

CLASS II PERMISSIVE CHANGE TEST REPORT

Report Number: 104058883MPK-001 Project Numbers: G104058883, G104323265 Original Issue Date: September 09, 2019 Revision Issue Date: May 06, 2020

Product Designation: Remote Control for Ceiling Fan

Model Tested: K6019-01, K6266-02

Model(s) Not Tested but declared equivalent

by the client: K6266-03, K6266-04, K6019-04

K5580-01, K5580-02, K5580-03, K5580-04, K6266-13

FCC ID: IN2TX45 IC: 3558A-TX45

to

FCC CFR47 Part 15 Subpart C (15.231) Industry Canada RSS-210 Issue 9 FCC Part 15, Subpart B Industry Canada ICES-003

For Hunter Fan Company

Test Performed by:

Intertek

1365 Adams Court

Menlo Park, CA 94025 USA

Test Authorized by:

Hunter Fan Company

545 E. Algonquin Road

Arlington Heights, Illinois 60005 USA

Prepared by: Date: September 09, 2019

Gerardo Narvaez

Reviewed by: Date: September 09, 2019

Krishna Vemuri

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to copy or distribute this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program. This report must not be used to claim product endorsement by A2LA, NIST nor any other agency of the U.S. Government.



	Report No. 104058883MPK-001				
Equipment Under Test:	Remote Control for Ceiling Fan				
Trade Name:	Hunter Fan Company				
Model Tested:	K6019-01, K6266-02				
Model(s) Not Tested but declared equivalent by the client:	K6266-03, K6266-04, K6019-04, K5580-01, K5580-02, K5580-03, K5580-04, K6266-13				
Serial Number:	09055 (K6019-01 Continuous Tx), 09168 (K6019-01 Normal), 15465 (K6266-02 Continuous Tx), 15468 (K6266-02 Normal)				
Applicant:	Hunter Fan Company				
Contact:	Julian Martin				
Address:	Hunter Fan Company 545 E. Algonquin Road Arlington Heights, Illinois 60005				
Country:	USA				
Tel. Number:	(901) 248-2810				
Email:	jmartin@hunterfan.com				
Applicable Regulation:	FCC 47 CFR PT 15.231, Industry Canada RSS-210 Issue 9, FCC Part 15, Subpart B, Industry Canada ICES-003 Issue 6				
Test Site Location:	ITS – Site 1 1365 Adams Drive Menlo Park, CA 94025				
Date(s) of Test:	August 25-26, 2019				

We attest to the accuracy of this report: (Revision 1.0 and 2.0):

Aaron Chang Hung
EMC Project Engineer Engi

Hung Huynh Engineer Krishna K Vemuri Engineering Team Lead

We attest to the accuracy of this report (Revision 3.0):

Gerardo Narvaez

EMC Project Engineer

Anderson Soungpanya

EMC Team Leader

Page 2 of 31



TABLE OF CONTENTS

1.0	Sum	mary of Tests	4
• •			
2.0		eral Description	
	2.1	Product Description	
	2.2	Related Submittal(s) Grants	
	2.3	Test Methodology	
	2.4	Test Facility	
3.0	Syste	em Test Configuration	8
	3.1	Support Equipment and description	
	3.2	Block Diagram of Test Setup	
	3.3	Justification	
	3.4	Software Exercise Program	
	3.5	Mode of Operation during test	
	3.6	Modifications required for Compliance	
	3.7	Additions, deviations and exclusions from standards	
4.0	Meas	surement Results	10
	4.1	Fundamental Field Strength	
	4.2	Transmitter Radiated Emissions	
	4.3	Digital Parts Radiated Emissions	
	4.4	AC Line Conducted Emission	
5.0	List	of test equipment	30
6.0	Docu	ument History	31



1.0 Summary of Tests

TEST	REFERENCE FCC 15.231	REFERENCE RSS-210	RESULTS
Field Strength Of Fundamental	15.231(b)	RSS-210, A.1.2(a)	Complies
Transmitter Radiated Emissions	15.231(b)	RSS-210, A.1.2(a)	Complies
Line Conducted Emissions	15.207	RSS-GEN	Not Applicable ²
Radiated Emission from Digital Part and Receiver	15.109	ICES 003	Complies
AC Line Conducted Emission	15.107	ICES 003	Not Applicable ²
Antenna Requirement	15.203	RSS-GEN	Complies ¹

EUT utilizes an internal Antenna.

² EUT is battery powered.



2.0 General Description

2.1 Product Description

Hunter Fan Company supplied the following description of the EUT:

The EUT was a handheld wireless transmitter used for remote control of a ceiling fan and light assembly.

For more information, refer to the following product specification, declared by the manufacturer.

	Overview of the EUT		
Applicant name & address:	Hunter Fan Company 545 E. Algonquin Road Arlington Heights, Illinois 60005 USA		
Contact info / Email: Julian Martin / jmartin@hunterfan.com			
Model: K6019-01, K6266-02, K6266-03, K6266-04, K6019-04			
FCC Identifier:	IN2TX45		
IC Identifier:	3558A-TX45		
Operating Frequency:	433.94 MHz		
Number of Channels:	1		
Type of Modulation:	ASK		
Antenna Type:	Permanent PCB Trace		

EUT receive date: August 25, 2019

EUT receive condition: The EUT was received in good condition with no apparent damage. As

declared by the Applicant it is identical to the production units.

Test start date: August 25, 2019 **Test completion date:** August 26, 2019



Variant Models:

The following variant models were not tested as part of this evaluation but have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

- K6266-03: identical as K6266-02 with Casablanca branding
- K6266-04: identical as K6266-02 with a different brand of battery per customer requirements
- K6019-04: identical as K6019-01 but manufacture at new facility
- K5580-01, K5580-02, K5580-03, K5580-04, K6266-13: identical to K6266-02. Existing remotes without mounting cradles



2.2 Related Submittal(s) Grants

None

2.3 Test Methodology

Radiated emissions and AC mains conducted emissions measurements were performed according to the procedures in ANSI C63.10: 2013, ANSI C63.4-2014, RSS-210 Issue 9, RSS-GEN Issue 5. Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "Data Sheet" of this report

2.4 Test Facility

The radiated emission test site and conducted measurement facility used to collect the data is 10m semi-anechoic chamber located in Menlo Park, California. This test facility and site measurement data have been fully placed on file with the FCC and Industry Canada (Site # 2042L-1).



3.0 System Test Configuration

3.1 Support Equipment and description

No support equipment was used for testing.

3.2 Block Diagram of Test Setup

Equipment Under Test							
Description Manufacturer Model Number Serial Number							
Ceiling Fan Remote	Hunter Fan Company	K6019-01 K6266-02	09055 (K6019-01 Continuous Tx) 09168 (K6019-01 Normal) 15465 (K6266-02 Continuous Tx) 15468 (K6266-02 Normal)				

The diagram shown below details the interconnection of the EUT and support equipment. For specific layout, refer to the test configuration photograph in the relevant section of this report.

EUT

S = Shielded	F = With Ferrite
U = Unshielded	m = Length in Meters

EMC Report for Acuity Brands Lighting Inc. on the Ceiling Fan Remote File: 104058883MPK-001



3.3 Justification

For radiated emission measurements the EUT is placed on a non-conductive table.

Class II permissive change testing was performed based on:

K6019-01: identical as K5579-01 with different color and button shape

K6266-02: identical as K5579-01 with different shape

K6266-03: identical as K6266-02 with Casablanca branding

K6266-04: identical as K6266-02 with a different brand of battery per customer requirements

K6019-04: identical as K6019-01 but manufacture at new facility

3.4 Software Exercise Program

The EUT exercise program used during radiated and conducted testing was provided by Hunter Fan Company

3.5 Mode of Operation during test

During transmitter testing, the transmitter was setup to continuously transmit.

3.6 Modifications required for Compliance

No modifications were installed by Intertek Testing Services during compliance testing in order to bring the product into compliance.

3.7 Additions, deviations and exclusions from standards

No additions, deviations or exclusion have been made from standard.



4.0 Measurement Results

4.1 Fundamental Field Strength

4.1.1 Requirements

The field strength of emissions, measured at 3 meters, from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of harmonics (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	¹ 1,250 to 3,750	¹ 125 to 375
174-260	3,750	375
260-470	¹ 3,750 to 12,500	¹ 375 to 1,250
Above 470	12,500	1,250

¹Linear interpolations.

4.1.2 Procedure

Tests are performed in accordance with ANSI C63.10-2013.

The EUT was placed on a non-conducting table 80 cm (below 1 GHz) or 1.5 meters (above 1 GHz) above the ground plane (turntable). The antenna to EUT distance was 3 meters.

The transmitter configured to transmit continuously. The turntable containing the EUT was rotated through 360 degrees and the receive antenna height was varied from 1 to 4 meters to locate the worst-case emissions levels. Measurements were made with the antenna in both the horizontal and vertical polarizations. EUT was tested at horizontal and vertical orientations, the possible orientations used by the end users. The worst-case data is recorded in this report.

New or fully charged batteries were used during measurement.



4.1.3 Test Results

K6019-01:

Frequency (MHz)	Measured Field Strength @3m dB(μV/m)	Lim @3m dB(µV/m)	Margin (dB)	Height (m)	Angle (°)	Antenna Polarization	Correction (dB)	Detection
433.940	62.62	80.8	-18.18	4.00	288	Vertical	-6.79	QPK

K6266-02:

Frequency (MHz)	Measured Field Strength @3m dB(μV/m)	Lim @3m dB(µV/m)	Margin (dB)	Height (m)	Angle (°)	Antenna Polarization	Correction (dB)	Detection
433.940	62.64	80.8	-18.16	2.50	233.5	Horizontal	-6.79	QPK

Results	Complies	
Test date:	August 26, 2019	



4.2 Transmitter Radiated Emissions FCC Rules: 15.231, 15.209, 15.205; RSS-210;

4.2.1 Requirements

The field strength of emissions, measured at 3 meters, from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of harmonics (microvolts/meter)		
40.66-40.70	2,250	225		
70-130	1,250	125		
130-174	¹ 1,250 to 3,750	¹ 125 to 375		
174-260	3,750	375		
260-470	¹ 3,750 to 12,500	¹ 375 to 1,250		
Above 470	12,500	1,250		

¹Linear interpolations.

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

4.2.2 Procedure

Tests are performed according to the procedures in ANSI C63.10-2013.

The EUT was placed on a non-conducting table 80 cm (below 1 GHz) or 1.5 meters (above 1 GHz) above the ground plane (turntable). Radiated test was performed at an antenna to EUT distance of 3 meters.

The spectrum from 30 MHz to the 10th harmonic was investigated with the transmitter configured to continuously transmit. The turntable containing the EUT was rotated through 360 degrees and the receive antenna height was varied from 1 to 4 meters to locate the worst-case emissions levels. Measurements were made with the antenna in both the horizontal and vertical polarizations. EUT was tested at horizontal and vertical orientations, the possible orientations used by the end users. The worst-case data is recorded in this report.

New or fully charged batteries were used during measurement.



4.2.3 Field Strength Calculation

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG; if measurement is performed at a distance other than specified in the rule, a Distance Correction Factor (DCF) shall be added.

Where FS = Field Strength in $dB(\mu V/m)$ RA = Receiver Amplitude (including preamplifier) in $dB(\mu V)$; AF = Antenna Factor in dB(1/m)CF = Cable Attenuation Factor in dB; AG = Amplifier Gain in dB

Assume a receiver reading of 52.0 dB(μ V) is obtained. The antennas factor of 7.4 dB(1/m) and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving field strength of 32 dB(μ V/m). This value in dB(μ V/m) was converted to its corresponding level in μ V/m.

 $RA = 52.0 \text{ dB}(\mu\text{V})$ AF = 7.4 dB(1/m)CF = 1.6 dB

AG = 29.0 dB $FS = 52.0+7.4+1.6-29.0 = 32 \text{ dB}(\mu\text{V/m}).$

Level in $\mu V/m = Common Antilogarithm [(32 dB<math>\mu V/m)/20] = 39.8 \mu V/m$.

EMC Report for Acuity Brands Lighting Inc. on the Ceiling Fan Remote File: 104058883MPK-001

Page 13 of 31



4.2.4 Test Result

K6019-01:

Frequency (MHz)	Measured Field Strength @3m (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	Antenna Height (m)	Angle °	Antenna Polarization	Correction	Detector
867.854	30.59	80.8	-33.85	1.02	19.75	Horizontal	-1.22	QPK
1301.867	45.58	74	-28.42	2.51	0	Vertical	-18.71	PK
1301.867	45.58	54	-8.42	2.51	0	Vertical	-18.71	PK
1301.733	43.22	74	-30.78	1.02	0	Horizontal	-18.71	PK
1301.733	43.22	54	-10.78	1.02	0	Horizontal	-18.71	PK
1735.867	44.33	74	-29.67	1.01	84.5	Vertical	-16.97	PK
1735.867	44.33	54	-9.67	1.01	84.5	Vertical	-16.97	PK
2169.867	30.13	74	-43.87	2.51	326.75	Vertical	-16.05	PK
2169.867	30.13	54	-23.87	2.51	326.75	Vertical	-16.05	PK

K6266-02:

Frequency (MHz)	Measured Field Strength @3m (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	Antenna Height (m)	Angle °	Antenna Polarization	Correction	Detector
867.854	41.26	80.8	-39.54	0.99	314.75	Horizontal	-1.22	QPK
1301.867	48.69	74	-25.31	2.51	0	Vertical	-18.71	PK
1301.867	48.69	54	-5.31	2.51	0	Vertical	-18.71	PK
1301.600	47.09	74	-26.91	1.02	0	Horizontal	-18.71	PK
1301.600	47.09	54	-6.91	1.02	0	Horizontal	-18.71	PK
1735.600	44.4	74	-29.6	1.01	134	Vertical	-16.98	PK
1735.600	44.4	54	-9.6	1.01	134	Vertical	-16.98	PK
2169.733	27.76	74	-46.24	2.51	309.75	Vertical	-16.06	PK
2169.733	27.76	54	-26.24	2.51	309.75	Vertical	-16.06	PK

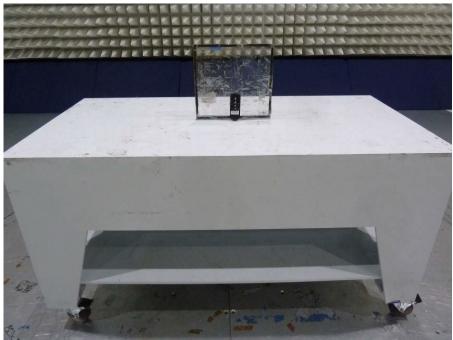
Results	Complies	
Test date:	August 25-26, 2019	



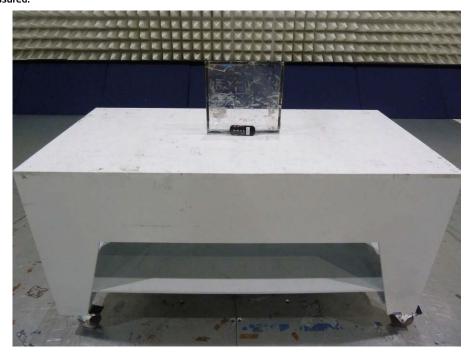
4.1.5 Test Configuration Photographs

The following photographs show the testing configurations used.





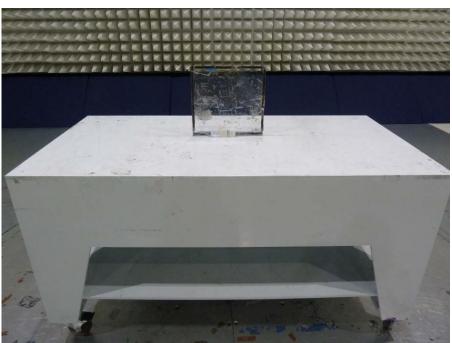




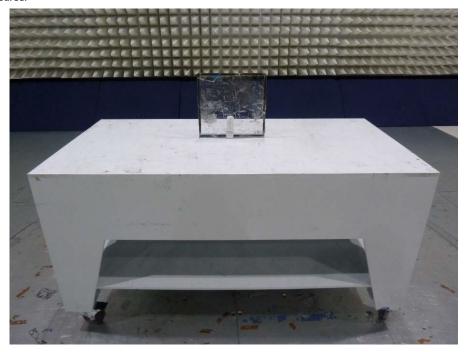






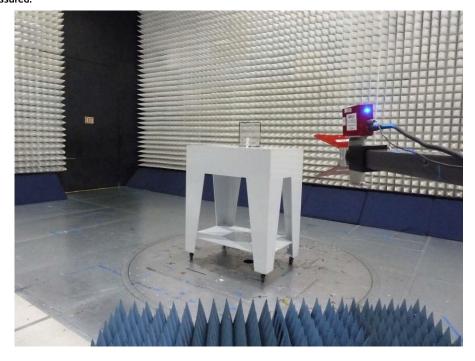


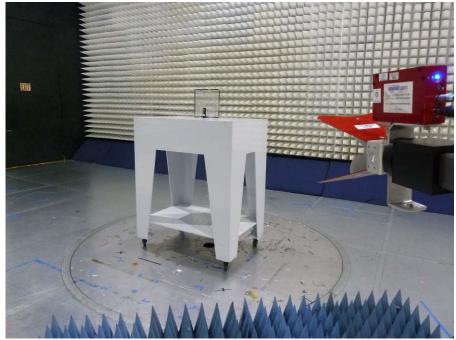














Total Quality. Assured.

4.3 Digital Parts Radiated Emissions FCC Ref: 15.109, ICES 003

4.3.1 Requirements

Limits for Electromagnetic Radiated Emissions FCC Section 15.109(b), ICES 003*, RSS GEN

Frequency	Class A at 10m	Class B at 3m
(MHz)	dB(μV/m)	dB(μV/m)
30-88	39	40.0
88-216	43.5	43.5
216-960	46.4	46.0
Above 960	49.5	54.0

^{*} According to FCC Part 15.109(g) an alternative to the radiated emission limits shown above, digital devices may be shown to comply with the limit of CISPR Pub. 22



4.3.2 Procedure

Measurements are conducted with a quasi-peak detector instrument in the frequency range of 30 MHz to 1000 MHz and with the average detector instrument in the frequency range above 1000 MHz. The measuring receiver meets the requirements of Section One of CISPR 16 and the measuring antenna correlates to a balanced dipole.

Measurements of the radiated field are made with the antenna located at a distance of 10 meters from the EUT. If the field-strength measurements at 10m cannot be made because of high ambient noise level or for other reasons, measurements of Class B equipment may be made at a closer distance, for example 3m. An inverse proportionality factor of 20 dB per decade should be used to normalize the measured data to the specified distance for determining compliance.

The antenna is adjusted between 1m and 4m in height above the ground plane for maximum meter reading at each test frequency.

The antenna-to-EUT azimuth is varied during the measurement to find the maximum field-strength readings.

The antenna-to-EUT polarization (horizontal and vertical) is varied during the measurements to find the maximum field-strength readings.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for a larger EUT.

Floor standing EUT are placed on a horizontal metal ground plane and isolated from the ground plane by resting on an insulating material.

Equipment setup for radiated disturbance tests followed the guidelines of ANSI C63.4-2014.



4.3.4 Test Result

The EUT met the radiated disturbance requirements of FCC & ICES 003 for a Class B device.

15.109 Radiated Emissions 30 MHz – 1 GHz, Class B K6019-01

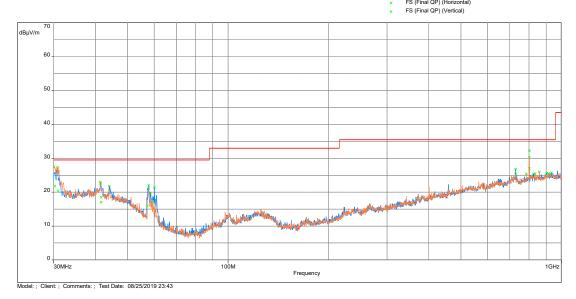
FCC Part 15/FCC Part 15.109 30M-40GHz B - QPeak/10.0m/
Meas.Peak (Horizontal)

Meas.Peak (Vertical)

Peak (Peak /Lim. QPeak) (Horizontal)

Peak (Peak /Lim. QPeak) (Vertical)

FS (Final QP) (Horizontal)



Frequency (MHz)	QPeak@10m dB(μV/m)	Lim. QPeak dB(μV/m)	Margin (dB)	Angle (°)	Height (m)	Antenna Polarization	Correction (dB)
30.238	21.76	29.5	-7.74	314.25	1.58	Horizontal	28.47
30.945	20.46	29.5	-9.04	40.5	4	Vertical	27.24
41.613	17.05	29.5	-12.45	341.5	2.43	Horizontal	23.66
41.668	18.46	29.5	-11.04	47.25	1.83	Vertical	25.08
57.295	15.96	29.5	-13.54	43.5	3.41	Vertical	30.38
801.822	32.2	35.5	-3.3	2	1.55	Horizontal	33.83

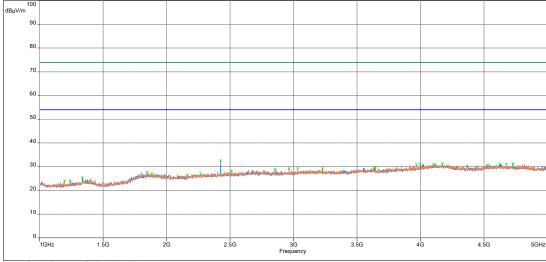
EMC Report for Acuity Brands Lighting Inc. on the Ceiling Fan Remote File: 104058883MPK-001



Radiated Emissions 1000 - 5000 MHz, Peak Scan vs Avg Limit







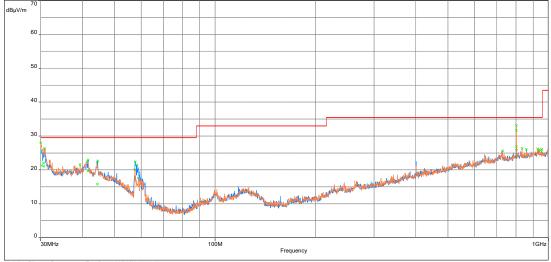
Model: ; Client: ; Comments: ; Test Date: 08/27/2019 01:03



15.109 Radiated Emissions 30 MHz - 1 GHz, Class B K6266-02



- Peak (Peak /Lim. QPeak) (Vertical)
 FS (Final QP) (Horizontal)
 FS (Final QP) (Vertical)



Model: ; Client: ; Comments: ; Test Date: 08/26/2019 00:22

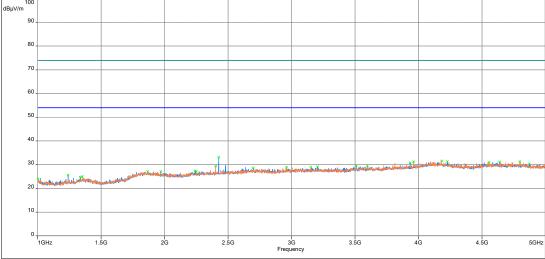
Frequency (MHz)	QPeak@10m dB(μV/m)	Lim. QPeak dB(μV/m)	Margin (dB)	Angle (°)	Height (m)	Antenna Polarization	Correction (dB)
30.160	21.26	29.5	-8.24	11	2.19	Horizontal	27.96
30.612	22.06	29.5	-7.44	80.75	3.84	Vertical	28.79
30.638	21.06	29.5	-8.44	130.25	2.13	Vertical	27.83
41.572	19.67	29.5	-9.83	252.5	1.85	Vertical	26.27
44.372	15.75	29.5	-13.75	206.5	1.76	Vertical	23.05
801.820	31.56	35.5	-3.94	1	1	Horizontal	33.19



Radiated Emissions 1000 - 5000 MHz, Peak Scan vs Avg Limit



Peak (Peak /Lim. Peak) (Horizontal)
 Peak (Peak /Lim. Peak) (Vertical)



Model: ; Client: ; Comments: ; Test Date: 08/27/2019 00:54

Results	Complies	
Test date:	August 25-26, 2019	



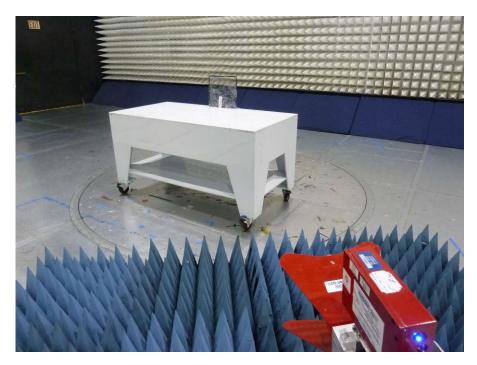
4.3.5 Test Configuration Photographs

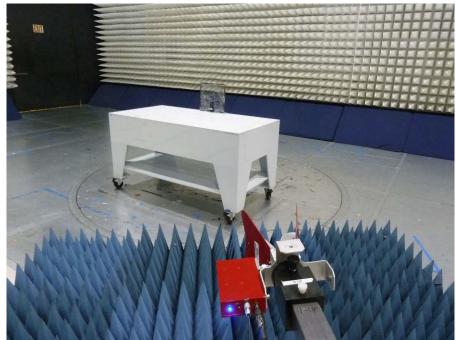
The following photographs show the testing configurations used.













Total Quality. Assured.

4.4 AC Line Conducted Emission FCC Rule 15.107/15.207

4.4.1 Requirement

Frequency Band	Class B Lin	nit dB(µV)	Class A Limit dB(μV)		
MHz	Quasi-Peak	Average	Quasi-Peak	Average	
0.15-0.50	66 to 56 *	56 to 46 *	79	66	
0.50-5.00	56	46	73	60	
5.00-30.00	60	50	73	60	

Note: *Decreases linearly with the logarithm of the frequency. At the transition frequency the lower limit applies.

4.4.2 Procedure

Measurements are carried out using quasi-peak and average detector receivers in accordance with CISPR 16. An AMN is required to provide a defined impedance at high frequencies across the power feed at the point of measurement of terminal voltage and also to provide isolation of the circuit under test from the ambient noise on the power lines. An AMN as defined in CISPR 16 shall be used.

The EUT is located so that the distance between the boundary of the EUT and the closest surface of the AMN is 0.8m.

Where a flexible mains cord is provided by the manufacturer, this shall be 1m long or if in excess of 1m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4m in length.

The EUT is arranged and connected with cables terminated in accordance with the product specification.

Conducted disturbance is measured between the phase lead and the reference ground, and between the neutral lead and the reference ground. Both measured values are reported.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. A vertical, metal reference plane is placed 0.4m from the EUT. The vertical metal reference-plane is at least 2m by 2m. The EUT shall be kept at least 0.8m from any other metal surface or other ground plane not being part of the EUT. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m but may be extended for larger EUT.

Floor standing EUT are placed on a horizontal metal ground plane and isolated from the ground plane by resting on an insulating material. The metal ground plane extends at least 0.5m beyond the boundaries of the EUT and has minimum dimensions of 2m by 2m.

EUT was placed in transmission mode then tested for conducted emissions per 15.207 and 15.107.



4.4.3 Test Result

This test is not applicable as the equipment under test is battery powered.



5.0 List of test equipment

Measurement equipment used for emission compliance testing utilized the equipment on the following list:

				0	
Equipment	Manufacturer	Model/Type	Serial No.	Calibration Interval	Cal Due
EMI Receiver	Rohde and	ESR	ITS 01607	12	10/24/19
	Schwarz				
EMI Receiver	Rohde and	ESU40	ITS 00961	12	10/26/19
	Schwarz				
BI-Log Antenna	Teseq	CBL 6111D	ITS 01058	12	09/20/19
Pre-Amplifier	Com-Power	PAM-103	ITS 01645	12	03/06/20
Active Horn Antenna	ETS Lindgren	3117-PA	ITS 01636	12	01/17/20

Software used for emission compliance testing utilized the following:

Name	Manufacturer	Version	Template/Profile
BAT-EMC	Nexio	3.16.0.64	Hunter Fan.bat



6.0 Document History

Revision/ Job Number	Writer Initials	Reviewer Initials	Date	Change
1.0 / G104058883	AC	KV	September 09, 2019	Original document
2.0 / G104323265	НН	KV	May 06, 2020	Added model K6019-04 to Variant Models. See section 2.1 for details.
3.0 / G104323265	GN	AS	December 14, 2022	Updates to Variant Models. See section 2.1 for details.

END OF REPORT