



REPORT No.: SZ19040375W04

TEST REPORT

APPLICANT : GREAT TALENT TECHNOLOGY LIMITED

PRODUCT NAME : Android Tablet

MODEL NAME : TEL-TE-U5

BRAND NAME : UMX

FCC ID : 2ALZM-TEL-TE-U5

STANDARD(S) : 47 CFR Part 15 Subpart E

RECEIPT DATE : 2019-05-07

TEST DATE : 2019-05-08 to 2019-05-30

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Change History		
Version	Date	Reason for change
1.0	2019-05-30	First edition



1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	GREAT TALENT TECHNOLOGY LIMITED
Applicant Address:	RM602,T3 Software Park,Nanshan,Shenzhen,China
Manufacturer:	SHENZHEN GIEC DIGITAL CO., LTD
Manufacturer Address:	1st&3rd Building, No.26 Puzai Road, Pingdi, Longgang District, Shenzhen, China

1.2. Equipment Under Test (EUT) Description

Product Name:	Android Tablet	
Serial No:	(N/A, marked #1 by test site)	
Hardware Version:	MQ_MPEG_J10F_02G_V1.0	
Software Version:	GK_MJQ1020-user.20190527	
Modulation Type:	OFDM	
Modulation Mode:	802.11a, 802.11n(HT20), 802.11n(HT40)	
Operating Frequency Range:	5.180 GHz- 5.240 GHz; 5.260 GHz -5.320 GHz ; 5.500 GHz -5.720 GHz ; 5.745GHz- 5.825GHz	
Antenna Type:	FPC Antenna	
Antenna Gain:	2.1 dBi	
Accessory Information:	Battery	
	Brand Name:	ENER LONG
	Model No.:	EL26140156P
	Serial No.:	(N/A, marked #1 by test site)
	Capacity:	6800mAh
	Rated Voltage:	3.7V
	Charge Limit:	4.2 V
	AC Adapter	
	Brand Name:	TEKA
	Model No.:	TEKA012-0502000UK
	Serial No.:	(N/A, marked #1 by test site)
	Rated Input:	5V=2A
	Rated Output:	100-240V ~ 50/60Hz 0.35A



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Note 1: WIFI hotspot does not support U-NII band.

Note 2: During test, the duty cycle of the EUT was setting to 100%.

Note 3: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.3.The channel number and frequency of EUT

Frequency Range: 5180MHz-5240MHz				
Bandwidth	Channel	Frequency (MHz)	Channel	Frequency (MHz)
20MHz	36	5180	40	5200
	44	5220	48	5240
40MHz	38	5190	46	5230
Frequency Range: 5260MHz-5320MHz				
Bandwidth	Channel	Frequency (MHz)	Channel	Frequency (MHz)
20MHz	52	5260	56	5280
	60	5300	64	5320
40MHz	54	5270	62	5310
Frequency Range: 5500MHz-5720MHz				
Bandwidth	Channel	Frequency (MHz)	Channel	Frequency (MHz)
20MHz	100	5500	105	5520
	108	5540	112	5560
	116	5580	120	5600
	124	5620	128	5640
	132	5660	136	5680
	140	5700	144	5720
40MHz	102	5510	110	5550
	118	5590	126	5630
	134	5670	142	5710
Frequency Range: 5745-5825MHz				
Bandwidth	Channel	Frequency (MHz)	Channel	Frequency (MHz)
20MHz	149	5745	153	5765
	157	5785	161	5805
	165	5825		
40MHz	151	5775	159	5795

Note 1: The black bold channels were selected for test.



1.4. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart E (U-NII band) for the EUT FCC ID Certification:

No	Identity	Document Title
1	47 CFR Part 15 (5-1-14 Edition)	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Test Date	Test Engineer	Result
1	15.203	Antenna Requirement	N/A	N/A	PASS
2	ANSI C63.10	Duty Cycle of the test signal	May 24, 2019	Wang Meng	PASS
3	15.407(a) (e)	Emission Bandwidth	May 20, 2019	Wang Meng	PASS
4	15.407(a)	Maximum conducted output Power	May 24, 2019	Wang Meng	PASS
5	15.407(a)	Peak Power spectral density	May 24, 2019	Wang Meng	PASS
6	15.407(g)	Frequency Stability	May 24, 2019	Wang Meng	PASS
7	15.207	Conducted Emission	May 08, 2019	Wu Zhongwen	PASS
8	15.407(b)	Restricted Frequency Bands	May 22&23, 2019	Wu Zhongwen	PASS
9	15.407(b)	Radiated Emission	May 30, 2019	Wu Zhongwen	PASS

Note1: The DFS test report was documented in a separate report (Report No.: SZ19040375W05).

Note2: The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.10 2013.

Note3: These RF tests were performed according to the method of measurements prescribed in KDB789033 D02 General UNII Test Procedures New Rules v01r03.

Note4: The path loss during the RF test is calibrated to correct the results by the offset setting in the test equipments. The ref offset 11.5dB contains two parts that cable loss 1.5dB and Attenuator 10dB.

1.5. Environmental Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15 - 35
Relative Humidity (%):	30 -60
Atmospheric Pressure (kPa):	86-106



2. 47 CFR Part 15E Requirements

2.1. Antenna requirement

2.1.1. Applicable Standard

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

2.1.2. 2.1.2 Result: Compliant

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

2.2. Duty Cycle of the test signal

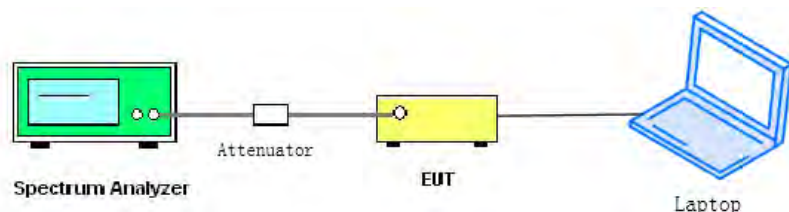
2.2.1. Requirement

Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%). When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be used to ensure that measurements are made only during transmissions at the maximum power control level. Such sweep triggering/signal gating techniques will require knowledge of the minimum transmission duration (T) over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. Sweep triggering/signal gating techniques can then be used if the measurement/sweep time of the analyzer can be set such that it does not exceed T at any time that data are being acquired (i.e., no transmitter OFF-time is to be considered).

When continuous transmission cannot be achieved and sweep triggering/signal gating cannot be implemented, alternative procedures are provided that can be used to measure the average power; however, they will require an additional measurement of the transmitter duty cycle (D). Within this subclause, the duty cycle refers to the fraction of time over which the transmitter is ON and is transmitting at its maximum power control level. The duty cycle is considered to be constant if variations are less than $\pm 2\%$; otherwise, the duty cycle is considered to be nonconstant.

2.2.2. Test Description

A. Test Set:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

2.2.3. Test Procedure

KDB 789033 Section B was used in order to prove compliance.

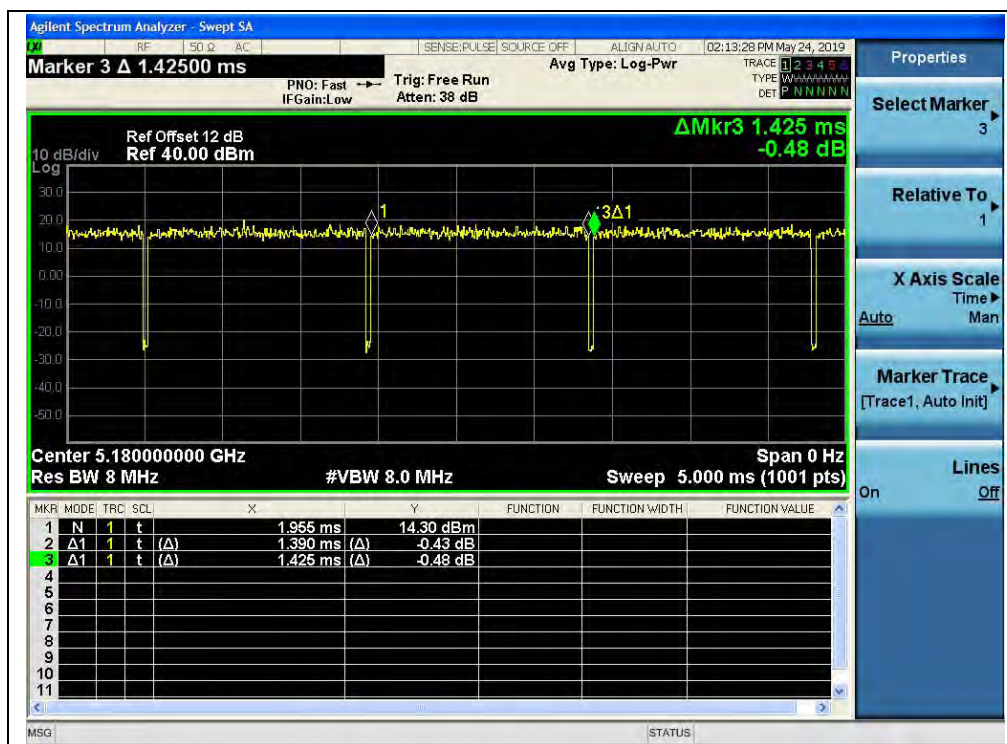


2.2.4. Test Result

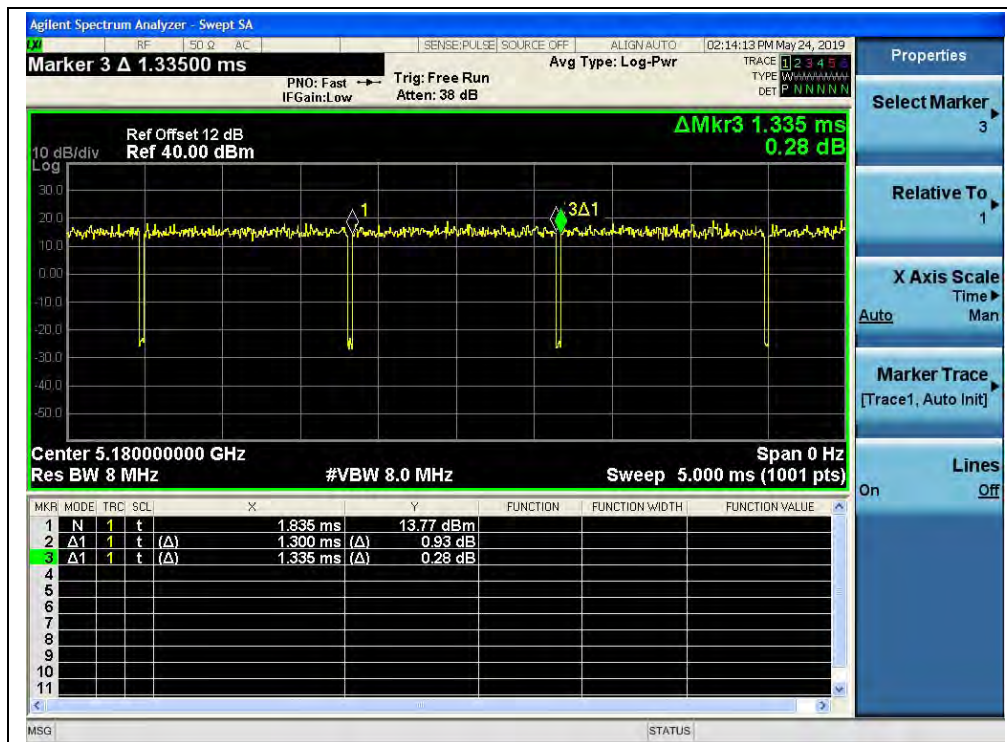
A. Test Verdict:

Test Mode	Duty Cycle (%) (D)	Duty Factor (10*log[1/D])
802.11a	97.54	0.11
802.11n(HT20)	97.38	0.12
802.11n(HT40)	94.74	0.23

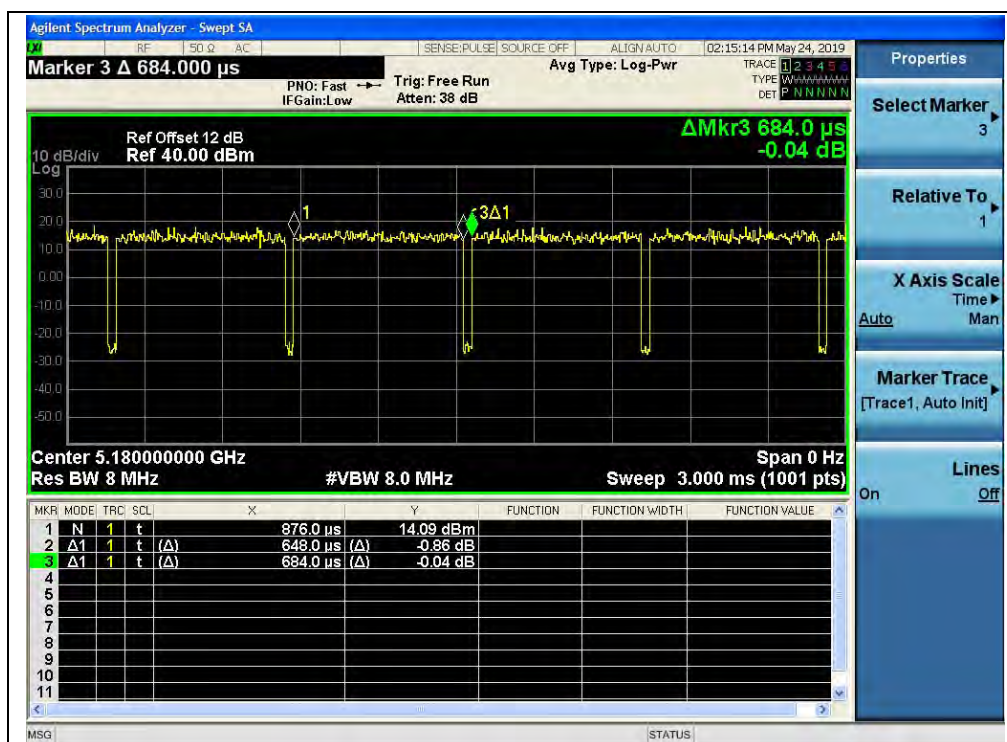
B. Test Plots



(CH36_5180MHz_802.11a)



(CH36_5180MHz_802.11n(HT20))



(CH38_5190MHz_802.11n(HT40))

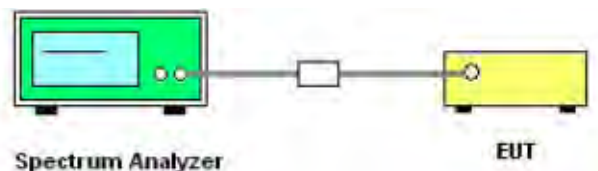
2.3. Emission Bandwidth

2.3.1. Requirement

For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement. Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

2.3.2. Test Description

A. Test Set:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50 Ohm; the path loss as the factor is calibrated to correct the reading.

2.3.3. Test Procedure

1. KDB 789033 Section C) 1) Emission Bandwidth was used in order to prove compliance
 - a) Set RBW = approximately 1% of the emission bandwidth.
 - b) Set the VBW > RBW.
 - c) Detector = Peak.
 - d) Trace mode = max hold.
 - e) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
2. KDB 789033 Section C) 2) minimum emission bandwidth for the band 5.725-5.85GHz was used in order to prove compliance.

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

 - a) Set RBW = 100 kHz.
 - b) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.



- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

2.3.4. Test Result

802.11a Test mode

A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	24.79
44	5220	24.16
48	5240	23.35 ^{Note}
52	5260	25.19
60	5300	24.36
64	5320	26.92
100	5500	29.14
120	5600	29.21
144	5720	28.27
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
144	5720	15.16
149	5745	15.39
157	5785	15.09
165	5825	15.15

Note: The high frequency of the -26dB is 5250.08MHz which is in the DFS frequency range, so DFS testing is required. Please refer to DFS report (Report No.: SZ19040375W05).



B. Test Plots



(Channel 36, 5180MHz, 802.11a,)



(Channel 44, 5220 MHz, 802.11a,)



(Channel 48, 5240MHz, 802.11a,)



(Channel 48, 5240MHz, fh of -26dB, 802.11a,)



(Channel 52, 5260MHz, 802.11a,)



(Channel 60, 5300 MHz, 802.11a,)



(Channel 64, 5320MHz, 802.11a,)



(Channel 100, 5500MHz, 802.11a,)



(Channel 120, 5600 MHz, 802.11a,)



(Channel 144, 5720MHz, 802.11a,)



(Channel 144, 5720MHz, 802.11a,)



(Channel 149, 5745MHz, 802.11a)



(Channel 157, 5785MHz, 802.11a)



(Channel 165, 5825MHz, 802.11a)



802.11n (HT20) Test mode

A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	22.84
44	5220	23.16
48	5240	22.94 Note
52	5260	23.26
60	5300	26.35
64	5320	26.87
100	5500	28.42
120	5600	28.78
144	5720	29.10
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
144	5720	16.25
149	5745	15.13
157	5785	15.73
165	5825	15.66

Note: The high frequency of the -26dB is 5250.23MHz which is in the DFS frequency range, so DFS testing is required. Please refer to DFS report (Report No.: SZ19040375W05).

B. Test Plots



(Channel 36, 5180MHz, 802.11 n (HT20))



(Channel 44, 5220 MHz, 802.11 n (HT20))



(Channel 48, 5240MHz, 802.11 n (HT20))



(Channel 48, 5240MHz, fh of -26dB, 802.11 n (HT20))



(Channel 52, 5260MHz, 802.11 n (HT20))



(Channel 60, 5300 MHz, 802.11 n (HT20))



(Channel 64, 5320MHz, 802.11 n (HT20))



(Channel 100, 5500MHz, 802.11 n (HT20))



(Channel 120, 5600 MHz, 802.11 n (HT20))



(Channel 144, 5720MHz, 802.11 n (HT20))



(Channel 144, 5720MHz, 802.11 n (HT20))



(Channel 149, 5745MHz, 802.11 n (HT20))



(Channel 157, 5785MHz, 802.11 n (HT20))



(Channel 165, 5825MHz, 802.11 n (HT20))

802.11n (HT40) Test mode

A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
38	5190	57.92
46	5230	56.96 Note
54	5270	58.89
62	5310	59.60
102	5510	73.00
126	5630	70.58
142	5710	74.51
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
142	5710	35.21
151	5755	35.31
159	5795	35.22

Note: The high frequency of the -26dB is 5250.34MHz which is in the DFS frequency range, so DFS testing is required. Please refer to DFS report (Report No.: SZ19040375W05).



B. Test Plots



(Channel 38, 5190MHz, 802.11n (HT40))



(Channel 46, 5230 MHz, 802.11n (HT40))



(Channel 46, 5230 MHz, fh of -26dB, 802.11n (HT40))



(Channel 54, 5270MHz, 802.11n (HT40))



(Channel 62, 5310 MHz, 802.11n (HT40))



(Channel 102, 5510MHz, 802.11n (HT40))



(Channel 126, 5630 MHz, 802.11n (HT40))



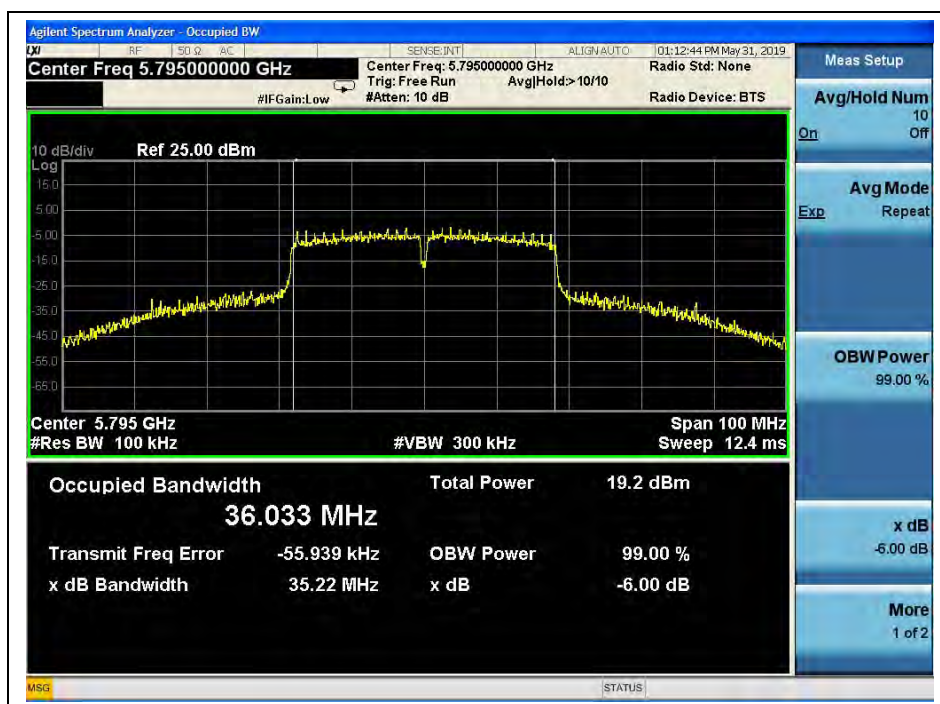
(Channel 142, 5710MHz, 802.11n (HT40))



(Channel 142, 5710MHz, 802.11n (HT40))



(Channel 151, 5755 MHz, 802.11n (HT40))



(Channel 159, 5795MHz, 802.11n (HT40))

2.4. Maximum conducted output power

2.4.1. Requirement

(1) For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

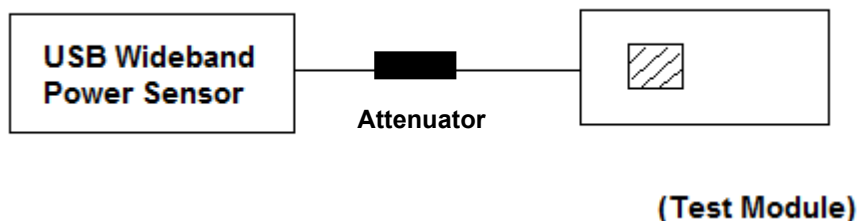
(4) According to KDB662911D01 Measure-and-sum technique, the conducted emission level (e.g., transmit power or power in specified bandwidth) is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in units that are directly proportional to power.

(5) According to KDB 662911 D01, the directional gain = $G_{\text{ANT}} + 10 \log(N_{\text{ANT}})$ dBi, where G_{ANT} is the antenna gain in dBi, N_{ANT} is the number of outputs.

2.4.2. Test Description

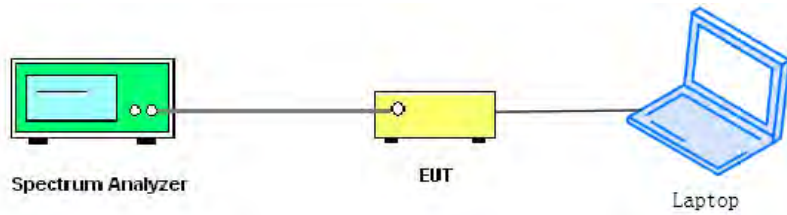
Section E) 3) of KDB 789033 defines a methodology using a USB Wideband Power Sensor.

A. Test Setup:



The EUT (Equipment under the test) which is coupled to the USB Wideband Power Sensor; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading, all test result in USB Wideband Power Sensor.

For ac (VHT80) mode power



The EUT (Equipment under the test) is coupled to the Spectrum analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading, all test result in Spectrum analyzer.

2.4.3. Limits

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz.

Mode	Band	Channel (MHz)	26dB BW (MHz)	$11+10\log(26\text{dB BW})$	Limits (dBm)
a	UNII-2a	5260	25.19	25.01	24.00
		5300	24.36	24.87	24.00
		5320	26.92	25.30	24.00
	UNII-2c	5500	29.14	25.64	24.00
		5600	29.21	25.66	24.00
		5720	28.27	25.51	24.00
n20	UNII-2a	5260	23.26	24.67	24.00
		5300	26.35	25.21	24.00
		5320	26.87	25.29	24.00
	UNII-2c	5500	28.42	25.54	24.00
		5600	28.78	25.59	24.00
		5720	29.10	25.64	24.00

**2.4.4. Test Result****802.11a Test mode**

Channel	Frequency (MHz)	Measured Peak Power (dBm)		Limit (dBm)	Verdict
36	5180	22.58		24	PASS
44	5220	22.65			
48	5240	22.31			
52	5260	22.25			
60	5300	21.94			
64	5320	21.90			
100	5500	21.00			
120	5600	20.82			
144	5720	20.27			
149	5745	21.02		30	
157	5785	20.89			
165	5825	20.57			
Channel	Frequency (MHz)	Average Power (dBm)		Limit (dBm)	Verdict
		Measured	Duty factor Calculated		
36	5180	12.74	12.85	24	PASS
44	5220	12.72	12.83		
48	5240	12.59	12.70		
52	5260	12.4	12.51		
60	5300	12.17	12.28		
64	5320	12.03	12.14		
100	5500	11.73	11.84		
120	5600	11.64	11.75		
144	5720	11.39	11.50		
149	5745	12.23	12.34	30	
157	5785	12.18	12.29		
165	5825	12.05	12.16		

**802.11n (HT20) Test mode**

Channel	Frequency (MHz)	Measured Peak Power (dBm)		Limit (dBm)	Verdict
36	5180	22.69		24	PASS
44	5220	22.51			
48	5240	22.39			
52	5260	22.25			
60	5300	21.94			
64	5320	21.62			
100	5500	21.03			
120	5600	20.65			
144	5720	20.26			
149	5745	20.91		30	
157	5785	20.75			
165	5825	20.44			
Channel	Frequency (MHz)	Measured Average Power (dBm)		Limit (dBm)	Verdict
		Measured	Duty factor Calculated		
36	5180	12.80	12.92	24	PASS
44	5220	12.70	12.82		
48	5240	12.56	12.68		
52	5260	12.35	12.47		
60	5300	12.14	12.26		
64	5320	11.46	11.58		
100	5500	11.71	11.83		
120	5600	11.62	11.74		
144	5720	11.36	11.48		
149	5745	12.19	12.31	30	
157	5785	12.12	12.24		
165	5825	11.98	12.10		

**802.11n (HT40) Test mode**

Channel	Frequency (MHz)	Measured Peak Power (dBm)		Limit (dBm)	Verdict
38	5190	22.84		24	PASS
46	5230	22.50			
54	5270	22.62			
62	5310	22.07			
102	5510	21.47			
126	5630	21.06			
142	5710	20.60			
151	5755	21.66		30	
159	5795	21.39			
Channel	Frequency (MHz)	Measured Average Power (dBm)		Limit (dBm)	Verdict
		Measured	Duty factor Calculated		
38	5190	11.71	11.94	24	PASS
46	5230	11.35	11.58		
54	5270	11.55	11.78		
62	5310	11.03	11.26		
102	5510	11.12	11.35		
126	5630	10.97	11.20		
142	5710	10.35	10.58		
151	5755	12.29	12.52	30	
159	5795	12.07	12.30		

2.5. Peak Power spectral density

2.5.1. Requirement

(1) For client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

(3) For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500KHz band.

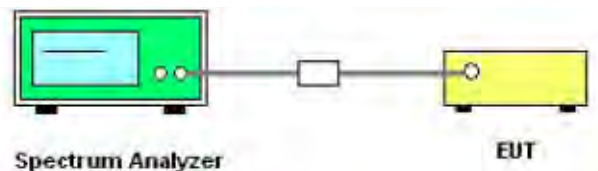
If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(4) According to KDB662911D01 Measure-and-sum technique, the conducted emission level (e.g., transmit power or power in specified bandwidth) is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in units that are directly proportional to power.

(5) According to KDB 662911 D01, the directional gain = $G_{ANT} + 10\log(N_{ANT})$ dBi, where G_{ANT} is the antenna gain in dBi, N_{ANT} is the number of outputs.

2.5.2. Test Description

A. Test Set:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.



2.5.3. Test Procedure

KDB 789033 Section F) Maximum Power Spectral Density (PSD) Method SA-1 was used in order to prove compliance

- 1) Set span to encompass the entire 26-dB emission bandwidth
- 2) Set RBW = 1 MHz. Set VBW $\geq$ 3 MHz.
- 3) Number of points in sweep $\geq$ 2 Span / RBW. Sweep time = auto.
- 4) Detector = Peak
- 5) Trace mode=Max hold
- 6) Record the max value

2.5.4. Test Result

802.11a Test mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
36	5180	10.09	11	PASS
44	5220	10.08		
48	5240	9.66		
52	5260	9.96		
60	5300	9.85		
64	5320	9.57		
100	5500	8.29		
120	5600	7.58		
144	5720	7.62		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
144	5720	4.25	30	PASS
149	5745	8.06		
157	5785	7.75		
165	5825	7.80		



B. Test Plots



(Channel 36, 5180MHz, 802.11a,)



(Channel 44, 5220 MHz, 802.11a,)



(Channel 48, 5240MHz, 802.11a,)



(Channel 52, 5260MHz, 802.11a,)



(Channel 60, 5300 MHz, 802.11a,)



(Channel 64, 5320MHz, 802.11a,)



(Channel 100, 5500MHz, 802.11a,)



(Channel 120, 5600 MHz, 802.11a,)



(Channel 144, 5720MHz, 802.11a,)



(Channel 144, 5720MHz, 802.11a,)



(Channel 149, 5745MHz, 802.11a)



(Channel 157, 5785MHz, 802.11a)



(Channel 165, 5825MHz, 802.11a)

802.11n (HT20) Test mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
36	5180	9.97	11	PASS
44	5220	9.97		
48	5240	8.57		
52	5260	9.30		
60	5300	9.14		
64	5320	8.77		
100	5500	9.04		
116	5600	8.46		
144	5720	8.04		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
144	5720	4.14	30	PASS
149	5745	8.08		
157	5785	8.14		
165	5825	8.38		

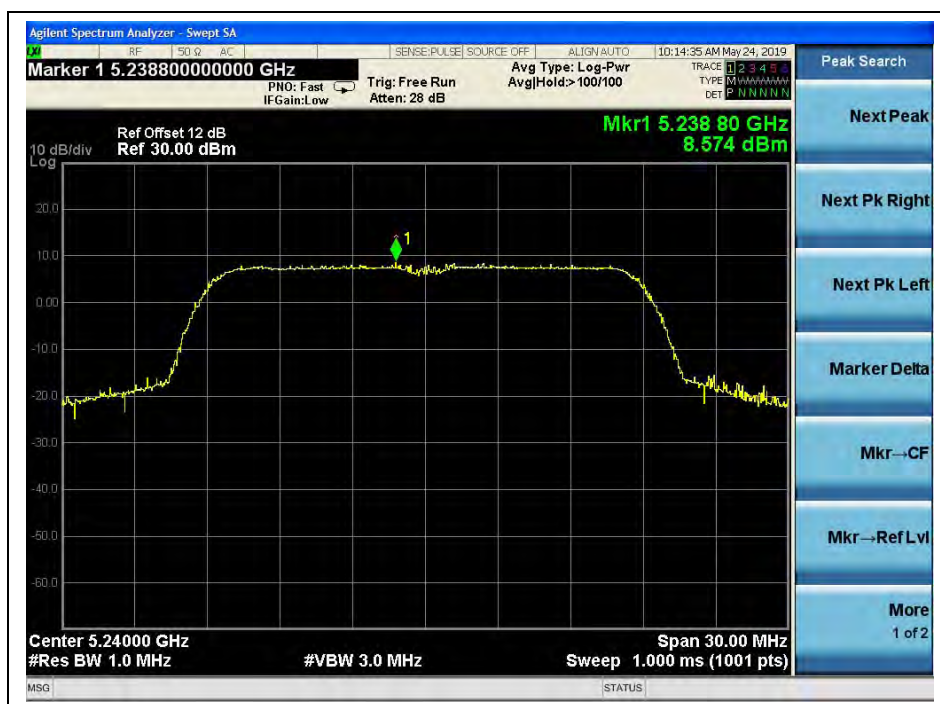
B. Test Plots



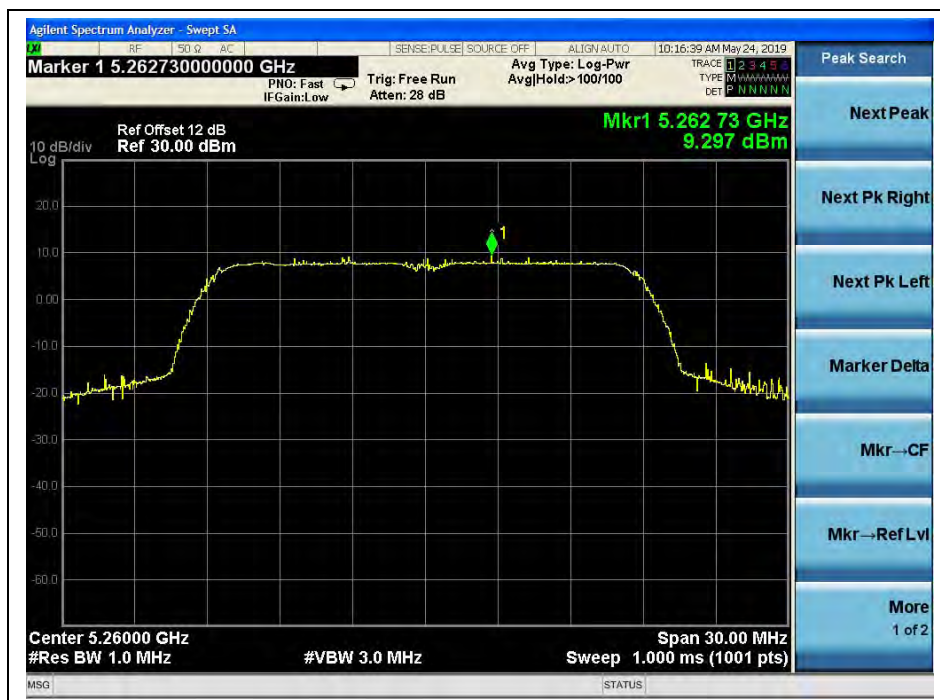
(Channel 36, 5180MHz, 802.11 n (HT20))



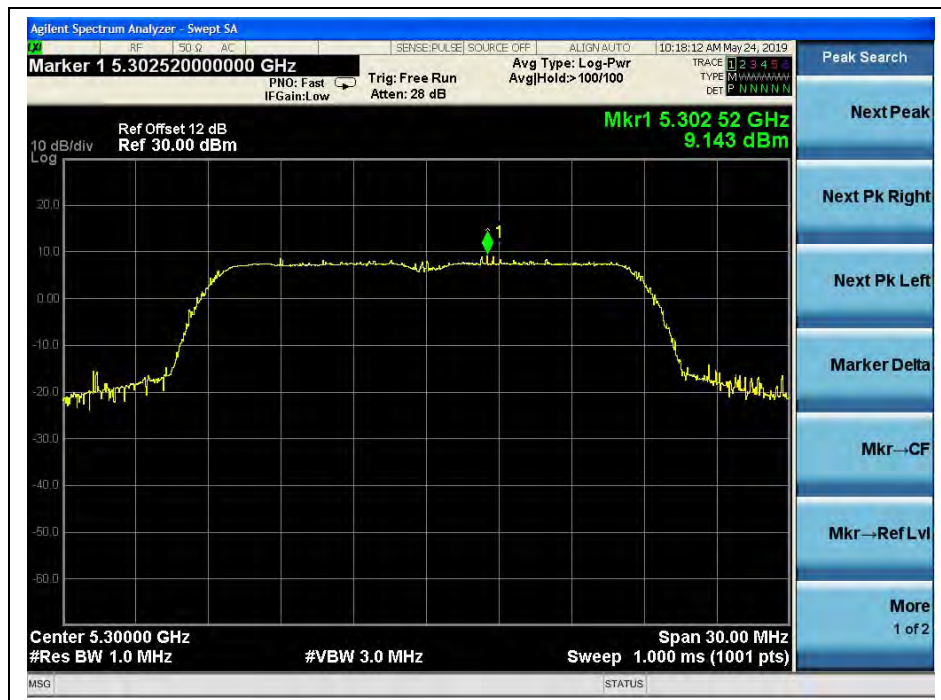
(Channel 44, 5220 MHz, 802.11 n (HT20))



(Channel 48, 5240MHz, 802.11 n (HT20))



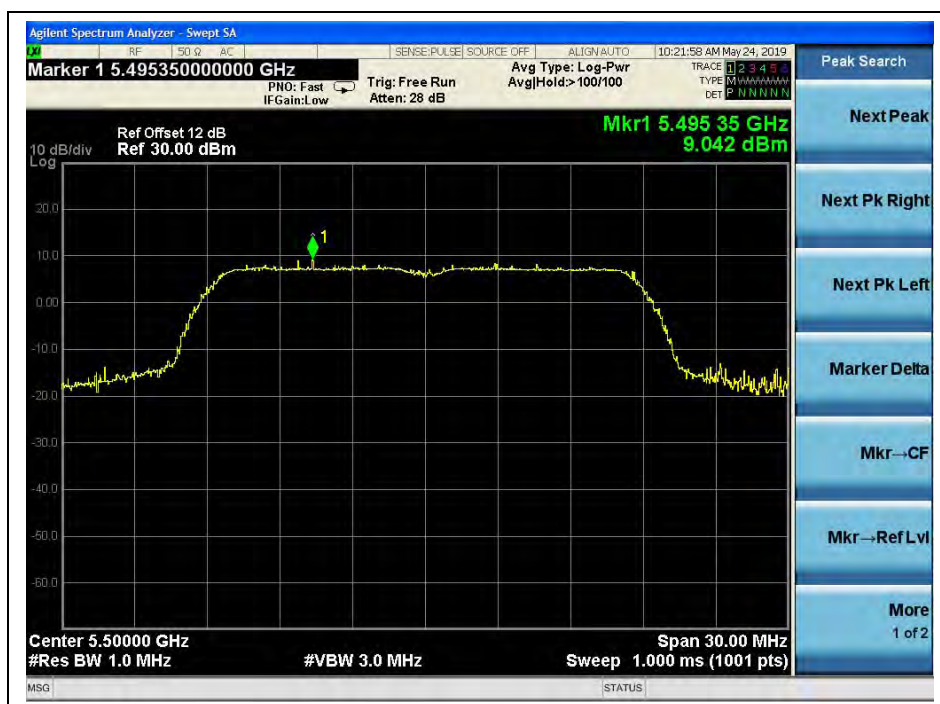
(Channel 52, 5260MHz, 802.11 n (HT20))



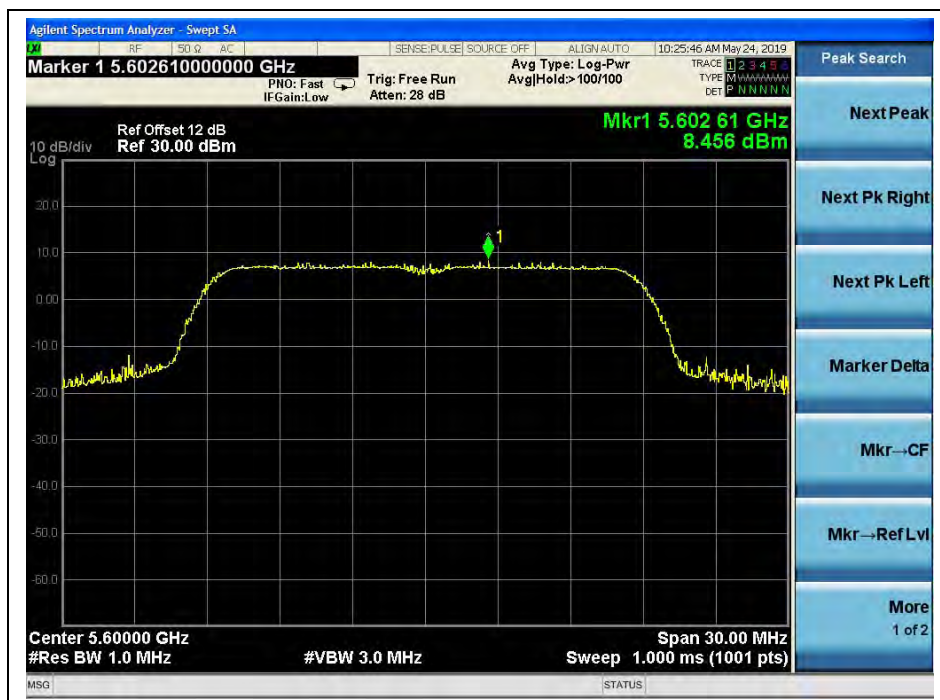
(Channel 60, 5300 MHz, 802.11 n (HT20))



(Channel 64, 5320MHz, 802.11 n (HT20))



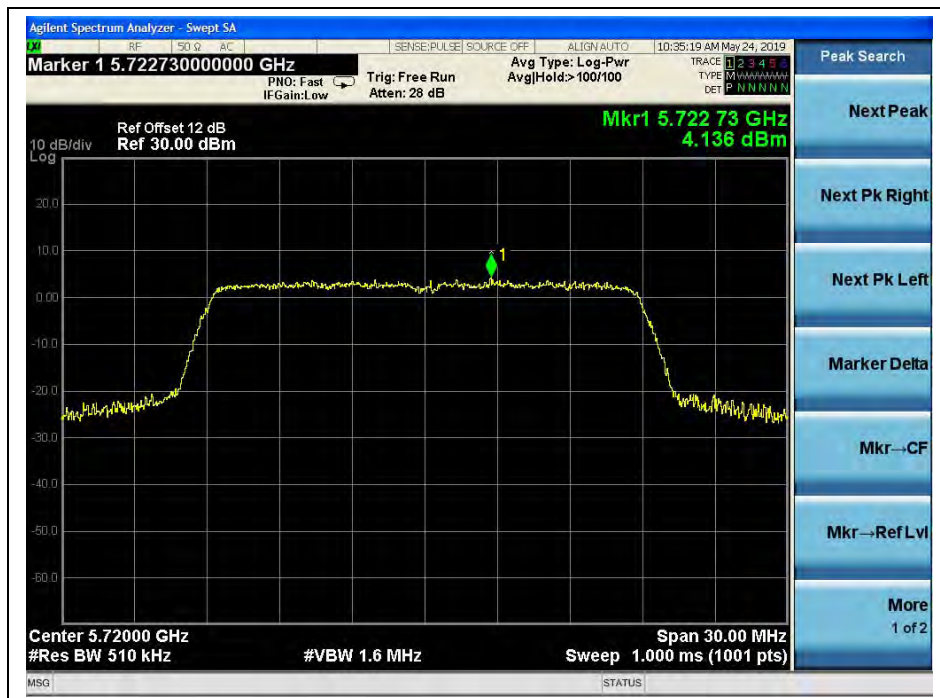
(Channel 100, 5500MHz, 802.11 n (HT20))



(Channel 120, 5600 MHz, 802.11 n (HT20))



(Channel 144, 5720MHz, 802.11 n (HT20))



(Channel 144, 5720MHz, 802.11 n (HT20))



(Channel 149, 5745MHz, 802.11 n (HT20))



(Channel 157, 5785MHz, 802.11 n (HT20))



(Channel 165, 5825MHz, 802.11 n (HT20))

802.11n (HT40) Test mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
38	5190	9.61	11	PASS
46	5230	9.92		
54	5270	9.67		
62	5310	9.19		
102	5510	9.15		
126	5630	8.12		
142	5710	8.35		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
142	5710	5.00	30	PASS
151	5755	5.50		
159	5795	5.21		



B. Test Plots



(Channel 38, 5190MHz, 802.11n (HT40))



(Channel 46, 5230 MHz, 802.11n (HT40))



(Channel 54, 5270MHz, 802.11n (HT40))



(Channel 62, 5310 MHz, 802.11n (HT40))



(Channel 102, 5510MHz, 802.11n (HT40))



(Channel 126, 5630 MHz, 802.11n (HT40))



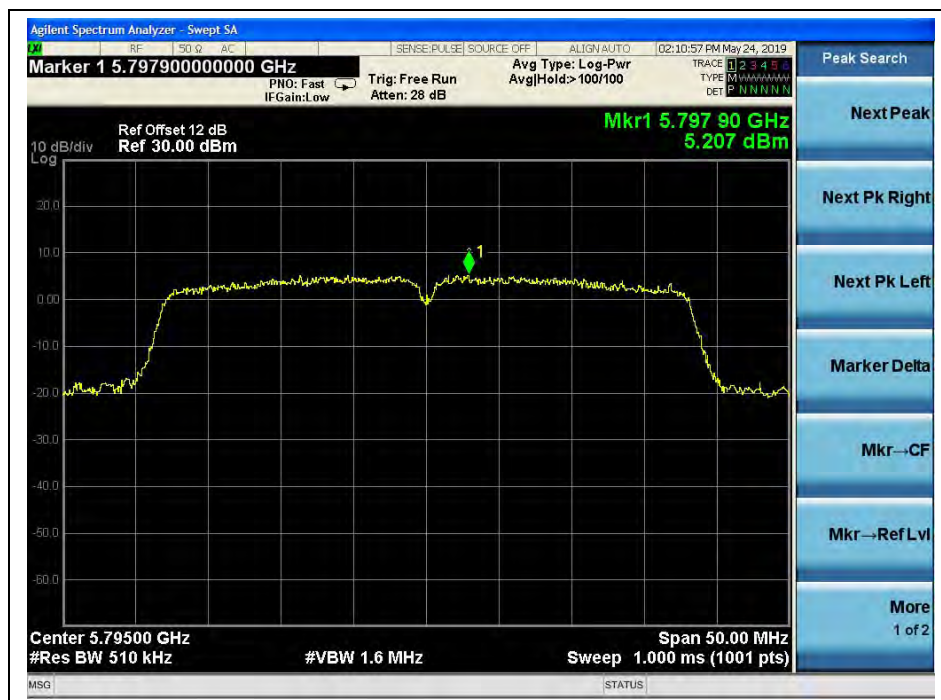
(Channel 142, 5710MHz, 802.11n (HT40))



(Channel 142, 5710MHz, 802.11n (HT40))



(Channel 151, 5755 MHz, 802.11n (HT40))



(Channel 159, 5795MHz, 802.11n (HT40))



2.6. Frequency Stability

2.6.1. Requirement

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

2.6.2. Test Procedure

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between 5°C to 40°C. The temperature was incremented by 10° intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded. Data for the worst case channel is shown below.

2.6.3. Test Result

U-NII-1 (Ch. 36) 5180MHz				
VOLTAGE (%)	POWER (VDC)	TEMP (°C)	Freq Dev. (Hz)	Deviation (ppm)
100%	5.00	+20(Ref)	25	0.005
100%		-30	47	0.009
100%		-20	50	0.010
100%		-10	39	0.008
100%		0	31	0.006
100%		+10	25	0.005
100%		+20	27	0.005
100%		+30	35	0.007
100%		+40	44	0.008
100%		+50	49	0.009
85%	4.25	+20	52	0.010
115%	5.57	+20	43	0.008



U-NII-2A (Ch. 52)				
5260MHz				
VOLTAGE (%)	POWER (VDC)	TEMP (°C)	Freq Dev. (Hz)	Deviation (ppm)
100%	5.00	+20(Ref)	30	0.006
100%		-30	53	0.010
100%		-20	46	0.009
100%		-10	39	0.007
100%		0	32	0.006
100%		+10	33	0.006
100%		+20	37	0.007
100%		+30	45	0.009
100%		+40	49	0.009
100%		+50	56	0.011
85%	4.25	+20	28	0.005
115%	5.57	+20	31	0.006

U-NII-2C (Ch. 100)				
5500MHz				
VOLTAGE (%)	POWER (VDC)	TEMP (°C)	Freq Dev. (Hz)	Deviation (ppm)
100%	5.00	+20(Ref)	19	0.003
100%		-30	48	0.009
100%		-20	37	0.007
100%		-10	29	0.005
100%		0	20	0.004
100%		+10	18	0.003
100%		+20	23	0.004
100%		+30	27	0.005
100%		+40	34	0.006
100%		+50	44	0.008
85%	4.25	+20	26	0.005
115%	5.57	+20	35	0.006



U-NII-3 (Ch. 149) 5745MHz				
VOLTAGE (%)	POWER (VDC)	TEMP (°C)	Freq Dev. (Hz)	Deviation (ppm)
100%	5.00	+20(Ref)	24	0.004
100%		-30	50	0.009
100%		-20	46	0.008
100%		-10	38	0.007
100%		0	30	0.005
100%		+10	22	0.004
100%		+20	29	0.005
100%		+30	24	0.004
100%		+40	37	0.006
100%		+50	43	0.007
85%	4.25	+20	49	0.009
115%	5.57	+20	37	0.006

2.7. Conducted Emission

2.7.1. Requirement

According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN).

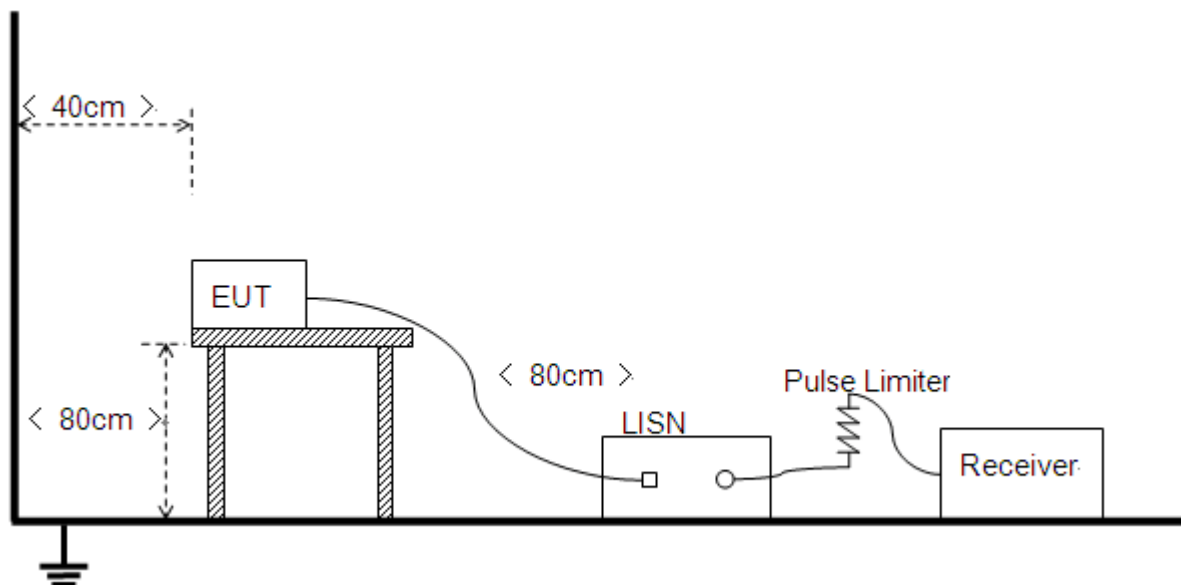
Frequency range (MHz)	Conducted Limit (dB μ V)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

NOTE:

- (a) The lower limit shall apply at the band edges.
- (b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

2.7.2. Test Description

A. Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10: 2013.



2.7.3. Test Result

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.

Note: Both of the test voltage AC 120V/60Hz and AC 230V/50Hz were considered and tested respectively, only the results of the worst case AC 120V/60Hz were recorded in this report.

A. Test setup:

Test Mode: EUT+ADAPTER+ WIFI TX

Test Voltage: AC 120V/60Hz

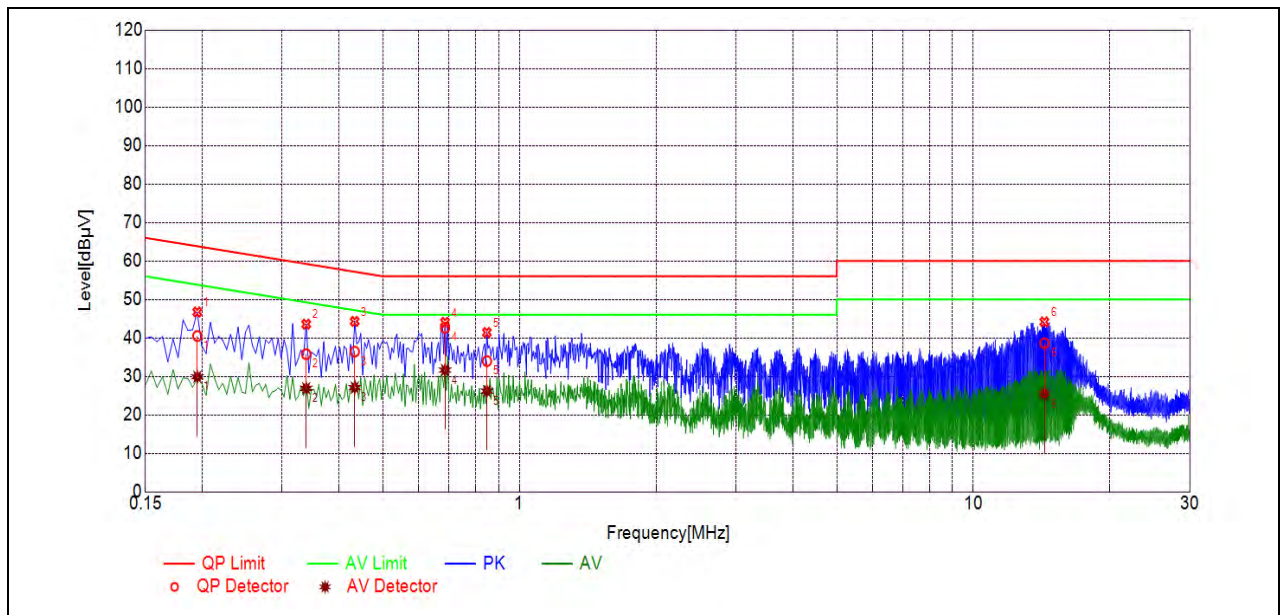
The measurement results are obtained as below:

$$E \text{ [dB}\mu\text{V]} = U_R + L_{\text{Cable loss}} \text{ [dB]} + A_{\text{Factor}}$$

U_R : Receiver Reading

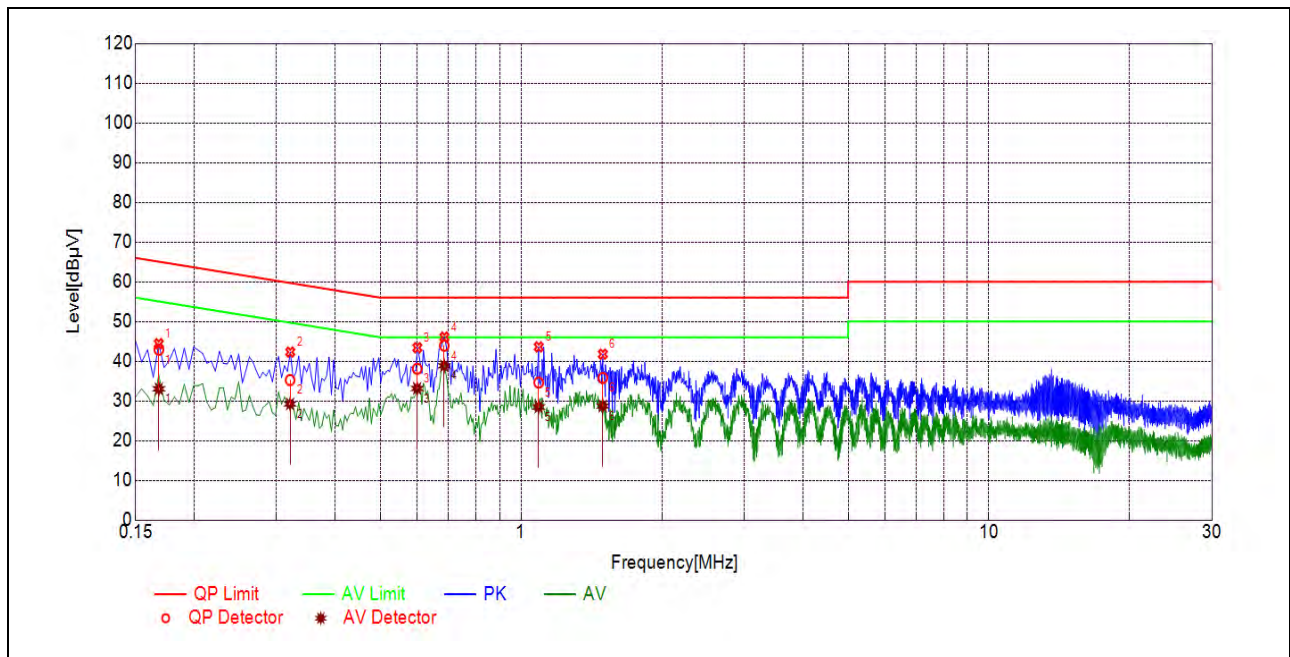
A_{Factor} : Voltage division factor of LISN

B. Test Plots:



(L Phase)

NO.	Fre. (MHz)	Emission Level (dBμV)		Limit (dBμV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1951	40.49	29.88	63.82	53.82	Line	PASS
2	0.3389	35.78	26.88	59.23	49.23		PASS
3	0.4336	36.44	27.08	57.18	47.18		PASS
4	0.6854	42.66	31.62	56.00	46.00		PASS
5	0.8477	33.97	26.19	56.00	46.00		PASS
6	14.3335	38.62	25.47	60.00	50.00		PASS



(N Phase)

NO.	Fre. (MHz)	Emission Level (dBμV)		Limit (dBμV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1681	42.90	33.04	65.05	55.05	Neutral	PASS
2	0.3207	35.26	29.24	59.69	49.69		PASS
3	0.5994	38.10	33.13	56.00	46.00		PASS
4	0.6849	43.91	38.84	56.00	46.00		PASS
5	1.0901	34.62	28.48	56.00	46.00		PASS
6	1.4947	35.79	28.72	56.00	46.00		PASS

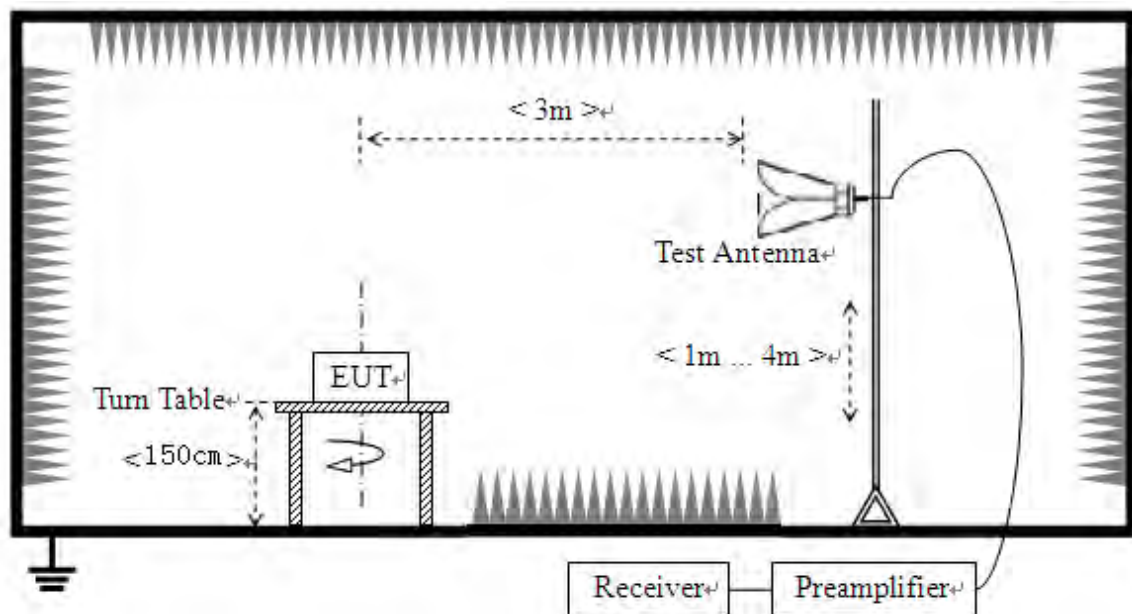
2.8. Restricted Frequency Bands

2.8.1. Requirement

According to FCC section 15.407(b)(7), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. 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).

2.8.2. Test Description

A. Test Setup



The Module is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

KDB 789033 Section H) 3)5)6(d)) was used in order to prove compliance

For the Test Antenna:

Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.