# ThinkEco, Inc.

## Modlet IQ ESP

## Model TE6010

**Report #: THKE0020**

Report Prepared By Northwest EMC Inc.

NORTHWEST EMC – (888) 364-2378 – www.nwemc.com

California – Minnesota – Oregon – New York – Washington

# CERTIFICATE OF TEST

WTD 12.5.23

**Last Date of Test: August 13, 2012**
**ThinkEco, Inc.**
**Model: Modlet IQ ESP**

## Emissions

| Test Description | Specification | Test Method | Pass/Fail |
|---|---|---|---|
| Duty Cycle | FCC 15.247:2012 | ANSI C63.10:2009 | Pass |
| Output Power | FCC 15.247:2012 | ANSI C63.10:2009 | Pass |
| Spurious Radiated Emissions | FCC 15.247:2012 | ANSI C63.10:2009 | Pass |
| AC Powerline Conducted Emissions | FCC 15.207:2012 | ANSI C63.10:2009 | Pass |
| Spurious Conducted Emissions | FCC 15.247:2010 | ANSI C63.10:2009 | Pass |
| Power Spectral Density | FCC 15.247:2010 | ANSI C63.10:2009 | Pass |
| Occupied Bandwidth | FCC 15.247:2010 | ANSI C63.10:2009 | Pass |
| Band Edge Compliance | FCC 15.247:2010 | ANSI C63.10:2009 | Pass |

## Deviations From Test Standards

None

## Approved By:

*Tim O'Shea, Operations Manager*

**NVLAP Lab Code: 200676-0**

### *Test Facility*

The measurement facility used to collect the data is located at:

Northwest EMC, Inc.
41 Tesla Ave.
Irvine, CA 92618

Phone: (503) 844-4066 Fax: 844-3826

This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada (Site filing #2834B-1).

NORTHWEST EMC

REV 2012.08.02

# REVISION HISTORY

| Revision Number | Description | Date | Page Number |
|---|---|---|---|
| 00 None | | | |

## Barometric Pressure

The recorded barometric pressure has been normalized to sea level.

REV 2012.05.24

# ACCREDITATIONS AND AUTHORIZATIONS

## United States

**FCC** - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

**A2LA** - Accredited by A2LA to ISO / IEC Guide 65 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

**NVLAP** - Each laboratory is accredited by NVLAP to ISO 17025

## Canada

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

## European Union

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

## Australia/New Zealand

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

## Korea

**KCC / RRA** - Recognized by KCC's RRA as a CAB for the acceptance of test data.

## Japan

**VCCI** - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

## Taiwan

**BSMI** – Recognized by BSMI as a CAB for the acceptance of test data.

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

## Singapore

**IDA** – Recognized by IDA as a CAB for the acceptance of test data.

## Hong Kong

**OFTA** – Recognized by OFTA as a CAB for the acceptance of test data.

## Vietnam

**MIC** – Recognized by MIC as a CAB for the acceptance of test data.

## Russia

**GOST** – Accredited by Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC to perform EMC and Hygienic testing for Information Technology products to GOST standards.

## SCOPE

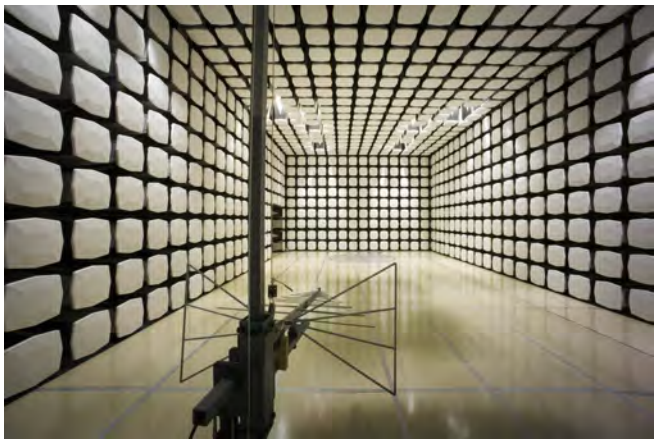
For details on the Scopes of our Accreditations, please visit:
http://www.nwemc.com/accreditations/

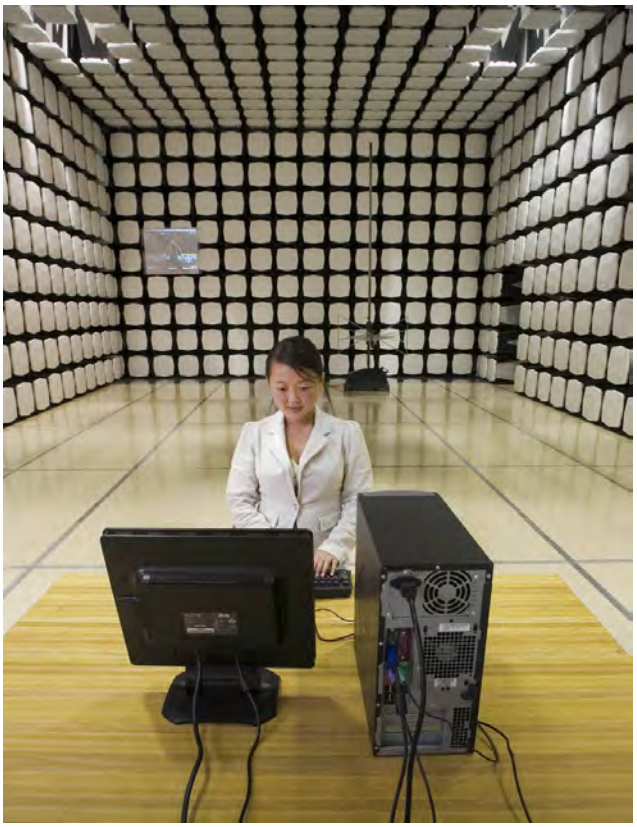
NORTHWEST EMC

REV 2012.08.03

# LOCATIONS

| **Oregon**<br>Labs EV01-EV12<br>22975 NW Evergreen Pkwy, #400<br>Hillsboro, OR 97124<br>(503) 844-4066 | **California**<br>Labs OC01-OC13<br>41 Tesla<br>Irvine, CA 92618<br>(949) 861-8918 | **New York**<br>Labs WA01-WA04<br>4939 Jordan Rd.<br>Elbridge, NY 13060<br>(315) 685-0796 | **Minnesota**<br>Labs MN01-MN08<br>9349 W Broadway Ave.<br>Brooklyn Park, MN 55445<br>(763) 425-2281 | **Washington**<br>Labs SU01-SU07<br>14128 339th Ave. SE<br>Sultan, WA 98294<br>(360) 793-8675 |
|---|---|---|---|---|
| **VCCI** | | | | |
| A-0108 A-0029 | | | A-0109 | A-0110 |
| **Industry Canada** | | | | |
| 2834D-1, 2834D-*2* | 2834B-1, 2834B-2, 2834B-3 | | 2834E-1 | 2834C-1 |





# PRODUCT DESCRIPTION

WTD 12.5.23

## Client and Equipment Under Test (EUT) Information

| | |
|---|---|
| **Company Name:** | ThinkEco, Inc. |
| **Address:** | 148 Madison Avenue, 8th Floor |
| **City, State, Zip:** | New York, NY 10016 |
| **Test Requested By:** | Peter Mayer |
| **Model:** | Modlet IQ ESP (Model TE6010) |
| **First Date of Test:** | August 18, 2011 |
| **Last Date of Test:** | August 13, 2012 |
| **Receipt Date of Samples:** | August 18, 2011 for Model TE1010; August 06, 2012 for Model TE6010 |
| **Equipment Design Stage:** | Production |
| **Equipment Condition:** | No Damage |

## Information Provided by the Party Requesting the Test

**Functional Description of the EUT (Equipment Under Test):**

Power conditioning system

**Testing Objective:**

To demonstrate compliance on a Zigbee radio to FCC 15.247 requirements for the tests listed within FCC 15.247 requirements.

The direct connect testing was completed with Model TE1010. This device contains the same radio as Model TE6010 and has the same direct connect characteristics.

# CONFIGURATIONS

WTD 12.5.23

## Configuration THKE0020- 1

| EUT | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| Power conditioning system | ThinkEco, Inc. | Modlet IQ ESP | None |

| Cables | | | | | |
|---|---|---|---|---|---|
| **Cable Type** | **Shield** | **Length (m)** | **Ferrite** | **Connection 1** | **Connection 2** |
| AC Power | No | 0.9m | No | Power conditioning system | AC Mains |
| RJ-14 | No | 2.15m | No | Power conditioning system | Unterminated |
| CAT-5e | No | 2.0m | No | Power conditioning system | Unterminated |
| AC Power | No | 1.8m | No | Power conditioning system | Unterminated |
| **PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.** | | | | | |

## Configuration THKE0020- 2

| EUT | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| Power conditioning system | ThinkEco, Inc. | Modlet IQ ESP | None |

| Cables | | | | | |
|---|---|---|---|---|---|
| **Cable Type** | **Shield** | **Length (m)** | **Ferrite** | **Connection 1** | **Connection 2** |
| AC Power | No | 0.9m | No | Power conditioning system | AC Mains |
| AC Power | No | 1.8m | No | Power conditioning system | Unterminated |
| AC Power | No | 1.8m | No | Power conditioning system | Unterminated |
| AC Power | No | 1.8m | No | Power conditioning system | Unterminated |
| (2) Ethernet Cables | No | 1.6m | No | Power conditioning system | Unterminated |
| (2) RJ-14 Cables | No | 1.6m | No | Power conditioning system | Unterminated |
| **PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.** | | | | | |

# CONFIGURATIONS

WTD 12.5.23

## Configuration THKE0005- 1

| EUT | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| 2.4 GHz ISM radio | ThinkEco, Inc. | Modlet TE1010 | 804F580000100A19 |

| Remote Equipment Outside of Test Setup Boundary | | | |
|---|---|---|---|
| **Description** | **Manufacturer** | **Model/Part Number** | **Serial Number** |
| PC for USB power | IBM | Thinkpad A21m | IS108 |

| Cables | | | | | |
|---|---|---|---|---|---|
| **Cable Type** | **Shield** | **Length (m)** | **Ferrite** | **Connection 1** | **Connection 2** |
| DC Power | No | 0.5m | No | PC | 2.4 GHz ISM radio |
| **PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.** | | | | | |

NORTHWEST EMC

WTD 12.5.23

# MODIFICATIONS

## Equipment Modifications

| Item | Date | Test | Modification | Note | Disposition of EUT |
|---|---|---|---|---|---|
| 1 | 8/18/2011 | Occupied Bandwidth | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 2 | 8/18/2011 | Band Edge Compliance | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 3 | 8/18/2011 | Power Spectral Density | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 4 | 8/18/2011 | Spurious Conducted Emissions | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | Scheduled testing was completed |
| 5 | 8/7/2012 | AC Powerline Conducted Emissions | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 6 | 8/9/2012 | Output Power | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 7 | 8/13/2012 | Duty Cycle | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 8 | 8/13/2012 | Spurious Radiated Emissions | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | Scheduled testing was completed. |

# Duty Cycle

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|---|---|---|---|---|---|
| Attenuator 20 dB, SMA M/F 26GHz | S.M. Electronics | SA26B-20 | AUY | 8/2/2012 | 12 |
| 40GHz DC Block | Miteq | DCB4000 | AMD | 6/25/2012 | 12 |
| Signal Generator | Agilent | E8257D | TGU | 2/1/2012 | 24 |
| Spectrum Analyzer | Agilent | E4440A | AFG | 5/16/2012 | 12 |

**MEASUREMENT UNCERTAINTY**

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

**TEST DESCRIPTION**

The test firmware was provided with a “Duty Cycle Demonstration” mode, called “Test 5”. The following description was included in the test instructions by the manufacturer about this mode:

“…sending 92-byte PRBS9 packets over the air on the selected channel at a rate of approximately 75 packets per second, which corresponds to the highest duty cycle the modlet can produce in real world use”

For the purposes of taking radiated spurious emissions data in the Average detector, the duty cycle was measured in its worst case mode of 8 pulses of 2.619 ms duration. The following value was calculated in dB to apply to the Average readings:

20 * LOG (8*2.619/100) = -13.6 dB

# Duty Cycle

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | Modlet IQ ESP | | | **Work Order:** | THKE0020 |
| **Serial Number:** | None | | | **Date:** | 08/13/12 |
| **Customer:** | ThinkEco, Inc. | | | **Temperature:** | 26.87°C |
| **Attendees:** | None | | | **Humidity:** | 48% |
| **Project:** | None | | | **Barometric Pres.:** | 1016 |
| **Tested by:** | Mark Baytan | **Power:** | 110VAC/60Hz | **Job Site:** | OC10 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2012 | ANSI C63.10:2009 |
| | |

**COMMENTS**

Transmitting continous mode with modulation.

**DEVIATIONS FROM TEST STANDARD**

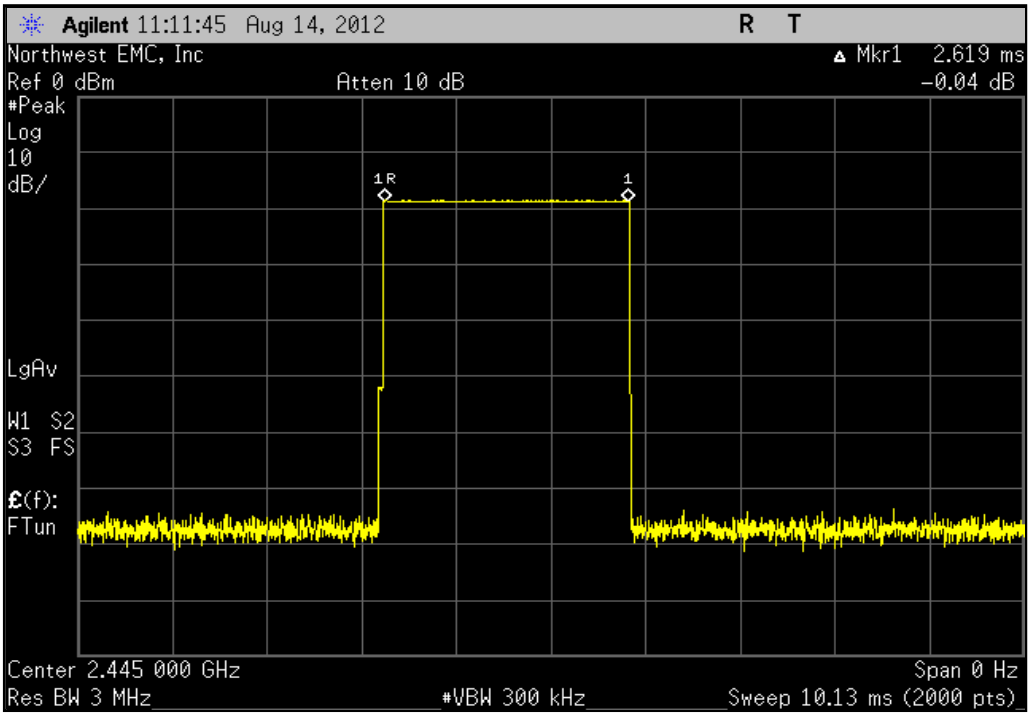
None

| Configuration # | 1 | Signature |
|---|---|---|

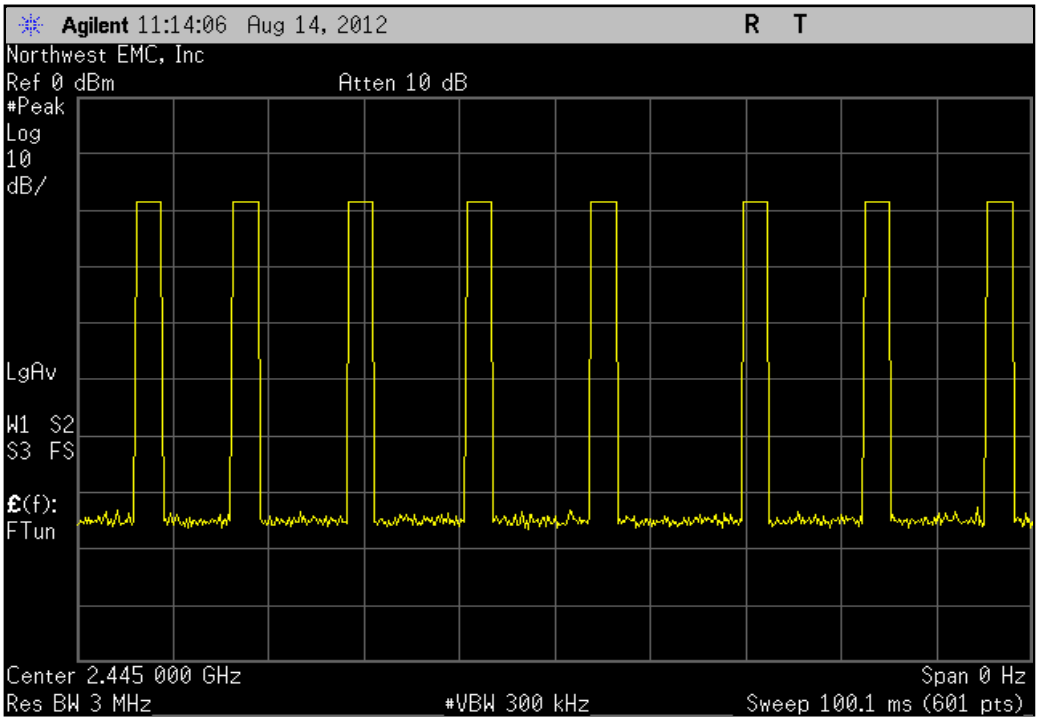
| Channel | Typical Pulse Width | 100ms Period |
|---|---|---|
| Mid Channel, 19, 2445 MHz | 2.619 ms | 8 Pulses |

# Duty Cycle

| Mid-Channel, 19, 2445MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | | **Typical Pulse Width** | | |
| | | | | 2.619 ms | | |




| Mid Channel, 19, 2445 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | | **100ms Period** | | |
| | | | | 8 Pulses | | |



# Output Power

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|---|---|---|---|---|---|
| Attenuator 20 dB, SMA M/F 26GHz | S.M. Electronics | SA26B-20 | AUY | 8/2/2012 | 12 |
| 40GHz DC Block | Miteq | DCB4000 | AMD | 6/25/2012 | 12 |
| Signal Generator | Agilent | E8257D | TGU | 2/1/2012 | 24 |
| Spectrum Analyzer | Agilent | E4440A | AFG | 5/16/2012 | 12 |

## MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

## TEST DESCRIPTION

The peak output power was measured with EUT set to low, medium, and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The EUT was transmitting at its only data rate available in no hope mode.

**De Facto EIRP Limit:** Per 47 CFR 15.247(b)(1-3), the EUT meets the de facto EIRP limit of +36dBm.

# Output Power

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | Modlet IQ ESP | | | **Work Order:** | THKE0020 |
| **Serial Number:** | None | | | **Date:** | 08/09/12 |
| **Customer:** | ThinkEco, Inc. | | | **Temperature:** | 26.87°C |
| **Attendees:** | None | | | **Humidity:** | 48% |
| **Project:** | None | | | **Barometric Pres.:** | 1016 |
| **Tested by:** | Jaemi Suh | **Power:** | 110VAC/60Hz | **Job Site:** | OC10 |

| TEST SPECIFICATIONS | Test Method |
|---|---|
| FCC 15.247:2012 | ANSI C63.10:2009 |
| | |

**COMMENTS**

Transmitting continous mode with modulation.

**DEVIATIONS FROM TEST STANDARD**

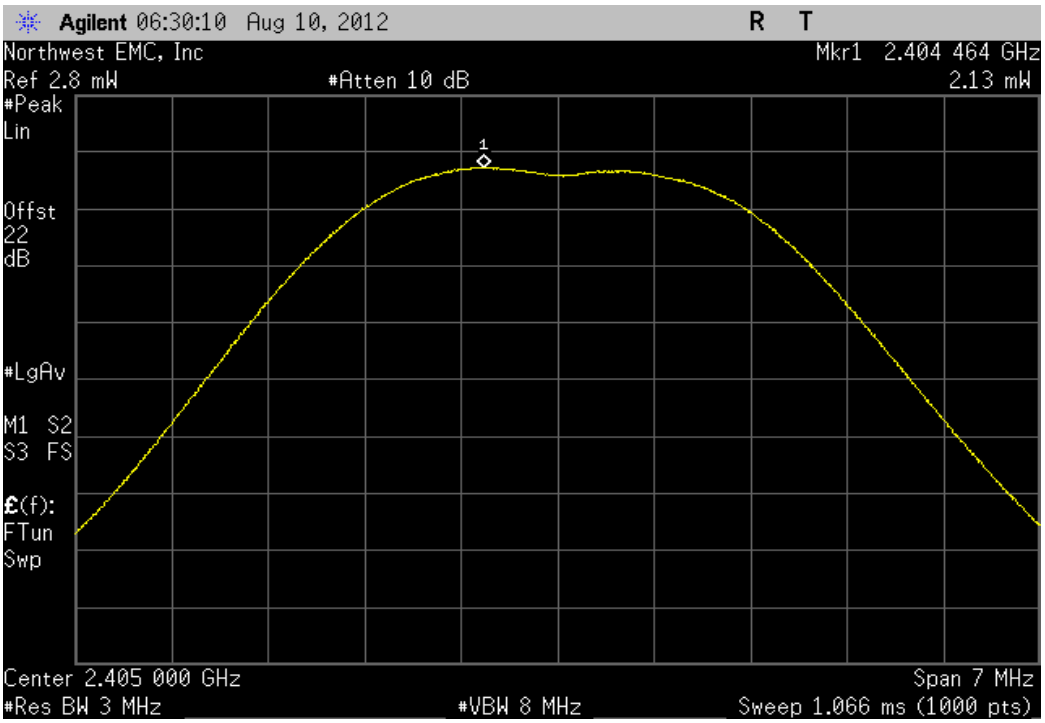
None

| Configuration # | 1 | Signature |
|---|---|---|

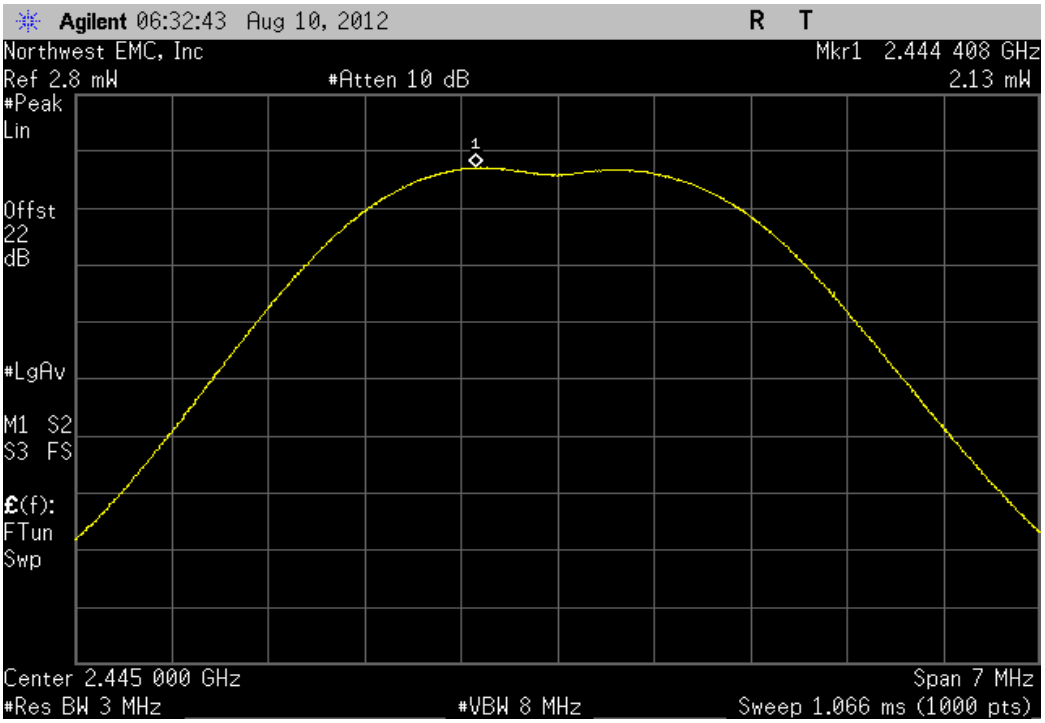
| Channel | Value | Limit | Result |
|---|---|---|---|
| Low Channel, 11, 2405 MHz | 2.132 mW | < 1 W | Pass |
| Mid Channel, 19, 2445 MHz | 2.128 mW | < 1 W | Pass |
| High Channel, 26, 2480 MHz | 2.101 mW | < 1 W | Pass |

# Output Power

| Low Channel, 11, 2405 MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value | Limit | Result |
| | | | | | 2.132 mW | < 1 W | Pass |

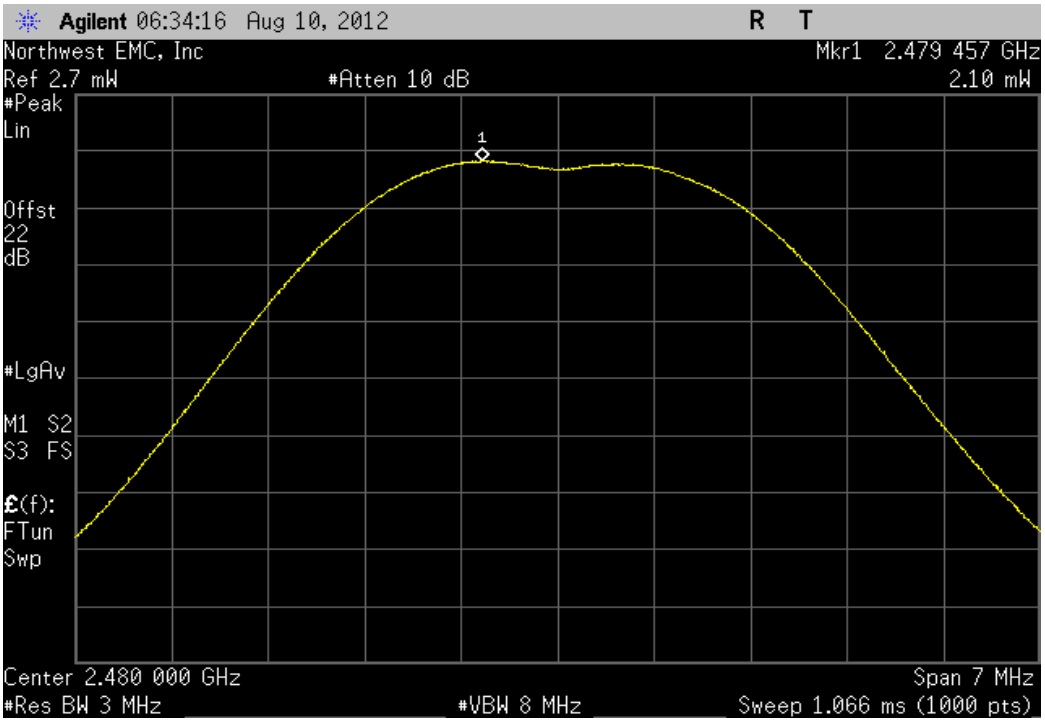



| Mid Channel, 19, 2445 MHz | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Value | Limit | Result |
| | | | | | 2.128 mW | < 1 W | Pass |



# Output Power

| High Channel, 26, 2480 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Value | Limit | Result |
| | | | | 2.101 mW | < 1 W | Pass |



# SPURIOUS RADIATED EMISSIONS

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

**MODES OF OPERATION**

Continuous modulated transmit: Low, Mid, and High Channel (CH11, CH19, and CH26)

**POWER SETTINGS INVESTIGATED**

110VAC/60Hz

**CONFIGURATIONS INVESTIGATED**

THKE0020 - 2

**FREQUENCY RANGE INVESTIGATED**

| | | | |
|---|---|---|---|
| Start Frequency | 30 MHz | Stop Frequency | 26000 MHz |

**SAMPLE CALCULATIONS**

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

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|---|---|---|---|---|---|
| Pre-Amplifier | Miteq | AMF-6F-18002650-25-10P | AOI | 4/27/2012 | 12 mo |
| Antenna, Horn | EMCO | 3160-09 | AHN | NCR | 0 mo |
| OC floating Cable | N/A | 18-26GHz RE Cables | OCK | 4/27/2012 | 12 mo |
| Pre-Amplifier | Miteq | AMF-6F-12001800-30-10P | AOF | 11/21/2011 | 12 mo |
| Antenna, Horn | ETS | 3160-08 | AHT | NCR | 0 mo |
| Pre-Amplifier | Miteq | AMF-6F-08001200-30-10P | AOE | 11/21/2011 | 12 mo |
| Antenna, Horn | ETS | 3160-07 | AHR | NCR | 0 mo |
| OC 10 Cables | N/A | 12-18GHz RE Cables | OCO | 10/13/2011 | 12 mo |
| Pre-Amplifier | Miteq | AMF-4D-010120-30-10P-1 | AOP | 6/7/2012 | 12 mo |
| Antenna, Horn | EMCO | 3115 | AHB | 3/8/2011 | 24 mo |
| OC10 Cables | N/A | 1-8GHz RE Cables | OCJ | 10/13/2011 | 12 mo |
| Antenna, Biconilog | EMCO | 3142 | AXB | 6/14/2012 | 12 mo |
| OC10 Cables | N/A | 10kHz-1GHz RE Cables | OCH | 6/7/2012 | 12 mo |
| Pre-Amplifier | Miteq | AM-1064-9079 | AOO | 6/7/2012 | 12 mo |
| Spectrum Analyzer | Agilent | E4440A | AFA | 6/15/2012 | 12 mo |

**MEASUREMENT BANDWIDTHS**

| Frequency Range (MHz) | Peak Data (kHz) | Quasi-Peak Data (kHz) | Average Data (kHz) |
|---|---|---|---|
| 0.01 - 0.15 | 1.0 | 0.2 | 0.2 |
| 0.15 - 30.0 | 10.0 | 9.0 | 9.0 |
| 30.0 - 1000 | 100.0 | 120.0 | 120.0 |
| Above 1000 | 1000.0 | N/A | 1000.0 |

**MEASUREMENT UNCERTAINTY**

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

**TEST DESCRIPTION**

The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and the EUT antenna in three orthogonal axis, and adjusting measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.10:2009). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.
For the purposes of taking radiated spurious emissions data in the Average detector, the duty cycle was measured in its worst case mode of 8 pulses of 2.619 ms duration. The following value was calculated in dB to apply to the Average readings:

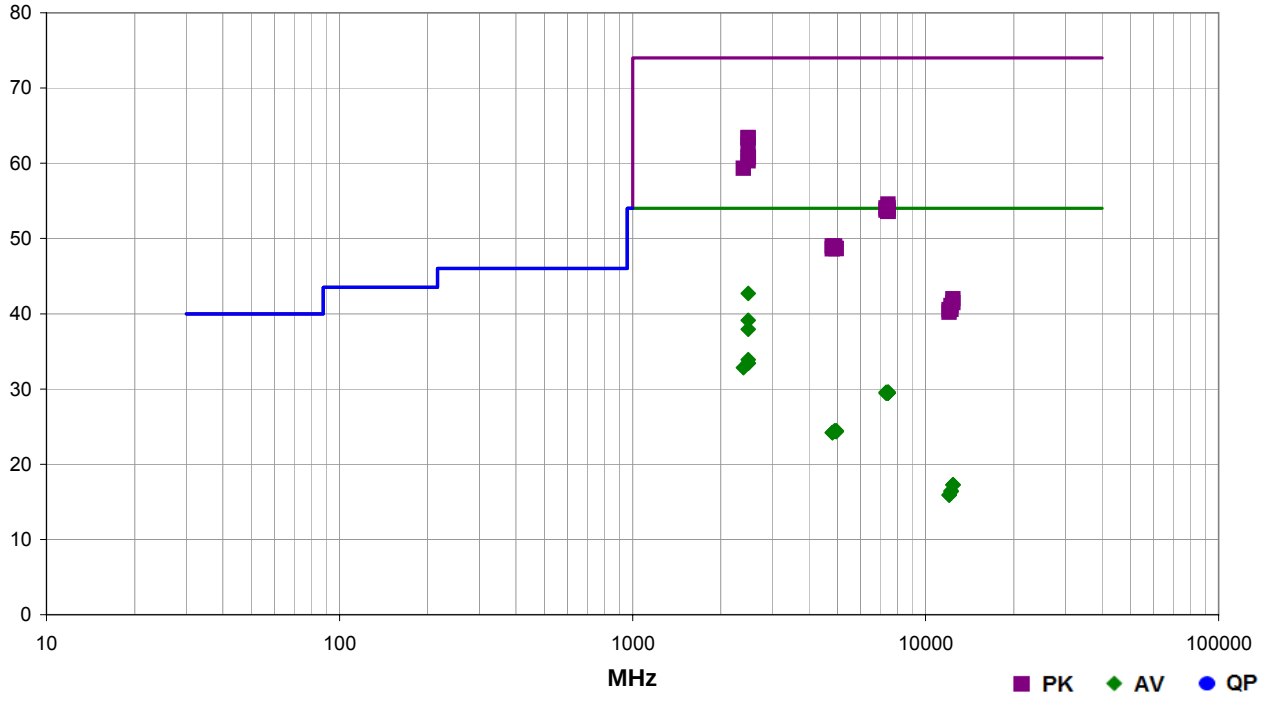
20 * LOG (8*2.619/100) = -13.6 dB

# SPURIOUS RADIATED EMISSIONS

| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | THKE0020 | **Date:** | 08/13/12 | | |
| **Project:** | None | **Temperature:** | 27.53 °C | | |
| **Job Site:** | OC10 | **Humidity:** | 41.95% RH | | |
| **Serial Number:** | 1 | **Barometric Pres.:** | 1011 mbar | **Tested by:** | Mark Baytan |
| **EUT:** | Modlet IQ ESP | | | | |
| **Configuration:** | 2 | | | | |
| **Customer:** | ThinkEco, Inc. | | | | |
| **Attendees:** | None | | | | |
| **EUT Power:** | 110VAC/60Hz | | | | |
| **Operating Mode:** | Continuous modulated transmit: Low, Mid, and High Channel (CH11, CH19, and CH26) | | | | |
| **Deviations:** | None | | | | |
| **Comments:** | None | | | | |

| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.247:2012 | ANSI C63.10:2009 |

| **Run #** | 6 | **Test Distance (m)** | 3 | **Antenna Height(s)** | 1-4m | **Results** | Pass |
|---|---|---|---|---|---|---|---|




| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Antenna Height (meters) | Azimuth (degrees) | Duty Cycle Correction Factor () | External Attenuation (dB) | Polarity/ Transducer Type | Detector | Distance Adjustment (dB) | Adjusted () | Spec. Limit () | Compared to Spec. (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2483.673 | 41.5 | 1.9 | 1.0 | 321.0 | 3.0 | 20.0 | Vert | PK | 0.0 | 63.4 | 74.0 | -10.6 |
| 2483.627 | 41.4 | 1.9 | 1.0 | 42.0 | 3.0 | 20.0 | Horz | PK | 0.0 | 63.3 | 74.0 | -10.7 |
| 2483.500 | 34.4 | 1.9 | 1.0 | 321.0 | 13.6 | 20.0 | Vert | AV | 0.0 | 42.7 | 54.0 | -11.3 |
| 2483.537 | 40.5 | 1.9 | 1.0 | 26.0 | 3.0 | 20.0 | Vert | PK | 0.0 | 62.4 | 74.0 | -11.6 |
| 2484.430 | 38.9 | 1.9 | 1.0 | 255.0 | 3.0 | 20.0 | Vert | PK | 0.0 | 60.8 | 74.0 | -13.2 |
| 2485.327 | 38.8 | 1.9 | 1.0 | 277.0 | 3.0 | 20.0 | Horz | PK | 0.0 | 60.7 | 74.0 | -13.3 |
| 2483.963 | 38.4 | 1.9 | 1.0 | 266.0 | 3.0 | 20.0 | Horz | PK | 0.0 | 60.3 | 74.0 | -13.7 |
| 2390.005 | 37.9 | 1.4 | 1.0 | 120.0 | 3.0 | 20.0 | Horz | PK | 0.0 | 59.3 | 74.0 | -14.7 |
| 2483.500 | 30.8 | 1.9 | 1.0 | 42.0 | 13.6 | 20.0 | Horz | AV | 0.0 | 39.1 | 54.0 | -14.9 |
| 2483.500 | 29.6 | 1.9 | 1.0 | 26.0 | 13.6 | 20.0 | Vert | AV | 0.0 | 37.9 | 54.0 | -16.1 |
| 7439.587 | 38.5 | 16.1 | 1.7 | 28.0 | 3.0 | 0.0 | Horz | PK | 0.0 | 54.6 | 74.0 | -19.4 |
| 7440.271 | 38.0 | 16.1 | 1.0 | 284.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 54.1 | 74.0 | -19.9 |
| 7334.508 | 38.1 | 15.9 | 1.9 | 205.0 | 3.0 | 0.0 | Vert | PK | 0.0 | 54.0 | 74.0 | -20.0 |

# AC POWERLINE CONDUCTED EMISSIONS

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## MODES OF OPERATION

Transmitting maximum duty cycle, high channel (CH 26)
Transmitting maximum duty cycle, mid channel (CH 19)
Transmitting maximum duty cycle, low channel (CH 11)

## POWER SETTINGS INVESTIGATED

110VAC/60Hz

## CONFIGURATIONS INVESTIGATED

THKE0020 - 1

## SAMPLE CALCULATIONS

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator

## TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|---|---|---|---|---|---|
| LISN | Solar | 9252-50-R-24-BNC | LIR | 11/4/2011 | 12 mo |
| Receiver | Rohde & Schwarz | ESCI | ARH | 3/29/2012 | 12 mo |
| High Pass Filter | TTE | H97-100K-50-720B | HHD | 2/1/2012 | 24 mo |
| Attenuator | Coaxicom | 66702 2910-20 | RBR | 8/7/2012 | 12 mo |
| EV07 Cables | N/A | Conducted Cables | EVG | 4/27/2012 | 12 mo |

## MEASUREMENT BANDWIDTHS

| Frequency Range (MHz) | Peak Data (kHz) | Quasi-Peak Data (kHz) | Average Data (kHz) |
|---|---|---|---|
| 0.01 - 0.15 | 1.0 | 0.2 | 0.2 |
| 0.15 - 30.0 | 10.0 | 9.0 | 9.0 |
| 30.0 - 1000 | 100.0 | 120.0 | 120.0 |
| Above 1000 | 1000.0 | N/A | 1000.0 |

Measurements were made using the bandwidths and detectors specified. No video filter was used.

## MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

## TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm.

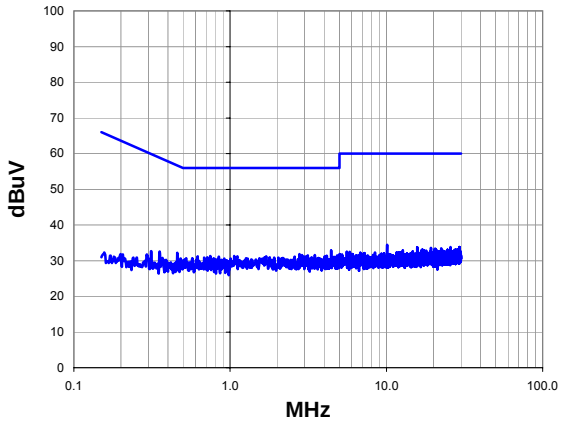
# AC POWERLINE CONDUCTED EMISSIONS

| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | THKE0020 | **Date:** | 08/07/12 | | |
| **Project:** | None | **Temperature:** | 23.6 °C | | |
| **Job Site:** | EV07 | **Humidity:** | 49% RH | | |
| **Serial Number:** | None | **Barometric Pres.:** | 1015.5 mbar | **Tested by:** | Carl Engholm |
| **EUT:** | Modlet IQ ESP | | | | |
| **Configuration:** | 1 | | | | |
| **Customer:** | ThinkEco, Inc. | | | | |
| **Attendees:** | None | | | | |
| **EUT Power:** | 110VAC/60Hz | | | | |
| **Operating Mode:** | Transmitting maximum duty cycle, low channel (CH 11) | | | | |
| **Deviations:** | None | | | | |
| **Comments:** | None | | | | |

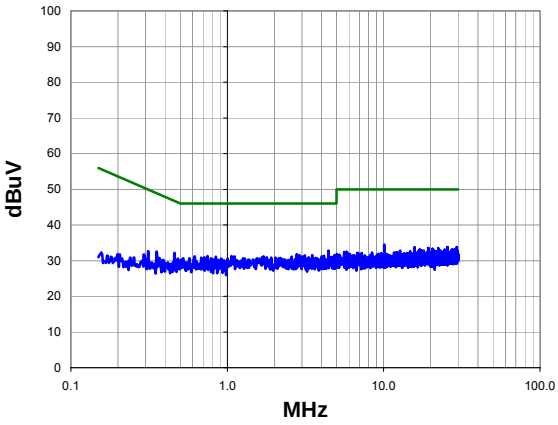
| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.207:2012 | ANSI C63.10:2009 |

| **Run #** | 5 | **Line:** | High Line | **Ext. Attenuation:** | 20 | **Results** | Pass |
|---|---|---|---|---|---|---|---|

**Peak Data - vs - Quasi Peak Limit**




**Peak Data - vs - Average Limit**




Peak Data - vs - Quasi Peak Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 4.432 | 12.2 | 20.7 | 32.9 | 56.0 | -23.1 |
| 2.784 | 11.3 | 20.5 | 31.8 | 56.0 | -24.2 |
| 3.488 | 11.0 | 20.6 | 31.6 | 56.0 | -24.4 |
| 2.888 | 11.0 | 20.5 | 31.5 | 56.0 | -24.5 |
| 4.856 | 10.8 | 20.7 | 31.5 | 56.0 | -24.5 |
| 0.459 | 11.9 | 20.3 | 32.2 | 56.7 | -24.5 |
| 3.136 | 10.9 | 20.5 | 31.4 | 56.0 | -24.6 |
| 4.152 | 10.8 | 20.6 | 31.4 | 56.0 | -24.6 |
| 0.747 | 11.0 | 20.3 | 31.3 | 56.0 | -24.7 |
| 1.064 | 10.9 | 20.4 | 31.3 | 56.0 | -24.7 |
| 1.704 | 10.8 | 20.4 | 31.2 | 56.0 | -24.8 |
| 0.619 | 10.9 | 20.3 | 31.2 | 56.0 | -24.8 |
| 4.024 | 10.6 | 20.6 | 31.2 | 56.0 | -24.8 |
| 0.847 | 10.8 | 20.4 | 31.2 | 56.0 | -24.8 |
| 2.584 | 10.6 | 20.5 | 31.1 | 56.0 | -24.9 |
| 4.888 | 10.3 | 20.7 | 31.0 | 56.0 | -25.0 |
| 4.728 | 10.3 | 20.7 | 31.0 | 56.0 | -25.0 |
| 4.624 | 10.3 | 20.7 | 31.0 | 56.0 | -25.0 |
| 1.792 | 10.5 | 20.5 | 31.0 | 56.0 | -25.0 |
| 3.320 | 10.4 | 20.5 | 30.9 | 56.0 | -25.1 |

Peak Data - vs - Average Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 4.432 | 12.2 | 20.7 | 32.9 | 46.0 | -13.1 |
| 2.784 | 11.3 | 20.5 | 31.8 | 46.0 | -14.2 |
| 3.488 | 11.0 | 20.6 | 31.6 | 46.0 | -14.4 |
| 2.888 | 11.0 | 20.5 | 31.5 | 46.0 | -14.5 |
| 4.856 | 10.8 | 20.7 | 31.5 | 46.0 | -14.5 |
| 0.459 | 11.9 | 20.3 | 32.2 | 46.7 | -14.5 |
| 3.136 | 10.9 | 20.5 | 31.4 | 46.0 | -14.6 |
| 4.152 | 10.8 | 20.6 | 31.4 | 46.0 | -14.6 |
| 0.747 | 11.0 | 20.3 | 31.3 | 46.0 | -14.7 |
| 1.064 | 10.9 | 20.4 | 31.3 | 46.0 | -14.7 |
| 1.704 | 10.8 | 20.4 | 31.2 | 46.0 | -14.8 |
| 0.619 | 10.9 | 20.3 | 31.2 | 46.0 | -14.8 |
| 4.024 | 10.6 | 20.6 | 31.2 | 46.0 | -14.8 |
| 0.847 | 10.8 | 20.4 | 31.2 | 46.0 | -14.8 |
| 2.584 | 10.6 | 20.5 | 31.1 | 46.0 | -14.9 |
| 4.888 | 10.3 | 20.7 | 31.0 | 46.0 | -15.0 |
| 4.728 | 10.3 | 20.7 | 31.0 | 46.0 | -15.0 |
| 4.624 | 10.3 | 20.7 | 31.0 | 46.0 | -15.0 |
| 1.792 | 10.5 | 20.5 | 31.0 | 46.0 | -15.0 |
| 3.320 | 10.4 | 20.5 | 30.9 | 46.0 | -15.1 |

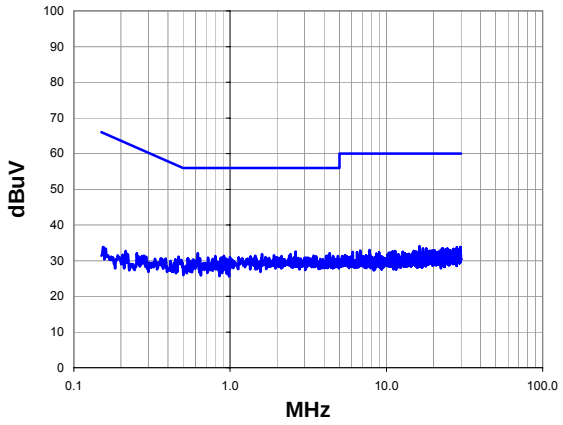
# AC POWERLINE CONDUCTED EMISSIONS

| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | THKE0020 | **Date:** | 08/07/12 | | |
| **Project:** | None | **Temperature:** | 23.6 °C | | |
| **Job Site:** | EV07 | **Humidity:** | 49% RH | | |
| **Serial Number:** | None | **Barometric Pres.:** | 1015.5 mbar | **Tested by:** | Carl Engholm |
| **EUT:** | Modlet IQ ESP | | | | |
| **Configuration:** | 1 | | | | |
| **Customer:** | ThinkEco, Inc. | | | | |
| **Attendees:** | None | | | | |
| **EUT Power:** | 110VAC/60Hz | | | | |
| **Operating Mode:** | Transmitting maximum duty cycle, low channel (CH 11) | | | | |
| **Deviations:** | None | | | | |
| **Comments:** | None | | | | |

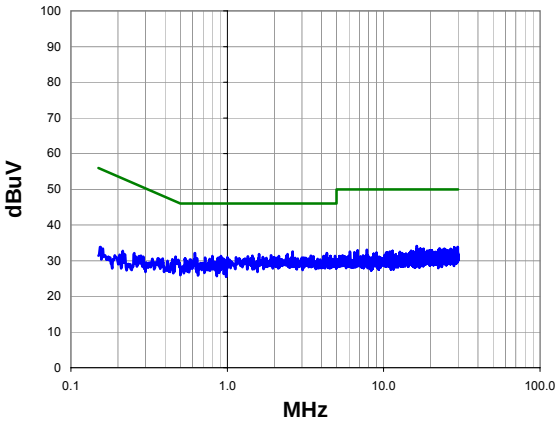
| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.207:2012 | ANSI C63.10:2009 |

| **Run #** | 6 | **Line:** | Neutral | **Ext. Attenuation:** | 20 | **Results** | Pass |
|---|---|---|---|---|---|---|---|

**Peak Data - vs - Quasi Peak Limit**




**Peak Data - vs - Average Limit**




Peak Data - vs - Quasi Peak Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 2.624 | 12.0 | 20.5 | 32.5 | 56.0 | -23.5 |
| 4.336 | 11.5 | 20.6 | 32.1 | 56.0 | -23.9 |
| 0.621 | 11.8 | 20.3 | 32.1 | 56.0 | -23.9 |
| 1.600 | 11.4 | 20.4 | 31.8 | 56.0 | -24.2 |
| 2.432 | 11.3 | 20.5 | 31.8 | 56.0 | -24.2 |
| 1.912 | 11.0 | 20.5 | 31.5 | 56.0 | -24.5 |
| 1.448 | 11.0 | 20.4 | 31.4 | 56.0 | -24.6 |
| 3.424 | 10.8 | 20.5 | 31.3 | 56.0 | -24.7 |
| 0.803 | 11.0 | 20.3 | 31.3 | 56.0 | -24.7 |
| 4.896 | 10.6 | 20.7 | 31.3 | 56.0 | -24.7 |
| 4.568 | 10.6 | 20.7 | 31.3 | 56.0 | -24.7 |
| 4.128 | 10.7 | 20.6 | 31.3 | 56.0 | -24.7 |
| 2.136 | 10.8 | 20.5 | 31.3 | 56.0 | -24.7 |
| 0.913 | 10.9 | 20.4 | 31.3 | 56.0 | -24.7 |
| 3.552 | 10.7 | 20.6 | 31.3 | 56.0 | -24.7 |
| 1.000 | 10.6 | 20.4 | 31.0 | 56.0 | -25.0 |
| 2.000 | 10.5 | 20.5 | 31.0 | 56.0 | -25.0 |
| 1.136 | 10.5 | 20.4 | 30.9 | 56.0 | -25.1 |
| 0.884 | 10.5 | 20.4 | 30.9 | 56.0 | -25.1 |
| 3.000 | 10.3 | 20.5 | 30.8 | 56.0 | -25.2 |

Peak Data - vs - Average Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 2.624 | 12.0 | 20.5 | 32.5 | 46.0 | -13.5 |
| 4.336 | 11.5 | 20.6 | 32.1 | 46.0 | -13.9 |
| 0.621 | 11.8 | 20.3 | 32.1 | 46.0 | -13.9 |
| 1.600 | 11.4 | 20.4 | 31.8 | 46.0 | -14.2 |
| 2.432 | 11.3 | 20.5 | 31.8 | 46.0 | -14.2 |
| 1.912 | 11.0 | 20.5 | 31.5 | 46.0 | -14.5 |
| 1.448 | 11.0 | 20.4 | 31.4 | 46.0 | -14.6 |
| 3.424 | 10.8 | 20.5 | 31.3 | 46.0 | -14.7 |
| 0.803 | 11.0 | 20.3 | 31.3 | 46.0 | -14.7 |
| 4.896 | 10.6 | 20.7 | 31.3 | 46.0 | -14.7 |
| 4.568 | 10.6 | 20.7 | 31.3 | 46.0 | -14.7 |
| 4.128 | 10.7 | 20.6 | 31.3 | 46.0 | -14.7 |
| 2.136 | 10.8 | 20.5 | 31.3 | 46.0 | -14.7 |
| 0.913 | 10.9 | 20.4 | 31.3 | 46.0 | -14.7 |
| 3.552 | 10.7 | 20.6 | 31.3 | 46.0 | -14.7 |
| 1.000 | 10.6 | 20.4 | 31.0 | 46.0 | -15.0 |
| 2.000 | 10.5 | 20.5 | 31.0 | 46.0 | -15.0 |
| 1.136 | 10.5 | 20.4 | 30.9 | 46.0 | -15.1 |
| 0.884 | 10.5 | 20.4 | 30.9 | 46.0 | -15.1 |
| 3.000 | 10.3 | 20.5 | 30.8 | 46.0 | -15.2 |

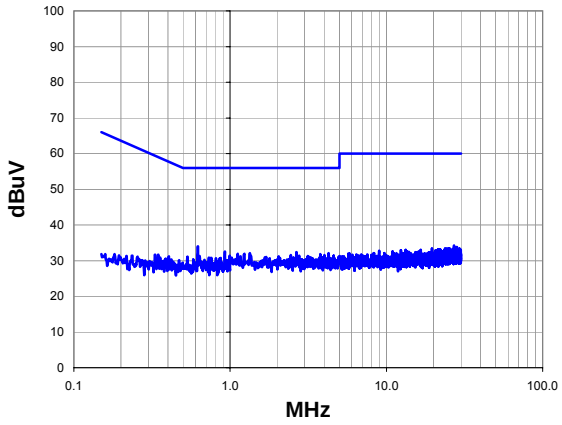
# AC POWERLINE CONDUCTED EMISSIONS

| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | THKE0020 | **Date:** | 08/07/12 | | |
| **Project:** | None | **Temperature:** | 23.6 °C | | |
| **Job Site:** | EV07 | **Humidity:** | 49% RH | | |
| **Serial Number:** | None | **Barometric Pres.:** | 1015.5 mbar | **Tested by:** | Carl Engholm |
| **EUT:** | Modlet IQ ESP | | | | |
| **Configuration:** | 1 | | | | |
| **Customer:** | ThinkEco, Inc. | | | | |
| **Attendees:** | None | | | | |
| **EUT Power:** | 110VAC/60Hz | | | | |
| **Operating Mode:** | Transmitting maximum duty cycle, mid channel (CH 19) | | | | |
| **Deviations:** | None | | | | |
| **Comments:** | None | | | | |

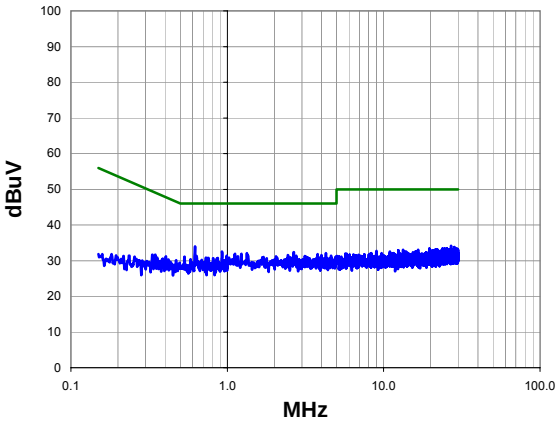
| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.207:2012 | ANSI C63.10:2009 |

| **Run #** | 7 | **Line:** | High Line | **Ext. Attenuation:** | 20 | **Results** | Pass |
|---|---|---|---|---|---|---|---|

**Peak Data - vs - Quasi Peak Limit**




**Peak Data - vs - Average Limit**




Peak Data - vs - Quasi Peak Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 0.623 | 13.7 | 20.3 | 34.0 | 56.0 | -22.0 |
| 0.925 | 12.2 | 20.4 | 32.6 | 56.0 | -23.4 |
| 2.664 | 11.9 | 20.5 | 32.4 | 56.0 | -23.6 |
| 4.272 | 11.5 | 20.6 | 32.1 | 56.0 | -23.9 |
| 1.336 | 11.7 | 20.4 | 32.1 | 56.0 | -23.9 |
| 1.232 | 11.5 | 20.4 | 31.9 | 56.0 | -24.1 |
| 1.120 | 11.5 | 20.4 | 31.9 | 56.0 | -24.1 |
| 3.776 | 11.3 | 20.6 | 31.9 | 56.0 | -24.1 |
| 2.440 | 11.1 | 20.5 | 31.6 | 56.0 | -24.4 |
| 4.008 | 11.0 | 20.6 | 31.6 | 56.0 | -24.4 |
| 4.600 | 10.7 | 20.7 | 31.4 | 56.0 | -24.6 |
| 0.993 | 11.0 | 20.4 | 31.4 | 56.0 | -24.6 |
| 3.136 | 10.8 | 20.5 | 31.3 | 56.0 | -24.7 |
| 2.048 | 10.7 | 20.5 | 31.2 | 56.0 | -24.8 |
| 0.533 | 10.8 | 20.3 | 31.1 | 56.0 | -24.9 |
| 1.704 | 10.6 | 20.4 | 31.0 | 56.0 | -25.0 |
| 3.920 | 10.4 | 20.6 | 31.0 | 56.0 | -25.0 |
| 0.730 | 10.5 | 20.3 | 30.8 | 56.0 | -25.2 |
| 0.869 | 10.4 | 20.4 | 30.8 | 56.0 | -25.2 |
| 0.759 | 10.4 | 20.3 | 30.7 | 56.0 | -25.3 |

Peak Data - vs - Average Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 0.623 | 13.7 | 20.3 | 34.0 | 46.0 | -12.0 |
| 0.925 | 12.2 | 20.4 | 32.6 | 46.0 | -13.4 |
| 2.664 | 11.9 | 20.5 | 32.4 | 46.0 | -13.6 |
| 4.272 | 11.5 | 20.6 | 32.1 | 46.0 | -13.9 |
| 1.336 | 11.7 | 20.4 | 32.1 | 46.0 | -13.9 |
| 1.232 | 11.5 | 20.4 | 31.9 | 46.0 | -14.1 |
| 1.120 | 11.5 | 20.4 | 31.9 | 46.0 | -14.1 |
| 3.776 | 11.3 | 20.6 | 31.9 | 46.0 | -14.1 |
| 2.440 | 11.1 | 20.5 | 31.6 | 46.0 | -14.4 |
| 4.008 | 11.0 | 20.6 | 31.6 | 46.0 | -14.4 |
| 4.600 | 10.7 | 20.7 | 31.4 | 46.0 | -14.6 |
| 0.993 | 11.0 | 20.4 | 31.4 | 46.0 | -14.6 |
| 3.136 | 10.8 | 20.5 | 31.3 | 46.0 | -14.7 |
| 2.048 | 10.7 | 20.5 | 31.2 | 46.0 | -14.8 |
| 0.533 | 10.8 | 20.3 | 31.1 | 46.0 | -14.9 |
| 1.704 | 10.6 | 20.4 | 31.0 | 46.0 | -15.0 |
| 3.920 | 10.4 | 20.6 | 31.0 | 46.0 | -15.0 |
| 0.730 | 10.5 | 20.3 | 30.8 | 46.0 | -15.2 |
| 0.869 | 10.4 | 20.4 | 30.8 | 46.0 | -15.2 |
| 0.759 | 10.4 | 20.3 | 30.7 | 46.0 | -15.3 |

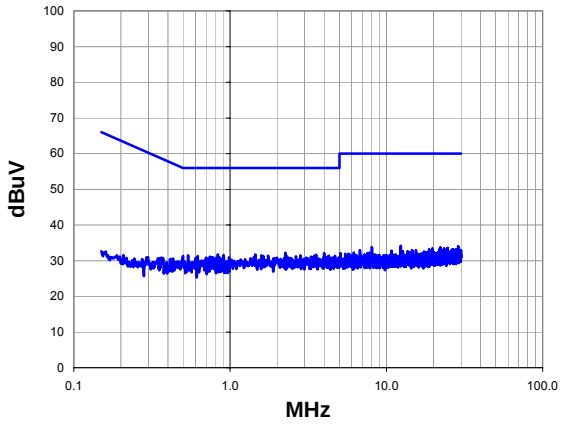
# AC POWERLINE CONDUCTED EMISSIONS

| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | THKE0020 | **Date:** | 08/07/12 | | |
| **Project:** | None | **Temperature:** | 23.6 °C | | |
| **Job Site:** | EV07 | **Humidity:** | 49% RH | | |
| **Serial Number:** | None | **Barometric Pres.:** | 1015.5 mbar | **Tested by:** | Carl Engholm |
| **EUT:** | Modlet IQ ESP | | | | |
| **Configuration:** | 1 | | | | |
| **Customer:** | ThinkEco, Inc. | | | | |
| **Attendees:** | None | | | | |
| **EUT Power:** | 110VAC/60Hz | | | | |
| **Operating Mode:** | Transmitting maximum duty cycle, mid channel (CH 19) | | | | |
| **Deviations:** | None | | | | |
| **Comments:** | None | | | | |

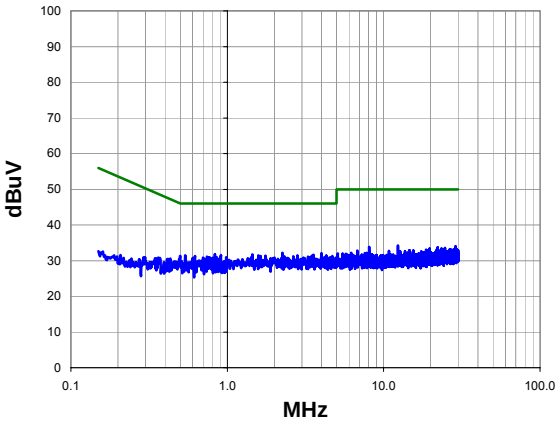
| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.207:2012 | ANSI C63.10:2009 |

| **Run #** | 8 | **Line:** | Neutral | **Ext. Attenuation:** | 20 | **Results** | Pass |
|---|---|---|---|---|---|---|---|

**Peak Data - vs - Quasi Peak Limit**




**Peak Data - vs - Average Limit**




Peak Data - vs - Quasi Peak Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 2.256 | 11.7 | 20.5 | 32.2 | 56.0 | -23.8 |
| 4.000 | 11.5 | 20.6 | 32.1 | 56.0 | -23.9 |
| 0.833 | 11.4 | 20.3 | 31.7 | 56.0 | -24.3 |
| 1.448 | 11.3 | 20.4 | 31.7 | 56.0 | -24.3 |
| 3.552 | 11.1 | 20.6 | 31.7 | 56.0 | -24.3 |
| 0.910 | 11.2 | 20.4 | 31.6 | 56.0 | -24.4 |
| 2.816 | 11.0 | 20.5 | 31.5 | 56.0 | -24.5 |
| 0.538 | 11.2 | 20.3 | 31.5 | 56.0 | -24.5 |
| 1.584 | 11.0 | 20.4 | 31.4 | 56.0 | -24.6 |
| 4.296 | 10.8 | 20.6 | 31.4 | 56.0 | -24.6 |
| 1.752 | 10.9 | 20.5 | 31.4 | 56.0 | -24.6 |
| 1.632 | 10.9 | 20.4 | 31.3 | 56.0 | -24.7 |
| 0.621 | 11.0 | 20.3 | 31.3 | 56.0 | -24.7 |
| 4.688 | 10.6 | 20.7 | 31.3 | 56.0 | -24.7 |
| 0.500 | 11.0 | 20.3 | 31.3 | 56.0 | -24.7 |
| 2.640 | 10.7 | 20.5 | 31.2 | 56.0 | -24.8 |
| 2.312 | 10.7 | 20.5 | 31.2 | 56.0 | -24.8 |
| 0.742 | 10.8 | 20.3 | 31.1 | 56.0 | -24.9 |
| 0.986 | 10.6 | 20.4 | 31.0 | 56.0 | -25.0 |
| 0.855 | 10.6 | 20.4 | 31.0 | 56.0 | -25.0 |

Peak Data - vs - Average Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 2.256 | 11.7 | 20.5 | 32.2 | 46.0 | -13.8 |
| 4.000 | 11.5 | 20.6 | 32.1 | 46.0 | -13.9 |
| 0.833 | 11.4 | 20.3 | 31.7 | 46.0 | -14.3 |
| 1.448 | 11.3 | 20.4 | 31.7 | 46.0 | -14.3 |
| 3.552 | 11.1 | 20.6 | 31.7 | 46.0 | -14.3 |
| 0.910 | 11.2 | 20.4 | 31.6 | 46.0 | -14.4 |
| 2.816 | 11.0 | 20.5 | 31.5 | 46.0 | -14.5 |
| 0.538 | 11.2 | 20.3 | 31.5 | 46.0 | -14.5 |
| 1.584 | 11.0 | 20.4 | 31.4 | 46.0 | -14.6 |
| 4.296 | 10.8 | 20.6 | 31.4 | 46.0 | -14.6 |
| 1.752 | 10.9 | 20.5 | 31.4 | 46.0 | -14.6 |
| 1.632 | 10.9 | 20.4 | 31.3 | 46.0 | -14.7 |
| 0.621 | 11.0 | 20.3 | 31.3 | 46.0 | -14.7 |
| 4.688 | 10.6 | 20.7 | 31.3 | 46.0 | -14.7 |
| 0.500 | 11.0 | 20.3 | 31.3 | 46.0 | -14.7 |
| 2.640 | 10.7 | 20.5 | 31.2 | 46.0 | -14.8 |
| 2.312 | 10.7 | 20.5 | 31.2 | 46.0 | -14.8 |
| 0.742 | 10.8 | 20.3 | 31.1 | 46.0 | -14.9 |
| 0.986 | 10.6 | 20.4 | 31.0 | 46.0 | -15.0 |
| 0.855 | 10.6 | 20.4 | 31.0 | 46.0 | -15.0 |

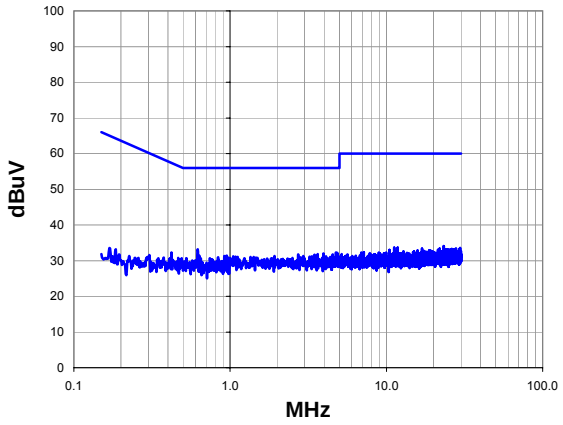
# AC POWERLINE CONDUCTED EMISSIONS

| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | THKE0020 | **Date:** | 08/07/12 | | |
| **Project:** | None | **Temperature:** | 23.6 °C | | |
| **Job Site:** | EV07 | **Humidity:** | 49% RH | | |
| **Serial Number:** | None | **Barometric Pres.:** | 1015.5 mbar | **Tested by:** | Carl Engholm |
| **EUT:** | Modlet IQ ESP | | | | |
| **Configuration:** | 1 | | | | |
| **Customer:** | ThinkEco, Inc. | | | | |
| **Attendees:** | None | | | | |
| **EUT Power:** | 110VAC/60Hz | | | | |
| **Operating Mode:** | Transmitting maximum duty cycle, high channel (CH 26) | | | | |
| **Deviations:** | None | | | | |
| **Comments:** | None | | | | |

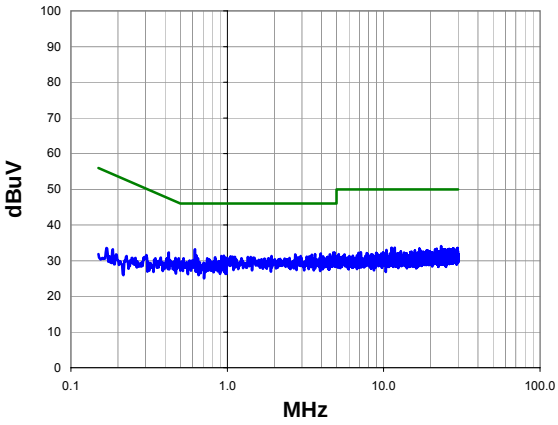
| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.207:2012 | ANSI C63.10:2009 |

| **Run #** | 9 | **Line:** | High Line | **Ext. Attenuation:** | 20 | **Results** | Pass |
|---|---|---|---|---|---|---|---|

**Peak Data - vs - Quasi Peak Limit**




**Peak Data - vs - Average Limit**




Peak Data - vs - Quasi Peak Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 0.621 | 12.9 | 20.3 | 33.2 | 56.0 | -22.8 |
| 4.760 | 11.6 | 20.7 | 32.3 | 56.0 | -23.7 |
| 4.856 | 11.5 | 20.7 | 32.2 | 56.0 | -23.8 |
| 3.960 | 11.4 | 20.6 | 32.0 | 56.0 | -24.0 |
| 3.640 | 11.3 | 20.6 | 31.9 | 56.0 | -24.1 |
| 4.536 | 11.1 | 20.7 | 31.8 | 56.0 | -24.2 |
| 2.720 | 11.2 | 20.5 | 31.7 | 56.0 | -24.3 |
| 3.472 | 11.1 | 20.6 | 31.7 | 56.0 | -24.3 |
| 0.636 | 11.1 | 20.3 | 31.4 | 56.0 | -24.6 |
| 0.951 | 11.0 | 20.4 | 31.4 | 56.0 | -24.6 |
| 2.944 | 10.8 | 20.5 | 31.3 | 56.0 | -24.7 |
| 0.917 | 10.9 | 20.4 | 31.3 | 56.0 | -24.7 |
| 1.920 | 10.8 | 20.5 | 31.3 | 56.0 | -24.7 |
| 3.344 | 10.7 | 20.5 | 31.2 | 56.0 | -24.8 |
| 1.048 | 10.8 | 20.4 | 31.2 | 56.0 | -24.8 |
| 4.104 | 10.6 | 20.6 | 31.2 | 56.0 | -24.8 |
| 3.224 | 10.6 | 20.5 | 31.1 | 56.0 | -24.9 |
| 1.416 | 10.6 | 20.4 | 31.0 | 56.0 | -25.0 |
| 1.112 | 10.6 | 20.4 | 31.0 | 56.0 | -25.0 |
| 0.837 | 10.6 | 20.4 | 31.0 | 56.0 | -25.0 |

Peak Data - vs - Average Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 0.621 | 12.9 | 20.3 | 33.2 | 46.0 | -12.8 |
| 4.760 | 11.6 | 20.7 | 32.3 | 46.0 | -13.7 |
| 4.856 | 11.5 | 20.7 | 32.2 | 46.0 | -13.8 |
| 3.960 | 11.4 | 20.6 | 32.0 | 46.0 | -14.0 |
| 3.640 | 11.3 | 20.6 | 31.9 | 46.0 | -14.1 |
| 4.536 | 11.1 | 20.7 | 31.8 | 46.0 | -14.2 |
| 2.720 | 11.2 | 20.5 | 31.7 | 46.0 | -14.3 |
| 3.472 | 11.1 | 20.6 | 31.7 | 46.0 | -14.3 |
| 0.636 | 11.1 | 20.3 | 31.4 | 46.0 | -14.6 |
| 0.951 | 11.0 | 20.4 | 31.4 | 46.0 | -14.6 |
| 2.944 | 10.8 | 20.5 | 31.3 | 46.0 | -14.7 |
| 0.917 | 10.9 | 20.4 | 31.3 | 46.0 | -14.7 |
| 1.920 | 10.8 | 20.5 | 31.3 | 46.0 | -14.7 |
| 3.344 | 10.7 | 20.5 | 31.2 | 46.0 | -14.8 |
| 1.048 | 10.8 | 20.4 | 31.2 | 46.0 | -14.8 |
| 4.104 | 10.6 | 20.6 | 31.2 | 46.0 | -14.8 |
| 3.224 | 10.6 | 20.5 | 31.1 | 46.0 | -14.9 |
| 1.416 | 10.6 | 20.4 | 31.0 | 46.0 | -15.0 |
| 1.112 | 10.6 | 20.4 | 31.0 | 46.0 | -15.0 |
| 0.837 | 10.6 | 20.4 | 31.0 | 46.0 | -15.0 |

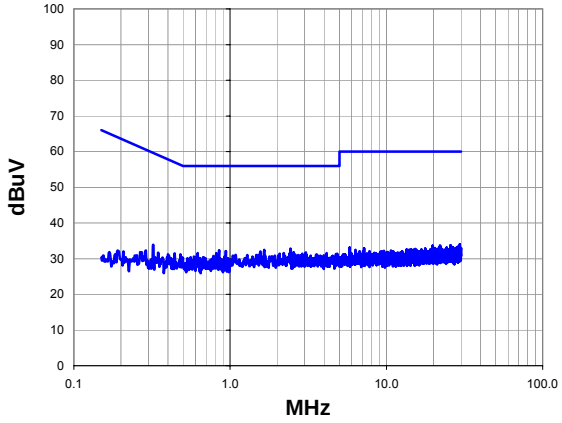
# AC POWERLINE CONDUCTED EMISSIONS

| | | | | | |
|---|---|---|---|---|---|
| **Work Order:** | THKE0020 | **Date:** | 08/07/12 | | |
| **Project:** | None | **Temperature:** | 23.6 °C | | |
| **Job Site:** | EV07 | **Humidity:** | 49% RH | | |
| **Serial Number:** | None | **Barometric Pres.:** | 1015.5 mbar | **Tested by:** | Carl Engholm |
| **EUT:** | Modlet IQ ESP | | | | |
| **Configuration:** | 1 | | | | |
| **Customer:** | ThinkEco, Inc. | | | | |
| **Attendees:** | None | | | | |
| **EUT Power:** | 110VAC/60Hz | | | | |
| **Operating Mode:** | Transmitting maximum duty cycle, high channel (CH 26) | | | | |
| **Deviations:** | None | | | | |
| **Comments:** | None | | | | |

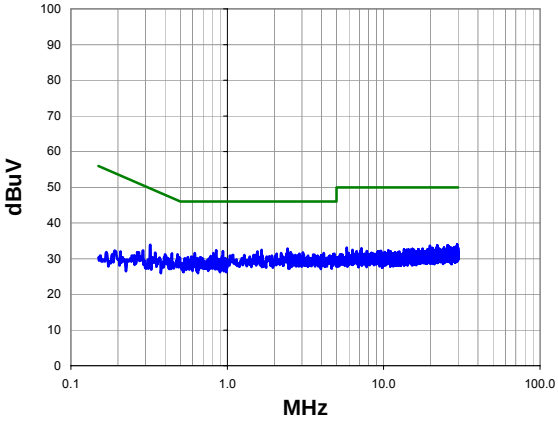
| **Test Specifications** | **Test Method** |
|---|---|
| FCC 15.207:2012 | ANSI C63.10:2009 |

| **Run #** | 10 | **Line:** | Neutral | **Ext. Attenuation:** | 20 | **Results** | Pass |
|---|---|---|---|---|---|---|---|

**Peak Data - vs - Quasi Peak Limit**




**Peak Data - vs - Average Limit**




Peak Data - vs - Quasi Peak Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 2.432 | 12.3 | 20.5 | 32.8 | 56.0 | -23.2 |
| 1.656 | 12.0 | 20.4 | 32.4 | 56.0 | -23.6 |
| 0.849 | 12.0 | 20.4 | 32.4 | 56.0 | -23.6 |
| 0.939 | 11.7 | 20.4 | 32.1 | 56.0 | -23.9 |
| 1.560 | 11.6 | 20.4 | 32.0 | 56.0 | -24.0 |
| 2.552 | 11.3 | 20.5 | 31.8 | 56.0 | -24.2 |
| 3.048 | 11.2 | 20.5 | 31.7 | 56.0 | -24.3 |
| 0.619 | 11.3 | 20.3 | 31.6 | 56.0 | -24.4 |
| 4.144 | 11.0 | 20.6 | 31.6 | 56.0 | -24.4 |
| 2.208 | 11.1 | 20.5 | 31.6 | 56.0 | -24.4 |
| 0.815 | 11.2 | 20.3 | 31.5 | 56.0 | -24.5 |
| 2.896 | 10.9 | 20.5 | 31.4 | 56.0 | -24.6 |
| 4.840 | 10.7 | 20.7 | 31.4 | 56.0 | -24.6 |
| 2.072 | 10.9 | 20.5 | 31.4 | 56.0 | -24.6 |
| 3.608 | 10.6 | 20.6 | 31.2 | 56.0 | -24.8 |
| 3.088 | 10.6 | 20.5 | 31.1 | 56.0 | -24.9 |
| 2.608 | 10.6 | 20.5 | 31.1 | 56.0 | -24.9 |
| 1.288 | 10.6 | 20.4 | 31.0 | 56.0 | -25.0 |
| 1.088 | 10.6 | 20.4 | 31.0 | 56.0 | -25.0 |
| 3.984 | 10.4 | 20.6 | 31.0 | 56.0 | -25.0 |

Peak Data - vs - Average Limit

| Freq (MHz) | Amplitude (dBuV) | Factor (dB) | Adjusted (dBuV) | Spec. Limit (dBuV) | Compared to Spec. (dB) |
|---|---|---|---|---|---|
| 2.432 | 12.3 | 20.5 | 32.8 | 46.0 | -13.2 |
| 1.656 | 12.0 | 20.4 | 32.4 | 46.0 | -13.6 |
| 0.849 | 12.0 | 20.4 | 32.4 | 46.0 | -13.6 |
| 0.939 | 11.7 | 20.4 | 32.1 | 46.0 | -13.9 |
| 1.560 | 11.6 | 20.4 | 32.0 | 46.0 | -14.0 |
| 2.552 | 11.3 | 20.5 | 31.8 | 46.0 | -14.2 |
| 3.048 | 11.2 | 20.5 | 31.7 | 46.0 | -14.3 |
| 0.619 | 11.3 | 20.3 | 31.6 | 46.0 | -14.4 |
| 4.144 | 11.0 | 20.6 | 31.6 | 46.0 | -14.4 |
| 2.208 | 11.1 | 20.5 | 31.6 | 46.0 | -14.4 |
| 0.815 | 11.2 | 20.3 | 31.5 | 46.0 | -14.5 |
| 2.896 | 10.9 | 20.5 | 31.4 | 46.0 | -14.6 |
| 4.840 | 10.7 | 20.7 | 31.4 | 46.0 | -14.6 |
| 2.072 | 10.9 | 20.5 | 31.4 | 46.0 | -14.6 |
| 3.608 | 10.6 | 20.6 | 31.2 | 46.0 | -14.8 |
| 3.088 | 10.6 | 20.5 | 31.1 | 46.0 | -14.9 |
| 2.608 | 10.6 | 20.5 | 31.1 | 46.0 | -14.9 |
| 1.288 | 10.6 | 20.4 | 31.0 | 46.0 | -15.0 |
| 1.088 | 10.6 | 20.4 | 31.0 | 46.0 | -15.0 |
| 3.984 | 10.4 | 20.6 | 31.0 | 46.0 | -15.0 |

# Spurious Conducted Emissions



Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|---|---|---|---|---|---|
| Spectrum Analyzer | Agilent | E4440A | AFD | 7/5/2011 | 12 |
| EV06 Direct Connect Cable | ESM Cable Corp. | TT | ECA | NCR | 0 |
| 40GHz DC Block | Miteq | DCB4000 | AMD | 8/12/2011 | 12 |
| Attenuator 20 dB, SMA M/F 26GHz | S.M. Electronics | SA26B-20 | AUY | 8/2/2011 | 12 |
| MXG Vector Signal Generator | Agilent | N5182A | TIF | NCR | 0 |

**MEASUREMENT UNCERTAINTY**

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

**TEST DESCRIPTION**

The spurious RF conducted emissions were measured with the EUT set to low, medium, and high transmit frequencies. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its only data rate available using direct sequence modulation. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

NORTHWEST
**EMC**

# Spurious Conducted Emissions

XMit 2011.08.04
PsaTx 2011.08.04

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | Modlet TE1010 | | | **Work Order:** | THKE0005 |
| **Serial Number:** | 804F580000100A19 | | | **Date:** | 08/18/11 |
| **Customer:** | ThinkEco, Inc. | | | **Temperature:** | 22.6°C |
| **Attendees:** | Bryan Takata | | | **Humidity:** | 48% |
| **Project:** | None | | | **Barometric Pres.:** | 30.3 in |
| **Tested by:** | Rod Peloquin | **Power:** | 5VDC via USB | **Job Site:** | EV06 |

| TEST SPECIFICATIONS | TEST METHOD |
|---|---|
| FCC 15.247:2011 | ANSI C63.10:2009 |

**COMMENTS**

Transmitting continuous mode with modulation. 0.4 dB added to reference level offset for antenna port adapter cable.

**DEVIATIONS FROM TEST STANDARD**

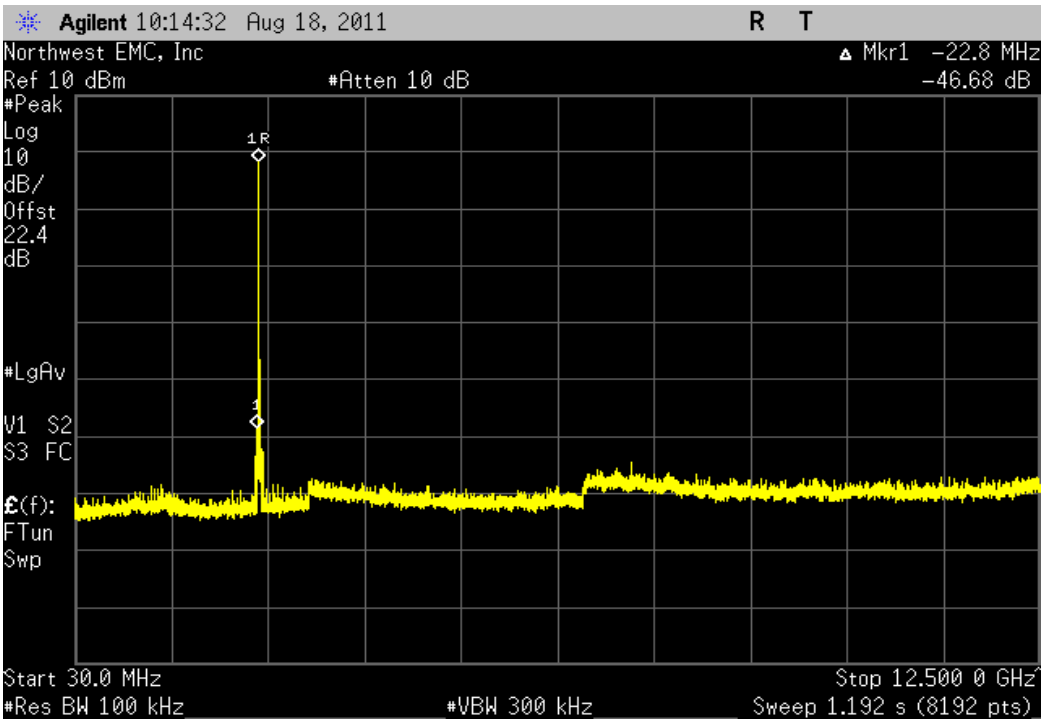
None

| Configuration # | 1 | Signature |
|---|---|---|

| Channel | Frequency Range | Value | Limit | Result |
|---|---|---|---|---|
| Low, 11, 2405 MHz | 30 MHz - 12.5 GHz | -46.68 dBc | ≤ -20 dBc | Pass |
| Low, 11, 2405 MHz | 12.5 GHz - 25 GHz | -51 dBc | ≤ -20 dBc | Pass |
| Mid, 19, 2445 MHz | 30 MHz - 12.5 GHz | -53.98 dBc | ≤ -20 dBc | Pass |
| Mid, 19, 2445 MHz | 12.5 GHz - 25 GHz | -51.27 dBc | ≤ -20 dBc | Pass |
| High, 26, 2480 MHz | 30 MHz - 12.5 GHz | -44.99 dBc | ≤ -20 dBc | Pass |
| High, 26, 2480 MHz | 12.5 GHz - 25 GHz | -51.06 dBc | ≤ -20 dBc | Pass |

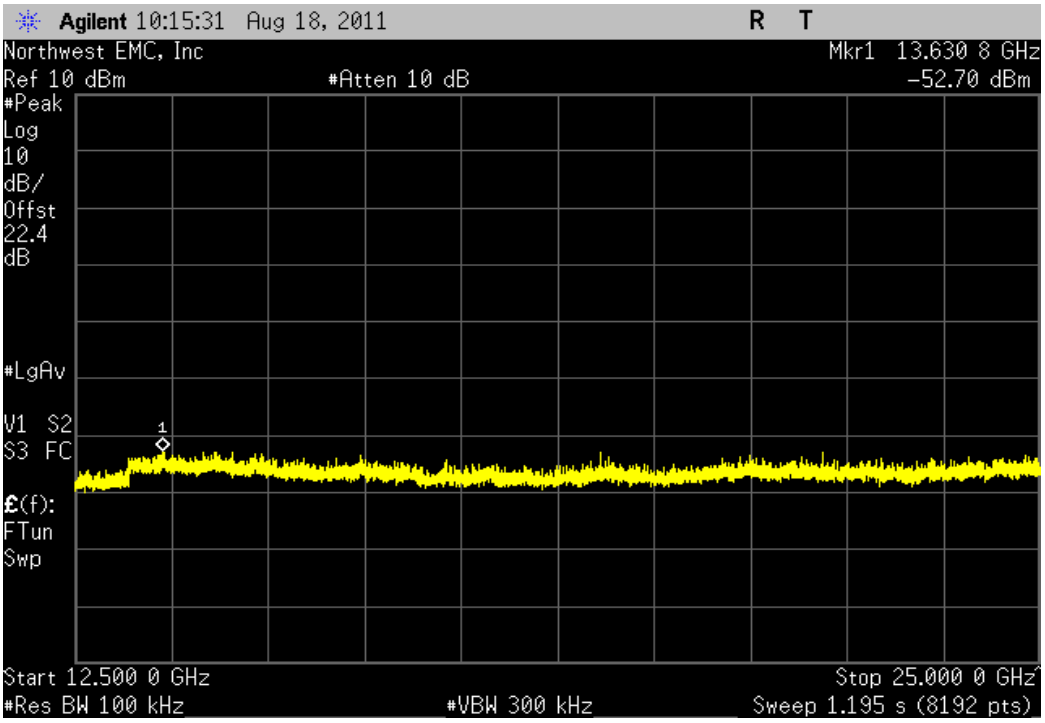
Low, 11, 2405 MHz

| Frequency Range | | Value | Limit | Result |
|---|---|---|---|---|
| 30 MHz - 12.5 GHz | | -46.68 dBc | ≤ -20 dBc | Pass |




Low, 11, 2405 MHz

| Frequency Range | | Value | Limit | Result |
|---|---|---|---|---|
| 12.5 GHz - 25 GHz | | -51 dBc | ≤ -20 dBc | Pass |

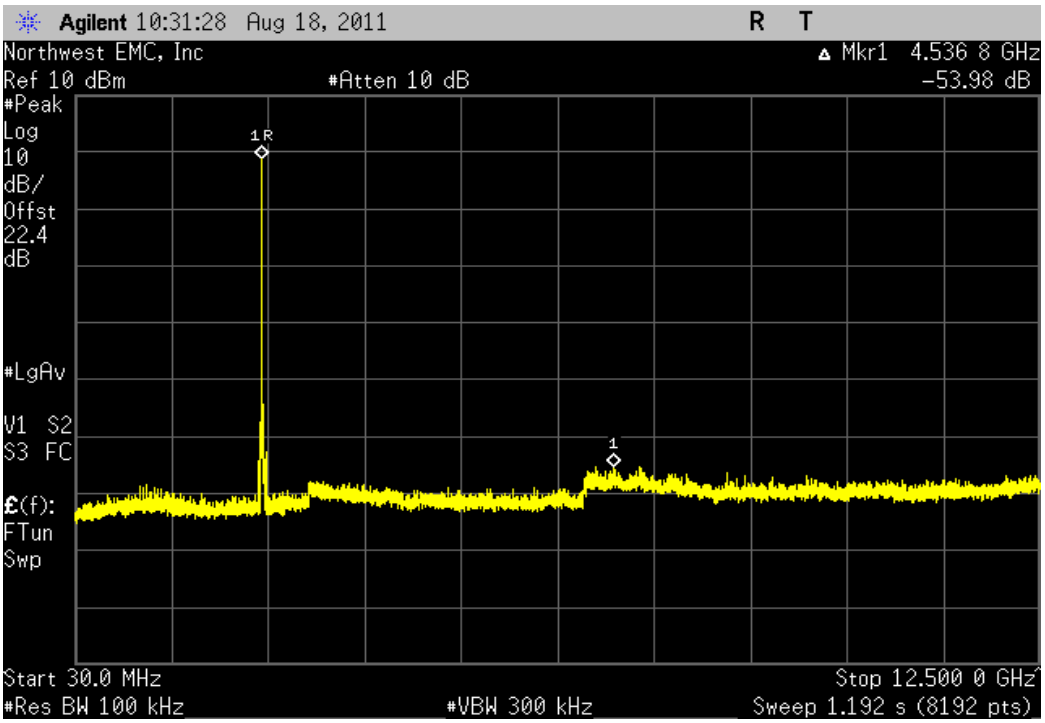


# Spurious Conducted Emissions



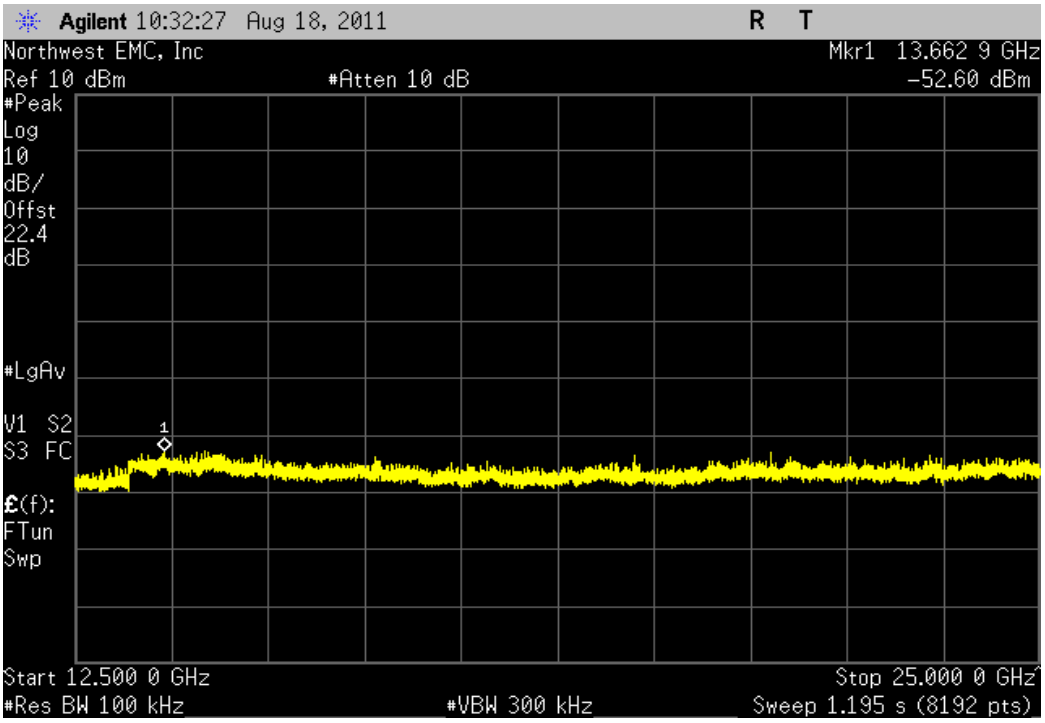
Mid, 19, 2445 MHz

| Frequency Range | | Value | Limit | Result |
|---|---|---|---|---|
| 30 MHz - 12.5 GHz | | -53.98 dBc | ≤ -20 dBc | Pass |

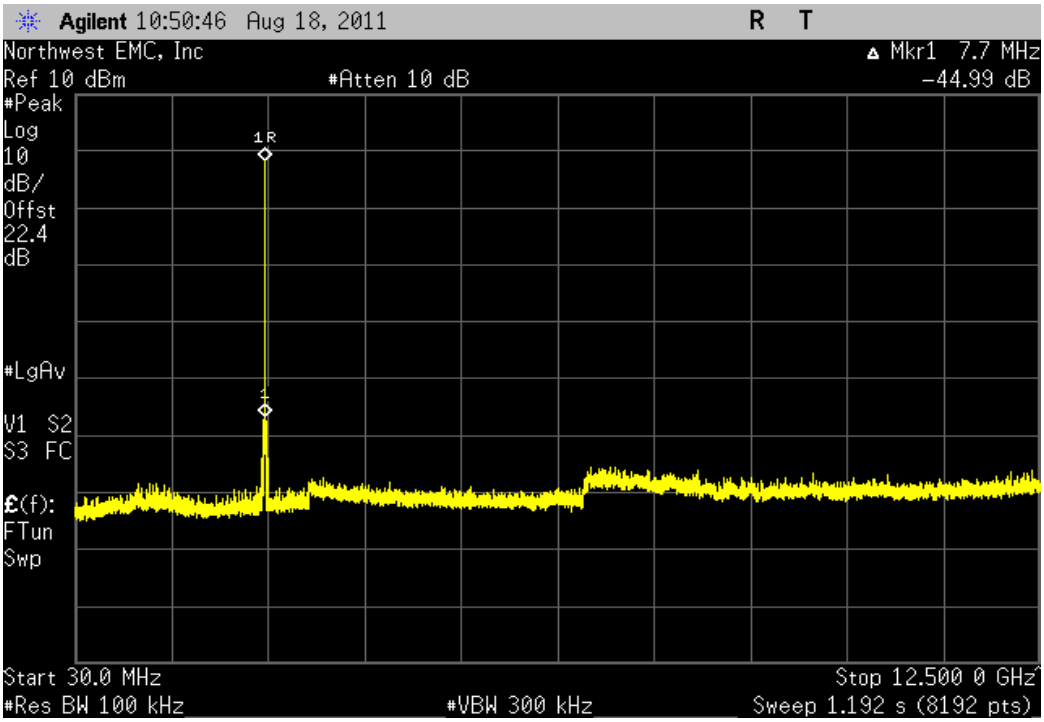



Mid, 19, 2445 MHz

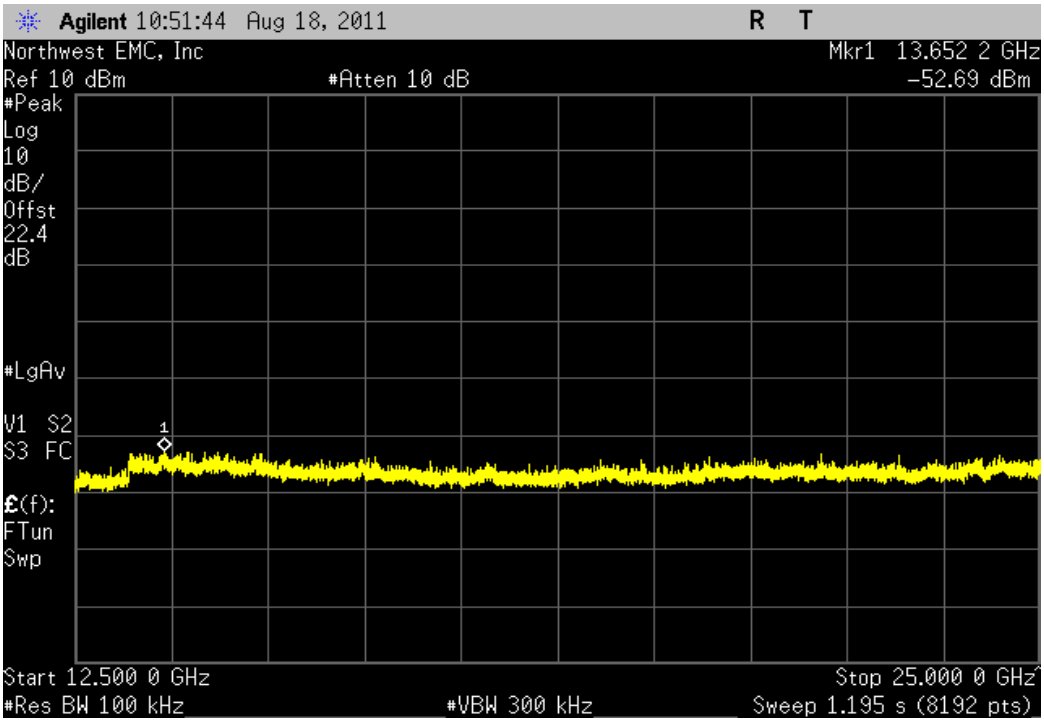
| Frequency Range | | Value | Limit | Result |
|---|---|---|---|---|
| 12.5 GHz - 25 GHz | | -51.27 dBc | ≤ -20 dBc | Pass |



| High, 26, 2480 MHz | | | | |
|---|---|---|---|---|
| **Frequency Range** | | **Value** | **Limit** | **Result** |
| 30 MHz - 12.5 GHz | | -44.99 dBc | ≤ -20 dBc | Pass |




| High, 26, 2480 MHz | | | | |
|---|---|---|---|---|
| **Frequency Range** | | **Value** | **Limit** | **Result** |
| 12.5 GHz - 25 GHz | | -51.06 dBc | ≤ -20 dBc | Pass |



# Power Spectral Density



Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|---|---|---|---|---|---|
| Spectrum Analyzer | Agilent | E4440A | AFD | 7/5/2011 | 12 |
| 40GHz DC Block | Miteq | DCB4000 | AMD | 8/12/2011 | 12 |
| Attenuator 20 dB, SMA M/F 26GHz | S.M. Electronics | SA26B-20 | AUY | 8/2/2011 | 12 |
| EV06 Direct Connect Cable | ESM Cable Corp. | TT | ECA | NCR | 0 |
| MXG Vector Signal Generator | Agilent | N5182A | TIF | NCR | 0 |

**MEASUREMENT UNCERTAINTY**

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

**TEST DESCRIPTION**

The power spectral density measurements were measured with the EUT set to low, mid, and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its only data rate available for each modulation type available. ANSI C63.10:2009, Section 6.11.2.3 was followed. The spectrum analyzer was set as follows:

The emission peak was located and zoomed in on within the passband.

a) RBW = 3 kHz

b) VBW = 10 kHz

c) Span = 300 kHz

d) Sweep time = 100s

e) Trace set to MAX

f) The 1 hz Marker Noise function on the analyzer was used. The data was corrected to 3 kHz by adding 34.8 dB to the reading.

NORTHWEST

**EMC**

# Power Spectral Density

XMit 2011.08.04
PsaTx 2011.08.04

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | Modlet TE1010 | | | **Work Order:** | THKE0005 |
| **Serial Number:** | 804F580000100A19 | | | **Date:** | 08/18/11 |
| **Customer:** | ThinkEco, Inc. | | | **Temperature:** | 22.6°C |
| **Attendees:** | Bryan Takata | | | **HuMid, 19, 2445 MHzity:** | 48% |
| **Project:** | None | | | **Barometric Pres.:** | 30.3 in |
| **Tested by:** | Rod Peloquin | **Power:** | 5VDC via USB | **Job Site:** | EV06 |

| TEST SPECIFICATIONS | TEST METHOD |
|---|---|
| FCC 15.247:2011 | ANSI C63.10:2009 |
| | |

**COMMENTS**

Transmitting continuous mode with modulation. 0.4 dB added to reference level offset for antenna port adapter cable.

**DEVIATIONS FROM TEST STANDARD**

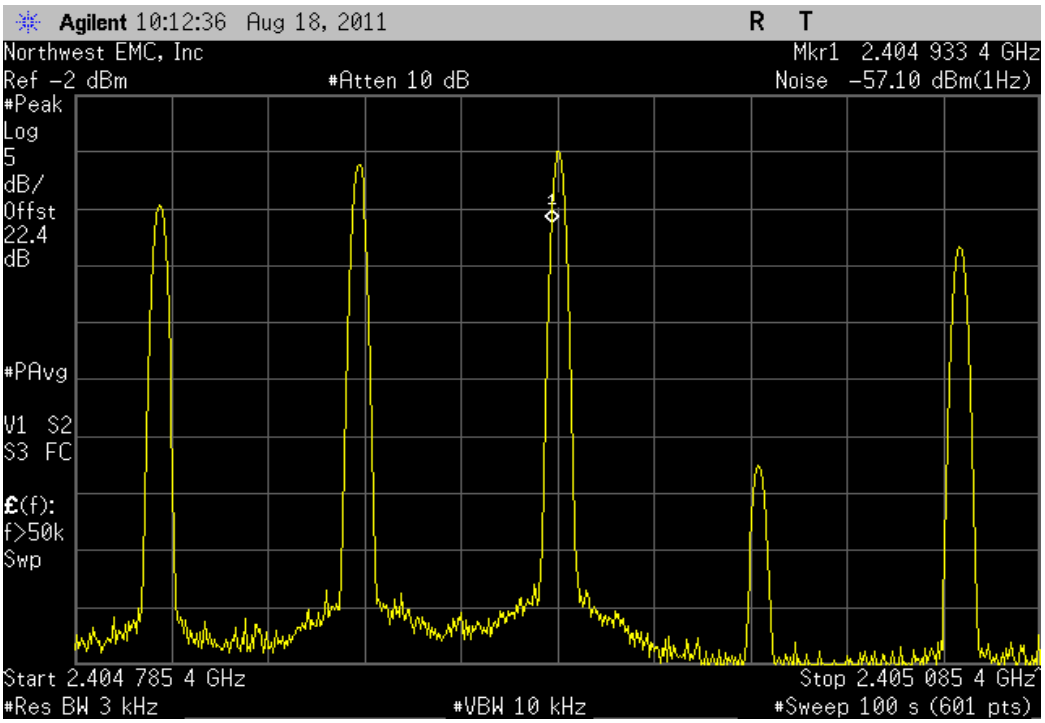
None

| Configuration # | 1 | Signature |
|---|---|---|

| Channel | Value (dBm / Hz) | (dBm / Hz) To (dBm / 3 kHz) | Value (dBm / 3 kHz) | Limit (dBm / 3 kHz) | Result |
|---|---|---|---|---|---|
| Low, 11, 2405 MHz | -57.096 | 34.8 | -22.296 | 8 | Pass |
| Mid, 19, 2445 MHz | -57.347 | 34.8 | -22.547 | 8 | Pass |
| High, 26, 2480 MHz | -57.453 | 34.8 | -22.653 | 8 | Pass |

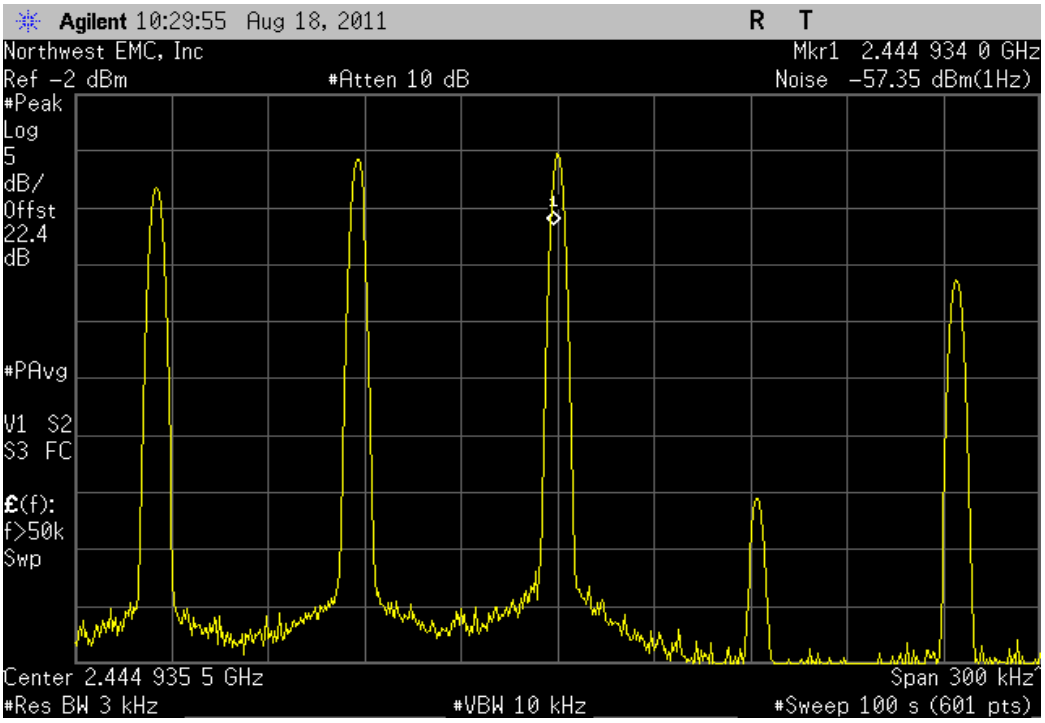
Low, 11, 2405 MHz

| | | Value (dBm / Hz) | (dBm / Hz) To (dBm / 3 kHz) | Value (dBm / 3 kHz) | Limit (dBm / 3 kHz) | Result |
|---|---|---|---|---|---|---|
| | | -57.096 | 34.8 | -22.296 | 8 | Pass |

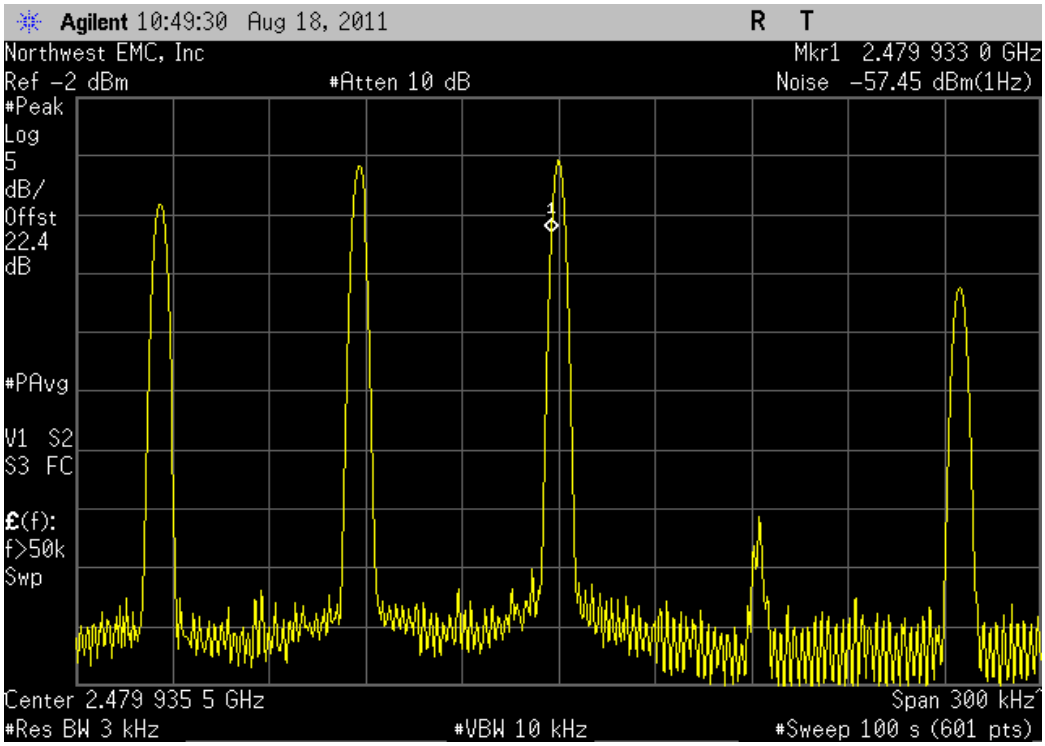



Mid, 19, 2445 MHz

| | | Value (dBm / Hz) | (dBm / Hz) To (dBm / 3 kHz) | Value (dBm / 3 kHz) | Limit (dBm / 3 kHz) | Result |
|---|---|---|---|---|---|---|
| | | -57.347 | 34.8 | -22.547 | 8 | Pass |



| High, 26, 2480 MHz | | | | | | |
|---|---|---|---|---|---|---|
| | | Value (dBm / Hz) | (dBm / Hz) To (dBm / 3 kHz) | Value (dBm / 3 kHz) | Limit (dBm / 3 kHz) | Result |
| | | -57.453 | 34.8 | -22.653 | 8 | Pass |



# Occupied Bandwidth



Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|---|---|---|---|---|---|
| Spectrum Analyzer | Agilent | E4440A | AFD | 7/5/2011 | 12 |
| 40GHz DC Block | Miteq | DCB4000 | AMD | 8/12/2011 | 12 |
| Attenuator 20 dB, SMA M/F 26GHz | S.M. Electronics | SA26B-20 | AUY | 8/2/2011 | 12 |
| EV06 Direct Connect Cable | ESM Cable Corp. | TT | ECA | NCR | 0 |
| MXG Vector Signal Generator | Agilent | N5182A | TIF | NCR | 0 |

**MEASUREMENT UNCERTAINTY**

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

**TEST DESCRIPTION**

The 6 dB occupied bandwidth was measured with the EUT set to low, medium, and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its only data rate available with the typical modulation.

NORTHWEST

**EMC**

# Occupied Bandwidth

XMit 2011.08.04
PsaTx 2011.08.04

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | Modlet TE1010 | | | **Work Order:** | THKE0005 |
| **Serial Number:** | 804F580000100A19 | | | **Date:** | 08/18/11 |
| **Customer:** | ThinkEco, Inc. | | | **Temperature:** | 22.6°C |
| **Attendees:** | Bryan Takata | | | **HuMid, 19, 2445 MHzity:** | 48% |
| **Project:** | None | | | **Barometric Pres.:** | 30.3 in |
| **Tested by:** | Rod Peloquin | **Power:** | 5VDC via USB | **Job Site:** | EV06 |

| TEST SPECIFICATIONS | TEST METHOD |
|---|---|
| FCC 15.247:2011 | ANSI C63.10:2009 |
| | |

**COMMENTS**

Transmitting continuous mode with modulation. 0.4 dB added to reference level offset for antenna port adapter cable.

**DEVIATIONS FROM TEST STANDARD**

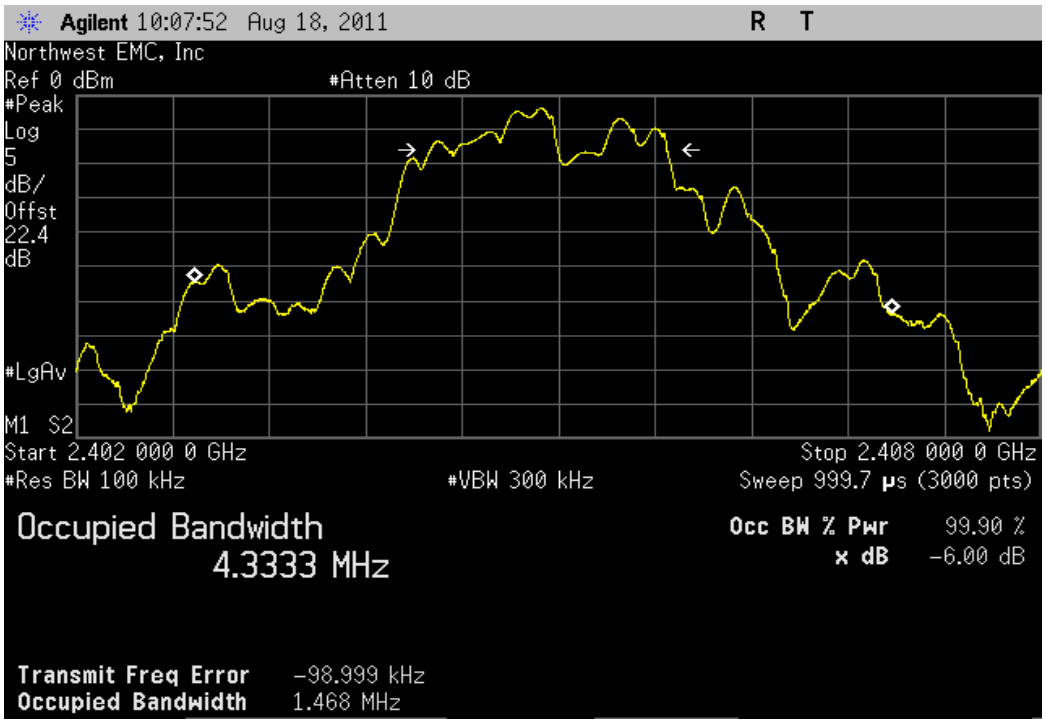
None

| Configuration # | 1 | Signature |
|---|---|---|

| Channel | Value | Limit | Result |
|---|---|---|---|
| Low, 11, 2405 MHz | 1.468 MHz | > 500 kHz | Pass |
| Mid, 19, 2445 MHz | 1.454 MHz | > 500 kHz | Pass |
| High, 26, 2480 MHz | 1.473 MHz | > 500 kHz | Pass |

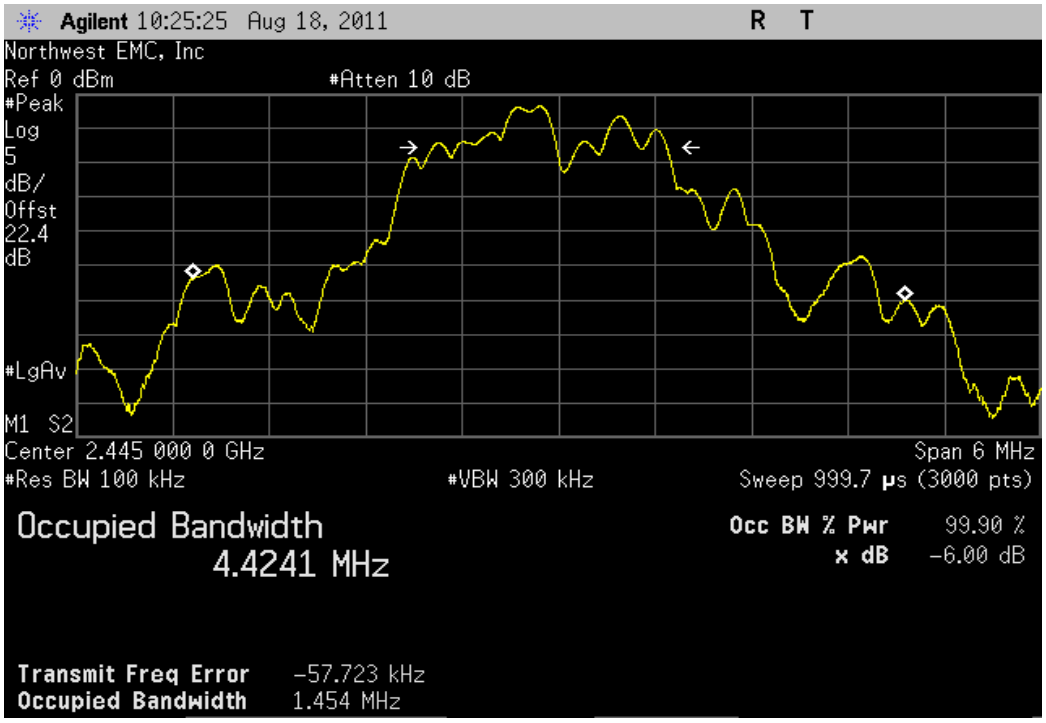
Low, 11, 2405 MHz

| Value | Limit | Result |
|---|---|---|
| 1.468 MHz | > 500 kHz | Pass |




Mid, 19, 2445 MHz

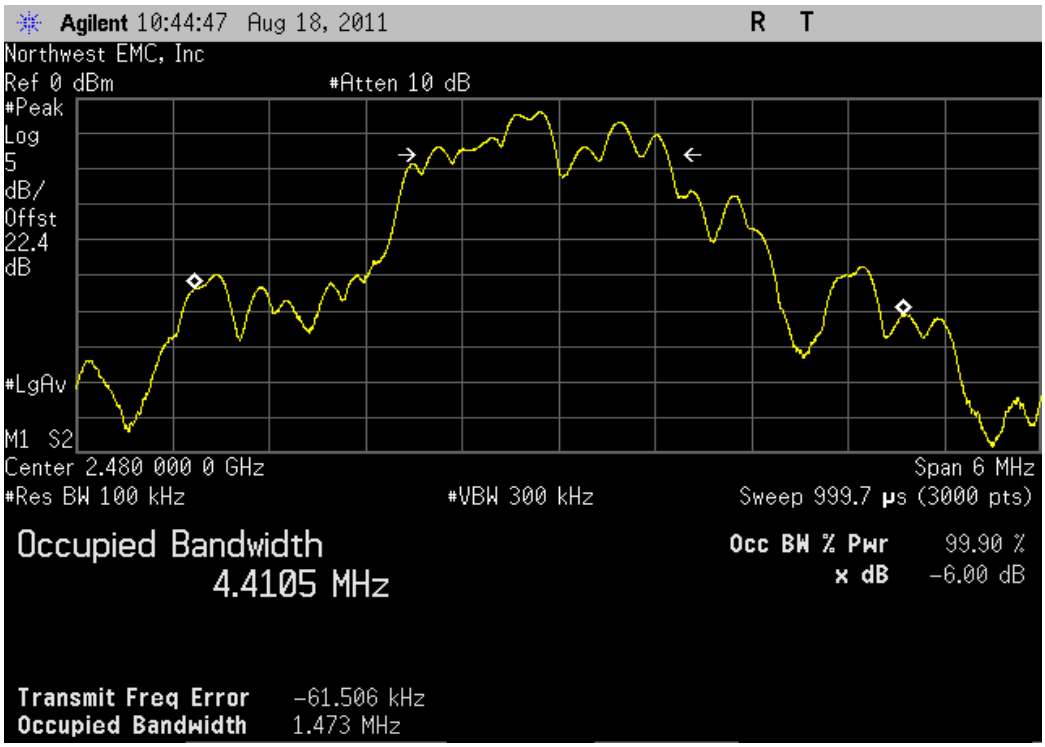
| Value | Limit | Result |
|---|---|---|
| 1.454 MHz | > 500 kHz | Pass |



# Occupied Bandwidth

High, 26, 2480 MHz

| | | | | Value | Limit | Result |
|---|---|---|---|---|---|---|
| | | | | 1.473 MHz | > 500 kHz | Pass |



# Band Edge Compliance



Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

**TEST EQUIPMENT**

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|---|---|---|---|---|---|
| Spectrum Analyzer | Agilent | E4440A | AFD | 7/5/2011 | 12 |
| 40GHz DC Block | Miteq | DCB4000 | AMD | 8/12/2011 | 12 |
| Attenuator 20 dB, SMA M/F 26GHz | S.M. Electronics | SA26B-20 | AUY | 8/2/2011 | 12 |
| EV06 Direct Connect Cable | ESM Cable Corp. | TT | ECA | NCR | 0 |
| MXG Vector Signal Generator | Agilent | N5182A | TIF | NCR | 0 |

**MEASUREMENT UNCERTAINTY**

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

**TEST DESCRIPTION**

The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in each available band. The channels closest to the band edges were selected. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its only data rate available.

The spectrum was scanned across each band edge from at least 10 MHz below the band edge to 10 MHz above the band edge.

NORTHWEST
**EMC**

# Band Edge Compliance

XMit 2011.08.04
PsaTx 2011.08.04

| | | | | | |
|---|---|---|---|---|---|
| **EUT:** | Modlet TE1010 | | | **Work Order:** | THKE0005 |
| **Serial Number:** | 804F580000100A19 | | | **Date:** | 08/18/11 |
| **Customer:** | ThinkEco, Inc. | | | **Temperature:** | 22.6°C |
| **Attendees:** | Bryan Takata | | | **Humidity:** | 48% |
| **Project:** | None | | | **Barometric Pres.:** | 30.3 in |
| **Tested by:** | Rod Peloquin | **Power:** | 5VDC via USB | **Job Site:** | EV06 |

| TEST SPECIFICATIONS | TEST METHOD |
|---|---|
| FCC 15.247:2011 | ANSI C63.10:2009 |

**COMMENTS**

Transmitting continuous mode with modulation. 0.4 dB added to reference level offset for antenna port adapter cable.

**DEVIATIONS FROM TEST STANDARD**

None

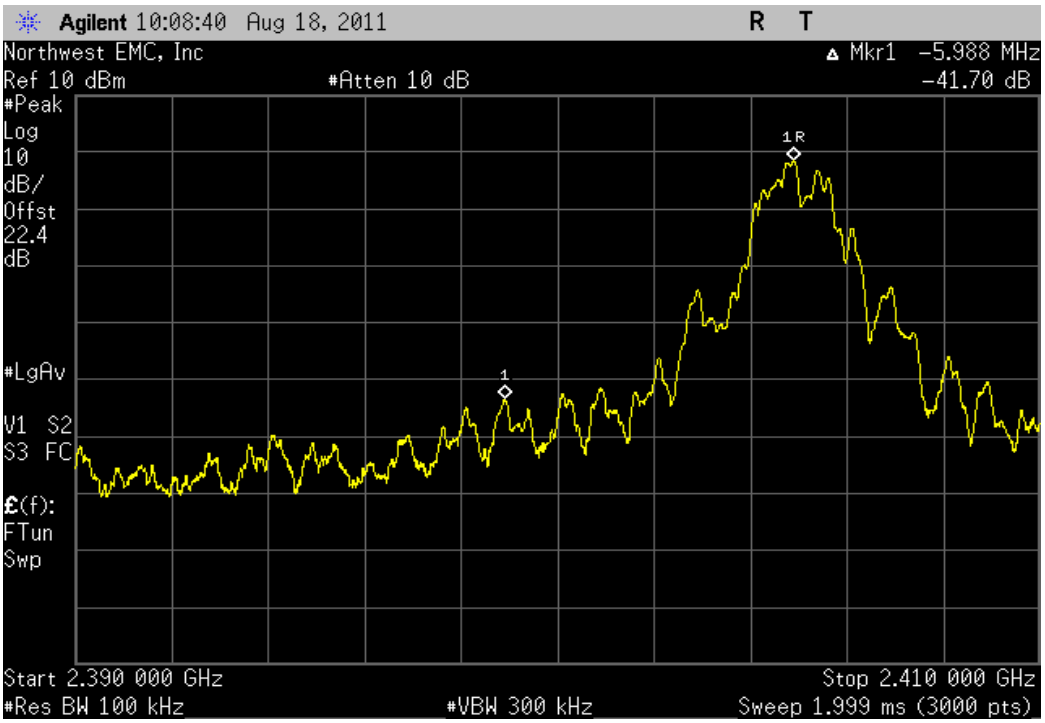
| Configuration # | 1 | Signature |
|---|---|---|

| Channel | Value | Limit | Result |
|---|---|---|---|
| Low, 11, 2405 MHz | -41.7 dBc | ≤ -20 dBc | Pass |
| High, 26, 2480 MHz | -39.66 dBc | ≤ -20 dBc | Pass |

# Band Edge Compliance

Low, 11, 2405 MHz

| | | | | Value | Limit | Result |
|---|---|---|---|---|---|---|
| | | | | -41.7 dBc | ≤ -20 dBc | Pass |




High, 26, 2480 MHz

| | | | | Value | Limit | Result |
|---|---|---|---|---|---|---|
| | | | | -39.66 dBc | ≤ -20 dBc | Pass |