



CTC Laboratories, Inc.

Room 101 Building B, No. 7, Lanqing 1st Road, Luhu Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China
Tel.: (86)755-27521059 Fax: (86)755-27521011 Http://www.sz-ctc.org.cn

TRF No: CTC-TR-062_A1

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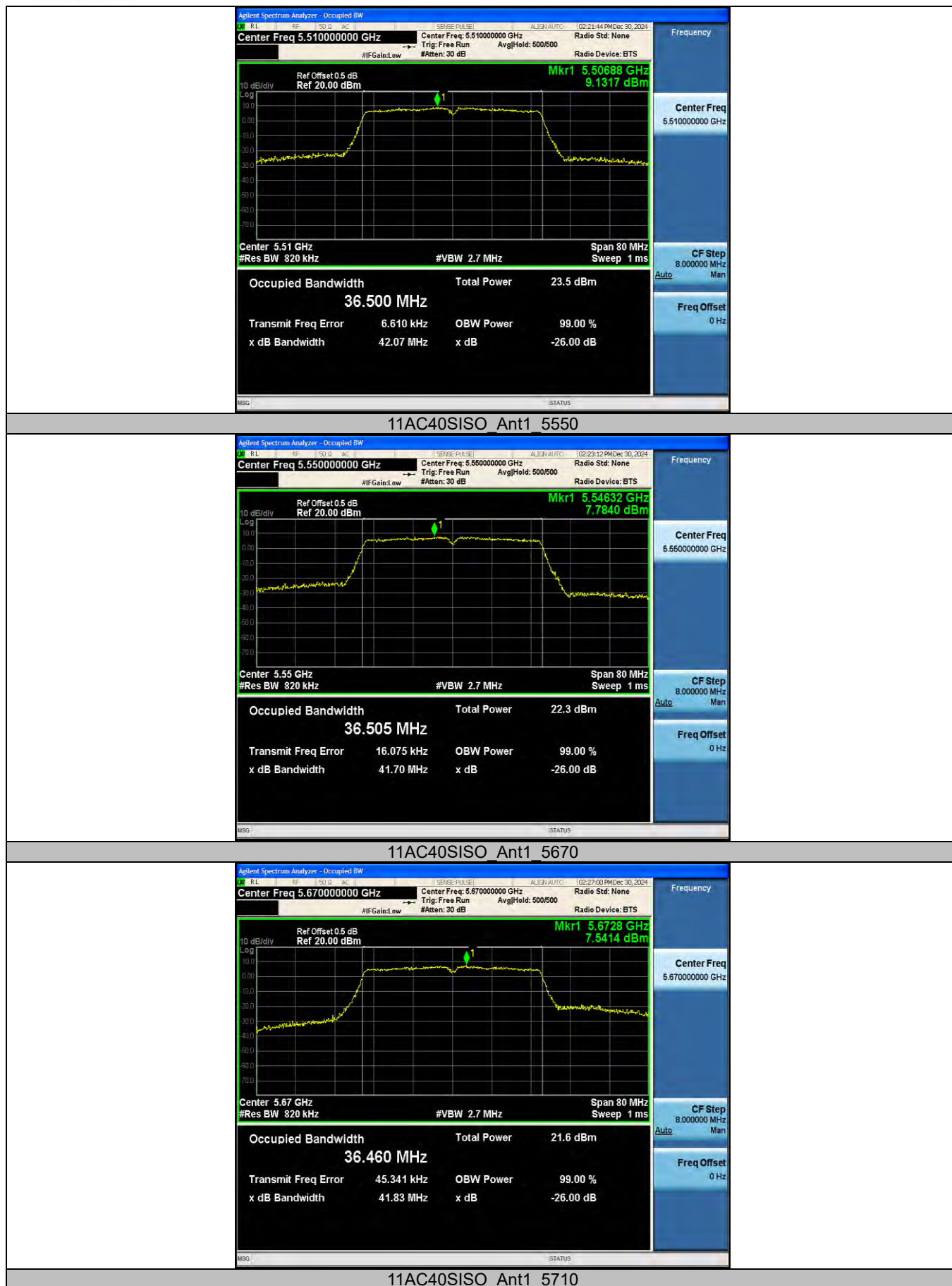


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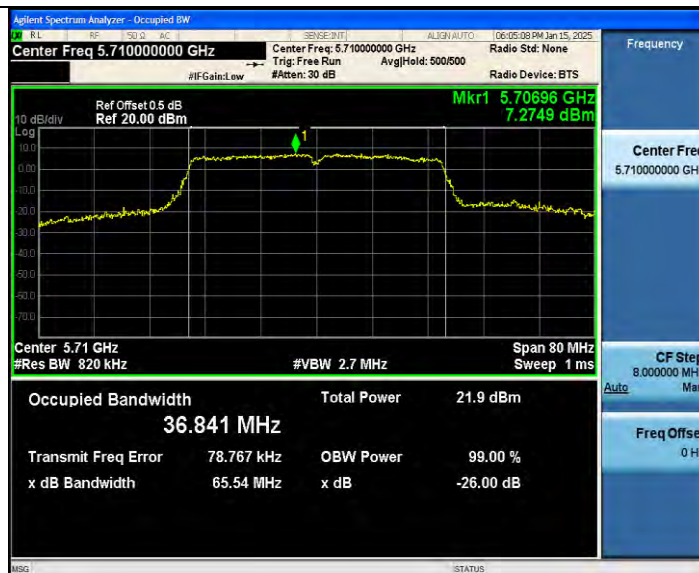


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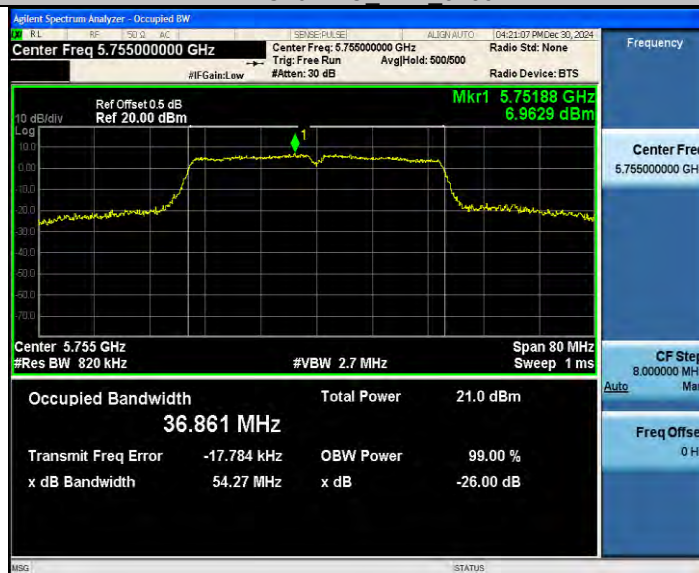
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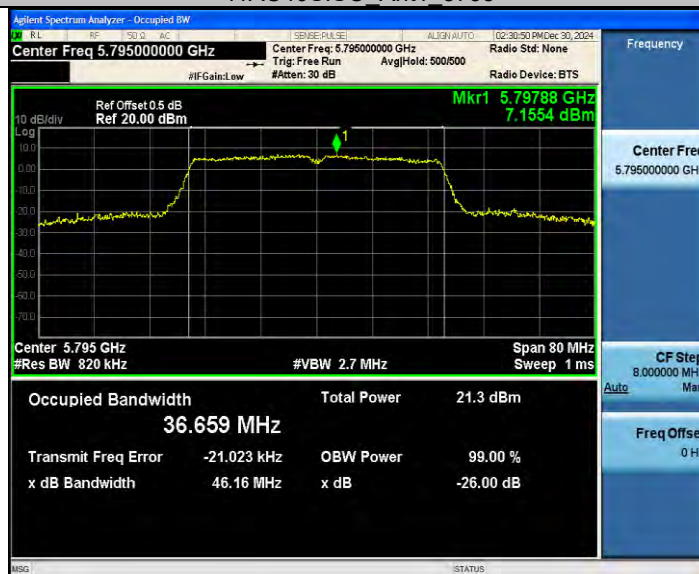
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11AC40SISO_Ant1_5755



11AC40SISO_Ant1_5795



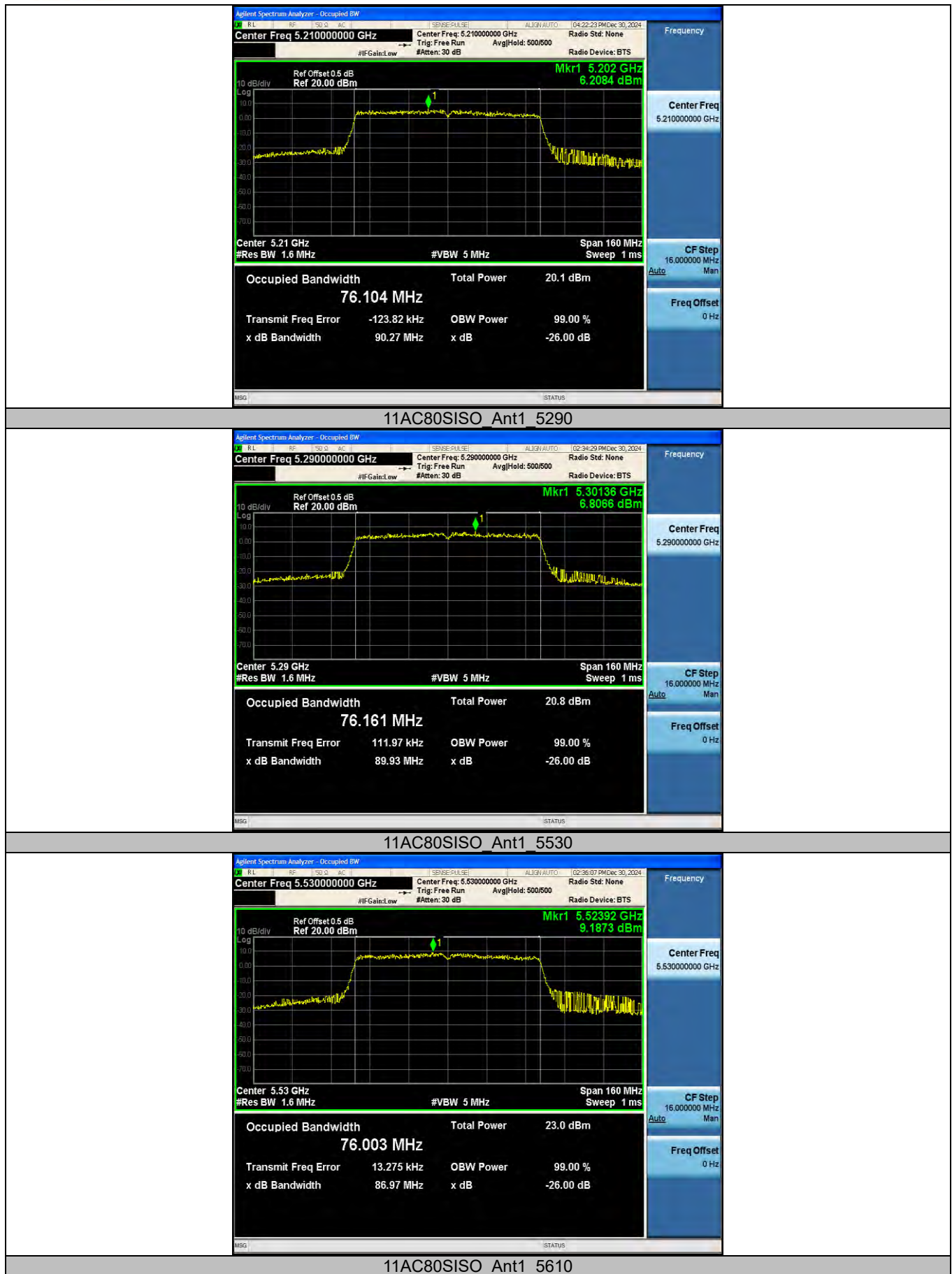
11AC80SISO_Ant1_5210

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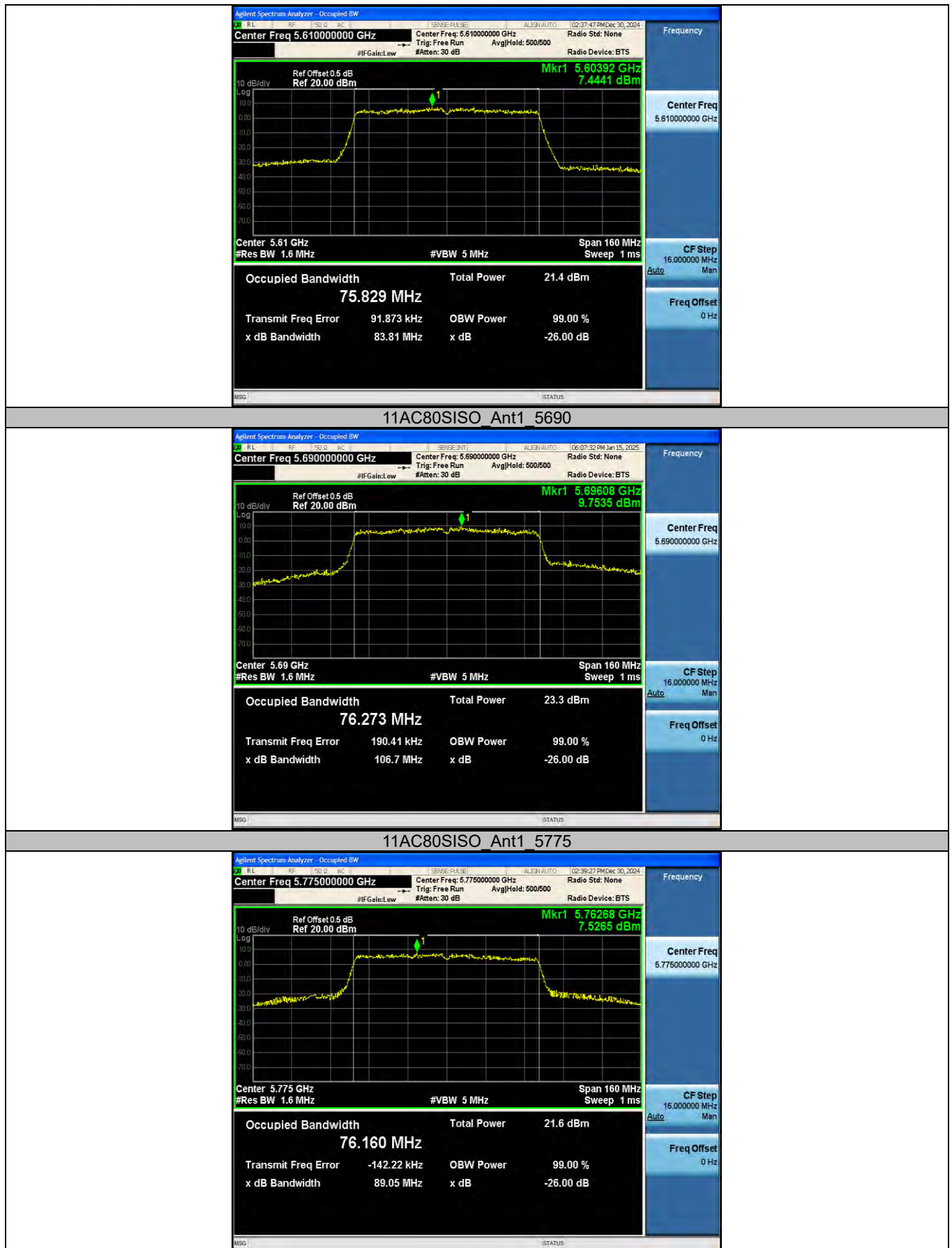


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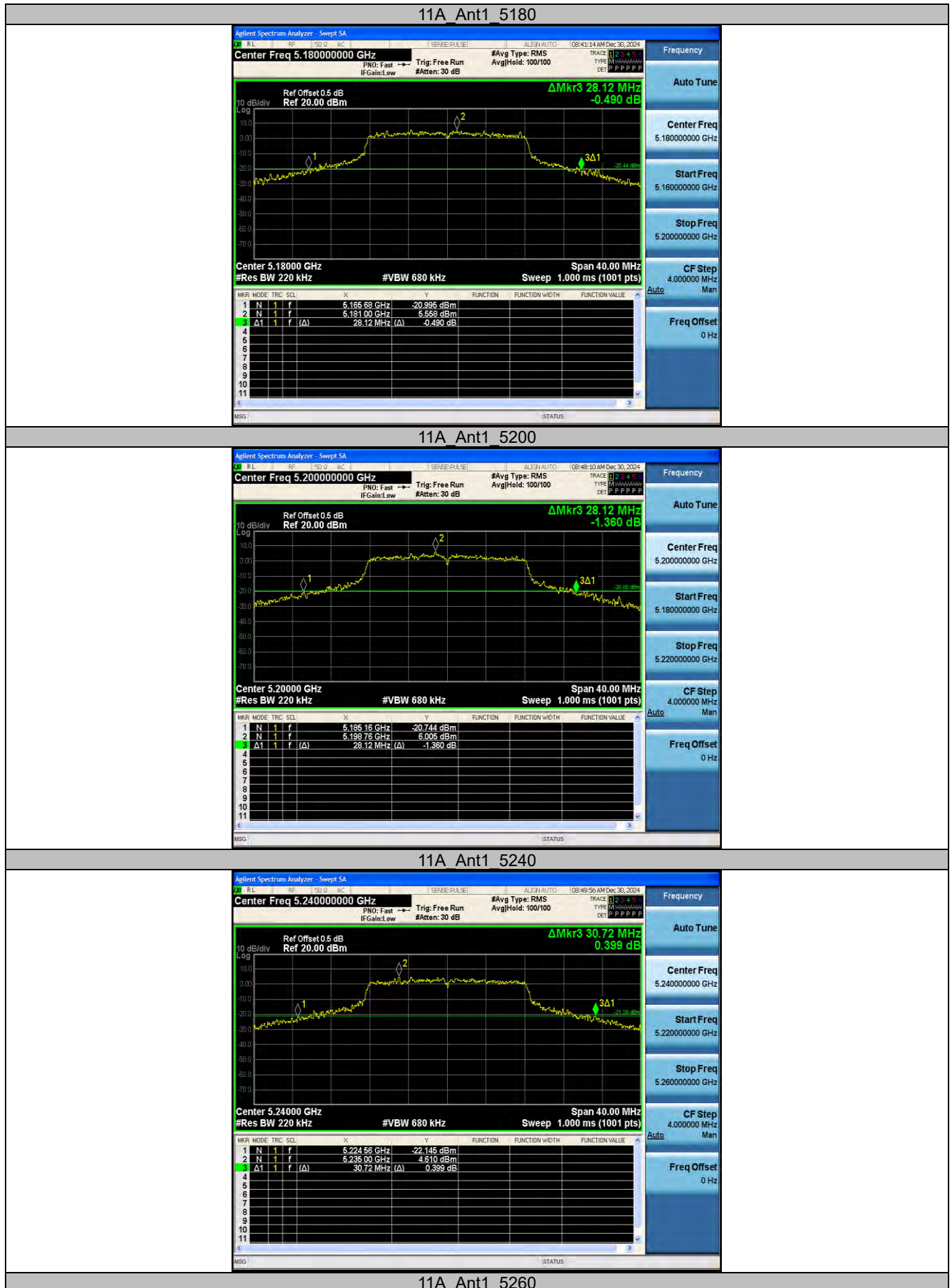
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26dB Bandwidth:



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11A Ant1 5280



11A Ant1 5320



11A Ant1 5500

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11A Ant1 5580



11A Ant1 5700



11A Ant1 5720

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11A Ant1 5745



11A Ant1 5785



11A Ant1 5825

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11AC20SISO_Ant1_5180



11AC20SISO_Ant1_5200



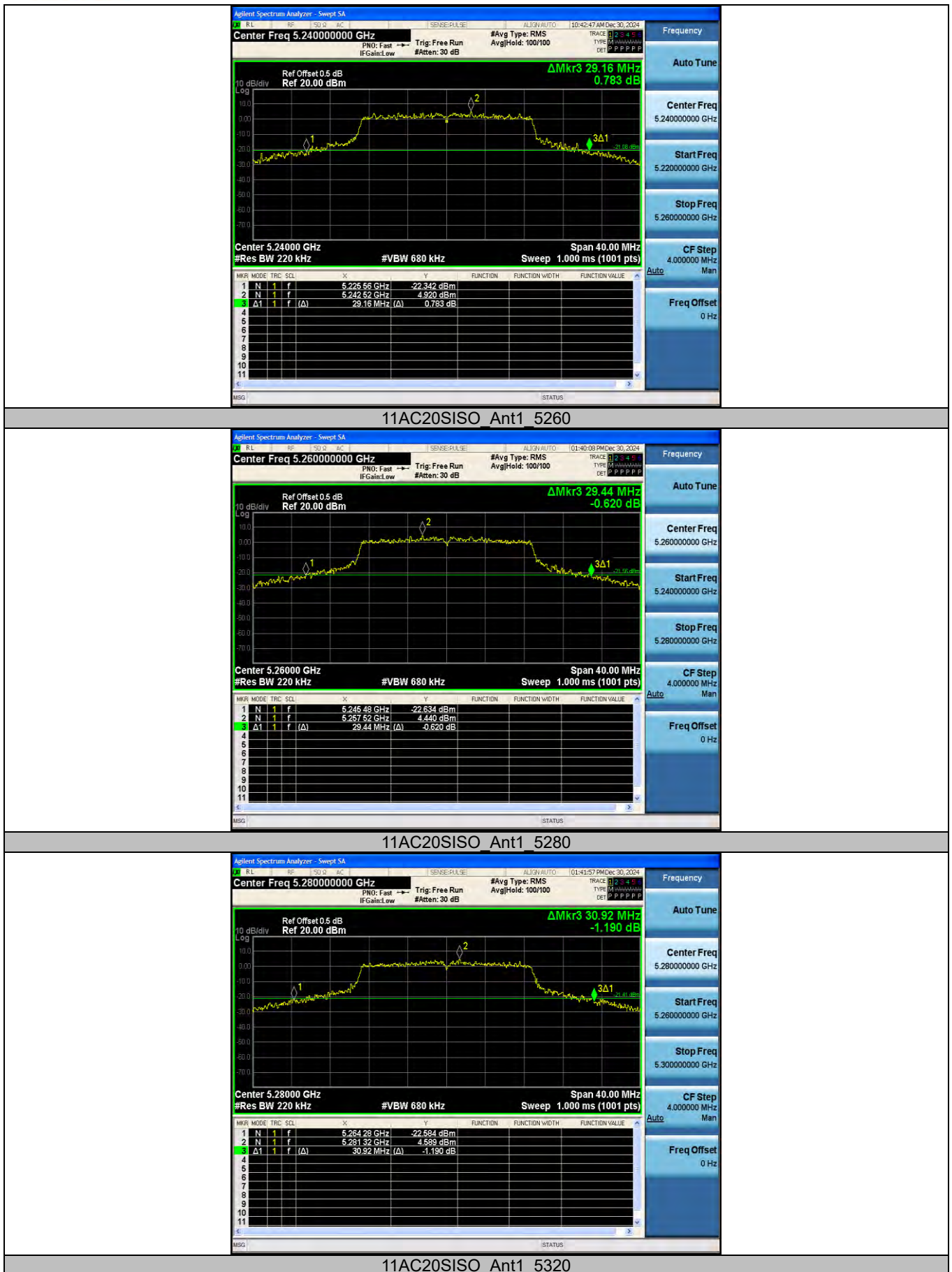
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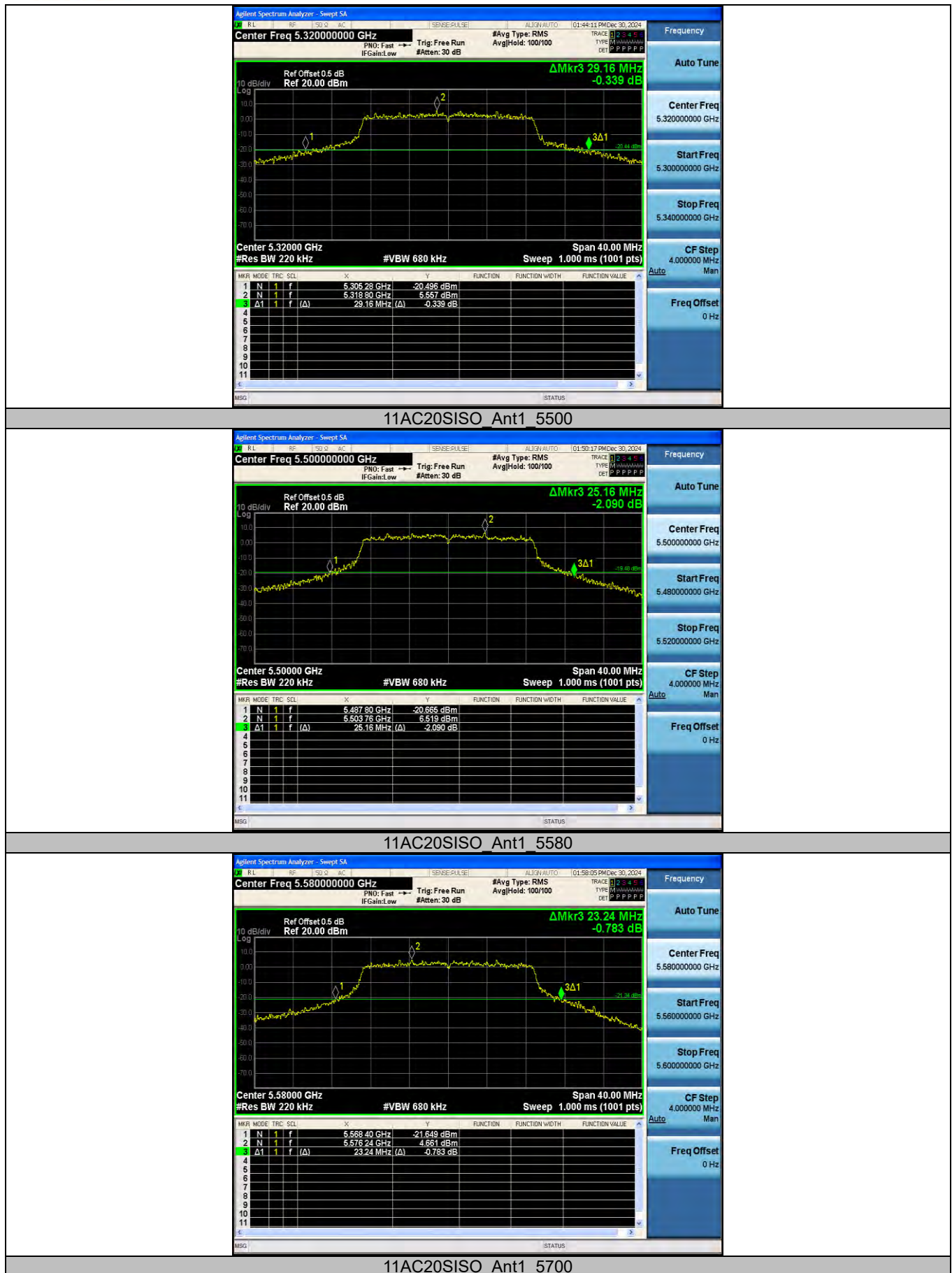


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11AC20SISO_Ant1_5720



11AC20SISO_Ant1_5745



11AC20SISO_Ant1_5785

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11AC20SISO_Ant1_5825



11AC40SISO_Ant1_5190



11AC40SISO_Ant1_5230

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TRF No: CTC-TR-062_A1

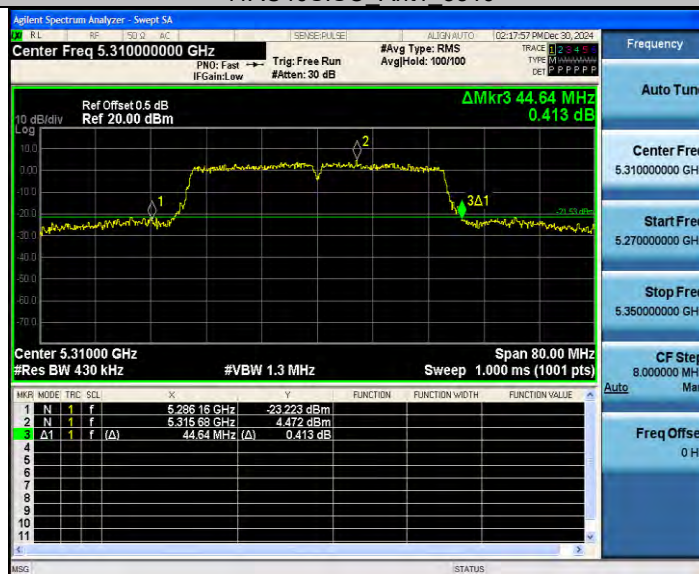
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11AC40SISO_Ant1_5270



11AC40SISO_Ant1_5310



11AC40SISO_Ant1_5510

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11AC40SISO_Ant1_5550



11AC40SISO_Ant1_5670



11AC40SISO_Ant1_5710

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11AC40SISO_Ant1_5755



11AC40SISO_Ant1_5795



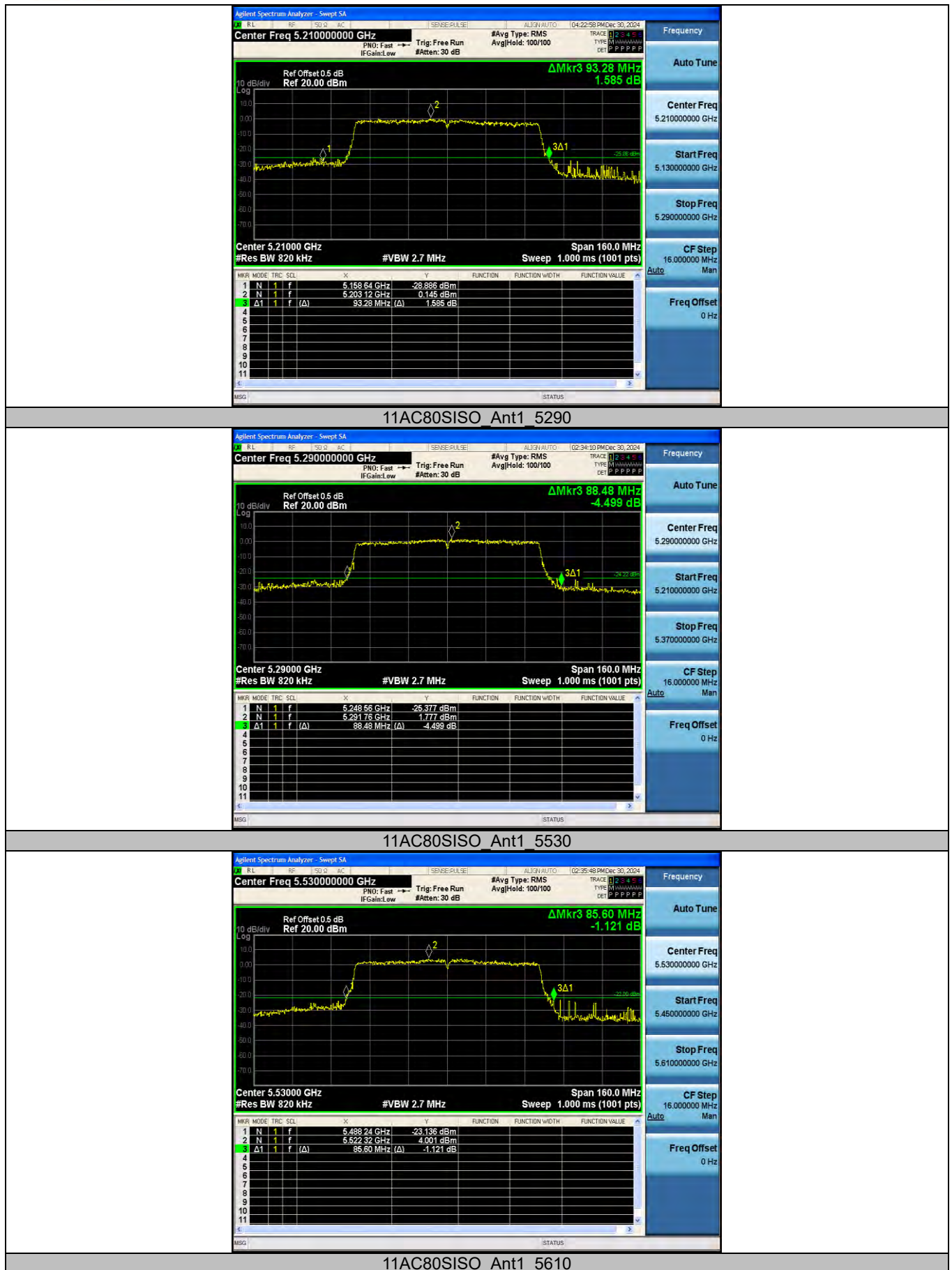
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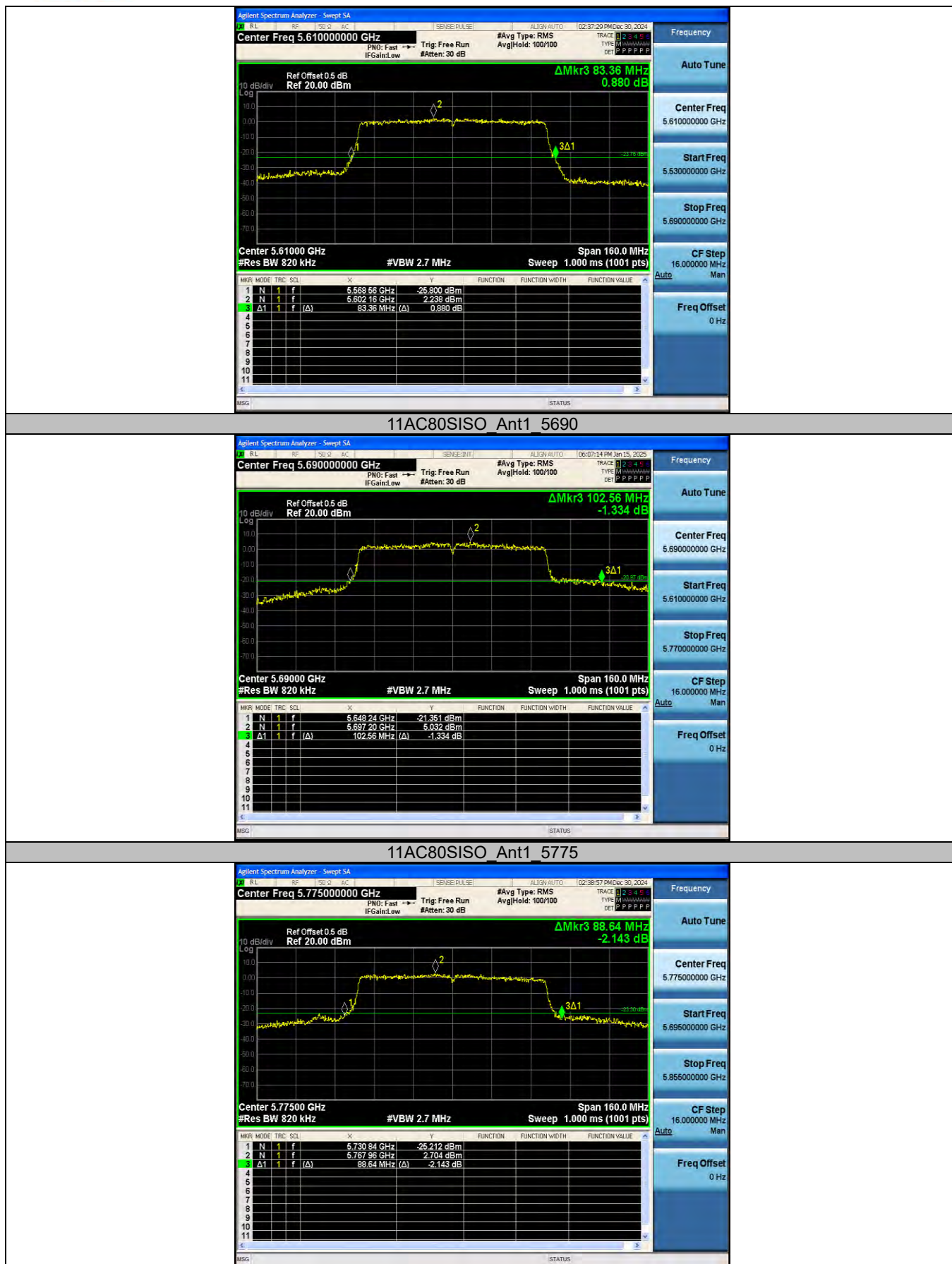


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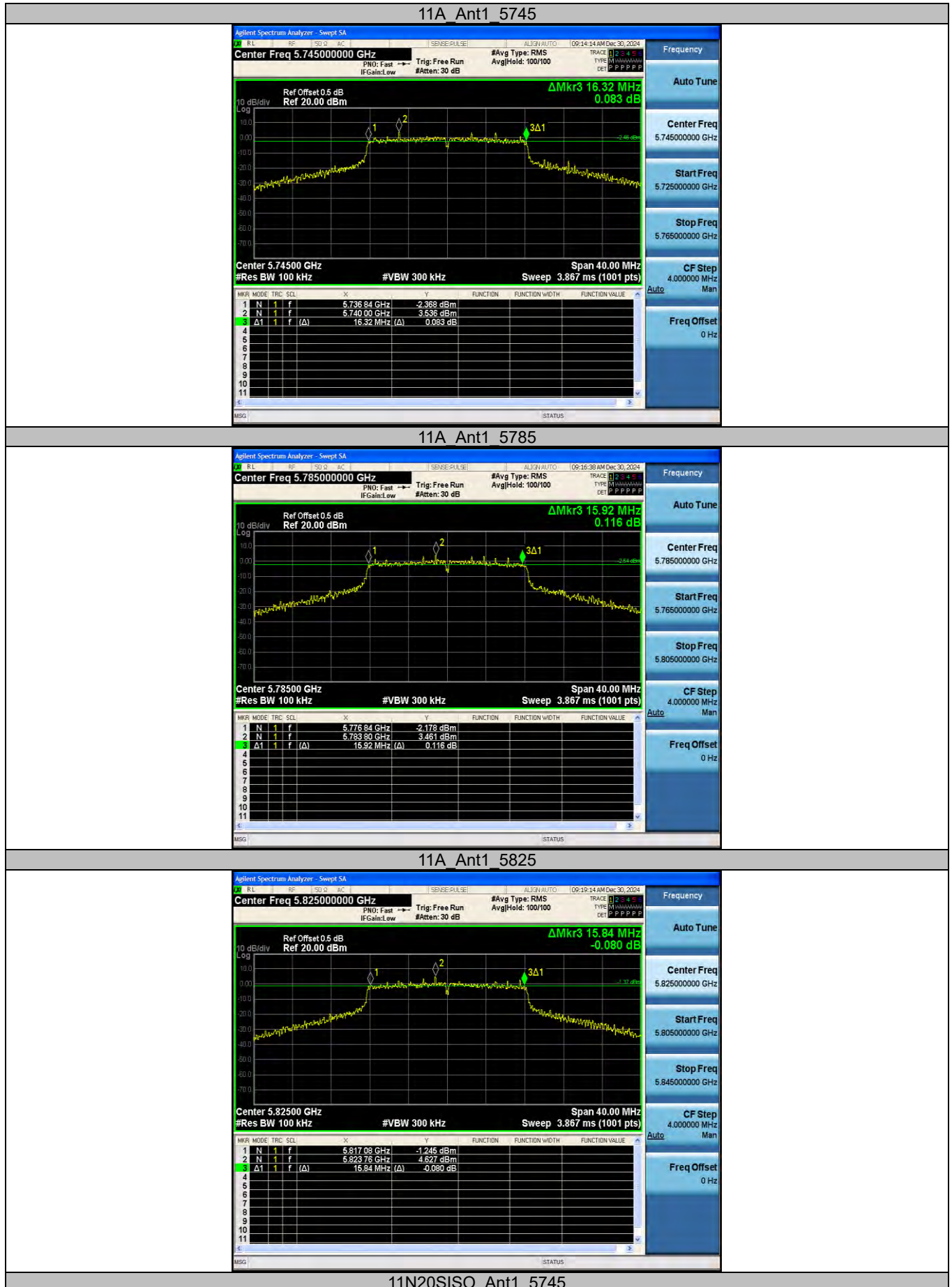
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6dB Bandwidth:

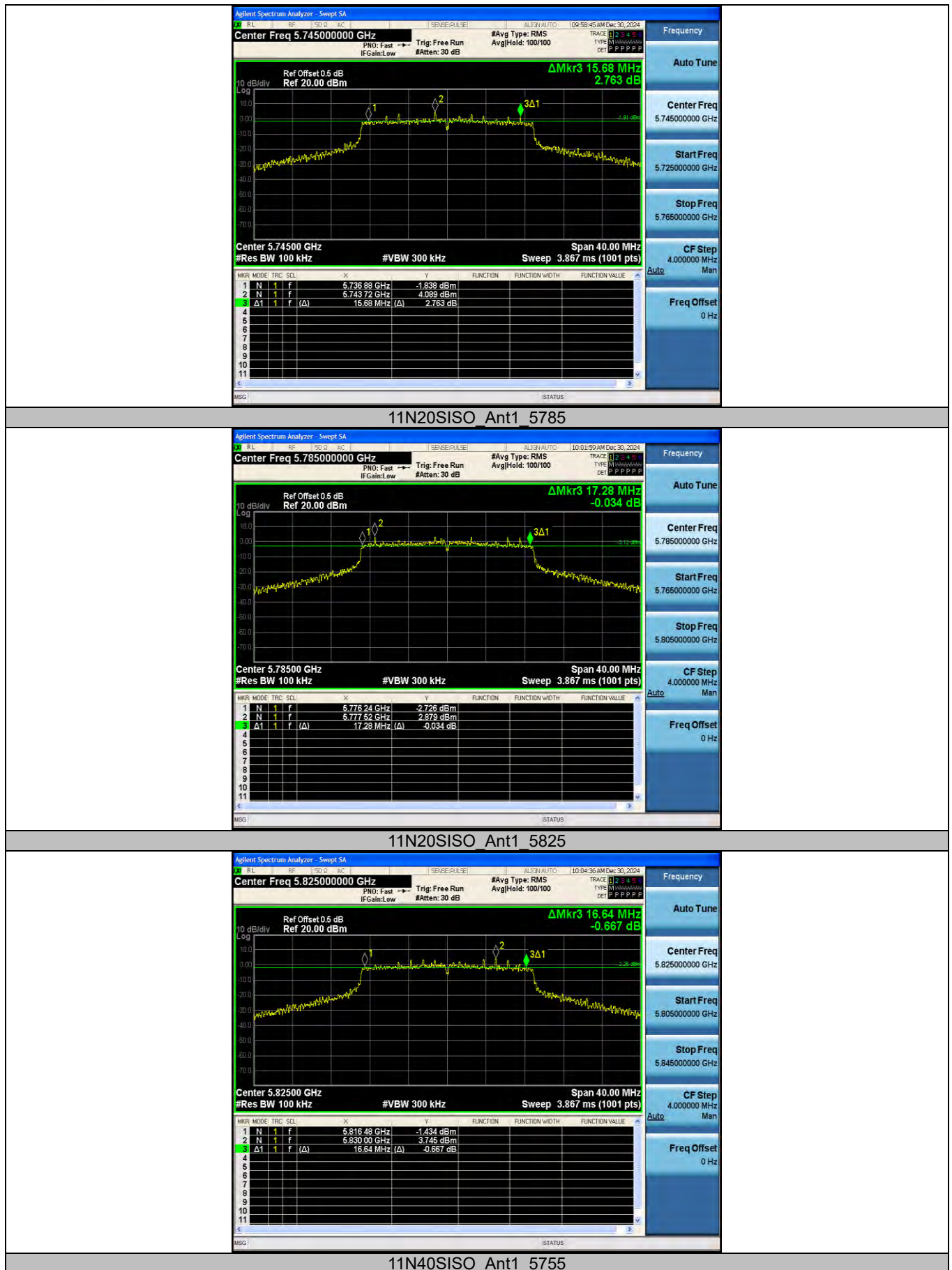


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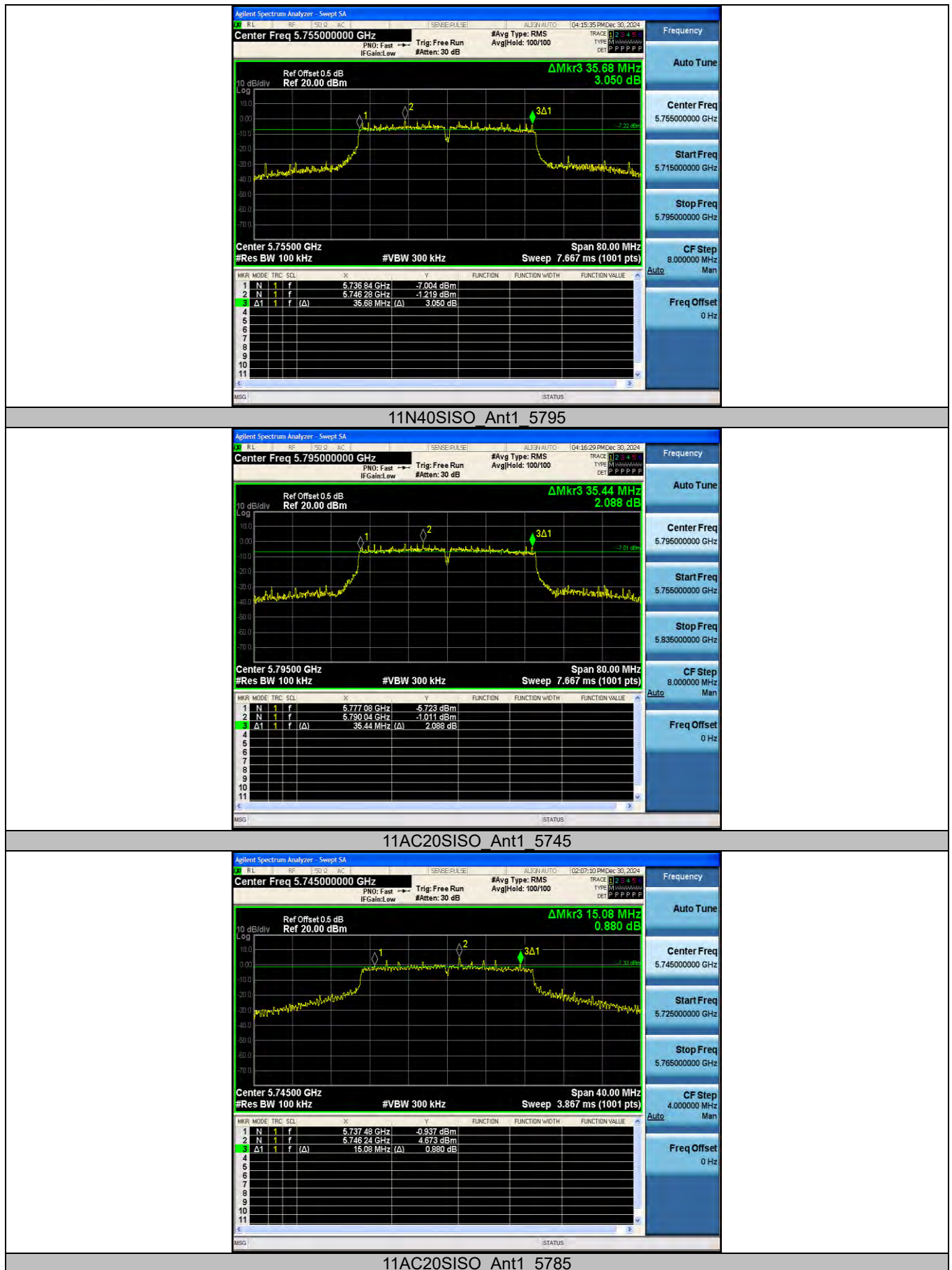


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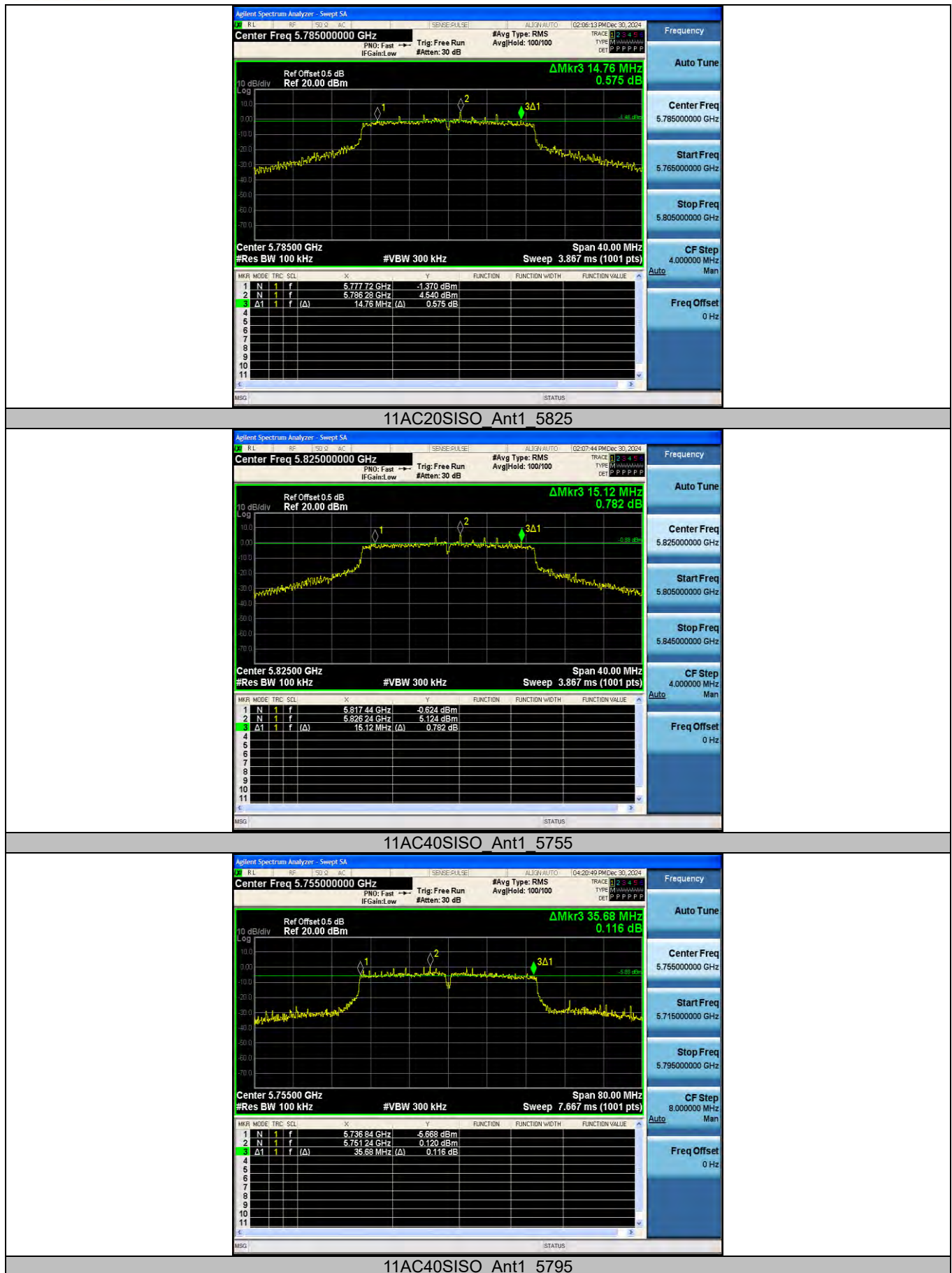


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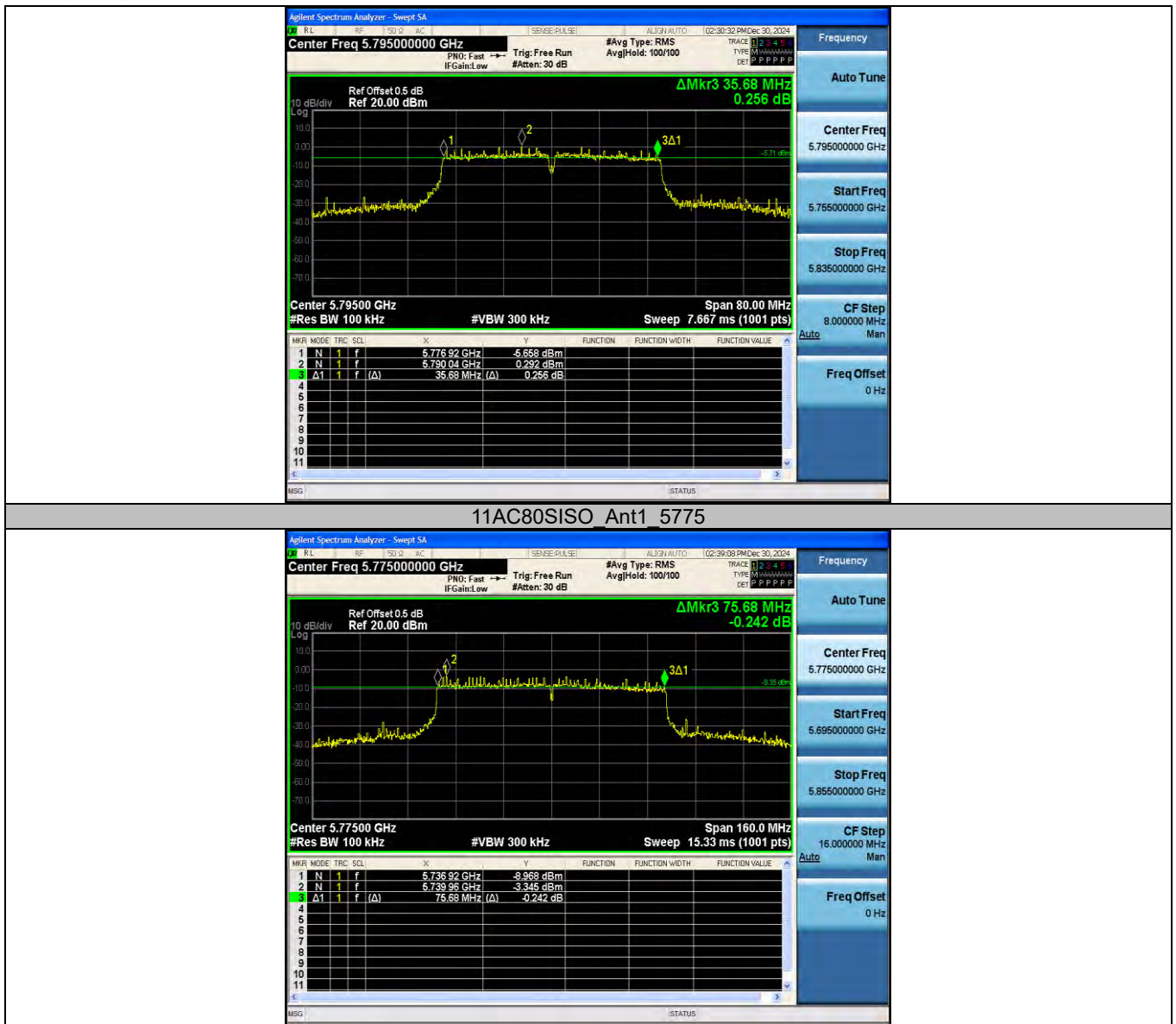


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3.5. Peak Output Power

Limit

FCC CFR Title 47 Part 15 Subpart E Section 15.407(a)

Test Item	Limit	Frequency Range (MHz)
Conducted Output Power	Fixed: 1 Watt (30dBm) Mobile and Portable: 250mW (24dBm)	5150~5250
	250mW (24dBm)	5250~5350
	250mW (24dBm)	5500~5700
	1 Watt (30dBm)	5725~5850

RSS-247 6.2

IC Power&PSD Limit					
Frequency	Type of devices	Maximum Conducted Output Power	EIRP Output Power	Conducted Power Spectral Density	EIRP Power Spectral Density
5150MHz-5250MHz	in vehicles		30mW or $1.76 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)		
	Other Devices		200mW or $10 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)		10dBm/MHz
5250MHz-5350MHz	in vehicles		30mW or $1.76 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)		
	Other Devices	250mW or $11 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)	1W or $17 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)	11dBm/MHz	
5470MHz-5600MHz 5650MHz-5725MHz	ALL Devices	250mW or $11 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)	1W or $17 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)	11dBm/MHz	
5725MHz-5850MHz	ALL Devices	1W		30dBm/500KHz	

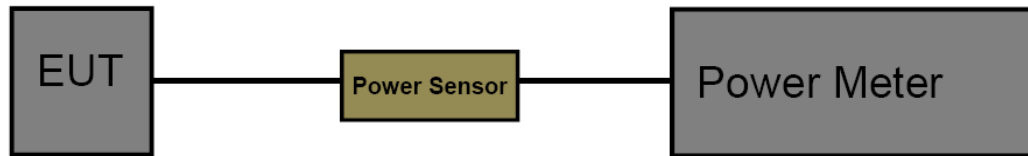
Test Configuration

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Test Procedure

The measurement is according to section 3 of KDB 789033 D02 General UNII Test Procedures New Rules V02r01.

Test Mode

Please refer to the clause 2.4.

Test Result

Model: WCN3988 A1

Test Mode	Freq(MHz)	Conducted Output Power [dBm]	Limit [dBm]	EIRP [dBm]	EIRP Limit [dBm]	Verdict
11A	5180	14.94	≤23.73	21.21	≤22.73	PASS
	5200	14.47	≤23.73	20.74	≤22.73	PASS
	5240	14.17	≤23.73	20.44	≤22.73	PASS
	5260	14.23	≤23.73	20.50	≤29.73	PASS
	5280	14.42	≤23.73	20.69	≤29.73	PASS
	5320	14.94	≤23.73	21.21	≤29.73	PASS
	5500	15.67	≤23.73	21.94	≤29.73	PASS
	5580	14.83	≤23.73	21.10	≤29.73	PASS
	5700	14.25	≤23.73	20.52	≤29.73	PASS
	5720 UNII-2C	14.14	≤23.73	20.41	≤29.73	PASS
	5720 UNII-3	10.70	≤23.73	16.97	≤29.73	PASS
	5745	13.91	≤29.73	/	/	PASS
	5785	13.93	≤29.73	/	/	PASS
	5825	14.26	≤29.73	/	/	PASS
11N20SISO	5180	14.11	≤23.73	20.38	≤22.73	PASS
	5200	14.20	≤23.73	20.47	≤22.73	PASS
	5240	14.06	≤23.73	20.33	≤22.73	PASS
	5260	14.16	≤23.73	20.43	≤29.73	PASS
	5280	14.27	≤23.73	20.54	≤29.73	PASS
	5320	14.28	≤23.73	20.55	≤29.73	PASS
	5500	14.47	≤23.73	20.74	≤29.73	PASS
	5580	14.44	≤23.73	20.71	≤29.73	PASS
	5700	14.11	≤23.73	20.38	≤29.73	PASS
	5720 UNII-2C	13.55	≤23.73	19.82	≤29.73	PASS
	5720 UNII-3	11.92	≤23.73	18.19	≤29.73	PASS
	5745	13.78	≤29.73	/	/	PASS
	5785	13.83	≤29.73	/	/	PASS
	5825	14.17	≤29.73	/	/	PASS
11N40SISO	5190	14.28	≤23.73	20.55	≤22.73	PASS
	5230	14.37	≤23.73	20.64	≤22.73	PASS
	5270	14.57	≤23.73	20.84	≤29.73	PASS
	5310	14.27	≤23.73	20.54	≤29.73	PASS
	5510	14.75	≤23.73	21.02	≤29.73	PASS
	5550	14.76	≤23.73	21.03	≤29.73	PASS

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	5670	14.65	≤23.73	20.92	≤29.73	PASS
	5710 UNII-2C	14.08	≤23.73	20.35	≤29.73	PASS
	5710 UNII-3	11.65	≤23.73	17.92	≤29.73	PASS
	5755	14.34	≤29.73	/	/	PASS
	5795	14.03	≤29.73	/	/	PASS
11AC20SISO	5180	14.94	≤23.73	21.21	≤22.73	PASS
	5200	14.45	≤23.73	20.72	≤22.73	PASS
	5240	14.50	≤23.73	20.77	≤22.73	PASS
	5260	14.81	≤23.73	21.08	≤29.73	PASS
	5280	14.40	≤23.73	20.67	≤29.73	PASS
	5320	14.46	≤23.73	20.73	≤29.73	PASS
	5500	15.72	≤23.73	21.99	≤29.73	PASS
	5580	14.61	≤23.73	20.88	≤29.73	PASS
	5700	14.71	≤23.73	20.98	≤29.73	PASS
	5720 UNII-2C	13.66	≤23.73	19.93	≤29.73	PASS
	5720 UNII-3	12.14	≤23.73	18.41	≤29.73	PASS
	5745	14.01	≤29.73	/	/	PASS
	5785	14.05	≤29.73	/	/	PASS
	5825	14.21	≤29.73	/	/	PASS
11AC40SISO	5190	14.38	≤23.73	20.65	≤22.73	PASS
	5230	14.62	≤23.73	20.89	≤22.73	PASS
	5270	14.66	≤23.73	20.93	≤29.73	PASS
	5310	14.44	≤23.73	20.71	≤29.73	PASS
	5510	15.86	≤23.73	22.13	≤29.73	PASS
	5550	14.83	≤23.73	21.10	≤29.73	PASS
	5670	14.82	≤23.73	21.09	≤29.73	PASS
	5710 UNII-2C	14.40	≤23.73	20.67	≤29.73	PASS
	5710 UNII-3	14.18	≤23.73	20.45	≤29.73	PASS
	5755	14.60	≤29.73	/	/	PASS
	5795	14.49	≤29.73	/	/	PASS
11AC80SISO	5210	12.08	≤23.73	18.35	≤22.73	PASS
	5290	11.84	≤23.73	18.11	≤29.73	PASS
	5530	14.13	≤23.73	20.40	≤29.73	PASS
	5610	12.56	≤23.73	18.83	≤29.73	PASS
	5690 UNII-2C	14.41	≤23.73	20.68	≤29.73	PASS
	5690 UNII-3	14.31	≤23.73	20.58	≤29.73	PASS
	5775	12.63	≤29.73	/	/	PASS

Model: WCN3988 A2

Test Mode	Freq(MHz)	Conducted Output Power [dBm]	Limit [dBm]	EIRP [dBm]	EIRP Limit [dBm]	Verdict
11A	5180	14.79	≤23.73	21.06	≤22.73	PASS
	5200	14.55	≤23.73	20.82	≤22.73	PASS
	5240	14.30	≤23.73	20.57	≤22.73	PASS
	5260	14.26	≤23.73	20.53	≤29.73	PASS
	5280	14.29	≤23.73	20.56	≤29.73	PASS
	5320	14.87	≤23.73	21.14	≤29.73	PASS
	5500	15.60	≤23.73	21.87	≤29.73	PASS
	5580	14.74	≤23.73	21.01	≤29.73	PASS
	5700	14.33	≤23.73	20.60	≤29.73	PASS
	5720 UNII-2C	14.10	≤23.73	20.37	≤29.73	PASS
	5720 UNII-3	10.67	≤23.73	16.94	≤29.73	PASS
	5745	13.96	≤29.73	/	/	PASS
	5785	13.90	≤29.73	/	/	PASS
	5825	14.05	≤29.73	/	/	PASS
11N20SISO	5180	14.18	≤23.73	20.45	≤22.73	PASS
	5200	14.23	≤23.73	20.50	≤22.73	PASS
	5240	14.15	≤23.73	20.42	≤22.73	PASS

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	5260	14.11	≤23.73	20.38	≤29.73	PASS
	5280	14.19	≤23.73	20.46	≤29.73	PASS
	5320	14.22	≤23.73	20.49	≤29.73	PASS
	5500	14.40	≤23.73	20.67	≤29.73	PASS
	5580	14.49	≤23.73	20.76	≤29.73	PASS
	5700	14.16	≤23.73	20.43	≤29.73	PASS
	5720_UNII-2C	13.49	≤23.73	19.76	≤29.73	PASS
	5720_UNII-3	11.87	≤23.73	18.14	≤29.73	PASS
	5745	13.71	≤29.73	/	/	PASS
	5785	13.79	≤29.73	/	/	PASS
11N40SISO	5825	14.10	≤29.73	/	/	PASS
	5190	14.21	≤23.73	20.48	≤22.73	PASS
	5230	14.40	≤23.73	20.67	≤22.73	PASS
	5270	14.52	≤23.73	20.79	≤29.73	PASS
	5310	14.33	≤23.73	20.60	≤29.73	PASS
	5510	14.69	≤23.73	20.96	≤29.73	PASS
	5550	14.71	≤23.73	20.98	≤29.73	PASS
	5670	14.58	≤23.73	20.85	≤29.73	PASS
	5710_UNII-2C	14.01	≤23.73	20.28	≤29.73	PASS
	5710_UNII-3	11.62	≤23.73	17.89	≤29.73	PASS
11AC20SISO	5755	14.39	≤29.73	/	/	PASS
	5795	14.22	≤29.73	/	/	PASS
	5180	14.88	≤23.73	21.15	≤22.73	PASS
	5200	14.49	≤23.73	20.76	≤22.73	PASS
	5240	14.53	≤23.73	20.80	≤22.73	PASS
	5260	14.75	≤23.73	21.02	≤29.73	PASS
	5280	14.35	≤23.73	20.62	≤29.73	PASS
	5320	14.42	≤23.73	20.69	≤29.73	PASS
	5500	15.66	≤23.73	21.93	≤29.73	PASS
	5580	14.54	≤23.73	20.81	≤29.73	PASS
	5700	14.69	≤23.73	20.96	≤29.73	PASS
	5720_UNII-2C	13.61	≤23.73	19.88	≤29.73	PASS
	5720_UNII-3	12.10	≤23.73	18.37	≤29.73	PASS
	5745	14.12	≤29.73	/	/	PASS
11AC40SISO	5785	14.10	≤29.73	/	/	PASS
	5825	14.18	≤29.73	/	/	PASS
	5190	14.42	≤23.73	20.69	≤22.73	PASS
	5230	14.63	≤23.73	20.90	≤22.73	PASS
	5270	14.60	≤23.73	20.87	≤29.73	PASS
	5310	14.41	≤23.73	20.68	≤29.73	PASS
	5510	15.82	≤23.73	22.09	≤29.73	PASS
	5550	14.86	≤23.73	21.13	≤29.73	PASS
	5670	14.85	≤23.73	21.12	≤29.73	PASS
	5710_UNII-2C	14.38	≤23.73	20.65	≤29.73	PASS
11AC80SISO	5710_UNII-3	14.12	≤23.73	20.39	≤29.73	PASS
	5755	14.54	≤29.73	/	/	PASS
	5795	14.46	≤29.73	/	/	PASS
	5210	12.12	≤23.73	18.39	≤22.73	PASS
	5290	12.00	≤23.73	18.27	≤29.73	PASS
	5530	14.10	≤23.73	20.37	≤29.73	PASS
	5610	12.51	≤23.73	18.78	≤29.73	PASS
	5690_UNII-2C	14.33	≤23.73	20.60	≤29.73	PASS
	5690_UNII-3	14.25	≤23.73	20.52	≤29.73	PASS
	5775	12.66	≤29.73	/	/	PASS



3.6. Power Spectral Density

Limit

FCC CFR Title 47 Part 15 Subpart E Section 15.407(a)

For the 5.15~5.25GHz band:

- Outdoor AP
The peak power spectral density (PSD) shall not exceed the lesser of 17dBm/MHz.
If $G_{TX} > 6\text{dBi}$, then $\text{PSD} = 17 - (G_{TX} - 6)$.
- Indoor AP
The peak power spectral density (PSD) shall not exceed the lesser of 17dBm/MHz.
If $G_{TX} > 6\text{dBi}$, then $\text{PSD} = 17 - (G_{TX} - 6)$.
- Point-to-point AP
The peak power spectral density (PSD) shall not exceed the lesser of 17dBm/MHz.
If $G_{TX} > 23\text{dBi}$, then $\text{PSD} = 17 - (G_{TX} - 23)$.
- Client devices
The peak power spectral density (PSD) shall not exceed the lesser of 11dBm/MHz.
If $G_{TX} > 6\text{dBi}$, then $\text{PSD} = 11 - (G_{TX} - 6)$.

For the 5.25~5.35GHz band:

The peak power spectral density (PSD) shall not exceed the lesser of 11dBm/MHz.
If $G_{TX} > 6\text{dBi}$, then $\text{PSD} = 11 - (G_{TX} - 6)$.

For the 5.47~5.725GHz band:

The peak power spectral density (PSD) shall not exceed the lesser of 11dBm/MHz.
If $G_{TX} > 6\text{dBi}$, then $\text{PSD} = 11 - (G_{TX} - 6)$.

For the 5.725~5.85GHz band:

- Point-to-multipoint systems (P2M)
The peak power spectral density (PSD) shall not exceed the lesser of 30dBm/500kHz.
If $G_{TX} > 6\text{dBi}$, then $\text{PSD} = 30 - (G_{TX} - 6)$.
- Point-to-point systems (P2P)
The peak power spectral density (PSD) shall not exceed the lesser of 30dBm/500kHz.

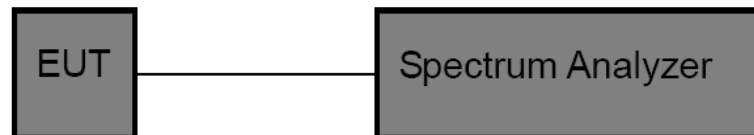
Note: G_{TX} : EUT Antenna gain.

RSS-247 6.2



IC Power&PSD Limit					
Frequency	Type of devices	Maximum Conducted Output Power	EIRP Output Power	Conducted Power Spectral Density	EIRP Power Spectral Density
5150MHz-5250MHz	in vehicles		30mW or $1.76 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)		
	Other Devices		200mW or $10 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)		10dBm/MHz
5250MHz-5350MHz	in vehicles		30mW or $1.76 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)		
	Other Devices	250mW or $11 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)	1W or $17 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)	11dBm/MHz	
5470MHz-5600MHz 5650MHz-5725MHz	ALL Devices	250mW or $11 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)	1W or $17 + 10 \times \log_{10} B$ dBm, whichever is less (B=99% OBW in MHz)	11dBm/MHz	
5725MHz-5850MHz	ALL Devices	1W		30dBm/500KHz	

Test Configuration



Test Procedure

The EUT was directly connected to the Spectrum Analyzer and antenna output port as show in the block diagram above. The measurement is according to KDB 789033 D02 General UNII Test Procedures New Rules V02r01.

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Set analyzer center frequency to transmitting frequency.
- (3) Set the span to encompass the entire emissions bandwidth (EBW) (alternatively, the entire 99% OBW) of the signal.
- (4) RBW=1MHz for devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz
RBW=500kHz for devices operating in the band 5.725-5.85 GHz.
- (5) Set the VBW to: ≥ 3 RBW
- (6) Detector: AVG
- (7) Trace: Max Hold and View
- (7) Sweep time: auto
- (8) Trace average at least 100 traces in power averaging.
- (9) User the peak marker function to determine the maximum amplitude level within the RBW. Apply correction to the result if different RBW is used.

NOTE: The EUT was set to continuously transmitting in each mode and low, middle and high channel for the test.

Test Mode

Please refer to the clause 2.4.

**Test Result**

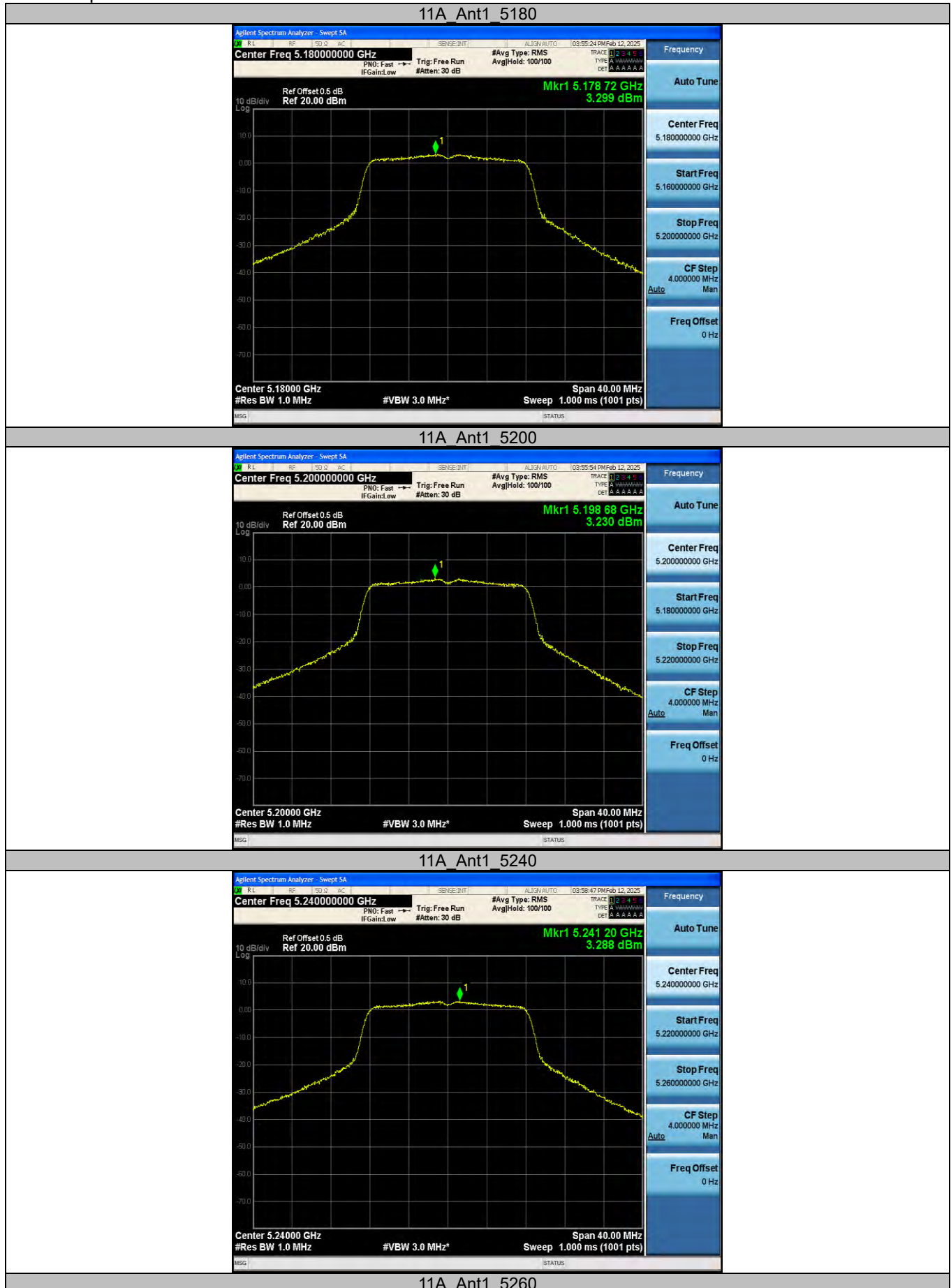
Test Mode	Freq(MHz)	Conducted PSD [dBm/MHz]	Conducted PSD Limit [dBm/MHz]	Conducted PSD Limit [dBm/500kHz]	EIRP PSD [dBm/MHz]	EIRP PSD Limit [dBm/MHz]	Verdict
11A	5180	3.36	≤10.73	/	9.63	≤9.73	PASS
	5200	3.31	≤10.73	/	9.58	≤9.73	PASS
	5240	3.38	≤10.73	/	9.65	≤9.73	PASS
	5260	3.98	≤10.73	/	/	/	PASS
	5280	3.93	≤10.73	/	/	/	PASS
	5320	4.65	≤10.73	/	/	/	PASS
	5500	5.31	≤10.73	/	/	/	PASS
	5580	4.48	≤10.73	/	/	/	PASS
	5700	3.75	≤10.73	/	/	/	PASS
	5720 UNII-2C	3.98	≤10.73	/	/	/	PASS
	5720 UNII-3	-0.66	/	≤29.73	/	/	PASS
	5745	0.86	/	≤29.73	/	/	PASS
	5785	1.01	/	≤29.73	/	/	PASS
	5825	0.92	/	≤29.73	/	/	PASS
11AC20SISO	5180	3.32	≤10.73	/	9.59	≤9.73	PASS
	5200	3.33	≤10.73	/	9.60	≤9.73	PASS
	5240	3.09	≤10.73	/	9.36	≤9.73	PASS
	5260	3.38	≤10.73	/	/	/	PASS
	5280	3.27	≤10.73	/	/	/	PASS
	5320	3.65	≤10.73	/	/	/	PASS
	5500	5.36	≤10.73	/	/	/	PASS
	5580	3.61	≤10.73	/	/	/	PASS
	5700	2.92	≤10.73	/	/	/	PASS
	5720 UNII-2C	3.02	≤10.73	/	/	/	PASS
	5720 UNII-3	-1.49	/	≤29.73	/	/	PASS
	5745	0.22	/	≤29.73	/	/	PASS
	5785	0.07	/	≤29.73	/	/	PASS
	5825	0.66	/	≤29.73	/	/	PASS
11AC40SISO	5190	0.56	≤10.73	/	6.83	≤9.73	PASS
	5230	-0.15	≤10.73	/	6.12	≤9.73	PASS
	5270	-0.08	≤10.73	/	/	/	PASS
	5310	0.80	≤10.73	/	/	/	PASS
	5510	2.31	≤10.73	/	/	/	PASS
	5550	0.77	≤10.73	/	/	/	PASS
	5670	0.22	≤10.73	/	/	/	PASS
	5710 UNII-2C	0.83	≤10.73	/	/	/	PASS
	5710 UNII-3	-4.11	/	≤29.73	/	/	PASS
	5755	-2.84	/	≤29.73	/	/	PASS
11AC80SISO	5795	-3.29	/	≤29.73	/	/	PASS
	5210	-4.80	≤10.73	/	1.47	≤9.73	PASS
	5290	-5.03	≤10.73	/	/	/	PASS
	5530	-2.85	≤10.73	/	/	/	PASS
	5610	-4.41	≤10.73	/	/	/	PASS
	5690 UNII-2C	-1.83	≤10.73	/	/	/	PASS
	5690 UNII-3	-7.90	/	≤29.73	/	/	PASS
	5775	-7.18	/	≤29.73	/	/	PASS

Note: 1.The Result and Limit Unit is dBm/500 kHz in the band 5.725–5.85 GHz.

2.The Duty Cycle Factor and RBW Factor is compensated in the graph.



Test Graphs



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11A_Ant1_5280



11A_Ant1_5320



11A_Ant1_5500

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