NORTHWEST EMC

Hunter Fan Company

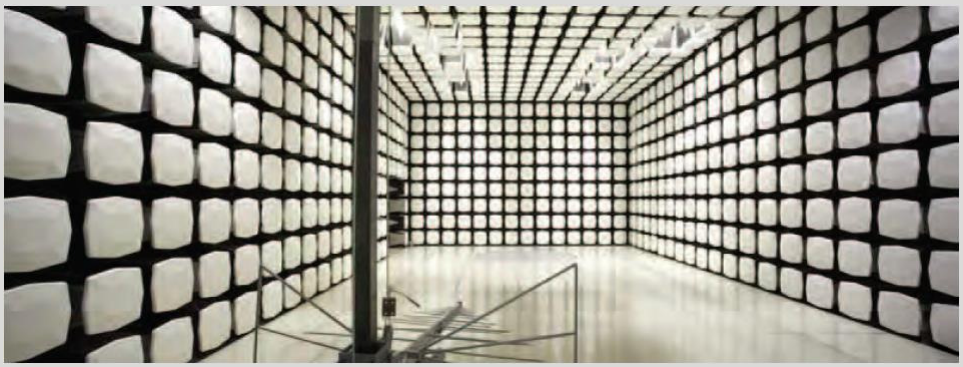
Hunter Fan Part No. K5497

FCC 15.207:2016

FCC 15.231:2016

Low Power Transceiver

Report # ADEK0009.1 Rev.1



NVLAP Lab Code: 200676-0

CERTIFICATE OF TEST

NORTHWEST EMC
2014-12-10

Last Date of Test: March 11, 2016
Hunter Fan Company
Model: Hunter Fan Part No. K5497

Radio Equipment Testing

Standards

Specification	Method
FCC 15.107:2016	ANSI C63.10:2013
FCC 15.231:2016	

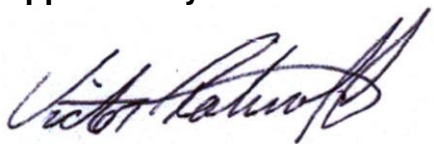
Results

Method Clause	Test Description	Applied	Results	Comments
6.2	AC – Powerline Conducted Emissions	Yes	Pass	
6.5, 6.6	Field Strength of Fundamental	Yes	Pass	
6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	
6.9.2	Occupied Bandwidth	Yes	Pass	
7.5	Duty Cycle	Yes	Pass	

Deviations From Test Standards

None

Approved By:



Victor Ratinoff, 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

NORTHWEST EMC
REV 2014.10.14

Revision Number	Description	Date	Page Number
01	The company name, EUT name and company address were changed throughout the report.	3-21-16	Throughout

ACCREDITATIONS AND AUTHORIZATIONS

NORTHWEST EMC
REV 2015.2.19

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 Northwest EMC to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

IC - Recognized by Industry Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with IC.

European Union

European Commission – Validated by the European Commission as a Conformity Assessment Body (CAB) under the EMC directive and as a Notified Body under the R&TTE Directive.

Australia/New Zealand

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

Korea

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

MEASUREMENT UNCERTAINTY

TMU.2015.07.10

Measurement Uncertainty

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

A measurement uncertainty estimation has been performed for each test per our internal quality document 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.

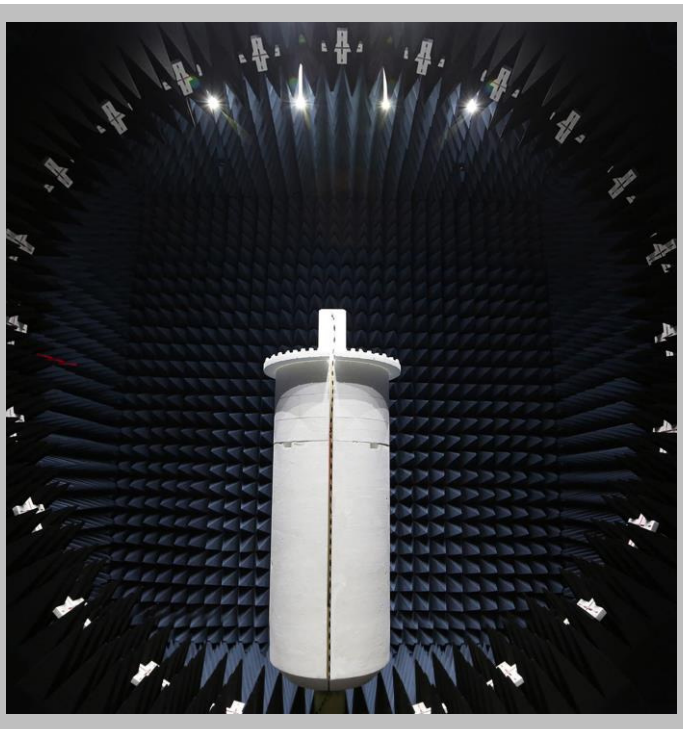
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

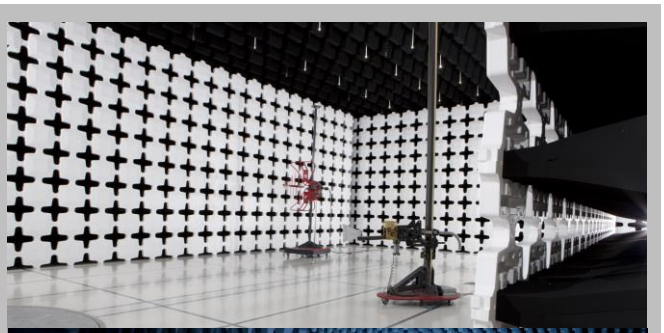
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%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

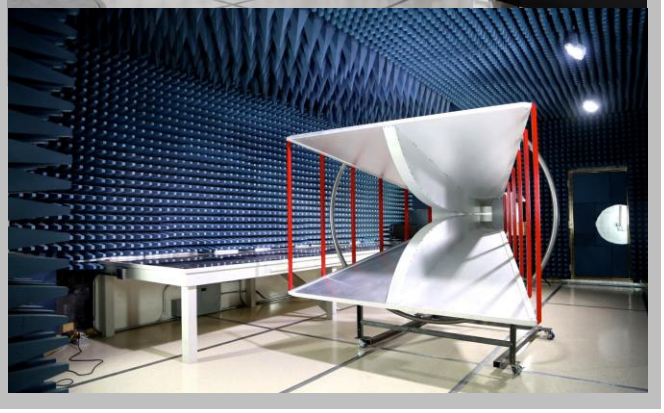
FACILITIES

NORTHWEST EMC
REV 2015.2.19

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







PRODUCT DESCRIPTION

NORTHWEST EMC
2014-12-10

Client and Equipment Under Test (EUT) Information

Company Name:	Hunter Fan Company
Address:	32 Journey
City, State, Zip:	Aliso Viejo, CA 92656
Test Requested By:	Georg Konstanznig
Model:	Hunter Fan Part No. K5497
First Date of Test:	March 09, 2016
Last Date of Test:	March 11, 2016
Receipt Date of Samples:	March 09, 2016
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
ISM Band 433.92 MHz transceiver powered by standard AC (Single phase) utilizing OOK modulation scheme for half duplex operation.

Testing Objective:
Provide the specific EMC testing requested by the customer.

CONFIGURATIONS

NORTHWEST EMC 2014-12-10

Configuration ADEK0009- 1

Software/Firmware Running during test	
Description	**Version**
Firmware version	1.39

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
HUNTER FAN PART NO. K5497	Hunter Fan Corp	ECM Rev 8.2	14704

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Cable	No	1.5m	No	AC Mains	HUNTER FAN PART NO. K5497

MODIFICATIONS

NORTHWEST EMC
2014-12-10

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	3/9/2016	Field Strength of Fundamental	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	3/9/2016	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	3/10/2016	Occupied Bandwidth	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	3/10/2016	AC – 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.
5	3/11/2016	Duty Cycle	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

DUTY CYCLE

XMit 2015.01.14

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.	Interval (mo)
Cable	Fairview Microwave	SCA1814-0101-120	OCZ	NCR	0
Probe - Near Field Set	Com-Power	PS-400	IPF	NCR	0
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	11/19/2015	12

TEST DESCRIPTION

For software controlled or pre-programmed devices, the manufacturer shall declare the duty cycle class or classes for the equipment under test. For manually operated or event dependant devices, with or without software controlled functions, the manufacturer shall declare whether the device once triggered, follows a pre-programmed cycle, or whether the transmission is constant until the trigger is released or manually reset. The manufacturer shall also give a description of the application for the device and include a typical usage pattern. The typical usage pattern as declared by the manufacturer shall be used to determine the duty cycle and hence the duty class.

Where an acknowledgement is required, the additional transmitter on-time shall be included and declared by the manufacturer.

To derive average emission measurements, a duty cycle correction factor was utilized:

Duty Cycle = On time/100 milliseconds (or the period, whichever is less)

Where “On time” = N1L1 +N2L2 +….

Where N1 is the number of type 1 pulses, L1 is length of type 1 pulses, N2 is the number of type 2 pulses, L2 is the length of type 2 pulses, etc.

Therefore, Duty Cycle = (N1L1 +N2L2 +…)/100mS or T, whichever is less. (Where T is the period of the pulse train.)

The worst-case measured values for the duty cycle during the EUT’s pulse train are as follows. This worst case single period was used due to the possibility of this sequence being repeated across an entire 100ms period:

Period = 6.55 mSec
Pulsewidth of Single Pulse = 4.858 mSec
Number of Pulses = 1

Duty Cycle = 20 log [4.858/6.55] = -2.6 dB

The duty cycle correction factor of -2.6 dB was added to the peak readings to mathematically derive the average levels. Peak measurements were made with a resolution bandwidth of 100kHz and a video bandwidth of 300kHz.

DUTY CYCLE

NORTHWEST EMC

XMit 2015.01.14

EUT:	Hunter Fan Part No. K5497			**Work Order:**	ADEK0009
Serial Number:	14704			**Date:**	03/11/16
Customer:	Hunter Fan Company			**Temperature:**	19.5°C
Attendees:	Georg Konstanznig, David Chen			**Humidity:**	44%
Project:	None			**Barometric Pres.:**	1016.2
Tested by:	Mike Tran	**Power:**	110VAC/60Hz	**Job Site:**	OC10

TEST SPECIFICATIONS	Test Method
FCC 15.231:2016	ANSI C63.10:2013

COMMENTS

Using near field probe

DEVIATIONS FROM TEST STANDARD

None

Configuration #	1	Signature

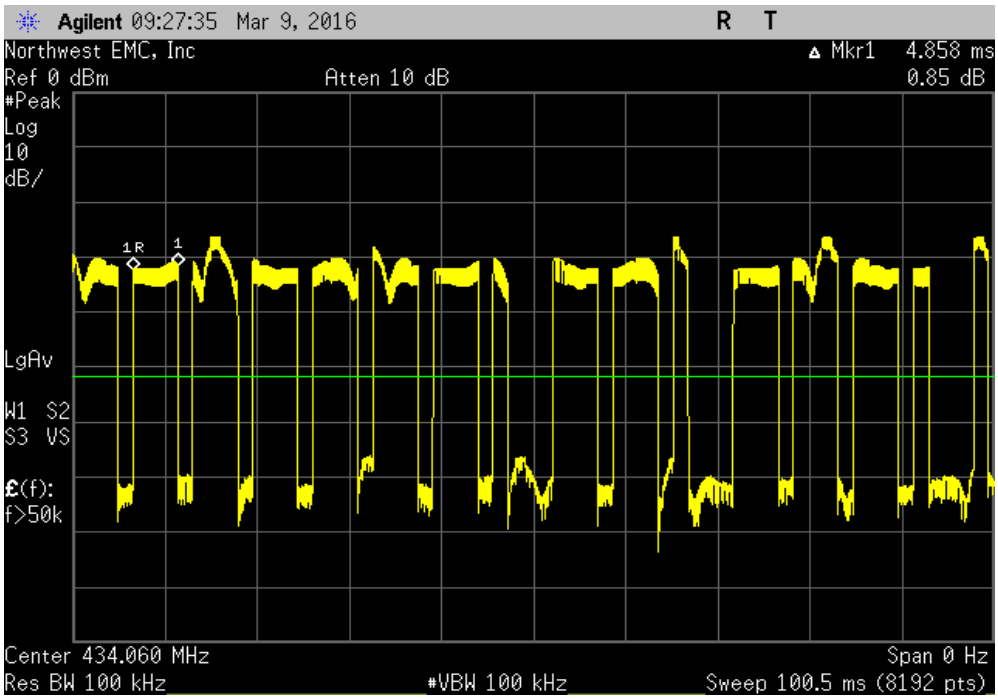
	Value	Limit	Result
Worst-Case Pulse On Time	4.858 mS	NA	NA
Period	6.55 mS	NA	NA
Pulse Train	1.67 sec	< 5 sec	Pass

DUTY CYCLE

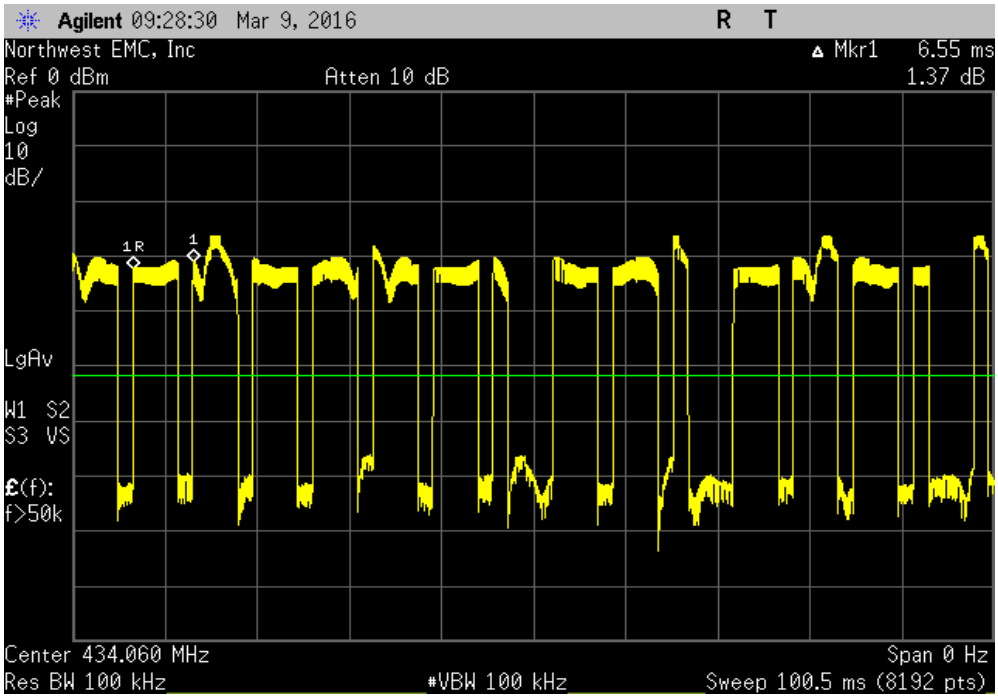
NORTHWEST EMC

XMit 2015.01.14

Worst-Case Pulse On Time						
				Value	Limit	Result
				4.858 mS	NA	NA



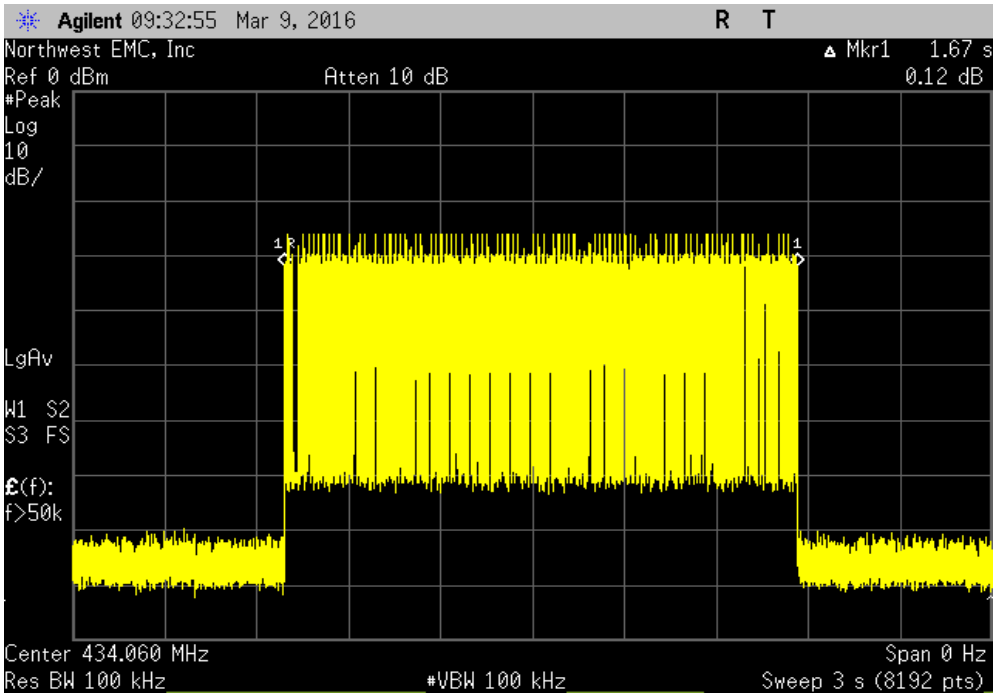
Period						
				Value	Limit	Result
				6.55 mS	NA	NA



DUTY CYCLE

XMit 2015.01.14

Pulse Train						
				Value	Limit	Result
				1.67 sec	< 5 sec	Pass



				Value	Limit	Result
						NA

OCCUPIED BANDWIDTH

XMit 2015.01.14

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.	Interval (mo)
Cable	Fairview Microwave	SCA1814-0101-120	OCZ	NCR	0
Probe - Near Field Set	Com-Power	PS-400	IPF	NCR	0
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	11/19/2015	12

TEST DESCRIPTION

The 20 dB occupied bandwidth is required to be no wider that 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz.

The measurement was made using near field probe near the integral antenna of the EUT to the input of the spectrum analyzer. The EUT was transmitting at its maximum data rate.

OCCUPIED BANDWIDTH

NORTHWEST EMC

XMit 2015.01.14

EUT:	Hunter Fan Part No. K5497			**Work Order:**	ADEK0009
Serial Number:	14704			**Date:**	03/10/16
Customer:	Hunter Fan Company			**Temperature:**	19.8°C
Attendees:	Georg Konstanznig, David Chen			**Humidity:**	46%
Project:	None			**Barometric Pres.:**	1016.2
Tested by:	Mike Tran	**Power:**	110VAC/60Hz	**Job Site:**	OC10

TEST SPECIFICATIONS	Test Method
FCC 15.231:2016	ANSI C63.10:2013

COMMENTS

Using near field probe

DEVIATIONS FROM TEST STANDARD

None

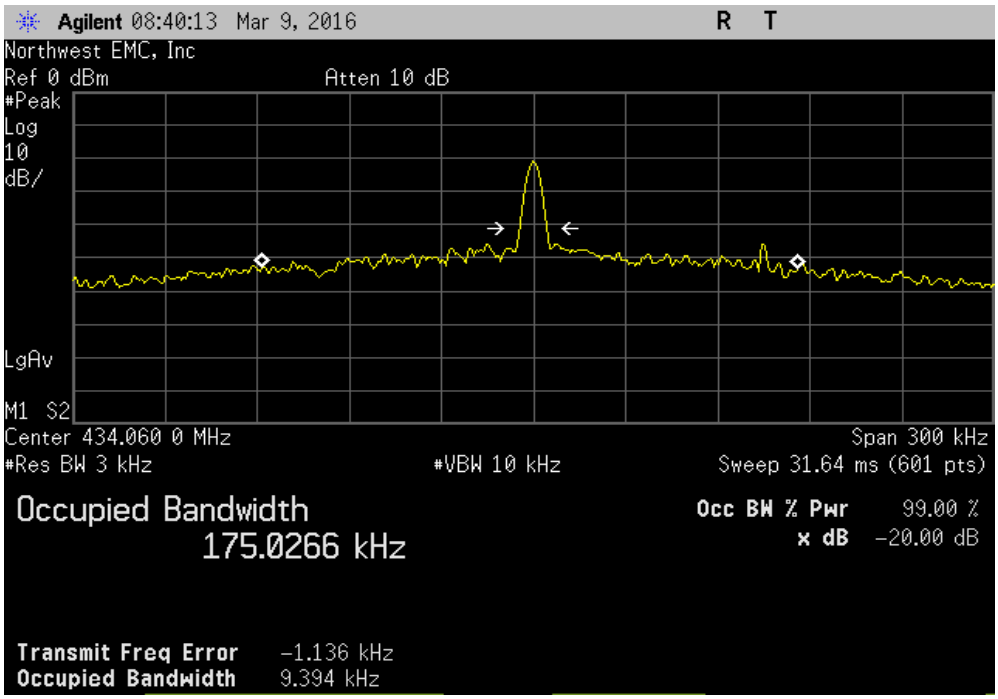
Configuration #	1	Signature

	Value	Limit	Result
434.06 MHz	9.4 kHz	1.085 MHz	Pass

OCCUPIED BANDWIDTH

XMit 2015.01.14

434.06 MHz Occupied Bandwidth						
				Value	Limit	Result
				9.4 kHz	1.085 MHz	Pass



FIELD STRENGTH OF FUNDAMENTAL

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

Continous wave transmitting at 434.06 MHz over period of time

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

ADEK0009 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	430 MHz	Stop Frequency	450 MHz

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Antenna - Biconilog	EMCO	3142	AXB	11/6/2015	24
Cable	Northwest EMC	10kHz-1GHz RE Cables	OCH	3/3/2016	12
Amplifier - Pre-Amplifier	Miteq	AM-1064-9079	AOO	3/3/2016	12
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	11/19/2015	12

TEST DESCRIPTION

The antennas to be used with the EUT were tested. The EUT was configured for continuous unmodulated operation at its single transmit frequency. The field strength of the transmit frequency was maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT in 3 orthogonal planes (per ANSI C63.10:2013).

To derive average emission measurements, a duty cycle correction factor per 15.35(c) was utilized:

Duty Cycle = On time/100 milliseconds (or the period, whichever is less)

Where “On time” = N1L1 +N2L2 +….

Where N1 is the number of type 1 pulses, L1 is length of type 1 pulses, N2 is the number of type 2 pulses, L2 is the length of type 2 pulses, etc.

Therefore, Duty Cycle = (N1L1 +N2L2 +…)/100mS or T, whichever is less. Where T is the period of the pulse train.

The measured values for the EUT’s pulse train are as follows:

Period = 6.55mSec
Pulsewidth of Single Pulse = 4.858 mSec
Number of Pulses = 1
Duty Cycle = 20 log [4.858/6.55] = -2.6 dB

The duty cycle correction factor of –2.6 dB was added to the peak readings to mathematically derive the average levels. Peak measurements were made with a resolution bandwidth of 100kHz and a video bandwidth of 300kHz.

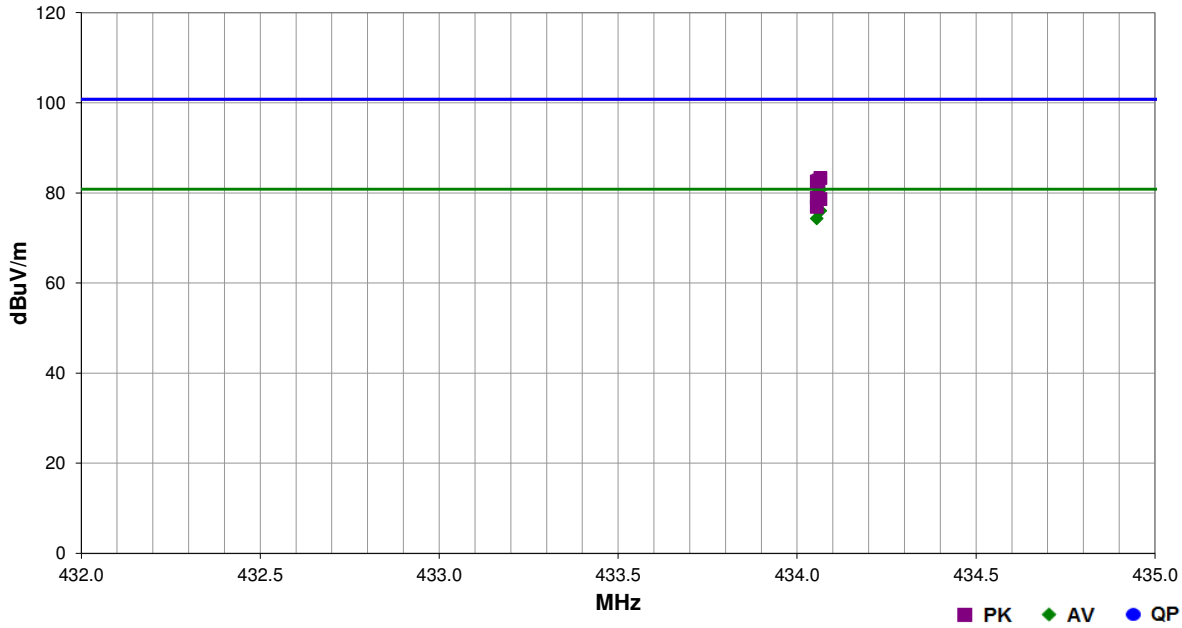
The field strength of the fundamental (transmit) frequency meets the limits as defined in 47 CFR 15.231(b). It also meets the provisions in 15.35 for averaging pulsed emissions and for limiting peak emissions.

FIELD STRENGTH OF FUNDAMENTAL

Work Order:	ADEK0009	**Date:**	03/09/16		
Project:	None	**Temperature:**	20.8 °C		
Job Site:	OC10	**Humidity:**	43.2% RH		
Serial Number:	14704	**Barometric Pres.:**	1016 mbar	**Tested by:**	Mike Tran
EUT:	Hunter Fan Part No. K5497				
Configuration:	1				
Customer:	Hunter Fan Company				
Attendees:	Georg Konstanznig, David Chen				
EUT Power:	110VAC/60Hz				
Operating Mode:	Continous wave transmitting at 434.06 MHz over period of time				
Deviations:	None				
Comments:	Power Setting = 32				

Test Specifications	**Test Method**
FCC 15.231(b):2016	ANSI C63.10:2013

Run #	12	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
434.065	58.5	24.8	1.0	250.0	-2.6	0.0	Horz	AV	0.0	80.7	80.8	-0.1	EUT on Side
434.060	57.9	24.8	1.0	256.0	-2.6	0.0	Horz	AV	0.0	80.1	80.8	-0.7	EUT Horz
434.055	57.7	24.8	1.0	256.0	-2.6	0.0	Horz	AV	0.0	79.9	80.8	-0.9	EUT Vert
434.055	54.1	24.8	1.2	270.0	-2.6	0.0	Vert	AV	0.0	76.3	80.8	-4.5	EUT Horz
434.065	53.8	24.8	1.3	284.0	-2.6	0.0	Vert	AV	0.0	76.0	80.8	-4.8	EUT on Side
434.055	52.1	24.8	1.0	282.0	-2.6	0.0	Vert	AV	0.0	74.3	80.8	-6.5	EUT Vert
434.065	58.5	24.8	1.0	250.0		0.0	Horz	PK	0.0	83.3	100.8	-17.5	EUT on Side
434.060	57.9	24.8	1.0	256.0		0.0	Horz	PK	0.0	82.7	100.8	-18.1	EUT Horz
434.055	57.7	24.8	1.0	256.0		0.0	Horz	PK	0.0	82.5	100.8	-18.3	EUT Vert
434.055	54.1	24.8	1.2	270.0		0.0	Vert	PK	0.0	78.9	100.8	-21.9	EUT Horz
434.065	53.8	24.8	1.3	284.0		0.0	Vert	PK	0.0	78.6	100.8	-22.2	EUT on Side
434.055	52.1	24.8	1.0	282.0		0.0	Vert	PK	0.0	76.9	100.8	-23.9	EUT Vert

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

Continous wave transmitting at 434.06 MHz over period of time

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

ADEK0009 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	5000 MHz

SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Amplifier - Pre-Amplifier	Miteq	AMF-4D-010120-30-10P-1	AOP	8/26/2015	12
Antenna - Double Ridge	EMCO	3115	AHB	3/10/2014	24
Cable	Northwest EMC	1-8GHz RE Cables	OCJ	8/26/2015	12
Antenna - Biconilog	EMCO	3142	AXB	11/6/2015	24
Cable	Northwest EMC	10kHz-1GHz RE Cables	OCH	3/3/2016	12
Amplifier - Pre-Amplifier	Miteq	AM-1064-9079	AOO	3/3/2016	12
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	11/19/2015	12

TEST DESCRIPTION

The single, integral antenna to be used with the EUT was tested. The EUT was configured for un-modulated, CW operation at its single transmit frequency. The field strength of the transmit frequency was maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT in 3 orthogonal planes (per ANSI C63.10:2013).

A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

To derive average emission measurements, a duty cycle correction factor per 15.35(c) was utilized:

Duty Cycle = On time/100 milliseconds (or the period, whichever is less)

Where “On time” = N1L1 +N2L2 +….

Where N1 is the number of type 1 pulses, L1 is length of type 1 pulses, N2 is the number of type 2 pulses, L2 is the length of type 2 pulses, etc.

Therefore, Duty Cycle = (N1L1 +N2L2 +…)/100mS or T, whichever is less. Where T is the period of the pulse train.

The measured values for the EUT’s pulse train are as follows:

Period = 6.55 mSec
Pulsewidth of single Pulse = 4.858 mSec
Number of Pulses = 1

Duty Cycle = 20 log [4.858/6.55] = -2.6 dB

The duty cycle correction factor of –2.6 dB was added to the peak readings to mathematically derive the average levels. Peak measurements were made with a resolution bandwidth of 100kHz and a video bandwidth of 300kHz for measurements at or below 1GHz. Above 1GHz, a resolution bandwidth of 1MHz and a video bandwidth of 3MHz was used.

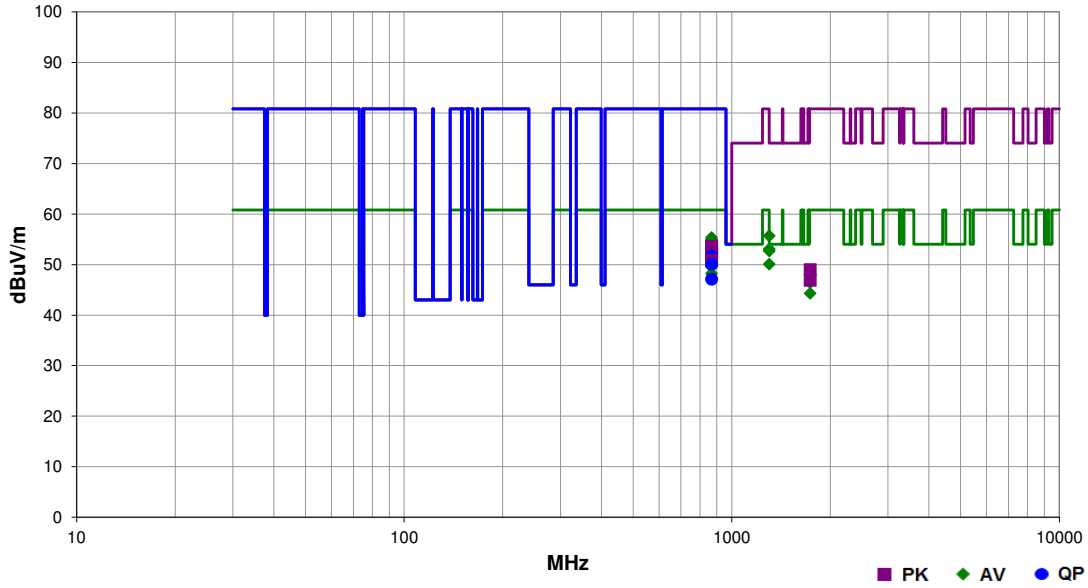
The field strength of the spurious emissions meet the limits as defined in 47 CFR 15.231(b). The spurious emissions also meet the provisions in 15.35 for averaging pulsed emissions and for limiting peak emissions. Further, spurious emissions meet the provisions of 15.205 using the measurement instrumentation specified in that section.

SPURIOUS RADIATED EMISSIONS

Work Order:	ADEK0009	**Date:**	03/09/16		
Project:	None	**Temperature:**	20.6 °C		
Job Site:	OC10	**Humidity:**	40.9% RH		
Serial Number:	14704	**Barometric Pres.:**	1015.7 mbar	**Tested by:**	Mike Tran
EUT:	Hunter Fan Part No. K5497				
Configuration:	1				
Customer:	Hunter Fan Company				
Attendees:	Georg Konstanznig, David Chen				
EUT Power:	110VAC/60Hz				
Operating Mode:	Continous wave transmitting at 434.06 MHz over period of time				
Deviations:	None				
Comments:	Power Setting = 32				

Test Specifications	**Test Method**
FCC 15.231:2016	ANSI C63.10:2013

Run #	13	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
1302.258	58.9	-3.2	1.0	225.0	-2.6	0.0	Vert	AV	0.0	53.1	54.0	-0.9	EUT Vert
1302.200	55.9	-3.2	1.2	0.0	-2.6	0.0	Horz	AV	0.0	50.1	54.0	-3.9	EUT Vert
868.120	42.4	12.9	1.0	302.0	-2.6	0.0	Horz	AV	0.0	52.7	60.8	-8.1	EUT Vert
868.125	42.0	12.9	1.0	180.0	-2.6	0.0	Horz	AV	0.0	52.3	60.8	-8.5	EUT Horz
868.110	41.1	12.9	1.6	342.0	-2.6	0.0	Vert	AV	0.0	51.4	60.8	-9.4	EUT Vert
868.125	40.6	12.9	1.0	170.0	-2.6	0.0	Horz	AV	0.0	50.9	60.8	-9.9	EUT on Side
868.130	39.2	12.9	1.5	324.0	-2.6	0.0	Vert	AV	0.0	49.5	60.8	-11.3	EUT on Side
868.125	37.9	12.9	1.5	0.0	-2.6	0.0	Vert	AV	0.0	48.2	60.8	-12.6	EUT Horz
1736.050	49.7	-0.7	1.2	315.0	-2.6	0.0	Horz	AV	0.0	46.4	60.8	-14.4	EUT Vert
1736.383	47.6	-0.7	1.0	118.0	-2.6	0.0	Vert	AV	0.0	44.3	60.8	-16.5	EUT Vert
1302.258	58.9	-3.2	1.0	225.0		0.0	Vert	PK	0.0	55.7	74.0	-18.3	EUT Vert
1302.200	55.9	-3.2	1.2	0.0		0.0	Horz	PK	0.0	52.7	74.0	-21.3	EUT Vert
868.120	42.4	12.9	1.0	302.0		0.0	Horz	PK	0.0	55.3	80.8	-25.5	EUT Vert
868.125	42.0	12.9	1.0	180.0		0.0	Horz	PK	0.0	54.9	80.8	-25.9	EUT Horz
868.126	42.0	12.9	1.0	302.0		0.0	Horz	QP	0.0	54.9	80.8	-25.9	EUT Vert
868.110	41.1	12.9	1.6	342.0		0.0	Vert	PK	0.0	54.0	80.8	-26.8	EUT Vert
868.118	40.7	12.9	1.6	342.0		0.0	Vert	QP	0.0	53.6	80.8	-27.2	EUT Vert
868.125	40.6	12.9	1.0	170.0		0.0	Horz	PK	0.0	53.5	80.8	-27.3	EUT on Side
868.123	40.2	12.9	1.0	170.0		0.0	Horz	QP	0.0	53.1	80.8	-27.7	EUT on Side
868.130	39.2	12.9	1.5	324.0		0.0	Vert	PK	0.0	52.1	80.8	-28.7	EUT on Side
868.126	38.8	12.9	1.5	324.0		0.0	Vert	QP	0.0	51.7	80.8	-29.1	EUT on Side
868.125	37.9	12.9	1.5	0.0		0.0	Vert	PK	0.0	50.8	80.8	-30.0	EUT Horz
868.118	37.2	12.9	1.5	0.0		0.0	Vert	QP	0.0	50.1	80.8	-30.7	EUT Horz
1736.050	49.7	-0.7	1.2	315.0		0.0	Horz	PK	0.0	49.0	80.8	-31.8	EUT Vert
868.194	34.2	12.9	1.0	180.0		0.0	Horz	QP	0.0	47.1	80.8	-33.7	EUT Horz
1736.383	47.6	-0.7	1.0	118.0		0.0	Vert	PK	0.0	46.9	80.8	-33.9	EUT Vert

AC - 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
Receiver	Rohde & Schwarz	ESCI	ARG	6/1/2015	6/1/2016
Cable - Conducted Cable Assembly	Northwest EMC	OCP, HFP, AWC	OCPA	4/10/2015	4/10/2016
LISN	Solar Electronics	9252-50-24-BNC	LIA	3/3/2016	3/3/2017

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

ADEK0009-1

MODES INVESTIGATED

Continuous wave transmitting at 434.06 MHz over period of time

AC - POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.12.01
PSA-ESCI 2015.07.01, EmiR5 2015.11.06

EUT:	Hunter Fan Part No. K5497	Work Order:	ADEK0009
Serial Number:	14704	Date:	03/10/2016
Customer:	Hunter Fan Company	Temperature:	20.4°C
Attendees:	Georg Konstanznig, David Chen	Relative Humidity:	51.4%
Customer Project:	None	Bar. Pressure:	1016.6 mb
Tested By:	Mike Tran	Job Site:	OC06
Power:	110VAC/60Hz	Configuration:	ADEK0009-1

TEST SPECIFICATIONS

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

TEST PARAMETERS

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

COMMENTS

None

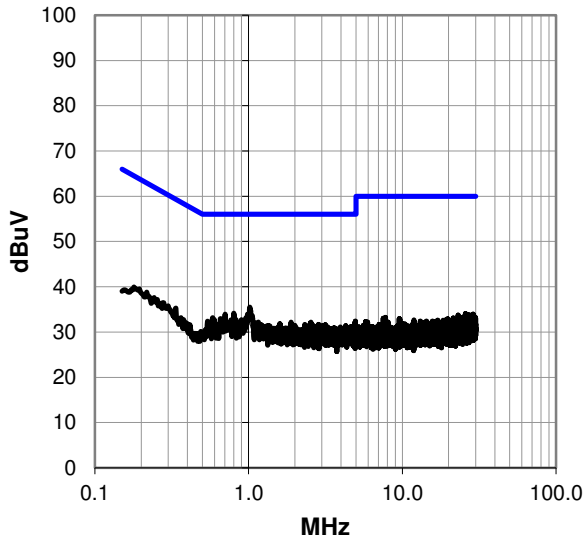
EUT OPERATING MODES

Continuous wave transmitting at 434.06 MHz over period of time

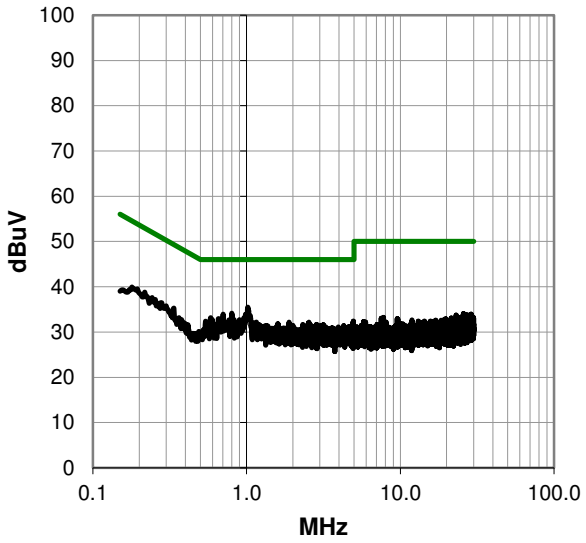
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



AC - POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC

WTD.2015.12.01
PSA-ESCI 2015.07.01, EmiR5 2015.11.06

RESULTS - Run #5

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.019	15.5	20.0	35.5	56.0	-20.5
0.799	14.1	20.1	34.2	56.0	-21.8
0.702	13.9	20.0	33.9	56.0	-22.1
0.583	13.2	19.9	33.1	56.0	-22.9
0.792	12.8	20.1	32.9	56.0	-23.1
0.542	12.5	19.9	32.4	56.0	-23.6
4.948	12.2	20.2	32.4	56.0	-23.6
1.154	12.1	20.1	32.2	56.0	-23.8
1.889	12.1	20.1	32.2	56.0	-23.8
2.538	12.1	20.1	32.2	56.0	-23.8
0.836	12.1	20.1	32.2	56.0	-23.8
4.914	11.8	20.2	32.0	56.0	-24.0
1.598	11.7	20.1	31.8	56.0	-24.2
1.202	11.6	20.1	31.7	56.0	-24.3
2.325	11.6	20.1	31.7	56.0	-24.3
2.851	11.5	20.2	31.7	56.0	-24.3
3.153	11.4	20.2	31.6	56.0	-24.4
2.624	11.4	20.1	31.5	56.0	-24.5
3.019	11.3	20.2	31.5	56.0	-24.5
2.004	11.4	20.1	31.5	56.0	-24.5
0.180	19.8	20.2	40.0	64.5	-24.5
1.351	11.3	20.1	31.4	56.0	-24.6
2.467	11.3	20.1	31.4	56.0	-24.6
4.295	11.2	20.2	31.4	56.0	-24.6
2.814	11.2	20.2	31.4	56.0	-24.6
4.631	11.0	20.2	31.2	56.0	-24.8

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.019	15.5	20.0	35.5	46.0	-10.5
0.799	14.1	20.1	34.2	46.0	-11.8
0.702	13.9	20.0	33.9	46.0	-12.1
0.583	13.2	19.9	33.1	46.0	-12.9
0.792	12.8	20.1	32.9	46.0	-13.1
0.542	12.5	19.9	32.4	46.0	-13.6
4.948	12.2	20.2	32.4	46.0	-13.6
1.154	12.1	20.1	32.2	46.0	-13.8
1.889	12.1	20.1	32.2	46.0	-13.8
2.538	12.1	20.1	32.2	46.0	-13.8
0.836	12.1	20.1	32.2	46.0	-13.8
4.914	11.8	20.2	32.0	46.0	-14.0
1.598	11.7	20.1	31.8	46.0	-14.2
1.202	11.6	20.1	31.7	46.0	-14.3
2.325	11.6	20.1	31.7	46.0	-14.3
2.851	11.5	20.2	31.7	46.0	-14.3
3.153	11.4	20.2	31.6	46.0	-14.4
2.624	11.4	20.1	31.5	46.0	-14.5
3.019	11.3	20.2	31.5	46.0	-14.5
2.004	11.4	20.1	31.5	46.0	-14.5
0.180	19.8	20.2	40.0	54.5	-14.5
1.351	11.3	20.1	31.4	46.0	-14.6
2.467	11.3	20.1	31.4	46.0	-14.6
4.295	11.2	20.2	31.4	46.0	-14.6
2.814	11.2	20.2	31.4	46.0	-14.6
4.631	11.0	20.2	31.2	46.0	-14.8

CONCLUSION

Pass

Tested By

AC - POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC
WTD.2015.12.01
PSA-ESCI 2015.07.01, EmiR5 2015.11.06

EUT:	Hunter Fan Part No. K5497	Work Order:	ADEK0009
Serial Number:	14704	Date:	03/10/2016
Customer:	Hunter Fan Company	Temperature:	20.4°C
Attendees:	Georg Konstanznig, David Chen	Relative Humidity:	51.4%
Customer Project:	None	Bar. Pressure:	1016.6 mb
Tested By:	Mike Tran	Job Site:	OC06
Power:	110VAC/60Hz	Configuration:	ADEK0009-1

TEST SPECIFICATIONS

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

TEST PARAMETERS

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

COMMENTS

None

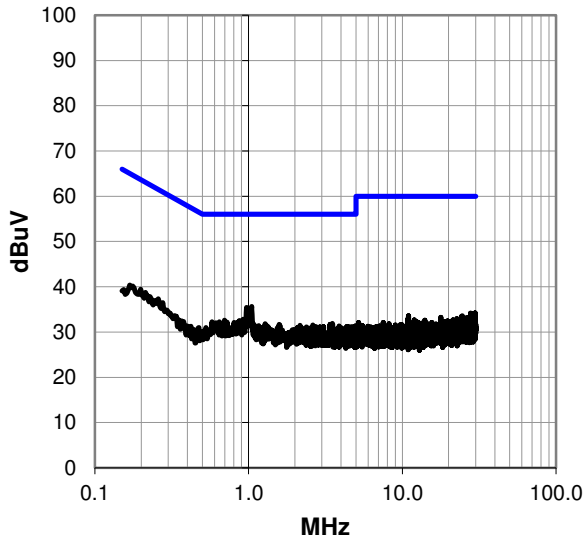
EUT OPERATING MODES

Continuous wave transmitting at 434.06 MHz over period of time

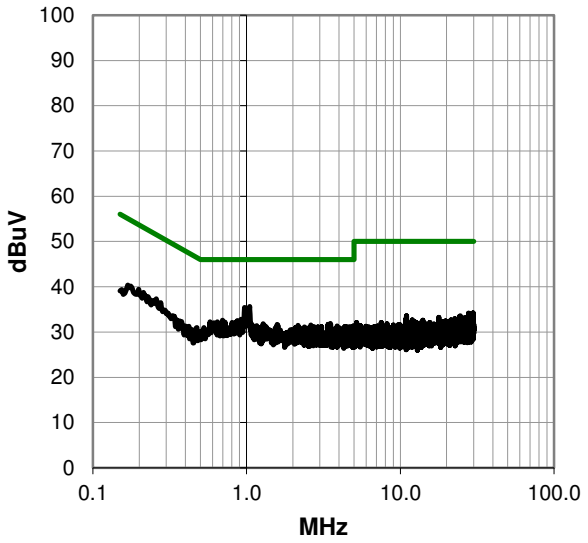
DEVIATIONS FROM TEST STANDARD

None

Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



AC - POWERLINE CONDUCTED EMISSIONS

NORTHWEST EMC

WTD.2015.12.01
PSA-ESCI 2015.07.01, EmiR5 2015.11.06

RESULTS - Run #6

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.045	15.6	20.0	35.6	56.0	-20.4
0.971	15.4	20.0	35.4	56.0	-20.6
0.698	12.6	20.0	32.6	56.0	-23.4
0.874	12.5	20.1	32.6	56.0	-23.4
0.646	12.3	20.0	32.3	56.0	-23.7
3.515	11.7	20.2	31.9	56.0	-24.1
1.280	11.7	20.1	31.8	56.0	-24.2
1.579	11.6	20.1	31.7	56.0	-24.3
3.392	11.5	20.2	31.7	56.0	-24.3
2.624	11.4	20.1	31.5	56.0	-24.5
2.157	11.4	20.1	31.5	56.0	-24.5
1.165	11.3	20.1	31.4	56.0	-24.6
1.310	11.3	20.1	31.4	56.0	-24.6
3.433	11.2	20.2	31.4	56.0	-24.6
0.169	20.2	20.2	40.4	65.0	-24.6
3.870	11.1	20.2	31.3	56.0	-24.7
4.959	11.1	20.2	31.3	56.0	-24.7
3.064	11.0	20.2	31.2	56.0	-24.8
3.362	11.0	20.2	31.2	56.0	-24.8
4.355	11.0	20.2	31.2	56.0	-24.8
4.504	11.0	20.2	31.2	56.0	-24.8
4.709	11.0	20.2	31.2	56.0	-24.8
2.743	11.0	20.2	31.2	56.0	-24.8
2.374	11.0	20.1	31.1	56.0	-24.9
2.907	10.9	20.2	31.1	56.0	-24.9
3.903	10.9	20.2	31.1	56.0	-24.9

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
1.045	15.6	20.0	35.6	46.0	-10.4
0.971	15.4	20.0	35.4	46.0	-10.6
0.698	12.6	20.0	32.6	46.0	-13.4
0.874	12.5	20.1	32.6	46.0	-13.4
0.646	12.3	20.0	32.3	46.0	-13.7
3.515	11.7	20.2	31.9	46.0	-14.1
1.280	11.7	20.1	31.8	46.0	-14.2
1.579	11.6	20.1	31.7	46.0	-14.3
3.392	11.5	20.2	31.7	46.0	-14.3
2.624	11.4	20.1	31.5	46.0	-14.5
2.157	11.4	20.1	31.5	46.0	-14.5
1.165	11.3	20.1	31.4	46.0	-14.6
1.310	11.3	20.1	31.4	46.0	-14.6
3.433	11.2	20.2	31.4	46.0	-14.6
0.169	20.2	20.2	40.4	55.0	-14.6
3.870	11.1	20.2	31.3	46.0	-14.7
4.959	11.1	20.2	31.3	46.0	-14.7
3.064	11.0	20.2	31.2	46.0	-14.8
3.362	11.0	20.2	31.2	46.0	-14.8
4.355	11.0	20.2	31.2	46.0	-14.8
4.504	11.0	20.2	31.2	46.0	-14.8
4.709	11.0	20.2	31.2	46.0	-14.8
2.743	11.0	20.2	31.2	46.0	-14.8
2.374	11.0	20.1	31.1	46.0	-14.9
2.907	10.9	20.2	31.1	46.0	-14.9
3.903	10.9	20.2	31.1	46.0	-14.9

CONCLUSION

Pass

Tested By