



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

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

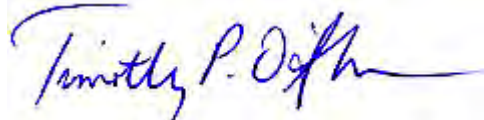
Emissions

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).

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America.

Product compliance is the responsibility of the client, therefore the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test.

REVISION HISTORY

Revision Number	Description	Date	Page Number
00 None			

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.

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.

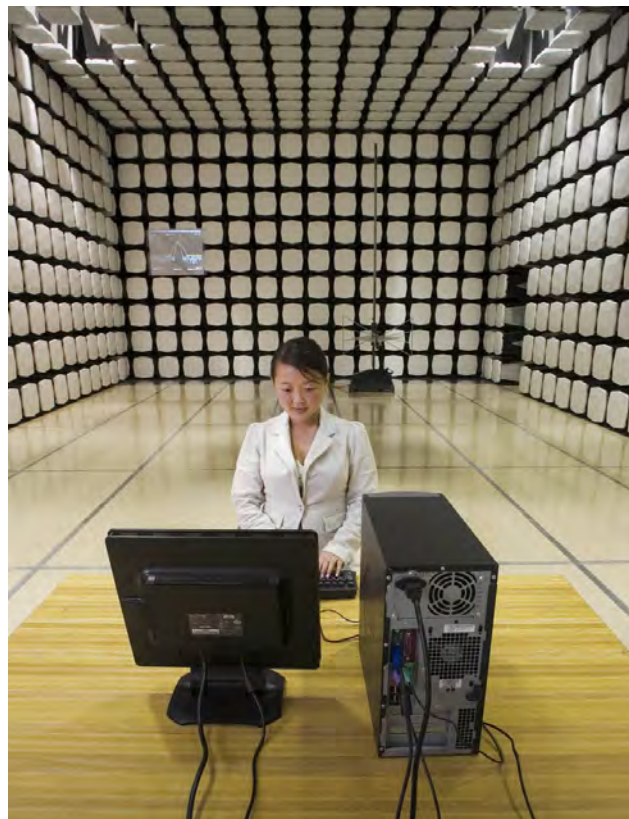
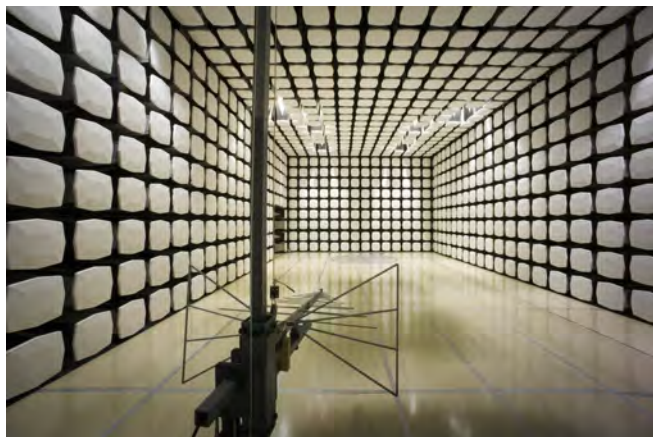
SCOPE

For details on the Scopes of our Accreditations, please visit:

<http://www.nwemc.com/accreditations/>



Oregon Labs EV01-EV12 22975 NW Evergreen Pkwy, #400 Hillsboro, OR 97124 (503) 844-4066	California Labs OC01-OC13 41 Tesla Irvine, CA 92618 (949) 861-8918	New York Labs WA01-WA04 4939 Jordan Rd. Elbridge, NY 13060 (315) 685-0796	Minnesota Labs MN01-MN08 9349 W Broadway Ave. Brooklyn Park, MN 55445 (763) 425-2281	Washington Labs SU01-SU07 14128 339 th Ave. SE Sultan, WA 98294 (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

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.

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.					

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.					

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:

$$20 * \text{LOG} (8 * 2.619 / 100) = -13.6 \text{ dB}$$



Duty Cycle

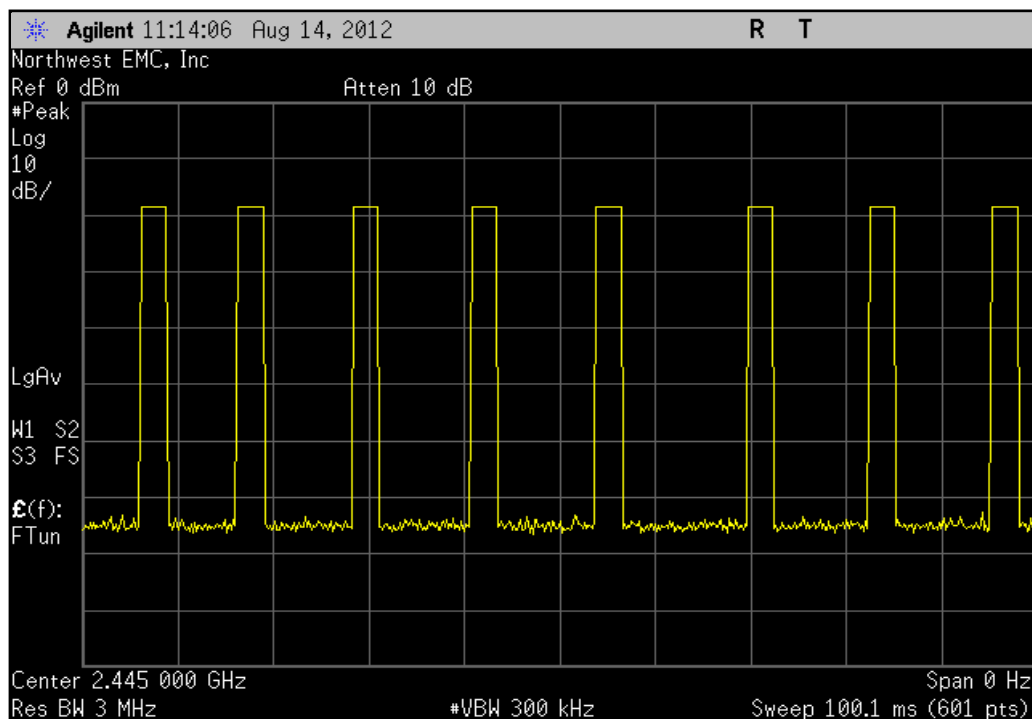
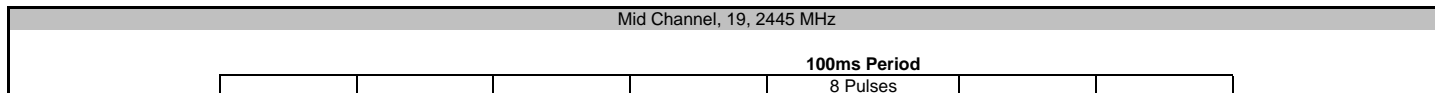
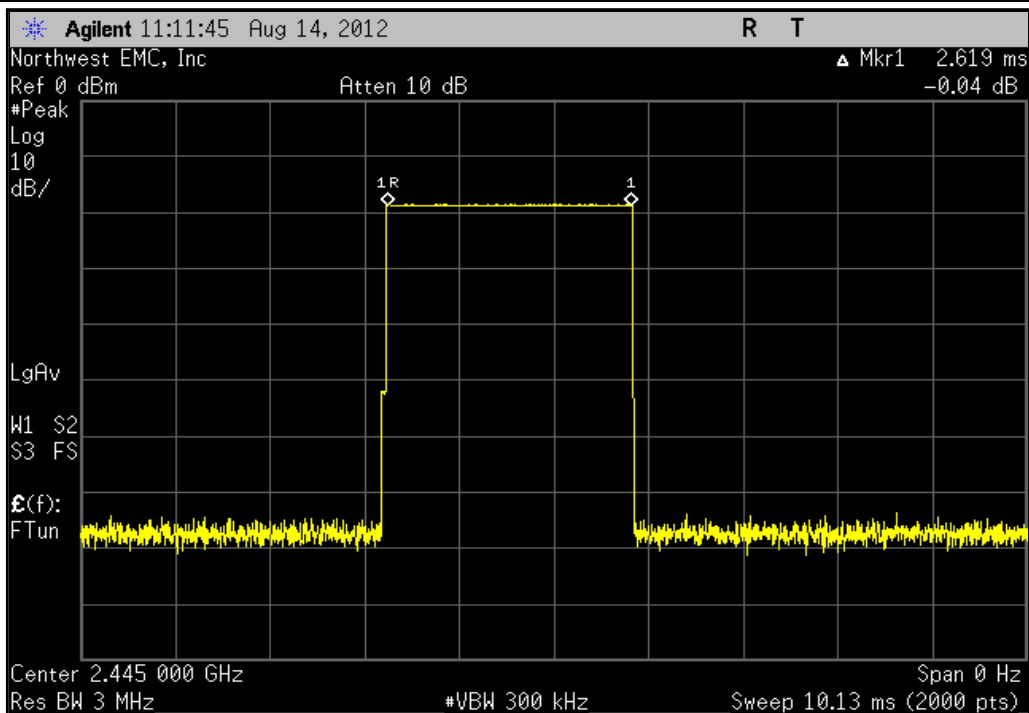
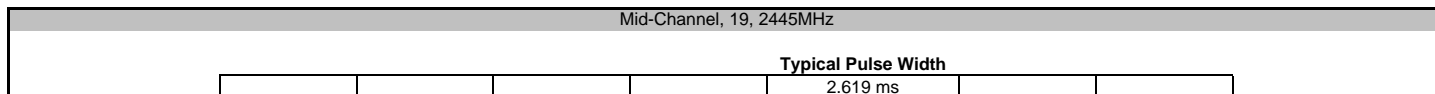
XMit 2012.07.31
PsaTx 2012.05.24

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		Job Site: OC10	
Power: 110VAC/60Hz			
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2012		ANSI C63.10:2009	
COMMENTS			
Transmitting continuous 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



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.



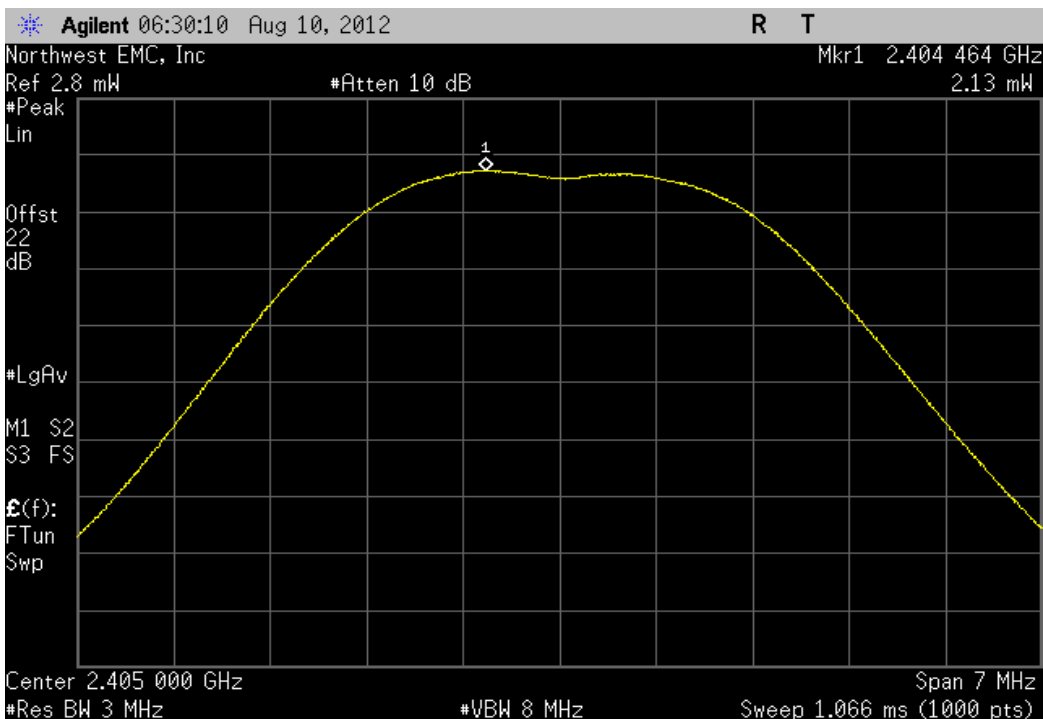
Output Power

XMit 2012.07.31
PsaTx 2012.05.24

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 continuous mode with modulation.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
Channel		Value	Limit
Low Channel, 11, 2405 MHz		2.132 mW	< 1 W
Mid Channel, 19, 2445 MHz		2.128 mW	< 1 W
High Channel, 26, 2480 MHz		2.101 mW	< 1 W
			Pass
			Pass
			Pass

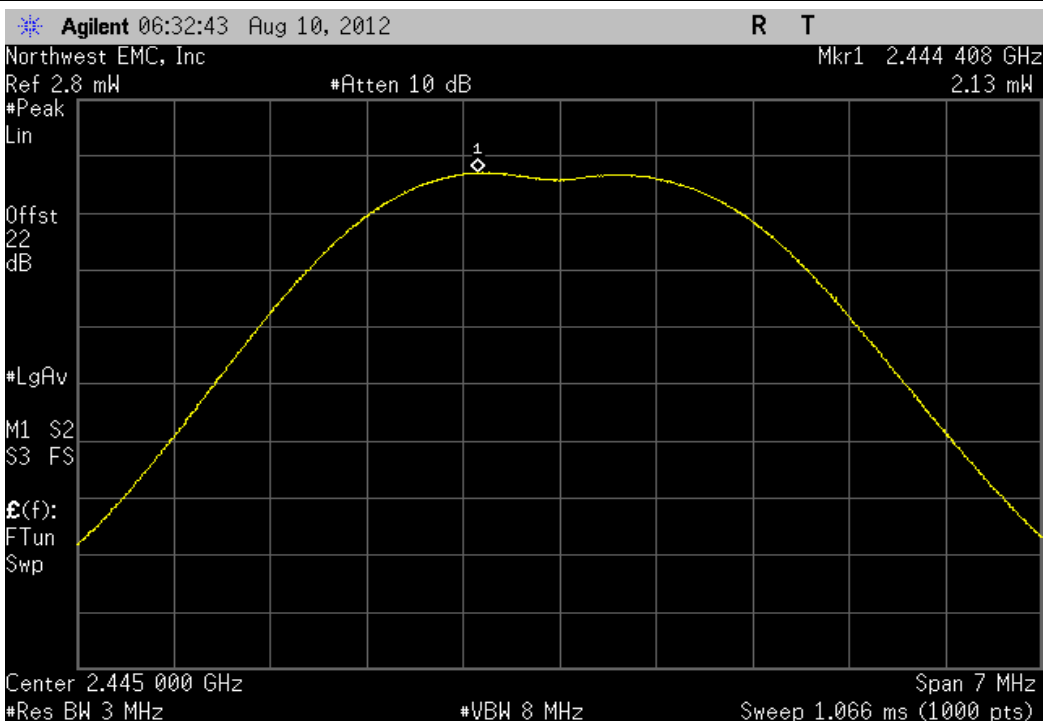
Low Channel, 11, 2405 MHz

				Value	Limit	Result
				2.132 mW	< 1 W	Pass



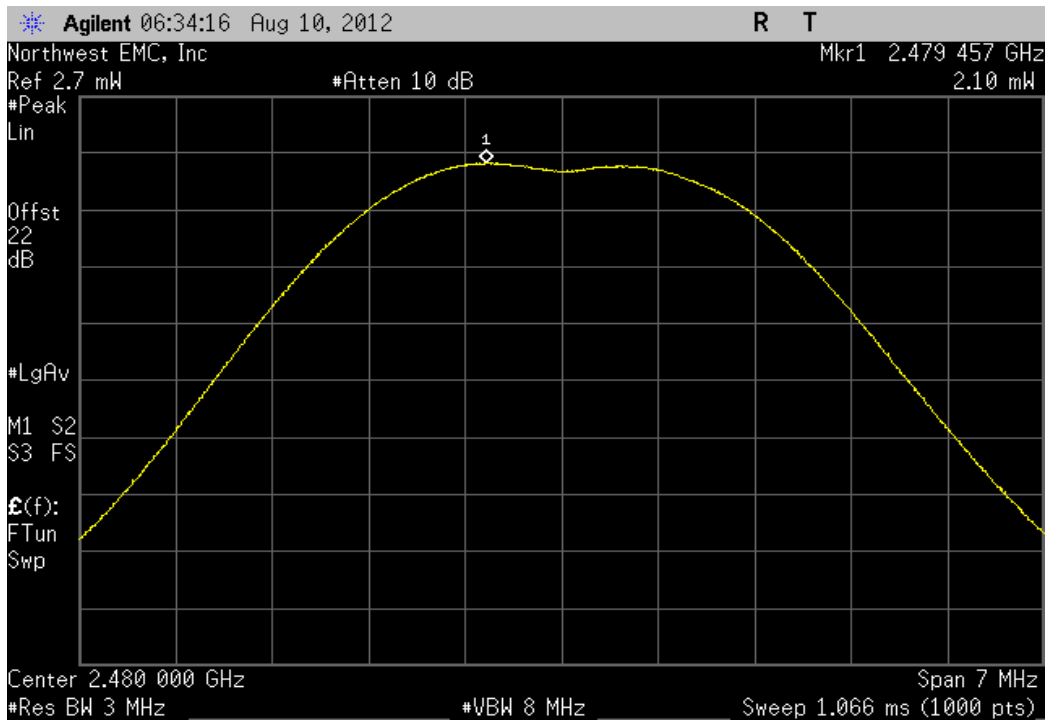
Mid Channel, 19, 2445 MHz

				Value	Limit	Result
				2.128 mW	< 1 W	Pass



High Channel, 26, 2480 MHz

Value	Limit	Result
2.101 mW	< 1 W	Pass



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
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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:

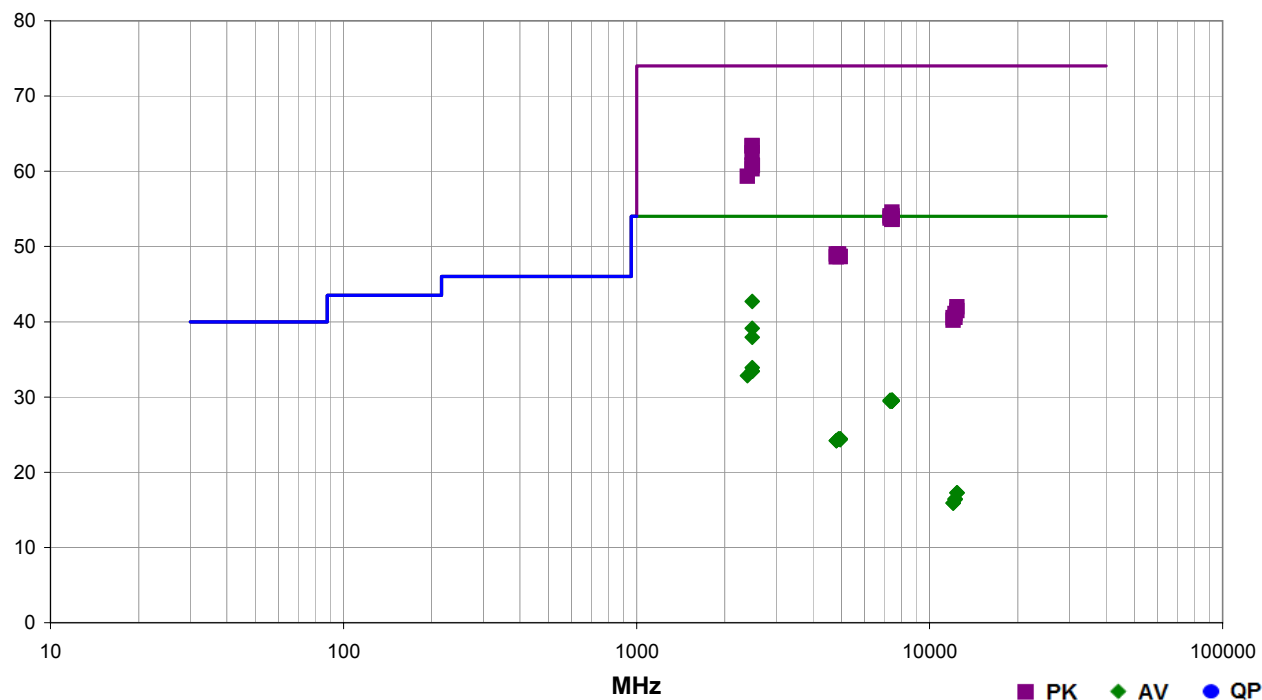
$$20 * \text{LOG} (8 * 2.619 / 100) = -13.6 \text{ dB}$$

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
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Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (I)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (I)	Spec. Limit (I)	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

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

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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.



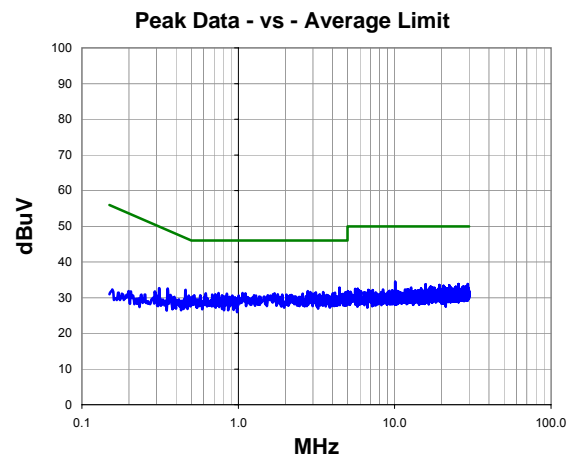
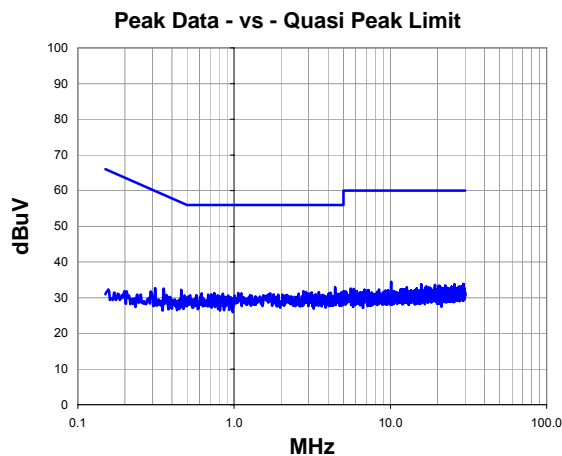
AC POWERLINE CONDUCTED EMISSIONS

PSA-ESCI 2012.05.07
PSA-ESCI Version 2011.12.21

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	
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
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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



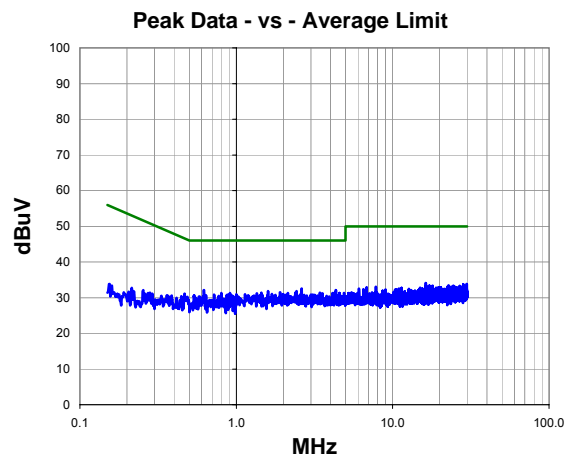
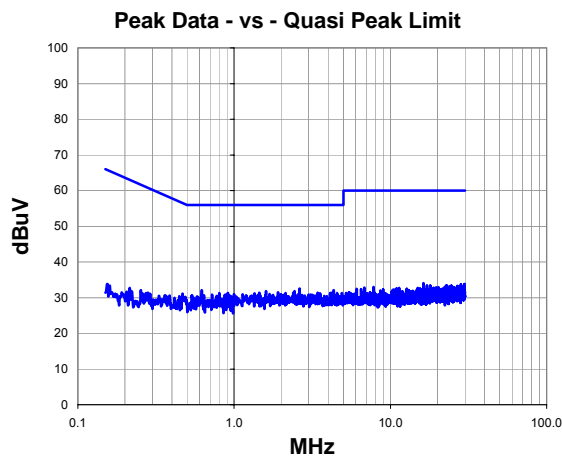
AC POWERLINE CONDUCTED EMISSIONS

PSA-ESCI 2012.05.07
PSA-ESCI Version 2011.12.21

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	
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
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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



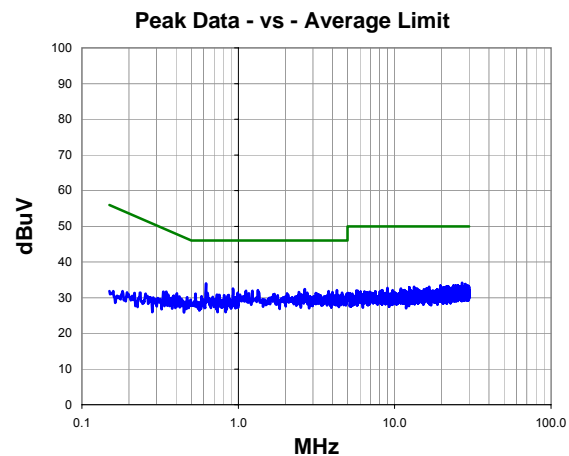
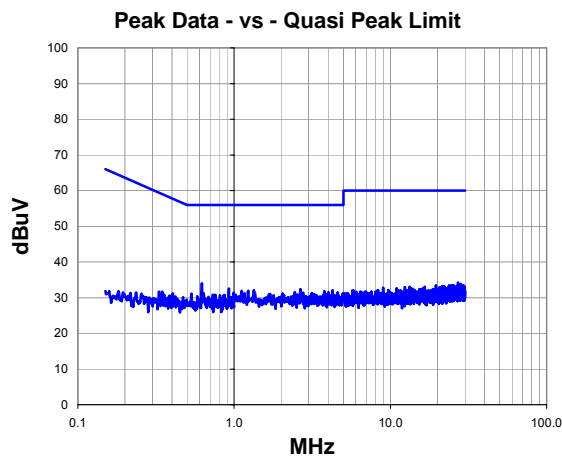
AC POWERLINE CONDUCTED EMISSIONS

PSA-ESCI 2012.05.07
PSA-ESCI Version 2011.12.21

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	
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
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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



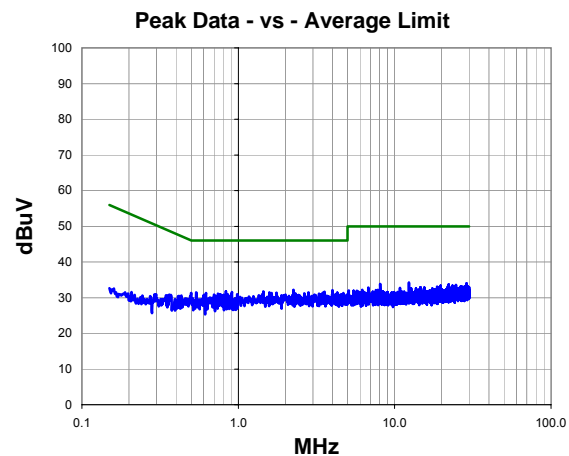
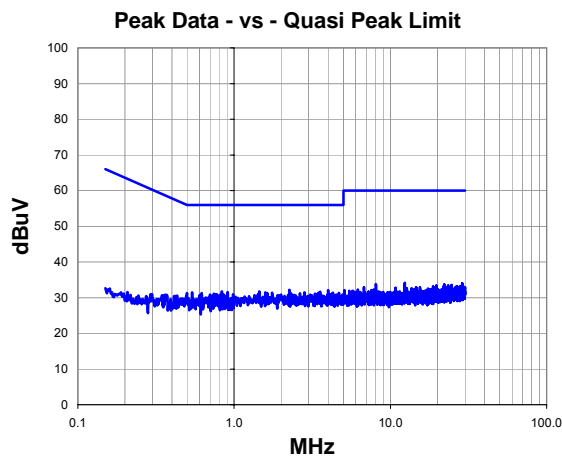
AC POWERLINE CONDUCTED EMISSIONS

PSA-ESCI 2012.05.07
PSA-ESCI Version 2011.12.21

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	
EUT:	Modlet IQ ESP			Tested by: Carl Engholm
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
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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



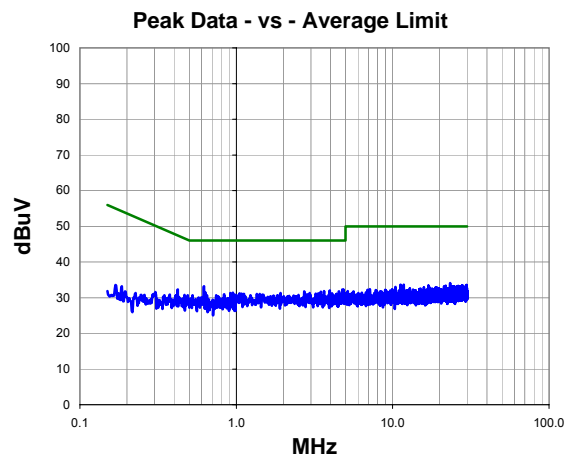
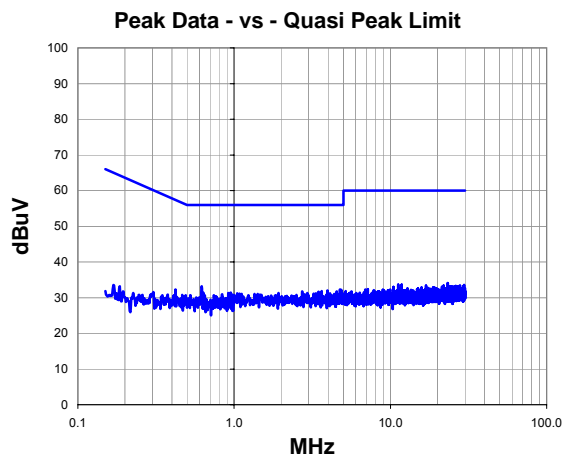
AC POWERLINE CONDUCTED EMISSIONS

PSA-ESCI 2012.05.07
PSA-ESCI Version 2011.12.21

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	
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
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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



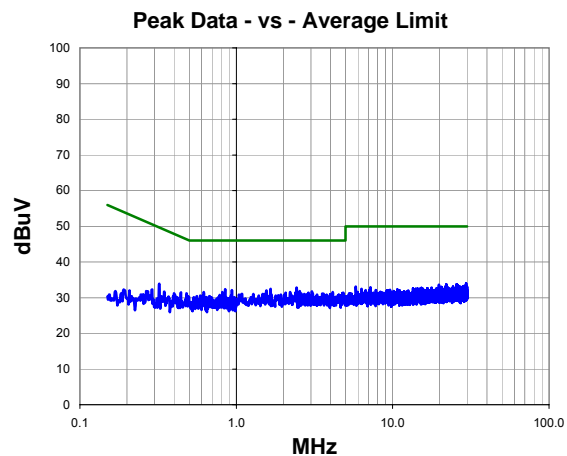
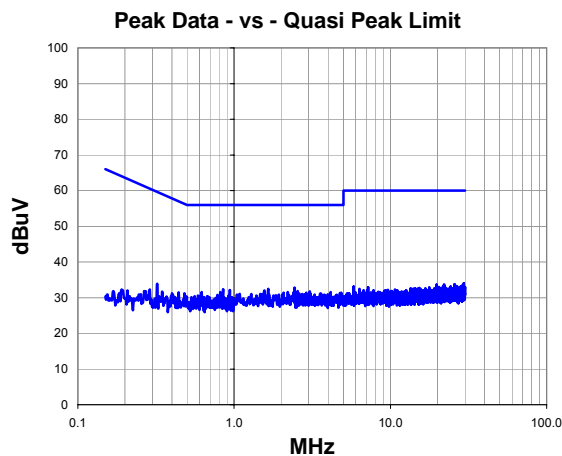
AC POWERLINE CONDUCTED EMISSIONS

PSA-ESCI 2012.05.07
PSA-ESCI Version 2011.12.21

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	
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
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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

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	<div>Signature</div> 
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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

30 MHz - 12.5 GHz

Value

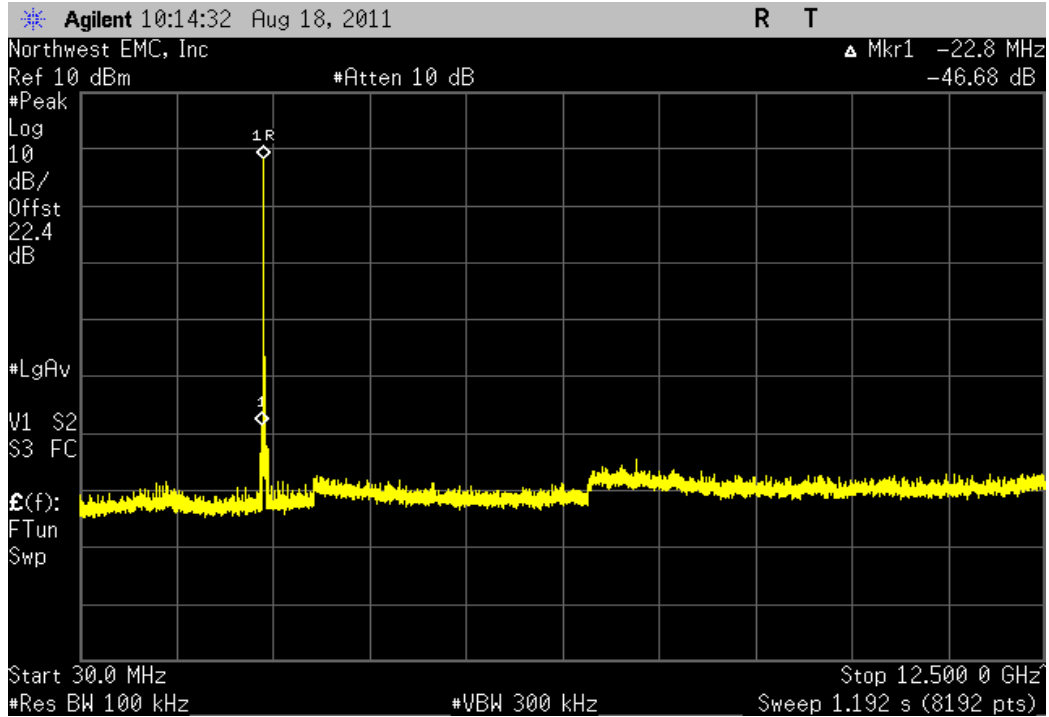
-46.68 dBc

Limit

≤ -20 dBc

Result

Pass



Low, 11, 2405 MHz

Frequency
Range

12.5 GHz - 25 GHz

Value

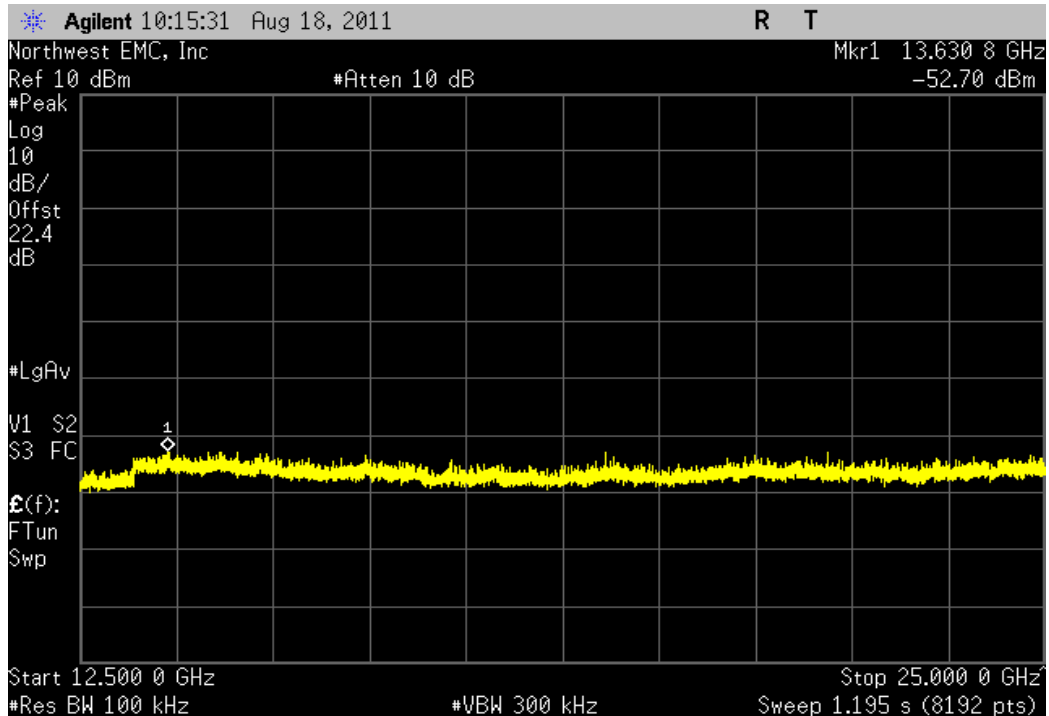
-51 dBc

Limit

≤ -20 dBc

Result

Pass



Mid, 19, 2445 MHz

Frequency
Range

30 MHz - 12.5 GHz

Value

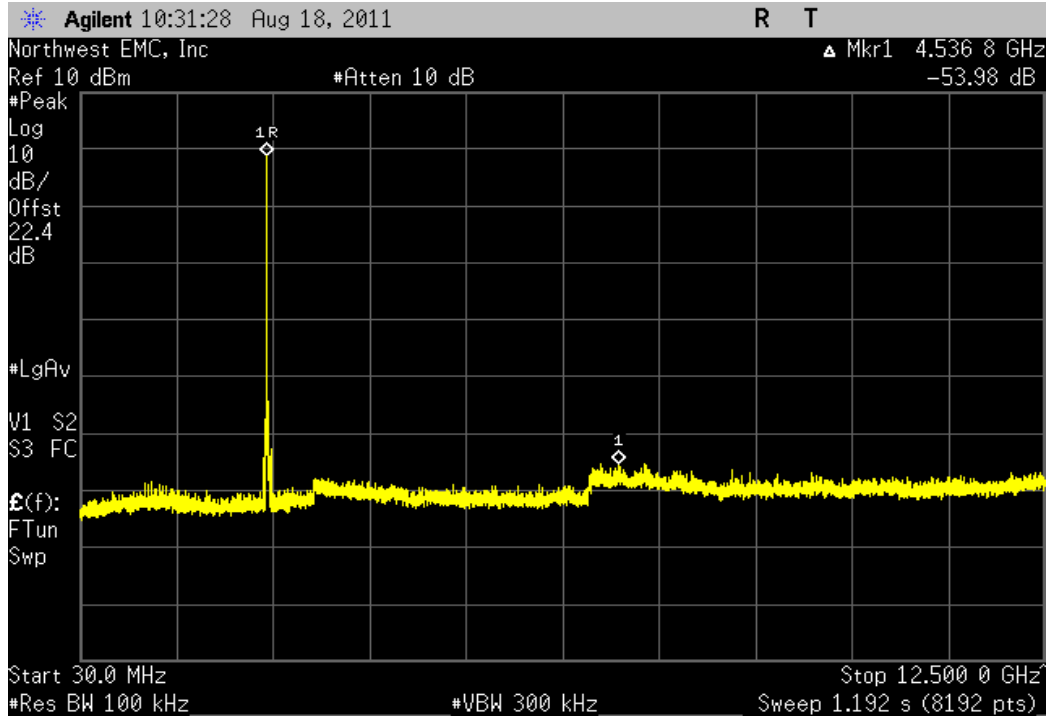
-53.98 dBc

Limit

≤ -20 dBc

Result

Pass



Mid, 19, 2445 MHz

Frequency
Range

12.5 GHz - 25 GHz

Value

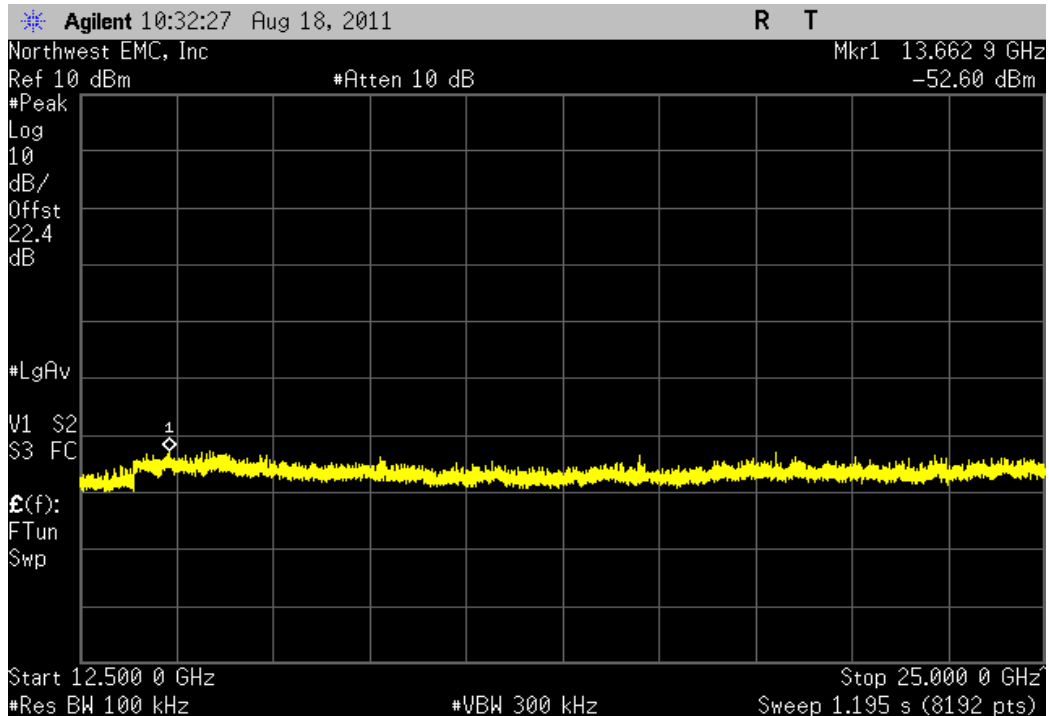
-51.27 dBc

Limit

≤ -20 dBc

Result

Pass



High, 26, 2480 MHz

Frequency
Range

30 MHz - 12.5 GHz

Value

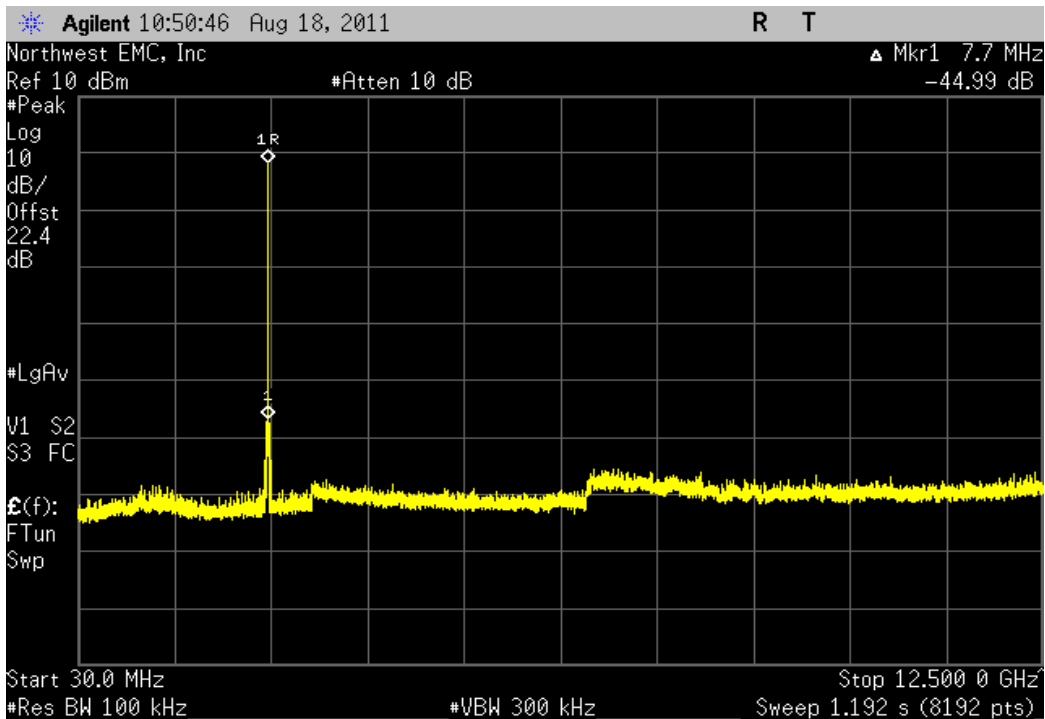
-44.99 dBc

Limit

≤ -20 dBc

Result

Pass



High, 26, 2480 MHz

Frequency
Range

12.5 GHz - 25 GHz

Value

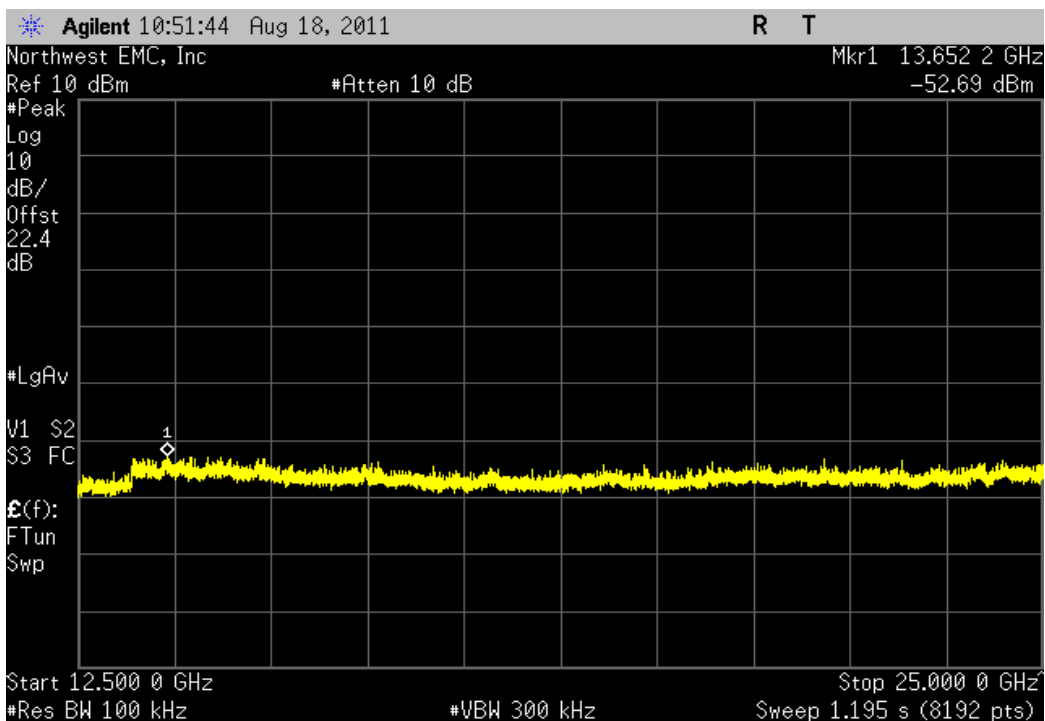
-51.06 dBc

Limit

≤ -20 dBc

Result

Pass



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

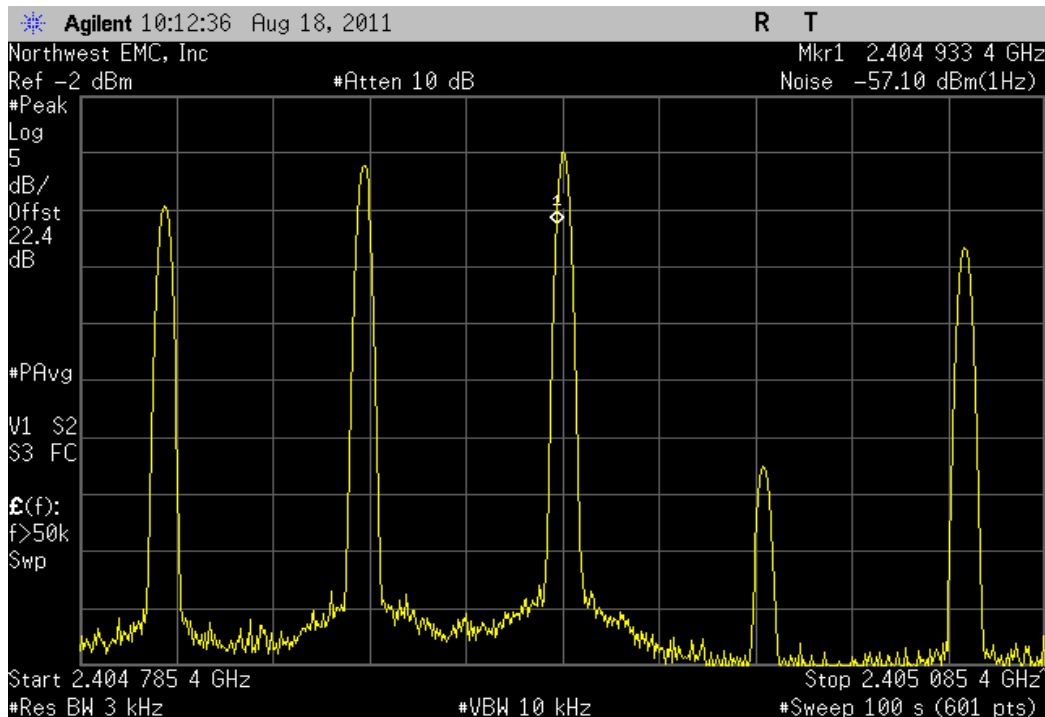
e) Trace set to MAX

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		Power Spectral Density		XMit 2011.08.04 PsaTx 2011.08.04		
EMC						
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

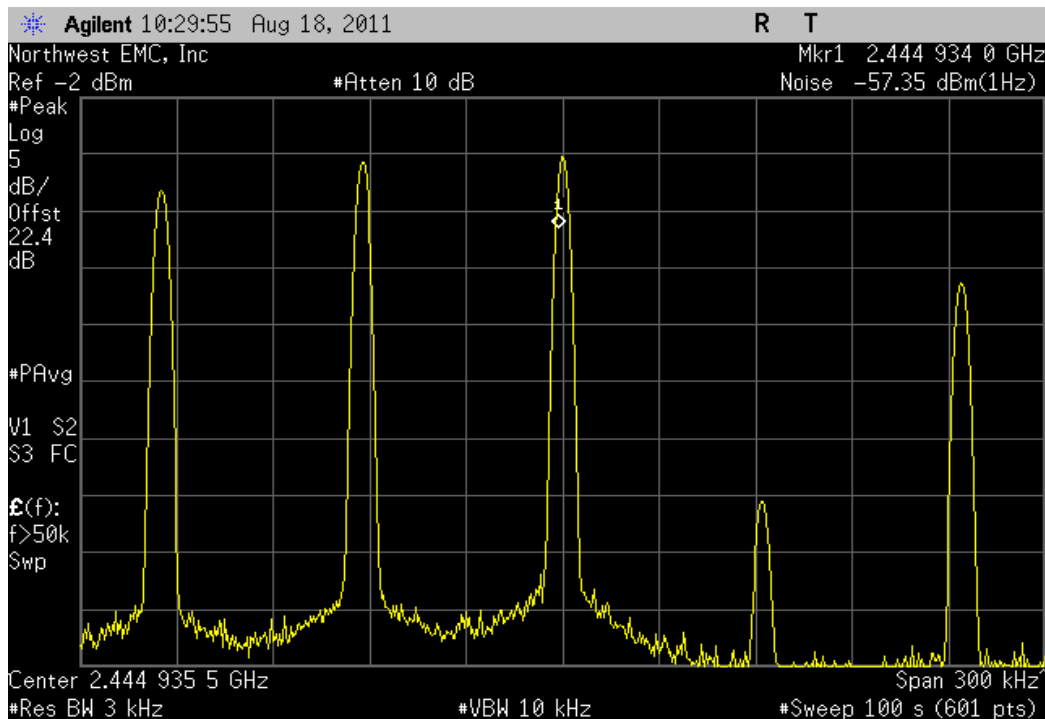
Low, 11, 2405 MHz

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

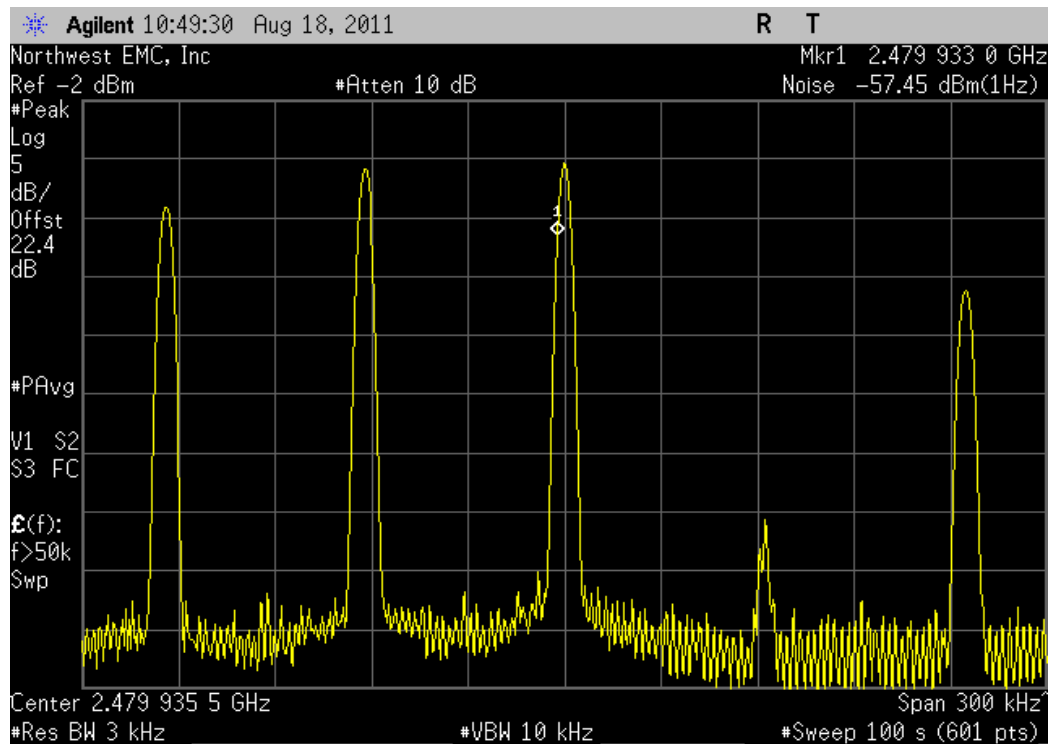


Mid, 19, 2445 MHz

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) To	Value	Limit	Result
	(dBm / Hz)	(dBm / 3 kHz)	(dBm / 3 kHz)	(dBm / 3 kHz)	
	-57.453	34.8	-22.653	8	Pass



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		XMit 2011.08.04 PsaTx 2011.08.04	
EMC		Occupied Bandwidth	
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
Low, 11, 2405 MHz		1.468 MHz	> 500 kHz
Mid, 19, 2445 MHz		1.454 MHz	> 500 kHz
High, 26, 2480 MHz		1.473 MHz	> 500 kHz
			Result
			Pass
			Pass
			Pass

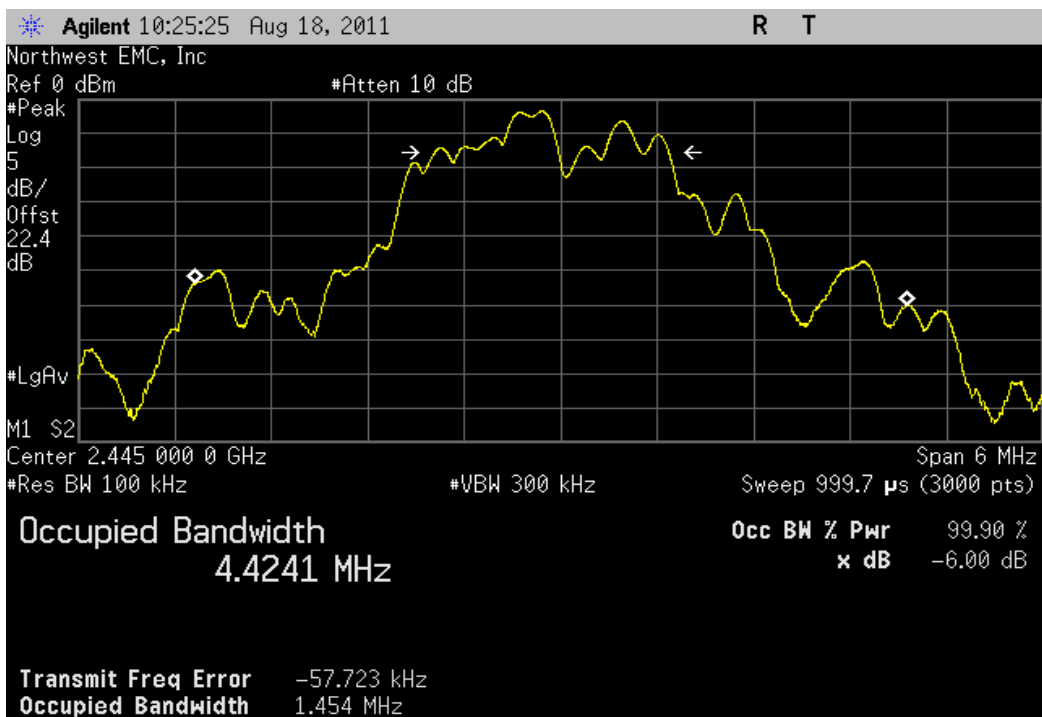
Low, 11, 2405 MHz

	Value	Limit	Result
	1.468 MHz	> 500 kHz	Pass



Mid, 19, 2445 MHz

	Value	Limit	Result
	1.454 MHz	> 500 kHz	Pass



High, 26, 2480 MHz

Value	Limit	Result
1.473 MHz	> 500 kHz	Pass



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

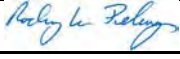
MEASUREMENT UNCERTAINTY

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

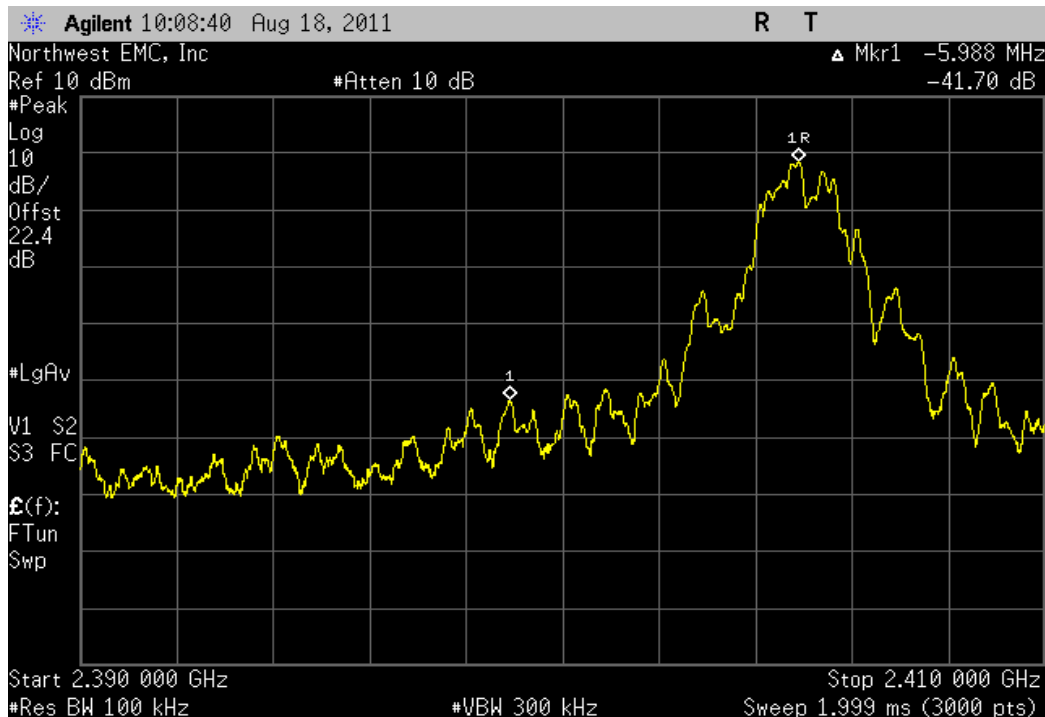
The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in each available band. The channels closest to the band edges were selected. The measurement was made using a direct connection between the RF output of the EUT 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		XMit 2011.08.04	
EMC		PsaTx 2011.08.04	
Band Edge Compliance			
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
Low, 11, 2405 MHz		-41.7 dBc	≤ -20 dBc
High, 26, 2480 MHz		-39.66 dBc	≤ -20 dBc
			Pass
			Pass

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

