

Hestan Smart Cooking Inc.

TEST REPORT FOR

Capsule
Model: 31500

Tested To The Following Standard:

FCC Part 15 Subpart C Section(s)

15.249

Report No.: 99206-9

Date of issue: November 21, 2016



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	3
Test Report Information	3
Report Authorization	3
Test Facility Information	4
Software Versions	4
Site Registration & Accreditation Information	4
Summary of Results	5
Modifications During Testing	5
Conditions During Testing	5
Equipment Under Test	6
General Product Information	6
FCC Part 15 Subpart C	7
15.215(c) Occupied Bandwidth (20dB BW)	7
15.249(a) Field Strength of Fundamental	11
15.249(a) Radiated Emissions	17
Supplemental Information	32
Measurement Uncertainty	32
Emissions Test Details	32

ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

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REPORT PREPARED BY:

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REPRESENTATIVE: Brenden Duncombe

Project Number: 99206

DATE OF EQUIPMENT RECEIPT:

November 2, 2016

DATE(S) OF TESTING:

November 2, 2016

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment 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
Bothell, WA 98021-4413

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.02

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Bothell	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)	Field Strength of Spurious Emissions	NA	Pass
15.207	AC Conducted Emissions	NA	NA1

NA = Not Applicable

NA1 = Not applicable because the EUT is battery powered and does not operate from AC mains.

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
Capsule	Hestan	31500	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:	100%
Antenna Type(s) and Gain:	Internal Trace / 0.0 dBi Estimated
Antenna Connection Type:	Integral
Nominal Input Voltage:	Battery: 0.8 to 3.0V, Nominal 1.5V
Firmware / Software used for Test:	DTM 1.0 / S130

FCC Part 15 Subpart C

15.215(c) Occupied Bandwidth (20dB BW)

Test Setup/Conditions			
Test Location:	Canyon Park C3	Test Engineer:	M. Atkinson
Test Method:	ANSI C63.10 (2013)	Test Date(s):	11/2/2016
Configuration:	1		
Test Conditions:	Frequency Range: 2402-2480MHz Frequency tested: 2402, 2440, 2480MHz Firmware power setting: Max Power EUT Firmware: DTM 1.0 / S130 Protocol / Modulation: GFSK Antenna type: Integral Trace Antenna Gain: 0.0 dBi Duty Cycle: 100% Test Mode: Continuously transmitting with modulation at max data rate. Test Setup: EUT is sitting on foam table transmitting. EUT is battery operated with fresh battery installed. Modifications Added: None		

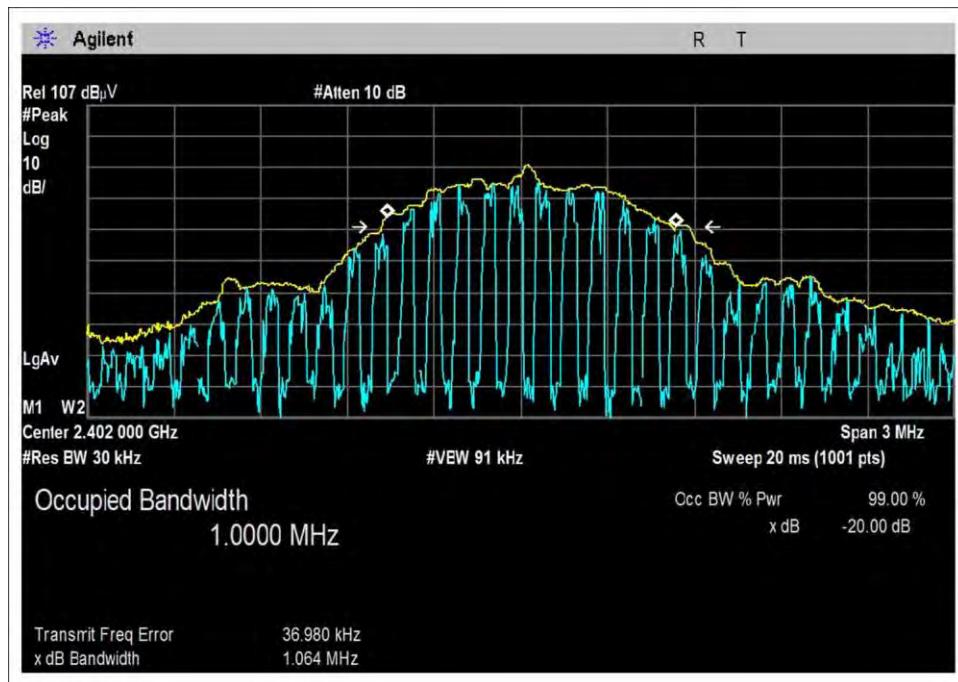
Environmental Conditions			
Temperature (°C)	22	Relative Humidity (%):	40

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02871	Spectrum Analyzer	Agilent	E4440A	8/25/2015	8/25/2017
P06540	Cable	Andrews	Heliax	10/29/2015	10/29/2017
P05305	Cable	Andrews	ETSI-50T	2/15/2016	2/15/2018
03540	Preamp	HP	83017A	4/30/2015	4/30/2017
01467	Horn Antenna	EMCO	3115	8/12/2015	8/12/2017
P06935	Cable	Astrolab	32026-29801-29801-18	3/11/2016	3/11/2018

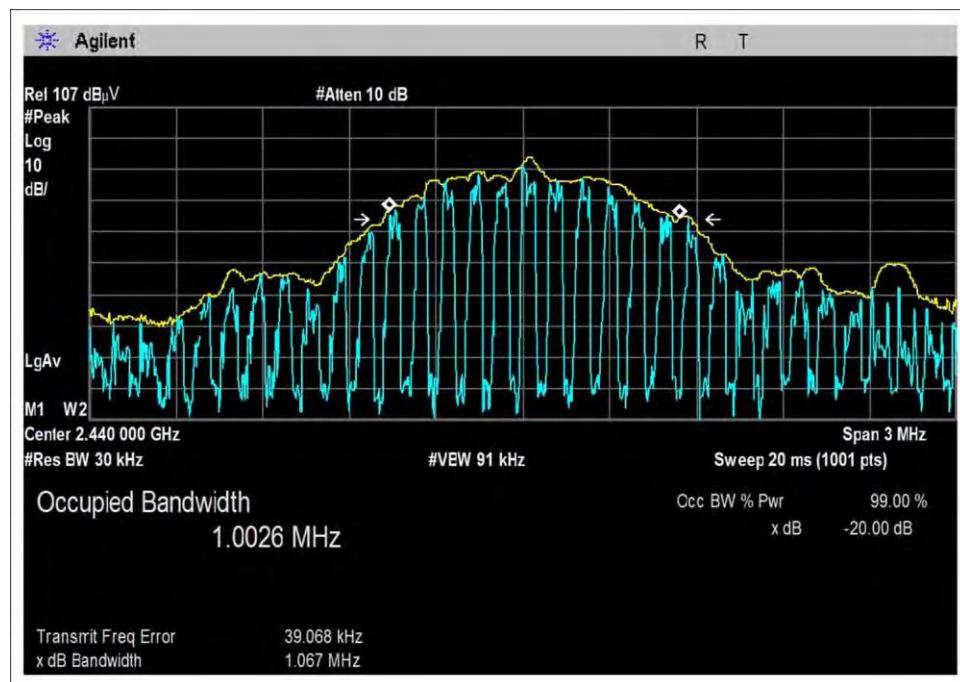
Test Data Summary

Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
2402	1	GFSK	1064	None	NA
2440	1	GFSK	1067	None	NA
2480	1	GFSK	1073	None	NA

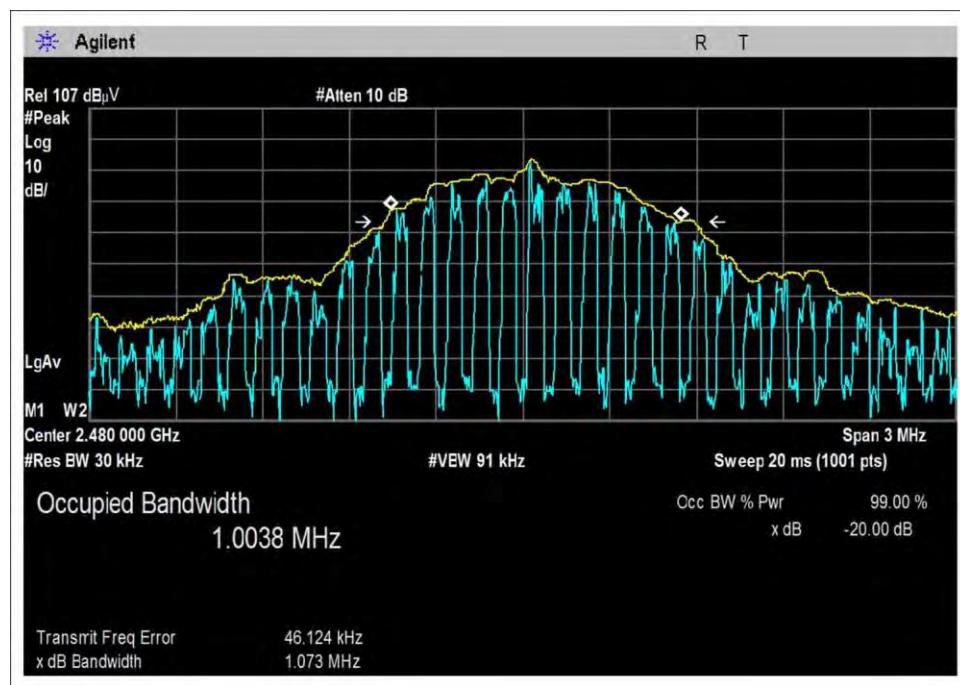
Plots



Low Channel



Middle Channel



High Channel

Test Setup Photo



11.02.2016 08:49

15.249(a) Field Strength of Fundamental

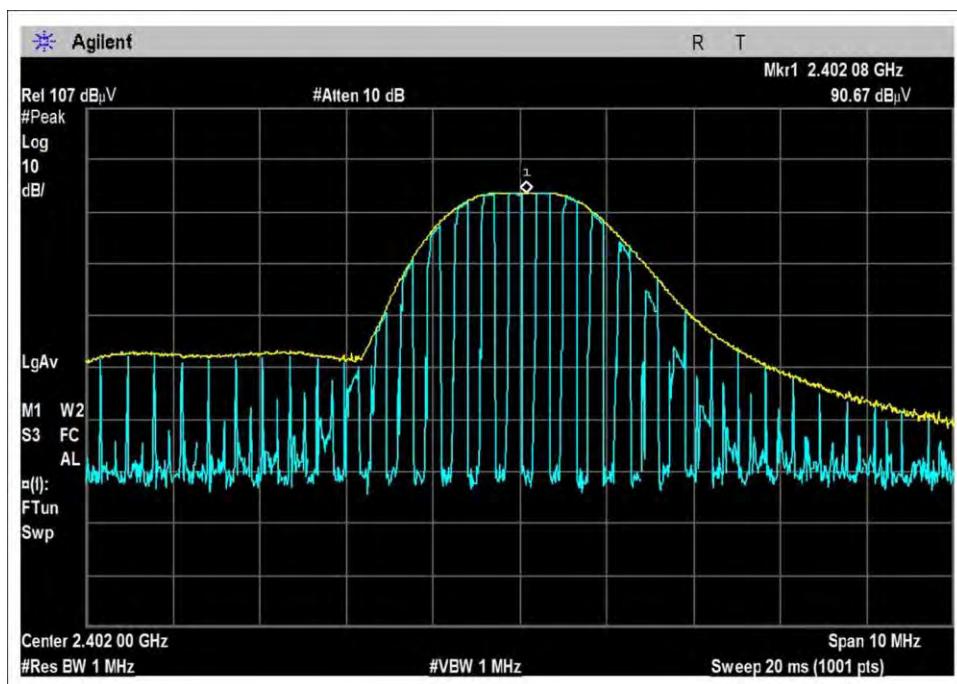
Test Data Summary - Voltage Variations

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

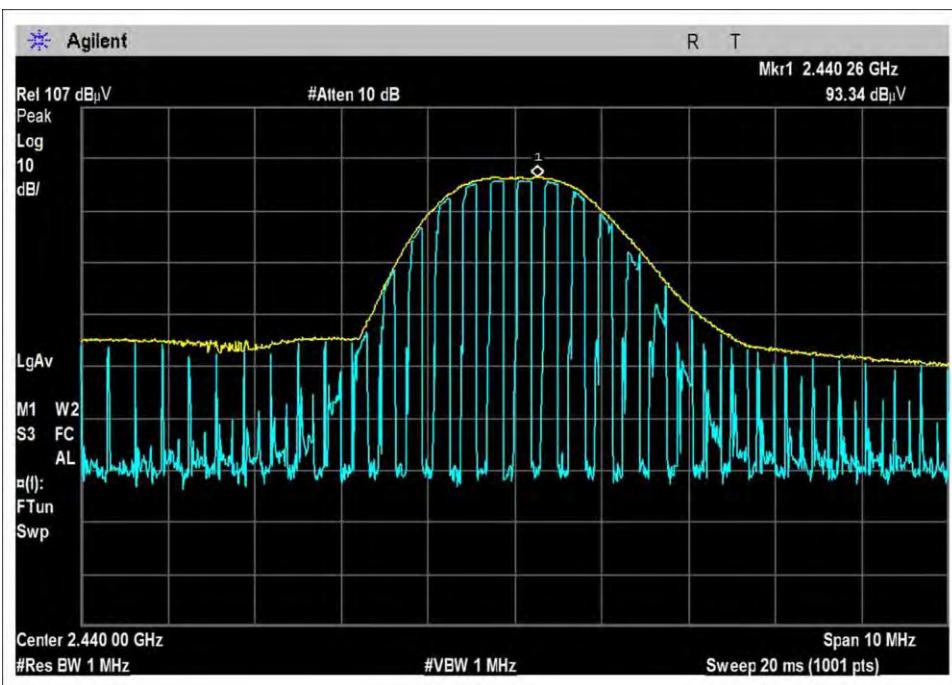
Test Data Summary – Radiated Field Strength Measurement

Frequency (MHz)	Modulation	Ant. Type	Measured (dB _µ V/m @ 3m)	Limit (dB _µ V/m @ 3m)	Results
2402	GFSK	Internal Trace	87.6	≤94	Pass
2440	GFSK	Internal Trace	90.3	≤94	Pass
2480	GFSK	Internal Trace	88.7	≤94	Pass

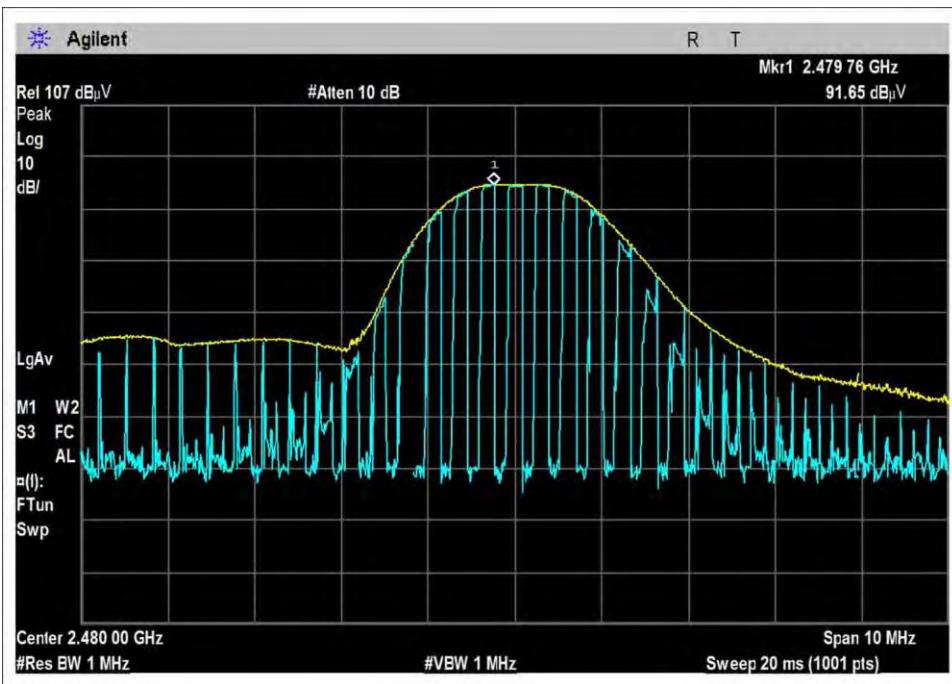
Plots



Low Channel



Middle Channel



High Channel

Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA. 98021 • 1-800-500-4EMC
 Customer: **Hestan**
 Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
 Work Order #: **99206** Date: 11/2/2016
 Test Type: **Maximized Emissions** Time: 10:55:41
 Tested By: Michael Atkinson Sequence#: 1
 Software: EMITest 5.03.02

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Frequency Range: 2402-2480MHz
 Frequency tested: 2402, 2440, 2480MHz
 Firmware power setting: Max Power
 EUT Firmware: DTM 1.0 / S130
 Protocol / Modulation: GFSK

Antenna type: Integral Trace

Antenna Gain: 0.0 dBi.

Duty Cycle: 100%

Test Mode: Continuously transmitting with modulation at max data rate.

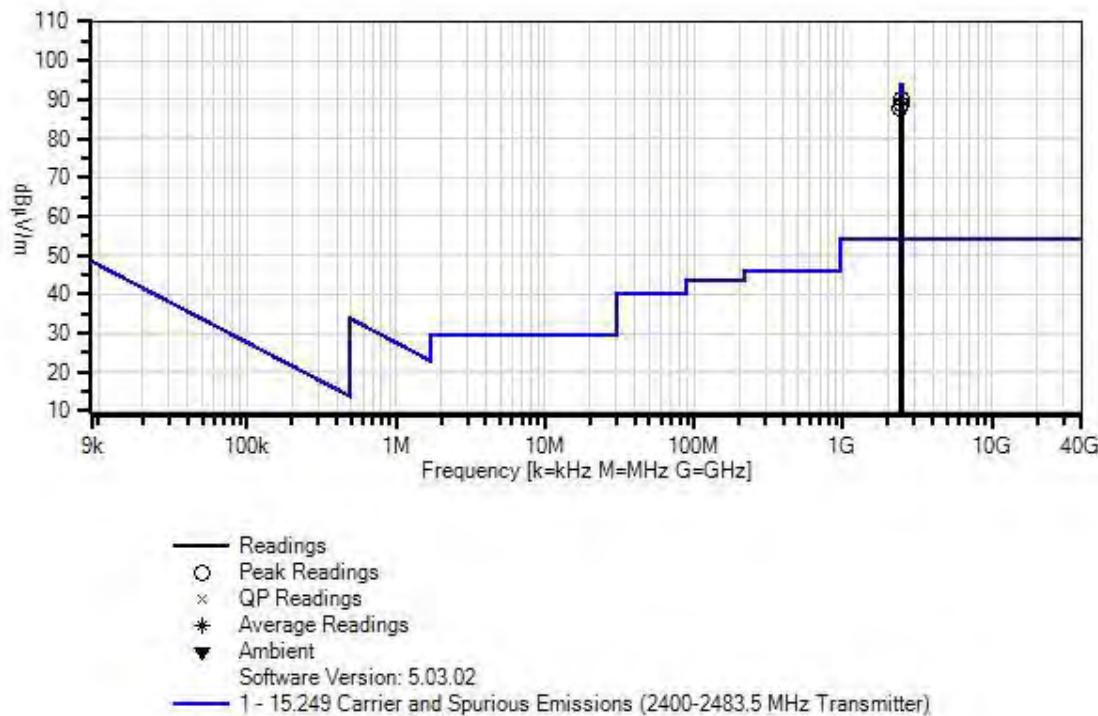
Test Setup: The EUT is sitting on foam table transmitting. X, Y, Z EUT axes investigated, both antenna polarities investigated, only worst case data reported. EUT is battery powered with fresh battery installed.

Modifications Added: None

Test Method ANSI C63.10 (2013)

Temperature: 22°C

Relative Humidity: 40%

Hestan WO#: 99206 Sequence#: 1 Date: 11/2/2016
 15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter) Test Distance: 3 Meters H+V

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02871	Spectrum Analyzer	E4440A	8/25/2015	8/25/2017
T1	ANP06540	Cable	Heliax	10/29/2015	10/29/2017
T2	ANP05305	Cable	ETSI-50T	2/15/2016	2/15/2018
T3	AN03540	Preamp	83017A	4/30/2015	4/30/2017
T4	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	8/12/2015	8/12/2017
T5	ANP06935	Cable	32026-29801-29801-18	3/11/2016	3/11/2018

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	2440.260M	93.3	+0.6	+2.9	-34.6	+27.7	+0.0	90.3	94.0	-3.7	H+V
			+0.4								
2	2479.760M	91.6	+0.6	+2.9	-34.5	+27.7	+0.0	88.7	94.0	-5.3	H+V
			+0.4								
3	2402.080M	90.7	+0.6	+2.8	-34.6	+27.7	+0.0	87.6	94.0	-6.4	H+V
			+0.4								

Test Setup Photos



X Axis



Y Axis



Z Axis

15.249(a) Radiated Emissions

Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA. 98021 • 1-800-500-4EMC
 Customer: **Hestan**
 Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)**
 Work Order #: **99206** Date: 11/2/2016
 Test Type: **Maximized Emissions** Time: 16:42:07
 Tested By: Michael Atkinson Sequence#: 1
 Software: EMITest 5.03.02

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Frequency Range: 0.09-25GHz
 Frequency tested: 2402, 2440, 2480MHz
 Firmware power setting: Max Power
 EUT Firmware: DTM 1.0 / S130
 Protocol / Modulation: GFSK

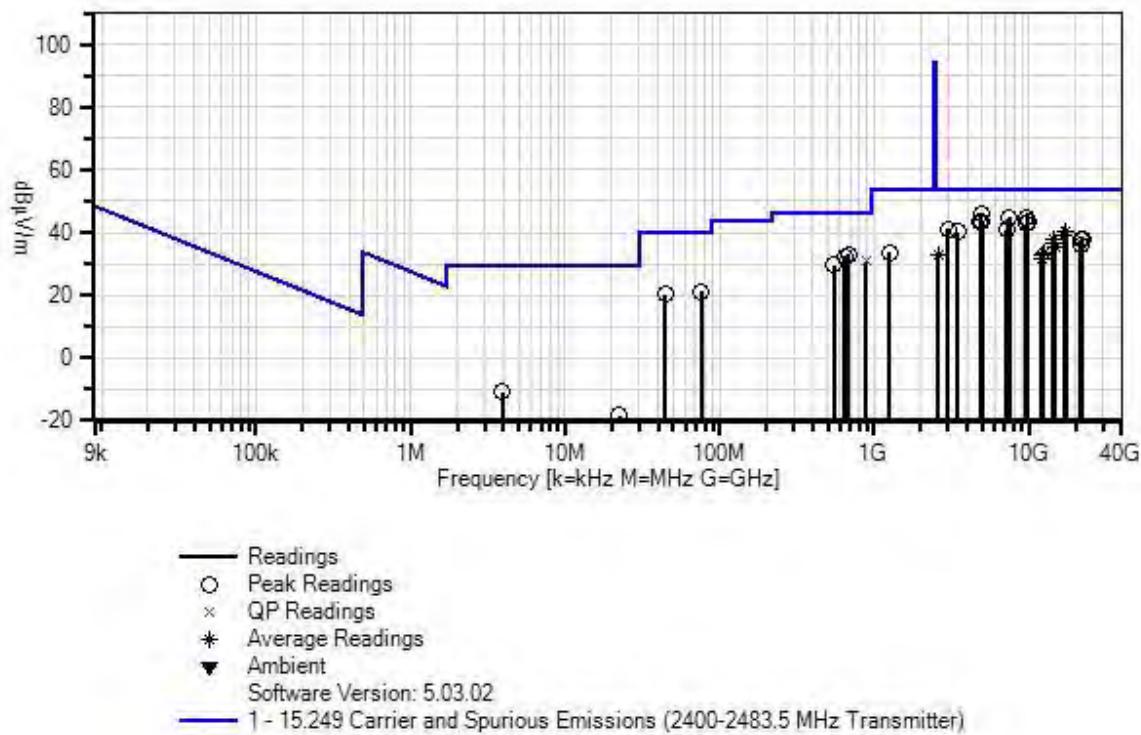
Antenna type: Integral Trace
 Antenna Gain: 0.0 dBi.

Duty Cycle: 100%

Test Mode: Continuously transmitting with modulation at max data rate.
 Test Setup: EUT is sitting on foam table transmitting. X, Y, Z EUT axes investigated, 3 antenna polarities investigated below 30MHz, horizontal and vertical antenna polarities investigated above 30MHz, only worst case data reported. EUT is battery operated with fresh battery installed.
 Modifications Added: None

Test Method: ANSI C63.10 (2013)
 Temperature: 22°C
 Relative Humidity: 40%

Hestan WO#: 99206 Sequence#: 1 Date: 11/2/2016
15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter) Test Distance: 3 Meters H+V



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02871	Spectrum Analyzer	E4440A	8/25/2015	8/25/2017
T2	ANP06540	Cable	Heliax	10/29/2015	10/29/2017
T3	ANP05305	Cable	ETSI-50T	2/15/2016	2/15/2018
T4	AN03540	Preamp	83017A	4/30/2015	4/30/2017
T5	AN01467	Horn Antenna- ANSI C63.5 Calibration	3115	8/12/2015	8/12/2017
T6	ANP06935	Cable	32026-29801- 29801-18	3/11/2016	3/11/2018
T7	ANP06678	Cable	32026-29801- 29801-144	9/19/2016	9/19/2018
T8	AN02742	Active Horn Antenna	AMFW-5F- 18002650-20- 10P	1/14/2015	1/14/2017
T9	ANP05963	Cable	RG-214	2/15/2016	2/15/2018
T10	ANP05360	Cable	RG214	12/1/2014	12/1/2016
T11	AN02307	Preamp	8447D	2/15/2016	2/15/2018
T12	AN01991	Biconilog Antenna	CBL6111C	3/11/2016	3/11/2018
T13	ANP05657	Attenuator	PE7004-6	12/22/2015	12/22/2017
T14	AN00052	Loop Antenna	6502	4/8/2016	4/8/2018

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

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6	T7	T8					
			T9	T10	T11	T12					
			T13	T14							
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	4879.700M	41.4	+0.0	+0.9	+4.4	-34.2	+0.0	45.7	54.0	-8.3	H+V
			+32.7	+0.5	+0.0	+0.0					Mid
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
2	7440.300M	36.2	+0.0	+1.3	+4.8	-34.7	+0.0	44.8	54.0	-9.2	H+V
			+36.6	+0.6	+0.0	+0.0					High
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
3	9759.700M	34.4	+0.0	+1.4	+6.1	-35.1	+0.0	44.8	54.0	-9.2	H+V
			+37.3	+0.7	+0.0	+0.0					Mid
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
4	7319.700M	36.4	+0.0	+1.2	+4.7	-34.6	+0.0	44.4	54.0	-9.6	H+V
			+36.1	+0.6	+0.0	+0.0					Mid
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
5	4804.000M	39.4	+0.0	+0.9	+4.3	-34.2	+0.0	43.6	54.0	-10.4	H+V
			+32.7	+0.5	+0.0	+0.0					Low
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					

6	4960.300M	39.1	+0.0	+0.9	+4.4	-34.2	+0.0	43.5	54.0	-10.5	H+V
			+32.8	+0.5	+0.0	+0.0				High	
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
7	9920.300M	33.2	+0.0	+1.3	+6.1	-35.2	+0.0	43.4	54.0	-10.6	H+V
			+37.2	+0.8	+0.0	+0.0				High	
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
8	9608.000M	31.9	+0.0	+1.5	+6.1	-35.0	+0.0	42.7	54.0	-11.3	H+V
			+37.4	+0.8	+0.0	+0.0				Low	
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
9	3006.000M	41.4	+0.0	+0.7	+3.2	-34.4	+0.0	41.1	54.0	-12.9	H+V
			+29.8	+0.4	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
10	678.000M	29.8	+0.0	+0.3	+0.0	+0.0	+0.0	32.9	46.0	-13.1	H+V
			+0.0	+0.0	+0.0	+0.0					
			+2.1	+1.7	-28.0	+21.0					
			+6.0	+0.0							
11	7206.000M	33.3	+0.0	+1.2	+4.5	-34.5	+0.0	40.8	54.0	-13.2	H+V
			+35.7	+0.6	+0.0	+0.0				Low	
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
12	17360.300	21.0	+0.0	+2.0	+8.8	-34.5	+0.0	40.6	54.0	-13.4	H+V
	M		+42.3	+1.0	+0.0	+0.0					
	Ave		+0.0	+0.0	+0.0	+0.0				High	
			+0.0	+0.0	+0.0	+0.0					
^	17360.300	32.1	+0.0	+2.0	+8.8	-34.5	+0.0	51.7	54.0	-2.3	H+V
	M		+42.3	+1.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0				High	
			+0.0	+0.0	+0.0	+0.0					
14	17079.700	21.5	+0.0	+2.1	+8.6	-34.4	+0.0	40.5	54.0	-13.5	H+V
	M		+41.7	+1.0	+0.0	+0.0					
	Ave		+0.0	+0.0	+0.0	+0.0				Mid	
			+0.0	+0.0	+0.0	+0.0					
^	17079.700	32.4	+0.0	+2.1	+8.6	-34.4	+0.0	51.4	54.0	-2.6	H+V
	M		+41.7	+1.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0				Mid	
			+0.0	+0.0	+0.0	+0.0					
16	642.100M	29.7	+0.0	+0.3	+0.0	+0.0	+0.0	32.3	46.0	-13.7	H+V
			+0.0	+0.0	+0.0	+0.0					
			+2.1	+1.7	-28.1	+20.6					
			+6.0	+0.0							
17	3482.000M	40.4	+0.0	+0.8	+3.5	-34.2	+0.0	40.3	54.0	-13.7	H+V
			+29.4	+0.4	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
18	16814.000	21.2	+0.0	+2.1	+8.6	-34.5	+0.0	39.3	54.0	-14.7	H+V
	M		+40.9	+1.0	+0.0	+0.0					
	Ave		+0.0	+0.0	+0.0	+0.0				Low	
			+0.0	+0.0	+0.0	+0.0					

^	16814.000	30.6	+0.0	+2.1	+8.6	-34.5	+0.0	48.7	54.0	-5.3	H+V
	M		+40.9	+1.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					Low
			+0.0	+0.0							
20	887.500M	22.7	+0.0	+0.3	+0.0	+0.0	+0.0	30.8	46.0	-15.2	H+V
	QP		+0.0	+0.0	+0.0	+0.0					
			+2.4	+2.0	-27.4	+24.8					
			+6.0	+0.0							
^	887.500M	28.6	+0.0	+0.3	+0.0	+0.0	+0.0	36.7	46.0	-9.3	H+V
			+0.0	+0.0	+0.0	+0.0					
			+2.4	+2.0	-27.4	+24.8					
			+6.0	+0.0							
22	22321.000	46.4	+0.0	+0.0	+0.0	+0.0	+0.0	38.1	54.0	-15.9	H+V
	M		+0.0	+0.0	+8.4	-16.7					
			+0.0	+0.0	+0.0	+0.0					High
			+0.0	+0.0							
23	21652.700	45.4	+0.0	+0.0	+0.0	+0.0	+0.0	37.7	54.0	-16.3	H+V
	M		+0.0	+0.0	+8.2	-15.9					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
24	549.000M	29.0	+0.0	+0.3	+0.0	+0.0	+0.0	29.6	46.0	-16.4	H+V
			+0.0	+0.0	+0.0	+0.0					
			+2.0	+1.5	-28.2	+19.0					
			+6.0	+0.0							
25	14412.000	21.3	+0.0	+1.8	+7.7	-35.0	+0.0	37.5	54.0	-16.5	H+V
	M		+40.7	+1.0	+0.0	+0.0					
	Ave		+0.0	+0.0	+0.0	+0.0					Low
			+0.0	+0.0							
^	14412.000	32.1	+0.0	+1.8	+7.7	-35.0	+0.0	48.3	54.0	-5.7	H+V
	M		+40.7	+1.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					Low
			+0.0	+0.0							
27	14639.700	20.9	+0.0	+1.8	+7.8	-34.9	+0.0	36.4	54.0	-17.6	H+V
	M		+39.9	+0.9	+0.0	+0.0					
	Ave		+0.0	+0.0	+0.0	+0.0					Mid
			+0.0	+0.0							
^	14639.700	31.6	+0.0	+1.8	+7.8	-34.9	+0.0	47.1	54.0	-6.9	H+V
	M		+39.9	+0.9	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					Mid
			+0.0	+0.0							
29	21954.200	43.9	+0.0	+0.0	+0.0	+0.0	+0.0	35.8	54.0	-18.2	H+V
	M		+0.0	+0.0	+8.3	-16.4					
			+0.0	+0.0	+0.0	+0.0					Mid
			+0.0	+0.0							
30	14880.300	20.9	+0.0	+1.8	+7.7	-34.9	+0.0	35.4	54.0	-18.6	H+V
	M		+39.0	+0.9	+0.0	+0.0					
	Ave		+0.0	+0.0	+0.0	+0.0					High
			+0.0	+0.0							
^	14880.300	32.5	+0.0	+1.8	+7.7	-34.9	+0.0	47.0	54.0	-7.0	H+V
	M		+39.0	+0.9	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					High
			+0.0	+0.0							

32	75.840M	34.5	+0.0	+0.1	+0.0	+0.0	+0.0	21.1	40.0	-18.9	H+V
			+0.0	+0.0	+0.0	+0.0					
			+0.8	+0.5	-27.8	+7.0					
			+6.0	+0.0							
33	44.160M	29.8	+0.0	+0.1	+0.0	+0.0	+0.0	20.2	40.0	-19.8	H+V
			+0.0	+0.0	+0.0	+0.0					
			+0.5	+0.3	-27.9	+11.4					
			+6.0	+0.0							
34	12400.300	20.0	+0.0	+1.6	+6.4	-34.7	+0.0	33.7	54.0	-20.3	H+V
	M		+39.5	+0.9	+0.0	+0.0					
	Ave		+0.0	+0.0	+0.0	+0.0				High	
			+0.0	+0.0							
^	12400.300	31.7	+0.0	+1.6	+6.4	-34.7	+0.0	45.4	54.0	-8.6	H+V
	M		+39.5	+0.9	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0				High	
			+0.0	+0.0							
36	1252.000M	42.9	+0.0	+0.4	+2.1	-36.3	+0.0	33.6	54.0	-20.4	H+V
			+24.2	+0.3	+0.0	+0.0				High	
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
37	12199.700	19.4	+0.0	+1.5	+6.6	-34.8	+0.0	32.9	54.0	-21.1	H+V
	M		+39.4	+0.8	+0.0	+0.0					
	Ave		+0.0	+0.0	+0.0	+0.0				Mid	
			+0.0	+0.0							
^	12199.700	32.0	+0.0	+1.5	+6.6	-34.8	+0.0	45.5	54.0	-8.5	H+V
	M		+39.4	+0.8	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0				Mid	
			+0.0	+0.0							
39	2579.373M	35.4	+0.0	+0.6	+2.9	-34.5	+0.0	32.9	54.0	-21.1	H+V
	Ave		+28.1	+0.4	+0.0	+0.0				High	
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							
^	2579.373M	62.6	+0.0	+0.6	+2.9	-34.5	+0.0	60.1	54.0	+6.1	H+V
			+28.1	+0.4	+0.0	+0.0				High	
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0							

41	12010.000	18.9	+0.0	+1.5	+6.4	-35.0	+0.0	31.8	54.0	-22.2	H+V
	M		+39.2	+0.8	+0.0	+0.0					
	Ave		+0.0	+0.0	+0.0	+0.0					Low
			+0.0	+0.0	+0.0						
^	12010.000	29.5	+0.0	+1.5	+6.4	-35.0	+0.0	42.4	54.0	-11.6	H+V
	M		+39.2	+0.8	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					Low
			+0.0	+0.0	+0.0						
43	3.952M	19.5	+0.0	+0.0	+0.1	+0.0	-40.0	-11.0	29.5	-40.5	Para+
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+9.4							
44	22.566M	14.0	+0.0	+0.0	+0.3	+0.0	-40.0	-18.2	29.5	-47.7	Para+
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+7.5							
45	22.561k	43.0	+0.0	+0.0	+0.0	+0.0	-80.0	-23.7	40.5	-64.2	Para+
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+0.0	+0.0	+0.0					
			+0.0	+13.3							

Band Edge

Band Edge Summary

Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
2390.0 (PEAK)	GFSK	Internal Trace	49.0	<74	Pass
2400.0 (PEAK)	GFSK	Internal Trace	53.7	<74	Pass
2483.5 (PEAK)	GFSK	Internal Trace	52.6	<74	Pass
2390.0 (AVG)	GFSK	Internal Trace	25.1	<54	Pass
2400.0 (AVG)	GFSK	Internal Trace	31.0	<54	Pass
2483.5 (AVG)	GFSK	Internal Trace	27.9	<54	Pass

Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA. 98021 • 1-800-500-4EMC
 Customer: **Hestan**
 Specification: **15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter) (AVG)**
 Work Order #: **99206** Date: 11/2/2016
 Test Type: **Maximized Emissions** Time: 12:36:01
 Tested By: Michael Atkinson Sequence#: 2
 Software: EMITest 5.03.02

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

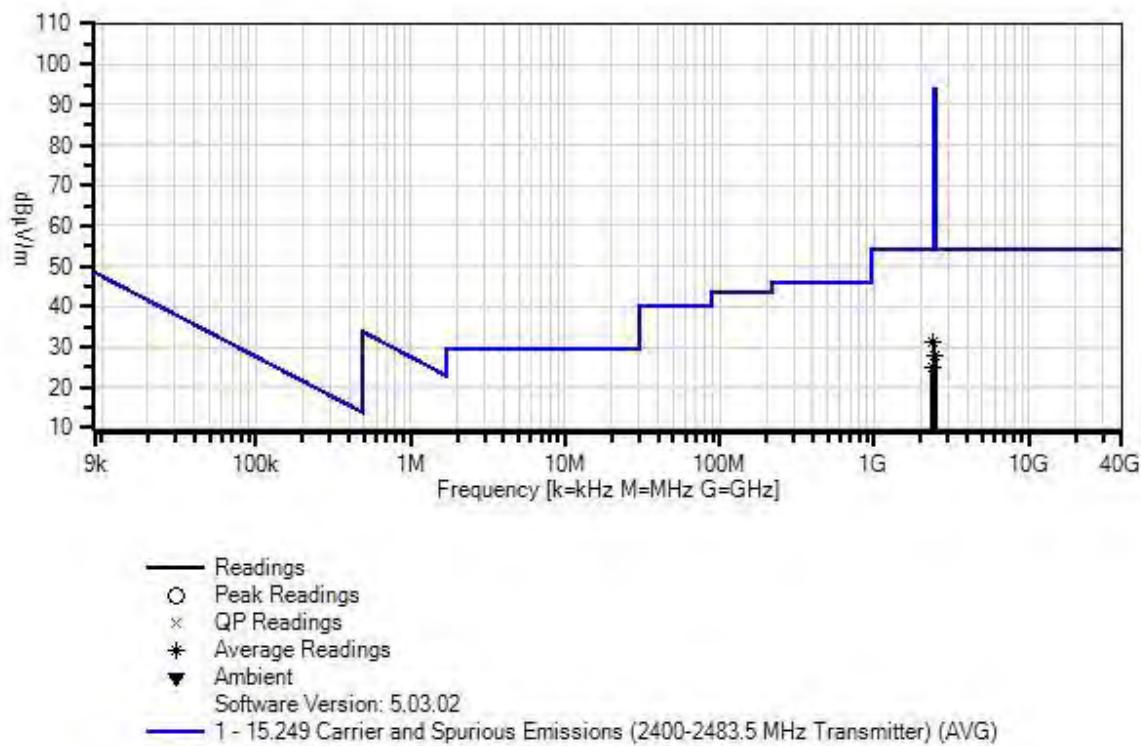
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Frequency Range: 2402-2480MHz Frequency tested: 2402, 2480MHz Firmware power setting: Max Power EUT Firmware: DTM 1.0 / S130 Protocol / Modulation: GFSK Antenna type: Integral Trace Antenna Gain: 0.0 dBi. Duty Cycle: 100% Test Mode: Continuously transmitting with modulation at max data rate. Test Setup: The EUT is sitting on foam table transmitting. X, Y, Z EUT axes investigated, both antenna polarities investigated, only worst case data reported. EUT is battery operated with fresh battery installed. Modifications Added: None

Hestan WO#: 99206 Sequence#: 2 Date: 11/2/2016
15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter) (AVG) Test Distance: 3 Meters H+V



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02871	Spectrum Analyzer	E4440A	8/25/2015	8/25/2017
T2	ANP06540	Cable	Heliax	10/29/2015	10/29/2017
T3	ANP05305	Cable	ETSI-50T	2/15/2016	2/15/2018
T4	AN03540	Preamp	83017A	4/30/2015	4/30/2017
T5	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	8/12/2015	8/12/2017
T6	ANP06935	Cable	32026-29801- 29801-18	3/11/2016	3/11/2018

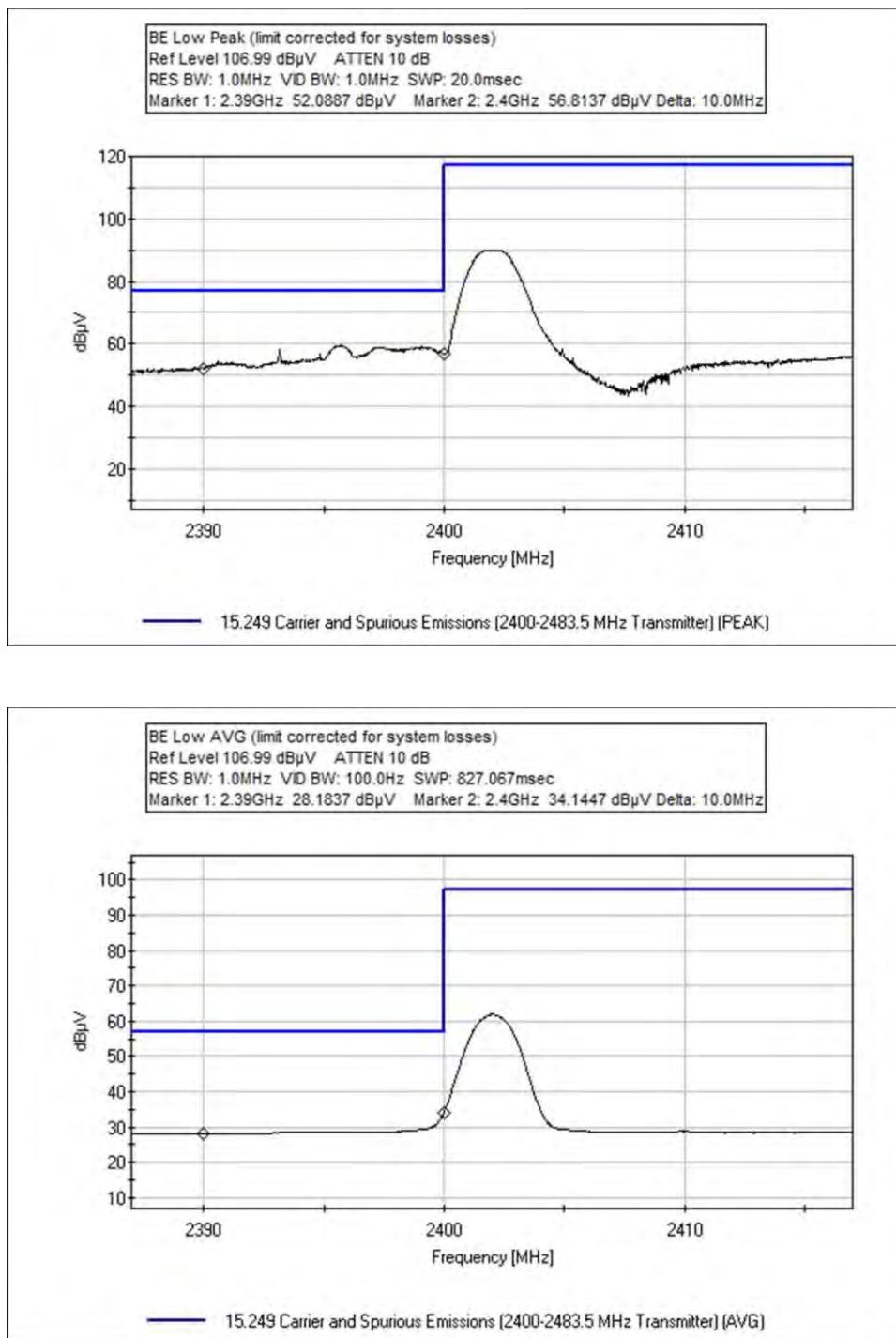
Measurement Data:

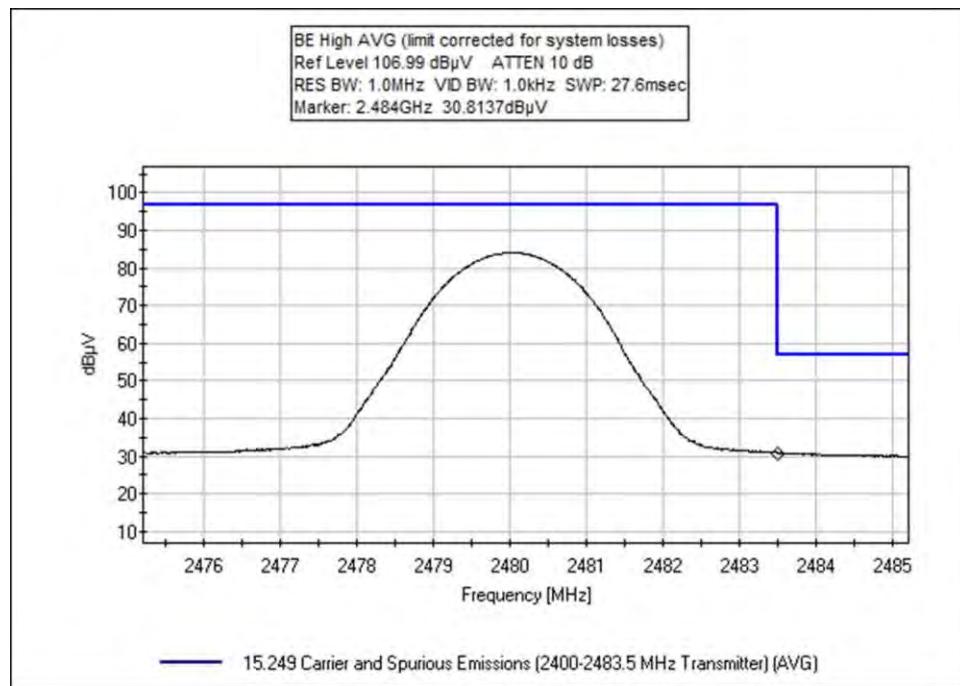
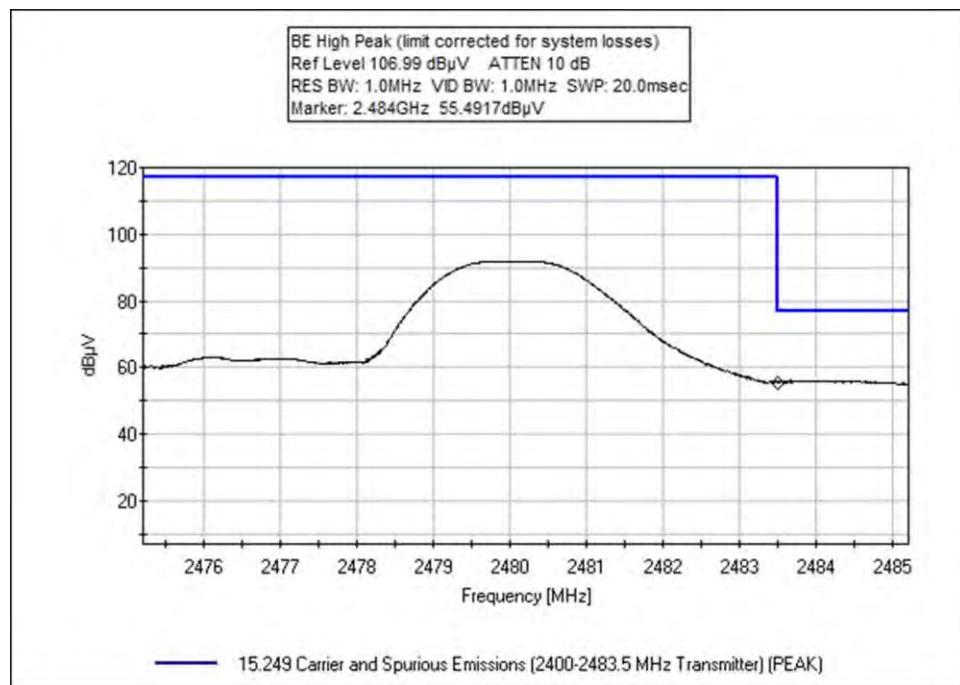
Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
			T5	T6			Table	dB μ V/m	dB μ V/m		
			MHz	dB μ V	dB	dB					Ant
1	2400.000M	34.1	+0.0	+0.6	+2.8	-34.6	+0.0	31.0	54.0	-23.0	H+V
	Ave		+27.7	+0.4							Low AVG
^	2400.000M	56.8	+0.0	+0.6	+2.8	-34.6	+0.0	53.7	74.0	-20.3	H+V
			+27.7	+0.4							Low Peak
3	2483.500M	30.8	+0.0	+0.6	+2.9	-34.5	+0.0	27.9	54.0	-26.1	H+V
	Ave		+27.7	+0.4							High AVG
^	2483.500M	55.5	+0.0	+0.6	+2.9	-34.5	+0.0	52.6	74.0	-21.4	H+V
			+27.7	+0.4							High Peak
5	2390.000M	28.2	+0.0	+0.6	+2.8	-34.6	+0.0	25.1	54.0	-28.9	H+V
	Ave		+27.7	+0.4							Low AVG
^	2390.000M	52.1	+0.0	+0.6	+2.8	-34.6	+0.0	49.0	74.0	-25.0	H+V
			+27.7	+0.4							Low Peak

Band Edge Plots





Test Setup Photos



9kHz – 1GHz



1 – 25GHz



X Axis



Y Axis



Z Axis

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

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

Reported uncertainties 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 $\text{dB}\mu\text{V}/\text{m}$, the spectrum analyzer reading in $\text{dB}\mu\text{V}$ 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	($\text{dB}\mu\text{V}$)
+ Antenna Factor	(dB/m)
+ Cable Loss	(dB)
- Distance Correction	(dB)
- Preamplifier Gain	(dB)
= Corrected Reading	($\text{dB}\mu\text{V}/\text{m}$)

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.