

# Test Report

Product Name	WHDI Tx Stick
Model No	WV400A
FCC ID	PPQ-WV400A

Applicant	LITE-ON Technology Corp.	
Address	4F, No.90, Chien 1 Rd., Chung-Ho, Taipei Hsien, Taiwan 235	

Date of Receipt	Sep. 16, 2011
Issued Date	Oct. 06, 2011
Report No.	119323R-RFUSP32V01
Report Version	V1.0

The test results relate only to the samples tested.

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# Test Report Certification

Issued Date: Oct. 06, 2011 Report No.: 119323R-RFUSP32V01



Product Name	WHDI Tx Stick		
Applicant	LITE-ON Technology Corp.		
Address	4F, No.90, Chien 1 Rd., Chung-Ho, Taipei Hsien, Taiwan 235		
Manufacturer	DONG GUAN G-COM COMPUTER CO., LTD.		
Model No.	WV400A		
FCC ID.	PPQ-WV400A		
EUT Rated Voltage	DC 5V (Power by USB)		
EUT Test Voltage	AC 120V/60Hz		
Trade Name	LITE-ON		
Applicable Standard	FCC CFR Title 47 Part 15 Subpart E: 2010		
	ANSI C63.4: 2009, FCC KDB-789033		
Test Result	Complied		

The Test Results relate only to the samples tested.

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Jinn Chen Documented By (Senior Adm. Specialist / Jinn Chen) Sabrina Tgai Tested By (Engineer / Sabrina Tsai) Approved By **Testing Laboratory** 0914 (Manager / Vincent Lin)

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## 1. GENERAL INFORMATION

## **1.1. EUT Description**

Product Name	WHDI Tx Stick	
Trade Name	LITE-ON	
FCC ID.	PPQ-WV400A	
Model No.	WV400A	
Frequency Range	20MHz-BW: 5180-5240MHz; 40MHz-BW: 5190-5230MHz	
Number of Channels	20MHz-BW: 4; 40MHz-BW: 2	
Data Speed	20MHz mode: 31.5Mbps, 40MHz mode: 63Mbps	
Channel Control	Auto	
Type of Modulation	OFDM	
Antenna type	Chip Antenna	
Antenna Gain	Refer to the table "Antenna List"	

#### Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	MAG.LAYERS	PCA-3216-5G0C1-A1	3dBi for 5GHz

Note: The antenna of EUT is conform to FCC 15.203

20MHz Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 36:	5180 MHz	Channel 40:	5200 MHz	Channel 44:	5220 MHz	Channel 48:	5240 MHz

40MHz Center Working Frequency of Each Channel:ChannelFrequencyChannel 38:5190 MHzChannel 46:5230 MHz

- 1. This device is a WHDI Tx Stick with a built-in and 5GHz WLAN transceiver.
- 2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
- 3. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart E for Unlicensed National Information Infrastructure devices.
- 4. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

## **1.2.** Operational Description

The EUT is a Full HD Video Wireless Transmitter Module with a built-in 5GHz transceiver, together with Full HD Video Wireless Receiver Module. It has a SIMO design of five channel and one slow rate output wireless channel, which generates an upstream channel for data content transmissions. The data modulation is OFDM, using five antennas to support 2(Transmit) \* 1(Receive) technology. The device only provided one transmitting speed 31.5Mbps in 20MHz bandwidth mode and 63Mbps in 40MHz bandwidth mode.

Presents the ultimate solution for converting any High Definition (HD) system, including Full HD, into a wireless one. These add-on modules enable wireless A/V applications that fit easily into the living room and eliminate traditional A/V wiring. The perfect HD video and audio quality and the high robustness are unmatched by any other wireless technology and present a true alternative to cable. The WHDI system transmits uncompressed video and audio streams wirelessly and thus simplifies and eliminates system issues, such as: lip-sync, large buffers and other burdens like retransmissions or error propagation.

The device can transmit audio and video signal to associate equipment, device will receive signal form associate equipment when associate equipment request change operation frequency. The AMN2120 WHDITM baseband transmitter chip is the heart of the WV400A WHDI transmitter module. The AMN2120 interfaces the A/V source through the WHDI connector. The AMN2120 includes an internal microcontroller for controlling the physical level. The AMN2120 is based on MIMO technology transmitting through up to four output channels. Four digital-to-analog converters and one analog-to-digital converter are embedded within the chip. The AMN2120 internal PLL accepts an input clock frequency of 40MHz. The input frequency is multiplied and then used as an internal system clock. The AMN2120 also generates a 10 MHz reference clock, derived from 40 MHz for general use.

The MAX2850 is a RF transmitter IC designed for 5GHz wireless HDMI applications. The IX includes all circuitry required to implement the complete 4-channel MIMO RF transmitter function and crystal oscillator, providing a fully integrated transmit path, VCO, frequency synthesis, and baseband/control interface. It includes a fast-setting, sigma-delta RF fractional synthesizer with 76Hz frequency programming step size. The IC also integrates on-chip I/Q amplitude and phases-error calibration circuits. Dynamic on/off control of four external Pas is implemented with programmable precision voltages. A 4-to-1 analog mux routes external PA power-detect voltages to the RSSI pin.

On-chip monolithic filters are included for transmitter I/Q baseband signal reconstruction to support both 20MHz and 40MHz RF channels. The baseband filtering and TX signal paths are optimized to meet stringent WHDI requirements. The upconverter local oscillator is coherent among all the transmitter channels.

Test Mode	Mode 1: Transmit - 20BW
	Mode 2: Transmit - 40BW

## **1.3.** Tested System Datails

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
(1)	Fixture	Lite-On	N/A	N/A	N/A
(2)	Notebook PC	DELL	PPT	N/A	N/A

	Signal Cable Type	Signal cable Description
А	Signal Cable	Non-Shielded, 0.2m
В	RS232 Cable	Shielded, 1.8m
С	USB Cable	Shielded, 1.0m

## **1.4.** Configuration of tested System



## **1.5. EUT Exercise Software**

- (1) Setup the EUT as shown in Section 1.4
- (2) Execute "APPcom" program on the Notebook.
- (3) Configure the test mode, the test channel, and the data rate.
- (4) Press "OK" to start the continuous Transmit.
- (5) Verify that the EUT works properly.

#### 1.6. **Test Facility**

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site : <u>http://www.quietek.com/tw/ctg/cts/accreditations.htm</u>

The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site : http://www.quietek.com/

Site Description: File on

Federal Communications Commission FCC Engineering Laboratory 7435 Oakland Mills Road Columbia, MD 21046 Registration Number: 92195

Accreditation on NVLAP NVLAP Lab Code: 200533-0





Site Name: Site Address:

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FCC Accreditation Number: TW1014



## 2. Conducted Emission

## 2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
Х	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2011	
Х	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2011	Peripherals
Х	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2011	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2011	EUT
Х	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2011	
	No.1 Shielded Room				

Note:

- 1. All equipments are calibrated every one year.
- 2. The test instruments marked by "X" are used to measure the final test results.

## 2.2. Test Setup



## 2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit										
Frequency	Lin	nits								
MHz	QP	AV								
0.15 - 0.50	66-56	56-46								
0.50-5.0	56	46								
5.0 - 30	60	50								

Remarks : In the above table, the tighter limit applies at the band edges.

## 2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2009 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

The EUT was setup to ANSI C63.4, 2009; tested to DTS test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

## 2.5. Uncertainty

± 2.26 dB

## 2.6. Test Result of Conducted Emission

Product	:	WHDI Tx Stick
Test Item	:	Conducted Emission Test
Power Line	:	Line 1
Test Mode	:	Mode 2: Transmit - 40BW (5190MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV	dB	dBuV
LINE 1					
Quasi-Peak					
0.166	9.724	41.320	51.044	-14.499	65.543
0.263	9.662	29.820	39.482	-23.289	62.771
0.373	9.650	31.160	40.810	-18.819	59.629
0.736	9.661	37.080	46.742	-9.258	56.000
2.767	9.704	11.460	21.164	-34.836	56.000
7.107	9.756	10.080	19.836	-40.164	60.000
Average					
0.166	9.724	24.870	34.594	-20.949	55.543
0.263	9.662	14.110	23.772	-28.999	52.771
0.373	9.650	10.460	20.110	-29.519	49.629
0.736	9.661	27.860	37.522	-8.478	46.000
2.767	9.704	5.450	15.154	-30.846	46.000
7.107	9.756	4.280	14.036	-35.964	50.000

- 1. All Reading Levels are Quasi-Peak and average value.
- 2. "means the worst emission level.
- 3. Measurement Level = Reading Level + Correct Factor

Product	: WHDI Tx Stick									
Test Item	: Conducted Emission Test									
Power Line	<ul> <li>: Line 2</li> <li>: Mode 2: Transmit - 40BW (5190MHz)</li> </ul>									
Test Mode										
Frequency	Correct	Reading	Measurement	Margin	Limit					
	Factor	Level	Level							
MHz	dB	dBuV	dBuV	dB	dBuV					
LINE 2										
Quasi-Peak										
0.162	9.727	39.120	48.847	-16.810	65.657					
0.209	9.692	34.960	44.651	-19.663	64.314					
0.341	9.650	29.120	38.770	-21.773	60.543					
0.502	9.650	25.280	34.930	-21.070	56.000					
0.685	9.650	35.900	45.550	-10.450	56.000					
6.287	9.754	7.060	16.814	-43.186	60.000					
Average										
0.162	9.727	25.640	35.367	-20.290	55.657					
0.209	9.692	16.800	26.491	-27.823	54.314					
0.341	9.650	13.300	22.950	-27.593	50.543					
0.502	9.650	13.450	23.100	-22.900	46.000					
0.685	9.650	27.390	37.040	-8.960	46.000					
6.287	9.754	0.200	9.954	-40.046	50.000					

- 1. All Reading Levels are Quasi-Peak and average value.
- " " means the worst emission level. 2.
- 3. Measurement Level = Reading Level + Correct Factor

## 3. Peak Transmit Power

## **3.1.** Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Х	Power Meter	Anritsu	ML2495A/6K00003357	May, 2011
Х	Power Sensor	Anritsu	MA2411B/0738448	Jun, 2011
Х	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2011
<b>Ъ</b> Т /				

Note:

1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

2. The test instruments marked with "X" are used to measure the final test results.

## 3.2. Test Setup

#### 26dBc Occupied Bandwidth



#### **Conduction Power Measurement**



## 3.3. Limits

- (1) For the band 5.15-5.25 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antenna of directional gain greater than 6 dBi are used, the peak transmit power shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.
- (2) For the band 5.25-5.35 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antenna of directional gain greater than 6 dBi are used, the peak transmit power shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.
- (3) For the band 5.725-5.825 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 1W or 17 dBm + 10log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antenna of directional gain greater than 6 dBi are used, the peak transmit power shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.

## 3.4. Test Procedur

As an alternative to FCC KDB-789033, the EUT peak power was measured with a peak power meter employing a video bandwidth greater than 6dB BW of the emission under test. Peak output power was read directly from the meter across all data rates, and across three channels within each sub-band. Special care was used to make sure that the EUT was transmitting in continuous mode. This method exceeds the limitations of FCC KDB-789033, and provides more accurate measurements.

## 3.5. Uncertainty

± 1.27 dB

## 3.6. Test Result of Peak Transmit Power

Product	:	WHDI Tx Stick
Test Item	:	Peak Transmit Power
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit - 20BW

#### Peak Transmit Power Measurement: (CHAIN A+B)

Channel Number	Frequency	26dB Bandwidth	Chain A Power	Chain B Power	Chain A+B Power	Output Power Limit	
	(MHz)	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	dBm+10log(BW)
36	5180	19.480	1.21	0.21	3.75	17	16.90
44	5220	19.440	0.37	0.25	3.32	17	16.89
48	5240	19.500	0.13	0.06	3.11	17	16.90

- 1. Power Output Value =Reading value on peak power meter + cable loss
- 2. Output Power (dBm) = 10\*LOG (Chain A Power (mW)+ Chain B Power (mW))
- 3. 26 dB Bandwidth is the bandwidth of chain A or chain B whichever is less bandwidth, output power limitation is more stringent.

#### 26dBc Occupied Bandwidth:

#### Channel 36 - Chain A



#### Channel 44 - Chain A

Agilent Spectrum Analyzer - Swep	ot SA				
50 Ω Center Freg 5.2200000	AC SEN	Avg Type:	LIGNAUTO 01:37:21 Log-Pwr TRA	PM Sep 29, 2011 CE 1 2 3 4 5 6	Frequency
Input: I	RF PNO: Fast 🖵 Trig: Free IFGain:Low Atten: 20	Run Avg Hold:3 dB	<sup>33/100</sup> Mkr1 5.218	70 GHz	Auto Tune
10 dB/div Ref 10.00 dBr	n		-1.3	51 dBm	
0.00	1 MM MMM MM	My why why			Center Freq 5.220000000 GHz
-10.0					Start Freq
-30.0			-26.00 dB 19.44 MHz		Stop Freg
-40.0	Likian		home .		5.245000000 GHz
-50.0			"" Webart Balto Shiney a	Harry Haw	CF Step 5.000000 MHz <u>Auto</u> Man
-70.0					Freq Offset 0 Hz
-80.0					
Center 5.22000 GHz #Res BW 300 kHz	#VBW 1.0 MHz	#	Span Sweep 500 ms	50.00 MHz (1001 pts)	
MSG			STATUS		

D Agilen	t Spectrum Ar	nalyzer - S	wept SA		-	1.5					
w Cente	50 Ω r Freq 5	.24000	00000 G	iHz	AC SEI	NSE:INT	Avg Type	ALIGNAUTO	01:38:52 Pf TRAC	M Sep 29, 2011	Frequency
10 dB/d	liv Ref	Inp 10.00 d	IBm	NO: Fast ( Gain:Low	Atten: 20	dB		Mkr	1 5.241 -1.58	35 GHz 31 dBm	Auto Tune
0.00				MM	May	Mart	᠕᠋ᡅᠰᡢ				Center Freq 5.240000000 GHz
-10.0								-26.00 c	B		Start Freq 5.215000000 GHz
-30.0			/	•/ /				19.54 N	AHz		<b>Stop Freq</b> 5.265000000 GHz
-50.0 -60.0 <mark>M</mark>	MMMM	lange pa <sup>l</sup> ti	dige that provided					Windship	nt. Mais Il Monorauth		CF Step 5.000000 MHz <u>Auto</u> Man
-70.0 —											Freq Offset 0 Hz
Center	r 5.24000 3W 300 ki	GHz Hz		#VBW	1.0 MHz			#Sweep	Span 5 500 ms (	0.00 MHz 1001 pts)	
MSG								STATUS	5		0

#### Channel 48 - Chain A

D Agile	nt Spectrum Analyzer - S	iwept SA		22			<u></u>		
Cente	50 Ω er Freq 5.1800	00000 GHz	AC SI	ENSE:INT	Avg Typ	e: Log-Pwr	01:36:21PM TRACE	Sep 29, 2011 1 2 3 4 5 6	Frequency
	Ing	out: RF PNO: Fast IFGain:Low	Atten: 20	e Run ) dB	AvgiHold	Mkr	1 5.178 1	5 GHz	Auto Tune
	'div Ref 10.00 c	IBm	<b>▲</b> 1				-1.14	8 aBm	Center Freq
-10.00		MM	home	myun	Wyrny	2			5.180000000 GHz
-20.0				V					<b>Start Freq</b> 5.155000000 GHz
-30.0 —						-26.00 c 19.54 N	IB AHz		Stop Freq
-40.0 —	- way all the stand	hy why have				Munik under schlip-	44444PM	<sup>d</sup> nath	5.205000000 GHz
-50.0 P								····	CF Step 5.000000 MHz Auto Man
-60.0 —									
-70.0 —									Freq Offset
-80.0 —									
L Cente #Res	er 5.18000 GHz BW 300 kHz	#V	BW 1.0 MHz	:		#Sweep	Span 50 500 ms (1	.00 MHz 001 pts)	
MSG						STATU	5		

## Channel 36 - Chain B

Channel 44 - Chain B

🗊 Agilo	ent Spectrum	Analyzer - S	Swept SA								
	50	Ω E 4000		4	AC SE	NSE:INT	Ava Typ		01:36:21P	M Sep 29, 2011	Frequency
Cent	ler Freq	5.16000	DUCUUUUU Dut: RF PN IFG	⊓Z IO: Fast  ⊊ Gain:Low	Trig: Free Atten: 20	Run dB	Avg Hold	: 32/100	TYI		Auto Tup
10 dB	Vdiv Re	f 10.00 c	IBm			2		Mkr	1 5.178 -1.1	15 GHz 48 dBm	Auto Tun
					£1						Center Fre
0.00				MMM	min	Mar	m	0		· · · · · · · · · · · · · · · · · · ·	5.180000000 GH
10.0				Y			P {				Start Fre
20.0	0			}				-26.00 c	в		5.155000000 GH
30.0								19.54 N	Hz		Stop Fre
40.0	at his	hiles the second second	hp. w. h. polle	<u>.</u>			5 C	Municipality	h had a how had		5.205000000 GH
50.0	MMMMII	44.11		-					a site and		CF Ste
60.0											5.000000 MH <u>Auto</u> Ma
70.0											Freg Offs
.0.0											0+
80.0											
L Cent	er 5.1800	0 GHz		#\/B\M	1 0 MH-		1	#Swoon	Span 5	0.00 MHz	
Res	9 DVV 300	NTIZ		#VDVV				#oweep	Jon us (	ioo i pisj	

				Chan	nci 40	Chai				
💴 Agilent S	pectrum Analyzer	Swept SA								
x Center	50 Ω Freg 5.2400	000000 G	Hz	AC SE	NSE:INT	Avg Typ	ALIGNAUTO e: Log-Pwr	01:38:20 P	M Sep 29, 2011	Frequency
		nput: RF PI IF(	10: Fast 🖵 Gain:Low	Trig: Free Atten: 20	e Run dB	Avg Hold	d: 35/100 Mkr	1 5.238	15 GHz	Auto Tune
0 dB/div	Ref 10.00	dBm	·02		S	0.		-1.9	90 dBm	
0.00				∳ <sup>1</sup>						Center Freq 5.240000000 GHz
10.0			mm	why my	m	mm				
-20.0										<b>Start Freq</b> 5.215000000 GHz
30.0			ĺ				-26.00 d	В		
-40.0	alikai	alled a left and the					19.50 W	HZ		<b>Stop Freq</b> 5.26500000 GHz
-50.0	~~Alotta, dutoutanta, a	~m·~					Ուտեւ	whether fillent	mul a	CF Step
-60.0										Auto Man
-70.0		*			P					Freq Offset
-80.0										0112
Center : #Res B\	5.24000 GHz N 300 kHz		#VBW	1.0 MHz			#Sweep	Span 5 500 ms (	0.00 MHz 1001 pts)	
MSG							STATUS			

Channel 48 - Chain B

Product	:	WHDI Tx Stick
Test Item	:	Peak Transmit Power
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit - 40BW

#### Peak Transmit Power Measurement: (CHAIN A+B)

Channel Number	Frequency	26dB Bandwidth	Chain A Power	Chain B Power	Chain A+B Power	Outp	out Power Limit
	(MHz)	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	dBm+10log(BW)
38	5190	39.120	-3.42	-3.47	-0.43	17	19.92
46	5230	39.070	-2.72	-2.04	0.64	17	19.92

Note:

1. Power Output Value =Reading value on peak power meter + cable loss

2. Output Power (dBm) = 10\*LOG (Chain A Power (mW)+ Chain B Power (mW))

3. 26 dB Bandwidth is the bandwidth of chain A or chain B whichever is less bandwidth, output power limitation is more stringent.

## 26dBc Occupied Bandwidth:

## Channel 38 – Chain A

D Agilent	🗊 Agilent Spectrum Analyzer - Swept SA 📃 🗖 🔀										
₩ Center	50 Ω Freq 5	.1900	00000	GHz	C SE		Avg Type Avg Hold	ALIGNAUTO : Log-Pwr 38/100	01:34:19F	M Sep 29, 2011	Frequency
10 dB/div	v Ref	וחן 10.00 נ	JBm	PNO: Fast C	Atten: 20	dB		Mkr	1 5.204 -10.3	15 GHz 34 dBm	Auto Tune
0.00									1	· · · ·	Center Freq 5.190000000 GHz
-10.0		aarruuluu vilad	phulimutai	hyprastronter Maria	ed. Arnet yorkelly	photometer	ar allow hat the	, rollificieur phosilith	profit party		<b>Start Freq</b> 5.165000000 GHz
-30.0	_							-20 39.1	6.00 dB	-	<b>Stop Freq</b> 5.215000000 GHz
-50.0 -60.0	ju M									Winnels.	CF Step 5.000000 MHz <u>Auto</u> Man
-70.0											Freq Offset 0 Hz
Center #Res B	5.19000 W 300 k	GHz Hz		#VBW	1.0 MHz			#Sweep	Span 5 500 ms (	0.00 MHz 1001 pts)	
MSG								STATUS			

#### Channel 46 – Chain A

DAgilent Spectrum	Analyzer - S	wept SA						22	i i	
Center Freq	2 5.23000	00000 GI	Hz A		NSE:INT	Avg Type	ALIGNAUTO : Log-Pwr	01:33:44 P	M Sep 29, 2011	Frequency
	Inp	ut: RF PN IFG	IO: Fast 😱 ain:Low	Trig: Free Atten: 20	dB	Avg Hold:	43/100 Mkr	1 5.244	15 GHz	Auto Tune
	10.00 d	IBM						1		Center Frec 5.230000000 GHz
-10.0	ularinandir Vilina 	p <sup>an</sup> nthadhatha	AND VIE VIEW	thining the	phatherenethelin	whythermouth		กระจะสมใจภาพระป		Start Free 5.205000000 GH
-30.0							-20 39.0	3.00 dB 27 MHz	-	Stop Free 5.255000000 GH
-50.0									L Lucharly	CF Stej 5.000000 MH <u>Auto</u> Ma
-70.0										Freq Offse 0 H
-80.0	0.047							Snon 5	0.00 MHz	
#Res BW 300	kHz		#VBW	1.0 MHz			#Sweep	500 ms (	1001 pts)	
MSG							STATUS	;		

💵 Agilent Spectrun	n Analyzer - Swi	ept SA		- 59						
SO Center Freq	Ω 5.190000	0000 GH	م اz	: SE	NSE:INT	Avg Type	ALIGN AUTO	01:34:49 P	M Sep 29, 2011 E 1 2 3 4 5 6	Frequency
10 dB/div <b>R</b> €	Input ef 10.00 d <b>E</b>	: RF PN IFG	0: Fast 😱 ain:Low	Atten: 20	dB	Avg Hold:	Mkr	1 5.185 -11.29	50 GHz 95 dBm	Auto Tune
				1						Center Free 5.190000000 GH
-10.0	p-J-WWWWanger	willhululuse and	halan an the start	hellin Hope and	phylogikastant and an	prin, bitwama ya yilan	Minumundi	nurullaugu		Start Fre 5.165000000 GH
-30.0							-21 39.1	5.00 dB		Stop Fre 5.215000000 GH
50.0 60.0									Munipelle	CF Ste 5.000000 MH <u>Auto</u> Ma
70.0										Freq Offso
-80.0										
Center 5.1900 #Res BW 300	00 GHz kHz		#VBW	1.0 MHz			#Sweep	Span 5 500 ms (	0.00 MHz 1001 pts)	
4SG							STATUS			

Channel 38 – Chain B

Channel 46 – Chain B

Agilent Spect	rum Analyzer - S	Swept SA								
× Center Fre	50Ω cq 5.2300	00000 G	Hz	.C   SEI		Avg Type	ALIGN AUTO	01:33:03 P TRAC	M Sep 29, 2011 E 1 2 3 4 5 6	Frequency
10 dB/div	Ref 10.00 c	iBm	io: Fast 🍙 Sain:Low	Atten: 20	dB		Mkr	1 5.244 -11.5	20 GHz 94 dBm	Auto Tun
0.00								1	· · · · · ·	Center Fre 5.230000000 GH
20.0	un Marine	fulkultyritherity	Maria	Nanhawa	Northermetry	<sub>ศ</sub> นุณพ <sub>ัต</sub> มใ <sub>ป</sub>	r like manife	ุศ <sub>าส</sub> าหป <sub>ัดสราส</sub> กุ		Start Fre 5.205000000 GH
40.0	¥						-20 -20	3.00 dB		<b>Stop Fre</b> 5.255000000 GH
50.0 60.0	/									CF Ste 5.00000 Mi <u>Auto</u> Mi
70.0										Freq Offs 0 F
Center 5.23 #Res BW 3	8000 GHz 00 kHz		#VBW	1.0 MHz			#Sweep	Span 5 500 ms (	0.00 MHz 1001 pts)	
ISG							STATUS			

## 4. Peak Power Spectral Density

## 4.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2011
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2011
Х	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr, 2011

Note:

- 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
- 2. The test instruments marked with "X" are used to measure the final test results.

## 4.2. Test Setup



## 4.3. Limits

- (1) For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. If transmitting antenna of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.
- (2) For the band 5.25-5.35 GHz, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band. If transmitting antenna of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.
- (3) For the band 5.725-5.825 GHz, the peak power spectral density shall not exceed 17 dBm in any 1-MHz band. If transmitting antenna of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.

## 4.4. Test Procedure

The EUT was setup to ANSI C63.4, 2009; tested to DTS test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

## 4.5. Uncertainty

± 1.27 dB

## 4.6. Test Result of Peak Power Spectral Density

Product	:	WHDI Tx Stick
Test Item	:	Peak Power Spectral Density
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit - 20BW

Channel Number	Frequency (MHz)	Chain AChain BPowerPower(dBm)(dBm)		Chain A+B Power (dBm)	Required Limit (dBm)	Result
36	5180	-14.852	-14.570	-11.698	<4	Pass
44	5220	-15.185	-15.164	-12.164	<4	Pass
48	5240	-15.330	-15.393	-12.351	<4	Pass

Note:

1. Measurement Level (dBm) = 10LOG (Chain A Power (mW)+ Chain B Power (mW))

D Agi	🛛 Agilent Spectrum Analyzer - Swept SA											
Cen	50 ter Freq	Ω 5.1800	00000 G	⊢ Hz	IC SEM	ISE:INT	Avg Type	ALIGN AUTO	01:19:31 P	M Sep 29, 2011 E 1 2 3 4 5 6	Frequency	
		Inț	out: RF PI IF(	NO: Fast 😱 Gain:Low	Atten: 20	dB	AvgiHold:	>100/100	DE		Auto Tuno	
10 dE	3/div <b>Re</b>	f 10.00 c	IBm	10)				Mkr1	5.178 4 -14.8	00 GHz 52 dBm	Auto Tune	
Log											Center Freq	
0.00				2							5.180000000 GHz	
-10.0					<b>→</b> <sup>1</sup>			-			Start Freq	
-20.0		1 month	n-forderstand	Prindly and a second	and the second sec	horal and a state of the second se	andry,happlannay.l	<sub>የሚ</sub> ለምረም የ	white many		5.167500000 GHz	
-30.0		[							<u>ا</u> ر			
	ļ	ſ									Stop Freq 5.192500000 GHz	
-40.0	Í									\		
-50.0		e							0	1	CF Step 2.500000 MHz	
-60.0	AN AND									Mumuhan	<u>Auto</u> Man	
-70.0								-			Freq Offset	
											0 Hz	
-80.0												
Center 5.18000 GHz Span 25.00 MHz												
#Res	s BW 1.0	MHz		#VBW	3.0 MHz			#Sweep	500 ms (	1001 pts)	I	
NOG								STATU	2			

Channel 36 – Chain A

Channel 44 – Chain A

🎾 Agi	lent Spectrum	Analyzer - S	iwept SA								
₩ Cen	50 ter Freq	Ω 5.2200	00000 G	) Hz	AC SEI	VSE:INT	Avg Type	ALIGNAUTO	01:24:45P	M Sep 29, 2011 E 1 2 3 4 5 6	Frequency
10 dE	3/div <b>R</b> e	հոր 10.00 c	l <b>Bm</b>	PNO: Fast 🕞 Gain:Low	Atten: 20	dB	Avg Hold	->100/100 Mkr1	5.221 6 -15.11	50 GHz 85 dBm	Auto Tune
0.00											Center Freq 5.220000000 GHz
-10.0 -20.0		and the second second	<sup>৵৽৸</sup> ৻৻ <sub>ঀ</sub> ৻৻৻৵৽৽৾৻৶৻ঢ়ঀ	rt Manufrancesso	were the first of the second	And Marine Marine	ward and all all the second	-guadayannahula	serious (Marka		Start Freq 5.207500000 GHz
-30.0 -40.0		/									<b>Stop Freq</b> 5.232500000 GHz
-50.0											CF Step 2.500000 MHz <u>Auto</u> Man
-70.0	Jan Andrews				-					" Marker	Freq Offset 0 Hz
-80.0 Cen	ter 5.2200	)0 GHz MHz		#\/B\A	3.0 MHz			#Sween	Span 2	5.00 MHz	
MSG	3 644 1.0	141112		# ¥ D¥¥	5.0 10112			STATUS	300 1113 (	1001 pts)	

-			and the second								
Agi Agi	ilent Spectr	um Analyzer -	Swept SA								
LXI		50 Ω		/	AC SEI	VSE:INT		ALIGNAUTO	01:25:50 PM	4 Sep 29, 2011	Frequency
Cen	iter Fre	q 5.2400	00000 G put: RF F IF	iHZ NO: Fast 🖵 Gain:Low	Trig: Free Atten: 20	Run dB	Avg Typ Avg Hold	e: Log-Pwr  >100/100	TYP	E A WWWWW T S N N N N N	. roquonoj
10 dl	B/div <b>F</b>	Ref 10.00 (	dBm					Mkr1	5.235 6 -15.33	50 GHz 30 dBm	Auto Tune
Log											Center Freq
-10.0				<b>1</b>							
-20.0		and and the second s	manulation	where the states of the states	ANT - LAND BOTH TO THE OWNER OF	whiterman	ning and the second	monumental	m Jordan Mark		Start Freq 5.227500000 GHz
-30.0		f							<u>۲</u>		Stop Freg
-40.0		/							۲ ۲		5.252500000 GHz
-50.0		(								$\left\{ - \right\}$	CF Step 2.500000 MHz
-60.0	Lawy W									White the state of	<u>Auto</u> Man
-70.0					1						Freq Offset 0 Hz
-80.0											
Cen #Re	L ter 5.24 s BW 1.	000 GHz 0 MHz		#VBW	3.0 MHz		1	#Sweep	Span 2: 500 ms (*	5.00 MHz	
MSG								STATU	s		

#### Channel 48 – Chain A

D Agi	lent Spectrum	Analyzer - S	Swept SA								
₩ Cen	50 s ter Freq	2 5.1800	00000 G	⊢ Hz		ISE:INT	Avg Type	ALIGNAUTO	01:22:16 PM TRACI	4 Sep 29, 2011 E 1 2 3 4 5 6	Frequency
		Inj	out: RF P IF	NO: Fast 😱 Gain:Low	Atten: 20	dB	Avginoid	Mkr1	5 181 2	50 GHz	Auto Tune
10 dE Log	B/div Rel	f 10.00 a	Bm						-14.57	70 dBm	
0.00											Center Freq
0.00											5.180000000 GHz
-10.0			ata hu u u	a martine		1- 1-					Start Freq
-20.0		- And a state of the state of t	11.11 Manh 44	an	and a second second	M	and and a line second of	A Shu a sea la bard	- Servin Au		5.167500000 GHz
-30.0		[				-					Stop Freg
-40.0									1		5.192500000 GHz
70.0	1									\	CE Sten
-30.0	An altraction									What	2.500000 MHz Auto Man
-60.0	Abbur .									10000	
-70.0											Freq Offset
-80.0											
Cen #Re	ter 5.1800 s BW 1.0 I	0 GHz MHz		#VBW	3.0 MHz			#Sweep	Span 2: 500 ms (1	5.00 MHz 1001 pts)	
MSG								STATU	5		

Channel 36 – Chain B

#### Channel 44 – Chain B



D Agi	lent Spectrum A	nalyzer - S	owept SA								
uv Cen	ter Freq t	5.2400	00000 G	Hz	C SET	Run	Avg Type Avg Hold	ALIGNAUTO : Log-Pwr :>100/100	01:26:56 Pl TRAC TYP	M Sep 29, 2011 E 1 2 3 4 5 6 E A WWWWW	Frequency
		t	IF	Gain:Low	Atten: 20	dB	1.77	Mkr1	5.243 7	25 GHz	Auto Tune
10 dE Log	3/div <b>Ref</b>	10.00 c	IBm				_		-15.39	93 dBm	
0.00				0							Center Freq 5.24000000 GHz
-10.0				0			<b>_</b> _1				
-20.0		an and the second	Www.angmu	alianteraliter	ulitical and a start	when previous	manager and the story	Los an	work when		Start Freq 5.227500000 GHz
-30.0	/	/				-			NA L		Stop Frog
-40.0	/										5.252500000 GHz
-50.0	/										CF Step
-60.0	chringh William									Mulphine	2.500000 MHz Auto Man
-70.0											Freq Offset
-80.0											0 Hz
Cent #Res	ter 5.24000 s BW 1.0 N	) GHz IHz		#VBW	3.0 MHz			#Sweep	Span 2 500 ms (	5.00 MHz 1001 pts)	
MSG								STATUS	5		

#### Channel 48 – Chain B

Product	:	WHDI Tx Stick
Test Item	:	Peak Power Spectral Density
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit - 40BW

Channel Number	Frequency (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Chain A+B Power (dBm)	Required Limit (dBm)	Result
38	5190	-20.935	-21.899	-18.380	<4	Pass
46	5230	-21.339	-22.487	-18.865	<4	Pass

1. Measurement Level (dBm) = 10LOG (Chain A Power (mW)+ Chain B Power (mW))

D Agil	lent Spectrun	n Analyzer - S	owept SA								
ux Cent	50 ter Freq	Ω 5.1900	00000 G	⊢z	C SEM		Avg Type AvalHold:	ALIGNAUTO : Log-Pwr >100/100	01:29:35 P TRAC TYP	M Sep 29, 2011 E 1 2 3 4 5 6 E A WWWWW	Frequency
		Int	JUC RF PI	iain:Low	Atten: 20	dB		Mkr	1 5.194	60 GHz	Auto Tune
10 dE Log	3/div <b>R</b> €	ef 10.00 c	IBm						-20.9	so abm	
0.00											Center Freq 5.19000000 GHz
-10.0							1				Start Freq
-20.0		الاردى.	11 W Wardshare	, the add of the grant of the	Nuplemetry R.	una trine ver	4		-	<u>.</u>	5.165000000 GHz
-30.0		J						•	H H		<b>Stop Freq</b> 5.215000000 GHz
-40.0									Ì		CF Step
-60.0	]									Į	5.000000 MHz <u>Auto</u> Man
-70.0	younger the provid									Mary Herenard	Freq Offset
-80.0											0 Hz
#Res	s BW 1.0	UU GHZ MHZ		#VBW	3.0 MHz			#Sweep	span 5 500 ms (	0.00 MHz 1001 pts)	
MSG								STATUS	5		

Channel 38 – Chain A

#### Channel 46 – Chain A

🗊 Agi	lent Spectrum	Analyzer -	Swept SA								
w Cen	50 ter Freq	Ω 5.2300	00000	GHz	AC SE	NSE:INT	Avg Type	ALIGNAUTO	01:30:53P TRAC	M Sep 29, 2011 E 1 2 3 4 5 6	Frequency
10 dE	3/div <b>Re</b>	וח f 10.00 (	put: RF d <b>Bm</b>	PNO: Fast G IFGain:Low	Atten: 20	dB	Avg Hold:	Mkr	1 5.215 -21.3	95 GHz 39 dBm	Auto Tune
0.00											Center Freq 5.230000000 GHz
-10.0 -20.0		water	A1	~L.1.~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m the second	مەربىلەر مەربىلەر يەلىرى	ل المرياسة. 10 يواليون	and mitting of the	Address A.L.		Start Freq 5.205000000 GHz
-30.0 -40.0				1997/~ · · · ·							<b>Stop Freq</b> 5.255000000 GHz
-50.0											CF Step 5.000000 MHz <u>Auto</u> Man
-70.0	tinkunanyound									Shill Marting Lag	Freq Offset 0 Hz
-80.0 Cent #Res	ter 5.2300 s BW 1.0	00 GHz MHz		#VB\	W 3.0 MHz			#Sweep	Span 5 500 ms (	0.00 MHz 1001 pts)	
MSG								STATUS	-		

D Agil	lent Spectrum	1 Analyzer - S	owept SA			12			890 -		
Cent	50 ter Freq	Ω 5.1900	00000 GI	Hz A		VSE:INT	Avg Type	ALIGNAUTO : Log-Pwr	01:28:31P TRAC	M Sep 29, 2011 E 1 2 3 4 5 6	Frequency
		Inj	out: RF PI IFC	10: Fast 😱 Gain:Low	Atten: 20	dB	Avg Hold:	>100/100			Auto Tune
10 dE	3/div Re	ef 10.00 c	IBm					IVIKI	-21.8	50 GHZ 99 dBm	
											Center Freq
0.00											5.19000000 GHz
-10.0									-		Start Eren
-20.0							1				5.165000000 GHz
		M WAT LAN	/***Ydr#Traeyak	aliter of the state of the stat	rhan watariliphaphan	Walter Marthan	Uppinglassing landsom	manynan	Mayler S. Arring		
-30.0		1							Ì		Stop Freq
-40.0		[									5.215000000 GHz
-50.0					2						CF Step
60.0	/									l	5.000000 MHz <u>Auto</u> Man
-00.0	allowerser									Mark Int	
-70.0	<del>г «М<sup>ир</sup></del>										Freq Offset
-80.0											
Cent #Res	ter 5.1900 s BW 1.0	00 GHz MHz		#VBW	3.0 MHz			#Sween	Span 5 500 ms (	0.00 MHz 1001 pts)	
MSG								STATU	s		I

Channel 38 – Chain B

Channel 46 – Chain B

🗊 Agi	lent Spectru	m Analyzer -	Swept SA								
<mark>⊯</mark> Cen	ter Freq	ັΩ 5.2300	00000 G	Hz		NSE:INT	Avg Type	ALIGNAUTO	01:32:10P	M Sep 29, 2011 E 1 2 3 4 5 6	Frequency
10 dE	3/div <b>R</b> i	In ef 10.00 (	put: RF P IF( d <b>Bm</b>	NO: Fast 🖵 Gain:Low	Atten: 20	dB	Avginoid.	Mkr	1 5.215 -22.4	80 GHz 87 dBm	Auto Tune
0.00											Center Freq 5.230000000 GHz
-10.0 -20.0			<b>↓</b> <sup>1</sup>		Atom Land	الجهرا					Start Freq 5.205000000 GHz
-30.0 -40.0		1 more and		and the factor of the second s		AN LONG TO A CONTROL	1700-160-64-0-4.1920-64	hole and the second	hug-And-Yapp-north		<b>Stop Freq</b> 5.255000000 GHz
-50.0 -60.0											CF Step 5.000000 MHz <u>Auto</u> Man
-70.0	tomore and the set									how the way to	Freq Offset 0 Hz
-80.0											
Cen #Re	ter 5.230 s BW 1.0	00 GHz MHz		#VBW	3.0 MHz			#Sweep	Span 5 500 ms (	0.00 MHz 1001 pts)	
MSG								STATUS			

## 5. Peak Excursion

## 5.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2011
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2011
Х	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2011

Note:

- 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
- 2. The test instruments marked with "X" are used to measure the final test results.

## 5.2. Test Setup

#### **Conduction Power Measurement**



## 5.3. Limits

The ratio of the peak excursion of the modulation envelope (measured suing a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

## 5.4. Test Procedure

The EUT was setup to ANSI C63.4, 2009; tested to DTS test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

## 5.5. Uncertainty

± 1.27 dB

## 5.6. Test Result of Peak Excursion

Product	:	WHDI Tx Stick
Test Item	:	Peak Excursion
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit - 20BW

#### Chain A

Channel No.	Frequency (MHz)	Measurement Level (dB)	Required Limit (dB)	Result
36	5180	11.504	<13	Pass
44	5220	12.215	<13	Pass
48	5240	10.861	<13	Pass

									•								
A a	ilent S	Spect	rum .	Analyzer	- Swep	ot SA											
w Cer	nter	Fre	50 ភ eq	5.180	0000	000 G	iHz	A		NSE:IN	T	#Avg	/ Type	LIGNAUTO	01:47:40	PM Sep 29, 2011 CE 1 2 3 4 5 6	Frequency
			Dof	10.00	Input:	RF P IF	NO: Fast Gain:Lov	t 😱 W	Atten: 20	dB		Avgin	1010.>	Mkr2	5.179 S	900 GHz	Auto Tune
-10.00 -10.00 -20.0				pin <sup>al-Atra</sup>		¶,₩r¶û^,Îdj	4 <b>, 4</b> , 4, 4, 1,	filmitute	LUYUUMMA	2 10 <sup>-71</sup>	- aptrology		W.A	1 4/1444-00441	Widthpatty		Center Freq 5.180000000 GHz
-30.0 -40.0 -50.0	unur MMM	n al an	μ.													Will Market	Start Freq 5.167500000 GHz
-70.0 -80.0																	<b>Stop Freq</b> 5.192500000 GHz
Cer #Re	nter : s B\ moda	5.13 N 1	800 .0 N	0 GHz /IHz		×	#V	BW	3.0 MHz		FUNCT	110N	#	Sweep	Span 2 500 ms	25.00 MHz (1001 pts)	CF Step 2.500000 MHz Auto Man
1 2 3 4	N N	1 2	f		5	. <u>185 75</u> .179 90	0 GHz 0 GHz		3.659 d -7.845 d	Bm Bm							Freq Offset
5 6 7 8 9 10																	0 Hz
12 MSG				*										STATUS			

#### Channel 36:



D Agilent S	Spectrum	Analyzer -	Swept SA			12					
w Center	50 s	<sup>ລ</sup> 5.2200	00000 G	Hz	AC SE	INSE:INT	#Avg	ALIGNAUTO Type: Pwr(RMS)	01:46:25 P	M Sep 29, 2011 E 1 2 3 4 5 6	Frequency
10 dB/div	/ Re	f 10.00	dBm	NO: Fast (_ Gain:Low	Atten: 20	dB		Mkr2	5.220 1 -8.9	00 GHz 64 dBm	Auto Tune
-10.0		A Manual and	LANN AND ALSO	₩ <sup>4</sup> ₩₩₩₩₩₽₩₽₩	A STATE AND A STAT		Washing the state of the state	Win-mentioner	walker Mark	<u> </u>	Center Freq 5.220000000 GHz
-30.0 -40.0 -50.0										Martin Martin	Start Freq 5.207500000 GHz
-60.0 -70.0 -80.0											<b>Stop Freq</b> 5.232500000 GHz
Center #Res Bl	5.2200 W 1.0	0 GHz MHz	×	#VB\	V 3.0 MHz Y	FU	NCTION	#Sweep	Span 2 500 ms (	5.00 MHz 1001 pts) INVALUE	CF Step 2.500000 MHz <u>Auto</u> Man
1 N 2 N 3 4 5 6 7	1 f 2 f		5.225 67 5.220 10	/5 GHz IO GHz	3.251 d -8.964 d	Bm Bm					Freq Offset 0 Hz
8 9 10 11 12 MSG								STATUS			

Channel 44:

Channel 48:

D Agilent	Spectr	ım Aı	nalyzer - Sv	wept SA								
v. Center	r Free	<sup>50 Ω</sup>	.24000	0000 G	Hz	AC SE		#Avg AvalH	ALIGNAUTO Type: Pwr(RMS)	01:41:31P TRAC	M Sep 29, 2011 E 1 2 3 4 5 6 F MM	Frequency
10 dB/di	مرابع مربع مربع مربع مربع مربع مربع مربع مر											Auto Tune
-10.0		f	AN WIN WALK		ullors hydr	warage of ANA Dealling	2 antiput	With the particular of the	Varishildight of the state	W. Harrison and All	\	Center Freq 5.240000000 GHz
-30.0 -40.0 -50.0		<b>r</b>									hr h hyle haren hallenstelle	<b>Start Freq</b> 5.227500000 GHz
-60.0												<b>Stop Freq</b> 5.252500000 GHz
Center #Res E	5.24 W 1.0	000 0 M	GHz Hz	~	#VB	W 3.0 MHz		FUNCTION	#Sweep	Span 2 500 ms (	5.00 MHz 1001 pts)	CF Step 2.500000 MHz
1 N 2 N 3 4 5 6	1 2	f		5.245 82 5.240 15	5 GHz 0 GHz	3.233 d -7.628 d	Bm Bm					Freq Offset 0 Hz
7 8 9 10 11 12												
MSG									STATUS			

Channel No.	Frequency (MHz)	Measurement Level (dB)	Required Limit (dB)	Result
36	5180	11.878	<13	Pass
44	5220	10.332	<13	Pass
48	5240	10.503	<13	Pass

#### Chain B

## Channel 36:

🎾 Agilent Spectrum Analyzer - Sv	wept SA			
Σ 50 Ω Center Freq 5.18000	00000 GHz	VSE:INT ALIGNAUTO #Avg Type: Pwr(RMS)	01:48:54 PM Sep 29, 2011 TRACE 1 2 3 4 5 6	Frequency
10 dB/div Ref 10.00 dl	IFGain:Low Atten: 20	Mkr2	5.179 850 GHz -8.327 dBm	Auto Tune
10.0 -20.0	orthe and the factor because of the state of	2 and marked and source of the particular and	Warton's With	Center Freq 5.180000000 GHz
-30.0			My had we	<b>Start Freq</b> 5.167500000 GHz
-60.0				<b>Stop Freq</b> 5.192500000 GHz
Center 5.18000 GHz #Res BW 1.0 MHz	#VBW 3.0 MHz	#Sweep	Span 25.00 MHz 500 ms (1001 pts)	CF Step 2.500000 MHz Auto Man
1         N         1         f           3         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -	5.185.825 GHz 3.551 dt 5.179 850 GHz -8.327 dt	3m		Freq Offset 0 Hz



D Agile	ent Sj	pectrur	n Analyze	er - Swept	SA		10							
Cent	erl	50 Frea	<sup>Ω</sup> 5.22	000000	00 GH	lz	AC	SENSE:IN	Г	#Avg Ty	ALIGNAUTO ype: Pwr(RMS)	01:44:59 P TRAC	M Sep 29, 2011 E 1 2 3 4 5 6	Frequency
10 dB	Input: RI-         PN0: Fast         Ing. ree tall         Arten: 20 dB         Mygriod 2 loo loo         Der P SNNN           I0 dB/div         Ref 10.00 dBm         -7.495 dBm         -7.495 dBm         -7.495 dBm												Auto Tune	
Log - 0.00 - -10.0 - -20.0 -			A ROAD	www.phrymania		Withing	All an alter and all the	14. 2 ×	ubbentper Rapp	elliphe ilener	in the manual			Center Freq 5.220000000 GHz
-30.0 -40.0 -50.0														Start Freq 5.207500000 GHz
-60.0 - -70.0 - -80.0 -														<b>Stop Freq</b> 5.232500000 GHz
Cent #Res	er 5 8 BV	0.220 V 1.0	00 GH MHz	z		#VB	N 3.0 MI	lz	FUNCT	ION	#Sweep	Span 2 500 ms ( EUNCII	5.00 MHz 1001 pts)	CF Step 2.500000 MHz <u>Auto</u> Man
1 3 4 5 6 7 8 9 10	N	1 f 2 f		5.2	20 325	GHz	2.837 -7.495	dBm						Freq Offset 0 Hz
11 12 MSG											STATUS			

Channel 44:

Channel 48:

💴 Agilent Spectrun	🛛 Agilent Spectrum Analyzer - Swept SA											
Center Freq	Ω 5.240000000 GHz	AC SENSE:INT	ALIGNAUTO #Avg Type: Pwr(RMS) AvglHold:>100(100	01:43:22 PM Sep 29, 2011 TRACE 1 2 3 4 5 6 TYPE MMINIMAN	Frequency							
10 dB/div Re	Input: RI- PNO: Fast IFGain:Low	Atten: 20 dB	Mkr2 5.	.240 325 GHz -7.605 dBm	Auto Tune							
-10.0	When the weather weather weather the second s	And And And And And And And And And		APArthone and a	Center Freq 5.240000000 GHz							
-30.0				M. Hukulna, Aky	Start Freq 5.227500000 GHz							
-60.0 -70.0 -80.0					<b>Stop Freq</b> 5.252500000 GHz							
Center 5.240 #Res BW 1.0	00 GHz MHz #VE	BW 3.0 MHz	#Sweep 50	Span 25.00 MHz 00 ms (1001 pts)	CF Step 2.500000 MHz Auto Man							
1         N         1         f           2         N         2         f           3         4         -         -           4         -         -         -           6         -         -         -           7         -         -         -           9         -         -         -           11         -         -         -	5.245 860 GHz 5.240 325 GHz	2.898 dBm -7.605 dBm			Freq Offset 0 Hz							

Product	:	WHDI Tx Stick
Test Item	:	Peak Excursion
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit - 40BW

## Chain A

Channel	Frequency	Measurement Level	Required Limit	Dogult	
No.	(MHz)	(dB)	(dB)	Kesult	
38	5190	10.163	<13	Pass	
46	5230	11.120	<13	Pass	

#### Channel 38:

💴 Agilent Spectrum Ana	ılyzer - Swept SA						
M 50 Ω Center Freq 5.	190000000 GHz	AC SEN	#Avg 1	ALIGNAUTO	01:51:49 PM S TRACE 1	ep 29, 2011 2 3 4 5 6	Frequency
10 dB(div Ref 1	Input: RF PNO: IFGair	Fast 😱 Trig: Free n:Low Atten: 20	dB	Mkr2	5.188 6	5 GHz dBm	Auto Tune
-10.0 -20.0	a long man and a long and	Leourint of the all are 2 สุกลับไห้เหมืองสีมีที่ได้เป็นไห้ 100	1 miniminantimatical	nder yn arwyd yn yw	with the string to		<b>Center Freq</b> 5.190000000 GHz
-30.0						Martha Jurger	Start Freq 5.165000000 GHz
-70.0							<b>Stop Freq</b> 5.215000000 GHz
Center 5.19000 ( #Res BW 1.0 MH MKR MODE TRO SCL 1 N 1 f	GHz  z 5.192 40 G	#VBW 3.0 MHz	FUNCTION	#Sweep {	Span 50.0 500 ms (10 EUNCTION V	00 MHz 01 pts)	<b>CF Step</b> 5.000000 MHz <u>Auto</u> Man
2         N         2         f           3         -         -         -           4         -         -         -           5         -         -         -           6         -         -         -           7         -         -         -           9         -         -         -           10         -         -         -	5.188 65 G	-15.647 dE					Freq Offset 0 Hz
11 12 MSG				STATUS			



D Ag	ilent S	Spect	irum .	Analyzer -	Swept SA								
Cer	nter	Fre	50 G 9 <b>q</b>	5.2300	00000	GHz	AC	SENSE:INT	#Avg Ty	ALIGNAUTO e: Pwr(RMS)	01:53:02 F	PM Sep 29, 2011 CE 1 2 3 4 5 6	Frequency
10 d	B/div	,	Ref	In 10.00 (	put: RF	PNO: Fast IFGain:Low	Atten:	ee Run 20 dB	Avg Hold	Mkr2	2 5.229 -16.7	80 GHz 78 dBm	Auto Tune
-10.0 -20.0			-	Marine Marin	in school familie and an ar familie and the school familie	การมี-4มีเราเรียงเ ประกิณฑร์สารปล	hear the server the se	n 2 Hrown	1 	yuraaryyeeyyyy Wilineddayyykadyy	abreed add any		Center Freq 5.230000000 GHz
-30.0 -40.0 -50.0	And the second s	ار مەربە	Å									M whenhaline	<b>Start Freq</b> 5.205000000 GHz
-60.0 -70.0 -80.0													<b>Stop Freq</b> 5.255000000 GHz
Cen #Re	ter sB	5.23 W 1	300 .0 N	0 GHz /IHz		#VE	3W 3.0 MH	z		#Sweep	Span 5 500 ms (	50.00 MHz (1001 pts)	CF Step 5.000000 MHz
1	N	1	f		5.234	35 GHz	-5.658	dBm			ronen	ON VALUE	Auto Mari
2 3 4 5 6	N	2	f		5.229	980 GHz	-16.778	dBm					Freq Offset 0 Hz
7 8 9 10 11 12													
MSG										STATUS			I

#### Channel 46:

Channel	Frequency	Measurement Level	Required Limit	Pogult
No.	(MHz)	(dB)	(dB)	Kesun
38	5190	10.873	<13	Pass
46	5230	11.963	<13	Pass

## Chain B

## Channel 38:

D Agilen	t Spectru	n Analyzer -	Swept SA								
ux Cente	r Freq	<sup>Ω</sup> 5.1900	000000 G	Hz	AC SE		#Avg Typ	ALIGNAUTO e: Pwr(RMS)	01:50:39 P	M Sep 29, 2011 E 1 2 3 4 5 6	Frequency
10 dB/c	Input: RF PNO: Fast C Ing: Free Run Avginoid>100/100 OFF SNNN IFGain:Low Atten: 20 dB Mkr2 5.190 10 GHz 10 dB/div Ref 10.00 dBm -16.480 dBm								Auto Tune		
-10.0		And and all	yunan selanyung filipatipatipatipatipati	hardida an	1	2 <u>mp - m</u>	lon-skraumahan Ny m-polonga-144	a generale a des los - de a des l'agos d'al de la se	and a stranged and		Center Freq 5.19000000 GHz
-30.0 — -40.0 — -50.0 —	1111000/1								14 	Marina Brangely	<b>Start Freq</b> 5.165000000 GHz
-70.0											<b>Stop Freq</b> 5.215000000 GHz
Cente #Res I MKE MOU	r 5.190 BW 1.0 DE TRC 15	00 GHz MHz	× 5.185 9	#VB	W 3.0 MHz -5.607 dl	FUI	NCTION FU	#Sweep	Span 5 500 ms ( FUNCIO	0.00 MHz 1001 pts) INVALUE	CF Step 5.000000 MHz <u>Auto</u> Man
2 N 3 4 5 6	2 1		5.190 1	0 GHz	-16.480 dl	Bm					Freq Offset 0 Hz
8 9 10 11 12											
MSG								STATUS			



D Agile	nt Spe	ectrum	Analyzer -	Swept SA								
Cente	er F	req	Ω 5.2300	000000	GHz	AC SE	NSE:INT	#Avg Typ	ALIGNAUTO e: Pwr(RMS)	01:54:16 F	M Sep 29, 2011 CE 1 2 3 4 5 6	Frequency
10 dB/	div	Re	ار f 10.00	nput: RF	PNO: Fast ⊂ FGain:Low	Atten: 20	e Run ) dB	Avg Hold	»100/100 Mkr2	5.229 -18.2	90 GHz 61 dBm	Auto Tune
Log - 0.00 - -10.0 - -20.0 -			- Harles	Laton Landan Halan Manadan	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Labor Last birts	2 <del>anarhala</del> pyprilaimia	<del>เป็อกมากระวงไป</del>	an al an	LALLAND		Center Freq 5.230000000 GHz
-30.0	winn LLW	1 1 1 1								Y	h h h h h h h h h h h h h h h h h h h	<b>Start Freq</b> 5.205000000 GHz
-70.0 - -80.0 -												<b>Stop Freq</b> 5.255000000 GHz
Cente #Res	er 5.: BW	2300 1.0	0 GHz MHz	X	#VB	W 3.0 MHz	FL	JNCTION FL	#Sweep	Span 5 500 ms ( EUNOI	0.00 MHz 1001 pts)	CF Step 5.000000 MHz <u>Auto</u> Man
2 N 3 4 5 6		2 f		5.229	90 GHz	-6.298 d -18.261 d	Bm					Freq Offset 0 Hz
7 9 10 11 12												
MSG									STATUS			

#### Channel 46:

## 6. Radiated Emission

## 6.1. Test Equipment

The following test equipments are used during the radiated emission test:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Site # 3	Х	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2011
	Х	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2011
	Х	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2011
	Х	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2011
	X Pre-Amplifier		QTK	AP-180C / CHM_0906076	Sep., 2011
	Х	Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2011
	Х	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2011
	Х	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2011
	Х	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2011
	Х	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	Χ	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

2. The test instruments marked with "X" are used to measure the final test results.

## 6.2. Test Setup

Radiated Emission Below 1GHz



## Radiated Emission Above 1GHz



## 6.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits							
Frequency MHz	uV/m@3m	dBuV/m@3m					
30-88	100	40					
88-216	150	43.5					
216-960	200	46					
Above 960	500	54					

Remarks: E field strength  $(dBuV/m) = 20 \log E$  field strength (uV/m)

## 6.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2009 and tested according to KDB-789033 test procedure for compliance to FCC 47CFR 15.407 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2009 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

Radiated emission measurements below 1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement. The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna. The worst radiated emission is measured in the Open Area Test Site on the Final Measurement. The measurement frequency range form 30MHz - 10th Harmonic of fundamental was investigated.

## 6.5. Uncertainty

- ± 3.8 dB below 1GHz
- ± 3.9 dB above 1GHz

## 6.6. Test Result of Radiated Emission

Product	:	WHDI Tx Stick
Test Item	:	Harmonic Radiated Emission Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit - 20BW (5180MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
10360.000	12.930	46.750	59.680	-14.320	74.000
15540.000	*	*	*	*	74.000
20720.000	*	*	*	*	74.000
25900.000	*	*	*	*	74.000
Average					
<b>Detector:</b>					
10360.000	12.930	28.970	41.900	-12.100	54.000
15540.000	*	*	*	*	54.000
20720.000	*	*	*	*	54.000
25900.000	*	*	*	*	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.

- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product Test Item	<ul> <li>WHDI Tx Stick</li> <li>Harmonic Radiated Emission Data</li> </ul>							
Test Site Test Mode	<ul> <li>No.3 OA1S</li> <li>Mode 1: Transmit - 20BW (5180MHz)</li> </ul>							
Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit			
MHz	dB	dBuV	dBuV/m	dB	dBuV/m			
Vertical								
Peak Detector:								
10360.000	13.724	45.510	59.234	-14.766	74.000			
15540.000	*	*	*	*	74.000			
20720.000	*	*	*	*	74.000			
25900.000	*	*	*	*	74.000			
Average								
<b>Detector:</b>								
10360.000	13.724	28.760	42.484	-11.516	54.000			
15540.000	*	*	*	*	54.000			
20720.000	*	*	*	*	54.000			
25900.000	*	*	*	*	54.000			

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- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	: WHDI Tx Stick								
Test Item	: Harmonic Radiated Emission Data								
Test Site	: No.3 O	ATS							
Test Mode	e : Mode 1: Transmit - 20BW (5220MHz)								
Frequency	Correct	Reading	Measurement	Margin	Limit				
	Factor	Level	Level						
MHz	dB	dBuV	dBuV/m	dB	dBuV/m				
Horizontal									
Peak Detector:									
10440.000	13.322	47.510	60.832	-13.168	74.000				
15660.000	*	*	*	*	74.000				
20880.000	*	*	*	*	74.000				
26100.000	*	*	*	*	74.000				
Average									
<b>Detector:</b>									
10440.000	13.322	30.350	43.672	-10.328	74.000				
15660.000	*	*	*	*	74.000				
20880.000	*	*	*	*	74.000				
26100.000	*	*	*	*	74.000				

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- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	: WHDI Tx Stick							
Test Item	: Harmonic Radiated Emission Data							
Test Site	: No.3 OATS							
Test Mode	: Mode 1: Transmit - 20BW (5220MHz)							
Frequency	Correct	Reading	Measurement	Margin	Limit			
	Factor	Level	Level					
MHz	dB	dBuV	dBuV/m	dB	dBuV/m			
Vertical								
Peak Detector:								
10440.000	14.245	47.020	61.265	-12.735	74.000			
15660.000	*	*	*	*	74.000			
20880.000	*	*	*	*	74.000			
26100.000	*	*	*	*	74.000			
Average								
Detector:								
10440.000	14.245	29.760	44.005	-9.995	74.000			
15660.000	*	*	*	*	74.000			
20880.000	*	*	*	*	74.000			
26100.000	*	*	*	*	74.000			

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- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	roduct : WHDI Tx Stick							
Test Item	: Harmonic Radiated Emission Data							
Test Site	: No.3 O	ATS						
Test Mode	: Mode 1	: Transmit - 20BV	V (5240MHz)					
Frequency	Correct	Reading	Measurement	Margin	Limit			
	Factor	Level	Level					
MHz	dB	dBuV	dBuV/m	dB	dBuV/m			
Horizontal								
Peak Detector:								
10480.000	13.693	47.530	61.224	-12.776	74.000			
15720.000	*	*	*	*	74.000			
20960.000	*	*	*	*	74.000			
26200.000	*	*	*	*	74.000			
Average								
Detector:								
10480.000	13.693	30.190	43.884	-10.116	74.000			
15720.000	*	*	*	*	74.000			
20960.000	*	*	*	*	74.000			
26200.000	*	*	*	*	74.000			

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	: WHDI Tx Stick							
Test Item	: Harmonic Radiated Emission Data							
Test Site	: No.3 OATS							
Test Mode	: Mode 1: Transmit - 20BW (5240MHz)							
Frequency	Correct	Reading	Measurement	Margin	Limit			
	Factor	Level	Level					
MHz	dB	dBuV	dBuV/m	dB	dBuV/m			
Vertical								
Peak Detector:								
10480.000	14.620	48.090	62.711	-11.289	74.000			
15720.000	*	*	*	*	74.000			
20960.000	*	*	*	*	74.000			
26200.000	*	*	*	*	74.000			
Average								
<b>Detector:</b>								
10480.000	14.620	30.800	45.421	-8.579	74.000			
15720.000	*	*	*	*	74.000			
20960.000	*	*	*	*	74.000			
26200.000	*	*	*	*	74.000			

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- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	: WHDI Tx Stick							
Test Item	: Harmonic Radiated Emission Data							
Test Site	: No.3 OATS							
Test Mode	: Mode 2	: Mode 2: Transmit - 40BW (5190MHz)						
Frequency	Correct	Reading	Measurement	Margin	Limit			
	Factor	Level	Level					
MHz	dB	dBuV	dBuV/m	dB	dBuV/m			
Horizontal								
Peak Detector:								
10380.000	12.939	46.720	59.659	-14.341	74.000			
15570.000	*	*	*	*	74.000			
20760.000	*	*	*	*	74.000			
25950.000	*	*	*	*	74.000			
Average								
Detector:								
10380.000	12.939	30.950	43.889	-10.111	74.000			
15570.000	*	*	*	*	74.000			
20760.000	*	*	*	*	74.000			
25950.000	*	*	*	*	74.000			

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- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	: WHDI Tx Stick						
Test Item	: Harmonic Radiated Emission Data						
Test Site	: No.3 OATS						
Test Mode	: Mode 2: Transmit - 40BW (5190MHz)						
Frequency	Correct	Reading	Measurement	Margin	Limit		
	Factor	Level	Level				
MHz	dB	dBuV	dBuV/m	dB	dBuV/m		
Vertical							
Peak Detector:							
10380.000	13.796	42.360	56.156	-17.844	74.000		
15570.000	*	*	*	*	74.000		
20760.000	*	*	*	*	74.000		
25950.000	*	*	*	*	74.000		
Average							
<b>Detector:</b>							
10380.000	13.796	26.910	40.706	-13.294	74.000		
15570.000	*	*	*	*	74.000		
20760.000	*	*	*	*	74.000		
25950.000	*	*	*	*	74.000		

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	: WHDI Tx Stick						
Test Item	: Harmonic Radiated Emission Data						
Test Site	: No.3 OATS						
Test Mode	: Mode 2: Transmit - 40BW (5230MHz)						
Frequency	Correct	Reading	Measurement	Margin	Limit		
	Factor	Level	Level				
MHz	dB	dBuV	dBuV/m	dB	dBuV/m		
Horizontal							
Peak Detector:							
10460.000	13.508	46.240	59.748	-14.252	74.000		
15690.000	*	*	*	*	74.000		
20920.000	*	*	*	*	74.000		
26150.000	*	*	*	*	74.000		
Average							
<b>Detector:</b>							
10460.000	13.508	30.860	44.368	-9.632	74.000		
15690.000	*	*	*	*	74.000		
20920.000	*	*	*	*	74.000		
26150.000	*	*	*	*	74.000		

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- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	: WHDI Tx Stick						
Test Item	: Harmonic Radiated Emission Data						
Test Site	: No.3 OATS						
Test Mode	: Mode 2:	: Transmit - 40BW	/ (5230MHz)				
Frequency	Correct	Reading	Measurement	Margin	Limit		
	Factor	Level	Level				
MHz	dB	dBuV	dBuV/m	dB	dBuV/m		
Vertical							
Peak Detector:							
10460.000	14.433	43.480	57.913	-16.087	74.000		
15690.000	*	*	*	*	74.000		
20920.000	*	*	*	*	74.000		
26150.000	*	*	*	*	74.000		
Average							
<b>Detector:</b>							
10460.000	14.433	29.940	44.373	-9.627	74.000		
15690.000	*	*	*	*	74.000		
20920.000	*	*	*	*	74.000		
26150.000	*	*	*	*	74.000		

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	: WHDI Tx Stick					
Test Item	: General Radiated Emission					
Test Site	: No.3 OATS					
Test Mode	: Mode 1:	Transmit - 20BW	(5220MHz)			
Frequency	Correct	Reading	Measurement	Margin	Limit	
	Factor	Level	Level			
MHz	dB	dBuV	dBuV/m	dB	dBuV/m	
Horizontal						
<b>Peak Detector</b>						
144.460	-10.377	43.570	33.193	-10.307	43.500	
295.780	-3.655	41.997	38.342	-7.658	46.000	
433.520	-1.972	40.586	38.614	-7.386	46.000	
600.360	3.977	35.907	39.884	-6.116	46.000	
800.180	5.141	32.818	37.959	-8.041	46.000	
901.060	5.591	27.708	33.299	-12.701	46.000	
Vertical						
<b>Peak Detector</b>						
66.860	-6.015	40.221	34.206	-5.794	40.000	
148.340	-6.244	45.484	39.240	-4.260	43.500	
365.620	-2.179	44.760	42.581	-3.419	46.000	
532.460	-0.563	38.830	38.267	-7.733	46.000	
687.660	2.444	30.720	33.164	-12.836	46.000	
967.020	8.071	30.509	38.580	-15.420	54.000	

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	: WHDI Tx Stick						
Test Item	: General Radiated Emission						
Test Site	: No.3 OATS						
Test Mode	: Mode 2:	Transmit - 40BW	(5190MHz)				
Frequency	Correct	Reading	Measurement	Margin	Limit		
	Factor	Level	Level				
MHz	dB	dBuV	dBuV/m	dB	dBuV/m		
Horizontal							
<b>Peak Detector</b>							
146.400	-10.318	44.202	33.884	-9.616	43.500		
249.220	-6.014	45.951	39.937	-6.063	46.000		
431.580	-2.099	42.167	40.068	-5.932	46.000		
600.360	3.977	36.721	40.698	-5.302	46.000		
800.180	5.141	34.150	39.291	-6.709	46.000		
932.100	6.922	24.866	31.788	-14.212	46.000		
Vertical							
<b>Peak Detector</b>							
66.860	-6.015	39.514	33.499	-6.501	40.000		
144.460	-6.257	44.923	38.666	-4.834	43.500		
251.160	-7.505	44.352	36.847	-9.153	46.000		
416.060	-8.415	43.648	35.233	-10.767	46.000		
532.460	-0.563	37.070	36.507	-9.493	46.000		
800.180	2.801	33.573	36.374	-9.626	46.000		

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

## 7. Band Edge

## 7.1. Test Equipment

#### **RF** Conducted Measurement

The following test equipments are used during the band edge tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2011
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2011
Х	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2011

Note:

- 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
- 2. The test instruments marked with "X" are used to measure the final test results.

## **RF Radiated Measurement:**

The following test equipments are used during the band edge tests:

	-				
Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
$\boxtimes$ Site # 3		Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2011
	Х	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2011
		Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2011
		Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2011
	Х	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2011
		Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2011
	Х	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2011
		Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2011
	Х	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2011
	Х	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	Х	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

Note:

1. All instruments are calibrated every one year.

2. The test instruments marked by "X" are used to measure the final test results.

## 7.2. Test Setup

## **RF** Conducted Measurement



#### **RF Radiated Measurement:**

