

# NORTHWEST EMC

## Honeywell, Automation and Control Solutions

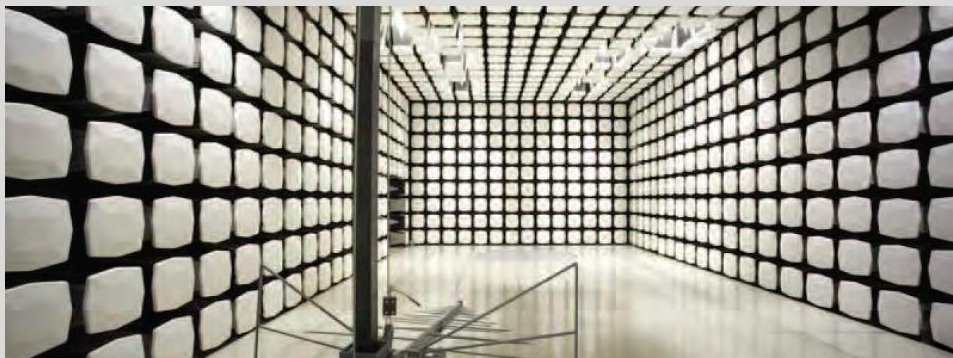
TH8321R01

FCC 15.207:2016

FCC 15.247:2016

902-928 MHz Transceiver

Report # HNYW0180.1



NVLAP Lab Code: 200881-0

*This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America. This Report may only be duplicated in its entirety*

# CERTIFICATE OF TEST

Last Date of Test: August 4, 2016  
Honeywell, Automation and Control Solutions  
Model:TH8321R1001

## Radio Equipment Testing

### Standards

Specification	Method
FCC 15.207:2016	ANSI C63.10:2013
FCC 15.247:2016	

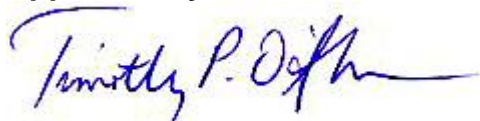
### Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	
7.5	Duty Cycle	Yes	N/A	Characterization of radio operation.
7.8.2	Carrier Frequency Separation	Yes	Pass	
7.8.3	Number of Hopping Frequencies	Yes	Pass	
7.8.4	Dwell Time	Yes	Pass	
7.8.5	Output Power	Yes	Pass	
7.8.6	Band Edge Compliance	Yes	Pass	
7.8.6	Band Edge Compliance - Hopping Mode	Yes	Pass	
7.8.7	Occupied Bandwidth	Yes	Pass	
7.8.8	Spurious Conducted Emissions	Yes	Pass	
11.10.2	Power Spectral Density	No	N/A	Not required for FHSS devices.

### Deviations from Test Standards

None

### Approved By:



Tim O'Shea, 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.*

# REVISION HISTORY

Revision Number		Description	Date	Page Number
00		None		

# ACCREDITATIONS AND AUTHORIZATIONS

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## United States

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**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 Northwest EMC to certify transmitters to FCC and IC specifications.

**NVLAP** - Each laboratory is accredited by NVLAP to ISO 17025

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## Canada

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**ISED** - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with ISED.

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## European Union

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**European Commission** – Validated by the European Commission as a Notified Body under the R&TTE Directive.

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## Australia/New Zealand

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

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## Korea

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

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## Japan

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

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## Taiwan

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**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.

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## Singapore

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

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## Israel

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

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## Hong Kong

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

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## Vietnam

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

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## SCOPE

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For details on the Scopes of our Accreditations, please visit:

<http://www.nwemc.com/accreditations/>  
<http://gsi.nist.gov/global/docs/cabs/designations.html>

# MEASUREMENT UNCERTAINTY

## Measurement Uncertainty

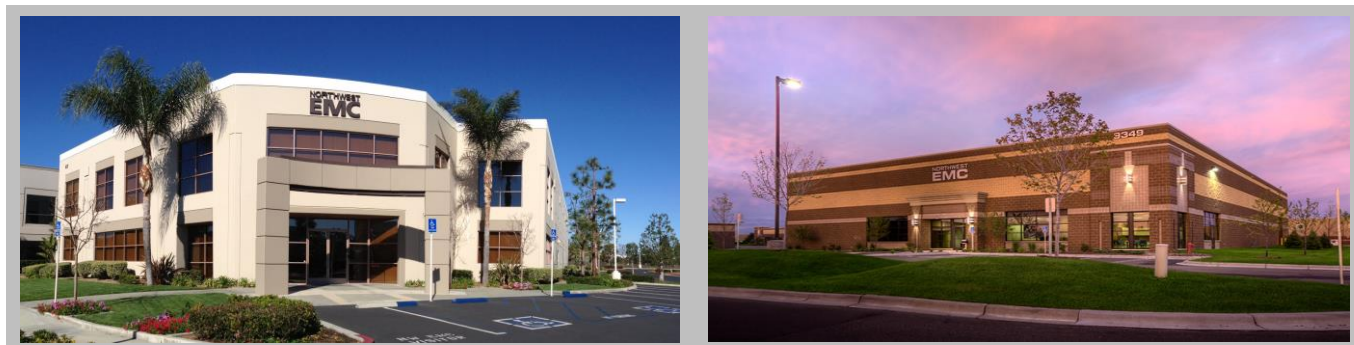
When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement 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 WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) for each test is on each data sheet. 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.

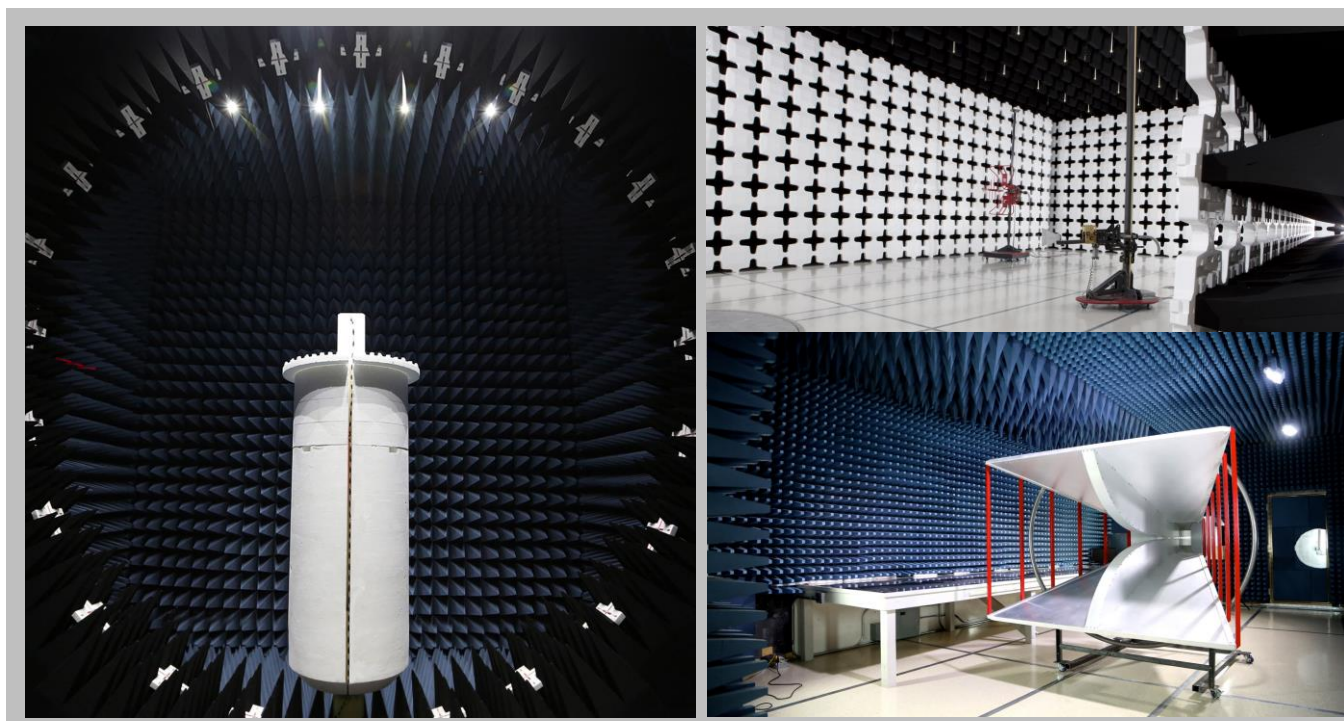
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

<b>Test</b>	<b>+ MU</b>	<b>- MU</b>
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

# FACILITIES



<b>California</b> Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	<b>Minnesota</b> Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	<b>New York</b> Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	<b>Oregon</b> Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	<b>Texas</b> Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	<b>Washington</b> Labs NC01-05 19201 120 <sup>th</sup> Ave NE Bothell, WA 98011 (425)984-6600
<b>NVLAP</b>					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
<b>Innovation, Science and Economic Development Canada</b>					
2834B-1, 2834B-3	2834E-1	N/A	2834D-1, 2834D-2	2834G-1	2834F-1
<b>BSMI</b>					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
<b>VCCI</b>					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
<b>Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRR, MIC, MOC, NCC, OFCA</b>					
US0158	US0175	N/A	US0017	US0191	US0157





# PRODUCT DESCRIPTION

## Client and Equipment Under Test (EUT) Information

<b>Company Name:</b>	Honeywell, Automation and Control Solutions
<b>Address:</b>	1985 Douglas Drive North
<b>City, State, Zip:</b>	Golden Valley, MN 55422
<b>Test Requested By:</b>	Job Villafuerte
<b>Model:</b>	TH8321R001
<b>First Date of Test:</b>	August 2, 2016
<b>Last Date of Test:</b>	August 4, 2016
<b>Receipt Date of Samples:</b>	August 2, 2016
<b>Equipment Design Stage:</b>	Production
<b>Equipment Condition:</b>	No Damage

## Information Provided by the Party Requesting the Test

<b>Functional Description of the EUT:</b>
Thermostat

<b>Client Justification:</b>
On the original grant under FCC ID: HS9-TH8321R01, there were three different models being approved for FCC and Industry Canada: TH8321R1001, TH8320R1003, TH8110R1008. They all share common PCBs, but differentiate by component population. The transceiver and related RF circuitry remain identical across the three models. Model TH8321R1001, which is the maximum populated device, was used for testing.

The changes to the product for this Class II Permissive Change consist of a new RF switch and the removal of a shield.

<b>Testing Objective:</b>
Demonstrate compliance for a Class II Permissive Change to FCC ID: HS9-TH8321R01 under FCC Part 15.247 for operation in the 902-928 MHz band.

# CONFIGURATIONS

## Configuration HNYW0180- 1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
AC Adaptor	CUI Inc.	48A-24-500	EPA240050-S/T-SZ
Wall Plate	Honeywell, Automation and Control Systems	1620	4174001 0363215
Thermostat DUT 315029	Honeywell, Automation and Control Systems	TH8321R1001	5191101 0315029

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Stand	Honeywell, Automation and Control Systems	None	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Power Cord	No	1.8m	No	AC Adaptor	Wall Plate

## Configuration HNYW0180- 3

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
AC Adaptor	CUI Inc.	48A-24-500	EPA240050-S/T-SZ
Wall Plate	Honeywell, Automation and Control Systems	1620	4174001 0363215
Thermostat DUT 315015	Honeywell, Automation and Control Systems	TH8321R1001	5191101 0315015

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Stand	Honeywell, Automation and Control Systems	None	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Power Cord	No	1.8m	No	AC Adaptor	Wall Plate



# MODIFICATIONS

## Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	8/2/2016	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	8/2/2016	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
3	8/4/2016	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
4	8/4/2016	Carrier Frequency Separation	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
5	8/4/2016	Number of Hopping Frequencies	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
6	8/4/2016	Dwell Time	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
7	8/4/2016	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
8	8/4/2016	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
9	8/4/2016	Band Edge Compliance – Hopping Mode	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
10	8/4/2016	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

# POWERLINE CONDUCTED EMISSIONS

## TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Per the standard, an insulating material was also added to ground plane between the EUT's power and remote I/O cables. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically, those measurements are made using a LISN (Line Impedance Stabilization Network), the 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
LISN	Solar Electronics	9252-50-R-24-BNC	LIY	3/21/2016	3/21/2017
Cable - Conducted Cable Assembly	Northwest EMC	MNC, HGN, TYK	MNCA	1/29/2016	1/29/2017
Receiver	Rohde & Schwarz	ESR7	ARI	6/14/2016	6/14/2017

## MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

## CONFIGURATIONS INVESTIGATED

HNYW0180-1

## MODES INVESTIGATED

Transmit mode mid channel 914.6 MHz, antenna A.

# POWERLINE CONDUCTED EMISSIONS

EUT:	TH8321R1001	Work Order:	HNYW0180
Serial Number:	5191101 0315029	Date:	08/02/2016
Customer:	Honeywell, Automation and Control Solutions	Temperature:	23.6°C
Attendees:	None	Relative Humidity:	61.4%
Customer Project:	None	Bar. Pressure:	1020 mb
Tested By:	Cole Ghizzone, Kyle McMullan	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	HNYW0180-1

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

## TEST PARAMETERS

Run #:	5	Line:	High Line	Add. Ext. Attenuation (dB):	0
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## COMMENTS

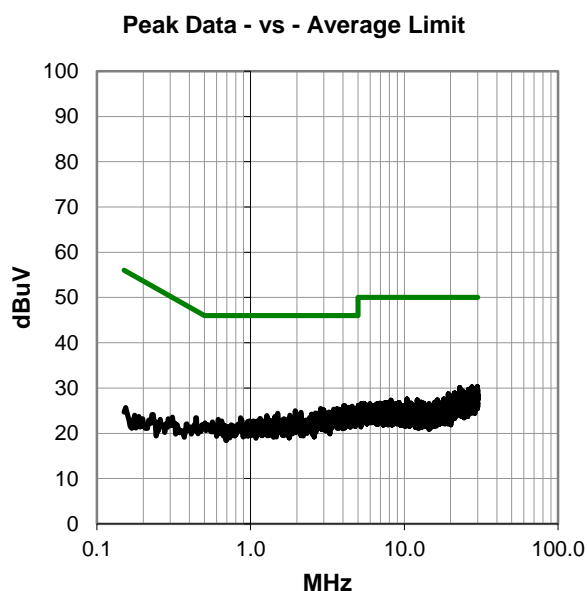
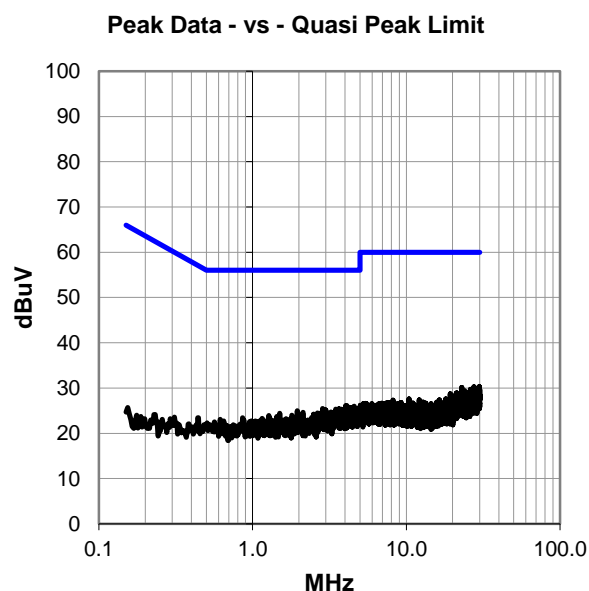
None.

## EUT OPERATING MODES

Transmit mode mid channel 914.6 MHz, antenna A.

## DEVIATIONS FROM TEST STANDARD

None.



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #5

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
27.504	8.0	22.3	30.3	60.0	-29.7
29.791	7.7	22.6	30.3	60.0	-29.7
29.884	7.7	22.6	30.3	60.0	-29.7
4.023	5.8	20.3	26.1	56.0	-29.9
4.097	5.8	20.3	26.1	56.0	-29.9
22.997	8.3	21.8	30.1	60.0	-29.9
29.743	7.5	22.6	30.1	60.0	-29.9
4.575	5.7	20.3	26.0	56.0	-30.0
29.619	7.4	22.6	30.0	60.0	-30.0
29.638	7.2	22.6	29.8	60.0	-30.2
26.168	7.6	22.1	29.7	60.0	-30.3
4.280	5.3	20.3	25.6	56.0	-30.4
4.332	5.3	20.3	25.6	56.0	-30.4
4.418	5.3	20.3	25.6	56.0	-30.4
4.955	5.2	20.4	25.6	56.0	-30.4
26.277	7.5	22.1	29.6	60.0	-30.4
28.276	7.2	22.4	29.6	60.0	-30.4
28.687	7.2	22.4	29.6	60.0	-30.4
28.978	7.1	22.5	29.6	60.0	-30.4
29.978	7.0	22.6	29.6	60.0	-30.4
2.859	5.3	20.2	25.5	56.0	-30.5
4.847	5.1	20.4	25.5	56.0	-30.5
26.986	7.3	22.2	29.5	60.0	-30.5
28.426	7.1	22.4	29.5	60.0	-30.5
29.123	7.0	22.5	29.5	60.0	-30.5
29.388	7.0	22.5	29.5	60.0	-30.5

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
27.504	8.0	22.3	30.3	50.0	-19.7
29.791	7.7	22.6	30.3	50.0	-19.7
29.884	7.7	22.6	30.3	50.0	-19.7
4.023	5.8	20.3	26.1	46.0	-19.9
4.097	5.8	20.3	26.1	46.0	-19.9
22.997	8.3	21.8	30.1	50.0	-19.9
29.743	7.5	22.6	30.1	50.0	-19.9
4.575	5.7	20.3	26.0	46.0	-20.0
29.619	7.4	22.6	30.0	50.0	-20.0
29.638	7.2	22.6	29.8	50.0	-20.2
26.168	7.6	22.1	29.7	50.0	-20.3
4.280	5.3	20.3	25.6	46.0	-20.4
4.332	5.3	20.3	25.6	46.0	-20.4
4.418	5.3	20.3	25.6	46.0	-20.4
4.955	5.2	20.4	25.6	46.0	-20.4
26.277	7.5	22.1	29.6	50.0	-20.4
28.276	7.2	22.4	29.6	50.0	-20.4
28.687	7.2	22.4	29.6	50.0	-20.4
28.978	7.1	22.5	29.6	50.0	-20.4
29.978	7.0	22.6	29.6	50.0	-20.4
2.859	5.3	20.2	25.5	46.0	-20.5
4.847	5.1	20.4	25.5	46.0	-20.5
26.986	7.3	22.2	29.5	50.0	-20.5
28.426	7.1	22.4	29.5	50.0	-20.5
29.123	7.0	22.5	29.5	50.0	-20.5
29.388	7.0	22.5	29.5	50.0	-20.5

## CONCLUSION

Pass



Tested By

# POWERLINE CONDUCTED EMISSIONS

EUT:	TH8321R1001	Work Order:	HNYW0180
Serial Number:	5191101 0315029	Date:	08/02/2016
Customer:	Honeywell, Automation and Control Solutions	Temperature:	23.6°C
Attendees:	None	Relative Humidity:	61.4%
Customer Project:	None	Bar. Pressure:	1020 mb
Tested By:	Cole Ghizzone, Kyle McMullan	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	HNYW0180-1

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2016	ANSI C63.10:2013

## TEST PARAMETERS

Run #:	6	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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## COMMENTS

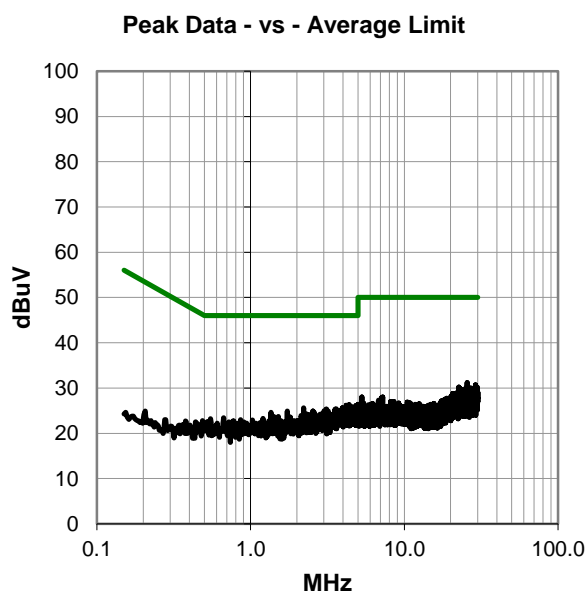
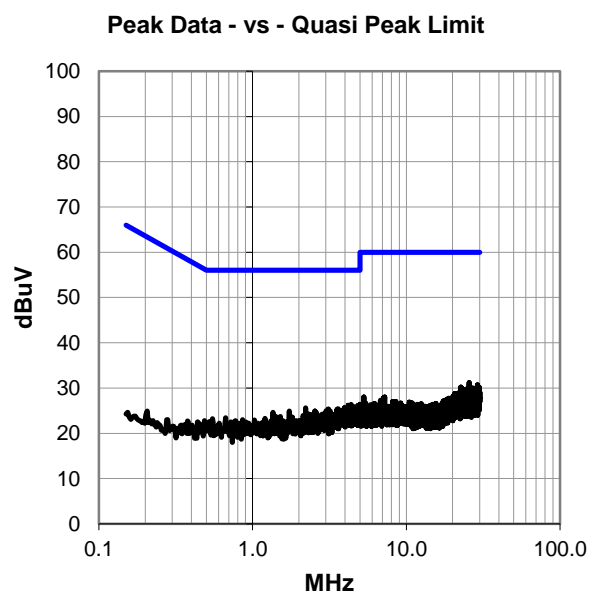
None.

## EUT OPERATING MODES

Transmit mode mid channel 914.6 MHz, antenna A.

## DEVIATIONS FROM TEST STANDARD

None.



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #6

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
25.594	9.1	22.1	31.2	60.0	-28.8
29.045	8.2	22.5	30.7	60.0	-29.3
4.996	6.0	20.4	26.4	56.0	-29.6
4.377	6.0	20.3	26.3	56.0	-29.7
4.183	5.9	20.3	26.2	56.0	-29.8
22.628	8.4	21.8	30.2	60.0	-29.8
29.731	7.6	22.6	30.2	60.0	-29.8
4.828	5.7	20.4	26.1	56.0	-29.9
25.135	7.9	22.1	30.0	60.0	-30.0
27.056	7.8	22.2	30.0	60.0	-30.0
28.944	7.5	22.5	30.0	60.0	-30.0
22.967	8.1	21.8	29.9	60.0	-30.1
28.870	7.4	22.5	29.9	60.0	-30.1
29.168	7.4	22.5	29.9	60.0	-30.1
29.291	7.4	22.5	29.9	60.0	-30.1
4.545	5.5	20.3	25.8	56.0	-30.2
26.445	7.7	22.1	29.8	60.0	-30.2
29.407	7.3	22.5	29.8	60.0	-30.2
4.399	5.4	20.3	25.7	56.0	-30.3
4.743	5.4	20.3	25.7	56.0	-30.3
29.858	7.1	22.6	29.7	60.0	-30.3
2.209	5.4	20.2	25.6	56.0	-30.4
3.952	5.3	20.3	25.6	56.0	-30.4
4.843	5.2	20.4	25.6	56.0	-30.4
23.721	7.7	21.9	29.6	60.0	-30.4
28.082	7.2	22.4	29.6	60.0	-30.4

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
25.594	9.1	22.1	31.2	50.0	-18.8
29.045	8.2	22.5	30.7	50.0	-19.3
4.996	6.0	20.4	26.4	46.0	-19.6
4.377	6.0	20.3	26.3	46.0	-19.7
4.183	5.9	20.3	26.2	46.0	-19.8
22.628	8.4	21.8	30.2	50.0	-19.8
29.731	7.6	22.6	30.2	50.0	-19.8
4.828	5.7	20.4	26.1	46.0	-19.9
25.135	7.9	22.1	30.0	50.0	-20.0
27.056	7.8	22.2	30.0	50.0	-20.0
28.944	7.5	22.5	30.0	50.0	-20.0
22.967	8.1	21.8	29.9	50.0	-20.1
28.870	7.4	22.5	29.9	50.0	-20.1
29.168	7.4	22.5	29.9	50.0	-20.1
29.291	7.4	22.5	29.9	50.0	-20.1
4.545	5.5	20.3	25.8	46.0	-20.2
26.445	7.7	22.1	29.8	50.0	-20.2
29.407	7.3	22.5	29.8	50.0	-20.2
4.399	5.4	20.3	25.7	46.0	-20.3
4.743	5.4	20.3	25.7	46.0	-20.3
29.858	7.1	22.6	29.7	50.0	-20.3
2.209	5.4	20.2	25.6	46.0	-20.4
3.952	5.3	20.3	25.6	46.0	-20.4
4.843	5.2	20.4	25.6	46.0	-20.4
23.721	7.7	21.9	29.6	50.0	-20.4
28.082	7.2	22.4	29.6	50.0	-20.4

## CONCLUSION

Pass



Tested By

# SPURIOUS RADIATED EMISSIONS

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

Continuous transmit, low channel, 903 MHz, ant. A
Continuous transmit, low channel, 903 MHz, ant. B
Continuous transmit, mid channel, 914.6 MHz, ant. A
Continuous transmit, mid channel, 914.6 MHz, ant. B
Continuous transmit, high channel, 926.4 MHz, ant. A
Continuous transmit, high channel, 926.4 MHz, ant. B

## POWER SETTINGS INVESTIGATED

110VAC/60Hz
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## CONFIGURATIONS INVESTIGATED

HNYW0180 - 1
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## FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	10000 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
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFI	1/27/2016	12 mo
Antenna - Biconilog	Teseq	CBL 6141B	AYD	1/6/2016	24 mo
Antenna - Double Ridge Guide	ETS Lindgren	3115	AJA	6/23/2016	24 mo
Attenuator	Fairview Microwave	SA18E-10	TYA	10/21/2015	12 mo
Attenuator	Fairview Microwave	SA18E-20	TWZ	10/21/2015	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	LFK	10/21/2015	12 mo
Filter - High Pass	Micro-Tronics	HPM50108	LFM	10/21/2015	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	3/1/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	12/10/2015	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AXP	NCR	0 mo
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	12/7/2015	12 mo
Cable	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	12/7/2015	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	3/1/2016	12 mo

## TEST DESCRIPTION


The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and the EUT antenna in three orthogonal axis, and adjusting measurement antenna height and polarization. A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.



# SPURIOUS RADIATED EMISSIONS

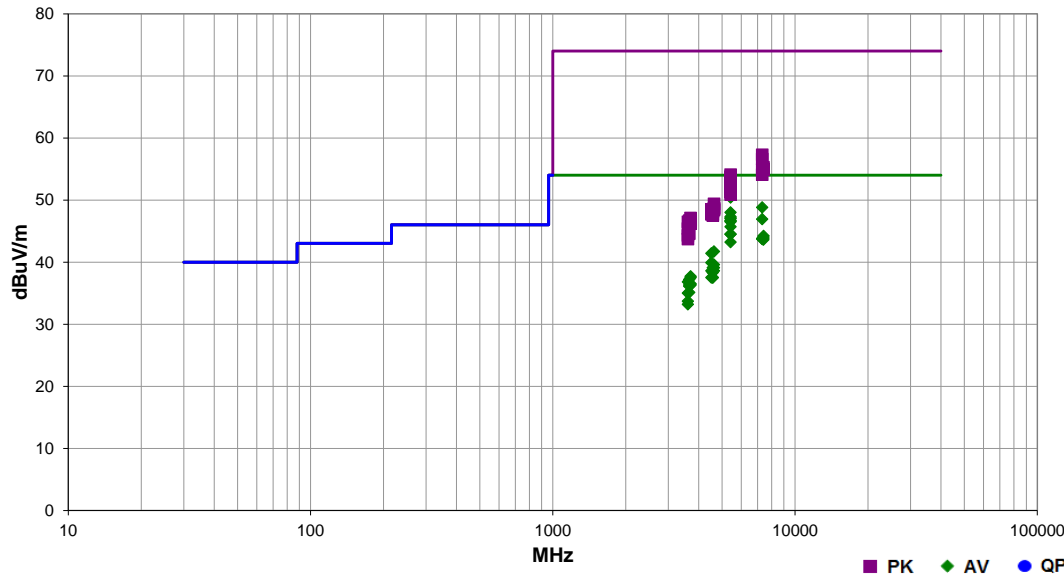


PSA-ESCI 2016.04.26.1  
EmiR5 2016.04.26.1

Work Order:	HNW0180	Date:	08/02/16	 Tested by: Cole Ghizzone, Kyle McMullan
Project:	None	Temperature:	23.8 °C	
Job Site:	MN05	Humidity:	57.4% RH	
Serial Number:	5191101 0315029	Barometric Pres.:	1020 mbar	
EUT:	TH8321R1001			
Configuration:	1			
Customer:	Honeywell, Automation and Control Solutions			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Continuous transmit, reference the data comments for channel, frequency and antenna			
Deviations:	None.			
Comments:	See data comments for EUT orientation.			

Test Specifications	Test Method
FCC 15.247:2016	ANSI C63.10:2013

Run #	36	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
5417.992	43.4	7.0	1.0	121.0	3.0	0.0	Horz	AV	0.0	50.4	54.0	-3.6	Low channel, 903 MHz, Ant. A, EUT on side
7316.725	35.6	13.2	1.1	285.0	3.0	0.0	Vert	AV	0.0	48.8	54.0	-5.2	Mid channel, 914.6 MHz, Ant. B, EUT horz
5417.983	41.0	7.0	1.0	234.0	3.0	0.0	Vert	AV	0.0	48.0	54.0	-6.0	Low channel, 903 MHz, Ant. B, EUT horz
5417.975	40.3	7.0	1.0	325.9	3.0	0.0	Horz	AV	0.0	47.3	54.0	-6.7	Low channel, 903 MHz, Ant. B, EUT vert
5417.975	40.1	7.0	2.0	321.0	3.0	0.0	Horz	AV	0.0	47.1	54.0	-6.9	Low channel, 903 MHz, Ant. B, EUT horz
5418.000	40.0	7.0	1.0	92.0	3.0	0.0	Horz	AV	0.0	47.0	54.0	-7.0	Low channel, 903 MHz, Ant. B, EUT on side
7316.767	33.7	13.2	1.0	250.0	3.0	0.0	Horz	AV	0.0	46.9	54.0	-7.1	Mid channel, 914.6 MHz, Ant. B, EUT vert
5417.958	39.7	7.0	2.0	235.0	3.0	0.0	Vert	AV	0.0	46.7	54.0	-7.3	Low channel, 903 MHz, Ant. A, EUT horz
5418.025	39.6	7.0	2.7	203.1	3.0	0.0	Vert	AV	0.0	46.6	54.0	-7.4	Low channel, 903 MHz, Ant. A, EUT on side
5418.000	39.5	7.0	1.0	303.0	3.0	0.0	Horz	AV	0.0	46.5	54.0	-7.5	Low channel, 903 MHz, Ant. A, EUT vert
5417.983	38.7	7.0	1.0	143.0	3.0	0.0	Horz	AV	0.0	45.7	54.0	-8.3	Low channel, 903 MHz, Ant. A, EUT horz
5418.025	37.5	7.0	1.0	220.1	3.0	0.0	Vert	AV	0.0	44.5	54.0	-9.5	Low channel, 903 MHz, Ant. A, EUT vert
5417.958	37.5	7.0	1.1	236.9	3.0	0.0	Vert	AV	0.0	44.5	54.0	-9.5	Low channel, 903 MHz, Ant. B, EUT vert
7411.075	31.1	13.1	3.8	306.0	3.0	0.0	Vert	AV	0.0	44.2	54.0	-9.8	High channel, 926.4 MHz, Ant. B, EUT horz
7408.600	30.9	13.1	1.0	167.1	3.0	0.0	Horz	AV	0.0	44.0	54.0	-10.0	High channel, 926.4 MHz, Ant. B, EUT horz
7316.830	30.6	13.2	1.0	167.1	3.0	0.0	Vert	AV	0.0	43.8	54.0	-10.2	Mid channel, 914.6 MHz, Ant. A, EUT on side
7409.770	30.7	13.1	1.4	290.9	3.0	0.0	Horz	AV	0.0	43.8	54.0	-10.2	High channel, 926.4 MHz, Ant. A, EUT horz
7316.842	30.5	13.2	3.8	110.0	3.0	0.0	Vert	AV	0.0	43.7	54.0	-10.3	Mid channel, 914.6 MHz, Ant. A, EUT horz
7409.520	30.5	13.1	1.6	289.9	3.0	0.0	Vert	AV	0.0	43.6	54.0	-10.4	High channel, 926.4 MHz, Ant. A, EUT on side
5417.983	36.2	7.0	1.0	322.9	3.0	0.0	Vert	AV	0.0	43.2	54.0	-10.8	Low channel, 903 MHz, Ant. B, EUT on side
4631.945	37.0	4.7	1.6	188.1	3.0	0.0	Horz	AV	0.0	41.7	54.0	-12.3	High channel, 926.4 MHz, Ant. A, EUT horz
4514.950	37.1	4.3	1.0	109.1	3.0	0.0	Horz	AV	0.0	41.4	54.0	-12.6	Low channel, 903 MHz, Ant. A, EUT on side
4514.967	35.6	4.3	1.0	252.0	3.0	0.0	Vert	AV	0.0	39.9	54.0	-14.1	Low channel, 903 MHz, Ant. B, EUT horz
4631.983	34.9	4.7	1.1	335.0	3.0	0.0	Horz	AV	0.0	39.6	54.0	-14.4	High channel, 926.4 MHz, Ant. B, EUT vert
4572.992	34.7	4.4	4.0	70.1	3.0	0.0	Vert	AV	0.0	39.1	54.0	-14.9	Mid channel, 914.6 MHz, Ant. A, EUT horz
4632.000	34.4	4.7	2.9	1.1	3.0	0.0	Vert	AV	0.0	39.1	54.0	-14.9	High channel, 926.4 MHz, Ant. A, EUT on side
4514.983	34.3	4.3	1.0	16.1	3.0	0.0	Vert	AV	0.0	38.6	54.0	-15.4	Low channel, 903 MHz, Ant. A, EUT horz
4632.025	33.9	4.7	1.0	228.1	3.0	0.0	Vert	AV	0.0	38.6	54.0	-15.4	High channel, 926.4 MHz, Ant. B, EUT horz
4573.008	33.9	4.4	3.3	228.1	3.0	0.0	Vert	AV	0.0	38.3	54.0	-15.7	Mid channel, 914.6 MHz, Ant. B, EUT horz

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
3705.525	36.0	1.7	1.0	229.0	3.0	0.0	Vert	AV	0.0	37.7	54.0	-16.3	High channel, 926.4 MHz, Ant. B, EUT horz
4572.920	33.1	4.4	2.9	340.9	3.0	0.0	Vert	AV	0.0	37.5	54.0	-16.5	Mid channel, 914.6 MHz, Ant. A, EUT on side
3705.545	35.8	1.7	1.0	178.1	3.0	0.0	Vert	AV	0.0	37.5	54.0	-16.5	High channel, 926.4 MHz, Ant. A EUT on side
4514.945	33.2	4.3	1.0	250.0	3.0	0.0	Horz	AV	0.0	37.5	54.0	-16.5	Low channel, 903 MHz, Ant. B, EUT vert
4572.975	33.1	4.4	1.0	344.9	3.0	0.0	Horz	AV	0.0	37.5	54.0	-16.5	Mid channel, 914.6 MHz, Ant. B, EUT vert
7316.525	44.1	13.2	1.1	285.0	3.0	0.0	Vert	PK	0.0	57.3	74.0	-16.7	Mid channel, 914.6 MHz, Ant. B, EUT horz
3658.408	35.9	1.3	1.1	333.0	3.0	0.0	Horz	AV	0.0	37.2	54.0	-16.8	Mid channel, 914.6 MHz, Ant. B, EUT vert
3611.933	36.0	0.8	1.0	250.9	3.0	0.0	Vert	AV	0.0	36.8	54.0	-17.2	Low channel, 903 MHz, Ant. B, EUT horz
7316.775	43.4	13.2	1.0	250.0	3.0	0.0	Horz	PK	0.0	56.6	74.0	-17.4	Mid channel, 914.6 MHz, Ant. B, EUT vert
3705.605	34.8	1.7	1.2	192.1	3.0	0.0	Horz	AV	0.0	36.5	54.0	-17.5	High channel, 926.4 MHz, Ant. A EUT horz
3658.430	35.0	1.3	1.0	186.0	3.0	0.0	Vert	AV	0.0	36.3	54.0	-17.7	Mid channel, 914.6 MHz, Ant. A, EUT on side
3705.458	34.6	1.7	1.0	332.0	3.0	0.0	Horz	AV	0.0	36.3	54.0	-17.7	High channel, 926.4 MHz, Ant. B, EUT vert
3658.350	34.8	1.3	1.0	224.1	3.0	0.0	Vert	AV	0.0	36.1	54.0	-17.9	Mid channel, 914.6 MHz, Ant. B, EUT horz
7409.375	42.2	13.1	3.8	306.0	3.0	0.0	Vert	PK	0.0	55.3	74.0	-18.7	High channel, 926.4 MHz, Ant. B, EUT horz
3658.375	33.8	1.3	1.0	46.0	3.0	0.0	Vert	AV	0.0	35.1	54.0	-18.9	Mid channel, 914.6 MHz, Ant. A, EUT horz
7411.460	41.9	13.1	1.6	289.9	3.0	0.0	Vert	PK	0.0	55.0	74.0	-19.0	High channel, 926.4 MHz, Ant. A EUT on side
3612.065	34.2	0.8	1.0	80.1	3.0	0.0	Horz	AV	0.0	35.0	54.0	-19.0	Low channel, 903 MHz, Ant. B, EUT vert
7317.560	41.7	13.2	1.0	167.1	3.0	0.0	Vert	PK	0.0	54.9	74.0	-19.1	Mid channel, 914.6 MHz, Ant. A, EUT on side
7410.835	41.8	13.1	1.4	290.9	3.0	0.0	Horz	PK	0.0	54.9	74.0	-19.1	High channel, 926.4 MHz, Ant. A EUT horz
7411.083	41.8	13.1	1.0	167.1	3.0	0.0	Horz	PK	0.0	54.9	74.0	-19.1	High channel, 926.4 MHz, Ant. A, EUT vert
5417.808	47.1	7.0	1.0	121.0	3.0	0.0	Horz	PK	0.0	54.1	74.0	-19.9	Low channel, 903 MHz, Ant. A, EUT on side
7316.633	40.9	13.2	3.8	110.0	3.0	0.0	Vert	PK	0.0	54.1	74.0	-19.9	Mid channel, 914.6 MHz, Ant. B, EUT horz
5417.875	46.8	7.0	1.0	234.0	3.0	0.0	Vert	PK	0.0	53.8	74.0	-20.2	Low channel, 903 MHz, Ant. B, EUT horz
3612.067	32.9	0.8	1.0	264.9	3.0	0.0	Horz	AV	0.0	33.7	54.0	-20.3	Low channel, 903 MHz, Ant. A, EUT on side
5418.025	46.7	7.0	1.0	325.9	3.0	0.0	Horz	PK	0.0	53.7	74.0	-20.3	Low channel, 903 MHz, Ant. B, EUT vert
3612.017	32.4	0.8	1.8	263.0	3.0	0.0	Vert	AV	0.0	33.2	54.0	-20.8	Low channel, 903 MHz, Ant. A, EUT horz
5417.825	46.2	7.0	2.0	321.0	3.0	0.0	Horz	PK	0.0	53.2	74.0	-20.8	Low channel, 903 MHz, Ant. B, EUT horz
5417.825	45.9	7.0	1.0	92.0	3.0	0.0	Horz	PK	0.0	52.9	74.0	-21.1	Low channel, 903 MHz, Ant. B, EUT on side
5418.083	45.4	7.0	1.0	306.0	3.0	0.0	Horz	PK	0.0	52.4	74.0	-21.6	Low channel, 903 MHz, Ant. A, EUT vert
5418.233	45.0	7.0	2.0	235.0	3.0	0.0	Vert	PK	0.0	52.0	74.0	-22.0	Low channel, 903 MHz, Ant. A, EUT horz
5418.175	44.9	7.0	2.7	203.1	3.0	0.0	Vert	PK	0.0	51.9	74.0	-22.1	Low channel, 903 MHz, Ant. A, EUT on side
5417.983	44.8	7.0	1.1	236.9	3.0	0.0	Vert	PK	0.0	51.8	74.0	-22.2	Low channel, 903 MHz, Ant. B, EUT vert
5418.075	44.3	7.0	1.0	143.0	3.0	0.0	Horz	PK	0.0	51.3	74.0	-22.7	Low channel, 903 MHz, Ant. A, EUT horz
5417.850	44.3	7.0	1.0	322.9	3.0	0.0	Vert	PK	0.0	51.3	74.0	-22.7	Low channel, 903 MHz, Ant. B, EUT on side
5417.667	43.9	7.0	1.0	220.1	3.0	0.0	Vert	PK	0.0	50.9	74.0	-23.1	Low channel, 903 MHz, Ant. A, EUT vert
4631.945	44.7	4.7	1.6	188.1	3.0	0.0	Horz	PK	0.0	49.4	74.0	-24.6	High channel, 926.4 MHz, Ant. A EUT horz
4631.992	44.0	4.7	1.0	228.1	3.0	0.0	Vert	PK	0.0	48.7	74.0	-25.3	High channel, 926.4 MHz, Ant. B, EUT horz
4632.535	43.9	4.7	2.9	1.1	3.0	0.0	Vert	PK	0.0	48.6	74.0	-25.4	High channel, 926.4 MHz, Ant. A EUT on side
4514.775	44.2	4.3	1.0	252.0	3.0	0.0	Vert	PK	0.0	48.5	74.0	-25.5	Low channel, 903 MHz, Ant. B, EUT horz
4515.008	44.1	4.3	1.0	109.1	3.0	0.0	Horz	PK	0.0	48.4	74.0	-25.6	Low channel, 903 MHz, Ant. A, EUT on side
4631.617	43.7	4.7	1.1	335.0	3.0	0.0	Horz	PK	0.0	48.4	74.0	-25.6	High channel, 926.4 MHz, Ant. B, EUT vert
4572.875	43.9	4.4	3.3	228.1	3.0	0.0	Vert	PK	0.0	48.3	74.0	-25.7	Mid channel, 914.6 MHz, Ant. B, EUT horz
4573.425	43.7	4.4	1.0	344.9	3.0	0.0	Horz	PK	0.0	48.1	74.0	-25.9	Mid channel, 914.6 MHz, Ant. B, EUT vert
4514.817	43.6	4.3	1.0	16.1	3.0	0.0	Vert	PK	0.0	47.9	74.0	-26.1	Low channel, 903 MHz, Ant. A, EUT horz
4573.208	43.3	4.4	4.0	70.1	3.0	0.0	Vert	PK	0.0	47.7	74.0	-26.3	Mid channel, 914.6 MHz, Ant. A, EUT horz
4515.700	43.4	4.3	1.0	250.0	3.0	0.0	Horz	PK	0.0	47.7	74.0	-26.3	Low channel, 903 MHz, Ant. B, EUT vert
4572.805	43.1	4.4	2.9	340.9	3.0	0.0	Vert	PK	0.0	47.5	74.0	-26.5	Mid channel, 914.6 MHz, Ant. A, EUT on side
3704.942	45.4	1.7	1.0	229.0	3.0	0.0	Vert	PK	0.0	47.1	74.0	-26.9	High channel, 926.4 MHz, Ant. B, EUT horz
3705.875	45.0	1.7	1.2	192.1	3.0	0.0	Horz	PK	0.0	46.7	74.0	-27.3	High channel, 926.4 MHz, Ant. A EUT horz
3658.717	45.4	1.3	1.1	333.0	3.0	0.0	Horz	PK	0.0	46.7	74.0	-27.3	Mid channel, 914.6 MHz, Ant. B, EUT vert
3612.475	45.7	0.8	1.0	250.9	3.0	0.0	Vert	PK	0.0	46.5	74.0	-27.5	Low channel, 903 MHz, Ant. B, EUT horz
3658.650	45.0	1.3	1.0	186.0	3.0	0.0	Vert	PK	0.0	46.3	74.0	-27.7	Mid channel, 914.6 MHz, Ant. A, EUT on side
3705.870	44.6	1.7	1.0	178.1	3.0	0.0	Vert	PK	0.0	46.3	74.0	-27.7	High channel, 926.4 MHz, Ant. A EUT on side
3658.133	45.0	1.3	1.0	224.1	3.0	0.0	Vert	PK	0.0	46.3	74.0	-27.7	Mid channel, 914.6 MHz, Ant. B, EUT horz
3705.383	44.5	1.7	1.0	332.0	3.0	0.0	Horz	PK	0.0	46.2	74.0	-27.8	High channel, 926.4 MHz, Ant. B, EUT vert
3612.205	44.6	0.8	1.0	80.1	3.0	0.0	Horz	PK	0.0	45.4	74.0	-28.6	Low channel, 903 MHz, Ant. B, EUT vert
3658.300	43.3	1.3	1.0	46.0	3.0	0.0	Vert	PK	0.0	44.6	74.0	-29.4	Mid channel, 914.6 MHz, Ant. A, EUT horz
3611.883	43.5	0.8	1.8	263.0	3.0	0.0	Vert	PK	0.0	44.3	74.0	-29.7	Low channel, 903 MHz, Ant. A, EUT horz
3612.025	42.9	0.8	1.0	264.9	3.0	0.0	Horz	PK	0.0	43.7	74.0	-30.3	Low channel, 903 MHz, Ant. A, EUT on side

# DUTY CYCLE

## TEST DESCRIPTION

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The Duty Cycle (x) were measured for each of the EUT operating modes. The measurements were made using a zero span on the spectrum analyzer to see the pulses in the time domain. The transmit power was set to its default maximum.

The duty cycle was calculated by dividing the transmission pulse duration (T) by the total period of a single on and total off time.

The EUT operates at 100% Duty Cycle.

# CARRIER FREQUENCY SEPARATION

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
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	10/17/2017
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	9/18/2016
Attenuator	S.M. Electronics	SA26B-20	RFW	2/26/2016	2/26/2017
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	9/18/2016
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/24/2016	3/24/2017

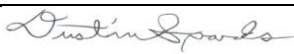
## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The channel carrier frequencies in the 900-928MHz band must be separated by 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. The EUT was operated in pseudorandom hopping mode. The spectrum was scanned across two adjacent peaks. The separation between the peaks of these channels was measured.

# CARRIER FREQUENCY SEPARATION

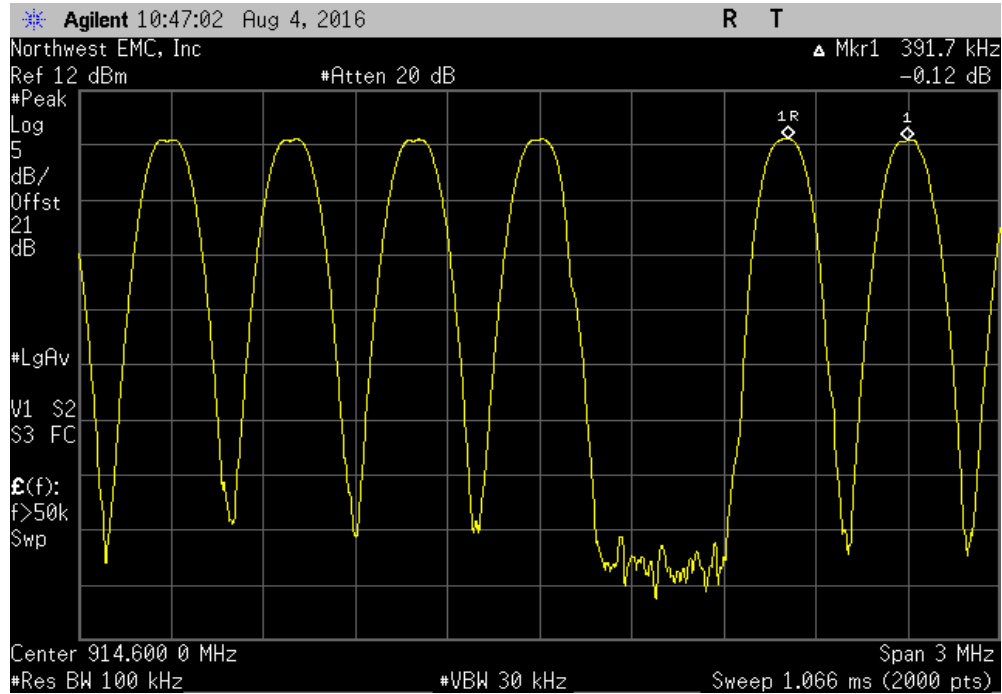


XMR 2016.05.06

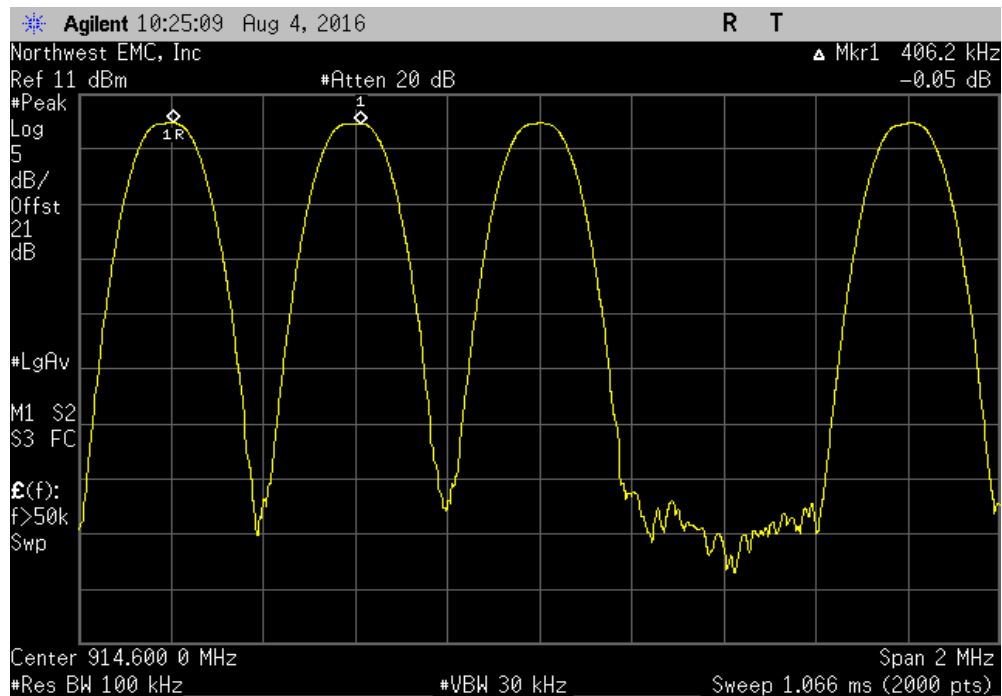
EUT: TH8321R1001		Work Order: HNYW0180	
Serial Number: 5191101 0315015		Date: 08/04/16	
Customer: Honeywell, Automation and Control Solutions		Temperature: 23.4 °C	
Attendees: None		Humidity: 60.8% RH	
Project: None		Barometric Pres.: 1012 mbar	
Tested by: Dustin Sparks	Power: 110VAC/60Hz	Job Site: MN08	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2016		ANSI C63.10:2013	
COMMENTS			
Limit is based on the 20dB occupied bandwidth.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	3	Signature 	
		Value	Limit Results
Antenna A	Mid Channel, 914.6 MHz	392 kHz	>65 kHz Pass
Antenna B	Mid Channel, 914.6 MHz	406 kHz	>65 kHz Pass

# CARRIER FREQUENCY SEPARATION

Antenna A, Mid Channel, 914.6 MHz						
				Value	Limit	Results
				392 kHz	>65 kHz	Pass



Antenna B, Mid Channel, 914.6 MHz						
				Value	Limit	Results
				406 kHz	>65 kHz	Pass



# NUMBER OF HOPPING FREQUENCIES

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
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	10/17/2017
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	9/18/2016
Attenuator	S.M. Electronics	SA26B-20	RFW	2/26/2016	2/26/2017
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	9/18/2016
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/24/2016	3/24/2017

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The number of hopping frequencies was measured across the authorized band. The hopping function of the EUT was enabled.

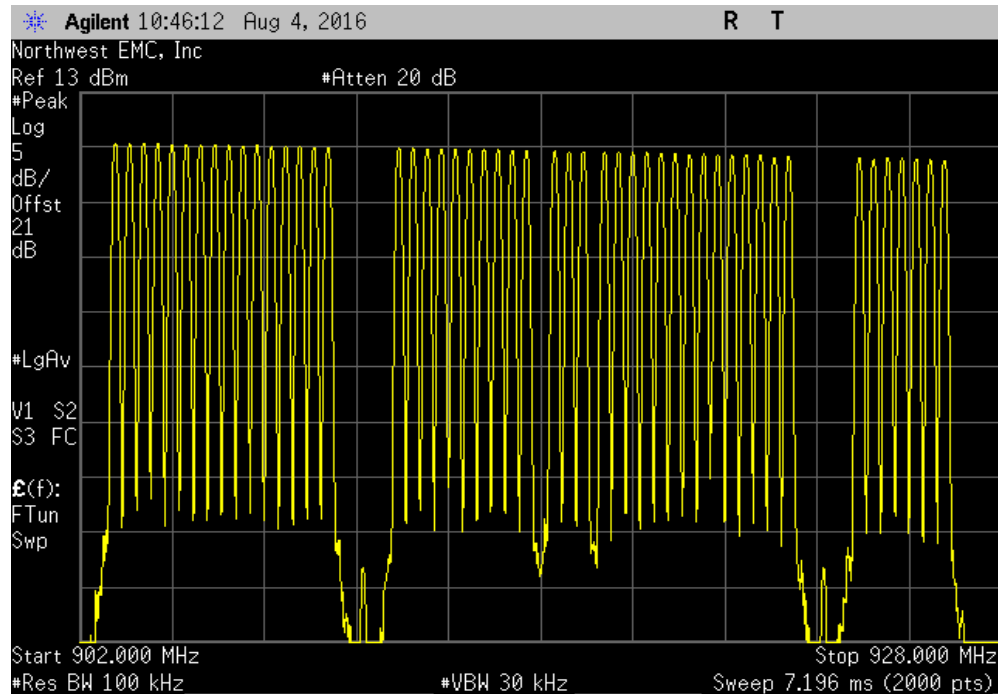


# NUMBER OF HOPPING FREQUENCIES

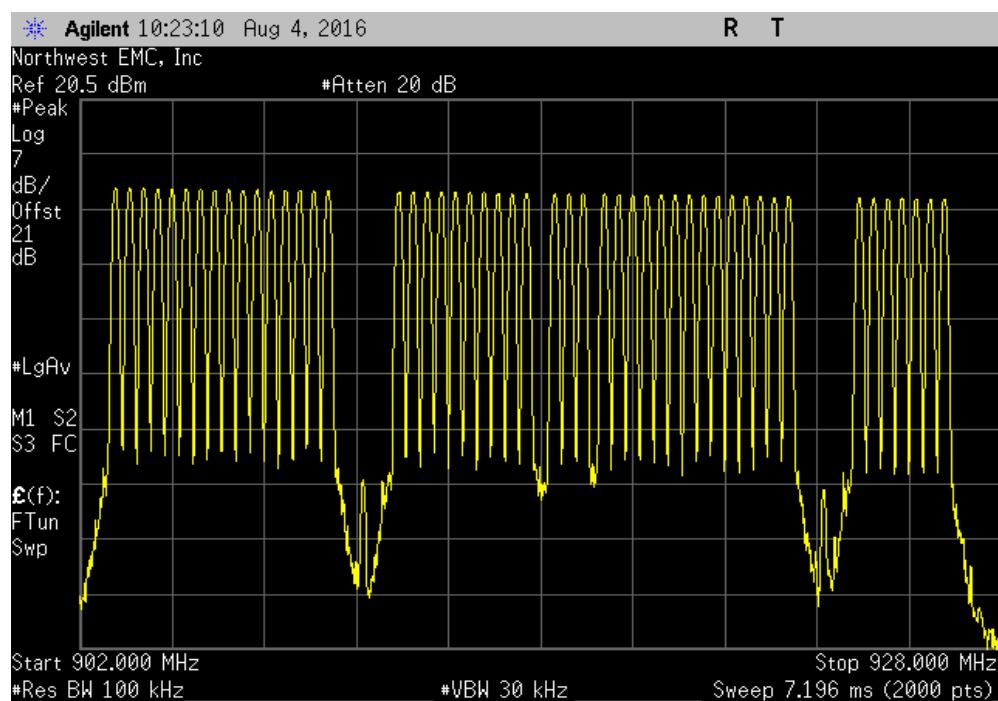
EUT: TH8321R1001		Work Order: HNYW0180	
Serial Number: 5191101 0315015		Date: 08/04/16	
Customer: Honeywell, Automation and Control Solutions		Temperature: 23.5 °C	
Attendees: None		Humidity: 61.2% RH	
Project: None		Barometric Pres.: 1012 mbar	
Tested by: Dustin Sparks	Power: 110VAC/60Hz	Job Site: MN08	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2016		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	3	Signature 	
		Number of Channels	Limit Results
Antenna A	Mid Channel, 914.6 MHz	50	≥ 50 Pass
Antenna B	Mid Channel, 914.6 MHz	50	≥ 50 Pass

# NUMBER OF HOPPING FREQUENCIES

Antenna A, Mid Channel, 914.6 MHz						
				Number of Channels	Limit	Results
				50		N/A



Antenna B, Mid Channel, 914.6 MHz						
				Number of Channels	Limit	Results
				50		N/A



# DWELL TIME

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
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	10/17/2017
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	9/18/2016
Attenuator	S.M. Electronics	SA26B-20	RFW	2/26/2016	2/26/2017
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	9/18/2016
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/24/2016	3/24/2017

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The average dwell time per hopping channel was measured at one hopping channel in the middle of the authorized band. The hopping function of the EUT was enabled.

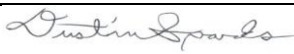
The dwell time limit is based on the Number of Hopping Channels \* 400 mS. For this radio, it is 50 Channels \* 400mS = 20.0 Sec.

On Time During 20.0 Sec = Pulse Width \* Average Number of Pulses \* Scale Factor

➤Average Number of Pulses is based on 4 samples.

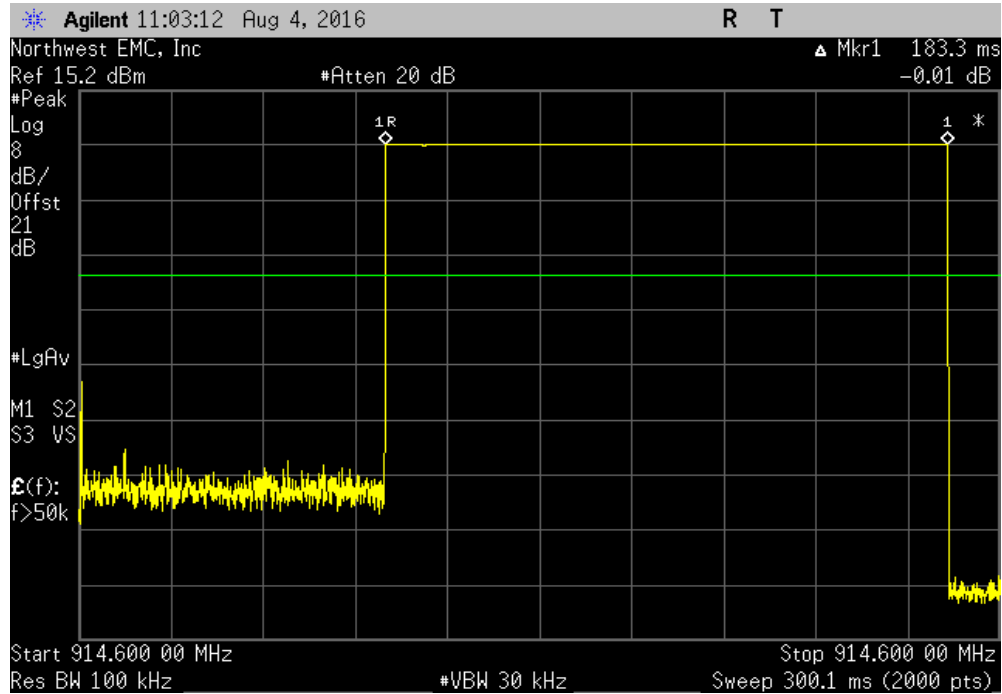
➤Scale Factor = 20.0 Sec / Screen Capture Sweep Time = 20.0 Sec / 60.0 Sec = 1/3

# DWELL TIME

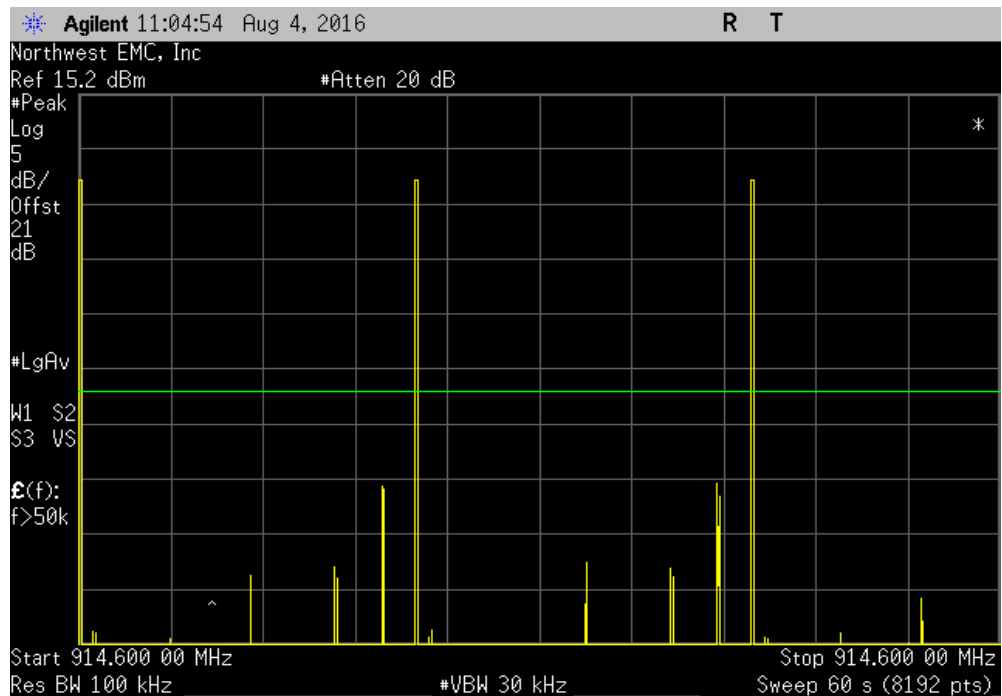
EUT: TH8321R1001		Work Order: HNYW0180	
Serial Number: 5191101 0315015		Date: 08/04/16	
Customer: Honeywell, Automation and Control Solutions		Temperature: 23.4 °C	
Attendees: None		Humidity: 60.8% RH	
Project: None		Barometric Pres.: 1011 mbar	
Tested by: Dustin Sparks	Power: 110VAC/60Hz	Job Site: MN08	
TEST SPECIFICATIONS			
FCC 15.247:2016		Test Method: ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	3	Signature: 	
		Pulse Width (ms)	Number of Pulses
		Average High Time (ms)	Scale Factor
		On Time (ms) During 20 s	Limit (ms)
		Results	
Antenna A	Mid Channel, 914.6 MHz	183.313	N/A
	Mid Channel, 914.6 MHz	183.313	3
		549.939	1/3
		183.313	400
		Pass	
Antenna B	Mid Channel, 914.6 MHz	183.313	N/A
	Mid Channel, 914.6 MHz	183.313	3
		549.939	183.313
		183.313	400
		Pass	

# DWELL TIME

Antenna A, Mid Channel, 914.6 MHz						
Pulse Width (ms)	Number of Pulses	Average High Time (ms)	Scale Factor	On Time (ms) During 20 s	Limit (ms)	Results
183.313	N/A	N/A	N/A	N/A	N/A	N/A

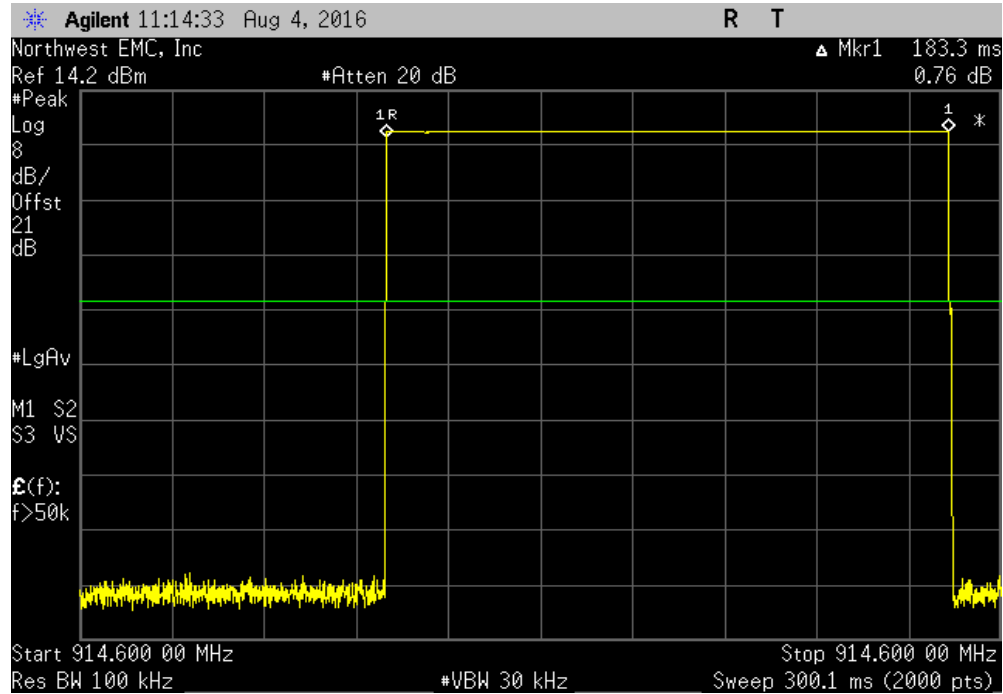


Antenna A, Mid Channel, 914.6 MHz						
Pulse Width (ms)	Number of Pulses	Average High Time (ms)	Scale Factor	On Time (ms) During 20 s	Limit (ms)	Results
183.313	3	549.9	1/3	183.3	400	Pass

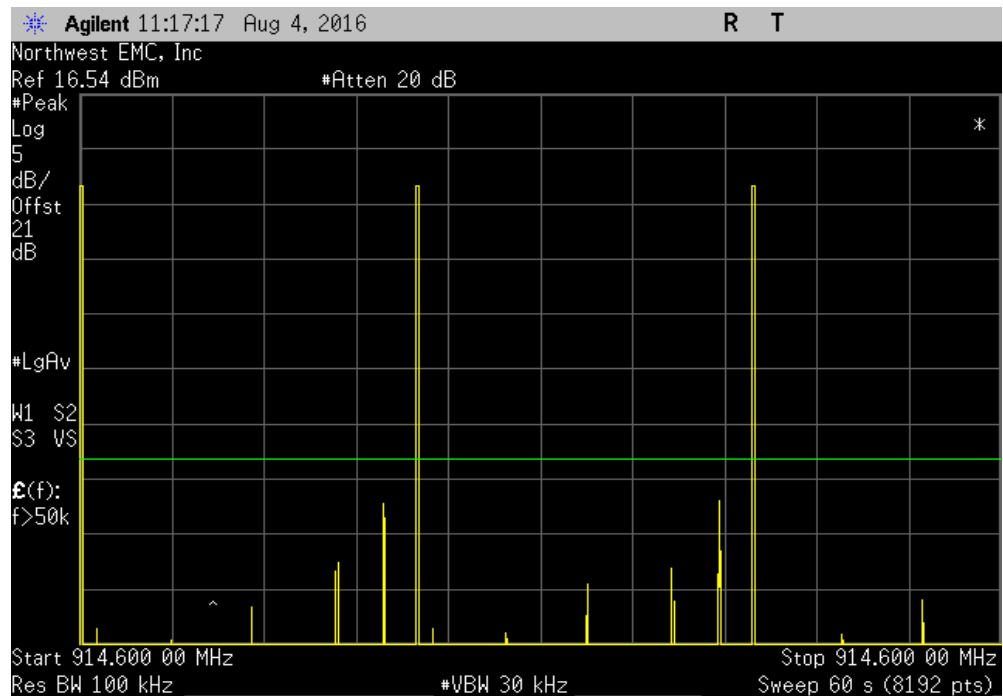


# DWELL TIME

Antenna B, Mid Channel, 914.6 MHz						
Pulse Width (ms)	Number of Pulses	Average High Time (ms)	Scale Factor	On Time (ms) During 20 s	Limit (ms)	Results
183.313	N/A	N/A	N/A	N/A	N/A	N/A



Antenna B, Mid Channel, 914.6 MHz						
Pulse Width (ms)	Number of Pulses	Average High Time (ms)	Scale Factor	On Time (ms) During 20 s	Limit (ms)	Results
183.313	3	549.939	183.313	183.313	400	Pass



# OUTPUT POWER

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
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	10/17/2017
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	9/18/2016
Attenuator	S.M. Electronics	SA26B-20	RFW	2/26/2016	2/26/2017
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	9/18/2016
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/24/2016	3/24/2017

## TEST DESCRIPTION

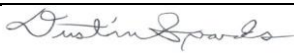
The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The peak output power was measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting in a no hop mode at the data rate(s) listed in the datasheet.

The method found in ANSI C63.10:2013 Section 7.8.5 was used for a FHSS radio.

**De Facto EIRP Limit:** Per 47 CFR 15.247 (b)(1-3), the EUT meets the de facto EIRP limit of +36 dBm.

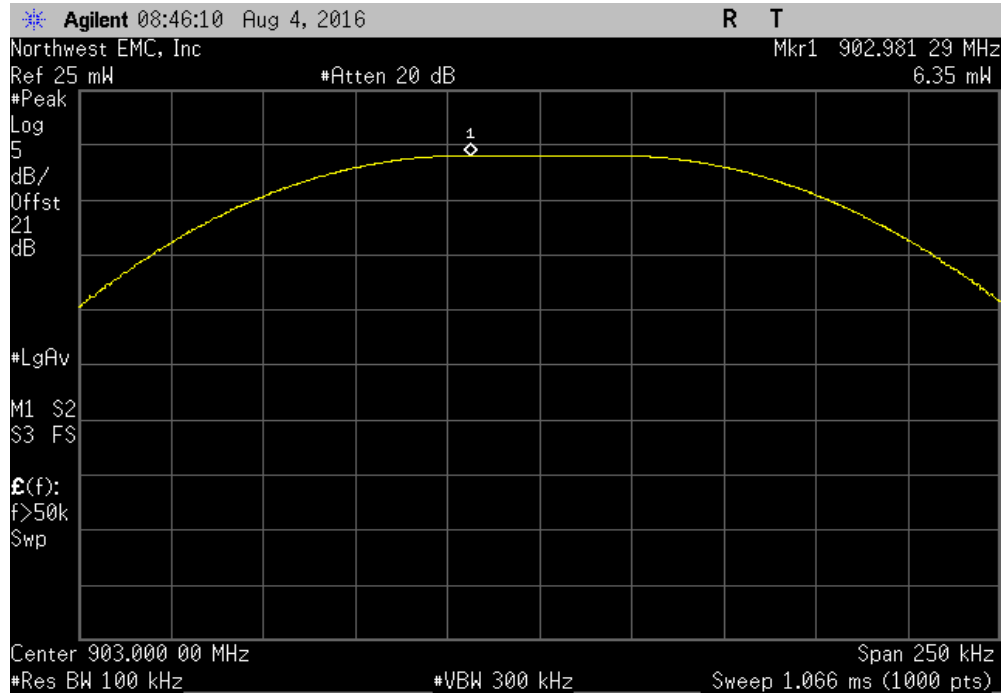


# OUTPUT POWER

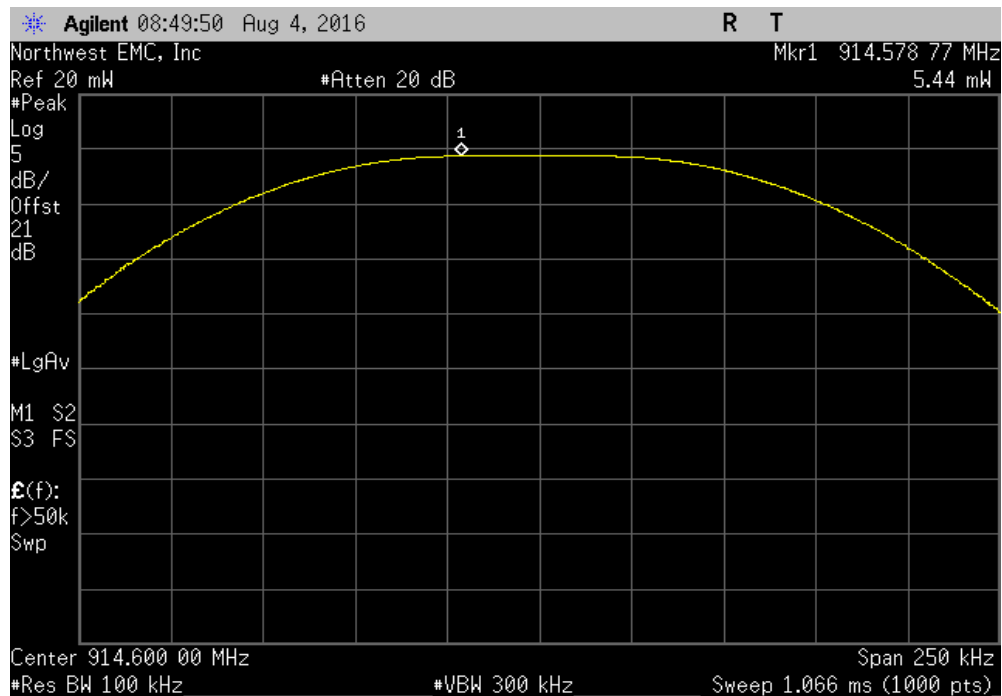
EUT: TH8321R1001		Work Order: HNYW0180	
Serial Number: 5191101 0315015		Date: 08/04/16	
Customer: Honeywell, Automation and Control Solutions		Temperature: 23.3 °C	
Attendees: None		Humidity: 60.1% RH	
Project: None		Barometric Pres.: 1013 mbar	
Tested by: Dustin Sparks	Power: 110VAC/60Hz	Job Site: MN08	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2016		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	3	Signature 	
		Value	Limit (<)
Antenna A	Low Channel, 903.0 MHz	6.353 mW	1 W
	Mid Channel, 914.6 MHz	5.438 mW	1 W
	High Channel, 926.4 MHz	4.474 mW	1 W
Antenna B	Low Channel, 903.0 MHz	7.547 mW	1 W
	Mid Channel, 914.6 MHz	6.59 mW	1 W
	High Channel, 926.4 MHz	5.526 mW	1 W
			Result
			Pass
			Pass
			Pass
			Pass
			Pass
			Pass

# OUTPUT POWER

Antenna A, Low Channel, 903.0 MHz						
				Value	Limit (<)	Result
				6.353 mW	1 W	Pass

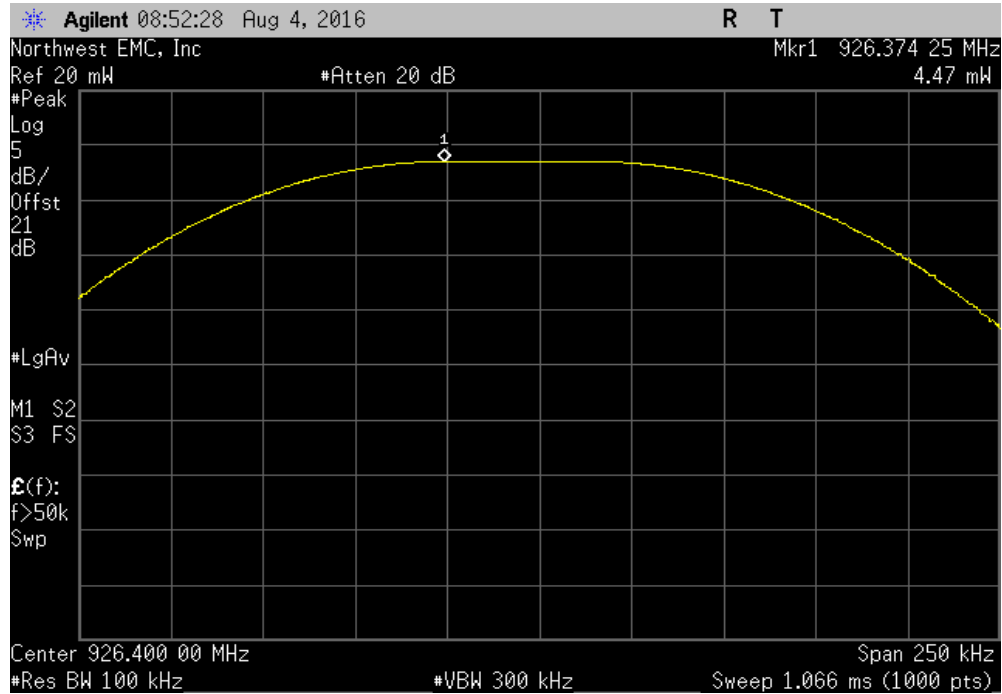


Antenna A, Mid Channel, 914.6 MHz						
				Value	Limit (<)	Result
				5.438 mW	1 W	Pass

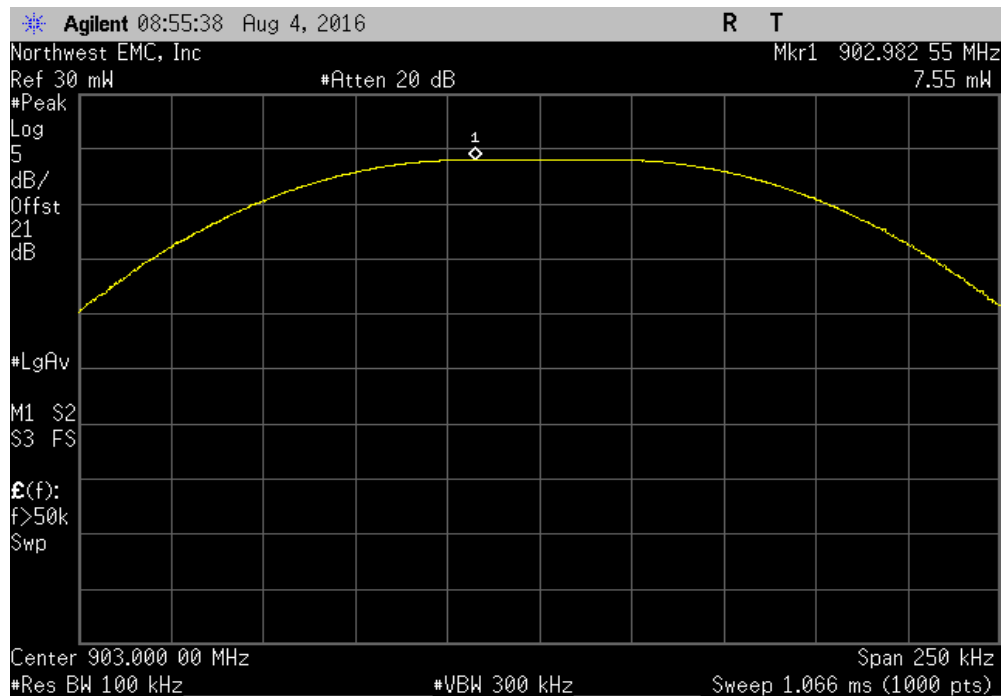


# OUTPUT POWER

Antenna A, High Channel, 926.4 MHz						
				Value	Limit (<)	Result
				4.474 mW	1 W	Pass

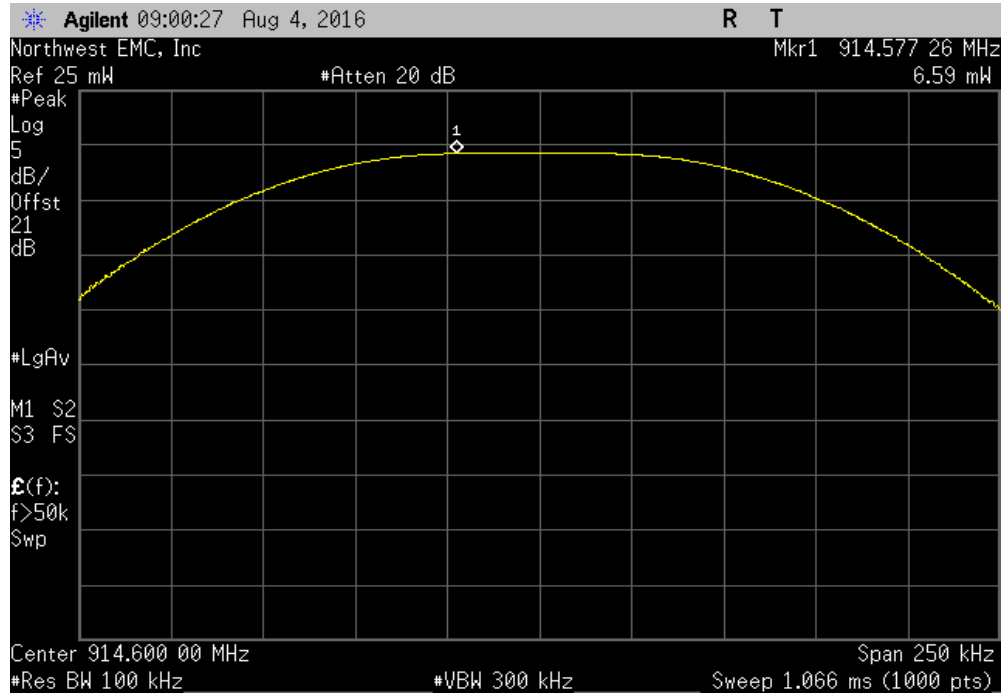


Antenna B, Low Channel, 903.0 MHz						
				Value	Limit (<)	Result
				7.547 mW	1 W	Pass

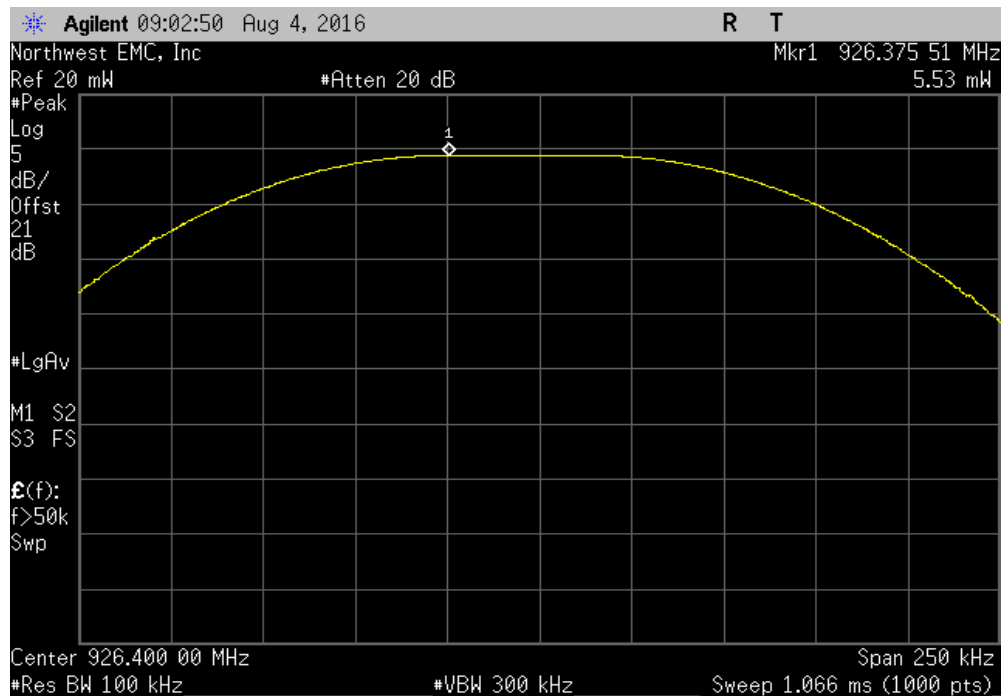


# OUTPUT POWER

Antenna B, Mid Channel, 914.6 MHz						
				Value	Limit (<)	Result
				6.59 mW	1 W	Pass



Antenna B, High Channel, 926.4 MHz						
				Value	Limit (<)	Result
				5.526 mW	1 W	Pass



# BAND EDGE COMPLIANCE

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

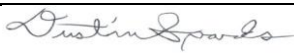
Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	10/17/2017
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	9/18/2016
Attenuator	S.M. Electronics	SA26B-20	RFW	2/26/2016	2/26/2017
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	9/18/2016
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/24/2016	3/24/2017

## 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 at the edges of the authorized band were measured with the EUT set to low and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet in a no hop mode. The channels closest to the band edges were selected.

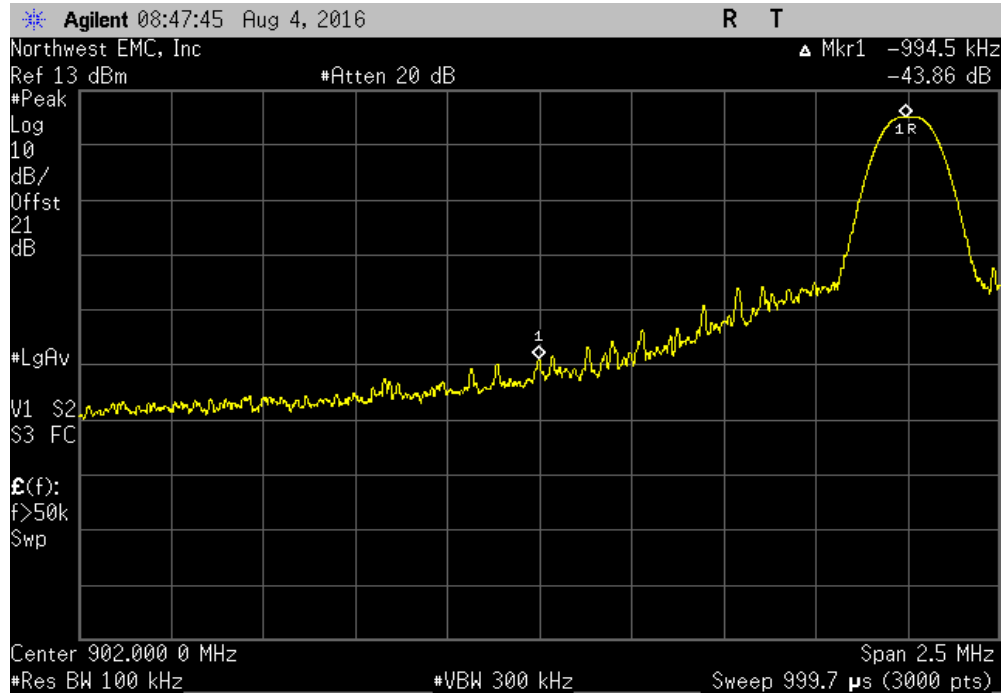
The spectrum was scanned below the lower band edge and above the higher band edge.

# BAND EDGE COMPLIANCE

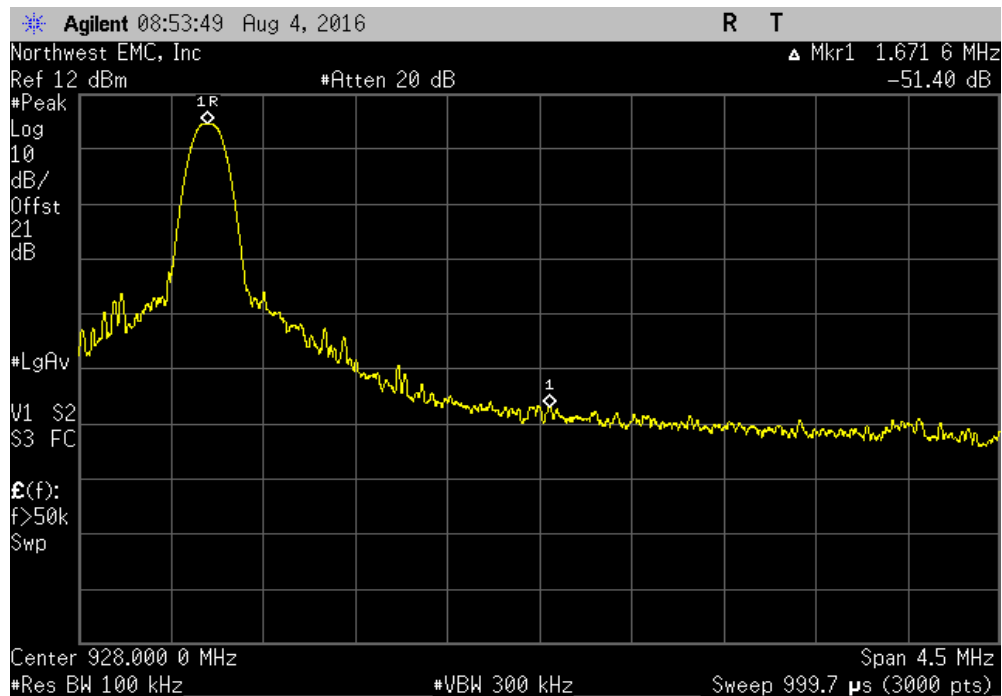
EUT: TH8321R1001		Work Order: HNYW0180	
Serial Number: 5191101 0315015		Date: 08/04/16	
Customer: Honeywell, Automation and Control Solutions		Temperature: 23.3 °C	
Attendees: None		Humidity: 59.9% RH	
Project: None		Barometric Pres.: 1013 mbar	
Tested by: Dustin Sparks	Power: 110VAC/60Hz	Job Site: MN08	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2016		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	3	Signature 	
		Value (dBc)	Limit ≤ (dBc) Result
Antenna A			
	Low Channel, 903.0 MHz	-43.86	-20 Pass
	High Channel, 926.4 MHz	-51.4	-20 Pass
Antenna B			
	Low Channel, 903.0 MHz	-45.4	-20 Pass
	High Channel, 926.4 MHz	-51.89	-20 Pass

# BAND EDGE COMPLIANCE

Antenna A, Low Channel, 903.0 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-43.86	-20	Pass



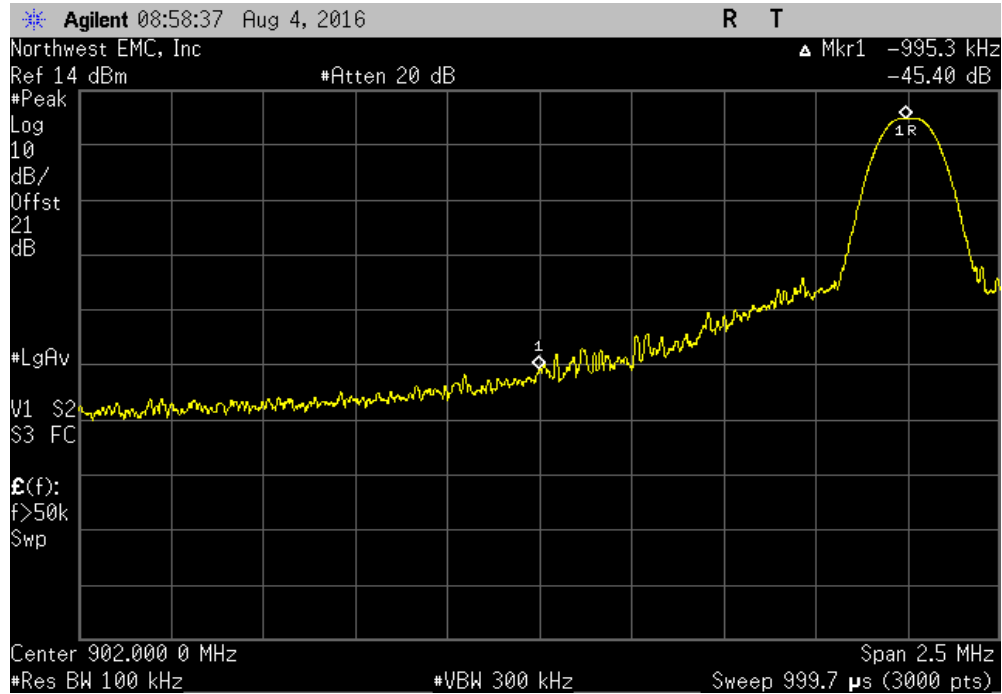
Antenna A, High Channel, 926.4 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-51.4	-20	Pass



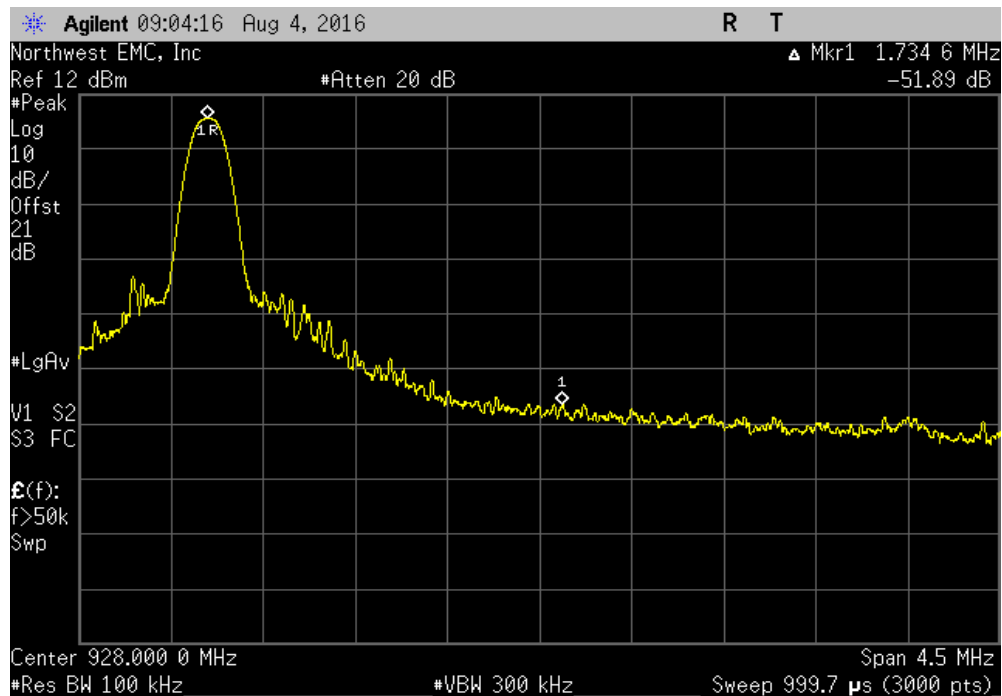


# BAND EDGE COMPLIANCE

Antenna B, Low Channel, 903.0 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-45.4	-20	Pass



Antenna B, High Channel, 926.4 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-51.89	-20	Pass



# BAND EDGE COMPLIANCE - HOPPING MODE

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

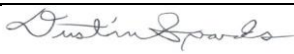
Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	10/17/2017
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	9/18/2016
Attenuator	S.M. Electronics	SA26B-20	RFW	2/26/2016	2/26/2017
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	9/18/2016
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/24/2016	3/24/2017

## 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 at the edges of the authorized band were measured with the EUT set to its normal pseudo-random hopping sequence. The EUT was transmitting at the data rate(s) listed in the datasheet.

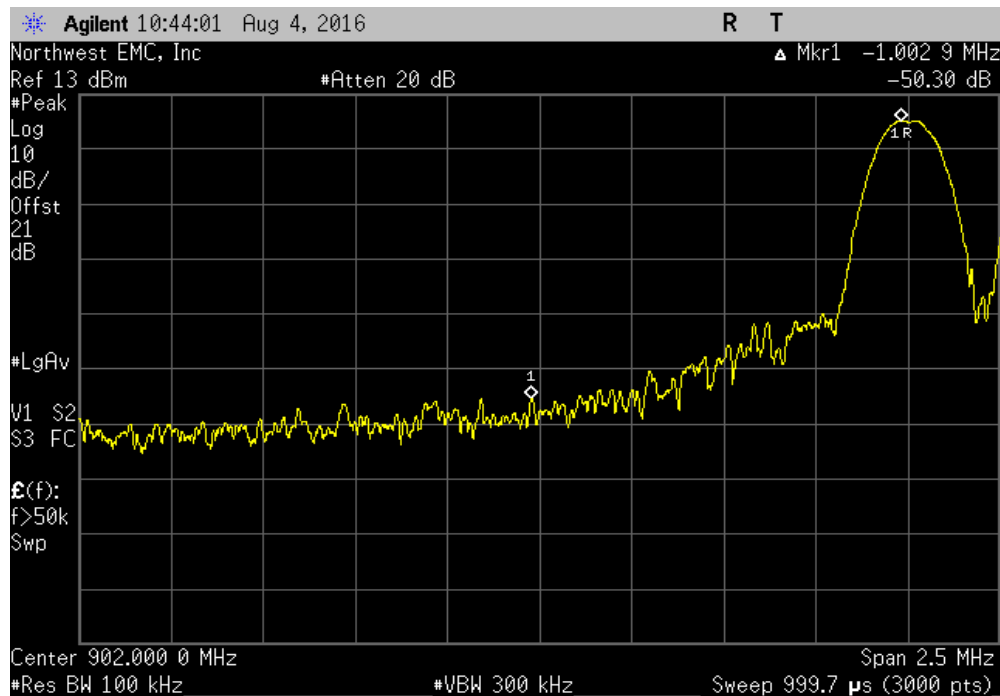
The spectrum was scanned below the lower band edge and above the higher band edge.

# BAND EDGE COMPLIANCE - HOPPING MODE

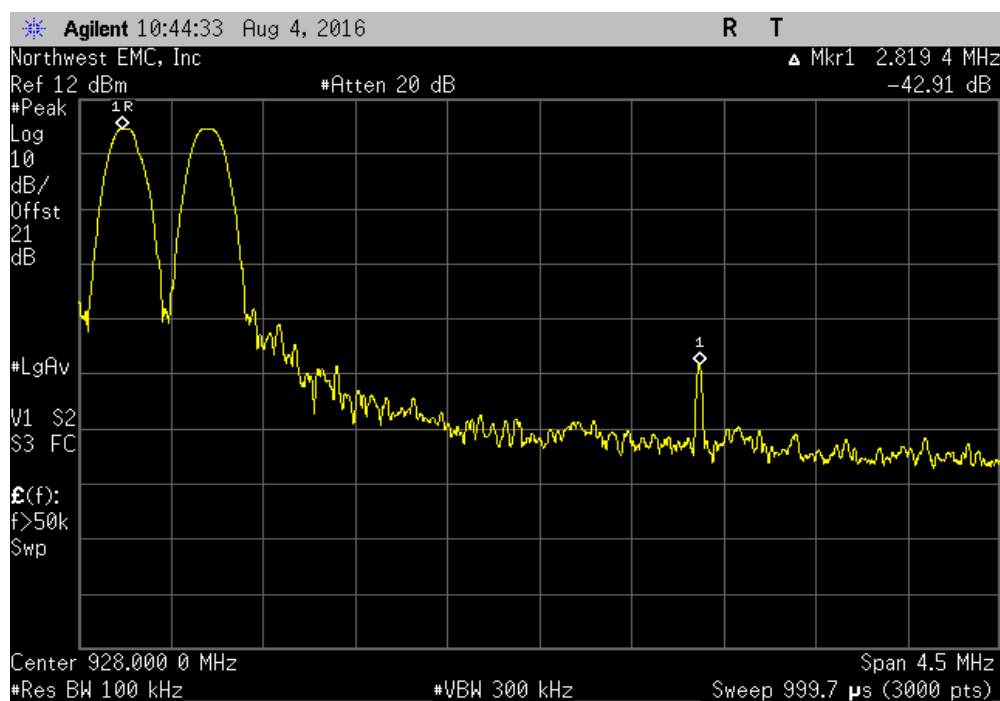
EUT: TH8321R1001		Work Order: HNYW0180	
Serial Number: 5191101 0315015		Date: 08/04/16	
Customer: Honeywell, Automation and Control Solutions		Temperature: 23.4 °C	
Attendees: None		Humidity: 60.9% RH	
Project: None		Barometric Pres.: 1012 mbar	
Tested by: Dustin Sparks	Power: 110VAC/60Hz	Job Site: MN08	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2016		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	3	Signature 	
		Value (dBc)	Limit ≤ (dBc) Result
Antenna A			
	Low Channel, 903.0 MHz	-50.31	-20 Pass
	High Channel, 926.4 MHz	-42.91	-20 Pass
Antenna B			
	Low Channel, 903.0 MHz	-50.27	-20 Pass
	High Channel, 926.4 MHz	-43.4	-20 Pass

# BAND EDGE COMPLIANCE - HOPPING MODE

Antenna A, Low Channel, 903.0 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-50.31	-20	Pass

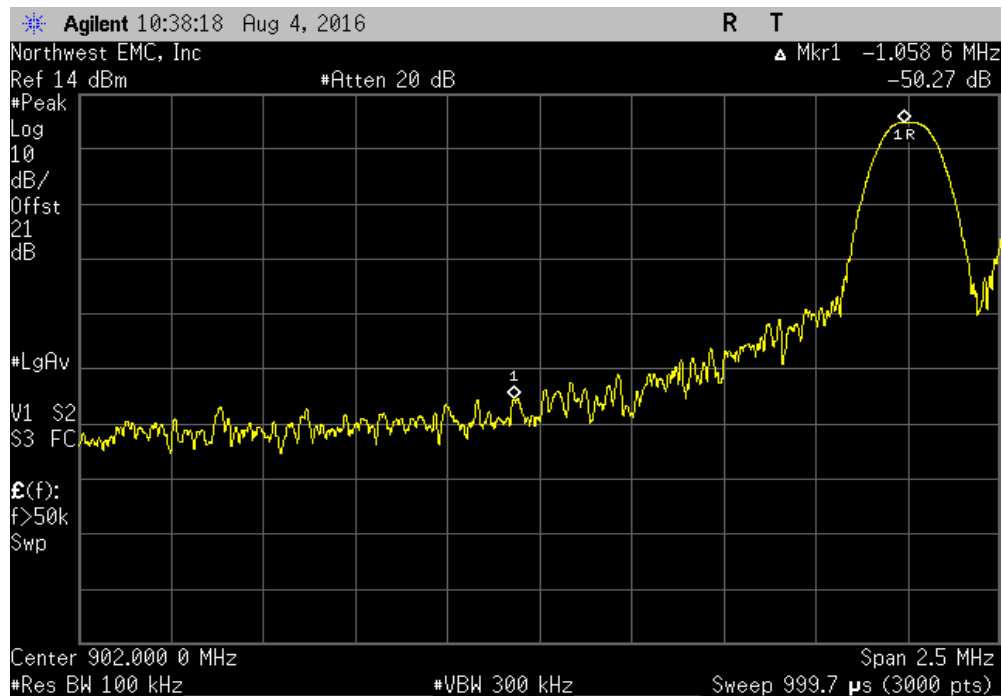


Antenna A, High Channel, 926.4 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-42.91	-20	Pass

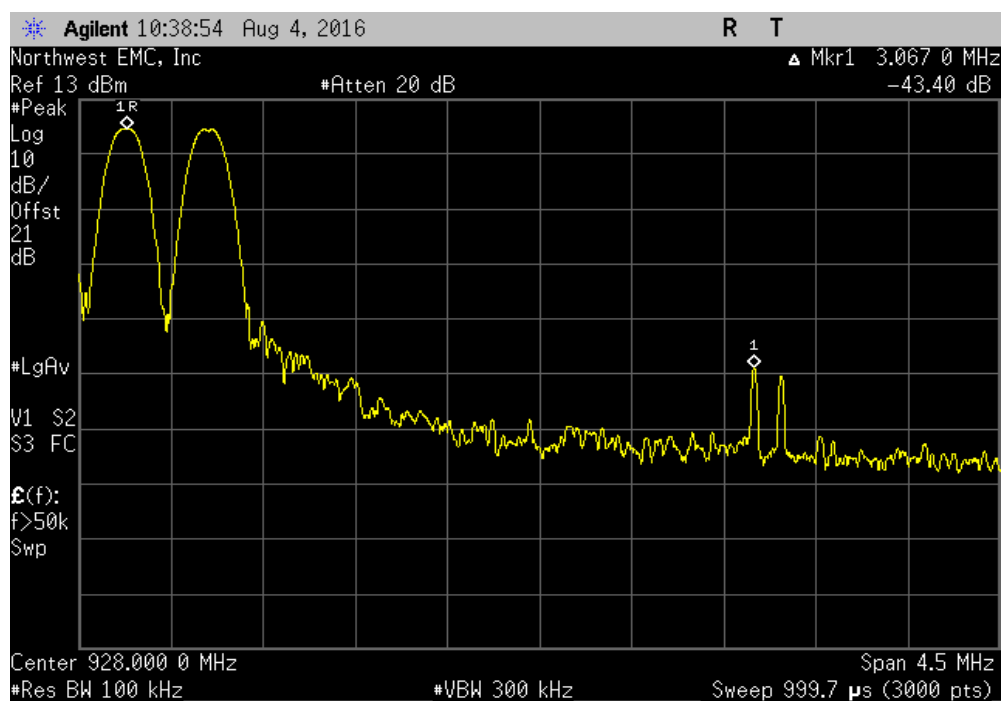


# BAND EDGE COMPLIANCE - HOPPING MODE

Antenna B, Low Channel, 903.0 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-50.27	-20	Pass



Antenna B, High Channel, 926.4 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-43.4	-20	Pass



# OCCUPIED BANDWIDTH

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
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	10/17/2017
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	9/18/2016
Attenuator	S.M. Electronics	SA26B-20	RFW	2/26/2016	2/26/2017
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	9/18/2016
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/24/2016	3/24/2017

## TEST DESCRIPTION

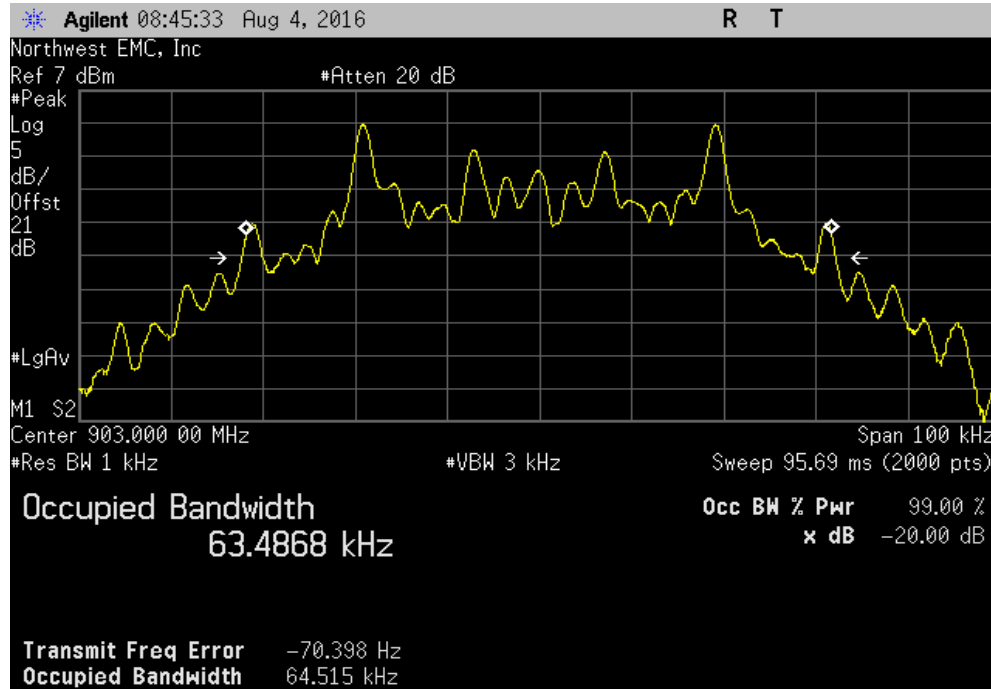
The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The 20 dB occupied bandwidth was measured with the EUT set to low, medium and high transmit frequencies in the band. The EUT was transmitting at the data rate(s) listed in the datasheet in a no-hop mode.

# OCCUPIED BANDWIDTH

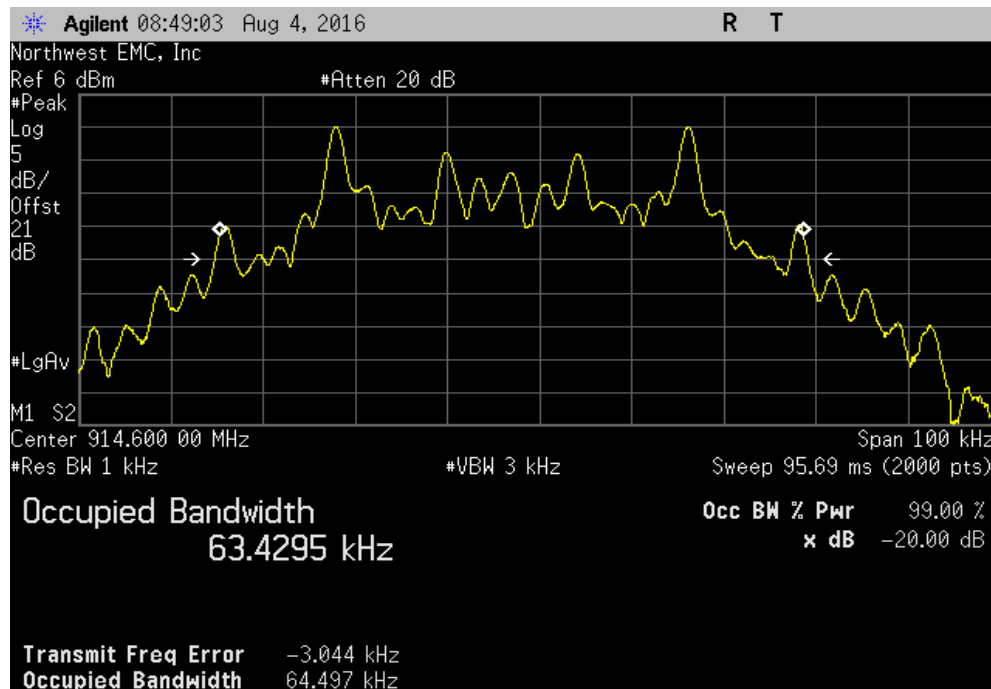
EUT: TH8321R1001		Work Order: HNYW0180	
Serial Number: 5191101 0315015		Date: 08/04/16	
Customer: Honeywell, Automation and Control Solutions		Temperature: 23.3 °C	
Attendees: None		Humidity: 59.8% RH	
Project: None		Barometric Pres.: 1014 mbar	
Tested by: Dustin Sparks	Power: 110VAC/60Hz	Job Site: MN08	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2016		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	3	Signature 	
		Value	Limit (S) Result
Antenna A			
	Low Channel, 903.0 MHz	64.515 kHz	250 kHz Pass
	Mid Channel, 914.6 MHz	64.497 kHz	250 kHz Pass
	High Channel, 926.4 MHz	64.497 kHz	250 kHz Pass
Antenna B			
	Low Channel, 903.0 MHz	64.516 kHz	250 kHz Pass
	Mid Channel, 914.6 MHz	64.54 kHz	250 kHz Pass
	High Channel, 926.4 MHz	64.517 kHz	250 kHz Pass

# OCCUPIED BANDWIDTH

Antenna A, Low Channel, 903.0 MHz						
				Value	Limit (S)	Result
				64.515 kHz	250 kHz	Pass



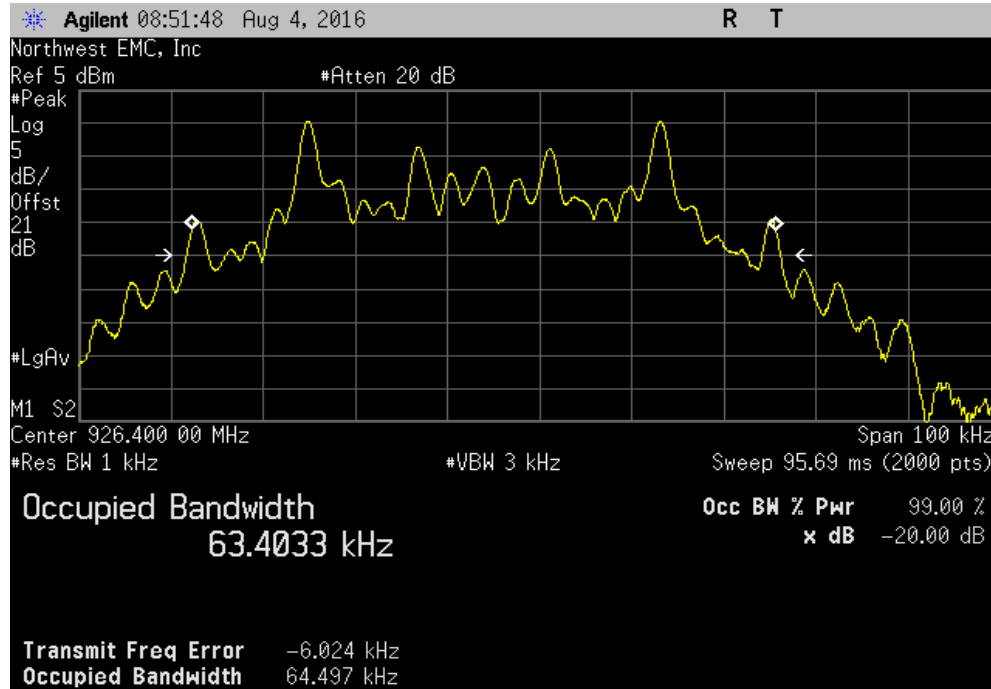
Antenna A, Mid Channel, 914.6 MHz						
				Value	Limit (S)	Result
				64.497 kHz	250 kHz	Pass



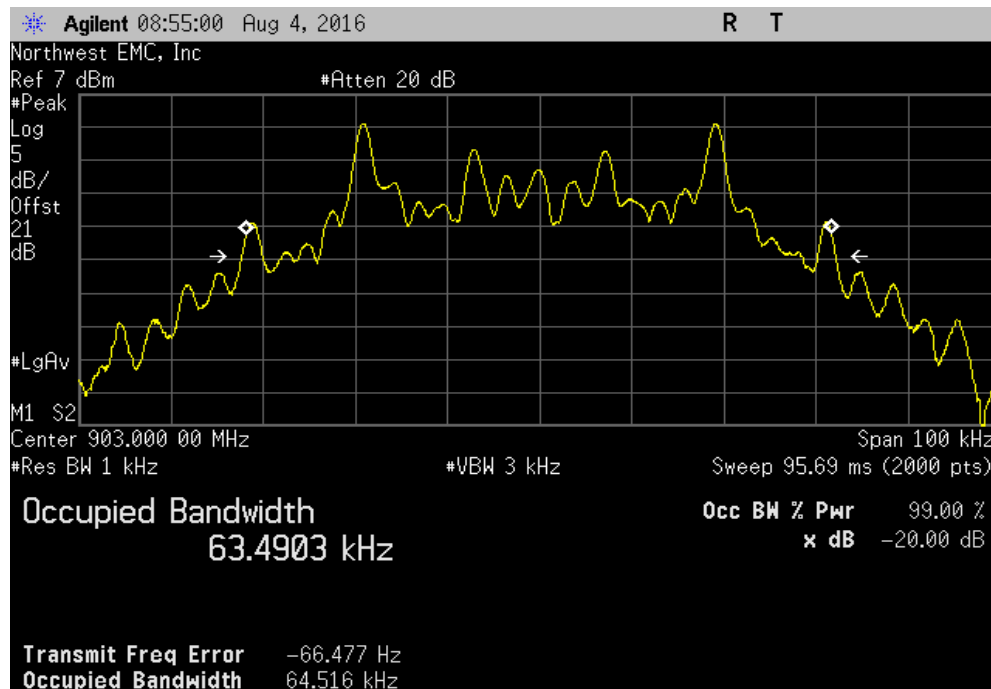


# OCCUPIED BANDWIDTH

Antenna A, High Channel, 926.4 MHz						
				Value	Limit (S)	Result
				64.497 kHz	250 kHz	Pass

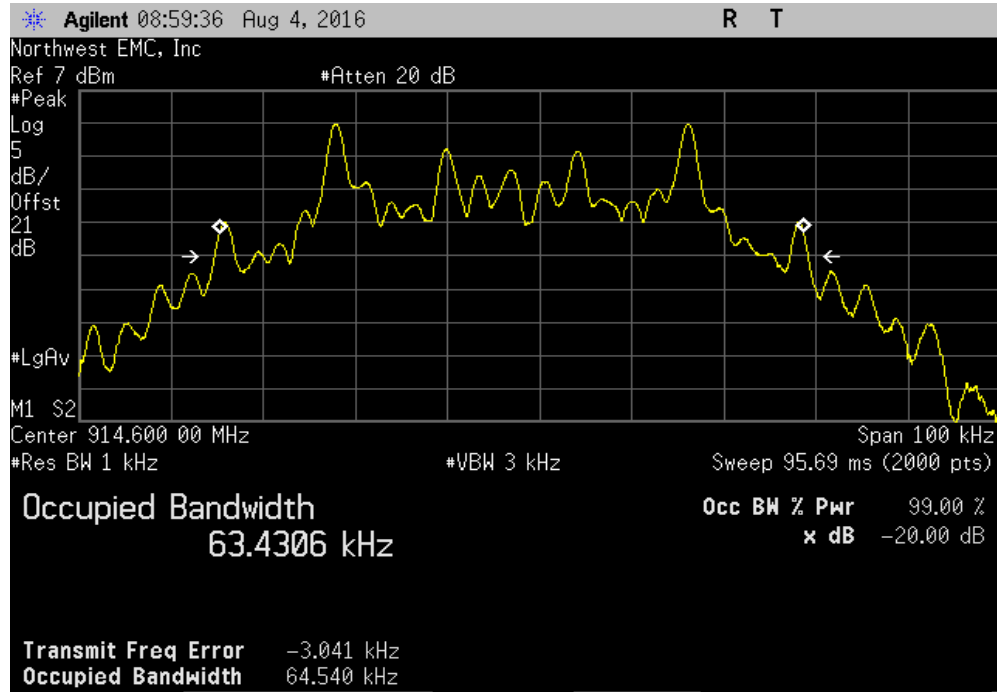


Antenna B, Low Channel, 903.0 MHz						
				Value	Limit (S)	Result
				64.516 kHz	250 kHz	Pass

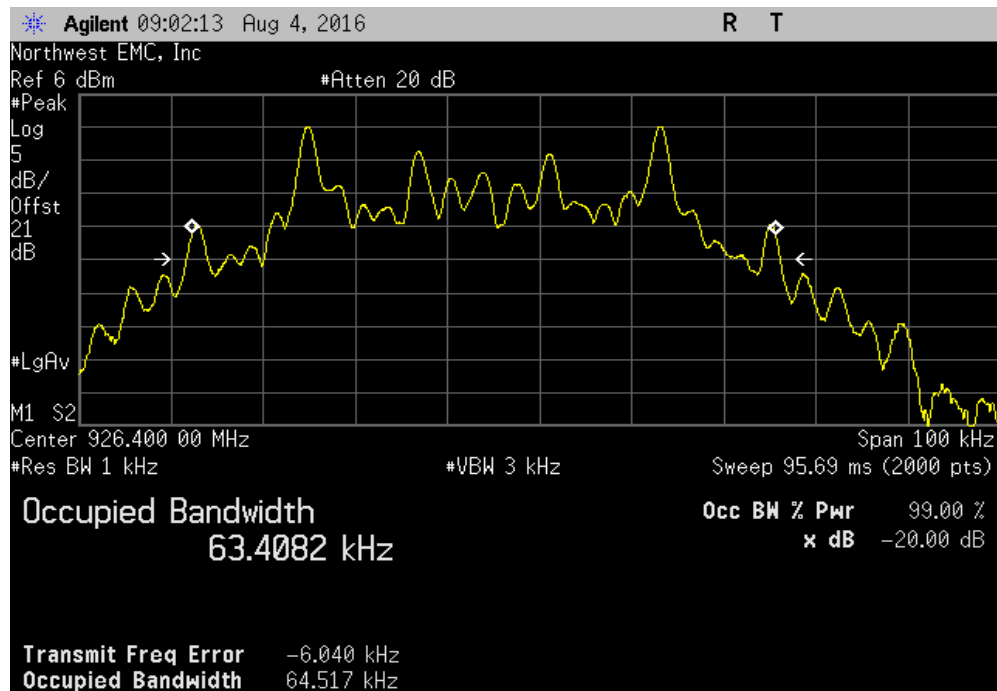


# OCCUPIED BANDWIDTH

Antenna B, Mid Channel, 914.6 MHz						
				Value	Limit (S)	Result
				64.54 kHz	250 kHz	Pass



Antenna B, High Channel, 926.4 MHz						
				Value	Limit (S)	Result
				64.517 kHz	250 kHz	Pass



# SPURIOUS CONDUCTED EMISSIONS

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
Generator - Signal	Agilent	N5183A	TIK	10/17/2014	10/17/2017
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNU	9/18/2015	9/18/2016
Attenuator	S.M. Electronics	SA26B-20	RFW	2/26/2016	2/26/2017
Block - DC	Fairview Microwave	SD3379	AMI	9/18/2015	9/18/2016
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/24/2016	3/24/2017

## TEST DESCRIPTION

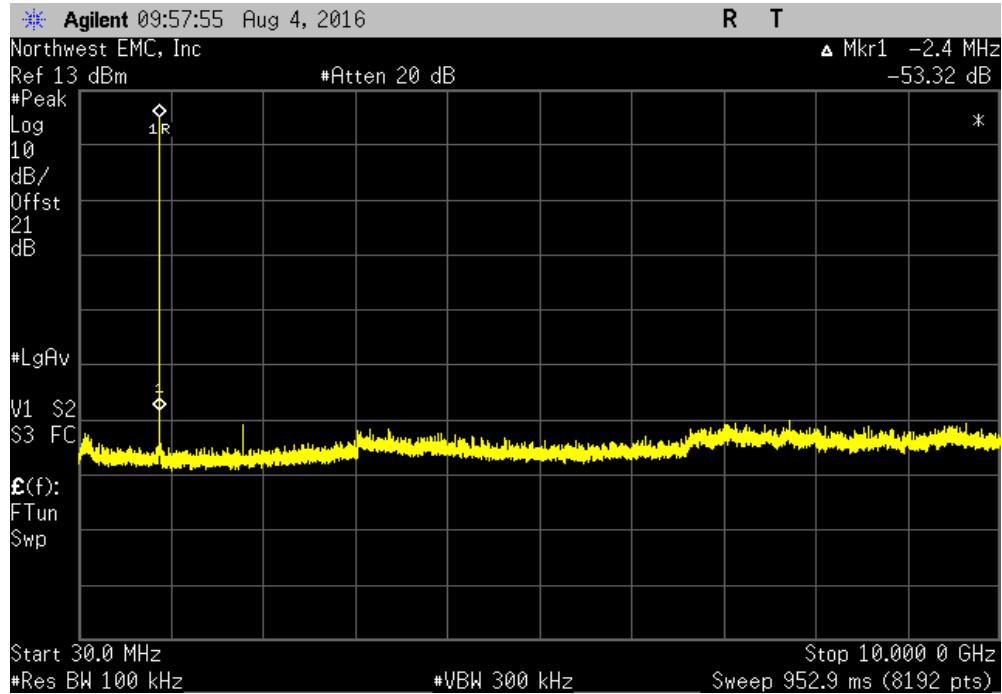
The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet in a no-hop mode. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

# SPURIOUS CONDUCTED EMISSIONS

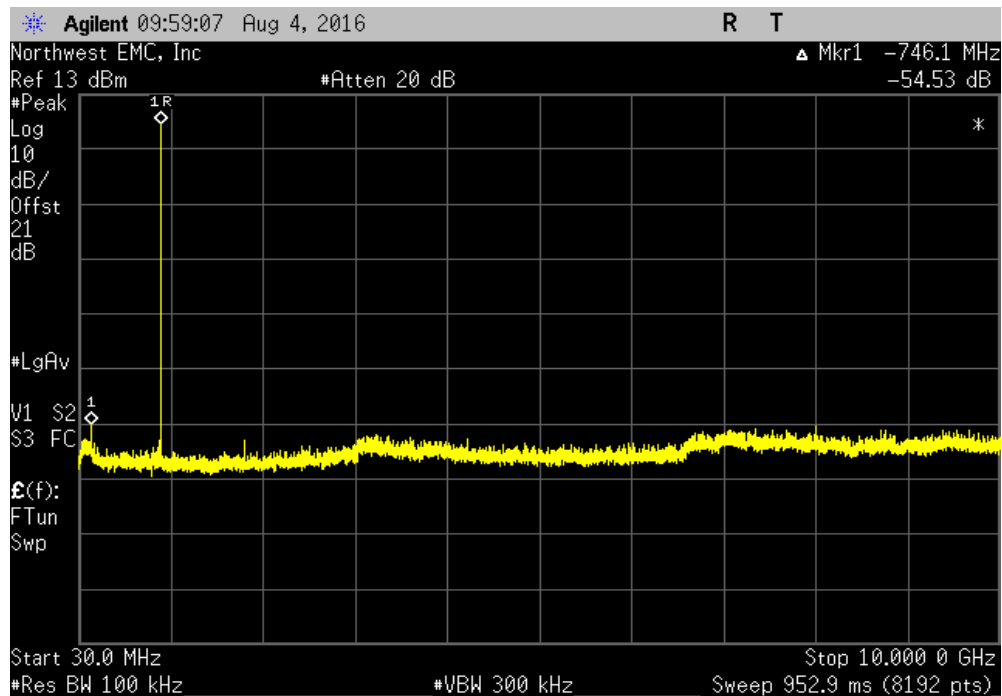
EUT: TH8321R1001		Work Order: HNYW0180	
Serial Number: 5191101 0315015		Date: 08/04/16	
Customer: Honeywell, Automation and Control Solutions		Temperature: 23.4 °C	
Attendees: None		Humidity: 60.4% RH	
Project: None		Barometric Pres.: 1013 mbar	
Tested by: Dustin Sparks	Power: 110VAC/60Hz	Job Site: MN08	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2016		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	3	Signature 	
		Frequency Range	Max Value (dBc) Limit ≤ (dBc) Result
Antenna A			
	Low Channel, 903.0 MHz	30 MHz - 10 GHz	-53.32 -20 Pass
	Mid Channel, 914.6 MHz	30 MHz - 10 GHz	-54.53 -20 Pass
	High Channel, 926.4 MHz	30 MHz - 10 GHz	-52.95 -20 Pass
Antenna B			
	Low Channel, 903.0 MHz	30 MHz - 10 GHz	-54.61 -20 Pass
	Mid Channel, 914.6 MHz	30 MHz - 10 GHz	-54.8 -20 Pass
	High Channel, 926.4 MHz	30 MHz - 10 GHz	-54.15 -20 Pass

# SPURIOUS CONDUCTED EMISSIONS

Antenna A, Low Channel, 903.0 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 10 GHz	-53.32	-20	Pass	

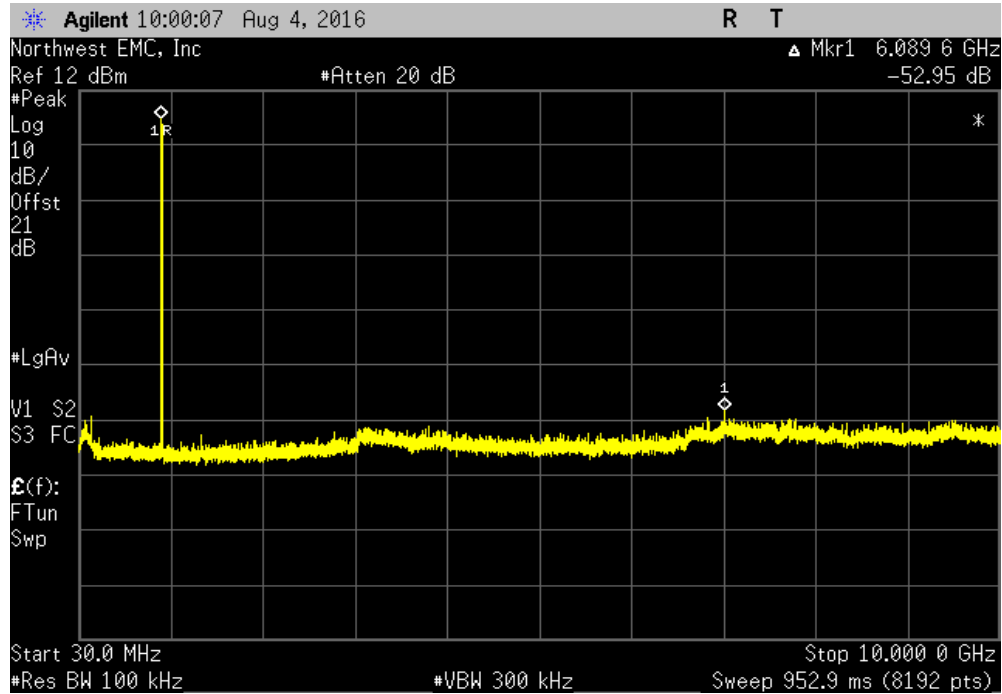


Antenna A, Mid Channel, 914.6 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 10 GHz	-54.53	-20	Pass	

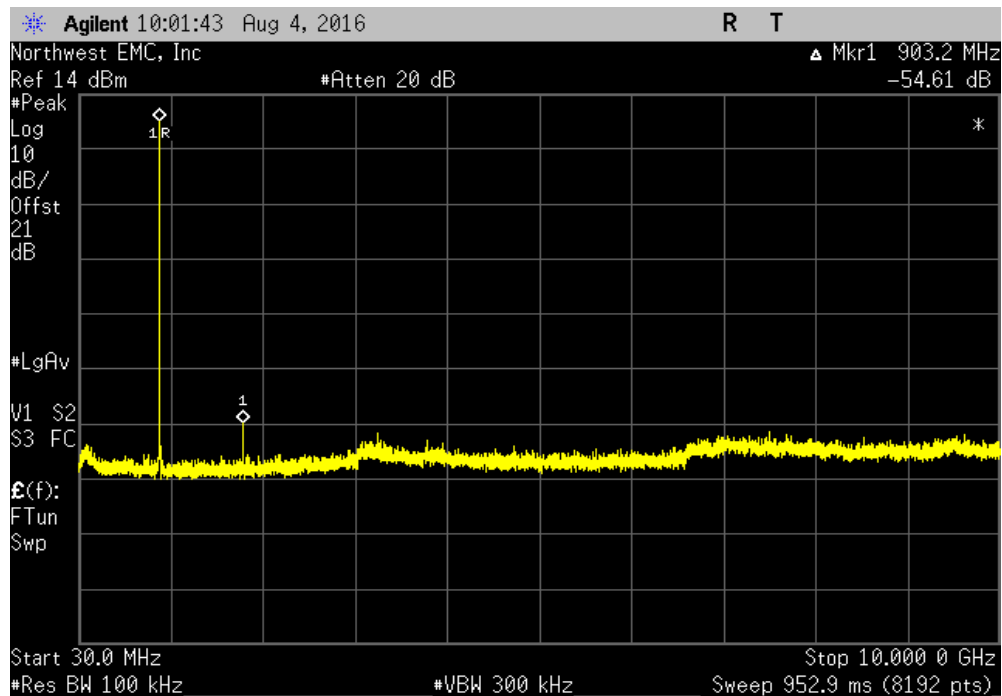


# SPURIOUS CONDUCTED EMISSIONS

Antenna A, High Channel, 926.4 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 10 GHz	-52.95	-20	Pass	

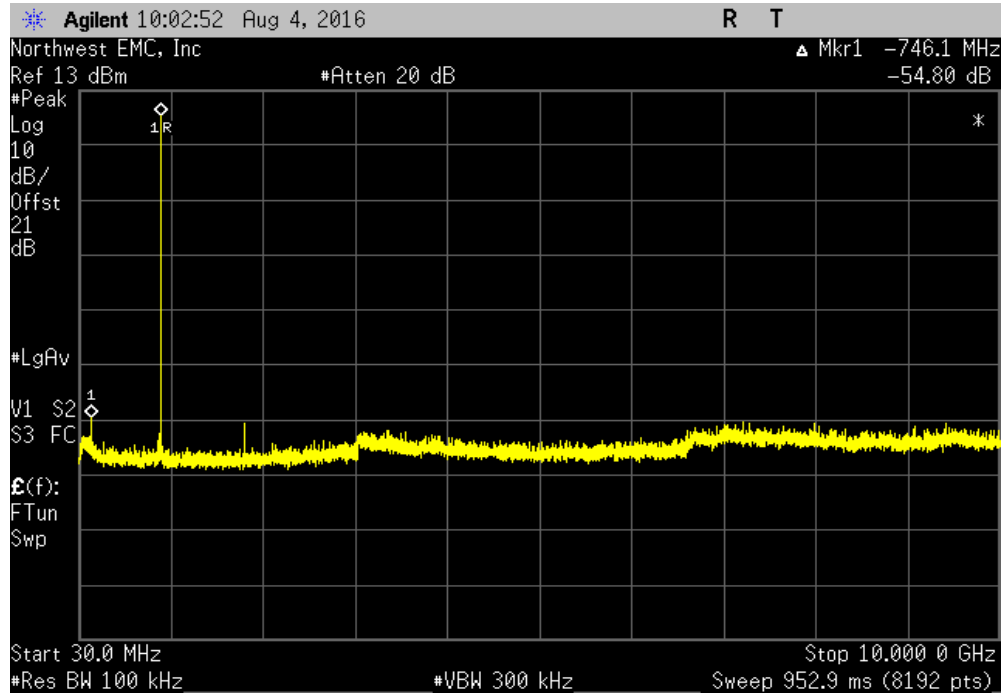


Antenna B, Low Channel, 903.0 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 10 GHz	-54.61	-20	Pass	



# SPURIOUS CONDUCTED EMISSIONS

Antenna B, Mid Channel, 914.6 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 10 GHz	-54.8	-20	Pass	



Antenna B, High Channel, 926.4 MHz				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 10 GHz	-54.15	-20	Pass	

