Project 17712-15

Triax Technologies SIM-P

Wireless Certification Report

Prepared for:

Justin Morgenthau Triax Technologies 66 Fort Point Street Norwalk, CT 06855

By

Professional Testing (EMI), Inc. 1601 North A.W. Grimes Blvd., Suite B Round Rock, Texas 78665

4 May 2016

Reviewed by

Larry Finn Chief Technical Officer Written by

Eric Lifsey EMC Engineer

Revision History

Revision Number	Description	Date
00	Draft for client and internal review.	1 Mar 2016
01	Final; revised with IC CN.	4 May 2016

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None.

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NOTICE: (1) This Report must not be used to claim product endorsement, by NVLAP, NIST, the FCC or any other Agency. This report also does not warrant certification by NVLAP or NIST. (2) This report shall not be reproduced except in full, without the written approval of Professional Testing (EMI), Inc. (3) The significance of this report is dependent on the representative character of the test sample submitted for evaluation and the results apply only in reference to the sample tested. The manufacturer must continuously implement the changes shown herein to attain and maintain the required degree of compliance.



Compliance Certificate

Applicant	Device & Test Identification		
Triax Technologies (Justin Morgenthau)	FCC ID:	2AGHISIM-P	
66 Fort Point Street	Industry Canada ID:	21358-SIM-P	
Norwalk, CT 06855	Model(s):	SIM-P	
Certificate Date: 1 May 2016	Laboratory Project ID:	17712-15	

The device named above was tested utilizing the following documents and found to be in compliance with the required criteria:

Requirement	Reference	Detail
FCC 47 CFR Part 15 C	15.247	Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.
FCC 47 CFR Part 15 C	15.209	Radiated emission limits; general requirements.
FCC 47 CFR Part 15 C	15.107, 15.207	Conducted emission limits.
FCC 47 CFR Part 15 C	15.205	Restricted Bands of Operation
KDB 558074 D01	DR01	DTS Measurement Guidance v03r02
KDB 412172	D01	Guidelines for Determining the ERP and EIRP of an RF Transmitting System
Edition 97-01, and OET Bulletin 65* Supplement C, Ed. 01-01		Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields
RSS-247	Issue 1	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence- Exempt Local Area Network (LE-LAN) Devices
RSS-Gen	Issue 4	General Requirements and Information for the Certification of Radio Apparatus
RSS-102	Issue 4	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

^{*}MPE is reported separately from this document. **Corresponding RSS references are listed in the body of the report.

I, Eric Lifsey, for Professional Testing (EMI), Inc., being familiar with the above requirements and test procedures have reviewed the test setup, measured data, and this report. I believe them to be true and accurate.



This report has been reviewed and accepted by the Applicant. The undersigned is responsible for ensuring that this device will continue to comply with the requirements listed above.

Representative of Applicant

1.0 Introduction

1.1 Scope

This report describes the extent to which the equipment under test (EUT) conformed to the intentional radiator requirements of the United States and Canada.

Professional Testing (EMI), Inc., (PTI) follows the guidelines of National Institute of Standards and Technology (NIST) for all uncertainty calculations, estimates, and expressions thereof for electromagnetic compatibility testing.

1.2 EUT Description

Table 1.2.1: Equipment Under Test				
Manufacturer / Model Serial # Description				
Triax Technologies SIM-P 221*		2400-2483.5 MHz FHSS transceiver; using Bluetooth Low Energy radio protocols.		

^{*}This was the normal firmware sample. Additional non-serial numbered samples were programmed to operate on fixed frequencies as needed for various tests.

Table 1.2.2: Support Equipment					
Manufacturer / Model Serial # Description					
none		none			

The EUT designed as a remote sensor of impact forces experienced by participants in contact sports.

The EUT measures approximately 33 mm x 13 mm x 9 mm. It includes a permanently embedded rechargeable battery. It plugs into a small adapter that connects the flush charging pins to a typical USB power source to charge. It uses about 25 mA of current when in operation.

1.3 EUT Operation

The EUT was exercised in a manner consistent with normal operations.

The EUT was tested as a DTS device as its bandwidth satisfies the DTS minimum bandwidth requirements. In the final application it will be also hopping per the Bluetooth protocol.

1.4 Modifications to Equipment

No modifications were made to the EUT during the performance of the test program.

1.5 Test Site

Measurements were made at the PTI semi-anechoic facility designated Site 45 (FCC 459644, IC 3036B-1) in Austin, Texas. The site is registered with the FCC under Section 2.948 and Industry Canada per RSS-GEN, and is subsequently confirmed by laboratory accreditation (NVLAP). The test site is located at 11400 Burnet Road, Austin, Texas 78758, while the main office is located at 1601 North A.W. Grimes Boulevard, Suite B, Round Rock, Texas, 78665.

1.6 Radiated Measurements

Radiated levels are determined as follows:

Raw Measured Level + Antenna Factor + Cable Losses - Amplifier Gain = Corrected Level

Conducted RF levels, if applicable, are determined as follows:

Conducted mains levels are determined as follows:

Raw Measured Level + LISN Factor + Cable/Filter/Limiter Losses = Corrected Level

Additionally, measurement distance extrapolation factors are applied and documented where used.

1.7 Applicable Documents and Clauses

Table 1.7.1: Applicable Documents			
Document	Title		
47 CFR	Part 15 – Radio Frequency Devices		
47 CFK	Subpart C -Intentional Radiators		
DCC 247 Issue 1	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-		
RSS-247 Issue 1	Exempt Local Area Network (LE-LAN) Devices		
RSS-Gen Issue 4	General Requirements and Information for the Certification of Radio Apparatus		
ANSI C63.4 2009	American National Standard for Methods of Measurement of Radio-Noise Emissions		
ANSI C05.4 2009	from Low Voltage Electrical and Electronic Equipment		

Table 1.7.2: Applicable Clauses					
Parameter	FCC Part 15	IC RSS References			
raiametei	Rule Paragraphs	ic K33 References			
Transmitter Characteristics	15.247	RSS-247 5.2 (DTS) & 5.4, RSS-Gen			
Bandwidth	15.247(a)(1), 2.1049, KDB 558074 D01	RSS-Gen 4.6			
Spurious Emission	15.247, 15.209, 15.205	RSS-247 5.5, RSS-GEN 4.9, 4.10			
Band Edge	15.247, 15.205	RSS-247 5.5, RSS-Gen 4.9			
Antenna Requirement	15.203	RSS-Gen 8.3			
Conducted Emissions, Mains	15.207	RSS-Gen 8.8			

2.0 Fundamental Power

2.1 Test Procedure

Peak power is measured using radiated means with modulation. The transmitter hopping sequence is disabled to operate on a single channel for the measurement.

2.2 Test Criteria

47 CFR (USA) // IC (Canada)					
Section Reference	Date				
	Fundamental Power				
15.247(a)(3) //	Conducted Limits	3 Feb 2016			
RSS-247 5.2	1 W	3160 2010			
	Limit Restated as Field: 125.23 dBμV/m @ 3 m				

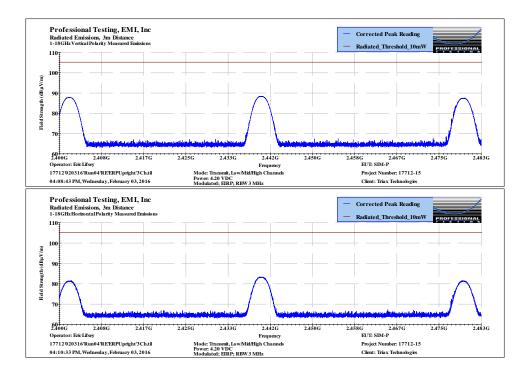
2.3 Test Results, Peak Power

The EUT was measured for radiated power in three orthogonal orientations; the maximum orientation is reported below.

Table 2.3.1 Power, Peak, Radiated; Orientation: Upright							
Frequency MHz	Measured Peak Power dBμV/m @ 3 m Vertical Polarity	Maximum Measured Peak Power Restated as EIRP in dBm	Maximum Measured Peak Power Restated as EIRP in mW				
2402	87.8	-7.43	0.181				
2440	88.4	-6.83	0.208				
2480	87.6	-7.63	0.173				

Measured in 3 MHz RBW, 3 MHz VBW.

The EUT was satisfied the requirements. Plotted measurements appear below.



2.4 Test Results, Duty Cycle

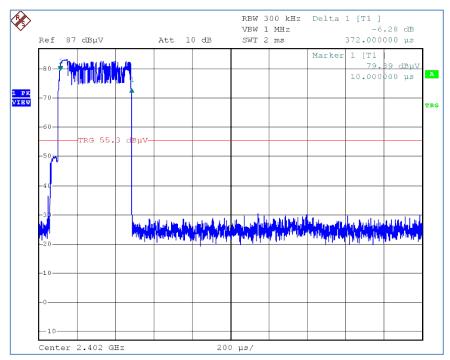
Measurement is based on intervals not to exceed 100 msec. Maximum transmitter on time is divided by the lesser of 100 msec or the actual measured minimum transmitter interval time. The result is converted to dB and applied as needed to peak measurements of transmitter artifacts to determine average power. This is not a pass/fail measurement.

The EUT was placed ~3 cm from the sense antenna and provoked to transmit by tapping it on the surface beneath it to simulate impacts. The EUT communicated with a personal device (iPod) that was located about 1 meter away. The signal was verified as being from the EUT and measurements were taken.

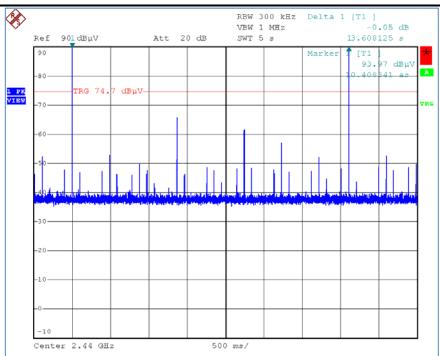
Table 2.5.1 Duty Cycle Results and Average Duty Cycle Factor Result					
Measured On Time (msec)	Measured Time Interval (msec)	Duty Cycle Factor Calculation	Result (dB)	Duty Cycle Factor Allowed (dB)	
0.372	13,600	= 20 * Log ₁₀ (0.372 msec / 100 msec)	-48.6	-20.0	

The allowed duty cycle factor is applied to peak measured harmonic signals to find average levels.

Plotted results appear below.



Transmit On Time



Transmit Period

3.0 Power Spectral Density

3.1 Test Procedure

A spectrum analyzer is either connected directly to the EUT or used by radiated means to measure the fundamental emission. It is adjusted to measure the power spectral density in the specified resolution bandwidth.

3.2 Test Criteria

47 CFR (USA) // IC (Canada)										
Section Reference	Parameter	Date								
15.247(e) // RSS-247, 5.2	Power Spectral Density, Conducted Limit: 8 dBm / 3 kHz Restated as field strength limit: 103.23 dBμV/m at 3 m	NA								

3.3 Test Results

The fundamental peak power measured below the limit for this test and at a greater resolution bandwidth; the EUT satisfies the criteria without additional measurement.

4.0 Occupied Bandwidth

4.1 Test Procedure

Bandwidth is measured by radiated means. A recording of the results is included.

4.2 Test Criteria

47 CFR (USA) // IC (Canada)		
Section Reference	Parameter	Date(s)
14.247(a)(2), 2.1049, KDB 558074 D01 // RSS-Gen 4.6	Bandwidth, 6 dB, 20 dB	3 Feb 2016

4.3 Test Results

The bandwidth measurement is used to verify DTS characteristics and/or for general reporting for agency application.

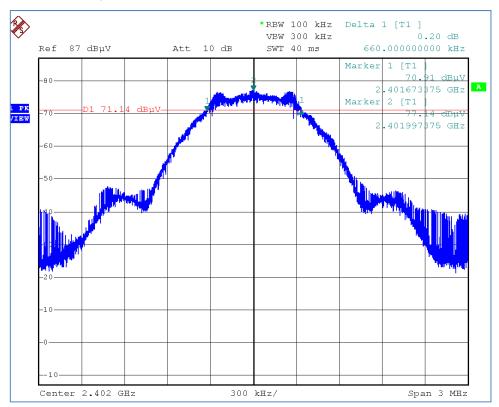
The EUT was found to be in compliance with applicable requirements.

Table 5.3.1 Band	dwidth 6 dB, Mini	mum 500 kHz in 1	LOO kHz RBW
Low Channel	Mid Channel	High Channel	Reported
Measured BW	Measured BW	Measured BW	Minimum BW
(kHz)	(kHz)	(kHz)	(kHz)
660	666	666	660

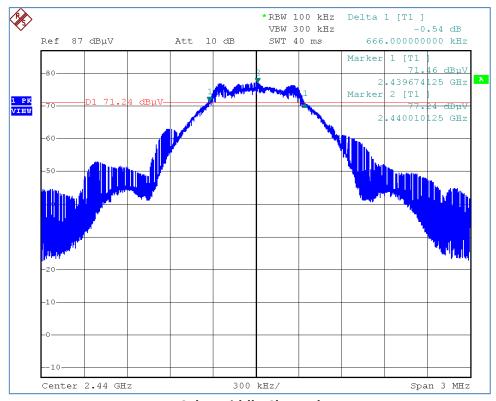
Table 5.3.2 Band	dwidth 20 dB, Me	asure and Report					
Low Channel	Mid Channel	High Channel	Reported				
Measured BW	Measured BW	Measured BW	Maximum BW				
(kHz)	(kHz)	(kHz)	(kHz)				
1098	1218	1254	1254				

Plotted measurements appear on the following pages.

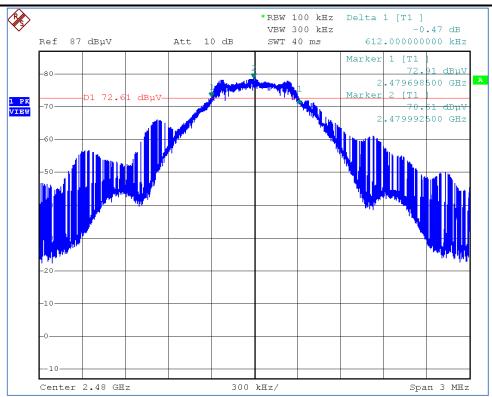
4.3.1 Bandwidth Plots, 6 dB



6 dB, Low Channel

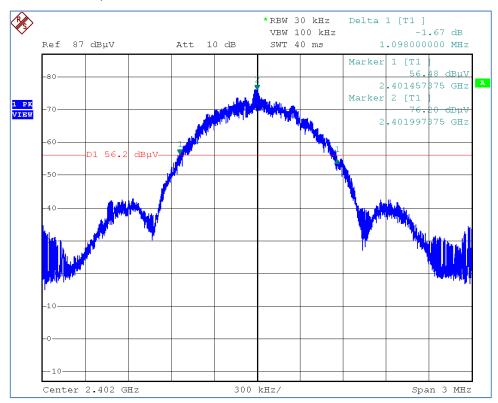


6 dB, Middle Channel

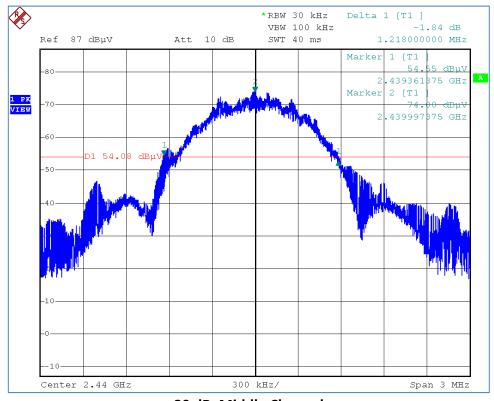


6 dB, High Channel

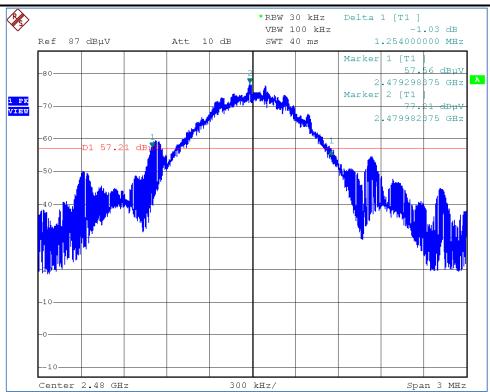
4.3.2 Bandwidth Plots, 20 dB



20 dB, Low Channel



20 dB, Middle Channel



20 dB, High Channel

5.0 Band Edge

5.1 Test Procedure

EUT is placed into normal transmit operation on the nearest band edge channel. The spectrum analyzer is approximately centered on the band edge frequency with span sufficient to include the peak of the adjacent fundamental signal. Measurement includes at least two standard bandwidths from the respective band edge. If required, the band-edge marker-delta method of C63.4 is utilized.

5.2 Test Criteria

47 CFR (USA) // IC (Canada)			
Section Reference	Parameter	Date(s)	
15.247, 15.205 //	Unwanted Emissions Adjacent to Authorized	4 Fab 2016	
RSS-247 5.5, RSS-Gen 4.9	Band, Radiated	4 Feb 2016	

5.3 Test Results

Measurements included more than 2 standard bandwidths (standard bandwidth 1 MHz) from the band edges to provide a clear view of the fundamental and the declining emission levels. Peak detection with max-hold was employed.

Peak detection of emissions at both band edges were below the general emission limits for average limit levels. Also, the duty cycle averaging factor applies -20.0 dB to the peaks recorded.

The EUT satisfied the criteria. Plotted results appears on the following pages.

5.3.1 Low Channel Band Edge

			PIC	716221	Ullai i	estili	g, EMI,	IIIC.					
Test M	lethod:	ANSI C63.1 Devices	0-2013 <i>A</i>	American	National S	tandard o	f Procedure	s for Con	pliance	Testing of	Unlicens	ed Wire	eles
In acco	ordance with:	FCC Part 15 Limits	.209 - Co	ode of Fe	deral Regu	lations Pa	rt 47, Subp	art C - Int	entiona	Radiators	, Radiate	d Emiss	ion
Section		15.209											
Test Da	ate(s):	2/4/2016				EUT S	Serial #:		none				
Custon		Triax Tech	nologi	es		EUT F	Part #:		none				
Project	t Number:	17712-15					<u> Fechniciar</u>	1 :	Eric Lif	sey			
	se Order #:	NA					rvisor:		Lisa Aı	ndt			
Equip.	Under Test:	SIM-P				Witne	ess' Name	:	None				
Radiated Emissions Test Results Da							t			Page:	1	of	1
El	UT Line Voltage	e:	4.2	VDC		EU	EUT Power Frequency:			0	N/A		
Antenna Orientation: Vertical						Frequency Range:				bove 10	3Hz		
	Band Edge; L	ow: EUT Mo	ode of (Operation	on:		Transmit; Low Channel						
Field Strength (dBµV/m) 80 90 90 90 90	0							Bar	d Edge E	D QF_AVG	PROFESS	SIDNAL	
Field Str 40													

5.3.2 High Channel Band Edge

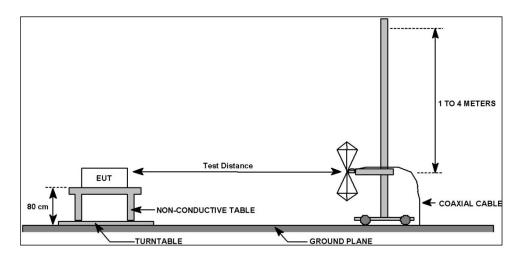
			Profess	sional Te	sting, EN	VII, Inc.			
Test Metho	d:	ANSI C63.10- Devices	2013 America	ın National Staı	ndard of Proce	dures for Con	npliance Testii	ng of Unlicen	sed Wireless
In accordar	ice with:	FCC Part 15.2 Limits	209 - Code of I	ederal Regulat	tions Part 47, S	Subpart C - Int	entional Radi	ators, Radiate	ed Emissions
Section:		15.209							
Test Date(s):	2/4/2016			EUT Serial	# :	none		
Customer:		Triax Techr	nologies		EUT Part #:		none		
Project Nur	nber:	17712-15			Test Techni	ician:	Eric Lifsey		
Purchase O	rder #:	NA			Supervisor:	1	Lisa Arndt		
Equip. Und	er Test:	SIM-P			Witness' Na	ame:	None		
	F	Radiated Em	issions Test	Results Dat	a Sheet		Pa	ge: 1	of 1
EUT Li	ne Voltage	: 4	.2 VDC		EUT Pow	er Frequen	cy: (N/A	
Antenna	Orientatio	n:	Vertic	al	Frequ	ency Range:		Above 1	GHz
Bar	d Edge; Hig	gh; EUT Mod	de of Opera	tion:		Trans	mit; Top Ch	annel	
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBμV/m)	Margin (dB)	Test Results
2484.81	3	188	1	Average	35.1	26.719	54.0	-27.2	Pass
2484.83	3	181	1	Average	35.1	26.743	54.0	-27.2	Pass
2484.87	3	54	1	Average	35.3	26.973	54.0	-27.0	Pass
2484.92	3	137	1	Average	35.8	27.444	54.0	-26.5	Pass
2484.95	3	334	1	Average	35.6	27.27	54.0	-26.7	Pass
2485.02	3	220	1	Average	35.6	27.185	54.0	-26.8	Pass
2485.11	3	29	1	Average	34.8	26.4	54.0	-27.6	Pass
2484.92	3	137	1	Peak	44.2	35.817	74.0	-38.1	Pass
2484.95	3	334	1	Peak	43.6	35.238	74.0	-38.7	Pass
2485.02	3	220	1	Peak	44.2	35.801	74.0	-38.2	Pass
Radiated	cional Testing, Emissions, 3m Dis certical Polarity Measu	tance	_	+ + -	 		rage Limit Level ak Limit Level Teched Peak Read Level Level 1-4-1385 B-039 M Edge High	eading ing AVG	SIONAL
Field Strength (dB µV/m) 09 09 09 09 09 09 09 09 09 09 09 09 09									
30	_	_				7		Attorney below the	ng afficient by profession
20 [‡] 2.479G	2.480G	2.481G	2.482G	2.483G 2.4	184G 2.485	G 2.486G	2.487G	2.488G	2.489G
Operator:	Eric Lifsey			Freq	uency	E	UT: SIM-P		
17712'020	416 Run03RETxBar	ndEdge'Upper.til	Mode: Tra Power: 4.2	nsmit,2 Ch; low/high		P	roject Number: 17712	2-15	

6.0 Radiated Spurious Emissions, Receive Mode

6.1 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The EUT was centered on a rotating turntable. Measurements below 1 GHz were taken at a test distance of 10 meters from the measurement antenna. Above 1 GHz the measurement distance was 3 meters.

Spurious emissions below 1 GHz were measured with quasi-peak detection with a resolution bandwidth of 120 kHz. Above 1 GHz peak measurements were taken and average measured where appropriate and 1 MHz resolution bandwidth. A diagram showing the test setup appears below.



6.2 Test Criteria

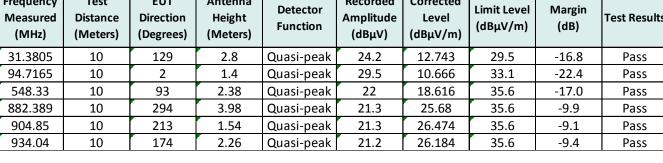
47 CFR (USA) // IC (Canada)		
Section Reference	Parameter	Date(s)
15.247, 15.209 // RSS-247 5.5, RSS-Gen 4.9 & 4.10	Field Strength of Radiated Spurious/Harmonic Emissions Receive Mode	4 Feb 2016

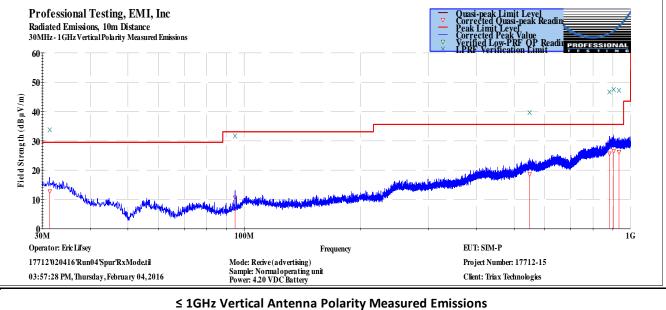
6.3 Test Results

The EUT was tuned to the middle channel and placed in receive mode.

The EUT satisfied the criteria. Recorded data is presented below.

										un i c	C111101C	,P1C3	J
Table 6.3.	1: Radiate	d Spur	rious I	Emission	s, Receive I	Mode, Belo	w 1 GHz,	Vertic	al Po	larit	y		
				Profess	sional Te	sting, El	VII, Inc.						
Test Metho	od:	ANSI C6		013 America	n National Star	ndard of Proce	dures for Con	npliance	Testir	g of U	nlicens	ed Wire	eless
In accordan	ice with:	FCC Par Limits	t 15.20	9 - Code of I	ederal Regulat	ions Part 47, S	Subpart C - Int	entional	l Radia	itors, I	Radiate	d Emiss	sions
Section:		15.209											
Test Date(s	;):	2/4/2016				EUT Serial	# :	none					
Customer:		Triax T	Techno	logies		EUT Part #:		none					
Project Number: 17712-15						Test Technician: Eric Lifsey							
Purchase O	rder #:	NA				Supervisor: Lisa Arndt							
Equip. Und	er Test:	SIM-P				Witness' Name: None							
	F	Radiate	d Emis	ssions Test	Results Data	a Sheet			Pag	ge:	1	of	1
EUT Li	ne Voltage:		4.2	VDC		EUT Pov	er Frequen	су:	0)	N/A		
Antenna	Orientatio	n:		Vertic	al	Frequ	ency Range:			30M	Hz to	1GHz	
	EUT N	lode of	f Opera	ation:			Receive	Mode	(Adve	ertisir	ng)		
Frequency Measured (MHz)	Test Distance (Meters)	EU ⁻ Direct (Degre	ion	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit L (dBµV			Test R	esults	
31.3805	10	129	9	2.8	Quasi-peak	24.2	12.743	29.	5	-1	6.8	Pa	ss
94.7165	10	2		1.4	Quasi-peak	29.5	10.666	33.	1	-2	2.4	Pa	SS





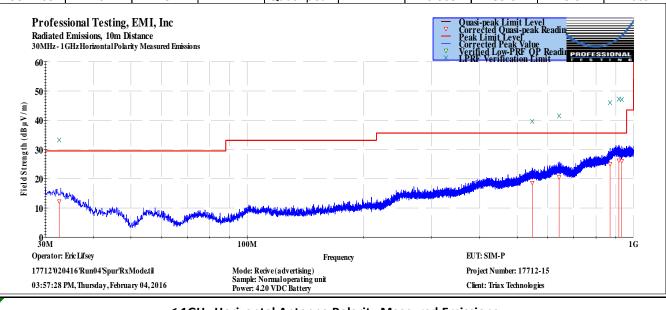
30MHz to 1GHz

		Pro	ofessional Te	sting, EMI, Inc.					
Test Method:	ANSI (C63.10-2013		ndard of Procedures for Co		Testing of U	Jnlicens	ed Wire	eless
In accordance with:	FCC Pa		ode of Federal Regula	tions Part 47, Subpart C - Ir	ntentiona	l Radiators,	Radiate	d Emiss	ions
Section:	15.20	9							
Test Date(s):	2/4/2	2016		EUT Serial #:	none				
Customer:	Triax	Technologi	es	EUT Part #:	none				
Project Number:	17712	2-15		Test Technician:	Eric Lifsey				
Purchase Order #:	NA			Supervisor:	Lisa A	rndt			
Equip. Under Test:	SIM-F)		Witness' Name:	None				
	Radiat	ed Emission	ns Test Results Dat	a Sheet		Page:	1	of	1
EUT Line Voltage	EUT Line Voltage: 4.2 VDC			EUT Power Freque	0	N/A			
		_	•						

Horizontal

Frequency Range:

	EUT N	lode of Ope	eration:		Receive Mode (Advertising)					
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBμV/m)	Margin (dB)	Test Results	
32.6168	10	110	2.24	Quasi-peak	23.7	12.241	29.5	-17.3	Pass	
546.914	10	328	1.09	Quasi-peak	22.1	18.586	35.6	-17.0	Pass	
642.127	10	239	3.18	Quasi-peak	21.9	20.498	35.6	-15.1	Pass	
870.025	10	233	2.24	Quasi-peak	21.4	25.003	35.6	-10.6	Pass	
916.844	10	312	1.05	Quasi-peak	21.2	26.233	35.6	-9.4	Pass	
932.765	10	19	2.1	Quasi-peak	21	26.063	35.6	-9.5	Pass	



Antenna Orientation:

			Profess	sional Te	sting, EN	VII, Inc.				
Test Metho	od:	ANSI C63.10- Devices	2013 America	ın National Staı	ndard of Proce	dures for Con	npliance Testi	ng of Unlicen	sed Wireless	
In accordar	nce with:	FCC Part 15.2 Limits	109 - Code of I	ederal Regulat	ions Part 47, S	Subpart C - Int	entional Radi	ators, Radiate	ed Emissions	
Section:		15.209								
Test Date(s):	2/4/2016			EUT Serial	#:	none			
Customer:		Triax Techr		none						
Project Number: 17712-15 Test Technician: Eric Lifsey										
Purchase O	rder #:	NA			Supervisor:		Lisa Arndt			
Equip. Und	er Test:	SIM-P			Witness' N	ame:	None			
	F	Radiated Em	issions Test	Results Data	a Sheet		Pa	ge: 1	of 1	
EUT Li	ne Voltage	: 4	.2 VDC		EUT Pow	ver Frequen	cy:	N/A		
Antenna	orientation	n:	Vertic	al	Frequ	ency Range:	e: Above 1GHz			
	EUT N	lode of Ope	eration:			Receive	Mode (Adv	ertising)		
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results	
2434.77	3	331	1	Peak	44.5	35.971	74.0	-38.0	Pass	
4878.53	3	255	1	Peak	43.3	39.48	74.0	-34.5	Pass	
7327.91	3	346	1	Peak	37.4	40.855	74.0	-33.1	Pass	
9752.84	3	32	1	Peak	35.4	42.313	74.0	-31.6	Pass	
12150	3	23	1	Peak	36.1	46.426	74.0	-27.5	Pass	
2434.77	3	331	1	Average	34.5	26.011	54.0	-27.9	Pass	
4878.53	3	255	1	Average	33.3	29.51	54.0	-24.4	Pass	
7327.91	3	346	1	Average	28.9	32.405	54.0	-21.6	Pass	
9752.84	3	32	1	Average	26.5	33.337	54.0	-20.6	Pass	
12150	3	23	1	Average	27.9	38.206	54.0	-15.8	Pass	
Radiated	sional Testing, Emissions, 3m Dis vertical Polarity Measu	tance				▽ Coi — Pea	erage Limit Level rrected Average R ak Limit Level rrected Peak Read		SIONAL 1 N 6	
Field Strength (dB µV/m) 70 40 40										
30 20 G	Color I Storm	land protect beauty grant	Y Y	and the second s	in the state of th	P. (19)	TIT. CIM D	7 10G	13G	
Operator:	Eric Lifsey			Freq	uency	E	UT: SIM-P			

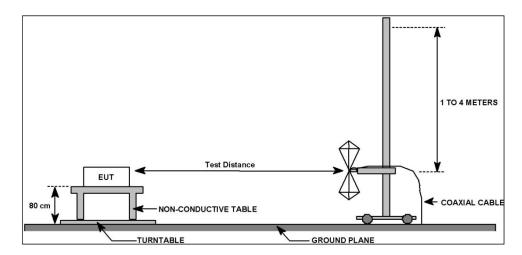
Table 6.3.	4: Radiate	d Spurious	Emission	s, Receive I	Mode, Abo	ve 1 GHz,	Horizonta	l Polarity	
			Profess	sional Te	sting, El	VII, Inc.			
Test Metho	od:	ANSI C63.10- Devices	2013 America	ın National Staı	ndard of Proce	dures for Con	npliance Testii	ng of Unlicen	sed Wireless
In accordar	nce with:	FCC Part 15.2 Limits	:09 - Code of I	ederal Regulat	tions Part 47, S	Subpart C - Int	tentional Radi	ators, Radiate	ed Emissions
Section:		15.209							
Test Date(s	s):	2/4/2016			EUT Serial	# :	none		
Customer:		Triax Techr	ologies		EUT Part #:		none		
Project Nu	mber:	17712-15			Test Techn	ician:	Eric Lifsey		
Purchase C	rder #:	NA			Supervisor:		Lisa Arndt		
Equip. Und	er Test:	SIM-P			Witness' N	ame:	None		
	F	Radiated Em	issions Test	Results Data	a Sheet		Pa	ge: 1	of 1
EUT L	ne Voltage:	: 4	.2 VDC		EUT Pow	er Frequen	cy: (N/A	
Antenna	Orientatio	n:	Horizor	ital	Frequ	ency Range:		Above 1	GHz
	EUT N	/lode of Ope	eration:			Receive	Mode (Adv	ertising)	
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
2444.36	3	320	1	Peak	44.3	35.784	74.0	-38.2	Pass
4877.72	3	254	1	Peak	41.4	37.637	74.0	-36.3	Pass
7315.97	3	221	1	Peak	38.4	41.804	74.0	-32.2	Pass
9747.08	3	201	1	Peak	35.3	42.159	74.0	-31.8	Pass
11290	3	307	1	Peak	37.2	47.127	74.0	-26.8	Pass
2444.36	3	320	1	Average	34.5	26.015	54.0	-27.9	Pass
4877.72	3	254	1	Average	33.3	29.475	54.0	-24.5	Pass
7315.97	3	221	1	Average	28.9	32.337	54.0	-21.6	Pass
9747.08	3	201	1	Average	26.5	33.372	54.0	-20.6	Pass
11290	3	307	1	Average	27.3	37.265	54.0	-16.7	Pass
Radiated	sional Testing, Emissions, 3m Dis Iorizontal Polarity Mo	tance				 ∇ Co Pe 	erage Limit Level rrected Average F ak Limit Level rrected Peak Read	Reading	SIONAL
Field Strength (dB µV/m)			 						A Monthly
30 - 20 - G	Managarida pada amang Pada	Albita de la casa de l La casa de la casa della casa de	The state of the s		er printitipes i ver her her het het he		y Y	7	<u> </u>
Operator: 17712'020	Eric Lifsey 1416 'Run04'Spur'Rx1 PM, Thursday, Februa	ary 04,2016	Sample: N Power: 4.2	Free (advertising) ormal operating unit 0 VDC Battery	Quency	(EUT: SIM-P Project Number: 1771 Client: Triax Technolog		13G

7.0 Radiated Spurious Emissions, Transmit Mode

7.1 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The EUT was centered on a rotating turntable. Measurements below 1 GHz were taken at a test distance of 10 meters from the measurement antenna. Above 1 GHz the measurement distance was 3 meters.

Spurious emissions below 1 GHz were measured with quasi-peak detection with a resolution bandwidth of 120 kHz. Above 1 GHz peak measurements were taken and average measured where appropriate using 1 MHz resolution bandwidth. A diagram showing the test setup appears below.



7.2 Test Criteria

47 CFR (USA) // IC (Canada)		
Section Reference	Parameter	Date(s)
15.247, 15.209 // RSS-247 5.5, RSS-Gen 4.9 & 4.10	Field Strength of Radiated Spurious/Harmonic Emissions Transmit Mode	4 Feb 2016

7.3 Test Results

Three EUTs were employed to cover the three test channels of bottom, middle, and top channel.

Modulation was enabled for this test and the transmitter was placed into continuous transmit mode.

The duty cycle averaging factor applies -20.0 dB to the peaks recorded for the harmonics.

All measurements used peak detection.

Table 7.3.1: TX Mode, Below 1 GHz, Vertical Polarity

	Professional To	esting, EMI, Inc	•			
Test Method:	ANSI C63.10-2013 American National St Devices	andard of Procedures for C	Compliance Testing of L	Jnlicens	sed Wire	eless
In accordance with:	FCC Part 15.209 - Code of Federal Regul Limits	ations Part 47, Subpart C -	Intentional Radiators,	Radiate	ed Emiss	ions
Section:	15.209					
Test Date(s):	2/4/2016	EUT Serial #:	none			
Customer:	Triax Technologies	EUT Part #:	none			
Project Number:	17712-15	Test Technician:	Eric Lifsey			
Purchase Order #:	NA	Supervisor:	Lisa Arndt			
Equip. Under Test:	SIM-P	Witness' Name:	None			
	Radiated Emissions Test Results Da	ta Sheet	Page:	1	of	1

1100101			4 5.1.000	. 480.	- 0
EUT Line Voltage:	4.2	VDC	EUT Power Frequency:	0	N/A
Antenna Orientation:		Vertical	Frequency Range:	30M	Hz to 1GHz

Frequency Test EUT Antenna Measured Distance Direction Height Detector Measured Distance Direction Height Transmit Mode, Modulated, 3 Channels/EUTs Recorded Corrected Amplitude Level Limit Level Margin Test Recorded Amplitude Level Limit Level Margin Test Recorded Limit Level Margin Test Recorde

Measured (MHz)	Distance (Meters)	Direction (Degrees)	Height (Meters)	Detector Function	Amplitude (dBμV)	Level (dBµV/m)	(dBµV/m)	Margin (dB)	Test Results
30.8241	10	35	3.06	Quasi-peak	24.2	12.7	29.5	-16.8	Pass
648.938	10	162	1.47	Quasi-peak	21.8	20.448	35.6	-15.2	Pass
884.565	10	37	2.79	Quasi-peak	21.3	25.812	35.6	-9.8	Pass
906.976	10	81	3.26	Quasi-peak	21.3	26.425	35.6	-9.2	Pass
921.557	10	145	1.29	Quasi-peak	21.1	26.076	35.6	-9.5	Pass
949.336	10	25	2.12	Quasi-peak	21	26.177	35.6	-9.4	Pass

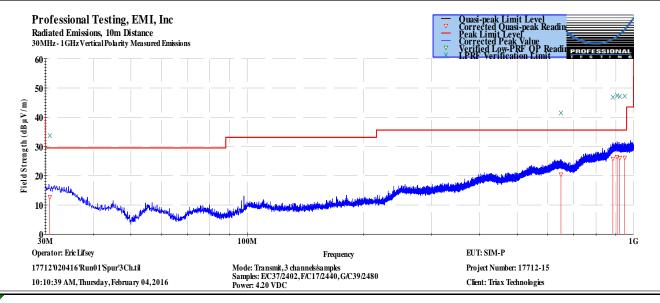


Table 7.3.2: TX Mode, Below 1 GHz, Horizontal Polarity

	Professional Testing, EMI, Inc.											
Test Method:	ANSI C63.10-2013 American National Devices	Standard of Procedures for (Compliance Testing of U	Jnlicens	ed Wir	eless						
In accordance with:	FCC Part 15.209 - Code of Federal Reg Limits	ulations Part 47, Subpart C -	Intentional Radiators,	Radiate	d Emiss	ions						
Section:	15.209											
Test Date(s):	2/4/2016	EUT Serial #:	none									
Customer:	Triax Technologies	EUT Part #:	none									
Project Number:	17712-15	Test Technician:	Eric Lifsey									
Purchase Order #:	NA	Supervisor:	Lisa Arndt									
Equip. Under Test:	SIM-P	Witness' Name:	None									
	Radiated Emissions Test Results D)ata Sheet	Page:	1	of	1						

1100101				. 480.	- 0
EUT Line Voltage:	4.2	VDC	EUT Power Frequency:	0	N/A
Antenna Orientation:	Н	orizontal	Frequency Range:	30M	Hz to 1GHz

EUT Mode of Operation:	
------------------------	--

Transmit Mode, Modulated, 3 Channels/EUTs

Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBμV/m)	Margin (dB)	Test Results
30.9033	10	207	3.7	Quasi-peak	24.2	12.787	29.5	-16.7	Pass
543.007	10	252	1.32	Quasi-peak	22.1	18.493	35.6	-17.1	Pass
633.169	10	299	1.3	Quasi-peak	22	20.368	35.6	-15.2	Pass
765.838	10	299	3.49	Quasi-peak	21.5	22.502	35.6	-13.1	Pass
896.133	10	80	1.3	Quasi-peak	21.4	26.46	35.6	-9.1	Pass
916.981	10	264	3.94	Quasi-peak	21.2	26.25	35.6	-9.4	Pass

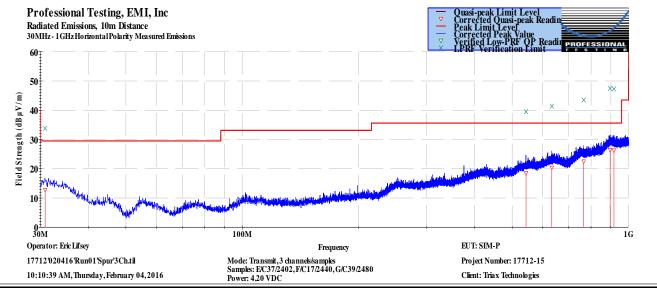


Table 7	2 2 · TY	Mode	Above 1 (CH2 Va	rtical D	alarity
rable /.	.5.5: IX	ivioae.	Above 1 (JHZ. VE	rucai P	oiaritv

			Profes	sional Te	sting. FN	/II. Inc.		THAX TECHNOL	ogies – SIM-
Test Metho	od:	ANSI C63.10- Devices		ın National Sta			npliance Tes	ting of Unlicen	sed Wireless
In accorda	nce with:	FCC Part 15.2	209 - Code of I	Federal Regulat	ions Part 47, S	Subpart C - Int	tentional Ra	diators, Radiat	ed Emissions
Section:		15.209							
Test Date(s	s):	2/4/2016			EUT Serial	# :	none		
Customer:	·	Triax Techr	ologies		EUT Part #:		none		
Project Nu	mber:	17712-15	0		Test Techni	ician:	Eric Lifsey	1	
Purchase C		NA			Supervisor:		Lisa Arnd		
Equip. Und	ler Test:	SIM-P			Witness' Na		None		
	F	Radiated Em	issions Test	Results Data	a Sheet		Р	age: 1	of 1
EUT L	ine Voltage:	: 4	.2 VDC		EUT Pow	er Frequen	су:	0 N/A	
Antenn	a Orientatio	n:	Vertic	al	Frequ	ency Range		Above 1	GHz
	EUT N	/lode of Ope	eration:		Trans	mit Mode, I	Modulated	d, 3 Channels	s/EUTs
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Leve	. 0	Test Results
3051.68	3	311	1	Peak	44.5	37.956	74.0	-36.0	Pass
4627.82	3	211	1	Peak	43.5	39.362	74.0	-34.6	Pass
10766.8	3	23	1	Peak	36.5	45.793	74.0	-28.2	Pass
11604.1	3	145	1	Peak	36.5	46.974	74.0	-27.0	Pass
16648.1	3	206	1	Peak	36.2	50.856	74.0	-23.1	Pass
16936.9	3	254	1	Peak	37.8	52.432	74.0	-21.5	Pass
3051.68	3	311	1	Average	35.1	28.611	54.0	-25.3	Pass
4627.82	3	211	1	Average	33.2	29.056	54.0	-24.9	Pass
10766.8	3	23	1	Average	27.2	36.45	54.0	-17.5	Pass
11604.1	3	145	1	Average	27.4	37.869	54.0	-16.1	Pass
16648.1	3	206	1	Average	27.4	42.093	54.0	-11.9	Pass
16936.9	3	254	1	Average	27.6	42.215	54.0	-11.7	Pass
Radiated	sional Testing, I Emissions, 3m Dis Vertical Polarity Measu	tance				 ∇ Con — Per 	erage Limit Lev rrected Average ak Limit Level rrected Peak Re	Reading	SIONAL
30 20 1G Operator:	Eric Lifsey 0416/Run01/Spur/3Cl	htil	Samples: I	Freq nsmit, 3 channels/sample XC37/2402, F/C17/2440 0 VDC		P	10G XJT: SIM-P troject Number: 177		18G

Table 7.3.4: TX Mode, Above 1 GHz, Horizontal Polarity

			Profess	sional Te	sting, El	MI, Inc.				
Test Metho	d:	ANSI C63.10- Devices	2013 America	ın National Sta	ndard of Proce	dures for Con	npliance T	esting of Unlice	nsed Wir	eless
In accordan	ice with:	FCC Part 15.2 Limits	109 - Code of F	ederal Regula	tions Part 47,	Subpart C - Int	entional I	Radiators, Radia	ited Emis	sions
Section:		15.209								
Test Date(s):	2/4/2016			EUT Serial	#:	none			
Customer:		Triax Techr	ologies		EUT Part #:		none			
Project Nur	nber:	17712-15			Test Techn	ician:	Eric Lifs	•		
Purchase O	rder #:	NA			Supervisor		Lisa Arn	dt		
Equip. Und	er Test:	SIM-P			Witness' N	ame:	None			
	F	Radiated Em	issions Test	Results Dat	a Sheet			Page: 1	of	1
EUT Li	ne Voltage	: 4	.2 VDC		EUT Pov	ver Frequen	cy:	0 N/	4	
Antenna	Orientatio	n:	Horizon	ital	Frequ	ency Range	:	Above	1GHz	
	EUT N	Node of Ope	eration:		Trans	mit Mode, I	Modulat	ed, 3 Channe	els/EUTs	
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Le		Test R	Results
3122.7	3	255	1	Peak	44.1	37.376	74.0	-36.6	Pa	ass
5208.92	3	250	1	Peak	41.9	38.861	74.0	-35.1	Pa	ass
8659.97	3	172	1	Peak	35.6	42.95	74.0	-31.0	Pa	ass
15046	3	212	1	Peak	36.8	48.767	74.0	-25.2	Pa	ass
16929	3	30	1	Peak	36.1	50.766	74.0	-23.2	Pa	ass
17686.5	3	38	1	Peak	35.4	49.88	74.0	-24.1	Pa	ass
3122.7	3	255	1	Average	34.8	28.1	54.0	-25.9	Pa	ass
5208.92	3	250	1	Average	32.6	29.616	54.0	-24.3	Pa	ass
8659.97	3	172	1	Average	27.2	34.541	54.0	-19.4	Pa	ass
15046	3	212	1	Average	28.4	40.37	54.0	-13.6	Pa	ass
16929	3	30	1	Average	27.6	42.206	54.0		_	ass
17686.5	3	38	1	Average	27.1	41.546	54.0	-12.4	Pa	ass
Radiated	sional Testing, Emissions, 3m Dis Iorizontal Polarity Mo	tance				 ∇ Cor Per 	erage Limit I rrected Aver ak Limit Lever rrected Peak	age Reading	ESSIONAL	
80										
ê -										
Field Streng th (dB µV/m) 90 90 90 90 90 90							+			
9 60 —										
된 50 						.				
d Str			1			فالتوام واستريال بروا	الماليين الماليين			
₹ 40 <u> </u>		المعارض	المراور المراوات المر		And the second s		_		7 17	
30		had a supplied to the supplied			-		7 +			
				, Y						
20 [‡] 1G		-		+ 1	+1	+ + +	100	3	18	G
Operator: 1					uency		UT: SIM-P	18812.15		
	416'Run01'Spur'3Cl AM, Thursday, Februa		Samples: H	nsmit,3 channels/sampl /C37/2402,F/C17/2440			roject Number: Llient: Triax Tecl			
11.20.13	, muisuay, ruotu	, 07,2010	Power: 4.2	UVDC		,	11HA 100	······································		

Table 7.3.5: TX Mode, 18-25 GHz, Vertical Polarity

Professional Testing, EMI, Inc. Test Method: ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wirel Devices In accordance with: FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emission Testing of Unlicensed Wirel Devices Section: 15.209 Test Date(s): 2/4/2016 EUT Serial #: none Project Number: 17712-15 Test Technician: Fric Lifsey Purchase Order #: NA Supervisor: Equip. Under Test: SIM-P Witness' Name: None Radiated Emissions Test Results Data Sheet Page: 1 of EUT Line Voltage: 4.2 VDC EUT Power Frequency: Antenna Orientation: Frequency Range: Above 1GHz Frequency Antenna Distance (MHz) (Meters) Indicated Distance Direction (Meters) Indicated Distance Direction (Meters) 19673.6 3 332 1 Average 33.4 Transmit Mode, Modulated, 3 Channels/EUTS Professional Testing, EMI, Inc Rediated Emissions Measured at In and Scaled to 3m Instance 13-24579.4 3 158 1 Average 33.4 33.6 33.942 Frequency Ange Limit Level Corrected Emissions Measured at In and Scaled to 3m Instance 13-24501.4 Professional Testing, EMI, Inc Rediated Emissions Measured at In and Scaled to 3m Instance 13-24501.4 Average 33.4 Average Average Average Emits Level Corrected Average Reading Prak Limit Level Corrected Average National Average	Table 7.3.5	5: TX Mod	e, 18-2	5 GF	dz, Vertica	Il Polarity							
Test Method: In accordance with: FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissic Limits Section: 15.209 Test Date(s): 2/4/2016 EUT Serial #:					Profess	ional Te	sting, EN	VII, Inc.					
Section: 15.209 Test Date(s): 2/4/2016 EUT Serial #: none Project Number: 17712-15 Test Technician: Fric Lifsey Purchase Order #: NA Supervisor: Lisa Arndt Equip. Under Test: SIM-P Witness' Name: None Radiated Emissions Test Results Data Sheet Page: 1 of EUT Line Voltage: 4.2 VDC EUT Power Frequency: 0 N/A Antenna Orientation: Vertical Frequency Range: Above 1GHz EUT Mode of Operation: Transmit Mode, Modulated, 3 Channels/EUTS Frequency Test Office (Meters) Direction (Meters) (Me	Test Metho	d:		.10-2	2013 America	n National Star	ndard of Proce	dures for Con	npliance	e Testir	ng of Unlicens	ed Wir	eless
Test Date(s): 2/4/2016 EUT Serial #: none Customer: Triax Technologies EUT Part #: none Project Number: 17712-15 Test Technician: Eric Lifsey Purchase Order #: NA Supervisor: Lisa Arndt Equip. Under Test: SIM-P Witness' Name: None Radiated Emissions Test Results Data Sheet Page: 1 of EUT Line Voltage: 4.2 VDC EUT Power Frequency: 0 N/A Antenna Orientation: Vertical Frequency Range: Above 1GHz EUT Mode of Operation: Transmit Mode, Modulated, 3 Channels/EUTs Frequency Test EUT Mode of Operation: Transmit Mode, Modulated, 3 Channels/EUTs Frequency (Metars) Distance (Meters) (Interction (Metars) Distance (MHz) (Meters) (Interction (Metars) Sistematic Metars (Interction (Metars) Sistematic Metars (Interction (Intercti	In accordan	ce with:		15.20	09 - Code of F	ederal Regulat	ions Part 47, S	Subpart C - Int	entiona	al Radia	ators, Radiate	d Emis	sions
Customer: Triax Technologies EUT Part #: none Project Number: 17712-15 Test Technician: Eric Lifsey Purchase Order #: NA Supervisor: Lisa Arndt Equip. Under Test: SIM-P Witness' Name: None Radiated Emissions Test Results Data Sheet Page: 1 of EUT Line Voltage: 4.2 VDC EUT Power Frequency: 0 N/A Antenna Orientation: Vertical Frequency Range: Above 1GHz EUT Mode of Operation: Transmit Mode, Modulated, 3 Channels/EUTS Frequency Test Distance (Meters) Clogrees) (Meters) (Met	Section:		15.209										
Project Number: 17712-15 Test Technician: Eric Lifsey Purchase Order #: NA Supervisor: Lisa Arndt Equip. Under Test: SIM-P Witness' Name: None Radiated Emissions Test Results Data Sheet Page: 1 of EUT Line Voltage: 4.2 VDC EUT Power Frequency: 0 N/A Antenna Orientation: Vertical Frequency Range: Above 1GHz EUT Mode of Operation: Transmit Mode, Modulated, 3 Channels/EUTs Frequency Measured (Meters) Distance (Meters) Distance (Meters) (M	Test Date(s):	2/4/201	L6			EUT Serial	# :	none				
Purchase Order #: NA Supervisor: Lisa Arndt Equip. Under Test: SIM-P Witness' Name: None Radiated Emissions Test Results Data Sheet Page: 1 of EUT Line Voltage: 4.2 VDC EUT Power Frequency: 0 N/A Antenna Orientation: Vertical Frequency Range: Above 1GHz EUT Mode of Operation: Transmit Mode, Modulated, 3 Channels/EUTS Frequency Measured Distance (MHz) (Degrees) (Meters) (Met	Customer:				ologies		EUT Part #:		_				
Radiated Emissions Test Results Data Sheet Page: 1 of EUT Line Voltage: 4.2 VDC EUT Power Frequency: 0 N/A Antenna Orientation: Vertical Frequency Range: Above 1GHz EUT Mode of Operation: Transmit Mode, Modulated, 3 Channels/EUTS Frequency Test Distance (Intertion Height (Intertion (Intertio	Project Nun	nber:	17712-1	.5			Test Techni	ician:	Eric Li	fsey			
Radiated Emissions Test Results Data Sheet FUT Line Voltage: 4.2 VDC EUT Power Frequency: 0 N/A Antenna Orientation: Vertical Frequency Range: Above 1GHz EUT Mode of Operation: Transmit Mode, Modulated, 3 Channels/EUTS Frequency Distance Direction Height (MHz) (Meters) (Degrees) (Meters) (Meters) (Meters) (Meters) (Degrees) (Meters) (Mete							•		_				
EUT Line Voltage: 4.2 VDC EUT Power Frequency: 0 N/A Antenna Orientation: Vertical Frequency Range: Above 1GHz EUT Mode of Operation: Transmit Mode, Modulated, 3 Channels/EUTs Frequency Test Distance (Meters) Direction (Meters) (Meters) Punction (MHz) (Meters)	Equip. Und	er Test:	SIM-P				Witness' N	ame:	None				
Antenna Orientation: Vertical Frequency Range: Above 1GHz EUT Mode of Operation: Transmit Mode, Modulated, 3 Channels/EUTs Frequency Test Distance (Meters) Distance (Meters) Distance (Meters) (Digrees) (Meters) (Meters) Punction (Meters) (Mete		R	adiated	Emi	ssions Test	Results Data	Sheet			Pag	ge: 1	of	1
Test EUT Mode of Operation: Transmit Mode, Modulated, 3 Channels/EUTs	EUT Li	ne Voltage:		4.2	2 VDC		EUT Pow	er Frequen	су:	0	N/A		
Test Distance (MHz) Distance (Meters) Direction (Degrees) Margin (Meters) Direction (MHz) Distance (Meters) Direction (Meters) Direction (Meters) Direction (Meters) Direction (Meters) Direction (Meters) Distance (Meters	Antenna	Orientatio	n:		Vertica	al	Frequ	ency Range:			Above 10	3Hz	
Measured (MHz) Distance (Meters) Direction (Meters) Corrected Peak Reading Peak Limit Level (MBμV/m) Margin (MB) Test Reserved (MBμV/m) (EUT M	lode of	Ope	ration:		Trans	mit Mode, I	Modul	ated,	3 Channels	/EUTs	
23721.6 3 281 1 Average 33.4 31.762 54.0 -22.2 Pass 24579.4 3 158 1 Average 33.4 32.8 54.0 -21.2 Pass 24791.5 3 157 1 Average 33.6 33.942 54.0 -20.0 Pass 24791.5 3 157 1 Average 33.6 33.942 54.0 -20.0 Pass 24791.5 3 50 4 Average Limit Level Corrected Average Reading Paores Silvan Pass 25.6 GHz Vertical Polarity Measured Emissions Paores Silvan Paores	Measured	Distance	Directio		Height		Amplitude	Level			_	Test R	esults
23721.6 3 281 1 Average 33.4 31.762 54.0 -22.2 Pass 24579.4 3 158 1 Average 33.4 32.8 54.0 -21.2 Pass 24791.5 3 157 1 Average 33.6 33.942 54.0 -20.0 Pass 33.6 Solidated Emissions, Measured at Im and Scaled to 3m Distance 18-26.5 GHz Vertical Polarity Measured Emissions Professional Testing, EMI, Inc Radiated Emissions, Measured Emissions Professional Testing, EMI, Inc Radiated Emissions, Measured Emissions Professional Testing, EMI, Inc Radiated Emissions P	19673.6	3	332	7	1	Average	32.3	27.76	54	.0	-26.2	Pa	SS
Professional Testing, EMI, Inc Radiated Emissions, Measured at 1m and Scaled to 3m Distance 18-265 GHz Vertical Polarity Measured Emissions 90 10 10 10 10 10 10 10 10 10 10 10 10 10	23721.6	3	281		1	Average	33.4	31.762	54	.0	-22.2	Pa	SS
Professional Testing, EMI, Inc Radiated Emissions, Measured at Im and Scaled to 3m Distance 18-26.5 GHz Vertical Polarity Measured Emissions 90 80 40 40 40 40 40 40 40 40 40 40 40 40 40	24579.4	3	158		1	Average	33.4	32.8	54	.0	-21.2	Pa	SS
Radiated Emissions, Measured at 1m and Scaled to 3m Distance 18-26.5 GHz Vertical Polarity Measured Emissions 90 80 70 40 18-26.5 GHz Vertical Polarity Measured Emissions Possessional Professional Profess	24791.5	3	157		1	Average	33.6	33.942	54	.0	-20.0	Pa	SS
The state of the s	Radiated Emissions, Measured at 1m and Scaled to 3m Distance 18-26.5 GHz Vertical Polarity Measured Emissions 90 80 Corrected Average Reading Peak Limit Level Corrected Peak Reading PROFESSIONAL												
17/12/0416 Kunu1 Spur 3-C.r.ii Mode: Iransmir, 3 channessampes Project Number: 17/12-15 Samples: EC37/2402, FC17/2440, G/C39/2480	High Solution 19 19 19 19 19 19 19 19 19 19 19 19 19	•	i, milli	Add Mills rate		nsmit,3 channels/sample	s			della din ella	-15	7 7	G

> 18 GHz Vertical Antenna Polarity Measured Emissions

Table 7.3.6: TX Mode, 18-25 GHz, Horizontal Polarity

	, , , , , , , , , , , , , , , , , , ,	<u> </u>			ontal Polarit sional Te		Al Inc					
			PI	DIES:	SiUllal TE	Stillg, El	vii, iiic.					
Test Metho	d:	ANSI C63 Devices	3.10-2013	America	an National Star	ndard of Proce	dures for Com	npliance	Testing o	of Unlicens	sed Wire	eless
In accordan	ce with:	FCC Part Limits	15.209 - C	ode of I	Federal Regulat	ions Part 47, S	Subpart C - Int	entional	Radiato	rs, Radiate	ed Emiss	sions
Section:		15.209										
Test Date(s):	2/4/20				EUT Serial #		none				
Customer:			echnolog	ies		EUT Part #:		none				
Project Nur		17712-	15			Test Techni		Eric Lif	•			
Purchase O		NA				Supervisor:		Lisa Ar	ndt			
Equip. Und	er Test:	SIM-P				Witness' Na	ame:	None				
	R	adiated	d Emissio	ns Test	Results Data	Sheet			Page:	1	of	1
EUT Li	ne Voltage:		4.2	VDC		EUT Pow	er Frequen	cy:	0	N/A		
Antenna	Orientatio	n:	F	lorizor	ntal	Freque	ency Range:		į	Above 1	GHz	
	EUT N	lode of	Operatio	n:		Trans	mit Mode, I	Modula	ited, 3 (Channels	/EUTs	
Frequency Measured (MHz)	Test Distance (Meters)	EUT Directi (Degre	on He	enna light eters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit L (dBμV		Margin (dB)	Test R	esults
20703.3	3	259		1	Average	33.1	29.251	54.	0	-24.7	Pa	SS
23759.3	3	29		1	Average	33.5	31.865	54.	0	-22.1	Pa	SS
25089.2	3	90		1	Average	33.9	34.216	54.	0	-19.7	Pa	SS
25659.9	3	66		1	Average	34.2	34.663	54.	0	-19.3	Pa	SS
Radiated 18-26.5 GF 90 80 80	ional Testing, Emissions, Measur Iz Horizontal Polarity	ed at 1m an		n Distance			∇ CorPea	ak Limit Le	erage Readi	PROFES	SIONAL 7 N 6	
Field Strength (dB µV/m) 09 00 00 00 00 00 00 00 00 00 00 00 00	a profite ditensife			na yarin	and the state of t	and the second second	And the state of t	VIANO (A	γ	Y		
20 18.0G Operator: I	Eric Lifsey 416 'Run01' Spur'3 Ch M, Thursday, Februa	ı.til			Freq ınsmit,3 channekskample 2/C37/2402, F/C17/2402			UT: SIM-P	er: 17712-15		26.5	G

> 18 GHz Horizontal Antenna Polarity Measured Emissions

8.0 Antenna Construction Requirements

The design was investigated for meeting the antenna construction requirements of the applicable rules.

8.1 Procedure

A direct examination of the antenna construction is performed and compared to rule criteria that prevent wireless device antennas from being modified by end users in ways that would void their authorization to use the device.

8.2 Criteria

47 CFR (USA) // IC (Canada)		
Section Reference	Parameter	Date(s)
15.203 // RSS-Gen 8.3	Antenna Construction	1 Mar 2016

8.3 Results

Table 8.3.1 Antenna Construction Details		
Antenna Manufacturer and Model	Specifications	
Manufacturer:		
Part Number:		

- Antenna is chip style component.
- There is no external antenna connector.
- The antenna is not accessible.

The antenna design above satisfies the requirements of the rules.

9.0 Equipment

9.1 Radiated Emissions 30 MHz to 25 GHz

Professional Testing, EMI, Inc.							
Test Method:	ANSI C63.10-2013 American N Unlicensed Wireless Devices	lational Standard of Proced	ures for Compliance Testing of				
	FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators,						
In accordance with:	Radiated Emissions Limits						
Section:	15.209						
Test Date(s):	2/4/2016	EUT Serial #:	none				
Customer:	Triax Technologies	EUT Part #:	none				
Project Number:	17712-15	Test Technician:	Eric Lifsey				
Purchase Order #:	NA	Supervisor:	Lisa Arndt				
Equip. Under Test:	SIM-P	Witness' Name:	None				

Radiated Emissions Test Equipment List

Tile! Software Version: 4.2.A, May 23, 2010, 08:38:52 AM

Test Profile: 2015 Rad Emissions_ClassA - LowPRF_072715.til or 2015 Rad Emissions_ClassB - LowPRF_072715.til

Asset #	Manufacturer	Model	Equipment Nomenclature	Serial Number	Calibration Due Date
1937	Agilent	E4440A	Spectrum Analyzer, 3 Hz - 26.5 GHz, Opt. AYZ	MY44808298	12/15/2016
1926	ETS-Lindgren	3142D	Antenna, Biconilog, 26 MHz - 6 GHz	135454	1/25/2017
C027D	none	RG214	Cable Coax, N-N, 25m	none	10/1/2016
1327	EMCO	1050	Controller, Antenna Mast	none	N/A
0942	EMCO	11968D	Turntable, 4ft.	9510-1835	N/A
1969	НР	11713A	Attenuator/Switch Driver	3748A04113	N/A
1509B	Braden	N/A	TDK 10M Chamber, VSWR > 1 GHz	DAC-012915-005	3/14/2017
2004	Miteq	AFS44-00101800- 2S-10P-44	Amplifier, 40dB, .1-18GHz	0	1/11/2018
C030	none	none	Cable Coax, N-N, 30m	none	10/1/2016
1325	EMCO	1050	Controller, Antenna Mast	9003-1461	N/A
1780	ETS-Lindgren	3117	Antenna, Double Ridged Guide Horn, 1 - 18 GHz	110313	2/25/2017
1542	A.H. Systems	SAS-572	Antenna, Horn 18-26.5GHz, 20dB gain	225	N/A
1973	Agilent	83017A	Amplifier, Microwave 0.5-26.5 GHz	MY39500497	2/2/2018

9.2 Bandwidth and Duty Cycle

Asset #	Manufacturer	Model #	Description	Calibration Due
ALN-077	Rohde & Schwarz	FSP-30	Spectrum Analyzer	16 Dec 2016

10.0 Measurement Bandwidths

Radiat	Radiated Emissions Spectrum Analyzer Bandwidth and Measurement Time - Peak Scan								
Frequency Band Start (MHz)	Frequency Band Stop (MHz)	6 dB Bandwidth (kHz)	Number of Ranges Used	Measurement Time per Range					
0.009	0.15	0.3	2	Multiple Sweeps					
0.15	30	9	6	Multiple Sweeps					
30	1000	120	2	Multiple 800 mS Sweeps					
1000	6000	1000	2	Multiple Sweeps					
6000	18000	1000	2	Multiple Sweeps					
18000	26500	1000	2	Multiple Sweeps					

*Notes:

^{1.} The settings above are specifically calculated for the E4440A series of spectrum analyzers, which have 8,000 data points per range.

^{2.} The measurement receiver resolution bandwidth setting was 300 Hz for quasi-peak measurements from 9-150 kHz.

^{3.} The measurement receiver resolution bandwidth setting was 9 kHz for quasi-peak measurements from 0.15-30 MHz.

^{4.} The measurement receiver resolution bandwidth setting was 120 kHz for quasi-peak measurements from 30-1000 MHz.

^{5.} The measurement receiver resolution bandwidth setting was 1 MHz for average measurements from 1-18 GHz.

Appendix: Policy, Rationale, and Evaluation of EMC Measurement Uncertainty

All uncertainty calculations, estimates and expressions thereof shall be in accordance with NIST policy. Since PTI operates in accordance with NIST (NVLAP) Handbook 150-11: 2007, all instrumentation having an effect on the accuracy or validity of tests shall be periodically calibrated or verified traceable to national standards by a competent calibration laboratory. The certificates of calibration or verification on this instrumentation shall include estimates of uncertainty as required by NIST Handbook 150-11.

1. Rationale and Summary of Expanded Uncertainty.

Each piece of instrumentation at PTI that is used in making measurements for determining conformance to a standard (or limit), shall be assessed to evaluate its contribution to the overall uncertainty of the measurement in which it is used. The assessment of each item will be based on either a type A evaluation or a type B evaluation. Most of the evaluations will be type B, since they will be based on the manufacturer's statements or specifications of the calibration tolerances, or uncertainty will be stated along with a brief rationale for the type of evaluation and the resulting stated uncertainties.

The individual uncertainties included in the combined standard uncertainty for a specific test result will depend on the configuration in which the item of instrumentation is used. The combination will always be based on the law of propagation of uncertainty. Any systematic effects will be accommodated by including their uncertainties, in the calculation of the combined standard uncertainty; except that if the direction and amount of the systematic effect cannot be determined and separated from its uncertainty, the whole effect will be treated as uncertainty and combined along with the other elements of the test setup.

Type A evaluations of standard uncertainty will usually be based on calculating the standard deviation of the mean of a series of independent observations, but may be based on a least-squares curve fit or the analysis of variance for unusual situations. Type B evaluations of standard uncertainty will usually be based on manufacturer's specifications, data provided in calibration reports, and experience. The type of probability distribution used (normal, rectangular, a priori, or u-shaped) will be stated for each Type B evaluation.

In the evaluation of the uncertainty of each type of measurement, the uncertainty caused by the operator will be estimated. One notable operator contribution to measurement uncertainty is the manipulation of cables to maximize the measured values of radiated emissions. The operator contribution to measurement uncertainty is evaluated by having several operators independently repeat the same test. This results in a Type A evaluation of operator-contributed measurement uncertainty.

A summary of the expanded uncertainties of PTI measurements is shown as Table 1. These are the worst-case uncertainties considering all operative influence factors.

Table 1: Summary of Measurement Uncertainties for Site 45

Type of Measurement	Frequency Range	Meas. Dist.	Expanded Uncertainty U, dB (k=2)
Mains Conducted Emissions	150 kHz to 30 MHz	N/A	2.9
Telecom Conducted Emissions	150 kHz to 30 MHz	N/A	2.8
Radiated Emissions	30 to 1,000 MHz	10 m	4.8
	1 to 18 GHz	3 m	5.7

End	Λf	Re	nor	f
Lillu	UI.	IZC	NUL I	L

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