

TEST REPORT

Part 15 Subpart E 15.407

Equipment under test NETWORK VIDEO RECORDER

Model name TRM-410S

FCC ID NLMTRM410S

Applicant Hanwha Techwin Co., Ltd.

Manufacturer Hanwha Techwin (Tianjin) Co.,Ltd.
Hanwha Techwin Security Vietnam Co.,Ltd.
D-TECH Co.,Ltd.

Date of test(s) 2019.01.07 ~ 2019.01.30

Date of issue 2019.02.14

Issued to

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Test report No.:
KES-RF-19T0013
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Revision history

Revision	Date of issue	Test report No.	Description
-	2019.02.14	KES-RF-19T0013	Initial

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1. General information

Applicant: Hanwha Techwin Co., Ltd.
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Test site: KES Co., Ltd.
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473-21, Gayeo-ro, Yeosu-si, Gyeonggi-do, Korea
Test Facility: FCC Accreditation Designation No.: KR0100, Registration No.: 444148
FCC rule part(s): 15.407
FCC ID: NLMTRM410S
Test device serial No.: ☒ Production ☐ Pre-production ☐ Engineering

1.1. EUT description

Equipment under test: NETWORK VIDEO RECORDER
Frequency range: UNII-1 5 180 MHz ~ 5 240 MHz (11ac_VHT20)
5 190 MHz ~ 5 230 MHz (11ac_VHT40)
5 210 MHz (11ac_VHT80)
UNII-2A 5 260 MHz ~ 5 320 MHz (11ac_VHT20)
5 270 MHz ~ 5 310 MHz (11ac_VHT40)
5 290 MHz (11ac_VHT80)
UNII-2C 5 500 MHz ~ 5 720 MHz (11ac_VHT20)
5 510 MHz ~ 5 710 MHz (11ac_VHT40)
5 530 MHz ~ 5 690 MHz (11ac_VHT80)
UNII-3 5 745 MHz ~ 5 825 MHz (11ac_VHT20)
5 755 MHz ~ 5 795 MHz (11ac_VHT40)
5 775 MHz (11ac_VHT80)
GPS 1 575.42 MHz (GPS)
Model: TRM-410S
Modulation technique: OFDM
Antenna specification: 5 GHz_UNII 1, 2A // Dipole Antenna & 2.72 dBi
5 GHz_UNII 2C // Dipole Antenna & 3.45 dBi
5 GHz_UNII 3 // Dipole Antenna & 5.63 dBi
Power source: DC 9V~36V

Number of channels 5 180 MHz ~ 5 240 MHz (11ac_VHT20) : 4ch
 5 190 MHz ~ 5 230 MHz (11ac_VHT40) : 2ch
 5 210 MHz (11ac_VHT80) : 1ch
 5 260 MHz ~ 5 320 MHz (11ac_VHT20) : 4ch
 5 270 MHz ~ 5 310 MHz (11ac_VHT40) : 2ch
 5 290 MHz (11ac_VHT80) : 1ch
 5 500 MHz ~ 5 720 MHz (11ac_VHT20) : 12ch
 5 510 MHz ~ 5 710 MHz (11ac_VHT40) : 6ch
 5 530 MHz ~ 5 690 MHz (11ac_VHT80) : 3ch
 5 745 MHz ~ 5 825 MHz (11ac_VHT20) : 5ch
 5 755 MHz ~ 5 795 MHz (11ac_VHT40) : 2ch
 5 775 MHz (11ac_VHT80) : 1ch
 1 575.42 MHz (GPS) : 1ch

1.2. Test configuration

The **Hanwha Techwin Co., Ltd. NETWORK VIDEO RECORDER FCC ID: NLMTRM410S** was tested according to the specification of EUT, the EUT must comply with following standards and KDB documents.

FCC Part 15.407
KDB 789033 D02 v02r01
ANSI C63.10-2013

1.3. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
Control Box	Hanwha Techwin(Tianjin) Co., Ltd.	-	-	-

1.4. Software and Firmware description

The software and firmware installed in the EUT is version V1.00_190129183607

1.5. Measurement results explanation example

For all conducted test items :

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\ &= 1.70 + 10 = 11.70 \text{ (dB)} \end{aligned}$$

1.6. Measurement Uncertainty

Test Item		Uncertainty
Uncertainty for Conduction emission test		2.62 dB
Uncertainty for Radiation emission test (include Fundamental emission)	9kHz - 30MHz	4.54 dB
	30MHz - 1GHz	4.36 dB
	Above 1GHz	5.00 dB
Note. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.		

1.7. Frequency/channel operations

UNII-1		UNII-2A		UNII-2C		UNII-3	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
36	5 180	52	5 260	100	5 500	149	5 745
44	5 220	56	5 280	120	5 600	157	5 785
48	5 240	64	5 320	144	5 720	165	5 825

Table 1.7-1. 802.11ac_VHT20 mode

UNII-1		UNII-2A		UNII-2C		UNII-3	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
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. 802.11ac_VHT40 mode

UNII-1		UNII-2A		UNII-2C		UNII-3	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
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

1.8. Maximum average output power

Refer to the average output power.

Note.

- 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.
- Worst-case data rates as provided by the client were:
UNII-1 ac_VHT20 : **MCS8**, ac_VHT40/80 : **MCS9**
UNII-2A ac_VHT20 : **MCS8**, ac_VHT40/80 : **MCS9**
UNII-2C ac_VHT20 : **MCS8**, ac_VHT40/80 : **MCS9**
UNII-3 ac_VHT20 : **MCS8**, ac_VHT40/80 : **MCS9**
- This report contains the worst case data from the following mode of the test in 20/40/80 MHz signal bandwidth.

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	N/A ^{Note.1}

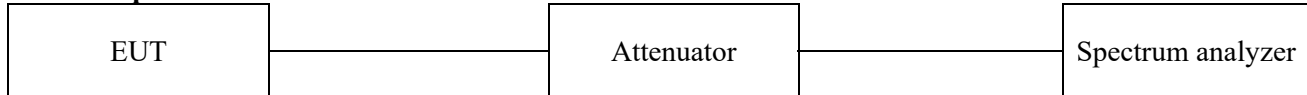
Note.

1. This device doesn't required AC conducted emission test because only use DC power.

3. Test results

3.1. 26 dB bandwidth & 99% Occupied Bandwidth

Test setup



Test procedure

26 dB bandwidth

KDB 789033 D02 v02r01– Section C.1

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%.

Limit

N/A

99 % bandwidth

KDB 789033 D02 v02r01– 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.

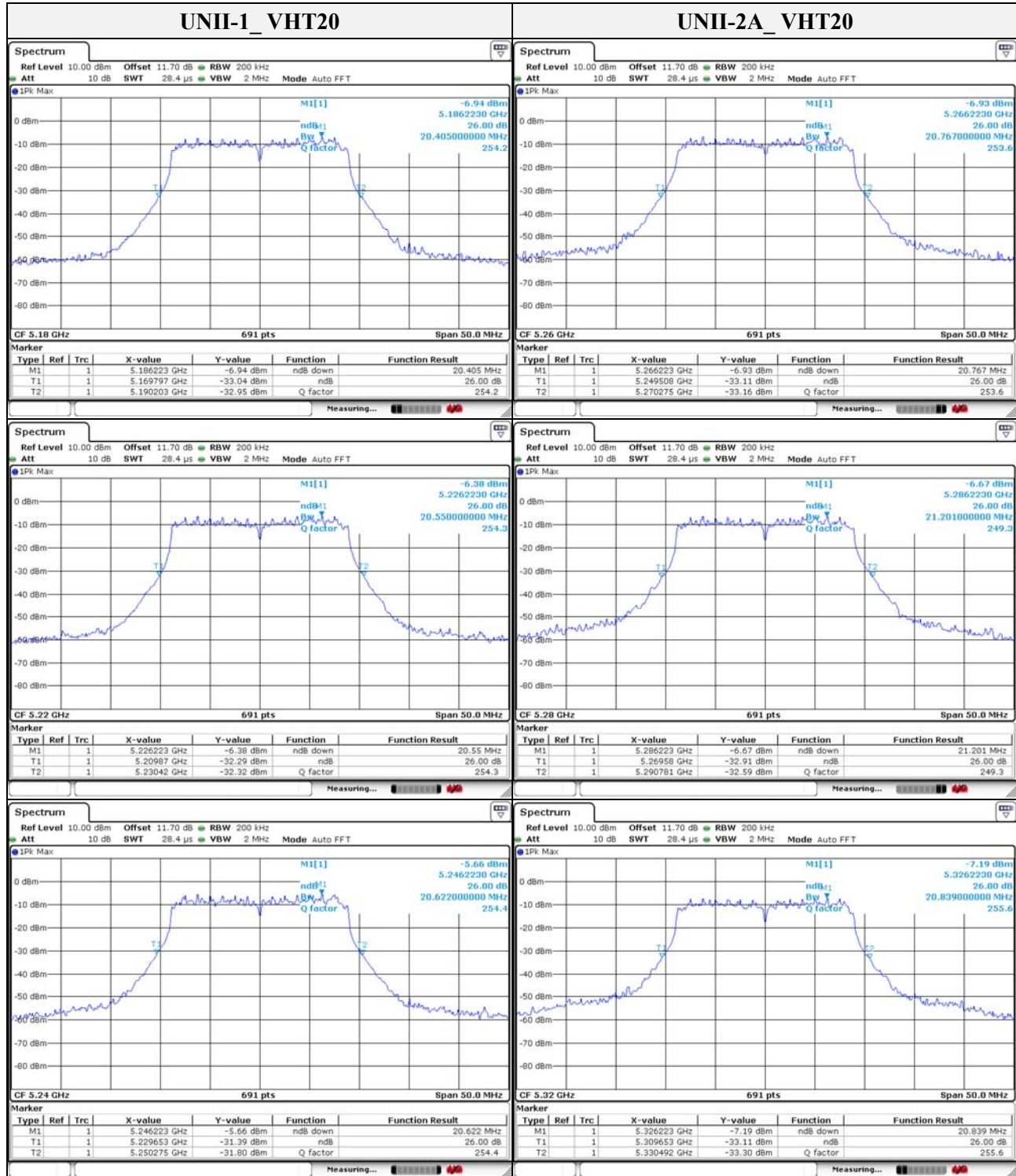
In the result,

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

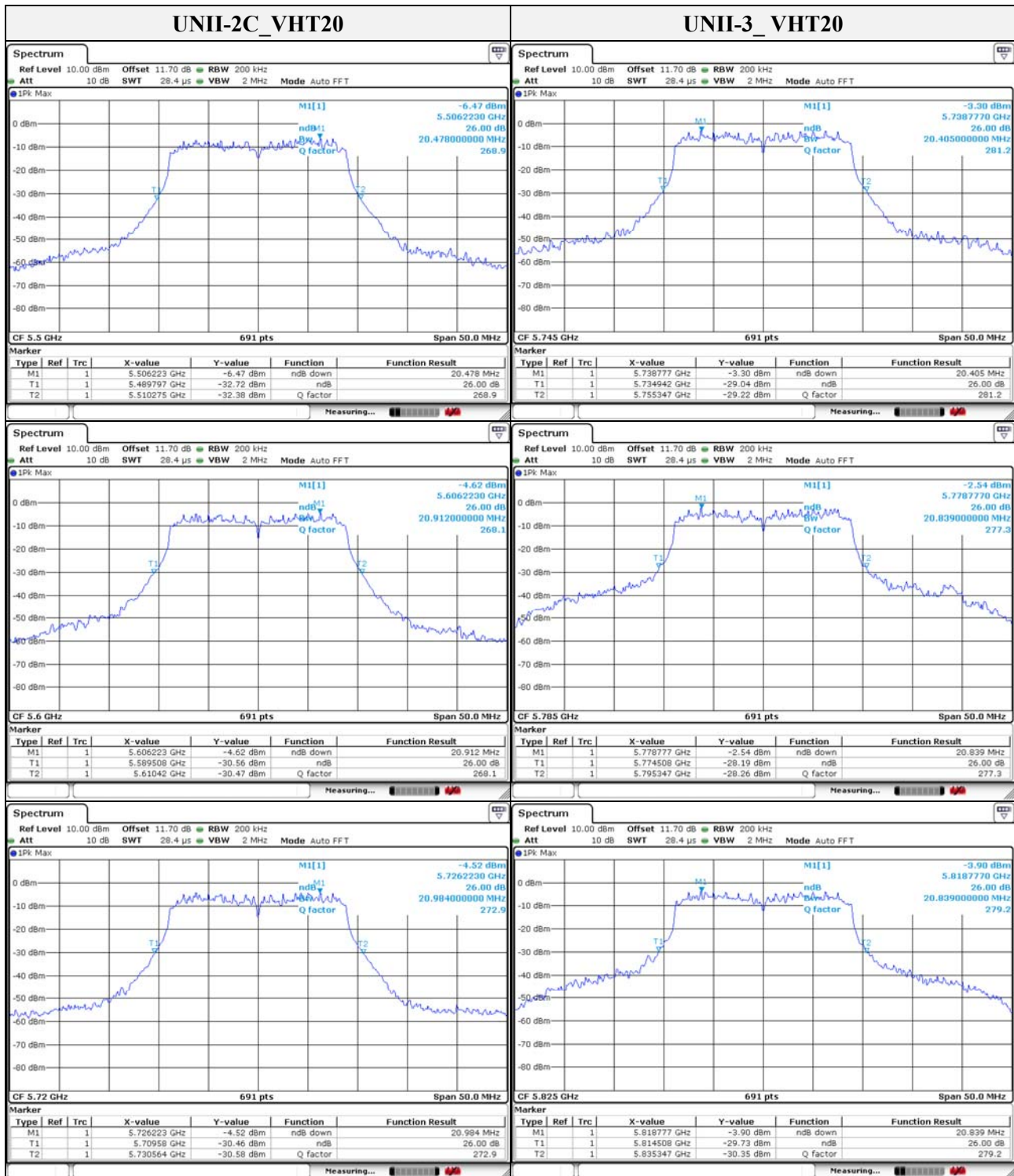
Test results

Band	Frequency(MHz)	Mode	26 dB bandwidth(MHz)	99 % bandwidth(MHz)
UNII-1	5 180	VHT20	20.405	17.800
	5 220		20.550	17.873
	5 240		20.622	17.945
UNII-2A	5 260		20.767	17.873
	5 280		21.201	17.728
	5 320		20.839	17.800
UNII-2C	5 500		20.478	17.873
	5 600		20.912	17.873
	5 720		20.984	17.873
UNII-3	5 745		20.405	17.728
	5 785		20.839	17.873
	5 825		20.839	17.945
UNII-1	5 190	VHT40	42.950	36.700
	5 230		42.260	36.816
UNII-2A	5 270		42.840	36.816
	5 310		41.910	36.700
UNII-2C	5 510		43.180	37.164
	5 590		42.720	36.816
	5 710		42.600	36.585
UNII-3	5 755		42.370	36.816
	5 795		42.720	36.932
UNII-1	5 210	VHT80	81.970	75.543
UNII-2A	5 290		82.140	75.543
UNII-2C	5 530		81.100	75.716
	5 610		81.790	75.543
	5 690		81.270	75.543
UNII-3	5 775		81.100	75.716
UNII-2C (Band-crossing channel)	5 720	VHT20	15.926	-
	5 710	VHT40	35.490	-
	5 690	VHT80	74.220	-

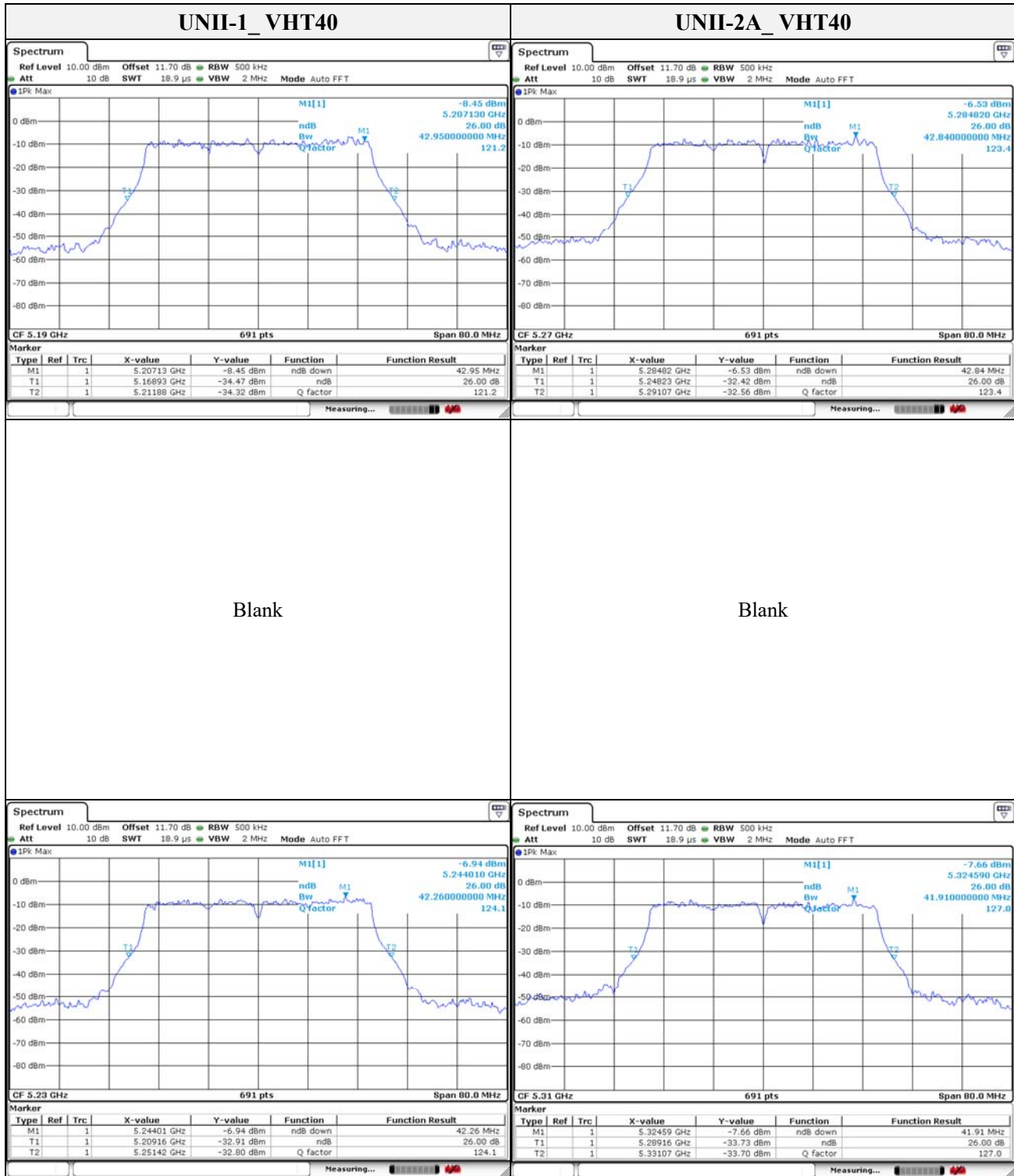
26 dB bandwidth

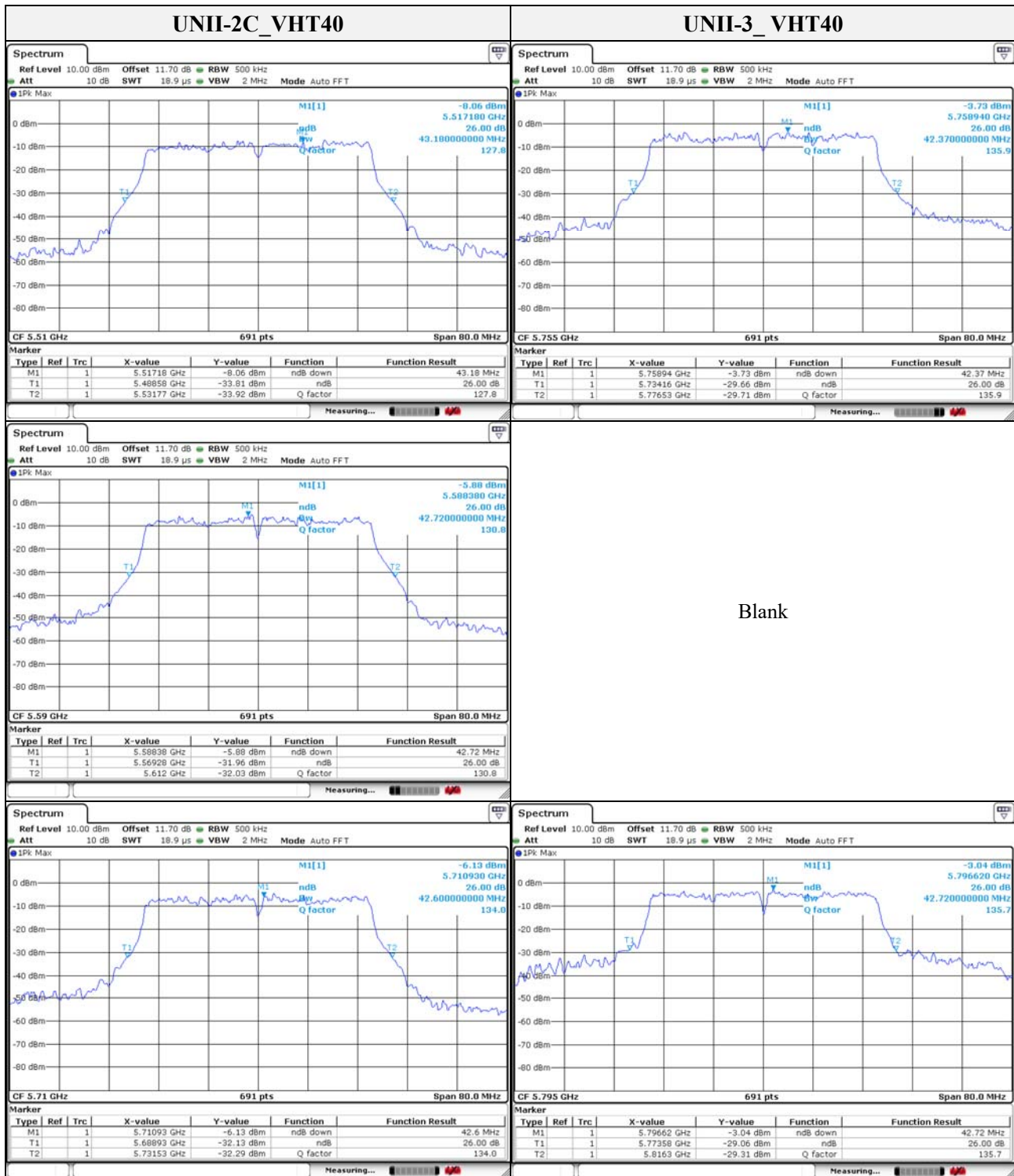


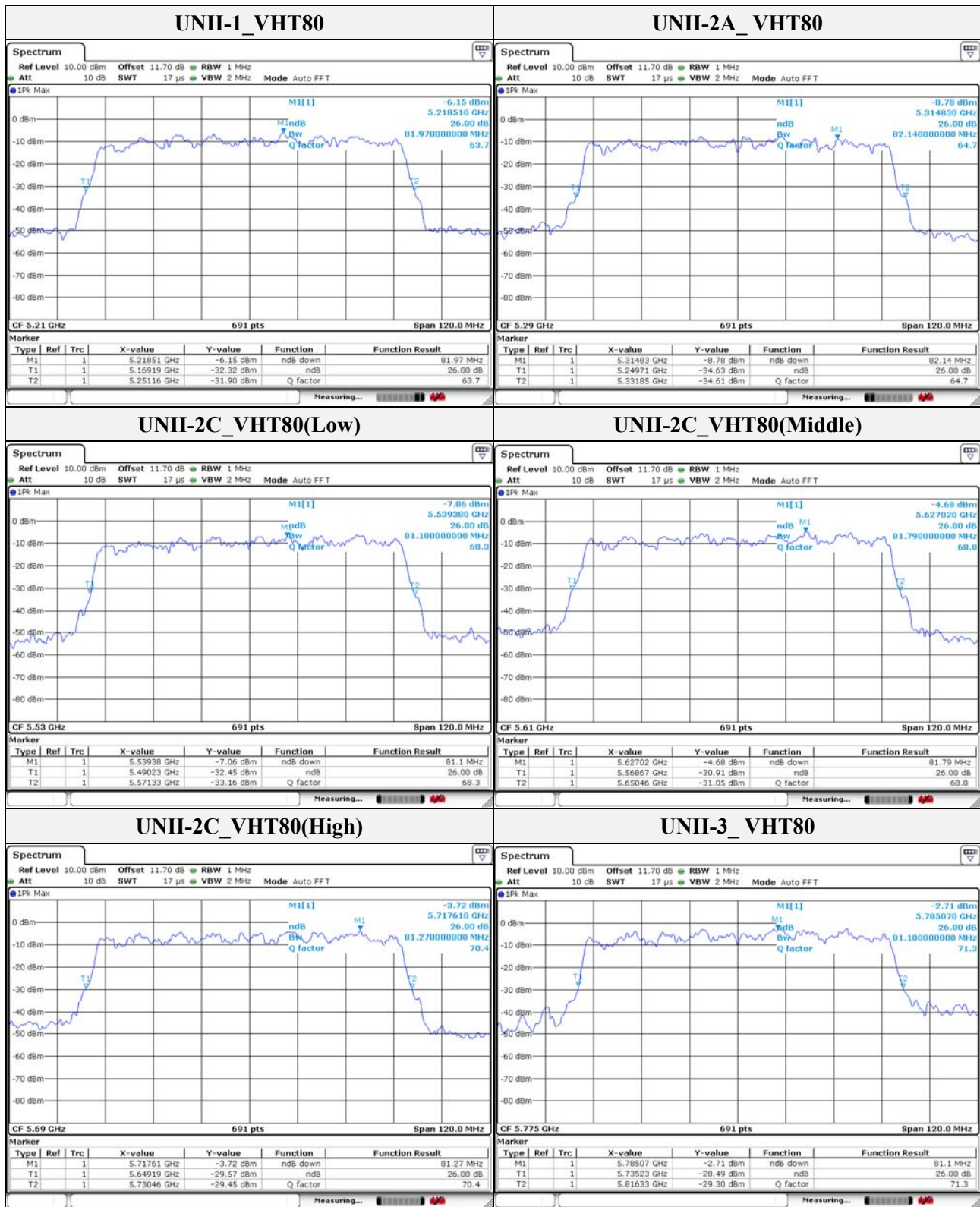
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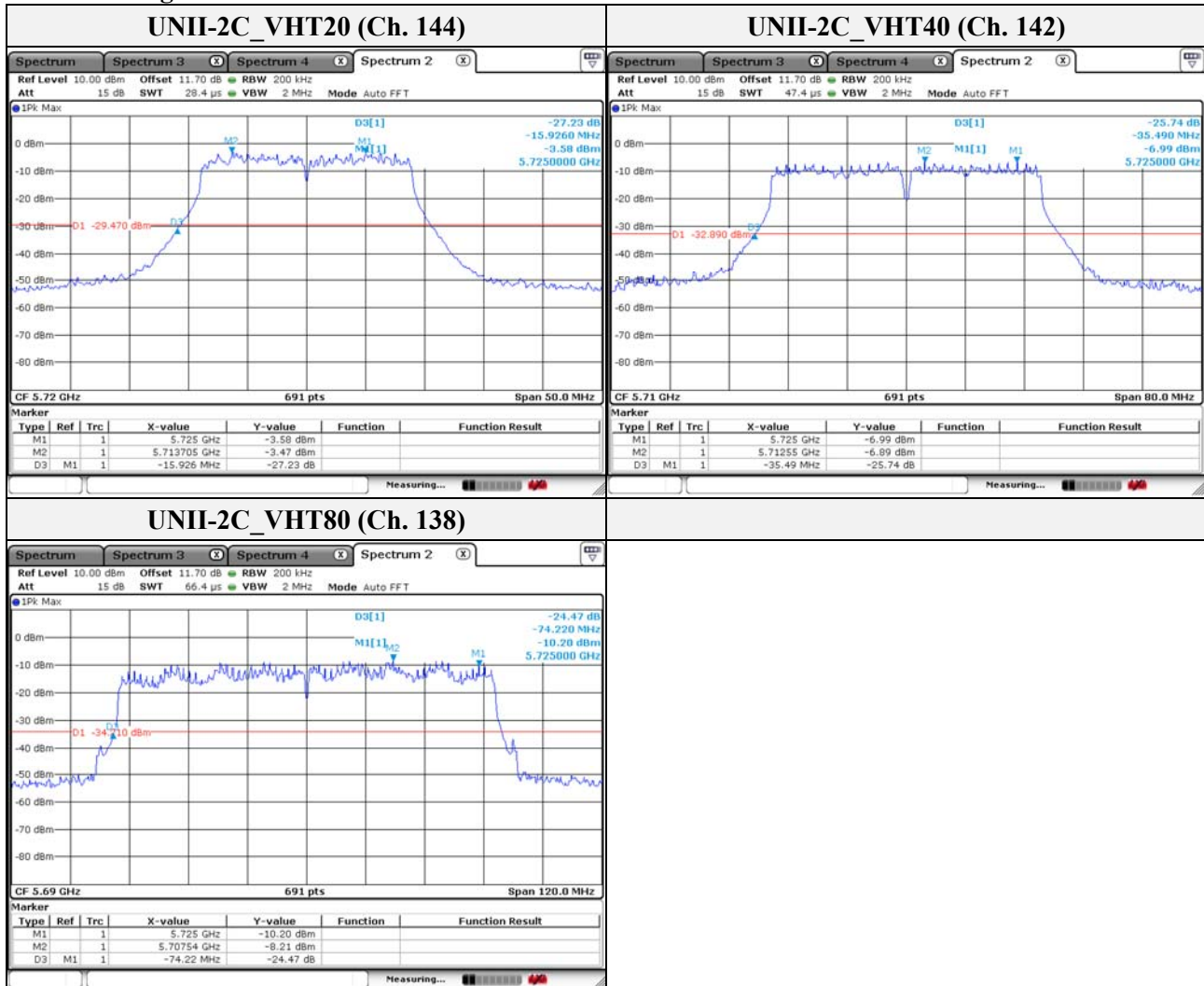




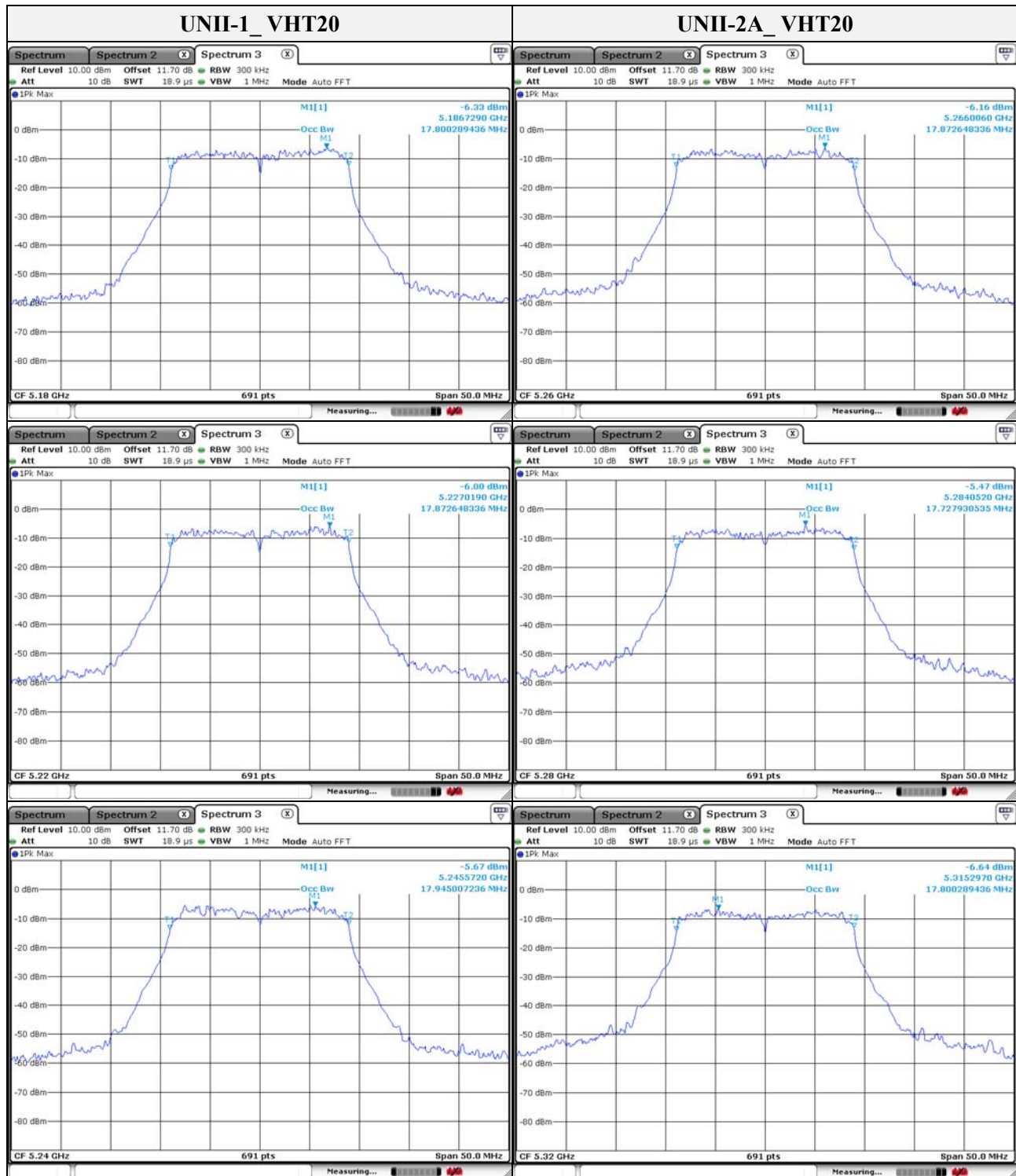


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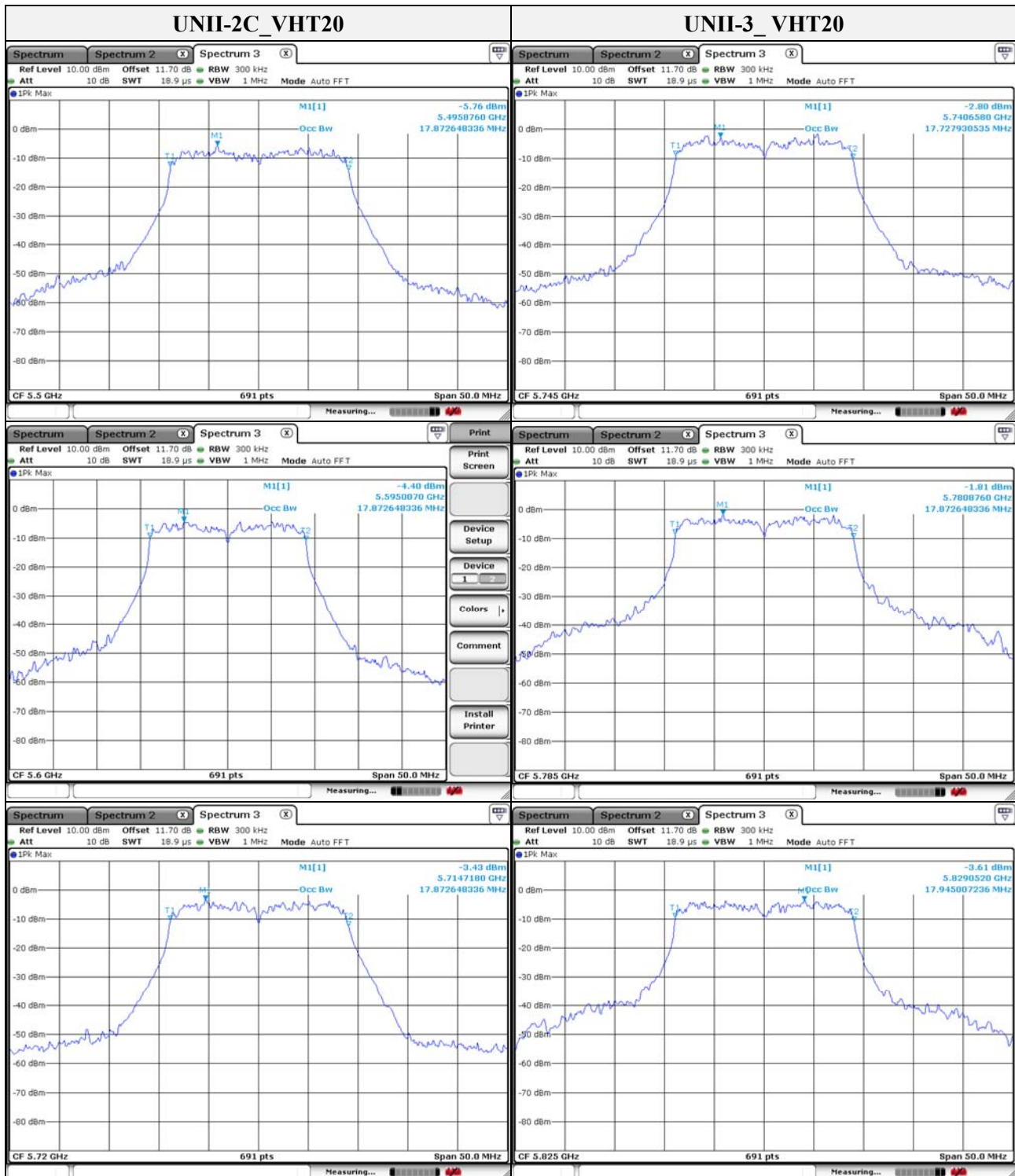
Band-crossing channels



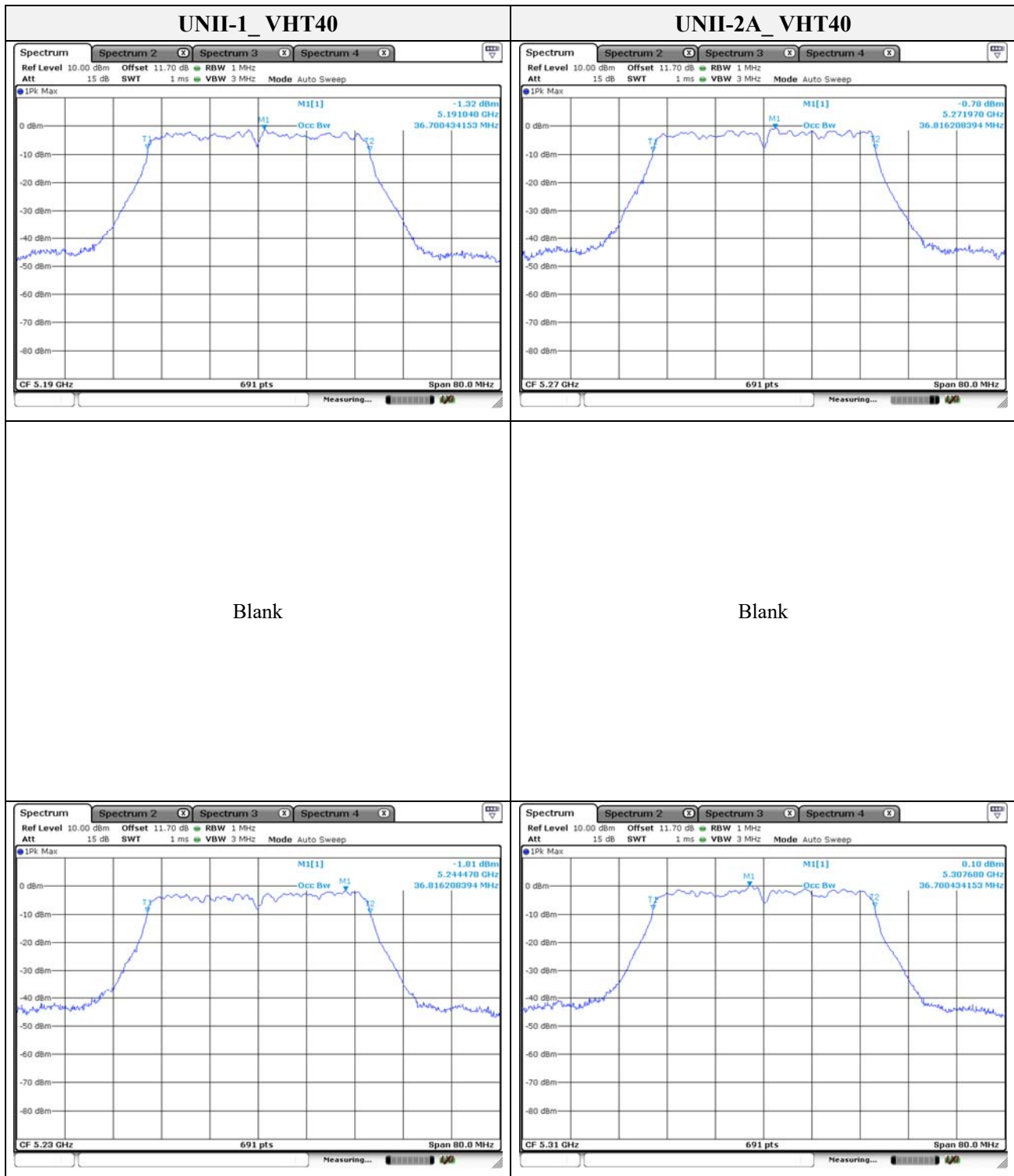
99% bandwidth

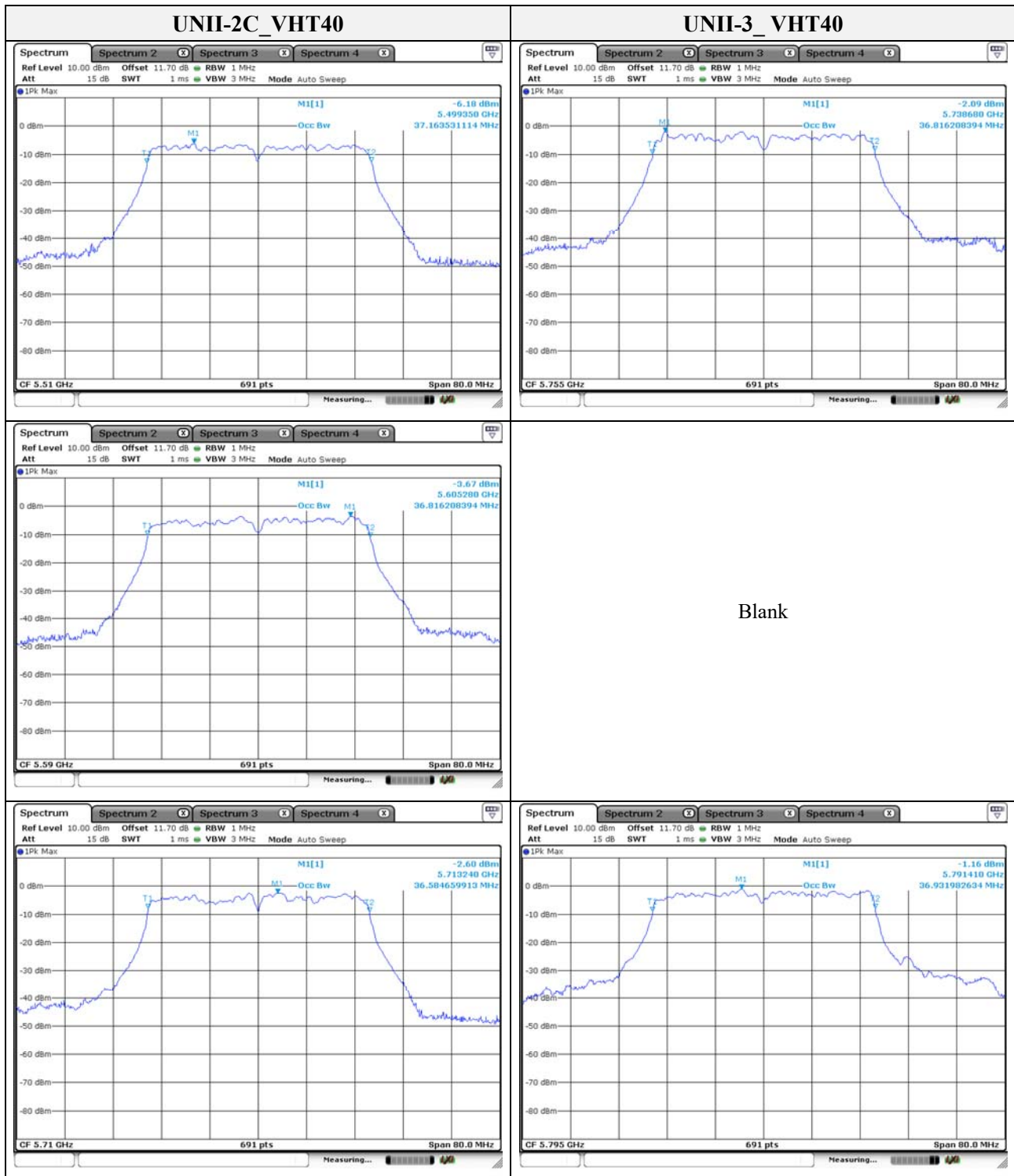


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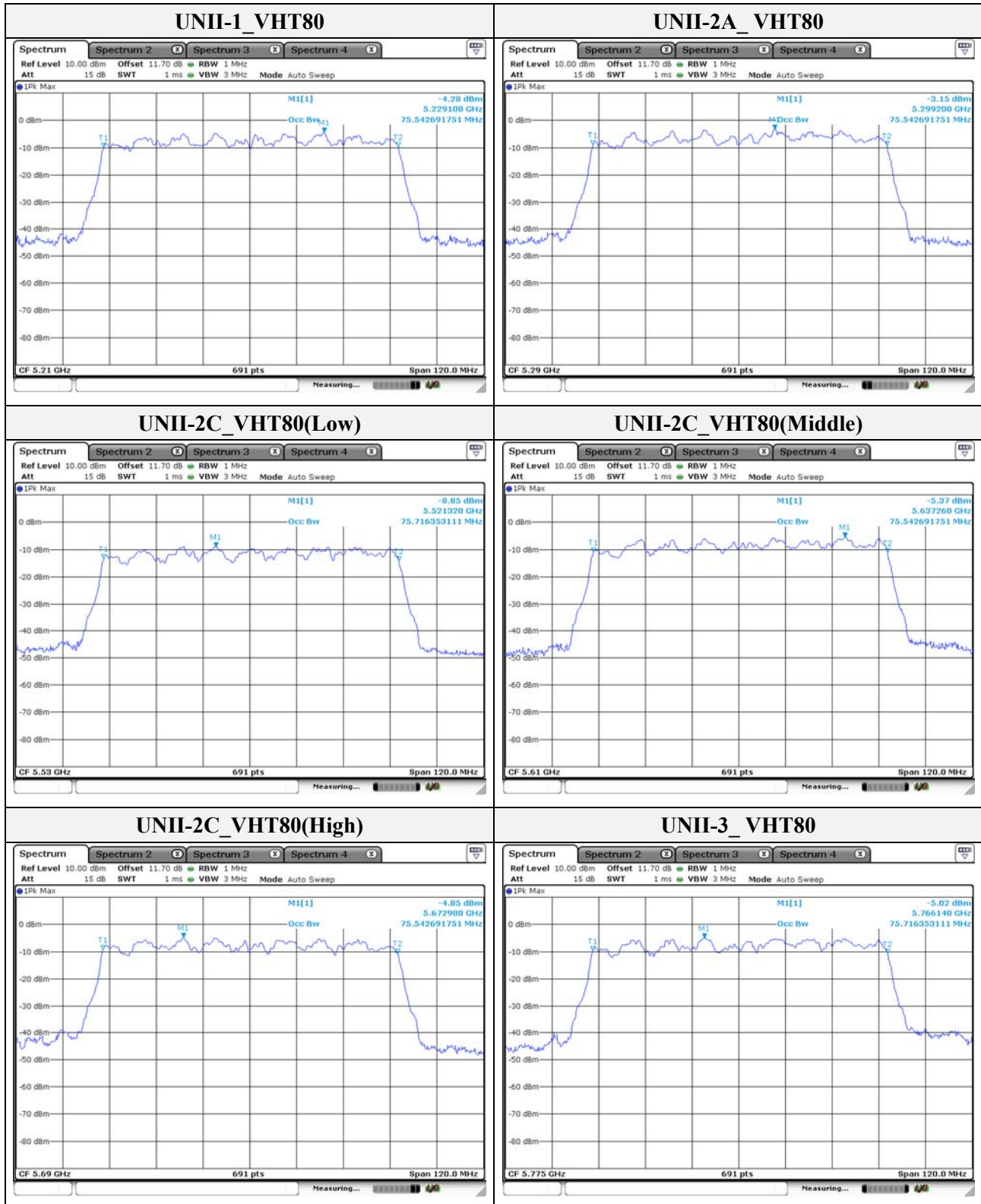


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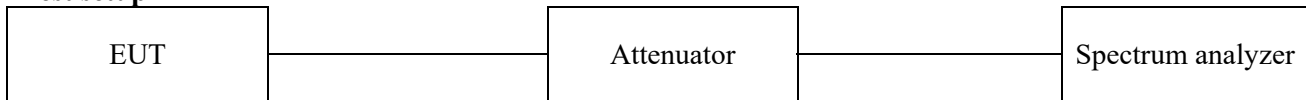
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3.2. 6 dB bandwidth

Test procedure

KDB 789033 D02 v02r01– Section C.2

Test setup



Section C.2

1. Set RBW = 100 kHz
2. Set the video bandwidth (VBW) $\geq 3 \times$ 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 dB relative to the maximum level measured in the fundamental emission.

Limit

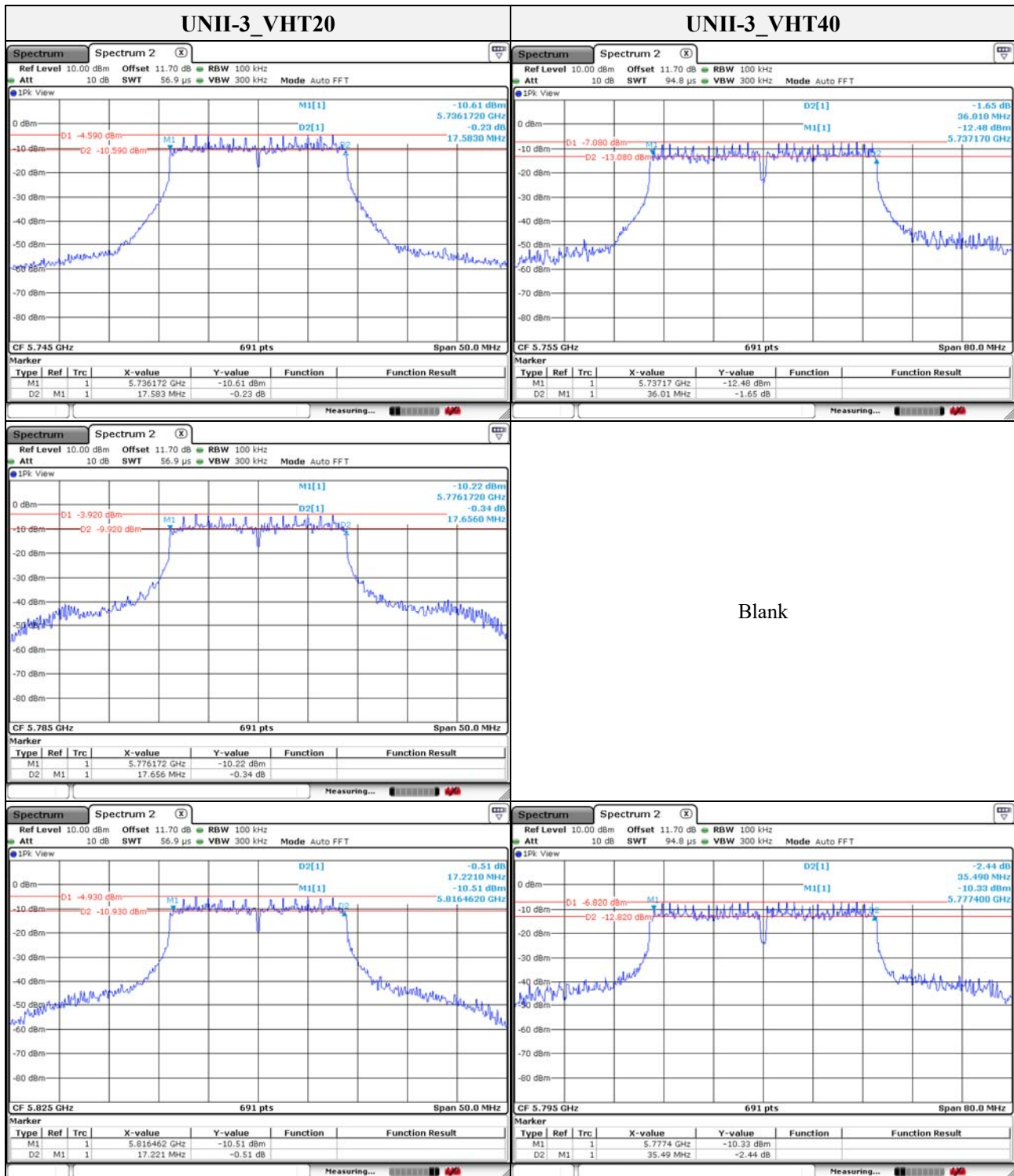
Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

According to RSS-247 6.1 (1), equipment operating in the band 5725-5850 MHz, the minimum 6 dB bandwidth shall be at least 500 kHz.

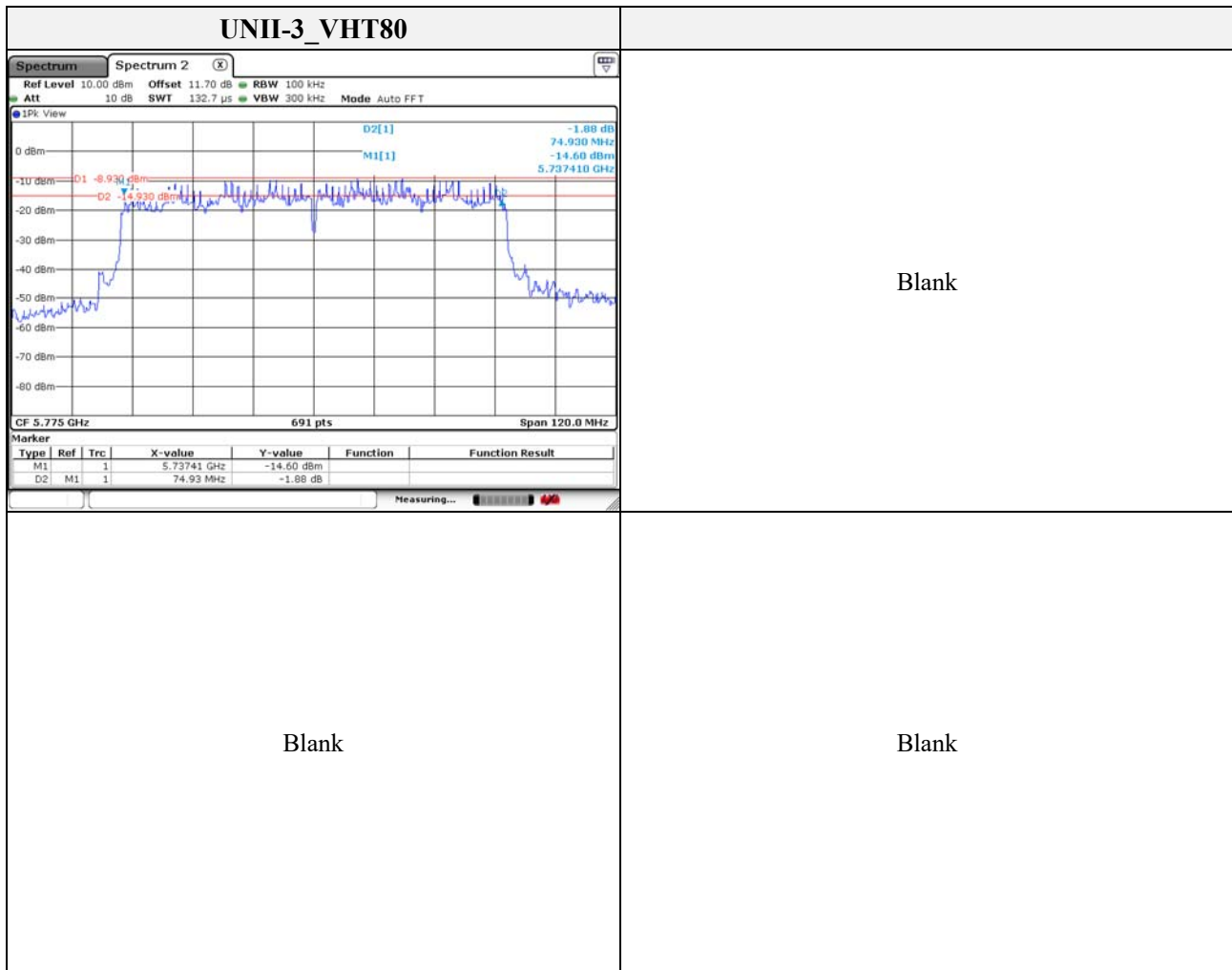
Test results

Band	Frequency(MHz)	Mode	6 dB bandwidth(MHz)
UNII-3	5 745	VHT20	17.583
	5 785		17.656
	5 825		17.221
	5 755	VHT40	36.010
	5 795		35.490
	5 775	VHT80	74.930
UNII-3 (Band-crossing channels)	5 720	VHT20	3.160
	5 710	VHT40	2.810
	5 690	VHT80	3.857

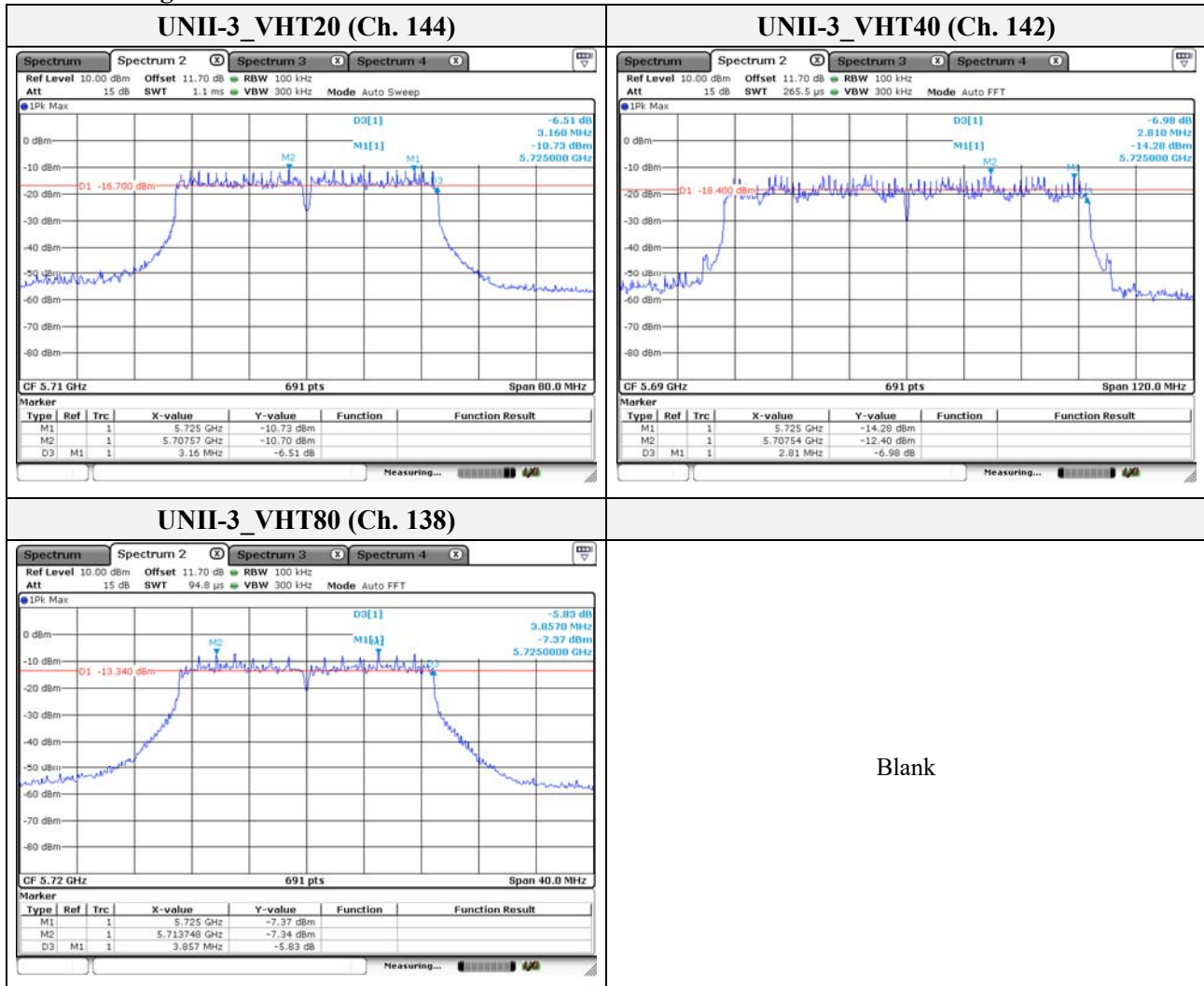
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Band-crossing channels



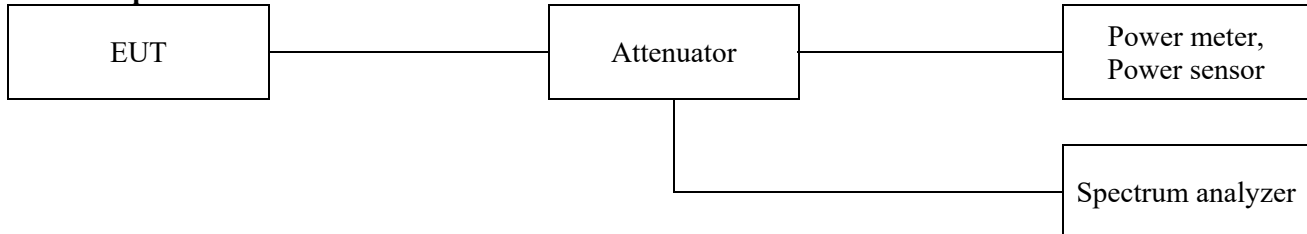
3.3. Maximum conducted output power

Test procedure

KDB 789033 D02 v02r01– Section E.3.a) or b)

Used test method is Section E.3.b)

Test setup



Section E.3.a)

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 %).

Section E.3.b)

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
FCC**

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. FCC Limit B is the 26 dB emission bandwidth.

Test results

Band	Frequency (MHz)	Mode	Detector mode	Output power (dBm)	Limit(dBm)
					FCC
UNII-1	5 180	VHT20	AV	7.59	24.00
	5 220		AV	7.76	
	5 240		AV	8.05	
UNII-2A	5 260		AV	6.45	24.00
	5 280		AV	6.66	
	5 320		AV	6.52	
UNII-2C	5 500		AV	6.99	24.00
	5 600		AV	7.50	
	5 720		AV	7.72	
UNII-3	5 745		AV	10.09	30.00
	5 785		AV	10.29	
	5 825		AV	9.71	

Band	Frequency (MHz)	Mode	Detector mode	Output power (dBm)	Limit(dBm)
					FCC
UNII-1	5 190	VHT40	AV	6.52	24.00
	5 230		AV	6.93	
UNII-2A	5 270		AV	5.85	24.00
	5 310		AV	6.13	
UNII-2C	5 510		AV	7.90	24.00
	5 590		AV	7.53	
	5 710		AV	7.96	
UNII-3	5 755		AV	10.23	30.00
	5 795		AV	10.19	

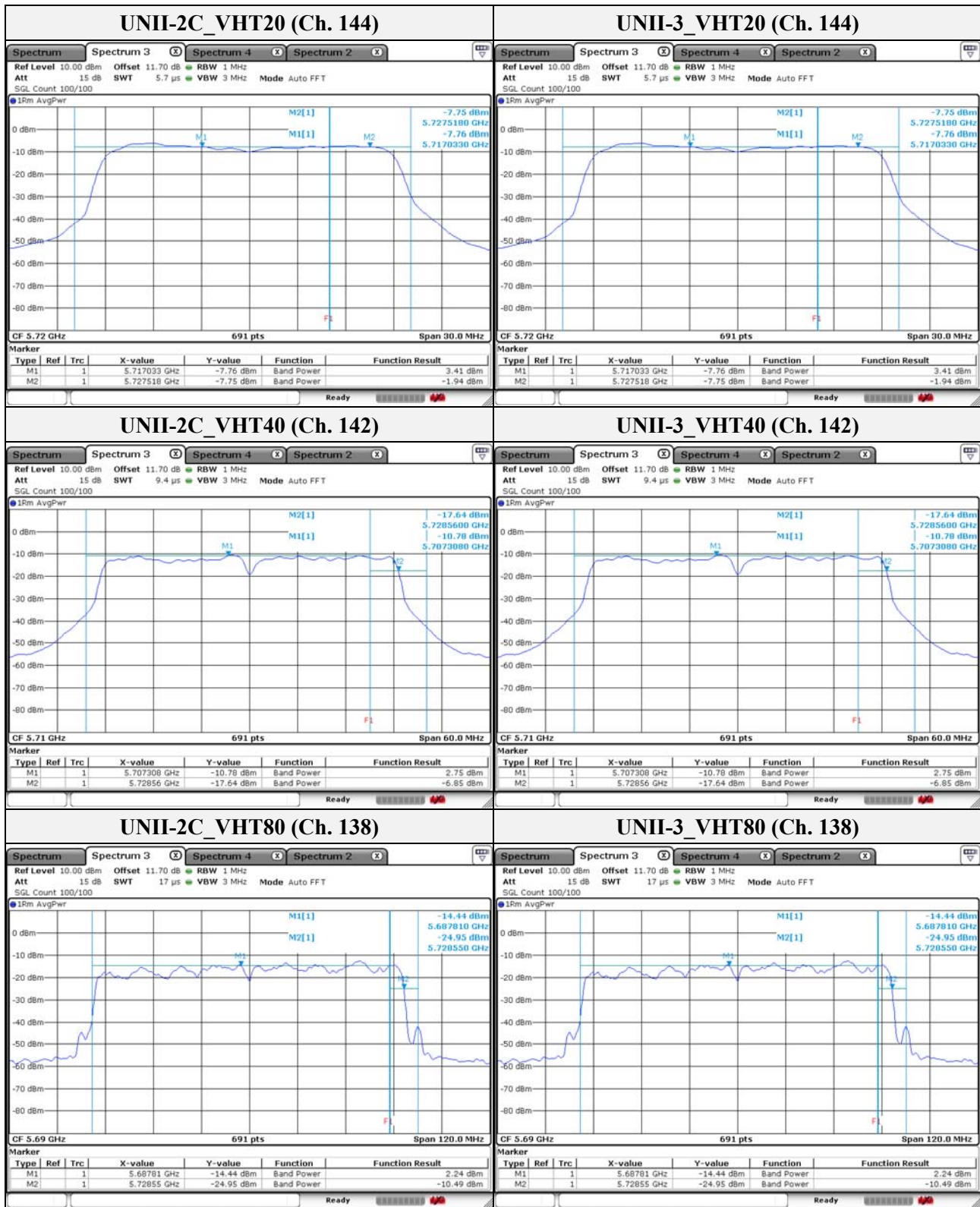
Band	Frequency (MHz)	Mode	Detector mode	Output power (dBm)	Limit(dBm)
					FCC
UNII-1	5 210	VHT80	AV	7.09	24.00
UNII-2A	5 290		AV	5.77	24.00
UNII-2C	5 530		AV	6.08	24.00
	5 610		AV	6.88	
	5 690		AV	6.94	
UNII-3	5 775		AV	9.68	30.00



Band-crossing channels

Band	Frequency (MHz)	Mode	Detector mode	Output power (dBm)	Limit(dBm)
					FCC
UNII-2C	5 720	VHT20	AV	3.41	22.90
	5 710	VHT40	AV	2.75	24.00
	5 690	VHT80	AV	2.24	24.00
UNII-3	5 720	VHT20	AV	-1.94	30.00
	5 710	VHT40	AV	-6.85	
	5 690	VHT80	AV	-10.49	

Band-crossing channels



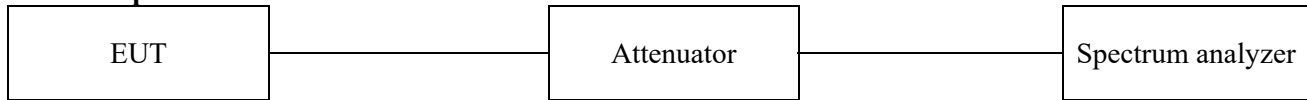
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3.4. Power spectral density

Test procedure

KDB 789033 D02 v02r01 – Section F

Test setup



Section F

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 MHz reference bandwidth.
5. For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, “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 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:
 - a) Set $RBW \geq 1/T$, where T is defined in section II.B.1.a)
 - b) Set $VBW \geq 3 \text{ RBW}$.
 - c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10 \log(500 \text{ kHz}/RBW)$ to the measured result, whereas $RBW (< 500 \text{ kHz})$ is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
 - d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add $10 \log(1 \text{ MHz}/RBW)$ to the measured result, whereas $RBW (< 1 \text{ MHz})$ 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.

Note.

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

**Limit
FCC**

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

Note.

1. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceed 6 dBi.

Test results

Band	Frequency (MHz)	Mode	PSD (dBm/MHz)	RBWF Note1	DCF Note2	Sum Note3	Limit(dBm/MHz)
							FCC
UNII-1	5 180	VHT20	-6.88	-	2.20	-4.68	11.00
	5 220		-7.49			-5.29	
	5 240		-6.88			-4.68	
	5 190	VHT40	-11.89		3.71	-8.18	
	5 230		-11.99			-8.28	
	5 210	VHT80	-14.59		3.70	-10.89	

Band	Frequency (MHz)	Mode	PSD (dBm/MHz)	RBWF Note1	DCF Note2	Sum Note3	Limit(dBm/MHz)
							FCC
UNII-2A	5 260	VHT20	-7.90	-	1.75	-6.15	11.00
	5 280		-7.40			-5.65	
	5 320		-7.63			-5.88	
	5 270	VHT40	-11.75		3.14	-8.61	
	5 310		-10.98			-7.84	
	5 290	VHT80	-15.04		3.78	-11.26	

Band	Frequency (MHz)	Mode	PSD (dBm/MHz)	RBWF Note1	DCF Note2	Sum Note3	Limit(dBm/MHz)
							FCC
UNII-2C	5 500	VHT20	-6.20	-	2.07	-4.13	11.00
	5 600		-6.93			-4.86	
	5 720		-5.56			-3.49	
	5 500	VHT40	-10.54		3.85	-6.69	
	5 600		-10.98			-7.13	
	5 720		-9.49			-5.64	
	5 530	VHT80	-14.17		4.52	-9.65	
	5 610		-14.03			-9.51	
	5 690		-12.59			-8.07	

Band	Frequency (MHz)	Mode	PSD (dBm/500kHz)	RBWF Note1	DCF Note2	Sum Note3	Limit(dBm/MHz)
							FCC
UNII-3	5 745	VHT20	-6.29	-	2.40	-3.89	30.00
	5 785		-6.24			-3.84	
	5 825		-7.54			-5.14	
	5 755	VHT40	-11.15		3.51	-7.64	
	5 795		-10.09			-6.58	
	5 775	VHT80	-12.75		4.07	-8.68	

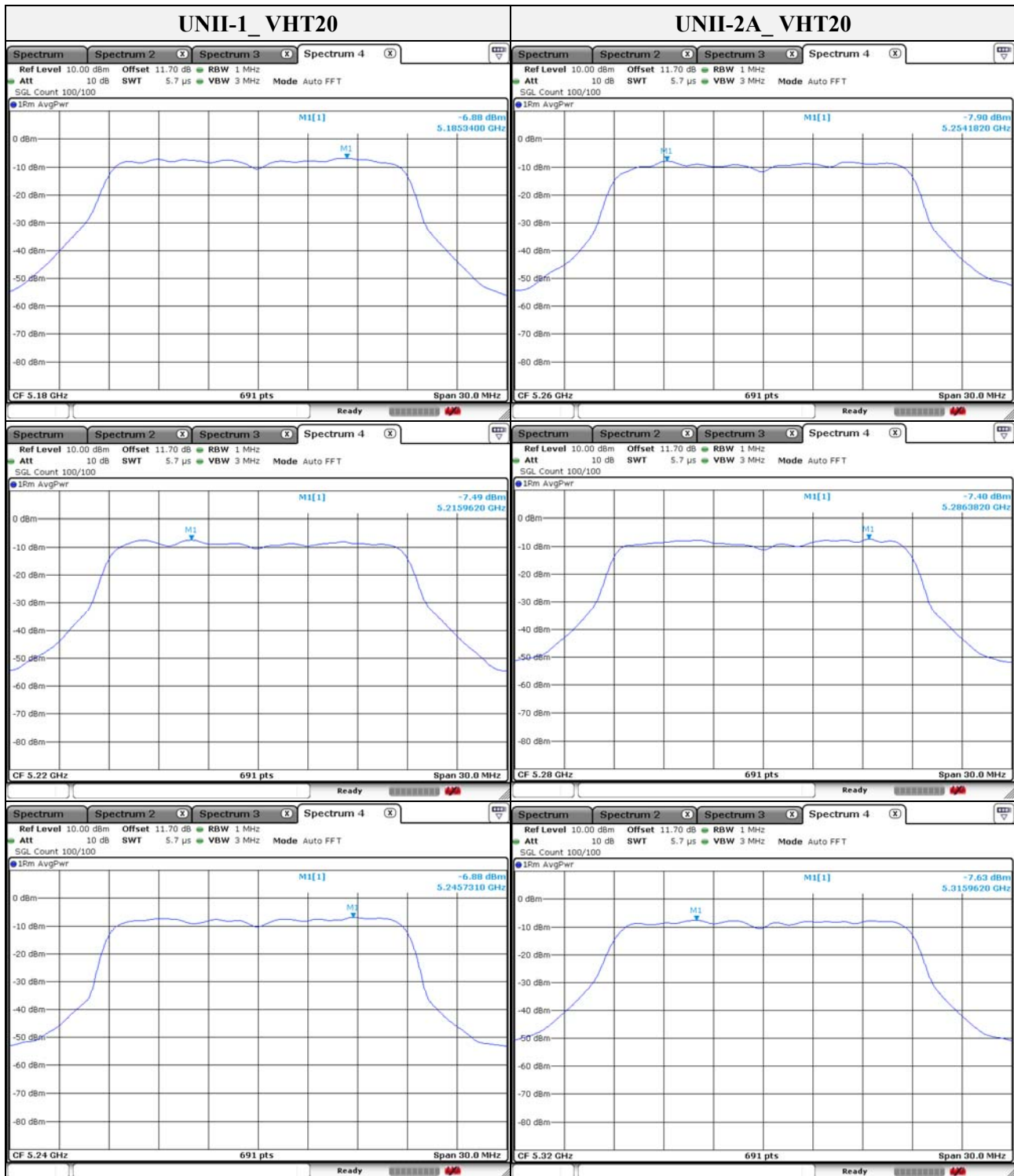
Band-crossing channels

Band	Frequency (MHz)	Mode	PSD (dBm/MHz)	RBWF Note1	DCF Note2	Sum Note3	Limit(dBm/MHz)
							FCC
UNII-2C	5 720	VHT20	-6.01	-	2.07	-3.94	11.00
	5 710	VHT40	-9.81	-	3.85	-5.96	
	5 690	VHT80	-12.24	-	4.52	-7.72	

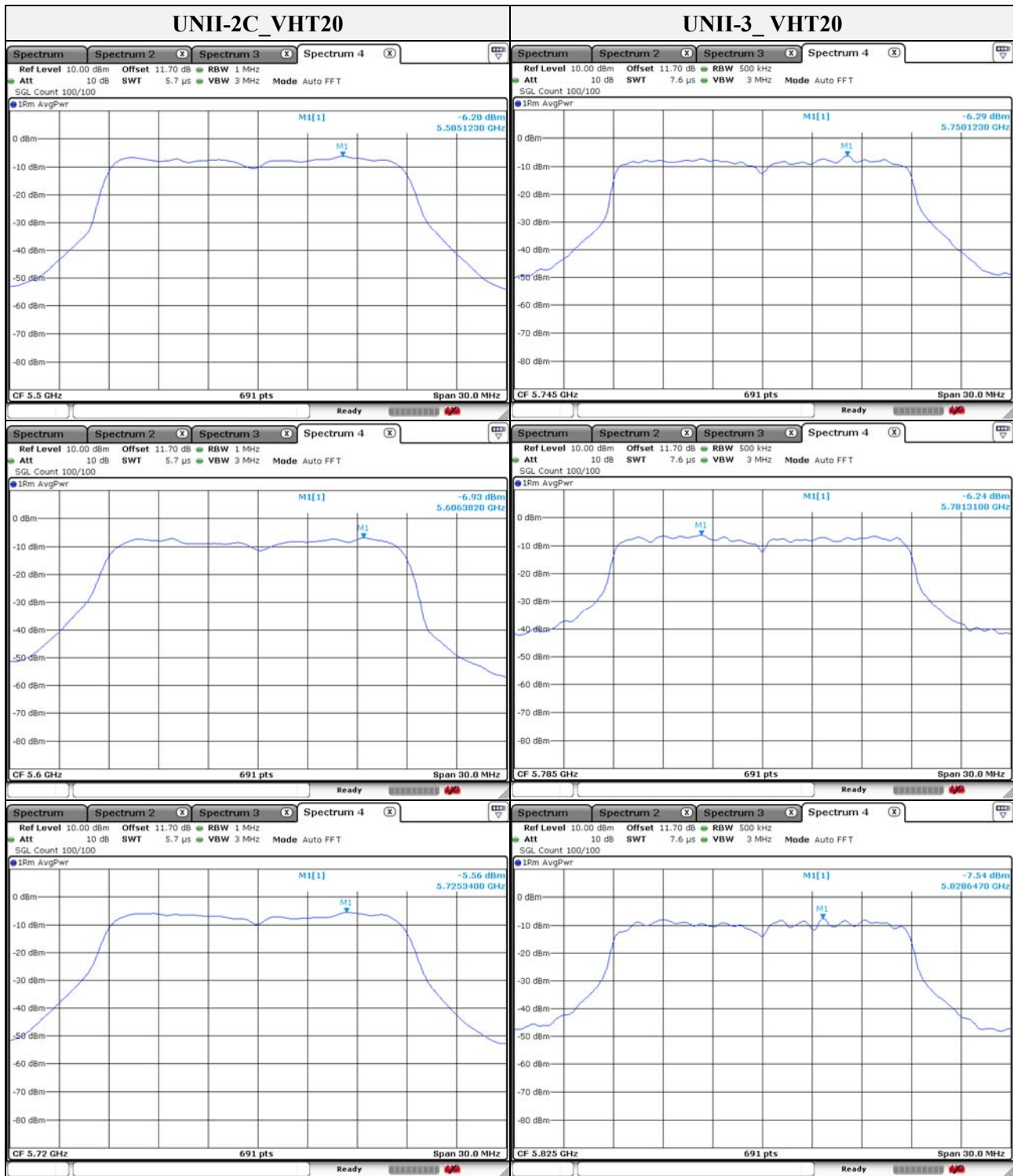
Band	Frequency (MHz)	Mode	PSD (dBm/500kHz)	RBWF Note1	DCF Note2	Sum Note3	Limit (dBm/500kHz)
							FCC
UNII-3	5 720	VHT20	-9.45	-	2.40	-7.05	30.00
	5 710	VHT40	-13.92	-	3.51	-10.41	
	5 690	VHT80	-17.69	-	4.07	-13.62	

Note.

- UNII-1 = $10\log(1 \text{ MHz}/1 \text{ MHz})$
UNII-2A = $10\log(1 \text{ MHz}/1 \text{ MHz})$
UNII-2C = $10\log(1 \text{ MHz}/1 \text{ MHz})$
UNII-3 = $10\log(500 \text{ kHz} / 500 \text{ kHz})$
- Refer to the page 53 on this report.
- $\text{Sum(dBm)} = \text{PSD(dBm)} + \text{RBWF} + \text{Duty correction factor (dB)}$



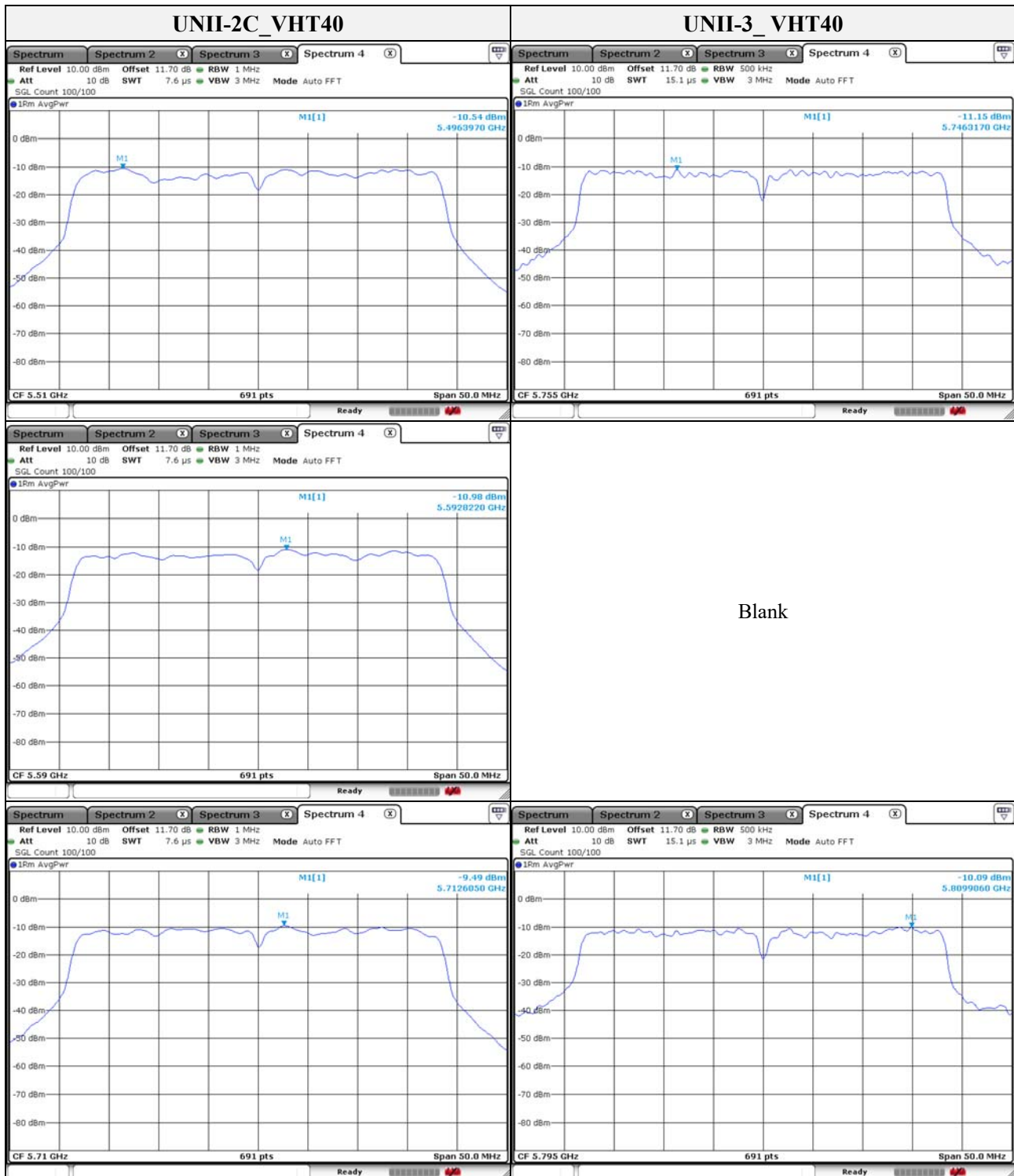
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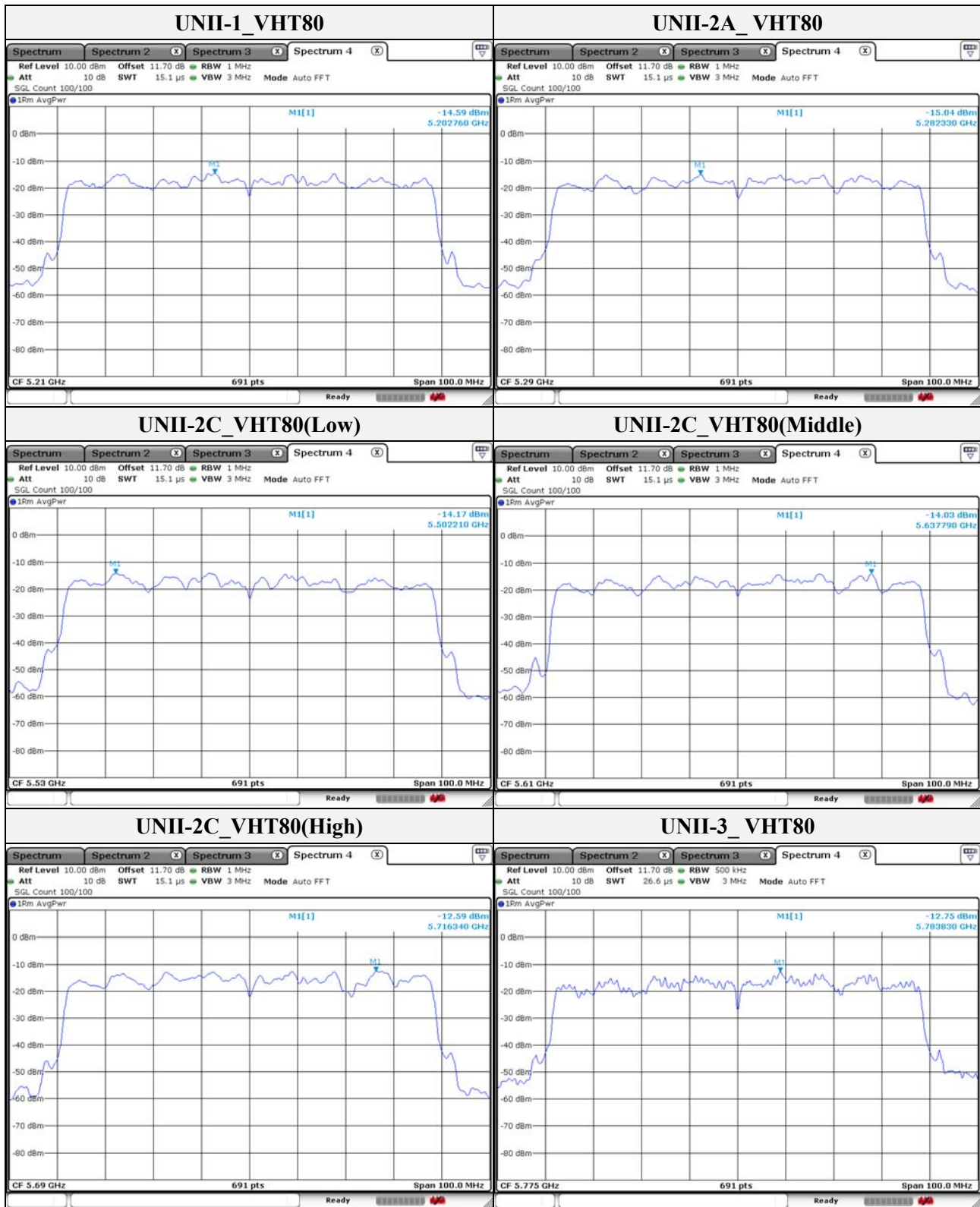
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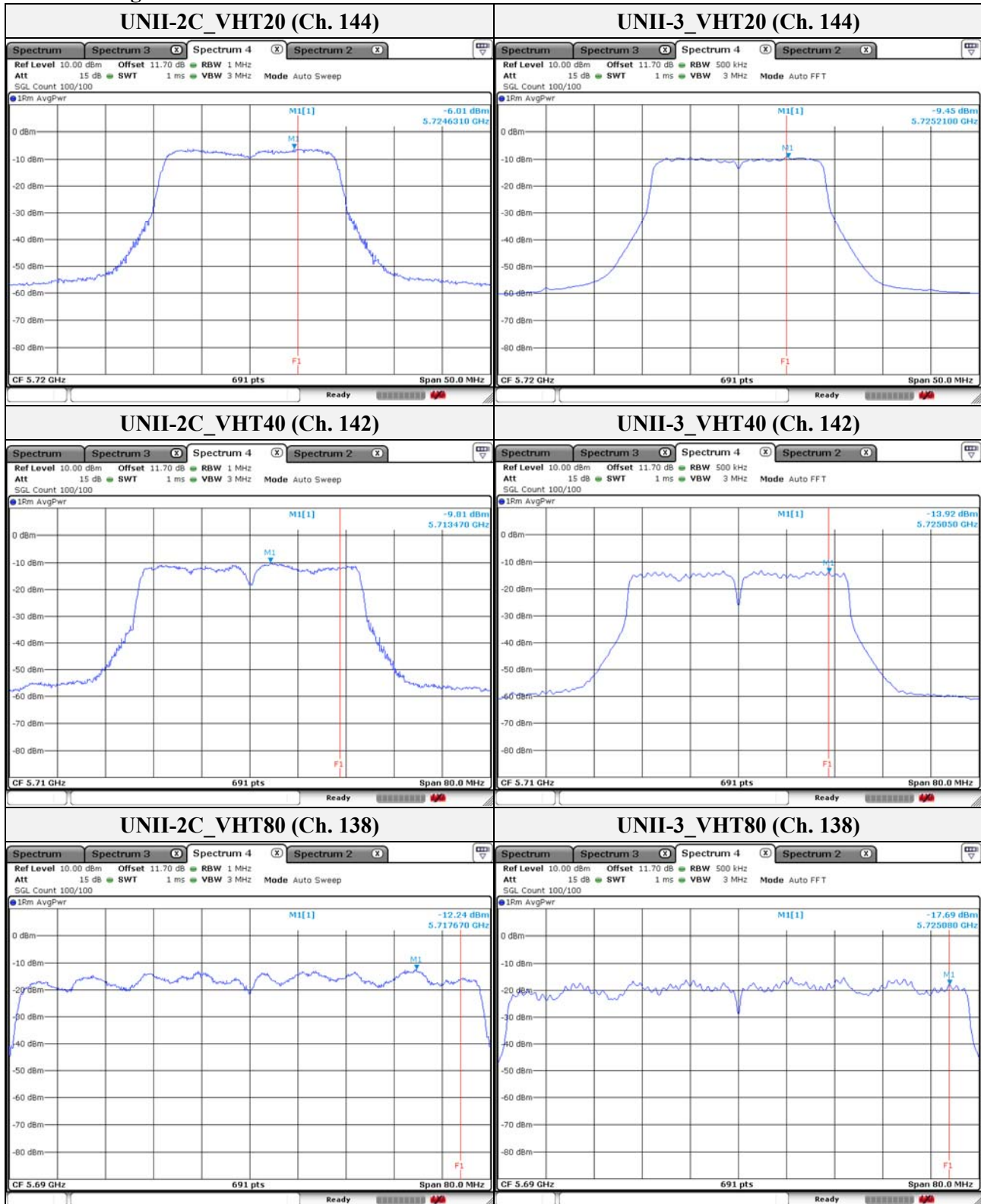


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Band-crossing channels



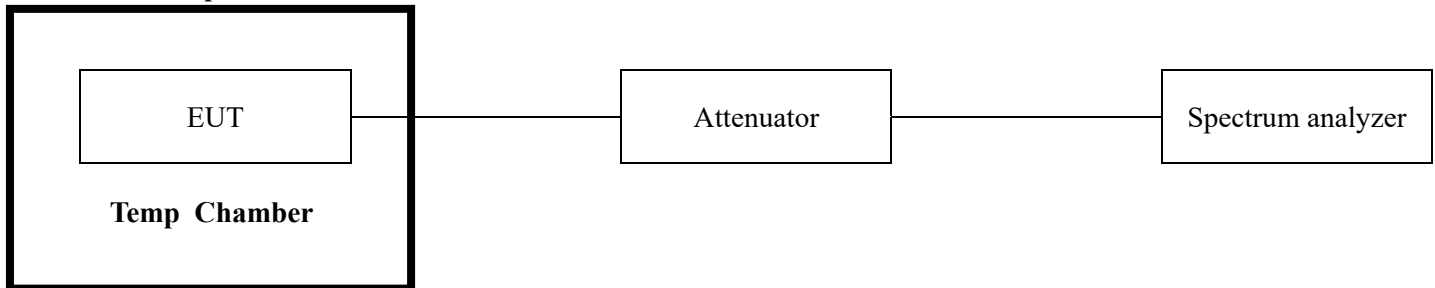
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3.5. Frequency Stability

Test procedure

ANSI C63.10-2013, clause 6.8.1

Test setup



1. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
2. Turn the EUT on and couple its output to a spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.
7. While maintaining a constant temperature inside the environmental chamber, turn the EUT on and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.

Limit

N/A

Test results

Mode: UNII-1

Operating frequency: 5 180 MHz

Test voltage (%)	Test voltage (V)	Temperature (℃)	Maintaining time	Measure frequency (MHz)	Frequency deviation (Hz)	Deviation (%)
100 %	DC 24	-20	Startup	5 180.028 413	28 413	0.000 549
			2 minutes	5 180.028 009	28 009	0.000 541
			5 minutes	5 180.027 169	27 169	0.000 524
			10 minutes	5 180.026 958	26 958	0.000 520
100 %		-10	Startup	5 180.024 289	24 289	0.000 469
			2 minutes	5 180.024 207	24 207	0.000 467
			5 minutes	5 180.023 729	23 729	0.000 458
			10 minutes	5 180.023 460	23 460	0.000 453
100 %		0	Startup	5 180.016 706	16 706	0.000 323
			2 minutes	5 180.016 633	16 633	0.000 321
			5 minutes	5 180.016 550	16 550	0.000 319
			10 minutes	5 180.015 159	15 159	0.000 293
100 %		10	Startup	5 180.009 413	9 413	0.000 182
			2 minutes	5 180.009 323	9 323	0.000 180
			5 minutes	5 180.009 228	9 228	0.000 178
			10 minutes	5 180.008 653	8 653	0.000 167
100 %		20	Startup	5 180.008 071	8 071	0.000 156
			2 minutes	5 180.007 476	7 476	0.000 144
			5 minutes	5 180.007 189	7 189	0.000 139
			10 minutes	5 180.006 492	6 492	0.000 125
100 %		23	Startup	5 180.006 733	6 733	0.000 130
			2 minutes	5 180.006 527	6 527	0.000 126
			5 minutes	5 180.005 570	5 570	0.000 108
			10 minutes	5 180.005 245	5 245	0.000 101
100 %		30	Startup	5 180.005 873	5 873	0.000 113
			2 minutes	5 180.006 445	6 445	0.000 124
			5 minutes	5 180.006 131	6 131	0.000 118
			10 minutes	5 180.005 183	5 183	0.000 100
100 %		40	Startup	5 179.991 197	-880 3	-0.000 170
			2 minutes	5 179.991 055	-894 5	-0.000 173
			5 minutes	5 179.990 936	-906 4	-0.000 175
			10 minutes	5 179.990 106	-989 4	-0.000 191
100 %		50	Startup	5 179.987 750	-122 50	-0.000 236
			2 minutes	5 179.987 607	-123 93	-0.000 239
			5 minutes	5 179.987 259	-127 41	-0.000 246
			10 minutes	5 179.986 965	-130 35	-0.000 252
85 %	DC 20.4	23	Startup	5 180.008 214	8 214	0.000 159
			2 minutes	5 180.007 896	7 896	0.000 152
			5 minutes	5 180.007 612	7 612	0.000 147
			10 minutes	5 180.007 573	7 573	0.000 146
115 %	DC 27.6	23	Startup	5 180.008 825	8 825	0.000 170
			2 minutes	5 180.008 317	8 317	0.000 161
			5 minutes	5 180.008 305	8 305	0.000 160
			10 minutes	5 180.007 463	7 463	0.000 144

Note.

- All 9-36V DC mode were investigated and the data 24VDC was reported in this section is the worst case condition

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Mode: UNII-2A

Operating frequency: 5 260 MHz

Test voltage (%)	Test voltage (V)	Temperature (°C)	Maintaining time	Measure frequency (MHz)	Frequency deviation (Hz)	Deviation (%)
100 %	DC 24	-20	Startup	5 260.028 324	28 324	0.000 538
			2 minutes	5 260.028 202	28 202	0.000 536
			5 minutes	5 260.027 813	27 813	0.000 529
			10 minutes	5 260.026 859	26 859	0.000 511
100 %		-10	Startup	5 260.025 149	25 149	0.000 478
			2 minutes	5 260.024 985	24 985	0.000 475
			5 minutes	5 260.024 497	24 497	0.000 466
			10 minutes	5 260.023 654	23 654	0.000 450
100 %		0	Startup	5 260.016 292	16 292	0.000 310
			2 minutes	5 260.015 586	15 586	0.000 296
			5 minutes	5 260.015 188	15 188	0.000 289
			10 minutes	5 260.015 073	15 073	0.000 287
100 %		10	Startup	5 260.010 189	10 189	0.000 194
			2 minutes	5 260.009 201	9 201	0.000 175
			5 minutes	5 260.008 824	8 824	0.000 168
			10 minutes	5 260.008 702	8 702	0.000 165
100 %		20	Startup	5 260.007 762	7 762	0.000 148
			2 minutes	5 260.007 748	7 748	0.000 147
			5 minutes	5 260.006 950	6 950	0.000 132
			10 minutes	5 260.006 306	6 306	0.000 120
100 %		23	Startup	5 260.007 136	7 136	0.000 136
			2 minutes	5 260.007 006	7 006	0.000 133
			5 minutes	5 260.006 122	6 122	0.000 116
			10 minutes	5 260.005 483	5 483	0.000 104
100 %		30	Startup	5 260.004 557	4 557	0.000 087
			2 minutes	5 260.005 364	5 364	0.000 102
			5 minutes	5 260.005 126	5 126	0.000 097
			10 minutes	5 260.004 134	4 134	0.000 079
100 %		40	Startup	5 259.991 286	-871 4	-0.000 166
			2 minutes	5 259.990 910	-909 0	-0.000 173
			5 minutes	5 259.990 841	-915 9	-0.000 174
			10 minutes	5 259.990 384	-961 6	-0.000 183
100 %		50	Startup	5 259.988 373	-116 27	-0.000 221
			2 minutes	5 259.988 253	-117 47	-0.000 223
			5 minutes	5 259.987 592	-124 08	-0.000 236
			10 minutes	5 259.987 322	-126 78	-0.000 241
85 %	DC 20.4	23	Startup	5 260.008 737	8 737	0.000 166
			2 minutes	5 260.008 270	8 270	0.000 157
			5 minutes	5 260.008 174	8 174	0.000 155
			10 minutes	5 260.007 906	7 906	0.000 150
115 %	DC 27.6	23	Startup	5 260.009 293	9 293	0.000 177
			2 minutes	5 260.008 543	8 543	0.000 162
			5 minutes	5 260.008 477	8 477	0.000 161
			10 minutes	5 260.008 442	8 442	0.000 160

Note.

- All 9-36V DC mode were investigated and the data 24VDC was reported in this section is the worst case condition

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Mode: UNII-2C

Operating frequency: 5500 MHz

Test voltage (%)	Test voltage (V)	Temperature (°C)	Maintaining time	Measure frequency (MHz)	Frequency deviation (Hz)	Deviation (%)
100 %	DC 24	-20	Startup	5 500.028837	28 837	0.000 524
			2 minutes	5 500.028737	28 737	0.000 522
			5 minutes	5 500.027351	27 351	0.000 497
			10 minutes	5 500.027066	27 066	0.000 492
100 %		-10	Startup	5 500.024991	24 991	0.000 454
			2 minutes	5 500.023921	23 921	0.000 435
			5 minutes	5 500.023803	23 803	0.000 433
			10 minutes	5 500.023749	23 749	0.000 432
100 %		0	Startup	5 500.016768	16 768	0.000 305
			2 minutes	5 500.016352	16 352	0.000 297
			5 minutes	5 500.016295	16 295	0.000 296
			10 minutes	5 500.015020	15 020	0.000 273
100 %		10	Startup	5 500.010558	10 558	0.000 192
			2 minutes	5 500.010188	10 188	0.000 185
			5 minutes	5 500.009717	9 717	0.000 177
			10 minutes	5 500.008928	8 928	0.000 162
100 %		20	Startup	5 500.007737	7 737	0.000 141
			2 minutes	5 500.007193	7 193	0.000 131
			5 minutes	5 500.006817	6 817	0.000 124
			10 minutes	5 500.006425	6 425	0.000 117
100 %		23	Startup	5 500.007068	7 068	0.000 129
			2 minutes	5 500.006436	6 436	0.000 117
			5 minutes	5 500.006038	6 038	0.000 110
			10 minutes	5 500.005391	5 391	0.000 098
100 %		30	Startup	5 500.005976	5 976	0.000 109
			2 minutes	5 500.006113	6 113	0.000 111
			5 minutes	5 500.006111	6 111	0.000 111
			10 minutes	5 500.005020	5 020	0.000 091
100 %		40	Startup	5 499.990867	-913 3	-0.000 166
			2 minutes	5 499.990466	-953 4	-0.000 173
			5 minutes	5 499.990262	-973 8	-0.000 177
			10 minutes	5 499.989965	-100 35	-0.000 182
100 %		50	Startup	5 499.988228	-117 72	-0.000 214
			2 minutes	5 499.988045	-119 55	-0.000 217
			5 minutes	5 499.987716	-122 84	-0.000 223
			10 minutes	5 499.987693	-123 07	-0.000 224
85 %	DC 20.4	23	Startup	5 500.008405	8 405	0.0001 53
			2 minutes	5 500.007793	7 793	0.0001 42
			5 minutes	5 500.007653	7 653	0.0001 39
			10 minutes	5 500.007498	7 498	0.0001 36
115 %	DC 27.6	23	Startup	5 500.008287	8 287	0.0001 51
			2 minutes	5 500.007920	7 920	0.0001 44
			5 minutes	5 500.007852	7 852	0.0001 43
			10 minutes	5 500.007622	7 622	0.0001 39

Note.

- All 9-36V DC mode were investigated and the data 24VDC was reported in this section is the worst case condition

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Mode: UNII-3

Operating frequency: 5 745 MHz

Test voltage (%)	Test voltage (V)	Temperature (°C)	Maintaining time	Measure frequency (MHz)	Frequency deviation (Hz)	Deviation (%)
100 %	DC 24	-20	Startup	5 745.028540	28 540	0.000 497
			2 minutes	5 745.028322	28 322	0.000 493
			5 minutes	5 745.027106	27 106	0.000 472
			10 minutes	5 745.026950	26 950	0.000 469
100 %		-10	Startup	5 745.025402	25 402	0.000 442
			2 minutes	5 745.024727	24 727	0.000 430
			5 minutes	5 745.024063	24 063	0.000 419
			10 minutes	5 745.024027	24 027	0.000 418
100 %		0	Startup	5 745.016845	16 845	0.000 293
			2 minutes	5 745.016668	16 668	0.000 290
			5 minutes	5 745.015610	15 610	0.000 272
			10 minutes	5 745.015325	15 325	0.000 267
100 %		10	Startup	5 745.010609	10 609	0.000 185
			2 minutes	5 745.010548	10 548	0.000 184
			5 minutes	5 745.009115	9 115	0.000 159
			10 minutes	5 745.008938	8 938	0.000 156
100 %		20	Startup	5 745.008371	8 371	0.000 146
			2 minutes	5 745.006909	6 909	0.000 120
			5 minutes	5 745.006861	6 861	0.000 119
			10 minutes	5 745.006544	6 544	0.000 114
100 %		23	Startup	5 745.007063	7 063	0.000 123
			2 minutes	5 745.006530	6 530	0.000 114
			5 minutes	5 745.006516	6 516	0.000 113
			10 minutes	5 745.006368	6 368	0.000 111
100 %		30	Startup	5 745.006083	6 083	0.000 106
			2 minutes	5 745.005895	5 895	0.000 103
			5 minutes	5 745.005841	5 841	0.000 102
			10 minutes	5 745.005578	5 578	0.000 097
100 %		40	Startup	5 744.991779	-822 1	-0.000 143
			2 minutes	5 744.991634	-836 6	-0.000 146
			5 minutes	5 744.990026	-997 4	-0.000 174
			10 minutes	5 744.989849	-101 51	-0.000 177
100 %		50	Startup	5 744.987574	-124 26	-0.000 216
			2 minutes	5 744.987572	-124 28	-0.000 216
			5 minutes	5 744.987452	-125 48	-0.000 218
			10 minutes	5 744.987121	-128 79	-0.000 224
85 %	DC 20.4	23	Startup	5 745.008795	8 795	0.000 153
			2 minutes	5 745.008741	8 741	0.000 152
			5 minutes	5 745.008612	8 612	0.000 150
			10 minutes	5 745.008027	8 027	0.000 140
115 %	DC 27.6	23	Startup	5 745.009214	9 214	0.000 160
			2 minutes	5 745.008654	8 654	0.000 151
			5 minutes	5 745.008342	8 342	0.000 145
			10 minutes	5 745.007792	7 792	0.000 136

Note.

- All 9-36V DC mode were investigated and the data 24VDC was reported in this section is the worst case condition

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