

Electric Imp, Inc. IMP004M EN 300 328 V2.1.1:2016 802.11bgn SISO Radio

Report # ELIM0016







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CERTIFICATE OF TEST



Last Date of Test: May 31, 2017 Electric Imp, Inc. Model: IMP004M

Radio Equipment Testing

Standards

Specification	Method	
EN 300 328 V2.1.1:2016	EN 300 328 V2.1.1:2016	

Results

Method Clause	Test Description	Applied	Results	Comments
5.4.2	RF Output Power	Yes	Pass	
5.4.2	Medium Utilization	No	N/A	Not required for adaptive equipment.
5.4.3	Power Spectral Density	Yes	Pass	
5.4.4	Duty Cycle, Tx-Sequence, Tx-Gap	No	N/A	Not required for adaptive equipment.
5.4.4	Accumulated Transmit Time, Frequency Occupation, Hopping Sequence	No	N/A	Not required unless EUT is a FHSS device.
5.4.5	Hopping Frequency Separation	No	N/A	Not required unless EUT is a FHSS device.
5.4.6	Adaptivity	No	N/A	Not required for devices with output power less than 10 dBm eirp.
5.4.7	Occupied Channel Bandwidth	Yes	Pass	
5.4.8	Transmitter Unwanted Emissions in the OOB Domain	Yes	Pass	
5.4.9	Transmitter Unwanted Emissions in the Spurious Domain	Yes	Pass	
5.4.10	Receiver Spurious Emissions	Yes	Pass	
5.4.11	Receiver Blocking	No	N/A	Not required.
N/A	Geo-Location Capability	No	N/A	Not required. Manufacturer's declaration if implemented.

Deviations From Test Standards

None

Approved By:

Victor Ratinoff, Operations Manager

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. 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. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information. As indicated in the Statement of Work sent with the quotation, Element's standard process is to always use the latest published version of the test methods even when earlier versions are cited in the test specification. Issuance of a purchase order was de facto acceptance of this approach. Otherwise, the client would have advised Element in writing of the specific version of the test methods they wanted applied to the subject testing.

REVISION HISTORY



Revision Number	Description	Date (yyyy-mm-dd)	Page Number
00	None		

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 17065 as a product certifier. This allows Element to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with ISED.

European Union

European Commission - Within Element, we have a EU Notified Body validated for the EMCD and RED Directives.

Australia/New Zealand

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

Korea

MSIT / 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.

Israel

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

Hong Kong

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

Vietnam

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

SCOPE

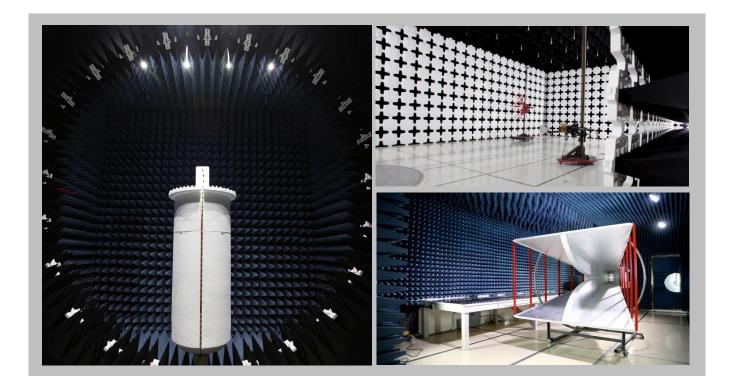
For details on the Scopes of our Accreditations, please visit: https://www.nwemc.com/emc-testing-accreditations

FACILITIES



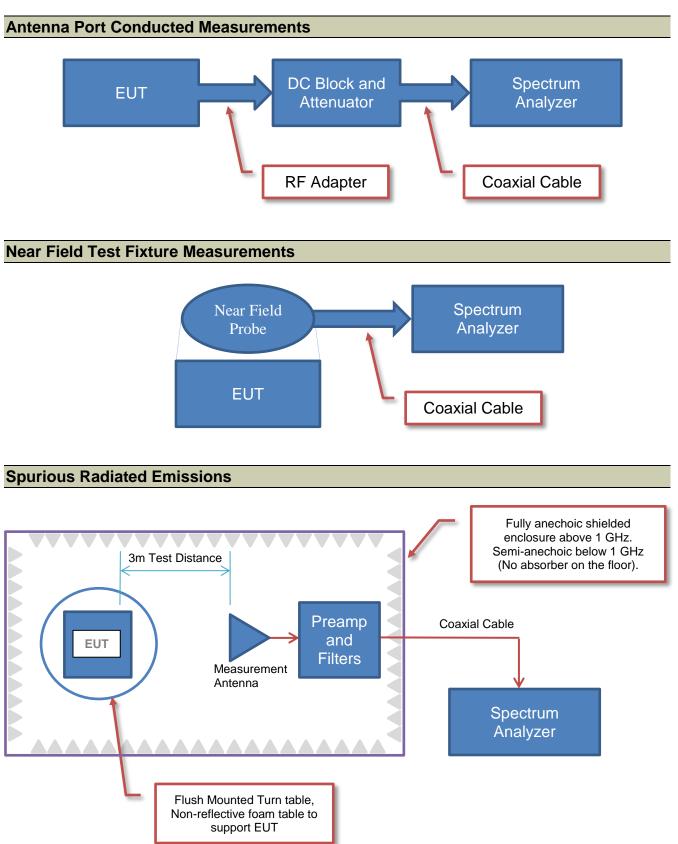


Labs OC01-17 Labs MN01-10 Labs NY01-0 41 Tesla 9349 W Broadway Ave. 4939 Jordan R Irvine, CA 92618 Brooklyn Park, MN 55445 Elbridge, NY 13		New York Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Oregon Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Texas Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Washington Labs NC01-05 19201 120 th Ave NE Bothell, WA 98011 (425)984-6600		
		NV	LAP				
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0		
	Innov	ation, Science and Eco	nomic Development Can	ada			
2834B-1, 2834B-3	2834E-1, 2834E-3	N/A	2834D-1, 2834D-2	2834G-1	2834F-1		
		BS	мі				
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R		
		VC	CI				
A-0029	A-0109	N/A	A-0108	A-0201	A-0110		
	Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA						
US0158	US0175	N/A	US0017	US0191	US0157		



Test Setup Block Diagrams





MEASUREMENT UNCERTAINTY



Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable test description page. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

Test	+ MU	<u>- MU</u>
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

PRODUCT DESCRIPTION



Client and Equipment Under Test (EUT) Information

Company Name:	Electric Imp, Inc.
Address:	5150 El Camino Real, Ste C-31
City, State, Zip:	Los Altos, CA 94022
Test Requested By:	Hugo Fiennes
Model:	IMP004M
First Date of Test:	May 23, 2017
Last Date of Test:	May 31, 2017
Receipt Date of Samples:	May 23, 2017
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

802.11bgn SISO radio WiFi module with added Bluetooth radio, with embedded OS that works with the Electric Imp cloud to allow internet connectivity for devices that use this WiFi/BT module.

Testing Objective:

To demonstrate compliance of the 802.11 radio under Article 3.2 of the RED for operation in the 2.4 GHz bands.





Configuration ELIM0013-1

EUT						
Description	Manufacturer	Model/Part Number	Serial Number			
WiFi Radio Module	Electric Imp, Inc.	IMP004M	0107			

Peripherals in test setup boundary						
Description Manufacturer Model/Part Number Serial Number						
Host Laptop	HP	15-ba009dx	CND71420K3			
Laptop Power Supply	HP	HSTNN-DA40	1WFTLD0CAR63O5H			

Cables							
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2		
USB Cable	No	2.0m	No	USB Extension	WiFi Radio Module		
AC Cable	No	1.1m	No	AC Mains	Laptop Power Supply		
DC Cable	No	2.0m	No	Host Laptop	Laptop Power Supply		

Configuration ELIM0013-2

EUT						
Description	Manufacturer	Model/Part Number	Serial Number			
WiFi Radio Module	Electric Imp, Inc.	IMP004M	0104			

Peripherals in test setup boundary						
Description Manufacturer Model/Part Number Serial Number						
Host Laptop	HP	15-ba009dx	CND71420K3			
Laptop Power Supply	HP	HSTNN-DA40	1WFTLD0CAR63O5H			

Cables						
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2	
USB Cable	No	2.0m	No	USB Extension	WiFi Radio Module	
AC Cable	No	1.1m	No	AC Mains	Laptop Power Supply	
DC Cable	No	2.0m	No	Host Laptop	Laptop Power Supply	
USB Extension Cable	No	2.0m	No	Host Laptop	USB Cable	

MODIFICATIONS



Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2017-05-23	Receiver Spurious Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2017-05-26	Transmitter Unwanted Emissions in the Spurious Domain	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
3	2017-05-31	RF Output power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	2017-05-31	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
5	2017-05-31	Occupied Channel Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
6	2017-05-31	Transmitter Unwanted Emissions in the OOB Domain.xls	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.



XMit 2017.02.08

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.	Cal. Due
Meter - Power	ETS Lindgren	7002-006	SRB	12/6/2016	12/6/2017
Generator - Signal	Agilent	E8257D	TGU	2/5/2015	2/5/2018
Attenuator	Fairview Microwave	SA18E-20	TKS	3/6/2017	3/6/2018
Block - DC	Aeroflex	INMET 8535	AMO	3/27/2017	3/27/2018
Cable	Fairview Microwave	SCA1814-0101-120	OCZ	NCR	NCR
Thermometer	Omega Engineering, Inc.	HH311	DUC	10/3/2014	10/3/2017
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPHS-32-3.5-SCT/AC	TBE	NCR	NCR

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The power measurement was then made using a direct connection between the RF output of the EUT and an ETSI EN 300 328 compliant RF Power Sensor which only measures across the high time of the burst of the carrier.

The RF output power was measured with the EUT set to the channels and modes called out in the data sheets.

The observed duty cycle was noted but not needed to calculate the EIRP.

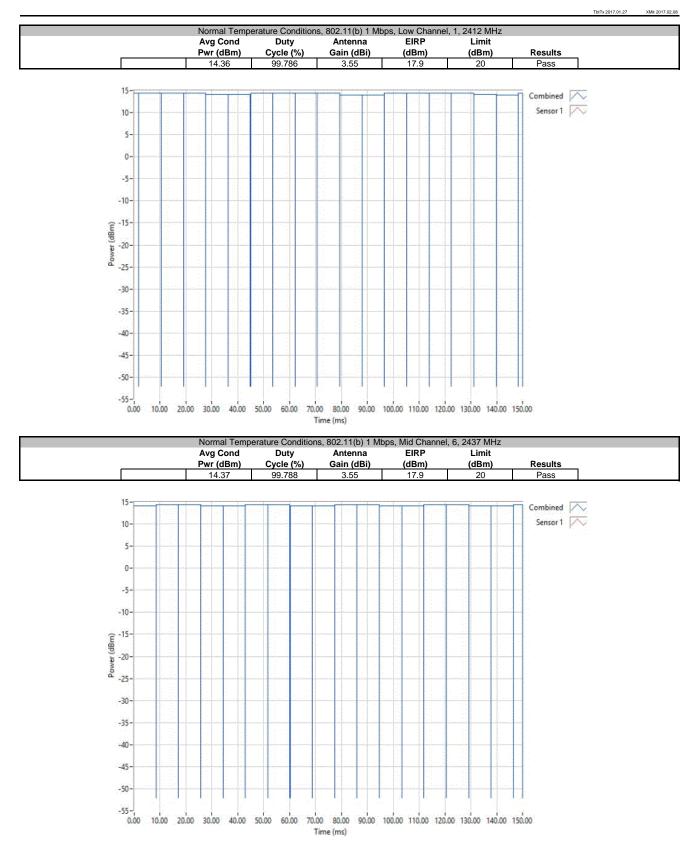
EIRP = Max Measured Power + Antenna gain (dBi)

The measurements were made under normal test and extreme test conditions.



Serial Number							05/31/17	
	r: Electric Imp, Inc. s: Jonathan Dillon					Temperature: Humidity:		
Projec	t: None					Barometric Pres.:	1014 mbar	
Tested by ST SPECIFICA	/: Mike Tran TIONS		Power: 5VDC via USB Pow Test Method	rer		Job Site:	10013	
300 328 V2.1.1			EN 300 328 V2.1.1:2	2016				
MMENTS								
	dB (20dB pad + DC Block +	coax cable + client provided	patch cable) at 2.4GHz					
	OM TEST STANDARD							
one			2					
onfiguration #	2	0'rm a fran	And duy					
		Signature	Avg Cond	Duty	Antenna	EIRP	Limit	
armal Tamparatu	ura Candiliana		Pwr (dBm)	Cycle (%)	Gain (dBi)	(dBm)	(dBm)	Result
ormal Temperatu	802.11(b) 1 Mbps							
	Low Channel		14.36 14.37	99.786 99.788	3.55 3.55	17.9 17.9	20 20	Pass Pass
	Mid Channel, High Channel	, 13, 2472 MHz	14.37	99.788 99.788	3.55	17.9	20	Pass
	802.11(b) 11 Mbps							
	Low Channel, Mid Channel,		14.44 14.42	97.942 97.938	3.55 3.55	18 18	20 20	Pass Pass
	High Channel	, 13, 2472 MHz	14.39	97.939	3.55	17.9	20	Pass
	802.11(g) 6 Mbps Low Channel	1, 2412 MHz	12.55	98.664	3.55	16.1	20	Pass
	Mid Channel,	6, 2437 MHz	12.47	98.656	3.55	16	20	Pass
	High Channel 802.11(g) 36 Mbps	, 13, 2472 MHz	12.55	98.678	3.55	16.1	20	Pass
	Low Channel		12.48	93.273	3.55	16	20	Pass
	Mid Channel, High Channel	6, 2437 MHz , 13, 2472 MHz	12.45 12.75	93.316 93.356	3.55 3.55	16 16.3	20 20	Pass Pass
	802.11(g) 54 Mbps							
	Low Channel, Mid Channel,		12.39 12.57	90.479 90.444	3.55 3.55	15.9 16.1	20 20	Pass Pass
	High Channel	, 13, 2472 MHz	12.37	90.44	3.55	16	20	Pass
	802.11(n) MCS0	4. 0440 MUI=	14.05	00.50	3.55	14.0	20	Deee
	Low Channel, Mid Channel,		11.05 11.23	98.56 98.583	3.55	14.6 14.8	20	Pass Pass
		, 13, 2472 MHz	11.49	98.562	3.55	15	20	Pass
	802.11(n) MCS7 Low Channel	1, 2412 MHz	11.35	89.203	3.55	14.9	20	Pass
	Mid Channel,	6, 2437 MHz	11.11	89.168	3.55	14.7	20	Pass
xtreme Temperat		, 13, 2472 MHz	11.33	89.183	3.55	14.9	20	Pass
	802.11(b) 1 Mbps							
	Low Channel, Mid Channel,		14.75 15.68	99.783 99.787	3.55 3.55	18.3 19.2	20 20	Pass Pass
	High Channel	, 13, 2472 MHz	13.87	99.789	3.55	17.4	20	Pass
	802.11(b) 11 Mbps Low Channel	1 2412 MHz	16.22	97.929	3.55	19.8	20	Pass
	Mid Channel,	6, 2437 MHz	15.55	97.928	3.55	19.1	20	Pass
	High Channel 802.11(g) 6 Mbps	, 13, 2472 MHz	14.92	97.948	3.55	18.5	20	Pass
	Low Channel	1, 2412 MHz	13.92	98.652	3.55	17.5	20	Pass
	Mid Channel,		13.64	98.635	3.55	17.2	20	Pass
	802.11(g) 36 Mbps	, 13, 2472 MHz	13.41	98.633	3.55	17	20	Pass
	Low Channel		14.01	93.258	3.55	17.6	20	Pass
	Mid Channel, High Channel	6, 2437 MHz , 13, 2472 MHz	13.73 14.54	93.266 93.302	3.55 3.55	17.3 18.1	20 20	Pass Pass
	802.11(g) 54 Mbps							
	Low Channel, Mid Channel,		14.11 13.57	90.449 90.408	3.55 3.55	17.7 17.1	20 20	Pass Pass
	High Channel	, 13, 2472 MHz	11.87	90.436	3.55	15.4	20	Pass
	802.11(n) MCS0 Low Channel	1. 2412 MHz	12.49	98.565	3.55	16	20	Pass
	Mid Channel,	6, 2437 MHz	12.65	98.563	3.55	16.2	20	Pass
	High Channel 802.11(n) MCS7	, 13, 2472 MHz	11.43	98.577	3.55	15	20	Pass
	Low Channel		14.11	89.247	3.55	17.7	20	Pass
	Mid Channel,	6, 2437 MHz	13.67	89.255	3.55	17.2	20	Pass
treme Temperat		, 13, 2472 MHz	12.6	89.335	3.55	16.2	20	Pass
	802.11(b) 1 Mbps			00 707	0.55	46.1		-
	Low Channel, Mid Channel,		14.53 14.37	99.787 99.787	3.55 3.55	18.1 17.9	20 20	Pass Pass
	High Channel	, 13, 2472 MHz	14.37	99.787	3.55	18	20	Pass
	802.11(b) 11 Mbps Low Channel	1 2412 MHz	14.63	97.938	3.55	18.2	20	Pass
	Mid Channel,		14.68	97.946	3.55	18.2	20	Pass
	High Channel	, 13, 2472 MHz	14.55	97.943	3.55	18.1	20	Pass
	802.11(g) 6 Mbps Low Channel	1, 2412 MHz	12.68	98.652	3.55	16.2	20	Pass
	Mid Channel,	6, 2437 MHz	12.67	98.655	3.55	16.2	20	Pass
	High Channel 802.11(g) 36 Mbps	, 13, 2472 MHz	12.77	98.665	3.55	16.3	20	Pass
	Low Channel	1, 2412 MHz	12.7	93.287	3.55	16.3	20	Pass
	Mid Channel,		12.48	93.316	3.55	16	20	Pass
	High Channel	, 13, 2472 MHz	12.61	93.294	3.55	16.2	20	Pass

Normal Temperature Conditions						_
802.11(b) 1 Mbps						
Low Channel, 1, 2412 MHz	12.69	90.443	3.55	16.2	20	Pass
Mid Channel, 6, 2437 MHz	12.75	90.457	3.55	16.3	20	Pass
High Channel, 13, 2472 MHz	12.71	90.48	3.55	16.3	20	Pass
802.11(n) MCS0						
Low Channel, 1, 2412 MHz	11.39	98.568	3.55	14.9	20	Pass
Mid Channel, 6, 2437 MHz	11.53	98.576	3.55	15.1	20	Pass
High Channel, 13, 2472 MHz	11.59	98.574	3.55	15.1	20	Pass
802.11(n) MCS7						
Low Channel, 1, 2412 MHz	11.35	89.24	3.55	14.9	20	Pass
Mid Channel, 6, 2437 MHz	11.28	89.051	3.55	14.8	20	Pass
High Channel, 13, 2472 MHz	11.4	89.078	3.55	15	20	Pass







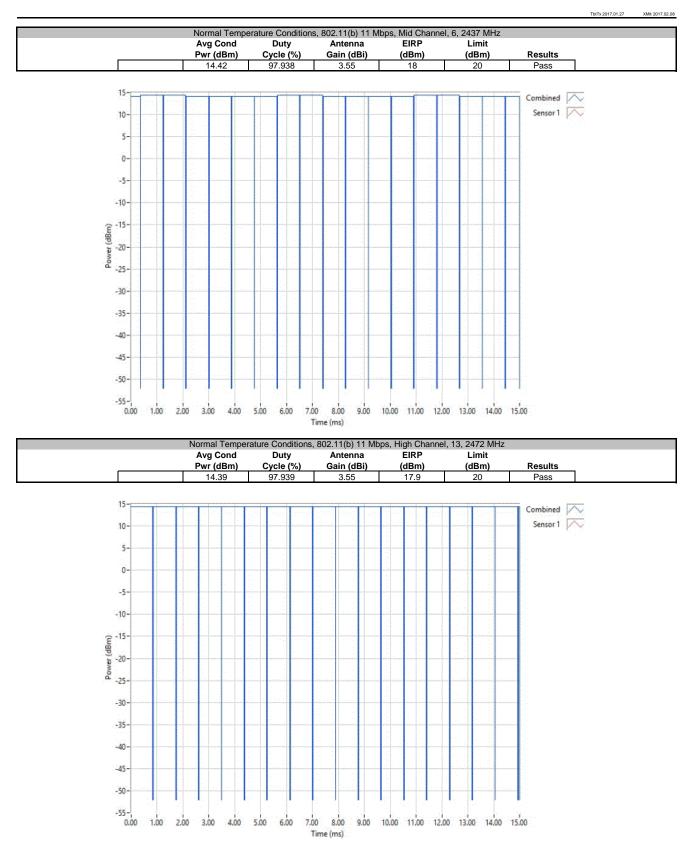
TbtTx 2017.01.27 XMit 2017.02.08 Normal Temperature Conditions, 802.11(b) 1 Mbps, High Channel, 13, 2472 MHz Avg Cond Duty Antenna EIRP Limit Pwr (dBm) Cycle (%) Gain (dBi) (dBm) (dBm) Results 14.47 99.788 3.55 18 20 Pass 15-Combined 📈 Sensor 1 📈 10-5-0-45--10--15--20--25--30--35--40--45--50--55o.bo 10.bo 20.bo 30.bo 40.bo 50.bo 60.bo 70.bo 80.bo 90.bo 100.bo 110.bo 120.bo 130.bo 140.bo 150.bo Time (ms) Normal Temperature Conditions, 802.11(b) 11 Mbps, Low Channel, 1, 2412 MHz Avg Cond Duty EIRP Antenna Limit Pwr (dBm) Cycle (%) Gain (dBi) (dBm) (dBm) Results 14.44 97.942 3.55 18 20 Pass 15-Combined 🔨 Sensor 1 📈 10-5-0--5--10-(ugg) -20-Pos -25--30--35--40-

7.00 8.00 9.00 10.00 11.00 12.00 13.00 14.00 15.00

Time (ms)

-45-

-55-0.00 1.00 2.00 3.00 4.00 5.00 6.00







Normal Temperature Conditions, 802.11(g) 6 Mbps, Low Channel, 1, 2412 MHz Avg Cond Duty Antenna EIRP Limit Pwr (dBm) Cycle (%) Gain (dBi) (dBm) (dBm) Results 12.55 98.664 3.55 16.1 20 Pass 15-Combined 📈 Sensor 1 📈 10-5-0--5--10ver (dBm) -20a -25--30--35--40--45--50--55-9.00 10.00 11.00 12.00 13.00 14.00 15.00 0.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 Time (ms) Normal Temperature Conditions, 802.11(g) 6 Mbps, Mid Channel, 6, 2437 MHz Avg Cond Duty Antenna EIRP Limit Pwr (dBm) Gain (dBi) (dBm) (dBm) Cycle (%) Results 12.47 98.656 3.55 16 20 Pass 15-Combined 🔨 Sensor 1 📉 10-5-0--5--10-(ggu) -20--25--30--35--40--45-



-50-



XMit 2017.02.08

TbtTx 2017.01.27

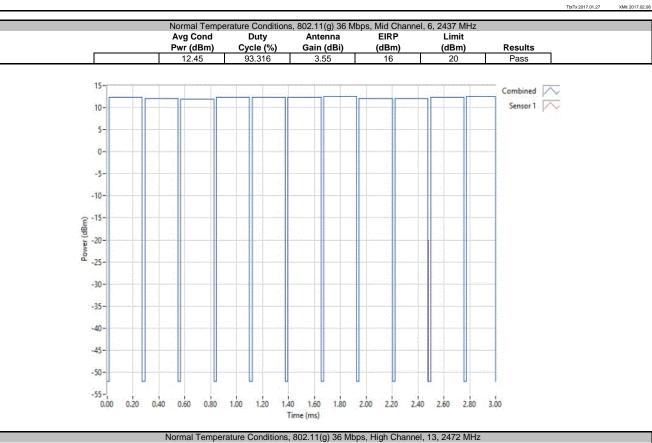
Normal Temperature Conditions, 802.11(g) 6 Mbps, High Channel, 13, 2472 MHz Avg Cond Duty Antenna EIRP Limit Pwr (dBm) Cycle (%) Gain (dBi) (dBm) (dBm) Results 12.55 98.678 3.55 16.1 20 Pass 15-Combined 📈 Sensor 1 📈 10-5-0--5--10-(u -15--20--25--30--35--40--45--50--55-9.00 10.00 11.00 12.00 13.00 14.00 15.00 0.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 Time (ms) Normal Temperature Conditions, 802.11(g) 36 Mbps, Low Channel, 1, 2412 MHz Avg Cond Duty Antenna EIRP Limit Pwr (dBm) Gain (dBi) (dBm) (dBm) Cycle (%) Results 12.48 93.273 3.55 16 20 Pass 15-Combined 🔨 Sensor 1 📉 10-5-0--5--10--15--00--25--25--30--35--40--45--50-

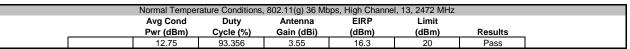
1,40 1.60 1.80

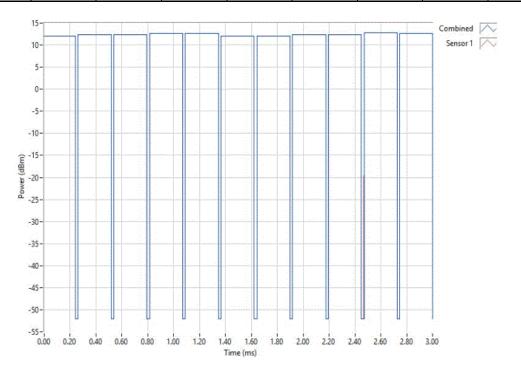
Time (ms)

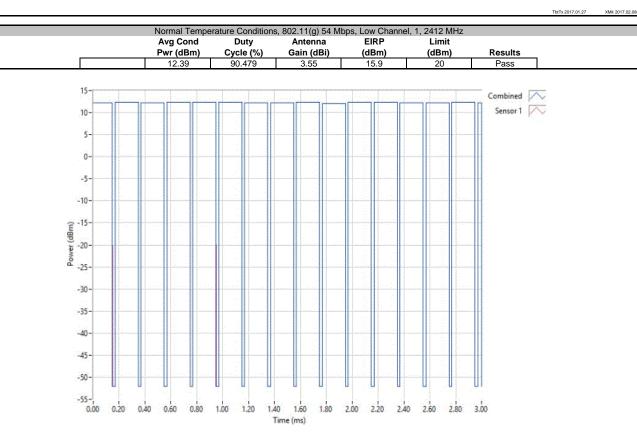
2.00 2.20 2.40 2.60 2.80 3.00

-55-0.00 0.20 0.40 0.60 0.80 1.00 1.20

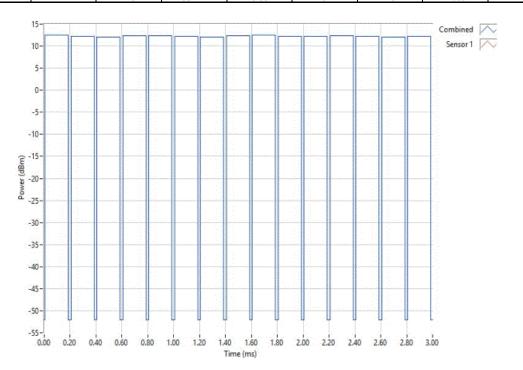


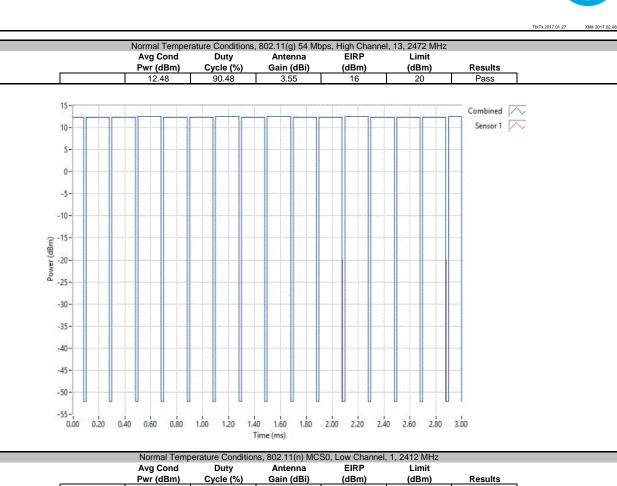


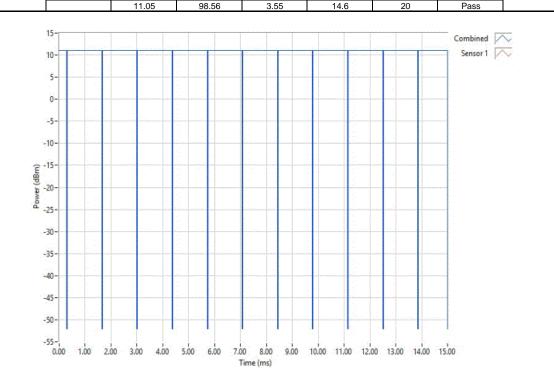




	Normal Tempe	erature Conditions	s, 802.11(g) 54 M	lbps, Mid Channe	l, 6, 2437 MHz	
	Avg Cond	Duty	Antenna	EIRP	Limit	
	Pwr (dBm)	Cycle (%)	Gain (dBi)	(dBm)	(dBm)	Results
	12.57	90.444	3.55	16.1	20	Pass

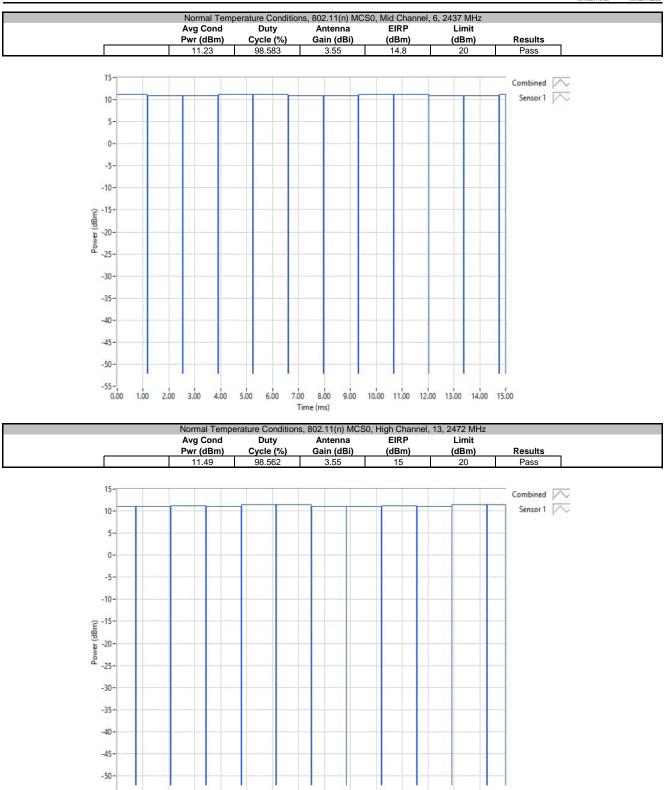


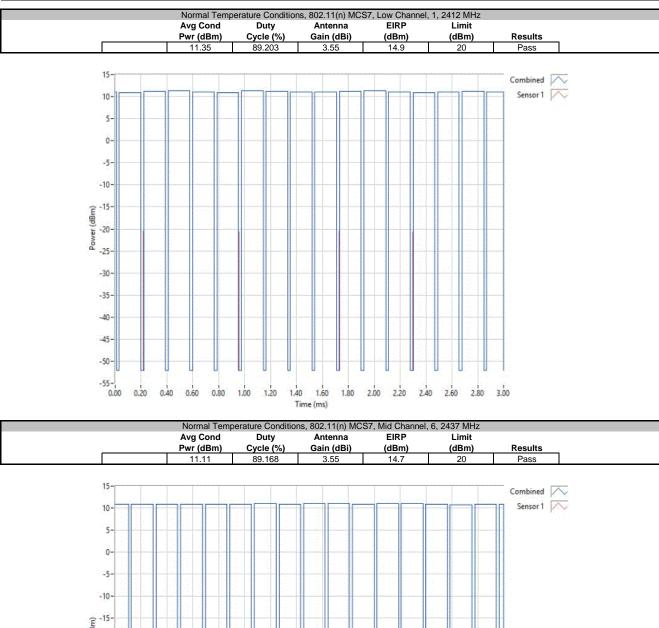


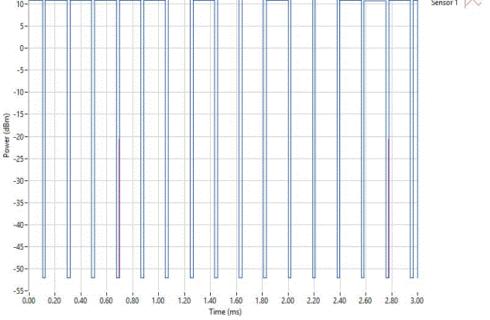














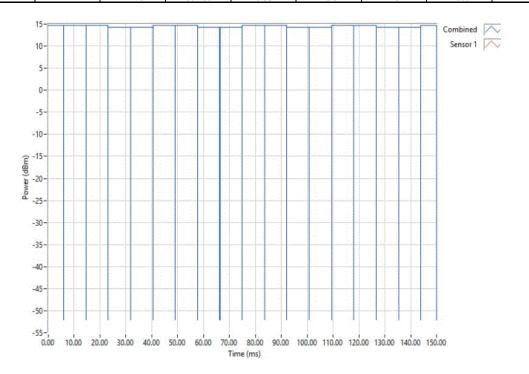
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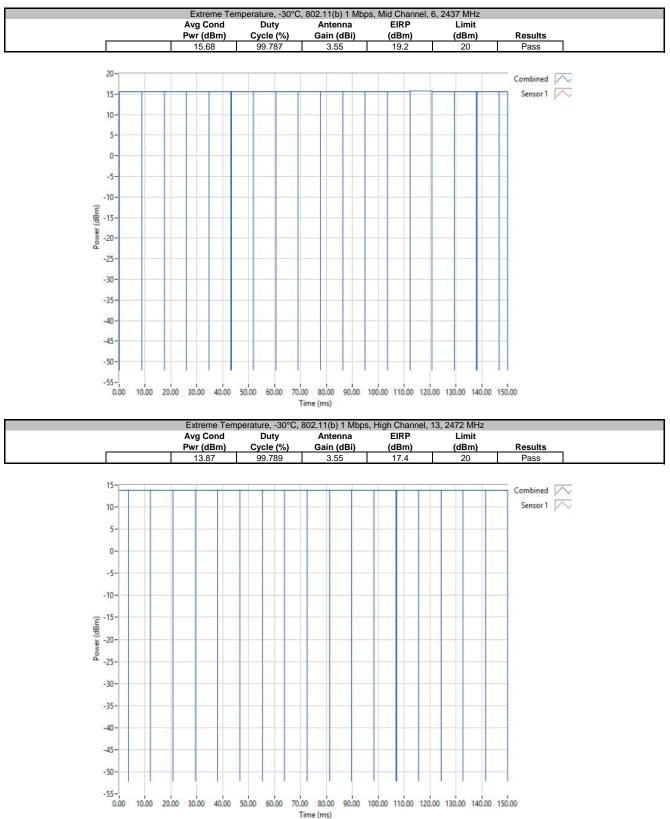


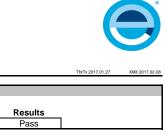
Normal Temperature Conditions, 802.11(n) MCS7, High Channel, 13, 2472 MHz Avg Cond Duty Antenna EIRP Limit Pwr (dBm) Cycle (%) Gain (dBi) (dBm) (dBm) Results 11.33 89.183 3.55 14.9 20 Pass 15-Combined 📈 Sensor 1 📈 10-5-0--5--10--15--20--25--30--35--40--45--50--55-1.80 2.00 2.20 2.40 2.60 2.80 3.00 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Time (ms)

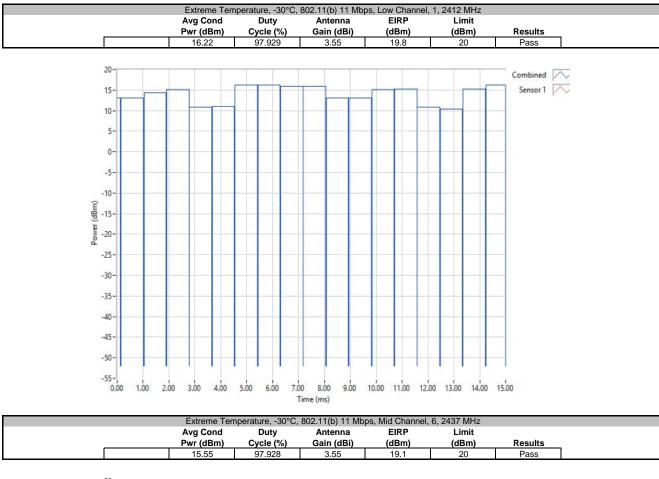
	Extreme Ter	1, 2412 MHz				
	Avg Cond	Duty	Antenna	EIRP	Limit	
	Pwr (dBm)	Cycle (%)	Gain (dBi)	(dBm)	(dBm)	Results
	14.75	99.783	3.55	18.3	20	Pass

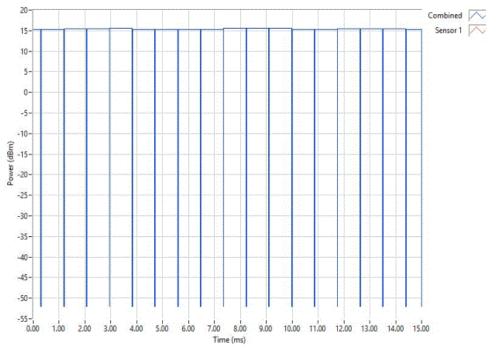






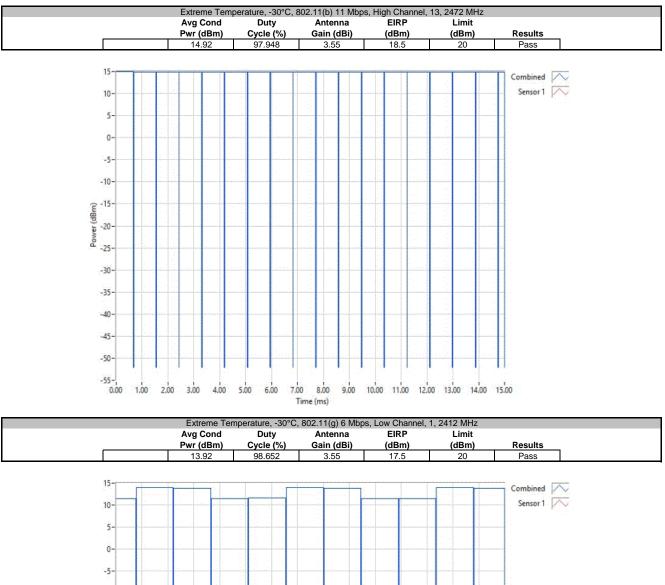


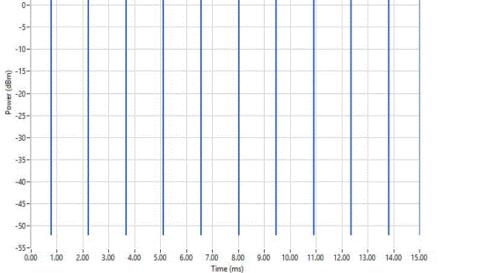


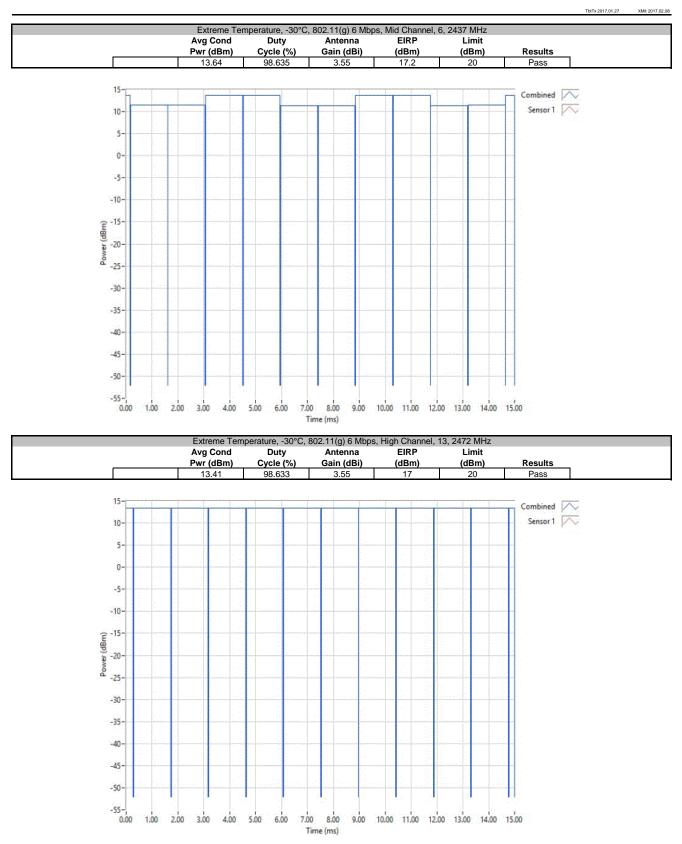




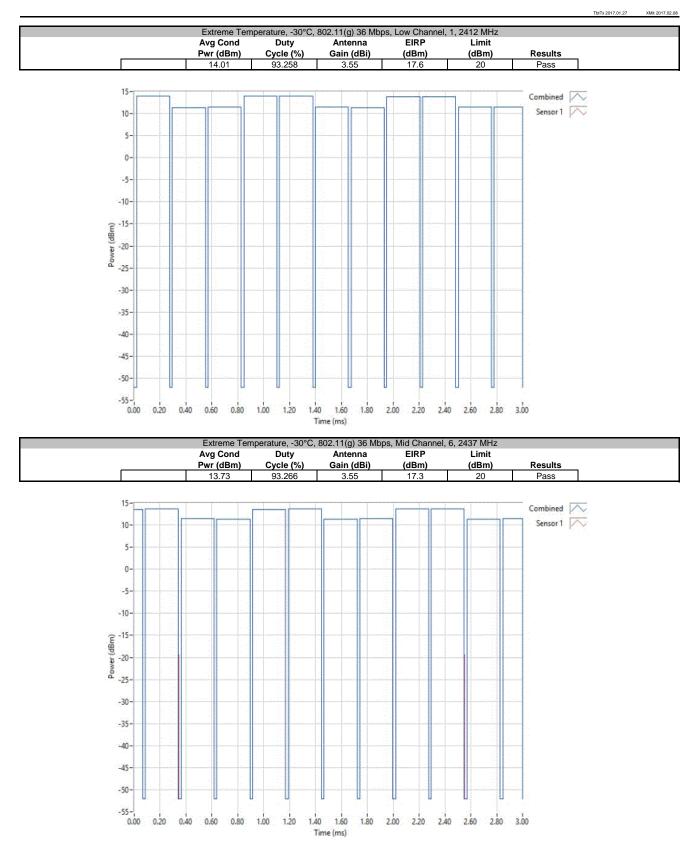
TbtTx 2017.01.27 XMit 2017.02.08



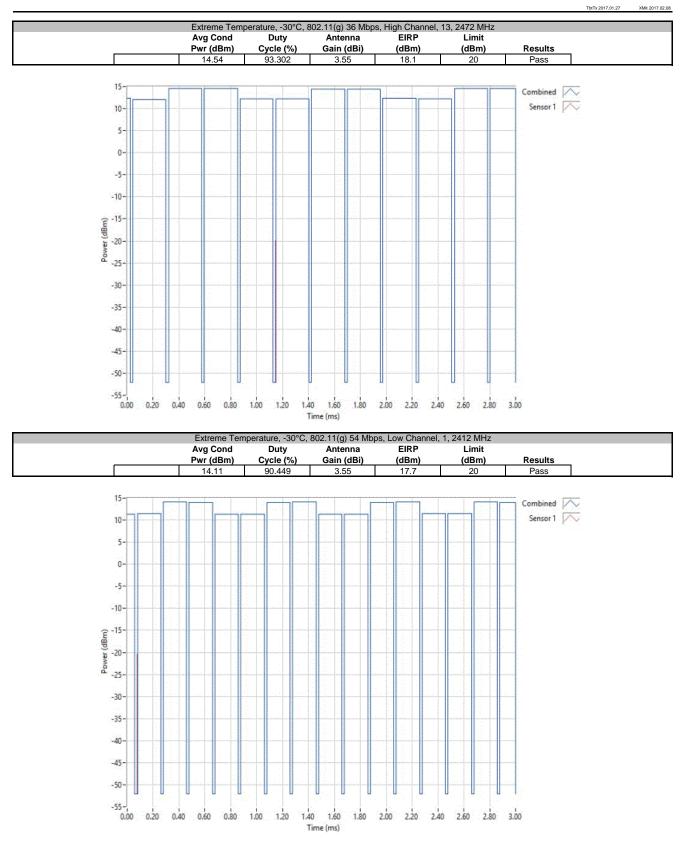




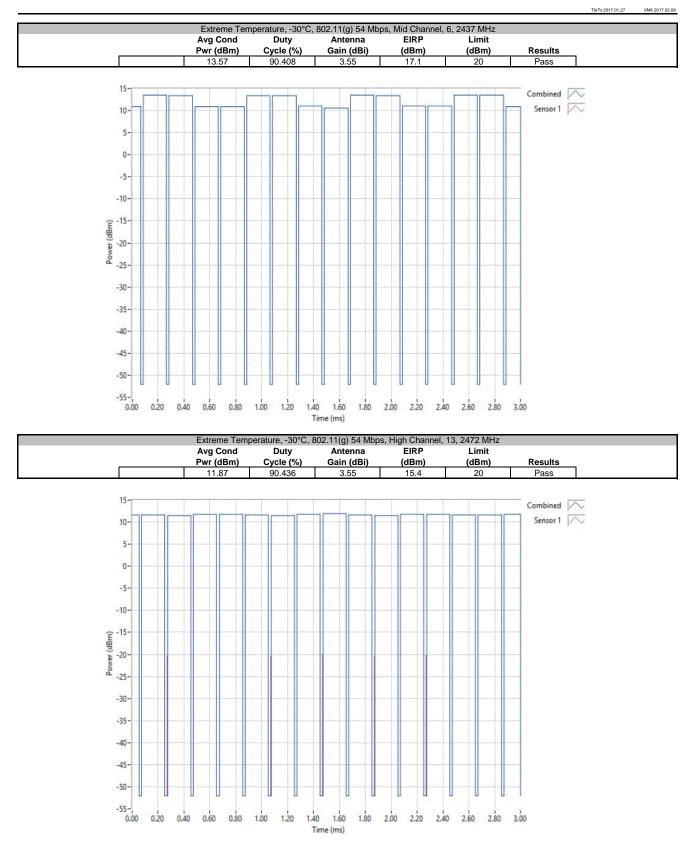




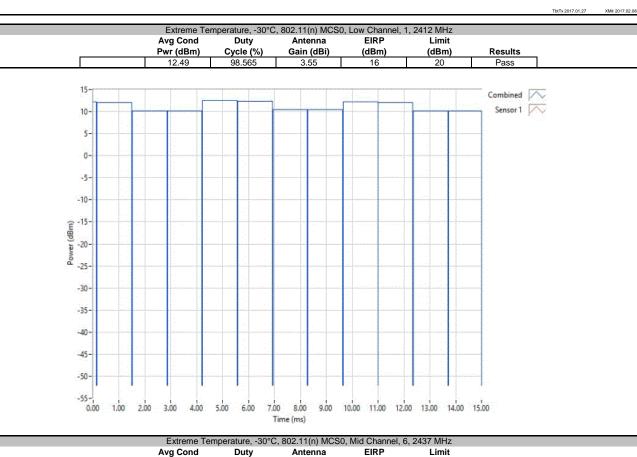


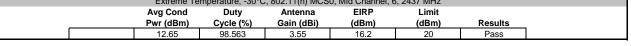


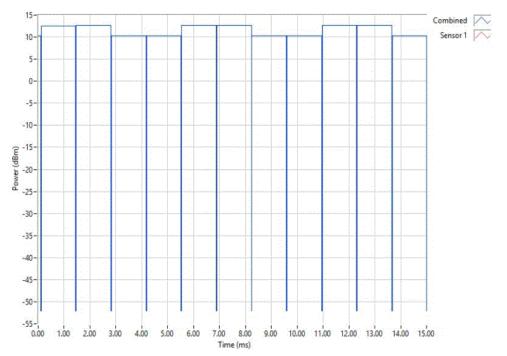








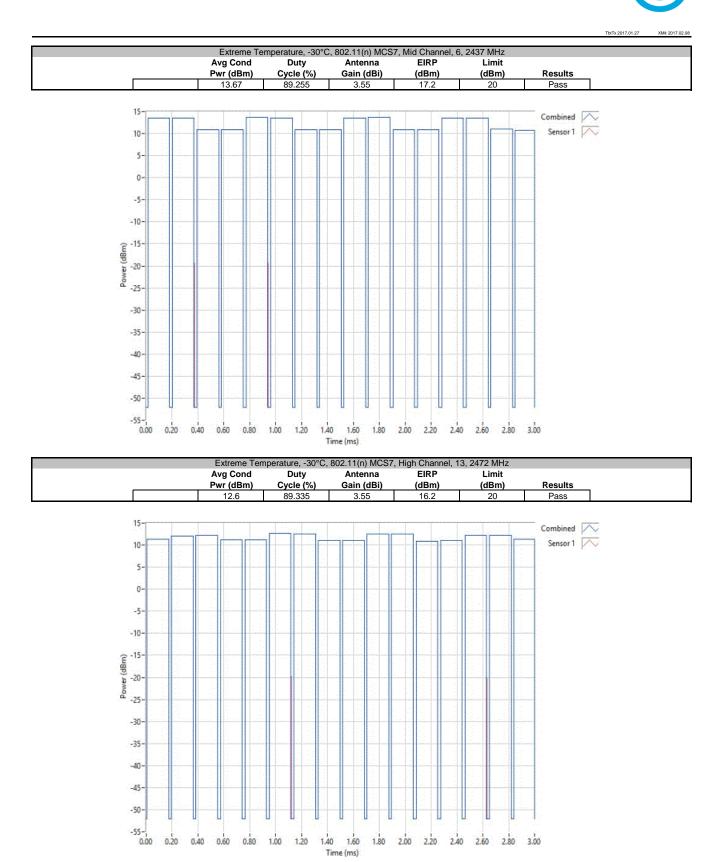


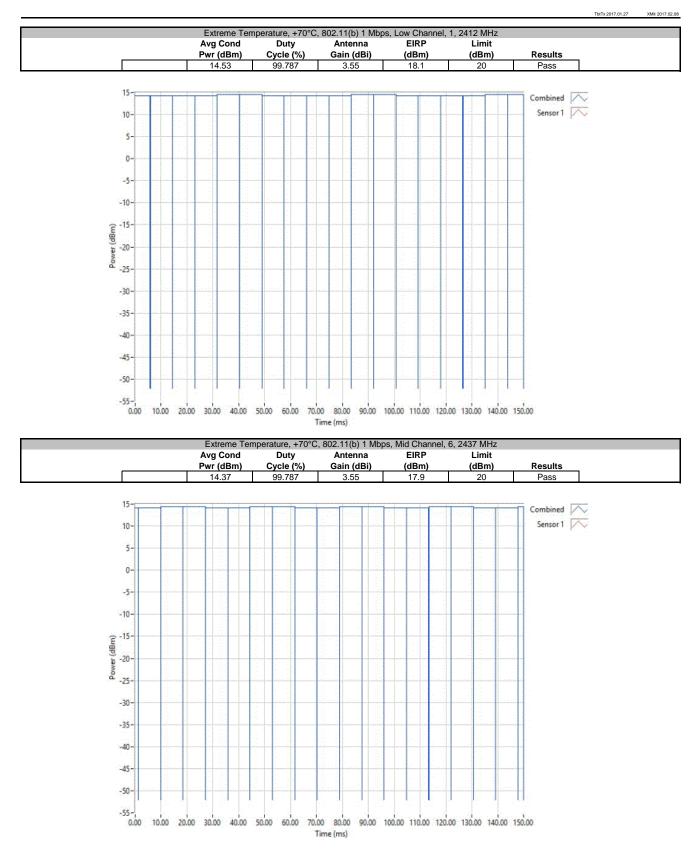




TbtTx 2017.01.27 Extreme Temperature, -30°C, 802.11(n) MCS0, High Channel, 13, 2472 MHz Avg Cond Duty Antenna EIRP Limit Pwr (dBm) Cycle (%) Gain (dBi) (dBm) (dBm) Results 11.43 98.577 3.55 15 20 Pass 15-Combined Sensor 1 📈 10-5-0--5--10wer (dBm) -20-™d -25--30--35--40--45--50--55-9.00 10.00 11.00 12.00 13.00 14.00 15.00 0.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 Time (ms) Extreme Temperature, -30°C, 802.11(n) MCS7, Low Channel, 1, 2412 MHz Duty EIRP Avg Cond Antenna Limit Pwr (dBm) Cycle (%) Gain (dBi) (dBm) (dBm) Results 14.11 89.247 3.55 17.7 20 Pass 15-Combined 🔨 Sensor 1 📉 10-5-0--5--10--15--20--25--25--30--35--40--45-

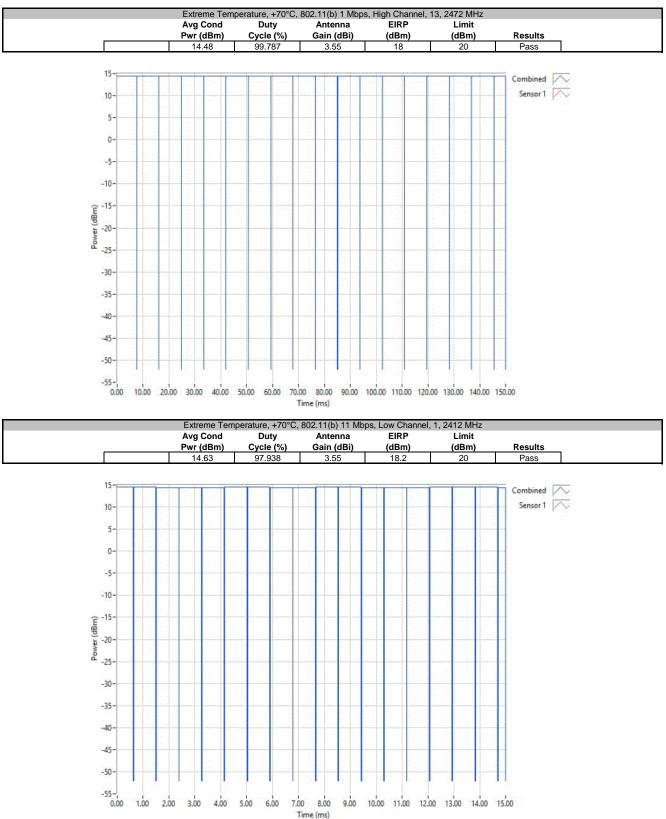
-50-

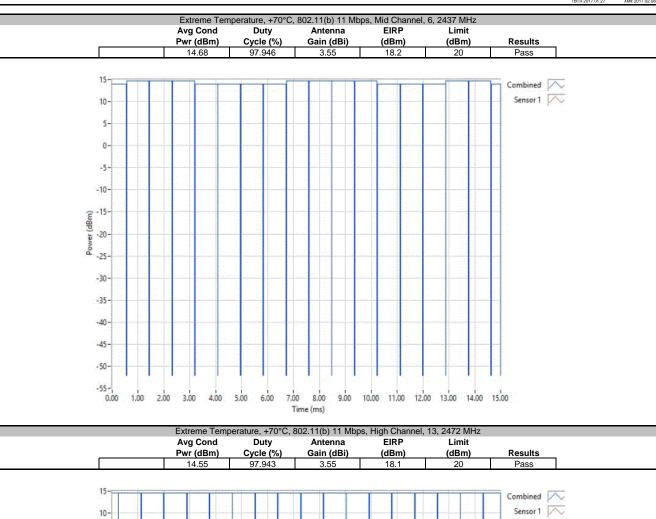


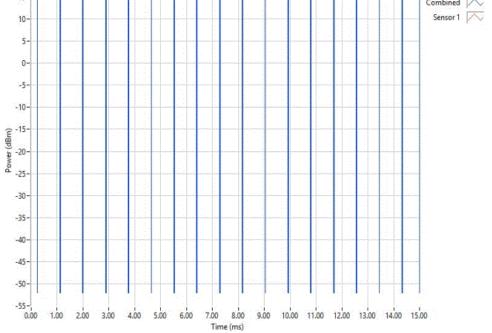




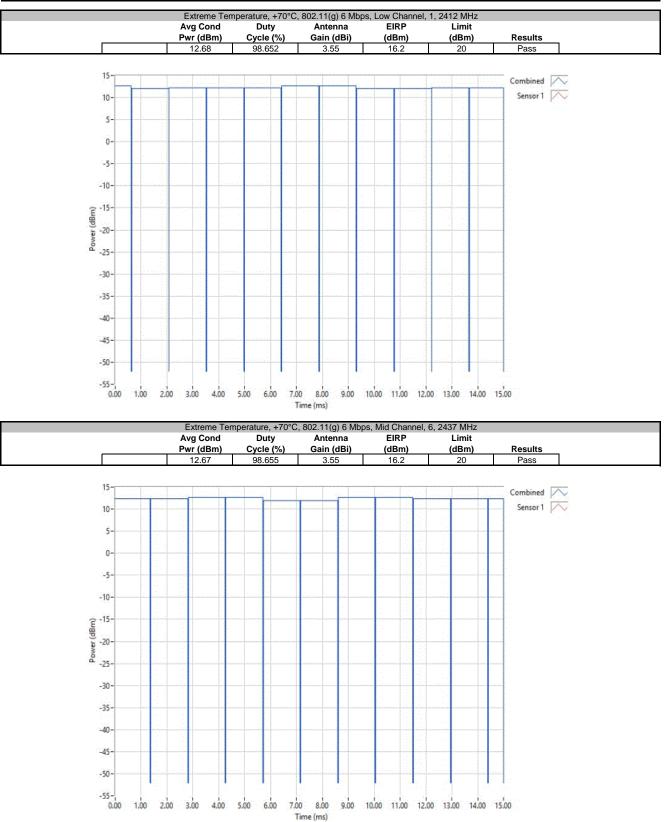


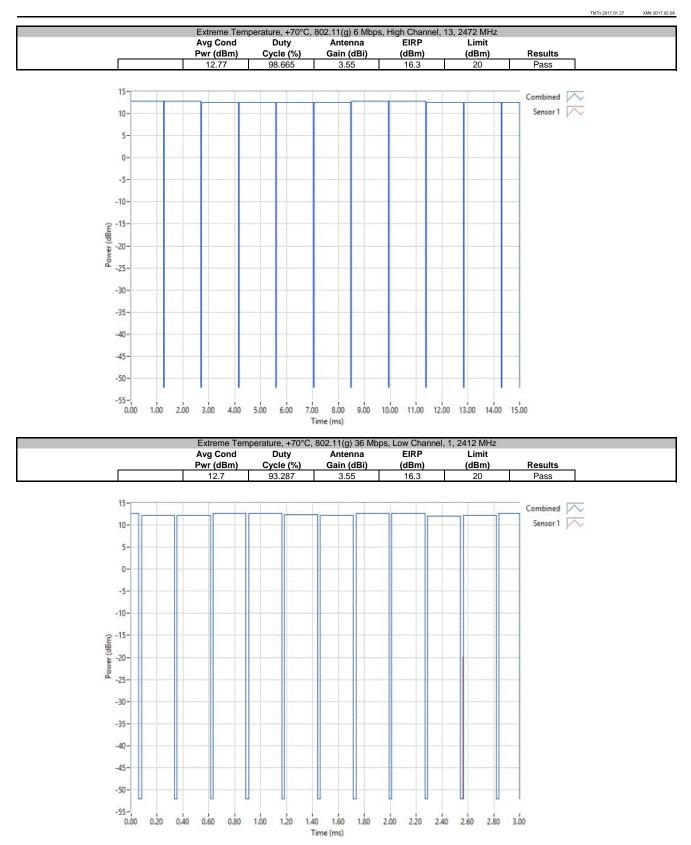






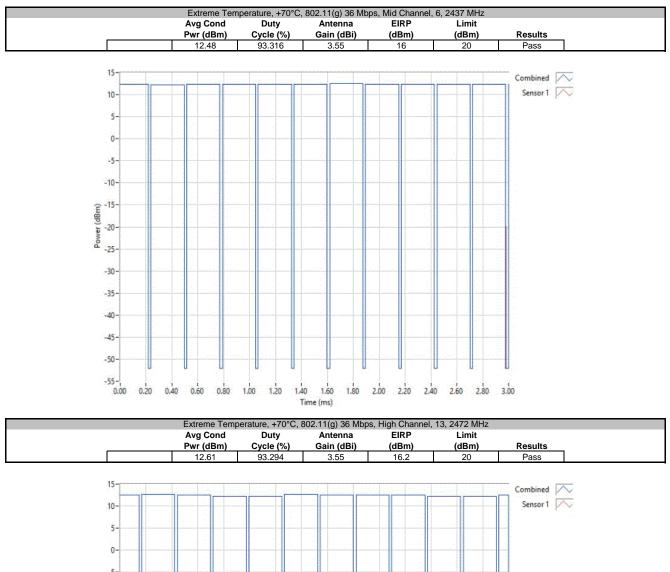


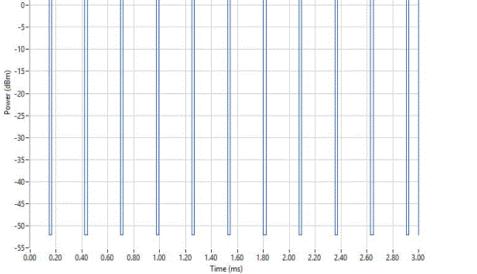




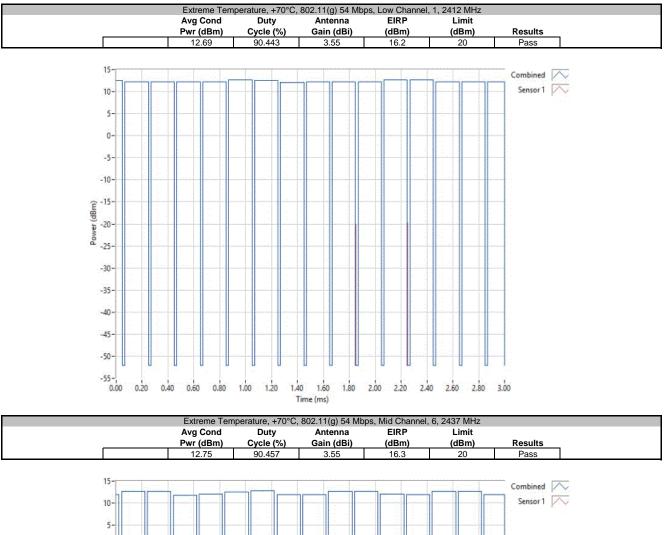


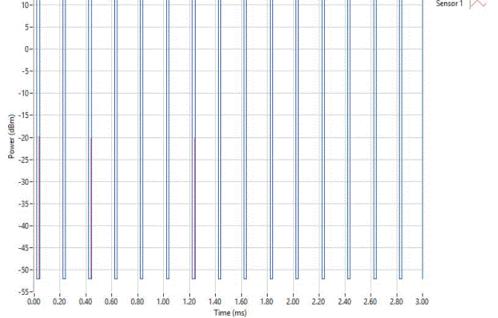


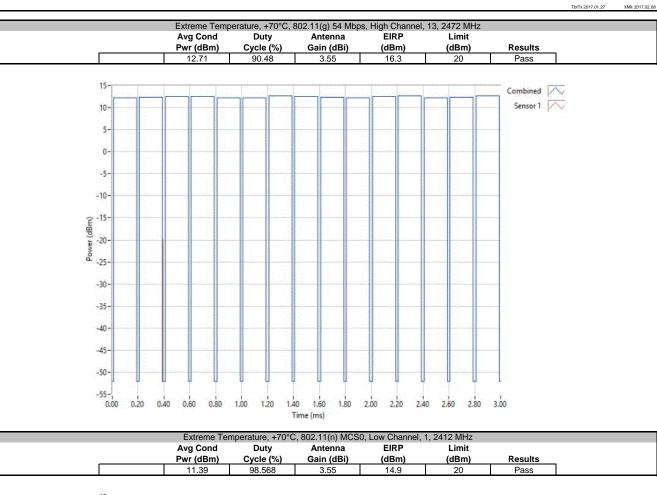


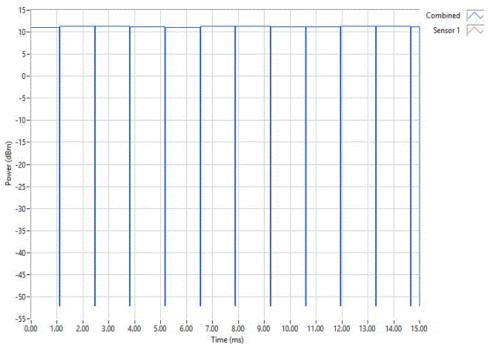






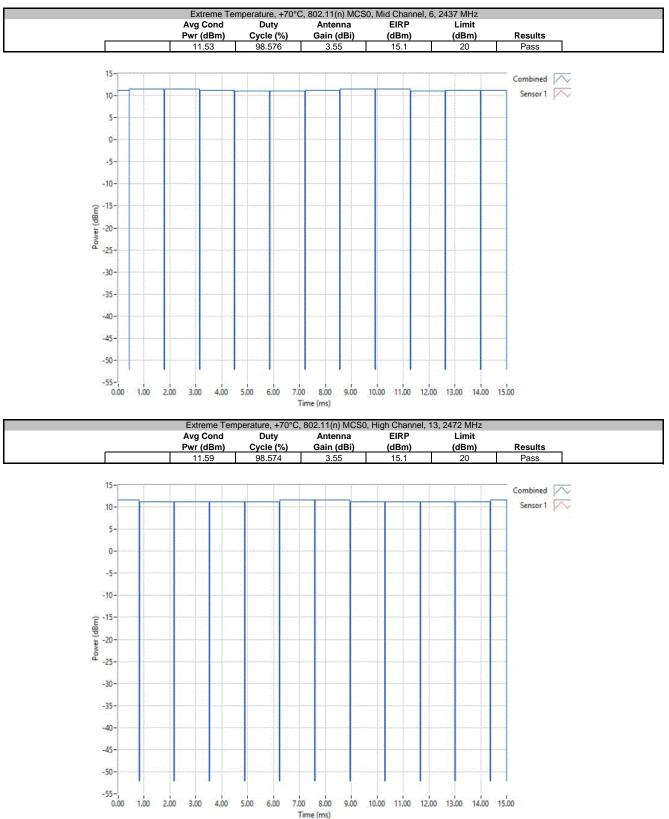


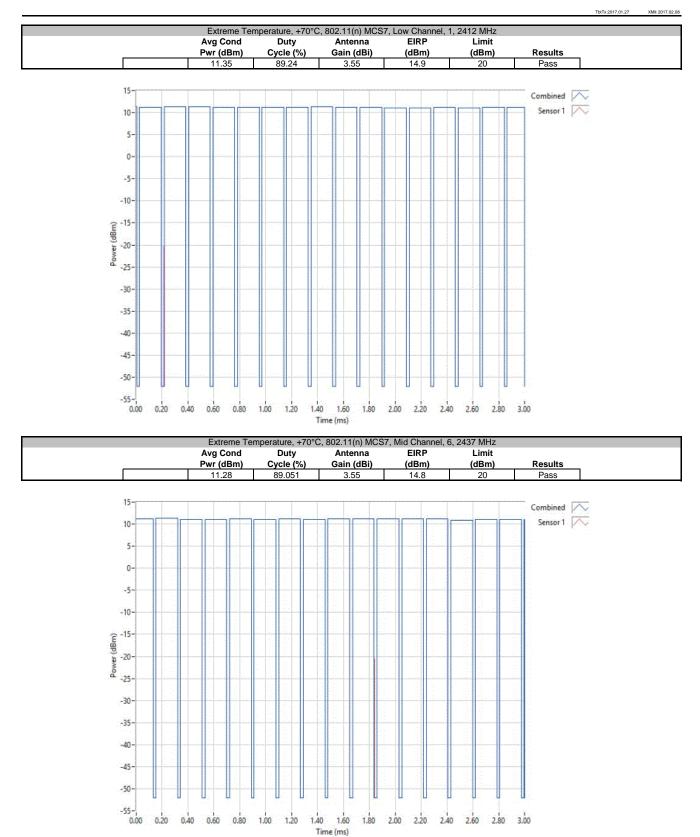








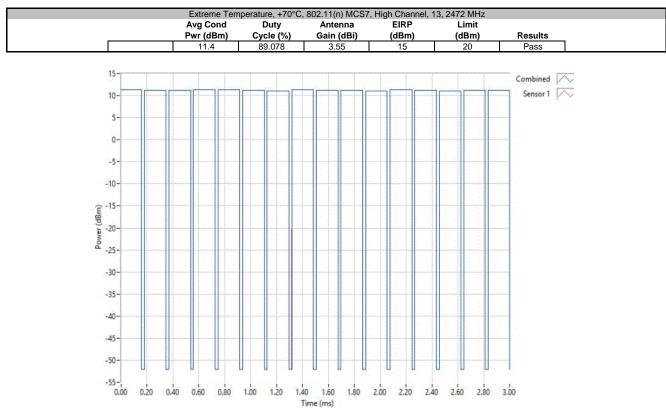




Time (ms)









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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.	Cal. Due	
Generator - Signal	Agilent	E8257D	TGU	2/5/2015	2/5/2018	
Attenuator	Fairview Microwave	SA18E-20	TKS	3/6/2017	3/6/2018	
Block - DC	Aeroflex	INMET 8535	AMO	3/27/2017	3/27/2018	
Cable	Fairview Microwave	SCA1814-0101-120	OCZ	NCR	NCR	
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	11/2/2016	11/2/2017	

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The Power Spectral Density was measured with the EUT set to the channels and modes called out in the data sheets.

The EUT antenna gain and duty cycle were used to calculate the output power of the EUT, and included in the calculations for Power Spectral Density. The measurements were made under normal test conditions.

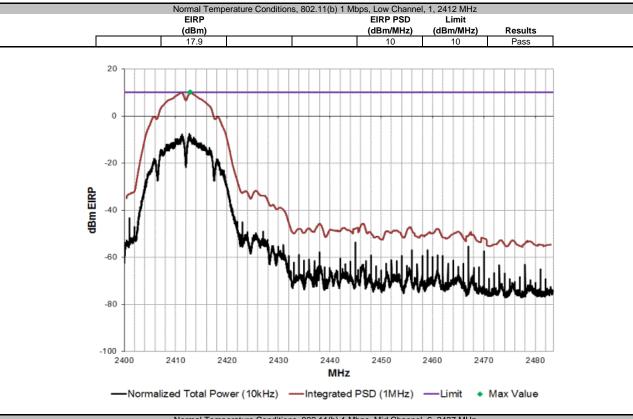
The spectrum analyzer was set to a 10kHz RBW and 30kHz VBW, while utilizing an RMS detector. A total of 8350 points were captured across the spectrum. The traces were captured both graphically and in point format. The data points were normalized based on antenna power measurements located elsewhere in this report.

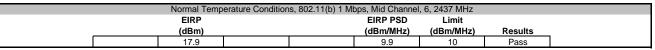
The reported Power Spectral Density is the highest sum for any 1MHz window in the specified spectrum.

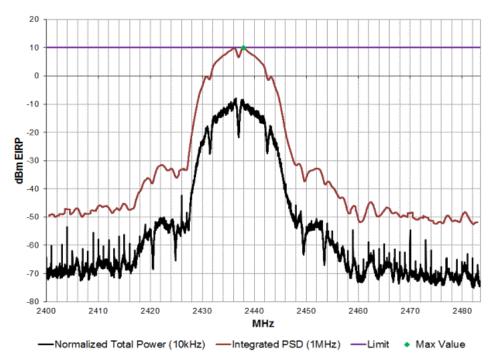


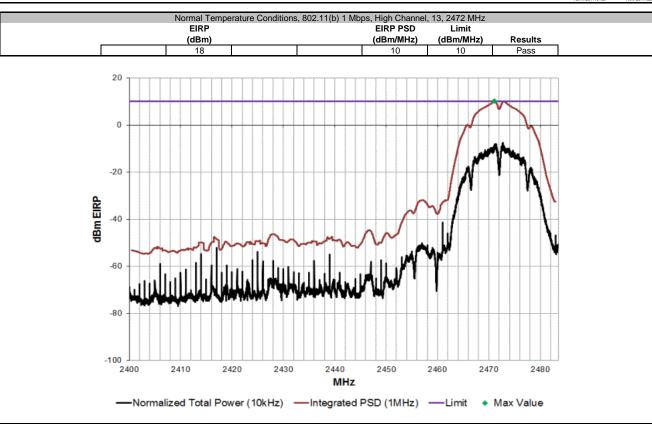
EUT:	IMP004M		Work Order:	ELIM0013	
Serial Number:				05/31/17	-
	Electric Imp, Inc.		Temperature:		
	Jonathan Dillon		Humidity:		
Project:			Barometric Pres.:		
Tested by:		Power: 5VDC via USB Power	Job Site:		
EST SPECIFICATI		Test Method	500 Site.	0013	
N 300 328 V2.1.1:2		EN 300 328 V2.1.1:2016			
4 300 320 VZ.1.1.2	010	EN 300 320 V2.1.1.2010			
OMMENTS					
otal Offset 22.59dl	B (20dB pad + DC Block + coax cable + client provided patc	h cable) at 2.4GHz			
	I TEST STANDARD				
	TEST STANDARD				
one					
onfiguration #	2	And duy			
oninguration #		Now and			
	Signature	EIRP	EIRP PSD	Limit	
		(dBm)	(dBm/MHz)	(dBm/MHz)	Results
ormal Temperature	Conditions	(dBill)	(uBili/MHz)	(ubili/iiiriz)	Results
	802.11(b) 1 Mbps				
	Low Channel, 1, 2412 MHz	17.9	10	10	Pass
	Mid Channel, 6, 2437 MHz	17.9	9.9	10	Pass
	High Channel, 13, 2437 MHz	17.9	9.9 10	10	
	802.11(b) 11 Mbps	10	10	10	Pass
	Low Channel, 1, 2412 MHz	17.9	9.5	10	Pass
	Mid Channel, 6, 2437 MHz	17:9	9.5	10	Pass
	High Channel, 13, 2437 MHz	18	9.7	10	Pass
	802.11(g) 6 Mbps	17.9	9.5	10	r doo
	Low Channel, 1, 2412 MHz	16.1	4.9	10	Pass
	Mid Channel, 6, 2437 MHz	16	4.9	10	Pass
		16.1	4.9		
	High Channel, 13, 2472 MHz 802.11(g) 36 Mbps	10.1	5	10	Pass
	Low Channel, 1, 2412 MHz	16	4.9	10	Pass
	Mid Channel, 6, 2437 MHz	16	4.9	10	Pass
	High Channel, 13, 2472 MHz	16.3	5.2	10	Pass
	802.11(g) 54 Mbps	10.5	5.2	10	1 455
	Low Channel, 1, 2412 MHz	15.9	4.8	10	Pass
	Mid Channel, 6, 2437 MHz	16.1	5.2	10	Pass
	High Channel, 13, 2472 MHz	16	5	10	Pass
	802.11(n) MCS0				
	Low Channel, 1, 2412 MHz	14.6	3.2	10	Pass
	Mid Channel, 6, 2437 MHz	14.8	3.4	10	Pass
	High Channel, 13, 2472 MHz	15	3.6	10	Pass
	802.11(n) MCS7		0.0		
			0.7	10	Pass
	Low Channel, 1, 2412 MHz	14.9			
	Low Channel, 1, 2412 MHz Mid Channel, 6, 2437 MHz	14.9 14.7	3.7 3.5	10	Pass

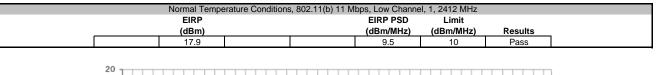


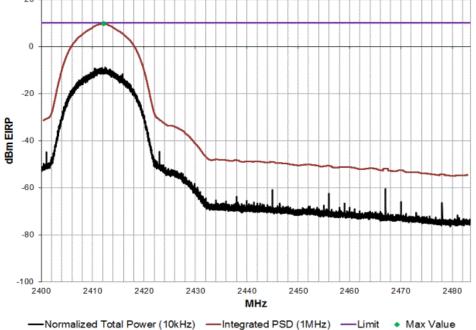








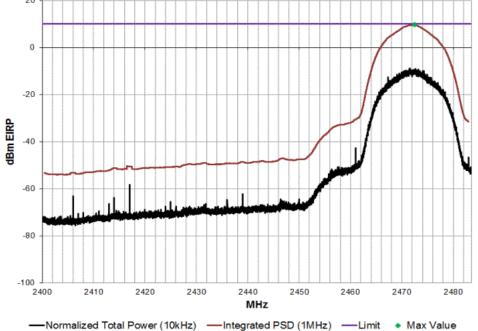






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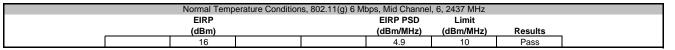
Normal Temperature Conditions, 802.11(b) 11 Mbps, Mid Channel, 6, 2437 MHz EIRP EIRP PSD Limit (dBm) (dBm/MHz) (dBm/MHz) Results 18 9.7 10 Pass 20 10 0 -10 -20 dBm EIRP -30 -40 -50 -60 -70 -80 _____ 2400 2410 2420 2430 2440 2450 2460 2470 2480 MHz -Normalized Total Power (10kHz) -Integrated PSD (1MHz) -Limit Aax Value Normal Temperature Conditions, 802.11(b) 11 Mbps, High Channel, 13, 2472 MHz EIRP EIRP EIRP SD Limit (dBm) (dBm/MHz) (dBm/MHz) Results 17.9 9.5 10 Pass 20

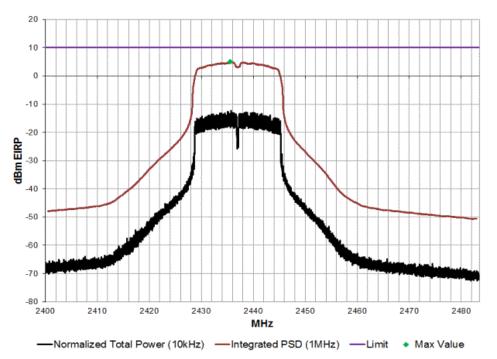


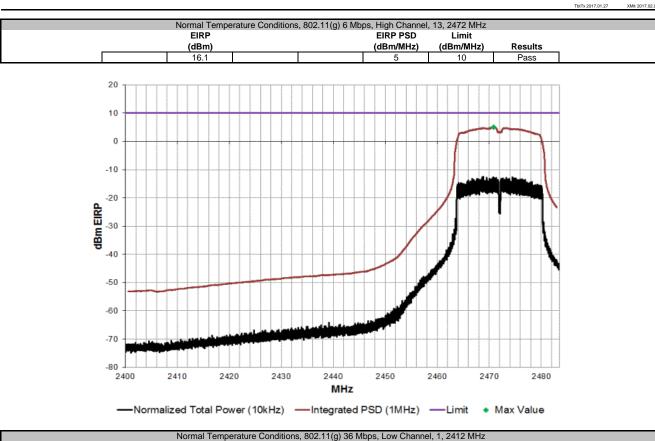


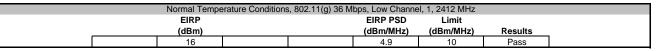
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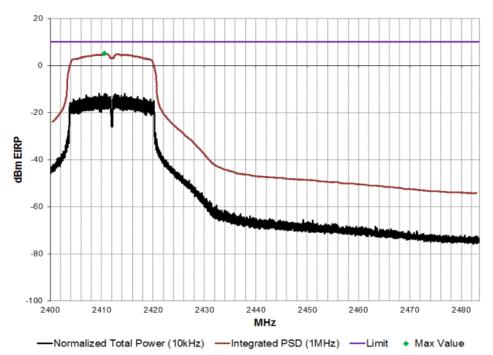
Normal Temperature Conditions, 802.11(g) 6 Mbps, Low Channel, 1, 2412 MHz EIRP EIRP EIRP PSD Limit Limit (dBm) (dBm/MHz) (dBm/MHz) Results 16.1 4.9 10 Pass 20 0 -20 dBm EIRP -40 -60 -80 -100 2400 2410 2420 2430 2440 2450 2460 2470 2480 MHz -Normalized Total Power (10kHz) -Integrated PSD (1MHz) -Limit Aax Value









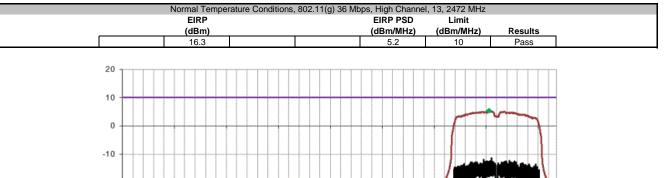


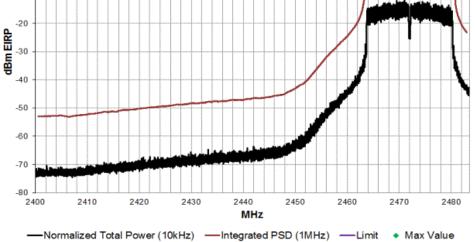


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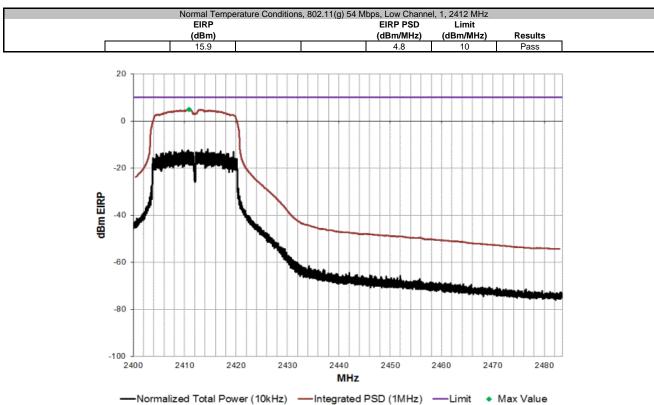
TbtTx 2017.01.27

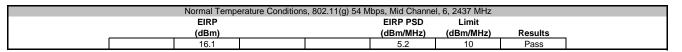
Normal Temperature Conditions, 802.11(g) 36 Mbps, Mid Channel, 6, 2437 MHz EIRP EIRP PSD Limit (dBm) (dBm/MHz) (dBm/MHz) Results 16 4.9 10 Pass 20 10 0 -10 -20 dBm EIRP -30 -40 -50 -60 -70 -80 2400 2410 2420 2430 2440 2450 2460 2470 2480 MHz ----Normalized Total Power (10kHz) ----Integrated PSD (1MHz) ----Limit
Max Value

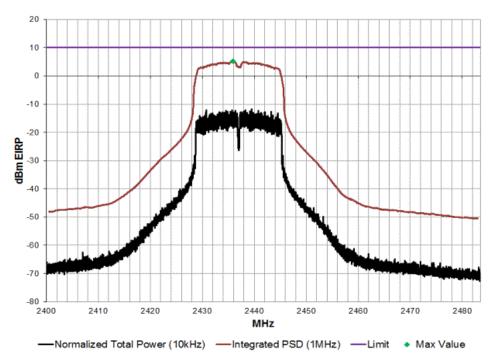


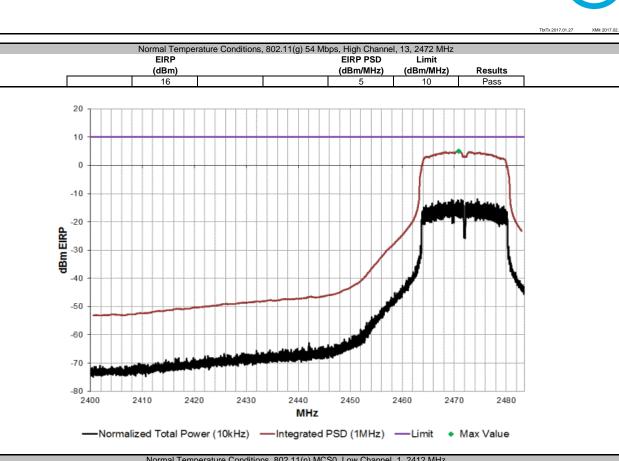


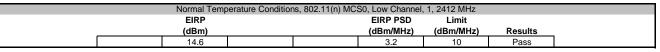


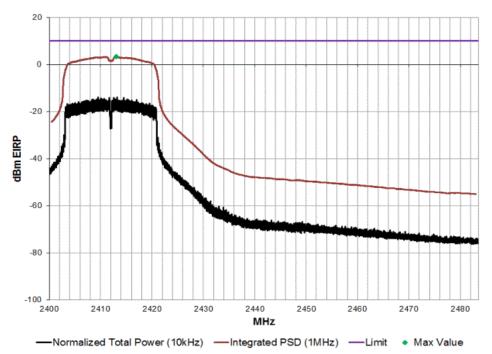




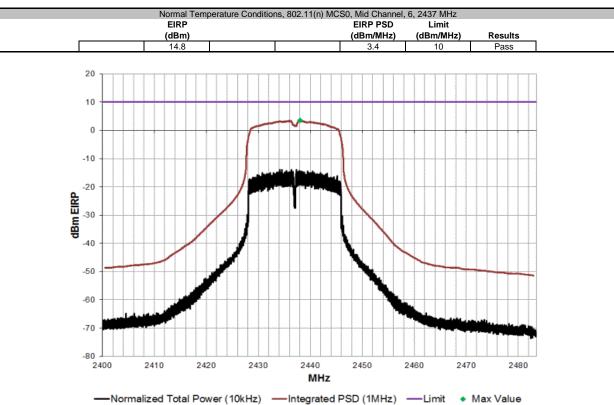


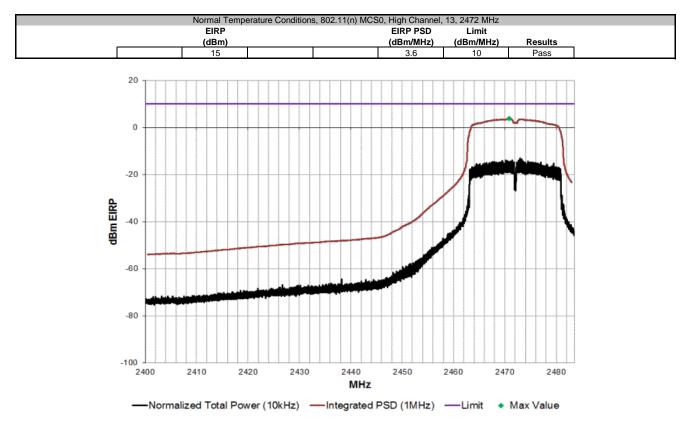










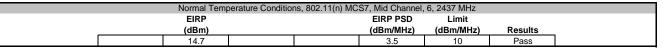


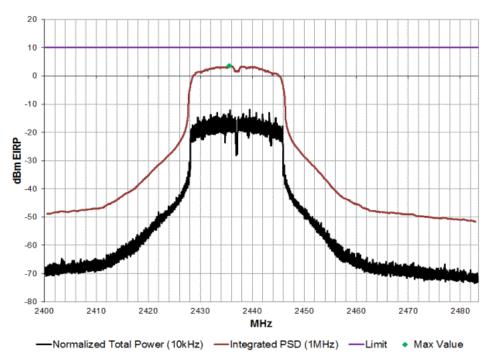


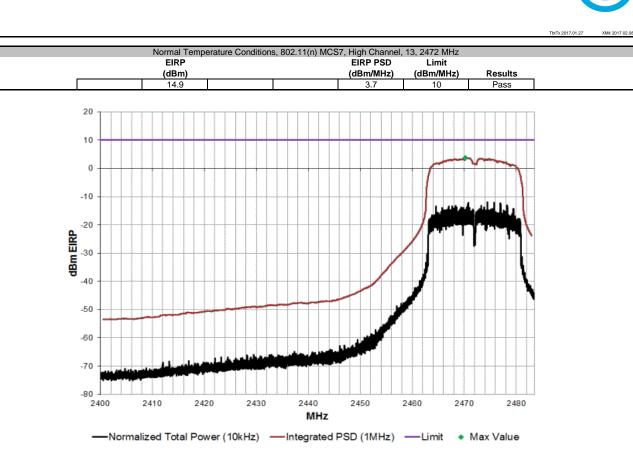
(Mit 2017.02.08

TbtTx 2017.01.27

Normal Temperature Conditions, 802.11(n) MCS7, Low Channel, 1, 2412 MHz EIRP EIRP EIRP PSD Limit Limit (dBm) (dBm/MHz) (dBm/MHz) Results 14.9 37 10 Pass 20 0 -20 dBm EIRP -40 -60 -80 -100 2400 2410 2420 2430 2440 2450 2460 2470 2480 MHz -Normalized Total Power (10kHz) -Integrated PSD (1MHz) -Limit Aax Value









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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.	Cal. Due
Cable	Fairview Microwave	SCA1814-0101-120	OCZ	NCR	NCR
Block - DC	Aeroflex	INMET 8535	AMO	3/27/2017	3/27/2018
Attenuator	Fairview Microwave	SA18E-20	TKS	3/6/2017	3/6/2018
Generator - Signal	Agilent	E8257D	TGU	2/5/2015	2/5/2018
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	11/2/2016	11/2/2017

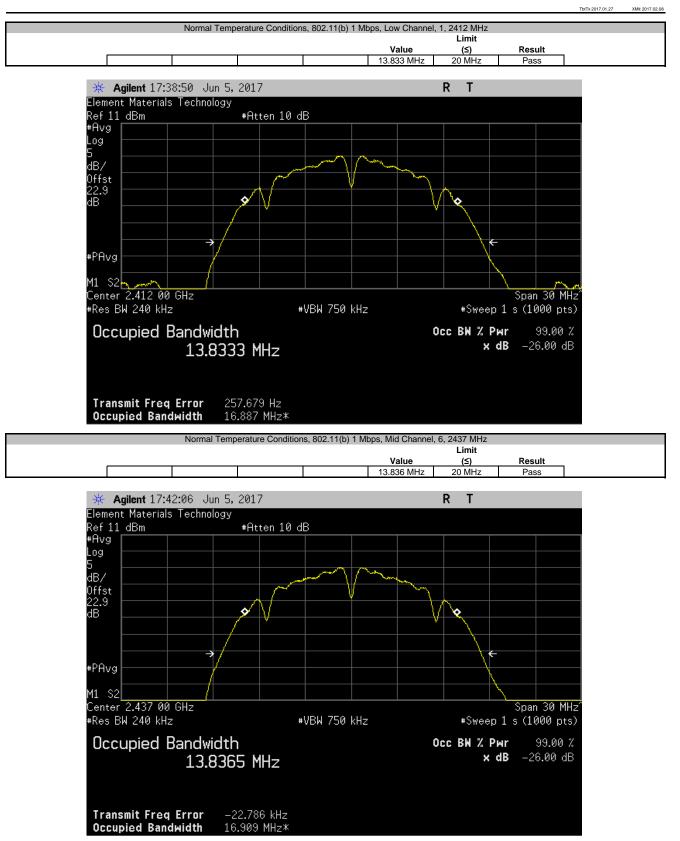
TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The occupied channel bandwidth was measured with the EUT set to the channels and modes as listed on the data sheets. The EUT was transmitting at the data rate(s) listed in the datasheet in a no-hop mode. The 99% occupied bandwidth measurement was made using the Agilent built in Occupied Bandwidth measurement function. The analyzer was set to a span equaling 2 times the nominal bandwidth, with a RBW of 1% of the span, VBW of 3 times the RBW, and utilizing an RMS detector.



EUT: II	MP004M			Work Order:	ELIM0013	
Serial Number: 0					05/31/17	
	lectric Imp, Inc.			Temperature:		
	onathan Dillon			Humidity:		-
Project: N				Barometric Pres.:		
Tested by: N			Power: 5VDC via USB Power	Job Site:		
ST SPECIFICATIO			Test Method	000 01101		
300 328 V2.1.1:20			EN 300 328 V2.1.1:2016			
			211 000 020 1211112010			
OMMENTS						
	(20dB mod + DC Blook +	coax cable + client provided patch ca	able) at 2 4CHz			
Stal Offset 22.590B	(200B pad + DC Block +)	coax cable + client provided patch ca	able) at 2.4GHZ			
EVIATIONS FROM	TEST STANDARD					
one						
nie						
onfiguration #	2	11	~ B+			
oniguration #	-	Signature	Off			
		oignature			Limit	
				Value	(≤)	Resul
ormal Temperature C	Conditions			Talao		
	02.11(b) 1 Mbps					
0	Low Channel,	1 2412 MHz		13.833 MHz	20 MHz	Pass
	Mid Channel, 6			13.836 MHz	20 MHz	Pass
		, 13, 2472 MHz		11.148 MHz	20 MHz	Pass
8	02.11(b) 11 Mbps	10, 2472 10112		11.140 Miliz	20 10112	1 433
	Low Channel,	1 2412 MHz		13.764 MHz	20 MHz	Pass
				13.758 MHz	20 MHz	Pass
	Mid Channel, 6, 2437 MHz High Channel, 13, 2472 MHz			13.756 MHz	20 MHz	Pass
8	02.11(q) 6 Mbps	10, 2112 11112			20 111 12	1 400
0	Low Channel,	1 2412 MHz		16.433 MHz	20 MHz	Pass
	Mid Channel, 6			16.433 MHz	20 MHz	Pass
	High Channel, 13, 2472 MHz			16.762 MHz	20 MHz	Pass
8	02.11(q) 36 Mbps	10, 2112 10112		10.702 WHZ	20 101112	1 033
	Low Channel,	1 2412 MHz		16.425 MHz	20 MHz	Pass
	Mid Channel, 6			16.424 MHz	20 MHz	Pass
		, 13, 2472 MHz		16.423 MHz	20 MHz	Pass
8	02.11(q) 54 Mbps	10, 2112 11112		10.120 11112	20 111 12	1 400
	Low Channel,	1 2412 MHz		16.418 MHz	20 MHz	Pass
	Mid Channel, 6			16.413 MHz	20 MHz	Pass
		, 13, 2472 MHz		16.415 MHz	20 MHz	Pass
8	02.11(n) MCS0					
0	Low Channel,	1. 2412 MHz		14.078 MHz	20 MHz	Pass
	Mid Channel, 6			14.128 MHz	20 MHz	Pass
		, 13, 2472 MHz		17.613 MHz	20 MHz	Pass
	02.11(n) MCS7			11.010 Mill2	20 10112	1 435
X					20 MHz	Pass
8	Low Channel	1. 2412 MHz		1/ 55/ MHz		
8	Low Channel, Mid Channel, 6			17.557 MHz 14.082 MHz	20 MHz 20 MHz	Pass







TbtTx 2017.01.2 (Mit 2017.02.08 Normal Temperature Conditions, 802.11(b) 1 Mbps, High Channel, 13, 2472 MHz Limit **(≤)** 20 MHz Value Result 11.148 MHz Pass Agilent 17:56:16 Jun 5, 2017 R T ₩. Element Materials Technology Ref 11 dBm #Atten 10 dB #Avg Log dB/ 0ffst 22.9 dB ٥/ Ŷ #PAvg M1 S2 Center 2.472 00 GHz #Res BW 240 kHz Span 30 MHz #VBW 750 kHz #Sweep 1 s (1000 pts) Occupied Bandwidth Occ BW % Pwr 99.00 % 11.1479 MHz -26.00 dB x dB **Transmit Freq Error** -3.411 MHz **Occupied Bandwidth** 13.469 MHz* Normal Temperature Conditions, 802.11(b) 11 Mbps, Low Channel, 1, 2412 MHz Limit Value (≤) Result 13.764 MHz 20 MHz Pass ⋇ Agilent 17:59:24 Jun 5, 2017 R T Element Materials Technology Ref 13 dBm #Avg #Atten 10 dB Log ∃Β∕ Offst 9 β 4 #PAvg M1 S2 Center 2.412 00 GHz Span 30 MHz #Res BW 240 kHz #VBW 750 kHz #Sweep 1 s (1000 pts)

Occ BW % Pwr

x dB

99.00 %

-26.00 dB

Occupied Bandwidth

Transmit Freq Error Occupied Bandwidth

13.7644 MHz

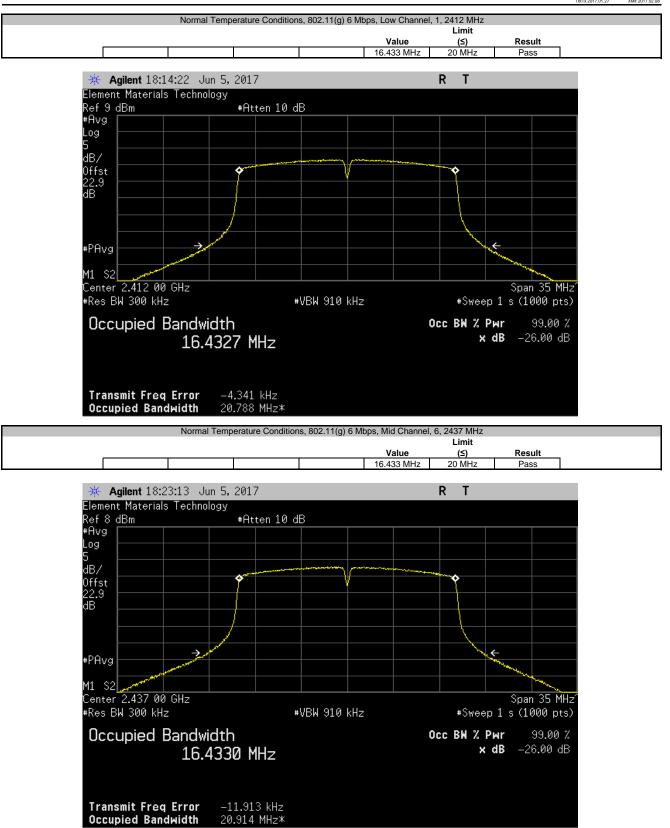
-8.038 kHz 17.251 MHz*



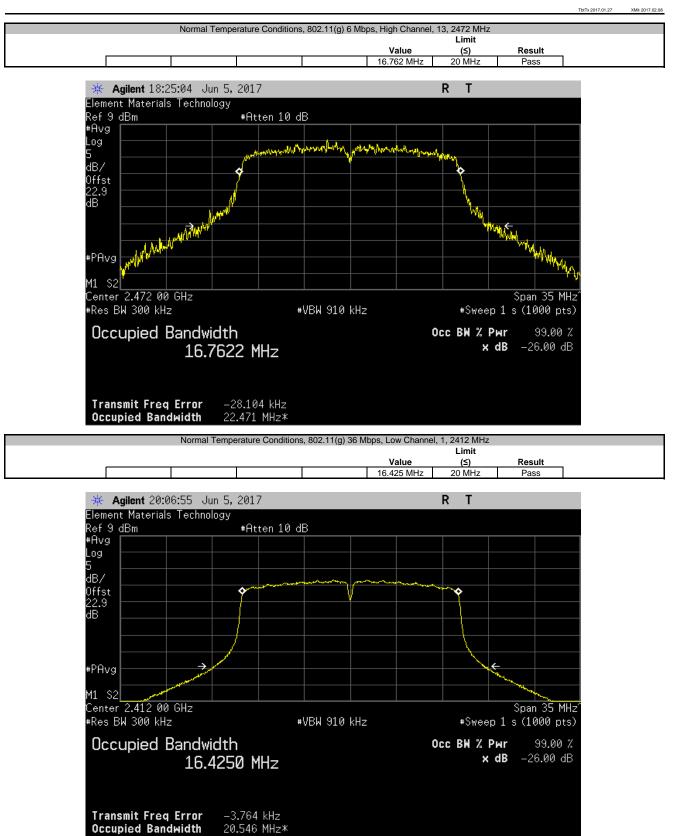
TbtTx 2017.01. (Mit 2017.02.08 Normal Temperature Conditions, 802.11(b) 11 Mbps, Mid Channel, 6, 2437 MHz Limit Value **(≤)** 20 MHz Result 13.758 MHz Pass Agilent 18:05:14 Jun 5, 2017 R T ₩. Element Materials Technology Ref 14 dBm #Atten 10 dB #Avg Log dB/ 0ffst 22.9 dB Ô #PAvg M1 S2 Center 2.437 00 GHz #Res BW 240 kHz Span 30 MHz #VBW 750 kHz #Sweep 1 s (1000 pts) Occupied Bandwidth Occ BW % Pwr 99.00 % 13.7582 MHz x dB -26.00 dB **Transmit Freq Error** -23.723 kHz **Occupied Bandwidth** 17.206 MHz* Normal Temperature Conditions, 802.11(b) 11 Mbps, High Channel, 13, 2472 MHz Limit Value (≤) Result 13.756 MHz 20 MHz Pass ⋇ Agilent 18:07:25 Jun 5, 2017 R T Element Materials Technology Ref 13 dBm #Avg #Atten 10 dB Log ¦β/ Offst 9 iΒ ٥

ì #PAvg M1 S2 Center 2.472 00 GHz Span 30 MHz #Res BW 240 kHz #VBW 750 kHz #Sweep 1 s (1000 pts) Occupied Bandwidth Occ BW % Pwr 99.00 % -26.00 dB 13.7564 MHz x dB Transmit Freq Error Occupied Bandwidth -46.364 kHz 17.177 MHz*



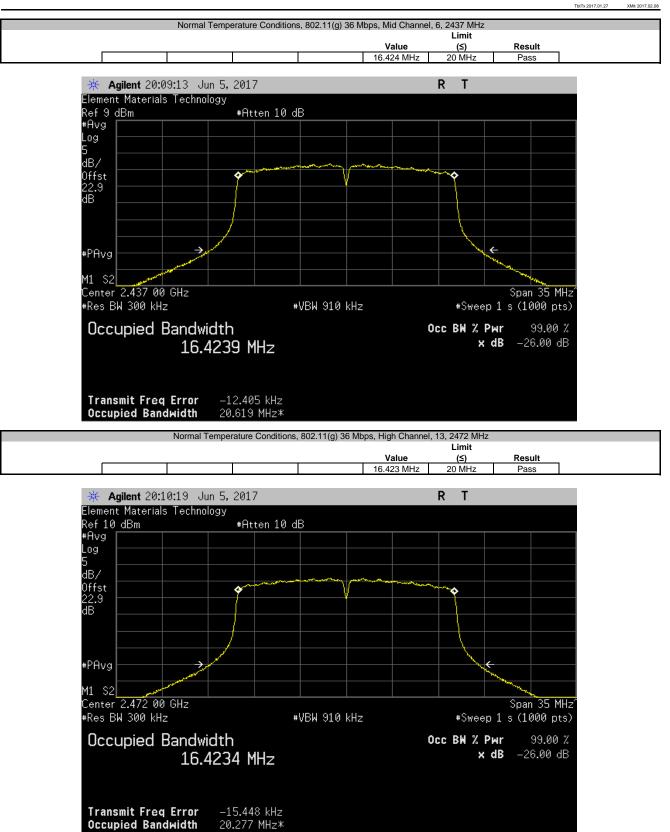




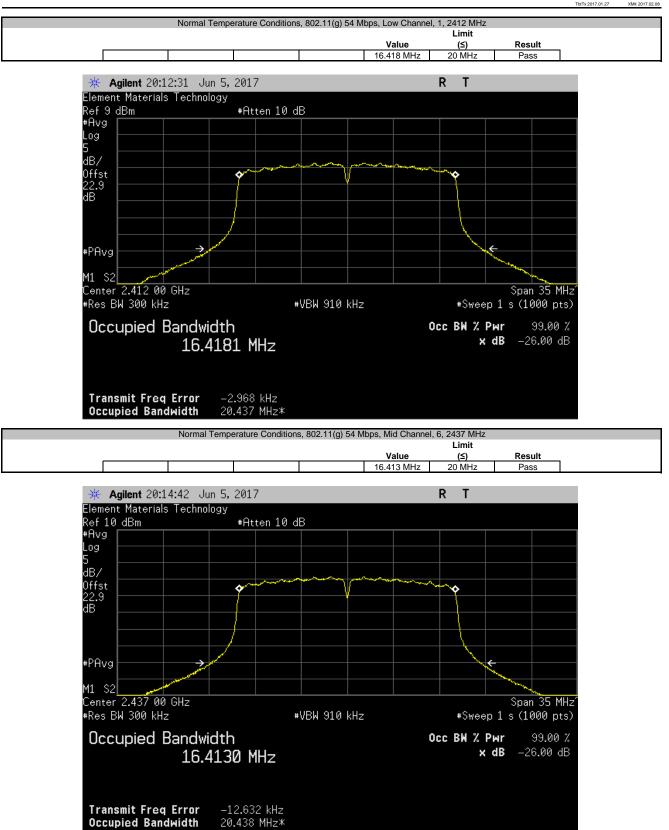


20.546 MHz*

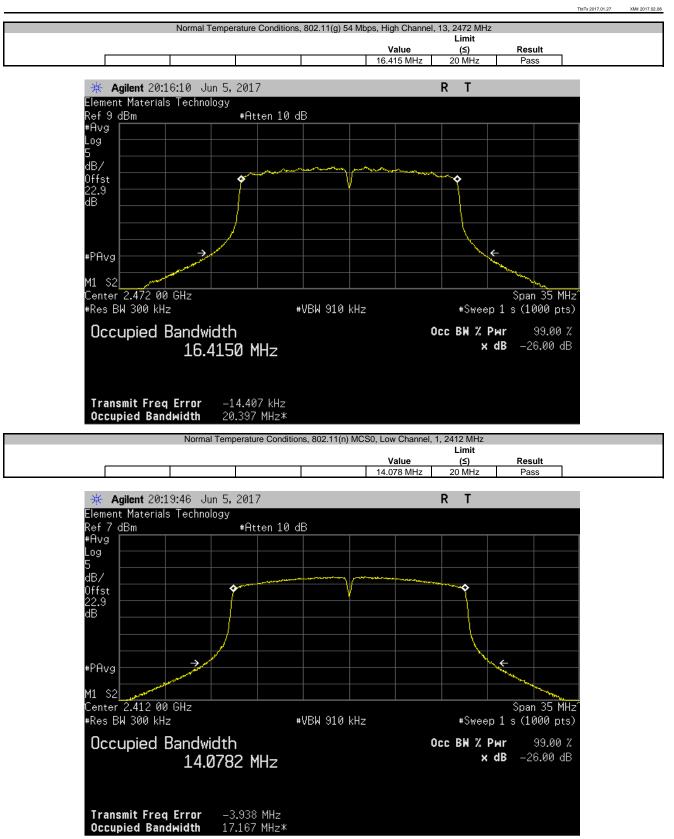






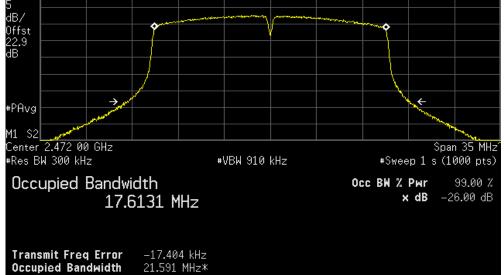




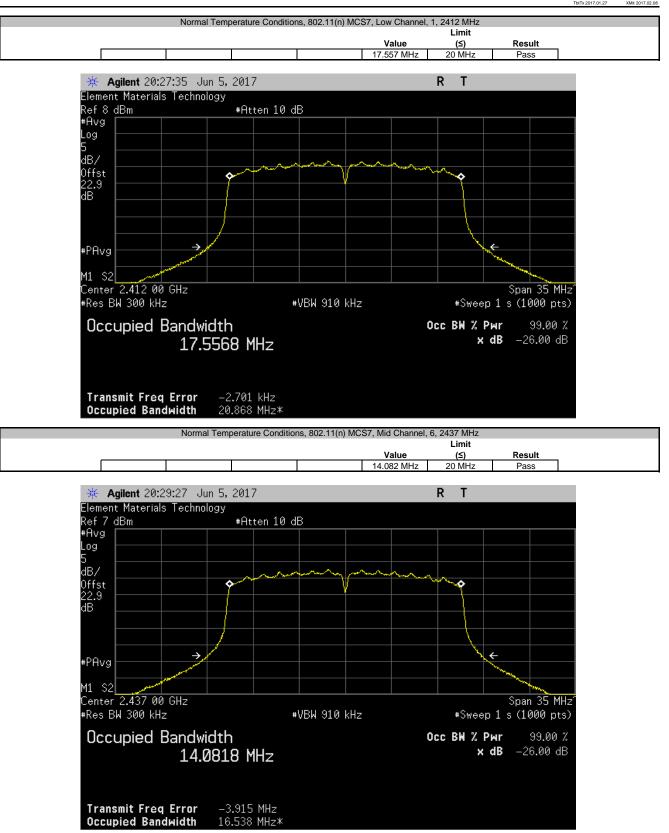




TbtTx 2017.01.2 (Mit 2017.02.08 Normal Temperature Conditions, 802.11(n) MCS0, Mid Channel, 6, 2437 MHz Limit **(≤)** 20 MHz Value Result 14.128 MHz Pass Agilent 20:23:49 Jun 5, 2017 R T ₩. Element Materials Technology Ref 6 dBm #Atten 10 dB #Avg Log dB/ 0ffst 22.9 dB →. ÷ #PAvg M1 S2 Center 2.437 00 GHz #Res BW 300 kHz Span 35 MHz #VBW 910 kHz #Sweep 1 s (1000 pts) Occupied Bandwidth Occ BW % Pwr 99.00 % 14.1282 MHz -26.00 dB x dB **Transmit Freq Error** -3.917 MHz **Occupied Bandwidth** 17.360 MHz* Normal Temperature Conditions, 802.11(n) MCS0, High Channel, 13, 2472 MHz Limit Value (≤) Result 17.613 MHz 20 MHz Pass ⋇ Agilent 20:25:04 Jun 5, 2017 R T Element Materials Technology Ref7dBm #Avg #Atten 10 dB Log







OCCUPIED CHANNEL BANDWIDTH



Normal Temperature Conditions, 802.11(n) MCS7, High Channel, 13, 2472 MHz Limit (≤) 20 MHz Value Result 17.55 MHz Pass 🔆 Agilent 20:30:30 Jun 5, 2017 R Т Element Materials Technology Ref 8 dBm #Atten 10 dB #Avg Log 5 dB/ dD7 Offst 22.9 dB ٥ 0 ÷ #PAvg M1 S2 Center 2.472 00 GHz #Res BW 300 kHz Span 35 MHz #VBW 910 kHz #Sweep 1 s (1000 pts) Occupied Bandwidth Occ BW % Pwr 99.00 % 17.5495 MHz **x dB** -26.00 dB Transmit Freq Error Occupied Bandwidth -16.447 kHz 20.818 MHz*

OCCUPIED CHANNEL BANDWIDTH



XMit 2017.02.08





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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.	Cal. Due
Cable	Fairview Microwave	SCA1814-0101-120	OCZ	NCR	NCR
Block - DC	Aeroflex	INMET 8535	AMO	3/27/2017	3/27/2018
Attenuator	Fairview Microwave	SA18E-20	TKS	3/6/2017	3/6/2018
Generator - Signal	Agilent	E8257D	TGU	2/5/2015	2/5/2018
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	11/2/2016	11/2/2017

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The measurement was made using a RMS detector, with a 1 MHz RBW and 3 MHz VBW.

The frequency ranges of the limit steps are dependent on the measured Occupied Channel Bandwidth (contained elsewhere in the report)

The declared antenna assembly gain (dBi) was added to the measurement system offset.

The Screen Captures show compliance to each OOB steps/spans as defined in the Transmit Mask.



EUT.						TbtTx 2017.01.27	XMit 201		
	IMP004M				Work Order:				
Serial Number:						05/31/17			
	Electric Imp, Inc.			Temperature: 21.3 °C					
	Jonathan Dillon				Humidity:				
Project:					Barometric Pres.:				
	Mark Baytan	Power: 5VDC v			Job Site:	OC13			
EST SPECIFICAT		Test Me							
N 300 328 V2.1.1:2	2016	EN 300	328 V2.1.1:2016						
COMMENTS									
	B (20dB pad + DC Block + coax cable + client provided								
otal Offset 22.590	B (200B pad + DC Block + coax cable + client provided	patch cable) at 2.4GHZ							
	I TEST STANDARD								
lone	1								
Configuration #	2	M+B+							
oninguration #	Z	The Off							
	Signature		Value	Limit	Value	Limit			
			(dBm/MHz)	(dBm/MHz)	(dBm/MHz)	(dBm/MHz)	Result		
ormal Temperature	e Conditions		(==)	(==::::=)	(==	(==			
	802.11(b) 1 Mbps								
	Low Channel, 1, 2412 MHz		-27.42	-10	-41.54	-20	Pass		
	High Channel, 13, 2472 MHz		-32.76	-10	-46.48	-20	Pass		
	802.11(b) 11 Mbps					20			
			-32.04	-10	-48.21	-20	Pass		
	Low Channel, 1, 2412 MHz			-10 -10		-20	Pass Pass		
	Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz		-32.04 -32.52	-10 -10	-48.21 -49.47		Pass Pass		
	Low Channel, 1, 2412 MHz					-20			
	Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz 802.11(g) 6 Mbps Low Channel, 1, 2412 MHz		-32.52 -24.16	-10 -10	-49.47	-20 -20 -20	Pass Pass		
	Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz 802.11(g) 6 Mbps		-32.52	-10	-49.47 -47	-20 -20	Pass		
	Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz 802.11(g) 6 Mbps Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz 802.11(g) 66 Mbps		-32.52 -24.16	-10 -10	-49.47 -47	-20 -20 -20	Pass Pass		
	Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz 802.11(g) 6 Mbps Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz 802.11(g) 36 Mbps Low Channel, 1, 2412 MHz		-32.52 -24.16 -25.24 -25.75	-10 -10 -10 -10	-49.47 -47 -48.91 -47.51	-20 -20 -20 -20 -20	Pass Pass Pass Pass		
	Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz 802.11(g) 6 Mbps Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz 802.11(g) 66 Mbps		-32.52 -24.16 -25.24	-10 -10 -10	-49.47 -47 -48.91	-20 -20 -20 -20	Pass Pass Pass		
	Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz 802.11(g) 6 Mbps Low Channel, 13, 2472 MHz High Channel, 13, 2472 MHz 802.11(g) 36 Mbps Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz 802.11(g) 64 Mbps		-32.52 -24.16 -25.24 -25.75 -25.15	-10 -10 -10 -10	-49.47 -47 -48.91 -47.51	-20 -20 -20 -20 -20	Pass Pass Pass Pass		
	Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz 802.11(g) 6 Mbps Low Channel, 13, 2472 MHz High Channel, 13, 2472 MHz 802.11(g) 36 Mbps Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz 802.11(g) 54 Mbps Low Channel, 1, 2412 MHz		-32.52 -24.16 -25.24 -25.75 -25.15 -25.57	-10 -10 -10 -10 -10 -10	-49.47 -47 -48.91 -47.51 -48.95 -47.63	-20 -20 -20 -20 -20 -20 -20 -20	Pass Pass Pass Pass Pass		
	Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz 802.11(g) 6 Mbps Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz 802.11(g) 36 Mbps Low Channel, 13, 2472 MHz High Channel, 13, 2472 MHz High Channel, 13, 2472 MHz High Channel, 13, 2472 MHz		-32.52 -24.16 -25.24 -25.75 -25.15	-10 -10 -10 -10 -10	-49.47 -47 -48.91 -47.51 -48.95	-20 -20 -20 -20 -20 -20 -20	Pass Pass Pass Pass Pass		
	Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz 802.11(g) 6 Mbps Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz 802.11(g) 56 Mbps Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz 802.11(g) 54 Mbps Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz 802.11(n) MCS0		-32.52 -24.16 -25.24 -25.75 -25.15 -25.57 -25.57 -25.21	-10 -10 -10 -10 -10 -10 -10	-49.47 -47 -48.91 -47.51 -48.95 -47.63 -49.18	-20 -20 -20 -20 -20 -20 -20 -20 -20 -20	Pass Pass Pass Pass Pass Pass Pass		
	Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz 802.11(g) 6 Mbps Low Channel, 13, 2472 MHz High Channel, 13, 2472 MHz 802.11(g) 36 Mbps Low Channel, 13, 2472 MHz High Channel, 13, 2472 MHz 802.11(g) 54 Mbps Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz 802.11(n) MCS0 Low Channel, 1, 2412 MHz		-32.52 -24.16 -25.24 -25.75 -25.15 -25.57 -25.21 -25.26	-10 -10 -10 -10 -10 -10 -10 -10	-49.47 -47 -48.91 -47.51 -48.95 -47.63 -49.18 -47.24	-20 -20 -20 -20 -20 -20 -20 -20 -20 -20	Pass Pass Pass Pass Pass Pass Pass		
	Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz 802.11(g) 6 Mbps Low Channel, 13, 2472 MHz 802.11(g) 36 Mbps Low Channel, 13, 2472 MHz High Channel, 13, 2472 MHz 802.11(g) 54 Mbps Low Channel, 13, 2472 MHz High Channel, 13, 2472 MHz 802.11(n) MCS0 Low Channel, 13, 2472 MHz High Channel, 13, 2472 MHz		-32.52 -24.16 -25.24 -25.75 -25.15 -25.57 -25.57 -25.21	-10 -10 -10 -10 -10 -10 -10	-49.47 -47 -48.91 -47.51 -48.95 -47.63 -49.18	-20 -20 -20 -20 -20 -20 -20 -20 -20 -20	Pass Pass Pass Pass Pass Pass Pass		
	Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz 802.11(g) 6 Mbps Low Channel, 13, 2472 MHz High Channel, 13, 2472 MHz 802.11(g) 36 Mbps Low Channel, 13, 2472 MHz High Channel, 13, 2472 MHz 802.11(g) 54 Mbps Low Channel, 1, 2412 MHz High Channel, 13, 2472 MHz 802.11(n) MCS0 Low Channel, 1, 2412 MHz		-32.52 -24.16 -25.24 -25.75 -25.15 -25.57 -25.21 -25.26	-10 -10 -10 -10 -10 -10 -10 -10	-49.47 -47 -48.91 -47.51 -48.95 -47.63 -49.18 -47.24	-20 -20 -20 -20 -20 -20 -20 -20 -20 -20	Pass Pass Pass Pass Pass Pass Pass		

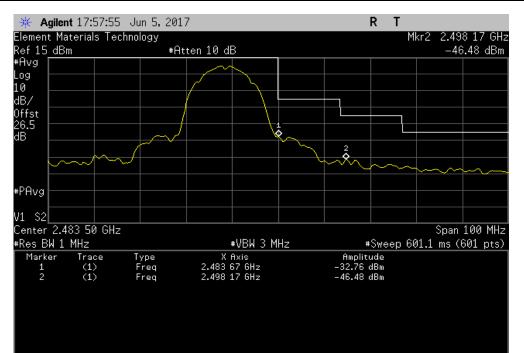


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TbtTx 2017.01.27

Normal Temperature Conditions, 802.11(b) 1 Mbps, Low Channel, 1, 2412 MHz Value Limit Value Limit (dBm/MHz) (dBm/MHz) (dBm/MHz) (dBm/MHz) Result -27.42 -10 41.54 -20 Pass R T Agilent 17:39:48 Jun 5, 2017 ₩. Mkr2 2.381 67 GHz Element Materials Technology Ref 15 dBm #Atten 10 dB -41.54 dBm #Avg Log 10 dB/ 0ffst 26.5 dB ¢ #PAvg V1 S2 Center 2.400 00 GHz #Res BW 1 MHz Span 100 MHz #Sweep 601.1 ms (601 pts) ₩VBW 3 MHz X Axis 2.398 83 GHz 2.381 67 GHz Amplitude -27.42 dBm -41.54 dBm Trace (1) (1) Marker Type Freq 1 2 Freq

Normal Temperature Conditions, 802.11(b) 1 Mbps, High Channel, 13, 2472 MHz										
Value Limit Value Limit										
		(dBm/MHz)	(dBm/MHz)	(dBm/MHz)	(dBm/MHz)	Result				
		-32.76	-10	-46.48	-20	Pass				



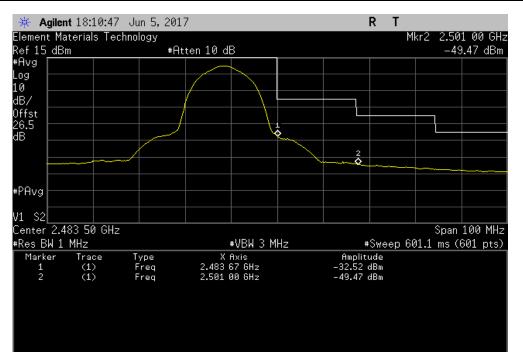


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TbtTx 2017.01.27

Normal Temperature Conditions, 802.11(b) 11 Mbps, Low Channel, 1, 2412 MHz Value Limit Value Limit (dBm/MHz) (dBm/MHz) (dBm/MHz) (dBm/MHz) Result 32.04 -10 -48.21 -20 Pass Agilent 18:04:05 Jun 5, 2017 R T ₩. Element Materials Technology Mkr2 2.377 67 GHz Ref 15 dBm -48.21 dBm #Atten 10 dB #Avg Log 10 dB/ 0ffst 26.5 dB 2 #PAvg V1 S2 Center 2.400 00 GHz Span 100 MHz #Res BW 1 MHz #Sweep 601.1 ms (601 pts) ₩VBW 3 MHz X Axis 2.399 83 GHz 2.377 67 GHz Amplitude -32.04 dBm -48.21 dBm Trace (1) (1) Marker Type Freq 1 2 Freq

Normal Temperature Conditions, 802.11(b) 11 Mbps, High Channel, 13, 2472 MHz								
		Value	Limit	Value	Limit			
		(dBm/MHz)	(dBm/MHz)	(dBm/MHz)	(dBm/MHz)	Result	_	
		-32.52	-10	-49.47	-20	Pass	ĺ	



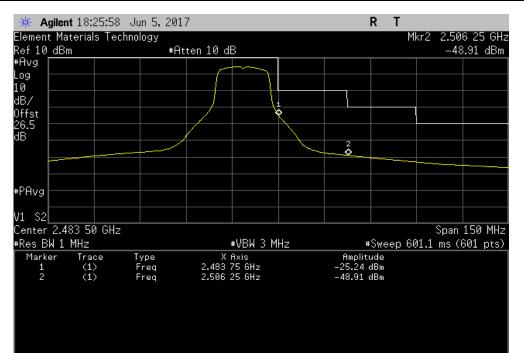


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TbtTx 2017.01.27

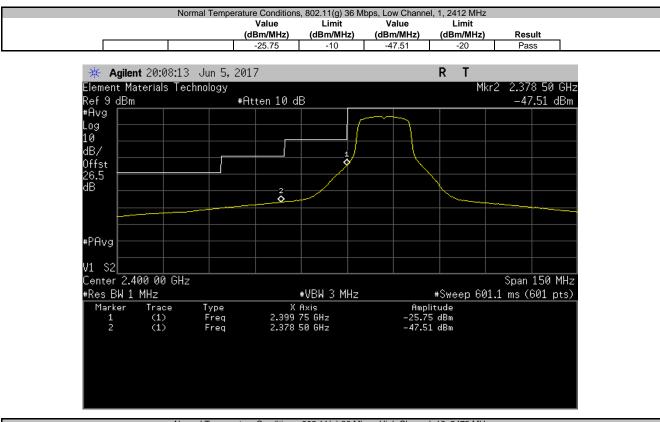
Normal Temperature Conditions, 802.11(g) 6 Mbps, Low Channel, 1, 2412 MHz Value Limit Value Limit (dBm/MHz) (dBm/MHz) (dBm/MHz) (dBm/MHz) Result -24.16 -10 -47 -20 Pass Agilent 18:17:15 Jun 5, 2017 R T ** Mkr2 2.378 50 GHz Element Materials Technology Ref9dBm #Avg #Atten 10 dB -47.00 dBm Log 10 dB/ 0ffst 26.5 dB 2 \$ #PAvg V1 S2 Center 2.400 00 GHz Span 150 MHz #Res BW 1 MHz #Sweep 601.1 ms (601 pts) ₩VBW 3 MHz X Axis 2.399 75 GHz 2.378 50 GHz Amplitude -24.16 dBm -47.00 dBm Trace (1) (1) Marker Type Freq 1 2 Freq

Normal Temperature Conditions, 802.11(g) 6 Mbps, High Channel, 13, 2472 MHz									
Value Limit Value Limit									
	(dBm/MHz)	(dBm/MHz)	(dBm/MHz)	(dBm/MHz)	Result				
	-25.24	-10	-48.91	-20	Pass				

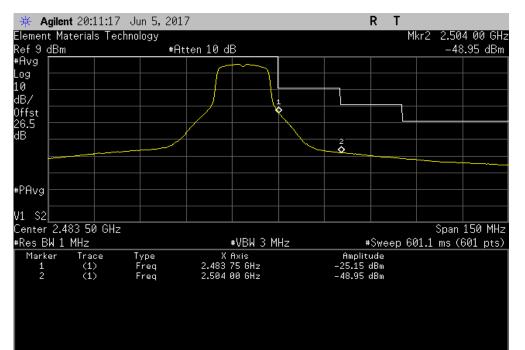




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Normal Temperature Conditions, 802.11(g) 36 Mbps, High Channel, 13, 2472 MHz									
		(dBm/MHz)	(dBm/MHz)	(dBm/MHz)	(dBm/MHz)	Result	_		
		-25.15	-10	-48.95	-20	Pass			



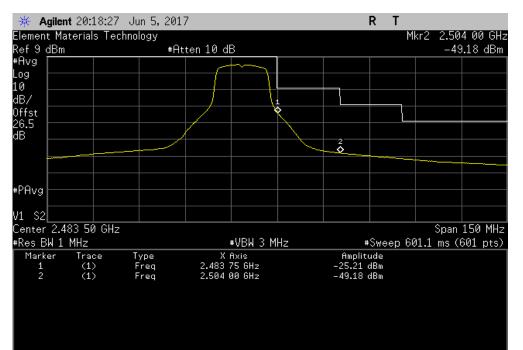


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TbtTx 2017.01.27

Normal Temperature Conditions, 802.11(g) 54 Mbps, Low Channel, 1, 2412 MHz Value Limit Value Limit (dBm/MHz) (dBm/MHz) (dBm/MHz) (dBm/MHz) Result -25.57 -10 -47.63 -20 Pass Agilent 20:14:00 Jun 5, 2017 R T ** Mkr2 2.379 25 GHz Element Materials Technology Ref9dBm #Avg #Atten 10 dB -47.63 dBm Log 10 dB/ 0ffst 26.5 dB 0 #PAvg V1 S2 Center 2.400 00 GHz Span 150 MHz #Res BW 1 MHz #Sweep 601.1 ms (601 pts) ₩VBW 3 MHz X Axis 2.399 75 GHz 2.379 25 GHz Amplitude -25.57 dBm -47.63 dBm Trace (1) (1) Marker Type Freq 1 2 Freq

Normal Temperature Conditions, 802.11(g) 54 Mbps, High Channel, 13, 2472 MHz									
	Value Limit Value Limit								
		(dBm/MHz)	(dBm/MHz)	(dBm/MHz)	(dBm/MHz)	Result	_		
		-25.21	-10	-49.18	-20	Pass			



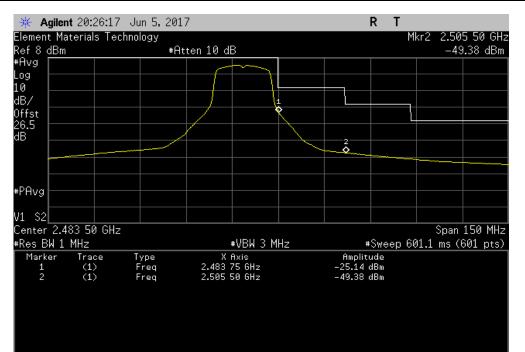


XMit 2017.02.08

TbtTx 2017.01.27

Normal Temperature Conditions, 802.11(n) MCS0, Low Channel, 1, 2412 MHz Value Limit Value Limit (dBm/MHz) (dBm/MHz) (dBm/MHz) (dBm/MHz) Result -25.26 -10 -47.24 -20 Pass Agilent 20:21:17 Jun 5, 2017 R T ₩. Mkr2 2.382 50 GHz Element Materials Technology Ref 8 dBm #Avg #Atten 10 dB -47.24 dBm Log 10 dB/ 0ffst 26.5 dB 2 #PAvg V1 S2 Center 2.400 00 GHz Span 100 MHz #Res BW 1 MHz #Sweep 601.1 ms (601 pts) ₩VBW 3 MHz X Axis 2.399 83 GHz 2.382 50 GHz Amplitude -25.26 dBm -47.24 dBm Trace (1) (1) Marker Type Freq 1 2 Freq

Normal Temperature Conditions, 802.11(n) MCS0, High Channel, 13, 2472 MHz									
	Value Limit Value Limit								
			(dBm/MHz)	(dBm/MHz)	(dBm/MHz)	(dBm/MHz)	Result		
			-25.14	-10	-49.38	-20	Pass		



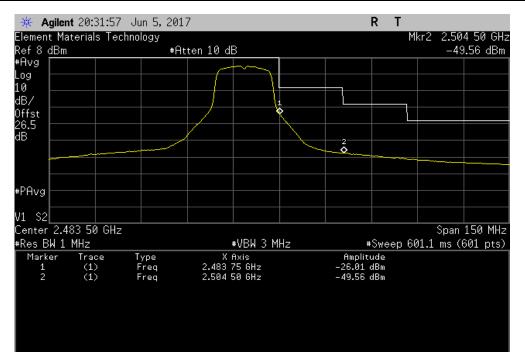


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TbtTx 2017.01.27

Normal Temperature Conditions, 802.11(n) MCS7, Low Channel, 1, 2412 MHz Value Limit Value Limit (dBm/MHz) (dBm/MHz) (dBm/MHz) (dBm/MHz) Result -26.76 -10 -48.28 -20 Pass Agilent 20:28:32 Jun 5, 2017 R T ** Mkr2 2.379 00 GHz Element Materials Technology Ref 8 dBm #Avg #Atten 10 dB -48.28 dBm Log 10 dB/ 0ffst 26.5 dB ¢ #PAvg V1 S2 Center 2.400 00 GHz Span 150 MHz #Res BW 1 MHz #Sweep 601.1 ms (601 pts) ₩VBW 3 MHz X Axis 2.399 75 GHz 2.379 00 GHz Amplitude -26.75 dBm -48.28 dBm Trace (1) (1) Marker Type Freq 1 2 Freq

	Normal Tempe	erature Condition	is, 802.11(n) MCS	S7, High Channel,	13, 2472 MHz		
Value Limit Value Limit							
(dBm/MHz) (dBm/MHz) (dBm/MHz) (dBm/MHz							
		-26.01	-10	-49.56	-20	Pass	





XMit 2017.02.08



TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN



PSA-ESCI 2017.01.26

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

Transmitting 802.11(b/g/n) at Low Ch 1-2412MHz, High Ch 13-2472MHz

POWER SETTINGS INVESTIGATED

5VDC via USB Power

CONFIGURATIONS INVESTIGATED

ELIM0013 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency 30 MHz Stop Frequency 12750 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
Generator - Signal	Agilent	E8257D	TGU	2/5/2015	36 mo
Power Sensor	Hewlett Packard	8481	SQP	1/26/2017	12 mo
Meter - Power	Hewlett Packard	E4418A	SPA	1/26/2017	12 mo
Cable	ESM Cable Corp.	8-18GHz cables	OCY	5/15/2017	12 mo
Amplifier - Pre-Amplifier	Miteq	JSDWK42-18004000-60-5P	PAN	1/4/2017	12 mo
Cable	ESM Cable Corp.	1-8GHz cables	OCX	5/15/2017	12 mo
Cable	D-Coax	None	OC4	1/4/2017	12 mo
Antenna - Double Ridge	A.H. Systems, Inc.	SAS-574	AXV	5/3/2016	24 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVP	8/15/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVL	10/17/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVJ	8/15/2016	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AIR	6/23/2016	24 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHX	NCR	0 mo
Antenna - Standard Gain	EMCO	3160-08	AHK	NCR	0 mo
Cable	ESM Cable Corp.	30-1GHz cables	OCW	5/15/2017	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	PAD	8/15/2016	12 mo
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAY	10/25/2016	12 mo

TEST DESCRIPTION

The EUT was operated in a worst-case configuration in transmit mode. The spectrum was scanned from 30 MHz to 12.75 GHz with the EUT set to low and high transmit frequencies. The EUT was transmitting at its maximum data rate. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height (1-4 meters) and polarization. A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity. The amplitude and frequency of the highest emissions were noted. The EUT was then replaced with a ½ wave dipole that was successively tuned to each of the highest spurious emissions. A signal generator was connected to the dipole (horn antenna for frequencies above 1 GHz), and its output was adjusted to match the level previously noted for each frequency. The output of the signal generator was recorded, and by factoring in the cable loss to the dipole antenna and its gain (dBi); the effective radiated power for each radiated spurious emission was determined.

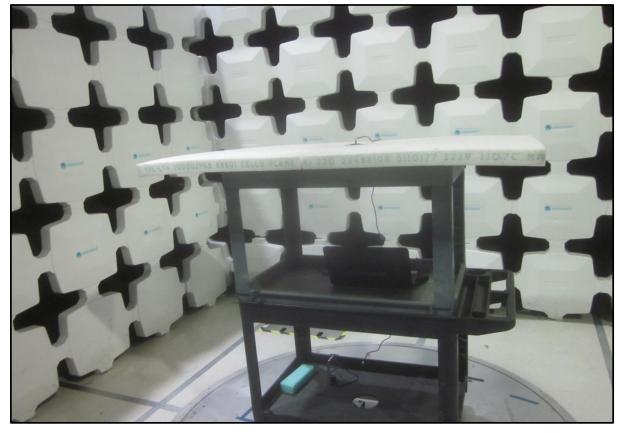


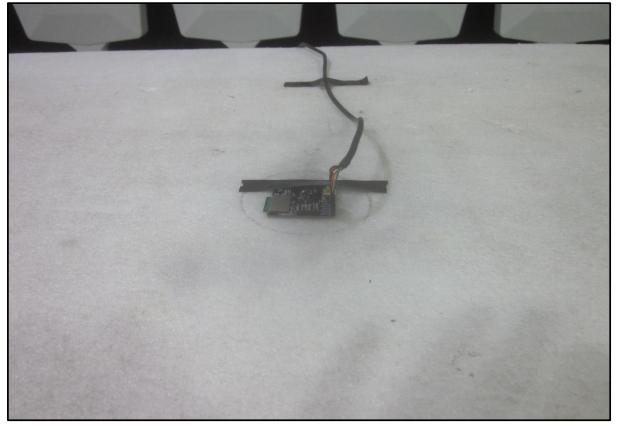
		_				-				EmiR5 2017.01.25		PSA-ESCI 2017.01
Wo	ork Order:				Date:	05/26		+	17.	-		
	Project:			Ten	perature:	21.1			Non	They		
	Job Site:				Humidity:	46.1%						
Seria	I Number:)7	Barome	tric Pres.:	1018	nbar		Fested by:	Mike Tran		
Oant		IMP004M										
Conf	iguration:	Electric Imp	Inc									
		Jonathan D										
		5VDC via U										
		Taxa a successively a			$(Ch 1_2/11)$	2MHz, High	Ch 12-247					
Operati	ing Mode:		y 002.11(b	/g/ll) at Low	/ CIT 1-2412	2101112, 111911	01113-247					
D	eviations:											
Co	omments:	TX Power fo	or B Mode	Only = 59.	All other m	odes default	TX power	was used.				
Test Speci	ifications						Test Meth	od	1			
EN 300 328		116						28 V2.1.1:20	16			
Run #	61	Toot Die	tance (m)	3	Antonna	a Height(s)		1 to 4(m)		Results		ass
	01	Test Dis	lance (III)	3	Antenna	i neigni(s)		1 (0 4(11)		Results	Г	d55
0 T												
-10 -												
-20 -												
-30 -												
шар -40 -												
P												
-50 -												
			┯┛┖┯						Ī			
-60 -												
-70 -												
-80 🛛												
10	0		100			1000			10000			100000
	-		.50			MHz						
										📕 PK 🛛 🔶	AV	o QP
				Polarity/								
				Transducer					Compared to			
	Freq	Antenna Height	Azimuth	Туре	Detector	EIRP	EIRP	Spec. Limit	Spec.	Co	mments	
				.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Detector					00	minorito	
	(MHz)	(meters)	(degrees)	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Delector	(Watts)	(dBm)	(dBm)	(dB)		ininonito	

Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Туре	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Spec. (dB)	Comments
9888.015	2.0	142.0	Horz	AV	1.57E-08	-48.0	-30.0	-18.0	EUT on Side, High Ch, 1Mbps
9888.005	1.8	207.0	Vert	AV	1.50E-08	-48.2	-30.0	-18.2	EUT Ver, High Ch, 1Mbps
9648.025	1.9	209.0	Vert	AV	1.17E-08	-49.3	-30.0	-19.3	EUT Ver, Low Ch, 1Mbps
9648.020	2.7	197.0	Horz	AV	1.14E-08	-49.4	-30.0	-19.4	EUT on Side, Low Ch, 1Mbps
9888.005	2.7	199.0	Horz	AV	1.11E-08	-49.5	-30.0	-19.5	EUT on Side, High Ch, MCS0

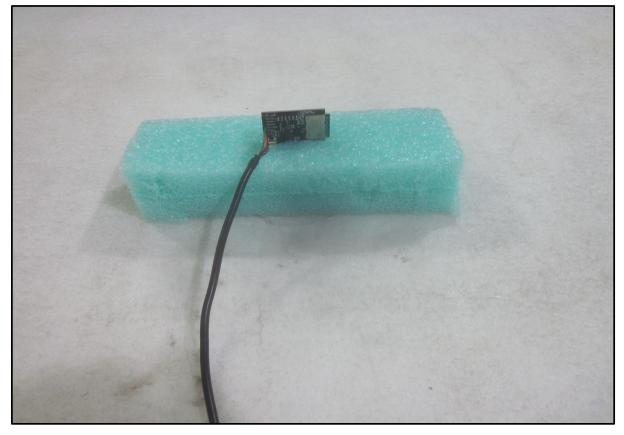
Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
9888.020	2.7	199.0	Horz	AV	1.06E-08	-49.7	-30.0	-19.7	EUT on Side, High Ch, 11Mbps
9888.015	2.7	199.0	Horz	AV	1.06E-08	-49.7	-30.0	-19.7	EUT on Side, High Ch, 6Mbps
9888.010	2.7	199.0	Horz	AV	9.93E-09	-50.0	-30.0	-20.0	EUT on Side, High Ch, 36Mbps
9888.000	2.7	199.0	Horz	AV	9.71E-09	-50.1	-30.0	-20.1	EUT on Side, High Ch, MCS7
9888.015	2.7	199.0	Horz	AV	9.49E-09	-50.2	-30.0	-20.2	EUT on Side, High Ch, 54Mbps
7415.240	1.0	250.0	Vert	AV	7.20E-09	-51.4	-30.0	-21.4	EUT Ver, High Ch, 1Mbps
7415.265	1.0	39.0	Horz	AV	7.03E-09	-51.5	-30.0	-21.5	EUT on Side, High Ch, 1Mbps
7236.795	1.0	237.0	Vert	AV	6.87E-09	-51.6	-30.0	-21.6	EUT Ver, Low Ch, 1Mbps
7236.840	1.0	18.0	Horz	AV	5.72E-09	-52.4	-30.0	-22.4	EUT on Side, Low Ch, 1Mbps
7236.810	1.0	132.0	Vert	AV	5.21E-09	-52.8	-30.0	-22.8	EUT Hor, Low Ch, 1Mbps
7236.915	3.4	113.0	Vert	AV	5.21E-09	-52.8	-30.0	-22.8	EUT on Side, Low Ch, 1Mbps
7236.810	1.0	71.0	Horz	AV	4.54E-09	-53.4	-30.0	-23.4	EUT Ver, Low Ch, 1Mbps
7236.955	1.5	183.0	Horz	AV	3.37E-09	-54.7	-30.0	-24.7	EUT Hor, Low Ch, 1Mbps
4944.015	1.3	27.0	Horz	AV	7.20E-10	-61.4	-30.0	-31.4	EUT on Side, High Ch, 1Mbps
4944.015	1.2	133.0	Vert	AV	7.20E-10	-61.4	-30.0	-31.4	EUT Ver, High Ch, 1Mbps
4823.935	1.0	166.0	Vert	AV	6.41E-10	-61.9	-30.0	-31.9	EUT Ver, Low Ch, 1Mbps
4823.975	1.1	151.0	Horz	AV	5.85E-10	-62.3	-30.0	-32.3	EUT on Side, Low Ch, 1Mbps















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

Receiving at Low Ch 1-2412MHz & High Ch 13-2472MHz

POWER SETTINGS INVESTIGATED

5VDC via USB Power

CONFIGURATIONS INVESTIGATED

ELIM0013 - 1

FREQUENCY RANGE INVESTIGATED

Start Frequency 30 MHz

Stop Frequency 12750 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.	Interva
Generator - Signal	Agilent	E8257D	TGU	2/5/2015	36 mo
Power Sensor	Hewlett Packard	8481	SQP	1/26/2017	12 mo
Meter - Power	Hewlett Packard	E4418A	SPA	1/26/2017	12 mo
Amplifier - Pre-Amplifier	Miteq	JSDWK42-18004000-60-5P	PAN	1/4/2017	12 mo
Cable	ESM Cable Corp.	1-8GHz cables	OCX	5/15/2017	12 mo
Cable	D-Coax	None	OC4	1/4/2017	12 mo
Antenna - Double Ridge	A.H. Systems, Inc.	SAS-574	AXV	5/3/2016	24 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVP	8/15/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVL	10/17/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVJ	8/15/2016	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AIR	6/23/2016	24 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHX	NCR	0 mo
Antenna - Standard Gain	EMCO	3160-08	AHK	NCR	0 mo
Cable	ESM Cable Corp.	30-1GHz cables	OCW	5/15/2017	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	PAD	8/15/2016	12 mo
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAY	10/25/2016	12 mo

TEST DESCRIPTION

The EUT was operated in a worst-case configuration in receive mode. The spectrum was scanned from 30 MHz to 12.75 GHz with the EUT set to low and high receive frequencies. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height (1-4 meters) and polarization. A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity. The amplitude and frequency of the highest emissions were noted. The EUT was then replaced with a ½ wave dipole that was successively tuned to each of the highest spurious emissions. A signal generator was connected to the dipole (horn antenna for frequencies above 1 GHz), and its output was adjusted to match the level previously noted for each frequency. The output of the signal generator was recorded, and by factoring in the cable loss to the dipole antenna and its gain (dBi); the effective radiated power for each radiated spurious emission was determined.



									EmiR5 2017.01.25		PSA-ESCI 2017.01.26
W	ork Order:	ELIM0013		Date:		3/17	100		- 0		
	Project:	None	Ten	nperature:	23	23 °C		Am	> Muy	-	
	Job Site:	OC07		Humidity:		51.1% RH			2		_
Seria	al Number:	0107	Barome	etric Pres.:	1017	017 mbar Tested by: Mike Tran					
		IMP004M									
	figuration:										
		Electric Imp, Inc.									
		Jonathan Dillon									
E	UT Power:	5VDC via USB Powe									
Operat	ting Mode:	Receiving at Low Ch	1-2412MHz	: & High Ch	13-2472M	Ηz					
D	Deviations:	None									
с	comments:	None									
Test Spec	ifications					Test Meth	od				
	28 V2.1.1:20	016					8 V2.1.1:20)16			
Run #	8	Test Distance (m) 3	Antenna	Height(s)		1 to 4(m)		Results	Pi	ass
80											
70											
60 -											
50											
₩/ ₩ 40								•			
30							•				
20 -											
10 -											+++
0 + 10	0	100)		1000 MHz			10000			100000
					External	Polarity/ Transducer		Distance	PK	◆ AV	QP Compared to

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7414.550	28.5	11.8	1.1	284.0	3.0	0.0	Horz	AV	0.0	40.3	48.2	-7.9	High Ch 13, EUT Hor
7414.560	28.3	11.8	1.0	346.0	3.0	0.0	Vert	AV	0.0	40.1	48.2	-8.1	High Ch 13, Eut Ver
7236.005	29.0	10.2	1.0	26.0	3.0	0.0	Vert	AV	0.0	39.2	48.2	-9.0	Low Ch 1, EUT Ver
7237.490	28.9	10.2	1.0	262.0	3.0	0.0	Horz	AV	0.0	39.1	48.2	-9.1	Low Ch 1, Eut Hor
4942.610	28.1	4.2	1.2	71.0	3.0	0.0	Horz	AV	0.0	32.3	48.2	-15.9	High Ch 13, EUT Hor
4942.630	28.0	4.2	1.0	340.0	3.0	0.0	Vert	AV	0.0	32.2	48.2	-16.0	High Ch 13, Eut Ver
4824.010	28.2	3.7	1.0	210.0	3.0	0.0	Horz	AV	0.0	31.9	48.2	-16.3	Low Ch 1, Eut Hor
4823.715	28.1	3.7	1.0	211.0	3.0	0.0	Vert	AV	0.0	31.8	48.2	-16.4	Low Ch 1, EUT Ver



