

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.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

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Vallejo, CA 94590

REPORT PREPARED BY:

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

REPRESENTATIVE: Brenden Duncombe

Project Number: 99206

DATE OF EQUIPMENT RECEIPT:

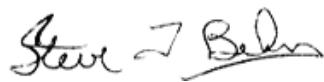
November 2, 2016

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)

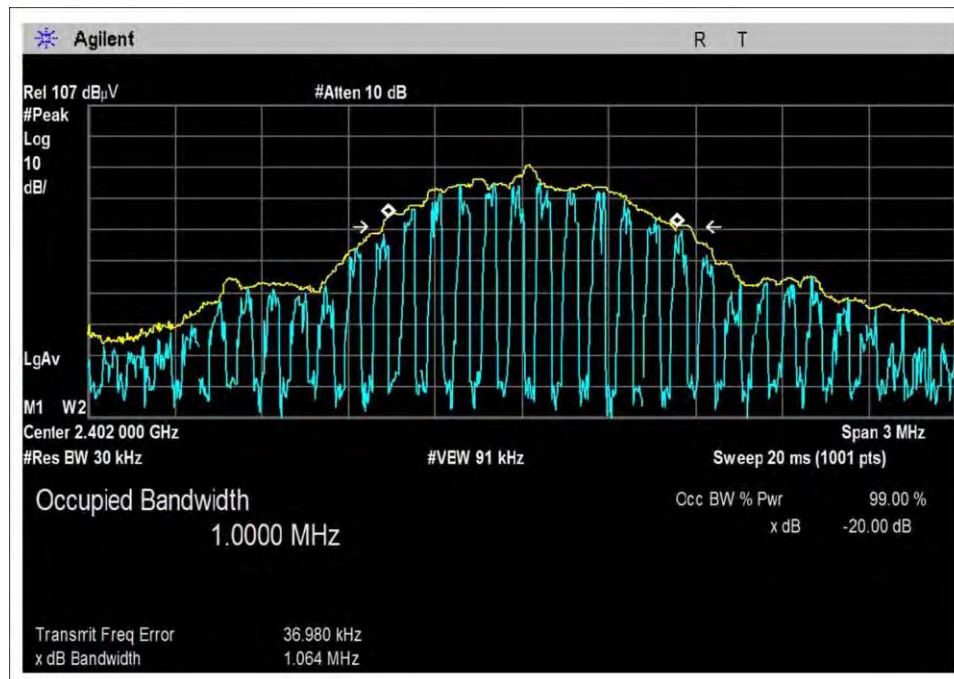
| Test Setup/Conditions | | | |
|-----------------------|---|----------------|-------------|
| Test Location: | Canyon Park C3 | Test Engineer: | M. Atkinson |
| Test Method: | ANSI C63.10 (2013) | Test Date(s): | 11/2/2016 |
| Configuration: | 1 | | |
| Test Conditions: | <p>Frequency Range: 2402-2480MHz Frequency tested: 2402, 2440, 2480MHz Firmware power setting: Max Power EUT Firmware: DTM 1.0 / S130 Protocol / Modulation: GFSK</p> <p>Antenna type: Integral Trace Antenna Gain: 0.0 dBi</p> <p>Duty Cycle: 100%</p> <p>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</p> | | |

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

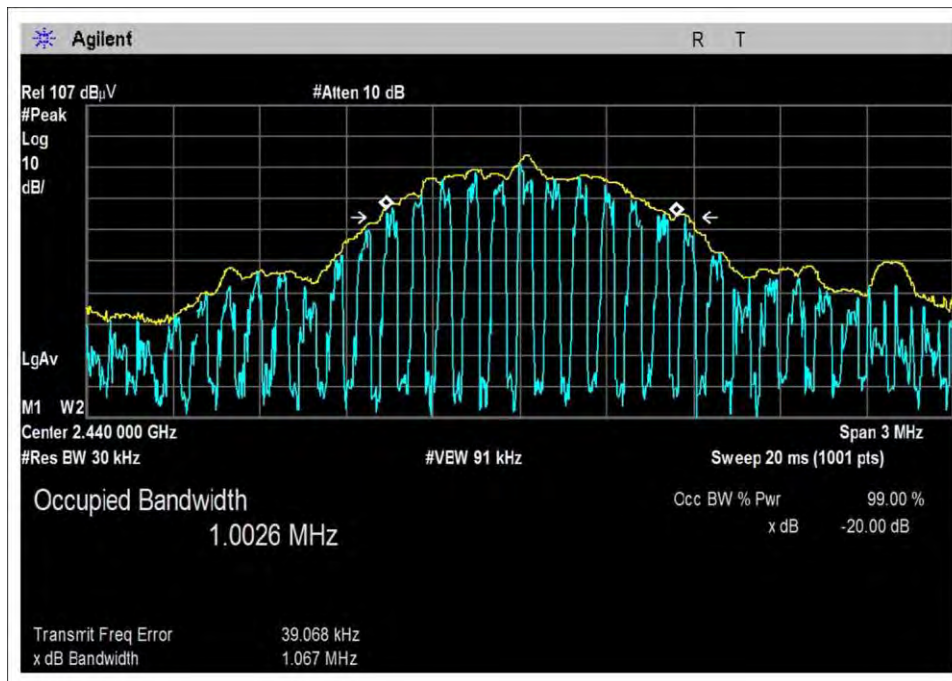
| Test Equipment | | | | | |
|----------------|-------------------|--------------|----------------------|------------|------------|
| Asset# | Description | Manufacturer | Model | Cal Date | Cal Due |
| 02871 | Spectrum Analyzer | Agilent | E4440A | 8/25/2015 | 8/25/2017 |
| P06540 | Cable | Andrews | Heliac | 10/29/2015 | 10/29/2017 |
| P05305 | Cable | Andrews | ETSI-50T | 2/15/2016 | 2/15/2018 |
| 03540 | Preamplifier | 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 |

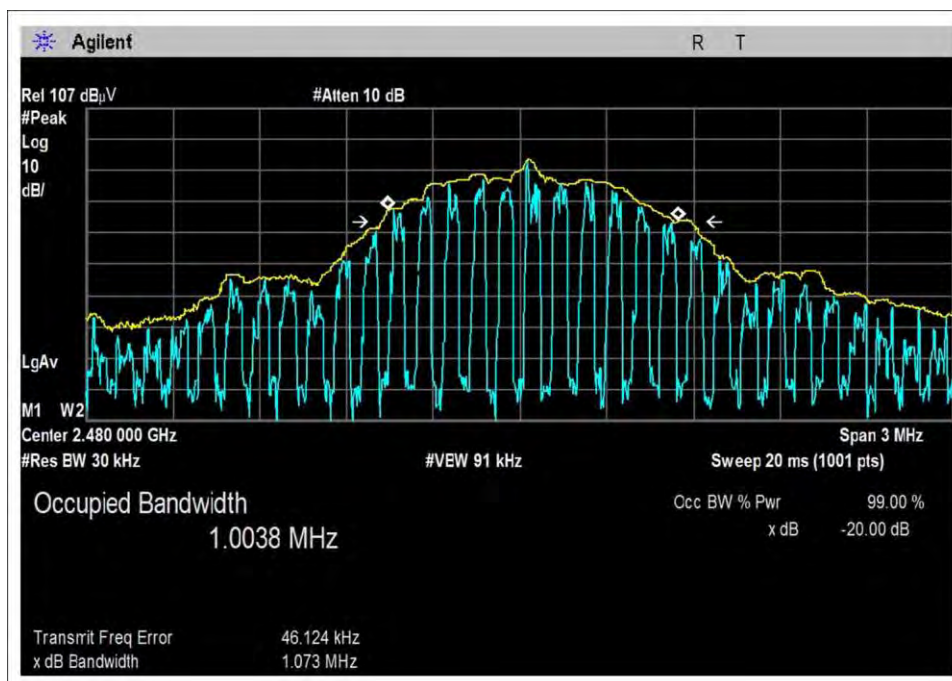
Plots



Low Channel



Middle Channel



High Channel

Test Setup Photo



15.249(a) Field Strength of Fundamental

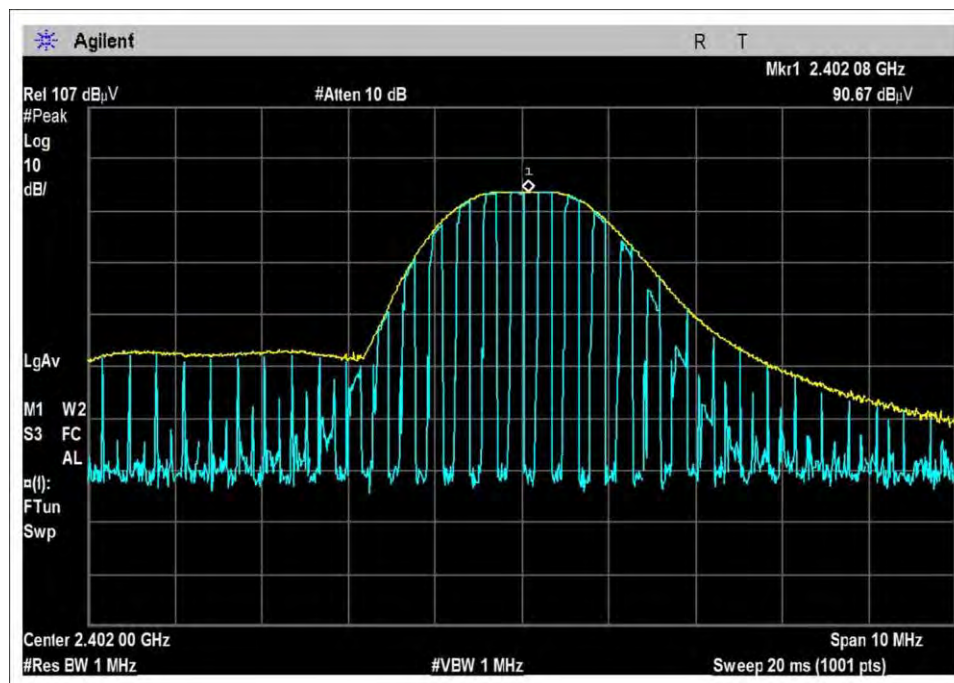
Test Data Summary - Voltage Variations

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

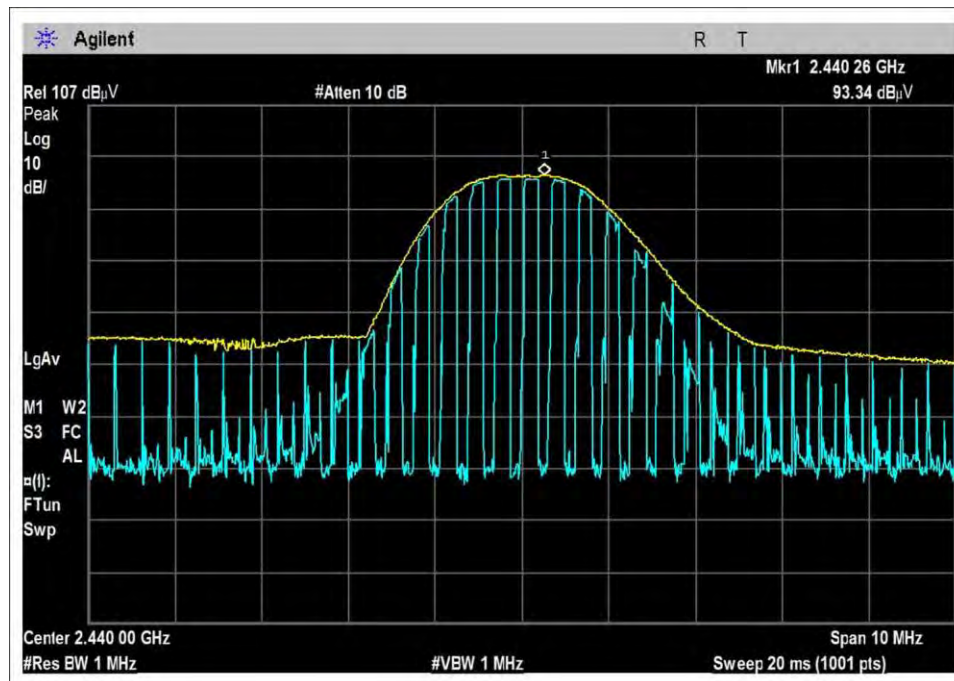
Test Data Summary – Radiated Field Strength Measurement

| Frequency (MHz) | Modulation | Ant. Type | Measured (dBuV/m @ 3m) | Limit (dBuV/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 |

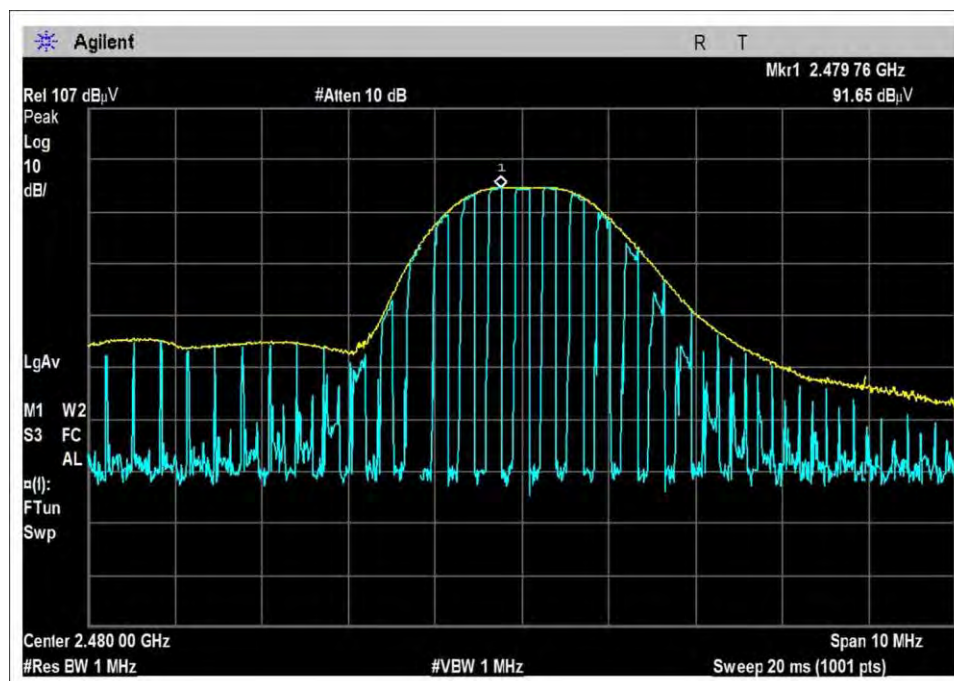
Plots



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 | | | |

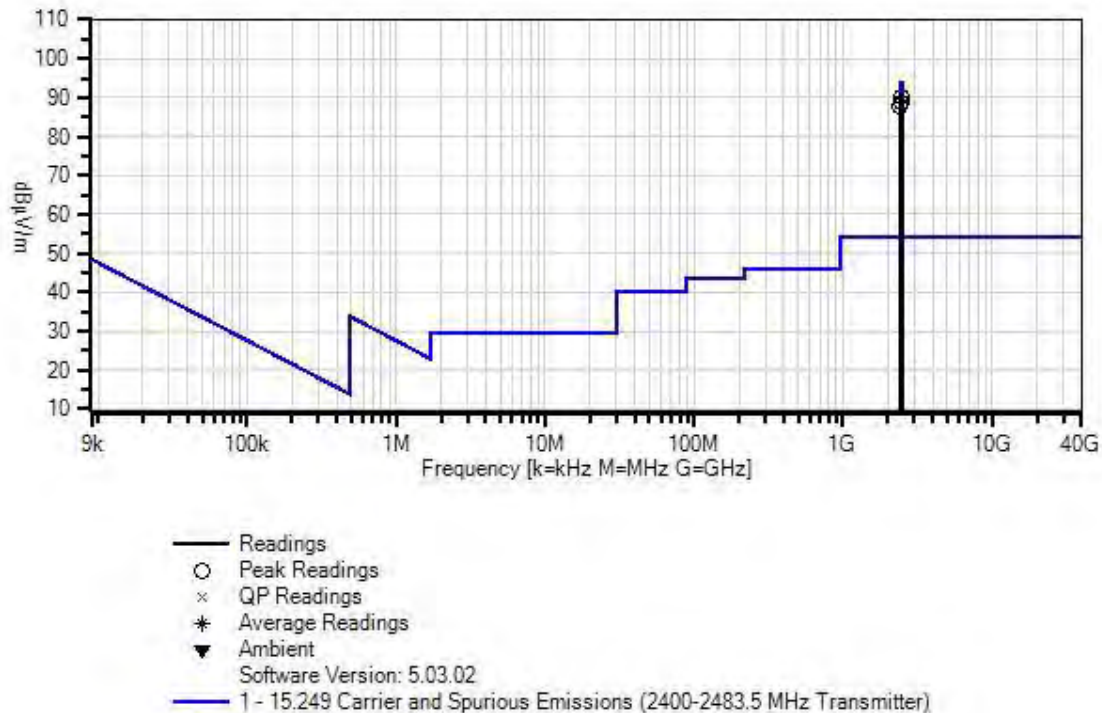
Support Equipment:

| 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 W/O#: 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 | Helix | 10/29/2015 | 10/29/2017 |
| T2 | ANP05305 | Cable | ETSI-50T | 2/15/2016 | 2/15/2018 |
| T3 | AN03540 | Preamplifier | 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 | dBμV | T5 | | | | | | | | |
| | | | dB | dB | dB | dB | Table | dBμV/m | dBμV/m | dB | Ant |
| 1 | 2440.260M | 93.3 | +0.6 +0.4 | +2.9 | -34.6 | +27.7 | +0.0 | 90.3 | 94.0 | -3.7 | H+V |
| 2 | 2479.760M | 91.6 | +0.6 +0.4 | +2.9 | -34.5 | +27.7 | +0.0 | 88.7 | 94.0 | -5.3 | H+V |
| 3 | 2402.080M | 90.7 | +0.6 +0.4 | +2.8 | -34.6 | +27.7 | +0.0 | 87.6 | 94.0 | -6.4 | H+V |

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

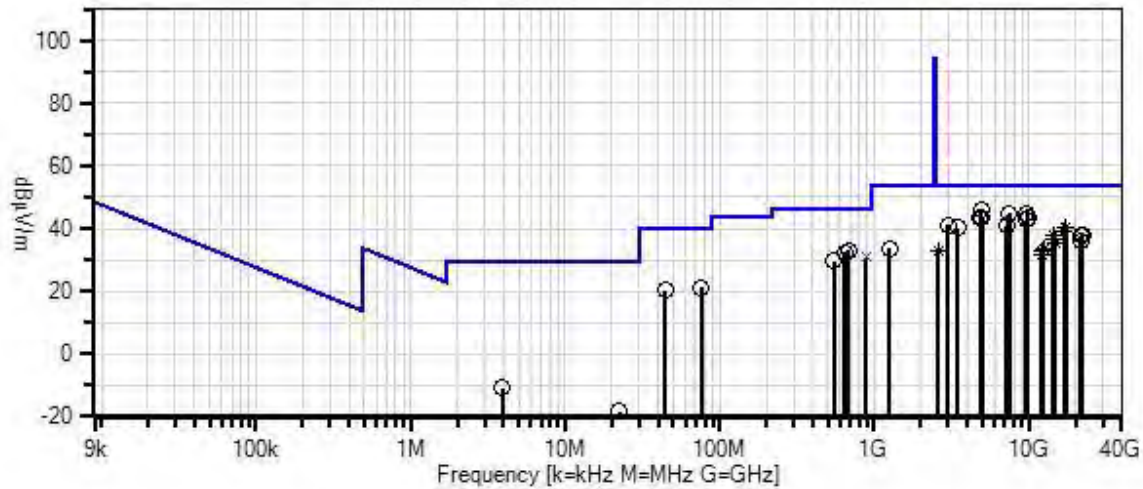
 Antenna type: Integral Trace
 Antenna Gain: 0.0 dBi.

 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%

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



- Readings
- Peak Readings
- × QP Readings
- * Average Readings
- ▼ Ambient
- Software Version: 5.03.02
- 1 - 15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter)

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 | Heliac | 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 T5 T9 T13 | T2 T6 T10 T14 | T3 T7 T11 | T4 T8 T12 | 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 | 4879.700M | 41.4 | +0.0 +32.7 +0.0 +0.0 | +0.9 +0.5 +0.0 +0.0 | +4.4 +0.0 +0.0 +0.0 | -34.2 +0.0 +0.0 +0.0 | +0.0 | 45.7 | 54.0 Mid | -8.3 | H+V |
| 2 | 7440.300M | 36.2 | +0.0 +36.6 +0.0 +0.0 | +1.3 +0.6 +0.0 +0.0 | +4.8 +0.0 +0.0 +0.0 | -34.7 +0.0 +0.0 +0.0 | +0.0 | 44.8 | 54.0 High | -9.2 | H+V |
| 3 | 9759.700M | 34.4 | +0.0 +37.3 +0.0 +0.0 | +1.4 +0.7 +0.0 +0.0 | +6.1 +0.0 +0.0 +0.0 | -35.1 +0.0 +0.0 +0.0 | +0.0 | 44.8 | 54.0 Mid | -9.2 | H+V |
| 4 | 7319.700M | 36.4 | +0.0 +36.1 +0.0 +0.0 | +1.2 +0.6 +0.0 +0.0 | +4.7 +0.0 +0.0 +0.0 | -34.6 +0.0 +0.0 +0.0 | +0.0 | 44.4 | 54.0 Mid | -9.6 | H+V |
| 5 | 4804.000M | 39.4 | +0.0 +32.7 +0.0 +0.0 | +0.9 +0.5 +0.0 +0.0 | +4.3 +0.0 +0.0 +0.0 | -34.2 +0.0 +0.0 +0.0 | +0.0 | 43.6 | 54.0 Low | -10.4 | H+V |

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

| | | | | | | | | | | | |
|----|-----------------------|------|-------|------|-------|-------|------|------|------|-------|-----|
| ^ | 16814.000 M | 30.6 | +0.0 | +2.1 | +8.6 | -34.5 | +0.0 | 48.7 | 54.0 | -5.3 | H+V |
| | | | +40.9 | +1.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | Low | | | | | | | | |
| 20 | 887.500M QP | 22.7 | +0.0 | +0.3 | +0.0 | +0.0 | +0.0 | 30.8 | 46.0 | -15.2 | H+V |
| | | | +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 M | 46.4 | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | 38.1 | 54.0 | -15.9 | H+V |
| | | | +0.0 | +0.0 | +8.4 | -16.7 | | | | | |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | High | | | | | | | | |
| 23 | 21652.700 M | 45.4 | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | 37.7 | 54.0 | -16.3 | H+V |
| | | | +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 M Ave | 21.3 | +0.0 | +1.8 | +7.7 | -35.0 | +0.0 | 37.5 | 54.0 | -16.5 | H+V |
| | | | +40.7 | +1.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | Low | | | | | | | | |
| ^ | 14412.000 M | 32.1 | +0.0 | +1.8 | +7.7 | -35.0 | +0.0 | 48.3 | 54.0 | -5.7 | H+V |
| | | | +40.7 | +1.0 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | Low | | | | | | | | |
| 27 | 14639.700 M Ave | 20.9 | +0.0 | +1.8 | +7.8 | -34.9 | +0.0 | 36.4 | 54.0 | -17.6 | H+V |
| | | | +39.9 | +0.9 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | Mid | | | | | | | | |
| ^ | 14639.700 M | 31.6 | +0.0 | +1.8 | +7.8 | -34.9 | +0.0 | 47.1 | 54.0 | -6.9 | H+V |
| | | | +39.9 | +0.9 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | Mid | | | | | | | | |
| 29 | 21954.200 M | 43.9 | +0.0 | +0.0 | +0.0 | +0.0 | +0.0 | 35.8 | 54.0 | -18.2 | H+V |
| | | | +0.0 | +0.0 | +8.3 | -16.4 | | | | | |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | Mid | | | | | | | | |
| 30 | 14880.300 M Ave | 20.9 | +0.0 | +1.8 | +7.7 | -34.9 | +0.0 | 35.4 | 54.0 | -18.6 | H+V |
| | | | +39.0 | +0.9 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | High | | | | | | | | |
| ^ | 14880.300 M | 32.5 | +0.0 | +1.8 | +7.7 | -34.9 | +0.0 | 47.0 | 54.0 | -7.0 | H+V |
| | | | +39.0 | +0.9 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | | | | |
| | | | High | | | | | | | | |

| | | | | | | | | | | | |
|----|-----------------------|------|-------|------|-------|-------|------|------|------|-------|-----|
| 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 M Ave | 20.0 | +0.0 | +1.6 | +6.4 | -34.7 | +0.0 | 33.7 | 54.0 | -20.3 | H+V |
| | | | +39.5 | +0.9 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | High | | | |
| | | | +0.0 | +0.0 | | | | | | | |
| ^ | 12400.300 M | 31.7 | +0.0 | +1.6 | +6.4 | -34.7 | +0.0 | 45.4 | 54.0 | -8.6 | H+V |
| | | | +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 M Ave | 19.4 | +0.0 | +1.5 | +6.6 | -34.8 | +0.0 | 32.9 | 54.0 | -21.1 | H+V |
| | | | +39.4 | +0.8 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | Mid | | | |
| | | | +0.0 | +0.0 | | | | | | | |
| ^ | 12199.700 M | 32.0 | +0.0 | +1.5 | +6.6 | -34.8 | +0.0 | 45.5 | 54.0 | -8.5 | H+V |
| | | | +39.4 | +0.8 | +0.0 | +0.0 | | | | | |
| | | | +0.0 | +0.0 | +0.0 | +0.0 | | Mid | | | |
| | | | +0.0 | +0.0 | | | | | | | |
| 39 | 2579.373M Ave | 35.4 | +0.0 | +0.6 | +2.9 | -34.5 | +0.0 | 32.9 | 54.0 | -21.1 | H+V |
| | | | +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 | | | | | | | |
| ^ | 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 | | | | | | | |
| 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 | | | |

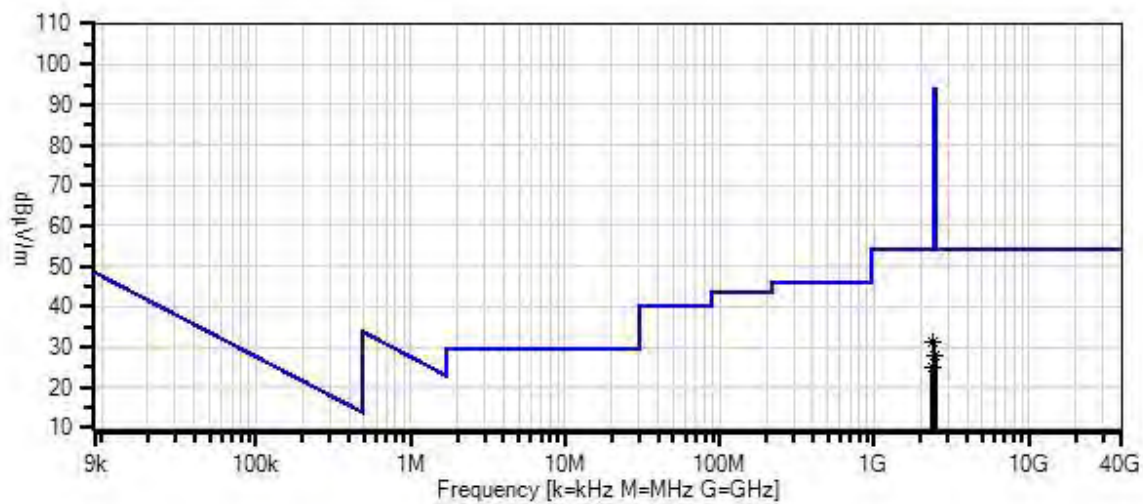
Test Conditions / Notes:

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



- Readings
- Peak Readings
- × QP Readings
- * Average Readings
- ▼ Ambient
- Software Version: 5.03.02
- 1 - 15.249 Carrier and Spurious Emissions (2400-2483.5 MHz Transmitter) (AVG)

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 | Heliac | 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 |

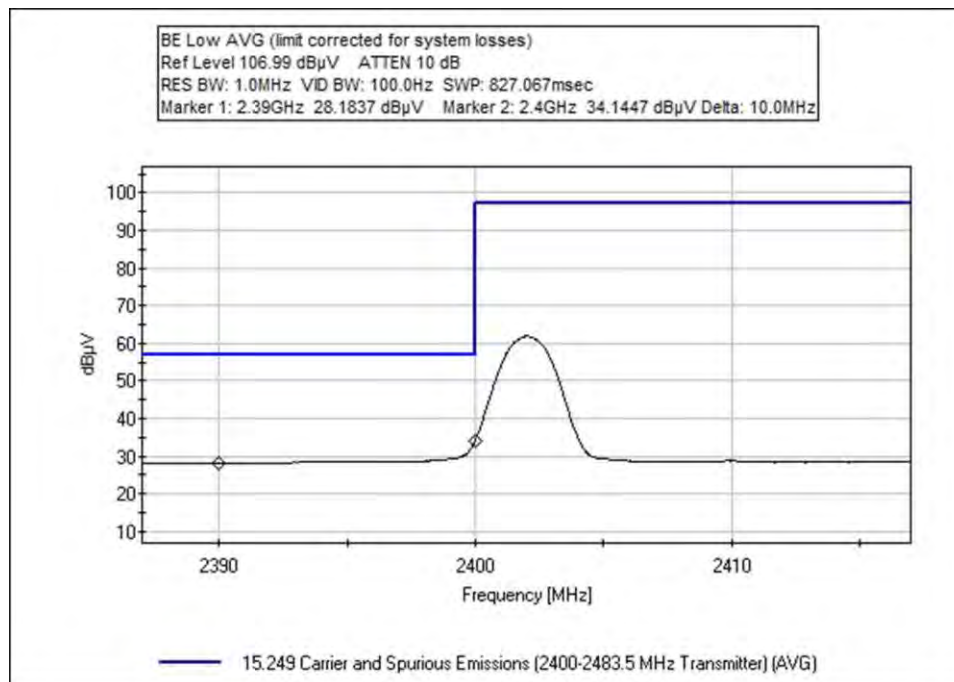
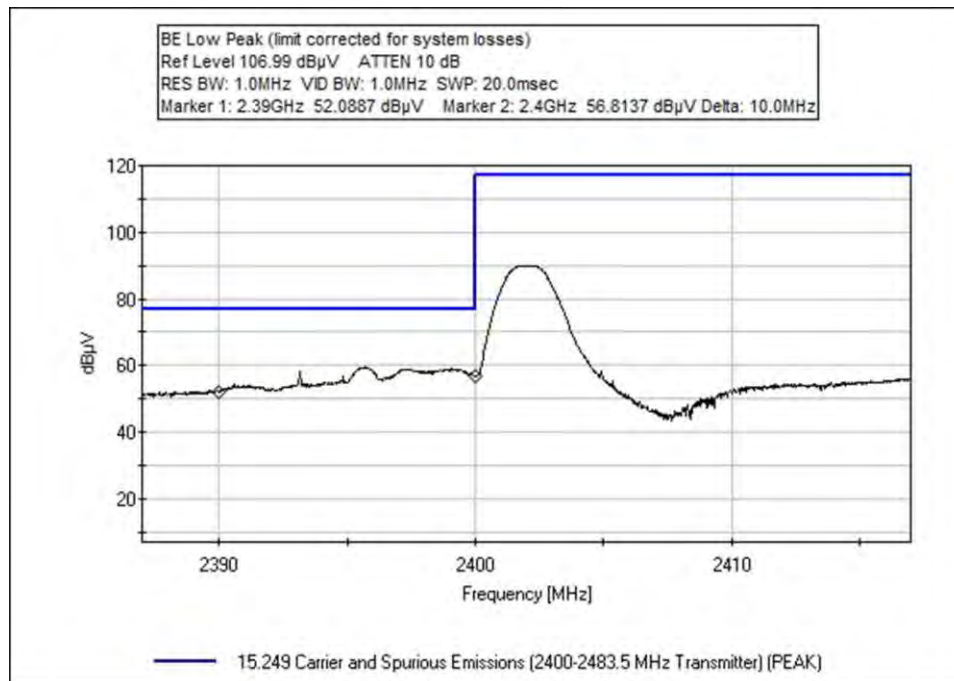
Measurement Data:

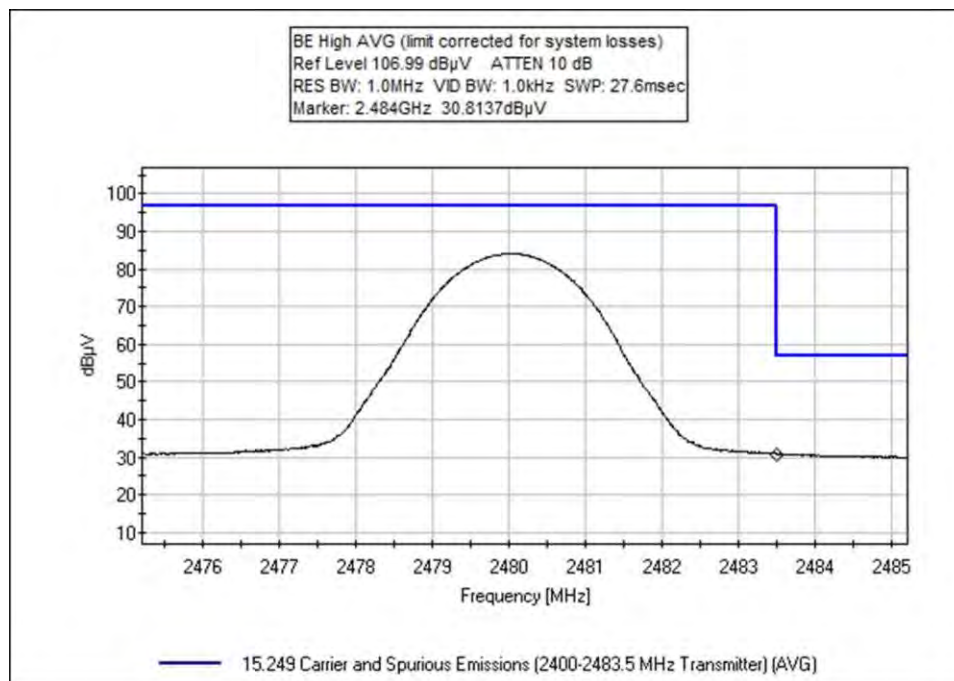
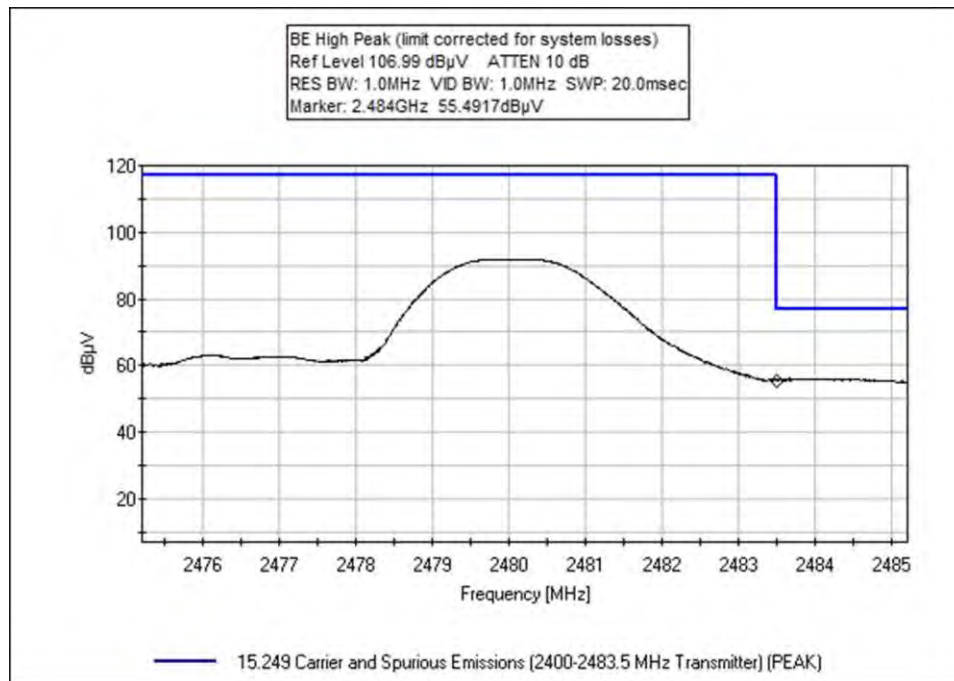
Reading listed by margin.

Test Distance: 3 Meters

| # | Freq | Rdng | T1 T5 | T2 T6 | T3 | T4 | Dist | Corr | Spec | Margin | Polar |
|---|-----------|------|----------|----------|------|-------|-------|--------|-----------|--------|-------|
| | MHz | dBμV | dB | dB | dB | dB | Table | dBμV/m | dBμV/m | 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.