

2422MHz by 802.11ac40:



2452MHz by 802.11ac40:



2412MHz by 802.11ax20:



2462MHz by 802.11ax20:



2422MHz by 802.11ax40:



2452MHz by 802.11ax40:



**AV-Ant 1+2+3+4 with Beam-forming:
2412MHz by 802.11b:**



2462MHz by 802.11b:



2412MHz by 802.11g:



2462MHz by 802.11g:



2412MHz by 802.11n20:



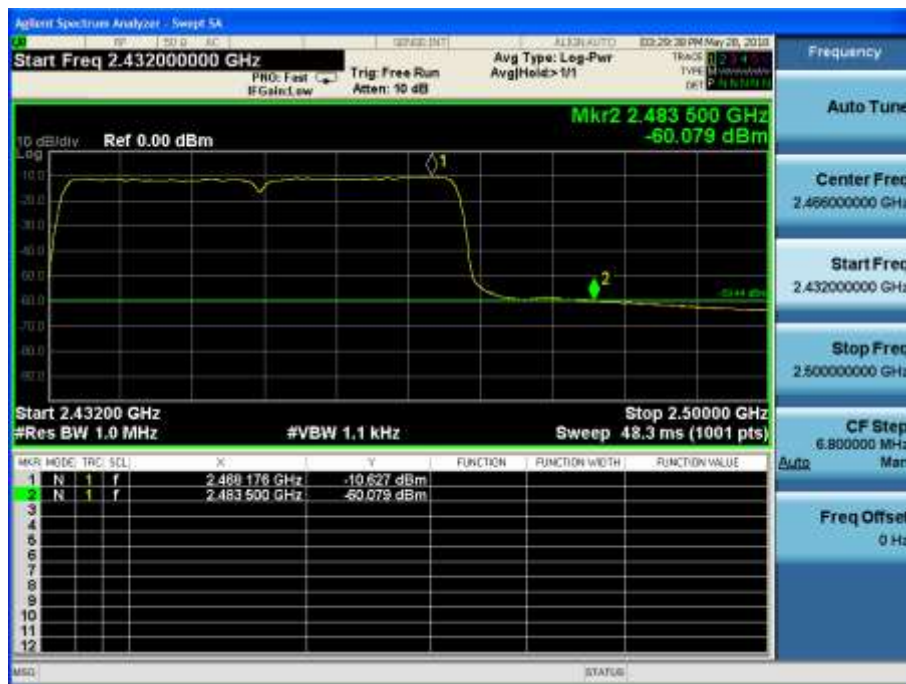
2462MHz by 802.11n20:



2422MHz by 802.11n40:



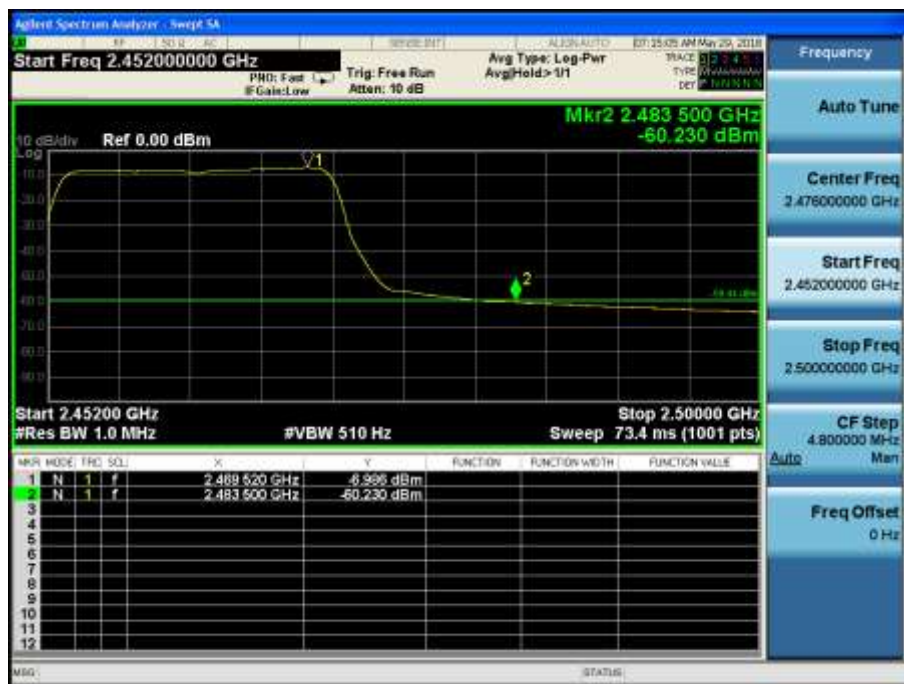
2452MHz by 802.11n40:



2412MHz by 802.11ac20:



2462MHz by 802.11ac20:



2422MHz by 802.11ac40:



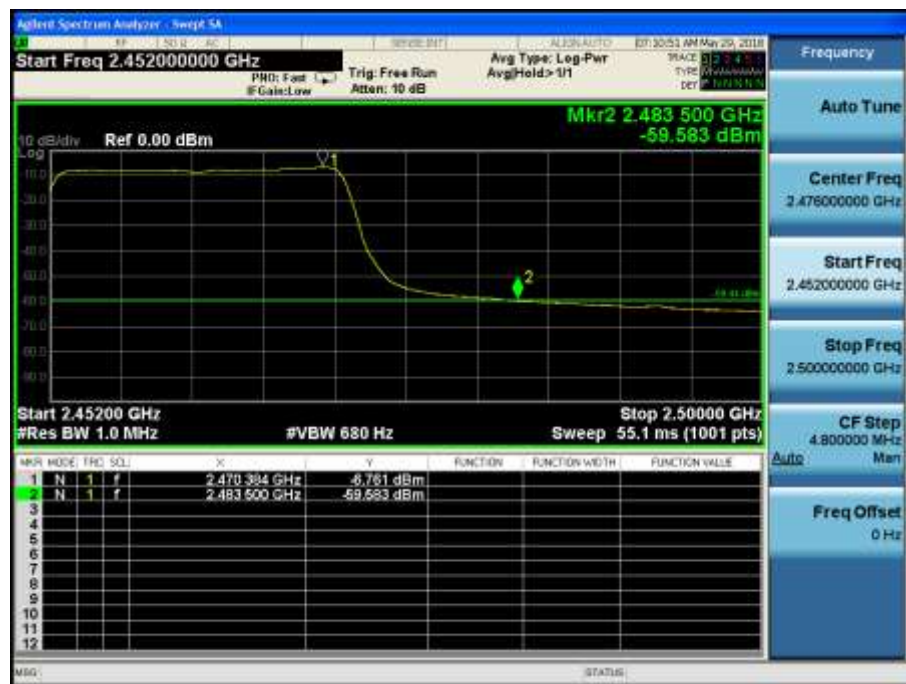
2452MHz by 802.11ac40:



2412MHz by 802.11ax20:



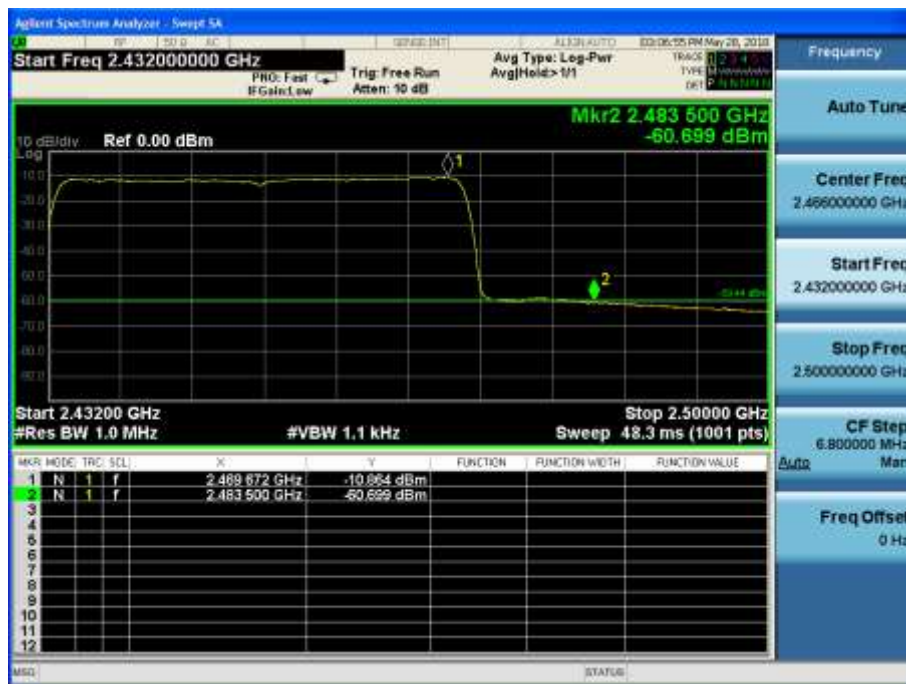
2462MHz by 802.11ax20:



2422MHz by 802.11ax40:



2452MHz by 802.11ax40:



**PK-Ant 1+2+3+4 with Beam-forming:
2412MHz by 802.11b:**



2462MHz by 802.11b:



2412MHz by 802.11g:



2462MHz by 802.11g:



2412MHz by 802.11n20:



2462MHz by 802.11n20:



2422MHz by 802.11n40:



2452MHz by 802.11n40:



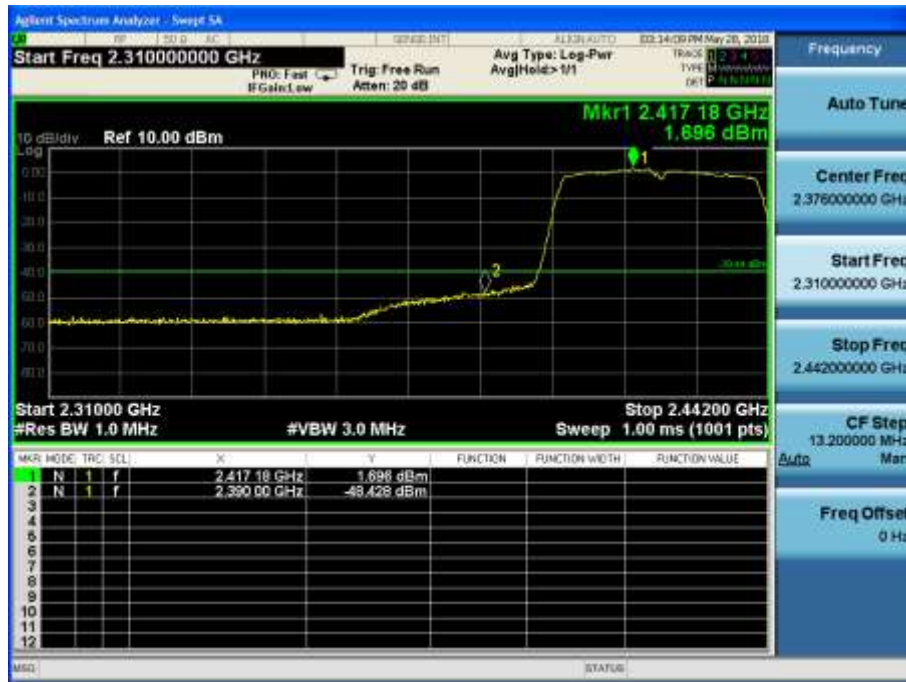
2412MHz by 802.11ac20:



2462MHz by 802.11ac20:



2422MHz by 802.11ac40:



2452MHz by 802.11ac40:



2412MHz by 802.11ax20:



2462MHz by 802.11ax20:



2422MHz by 802.11ax40:



2452MHz by 802.11ax40:



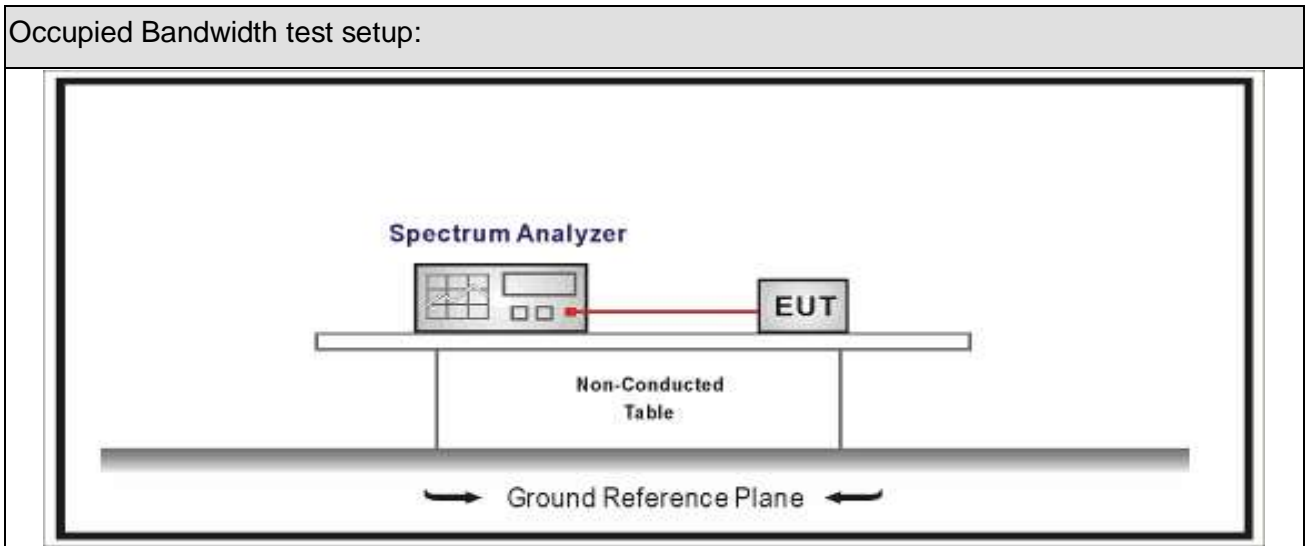
7. Occupied Bandwidth

7.1. Test Equipment

Occupied Bandwidth / TR-8					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2018.02.04	2019.02.03
EXA Spectrum Analyzer	Keysight	N9010A	MY55370495	2018.04.09	2019.04.08
MXA Signal Analyzer	Keysight	N9020A	MY56060147	2018.04.09	2019.04.08
Temperature/Humidity Meter	zhichen	ZC1-2	TR8-TH	2018.04.10	2019.04.09

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

7.2. Test Setup



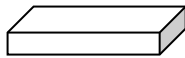
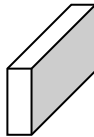
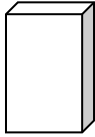
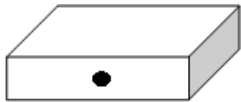
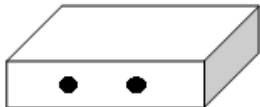
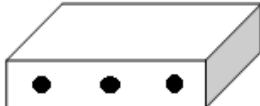
7.3. Limit

Occupied Bandwidth
Systems using digital modulation techniques operate in the 2400-2483.5 MHz. The minimum 6 dB bandwidth shall be at least 500 kHz

7.4. Test Procedure

Test Method			
	Reference Rule	Chapter	Description
<input checked="" type="checkbox"/>	ANSI C63.10	11.8	DTS bandwidth
	<input type="checkbox"/> ANSI C63.10	11.8.1	Option 1
	<input checked="" type="checkbox"/> ANSI C63.10	11.8.2	Option 2

7.5. EUT test definition

Item	Occupied Bandwidth			
Device Category	<input type="checkbox"/>	Fixed point-to-point		
	<input type="checkbox"/>	Emit multiple directional beams, simultaneously or sequentially		
	<input checked="" type="checkbox"/>	Other cases		
Test mode	Mode 1~8			
Test method	<input type="checkbox"/>	Radiated		
		X Axis	Y Axis	Z Axis
				
		Worst Axis <input type="checkbox"/>	Worst Axis <input type="checkbox"/>	Worst Axis <input type="checkbox"/>
	<input checked="" type="checkbox"/>	Conducted		
	<input type="checkbox"/>	Chain 1		
				
	<input checked="" type="checkbox"/>	Chain 1	Chain 2	
				
	<input type="checkbox"/>	Chain 1	Chain 2	Chain 3
				

7.6. Test Result

Product Name	: Wireless Access Point	Power	: AC 120V/60Hz
Test Mode	: Mode1~8	Test Site	: TR8
Test Date	: 2018.01.02	Test Engineer	: Damon

CDD 2*TX+2*RX:

Mode	CH.	Test Freq. (MHz)	99% Occupied Bandwidth (MHz)		6dB Occupied Bandwidth (MHz)		Limit (kHz)	Result
			Ant 0	Ant 1	Ant 0	Ant 1		
1	01	2412	10.793	10.739	10.72	7.59	>500	Pass
1	06	2437	10.871	10.953	7.54	7.55	>500	Pass
1	11	2462	10.873	10.874	6.58	6.59	>500	Pass
2	01	2412	16.465	16.468	16.35	15.97	>500	Pass
2	06	2437	16.499	16.500	16.34	16.34	>500	Pass
2	11	2462	16.498	16.502	16.39	16.42	>500	Pass
3	01	2412	17.654	17.663	16.71	16.55	>500	Pass
3	06	2437	17.707	17.699	17.59	17.58	>500	Pass
3	11	2462	17.691	17.682	17.58	17.60	>500	Pass
4	03	2422	35.966	35.969	35.12	35.17	>500	Pass
4	06	2437	36.171	36.167	36.34	35.76	>500	Pass
4	09	2452	36.236	36.230	36.42	36.42	>500	Pass
5	01	2412	17.652	17.654	17.18	16.94	>500	Pass
5	06	2437	17.712	17.694	17.61	17.59	>500	Pass
5	11	2462	17.686	17.692	17.57	17.24	>500	Pass
6	01	2422	36.014	35.993	35.45	35.41	>500	Pass
6	06	2437	36.183	36.193	36.37	35.76	>500	Pass
6	11	2452	36.256	36.238	36.45	36.39	>500	Pass
7	01	2412	18.906	18.913	18.23	18.21	>500	Pass
7	06	2437	18.944	18.949	18.82	18.81	>500	Pass
7	11	2462	18.932	18.935	18.70	18.69	>500	Pass
8	03	2422	37.187	37.171	35.09	35.85	>500	Pass
8	06	2437	37.509	37.452	37.33	36.60	>500	Pass
8	09	2452	37.557	37.582	37.69	37.68	>500	Pass

BF 2*TX+2*RX:

Mode	CH.	Test Freq. (MHz)	99% Occupied Bandwidth (MHz)		6dB Occupied Bandwidth (MHz)		Limit (kHz)	Result
			Ant 0	Ant 1	Ant 0	Ant 1		
1	01	2412	11.959	11.898	9.58	9.57	>500	Pass
1	06	2437	11.921	11.952	9.60	9.62	>500	Pass
1	11	2462	12.125	12.085	9.61	9.23	>500	Pass
2	01	2412	16.474	16.477	16.42	16.38	>500	Pass
2	06	2437	16.474	16.468	16.37	16.39	>500	Pass
2	11	2462	16.470	16.468	16.41	16.38	>500	Pass
3	01	2412	17.670	17.661	17.63	17.60	>500	Pass
3	06	2437	17.652	17.667	17.60	17.60	>500	Pass
3	11	2462	17.657	17.670	17.61	17.61	>500	Pass
4	03	2422	36.168	36.186	36.39	36.41	>500	Pass
4	06	2437	36.129	36.127	36.09	36.31	>500	Pass
4	09	2452	36.116	36.140	36.33	36.37	>500	Pass
5	01	2412	17.671	17.674	17.62	17.64	>500	Pass
5	06	2437	17.662	17.665	17.60	17.60	>500	Pass
5	11	2462	17.662	17.655	17.62	17.64	>500	Pass
6	01	2422	36.187	36.169	36.44	36.40	>500	Pass
6	06	2437	36.128	36.096	36.37	36.29	>500	Pass
6	11	2452	36.120	36.119	36.31	36.33	>500	Pass
7	01	2412	18.982	18.978	18.96	18.97	>500	Pass
7	06	2437	18.978	18.957	18.73	18.72	>500	Pass
7	11	2462	18.976	18.965	18.95	18.89	>500	Pass
8	03	2422	37.498	36.85	37.46	36.99	>500	Pass
8	06	2437	37.406	37.397	36.03	36.36	>500	Pass
8	09	2452	37.401	37.374	35.77	36.66	>500	Pass

Note : The worst case of Occupied Bandwidth as below in next page:

Mode 1 CH11 (2462MHz) Ant 0



Mode 1 CH11 (2462MHz) Ant 1



CDD 4*TX+4*RX:

Mode	CH.	Test Freq. (MHz)	99% Occupied Bandwidth (MHz)				6dB Occupied Bandwidth (MHz)				Limit (kHz)	Result
			Ant 0	Ant 1	Ant 2	Ant 3	Ant 0	Ant 1	Ant 2	Ant 3		
1	01	2412	10.164	10.153	10.182	10.152	6.08	6.55	7.06	6.59	>500	Pass
1	06	2437	10.207	10.228	10.231	10.216	6.55	7.09	7.09	7.55	>500	Pass
1	11	2462	10.215	10.208	10.218	10.199	7.07	6.56	6.59	6.57	>500	Pass
2	01	2412	16.449	16.450	16.459	16.451	16.34	16.08	16.32	16.32	>500	Pass
2	06	2437	16.489	16.496	16.491	16.492	16.41	16.36	16.32	16.39	>500	Pass
2	11	2462	16.526	16.525	16.482	16.493	16.36	16.36	16.37	16.35	>500	Pass
3	01	2412	17.655	17.665	17.665	17.654	16.94	16.67	17.59	16.73	>500	Pass
3	06	2437	17.705	17.707	17.706	17.717	17.62	17.63	17.61	17.60	>500	Pass
3	11	2462	17.700	17.703	17.698	17.696	17.59	17.30	17.58	17.60	>500	Pass
4	03	2422	35.937	35.966	35.959	35.983	35.44	35.13	35.12	35.08	>500	Pass
4	06	2437	36.175	36.194	36.176	36.198	36.34	36.37	36.33	36.38	>500	Pass
4	09	2452	36.230	36.221	36.238	36.214	36.21	36.42	36.44	36.42	>500	Pass
5	01	2412	17.653	17.659	17.641	17.652	17.20	17.30	16.34	17.56	>500	Pass
5	06	2437	17.697	17.692	17.681	17.681	17.59	17.60	17.60	17.60	>500	Pass
5	11	2462	17.700	17.690	17.706	17.684	17.60	17.59	17.60	17.59	>500	Pass
6	01	2422	35.969	36.001	35.986	36.019	35.46	35.12	35.46	35.09	>500	Pass
6	06	2437	36.207	36.178	36.183	36.200	36.37	36.37	35.80	36.38	>500	Pass
6	11	2452	36.224	36.242	36.234	36.234	36.42	36.43	36.42	36.42	>500	Pass
7	01	2412	18.954	18.897	18.885	18.912	18.98	18.21	18.59	18.24	>500	Pass
7	06	2437	18.949	18.957	18.958	18.960	18.70	18.81	18.78	18.89	>500	Pass
7	11	2462	18.962	18.945	18.966	18.936	18.70	18.70	18.16	18.66	>500	Pass
8	03	2422	37.218	37.217	37.200	37.211	35.84	36.35	35.86	35.63	>500	Pass
8	06	2437	37.485	37.484	37.474	37.469	37.30	37.31	36.67	37.28	>500	Pass
8	09	2452	37.561	37.579	37.561	37.550	37.66	37.65	37.68	36.99	>500	Pass

BF 4*TX+4*RX:

Mode	CH.	Test Freq. (MHz)	99% Occupied Bandwidth (MHz)				6dB Occupied Bandwidth (MHz)				Limit (kHz)	Result
			Ant 0	Ant 1	Ant 2	Ant 3	Ant 0	Ant 1	Ant 2	Ant 3		
1	01	2412	10.193	10.194	10.184	10.196	7.05	6.55	7.53	7.08	>500	Pass
1	06	2437	10.254	10.224	10.263	10.246	6.54	7.08	7.53	6.56	>500	Pass
1	11	2462	10.234	10.238	10.277	10.232	7.09	7.07	7.05	7.06	>500	Pass
2	01	2412	16.509	16.507	16.505	16.507	16.39	16.38	16.39	16.38	>500	Pass
2	06	2437	16.508	16.502	16.502	16.495	16.38	16.35	16.38	16.41	>500	Pass
2	11	2462	16.496	16.505	16.501	16.509	16.36	16.37	16.51	16.40	>500	Pass
3	01	2412	17.669	17.669	17.667	17.670	17.63	17.61	17.60	17.61	>500	Pass
3	06	2437	17.664	17.662	17.654	17.656	17.62	17.60	17.61	17.62	>500	Pass
3	11	2462	17.665	17.661	17.653	17.666	17.62	17.61	17.61	17.59	>500	Pass
4	03	2422	36.174	36.191	36.180	36.195	36.41	36.39	36.40	36.39	>500	Pass
4	06	2437	36.142	36.125	36.125	36.141	36.36	36.37	36.37	36.36	>500	Pass
4	09	2452	36.096	36.110	36.144	36.089	36.36	36.35	36.37	36.31	>500	Pass
5	01	2412	17.675	17.672	17.690	17.677	17.65	17.63	17.64	17.63	>500	Pass
5	06	2437	17.663	17.663	17.664	17.672	17.62	17.65	17.64	17.60	>500	Pass
5	11	2462	17.664	17.662	17.667	17.652	17.64	17.62	17.63	17.62	>500	Pass
6	01	2422	36.186	36.206	36.189	36.225	36.44	36.45	36.39	36.45	>500	Pass
6	06	2437	36.153	36.172	36.155	36.155	36.36	36.39	36.37	36.39	>500	Pass
6	11	2452	36.137	36.151	36.126	36.123	36.35	36.36	36.35	36.34	>500	Pass
7	01	2412	18.978	18.969	18.975	18.990	18.92	18.95	18.99	18.91	>500	Pass
7	06	2437	18.963	18.952	18.974	18.948	18.28	18.93	18.74	18.76	>500	Pass
7	11	2462	18.955	18.980	18.952	18.967	18.88	18.98	18.93	18.98	>500	Pass
8	03	2422	37.489	37.485	37.529	37.464	37.17	36.86	37.23	37.18	>500	Pass
8	06	2437	37.395	37.454	37.406	37.441	36.12	36.16	36.46	36.40	>500	Pass
8	09	2452	37.395	37.388	37.428	37.408	36.89	35.53	36.89	36.57	>500	Pass

Note : The worst case of Occupied Bandwidth as below in next page:

Mode 1 CH01 (2412MHz) Ant 0



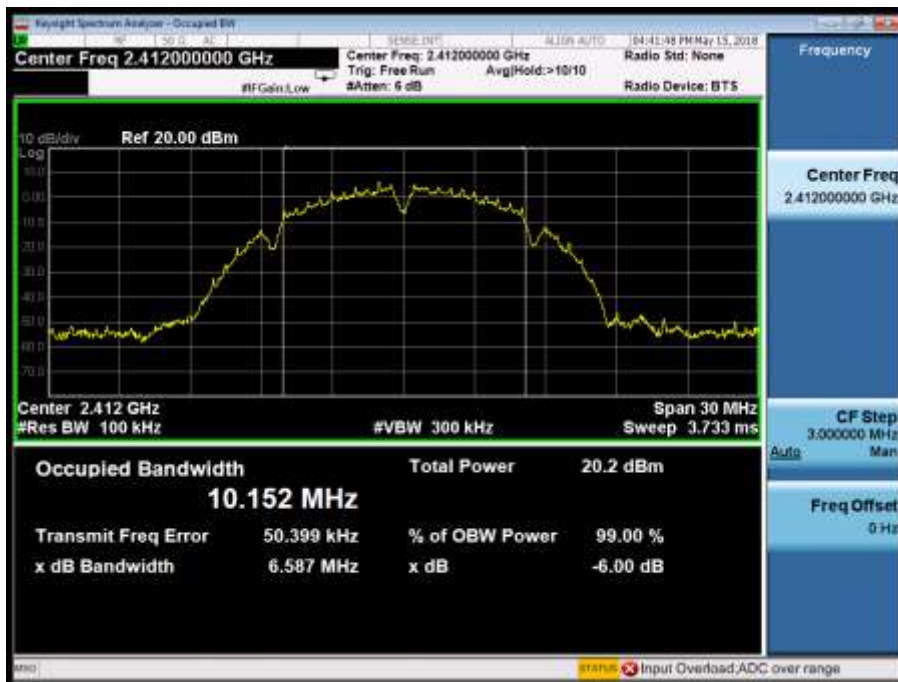
Mode 1 CH01 (2412MHz) Ant 1



Mode 1 CH01 (2412MHz) Ant 2



Mode 1 CH01 (2412MHz) Ant 3



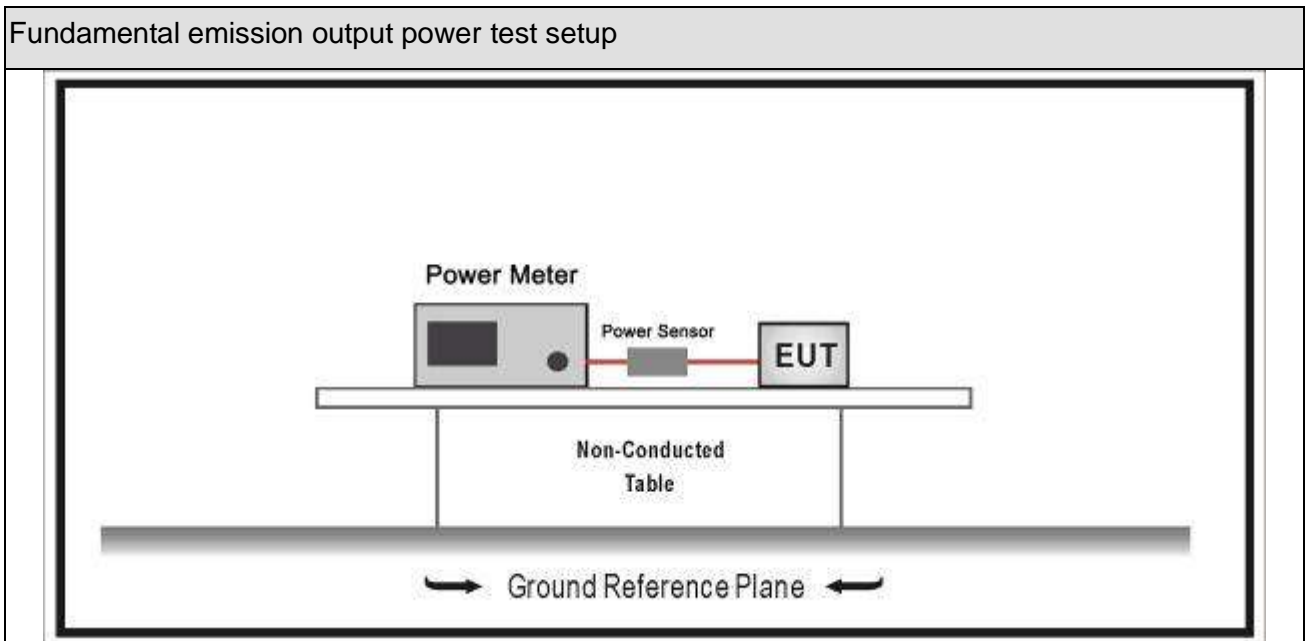
8. Fundamental emission output power

8.1. Test Equipment

Fundamental emission output power/ TR-8					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2018.01.04	2019.01.03
Spectrum Analyzer	Agilent	N9010A	MY48030494	2018.02.04	2019.02.03
Wideband Peak Power Meter	Anritsu	ML2495A	0905006	2017.10.14	2018.10.13
Power Sensor	Anritsu	MA2411B	0846014	2017.10.14	2018.10.13
Temperature/Humidity Meter	zhicheng	ZC1-2	TR8-TH	2018.04.10	2019.04.09

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

8.2. Test Setup



8.3. Limit

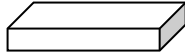
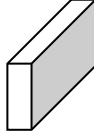
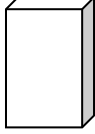



Fundamental emission output power Limit		
<input checked="" type="checkbox"/>	$G_{TX} < 6\text{dBi}$	$P_{out} \leq 30\text{dBm}$
<input type="checkbox"/>	$G_{TX} > 6\text{dBi}$	
<input type="checkbox"/>	Non-Fix point-point	$P_{out} \leq 30 - (G_{TX} - 6)$
<input type="checkbox"/>	Fix point-point	$P_{out} \leq 30 - [(G_{TX} - 6)]/3$
<input type="checkbox"/>	Point-to-multipoint	$P_{out} \leq 30 - (G_{TX} - 6)$
<input type="checkbox"/>	Overlap Beams	$P_{out} \leq 30 - [(G_{TX} - 6)]/3$
<input type="checkbox"/>	Aggregate power transmitted simultaneously on all beams	$P_{out} \leq 30 - [(G_{TX} - 6)]/3$
<input type="checkbox"/>	single directional beam	$P_{out} \leq 30 - [(G_{TX} - 6)]/3 + 8\text{dB}$
Note 1 : G_{TX} directional gain of transmitting antennas.		
Note 2 : P_{out} is maximum peak conducted output power .		

8.4. Test Procedure

Fundamental emission output power Test Method			
	References Rule	Chapter	Description
<input checked="" type="checkbox"/>	ANSI C63.10	11.9	Fundamental emission output power
<input checked="" type="checkbox"/>	ANSI C63.10	11.9.1	Maximum peak conducted output power
	<input type="checkbox"/> ANSI C63.10	11.9.1.1	RBW \geq DTS bandwidth
	<input type="checkbox"/> ANSI C63.10	11.9.1.2	Integrated band power method
	<input checked="" type="checkbox"/> ANSI C63.10	11.9.1.3	PKPM1 Peak power meter method
<input type="checkbox"/>	ANSI C63.10	11.9.2	Maximum conducted (average) output power
	<input type="checkbox"/> ANSI C63.10	11.9.2.2	Measurement using a spectrum analyzer (SA)
	<input type="checkbox"/> ANSI C63.10	11.9.2.2.2	Method AVGSA-1(Duty cycle \geq 98%)
	<input type="checkbox"/> ANSI C63.10	11.9.2.2.3	Method AVGSA-1A(Duty cycle \geq 98%)
	<input type="checkbox"/> ANSI C63.10	11.9.2.2.4	Method AVGSA-2(Duty cycle \leq 98%)
	<input type="checkbox"/> ANSI C63.10	11.9.2.2.5	Method AVGSA-2A(Duty cycle \leq 98%)
	<input type="checkbox"/> ANSI C63.10	11.9.2.2.4	Method AVGSA-3
	<input type="checkbox"/> ANSI C63.10	11.9.2.2.5	Method AVGSA-3A
<input type="checkbox"/>	ANSI C63.10	11.9.2.3	Measurement using a power meter (PM)
	<input type="checkbox"/> ANSI C63.10	11.9.2.3.1	Method AVGPM
	<input type="checkbox"/> ANSI C63.10	11.9.2.3.2	Method AVGPM-G

Directional Gain Calculations for In-Band test method			
	References Rule	Chapter	Description
<input type="checkbox"/>	KDB 662911	F2)a)	Basic methodology
	<input type="checkbox"/> KDB 662911	F2)a) (i)	transmit signals are correlated
	<input type="checkbox"/> KDB 662911	F2)a) (ii)	transmit signals are uncorrelated
<input type="checkbox"/>	KDB 662911	F2)b)	Sectorized antenna systems.
<input type="checkbox"/>	KDB 662911	F2)c)	Cross-polarized antennas
	<input type="checkbox"/> ANSI C63.10	F2)c) (i)	Cross-polarized antennas
	<input type="checkbox"/> ANSI C63.10	F2)c) (ii)	Multiple antennas
<input checked="" type="checkbox"/>	KDB 662911	F2)e)	Spatial Multiplexing
	<input checked="" type="checkbox"/> KDB 662911	F2)e) (i)	Antennas have the same gain
	<input type="checkbox"/> KDB 662911	F2)e) (ii)	Antenna have the different gain with one spatial stream
	<input type="checkbox"/> KDB 662911	F2)e) (iii)	Antenna have the different gain with more than one spatial stream
<input checked="" type="checkbox"/>	KDB 662911	F2)f)	Cyclic Delay Diversity (CDD)
	<input checked="" type="checkbox"/> KDB 662911	F2)f) (i)	Antennas have the same gain
	<input type="checkbox"/> KDB 662911	F2)f) (ii)	Antenna have the different gain with one spatial stream
	<input type="checkbox"/> KDB 662911	F2)f) (iii)	Antenna have the different gain with more than one spatial stream

8.5. EUT test definition

Item	Fundamental emission output power			
Device Category	<input type="checkbox"/>	Fixed point-to-point		
	<input type="checkbox"/>	Emit multiple directional beams, simultaneously or sequentially		
	<input checked="" type="checkbox"/>	Other cases		
Test mode	Mode 1~8			
Test method	<input type="checkbox"/>	Radiated		
		X Axis	Y Axis	Z Axis
				
		Worst Axis <input type="checkbox"/>	Worst Axis <input type="checkbox"/>	Worst Axis <input type="checkbox"/>
	<input checked="" type="checkbox"/>	Conducted		
	<input type="checkbox"/>	Chain 1		
				
	<input checked="" type="checkbox"/>	Chain 1	Chain 2	
				
	<input type="checkbox"/>	Chain 1	Chain 2	Chain 3
				

8.6. Test Result

Mode 1: Transmit by 802.11b with CDD by Ant 1+2						
Channel No.	Frequency (MHz)	Measurement Power(dBm)		Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2			
CH01	2412	20.76	21.18	23.99	30.00	Pass
CH06	2437	20.87	21.09	23.99	30.00	Pass
CH11	2462	20.95	21.26	24.12	30.00	Pass

Mode 1: Transmit by 802.11b with CDD by Ant 1+2+3+4								
Channel No.	Frequency (MHz)	Measurement Power(dBm)				Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2	Ant3	Ant4			
CH01	2412	20.19	20.67	20.85	20.49	26.58	30.00	Pass
CH06	2437	20.06	20.64	20.82	20.57	26.55	30.00	Pass
CH11	2462	20.25	20.75	20.82	20.64	26.64	30.00	Pass

Mode 1: Transmit by 802.11b with Beam-forming by Ant 1+2						
Channel No.	Frequency (MHz)	Measurement Power(dBm)		Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2			
CH01	2412	20.13	20.32	23.24	30.00	Pass
CH06	2437	20.06	20.25	23.17	30.00	Pass
CH11	2462	20.27	20.21	23.25	30.00	Pass

Mode 1: Transmit by 802.11b with Beam-forming by Ant 1+2+3+4								
Channel No.	Frequency (MHz)	Measurement Power(dBm)				Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2	Ant3	Ant4			
CH01	2412	18.45	18.91	19.13	18.83	24.86	30.00	Pass
CH06	2437	18.39	18.89	19.04	18.86	24.82	30.00	Pass
CH11	2462	18.55	19.00	19.03	18.96	24.91	30.00	Pass

Mode 2: Transmit by 802.11g with CDD by Ant 1+2						
Channel No.	Frequency (MHz)	Measurement Power(dBm)		Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2			
CH01	2412	14.87	15.33	18.12	30.00	Pass
CH06	2437	14.94	15.31	18.14	30.00	Pass
CH11	2462	13.88	14.32	17.12	30.00	Pass

Mode 2: Transmit by 802.11g with CDD by Ant 1+2+3+4								
Channel No.	Frequency (MHz)	Measurement Power(dBm)				Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2	Ant3	Ant4			
CH01	2412	11.81	11.87	12.02	11.95	17.93	30.00	Pass
CH06	2437	11.91	11.97	12.09	12.05	18.03	30.00	Pass
CH11	2462	11.96	12.07	12.16	12.05	18.08	30.00	Pass

Mode 2: Transmit by 802.11g with Beam-forming by Ant 1+2						
Channel No.	Frequency (MHz)	Measurement Power(dBm)		Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2			
CH01	2412	14.05	14.5	17.29	30.00	Pass
CH06	2437	14.15	14.59	17.39	30.00	Pass
CH11	2462	13.23	13.43	16.34	30.00	Pass

Mode 2: Transmit by 802.11g with Beam-forming by Ant 1+2+3+4								
Channel No.	Frequency (MHz)	Measurement Power(dBm)				Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2	Ant3	Ant4			
CH01	2412	11.59	11.78	11.81	11.82	17.77	30.00	Pass
CH06	2437	11.60	11.82	11.86	11.81	17.79	30.00	Pass
CH11	2462	11.65	11.82	11.96	11.84	17.84	30.00	Pass

Mode 3: Transmit by 802.11n(20MHz) with CDD by Ant 1+2						
Channel No.	Frequency (MHz)	Measurement Power(dBm)		Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2			
CH01	2412	14.48	14.86	17.68	30.00	Pass
CH06	2437	14.49	14.83	17.67	30.00	Pass
CH11	2462	13.71	14.16	16.95	30.00	Pass

Mode 3: Transmit by 802.11n(20MHz) with CDD by Ant 1+2+3+4								
Channel No.	Frequency (MHz)	Measurement Power(dBm)				Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2	Ant3	Ant4			
CH01	2412	12.21	12.43	12.64	12.41	18.45	30.00	Pass
CH06	2437	12.07	12.53	12.77	12.35	18.46	30.00	Pass
CH11	2462	12.14	12.45	12.81	12.52	18.51	30.00	Pass

Mode 3: Transmit by 802.11n(20MHz) with Beam-forming by Ant 1+2						
Channel No.	Frequency (MHz)	Measurement Power(dBm)		Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2			
CH01	2412	13.94	14.17	17.07	30.00	Pass
CH06	2437	13.79	13.85	16.83	30.00	Pass
CH11	2462	12.84	13.28	16.08	30.00	Pass

Mode 3: Transmit by 802.11n(20MHz) with Beam-forming by Ant 1+2+3+4								
Channel No.	Frequency (MHz)	Measurement Power(dBm)				Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2	Ant3	Ant4			
CH01	2412	12.10	12.19	12.42	12.28	18.27	30.00	Pass
CH06	2437	11.95	12.22	12.43	12.12	18.20	30.00	Pass
CH11	2462	11.93	12.15	12.48	12.20	18.22	30.00	Pass

Mode 4: Transmit by 802.11n(40MHz) with CDD by Ant 1+2						
Channel No.	Frequency (MHz)	Measurement Power(dBm)		Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2			
CH03	2422	12.55	12.61	15.59	30.00	Pass
CH06	2437	12.63	12.54	15.60	30.00	Pass
CH09	2452	11.12	11.01	14.08	30.00	Pass

Mode 4: Transmit by 802.11n(40MHz) with CDD by Ant 1+2+3+4								
Channel No.	Frequency (MHz)	Measurement Power(dBm)				Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2	Ant3	Ant4			
CH03	2422	12.07	12.35	12.73	12.49	18.44	30.00	Pass
CH06	2437	12.18	12.34	12.78	12.26	18.42	30.00	Pass
CH09	2452	12.28	12.42	12.83	12.28	18.48	30.00	Pass

Mode 4: Transmit by 802.11n(40MHz) with Beam-forming by Ant 1+2						
Channel No.	Frequency (MHz)	Measurement Power(dBm)		Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2			
CH03	2422	11.69	11.77	14.74	30.00	Pass
CH06	2437	11.88	11.79	14.85	30.00	Pass
CH09	2452	10.42	10.28	13.36	30.00	Pass

Mode 4: Transmit by 802.11n(40MHz) with Beam-forming by Ant 1+2+3+4								
Channel No.	Frequency (MHz)	Measurement Power(dBm)				Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2	Ant3	Ant4			
CH03	2422	11.89	12.15	12.51	12.17	18.21	30.00	Pass
CH06	2437	11.90	12.09	12.51	12.16	18.19	30.00	Pass
CH09	2452	11.99	12.24	12.49	12.09	18.23	30.00	Pass

Mode 5: Transmit by 802.11ac(20MHz) with CDD by Ant 1+2						
Channel No.	Frequency (MHz)	Measurement Power(dBm)		Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2			
CH01	2412	14.72	14.96	17.85	30.00	Pass
CH06	2437	14.88	15.24	18.07	30.00	Pass
CH11	2462	13.97	14.29	17.14	30.00	Pass

Mode 5: Transmit by 802.11ac(20MHz) with CDD by Ant 1+2+3+4								
Channel No.	Frequency (MHz)	Measurement Power(dBm)				Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2	Ant3	Ant4			
CH01	2412	12.17	12.37	12.66	12.32	18.40	30.00	Pass
CH06	2437	12.13	12.35	12.58	12.62	18.45	30.00	Pass
CH11	2462	12.11	12.41	12.71	12.56	18.47	30.00	Pass

Mode 5: Transmit by 802.11ac(20MHz) with Beam-forming by Ant 1+2						
Channel No.	Frequency (MHz)	Measurement Power(dBm)		Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2			
CH01	2412	14.04	14.22	17.14	30.00	Pass
CH06	2437	14.15	14.43	17.30	30.00	Pass
CH11	2462	13.04	13.54	16.31	30.00	Pass

Mode 5: Transmit by 802.11ac(20MHz) with Beam-forming by Ant 1+2+3+4								
Channel No.	Frequency (MHz)	Measurement Power(dBm)				Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2	Ant3	Ant4			
CH01	2412	12.00	12.18	12.32	12.07	18.16	30.00	Pass
CH06	2437	11.91	12.23	12.34	12.38	18.24	30.00	Pass
CH11	2462	11.79	12.24	12.52	12.27	18.23	30.00	Pass

Mode 6: Transmit by 802.11ac(40MHz) with CDD by Ant 1+2						
Channel No.	Frequency (MHz)	Measurement Power(dBm)		Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2			
CH03	2422	12.97	12.88	15.94	30.00	Pass
CH06	2437	12.88	12.95	15.93	30.00	Pass
CH09	2452	11.65	11.68	14.68	30.00	Pass

Mode 6: Transmit by 802.11ac(40MHz) with CDD by Ant 1+2+3+4								
Channel No.	Frequency (MHz)	Measurement Power(dBm)				Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2	Ant3	Ant4			
CH03	2422	12.17	12.45	12.75	12.43	18.48	30.00	Pass
CH06	2437	12.07	12.33	12.89	12.42	18.46	30.00	Pass
CH09	2452	12.23	12.44	12.77	12.59	18.53	30.00	Pass

Mode 6: Transmit by 802.11ac(40MHz) with Beam-forming by Ant 1+2						
Channel No.	Frequency (MHz)	Measurement Power(dBm)		Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2			
CH03	2422	12.04	12.34	15.20	30.00	Pass
CH06	2437	12.09	12.20	15.16	30.00	Pass
CH09	2452	10.65	10.86	13.77	30.00	Pass

Mode 6: Transmit by 802.11ac(40MHz) with Beam-forming by Ant 1+2+3+4								
Channel No.	Frequency (MHz)	Measurement Power(dBm)				Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2	Ant3	Ant4			
CH03	2422	11.84	12.22	12.65	12.24	18.27	30.00	Pass
CH06	2437	11.99	12.12	12.62	12.18	18.25	30.00	Pass
CH09	2452	12.02	12.13	12.52	12.46	18.31	30.00	Pass

Mode 7: Transmit by 802.11ax(20MHz) with CDD by Ant 1+2						
Channel No.	Frequency (MHz)	Measurement Power(dBm)		Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2			
CH01	2412	13.99	14.07	17.04	30.00	Pass
CH06	2437	14.16	14.14	17.16	30.00	Pass
CH11	2462	13.27	13.22	16.26	30.00	Pass

Mode 7: Transmit by 802.11ax(20MHz) with CDD by Ant 1+2+3+4								
Channel No.	Frequency (MHz)	Measurement Power(dBm)				Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2	Ant3	Ant4			
CH01	2412	9.92	9.93	10.12	10.02	16.02	30.00	Pass
CH06	2437	9.85	9.88	10.20	10.11	16.03	30.00	Pass
CH11	2462	9.92	10.05	10.26	10.15	16.12	30.00	Pass

Mode 7: Transmit by 802.11ax(20MHz) with Beam-forming by Ant 1+2						
Channel No.	Frequency (MHz)	Measurement Power(dBm)		Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2			
CH01	2412	14.18	13.95	17.08	30.00	Pass
CH06	2437	14.20	14.26	17.24	30.00	Pass
CH11	2462	13.36	13.50	16.44	30.00	Pass

Mode 7: Transmit by 802.11ax(20MHz) with Beam-forming by Ant 1+2+3+4								
Channel No.	Frequency (MHz)	Measurement Power(dBm)				Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2	Ant3	Ant4			
CH01	2412	9.70	9.68	9.90	9.89	15.81	30.00	Pass
CH06	2437	9.59	9.71	9.91	9.87	15.79	30.00	Pass
CH11	2462	9.67	9.74	10.06	9.89	15.86	30.00	Pass

Mode 8: Transmit by 802.11ax(40MHz) with CDD by Ant 1+2						
Channel No.	Frequency (MHz)	Measurement Power(dBm)		Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2			
CH03	2422	12.88	12.98	15.94	30.00	Pass
CH06	2437	13.05	13.12	16.10	30.00	Pass
CH09	2452	11.63	11.66	14.66	30.00	Pass

Mode 8: Transmit by 802.11ax(40MHz) with CDD by Ant 1+2+3+4								
Channel No.	Frequency (MHz)	Measurement Power(dBm)				Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2	Ant3	Ant4			
CH03	2422	11.85	12.02	12.19	12.09	18.06	30.00	Pass
CH06	2437	11.75	12.09	12.09	12.01	18.01	30.00	Pass
CH09	2452	11.75	12.11	12.21	12.25	18.11	30.00	Pass

Mode 8: Transmit by 802.11ax(40MHz) with Beam-forming by Ant 1+2						
Channel No.	Frequency (MHz)	Measurement Power(dBm)		Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2			
CH03	2422	12.27	12.34	15.32	30.00	Pass
CH06	2437	12.29	12.32	15.32	30.00	Pass
CH09	2452	10.76	10.88	13.83	30.00	Pass

Mode 8: Transmit by 802.11ax(40MHz) with Beam-forming by Ant 1+2+3+4								
Channel No.	Frequency (MHz)	Measurement Power(dBm)				Total Power (dBm)	Limit (dBm)	Result
		Ant1	Ant2	Ant3	Ant4			
CH03	2422	11.67	11.73	11.95	11.83	17.82	30.00	Pass
CH06	2437	11.58	11.72	11.95	11.83	17.79	30.00	Pass
CH09	2452	11.58	11.88	12.03	11.92	17.88	30.00	Pass

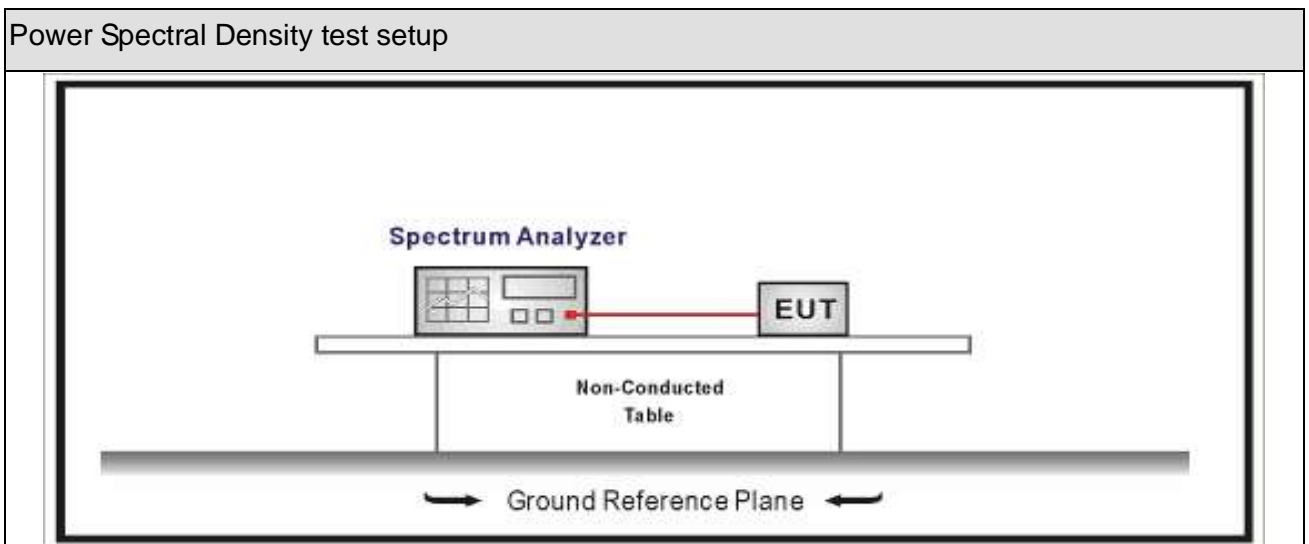
9. Power Spectral Density

9.1. Test Equipment

Power Spectral Density / TR-8					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2018.02.04	2019.02.03
EXA Spectrum Analyzer	Keysight	N9010A	MY55370495	2018.04.09	2019.04.08
MXA Signal Analyzer	Keysight	N9020A	MY56060147	2018.04.09	2019.04.08
Temperature/Humidity Meter	zhichen	ZC1-2	TR8-TH	2018.04.10	2019.04.09

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

9.2. Test Setup



9.3. Limit

Power Spectral Density Limit

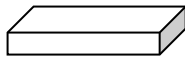
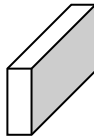
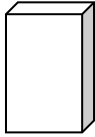
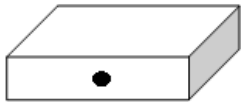
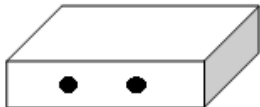
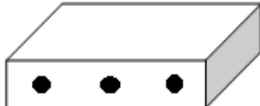
Power Spectral Density $\leq 8\text{dBm}/3\text{kHz}$

9.4. Test Procedure

Power Spectral Density Test Method			
	References Rule	Chapter	Description
<input checked="" type="checkbox"/>	ANSI C63.10	11.10	Maximum power spectral density level in the fundamental emission
<input checked="" type="checkbox"/>	ANSI C63.10	11.10.2	Method PKPSD (peak PSD)
<input type="checkbox"/>	ANSI C63.10	11.10.3	Method AVGPSD-1(Duty cycle \geq 98%)
<input type="checkbox"/>	ANSI C63.10	11.10.4	Method AVGPSD-1A(Duty cycle \geq 98%)
<input type="checkbox"/>	ANSI C63.10	11.10.5	Method AVGPSD-2(Duty cycle <98%)
<input type="checkbox"/>	ANSI C63.10	11.10.6	Method AVGPSD-2A(Duty cycle <98%)
<input type="checkbox"/>	ANSI C63.10	11.10.7	Method AVGPSD-3
<input type="checkbox"/>	ANSI C63.10	11.10.8	Method AVGPSD-3A

Directional Gain Calculations for In-Band test method				
	Referred Rule		Chapter	Description
<input type="checkbox"/>	KDB 662911		F2)a)	Basic methodology
	<input type="checkbox"/>	KDB 662911	F2)a) (i)	transmit signals are correlated
	<input type="checkbox"/>	KDB 662911	F2)a) (ii)	transmit signals are uncorrelated
<input type="checkbox"/>	KDB 662911		F2)b)	Sectorized antenna systems.
<input type="checkbox"/>	KDB 662911		F2)c)	Cross-polarized antennas
	<input type="checkbox"/>	ANSI C63.10	F2)c) (i)	Cross-polarized antennas
	<input type="checkbox"/>	ANSI C63.10	F2)c) (ii)	Multiple antennas
<input checked="" type="checkbox"/>	KDB 662911		F2)e)	Spatial Multiplexing
	<input checked="" type="checkbox"/>	KDB 662911	F2)e) (i)	Antennas have the same gain
	<input type="checkbox"/>	KDB 662911	F2)e) (ii)	Antenna have the different gain with one spatial stream
	<input type="checkbox"/>	KDB 662911	F2)e) (iii)	Antenna have the different gain with more than one spatial stream
<input checked="" type="checkbox"/>	KDB 662911		F2)f)	Cyclic Delay Diversity (CDD)
	<input checked="" type="checkbox"/>	KDB 662911	F2)f) (i)	Antennas have the same gain
	<input type="checkbox"/>	KDB 662911	F2)f) (ii)	Antenna have the different gain with one spatial stream
	<input type="checkbox"/>	KDB 662911	F2)f) (iii)	Antenna have the different gain with more than one spatial stream

9.5. EUT test definition

Item	Power Spectral Density Test Method			
Device Category	<input type="checkbox"/>	Fixed point-to-point		
	<input type="checkbox"/>	Emit multiple directional beams, simultaneously or sequentially		
	<input checked="" type="checkbox"/>	Other cases		
Test mode	Mode 1~8			
Test method	<input type="checkbox"/>	Radiated		
		X Axis	Y Axis	Z Axis
				
		Worst Axis <input type="checkbox"/>	Worst Axis <input type="checkbox"/>	Worst Axis <input type="checkbox"/>
	<input checked="" type="checkbox"/>	Conducted		
	<input type="checkbox"/>	Chain 1		
				
	<input checked="" type="checkbox"/>	Chain 1	Chain 2	
				
	<input type="checkbox"/>	Chain 1	Chain 2	Chain 3
				

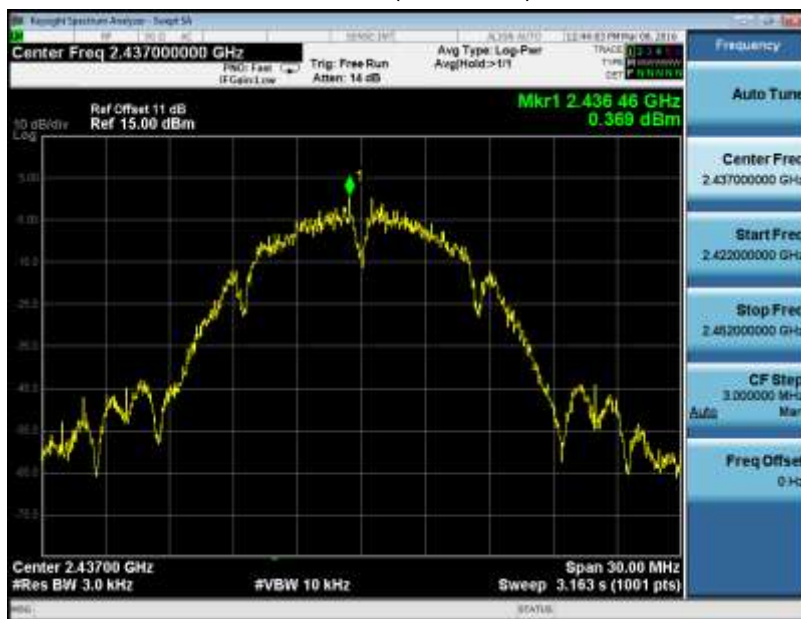
9.6. Test Result

Product Name	: Wireless Access Point	Power	: AC 120V/60Hz
Test Mode	: Mode1~8	Test Site	: TR8
Test Date	: 2018.05.25	Test Engineer	: Damon

CDD

Mode	Channel	Test Frequency (MHz)	Measurement PSD (dBm/3kHz)		Total Measurement PSD (dBm/3kHz)	Directional Gain (dBi)	Limit (dBm/3kHz)	Result
			Ant 1	Ant 2				
1	01	2412	-1.440	-0.927	1.83	8.0	6.0	Pass
1	06	2437	0.369	-0.163	3.12	8.0	6.0	Pass
1	11	2462	0.060	-1.312	2.44	8.0	6.0	Pass
2	01	2412	-10.720	-10.029	-7.35	8.0	6.0	Pass
2	06	2437	-9.688	-10.468	-7.05	8.0	6.0	Pass
2	11	2462	-10.932	-11.728	-8.30	8.0	6.0	Pass
3	01	2412	-8.469	-8.003	-5.22	8.0	6.0	Pass
3	06	2437	-8.534	-9.530	-5.99	8.0	6.0	Pass
3	11	2462	-11.088	-10.214	-7.62	8.0	6.0	Pass
4	03	2422	-13.274	-13.939	-10.58	8.0	6.0	Pass
4	06	2437	-13.524	-13.965	-10.73	8.0	6.0	Pass
4	09	2452	-13.420	-13.621	-10.51	8.0	6.0	Pass

Mode 1 CH06(2437MHz) Ant 1



BF

Mode	Channel	Test Frequency (MHz)	Measurement PSD (dBm/3kHz)		Total Measurement PSD (dBm/3kHz)	Directional Gain (dBi)	Limit (dBm/3kHz)	Result
			Ant 1	Ant 2				
1	01	2412	-2.021	-0.139	2.03	8.0	6.0	Pass
1	06	2437	0.150	-1.441	2.44	8.0	6.0	Pass
1	11	2462	0.180	-1.798	2.31	8.0	6.0	Pass
2	01	2412	-10.014	-10.280	-7.13	8.0	6.0	Pass
2	06	2437	-10.588	-9.512	-7.01	8.0	6.0	Pass
2	11	2462	-10.838	-10.897	-7.86	8.0	6.0	Pass
3	01	2412	-9.585	-10.188	-6.87	8.0	6.0	Pass
3	06	2437	-9.000	-8.007	-5.46	8.0	6.0	Pass
3	11	2462	-10.411	-11.568	-7.94	8.0	6.0	Pass
4	03	2422	-13.946	-14.104	-11.01	8.0	6.0	Pass
4	06	2437	-13.978	-13.473	-10.71	8.0	6.0	Pass
4	09	2452	-13.410	-13.257	-10.32	8.0	6.0	Pass

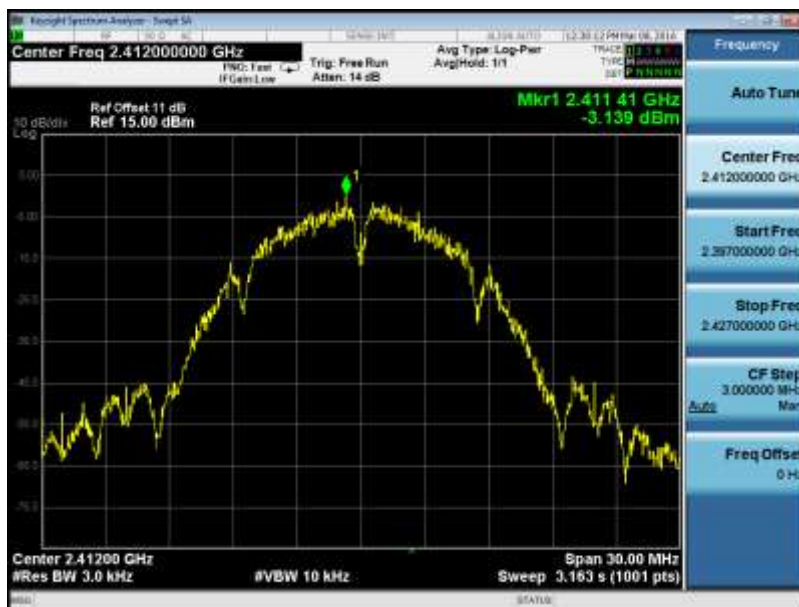
Mode 1 CH11(2462MHz) Ant 1



CDD

Mode	Channel	Test Frequency (MHz)	Measurement PSD (dBm/3kHz)				Total Measurement PSD (dBm/3kHz)	Directional Gain (dBi)	Limit (dBm/3kHz)	Result
			Ant 1	Ant 2	Ant 3	Ant 4				
1	01	2412	-3.480	-4.042	-4.097	-3.139	2.35	11.0	3.0	Pass
1	06	2437	-3.419	-3.741	-3.152	-3.348	2.61	11.0	3.0	Pass
1	11	2462	-3.228	-3.464	-3.187	-3.709	2.63	11.0	3.0	Pass
2	01	2412	-9.615	-10.611	-9.723	-9.954	-3.94	11.0	3.0	Pass
2	06	2437	-9.608	-9.303	-9.517	-10.003	-3.58	11.0	3.0	Pass
2	11	2462	-9.780	-10.055	-10.685	-11.054	-4.34	11.0	3.0	Pass
3	01	2412	-8.805	-9.031	-8.685	-9.020	-2.86	11.0	3.0	Pass
3	06	2437	-9.084	-9.285	-8.303	-8.901	-2.86	11.0	3.0	Pass
3	11	2462	-9.794	-10.245	-9.709	-10.523	-4.03	11.0	3.0	Pass
4	03	2422	-13.732	-14.341	-13.744	-14.052	-7.94	11.0	3.0	Pass
4	06	2437	-14.945	-14.424	-14.741	-13.521	-8.35	11.0	3.0	Pass
4	09	2452	-13.955	-14.450	-15.212	-14.585	-8.51	11.0	3.0	Pass

Mode 1 CH06(2437MHz) Ant 2



BF

Mode	Channel	Test Frequency (MHz)	Measurement PSD (dBm/3kHz)				Total Measurement PSD (dBm/3kHz)	Directional Gain (dBi)	Limit (dBm/3kHz)	Result
			Ant 1	Ant 2	Ant 3	Ant 4				
1	01	2412	-4.936	-4.021	-4.330	-4.523	1.58	11.0	3.0	Pass
1	06	2437	-4.398	-4.627	-4.099	-4.562	1.60	11.0	3.0	Pass
1	11	2462	-4.338	-4.861	-4.658	-4.668	1.39	11.0	3.0	Pass
2	01	2412	-9.917	-9.751	-10.377	-9.559	-3.87	11.0	3.0	Pass
2	06	2437	-10.041	-9.426	-9.522	-10.055	-3.73	11.0	3.0	Pass
2	11	2462	-10.818	-10.993	-10.089	-10.292	-4.51	11.0	3.0	Pass
3	01	2412	-9.309	-8.888	-8.567	-8.502	-2.78	11.0	3.0	Pass
3	06	2437	-8.035	-9.236	-9.602	-9.961	-3.13	11.0	3.0	Pass
3	11	2462	-9.246	-10.399	-10.530	-10.939	-4.21	11.0	3.0	Pass
4	03	2422	-13.615	-14.213	-13.919	-13.877	-7.88	11.0	3.0	Pass
4	06	2437	-14.640	-14.444	-15.081	-14.723	-8.70	11.0	3.0	Pass
4	09	2452	-14.605	-13.919	-14.539	-15.010	-8.48	11.0	3.0	Pass

Mode 1 CH06(2437MHz) Ant 1



10. Antenna Requirement

10.1. Limit

Antenna Requirement Limit
<p>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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.</p>

10.2. Antenna Connector Construction

Antenna Connector Construction	
<input checked="" type="checkbox"/>	The use of a permanently attached antenna
<input type="checkbox"/>	The antenna use of a unique coupling to the intentional radiator
<input type="checkbox"/>	The use of a nonstandard antenna jack or electrical connector
Please refer to the attached document "Internal Photograph" to show the antenna connector.	

_____ The End _____