EN 300 440 V2.1.1 (2017-03)

TEST REPORT

for

Mimosa Networks

469 El Camino Real, Suite 100

Santa Clara, CA 95050

Model: B24

Report Type: Original Report	**Product Type:** Point-to-Point Wireless Link
Prepared By:	Vincent Licata Test Engineer
Report Number:	R1712272-440
Report Date:	2018-03-14
Reviewed By:	Jin Yang RF Lead
	Bay Area Compliance Laboratories Corp. 1274 Anvilwood Avenue, Sunnyvale, CA 94089 Tel: (408) 732-9162 Fax: (408) 732 9164

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1712272-440	Original Report	2018-03-14

1 General Information

1.1 Product Description for Equipment under Test (UUT)

This test and measurement report was prepared on behalf of *Mimosa Networks*, and their product model: *B24*, or the "UUT" as referred to in this report. The UUT is a Point-to-Point Wireless Link that contains 802.11ac Point-to-Point radio with integrated antenna inside.

1.2 Mechanical Description of UUT

The UUT measures approximately 26.0 cm (L) x 26 cm (W) x 15 cm (H) and weighs approximately 2 kg.

1.3 Objective

The following report is prepared on behalf *Mimosa Networks* in accordance with EN 300 440 V2.1.1 (2017-03), Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Device (SRD) for radio equipment in the 1 GHz to 40 GHz frequency range.

The object is to determine compliance with EN 300 440 V2.1.1 (2017-03) for Equivalent Isotropically Radiated Power, Permitted Range of Operating Frequencies, Transmitter Spurious Emissions, Receiver Spurious Radiations, and Blocking or desensitization.

1.4 Related Submittal(s)/Grant(s)

No related submittals.

1.5 Test Methodology

All measurements contained in this report were conducted with ETSI EN 300 440 V2.1.1: 2017-03. As there is no product specific standard for this device, the EN 300 440 V2.1.1: 2017-03 standard was used as a guide for measurements and not necessarily for the limits of emissions of this standard.

All tests were performed at Bay Area Compliance Laboratories Corp.

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.

Based on CISPR16-4-2:2011, The Treatment of Uncertainty in EMC Measurements, the values ranging from ±2.0 dB for Conducted Emissions tests and ±4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

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***
- - 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 (Industry Canada):
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: (Industry Canada - IC) Foreign Certification Body – FCB – APEC Tel MRA -Phase I & Phase II;
- Chinese Taipei (Republic of China – Taiwan):
  - BSMI (Bureau of Standards, Metrology and Inspection) APEC Tel MRA -Phase I;
  - NCC (National Communications Commission) APEC Tel MRA -Phase I;
- European Union:
  - EMC Directive 2014/30/EU US-EU EMC & Telecom MRA CAB (NB)
  - Radio & Teleterminal Equipment (R&TTE) Directive 1995/5/EC US -EU EMC & Telecom MRA CAB (NB)
  - Radio Equipment (RE) Directive 2014/53/EU US-EU EMC & Telecom MRA CAB (NB)
  - 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:
  - ENERGY STAR Recognized Test Laboratory – US EPA
  - Telecommunications Certification Body (TCB) – US FCC;
  - Nationally Recognized Test Laboratory (NRTL) – US OSHA
- Vietnam: APEC Tel MRA -Phase I;

2 System Test Configuration

2.1 Justification

The UUT and its host were configured for testing according to ETSI EN 300 440 V2.1.1: 2017-03.

2.2 UUT Exercise Software

The test firmware used was the Teraterm and setup commands provided by *Mimosa Networks*, the software is compliant with the standard requirements being tested against.

Modulation	Frequency (MHz)	Power Setting
802.11ac20	24010	-12
	24140	-12
	24235	-12
802.11ac40	24020	-13
	24140	-13
	24225	-13
802.11ac80	24040	-12
	24130	-12
	24205	-12

2.3 Equipment Modifications

N/A

2.4 Local Support Equipment

Manufacturer	Description	Model	Serial Number
Dell	Laptop	Latitude E6410	3CKRAQ1

2.5 Support Equipment

N/A

2.6 Interface Ports and Cabling

Cable Description	Length (m)	To	From
RF Cable	< 1 m	UUT	PSA
Ethernet Cable	< 1m	Laptop	POE
Ethernet Cable	< 1m	UUT	POE

3 Summary of Test Results

Rules	Description of test	Result(s)
Clause 4.2.2	Equivalent Isotropically Radiated Power	Compliant
Clause 4.2.3	Permitted Range of Operating Frequencies	Compliant
Clause 4.2.4	Unwanted Emissions in the Spurious Domain	Compliant
Clause 4.2.5.4	Duty Cycle	N/A[0]
Clause 4.2.6	Additional Requirements for FHSS Equipment	N/A[1]
Clause 4.3.3	Adjacent Channel Selectivity	N/A[2]
Clause 4.3.4	Blocking or Desensitization	Compliant
Clause 4.3.5	Receiver Spurious Radiations	Compliant
Clause 4.4	Spectrum Access Techniques	N/A[3]
Clause 4.6.4	GBSAR Antenna Pattern	N/A[4]
Annex F	Limits for GBSAR	N/A[4]

N/A[0]: According to Table 4 in Clause 4.2.5.4 of EN 300 440 v2.1.1, no duty cycle restriction applies to radio equipment operating in 24-24.25 GH, so duty cycle is not required.
N/A[1]: the device is not utilizing FHSS modulation.
N/A[2]: the device is category 2 receiver.
N/A[3]: the device does not utilize LBT or DAA.
N/A[4]: the device is not GBSAR system.

4 EN 300 440 Clause 4.2.2 – Equivalent Isotropically Radiated Power

4.1 Applicable Standard

EN 300 440 V2.1.1 Clause 4.2.2

The transmitter maximum e.i.r.p. under normal and extreme test conditions shall not exceed the values given in table 4.

Table 4: Maximum radiated peak power (e.i.r.p.)

Frequency Bands	Power	Application	Notes
2 400 MHz to 2 483,5 MHz	10 mW e.i.r.p.	Generic use	
2 400 MHz to 2 483,5 MHz	25 mW e.i.r.p.	Detection, movement and alert applications	
(a) 2 446 MHz to 2 454 MHz	500 mW e.i.r.p.	RFID	See also table 6 and annex C
(b) 2 446 MHz to 2 454 MHz	4 W e.i.r.p.	RFID	See also table 6 and annex C
5 725 MHz to 5 875 MHz	25 mW e.i.r.p.	Generic use	
9 200 MHz to 9 500 MHz	25 mW e.i.r.p.	Radiodetermination: radar, detection, movement and alert applications	
9 500 MHz to 9 975 MHz	25 mW e.i.r.p.	Radiodetermination: Radar, detection, movement and alert applications	
10,5 GHz to 10,6 GHz	500 mW e.i.r.p.	Radiodetermination: Radar, detection, movement and alert applications	
13,4 GHz to 14,0 GHz	25 mW e.i.r.p.	Radiodetermination: Radar, detection, movement and alert applications	
17,1 GHz to 17,3 GHz	400 mW e.i.r.p.	Radiodetermination: GBSAR detection, movement and alert applications	See annex E
24,00 GHz to 24,25 GHz	100 mW e.i.r.p.	Generic use and Radiodetermination: radar, detection, movement and alert applications	

4.2 Measurement Procedure

EN 300 440 v2.1.1 Clause 4.2.3

4.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Cycle
Agilent	Analyzer, Spectrum	E4446A	US44300386	2017-04-20	1 year
-	RF cable	-	-	Each time[1]	N/A

Note[1]: cable included in the test set-up will be checked each time before testing.

Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".*

4.4 Test Environmental Conditions

Temperature:	23 °C
Relative Humidity:	35 %
ATM Pressure:	101.15kPa

The testing was performed by Vincent Licata on 2018-02-02 in RF Bench.

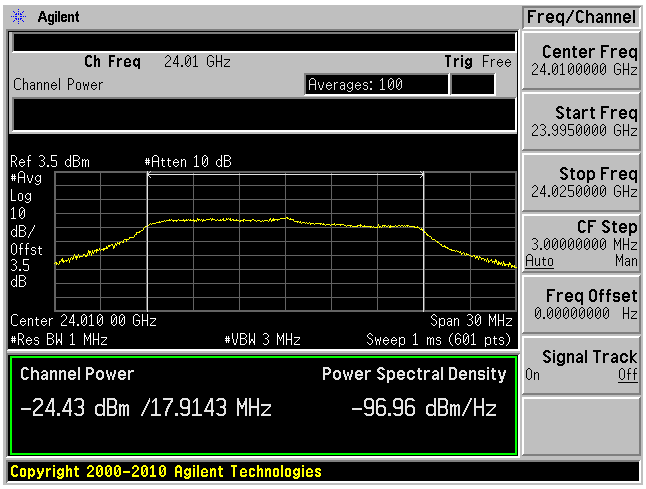
4.5 Test Results

Frequency (MHz)	Mode	TX Paths	Ant-1 (dBm)	Ant-2 (dBm)	ANT Gain (dBi)	Total (dBm)	Limit (dBm)	Margin (dB)
24010	20 MHz Tx1 and Tx3	2	-24.43	-20.55	33	13.94	20.00	-6.06
24010	20 MHz Tx2 and Tx4	2	-25.78	-17.39	33	16.20	20.00	-3.80
24140	20 MHz Tx1 and Tx3	2	-18.03	-15.17	33	19.64	20.00	-0.36
24140	20 MHz Tx2 and Tx4	2	-17.42	-15.69	33	19.54	20.00	-0.46
24235	20 MHz Tx1 and Tx3	2	-18.95	-15.11	33	19.39	20.00	-0.61
24235	20 MHz Tx2 and Tx4	2	-17.3	-16.51	33	19.12	20.00	-0.88
24020	40 MHz Tx1 and Tx3	2	-23.11	-20.18	33	14.61	20.00	-5.39
24020	40 MHz Tx2 and Tx4	2	-20.94	-21.71	33	14.70	20.00	-5.30
24140	40 MHz Tx1 and Tx3	2	-19.42	-16.25	33	18.46	20.00	-1.54
24140	40 MHz Tx2 and Tx4	2	-18.18	-16.65	33	18.66	20.00	-1.34
24225	40 MHz Tx1 and Tx3	2	-18.66	-14.8	33	19.70	20.00	-0.30
24225	40 MHz Tx2 and Tx4	2	-17.04	-16.04	33	19.50	20.00	-0.50
24040	80 MHz Tx1 and Tx3	2	-24.56	-19.36	33	14.79	20.00	-5.21
24040	80 MHz Tx2 and Tx4	2	-25.5	-20.98	33	13.33	20.00	-6.67
24130	80 MHz Tx1 and Tx3	2	-19.87	-15.67	33	18.73	20.00	-1.27
24130	80 MHz Tx2 and Tx4	2	-17.74	-16.82	33	18.75	20.00	-1.25
24205	80 MHz Tx1 and Tx3	2	-18.58	-14.84	33	19.69	20.00	-0.31
24205	80 MHz Tx2 and Tx4	2	-18.75	-15.82	33	18.97	20.00	-1.03

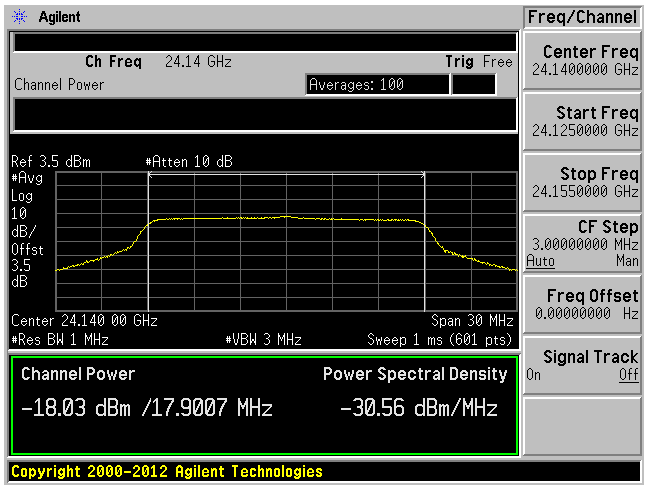
Please refer to the following graphs.

802.11ac20 mode Tx1

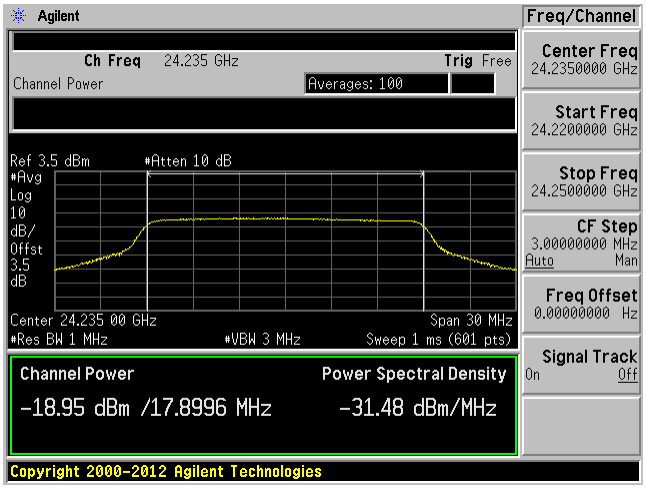
Low Channel 24010 MHz



Middle Channel 24140 MHz

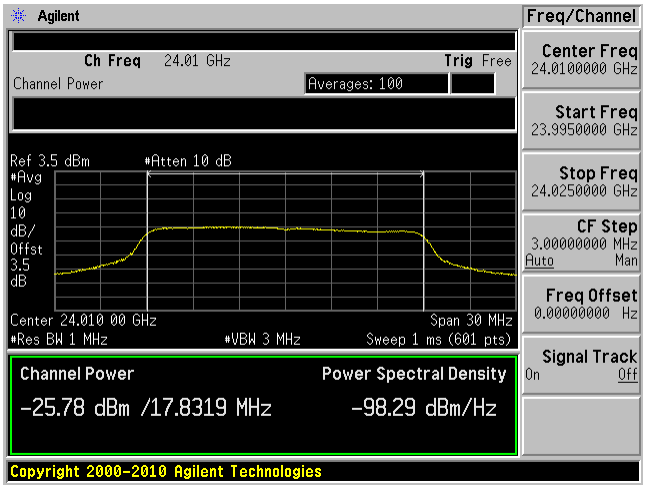


High Channel 24235 MHz

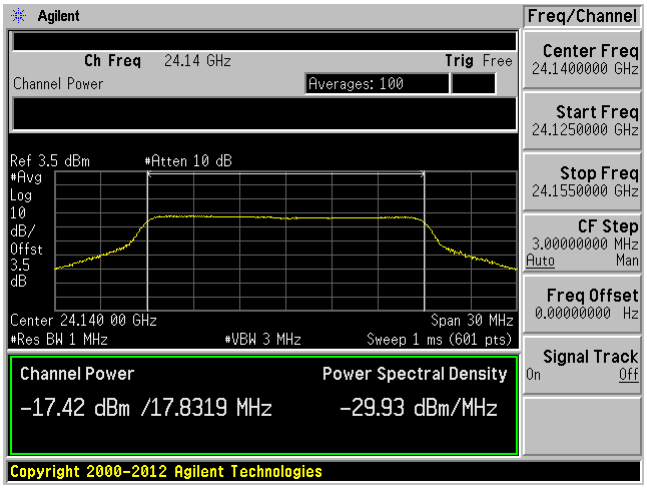


802.11ac20 mode Tx2

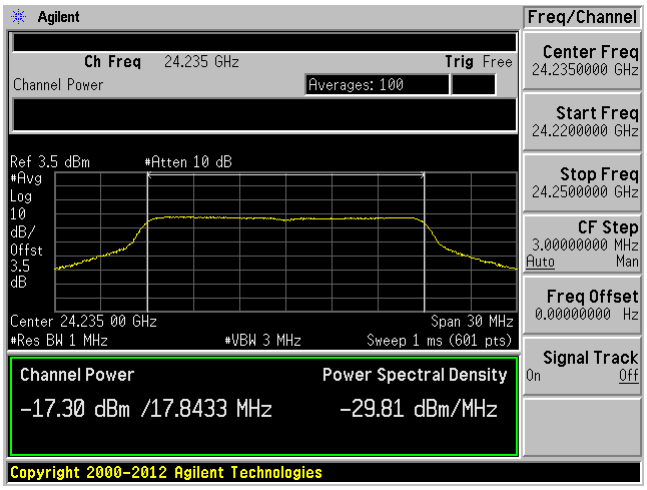
Low Channel 24010 MHz



Middle Channel 24140 MHz

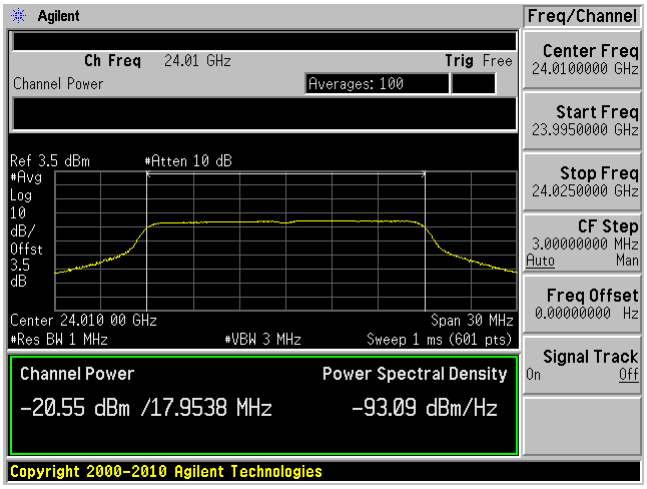


High Channel 24235 MHz

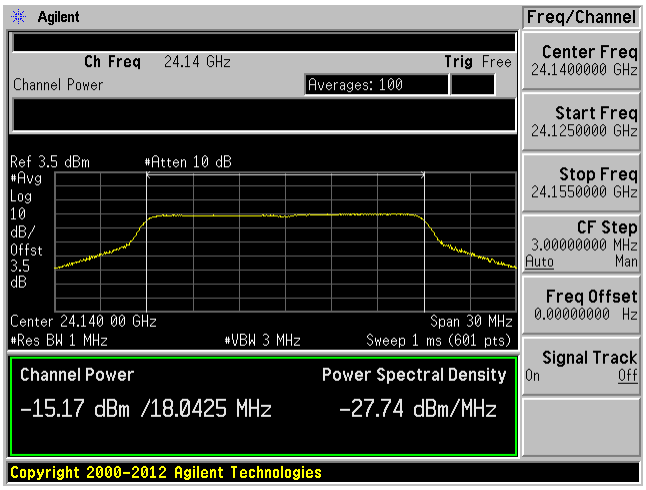


802.11ac20 mode Tx3

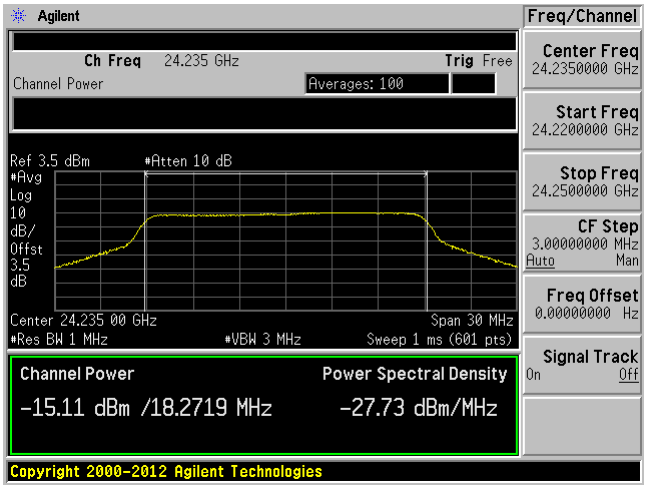
Low Channel 24010 MHz



Middle Channel 24140 MHz

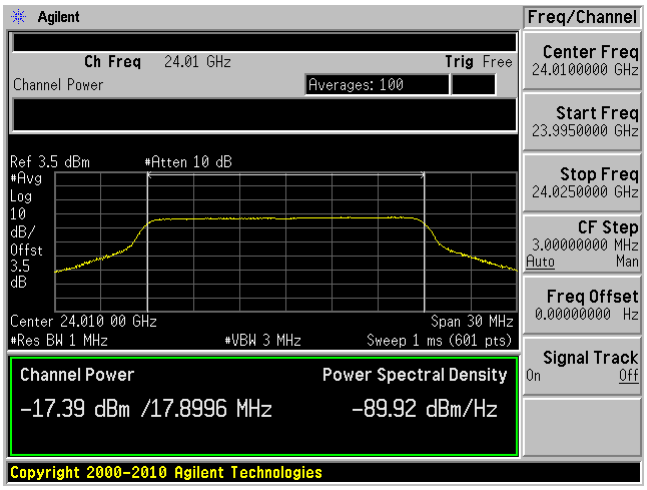


High Channel 24235 MHz

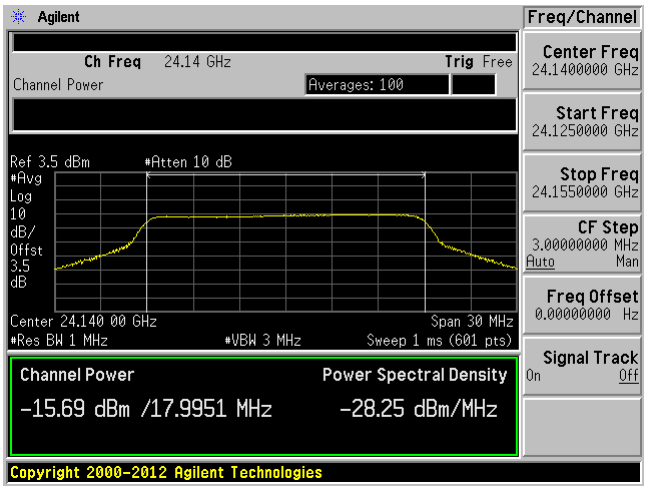


802.11ac20 mode

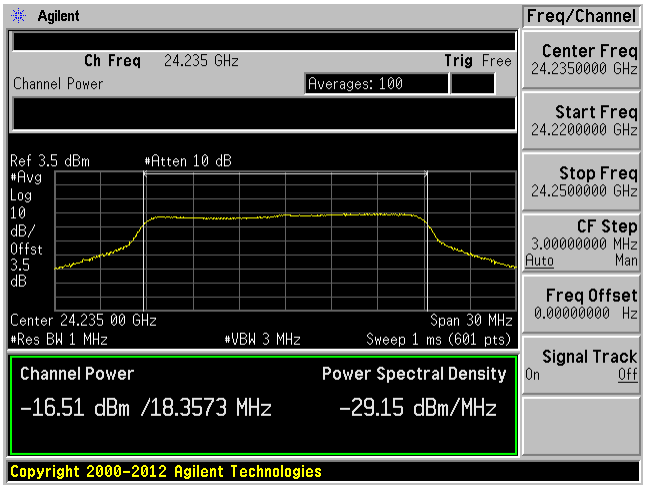
Low Channel 24010 MHz



Middle Channel 24140 MHz

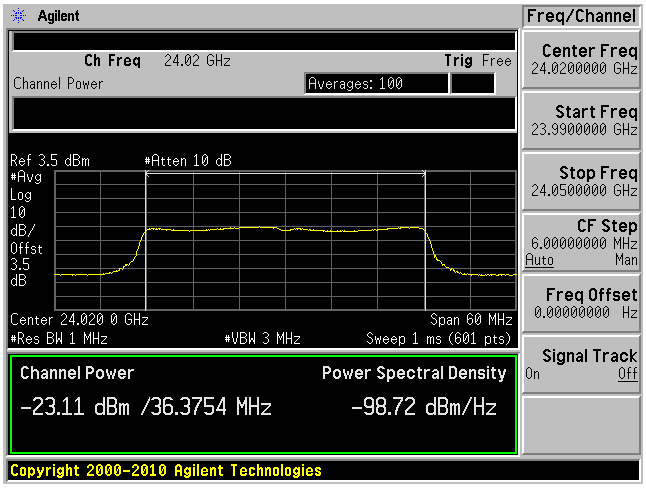


High Channel 24235 MHz

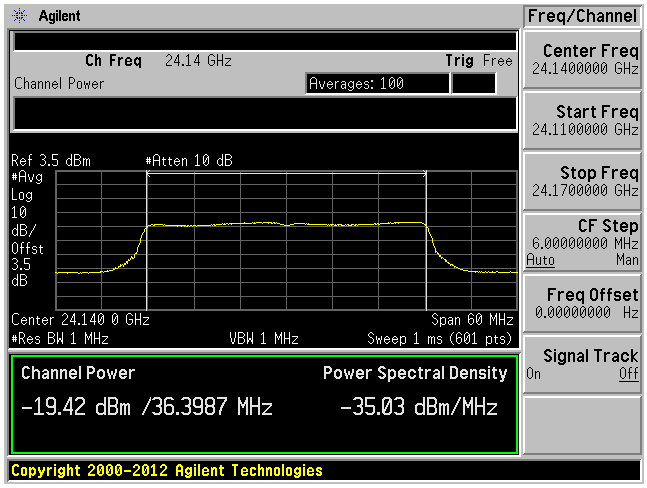


802.11ac40 mode Tx1

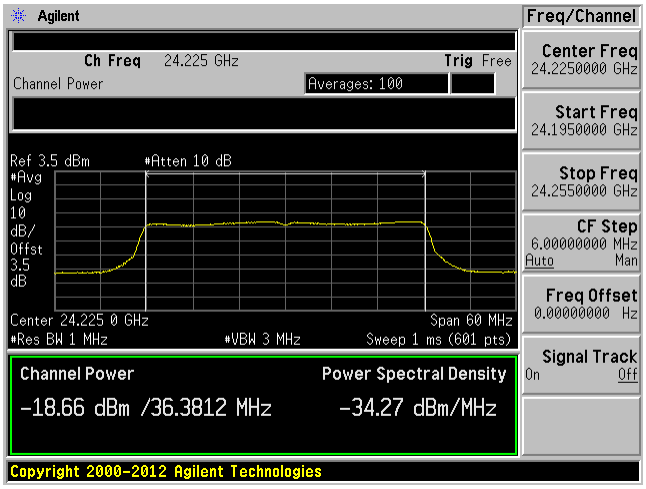
Low Channel 24020 MHz



Middle Channel 24140 MHz

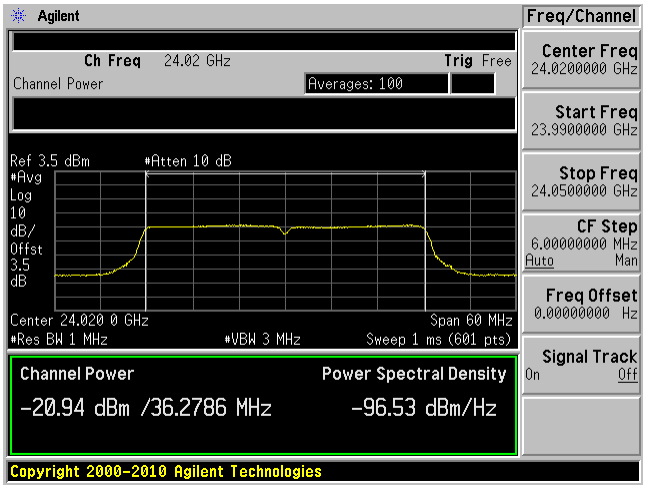


High Channel 24225 MHz

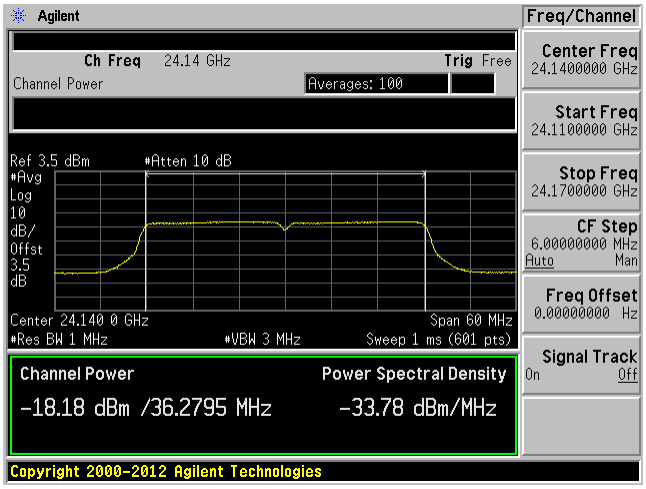


802.11ac40 mode Tx2

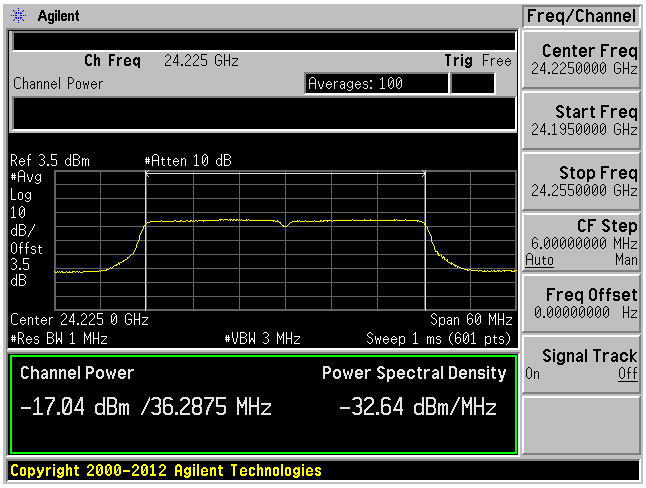
Low Channel 24040 MHz



Middle Channel 24140 MHz

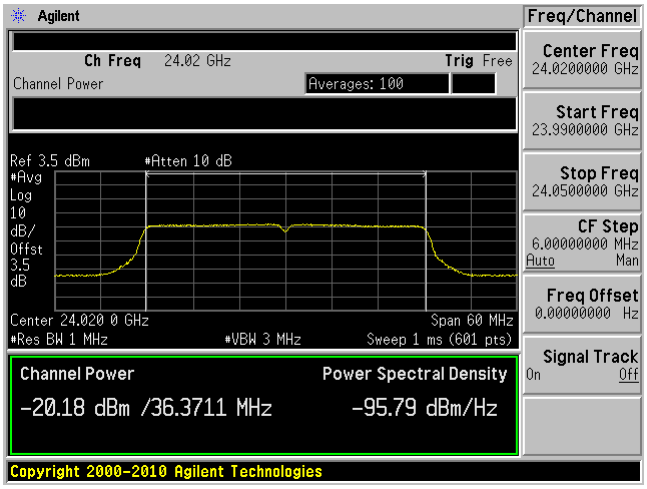


High Channel 24225 MHz

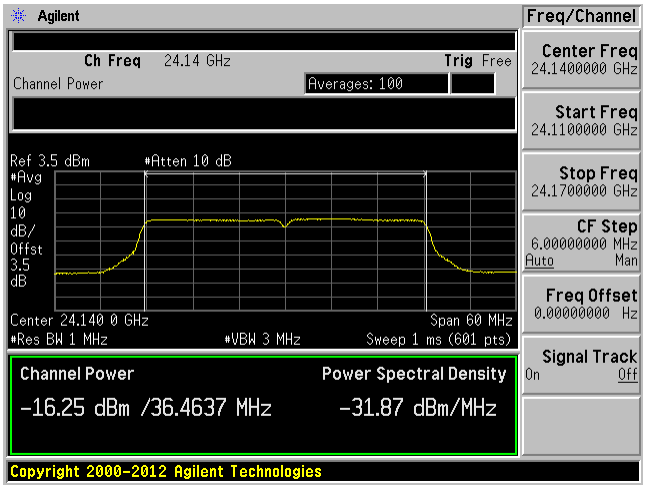


802.11ac40 mode

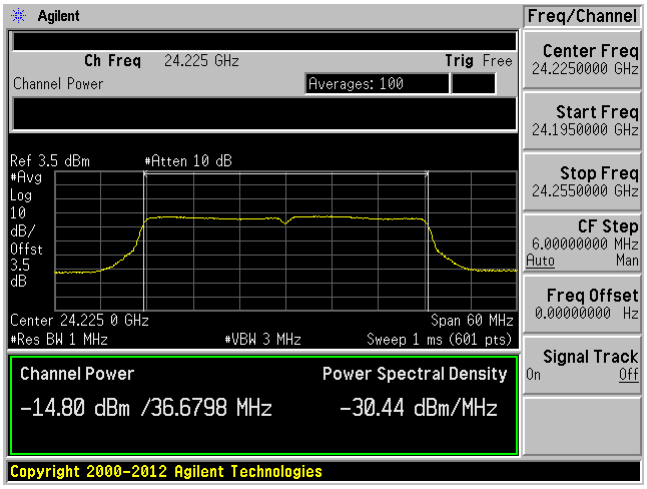
Low Channel 24020 MHz



Middle Channel 24140 MHz

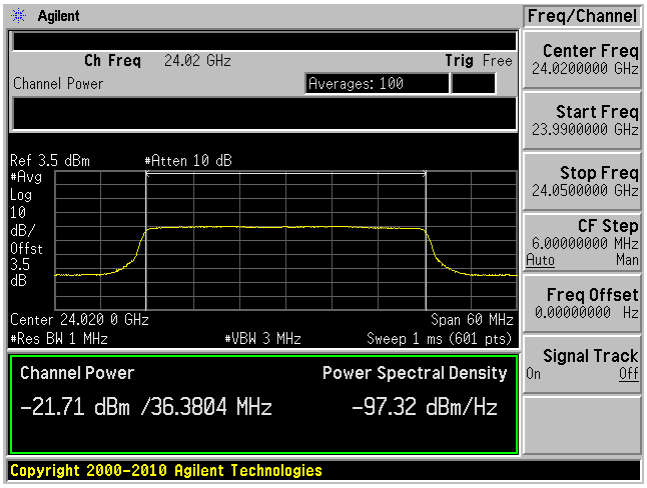


High Channel 24225 MHz

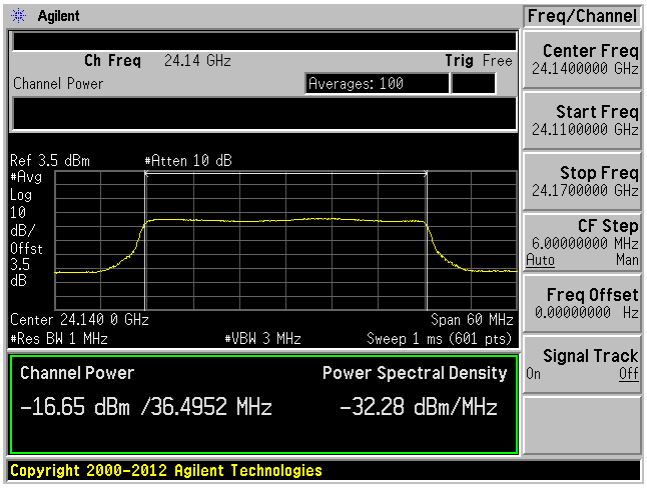


802.11ac40 mode Tx4

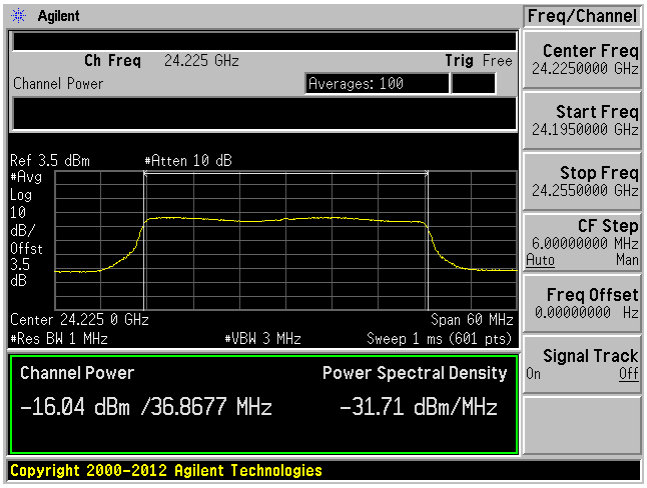
Low Channel 24020 MHz



Middle Channel 24140 MHz

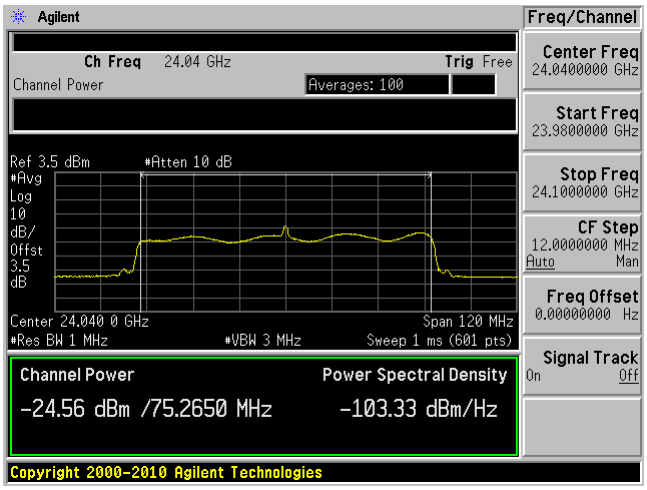


High Channel 24225 MHz

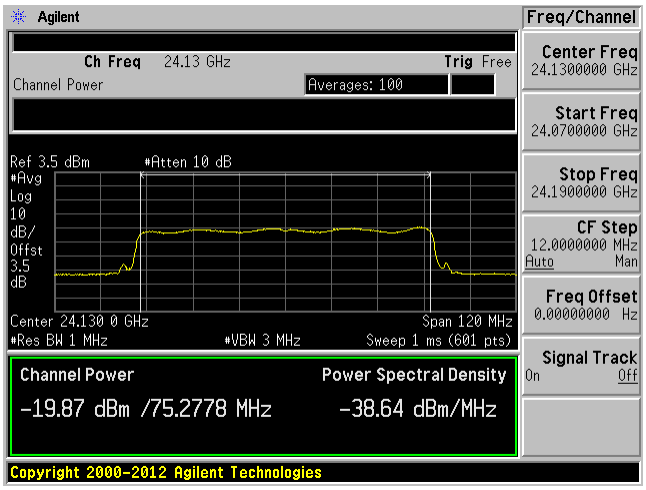


802.11ac80 mode Tx1

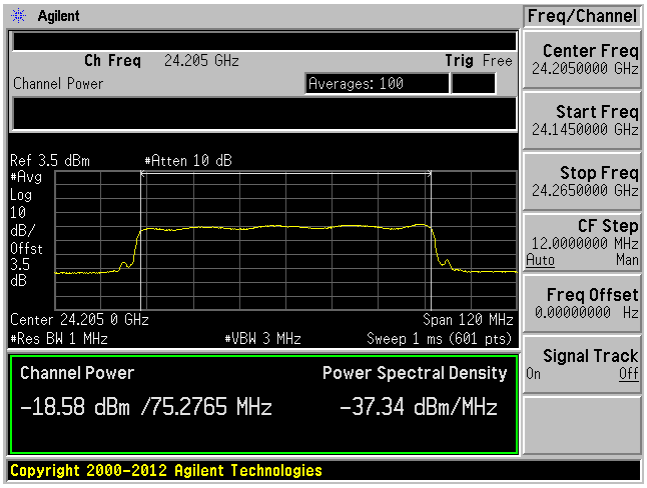
Low Channel 24040 MHz



Middle Channel 24130 MHz

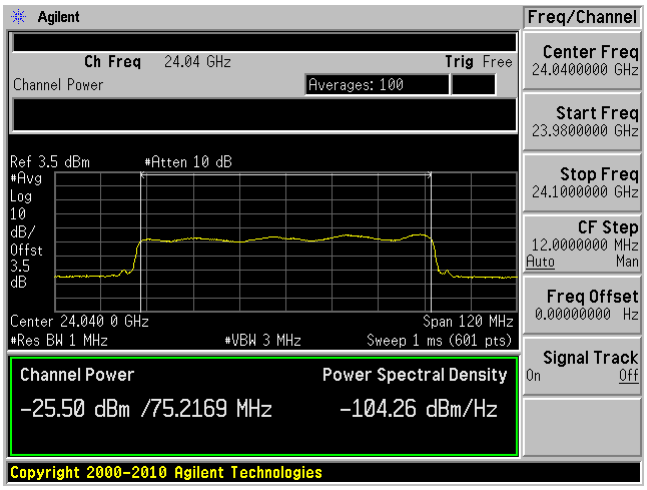


High Channel 24205 MHz

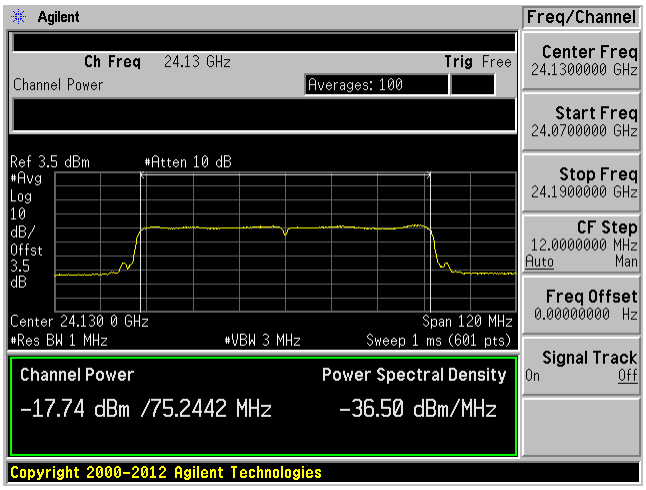


802.11ac80 mode Tx2

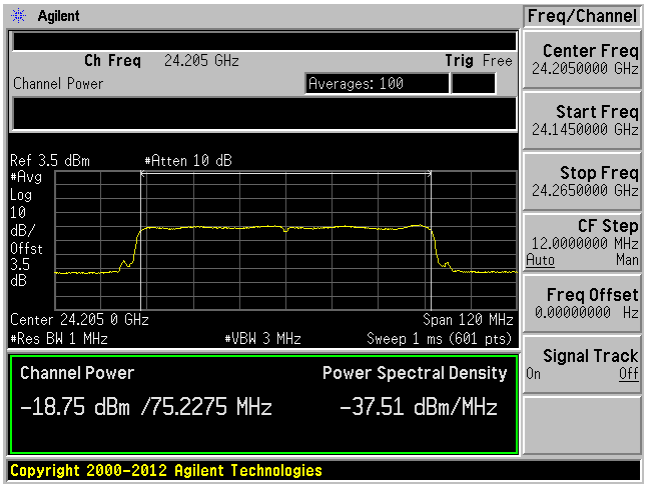
Low Channel 24040 MHz



Middle Channel 24130 MHz

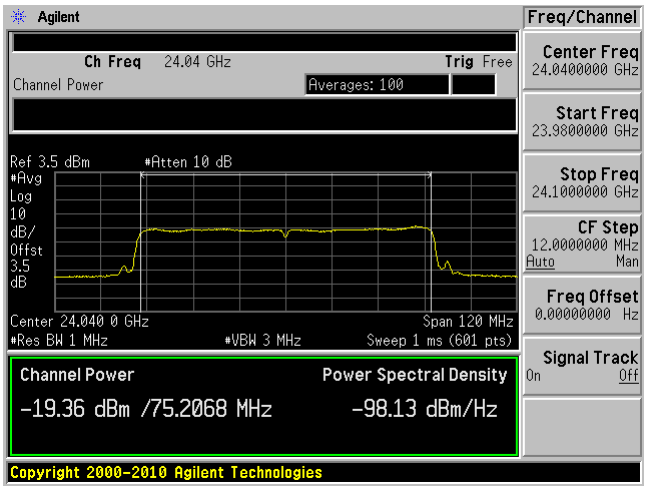


High Channel 24205 MHz

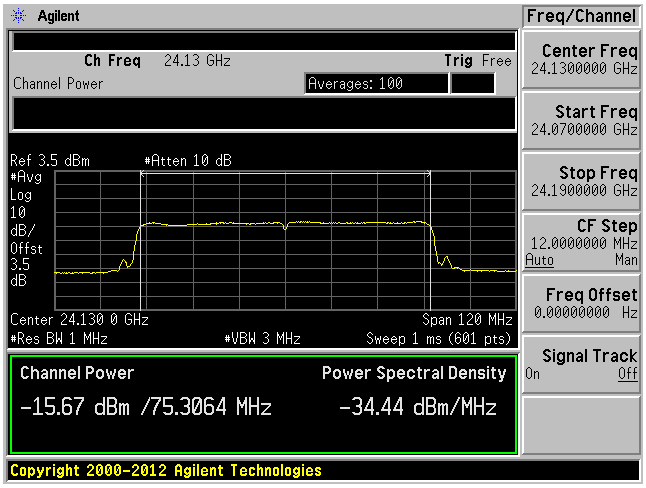


802.11ac80 mode Tx3

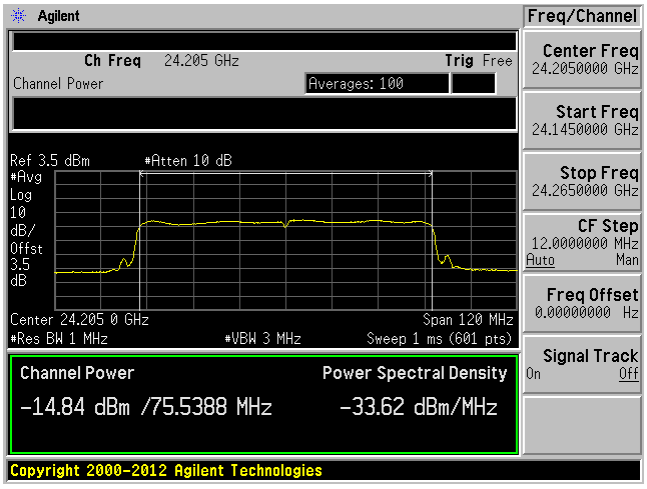
Low Channel 24040 MHz



Middle Channel 24130 MHz

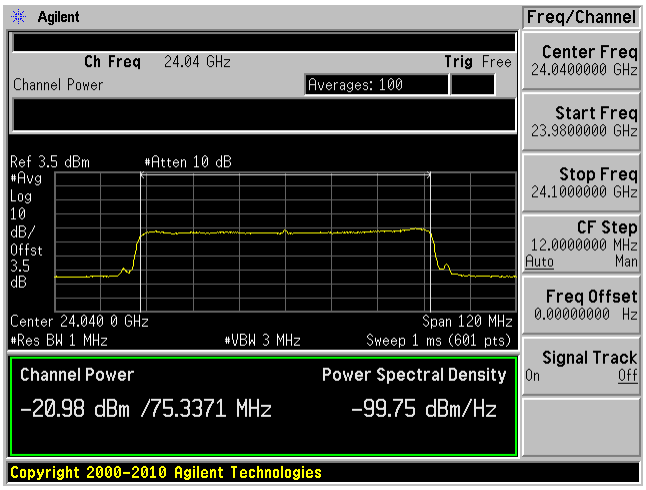


High Channel 24205 MHz

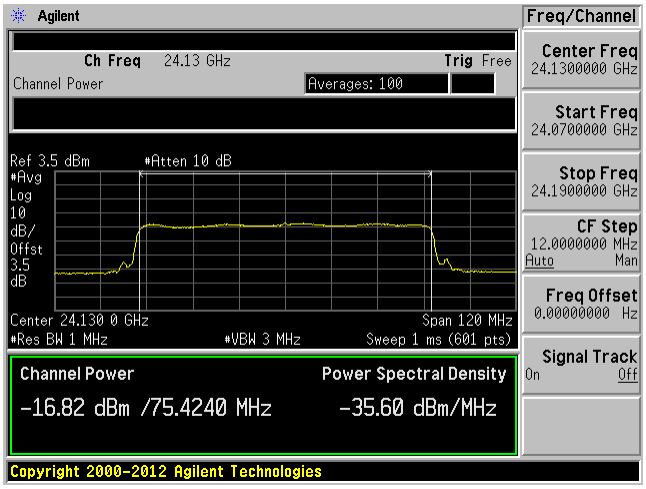


802.11ac80 mode Tx4

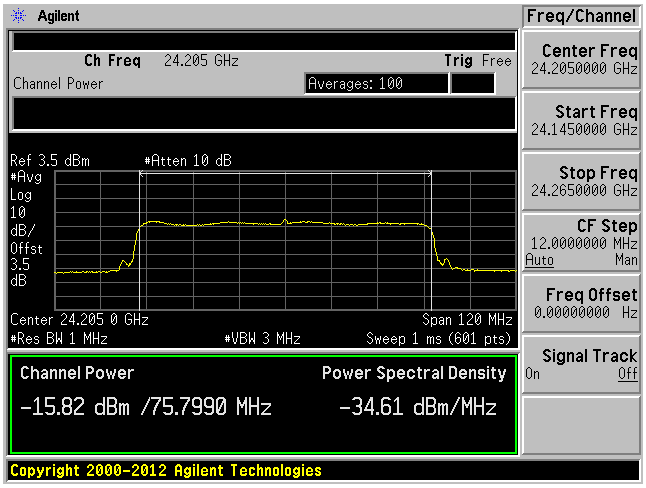
Low Channel 24040 MHz



Middle Channel 24130 MHz



High Channel 24205 MHz



5 EN 300 440 Clause 4.2.3 – Permitted Range of Operating Frequencies

5.1 Applicable Standard

EN 300 440 V2.1.1 Clause 4.2.3

The frequency range of the equipment is determined by the lowest and highest frequencies occupied by the power envelope in accordance with clause 7.1.3, table 4.

F_H is the highest frequency of the power envelope, it is the frequency furthest above the frequency of maximum power where the output power envelope drops below the level of -75 dBm/Hz spectral power density (e.g. -30 dBm if measured in a 30 kHz reference bandwidth) e.i.r.p.

F_L is the lowest frequency of the power envelope; it is the frequency furthest below the frequency of maximum power where the output power drops below the level of -75 dBm/Hz spectral power density (e.g. -30 dBm if measured in a 30 kHz reference bandwidth) e.i.r.p.

The power envelope shall contain the occupied bandwidth representing 99 % of the emissions.

The occupied and necessary bandwidths of the transmitter shall be declared. Where differing modes of emission are available, all modes and their associated bandwidths shall be stated.

5.2 Measurement Procedure

EN 300 440 v2.1.1 Clause 4.2.3.3

5.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4446A	US44300386	2017-04-20	1 year
-	RF cable	-	-	Each time[1]	N/A
Tenney	Chamber, Environmental	TUJR	27445-06	2017-10-02	1 year

Note[1]: cable included in the test set-up will be checked each time before testing.

Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".*

5.4 Test Environmental Conditions

Temperature:	23°C
Relative Humidity:	35 %
ATM Pressure:	101.15kPa

The testing was performed by Vincent Licata on 2018-02-02 in RF Bench.

5.5 Test Results

(UUT uses POE for power supply, different voltage added to the POE will not affect the voltage on the UUT so only the normal voltage condition is tested)

Normal Temperature 23℃

Tx1

Channel	Mode	Frequency (GHz)	Measured Frequency (GHz)	Allowed Frequency Band (GHz)	Result
Low	802.11ac20	24010	24.00034	24.00-24.25	PASS
High	802.11ac20	24235	24.24492	24.00-24.25	PASS
Low	802.11ac40	24020	24.00128	24.00-24.25	PASS
High	802.11ac40	24225	24.24394	24.00-24.25	PASS
Low	802.11ac80	24040	24.00166	24.00-24.25	PASS
High	802.11ac80	24205	24.24347	24.00-24.25	PASS

Tx2

Channel	Mode	Frequency (GHz)	Measured Frequency (GHz)	Allowed Frequency Band (GHz)	Result
Low	802.11ac20	24010	24.00034	24.00-24.25	PASS
High	802.11ac20	24235	24.24509	24.00-24.25	PASS
Low	802.11ac40	24020	24.00128	24.00-24.25	PASS
High	802.11ac40	24225	24.24360	24.00-24.25	PASS
Low	802.11ac80	24040	24.00166	24.00-24.25	PASS
High	802.11ac80	24205	24.24347	24.00-24.25	PASS

Tx3

Channel	Mode	Frequency (GHz)	Measured Frequency (GHz)	Allowed Frequency Band (GHz)	Result
Low	802.11ac20	24010	24.00034	24.00-24.25	PASS
High	802.11ac20	24235	24.24539	24.00-24.25	PASS
Low	802.11ac40	24020	24.00128	24.00-24.25	PASS
High	802.11ac40	24225	24.24385	24.00-24.25	PASS
Low	802.11ac80	24040	24.00166	24.00-24.25	PASS
High	802.11ac80	24205	24.24351	24.00-24.25	PASS

Tx4

Channel	Mode	Frequency (GHz)	Measured Frequency (GHz)	Allowed Frequency Band (GHz)	Result
Low	802.11ac20	24010	24.00034	24.00-24.25	PASS
High	802.11ac20	24235	24.24539	24.00-24.25	PASS
Low	802.11ac40	24020	24.00128	24.00-24.25	PASS
High	802.11ac40	24225	24.24424	24.00-24.25	PASS
Low	802.11ac80	24040	24.00166	24.00-24.25	PASS
High	802.11ac80	24205	24.24334	24.00-24.25	PASS

Low Temperature -40℃

Tx1

Channel	Mode	Frequency (GHz)	Measured Frequency (GHz)	Allowed Frequency Band (GHz)	Result
Low	802.11ac20	24010	24.00042	24.00-24.25	PASS
High	802.11ac20	24235	24.24484	24.00-24.25	PASS
Low	802.11ac40	24020	24.00145	24.00-24.25	PASS
High	802.11ac40	24225	24.24355	24.00-24.25	PASS
Low	802.11ac80	24040	24.00166	24.00-24.25	PASS
High	802.11ac80	24205	24.24334	24.00-24.25	PASS

Tx2

Channel	Mode	Frequency (GHz)	Measured Frequency (GHz)	Allowed Frequency Band (GHz)	Result
Low	802.11ac20	24010	24.00055	24.00-24.25	PASS
High	802.11ac20	24235	24.24488	24.00-24.25	PASS
Low	802.11ac40	24020	24.00140	24.00-24.25	PASS
High	802.11ac40	24225	24.24355	24.00-24.25	PASS
Low	802.11ac80	24040	24.00166	24.00-24.25	PASS
High	802.11ac80	24205	24.24334	24.00-24.25	PASS

Tx3

Channel	Mode	Frequency (GHz)	Measured Frequency (GHz)	Allowed Frequency Band (GHz)	Result
Low	802.11ac20	24010	24.00055	24.00-24.25	PASS
High	802.11ac20	24235	24.24488	24.00-24.25	PASS
Low	802.11ac40	24020	24.00140	24.00-24.25	PASS
High	802.11ac40	24225	24.24372	24.00-24.25	PASS
Low	802.11ac80	24040	24.00166	24.00-24.25	PASS
High	802.11ac80	24205	24.24334	24.00-24.25	PASS

Tx4

Channel	Mode	Frequency (GHz)	Measured Frequency (GHz)	Allowed Frequency Band (GHz)	Result
Low	802.11ac20	24010	24.00055	24.00-24.25	PASS
High	802.11ac20	24235	24.24492	24.00-24.25	PASS
Low	802.11ac40	24020	24.00140	24.00-24.25	PASS
High	802.11ac40	24225	24.24372	24.00-24.25	PASS
Low	802.11ac80	24040	24.00166	24.00-24.25	PASS
High	802.11ac80	24205	24.24334	24.00-24.25	PASS

High Temperature 85℃

Tx1

Channel	Mode	Frequency (GHz)	Measured Frequency (GHz)	Allowed Frequency Band (GHz)	Result
Low	802.11ac20	24010	24.00055	24.00-24.25	PASS
High	802.11ac20	24235	24.24462	24.00-24.25	PASS
Low	802.11ac40	24020	24.00145	24.00-24.25	PASS
High	802.11ac40	24225	24.24355	24.00-24.25	PASS
Low	802.11ac80	24040	24.00166	24.00-24.25	PASS
High	802.11ac80	24205	24.24334	24.00-24.25	PASS

Tx2

Channel	Mode	Frequency (GHz)	Measured Frequency (GHz)	Allowed Frequency Band (GHz)	Result
Low	802.11ac20	24010	24.00055	24.00-24.25	PASS
High	802.11ac20	24235	24.24462	24.00-24.25	PASS
Low	802.11ac40	24020	24.00140	24.00-24.25	PASS
High	802.11ac40	24225	24.24355	24.00-24.25	PASS
Low	802.11ac80	24040	24.00166	24.00-24.25	PASS
High	802.11ac80	24205	24.24334	24.00-24.25	PASS

Tx3

Channel	Mode	Frequency (GHz)	Measured Frequency (GHz)	Allowed Frequency Band (GHz)	Result
Low	802.11ac20	24010	24.00055	24.00-24.25	PASS
High	802.11ac20	24235	24.24492	24.00-24.25	PASS
Low	802.11ac40	24020	24.00140	24.00-24.25	PASS
High	802.11ac40	24225	24.24381	24.00-24.25	PASS
Low	802.11ac80	24040	24.00166	24.00-24.25	PASS
High	802.11ac80	24205	24.24334	24.00-24.25	PASS

Tx4

Channel	Mode	Frequency (GHz)	Measured Frequency (GHz)	Allowed Frequency Band (GHz)	Result
Low	802.11ac20	24010	24.00055	24.00-24.25	PASS
High	802.11ac20	24235	24.24488	24.00-24.25	PASS
Low	802.11ac40	24020	24.00140	24.00-24.25	PASS
High	802.11ac40	24225	24.24372	24.00-24.25	PASS
Low	802.11ac80	24040	24.00166	24.00-24.25	PASS
High	802.11ac80	24205	24.24334	24.00-24.25	PASS

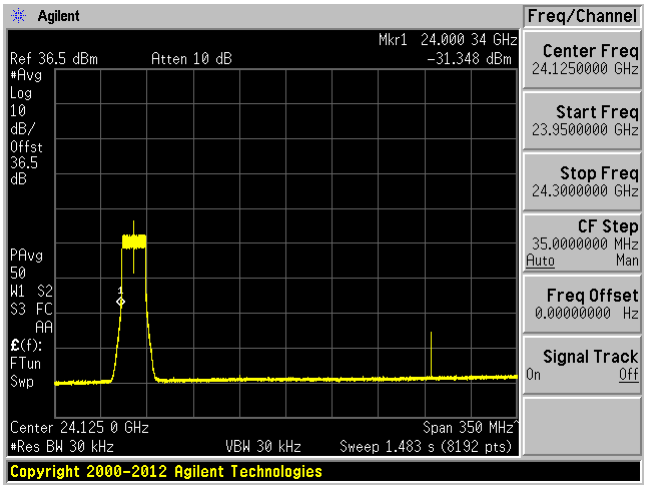
Please refer to the following plots

Normal Temperature 23℃

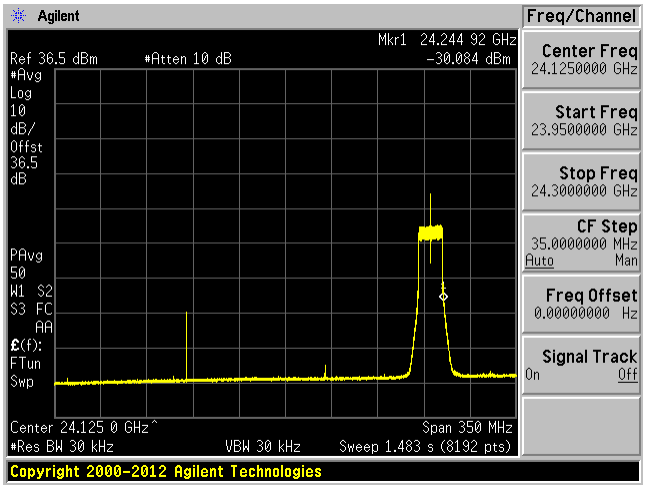
802.11ac20 mode

Tx1

Low Channel 24010 MHz

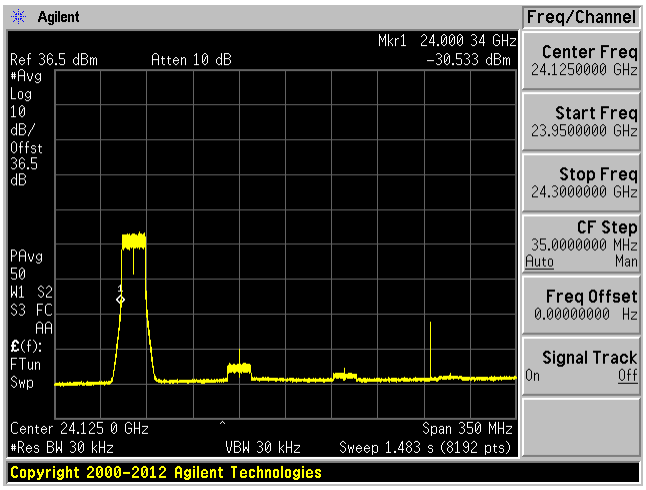


High Channel 24235 MHz

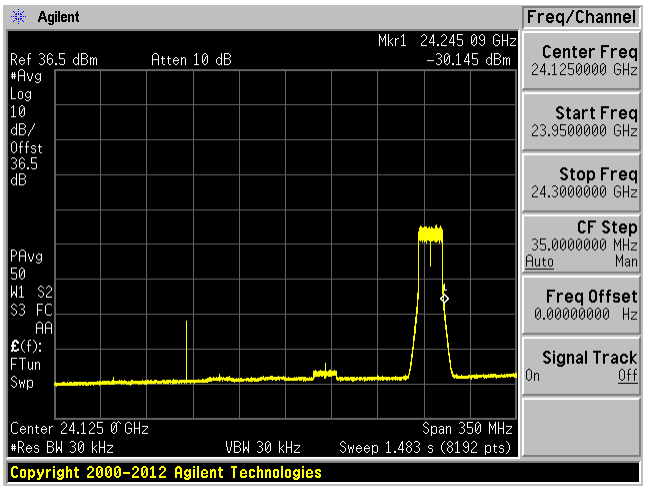


Tx2

Low Channel 24010 MHz

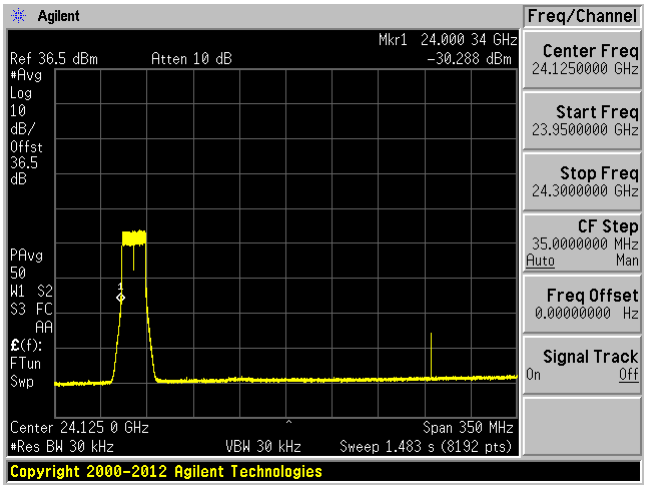


High Channel 24235 MHz

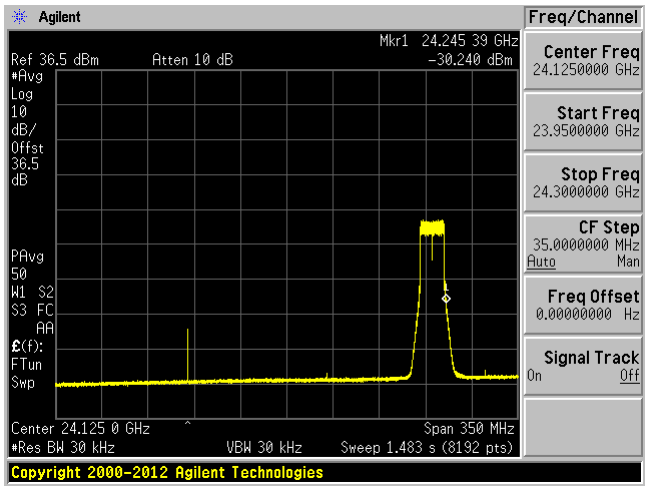


Tx3

Low Channel 24010 MHz

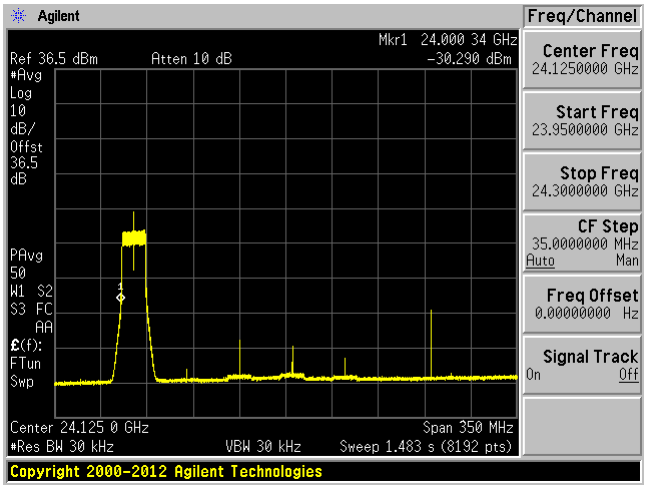


High Channel 24235 MHz

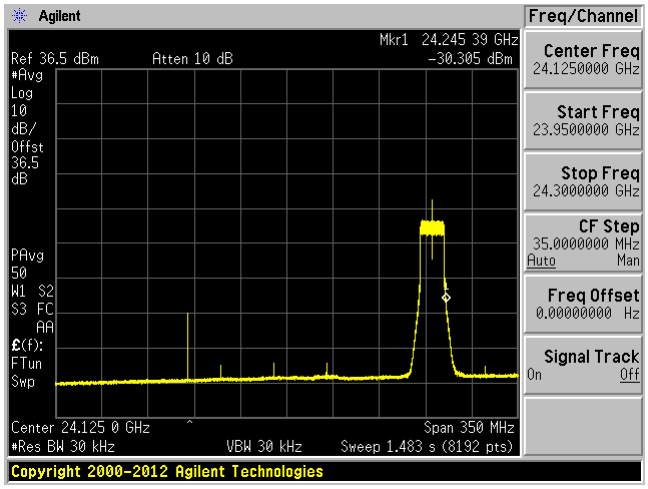


Tx4

Low Channel 24010 MHz



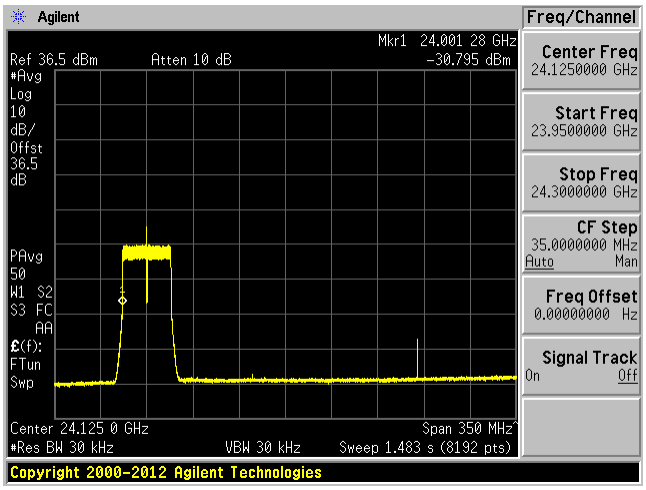
High Channel 24235 MHz



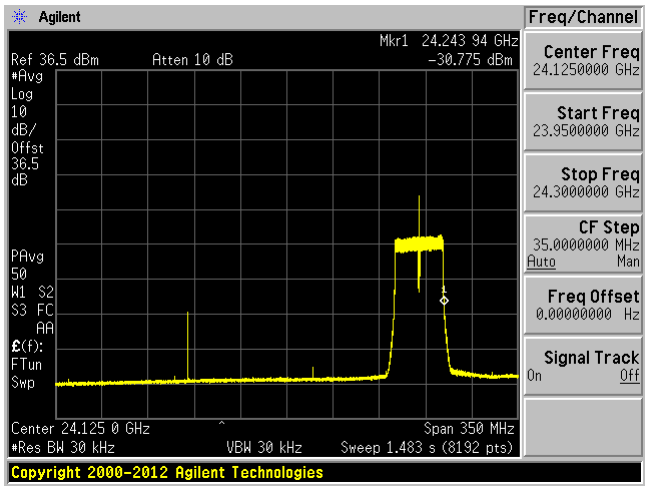
802.11ac40 mode

Tx1

Low Channel 24020 MHz

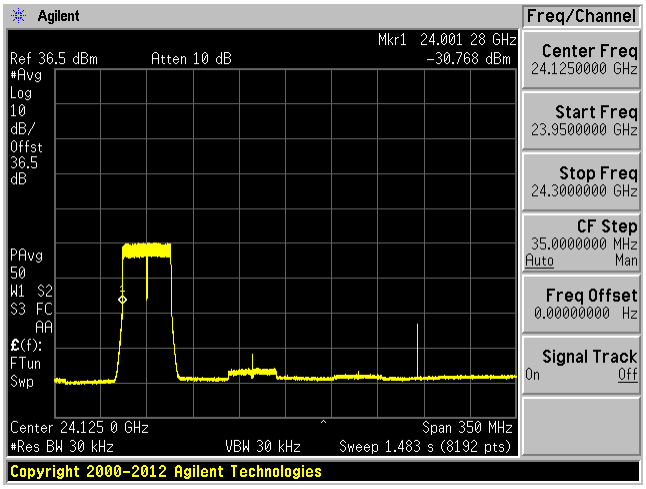


High Channel 24225 MHz

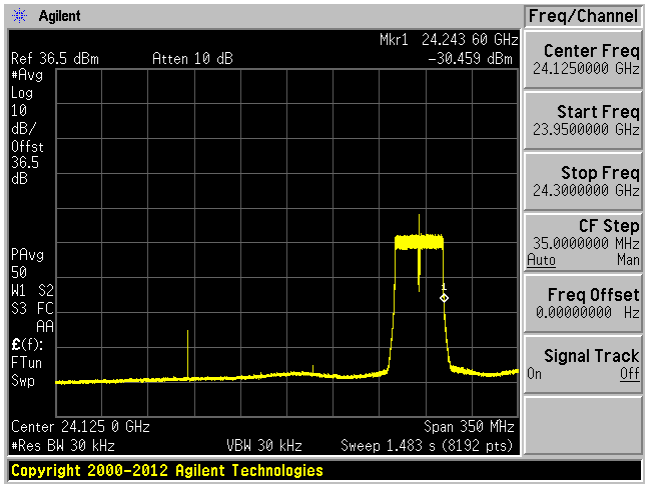


Tx2

Low Channel 24020 MHz

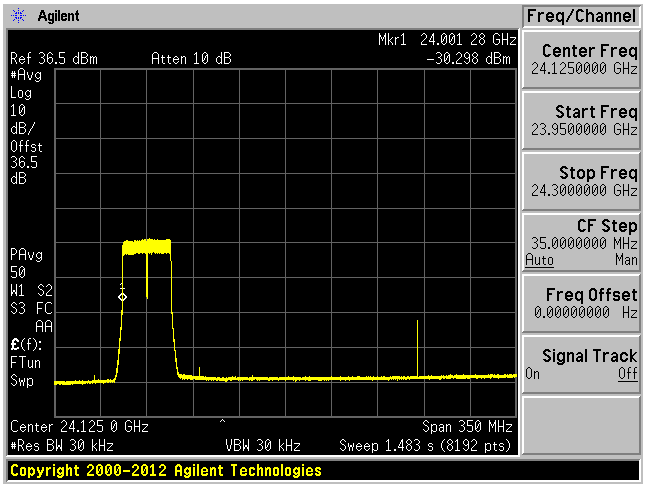


High Channel 24225 MHz

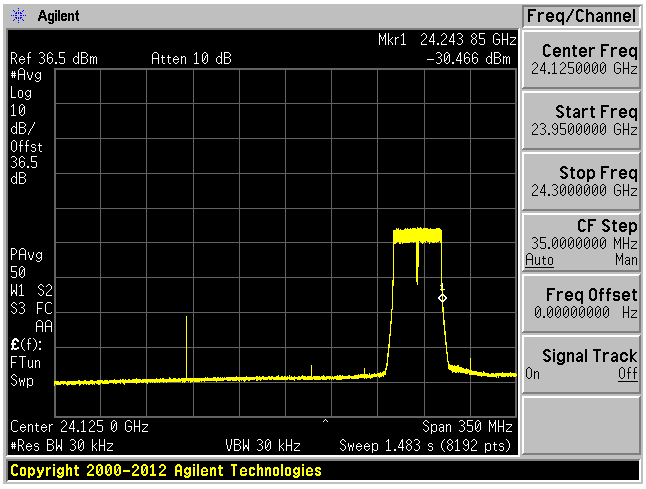


Tx3

Low Channel 24020 MHz

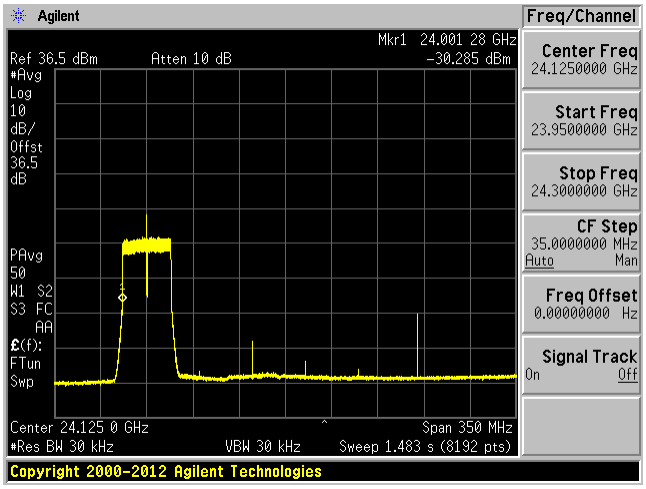


High Channel 24225 MHz

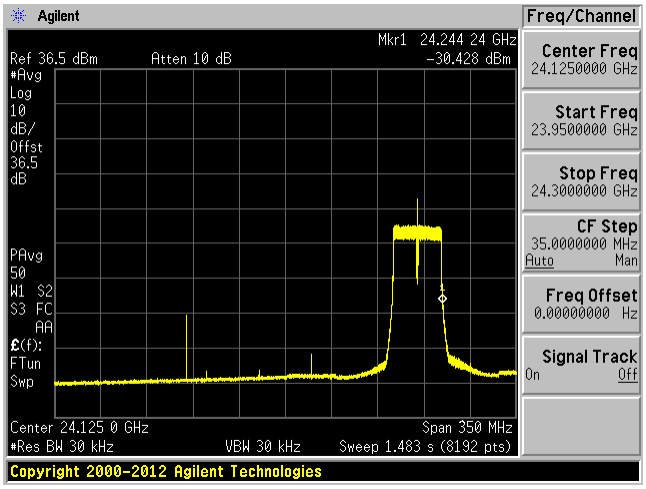


Tx4

Low Channel 24020 MHz



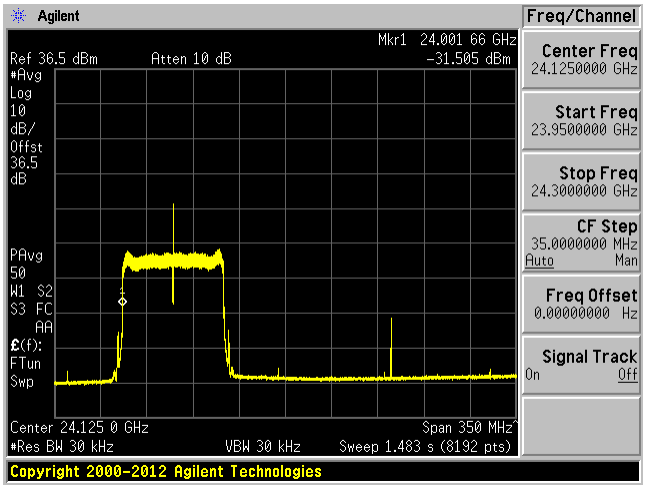
High Channel 24225 MHz



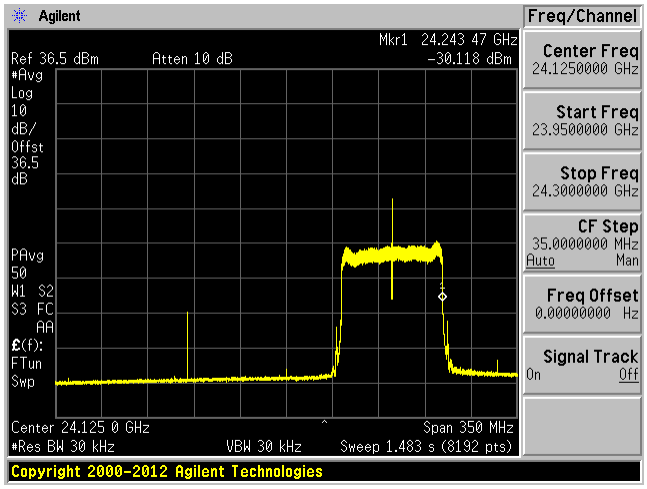
802.11ac80 mode

Tx1

Low Channel 24040 MHz

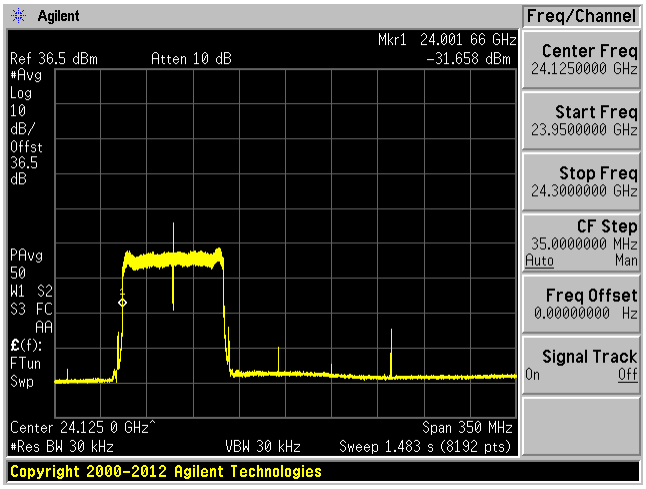


High Channel 24205 MHz

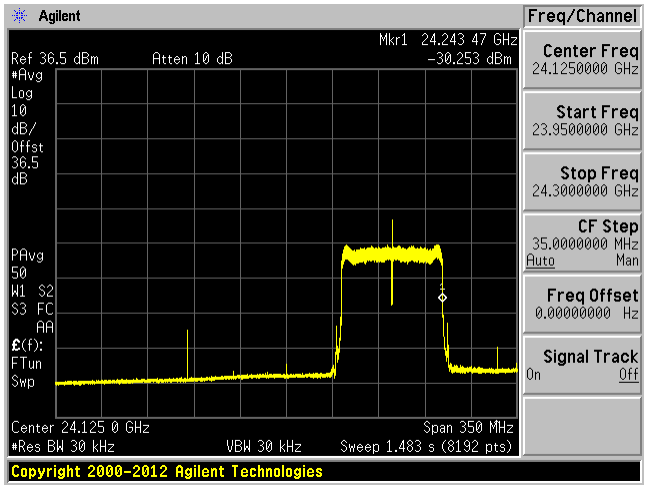


Tx2

Low Channel 24040 MHz

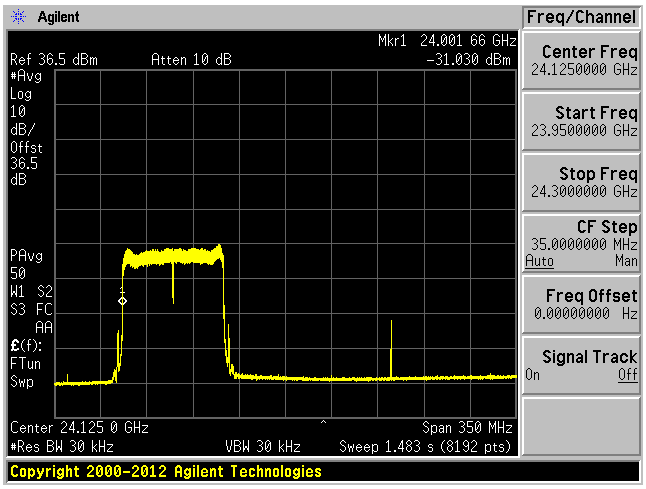


High Channel 24205 MHz

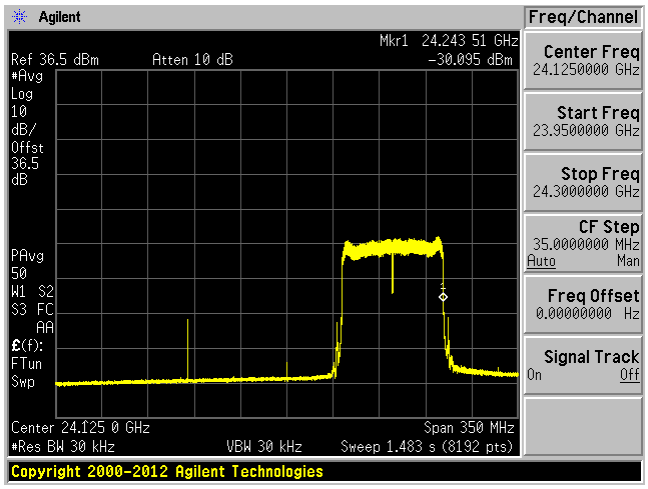


Tx3

Low Channel 24040 MHz

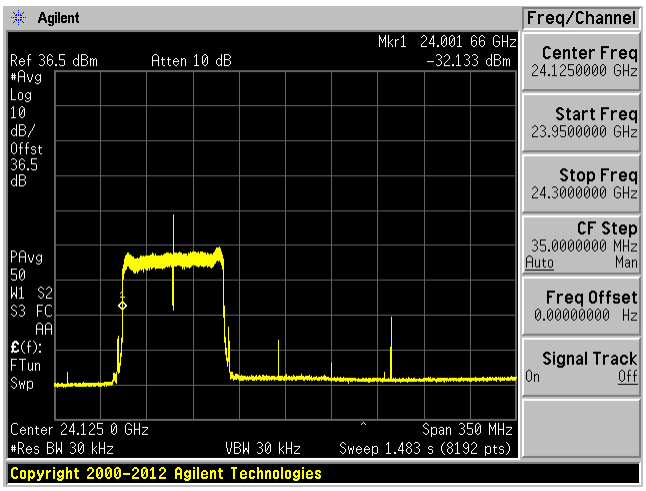


High Channel 24205 MHz

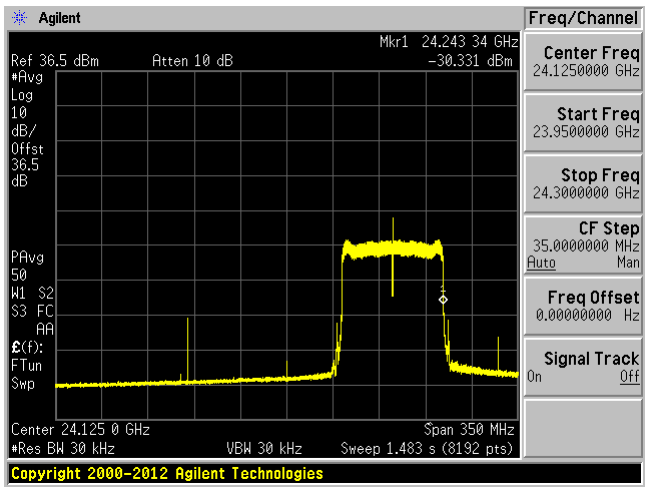


Tx4

Low Channel 24040 MHz



High Channel 24205 MHz

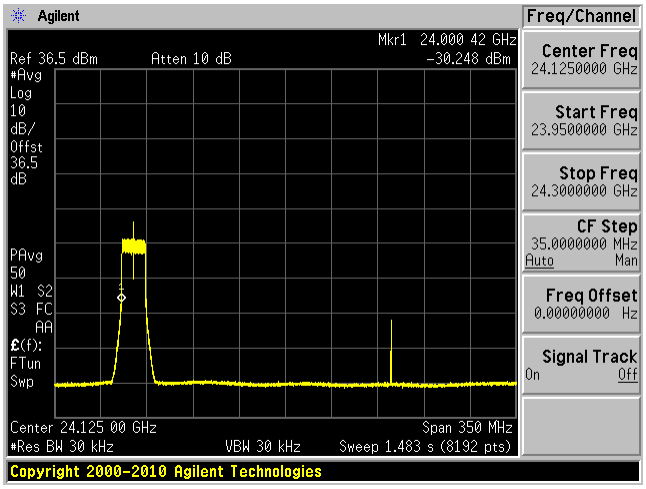


Low Temperature -40℃

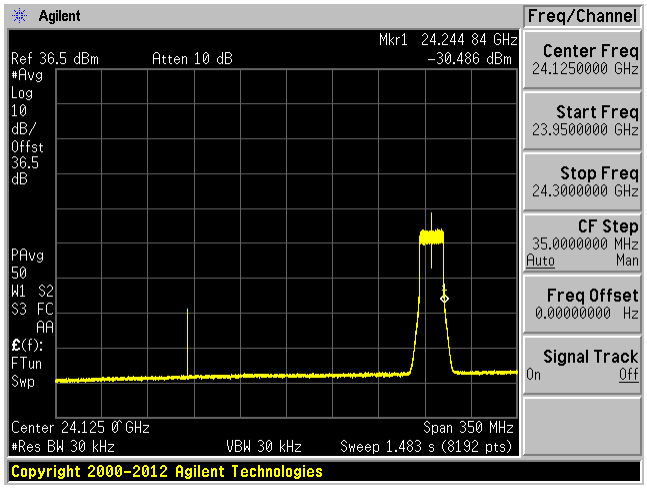
802.11ac20 mode

Tx1

Low Channel 24010 MHz

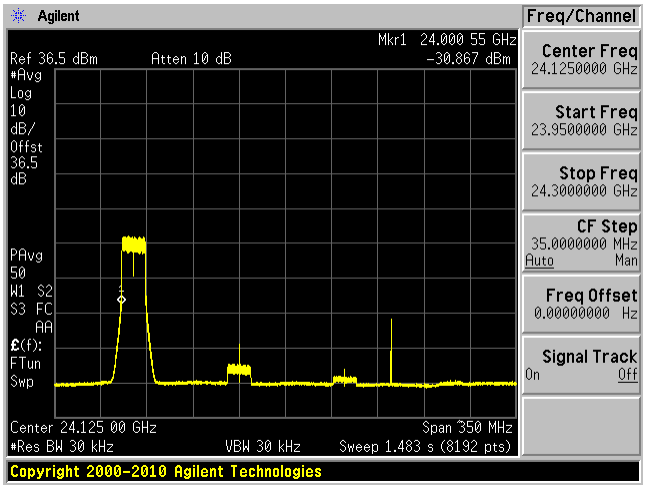


High Channel 24235 MHz

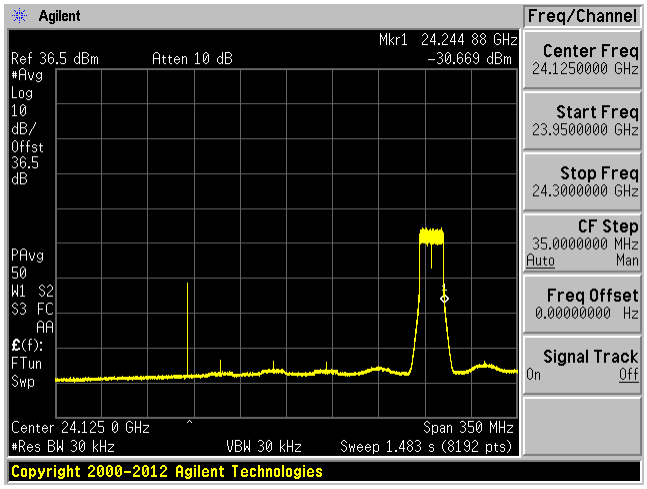


Tx2

Low Channel 24010 MHz

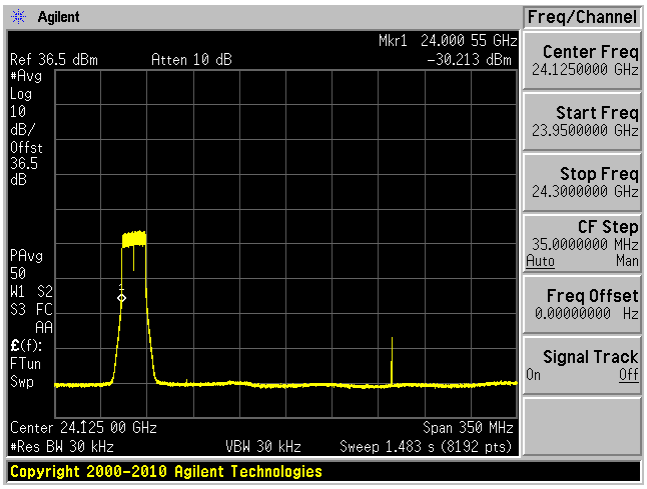


High Channel 24235 MHz

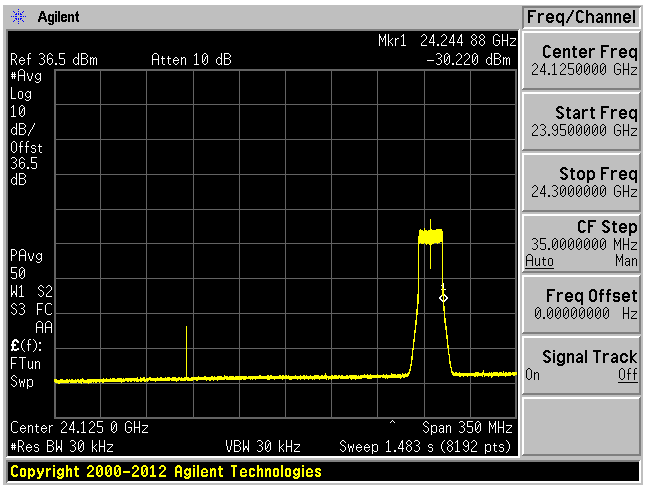


Tx3

Low Channel 24010 MHz

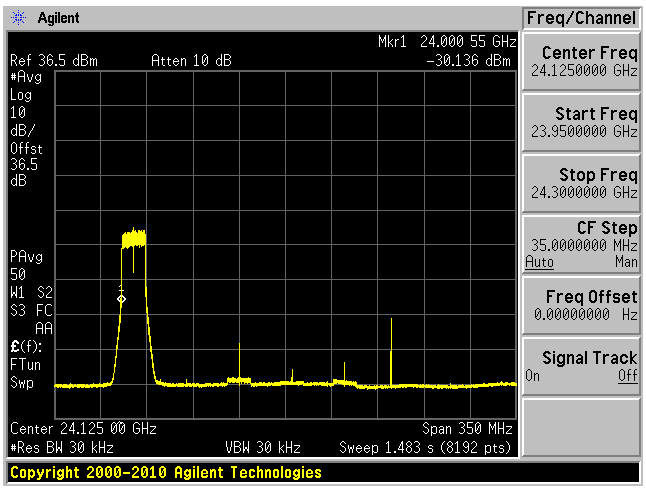


High Channel 24235 MHz

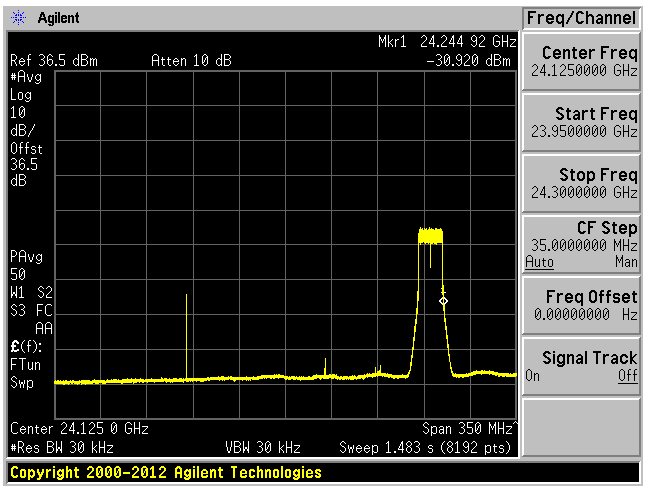


Tx4

Low Channel 24010 MHz



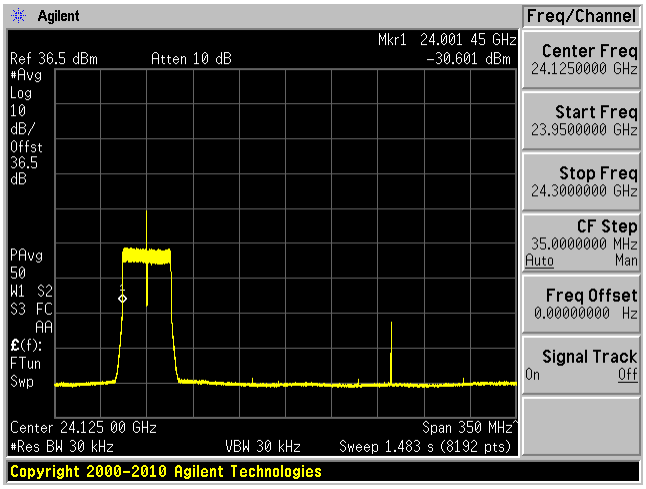
High Channel 24235 MHz



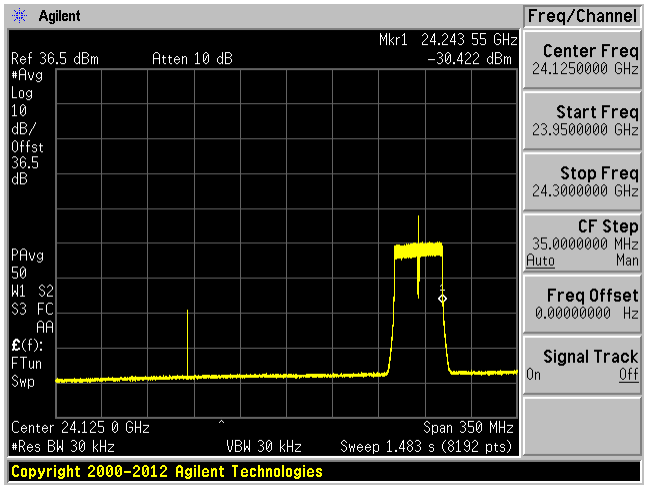
802.11ac40 mode

Tx1

Low Channel 24020 MHz

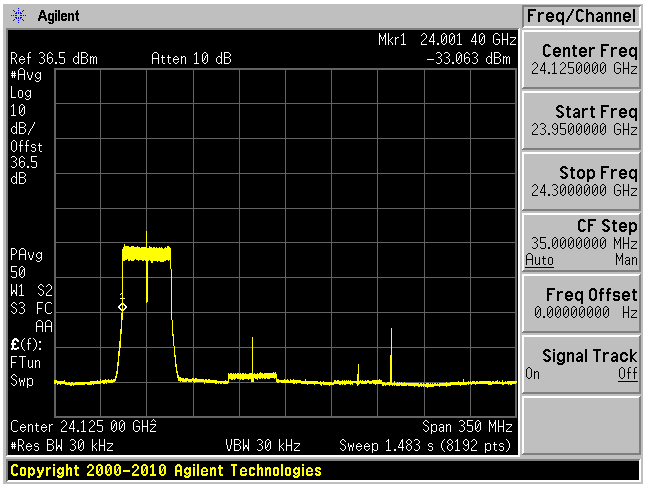


High Channel 24225 MHz

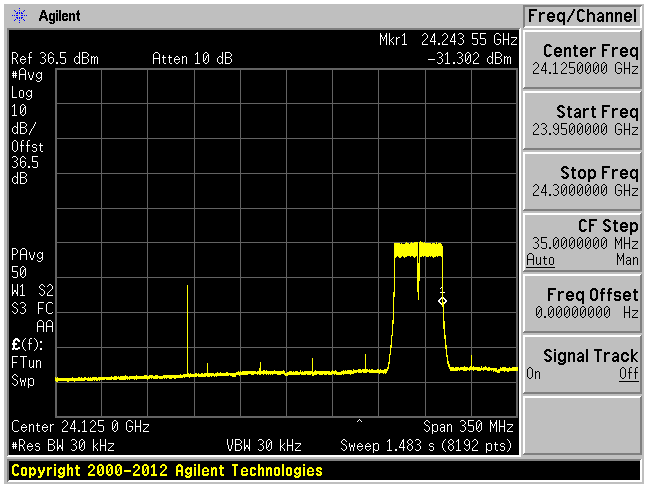


Tx2

Low Channel 24020 MHz

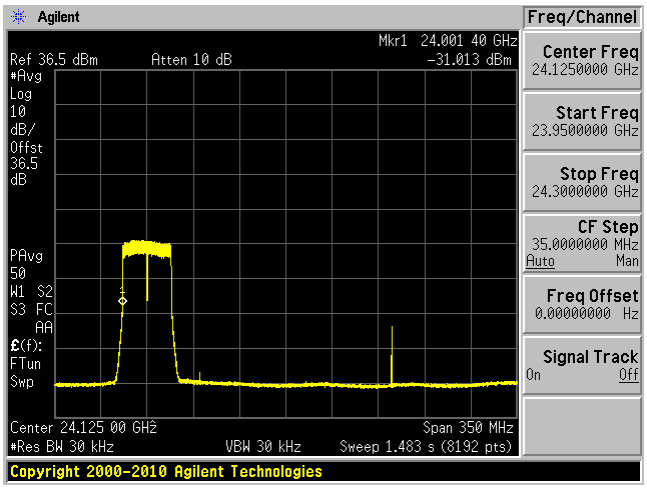


High Channel 24225 MHz

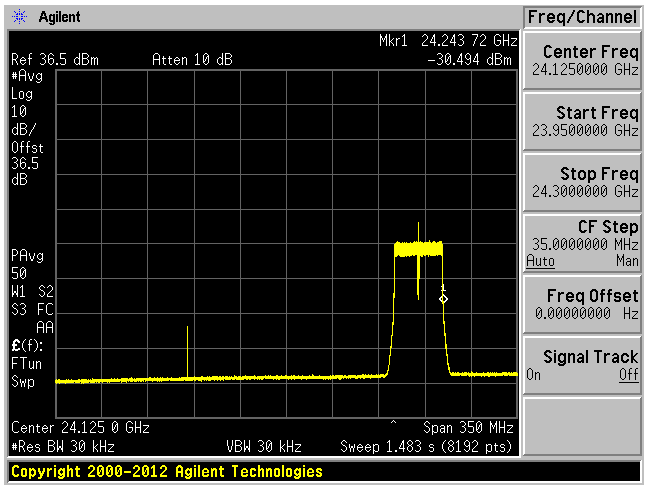


Tx3

Low Channel 24020 MHz

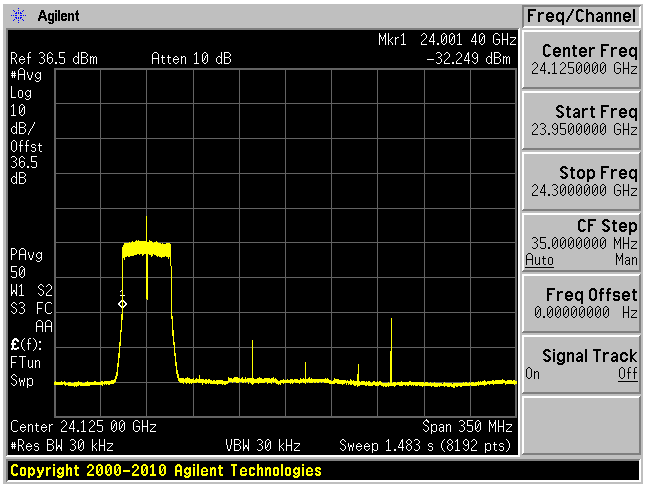


High Channel 24225 MHz

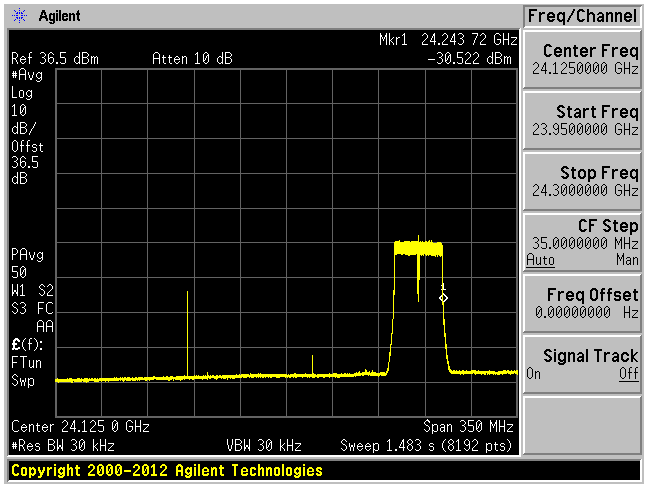


Tx4

Low Channel 24020 MHz



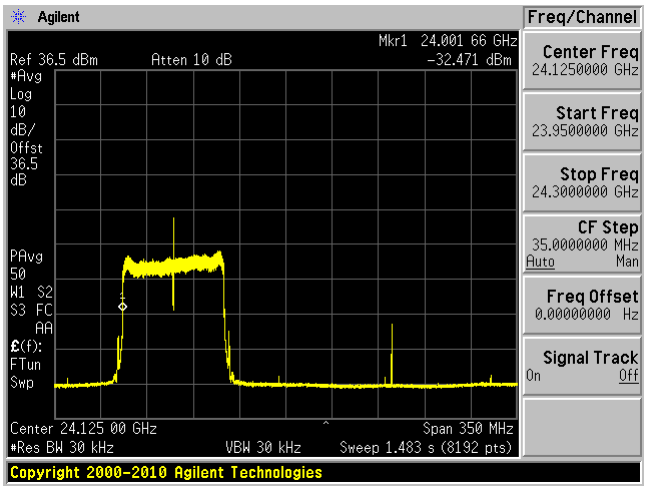
High Channel 24225 MHz



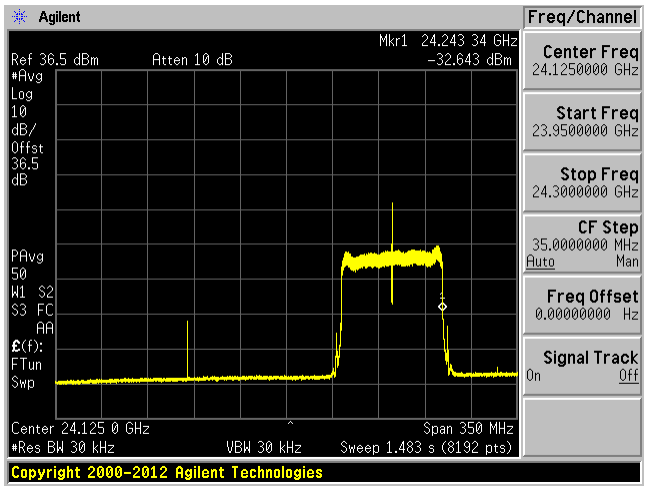
802.11ac80 mode

Tx1

Low Channel 24040 MHz

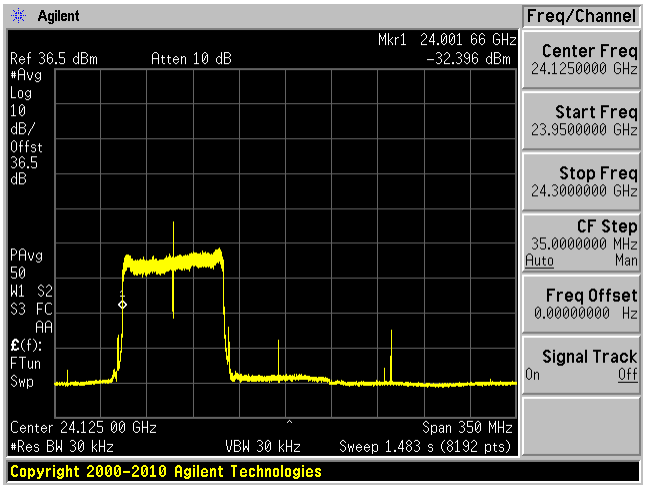


High Channel 24205 MHz

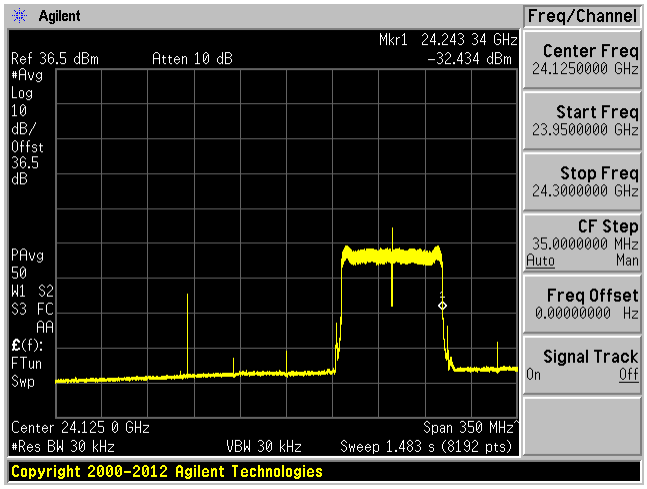


Tx2

Low Channel 24040 MHz

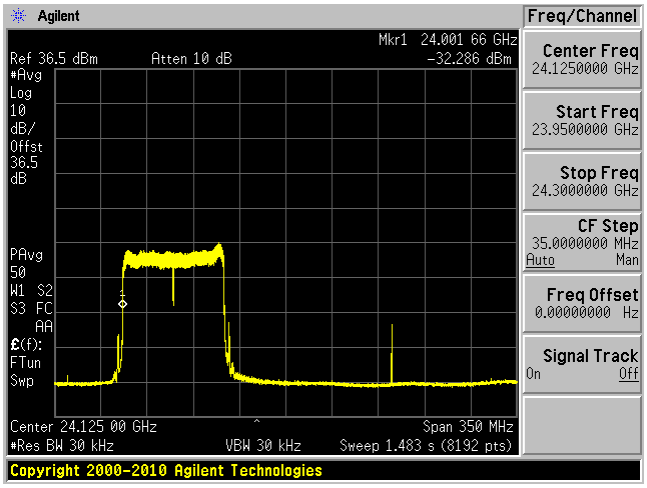


High Channel 24205 MHz

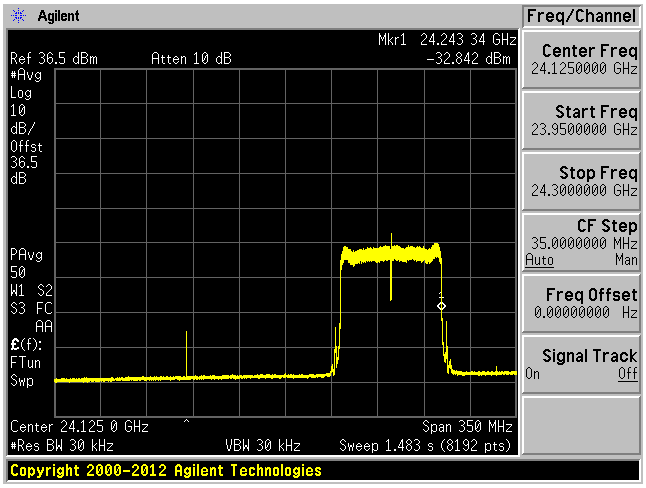


Tx3

Low Channel 24040 MHz

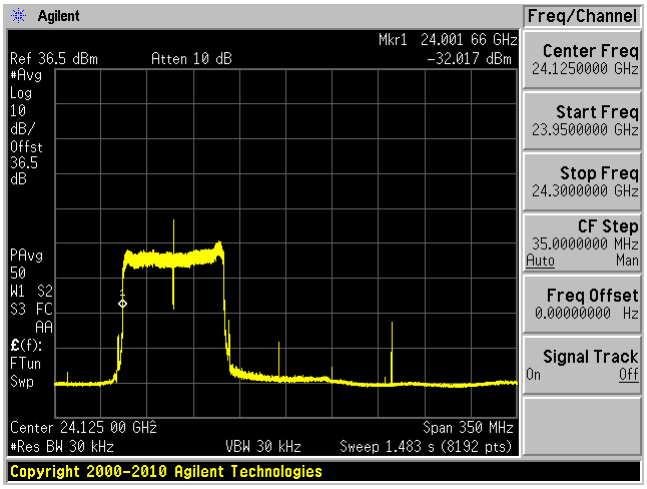


High Channel 24205 MHz

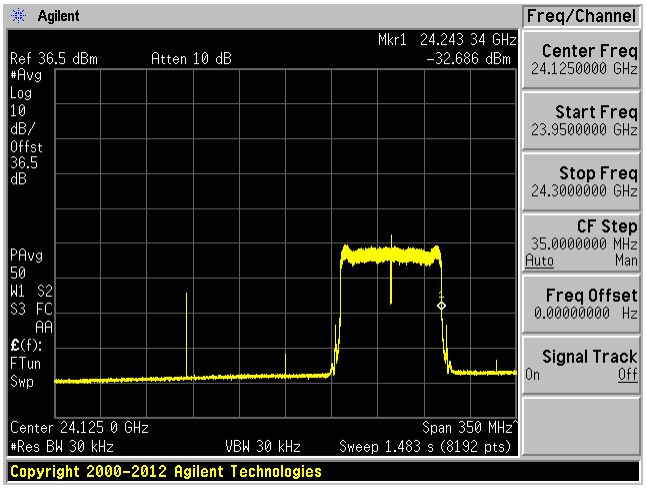


Tx4

Low Channel 24040 MHz



High Channel 24205 MHz

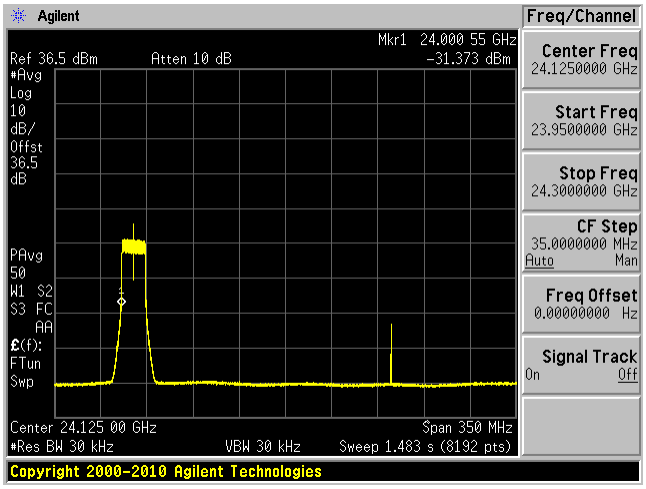


High Temperature 85℃

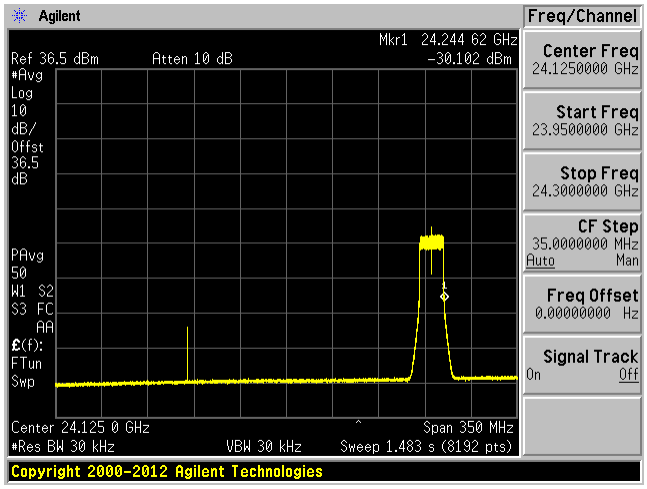
802.11ac20 mode

Tx1

Low Channel 24010 MHz

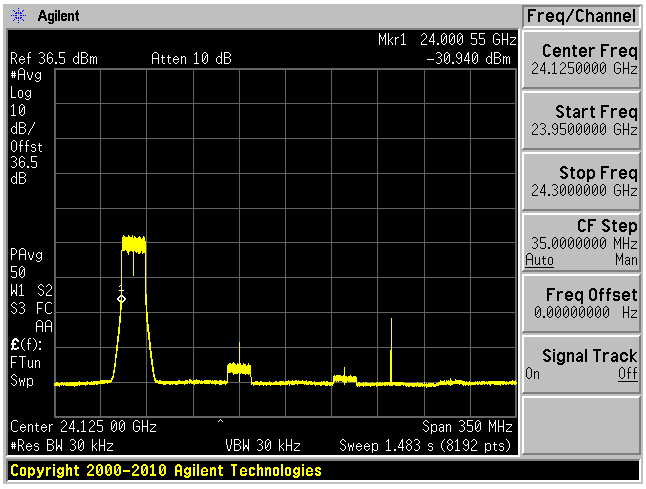


High Channel 24235 MHz

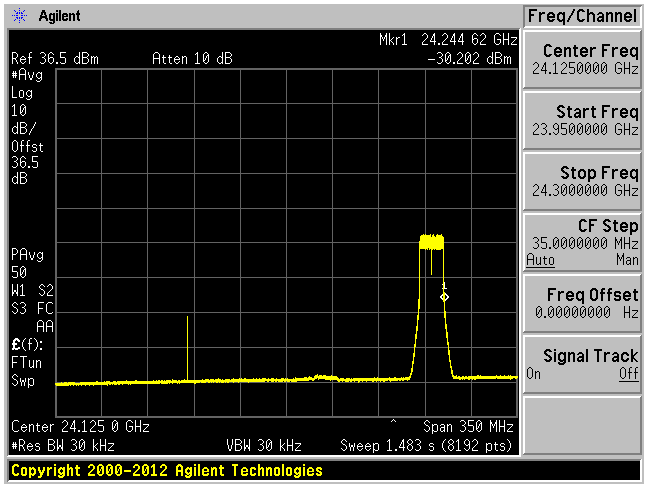


Tx2

Low Channel 24010 MHz

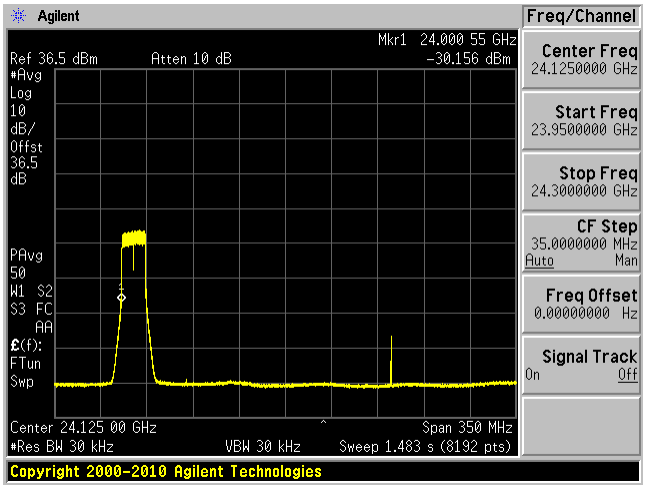


High Channel 24235 MHz

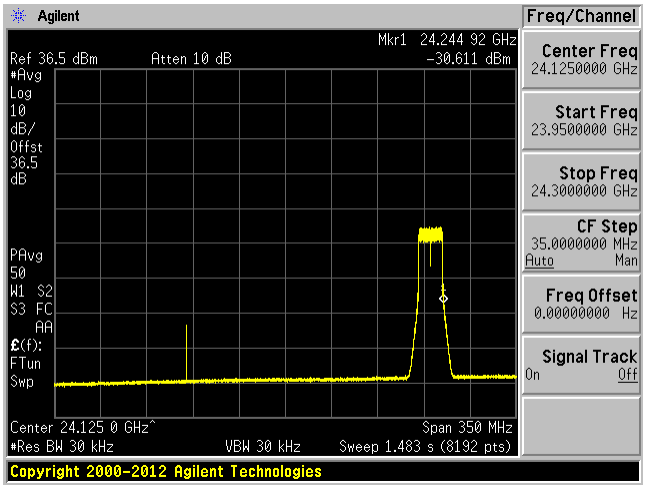


Tx3

Low Channel 24010 MHz

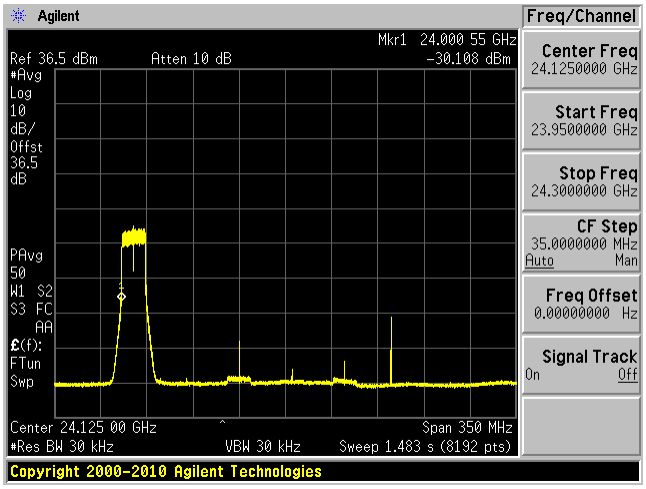


High Channel 24235 MHz

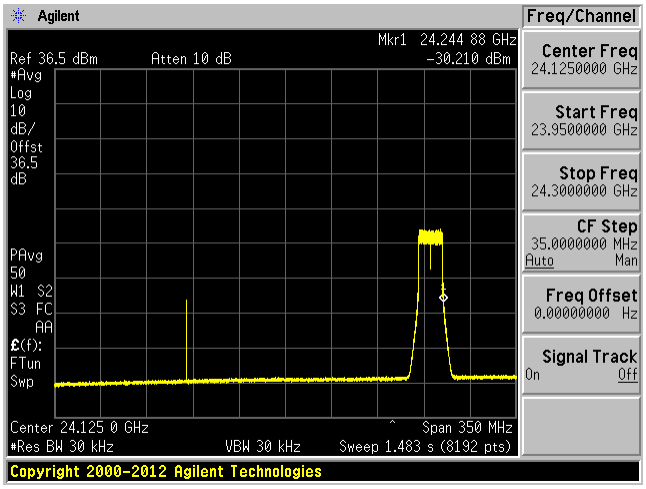


Tx4

Low Channel 24010 MHz



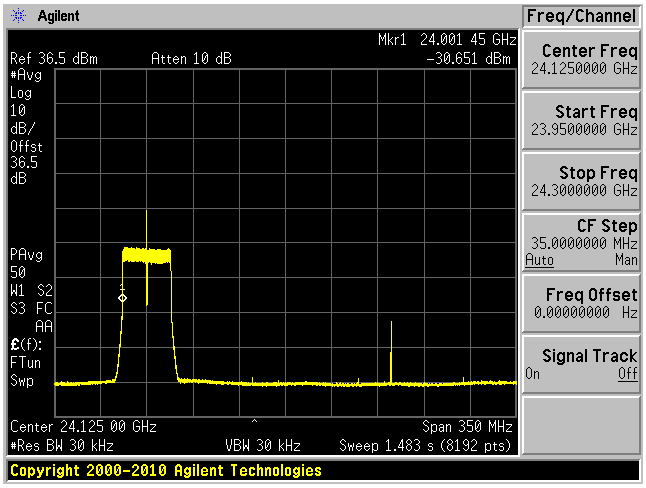
High Channel 24235 MHz



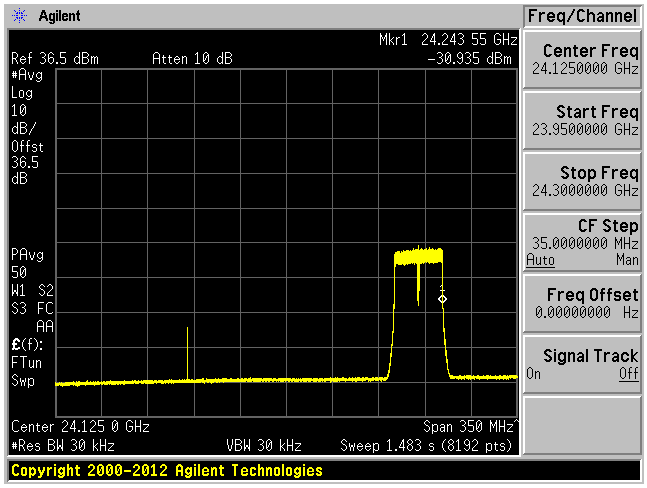
802.11ac40 mode

Tx1

Low Channel 24020 MHz

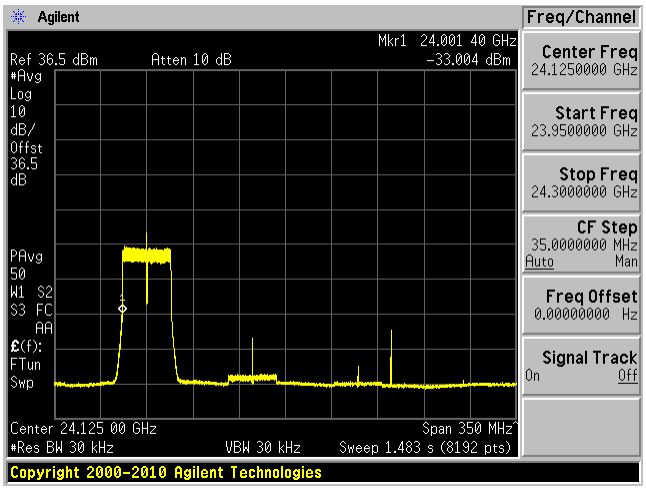


High Channel 24225 MHz

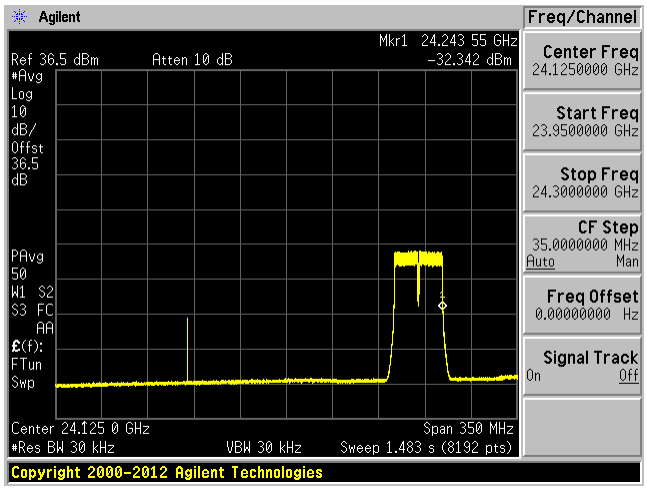


Tx2

Low Channel 24020 MHz

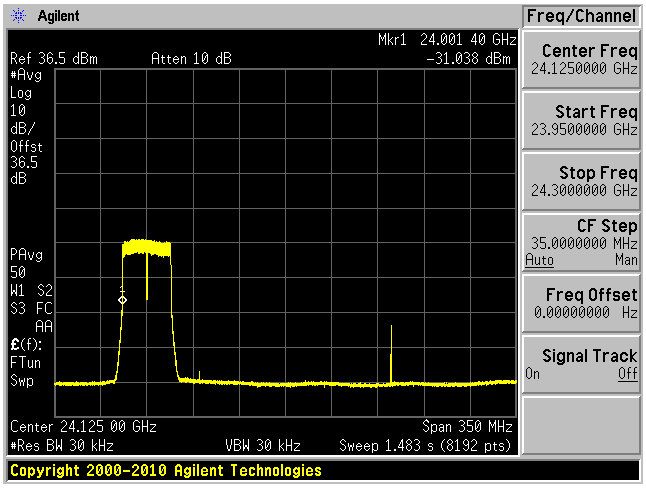


High Channel 24225 MHz

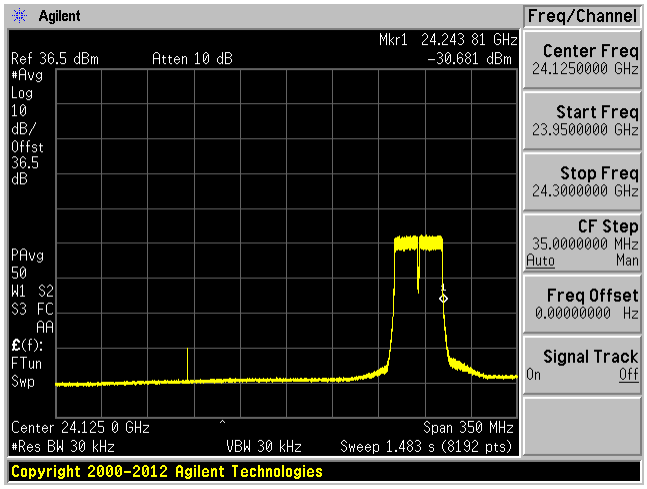


Tx3

Low Channel 24020 MHz

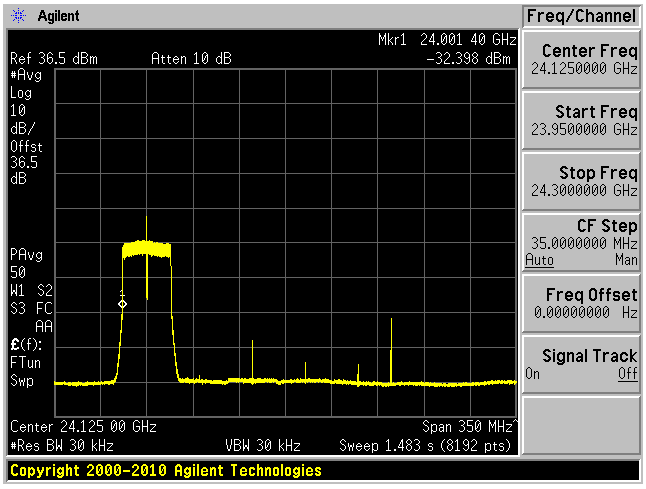


High Channel 24225 MHz

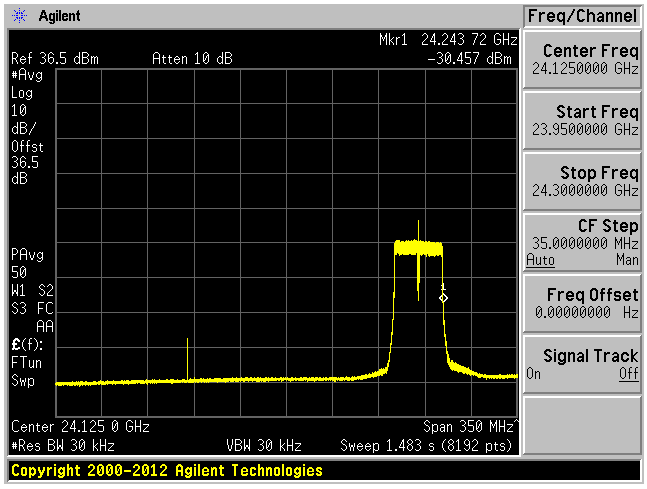


Tx4

Low Channel 24020 MHz



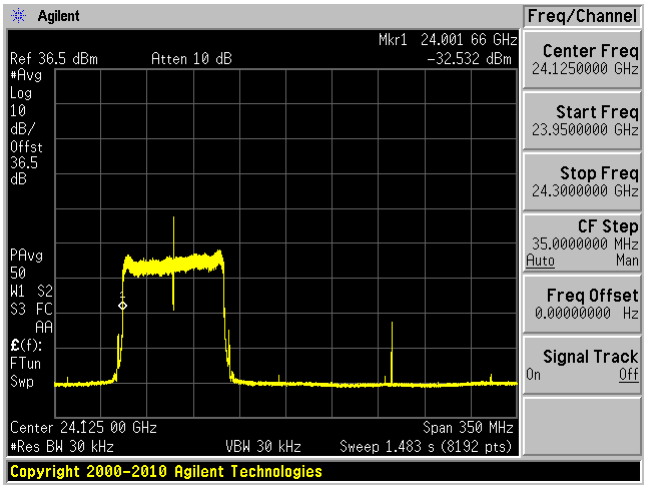
High Channel 24225 MHz



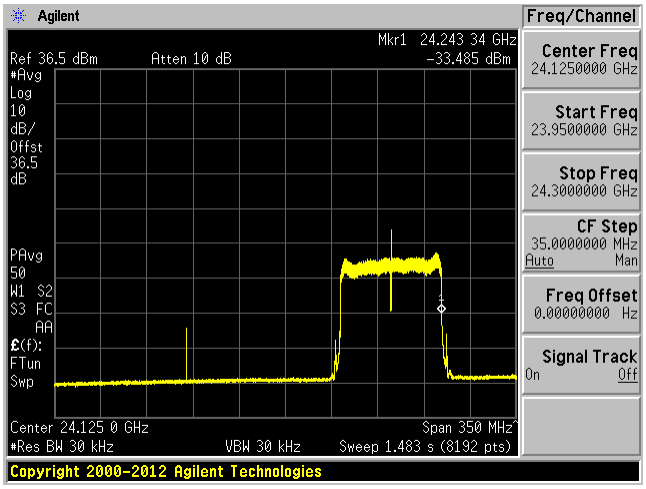
802.11ac80 mode

Tx1

Low Channel 24040 MHz

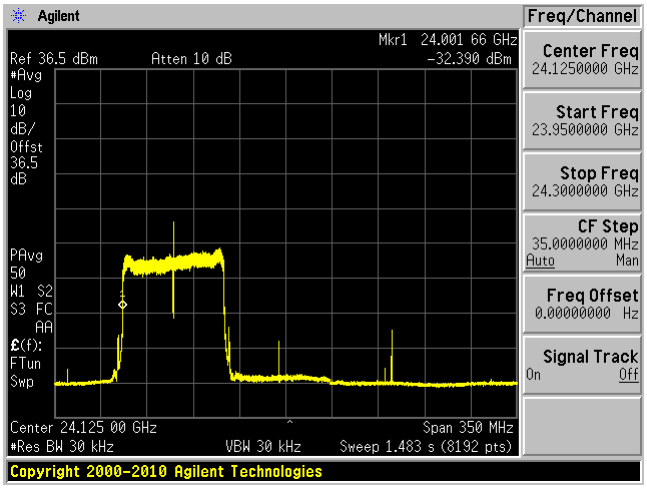


High Channel 24205 MHz

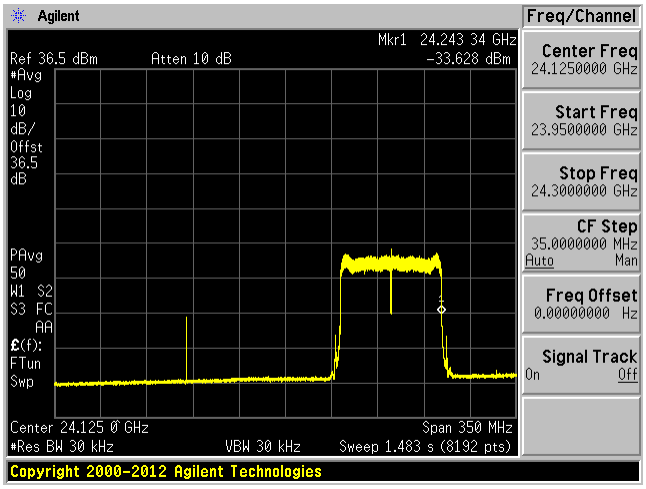


Tx2

Low Channel 24040 MHz

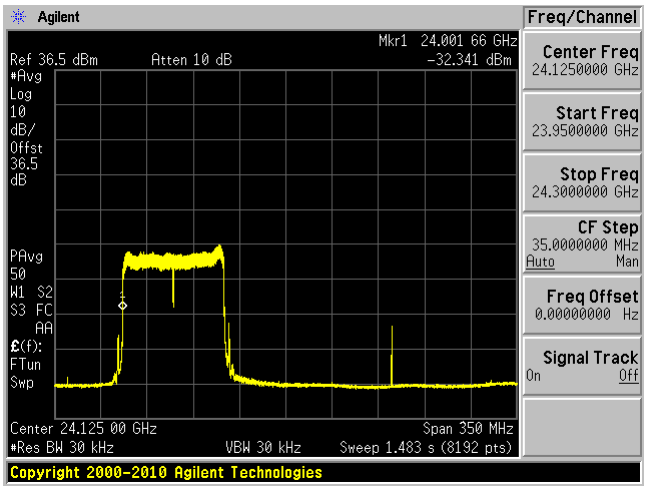


High Channel 24205 MHz

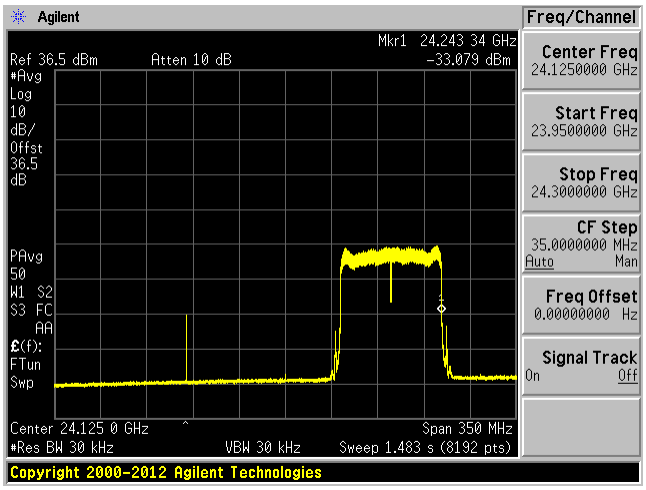


Tx3

Low Channel 24040 MHz

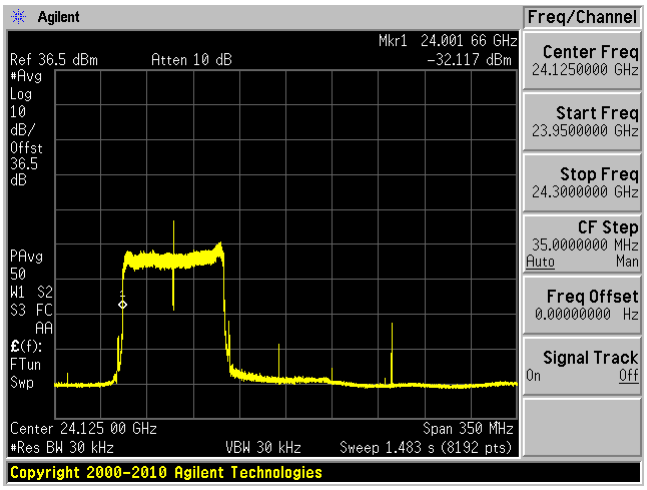


High Channel 24205 MHz

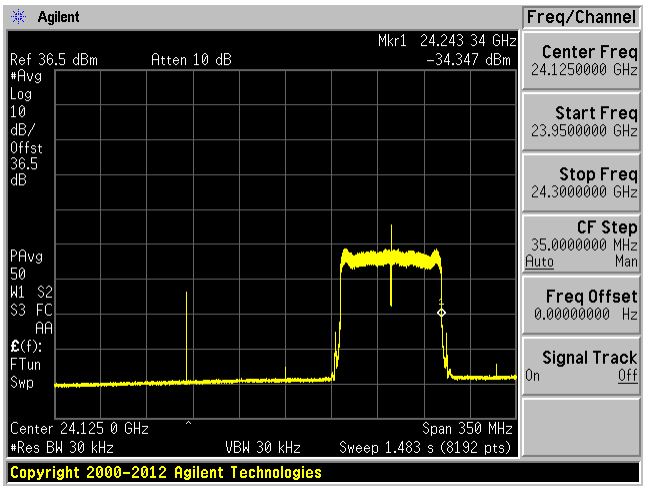


Tx4

Low Channel 24040 MHz



High Channel 24205 MHz



6 EN 300 440 Clause 4.2.4 – Transmitter Spurious Emissions

6.1 Applicable Standard

EN 300 440 V2.1.1 Clause 4.2.4

The power of any spurious emission shall not exceed the following values given in table 5.

Table 5: Spurious emissions

Frequency ranges / State	47 MHz to 74 MHz 87,5 MHz to 108 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other frequencies ≤ 1 000 MHz	Frequencies > 1 000 MHz
Operating	4 nW	250 nW	1 µW
Standby	2 nW	2 nW	20 nW

6.2 Measurement Procedure

EN 300 440 v2.1.1 Clause 4.2.4.3.3

6.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Cycle
Agilent	Spectrum Analyzer	E4446A	MY48250238	2018-01-29	1 year
Agilent	Analyzer, Spectrum	E4440A	US45303156	2017-02-24	1 year
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	N/R
Sunol Sciences	Antenna, Biconi-Log	JB3	A020106-2	2018-01-25	2 years
Agilent	Pre-Amplifier	8449B	3008A01978	2017-06-15	1 year
Agilent	Amplifier, Pre	8447D	2944A07030	2017-05-17	1 year
Sunol Sciences	Antenna, Horn	DRH-118	A052704	2017-03-27	2 years
A. H. Systems	Antenna, Horn	SAS-200/571	261	2017-05-16	2 years
HP	Generator, Signal	83650B	3614A00276	2017-11-06	1 year
Agilent	Generator, Signal	E4438C	MY45091309	2017-11-06	1 year
COM-POWER	Antenna, Dipole	AD-100 DB-4	721033DB1, 2, 3, 4	2017-02-13	2 years
Rohde & Schwarz	Signal Analyzer	FSQ26	200749	2017-06-08	2 years
-	RF Cable	-	-	Each time[1]	N/A
-	RF cable	-	-	Each time[1]	N/A
-	N-Type Cable	-	C00012	Each time[1]	N/A
-	N-Type Cable	-	C00014	Each time[1]	N/A
Wisewave	Antenna, Horn	ARH-2823-02	10555-02	2017-12-15	2 years
Wisewave	Antenna, Horn	ARH-4223-02	10555-02	2017-12-15	2 years
AH Systems	18-40GHz Pre-Amplifier	PAM-1840VH	170	2017-02-28	14 months

Note[1]: cables included in the test set-up will be checked each time before testing.

Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".*

6.4 Test Environmental Conditions

Temperature:	23° C
Relative Humidity:	35 %
ATM Pressure:	101.15kPa

The testing was performed by Vincent Licata on 2018-02-12 in 5 meter chamber 3.

6.5 Summary of Test Results

According to the recorded data, the UUT complied with the EN 300 440 V2.1.1 standards' limits and had the worst margin of:

-2.04 dB at 97.9 MHz in the Vertical polarization in

Please refer to the following table and plots for detailed test results

6.6 Radiated Emissions Test Results

802.11ac20 Low and High Channel

Freq. (MHz)	S.A. Amp. (dBµV/m)	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)
97.9	44.23	30	213	H	97.9	-58.69	0	0.15	-58.84	-54	-4.84
97.9	**47.61**	**49**	**100**	**V**	**97.9**	**-55.89**	**0**	**0.15**	**-56.04**	**-54**	**-2.04**
210	44.98	318	100	H	210	-57.59	0	0.21	-57.8	-54	-3.8
210	33.91	118	100	V	210	-68.7	0	0.21	-68.91	-54	-14.91
499.97	44.2	186	100	H	499.97	-56.35	0	0.3	-56.65	-54	-2.65
499.97	35.06	170	119	V	499.97	-65.08	0	0.3	-65.38	-54	-11.38
1265	49.63	0	100	H	1265	-50.61	7.4	0.4	-43.61	-30	-13.61
1265	48.46	0	100	V	1265	-51.78	7.4	0.4	-44.78	-30	-14.78

802.11ac40 Low and High Channel

Freq. (MHz)	S.A. Amp. (dBµV/m)	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)
97.9	44.79	30	218	H	97.9	-58.13	0	0.15	-58.28	-54	-4.28
97.9	46.78	46	100	V	97.9	-56.72	0	0.15	-56.87	-54	-2.87
210	45.78	331	105	H	210	-56.79	0	0.21	-57	-54	-3
210	36.15	122	118	V	210	-66.46	0	0.21	-66.67	-54	-12.67
499.97	44.58	183	100	H	499.97	-55.97	0	0.3	-56.27	-54	-2.27
499.97	35.64	162	124	V	499.97	-64.5	0	0.3	-64.8	-54	-10.8
1265	49.48	0	100	H	1265	-50.76	7.4	0.4	-43.76	-30	-13.76
1265	48.61	0	100	V	1265	-51.63	7.4	0.4	-44.63	-30	-14.63

802.11ac80 Low and High Channel

Freq. (MHz)	S.A. Amp. (dBµV/m)	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)
97.9	45.06	32	203	H	97.9	-57.86	0	0.15	-58.01	-54	-4.01
97.9	47.22	47	100	V	97.9	-56.28	0	0.15	-56.43	-54	-2.43
210	46.06	328	101	H	210	-56.51	0	0.21	-56.72	-54	-2.72
210	36.25	126	116	V	210	-66.36	0	0.21	-66.57	-54	-12.57
499.97	44.41	190	100	H	499.97	-56.14	0	0.3	-56.44	-54	-2.44
499.97	35.72	161	114	V	499.97	-64.42	0	0.3	-64.72	-54	-10.72
1265	49.66	0	100	H	1265	-50.58	7.4	0.4	-43.58	-30	-13.58
1265	48.53	0	100	V	1265	-51.71	7.4	0.4	-44.71	-30	-14.71

Note: Emissions other than above recorded are noise floor.
Note: MIMO configuration was selected as the worst case for the spurious emission test.

Standby Mode

Freq. (MHz)	S.A. Amp. (dBµV/m)	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)
97.9	43.97	32	208	H	97.9	-58.95	0	0.15	-59.1	-57	-2.1
97.9	**46.19**	**48**	**100**	**V**	**97.9**	**-57.31**	**0**	**0.15**	**-57.46**	**-57**	**-0.46**
210	45.11	329	100	H	210	-57.46	0	0.21	-57.67	-57	-0.67
210	36.43	127	115	V	210	-66.18	0	0.21	-66.39	-57	-9.39
1265	44.41	0	100	H	1265	-55.83	7.4	0.4	-48.83	-47	-1.83
1265	43.94	0	100	V	1265	-56.3	7.4	0.4	-49.3	-47	-2.3

7 EN 300 440 Clause 4.3.5 –Receiver Spurious Radiations

7.1 Applicable Standard

EN 300 440 V2.1.1 Clause 4.3.5

The power of any spurious emission shall not exceed 2 nW in the range 25 MHz to 1 GHz and shall not exceed 20 nW on frequencies above 1 GHz.

7.2 Measurement Procedure

EN 300 440 v2.1.1 Clause 4.3.5

7.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Cycle
Agilent	Spectrum Analyzer	E4446A	MY48250238	2018-01-29	1 year
Agilent	Analyzer, Spectrum	E4440A	US45303156	2017-02-24	1 year
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	N/R
Sunol Sciences	Antenna, Biconi-Log	JB3	A020106-2	2018-01-25	2 years
Agilent	Pre-Amplifier	8449B	3008A01978	2017-06-15	1 year
Agilent	Amplifier, Pre	8447D	2944A07030	2017-05-17	1 year
Sunol Sciences	Antenna, Horn	DRH-118	A052704	2017-03-27	2 years
A. H. Systems	Antenna, Horn	SAS-200/571	261	2017-05-16	2 years
HP	Generator, Signal	83650B	3614A00276	2017-11-06	1 year
Agilent	Generator, Signal	E4438C	MY45091309	2017-11-06	1 year
COM-POWER	Antenna, Dipole	AD-100 DB-4	721033DB1, 2, 3, 4	2017-02-13	2 years
Rohde & Schwarz	Signal Analyzer	FSQ26	200749	2017-06-08	2 years
-	RF Cable	-	-	Each time[1]	N/A
-	RF cable	-	-	Each time[1]	N/A
-	N-Type Cable	-	C00012	Each time[1]	N/A
-	N-Type Cable	-	C00014	Each time[1]	N/A
Wisewave	Antenna, Horn	ARH-2823-02	10555-02	2017-12-15	2 years
Wisewave	Antenna, Horn	ARH-4223-02	10555-02	2017-12-15	2 years
AH Systems	18-40GHz Pre-Amplifier	PAM-1840VH	170	2017-02-28	14 months

Note[1]: cables included in the test set-up will be checked each time before testing.

Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".*

7.4 Test Environmental Conditions

Temperature:	23° C
Relative Humidity:	41 %
ATM Pressure:	101.15kPa

The testing was performed by Vincent Licata on 2018-02-12 in 5 meter chamber 3.

7.5 Summary of Test Results

According to the recorded data, the UUT complied with the EN 300 440 V2.1.1 standards' limits and had the worst margin of:

-0.46 dB at 97.9 MHz in the Vertical polarization

Please refer to the following table and plots for detailed test results

7.6 Radiated Emissions Test Results

RX mode: (24.00-24.25 GHz)

Freq. (MHz)	S.A. Amp. (dBµV/m)	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)
97.9	43.97	32	208	H	97.9	-58.95	0	0.15	-59.1	-57	-2.1
97.9	**46.19**	**48**	**100**	**V**	**97.9**	**-57.31**	**0**	**0.15**	**-57.46**	**-57**	**-0.46**
210	45.11	329	100	H	210	-57.46	0	0.21	-57.67	-57	-0.67
210	36.43	127	115	V	210	-66.18	0	0.21	-66.39	-57	-9.39
1265	44.41	0	100	H	1265	-55.83	7.4	0.4	-48.83	-47	-1.83
1265	43.94	0	100	V	1265	-56.3	7.4	0.4	-49.3	-47	-2.3

Note: Emissions other than above recorded are noise floor.

8 EN 300 440 Clause 4.3.4 –Blocking or desensitization

8.1 Applicable Standard

EN 300 440 V2.1.1 Clause 4.3.4

This requirement applies to Equipment Category 1 and Category 2 receivers, when invoked, as defined in clause 4.3.1.

8.2 Measurement Procedure

EN 300 440 v2.1.1 Clause 4.3.4.3

This measurement shall be conducted under normal conditions.

Two signal generators A and B shall be connected to the receiver via a combining network to the receiver, either:

a) via a test fixture or a test antenna to the receiver integrated, dedicated or test antenna; or

b) directly to the receiver permanent or temporary antenna connector.

The method of coupling to the receiver shall be stated in the test report.

Signal generator A shall be at the nominal frequency of the receiver, with normal modulation of the wanted signal. Signal generator B shall be unmodulated and shall be adjusted to a test frequency at approximately 10 times, 20 times and 50 times of the receive channel bandwidth above upper band edge of the receive channel.

Initially signal generator B shall be switched off and using signal generator A the level which still gives sufficient response shall be established. The output level of generator A shall then be increased by 3 dB.

Signal generator B is then switched on and adjusted until the wanted criteria are met. This level shall be recorded.

The measurement shall be repeated with the test frequency for signal generator B at approximately 10 times, 20 times and 50 times of the receive channel bandwidth below the lower band edge of the receive channel.

The blocking or desensitization shall be recorded as the level in dBm of lowest level of the unwanted signal (generator B).

8.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	MY48250238	2018-01-29	1 year
Mini-Circuits	Power Splitter	ZFSC-2-10G	N/A	N/A	N/A
-	RF cable	-	-	Each time[1]	N/A
HP	Generator, Signal	83650B	3614A00276	2017-11-06	1 year

Note[1]: cable included in the test set-up will be checked each time before testing.

Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 09 June 2016) "A2LA Policy on Metrological Traceability".*

8.4 Test Environmental Conditions

Temperature:	20 °C
Relative Humidity:	35 %
ATM Pressure:	101.15kPa

The testing was performed by Vincent Licata on 2018-02-08 in RF Bench.

8.5 Test Results

Channel	Mode	Frequency (MHz)	Blocking Frequency (MHz)	Measured Blocking Level (dBm)	Result
Low	802.11ac20	24010	23800	-45	PASS
High	802.11ac20	24235	24450	-45	PASS
Low	802.11ac20	24010	23600	-45	PASS
High	802.11ac20	24235	24650	-45	PASS
Low	802.11ac20	24010	23000	-45	PASS
High	802.11ac20	24235	25250	-45	PASS
Low	802.11ac40	24020	23600	-45	PASS
High	802.11ac40	24225	24650	-45	PASS
Low	802.11ac40	24020	23200	-45	PASS
High	802.11ac40	24225	25050	-45	PASS
Low	802.11ac40	24020	22000	-45	PASS
High	802.11ac40	24225	26250	-45	PASS
Low	802.11ac80	24040	23200	-45	PASS
High	802.11ac80	24205	25050	-45	PASS
Low	802.11ac80	24040	22400	-45	PASS
High	802.11ac80	24205	25850	-45	PASS
Low	802.11ac80	24040	20000	-45	PASS
High	802.11ac80	24205	28250	-45	PASS

9 Annex A (Normative) - CE Product Labelling

9.1 CE Label Requirements

1. The CE conformity marking must consist of the initials 'CE' taking the form below. If the CE marking is reduced or enlarged the proportions must be respected.

2. The CE marking must have a height of at least 5 mm except where this is not possible on account of the nature of the apparatus.

   The EMC Directive recognizes that there are circumstances where it is "not possible or warranted on account of the nature of the product" to have the marking affixed to the apparatus or to its data plate. In such cases it is allowed to have the CE marking' affixed on the packaging, refer to the Blue Guide when such exemptions are allowed.

3. The CE marking must be affixed to the product or to its data plate. Additionally it must be affixed to the packaging, if any, and to the accompanying documents, where the directive concerned provides for such documents.

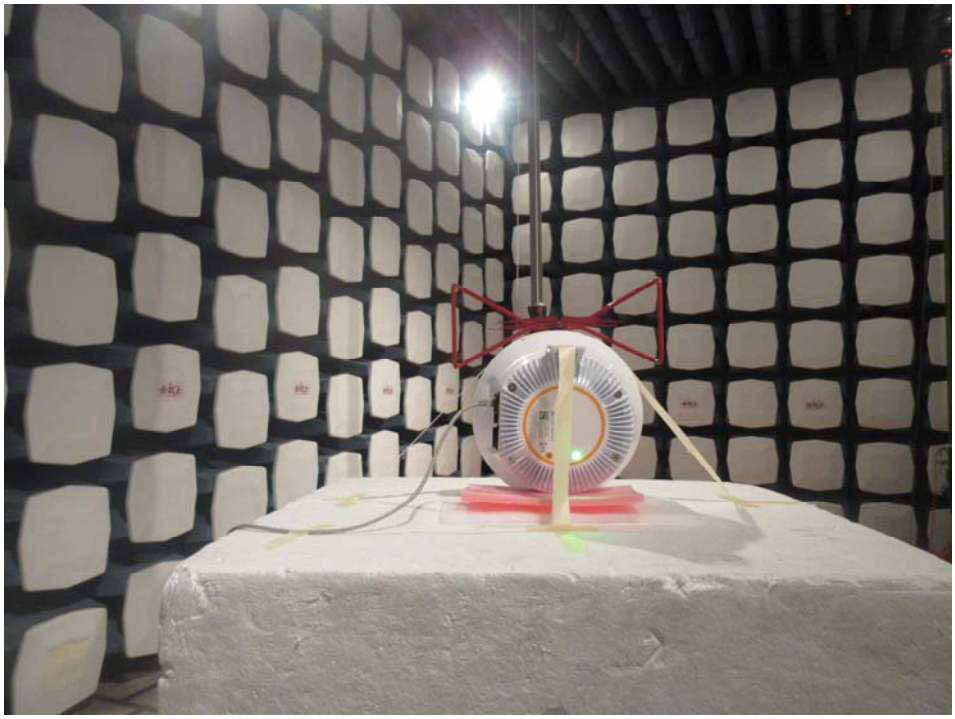
4. The CE marking must be affixed visibly, legibly, and indelibly.

5. Other labeling requirements maybe required if the product(s) is/are subject to several directives.

Specifications: Text is black or white in color and is left justified. Labels are printed in indelible ink on permanent adhesive backing or silk-screened and shall be affixed at a conspicuous location on the UUT. The label cannot be positioned on a removable portion of the UUT (e.g. battery cover).

10 Annex B (Normative) – Test Setup Photographs

10.1 Radiated Emission Below 1 GHz at 3 Meter Distance – Front View



10.2 Radiated Emission Below 1 GHz at 3 Meter Distance – Rear View

10.3 Radiated Emission 1- 18 GHz at 3 Meter Distance – Front View

10.4 Radiated Emission 1-18 GHz at 3 Meter Distance – Rear View

10.5 Radiated Emission 18- 26.5 GHz at 3 Meter Distance – Front View

10.6 Radiated Emission 18-26.5 GHz at 3 Meter Distance – Rear View

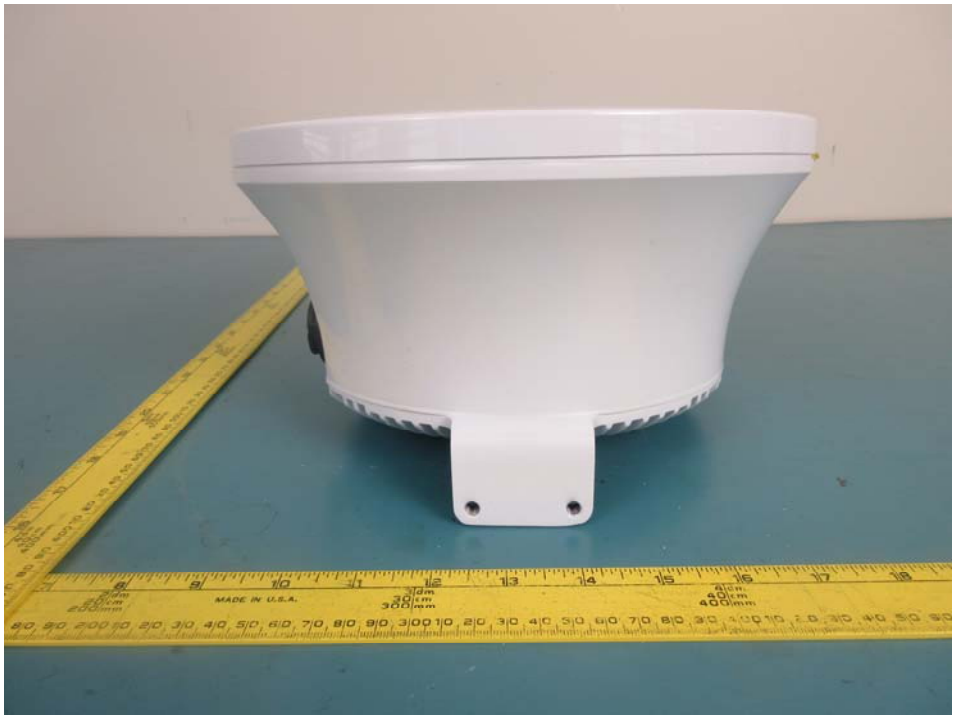
10.7 Radiated Emission 26.5-40 GHz at 3 Meter Distance – Front View

10.8 Radiated Emission 26.5-40 GHz at 3 Meter Distance – Rear View

11 Annex C (Normative) – UUT Photographs

11.1 UUT – Front View

11.2 UUT – Back View



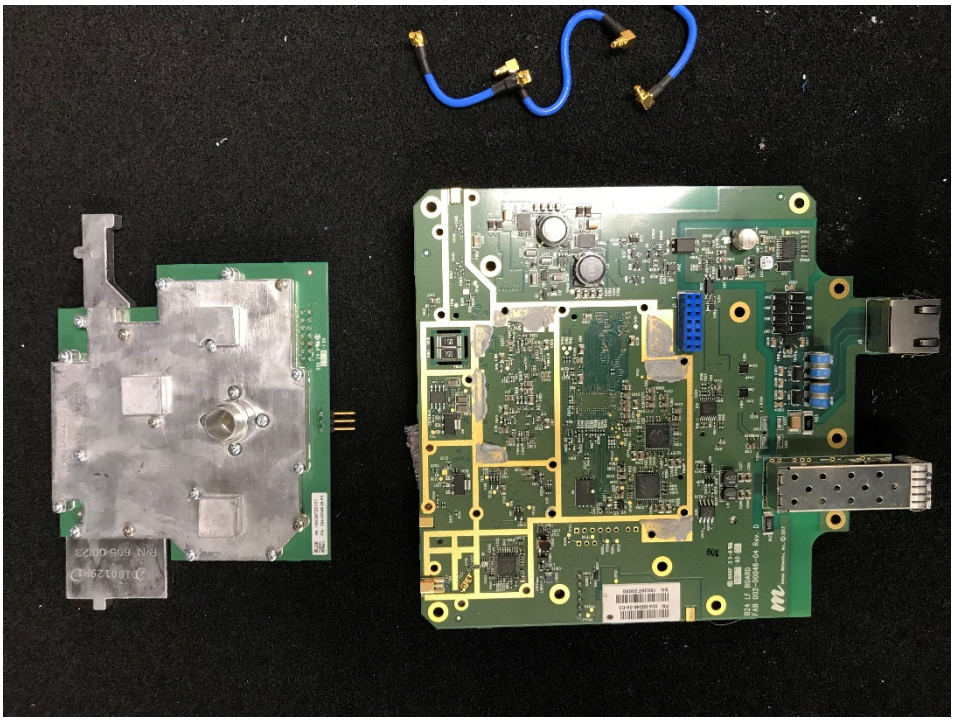
11.3 UUT – Left Side View

11.4 UUT – Right Side View

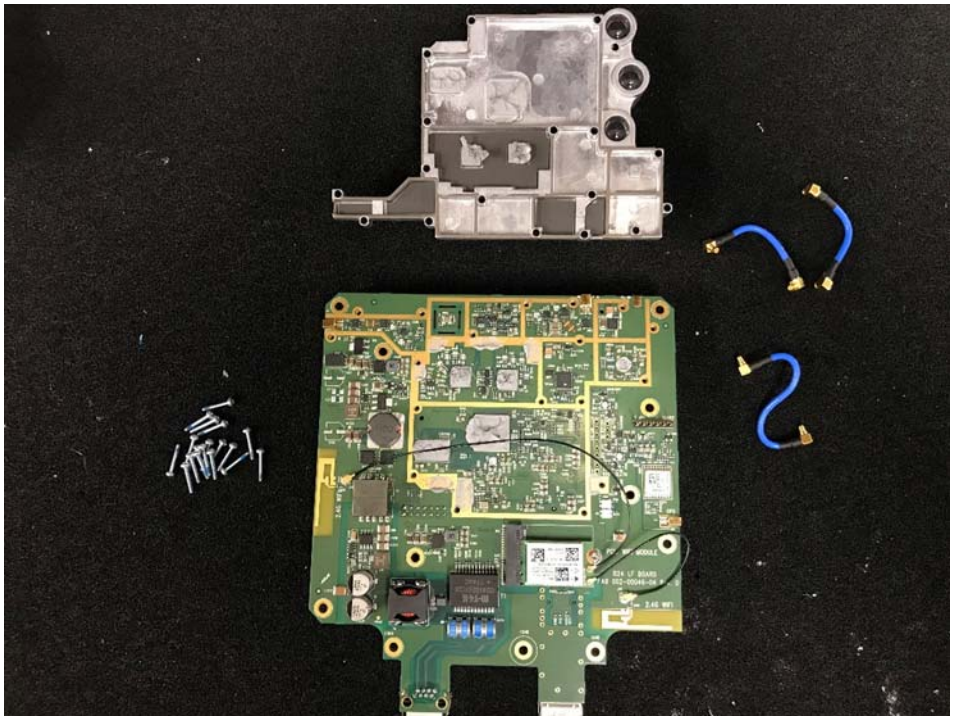
11.5 UUT – Top Side View

11.6 UUT – Bottom Side View

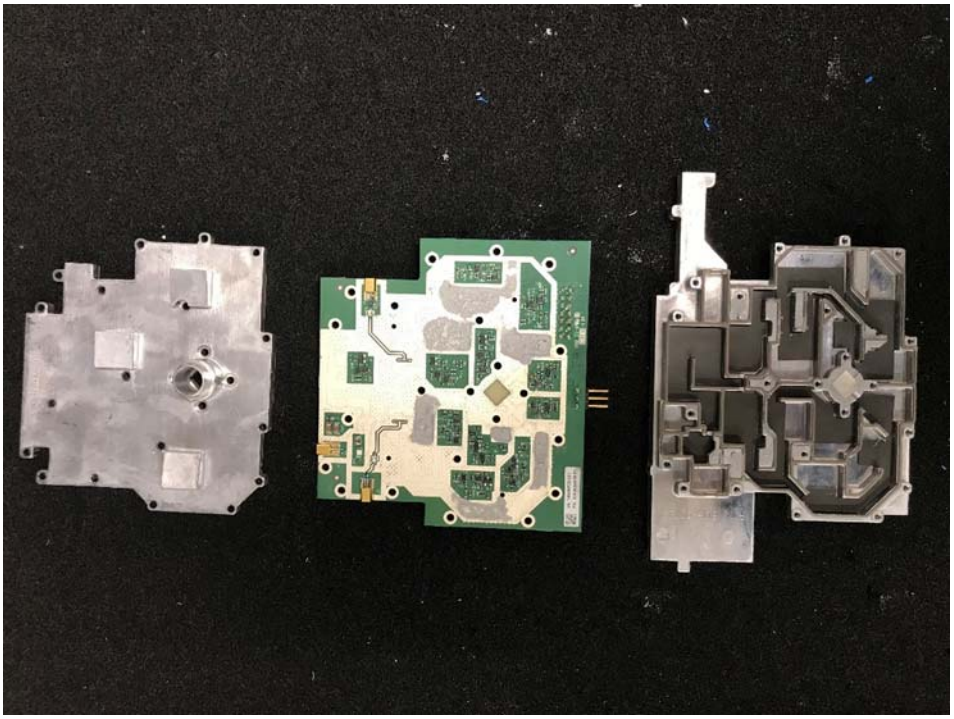
11.7 UUT Main Board Top View



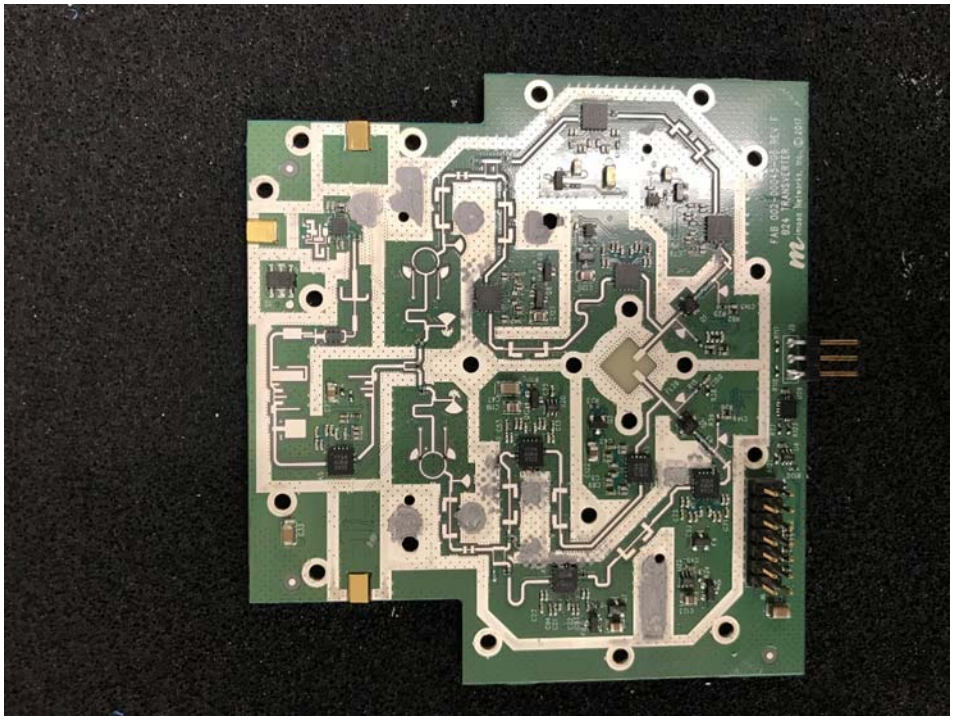
11.8 UUT Main Board Bottom View



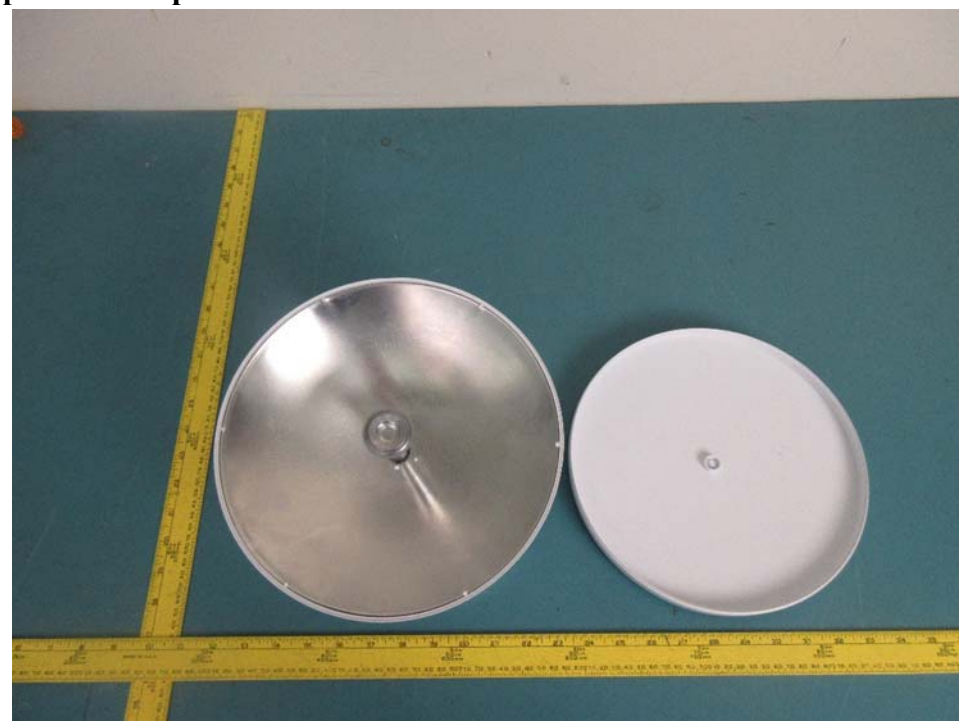
11.9 UUT Second Board Top View



11.10 UUT Second Board Bottom View



11.11 UUT Open Case Top View



11.12 UUT Open Case Bottom View

11.13 UUT Power Supply

12 Annex D (Informative) - 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 the requirements of 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 8 January 2009*).

Presented this 30th day of August 2016.

Senior Director of Quality & Communications
For the Accreditation Council
Certificate Number 3297.02
Valid to September 30, 2018

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

---END OF REPORT ---