

FCC 15.407 NII 5GHz Test Report

for

Qisda Corporation

**157, Shan-Ying Road, Gueishan,
Taoyuan 333, Taiwan, R.O.C.**

Product Name : LCD Monitor
Model Name : (1)HSD-0015-Q (2)OMEN X 65
(3)Omen X Emperium 65
Display (4)OMEN X Emperium
65 with NVIDIA G-SYNC HDR
(5)OMEN X Emperium 65 Big
Format Gaming Display with
NVIDIA G-SYNC HDR
Brand HP
REF. No. : RL-24029, RL-24472
FCC ID : VRSHSD-0015-Q

Prepared by: : AUDIX Technology Corporation,
EMC Department



The test report is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo.
The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the U.S. Government.

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TEST REPORT CERTIFICATION

Applicant : Qisda Corporation
Manufacturer : Qisda Corporation
Factory #1 : Qisda (Suzhou) Co., Ltd.
Factory #2 : Qisda Czech s.r.o.
Factory #3 : Qisda Czech s.r.o.
Factory #4 : Qisda Optronics (Suzhou) Co., Ltd.
Factory #5 : Shanghai Hewlett-Packard Co., Ltd.
Factory #6 : HP Singapore Personal Service Division Asia.
Factory #7 : Hewlett-Packard Company
EUT Description
(1) Product : LCD Monitor
(2) Model : (1)HSD-0015-Q (2)OMEN X 65 (3)Omen X Emperium 65 Display
(4)OMEN X Emperium 65 with NVIDIA G-SYNC HDR
(5)OMEN X Emperium 65 Big Format Gaming Display with
NVIDIA G-SYNC HDR
(3) Brand : HP
(4) Ref. No : RL-24029, RL-24472
(5) Power Rating : AC 100-240V, 50/60Hz

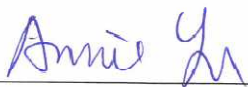
Applicable Standards:

47CFR FCC Part 15 Subpart E
ANSI C63.10:2013
KDB 789033 D02 General UNII Test Procedures New Rules v02r01

Audix Technology Corp. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

Audix Technology Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Report: 2018. 11.28

Reviewed by:  (Annie Yu/Administrator)

Approved by:  (Ben Cheng/Manager)



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1. REVISION RECORD OF TEST REPORT

Edition No	Issued Date	Revision Summary	Report Number
0	2018. 11. 28	Original Report	EM-F180514

2. SUMMARY OF TEST RESULTS

Rule	Description	Results
15.207	Conducted Emission	PASS
15.205/15.209	Radiated Band Edge and Radiated Spurious Emission	PASS
15.407(a)(5)/15.407(e)	Emission Bandwidth Measurement	PASS
15.407(a)	Maximum Output Power	PASS
15.407(b)	Conducted Band Edges and Conducted Spurious Emission	PASS
15.407(a)	Power Spectral Density	PASS
15.203	Antenna Requirement	Compliance
15.407	Frequency Stability	PASS

3. GENERAL INFORMATION

3.1. Description of Application

Applicant	Qisda Corporation 157, Shan-Ying Road, Gueishan, Taoyuan 333, Taiwan, R.O.C.
Manufacturer	Qisda Corporation NO. 157 & 159, SHANYING RD., GUEISHAN DIST., TAOYUAN CITY 33341, TAIWAN, R.O.C.
Factory #1	Qisda (Suzhou) Co., Ltd. No. 169, Zhujiang Road, New District, Suzhou, Jiangsu Province, P.R. China
Factory #2	Qisda Czech s.r.o. Turanka 114, 62700 BmoSlatina Czech Republic
Factory #3	Qisda Czech s.r.o. Turanka 98B, 62700 BmoSlatina Czech Republic
Factory #4	Qisda Optonics(Suzhou)Co., Ltd No. 169, Zhujiang Road, New District, Suzhou, Jiangsu Province, P.R. China
Factory #5	Shanghai Hewlett-Packard Co., Ltd. 25 Yun Qiao Rd., Pudong, 201206 Shanghai, China.
Factory #6	HP Singapore Personal Service Division Asia. 452 ALEXSNDRA ROAD SINGAPORE 119961
Factory #7	Hewlett-Packard Company 11445 Compaq Center Drive West Houston, TX77070, U.S.A.
Product	LCD Monitor
Brand	HP
Model	(1)HSD-0015-Q (2)OMEN X 65 (3)Omen X Emperium 65 Display (4)OMEN X Emperium 65 with NVIDIA G-SYNC HDR (5)OMEN X Emperium 65 Big Format Gaming Display with NVIDIA G-SYNC HDR The difference between above models is in sales marketing.

3.2. Description of EUT

Test Model	HSD-0015-Q																				
Serial Number	N/A																				
Power Rating	AC 100-240, 50/60Hz																				
RF Features	WLAN: 802.11a/b/g/n/ac Bluetooth: BT and BLE																				
Transmit Type	<table border="1"> <thead> <tr> <th colspan="2">2.4 GHz</th> </tr> </thead> <tbody> <tr> <td>802.11b</td><td>1T1R</td></tr> <tr> <td>802.11g</td><td>1T1R</td></tr> <tr> <td>802.11n-HT20</td><td>2T2R</td></tr> <tr> <td>BT/BLE</td><td>1T1R</td></tr> <tr> <th colspan="2">UNII Bands</th> </tr> <tr> <td>802.11a</td><td>1T1R</td></tr> <tr> <td>802.11n-HT20/ 802.11ac-VHT20</td><td>2T2R</td></tr> <tr> <td>802.11n-HT40/ 802.11ac-VHT40</td><td>2T2R</td></tr> <tr> <td>802.11ac-VHT80</td><td>2T2R</td></tr> </tbody> </table>	2.4 GHz		802.11b	1T1R	802.11g	1T1R	802.11n-HT20	2T2R	BT/BLE	1T1R	UNII Bands		802.11a	1T1R	802.11n-HT20/ 802.11ac-VHT20	2T2R	802.11n-HT40/ 802.11ac-VHT40	2T2R	802.11ac-VHT80	2T2R
2.4 GHz																					
802.11b	1T1R																				
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BT/BLE	1T1R																				
UNII Bands																					
802.11a	1T1R																				
802.11n-HT20/ 802.11ac-VHT20	2T2R																				
802.11n-HT40/ 802.11ac-VHT40	2T2R																				
802.11ac-VHT80	2T2R																				
Device Category	☐ Outdoor Access Point ☐ Fixed point-to-point Access Point ☐ Indoor Access Point ☒ Mobile and Portable client device																				
Sample Status	Production																				
Date of Receipt	2018. 09. 29																				
Date of Test	2018. 10. 08 ~ 11. 20																				
Interface Ports of EUT	Left Side View • One RJ-45 Port • Two USB Type A Down Stream Ports • One Display Port • Two HDMI Ports • One HDMI (ARC) Port • One S/PDIF Port • One Headphone out Port Right Side View • Two USB Type A Charge Port Back View • One DC In Port																				
Accessories Supplied	• Display Cable • HDMI Cable • AC Power Cord (3C) • SHIELD Remote (FCC ID: VOB -P2930/IC: 7361A-P2930)																				

3.3. Antenna Information

2.4G Antenna					
No.	Antenna Part Number	Manufacture	Antenna Type	Frequency (MHz)	Max Gain (dBi)
1	AEM6Y-100000 (Main)	ACON	PIFA	2400	-0.07
				2450	-0.42
				2500	-0.57
2	AEM6Y-100001 (AUX)	ACON	PIFA	2400	2.73
				2450	2.43
				2500	2.53

5G Antenna					
No.	Antenna Part Number	Manufacture	Antenna Type	Frequency (MHz)	Max Gain (dBi)
1	AEM6Y-100000 (Main)	ACON	PIFA	5150	2.89
				5350	2.77
				5470	2.98
				5850	1.32
2	AEM6Y-100001 (AUX)	ACON	PIFA	5150	3.86
				5350	2.93
				5470	2.64
				5850	1.71

3.4. EUT Specifications Assessed in Current Report

Mode	UNII Band	Fundamental Range (MHz)	Channel Number
802.11a	I	5180-5240	4
	II-2A	5260-5320	4
	II-2C	5500-5700	11
	III	5745-5825	5
802.11n-HT20/ 802.11ac-VHT20	I	5180-5240	4
	II-2A	5260-5320	4
	II-2C	5500-5700	11
	III	5745-5825	5
802.11n-HT40/ 802.11ac-VHT40	I	5190-5230	2
	II-2A	5270-5310	2
	II-2C	5510-5670	5
	III	5755-5795	2
802.11ac-VHT80	I	5210	1
	II-2A	5290	1
	II-2C	5530-5610	2
	III	5775	1
Remark: UNII Band II-2A and II-2C (DFS Function, Slave/no In service monitor, no Ad-Hoc mode)			

Mode	Modulation	Data Rate (Mbps)
802.11a	OFDM (BPSK/QPSK/16QAM/64QAM)	Up to 54
802.11n-HT20	OFDM (BPSK/QPSK/16QAM/64QAM)	Up to 144.4
802.11n-HT40		Up to 300
802.11ac-VHT20	OFDM (BPSK/QPSK/16QAM/64QAM/256QAM)	Up to 173.3
802.11ac-VHT40		Up to 400
802.11ac-VHT80		Up to 866.7

Channel List					
802.11a/802.11n-HT20/802.11ac-VHT20					
UNII Band	Channel Number	Frequency (MHz)	UNII Band	Channel Number	Frequency (MHz)
I	36	5180	II-2C	120	5600
	40	5200		124	5620
	44	5220		128	5640
	48	5240		132	5660
II-2A	52	5260		136	5680
	56	5280		140	5700
	60	5300	III	149	5745
	64	5320		153	5765
II-2C	100	5500		157	5785
	104	5520		161	5805
	108	5540		165	5825
	112	5560			
	116	5580			

Channel List					
802.11n-HT40/802.11ac-VHT40					
UNII Band	Channel Number	Frequency (MHz)	UNII Band	Channel Number	Frequency (MHz)
I	38	5190	II-2C	118	5590
	46	5230		126	5630
II-2A	54	5270		134	5670
	62	5310	III	151	5755
II-2C	102	5510		159	5795
	110	5550			

Channel List					
802.11ac-VHT80					
UNII Band	Channel Number	Frequency (MHz)	UNII Band	Channel Number	Frequency (MHz)
I	42	5210	III	155	5775
II-2A	58	5290			
II-2C	106	5530			
	122	5610			

Note: Test modes are presented at section 3.8.

3.5. Description of Key Components

None

3.6. Data Rate Relative to Output Power

802.11a				802.11ac-VHT20			
Channel	Modulation	Date Rate	Power (dBm)	Channel	Modulation	Date Rate	Power (dBm)
36	BPSK	6	18.21	36	BPSK	HT MCS8	20.88
36	QPSK	9	18.17	36	QPSK	HT MCS9	20.84
36	QPSK	12	18.15	36	QPSK	HT MCS10	20.82
36	16-QAM	18	18.11	36	16-QAM	HT MCS11	20.79
36	16-QAM	24	18.13	36	16-QAM	HT MCS12	20.74
36	64-QAM	36	18.12	36	64-QAM	HT MCS13	20.75
36	64-QAM	48	18.07	36	64-QAM	HT MCS14	20.72
36	64-QAM	54	18.09	36	64-QAM	HT MCS15	20.73

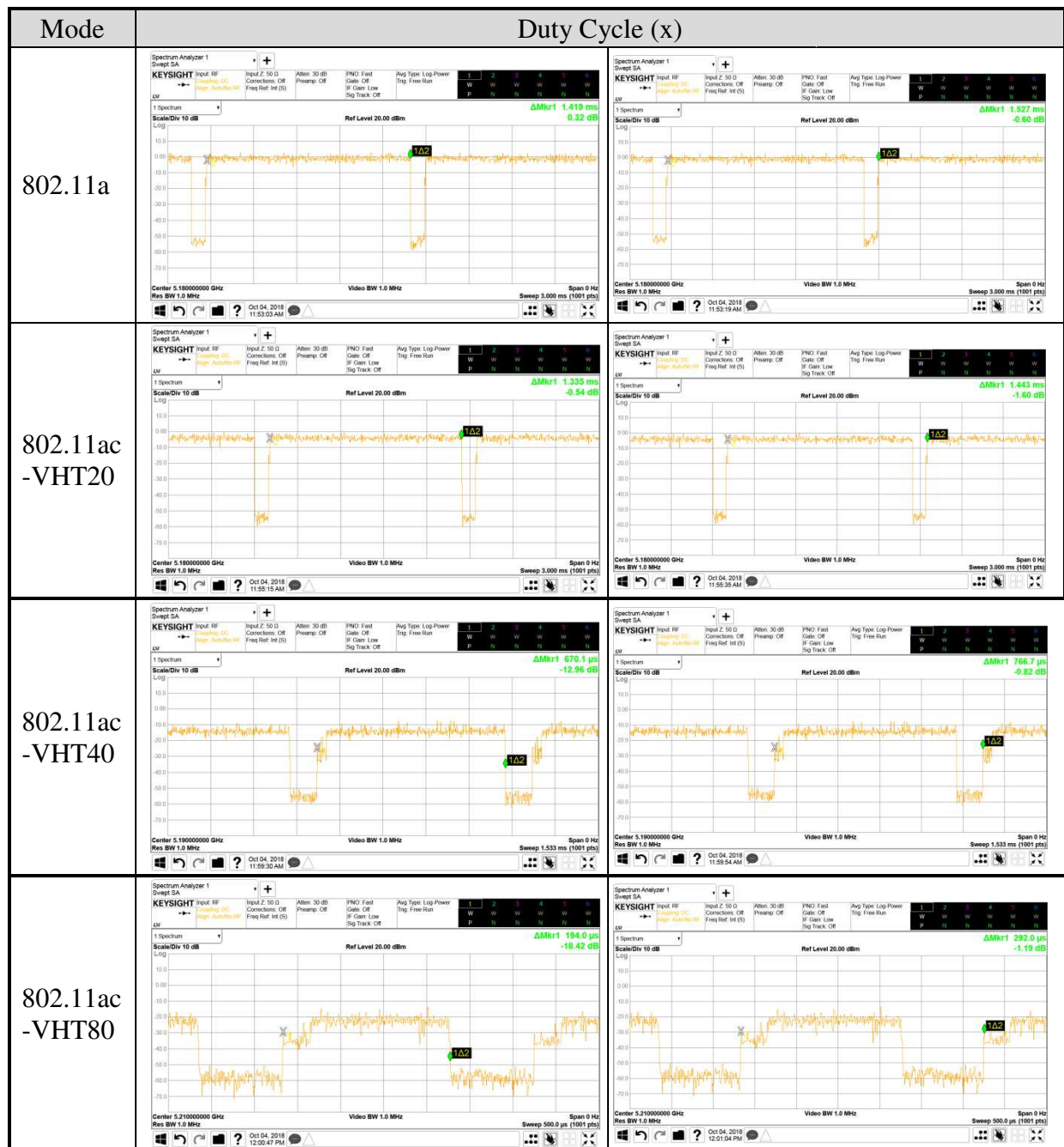
802.11ac-VHT40				802.11ac-VHT80			
Channel	Modulation	Date Rate	Power (dBm)	Channel	Modulation	Date Rate	Power (dBm)
38	BPSK	HT MCS8	17.59	42	BPSK	VHT MCS0	17.70
38	QPSK	HT MCS9	17.55	42	QPSK	VHT MCS1	17.63
38	QPSK	HT MCS10	17.53	42	QPSK	VHT MCS2	17.65
38	16-QAM	HT MCS11	17.56	42	16-QAM	VHT MCS3	17.59
38	16-QAM	HT MCS12	17.54	42	16-QAM	VHT MCS4	17.56
38	64-QAM	HT MCS13	17.45	42	64-QAM	VHT MCS5	17.58
38	64-QAM	HT MCS14	17.47	42	64-QAM	VHT MCS6	17.60
38	64-QAM	HT MCS15	17.41	42	64-QAM	VHT MCS7	17.59
				42	256-QAM	VHT MCS8	17.62
				42	256-QAM	VHT MCS9	17.66

Note: Above results are assessed in average power.

3.7. Test Configuration

Mode	Duty Cycle (x)	T (ms)	Duty Cycle Factor (dB)
802.11a	0.929	1.419	0.32
802.11ac-VHT20	0.925	1.335	0.34
802.11ac-VHT40	0.874	0.6701	0.58
802.11ac-VHT80	0.664	0.194	1.78

Note: When duty cycle is less than 98% (0.98) that duty cycle factor $10\log(1/x)$ is needed to add in conducted test items measured in average detector.



AC Conduction	
Test Case	Normal operation

Item	Mode	Data Rate	Test Channel
Radiated Test Case	Radiated Band Edge ^{Note1}	802.11a	6 Mbps
		802.11ac-VHT20	HT MCS8
		802.11ac-VHT40	HT MCS8
		802.11ac-VHT80	VHT MCS0
	Radiated Spurious Emission ^{Note1& 2}	802.11a	6 Mbps
		802.11ac-VHT20	HT MCS8
		802.11ac-VHT40	HT MCS8
		802.11ac-VHT80	VHT MCS0
Conducted Test Case	Emission Bandwidth	802.11a	6 Mbps
		802.11ac-VHT20	HT MCS8
		802.11ac-VHT40	HT MCS8
		802.11ac-VHT80	HT MCS0
	Maximum output power	802.11a	6 Mbps
		802.11ac-VHT20	MCS8
		802.11ac-VHT40	MCS8
		802.11ac-VHT80	MCS0
	Emission Limitations	802.11a	6 Mbps
		802.11ac-VHT20	MCS8
		802.11ac-VHT40	MCS8
		802.11ac-VHT80	MCS0
	Power spectral density	802.11a	6 Mbps
		802.11ac-VHT20	MCS8
		802.11ac-VHT40	MCS8
		802.11ac-VHT80	MCS0

Item		Mode	Data Rate	Test Channel
Conducted Test Case	Frequency Stability	---	---	36

Note 1: ☒ Mobile Device

☐ Portable Device, and 3 axis were assessed. The worst scenario for Radiated Spurious Emission as follow: ☐ Lie ☐ Side ☐ Stand

Note 2: Low, mid, and high channels were measured, only the worst channel of each modulation was presented in this report.

3.8. Tested Supporting System List

3.8.1. Support Peripheral Unit

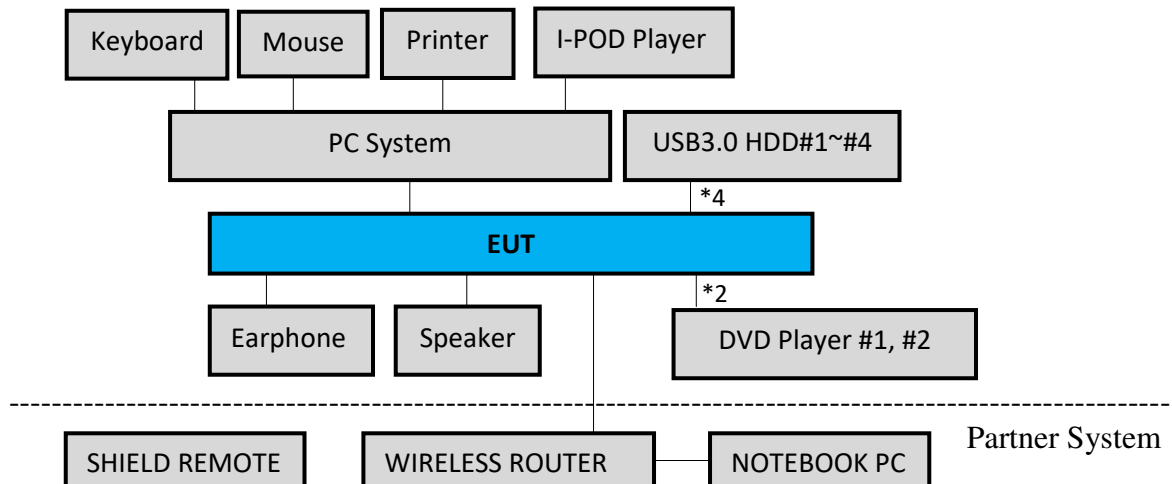
No.	Product	Brand	Model No.	Serial No.	Approval
1.	PC System	FUJITSU	ESPRIMO P757/E94+	S26361-K1444-V220	FCC By DoC
		HP	HP ProDesk 490 G1 MT Business PC	SGH437TNKC	FCC By DoC
2.	Notebook PC	Lenovo	TP00034A	895097	FCC By DoC
3.	Notebook PC	HP	P7Q52PA	N/A	Contains FCC ID:PD98260NG
4.	USB Keyboard	HP	KB-0316	N/A	FCC By DoC
5.	USB Mouse	HP	M-UAE96	FATSK0K8FYKADW	FCC By DoC
6.	Printer	HP	Deskjet 2000	CN25N13K36	FCC By DoC
7.	I-POD Player	APPLE	A1204	4H722TFVVTE	FCC By DoC
8.	USB 3.0 HDD #1	SONY	HD-B1	BBW3DEK78041FC8	FCC By DoC
	USB 3.0 HDD #2	SONY	HD-B1	BBW3DEK78041FC3	FCC By DoC
	USB 3.0 HDD #3	SONY	HD-B1	BBW3DEK78041FEF	FCC By DoC
	USB 3.0 HDD #4	SONY	HD-B1	BBW3DEK78041FE7	FCC By DoC
9.	DVD Player #1	SONY	BDP-S370	3213944	N/A
	DVD Player #2	SONY	BDP-S780	3201205	N/A
10.	Speaker	Edifier	S330D	N/A	N/A
11.	Earphone	LGITON	FS-99	N/A	N/A
12.	Wireless Router	D-Link	DIR-868L	R3WE1D7002319	FCC ID:KA2IR868LA1 Contains FCC ID: RRK2012060056-1

3.8.2. Cable Lists

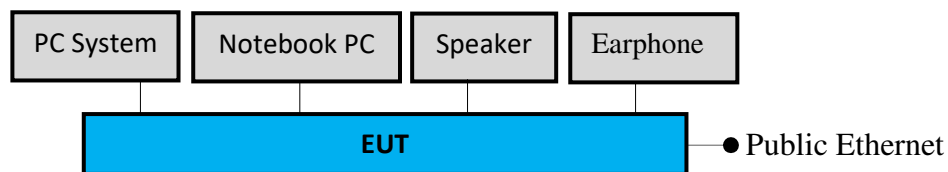
No.	Cable Description Of The Above Support Units
1.	HDMI Cable: Shielded, Detachable, 1.8m, Bonded two ferrite cores DP Cable: Shielded, Detachable, 1.8m AC Power Cord: Unshielded, Detachable, 1.8m
2.	LAN Cable: Unshielded, Detachable, 3m
3.	USB Cable: Unshielded, Detachable, 1.5m Adapter: HP, M/N HSTNN-CA40, DC Cord : Shielded, Undetachable, 1.8m, Bonded a ferrite core AC Power Cord : Unshielded, Detachable, 1.8m
4.	PS2 Cable: Shielded, Detachable, 1.8m
5.	USB Cable: Shielded, Detachable, 1.8m
6.	USB Cable: Unshielded, Detachable, 1.5m
7.	USB Cable: Unshielded, Detachable, 1.0m
8.	USB Cable: Unshielded, Detachable, 1.1m
9.	HDMI Cable: Shielded, Detachable, 1.8m
10.	Optical Cable: Unshielded, Detachable, 1.5m
11.	Audio Cable: Unshielded, Detachable, 1.1m
12.	LAN Cable: Unshielded, Detachable, 10m

3.9. Setup Configuration

3.9.1. EUT Configuration for Power Line



3.9.2. EUT Configuration for Radiated Emission



3.9.3. EUT Configuration for RF Conducted Test Items



3.10. Operating Condition of EUT

Test program “cmd” is used for enabling EUT WLAN function under continues transmitting and choosing data rate/ channel.

3.11. Description of Test Facility

Name of Test Firm	Audix Technology Corporation / EMC Department No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan Tel: +886-2-26092133 Fax: +886-2-26099303 Website : www.audixtech.com Contact e-mail: attemc_report@audixtech.com
Accreditations	The laboratory is accredited by following organizations under ISO/IEC 17025:2005 (1) NVLAP(USA) NVLAP Lab Code 200077-0 (2) TAF(Taiwan) No. 1724
Test Facilities	FCC OET Designation Number under APEC MRA by NCC is : TW1724 (1) No. 7 Shielding Room (2) Semi-Anechoic Chamber (IC Test Site Registration No.:5183B-1)

3.12. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty
Conduction Test	150kHz~30MHz	±3.50dB
Radiation Test (Distance: 3m)	30MHz~1000MHz	± 3.68dB
	Above 1GHz	±5.82dB

Remark : Uncertainty = $ku_c(y)$

Test Item	Uncertainty
Emission Bandwidth	± 0.2kHz
Maximum output power	± 0.33dB
Power spectral density	± 0.13dB
Conducted Emission Limitations	± 0.13dB

4. MEASUREMENT EQUIPMENT LIST

4.1. Conducted Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Test Receiver	R&S	ESCI	101276	2018. 03. 21	1 Year
2.	A.M.N.	R&S	ESH2-Z5	100366	2018. 07. 18	1 Year
3.	L.I.S.N.	Kyoritsu	KNW-407	8-1539-3	2018. 01. 09	1 Year
4.	Pulse Limiter	R&S	ESH3-Z2	101495	2018. 01. 16	1 Year
5.	Signal Cable	Thermax/CDT	RG-142	CE-07	2018. 05. 24	1 Year
6.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.7 S/R	2018. 04. 20	1 Year
7.	Test Software	Audix	e3	V.120619C	N.C.R.	N.C.R.

4.2. Radiated Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2018. 09. 13	1 Year
2.	Test Receiver	R & S	ESCS30	100338	2018. 06. 20	1 Year
3.	Amplifier	HP	8447D	2944A06305	2018. 01. 30	1 Year
4.	Microwave Amplifier	Keysight	83051A	MY53010042	2018. 09. 09	1 Year
5.	Loop Antenna	R&S	HFH2-Z2	891847/27	2017. 12. 18	1 Year
6.	Bilog Antenna	CHASE	CBL6112D	33821	2018. 01. 21	1 Year
7.	Horn Antenna	EMCO	3115	9609-4927	2018. 06. 22	1 Year
8.	Horn Antenna	COM-POWER	AH-840	101092	2018. 05. 07	1 Year
9.	5G Notch Filter	Microwave Circuits	N0452502	459775	2018. 01. 05	1 Year
10.	5G Notch Filter	Microwave Circuits	N0555983	459481	2018. 05. 21	1 Year
11.	5G Notch Filter	Microwave Circuits	N0257881	459776	2018. 08. 22	1 Year
12.	Digital Thermo-Hygro Meter	iMax	HTC-1	No.1 3m A/C	2018. 04. 20	1 Year
13.	Test Software	Audix	e3	V.6.110601	N.C.R.	N.C.R.

4.3. RF Conducted Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
1.	Spectrum Analyzer	Keysight	N9010B-544	MY55460198	2018. 04. 26	1 Year
2.	Power Meter	Anritsu	ML2495A	1145008	2018. 11. 07	1 Year
3.	Power Sensor	Anritsu	MA2411B	1126096	2018. 11. 07	1 Year
4.	Digital Thermo-Hygro Meter	Shenzhen Datronn Electronics	KT-905	RF	2018. 04. 20	1 Year

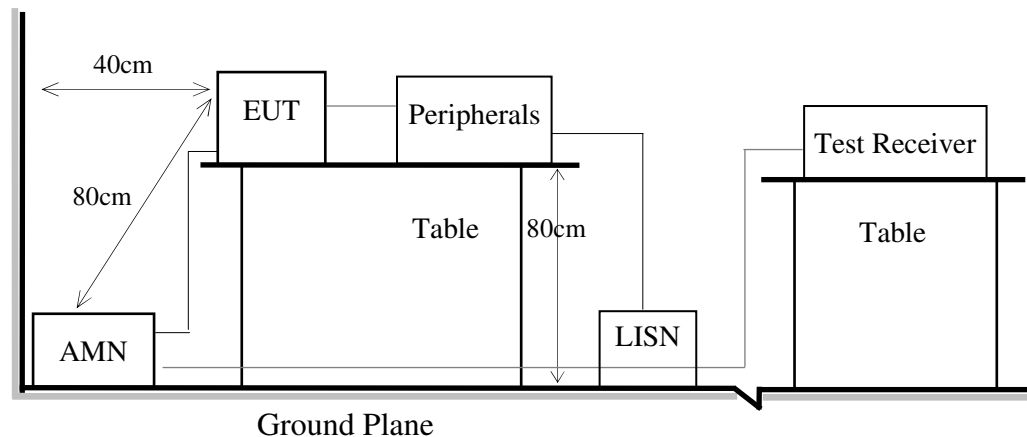
5. CONDUCTED EMISSION

5.1. Block Diagram of Test Setup

5.1.1. Block Diagram of EUT

Indicated as section 3.9

5.1.2. Shielded Room Setup Diagram



5.2. Conducted Emission Limit

Frequency	Conducted Limit	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dB μ V	56 ~ 46 dB μ V
500kHz ~ 5MHz	56 dB μ V	46 dB μ V
5MHz ~ 30MHz	60 dB μ V	50 dB μ V

Remark1.: If the average limit is met when using a Quasi-Peak detector, the measurement using the average detector is not required.

2.: The lower limit applies to the band edges.

5.3. Test Procedure

- 5.3.1. To set up the EUT as indicated in ANSI C 63.10. The EUT was placed on the table which has 80 cm height to the ground and 40 cm distance to the conducting wall.
- 5.3.2. Power supplier of the EUT was connected to the AC mains through an Artificial Mains Network (A.M.N.).
- 5.3.3. The AC power supplies to all peripheral devices must be provided through line impedance stabilization network (L.I.S.N.)
- 5.3.4. Checking frequency range from 150kHz to 30 MHz and record the emission which does not have 20 dB below limit.

5.4. Test Results

Please refer to Appendix A.

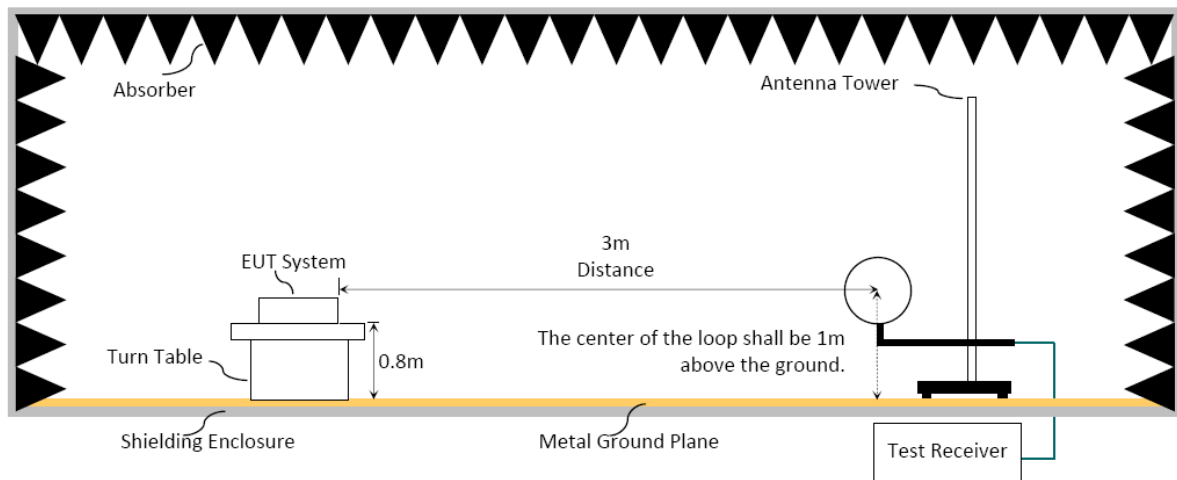
6. RADIATED EMISSION

6.1. Block Diagram of Test Setup

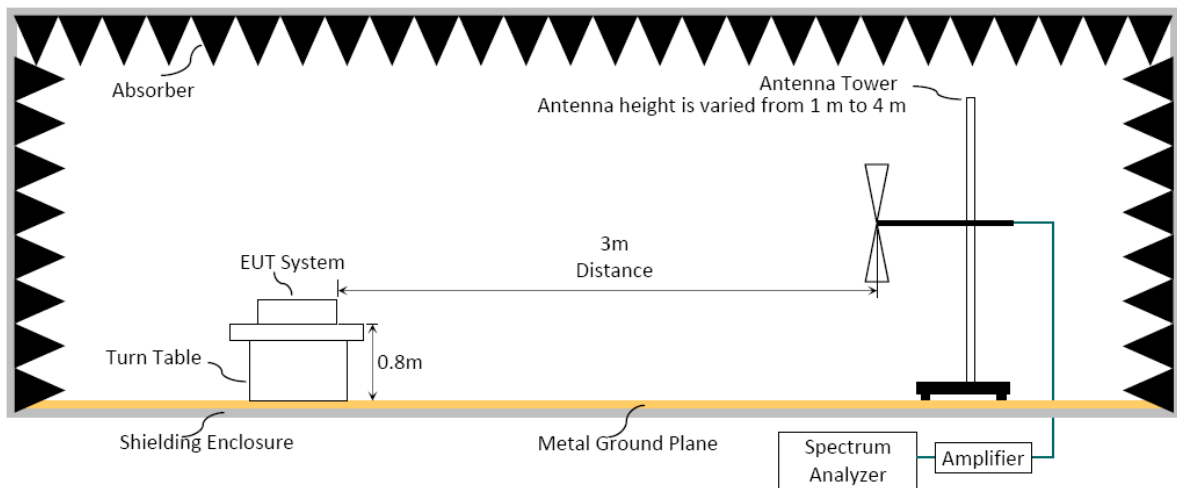
6.1.1. Block Diagram of EUT

Indicated as section 3.9

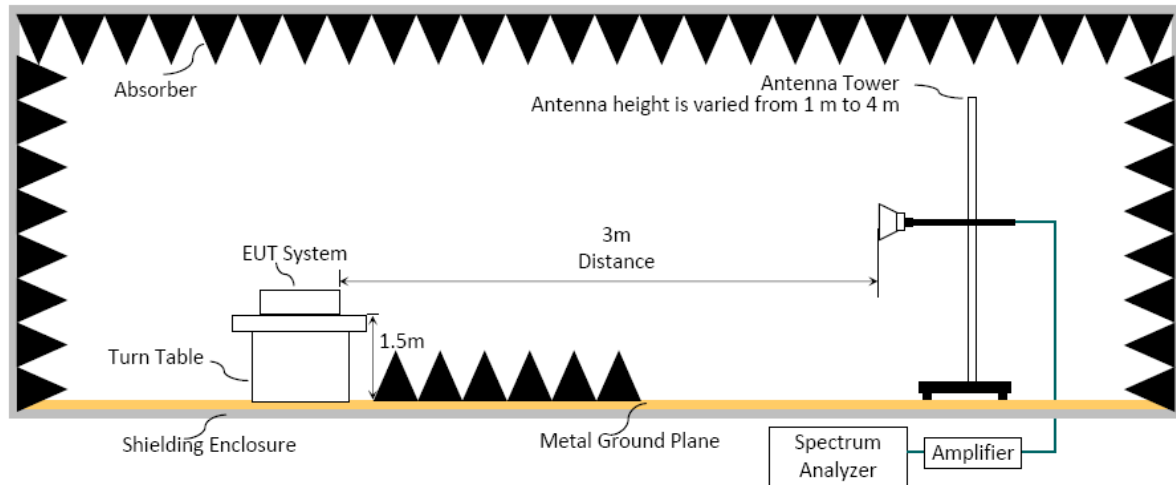
6.1.2. Setup Diagram for 9kHz-30MHz



6.1.3. Setup Diagram for 30-1000MHz



6.1.4. Setup Diagram for above 1GHz



6.2. Radiated Emission Limits

Radiated emissions fall in restricted bands, as defined in Section 15.205 must be in compliance with the radiated emission limits specified in 15.209 as below.

6.2.1. General Limit

Frequency (MHz)	Distance(m)	Limits	
		dB μ V/m	μ V/m
0.009 - 0.490	300	67.6-20 log f(kHz)	2400/f kHz
0.490 - 1.705	30	87.6-20 log f(kHz)	24000/f kHz
1.705 - 30	30	29.5	30
30 - 88	3	40.0	100
88- 216	3	43.5	150
216- 960	3	46.0	200
Above 960	3	54.0	500
Above 1000	3	74.0 dB μ V/m (Peak) 54.0 dB μ V/m (Average)	

Remark : (1) dB μ V/m = 20 log (μ V/m)

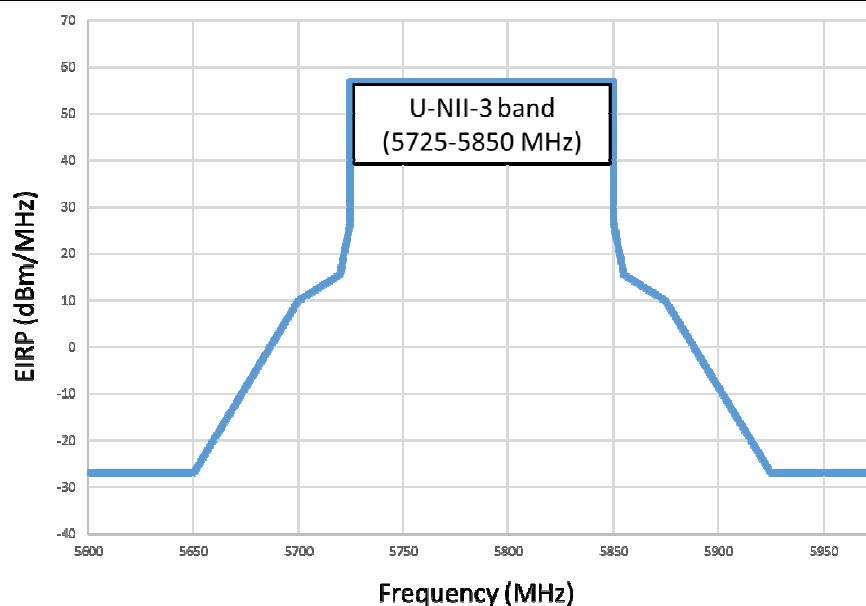
- (2) The tighter limit applies to the edge between two frequency bands.
- (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
- (4) Fundamental and emission fall within operation band are exempted from this section.
- (5) Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

6.2.2. Limit for non-restricted frequency above 1 GHz

Frequency Band (MHz)	E.I.R.P. Limit	Field Strength Limit at 3 m
5150 to 5250	-27 dBm	68.2
5250 to 5350		68.2
5470 to 5725		68.2

Note: Field Strength at 3 m= E.I.R.P. + 95.2 dB

Frequency Band (MHz)	Field Strength Limit at 3 m	
5725 to 5850	☒	15.407(b)(4)(i) All emissions shall be limited to a level of 68.2 dBμV/m at 75 MHz or more above or below the band edge increasing linearly to 105.2dBμV/m at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 110.8 dBμV/m at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 68.2 dBμV/m at the band edge.
	☐	15.407(b)(4)(ii) ,compliance with the emission limits in § 15.247(d) Shall be at least 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power,. Attenuation below the general limits specified in §15.209(a) is not required. In addition,radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c))



6.3. Test Procedure

Frequency Range 9kHz~30MHz:

The EUT setup on the turntable which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

- (1) RBW = 9kHz with peak and average detector.
- (2) Detector: average and peak (9kHz-490kHz)
Q.P. (490kHz-30MHz)

Frequency Range 30MHz ~ 40GHz:

The EUT setup on the turn table which has 80cm (for 30-1000MHz) and 1.5m (for above 1GHz) height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

Frequency below 1GHz:

Spectrum Analyzer is used for pre-testing with following setting:

- (1) RBW = 120KHz
- (2) VBW $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.
- (7) When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required, otherwise using Q.P. for final measurement.

Frequency above 1GHz to 10th harmonic(up to 40 GHz):

Peak Detector:

- (1) RBW = 1MHz
- (2) VBW $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.
- (7) When peak-detected value is lower than limit that the measurement using the average detector is not required, otherwise using average detector for final measurement.

Average Detector:☒ **Option 1:**

(1) RBW = 1MHz

(2) VBW $\geq 1/T$.

Modulation Type	T (ms)	1/T (kHz)	VBW Setting (kHz)
802.11a	1.419	0.705	0.68
802.11ac-VHT20	1.335	0.749	0.75
802.11ac-VHT40	0.6701	1.492	1.5
802.11ac-VHT80	0.194	5.155	5.1

N/A: 1/T is not implemented when duty cycle presented in section 3.7 is $\geq 98\%$.

(1) Detector = Peak.

(2) Sweep time = auto.

(3) Trace mode = max hold.

(4) Allow sweeps to continue until the trace stabilizes.

☐ **Option 2:**

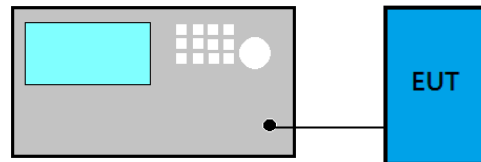
Average Emission Level = Peak Emission Level + D.C.C.F.

6.4. Measurement Result Explanation☒ Peak Emission Level = Antenna Factor + Cable Loss + Meter Reading☒ Average Emission Level = Antenna Factor + Cable Loss + Meter Reading☐ Average Emission Level = Peak Emission Level + DCCFDuty Cycle Correction Factor (DCCF) = $20\log(TX_{on}/TX_{on+off})$ presented in section 3.7☐ ERP = Peak Emission Level - 95.2dB - 2.14dB**6.5. Test Results**

Please refer to Appendix A.

7. EMISSION BANDWIDTH

7.1. Block Diagram of Test Setup



7.2. Specification Limits

Frequency Band (MHz)	Limit
5150 to 5250	Reference only
5250 to 5350	
5470 to 5725	
5725 to 5850	$\geq 500\text{kHz}$

7.3. Test Procedure

Following measurement procedure is reference to KDB 789033 D02 General UNII Test Procedures New Rules v02r01:

■ Applicable to all bands except to 5725 MHz- 5850 MHz

- (1) Set RBW= 1% of the emission bandwidth
- (2) Set VBW > RBW
- (3) Detector = Peak
- (4) Trace mode = max hold
- (5) Setting channel bandwidth function x dB to -26 dB to record the final bandwidth.

■ 5725 MHz- 5850 MHz

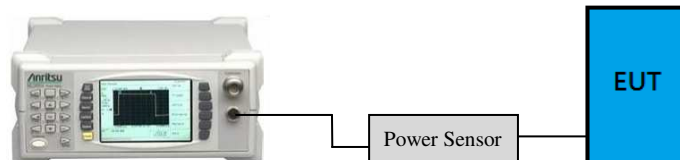
- (1) Set RBW = 100 kHz.
- (2) Set the video bandwidth (VBW) $\geq 3 \times \text{RBW}$.
- (3) Detector = Peak.
- (4) Trace mode = max hold.
- (5) Sweep = auto couple.
- (6) Allow the trace to stabilize.
- (7) Setting channel bandwidth function x dB to -6 dB to record the final bandwidth.

7.4. Test Results

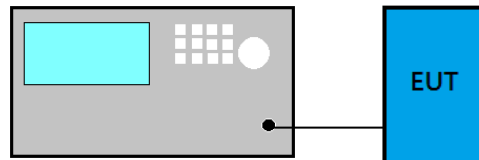
Please refer to Appendix A

8. MAXIMUM OUTPUT POWER

8.1. Block Diagram of Test Setup



- For 802.11ac-VHT80/VHT160 modes only



8.2. Specification Limits

Frequency Band (MHz)	Category	Limit
5150 to 5250	Outdoor Access Point	1 W(30 dBm)/ Max e.i.r.p. ≤ 125 mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon
	Fixed point-to-point Access Point	1 W(30 dBm)
	Indoor Access Point	1 W(30 dBm)
	Mobile and Portable client device	250 mW(24 dBm)
5250 to 5350	N/A	250 mW or $11 \text{ dBm} + 10 \log B$ ^{Note1}
5470 to 5725		250 mW or $11 \text{ dBm} + 10 \log B$ ^{Note1}
5725 to 5850		1 W(30 dBm)

Note 1: B is the 26 dB emission bandwidth, which presented in section 7 and appendix A.1.

8.3. Test Procedure

Following measurement procedure is reference to KDB 789033 D02 General UNII Test Procedures New Rules v02r01:

■ **Method AVGPM (Measurement using an RF average power meter):**

EUT is connected to power sensor and record the maximum average output power and duty cycle factor is added when duty cycle presented in section 3.7 is < 98%.

■ **Method AVGSA-2 (Spectrum channel power) for 802.11ac-VHT80/VHT 160 modes only**

- (1) Set span to at least 1.5 times the OBW
- (2) Set RBW = 1 MHz
- (3) Set the video bandwidth (VBW) ≥ 3 MHz.
- (4) Detector = RMS.
- (5) Trace mode = trace average at least 100 traces
- (6) Sweep = auto couple.
- (7) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges.
- (8) Duty cycle factor is added when duty cycle presented in section 3.7 is < 98%.

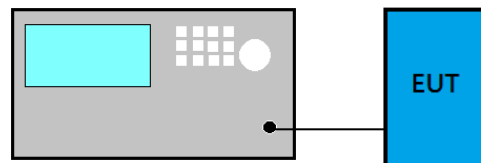
8.4. Test Results

Please refer to Appendix A

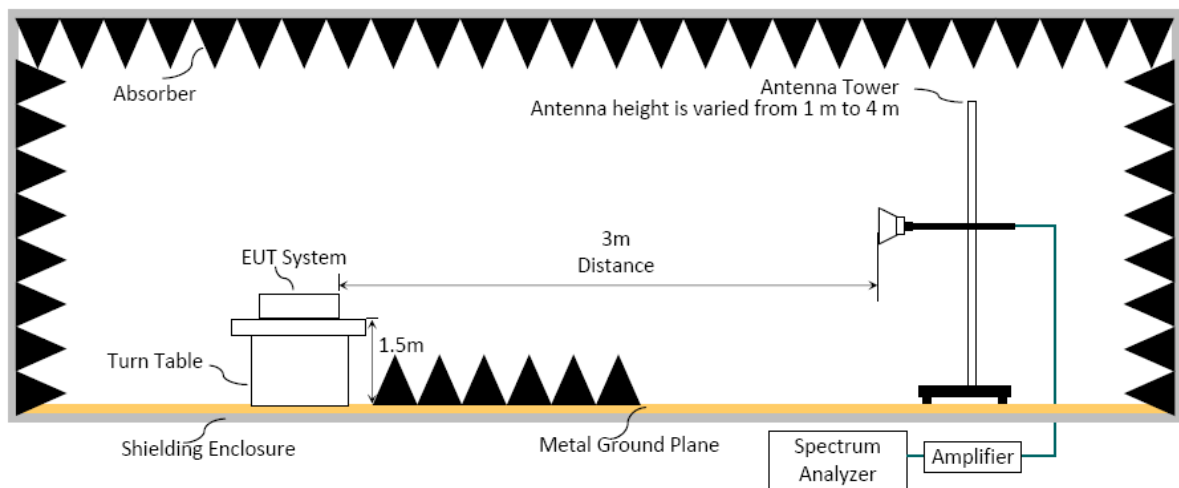
9. EMISSION LIMITATIONS MEASUREMENT

9.1. Block Diagram of Test Setup

- For band edge

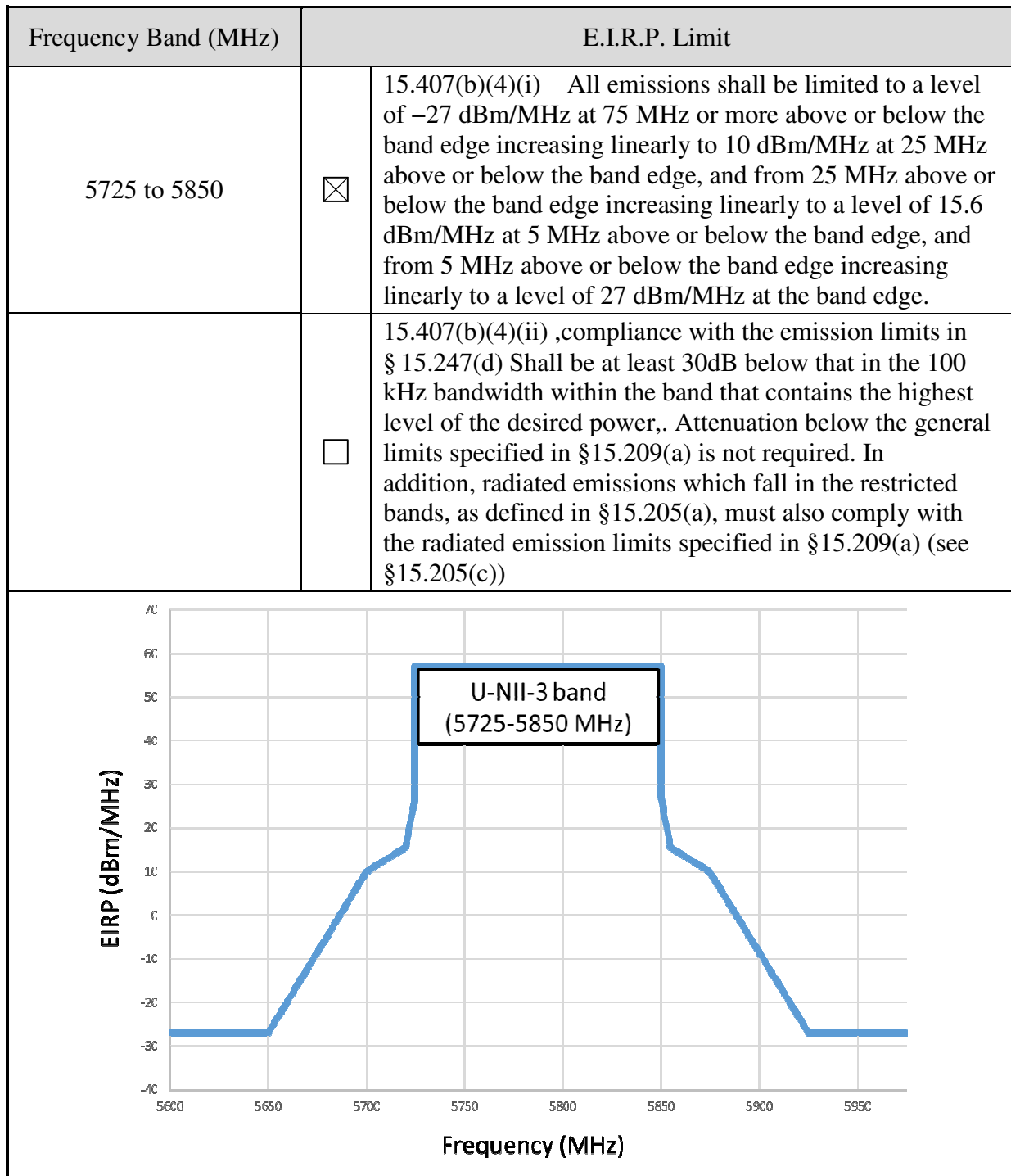


- For outside of the restricted bands



9.2. Specification Limits

Frequency Band (MHz)	E.I.R.P. Limit
5150 to 5250	-27 dBm
5250 to 5350	
5470 to 5725	



9.3. Test Procedure

Following measurement procedure is reference to KDB 789033 D02 General UNII Test Procedures New Rules v02r01:

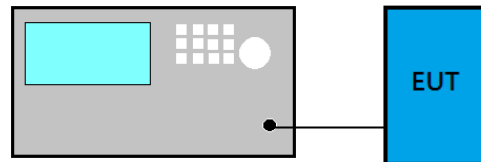
- (1) RBW = 1 MHz
- (2) VBW $\geq 3 \times$ RBW
- (3) Detector = Peak
- (4) Sweep time = auto
- (5) Trace mode = max hold
- (6) Allow sweeps to continue until the trace stabilizes.

9.4. Test Results

Please refer to Appendix A

10. POWER SPECTRAL DENSITY

10.1. Block Diagram of Test Setup



10.2. Specification Limits

Frequency Band (MHz)	Category	Limit
5150 to 5250	Outdoor Access Point	17dBm/MHz
	Fixed point-to-point Access Point	
	Indoor Access Point	
	Mobile and Portable client device	11 dBm/MHz
5250 to 5350	N/A	11 dBm/MHz
5470 to 5725		11 dBm/MHz
5725 to 5850		30dBm/500 kHz

10.3. Test Procedure

Following measurement procedure is reference to KDB 789033 D02 General UNII Test Procedures New Rules v02r01:

■ Method AVGSA-2 (Spectrum channel power)

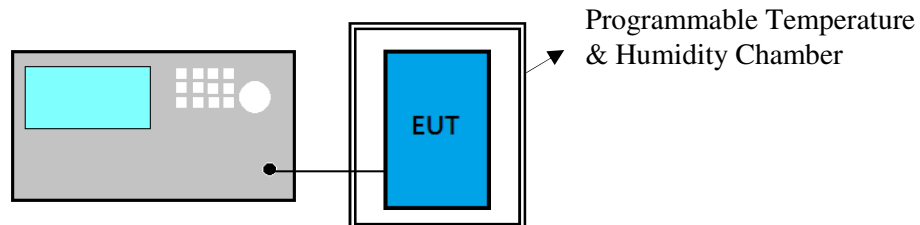
- (1) Set span to at least 1.5 times the OBW
- (2) Set RBW = 1 MHz
- (3) Set the video bandwidth (VBW) ≥ 3 MHz.
- (4) Detector = RMS.
- (5) Trace mode = trace average at least 100 traces
- (6) Sweep = auto couple.
- (7) Use peak search function to find out the maximum power density.
- (8) Duty cycle factor is added when duty cycle presented in section 3.7 is $< 98\%$.

10.4. Test Results

Please refer to Appendix A

11. FREQUENCY STABILITY

11.1. Block Diagram of Test Setup



11.2. Specification Limits

NONE

11.3. Test Procedure

- (1) Frequency: Test frequency.
- (2) Span: enough to cover the complete power envelope
- (3) RBW: 1MHz(modulation ON) ; 10KHz(CW)
- (4) VBW: 1MHz(modulation ON) ; 10KHz(CW)
- (5) Detector Mode: Positive Peak
- (6) Indication mode: Max hold
- (7) Find the peak frequency and take calculate by the formula:
(Measurement Value-declaration frequency)/ declaration frequency)

11.4. Test Results

Please refer to Appendix A



12.DEVIATION TO TEST SPECIFICATIONS

【NONE】



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APPENDIX A

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APPDNDIX A

TEST DATA AND PLOTS

(Model: HSD-0015-Q)



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APPENDIX B

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APPDNDIX B

TEST PHOTOGRAPHS

(Model: HSD-0015-Q)