Hestan

TEST REPORT FOR

Hestan Cue Smart Cookware
Model: 31520

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.249

Report No.: 100774-9

Date of issue: March 29, 2018

Certificate # 803.05

This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of EMC testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

TABLE OF CONTENTS

ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Hestan
1080 W Ewing Pl. Suite 300
Seattle, WA 98119

Representative: Kathleen McVey
Customer Reference Number: 362018

REPORT PREPARED BY:

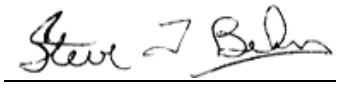
Terri Rayle
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 100774

DATE OF EQUIPMENT RECEIPT: February 9, 2018
DATE(S) OF TESTING: February 9, 2018 - March 5, 2018

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the equipment provided by the client, tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc



Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information

Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
22116 23rd Drive S.E., Suite A
Canyon Park, Bothell, WA 98021

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.11

Site Registration & Accreditation Information

Location	NIST CB #	TAIWAN	CANADA	FCC	JAPAN
Canyon Park Bothell, WA	US0081	SL2-IN-E-1145R	3082C-1	US1022	A-0148

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C - 15.249

Test Procedure	Description	Modifications	Results
15.215(c)	Occupied Bandwidth	NA	Pass
15.249(a)	Field Strength of Fundamental	NA	Pass
15.249(a)	Radiated Emissions and Band Edge	NA	Pass

NA = Not Applicable

Modifications During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions
No modifications were made during testing.

Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions
None

EQUIPMENT UNDER TEST (EUT)

During testing, numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

Configuration 1

Equipment Tested:

Device	Manufacturer	Model #	S/N
Hestan Cue Smart Cookware	Hestan	31520	NA

Support Equipment:

Device	Manufacturer	Model #	S/N
None			

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Modulation Type(s):	GFSK (G1D)
Maximum Duty Cycle:	Tested 100% as worst case
Antenna Type(s) and Gain:	Internal Trace -10dBi
Antenna Connection Type:	Integral
Nominal Input Voltage:	Battery, 1.5V nominal (0.7-3.0V)
Firmware / Software used for Test:	EUT Firmware 0.1/ TeraTerm 4.77

FCC Part 15 Subpart C

15.215(c) Occupied Bandwidth (20dB BW)

Test Setup/Conditions			
Test Location:	Bothell Lab C3	Test Engineer:	Steven M. Pittsford & Mike Atkinson
Test Method:	ANSI C63.10 (2013)	Test Date(s):	2/23/2018 & 3/5/2018
Configuration:	1		
Test Setup:	The EUT is continuously transmitting modulated data. Low, Mid, and High channels investigated. The EUT is battery powered with a fresh battery installed.		

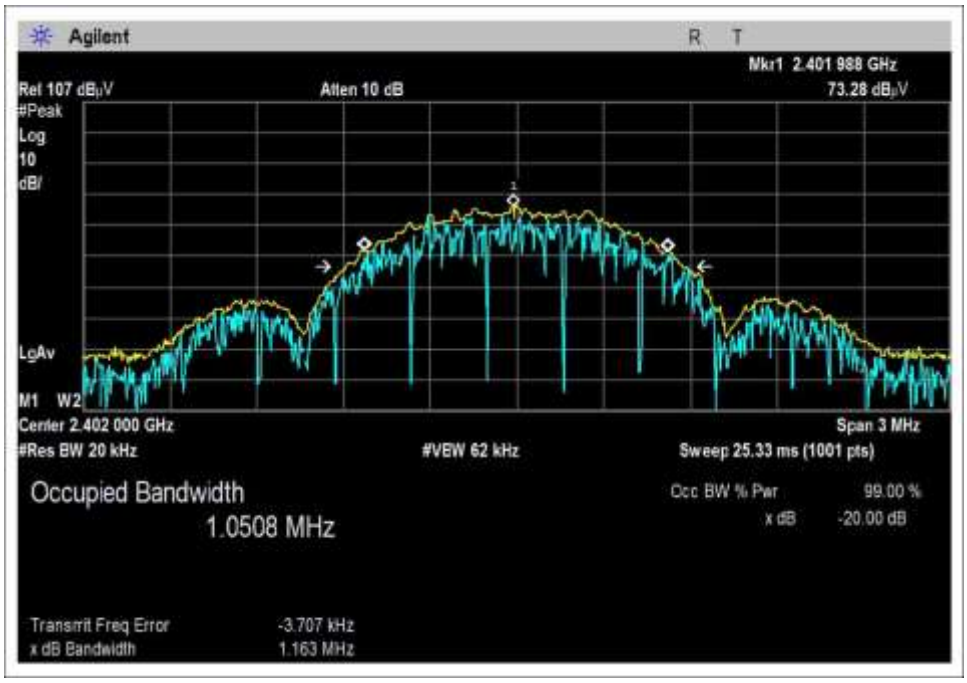
Environmental Conditions			
Temperature (ºC)	20-22	Relative Humidity (%):	20-30

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
01467	Horn Antenna	EMCO	3115	7/21/2017	7/21/2019
P05305	Cable	Andrews	ETSI-50T	10/24/2017	10/24/2019
02673	Spectrum Analyzer	Agilent	E4446A	2/3/2017	2/3/2019
P06540	Cable	Andrews	Heliax	10/30/2017	10/30/2019
03540	Preamp	HP	83017A	5/2/2017	5/2/2019
P06934	Cable	Astrolab	32026-29801-29801-18	3/11/2016	3/11/2018
P07033	Cable	Andrews	Heliax	12/11/2017	12/11/2019

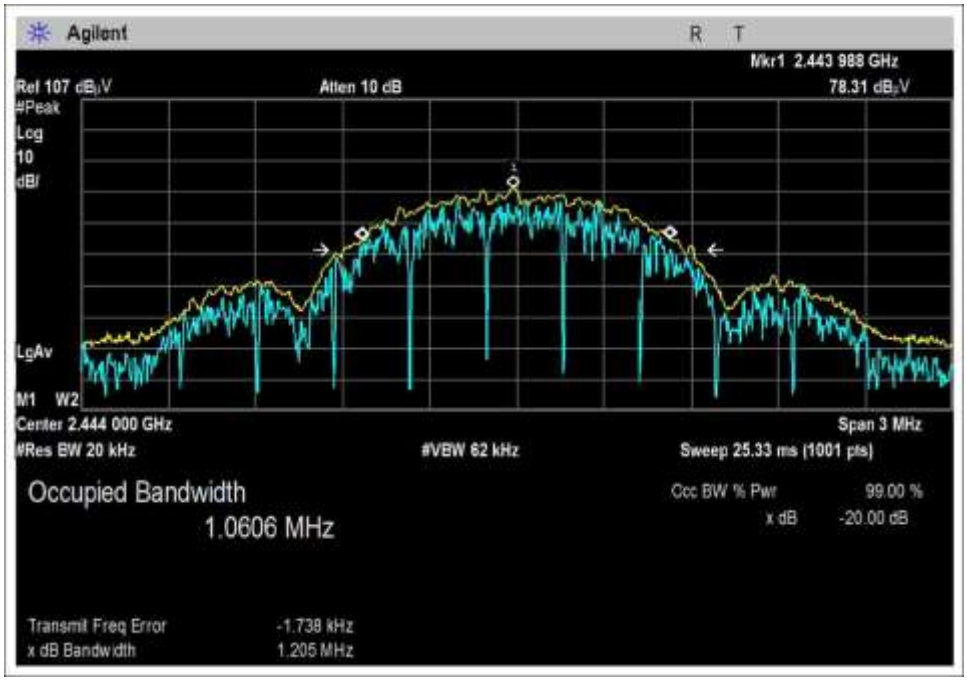
Test Data Summary					
Frequency (MHz)	**Antenna Port**	**Modulation**	**Measured (kHz)**	**Limit (kHz)**	**Results**
2402	1	GFSK	1163	None	NA
2444	1	GFSK	1205	None	NA
2480	1	GFSK	1210	None	NA

NA = Not applicable, because FCC 15.215 does not give any limits so there is no criteria for pass or fail.

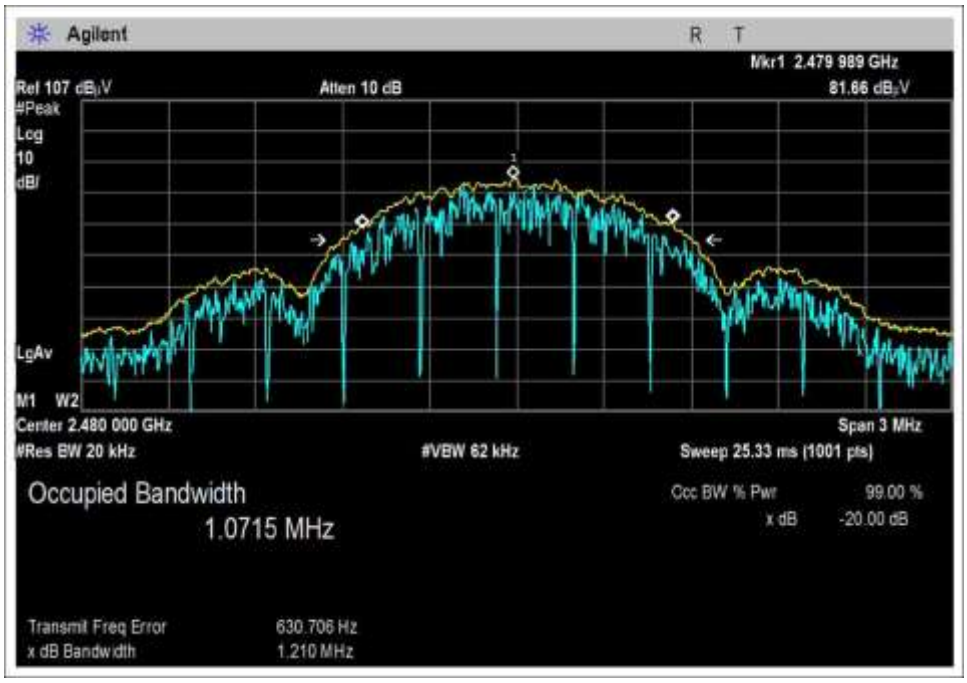
Plots



Low Channel

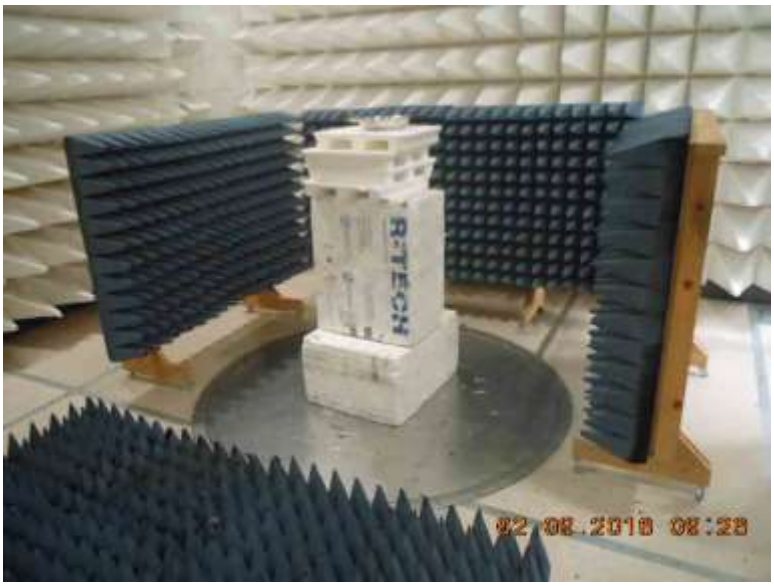


Middle Channel



High Channel

Test Setup Photo



Above 1GHz Cone placement

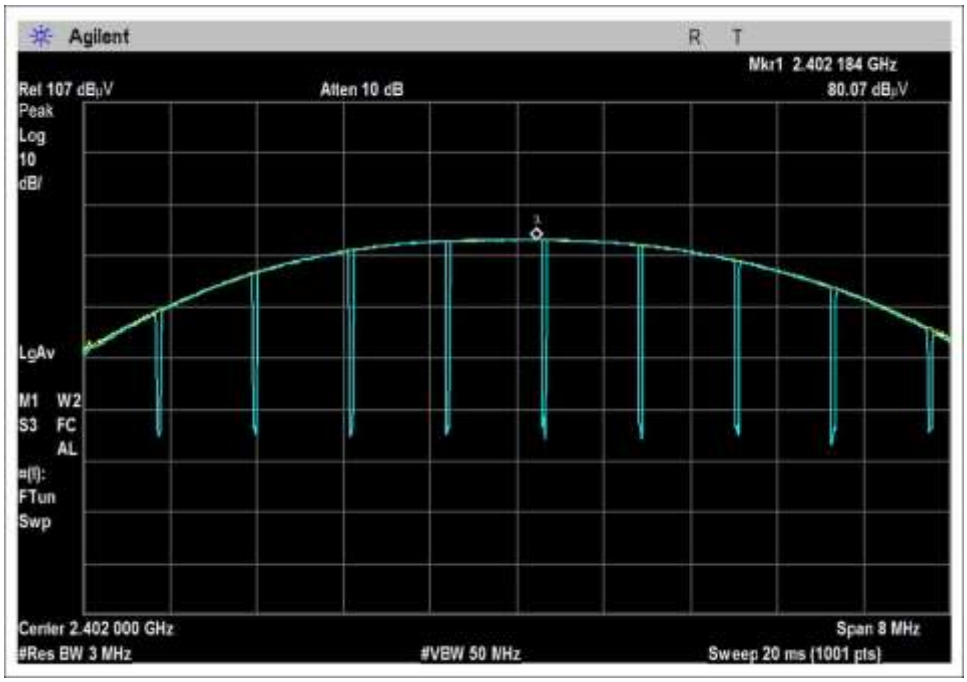
15.249(a) Field Strength of Fundamental

Test Data Summary - Voltage Variations

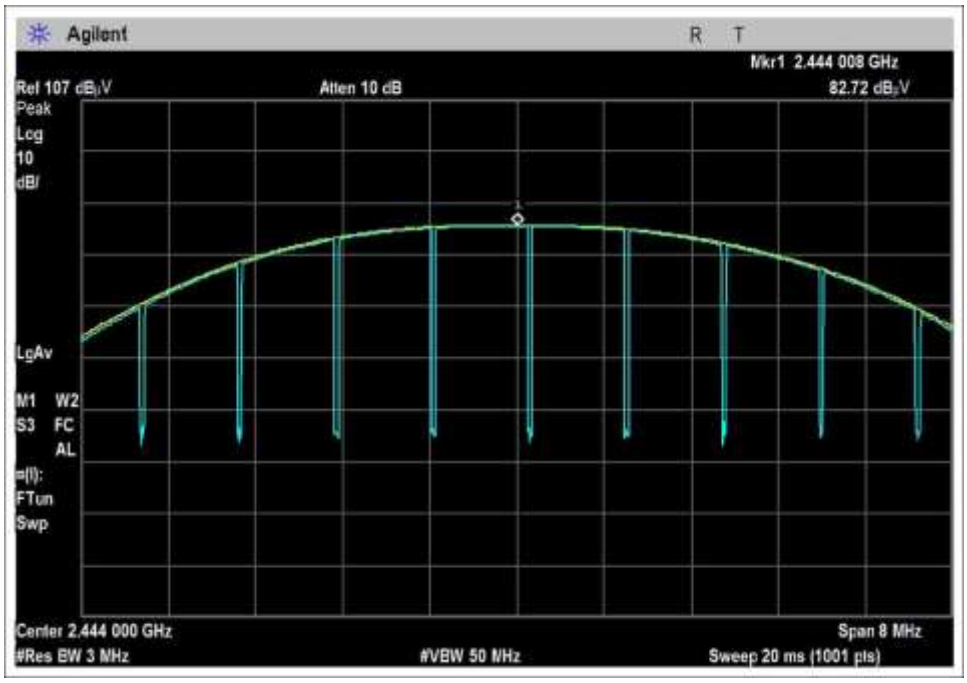
This equipment is battery powered. Power output tests were performed using a fresh battery.

Test Data Summary – Radiated Field Strength Measurement					
See data sheet for corrections from raw reading seen in plot to corrected reading reported.					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Measured (dBuV/m @ 3m)**	**Limit (dBuV/m @ 3m)**	**Results**
2402	GFSK	Internal Trace	78.5	≤94	Pass
2444	GFSK	Internal Trace	80.4	≤94	Pass
2480	GFSK	Internal Trace	81.2	≤94	Pass

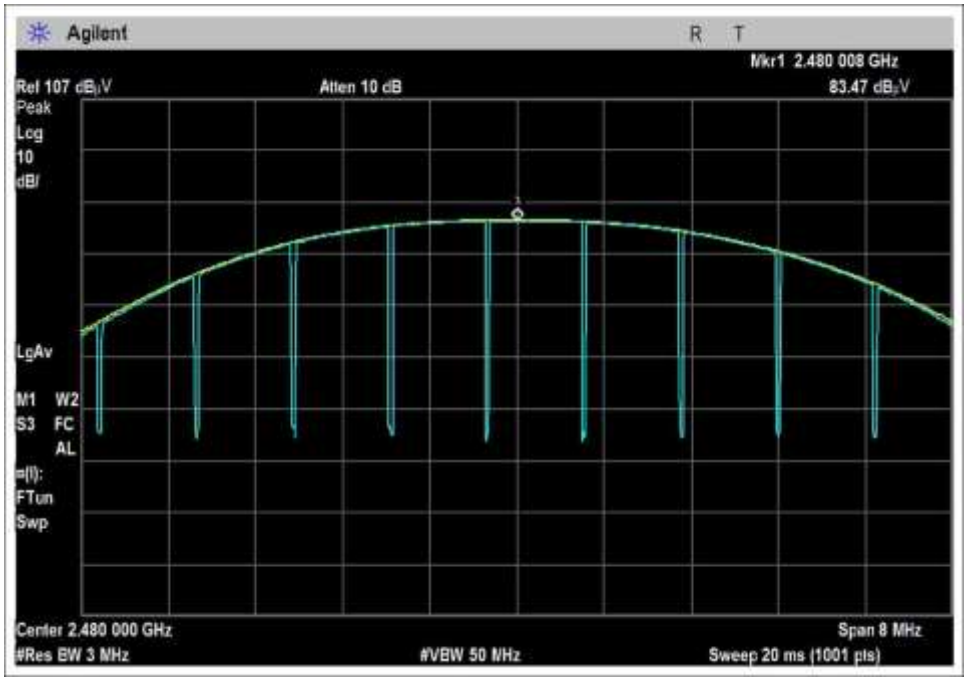
Plots



Low Channel



Middle Channel



High Channel

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 22116 23rd DR SE • Bothell WA, 98021 • (425) 402-1717		
Customer:	**Hestan**		
Specification:	**15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**		
Work Order #:	**100774**	Date:	3/5/2018
Test Type:	**Maximized Emissions**	Time:	11:11:26
Tested By:	Steven Pittsford	Sequence#:	1
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

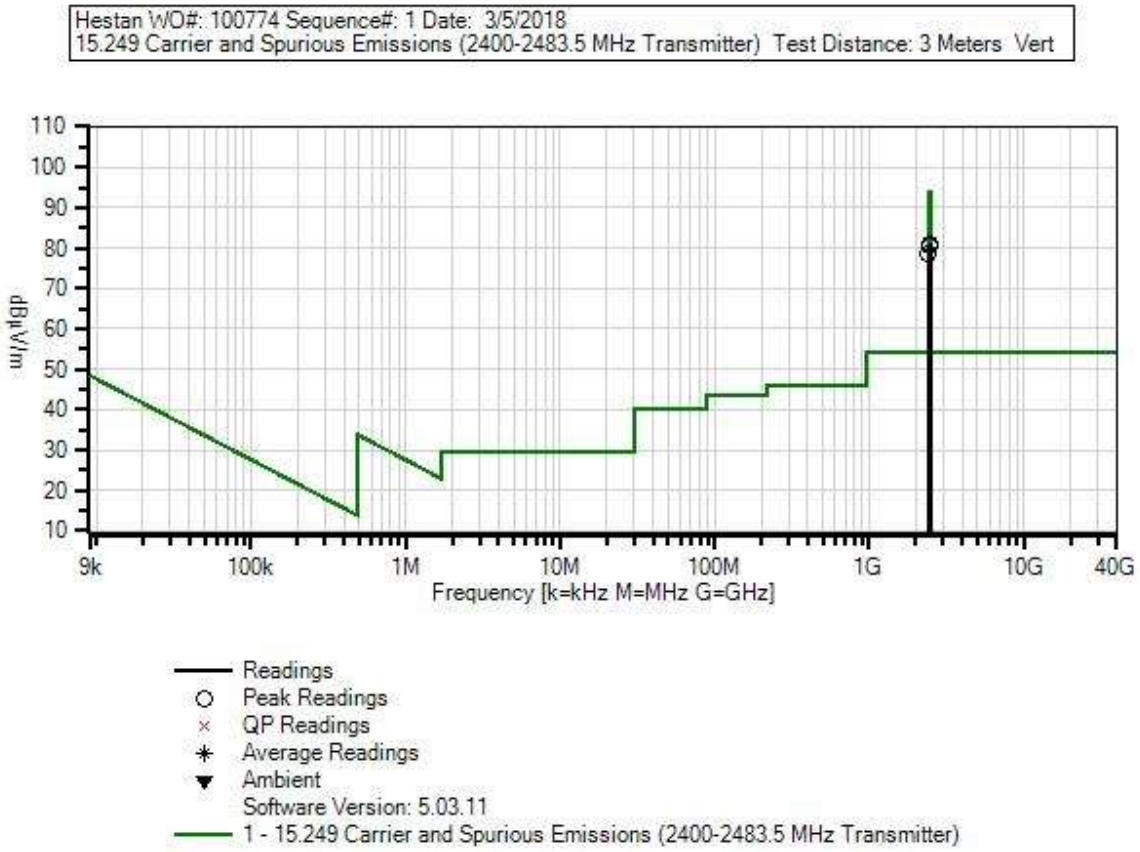
Test Conditions / Notes:

Frequency Range: 2402-2480
Frequency tested: 2402, 2444, 2480MHz
Firmware power setting: -4
Temperature (ºC): 20-22
Relative Humidity (%): 20-30

Test Location: Canyon Park Lab C3
Test Date(s): 2/23/2018 & 3/5/2018
Test Method: ANSI C63.10 (2013)

Duty Cycle: 100%

Test Mode: Continuously transmitting
Test Setup: the EUT has a fresh battery installed.
The EUT is on a test table 1.5m high.


Hestan WO#: 100774 Sequence#: 1 Date: 3/5/2018
15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter) Test Distance: 3 Meters Vert
dBµV/m
110
100
90
80
70
60
50
40
30
20
10
9k
100k
1M
10M
100M
1G
10G
40G
Frequency [k=kHz M=MHz G=GHz]
Readings
Peak Readings
QP Readings
Average Readings
Ambient
Software Version: 5.03.11
1 - 15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)

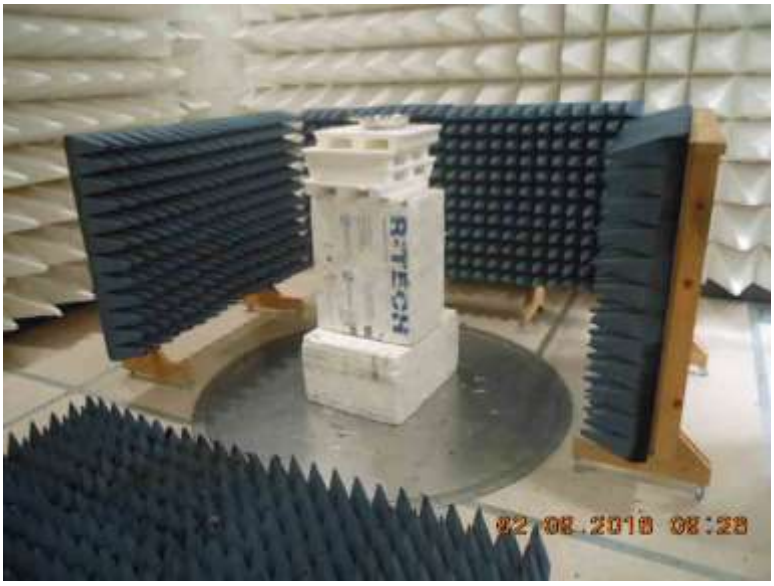
Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03540	Preamp	83017A	5/2/2017	5/2/2019
T2	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	7/21/2017	7/21/2019
T3	ANP06540	Cable	Heliax	10/30/2017	10/30/2019
T4	ANP06934	Cable	32026-29801-29801-18	3/11/2016	3/11/2018
	AN02673	Spectrum Analyzer	E4446A	2/3/2017	2/3/2019
T5	ANP05305	Cable	ETSI-50T	10/24/2017	10/24/2019
T6	ANP07033	Cable	Heliax	12/11/2017	12/11/2019

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2480.008M	83.5	-34.0 +2.8	+28.1 +0.0	+0.4	+0.4	+0.0 20	81.2	94.0	-12.8	Horiz 181
2	2444.008M	82.7	-34.0 +2.8	+28.1 +0.0	+0.4	+0.4	+0.0 16	80.4	94.0	-13.6	Horiz 154
3	2402.184M	80.7	-34.0 +0.0	+28.1 +2.9	+0.4	+0.4	+0.0	78.5	94.0	-15.5	Horiz

Test Setup Photos



Above 1GHz Cone placement

15.249(a) Radiated Emissions and Band Edge

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 22116 23rd DR SE • Bothell WA, 98021 • (425) 402-1717		
Customer:	**Hestan**		
Specification:	**15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**		
Work Order #:	**100774**	Date:	3/5/2018
Test Type:	**Maximized Emissions**	Time:	10:29:39
Tested By:	Steven Pittsford	Sequence#:	1
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

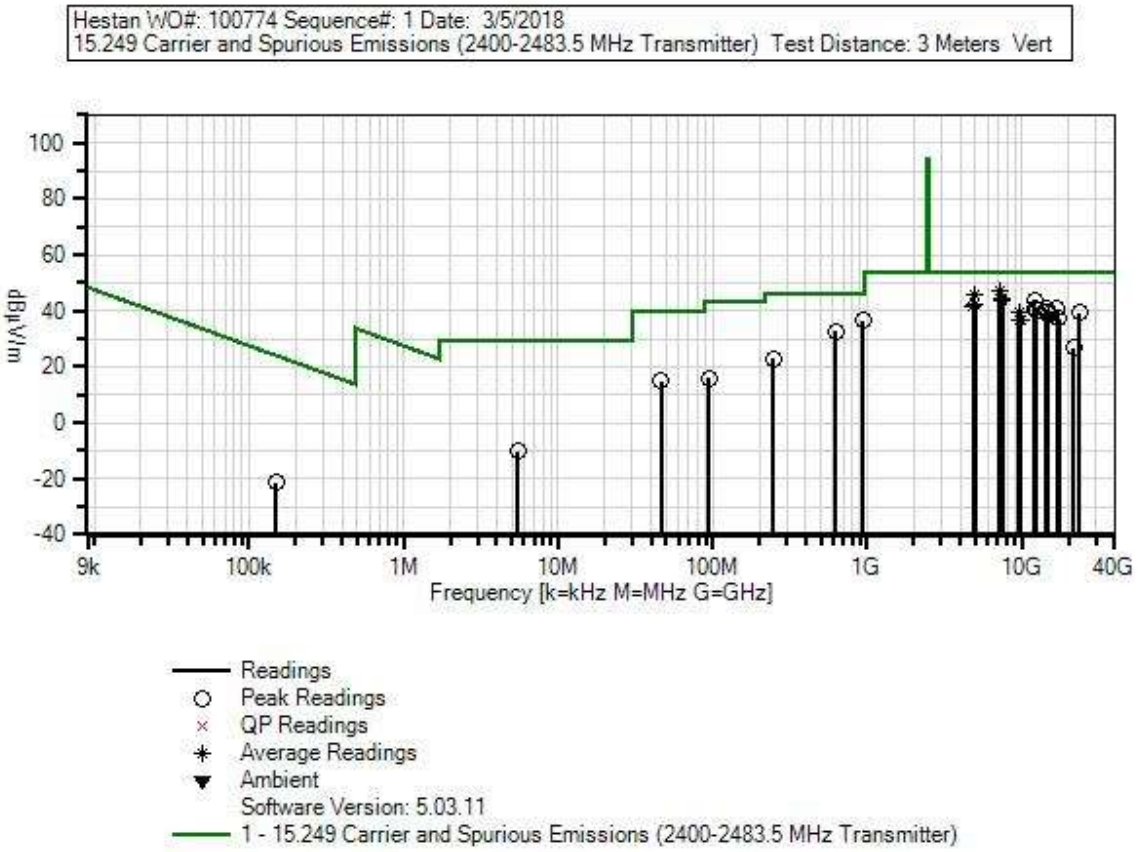
Test Conditions / Notes:

Frequency Range: 9k-25GHz
Frequency tested: 2402, 2444, 2480MHz
Firmware power setting: -4

Temperature (ºC): 20-22
Relative Humidity (%): 20-30
Test Location: Canyon Park Lab C3
Test Date(s): 2/9/2018, 2/22/22018, 2/23/2018 & 3/5/2018

Duty Cycle: 100%

Test Mode: Continuously transmitting
Test Setup: The EUT has a fresh battery installed.
The EUT is on a test table 1.5m high above 1GHz and 0.8m high below 1GHz
Test Method: ANSI C63.10 (2013)


Hestan WO#: 100774 Sequence#: 1 Date: 3/5/2018
15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter) Test Distance: 3 Meters Vert
dBµV/m
100
80
60
40
20
0
-20
-40
9k
100k
1M
10M
100M
1G
10G
40G
Frequency [k=kHz M=MHz G=GHz]
Readings
Peak Readings
QP Readings
Average Readings
Ambient
Software Version: 5.03.11
1 - 15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03540	Preamp	83017A	5/2/2017	5/2/2019
T2	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	7/21/2017	7/21/2019
T3	ANP06540	Cable	Heliax	10/30/2017	10/30/2019
T4	ANP06934	Cable	32026-29801-29801-18	3/11/2016	3/11/2018
T5	AN02673	Spectrum Analyzer	E4446A	2/3/2017	2/3/2019
T6	ANP05305	Cable	ETSI-50T	10/24/2017	10/24/2019
T7	AN02741	Active Horn Antenna	AMFW-5F-12001800-20-10P	3/30/2017	3/30/2019
T8	AN02742	Active Horn Antenna	AMFW-5F-18002650-20-10P	10/7/2016	10/7/2018
T9	ANP06678	Cable	32026-29801-29801-144	9/19/2016	9/19/2018
T10	AN03122	Cable	32026-2-29801-36	4/28/2016	4/28/2018
T11	AN02763-69	Waveguide	Multiple	7/14/2017	7/14/2019
T12	AN02307	Preamp	8447D	1/15/2018	1/15/2020
T13	AN03628	Biconilog Antenna	3142E	6/7/2017	6/7/2019
T14	ANP06123	Attenuator	18N-6	5/5/2017	5/5/2019
T15	AN06963	Cable	Heliax	3/14/2016	3/14/2018
T16	ANP05963	Cable	RG-214	2/15/2016	2/15/2018
T17	AN00052	Loop Antenna	6502	4/8/2016	4/8/2018
T18	ANP07033	Cable	Heliax	12/11/2017	12/11/2019

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9 T13 T17	T2 T6 T10 T14 T18	T3 T7 T11 T15	T4 T8 T12 T16	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	7206.710M Ave	37.5	-33.9 +0.0 +0.0 +0.0 +0.0	+36.2 +0.0 +0.0 +0.0 +6.4	+0.7 +0.0 +0.0 +0.0	+0.6 +0.0 +0.0 +0.0	+0.0	47.5	54.0 Low	-6.5	Horiz 201
^	7206.710M	45.9	-33.9 +0.0 +0.0 +0.0 +0.0	+36.2 +0.0 +0.0 +0.0 +6.4	+0.7 +0.0 +0.0 +0.0	+0.6 +0.0 +0.0 +0.0	+0.0 338	55.9	54.0 Low	+1.9	Horiz 112

3	4888.000M	41.3	-33.2	+32.4	+0.5	+0.5	+0.0	45.5	54.0	-8.5	Vert
	Ave		+0.0	+4.0	+0.0	+0.0	360		Mid		158
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
^	4887.920M	48.2	-33.2	+32.4	+0.5	+0.5	+0.0	52.4	54.0	-1.6	Vert
			+0.0	+4.0	+0.0	+0.0	360		Mid		155
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
5	942.520M	28.6	+0.0	+0.0	+0.4	+0.0	+0.0	36.7	46.0	-9.3	Vert
			+0.0	+0.0	+0.0	+0.0	360				129
			+0.0	+0.0	+0.0	-27.2					
			+24.9	+5.9	+1.7	+2.4					
			+0.0	+0.0							
6	7439.320M	34.7	-34.4	+36.8	+1.1	+0.6	+0.0	44.2	54.0	-9.8	Horiz
	Ave		+0.0	+5.4	+0.0	+0.0			High		211
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
^	7439.320M	43.4	-34.4	+36.8	+1.1	+0.6	+0.0	52.9	54.0	-1.1	Horiz
			+0.0	+5.4	+0.0	+0.0	360		High		211
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
8	7331.250M	34.5	-34.1	+36.5	+0.9	+0.6	+0.0	43.9	54.0	-10.1	Horiz
	Ave		+0.0	+5.5	+0.0	+0.0	360		Mid		126
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
^	7331.250M	43.9	-34.1	+36.5	+0.9	+0.6	+0.0	53.3	54.0	-0.7	Horiz
			+0.0	+5.5	+0.0	+0.0	360		Mid		126
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
10	12010.710	47.4	+0.0	+0.0	+1.0	+0.0	+0.0	43.6	54.0	-10.4	Vert
	M		+0.0	+0.0	-13.3	+0.0					
			+0.0	+0.0	+0.0	+0.0			Low		154
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+8.5							
11	4959.460M	37.7	-33.2	+32.5	+0.5	+0.5	+0.0	42.0	54.0	-12.0	Horiz
	Ave		+0.0	+4.0	+0.0	+0.0			High		174
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
^	4959.460M	46.1	-33.2	+32.5	+0.5	+0.5	+0.0	50.4	54.0	-3.6	Horiz
			+0.0	+4.0	+0.0	+0.0			High		174
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							

13	4803.781M Ave	37.4	-33.2 +0.0 +0.0 +0.0 +0.0	+32.3 +0.0 +0.0 +0.0 +4.1	+0.5 +0.0 +0.0 +0.0	+0.5 +0.0 +0.0 +0.0	+0.0	41.6	54.0 Low	-12.4	Vert
^	4803.781M	43.4	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +4.1	+0.5 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 332	48.0	54.0 Low	-6.0	Vert 150
15	12218.600 M	46.2	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 +7.1 +0.0 +0.0 +0.0	+1.0 -13.2 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 360	41.1	54.0 Mid	-12.9	Vert 169
16	628.300M	29.5	+0.0 +0.0 +0.0 +21.8 +0.0	+0.0 +0.0 +0.0 +5.9 +0.0	+0.3 +0.0 +0.0 +1.5	+0.0 +0.0 -28.2 +2.1	+0.0	32.9	46.0	-13.1	Vert 129
17	14412.760 M	45.6	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +9.1	+0.7 -14.6 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 360	40.8	54.0 Low	-13.2	Vert 170
18	16814.760 M	38.5	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +10.6	+1.4 -9.9 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0	40.6	54.0 Low	-13.4	Vert 170
19	12401.256 M	45.1	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 +7.2 +0.0 +0.0 +0.0	+1.1 -13.4 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 360	40.0	54.0 High	-14.0	Vert 160
20	14662.355 M	45.5	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 +8.3 +0.0 +0.0 +0.0	+0.5 -14.5 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 287	39.8	54.0 Mid	-14.2	Vert 170
21	9608.710M Ave	27.5	-33.5 +0.0 +0.0 +0.0 +0.0	+37.5 +0.0 +0.0 +0.0 +6.5	+0.7 +0.0 +0.0 +0.0	+0.8 +0.0 +0.0 +0.0	+0.0 360	39.5	54.0 Low	-14.5	Vert 153
^	9608.710M	35.1	-33.5 +0.0 +0.0 +0.0 +0.0	+37.5 +0.0 +0.0 +0.0 +6.5	+0.7 +0.0 +0.0 +0.0	+0.8 +0.0 +0.0 +0.0	+0.0	47.1	54.0 Low	-6.9	Vert 200

23	23516.000 M	41.4	+0.0 +0.0 +8.4 +0.0 +0.0	+0.0 +0.0 +2.4 +0.0 +0.0	+0.0 +0.0 +1.4 +0.0 +0.0	+0.0 -14.1 +0.0 +0.0	+0.0 360	39.5	54.0 Mid	-14.5	Vert 162
24	23579.000 M	41.1	+0.0 +0.0 +8.4 +0.0 +0.0	+0.0 +0.0 +2.4 +0.0 +0.0	+0.0 +0.0 +1.3 +0.0 +0.0	+0.0 -13.9 +0.0 +0.0	+0.0 108	39.3	54.0 High	-14.7	Vert 162
25	14881.400 M	44.4	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 +8.2 +0.0 +0.0 +0.0	+0.5 -14.2 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0	38.9	54.0 High	-15.1	Vert 167
26	17107.265 M	38.0	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 +9.0 +0.0 +0.0 +0.0	+1.3 -10.9 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0	37.4	54.0 Mid	-16.6	Vert 156
27	17356.824 M	37.7	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 +9.2 +0.0 +0.0 +0.0	+1.2 -10.8 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0	37.3	54.0 High	-16.7	Vert 162
28	9918.970M Ave	25.8	-33.7 +0.0 +0.0 +0.0 +0.0	+37.7 +6.2 +0.0 +0.0 +0.0	+0.4 +0.0 +0.0 +0.0 +0.0	+0.7 +0.0 +0.0 +0.0 +0.0	+0.0 360	37.1	54.0 High	-16.9	Vert 217
^	9918.970M	37.8	-33.7 +0.0 +0.0 +0.0 +0.0	+37.7 +6.2 +0.0 +0.0 +0.0	+0.4 +0.0 +0.0 +0.0 +0.0	+0.7 +0.0 +0.0 +0.0 +0.0	+0.0 30	49.1	54.0 High	-4.9	Vert 163
30	9776.970M Ave	25.3	-33.6 +0.0 +0.0 +0.0 +0.0	+37.6 +6.3 +0.0 +0.0 +0.0	+0.5 +0.0 +0.0 +0.0 +0.0	+0.7 +0.0 +0.0 +0.0 +0.0	+0.0 41	36.8	54.0 Mid	-17.2	Horiz 166
^	9776.970M	38.3	-33.6 +0.0 +0.0 +0.0 +0.0	+37.6 +6.3 +0.0 +0.0 +0.0	+0.5 +0.0 +0.0 +0.0 +0.0	+0.7 +0.0 +0.0 +0.0 +0.0	+0.0 274	49.8	54.0 Mid	-4.2	Horiz 221
32	247.080M	29.1	+0.0 +0.0 +0.0 +12.3 +0.0	+0.0 +0.0 +0.0 +5.9 +0.0	+0.2 +0.0 +0.0 +0.9	+0.0 +0.0 -27.0 +1.5	+0.0 360	22.9	46.0	-23.1	Vert 129

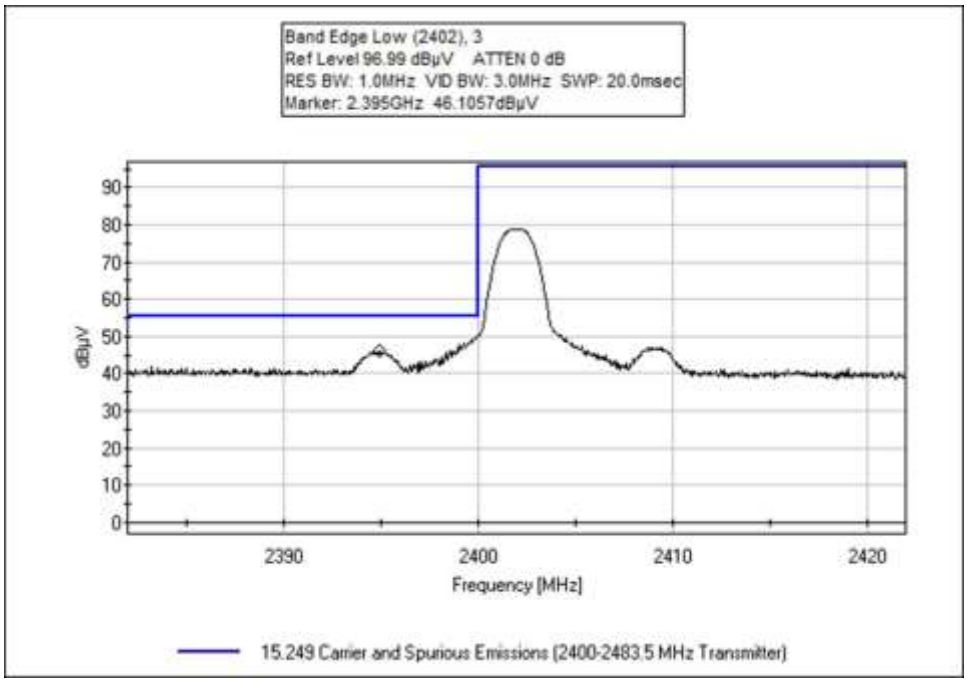
33	46.660M	28.2	+0.0 +0.0 +0.0 +7.6 +0.0	+0.0 +0.0 +0.0 +5.9 +0.0	+0.1 +0.0 +0.0 +0.4	+0.0 +0.0 -27.9 +0.6	+0.0 360	14.9	40.0	-25.1	Vert 129
34	21618.760 M	40.8	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 -14.1 +0.0 +0.0	+0.0 360	26.7	54.0 Low	-27.3	Vert 162
35	95.040M	28.6	+0.0 +0.0 +0.0 +7.5 +0.0	+0.0 +0.0 +0.0 +5.9 +0.0	+0.1 +0.0 +0.0 +0.5	+0.0 +0.0 -27.7 +1.1	+0.0 360	16.0	43.5	-27.5	Vert 109
36	5.493M	20.2	+0.0 +0.0 +0.0 +0.0 +9.4	+0.0 +0.0 +0.0 +0.0 +0.1	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	-40.0	-10.3	29.5	-39.8	Paral 136
37	150.000k	48.9	+0.0 +0.0 +0.0 +0.0 +9.7	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	-80.0	-21.4	24.1	-45.5	Perpe 136
38	323.900k	26.7	+0.0 +0.0 +0.0 +0.0 +9.6	+0.0 +0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	+0.0 +0.0 +0.0 +0.0	-80.0 360	-43.7	17.4	-61.1	Perpe 136

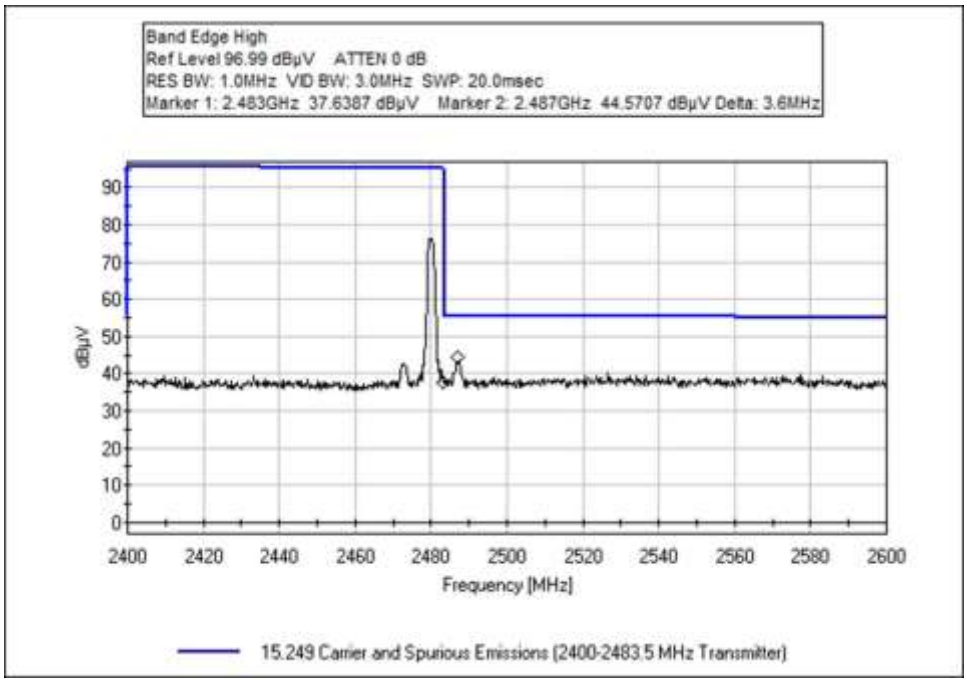
Band Edge

Band Edge Summary					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
2395	GFSK	Internal Trace	45.2	<54	Pass
2487	GFSK	Internal Trace	43.1	<54	Pass
2400	GFSK	Internal Trace	49.1	<54	Pass
2483.5	GFSK	Internal Trace	36.1	<54	Pass

Test performed using operational mode with the highest output power, representing worst case

Band Edge Plots





Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd DR SE • Bothell WA, 98021 • (425) 402-1717
Customer: **Hestan**
Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
Work Order #: **100774** Date: 3/5/2018
Test Type: **Maximized Emissions** Time: 10:44:02
Tested By: Steven Pittsford Sequence#: 1
Software: EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Frequency Range: 2380-2600MHz
Frequency tested: 2402, 2480MHz
Firmware power setting: -4
Temperature (ºC): 20-22
Relative Humidity (%): 20-30
Test Location: Bothell Lab C3
Test Method: ANSI C63.10 (2013)
Duty Cycle: 100%

Test Mode: Continuously transmitting
Test Setup: The EUT has a fresh battery installed.
The EUT is on a test table 1.5m high.

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03540	Preamp	83017A	5/2/2017	5/2/2019
T2	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	7/21/2017	7/21/2019
T3	ANP06540	Cable	Heliax	10/30/2017	10/30/2019
T4	ANP06934	Cable	32026-29801-29801-18	3/11/2016	3/11/2018
	AN02673	Spectrum Analyzer	E4446A	2/3/2017	2/3/2019
T5	AN03122	Cable	32026-2-29801-36	4/28/2016	4/28/2018
T6	ANP05305	Cable	ETSI-50T	10/24/2017	10/24/2019

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	2394.960M	46.8	-34.0 +0.7	+28.1 +2.8	+0.4	+0.4	+0.0	45.2	54.0	-8.8	Horiz
2	2487.000M	44.6	-34.0 +0.8	+28.1 +2.8	+0.4	+0.4	+0.0	43.1	54.0	-10.9	Horiz 173

Test Setup Photos

Below 1GHz

Above 1GHz Cone placement

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

Uncertainties reported are worst case for all CKC Laboratories' sites and represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Compliance is deemed to occur provided measurements are below the specified limits.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBµV/m, the spectrum analyzer reading in dBµV was corrected by using the following formula. This reading was then compared to the applicable specification limit. Individual measurements were compared with the displayed limit value in the margin column. The margin was calculated based on subtracting the limit value from the corrected measurement value; a positive margin represents a measurement exceeding the limit, while a negative margin represents a measurement less than the limit.

SAMPLE CALCULATIONS		
	Meter reading	(dBµV)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or caret (“^”) was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point, the measuring device is set into the linear mode and the scan time is reduced.