



CTC Laboratories, Inc.

1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

Tel: +86-755- 27521059 Fax: +86-755- 27521011 [Http://www.sz-ctc.org.cn](http://www.sz-ctc.org.cn)

Appendix for 5G WIFI

Applicant: Shenzhen Ntmer Technology Co., Ltd.

**Address: 2109, Hivac Building, NO.2, Keji South 8th Road, High
Tech Zone Community, Yuehai Subdistrict, Nanshan District,
Shenzhen, China**

Product Name: Portable Computer

Model: TW220

FCC ID: 2A76QTW220

TABLE OF CONTENTS

Appendix A1: Emission Bandwidth 3

Appendix A2: Occupied channel bandwidth..... 68

Appendix A3: Min emission bandwidth 132

Appendix B: Maximum conducted output power..... 147

Appendix C: Maximum power spectral density 160

Appendix D: Frequency Stability 305

Appendix E: Duty Cycle 316

Appendix A1: Emission Bandwidth

Test Result

Test Mode	Antenna	Channel	RU Configuration	26db EBW [MHz]	FL[MHz]	FH[MHz]	Verdict
802.11a	Ant1	5180	/	19.240	5170.280	5189.520	PASS
	Ant2	5180	/	18.960	5170.440	5189.400	PASS
	Ant1	5200	/	19.120	5190.320	5209.440	PASS
	Ant2	5200	/	19.040	5190.400	5209.440	PASS
	Ant1	5240	/	18.840	5230.440	5249.280	PASS
	Ant2	5240	/	19.200	5230.400	5249.600	PASS
	Ant1	5260	/	19.120	5250.280	5269.400	PASS
	Ant2	5260	/	19.320	5250.200	5269.520	PASS
	Ant1	5280	/	19.000	5270.360	5289.360	PASS
	Ant2	5280	/	19.240	5270.200	5289.440	PASS
	Ant1	5320	/	19.240	5310.280	5329.520	PASS
	Ant2	5320	/	19.120	5310.320	5329.440	PASS
	Ant1	5500	/	19.120	5490.280	5509.400	PASS
	Ant2	5500	/	19.280	5490.240	5509.520	PASS
	Ant1	5580	/	18.880	5570.400	5589.280	PASS
	Ant2	5580	/	19.040	5570.360	5589.400	PASS
	Ant1	5700	/	19.080	5690.240	5709.320	PASS
	Ant2	5700	/	19.240	5690.320	5709.560	PASS
	Ant1	5745	/	19.080	5735.280	5754.360	PASS
	Ant2	5745	/	18.960	5735.360	5754.320	PASS
	Ant1	5785	/	19.200	5775.280	5794.480	PASS
	Ant2	5785	/	19.400	5775.280	5794.680	PASS
	Ant1	5825	/	19.200	5815.240	5834.440	PASS
	Ant2	5825	/	19.160	5815.200	5834.360	PASS
802.11n(HT20)	Ant1	5180	/	20.400	5169.840	5190.240	PASS
	Ant2	5180	/	20.360	5169.880	5190.240	PASS
	Ant1	5200	/	20.480	5189.760	5210.240	PASS
	Ant2	5200	/	20.240	5189.800	5210.040	PASS
	Ant1	5240	/	20.640	5229.680	5250.320	PASS
	Ant2	5240	/	20.120	5229.960	5250.080	PASS
	Ant1	5260	/	20.320	5249.880	5270.200	PASS
	Ant2	5260	/	20.120	5249.840	5269.960	PASS
	Ant1	5280	/	20.240	5269.800	5290.040	PASS
	Ant2	5280	/	20.400	5269.800	5290.200	PASS
	Ant1	5320	/	20.120	5309.800	5329.920	PASS
	Ant2	5320	/	20.320	5309.840	5330.160	PASS
	Ant1	5500	/	20.040	5489.920	5509.960	PASS
	Ant2	5500	/	20.160	5489.960	5510.120	PASS
	Ant1	5580	/	20.480	5569.680	5590.160	PASS
	Ant2	5580	/	20.160	5569.840	5590.000	PASS
	Ant1	5700	/	20.200	5689.880	5710.080	PASS

	Ant2	5700	/	20.120	5689.880	5710.000	PASS
	Ant1	5745	/	20.400	5734.760	5755.160	PASS
	Ant2	5745	/	20.280	5734.880	5755.160	PASS
	Ant1	5785	/	20.240	5774.840	5795.080	PASS
	Ant2	5785	/	20.080	5774.840	5794.920	PASS
	Ant1	5825	/	20.440	5814.680	5835.120	PASS
	Ant2	5825	/	20.040	5814.920	5834.960	PASS
802.11n(HT40)	Ant1	5190	/	39.920	5170.000	5209.920	PASS
	Ant2	5190	/	39.280	5170.320	5209.600	PASS
	Ant1	5230	/	39.600	5210.080	5249.680	PASS
	Ant2	5230	/	39.440	5210.240	5249.680	PASS
	Ant1	5270	/	39.600	5250.080	5289.680	PASS
	Ant2	5270	/	39.760	5250.320	5290.080	PASS
	Ant1	5310	/	39.520	5290.240	5329.760	PASS
	Ant2	5310	/	39.200	5290.400	5329.600	PASS
	Ant1	5510	/	39.680	5490.160	5529.840	PASS
	Ant2	5510	/	39.360	5490.320	5529.680	PASS
	Ant1	5550	/	39.680	5530.160	5569.840	PASS
	Ant2	5550	/	39.520	5530.320	5569.840	PASS
	Ant1	5670	/	39.600	5650.160	5689.760	PASS
	Ant2	5670	/	39.680	5650.080	5689.760	PASS
	Ant1	5755	/	39.520	5735.240	5774.760	PASS
	Ant2	5755	/	39.840	5735.080	5774.920	PASS
	Ant1	5795	/	40.080	5775.000	5815.080	PASS
	Ant2	5795	/	39.360	5775.400	5814.760	PASS
802.11ac(VHT20)	Ant1	5180	/	20.080	5169.920	5190.000	PASS
	Ant2	5180	/	20.240	5169.880	5190.120	PASS
	Ant1	5200	/	20.400	5189.720	5210.120	PASS
	Ant2	5200	/	20.280	5189.760	5210.040	PASS
	Ant1	5240	/	20.520	5229.640	5250.160	PASS
	Ant2	5240	/	19.920	5230.000	5249.920	PASS
	Ant1	5260	/	20.520	5249.600	5270.120	PASS
	Ant2	5260	/	20.200	5249.880	5270.080	PASS
	Ant1	5280	/	20.600	5269.600	5290.200	PASS
	Ant2	5280	/	19.960	5270.040	5290.000	PASS
	Ant1	5320	/	20.480	5309.800	5330.280	PASS
	Ant2	5320	/	20.080	5310.000	5330.080	PASS
	Ant1	5500	/	20.080	5489.920	5510.000	PASS
	Ant2	5500	/	20.440	5489.600	5510.040	PASS
	Ant1	5580	/	20.640	5569.640	5590.280	PASS
	Ant2	5580	/	20.080	5569.920	5590.000	PASS
	Ant1	5700	/	20.120	5689.920	5710.040	PASS
	Ant2	5700	/	20.240	5689.840	5710.080	PASS
	Ant1	5745	/	20.080	5734.920	5755.000	PASS
	Ant2	5745	/	20.000	5734.920	5754.920	PASS
	Ant1	5785	/	20.200	5774.800	5795.000	PASS

	Ant2	5785	/	20.000	5775.000	5795.000	PASS
	Ant1	5825	/	20.160	5814.880	5835.040	PASS
	Ant2	5825	/	20.080	5815.000	5835.080	PASS
802.11ac(VHT40)	Ant1	5190	/	40.400	5169.680	5210.080	PASS
	Ant2	5190	/	39.440	5170.320	5209.760	PASS
	Ant1	5230	/	39.760	5210.160	5249.920	PASS
	Ant2	5230	/	39.520	5210.160	5249.680	PASS
	Ant1	5270	/	40.160	5250.080	5290.240	PASS
	Ant2	5270	/	39.760	5250.080	5289.840	PASS
	Ant1	5310	/	39.760	5290.080	5329.840	PASS
	Ant2	5310	/	39.440	5290.400	5329.840	PASS
	Ant1	5510	/	39.840	5490.080	5529.920	PASS
	Ant2	5510	/	39.280	5490.320	5529.600	PASS
	Ant1	5550	/	40.080	5530.000	5570.080	PASS
	Ant2	5550	/	39.520	5530.080	5569.600	PASS
	Ant1	5670	/	39.760	5650.080	5689.840	PASS
	Ant2	5670	/	39.600	5650.160	5689.760	PASS
	Ant1	5755	/	39.760	5735.080	5774.840	PASS
	Ant2	5755	/	39.600	5735.160	5774.760	PASS
	Ant1	5795	/	39.840	5775.080	5814.920	PASS
	Ant2	5795	/	39.760	5775.080	5814.840	PASS
802.11ac(VHT80)	Ant1	5210	/	82.240	5169.200	5251.440	PASS
	Ant2	5210	/	81.280	5169.360	5250.640	PASS
	Ant1	5290	/	81.920	5249.040	5330.960	PASS
	Ant2	5290	/	80.800	5249.520	5330.320	PASS
	Ant1	5530	/	81.760	5489.040	5570.800	PASS
	Ant2	5530	/	81.920	5488.880	5570.800	PASS
	Ant1	5610	/	81.760	5569.040	5650.800	PASS
	Ant2	5610	/	80.960	5569.360	5650.320	PASS
	Ant1	5775	/	81.600	5734.360	5815.960	PASS
	Ant2	5775	/	81.440	5734.360	5815.800	PASS
802.11ac(VHT160)	Ant1	5250	/	165.120	5167.760	5332.880	PASS
	Ant2	5250	/	163.840	5167.760	5331.600	PASS
	Ant1	5570	/	164.480	5488.080	5652.560	PASS
	Ant2	5570	/	163.840	5488.080	5651.920	PASS
802.11ax(HE20)	Ant1	5180	242/61	21.080	5169.400	5190.480	PASS
	Ant2	5180	242/61	20.880	5169.640	5190.520	PASS
	Ant1	5200	242/61	20.960	5189.560	5210.520	PASS
	Ant2	5200	242/61	20.680	5189.600	5210.280	PASS
	Ant1	5240	242/61	20.960	5229.520	5250.480	PASS
	Ant2	5240	242/61	20.760	5229.760	5250.520	PASS
	Ant1	5260	242/61	21.080	5249.360	5270.440	PASS
	Ant2	5260	242/61	20.760	5249.680	5270.440	PASS
	Ant1	5280	242/61	21.200	5269.400	5290.600	PASS
	Ant2	5280	242/61	20.720	5269.720	5290.440	PASS
	Ant1	5320	242/61	21.040	5309.600	5330.640	PASS

	Ant2	5320	242/61	20.800	5309.680	5330.480	PASS
	Ant1	5500	242/61	20.880	5489.600	5510.480	PASS
	Ant2	5500	242/61	20.720	5489.640	5510.360	PASS
	Ant1	5580	242/61	20.720	5569.640	5590.360	PASS
	Ant2	5580	242/61	20.720	5569.560	5590.280	PASS
	Ant1	5700	242/61	20.880	5689.560	5710.440	PASS
	Ant2	5700	242/61	20.800	5689.560	5710.360	PASS
	Ant1	5745	242/61	20.800	5734.560	5755.360	PASS
	Ant2	5745	242/61	21.040	5734.520	5755.560	PASS
	Ant1	5785	242/61	20.880	5774.480	5795.360	PASS
	Ant2	5785	242/61	21.000	5774.440	5795.440	PASS
	Ant1	5825	242/61	20.880	5814.480	5835.360	PASS
	Ant2	5825	242/61	20.720	5814.520	5835.240	PASS
802.11ax(HE40)	Ant1	5190	484/65	40.560	5169.760	5210.320	PASS
	Ant2	5190	484/65	40.400	5169.920	5210.320	PASS
	Ant1	5230	484/65	40.240	5209.920	5250.160	PASS
	Ant2	5230	484/65	40.320	5209.920	5250.240	PASS
	Ant1	5270	484/65	40.720	5249.600	5290.320	PASS
	Ant2	5270	484/65	40.800	5249.600	5290.400	PASS
	Ant1	5310	484/65	40.480	5289.680	5330.160	PASS
	Ant2	5310	484/65	40.160	5290.000	5330.160	PASS
	Ant1	5510	484/65	40.240	5489.920	5530.160	PASS
	Ant2	5510	484/65	40.320	5489.840	5530.160	PASS
	Ant1	5550	484/65	40.320	5530.000	5570.320	PASS
	Ant2	5550	484/65	40.160	5529.920	5570.080	PASS
	Ant1	5670	484/65	40.480	5649.840	5690.320	PASS
	Ant2	5670	484/65	40.240	5649.760	5690.000	PASS
	Ant1	5755	484/65	40.320	5734.840	5775.160	PASS
	Ant2	5755	484/65	40.160	5734.840	5775.000	PASS
	Ant1	5795	484/65	40.320	5774.840	5815.160	PASS
	Ant2	5795	484/65	40.320	5774.760	5815.080	PASS

802.11ax(HE80)	Ant1	5210	996/67	81.760	5168.720	5250.480	PASS
	Ant2	5210	996/67	82.080	5168.880	5250.960	PASS
	Ant1	5290	996/67	81.280	5249.520	5330.800	PASS
	Ant2	5290	996/67	81.760	5249.360	5331.120	PASS
	Ant1	5530	996/67	82.880	5488.560	5571.440	PASS
	Ant2	5530	996/67	82.080	5489.040	5571.120	PASS
	Ant1	5610	996/67	82.080	5568.880	5650.960	PASS
	Ant2	5610	996/67	81.920	5568.880	5650.800	PASS
	Ant1	5775	996/67	82.240	5733.720	5815.960	PASS
	Ant2	5775	996/67	81.760	5734.200	5815.960	PASS
802.11ax(HE160)	Ant1	5250	996 * 2/68	163.200	5168.400	5331.600	PASS
	Ant2	5250	996 * 2/68	165.120	5167.440	5332.560	PASS
	Ant1	5570	996 * 2/68	165.120	5487.760	5652.880	PASS
	Ant2	5570	996 * 2/68	163.520	5488.080	5651.600	PASS

Test Graphs

802.11a_Ant1_5180



802.11a_Ant2_5180



802.11a_Ant1_5200



802.11a_Ant2_5200



802.11a_Ant1_5240



802.11a_Ant2_5240



802.11a_Ant1_5260



802.11a_Ant2_5260



802.11a_Ant1_5280



802.11a_Ant2_5280



802.11a_Ant1_5320



802.11a_Ant2_5320



802.11a_Ant1_5500



802.11a_Ant2_5500



802.11a_Ant1_5580



802.11a_Ant2_5580



802.11a_Ant1_5700



802.11a_Ant2_5700



802.11a_Ant1_5745



802.11a_Ant2_5745



802.11a_Ant1_5785



802.11a_Ant2_5785



802.11a_Ant1_5825



802.11a_Ant2_5825



802.11n(HT20)_Ant1_5180



802.11n(HT20)_Ant2_5180



802.11n(HT20)_Ant1_5200



802.11n(HT20)_Ant2_5200



802.11n(HT20)_Ant1_5240



802.11n(HT20)_Ant2_5240



802.11n(HT20)_Ant1_5260



802.11n(HT20)_Ant2_5260



802.11n(HT20)_Ant1_5280



802.11n(HT20)_Ant2_5280



802.11n(HT20)_Ant1_5320



802.11n(HT20)_Ant2_5320



802.11n(HT20)_Ant1_5500



802.11n(HT20)_Ant2_5500



802.11n(HT20)_Ant1_5580



802.11n(HT20)_Ant2_5580



802.11n(HT20)_Ant1_5700



802.11n(HT20)_Ant2_5700



802.11n(HT20)_Ant1_5745



802.11n(HT20)_Ant2_5745



802.11n(HT20)_Ant1_5785



802.11n(HT20)_Ant2_5785



802.11n(HT20)_Ant1_5825



802.11n(HT20)_Ant2_5825



802.11n(HT40)_Ant1_5190



802.11n(HT40)_Ant2_5190



802.11n(HT40)_Ant1_5230



802.11n(HT40)_Ant2_5230



802.11n(HT40)_Ant1_5270



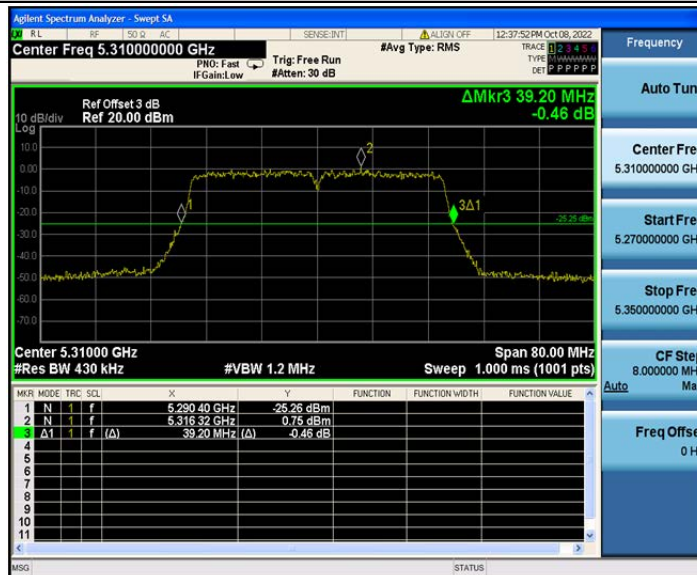
802.11n(HT40)_Ant2_5270



802.11n(HT40)_Ant1_5310



802.11n(HT40)_Ant2_5310



802.11n(HT40)_Ant1_5510



802.11n(HT40)_Ant2_5510



802.11n(HT40)_Ant1_5550



802.11n(HT40)_Ant2_5550



802.11n(HT40)_Ant1_5670



802.11n(HT40)_Ant2_5670



802.11n(HT40)_Ant1_5755



802.11n(HT40)_Ant2_5755



802.11n(HT40)_Ant1_5795



802.11n(HT40)_Ant2_5795



802.11ac(VHT20)_Ant1_5180



802.11ac(VHT20)_Ant2_5180



802.11ac(VHT20)_Ant1_5200



802.11ac(VHT20)_Ant2_5200



802.11ac(VHT20)_Ant1_5240



802.11ac(VHT20)_Ant2_5240



802.11ac(VHT20)_Ant1_5260



802.11ac(VHT20)_Ant2_5260



802.11ac(VHT20)_Ant1_5280



802.11ac(VHT20)_Ant2_5280



802.11ac(VHT20)_Ant1_5320



802.11ac(VHT20)_Ant2_5320



802.11ac(VHT20)_Ant1_5500