

TEST REPORT

Part 15 Subpart E 15.407 & RSS-247 (Issue 2)

Equipment under test IIRCADE GAME CONSOLE BARTOP

Model name IRORO2-128C19

FCC ID 2AXRR-IRORO2

IC 26813-IRORO2

Applicant IIRCADE, INC.

Manufacturer IIRCADE, INC.

Date of test(s) 2022.05.23 ~ 2022.06.17

Date of issue 2022.06.22

Issued to
IIRCADE, INC.

No.A-627, 338 GwanggyoJungang-Ro, Suji-Gu, Yongin-Si, Gyeonggi-Do, 16942
Republic of Korea
Tel: +82-31-893-1540 Fax : +82-31-893-1541

Issued by
KES Co., Ltd.

3701, 40, Simin-daero 365beon-gil, Dongan-gu, Anyang-si,
Gyeonggi-do, 14057, Korea
473-21, Gayeo-ro, Yeoju-si, Gyeonggi-do, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450

Test and report completed by :	Report approval by :
	
Gu-Bong, Kang Test engineer	Yeong-Jun Cho Technical manager

This test report is not related to KS Q ISO/IEC 17025 and KOLAS

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr



Revision history

Revision	Date of issue	Test report No.	Description
-	2022.06.22	KES-RF1-22T0071	Initial

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr

TABLE OF CONTENTS

1.	General information	4
1.1.	EUT description	4
1.2.	Test configuration.....	5
1.3.	Derivative Model Information.....	6
1.4.	Accessory information.....	6
1.5.	Sample calculation	6
1.6.	Measurement Uncertainty	6
1.7.	Frequency/channel operations	7
2.	Summary of tests	9
3.	Test results.....	10
3.1.	26 dB bandwidth & 99% Occupied Bandwidth	10
3.2.	6 dB bandwidth	36
3.3.	Maximum conducted output power	51
3.4.	Power spectral density	56
3.5.	Frequency Stability.....	72
3.2.	Radiated restricted band and emissions.....	77
Appendix A.	Measurement equipment	213
Appendix B.	Test setup photos	214

1. General information

Applicant: IIRCADE, INC.
Applicant address: No.A-627, 338 GwanggyoJungang-Ro, Suji-Gu, Yongin-Si, Gyeonggi-Do,16942
Republic of Korea
Test site: KES Co., Ltd.
Test site address: ☐ 3701, 40, Simin-daero 365beon-gil, Dongan-gu, Anyang-si,
Gyeonggi-do, 14057, Korea
☒ 473-21, Gayeo-ro, Yeoju-si, Gyeonggi-do, Korea
Test Facility: FCC Accreditation Designation No.: KR0100, Registration No.: 444148
ISED Registration No.: 23298
FCC,IC rule part(s): FCC : 15.247 / IC : RSS-247
FCC ID: 2AXRR-IRORO2
IC ID: 26813-IRORO2
Test device serial No.: ☒ Production ☐ Pre-production ☐ Engineering

1.1. EUT description

Equipment under test: iiRCADE GAME CONSOLE BARTOP
Frequency range: 2 402 Mhz ~ 2 480 Mhz (BDR/EDR)
2 402 Mhz ~ 2 480 Mhz (LE 1Mbps)
2 412 Mhz ~ 2 462 Mhz (11b/g/n_HT20)
2 422 Mhz ~ 2 452 Mhz (11n_HT40)
UNII-1: 5 180 Mhz ~ 5 240 Mhz (11a/an_VHT20/ac_VHT20)
5 190 Mhz ~ 5 230 Mhz (11an_VHT40/ac_VHT40)
5 210 Mhz (11ac_VHT80)
UNII-2A: 5 260 Mhz ~ 5 320 Mhz (11a/an_VHT20/ac_VHT20)
5 270 Mhz ~ 5 310 Mhz (11an_VHT40/ac_VHT40)
5 290 Mhz (11ac_VHT80)
UNII-2C: 5 500 Mhz ~ 5 720 Mhz (11a/an_VHT20/ac_VHT20)
5 530 Mhz ~ 5 710 Mhz (11an_VHT40/ac_VHT40)
5 530 Mhz ~ 5 690 Mhz (11ac_VHT80)
UNII-3: 5 745 Mhz ~ 5 825 Mhz (11a/an_VHT20/ac_VHT20)
5 755 Mhz ~ 5 795 Mhz (11an_VHT40/ac_VHT40)
5 775 Mhz (11ac_VHT80)
Model: IRORO2-128C19
Modulation technique: GFSK, $\pi/4$ DQPSK, 8DPSK, CCK, DQPSK, DBPSK, OFDM, QPSK,
BPSK 16QAM, 64QAM, 256QAM

Number of channels	2 402 MHz ~ 2 480 MHz (BDR/EDR) : 79ch 2 402 MHz ~ 2 480 MHz (LE 1Mbps) : 40ch 2 412 MHz ~ 2 462 MHz (11b/g/n_HT20) : 11ch 2 422 MHz ~ 2 452 MHz (11n_HT40) : 7ch
UNII-1	5 180 MHz ~ 5 240 MHz (11a/an_VHT20/ac_VHT20) : 4ch 5 190 MHz ~ 5 230 MHz (11an_VHT40/ac_VHT40) : 2ch 5 210 MHz (11ac_VHT80) : 1ch
UNII-2A	5 260 MHz ~ 5 320 MHz (11a/an_VHT20/ac_VHT20) : 4ch 5 270 MHz ~ 5 310 MHz (11an_VHT40/ac_VHT40) : 2ch 5 290 MHz (11ac_VHT80) : 1ch
UNII-2C	5 500 MHz ~ 5 720 MHz (11a/an_VHT20/ac_VHT20) : 12ch 5 530 MHz ~ 5 710 MHz (11an_VHT40/ac_VHT40) : 6ch 5 530 MHz ~ 5 690 MHz (11ac_VHT80) : 3ch
UNII-3	5 745 MHz ~ 5 825 MHz (11a/an_VHT20/ac_VHT20) : 5ch 5 755 MHz ~ 5 795 MHz (11an_VHT40/ac_VHT40) : 2ch 5 775 MHz (11ac_VHT80) : 1ch
Antenna specification	PCB Antenna BT / LE / 2.4G WiFi : -0.58 dBi UNII-1 : 0.50 dBi / UNII-2A : 0.06 dBi / UNII-2C : -1.43 dBi / UNII-3 : -2.35 dBi
Power source	DC 24V (Adapter)
H/W version	1.5
S/W version	9.008.002

1.2. Test configuration

The **IIRCADE, INC.// iiRCADE GAEM CONSOLE BARTOP // IRORO2-128C19 //**

FCC ID: 2AXRR-IRORO2 // IC ID: 26813-IRORO2 was tested according to the specification of EUT, the EUT must comply with following standards and KDB documents.

FCC Part 15.407
ISED RSS-247 Issue 2 and RSS-Gen Issue 5
KDB 789033 D02 v02r01
ANSI C63.10-2013

1.3. Derivative Model Information

N/A

1.4. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
-	-	-	-	-

1.5. Sample calculation

Where relevant, the following sample calculation is provided

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.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 0.72 + 10 = 10.72 \text{ (dB)}\end{aligned}$$

For Radiation test :

Field strength level (dB μ V/m) = Measured level (dB μ V) + Antenna factor (dB) + Cable loss (dB) – Amplifier gain (dB)

1.6. Measurement Uncertainty

Test Item		Uncertainty
Uncertainty for Conduction emission test		2.46 dB
Uncertainty for Radiation emission test (include Fundamental emission)	Below 1GHz	4.40 dB
	Above 1GHz	5.94 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

Ch.	Frequency (MHz)	Mode
00	2 402	BDR 1 Mbps, EDR 2 Mbps, EDR 3 Mbps
.	.	.
40	2 442	BDR 1 Mbps, EDR 2 Mbps, EDR 3 Mbps
.	.	.
78	2 480	BDR 1 Mbps, EDR 2 Mbps, EDR 3 Mbps

Ch.	Frequency (MHz)	Mode
00	2 402	BLE 1 Mbps
.	.	.
20	2 442	BLE 1 Mbps
.	.	.
39	2 480	BLE 1 Mbps

Ch.	Frequency (MHz)	Mode
1	2 412	802.11b/g/n_HT20
.	.	.
6	2 437	802.11b/g/n_HT20
.	.	.
11	2 462	802.11b/g/n_HT20

Ch.	Frequency (MHz)	Mode
3	2 422	802.11n_HT40
.	.	.
6	2 437	802.11n_HT40
.	.	.
9	2 452	802.11n_HT40

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr

UNII-1

Ch.	Frequency (MHz)
36	5 180
44	5 220
48	5 240

UNII-2A

Ch.	Frequency (MHz)
52	5 260
56	5 280
64	5 320

UNII-2C

Ch.	Frequency (MHz)
100	5 500
124	5 620
140	5 700

UNII-3

Ch.	Frequency (MHz)
149	5 745
157	5 785
165	5 825

802.11a/an_VHT20/ac_VHT20 mode

UNII-1

Ch.	Frequency (MHz)
38	5 190
46	5 230

UNII-2A

Ch.	Frequency (MHz)
54	5 270
62	5 310

UNII-2C

Ch.	Frequency (MHz)
102	5 510
118	5 590
142	5 710

UNII-3

Ch.	Frequency (MHz)
151	5 755
159	5 795

802.11an_VHT20/ac_VHT40 mode

UNII-1

Ch.	Frequency (MHz)
42	5 210

UNII-2A

Ch.	Frequency (MHz)
58	5 290

UNII-2C

Ch.	Frequency (MHz)
106	5 530
122	5 610
138	5 690

UNII-3

Ch.	Frequency (MHz)
155	5 775

802.11ac_VHT80 mode

2. Summary of tests

Section in FCC Part 15	Section in RSS-247 & Gen	Parameter	Test results
15.407(a)	RSS-247 6.2	26 dB bandwidth & 99 % bandwidth	Pass
15.407(a)	-	6 dB bandwidth	Pass
15.407(a)	RSS-247 6.2	Maximum conducted output power	Pass
15.407(a)	RSS-247 6.2	Power spectral density	Pass
15.407(g)	RSS-Gen 6.11	Frequency stability	Pass
15.205 15.209 15.407(b)	RSS-247 6.2 RSS-Gen 8.9, 8.10	Radiated restricted band and emission	Pass
15.207	RSS-Gen 8.8	AC power line conducted emissions	Pass

Note.

1. Worst-case data rates as provided by the client were:

b : **1Mbps**, g : **6Mbps**, n_HT20 : **MCS0**, n_HT40 : **MCS0**
 UNII-1 a : **6 Mbps**, an_VHT20/40 : **MCS0**, ac_VHT20/40/80 : **MCS0**
 UNII-2A a : **6 Mbps**, an_VHT20/40 : **MCS0**, ac_VHT20/40/80 : **MCS0**
 UNII-2C a : **6 Mbps**, an_VHT20/40 : **MCS0**, ac_VHT20/40/80 : **MCS0**
 UNII-3 a : **6 Mbps**, an_VHT20/40 : **MCS0**, ac_VHT20/40/80 : **MCS0**

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	a	24.73	17.57
	5 220		21.62	17.43
	5 240		21.64	17.35
UNII-2A	5 260		21.24	17.16
	5 280		21.39	17.16
	5 320		20.53	17.09
UNII-2C	5 500		19.68	16.79
	5 620		19.63	16.80
	5 700		19.32	16.80
UNII-3	5 745		20.08	16.78
	5 785		19.82	16.75
	5 825		19.85	16.77
UNII-1	5 180	an_HT20	24.74	18.56
	5 220		22.55	18.43
	5 240		21.89	18.36
UNII-2A	5 260		20.94	18.11
	5 280		21.47	18.16
	5 320		21.23	18.06
UNII-2C	5 500		20.05	17.78
	5 620		20.10	17.74
	5 700		20.19	17.78
UNII-3	5 745		20.02	17.73
	5 785		20.22	17.71
	5 825		20.28	17.72

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
 The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
 The authenticity of the test report, contact shchoi@kes.co.kr

Band	Frequency(MHz)	Mode	26 dB bandwidth(MHz)	99 % bandwidth(MHz)
UNII-1	5 180	ac_HT20	22.51	18.51
	5 220		22.41	18.42
	5 240		22.80	18.36
UNII-2A	5 260		21.30	18.13
	5 280		21.39	18.16
	5 320		21.09	18.06
UNII-2C	5 500		20.07	17.79
	5 620		20.21	17.73
	5 700		20.26	17.79
UNII-3	5 745		20.14	17.71
	5 785		20.29	17.71
	5 825		20.30	17.72
UNII-1	5 190	an_HT40	45.54	36.77
	5 230		44.06	36.75
UNII-2A	5 270		40.73	36.41
	5 310		40.92	36.40
UNII-2C	5 510		39.32	36.07
	5 690		39.49	36.05
	5 710		39.46	36.05
UNII-3	5 755		39.20	36.02
	5 795		38.99	36.02
UNII-1	5 190	ac_HT40	45.12	36.87
	5 230		44.39	36.79
UNII-2A	5 270		40.87	36.43
	5 310		40.40	36.43
UNII-2C	5 510		39.22	36.09
	5 690		39.55	36.05
	5 710		39.33	36.06
UNII-3	5 755		39.33	36.01
	5 795		39.07	36.02

This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr

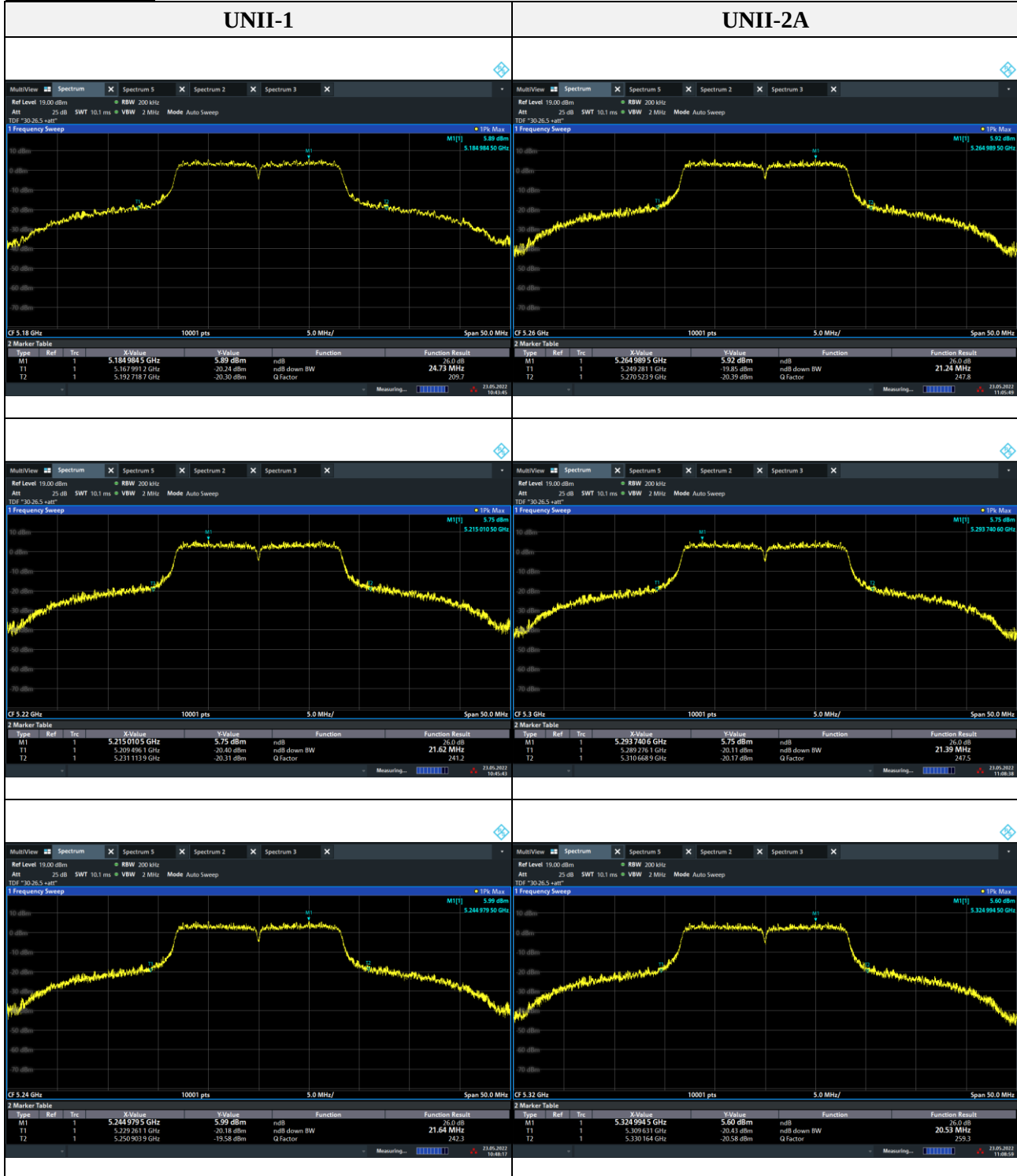


Band	Frequency(MHz)	Mode	26 dB bandwidth(MHz)	99 % bandwidth(MHz)
UNII-1	5 210	ac_HT80	80.63	75.76
UNII-2A	5 290		78.62	75.41
UNII-2C	5 530		78.21	78.06
	5 610		78.27	75.06
	5 690		78.22	75.09
UNII-3	5 775		77.94	75.07

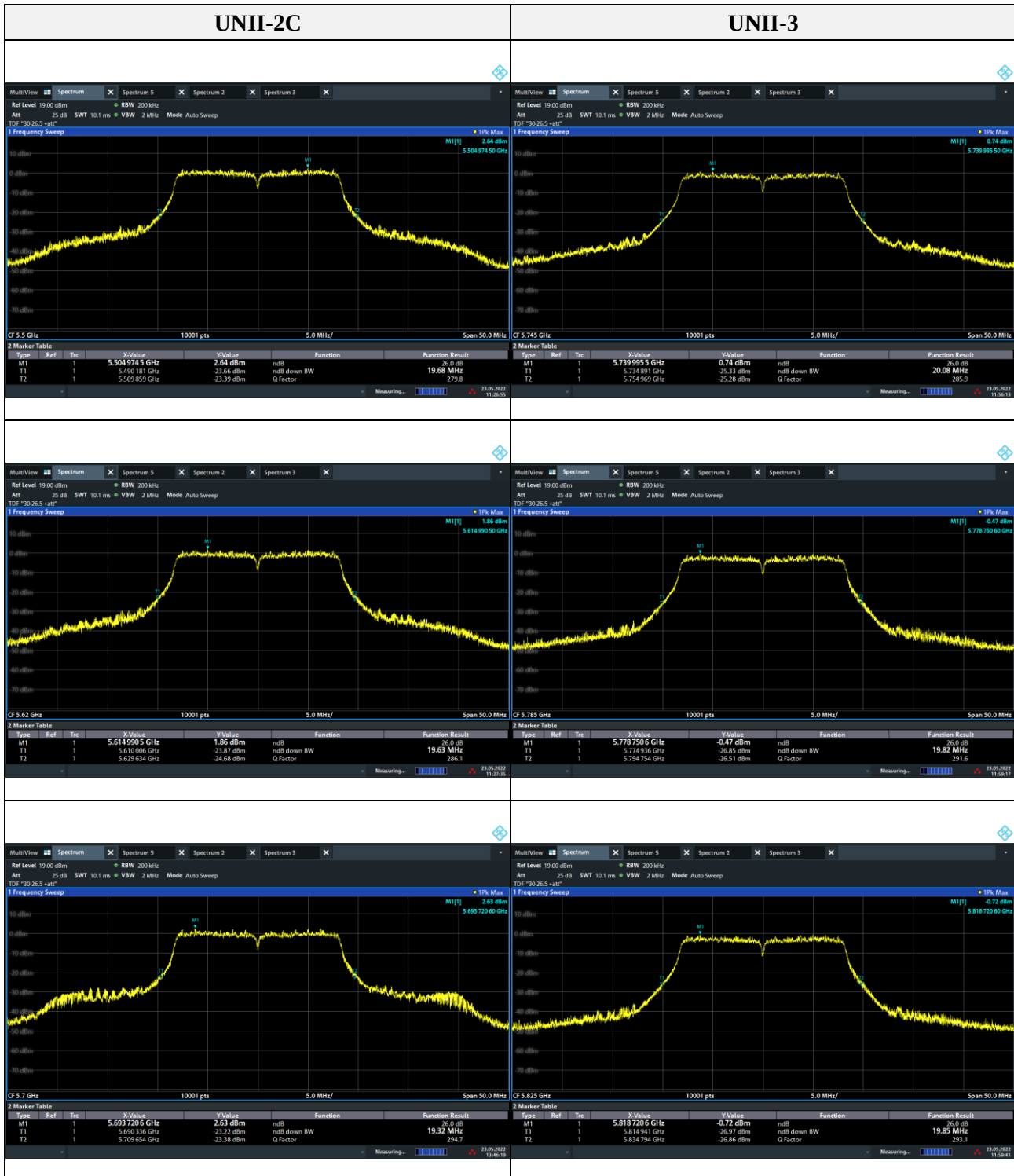
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact shchoi@kes.co.kr

26 dB bandwidth

Mode : 802.11a

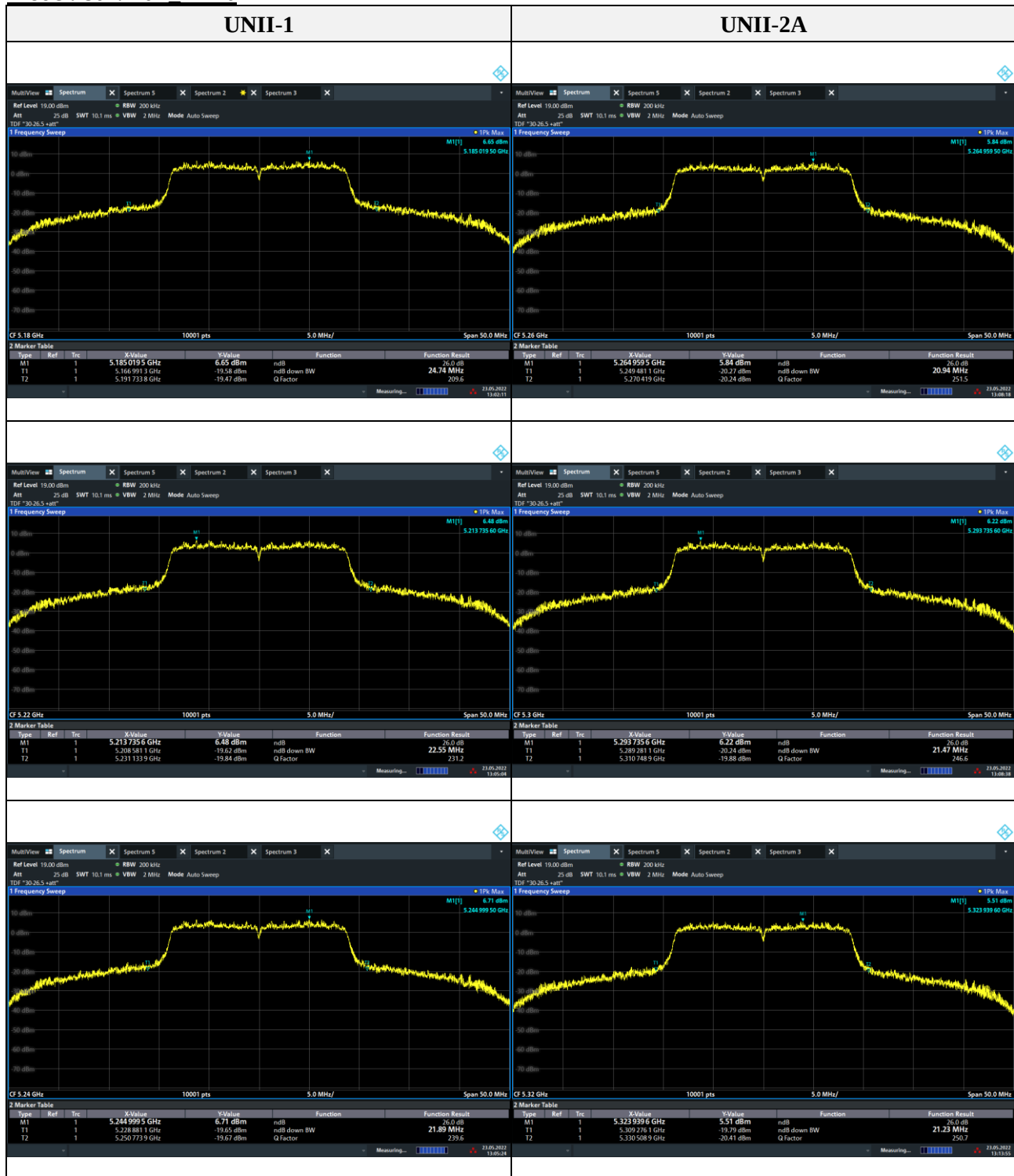


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
 The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
 The authenticity of the test report, contact shchoi@kes.co.kr

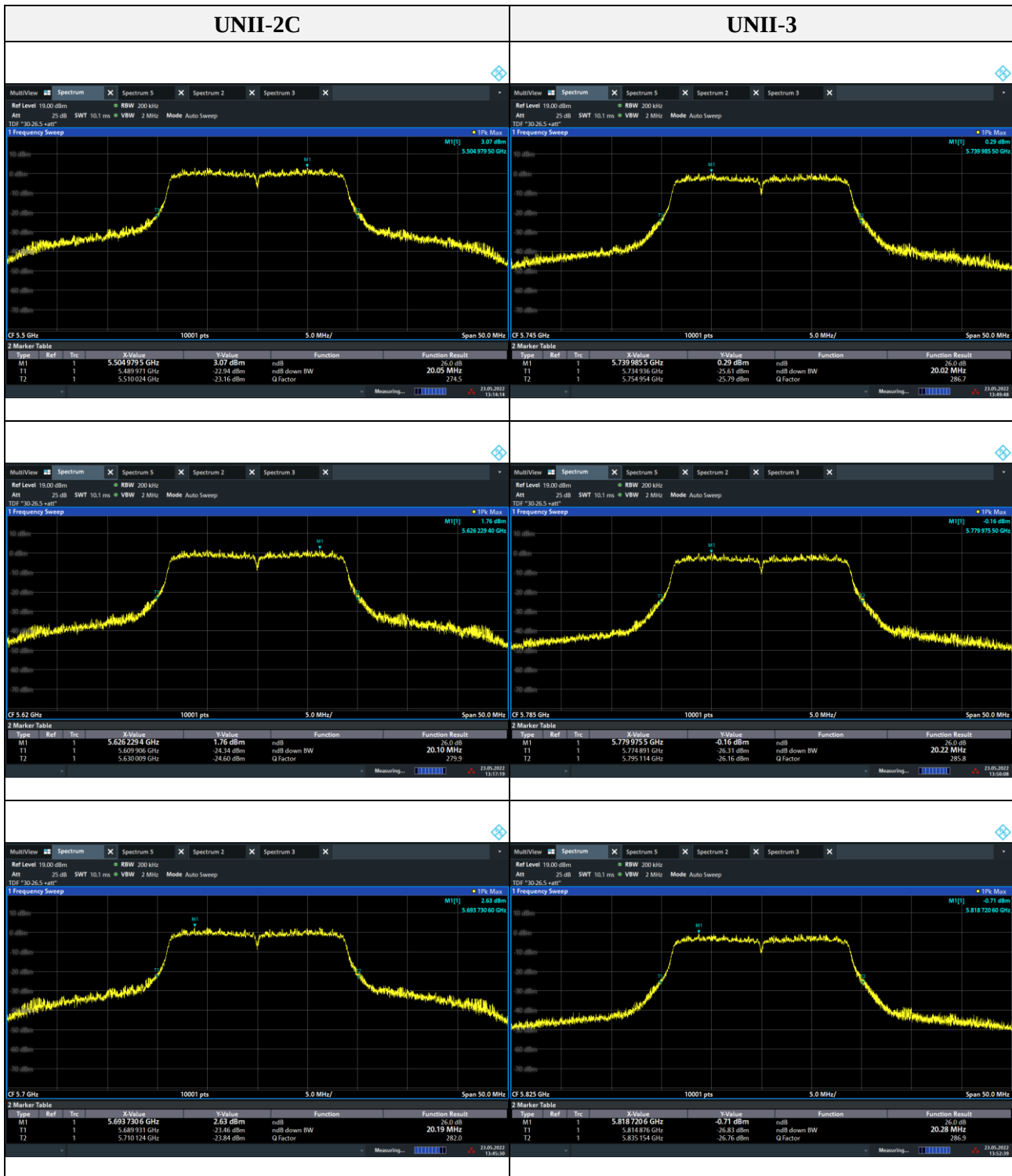


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
 The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
 The authenticity of the test report, contact shchoi@kes.co.kr

Mode : 802.11an HT20

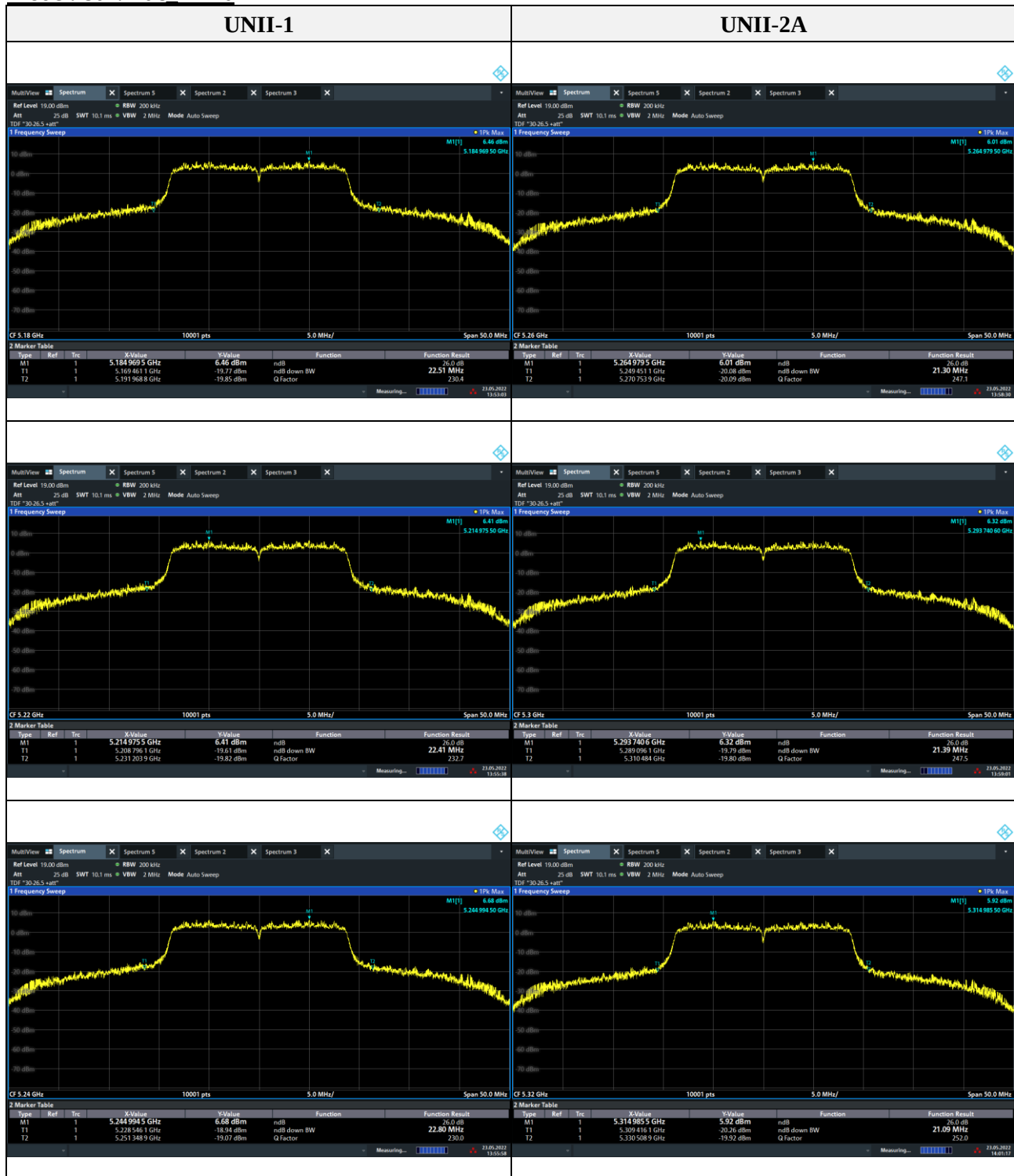


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
 The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
 The authenticity of the test report, contact shchoi@kes.co.kr

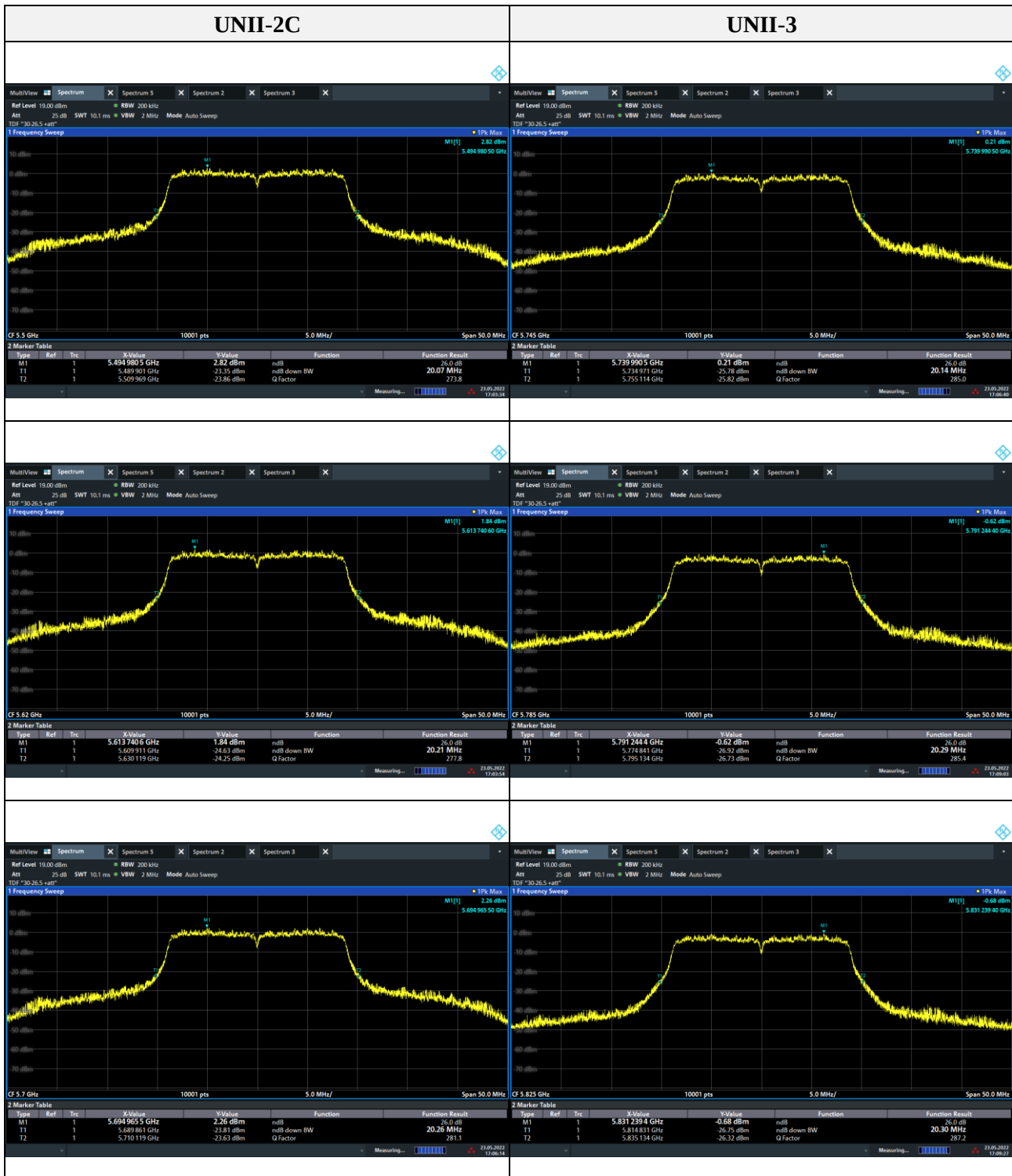


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
 The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
 The authenticity of the test report, contact shchoi@kes.co.kr

Mode : 802.11ac HT20

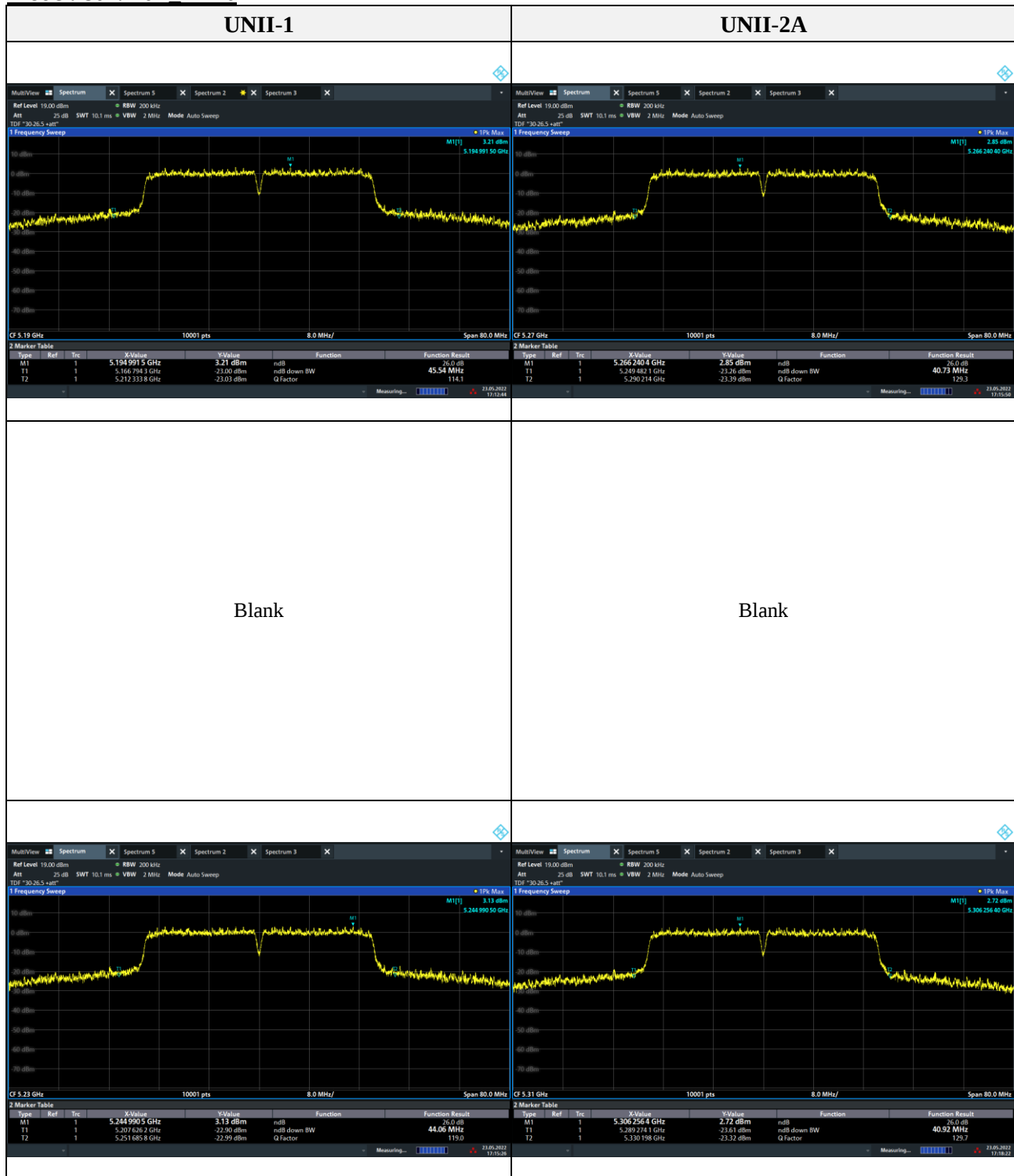


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
 The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
 The authenticity of the test report, contact shchoi@kes.co.kr

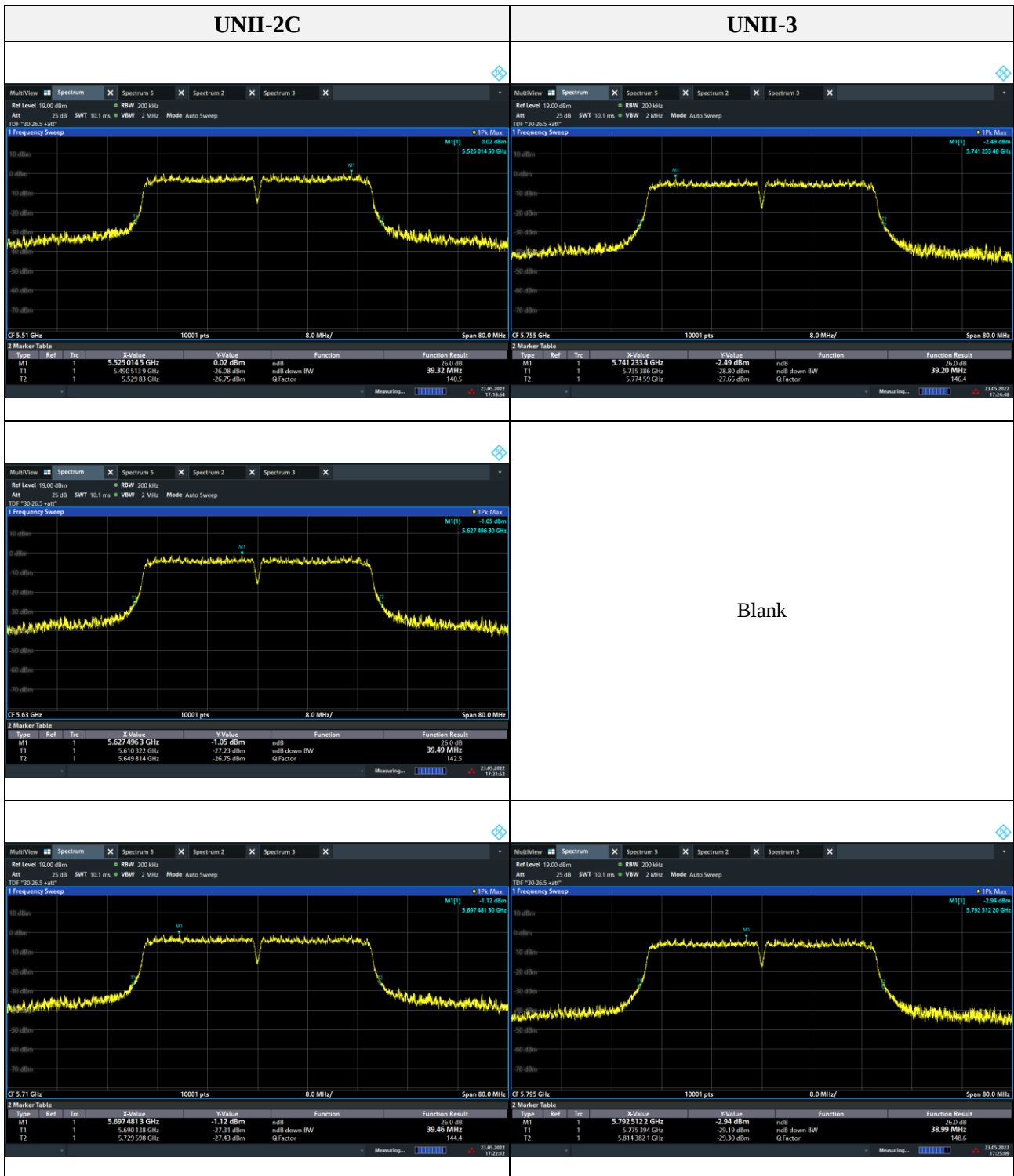


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
 The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
 The authenticity of the test report, contact shchoi@kes.co.kr

Mode : 802.11an HT40

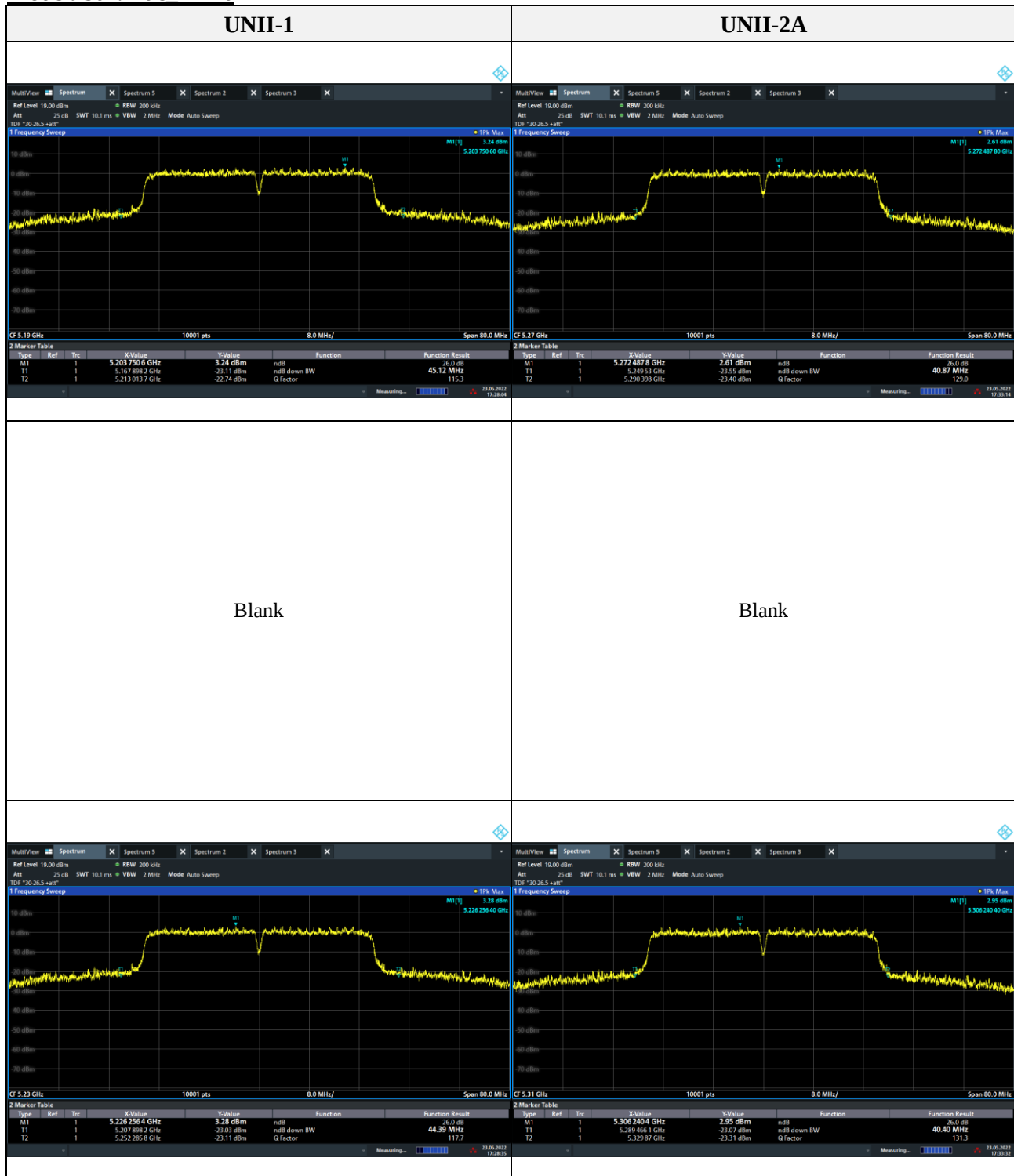


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
 The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
 The authenticity of the test report, contact shchoi@kes.co.kr

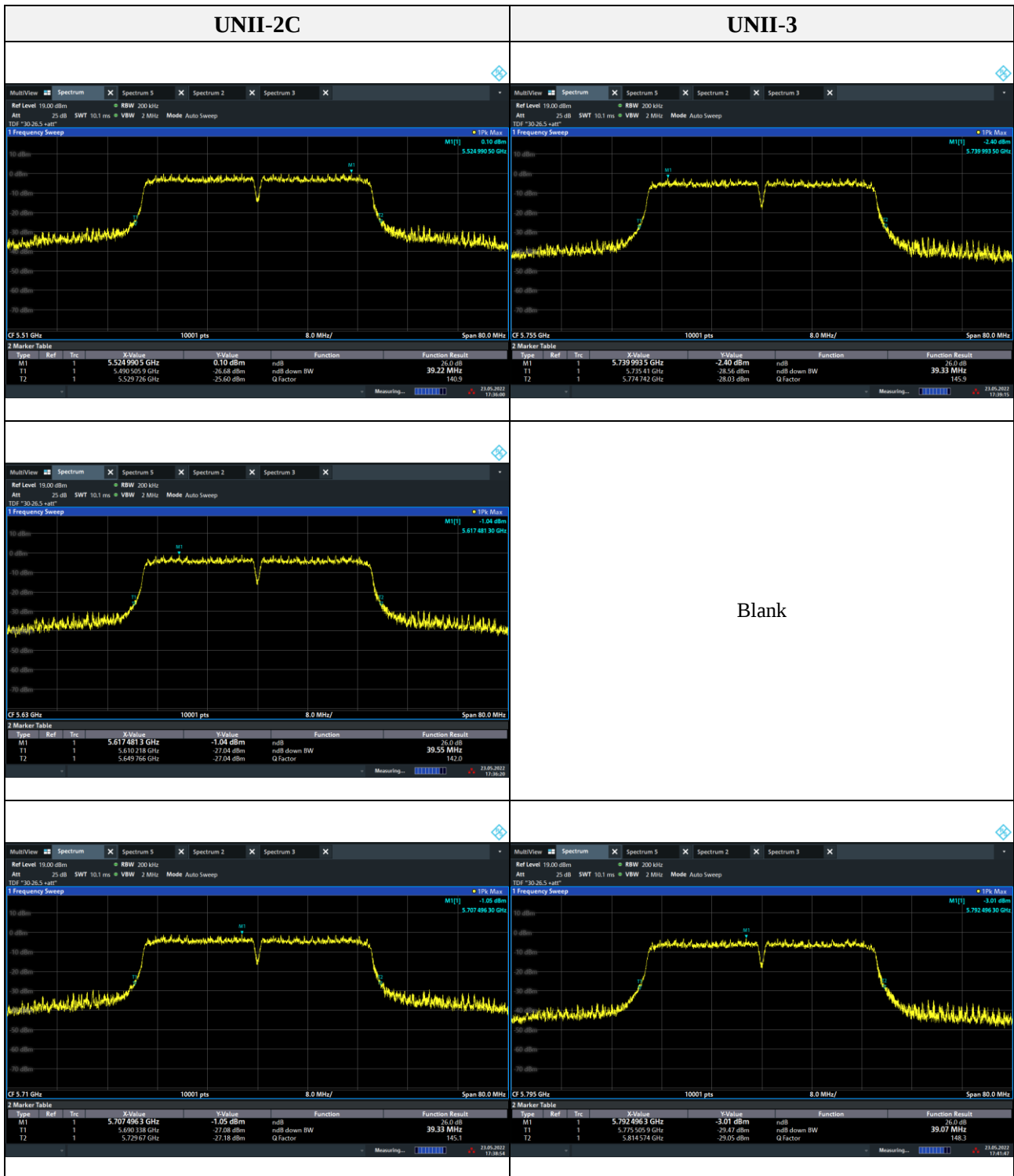


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
 The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
 The authenticity of the test report, contact shchoi@kes.co.kr

Mode : 802.11ac HT40

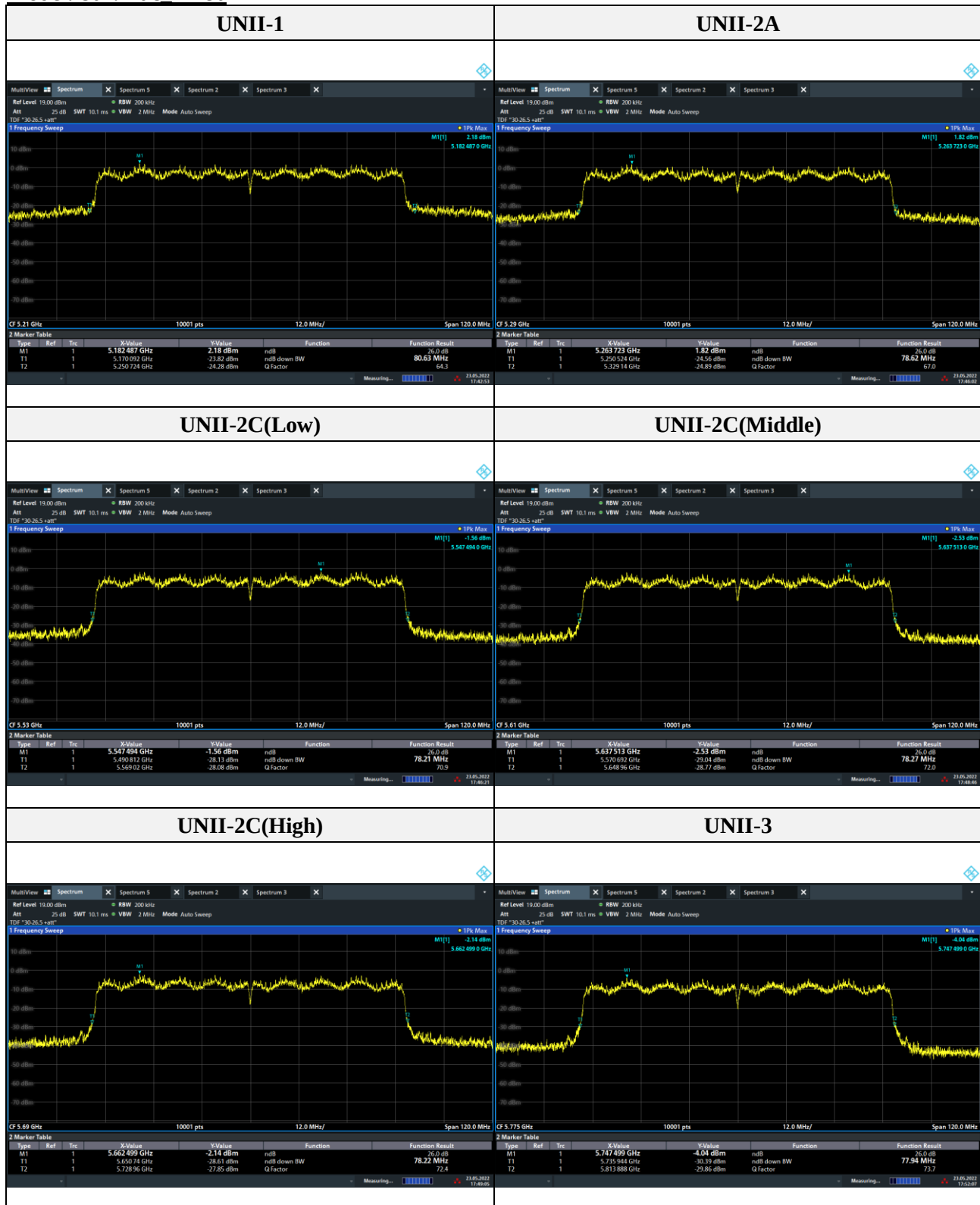


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
 The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
 The authenticity of the test report, contact shchoi@kes.co.kr



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
 The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
 The authenticity of the test report, contact shchoi@kes.co.kr

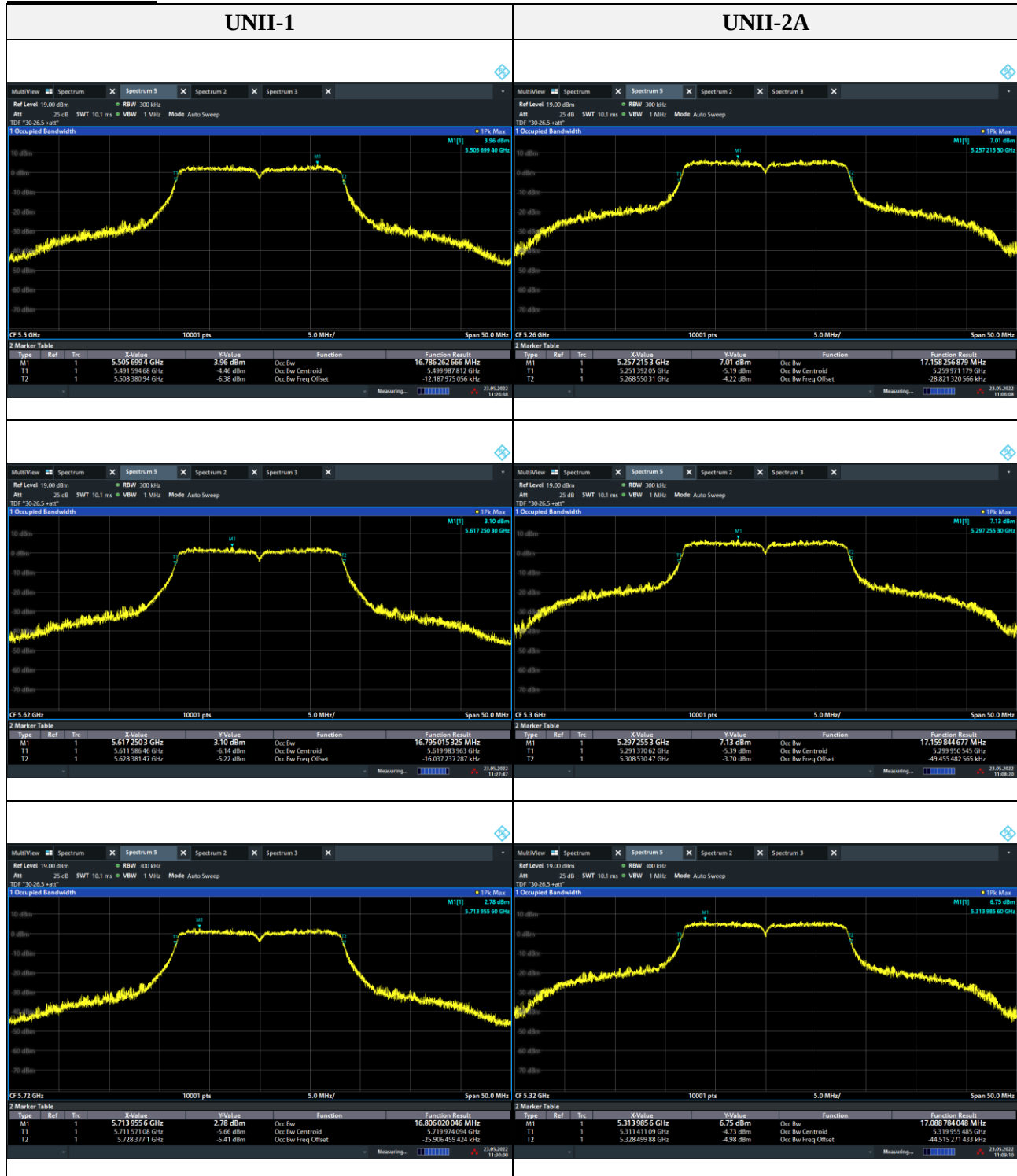
Mode : 802.11ac HT80



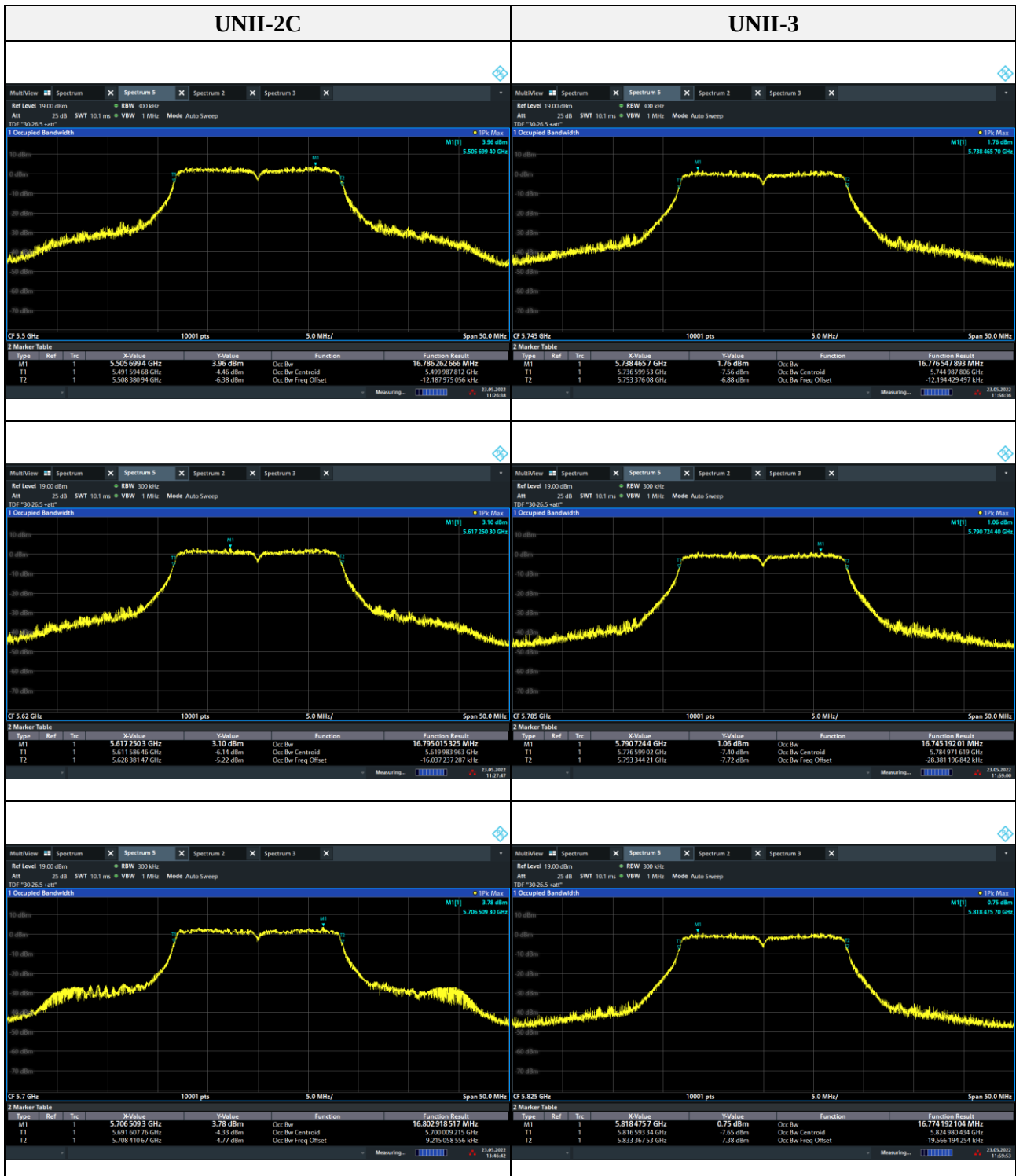
This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
 The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
 The authenticity of the test report, contact shchoi@kes.co.kr

99% bandwidth

Mode : 802.11a

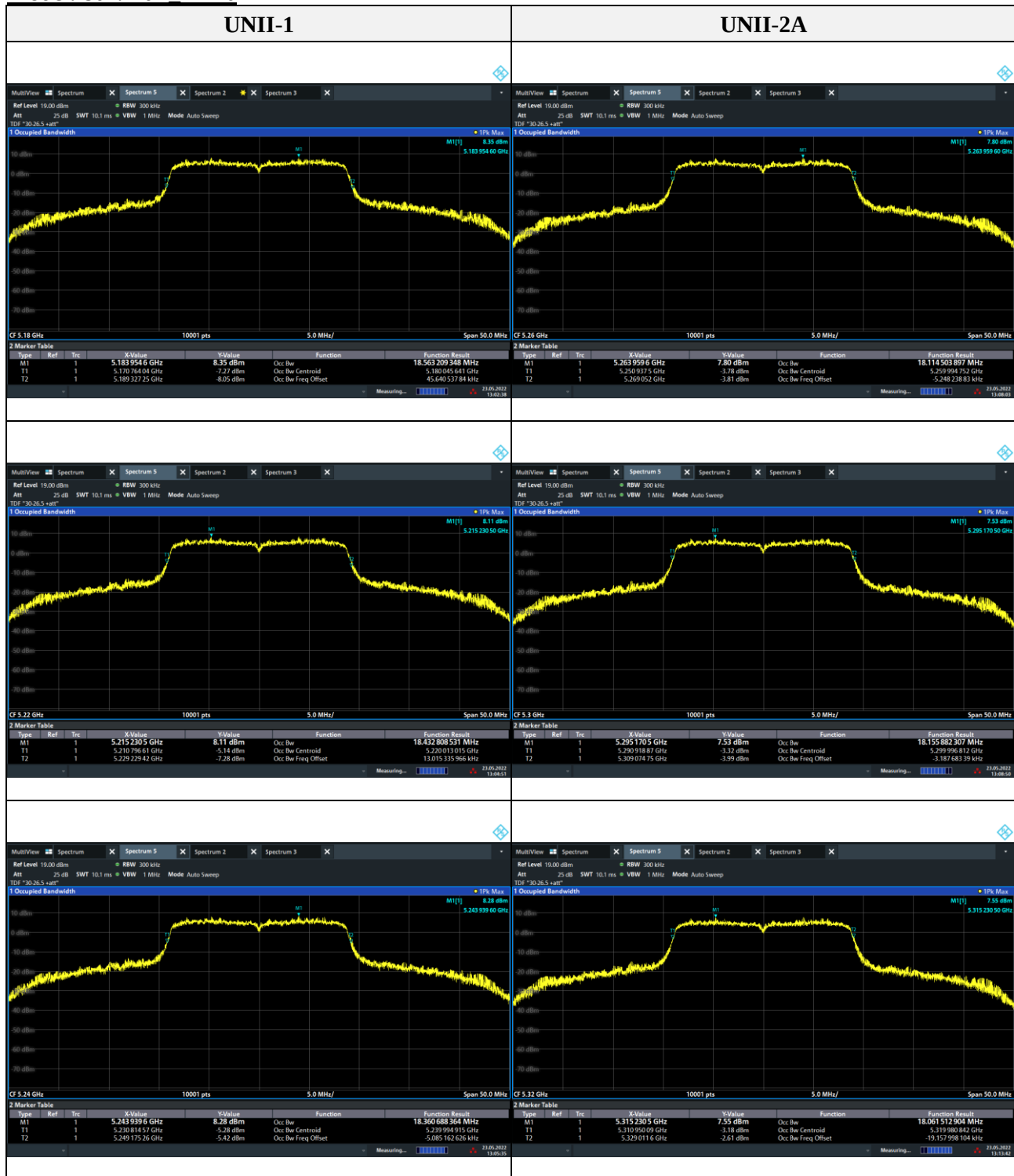


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
 The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
 The authenticity of the test report, contact shchoi@kes.co.kr

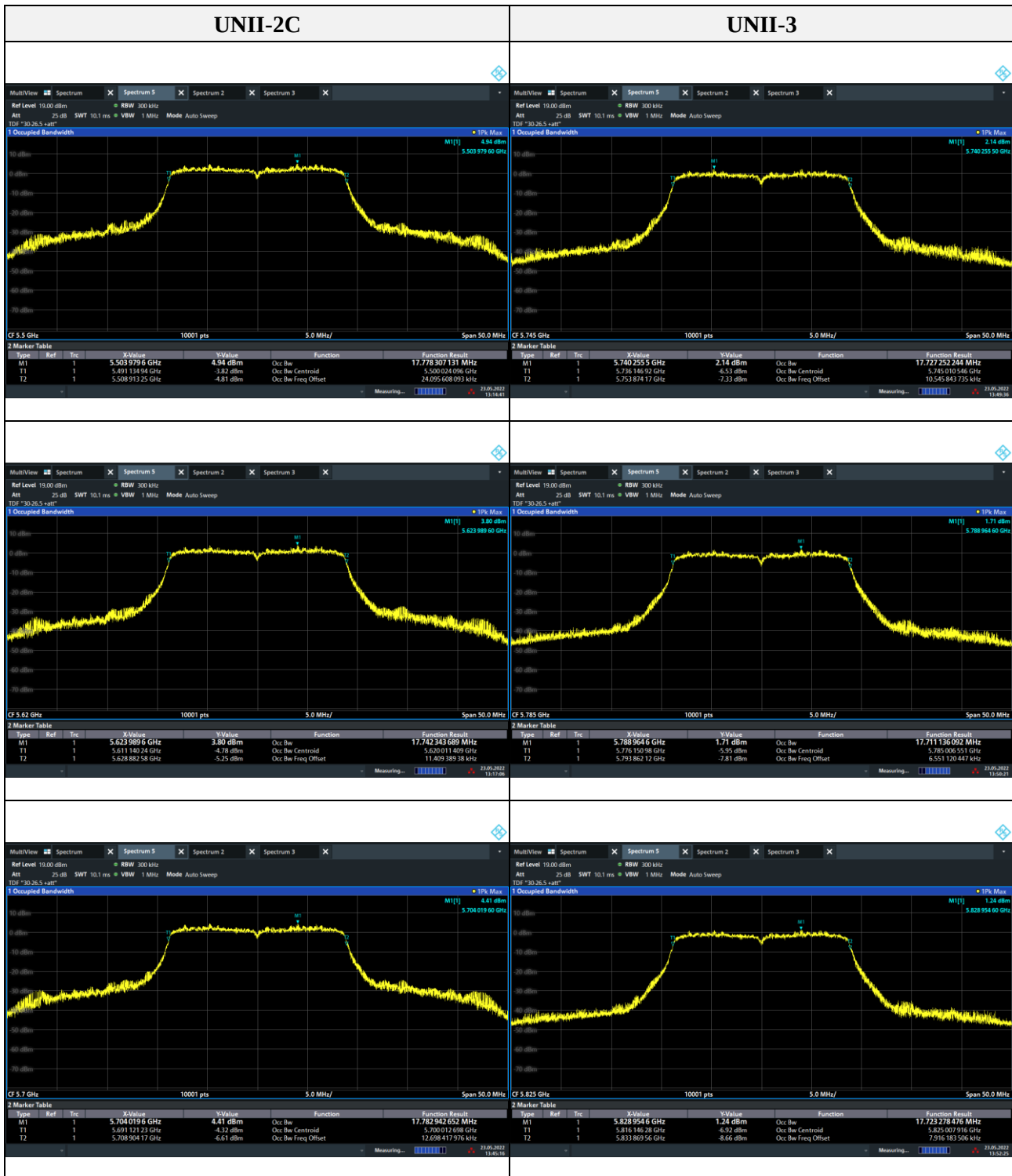


This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
 The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
 The authenticity of the test report, contact shchoi@kes.co.kr

Mode : 802.11an HT20



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
 The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
 The authenticity of the test report, contact shchoi@kes.co.kr



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
 The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
 The authenticity of the test report, contact shchoi@kes.co.kr

Mode : 802.11ac HT20



This report shall not be reproduced except in full, without the written approval of KES Co., Ltd.
 The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
 The authenticity of the test report, contact shchoi@kes.co.kr