

6.6. Power Spectral Density

6.6.1. Test Specification

Test Requirement:	FCC Part15 E Section 15.407 (a)
Test Method:	KDB662911 D01 Multiple Transmitter Output v02r01r01 KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section F
Limit:	$\leq 11.00\text{dBm/MHz}$ for Band 1 5150MHz-5250MHz(client device) $\leq 11.00\text{dBm/MHz}$ for Band 2A&2C 5250-5350&5470-5725 $\leq 30.00\text{dBm/500KHz}$ for Band 3 5725MHz-5850MHz The e.i.r.p spectral density for Band 1 5150MHz – 5250 MHz should not exceed 10dBm/MHz
Test Setup:	 Spectrum Analyzer EUT
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. Set the spectrum analyzer or EMI receiver span to view the entire emission bandwidth. 1. Set RBW = 510 kHz/1 MHz, VBW $\geq 3 \times$ RBW, Sweep time = Auto, Detector = RMS. 2. Allow the sweeps to continue until the trace stabilizes. 3. Use the peak marker function to determine the maximum amplitude level. 4. The E.I.R.P spectral density used radiated test method. At a test site that has been validated using the procedures of ANSI C63.4 or the latest CISPR 16-1-4 for measurements above 1 GHz, so as to simulate a near free-space environment.
Test Result:	PASS

6.6.2. Test Instruments

RF Test Room				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100619	Sep. 20, 2019
RF Cable (9KHz-40GHz)	TCT	RE-03	N/A	Sep. 20, 2019
Antenna Connector	TCT	RFC-03	N/A	Sep. 20, 2019

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

6.6.3. Test data

Configuration Band 1 (5180-5240 MHz) / Antenna 0+Antenna 1						
Mode	Test channel	Power Spectral Density			Limit (dBm/MHz)	Result
		Ant0	Ant1	Total		
11a	CH36	6.300	6.129	/	11	PASS
11a	CH40	4.909	5.452	/	11	PASS
11a	CH48	5.623	3.916	/	11	PASS
11n(HT20)	CH36	4.193	5.484	7.897	11	PASS
11n(HT20)	CH40	4.444	3.938	7.209	11	PASS
11n(HT20)	CH48	3.877	3.703	6.801	11	PASS
11n(HT40)	CH38	-0.563	-2.391	1.629	11	PASS
11n(HT40)	CH46	-0.985	-2.154	1.480	11	PASS
11ac(VHT20)	CH36	3.304	4.491	6.948	11	PASS
11ac(VHT20)	CH40	2.391	3.027	5.731	11	PASS
11ac(VHT20)	CH48	3.803	2.120	6.053	11	PASS
11ac(VHT40)	CH38	-0.905	-2.626	1.329	11	PASS
11ac(VHT40)	CH46	-0.499	-2.300	1.703	11	PASS
11ac(VHT80)	CH42	-5.452	-6.215	-2.806	11	PASS

Note: 1. All antennas have the same gain. $G_{ANT}=2\text{dBi}$, Array Gain= $10\log(N_{ANT}/N_{SS})=3.01\text{dBi}$

Directional Gain= $G_{ANT} + \text{Array Gain}=5.01\text{dBi}$, $5.01\text{dBi} < 6\text{dBi}$ so limit=11dBm/MHz

2. The total PSD method used the sum spectra maxima across the outputs.

Configuration Band 2A (5260-5320MHz) / Antenna 0+Antenna 1

Mode	Test channel	Power Spectral Density			Limit (dBm/MHz)	Result
		Ant0	Ant1	Total		
11a	CH52	5.465	4.409	/	11	PASS
11a	CH60	6.121	4.311	/	11	PASS
11a	CH64	6.069	4.368	/	11	PASS
11n(HT20)	CH52	5.166	3.893	7.586	11	PASS
11n(HT20)	CH60	5.011	4.196	7.633	11	PASS
11n(HT20)	CH64	3.354	4.034	6.718	11	PASS
11n(HT40)	CH54	0.117	-1.762	2.289	11	PASS
11n(HT40)	CH62	-0.265	-2.125	1.914	11	PASS
11ac(VHT20)	CH52	3.695	2.909	6.330	11	PASS
11ac(VHT20)	CH60	4.671	2.912	6.890	11	PASS
11ac(VHT20)	CH64	3.478	2.898	6.208	11	PASS
11ac(VHT40)	CH54	0.034	-2.776	1.863	11	PASS
11ac(VHT40)	CH62	-0.433	-2.766	1.566	11	PASS
11ac(VHT80)	CH58	-3.277	-6.328	-1.530	11	PASS

Note: 1. All antennas have the same gain. $G_{ANT}=2\text{dBi}$, Array Gain= $10\log(N_{ANT}/N_{SS})=3.01\text{dBi}$

Directional Gain= $G_{ANT} + \text{Array Gain}=5.01\text{dBi}$, $5.01\text{dBi} < 6\text{dBi}$ so limit=11dBm/MHz

2. The total PSD method used the sum spectra maxima across the outputs.

Configuration Band 2C (5500-5720 MHz) / Antenna 0+Antenna 1

Mode	Test channel	Power Spectral Density			Limit (dBm/MHz)	Result
		Ant0	Ant1	Total		
11a	CH100	5.673	4.247	/	11	PASS
11a	CH120	5.535	4.722	/	11	PASS
11a	CH144	5.463	4.973	/	11	PASS
11n(HT20)	CH100	4.382	3.854	7.136	11	PASS
11n(HT20)	CH120	4.365	3.147	6.809	11	PASS
11n(HT20)	CH144	4.528	3.708	7.148	11	PASS
11n(HT40)	CH102	-1.305	-1.799	1.465	11	PASS
11n(HT40)	CH118	-1.820	-2.430	0.896	11	PASS
11n(HT40)	CH142	0.205	-0.785	2.748	11	PASS
11ac(VHT20)	CH100	2.568	2.618	5.603	11	PASS
11ac(VHT20)	CH120	3.322	2.127	5.776	11	PASS
11ac(VHT20)	CH144	3.719	3.057	6.411	11	PASS
11ac(VHT40)	CH102	-1.143	-2.177	1.381	11	PASS
11ac(VHT40)	CH118	-1.716	-2.469	0.934	11	PASS
11ac(VHT40)	CH142	-0.391	-1.139	2.261	11	PASS
11ac(VHT80)	CH106	-4.752	-5.971	-2.309	11	PASS
11ac(VHT80)	CH138	-3.156	-5.342	-1.103	11	PASS

Note: 1. All antennas have the same gain. $G_{ANT}=2\text{dBi}$, Array Gain= $10\log(N_{ANT}/N_{SS})=3.01\text{dBi}$

Directional Gain= $G_{ANT} + \text{Array Gain}=5.01\text{dBi}$, $5.01\text{dBi} < 6\text{dBi}$ so limit= 11dBm/MHz

2. The total PSD method used the sum spectra maxima across the outputs.

Configuration Band 3(5745-5825MHz) / Antenna 0+Antenna 1

Mode	Test channel	Power Spectral Density			Limit (dBm/MHz)	Result
		Ant0	Ant1	Total		
11a	CH52	2.932	1.948	/	30	PASS
11a	CH60	2.532	2.242	/	30	PASS
11a	CH64	3.337	2.367	/	30	PASS
11n(HT20)	CH52	2.040	1.600	4.836	30	PASS
11n(HT20)	CH60	1.455	0.207	3.886	30	PASS
11n(HT20)	CH64	2.353	0.568	4.562	30	PASS
11n(HT40)	CH54	-2.466	-4.041	-0.172	30	PASS
11n(HT40)	CH62	-1.583	-4.411	0.240	30	PASS
11ac(VHT20)	CH52	1.017	-0.695	3.255	30	PASS
11ac(VHT20)	CH60	1.436	-0.204	3.703	30	PASS
11ac(VHT20)	CH64	2.047	-0.282	4.047	30	PASS
11ac(VHT40)	CH54	-2.535	-3.811	-0.116	30	PASS
11ac(VHT40)	CH62	-1.467	-4.620	0.247	30	PASS
11ac(VHT80)	CH58	-5.225	-8.527	-3.355	30	PASS

Note: 1. All antennas have the same gain. $G_{ANT}=2\text{dBi}$, Array Gain= $10\log(N_{ANT}/N_{SS})=3.01\text{dBi}$

Directional Gain= $G_{ANT} + \text{Array Gain}=5.01\text{dBi}$, $5.01\text{dBi} < 6\text{dBi}$ so limit= 30dBm/MHz

2. The total PSD method used the sum spectra maxima across the outputs.

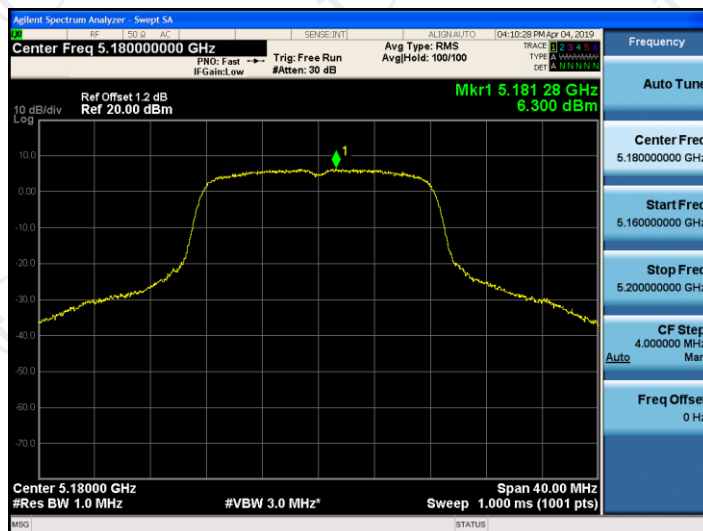
Test plots as follows:

ANT 0

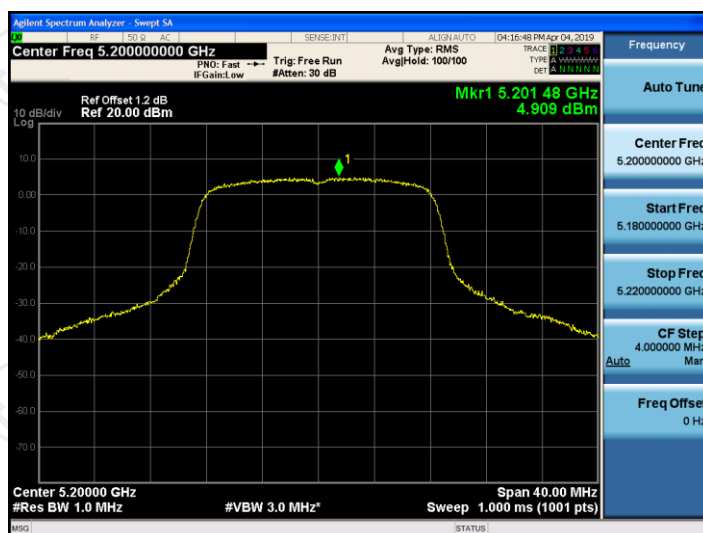
Band1 (5180-5240 MHz)

11a

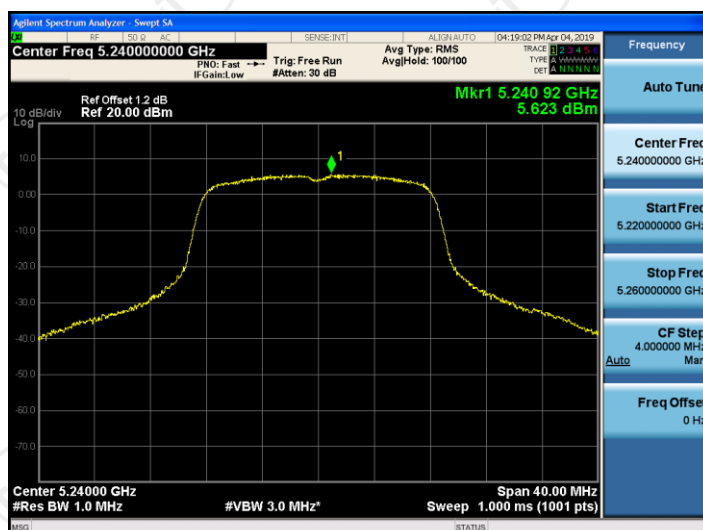
CH36



CH40

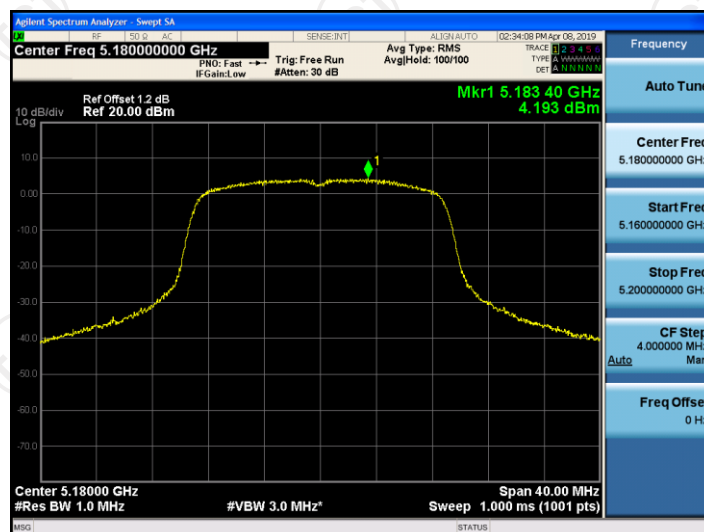


CH48

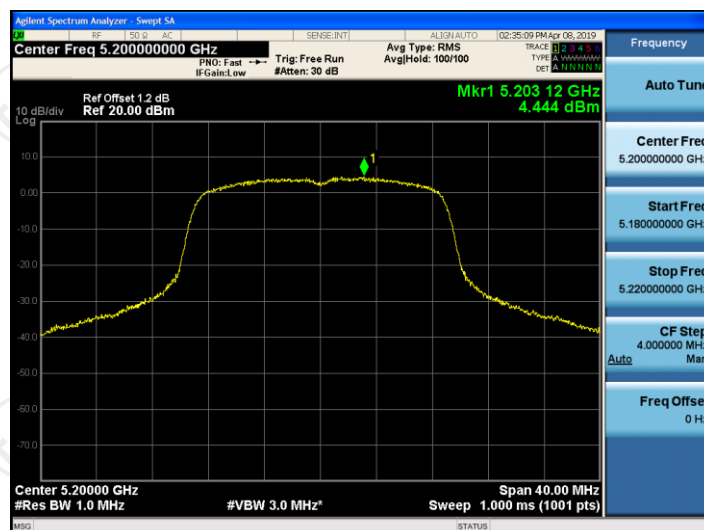


11n(HT20)

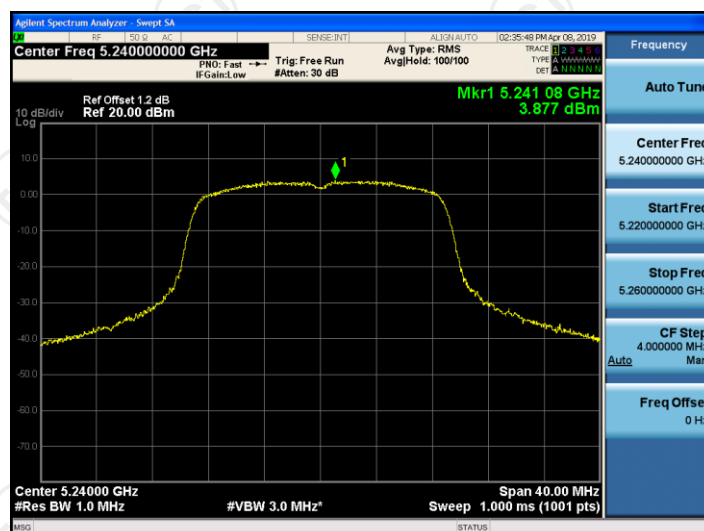
CH36



CH40

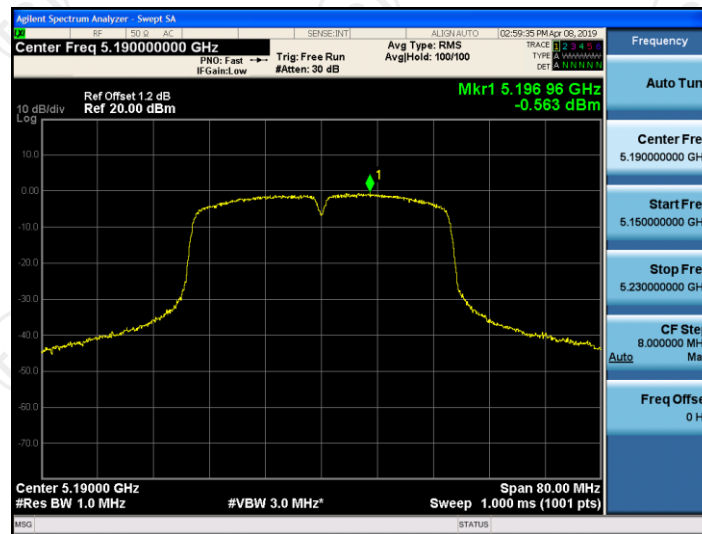


CH48

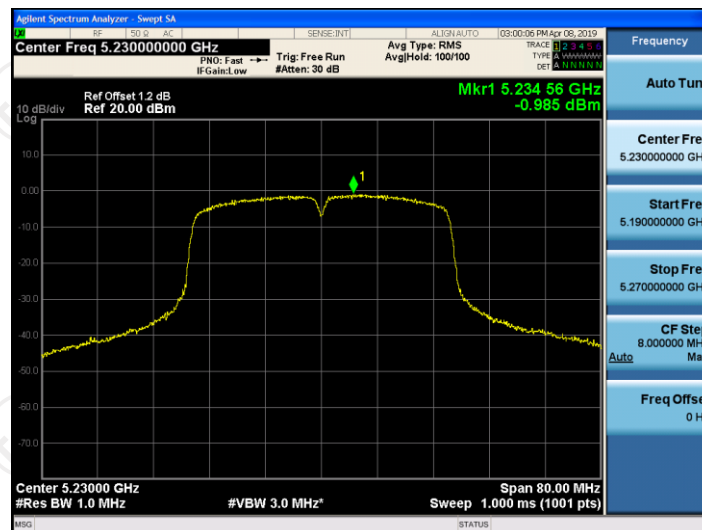


11n(HT40)

CH38

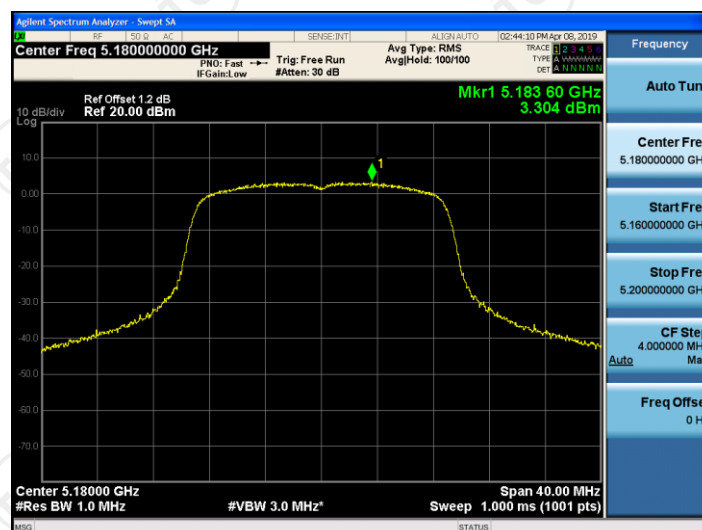


CH46

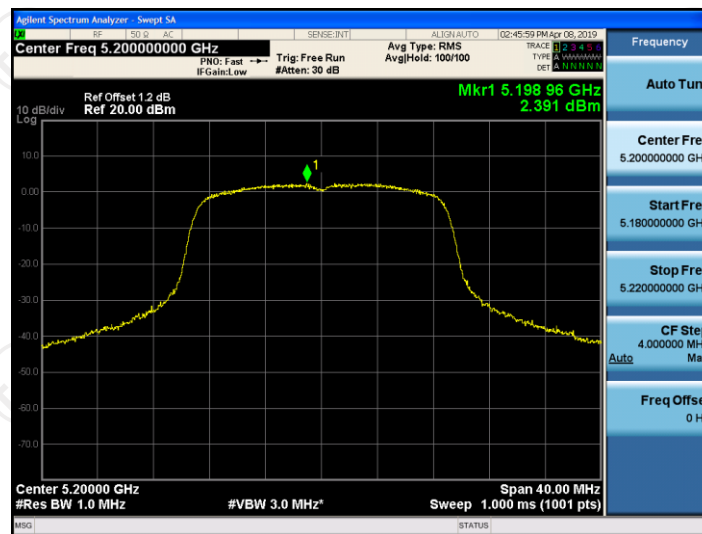


11ac(VHT20)

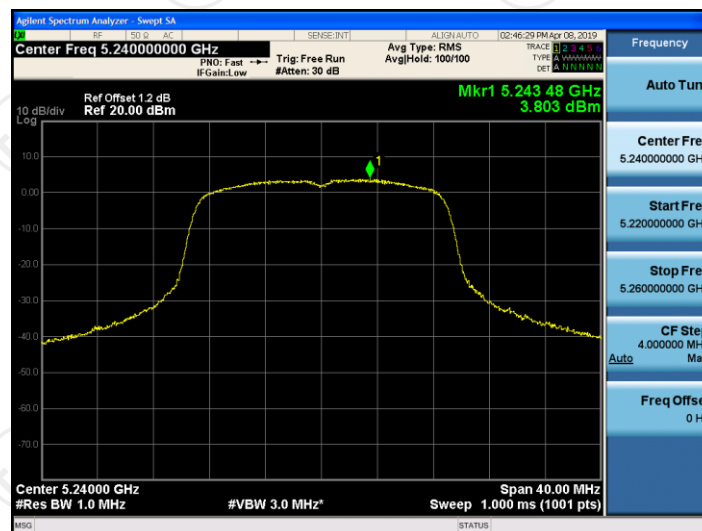
CH36



CH40

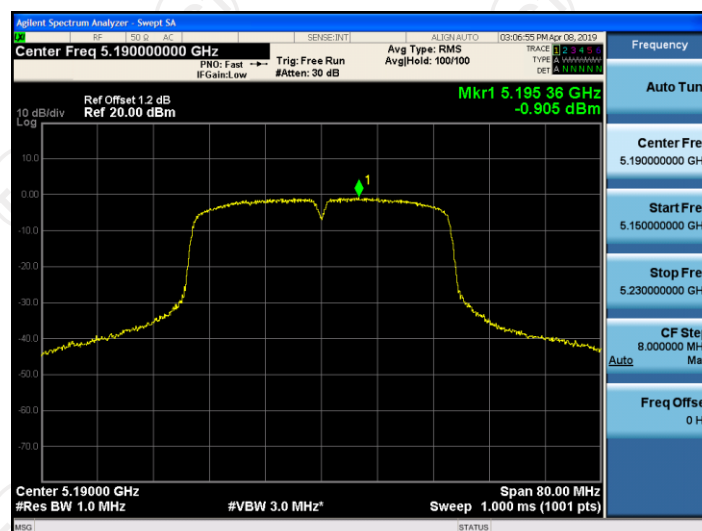


CH48

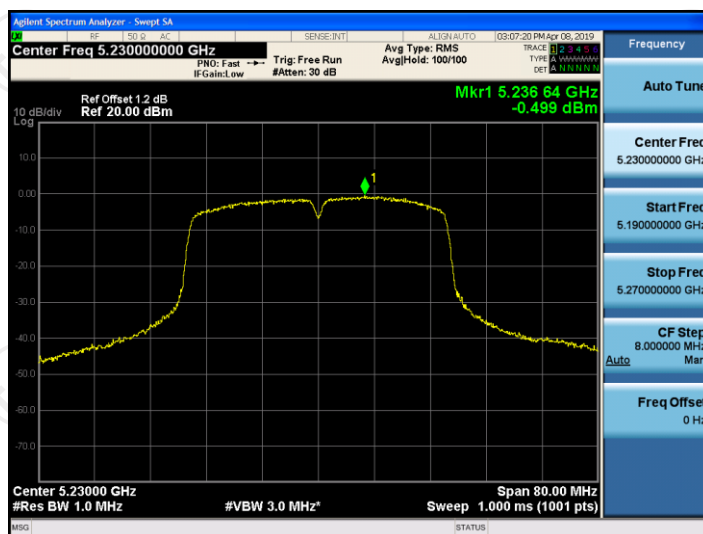


11ac(VHT40)

CH38

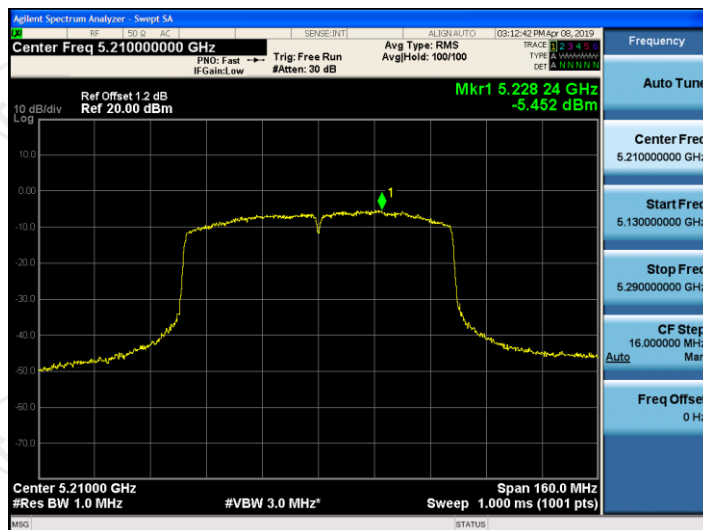


CH46



11ac(VHT80)

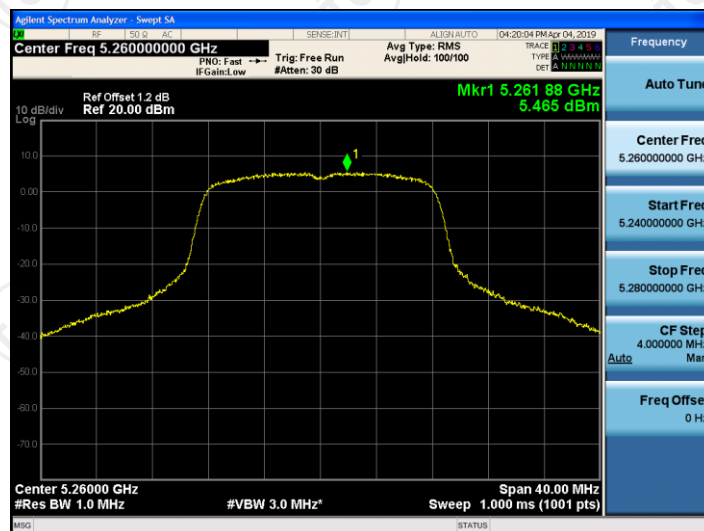
CH42



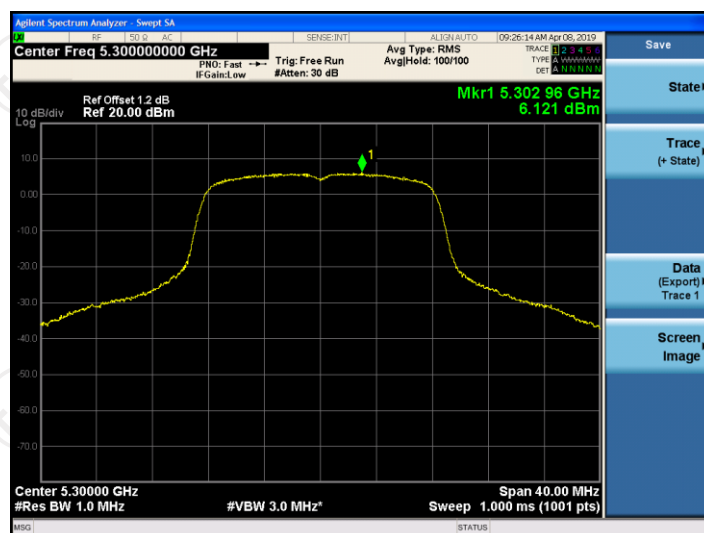
Band 2A (5260-5320MHz)

11a

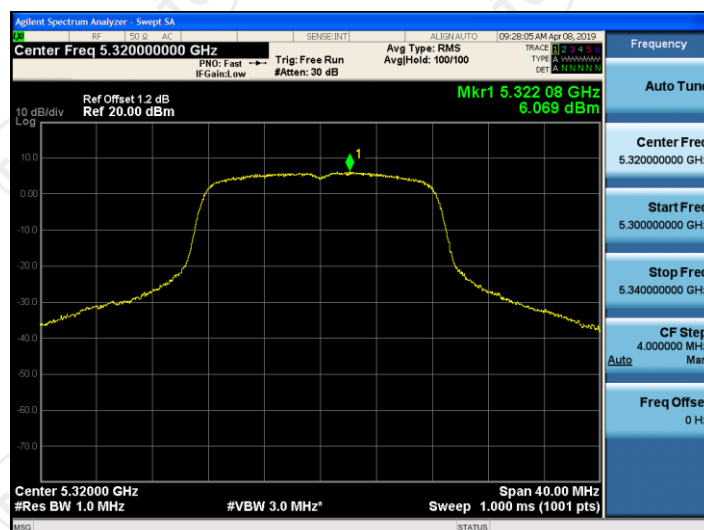
CH52



CH60

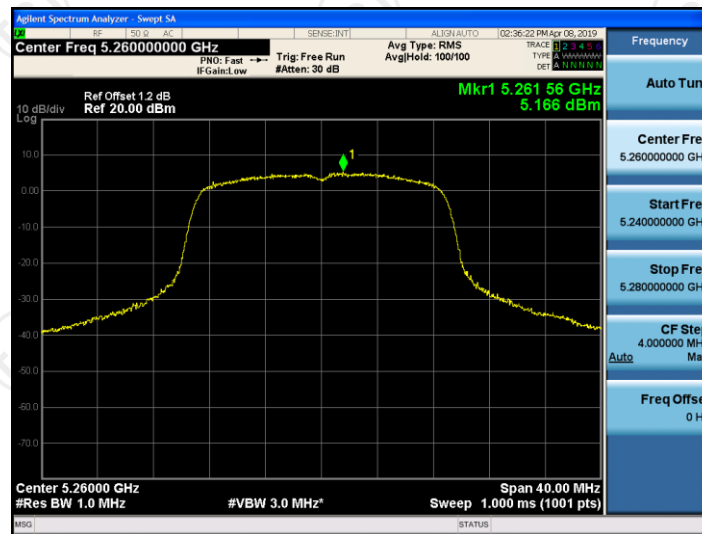


CH64

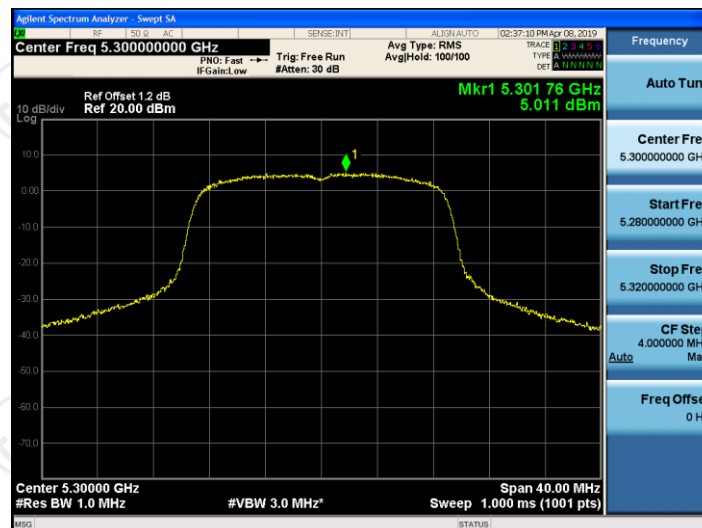


11n(HT20)

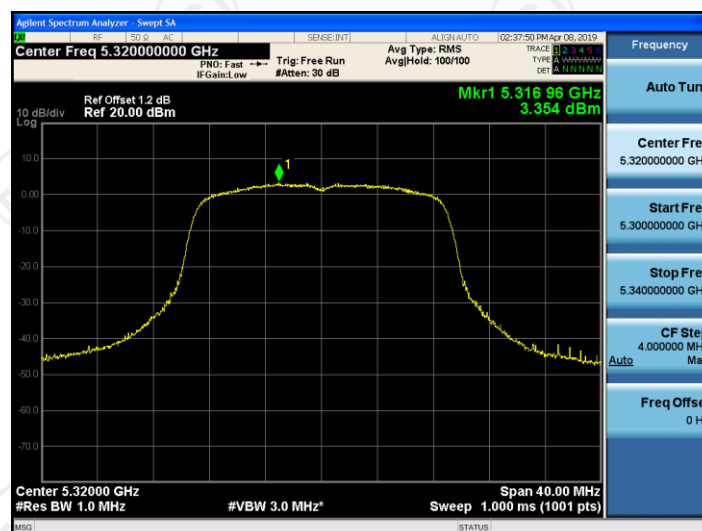
CH52



CH60

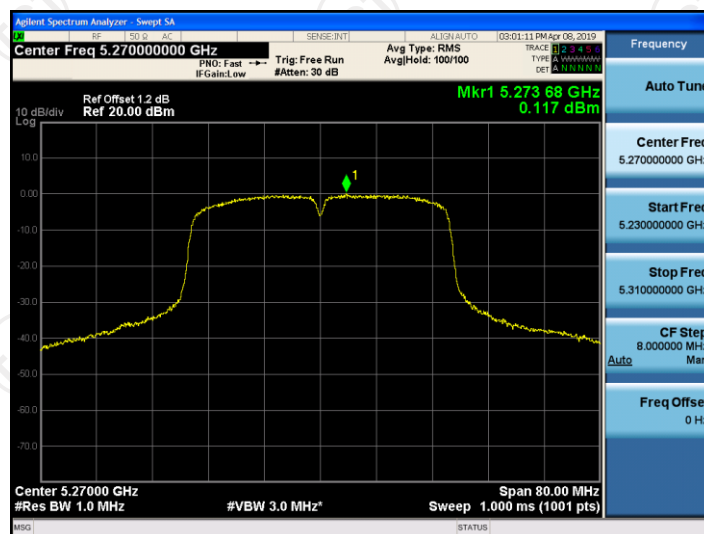


CH64

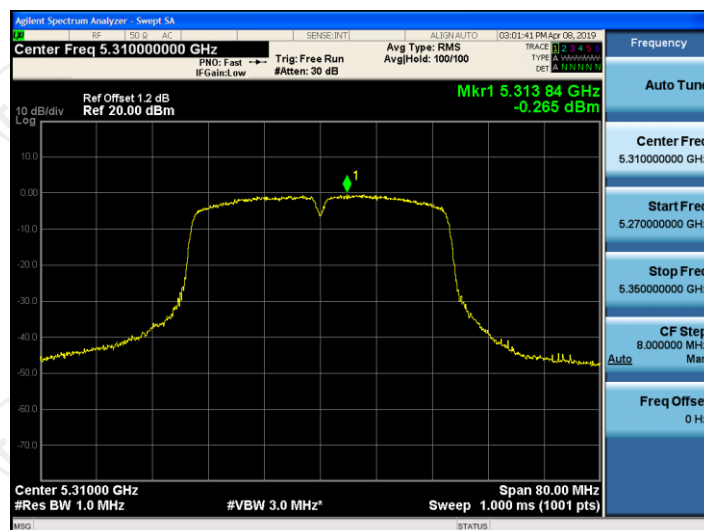


11n(HT40)

CH54

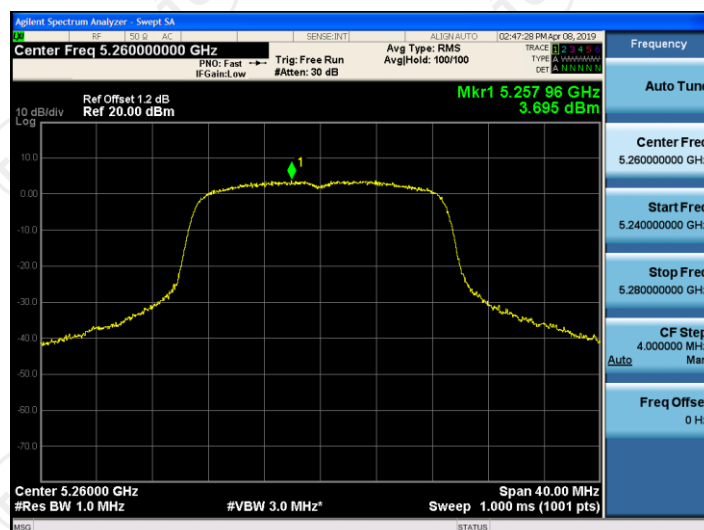


CH62

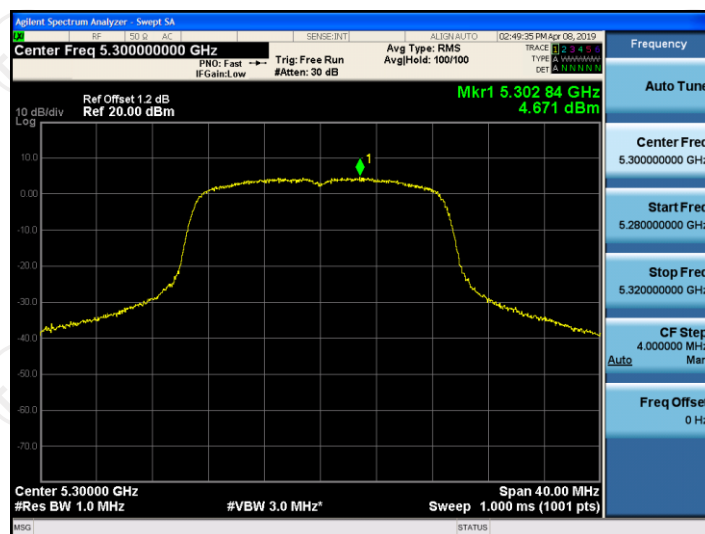


11ac(VHT20)

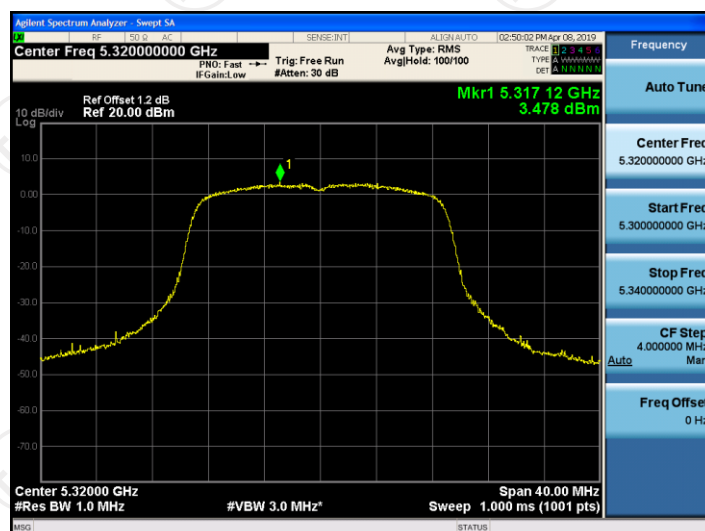
CH52



CH60

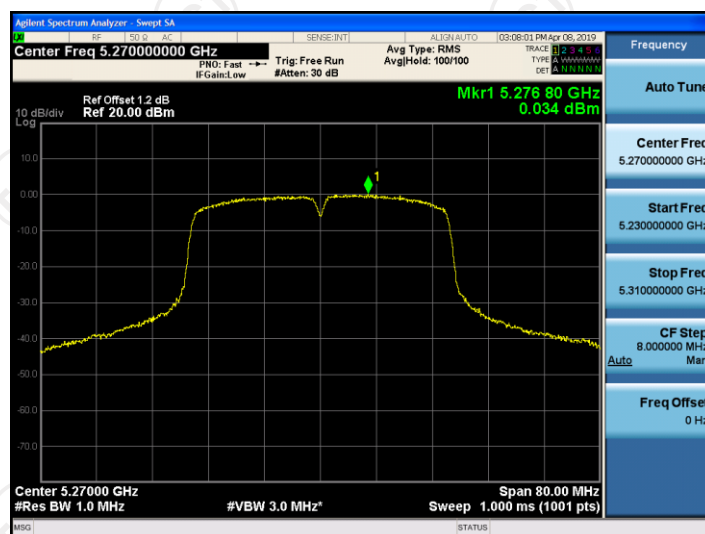


CH64

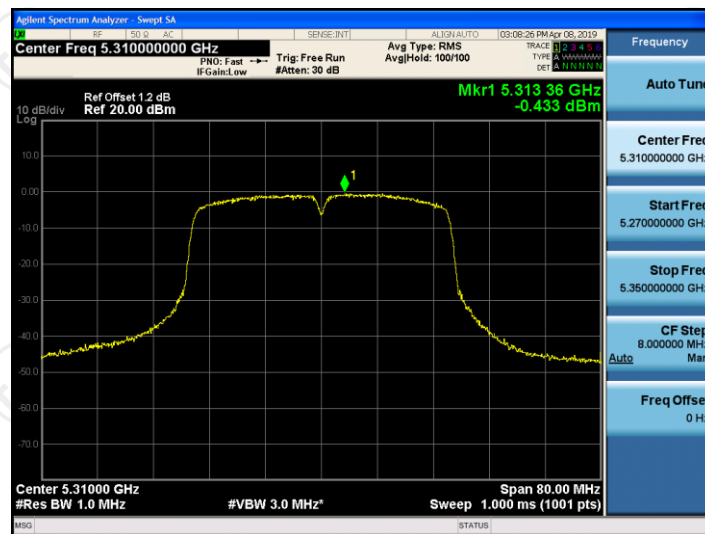


11ac(VHT40)

CH54

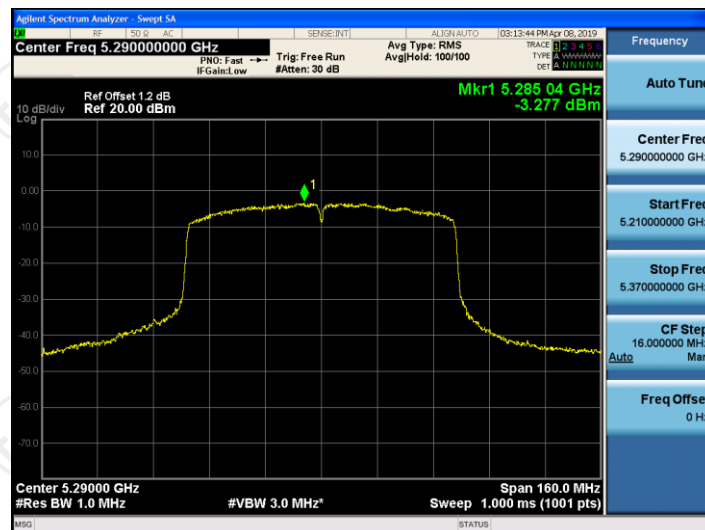


CH62



11ac(VHT80)

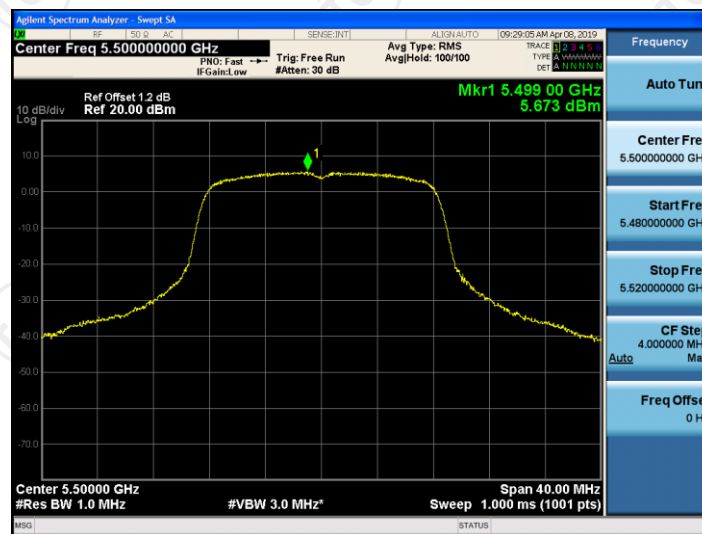
CH58



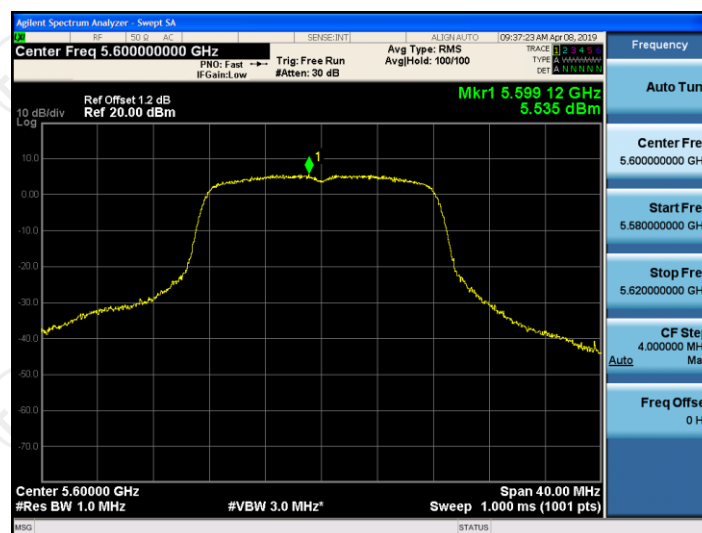
Band 2C (5500-5720MHz)

11a

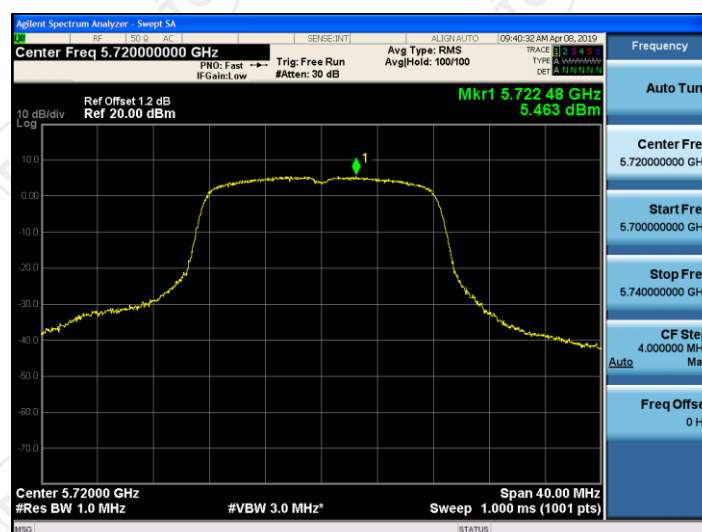
CH100



CH120

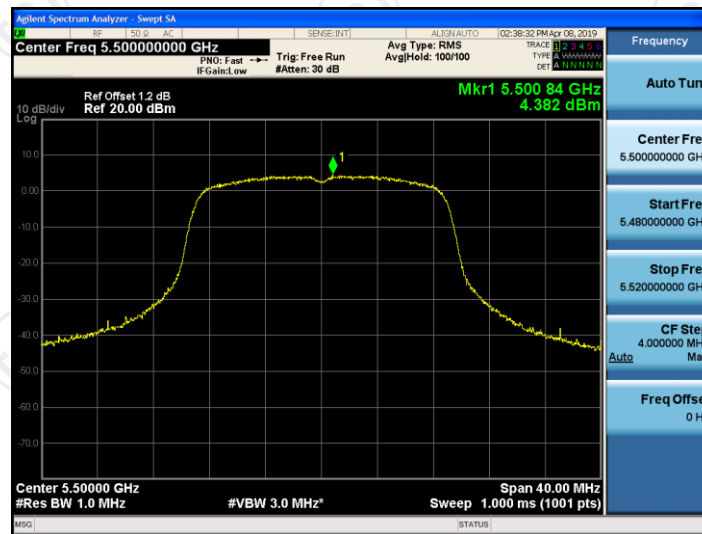


CH144

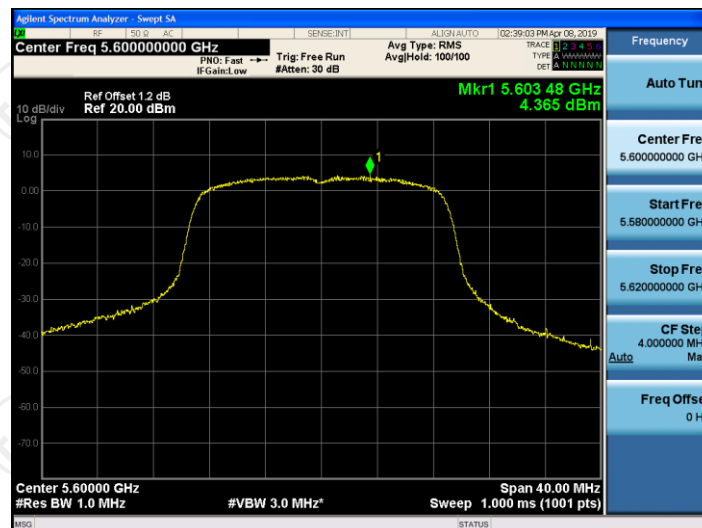


11n(HT20)

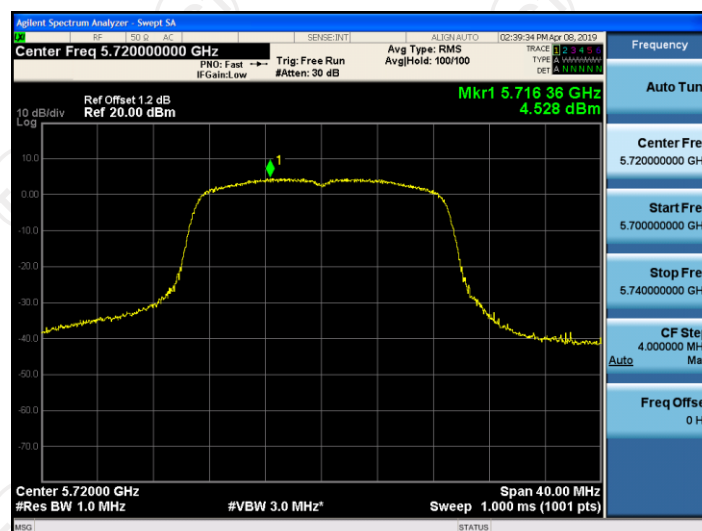
CH100



CH120

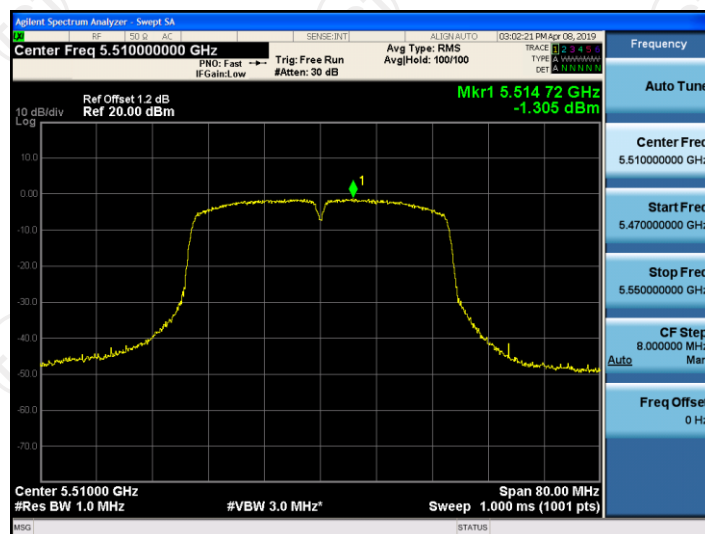


CH144

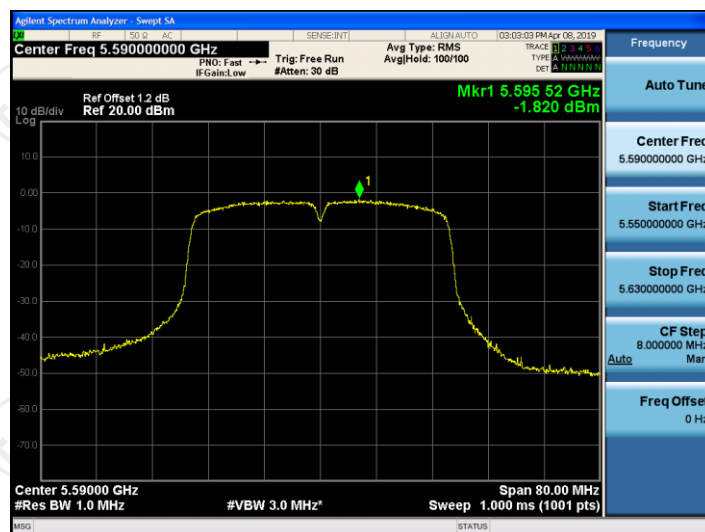


11n(HT40)

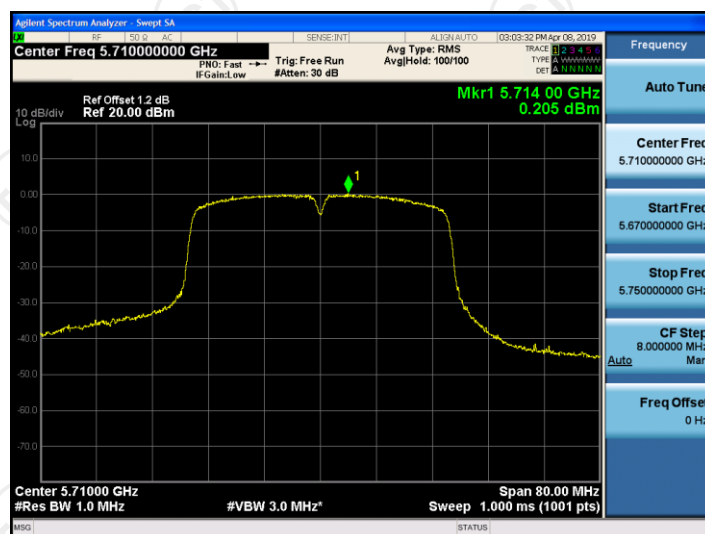
CH102



CH118

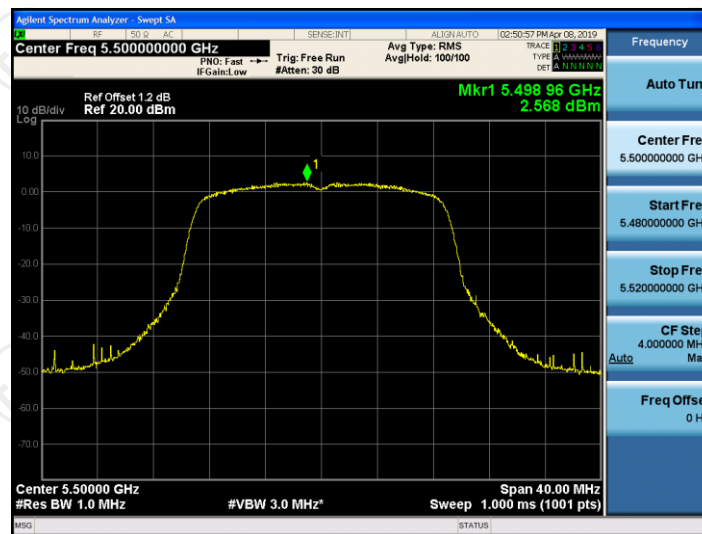


CH142

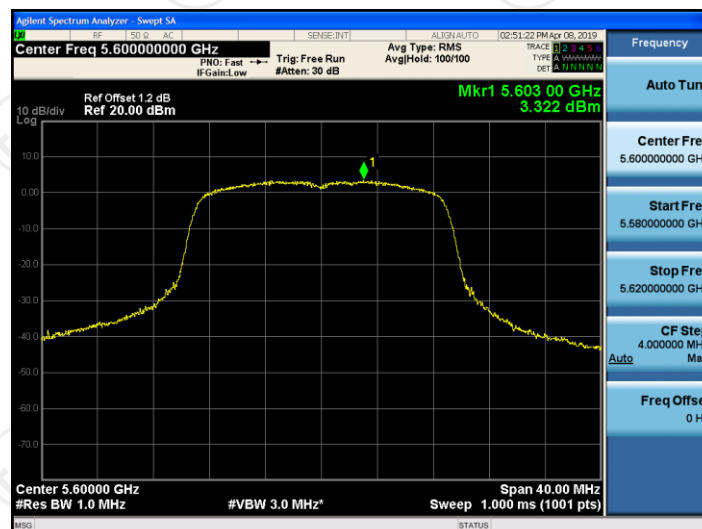


11ac(VHT20)

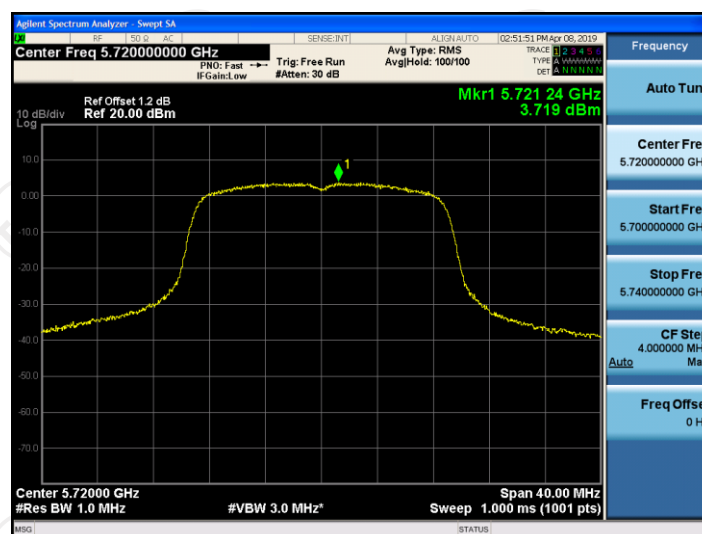
CH100



CH120

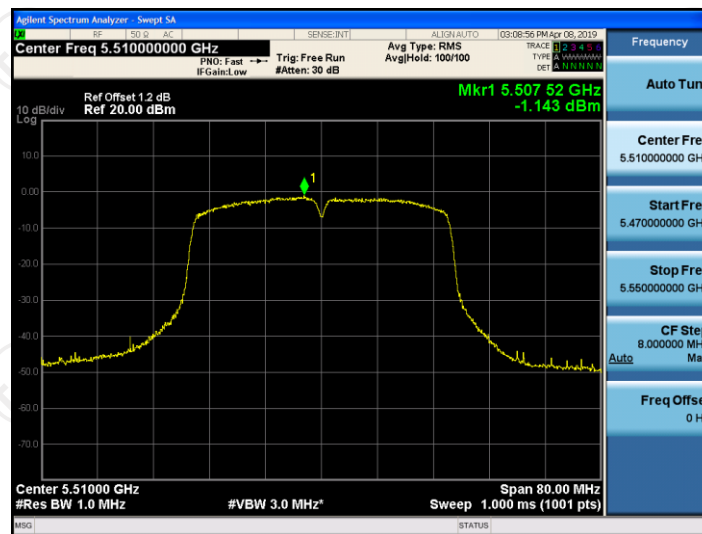


CH144

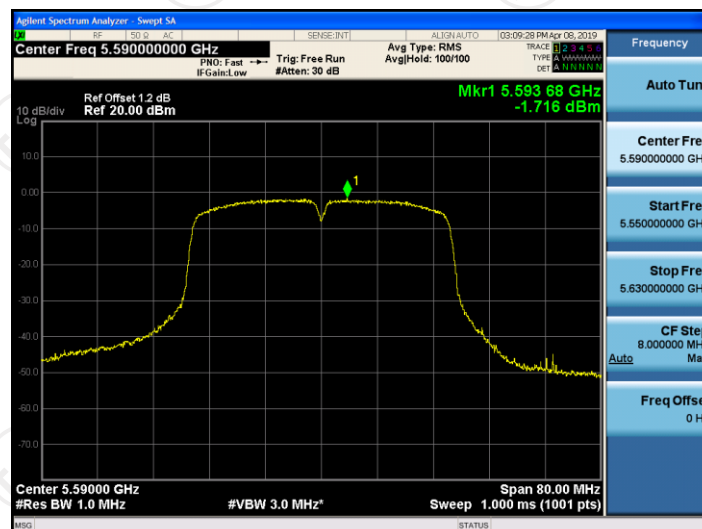


11ac(VHT40)

CH102



CH118



CH142

