

Honeywell SARA

FCC Part 87:2019
Aviation Altimeter

Report # HNYE0001 Rev. 1







CERTIFICATE OF TEST



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

Radio Equipment Testing

Standards

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

Results

itocait	•			
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.

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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

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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

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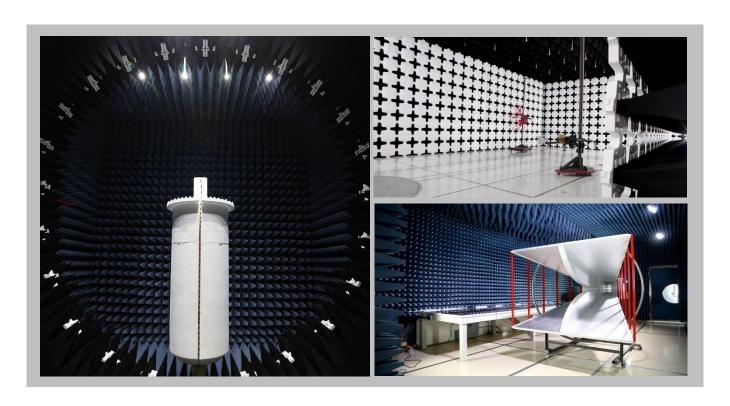
FACILITIES







California Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Oregon Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Texas Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Washington Labs NC01-05 19201 120 th 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			
Re	Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA						
US0158	US0175	US0017	US0191	US0157			



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MEASUREMENT UNCERTAINTY



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.

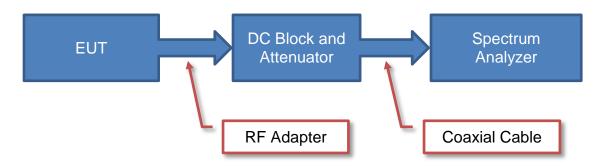
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%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

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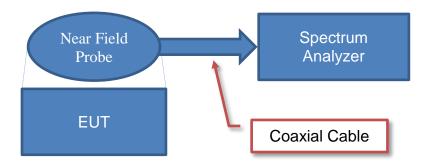
Test Setup Block Diagrams



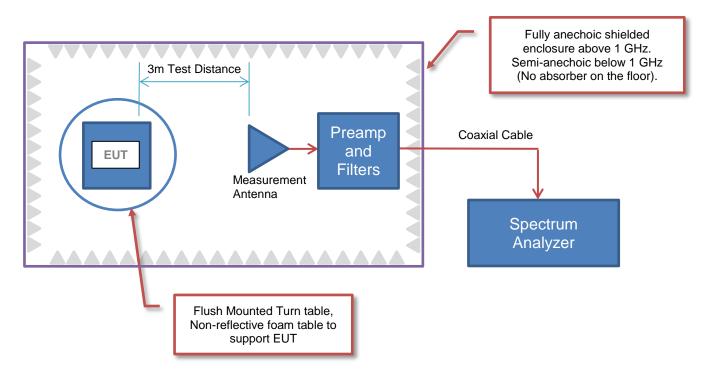
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



Spurious Radiated Emissions



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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.

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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

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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			

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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		

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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			

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MODIFICATIONS



Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT	
			Tested as	No EMI suppression	EUT remained at	
1	2019-04-01	Emissions Mask	delivered to	devices were added or	Element following	
			Test Station.	modified during this test.	the test.	
		Frequency	Tested as	No EMI suppression	EUT remained at	
2	2019-07-11	Stability	delivered to	devices were added or	Element following	
		Stability	Test Station.	modified during this test.	the test.	
			Tested as	No EMI suppression	EUT remained at	
3	2019-07-12	Output Power	delivered to	devices were added or	Element following	
			Test Station.	modified during this test.	the test.	
		Occupied Bandwidth	Tested as	No EMI suppression	EUT remained at	
4	2019-07-12		delivered to	devices were added or	Element following	
		Dandwidth	Test Station.	modified during this test.	the test.	
		Spurious	Tested as	No EMI suppression	EUT remained at	
5	2019-07-12	Emissions at	delivered to	devices were added or	Element following	
	Antenna	Test Station.	modified during this test.	the test.		
		Field Strength of	Tested as	No EMI suppression	Scheduled testing	
6	2019-07-12	9-07-12 Spurious	delivered to	devices were added or	was completed.	
		Emissions	Test Station.	modified during this test.	was completed.	

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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 sensitivity 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.



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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		Pov	wer: 28VDC			Job Site:	MN02	
TEST SPECIFICAT	IONS			Test Method					
FCC 87.131:2019				ANSI TIA-603-E:2016	i				
COMMENTS									
	ropriate standards during	the certification process." Power limit	t is based on r	ated power value provide	ed by the manufa	acturer (+19 dBm ±	2 dB = 79.4 mW)	·	•
None									
Configuration #	See Comments	7							
J	occ comments	Signature	Lyla	makela					
	occ comments	Signature	ryle	Peak	Peak	Average	Average	Average	
	occ comments	Signature	ryer		Peak Value (W)	Average Factor	Average Value (mW)	Average Limit (mW)	Result
SSID#1 4220-4391 I		Signature	ry to	Peak					Result Pass
SSID#1 4220-4391 SSID#2 4215-4386	MHz	Signature	tyte	Peak Value (dBm)	Value (W)	Factor	Value (mW)	Limit (mW)	
	MHz MHz	Signature	tryth	Peak Value (dBm) 19.57	Value (W) 0.0906	Factor 0.00406	Value (mW) 0.368	Limit (mW) 79.4	Pass

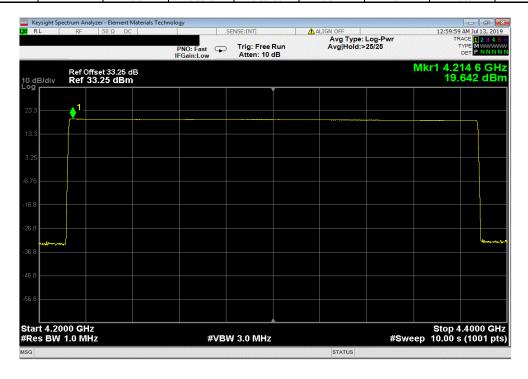
Report No. HNYE0001 15/58



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



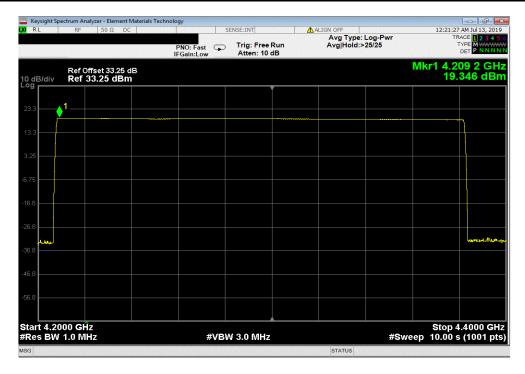
		SSI	D#2 4215-4386 I	MHz		
	Peak	Peak	Average	Average	Average	
	 Value (dBm)	Value (W)	Factor	Value (mW)	Limit (mW)	Result
İ	19.64	0.0920	0.00406	0.374	79.4	Pass



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



Report No. HNYE0001 17/58



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.



EUT: SARA
Serial Number: 00204
Customer: Honeywell
Attendees: Karim Habib
Project: None
Tested by: Kyle McMullan
TEST SPECIFICATIONS Work Order: HNYE0004
Date: 12-Jul-19
Temperature: 22.5 °C Humidity: 58.3% RH Barometric Pres.: 1015 mbar Power: 28VDC Test Method Job Site: MN02 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 Knyli Configuration # See Comments Signature 99% Occupied Bandwidth (MHz) 172.50 Upper Value (MHz) 4391 Upper Limit (MHz) 4400 Lower Value (MHz) Lower Limit (MHz) Result Pass 4214 4386 Pass Pass SSID#2 4215-4386 MHz 172.17 4200 4400 SSID#3 4210-4381 MHz 172.09 4209 4200 4381 4400

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SSID#1 4220-4391 MHz
99% Occupied Lower Lower Upper Upper
3andwidth (MHz Value (MHz) Limit (MHz) Value (MHz) Limit (MHz) Result
172.50 4219 4200 4391 4400 Pass



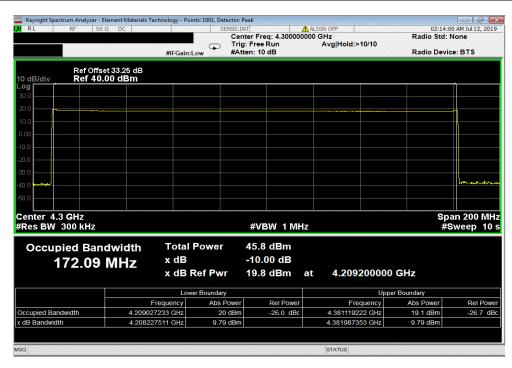
		SSI	D#2 4215-4386 N	ИHz		
	99% Occupied	Lower	Lower	Upper	Upper	
	3andwidth (MHz	Value (MHz)	Limit (MHz)	Value (MHz)	Limit (MHz)	Result
	172.17	4214	4200	4386	4400	Pass



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



Report No. HNYE0001 21/58



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 500	000 MHz
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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	Peak Data	Quasi-Peak Data	Average Data
(MHz)	(kHz)	(kHz)	(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

Report No. HNYE0001 22/58

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.



															EmiR	5 2018.09	9.26		PSA-E	SCI 2019.
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		Project:		_	Те	mpera			22.1			12	24	h		1112	-	me	Ta	_
		Job Site: Number:			Barom		nidity		23.79 1020				Tool	ad by	ll/vl/	. 1/01	Aude	. n		
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Co	onfic	uration																		
			Honeywell																	
	Att	endees	Karim Habi	ib																
	EUT	Power:	28VDC																	
Ope	ratin	g Mode:	SSID #1, F	MCW from	1 4220-439	91 MH	Z.													
	De	viations																		
	Coi	mments	Isolation filt This 30.3 d					value	e calcula	ated v	/ith r	eference	to mea	asured	fund	lamei	ntal v	value (of 30.5	3 dBr
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		cations (a):2019										603-E:20	16							
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Run	1#	18	l est Dis	tance (m)	3	Ar	itenn	а не	ght(s)			1 to 4(m	1)		K	esult	S		Pass	
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		Freq	Antenna Height	Azimuth	Туре	De	tector		EIRP	EIR		Spec. Limit	t S	Spec.			C	commer	ts	
		(MHz)	(meters)	(degrees)				(1	Watts)	(dBı	n)	(dBc)		(dBc)						
		4801.250	2.7	336.0	Vert		PK	4.3	34E-05	-13	.6	-9.7		-3.9	EUT	Horz				
		3792.883	1.0	51.0	Vert	I	PK		9E-05	-14		-9.7		-5.1		Horz				
		4502.900	1.0	307.9	Vert		PK		3E-05	-15		-4.7		10.6		Horz				
		4097.733	1.0	232.9	Vert		PK		0E-05	-16		-4.7 5.2		11.3		Horz				
		4403.850 4191.433	1.0 1.0	329.9 192.9	Vert Vert		PK PK		9E-05 0E-05	-14 -15		5.3 5.3		20.1 20.5		Horz				
		4240.333	1.4	77.9	Vert		PK PK		6E+00	30.		o.s N/A		N/A			Ref /	Only, dE	c Ref	Value
		4231.667	1.3	78.9	Horz		PK		5E-01	29		N/A		N/A				Ref Only		
		4264.000	3.9	350.0	Vert		PK	6.7	'2E-02	18		N/A		N/A		Vert,		-		
		4250.333	3.9	52.0	Horz		PK		2E-02	15		N/A		N/A		Vert,				
		4264.000	3.9	350.0	Vert	 	PK	6.7 3.5 2.0	'2E-02	18	.3 .5 .1	N/A		N/A	EUT EUT	Vert, Vert,	Ref C Ref C ide, R	Only Only Ref Only		

Report No. HNYE0001 24/58



Work Order:	\A/ ₄	ouls Oudou	HNYE0004		Date:	40 lu	2010			EmiR5 2019.05.20	F	PSA-ESCI 2019.05.10
Serial Number Serial Properties Serial Number Serial	VVC			т.				7/	1	ma	mel	m
Serial Number: Go215 Barometric Press: 1015 mbar Tested by: Kyle McMullan				•					7			
Configuration 2 Customer	Seria			Baror					Tested by:	Kyle McMu	llan	
Customer:									•	, , , , , ,		
### Attendees: Karim Habib EUT Power: 28VDC Operating Mode: Deviations: SSID #2, FMCW from 4214-4386 MHz.												
Comments												
Deviations None SSID #2, FMCW from 4214-4386 MHz.												
None Solation 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.	El	UT Power:										
Solation filter and box not in line. dBc limit value calculated with reference to measured fundamental value of 30.3 dBm ralue of 30.3 dBm value is for reference only. Fest Specifications	Operat	ing Mode:	SSID #2, FMCW	from 4214-43	386 MHz.							
Title Titl	D	eviations:										
Run # 0 Test Distance (m) 3 Antenna Height (s) 1 to 4(m) Results Pass	C	omments:				alue calcul	ated with re	eference to	measured	fundamenta	ll value of 3	30.3 dBm.
Run # 0 Test Distance (m) 3 Antenna Height (s) 1 to 4(m) Results Pass	Test Spec	ifications					Tost Moth	nod				
Run # 0 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Results Pass	ECC 07 12	0(0):2010										
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-20 -30 -40 -50 3600 MHz Polarity/ Transducer Type Detector EIRP (valts) (dBm) (0 -											
-20 -30 -40 -50 3600 MHz Polarity/ Transducer Type Detector EIRP (valts) (dBm) (_											
-20 -30 -40 -50 3600 MHz Polarity/ Transducer Type Detector EIRP (valts) (dBm) (ă ,											
-20 -30 -40 -50 3600 MHz Freq (MHz) Antenna Height (degrees) Polarity/ Transducer Type Detector EIRP (Watts) (dBm) Compared to Spec. Limit (dBm)	5 -10 -											
-20 -30 -40 -50 3600 MHz Freq (MHz) Antenna Height (degrees) Polarity/ Transducer Type Detector EIRP (Watts) (dBm) Compared to Spec. Limit (dBm)			_		_							
-30 -40 -40 -50 3600 MHz MHz Freq (MHz)	-20							_				
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-50 MHz Freq (MHz) Antenna Height (degrees) PK AZimuth (degrees) PK (dBm) PK AZimuth (dB												
-50 MHz Freq (MHz) Antenna Height (degrees) PK AZimuth (degrees) PK (dBm) PK AZimuth (dB	-40											
## PK	-40											
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Freq (MHz)	-50											
Freq (MHz)	36	00						4	4600			
Freq (MHz)						MHz				■ DV	Δ Δ1/	• OP
Freq (MHz)										■ FN	▼ AV	→ ₩ Γ
Freq (MHz)									0			
(MHz) (meters) (degrees) Watts (dBm) (dBm) (dBm) (dB) 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		Freg	Antenna Height Azimi			EIRP	EIRP	Spec. Limit			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					20.00.01							
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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												
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												
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												
		4186.667	1.5 73.	0 Vert	PK	16.5E-6	-17.8	5.3	-23.1			
4307.980 1.4 261.0 Vert PK 1.1E+0 30.3 N/A N/A EUT Horz, Ref Only, dBc Ref Value												5 ()(:
		4307.980	1.4 261	.u Vert	PK	1.1E+0	30.3	N/A	N/A	EU1 Horz, Re	er Only, dBc	ket value

Report No. HNYE0001 25/58



										EmiR5 2019.05.20		PSA-ESCI 2019.05.10
Wo	ork Order:			-	Date:			7/		ne	mel	
	Project: Job Site:				nperature: Humidity:			12	yla	Ma	mer	m
Serial	Number:				etric Pres.:	1015			Tested hy	Kyle McMi	ıllan	
Jeriai		SARA	10	Daionic	, IIIC I 1 C 3	1013	IIIDai		rested by.	Tryle Micivit	aliai i	
Confi	iguration:											
		Honeywell										
		Karim Habi	b									
	JT Power:											
Operati	ng Mode:	SSID #3, FI	MCW from	4210-438	1 MHz.							
De	eviations:	None										
Co	omments:	Isolation filt This 30.2 d				value calcul	ated with r	eference to	measured	fundament	al value of	30.2 dBm.
Test Speci	fications						Test Meth	od				
FCC 87.13								603-E:2016	}			
Run#	1	Test Dis	tance (m)	3	Antenna	a Height(s)		1 to 4(m)		Results	l P	ass
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360	00	3800		4000	420	00	4400		4600	4800)	5000
						MHz						
										■ PK	◆ AV	QP
				Polarity/ Transducer					Compared to			
	Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	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 4154.533	1.5 1.5	73.0 128.9	Vert Vert	PK PK	15.0E-6 16.5E-6	-18.2 -17.8	-4.8 5.2	-13.4 -23.0	EUT horz EUT horz		
	4425.600	1.5	250.9	Vert	PK	16.3E-6	-17.6 -17.9	5.2	-23.0 -23.1	EUT horz		
	4238.260	1.3	257.9	Vert	PK	1.0E+0	30.2	N/A	N/A		tef Only, dBc	Ref Value

Report No. HNYE0001 26/58



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 sensitivity 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.

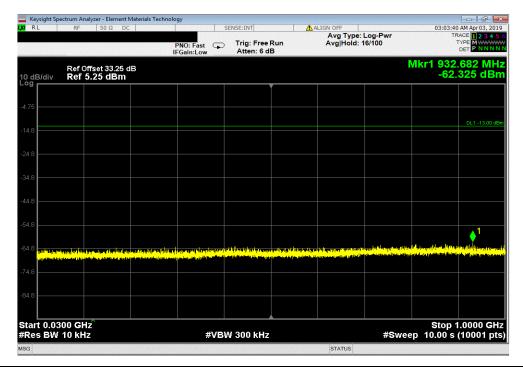


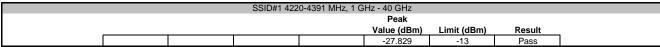
EUT:	SARA				Work Order:		
Serial Number:						12-Jul-19	
Customer:	Honeywell				Temperature:		
	Karim Habib					57.8% RH	
Project:					Barometric Pres.:		
	Kyle McMullan		Power:	28VDC	Job Site:	MN02	
TEST SPECIFICAT	TIONS			Test Method			
FCC 87.139:2019				ANSI TIA-603-E:2016			
COMMENTS							
Isolation filter and	box not in line. Configura	ation HNYE0001-2 used for SSID#1,	configuration HNYE0	004-1 used for SSID#2 and SSI	D#3.		
	· ·		· ·				
DEVIATIONS FROM	M TEST STANDARD						
None							
			7/ 2 7	2. 16.00			
Configuration #	See Comments		Knyle 1	Mathellan			
Configuration #	See Comments	Signature	Veryla 11.	Milla			
Configuration #	See Comments	Signature	Knyler 11	Malla	Peak		
· ·		Signature	Knylo W	Malla	Peak Value (dBm)	Limit (dBm)	Result
Configuration # SSID#1 4220-4391	MHz	Signature	Vryle M	Malla	Value (dBm)	` '	
· ·	MHz 30 MHz - 1 GHz	Signature	Knyler 11	Milla	-62.325	-13	Pass
SSID#1 4220-4391	MHz 30 MHz - 1 GHz 1 GHz - 40 GHz	Signature	Vryle W	Malla .	Value (dBm)	` '	
· ·	MHz 30 MHz - 1 GHz 1 GHz - 40 GHz MHz	Signature	Knylir W	Mille	-62.325 -27.829	-13 -13	Pass Pass
SSID#1 4220-4391	MHz 30 MHz - 1 GHz 1 GHz - 40 GHz MHz 30 MHz - 1 GHz	Signature	Voylo W	Malla	Value (dBm) -62.325 -27.829 -61.045	-13 -13	Pass Pass Pass
SSID#1 4220-4391 SSID#2 4215-4386	MHz 30 MHz - 1 GHz 1 GHz - 40 GHz MHz 30 MHz - 1 GHz 1 GHz - 40 GHz	Signature	Knyli M	Milla	-62.325 -27.829	-13 -13	Pass Pass
SSID#1 4220-4391	MHz 30 MHz - 1 GHz 1 GHz - 40 GHz MHz 30 MHz - 1 GHz 1 GHz - 40 GHz MHz	Signature	Vnylo W	Miller	Value (dBm) -62.325 -27.829 -61.045 -26.497	-13 -13 -13 -13	Pass Pass Pass Pass
SSID#1 4220-4391 SSID#2 4215-4386	MHz 30 MHz - 1 GHz 1 GHz - 40 GHz MHz 30 MHz - 1 GHz 1 GHz - 40 GHz MHz 30 MHz - 1 GHz	Signature	Knyli W	Malla	Value (dBm) -62.325 -27.829 -61.045	-13 -13	Pass Pass Pass
SSID#1 4220-4391 SSID#2 4215-4386	MHz 30 MHz - 1 GHz 1 GHz - 40 GHz MHz 30 MHz - 1 GHz 1 GHz - 40 GHz MHz	Signature	Vingli W	Malla	Value (dBm) -62.325 -27.829 -61.045 -26.497	-13 -13 -13 -13	Pass Pass Pass Pass

Report No. HNYE0001 28/58



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



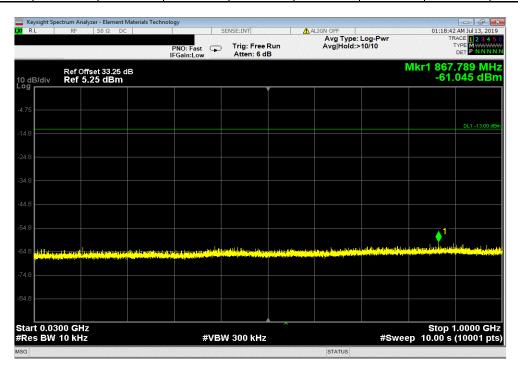


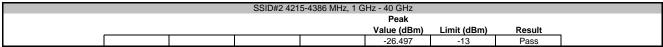


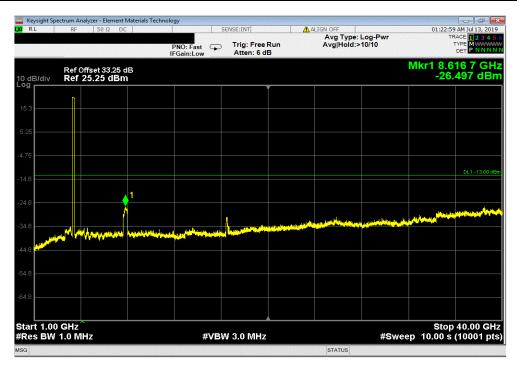
Report No. HNYE0001 29/58



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



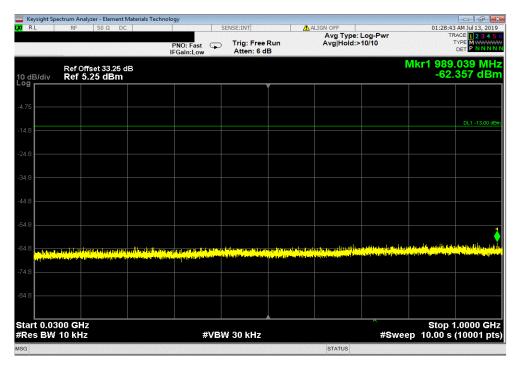


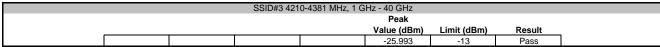


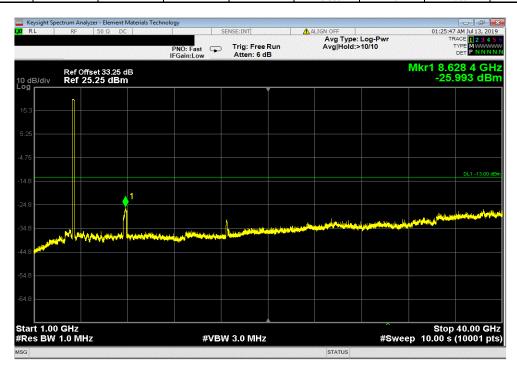
Report No. HNYE0001 30/58



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







Report No. HNYE0001 31/58



PSA-FSCI 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

Report No. HNYE0001 32/58



PSA-ESCI 2019.02.26

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.

Report No. HNYE0001



										EmiR5 2018.09.26		PSA-ESCI 2019
Wo	ork Order:		E0001	T	Date:		-2019 1 °C	7		Ma	16. 0	
	Project: Job Site:		one N05	ren	nperature: Humidity:		% RH	1	yes	4		
Seria	Number:		207	Barome	etric Pres.:		mbar		Tested by:	Kyle McMul	lan	
		SARA							,	1. 7.0		
	iguration:											
		Honeywell										
		Karim Hab	oib									
EU	JT Power:			1000 /	1004 1411							
	ing Mode:	SSID#1, T	x FMCW fr	om 4220 to	4391 MHz.							
D	eviations:		ter and how	not in line.								
Co	omments:	isolation iii	iter and box	CHOCHT IIIIe.								
est Speci	ifications						Test Meth	od				
	9(d):2019							603-E:2016	<u> </u>			
Run #	19	Test Dis	stance (m)	3	Antenna	Height(s)		1 to 4(m)		Results	Р	ass
-5												
Ŭ												
											_	
-15												
-25												
-35												
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표 연 -45 -												
-55												
-65												
-75												
-75 +												
-85 ¹	<u> </u>		100	<u> </u>		1000			10000			100000
10	J		100	,					10000			100000
						MHz				■ PK	◆ AV	• QP
	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 8506.667	3.9 1.0	252.0 142.9	Vert Horz	PK PK	3.69E-08 1.94E-08	-44.3 -47.1	-13.0 -13.0	-31.3 -34.1	EUT Horz EUT On Side		
	12729.330	1.0	49.9	Horz	PK	1.77E-08	-47.1 -47.5	-13.0	-34.1	EUT On Side		
	13141.330	2.0	254.9	Vert	PK	1.73E-08	-47.6	-13.0	-34.6	EUT Horz		
	8503.333 8497.333	1.3 1.6	30.9 294.9	Vert Horz	PK PK	8.26E-09 4.98E-09	-50.8 -53.0	-13.0 -13.0	-37.8 -40.0	EUT Horz EUT Horz		
	8486.000	2.0	156.0	Vert	PK	4.96E-09 4.87E-09	-53.0 -53.1	-13.0	-40.0 -40.1	EUT Vert		
	8508.667	3.4	216.0	Horz	PK	3.61E-09	-54.4	-13.0	-41.4	EUT Vert		
	8508.667 8601.415	3.4 1.0	216.0 282.0	Vert	PK PK	3.61E-09 3.07E-09	-54.4 -55.1	-13.0 -13.0	-41.4 -42.1	EUT Vert EUT On Side		

Report No. HNYE0001 34/58



										EmiR5 2018.09.26		PSA-ESCI 2019.02.26
We	ork Order:	HNYE000	01		Date:	1-Apr-		7		-12-	11 1	
	Project:				perature:	22.1		K	yla	Ma	mer	In
	Job Site:				Humidity:	23.7%						
Seria	l Number:			Barome	tric Pres.:	1020	mbar	-	Tested by:	Kyle McMull	an	
		SARA										
	iguration:											
	Customer:	Honeywell										
		Karim Habib										
El	UT Power:											
Operat	ing Mode:		/ICW fro	m 4220 to	4391 MHz.							
D	eviations:											
С	omments:	Isolation filter a The fundamen										30.3 dBm.
Test Spec	ifications	I				l	Test Meth	od				
FCC 87.13	20(4):2010							603-E:2016	<u> </u>			
	` '											
Run #	18	Test Distan	ce (m)	3	Antenna	Height(s)		1 to 4(m)		Results	Pa	ass
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-65 -												
-85												
1	0		100			1000			10000			100000
·						MHz						
						1711 12				■ PK	◆ AV	QP
				Polarity/								
	Freq (MHz)		zimuth legrees)	Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBc)	Compared to Spec. (dBc)		Comments	
	17192.000		258.9	Horz	PK	3.95E-08	-44.0	-9.7	-34.3	EUT On Side		
	17524.000		252.0	Vert	PK	3.69E-08	-44.3	-9.7	-34.6	EUT Horz		
	8506.667		142.9	Horz	PK	1.94E-08	-47.1	-9.7	-37.4	EUT On Side		
	12729.330		49.9	Horz	PK	1.77E-08	-47.5	-9.7	-37.8	EUT On Side		
	13141.330 8503.333		254.9 30.9	Vert Vert	PK PK	1.73E-08	-47.6 -50.8	-9.7 -9.7	-37.9 -41.1	EUT Horz EUT Horz		
	8497.333		30.9 294.9	Vert Horz	PK PK	8.26E-09 4.98E-09	-50.8 -53.0	-9.7 -9.7	-41.1 -43.3	EUT Horz		
	8486.000		294.9 156.0	Vert	PK PK	4.96E-09 4.87E-09	-53.0 -53.1	-9.7 -9.7	-43.3 -43.4	EUT Vert		
	8508.667		216.0	Horz	PK	3.61E-09	-54.4	-9.7	-44.7	EUT Vert		
	8601.415		282.0	Vert	PK	3.07E-09	-55.1	-9.7	-45.4	EUT On Side		

Report No. HNYE0001 35/58



Wo										EmiR5 2019.05.20		
	rk Order:				Date:	12-Jul					120	, /
	Project:	No	ne	Ten	nperature:	22.6	S °C			Roo	1	2
	Job Site:	MN	105		Humidity:	58.29	6 RH		5	100	- Such	
Serial	Number:	002	215	Barome	tric Pres.:	1014	mbar		Tested by:	Andrew Rog	gstad	
	EUT:	SARA		•	•					•		
Confi	guration:											
C	ustomer	Honeywell										
		Karim Habi	ih									
	JT Power:		ID									
EU	or Power:		EN 40VA/ (10111	4000 1411							
Operati	ng Mode:		X FIVICAN TR	om 4214 to	4386 MHZ.							
De	eviations:	None										
Co	omments:		ter and box	k not in line.								
st Speci	fications						Test Meth	od				
	9(a):2019						TOST MOTH	<u>ou</u>				
Run #	8	Test Dis	stance (m)	3	Antenna	Height(s)		1 to 4(m)		Results		Pass
ituii π		TCSt DIS	itarice (iii)		Antenna	ricigiit(3)		1 10 4(111)		Results	<u>'</u>	1 433
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-35 - Eg 7 -45 -									-			
-35 - E 89 -45 - -55 -												
-35 - Eg 7 -45 -												
-35 - E 89 -45 - -55 -												
-35 - EBO -45 - -55 - -65 - -75 -												
-35 - EXECUTE -3555657585 -			100			1000			10000			100000
-35 - EBO -45 - -55 - -65 - -75 -			100			1000			10000			100000
-35 - EXECUTE -3555657585 -)		100			1000 MHz			10000	■ PK	◆ AV	100000
-35 - EXECUTE -3555657585 -			100						10000	■ PK	◆ AV	
-35 - EXECUTE -3555657585 -) Freq (MHz)	Antenna Height (meters)	100 Azimuth (degrees)	Polarity/ Transducer Type	Detector		EIRP (dBm)	Spec. Limit (dBm)	10000 Compared to Spec. (dB)		◆ AV Comment	• QP
-35 - EXECUTE -3555657585 -	Freq		Azimuth	Polarity/ Transducer	Detector	MHz			Compared to Spec.			• QP
-35 - EXECUTE -3555657585 -	Freq (MHz)	(meters)	Azimuth (degrees)	Polarity/ Transducer Type		MHz EIRP (Watts)	(dBm)	(dBm)	Compared to Spec. (dB)	(• QP
-35 - EXECUTE -3555657585 -	Freq (MHz) 17445.390	(meters)	Azimuth (degrees)	Polarity/ Transducer Type	PK	MHz EIRP (Watts) 22.8E-9	(dBm) -46.4	-13.0	Compared to Spec. (dB)	EUT on side		• QP
-35 - EXECUTE -3555657585 -	Freq (MHz) 17445.390 8503.107 17297.470 12905.160	3.6 1.5 2.3 1.5	Azimuth (degrees) 192.9 116.0 171.0 243.0	Polarity/ Transducer Type Horz Horz	PK PK PK PK	EIRP (Watts) 22.8E-9 16.1E-9 13.4E-9 6.4E-9	-46.4 -47.9 -48.7 -51.9	-13.0 -13.0 -13.0 -13.0	Compared to Spec. (dB) -33.4 -34.9 -35.7 -38.9	EUT on side EUT on side EUT horz EUT on side		• QP
-35 - EXECUTE -3555657585 -	Freq (MHz) 17445.390 8503.107 17297.470	3.6 1.5 2.3	Azimuth (degrees) 192.9 116.0 171.0	Polarity/ Transducer Type Horz Horz Vert	PK PK PK	EIRP (Watts) 22.8E-9 16.1E-9 13.4E-9	-46.4 -47.9 -48.7	-13.0 -13.0 -13.0	Compared to Spec. (dB) -33.4 -34.9 -35.7	EUT on side EUT on side EUT horz		• QP

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FIELD STRENGTH OF SPURIOUS **EMISSIONS**



\\/.	ork Ordor:	HNYE	0004		Data	12 lul	2010	1		EmiR5 2019.05.20		PSA-ESCI 201
VVC	ork Order: Project:	No		Ton	Date:	12-Jul 22.6			3	10	1	0
						58.29		0	-	Rog	das	
Coriol	Job Site: Number:	MN 002			Humidity: etric Pres.:				Tootod by			
Serial			215	Barome	etric Pres.:	1014	mbar		rested by:	Andrew Rogs	stau	
		SARA										
	iguration:											
		Honeywell										
		Karim Habi	ib									
EU	JT Power:											
Operati	ing Mode:	SSID#2, T	x FMCW fro	om 4214 to	4386 MHz.							
D	eviations:	None										
Co	omments:									undamental va Mask module.	alue of 3	30.3 dBn
st Snaci	fications						Test Meth	od				
	9(a):2019							603-E:2016				
Run #	8	Test Dis	stance (m)	3	Antenna	Height(s)		1 to 4(m)		Results	F	oass
Ruπ #		TOST DIS	starice (III)		Antenna	ricigiit(3)		1 10 4(111)		results		433
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-5												
-15												
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-55												
-65												+++
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-85 [⊥]	<u> </u>		400			1000			10000			400000
10	J		100			1000			10000			100000
						MHz				■ PK	♦ AV	• QF
				Polority/								
				Polarity/ Transducer					Compared to			
		Antenna					FIDD					
	Freq	Antenna Height	Azimuth	Туре	Detector	EIRP	EIRP	Spec. Limit	Spec.	C	Comments	3
	Freq (MHz)		Azimuth (degrees)		Detector	EIRP (Watts)	(dBm)	Spec. Limit (dBm)	Spec. (dB)	C	comments	3
	(MHz)	Height (meters)	(degrees)	Туре		(Watts)	(dBm)	(dBm)	(dB)		Comments	5
	(MHz) 17445.390	Height (meters)	(degrees)	Type Horz	PK	(Watts) 22.8E-9	(dBm) -46.4	(dBm) -9.7	-36.7	EUT on side	Comments	5
	(MHz) 17445.390 8503.107	Height (meters) 3.6 1.5	(degrees) 192.9 116.0	Type Horz Horz	PK PK	(Watts) 22.8E-9 16.1E-9	-46.4 -47.9	-9.7 -9.7	-36.7 -38.2	EUT on side EUT on side	Comments	5
	(MHz) 17445.390	Height (meters)	(degrees)	Type Horz	PK	(Watts) 22.8E-9	(dBm) -46.4	(dBm) -9.7	-36.7	EUT on side	Comments	5

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6.4E-9

5.3E-9

-51.9

-52.7

-9.7

-9.7

-42.2

-43.0

EUT horz

EUT horz

Vert

Vert

PK

PΚ

253.9

224.0

12918.060

8545.533

1.5

1.5

FIELD STRENGTH OF SPURIOUS EMISSIONS

17238.480

8491.387

12760.300

12862.640

225.9

59.9

85.9

306.0

1.6

2.8

1.5

1.5



										EmiR5 2019.05.20		PSA-ESCI 2019.
Wo	rk Order:	HNYE	0004		Date:	12-Jul	-2019					
	Project:				nperature:	22.6			1	Rose	1	R
	Job Site:				Humidity:	58.29						
Serial	Number:	002	15	Barome	tric Pres.:	1014	mbar		Tested by:	Andrew Ro	gstad	
	EUT:	SARA			,	-		•		•		
Conf	iguration:	2										
C	ustomer:	Honeywell										
А	ttendees:	Karim Habil	b									
EU	IT Power:	28VDC										
		COID#O To	FMCW fro	om 4209 to	4381 MHz.							
Operati	ng Mode:	00.20,		00 .0								
D	eviations:	None										
Co	omments:	Isolation filt	er and box	not in line.								
act Speci	fications						Test Meth	od				
CC 87.13								603-E:2016				
Run#	16	Test Dis	tance (m)	3	Antenna	ı Height(s)		1 to 4(m)		Results	F	Pass
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-5												
45								—			-	
-15												
-25												
-23												
-35												
E Q P -45												
₩ -45									 			
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-75												
-85												
-05 1()		100			1000			10000			100000
	-		. 30			MHz				■ PK	◆ AV	• QP
										■ FN	▼ AV	→ QF
		Antonna		Polarity/					Compared			
	Freq	Antenna Height	Azimuth	Transducer Type	Detector	EIRP	EIRP	Spec. Limit	Compared to Spec.		Comment	S
	(MHz)	(meters)	(degrees)	7.5		(Watts)	(dBm)	(dBm)	(dB)			
	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		

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17.3E-9

8.9E-9

6.7E-9

5.8E-9

PΚ

PΚ

PΚ

PΚ

Horz

Vert

Horz

Vert

-13.0

-13.0

-13.0

-13.0

-47.6

-50.5

-51.7

-52.3

-34.6

-37.5

-38.7

-39.3

EUT on side

EUT on side

EUT horz

EUT horz

FIELD STRENGTH OF SPURIOUS EMISSIONS



Serial Number: 00215 Barometric Pres.: 1014 mbar Tested by: Andrew Ro 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	ogstad
Job Site: MN05 Humidity: 58.2% RH Serial Number: 00215 Barometric Pres.: 1014 mbar Tested by: Andrew Ro EUT: SARA Configuration: 2 Customer: Honeywell Attendees: Karim Habib EUT Power: 28VDC Deviations: None None	
Serial Number: 00215 Barometric Pres.: 1014 mbar Tested by: Andrew Ro 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	
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	ogstad
Configuration: 2 Customer: Honeywell Attendees: Karim Habib EUT Power: 28VDC Operating Mode: SSID#3, Tx FMCW from 4209 to 4381 MHz. Deviations: None	
Customer: Honeywell Attendees: Karim Habib EUT Power: 28VDC Operating Mode: SSID#3, Tx FMCW from 4209 to 4381 MHz. Deviations: None	
Customer: Honeywell Attendees: Karim Habib EUT Power: 28VDC Operating Mode: SSID#3, Tx FMCW from 4209 to 4381 MHz. Deviations: None	
Attendees: Karim Habib EUT Power: 28VDC Operating Mode: SSID#3, Tx FMCW from 4209 to 4381 MHz. Deviations: None	
EUT Power: 28VDC Operating Mode: SSID#3, Tx FMCW from 4209 to 4381 MHz. Deviations: None	
Deviations: SSID#3, Tx FMCW from 4209 to 4381 MHz. Deviations: None	
Deviations: None	
Deviations:	
	(00.0.17
Isolation filter and box not in line. dBc limit value calculated with reference to measured fundamental The fundamental maximization reference measuremenents are found the Emissions Mask module.	
t Specifications Test Method	
87.139(d):2019 ANSI TIA-603-E:2016	
Port 4 40 Tot Bistones (a) 0 Actions United (a) 445 4(a)	Date
Run # 16 Test Distance (m) 3 Antenna Height(s) 1 to 4(m) Results	Pass
-5	
	
-15	
-25	
-35	
-45	
3 -45	
, -43	
ee	
-55	
-65	
-75	
-85	
10 100 1000 10000	10000
MHz ■ PK	◆ AV • QI
Polarity/	
Antenna Transducer Compared to	•
Freq Height Azimuth Type Detector EIRP EIRP Spec. Limit Spec.	Comments
(MHz) (meters) (degrees) (Watts) (dBm) (dBm)	
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	

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5.8E-9

-52.3

-9.8

-42.5 EUT horz

12862.640

1.5

306.0

Vert

PK



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 sensitivity 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.

Extreme Temperature -20°C



EUT: SARA Serial Number: 00204 Work Order: HNYE0004 Customer: Honeywell Temperature: 22.2 °C Humidity: 57.7% RH Project: None
Tested by: Kyle McMullan
TEST SPECIFICATIONS Barometric Pres.: 1020 mba Power: 28VDC Test Method Job Site: MN08 FCC 87.133:2019 ANSI TIA-603-E:2016 COMMENTS solation 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 Knyla Configuration # See Comments Signature Upper Value (MHz) Upper Limit (MHz) Lower Value (MHz) Lower Limit (MHz) Result (ppm) 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 4200 4400 Extreme Temperature +50°C 4219 4391 116.1 Pass Extreme Temperature +40°C Extreme Temperature +30°C 4219 4200 4391 4400 116.1 Pass 4200 4391 4400 116.1 4219 Pass Extreme Temperature +20°C Extreme Temperature +10°C 0.0 Pass Pass 4219 4200 4392 4400 4392 4400 Extreme Temperature 0°C Extreme Temperature -10°C 4218 4200 4392 4400 116.1 Pass 4219 4200 4392 Pass 0.0 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% 4400 4214 4200 4386 116.3 Pass Extreme Voltage +15% Extreme Temperature +50°C 4214 4200 4386 4400 116.3 Pass 4200 4400 4214 4386 116.3 Pass Extreme Temperature +40°C Extreme Temperature +30°C 4386 4386 Pass Pass 4214 4200 4400 116.3 4214 4200 4400 116.3 Extreme Temperature +20°C Extreme Temperature +10°C 4214 4200 4386 4400 116.3 Pass 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% Extreme Temperature +50°C 4209 4200 4381 4400 116.4 Pass 4209 4200 4381 4400 116.4 Pass Extreme Temperature +40°C Extreme Temperature +30°C 4209 4200 4381 4400 116.4 Pass 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
Extreme Temperature -10°C 4209 4200 4381 4400 116.4 Pass

4209

4209

4200

4200

4381

4381

4400

4400

116.4

116.4

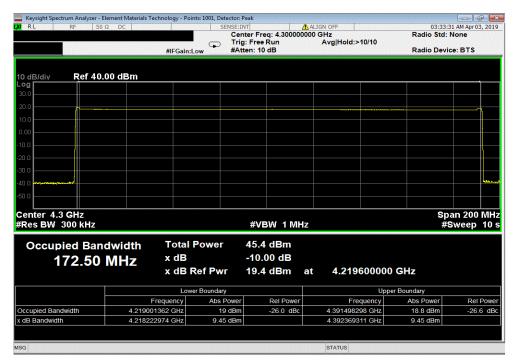
Pass

Pass

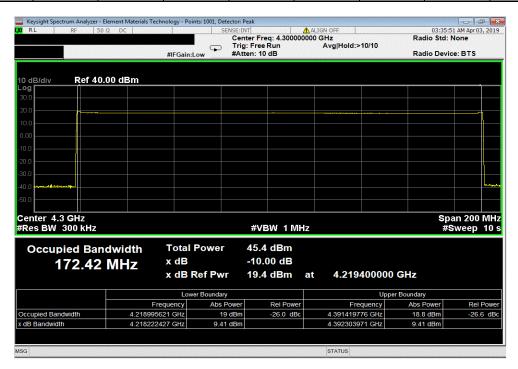
Report No. HNYE0001 41/58



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



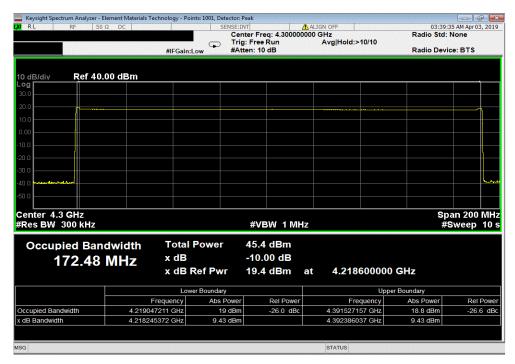
		SSID#1 4220-4	391 MHz, Extrem	e Voltage -15%			
	Lower	Lower	Upper	Upper	Freq Tolerance		
	Value (MHz)	Limit (MHz)	Value (MHz)	Limit (MHz)	(ppm)	Result	_
	4219	4200	4391	4400	116.1	Pass	



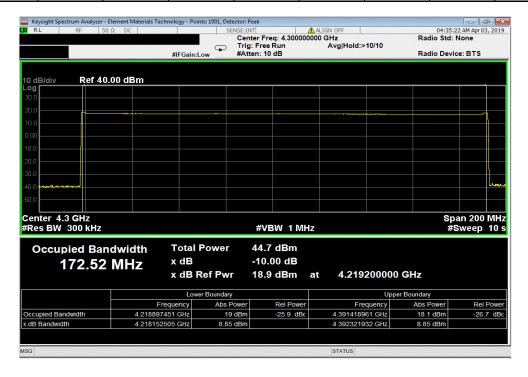
Report No. HNYE0001 42/58



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



	S	SID#1 4220-4391	1 MHz, Extreme T	emperature +50	°C		
	Lower	Lower	Upper	Upper	Freq Tolerance		
	Value (MHz)	Limit (MHz)	Value (MHz)	Limit (MHz)	(ppm)	Result	_
	4219	4200	4391	4400	116.1	Pass	



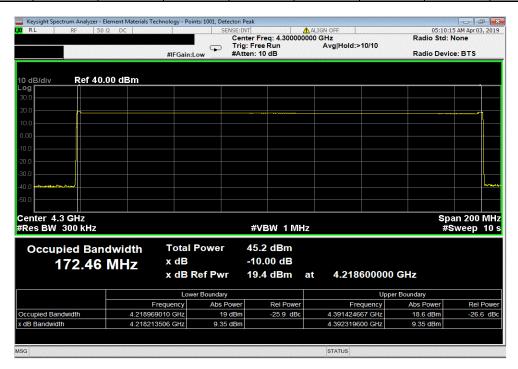
Report No. HNYE0001 43/58



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



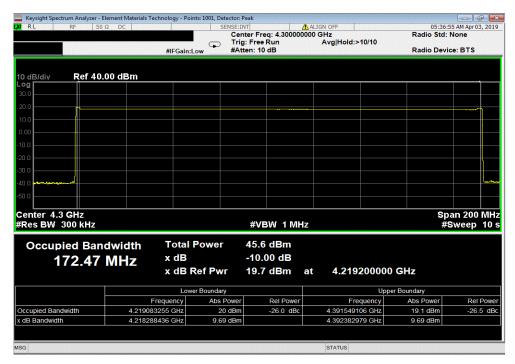
	S	SID#1 4220-4391	1 MHz, Extreme T	emperature +30	°C		
	Lower	Lower	Upper	Upper	Freq Tolerance		
	Value (MHz)	Limit (MHz)	Value (MHz)	Limit (MHz)	(ppm)	Result	_
	4219	4200	4391	4400	116.1	Pass	



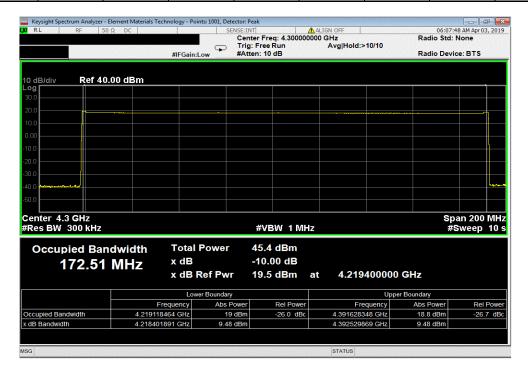
Report No. HNYE0001 44/58



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



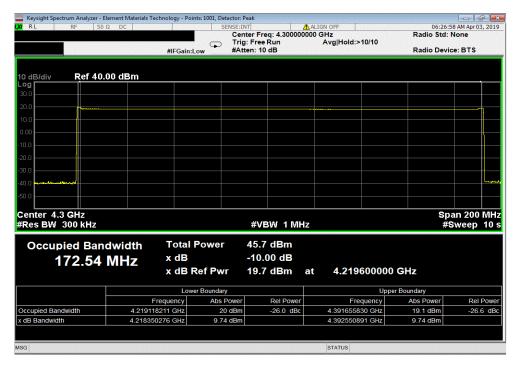
	S	SID#1 4220-4391	1 MHz, Extreme T	emperature +10	°C		
	Lower	Lower	Upper	Upper	Freq Tolerance		
	Value (MHz)	Limit (MHz)	Value (MHz)	Limit (MHz)	(ppm)	Result	_
	4219	4200	4392	4400	0.0	Pass	



Report No. HNYE0001 45/58



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



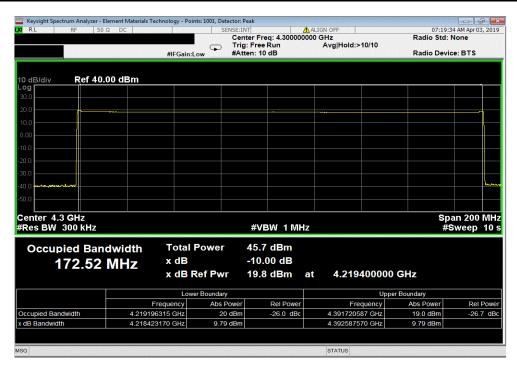
	S	SID#1 4220-439	1 MHz, Extreme 7	Femperature -10°	°C	
	Lower	Lower	Upper	Upper	Freq Tolerance	
	Value (MHz)	Limit (MHz)	Value (MHz)	Limit (MHz)	(ppm)	Result
	4219	4200	4392	4400	0.0	Pass



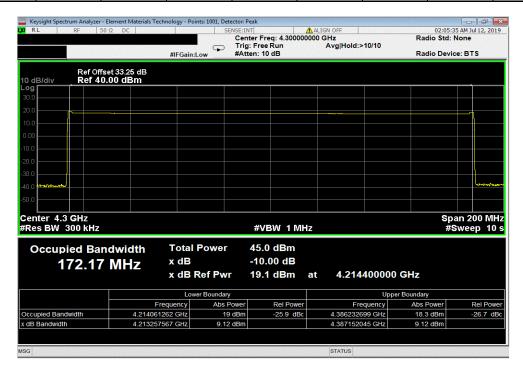
Report No. HNYE0001 46/58



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



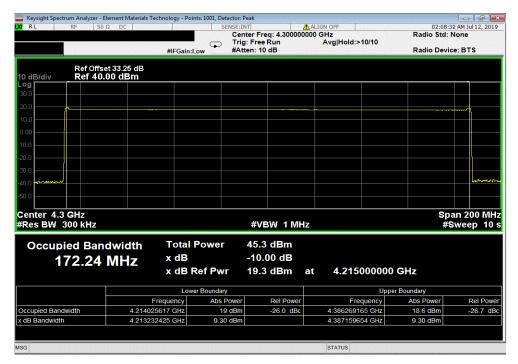
ı		SSID#2 4215	-4386 MHz, Norn	nal Conditions		
ı	Lower	Lower	Upper	Upper	Freq Tolerance	
	 Value (MHz)	Limit (MHz)	Value (MHz)	Limit (MHz)	(ppm)	Result
	4215	4200	4386	4400	0.0	Pass



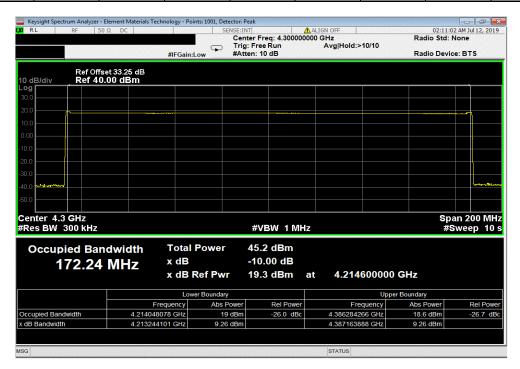
Report No. HNYE0001 47/58



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



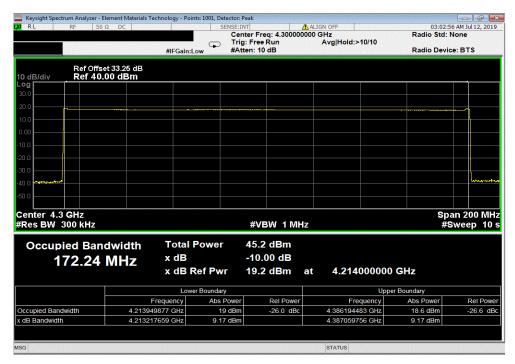
		SSID#2 4215-43	386 MHz, Extrem	e Voltage +15%			
	Lower	Lower	Upper	Upper	Freq Tolerance		
	Value (MHz)	Limit (MHz)	Value (MHz)	Limit (MHz)	(ppm)	Result	_
	4214	4200	4386	4400	116.3	Pass	



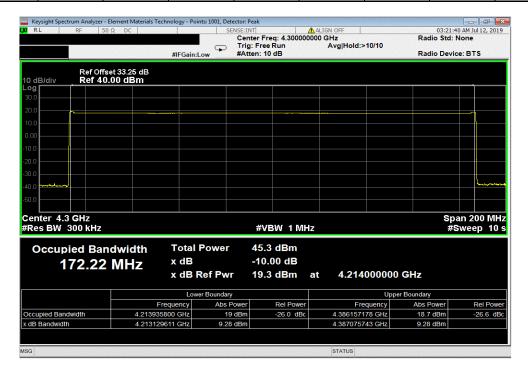
Report No. HNYE0001 48/58



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



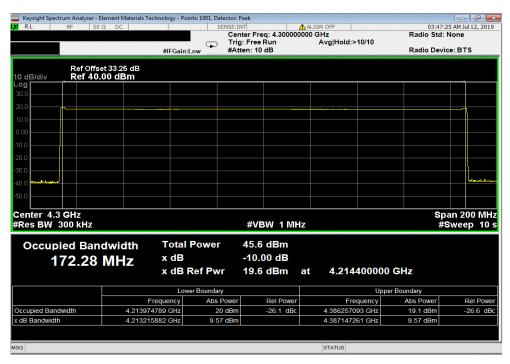
	S	SID#2 4215-4386	6 MHz, Extreme T	emperature +40	°C		
	Lower	Lower	Upper	Upper	Freq Tolerance		
	Value (MHz)	Limit (MHz)	Value (MHz)	Limit (MHz)	(ppm)	Result	_
	4214	4200	4386	4400	116.3	Pass	



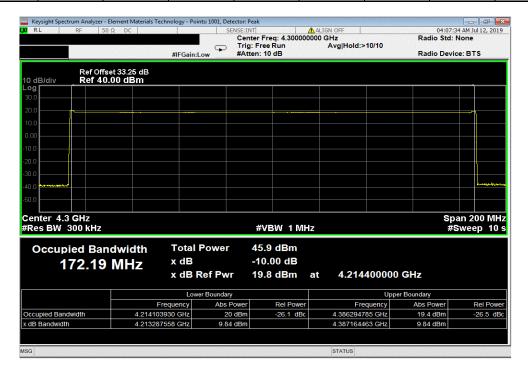
Report No. HNYE0001 49/58



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



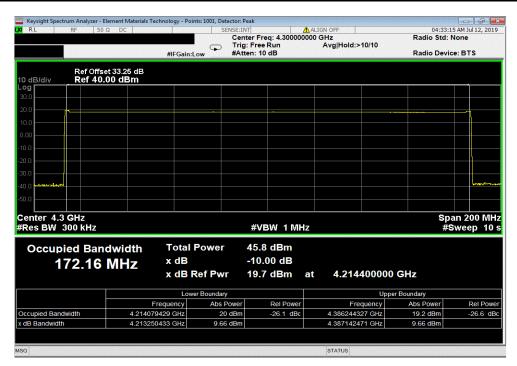
SSID#2 4215-4386 MHz, Extreme Temperature +20°C							
Lower Lower Upper Upper Freq Tolerance							
	Value (MHz)	Limit (MHz)	Value (MHz)	Limit (MHz)	(ppm)	Result	_
	4214	4200	4386	4400	116.3	Pass	



Report No. HNYE0001 50/58



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



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



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



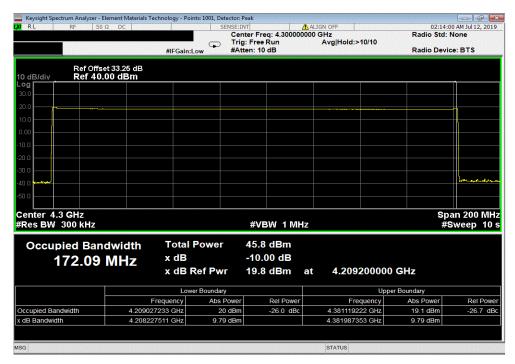
SSID#2 4215-4386 MHz, Extreme Temperature -20°C							
Lower Lower Upper Upper Freq Tolerance							
	Value (MHz)	Limit (MHz)	Value (MHz)	Limit (MHz)	(ppm)	Result	_
	4214	4200	4386	4400	116.3	Pass	



Report No. HNYE0001 52/58



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



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



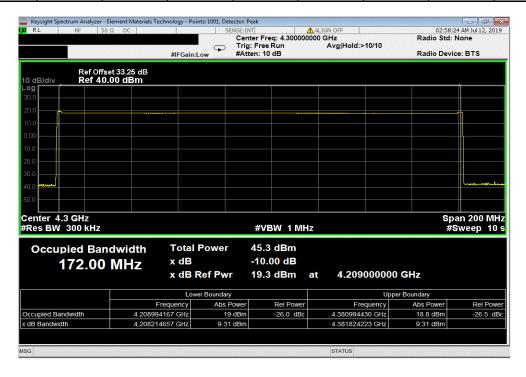
Report No. HNYE0001 53/58



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



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



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



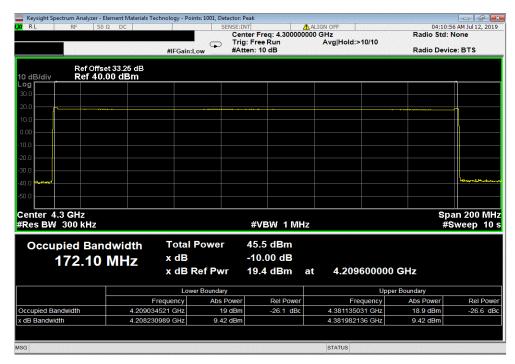
SSID#3 4210-4381 MHz, Extreme Temperature +30°C							
Lower Lower Upper Upper Freq Tolerance							
	Value (MHz)	Limit (MHz)	Value (MHz)	Limit (MHz)	(ppm)	Result	_
	4209	4200	4381	4400	116.4	Pass	



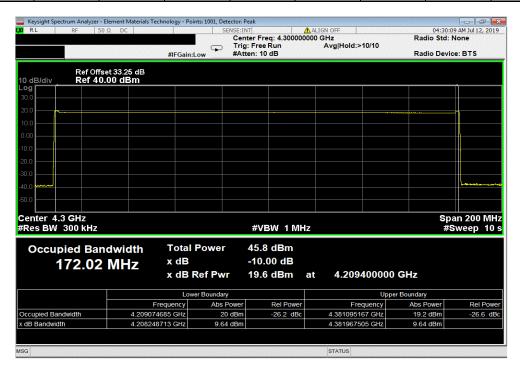
Report No. HNYE0001 55/58



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



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



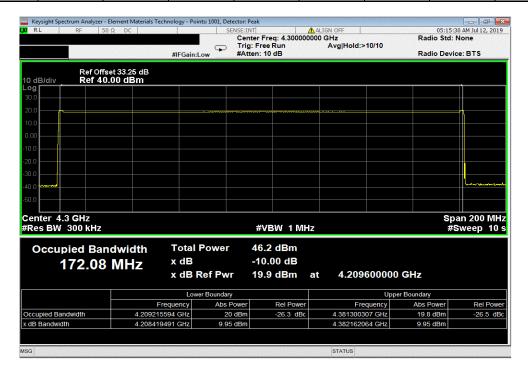
Report No. HNYE0001 56/58



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



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



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



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