

UBTECH ROBOTICS CORP

SCOPE OF WORK FCC TESTING–IPSWSTS

REPORT NUMBER SZHH01201042-005

ISSUE DATE

14 December 2017

PAGES

77

DOCUMENT CONTROL NUMBER FCC ID 247_b © 2017 INTERTEK



TEST REPORT

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Intertek Report No.: SZHH01201042-005

UBTECH ROBOTICS CORP

Application For Certification

FCC ID: 2AHJX-IPSWSTS

First Order Stormtrooper[™] Robot with companion app

Model: IPSWSTS

2.4GHz Wi-Fi Transceiver

Report No.: SZHH01201042-005

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, mention 47 CFR [10-1-16]

Prepared and Checked by:

Approved by:

Sign on File Terry Tang Senior Engineer

Kidd Yang Senior Project Engineer Date: 14 December 2017

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MEASUREMENT/TECHNICAL REPORT

First Order Stormtrooper[™] Robot with companion app

Model: IPSWSTS

FCC ID: 2AHJX-IPSWSTS

This report concerns (check one)	Original Grant	X Class II Change
Equipment Type: <u>DTS - Part 15</u> portion)	Digital Transmission	Systems (Wi-Fi transmitter
Deferred grant requested per 47 C	FR 0.457(d)(1)(ii)?	Yes NoX_
Company Name agrees to notify th		If yes, defer until : date
of the intended date of announce issued on that date.	ment of the produc	date ct so that the grant can be
Transition Rules Request per 15.37	<i>"</i> ?	Yes NoX
If no, assumed Part 15, Subpart [10-01-16] Edition] provision.	C for intentional 1	radiator - the new 47 CFR
Report prepared by:		
Terry Tang Intertek Testing Services Shenzhen Ltd. Longhua Branch 1F/2F, Building B, QiaoAn Scientific Technology Park, Shangkeng Community, Guanhu Subdistrict, Longhua District, Shenzhen, P.R. China Tel: (86 755) 8601 6288 Fax: (86 755) 8601 6751		



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List of attached file

Exhibit type	File Description	Filename
Test Report	Test Report	report.pdf
Test Setup Photo	Radiated Emission	radiated photos.pdf
External Photo	External Photo	external photos.pdf
Internal Photo	Internal Photo	internal photos.pdf
Block Diagram	Block Diagram	block.pdf
Schematics	Circuit Diagram	circuit.pdf
Operation Description	Technical Description	descri.pdf
ID Label/Location	Label Artwork and Location	label.pdf
User Manual	User Manual	manual.pdf
Cover Letter	Confidentiality Letter	request.pdf
Cover Letter	Letter of Agency	agency.pdf



Intertek Report No.: SZHH01201042-005

EXHIBIT 1

SUMMARY OF TEST RESULTS



1.0 Summary of Test results

First Order Stormtrooper[™] Robot with companion app

Model: IPSWSTS

FCC ID: 2AHJX-IPSWSTS

TEST ITEM	REFERENCE	RESULTS
Max. Output power	15.247(b)(3)	Pass
6 dB Bandwidth	15.247(a)(2)	Pass
Max. Power Density	15.247(e)	Pass
Out of Band Antenna Conducted Emission	15.247(d)	Pass
Radiated Emission in Restricted Bands	15.247(d)	Pass
Antenna Requirement	15.203	Pass (See Notes)

Notes: The EUT uses an Integral Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.



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EXHIBIT 2

GENERAL DESCRIPTION



2.0 General Description

2.1 Product Description

The Equipment Under Test (EUT) is a First Order Stormtrooper[™] Robot with companion app with Wi-Fi function operating at 2412-2462MHz for 802.11b/g/n-HT20, 11 channels with 5MHz channel spacing. The EUT is powered by two rechargeable battery which can be charged by adapter. The EUT can't operate while charging. For more detailed features description, please refer to the user's manual.

Type of Modulation: CCK, BPSK, QPSK, 16QAM, 64QAM

Antenna Type: Integral Antenna

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

2.2 Related Submittal(s) Grants

This is an application for certification of: DTS- Part 15 Digital Transmission Systems (2.4GHz Wi-Fi transmitter portion).

2.3 Test Methodology

Radiated emission measurements was performed according to the procedures in ANSI C63.10: 2013 and KDB 558074 D01 v04. Radiated emission measurement was performed in semi-anechoic chamber. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

2.4 Test Facility

The Semi-anechoic chamber used to collect the radiated data is Intertek **Testing Services Shenzhen Ltd. Longhua Branch** and located at 1F/2F, Building B, QiaoAn Scientific Technology Park, Shangkeng Community, Guanhu Subdistrict, Longhua District, Shenzhen, P.R. China. This test facility and site measurement data have been fully placed on file with File Number: CN1188.

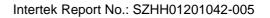




EXHIBIT 3

SYSTEM TEST CONFIGURATION



3.0 System Test Configuration

3.1 Justification

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables were manipulated to produce worst case emissions. The EUT was powered by two fully rechargeable battery during the test.

On 802.11b/g/n-HT20 mode, only one antenna is used, and all data rate were tested and only the worst case data is shown in the report.

For maximizing emissions, the EUT was rotated through 360°, the EUT was placed on the styrene turntable with 0.8m up to 1GHz and 1.5 m above 1GHz. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

The unit was operated standalone and placed at the centre of turntable.

Radiated emission measurement were performed the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

3.2 EUT Exercising Software

The EUT exercise program (provided by client) used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The worst case configuration is used in all specified testing.

The parameters of test software setting:

During the test, Channel and power controlling software provided by the applicant was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the application and is going to be fixed on the firmware of the end product.



3.3 Special Accessories

N/A.

3.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

Uncertainty and Compliance - Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

3.5 Equipment Modification

Any modifications installed previous to testing by UBTECH ROBOTICS CORP will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Longhua Branch.

3.6 Support Equipment List and Description

This product was tested in the following configuration:

Refer List:

Description	Manufacturer	Model No.
iPad (Provided by Client)	Apple	A1822
Router (Provided by Intertek)	TP-LINK	TL-WDR7500



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EXHIBIT 4

MEASUREMENT RESULTS



Applicant: UBTECH ROBOTICS CORP Date of Test: 2 November 2017

Model: IPSWSTS

4.0 Measurement Results

4.1 Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b)(3):

The antenna power of the EUT was connected to the input of a broadband peak RF power meter. The power meter have a video bandwidth that is greater than DTS bandwidth and utilize a fast-responding diode detector. Power was read directly at the EUT antenna terminals with cable loss added.

For antennas with gains of 6 dBi or less, maximum allowed Transmitter output is 1 watt (+30 dBm).

IEEE 802.11b (Antenna Gain = 2dBi) (CCK, 1Mbps)			
Frequency (MHz) Output in dBm Output in mWatt			
Low Channel: 2412	15.7	37.2	
Middle Channel: 2437 16.4 43.7			
High Channel: 2462	16.9	49.0	

IEEE 802.11g (Antenna Gain = 2dBi) (16QAM, 6Mbps)			
Frequency (MHz)	Output in dBm	Output in mWatt	
Low Channel: 2412	17.0	50.1	
Middle Channel: 2437 17.6 57.5			
High Channel: 2462	18.2	66.1	

IEEE 802.11n-HT20 (Antenna Gain = 2dBi) (64QAM, 6Mbps)		
Frequency (MHz)	Output in dBm	Output in mWatt
Low Channel: 2412	18.4	69.2
Middle Channel: 2437	19.0	79.4
High Channel: 2462	19.3	85.1

Cable loss: 1.0 dB External Attenuation: 0 dB

Cable loss, external attenuation has been included in OFFSET function

EUT max. output level = 19.3dBm EUT max. E.I.R.P level = 19.3dBm + 2dBi = 21.3dBm



Applicant: UBTECH ROBOTICS CORP Date of Test: 2 November 2017

Model: IPSWSTS

4.2 Minimum 6 dB RF Bandwidth, FCC Rule 15.247(a) (2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was set to 100 KHz according to FCC KDB 558074 D01 v04. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 6 dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

Limit: The 6 dB Bandwidth is at least 500 kHz.

IEEE 802.11b (CCK, 1Mbps)		
Frequency (MHz)	6 dB Bandwidth (MHz)	
2412	9.074	
2437	9.074	
2462	9.074	

IEEE 802.11g (16QAM, 6Mbps)		
Frequency (MHz)6 dB Bandwidth (MHz)		
2412	16.411	
2437	16.368	
2462	16.411	

IEEE 802.11n-HT20 (64QAM, 6Mbps)		
Frequency (MHz)6 dB Bandwidth (MHz)		
2412	17.583	
2437	17.540	
2462	17.583	

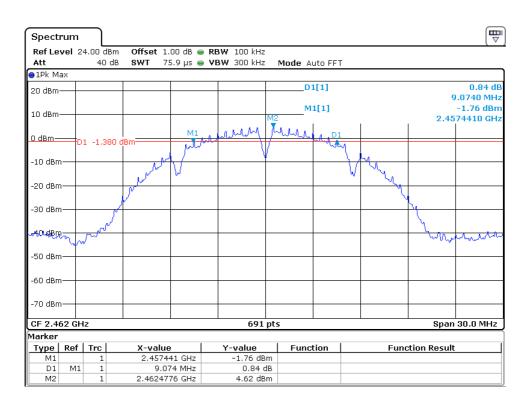
The test plots are attached as below.



802.11b

₩ Spectrum Ref Level 24.00 dBm Offset 1.00 dB 🖷 RBW 100 kHz Att 40 dB SWT 75.9 µs 👄 **VBW** 300 kHz Mode Auto FFT ⊖1Pk Ma× D1[1] 0.66 dB 20 dBm-9.0740 MHz M1[1] -1.84 dBm 10 dBm 2.4074410 GHz 1 M.M. MA M1 0 dBm--1.520 dBm and the -10 dBm -20 dBm -30 dBm 40 dBmmonth -50 dBm--60 dBm--70 dBm-Span 30.0 MHz CF 2.412 GHz 691 pts Marker Type | Ref | Trc Y-value Function **Function Result** X-value 2.407441 GHz М1 -1.84 dBm 9.074 MHz D1 0.66 dB M1 1 M2 2.411479 GHz 4.48 dBm 1 ₩ Spectrum Ref Level 24.00 dBm Offset 1.00 dB 🖷 RBW 100 kHz Att 40 dB SWT 75.9 µs 👄 **VBW** 300 kHz Mode Auto FFT ∋1Pk Ma× D1[1] 0.19 dB 20 dBm 9.0740 MHz M1[1] -1.03 dBm 10 dBm-2.4324410 GHz mm М1 Mul 0 dBm D1 -0.930 dBr -10 dBm -20 dBm -30 dBm 40 dBmwww ١J -50 dBm -60 dBm--70 dBm-Span 30.0 MHz CF 2.437 GHz 691 pts Marker Type Ref Trc X-value Y-value Function Function Result 2.432441 GHz M1 1 -1.03 dBm D1 9.074 MHz 0.19 dB M1 1 M2 2.436479 GHz 5.07 dBm 1







802.11g

T Spectrum Ref Level 24.00 dBm Offset 1.00 dB 😑 RBW 100 kHz Att 40 dB SWT 75.9 µs 👄 **VBW** 300 kHz Mode Auto FFT ●1Pk Max _D1[1] -0.69 dB 20 dBm 16.4110 MHz M1[1] -9.48 dBm 10 dBm 2.4037950 GHz 0 dBm-М1 Montinution alerth Much N D1 -8.900 dBr -10 dBm--20 dBm--30 dBm ᡃᠰᡁ -40 dBm white -50 dBm -60 dBm -70 dBm-CF 2.412 GHz 691 pts Span 30.0 MHz Marker Type Ref Trc Function X-value 2.403795 GHz Y-value -9.48 dBm **Function Result** Μ1 1 D1 Μ1 1 16.411 MHz -0.69 dB M2 1 2.4057482 GHz -2.90 dBm ₽ Spectrum Ref Level 24.00 dBm Offset 1.00 dB 👄 RBW 100 kHz Att 40 dB SWT 75.9 µs 👄 **VBW** 300 kHz Mode Auto FFT ●1Pk Max _D1[1] 1.09 dB 20 dBm 16.3680 MHz M1[1] -9.32 dBm 10 dBm 2.4287950 GHz 0 dBm-Munh М1 Arrest Myphie alinh Annal P. D1 -8.680 -10 dBm--20 dBm -30 dBm Why -40 dBm Anw -50 dBm -60 dBm--70 dBm-Span 30.0 MHz CF 2.437 GHz 691 pts Marker Type | Ref | Trc | Y-value Function **Function Result** X-value 2.428795 GHz -9.32 dBm Μ1 1 D1 M2 16.368 MHz 2.430748 GHz 1.09 dB -2.68 dBm Μ1 1 1



Spect	rum											
Ref Le Att	vel 2	4.00 dBn 40 dB		-		100 kHz 300 kHz		ode Al	uto FFT			
😑 1Pk M	ах											
20 dBm								D:	1[1]		16	-0.56 dB .4110 MHz
10 dBm								M	1[1]	1		-9.24 dBm 37950 GHz
0 dBm—			мі. Л	1	<u> </u>	λ			M2	h .		
-10 dBm	n D	1 -8.750	dBm	when	Junt	mount	frad"	www	white	Multon 1		
-20 dBr	n		<i>, , , , , , , , , ,</i>							ેળ	4.	
-30 dBm	n	مر مر مرکز میں									When when	
-40 dBr	over										° %	have have have have have have have have
-50 dBm	n											
-60 dBm	n											
-70 dBm	n											
CF 2.4	62 GH	lz				691	pts				Span	30.0 MHz
Marker												
Туре	Ref	Trc	X-value	.	Y	-value		Funct	tion	Fun	ction Result	
M1		1	2.4537			-9.24 dB						
D1	M1	1		L1 MHz		-0.56 (
M2		1	2.4669	93 GHz		-2.75 dB	3m					



802.11n-HT20

-Spectrum Ref Level 24.00 dBm Offset 1.00 dB 🖷 RBW 100 kHz SWT 75.9 μs 👄 VBW 300 kHz 40 dB Att Mode Auto FFT 🔵 1 Pk Max D1[1] 0.46 dB 20 dBm 17.5830 MHz -8.58 dBm M1[1] 10 dBm 2.4031870 GHz 0 dBm Л. moundarit had Aurto May na A -8.130 -10 dBm -20 dBm--30 dBm M. 1 Andrew 49rdBm A -50 dBm -60 dBm -70 dBm-CF 2.412 GHz 691 pts Span 30.0 MHz Marker Y-value -8.58 dBm Function **Function Result** Type Ref Trc X-value 2.403187 GHz Μ1 1 D1 17.583 MHz 0.46 dB Μ1 M2 1 2.405748 GHz -2.13 dBm ₩ Spectrum Ref Level 24.00 dBm Offset 1.00 dB 🖷 RBW 100 kHz 40 dB SWT 75.9 µs 👄 **VBW** 300 kHz Mode Auto FFT Att ⊖1Pk Max D1[1] -0.38 dB 20 dBm-17.5400 MHz -8.20 dBm M1[1] 10 dBm 2.4282300 GHz 0 dBm Sugar And ٨. M Mar ۸. X. D1 -8.560 -10 dBm--20 dBm -30 dBm 5 -40 dBm-May -50 dBm -60 dBm -70 dBm-CF 2.437 GHz 691 pts Span 30.0 MHz Marker Function Function Result Туре Ref Trc X-value Y-value 2.42823 GHz 17.54 MHz -8.20 dBm M1 1 D1 -0.38 dB Μ1 M2 1 2.430748 GHz -2.56 dBm



Spect	rum									
Ref Le Att	vel 2	4.00 dBr 40 dl			RBW 100 kHz VBW 300 kHz		Auto FFT			
😑 1Pk M	ax									
20 dBm							01[1]		17	0.76 dB .5830 MHz
10 dBm						r	M1[1]	I	2.45	-9.20 dBm 31870 GHz
0 dBm—			M2		In Mundary		mushush	hard D		
-10 dBn	<mark>ר די</mark>	1 -8.640	dem <u>poppanos</u>	MON (MANY	and more wally					
-20 dBn	יר	گى	1						h.	
-30 dBn	at	Juran							Mar My	N
-40, dBP										mm
-50 dBn	<u>ו</u> רי									
-60 dBn										
-70 dBn										
CF 2.4	62 GF	iz			691	pts			Span	30.0 MHz
Marker	D (1 1		1		1 =		-		1
Type M1	Ref	Trc 1	X-value		<u>Y-value</u> -9.20 dB		<u>ction</u>	Fund	tion Result	
D1	M1	1	2.45318	I3 MHz	-9.20 di					
M2	1911	1	2.45574		-2.64 dB					



Applicant: UBTECH ROBOTICS CORP Date of Test: 2 November 2017

Model: IPSWSTS

4.3 Maximum Power Density Reading, FCC Rule 15.247(e):

The Measurement Procedure PKPSD was set according to the FCC KDB 558074 D01 v04.

Antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function.

Limit: The Power Density does not exceed 8dBm/3 kHz.

IEEE 802.11b (CCK, 1Mbps)						
Frequency (MHz)	Power Density with RBW 3KHz					
2412	0.01					
2437	0.10					
2462	0.09					

IEEE 802.11g (16QAM, 6Mbps)							
Frequency (MHz)	Power Density with RBW 3KHz						
2412	-18.14						
2437	-18.51						
2462	-16.46						

IEEE 802.11n-HT20 (64QAM, 6Mbps)						
Frequency (MHz)	Power Density with RBW 3KHz					
2412	-17.62					
2437	-17.98					
2462	-17.80					

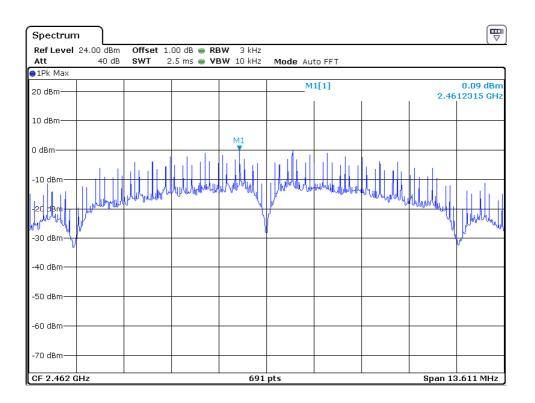
The test plots are attached as below.



802.11b

₩ Spectrum Offset 1.00 dB 🖷 RBW Ref Level 24.00 dBm 3 kHz 40 dB SWT 2.5 ms 👄 **VBW** 10 kHz Mode Auto FFT Att ⊖1Pk Max M1[1] 0.01 dBn 20 dBm 2.4112315 GHz 10 dBm M: 0 dBm L. -10 dBm 2d Henny -30 dBm--40 dBm--50 dBm -60 dBm--70 dBm Span 13.611 MHz CF 2.412 GHz 691 pts **T** Spectrum Ref Level 24.00 dBm Offset 1.00 dB 👄 RBW 3 kHz 40 dB SWT 2.5 ms 😑 VBW 10 kHz Att Mode Auto FFT ⊖1Pk Max 0.10 dBm M1[1] 20 dBm-2.4362315 GHz 10 dBm M 0 dBm -10 dBm Juntit -30 dBm--40 dBm -50 dBm -60 dBm -70 dBm CF 2.437 GHz Span 13.611 MHz 691 pts



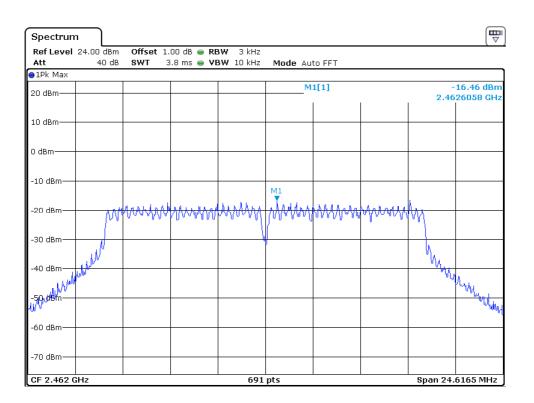




802.11g

₩ Spectrum Offset 1.00 dB 🖷 RBW Ref Level 24.00 dBm 3 kHz 40 dB SWT 3.8 ms 👄 **VBW** 10 kHz Mode Auto FFT Att ⊖1Pk Max M1[1] -18.14 dBn 20 dBm 2.4126058 GHz 10 dBm 0 dBm· -10 dBm M1 -20 dBm Manhanhanna MANAMANAMANA -30 dBm Ŵ the way way -40 dBm -50 d**ø** -60 dBm -70 dBm CF 2.412 GHz 691 pts Span 24.6165 MHz ₩ Spectrum Ref Level 24.00 dBm Offset 1.00 dB 👄 RBW 3 kHz 40 dB SWT 3.8 ms 😑 VBW 10 kHz Att Mode Auto FFT ●1Pk Max -18.51 dBm M1[1] 20 dBm-2.4376040 GHz 10 dBm 0 dBm -10 dBm -20 dBm MMMMM -30 dBm 40 dBm મા Myran -50 d**i** n M) -60 dBm -70 dBm CF 2.437 GHz Span 24.552 MHz 691 pts







802.11n-HT20

₽ Spectrum Offset 1.00 dB 👄 RBW 3 kHz Ref Level 24.00 dBm 40 dB SWT 3.8 ms 😑 **VBW** 10 kHz Att Mode Auto FFT ⊖1Pk Max M1[1] -17.62 dBm 20 dBm-2.4045188 GHz 10 dBm-0 dBm--10 dBm (M1 -20 dBm MANANANA ለኩለኩለስኮለኩለካ -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.412 GHz 691 pts Span 26.3745 MHz ₩ Spectrum Ref Level 24.00 dBm Offset 1.00 dB 👄 RBW 3 kHz 40 dB 3.8 ms 😑 VBW 10 kHz Att SWT Mode Auto FFT 🔵 1 Pk Max M1[1] -17.98 dBm 20 dBm-2.4295370 GHz 10 dBm 0 dBm -10 dBm м1 **Т** -20 dBm www.www.www.www.www. WWWW $\sqrt{1}$ ΛN -30 dBm -40 dBm -50 dBm Film mphi -60 dBm -70 dBm CF 2.437 GHz 691 pts Span 26.31 MHz



Spectrum	ī								
	24.00 dBm		00 dB 👄 RE						
Att	40 dB	SWT 3	.8 ms 👄 VE	SW IU KHZ	Mode Au	to FFT			
20 dBm					M	1[1]	1		17.80 dBm 38708 GHz
10 dBm									
0 dBm									
-10 dBm					M1				
-20 dBm	NM	M MM	hwww	www.	Ţ	ntinnin	MMMM	My	
-30 dBm	л							4	
-40 dBm	www							- La Carro	
-50 dBm+#**									en and a second
-60 dBm									0.15
-70 dBm									
CF 2.462 C	Hz			691	pts			Span 26.	3745 MHz



Intertek Report No.: SZHH01201042-005

Applicant: UBTECH ROBOTICS CORP Date of Test: 2 November 2017

Model: IPSWSTS

4.4 Out of Band Conducted Emissions, FCC Rule 15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. The Measurement Procedure was set according to the FCC KDB 558074 D01 v04.

All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the passband.

Refer to the attached test plots for out of band conducted emissions data with rate of 1Mbps for 802.11b and 6Mbps for 802.11g and 6Mbps for 802.11n-HT20.

The test plots showed all spurious emission up to the tenth harmonic were measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

The test plots are attached as below.



802.11b Channel 01 (2412MHz) Reference Level: 3.86dBm

Spectrum Ref Level 24.00 dBm Offset 1.00 dB 👄 RBW 100 kHz Att 40 dB SWT 37.9 µs 👄 **VBW** 300 kHz Mode Auto FFT ⊖1Pk Max M1[1] 3.86 dBm 20 dBm· 2.4114875 GHz 10 dBm M1 ٨ And 0 dBm Δ. ٨ ٨... -70 UBA -20 dBm -30 dBm -40 dBm -50 dBm--60 dBm -70 dBm-CF 2.412 GHz 691 pts Span 13.611 MHz [₩ Spectrum Ref Level 24.00 dBm Offset 1.00 dB 👄 RBW 100 kHz Att 40 dB SWT 24 ms 👄 VBW 300 kHz Mode Auto Sweep ●1Pk Max M1[1] 43.60 dBn 20 dBm 2.39830 GHz 10 dBm 0 dBm -10 dBm D1 -16.140 dBm -20 dBm -30 dBm -40 dBm mallipatration of the source o -50 dBm to million month -60 dBm -70 dBm-Start 1.0 MHz 691 pts Stop 2.4 GHz



Spectrum	ſ							E
Ref Level 24.00		1.00 dB 👄 RE						(*)
Att	40 dB SWT	226 ms 👄 VI	BW 300 KHZ	Mode A	uto Sweep			—
20 dBm				м	1[1]		-	42.01 dBm
20 0811					1	I	20).3565 GHz
10 dBm								
0 dBm								
-10 dBm								
D1 -1	16.140 dBm							
-20 dBm								
-30 dBm								
40 d0m						M:		
-40 dBm		roldwarden	k. 1	1 a WHA	Ahr. M	March March		
000 dBm	hand a president	roldmonaum	waterward	MULLING	h		hornor	m. Maralle destro
-60 dBm								
-70 dBm								
Start 2.4835 GF			601				Stan	
Start 2.4833 GP	12		691	pts			Stup	25.0 GHz
Spectrum)							
Spectrum Ref Level 24.00	dBm Offset	1.00 dB 👄 R	RBW 100 kH	z				
Ref Level 24.00) dBm Offset 40 dB SWT	1.00 dB ● R 132.7 µs ● V			Auto FFT			
Ref Level 24.00				z Mode a				
Ref Level 24.00				z Mode /	1[1]		-15	-44.33 dB 5.4560 MHz
Ref Level 24.00 Att 1Pk Max 20 dBm				z Mode /				-44.33 dB 5.4560 MHz 3.71 dBm
Ref Level 24.00 Att 1Pk Max				z Mode /	1[1]	M1		-44.33 dB 5.4560 MHz
Ref Level 24.00 Att 1Pk Max 20 dBm 10 dBm				z Mode /	1[1]	M1 Muu,		-44.33 dB 5.4560 MHz 3.71 dBm
Ref Level 24.00 Att 1Pk Max 20 dBm				z Mode /	1[1] 1[1]	MI		-44.33 dB 5.4560 MHz 3.71 dBm
Ref Level 24.00 Att 1Pk Max 20 dBm 10 dBm				z Mode /	1[1] 1[1]	MI		-44.33 dB 5.4560 MHz 3.71 dBm
Ref Level 24.00 Att 1Pk Max 20 dBm 10 dBm 0 dBm				z Mode /	1[1] 1[1]	MI		-44.33 dB 5.4560 MHz 3.71 dBm
Ref Level 24.00 Att 1Pk Max 20 dBm 10 dBm 0 dBm				z Mode /	1[1] 1[1]	MI		-44.33 dB 5.4560 MHz 3.71 dBm
Ref Level 24.00 Att 1Pk Max 20 dBm 10 dBm 0 dBm -10 dBm				z Mode /	1[1] 1[1]	MI		-44.33 dB 5.4560 MHz 3.71 dBm
Ref Level 24.00 Att 1Pk Max 20 dBm 10 dBm 0 dBm -10 dBm				z Mode /	1[1] 1[1]	MI		-44.33 dB 5.4560 MHz 3.71 dBm
Ref Level 24.00 Att 1Pk Max 20 dBm 10 dBm 0 dBm -10 dBm -10 dBm -30 dBm			/BW 300 kH	z Mode /	1[1] 1[1]	MI		-44.33 dB 5.4560 MHz 3.71 dBm
Ref Level 24.00 Att 1Pk Max 20 dBm 10 dBm 0 dBm -10 dBm -20 dBm		132.7 µs • V	200 kH	z Mode /	1[1] 1[1]	MI		-44.33 dB 5.4560 MHz 3.71 dBm
Ref Level 24.00 Att 1Pk Max 20 dBm 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm	40 dB SWT	132.7 µs • V	200 kH	z Mode /	1[1] 1[1]	MI		-44.33 dB 5.4560 MHz 3.71 dBm 34590 GHz
Ref Level 24.00 Att 1Pk Max 20 dBm 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm	40 dB SWT		200 kH	z Mode /	1[1] 1[1]	M1 Juliu Lutry	2.41	-44.33 dB 5.4560 MHz 3.71 dBm 34590 GHz
Ref Level 24.00 Att 1Pk Max 20 dBm 10 dBm 0 dBm -10 dBm -10 dBm -30 dBm -40 dBm	40 dB SWT	132.7 µs • V	200 kH	z Mode /	1[1] 1[1]		2.41	-44.33 dB 5.4560 MHz 3.71 dBm 34590 GHz
Ref Level 24.00 Att 1Pk Max 20 dBm 10 dBm 0 dBm -10 dBm -10 dBm -30 dBm -40 dBm	40 dB SWT	132.7 µs • V	200 kH	z Mode /	1[1] 1[1]		2.41	-44.33 dB 5.4560 MHz 3.71 dBm 34590 GHz
Ref Level 24.00 Att 1Pk Max 20 dBm 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -60 dBm	40 dB SWT	132.7 µs • V	200 kH	z Mode /	1[1] 1[1]		2.41	-44.33 dB 5.4560 MHz 3.71 dBm 34590 GHz
Ref Level 24.00 Att 1Pk Max 20 dBm 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm	40 dB SWT	132.7 µs • V	200 kH	z Mode	1[1] 1[1]		2.41	-44.33 dB 5.4560 MHz 3.71 dBm 34590 GHz



Channel 06 (2437MHz) Reference Level: 3.68dBm

Spectrum Ref Level 24.00 dBm Offset 1.00 dB 👄 RBW 100 kHz 37.9 µs 👄 **VBW** 300 kHz 40 dB SWT Att Mode Auto FFT ●1Pk Max M1[1] 3.68 dBn 20 dBm 2.4364875 GHz 10 dBm м1 ... 0 dBm ...A Mus -to-upy -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm-CF 2.437 GHz 691 pts Span 13.611 MHz Spectrum Ref Level 24.00 dBm Offset 1.00 dB 👄 RBW 100 kHz Att 40 dB SWT 24 ms 🖷 VBW 300 kHz Mode Auto Sweep ●1Pk Max -48.94 dBm M1[1] 20 dBm 836.00 MHz 10 dBm 0 dBm -10 dBm D1 -16.320 dBm -20 dBm -30 dBm -40 dBm M1 -50 dBm-ᇪᆺ -60 dBm -70 dBm-Start 1.0 MHz 691 pts Stop 2.4 GHz



Spectrun	n								
	24.00 dBm			W 100 kHz					
Att	40 dB	SWT 23	26 ms 😑 VE	3W 300 kHz	Mode A	uto Sweep			
⊖1Pk Max									
20 dBm					M	1[1]			42.49 dBm 1.2915 GHz
10 dBm									
0 dBm									
-10 dBm									
-20 dBm	D1 -16.320	dBm							
-30 dBm									
-40 dBm—						aden A.k.	M Maria		
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-60 dBm									
-70 dBm									
Start 2.48	35 GHz	1		691	pts	1		Stop	25.0 GHz

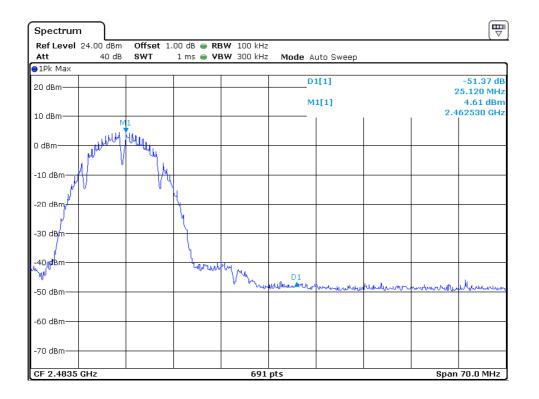


Channel 11 (2462MHz) Reference Level: 2.19dBm

₩ Spectrum Ref Level 24.00 dBm Offset 1.00 dB 👄 RBW 100 kHz 40 dB Att SWT 37.9 µs 👄 **VBW** 300 kHz Mode Auto FFT ⊖1Pk Max M1[1] 2.19 dBm 20 dBm-2.4624925 GHz 10 dBm м1 0 dBm· wh ۸. ۸ ٨ -1,0_dBm -20 dBm--30 dBm -40 dBm--50 dBm--60 dBm--70 dBm-Span 13.611 MHz CF 2.462 GHz 691 pts ₩ Spectrum Ref Level 24.00 dBm Offset 1.00 dB 👄 RBW 100 kHz 40 dB 24 ms 👄 **VBW** 300 kHz Att SWT Mode Auto Sweep ⊖1Pk Max M1[1] 47.66 dBm 20 dBm 1.77330 GHz 10 dBm 0 dBm--10 dBm D1 -17.810 dBm -20 dBm--30 dBm -40 dBm-M1 15012BM-11 and manufacture with -60 dBm--70 dBm-Start 1.0 MHz Stop 2.4 GHz 691 pts



Spectrun	n								
Ref Level Att	24.00 dBm 40 dB	Offset 1 SWT 2	.00 dB 👄 RE 26 ms 👄 VI	3W 100 kHz 3W 300 kHz		uto Sweep			
⊖1Pk Max									
20 dBm					M	1[1]	1		42.59 dBm 1.3235 GHz
10 dBm									
0 dBm									
-10 dBm—									
-20 dBm—	D1 -17.810	dBm							
-30 dBm									
-40 dBm—					1	ada a	M:		
weardem-	Mannahanna	United market	hannela	annahana	Hendynewy	Jun way	Marthe an an I	Munnerall	witch unfertune
-60 dBm—									
-70 dBm—									
Start 2.48	35 GHz			691	pts			Stop	25.0 GHz



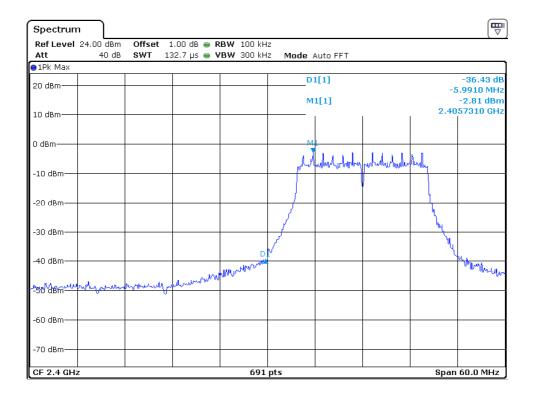


802.11g Channel 01 (2412MHz) Reference Level: -2.99dBm

Spectrun	n								
Ref Level Att	24.00 dBm 40 dB	Offset 1. SWT		3W 100 kHz 3W 300 kHz		uto FFT			(v)
⊖1Pk Max									
20 dBm					M	1[1]	I		-2.99 dBm 94808 GHz
10 dBm									
0 dBm								11	
-10 dBm	lang -	molund	montun	mentury	prelion	hundren	hinhur	Ing	
-20 dBm	<u></u>			4	/			l,	
-30 dBm	لمميهم							WWW	Ŋ
40 dBm-									WW WWW
-50 dBm									
-60 dBm—									
-70 dBm—									
CF 2.412 (GHz			691	pts			Span 24.6	5165 MHz
Spectrun Ref Level	n	Offset 1.	00 dB 😑 RE	3W 100 kHz					
Att	40 dB	SWT	24 ms 😑 🛛	3W 300 kHz	Mode A	uto Sweep			
●1Pk Max 20 dBm					м	1[1]			41.59 dBm 39830 GHz
10 dBm									55000 0112
0 dBm									
-10 dBm									
-20 dBm	D1 -22.990	dBm							
-30 dBm									
									M
-40 dBm									-1
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Spectrun	n								
Ref Level Att	24.00 dBm 40 dB	Offset 1. SWT 2:	00 dB 👄 RE 26 ms 👄 VE	3W 100 kHz 3W 300 kHz		uto Sweep			
🔵 1Pk Max									
20 dBm					M	1[1]	1		42.68 dBm 6.6095 GHz
10 dBm									
0 dBm									
-10 dBm—									
-20 dBm—	D1 -22.990	dBm							
-30 dBm—									
-40 dBm						M1	م المارية		
-40 aBm	wellenter	Www.www	unger	whentheyperter	nt-www.	hall and the second s	Plyhordrayro	Problement	withthe
-60 dBm									
-70 dBm									
Start 2.48	35 GHz	1		691	pts	1	1	Stop	25.0 GHz





Channel 06 (2437MHz) Reference Level: -2.96dBm

₽ Spectrum Ref Level 24.00 dBm Offset 1.00 dB 👄 RBW 100 kHz Att 40 dB SWT 56.9 µs 👄 **VBW** 300 kHz Mode Auto FFT ●1Pk Max M1[1] -2.96 dBm 20 dBm 2.4307110 GH 10 dBm 0 dBm Angenturator malunducaturation -10 dBm -20 dBm the second -30 dBmmay М ∬40 dBm -50 dBm -60 dBm--70 dBm-CF 2.437 GHz 691 pts Span 24.552 MHz Spectrum Ref Level 24.00 dBm Offset 1.00 dB 👄 RBW 100 kHz Att 40 dB SWT 24 ms 👄 **VBW** 300 kHz Mode Auto Sweep ⊖1Pk Max -48.22 dBm M1[1] 20 dBm 1.08590 GHz 10 dBm 0 dBm -10 dBm -20 dBm-D1 -22.960 dBm--30 dBm -40 dBm M1 50 dBmb -60 dBm -70 dBm-Start 1.0 MHz 691 pts Stop 2.4 GHz



Spectrun	n)								
Ref Level Att	24.00 dBm 40 dB	Offset 1. SWT 2	_	3W 100 kHz 3W 300 kHz		uto Sweep			
●1Pk Max									
20 dBm					M	1[1]	I		41.56 dBm 1.3895 GHz
10 dBm									
0 dBm									
-10 dBm									
-20 dBm	D1 -22.960	dBm							
-30 dBm									
-40 dBm							M		
~ 50°°dB m—	burnhow	hollowinght	mandertharra	warden	Maradrana	ununun	- Graden and	whither white	white
-60 dBm									
-70 dBm									
Start 2.48	35 GHz			691	pts			Stop	25.0 GHz

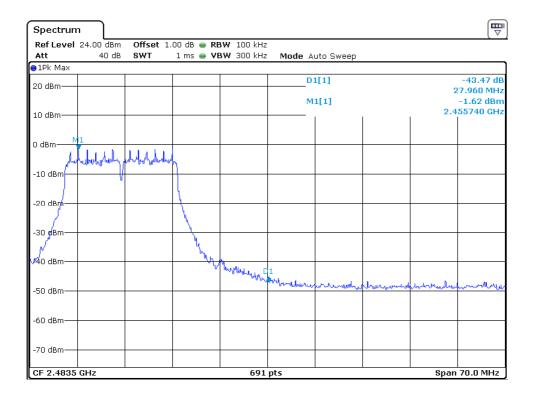


Channel 11 (2462MHz) Reference Level: -3.90dBm

₩ Spectrum Ref Level 24.00 dBm Offset 1.00 dB 👄 RBW 100 kHz Att 40 dB SWT 57 µs 👄 **VBW** 300 kHz Mode Auto FFT ⊖1Pk Ma× -3.90 dBm M1[1] 20 dBm 2.4557298 GH 10 dBm 0 dBm-Å meterstration Anutrenter hardree n.i -10 dBm -20 dBm W. -30 dBm myy Л^ъ 40 dBm -50 dBm -60 dBm -70 dBm-CF 2.462 GHz 691 pts Span 24.6165 MHz ₩ Spectrum Ref Level 24.00 dBm Offset 1.00 dB 🖷 RBW 100 kHz Att 40 dB SWT 24 ms 👄 **VBW** 300 kHz Mode Auto Sweep ⊖1Pk Ma× M1[1] -47.61 dBm 20 dBm-2.29060 GH 10 dBm 0 dBm--10 dBm -20 dBm-D1 -23.900.dBm--30 dBm -40 dBm-М1 L <mark>,</mark>50,d<mark>0m≁</mark> ر الل -60 dBm -70 dBm-Stop 2.4 GHz Start 1.0 MHz 691 pts



Spectrum									
Ref Level Att	24.00 dBm 40 dB	Offset 1. SWT 2	_	3W 100 kHz 3W 300 kHz	Mode A	uto Sweep			
⊖1Pk Max									
20 dBm					M	1[1]	1		42.14 dBm 9.6725 GHz
10 dBm									
0 dBm									
-10 dBm									
-20 dBm—									
-30 dBm—	D1 -23.900	dBm							
-40 dBm							M1		
Laboren	malidemonthall	mohudo	www.	monumulu	runderner	waynuund	number	arabanta	herefoldering
-60 dBm									
-70 dBm—									
Start 2.48	35 GHz	I		691	pts			Stop	25.0 GHz



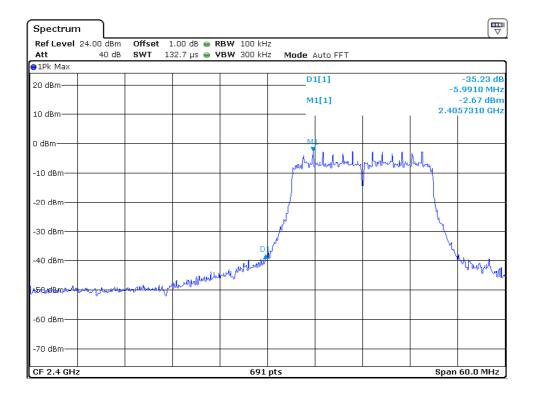


802.11n-HT20 Channel 01 (2412MHz) Reference Level: -2.74dBm

Spectrun	n								
Ref Level Att	24.00 dBm 40 dB		.00 dB 👄 RE 5.8 µs 👄 VE			uto FFT			
⊖1Pk Max	1		1						
20 dBm					M	1[1]	I	2.41	-2.74 dBm 94808 GHz
10 dBm									
0 dBm			1 .	o J	۸ N		A 1		
-10 dBm	pro	Mujulin	Jawkin	the have	paulinal	mollinVI	malant	uny y	
-20 dBm—				1	1			- <u>L</u>	
-30 dBm	poor the second							- ^W V	N-1
-40 dBm-									- Mulup
-50 dBm									
-60 dBm									
-70 dBm—									
CF 2.412 (
Spectrun				691	pts			Span 26.	<u>3745 MHz</u>
Spectrun			.00 dB 👄 RE 24 ms 👄 VE	3W 100 kHz		uto Sweep		Span 26.	
Spectrun Ref Level Att	n			3W 100 kHz	Mode A	uto Sweep			
Spectrun Ref Level Att 1Pk Max	n			3W 100 kHz	Mode A				(₩ 39.66 dBm
Spectrun Ref Level Att 1Pk Max 20 dBm	n			3W 100 kHz	Mode A				(₩ 39.66 dBm
Spectrun Ref Level Att 1Pk Max 20 dBm	n			3W 100 kHz	Mode A				(₩ 39.66 dBm
Spectrun Ref Level Att 1Pk Max 20 dBm	n	SWT		3W 100 kHz	Mode A				(₩ 39.66 dBm
Spectrun Ref Level Att 1Pk Max 20 dBm	n24.00 dBm40 dB	SWT		3W 100 kHz	Mode A				(₩ 39.66 dBm
Spectrum Ref Level Att 1Pk Max 20 dBm	n24.00 dBm40 dB	SWT		3W 100 kHz	Mode A				(₩ 39.66 dBm
Spectrum Ref Level Att 1Pk Max 20 dBm	n	SWT		3W 100 kHz	Mode A				(₩ 39.66 dBm
Spectrun Ref Level Att 10 dBm	n	SWT		3W 100 kHz 3W 300 kHz	Mode A				(₩ 39.66 dBm
Spectrun Ref Level Att 1Pk Max 20 dBm	n	SWT		3W 100 kHz 3W 300 kHz	Mode A				(₩ 39.66 dBm

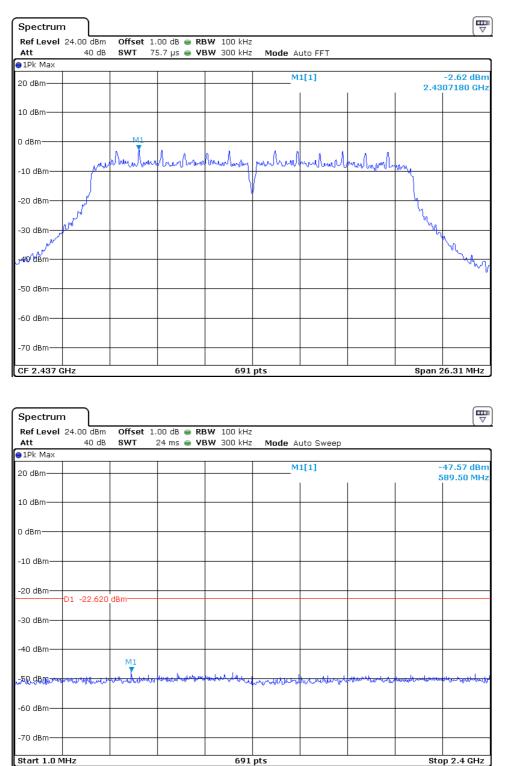


Spectrun	n								
Ref Level Att	24.00 dBm 40 dB	Offset 1. SWT 2	_	3W 100 kHz 3W 300 kHz		uto Sweep			
⊖1Pk Max									
20 dBm					M1[1] -42.22 19.7375				
10 dBm									
0 dBm									
-10 dBm									
-20 dBm	D1 -22.740	dBm							
-30 dBm									
-40 dBm—							M1		
₩90 ⁰ dBm	manufahilint	handrowsky	Winterstranely	productional Manual	droubur tour the	when have	MANN M.	Munulut	aly the second
-60 dBm									
-70 dBm									
Start 2.48	35 GHz			691	pts			Stop	25.0 GHz





Channel 06 (2437MHz) Reference Level: -2.62dBm

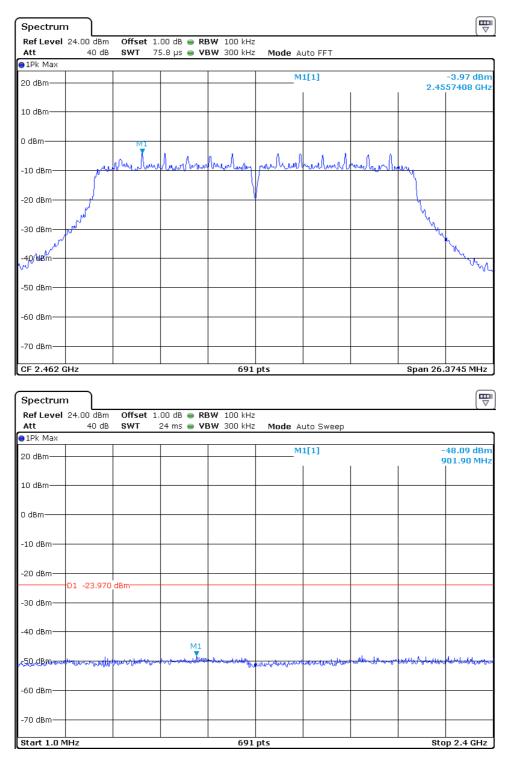




Spectrun	n								
Ref Level	24.00 dBm		.00 dB 😑 RE						
Att	40 dB	SWT 2	26 ms 😑 VE	3W 300 kHz	Mode A	uto Sweep			,
⊖1Pk Max	1		1						
20 dBm					M	1[1]	I		41.52 dBm).3565 GHz
10 dBm									
0 dBm									
-10 dBm									
-20 dBm	D1 -22.620	dBm							
-30 dBm									
-40 dBm							M.		
usortism-	Mulathand	hundrehn My	nade to have the	howenner	Manduktara	proversion	run Arne ve l	million	naunn
-60 dBm									
-70 dBm—									
Start 2.48	35 GHz			691	pts			Stop	25.0 GHz



Channel 11 (2462MHz) Reference Level: -3.97dBm





Mode Auto Sweep	
Hode Hate Smoop	
	-42.47 dBr
M1[1]	-42.47 dBr 19.7375 GH
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Mile and a divident (hilling a	monautherspelander
;	Stop 25.0 GHz
Mode Auto Sweep	
D1[1]	-43.44 d
M1[1]	15.400 MH -2.57 dBi
I	2.469520 GH
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	Mode Auto Sweep



Applicant: UBTECH ROBOTICS CORP Date of Test: 2 November 2017

Model: IPSWSTS

4.5 Out of Band Radiated Emissions (for emissions in 4.4 above that are less than 20dB below carrier), FCC Rule 15.247(d):

For out of band emissions that are close to or that exceed the 20dB attenuation requirement described in the specification, radiated measurements were performed at a 3m separation distance to determine whether these emissions complied with the general radiated emission requirement.

- [X] Not required, since all emissions are more than 20dB below fundamental
- [] See attached data sheet



Applicant: UBTECH ROBOTICS CORP Date of Test: 2 November 2017

Model: IPSWSTS

4.6 Transmitter Radiated Emissions in Restricted Bands, FCC Rule 15.35(b) (c):

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included. All measurements were performed with peak detection unless otherwise specified.

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.



Applicant: UBTECH ROBOTICS CORP Date of Test: 2 November 2017

Model: IPSWSTS

4.7 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD

Where FS = Field Strength in $dB\mu V/m$ RA = Receiver Amplitude (including preamplifier) in $dB\mu V$ CF = Cable Attenuation Factor in dB AF = Antenna Factor in dB AG = Amplifier Gain in dBPD = Pulse Desensitization in dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD

Example

Assume a receiver reading of 62.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB. The net field strength for comparison to the appropriate emission limit is 42 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

RA = 62.0 dB μ V AF = 7.4 dB CF = 1.6 dB AG = 29.0 dB PD = 0 dB FS = 62 + 7.4 + 1.6 - 29 + 0 = 42 dB μ V/m

Level in mV/m = Common Antilogarithm [(42 dB μ V/m)/20] = 125.9 μ V/m



Applicant: UBTECH ROBOTICS CORP Date of Test: 2 November 2017

Model: IPSWSTS

4.8 Radiated Spurious Emission

Worst Case Radiated Spurious Emission (802.11b-Channel 01) at 4824.0MHz is passed by 1.9dB margin.

For the electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated photos.pdf.



TEST REPORT

Intertek Report No.: SZHH01201042-005

Applicant: UBTECH ROBOTICS CORP Date of Test: 2 November 2017

Worst Case Operating Mode:

Model: IPSWSTS

Transmitting (802.11b-Channel 01)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	36.000	27.3	20.0	13.3	20.6	40.0	-19.4
Horizontal	41.000	24.8	20.0	15.7	20.5	40.0	-19.5
Horizontal	59.000	19.9	20.0	19.3	19.2	40.0	-20.8
Vertical	38.000	37.5	20.0	13.5	31.0	40.0	-9.0
Vertical	98.000	33.4	20.0	15.8	29.2	43.5	-14.3
Vertical	192.000	32.6	20.0	20.3	32.9	43.5	-10.6

NOTES: 1. Quasi-Peak detector is used for frequency below 1GHz.

- 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
- 3. Negative value in the margin column shows emission below limit.



Applicant: UBTECH ROBOTICS CORP Date of Test: 2 November 2017

Model: IPSWSTS

Worst Case Operating Mode:

Transmitting (802.11b-Channel 01)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	62.1	36.8	33.5	58.8	74.0	-15.2
Horizontal	*2390.000	57.3	36.4	29.1	50.0	74.0	-24.0

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	55.4	36.8	33.5	52.1	54.0	-1.9
Horizontal	*2390.000	39.1	36.4	29.1	31.8	54.0	-22.2

NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz/VBW=10Hz for average value.

- 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
- 3. Negative value in the margin column shows emission below limit.
- 4. Horn antenna used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.



Applicant: UBTECH ROBOTICS CORP Date of Test: 2 November 2017

Model: IPSWSTS

Worst Case Operating Mode:

Transmitting (802.11b-Channel 06)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	63.7	36.7	33.4	60.4	74.0	-13.6
Horizontal	*7311.000	61.7	36.6	35.8	60.9	74.0	-13.1

Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	54.6	36.7	33.4	51.3	54.0	-2.7
Horizontal	*7311.000	48.9	36.6	35.8	48.1	54.0	-5.9

- NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
 - 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 - 3. Negative value in the margin column shows emission below limit.
 - 4. Horn antenna used for the emission over 1000MHz.
 - * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.



Applicant: UBTECH ROBOTICS CORP Date of Test: 2 November 2017

Model: IPSWSTS

Worst Case Operating Mode:

Transmitting (802.11b-Channel 11)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	62.5	36.8	33.3	59.0	74.0	-15.0
Horizontal	*7386.50	64.3	36.7	33.2	60.8	74.0	-13.2
Horizontal	*2484.50	57.3	36.5	29.3	50.1	74.0	-23.9

Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	55.5	36.8	33.3	52.0	54.0	-2.0
Horizontal	*7386.50	51.3	36.7	33.2	47.8	54.0	-6.2
Horizontal	*2484.50	37.6	36.5	29.3	30.4	54.0	-23.6

NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.

- 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
- 3. Negative value in the margin column shows emission below limit.
- 4. Horn antenna used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.



Applicant: UBTECH ROBOTICS CORP Date of Test: 2 November 2017

Model: IPSWSTS

Worst Case Operating Mode:

Transmitting (802.11g-Channel 01)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	53.9	36.8	33.5	50.6	74.0	-23.4
Horizontal	*2390.000	57.4	36.4	29.1	50.1	74.0	-23.9

Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	39.3	36.8	33.5	36.0	54.0	-18.0
Horizontal	*2390.000	37.3	36.4	29.1	30.0	54.0	-24.0

NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz/VBW=10Hz for average value.

- 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
- 3. Negative value in the margin column shows emission below limit.
- 4. Horn antenna used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.



Applicant: UBTECH ROBOTICS CORP Date of Test: 2 November 2017

Model: IPSWSTS

Worst Case Operating Mode:

Transmitting (802.11g-Channel 06)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	54.2	36.7	33.4	50.9	74.0	-23.1
Horizontal	*7311.000	57.4	36.6	35.8	56.6	74.0	-17.4

Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	39.4	36.7	33.4	36.1	54.0	-17.9
Horizontal	*7311.000	42.8	36.6	35.8	42.0	54.0	-12.0

- NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
 - 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 - 3. Negative value in the margin column shows emission below limit.
 - 4. Horn antenna used for the emission over 1000MHz.
 - * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.



Applicant: UBTECH ROBOTICS CORP Date of Test: 2 November 2017

Worst Case Operating Mode:

*7386.50

*2484.50

Horizontal

Horizontal

45.5

38.0

Model: IPSWSTS

Transmitting (802.11g-Channel 11)

Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	54.6	36.8	33.3	51.1	74.0	-22.9
Horizontal	*7386.50	59.7	36.7	33.2	56.2	74.0	-17.8
Horizontal	*2484.50	57.6	36.5	29.3	50.4	74.0	-23.6
Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	39.7	36.8	33.3	36.2	54.0	-17.8

Radiated Emissions

NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.

36.7

36.5

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

33.2

29.3

42.0

30.8

54.0

54.0

-12.0

-23.2

- 3. Negative value in the margin column shows emission below limit.
- 4. Horn antenna used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.



Applicant: UBTECH ROBOTICS CORP Date of Test: 2 November 2017

Model: IPSWSTS

Worst Case Operating Mode:

Transmitting (802.11n20-Channel 01)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	54.8	36.8	33.5	51.5	74.0	-22.5
Horizontal	*2390.000	57.6	36.4	29.1	50.3	74.0	-23.7

Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4824.000	39.5	36.8	33.5	36.2	54.0	-17.8
Horizontal	*2390.000	37.9	36.4	29.1	30.6	54.0	-23.4

NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz/VBW=10Hz for average value.

- 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
- 3. Negative value in the margin column shows emission below limit.
- 4. Horn antenna used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.



Applicant: UBTECH ROBOTICS CORP Date of Test: 2 November 2017

Model: IPSWSTS

Worst Case Operating Mode:

Transmitting (802.11n20-Channel 06)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	54.1	36.7	33.4	50.8	74.0	-23.2
Horizontal	*7311.000	57.3	36.6	35.8	56.5	74.0	-17.5

Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4874.000	39.7	36.7	33.4	36.4	54.0	-17.6
Horizontal	*7311.000	43.2	36.6	35.8	42.4	54.0	-11.6

- NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
 - 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 - 3. Negative value in the margin column shows emission below limit.
 - 4. Horn antenna used for the emission over 1000MHz.
 - * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.



Applicant: UBTECH ROBOTICS CORP Date of Test: 2 November 2017

Model: IPSWSTS

Worst Case Operating Mode:

Transmitting (802.11n20-Channel 11)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	54.0	36.8	33.3	50.5	74.0	-23.5
Horizontal	*7386.50	59.9	36.7	33.2	56.4	74.0	-17.6
Horizontal	*2484.50	57.3	36.5	29.3	50.1	74.0	-23.9

Polarization	Frequency (MHz)	Reading (dBµV)	Pre- Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	*4924.000	39.4	36.8	33.3	35.9	54.0	-18.1
Horizontal	*7386.50	45.8	36.7	33.2	42.3	54.0	-11.7
Horizontal	*2484.50	37.9	36.5	29.3	30.7	54.0	-23.3

- NOTES: 1. Peak detector is used, RBW=1MHz/VBW=3MHz for peak value and RBW=1MHz / VBW=10Hz for average value.
 - 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 - 3. Negative value in the margin column shows emission below limit.
 - 4. Horn antenna used for the emission over 1000MHz.
 - * Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.



Applicant: UBTECH ROBOTICS CORP Date of Test: 2 November 2017

Model: IPSWSTS

- 4.9 Radiated Emissions from Digital Section of Transceiver, FCC Ref: 15.109
- [] Not required No digital part
- [] Test results are attached
- [x] Included in the separated report.



Applicant: UBTECH ROBOTICS CORP Date of Test: 2 November 2017

Model: IPSWSTS

4.10 Transmitter Duty Cycle Calculation and Measurements, FCC Rule 15.35(b), (c)

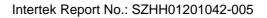
The EUT antenna output port was connected to the input of the spectrum analyzer. The analyzer center frequency was set to EUT RF channel carrier. The SWEP function on the analyzer was set to ZERO SPAN. The Transmitter ON time was determined from the resultant time-amplitude display:

		See attached spectrum analyzer chart (s) for Transmitter timing
		See Transmitter timing diagram provided by manufacturer
2	х	Not applicable, duty cycle was not used.



EXHIBIT 5

EQUIPMENT PHOTOGRAPHS





5.0 Equipment Photographs

For electronic filing, the photographs are saved with filename: external photos.pdf & internal photos.pdf.



EXHIBIT 6

PRODUCT LABELLING



6.0 Product Labeling

For electronic filing, the FCC ID label artwork and location is saved with filename: label.pdf.

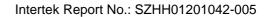




EXHIBIT 7

TECHNICAL SPECIFICATIONS



7.0 Technical Specifications

For electronic filing, the block diagram and circuit diagram are saved with filename: block.pdf and circuit.pdf respectively.

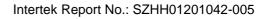




EXHIBIT 8

INSTRUCTION MANUAL



8.0 Instruction Manual

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.



EXHIBIT 9

CONFIDENTIALITY REQUEST



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9.0 Confidentiality Request

For electronic filing, the confidentiality request of the tested EUT is saved with filename: request.pdf.



EXHIBIT 10

MISCELLANEOUS INFORMATION



10.0 Discussion of Pulse Desensitization

The determination of pulse desensitivity was made in accordance with Hewlett Packard Application Note 150-2, *Spectrum Analysis ... Pulsed RF.*

Pulse desensitivity is not applicable for this device since the transmitter transmits the RF signal continuously.



EXHIBIT 11

TEST EQUIPMENT LIST



11.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ182-02	RF Power Meter	Anritsu	ML2496A	1302005	1-Jun-2017	1-Jun-2018
SZ182-02-01	Power Sensor	Anritsu	MA2411B	1207429	1-Jun-2017	1-Jun-2018
SZ061-12	BiConiLog Antenna	ETS	3142E	00166158	20-Sep-2017	20-Sep-2018
SZ185-01	EMI Receiver	R&S	ESCI	100547	9-Feb-2017	9-Feb-2018
SZ061-09	Horn Antenna	ETS	3115	00092346	17-Oct-2017	17-Oct-2018
SZ061-07	Pyramidal Horn Antenna	ETS	3160-09	00083067	16-Mar-2017	16-Mar-2018
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	26-May-2017	26-May-2018
SZ056-06	Spectrum Analyzer	R&S	FSV40	101101	7-Jul-2017	7-Jul-2018
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	9-Feb-2017	9-Feb-2018
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	16-Jan-2017	16-Jan-2019
SZ062-02	RF Cable	RADIALL	RG 213U		8-Jul-2017	8-Jan-2018
SZ062-05	RF Cable	RADIALL	0.04-26.5GHz		9-Sep-2017	9- Mar-2018
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz		9-Sep-2017	9- Mar-2018
SZ067-04	Notch Filter	Micro-Tronics	BRM50702-02		14-Jun-2017	14-Jun-2018