4.3 OUTPUT POWER MEASUREMENT

4.3.1 Test Limit

According to §15.407 (a)(1), 15.407(a)(2) and 15.407(a)(3) and RSS-247 section 6.2.1(1), section 6.2.2(1), section 6.2.3(1) and section 6.2.4(1)

UNII-1 :

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW(24 dBm) and The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10B, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz ,provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

UNII-2a and 2c:

the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. and The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 Log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

UNII-3:

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

UNII-1 Limit	☒ Antenna not exceed 6 dBi：24dBm (EIRP : 23dBm) ☐ Antenna with DG greater than 6 dBi： [Limit = 24 – (DG – 6)]
UNII-2a/2c Limit	☒ Antenna not exceed 6 dBi：24dBm (EIRP : 30dBm) ☐ Antenna with DG greater than 6 dBi： [Limit = 24 – (DG – 6)]
UNII-3 Limit	☒ Antenna not exceed 6 dBi：30dBm ☐ Antenna with DG greater than 6 dBi： [Limit = 30 – (DG – 6)]

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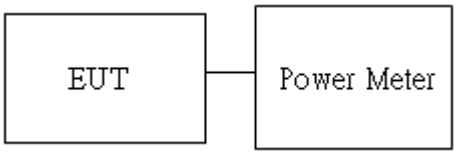
4.3.2 Test Procedure

Test method Refer as KDB 789033 D02 v01r03, Section E.3.b.

1. The EUT RF output connected to the power meter by RF cable.
2. Setting maximum power transmit of EUT.
3. The path loss was compensated to the results for each measurement.
4. Measure and record the result of Average output power. in the test report.

4.3.3 Test Setup



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4.3.4 Test Result

Conducted output power：

UNII-1													
Config	CH	Freq. (MHz)	Power Set		AV Power(dBm)		AV Total Power (dBm)	EIRP AV Total Power (dBm)	AV Total Power (W)	EIRP AV Total Power (W)	DG (dBi)	Limit (dBm)	EIRP Limit (dBm)
			chain0	chain1	chain0	chain1							
IEEE 802.11a Data rate: 6Mbps	36	5180	16	-	15.13	-	15.13	17.13	0.0326	0.0516	2	24	23
	44	5220	16	-	15.87	-	15.87	17.87	0.0386	0.0612			
	48	5240	16	-	15.93	-	15.93	17.93	0.0392	0.0621			
IEEE 802.11n HT20 Data rate: MCS8	36	5180	15	15	14.41	13.96	17.20	19.20	0.0525	0.0832			
	44	5220	15	15	14.86	14.30	17.60	19.60	0.0576	0.0912			
	48	5240	15	15	15.09	14.46	17.80	19.80	0.0602	0.0955			
IEEE 802.11n HT40 Data rate: MCS8	38	5190	13	13	12.68	11.85	15.29	17.29	0.0338	0.0536			
	46	5230	14	14	14.30	13.51	16.93	18.93	0.0493	0.0782			
IEEE 802.11ac VHT80 Data rate: MCS8	42	5210	8	8	9.12	7.04	11.22	13.22	0.0132	0.0210			

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UNII-2a													
Config	CH	Freq. (MHz)	Power Set		AV Power(dBm)		AV Total Power (dBm)	EIRP AV Total Power (dBm)	AV Total Power (W)	EIRP AV Total Power (W)	DG (dBi)	Limit (dBm)	EIRP Limit (dBm)
			chain0	chain1	chain0	chain1							
IEEE 802.11a Data rate: 6Mbps	52	5260	15	-	15.80	-	15.80	18.92	0.0380	0.0780	3.12	24	30
	56	5280	16	-	16.22	-	16.22	19.34	0.0419	0.0859			
	64	5320	16	-	16.26	-	16.26	19.38	0.0423	0.0867			
IEEE 802.11n HT20 Data rate: MCS8	52	5260	15	15	14.41	13.27	16.89	20.01	0.0489	0.1002			
	56	5280	15	15	14.30	13.39	16.88	20.00	0.0488	0.1000			
	64	5320	14	14	14.65	13.46	17.11	20.23	0.0514	0.1054			
IEEE 802.11n HT40 Data rate: MCS8	54	5270	14	14	14.31	13.42	16.90	20.02	0.0489	0.1004			
	62	5310	11	11	10.78	9.88	13.36	16.48	0.0217	0.0445			
IEEE 802.11ac VHT80 Data rate: MCS8	58	5290	8	8	9.39	7.48	11.55	14.67	0.0143	0.0293			

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UNII-2c													
Config	CH	Freq. (MHz)	Power Set		AV Power(dBm)		AV Total Power (dBm)	EIRP AV Total Power (dBm)	AV Total Power (W)	EIRP AV Total Power (W)	DG (dBi)	Limit (dBm)	EIRP Limit (dBm)
			chain0	chain1	chain0	chain1							
IEEE 802.11a Data rate: 6Mbps	100	5500	14	-	15.90	-	15.90	19.02	0.0389	0.0798	3.12	24	24
	116	5580	14	-	14.90	-	14.90	18.02	0.0309	0.0634			
	140	5700	15	-	16.09	-	16.09	19.21	0.0406	0.0834			
	144	5720	12	-	11.21	-	11.21	14.33	0.0132	0.0271			
IEEE 802.11n HT20 Data rate: MCS8	100	5500	11	11	12.02	10.67	14.41	17.53	0.0276	0.0566			
	116	5580	15	15	14.79	14.21	17.52	20.64	0.0565	0.1159			
	140	5700	11	11	12.25	10.56	14.50	17.62	0.0282	0.0578			
	144	5720	12	12	10.91	9.84	13.42	16.54	0.0220	0.0451			
IEEE 802.11n HT40 Data rate: MCS8	102	5510	8	8	8.44	7.18	10.86	13.98	0.0122	0.0250			
	110	5550	14	14	13.61	12.88	16.27	19.39	0.0423	0.0869			
	134	5670	12	12	14.06	11.57	16.00	19.12	0.0398	0.0816			
	142	5710	10	10	9.51	8.25	11.93	15.05	0.0156	0.0320			
IEEE 802.11ac VHT80 Data rate: MCS8	106	5530	8	8	11.62	9.13	13.57	16.69	0.0227	0.0466			
	138	5690	11	11	9.69	8.62	12.20	15.32	0.0166	0.0341			

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UNII-3												
Config	CH	Freq. (MHz)	Power Set		AV Power(dBm)		AV Total Power (dBm)	EIRP AV Total Power (dBm)	AV Total Power (W)	EIRP AV Total Power (W)	DG (dBi)	Limit (dBm)
			chain0	chain1	chain0	chain1						
IEEE 802.11a Data rate: 6Mbps	144	5720	12	-	3.87	-	3.87	6.87	0.0024	0.0049	3.12	30
	149	5745	15	-	16.14	-	16.14	19.14	0.0411	0.0820		
	157	5785	15	-	16.17	-	16.17	19.17	0.0414	0.0826		
	165	5825	17	-	17.33	-	17.33	20.33	0.0541	0.1079		
IEEE 802.11n HT20 Data rate: MCS0	144	5720	12	12	3.84	2.84	6.38	9.26	0.0043	0.0084		
	149	5745	15	15	14.71	13.86	17.32	20.20	0.0539	0.1047		
	157	5785	15	15	14.39	13.62	17.03	19.91	0.0505	0.0979		
	165	5825	15	15	13.63	12.40	16.07	18.95	0.0405	0.0785		
IEEE 802.11n HT40 Data rate: MCS0	142	5710	10	10	-3.59	-4.01	-0.79	1.88	0.0008	0.0015		
	151	5755	14	14	14.00	13.11	16.59	19.25	0.0456	0.0841		
	159	5795	14	14	14.21	12.69	16.52	19.19	0.0449	0.0830		
IEEE 802.11ac VHT80 Data rate: MCS0	138	5690	11	11	-4.27	-5.39	-1.78	-0.62	0.0007	0.0009		
	155	5775	10	10	11.30	10.42	13.90	15.05	0.0245	0.0320		

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4.4 POWER SPECTRAL DENSITY

4.4.1 Test Limit

According to §15.407 (a)(1), 15.407(a)(2) and 15.407(a)(3) and RSS-247 section 6.2.1(1), section 6.2.2(1), section 6.2.3(1) and section 6.2.4(1)

UNII-1 :

FCC: The maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

IC: The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

UNII-2a and 2c:

The maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

UNII-3:

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.i.

UNII-1 Limit	☒ Antenna not exceed 6 dBi：11 dBm (EIRP : 10 dBm) ☐ Antenna with DG greater than 6 dBi： [Limit = 11 – (DG – 6)]
UNII-2a Limit	☒ Antenna not exceed 6 dBi：11 dBm ☐ Antenna with DG greater than 6 dBi： [Limit = 11 – (DG – 6)]
UNII-2c Limit	☐ Antenna not exceed 6 dBi：11 dBm ☒ Antenna with DG greater than 6 dBi： [Limit = 11 – (DG – 6)]
UNII-3 Limit	☒ Antenna not exceed 6 dBi：30 dBm ☐ Antenna with DG greater than 6 dBi： [Limit = 30 – (DG – 6)]

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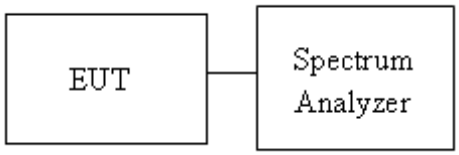
4.4.2 Test Procedure

Test method Refer as KDB 789033 D02 v01r03, Section F

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT
3. UNII-1, UNII-2a and UNII-2c, SA set RBW = 1MHz, VBW = 3MHz and Detector = RMS, to measurement Power Density.
4. UNII-3, SA set RBW = 500kHz, VBW = 2MHz and Detector = RMS, to measurement Power Density
5. The path loss and Duty Factor were compensated to the results for each measurement by SA.
6. Mark the maximum level.
7. Measure and record the result of power spectral density. in the test report.

4.4.3 Test Setup



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4.4.4 Test Result

UNII-1 5150-5250 MHz							
Test mode: IEEE 802.11a mode							
Channel	**Frequency (MHz)**	**Chain 0 PPSD (dBm)**	**Chain 1 PPSD (dBm)**	**Total PSSD (dBm)**	**EIRP Total PSSD (dBm)**	**Limit (dBm)**	**EIRP Limit (dBm)**
Low	5180	3.19	-	3.19	6.31	11	10
Mid	5220	3.97	-	3.97	7.09		
High	5240	4.16	-	4.16	7.28		
Test mode: IEEE 802.11n HT20 mode							
Channel	**Frequency (MHz)**	**Chain 0 PPSD (dBm)**	**Chain 1 PPSD (dBm)**	**Total PSSD (dBm)**	**EIRP Total PSSD (dBm)**	**Limit (dBm)**	**EIRP Limit (dBm)**
Low	5180	0.37	2.28	4.44	7.5595	11	10
Mid	5220	1.07	2.73	4.99	8.1091		
High	5240	1.36	1.85	4.62	7.7422		
Test mode: IEEE 802.11n HT40 mode							
Channel	**Frequency (MHz)**	**Chain 0 PPSD (dBm)**	**Chain 1 PPSD (dBm)**	**Total PSSD (dBm)**	**EIRP Total PSSD (dBm)**	**Limit (dBm)**	**EIRP Limit (dBm)**
Low	5190	-1.48	-4.40	0.31	3.4312	11	10
High	5230	-2.10	-1.65	1.14	4.2611		
Test mode: IEEE 802.11ac VHT80 mode							
Channel	**Frequency (MHz)**	**Chain 0 PPSD (dBm)**	**Chain 1 PPSD (dBm)**	**Total PSSD (dBm)**	**EIRP Total PSSD (dBm)**	**Limit (dBm)**	**EIRP Limit (dBm)**
Mid	5210	-8.72	-11.04	-6.72	-3.5966	11	10

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UNII-2a 5250-5350 MHz					
Test mode: IEEE 802.11a mode					
Channel	**Frequency (MHz)**	**Chain 0 PPSD (dBm)**	**Chain 1 PPSD (dBm)**	**Total PSSD (dBm)**	**Limit (dBm)**
Low	5260	3.61	-	3.61	11
Mid	5280	4.62	-	4.62	
High	5320	4.63	-	4.63	
Test mode: IEEE 802.11n HT20 mode					
Channel	**Frequency (MHz)**	**Chain 0 PPSD (dBm)**	**Chain 1 PPSD (dBm)**	**Total PSSD (dBm)**	**Limit (dBm)**
Low	5260	1.61	2.66	5.18	11
Mid	5280	1.67	2.70	5.23	
High	5320	3.59	0.35	5.28	
Test mode: IEEE 802.11n HT40 mode					
Channel	**Frequency (MHz)**	**Chain 0 PPSD (dBm)**	**Chain 1 PPSD (dBm)**	**Total PSSD (dBm)**	**Limit (dBm)**
Low	5270	-1.91	-0.91	1.63	11
High	5310	-2.07	-5.70	-0.51	
Test mode: IEEE 802.11ac VHT80 mode					
Channel	**Frequency (MHz)**	**Chain 0 PPSD (dBm)**	**Chain 1 PPSD (dBm)**	**Total PSSD (dBm)**	**Limit (dBm)**
Mid	5290	-9.22	-9.22	-6.21	11

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UNII-2c 5470-5725 MHz					
Test mode: IEEE 802.11a mode					
Channel	**Frequency (MHz)**	**Chain 0 PPSD (dBm)**	**Chain 1 PPSD (dBm)**	**Total PSSD (dBm)**	**Limit (dBm)**
Low	5500	3.61	-	3.61	10.87
Mid	5580	2.84	-	2.84	
High	5700	4.48	-	4.48	
Cross	5720	0.78	-	0.78	
Test mode: IEEE 802.11n HT20 mode					
Channel	**Frequency (MHz)**	**Chain 0 PPSD (dBm)**	**Chain 1 PPSD (dBm)**	**Total PSSD (dBm)**	**Limit (dBm)**
Low	5500	2.34	-1.44	3.86	10.87
Mid	5580	3.89	3.49	6.70	
High	5700	1.88	-2.01	3.37	
Cross	5720	0.53	0.65	3.60	
Test mode: IEEE 802.11n HT40 mode					
Channel	**Frequency (MHz)**	**Chain 0 PPSD (dBm)**	**Chain 1 PPSD (dBm)**	**Total PSSD (dBm)**	**Limit (dBm)**
Low	5510	-6.19	-8.13	-4.04	10.87
High	5670	-3.24	-3.09	-0.15	
Cross	5710	-4.44	-5.85	-2.08	
Test mode: IEEE 802.11ac VHT80 mode					
Channel	**Frequency (MHz)**	**Chain 0 PPSD (dBm)**	**Chain 1 PPSD (dBm)**	**Total PSSD (dBm)**	**Limit (dBm)**
Mid	5530	-9.64	-10.61	-7.09	10.87
Cross	5690	-7.59	-8.24	-4.89	

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UNII-3 5725-5825 MHz					
Test mode: IEEE 802.11a mode					
Channel	**Frequency (MHz)**	**Chain 0 PPSD (dBm)**	**Chain 1 PPSD (dBm)**	**Total PSSD (dBm)**	**Limit (dBm)**
Low	5745	9.84	-	9.84	30
Mid	5785	9.97	-	9.97	
High	5825	10.25	-	10.25	
Cross	5720	-1.43	-	-1.43	
Test mode: IEEE 802.11n HT20 mode					
Channel	**Frequency (MHz)**	**Chain 0 PPSD (dBm)**	**Chain 1 PPSD (dBm)**	**Total PSSD (dBm)**	**Limit (dBm)**
Low	5745	9.00	8.59	11.81	30
Mid	5785	6.88	9.20	11.20	
High	5825	5.31	5.07	8.20	
Cross	5720	-3.39	-4.37	-0.84	
Test mode: IEEE 802.11n HT40 mode					
Channel	**Frequency (MHz)**	**Chain 0 PPSD (dBm)**	**Chain 1 PPSD (dBm)**	**Total PSSD (dBm)**	**Limit (dBm)**
Low	5755	4.38	2.87	6.70	30
High	5795	3.76	6.68	8.47	
Cross	5710	-9.73	-11.23	-7.41	
Test mode: IEEE 802.11ac VHT80 mode					
Channel	**Frequency (MHz)**	**Chain 0 PPSD (dBm)**	**Chain 1 PPSD (dBm)**	**Total PSSD (dBm)**	**Limit (dBm)**
Mid	5690	-12.27	-10.20	-8.10	30
Mid	5775	-8.88	-9.74	-6.28	

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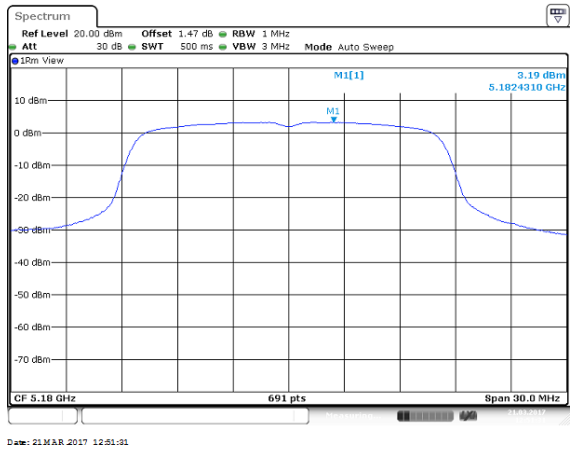
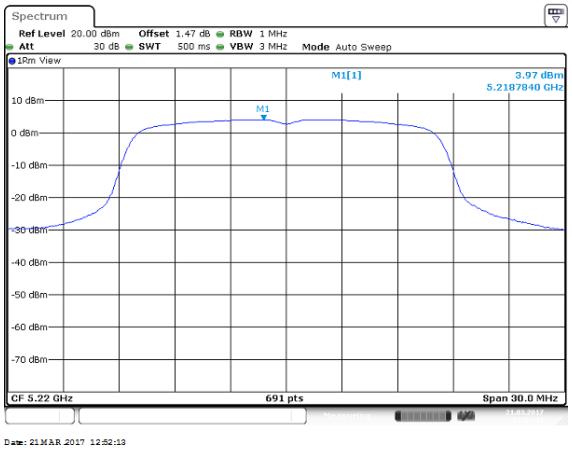
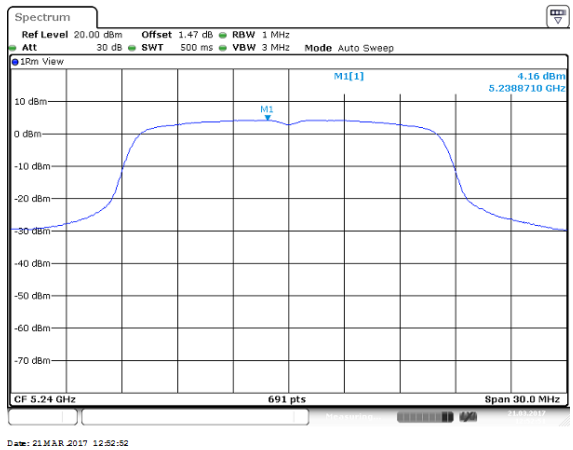
Test Data

UNII-1 IEEE 802.11a mode- chain 0	
Low CH	**Mid CH**
	
High CH	
	

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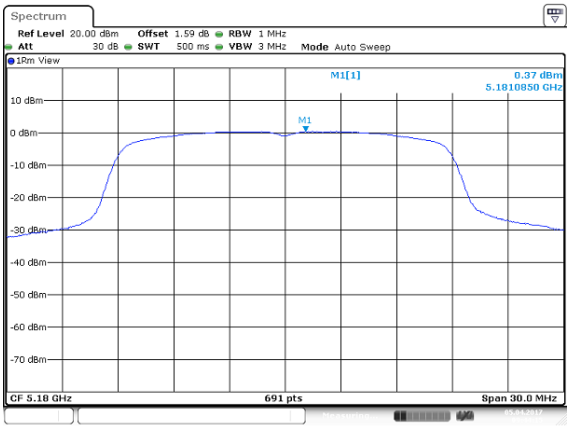
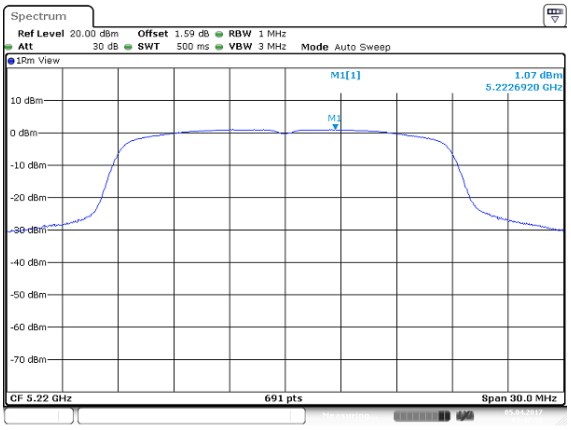
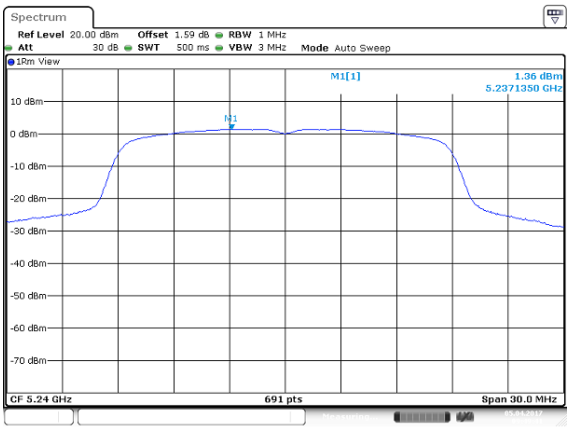
UNII-1 IEEE 802.11n HT20 mode- chain 0	
Low CH	**Mid CH**
	
High CH	
	

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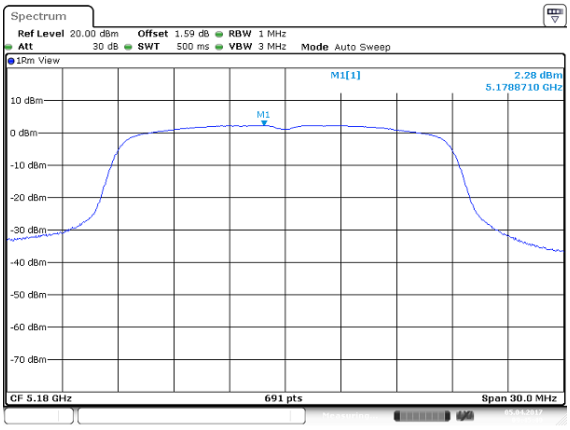
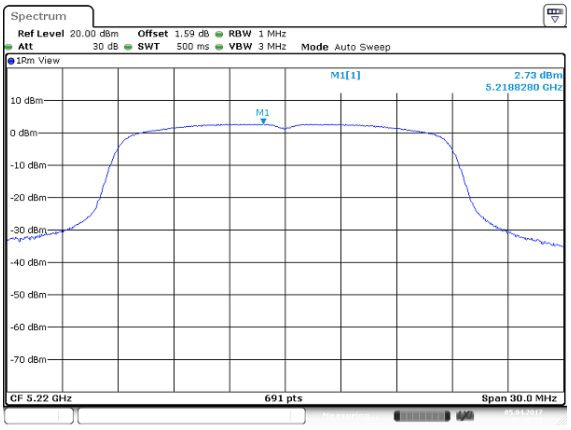
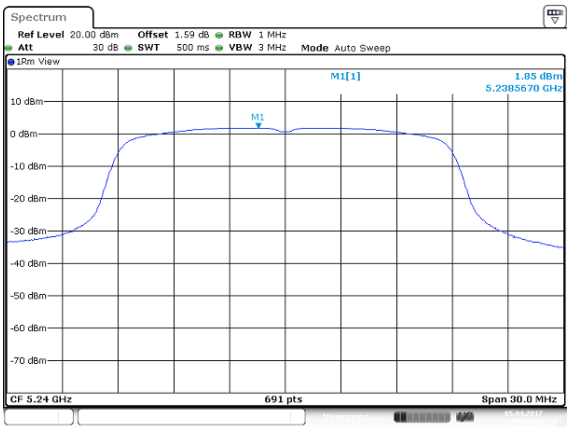
UNII-1 IEEE 802.11n HT20 mode- chain 1	
Low CH	**Mid CH**
	
High CH	
	

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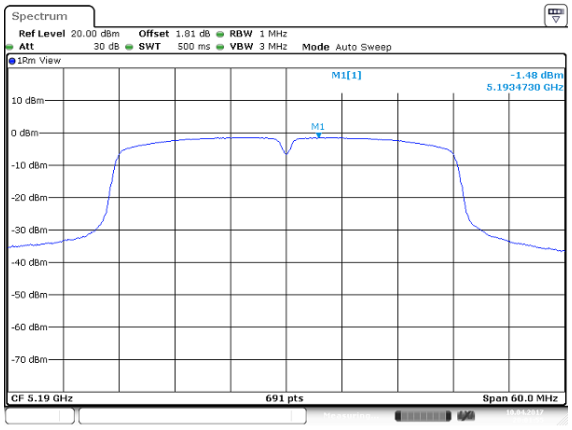
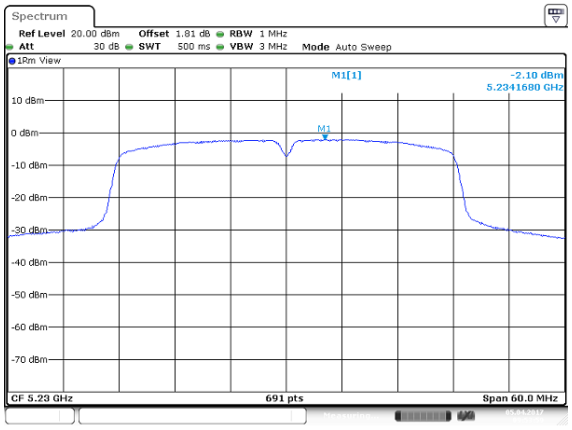
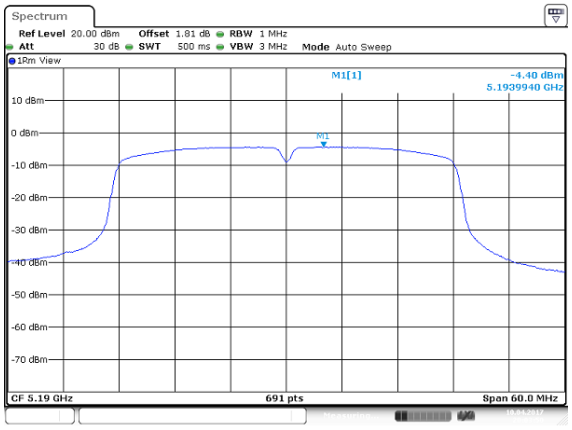
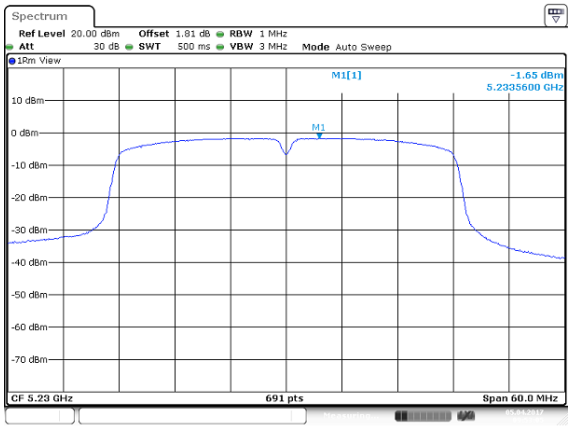
UNII-1 IEEE 802.11n HT40 mode- chain 0	
Low CH	**High CH**
	

UNII-1 IEEE 802.11n HT40 mode- chain 1	
Low CH	**High CH**
	

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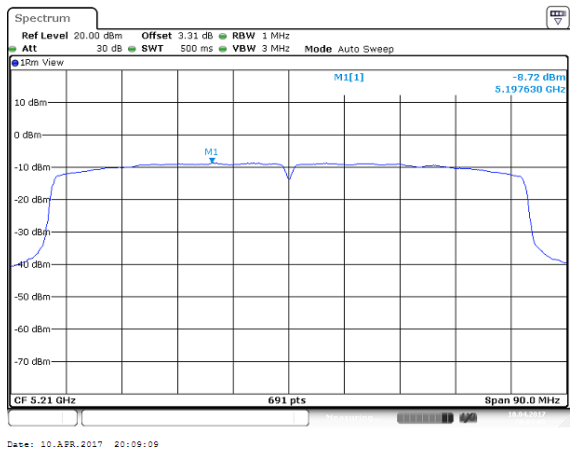
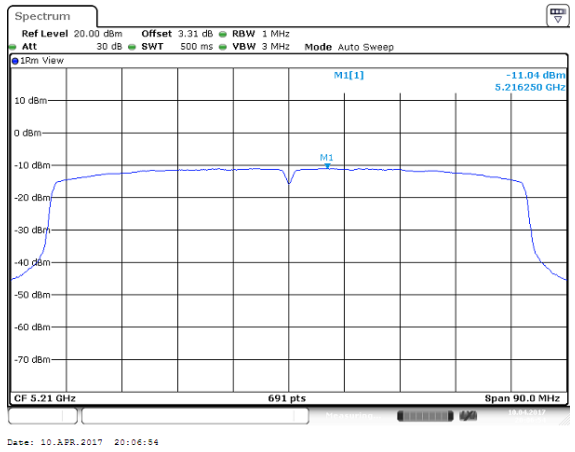
UNII-1 IEEE 802.11ac VHT80 mode- chain 0

Mid CH



UNII-1 IEEE 802.11ac VHT80 mode- chain 1

Mid CH



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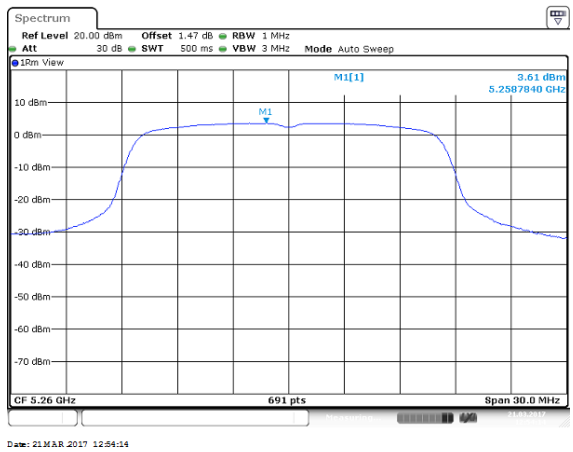
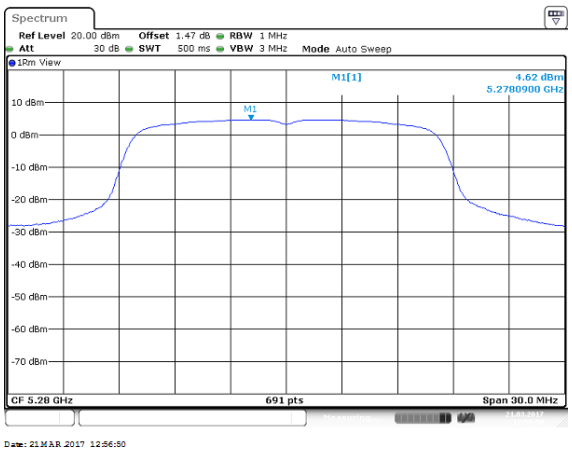
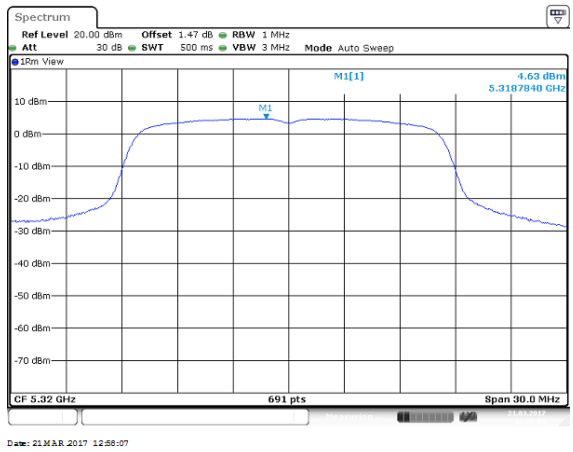
Test Data

UNII-2a IEEE 802.11a mode- chain 0	
Low CH	**Mid CH**
	
High CH	
	

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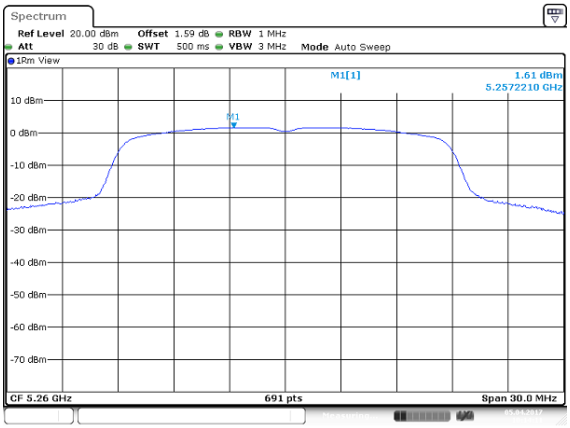
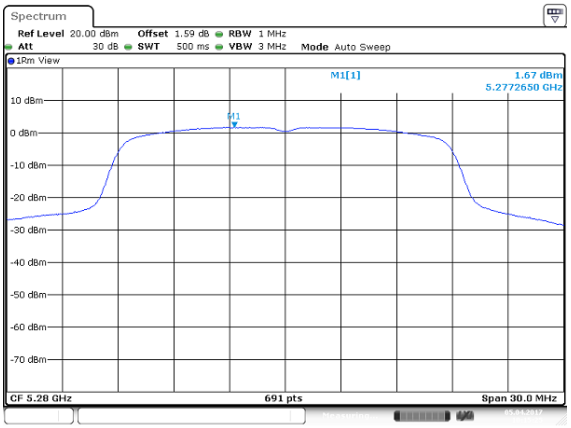
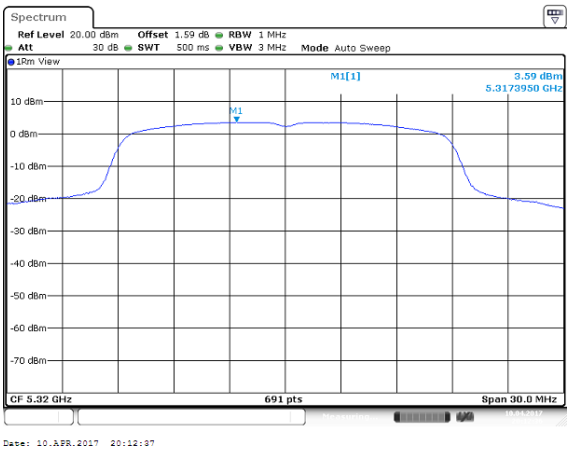
UNII-2a IEEE 802.11n HT20 mode- chain 0	
Low CH	**Mid CH**
	
High CH	
	

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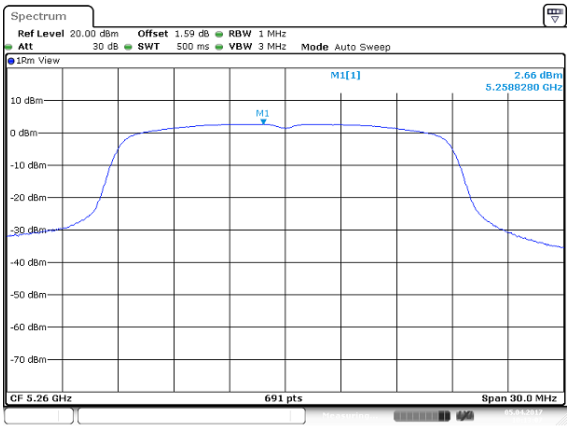
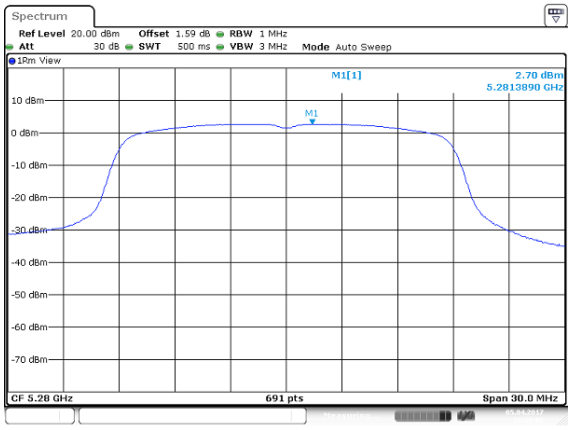
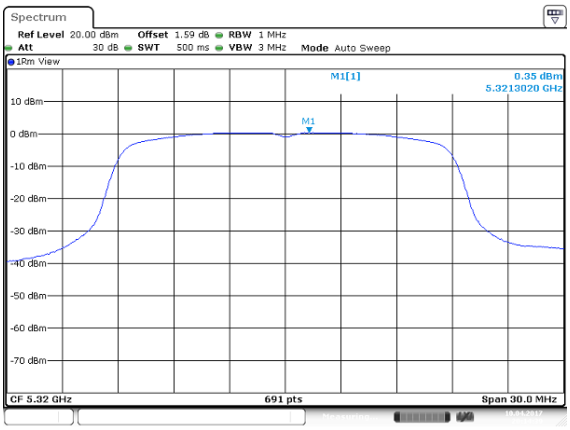
UNII-2a IEEE 802.11n HT20 mode- chain 1	
Low CH	**Mid CH**
	
High CH	
	

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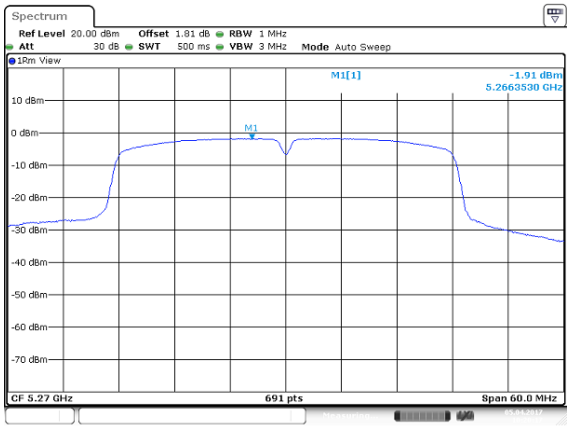
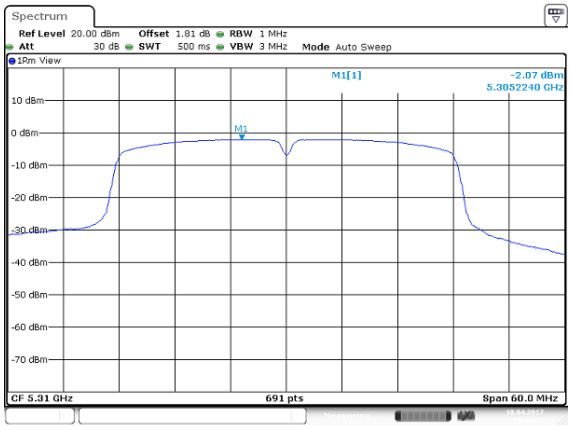
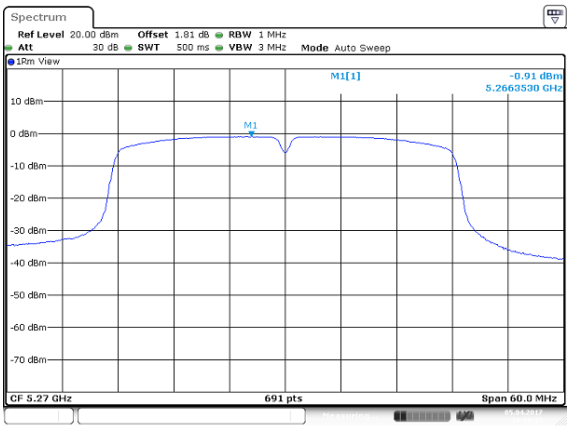
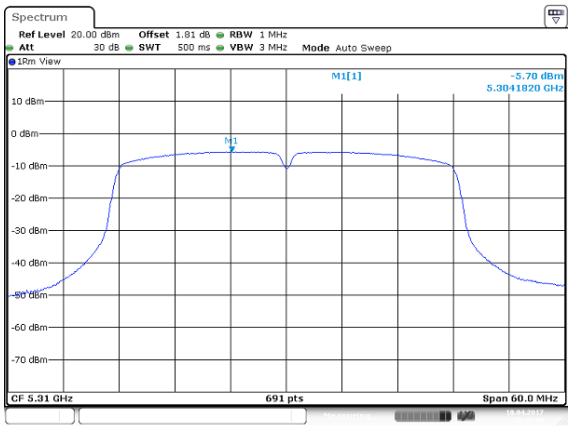
UNII-2a IEEE 802.11n HT40 mode- chain 0	
Low CH	**High CH**
	

UNII-2a IEEE 802.11n HT40 mode- chain 1	
Low CH	**High CH**
	

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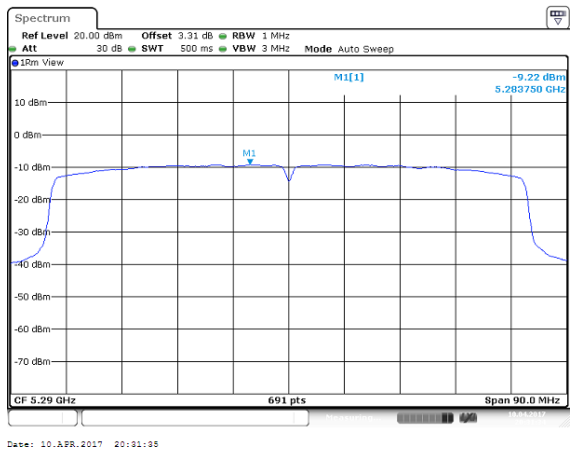
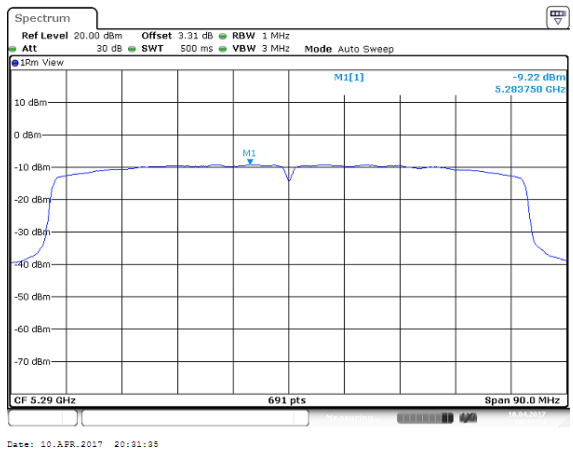
UNII-2a IEEE 802.11ac VHT80 mode- chain 0
Mid CH



UNII-2a IEEE 802.11ac VHT80 mode- chain 1
Mid CH



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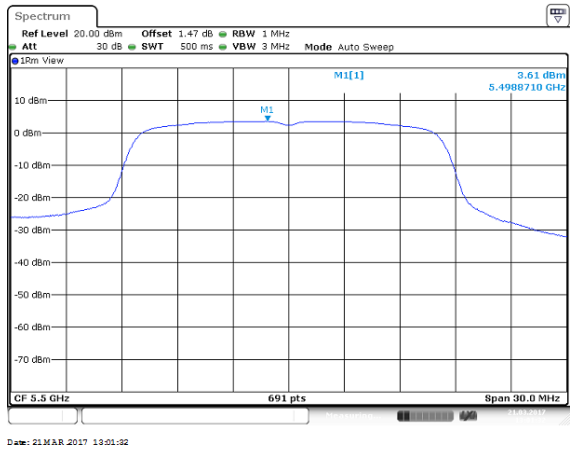
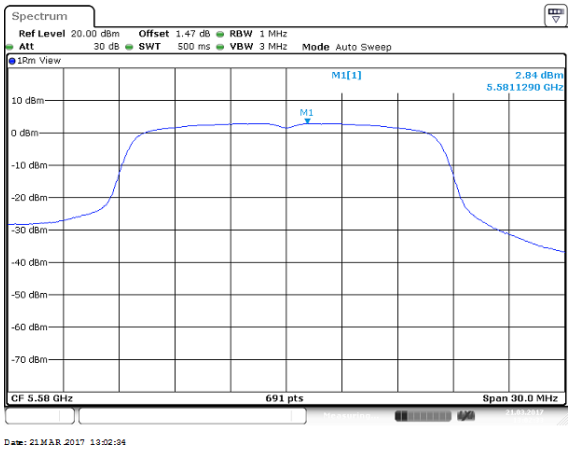
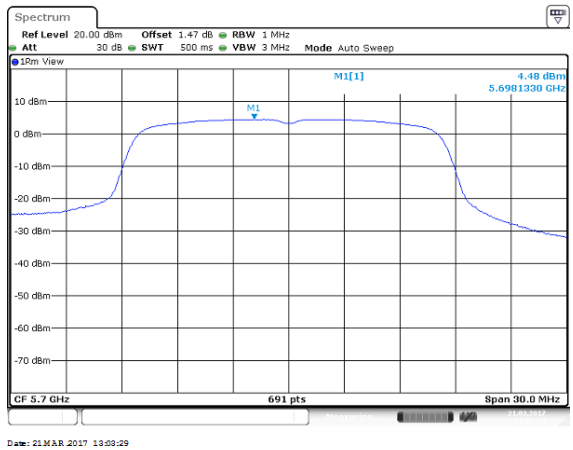
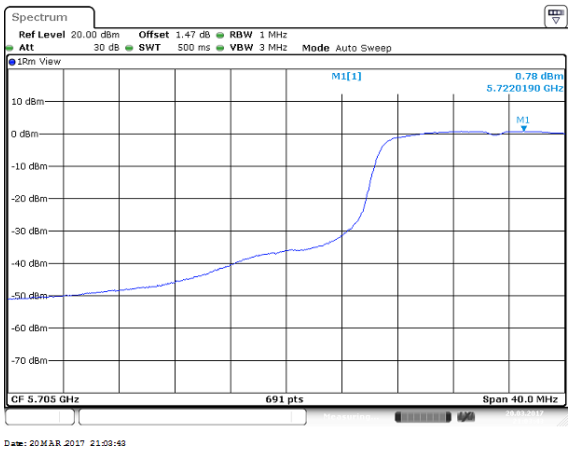
Test Data

UNII-2c IEEE 802.11a mode- chain 0	
Low CH	**Mid CH**
	
High CH	**Cross CH**
	

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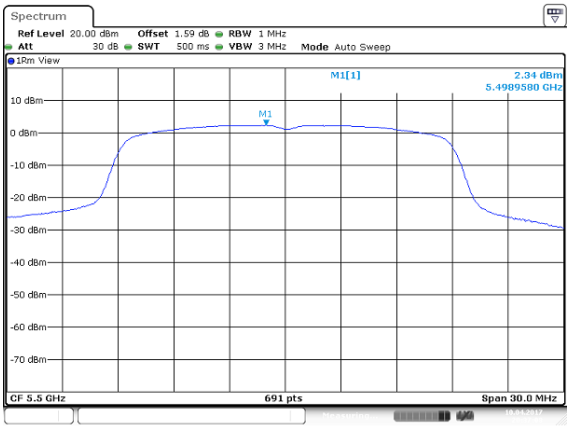
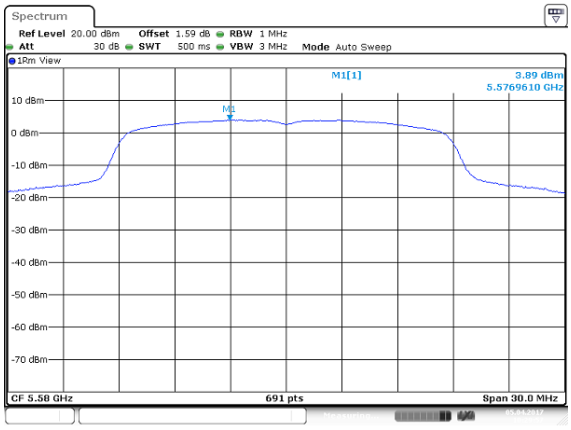
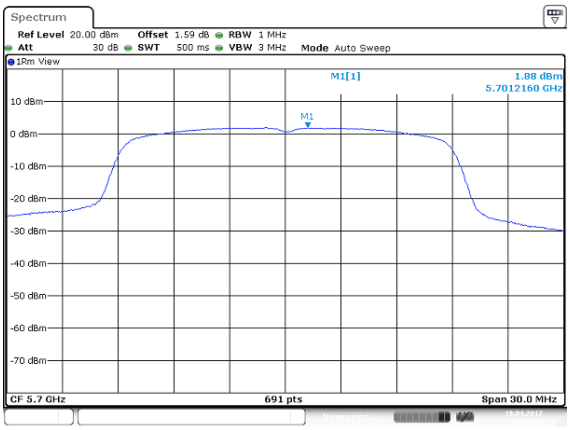
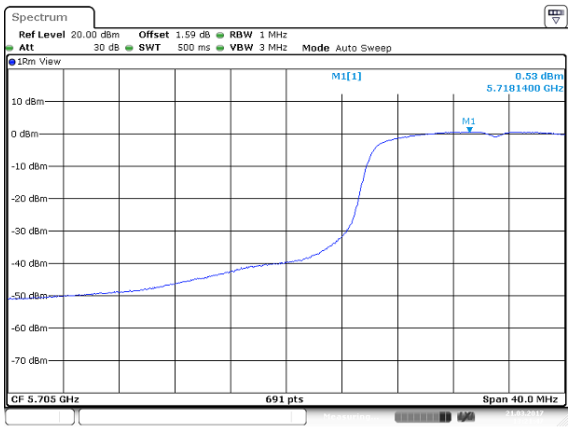
UNII-2c IEEE 802.11n HT20 mode- chain 0	
Low CH	**Mid CH**
	
High CH	**Cross CH**
	

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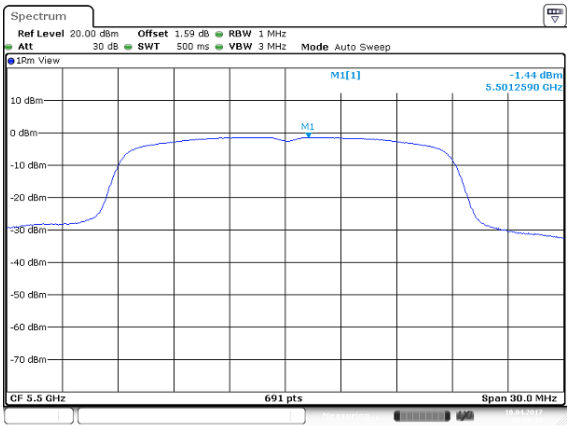
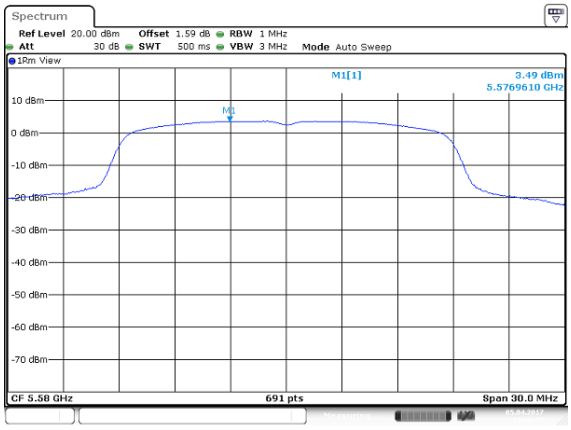
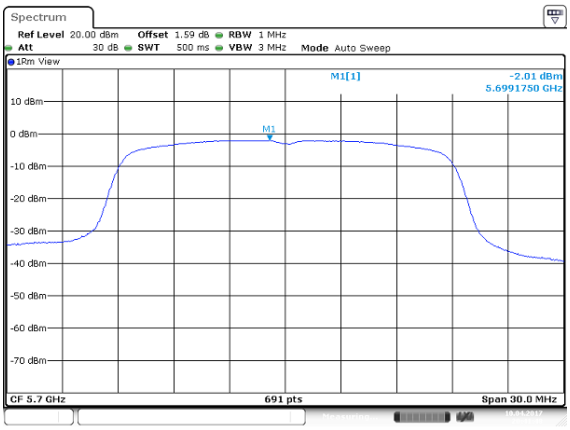
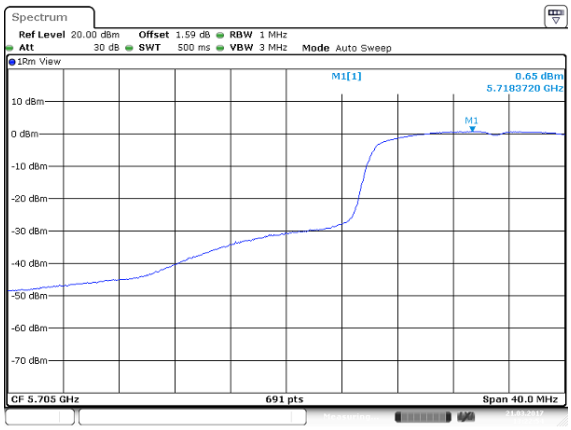
UNII-2c IEEE 802.11n HT20 mode- chain 1	
Low CH	**Mid CH**
	
High CH	**Cross CH**
	

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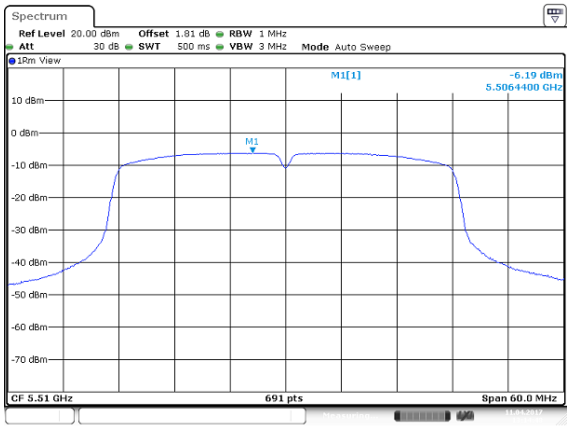
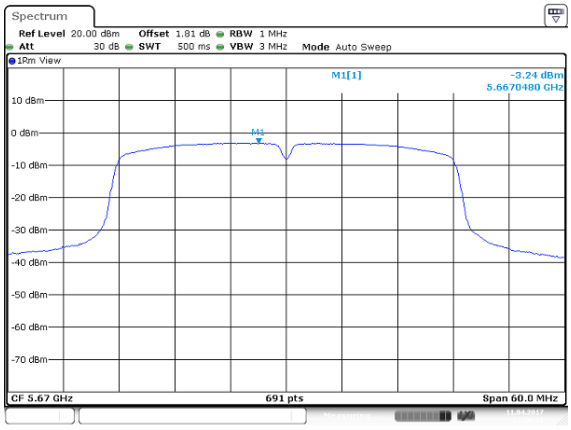
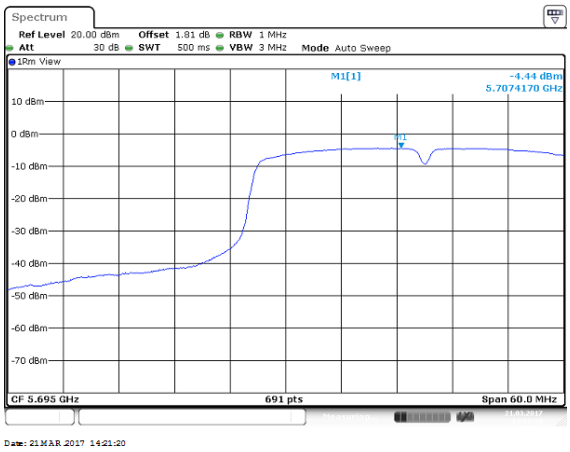
UNII-2c IEEE 802.11n HT40 mode- chain 0	
Low CH	**High CH**
	
Cross CH	
	

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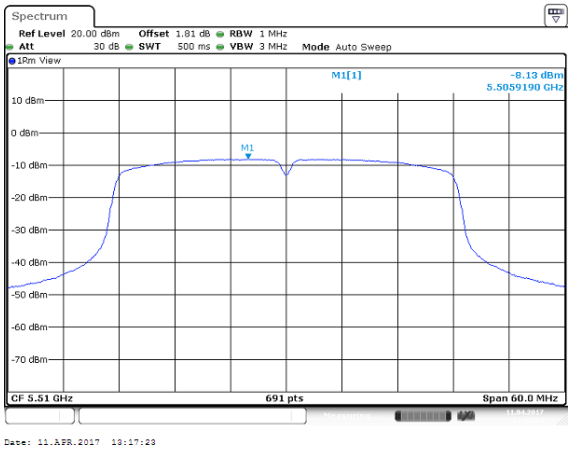
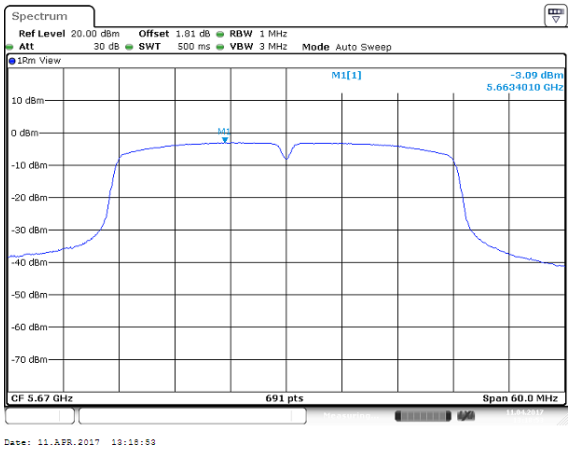
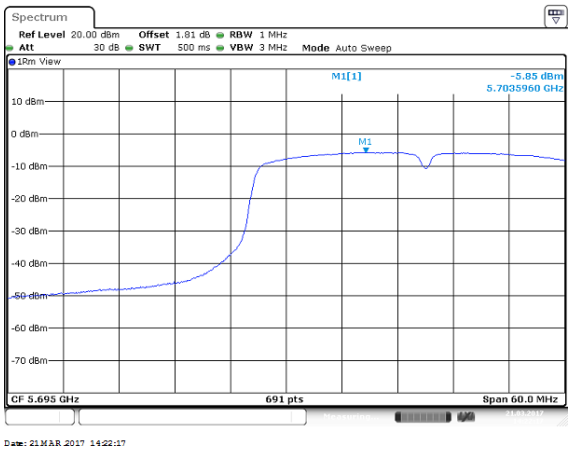
UNII-2c IEEE 802.11n HT40 mode- chain 1	
Low CH	**High CH**
	
Cross CH	
	

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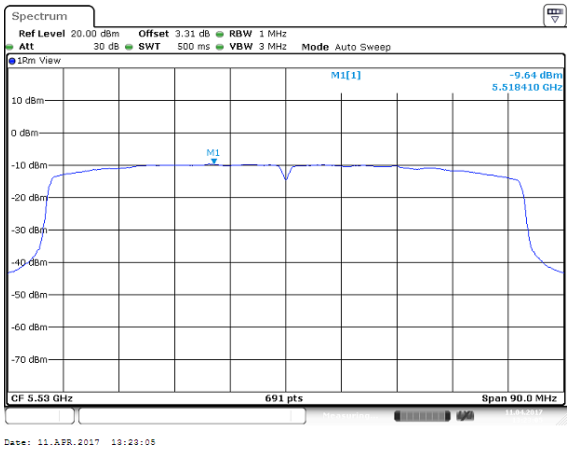
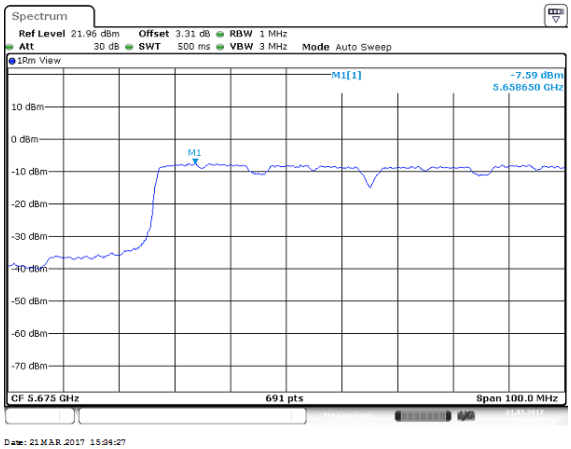
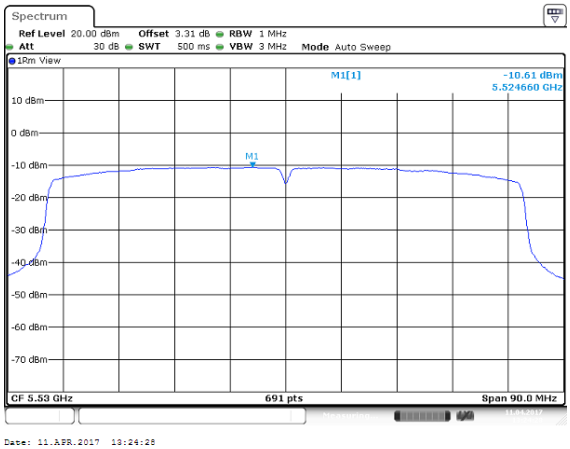
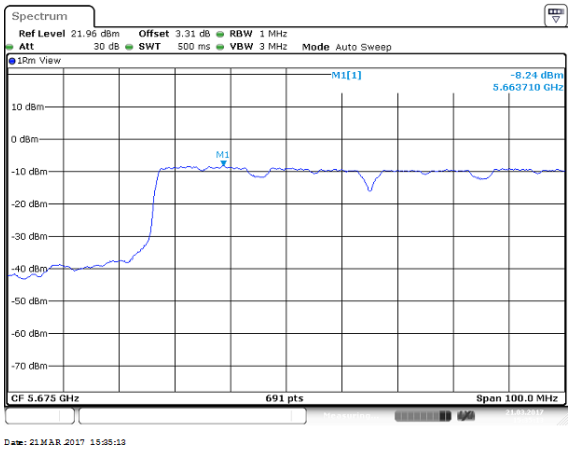
UNII-2c IEEE 802.11ac VHT80 mode- chain 0	
Mid CH	**Cross CH**
	

UNII-2c IEEE 802.11ac VHT80 mode- chain 1	
Mid CH	**Cross CH**
	

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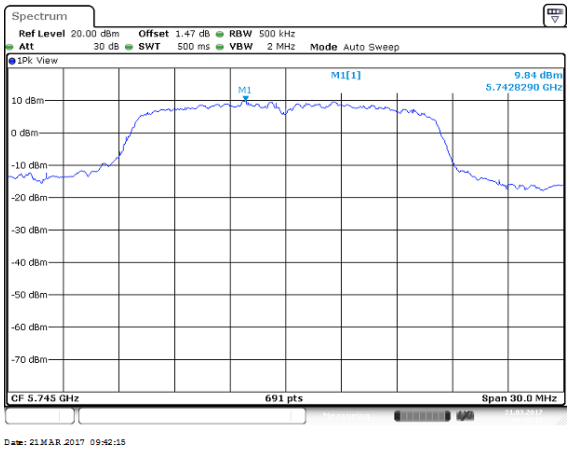
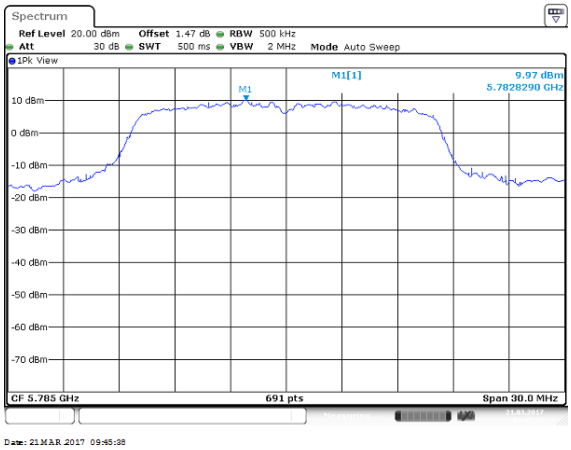
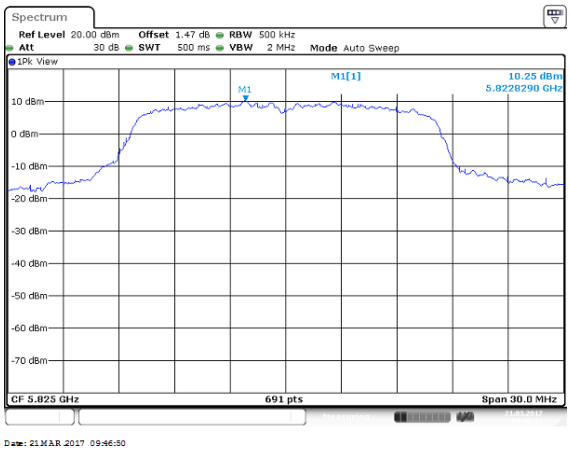
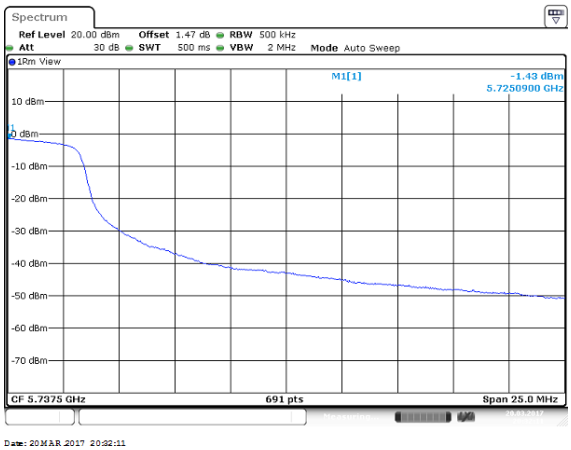
Test Data

UNII-3 IEEE 802.11a mode- chain 0	
Low CH	**Mid CH**
	
High CH	**Cross CH**
	

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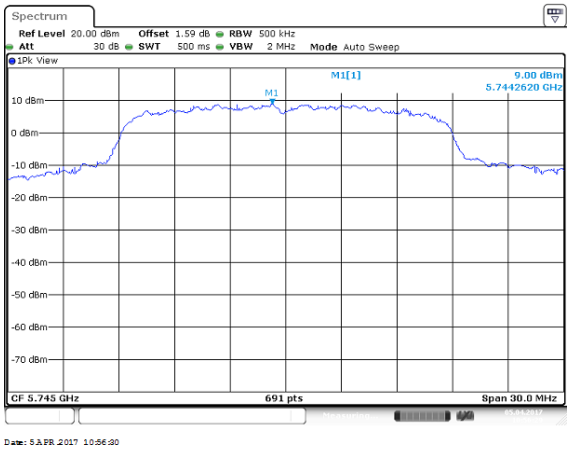
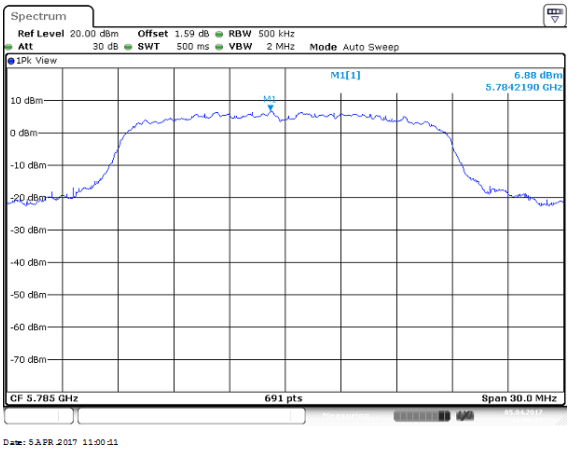
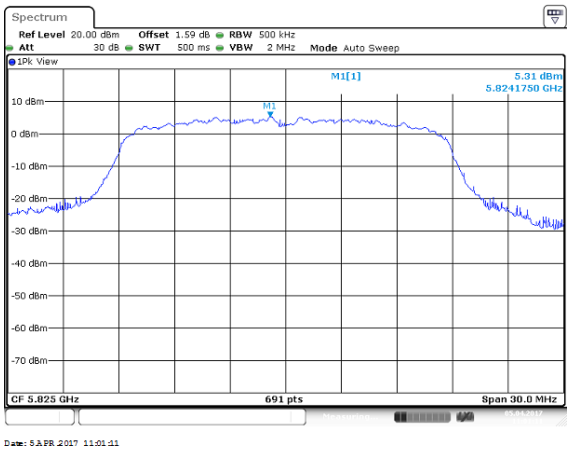
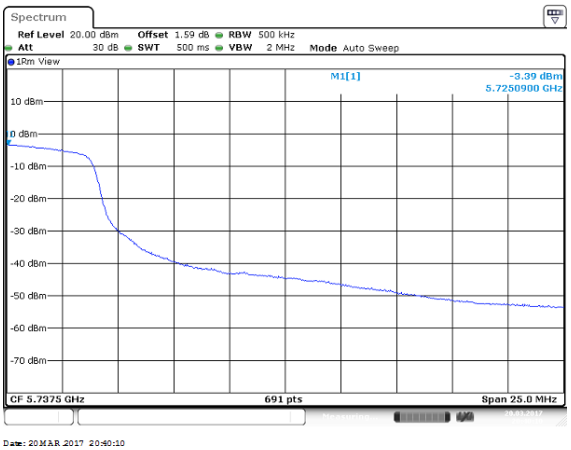
UNII-3 IEEE 802.11n HT20 mode- chain 0	
Low CH	**Mid CH**
	
High CH	**Cross CH**
	

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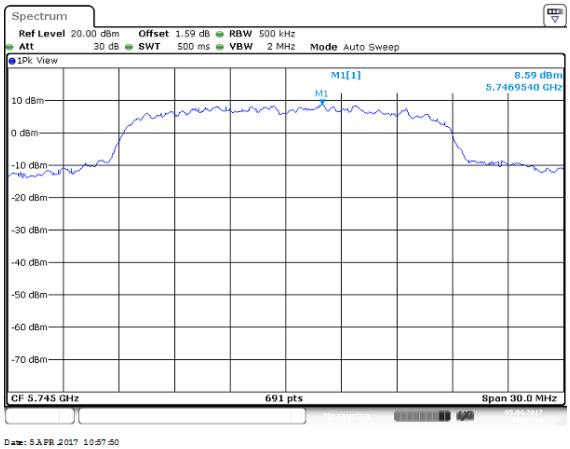
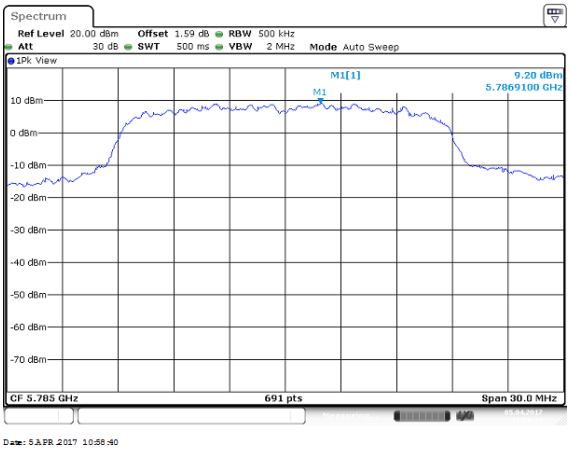
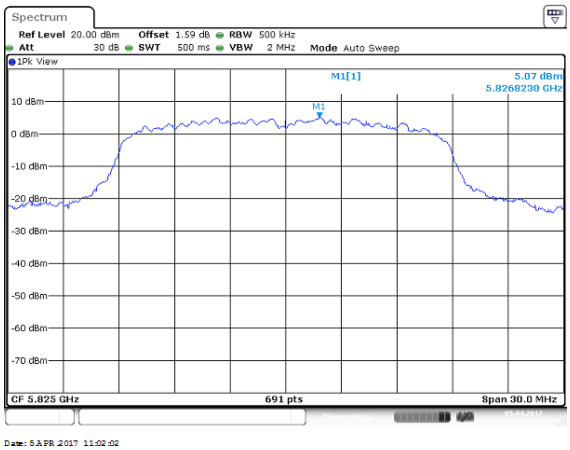
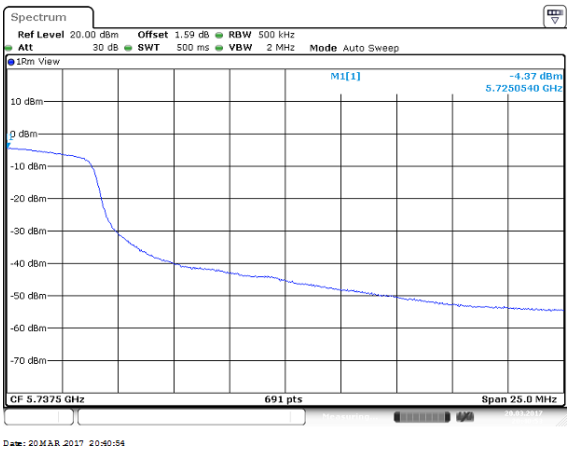
UNII-3 IEEE 802.11n HT20 mode- chain 1	
Low CH	**Mid CH**
	
High CH	**Cross CH**
	

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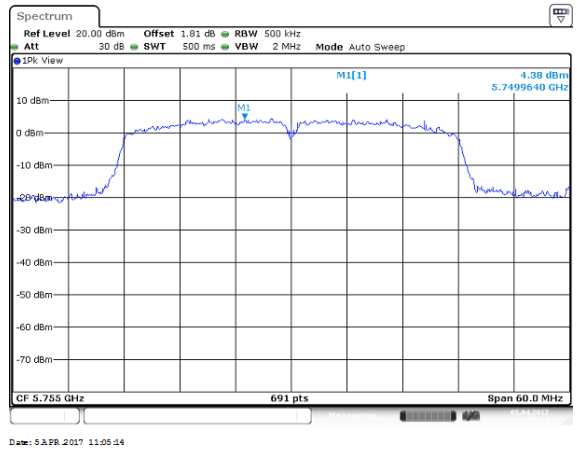
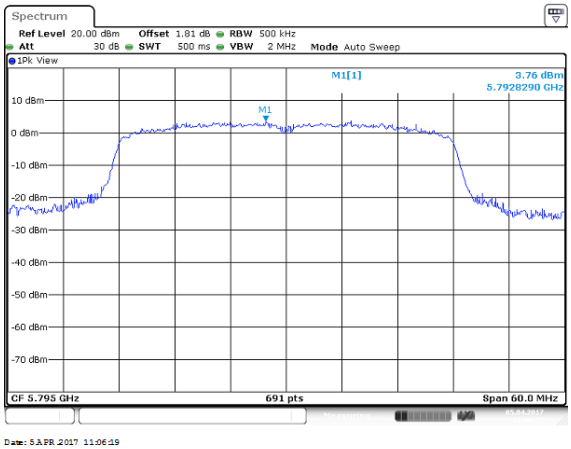
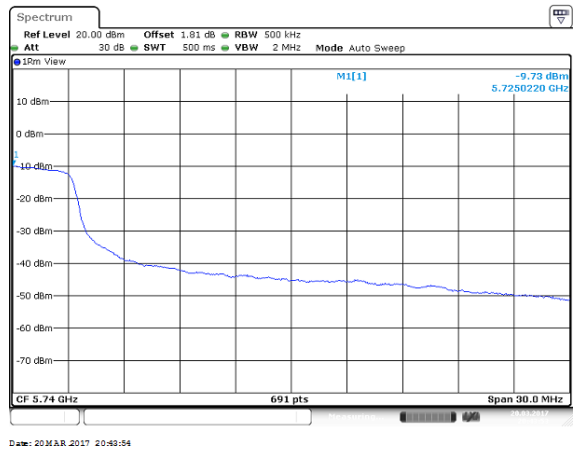
UNII-3 IEEE 802.11n HT40 mode- chain 0	
Low CH	**High CH**
	
Cross CH	
	

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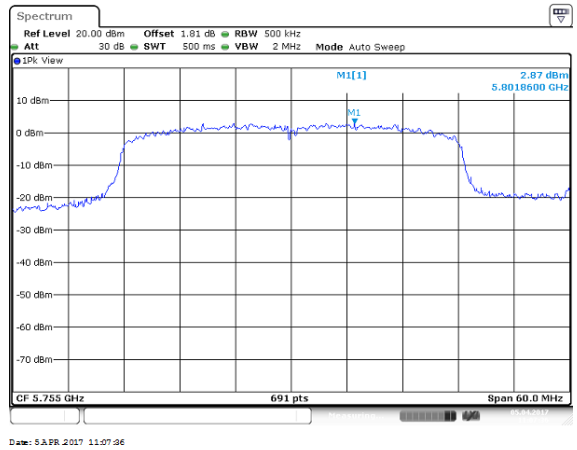
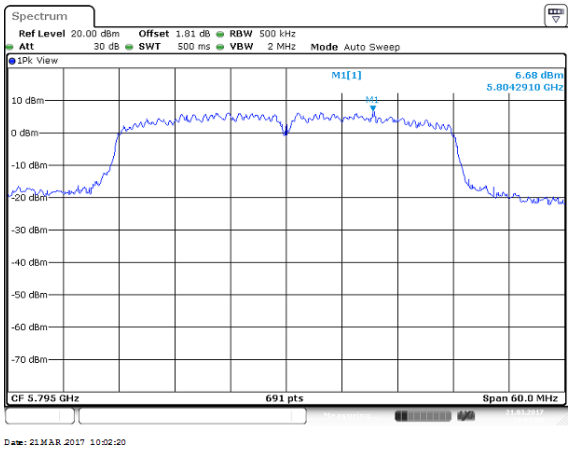
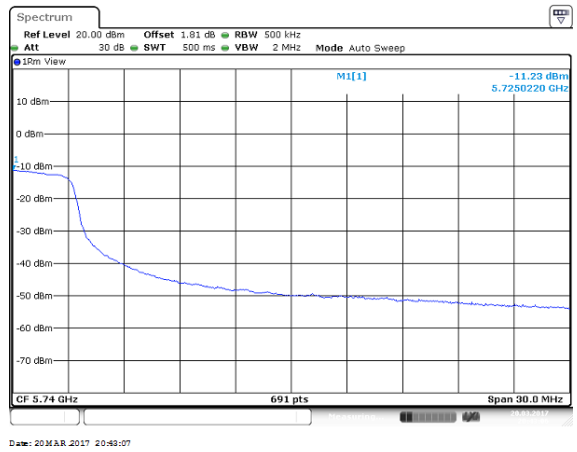
UNII-3 IEEE 802.11n HT40 mode- chain 1	
Low CH	**High CH**
	
Cross CH	
	

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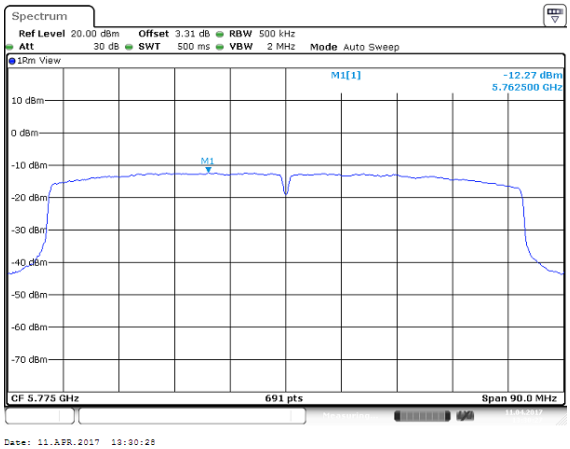
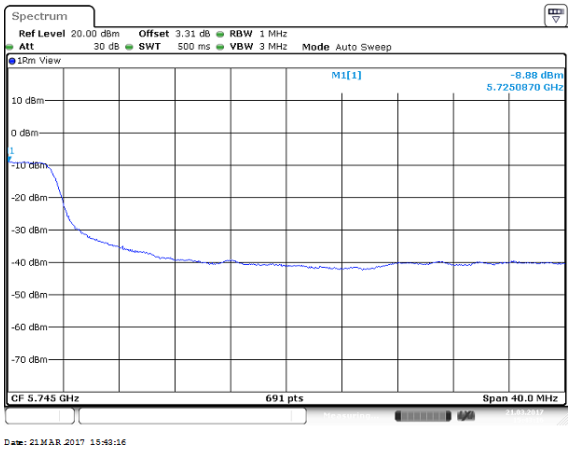
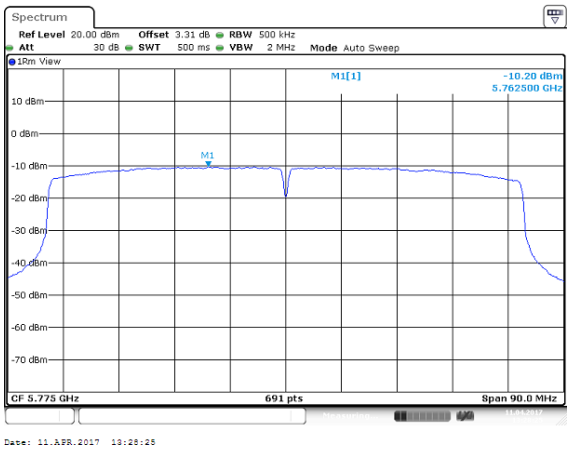
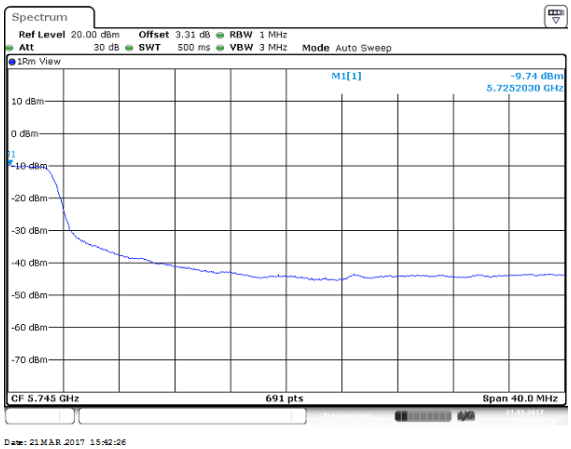
UNII-3 IEEE 802.11ac VHT80 mode- chain 0	
Mid CH	**Cross CH**
	

UNII-3 IEEE 802.11ac VHT80 mode- chain 1	
Mid CH	**Cross CH**
	

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