

FCC 47 CFR PART 15 SUBPART E

Product Type : Rugged Tablet Computer
Applicant : Unitech Electronics Co., Ltd.
Address : 5F., No.136, Lane 235, Pao-Chiao Rd., Hsin-Tien Dist., New Taipei City, Taiwan 231, R.O.C.
Trade Name : unitech
Model Number : TB120
Test Specification : FCC 47 CFR PART 15 SUBPART E: Oct., 2014
ANSI C63.10:2013
Application Purpose : Original
Receive Date : Apr. 30, 2015
Test Period : May 22 ~ Jun. 30, 2015
Issue Date : Jul. 27, 2015

Issue by

A Test Lab Techno Corp.
No. 140-1, Changan Street, Bade City,
Taoyuan County 334, Taiwan R.O.C.
Tel : +86-3-2710188 / Fax : +86-3-2710190



Taiwan Accreditation Foundation accreditation number: 1330

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Revision History

Rev.	Issue Date	Revisions	Revised By
00	Jul. 27, 2015	Initial Issue	

Verification of Compliance

Issued Date: 07/27/2015

Product Type : Rugged Tablet Computer
Applicant : Unitech Electronics Co., Ltd.
Address : 5F., No.136, Lane 235, Pao-Chiao Rd., Hsin-Tien Dist., New Taipei City, Taiwan 231, R.O.C.
Trade Name : unitech
Model Number : TB120
FCC ID : HLETB120BTNFP
EUT Rated Voltage : DC 5V, 3A
Test Voltage : 120 Vac / 60 Hz
Applicable Standard : FCC 47 CFR PART 15 SUBPART E: Oct., 2014
ANSI C63.10:2013

Test Result : Complied

Application Purpose : Original

Performing Lab. : A Test Lab Techno Corp.

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<http://www.atl-lab.com.tw/e-index.htm>



A Test Lab Techno Corp. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by A Test Lab Techno Corp. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

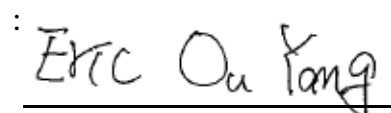
Approved By :



(Manager)

(Fly Lu)

Reviewed By :



(Testing Engineer)

(Eric Ou Yang)

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1 General Information

1.1. Summary of Test Result

Standard	Item	Result	Remark
15.407(b)(6) 15.207	AC Power Conducted Emission	PASS	---
15.407(b) 15.205 / 15.209	Transmitter Radiated Emissions	PASS	---
15.407(a)	Maximum Conducted Output Power	PASS	---
15.407(a)	26dB RF Bandwidth	Reference	---
15.407(a)	6dB RF Bandwidth	PASS	----
15.407(a)	Peak Power Spectral Density	PASS	---
15.407(g)	Frequency Stability	PASS	---
15.407(a) 15.203	Antenna Requirement	PASS	---

The test results of this report relate only to the tested sample(s) identified in this report. Manufacturer or whom it may concern should recognize the pass or fail of the test result.

1.2. Measurement Uncertainty

Measurement Item	Frequency Range		Uncertainty (dB)
Conducted Emission	9kHz ~ 30MHz		± 2.020
Radiated Emission	30MHz ~ 1000MHz	Horizontal	± 3.960
		Vertical	± 3.570
	1000MHz ~ 18000MHz	Horizontal	± 3.072
		Vertical	± 3.028
	18000MHz ~ 40000MHz	Horizontal	± 3.622
		Vertical	± 3.506

2 EUT Description

Product Type	Rugged Tablet Computer			
Trade Name	unitech			
Model No.	TB120			
Applicant	Unitech Electronics Co., Ltd. 5F., No.136, Lane 235, Pao-Chiao Rd., Hsin-Tien Dist., New Taipei City, Taiwan 231, R.O.C.			
Manufacturer	Unitech Electronics Co., Ltd. 5F., No.136, Lane 235, Pao-Chiao Rd., Hsin-Tien Dist., New Taipei City, Taiwan 231, R.O.C.			
FCC ID	HLETB120BTNFP			
IMEI No.	359570021578553			
Frequency Range	Band	Mode	Frequency Range (MHz)	Number of Channels
	U-NII Band I	IEEE 802.11a	5180 – 5240	4 Channels
		IEEE 802.11n 20 MHz	5180 – 5240	4 Channels
	U-NII Band III	IEEE 802.11a	5745 – 5825	5 Channels
		IEEE 802.11n 20 MHz	5745 – 5825	5 Channels
Modulation Type	OFDM			
Equipment Type	Client			
Antenna Type	FPCB Antenna			
Antenna Gain	-3.8 dBi			
Antenna Delivery	1TX + 1RX			
RF Output Power	IEEE 802.11a U-NII Band I : 0.015 W / 11.70 dBm IEEE 802.11a U-NII Band III : 0.026 W / 14.12 dBm IEEE 802.11n 20MHz U-NII Band I: 0.014 W / 11.53 dBm IEEE 802.11n 20MHz U-NII Band III: 0.025 W / 13.91 dBm			
Temperature Range	-10 ~ 50 °C			

3 Test Methodology

3.1. Mode of Operation

Decision of Test ATL has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: Normal Operation Mode
Mode 2: IEEE 802.11a Link Mode
Mode 3: IEEE 802.11n 20MHz Link Mode

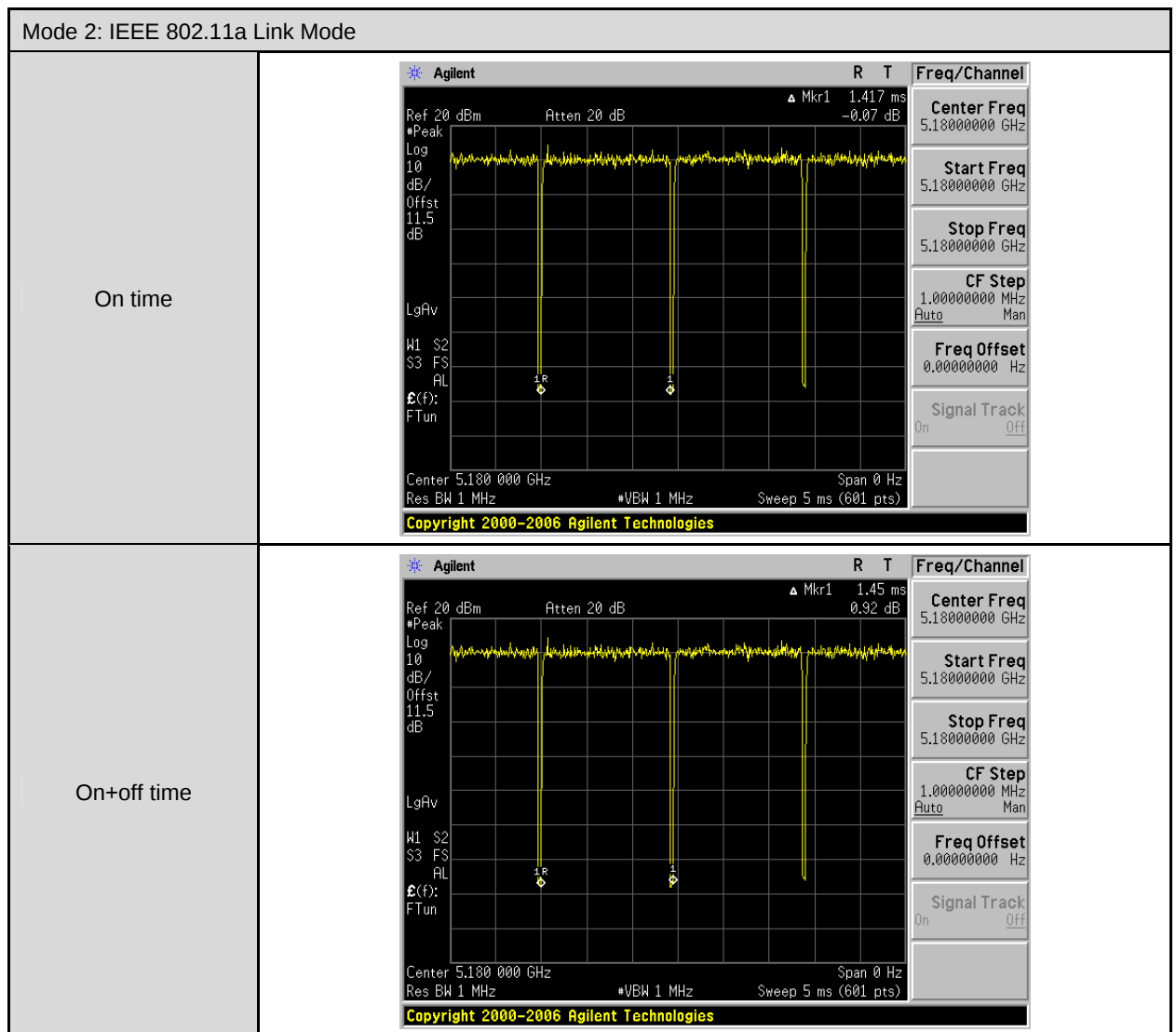
Software used to control the EUT for staying in continuous transmitting mode was programmed.

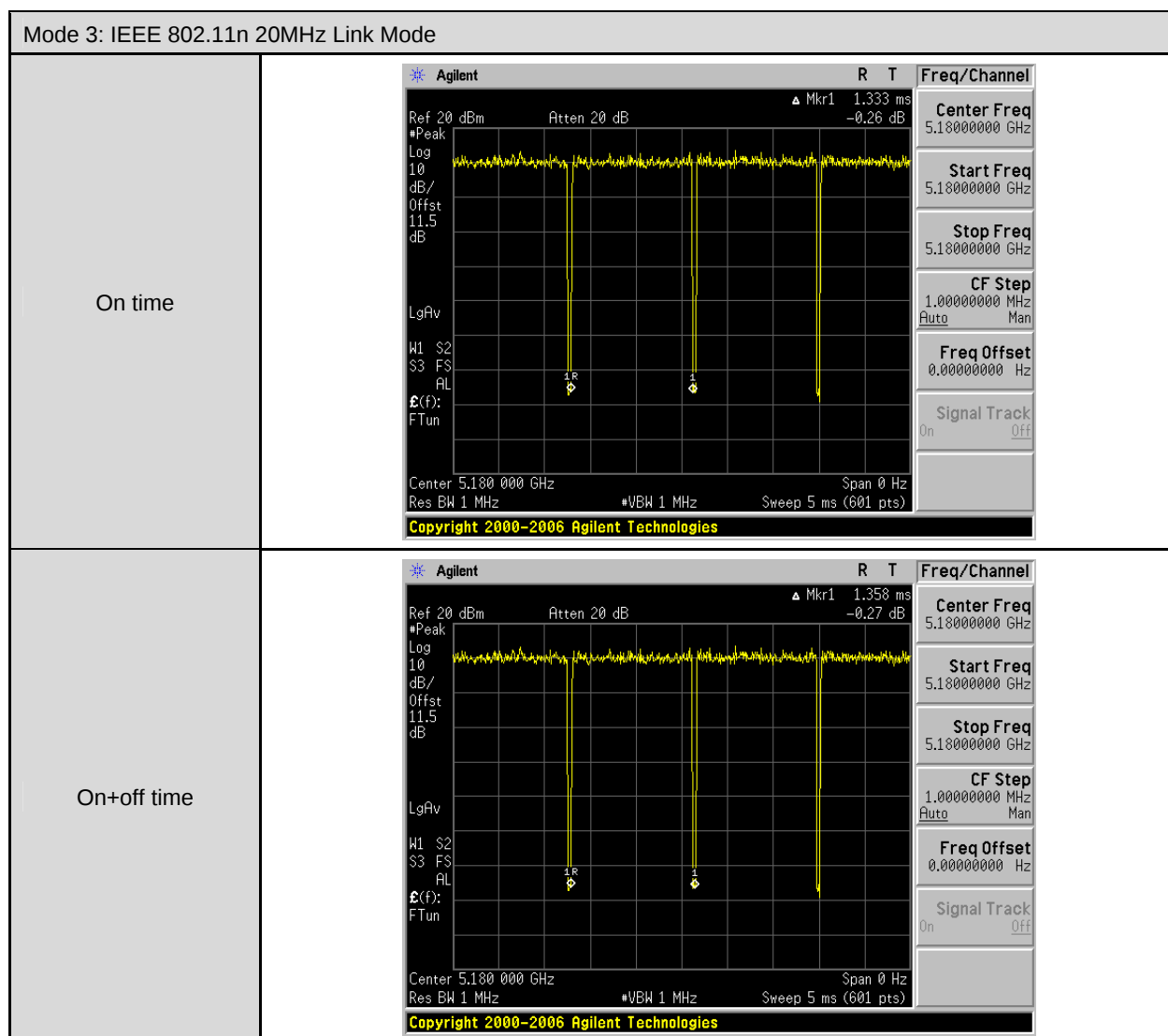
After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in normal link mode only.

Test Mode	Band	Data Rate	Test Channel
IEEE 802.11a Link Mode	U-NII Band I	6M	36, 40, 48
	U-NII Band III		149, 157, 165
IEEE 802.11n 20MHz Link Mode	U-NII Band I	6.5M	36, 40, 48
	U-NII Band III		149, 157, 165

Duty cycle

Test Mode	Frequency (MHz)	on time (ms)	on+off time (ms)	Duty cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
Mode 2: IEEE 802.11a Link Mode	5180.0	1.417	1.450	0.977	0.100	0.706
Mode 3: IEEE 802.11n 20MHz Link Mode	5180.0	1.333	1.358	0.982	0.081	0.010





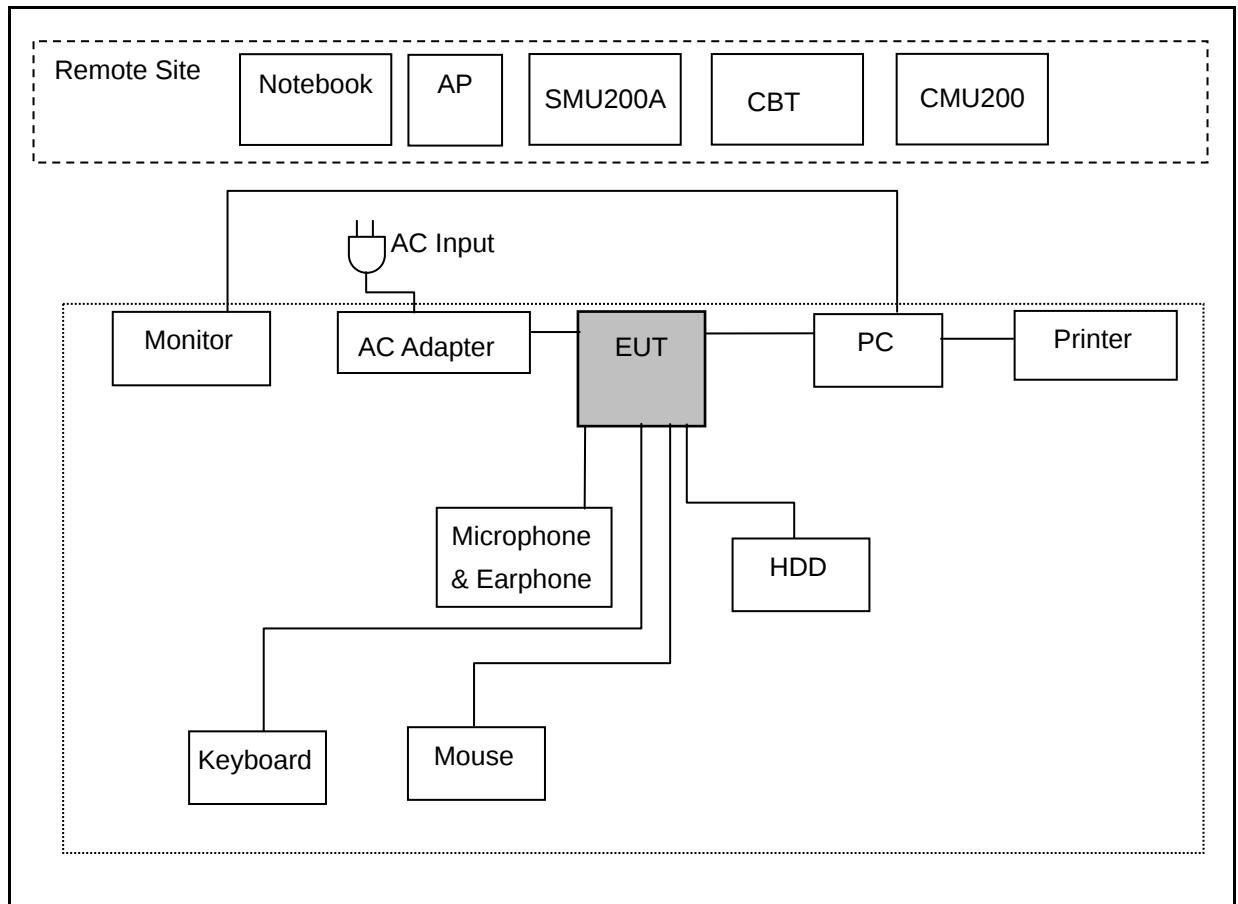
3.2. EUT Exercise Software

The EUT is operated in the engineering mode to fix the TX frequency for the purposes of measurement. According to its specifications, the EUT must comply with the requirements of Section 15.407 under the FCC Rules Part 15 Subpart E.

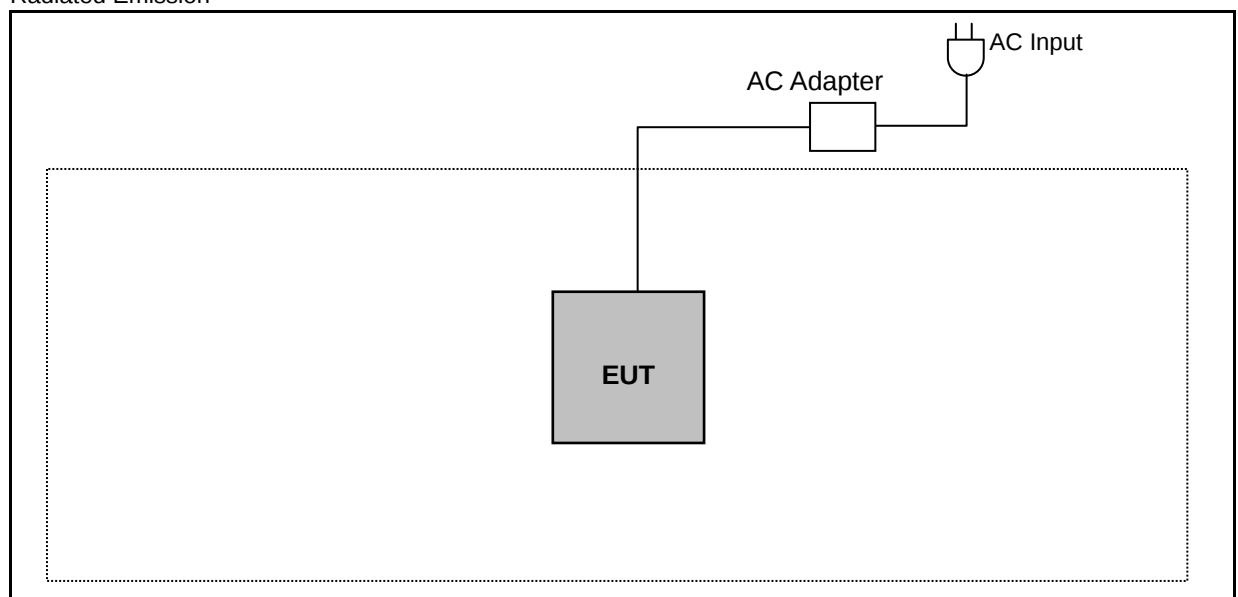
1.	Setup the EUT shown on 3.3.
2.	Turn on the power of all equipment.
3.	Turn on Wi-Fi function link to Notebook.
4.	EUT run test program.

3.3. Configuration of Test System Details

Conducted Emission



Radiated Emission



3.4. Test Site Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	26
Humidity (%RH)	25-75	60
Barometric pressure (mbar)	860-1060	950

4 AC Power Conducted Emission Measurement

4.1. Limit

Frequency (MHz)	Quasi-peak	Average
0.15 - 0.5	66 to 56	56 to 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

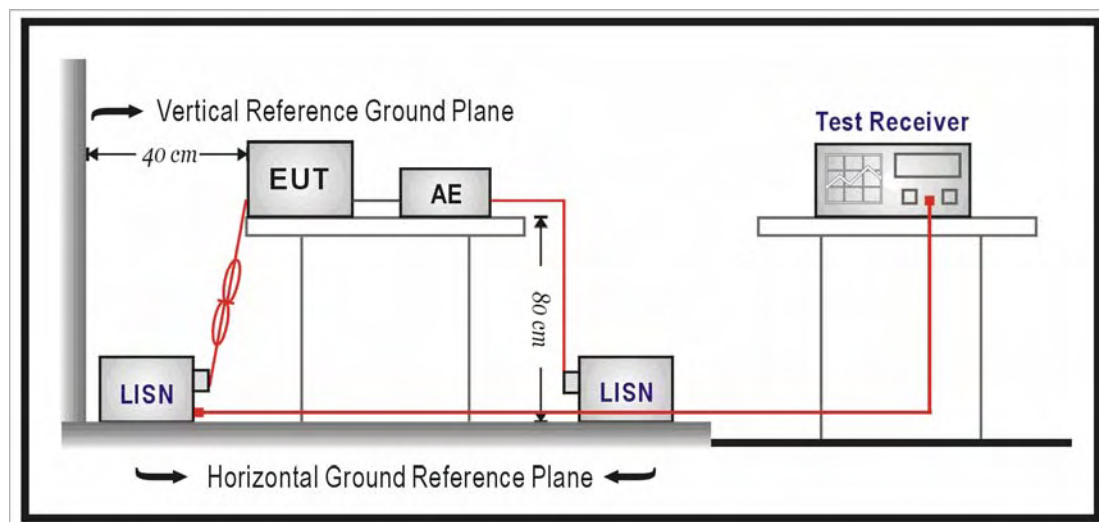
4.2. Test Instruments

Describe	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Test Receiver	R&S	ESCI	100367	06/25/2015	(1)
LISN	R&S	ENV216	101040	03/10/2015	(1)
LISN	R&S	ENV216	101041	03/06/2015	(1)
Test Site	ATL	TE05	TE05	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years.

Note: N.C.R. = No Calibration Request.

4.3. Test Setup



4.4. Test Procedure

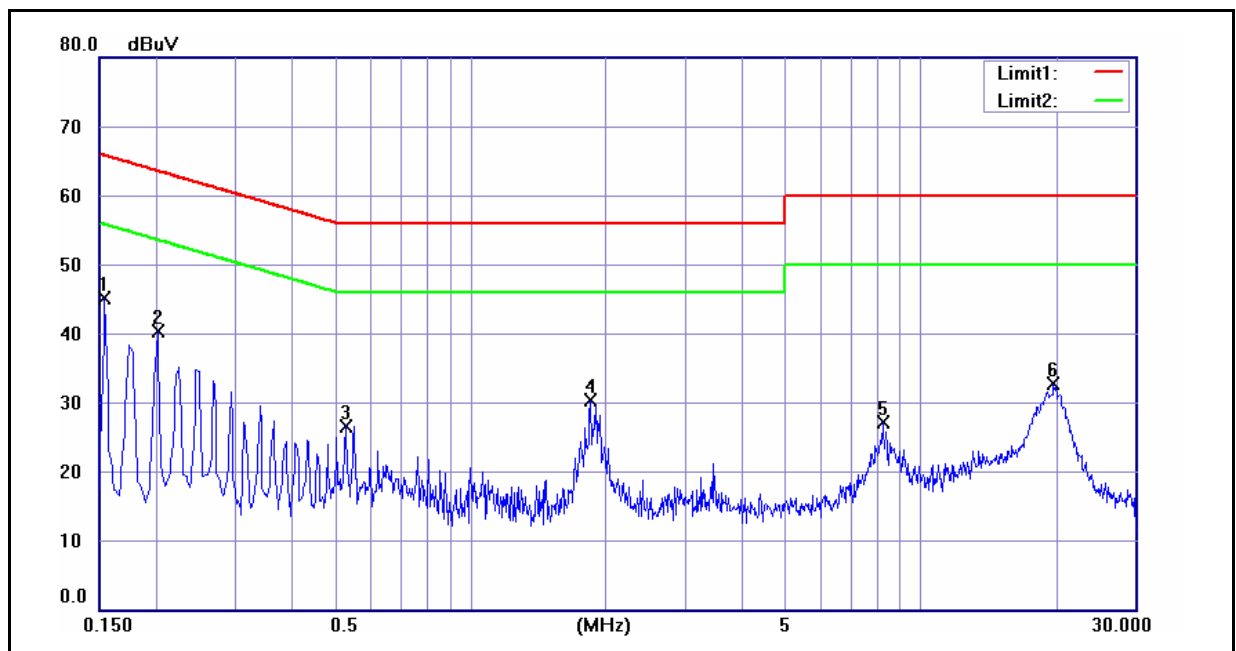
The power line conducted emission measurements were performed in a shielded enclosure. The EUT was assembled on a wooden table which is 80 centimeters high, was placed 40 centimeters from the back wall and at least 1 meter from the sidewall.

Power was fed to the EUT from the public utility power grid through a line filter and EMCO Model 3162/2 SH Line Impedance Stabilization Networks (LISN). The LISN housing, measuring instrumentation case, ground plane, etc., were electrically bonded together at the same RF potential. The Spectrum analyzer was connected to the AC line through an isolation transformer. The 50-ohm output of the LISN was connected to the spectrum analyzer directly. Conducted emission levels were in the CISPR quasi-peak detection mode. The analyzer's 6 dB bandwidth was set to 9 KHz. No post-detector video filter was used.

The spectrum was scanned from 150 KHz to 30 MHz. The physical arrangement of the test system and associated cabling was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude and frequency. All spurious emission frequencies were observed. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in paragraph 4.1.

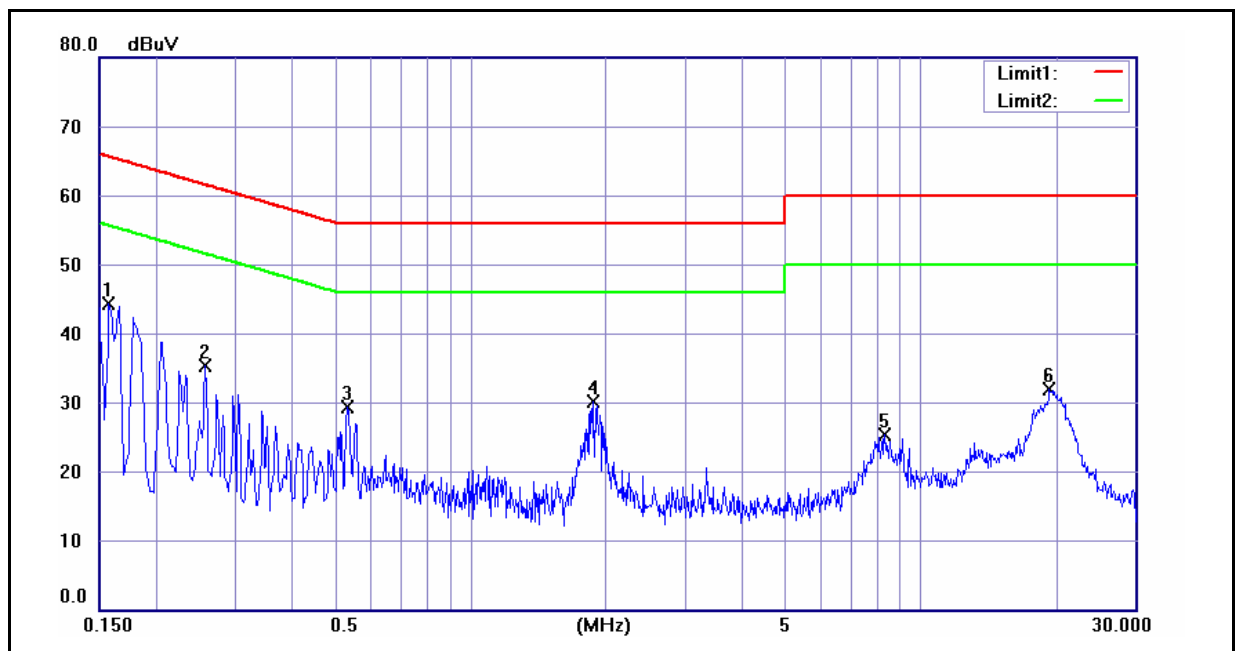
4.5. Test Result

Standard:	FCC Part 15E	Line:	L1
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model Number:	TB120	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Test Mode:	Mode 1	Date:	05/22/2015
		Test By:	Eric Ou Yang
Description:			



No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1540	30.47	10.91	9.60	40.07	20.51	65.78	55.78	-25.71	-35.27	Pass
2	0.2020	23.79	6.55	9.60	33.39	16.15	63.53	53.53	-30.14	-37.38	Pass
3	0.5300	12.98	3.47	9.62	22.60	13.09	56.00	46.00	-33.40	-32.91	Pass
4	1.8500	15.35	7.01	9.68	25.03	16.69	56.00	46.00	-30.97	-29.31	Pass
5	8.2780	8.90	1.53	9.89	18.79	11.42	60.00	50.00	-41.21	-38.58	Pass
6	19.8060	18.07	13.28	10.25	28.32	23.53	60.00	50.00	-31.68	-26.47	Pass

Standard:	FCC Part 15E	Line:	N
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model Number:	TB120	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Test Mode:	Mode 1	Date:	05/22/2015
		Test By:	Eric Ou Yang
Description:			



No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1580	29.70	11.18	9.60	39.30	20.78	65.57	55.57	-26.27	-34.79	Pass
2	0.2580	18.46	4.51	9.61	28.07	14.12	61.50	51.50	-33.43	-37.38	Pass
3	0.5340	15.56	7.05	9.62	25.18	16.67	56.00	46.00	-30.82	-29.33	Pass
4	1.8780	16.06	6.55	9.70	25.76	16.25	56.00	46.00	-30.24	-29.75	Pass
5	8.3260	9.54	3.74	9.92	19.46	13.66	60.00	50.00	-40.54	-36.34	Pass
6	19.4260	16.57	9.34	10.22	26.79	19.56	60.00	50.00	-33.21	-30.44	Pass

5 Radiated Emission Measurement

5.1. Limit

Limits of Radiated Emission Measurement

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequency Range (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	10	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note: 1. The lower limit shall apply at the transition frequencies.

2. Emission level (dBuV/m) = 20 log Emission level (uV/m).

3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

5.2. Test Instruments

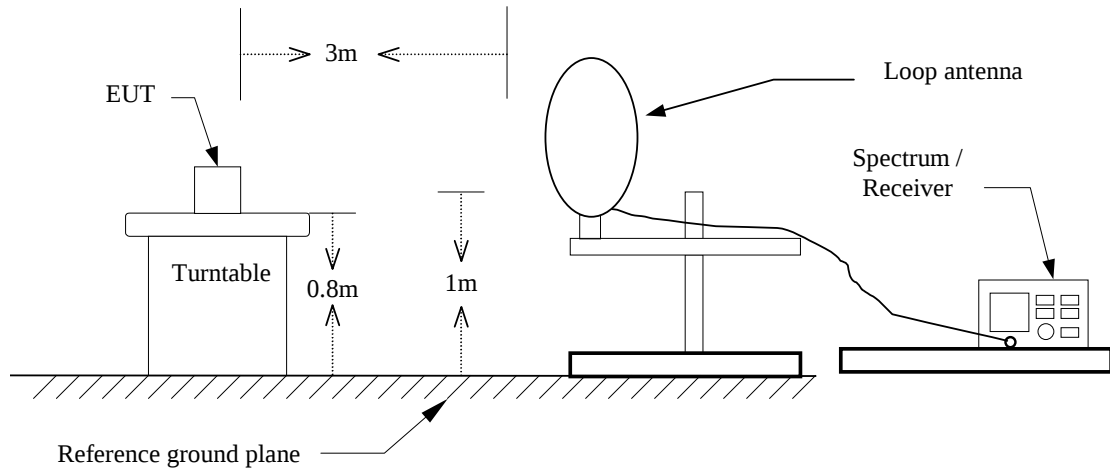
3 Meter Chamber					
Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
RF Pre-selector	Agilent	N9039A	MY46520256	01/06/2015	(1)
Spectrum Analyzer	Agilent	E4446A	MY46180578	01/06/2015	(1)
Pre Amplifier	Agilent	8449B	3008A02237	02/24/2015	(1)
Pre Amplifier	Agilent	8447D	2944A10961	02/24/2015	(1)
Broadband Antenna (30MHz~1GHz)	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	9163-270	07/18/2014	(1)
Horn Antenna (1~18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	9120D-550	06/12/2015	(1)
Horn Antenna (18~40GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9170	9170-320	07/06/2015	(1)
Test Site	ATL	TE01	888001	08/28/2014	(1)

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years.

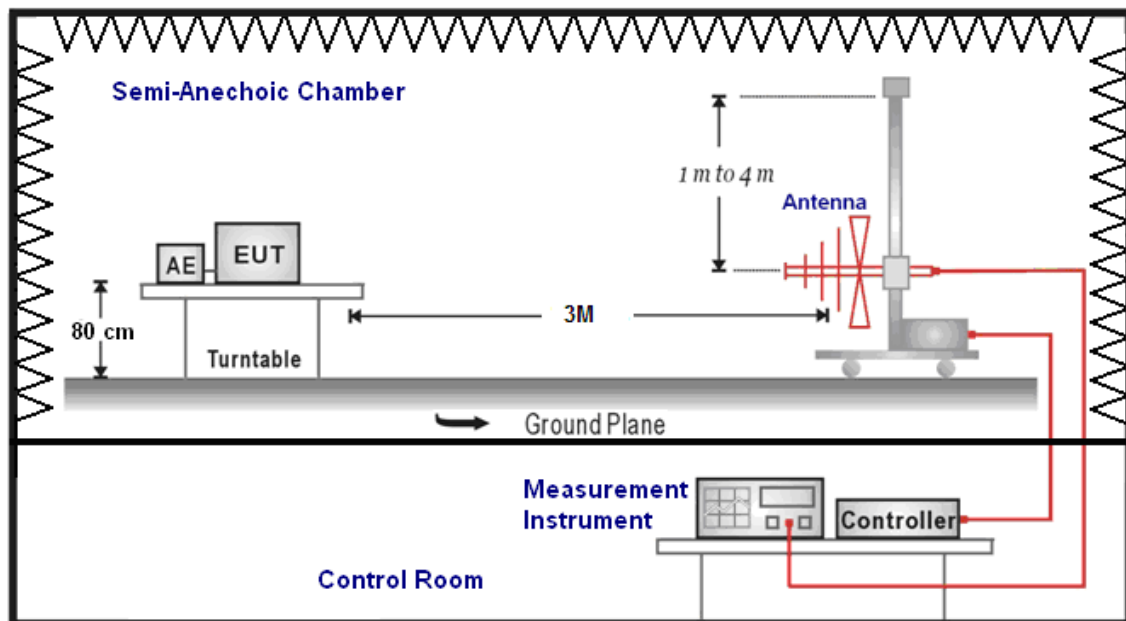
Note: N.C.R. = No Calibration Request.

5.3. Setup

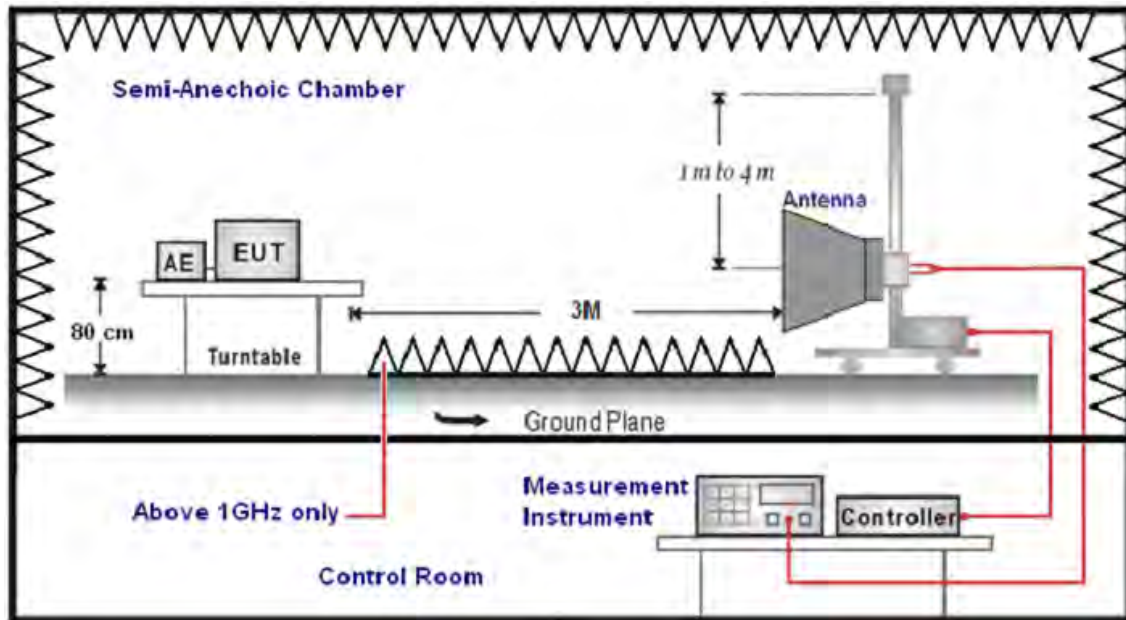
9kHz ~ 30MHz



30MHz ~ 1GHz



Above 1GHz



5.4. Test Procedure

Final radiation measurements were made on a three-meter, Semi Anechoic Chamber. The EUT system was placed on a nonconductive turntable which is 0.8 meters height, top surface 1.0 x 1.5 meter. The spectrum was examined from 250 MHz to 2.5 GHz in order to cover the whole spectrum below 10th harmonic which could generate from the EUT. During the test, EUT was set to transmit continuously & Measurements spectrum range from 9 kHz to 40 GHz is investigated.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, and then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements when Duty cycle >98% / 1/T for average measurements when Duty cycle <98%. A nonconductive material surrounded the EUT to supporting the EUT for standing on three orthogonal planes. At each condition, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarization.

SCHWARZBECK MESS-ELEKTRONIK Trilog-Broadband Antenna (mode SB AC VULB) at 3 Meter and the ETS-Lindgren Double-Ridged Waveguide Horn antenna (model 3117) Schwarzbeck Mess-Elektronik Broadband Horn Antenna (BBHA 9170) was used in frequencies 1 – 40 GHz at a distance of 1 meter. All test results were extrapolated to equivalent signal at 3 meters utilizing an inverse linear distance extrapolation Factor (20dB/decade). For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

Appropriate preamplifiers were used for improving sensitivity and precautions were taken to avoid overloading or desensitizing the spectrum analyzer. No post – detector video filters were used in the test.

The spectrum analyzer's 6 dB bandwidth was set to 1 MHz, and the analyzer was operated in the peak detection mode, for frequencies both below and up 1 GHz. The average levels were obtained by subtracting the duty cycle correction factor from the peak readings.

The following procedures were used to convert the emission levels measured in decibels referenced to 1 microvolt (dBuV) into field intensity in micro volts per meter (uV/m).

The actual field intensity in decibels referenced to 1 microvolt in to field intensity in micro volts per meter (dBuV/m).

The actual field intensity in decibels referenced to 1 microvolt per meter (dBuV/m) is determined by algebraically adding the measured reading in dBuV, the antenna factor (dB), and cable loss (dB) and Subtracting the gain of preamplifier (dB) is auto calculate in spectrum analyzer.

(1) $\text{Amplitude (dBuV/m)} = \text{FI (dBuV)} + \text{AF (dBuV)} + \text{CL (dBuV)} - \text{Gain (dB)}$

FI= Reading of the field intensity.

AF= Antenna factor.

CL= Cable loss.

P.S Amplitude is auto calculate in spectrum analyzer.

(2) $\text{Actual Amplitude (dBuV/m)} = \text{Amplitude (dBuV)} - \text{Dis(dB)}$

The FCC specified emission limits were calculated according the EUT operating frequency and by following linear interpolation equations:

(a) For fundamental frequency : Transmitter Output < +30dBm

(b) For spurious frequency : Spurious emission limits = fundamental emission limit /10

5.5. Test Result

Below 1GHz

Standard:		FCC Part 15E		Test Distance:		3m	
Test item:		Radiated Emission		Power:		AC 120V/60Hz	
Model Number:		TB120		Temp.(°C)/Hum.(%RH):		26(°C)/60%RH	
Test Mode:		Mode 1		Date:		06/30/2015	
				Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
150.5000	38.54	-11.40	27.14	43.50	-16.36	QP	H
193.5000	36.71	-13.40	23.31	43.50	-20.19	QP	H
274.5000	36.34	-10.35	25.99	46.00	-20.01	QP	H
296.5000	34.64	-9.50	25.14	46.00	-20.86	QP	H
408.5000	31.63	-7.17	24.46	46.00	-21.54	QP	H
440.0000	32.39	-6.51	25.88	46.00	-20.12	QP	H
181.5000	30.89	-12.50	18.39	43.50	-25.11	QP	V
279.0000	24.40	-10.06	14.34	46.00	-31.66	QP	V
488.0000	28.13	-5.63	22.50	46.00	-23.50	QP	V
583.0000	25.68	-3.61	22.07	46.00	-23.93	QP	V
690.0000	24.94	-1.68	23.26	46.00	-22.74	QP	V
872.0000	25.94	1.92	27.86	46.00	-18.14	QP	V

Note: No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).

Above 1GHz

Standard:		FCC Part 15E		Test Distance:		3m	
Test item:		Radiated Emission		Power:		AC 120V/60Hz	
Model Number:		TB120		Temp.(℃)/Hum.(%RH):		26(℃)/60%RH	
Test Mode:		Mode 2		Date:		06/30/2015	
Frequency:		5180MHz		Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2799.000	37.43	5.59	43.02	74.00	-30.98	peak	H
4598.000	32.54	9.91	42.45	74.00	-31.55	peak	H
7650.000	33.20	13.27	46.47	74.00	-27.53	peak	H
2841.000	36.20	5.70	41.90	74.00	-32.10	peak	V
4563.000	33.39	9.86	43.25	74.00	-30.75	peak	V
7643.000	33.95	13.27	47.22	74.00	-26.78	peak	V

Standard:	FCC Part 15E			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	TB120			Temp.(℃)/Hum.(%RH):	26(℃)/60%RH		
Test Mode:	Mode 2			Date:	06/30/2015		
Frequency:	5200MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2827.000	35.68	5.66	41.34	74.00	-32.66	peak	H
4577.000	33.62	9.87	43.49	74.00	-30.51	peak	H
7650.000	33.24	13.27	46.51	74.00	-27.49	peak	H
2813.000	36.65	5.62	42.27	74.00	-31.73	peak	V
4549.000	33.03	9.83	42.86	74.00	-31.14	peak	V
7650.000	33.60	13.27	46.87	74.00	-27.13	peak	V

Standard:		FCC Part 15E		Test Distance:		3m	
Test item:		Radiated Emission		Power:		AC 120V/60Hz	
Model Number:		TB120		Temp.(℃)/Hum.(%RH):		26(℃)/60%RH	
Test Mode:		Mode 2		Date:		06/30/2015	
Frequency:		5240MHz		Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2813.000	36.24	5.62	41.86	74.00	-32.14	peak	H
4577.000	34.49	9.87	44.36	74.00	-29.64	peak	H
7685.000	31.57	13.30	44.87	74.00	-29.13	peak	H
2799.000	37.04	5.59	42.63	74.00	-31.37	peak	V
4311.000	34.37	9.39	43.76	74.00	-30.24	peak	V
7650.000	31.03	13.27	44.30	74.00	-29.70	peak	V

Standard:	FCC Part 15E			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	TB120			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Test Mode:	Mode 2			Date:	06/30/2015		
Frequency:	5745MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2785.000	37.96	5.54	43.50	74.00	-30.50	peak	H
4605.000	32.69	9.92	42.61	74.00	-31.39	peak	H
7657.000	32.27	13.28	45.55	74.00	-28.45	peak	H
2834.000	36.51	5.67	42.18	74.00	-31.82	peak	V
4549.000	32.71	9.83	42.54	74.00	-31.46	peak	V
7650.000	31.28	13.27	44.55	74.00	-29.45	peak	V

Standard:		FCC Part 15E		Test Distance:		3m	
Test item:		Radiated Emission		Power:		AC 120V/60Hz	
Model Number:		TB120		Temp.(℃)/Hum.(%RH):		26(℃)/60%RH	
Test Mode:		Mode 2		Date:		06/30/2015	
Frequency:		5785MHz		Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2799.000	36.28	5.59	41.87	74.00	-32.13	peak	H
4598.000	33.49	9.91	43.40	74.00	-30.60	peak	H
7643.000	32.72	13.27	45.99	74.00	-28.01	peak	H
2827.000	35.22	5.66	40.88	74.00	-33.12	peak	V
4577.000	33.57	9.87	43.44	74.00	-30.56	peak	V
7671.000	32.82	13.30	46.12	74.00	-27.88	peak	V

Standard:		FCC Part 15E		Test Distance:		3m	
Test item:		Radiated Emission		Power:		AC 120V/60Hz	
Model Number:		TB120		Temp.(℃)/Hum.(%RH):		26(℃)/60%RH	
Test Mode:		Mode 2		Date:		06/30/2015	
Frequency:		5825MHz		Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2834.000	36.96	5.67	42.63	74.00	-31.37	peak	H
4591.000	33.43	9.90	43.33	74.00	-30.67	peak	H
7678.000	33.70	13.30	47.00	74.00	-27.00	peak	H
2834.000	36.62	5.67	42.29	74.00	-31.71	peak	V
4570.000	33.35	9.87	43.22	74.00	-30.78	peak	V
7657.000	33.92	13.28	47.20	74.00	-26.80	peak	V

Standard:	FCC Part 15E			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	TB120			Temp.(℃)/Hum.(%RH):	26(℃)/60%RH		
Test Mode:	Mode 3			Date:	06/30/2015		
Frequency:	5180MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2827.000	37.47	5.66	43.13	74.00	-30.87	peak	H
4563.000	33.98	9.86	43.84	74.00	-30.16	peak	H
7629.000	32.44	13.25	45.69	74.00	-28.31	peak	H
2827.000	36.38	5.66	42.04	74.00	-31.96	peak	V
4563.000	33.36	9.86	43.22	74.00	-30.78	peak	V
7685.000	32.98	13.30	46.28	74.00	-27.72	peak	V

Standard:	FCC Part 15E			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	TB120			Temp.(℃)/Hum.(%RH):	26(℃)/60%RH		
Test Mode:	Mode 3			Date:	06/30/2015		
Frequency:	5200MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2813.000	37.13	5.62	42.75	74.00	-31.25	peak	H
4591.000	35.25	9.90	45.15	74.00	-28.85	peak	H
7657.000	33.62	13.28	46.90	74.00	-27.10	peak	H
2827.000	37.08	5.66	42.74	74.00	-31.26	peak	V
4563.000	33.93	9.86	43.79	74.00	-30.21	peak	V
7657.000	33.40	13.28	46.68	74.00	-27.32	peak	V

Standard:	FCC Part 15E			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	TB120			Temp.(℃)/Hum.(%RH):	26(℃)/60%RH		
Test Mode:	Mode 3			Date:	06/30/2015		
Frequency:	5240MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2813.000	36.76	5.62	42.38	74.00	-31.62	peak	H
4577.000	33.67	9.87	43.54	74.00	-30.46	peak	H
7671.000	32.05	13.30	45.35	74.00	-28.65	peak	H
2813.000	36.32	5.62	41.94	74.00	-32.06	peak	V
4598.000	34.74	9.91	44.65	74.00	-29.35	peak	V
7643.000	33.17	13.27	46.44	74.00	-27.56	peak	V

Standard:	FCC Part 15E			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	TB120			Temp.(℃)/Hum.(%RH):	26(℃)/60%RH		
Test Mode:	Mode 3			Date:	06/30/2015		
Frequency:	5745MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2813.000	37.13	5.62	42.75	74.00	-31.25	peak	H
4311.000	33.95	9.39	43.34	74.00	-30.66	peak	H
7615.000	33.16	13.24	46.40	74.00	-27.60	peak	H
2813.000	36.69	5.62	42.31	74.00	-31.69	peak	V
4570.000	33.72	9.87	43.59	74.00	-30.41	peak	V
7678.000	32.42	13.30	45.72	74.00	-28.28	peak	V

Standard:	FCC Part 15E			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	TB120			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Test Mode:	Mode 3			Date:	06/30/2015		
Frequency:	5785MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2813.000	36.00	5.62	41.62	74.00	-32.38	peak	H
4577.000	33.35	9.87	43.22	74.00	-30.78	peak	H
7671.000	33.19	13.30	46.49	74.00	-27.51	peak	H
2785.000	36.10	5.54	41.64	74.00	-32.36	peak	V
4542.000	32.46	9.83	42.29	74.00	-31.71	peak	V
7671.000	32.48	13.30	45.78	74.00	-28.22	peak	V

Standard:	FCC Part 15E			Test Distance:	3m		
Test item:	Radiated Emission			Power:	AC 120V/60Hz		
Model Number:	TB120			Temp.(°C)/Hum.(%RH):	26(°C)/60%RH		
Test Mode:	Mode 3			Date:	06/30/2015		
Frequency:	5825MHz			Test By:	Eric Ou Yang		
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2785.000	37.37	5.54	42.91	74.00	-31.09	peak	H
4563.000	32.91	9.86	42.77	74.00	-31.23	peak	H
7650.000	32.94	13.27	46.21	74.00	-27.79	peak	H
2827.000	37.80	5.66	43.46	74.00	-30.54	peak	V
4577.000	34.03	9.87	43.90	74.00	-30.10	peak	V
7678.000	34.17	13.30	47.47	74.00	-26.53	peak	V

Band Edge

Standard:		FCC Part 15E			Test Distance:		3m	
Test item:		Radiated Emission			Power:		AC 120V/60Hz	
Model Number:		TB120			Temp.(°C)/Hum.(%RH):		26(°C)/60%RH	
Test Mode:		Mode 2			Date:		06/29/2015	
Frequency:		5180 MHz			Test By:		Eric Ou Yang	
Frequency	Reading	Correct Factor	Result	Limit	Margin	Remark	Ant.Polar.	
(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)		H / V	
5148.200	51.13	10.74	61.87	74.00	-12.13	peak	H	
5148.200	38.59	10.74	49.33	54.00	-4.67	AVG	H	
5150.000	51.01	10.74	61.75	74.00	-12.25	peak	H	
5150.000	39.74	10.74	50.48	54.00	-3.52	AVG	H	
5148.200	53.83	10.74	64.57	74.00	-9.43	peak	V	
5148.200	40.90	10.74	51.64	54.00	-2.36	AVG	V	
5150.000	54.63	10.74	65.37	74.00	-8.63	peak	V	
5150.000	41.64	10.74	52.38	54.00	-1.62	AVG	V	

Standard:		FCC Part 15E		Test Distance:		3m	
Test item:		Radiated Emission		Power:		AC 120V/60Hz	
Model Number:		TB120		Temp.(℃)/Hum.(%RH):		26(℃)/60%RH	
Test Mode:		Mode 3		Date:		06/29/2015	
Frequency:		5180 MHz		Test By:		Eric Ou Yang	
Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
5142.600	47.25	10.73	57.98	74.00	-16.02	peak	H
5142.600	35.09	10.73	45.82	54.00	-8.18	AVG	H
5150.000	44.78	10.74	55.52	74.00	-18.48	peak	H
5150.000	36.24	10.74	46.98	54.00	-7.02	AVG	H
5147.500	55.67	10.74	66.41	74.00	-7.59	peak	V
5147.500	37.26	10.74	48.00	54.00	-6.00	AVG	V
5150.000	56.68	10.74	67.42	74.00	-6.58	peak	V
5150.000	37.57	10.74	48.31	54.00	-5.69	AVG	V

6 Maximum Conducted Output Power Measurement

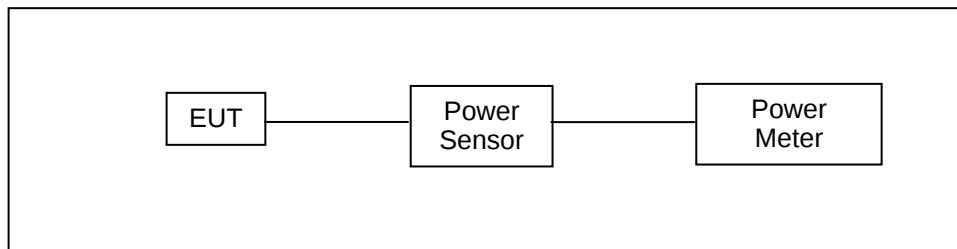
6.1. Limit

Conducted Output Power

Frequency Range (MHz)	FCC Limit
5.150 ~ 5.250 GHz	The lesser of 250mW (24dBm)
	The lesser of 1000mW (30dBm)
5.250 ~ 5.350 GHz	The lesser of 250mW (24dBm) or 11dBm + 10log (B)
5.470 ~ 5.725 GHz	The lesser of 250mW (24dBm) or 11dBm + 10log (B)
5.725 ~ 5.850 GHz	The lesser of 1000mW (30dBm)

Note: Where B is the 26dB emission bandwidth in MHz.

6.2. Test Setup



6.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Power Sensor	Anritsu	MA2411B	1126022	08/21/2014	(1)
Power Meter	Anritsu	ML2495A	1135009	08/21/2014	(1)
Test Site	ATL	TE02	TE02	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years.

Note: N.C.R. = No Calibration Request.

6.4. Test Procedure

The test is performed in accordance with KDB789033: D02 General UNII Test Procedures New Rules v01, Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E.

6.5. Test Result

Model Number		TB120		
Test Item		Maximum Conducted Output Power		
Test Mode		Mode 2: IEEE 802.11a Link Mode		
Date of Test		05/22/2015	Test Site	TE02
Frequency (MHz)	Data Rate	Average Power		FCC Limit (dBm)
		(dBm)	(W)	
5180.0	6M	11.21	0.013	< 24
5200.0		11.33	0.014	
5220.0		11.56	0.014	
5240.0		11.70	0.015	
5745.0		13.90	0.025	< 30
5765.0		14.12	0.026	
5785.0		14.01	0.025	
5805.0		13.86	0.024	
5825.0		13.67	0.023	
5180.0	54M	11.00	0.013	< 24
5200.0		11.12	0.013	
5220.0		11.35	0.014	
5240.0		11.49	0.014	
5745.0		13.71	0.023	< 30
5765.0		13.93	0.025	
5785.0		13.82	0.024	
5805.0		13.67	0.023	
5825.0		13.48	0.022	

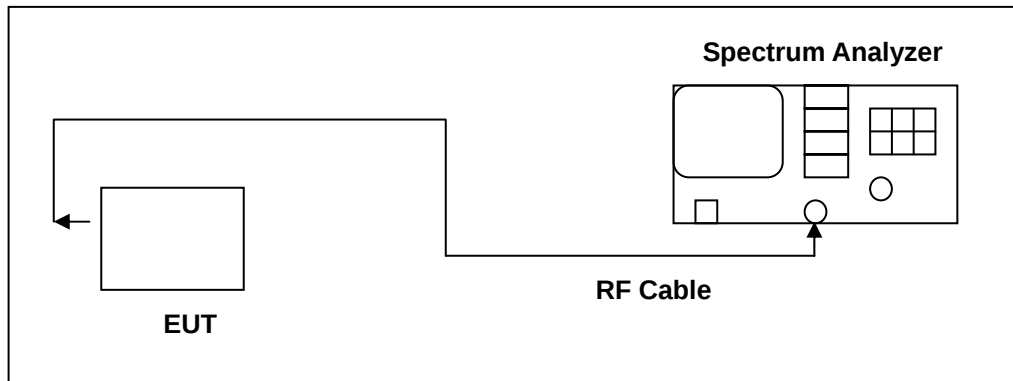
Model Number		TB120		
Test Item		Maximum Conducted Output Power		
Test Mode		Mode 3: IEEE 802.11n 20MHz Link Mode		
Date of Test		05/22/2015	Test Site	TE02
Frequency (MHz)	Data Rate	Average Power		FCC Limit (dBm)
		(dBm)	(W)	
5180.0	6.5M	11.04	0.013	< 24
5200.0		11.16	0.013	
5220.0		11.39	0.014	
5240.0		11.53	0.014	
5745.0		13.69	0.023	< 30
5765.0		13.91	0.025	
5785.0		13.80	0.024	
5805.0		13.65	0.023	
5825.0		13.46	0.022	
5180.0	65M	10.86	0.012	< 24
5200.0		10.98	0.013	
5220.0		11.21	0.013	
5240.0		11.35	0.014	
5745.0		13.48	0.022	< 30
5765.0		13.70	0.023	
5785.0		13.59	0.023	
5805.0		13.44	0.022	
5825.0		13.25	0.021	

7 26dB RF Bandwidth & 99 % Occupied Bandwidth Measurement

7.1. Limit

N/A

7.2. Test Setup



7.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY45300744	12/16/2014	(1)
Test Site	ATL	TE02	TE02	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years.

Note: N.C.R. = No Calibration Request.

7.4. Test Procedure

The test is performed in accordance with KDB789033: D02 General UNII Test Procedures New Rules v01, Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E.

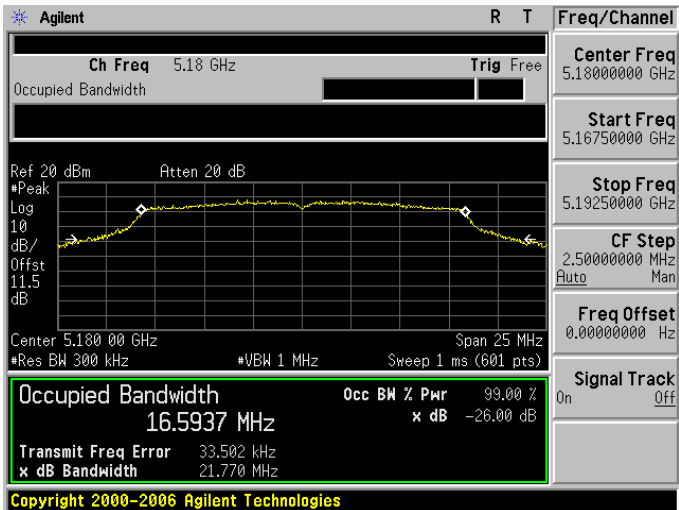
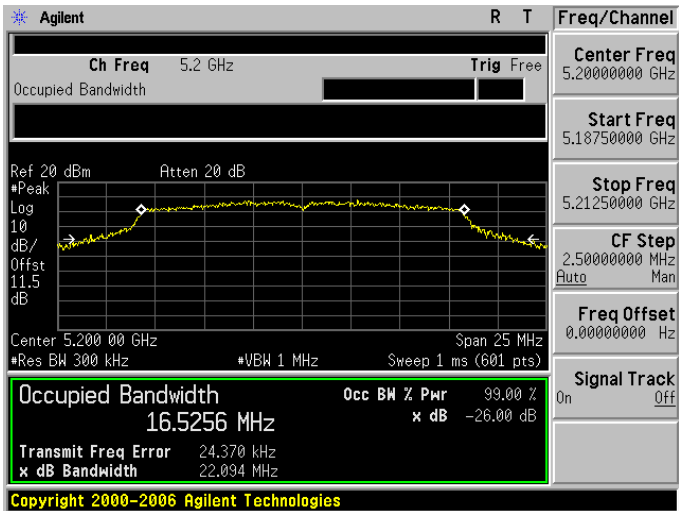
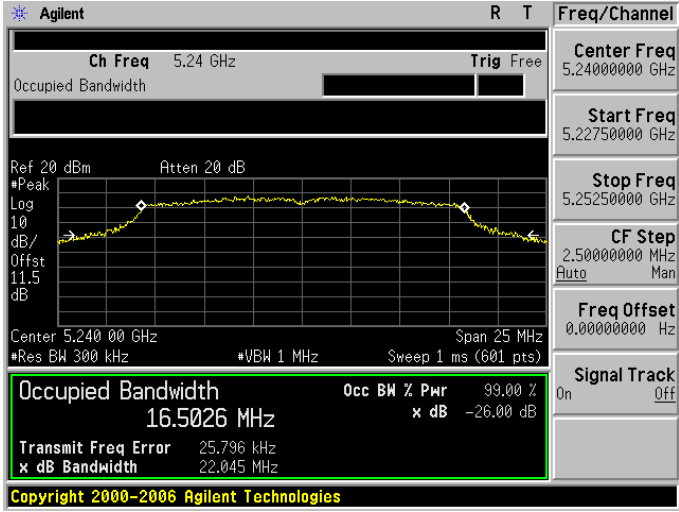
7.5. Test Result

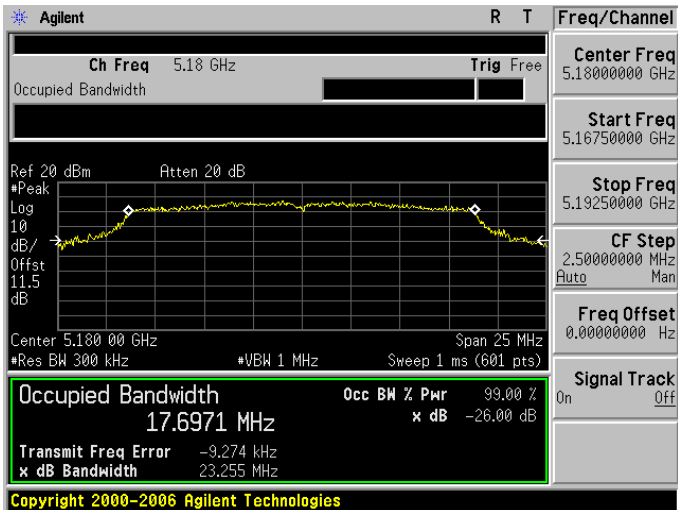
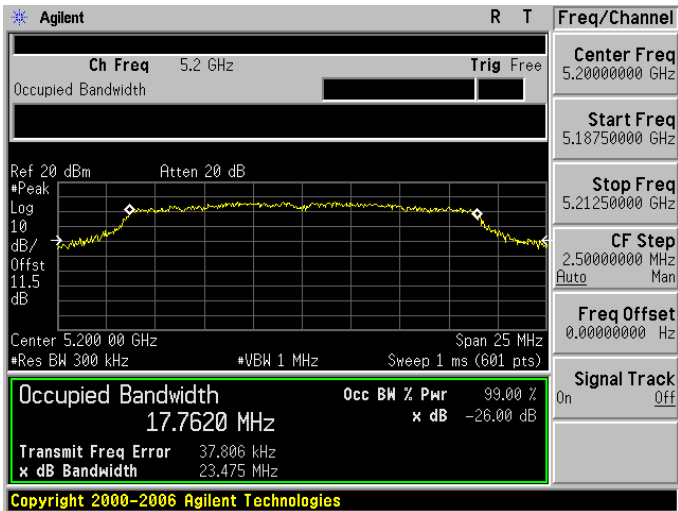
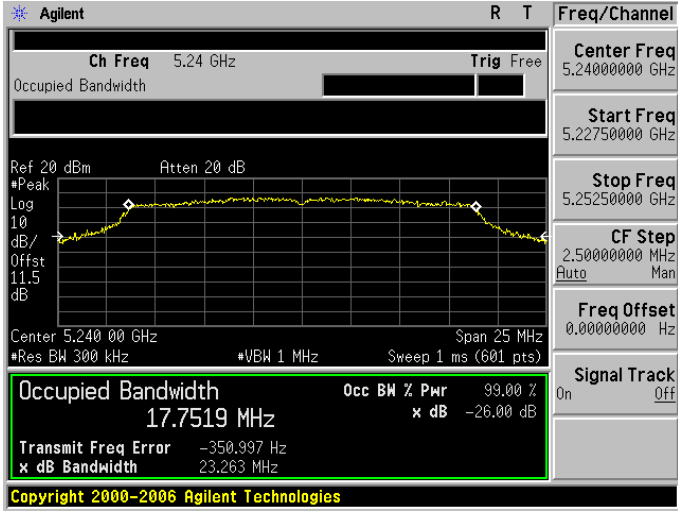
Model Number	TB120		
Test Item	26dB RF Bandwidth & 99 % Occupied Bandwidth Measurement		
Test Mode	Mode 2: IEEE 802.11a Link Mode		
Date of Test	06/30/2015	Test Site	TE02
Frequency (MHz)	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	
5180	21.770		
5200	22.094		
5240	22.045		

Model Number	TB120		
Test Item	26dB RF Bandwidth & 99 % Occupied Bandwidth Measurement		
Test Mode	Mode 3: IEEE 802.11n 20MHz Link Mode		
Date of Test	06/30/2015	Test Site	TE02
Frequency (MHz)	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	
5180	23.255		
5200	23.475		
5240	23.263		

Note: The 99% occupied bandwidth not crossed 5250MHz.

7.6. Test Graphs

Mode 2: IEEE 802.11a Link Mode	
5180	 Agilent R T Freq/Channel Ch Freq 5.18 GHz Trig Free Center Freq 5.1800000 GHz Start Freq 5.1675000 GHz Stop Freq 5.1925000 GHz CF Step 2.5000000 MHz Auto Man Freq Offset 0.0000000 Hz Signal Track On Off Ref 20 dBm Atten 20 dB #Peak Log 10 dB/Offst 11.5 dB Center 5.180 00 GHz Span 25 MHz #Res BW 300 kHz #VBW 1 MHz Sweep 1 ms (601 pts) Occupied Bandwidth 16.5937 MHz Occ BW % Pwr 99.00 % x dB -26.00 dB Transmit Freq Error 33.502 kHz x dB Bandwidth 21.770 MHz Copyright 2000-2006 Agilent Technologies
5200	 Agilent R T Freq/Channel Ch Freq 5.2 GHz Trig Free Center Freq 5.2000000 GHz Start Freq 5.1875000 GHz Stop Freq 5.2125000 GHz CF Step 2.5000000 MHz Auto Man Freq Offset 0.0000000 Hz Signal Track On Off Ref 20 dBm Atten 20 dB #Peak Log 10 dB/Offst 11.5 dB Center 5.200 00 GHz Span 25 MHz #Res BW 300 kHz #VBW 1 MHz Sweep 1 ms (601 pts) Occupied Bandwidth 16.5256 MHz Occ BW % Pwr 99.00 % x dB -26.00 dB Transmit Freq Error 24.370 kHz x dB Bandwidth 22.094 MHz Copyright 2000-2006 Agilent Technologies
5240	 Agilent R T Freq/Channel Ch Freq 5.24 GHz Trig Free Center Freq 5.2400000 GHz Start Freq 5.2275000 GHz Stop Freq 5.2525000 GHz CF Step 2.5000000 MHz Auto Man Freq Offset 0.0000000 Hz Signal Track On Off Ref 20 dBm Atten 20 dB #Peak Log 10 dB/Offst 11.5 dB Center 5.240 00 GHz Span 25 MHz #Res BW 300 kHz #VBW 1 MHz Sweep 1 ms (601 pts) Occupied Bandwidth 16.5026 MHz Occ BW % Pwr 99.00 % x dB -26.00 dB Transmit Freq Error 25.796 kHz x dB Bandwidth 22.045 MHz Copyright 2000-2006 Agilent Technologies

Mode 3: IEEE 802.11n 20MHz Link Mode	
5180	 Agilent R T Freq/Channel Ch Freq 5.18 GHz Trig Free Center Freq 5.1800000 GHz Start Freq 5.1675000 GHz Stop Freq 5.1925000 GHz CF Step 2.5000000 MHz Auto Man Freq Offset 0.0000000 Hz Signal Track On Off Ref 20 dBm Atten 20 dB #Peak Log 10 dB/ Offst 11.5 dB Center 5.180 00 GHz Span 25 MHz #Res BW 300 kHz #VBW 1 MHz Sweep 1 ms (601 pts) Occupied Bandwidth 17.6971 MHz Occ BW % Pwr 99.00 % x dB -26.00 dB Transmit Freq Error -9.274 kHz x dB Bandwidth 23.255 MHz Copyright 2000-2006 Agilent Technologies
5200	 Agilent R T Freq/Channel Ch Freq 5.2 GHz Trig Free Center Freq 5.2000000 GHz Start Freq 5.1875000 GHz Stop Freq 5.2125000 GHz CF Step 2.5000000 MHz Auto Man Freq Offset 0.0000000 Hz Signal Track On Off Ref 20 dBm Atten 20 dB #Peak Log 10 dB/ Offst 11.5 dB Center 5.200 00 GHz Span 25 MHz #Res BW 300 kHz #VBW 1 MHz Sweep 1 ms (601 pts) Occupied Bandwidth 17.7620 MHz Occ BW % Pwr 99.00 % x dB -26.00 dB Transmit Freq Error 37.806 kHz x dB Bandwidth 23.475 MHz Copyright 2000-2006 Agilent Technologies
5240	 Agilent R T Freq/Channel Ch Freq 5.24 GHz Trig Free Center Freq 5.2400000 GHz Start Freq 5.2275000 GHz Stop Freq 5.2525000 GHz CF Step 2.5000000 MHz Auto Man Freq Offset 0.0000000 Hz Signal Track On Off Ref 20 dBm Atten 20 dB #Peak Log 10 dB/ Offst 11.5 dB Center 5.240 00 GHz Span 25 MHz #Res BW 300 kHz #VBW 1 MHz Sweep 1 ms (601 pts) Occupied Bandwidth 17.7519 MHz Occ BW % Pwr 99.00 % x dB -26.00 dB Transmit Freq Error -350.997 Hz x dB Bandwidth 23.263 MHz Copyright 2000-2006 Agilent Technologies

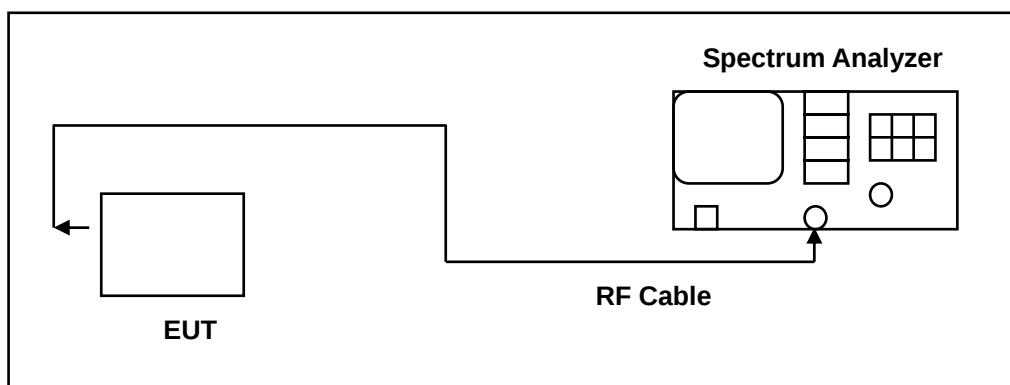
8 6dB RF Bandwidth Measurement

8.1. Limit

6dB RF Bandwidth

Systems using digital modulation techniques may operate in the 5725~5850MHz bands. The minimum 6 dB band-width shall be at least 500 kHz.

8.2. Test Setup



8.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY45300744	12/16/2014	(1)
Test Site	ATL	TE05	TE05	N.C.R.	-----

dRemark: (1) Calibration period 1 year. (2) Calibration period 2 years. (3) Calibration period 3 years.

Note: N.C.R. = No Calibration Request.

8.4. Test Procedure

6dB RF Bandwidth

The EUT tested to UNII test procedure of KDB789033 D02 for compliance to FCC 47CFR 15.247 requirements.

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

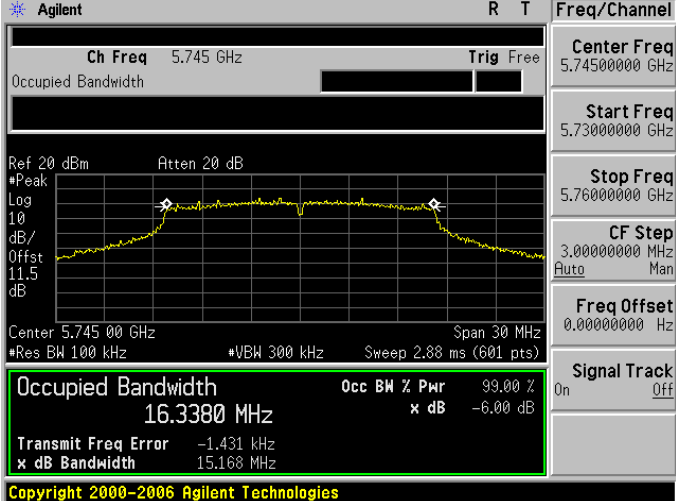
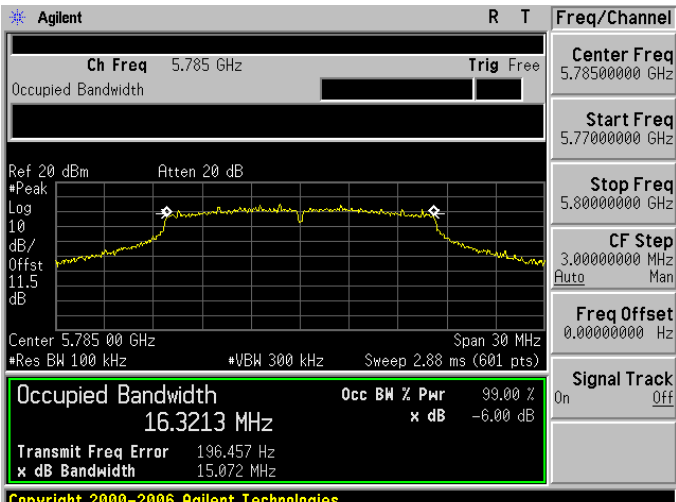
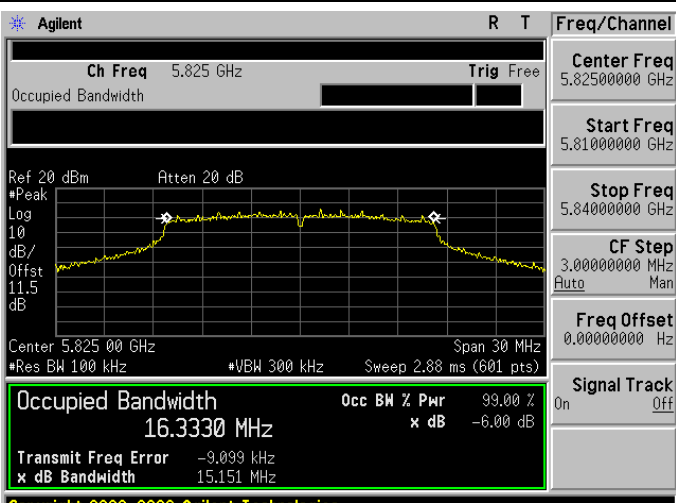
The test was performed at 3 channels.

8.5. Test Result

Model Number	TB120		
Test Item	6dB RF Bandwidth		
Test Mode	Mode 2: IEEE 802.11a Link Mode		
Date of Test	06/30/2015	Test Site	TE05
Frequency (MHz)	6dB Bandwidth (MHz)	6dB Bandwidth Limit (kHz)	
5745	15.168	> 500	
5785	15.072	> 500	
5825	15.151	> 500	

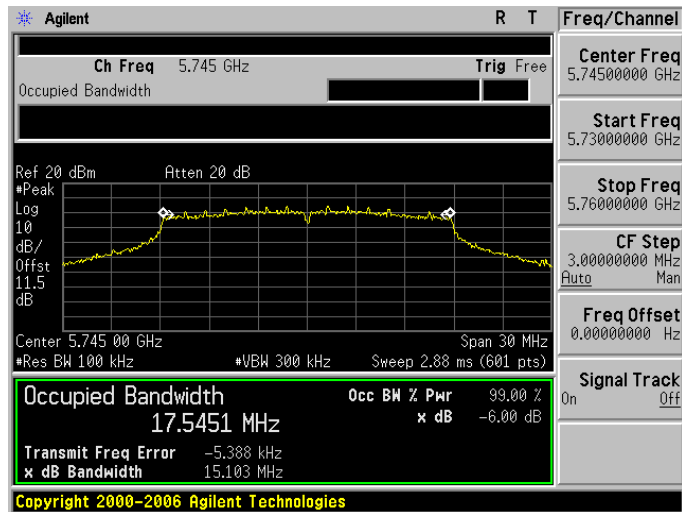
Model Number	TB120		
Test Item	6dB RF Bandwidth		
Test Mode	Mode 3: IEEE 802.11n 20MHz Link Mode		
Date of Test	06/30/2015	Test Site	TE05
Frequency (MHz)	6dB Bandwidth (MHz)	6dB Bandwidth Limit (kHz)	
5745	15.103	> 500	
5785	14.077	> 500	
5825	15.044	> 500	

8.6. Test Graphs

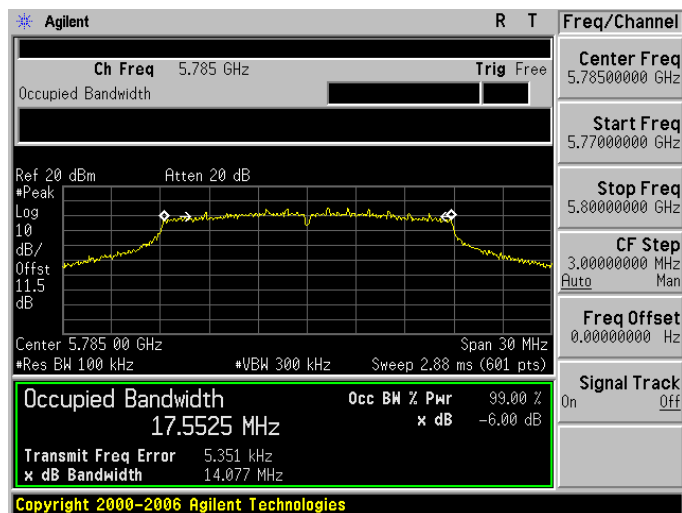
Mode 2: IEEE 802.11a Link Mode	
5745	 Agilent R T Freq/Channel Ch Freq 5.745 GHz Trig Free Center Freq 5.74500000 GHz Start Freq 5.73000000 GHz Stop Freq 5.76000000 GHz CF Step 3.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Ref 20 dBm Atten 20 dB Peak Log 10 dB/ Offst 11.5 dB Center 5.745 00 GHz Span 30 MHz *Res BW 100 kHz *VBW 300 kHz Sweep 2.88 ms (601 pts) Occupied Bandwidth 16.3380 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error -1.431 kHz x dB Bandwidth 15.168 MHz Copyright 2000-2006 Agilent Technologies
5785	 Agilent R T Freq/Channel Ch Freq 5.785 GHz Trig Free Center Freq 5.78500000 GHz Start Freq 5.77000000 GHz Stop Freq 5.80000000 GHz CF Step 3.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Ref 20 dBm Atten 20 dB Peak Log 10 dB/ Offst 11.5 dB Center 5.785 00 GHz Span 30 MHz *Res BW 100 kHz *VBW 300 kHz Sweep 2.88 ms (601 pts) Occupied Bandwidth 16.3213 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error 196.457 Hz x dB Bandwidth 15.072 MHz Copyright 2000-2006 Agilent Technologies
5825	 Agilent R T Freq/Channel Ch Freq 5.825 GHz Trig Free Center Freq 5.82500000 GHz Start Freq 5.81000000 GHz Stop Freq 5.84000000 GHz CF Step 3.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off Ref 20 dBm Atten 20 dB Peak Log 10 dB/ Offst 11.5 dB Center 5.825 00 GHz Span 30 MHz *Res BW 100 kHz *VBW 300 kHz Sweep 2.88 ms (601 pts) Occupied Bandwidth 16.3330 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB Transmit Freq Error -9.099 kHz x dB Bandwidth 15.151 MHz Copyright 2000-2006 Agilent Technologies

Mode 3: IEEE 802.11n 20MHz Link Mode

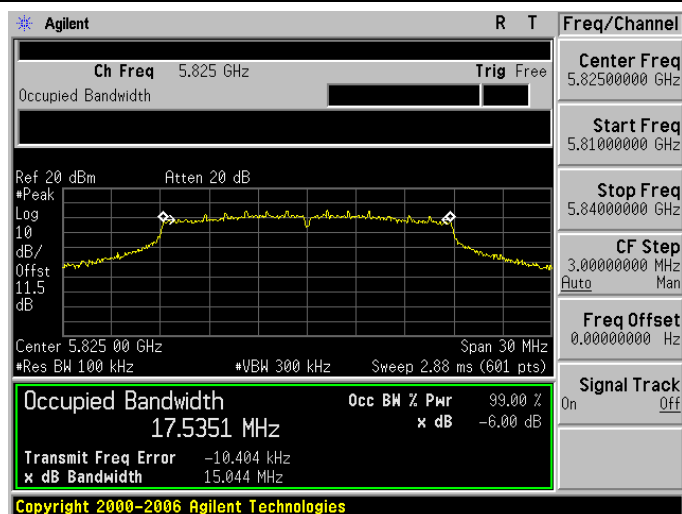
5745



5785



5825



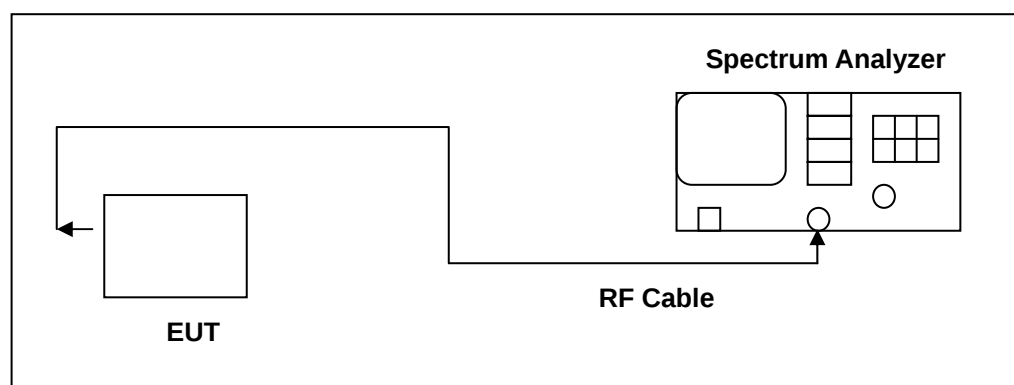
9 Peak Power Spectral Density Measurement

9.1. Limit

Conducted power spectral density

Frequency Range (MHz)	FCC Limit
5.150 ~ 5.250 GHz	11 dBm/MHz
	17 dBm/MHz
5.250 ~ 5.350 GHz	11 dBm/MHz
5.470 ~ 5.725 GHz	11 dBm/MHz
5.725 ~ 5.850 GHz	30 dBm/500KHz

9.2. Test Setup



9.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY45300744	12/16/2014	(1)
Test Site	ATL	TE02	TE02	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years.

Note: N.C.R. = No Calibration Request.

9.4. Test Procedure

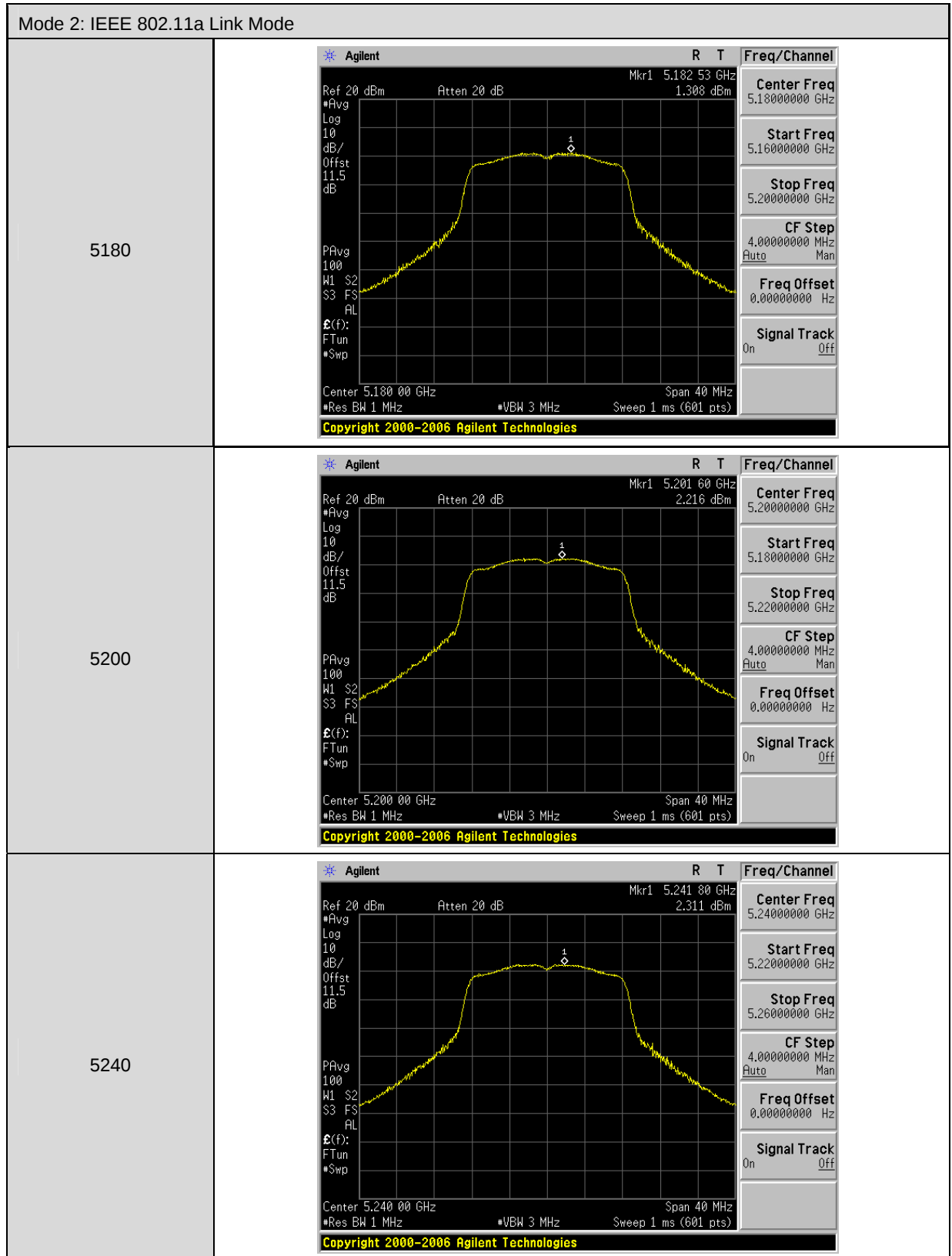
The test is performed in accordance with KDB789033: D02 General UNII Test Procedures New Rules v01, Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E.

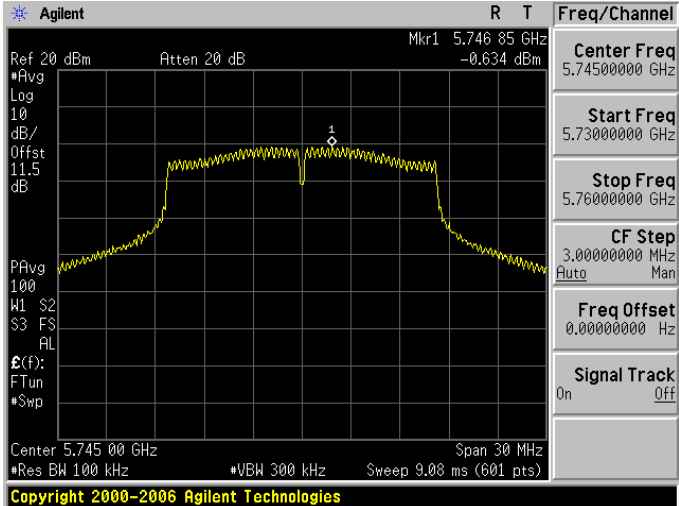
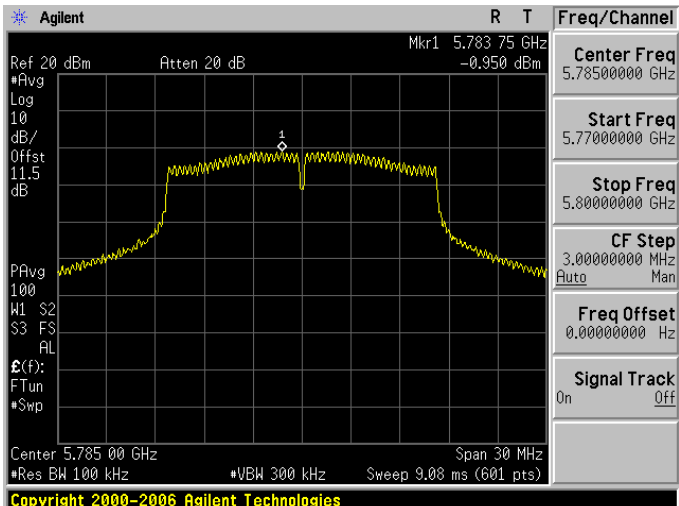
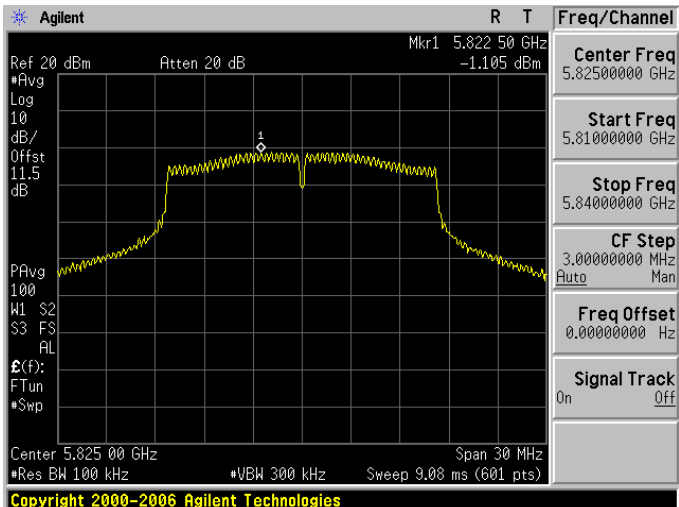
9.5. Test Result

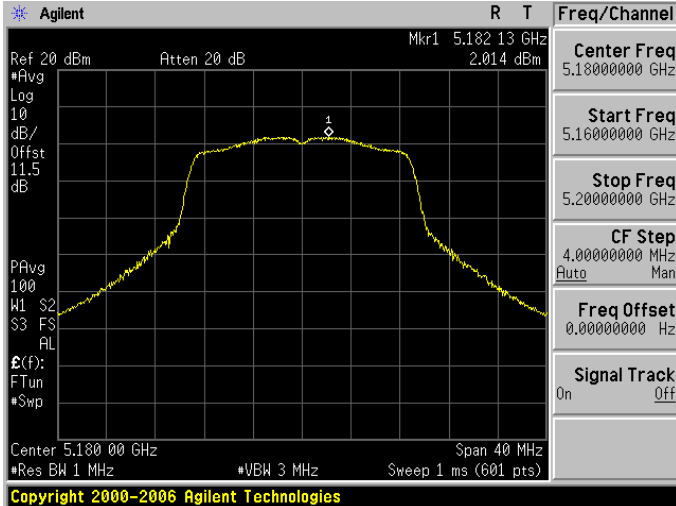
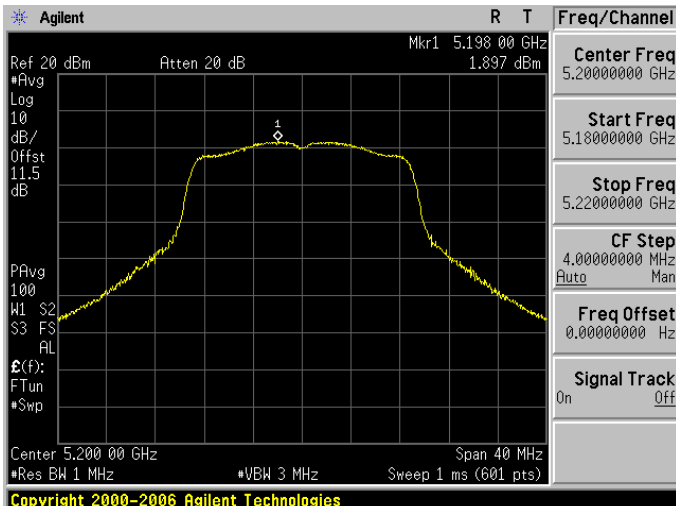
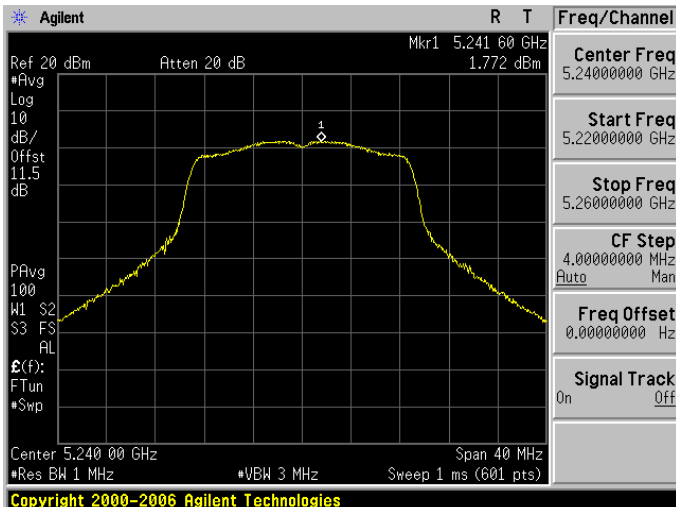
Model Number	TB120		
Test Item	Conducted power spectral density		
Test Mode	Mode 2: IEEE 802.11a Link Mode		
Date of Test	06/30/2015	Test Site	TE02
Frequency (MHz)	Measurement (dBm/MHz)		FCC Limit (dBm/MHz)
5180	1.308		< 11
5200	2.216		
5240	2.311		
Frequency (MHz)	Measurement (dBm/100KHz)	Measurement (dBm/500KHz)	FCC Limit (dBm/500KHz)
5745	-0.63	6.36	< 30
5785	-0.95	6.04	
5825	-1.11	5.88	

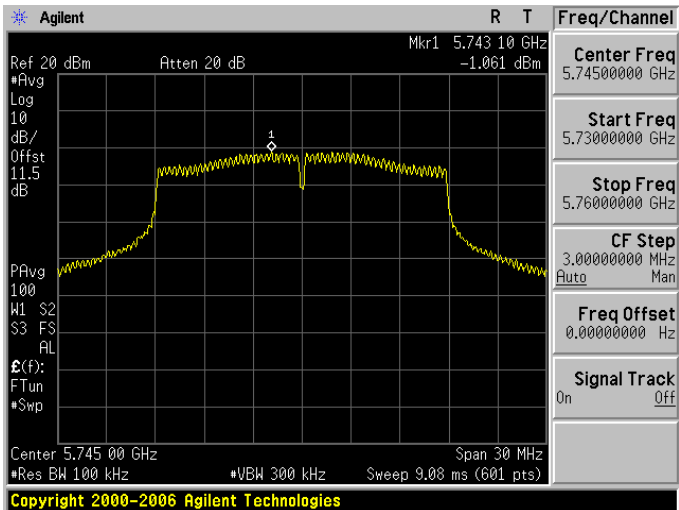
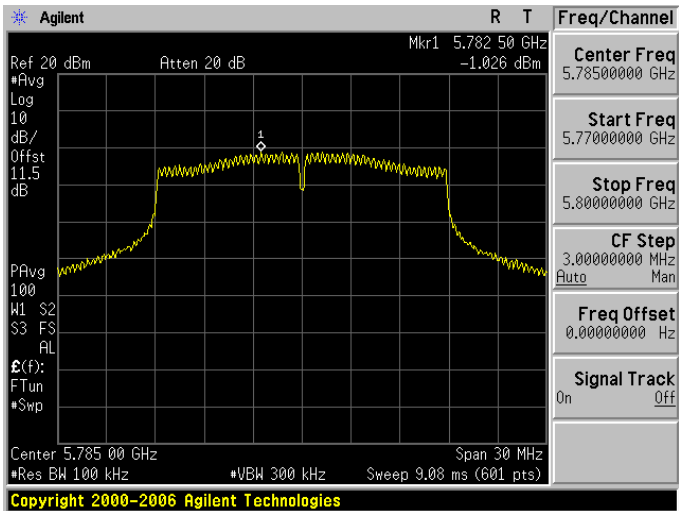
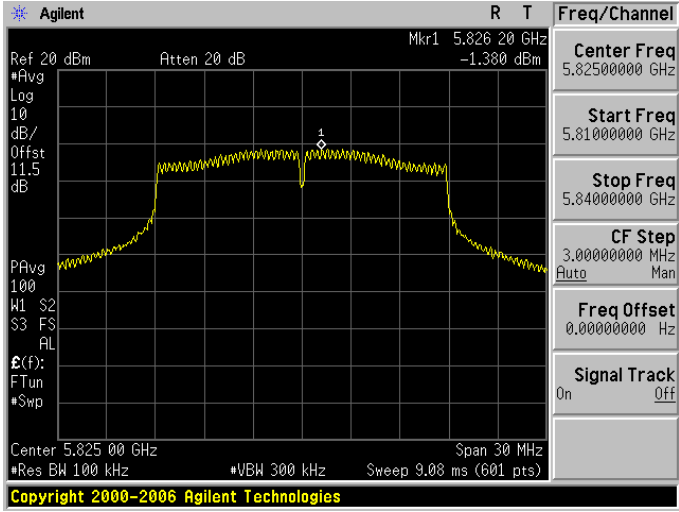
Model Number	TB120		
Test Item	Conducted power spectral density		
Test Mode	Mode 3: IEEE 802.11n 20MHz Link Mode		
Date of Test	06/30/2015	Test Site	TE02
Frequency (MHz)	Measurement (dBm/MHz)		FCC Limit (dBm/MHz)
5180	2.014		< 11
5200	1.897		
5240	1.772		
Frequency (MHz)	Measurement (dBm/100KHz)	Measurement (dBm/500KHz)	FCC Limit (dBm/500KHz)
5745	-1.06	5.93	< 30
5785	-1.03	5.96	
5825	-1.38	5.61	

9.6. Test Graphs



Mode 2: IEEE 802.11a Link Mode	
5745	 Copyright 2000-2006 Agilent Technologies
5785	 Copyright 2000-2006 Agilent Technologies
5825	 Copyright 2000-2006 Agilent Technologies

Mode 3: IEEE 802.11n 20MHz Link Mode	
5180	 Copyright 2000-2006 Agilent Technologies
5200	 Copyright 2000-2006 Agilent Technologies
5240	 Copyright 2000-2006 Agilent Technologies

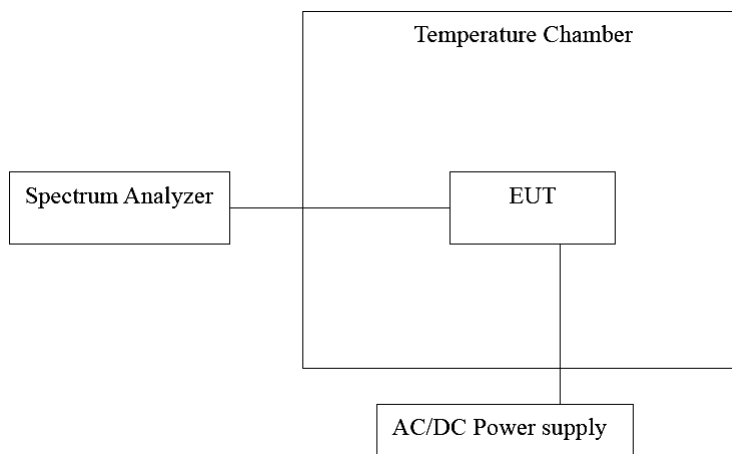
Mode 3: IEEE 802.11n 20MHz Link Mode	
5745	 Agilent R T Freq/Channel Ref 20 dBm Atten 20 dB Mkr1 5.743 10 GHz #Avg Log 10 dB/ Offst 11.5 dB PAvg 100 W1 S2 S3 FS AL Ⓔ(f): FTun #Swp Center 5.745 00 GHz Span 30 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 9.08 ms (601 pts) Copyright 2000-2006 Agilent Technologies Center Freq 5.74500000 GHz Start Freq 5.73000000 GHz Stop Freq 5.76000000 GHz CF Step 3.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off
5785	 Agilent R T Freq/Channel Ref 20 dBm Atten 20 dB Mkr1 5.782 50 GHz #Avg Log 10 dB/ Offst 11.5 dB PAvg 100 W1 S2 S3 FS AL Ⓔ(f): FTun #Swp Center 5.785 00 GHz Span 30 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 9.08 ms (601 pts) Copyright 2000-2006 Agilent Technologies Center Freq 5.78500000 GHz Start Freq 5.77000000 GHz Stop Freq 5.80000000 GHz CF Step 3.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off
5825	 Agilent R T Freq/Channel Ref 20 dBm Atten 20 dB Mkr1 5.826 20 GHz #Avg Log 10 dB/ Offst 11.5 dB PAvg 100 W1 S2 S3 FS AL Ⓔ(f): FTun #Swp Center 5.825 00 GHz Span 30 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 9.08 ms (601 pts) Copyright 2000-2006 Agilent Technologies Center Freq 5.82500000 GHz Start Freq 5.81000000 GHz Stop Freq 5.84000000 GHz CF Step 3.00000000 MHz Auto Man Freq Offset 0.00000000 Hz Signal Track On Off

10 Frequency Stability Measurement

10.1. Limit

The frequency tolerance of the carrier signal shall be maintained within the band of operation frequency over a temperature variation of –30 degrees to 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

10.2. Test Setup



10.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4408B	MY45107753	07/24/2014	(1)
Temperature & Humidity Chamber	TAICHY	MHU-225LA	980729	04/27/2015	(1)
Test Site	ATL	TE02	TE02	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years.

Note: N.C.R. = No Calibration Request.

10.4. Test Procedure

1. The EUT was placed inside the environmental test chamber and powered by nominal AC/DC voltage.
2. Turn the EUT on and couple its output to a spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

10.5. Test Result

Temperature Variations

Model Number	TB120				
Test Mode	Mode 2				
Frequency	5200 MHz				
Date of Test	06/30/2015			Test Site	TE02
Temp. (°C)	Voltage (VDC)	Measured Frequency (MHz)	Delta Frequency (Hz)	Tolerance (ppm)	Result (Pass/Fail)
-10	3.8	5200.0074	7400	1.423	Pass
0		5200.0091	9100	1.750	Pass
10		5200.0085	8500	1.635	Pass
20		5200.0027	2700	0.519	Pass
30		5199.9985	-1500	-0.288	Pass
40		5199.9954	-4600	-0.885	Pass
50		5199.9959	-4100	-0.788	Pass

Note: The manufacturer's frequency stability specification is better than 250ppm.

Model Number	TB120				
Test Mode	Mode 2				
Frequency	5785 MHz				
Date of Test	06/30/2015			Test Site	TE02
Temp. (°C)	Voltage (VDC)	Measured Frequency (MHz)	Delta Frequency (Hz)	Tolerance (ppm)	Result (Pass/Fail)
-10	3.8	5784.9965	-3500	-0.605	Pass
0		5785.0076	7600	1.314	Pass
10		5785.0014	1400	0.242	Pass
20		5785.0096	9600	1.659	Pass
30		5784.9977	-2300	-0.398	Pass
40		5785.0041	4100	0.709	Pass
50		5784.9902	-9800	-1.694	Pass

Model Number	TB120				
Test Mode	Mode 3				
Frequency	5200 MHz				
Date of Test	06/30/2015			Test Site	TE02
Temp. (°C)	Voltage (VDC)	Measured Frequency (MHz)	Delta Frequency (Hz)	Tolerance (ppm)	Result (Pass/Fail)
-10	3.8	5199.9926	-7400	-1.423	Pass
0		5200.0006	600	0.115	Pass
10		5199.9906	-9400	-1.808	Pass
20		5199.9933	-6700	-1.288	Pass
30		5199.9906	-9400	-1.808	Pass
40		5200.0041	4100	0.788	Pass
50		5199.9949	-5100	-0.981	Pass

Note: The manufacturer's frequency stability specification is better than 250ppm.

Model Number	TB120				
Test Mode	Mode 3				
Frequency	5785 MHz				
Date of Test	06/30/2015			Test Site	TE02
Temp. (°C)	Voltage (VDC)	Measured Frequency (MHz)	Delta Frequency (Hz)	Tolerance (ppm)	Result (Pass/Fail)
-10	3.8	5784.9949	-5100	-0.882	Pass
0		5785.0031	3100	0.536	Pass
10		5785.0007	700	0.121	Pass
20		5785.0003	300	0.052	Pass
30		5785.0074	7400	1.279	Pass
40		5784.9999	-100	-0.017	Pass
50		5785.0073	7300	1.262	Pass

Note: The manufacturer's frequency stability specification is better than 250ppm.

Voltage Variations

Model Number	TB120				
Test Mode	Mode 2				
Frequency	5220 MHz				
Date of Test	06/30/2015			Test Site	TE02
Temp. (°C)	Voltage (VDC)	Measured Frequency (MHz)	Delta Frequency (Hz)	Tolerance (ppm)	Result (Pass/Fail)
20	4.4	5199.9926	-7400	-1.423	Pass
	3.8	5200.0048	4800	0.923	Pass
	3.6	5200.0017	1700	0.327	Pass

Model Number	TB120				
Test Mode	Mode 2				
Frequency	5785 MHz				
Date of Test	06/30/2015			Test Site	TE02
Temp. (°C)	Voltage (VDC)	Measured Frequency (MHz)	Delta Frequency (Hz)	Tolerance (ppm)	Result (Pass/Fail)
20	4.4	5785.0091	9100	1.573	Pass
	3.8	5784.9918	-8200	-1.417	Pass
	3.6	5785.0068	6800	1.175	Pass

Note: The manufacturer's frequency stability specification is better than 250ppm.

Model Number	TB120				
Test Mode	Mode 3				
Frequency	5220 MHz				
Date of Test	06/30/2015			Test Site	TE02
Temp. (°C)	Voltage (VDC)	Measured Frequency (MHz)	Delta Frequency (Hz)	Tolerance (ppm)	Result (Pass/Fail)
20	4.4	5200.0048	4800	0.923	Pass
	3.8	5199.9940	-6000	-1.154	Pass
	3.6	5199.9924	-7600	-1.462	Pass

Model Number	TB120				
Test Mode	Mode 3				
Frequency	5785 MHz				
Date of Test	06/30/2015			Test Site	TE02
Temp. (°C)	Voltage (VDC)	Measured Frequency (MHz)	Delta Frequency (Hz)	Tolerance (ppm)	Result (Pass/Fail)
20	4.4	5785.0013	1300	0.225	Pass
	3.8	5784.9968	-3200	-0.553	Pass
	3.6	5785.0069	6900	1.193	Pass

Note: The manufacturer's frequency stability specification is better then 250ppm.

11 Antenna Requirement

11.1. Limit

For intentional device, according to 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.

And According to 15.407 (a), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

11.2. Antenna Connector Construction

The antenna used in this product is FPCB Antenna. And the maximum Gain of this antenna is only -3.8 dBi.