TEST REPORT

Part 15 Subpart E 15.407

Equipment under test	Station Hub
Model name	SNS-R0810W
FCC ID	NLMSNSR0810W
Applicant	Hanwha Techwin Co., Ltd.
Manufacturer	Hanwha Techwin(Tianjin) Co., Ltd
Date of test(s)	2017.02.09 ~ 2017.02.20, 2017.02.23 ~ 2017.02.24
Date of issue	2017.02.24

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	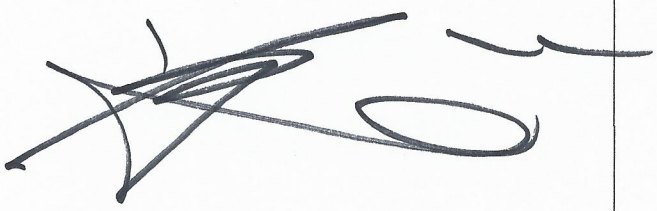
Kwang-yeol Choo Test engineer	Jeff Do Technical manager

Revision history

Revision	Date of issue	Test report No.	Description
-	2017.02.22	KES-RF-17T0023	Initial
R1	2017.02.24	KES-RF-17T0023-R1	1. Added radiated emissions & Frequency stability 2. Retest power spectral density

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1. General information

Applicant: Hanwha Techwin Co., Ltd.

Applicant address: 1204, Changwon-daero, Seongsan-gu, Changwon-si
Gyeongsangnam-do, South Korea

Test site: KES Co., Ltd.

Test site address: C-3701, 40, Simin-daero 365beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do, Korea
473-29, Gayeo-ro, Yeoju-si, Gyeonggi-do, Korea

FCC rule part(s): 15.407

FCC ID: NLMSNSR0810W

Test device serial No.: ☒ Production ☐ Pre-production ☐ Engineering

1.1. EUT description

Equipment under test: Station Hub

Frequency range

Single band module	2.4 GHz	2 412 ㎒ ~ 2 462 ㎒ (11b/g/n_HT20)
		2 422 ㎒ ~ 2 452 ㎒ (11n_HT40)
Dual band module	2.4 GHz	2 412 ㎒ ~ 2 462 ㎒ (11b/g/n_HT20)
		2 422 ㎒ ~ 2 452 ㎒ (11n_HT40)
	UNII-1	5 180 ㎒ ~ 5 240 ㎒ (11a/n_HT20, 11ac_VHT20)
		5 190 ㎒ ~ 5 230 ㎒ (11n_HT40, 11ac_VHT40)
		5 210 ㎒ (11ac_VHT80)
	UNII-2A	5 260 ㎒ ~ 5 320 ㎒ (11a/n_HT20, 11ac_VHT20)
		5 270 ㎒ ~ 5 310 ㎒ (11n_HT40, 11ac_VHT40)
		5 290 ㎒ (11ac_VHT80)
	UNII-2C	5 500 ㎒ ~ 5 720 ㎒ (11a/n_HT20, 11ac_VHT20)
		5 510 ㎒ ~ 5 710 ㎒ (11n_HT40, 11ac_VHT40)
		5 530 ㎒ ~ 5 690 ㎒ (11ac_VHT80)
	UNII-3	5 745 ㎒ ~ 5 825 ㎒ (11a/n_HT20, 11ac_VHT20)
		5 755 ㎒ ~ 5 795 ㎒ (11n_HT40, 11ac_VHT40)
		5 775 ㎒ (11ac_VHT80)
900MHz band module	900 MHz	920.6 ㎒ ~922.0 ㎒

Model: SNS-R0810W

Modulation technique: DSSS, OFDM

Number of channels: 11ch : 2 412 ㎒ ~ 2 462 ㎒, 7 ch : 2 422 ㎒ ~ 2 452 ㎒
4ch : 5 180 ㎒ ~ 5 240 ㎒, 2ch : 5 190 ㎒ ~ 5 230 ㎒, 1ch : 5 210 ㎒
4ch : 5 260 ㎒ ~ 5 320 ㎒, 2ch : 5 270 ㎒ ~ 5 310 ㎒, 1ch : 5 290 ㎒
12ch : 5 500 ㎒ ~ 5 720 ㎒, 6ch : 5 510 ㎒ ~ 5 710 ㎒, 3ch : 5 530 ㎒ ~ 5 690 ㎒
5ch : 5 745 ㎒ ~ 5 825 ㎒, 2ch : 5 755 ㎒ ~ 5795 ㎒, 1ch : 5 775 ㎒
8ch : 920.6 ㎒ ~922.0 ㎒

Antenna specification	11b/g/n_HT20/40	: PCB antenna & 3.4 dBi (Single band)
	11b/g/n_HT20/40	: PCB antenna & 2.9 dBi (Dual band)
	UNII-1	: PCB antenna & 0.6 dBi
	UNII-2A	: PCB antenna & 0.6 dBi
	UNII-2C	: PCB antenna & 0.6 dBi
	UNII-3	: PCB antenna & 0.6 dBi
	900 ㎒	: Chip antenna & -1.7 dBi
Power source	AC 120V Adapter (Output : DC 12V / 1.5 A)	

1.2. Information about derivative model

N/A

1.3. Test configuration

The **Hanwha Techwin Co., Ltd. Station Hub FCC ID: NLMSNSR0810W** was tested per the guidance of KDB 789033 D02 v01r03 and KDB 644545 D03 v01. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing

This report contains the worst case data from the following mode of the test in 20/40/80 MHz signal bandwidth.

1.4. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
Station Camera	Hanwha Techwin(Tianjin) Co., Ltd	SNW-R0210SW	-	DC 3.7V(Battery)
AC/DC Adapter	DELTA ELECTRONICS, INC.	ADP-18TB C	146W6980005	AC 120V (Output : DC 12V / 1.5 A)

1.5. Device modifications

N/A

1.6. Frequency/channel operations

UNII-1		UNII-2A		UNII-2C		UNII-3	
Ch.	**Frequency (㎒)**	**Ch.**	**Frequency (㎒)**	**Ch.**	**Frequency (㎒)**	**Ch.**	**Frequency (㎒)**
36	5 180	52	5 260	100	5 500	149	5 745
44	5 220	56	5 280	116	5 580	157	5 785
48	5 240	64	5 320	144	5 720	165	5 825

Table 1.7-1. 802.11a/n/ac_HT20/VHT20 mode

UNII-1		UNII-2A		UNII-2C		UNII-3	
Ch.	**Frequency (㎒)**	**Ch.**	**Frequency (㎒)**	**Ch.**	**Frequency (㎒)**	**Ch.**	**Frequency (㎒)**
38	5 190	54	5 270	102	5 510	151	5 755
46	5 230	62	5 310	118	5 590	159	5 795
				142	5 710		

Table 1.7-2. 802.11a/n/ac_HT40/VHT40 mode

UNII-1		UNII-2A		UNII-2C		UNII-3	
Ch.	**Frequency (㎒)**	**Ch.**	**Frequency (㎒)**	**Ch.**	**Frequency (㎒)**	**Ch.**	**Frequency (㎒)**
42	5 210	58	5 290	106	5 530	155	5 775
				122	5 610		
				138	5 690		

Table 1.7-3. 802.11ac_VHT80 mode

1.7. Maximum average output power

Refer to the average output power.

Note.

1. Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.
2. Worst-case data rates as provided by the client were:

UNII-1 a : **6 Mbps** , n/ac_HT20/40/VHT20/40/80 : **MCS0**
UNII-2A a : **6 Mbps** , n/ac_HT20/40/VHT20/40/80 : **MCS0**
UNII-2C a : **6 Mbps** , n/ac_HT20/40/VHT20/40/80 : **MCS0**
UNII-3 a : **6 Mbps** , n/ac_HT20/40/VHT20/40/80 : **MCS0**

2. Summary of tests

Reference	Parameter	Test results
15.407(a)	26 dB bandwidth & 99 % Occupied Bandwidth	Pass
15.407(e)	6 dB bandwidth	Pass
15.407(a)	Maximum conducted output power	Pass
15.407(a)	Power spectral density	Pass
15.407(g)	Frequency stability	Pass
15.205 15.209	Radiated restricted band and emission	Pass
15.407(d)	General field strength limit (Restricted bands and radiated emission limit)	Pass
15.207	AC power line conducted emissions	Pass

3. Test results

3.1. 26 dB bandwidth & 99% Occupied Bandwidth

Test procedure

26 dB bandwidth

KDB 789033 D02 v01r03– Section C.1, KDB 644545 D03 v01

1. Set RBW = approximately 1% of the emission bandwidth.
2. Set the VBW > RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
6. In case of band crossing channels 138, 142 and 144, the measurement is complied with section D of KDB 644545_D03 v01

Limit

N/A

99 % bandwidth

KDB 789033 D02 v01r03– Section D

1. Set span = 1.5 times to 5.0 times the OBW.
2. Set RBW = 1% to 5% of the OBW
3. Set the VBW > 3 x RBW.
4. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak bandwidth function of the instrument (if available).
5. Use the 99% power bandwidth function of the instrument (if available).
6. If the instrument does not have a 99% power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

In the result,

-DFS requirements are not applicable in the 5 150 ㎒ ~ 5 250 ㎒.

Test results

Band	Frequency(㎒)	Mode	26 dB bandwidth(㎒)	99 % bandwidth(㎒)
UNII-1	5 180	a	20.333	-
	5 220		20.912	-
	5 240		20.695	16.787
UNII-2A	5 260		20.550	16.860
	5 280		20.912	-
	5 320		20.767	-
UNII-2C	5 500		20.695	-
	5 580		20.550	-
	5 720		20.333	-
UNII-3	5 745		20.622	-
	5 785		20.333	-
	5 825		20.622	-
UNII-1	5 180	HT20	21.491	-
	5 220		21.491	-
	5 240		21.274	17.873
UNII-2A	5 260		21.274	17.873
	5 280		20.984	-
	5 320		21.563	-
UNII-2C	5 500		21.491	-
	5 580		21.491	-
	5 720		21.201	-
UNII-3	5 745		21.418	-
	5 785		21.274	-
	5 825		21.201	-
UNII-1	5 190	HT40	44.110	-
	5 230		43.880	37.395
UNII-2A	5 270		44.110	37.395
	5 310		43.990	-
UNII-2C	5 510		43.990	-
	5 590		44.340	-
	5 710		44.110	-
UNII-3	5 755		43.990	-
	5 795		44.340	-

Band	Frequency(㎒)	Mode	26 dB bandwidth(㎒)	99 % bandwidth(㎒)
UNII-1	5 180	VHT20	21.274	-
	5 220		21.418	-
	5 240		21.418	17.945
UNII-2A	5 260		21.346	17.873
	5 280		21.274	-
	5 320		21.418	-
UNII-2C	5 500		21.491	-
	5 580		21.346	-
	5 720		21.201	-
UNII-3	5 745		21.274	-
	5 785		21.563	-
	5 825		21.274	-
UNII-1	5 190	VHT40	44.110	-
	5 230		43.990	37.395
UNII-2A	5 270		43.990	37.395
	5 310		43.990	-
UNII-2C	5 510		43.990	-
	5 590		44.110	-
	5 710		44.340	-
UNII-3	5 755		44.110	-
	5 795		44.340	-
UNII-1	5 210	VHT80	82.660	75.022
UNII-2A	5 290		82.320	75.022
UNII-2C	5 530		82.840	-
	5 610		83.180	-
	5 690		83.180	-
UNII-3	5 775		83.010	-
UNII-2C (Band-crossing channel)	5 720	a	15.275	-
	5 720	HT20	15.637	-
	5 710	HT40	37.240	-
	5 720	VHT20	15.709	-
	5 710	VHT40	37.360	-
	5 690	VHT80	76.260	-

26 dB bandwidth

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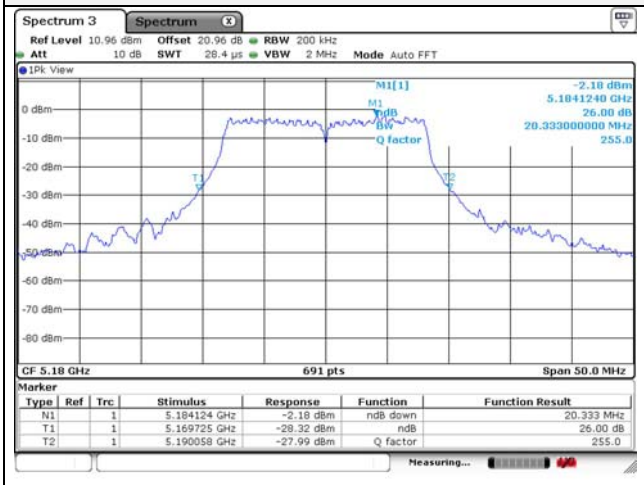	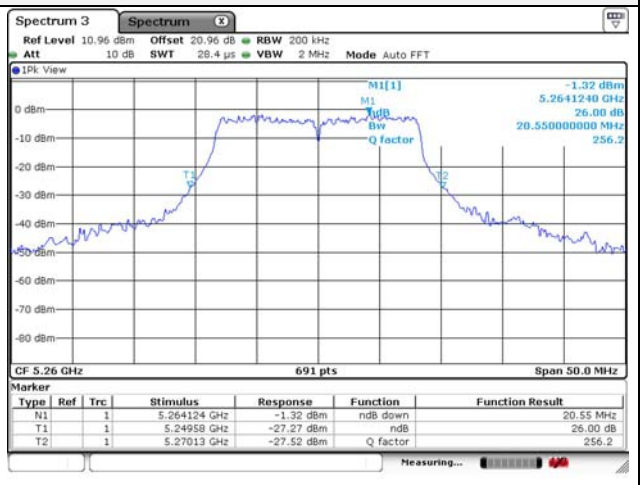
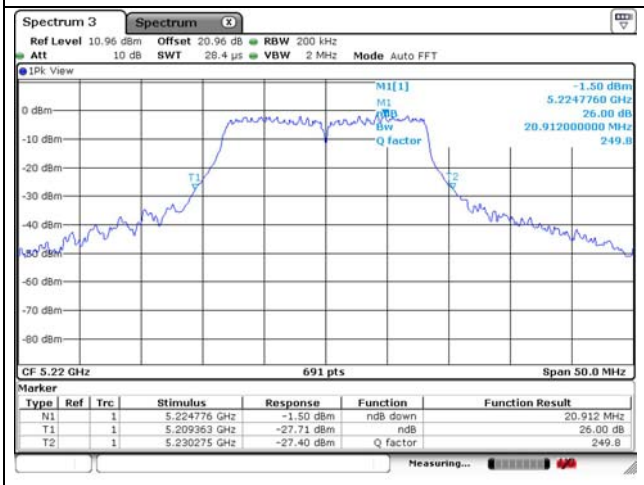	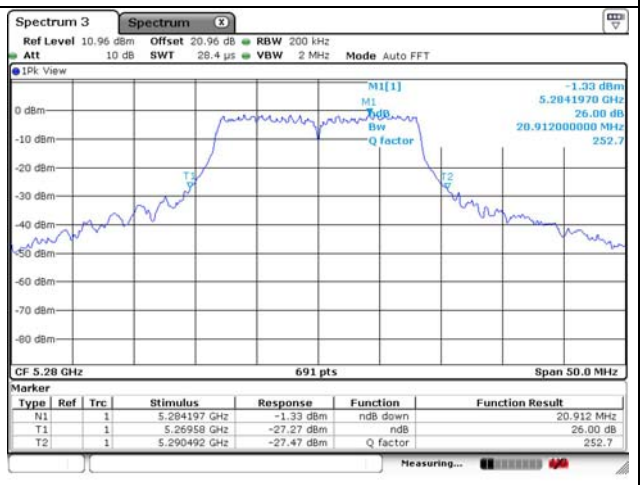
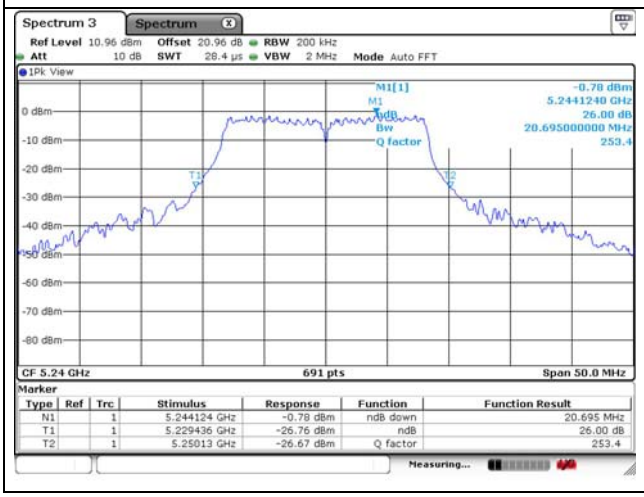	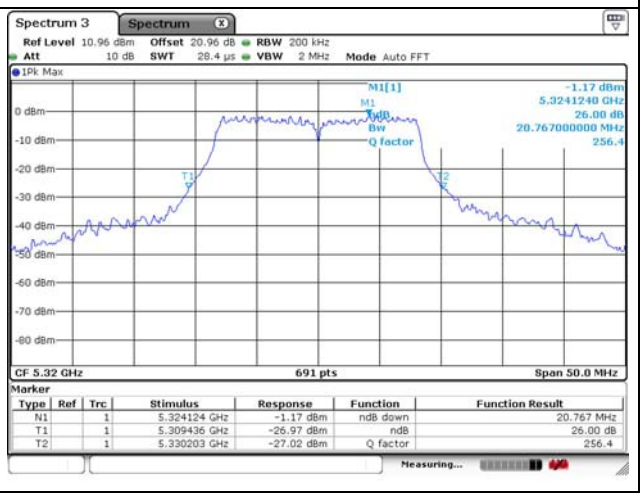

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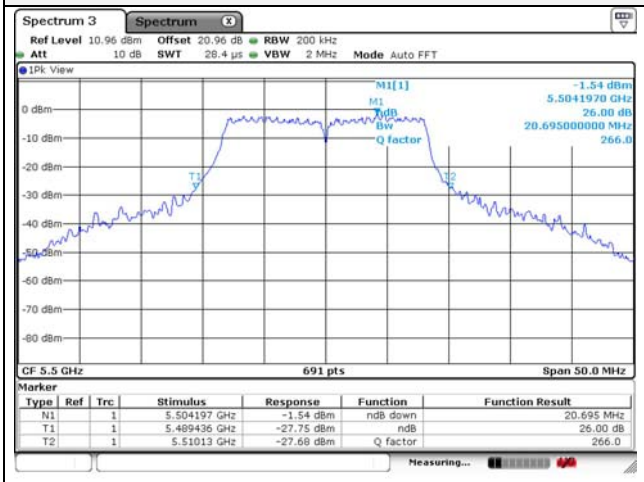	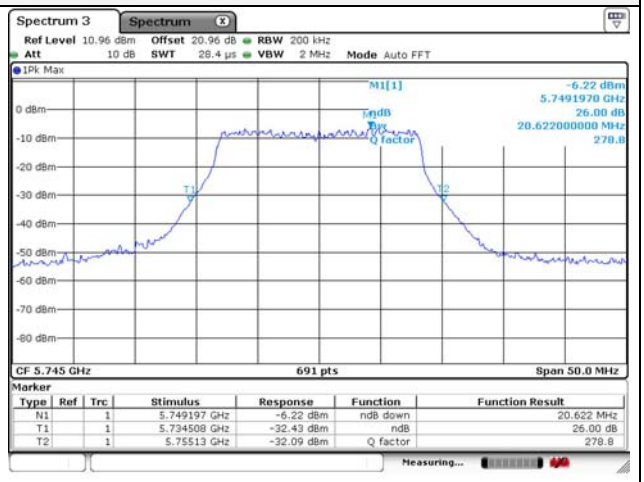
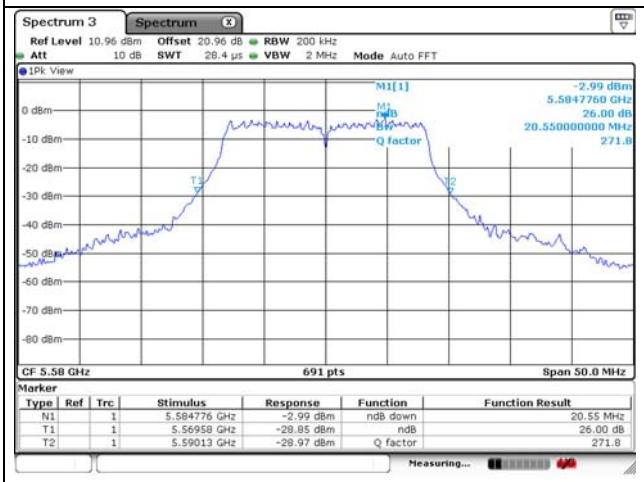	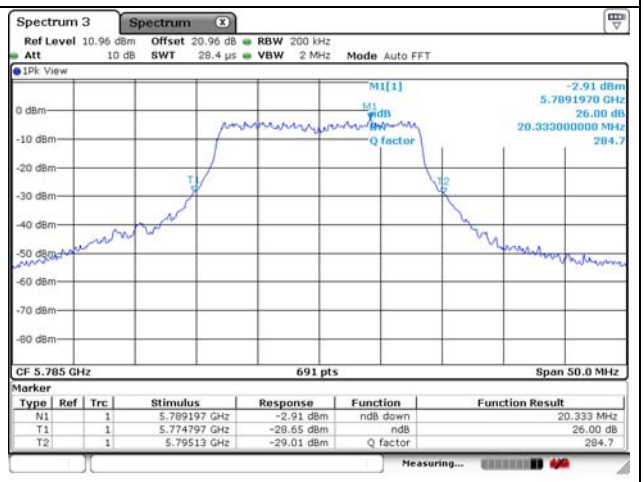
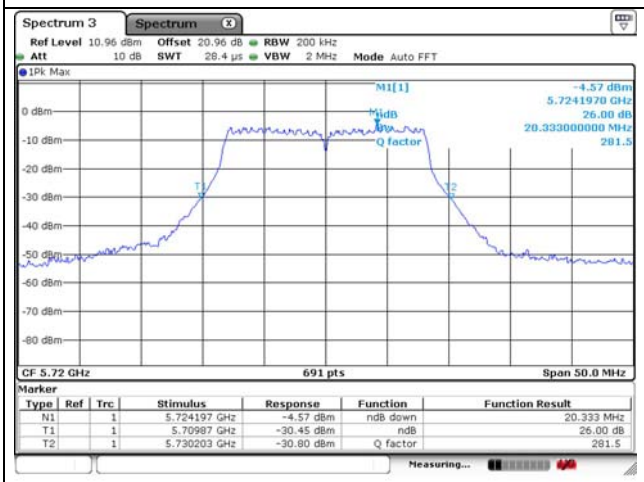	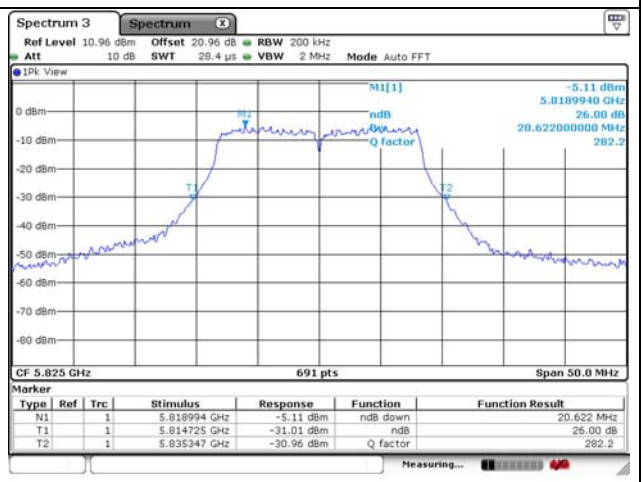

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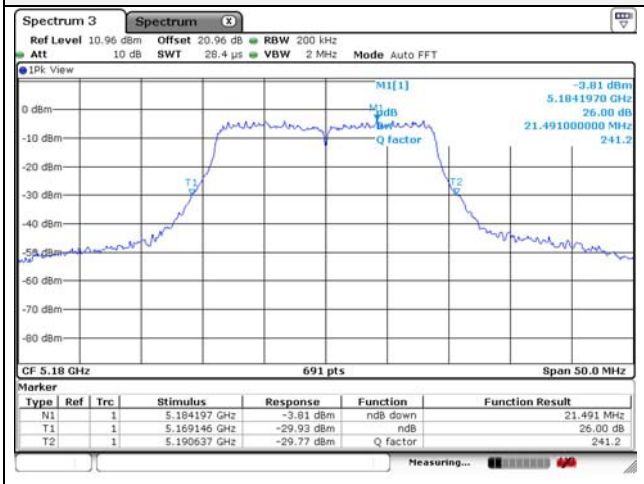	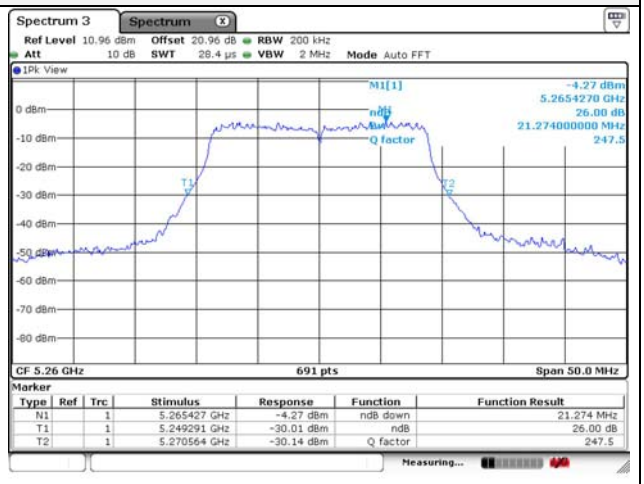
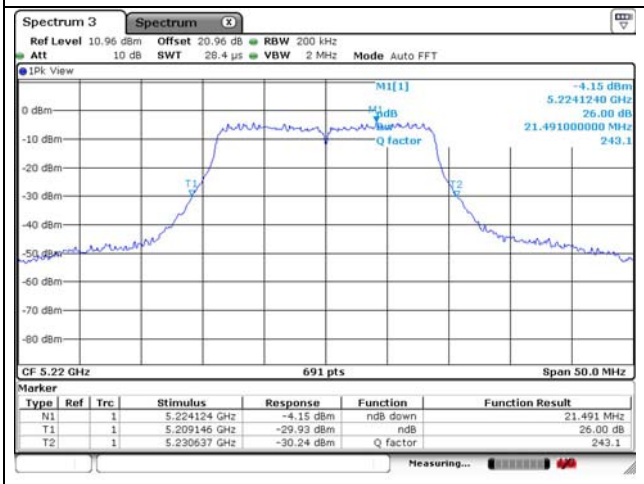	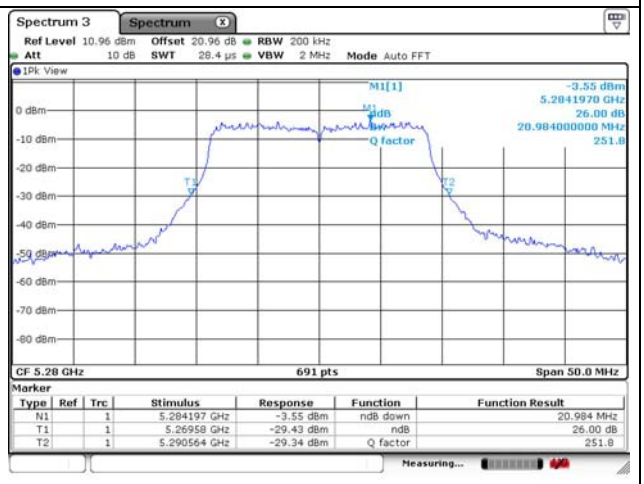
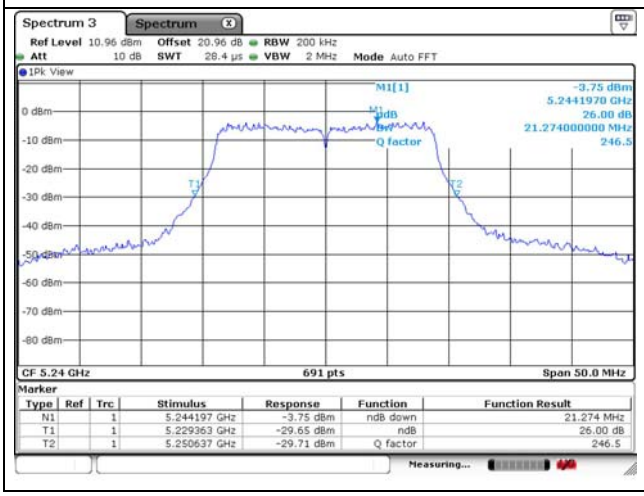	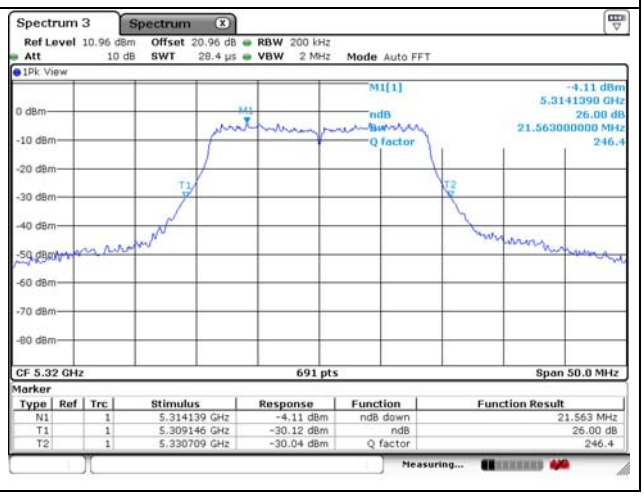

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	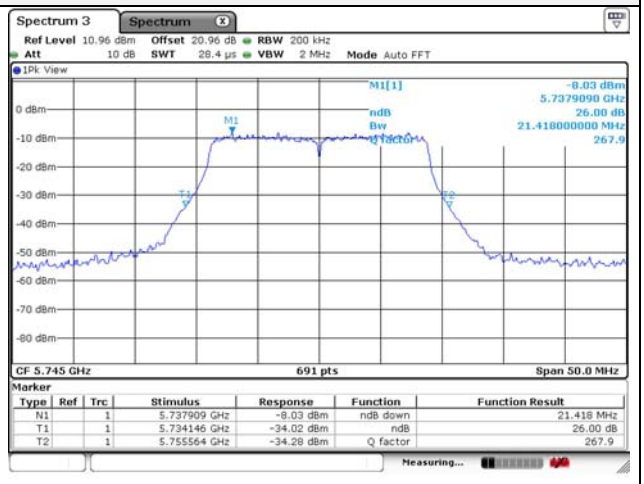
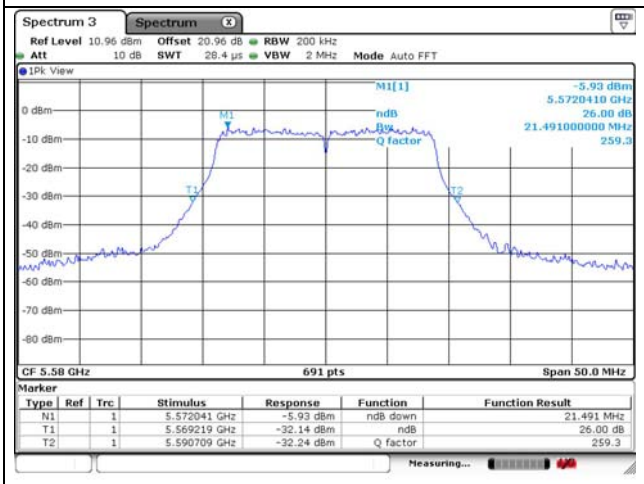	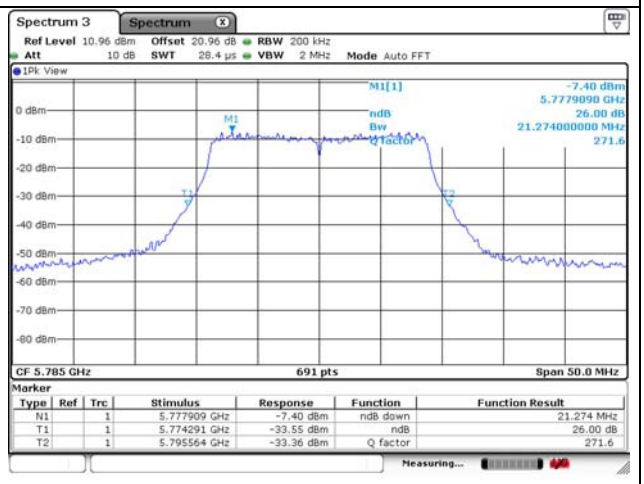
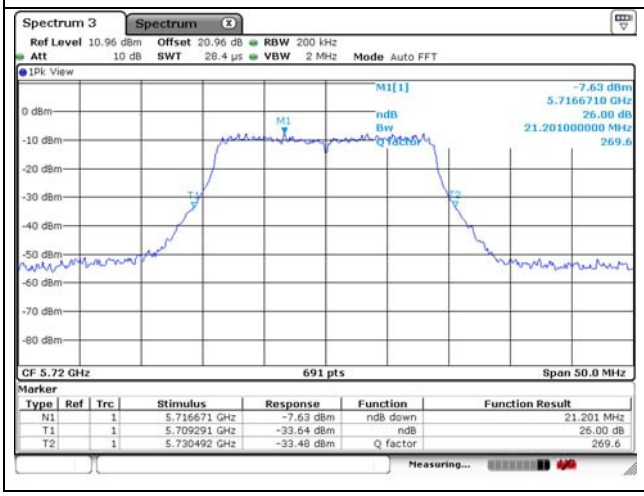	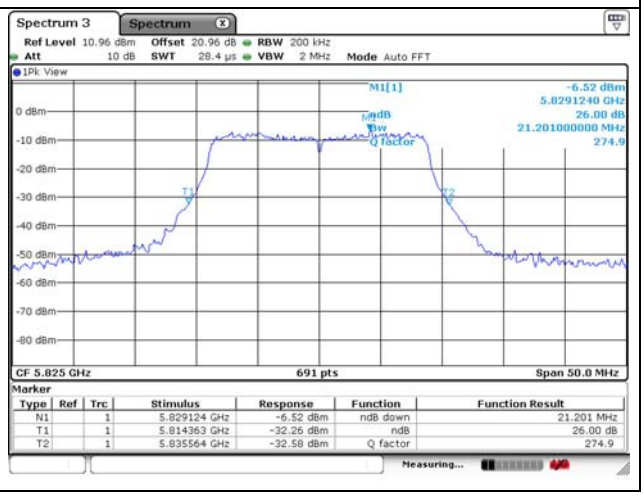

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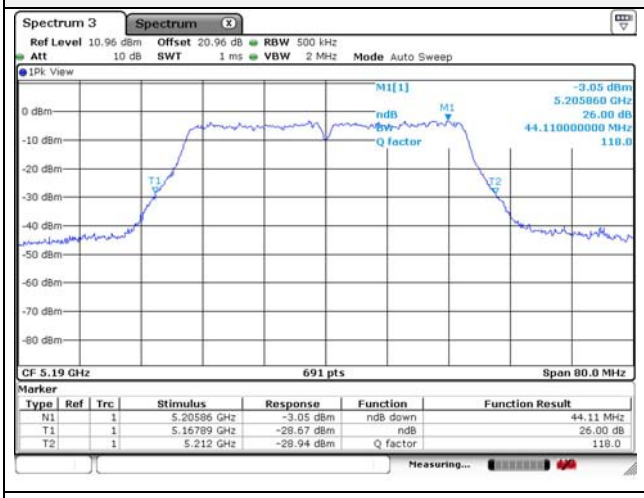	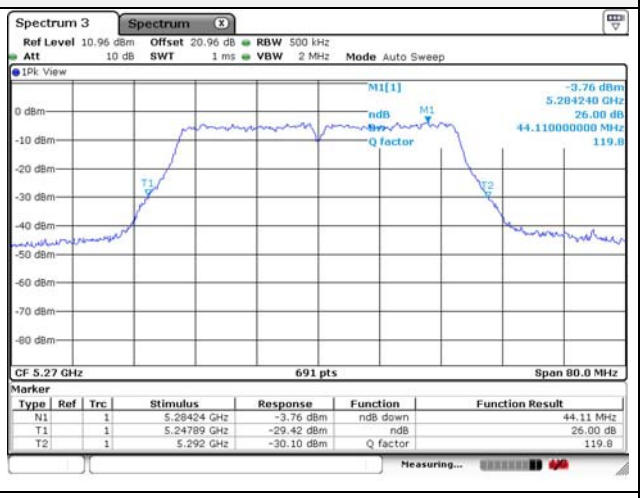
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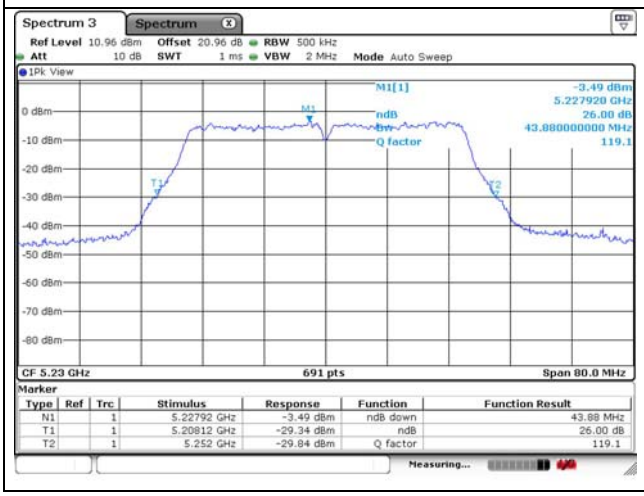
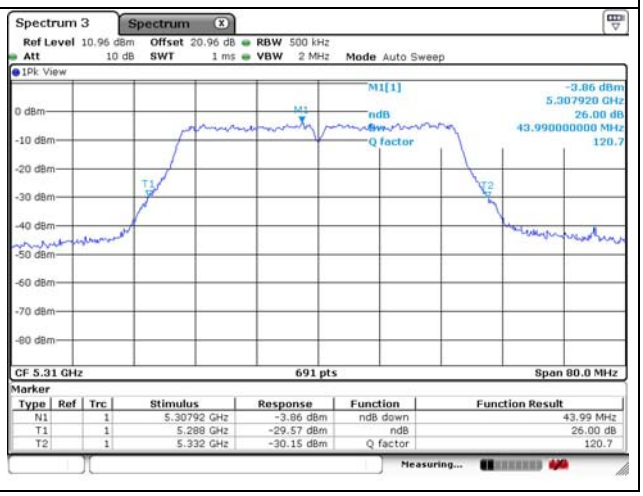
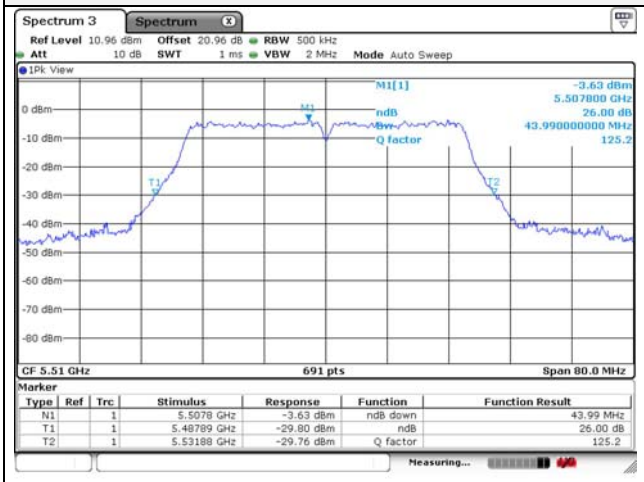
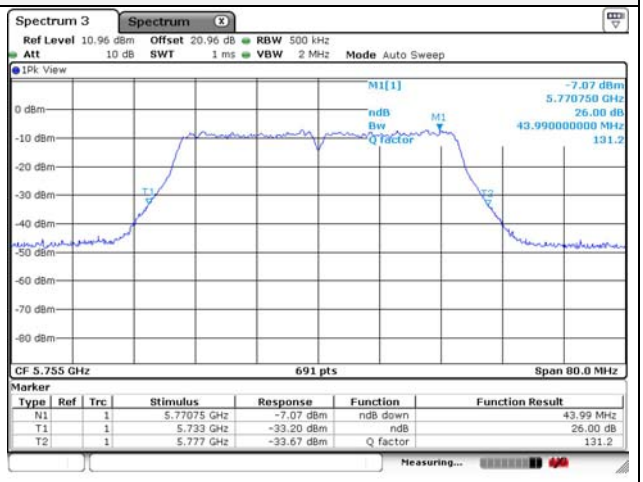
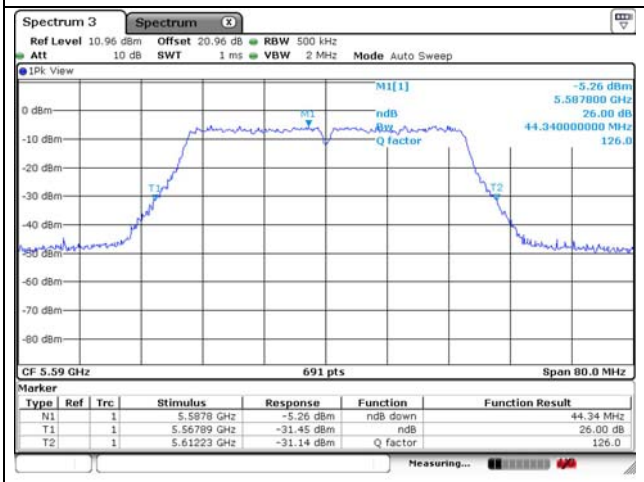
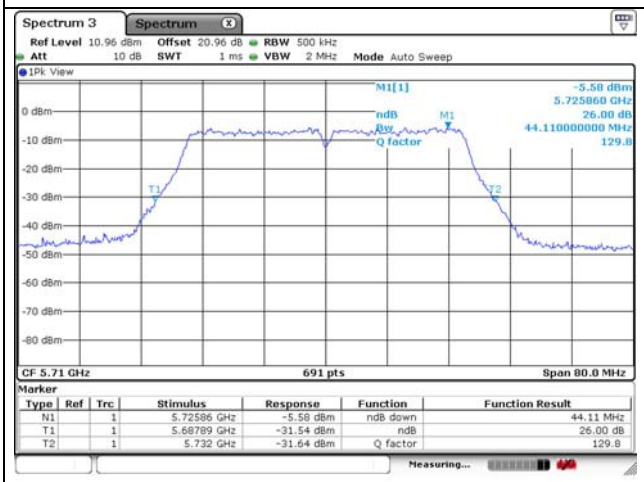
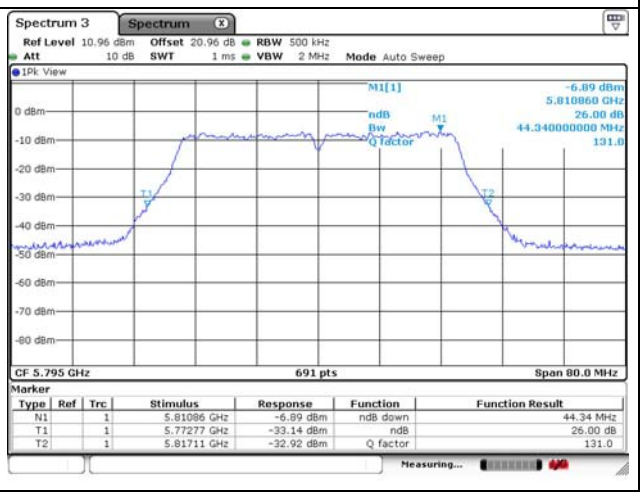
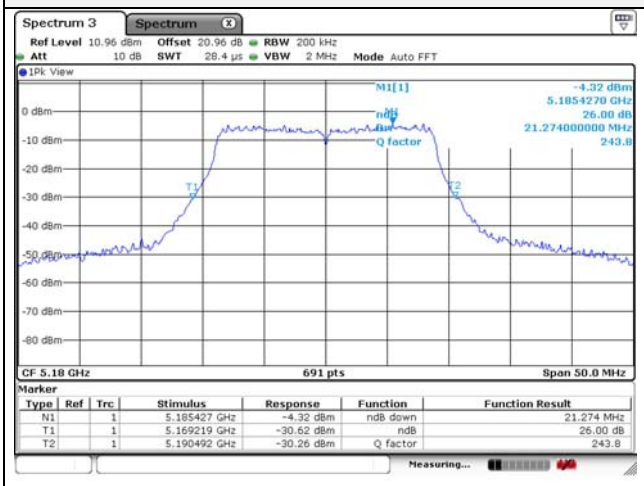
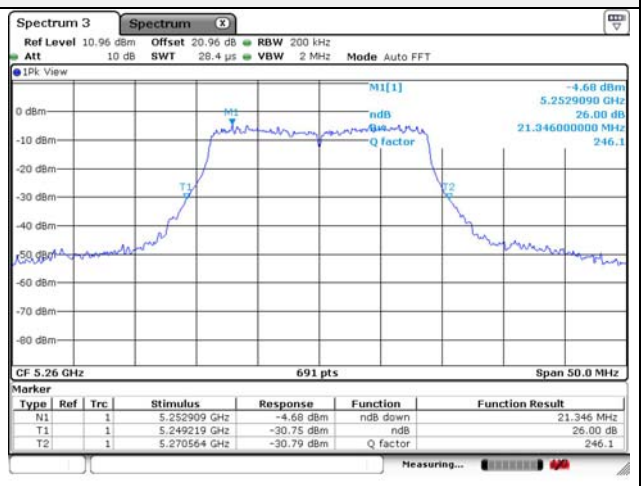
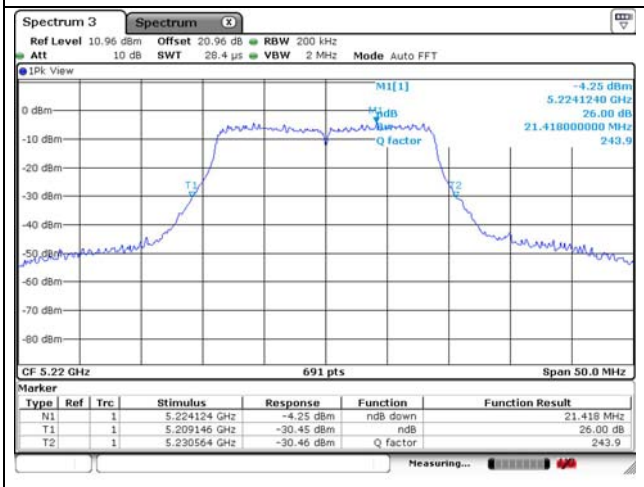
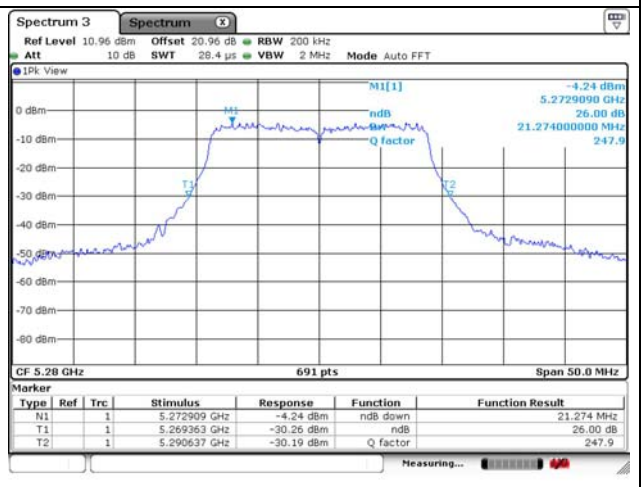
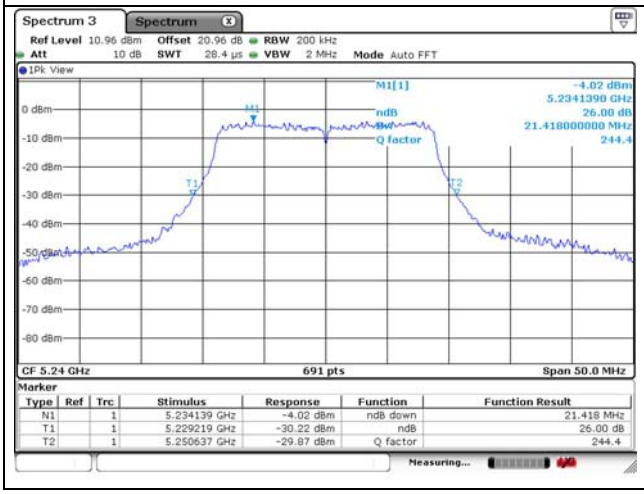
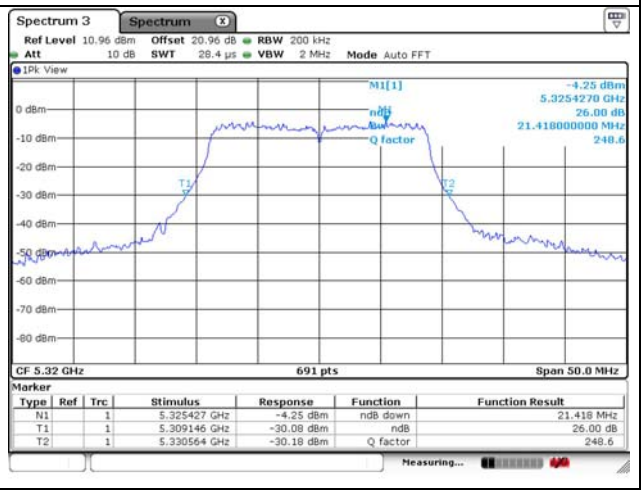
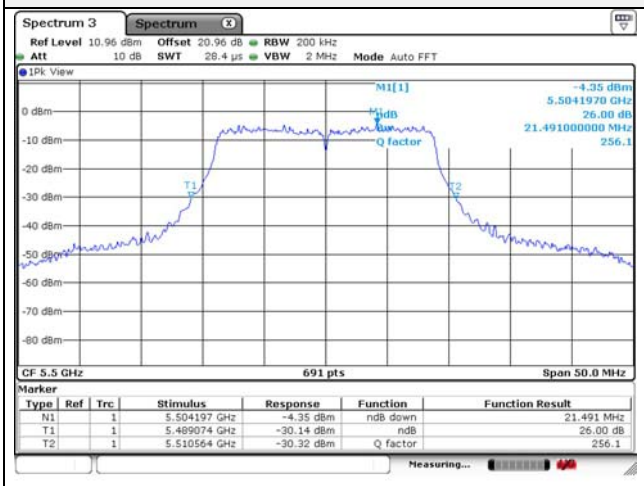
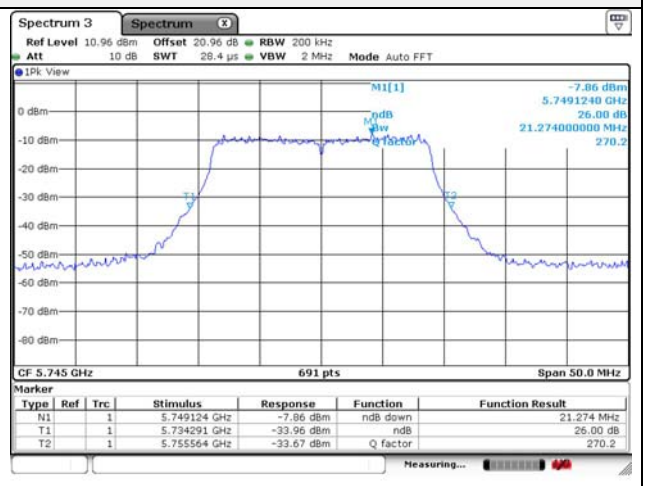
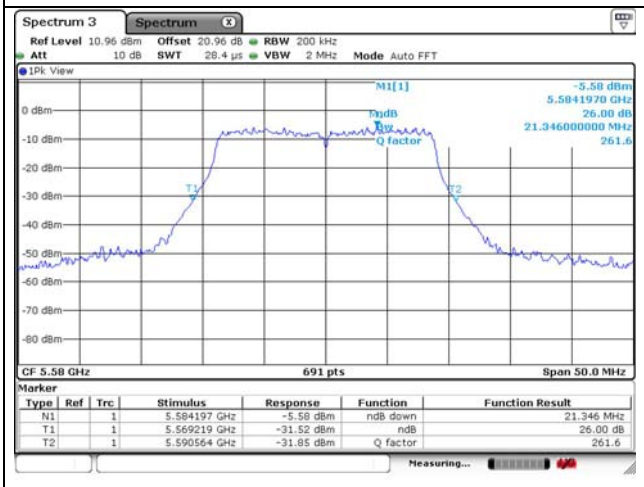
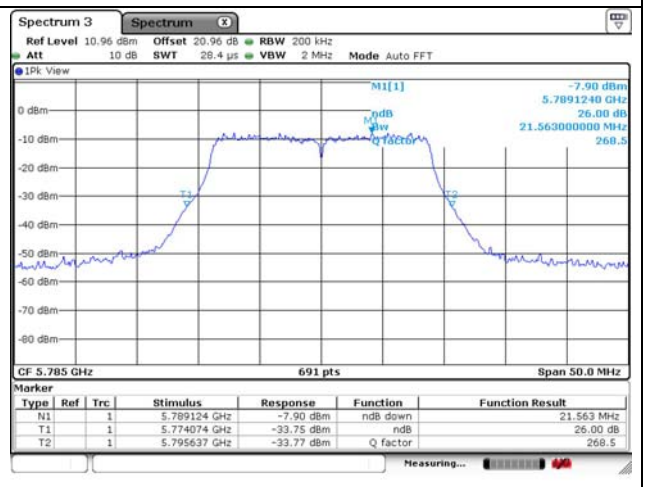
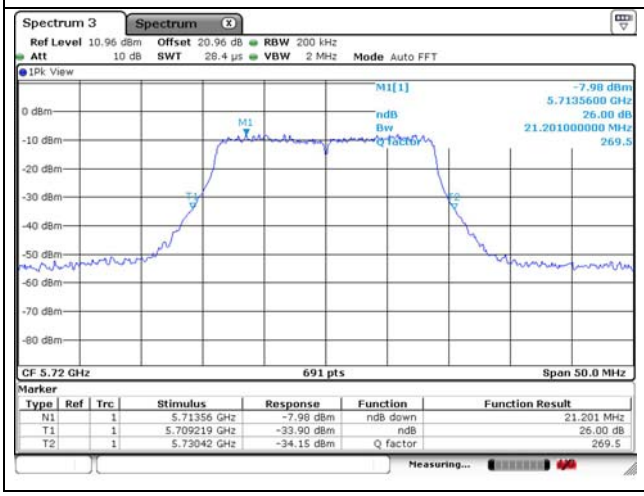
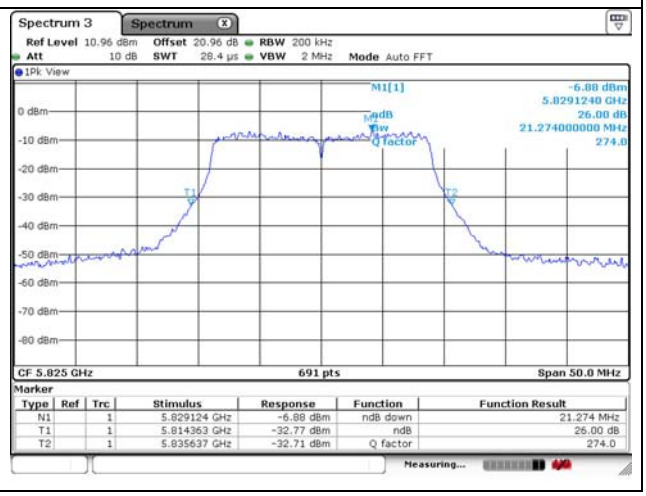
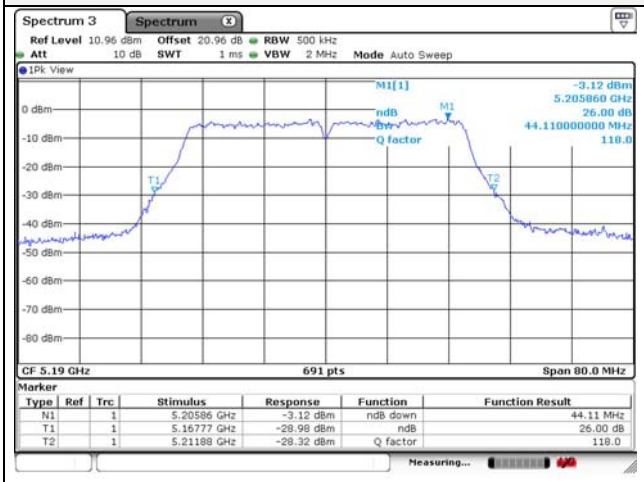
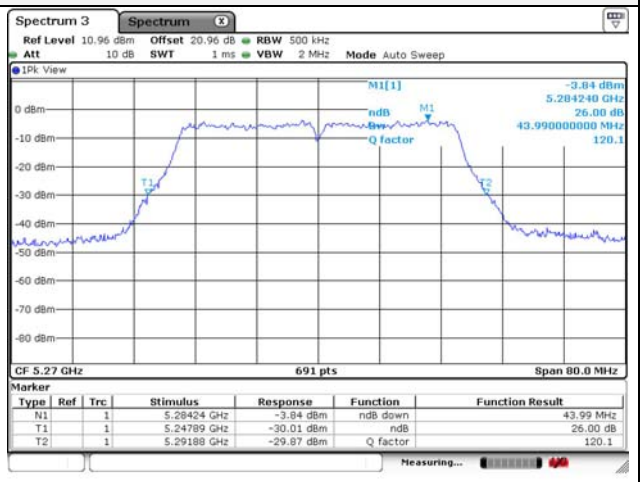
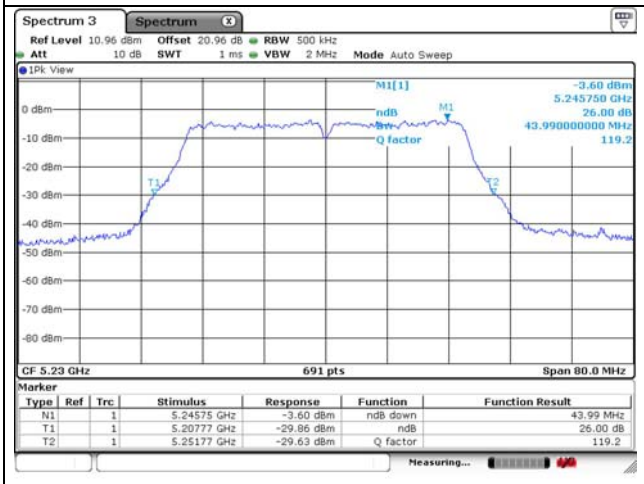
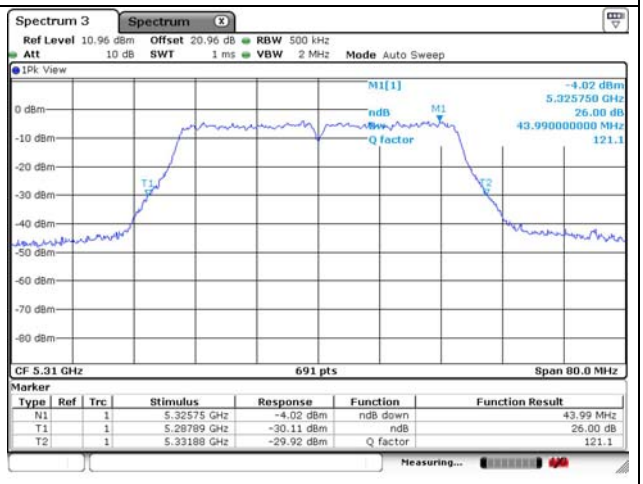
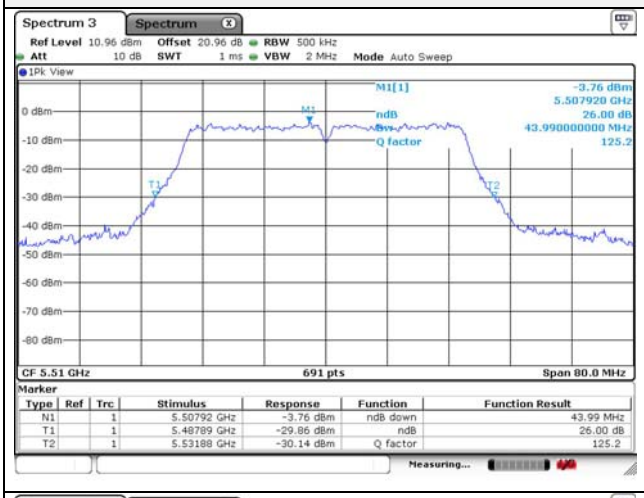
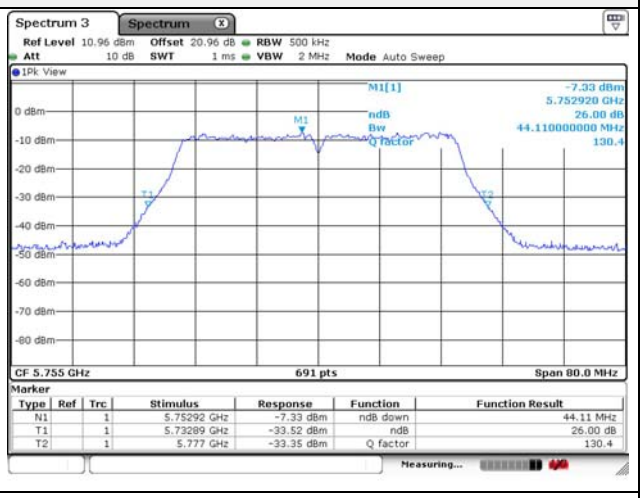
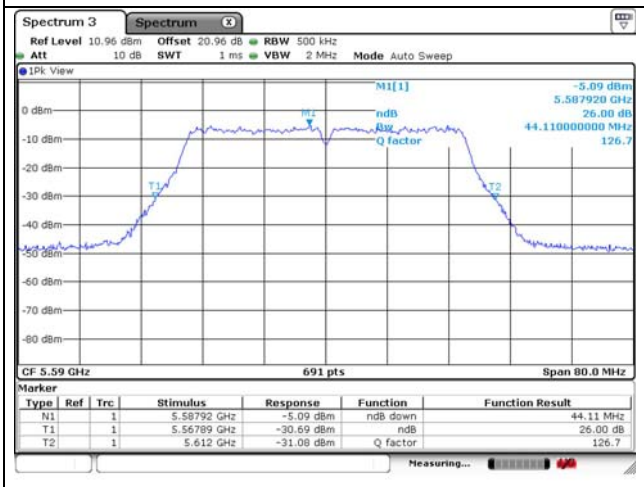
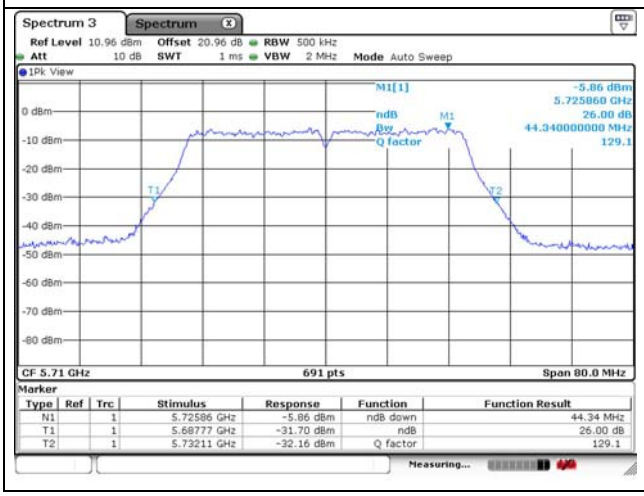
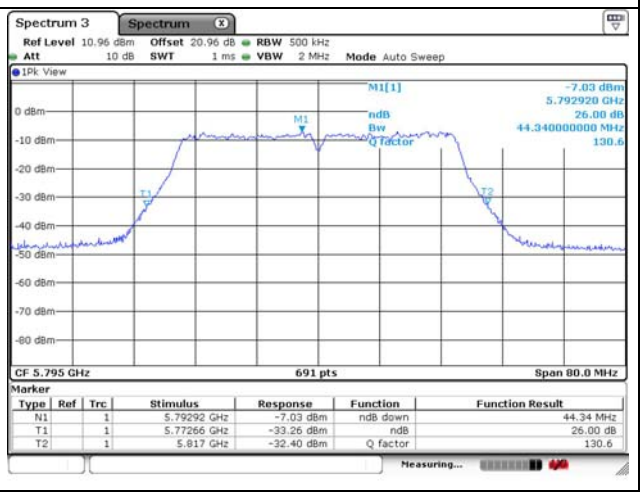
	

UNII-2C_HT40	UNII-3_ HT40
	
	N/A
	

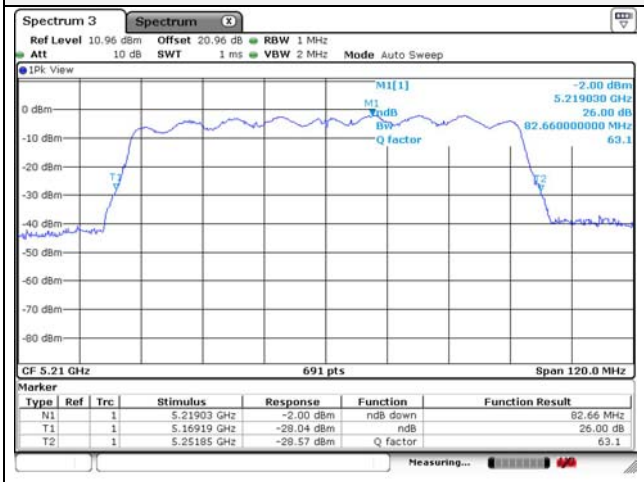
UNII-1_ VHT20	UNII-2A_ VHT20
	
	
	

UNII-2C_VHT20	UNII-3_ VHT20
	
	
	

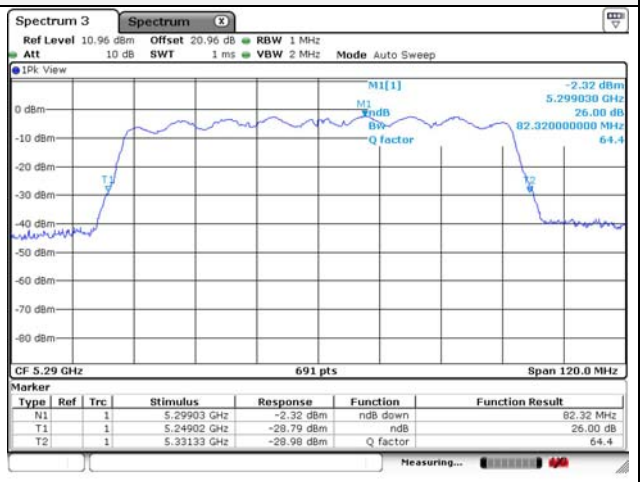
UNII-1_ VHT40	UNII-2A_ VHT40
	
N/A	N/A
	

UNII-2C_VHT40	UNII-3_ VHT40
	
	N/A
	

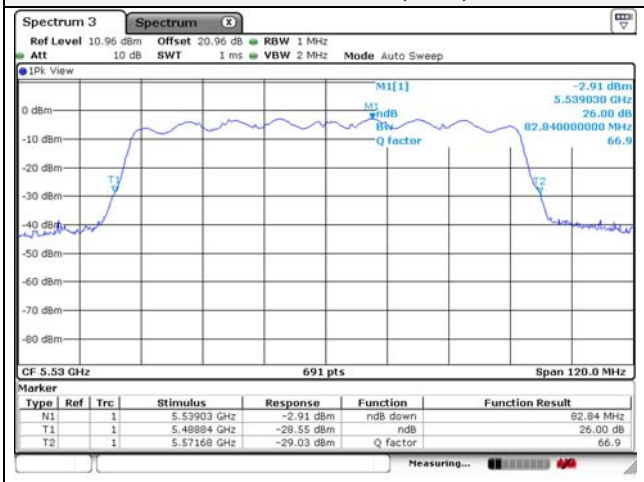
UNII-1_VHT80



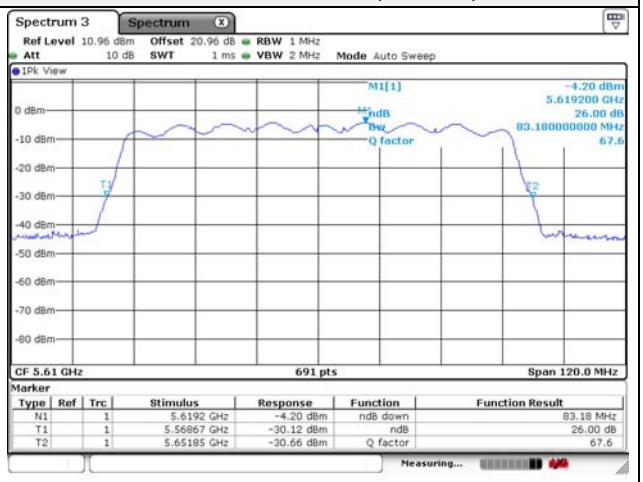
UNII-2A_ VHT80



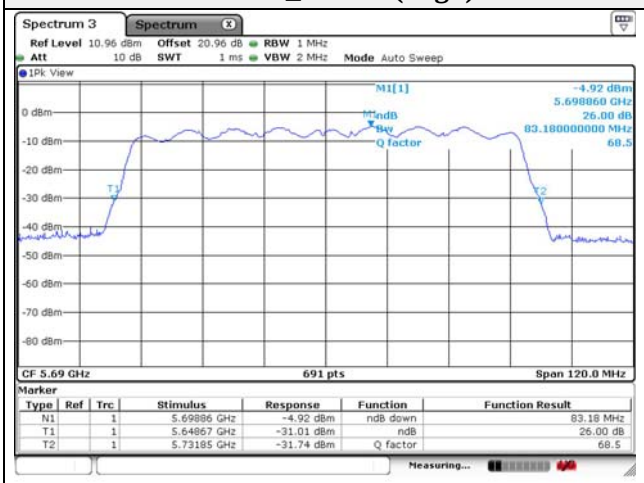
UNII-2C_VHT80(Low)



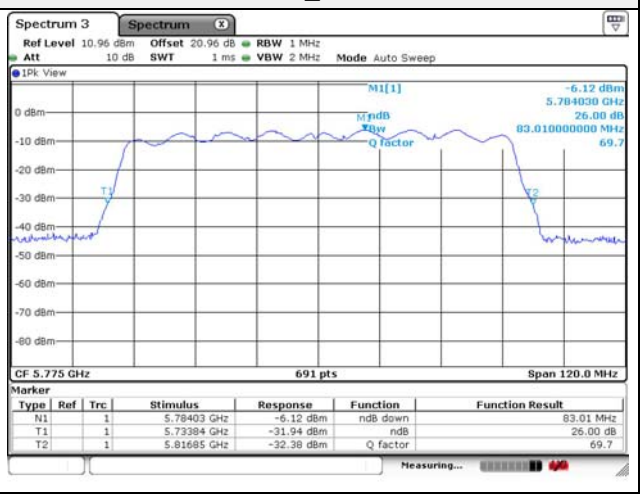
UNII-2C_VHT80(Middle)



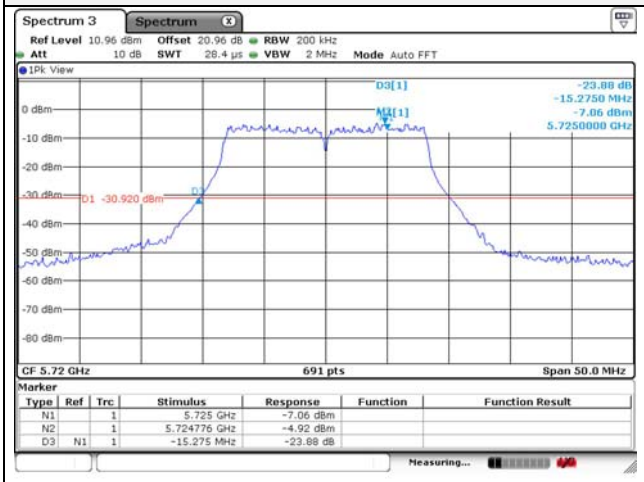
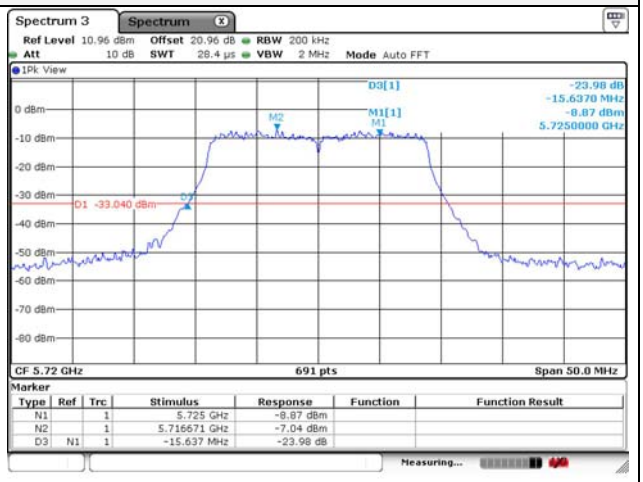
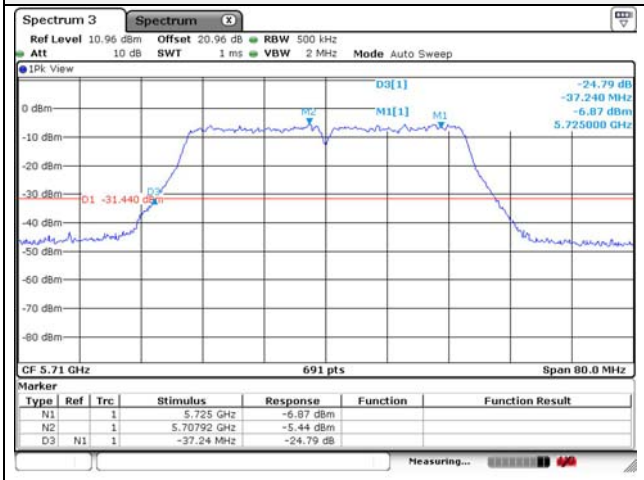
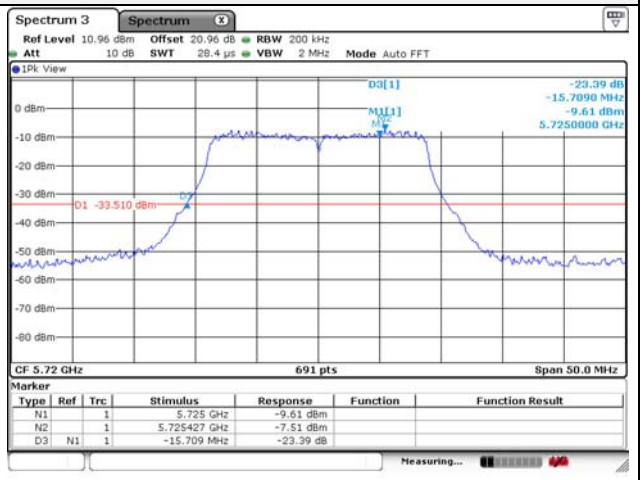
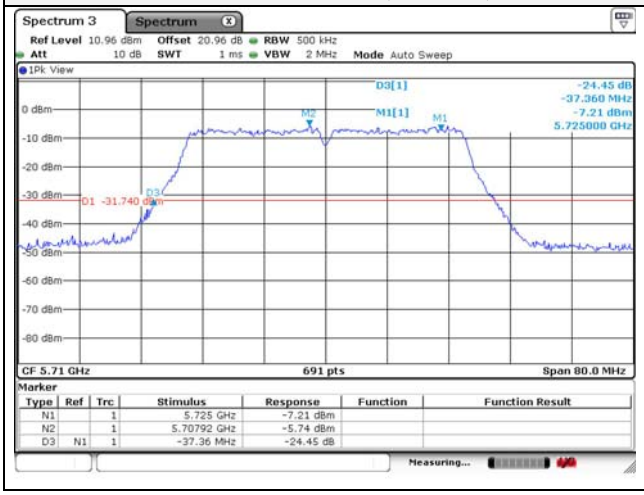
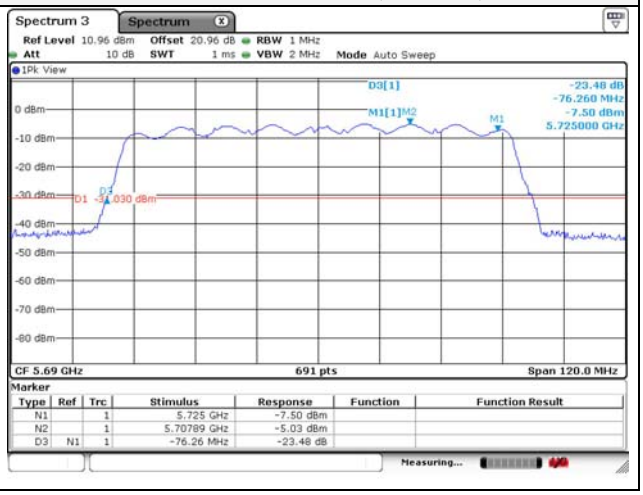
UNII-2C_VHT80(High)



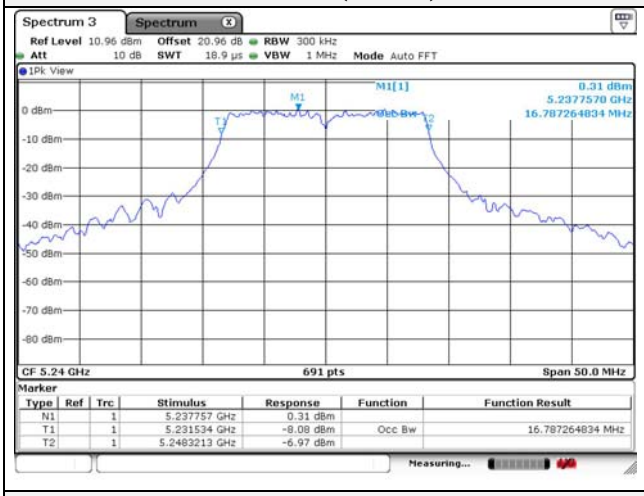
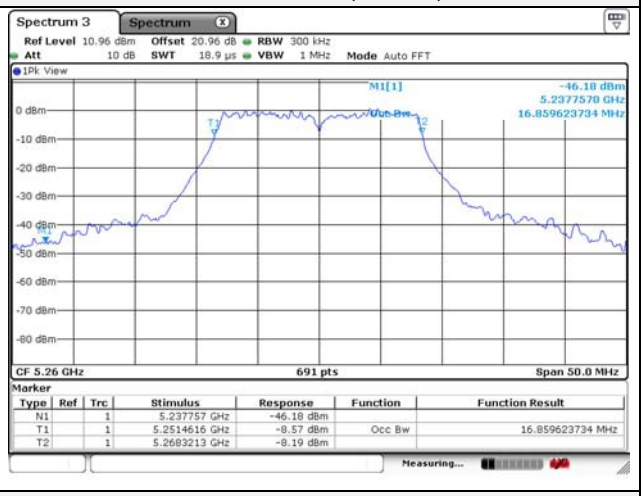
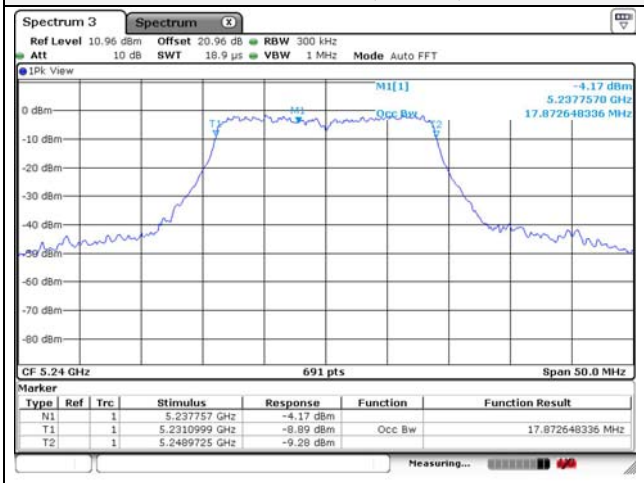
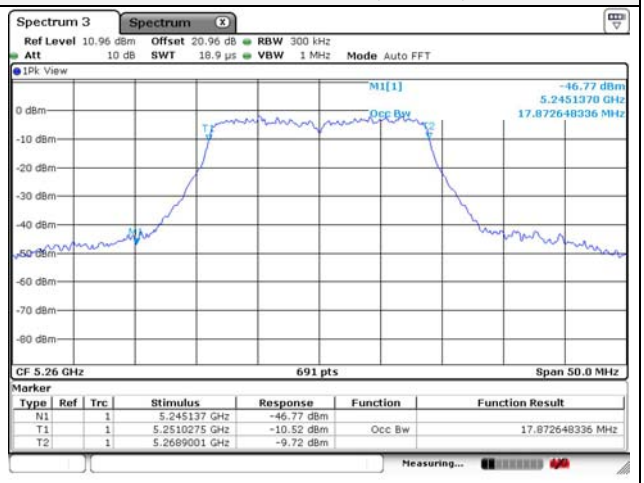
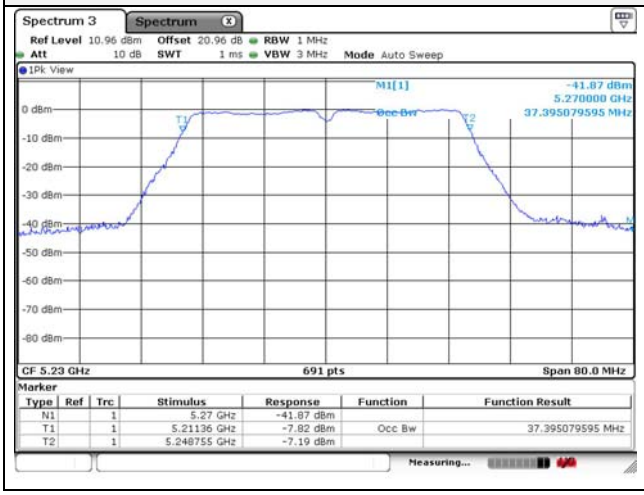
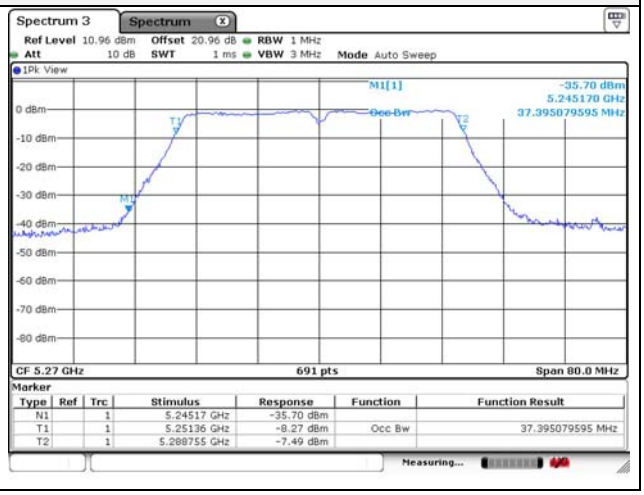
UNII-3_ VHT80

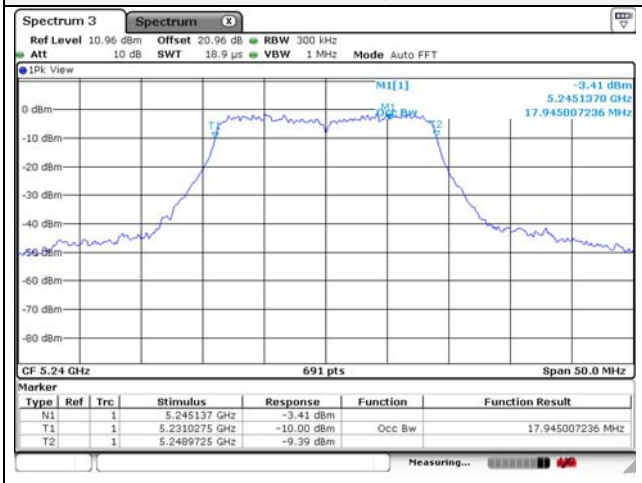
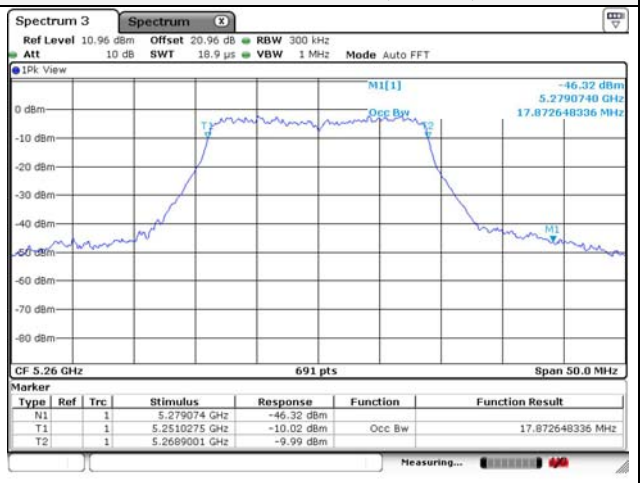
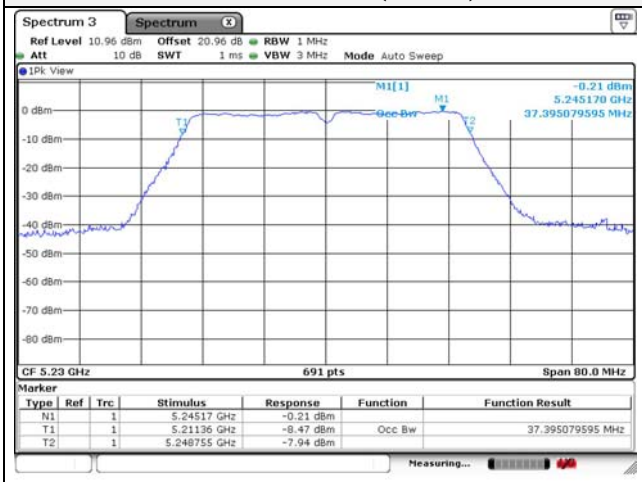
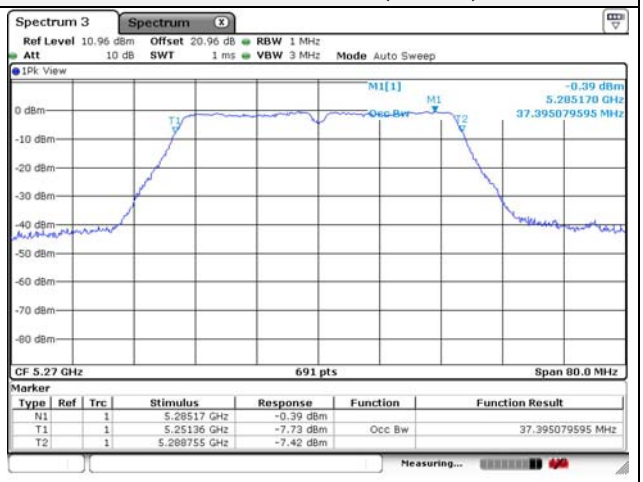
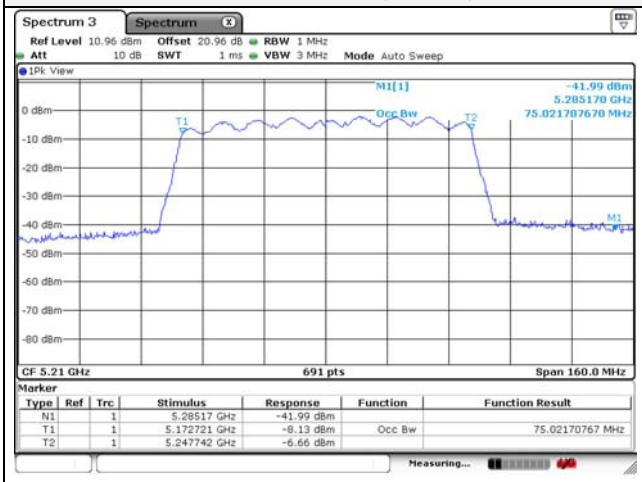
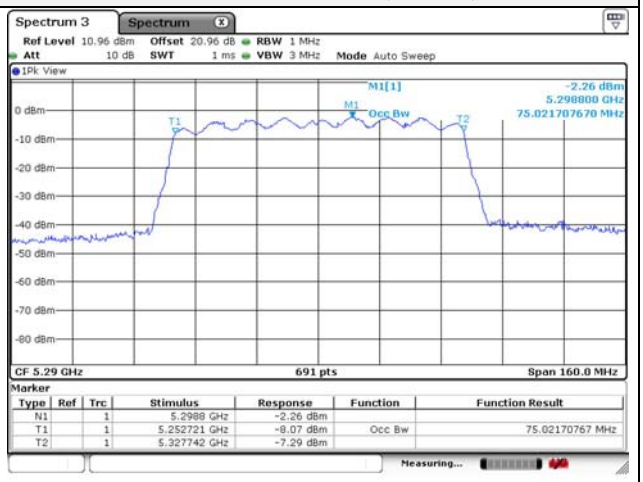


Band-crossing channels

UNII-2C_a (Ch. 144)	UNII-2C_ HT20 (Ch. 144)
	
UNII-2C_ HT40 (Ch. 142)	**UNII-2C_VHT20 (Ch. 144)**
	
UNII-2C_VHT40 (Ch. 142)	**UNII-2C_VHT80 (Ch. 138)**
	

99 % bandwidth

UNII-1_a (Ch. 48)	UNII-2A_ a (Ch. 52)
	
UNII-1_HT20 (Ch. 48)	**UNII-2A_HT20 (Ch. 52)**
	
UNII-1_HT40 (Ch. 46)	**UNII-2A_HT40 (Ch. 54)**
	

UNII-1_VHT20 (Ch. 48)	UNII-2A_VHT20 (Ch. 52)
	
UNII-1_VHT40 (Ch. 46)	**UNII-2A_VHT40 (Ch. 54)**
	
UNII-1_VHT80 (Ch. 42)	**UNII-2A_VHT80 (Ch. 58)**
	

3.2. 6 dB bandwidth

Test procedure

KDB 789033 D02 v01r03– Section C.2, KDB 644545 D03 v01

1. Set RBW = 100 ㎑
2. Set the video bandwidth (VBW) ≥ 3 × RBW.
3. Detector = peak.
4. Sweep = auto couple.
5. Allow the trace to stabilize
6. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 ㏈ relative to the maximum level measured in the fundamental emission.
7. In case of band crossing channels 138, 142 and 144, the measurement is complied with section D of KDB 644545_D03 v01.

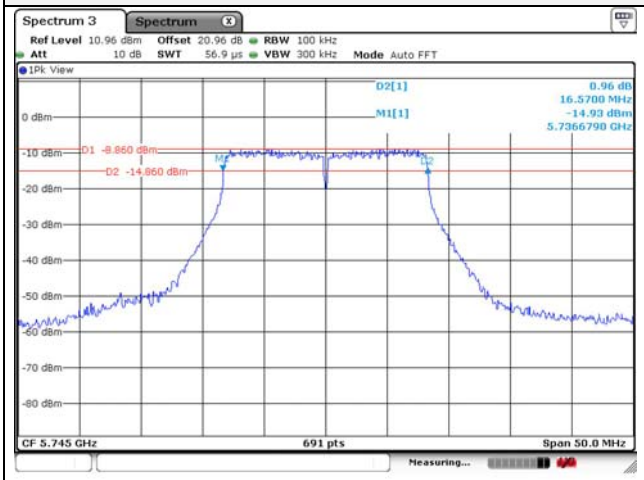
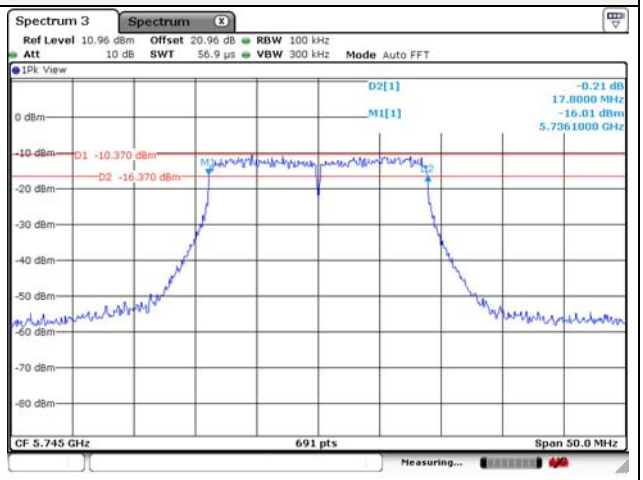
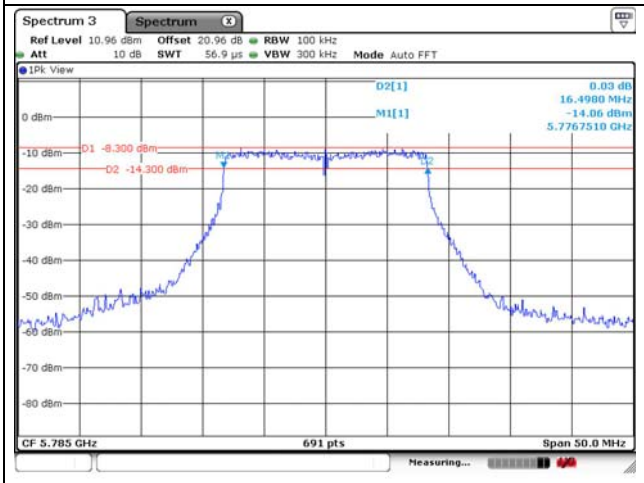
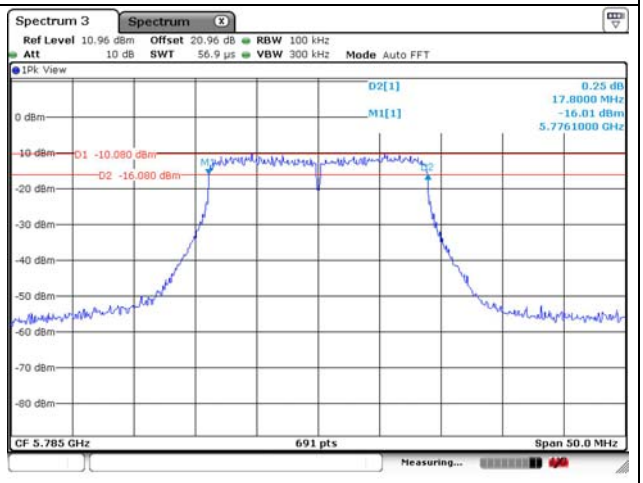
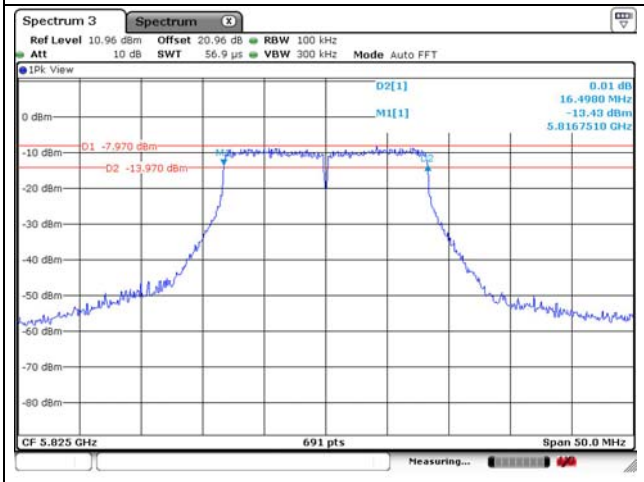
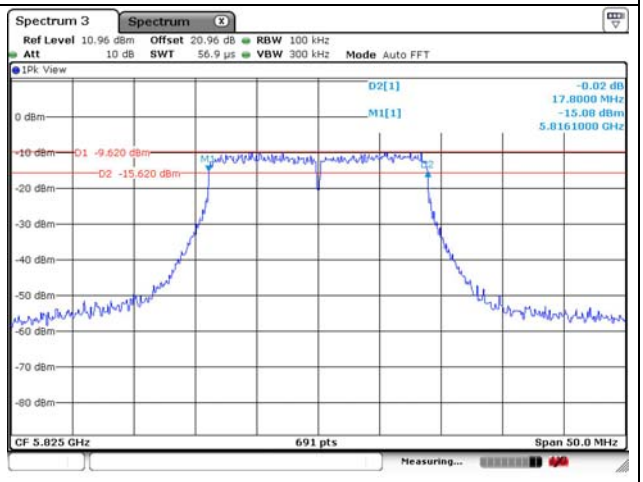
Limit

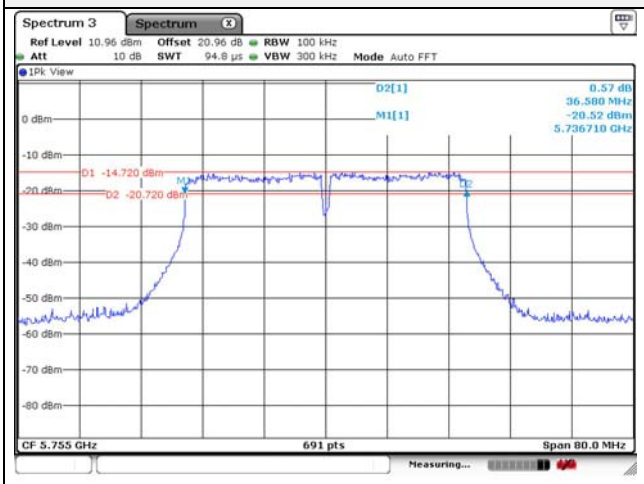
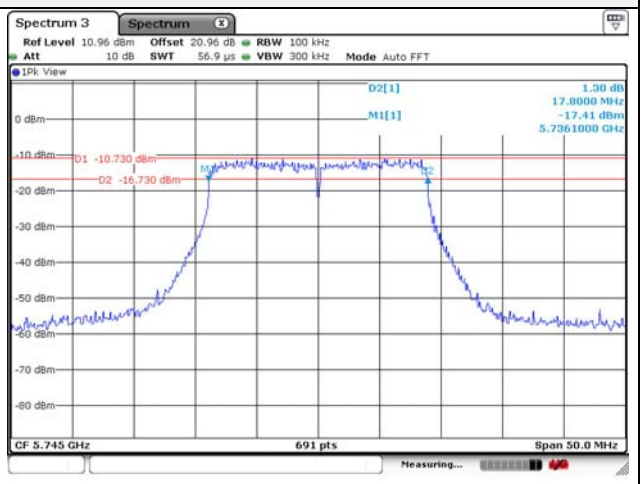
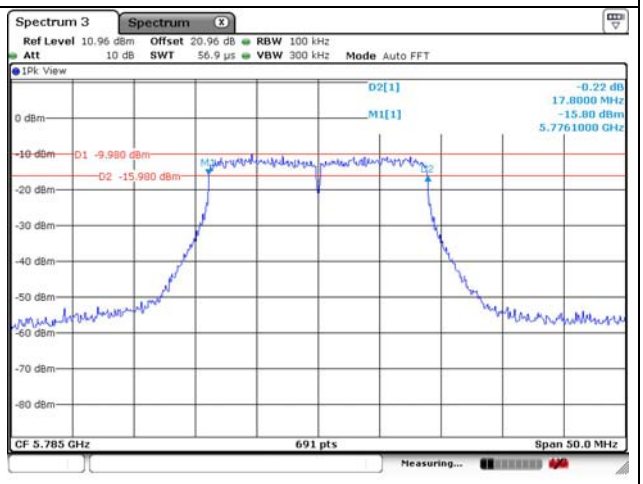
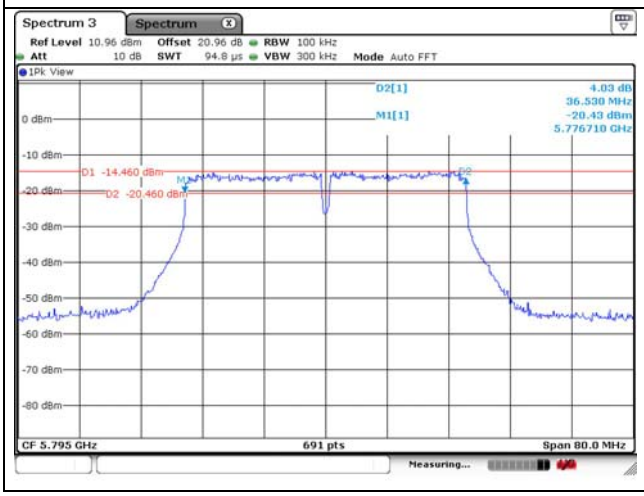
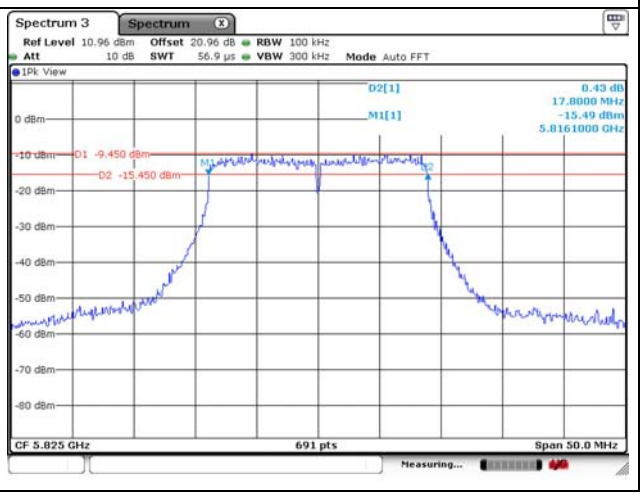
Within the 5.725-5.85 ㎓ band, the minimum 6 ㏈ bandwidth of U-NII devices shall be at least 500 ㎑.

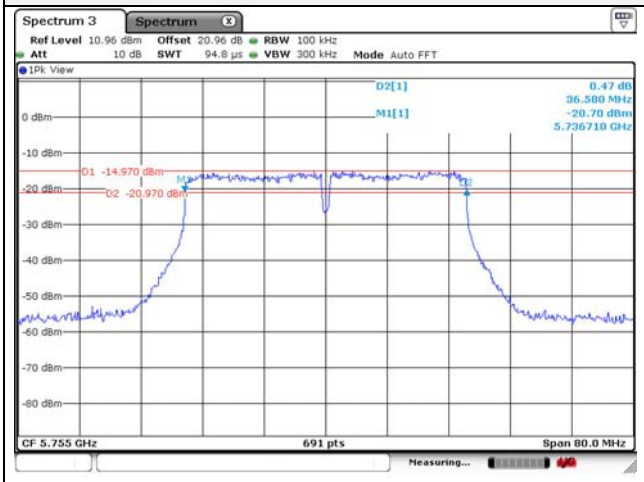
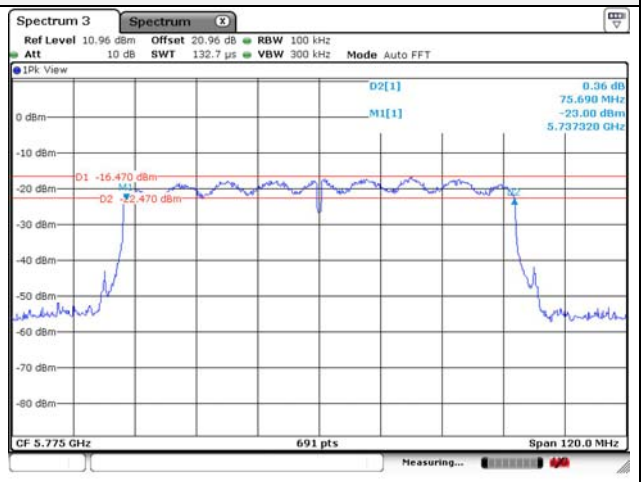
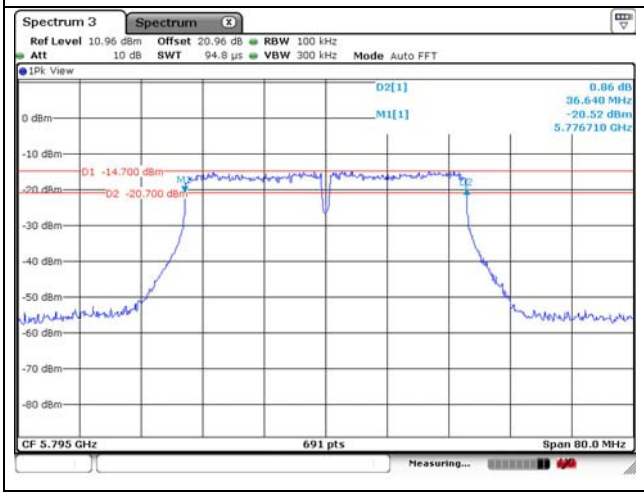
Test results

Band	Frequency(㎒)	Mode	6 dB bandwidth(㎒)
UNII-3	5 745	a	16.570
	5 785		16.498
	5 825		16.498
	5 745	HT20	17.800
	5 785		17.800
	5 825		17.800
	5 755	HT40	36.580
	5 795		36.530
	5 745	VHT20	17.800
	5 785		17.800
	5 825		17.800
	5 755	VHT40	36.580
	5 795		36.640
	5 775	VHT80	75.690
UNII-3 (Band-crossing channels)	5 720	a	3.249
	5 720	HT20	3.828
	5 710	HT40	3.250
	5 720	VHT20	3.828
	5 710	VHT40	3.250
	5 690	VHT80	2.900

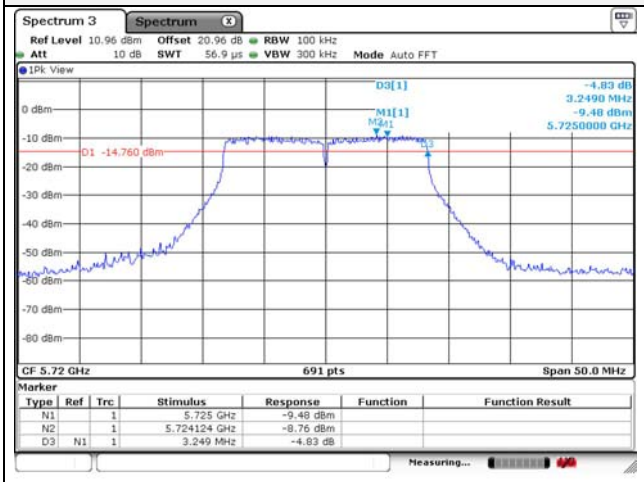
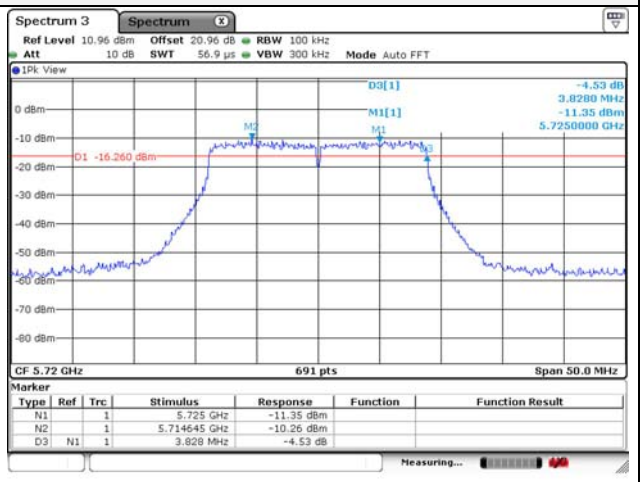
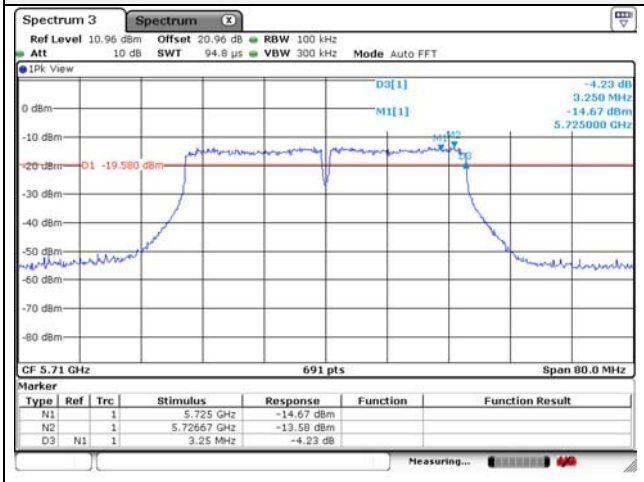
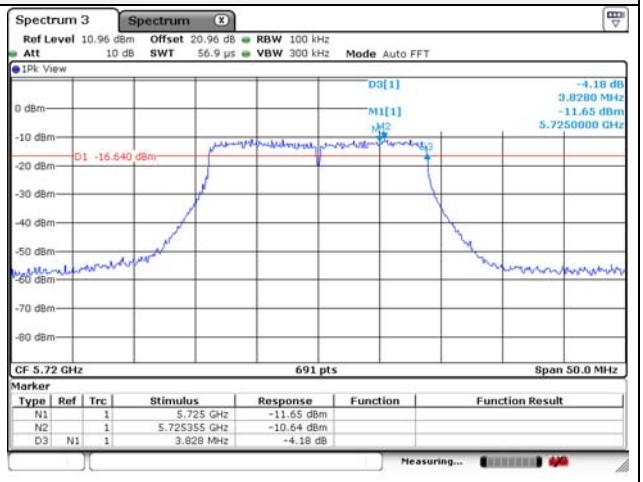
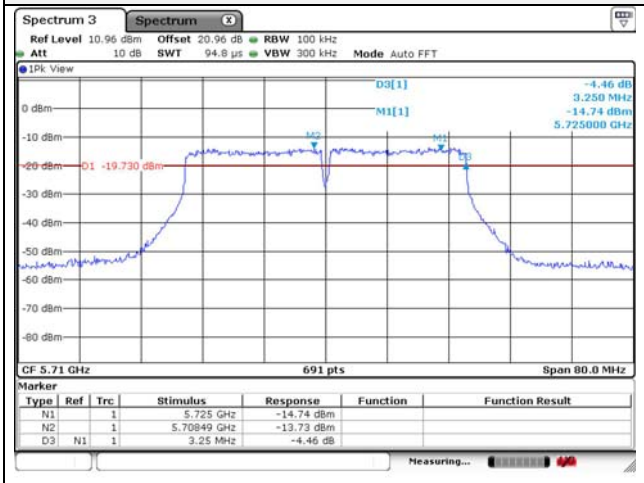
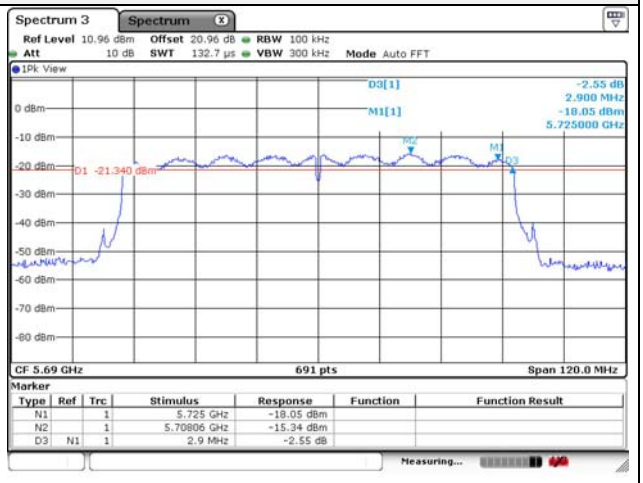
802.11a

UNII-3_a	UNII-3_HT20
	
	
	

UNII-3_HT40	UNII-3_VHT20
	
N/A	
	

UNII-3_VHT40	UNII-3_VHT80
	
	N/A

Band-crossing channels
802.11a

UNII-3_a (Ch. 144)	UNII-3_ HT20 (Ch. 144)
	
UNII-3_ HT40 (Ch. 142)	**UNII-3_VHT20 (Ch. 144)**
	
UNII-3_VHT40 (Ch. 142)	**UNII-3_VHT80 (Ch. 138)**
	

3.3. Maximum conducted output power

Test procedure

KDB 789033 D02 v01r03– Section E.3.a) or b), KDB 644545 D03 v01

Method PM (Measurement using an RF average power meter):

i. Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied.
- The EUT is configured to transmit continuously or to transmit with a constant duty cycle.
- At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.
- The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

ii. If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in section II.B.

iii. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.

iv. Adjust the measurement in dBm by adding 10 log (1/x) where x is the duty cycle (e.g., 10 log (1/0.25) if the duty cycle is 25 %).

v. In case of band crossing channels 138, 142 and 144, the measurement is complied with section E.2.d of KDB 644545_D03 v01

Method PM-G (Measurement using a gated RF average power meter):

Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

Limit

Band	EUT Category		Limit
UNII-1		Outdoor access point	1 W (30 dBm)
		Indoor access point	
		Fixed point-to-point access point	
	✓	Mobile and portable client device	250 mW(24 dBm)
UNII-2A	✓		250 mW or 11 dBm + 10logB*
UNII-2C	✓		250 mW or 11 dBm + 10logB*
UNII-3	✓		1 W (30 dBm)

Note.

1. B is the 26 dB emission bandwidth.

Test results

Band	Frequency (㎒)	Mode	Detector mode	DCF Note1	Output power(dBm)	Limit (dBm)
UNII-1	5 180	a	AV	-	10.84	24.00
	5 220		AV		10.91	
	5 240		AV		11.46	
UNII-2A	5 260		AV	-	11.47	24.00
	5 280		AV		11.82	
	5 320		AV		11.93	
UNII-2C	5 500		AV	-	11.80	24.00
	5 580		AV		12.04	
	5 720		AV		11.19	
UNII-3	5 745		AV	-	9.66	30.00
	5 785		AV		9.37	
	5 825		AV		8.51	

Band	Frequency (㎒)	Mode	Detector mode	DCF Note1	Output power(dBm)	Limit (dBm)
UNII-1	5 180	HT20	AV	-	8.87	24.00
	5 220		AV		8.97	
	5 240		AV		9.43	
UNII-2A	5 260		AV	-	8.77	24.00
	5 280		AV		9.27	
	5 320		AV		9.74	
UNII-2C	5 500		AV	-	10.02	24.00
	5 580		AV		10.43	
	5 720		AV		9.61	
UNII-3	5 745		AV	-	7.38	30.00
	5 785		AV		7.02	
	5 825		AV		6.24	

Note.

1. Refer to the page 66 on this report.

Band	Frequency (㎒)	Mode	Detector mode	DCF Note1	Output power(dBm)	Limit (dBm)
UNII-1	5 190	HT40	AV	-	7.84	24.00
	5 230		AV		8.15	
UNII-2A	5 270		AV	-	8.49	24.00
	5 310		AV		8.79	
UNII-2C	5 510		AV	-	9.13	24.00
	5 590		AV		9.86	
	5 710		AV		8.75	
UNII-3	5 755		AV	-	6.75	30.00
	5 795		AV		6.31	

Band	Frequency (㎒)	Mode	Detector mode	DCF Note1	Output power(dBm)	Limit (dBm)
UNII-1	5 180	VHT20	AV	-	8.51	24.00
	5 220		AV		8.64	
	5 240		AV		9.17	
UNII-2A	5 260		AV	-	8.90	24.00
	5 280		AV		9.24	
	5 320		AV		9.41	
UNII-2C	5 500		AV	-	9.87	24.00
	5 580		AV		10.18	
	5 720		AV		9.67	
UNII-3	5 745		AV	-	7.22	30.00
	5 785		AV		6.94	
	5 825		AV		6.41	

Note.

1. Refer to the page 66 on this report.

Band	Frequency (㎒)	Mode	Detector mode	DCF Note1	Output power(dBm)	Limit (dBm)
UNII-1	5 190	VHT40	AV	-	7.80	24.00
	5 230		AV		8.09	
UNII-2A	5 270		AV	-	8.44	24.00
	5 310		AV		8.75	
UNII-2C	5 510		AV	-	9.11	24.00
	5 590		AV		9.84	
	5 710		AV		8.71	
UNII-3	5 755		AV	-	6.69	30.00
	5 795		AV		6.29	

Band	Frequency (㎒)	Mode	Detector mode	DCF Note1	Output power(dBm)	Limit (dBm)
UNII-1	5 210	VHT80	AV	-	8.52	24.00
UNII-2A	5 290		AV	-	8.63	24.00
UNII-2C	5 530		AV	-	9.29	24.00
	5 610		AV		9.50	
	5 590		AV		7.84	
UNII-3	5 775		AV	-	6.27	30.00

Note.

1. Refer to the page 66 on this report.

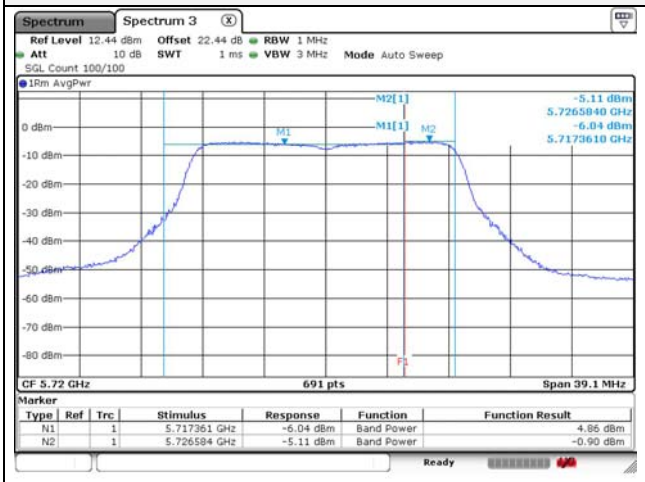
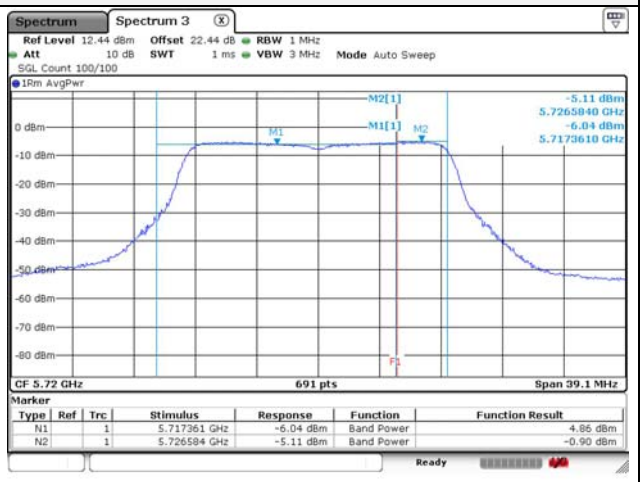
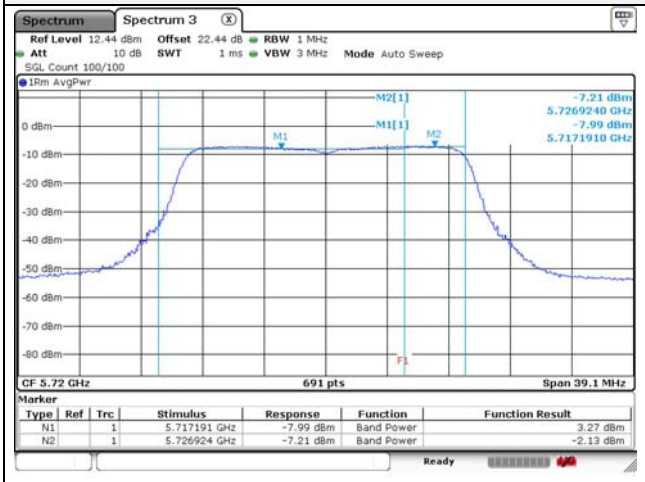
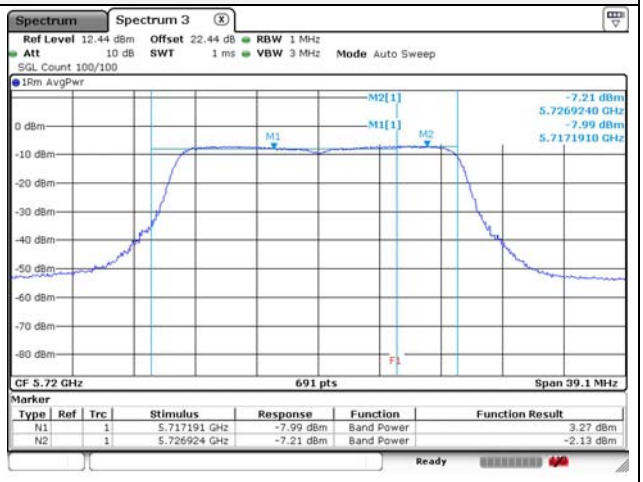
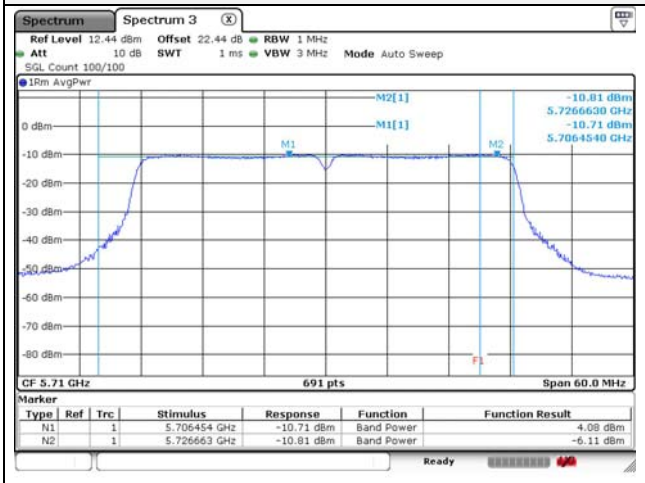
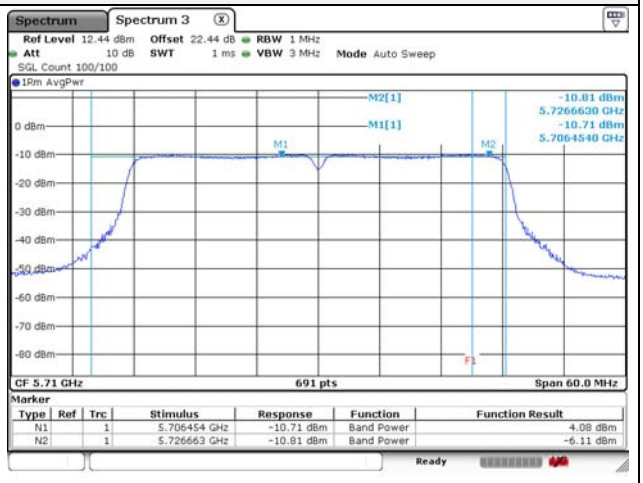
Band-crossing channels

Band	Frequency (㎒)	Mode	Detector mode	DCF Note1	Output power(dBm)	Limit (dBm)
UNII-2C	5 720	a	AV	-	4.86	22.92
	5 720	HT20	AV		3.27	23.00
	5 710	HT40	AV		4.08	30.00
	5 720	VHT20	AV		3.02	23.02
	5 710	VHT40	AV		3.91	30.00
	5 690	VHT80	AV		3.93	30.00
UNII-3	5 720	a	AV	-	-0.90	30.00
	5 720	HT20	AV		-2.13	
	5 710	HT40	AV		-6.11	
	5 720	VHT20	AV		-2.36	
	5 710	VHT40	AV		-6.31	
	5 690	VHT80	AV		-11.10	

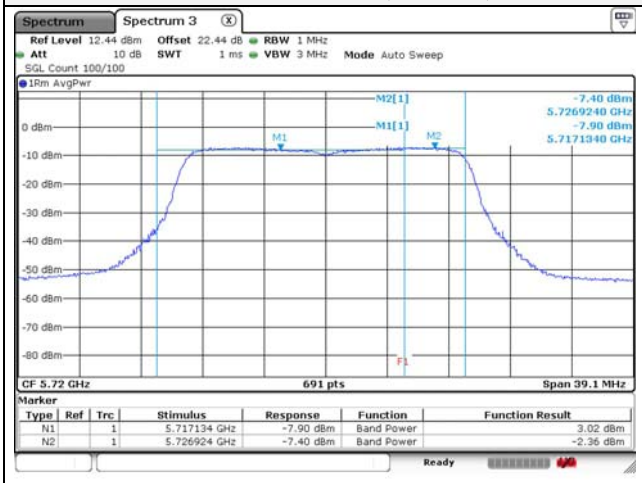
Note.

1. Refer to the page 66 on this report.

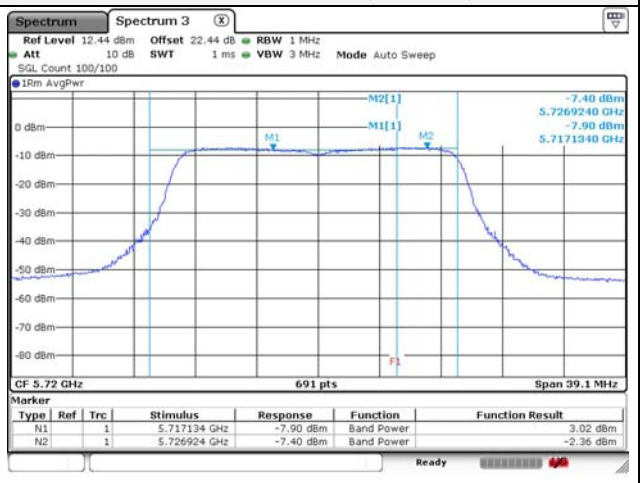
Band-crossing channels

UNII-2C_a (Ch. 144)	UNII-3_a (Ch. 144)
	
UNII-2C_HT20 (Ch. 144)	**UNII-3_HT20 (Ch. 144)**
	
UNII-2C_HT40 (Ch. 142)	**UNII-3_HT40 (Ch. 142)**
	

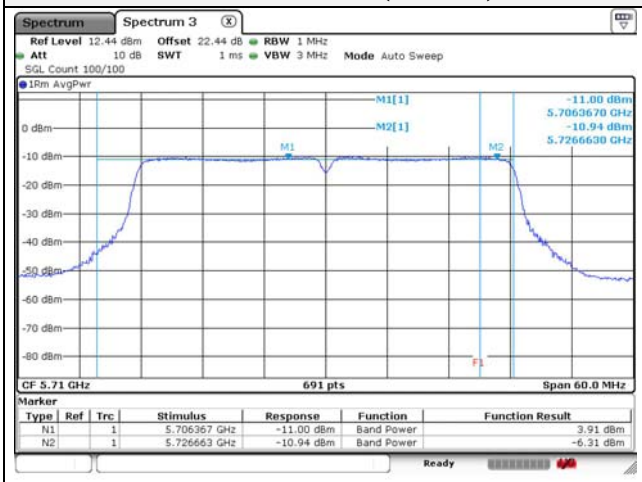
UNII-2C_VHT20 (Ch. 144)



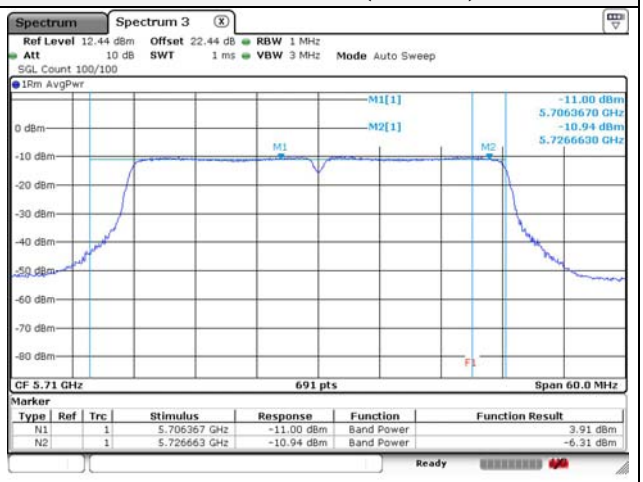
UNII-3_VHT20 (Ch. 144)



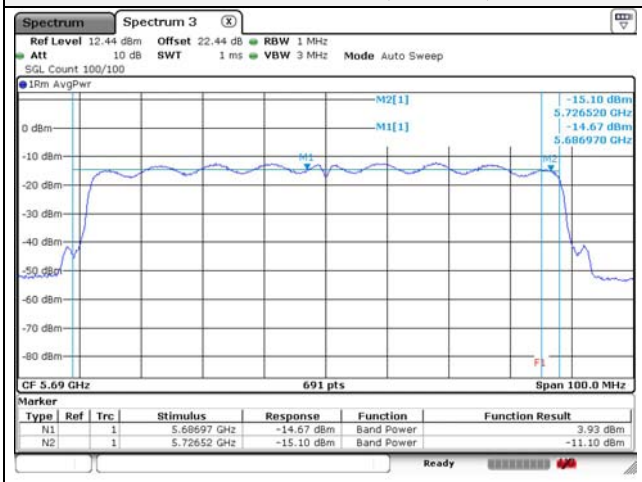
UNII-2C_VHT40 (Ch. 142)



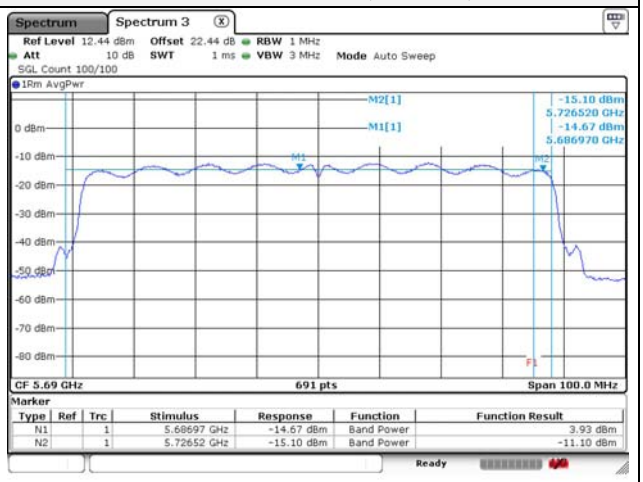
UNII-3_VHT40 (Ch. 142)



UNII-2C_VHT80 (Ch. 138)



UNII-3_VHT80 (Ch. 138)



3.4. Power spectral density

Test procedure

KDB 789033 D02 v01r03 – Section F, KDB 644545 D03 v01

1. Create an average power spectrum for the EUT operating mode being tested by following the instructions in section II.E.2. for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, "Compute power…." (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)
2. Use the peak search function on the instrument to find the peak of the spectrum and record its value.
3. Make the following adjustments to the peak value of the spectrum, if applicable:
   a) If Method SA-2 or SA-2 Alternative was used, add 10 log (1/x), where x is the duty cycle, to the peak of the spectrum.
   b) If Method SA-3 Alternative was used and the linear mode was used in step II.E.2.g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
4. The result is the Maximum PSD over 1 ㎒ reference bandwidth.
5. For devices operating in the bands 5.15-5.25 ㎓, 5.25-5.35 ㎓, and 5.47-5.725 ㎓, the above procedures make use of 1 ㎒ RBW to satisfy directly the 1 ㎒ reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 ㎓, the rules specify a measurement bandwidth of 500 ㎑. Many spectrum analyzers do not have 500 ㎑ RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 ㎒, or 500 ㎑, "provided that the measured power is integrated over the full reference bandwidth" to show the total power over the specified measurement bandwidth (i.e., 1 ㎒, or 500 ㎑). If measurements are performed using a reduced resolution bandwidth (< 1 ㎒, or < 500 ㎑) and integrated over 1 ㎒, or 500 ㎑ bandwidth, the following adjustments to the procedures apply:

   a) Set RBW ≥ 1/T, where T is defined in section II.B.l.a)
   b) Set VBW ≥ 3 RBW.
   c) If measurement bandwidth of Maximum PSD is specified in 500 ㎑, add 10 log (500 ㎑/RBW) to the measured result, whereas RBW (< 500 ㎑) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
   d) If measurement bandwidth of Maximum PSD is specified in 1 ㎒, add 10 log (1 ㎒/RBW) to the measured result, whereas RBW (< 1 ㎒) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
   e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.
6. In case of band crossing channels 138, 142 and 144, the measurement is complied with section D of KDB 644545_D03 v01.

Note.

As a practical matter, it is recommended to use reduced RBW of 100 ㎑ for the sections 5.c) and 5.d) above, since RBW=100 ㎑ is available on nearly all spectrum analyzers.

Limit

Band	EUT Category		Limit
UNII-1		Outdoor access point	17 dBm/㎒
		Indoor access point	
		Fixed point-to-point access point	
	✓	Mobile and portable client device	11 dBm/㎒
UNII-2A	✓		11 dBm/㎒
UNII-2C	✓		11 dBm/㎒
UNII-3	✓		30 dBm/500 ㎑

Test results

Band	Frequency (㎒)	Mode	PSD(dBm)	RBWF Note1	DCF Note2	Sum Note3
UNII-1	5 180	a	-1.80	-	-	-1.80
	5 220		-1.85	-		-1.85
	5 240		-1.36	-		-1.36
UNII-2A	5 260		-1.12	-	-	-1.12
	5 280		-0.89	-		-0.89
	5 320		-1.09	-		-1.09
UNII-2C	5 500		-0.74	-	-	-0.74
	5 580		-1.82	-		-1.82
	5 720		-5.21	-		-5.21
UNII-3	5 745		-6.71	-	-	-6.71
	5 785		-6.38	-		-6.38
	5 825		-5.90	-		-5.90

Band	Frequency (㎒)	Mode	PSD(dBm)	RBWF Note1	DCF Note2	Sum Note3
UNII-1	5 180	HT20	-3.57	-	-	-3.57
	5 220		-3.93	-		-3.93
	5 240		-2.92	-		-2.92
UNII-2A	5 260		-3.04	-	-	-3.04
	5 280		-2.89	-		-2.89
	5 320		-3.22	-		-3.22
UNII-2C	5 500		-2.68	-	-	-2.68
	5 580		-3.89	-		-3.89
	5 720		-7.19	-		-7.19
UNII-3	5 745		-8.54	-	-	-8.54
	5 785		-8.03	-		-8.03
	5 825		-7.50	-		-7.50

Band	Frequency (㎒)	Mode	PSD(dBm)	RBWF Note1	DCF Note2	Sum Note3
UNII-1	5 190	HT40	-7.22	-	-	-7.22
	5 230		-7.81	-		-7.81
UNII-2A	5 270		-7.25	-	-	-7.25
	5 310		-7.61	-		-7.61
UNII-2C	5 510		-6.64	-	-	-6.64
	5 590		-7.97	-		-7.97
	5 710		-9.85	-		-9.85
UNII-3	5 755		-12.95	-	-	-12.95
	5 795		-12.29	-		-12.29

Band	Frequency (㎒)	Mode	PSD(dBm)	RBWF Note1	DCF Note2	Sum Note3
UNII-1	5 180	VHT20	-4.12	-	-	-4.12
	5 220		-4.00	-		-4.00
	5 240		-2.72	-		-2.72
UNII-2A	5 260		-3.37	-	-	-3.37
	5 280		-2.98	-		-2.98
	5 320		-3.46	-		-3.46
UNII-2C	5 500		-2.94	-	-	-2.94
	5 580		-4.00	-		-4.00
	5 720		-7.10	-		-7.10
UNII-3	5 745		-8.62	-	-	-8.62
	5 785		-8.36	-		-8.36
	5 825		-7.71	-		-7.71

Band	Frequency (㎒)	Mode	PSD(dBm)	RBWF Note1	DCF Note2	Sum Note3
UNII-1	5 190	VHT40	-7.51	-	-	-7.51
	5 230		-7.99	-		-7.99
UNII-2A	5 270		-7.58	-	-	-7.58
	5 310		-7.82	-		-7.82
UNII-2C	5 510		-6.90	-	-	-6.90
	5 590		-8.22	-		-8.22
	5 710		-10.09	-		-10.09
UNII-3	5 755		-12.64	-	-	-12.64
	5 795		-12.43	-		-12.43

Band	Frequency (㎒)	Mode	PSD(dBm)	RBWF Note1	DCF Note2	Sum Note3
UNII-1	5 210	VHT80	-9.79	-	-	-9.79
UNII-2A	5 290		-9.44	-	-	-9.44
UNII-2C	5 530		-9.41	-	-	-9.41
	5 610		-10.37	-		-10.37
	5 690		-12.27	-		-12.27
UNII-3	5 775		-15.30	-	-	-15.30

Band-crossing channels

Band	Frequency (㎒)	Mode	PSD(dBm)	RBWF Note1	DCF Note2	Sum Note3
UNII-2C	5 720	a	-5.21	-	-	-5.21
	5 720	HT20	-7.19	-		-7.19
	5 710	HT40	-9.85	-		-9.85
	5 720	VHT20	-7.10	-		-7.10
	5 710	VHT40	-10.09	-		-10.09
	5 690	VHT80	-12.27	-		-12.27
UNII-3	5 720	a	-7.92	-	-	-7.92
	5 720	HT20	-9.34	-		-9.34
	5 710	HT40	-12.70	-		-12.70
	5 720	VHT20	-9.55	-		-9.55
	5 710	VHT40	-12.67	-		-12.67
	5 690	VHT80	-17.06	-		-17.06

Note.

1. UNII-1 = 10log(1 ㎒/1 ㎒)
   UNII-2A = 10log(1 ㎒/1 ㎒)
   UNII-2C = 10log(1 ㎒/1 ㎒)
   UNII-3 = 10log(500 ㎑ /500 ㎑)
2. Refer to the page 66 on this report.
3. Sum(dBm) = PSD(dBm) + RBWF + Duty correction factor (dB)