Nemko Test Report:	2015_278957_FCC_15517 R4
Applicant:	ABG Tag and Traq, Inc. 2300 Joe Ramsey Blvd E Greenville, TX 75401 USA
Equipment Under Test: (E.U.T.)	Ultra-wideband Transmitter Module (MOD1UWB)
FCC Identifier:	2AAXVTNTMOD1
IC Identifier:	11400A-TNTMOD1
In Accordance With:	**FCC Part 15, Subpart C, 15.517 and Industry Canada RSS-220, Issue 1** Technical requirements for indoor UWB systems
Tested By:	Nemko USA, Inc. 2210 Faraday Ave. Ste 150 Carlsbad, CA 92008 USA

TESTED BY: _____ **DATE:** 19 October 2015

David Light, Wireless Engineer

APPROVED BY: _____ **DATE:** 19 October 9, 2015

James Morris,EMC/Wireless Manager

Total Number of Pages: 33

Table of Contents

Section 1. Summary Of Test Results

Manufacturer: ABG Tag and Traq

Model No.: MOD1UWB

Serial No.: None

General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 15, Subpart C, Paragraph 15.517 and Industry Canada RSS-220, Issue 1 for ultra wide band operation. All tests were conducted using measurement procedure ANSI C63.10-2013.

☒ New Submission ☐ Production Unit

☐ Class II Permissive Change ☒ Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE. NONE
See " Summary of Test Data".

NVLAP Lab Code 200116-0

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government. Nemko USA, Inc. is a NVLAP accredited laboratory.

Summary Of Test Data

NAME OF TEST	PARA. NO.	RESULT
Conducted Emissions	15.207 / RSS-Gen Para. 7.2.4	Complies
Definition of UWB	15.503(d) / RSS-220 Para. 2	Complies
Radiated Emissions	15.517(c) / RSS-220 Para 5.2.1(d)	Complies
Radiated Emissions	15.517(d) / RSS-220 Para. 5.2.1(e)	Complies
Peak Emission at f_M	15.517(e) / RSS-220 Annex 4(c)	Complies

Footnotes:

Section 2. General Equipment Specification

Frequency Range:	3.1 GHz to 4.46 GHz
Operating Frequency(ies) of Sample:	3.15-4 GHz or 3.48-4.46 GHz
Center Frequency:	3.5 GHz or 4.0 GHz
10 dB Occupied Bandwidth:	550 to 580 MHz
User Frequency Adjustment:	None

	Yes	No
Integral Antenna	☒	☐

Description of Device Tested

The model MOD1UWB Ultra-wideband transmitter module is intended for use with proximity detection and other related device applications

Section 3. Radiated Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: FCC 15.517(c)&(d) RSS-220 5.2.1(d)&(e)
TESTED BY: David Light	DATE: 27 February 2015

Test Results: Complies

Measurement Data: See attached table(s).

Maximizing Emission Levels:
The emissions were scanned from 30 MHz to 16000 MHz.
For measurements below 960 MHz the emissions were made using a PEAK detector RBW=VBW=100 kHz.

For Frequency above 960 MHz and outside the below frequency bands, the emissions were measured using RMS detector, RBW=1MHz, VBW=3MHz

For frequencies fall inside 1164-1240 and 1559-1610 MHz, the emissions were measured using EMI RMS Detector, RBW = 1 KHz, VBW = 1 MHz

Spectrum Analyzer Settings:

Below 1000 MHz:	RBW=VBW=100 kHz Peak detector		
Above 1000 MHz:	RBW=1 MHz	VBW=3MHz	RMS detector
GPS Bands:	RBW=1 kHz	VBW=1 MHz	RMS detector

Equipment Used: 1036-877-E1029-1480-902

Measurement Uncertainty: +/-3.7 dB

Temperature: 21 °C

Relative Humidity: 48 %

Note: Noise floor readings were verified using a higher gain without the radios transmitting.

FCC Limits below 960 MHz (15.209)

Frequency (MHz)	Field Strength Limits (microvolts/m)	Measuring RBW	Distance (Meters)
0.009-0.490	2400/F(kHz)	1 kHz	300
0.490-1.705	24000/F(kHz)	10 kHz	30
1.705-30.0	30	10 kHz	30
30-88	100	100 kHz	3
88-216	150	100 kHz	3
216-960	200	100 kHz	3

FCC Limits above 960 MHz (15.517)

Frequency (MHz)	E.I.R.P. (dBm)	Measuring RBW	Distance (Meters)
960-1610	-75.3	1 MHz	3
1610-1990	-53.3	1 MHz	3
1990-3100	-51.3	1 MHz	3
3100-10600	-41.3	1 MHz	3
Above 10600	-51.3	1 MHz	3
1164-1240	-85.3	1 kHz	3
1559-1610	-85.3	1 kHz	3

Industry Canada Limits below 960 MHz (RSS-220, Section 3.4)

Frequency (MHz)	Field Strength (Microvolts/m)	Measurement Distance (Metres)	E.i.r.p. (dBmW)
0.009-0.490	2,400/F (F in kHz)	300	10 log (17.28 / F^2) (F in kHz)
0.490-1.705	24,000/F (F in kHz)	30	10 log (17.28 / F^2) (F in kHz)
1.705-30	30	30	-45.7
30-88	100	3	-55.2
88-216	150	3	-51.7
216-960	200	3	-49.2

Industry Canada Limits Above 1 GHz (RSS-220, section 5.2.1(d))

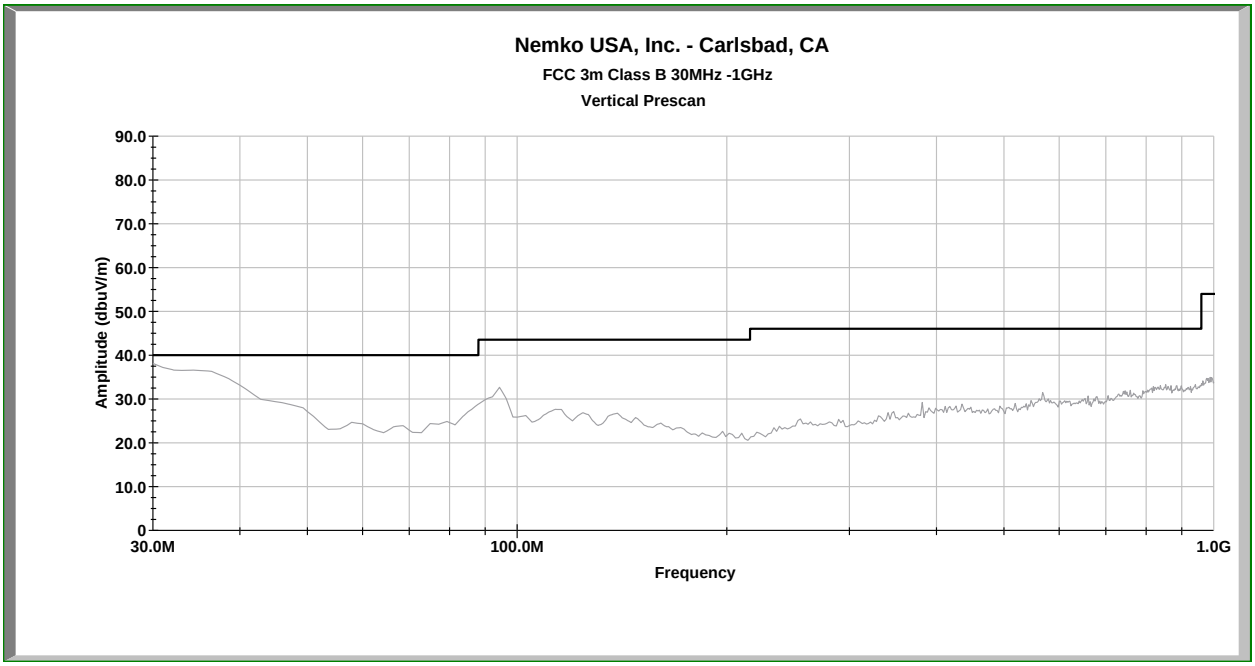
Indoor Communication, Measurement, Location Sensing and Tracking Devices	
Frequency	**E.i.r.p. in a Resolution Bandwidth of 1 MHz**
960-1 610 MHz	-75.3 dBm
1.61-4.75 GHz	-70.0 dBm
4.75-10.6 GHz	-41.3 dBm
Above 10.6 GHz	-51.3 dBm

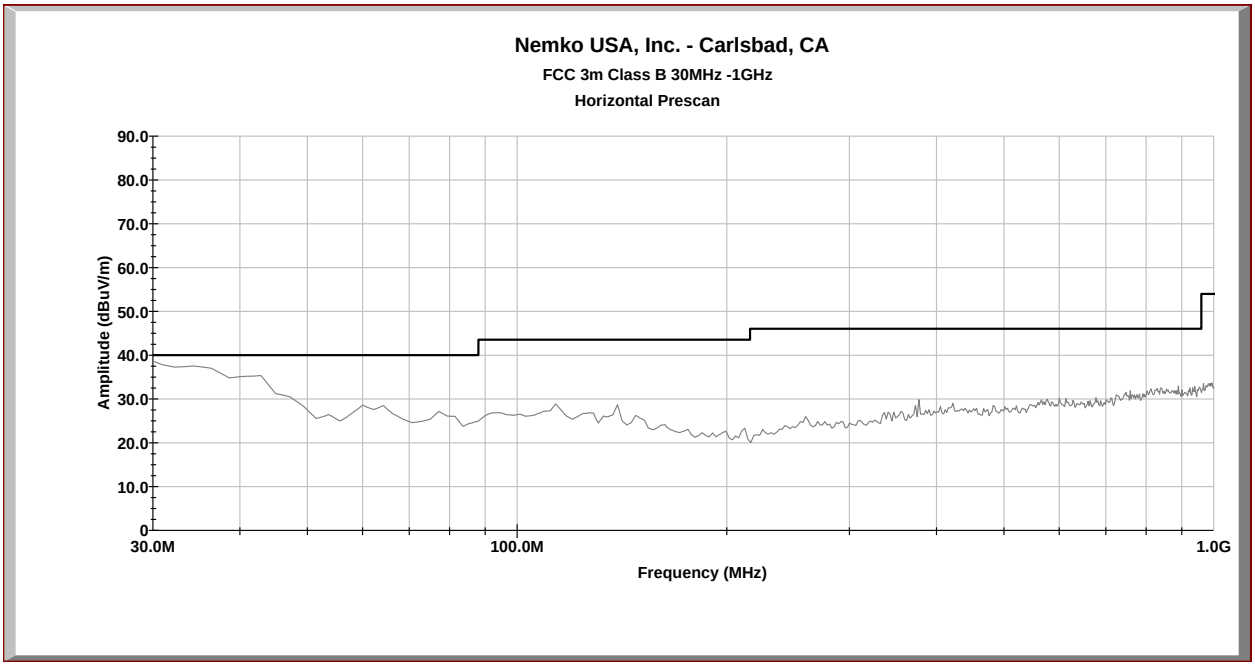
Industry Canada Limits Above 1 GHz (RSS-220, section 5.2.1(e))

Frequency	E.i.r.p. in a Resolution Bandwidth of no less than 1 kHz
1 164-1 240 MHz	-85.3 dBm
1 559-1 610 MHz	-85.3 dBm

Test Data – Radiated Emissions

3.5 GHz Configuration





Test Data – Radiated Emissions

FCC Results above 960 MHz (15.517(c))

3.5 GHz Configuration

Meas. Freq. (MHz)	Ant. Pol. (H/V)	Atten. (dB)	Meter Reading (dBuV)	Antenna Factor (dB)	Path Loss (dB)	RF Gain (dB)	EIRP (dBm)	EIRP Limit (dBm)	CR/SL Diff. (dB)	Pass Fail Unc.	Comment
1000	V	-95.2	32.1	24.0	4.1	42.1	-77.1	-75.3	-1.8	Pass.	
1620	V	-95.2	32.0	25.8	4.7	43.0	-75.7	-53.3	-22.4	Pass	
2550	V	-95.2	29.5	28.7	5.8	44.2	-75.4	-51.3	-24.1	Pass	
7000	V	-95.2	26.1	35.1	9.5	45.1	-69.6	-41.3	-28.3	Pass	
16000	V	-95.2	24.3	37.6	14.2	44.2	-63.3	-51.3	-12.0	Pass	
1000	H	-95.2	32.0	24.0	4.1	42.1	-77.2	-75.3	-1.9	Pass.	
1620	H	-95.2	32.0	25.8	4.7	43.0	-75.7	-53.3	-22.4	Pass	
2550	H	-95.2	29.0	28.7	5.8	44.2	-75.9	-51.3	-24.6	Pass	
7000	H	-95.2	26.3	35.1	9.5	45.1	-69.4	-41.3	-28.1	Pass	
16000	H	-95.2	24.1	37.6	14.2	44.2	-63.5	-51.3	-12.2	Pass	

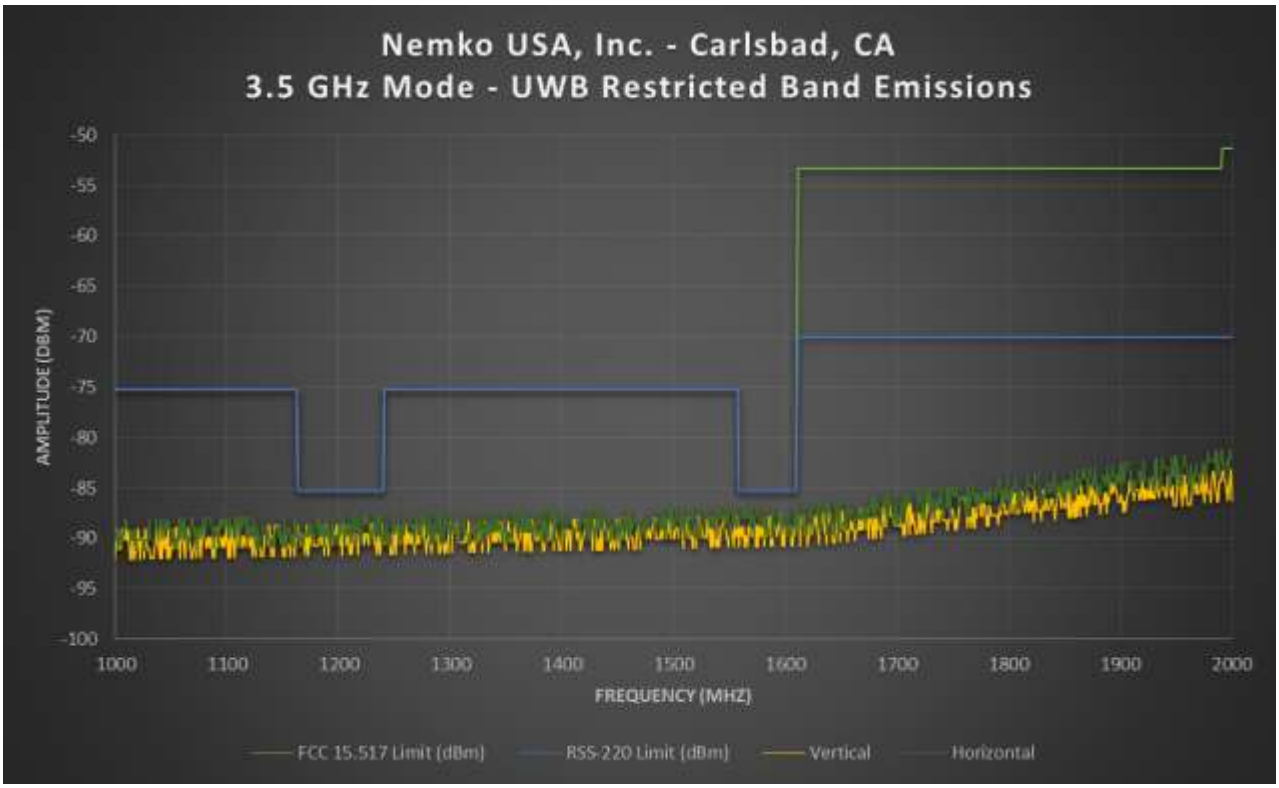
Industry Canada Limits Above 1 GHz (RSS-220, section 5.2.1(d))

3.5 GHz Configuration

Meas. Freq. (MHz)	Ant. Pol. (H/V)	Atten. (dB)	Meter Reading (dBuV)	Antenna Factor (dB)	Path Loss (dB)	RF Gain (dB)	EIRP (dBm)	EIRP Limit (dBm)	CR/SL Diff. (dB)	Pass Fail Unc.	Comment
1000	V	-95.2	32.1	24.0	4.1	42.1	-77.1	-75.3	-1.8	Pass.	
1620	V	-95.2	32.0	25.8	4.7	43.0	-75.7	-70.0	-5.7	Pass	
2550	V	-95.2	29.5	28.7	5.8	44.2	-75.4	-70.0	-5.4	Pass	
7000	V	-95.2	26.1	35.1	9.5	45.1	-69.6	-41.3	-28.3	Pass	
16000	V	-95.2	24.3	37.6	14.2	44.2	-63.3	-51.3	-12.0	Pass	
1000	H	-95.2	32.0	24.0	4.1	42.1	-77.2	-75.3	-1.9	Pass.	
1620	H	-95.2	32.0	25.8	4.7	43.0	-75.7	-70.0	-5.7	Pass	
2550	H	-95.2	29.0	28.7	5.8	44.2	-75.9	-70.0	-5.9	Pass	
7000	H	-95.2	26.3	35.1	9.5	45.1	-69.4	-41.3	-28.1	Pass	
16000	H	-95.2	24.1	37.6	14.2	44.2	-63.5	-51.3	-12.2	Pass	

Test Data – Radiated Emissions

FCC & Industry Canada Results above 960 MHz (15.517(d) & RSS-220 5.2.1(e))
3.5 GHz Configuration



Test Data – Radiated Emissions

FCC & Industry Canada Results above 960 MHz (15.517(d) & RSS-220 5.2.1(e))
3.5 GHz Configuration

Freq (MHz)	15.517 Limit (dBm)	RSS-220 Limit (dBm)	Vertical Result (dBm)	Horizontal Result (dBm)	Diff Limit (V)	Diff Limit (H)	Result	Comments
1164	-85.3	-85.3	-88.73	-89.83	-3.43	-4.53	PASS	1kHz RBW
1165	-85.3	-85.3	-90.73	-89.83	-5.43	-4.53	PASS	1kHz RBW
1166	-85.3	-85.3	-89.73	-90.83	-4.43	-5.53	PASS	1kHz RBW
1167	-85.3	-85.3	-89.72	-89.82	-4.42	-4.52	PASS	1kHz RBW
1168	-85.3	-85.3	-89.72	-90.82	-4.42	-5.52	PASS	1kHz RBW
1169	-85.3	-85.3	-90.72	-89.82	-5.42	-4.52	PASS	1kHz RBW
1170	-85.3	-85.3	-91.72	-89.82	-6.42	-4.52	PASS	1kHz RBW
1171	-85.3	-85.3	-88.71	-89.81	-3.41	-4.51	PASS	1kHz RBW
1172	-85.3	-85.3	-90.71	-88.81	-5.41	-3.51	PASS	1kHz RBW
1173	-85.3	-85.3	-91.71	-88.81	-6.41	-3.51	PASS	1kHz RBW
1174	-85.3	-85.3	-89.71	-89.81	-4.41	-4.51	PASS	1kHz RBW
1175	-85.3	-85.3	-88.70	-88.80	-3.40	-3.50	PASS	1kHz RBW
1176	-85.3	-85.3	-90.70	-88.80	-5.40	-3.50	PASS	1kHz RBW
1177	-85.3	-85.3	-89.70	-90.80	-4.40	-5.50	PASS	1kHz RBW
1178	-85.3	-85.3	-89.70	-89.80	-4.40	-4.50	PASS	1kHz RBW
1179	-85.3	-85.3	-90.70	-89.80	-5.40	-4.50	PASS	1kHz RBW
1180	-85.3	-85.3	-90.69	-88.79	-5.39	-3.49	PASS	1kHz RBW
1181	-85.3	-85.3	-90.69	-87.79	-5.39	-2.49	PASS	1kHz RBW
1182	-85.3	-85.3	-90.69	-89.79	-5.39	-4.49	PASS	1kHz RBW
1183	-85.3	-85.3	-88.69	-87.79	-3.39	-2.49	PASS	1kHz RBW
1184	-85.3	-85.3	-89.68	-89.78	-4.38	-4.48	PASS	1kHz RBW
1185	-85.3	-85.3	-90.68	-88.78	-5.38	-3.48	PASS	1kHz RBW
1186	-85.3	-85.3	-88.68	-88.78	-3.38	-3.48	PASS	1kHz RBW
1187	-85.3	-85.3	-91.68	-90.78	-6.38	-5.48	PASS	1kHz RBW
1188	-85.3	-85.3	-88.68	-87.78	-3.38	-2.48	PASS	1kHz RBW
1189	-85.3	-85.3	-90.67	-89.77	-5.37	-4.47	PASS	1kHz RBW
1190	-85.3	-85.3	-88.67	-89.77	-3.37	-4.47	PASS	1kHz RBW
1191	-85.3	-85.3	-91.67	-88.77	-6.37	-3.47	PASS	1kHz RBW
1192	-85.3	-85.3	-90.67	-90.77	-5.37	-5.47	PASS	1kHz RBW
1193	-85.3	-85.3	-89.66	-90.76	-4.36	-5.46	PASS	1kHz RBW
1194	-85.3	-85.3	-90.66	-88.76	-5.36	-3.46	PASS	1kHz RBW
1195	-85.3	-85.3	-90.66	-88.76	-5.36	-3.46	PASS	1kHz RBW
1196	-85.3	-85.3	-90.66	-90.76	-5.36	-5.46	PASS	1kHz RBW
1197	-85.3	-85.3	-89.66	-89.76	-4.36	-4.46	PASS	1kHz RBW

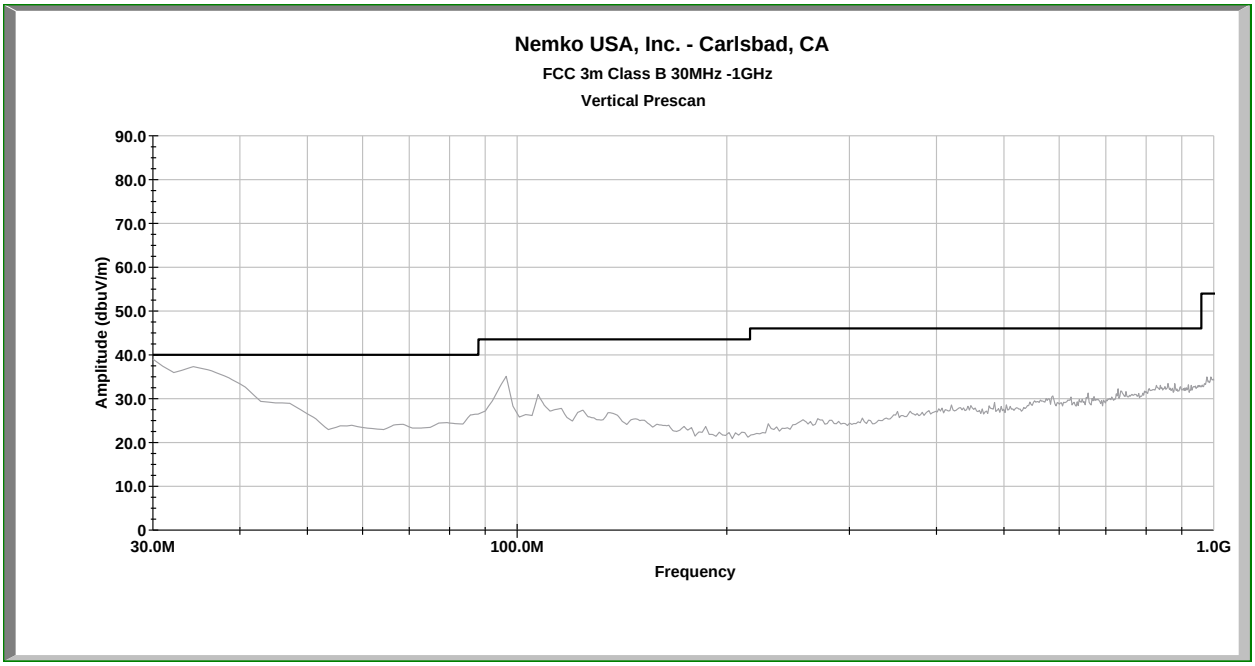
Freq (MHz)	15.517 Limit (dBm)	RSS-220 Limit (dBm)	Vertical Result (dBm)	Horizontal Result (dBm)	Diff Limit (V)	Diff Limit (H)	Result	Comments
1198	-85.3	-85.3	-88.65	-89.75	-3.35	-4.45	PASS	1kHz RBW
1199	-85.3	-85.3	-90.65	-90.75	-5.35	-5.45	PASS	1kHz RBW
1200	-85.3	-85.3	-90.65	-88.75	-5.35	-3.45	PASS	1kHz RBW
1201	-85.3	-85.3	-90.65	-89.75	-5.35	-4.45	PASS	1kHz RBW
1202	-85.3	-85.3	-89.64	-88.74	-4.34	-3.44	PASS	1kHz RBW
1203	-85.3	-85.3	-91.64	-87.74	-6.34	-2.44	PASS	1kHz RBW
1204	-85.3	-85.3	-88.64	-87.74	-3.34	-2.44	PASS	1kHz RBW
1205	-85.3	-85.3	-88.64	-90.74	-3.34	-5.44	PASS	1kHz RBW
1206	-85.3	-85.3	-89.63	-89.73	-4.33	-4.43	PASS	1kHz RBW
1207	-85.3	-85.3	-90.63	-88.73	-5.33	-3.43	PASS	1kHz RBW
1208	-85.3	-85.3	-89.63	-89.73	-4.33	-4.43	PASS	1kHz RBW
1209	-85.3	-85.3	-88.63	-88.73	-3.33	-3.43	PASS	1kHz RBW
1210	-85.3	-85.3	-91.63	-89.73	-6.33	-4.43	PASS	1kHz RBW
1211	-85.3	-85.3	-90.62	-88.72	-5.32	-3.42	PASS	1kHz RBW
1212	-85.3	-85.3	-91.62	-89.72	-6.32	-4.42	PASS	1kHz RBW
1213	-85.3	-85.3	-90.62	-88.72	-5.32	-3.42	PASS	1kHz RBW
1214	-85.3	-85.3	-89.62	-87.72	-4.32	-2.42	PASS	1kHz RBW
1215	-85.3	-85.3	-89.61	-90.71	-4.31	-5.41	PASS	1kHz RBW
1216	-85.3	-85.3	-89.61	-88.71	-4.31	-3.41	PASS	1kHz RBW
1217	-85.3	-85.3	-91.61	-87.71	-6.31	-2.41	PASS	1kHz RBW
1218	-85.3	-85.3	-89.61	-87.71	-4.31	-2.41	PASS	1kHz RBW
1219	-85.3	-85.3	-90.61	-90.71	-5.31	-5.41	PASS	1kHz RBW
1220	-85.3	-85.3	-90.60	-90.70	-5.30	-5.40	PASS	1kHz RBW
1221	-85.3	-85.3	-89.60	-89.70	-4.30	-4.40	PASS	1kHz RBW
1222	-85.3	-85.3	-89.60	-87.70	-4.30	-2.40	PASS	1kHz RBW
1223	-85.3	-85.3	-90.60	-87.70	-5.30	-2.40	PASS	1kHz RBW
1224	-85.3	-85.3	-89.59	-88.69	-4.29	-3.39	PASS	1kHz RBW
1225	-85.3	-85.3	-89.59	-87.69	-4.29	-2.39	PASS	1kHz RBW
1226	-85.3	-85.3	-89.59	-87.69	-4.29	-2.39	PASS	1kHz RBW
1227	-85.3	-85.3	-90.59	-88.69	-5.29	-3.39	PASS	1kHz RBW
1228	-85.3	-85.3	-89.59	-88.69	-4.29	-3.39	PASS	1kHz RBW
1229	-85.3	-85.3	-89.58	-90.68	-4.28	-5.38	PASS	1kHz RBW
1230	-85.3	-85.3	-88.58	-89.68	-3.28	-4.38	PASS	1kHz RBW
1231	-85.3	-85.3	-89.58	-88.68	-4.28	-3.38	PASS	1kHz RBW
1232	-85.3	-85.3	-90.58	-89.68	-5.28	-4.38	PASS	1kHz RBW
1233	-85.3	-85.3	-90.57	-87.67	-5.27	-2.37	PASS	1kHz RBW
1234	-85.3	-85.3	-91.57	-89.67	-6.27	-4.37	PASS	1kHz RBW

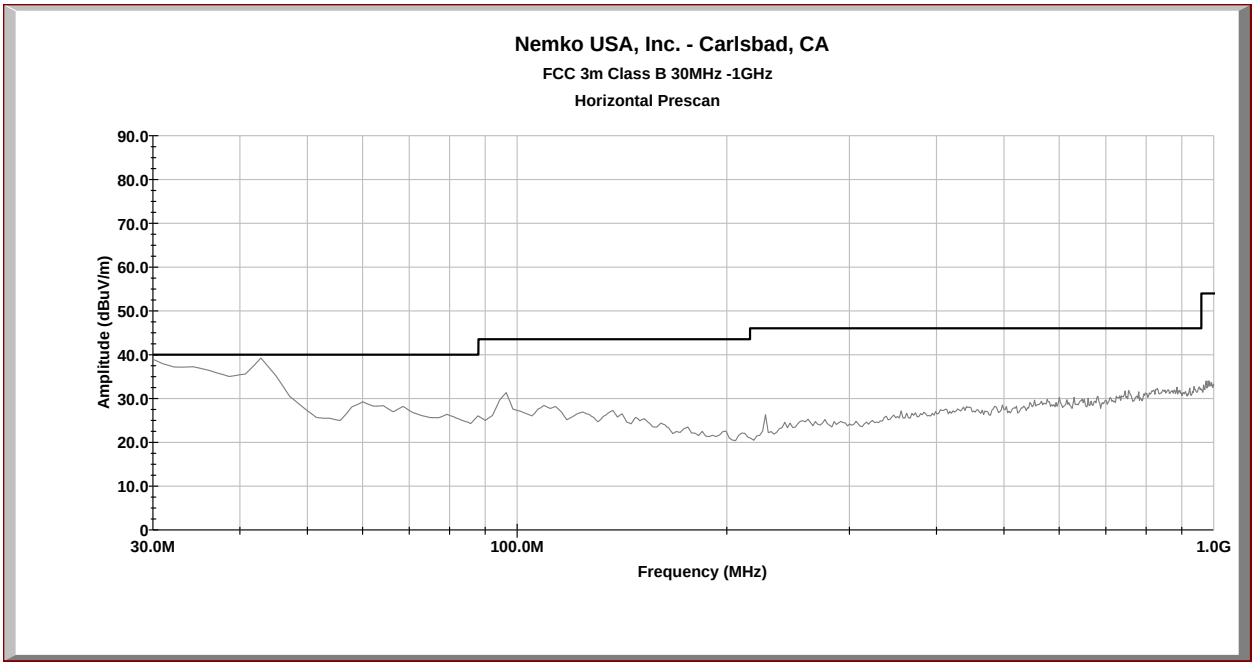
Freq (MHz)	15.517 Limit (dBm)	RSS-220 Limit (dBm)	Vertical Result (dBm)	Horizontal Result (dBm)	Diff Limit (V)	Diff Limit (H)	Result	Comments
1235	-85.3	-85.3	-89.57	-89.67	-4.27	-4.37	PASS	1kHz RBW
1236	-85.3	-85.3	-90.57	-87.67	-5.27	-2.37	PASS	1kHz RBW
1237	-85.3	-85.3	-91.56	-88.66	-6.26	-3.36	PASS	1kHz RBW
1238	-85.3	-85.3	-90.56	-87.66	-5.26	-2.36	PASS	1kHz RBW
1239	-85.3	-85.3	-88.56	-90.66	-3.26	-5.36	PASS	1kHz RBW
1240	-85.3	-85.3	-90.56	-89.66	-5.26	-4.36	PASS	1kHz RBW
1559	-85.3	-85.3	-90.84	-87.94	-5.54	-2.64	PASS	1kHz RBW
1560	-85.3	-85.3	-88.84	-87.94	-3.54	-2.64	PASS	1kHz RBW
1561	-85.3	-85.3	-89.83	-87.93	-4.53	-2.63	PASS	1kHz RBW
1562	-85.3	-85.3	-88.83	-86.93	-3.53	-1.63	PASS	1kHz RBW
1563	-85.3	-85.3	-90.83	-87.93	-5.53	-2.63	PASS	1kHz RBW
1564	-85.3	-85.3	-89.83	-86.93	-4.53	-1.63	PASS	1kHz RBW
1565	-85.3	-85.3	-89.82	-87.92	-4.52	-2.62	PASS	1kHz RBW
1566	-85.3	-85.3	-90.82	-86.92	-5.52	-1.62	PASS	1kHz RBW
1567	-85.3	-85.3	-88.82	-87.92	-3.52	-2.62	PASS	1kHz RBW
1568	-85.3	-85.3	-88.82	-87.92	-3.52	-2.62	PASS	1kHz RBW
1569	-85.3	-85.3	-88.82	-88.92	-3.52	-3.62	PASS	1kHz RBW
1570	-85.3	-85.3	-89.81	-86.91	-4.51	-1.61	PASS	1kHz RBW
1571	-85.3	-85.3	-89.81	-87.91	-4.51	-2.61	PASS	1kHz RBW
1572	-85.3	-85.3	-88.81	-89.91	-3.51	-4.61	PASS	1kHz RBW
1573	-85.3	-85.3	-88.81	-87.91	-3.51	-2.61	PASS	1kHz RBW
1574	-85.3	-85.3	-90.80	-87.90	-5.50	-2.60	PASS	1kHz RBW
1575	-85.3	-85.3	-88.80	-86.90	-3.50	-1.60	PASS	1kHz RBW
1576	-85.3	-85.3	-90.80	-86.90	-5.50	-1.60	PASS	1kHz RBW
1577	-85.3	-85.3	-88.80	-86.90	-3.50	-1.60	PASS	1kHz RBW
1578	-85.3	-85.3	-89.79	-88.89	-4.49	-3.59	PASS	1kHz RBW
1579	-85.3	-85.3	-88.79	-88.89	-3.49	-3.59	PASS	1kHz RBW
1580	-85.3	-85.3	-88.79	-87.89	-3.49	-2.59	PASS	1kHz RBW
1581	-85.3	-85.3	-90.79	-87.89	-5.49	-2.59	PASS	1kHz RBW
1582	-85.3	-85.3	-88.79	-89.89	-3.49	-4.59	PASS	1kHz RBW
1583	-85.3	-85.3	-89.78	-87.88	-4.48	-2.58	PASS	1kHz RBW
1584	-85.3	-85.3	-88.78	-88.88	-3.48	-3.58	PASS	1kHz RBW
1585	-85.3	-85.3	-88.78	-89.88	-3.48	-4.58	PASS	1kHz RBW
1586	-85.3	-85.3	-87.78	-89.88	-2.48	-4.58	PASS	1kHz RBW
1587	-85.3	-85.3	-90.77	-89.87	-5.47	-4.57	PASS	1kHz RBW
1588	-85.3	-85.3	-89.77	-89.87	-4.47	-4.57	PASS	1kHz RBW
1589	-85.3	-85.3	-90.77	-86.87	-5.47	-1.57	PASS	1kHz RBW

Freq (MHz)	15.517 Limit (dBm)	RSS-220 Limit (dBm)	Vertical Result (dBm)	Horizontal Result (dBm)	Diff Limit (V)	Diff Limit (H)	Result	Comments
1590	-85.3	-85.3	-88.77	-89.87	-3.47	-4.57	PASS	1kHz RBW
1591	-85.3	-85.3	-88.77	-88.87	-3.47	-3.57	PASS	1kHz RBW
1592	-85.3	-85.3	-88.76	-88.86	-3.46	-3.56	PASS	1kHz RBW
1593	-85.3	-85.3	-89.76	-88.86	-4.46	-3.56	PASS	1kHz RBW
1594	-85.3	-85.3	-88.76	-87.86	-3.46	-2.56	PASS	1kHz RBW
1595	-85.3	-85.3	-87.76	-87.86	-2.46	-2.56	PASS	1kHz RBW
1596	-85.3	-85.3	-87.75	-88.85	-2.45	-3.55	PASS	1kHz RBW
1597	-85.3	-85.3	-90.75	-87.85	-5.45	-2.55	PASS	1kHz RBW
1598	-85.3	-85.3	-89.75	-87.85	-4.45	-2.55	PASS	1kHz RBW
1599	-85.3	-85.3	-90.75	-88.85	-5.45	-3.55	PASS	1kHz RBW
1600	-85.3	-85.3	-88.75	-88.85	-3.45	-3.55	PASS	1kHz RBW
1601	-85.3	-85.3	-88.74	-88.84	-3.44	-3.54	PASS	1kHz RBW
1602	-85.3	-85.3	-88.74	-87.84	-3.44	-2.54	PASS	1kHz RBW
1603	-85.3	-85.3	-88.74	-89.84	-3.44	-4.54	PASS	1kHz RBW
1604	-85.3	-85.3	-88.74	-88.84	-3.44	-3.54	PASS	1kHz RBW
1605	-85.3	-85.3	-89.73	-89.83	-4.43	-4.53	PASS	1kHz RBW
1606	-85.3	-85.3	-90.73	-88.83	-5.43	-3.53	PASS	1kHz RBW
1607	-85.3	-85.3	-90.73	-88.83	-5.43	-3.53	PASS	1kHz RBW
1608	-85.3	-85.3	-88.73	-88.83	-3.43	-3.53	PASS	1kHz RBW
1609	-85.3	-85.3	-89.72	-86.82	-4.42	-1.52	PASS	1kHz RBW
1610	-85.3	-85.3	-89.72	-89.82	-4.42	-4.52	PASS	1kHz RBW

Test Data – Radiated Emissions

4.0 GHz Configuration





Test Data – Radiated Emissions

FCC Results above 960 MHz (15.517(c))

4.0 GHz Configuration

Meas. Freq. (MHz)	Ant. Pol. (H/V)	Atten. (dB)	Meter Reading (dBuV)	Antenna Factor (dB)	Path Loss (dB)	RF Gain (dB)	EIRP (dBm)	EIRP Limit (dBm)	CR/SL Diff. (dB)	Pass Fail Unc.	Comment
1000	V	-95.2	21.0	24.0	4.1	42.1	-88.2	-75.3	-12.9	Pass.	
1620	V	-95.2	32.0	25.8	4.7	43.0	-75.7	-53.3	-22.4	Pass	
2550	V	-95.2	29.0	28.7	5.8	44.2	-75.9	-51.3	-24.6	Pass	
7000	V	-95.2	26.0	35.1	9.5	45.1	-69.7	-41.3	-28.4	Pass	
16000	V	-95.2	24.0	37.6	14.2	44.2	-63.6	-51.3	-12.3	Pass	
1000	H	-95.2	21.0	24.0	4.1	42.1	-88.2	-75.3	-12.9	Pass.	
1620	H	-95.2	32.0	25.8	4.7	43.0	-75.7	-53.3	-22.4	Pass	
2550	H	-95.2	29.0	28.7	5.8	44.2	-75.9	-51.3	-24.6	Pass	
7000	H	-95.2	26.0	35.1	9.5	45.1	-69.7	-41.3	-28.4	Pass	
16000	H	-95.2	24.0	37.6	14.2	44.2	-63.6	-51.3	-12.3	Pass	

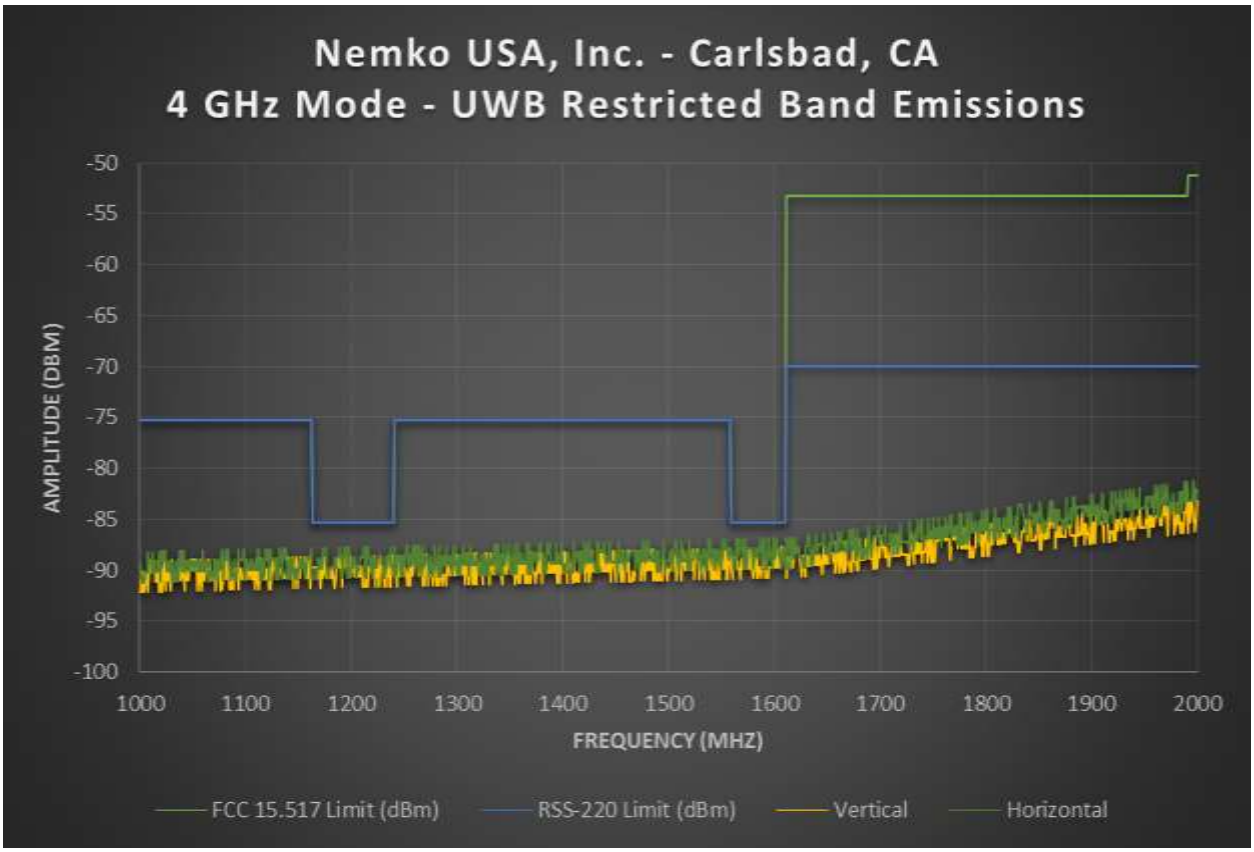
Industry Canada Limits Above 1 GHz (RSS-220, section 5.2.1(d))

4.0 GHz Configuration

Meas. Freq. (MHz)	Ant. Pol. (H/V)	Atten. (dB)	Meter Reading (dBuV)	Antenna Factor (dB)	Path Loss (dB)	RF Gain (dB)	EIRP (dBm)	EIRP Limit (dBm)	CR/SL Diff. (dB)	Pass Fail Unc.	Comment
1000	V	-95.2	21.0	24.0	4.1	42.1	-88.2	-75.3	-12.9	Pass.	
1620	V	-95.2	32.0	25.8	4.7	43.0	-75.7	-70.0	-5.7	Pass	
2550	V	-95.2	29.0	28.7	5.8	44.2	-75.9	-70.0	-5.9	Pass	
7000	V	-95.2	26.0	35.1	9.5	45.1	-69.7	-41.3	-28.4	Pass	
16000	V	-95.2	24.0	37.6	14.2	44.2	-63.6	-51.3	-12.3	Pass	
1000	H	-95.2	21.0	24.0	4.1	42.1	-88.2	-75.3	-12.9	Pass.	
1620	H	-95.2	32.0	25.8	4.7	43.0	-75.7	-70.0	-5.7	Pass	
2550	H	-95.2	29.0	28.7	5.8	44.2	-75.9	-70.0	-5.9	Pass	
7000	H	-95.2	26.0	35.1	9.5	45.1	-69.7	-41.3	-28.4	Pass	
16000	H	-95.2	24.0	37.6	14.2	44.2	-63.6	-51.3	-12.3	Pass	

Test Data – Radiated Emissions

FCC & Industry Canada Results above 960 MHz (15.517(d) & RSS-220 5.2.1(e))
4 GHz Configuration



Test Data – Radiated Emissions

FCC & Industry Canada Results above 960 MHz (15.517(d) & RSS-220 5.2.1(e))
4 GHz Configuration

Freq (MHz)	15.517 Limit (dBm)	RSS-220 Limit (dBm)	Vertical Result (dBm)	Horizontal Result (dBm)	Diff Limit (V)	Diff Limit (H)	Result	Comments
1164	-85.3	-85.3	-89.73	-90.83	-4.43	-5.53	PASS	1kHz RBW
1165	-85.3	-85.3	-89.73	-90.83	-4.43	-5.53	PASS	1kHz RBW
1166	-85.3	-85.3	-89.73	-89.83	-4.43	-4.53	PASS	1kHz RBW
1167	-85.3	-85.3	-89.72	-90.82	-4.42	-5.52	PASS	1kHz RBW
1168	-85.3	-85.3	-90.72	-89.82	-5.42	-4.52	PASS	1kHz RBW
1169	-85.3	-85.3	-89.72	-88.82	-4.42	-3.52	PASS	1kHz RBW
1170	-85.3	-85.3	-89.72	-88.82	-4.42	-3.52	PASS	1kHz RBW
1171	-85.3	-85.3	-91.71	-89.81	-6.41	-4.51	PASS	1kHz RBW
1172	-85.3	-85.3	-89.71	-89.81	-4.41	-4.51	PASS	1kHz RBW
1173	-85.3	-85.3	-90.71	-87.81	-5.41	-2.51	PASS	1kHz RBW
1174	-85.3	-85.3	-89.71	-87.81	-4.41	-2.51	PASS	1kHz RBW
1175	-85.3	-85.3	-88.70	-87.80	-3.40	-2.50	PASS	1kHz RBW
1176	-85.3	-85.3	-89.70	-87.80	-4.40	-2.50	PASS	1kHz RBW
1177	-85.3	-85.3	-90.70	-89.80	-5.40	-4.50	PASS	1kHz RBW
1178	-85.3	-85.3	-90.70	-90.80	-5.40	-5.50	PASS	1kHz RBW
1179	-85.3	-85.3	-90.70	-89.80	-5.40	-4.50	PASS	1kHz RBW
1180	-85.3	-85.3	-89.69	-89.79	-4.39	-4.49	PASS	1kHz RBW
1181	-85.3	-85.3	-90.69	-89.79	-5.39	-4.49	PASS	1kHz RBW
1182	-85.3	-85.3	-89.69	-89.79	-4.39	-4.49	PASS	1kHz RBW
1183	-85.3	-85.3	-90.69	-89.79	-5.39	-4.49	PASS	1kHz RBW
1184	-85.3	-85.3	-91.68	-88.78	-6.38	-3.48	PASS	1kHz RBW
1185	-85.3	-85.3	-90.68	-89.78	-5.38	-4.48	PASS	1kHz RBW
1186	-85.3	-85.3	-90.68	-89.78	-5.38	-4.48	PASS	1kHz RBW
1187	-85.3	-85.3	-88.68	-88.78	-3.38	-3.48	PASS	1kHz RBW
1188	-85.3	-85.3	-88.68	-88.78	-3.38	-3.48	PASS	1kHz RBW
1189	-85.3	-85.3	-89.67	-87.77	-4.37	-2.47	PASS	1kHz RBW
1190	-85.3	-85.3	-88.67	-88.77	-3.37	-3.47	PASS	1kHz RBW
1191	-85.3	-85.3	-91.67	-89.77	-6.37	-4.47	PASS	1kHz RBW
1192	-85.3	-85.3	-90.67	-90.77	-5.37	-5.47	PASS	1kHz RBW
1193	-85.3	-85.3	-88.66	-88.76	-3.36	-3.46	PASS	1kHz RBW
1194	-85.3	-85.3	-89.66	-87.76	-4.36	-2.46	PASS	1kHz RBW
1195	-85.3	-85.3	-88.66	-87.76	-3.36	-2.46	PASS	1kHz RBW
1196	-85.3	-85.3	-90.66	-90.76	-5.36	-5.46	PASS	1kHz RBW
1197	-85.3	-85.3	-89.66	-90.76	-4.36	-5.46	PASS	1kHz RBW

Freq (MHz)	15.517 Limit (dBm)	RSS-220 Limit (dBm)	Vertical Result (dBm)	Horizontal Result (dBm)	Diff Limit (V)	Diff Limit (H)	Result	Comments
1198	-85.3	-85.3	-89.65	-87.75	-4.35	-2.45	PASS	1kHz RBW
1199	-85.3	-85.3	-88.65	-90.75	-3.35	-5.45	PASS	1kHz RBW
1200	-85.3	-85.3	-90.65	-89.75	-5.35	-4.45	PASS	1kHz RBW
1201	-85.3	-85.3	-89.65	-89.75	-4.35	-4.45	PASS	1kHz RBW
1202	-85.3	-85.3	-89.64	-88.74	-4.34	-3.44	PASS	1kHz RBW
1203	-85.3	-85.3	-90.64	-88.74	-5.34	-3.44	PASS	1kHz RBW
1204	-85.3	-85.3	-89.64	-88.74	-4.34	-3.44	PASS	1kHz RBW
1205	-85.3	-85.3	-90.64	-90.74	-5.34	-5.44	PASS	1kHz RBW
1206	-85.3	-85.3	-89.63	-89.73	-4.33	-4.43	PASS	1kHz RBW
1207	-85.3	-85.3	-90.63	-89.73	-5.33	-4.43	PASS	1kHz RBW
1208	-85.3	-85.3	-90.63	-88.73	-5.33	-3.43	PASS	1kHz RBW
1209	-85.3	-85.3	-90.63	-88.73	-5.33	-3.43	PASS	1kHz RBW
1210	-85.3	-85.3	-89.63	-88.73	-4.33	-3.43	PASS	1kHz RBW
1211	-85.3	-85.3	-91.62	-88.72	-6.32	-3.42	PASS	1kHz RBW
1212	-85.3	-85.3	-91.62	-87.72	-6.32	-2.42	PASS	1kHz RBW
1213	-85.3	-85.3	-91.62	-89.72	-6.32	-4.42	PASS	1kHz RBW
1214	-85.3	-85.3	-88.62	-90.72	-3.32	-5.42	PASS	1kHz RBW
1215	-85.3	-85.3	-89.61	-87.71	-4.31	-2.41	PASS	1kHz RBW
1216	-85.3	-85.3	-91.61	-87.71	-6.31	-2.41	PASS	1kHz RBW
1217	-85.3	-85.3	-89.61	-88.71	-4.31	-3.41	PASS	1kHz RBW
1218	-85.3	-85.3	-89.61	-89.71	-4.31	-4.41	PASS	1kHz RBW
1219	-85.3	-85.3	-89.61	-88.71	-4.31	-3.41	PASS	1kHz RBW
1220	-85.3	-85.3	-90.60	-90.70	-5.30	-5.40	PASS	1kHz RBW
1221	-85.3	-85.3	-90.60	-90.70	-5.30	-5.40	PASS	1kHz RBW
1222	-85.3	-85.3	-88.60	-88.70	-3.30	-3.40	PASS	1kHz RBW
1223	-85.3	-85.3	-91.60	-89.70	-6.30	-4.40	PASS	1kHz RBW
1224	-85.3	-85.3	-89.59	-89.69	-4.29	-4.39	PASS	1kHz RBW
1225	-85.3	-85.3	-90.59	-88.69	-5.29	-3.39	PASS	1kHz RBW
1226	-85.3	-85.3	-88.59	-88.69	-3.29	-3.39	PASS	1kHz RBW
1227	-85.3	-85.3	-91.59	-88.69	-6.29	-3.39	PASS	1kHz RBW
1228	-85.3	-85.3	-89.59	-88.69	-4.29	-3.39	PASS	1kHz RBW
1229	-85.3	-85.3	-89.58	-88.68	-4.28	-3.38	PASS	1kHz RBW
1230	-85.3	-85.3	-89.58	-89.68	-4.28	-4.38	PASS	1kHz RBW
1231	-85.3	-85.3	-91.58	-90.68	-6.28	-5.38	PASS	1kHz RBW
1232	-85.3	-85.3	-91.58	-89.68	-6.28	-4.38	PASS	1kHz RBW
1233	-85.3	-85.3	-90.57	-88.67	-5.27	-3.37	PASS	1kHz RBW
1234	-85.3	-85.3	-90.57	-89.67	-5.27	-4.37	PASS	1kHz RBW

Freq (MHz)	15.517 Limit (dBm)	RSS-220 Limit (dBm)	Vertical Result (dBm)	Horizontal Result (dBm)	Diff Limit (V)	Diff Limit (H)	Result	Comments
1235	-85.3	-85.3	-88.57	-88.67	-3.27	-3.37	PASS	1kHz RBW
1236	-85.3	-85.3	-91.57	-88.67	-6.27	-3.37	PASS	1kHz RBW
1237	-85.3	-85.3	-91.56	-87.66	-6.26	-2.36	PASS	1kHz RBW
1238	-85.3	-85.3	-90.56	-89.66	-5.26	-4.36	PASS	1kHz RBW
1239	-85.3	-85.3	-88.56	-89.66	-3.26	-4.36	PASS	1kHz RBW
1240	-85.3	-85.3	-88.56	-90.66	-3.26	-5.36	PASS	1kHz RBW
1559	-85.3	-85.3	-89.84	-87.94	-4.54	-2.64	PASS	1kHz RBW
1560	-85.3	-85.3	-90.84	-88.94	-5.54	-3.64	PASS	1kHz RBW
1561	-85.3	-85.3	-88.83	-88.93	-3.53	-3.63	PASS	1kHz RBW
1562	-85.3	-85.3	-88.83	-89.93	-3.53	-4.63	PASS	1kHz RBW
1563	-85.3	-85.3	-88.83	-88.93	-3.53	-3.63	PASS	1kHz RBW
1564	-85.3	-85.3	-87.83	-86.93	-2.53	-1.63	PASS	1kHz RBW
1565	-85.3	-85.3	-88.82	-86.92	-3.52	-1.62	PASS	1kHz RBW
1566	-85.3	-85.3	-89.82	-88.92	-4.52	-3.62	PASS	1kHz RBW
1567	-85.3	-85.3	-89.82	-87.92	-4.52	-2.62	PASS	1kHz RBW
1568	-85.3	-85.3	-90.82	-86.92	-5.52	-1.62	PASS	1kHz RBW
1569	-85.3	-85.3	-88.82	-87.92	-3.52	-2.62	PASS	1kHz RBW
1570	-85.3	-85.3	-89.81	-88.91	-4.51	-3.61	PASS	1kHz RBW
1571	-85.3	-85.3	-89.81	-89.91	-4.51	-4.61	PASS	1kHz RBW
1572	-85.3	-85.3	-89.81	-86.91	-4.51	-1.61	PASS	1kHz RBW
1573	-85.3	-85.3	-87.81	-86.91	-2.51	-1.61	PASS	1kHz RBW
1574	-85.3	-85.3	-87.80	-89.90	-2.50	-4.60	PASS	1kHz RBW
1575	-85.3	-85.3	-89.80	-87.90	-4.50	-2.60	PASS	1kHz RBW
1576	-85.3	-85.3	-88.80	-87.90	-3.50	-2.60	PASS	1kHz RBW
1577	-85.3	-85.3	-87.80	-87.90	-2.50	-2.60	PASS	1kHz RBW
1578	-85.3	-85.3	-89.79	-87.89	-4.49	-2.59	PASS	1kHz RBW
1579	-85.3	-85.3	-89.79	-87.89	-4.49	-2.59	PASS	1kHz RBW
1580	-85.3	-85.3	-90.79	-89.89	-5.49	-4.59	PASS	1kHz RBW
1581	-85.3	-85.3	-88.79	-88.89	-3.49	-3.59	PASS	1kHz RBW
1582	-85.3	-85.3	-88.79	-87.89	-3.49	-2.59	PASS	1kHz RBW
1583	-85.3	-85.3	-90.78	-87.88	-5.48	-2.58	PASS	1kHz RBW
1584	-85.3	-85.3	-88.78	-87.88	-3.48	-2.58	PASS	1kHz RBW
1585	-85.3	-85.3	-90.78	-88.88	-5.48	-3.58	PASS	1kHz RBW
1586	-85.3	-85.3	-89.78	-87.88	-4.48	-2.58	PASS	1kHz RBW
1587	-85.3	-85.3	-89.77	-86.87	-4.47	-1.57	PASS	1kHz RBW
1588	-85.3	-85.3	-90.77	-87.87	-5.47	-2.57	PASS	1kHz RBW
1589	-85.3	-85.3	-88.77	-89.87	-3.47	-4.57	PASS	1kHz RBW

Freq (MHz)	15.517 Limit (dBm)	RSS-220 Limit (dBm)	Vertical Result (dBm)	Horizontal Result (dBm)	Diff Limit (V)	Diff Limit (H)	Result	Comments
1590	-85.3	-85.3	-89.77	-87.87	-4.47	-2.57	PASS	1kHz RBW
1591	-85.3	-85.3	-87.77	-86.87	-2.47	-1.57	PASS	1kHz RBW
1592	-85.3	-85.3	-90.76	-89.86	-5.46	-4.56	PASS	1kHz RBW
1593	-85.3	-85.3	-90.76	-89.86	-5.46	-4.56	PASS	1kHz RBW
1594	-85.3	-85.3	-90.76	-87.86	-5.46	-2.56	PASS	1kHz RBW
1595	-85.3	-85.3	-89.76	-86.86	-4.46	-1.56	PASS	1kHz RBW
1596	-85.3	-85.3	-89.75	-87.85	-4.45	-2.55	PASS	1kHz RBW
1597	-85.3	-85.3	-89.75	-88.85	-4.45	-3.55	PASS	1kHz RBW
1598	-85.3	-85.3	-89.75	-89.85	-4.45	-4.55	PASS	1kHz RBW
1599	-85.3	-85.3	-89.75	-86.85	-4.45	-1.55	PASS	1kHz RBW
1600	-85.3	-85.3	-88.75	-88.85	-3.45	-3.55	PASS	1kHz RBW
1601	-85.3	-85.3	-89.74	-88.84	-4.44	-3.54	PASS	1kHz RBW
1602	-85.3	-85.3	-87.74	-86.84	-2.44	-1.54	PASS	1kHz RBW
1603	-85.3	-85.3	-89.74	-87.84	-4.44	-2.54	PASS	1kHz RBW
1604	-85.3	-85.3	-88.74	-87.84	-3.44	-2.54	PASS	1kHz RBW
1605	-85.3	-85.3	-89.73	-88.83	-4.43	-3.53	PASS	1kHz RBW
1606	-85.3	-85.3	-88.73	-89.83	-3.43	-4.53	PASS	1kHz RBW
1607	-85.3	-85.3	-87.73	-89.83	-2.43	-4.53	PASS	1kHz RBW
1608	-85.3	-85.3	-87.73	-87.83	-2.43	-2.53	PASS	1kHz RBW
1609	-85.3	-85.3	-88.72	-87.82	-3.42	-2.52	PASS	1kHz RBW
1610	-85.3	-85.3	-89.72	-89.82	-4.42	-4.52	PASS	1kHz RBW

Section 4. Peak Emissions

NAME OF TEST: Peak Emissions	PARA. NO.: FCC 15.517(e) RSS-220 Annex 4(c)
TESTED BY: David Light	DATE: 27 February 2015

Limits: There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs, fM . That limit is 0 dBm EIRP. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit

Equipment Used: 1036-993-1783

Measurement Uncertainty: +/-1.7 dB

Temperature: 21 °C

Relative Humidity: 48 %

Test Data:

EIRP @ 3.5 GHz Configuration (50 MHz RBW limit adjusted to 10 MHz RBW)

Meas. Freq. (MHz)	Ant. Pol. (H/V)	Atten. (dB)	Meter Reading (dBuV)	Antenna Factor (dB)	Path Loss (dB)	RF Gain (dB)	10 MHz EIRP (dBm)	50 MHz EIRP (dBm)	EIRP Limit (dBm)	CR/SL Diff. (dB)	Pass Fail Unc.	Comment
3500	V	-95.2	61.2	32.5	7.3	30.0	-24.2	-17.21	0	-10.2	Pass	
3500	H	-95.2	54.4	32.5	7.3	30.0	-31.0	-24.01	0	-17.0	Pass	

EIRP @ 4.0 GHz Configuration (50 MHz RBW limit adjusted to 10 MHz RBW)

Meas. Freq. (MHz)	Ant. Pol. (H/V)	Atten. (dB)	Meter Reading (dBuV)	Antenna Factor (dB)	Path Loss (dB)	RF Gain (dB)	10 MHz EIRP (dBm)	50 MHz EIRP (dBm)	EIRP Limit (dBm)	CR/SL Diff. (dB)	Pass Fail Unc.	Comment
4000	V	-95.2	69.3	32.5	7.3	30.0	-16.1	-9.11	0	-2.1	Pass	
4000	H	-95.2	60.0	32.5	7.3	30.0	-25.4	-18.41	0	-11.4	Pass	

The measurement was made using a RBW = 10 MHz and VBW = 10 MHz, Peak detector. The coversion method was used to adjust results to 50MHZ RBW.

Conversion factor for EIRP (10MHz to 50 MHz) = (10*log(10/50)) = + 7 dBm

Section 5. Definition of UWB Transmitter

NAME OF TEST: Definition of UWB Transmitter	PARA. NO.: FCC 15.503(d) RSS-220 Para. 2
TESTED BY: David Light	DATE: 27 February 2015

Limits: *Ultra-wideband (UWB) transmitter.* An intentional radiator that, at any point in time, has a fractional bandwidth equal to or greater than 0.20 or has a UWB bandwidth equal to or greater than 500 MHz, regardless of the fractional bandwidth.

Equipment Used: 877-E1029

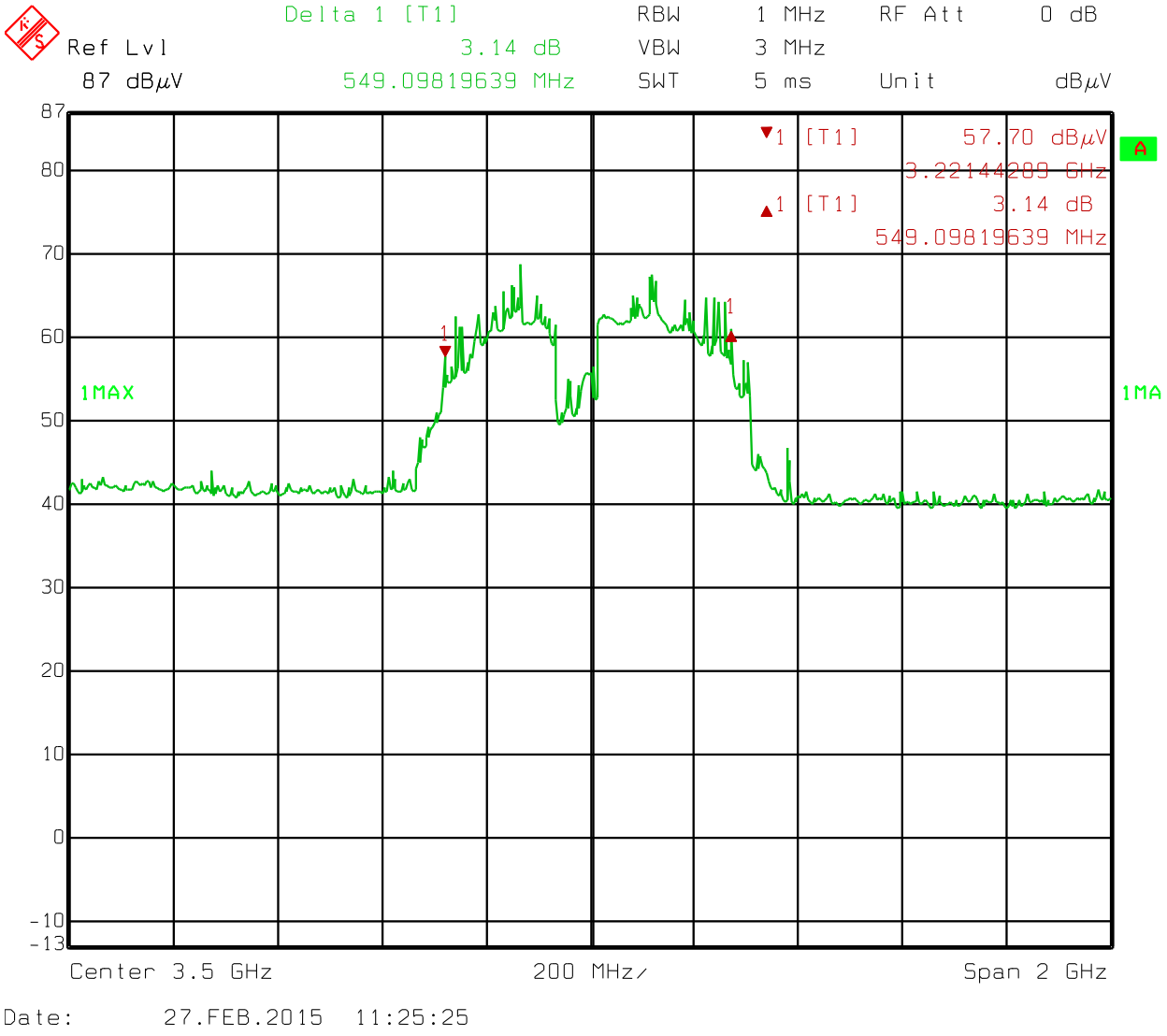
Measurement Uncertainty: +/-1.7 dB

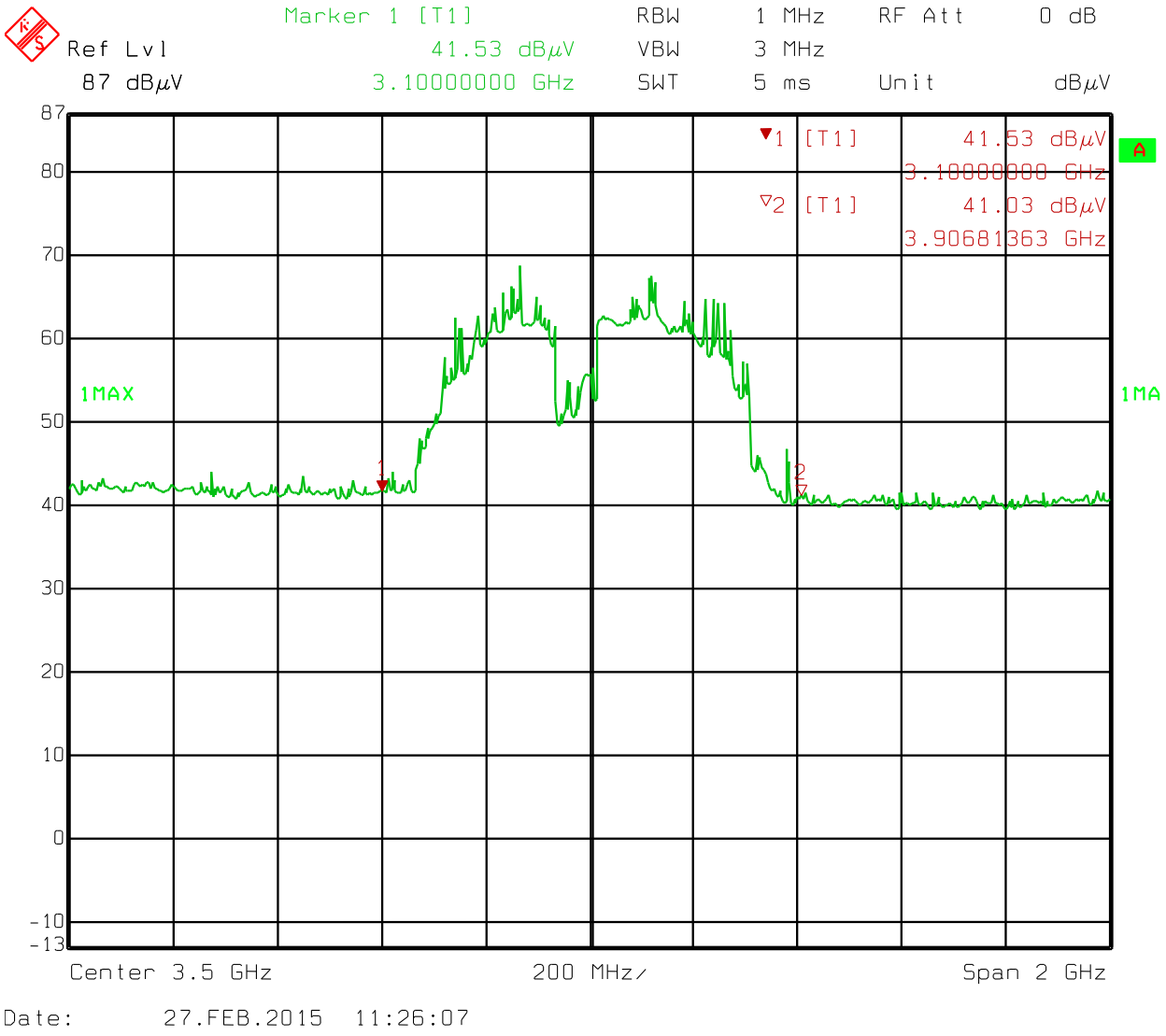
Temperature: 21 °C

Relative Humidity: 48 %

Test Data

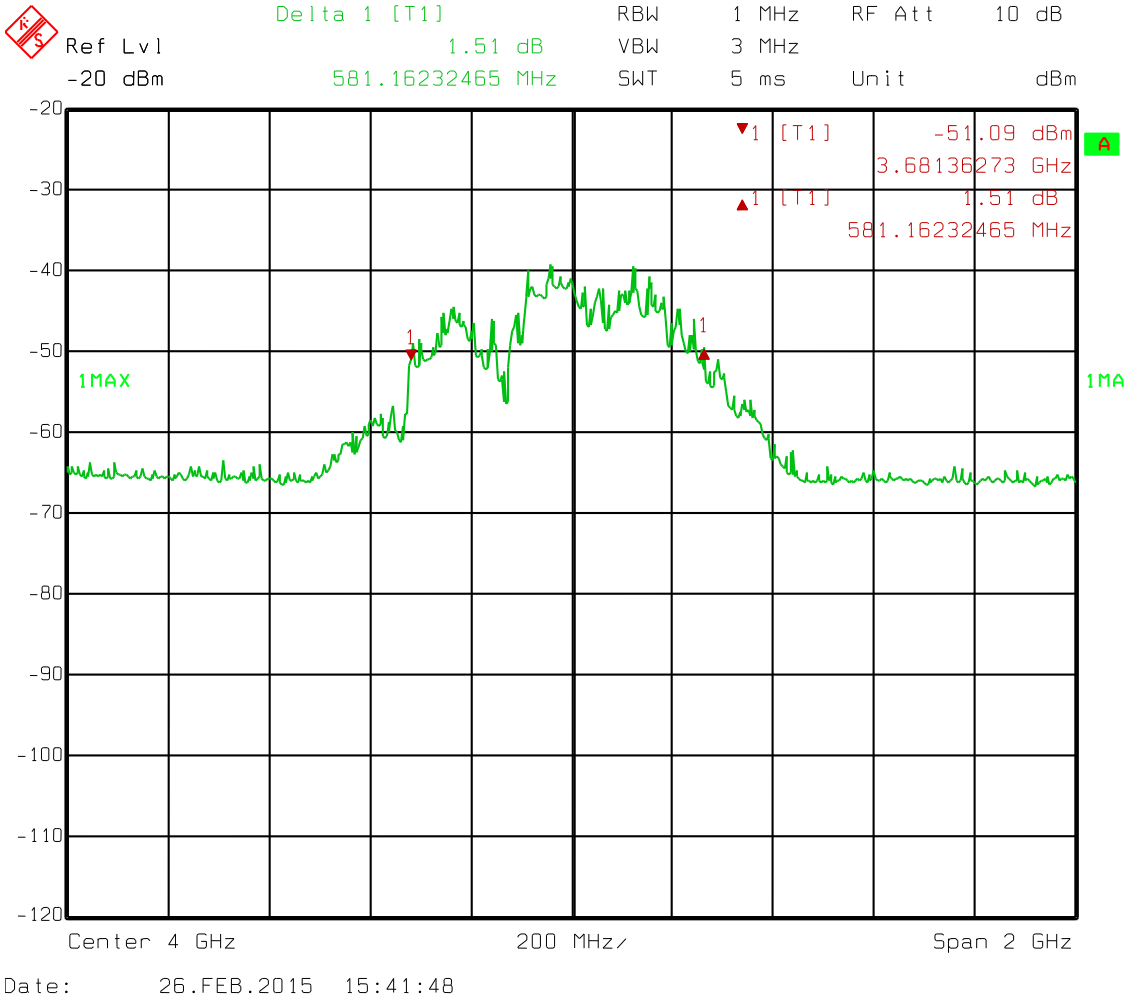
3.5 GHz Configuration

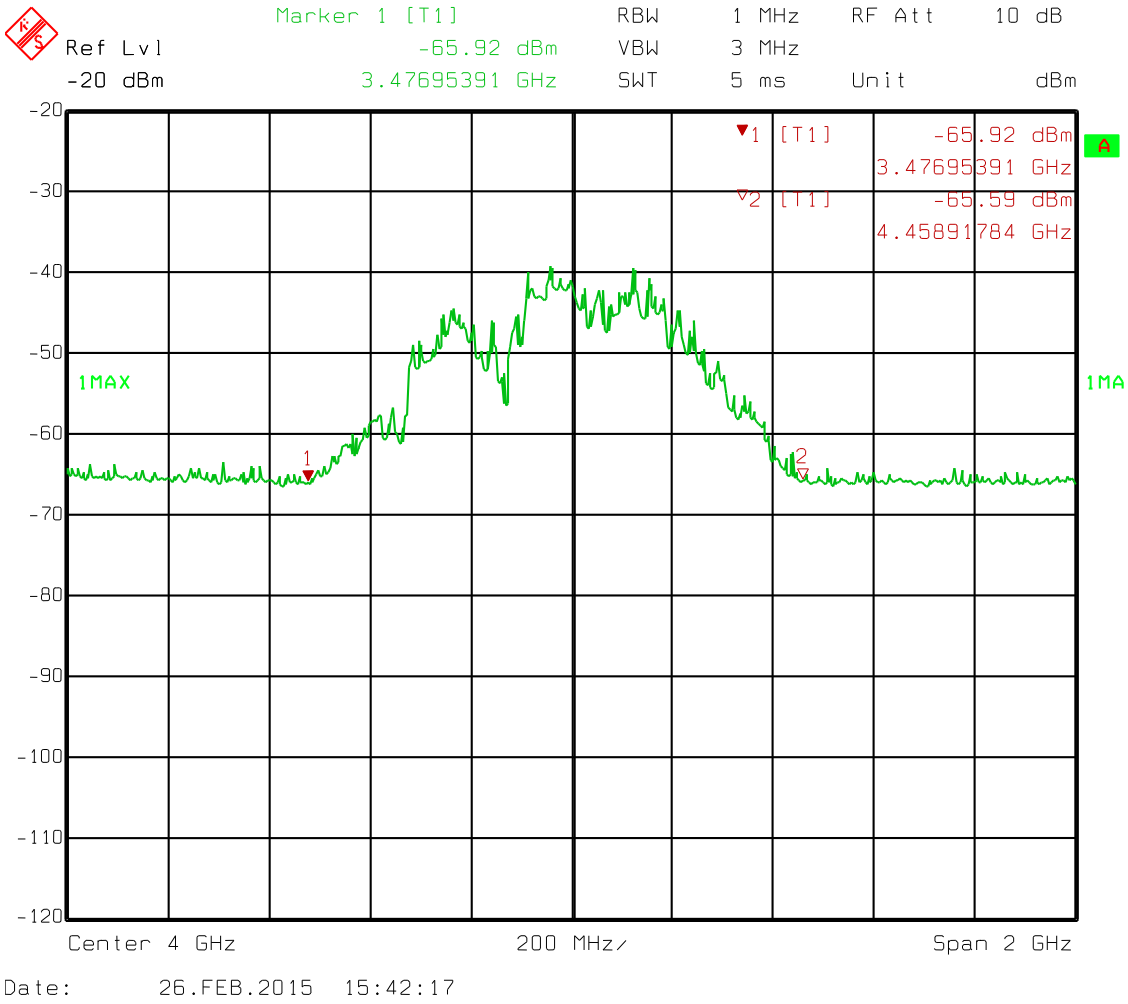



Marker 1 [T1]
41.53 dBµV
3.10000000 GHz
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 0 dB
Unit dBµV
Ref Lvl
87 dBµV
1 [T1] 41.53 dBµV
3.10000000 GHz
2 [T1] 41.03 dBµV
3.90681363 GHz
1MAX
1MA
A
87
80
70
60
50
40
30
20
10
0
-10
-13
Center 3.5 GHz
200 MHz/
Span 2 GHz
Date: 27.FEB.2015 11:26:07

Test Data

4.0 GHz Configuration




Marker 1 [T1]
Ref Lvl
-20 dBm
-65.92 dBm
3.47695391 GHz
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 10 dB
Unit dBm
1 [T1] -65.92 dBm
3.47695391 GHz
2 [T1] -65.59 dBm
4.45891784 GHz
1MAX
1MA
A
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
Center 4 GHz
200 MHz/
Span 2 GHz
Date: 26.FEB.2015 15:42:17

Section 6. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207(a)
TESTED BY: David Light	DATE: 27 February 2015

Test Results: Complies. The worst case emission was 52.7 dBµV at 163.1 kHz. This is 12.9 dB below the quasi-peak specification limit of 65.6 dBµV.

Test Data: Refer to attached plots

Equipment Used: E1026-E1029

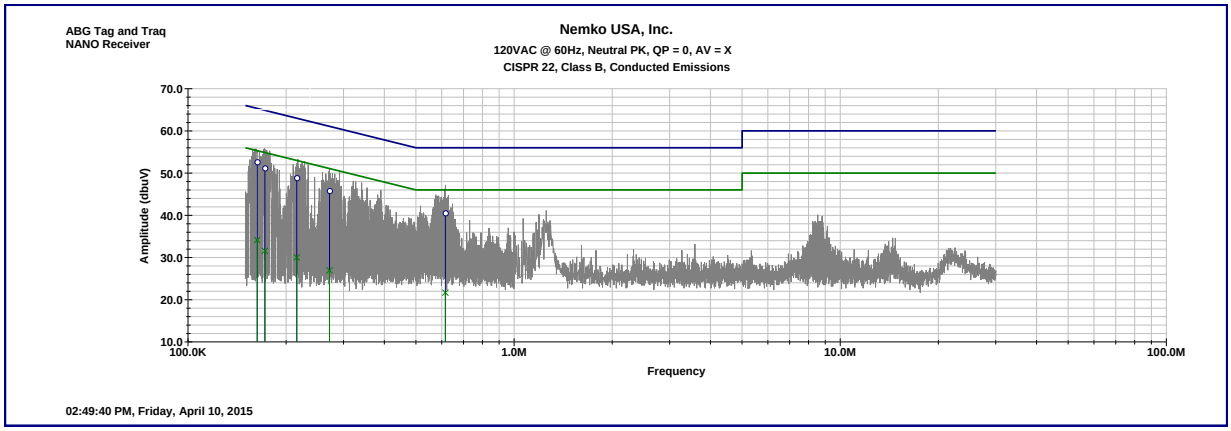
Measurement Uncertainty: +/- 1.7 dB

Temperature: 22 °C

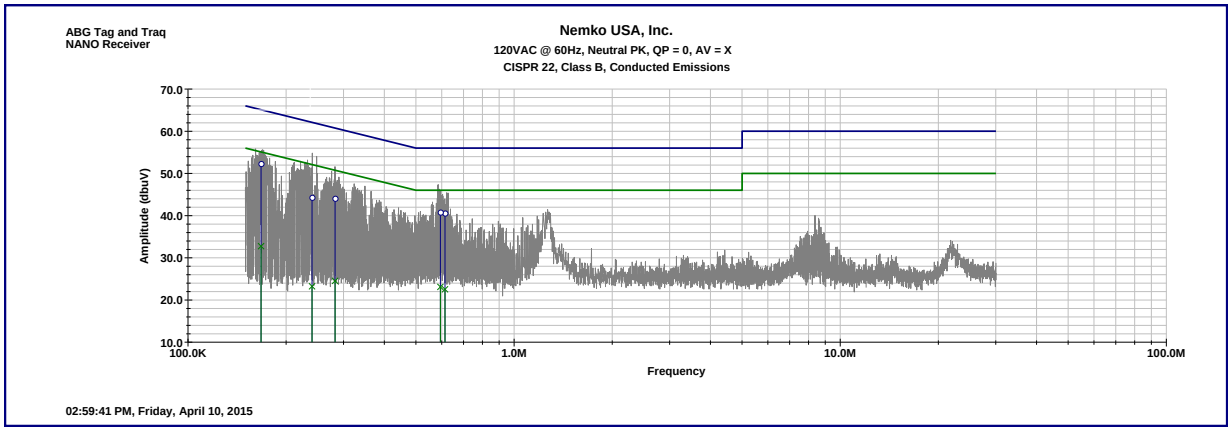
Relative Humidity: 47 %

Test Data – Powerline Conducted Emissions

Line side



Neutral side



Section 7. Test Equipment List

Asset Tag	Description	Manufacturer	Model	Serial #	Last Cal	Next Cal
877	Antenna,	AH Systems	SAS-571	688	25-Nov-2014	25-Nov-2016
902	pre amp	Sonoma	310 N	185803	08-Aug-2014	08-Aug-2015
E1019	Two Line V-Network	Rohde & Schwarz	ENV216	101045	07-May-2014	07-May-2015
E1026	EMI Test Receiver 9kHz to 7GHz	Rohde & Schwarz	ESCI 7	100800	14-Aug-2014	14-Aug-2015
E1029	Preamplifier	A.H. Systems, Inc.	PAM-0118	343	12-Aug-2014	12-Aug-2015
1036	Spectrum Analyzer	Rohde & Schwartz	FSEK30	830844/006	15-Jul-2013	15-Jul-2015
1480	Antenna, Bilog	Schaffner-Chase	CBL6111C	2572	02-Apr-2014	02-Apr-2015

ANNEX A

TEST DIAGRAMS

Radiated Emissions