

8. SPECTRAL DENSITY TEST

8.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY53311015	Oct.15,17	1 Year
2.	Attenuator (20dB)	Agilent	8491B	MY39262165	Apr.22,17	1 Year
3.	RF Cable	Marvelous Microwave Inc	SFL402105FLEX	NO.1	Oct.15,17	1 Year

8.2. Limit

Band 5150-5250 MHz:

The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

Band 5250-5350 MHz:

The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

Band 5470-5725 MHz:

The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

Band 5725-5850 MHz:

The power spectral density shall not exceed 30 dBm in any 500 KHz band.

8.3. Test Procedure

For the Band 5.15-5.35GHz; 5.47-5.725 GHz:

The transmitter output was connected to a spectrum analyzer. Power density was measured by spectrum analyzer with 1MHz RBW and 3MHz VBW; Detector: RMS mode.

For the band 5.725-5.85 GHz:

The transmitter output was connected to a spectrum analyzer. Power density was measured by spectrum analyzer with 1MHz RBW and 3MHz VBW,RMS Detector.

So use the test method described in KDB789033 clause E

- 1) Set the RBW=100kHz and VBW =3MHz
- 2) Number of points in sweep ≥ 2 Span / RBW.(This ensures that bin-to-bin spacing is $\leq$ RBW/2, so that narrowband signals are not lost between frequency bins.)
- 3) Sweep time = auto
- 4) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
- 5) Use the “peak search” function of spectrum analyzer find the max value, then add $10\log(500\text{kHz}/\text{RBW})$ to the measured result.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

8.4.Test Results

5180-5240MHz Band:

EUT: Gemini		
M/N:Gemini 4G		
Test date: 2018-01-18	Test date: 2018-01-23	Test date: 2018-01-23
Tested by: Kayle	Tested by: Kayle	Tested by: Kayle

Test Mode	Frequency (MHz)	Power density (dBm/MHz)	Limit (dBm/MHz)
11a	5180	10.908	11
	5200	10.891	11
	5240	10.765	11
11n HT20	5180	10.551	11
	5200	10.687	11
	5240	10.360	11
11n HT40	5190	8.287	11
	5230	8.117	11
11ac VHT20	5180	10.635	11
	5200	10.718	11
	5240	10.323	11
11ac VHT40	5190	8.159	11
	5230	8.079	11
11ac VHT80	5210	6.043	11
Conclusion: PASS			

Note: Antenna Gain= 0.42dBi<6dBi.

5745-5825MHz Band:

EUT: Gemini		
M/N: Gemini 4G		
Test date: 2018-01-19	Test date: 2018-01-23	Test date: 2018-01-23
Tested by: Kayle	Tested by: Kayle	Tested by: Kayle

Test Mode	Frequency (MHz)	Power density (dBm/500KHz)	Limit (dBm/500KHz)
11a	5745	10.108	30
	5785	10.747	30
	5825	9.883	30
11n HT20	5745	9.971	30
	5785	11.168	30
	5825	10.889	30
11n HT40	5755	7.945	30
	5795	8.156	30
11ac VHT20	5745	10.680	30
	5785	11.460	30
	5825	10.376	30
11ac VHT40	5755	7.826	30
	5795	8.136	30
11ac VHT80	5775	4.714	30
Conclusion: PASS			

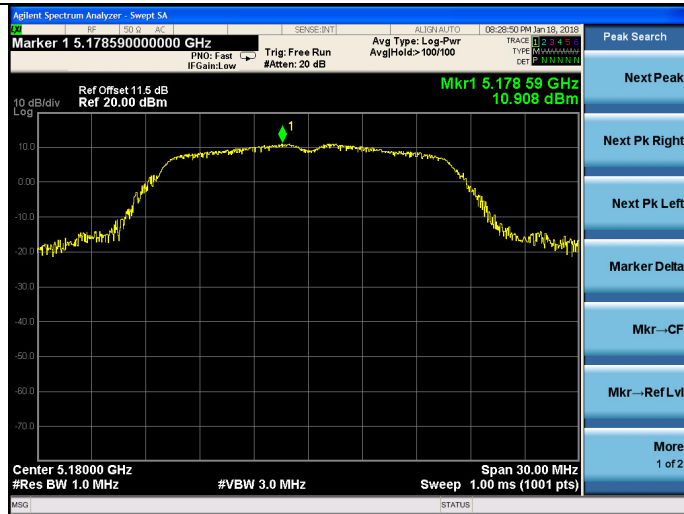
Note: 1. Antenna Gain= 0.42dBi<6dBi.

2. The total result = Reading + 10log(500kHz/100kHz)

5180-5240MHz Band:

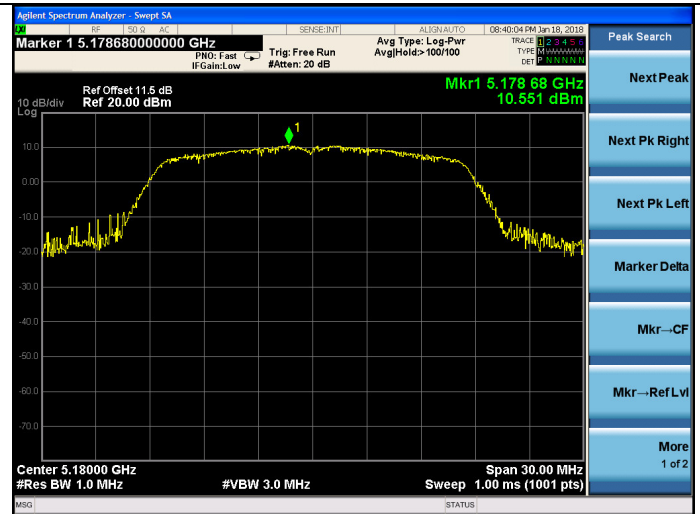
11a

5180MHz

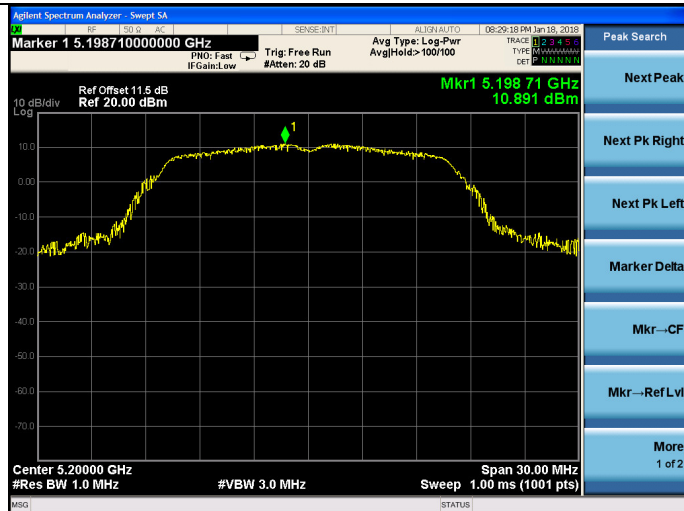


11n HT20

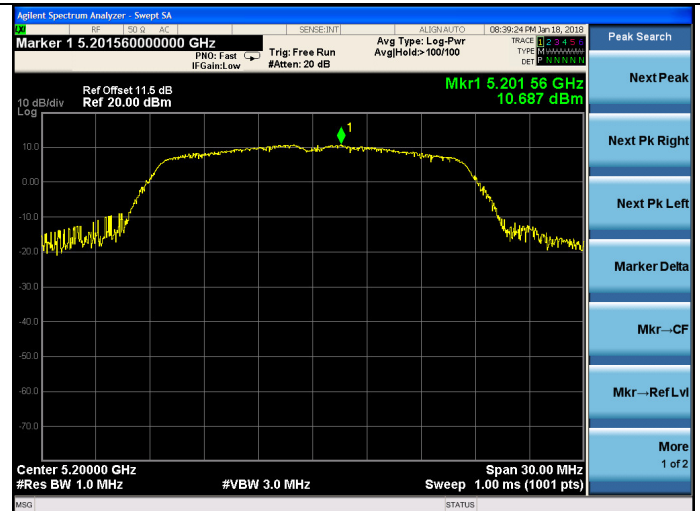
5180MHz



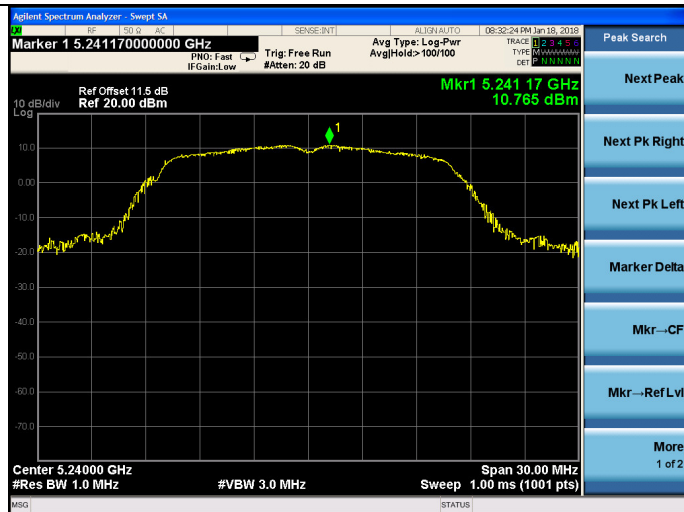
5200MHz



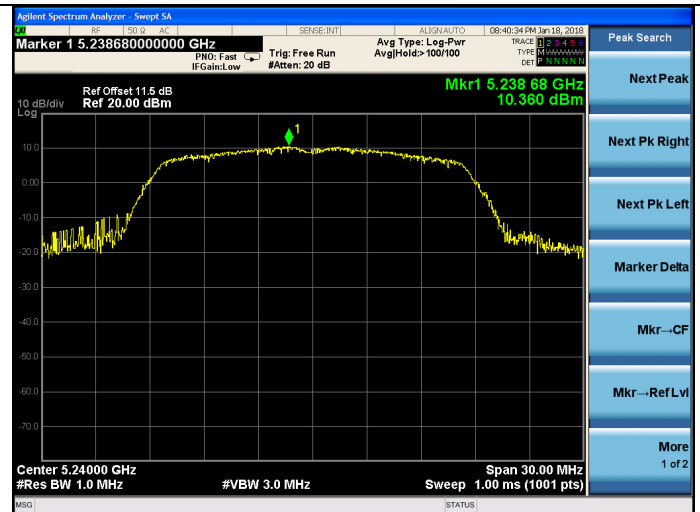
5200MHz



5240MHz



5240MHz

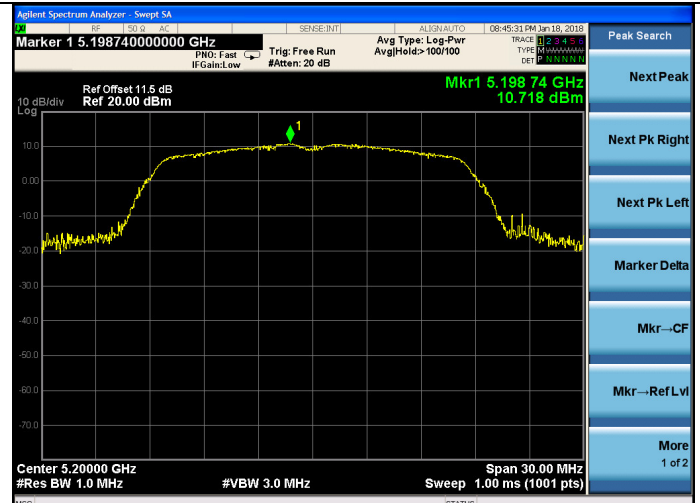


11n HT40

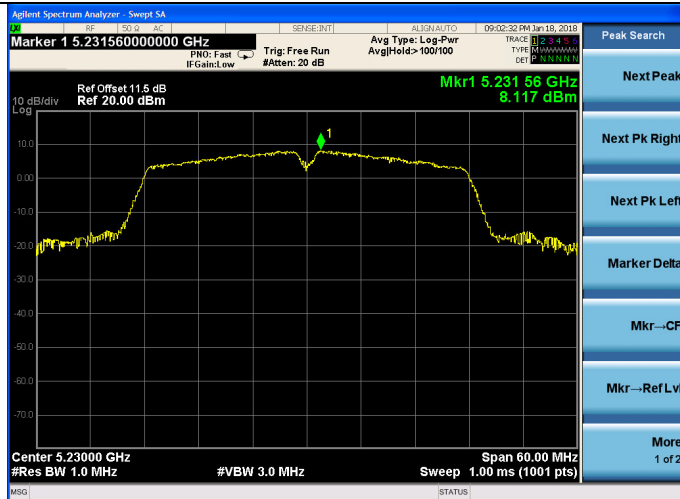
5190MHz



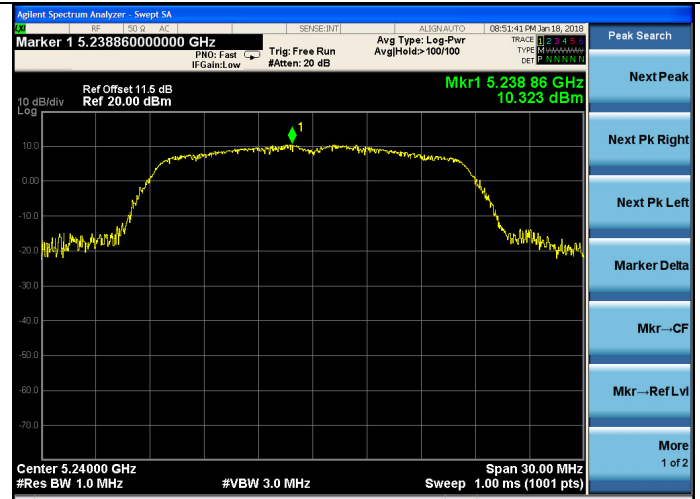
5200MHz



5230MHz

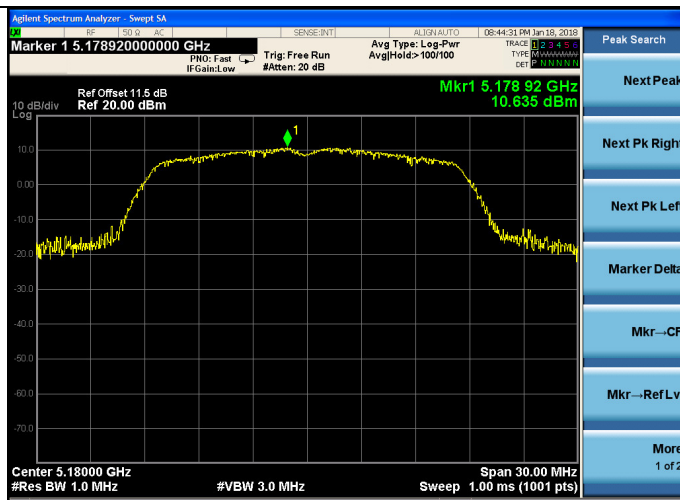


5240MHz



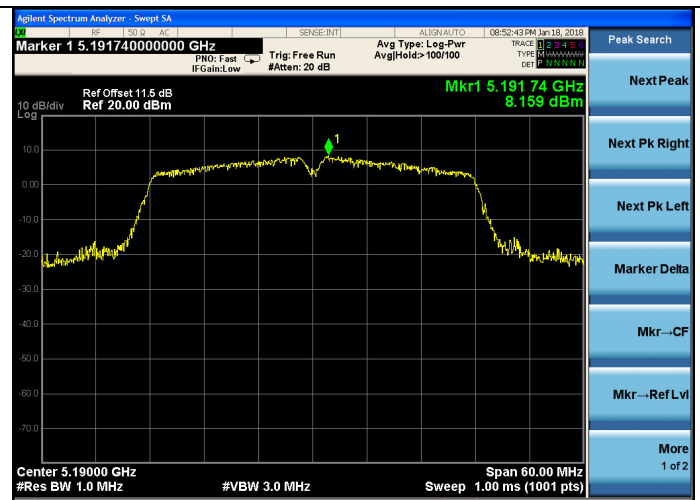
11ac VHT20

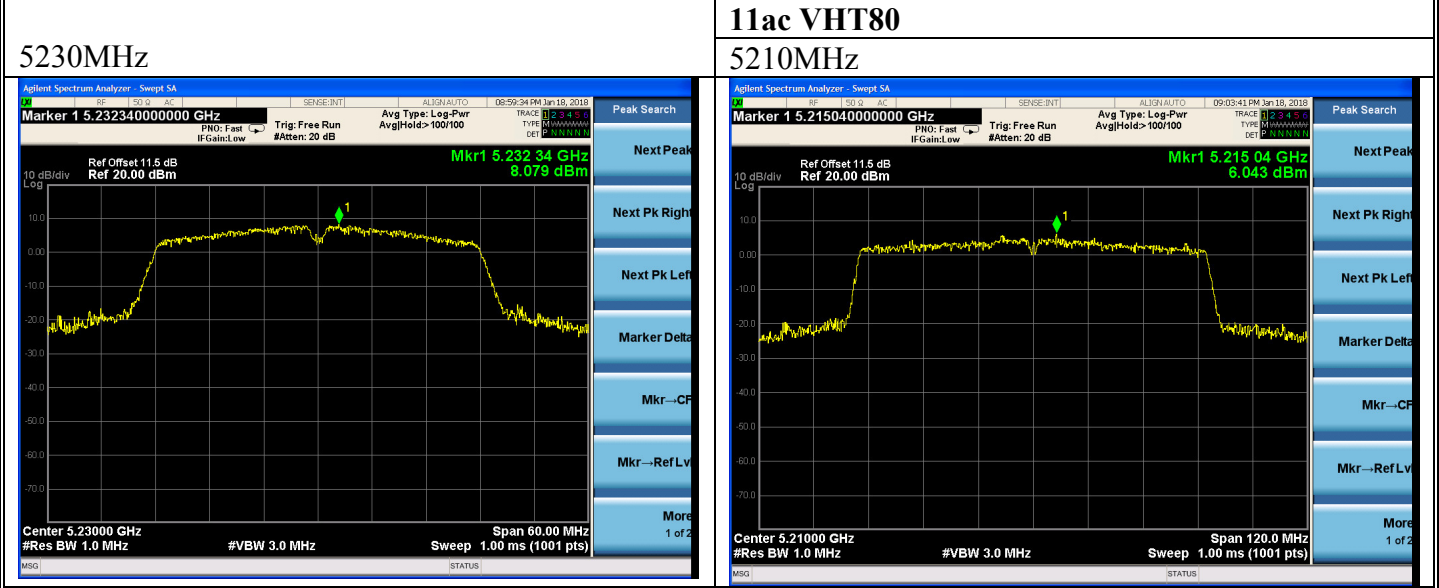
5180MHz



11ac VHT40

5190MHz

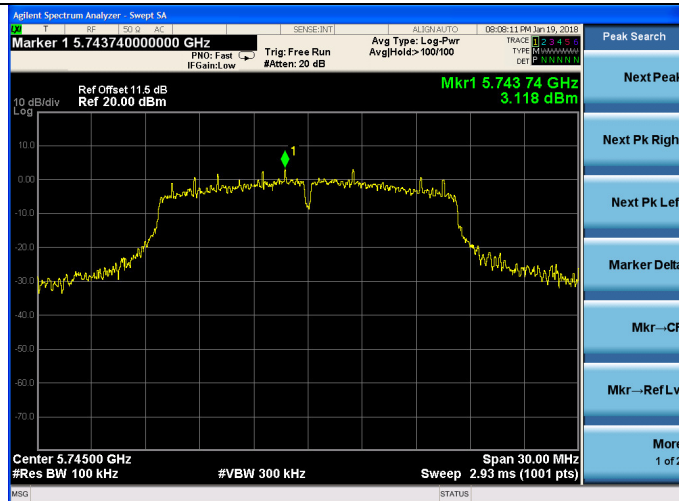




5745-5825MHz Band:

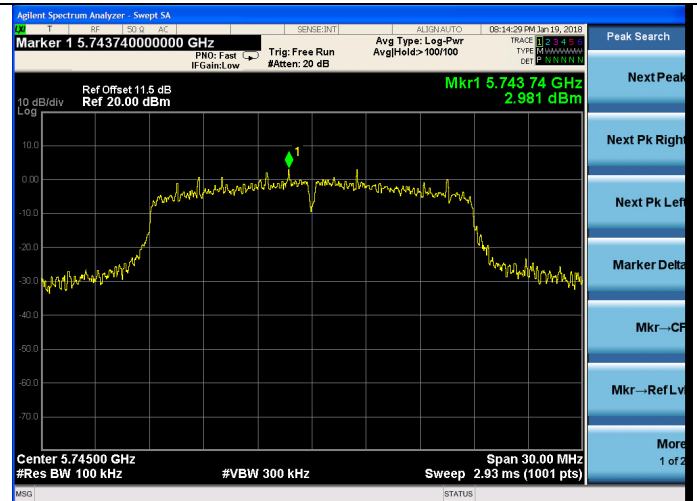
11a

5745MHz

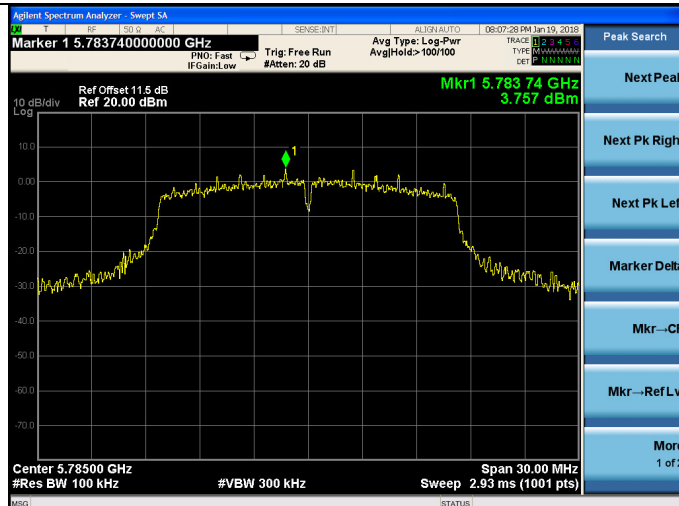


11n HT20

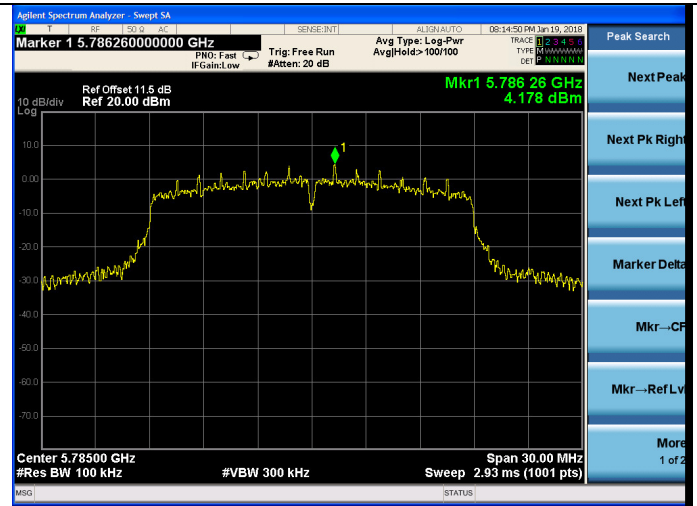
5745MHz



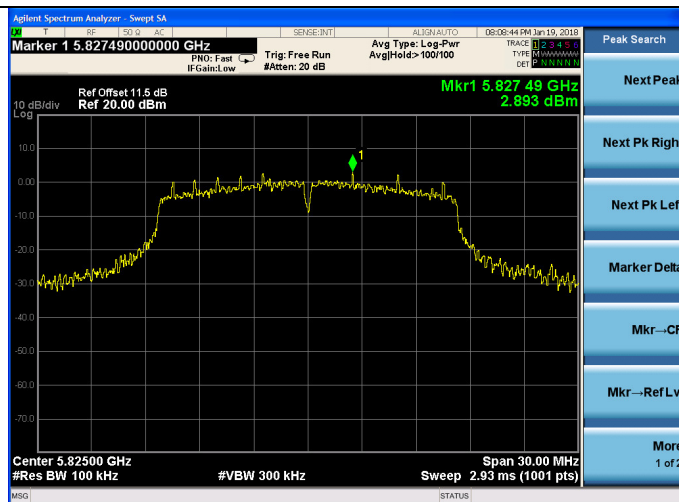
5785MHz



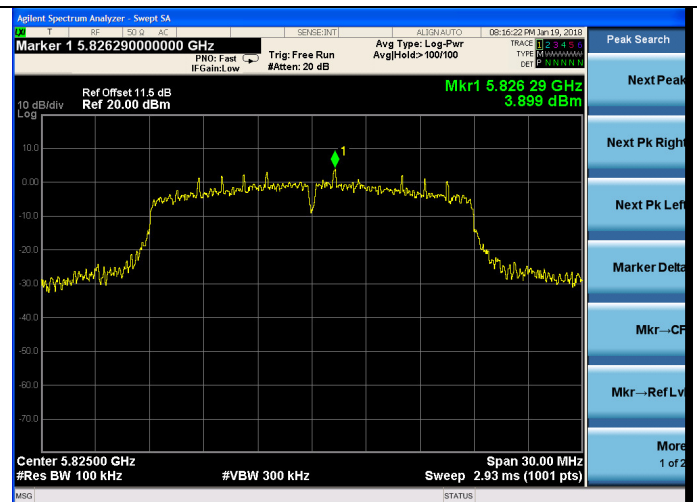
5785MHz



5825MHz

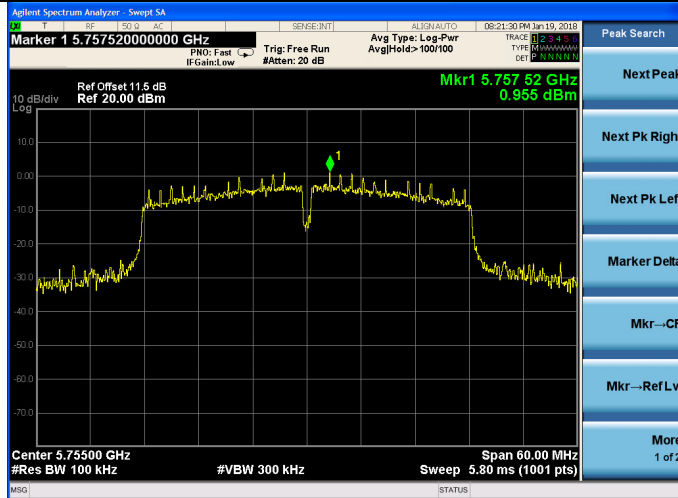


5825MHz

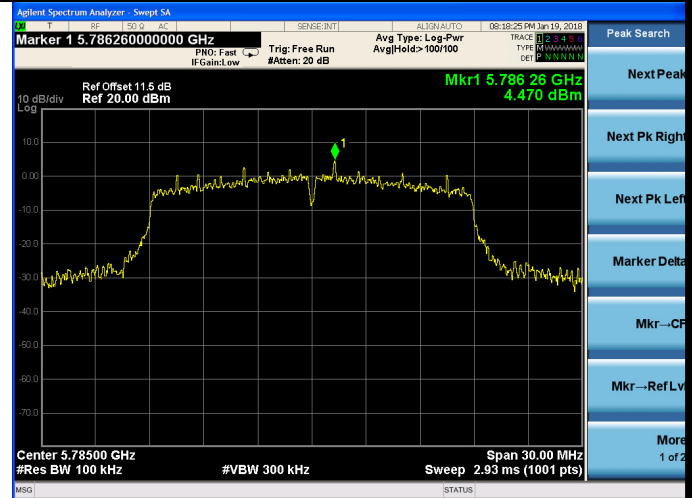


11n HT40

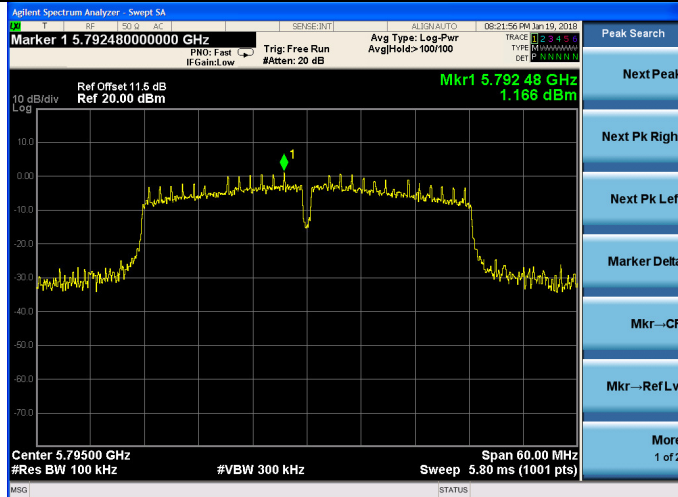
5755MHz



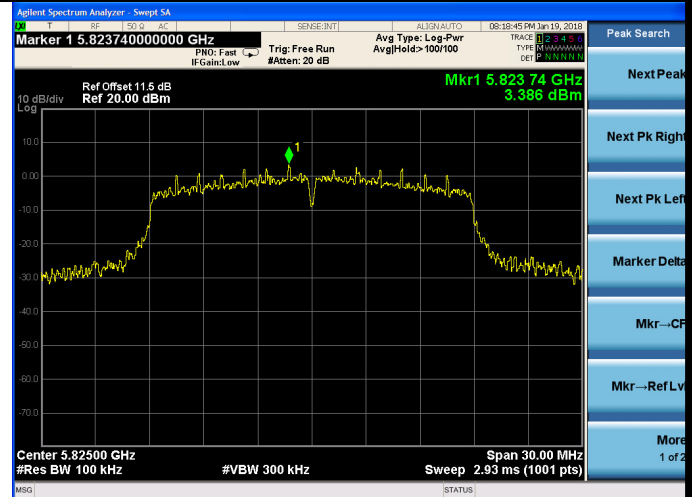
5785MHz



5795MHz

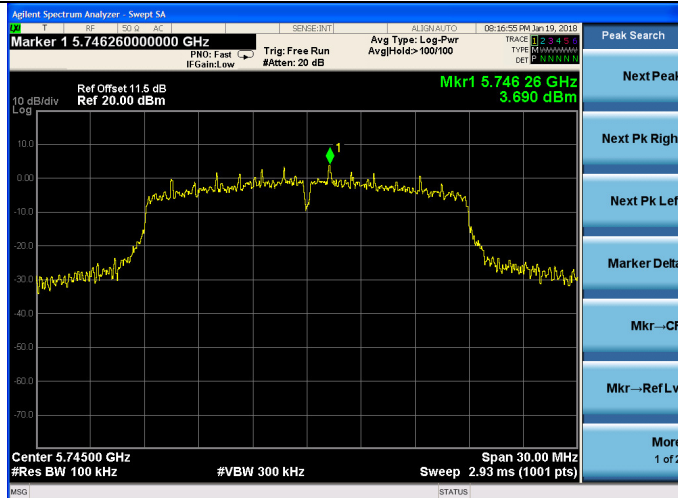


5825MHz



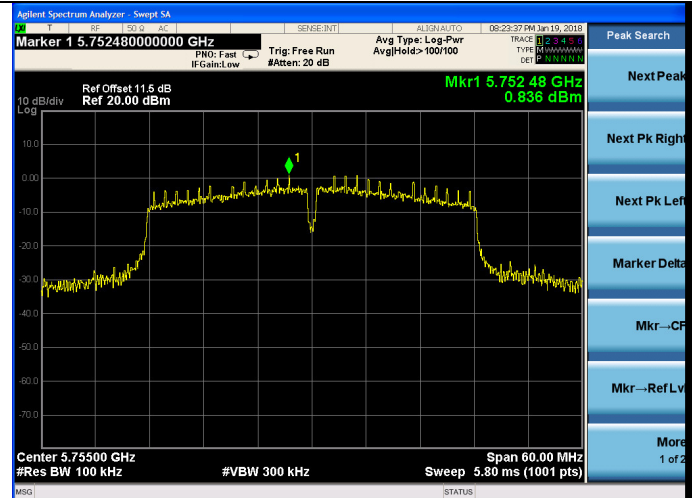
11ac VHT20

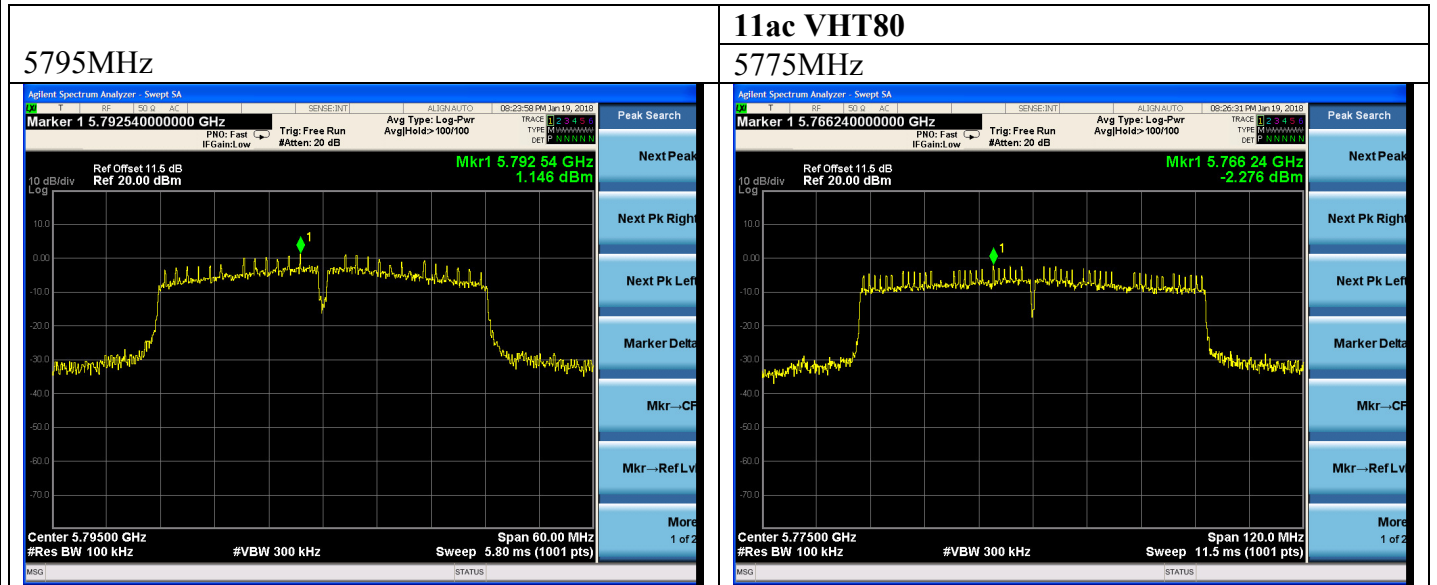
5745MHz



11ac VHT40

5755MHz





9. FREQUENCY STABILITY MEASUREMENT

9.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	PXA Signal Analyzer	Agilent	N9030A	MY51380221	Oct.15,17	1 Year
2.	Amp	HP	8449B	3008A02495	Apr.22.17	1 Year
3.	Horn Antenna	ETC	MCTD 1209	DRH15F03006	MAY.15,17	1 Year
4.	HF Cable	Hubersuhner	Sucoflex104	274094/4	Apr.22,17	1 Year

9.2. Limit

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

9.3. Test Procedure

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
EUT have transmitted absence of modulation signal and fixed channelise. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings. fc is declaring of channel frequency. Then the frequency error formula is $(f_c - f)/f \times 106\text{ppm}$. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value.
2. Extreme temperature rule is -30°C~50°C.

9.4. Test Result

EUT: Gemini		
M/N: Gemini 4G		
Test date: 2018-01-26	Pressure: 102.4±1.0 kpa	Humidity: 52.6±3.0%
Tested by: Kayle	Test site: RF site	Temperature: 23.2±0.6 °C

Test Voltage	Temperature	CH	Max. Reading (MHz)	Target Frequency (MHz)	Result (ppm)
AC 120V	25°C	CH36	5180.0005	5180	0.097
		CH38	5190.0005	5190	0.096
		CH40	5200.0005	5200	0.096
		CH42	5210.0005	5210	0.096
		CH46	5230.0005	5230	0.096
		CH48	5240.0005	5240	0.095
		CH149	5745.0005	5745	0.087
		CH151	5755.0005	5755	0.087
		CH155	5775.0005	5775	0.087
		CH157	5785.0005	5785	0.086
		CH159	5795.0005	5795	0.086
		CH165	5825.0005	5825	0.086
AC 108V	-20°C	CH36	5180.0013	5180	0.251
		CH38	5190.0017	5190	0.328
		CH40	5200.0012	5200	0.231
		CH42	5210.0012	5210	0.230
		CH46	5230.0014	5230	0.268
		CH48	5240.0012	5240	0.229
		CH149	5745.0010	5745	0.174
		CH151	5755.0008	5755	0.139
		CH155	5775.0006	5775	0.104
		CH157	5785.0006	5785	0.104
		CH159	5795.0009	5795	0.155
		CH165	5825.0011	5825	0.189
		CH36	5180.0008	5180	0.251
Conclusion: PASS					

Test Voltage	Temperature	CH	Max. Reading (MHz)	Target Frequency (MHz)	Result (ppm)
AC 132V	15°C	CH36	5180.0013	5180	0.251
		CH38	5190.0010	5190	0.193
		CH40	5200.0012	5200	0.231
		CH42	5210.0009	5210	0.173
		CH46	5230.0008	5230	0.153
		CH48	5240.0006	5240	0.115
		CH149	5745.0008	5745	0.139
		CH151	5755.0005	5755	0.087
		CH155	5775.0012	5775	0.208
		CH157	5785.0010	5785	0.173
		CH159	5795.0002	5795	0.035
		CH165	5825.0004	5825	0.069
AC 108V	35°C	CH36	5180.0009	5180	0.174
		CH38	5190.0008	5190	0.154
		CH40	5200.0006	5200	0.115
		CH42	5210.0010	5210	0.192
		CH46	5230.0008	5230	0.153
		CH48	5240.0007	5240	0.134
		CH149	5745.0013	5745	0.226
		CH151	5755.0007	5755	0.122
		CH155	5775.0009	5775	0.156
		CH157	5785.0006	5785	0.104
		CH159	5795.0008	5795	0.138
		CH165	5825.0012	5825	0.206
Conclusion: PASS					

Test Voltage	Temperature	CH	Max. Reading (MHz)	Target Frequency (MHz)	Result (ppm)
AC 120V	50℃	CH36	5180.0008	5180	0.154
		CH38	5190.0013	5190	0.250
		CH40	5200.0016	5200	0.308
		CH42	5210.0017	5210	0.326
		CH46	5230.0012	5230	0.229
		CH48	5240.0011	5240	0.210
		CH149	5745.0012	5745	0.209
		CH151	5755.0008	5755	0.139
		CH155	5775.0008	5775	0.139
		CH157	5785.0015	5785	0.259
		CH159	5795.0008	5795	0.138
		CH165	5825.0013	5825	0.223
Conclusion: PASS					

10. ANTENNA REQUIREMENT

10.1. Standard Applicable

For intentional device, according to FCC 47 CFR Section 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 FCC 47 CFR Section 15.407 (a), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

10.2. Antenna Connected Construction

The antennas used for this product are PIFA antenna that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is 0.42dBi.

11. DEVIATION TO TEST SPECIFICATIONS

[NONE]