### Project 17647-15

# Trident Research LLC Quantum Q6 Edge Head Array with Bluetooth Low Energy

### **IDHBT500**

### **Wireless Certification Report**

Prepared for:

Stealth Products LLC 104 John Kelly Dr Burnet, Texas 78611

By

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

7 April 2017

Reviewed by

Larry Finn Chief Technical Officer . /

Written by

Eric Lifsey EMC Engineer

### **Revision History**

Revision Number	Description	Date
DRAFT	Draft for review.	7 Apr 2017
01	Finalized.	18 Apr 2017

### Corrections:

All citations in this report of iDrive, Quantum 6, refer to the IDHBT500.

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# **Compliance Certificate**

Applicant	Device & Test Identification	
Stealth Products LLC	FCC ID:	2AJXVIDHBT500
104 John Kelly Dr	Industry Canada ID:	Not applicable.
Burnet, Texas 78611	Model(s):	IDHBT500
Certificate Date: 7 April 2017	Laboratory Project ID:	17647-15

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, <u>2400-2483.5 MHz</u> , 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	
OET Bulletin 65*	Edition 97-01, and 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 (Al Frequency Bands)	

<sup>\*</sup>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				
Stealth Products LLC	nono	2400-2483.5 MHz FHSS transceiver; using Bluetooth Low		
iDrive 4.0	none	Energy radio protocols.		

<sup>\*</sup>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 is a HMI controlled by sensors that respond to intentional head movement by the wheelchair occupant. It includes a Bluetooth Low Energy radio designed as a wireless link to wheelchair electronic controls by smart phones.

The EUT measures approximately 12.5 cm x 4.5 cm x 3.5 cm. It is powered by the 12 V power system of the host wheelchair.

### 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 CFR	Subpart C -Intentional Radiators		
DCC 247 Janua 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		
ANCI C62 10.2012	American National Standard of Procedures for Compliance Testing of Unlicensed		
ANSI C63.10:2013	Wireless Devices		

Table 1.7.2: Applicable Clauses					
Parameter	FCC Part 15	IC RSS References			
raiailletei	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			
15.247(a)(3) // RSS-247 5.2	Fundamental Power Conducted Limits 1 W Limit Restated as Field: 125.23 dBμV/m @ 3 m	12 Sep 2016		

### 2.3 Test Results, Peak Power

The EUT was measured for radiated power in three orthogonal orientations and two polarities each; the maximum orientation/polarity is reported below.

Table 2.3.1 Power, Peak, Radiated; Orientation: Upright; Polarity Horizontal					
Frequency MHz	Measured Peak Power dBμV/m @ 3 m	Maximum Measured Peak Power Restated as EIRP in dBm	Maximum Measured Peak Power Restated as EIRP in mW		
2402	94.0	-1.2	0.75		
2440	84.1	-11.1	0.08		
2480	80.2	-15.0	0.03		

Measured in 3 MHz RBW, 3 MHz VBW.

The EUT was satisfied the requirements.

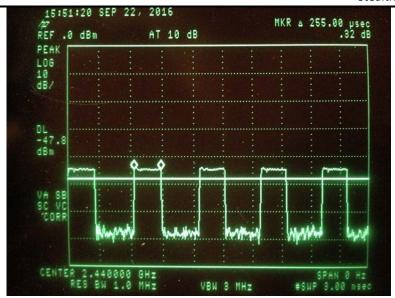
### 2.4 Test Results, Duty Cycle

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.

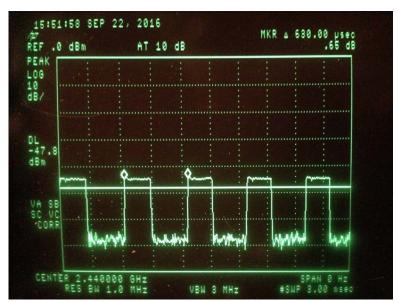
Table 2.5.1 Duty Cycle Results and Average Duty Cycle Factor Result					
Measured On Time (msec)	Measured Time Interval (msec)	Duty Cycle Factor Calculation	Result (dB)	Duty Cycle Factor Allowed (dB)	
0.255	0.630	= 20 * Log <sub>10</sub> (0.255 msec / 0.630 msec )	-7.85	-7.85	

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	8 Aug 2016						

### 4.3 Test Results

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

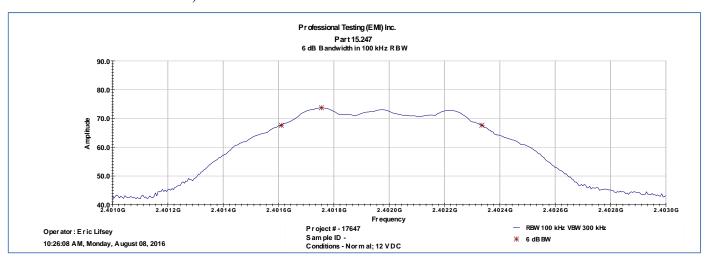
The EUT was found to be in compliance with applicable requirements.

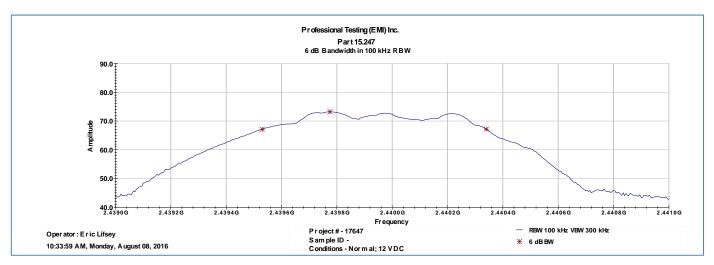
Table 5.3.1 Bandwidth 6 dB, Minimum 500 kHz in 100 kHz RBW									
Low Channel	Mid Channel	High Channel	Reported						
Measured BW	Measured BW	Measured BW	Minimum BW						
(kHz)	(kHz)	(kHz)	(kHz)						
725	810	755	725						

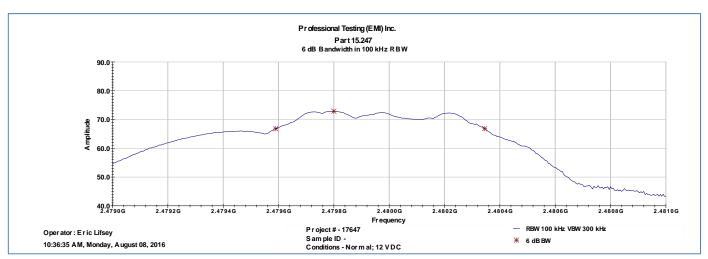
Table 5.3.2 Bandwidth 20 dB, Measure and Report									
Low Channel	Mid Channel	High Channel	Reported						
Measured BW	Measured BW	Measured BW	Maximum BW						
(kHz)	(kHz)	(kHz)	(kHz)						
1155	1245	1450	1450						

Plotted measurements appear on the following pages.

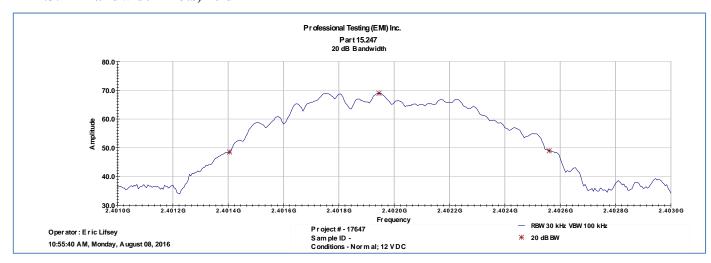
### 4.3.1 Bandwidth Plots, 6 dB

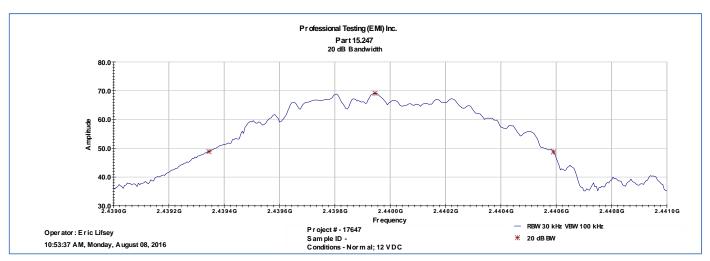


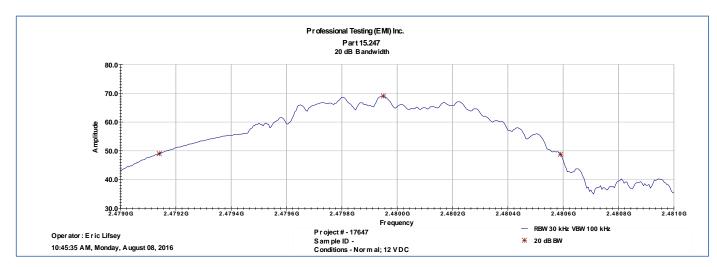




### 4.3.2 Bandwidth Plots, 20 dB







### 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	22 Can 2016						
RSS-247 5.5, RSS-Gen 4.9	Band, Radiated	22 Sep 2016						

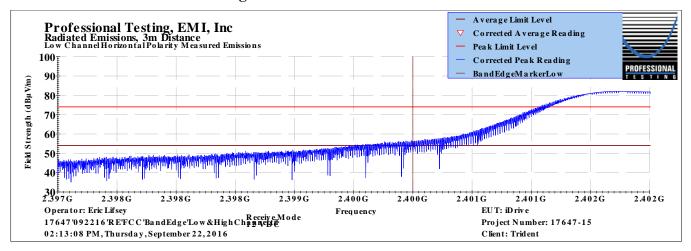
#### 5.3 Test Results

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.

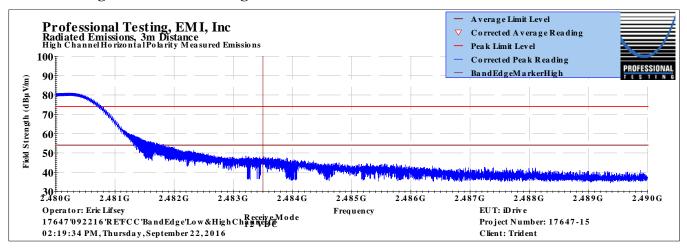
Applicable Duty Cycle Factor for Averaging Peak Emissions: -7.85 dB

The EUT satisfied the criteria. Plotted results of peak detection appear on the following pages.

### 5.3.1 Low Channel Band Edge



### 5.3.2 High Channel Band Edge

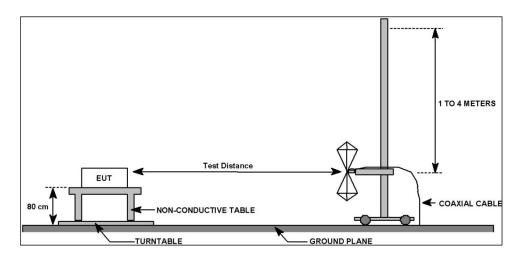


### 6.0 Radiated Spurious Emissions, Receive Mode

### **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	22 Sep 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.

Table 6.3.1: Radiated Spurious Emissions, Receive Mode, Below 1 GHz, Vertical Polarity

	Pr	rofession	al Test	ing, EMI,	Inc.					
est Method: ANSI C	C63.10–201	3								
n accordance with:	art 15.109 - ions Limits	Code of Federal	Regulation	ns Part 47, Subpa	art B - Un	intenti	onal Radiato	ors, Radi	ated	
ection: 15.109	9									
est Date(s): 9/22/	/2016		El	JT Serial #:		none				
Customer: Tride	nt		El	JT Part #:	1	none				
Project Number: 1764	7-15		Te	est Technician	:	Eric Li	fsey			
Purchase Order #: N/A			Sı	pervisor:	1	Lisa A	rndt			
quip. Under Test: iDrive	e Head Arı	ray	W	itness' Name	•	none				
Radiat	ed Emissio	ons Test Resul	its Data S	heet			Page:	1	of	1
EUT Line Voltage:	12	VDC		EUT Power F	Power Frequency:			N/A		
Antenna Orientation:		Vertical		Frequency	Range:		30N	1Hz to	1GHz	
EUT Mode o	of Operati	on:			Receiv	e (BT a	advertisin	g)		
Professional Testing, EMI, In Radiated Emissions, 10m Distance 30MHz-1GHzVerticalPolarity Measured F					<ul><li>∇ Correct</li><li>Correct</li><li>∇ Verifies</li></ul>	ted Peak V	oeak Reading alue QP Reading		PROFESS	IONA
50 to an appear of the part of										
4 - Allien 1	_  _  _	A STATE OF THE PERSON NAMED IN COLUMN TO THE PERSON NAMED IN COLUM		and the state of t					-	
10	Maria Cara Cara Cara Cara Cara Cara Cara	Mark The Control of t								
30M  Operator: Eric Lifsey	Miles and the second se	100M	Frequenc	cy		UT: iDrive			16	

Table 6.3.2: Radiated Spurious Emissions, Receive Mode, Below 1 GHz, Horizontal Polarity

	P	rofessional	Testing, EMI	, Inc.				
Test Method: AN	NSI C63.10–201	.3						
n accordance with:	C Part 15.109 -	Code of Federal Re	gulations Part 47, Sub	part B - Unintenti	onal Radiato	ors, Radi	ated	
Section: 15	.109							
Test Date(s): 9/	/22/2016		EUT Serial #:	none				
Customer: Tr	ident		EUT Part #:	none				
Project Number: 17	7647-15		Test Technicia	n: Eric L	ifsey			
Purchase Order #: N/	/A		Supervisor:	Lisa A	rndt			
quip. Under Test: iD	rive Head Ar	ray	Witness' Nam	e: none				
Rad	liated Emissi	ons Test Results	Data Sheet		Page:	1	of	1
EUT Line Voltage:	12	VDC	EUT Power	Frequency:	0	N/A		
Antenna Orientation:		Horizontal	Frequenc	y Range:	30N	/IHz to	1GHz	
EUT Mod	de of Operat	ion:		Receive (BT	advertisin	g)		
Professional Testing, EM Radiated Emissions, 10m Distance 30MHz - 1GHz Horizontal Polarity M	ce			— Quasi-peak Limit     ▽ Corrected Quasi-     — Corrected Peak V     ▽ Verified Low-PRI     × LPRF Verification	peak Reading alue F QP Reading		PROFESS	SIONA
50 (R) 40 and (A) 20 and (B) 40 a								
± 100 100 100 100 100 100 100 100 100 10	The state of the s							
0	<del></del>							
9 30 M		100M	Frequency	EUT: iDrive			1G	

Table 6.3.3: Radiated Spurious Emissions, Receive Mode, Above 1 GHz, Vertical Polarity

	F	rofession	al Te	sting, E	MI, Inc	•				
est Method: A	NSI C63.10–20	13								
n accordance with:	CC Part 15.109 missions Limits	- Code of Federa	l Regulat	ions Part 47,	Subpart B -	Unintenti	onal Radiato	ors, Radi	ated	
ection: 15	5.109									
est Date(s): 9	/22/2016			<b>EUT Serial</b>	#:	none				
ustomer: T	rident			EUT Part #	:	none				
roject Number: 1	7647-15			Test Techr	nician:	Eric L	ifsey			
urchase Order #: N	/A			Supervisor	:	Lisa A	rndt			
quip. Under Test: iC	rive Head A	rray		Witness' N	lame:	none				
Rad	diated Emiss	ions Test Resu	lts Data	Sheet			Page:	1	of	1
EUT Line Voltage:	12	VDC		EUT Power Frequency:			0	N/A		
Antenna Orientation:	;	Vertical		Frequ	iency Ran	ge:	Al	bove 10	3Hz	
EUT Mo	de of Opera	tion:			Rec	eive (BT	advertisin	g)		
Professional Testing, EN Radiated Emissions, 3m Distance 1-18GHz Vertical Polarity Measured 90 80	e				▽ C - P	verage Limit Le orrected A vera eak Limit Level orrected Peak F	ge Reading		PROFESS T E S T	SIONA
70		Acceptable and an internal and				A state of the sta			and the state of t	
30										
20 <sup>±</sup> / <sub>G</sub>			France	uency	. —		. ,	10G	130	G
Operator: Eric Lifsey  17647'092216'RE'FC C'Spurious'R'	K mode'.til	R eceiv e Mode 12 VDC	rreq	ucuty		EUT: iDrive Project Num	ber: 17647-15			

Table 6.3.4: Radiated Spurious Emissions, Receive Mode, Above 1 GHz, Horizontal Polarity

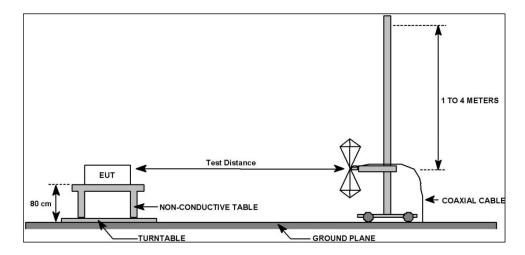
		Profession	nal Te	sting, EN	II, Inc.					
est Method:	ANSI C63.10-	-2013								
n accordance with:	FCC Part 15.1 Emissions Lin	.09 - Code of Federa	al Regulat	ions Part 47, Su	ıbpart B - Ur	nintentio	nal Radiato	ors, Radi	ated	
ection:	15.109									
est Date(s):	9/22/2016			EUT Serial #:		none				
ustomer:	Trident			EUT Part #:		none				
roject Number:	17647-15			Test Technic	ian:	Eric Lif	sey			
urchase Order #:	N/A			Supervisor:		Lisa Aı	ndt			
quip. Under Test:	iDrive Head	d Array		Witness' Na	me:	none				
ı	Radiated Em	issions Test Resi	ults Data	a Sheet			Page:	1	of	1
<b>EUT Line Voltage</b>	: 1	2 VDC		EUT Power Frequency:			0	N/A		
Antenna Orientatio	n:	Horizontal		Freque		Al	bove 10	3Hz		
EUT N	/lode of Ope	eration:			Receiv	re (BT a	dvertisin	g)		
Professional Testing, Radiated Emissions, 3m Dis 1-18GHz Horizontal Polarity M	tance				▽ Corre	nge Limit Leve ected Average Limit Level ected Peak Re	Reading		PROFESS T E S T	SIONA
Field Strength (dBpt Vm)  201  402  405					January division of the state o			Harris Maria		
30										
20 E		+	+		+	-	-	10G	130	G
Operator: Eric Lifsey 17647'092216'REFCC'Spurio	ıs'R X mo de'.til	R eceiv e Mode 12 VDC	Freq	uency		CUT: iDrive Project Numb	er: 17647-15			

### 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	3 Aug 2016 – 22 Aug 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 -7.85 dB to the peaks recorded for the harmonics.

All measurements used peak detection.

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

				tical Polarit sional Te	-	MI. I	nc.						
Test Metho	d:	ANSI C63.1 Devices		an National Star	<u> </u>			npliance	Testin	g of Unlice	ense	ed Wire	less
In accordance with:  FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits													
Section: 15.109  Test Date(s): 8/3/2016, 8/19/16, 8/22/16 EUT Serial #: None													
Test Date(s Customer:	): 		<u>, 8/19/16, 8/</u> esearch LLC	22/16	EUT Serial #			None None					
Project Nur	mber:	17647-10	CJCUICII EEC		Test Techni				v. D K	Cohutek,	an	d S Flir	nt
Purchase O		P010882			Supervisor:			Lisa Ar	•			<u> </u>	-
Equip. Und		iDrive He	ad Array		Witness' N			Sean B	rickle	<b>⊋</b> y			
	F	Radiated E	missions Test	t Results Data	a Sheet				Pag	ge: 1	L	of	1
EUT Li		EUT Pow	ver Fr	equen	су:	N/	A N/	Α					
Antenna	Orientatio	n:	Vertic	al	Frequ	ency F	Range			30MHz t	to 1	.GHz	•
	EUT N	lode of O	peration:		Tr	ansmi	it Hop	ping, R	ight F	od Activ	/ate	ed	
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	- 0	Detector Function	Recorded Amplitude (dBµV)	Le	ected vel V/m)	Limit L (dBμV		Margin (dB)	,	Test Re	sults
31.7921	10	191	1.59	Quasi-peak	24.1	12.	625	29.	5	-16.9		Pas	is
33.1104	10	44	1.92	Quasi-peak	23.6	12.	127	29.	5	-17.4		Pas	S
34.8589	10	42	1.24	Quasi-peak	23	11.	11.479		.5 -18.0			Pass	
45.5663	10	64	4.11	Quasi-peak	23.5	6.334		_	29.5 -23.2			Pas	
396.746	10	217	3.11	Quasi-peak	22.2	15.108		35.6		-20.5		Pass	
754.816 916.027	10 10	148 117	3.01	Quasi-peak	21.7 21.3	22.604 26.291		35.		-13.0		Pas	
Profess Radiated	sional Testing, Emissions, 10m Di	EMI, Inc	s 1.29	Quasi-peak	21.5		<ul><li>Quas</li><li>Corr</li><li>Corr</li></ul>	35. si-peak Limit I ected Quasi-p ected Peak Va ied Low-PRF	Level eak Readi			Pas	
50								F V erification	-	ug		PROFESS TEST	ONAL N 6
Field Strength (dB w/m)  ××  30  ××											×		
7 🗸	× × × × × × × × × × × × × × × × × × ×				Marie Marie Hard Marie M	rockstylete assert A Aleksense en progra	James Control	I de la Principal de la Princi			7	\(\frac{\partial}{\partial}\)	
10 0 30M	A STATE OF THE STA	A PARTY OF THE PAR	philiphineside had been alled to		Addition of the second								
Operator: 17647_ RI	Dave Kohutek EB_FCC_01.til	ust 03,2016		Free e: Transmitt Hopping er: 12VDC	quency		1	EUT: iD rive H Project Numb Client: Triden	er: 17647	-10		16	
		≤	1GHz Vertica	l Antenna Po	larity Meas	ured I	Emissi	ons					

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

				<u> </u>	izontal Pola		<b>11</b>	lnc.						
					sional Te									
Test Metho	d:	ANSI C6 Devices		2013 America	an National Star	ndard of Proce	dures	for Con	npliance	Testin	g of U	nlicens	ed Wire	less
In accordar	ice with:	FCC Part			Federal Regulat	ions Part 47, S	Subpar	t B - Un	intentio	nal Ra	diator	s, Radi	ated	
Section:		15.109												
Test Date(s	):	_		3/19/16, 8/	22/16	EUT Serial	#:		None					
Customer:		_		earch LLC		EUT Part #:			None					
Project Nur		17647-				Test Techn			E Lifse	-	ohut	ek, ar	nd S Fli	nt
Purchase O		P01088				Supervisor			Lisa Aı					
Equip. Und	er Test:	iDrive	Head	l Array		Witness' N	ame:		Sean E	Brickle	ey .			
	F	Radiate	d Em	issions Test	Results Data	Sheet				Pag	e:	1	of	1
EUT Li	ne Voltage	:	13	2 VDC		EUT Pow	ver Fr	equen	су:	N/	Α	N/A		
Antenna	Orientatio	n:		Horizor	ntal	Frequ	ency l	Range:			30MI	Hz to	1GHz	
		/lode of	Оре	ration:		•	•		ping, R					
Frequency Measured (MHz)	Test Distance (Meters)	EU1 Directi (Degre	ion	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBμV)	Le	ected vel V/m)	Limit L (dBμV		Maı (d	_	Test Ro	esults
32.5663	10	50		2.51	Quasi-peak	23.8	12.	356	29.	5	-17	7.1	Pa	SS
33.9953	10	106	5	2.97	Quasi-peak	23.3	11.	741	29.	.5	-17	7.8	Pas	SS
36.3451	10	70		3.58	Quasi-peak	23	9.0	592	29.	.5	-19	9.8	Pas	SS
293.714	10	158	3	2.34	Quasi-peak	22.1	11.	741	35.	6	-23	3.9	Pas	SS
571.37	10	187		1.29	Quasi-peak	22.1		419	35.		-17		Pa	SS
891.703	10	126	5	3.72	Quasi-peak	21.3	26.	226	35.	6	-9	.4	Pa:	55
Radiated 30 MHz - 10	sional Testing, Emissions, 10m D GHz Horizontal Polar	istance		s				<ul><li>∇ Corre</li><li>Corre</li><li>∇ Verifi</li></ul>	i-peak Limit I ected Quasi-p ected Peak Va ied Low-PRF Verification	eak Readi alue QP Readii			PROFESS T E S T	
Fied Strength (d By Vigin 1997)	< ×  No. of the block of the b	and Affebracion and the	A SA MARINE OF THE SA MARINE	100M	From Front	man de la companya de	× × × × × × × × × × × × × × × × × × ×	end dented all form			X		16	
-	Dave Kohutek			FIITMAd	Free e: Transmitt Hopping	quency			EUT: iD riv e H	-				
_	EB_FCC_01.til				e: 17ansmit Hopping er: 12VDC				Project Numb					
10:25:50 A	M, Wednesday, Aug	ust 03,2016						(	Client: Triden	t Research	LLC			

≤ 1GHz Horizontal Antenna Polarity Measured Emissions

Table 7.3.	3: TX Mod	e, Above	1 GHz, Ver	tical Polarit	ty, Bottom	Channel					
				sional Te							
Test Metho	od:	ANSI C63.1 Devices	0-2013 America	an National Sta	ndard of Proce	dures for Co	npliance Testi	ng of Unlicen	sed Wireless		
In accordar	nce with:	FCC Part 15 Limits	.209 - Code of I	Federal Regulat	tions Part 47,	Subpart C - In	tentional Radi	ators, Radiate	ed Emissions		
Section:		15.209									
Test Date(s	s):	8/3/2016	8/19/16, 8/	22/16	<b>EUT Serial</b>	#:	None				
<b>Customer:</b>		Trident R	esearch LLC		EUT Part #		None				
Project Nur	mber:	17647-10			Test Techn	ician:	E Lifsey, D	Kohutek, a	nd S Flint		
Purchase O	rder #:	P010882			Supervisor		Lisa Arndt				
Equip. Und	er Test:	iDrive He	ad Array	Witness' N	ame:	Sean Brickl	ey				
	F	Radiated E	missions Test	: Results Data	a Sheet		Pa	ge: 1	of 1		
EUT Li	ine Voltage	:	12 VDC		EUT Pov	ver Frequer	ncy: N	/A N/A			
Antenna	orientation	n:	Vertic	al	Frequency Range: Above 1GHz						
	EUT N	/lode of Op	eration:				Transmit CH	0			
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		
11530.6	3	234	2.11	Average	27.3	38.708	54.0	-15.2	Pass		
12522.6	3	32	2	Average	27.8	38.689	54.0	-15.3	Pass		
12640.3	3	333	2.66	Average	27.8	38.633	54.0	-15.3	Pass		
14828.2	3	138	1.95	Average	28.5	40.137	54.0	-13.8	Pass		
16668.2	3	40	1.23	Average	27.3	42.764	54.0	-11.2	Pass		
16902.5	3	352	1.9	Average	27.3	42.798	54.0	-11.2	Pass		
17823.9	3	11	3.3	Average	27.1	43.026	54.0	-10.9	Pass		
Radiated	sional Testing, Emissions, 3m Dis 'ertical Polarity Measu	tance				▽ Corr	age Limit Level ected A verage Reading Limit Level ected Peak Reading		PROFESSIONAL TESTING		

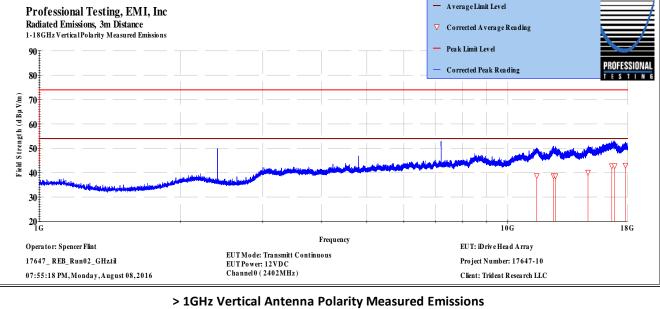


Table 7.3.	4: TX Mod	e, Above 1	L GHz, Hor	izontal Pol	arity, Botto	om Chann	el		
			Profess	sional Te	sting, EN	MI, Inc.			
		ANSI C63.10		n National Sta			mpliance Testi	ng of Unlicen	sed Wireless
Test Metho	d:	Devices							
In accordar	nce with:	FCC Part 15.2 Limits	209 - Code of F	ederal Regula	tions Part 47, S	Subpart C - In	tentional Radi	ators, Radiate	ed Emissions
Section:		15.209							
Test Date(s	5):	7	8/19/16, 8/2	22/16	EUT Serial	#:	None		
Customer:		Trident Re	search LLC		EUT Part #:		None		
Project Nur		17647-10			Test Techn		E Lifsey, D	Kohutek, a	nd S Flint
Purchase O		P010882			Supervisor		Lisa Arndt		
Equip. Und	er Test:	iDrive Hea	d Array		Witness' N	ame:	Sean Brickl	еу	
	F	Radiated Em	nissions Test	Results Dat	a Sheet		Pa	ge: 1	of 1
EUT Li	ne Voltage	: 1	2 VDC		EUT Pow	ver Frequer	ncy: N	/A N/A	
Antenna	Orientatio	n:	Horizon	ıtal	Frequ	ency Range	:	Above 1	GHz
	EUT N	Node of Ope	eration:				Transmit CH	0	
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
11514.5	3	186	1.78	Average	27.3	38.844	54.0	-15.1	Pass
11630.5	3	40	2.19	Average	27.3	38.29	54.0	-15.7	Pass
14921.9	3	333	3.64	Average	28.5	40.542	54.0	-13.4	Pass
15098.7	3	234	3.04	Average	27.8	40.438	54.0	-13.5	Pass
16285.6	3	242	1.29	Average	27.4	42.496	54.0	-11.5	Pass
16871.2	3	51	3.72	Average	27.6	43.045	54.0	-10.9	Pass
17731	3	351	2.15	Average	26.9	42.421	54.0	-11.5	Pass
Radiated	sional Testing, Emissions, 3m Dis Torizontal Polarity Mo	tance				▽ Corr	age Limit Level ected Average Reading Limit Level		PROFESSIONAL
80						— Corr	ected Peak Reading		T E S T I N G
Field Strength (d B µ V/m)  09 40									
30		A discription of the land of t					10G		18G
Operator:	Spencer Flint				quency	:	EUT: iDrive Head Arra	y	
	EB_Run02_GHz.til PM,Monday,August	08,2016	EUT Po we	:: Transmitt Continuou: r: 12VDC ( 2402MHz)	s		Project Number: 17647 Client: Trident Research		

> 1GHz Horizontal Antenna Polarity Measured Emissions

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

		Pro	ofessional Te	sting, EMI,	Inc.				
est Method:	ANSI C Device		American National Star	ndard of Procedures	for Compliance	e Testing of	Unlicens	ed Wir	eles
n accordance with:	FCC Pa	rt 15.209 - C	code of Federal Regulat	tions Part 47, Subpa	rt C - Intention	al Radiators,	Radiate	d Emis	sion
ection:	15.209	)							
est Date(s):	9/12/	2016		EUT Serial #:	None				
Customer:	Tride	nt Researc	h LLC	EUT Part #:	None				
Project Number:	17647	7-10		Test Technician:	Eric Li	ifsey			
Purchase Order #:	P0108	382		Supervisor:	Lisa A	rndt			
quip. Under Test:	iDrive	Head Arra	ау	Witness' Name:	None				
	Radiate	ed Emissio	ns Test Results Data	a Sheet		Page:	1	of	1
EUT Line Voltag	e:	12	VDC	EUT Power Fr	equency:	N/A	N/A		
Antenna Orientat	ion:		Vertical	Frequency	Range:	Al	oove 10	GHz	
EUT	Mode o	of Operation	n:		Transm	nit CH0			
18-26.5 GHz Verticall	esting, I s, Measur Polarity Me	EMI, Inc ed at 1m and asured Emission	1 Scaled to 3m Distance		— Peak Limit 1	A v era g e R ea d ii	ng	PROFES T E S	SION T I N
30 18.0G 18.7G Operator: Spencer Flin 17647_ REB_Run02_ 01:06:47 PM, Monda	_GHz+18-2	25_ChanBotto		5G 22.2G quency ntinuous	EUT: iDr Project N	23.6G ive Head A rray umber: 17647	-10	25.	

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

		Pro	ofessional	Testing	, EMI,	Inc.				
			American Nationa	Standard of	Procedure	s for Compliance	Testing of	Unlicens	sed Wir	eles
Test Method:	Devices									
n accordance with:	FCC Par Limits	t 15.209 - C	ode of Federal Re	gulations Pa	rt 47, Subpa	art C - Intentiona	al Radiators,	Radiate	ed Emis	sion
Section:	15.209									
Test Date(s):	9/12/2	016		EUT S	erial #:	None				
Customer:	Triden	t Researcl	n LLC	EUT P	art #:	None				
Project Number:	17647-	10		Test T	echnician	: Eric Li	fsey			
Purchase Order #:	P0108	32		Super	visor:	Lisa A	rndt			
quip. Under Test:	iDrive	Head Arra	ay	Witne	ess' Name	: None				
	Radiate	d Emissio	ns Test Results	Data Shee	t		Page:	1	of	1
EUT Line Voltag	e:	12	VDC	EU.	Γ Power F	requency:	N/A	N/A		
Antenna Orientat	ion:	H	Iorizontal	ı	requency	Range:	Al	ove 1	GHz	
EUT	Mode of	Operatio	n:			Transm	it CH0			
Professional T Radiated Emissions 18-26.5 GHz Horizont	esting, E s, Measure alPolarity M	MI, Inc d at 1m and leasured Emis	Scaled to 3m Dist	ance		— Peak Limit I	v era g e R ea d ii	ng	PROFES T E S	SSIONA
The state of the s	19.4	5 20.1	G 20.8G	21.5 G	22.2G	22.9 G	23.6G	24.3G	25,	- -
Operator: Spencer Flin	t		EUT Mode: Transm MEUT Power: 12 VD C	Frequency		EUT: iD ri	ve Head Array umber: 17647	7	23.	wu

			Profess	ional Te	sting, El	MI, I	nc.					
Test Metho	od:	ANSI C63.10 Devices	-2013 America	n National Star	ndard of Proce	dures f	or Con	npliance Test	ing of l	Jnlicens	sed Wire	eless
In accordar	nce with:	FCC Part 15.2 Limits	209 - Code of F	ederal Regulat	ions Part 47,	Subpart	C - Int	entional Rac	liators,	Radiate	ed Emiss	sions
Section:		15.209			1							
Test Date(s	s):	1/	8/19/16, 8/2	22/16	EUT Serial			None				
Customer:	_	Trident Re	search LLC		EUT Part #			None				
Project Nur		17647-10			Test Techn			E Lifsey, D		tek, aı	nd S Fli	nt
Purchase O		P010882			Supervisor			Lisa Arndt				
Equip. Und	er Test:	iDrive Hea	d Array		Witness' N	ame:		Sean Brick	ley			
	F	Radiated Em	issions Test	Results Data	a Sheet			P	age:	1	of	1
EUT Li	ine Voltage	: 1	2 VDC		EUT Pov	ver Fre	quen	cy: N	I/A	N/A		
Antenna	orientation	n:	Vertica	al	Frequ	ency R	lange:	;	Ab	ove 10	GHz	
	EUT N	/lode of Op	eration:				Tı	ransmit CH	19			
Frequency	Test	EUT	Antenna		Recorded	Corre	cted					
Measured	Distance	Direction	Height	Detector	Amplitude	Lev	vel	Limit Level		argin	Test Re	esults
(MHz)	(Meters)	(Degrees)	(Meters)	Function	(dBμV)	(dBµ\	V/m)	(dBµV/m)	(	dB)		
5335.77	3	250	3.77	Average	32.6	30.4	454	54.0	-2	23.5	Pas	SS
11447.1	3	225	1.75	Average	27.1	38.	526	54.0	-1	L5.4	Pas	SS
12479.2	3	268	1.04	Average	27.8	38.	711	54.0	-1	L5.2	Pas	SS
13950.1	3	85	1.29	Average	28.2	38.9	987	54.0	-1	L5.0	Pa:	SS
15418	3	288	3.77	Average	27.2	40.	784	54.0	-1	L3.2	Pa:	SS
16725.6	3	303	1.36	Average	27.3	42.8	811	54.0	-1	l1.1	Pas	SS
16956.7	3	338	1.43	Average	27.3	42.0	692	54.0	-1	l1.3	Pa:	SS
17110.3	3	348	1.36	Average	27.1	42.3	315	54.0	-1	l1.6	Pas	SS
Radiated	sional Testing, Emissions, 3m Dis ertical Polarity Meas	stance					∇ Corre	age Limit Level ected Average Readi	ng			1
90 — — 80 — —								Limit Level ected Peak Reading			PROFESS	SIONAL
<b>1</b> 70 -												
ВμV//												
ੁੱ 60 – <i>–</i>				-					_ T			
<u> </u>				i — — i -					فأستعلى وأرغ	100		
Eind Strength (dBjrVm)		<u>,</u>		In the second second second	ليوسية الراران المتحداد		Marie Marie	Market Market Street		No. of the state o	_ ₩	
سيلي	Marile Marie	and the same of	And the Party of t						7 7	_ Y	Y III	
30 -					— <del>                                    </del>					_	1 -  -	
20 G								10G			196	r.
	C			Free	quency		_				180	or .
Operator:	Spencer Flint		EUT Mode	: Transmitt Continuous				UT: iD riv e Head Ar				
17647 DI	ER Dun(13 / 11-43				•		r	Project Number 174	47-10			
	EB_Run03_GHz.til PM,Friday,August 1	9,2016	EUT Power					Project Number: 176 Client: Trident Resea				

Note - The 5335.77 MHz signal was found to be an ambient and not from the EUT.

Table 7.3.8: TX Mode, Above 1 GHz, Horizontal Polarity, Middle Channel

				izontal Pola Sional Te								
Test Metho	d:	ANSI C63.10 Devices		n National Sta				npliance Te	sting of	Unlicens	sed Wire	eless
n accordar	ice with:	FCC Part 15. Limits	209 - Code of I	ederal Regulat	tions Part 47, S	Subpart	C - Int	entional Ra	diators,	Radiate	ed Emiss	ions
Section:		15.209										
Test Date(s	):		8/19/16, 8/	22/16	EUT Serial			None				
Customer:			search LLC		EUT Part #:			None				
Project Nur		17647-10			Test Techn			E Lifsey, I		tek, ai	nd S Fli	nt
urchase O		P010882			Supervisor:			Lisa Arnd				
quip. Und	er Test:	iDrive Hea	d Array		Witness' N	ame:		Sean Bric	kley			
	F	Radiated Er	nissions Test	Results Data	a Sheet			ſ	Page:	1	of	1
EUT Li	ne Voltage		12 VDC		EUT Pow	ver Fre	quen	cy:	N/A	N/A		
Antenna	Orientatio	n:	Horizor	ntal	Frequ	ency R	ange:		Al	ove 10	GHz	
	EUT N	/lode of Op	eration:				Tı	ansmit C	H19			
Frequency	Test	EUT	Antenna		Recorded	Corre	cted					
Measured	Distance	Direction	Height	Detector	Amplitude	Lev		Limit Leve		argin	Test R	esult
(MHz)	(Meters)	(Degrees)	(Meters)	Function	(dBµV)	(dBμ\	//m)	(dBμV/m	) (	dB)		
11547.4	3	272	2.62	Average	27.4	38.7	715	54.0	-:	15.2	Pa	SS
12508.4	3	18	3.27	Average	27.8	38.	71	54.0	-1	L5.2	Pa	SS
13172.3	3	282	3.6	Average	26.6	38.0	)66	54.0	-:	L5.9	Pa	SS
13829.1	3	90	3.15	Average	28.6	39.0	)66	54.0	-:	L4.9	Pa	SS
15190.6	3	311	1.16	Average	27.6	40.3	312	54.0	-1	L3.6	Pa	SS
16296.2	3	351	3.04	Average	27.4	42.5	35	54.0	-:	L1.4	Pa	SS
16867.8	3	24	1.21	Average	27.5	43.0	)17	54.0	-:	L0.9	Pa	SS
17970.1	3	126	3.46	Average	26.5	42.9	919	54.0	-1	l1.0	Pa	SS
Radiated	sional Testing, Emissions, 3m Dis torizontal Polarity Mo	tance					∨ Corre	g e Limit Lev el cted A v era g e R ea Limit Lev el cted Pea k R ea din			PROFESS	
Field Strength (d B µ V/m) 30 30 30 30 30 30 30 30 30 30 30 30 30	all the same of th	i status di dilamania				, in the second		10G	YY	V Y	7 7 7	G
17647_ RI	Spencer Flint EB_Run03_GHz.til PM, Friday, August 1	9,2016	EUT Powe	Fre e: Transmitt Continuou r: 12VDC 9 (2440MHz)	quency s		P	UT: iDrive Head A roject Number: 1' lient: Trident Rese	7647-10			

Table 7.3.9: TX Mode, 18-25 GHz, Vertical Polarity, Middle Channel

		<b>Professional Te</b>	sting, EMI, In	C.				
		013 American National Star	ndard of Procedures for	r Compliance	Testing of U	Jnlicens	ed Wir	eless
Test Method:	Devices							
In accordance with:	FCC Part 15.20 Limits	9 - Code of Federal Regulat	ions Part 47, Subpart (	- Intentiona	al Radiators,	Radiate	d Emis	sions
Section:	15.209							
Test Date(s):	9/12/2016		EUT Serial #:	None				
Customer:	Trident Rese	arch LLC	EUT Part #:	None				
Project Number:	17647-10		Test Technician:	Eric Li	fsey			
Purchase Order #:	P010882		Supervisor:	Lisa A	rndt			
Equip. Under Test:	Drive Head	Array	Witness' Name:	None				
Ra	adiated Emis	ssions Test Results Data	a Sheet		Page:	1	of	1
EUT Line Voltage:	12	VDC	EUT Power Freq	luency:	N/A	N/A		
Antenna Orientation	n:	Vertical	Frequency Ra	nge:	Ab	ove 10	3Hz	
EUT M	ode of Oper	ation:		Transmi	it CH19			
Professional Test Radiated Emissions, M 18-26.5 GHz Vertical Pola 80	ting, EMI, I Measured at 1n ority Measured En	nc n and Scaled to 3m Distance nissions	- - - -	– Peak Limit I	v era g e R ea d in .ev el	g	PROFES	SIONAL
70	19.4G	Fra	IIIAnev	22.9G EUT: iDri	v e Head Array		25.0	TING
17647_ REB_Run03_GF 12:48:45 PM, Monday, S	Hz+18-25_Chan!	Middle. TOT Power: 12VDC 6 Channel 19 (2440 MHz)	nemu v u s	•	umber: 17647 ident Research			

Table 7.3.10: TX Mode, 18-25 GHz, Horizontal Polarity, Middle Channel

		Pr	ofessional Te	sting, EMI,	Inc.				
			American National Star	ndard of Procedures	for Compliance	e Testing of	Unlicens	ed Wir	eless
Test Method:	Devices								
n accordance with:		t 15.209 -	Code of Federal Regulat	ions Part 47, Subpa	rt C - Intention	al Radiators,	Radiate	d Emis	sions
	Limits								
Section:	15.209	016		· · · ·	<b>'</b>				
Test Date(s):	9/12/2		-k 11C	EUT Serial #:	None				
Customer:	17647-	t Researd	cn LLC	EUT Part #:					
Project Number: Purchase Order #:	P01088			Test Technician: Supervisor:	Eric Li Lisa A	•			
Equip. Under Test:		Head Arı	·av	Witness' Name:	None				
equip. Onder Test.	IDIIVE	ileau All	ау	vvicile33 ivaille.	None				
	Radiate	d Emissio	ons Test Results Data	a Sheet		Page:	1	of	1
EUT Line Voltage	e:	12	VDC	EUT Power Fr	equency:	N/A	N/A		
Antenna Orientati	on:		Horizontal	Frequency	Range:	Al	ove 10	GHz	
EUT	Mode of	Operati	on:		Transm	it CH19			
D 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					— Average Lii	mit Level			
Professional To	esting, E	MI, Inc	d Scaled to 3m Distance		Ü	A v era g e R ea d ii	n or		
18-26.5 GHz Horizonta	al Polarity M	leasured Em	issions			Ü	ııg	复	/
80					Pea k Limit 1			DDUCES	CIONIA
<u> </u>					— Corrected F	Peak Reading		T E S	SIONA TIN
<b>E</b> 70									
Steen gth (d B µ V m g l h l m g l h									
at p									
<u> </u>		. —— —							
d St	أوار والماملة		عاديات بين المرابعة	والمالية المالية والمالية	Mary Mary Land Bridge		MANAGEMENT OF THE PARTY.	AND THE PARTY OF T	
F 40									
‡									
30 <sup>‡</sup>	19.40	÷ 20.	1G 20.8G 21	.5G 22.2G	22.9 G	23.6G	24.3 G	25.	0 G
	 i		Fra	anev		iv e Head Array			
Operator: Spencer Flint			FILT Moder Transmitt Co	ntinuous					
Operator: Spencer Fint 17647_ REB_Run03_	GHz+18-25	_ChanMido	lle. HUT Power: 12VDC Channel 19 (2440MHz)	ntmuous	Project N	umber: 17647	-10		

11: TX Mo	de. Above	1 GHz. Ve	rtical Polar	itv. Top Ch	nannel			
	,							
od:	ANSI C63.10 Devices					npliance Test	ing of Unlicen	sed Wireless
nce with:	FCC Part 15.2	209 - Code of F	ederal Regulat	ions Part 47, S	Subpart C - Int	entional Rad	liators, Radiate	ed Emissions
	15.209							
s):			22/16	EUT Serial	#:	None		
		search LLC		EUT Part #:		None		
mber:	_							nd S Flint
rder #:	_			<u> </u>				
er Test:	iDrive Hea	d Array		Witness' N	ame:	Sean Brick	ley	
F	Radiated En	nissions Test	Results Data	a Sheet		Pa	age: 1	of 1
ine Voltage:	: 1	.2 VDC		EUT Pow	ver Frequen	cy: N	N/A	
a Orientatio	n:	Vertica	al	Freque	ency Range:	1	Above 1	GHz
EUT N	/lode of Op	eration:			T	ransmit CH	139	
Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)			Test Results
3	294	2.37	Average	27.3	38.728	54.0	-15.2	Pass
3	154	1.95	Average	27.5	38.23	54.0	-15.7	Pass
3	240	1.29	Average	28.5	40.281	54.0	-13.7	Pass
3	140	1.25	Average	27.2	42.214	54.0	-11.7	Pass
3	346	3.73	Average	27.3	42.779	54.0	-11.2	Pass
3	335	1.13	Average	27.6	43.091	54.0	-10.9	Pass
3	21	3.8	Average	26.8	42.423	54.0	-11.5	Pass
Emissions, 3m Dis	tance				▽ Corre	cted Average Readii Limit Level	ng	PROFESSIONAL TESTING
	distribution de la late						Y Y Y	▼ ▼
	mber: prder #: prder #: prer Test:  Test Distance (Meters)  3 3 3 3 3 3 3 sional Testing, Emissions, 3m Dis	ANSI C63.10 Devices  The with:  FCC Part 15.1 Limits  15.209 S):  8/3/2016, Trident Rember:  17647-10 P010882 P1010882 P	ANSI C63.10-2013 Americal Devices  ANSI C63.10-2013 Americal Devices  The with:  FCC Part 15.209 - Code of Filmits  15.209  S):  8/3/2016, 8/19/16, 8/2  Trident Research LLC  Trident Research LLC  Trident Research LLC  Toder #:  P010882  Ter Test:  IDrive Head Array  Radiated Emissions Test  Test  Direction:  FUT Mode of Operation:  Test  Direction (Meters)  3 294 2.37  3 154 1.95  3 240 1.29  3 140 1.25  3 346 3.73  3 346 3.73  3 35 1.13  3 321 3.8  Stional Testing, EMI, Inc  Emissions, 3m Distance	ANSI C63.10-2013 American National Start Devices  The with:  FCC Part 15.209 - Code of Federal Regular Limits  15.209  S):  8/3/2016, 8/19/16, 8/22/16  Trident Research LLC  Mber:  17647-10  Porder #:  P010882  er Test:  IDrive Head Array  Radiated Emissions Test Results Data  Ine Voltage:  12 VDC  A Orientation:  Vertical  EUT Mode of Operation:  Test Distance (Meters)  Direction Height (Meters)  3 294 2.37 Average  3 154 1.95 Average  3 240 1.29 Average  3 140 1.25 Average  3 346 3.73 Average  3 347 Average  3 348 Average	ANSI C63.10-2013 American National Standard of Proce Devices  PCC Part 15.209 - Code of Federal Regulations Part 47, Similar to Limits  15.209  Si: 8/3/2016, 8/19/16, 8/22/16 EUT Serial Similar to Proce Devices  By Sylvary to Poliose to Polio	Devices  FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intimits  15.209  S): 8/3/2016, 8/19/16, 8/22/16	Professional Testing, EMI, Inc.  ANSI C63.10-2013 American National Standard of Procedures for Compliance Test Devices  Test Distance (Meters)  Distance (Meters)  15.29  And Professional Testing, EMI, Inc.  Professional Testing, EMI, Inc Emissions, 3ml Distance  ANSI C63.10-2013 American National Standard of Procedures for Compliance Test and Devices  ANSI C63.10-2013 American National Standard of Procedures for Compliance Test and Devices  ANSI C63.10-2013 American National Standard of Procedures for Compliance Test and Devices  FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Ractions and Devices and D	Professional Testing, EMI, Inc.  ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicended:  Devices  Compliance Testing of Unlicended:  Devices  Compliance Testing of Unlicended:  Devices  FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, R

EUT Mode: Transmitt Continuous EUT Power: 12VDC Channel 39 (2480 MHz)

Frequency

EUT: iDrive Head Array

Project Number: 17647-10

Client: Trident Research LLC

Operator: Spencer Flint

17647\_ REB\_Run05\_GHztil 08:53:05 PM,Monday,August 22,2016

Table 7.3.:	12: TX Mo	de, Above	1 GHz, Ho	rizontal Po	larity, Top	Channel	<u> </u>		C - IDIIB1300
			Profess	sional Te	sting, EN	VII, Inc.			
Test Metho	od:	ANSI C63.10 Devices	-2013 America	an National Sta	ndard of Proce	dures for Con	npliance Test	ing of Unlicen	sed Wireless
In accordar	nce with:	FCC Part 15.2 Limits	209 - Code of I	Federal Regula	tions Part 47, S	Subpart C - Int	tentional Rad	liators, Radiato	ed Emissions
Section:		15.209							
Test Date(s	s):		8/19/16, 8/ <u>3</u>	22/16	EUT Serial	#:	None		
Customer:		Trident Re	search LLC		EUT Part #:		None		
Project Nur		17647-10			Test Techn	ician:		Kohutek, a	nd S Flint
Purchase O		P010882			Supervisor:		Lisa Arndt		
Equip. Und	er Test:	iDrive Head	d Array		Witness' N	ame:	Sean Brick	ley	
	F	Radiated Em	nissions Test	: Results Dat	a Sheet		Pa	age: 1	of 1
EUT Li	ine Voltage:	: 1	.2 VDC		EUT Pow	ver Frequen	cy: N	I/A N/A	
Antenna	a Orientatio	n:	Horizor	ntal	Freque	ency Range	•	Above 1	GHz
	EUT N	lode of Ope	eration:			Т	ransmit CH	39	
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
11528.1	3	277	3.76	Average	27.3	38.804	54.0	-15.2	Pass
12399.1	3	117	1.99	Average	27.2	38.095	54.0	-15.9	Pass
12681	3	229	1.94	Average	27.6	38.36	54.0	-15.6	Pass
16709	3	21	2.48	Average	27.3	42.809	54.0	-11.1	Pass
16809.7	3	218	2.79	Average	27.6	43.087	54.0	-10.9	Pass
17840.8	3	160	1.62	Average	27.2	43.109	54.0	-10.8	Pass
17902.9	3	47	2.31	Average	26.9	43.12	54.0	-10.8	Pass
Radiated	sional Testing, Emissions, 3m Dis Iorizontal Polarity Me	tance				▽ Corre	ge Limit Level ceted Average Readin Limit Level ceted Peak Reading	ıg	PROFESSIONAL TESTING

EUT Mode: Transmitt Continuous EUT Power: 12VDC Channel 39 (2480MHz)

Frequency

30

20 E

Operator: Spencer Flint

17647\_REB\_Run05\_GHz.til

08:53:05 PM, Monday, August 22, 2016

10G

EUT: iDrive Head Array

Project Number: 17647-10

Client: Trident Research LLC

Table 7.3.13: TX Mode, 18-25 GHz, Vertical Polarity, Top Channel

		Professional Te	sting, EMI, Inc.					
Fest Method:	ANSI C Device	63.10-2013 American National Star es	ndard of Procedures for Co	mpliance	Testing of L	Jnlicens	ed Wir	eless
n accordance with:	FCC Pa	rt 15.209 - Code of Federal Regulat	tions Part 47, Subpart C - Ir	ntentional	l Radiators,	Radiate	d Emiss	sions
Section:	15.209	)						
Test Date(s):	9/12/	2016	EUT Serial #:	None				
Customer:	Tride	nt Research LLC	EUT Part #:	None				
Project Number:	17647	7-10	Test Technician:	Eric Lif	fsey			
Purchase Order #:	P0108	382	Supervisor:	Lisa Ar	rndt			
quip. Under Test:	iDrive	e Head Array	Witness' Name:	None				
	Radiate	ed Emissions Test Results Data	a Sheet		Page:	1	of	1
EUT Line Voltage	::	12 VDC	EUT Power Freque	ncy:	N/A	N/A		
Antenna Orientati	on:	Vertical	Frequency Range	e:	Ab	ove 10	3Hz	
EUT	Mode c	of Operation:	7	Transmit	t CH39			
80	sting, Measur	EMI, Inc ed at 1m and Scaled to 3m Distance casured Emissions	▽ C	Peak Limit Lo	v era g e R ea d in	g	PROFES T E S	SIONAL T I N G
70 18.0G 18.0G 18.0G 18.7G Operator: Spencer Flint 17647_REB_Run05_0	19.4	4G 20.1G 20.8G 21  25_ChanTop.til EUT Mode: Transmitt Col EUT Power: 12VDC cer 12,2016 Channel 39 (2480MHz)	5G 22.2G 22.9	-	3.6G 2	24.3 G	25.0	0 G

Table 7.3.14: TX Mode, 18-25 GHz, Horizontal Polarity, Bottom Channel

	PI	ofessional Te	Sting, Eivii,	inc.				
		American National Star	ndard of Procedures	for Compliance	Testing of U	Jnlicens	ed Wir	eless
FCC Par Limits	rt 15.209 - (	Code of Federal Regulat	ions Part 47, Subpa	rt C - Intentiona	al Radiators,	Radiate	d Emis	sions
15.209								
9/12/	2016		EUT Serial #:	None				
Trider	nt Researc	h LLC	EUT Part #:	None				
17647	-10		Test Technician:	Eric Li	fsey			
P0108	82		Supervisor:	Lisa A	rndt			
iDrive	Head Arr	ау	Witness' Name:	None				
Radiate	ed Emissio	ns Test Results Data	a Sheet		Page:	1	of	1
<b>e</b> :	12	VDC	EUT Power Fr	requency:	N/A	N/A		
on:	ı	Horizontal	Frequency	Range:	Ab	ove 10	GHz	
Mode o	f Operation	on:		Transmi	it CH39			
sting, I Measure ilPolarity	EMI, Inc ed at 1m and Measured Emis	d Scaled to 3m Distance		∨ Corrected A  — Peak Limit I	v era g e R ea d in .ev el	g	PROFES T E S	SIONAL I N G
t GHz+18-2		Free	anenev	EUT: iDri Project N	v e Head Array	-10	25.	0 G
t i	FCC Pail Limits 15.209 9/12/ Trider 17647 P0108 iDrive Radiate e: ion: Mode o	ANSI C63.10-2013 Devices  FCC Part 15.209 - C Limits  15.209 9/12/2016 Trident Researc 17647-10 P010882 iDrive Head Arra Radiated Emissio e: 12 ion: H Mode of Operation esting, EMI, Inc. Measured at 1m and alPolarity Measured Emis alPolarity Measured Emis  19.4G 20.1	ANSI C63.10-2013 American National Star Devices  FCC Part 15.209 - Code of Federal Regular Limits  15.209  9/12/2016  Trident Research LLC  17647-10  P010882  iDrive Head Array  Radiated Emissions Test Results Data e: 12 VDC  ion: Horizontal  Mode of Operation:  esting, EMI, Inc  Measured at 1m and Scaled to 3m Distance al Polarity Measured Emissions  19.4G 20.1G 20.8G 21  GHz+18-25_ChanTop.til  EUT Mode: Transmitt Co	ANSI C63.10-2013 American National Standard of Procedures Devices  FCC Part 15.209 - Code of Federal Regulations Part 47, Subpa Limits  15.209  9/12/2016	ANSI C63.10-2013 American National Standard of Procedures for Compliance Devices  FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Limits  15.209  9/12/2016	ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of a Devices  FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Limits  15.209  9/12/2016	ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicens Devices  FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiate Limits 15.209  9/12/2016	ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wird Devices  FCC Part 15.209 - Code of Federal Regulations Part 47, Subpart C - Intentional Radiators, Radiated Emissions Test Research LLC  FUT Serial #: None  17647-10

### **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	8 Aug 2016

### 8.3 Results

Table 8.3.1 Antenna Construction Details				
Antenna Manufacturer and Model/PN Specifications				
Linx Technologies	ANT-2.45-CHP-T		Antennas 2.45GHz Chip Ant.	
Max Gain 0.5 dBi				

- 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

Radiated Emissions Test Equipment List								
Til	Tile! Software Version: 4.2.A, May 23, 2010, 08:38:52 AM							
Test Profile: 2016 RE_ClassB - Boresite+Mast_LowPRF_072616.til								
Asset #	Manufacturer	Model	Equipment Nomenclature	Serial Number	Calibration Due Date			
1509A	Braden	N/A	TDK 10M Chamber, NSA < 1 GHz	DAC-012915-005	2/5/2017			
1890	НР	8447F	Preamp/Amp, 9kHz-1300MHz, 28/25dB	3313A05298	2/1/2018			
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	HP	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			
2262	Keysight	E4440A	Spectrum Analyzer, 3 Hz - 26.5 GHz	MY42510155	7/18/2017			

## 9.2 Bandwidth and Duty Cycle

Asset #	Manufacturer	Model #	Description	Calibration Due
2216	НР	8593E	Spectrum Analyzer	19 Jul 2017

### 10.0 Measurement Bandwidths

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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