



FCC PART 90

TEST AND MEASUREMENT REPORT

For

Alphawave Golf (Pty) Ltd.

18 Techno Avenue, Technopark,
Stellenbosch 7600, South Africa

FCC ID: 2A03F-EA-XRN-9000

Report Type: Original Report	Product Type: Radar Sensor
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Report Number: R1807237-90	
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report **must not** be used by the customer to claim product certification, approval, or endorsement by A2LA*, NIST, or any agency of the Federal Government.

* This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "*" see 10

TABLE OF CONTENTS

1	General Description	5
1.1	Product Description for Equipment Under Test (EUT)	5
1.2	Mechanical Description of EUT	5
1.3	Objective.....	5
1.4	Related Submittal(s)/Grant(s)	5
1.5	Test Methodology	5
1.6	Measurement Uncertainty	5
1.7	Test Facility Registrations	6
1.8	Test Facility Accreditations	6
2	System Test Configuration	9
2.1	Justification.....	9
2.2	EUT Exercise Software.....	9
2.3	Special Equipment	9
2.4	Equipment Modifications.....	9
2.5	Local Support Equipment	9
2.6	Interface Ports and Cables	9
2.7	Power Supply List and Details.....	9
3	Summary of Test Results	10
4	FCC §1.1310 & §2.1091 - RF Exposure	11
4.1	Applicable Standard.....	11
4.2	MPE Prediction.....	11
4.3	MPE Results	11
5	FCC §2.1053 & §90.210 - Spurious Radiated Emissions	12
5.1	Applicable Standard.....	12
5.2	Test Setup	12
5.3	Test Procedure	12
5.4	Test Environmental Conditions	12
5.5	Test Equipment List and Details.....	13
5.6	Summary of Test Results.....	13
5.7	Test Results.....	14
6	FCC §2.1049 - Occupied Bandwidth	15
6.1	Applicable Standard.....	15
6.2	Measurement Procedure.....	15
6.3	Test Equipment List and Details.....	15
6.4	Test Environmental Conditions	15
6.5	Test Results.....	15
7	FCC §2.1046, §90.205(s) & §90.103(c) - RF Output Power.....	18
7.1	Applicable Standard.....	18
7.2	Measurement Procedure.....	18
7.3	Test Equipment List and Details.....	18
7.4	Test Environmental Conditions	18
7.5	Test Results.....	19
8	FCC §2.1055 & §90.213(b) - Frequency Stability.....	21
8.1	Applicable Standard.....	21
8.2	Measurement Procedure.....	21
8.3	Test Equipment List and Details.....	21
8.4	Test Environmental Conditions	21
8.5	Test Results.....	22

9 FCC §90.219(e) - Spurious Emissions at Antenna Terminals 23

9.1 Applicable Standard..... 23

9.2 Test Procedure 23

9.3 Test Equipment List and Details..... 23

9.4 Test Environmental Conditions 23

9.5 Test Results..... 24

10 Appendix A (Normative) - FCC Equipment Labeling Requirements 29

10.1 FCC ID Label Requirements 29

10.2 FCC ID Label Contents and Location..... 30

11 Appendix B - EUT Photographs 31

12 Appendix C (Normative) - A2LA Electrical Testing Certificate..... 32

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1807237-90	Original	2018-10-04

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report was prepared on behalf of *Alphawave Golf (Pty) Ltd* and their product model: *EA-XRN-9000*, *FCC ID: 2A03F-EA-XRN-9000* or the “EUT” as referred to in this report. The EUT is a radar sensor

1.2 Mechanical Description of EUT

The EUT measures approximately 42 cm (L) x 14 cm (W) x 7 cm (H) and weighs 2.9 kg.

The test data gathered are from typical production sample, serial number: 0018 assigned by Alphawave Golf (Pty) Ltd.

1.3 Objective

This report is prepared on behalf of *Alphawave Golf (Pty) Ltd* in accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 90 of the Federal Communication Commission’s rules.

The objective is to determine compliance with FCC Part 90 rules for Output Power, Occupied Bandwidth, Frequency Stability, Radiated Spurious Emissions and Conducted Spurious Emissions.

1.4 Related Submittal(s)/Grant(s)

N/A

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with TIA-603-D

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Parameter	Measurement uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.57 dB
Power Spectral Density, conducted	±1.48dB
Unwanted Emissions, conducted	±1.57dB
All emissions, radiated	±4.0 dB
AC power line Conducted Emission	±2.0 dB
Temperature	±2 ° C
Humidity	±5 %
DC and low frequency voltages	±1.0 %
Time	±2 %
Duty Cycle	±3 %

1.7 Test Facility Registrations

BACLs test facilities that are used to perform Radiated and Conducted Emissions tests are currently recognized by the Federal Communications Commission as Accredited with NIST Designation Number US1129.

BACL's test facilities that are used to perform Radiated and Conducted Emissions tests are currently registered with Industry Canada under Registration Numbers: 3062A-1, 3062A-2, and 3062A-3.

BACL is a Chinese Taipei Bureau of Standards Metrology and Inspection (BSMI) validated Conformity Assessment Body (CAB), under Appendix B, Phase I Procedures of the APEC Mutual Recognition Arrangement (MRA). BACL's BSMI Lab Code Number is: SL2-IN-E-1002R

BACL's test facilities that are used to perform AC Line Conducted Emissions, Telecommunications Line Conducted Emissions, Radiated Emissions from 30 MHz to 1 GHz, and Radiated Emissions from 1 GHz to 6 GHz are currently recognized as Accredited in accordance with the Voluntary Control Council for Interference [VCCI] Article 15 procedures under Registration Number A-0027.

1.8 Test Facility Accreditations

Bay Area Compliance Laboratories Corp. (BACL) is:

A- An independent, 3rd-Party, Commercial Test Laboratory accredited to ISO/IEC 17025:2005 by A2LA (Test Laboratory Accreditation Certificate Number 3279.02), in the fields of: Electromagnetic Compatibility and Telecommunications. Unless noted by an Asterisk (*) in the Compliance Matrix (See Section 3 of this Test Report), BACL's ISO/IEC 17025:2005 Scope of Accreditation includes all of the Test Method Standards and/or the Product Family Standards detailed in this Test Report..

BACL's ISO/IEC 17025:2005 Scope of Accreditation includes a comprehensive suite of EMC Emissions, EMC Immunity, Radio, RF Exposure, Safety and wireline Telecommunications test methods applicable to a wide range of product categories. These product categories include Central Office Telecommunications Equipment [including NEBS - Network Equipment Building Systems], Unlicensed and Licensed Wireless and RF devices, Information Technology Equipment (ITE); Telecommunications Terminal Equipment (TTE); Medical Electrical Equipment; Industrial, Scientific and Medical Test Equipment; Professional Audio and Video Equipment; Industrial and Scientific Instruments and Laboratory Apparatus; Cable Distribution Systems, and Energy Efficient Lighting.

B- A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3279.03) to certify

- For the USA (Federal Communications Commission):
 - 1- All Unlicensed radio frequency devices within FCC Scopes A1, A2, A3, and A4;
 - 2- All Licensed radio frequency devices within FCC Scopes B1, B2, B3, and B4;
 - 3- All Telephone Terminal Equipment within FCC Scope C.
- For the Canada (Innovation, Science and Economic development Canada - ISEDC):
 - 1 All Scope 1-Licence-Exempt Radio Frequency Devices;
 - 2 All Scope 2-Licensed Personal Mobile Radio Services;
 - 3 All Scope 3-Licensed General Mobile & Fixed Radio Services;
 - 4 All Scope 4-Licensed Maritime & Aviation Radio Services;
 - 5 All Scope 5-Licensed Fixed Microwave Radio Services
 - 6 All Broadcasting Technical Standards (BETS) in the Category I Equipment Standards List.
- For Singapore (Info-Communications Development Authority (IDA)):
 - 1 All Line Terminal Equipment: All Technical Specifications for Line Terminal Equipment – Table 1 of IDA MRA Recognition Scheme: 2011, Annex 2
 2. All Radio-Communication Equipment: All Technical Specifications for Radio-Communication Equipment – Table 2 of IDA MRA Recognition Scheme: 2011, Annex 2
- For the Hong Kong Special Administrative Region:
 - 1 All Radio Equipment, per KHCA 10XX-series Specifications;
 - 2 All GMDSS Marine Radio Equipment, per HKCA 12XX-series Specifications;
 - 3 All Fixed Network Equipment, per HKCA 20XX-series Specifications.
- For Japan:
 - 1 MIC Telecommunication Business Law (Terminal Equipment):
 - All Scope A1 - Terminal Equipment for the Purpose of Calls;
 - All Scope A2 - Other Terminal Equipment
 - 2 Radio Law (Radio Equipment):
 - All Scope B1 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 1 of the Radio Law
 - All Scope B2 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 2 of the Radio Law
 - All Scope B3 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 3 of the Radio Law

C- A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3279.01) to certify Products to USA's Environmental Protection Agency (EPA) ENERGY STAR Product Specifications for:

- 1 Electronics and Office Equipment:
 - for Telephony (ver. 3.0)
 - for Audio/Video (ver. 3.0)
 - for Battery Charging Systems (ver. 1.1)
 - for Set-top Boxes & Cable Boxes (ver. 4.1)
 - for Televisions (ver. 6.1)
 - for Computers (ver. 6.0)
 - for Displays (ver. 6.0)
 - for Imaging Equipment (ver. 2.0)
 - for Computer Servers (ver. 2.0)
- 2 Commercial Food Service Equipment
 - for Commercial Dishwashers (ver. 2.0)
 - for Commercial Ice Machines (ver. 2.0)
 - for Commercial Ovens (ver. 2.1)

- for Commercial Refrigerators and Freezers
- 3 Lighting Products
 - For Decorative Light Strings (ver. 1.5)
 - For Luminaires (including sub-components) and Lamps (ver. 1.2)
 - For Compact Fluorescent Lamps (CFLs) (ver. 4.3)
 - For Integral LED Lamps (ver. 1.4)
- 4 Heating, Ventilation, and AC Products
 - for Residential Ceiling Fans (ver. 3.0)
 - for Residential Ventilating Fans (ver. 3.2)
- 5 Other
 - For Water Coolers (ver. 3.0)

D- A NIST Designated Phase-I and Phase-II Conformity Assessment Body (CAB) for the following economies and regulatory authorities under the terms of the stated MRAs/Treaties:

- Australia: ACMA (Australian Communication and Media Authority) – APEC Tel MRA -Phase I;
- Canada: (Innovation, Science and Economic development Canada - ISEDC) Foreign Certification Body – FCB – APEC Tel MRA -Phase I & Phase II;
- Chinese Taipei (Republic of China – Taiwan):
 - o BSMI (Bureau of Standards, Metrology and Inspection) APEC Tel MRA -Phase I;
 - o NCC (National Communications Commission) APEC Tel MRA -Phase I;
- European Union:
 - o EMC Directive 2014/30/EC US-EU EMC & Telecom MRA CAB
 - o Radio & Teleterminal Equipment (R&TTE) Directive 1995/5/EC
US -EU EMC & Telecom MRA CAB
 - o Low Voltage Directive (LVD) 2014/35/EU
- Hong Kong Special Administrative Region: (Office of the Telecommunications Authority – OFTA)
APEC Tel MRA -Phase I & Phase II
- Israel – US-Israel MRA Phase I
- Republic of Korea (Ministry of Communications - Radio Research Laboratory) APEC Tel MRA -Phase I
- Singapore: (Infocomm Development Authority - IDA) APEC Tel MRA -Phase I & Phase II;
- Japan: VCCI - Voluntary Control Council for Interference US-Japan Telecom Treaty VCCI Side Letter-
- USA:
 - o ENERGY STAR Recognized Test Laboratory – US EPA
 - o Telecommunications Certification Body (TCB) – US FCC;
 - o Nationally Recognized Test Laboratory (NRTL) – US OSHA
- Vietnam: APEC Tel MRA -Phase I;

2 System Test Configuration

2.1 Justification

The EUT was configured for testing according to FCC CFR 47 part 2, FCC CFR 47 Part 90, and TIA 603D.

The EUT was tested in a testing mode to represent worst-case results during the final qualification test.

2.2 EUT Exercise Software

The exercise software used was *AlpawaveGolfControlSoftwareNoGPS.exe*, provided by Alphawave Golf (Pty) Ltd. and was verified by Frank Wang to comply with the standard requirements being tested against.

2.3 Special Equipment

There were no special accessories required, included, or intended for use with EUT during these tests.

2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 Local Support Equipment

Manufacturer	Description	Model	Serial Number
HP	Laptop	Latitude D630	-
Trendnet	Media Converter	TFC-1000MGB	-

2.6 Interface Ports and Cables

Cable Description	Length (m)	To	From
Power Cable Assembly	>1.0	EUT	Power Supply
ODC-2 to LC Fibre	>1.0	EUT	Ethernet Media Converter
RJ45	>1.0	Ethernet Media Converter	Laptop

2.7 Power Supply List and Details

Manufacturer	Description	Model	Part Number
HP	DC Power Supply	E3617A	-

3 Summary of Test Results

Results reported relate only to the product tested.

FCC Rules	Description of Test	Results
§1.1310 & 2.1091	RF Exposure	Compliant
§2.1053, §90.210	Radiated Spurious Emissions	Compliant
§2.1049	Occupied Bandwidth	Compliant
§2.1046, §90.205(s), §90.103(c)(13)	Output Power	Compliant
§2.1055, §90.213(b)	Frequency Stability	Compliant
§2.1053, §90.210	Conducted Spurious Emissions	Compliant

4 FCC §1.1310 & §2.1091 - RF Exposure

4.1 Applicable Standard

According to FCC §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	* (100)	30
1.34-30	824/f	2.19/f	* (180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

4.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

4.3 MPE Results

Maximum peak output power at antenna input terminal (dBm): 28.22

Maximum peak output power at antenna input terminal (mW): 663.74

Prediction distance (cm): 30

Prediction frequency (MHz): 10278

Maximum Antenna Gain, typical (dBi): 11

Maximum Antenna Gain (numeric): 12.59

Power density of prediction frequency at 20.0 cm (mW/cm²): 0.7388

MPE limit for uncontrolled exposure at prediction frequency (mW/cm²): 1.0

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 30 cm is 0.7388 mW/cm². Limit is 1.0 mW/cm².

5 FCC §2.1053 & §90.210 - Spurious Radiated Emissions

5.1 Applicable Standard

FCC §2.1053 and FCC §90.210

Emission Mask C. For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier output power (P) as follows:

- (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5 kHz, but not more than 10 kHz: At least $83 \log(f_d/5)$ dB;
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10 kHz, but not more than 250 percent of the authorized bandwidth: At least $29 \log(f_d^2/11)$ dB or 50 dB, whichever is the lesser attenuation;
- (3) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least $43 + 10 \log(P)$ dB.

5.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with TIA-603D. The specification used was the FCC §2.1053 and FCC §90.210 limits.

External I/O cables were draped along the edge of the test table and bundle when necessary.

5.3 Test Procedure

TIA-603-D §2.2.12

5.4 Test Environmental Conditions

Temperature:	22 °C
Relative Humidity:	44 %
ATM Pressure:	102kPa

The testing was performed by Frank Wang on 2018-10-02 at 5 meter Chamber.

5.5 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Cycle
Agilent	Spectrum Analyzer	E4446A	US44300386	2018-06-01	1 year
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-3	2017-11-02	2 years
EMCO	Antenna, Horn	3115	9511-4627	2018-03-28	2 years
ARA	Antenna, Horn	DRG-118/A	1132	2018-02-13	2 years
Agilent	Pre-Amplifier	8449B	3008A01978	2018-08-10	1 year
Agilent	Amplifier, Pre	8447D	2944A10187	2018-04-02	1 year
A.R.A.	Antenna, Horn	DRG-118/A	1132	2018-02-13	2 years
EMCO	Antenna, Horn	3115	9511-4627	2018-03-28	2 years
Wisewave	Antenna, Horn	ARH-4223-02	10555-01	2018-10-22	2 years
Wisewave	Antenna, Horn	ARH-2823-02	10555-02	2017-12-15	2 years
COM-POWER	Antenna, Dipole	AD-100	721033DB1, 2, 3, 4	2017-02-13	2 years
OML	Diplexer for Agilent Spectrum Analyzer	DPL.26	N/A	N/A ¹	N/A
OML	WR-19 Harmonic Mixer with Horn Antenna	M19HWA	17061501	N/A ¹	N/A
-	RF Cable	-	-	Each time ¹	N/A
Vasona	Test software	V6.0 build 11	10400213	N/R	N/R

Statement of Traceability: *BACL attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.*

5.6 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Title 47, Part FCC §2.1053 and FCC §90.210 standards radiated emissions limits, and had the worst margin of:

Mode: Transmitting			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Mode, Channel
-35.09	1687	Vertical	Middle Channel

Please refer to the following table and plots for specific test result details

5.7 Test Results

Middle Channel

Freq. (MHz)	S.A. Amp. (dB μ V)	Table Azimuth (Degrees)	Test Antenna		Substitution				Absolute Level (dBm)	Result	
			Height (cm)	Polar (H/V)	Freq. (MHz)	S.G. Level (dBm)	Antenna Gain (dB)	Cable Loss (dB)		Limit (dBm)	Margin (dB)
99	51.73	226	144	H	99	-59.39	0	0.076	-59.466	-13	-46.47
99	51.9	203	106	V	99	-57.66	0	0.076	-57.736	-13	-44.74
562	40.11	0	143	H	562	-61.56	0	0.076	-61.636	-13	-48.64
562	39.97	228	150	V	562	-60.45	0	0.076	-60.526	-13	-47.53
249	48.42	289	100	H	249	-61.73	0	0.076	-61.806	-13	-48.81
250	45.81	177	140	V	250	-62.84	0	0.076	-62.916	-13	-49.92
1687	55.7	0	100	V	1687	-56.15	8.754	0.695	-48.091	-13	-35.09
1687	54.41	0	100	H	1687	-56.97	8.754	0.695	-48.911	-13	-35.91
2100	51.06	0	100	V	2100	-57.54	7.994	0.335	-49.881	-13	-36.88
2100	51.26	0	100	H	2100	-57.15	7.994	0.335	-49.491	-13	-36.49

Note: Testing was operated from 30 MHz to 60 GHz.

6 FCC §2.1049 - Occupied Bandwidth

6.1 Applicable Standard

FCC §2.1049

6.2 Measurement Procedure

The transmitter output is connected to the spectrum analyzer. The sweep time is coupled. The spectrum analyzer internal 26dB bandwidth function is utilized.

KDB 971168 Occupied bandwidth measurement method is used.

6.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Cycle
Agilent	Spectrum Analyzer	E4446A	US44300386	2018-06-01	1 year
-	20 dB Attenuator	-	-	-	-

Statement of Traceability: BACL attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.

6.4 Test Environmental Conditions

Temperature:	22 °C
Relative Humidity:	44 %
ATM Pressure:	102kPa

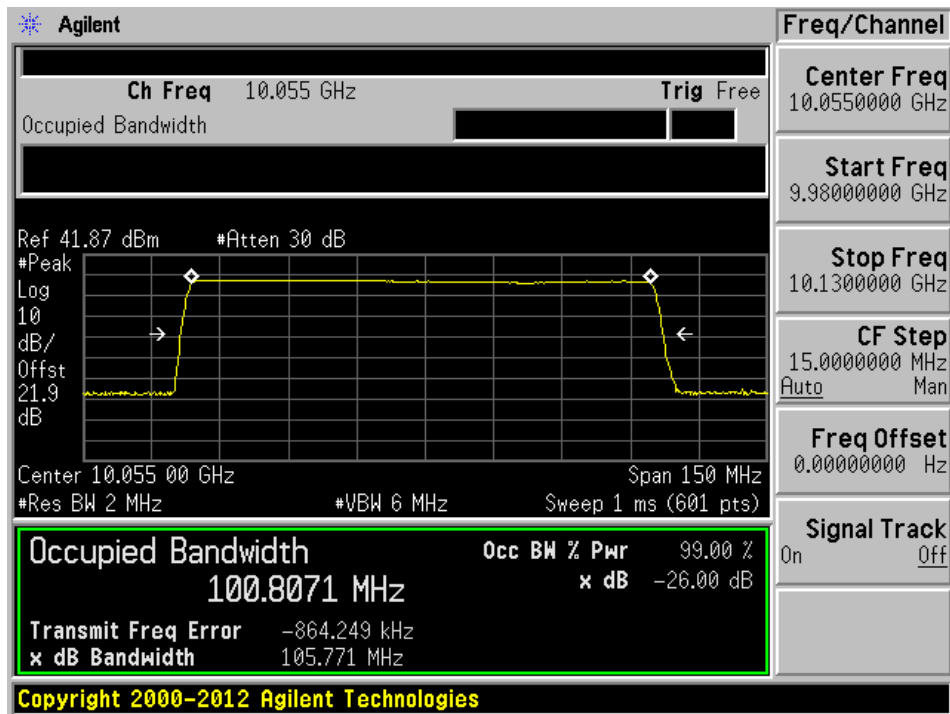
The testing was performed by Vincent Licata on 2018-09-28 in the RF site.

6.5 Test Results

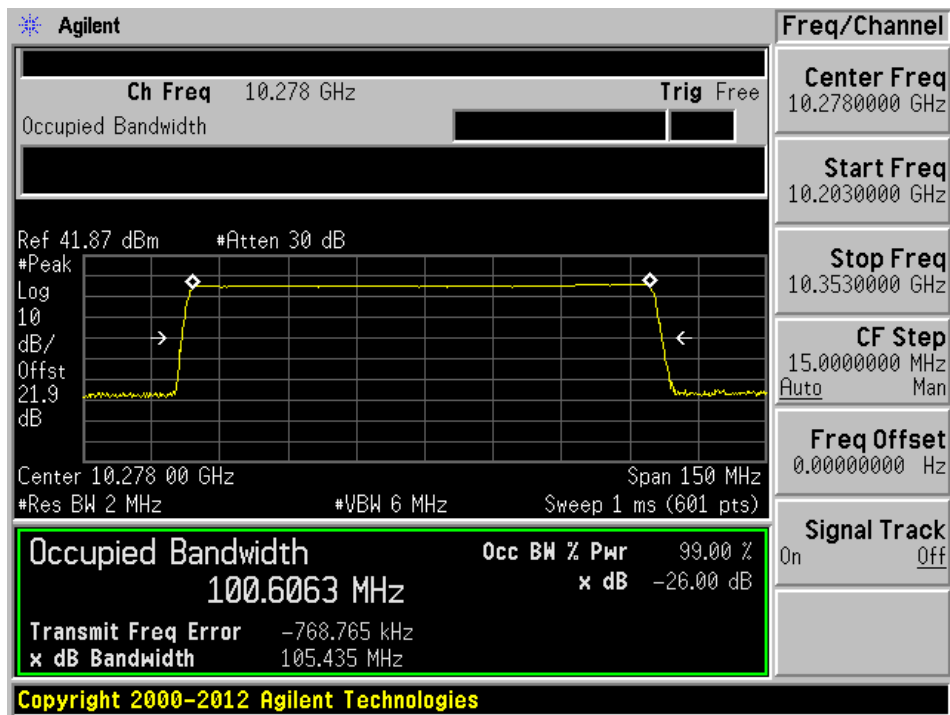
Channel	Frequency (MHz)	26 dB OBW (MHz)	99% OBW (MHz)
Low	10055	105.771	100.8071
Middle	10278	105.435	100.6063
High	10445.25	105.645	100.4784

Please refer to the following plots for detailed test results

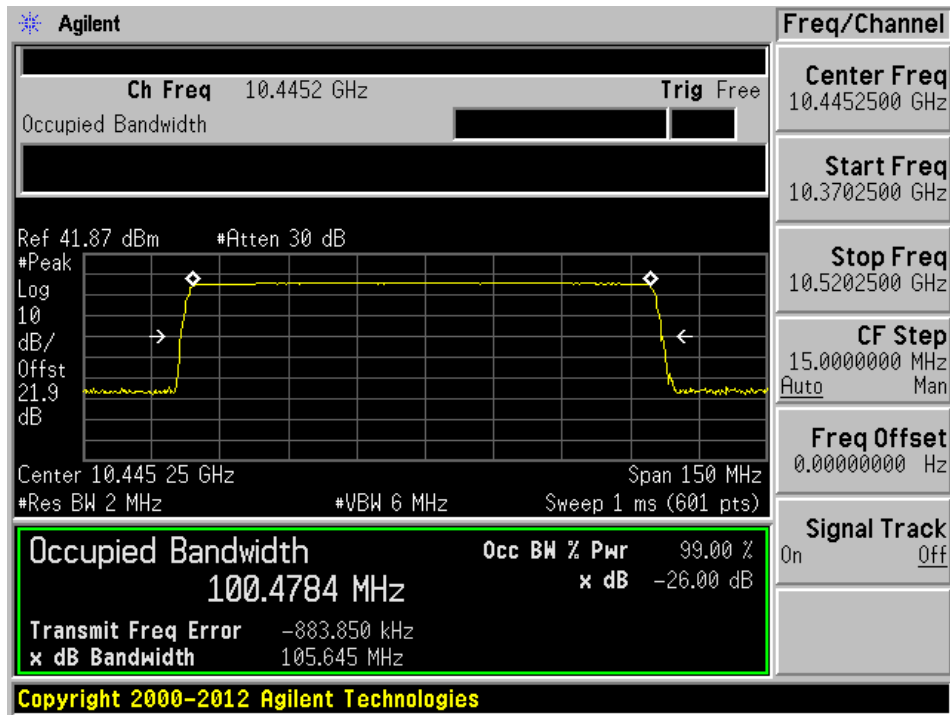
Low channel: 10055 MHz



Middle channel: 10278 MHz



High channel: 10445.25 MHz



7 FCC §2.1046, §90.205(s) & §90.103(c) - RF Output Power

7.1 Applicable Standard

FCC §2.1046

FCC §90.205 (s) The output power shall not exceed by more than 20 percent either the output power shown in the Radio Equipment List [available in accordance with §90.203(a)(1)] for transmitters included in this list or when not so listed, the manufacturer's rated output power for the particular transmitter specifically listed on the authorization.

FCC §90.103 (c) (13) Operations in this band are limited to survey operations using transmitters with a peak power not to exceed 5 watts into the antenna.

7.2 Measurement Procedure

The transmitter output was connected to the input terminal via calibrated coaxial cable. The output power was measured with the wideband power meter at the low, middle and high channel in each band.

KDB 9771168 wideband power measurement method is used.

7.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Cycle
Agilent	Spectrum Analyzer	E4446A	US44300386	2018-06-01	1 year
-	20 dB Attenuator	-	-	-	-

Statement of Traceability: BACL attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.

7.4 Test Environmental Conditions

Temperature:	22 °C
Relative Humidity:	44 %
ATM Pressure:	102kPa

The testing was performed by Vincent Licata on 2018-09-28 in the RF site.

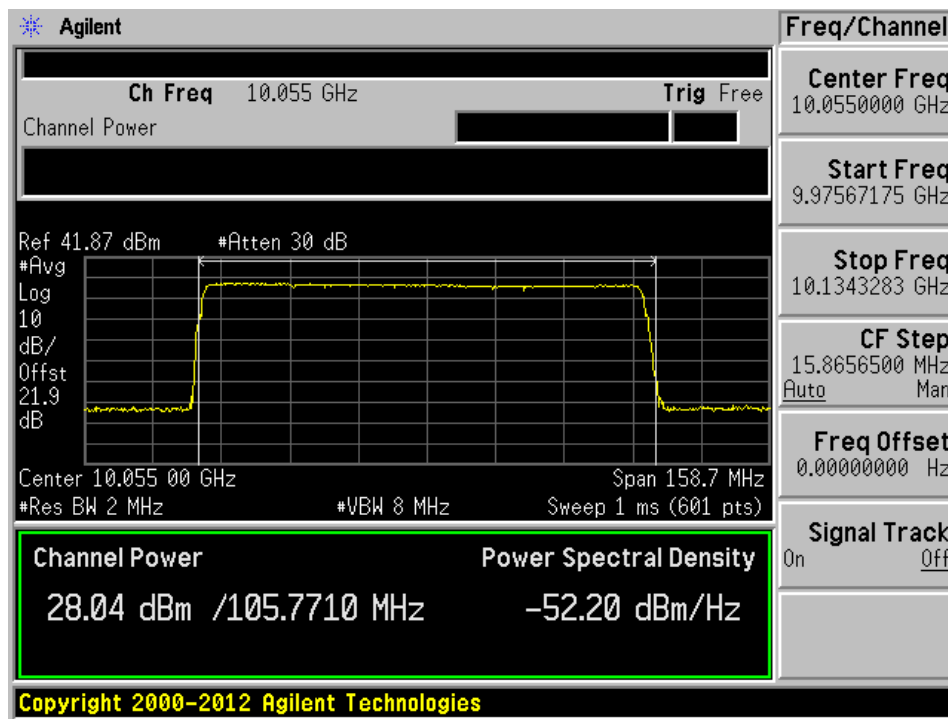
7.5 Test Results

Conducted Output Power

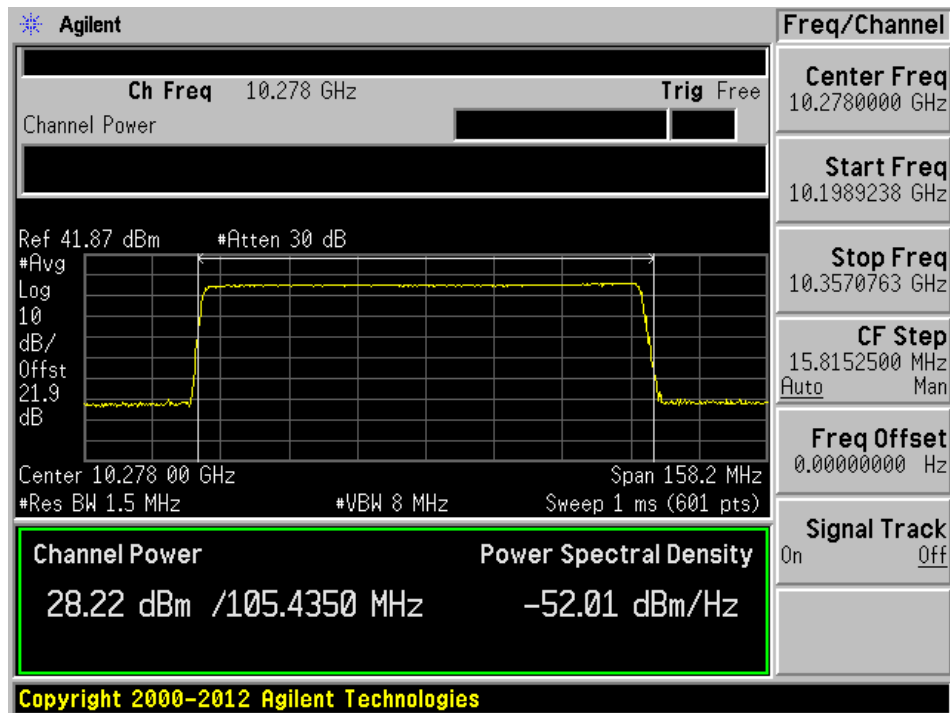
Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)	Margin (dB)
10055	28.04	37	-8.96
10278	28.22	37	-8.78
10445.25	27.85	37	-9.15

Please refer to the below plots for details.

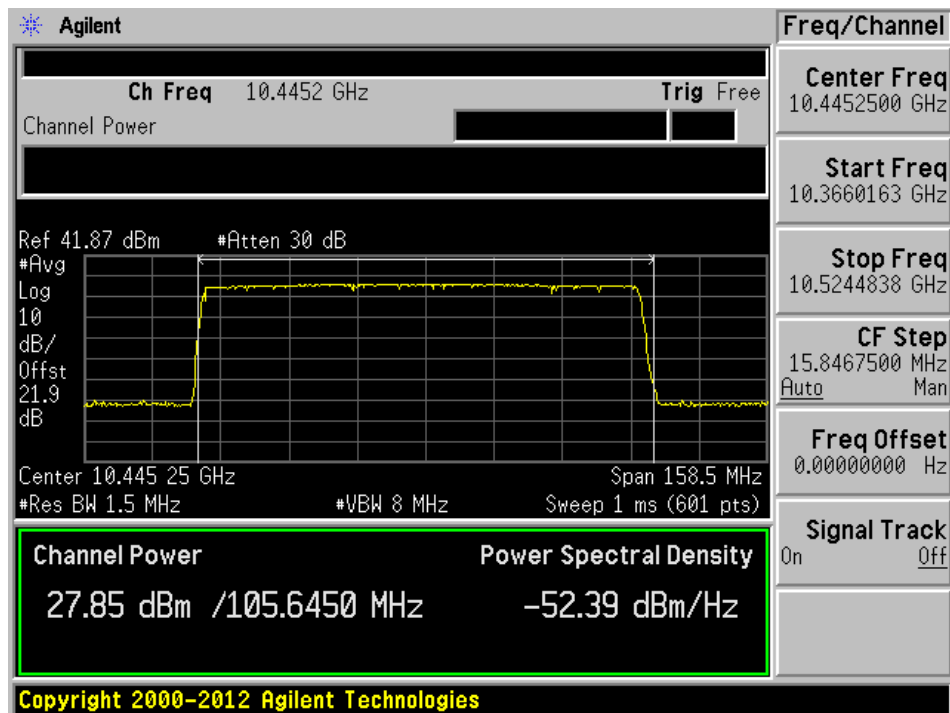
Low CH, 10055 MHz



Mid CH, 10278 MHz



High CH, 10445.25 MHz



8 FCC §2.1055 & §90.213(b) - Frequency Stability

8.1 Applicable Standard

FCC §2.1055

FCC §90.213 (b) For the purpose of determining the frequency stability limits, the power of a transmitter is considered to be the maximum rated output power as specified by the manufacturer

8.2 Measurement Procedure

ANSI/TIA/EIA 603-D clause 2.2.2

8.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Cycle
Agilent	Spectrum Analyzer	E4446A	US44300386	2018-06-01	1 year
Tenney	Chamber, Environmental	TUJR	27445-06	2017-10-02	1 year
BK PRECISION	DC Power Supply	E3	N/A	N/A	N/A
Fluke	Multimeter	75 Series II	56241558	2018-01-12	1 year
-	20 dB Attenuator	-	-	-	-

Statement of Traceability: BACL attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.

8.4 Test Environmental Conditions

Temperature:	22 °C
Relative Humidity:	44 %
ATM Pressure:	102kPa

The testing was performed by Vincent Licata on 2018-09-28 in the RF site.

8.5 Test Results

Reference Frequency: EUT Channel Frequency, 10250 MHz			
Power Supply (VDC)	Environment Temperature (°C)	Frequency Deviation Measured	
		(MHz)	Delta (ppm)
48	50	10249.9724	-2.69
48	40	10249.9891	-1.06
48	30	10250.0310	3.02
55.2	20	10249.9474	-5.13
48	20	10249.9474	-5.13
40.8	20	10249.9465	-5.22
48	10	10250.0385	3.76
48	0	10250.0243	2.37
48	-10	10250.0410	4.00
48	-20	10250.0418	4.08
48	-30	10250.0418	4.08

9 FCC §90.219(e) - Spurious Emissions at Antenna Terminals

9.1 Applicable Standard

FCC §2.1053 and FCC §90.210

Emission Mask C. For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier output power (P) as follows:

- (1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5 kHz, but not more than 10 kHz: At least $83 \log (f_d/5)$ dB;
- (2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10 kHz, but not more than 250 percent of the authorized bandwidth: At least $29 \log (f_d^2/11)$ dB or 50 dB, whichever is the lesser attenuation;
- (3) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least $43 + 10 \log (P)$ dB.

9.2 Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

9.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Cycle
Agilent	Spectrum Analyzer	E4446A	US44300386	2018-06-01	1 year
OML	Diplexer for Agilent Spectrum Analyzer	DPL.26	N/A	N/A ¹	N/A
-	20 dB Attenuator	-	-	-	-

Statement of Traceability: **BACL Corp.** attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.

9.4 Test Environmental Conditions

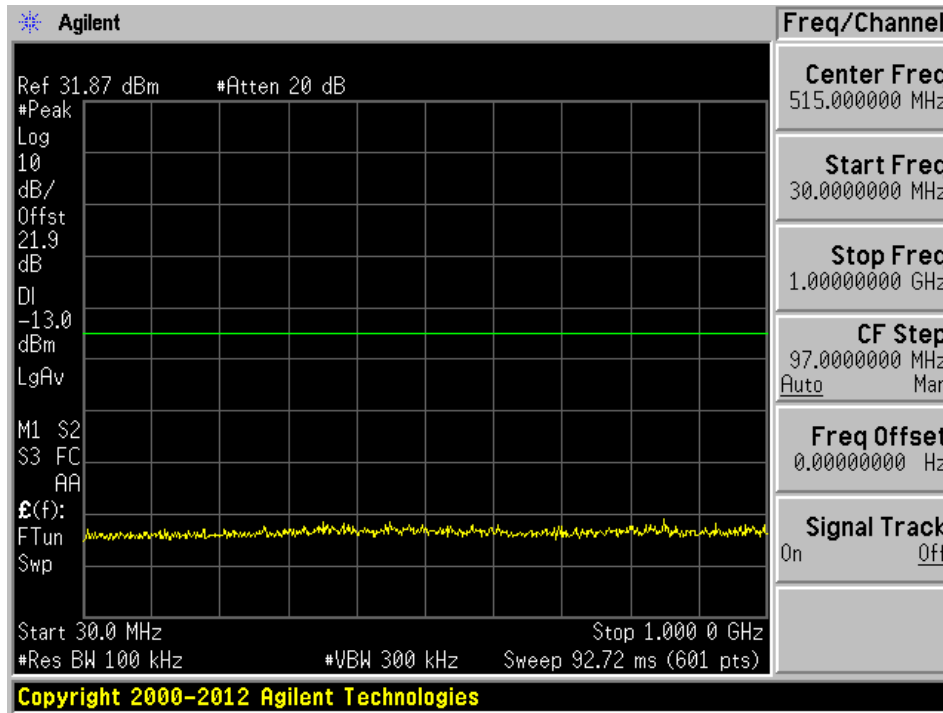
Temperature:	23 °C
Relative Humidity:	32 %
ATM Pressure:	101.3 kPa

The testing was performed by Vincent Licata on 2018-09-28 in the RF site.

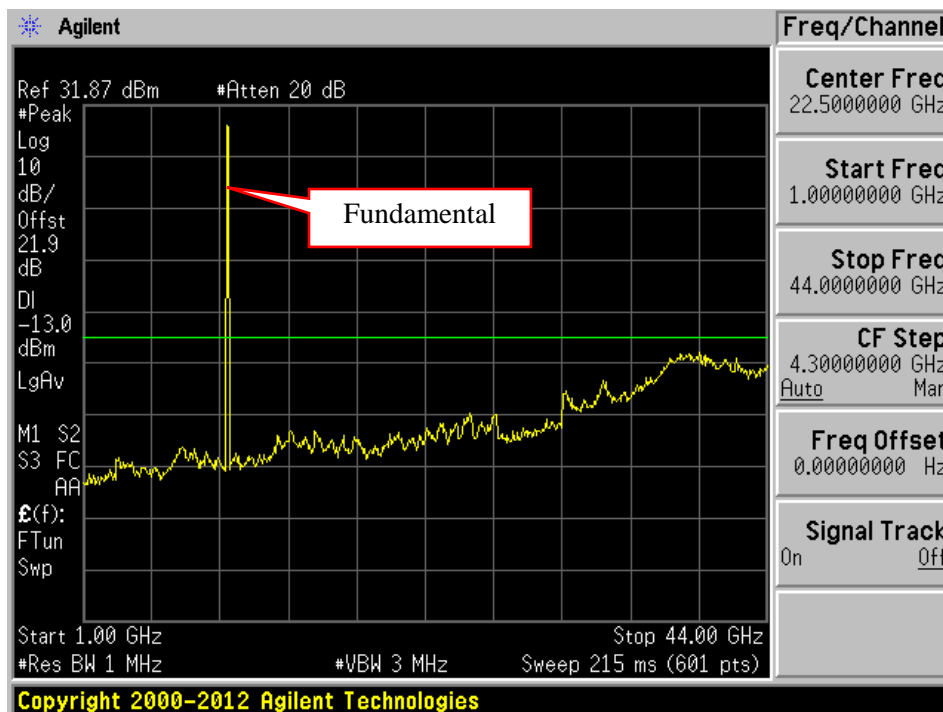
9.5 Test Results

Please refer to the following plots.

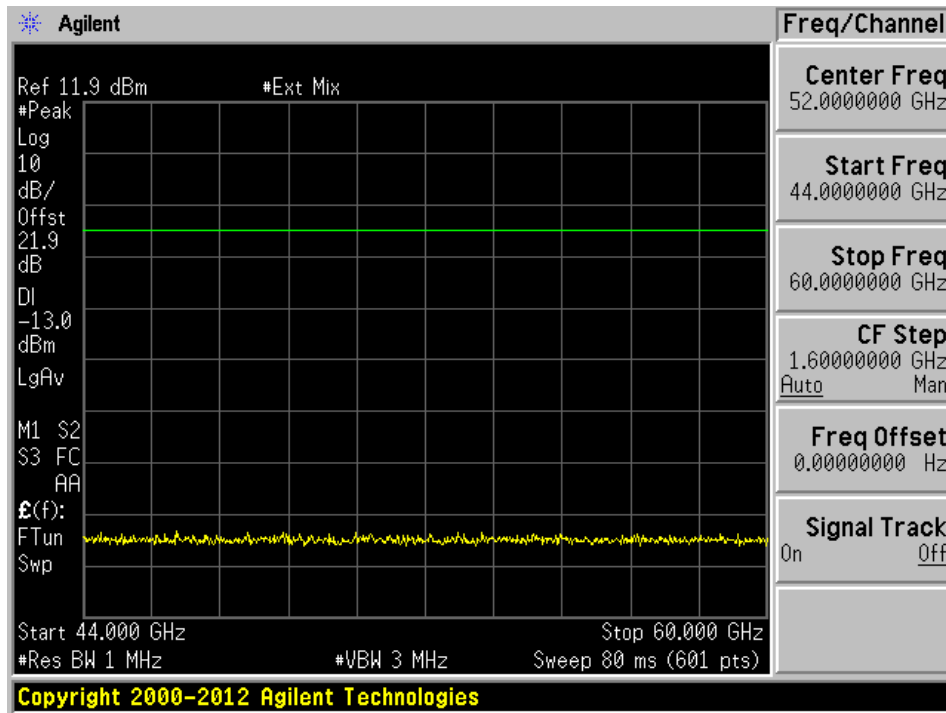
Low Channel – 10055 MHz
30 MHz – 1 GHz



1 GHz – 44 GHz

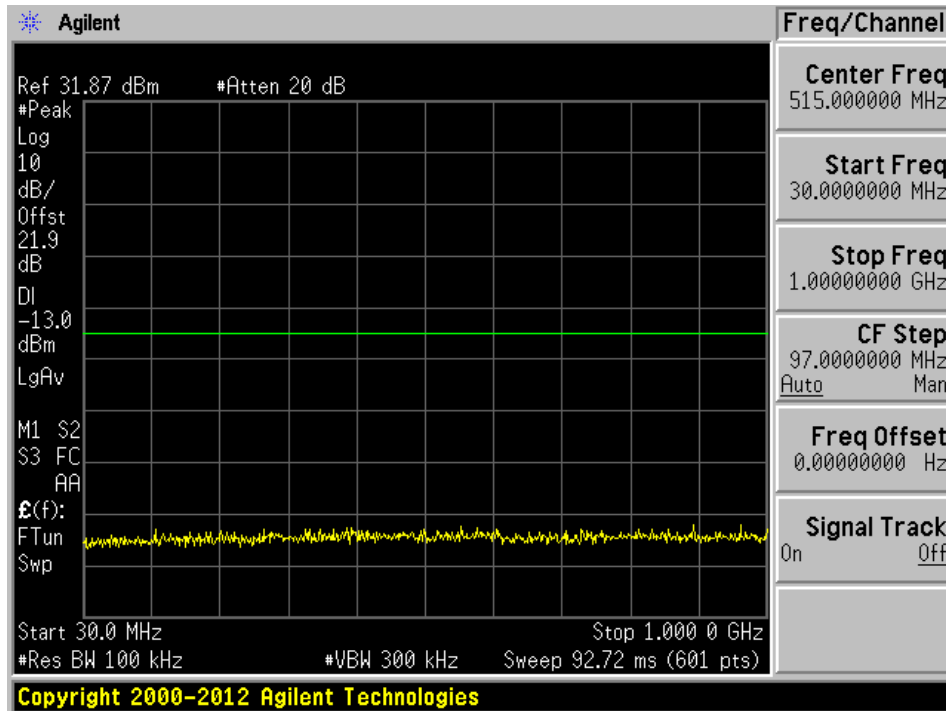


44 GHz – 60 GHz

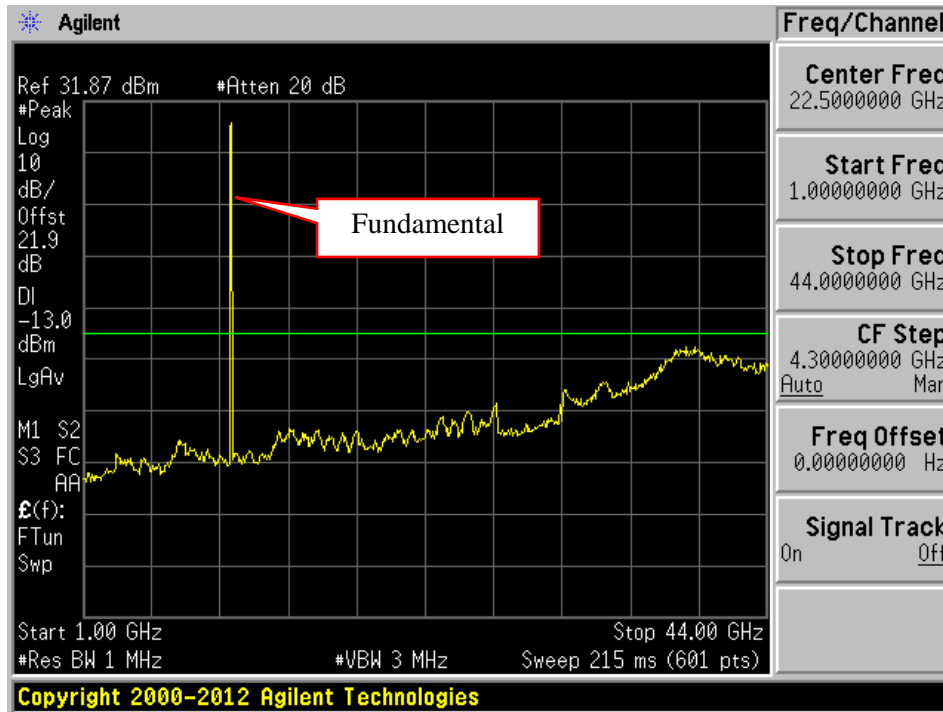


Middle Channel – 10278 MHz

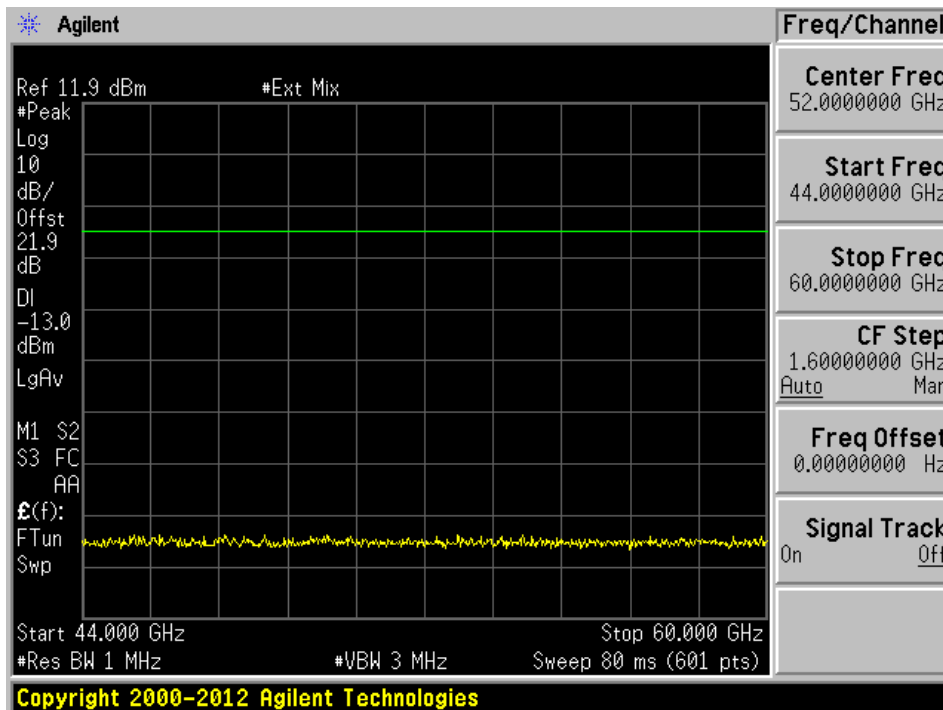
30 MHz – 1 GHz



1 GHz – 44 GHz

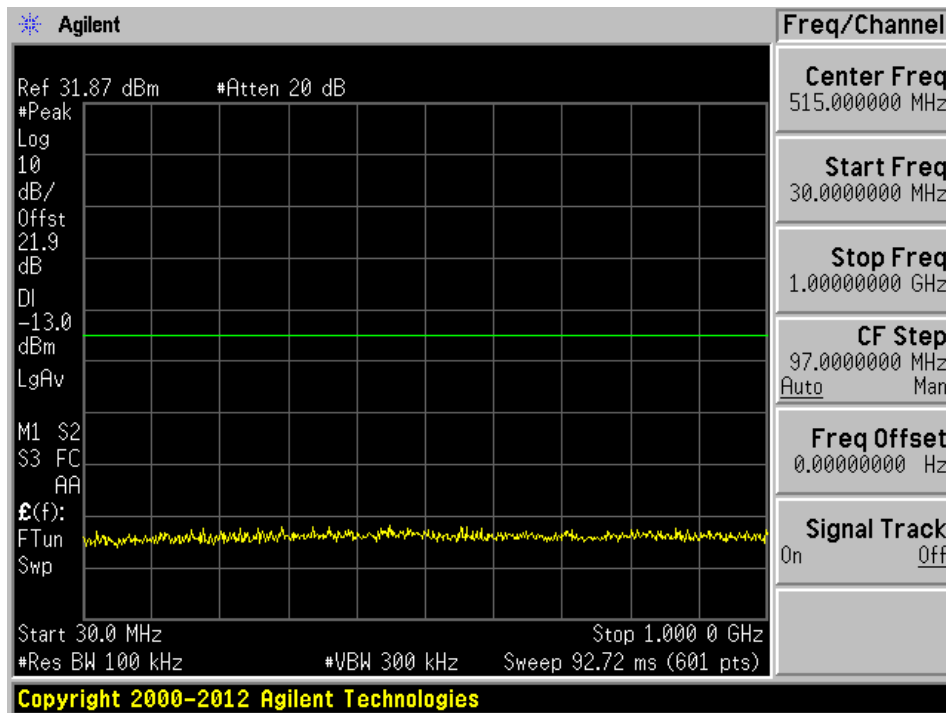


44 GHz – 60 GHz

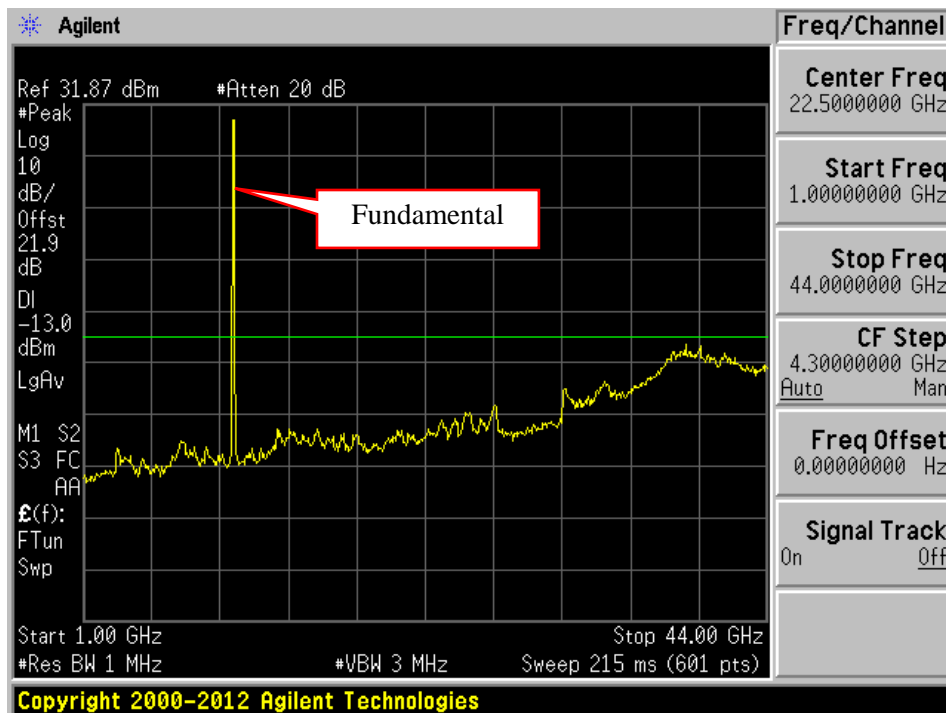


High Channel – 10445.25 MHz

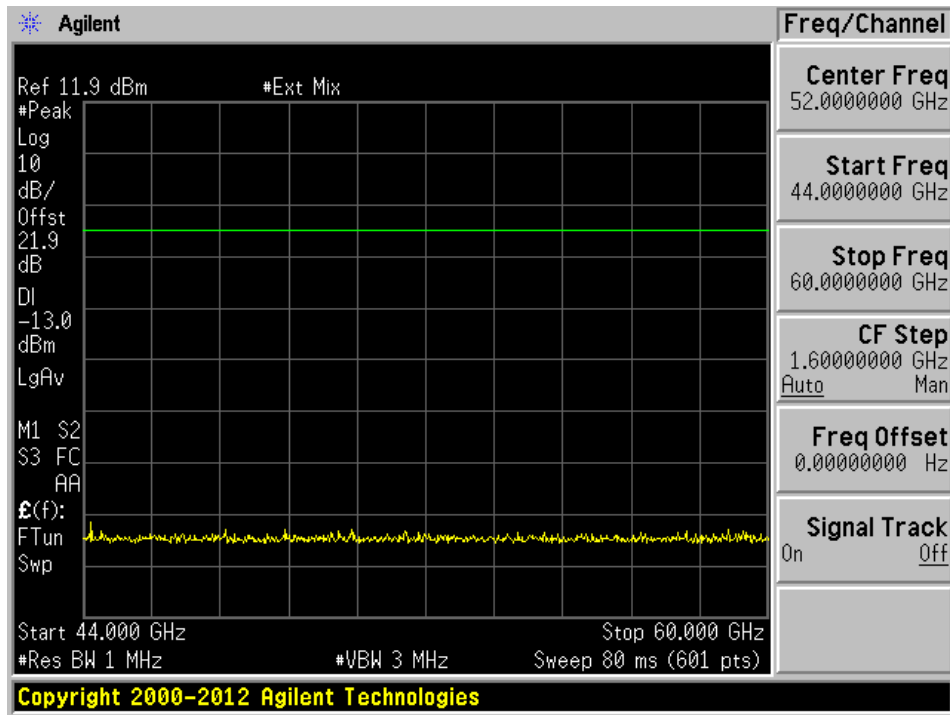
30 MHz – 1 GHz



1 GHz – 44 GHz



44 GHz – 60 GHz



10 Appendix A (Normative) - FCC Equipment Labeling Requirements

10.1 FCC ID Label Requirements

As per FCC §2.925,

(a) Each equipment covered in an application for equipment authorization shall bear a nameplate or label listing the following:

(1) FCC Identifier consisting of the two elements in the exact order specified in §2.926. The FCC Identifier shall be preceded by the term FCC ID in capital letters on a single line, and shall be of a type size large enough to be legible without the aid of magnification.

Example: FCC ID: XXX123

Where: XXX—Grantee Code, 123—Equipment Product Code

As per FCC §15.19,

(a) In addition to the requirements in part 2 of this chapter, a device subject to certification, or verification shall be labeled as follows:

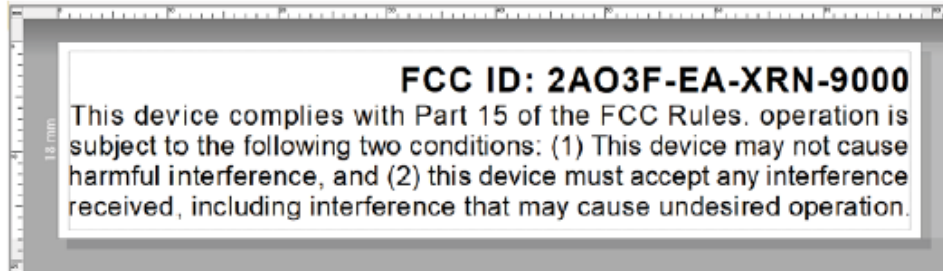
(3) All other devices shall bear the following statement in a conspicuous location on the device:
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

(4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified above is required to be affixed only to the main control unit. If the EUT is integrated within another device then a label affixed to the host shall also state, "Contains FCC ID: XXXXXX"

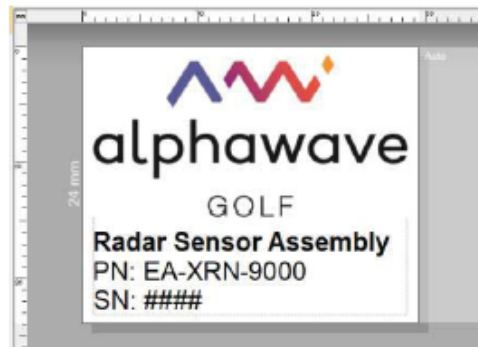
(5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

10.2 FCC ID Label Contents and Location

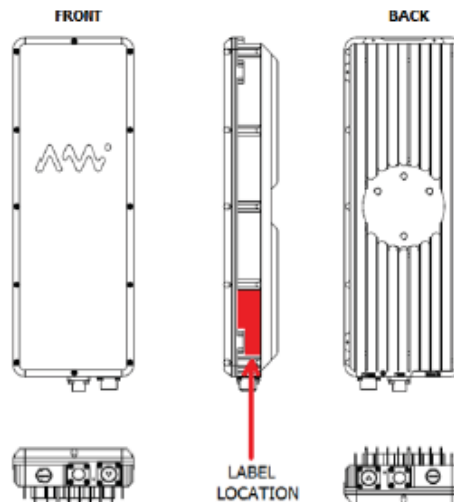
A sample of the FCC label for the EA-XRN-9000 radar sensor with the FCC ID is shown below.



A sample of the serial number label for EA-XRN-9000 is shown below.



The location of the label is indicated on the line drawing and photographs of the device provided below:



11 Appendix B - EUT Photographs

Please see attachments:

- Exhibit – EUT Test Setup Photographs
- Exhibit – EUT External Photographs
- Exhibit – EUT Internal Photographs

12 Appendix C (Normative) - A2LA Electrical Testing Certificate



Accredited Laboratory

A2LA has accredited

BAY AREA COMPLIANCE LABORATORIES CORP.

Sunnyvale, CA

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. This laboratory also meets A2LA R222 - Specific Requirements EPA ENERGY STAR Accreditation Program. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



Presented this 2nd day of October 2018.

A handwritten signature in black ink, appearing to be 'L. J. ...', written over a horizontal line.

President and CEO
 For the Accreditation Council
 Certificate Number 3297.02
 Valid to September 30, 2020

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

--- END OF REPORT ---