA Report 84-157 “Measurement Procedures for the Radar Spectrum Engineering Criteria” August 1984, NTIA Report TR-05-420 “Measurement Procedures for the Radar Spectrum Engineering Criteria (RSEC)” March 2005, and NTIA Manual of Regulations and Procedures for Federal Radio Frequency Management May 2013 Edition (Rev. 5/2014) [in this report this document is denoted as “NTIA 2014 Manual”].

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
☒ Chamber A	☐ Chamber D
☐ Chamber B	☐ Chamber E
☐ Chamber C	☐ Chamber F
	☐ Chamber G

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/2000650.htm.

Notes:

1. The Occupied Bandwidth measurements and RF Exposure evaluation are within the scope of the Laboratory’s NVLAP accreditation.
2. All other measurements documented in this report are outside the scope of the Laboratory’s NVLAP accreditation.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	±3.52 dB
Radiated Disturbance, 30 to 1000 MHz	±4.94 dB
Radiated Disturbance, 1 to 6 GHz	±3.86 dB
Radiated Disturbance, 6 to 18 GHz	±4.23 dB
Radiated Disturbance, 18 to 26 GHz	±5.30 dB
Radiated Disturbance, 26 to 40 GHz	±3.23 dB
Radiated Disturbance, 40 GHz above	±3.50dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an FM/CW radar operating in the 33.4 to 36.0 GHz band.

- FM/CW radar
- Operating frequency 35 to 36 GHz
- Linear FM Frequency sweep direction is high-to-low
- Total frequency deviation (Chirp Width) 235 MHz
- Chirp Period (Duration) 214 us
- Flyback time 6 us
- Maximum Conducted Tune-up power +17 dBm / 0.05 W
- Four fixed channels

5.2. OUTPUT POWER

The maximum conducted output power is 16.7 dBm (0.047 W)

5.3. BANDWIDTH / EMISSION DESIGNATOR

The Necessary Bandwidth is 235 MHz and the emission designator is 235MF3N.

5.4. DESCRIPTION OF ANTENNA

The antenna is an integral dish antenna with a diameter of 16.5 inches (0.419 meters) and a gain of 39 dBi.

5.5. SOFTWARE AND FIRMWARE

The software used during testing was Release: 3.4.3, version 4.0.15.7969

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST			
Description	**Manufacturer**	**Model**	**Serial Number**
Laptop	Panasonic	CF-31ATNJX2M	0JKYA308800JKYA30880
Laptop Power supply	Panasonic	CF-AA1653A	1653AMA07704441A

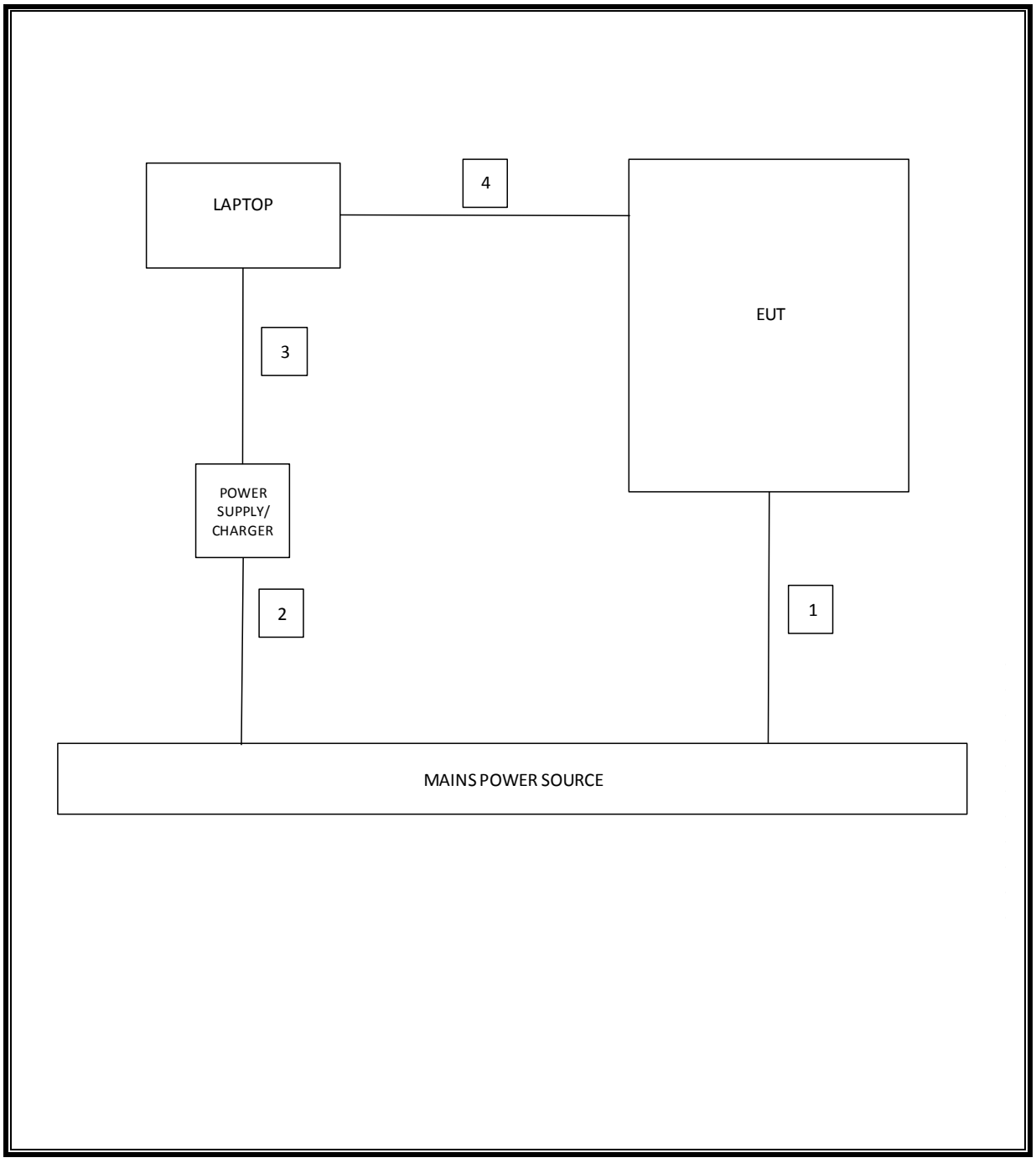
I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	1	3-Prong	Unshielded	30.5	EUT Mains
2	AC	1	3-Prong	Unshielded	0.9	Laptop Mains
3	DC	1	Barrel	Sheilded	1.8	Laptop DC
4	Ethernet	1	RJ45	Sheilded	45.7	--

TEST SETUP

A laptop computer was utilized to adjust the EUT for testing purposes.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List					
Description	**Manufacturer**	**Model**	**S/N**	**Local ID (T No.)**	**Cal Due**
PXA Signal Analyzer	Agilent	N9030A	MY52350427	313	8/4/2016
Horn antenna, 33-50 GHz	CMI	HO22R	--	--	CNR
Filter, 50 GHz LPF	Spacek	LPF5-60-8-22	14L20	1099	1/21/2017
LNA, 40-50 GHz	Spacek	SL4510-33-4W	14J05	1099	1/21/2017
Horn Antenna, 50-75 GHz	CMI	HO15R	--	--	CNR
LNA, 50-75 GHz	Vivatech	VTLNA-15-6018-FB	2013051	--	5/30/2017
Harmonic Mixer, 50-80 GHz	Agilent	M1970V	MY51390830	994	12/12/2016
Horn Antenna, 75-110 GHz	CMI	HO10R	--	--	CNR
LNA, 75-110 GHz	Spacek	SLW-22-5	15J04	1600079	7/1/2017
Harmonic Mixer, 75-110 GHz	Agilent	M1970W	MY51430784	993	8/11/2016
Horn Antenna, 110-170 GHz	CMI	HO6R	--	--	CNR
LNA, 110-170 GHz	Vivatech	VTLNA-06S01	2015085	--	7/1/2017
Harmonic Mixer, 110-170 GHz	OML	M06HWDXA	F90519-2	150918-1	9/18/2016
Horn Antenna, 170-260 GHz	CMI	HO4R	--	--	CNR
Harmonic Mixer, 170-260 GHz	OML	M04HWDXA	150918-1	--	9/18/2016
Fixed Attenuator, 6 dB, 40 GHz	Midwest Microwave	ATT-0640-06--29M-02	--	--	5/16/2017
33 GHz Detector, characterized to 40 GHz	Agilent	8474C	207	116	5/16/2017
Oscilloscope, 8 GHz	Agilent	DSA90804A	MY51420139	215	6/11/2016 *
Analog Signal Generator, 40 GHz	Agilent	E8257D	MY48050681	181	10/1/2016
33-50 GHz Mixer	HP	11970Q	3003A03363	47	5/16/2017
Filter, 250-1000 MHz BPF	EWT	EWT-S70248	R1	1120	12/29/2016
Preamp, 1000 MHz	Sonoma	310N	--	286	6/4/2017
Spectrum Analyzer	HP	8564E	--	106	8/14/2016
Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	2093387	449	5/26/2017
PreAmplifier, 1-26.5GHz	Agilent	8449B	3008A04710	404	7/5/2017
Horn Antenna, 26-40 GHz	ARA	MWH-2640/B	1029	90	7/27/2016*
Preamplifier, 26-40 GHz	Miteq	NSP4000-SP2	924343	88	4/7/2017
PXA Signal Analyzer	Agilent	N9030A	MY53310968	908	4/13/2017
Hybrid Antenna, 30-1000 MHz	Sunol Sciences	JB3	A051314-2	899	6/26/2017
Preamp, 1000 MHz	Sonoma	310N	--	300	11/5/2016
Horn Antenna, 1-18 GHz	ETS Lindgren	3117	--	346	2/22/2017
RF PreAmplifier, 1-18 GHz	Miteq	AFS42-00101800-25-S-42	--	493	3/9/2017
Conducted Software	UL	UL EMC	Ver 9.5, July 22, 2014		
Radiated Software	UL	UL EMC	Ver 9.5, July 22, 2014		

* Equipment used before due date.

7. APPLICABLE LIMITS AND TEST RESULTS

7.1. RADAR CRITERIA CATEGORY

This radar falls under NTIA RSEC Criteria A

7.2. §2.1046 – RF power output

7.2.1. Limit

1 Watt (+30 dBm) Peak

Limit associated with the applied spurious mask in accordance with NTIA 2014 Manual, Section 5.5.7.1

7.2.2. Procedure

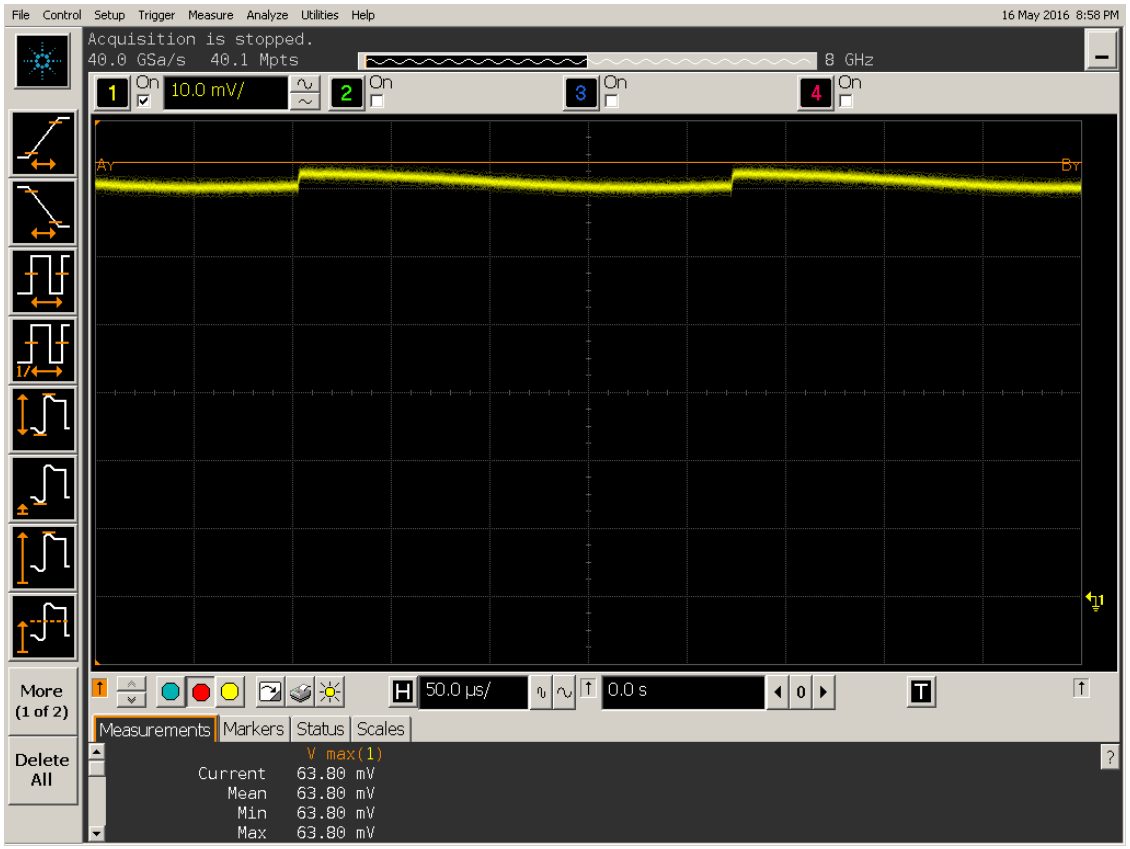
NTIA Report TR-05-420 Section 2 TRANSMITTER OUTPUT POWER DETERMINATION

7.2.3. Results

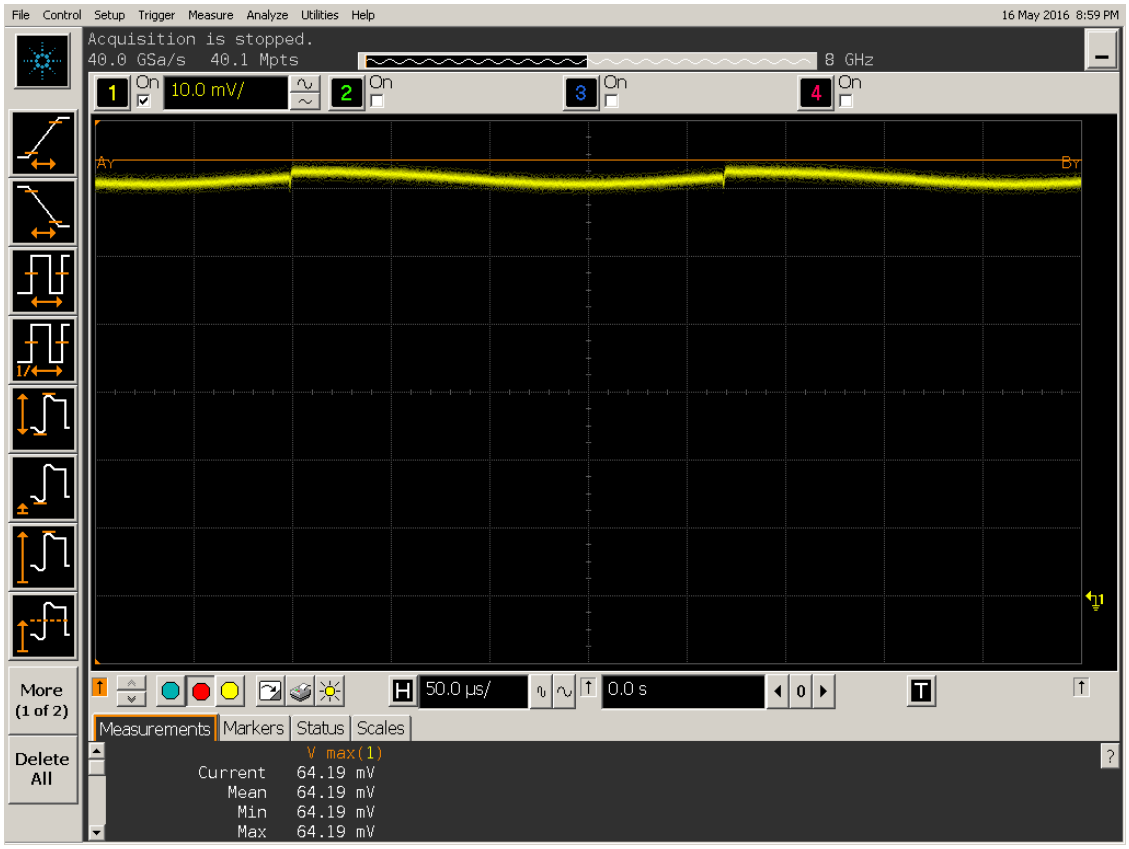
Channel	Peak Detector Voltage (mV)	Substitution Power (dBm)	External Pad (dB)	Peak Transmitter Power (dBm)	Peak Transmitter Power (mW)
Low	63.8	9.41	7.17	16.58	45.50
Mid	64.2	9.51	7.18	16.69	46.67
High	64.1	9.40	7.22	16.62	45.92

DETECTOR OUTPUT VOLTAGE

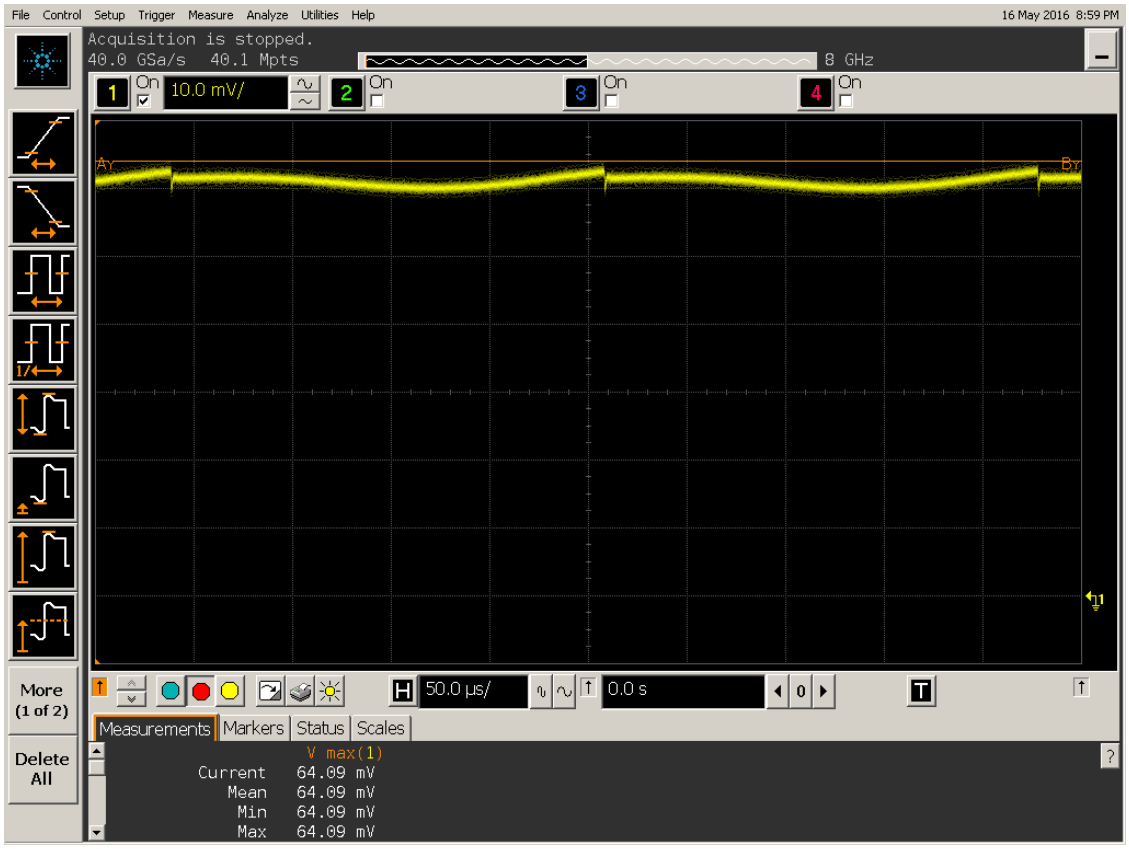
LOW CHANNEL DETECTOR VOLTAGE



MID CHANNEL DETECTOR VOLTAGE



HIGH CHANNEL DETECTOR VOLTAGE



7.3. §2.1047 – Modulation characteristics

7.3.1. Limit

None; reporting requirement only.

$B_{FM/CW}$ = Total frequency deviation for the carrier frequency for the FM/CW radar system.

$T_{FM/CW}$ = The FM (chirp) period for the FM/CW radar system.

The -40 dB bandwidth B(-40 dB), Necessary bandwidth B_n, and emission designator are calculated or derived from the above parameters.

7.3.2. Procedure

NTIA Report TR-05-420 Section 3.2.2 Pulse modulation parameter measurement procedures

An HP/Keysight 11970Q 33-50 GHz harmonic mixer is utilized to downconvert the 36 GHz radar signal to approximately 500 MHz. The mixer is operated on the 8th harmonic of the LO drive. The LO frequency is adjusted separately for each radar channel; the adjustment range of 4.32 to 4.42 GHz falls within the specified LO range for this mixer. The IF output from the mixer feeds the oscilloscope via a 250-1000 MHz bandpass filter and a 1000 MHz / 32 dB gain low noise amplifier.

An Agilent/Keysight DSO90804A 8 GHz oscilloscope with Agilent/Keysight 89600 Vector Signal Analyzer software is configured for FM Demodulation. The VSA Center Frequency is set to 500 MHz and the VSA Span is set to 384 MHz.

NTIA 2014 Manual section 5.5.4 Non-Hopping Radar -40 dB Bandwidth Equations

NTIA 2014 Manual ANNEX J Guidance for Determination of Necessary Bandwidth

EQUATIONS

The VSA Channel Center is calculated as:

VSA Channel Center = VSA Center Freq + (Relative Deviation High + Relative Deviation Low) / 2

The Total FM Deviation is calculated as:

Total FM Deviation = Relative Deviation High – Relative Deviation Low

The FM Chirp Period is calculated as:

FM Chirp Period = Total Period – Flyback Time

The Channel Center Frequency is calculated as:

Channel Center Frequency = 8 * LO Frequency + VSA Channel Center

The Channel Low Frequency is calculated as:

Channel Low Frequency = Channel Center Frequency – Total FM Deviation / 2

The Channel High Frequency is calculated as:

Channel High Frequency = Channel Center Frequency + Total FM Deviation / 2

The -40 dB Bandwidth B(-40 dB) is calculated in accordance with NTIA 2014 Manual section 5.5.4 Equation 3:

For FM/CW: $$Eq.3: B(-40dB) = 1.2 * B_{FM/CW}\left(1+\frac{200}{\pi\sqrt{B_{FW/CW}T_{FM/CW}}}\right)^{1/2}$$

$B_{FM/CW}$ = Total frequency deviation for the carrier frequency for the FM/CW radar system.
$T_{FM/CW}$ = The FM (chirp) period for the FM/CW radar system.
NOTE: $B_{FW/CW}$ is a typo and actually refers to $B_{FM/CW}$.

The Necessary Bandwidth B_n is $2*B_d$ in accordance with NTIA Manual 2014 ANNEX J Table A, where B_d = Bandwidth of the frequency deviation (peak difference between instantaneous frequency of the modulated wave and the carrier frequency for FM/CW radar systems).
Since $B_d = (B_{FM/CW})/2$, $B_n = B_{FM/CW}$.

7.3.3. Results

Channel	VSA Center Freq (MHz)	Relative Deviation Low (MHz)	Relative Deviation High (MHz)	VSA Channel Center (MHz)	Total FM Deviation (MHz)
Low	500	-110.111	116.934	503.4115	227.045
Mid	500	-117.887	117.104	499.6085	234.991
High	500	-106.039	112.519	503.2400	218.558

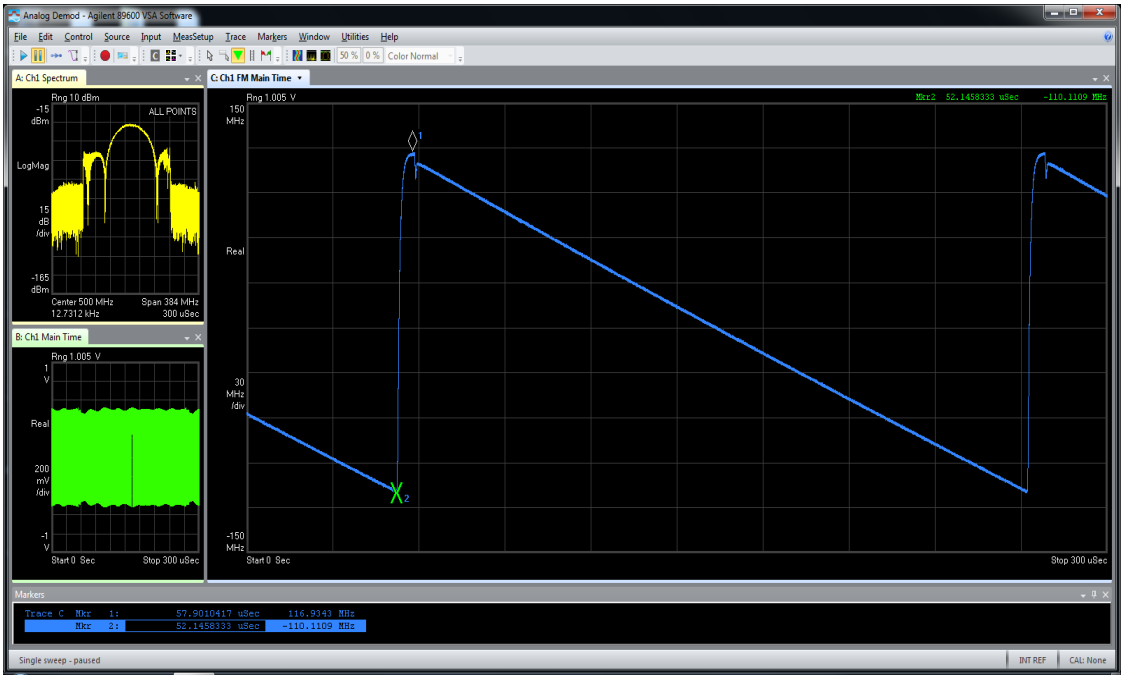
Channel	Total Period (us)	Flyback Time (us)	FM Chirp Period (us)	B(-40 dB) (MHz)	Necessary Bandwidth (MHz)
Low	220.292	5.755	214.537	309.280	227.045
Mid	219.951	6.438	213.513	319.577	234.991
High	219.792	6.427	213.365	298.453	218.558

Channel	LO Freq (GHz)	8 * LO Freq (GHz)	Channel Center Freq (GHz)	Channel Low Freq (GHz)	Channel High Freq (GHz)
Low	4.329	34.632	35.135	35.0219	35.2489
Mid	4.361	34.888	35.388	35.2701	35.5051
High	4.420	35.360	35.863	35.7540	35.9725

The emission designator is 235MF3N.

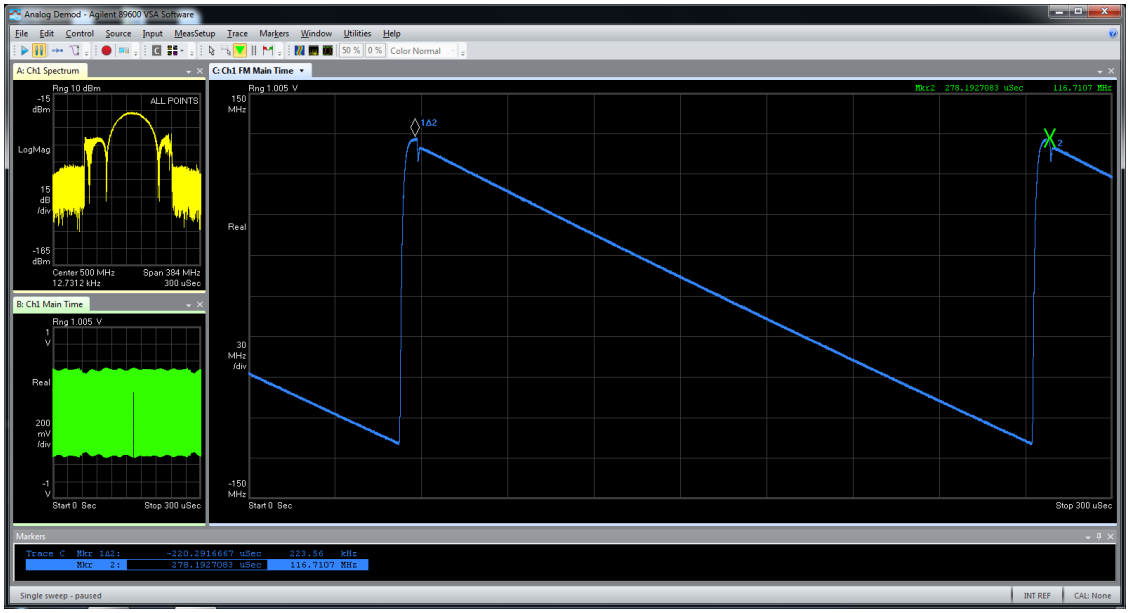
LOW CHANNEL – FREQUENCY

LOW CHANNEL DEVIATION

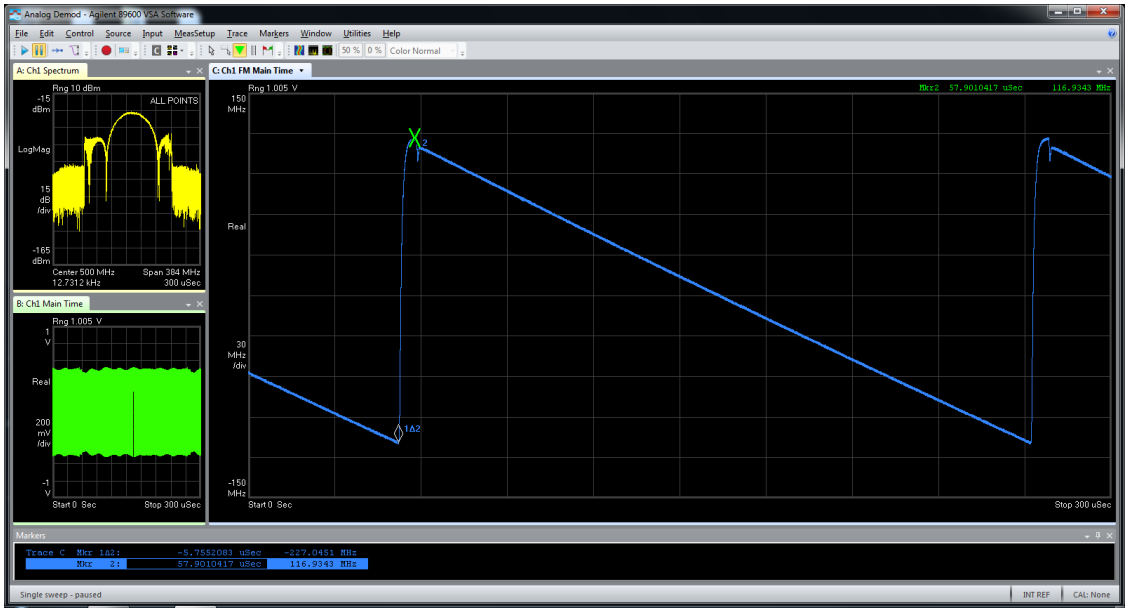


LOW CHANNEL – TIME

LOW CHANNEL TOTAL PERIOD

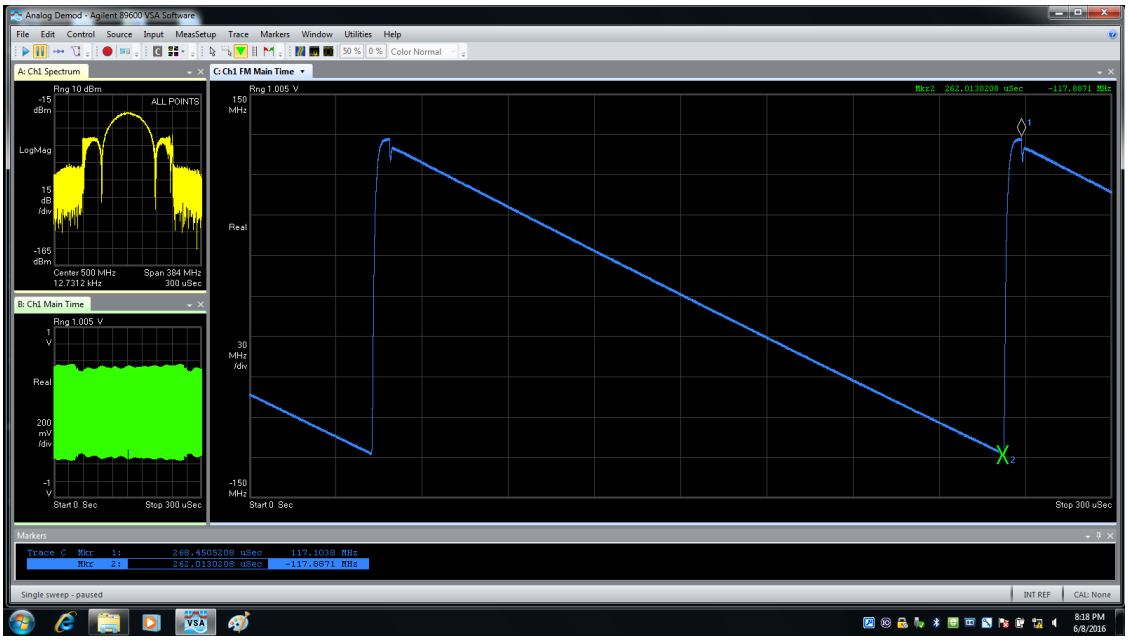


LOW CHANNEL FLYBACK TIME



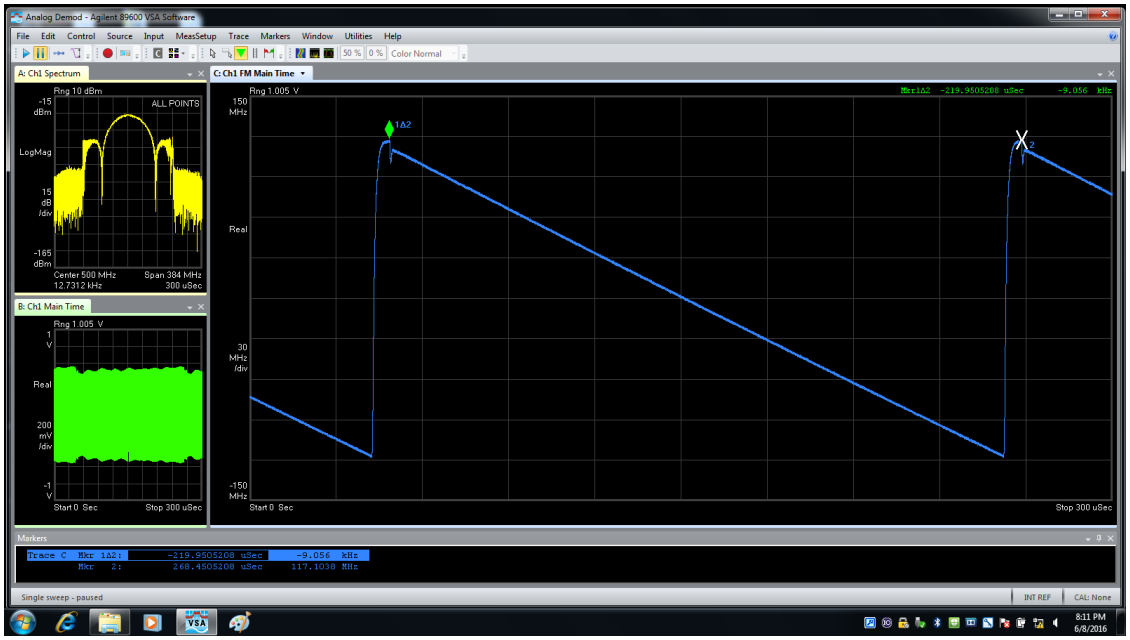
MID CHANNEL – FREQUENCY

MID CHANNEL DEVIATION

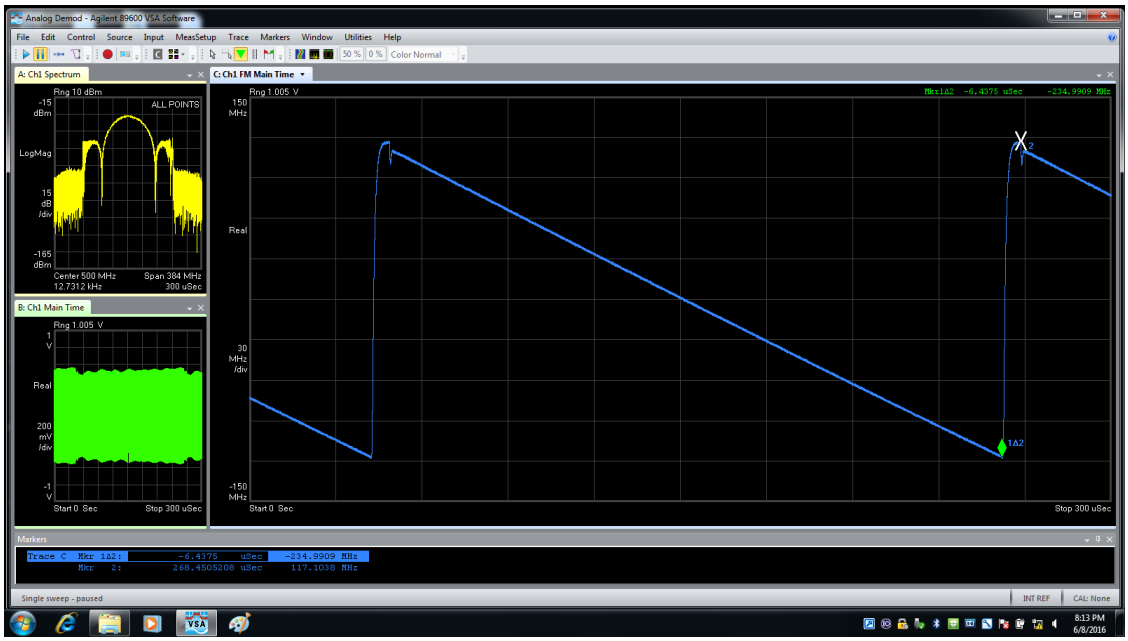


MID CHANNEL – TIME

MID CHANNEL TOTAL PERIOD

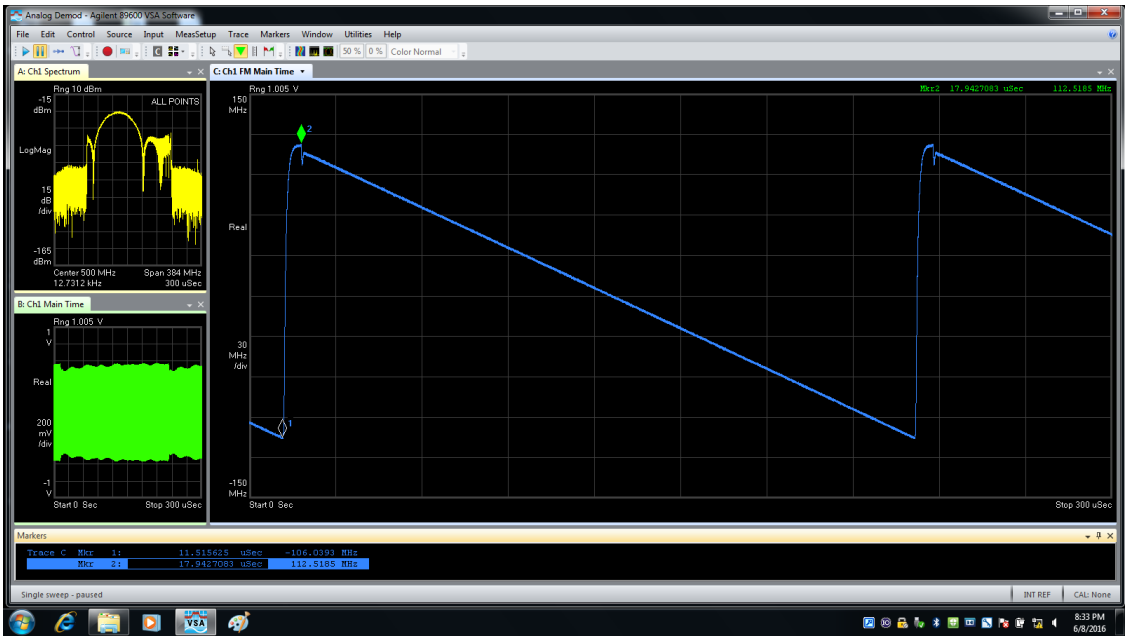


MID CHANNEL FLYBACK TIME



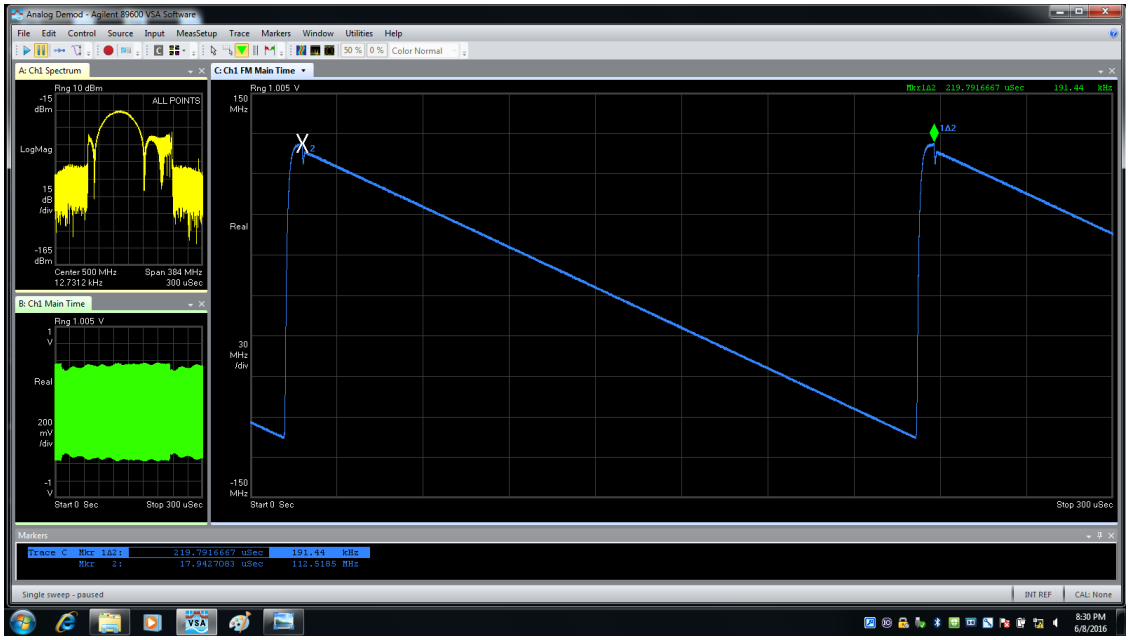
HIGH CHANNEL – FREQUENCY

HIGH CHANNEL DEVIATION

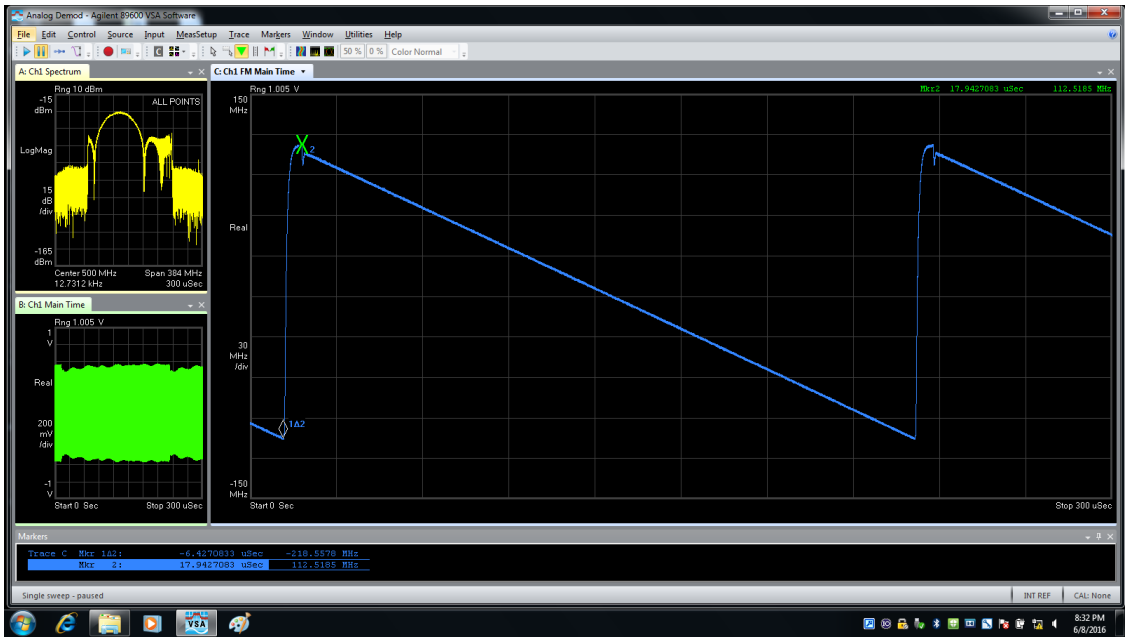


HIGH CHANNEL – TIME

HIGH CHANNEL TOTAL PERIOD



HIGH CHANNEL FLYBACK TIME



7.4. §2.1049 – Occupied bandwidth

7.4.1. Limits

99% Occupied BW <= Necessary Bandwidth

The 99% Occupied BW must remain within the authorized band.

In accordance with §90.103 (b) RADIOLOCATION SERVICE FREQUENCY TABLE, the applicable authorized band is 33,400 to 36,000 MHz.

7.4.2. Procedure

ANSI C63.10-2013 Clause 6.9

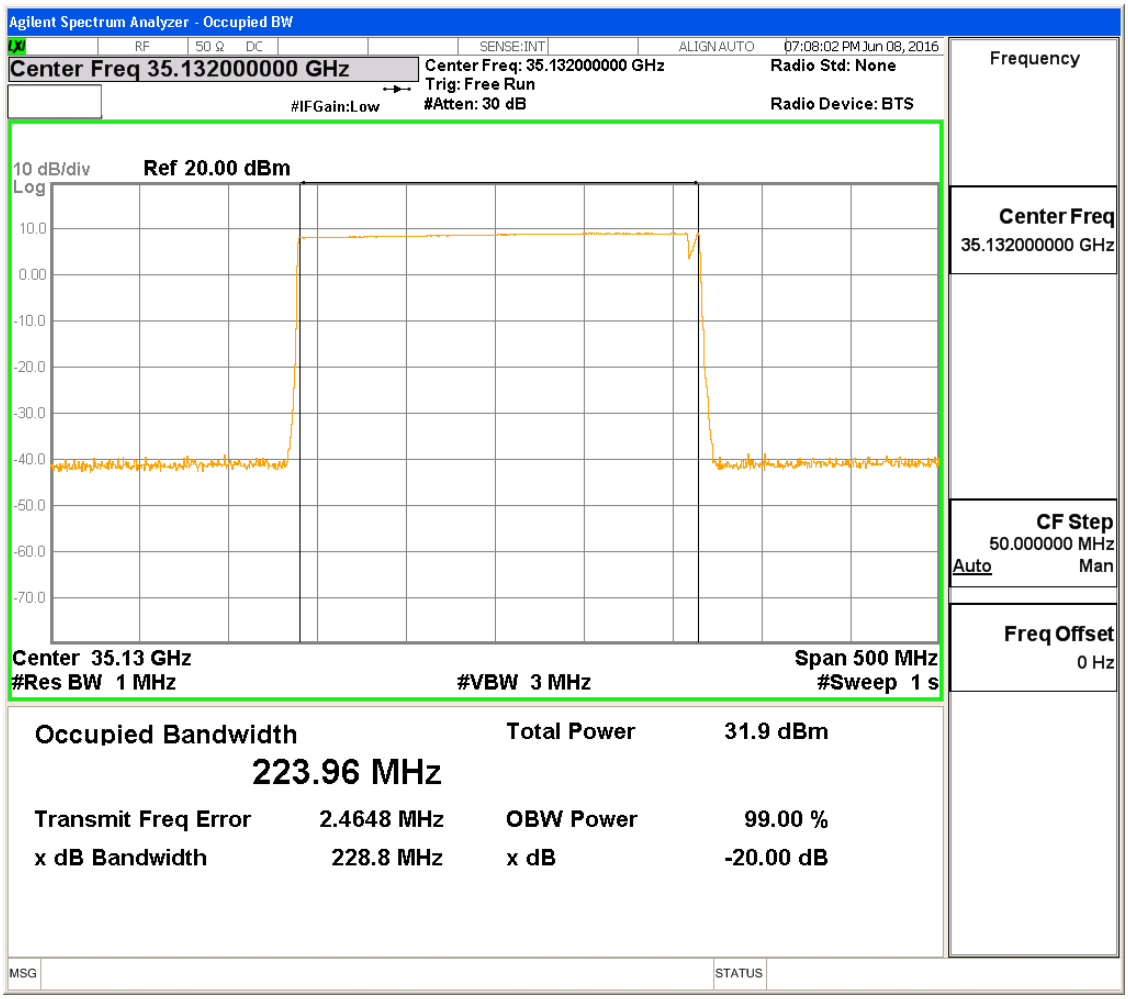
7.4.3. Results

Channel	99% Occupied Bandwidth (MHz)	Necessary Bandwidth (MHz)	Channel Center Freq (GHz)	CF - OccBW/2 (GHz)	CF + OccBW/2 (GHz)	Authorized Band (GHz)
Low	223.960	227.045	35.135	35.023		33.4
Mid	232.300	234.991				
High	216.100	218.558	35.863		35.971	36.0

Including Frequency Drift				
Absolute Drift (GHz)	Channel	CF - OccBW/2 - Drift (GHz)	CF + OccBW/2 + Drift (GHz)	Authorized Band (GHz)
0.006	Low	35.017		33.4
	High		35.977	36.0

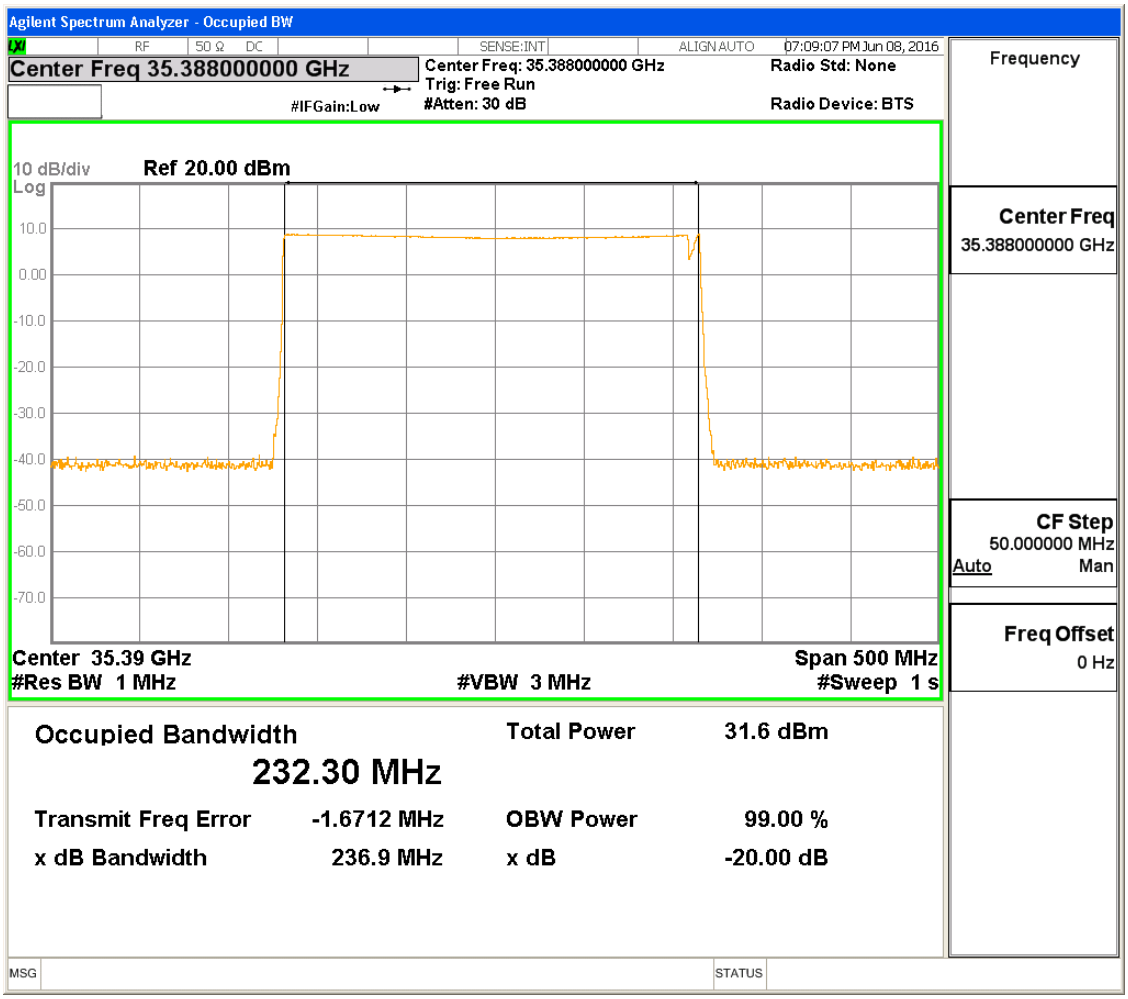
LOW CHANNEL BANDWIDTH

LOW CHANNEL BANDWIDTH



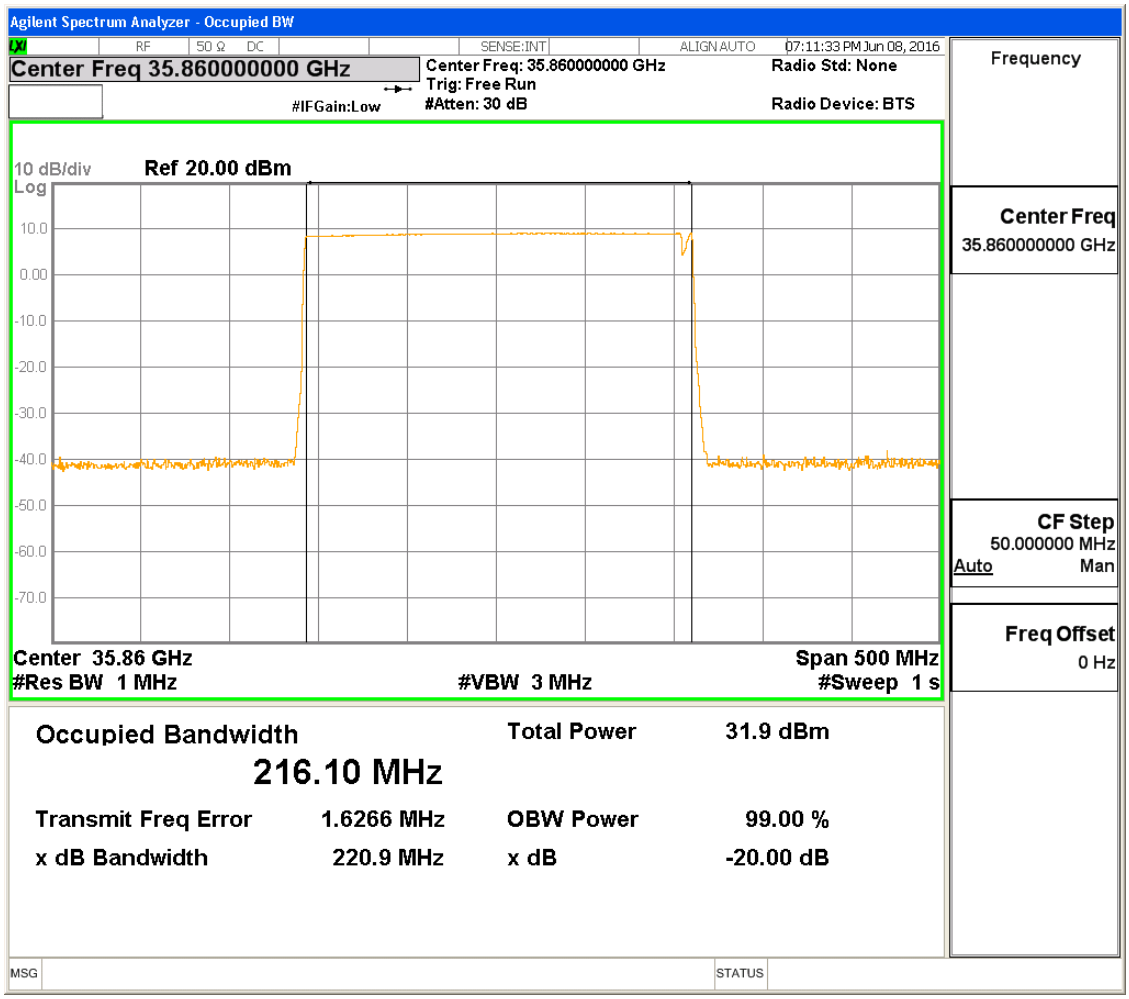
MID CHANNEL BANDWIDTH

MID CHANNEL BANDWIDTH



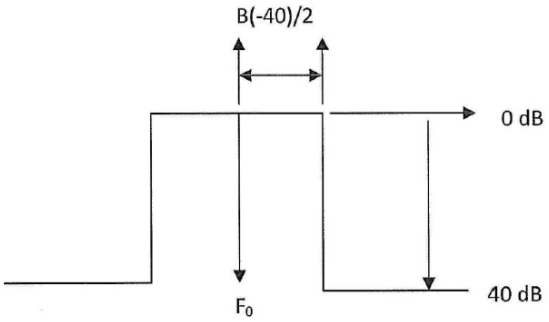
HIGH CHANNEL BANDWIDTH

HIGH CHANNEL BANDWIDTH



7.5. §2.1051 – Spurious emissions at antenna terminals

7.5.1. Limit



RSEC A Mask for systems with peak power equal to and below 1 watt

7.5.2. Procedure

NTIA Report TR-05-420 Section 5 EMISSION SPECTRA

NTIA Report TR-05-420 Appendix C.2.1 Stepped Measurement Algorithm

NTIA Report TR-05-420 Appendix C.4 Dynamic Range of the Measurement System

NTIA Report 84-157 Section 3.3. Frequency Test Range for Spurious Emissions

7.5.3. Results

Emission Mask break point frequencies

Channel	Channel Center Freq (GHz)	B(-40 dB) (MHz)	CF - B(-40 dB)/2 (GHz)	CF + B(-40 dB)/2 (GHz)
Low	35.135	309.280	34.981	35.290
Mid	35.388	319.577	35.228	35.547
High	35.863	298.453	35.714	36.012

Frequency test range for spurious emissions

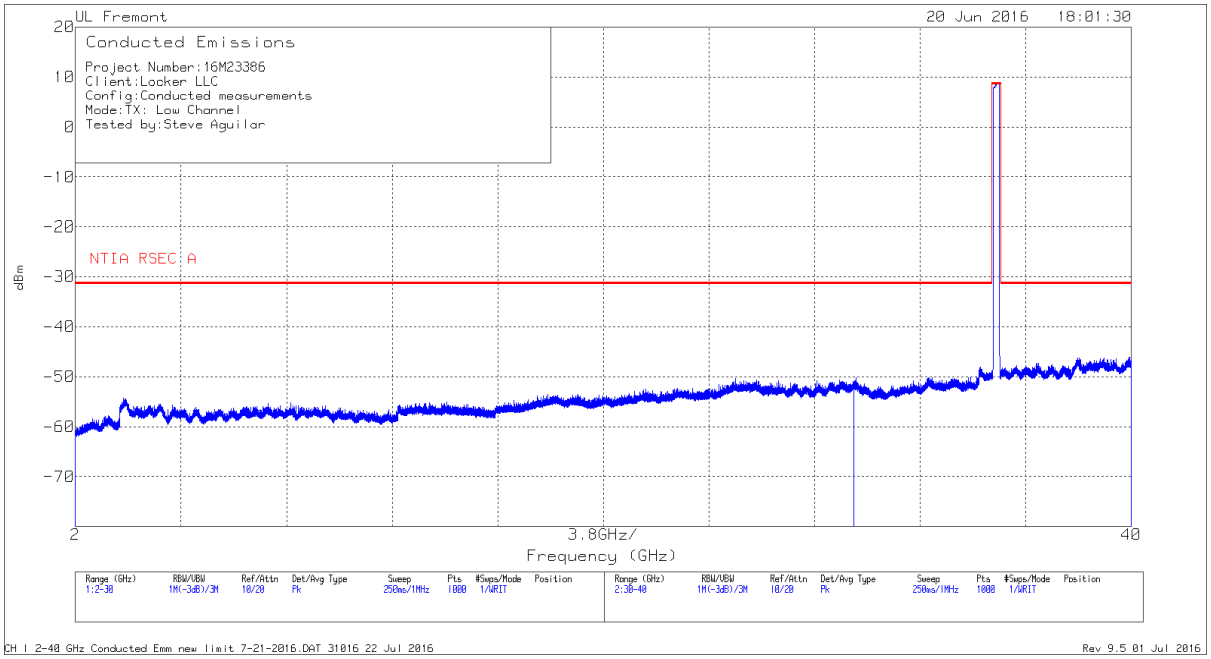
F(base) is 2.19 GHz and the lowest 0.5 F(0) is 17.5 GHz, therefore F(Min) is 2.19 GHz.

The highest F(0) is 36 GHz, therefore F(Max) = 40 GHz

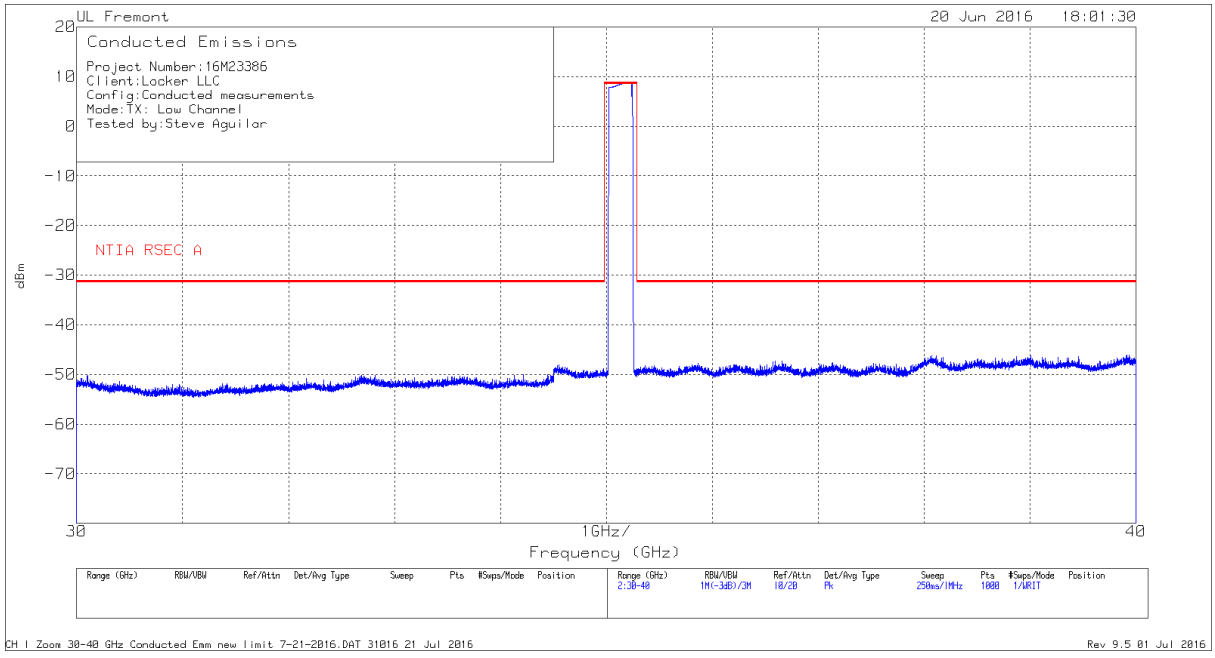
Measurements are made over the range of 2 to 40 GHz

LOW CHANNEL – CONDUCTED SPURIOUS EMISSIONS

CONDUCTED SPURIOUS EMISSIONS FULL SCAN

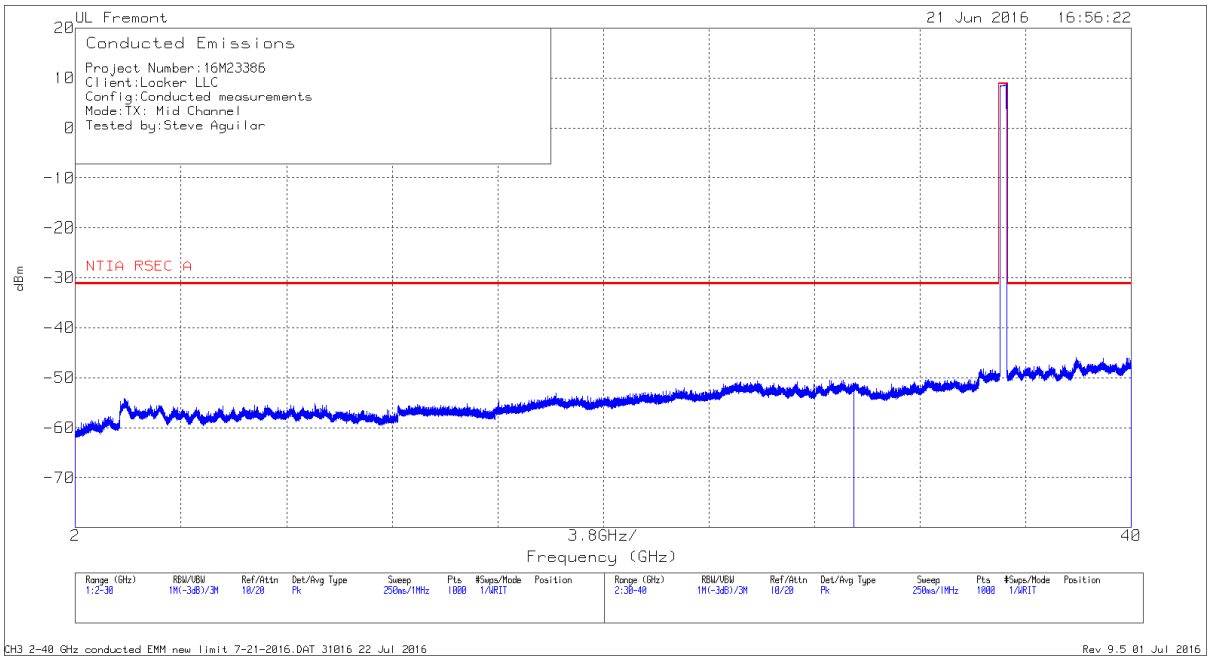


CONDUCTED SPURIOUS EMISSIONS ZOOM SCAN

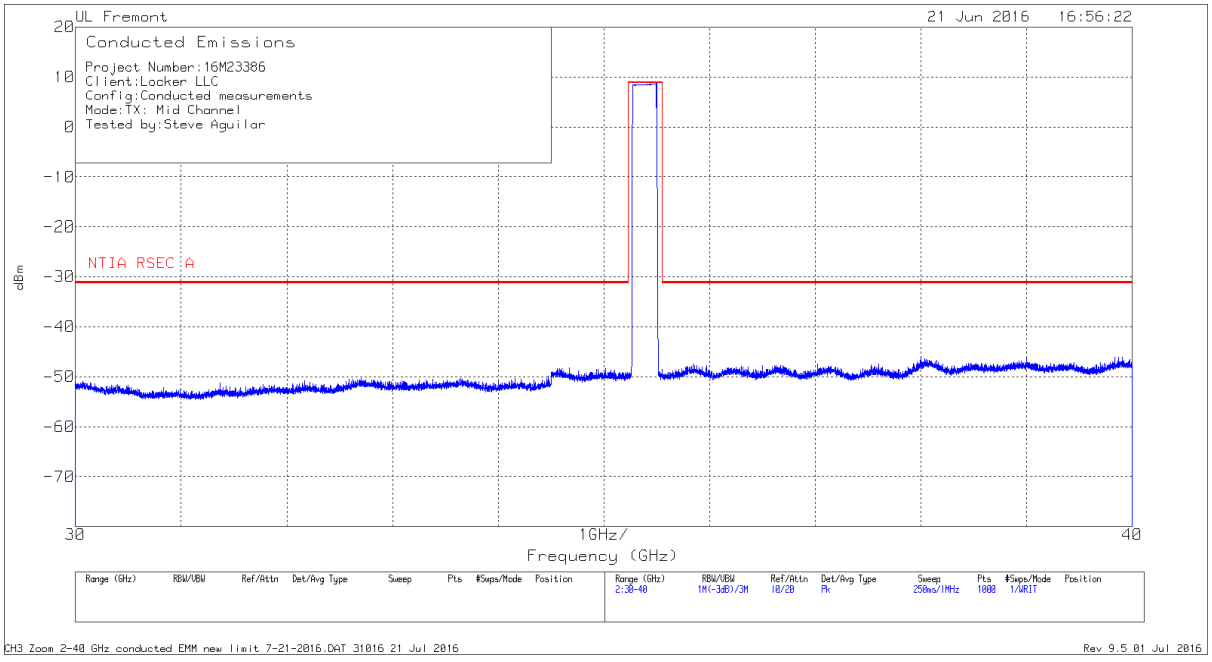


MID CHANNEL – CONDUCTED SPURIOUS EMISSIONS

CONDUCTED SPURIOUS EMISSIONS FULL SCAN

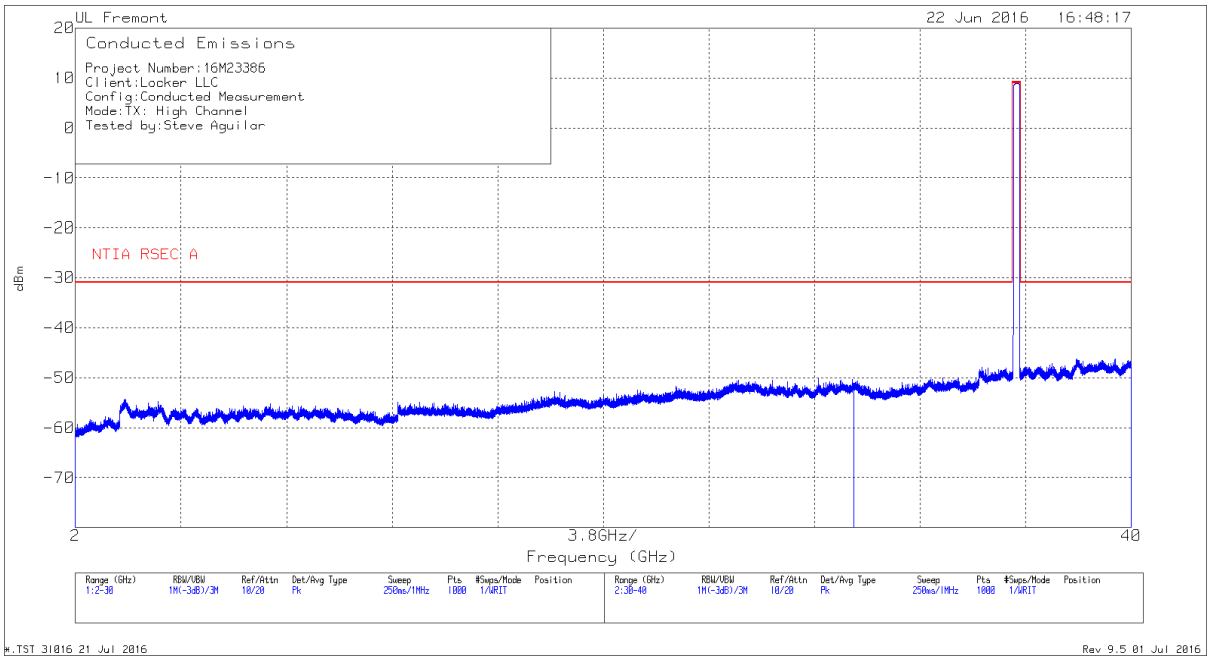


CONDUCTED SPURIOUS EMISSIONS ZOOM SCAN

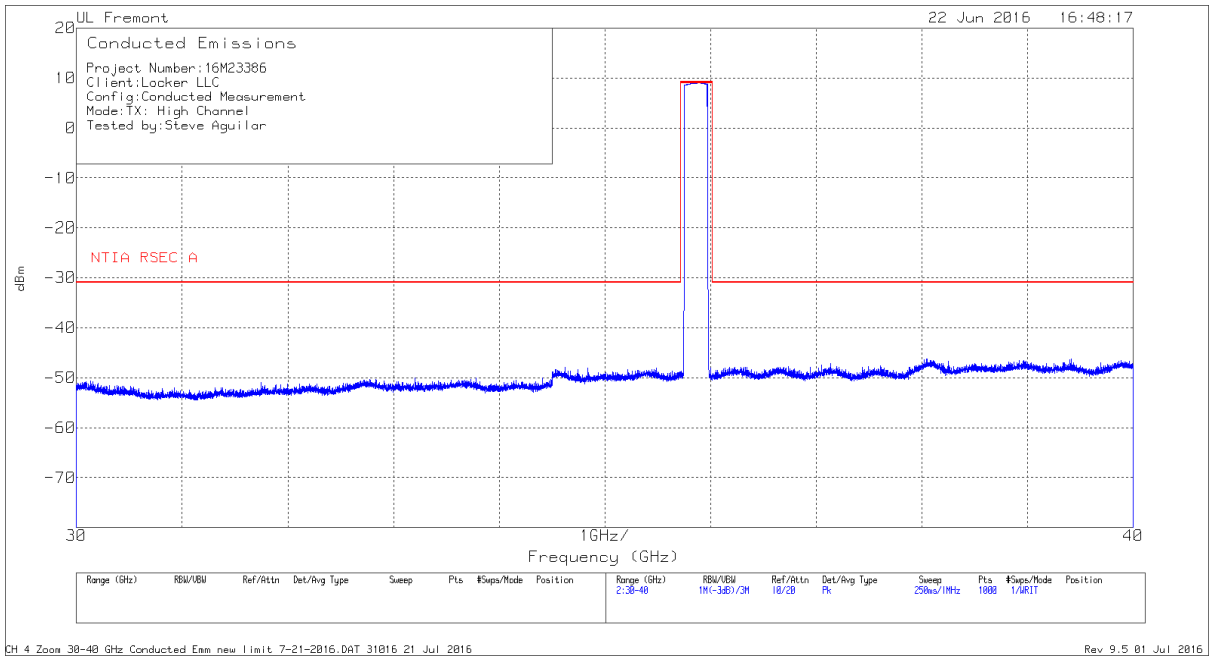


HIGH CHANNEL – CONDUCTED SPURIOUS EMISSIONS

CONDUCTED SPURIOUS EMISSIONS FULL SCAN



CONDUCTED SPURIOUS EMISSIONS ZOOM SCAN



7.6. §2.1053 – Field strength of spurious radiation / §2.1057 – Frequency spectrum to be investigated

7.6.1. Limit

On any frequency removed from the assigned frequency by more than 50% of the B(-40dB) bandwidth, the power of emissions must be reduced below the output power (P in watts) of the transmitter of at least 43 + 10 log (P) dB.

7.6.2. Procedure

NTIA Report TR-05-420 Section 5 EMISSION SPECTRA

NTIA Report TR-05-420 Appendix C.2.1 Stepped Measurement Algorithm

Measure Mid channel only, providing that the overall (conducted) out of band emission profile of the device is not drastically different across all three low, mid and high channels

7.6.3. Results

The lowest radio frequency generated in the equipment is 2.19 GHz.

The equipment operates above 30 GHz and the fifth harmonic of highest frequency generated in the radar system is 5 * 36 = 180 GHz.

The required radiated frequency spectrum to investigate is 2.19 GHz to 180 GHz.

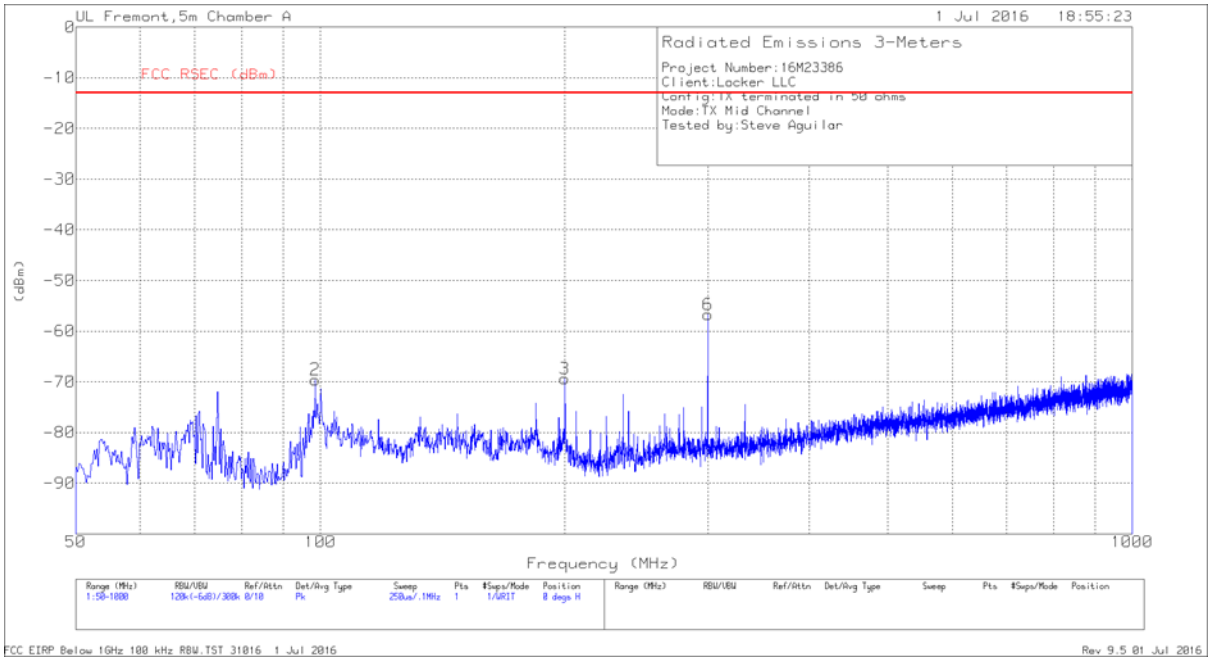
The radiated frequency spectrum was investigated from 50 MHz to 180 GHz.

The overall (conducted) out of band emission profile of the device is similar across all three low, mid and high channels, therefore radiated spurious emissions are measured only on the mid channel.

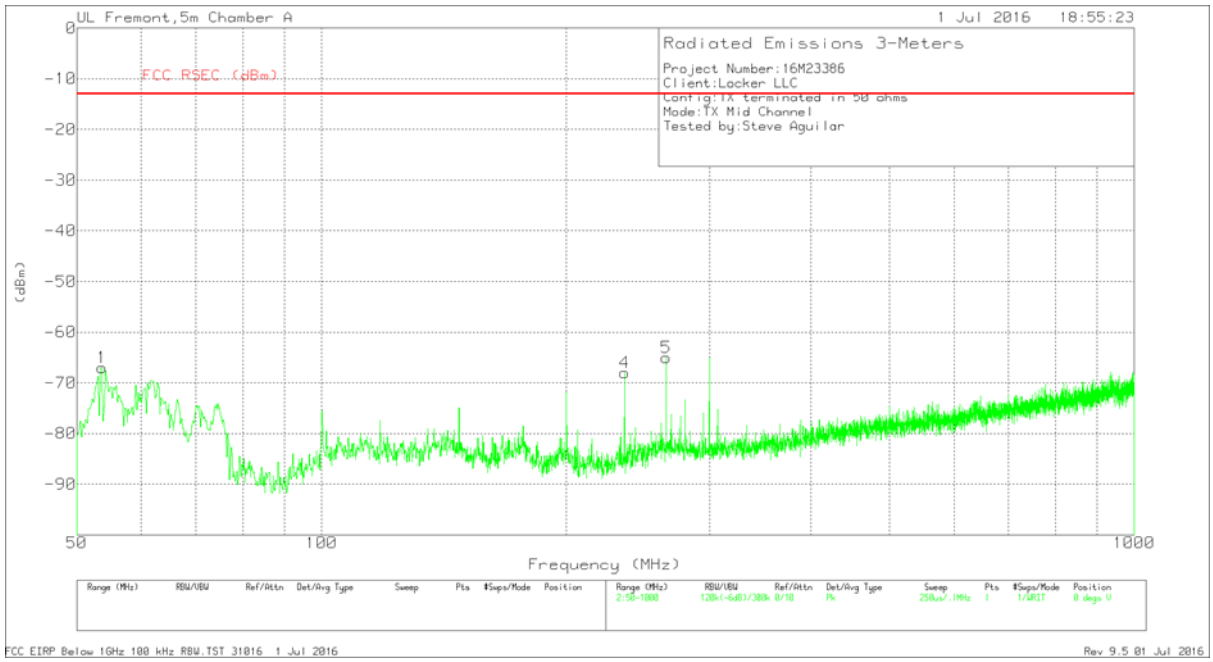
No emissions observed above the measurement system noise floor from 1-180 GHz.

RADIATED SPURIOUS EMISSIONS 50 – 1000 MHz

RADIATED SPURIOUS EMISSIONS HORIZONTAL 50 – 1000 MHz



RADIATED SPURIOUS EMISSIONS VERTICAL 50 – 1000 MHz



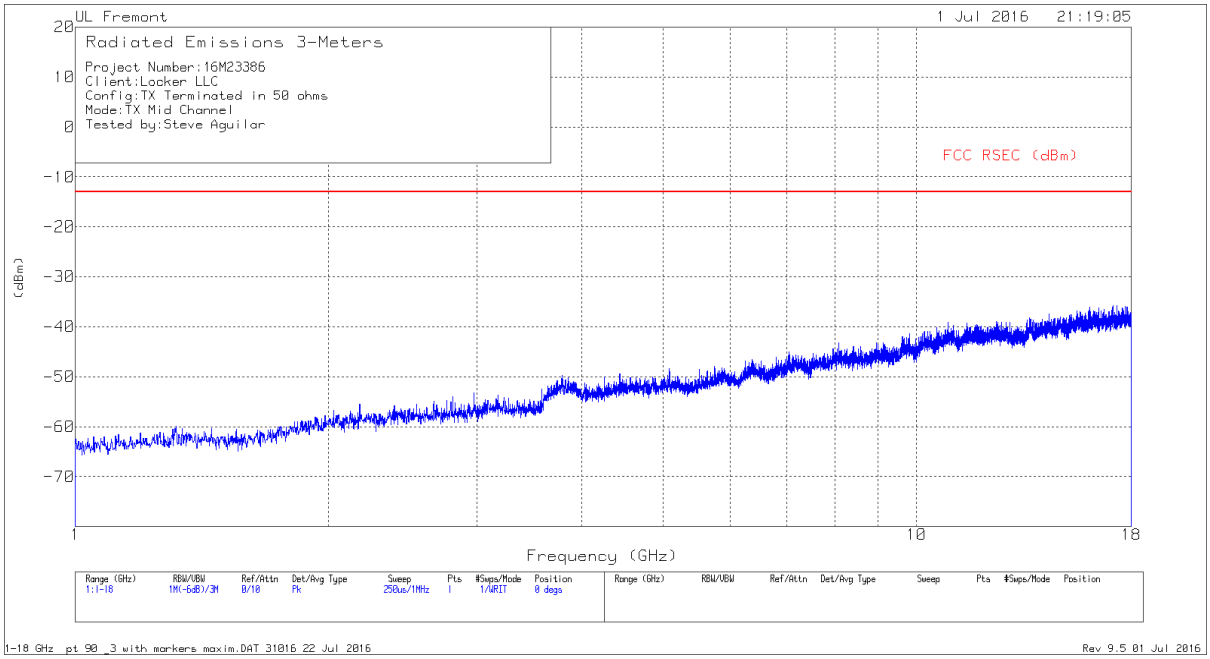
Radiated Emissions

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T899 (dB/m)	Amp/Cbl (dB/m)	Conversion Factor (dB)	Corrected Reading (dBm)	FCC RSEC (dBm)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	56.825	-56.18	Pk	11.3	-30.9	11.8	-63.98	-13	-50.98	225	110	V
2	100.0106	-48.28	Pk	14.3	-30.6	11.8	-52.78	-13	-39.78	167	157	H
3	200	-54.49	Pk	16.6	-29.9	11.8	-55.99	-13	-42.99	85	170	H
4	235.952	-64.33	Pk	15.2	-29.7	11.8	-67.03	-13	-54.03	346	159	V
5	265.422	-62.58	Pk	16.8	-29.6	11.8	-63.58	-13	-50.58	339	153	V
6	299.994	-51.89	Pk	17.4	-29.4	11.8	-52.09	-13	-39.09	137	105	H

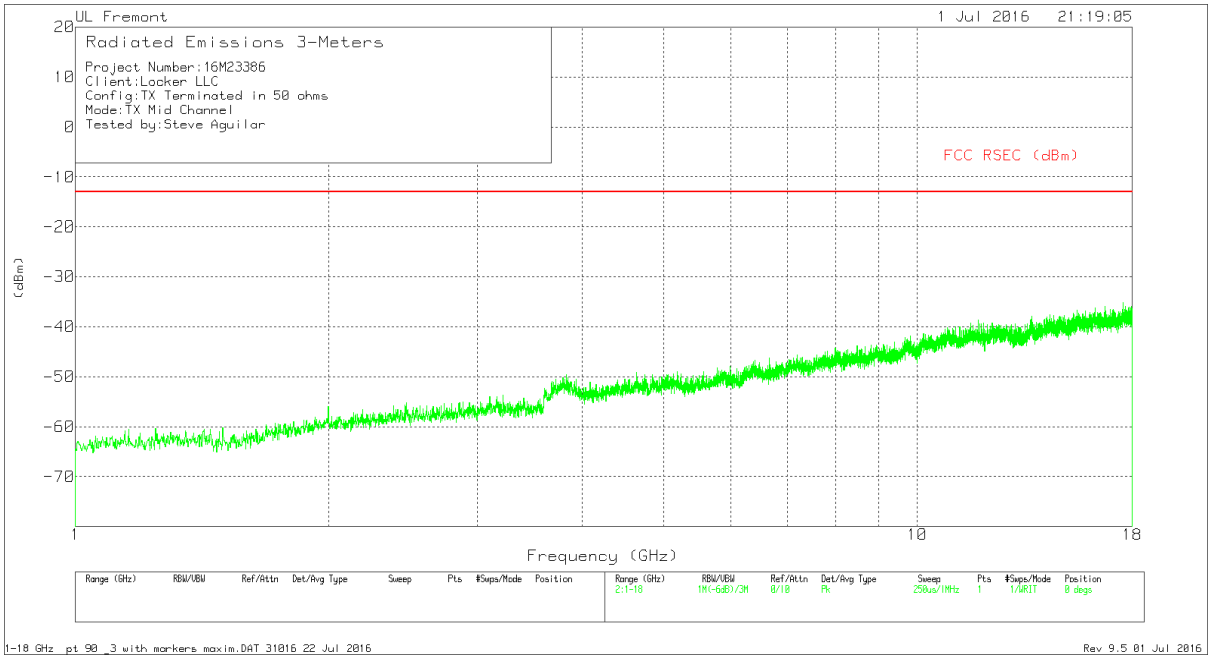
Pk - Peak detector
FCC EIRP Below 1GHz 100 kHz RBW.TST 31016 1 Jul 2016
Rev 9.5 01 Jul 2016

RADIATED SPURIOUS EMISSIONS 1 – 18 GHz

RADIATED SPURIOUS EMISSIONS HORIZONTAL 1 – 18 GHz

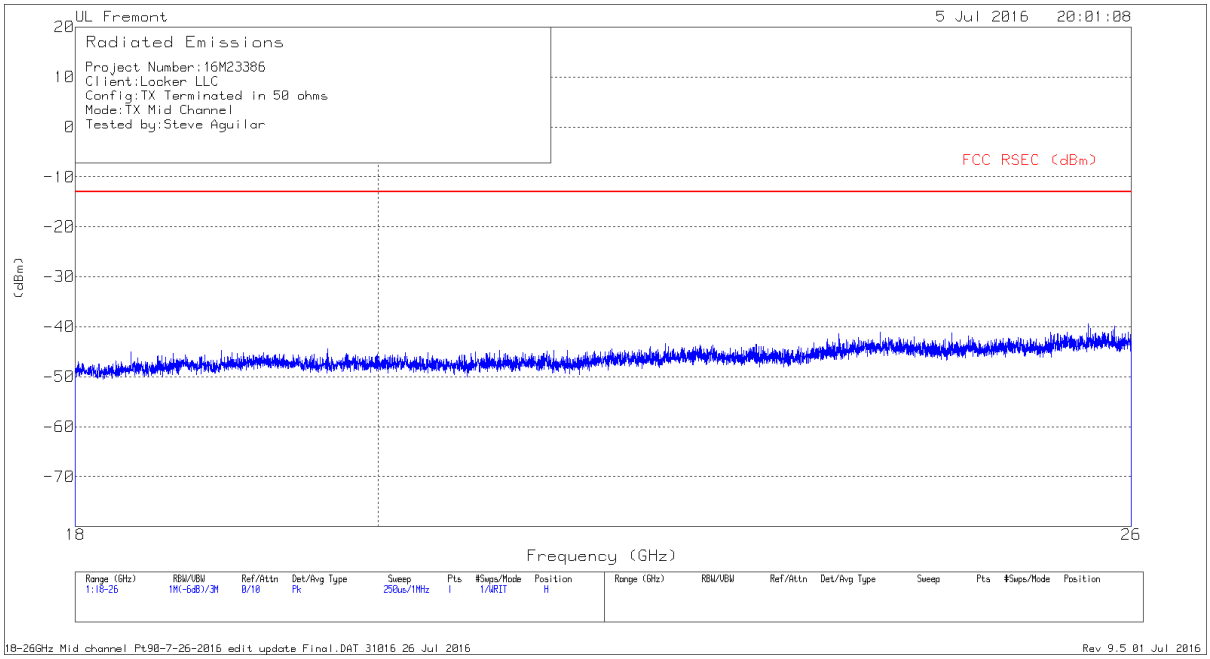


RADIATED SPURIOUS EMISSIONS VERTICAL 1 – 18 GHz

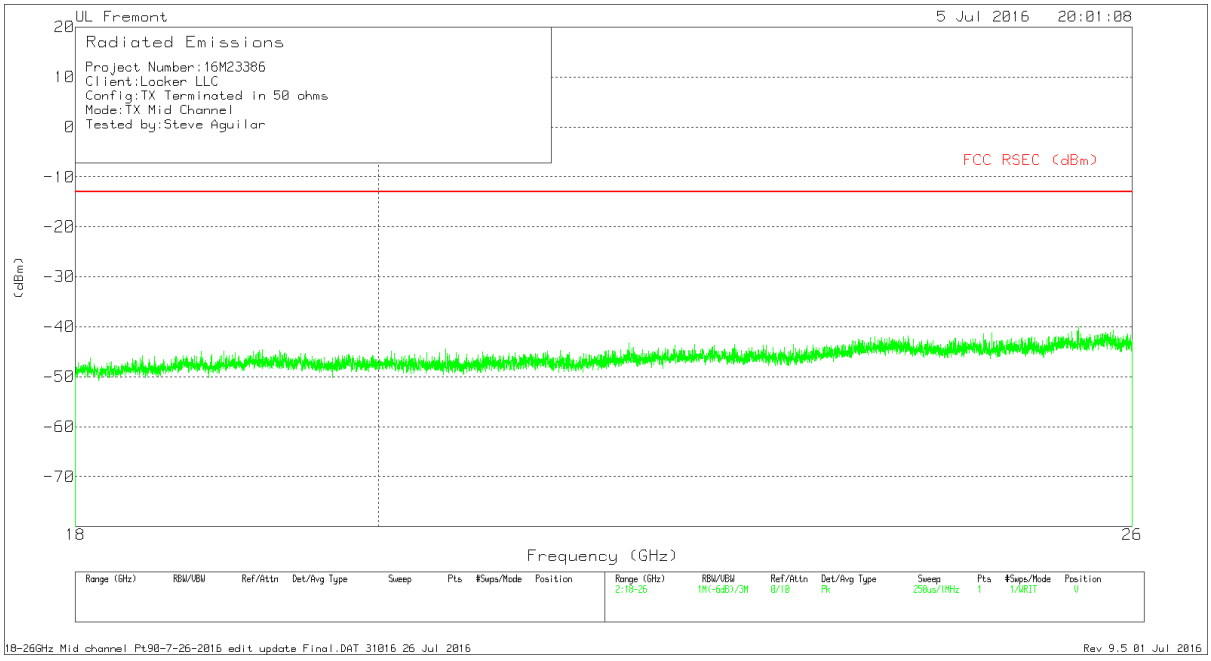


RADIATED SPURIOUS EMISSIONS 18 – 26 GHz

RADIATED SPURIOUS EMISSIONS HORIZONTAL 18 – 26 GHz

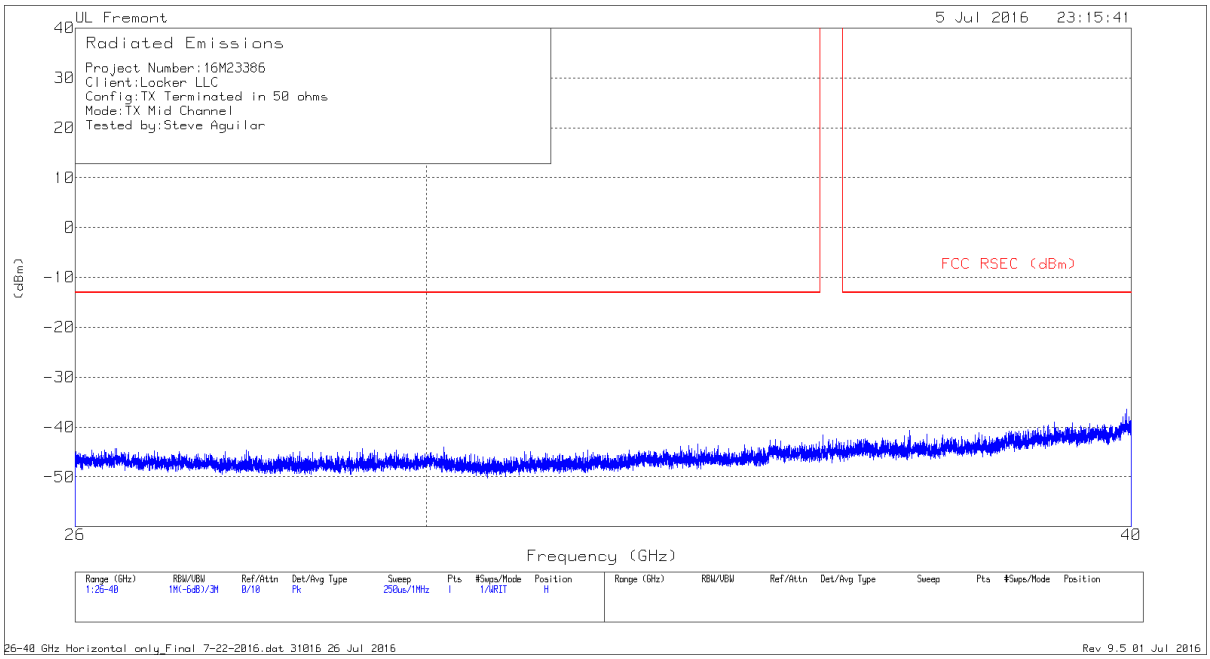


RADIATED SPURIOUS EMISSIONS VERTICAL 18 – 26 GHz

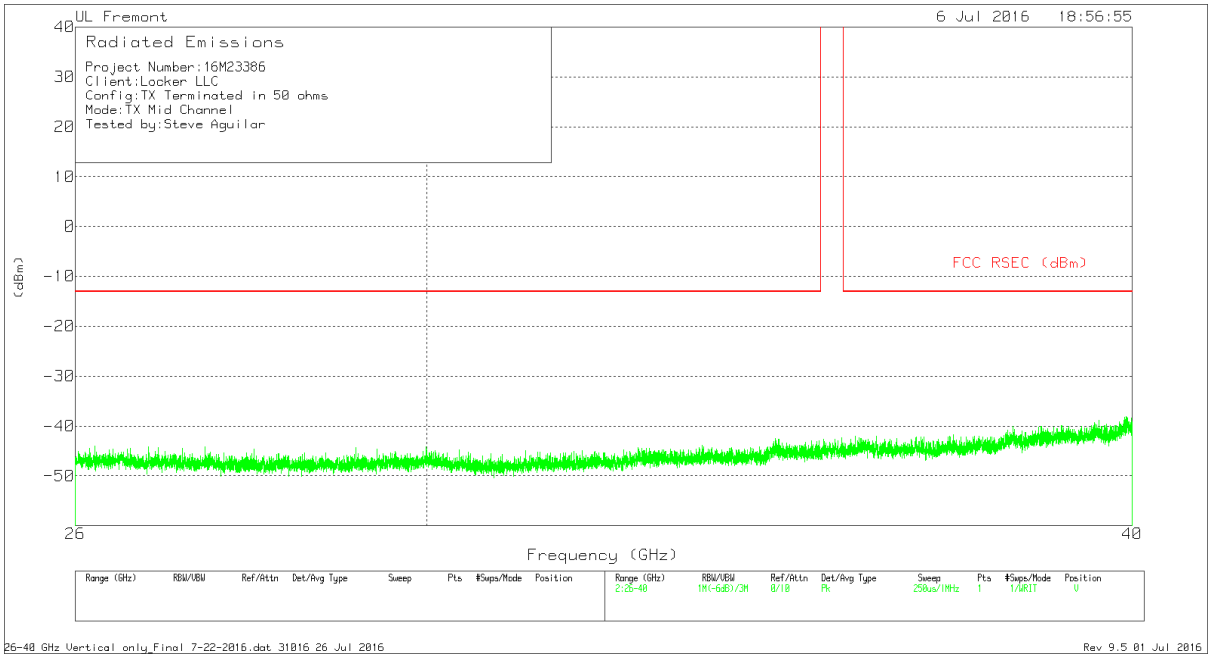


RADIATED SPURIOUS EMISSIONS 26 – 40 GHz

RADIATED SPURIOUS EMISSIONS HORIZONTAL 26 – 40 GHz

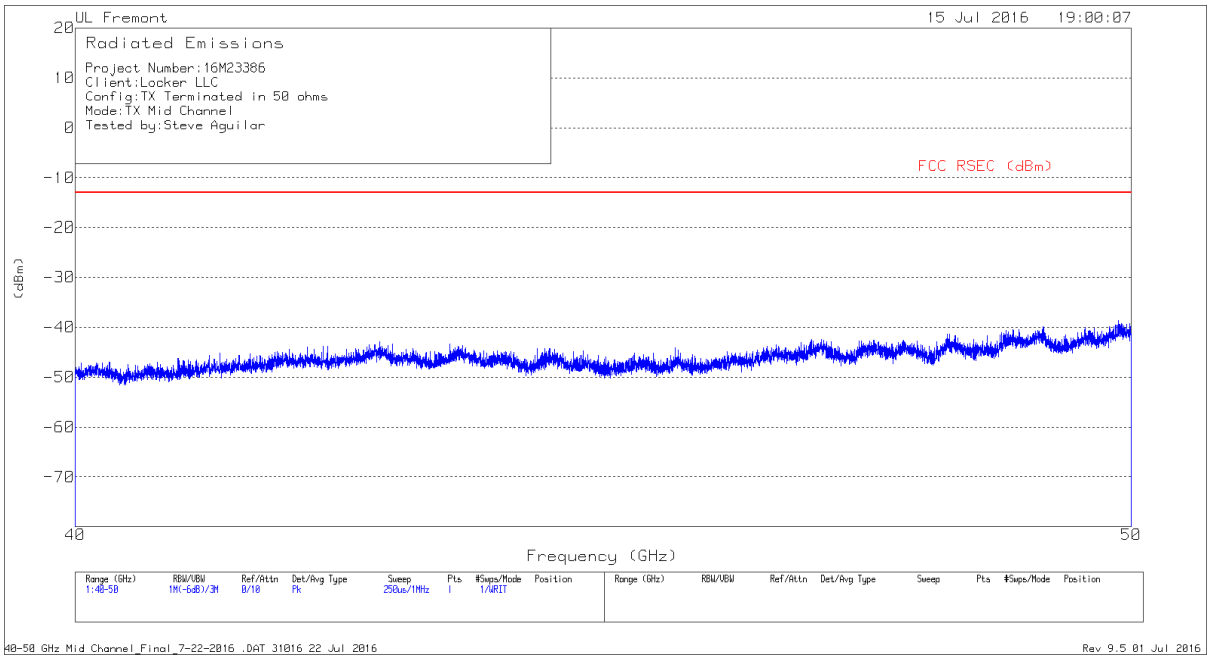


RADIATED SPURIOUS EMISSIONS VERTICAL 26 – 40 GHz

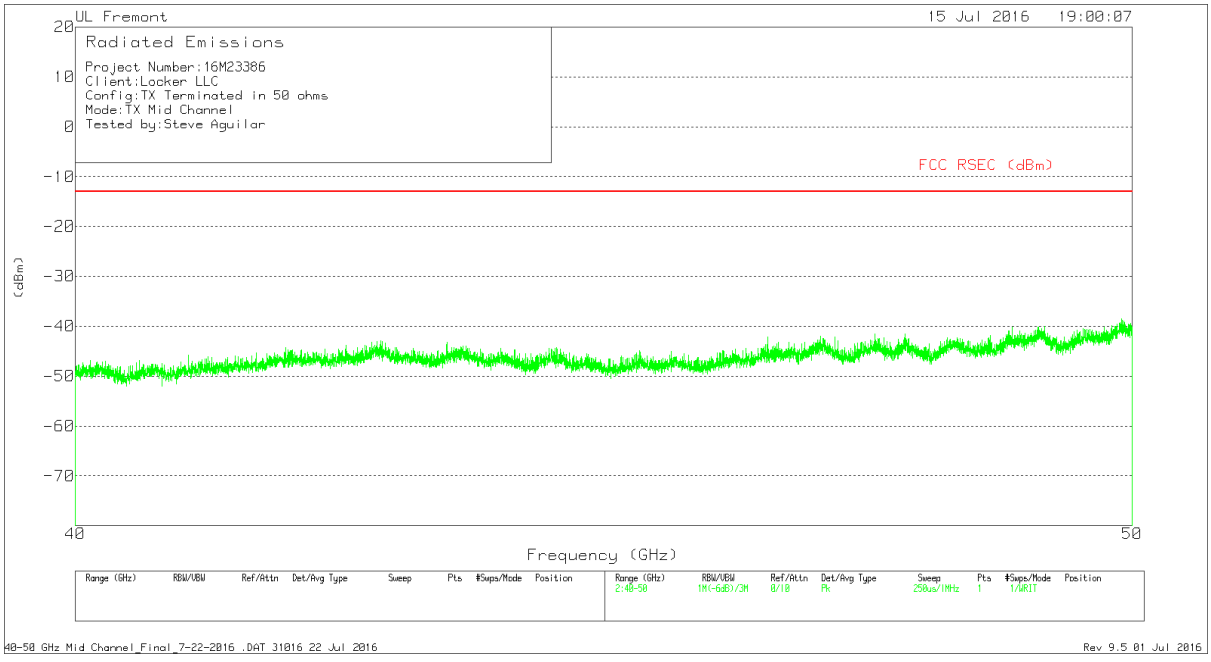


RADIATED SPURIOUS EMISSIONS 40 – 50 GHz

RADIATED SPURIOUS EMISSIONS HORIZONTAL 40 – 50 GHz

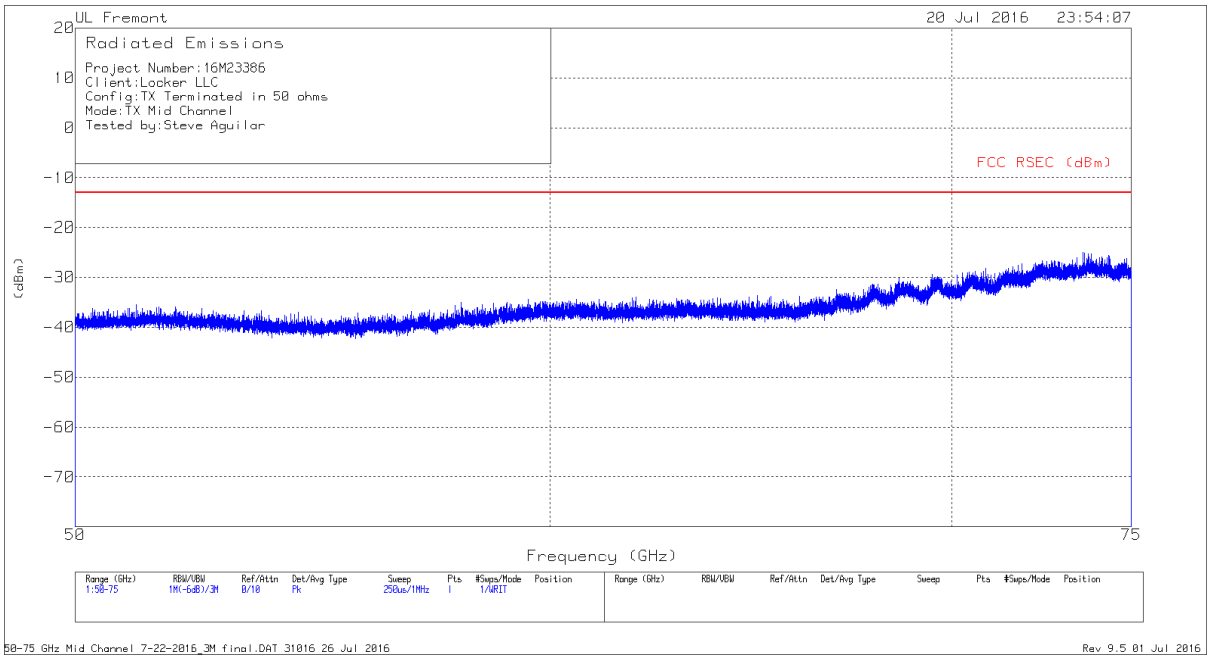


RADIATED SPURIOUS EMISSIONS VERTICAL 40 – 50 GHz

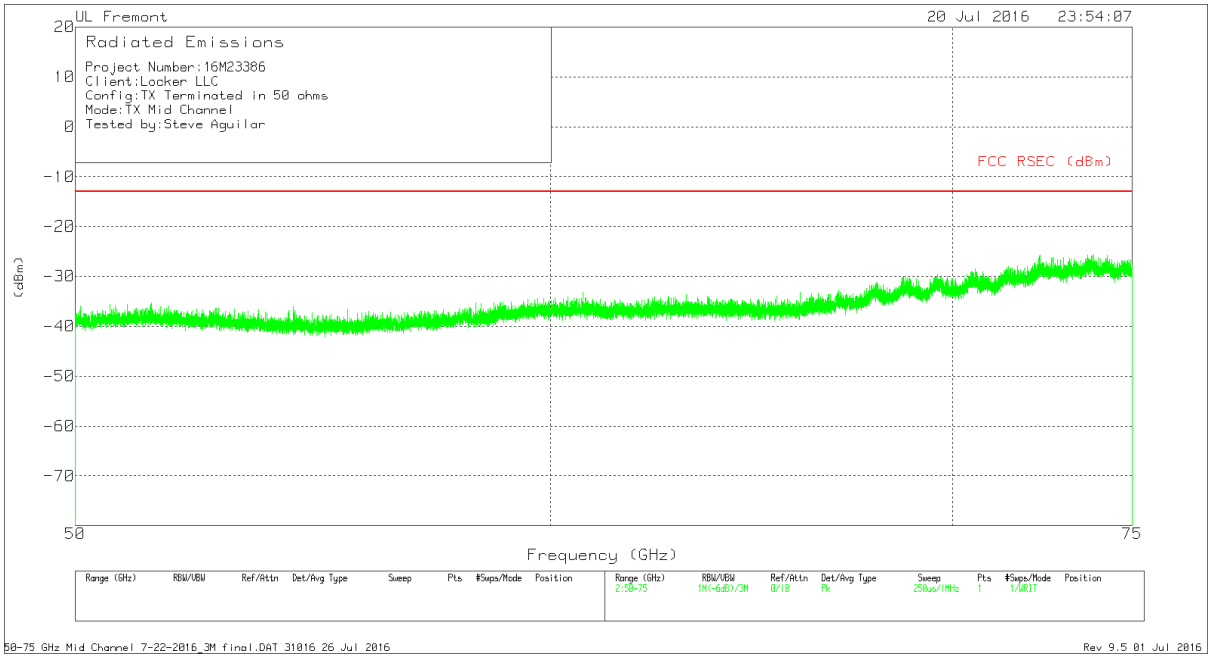


RADIATED SPURIOUS EMISSIONS 50 – 75 GHz

RADIATED SPURIOUS EMISSIONS HORIZONTAL 50 – 75 GHz

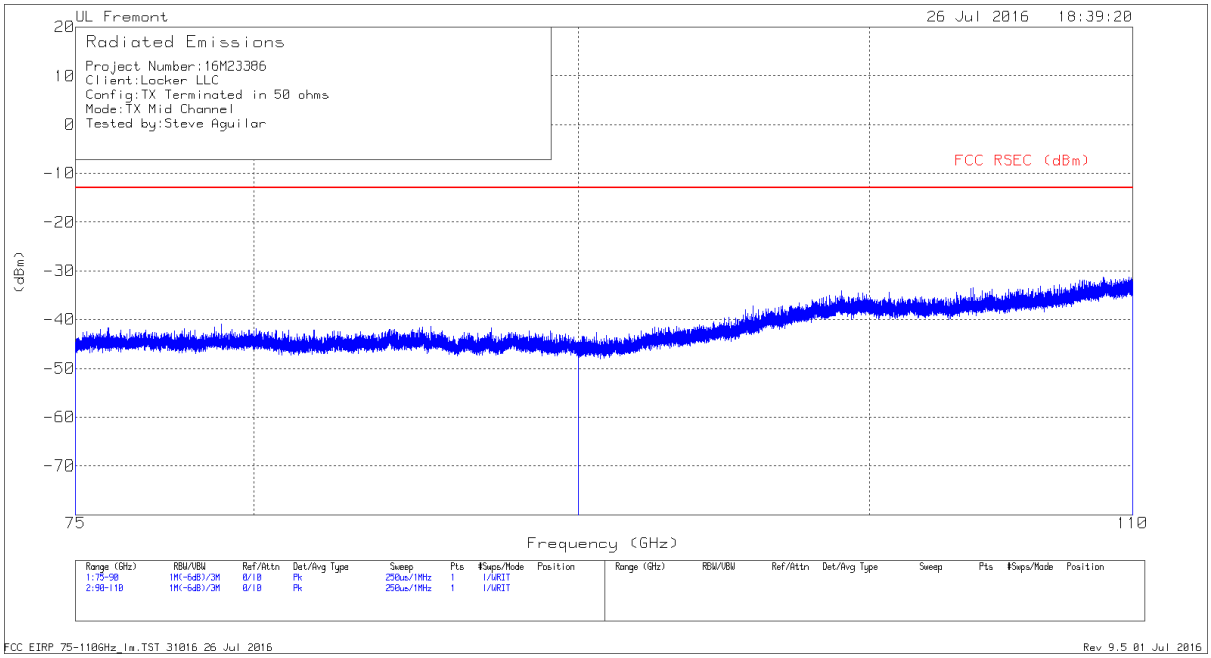


RADIATED SPURIOUS EMISSIONS VERTICAL 50 – 75 GHz

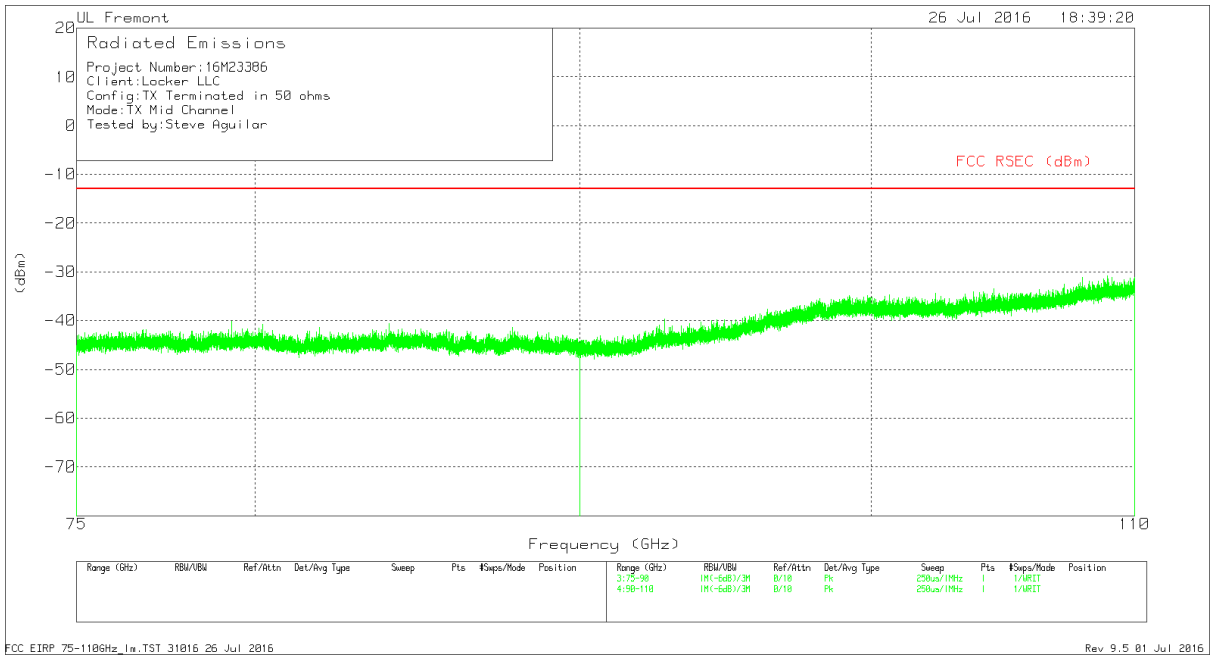


RADIATED SPURIOUS EMISSIONS 75 – 110 GHz

RADIATED SPURIOUS EMISSIONS HORIZONTAL 75 – 110 GHz

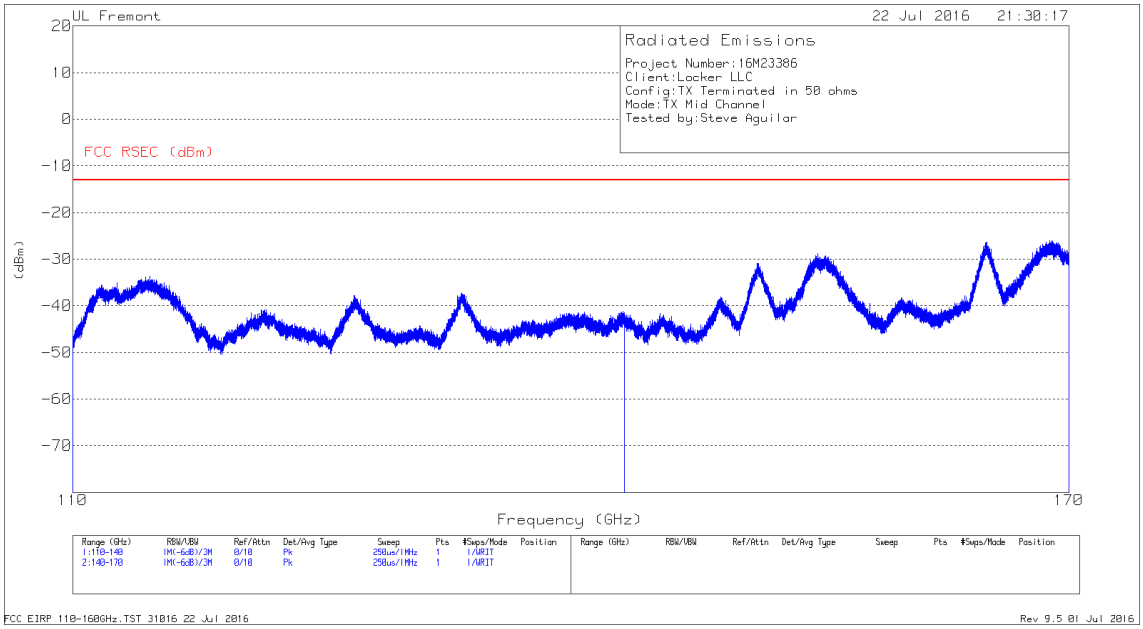


RADIATED SPURIOUS EMISSIONS VERTICAL 75 – 110 GHz

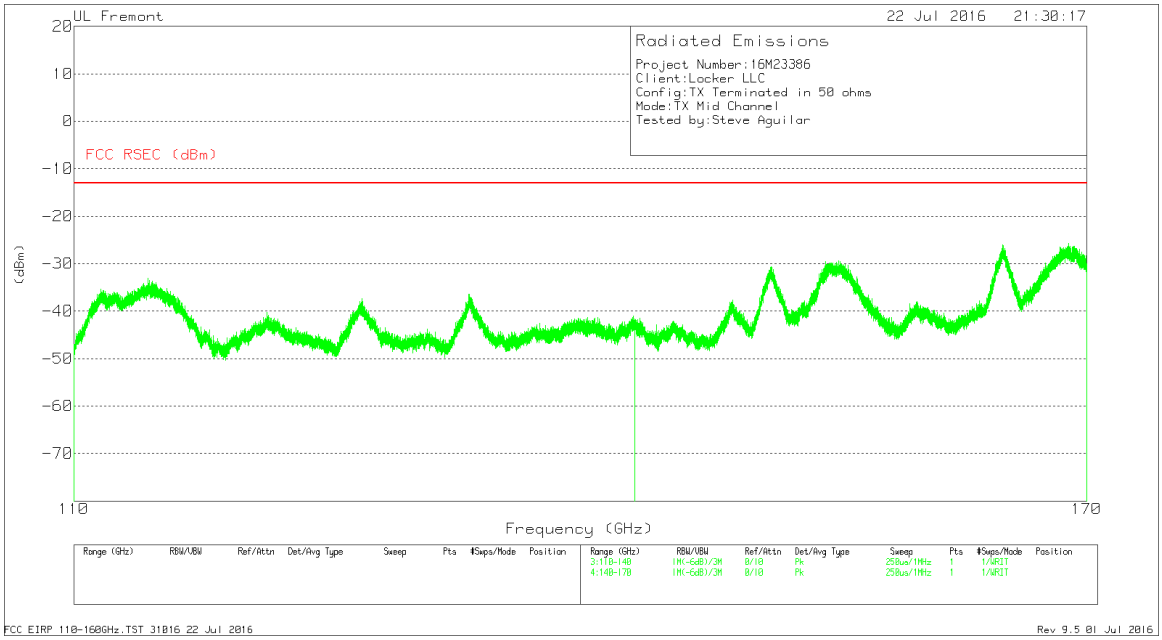


RADIATED SPURIOUS EMISSIONS 110 – 170 GHz

RADIATED SPURIOUS EMISSIONS HORIZONTAL 110 – 170 GHz

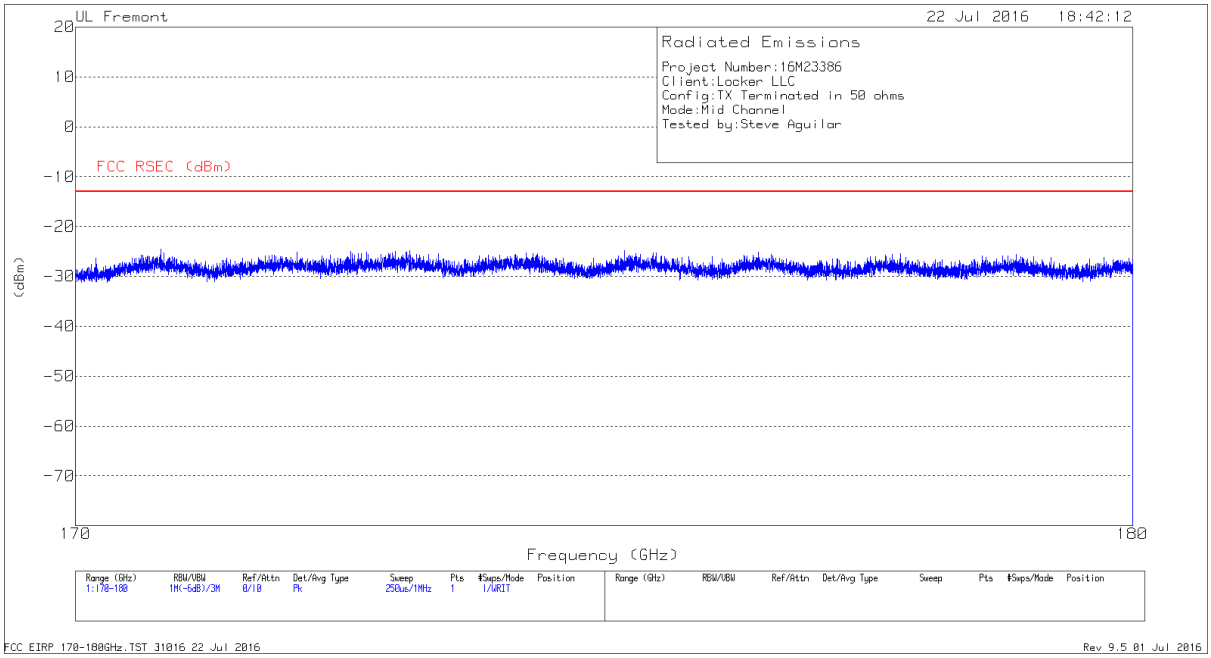


RADIATED SPURIOUS EMISSIONS VERTICAL 110 – 170 GHz

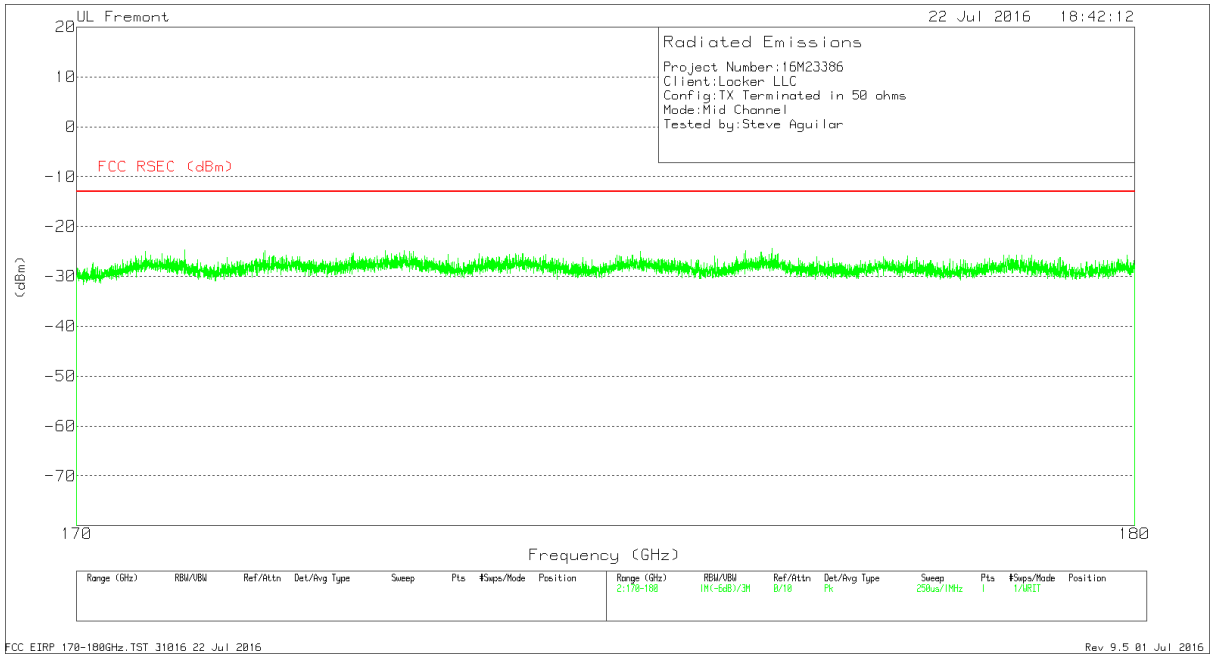


RADIATED SPURIOUS EMISSIONS 170 – 180 GHz

RADIATED SPURIOUS EMISSIONS HORIZONTAL 170 – 180 GHz



RADIATED SPURIOUS EMISSIONS VERTICAL 170 – 180 GHz



7.7. §2.1055 – Frequency stability

7.7.1. Limit

Frequency Tolerance <= 5000 ppm

Frequency Band Greater than 30 GHz	Frequency Tolerance
I. Fixed Stations	75
II. Mobile (Aeronautical, Land, Maritime) Stations	150
III. Radiodetermination Stations	5000
IV. Space and Earth Stations	75

7.7.2. Procedure

NTIA Report TR-05-420 Section 7 FREQUENCY TOLERANCE AND TUNABILITY

Observation period = 8 hours

7.7.3. Results

Center Freq (GHz)	Channel Low Begin (GHz)	Channel Low End (GHz)	Channel High Begin (GHz)	Channel High End (GHz)	Absolute Drift (GHz)	Relative Drift (ppm)
35.388	35.274178	35.268275	35.506634	35.506634	0.005903	166.8

FREQUENCY DRIFT

MID CHANNEL FREQUENCY DRIFT