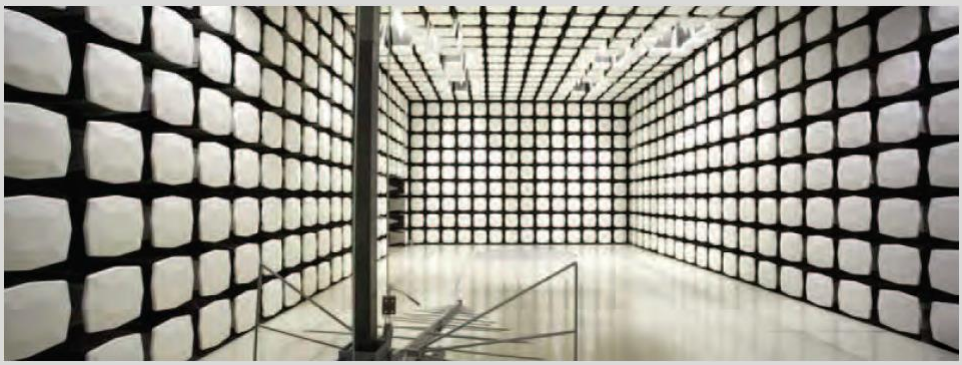
Honeywell

SARA

FCC Part 87:2019

Aviation Altimeter

Report # HNYE0001 Rev. 1



NVLAP LAB CODE: 200881-0

CERTIFICATE OF TEST

Last Date of Test: July 12, 2019
Honeywell
Model: SARA

Radio Equipment Testing

Standards

Specification	Method
FCC 87.131:2019	ANSI TIA-603-E:2016
FCC 87.133:2019	
FCC 87.139:2019	
FCC 87.139(a):2019	
FCC 87.139(d):2019	

Results

Method Clause	Test Description	Applied	Results	Comments
N/A	Modulation Requirements	No	N/A	Not required to test. Assumes manufacturer will provide all required test data.
N/A	Powerline Conducted Emissions	No	N/A	Not required, assuming device is DC powered and will not be connected to the public AC mains during normal operation.
5.2.4.2	Output Power	Yes	Pass	
5.4	Occupied Bandwidth	Yes	Pass	
5.5	Emissions Mask	Yes	Pass	
5.5	Spurious Emissions at Antenna	Yes	Pass	
5.5	Field Strength of Spurious Emissions	Yes	Pass	
5.6	Frequency Stability	Yes	Pass	

Deviations From Test Standards

None

Approved By:

Matt Nuernberg, Operations Manager

Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information. As indicated in the Statement of Work sent with the quotation, Element's standard process is to always use the latest published version of the test methods even when earlier versions are cited in the test specification. Issuance of a purchase order was de facto acceptance of this approach. Otherwise, the client would have advised Element in writing of the specific version of the test methods they wanted applied to the subject testing.

REVISION HISTORY

Revision Number	Description	Date (yyyy-mm-dd)	Page Number
00	None		
01	Updated Comments and Results section	2019-08-01	15-17
01	Updated Functional Description	2019-08-01	8

ACCREDITATIONS AND AUTHORIZATIONS

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Element to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB) and as a CAB for the acceptance of test data.

European Union

European Commission – Within Element, we have a EU Notified Body validated for the EMCD and RED Directives.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

MSIT / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Israel

MOC – Recognized by MOC as a CAB for the acceptance of test data.

Hong Kong

OFCA – Recognized by OFCA as a CAB for the acceptance of test data.

Vietnam

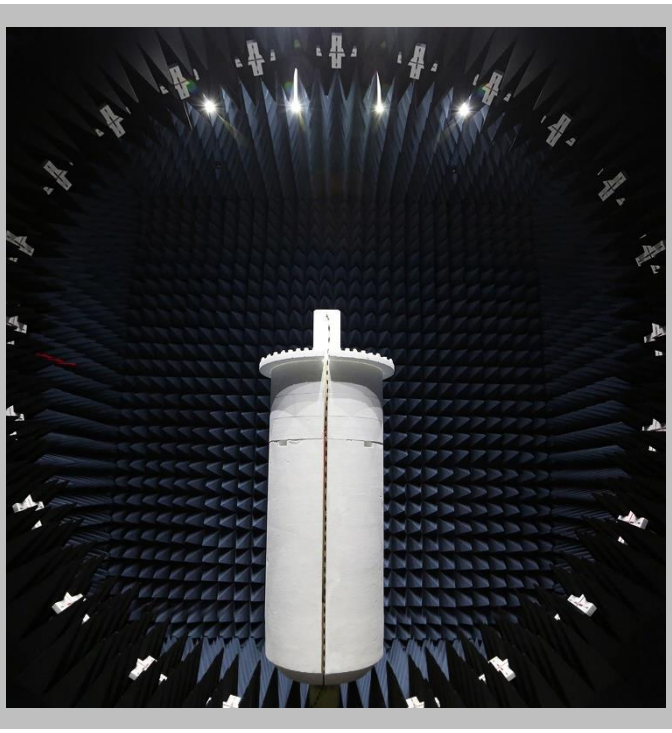
MIC – Recognized by MIC as a CAB for the acceptance of test data.

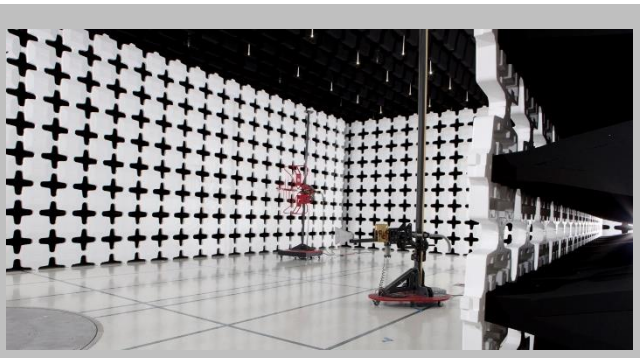
SCOPE

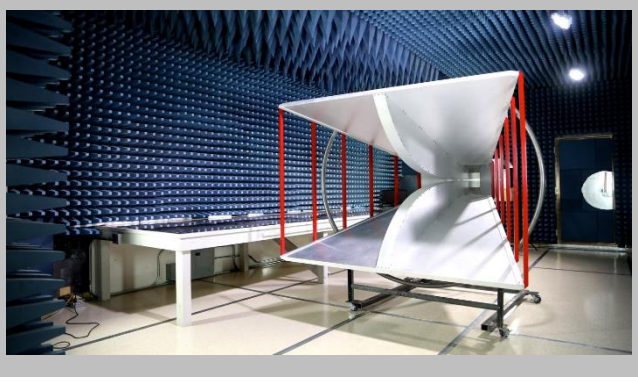
For details on the Scopes of our Accreditations, please visit:
https://www.nwemc.com/emc-testing-accreditations

FACILITIES

California	Minnesota	Oregon	Texas	Washington
Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP				
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Innovation, Science and Economic Development Canada				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
BSMI				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI				
A-0029	A-0109	A-0108	A-0201	A-0110
Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA				
US0158	US0175	US0017	US0191	US0157







MEASUREMENT UNCERTAINTY

element
TMU.2015.07.10

Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

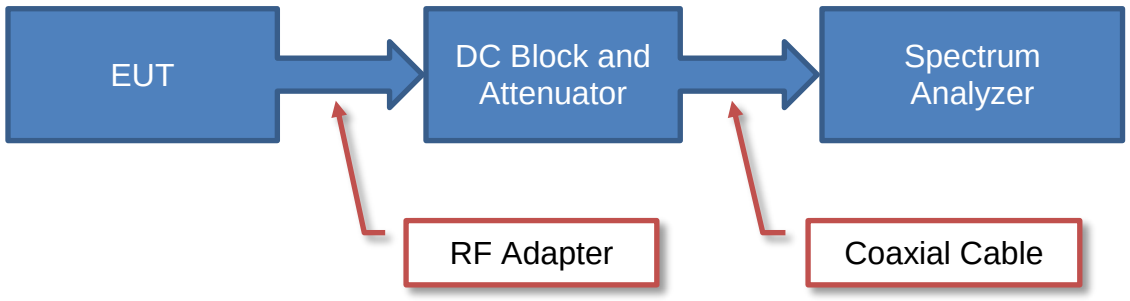
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable test description page. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

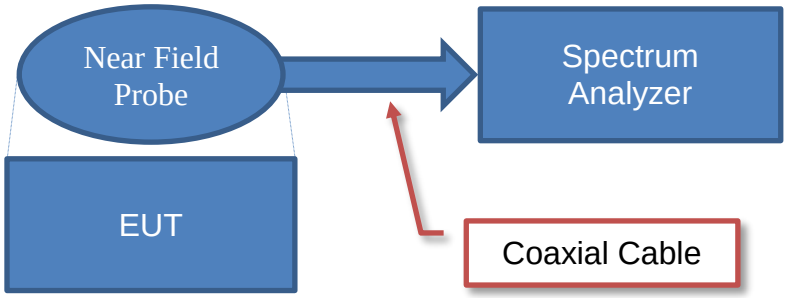
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

Test Setup Block Diagrams

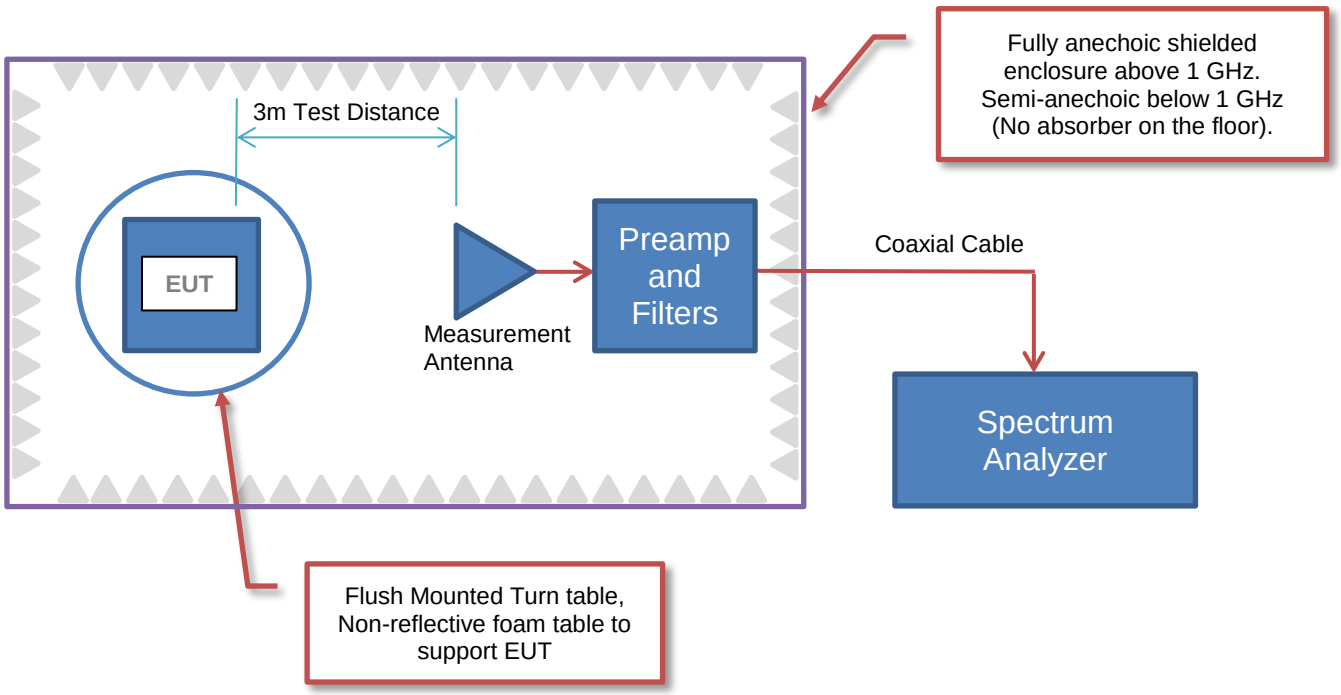
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



Spurious Radiated Emissions



PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Honeywell
Address:	2600 Ridgway Parkway
City, State, Zip:	Minneapolis, MN 55413
Test Requested By:	Jim Law
Model:	SARA
First Date of Test:	April 1, 2019
Last Date of Test:	July 12, 2019
Receipt Date of Samples:	April 1, 2019
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
The SARA is a radio altimeter for commercial aviation. The device has an integral antenna and operates at 4.2 - 4.4 GHz using FMCW modulation.

Testing Objective:
To demonstrate compliance of the radio to FCC Part 87 requirements for operation in the 4200-4400 MHz band.

CONFIGURATIONS

Configuration HNYE0001- 1

Software/Firmware Running during test	
Description	**Version**
SARA Software	Mod 5
SARA Hardware	Mod 6
Qual Test System Software	Rev J V1.0

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
SARA	Honeywell	SARA	00207

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Qual Test System	Honeywell	PN 69003490-001	204

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power from I/O Cable PN 69003883-020	No	>3.0 m	No	SARA	TQL
I/O Cable PN 69003883-020	No	3.0 m	No	SARA	I/O Cable PN 69003883-050
I/O Cable PN 69003883-050	No	>3.0 m	No	I/O Cable PN 69003883-020	Qual Test System
AC Power	No	>3.0 m	No	AC Mains	Qual Test System

CONFIGURATIONS

Configuration HNYE0001- 2

Software/Firmware Running during test	
Description	**Version**
SARA Software	Mod 5
SARA Hardware	Mod 6
Qual Test System Software	Rev J V1.0

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
SARA	Honeywell	SARA	00204

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Qual Test System	Honeywell	PN 69003490-001	204

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power from I/O Cable PN 69003883-020	No	>3.0 m	No	SARA	TQL
I/O Cable PN 69003883-020	No	3.0 m	No	SARA	I/O Cable PN 69003883-050
I/O Cable PN 69003883-050	No	>3.0 m	No	I/O Cable PN 69003883-020	Qual Test System
AC Power	No	>3.0 m	No	AC Mains	Qual Test System

CONFIGURATIONS

Configuration HNYE0004- 1

Software/Firmware Running during test	
Description	**Version**
Qual Test System Software	Rev J V1.0
SARA Software	Mod 5
SARA Hardware	Mod 7

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
SARA	Honeywell	SARA	00204

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Qual Test System	Honeywell	PN 69003490-001	204

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power	No	>3.0 m	No	SARA	TQL
DC Power from I/O Cable PN 69003883-020	No	>3.0 m	No	SARA	I/O Cable PN 69003883-050
I/O Cable PN 69003883-020	No	3.0 m	No	I/O Cable PN 69003883-020	Qual Test System
I/O Cable PN 69003883-010	No	>3.0 m	No	AC Mains	Qual Test System

CONFIGURATIONS

Configuration HNYE0004- 2

Software/Firmware Running during test	
Description	**Version**
Qual Test System Software	Rev J V1.0
SARA Software	Mod 5
SARA Hardware	Mod 7

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
SARA	Honeywell	SARA	00215

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Qual Test System	Honeywell	PN 69003490-001	204

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power from I/O Cable PN 69003883-020	No	>3.0 m	No	SARA	I/O Cable PN 69003883-050
I/O Cable PN 69003883-020	No	3.0 m	No	I/O Cable PN 69003883-020	Qual Test System
I/O Cable PN 69003883-010	No	>3.0 m	No	AC Mains	Qual Test System

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2019-04-01	Emissions Mask	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2019-07-11	Frequency Stability	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
3	2019-07-12	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	2019-07-12	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
5	2019-07-12	Spurious Emissions at Antenna	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
6	2019-07-12	Field Strength of Spurious Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

OUTPUT POWER

XMit 2019.06.11

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Power Supply	Kikusui	PWR401ML	TQL	NCR	NCR
Meter - Multimeter	Fluke	117	MLS	23-Jan-17	23-Jan-20
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPH-32-3.5-SCT/AC	TBF	NCR	NCR
Thermometer	Omega Engineering, Inc.	HH311	DUB	10-Nov-17	10-Nov-20
Generator - Signal	Agilent	E4422B	TGQ	15-Mar-18	15-Mar-21
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	11-Apr-19	11-Apr-20
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Analyzer - Spectrum Analyzer	Keysight	N9010A (EXA)	AFQ	13-Dec-18	13-Dec-19

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum.

The output power was measured for the FMCW radio based on guidance from the FCC. This allowed for FMCW measurement guidelines from KDB 890966 D01 section F to be applied. The peak power was measured across the entire span of the FMCW transmitter using settings from KDB 890966 D01 section F. The sweep speed on the spectrum analyzer was slowed enough to make sure no decrease in sensitiviy or resolution would apply from when an IF amplifier is sweeping an CW signal. The formula to ensure this is:

$$B_{eff} = B * \sqrt{1 + \left(\frac{2 * \ln(2)}{\pi}\right)^2 * \left(\frac{F_s}{T_s * B^2}\right)^2}$$

Where B_eff is the effective bandwidth in Hz, B is the bandwidth in Hz, F_s is the sweep width in Hz, and T_s is the sweep time in S.

The Average Factor from KDB 890966 D01 section F was then found using the following formula:

$$Average\ Factor = \frac{T_s}{Cycle\ Time} * \frac{1}{\Delta F}$$

Where T_s is the sweep time in S and ΔF is the signal sweep frequency span in MHz. The cycle time is the total time it takes for the EUT to do a complete cycle including time the EUT is not transmitting. The ratio of T_s to the Cycle Time was declared by the manufacturer to be 0.7. The value for ΔF was measured in the Occupied Bandwidth module to be 172.50 MHz. The average factor is 0.00406.

The Average Value was then calculated based off of the Peak Value multiplied by the Average Factor.

OUTPUT POWER

XMit 2019.06.11

EUT:	SARA			**Work Order:**	HNYE0004
Serial Number:	00204			**Date:**	12-Jul-19
Customer:	Honeywell			**Temperature:**	22.5 °C
Attendees:	Karim Habib			**Humidity:**	57.9% RH
Project:	None			**Barometric Pres.:**	1015 mbar
Tested by:	Kyle McMullan	**Power:**	28VDC	**Job Site:**	MN02

TEST SPECIFICATIONS	Test Method
FCC 87.131:2019	ANSI TIA-603-E:2016

COMMENTS

Isolation filter and box not in line. Configuration HNYE0001-2 used for SSID#1, configuration HNYE0004-1 used for SSID#2 and SSID#3. Per FCC 87.131 Note 7: "Frequency, emission, and maximum power will be determined by appropriate standards during the certification process." Power limit is based on rated power value provided by the manufacturer (+19 dBm ±2 dB = 79.4 mW)

DEVIATIONS FROM TEST STANDARD

None

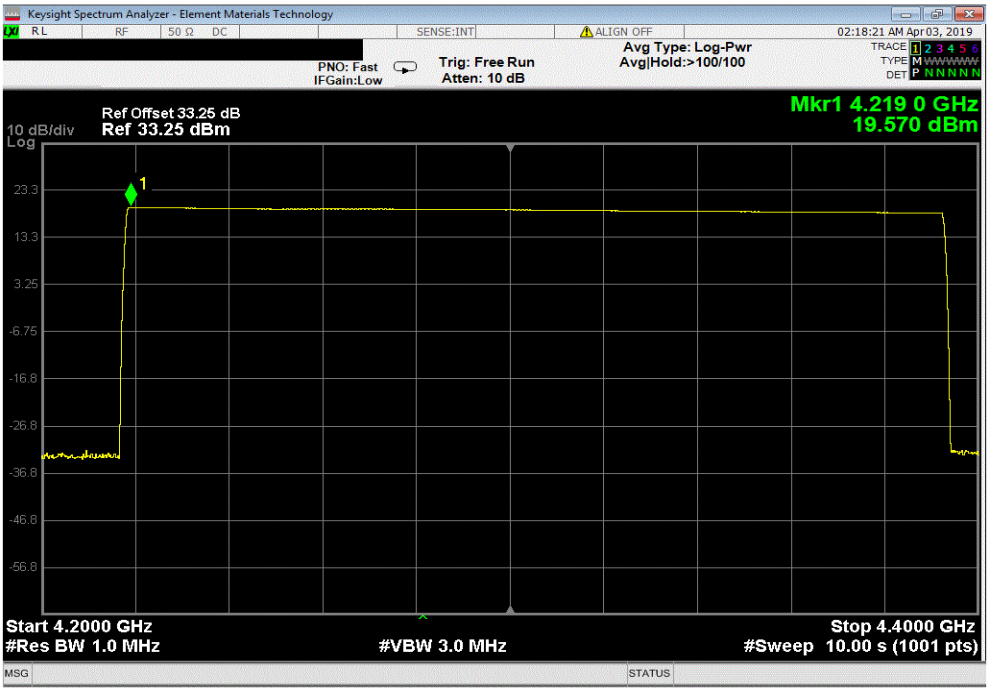
Configuration #	See Comments	Signature
		Kyle McMullan

	Peak Value (dBm)	Peak Value (W)	Average Factor	Average Value (mW)	Average Limit (mW)	Result
SSID#1 4220-4391 MHz	19.57	0.0906	0.00406	0.368	79.4	Pass
SSID#2 4215-4386 MHz	19.64	0.0920	0.00406	0.374	79.4	Pass
SSID#3 4210-4381 MHz	19.35	0.0861	0.00406	0.350	79.4	Pass

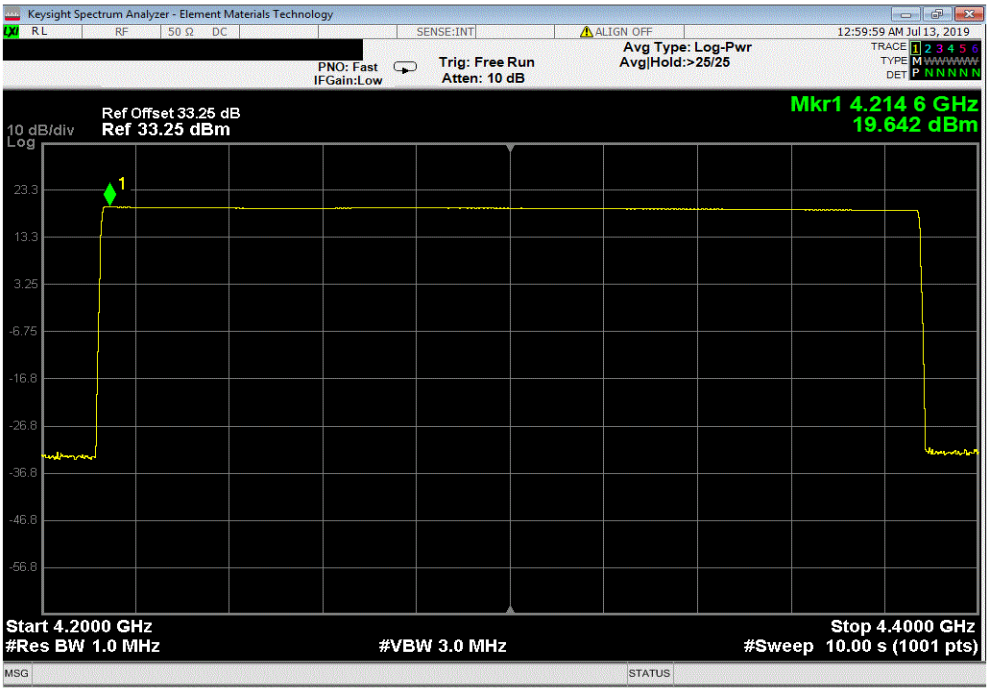
OUTPUT POWER

XMit 2019.06.11

SSID#1 4220-4391 MHz						
	Peak Value (dBm)	Peak Value (W)	Average Factor	Average Value (mW)	Average Limit (mW)	Result
	19.57	0.0906	0.00406	0.368	79.4	Pass



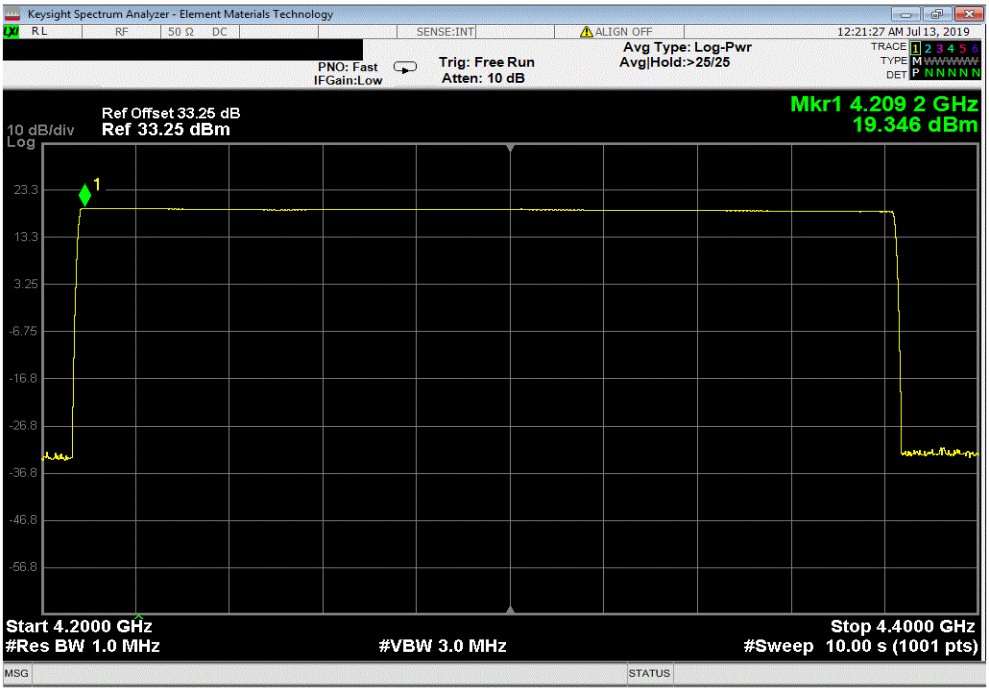
SSID#2 4215-4386 MHz						
	Peak Value (dBm)	Peak Value (W)	Average Factor	Average Value (mW)	Average Limit (mW)	Result
	19.64	0.0920	0.00406	0.374	79.4	Pass



OUTPUT POWER

XMit 2019.06.11

SSID#3 4210-4381 MHz						
	Peak Value (dBm)	Peak Value (W)	Average Factor	Average Value (mW)	Average Limit (mW)	Result
	19.35	0.0861	0.00406	0.350	79.4	Pass



OCCUPIED BANDWIDTH

XMit 2019.06.11

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Power Supply	Kikusui	PWR401ML	TQL	NCR	NCR
Meter - Multimeter	Fluke	117	MLS	23-Jan-17	23-Jan-20
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPH-32-3.5-SCT/AC	TBF	NCR	NCR
Thermometer	Omega Engineering, Inc.	HH311	DUB	10-Nov-17	10-Nov-20
Generator - Signal	Agilent	E4422B	TGQ	15-Mar-18	15-Mar-21
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	11-Apr-19	11-Apr-20
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Analyzer - Spectrum Analyzer	Keysight	N9010A (EXA)	AFQ	13-Dec-18	13-Dec-19

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The EUT was set to the channels and modes listed in the datasheet.

The 99% occupied bandwidth (OBW) was measured using using an Resolution Bandwidth (RBW) between 1% and 5% of the 99% OBW. The Video Bandwidth was set to 3x the RBW. A peak detector with a max hold was used.

The sweep speed on the spectrum analyzer was slowed enough to make sure no decrease in sensitivtiy or resolution while the IF amplifier is sweeping the CW signal. The formula to ensure this is:

$$B_{eff} = B * \sqrt{1 + \left(\frac{2 * \ln(2)}{\pi}\right)^2 * \left(\frac{F_s}{T_s * B^2}\right)^2}$$

Where B_eff is the effective bandwidth in Hz, B is the bandwidth in Hz, F_s is the sweep width in Hz, and T_s is the sweep time in S.

The lower edge of the 99% OBW was compared against the lower edge of the authorized band to determine compliance. The upper edge of the 99% OBW was compared against the upper edge of the authorized band to determine compliance.
The 99% occupied bandwidth value was calculated and is shown for informational purposes only.

OCCUPIED BANDWIDTH

XMit 2019.06.11

EUT:	SARA			**Work Order:**	HNYE0004
Serial Number:	00204			**Date:**	12-Jul-19
Customer:	Honeywell			**Temperature:**	22.5 °C
Attendees:	Karim Habib			**Humidity:**	58.3% RH
Project:	None			**Barometric Pres.:**	1015 mbar
Tested by:	Kyle McMullan	**Power:**	28VDC	**Job Site:**	MN02

TEST SPECIFICATIONS	Test Method
FCC 87.133:2019	ANSI TIA-603-E:2016

COMMENTS

Isolation filter and box not in line. Configuration HNYE0001-2 used for SSID#1, configuration HNYE0004-1 used for SSID#2 and SSID#3.

DEVIATIONS FROM TEST STANDARD

None

Configuration #	See Comments	Signature

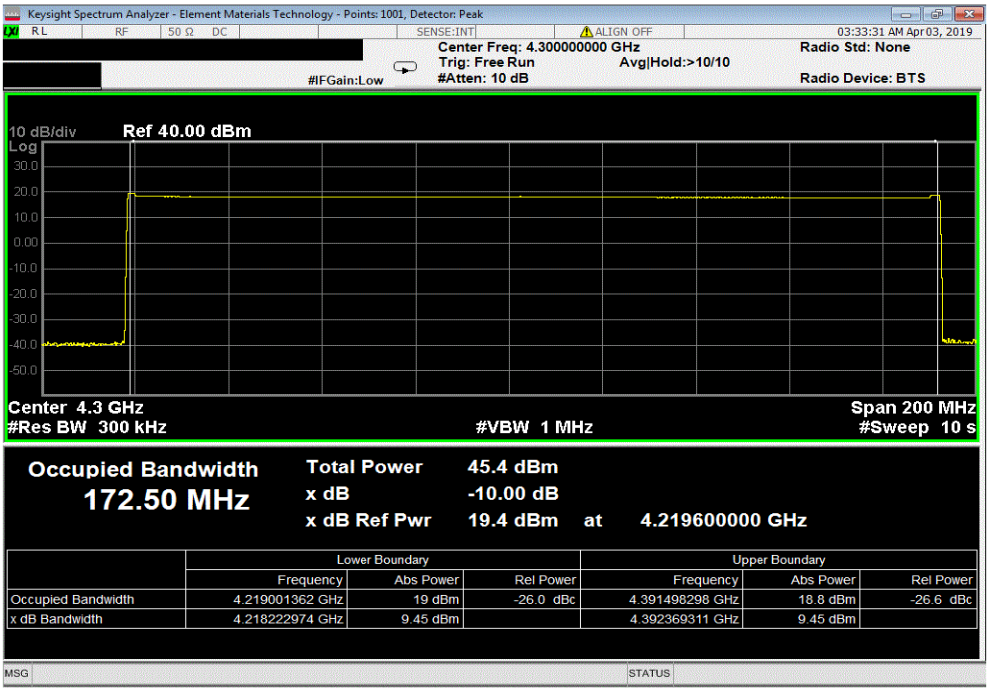
	99% Occupied Bandwidth (MHz)	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Result
SSID#1 4220-4391 MHz	172.50	4219	4200	4391	4400	Pass
SSID#2 4215-4386 MHz	172.17	4214	4200	4386	4400	Pass
SSID#3 4210-4381 MHz	172.09	4209	4200	4381	4400	Pass

OCCUPIED BANDWIDTH

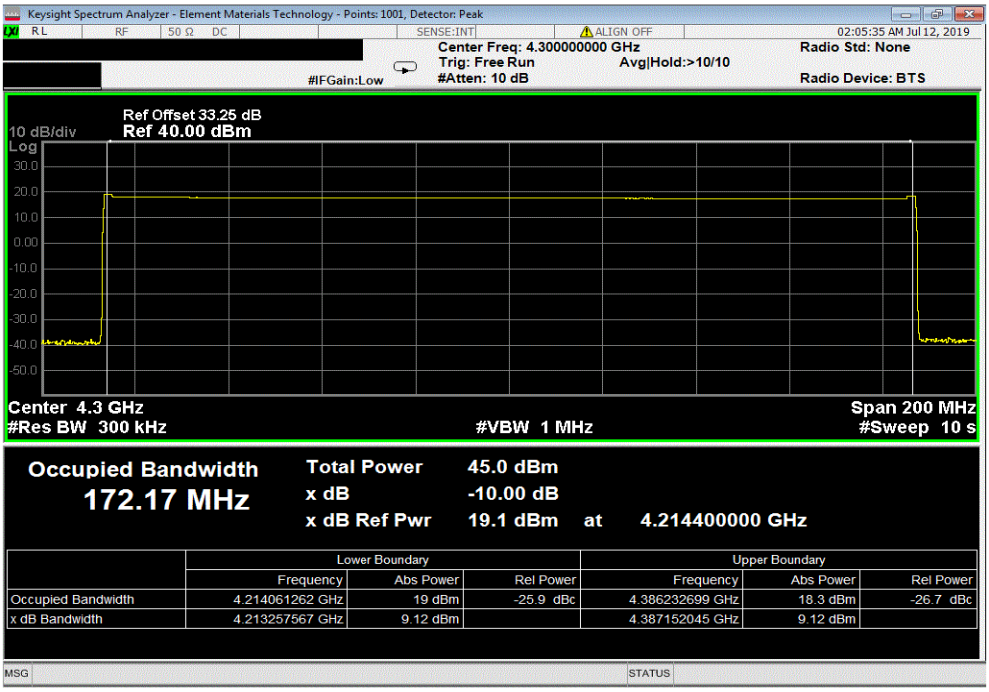
element

XMit 2019.06.11

SSID#1 4220-4391 MHz						
	99% Occupied Bandwidth (MHz	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Result
	172.50	4219	4200	4391	4400	Pass



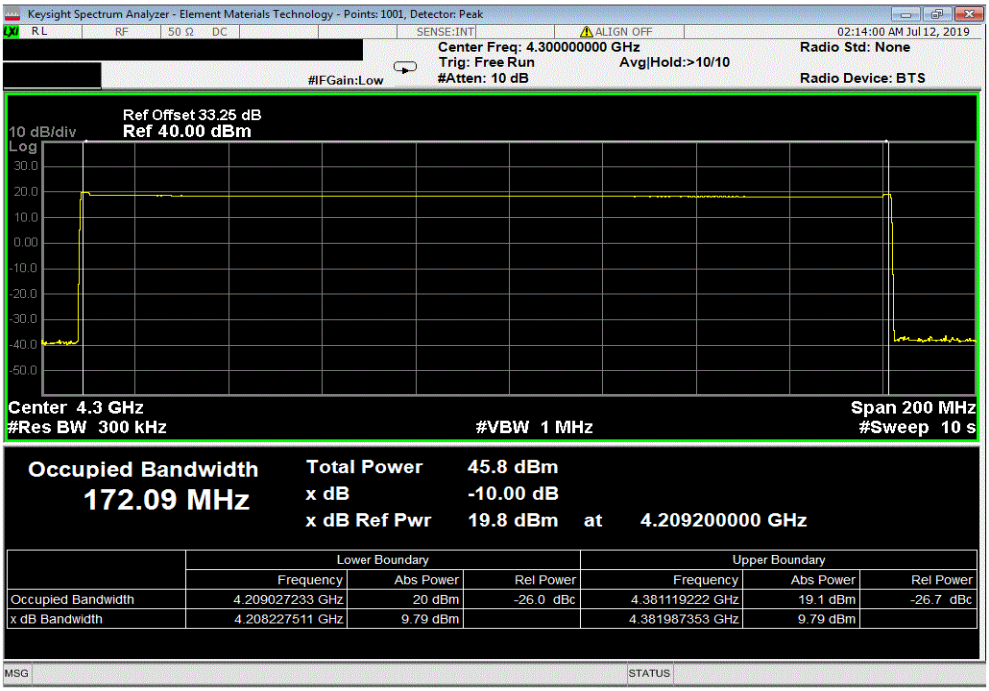
SSID#2 4215-4386 MHz						
	99% Occupied Bandwidth (MHz	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Result
	172.17	4214	4200	4386	4400	Pass



OCCUPIED BANDWIDTH

XMit 2019.06.11

SSID#3 4210-4381 MHz						
	99% Occupied Bandwidth (MHz	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Result
	172.09	4209	4200	4381	4400	Pass



EMISSIONS MASK

PSA-ESCI 2019.02.26

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

SSID #1, FMCW from 4220-4391 MHz.
SSID #2, FMCW from 4214-4386 MHz.
SSID #3, FMCW from 4210-4381 MHz.

POWER SETTINGS INVESTIGATED

28VDC

CONFIGURATIONS INVESTIGATED

HNYE0004 - 2
HNYE0001 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	3600 MHz	Stop Frequency	5000 MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Antenna - Double Ridge	ETS-Lindgren	3115	AJQ	NCR	0 mo
Generator - Signal	Agilent	N5173B	TIW	5-Jul-2017	36 mo
Meter - Power	Agilent	N1913A	SQL	16-Jul-2018	12 mo
Power Sensor	Agilent	N8481A	SQN	16-Jul-2018	12 mo
Antenna	AH Systems	SAS-588	AJO	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	JSW45-26004000-40-5P	AVN	13-Sep-2018	12 mo
Cable	Northwest EMC	TTBJ141-KMKM-72	MNQ	13-Sep-2018	12 mo
Cable	ESM Cable Corp	TTBJ141 KMKM-72	MNP	12-Sep-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	13-Sep-2018	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AHG	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	8-Feb-2019	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AIQ	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	8-Feb-2019	12 mo
Cable	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	8-Mar-2019	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AXP	NCR	0 mo
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	24-Sep-2018	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AJA	27-Jun-2018	24 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	2-Nov-2018	12 mo
Cable	ESM Cable Corp.	Bilog Cables	MNH	2-Nov-2018	12 mo
Antenna - Biconilog	Teseq	CBL 6141B	AYD	25-Jan-2018	24 mo
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	27-Apr-2018	12 mo

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for transmitting in FMCW mode.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis if required, and adjusting the measurement antenna height and polarization (per TIA-603-E:2016). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for the emissions mask. Measurements of the fundamental were made across a sufficient span to see the entire intended signal. Measurements were made with a slow enough sweep speed to satisfy the bandwidth concerns of the FCC. The formula to ensure this is:

$$B_{eff} = B * \sqrt{1 + \left(\frac{2 * \ln(2)}{\pi}\right)^2 * \left(\frac{F_s}{T_s * B^2}\right)^2}$$

Where B_eff is the effective bandwidth in Hz, B is the bandwidth in Hz, F_s is the sweep width in Hz, and T_s is the sweep time in S.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

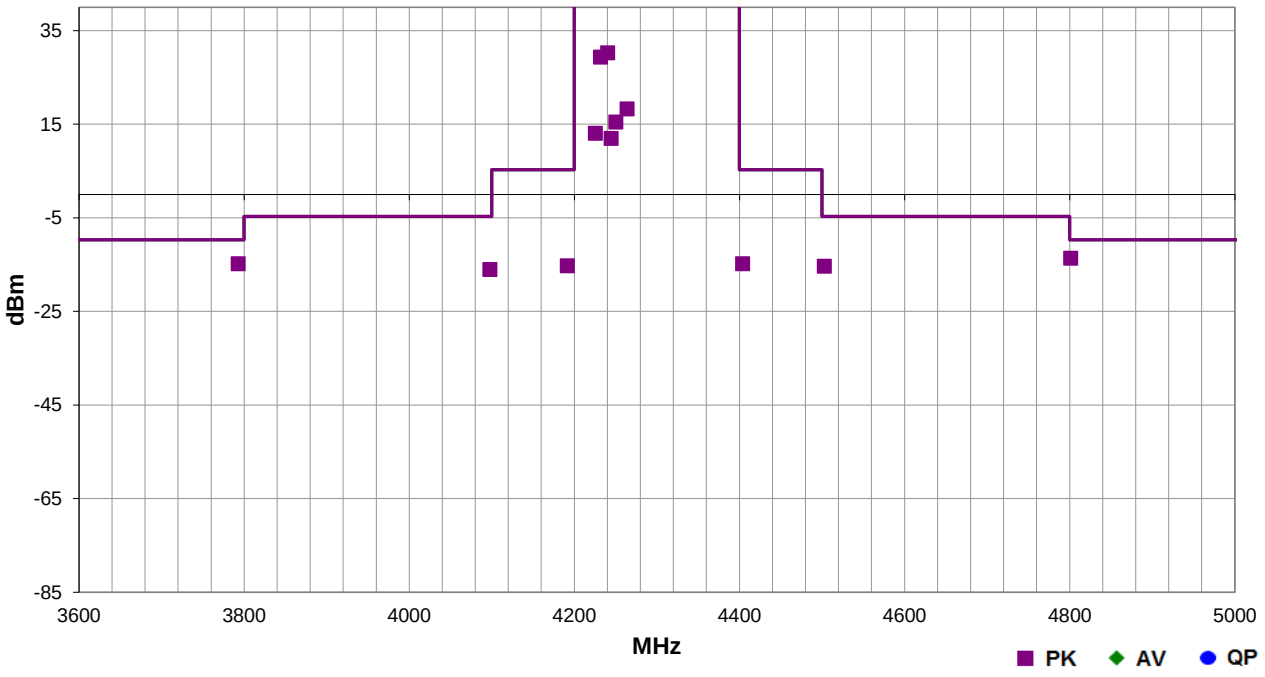
EMISSIONS MASK

EmiR5 2018.09.26 PSA-ESCI 2019.02.26

Work Order:	HNYE0001	**Date:**	1-Apr-2019		
Project:	None	**Temperature:**	22.1 °C		
Job Site:	MN05	**Humidity:**	23.7% RH		
Serial Number:	00207	**Barometric Pres.:**	1020 mbar	**Tested by:**	Kyle McMullan
EUT:	SARA				
Configuration:	1				
Customer:	Honeywell				
Attendees:	Karim Habib				
EUT Power:	28VDC				
Operating Mode:	SSID #1, FMCW from 4220-4391 MHz.				
Deviations:	None				
Comments:	Isolation filter and box not in line. dBc limit value calculated with reference to measured fundamental value of 30.3 dBm. This 30.3 dBm value is for reference only.				

Test Specifications	**Test Method**
FCC 87.139(a):2019	ANSI TIA-603-E:2016

Run #	18	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



	Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBc)	Compared to Spec. (dBc)	Comments
	4801.250	2.7	336.0	Vert	PK	4.34E-05	-13.6	-9.7	-3.9	EUT Horz
	3792.883	1.0	51.0	Vert	PK	3.29E-05	-14.8	-9.7	-5.1	EUT Horz
	4502.900	1.0	307.9	Vert	PK	2.93E-05	-15.3	-4.7	-10.6	EUT Horz
	4097.733	1.0	232.9	Vert	PK	2.50E-05	-16.0	-4.7	-11.3	EUT Horz
	4403.850	1.0	329.9	Vert	PK	3.29E-05	-14.8	5.3	-20.1	EUT Horz
	4191.433	1.0	192.9	Vert	PK	3.00E-05	-15.2	5.3	-20.5	EUT Horz
	4240.333	1.4	77.9	Vert	PK	1.06E+00	30.3	N/A	N/A	EUT Horz, Ref Only, dBc Ref Value
	4231.667	1.3	78.9	Horz	PK	8.65E-01	29.4	N/A	N/A	EUT On Side, Ref Only
	4264.000	3.9	350.0	Vert	PK	6.72E-02	18.3	N/A	N/A	EUT Vert, Ref Only
	4250.333	3.9	52.0	Horz	PK	3.52E-02	15.5	N/A	N/A	EUT Vert, Ref Only
	4225.333	1.7	66.0	Vert	PK	2.03E-02	13.1	N/A	N/A	EUT On Side, Ref Only
	4244.667	1.0	52.9	Horz	PK	1.57E-02	12.0	N/A	N/A	EUT Horz, Ref Only

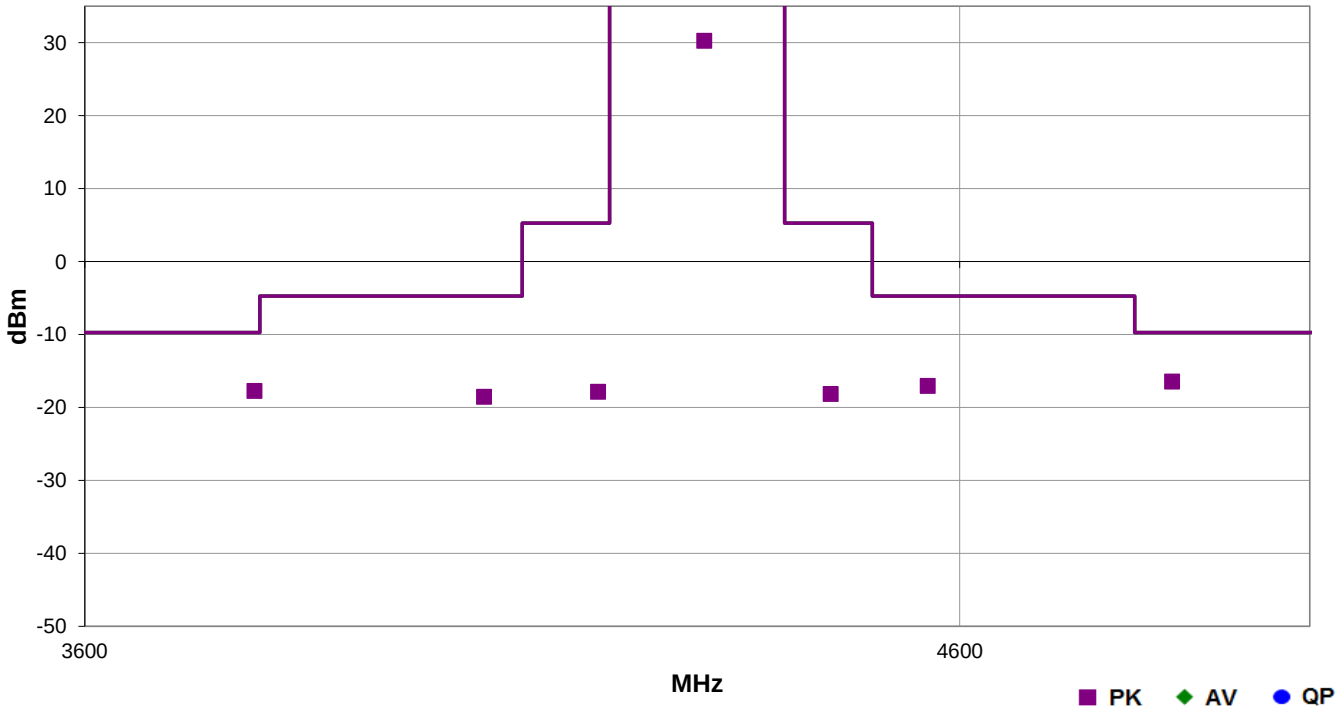
EMISSIONS MASK

EmiR5 2019.05.20 PSA-ESCI 2019.05.10

Work Order:	HNYE0004	**Date:**	12-Jul-2019		
Project:	None	**Temperature:**	22.5 °C		
Job Site:	MN05	**Humidity:**	59.1% RH		
Serial Number:	00215	**Barometric Pres.:**	1015 mbar	**Tested by:**	Kyle McMullan
EUT:	SARA				
Configuration:	2				
Customer:	Honeywell				
Attendees:	Karim Habib				
EUT Power:	28VDC				
Operating Mode:	SSID #2, FMCW from 4214-4386 MHz.				
Deviations:	None				
Comments:	Isolation filter and box not in line. dBc limit value calculated with reference to measured fundamental value of 30.3 dBm. This 30.3 dBm value is for reference only.				

Test Specifications	**Test Method**
FCC 87.139(a):2019	ANSI TIA-603-E:2016

Run #	0	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



	Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
	4842.533	1.5	246.9	Vert	PK	22.8E-6	-16.4	-9.7	-6.7	EUT Horz
	3794.000	2.4	329.9	Vert	PK	16.9E-6	-17.7	-9.7	-8.0	EUT Horz
	4563.467	1.5	325.9	Vert	PK	19.8E-6	-17.0	-4.7	-12.3	EUT Horz
	4056.267	1.5	310.0	Vert	PK	14.0E-6	-18.5	-4.7	-13.8	EUT Horz
	4186.667	1.5	73.0	Vert	PK	16.5E-6	-17.8	5.3	-23.1	EUT Horz
	4452.533	1.2	114.9	Vert	PK	15.4E-6	-18.1	5.3	-23.4	EUT Horz
	4307.980	1.4	261.0	Vert	PK	1.1E+0	30.3	N/A	N/A	EUT Horz, Ref Only, dBc Ref Value

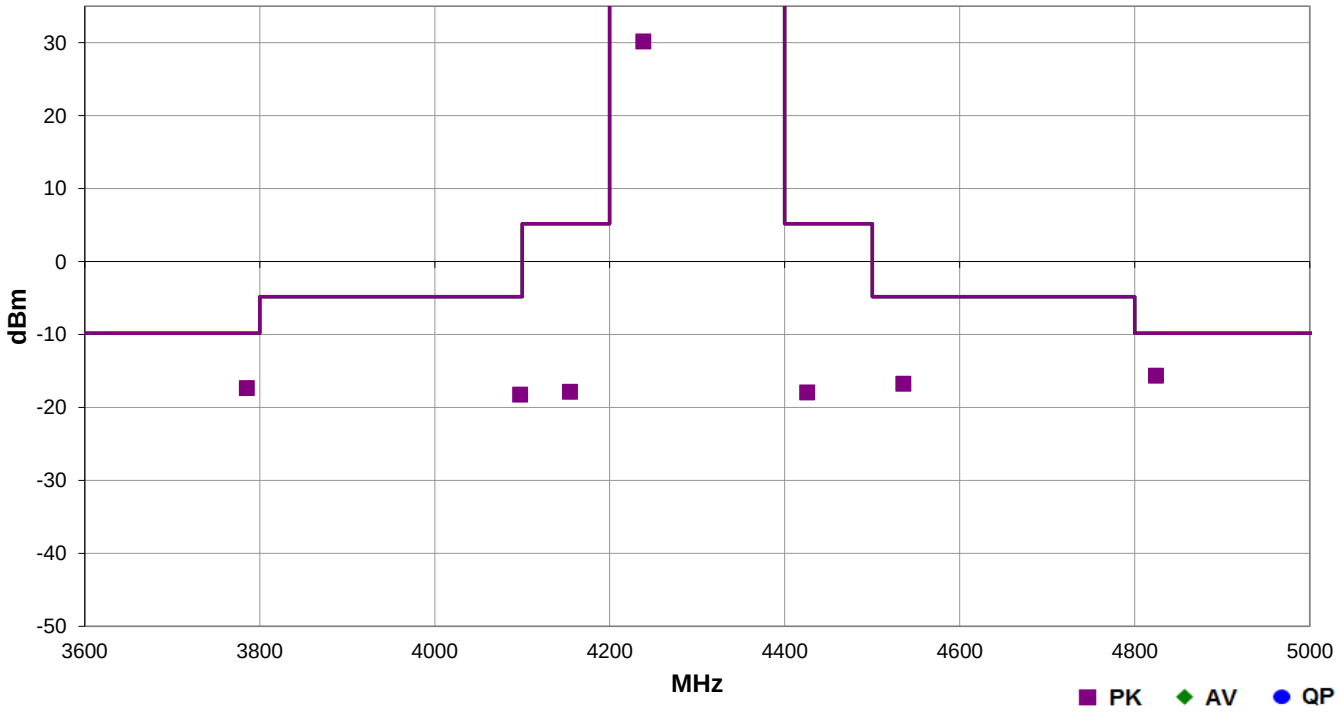
EMISSIONS MASK

EmiR5 2019.05.20 PSA-ESCI 2019.05.10

Work Order:	HNYE0004	**Date:**	12-Jul-2019		
Project:	None	**Temperature:**	22.5 °C		
Job Site:	MN05	**Humidity:**	59.1% RH		
Serial Number:	00215	**Barometric Pres.:**	1015 mbar	**Tested by:**	Kyle McMullan
EUT:	SARA				
Configuration:	2				
Customer:	Honeywell				
Attendees:	Karim Habib				
EUT Power:	28VDC				
Operating Mode:	SSID #3, FMCW from 4210-4381 MHz.				
Deviations:	None				
Comments:	Isolation filter and box not in line. dBc limit value calculated with reference to measured fundamental value of 30.2 dBm. This 30.2 dBm value is for reference only.				

Test Specifications	**Test Method**
FCC 87.139(a):2019	ANSI TIA-603-E:2016

Run #	1	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



	Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
	4824.133	1.5	13.9	Vert	PK	27.4E-6	-15.6	-9.8	-5.8	EUT horz
	3785.333	1.5	333.9	Vert	PK	18.5E-6	-17.3	-9.8	-7.5	EUT horz
	4535.600	1.5	227.0	Vert	PK	21.2E-6	-16.7	-4.8	-11.9	EUT horz
	4097.600	1.5	73.0	Vert	PK	15.0E-6	-18.2	-4.8	-13.4	EUT horz
	4154.533	1.5	128.9	Vert	PK	16.5E-6	-17.8	5.2	-23.0	EUT horz
	4425.600	1.5	250.9	Vert	PK	16.1E-6	-17.9	5.2	-23.1	EUT horz
	4238.260	1.3	257.9	Vert	PK	1.0E+0	30.2	N/A	N/A	EUT Horz, Ref Only, dBc Ref Value

SPURIOUS EMISSIONS AT ANTENNA

XMit 2019.06.11

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Power Supply	Kikusui	PWR401ML	TQL	NCR	NCR
Meter - Multimeter	Fluke	117	MLS	23-Jan-17	23-Jan-20
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPH-32-3.5-SCT/AC	TBF	NCR	NCR
Thermometer	Omega Engineering, Inc.	HH311	DUB	10-Nov-17	10-Nov-20
Generator - Signal	Agilent	E4422B	TGQ	15-Mar-18	15-Mar-21
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	11-Apr-19	11-Apr-20
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Analyzer - Spectrum Analyzer	Keysight	N9010A (EXA)	AFQ	13-Dec-18	13-Dec-19

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions were measured with the EUT set to transmit FMCW centered at 4300 MHz. The spectrum was scanned throughout the specified frequency range using a peak detector. The sweep speed on the spectrum analyzer was slowed enough to make sure no decrease in sensitiviy or resolution would apply from when an IF amplifier is sweeping an CW signal. The formula to ensure this is:

$$B_{eff} = B * \sqrt{1 + \left(\frac{2 * \ln(2)}{\pi}\right)^2 * \left(\frac{F_s}{T_s * B^2}\right)^2}$$

Where B_eff is the effective bandwidth in Hz, B is the bandwidth in Hz, F_s is the sweep width in Hz, and T_s is the sweep time in S.

The peak value was recorded and compared to the limit to determine compliance.

SPURIOUS EMISSIONS AT ANTENNA

XMit 2019.06.11

EUT:	**SARA**			**Work Order:**	**HNYE0004**
Serial Number:	**00204**			**Date:**	**12-Jul-19**
Customer:	**Honeywell**			**Temperature:**	**22.5 °C**
Attendees:	**Karim Habib**			**Humidity:**	**57.8% RH**
Project:	**None**			**Barometric Pres.:**	**1015 mbar**
Tested by:	**Kyle McMullan**	**Power:**	**28VDC**	**Job Site:**	**MN02**

TEST SPECIFICATIONS	**Test Method**
FCC 87.139:2019	ANSI TIA-603-E:2016

COMMENTS

Isolation filter and box not in line. Configuration HNYE0001-2 used for SSID#1, configuration HNYE0004-1 used for SSID#2 and SSID#3.

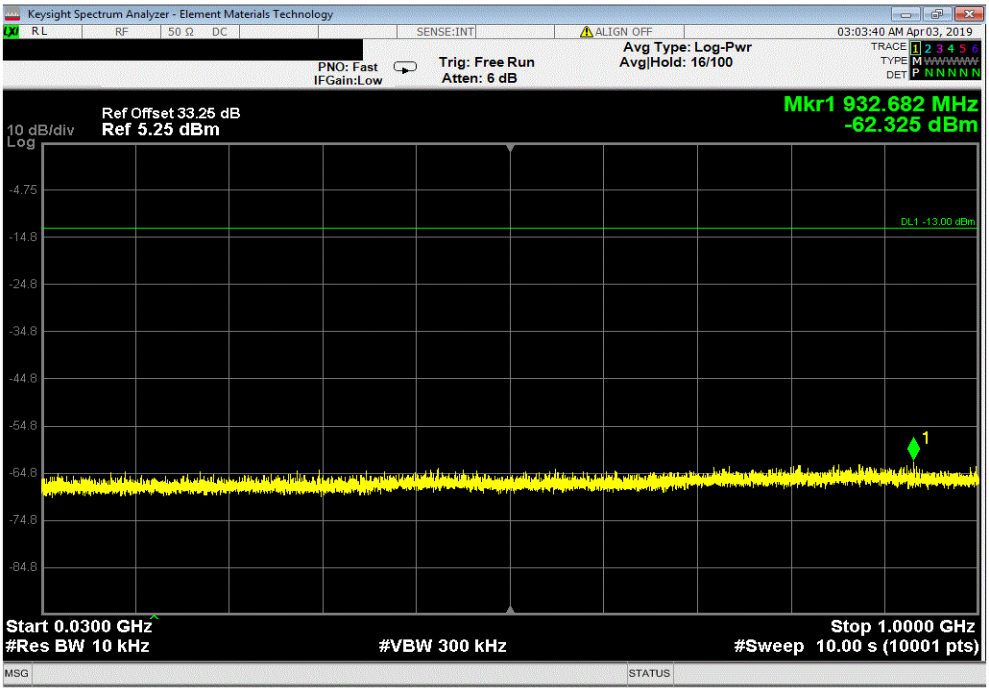
DEVIATIONS FROM TEST STANDARD

None

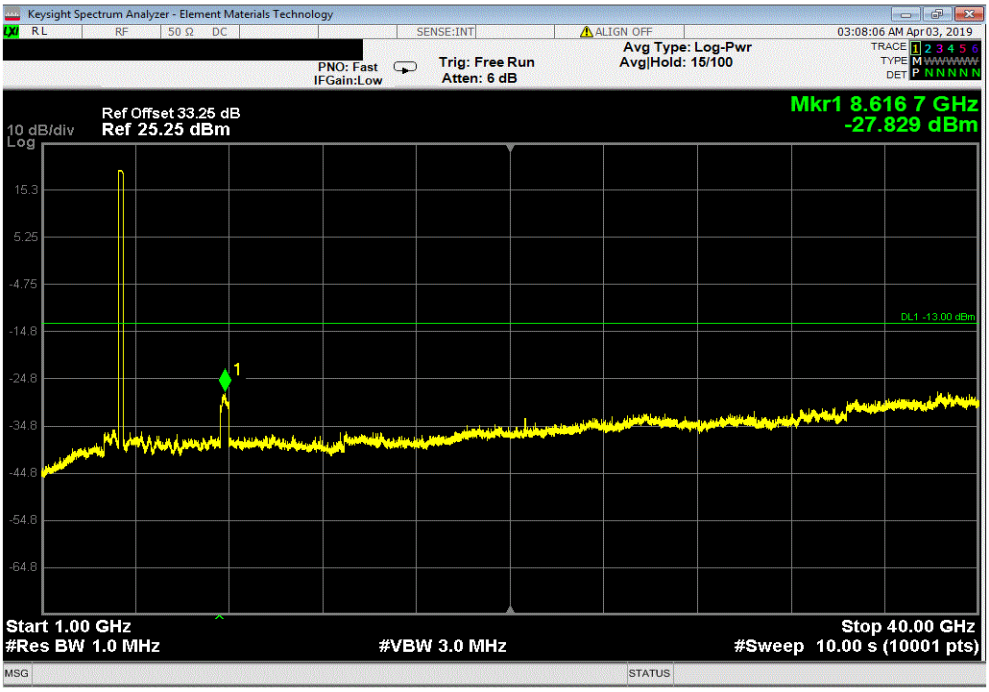
Configuration #	**See Comments**	*Signature*

	Peak Value (dBm)	**Limit (dBm)**	**Result**
SSID#1 4220-4391 MHz			
30 MHz - 1 GHz	-62.325	-13	Pass
1 GHz - 40 GHz	-27.829	-13	Pass
SSID#2 4215-4386 MHz			
30 MHz - 1 GHz	-61.045	-13	Pass
1 GHz - 40 GHz	-26.497	-13	Pass
SSID#3 4210-4381 MHz			
30 MHz - 1 GHz	-62.357	-13	Pass
1 GHz - 40 GHz	-25.993	-13	Pass

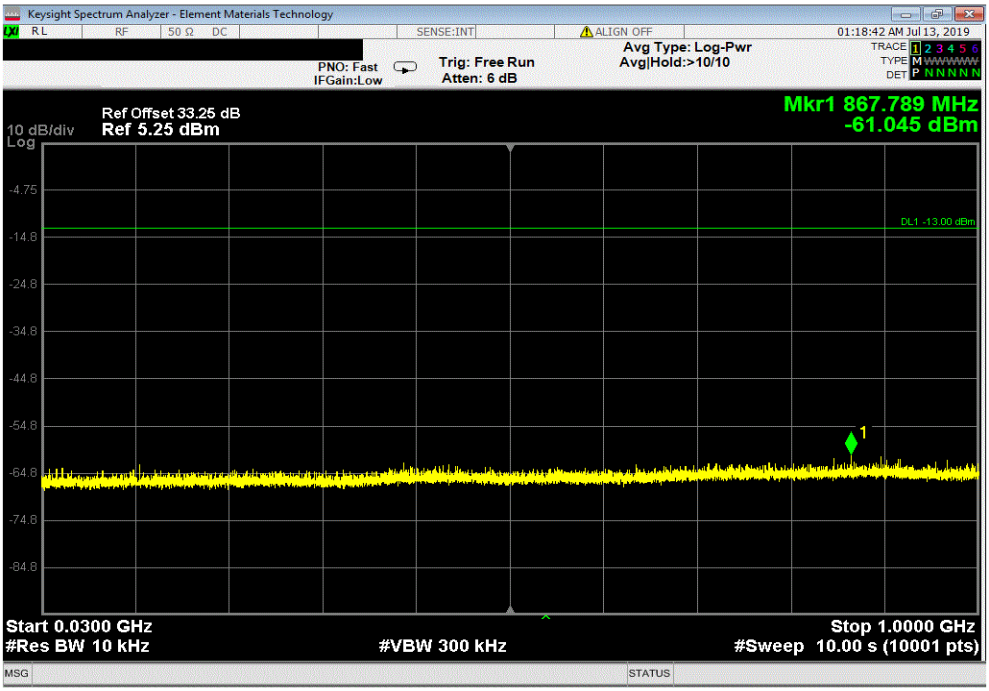
SSID#1 4220-4391 MHz, 30 MHz - 1 GHz						
				Peak		
				Value (dBm)	Limit (dBm)	Result
				-62.325	-13	Pass



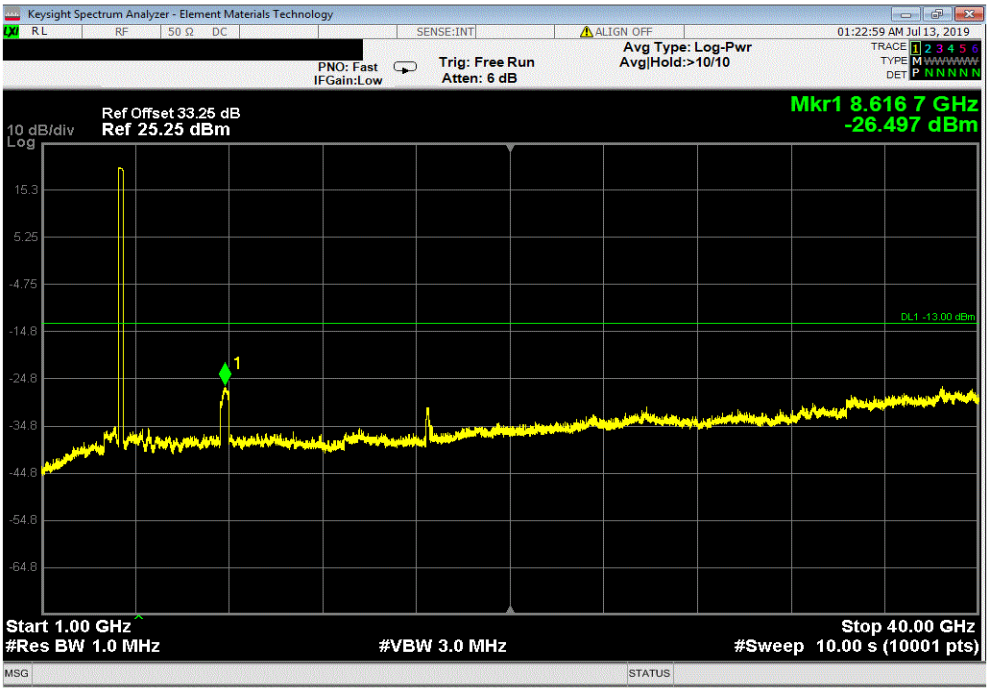
SSID#1 4220-4391 MHz, 1 GHz - 40 GHz						
				Peak		
				Value (dBm)	Limit (dBm)	Result
				-27.829	-13	Pass



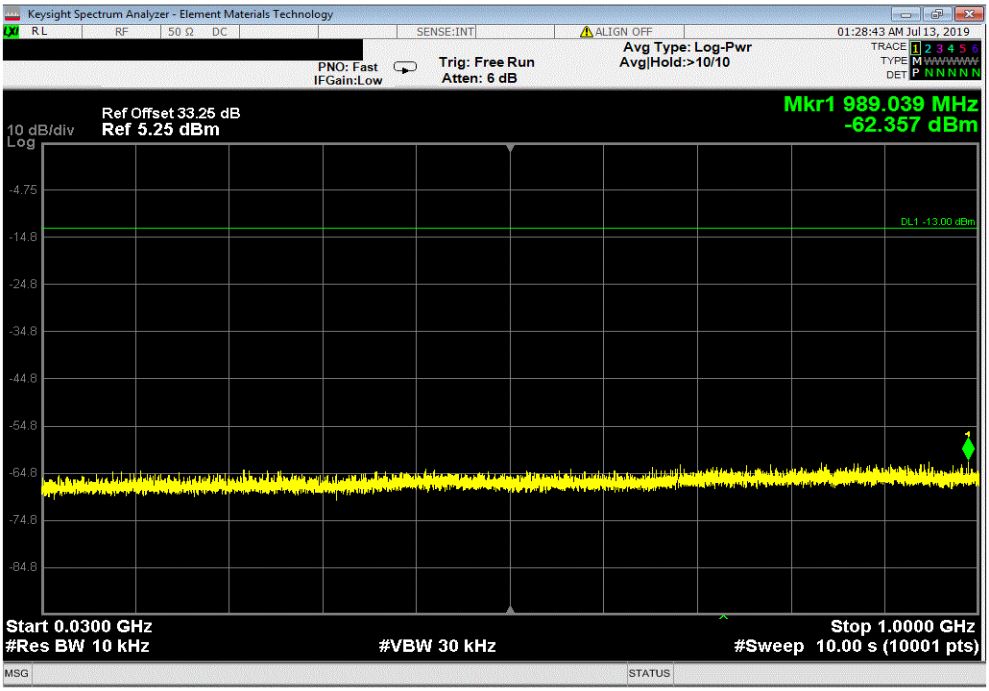
SSID#2 4215-4386 MHz, 30 MHz - 1 GHz						
				Peak		
				Value (dBm)	Limit (dBm)	Result
				-61.045	-13	Pass



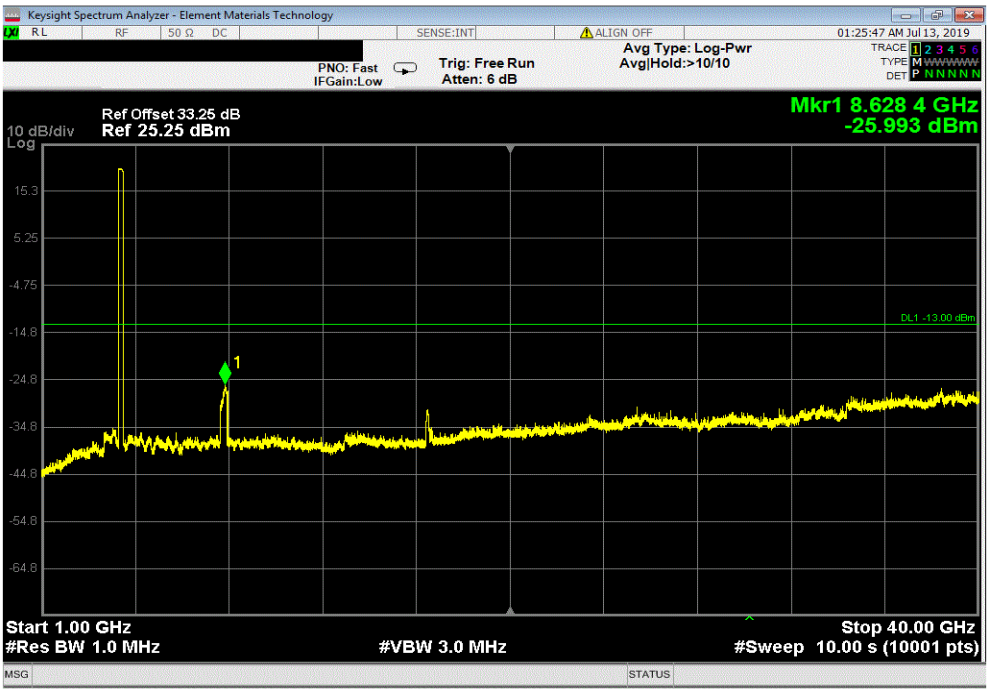
SSID#2 4215-4386 MHz, 1 GHz - 40 GHz						
				Peak		
				Value (dBm)	Limit (dBm)	Result
				-26.497	-13	Pass



SSID#3 4210-4381 MHz, 30 MHz - 1 GHz						
				Peak		
				Value (dBm)	Limit (dBm)	Result
				-62.357	-13	Pass



SSID#3 4210-4381 MHz, 1 GHz - 40 GHz						
				Peak		
				Value (dBm)	Limit (dBm)	Result
				-25.993	-13	Pass



FIELD STRENGTH OF SPURIOUS EMISSIONS

PSA-ESCI 2019.02.26

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

MODES OF OPERATION

SSID#1, Tx FMCW from 4220 to 4391 MHz.
SSID#2, Tx FMCW from 4214 to 4386 MHz.
SSID#3, Tx FMCW from 4209 to 4381 MHz.

POWER SETTINGS INVESTIGATED

28VDC

CONFIGURATIONS INVESTIGATED

HNYE0001 - 1
HNYE0004 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	40 GHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Antenna - Double Ridge	ETS-Lindgren	3115	AJQ	NCR	0 mo
Generator - Signal	Agilent	N5173B	TIW	5-Jul-2017	36 mo
Meter - Power	Agilent	N1913A	SQL	16-Jul-2018	12 mo
Power Sensor	Agilent	N8481A	SQN	16-Jul-2018	12 mo
Antenna	AH Systems	SAS-588	AJO	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	JSW45-26004000-40-5P	AVN	13-Sep-2018	12 mo
Cable	Northwest EMC	TTBJ141-KMKM-72	MNQ	13-Sep-2018	12 mo
Cable	ESM Cable Corp	TTBJ141 KMKM-72	MNP	12-Sep-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	13-Sep-2018	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AHG	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	8-Feb-2019	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AIQ	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	8-Feb-2019	12 mo
Cable	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	8-Mar-2019	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AXP	NCR	0 mo
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	24-Sep-2018	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AJA	27-Jun-2018	24 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	2-Nov-2018	12 mo
Cable	ESM Cable Corp.	Bilog Cables	MNH	2-Nov-2018	12 mo
Antenna - Biconilog	Teseq	CBL 6141B	AYD	25-Jan-2018	24 mo
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	27-Apr-2018	12 mo

MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

FIELD STRENGTH OF SPURIOUS EMISSIONS

TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for transmitting in FMCW mode.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These “pre-scans” are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis if required, and adjusting the measurement antenna height and polarization (per TIA-603-E:2016). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions. Measurements were made across a sufficient span to see the entire spurious emission made from the harmonics of the FMCW range. Measurements were made with a slow enough sweep speed to satisfy the bandwidth concerns of the FCC. The formula to ensure this is:

$$B_{eff} = B * \sqrt{1 + \left(\frac{2 * \ln(2)}{\pi}\right)^2 * \left(\frac{F_s}{T_s * B^2}\right)^2}$$

Where B_eff is the effective bandwidth in Hz, B is the bandwidth in Hz, F_s is the sweep width in Hz, and T_s is the sweep time in S.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

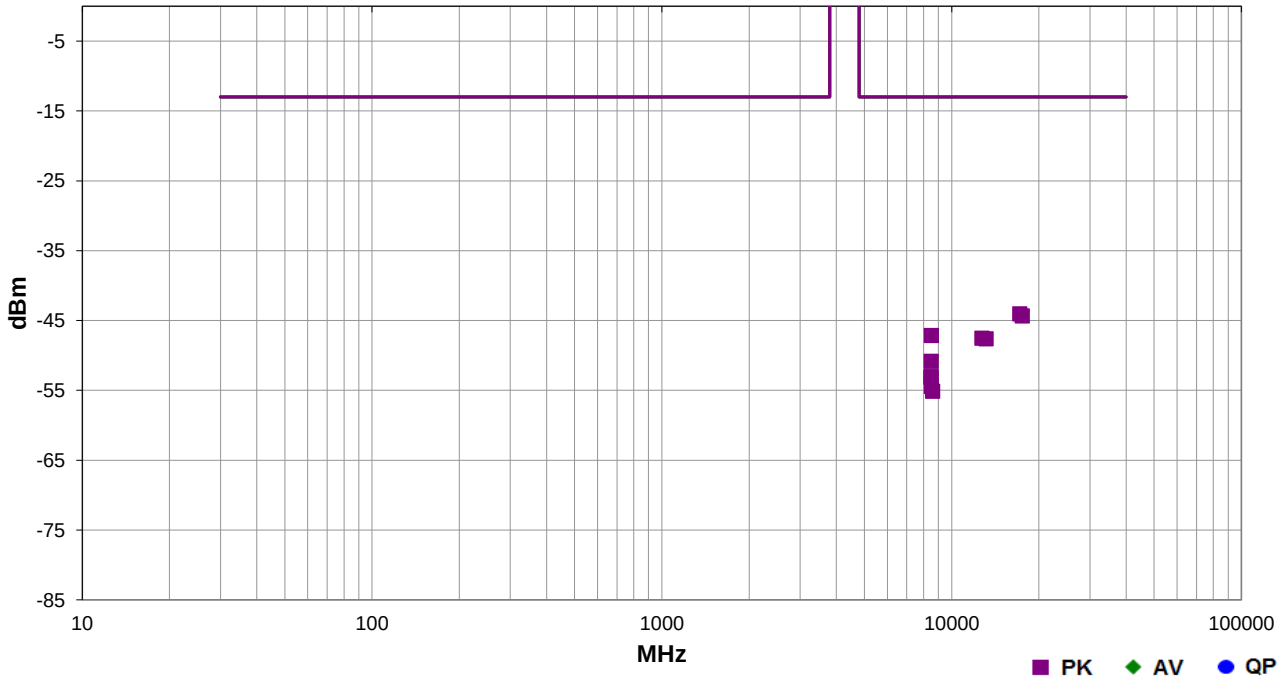
FIELD STRENGTH OF SPURIOUS EMISSIONS

EmiR5 2018.09.26 PSA-ESCI 2019.02.26

Work Order:	HNYE0001	**Date:**	1-Apr-2019		
Project:	None	**Temperature:**	22.1 °C		
Job Site:	MN05	**Humidity:**	23.7% RH		
Serial Number:	00207	**Barometric Pres.:**	1020 mbar	**Tested by:**	Kyle McMullan
EUT:	SARA				
Configuration:	1				
Customer:	Honeywell				
Attendees:	Karim Habib				
EUT Power:	28VDC				
Operating Mode:	SSID#1, Tx FMCW from 4220 to 4391 MHz.				
Deviations:	None				
Comments:	Isolation filter and box not in line.				

Test Specifications	**Test Method**
FCC 87.139(d):2019	ANSI TIA-603-E:2016

Run #	19	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



	Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
	17192.000	1.0	258.9	Horz	PK	3.95E-08	-44.0	-13.0	-31.0	EUT On Side
	17524.000	3.9	252.0	Vert	PK	3.69E-08	-44.3	-13.0	-31.3	EUT Horz
	8506.667	1.0	142.9	Horz	PK	1.94E-08	-47.1	-13.0	-34.1	EUT On Side
	12729.330	1.0	49.9	Horz	PK	1.77E-08	-47.5	-13.0	-34.5	EUT On Side
	13141.330	2.0	254.9	Vert	PK	1.73E-08	-47.6	-13.0	-34.6	EUT Horz
	8503.333	1.3	30.9	Vert	PK	8.26E-09	-50.8	-13.0	-37.8	EUT Horz
	8497.333	1.6	294.9	Horz	PK	4.98E-09	-53.0	-13.0	-40.0	EUT Horz
	8486.000	2.0	156.0	Vert	PK	4.87E-09	-53.1	-13.0	-40.1	EUT Vert
	8508.667	3.4	216.0	Horz	PK	3.61E-09	-54.4	-13.0	-41.4	EUT Vert
	8601.415	1.0	282.0	Vert	PK	3.07E-09	-55.1	-13.0	-42.1	EUT On Side

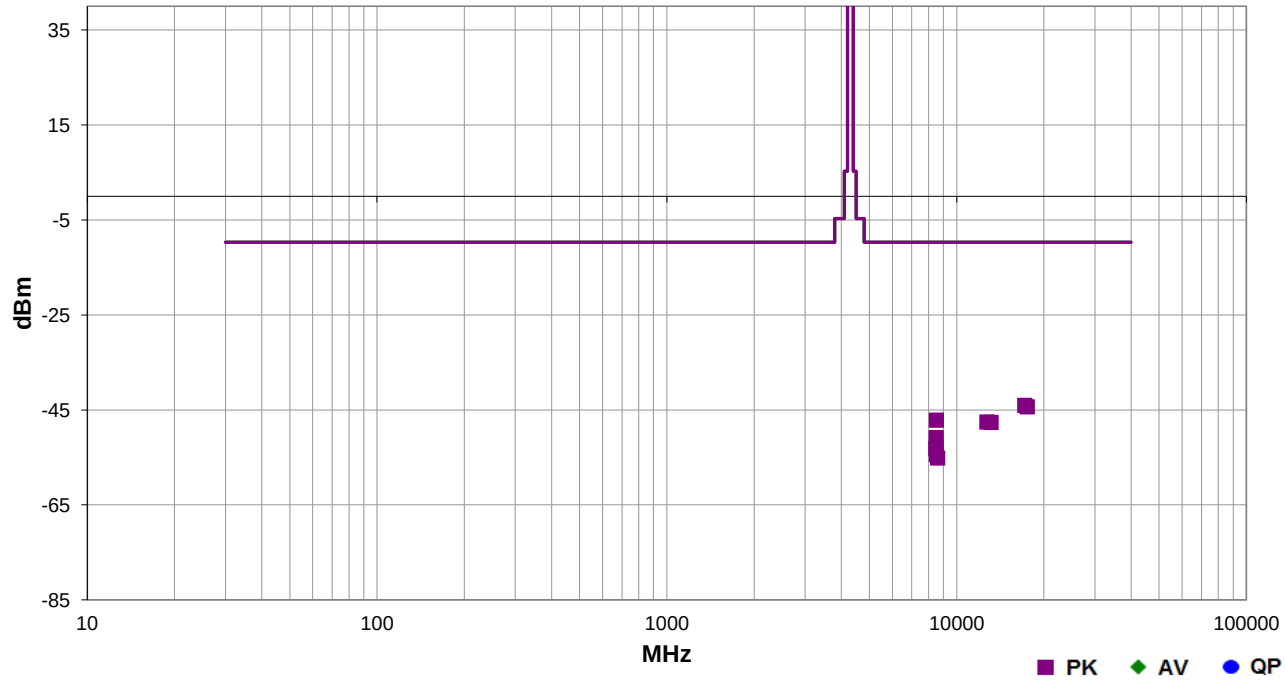
FIELD STRENGTH OF SPURIOUS EMISSIONS

EmiR5 2018.09.26 PSA-ESCI 2019.02.26

Work Order:	HNYE0001	**Date:**	1-Apr-2019		
Project:	None	**Temperature:**	22.1 °C		
Job Site:	MN05	**Humidity:**	23.7% RH		
Serial Number:	00207	**Barometric Pres.:**	1020 mbar	**Tested by:**	Kyle McMullan
EUT:	SARA				
Configuration:	1				
Customer:	Honeywell				
Attendees:	Karim Habib				
EUT Power:	28VDC				
Operating Mode:	SSID#1, Tx FMCW from 4220 to 4391 MHz.				
Deviations:	None				
Comments:	Isolation filter and box not in line. dBc limit value calculated with reference to measured fundamental value of 30.3 dBm. The fundamental maximization reference measuremenents are found the the Emissions Mask module.				

Test Specifications	**Test Method**
FCC 87.139(d):2019	ANSI TIA-603-E:2016

Run #	18	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



	Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBc)	Compared to Spec. (dBc)	Comments
	17192.000	1.0	258.9	Horz	PK	3.95E-08	-44.0	-9.7	-34.3	EUT On Side
	17524.000	3.9	252.0	Vert	PK	3.69E-08	-44.3	-9.7	-34.6	EUT Horz
	8506.667	1.0	142.9	Horz	PK	1.94E-08	-47.1	-9.7	-37.4	EUT On Side
	12729.330	1.0	49.9	Horz	PK	1.77E-08	-47.5	-9.7	-37.8	EUT On Side
	13141.330	2.0	254.9	Vert	PK	1.73E-08	-47.6	-9.7	-37.9	EUT Horz
	8503.333	1.3	30.9	Vert	PK	8.26E-09	-50.8	-9.7	-41.1	EUT Horz
	8497.333	1.6	294.9	Horz	PK	4.98E-09	-53.0	-9.7	-43.3	EUT Horz
	8486.000	2.0	156.0	Vert	PK	4.87E-09	-53.1	-9.7	-43.4	EUT Vert
	8508.667	3.4	216.0	Horz	PK	3.61E-09	-54.4	-9.7	-44.7	EUT Vert
	8601.415	1.0	282.0	Vert	PK	3.07E-09	-55.1	-9.7	-45.4	EUT On Side

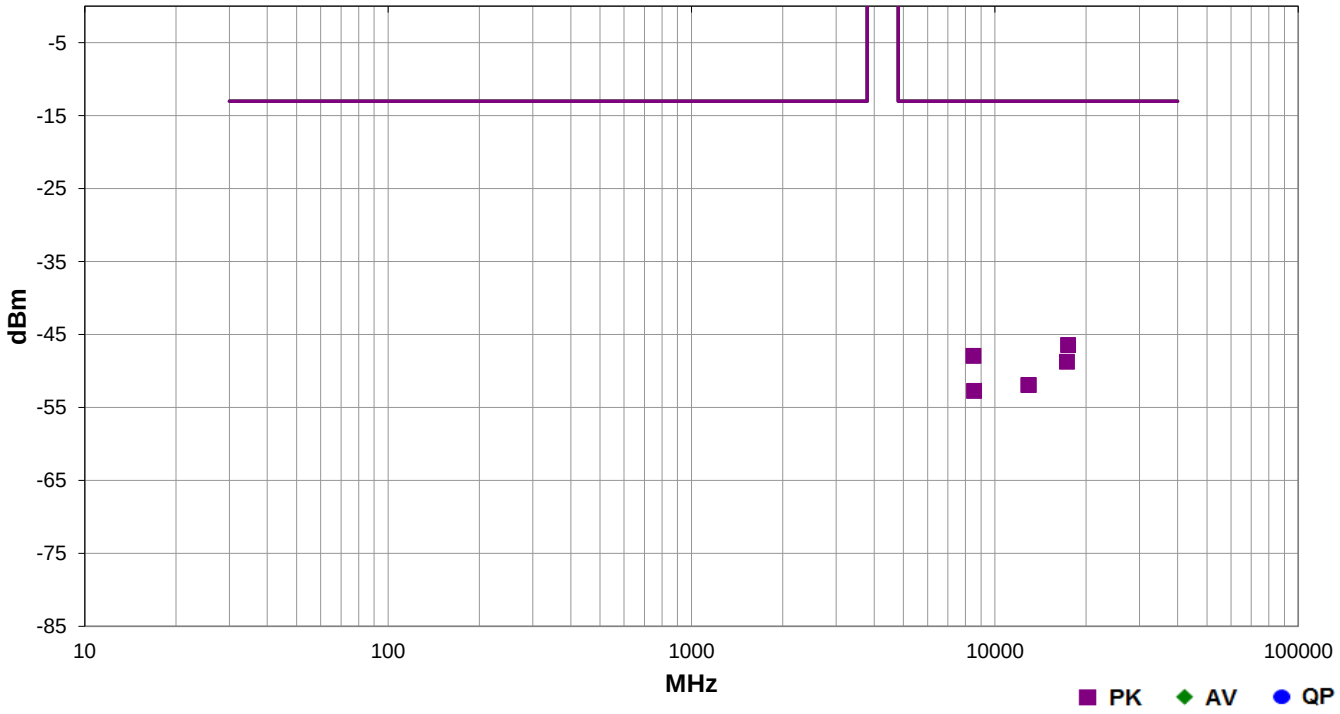
FIELD STRENGTH OF SPURIOUS EMISSIONS

EmiR5 2019.05.20 PSA-ESCI 2019.05.10

Work Order:	HNYE0004	**Date:**	12-Jul-2019		
Project:	None	**Temperature:**	22.6 °C		
Job Site:	MN05	**Humidity:**	58.2% RH		
Serial Number:	00215	**Barometric Pres.:**	1014 mbar	**Tested by:**	Andrew Rogstad
EUT:	SARA				
Configuration:	2				
Customer:	Honeywell				
Attendees:	Karim Habib				
EUT Power:	28VDC				
Operating Mode:	SSID#2, Tx FMCW from 4214 to 4386 MHz.				
Deviations:	None				
Comments:	Isolation filter and box not in line.				

Test Specifications	**Test Method**
FCC 87.139(a):2019	

Run #	8	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



	Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
	17445.390	3.6	192.9	Horz	PK	22.8E-9	-46.4	-13.0	-33.4	EUT on side
	8503.107	1.5	116.0	Horz	PK	16.1E-9	-47.9	-13.0	-34.9	EUT on side
	17297.470	2.3	171.0	Vert	PK	13.4E-9	-48.7	-13.0	-35.7	EUT horz
	12905.160	1.5	243.0	Horz	PK	6.4E-9	-51.9	-13.0	-38.9	EUT on side
	12918.060	1.5	253.9	Vert	PK	6.4E-9	-51.9	-13.0	-38.9	EUT horz
	8545.533	1.5	224.0	Vert	PK	5.3E-9	-52.7	-13.0	-39.7	EUT horz

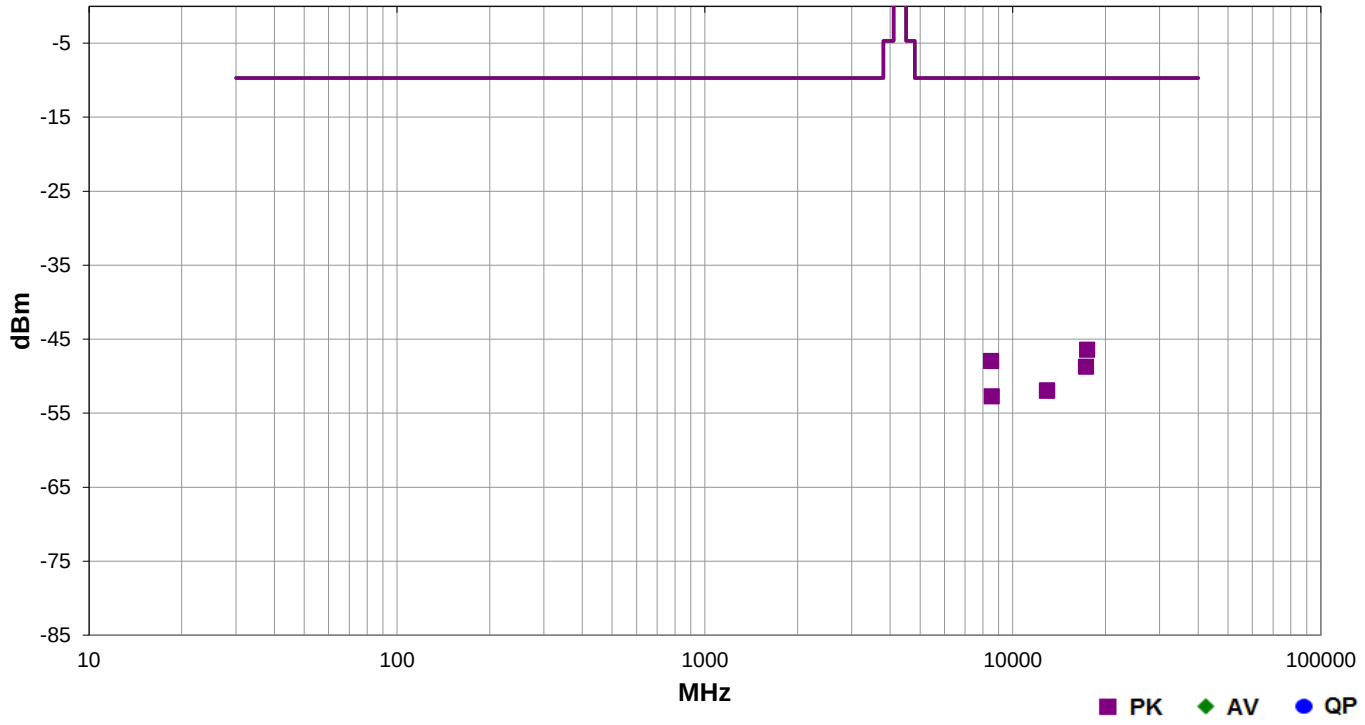
FIELD STRENGTH OF SPURIOUS EMISSIONS

EmiR5 2019.05.20 PSA-ESCI 2019.05.10

Work Order:	HNYE0004	**Date:**	12-Jul-2019		
Project:	None	**Temperature:**	22.6 °C		
Job Site:	MN05	**Humidity:**	58.2% RH		
Serial Number:	00215	**Barometric Pres.:**	1014 mbar	**Tested by:**	Andrew Rogstad
EUT:	SARA				
Configuration:	2				
Customer:	Honeywell				
Attendees:	Karim Habib				
EUT Power:	28VDC				
Operating Mode:	SSID#2, Tx FMCW from 4214 to 4386 MHz.				
Deviations:	None				
Comments:	Isolation filter and box not in line. dBc limit value calculated with reference to measured fundamental value of 30.3 dBm. The fundamental maximization reference measuremenents are found the the Emissions Mask module.				

Test Specifications	**Test Method**
FCC 87.139(a):2019	ANSI TIA-603-E:2016

Run #	8	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



	Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
	17445.390	3.6	192.9	Horz	PK	22.8E-9	-46.4	-9.7	-36.7	EUT on side
	8503.107	1.5	116.0	Horz	PK	16.1E-9	-47.9	-9.7	-38.2	EUT on side
	17297.470	2.3	171.0	Vert	PK	13.4E-9	-48.7	-9.7	-39.0	EUT horz
	12905.160	1.5	243.0	Horz	PK	6.4E-9	-51.9	-9.7	-42.2	EUT on side
	12918.060	1.5	253.9	Vert	PK	6.4E-9	-51.9	-9.7	-42.2	EUT horz
	8545.533	1.5	224.0	Vert	PK	5.3E-9	-52.7	-9.7	-43.0	EUT horz

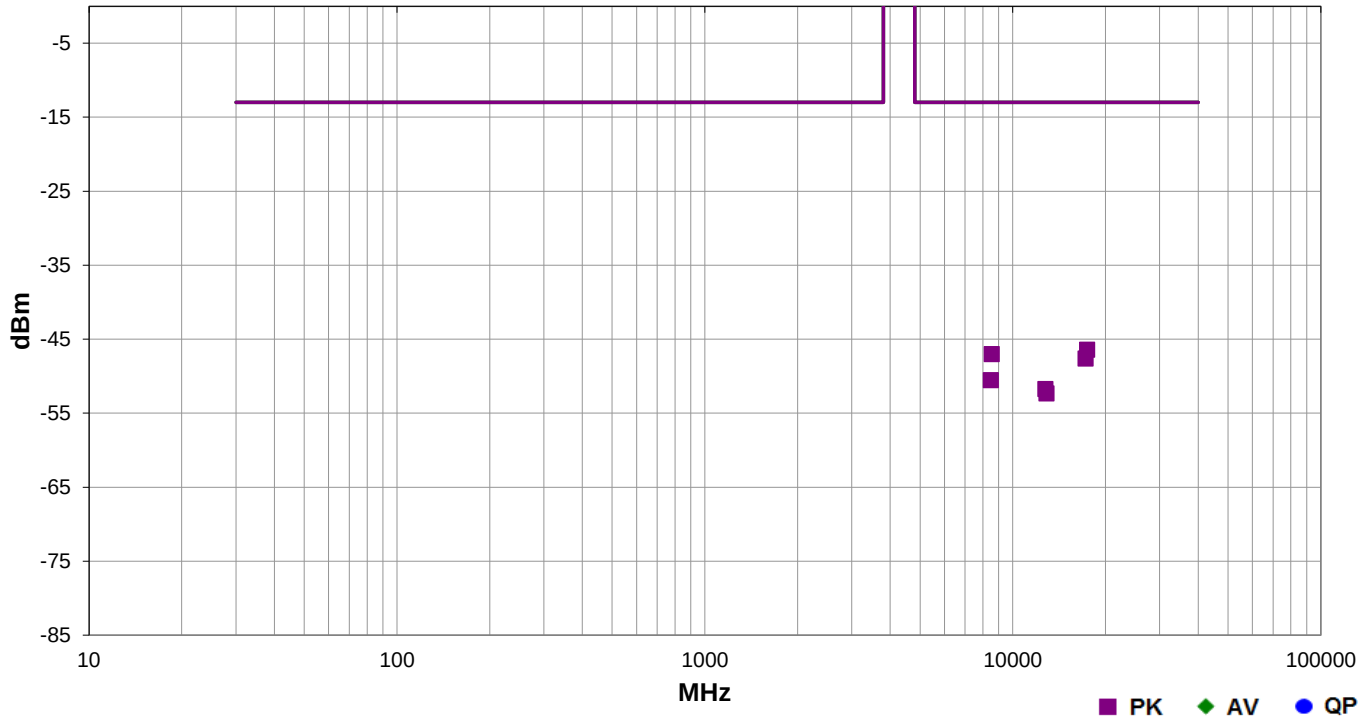
FIELD STRENGTH OF SPURIOUS EMISSIONS

EmiR5 2019.05.20 PSA-ESCI 2019.05.10

Work Order:	HNYE0004	**Date:**	12-Jul-2019		
Project:	None	**Temperature:**	22.6 °C		
Job Site:	MN05	**Humidity:**	58.2% RH		
Serial Number:	00215	**Barometric Pres.:**	1014 mbar	**Tested by:**	Andrew Rogstad
EUT:	SARA				
Configuration:	2				
Customer:	Honeywell				
Attendees:	Karim Habib				
EUT Power:	28VDC				
Operating Mode:	SSID#3, Tx FMCW from 4209 to 4381 MHz.				
Deviations:	None				
Comments:	Isolation filter and box not in line.				

Test Specifications	**Test Method**
FCC 87.139(d):2019	ANSI TIA-603-E:2016

Run #	16	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



	Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
	17421.950	1.5	337.9	Vert	PK	22.8E-9	-46.4	-13.0	-33.4	EUT horz
	8541.267	1.2	149.0	Horz	PK	19.8E-9	-47.0	-13.0	-34.0	EUT on side
	17238.480	1.6	225.9	Horz	PK	17.3E-9	-47.6	-13.0	-34.6	EUT on side
	8491.387	2.8	59.9	Vert	PK	8.9E-9	-50.5	-13.0	-37.5	EUT horz
	12760.300	1.5	85.9	Horz	PK	6.7E-9	-51.7	-13.0	-38.7	EUT on side
	12862.640	1.5	306.0	Vert	PK	5.8E-9	-52.3	-13.0	-39.3	EUT horz

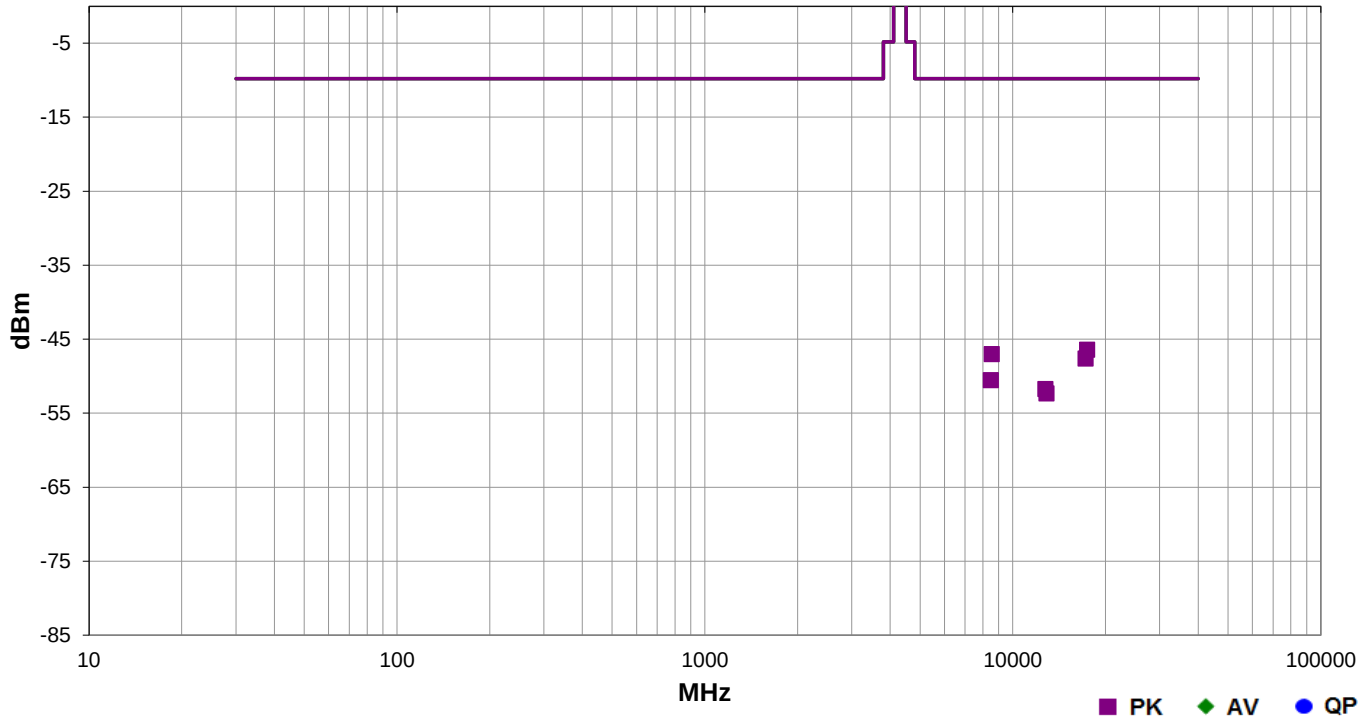
FIELD STRENGTH OF SPURIOUS EMISSIONS

EmiR5 2019.05.20 PSA-ESCI 2019.05.10

Work Order:	HNYE0004	**Date:**	12-Jul-2019		
Project:	None	**Temperature:**	22.6 °C		
Job Site:	MN05	**Humidity:**	58.2% RH		
Serial Number:	00215	**Barometric Pres.:**	1014 mbar	**Tested by:**	Andrew Rogstad
EUT:	SARA				
Configuration:	2				
Customer:	Honeywell				
Attendees:	Karim Habib				
EUT Power:	28VDC				
Operating Mode:	SSID#3, Tx FMCW from 4209 to 4381 MHz.				
Deviations:	None				
Comments:	Isolation filter and box not in line. dBc limit value calculated with reference to measured fundamental value of 30.2 dBm. The fundamental maximization reference measuremenents are found the the Emissions Mask module.				

Test Specifications	**Test Method**
FCC 87.139(d):2019	ANSI TIA-603-E:2016

Run #	16	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



	Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
	17421.950	1.5	337.9	Vert	PK	22.8E-9	-46.4	-9.8	-36.6	EUT horz
	8541.267	1.2	149.0	Horz	PK	19.8E-9	-47.0	-9.8	-37.2	EUT on side
	17238.480	1.6	225.9	Horz	PK	17.3E-9	-47.6	-9.8	-37.8	EUT on side
	8491.387	2.8	59.9	Vert	PK	8.9E-9	-50.5	-9.8	-40.7	EUT horz
	12760.300	1.5	85.9	Horz	PK	6.7E-9	-51.7	-9.8	-41.9	EUT on side
	12862.640	1.5	306.0	Vert	PK	5.8E-9	-52.3	-9.8	-42.5	EUT horz

FREQUENCY STABILITY

XMit 2019.05.15

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Power Supply	Kikusui	PWR401ML	TQL	NCR	NCR
Meter - Multimeter	Fluke	117	MLS	23-Jan-17	23-Jan-20
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPH-32-3.5-SCT/AC	TBF	NCR	NCR
Thermometer	Omega Engineering, Inc.	HH311	DUB	10-Nov-17	10-Nov-20
Generator - Signal	Agilent	E4422B	TGQ	15-Mar-18	15-Mar-21
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	11-Apr-19	11-Apr-20
Block - DC	Fairview Microwave	SD3379	AMI	7-Sep-18	7-Sep-19
Analyzer - Spectrum Analyzer	Keysight	N9010A (EXA)	AFQ	13-Dec-18	13-Dec-19

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum.

The 99% occupied bandwidth of the entire span of the FMCW transmit frequency was measured using a peak detector and a max hold to determine the frequency stability. The sweep speed on the spectrum analyzer was slowed enough to make sure no decrease in sensitiviy or resolution would apply from when an IF amplifier is sweeping an CW signal. The formula to ensure this is:

$$B_{eff} = B * \sqrt{1 + \left(\frac{2 * \ln(2)}{\pi}\right)^2 * \left(\frac{F_s}{T_s * B^2}\right)^2}$$

Where B_eff is the effective bandwidth in Hz, B is the bandwidth in Hz, F_s is the sweep width in Hz, and T_s is the sweep time in S.

The requirement is for the transmit frequency to remain in the authorized band across a voltage variation of +/-15% of the nominal DC voltage and across a temperature variation of +50°C to -20°C in 10°C steps.

The lower edge of the 99% OBW for each measurement condition was compared against the lower edge of the authorized band to determine compliance. The upper edge of the 99% OBW for each measurement condition was compared against the upper edge of the authorized band to determine compliance.

FREQUENCY STABILITY

element

XMit 2019.05.15

EUT:	**SARA**			**Work Order:**	**HNYE0004**
Serial Number:	**00204**			**Date:**	**11-Jul-19**
Customer:	**Honeywell**			**Temperature:**	**22.2 °C**
Attendees:	**Karim Habib**			**Humidity:**	**57.7% RH**
Project:	**None**			**Barometric Pres.:**	**1020 mbar**
Tested by:	**Kyle McMullan**	**Power:**	**28VDC**	**Job Site:**	**MN08**

TEST SPECIFICATIONS	**Test Method**
FCC 87.133:2019	ANSI TIA-603-E:2016

COMMENTS

Isolation filter and box not in line. Configuration HNYE0001-2 used for SSID#1, configuration HNYE0004-1 used for SSID#2 and SSID#3.

DEVIATIONS FROM TEST STANDARD

None

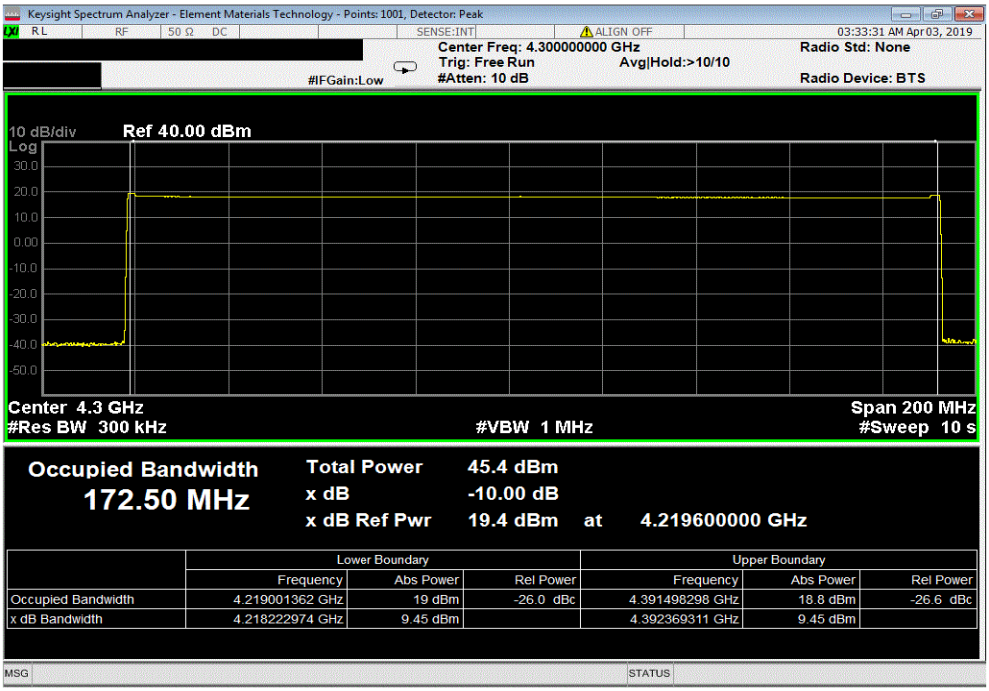
Configuration #	**See Comments**	*Signature*

		Lower Value (MHz)	**Lower Limit (MHz)**	**Upper Value (MHz)**	**Upper Limit (MHz)**	**Freq Tolerance (ppm)**	**Result**
SSID#1 4220-4391 MHz							
	Normal Conditions	4219	4200	4391	4400	116.1	Pass
	Extreme Voltage -15%	4219	4200	4391	4400	116.1	Pass
	Extreme Voltage +15%	4219	4200	4392	4400	0.0	Pass
	Extreme Temperature +50°C	4219	4200	4391	4400	116.1	Pass
	Extreme Temperature +40°C	4219	4200	4391	4400	116.1	Pass
	Extreme Temperature +30°C	4219	4200	4391	4400	116.1	Pass
	Extreme Temperature +20°C	4219	4200	4392	4400	0.0	Pass
	Extreme Temperature +10°C	4219	4200	4392	4400	0.0	Pass
	Extreme Temperature 0°C	4218	4200	4392	4400	116.1	Pass
	Extreme Temperature -10°C	4219	4200	4392	4400	0.0	Pass
	Extreme Temperature -20°C	4219	4200	4392	4400	0.0	Pass
SSID#2 4215-4386 MHz							
	Normal Conditions	4215	4200	4386	4400	0.0	Pass
	Extreme Voltage -15%	4214	4200	4386	4400	116.3	Pass
	Extreme Voltage +15%	4214	4200	4386	4400	116.3	Pass
	Extreme Temperature +50°C	4214	4200	4386	4400	116.3	Pass
	Extreme Temperature +40°C	4214	4200	4386	4400	116.3	Pass
	Extreme Temperature +30°C	4214	4200	4386	4400	116.3	Pass
	Extreme Temperature +20°C	4214	4200	4386	4400	116.3	Pass
	Extreme Temperature +10°C	4214	4200	4386	4400	116.3	Pass
	Extreme Temperature 0°C	4214	4200	4386	4400	116.3	Pass
	Extreme Temperature -10°C	4214	4200	4386	4400	116.3	Pass
	Extreme Temperature -20°C	4214	4200	4386	4400	116.3	Pass
SSID#3 4210-4381 MHz							
	Normal Conditions	4209	4200	4381	4400	116.4	Pass
	Extreme Voltage -15%	4209	4200	4381	4400	116.4	Pass
	Extreme Voltage +15%	4209	4200	4381	4400	116.4	Pass
	Extreme Temperature +50°C	4209	4200	4381	4400	116.4	Pass
	Extreme Temperature +40°C	4209	4200	4381	4400	116.4	Pass
	Extreme Temperature +30°C	4209	4200	4381	4400	116.4	Pass
	Extreme Temperature +20°C	4209	4200	4381	4400	116.4	Pass
	Extreme Temperature +10°C	4209	4200	4381	4400	116.4	Pass
	Extreme Temperature 0°C	4209	4200	4381	4400	116.4	Pass
	Extreme Temperature -10°C	4209	4200	4381	4400	116.4	Pass
	Extreme Temperature -20°C	4209	4200	4381	4400	116.4	Pass

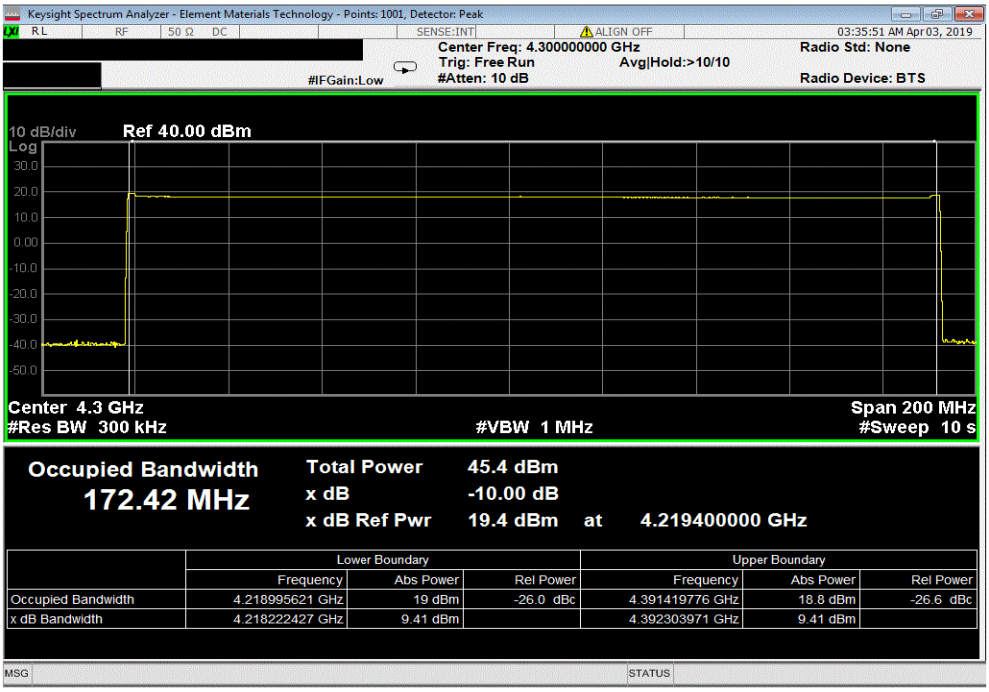
FREQUENCY STABILITY

XMit 2019.05.15

SSID#1 4220-4391 MHz, Normal Conditions						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4219	4200	4391	4400	116.1	Pass



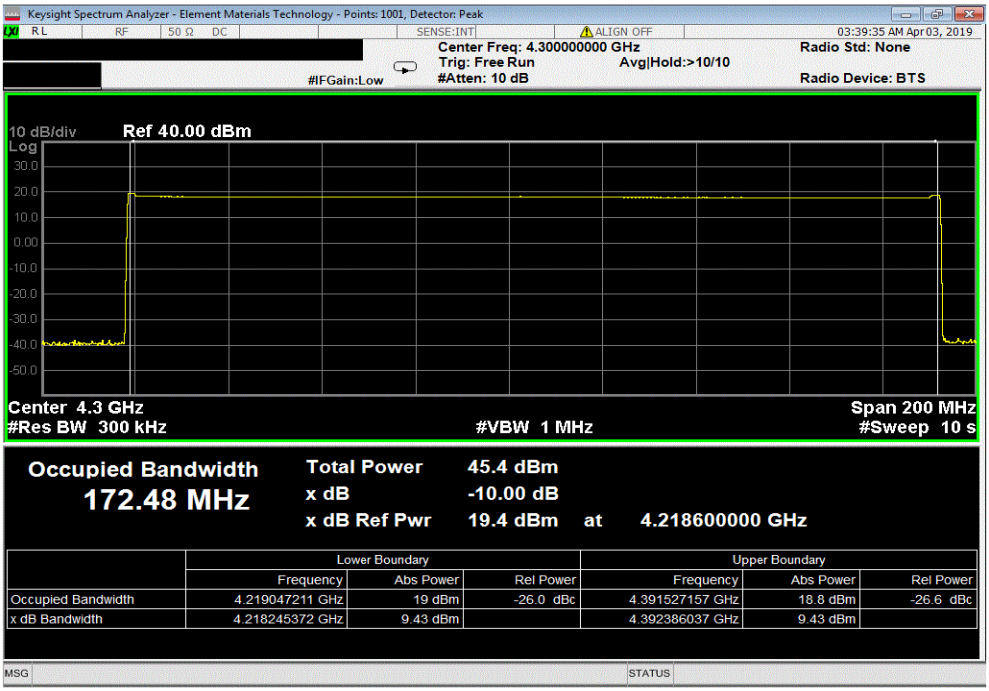
SSID#1 4220-4391 MHz, Extreme Voltage -15%						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4219	4200	4391	4400	116.1	Pass



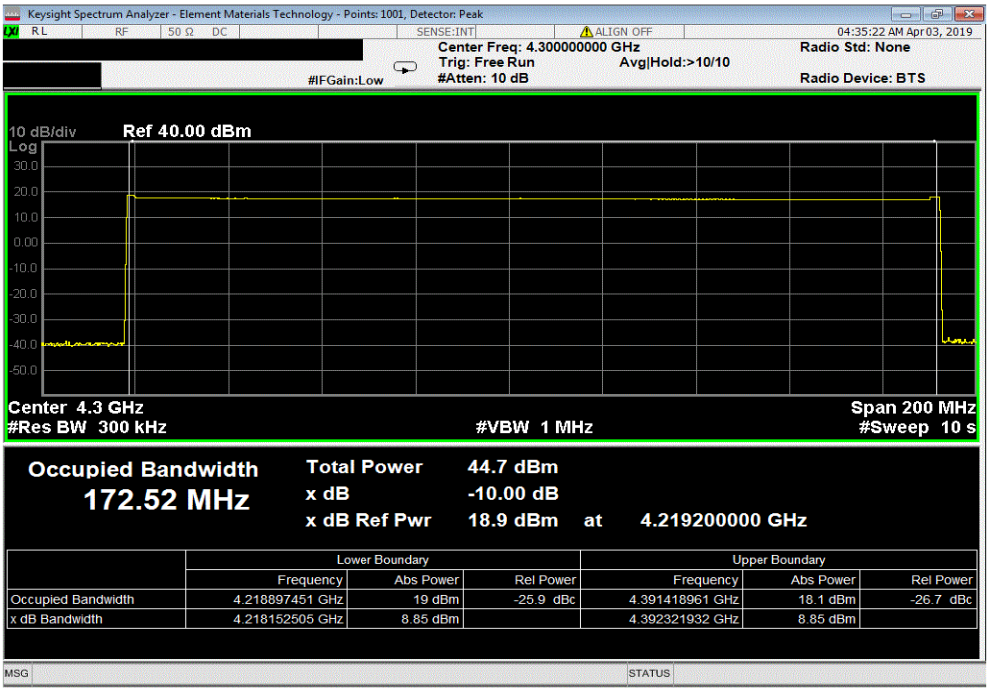
FREQUENCY STABILITY

XMit 2019.05.15

SSID#1 4220-4391 MHz, Extreme Voltage +15%						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4219	4200	4392	4400	0.0	Pass



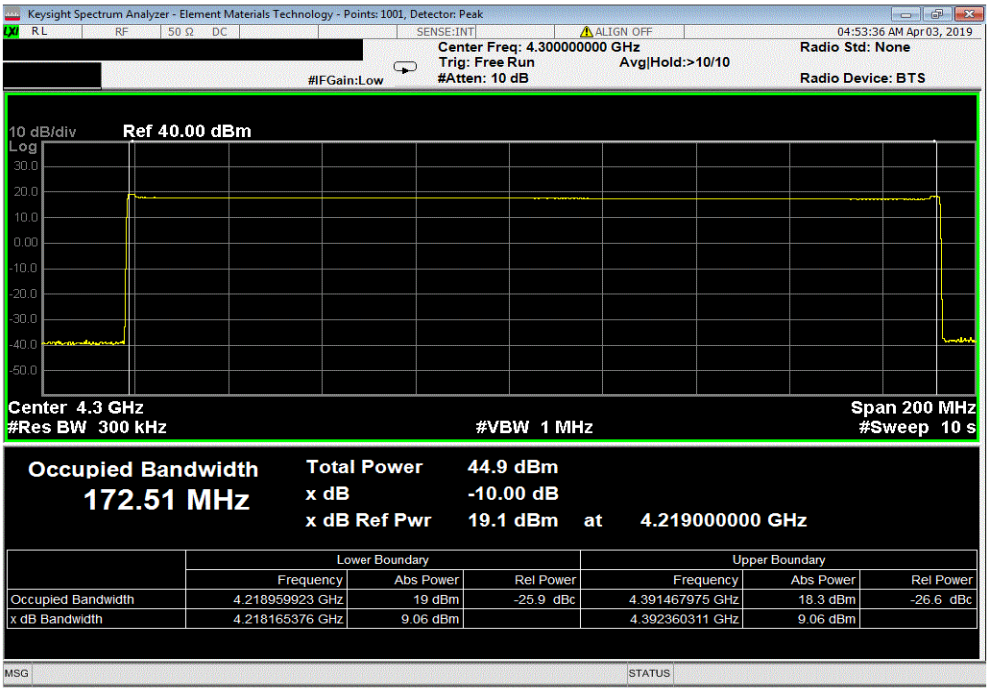
SSID#1 4220-4391 MHz, Extreme Temperature +50°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4219	4200	4391	4400	116.1	Pass



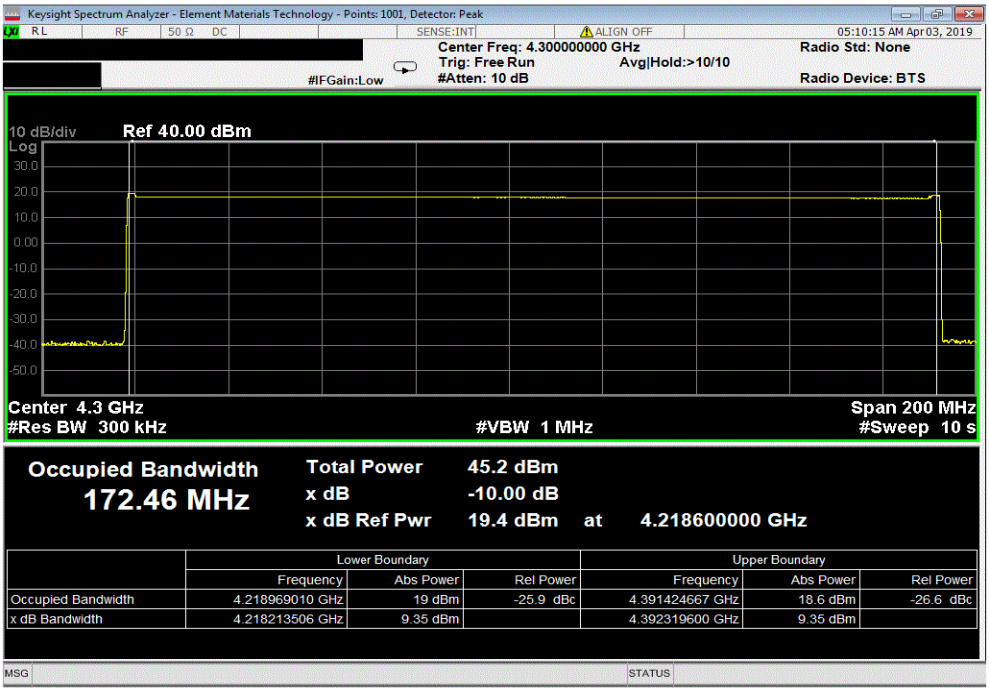
FREQUENCY STABILITY

XMit 2019.05.15

SSID#1 4220-4391 MHz, Extreme Temperature +40°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4219	4200	4391	4400	116.1	Pass



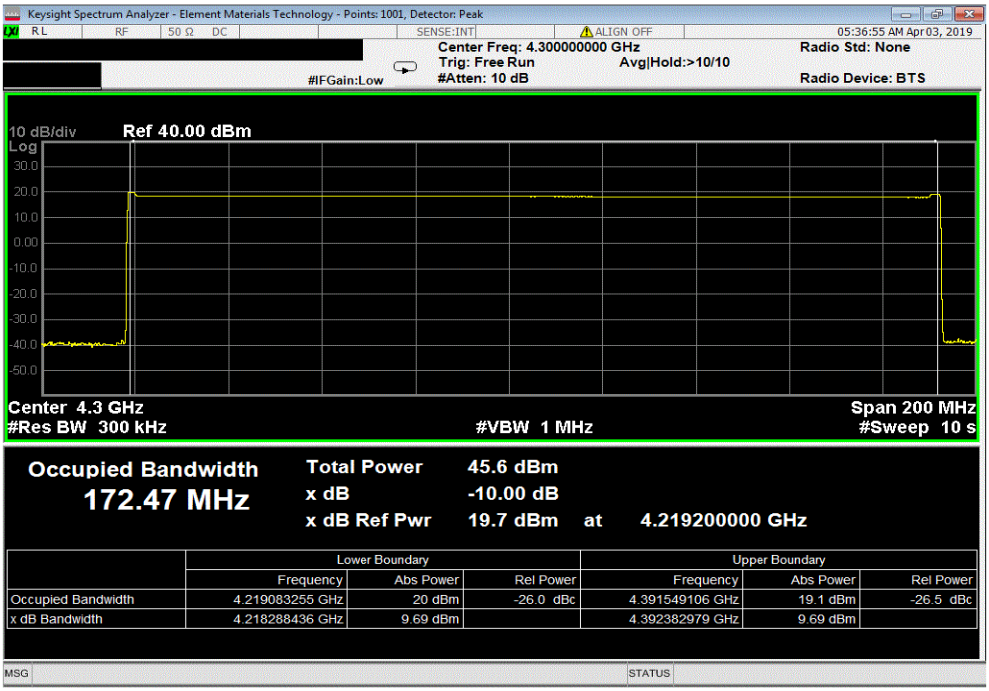
SSID#1 4220-4391 MHz, Extreme Temperature +30°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4219	4200	4391	4400	116.1	Pass



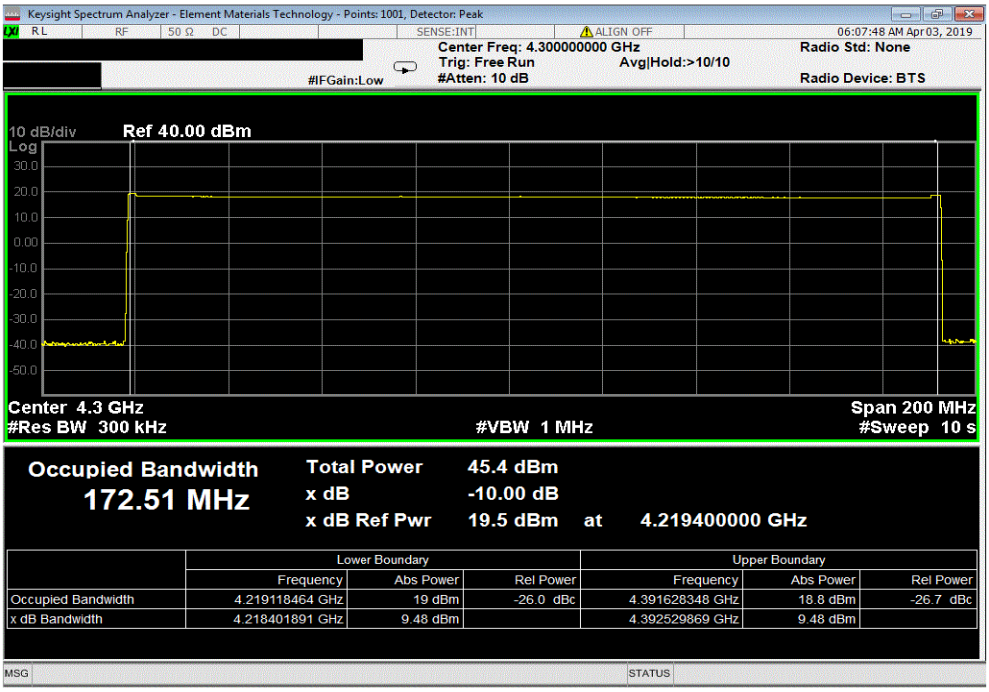
FREQUENCY STABILITY

XMit 2019.05.15

SSID#1 4220-4391 MHz, Extreme Temperature +20°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4219	4200	4392	4400	0.0	Pass



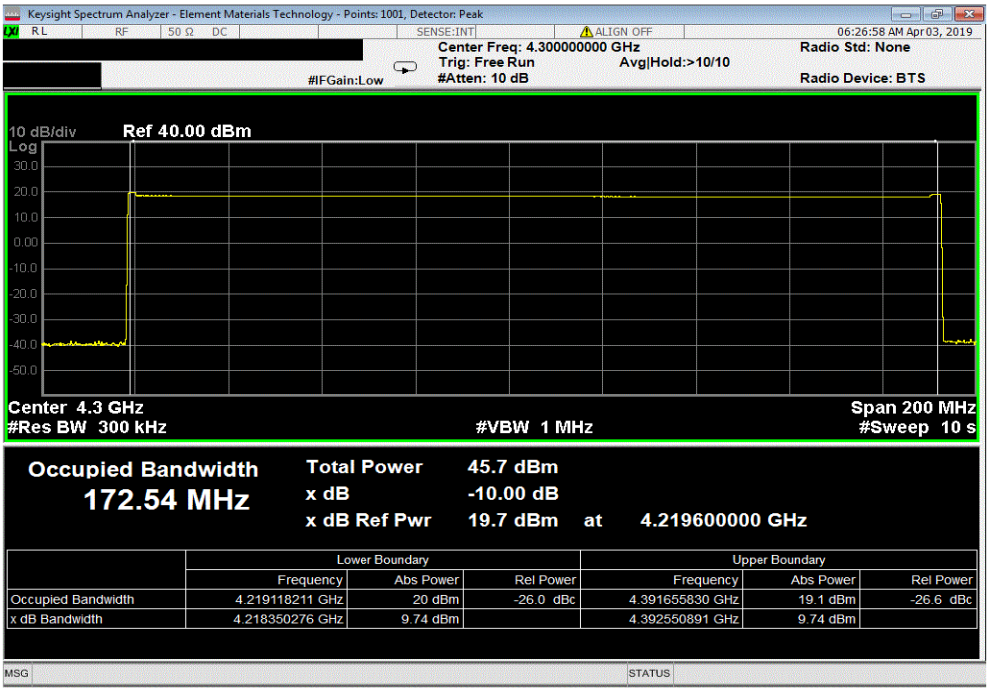
SSID#1 4220-4391 MHz, Extreme Temperature +10°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4219	4200	4392	4400	0.0	Pass



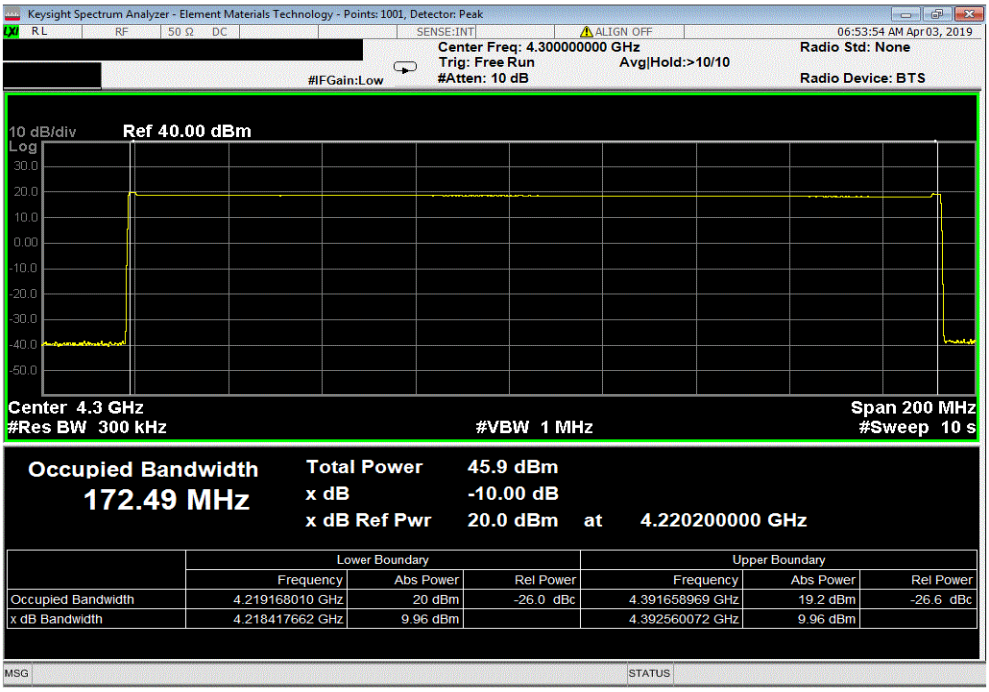
FREQUENCY STABILITY

XMit 2019.05.15

SSID#1 4220-4391 MHz, Extreme Temperature 0°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4218	4200	4392	4400	116.1	Pass



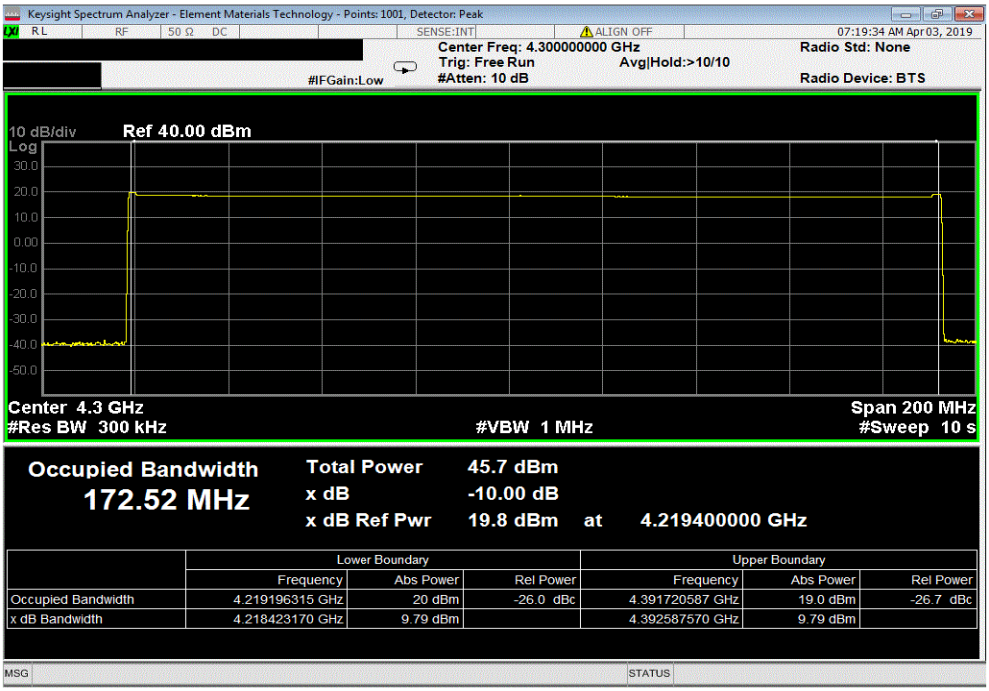
SSID#1 4220-4391 MHz, Extreme Temperature -10°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4219	4200	4392	4400	0.0	Pass



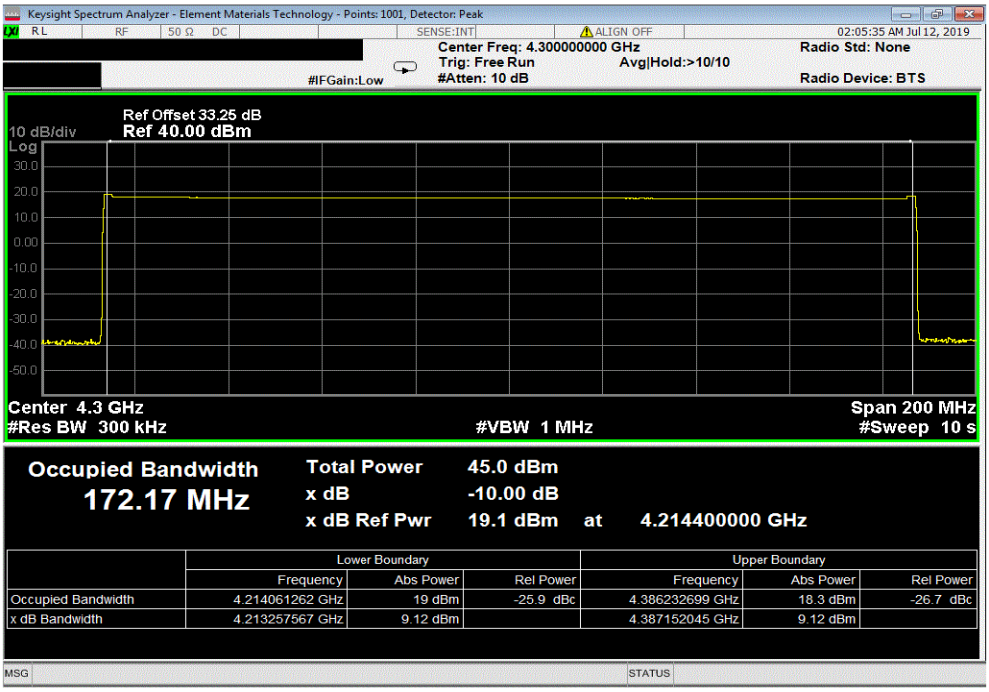
FREQUENCY STABILITY

XMit 2019.05.15

SSID#1 4220-4391 MHz, Extreme Temperature -20°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4219	4200	4392	4400	0.0	Pass



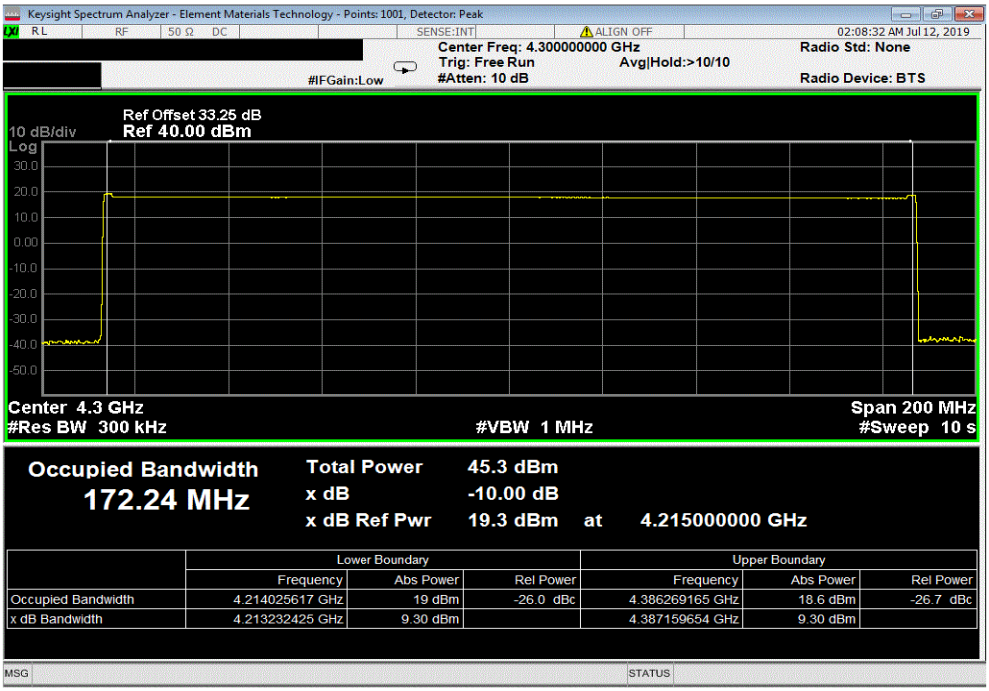
SSID#2 4215-4386 MHz, Normal Conditions						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4215	4200	4386	4400	0.0	Pass



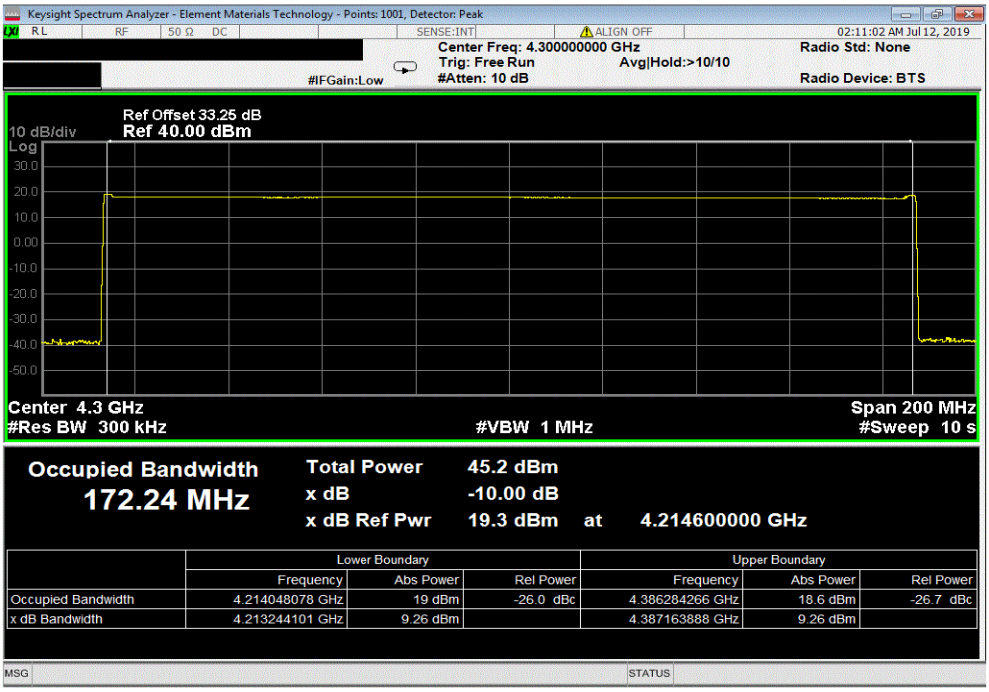
FREQUENCY STABILITY

XMit 2019.05.15

SSID#2 4215-4386 MHz, Extreme Voltage -15%						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4214	4200	4386	4400	116.3	Pass



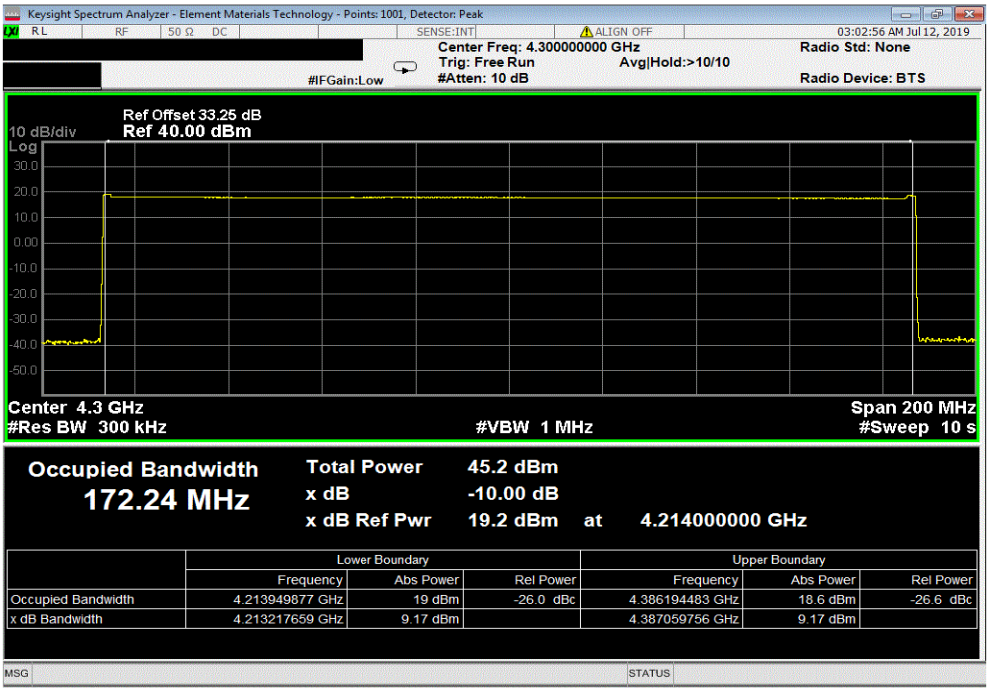
SSID#2 4215-4386 MHz, Extreme Voltage +15%						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4214	4200	4386	4400	116.3	Pass



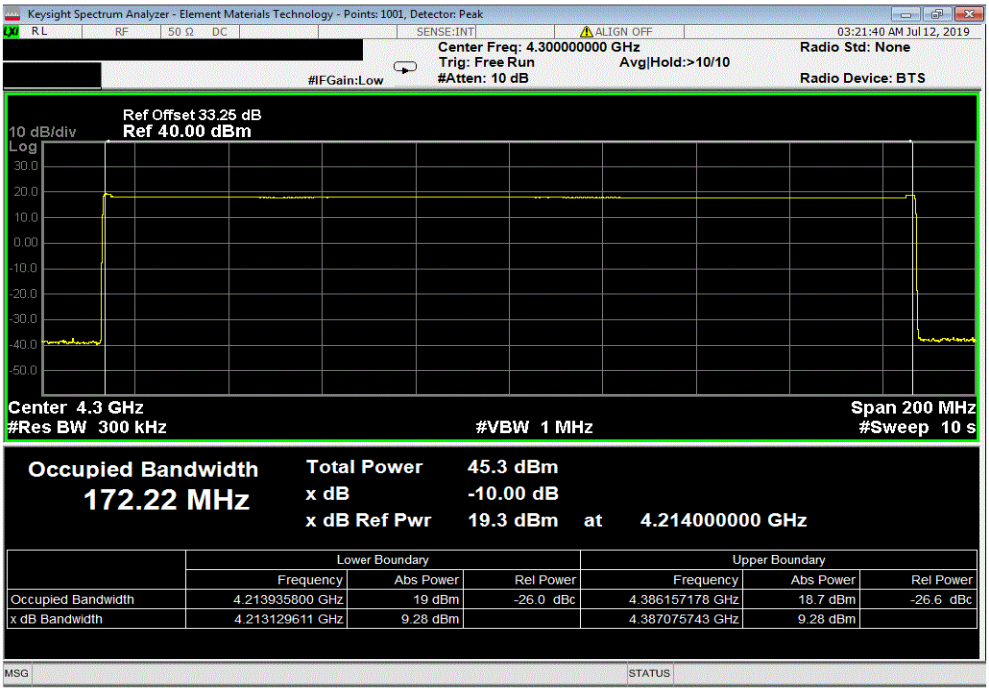
FREQUENCY STABILITY

XMit 2019.05.15

SSID#2 4215-4386 MHz, Extreme Temperature +50°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4214	4200	4386	4400	116.3	Pass



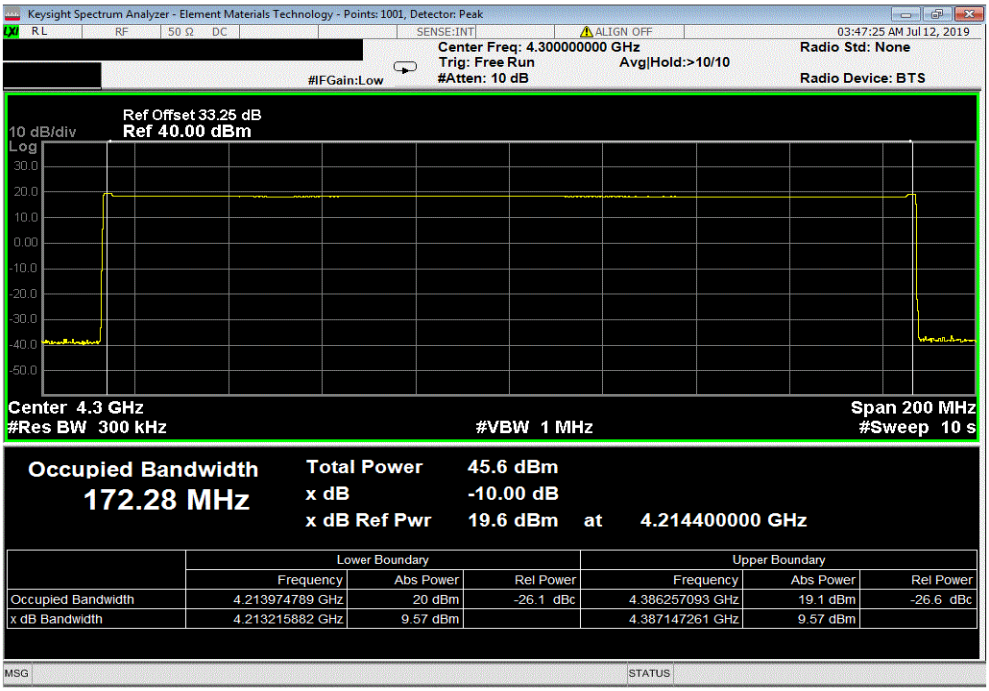
SSID#2 4215-4386 MHz, Extreme Temperature +40°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4214	4200	4386	4400	116.3	Pass



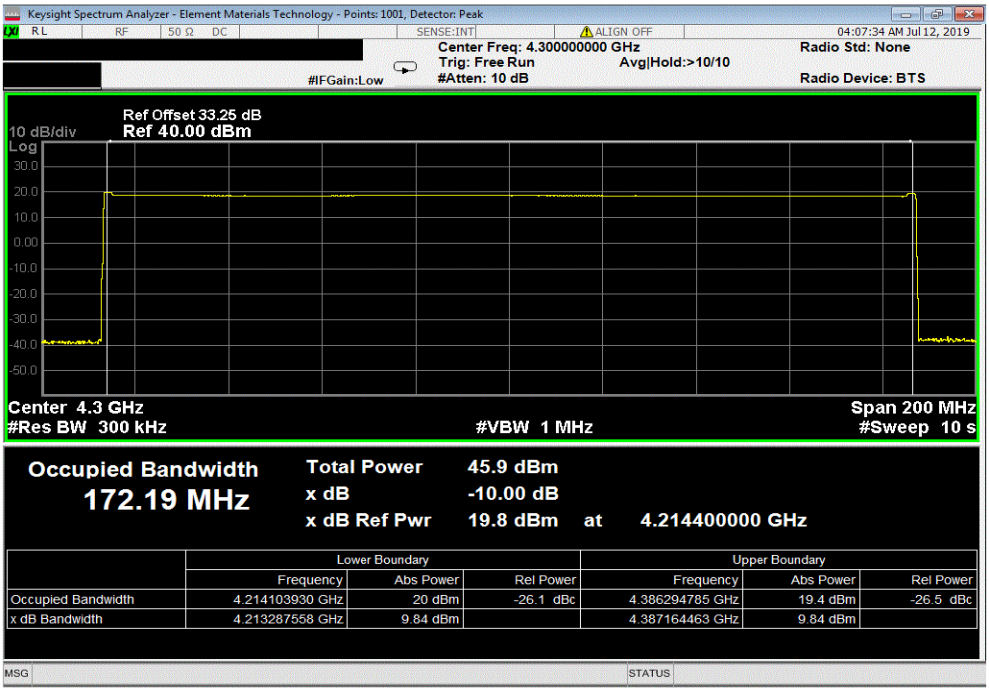
FREQUENCY STABILITY

XMit 2019.05.15

SSID#2 4215-4386 MHz, Extreme Temperature +30°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4214	4200	4386	4400	116.3	Pass



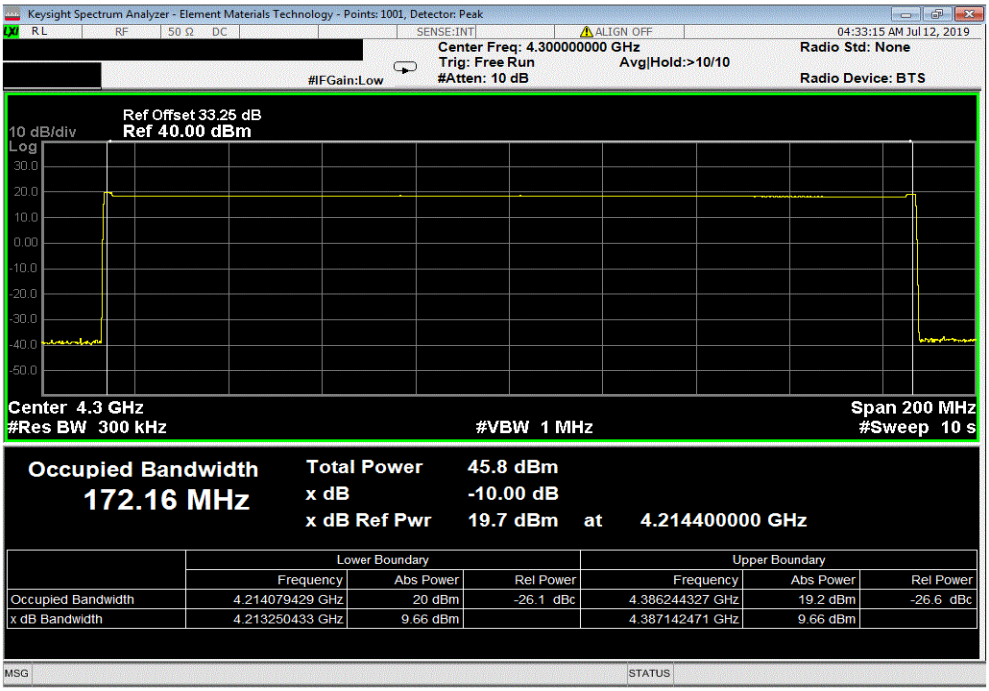
SSID#2 4215-4386 MHz, Extreme Temperature +20°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4214	4200	4386	4400	116.3	Pass



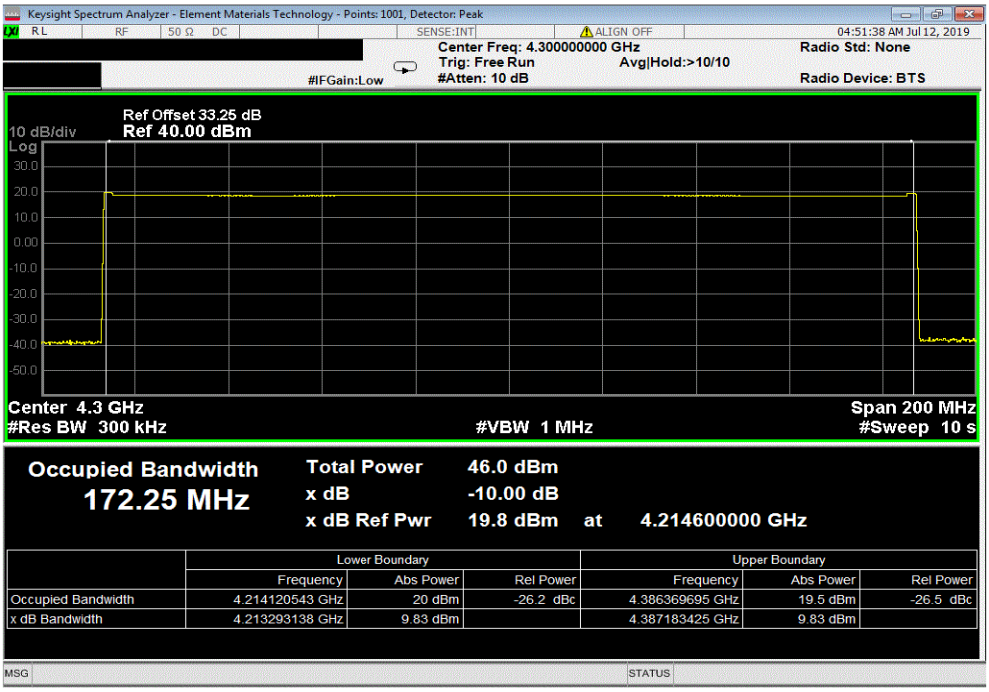
FREQUENCY STABILITY

XMit 2019.05.15

SSID#2 4215-4386 MHz, Extreme Temperature +10°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4214	4200	4386	4400	116.3	Pass



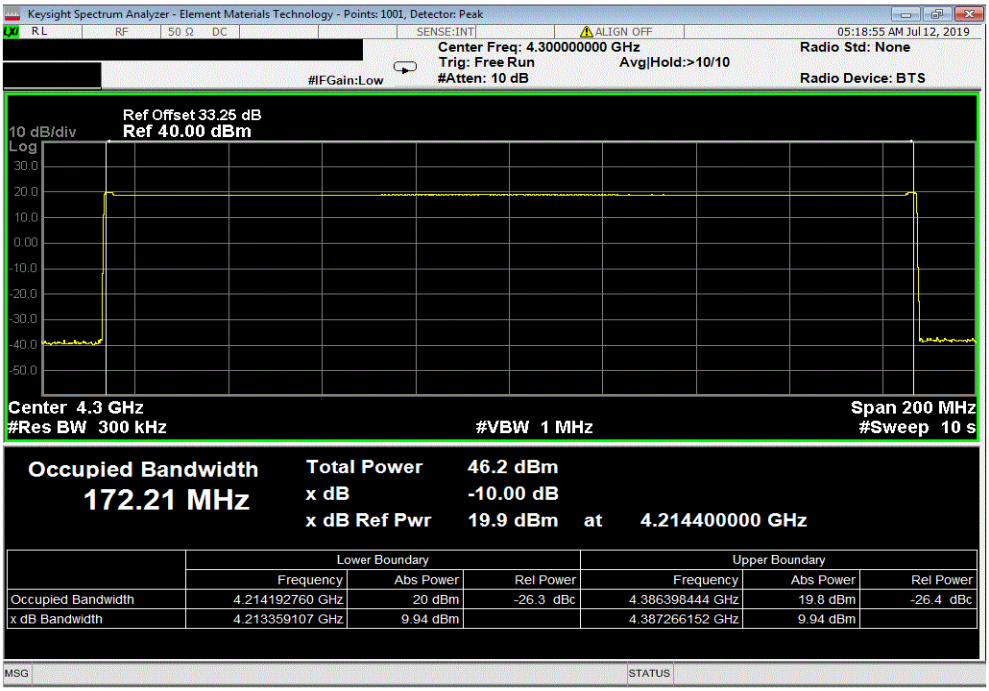
SSID#2 4215-4386 MHz, Extreme Temperature 0°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4214	4200	4386	4400	116.3	Pass



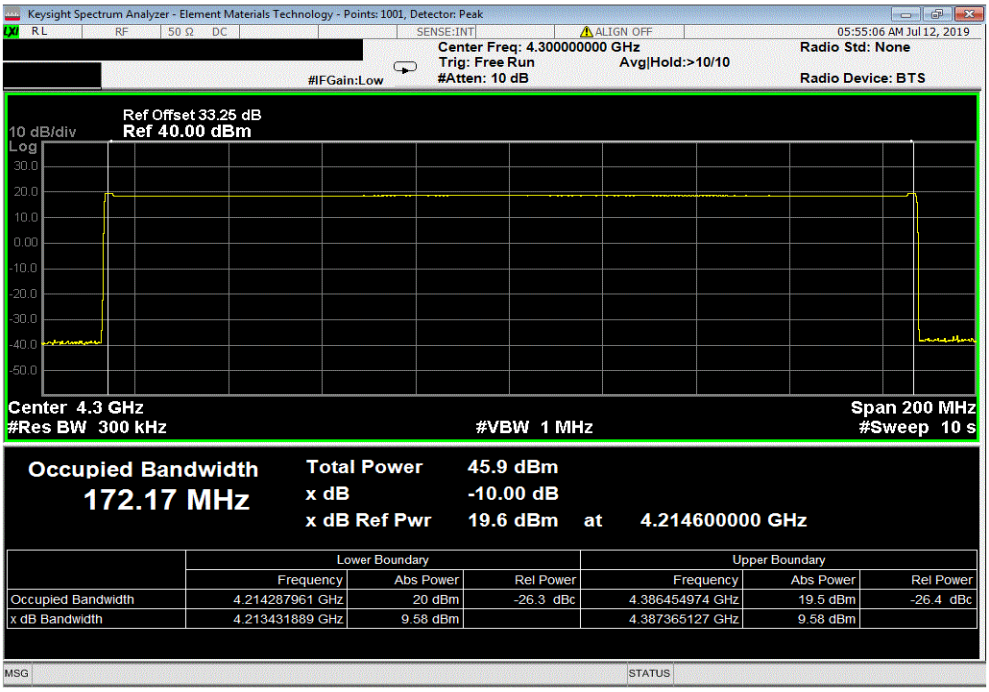
FREQUENCY STABILITY

XMit 2019.05.15

SSID#2 4215-4386 MHz, Extreme Temperature -10°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4214	4200	4386	4400	116.3	Pass



SSID#2 4215-4386 MHz, Extreme Temperature -20°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4214	4200	4386	4400	116.3	Pass

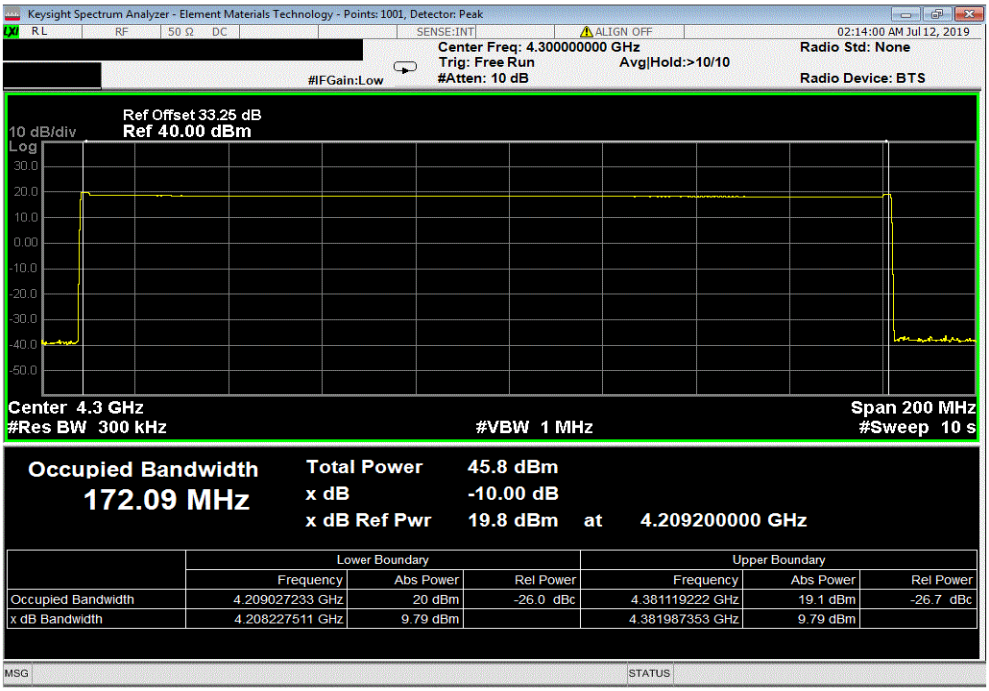


FREQUENCY STABILITY

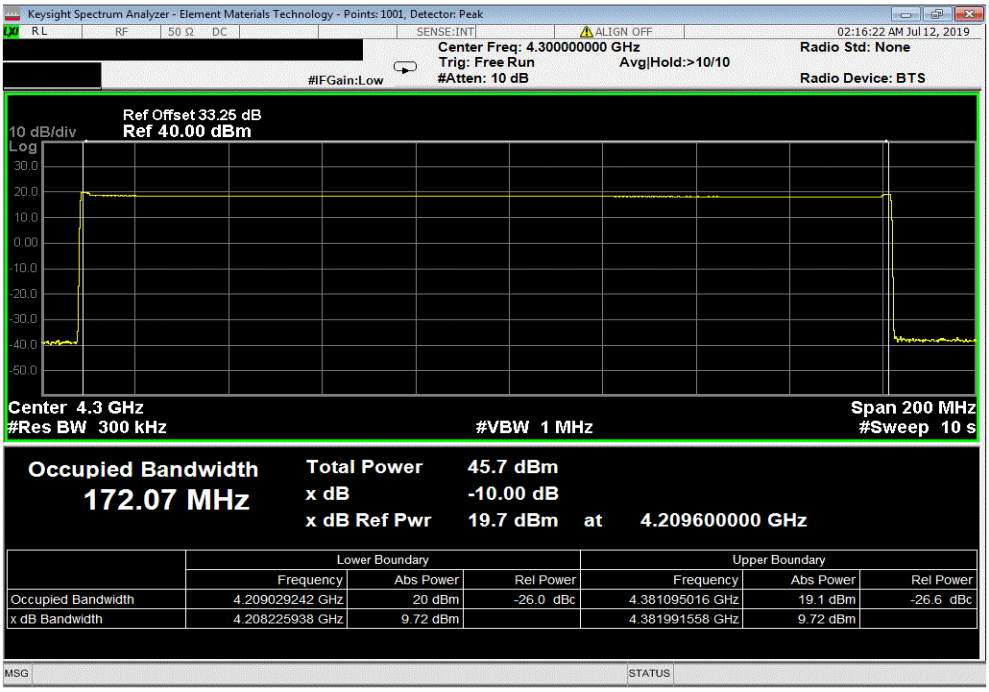
element

XMit 2019.05.15

SSID#3 4210-4381 MHz, Normal Conditions						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4209	4200	4381	4400	116.4	Pass



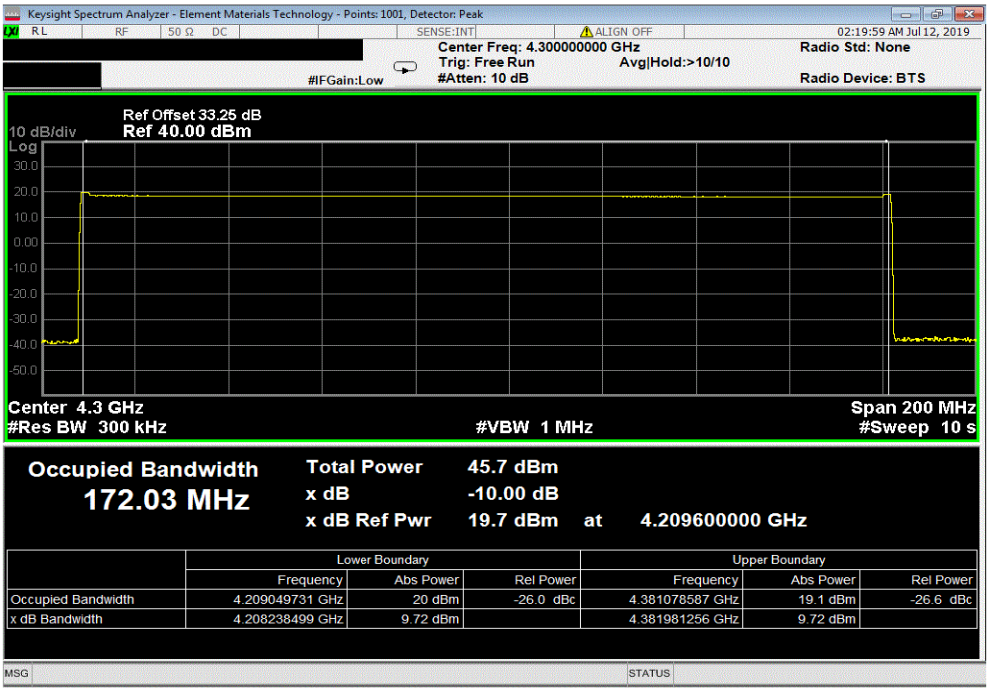
SSID#3 4210-4381 MHz, Extreme Voltage -15%						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4209	4200	4381	4400	116.4	Pass



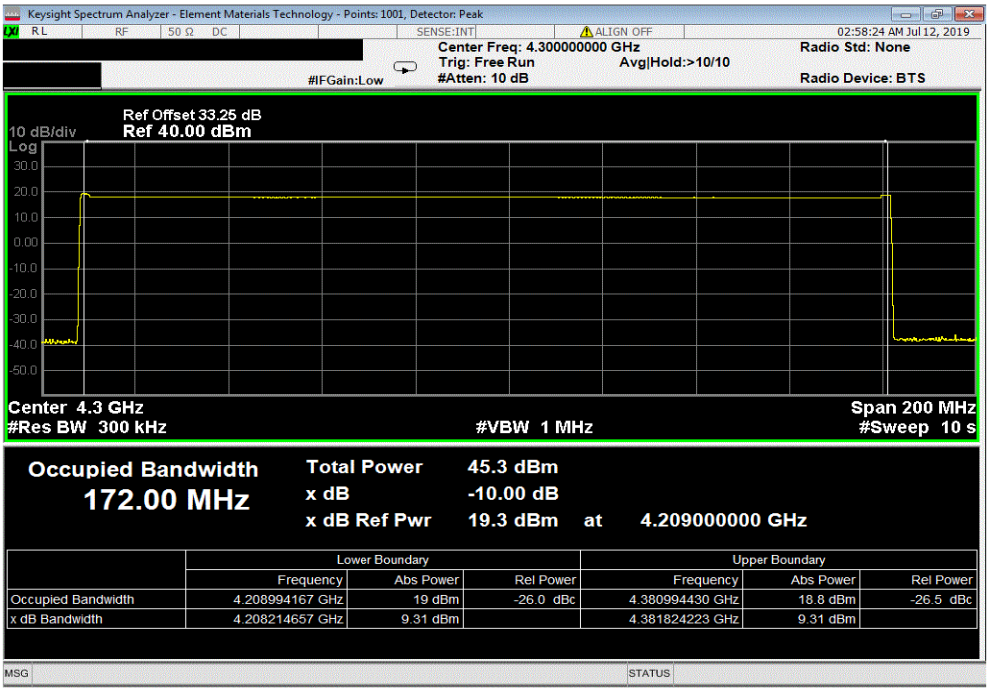
FREQUENCY STABILITY

XMit 2019.05.15

SSID#3 4210-4381 MHz, Extreme Voltage +15%						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4209	4200	4381	4400	116.4	Pass



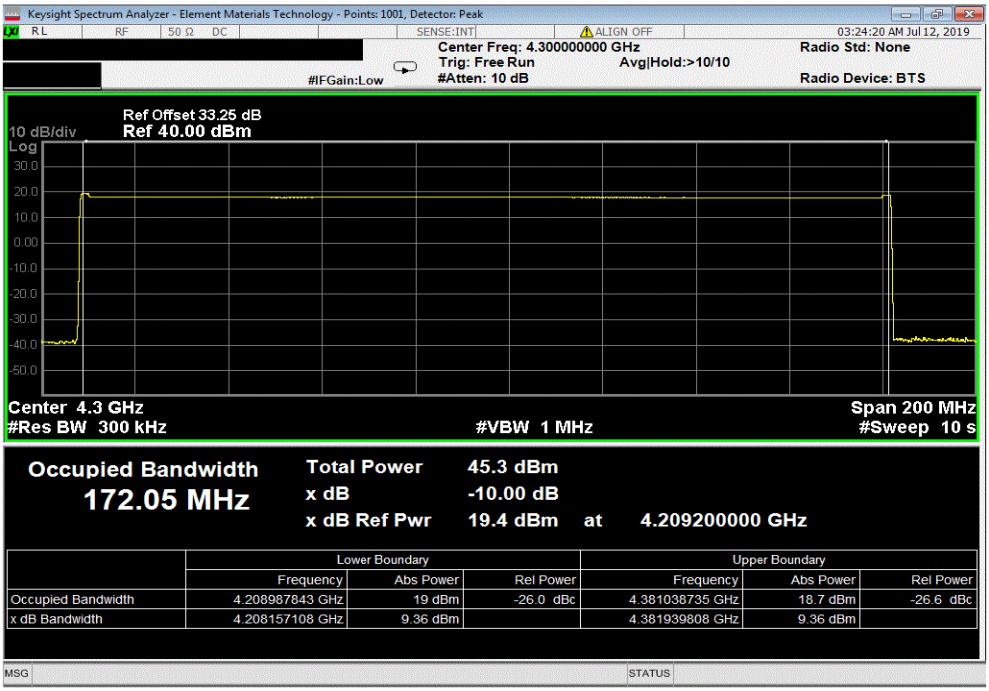
SSID#3 4210-4381 MHz, Extreme Temperature +50°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4209	4200	4381	4400	116.4	Pass



FREQUENCY STABILITY

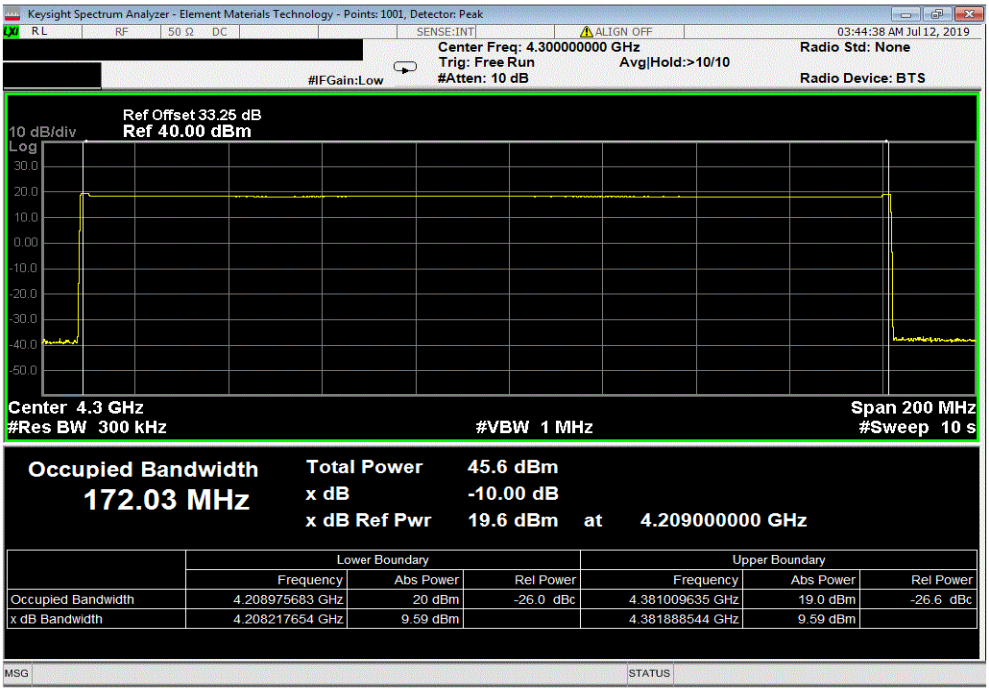
XMit 2019.05.15

SSID#3 4210-4381 MHz, Extreme Temperature +40°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4209	4200	4381	4400	116.4	Pass



	Lower Boundary			Upper Boundary		
	Frequency	Abs Power	Rel Power	Frequency	Abs Power	Rel Power
Occupied Bandwidth	4.208987843 GHz	19 dBm	-26.0 dBc	4.381038735 GHz	18.7 dBm	-26.6 dBc
x dB Bandwidth	4.208157108 GHz	9.36 dBm		4.381939808 GHz	9.36 dBm	

SSID#3 4210-4381 MHz, Extreme Temperature +30°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4209	4200	4381	4400	116.4	Pass

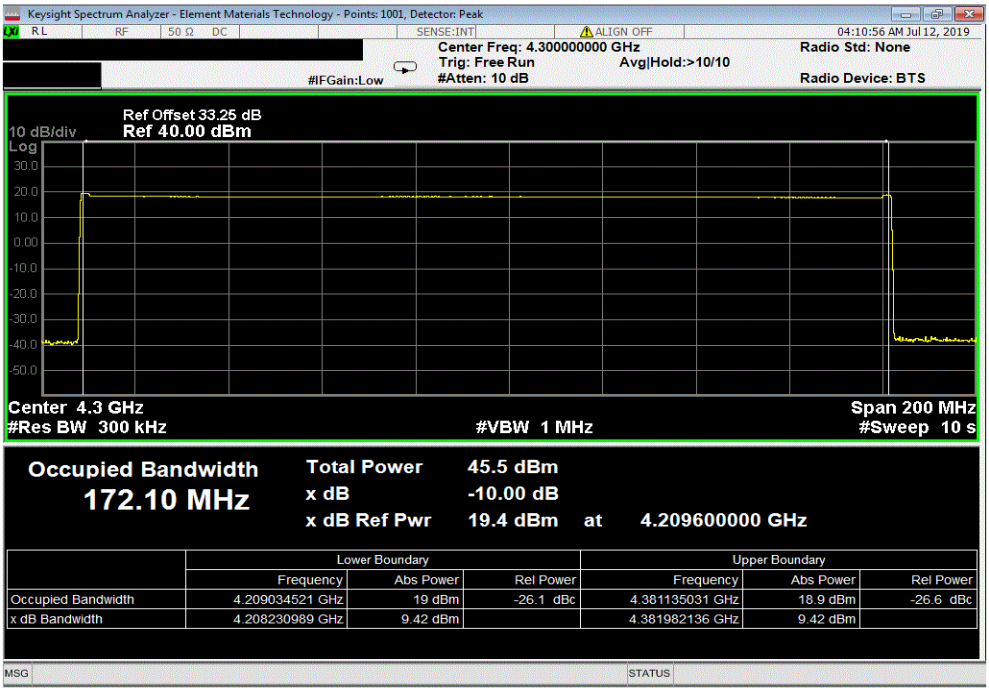


	Lower Boundary			Upper Boundary		
	Frequency	Abs Power	Rel Power	Frequency	Abs Power	Rel Power
Occupied Bandwidth	4.208975683 GHz	20 dBm	-26.0 dBc	4.381009635 GHz	19.0 dBm	-26.6 dBc
x dB Bandwidth	4.208217654 GHz	9.59 dBm		4.381888544 GHz	9.59 dBm	

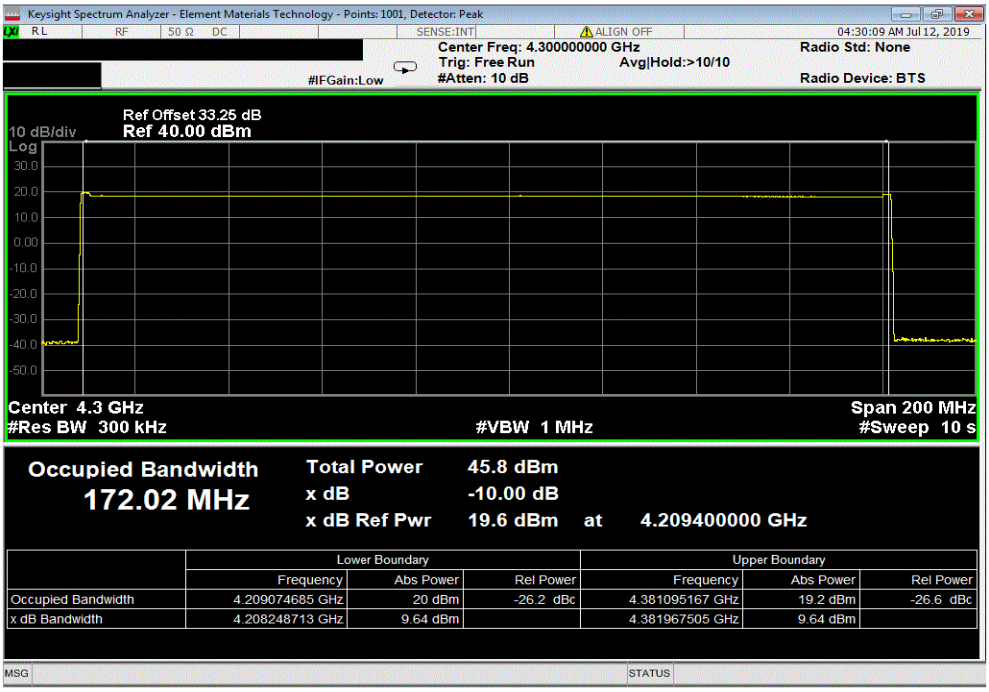
FREQUENCY STABILITY

XMit 2019.05.15

SSID#3 4210-4381 MHz, Extreme Temperature +20°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4209	4200	4381	4400	116.4	Pass



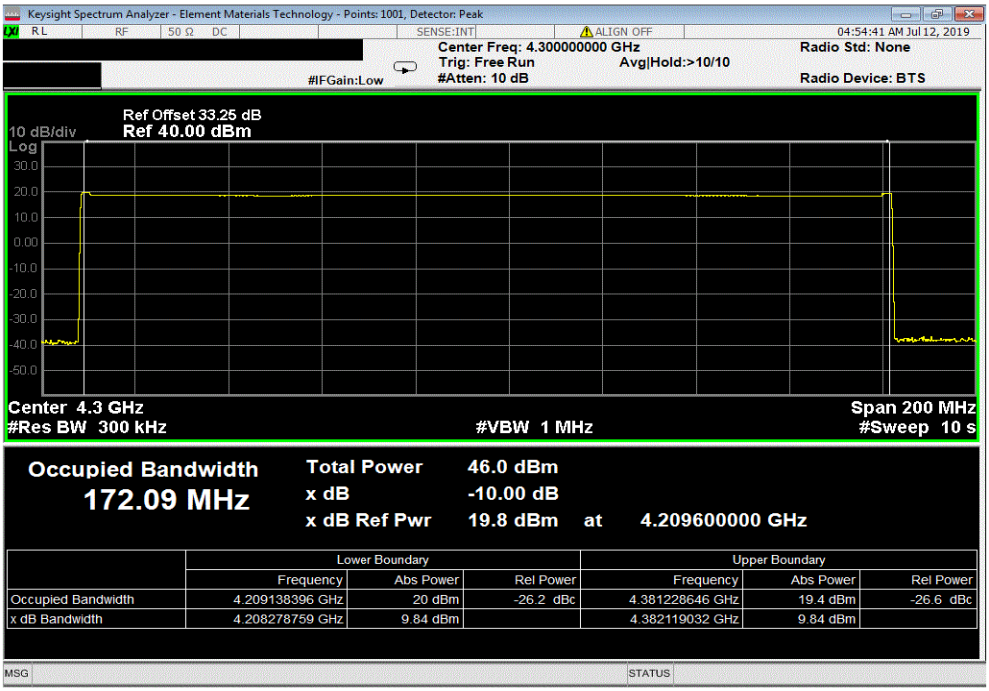
SSID#3 4210-4381 MHz, Extreme Temperature +10°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4209	4200	4381	4400	116.4	Pass



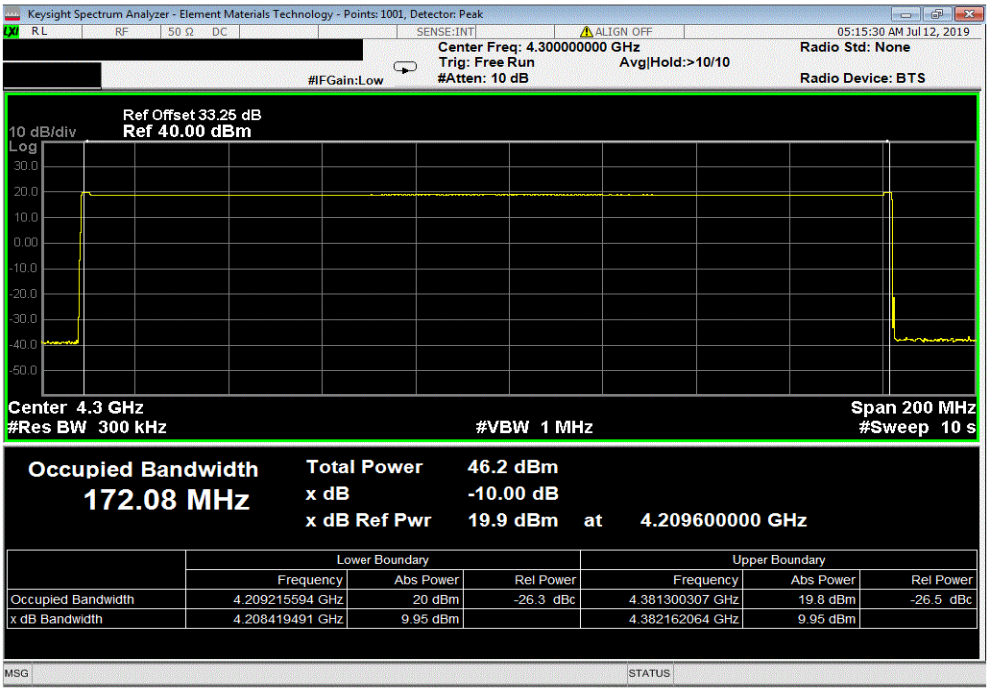
FREQUENCY STABILITY

XMit 2019.05.15

SSID#3 4210-4381 MHz, Extreme Temperature 0°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4209	4200	4381	4400	116.4	Pass



SSID#3 4210-4381 MHz, Extreme Temperature -10°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4209	4200	4381	4400	116.4	Pass



SSID#3 4210-4381 MHz, Extreme Temperature -20°C						
	Lower Value (MHz)	Lower Limit (MHz)	Upper Value (MHz)	Upper Limit (MHz)	Freq Tolerance (ppm)	Result
	4209	4200	4381	4400	116.4	Pass