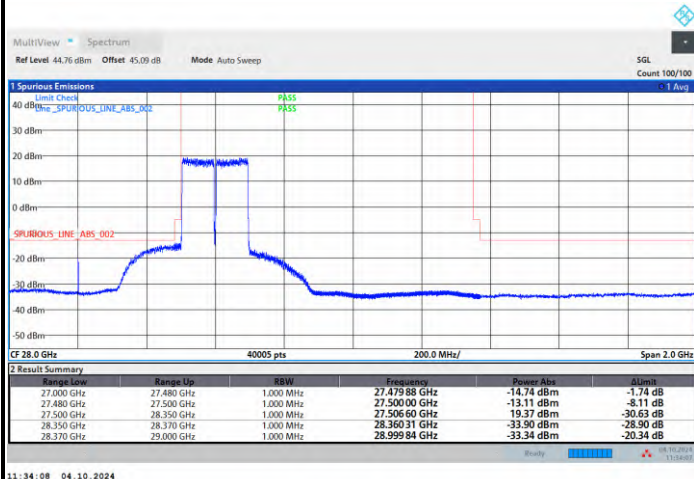




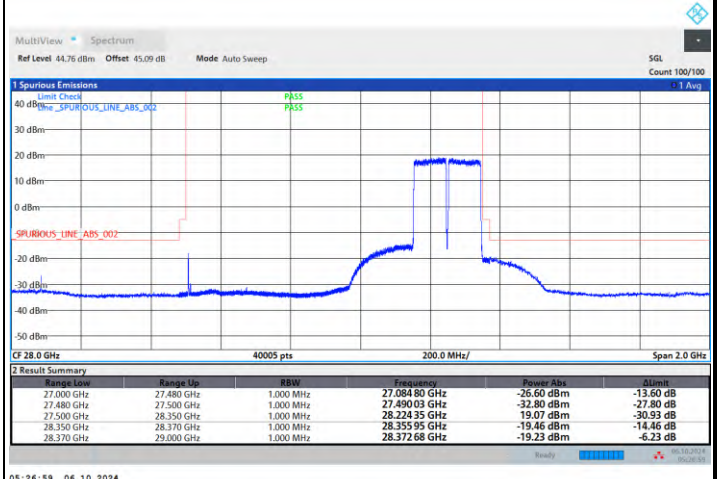
DFT-s-OFDM Module 1

NR Band n261 / 200MHz / 64QAM

Lowest Band Edge / Full RB

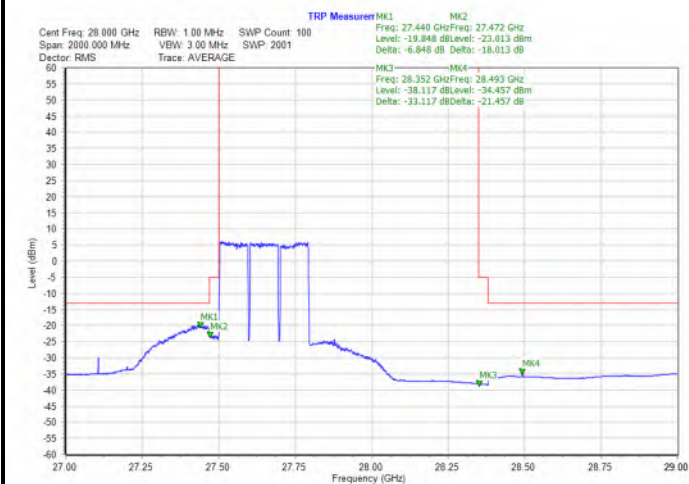


Highest Band Edge / Full RB

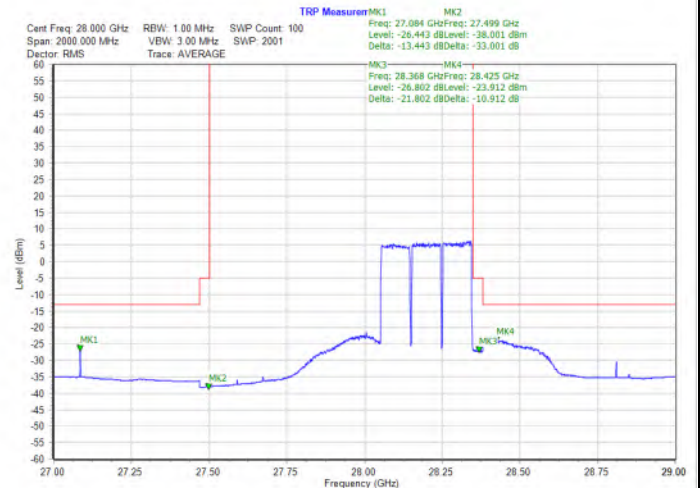


NR Band n261 / 300MHz / QPSK

Lowest Band Edge / Full RB



Highest Band Edge / Full RB

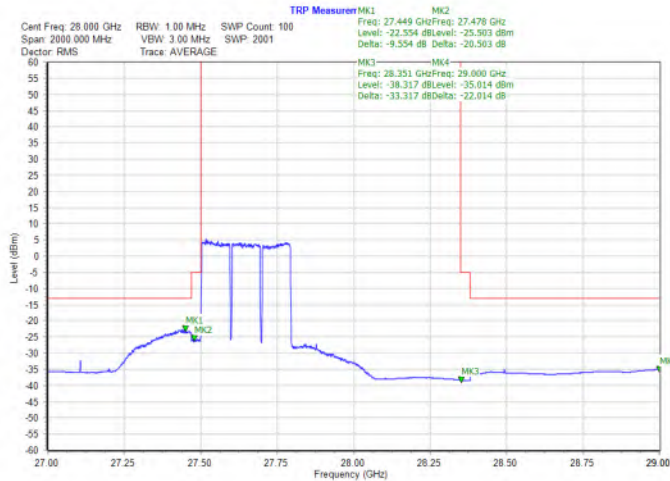




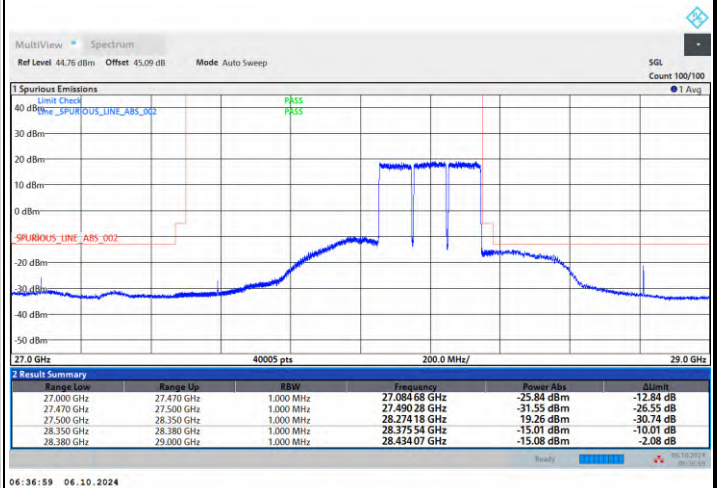
DFT-s-OFDM Module 1

NR Band n261 / 300MHz / 16QAM

Lowest Band Edge / Full RB

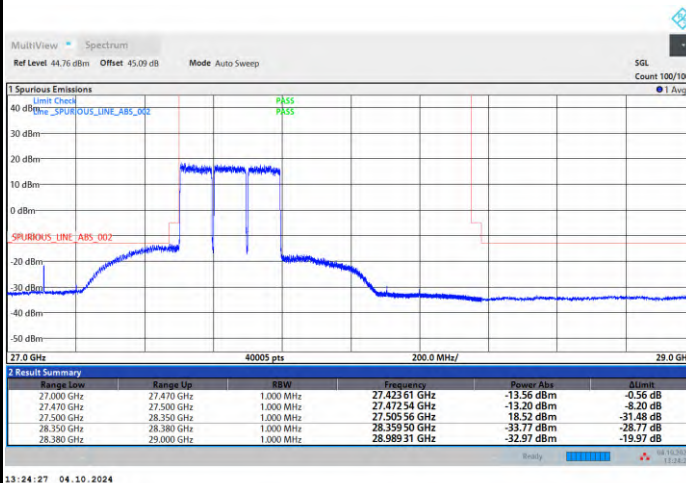


Highest Band Edge / Full RB

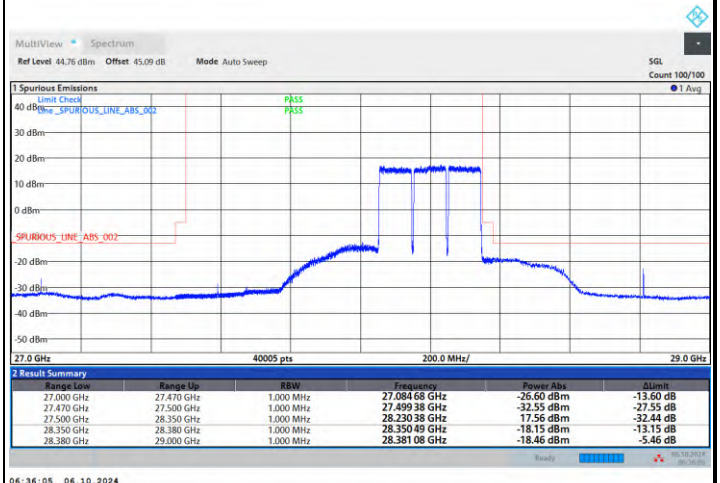


NR Band n261 / 300MHz / 64QAM

Lowest Band Edge / Full RB



Highest Band Edge / Full RB

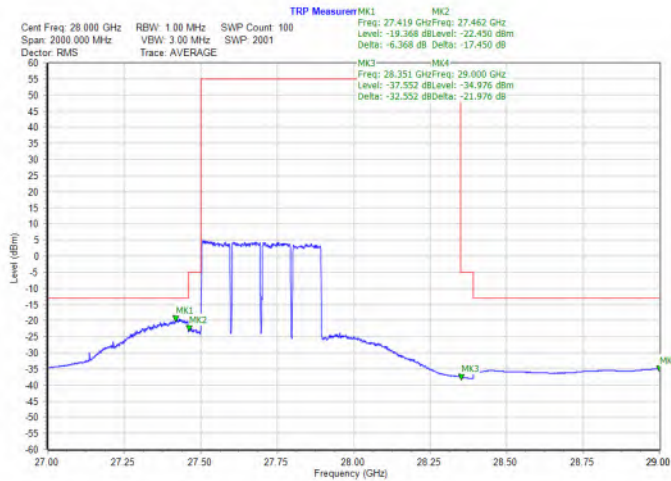




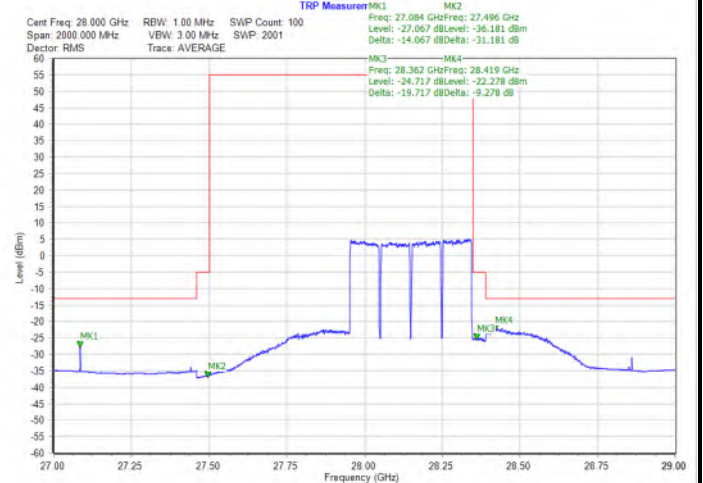
DFT-s-OFDM Module 1

NR Band n261 / 400MHz / QPSK

Lowest Band Edge / Full RB

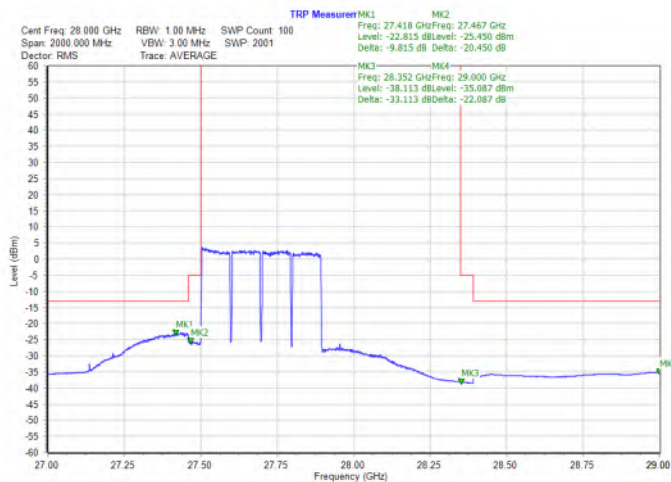


Highest Band Edge / Full RB

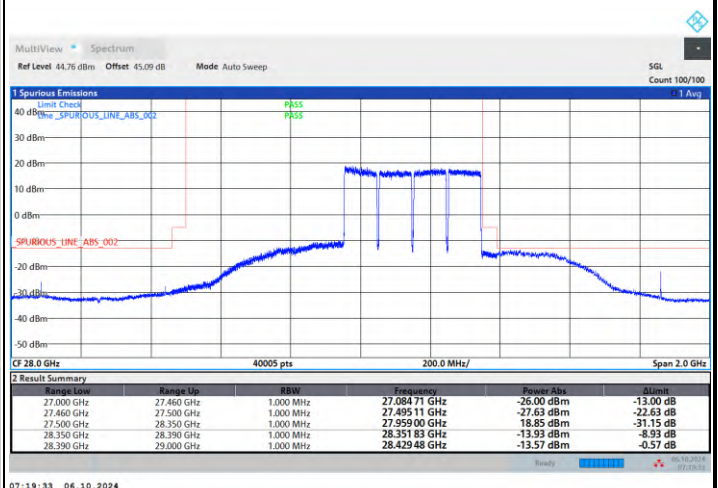


NR Band n261 / 400MHz / 16QAM

Lowest Band Edge / Full RB



Highest Band Edge / Full RB

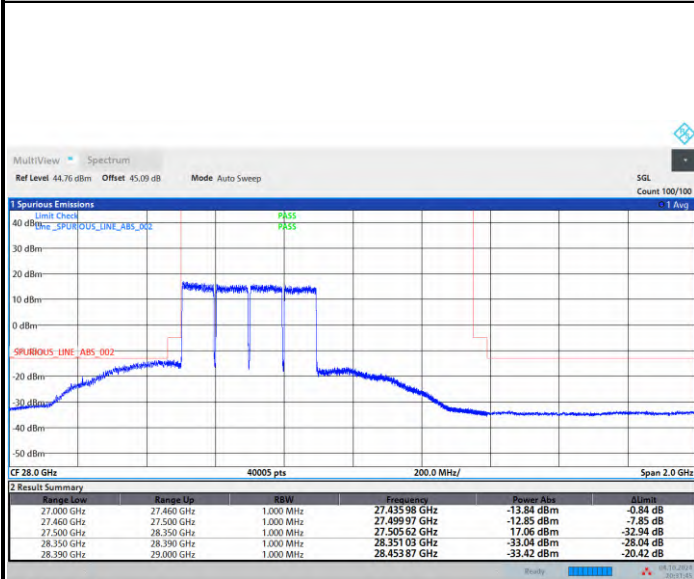




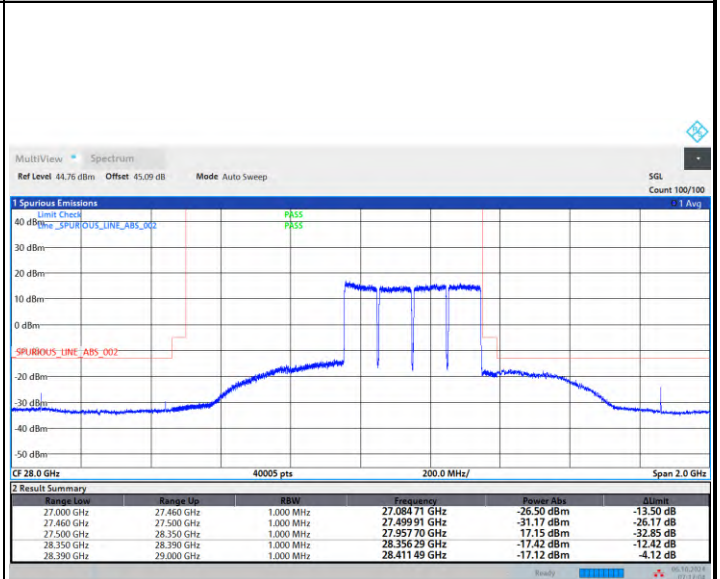
DFT-s-OFDM Module 1

NR Band n261 / 400MHz / 64QAM

Lowest Band Edge / Full RB



Highest Band Edge / Full RB

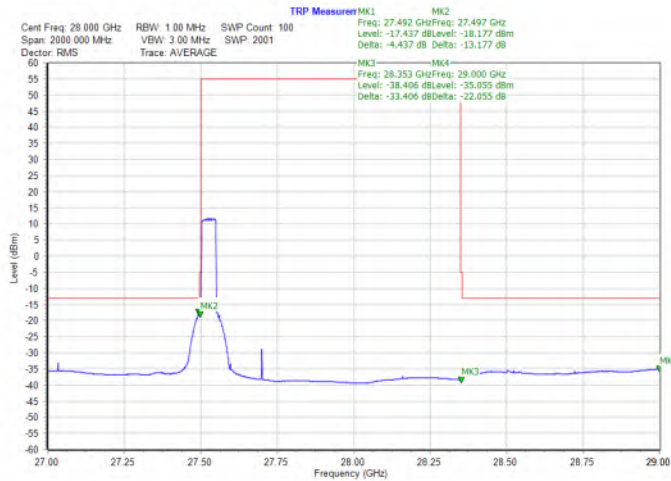




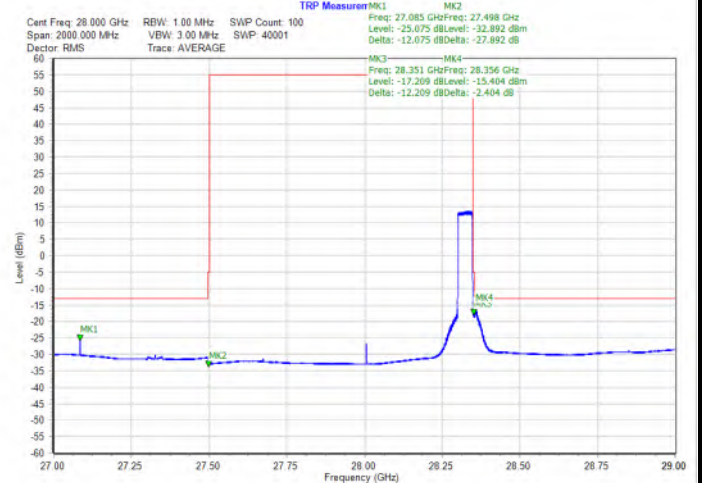
CP-OFDM Module 1

NR Band n261 / 50MHz / QPSK

Lowest Band Edge / Full RB

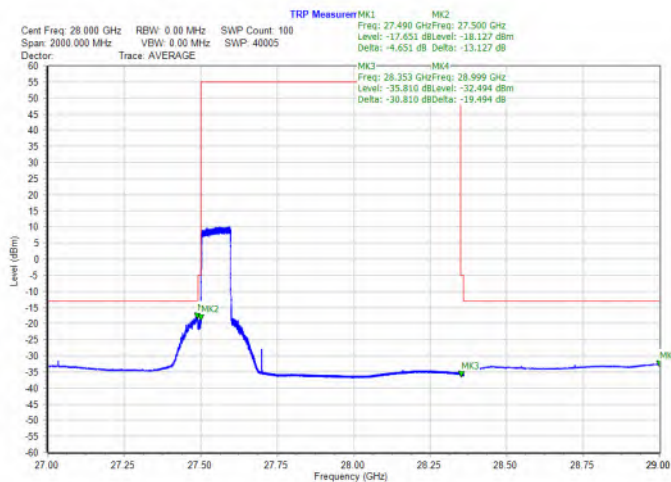


Highest Band Edge / Full RB

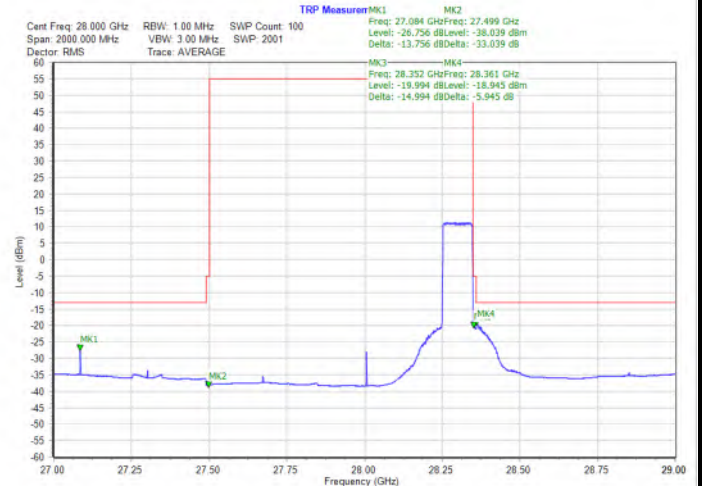


NR Band n261 / 100MHz / QPSK

Lowest Band Edge / Full RB



Highest Band Edge / Full RB

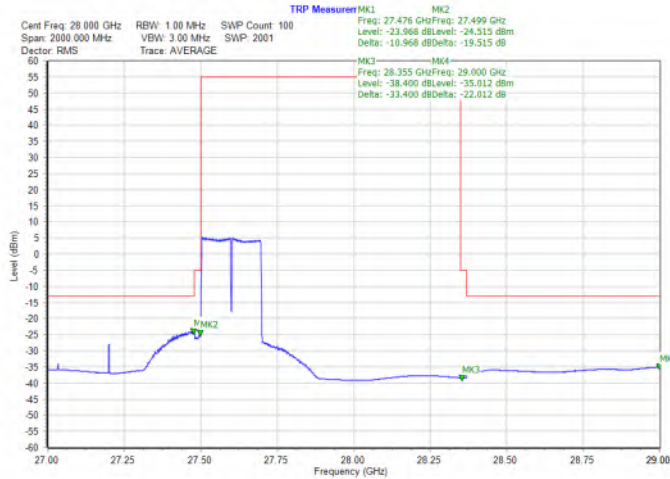




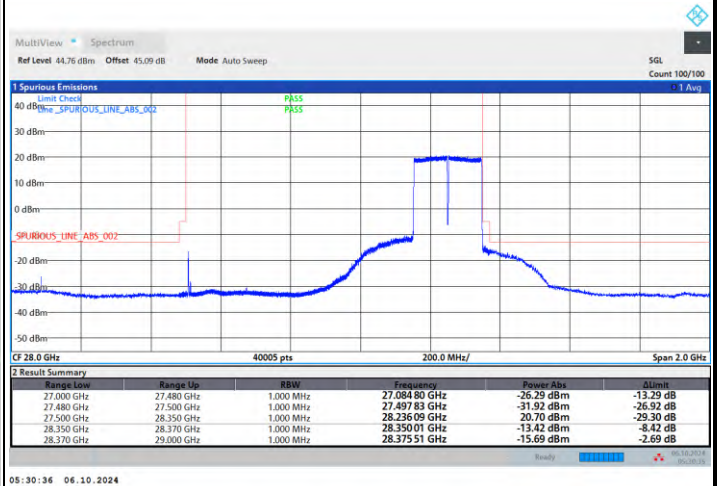
CP-OFDM Module 1

NR Band n261 / 200MHz / QPSK

Lowest Band Edge / Full RB

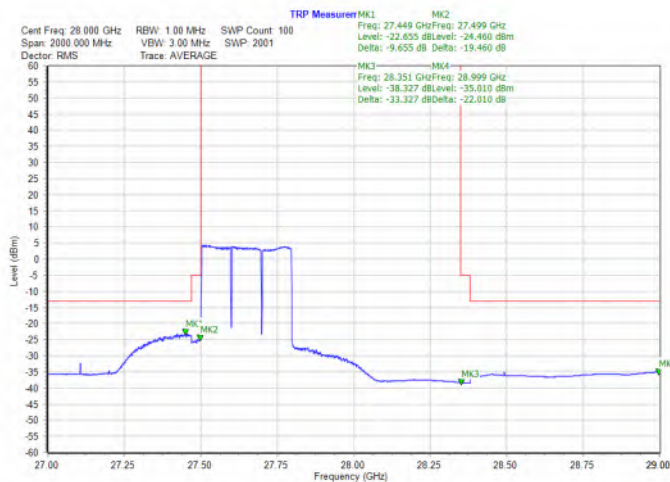


Highest Band Edge / Full RB

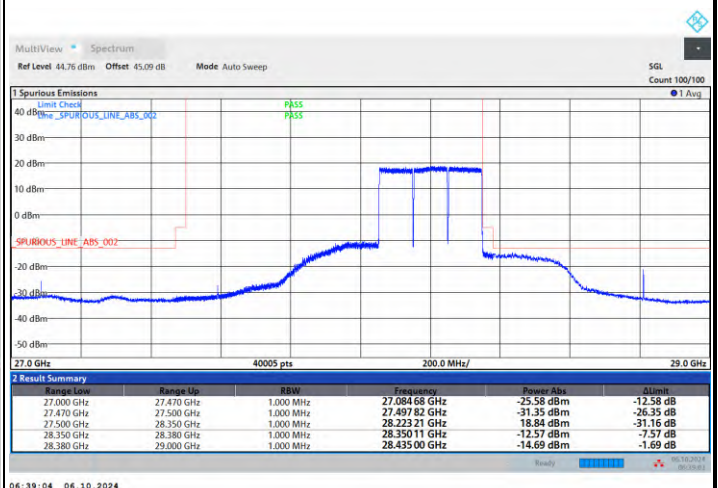


NR Band n261 / 300MHz / QPSK

Lowest Band Edge / Full RB



Highest Band Edge / Full RB

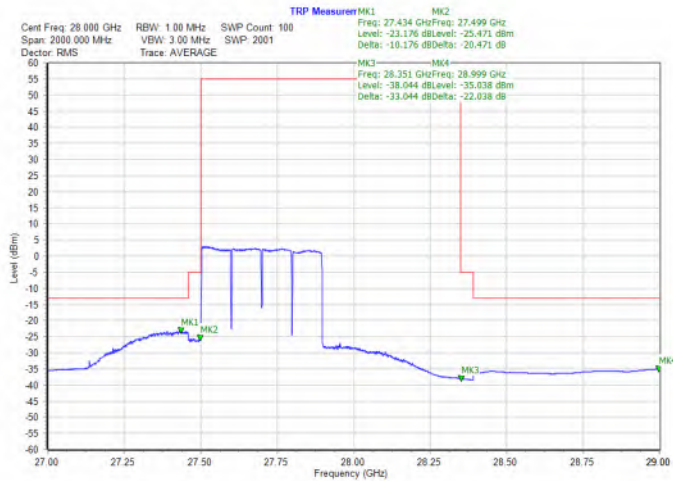




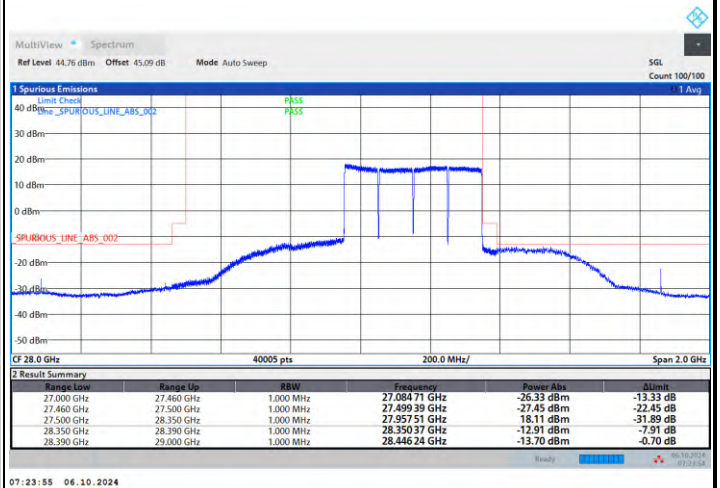
CP-OFDM Module 1

NR Band n261 / 400MHz / QPSK

Lowest Band Edge / Full RB



Highest Band Edge / Full RB





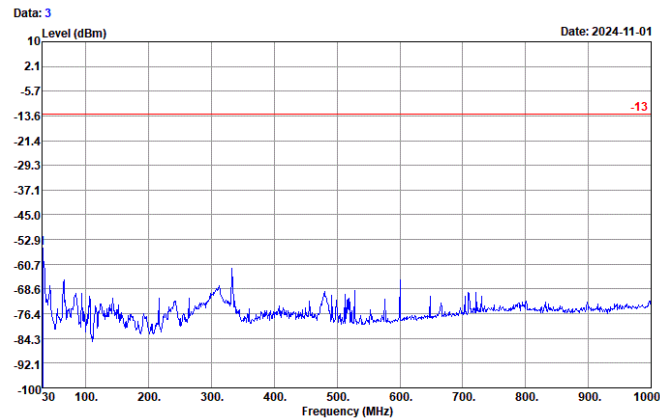
Spurious Emission

There is no significant spurious emission signal found for frequency started from 30MHz up to 18GHz.

Only the noise floor is reported.

NR Band n261 (30MHz-1GHz)

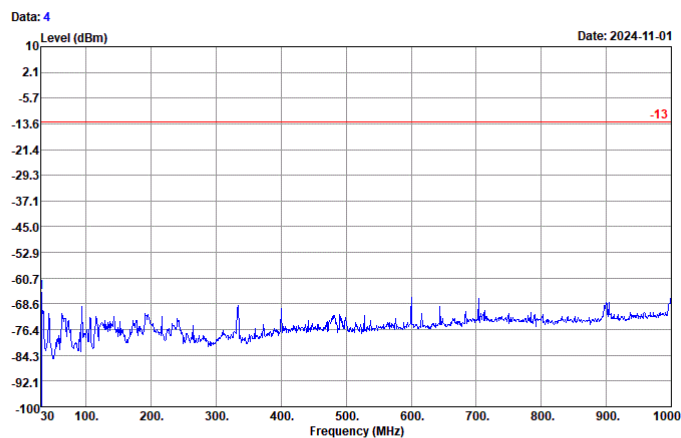
Horizontal



Site : 03CH23-HY
Condition : -13 ERP_20231229 HORIZONTAL
Project : 470412-01
: n261

Freq	Level	Over	Limit
MHz	dBm	dB	dBm
1	30.97	-55.70	-42.70 -13.00

Vertical



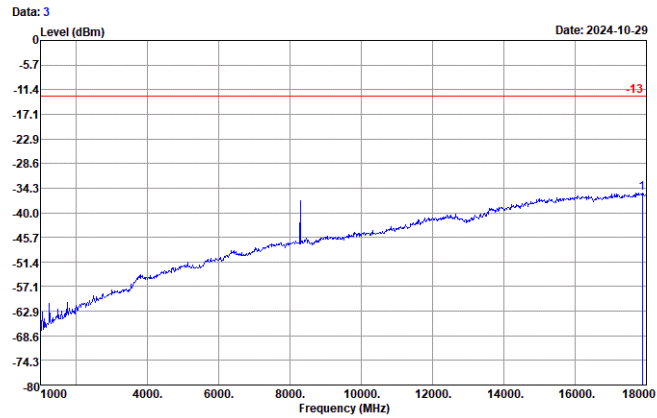
Site : 03CH23-HY
Condition : -13 ERP_20231229 VERTICAL
Project : 470412-01
: n261

Freq	Level	Over	Limit
MHz	dBm	dB	dBm
1	30.97	-64.96	-51.96 -13.00



NR Band n261 (1GHz-18GHz)

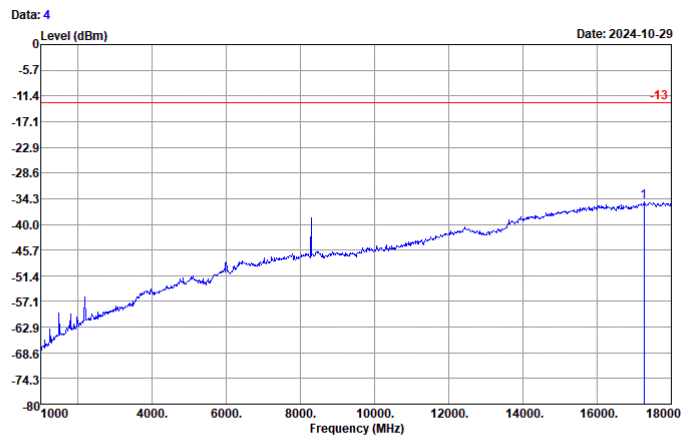
Horizontal



Site : 03CH23-HY
Condition : -13 EIRP_20231229 HORIZONTAL
Project : 470412-01
: n261

Freq	Level	Over	Limit
MHz	dBm	dB	dBm
1	17881.00	-35.33	-22.33 -13.00

Vertical

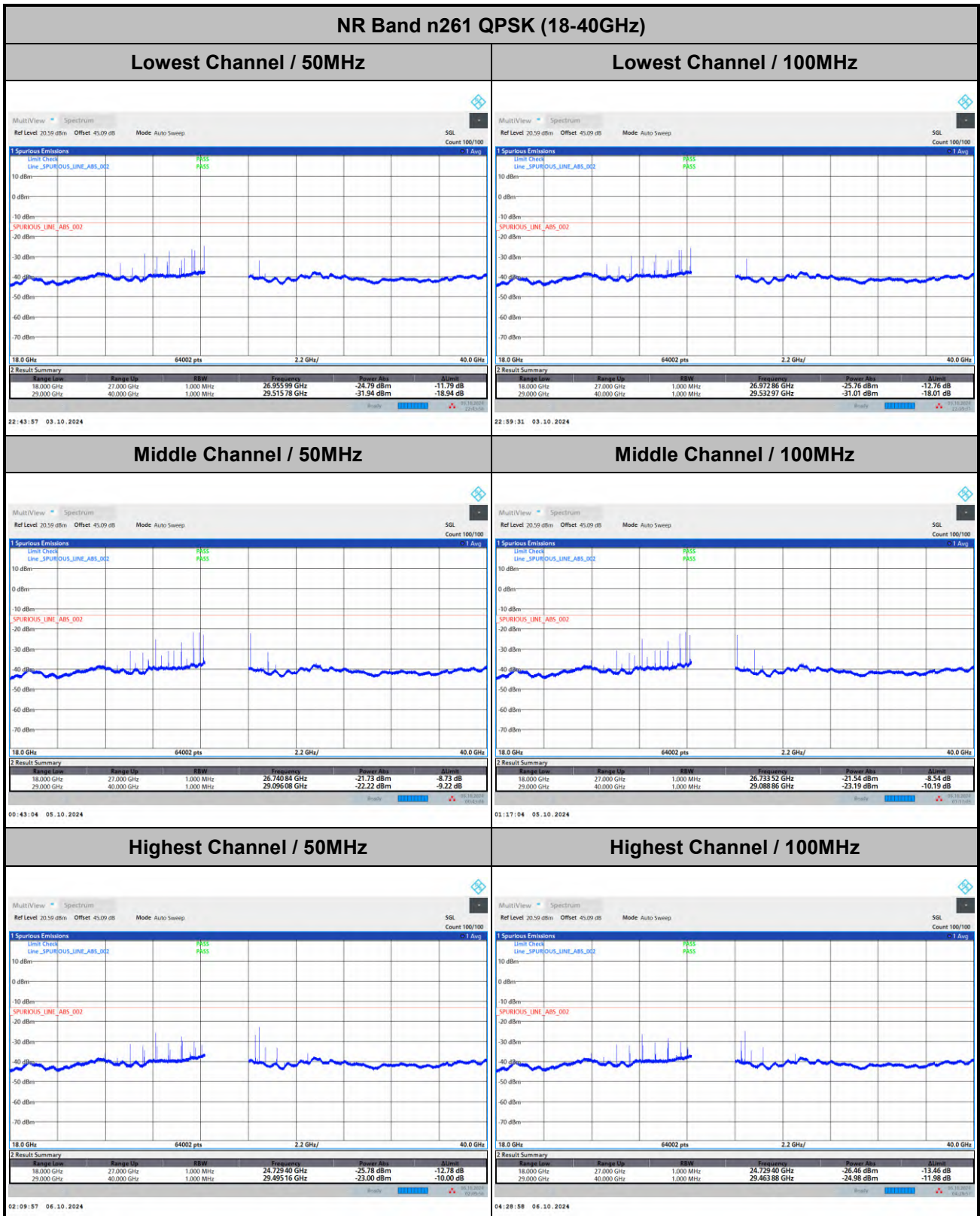


Site : 03CH23-HY
Condition : -13 EIRP_20231229 VERTICAL
Project : 470412-01
: n261

Freq	Level	Over	Limit
MHz	dBm	dB	dBm
1	17269.00	-35.03	-22.03 -13.00



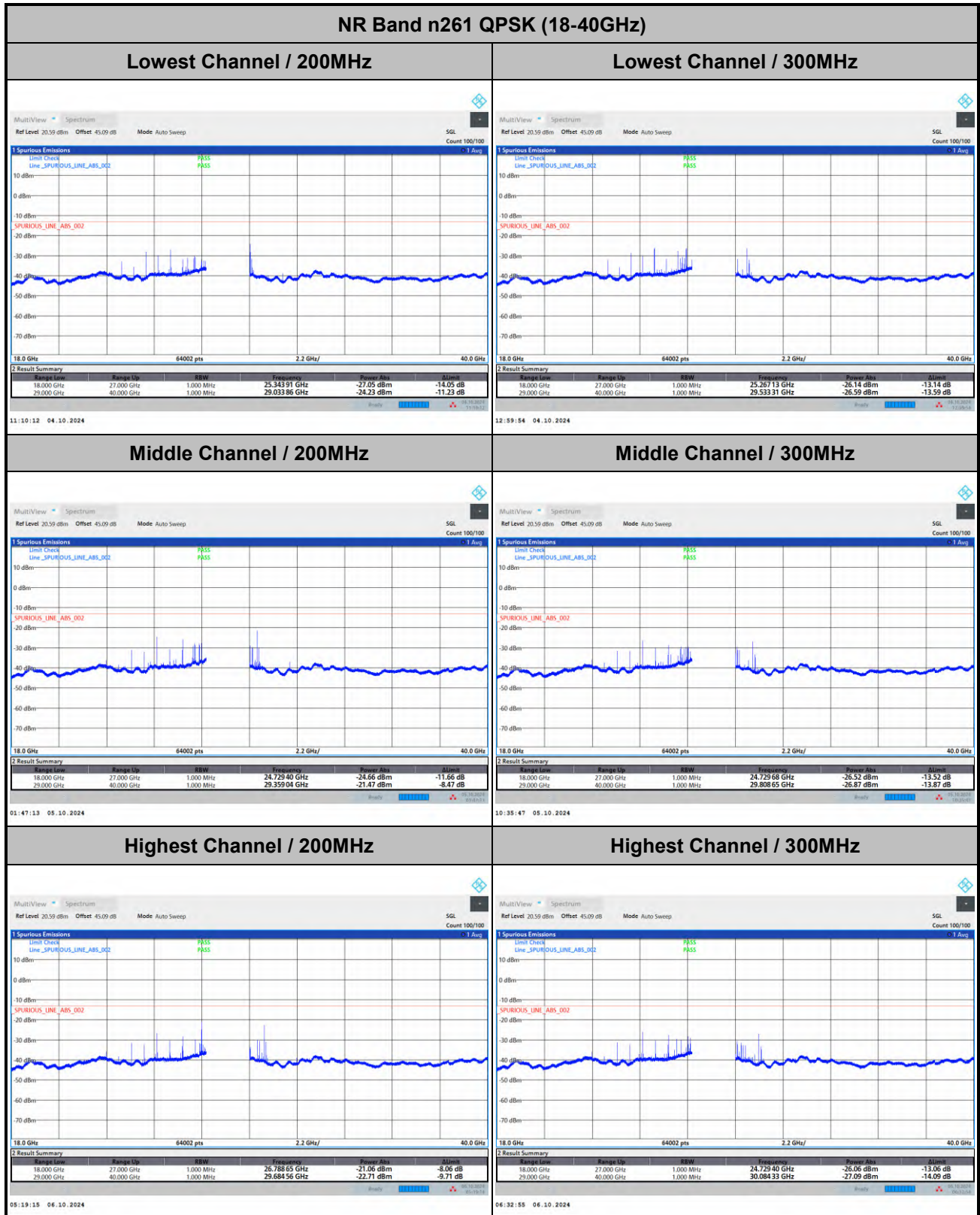
Spurious emission between 18GHz to 40GHz worst case plot is reported as following.

DFT-s-OFDM Module 1

Remark: In band and out of band frequencies are omitted.



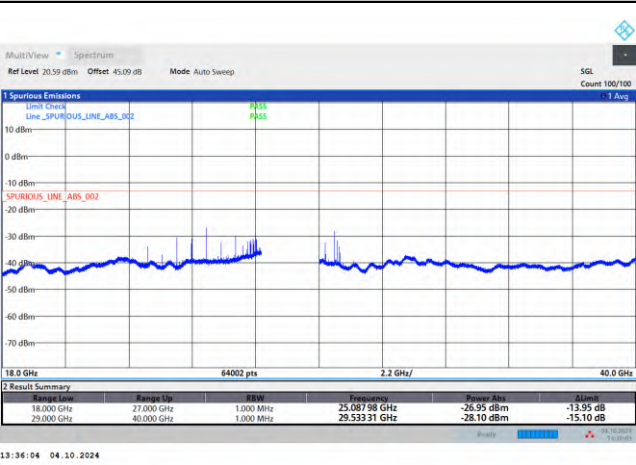
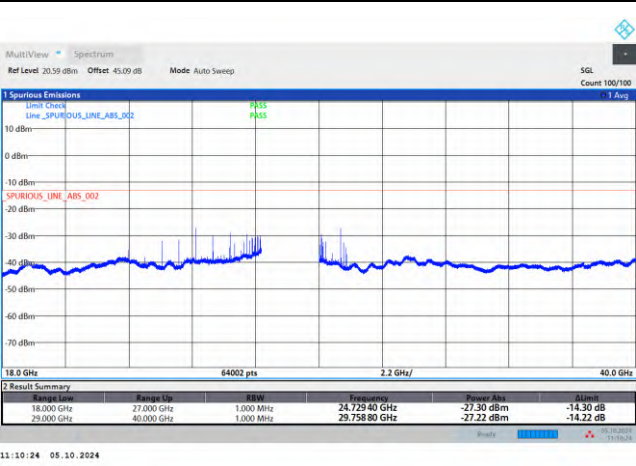
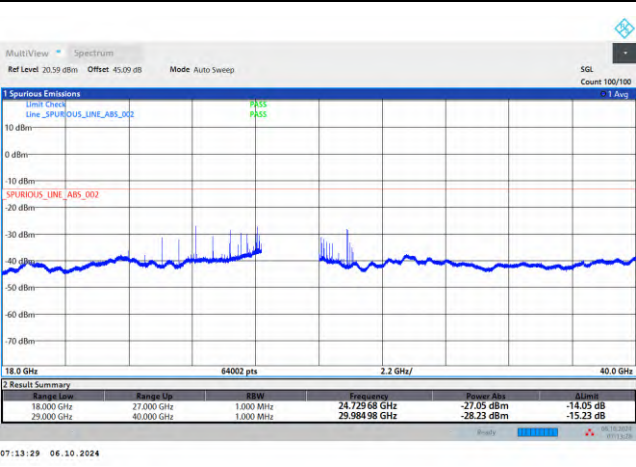
DFT-s-OFDM Module 1



Remark: In band and out of band frequencies are omitted.



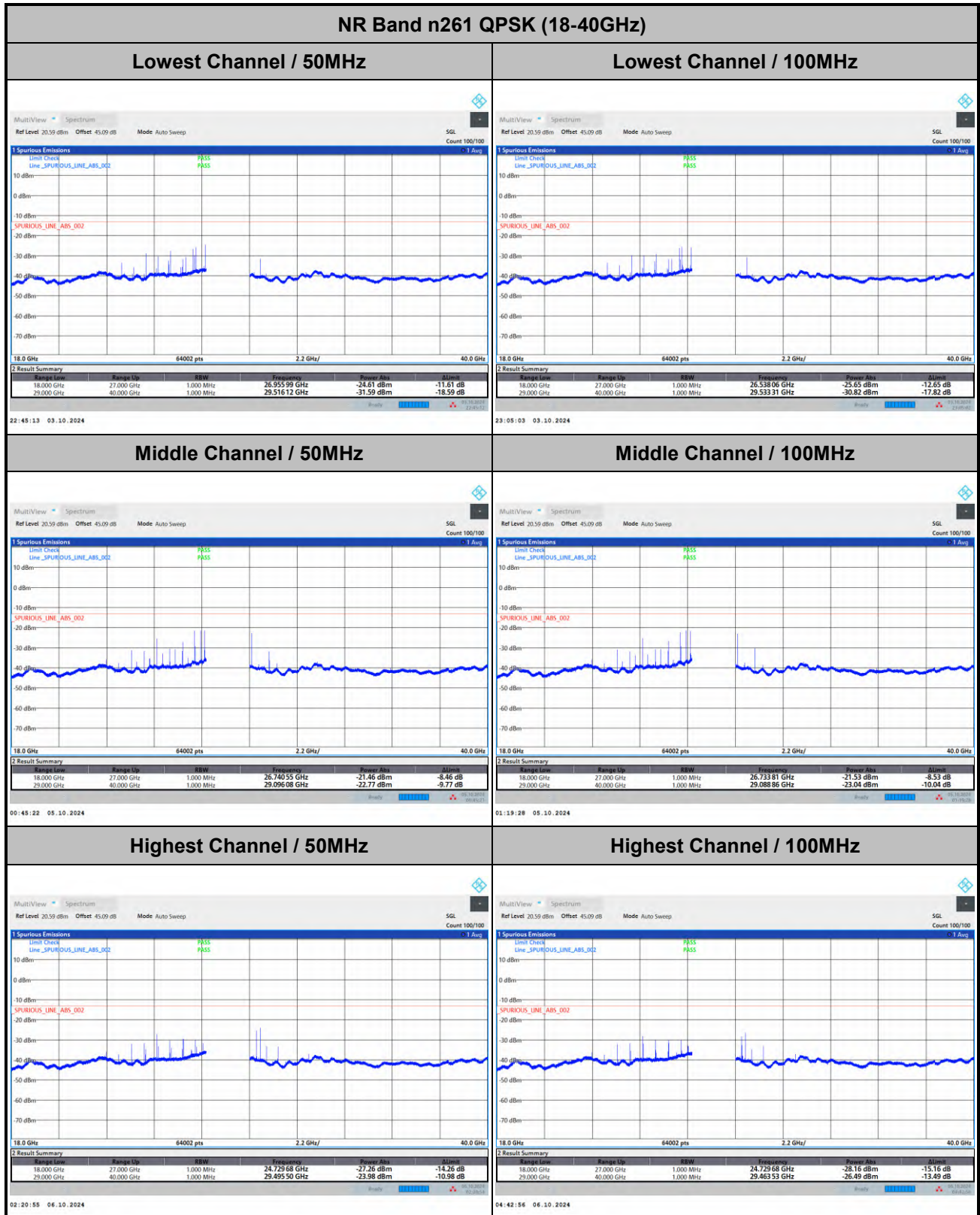
DFT-s-OFDM Module 1

NR Band n261 QPSK (18-40GHz)	
Lowest Channel / 400MHz	
 intentionally blank	
Middle Channel / 400MHz	
 intentionally blank	
Highest Channel / 400MHz	
 intentionally blank	

Remark: In band and out of band frequencies are omitted.



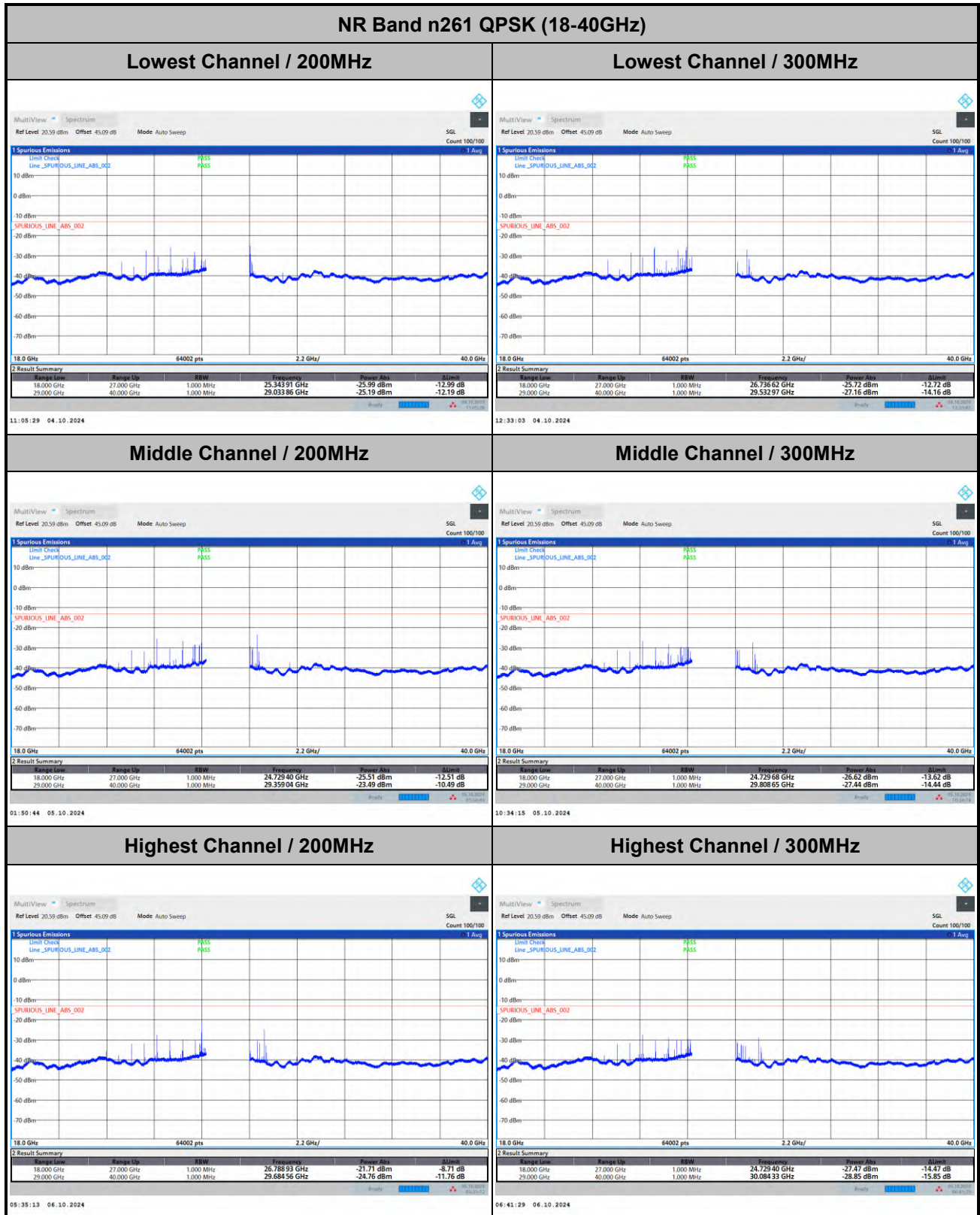
CP-OFDM Module 1



Remark: In band and out of band frequencies are omitted.



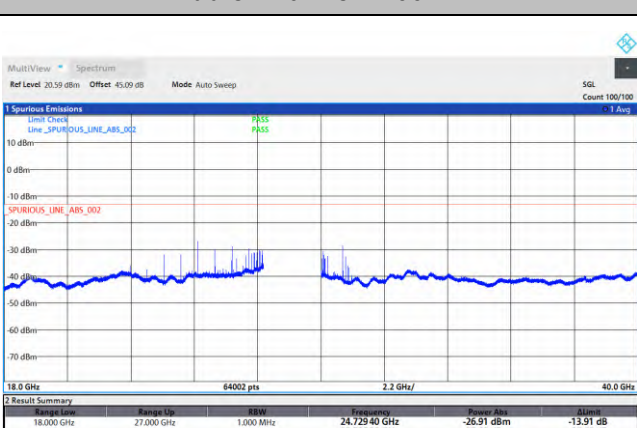
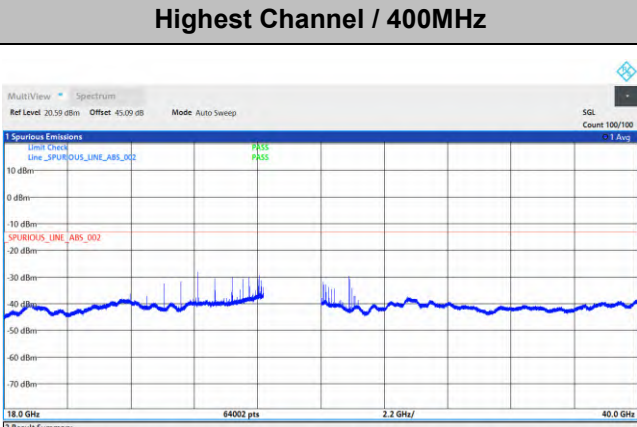
CP-OFDM Module 1



Remark: In band and out of band frequencies are omitted.

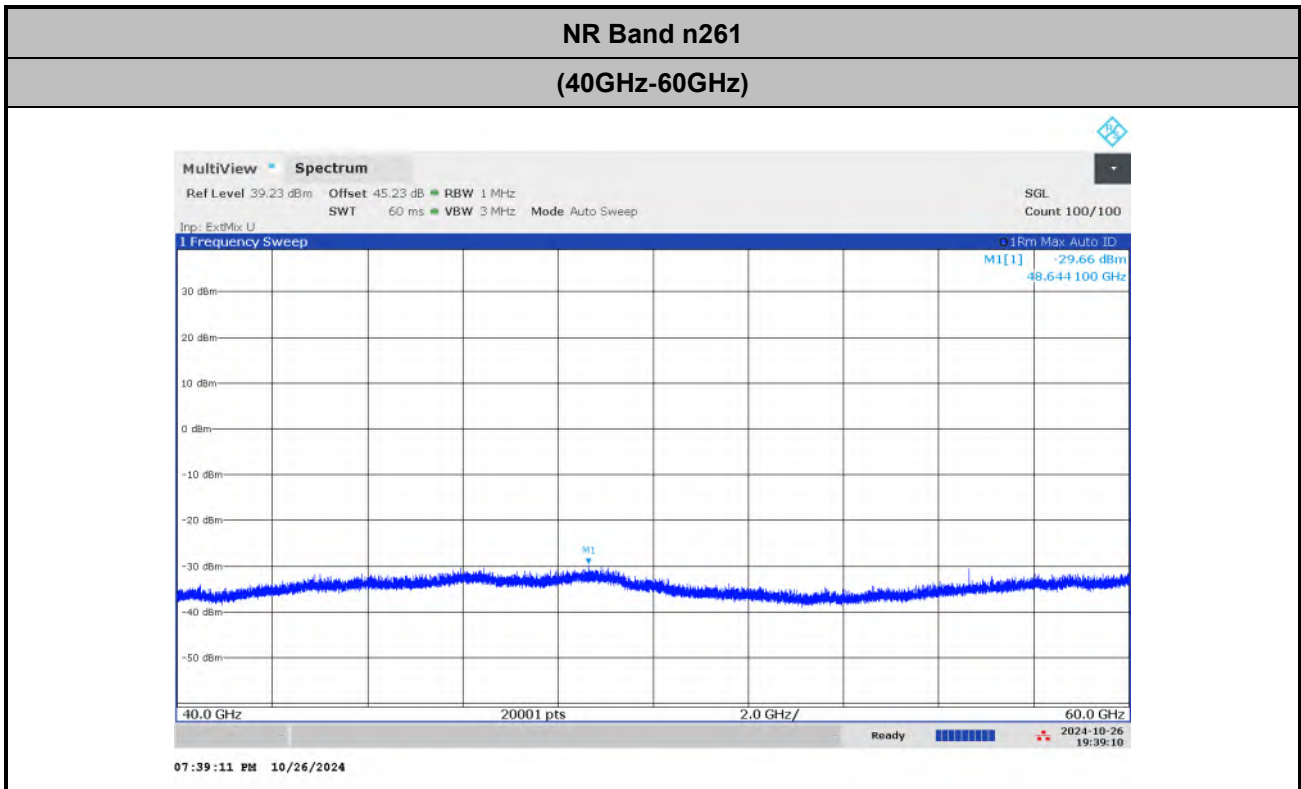


CP-OFDM Module 1

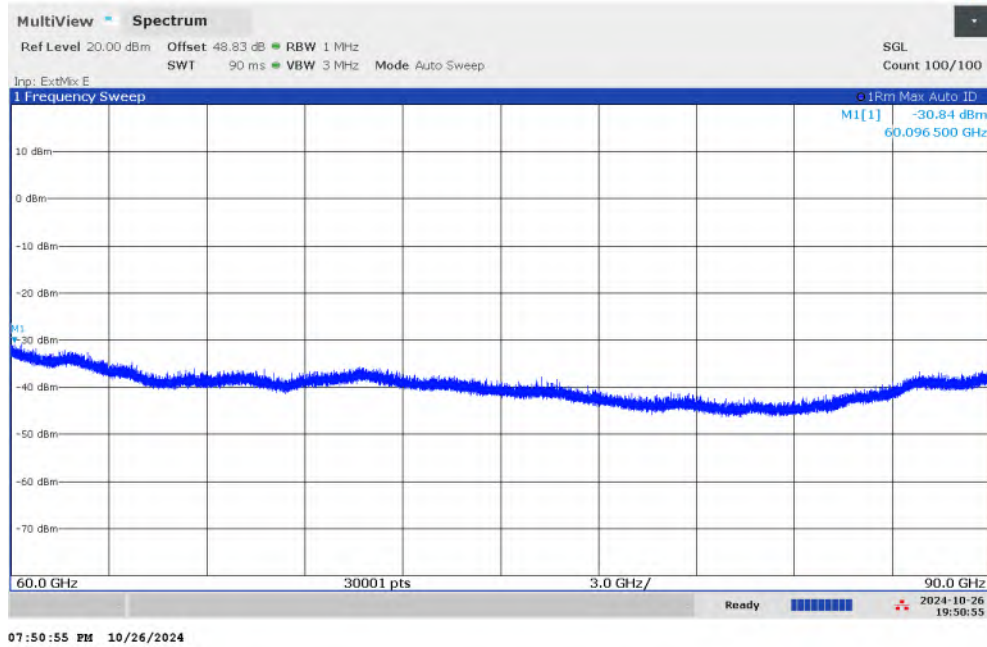
NR Band n261 QPSK (18-40GHz)																									
Lowest Channel / 400MHz																									
 <table><tr><th>Line</th><th>Check</th><th>Result</th></tr><tr><td>Line_SPURIOUS_LINE_AIR_002</td><td>PASS</td><td>PASS</td></tr></table> <table><tr><th>Range Low</th><th>Range Up</th><th>RBW</th><th>Frequency</th><th>Power Abs</th><th>Limit</th></tr><tr><td>18,000 GHz</td><td>27,000 GHz</td><td>1,000 MHz</td><td>25,087.98 GHz</td><td>-26.73 dBm</td><td>-13.73 dB</td></tr><tr><td>29,000 GHz</td><td>40,000 GHz</td><td>1,000 MHz</td><td>29,532.97 GHz</td><td>-29.52 dBm</td><td>-16.52 dB</td></tr></table> 13:34:40 04.10.2024	Line	Check	Result	Line_SPURIOUS_LINE_AIR_002	PASS	PASS	Range Low	Range Up	RBW	Frequency	Power Abs	Limit	18,000 GHz	27,000 GHz	1,000 MHz	25,087.98 GHz	-26.73 dBm	-13.73 dB	29,000 GHz	40,000 GHz	1,000 MHz	29,532.97 GHz	-29.52 dBm	-16.52 dB	intentionally blank
Line	Check	Result																							
Line_SPURIOUS_LINE_AIR_002	PASS	PASS																							
Range Low	Range Up	RBW	Frequency	Power Abs	Limit																				
18,000 GHz	27,000 GHz	1,000 MHz	25,087.98 GHz	-26.73 dBm	-13.73 dB																				
29,000 GHz	40,000 GHz	1,000 MHz	29,532.97 GHz	-29.52 dBm	-16.52 dB																				
Middle Channel / 400MHz																									
 <table><tr><th>Line</th><th>Check</th><th>Result</th></tr><tr><td>Line_SPURIOUS_LINE_AIR_002</td><td>PASS</td><td>PASS</td></tr></table> <table><tr><th>Range Low</th><th>Range Up</th><th>RBW</th><th>Frequency</th><th>Power Abs</th><th>Limit</th></tr><tr><td>18,000 GHz</td><td>27,000 GHz</td><td>1,000 MHz</td><td>24,729.40 GHz</td><td>-26.91 dBm</td><td>-13.91 dB</td></tr><tr><td>29,000 GHz</td><td>40,000 GHz</td><td>1,000 MHz</td><td>29,758.80 GHz</td><td>-28.66 dBm</td><td>-15.66 dB</td></tr></table> 11:07:17 05.10.2024	Line	Check	Result	Line_SPURIOUS_LINE_AIR_002	PASS	PASS	Range Low	Range Up	RBW	Frequency	Power Abs	Limit	18,000 GHz	27,000 GHz	1,000 MHz	24,729.40 GHz	-26.91 dBm	-13.91 dB	29,000 GHz	40,000 GHz	1,000 MHz	29,758.80 GHz	-28.66 dBm	-15.66 dB	intentionally blank
Line	Check	Result																							
Line_SPURIOUS_LINE_AIR_002	PASS	PASS																							
Range Low	Range Up	RBW	Frequency	Power Abs	Limit																				
18,000 GHz	27,000 GHz	1,000 MHz	24,729.40 GHz	-26.91 dBm	-13.91 dB																				
29,000 GHz	40,000 GHz	1,000 MHz	29,758.80 GHz	-28.66 dBm	-15.66 dB																				
Highest Channel / 400MHz																									
 <table><tr><th>Line</th><th>Check</th><th>Result</th></tr><tr><td>Line_SPURIOUS_LINE_AIR_002</td><td>PASS</td><td>PASS</td></tr></table> <table><tr><th>Range Low</th><th>Range Up</th><th>RBW</th><th>Frequency</th><th>Power Abs</th><th>Limit</th></tr><tr><td>18,000 GHz</td><td>27,000 GHz</td><td>1,000 MHz</td><td>24,729.68 GHz</td><td>-27.92 dBm</td><td>-14.92 dB</td></tr><tr><td>29,000 GHz</td><td>40,000 GHz</td><td>1,000 MHz</td><td>29,984.98 GHz</td><td>-29.68 dBm</td><td>-16.68 dB</td></tr></table> 07:27:33 06.10.2024	Line	Check	Result	Line_SPURIOUS_LINE_AIR_002	PASS	PASS	Range Low	Range Up	RBW	Frequency	Power Abs	Limit	18,000 GHz	27,000 GHz	1,000 MHz	24,729.68 GHz	-27.92 dBm	-14.92 dB	29,000 GHz	40,000 GHz	1,000 MHz	29,984.98 GHz	-29.68 dBm	-16.68 dB	intentionally blank
Line	Check	Result																							
Line_SPURIOUS_LINE_AIR_002	PASS	PASS																							
Range Low	Range Up	RBW	Frequency	Power Abs	Limit																				
18,000 GHz	27,000 GHz	1,000 MHz	24,729.68 GHz	-27.92 dBm	-14.92 dB																				
29,000 GHz	40,000 GHz	1,000 MHz	29,984.98 GHz	-29.68 dBm	-16.68 dB																				

Remark: In band and out of band frequencies are omitted.

There is no significant spurious emission signal found for frequency started from 40GHz up to 200GHz.
Only the noise floor is reported.

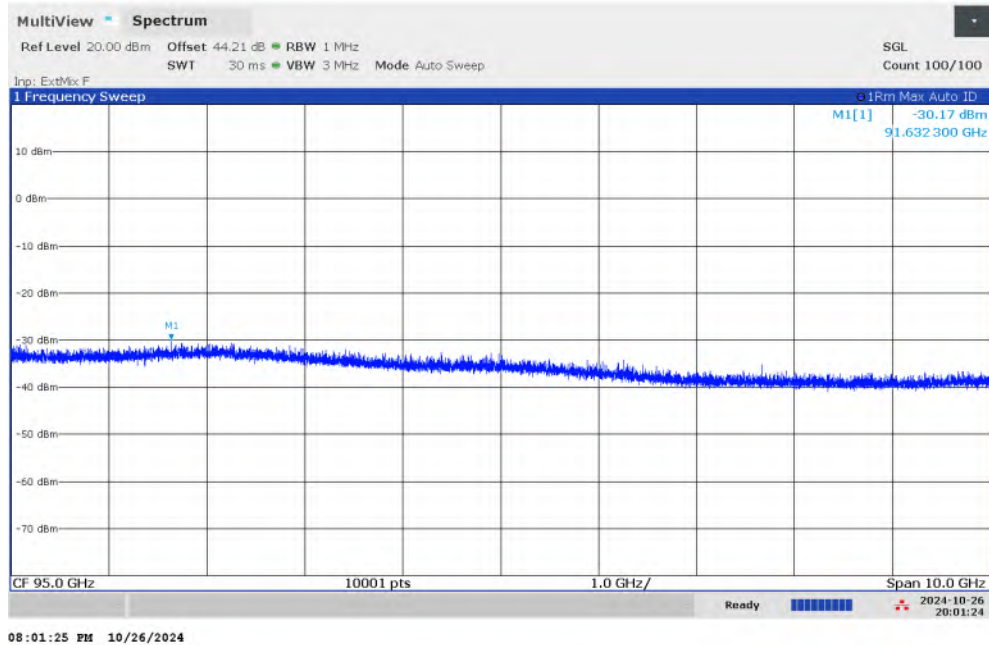


$$\begin{aligned} \text{Offset} &= \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} + 107 + 20\log(D) - 104.8 \\ &= 42.6 + 0.43 + 107 + 20\log(1) - 104.8 = 45.23(\text{dB}) \end{aligned}$$

NR Band n261
(60GHz-90GHz)


$$\text{Offset} = \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} + 107 + 20\log(D) - 104.8$$

$$= 46.2 + 0.43 + 107 + 20\log(1) - 104.8 = 48.83 \text{ (dB)}$$

NR Band n261
(90GHz-100GHz)


$$\text{Offset} = \text{Antenna Factor (dB/m)} + \text{Cable Loss (dB)} + 107 + 20\log(D) - 104.8$$

$$= 47.6 + 0.43 + 107 + 20\log(0.5) - 104.8 = 44.21 \text{ (dB)}$$

Frequency Stability

Test Conditions		NR Band n261 / Middle Channel			Limit
Temperature (°C)	Voltage (Volt)	CW tone			Note 2.
		Frequency (GHz)	Deviation (kHz)	Deviation (ppm)	Result
50	Normal Voltage	27.9347892	112.800	4.039	Pass
40	Normal Voltage	27.9347872	114.800	4.111	
30	Normal Voltage	27.9348231	78.900	2.825	
20(Ref.)	Normal Voltage	27.934902	0.000	0.000	
10	Normal Voltage	27.9348121	89.900	3.219	
0	Normal Voltage	27.9347812	120.800	4.326	
-10	Normal Voltage	27.9348461	55.900	2.002	
-20	Normal Voltage	27.9348371	64.900	2.324	
-30	Normal Voltage	27.9348021	99.900	3.577	
20	Maximum Voltage	27.9348871	14.900	0.534	
20	Normal Voltage	27.934897	5.000	0.179	
20	Battery End Point	27.934892	10.000	0.358	

Note:

1. Normal Voltage = 56 V. ; Battery End Point (BEP) = 47.6 V. ; Maximum Voltage = 64.4 V.
2. The frequency fundamental emissions stay within the operation band.



Appendix B. R&S Mixer and Horn Antenna Calibration Reports

- Certificate No : IC-2024-057622
- Calibration No : C-2024-067791

page : 1 of 3

1. Client

- Name : SPORTON INTERNATIONAL INC.
- Address : No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd., Guishan Dist., Taoyuan City 333, Taiwan, R.O.C.

2. Calibration Subject

◇Registration No : 527287

- Description : HARMONIC MIXER
- Manufacturer and Model Name : ROHDE & SCHWARZ / FS-Z60
- Serial Number : 101033

3. Date of Calibration

: 2024.06.27

4. Environment

- Temperature : (23.1 ± 0.3) °C - Humidity : (48 ± 2) % R.H.
- Location : Permanent Calibration Lab
(Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea)

5. Traceability**Calibration method and/or brief description**

This certifies that the equipment has been calibrated using applicable HCT procedure(HCT-CS-125-40641), in compliance with ISO/IEC 17025. Measurement are traceable to the International System of Unit (SI) via national metrology institutes.

List of used standards/specifications

Description	Manufacturer / Model Name	Serial Number	The due date of next Calibration	Calibration laboratory
PSG ANALOG SIGNAL GENERATOR	AGILENT/E8257D	MY46130629	2025/06/12	HCT CO., LTD.
THERMAL POWER SENSOR	ROHDE & SCHWARZ/NRP110T	101259	2025/05/14	ROHDE & SCHWARZ
WR-19 MULTIPLIER SOURCE MODULE	OML/S19MS-A	160516-1	2024/07/19	HCT CO., LTD.
SIGNAL & SPECTRUM ANALYZER	ROHDE & SCHWARZ/FSW43	102337	2024/07/11	HCT CO., LTD.

6. Calibration result

: Refer to attachment

7. Measurement uncertainty

: Refer to attachment

(Confidence level about 95 %, $k = 2$)

affirmation	Measurements performed by	Approved by
	Name : Seokhoon Kang (signature)	Title Technical Cal. Manager Name Kwangchul Kim (signature)

The above calibration certificate is the accredited calibration items by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA.

2024. 06. 27Accredited by KOLAS, Republic of KOREA **HCT Co., Ltd.**

(NOTE) If any significant instability or other adverse factor(overload, temperature, humidity etc.) manifests itself before, during or after calibration, and is likely to affect the validity of the calibration.

Calibration Results

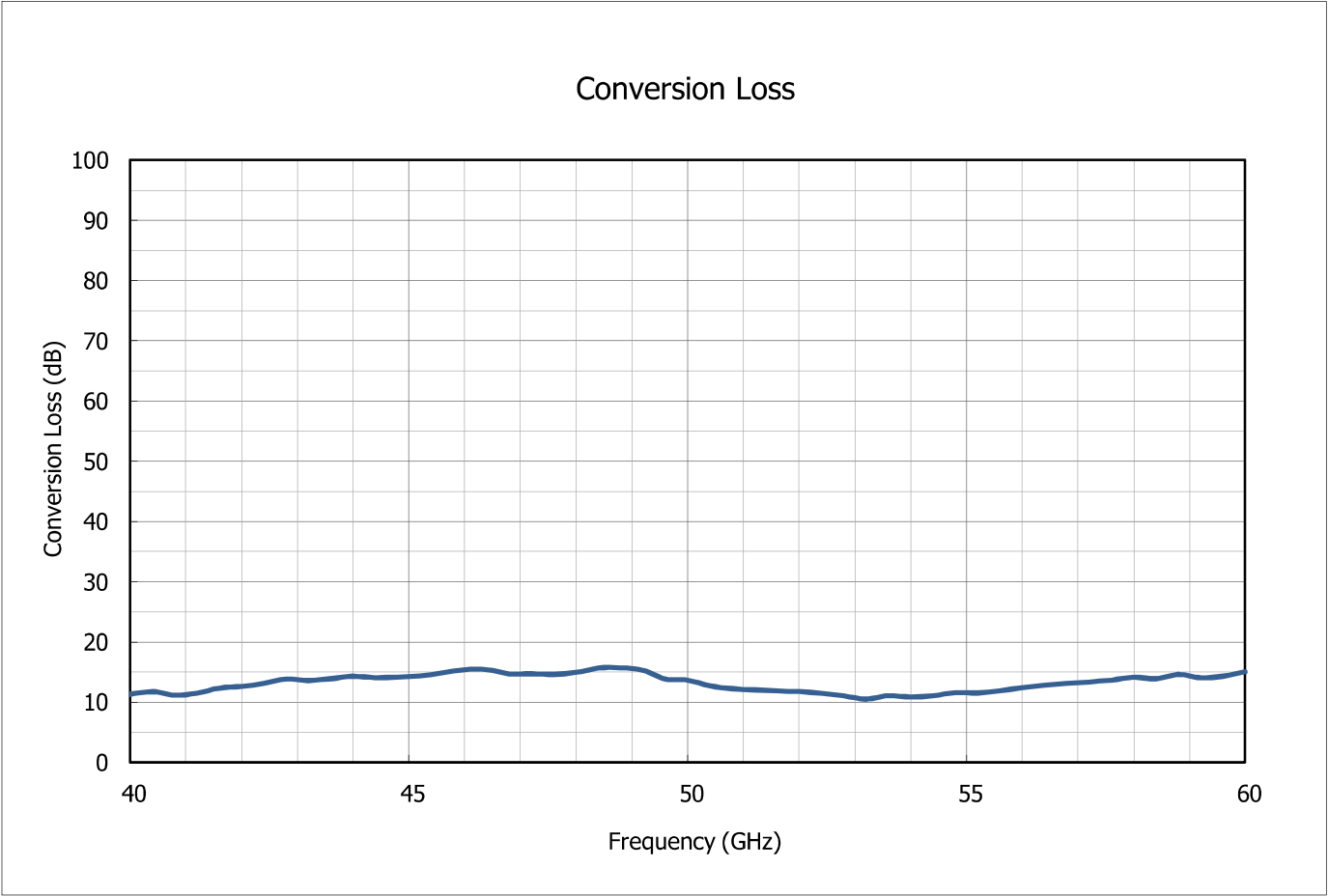


Certificate No : IC-2024-057622

Calibration No : C-2024-067791

page : 2 of 3

※ Conversion Loss Graph



[Note]

1. Measurement Condition : RF = -30 dBm, Harmonic Order = 4, L.O. Level = 15.5 dBm, IF = 1 330 MHz, Bias Value = 0.00 mA

Calibration Results



Certificate No : IC-2024-057622

Calibration No : C-2024-067791

page : 3 of 3

1. Conversion Loss Data

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
40.0	11.34	0.82	50.4	12.73	0.82
40.4	11.77	0.82	50.8	12.26	0.82
40.8	11.17	0.82	51.2	12.05	0.82
41.2	11.51	0.82	51.6	11.87	0.82
41.6	12.36	0.82	52.0	11.77	0.82
42.0	12.64	0.82	52.4	11.48	0.82
42.4	13.13	0.82	52.8	11.06	0.82
42.8	13.85	0.82	53.2	10.53	0.82
43.2	13.60	0.82	53.6	11.10	0.82
43.6	13.91	0.82	54.0	10.88	0.82
44.0	14.31	0.82	54.4	11.08	0.82
44.4	14.08	0.82	54.8	11.60	0.82
44.8	14.18	0.82	55.2	11.56	0.82
45.2	14.36	0.82	55.6	11.90	0.82
45.6	14.88	0.82	56.0	12.44	0.82
46.0	15.42	0.82	56.4	12.81	0.82
46.4	15.42	0.82	56.8	13.11	0.82
46.8	14.70	0.82	57.2	13.37	0.82
47.2	14.73	0.82	57.6	13.69	0.82
47.6	14.63	0.82	58.0	14.13	0.82
48.0	14.95	0.82	58.4	13.91	0.82
48.4	15.68	0.82	58.8	14.61	0.82
48.8	15.72	0.82	59.2	14.08	0.82
49.2	15.30	0.82	59.6	14.33	0.82
49.6	13.86	0.82	60.0	15.07	0.82
50.0	13.68	0.82	-	-	-

END.

- Certificate No : IC-2024-057625
- Calibration No : C-2024-067794

page : 1 of 3

1. Client

- Name : SPORTON INTERNATIONAL INC.
- Address : No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd., Guishan Dist., Taoyuan City 333, Taiwan, R.O.C.

2. Calibration Subject

◇Registration No : 527290

- Description : HARMONIC MIXER
- Manufacturer and Model Name : ROHDE & SCHWARZ / FS-Z90
- Serial Number : 101867

3. Date of Calibration

: 2024.06.27

4. Environment

- Temperature : (23.2 ± 0.3) °C - Humidity : (48 ± 2) % R.H.
- Location : Permanent Calibration Lab
(Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea)

5. Traceability**Calibration method and/or brief description**

This certifies that the equipment has been calibrated using applicable HCT procedure(HCT-CS-125-40641), in compliance with ISO/IEC 17025. Measurement are traceable to the International System of Unit (SI) via national metrology institutes.

List of used standards/specifications

Description	Manufacturer / Model Name	Serial Number	The due date of next Calibration	Calibration laboratory
PSG ANALOG SIGNAL GENERATOR	AGILENT/E8257D	MY46130629	2025/06/12	HCT CO., LTD.
WR-12 MULTIPLIER SOURCE MODULE	OML/S12MS-A	160419-1	2024/07/19	HCT CO., LTD.
SIGNAL & SPECTRUM ANALYZER	ROHDE & SCHWARZ/FSW43	102337	2024/07/11	HCT CO., LTD.
THERMAL POWER SENSOR	ROHDE & SCHWARZ/NRP110T	101259	2025/05/14	ROHDE & SCHWARZ

6. Calibration result

: Refer to attachment

7. Measurement uncertainty

: Refer to attachment

(Confidence level about 95 %, $k = 2$)

affirmation	Measurements performed by	Approved by
	Name : Seokhoon Kang (signature)	Title Technical Cal. Manager Name Kwangchul Kim (signature)

The above calibration certificate is the accredited calibration items by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA.

2024. 06. 27Accredited by KOLAS, Republic of KOREA **HCT Co., Ltd.**

(NOTE) If any significant instability or other adverse factor(overload, temperature, humidity etc.) manifests itself before, during or after calibration, and is likely to affect the validity of the calibration.

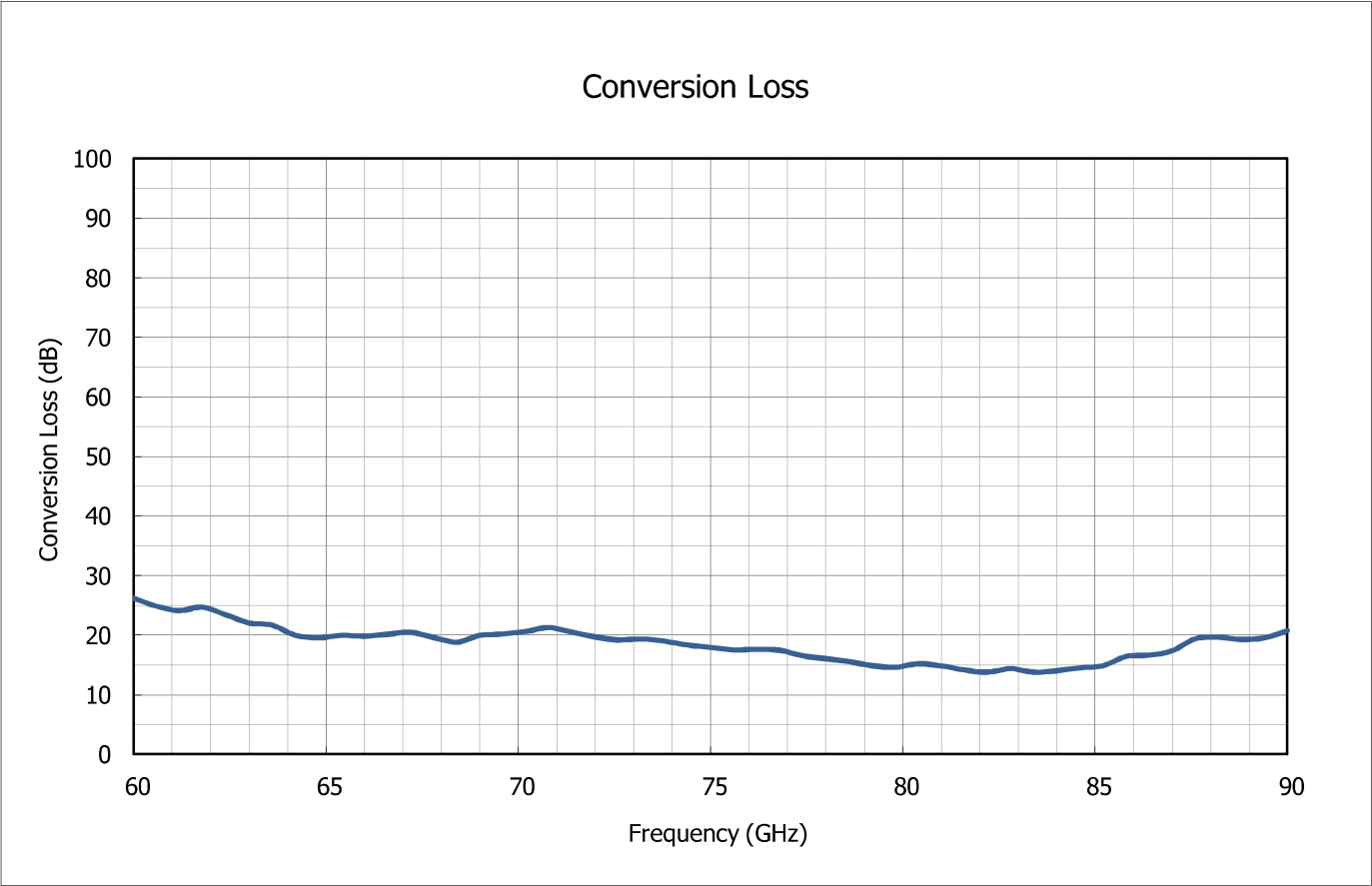
Calibration Results



Certificate No : IC-2024-057625
Calibration No : C-2024-067794

page : 2 of 3

※ Conversion Loss Graph



[Note]

1. Measurement Condition : RF = -30 dBm, Harmonic Order = 6, L.O. Level = 15.5 dBm, IF = 1 330 MHz, Bias Value = 0.00 mA

Calibration Results



Certificate No : IC-2024-057625
Calibration No : C-2024-067794

page : 3 of 3

1. Conversion Loss Data

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
60.0	26.25	0.82	75.6	17.55	0.82
60.6	24.88	0.82	76.2	17.67	0.82
61.2	24.13	0.82	76.8	17.48	0.82
61.8	24.70	0.82	77.4	16.54	0.82
62.4	23.44	0.82	78.0	16.09	0.82
63.0	22.07	0.82	78.6	15.56	0.82
63.6	21.70	0.82	79.2	14.91	0.82
64.2	20.03	0.82	79.8	14.63	0.82
64.8	19.57	0.82	80.4	15.22	0.82
65.4	19.98	0.82	81.0	14.88	0.82
66.0	19.85	0.82	81.6	14.17	0.82
66.6	20.17	0.82	82.2	13.81	0.82
67.2	20.50	0.82	82.8	14.41	0.82
67.8	19.62	0.82	83.4	13.81	0.82
68.4	18.82	0.82	84.0	14.05	0.82
69.0	19.95	0.82	84.6	14.53	0.82
69.6	20.23	0.82	85.2	14.88	0.82
70.2	20.61	0.82	85.8	16.44	0.82
70.8	21.30	0.82	86.4	16.67	0.82
71.4	20.49	0.82	87.0	17.38	0.82
72.0	19.73	0.82	87.6	19.41	0.82
72.6	19.21	0.82	88.2	19.67	0.82
73.2	19.38	0.82	88.8	19.31	0.82
73.8	19.00	0.82	89.4	19.56	0.82
74.4	18.34	0.82	90.0	20.80	0.82
75.0	17.98	0.82	-	-	-

END.

- Certificate No : IC-2024-057623
- Calibration No : C-2024-067792

page : 1 of 3

1. Client

- Name : SPORTON INTERNATIONAL INC.
- Address : No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd., Guishan Dist., Taoyuan City 333, Taiwan, R.O.C.

2. Calibration Subject

◇Registration No : 527288

- Description : HARMONIC MIXER
- Manufacturer and Model Name : ROHDE & SCHWARZ / FS-Z140
- Serial Number : 101130

3. Date of Calibration

: 2024.06.27

4. Environment

- Temperature : (23.1 $\pm$ 0.4) °C - Humidity : (49 $\pm$ 2) % R.H.
- Location : Permanent Calibration Lab
(Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea)

5. Traceability**Calibration method and/or brief description**

This certifies that the equipment has been calibrated using applicable HCT procedure(HCT-CS-125-40641), in compliance with ISO/IEC 17025. Measurement are traceable to the International System of Unit (SI) via national metrology institutes.

List of used standards/specifications

Description	Manufacturer / Model Name	Serial Number	The due date of next Calibration	Calibration laboratory
PSG ANALOG SIGNAL GENERATOR	AGILENT/E8257D	MY46130629	2025/06/12	HCT CO., LTD.
THERMAL POWER SENSOR	ROHDE & SCHWARZ/NRP110T	101259	2025/05/14	ROHDE & SCHWARZ
WR-08 MULTIPLIER SOURCE MODULE	OML/S08MS-A	160419-1	2024/07/19	HCT CO., LTD.
SIGNAL & SPECTRUM ANALYZER	ROHDE & SCHWARZ/FSW43	102337	2024/07/11	HCT CO., LTD.

6. Calibration result

: Refer to attachment

7. Measurement uncertainty

: Refer to attachment

(Confidence level about 95 %, $k = 2$)

affirmation	Measurements performed by	Approved by
	Name : Seokhoon Kang (signature)	Title Technical Cal. Manager Name Kwangchul Kim (signature)

The above calibration certificate is the accredited calibration items by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA.

2024. 06. 27Accredited by KOLAS, Republic of KOREA **HCT Co., Ltd.**

(NOTE) If any significant instability or other adverse factor(overload, temperature, humidity etc.) manifests itself before, during or after calibration, and is likely to affect the validity of the calibration.

Calibration Results

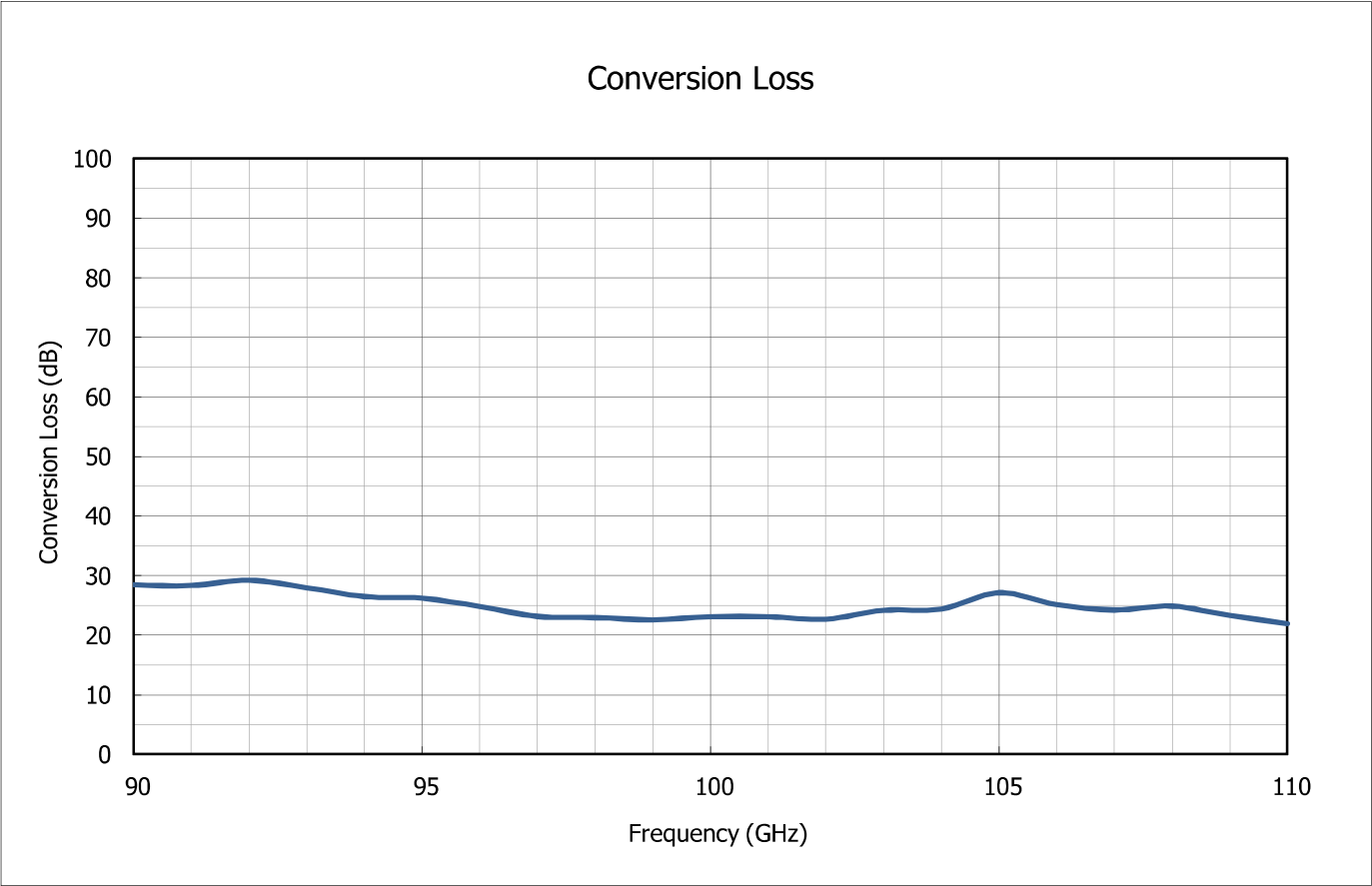


Certificate No : IC-2024-057623

Calibration No : C-2024-067792

page : 2 of 3

※ Conversion Loss Graph



[Note]

1. Measurement Condition : RF = -30 dBm, Harmonic Order = 10, L.O. Level = 15.5 dBm, IF = 1 330 MHz, Bias Value = 0.00 mA

Calibration Results



Certificate No : IC-2024-057623

Calibration No : C-2024-067792

page : 3 of 3

1. Conversion Loss Data

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
90.0	28.44	0.82	101.0	23.08	0.82
91.0	28.33	0.82	102.0	22.69	0.82
92.0	29.21	0.82	103.0	24.17	0.82
93.0	27.97	0.82	104.0	24.41	0.82
94.0	26.49	0.82	105.0	27.13	0.82
95.0	26.21	0.82	106.0	25.15	0.82
96.0	24.82	0.82	107.0	24.24	0.82
97.0	23.16	0.82	108.0	24.88	0.82
98.0	22.96	0.82	109.0	23.31	0.82
99.0	22.60	0.82	110.0	21.96	0.82
100.0	23.10	0.82	-	-	-

END.

Measurement Report

74, Seoicheon-ro 578beon-gil, Majang-myeon,
Icheon-si, Gyeonggi-do, Korea 17383
Tel :82-31-645-6900, www.hct.co.kr보고서번호(Report No) : IC-2024-059304
측정번호(Measurement No) : C-2024-069557

페이지(page) : 1 of 3

1. 의뢰자 (Client)

- 기관명 (Name) : SPORTON INTERNATIONAL INC.
- 주소 (Address) : No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd., Guishan Dist., Taoyuan City 333, Taiwan, R.O.C.

2. 대상품목 (Measurement Item)

◇ HCT 등록번호 : 527857

- 기기명 (Description) : HARMONIC MIXER
- 제작회사 및 형식(Manufacturer and Model Name) : ROHDE & SCHWARZ / FS-Z140
- 기기번호 (Serial Number) : 101130

3. 측정일자 (Measurement date) : 2024.06.27

4. 측정환경 (Environment)

- 온도(Temperature) : (23.2 ± 0.3) °C - 습도(Humidity) : (46 ± 3) % R.H.

5. 측정방법 (Measurement method used)

This certifies that the above equipment was measured using the standard equipment below according to customer requirements.

측정에 사용한 표준장비 명세 (List of used standards/specifications)

기기명 (Description)	제작회사 / 형식 (Manufacturer and Model Name)	기기번호 (Serial Number)	차기교정예정일자 (The due date of next Calibration)	교정기관 (Calibration laboratory)
PSG ANALOG SIGNAL GENERATOR	AGILENT/E8257D	MY46130629	2025/06/12	HCT CO., LTD.
SIGNAL & SPECTRUM ANALYZER	ROHDE & SCHWARZ/FSW43	102337	2024/07/11	HCT CO., LTD.
ERICKSON POWER METER	VDI/PM5	394V	NCR	HCT CO., LTD.
WR-08 MULTIPLIER SOURCE MODULE	OML/S08MS-A	160419-1	NCR	HCT CO., LTD.

6. 측정결과 (Measurement result)

: 측정결과 참조 (Refer to attachment)

(주) 이 측정결과는 의뢰자가 제시한 시료 및 시료명에만 한정됩니다.

The measurement results shown in this report refer only to the sample(s) measured unless otherwise stated.

확 인 (Affirmation)	작성자 (Tested by)	승인자 (Approved by)
	성명 (Name) : Seokhoon Kang	직위 (Title) : 기술책임자(Technical Manager) 성명 (Name) : Kwangchul Kim

이 성적서는 ILAC MRA 서명 기관인 KOLAS(Korea Laboratory Accreditation Scheme)와 A2LA (American Laboratory for Laboratory Accreditation)의 인정
과 무관합니다. This calibration certificate is Not an accredited report by KOLAS(Korea Laboratory Accreditation Scheme) and A2LA(American Association
for Laboratory Accreditation), a ILAC MRA signatory.

2024. 07. 17

HCT

(주)에이치시티 대표이사
President, HCT Co., Ltd.

(주) 측정결과는 측정기의 정밀정확도에 영향을 미치는 요소(과부하, 온도, 습도 등)의 급격한 변화가 발생한 경우에는 무효가 됩니다. If any significant instability
or other adverse factor(overload, temperature, humidity etc.) manifests itself before, during or after calibration, and is likely to affect the validity of the calibration.

F-02P-02-010 (Rev.01)

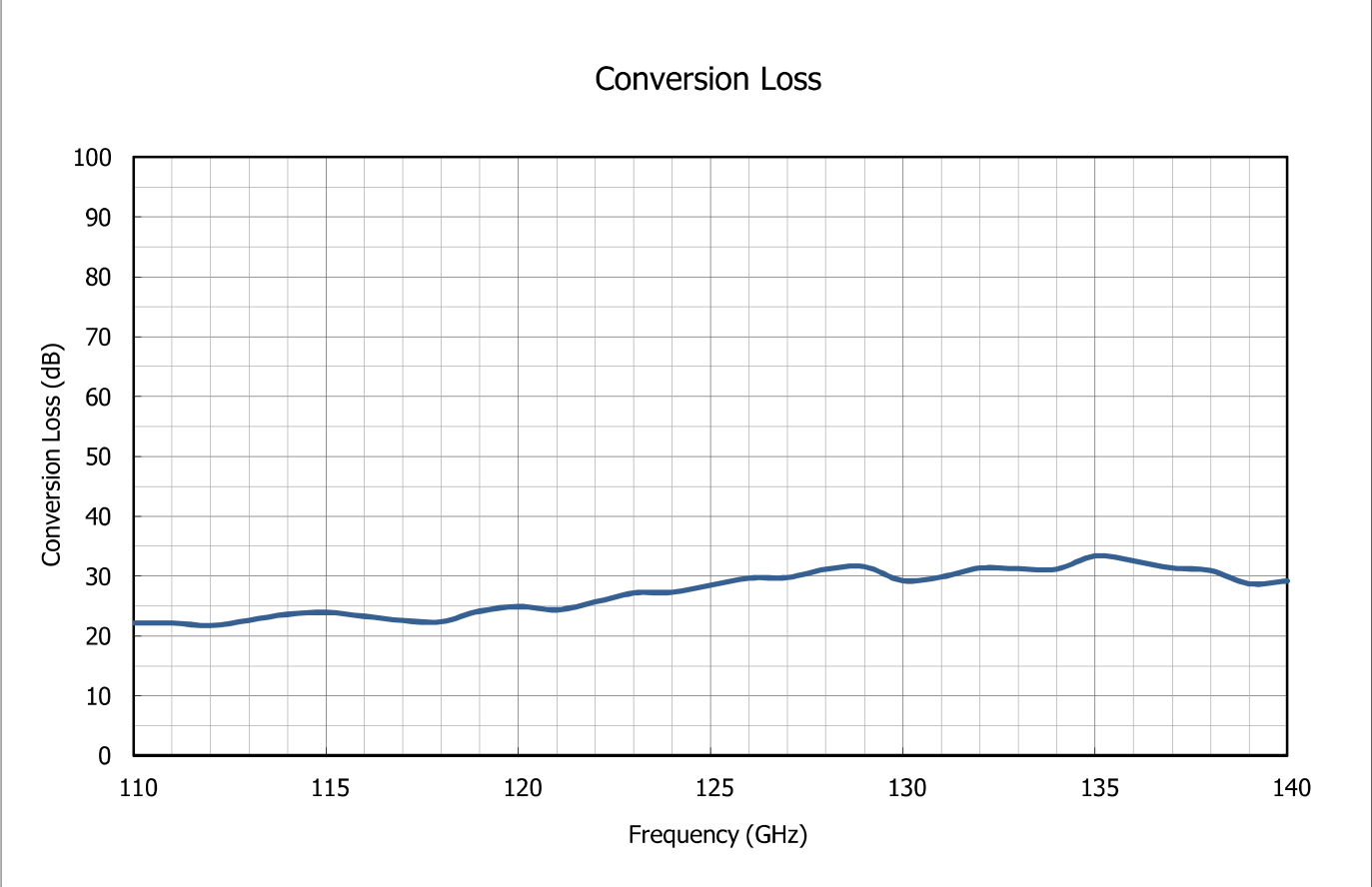
*NCR(No Calibration Requirement)

Measurement Results

Certificate No : IC-2024-059304
Measurement No : C-2024-069557

페이지(page) : 2 of 3

※ Conversion Loss Graph



[Note]

1. Measurement Condition : RF = -30 dBm, Harmonic Order = 10, L.O. Level = 15.5 dBm, IF = 1 330 MHz, Bias Value = 0.00 mA

Measurement Results

1. Conversion Loss Data

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
110.0	22.13	0.82	126.0	29.66	0.82
111.0	22.13	0.82	127.0	29.76	0.82
112.0	21.74	0.82	128.0	31.13	0.82
113.0	22.62	0.82	129.0	31.56	0.82
114.0	23.61	0.82	130.0	29.23	0.82
115.0	23.92	0.82	131.0	29.85	0.82
116.0	23.30	0.82	132.0	31.32	0.82
117.0	22.57	0.82	133.0	31.22	0.82
118.0	22.37	0.82	134.0	31.15	0.82
119.0	24.14	0.82	135.0	33.35	0.82
120.0	24.89	0.82	136.0	32.51	0.82
121.0	24.37	0.82	137.0	31.34	0.82
122.0	25.64	0.82	138.0	30.90	0.82
123.0	27.16	0.82	139.0	28.72	0.82
124.0	27.30	0.82	140.0	29.16	0.82
125.0	28.48	0.82	-	-	-

END.

Measurement Report

74, Seoicheon-ro 578beon-gil, Majang-myeon,
Icheon-si, Gyeonggi-do, Korea 17383
Tel :82-31-645-6900, www.hct.co.kr보고서번호(Report No) : IC-2024-057626
측정번호(Measurement No) : C-2024-067795

페이지(page) : 1 of 3

1. 의뢰자 (Client)

- 기관명 (Name) : SPORTON INTERNATIONAL INC.
- 주소 (Address) : No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd., Guishan Dist., Taoyuan City 333, Taiwan, R.O.C.

2. 대상품목 (Measurement Item)

◇ HCT 등록번호 : 527291

- 기기명 (Description) : HARMONIC MIXER
- 제작회사 및 형식(Manufacturer and Model Name) : ROHDE & SCHWARZ / FS-Z220
- 기기번호 (Serial Number) : 101042

3. 측정일자 (Measurement date) : 2024.06.27

4. 측정환경 (Environment)

- 온도(Temperature) : (23.1 ± 0.3) °C - 습도(Humidity) : (49 ± 2) % R.H.

5. 측정방법 (Measurement method used)

This certifies that the above equipment was measured using the standard equipment below according to customer requirements.

측정에 사용한 표준장비 명세 (List of used standards/specifications)

기기명 (Description)	제작회사 / 형식 (Manufacturer and Model Name)	기기번호 (Serial Number)	차기교정예정일자 (The due date of next Calibration)	교정기관 (Calibration laboratory)
PSG ANALOG SIGNAL GENERATOR	AGILENT/E8257D	MY46130629	2025/06/12	HCT CO., LTD.
SIGNAL & SPECTRUM ANALYZER	ROHDE & SCHWARZ/FSW43	102337	2024/07/11	HCT CO., LTD.
ERICKSON POWER METER	VDI/PM5	394V	NCR	HCT CO., LTD.
WR-05 MULTIPLIER SOURCE MODULE	OML/S05MS-A	160419-1	NCR	HCT CO., LTD.

6. 측정결과 (Measurement result)

: 측정결과 참조 (Refer to attachment)

(주) 이 측정결과는 의뢰자가 제시한 시료 및 시료명에만 한정됩니다.

The measurement results shown in this report refer only to the sample(s) measured unless otherwise stated.

확 인 (Affirmation)	작성자 (Tested by)	승인자 (Approved by)
	성명 (Name) : Seokhoon Kang	직위 (Title) : 기술책임자(Technical Manager) 성명 (Name) : Kwangchul Kim

이 성적서는 ILAC MRA 서명 기관인 KOLAS(Korea Laboratory Accreditation Scheme)와 A2LA (American Laboratory for Laboratory Accreditation)의 인정
과 무관합니다. This calibration certificate is Not an accredited report by KOLAS(Korea Laboratory Accreditation Scheme) and A2LA(American Association
for Laboratory Accreditation), a ILAC MRA signatory.

2024. 07. 17

HCT

(주)에이치시티 대표이사
President, HCT Co., Ltd.

(주) 측정결과는 측정기의 정밀정확도에 영향을 미치는 요소(과부하, 온도, 습도 등)의 급격한 변화가 발생한 경우에는 무효가 됩니다. If any significant instability
or other adverse factor(overload, temperature, humidity etc.) manifests itself before, during or after calibration, and is likely to affect the validity of the calibration.

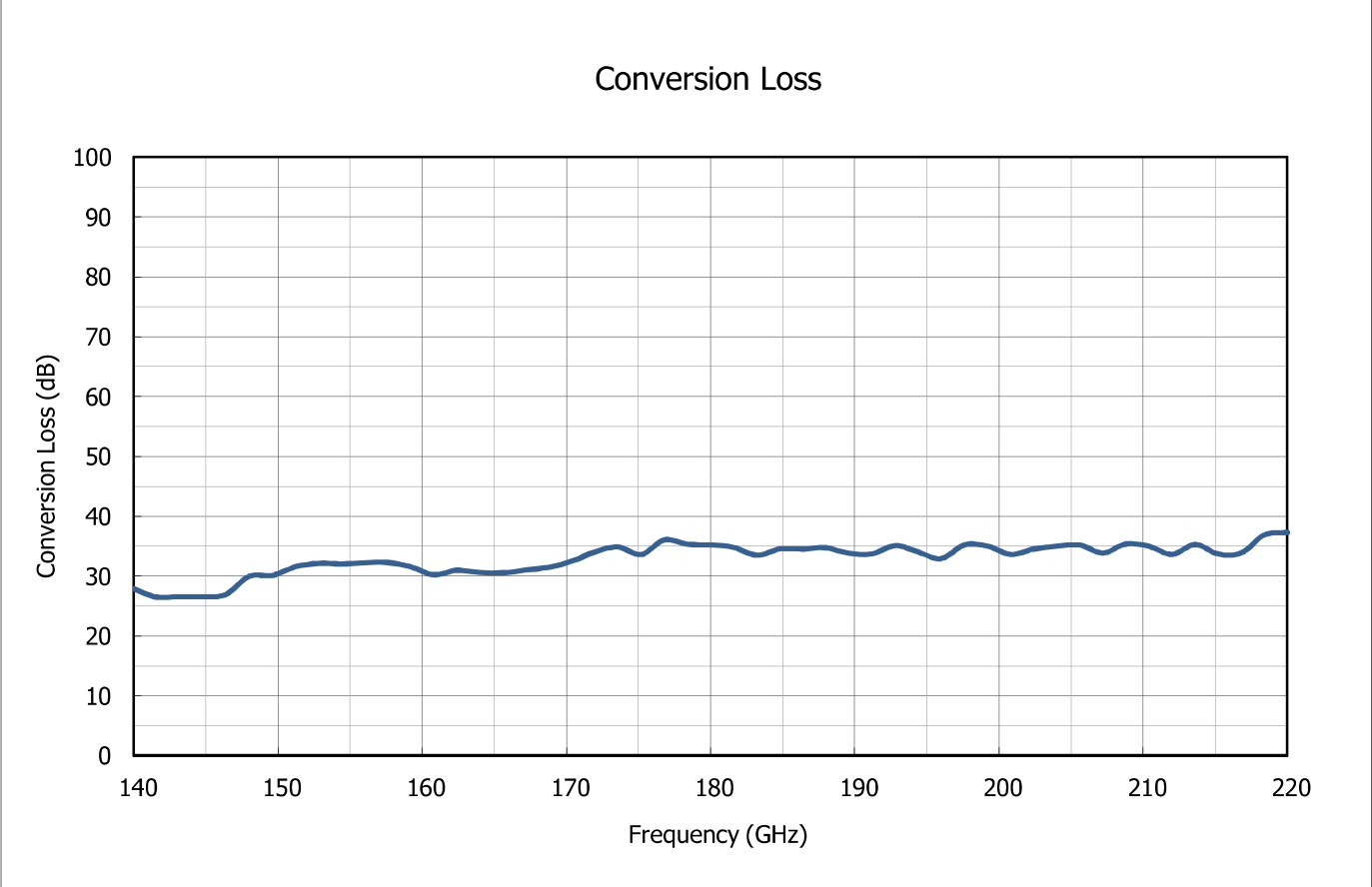
F-02P-02-010 (Rev.01)

*NCR(No Calibration Requirement)

Measurement Results

Certificate No : IC-2024-057626
Measurement No : C-2024-067795

1. Conversion Loss Graph



[Note]

1. Measurement Condition : RF = -30 dBm, Harmonic Order = 16, L.O. Level = 15.5 dBm, IF = 1 330 MHz, Bias Value = 0.00 mA

Measurement Results

1. Conversion Loss Data

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
140.00	27.89	0.89	181.60	34.79	0.89
141.60	26.48	0.89	183.20	33.48	0.89
143.20	26.57	0.89	184.80	34.51	0.89
144.80	26.57	0.89	186.40	34.52	0.89
146.40	26.91	0.89	188.00	34.72	0.89
148.00	29.94	0.89	189.60	33.82	0.89
149.60	30.10	0.89	191.20	33.72	0.89
151.20	31.53	0.89	192.80	35.08	0.89
152.80	32.12	0.89	194.40	33.99	0.89
154.40	32.02	0.89	196.00	32.90	0.89
156.00	32.21	0.89	197.60	35.20	0.89
157.60	32.26	0.89	199.20	34.97	0.89
159.20	31.54	0.89	200.80	33.62	0.89
160.80	30.23	0.89	202.40	34.50	0.89
162.40	30.97	0.89	204.00	34.98	0.89
164.00	30.57	0.89	205.60	35.16	0.89
165.60	30.55	0.89	207.20	33.84	0.89
167.20	31.00	0.89	208.80	35.35	0.89
168.80	31.48	0.89	210.40	34.95	0.89
170.40	32.48	0.89	212.00	33.62	0.89
172.00	34.05	0.89	213.60	35.25	0.89
173.60	34.85	0.89	215.20	33.66	0.89
175.20	33.57	0.89	216.80	33.88	0.89
176.80	36.03	0.89	218.40	36.85	0.89
178.40	35.30	0.89	220.00	37.27	0.89
180.00	35.18	0.89	-	-	-

END.

- Certificate No : IC-2024-057639
- Calibration No : C-2024-067808

page : 1 of 5

1. Client

- Name : SPORTON INTERNATIONAL INC.
- Address : No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd., Guishan Dist., Taoyuan City 333, Taiwan, R.O.C.

2. Calibration Subject

◇Registration No : 527313

- Description : ANTENNA
- Manufacturer and Model Name : QUINSTAR / QWH-UPRR00
- Serial Number : 1410300003

3. Date of Calibration

: 2024.06.27

4. Environment

- Temperature : (22.7 ± 0.1) °C - Humidity : (48 ± 2) % R.H.
- Location : Permanent Calibration Lab
(Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea)

5. Traceability**Calibration method and/or brief description**

This certifies that the equipment has been calibrated using applicable HCT procedure(HCT-CS-264-40707), (HCT-CS-264-40707), in compliance with ISO/IEC 17025. Measurement are traceable to the International System of Unit (SI) via national metrology institutes.

List of used standards/specifications

Description	Manufacturer / Model Name	Serial Number	The due date of next Calibration	Calibration laboratory
PNA SERIES NETWORK ANALYZER	AGILENT/E8363B	MY43030182	2025/06/18	HCT CO., LTD.
NETWORK ANALYZER	AGILENT/N5230C	MY49001853	2024/09/27	HCT CO., LTD.
TRANSMISSION/REFLECTION MODULE SET	OML/V15VNA2-T/R	200722-1	2024/10/18	HCT CO., LTD.
CALIBRATION KIT(2.4 mm)	KEYSIGHT/85056D	MY53400508	2025/02/28	KRISS
CALIBRATION KIT	Keysight Technologies/V11644A	MY46042094	2024/10/06	Keysight Technologies

6. Calibration result

: Refer to attachment

7. Measurement uncertainty

: Refer to attachment

(Confidence level about 95 %, $k = 2$)

affirmation	Measurements performed by	(signature)	Approved by	(signature)
	Name : Minhyeong Shin		Title Technical Cal. Manager Name Jaesang So	

The above calibration certificate is the accredited calibration items by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA.

2024. 06. 27Accredited by KOLAS, Republic of KOREA **HCT Co., Ltd.**

(NOTE) If any significant instability or other adverse factor(overload, temperature, humidity etc.) manifests itself before, during or after calibration, and is likely to affect the validity of the calibration.

Calibration Results



Certificate No : IC-2024-057639

Calibration No : C-2024-067808

page : 2 of 5

1. Antenna Factor & Gain

Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)
40.00	39.9	22.4	43.70	40.4	22.6	47.40	41.0	22.8
40.10	39.9	22.3	43.80	40.4	22.6	47.50	41.0	22.8
40.20	40.0	22.3	43.90	40.5	22.6	47.60	41.0	22.8
40.30	40.0	22.3	44.00	40.5	22.6	47.70	41.1	22.7
40.40	40.1	22.3	44.10	40.6	22.5	47.80	41.1	22.7
40.50	40.1	22.3	44.20	40.7	22.5	47.90	41.1	22.7
40.60	40.1	22.3	44.30	40.7	22.4	48.00	41.2	22.7
40.70	40.1	22.3	44.40	40.8	22.4	48.10	41.2	22.7
40.80	40.1	22.3	44.50	40.8	22.4	48.20	41.2	22.7
40.90	40.1	22.3	44.60	40.8	22.4	48.30	41.2	22.7
41.00	40.1	22.4	44.70	40.8	22.4	48.40	41.2	22.7
41.10	40.1	22.4	44.80	40.8	22.4	48.50	41.2	22.8
41.20	40.1	22.4	44.90	40.8	22.5	48.60	41.1	22.8
41.30	40.1	22.4	45.00	40.7	22.6	48.70	41.1	22.9
41.40	40.1	22.4	45.10	40.7	22.6	48.80	41.1	22.9
41.50	40.2	22.4	45.20	40.7	22.7	48.90	41.1	22.9
41.60	40.2	22.4	45.30	40.6	22.7	49.00	41.1	22.9
41.70	40.2	22.4	45.40	40.6	22.7	49.10	41.1	22.9
41.80	40.2	22.4	45.50	40.7	22.7	49.20	41.2	22.9
41.90	40.2	22.4	45.60	40.7	22.7	49.30	41.2	22.9
42.00	40.2	22.4	45.70	40.7	22.7	49.40	41.3	22.8
42.10	40.2	22.5	45.80	40.8	22.6	49.50	41.3	22.8
42.20	40.3	22.5	45.90	40.9	22.6	49.60	41.4	22.7
42.30	40.3	22.5	46.00	41.0	22.5	49.70	41.4	22.7
42.40	40.3	22.5	46.10	41.0	22.5	49.80	41.5	22.7
42.50	40.3	22.5	46.20	41.1	22.5	49.90	41.5	22.7
42.60	40.4	22.4	46.30	41.1	22.4	50.00	41.5	22.8
42.70	40.4	22.4	46.40	41.1	22.5	50.10	41.4	22.8
42.80	40.5	22.4	46.50	41.1	22.5	50.20	41.4	22.8
42.90	40.5	22.4	46.60	41.0	22.5	50.30	41.4	22.8
43.00	40.5	22.4	46.70	41.0	22.6	50.40	41.4	22.9
43.10	40.5	22.4	46.80	41.0	22.7	50.50	41.4	22.9
43.20	40.5	22.4	46.90	40.9	22.7	50.60	41.4	22.9
43.30	40.5	22.4	47.00	40.9	22.8	50.70	41.4	22.9
43.40	40.5	22.5	47.10	40.9	22.8	50.80	41.4	22.9
43.50	40.5	22.5	47.20	40.9	22.8	50.90	41.4	22.9
43.60	40.4	22.6	47.30	40.9	22.8	51.00	41.5	22.9

Calibration Results



Certificate No : IC-2024-057639

Calibration No : C-2024-067808

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1. Antenna Factor & Gain (cont.)

Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)
51.10	41.5	22.9	54.10	41.9	22.9	57.10	42.6	22.7
51.20	41.6	22.8	54.20	41.9	23.0	57.20	42.6	22.7
51.30	41.6	22.8	54.30	41.9	23.0	57.30	42.6	22.8
51.40	41.7	22.8	54.40	41.9	23.0	57.40	42.6	22.8
51.50	41.7	22.7	54.50	42.0	23.0	57.50	42.6	22.8
51.60	41.8	22.7	54.60	42.0	22.9	57.60	42.6	22.9
51.70	41.8	22.7	54.70	42.1	22.9	57.70	42.6	22.9
51.80	41.8	22.7	54.80	42.2	22.8	57.80	42.6	22.9
51.90	41.8	22.8	54.90	42.2	22.8	57.90	42.6	22.9
52.00	41.7	22.8	55.00	42.3	22.7	58.00	42.6	22.9
52.10	41.7	22.8	55.10	42.3	22.7	58.10	42.6	22.9
52.20	41.7	22.9	55.20	42.4	22.7	58.20	42.7	22.9
52.30	41.7	22.9	55.30	42.4	22.7	58.30	42.7	22.8
52.40	41.7	22.9	55.40	42.4	22.7	58.40	42.8	22.8
52.50	41.7	22.9	55.50	42.4	22.8	58.50	42.8	22.7
52.60	41.7	22.9	55.60	42.3	22.8	58.60	42.9	22.7
52.70	41.7	22.9	55.70	42.3	22.8	58.70	42.9	22.7
52.80	41.8	22.9	55.80	42.3	22.8	58.80	43.0	22.6
52.90	41.8	22.9	55.90	42.3	22.8	58.90	43.0	22.6
53.00	41.8	22.9	56.00	42.3	22.9	59.00	43.0	22.6
53.10	41.9	22.8	56.10	42.3	22.9	59.10	43.0	22.7
53.20	42.0	22.8	56.20	42.3	22.9	59.20	42.9	22.7
53.30	42.0	22.7	56.30	42.4	22.9	59.30	42.9	22.8
53.40	42.1	22.7	56.40	42.4	22.9	59.40	42.8	22.9
53.50	42.1	22.7	56.50	42.4	22.9	59.50	42.7	23.0
53.60	42.2	22.7	56.60	42.5	22.8	59.60	42.7	23.1
53.70	42.1	22.7	56.70	42.5	22.8	59.70	42.6	23.1
53.80	42.1	22.7	56.80	42.6	22.8	59.80	42.6	23.1
53.90	42.1	22.8	56.90	42.6	22.7	59.90	42.6	23.2
54.00	42.0	22.9	57.00	42.6	22.7	60.00	42.6	23.2

※ The measurement uncertainty of this result is 1.2 dB (Confidence level about 95 %, $k = 2$)

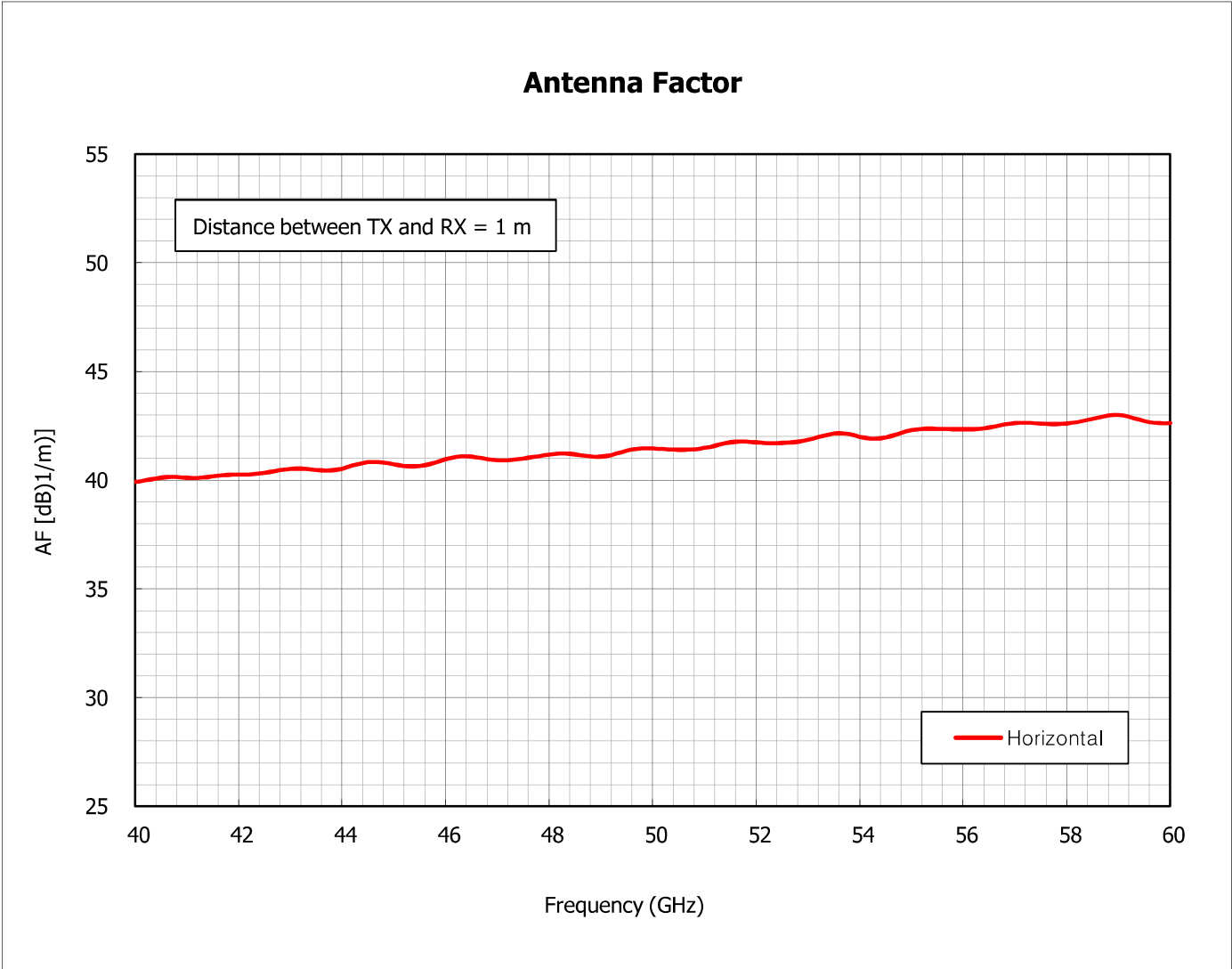
Calibration Results



Certificate No : IC-2024-057639
Calibration No : C-2024-067808

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2. Antenna Factor Curve



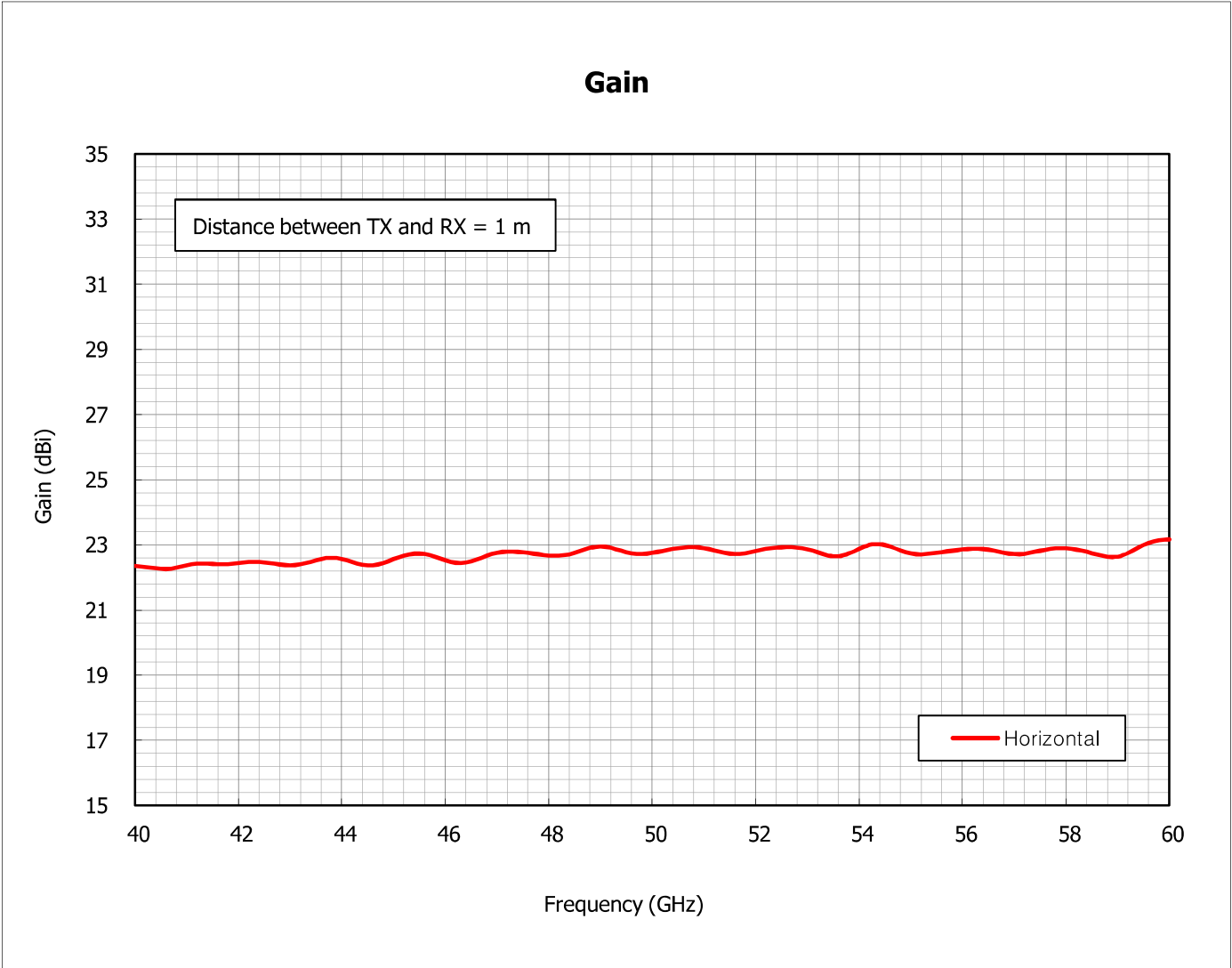
Calibration Results



Certificate No : IC-2024-057639
Calibration No : C-2024-067808

page : 5 of 5

3. Gain Curve



END.

- Certificate No : IC-2024-057635
- Calibration No : C-2024-067804

page : 1 of 6

1. Client

- Name : SPORTON INTERNATIONAL INC.
- Address : No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd., Guishan Dist., Taoyuan City 333, Taiwan, R.O.C.

2. Calibration Subject

◇Registration No : 527309

- Description : ANTENNA
- Manufacturer and Model Name : QUINSTAR / QWH-EPRR00
- Serial Number : 1372000000

3. Date of Calibration

: 2024.06.27

4. Environment

- Temperature : (22.6 ± 0.1) °C - Humidity : (46 ± 2) % R.H.
- Location : Permanent Calibration Lab
(Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea)

5. Traceability**Calibration method and/or brief description**

This certifies that the equipment has been calibrated using applicable HCT procedure(HCT-CS-264-40707), (HCT-CS-264-40707), in compliance with ISO/IEC 17025. Measurement are traceable to the International System of Unit (SI) via national metrology institutes.

List of used standards/specifications

Description	Manufacturer / Model Name	Serial Number	The due date of next Calibration	Calibration laboratory
PNA SERIES NETWORK ANALYZER	AGILENT/E8363B	MY43030182	2025/06/18	HCT CO., LTD.
TRANSMISSION/REFLECTION MODULE SET	OML/V15VNA2-T/R	200722-1	2024/10/18	HCT CO., LTD.
TRANSMISSION/REFLECTION MODULE SET	OML/V10VNA2-T/R	200722-1	2024/10/18	HCT CO., LTD.
CALIBRATION KIT	Keysight Technologies/V11644A	MY46042094	2024/10/06	Keysight Technologies
CALIBRATION KIT	Keysight Technologies/W11644A	MY46042118	2024/10/08	Keysight Technologies

6. Calibration result

: Refer to attachment

7. Measurement uncertainty

: Refer to attachment

(Confidence level about 95 %, k = 2)

affirmation	Measurements performed by	(signature)	Approved by	(signature)
	Name : Minhyeong Shin		Title Technical Cal. Manager Name Jaesang So	

The above calibration certificate is the accredited calibration items by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA.

2024. 06. 27Accredited by KOLAS, Republic of KOREA **HCT Co., Ltd.**

(NOTE) If any significant instability or other adverse factor(overload, temperature, humidity etc.) manifests itself before, during or after calibration, and is likely to affect the validity of the calibration.

Calibration Results



Certificate No : IC-2024-057635

Calibration No : C-2024-067804

page : 2 of 6

1. Antenna Factor & Gain

Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)
60.00	43.6	22.2	63.70	43.8	22.5	67.40	44.0	22.8
60.10	43.6	22.2	63.80	43.8	22.5	67.50	44.0	22.8
60.20	43.6	22.2	63.90	43.8	22.5	67.60	44.0	22.8
60.30	43.7	22.2	64.00	43.8	22.6	67.70	44.1	22.8
60.40	43.7	22.2	64.10	43.8	22.6	67.80	44.1	22.8
60.50	43.7	22.2	64.20	43.8	22.6	67.90	44.1	22.8
60.60	43.7	22.2	64.30	43.8	22.6	68.00	44.1	22.7
60.70	43.7	22.2	64.40	43.8	22.7	68.10	44.2	22.7
60.80	43.7	22.2	64.50	43.7	22.7	68.20	44.2	22.7
60.90	43.7	22.2	64.60	43.7	22.7	68.30	44.2	22.7
61.00	43.7	22.3	64.70	43.7	22.7	68.40	44.3	22.7
61.10	43.6	22.3	64.80	43.8	22.7	68.50	44.3	22.6
61.20	43.6	22.4	64.90	43.8	22.7	68.60	44.3	22.6
61.30	43.6	22.4	65.00	43.8	22.6	68.70	44.4	22.6
61.40	43.5	22.4	65.10	43.9	22.6	68.80	44.4	22.6
61.50	43.5	22.5	65.20	43.9	22.6	68.90	44.4	22.6
61.60	43.5	22.5	65.30	44.0	22.6	69.00	44.4	22.6
61.70	43.5	22.5	65.40	44.0	22.5	69.10	44.3	22.7
61.80	43.5	22.5	65.50	44.0	22.5	69.20	44.3	22.7
61.90	43.6	22.5	65.60	44.0	22.5	69.30	44.3	22.7
62.00	43.6	22.5	65.70	44.0	22.5	69.40	44.3	22.8
62.10	43.6	22.5	65.80	44.0	22.5	69.50	44.3	22.8
62.20	43.7	22.4	65.90	44.1	22.5	69.60	44.2	22.8
62.30	43.7	22.4	66.00	44.1	22.6	69.70	44.2	22.9
62.40	43.7	22.4	66.10	44.1	22.6	69.80	44.2	22.9
62.50	43.7	22.4	66.20	44.1	22.6	69.90	44.2	22.9
62.60	43.7	22.4	66.30	44.1	22.6	70.00	44.2	22.9
62.70	43.8	22.4	66.40	44.1	22.6	70.10	44.2	22.9
62.80	43.8	22.4	66.50	44.1	22.6	70.20	44.2	22.9
62.90	43.8	22.4	66.60	44.0	22.7	70.30	44.3	22.9
63.00	43.8	22.4	66.70	44.0	22.7	70.40	44.3	22.9
63.10	43.9	22.4	66.80	44.0	22.7	70.50	44.3	22.9
63.20	43.9	22.4	66.90	44.0	22.7	70.60	44.3	22.9
63.30	43.9	22.4	67.00	44.0	22.8	70.70	44.4	22.8
63.40	43.9	22.4	67.10	44.0	22.8	70.80	44.4	22.8
63.50	43.9	22.4	67.20	44.0	22.8	70.90	44.4	22.8
63.60	43.8	22.4	67.30	44.0	22.8	71.00	44.5	22.8

Calibration Results



Certificate No : IC-2024-057635

Calibration No : C-2024-067804

page : 3 of 6

1. Antenna Factor & Gain (cont.)

Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)
71.10	44.5	22.7	74.60	44.8	22.9	78.10	44.9	23.1
71.20	44.6	22.7	74.70	44.8	22.9	78.20	44.9	23.1
71.30	44.6	22.7	74.80	44.8	22.9	78.30	44.9	23.2
71.40	44.6	22.7	74.90	44.8	22.9	78.40	44.9	23.2
71.50	44.6	22.7	75.00	44.8	23.0	78.50	44.9	23.2
71.60	44.6	22.7	75.10	44.7	23.0	78.60	44.9	23.2
71.70	44.6	22.7	75.20	44.7	23.0	78.70	44.9	23.2
71.80	44.6	22.7	75.30	44.7	23.0	78.80	44.9	23.2
71.90	44.6	22.7	75.40	44.7	23.1	78.90	45.0	23.2
72.00	44.6	22.8	75.50	44.7	23.1	79.00	45.0	23.2
72.10	44.6	22.8	75.60	44.7	23.1	79.10	45.0	23.1
72.20	44.5	22.9	75.70	44.7	23.1	79.20	45.1	23.1
72.30	44.5	22.9	75.80	44.7	23.2	79.30	45.1	23.1
72.40	44.5	22.9	75.90	44.7	23.1	79.40	45.2	23.0
72.50	44.5	23.0	76.00	44.7	23.1	79.50	45.2	23.0
72.60	44.5	23.0	76.10	44.7	23.1	79.60	45.3	23.0
72.70	44.4	23.0	76.20	44.8	23.1	79.70	45.3	23.0
72.80	44.4	23.0	76.30	44.8	23.0	79.80	45.3	22.9
72.90	44.4	23.0	76.40	44.9	23.0	79.90	45.3	23.0
73.00	44.5	23.0	76.50	44.9	23.0	80.00	45.3	23.0
73.10	44.5	23.0	76.60	44.9	23.0	80.10	45.3	23.0
73.20	44.5	23.0	76.70	45.0	22.9	80.20	45.3	23.0
73.30	44.5	23.0	76.80	45.0	22.9	80.30	45.3	23.0
73.40	44.5	23.0	76.90	45.0	22.9	80.40	45.3	23.1
73.50	44.5	23.0	77.00	45.0	22.9	80.50	45.2	23.1
73.60	44.6	23.0	77.10	45.0	22.9	80.60	45.2	23.1
73.70	44.6	23.0	77.20	45.0	22.9	80.70	45.2	23.1
73.80	44.6	22.9	77.30	45.0	23.0	80.80	45.2	23.2
73.90	44.7	22.9	77.40	45.0	23.0	80.90	45.2	23.2
74.00	44.7	22.9	77.50	45.0	23.0	81.00	45.2	23.2
74.10	44.7	22.9	77.60	45.0	23.0	81.10	45.2	23.2
74.20	44.8	22.9	77.70	45.0	23.1	81.20	45.2	23.2
74.30	44.8	22.9	77.80	45.0	23.1	81.30	45.2	23.2
74.40	44.8	22.9	77.90	45.0	23.1	81.40	45.2	23.2
74.50	44.8	22.9	78.00	45.0	23.1	81.50	45.2	23.2

Calibration Results



Certificate No : IC-2024-057635

Calibration No : C-2024-067804

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1. Antenna Factor & Gain (cont.)

Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)
81.60	45.3	23.2	84.50	45.6	23.1	87.40	45.9	23.1
81.70	45.3	23.2	84.60	45.7	23.1	87.50	46.0	23.1
81.80	45.3	23.2	84.70	45.7	23.1	87.60	46.0	23.1
81.90	45.3	23.1	84.80	45.8	23.0	87.70	46.0	23.0
82.00	45.4	23.1	84.90	45.8	23.0	87.80	46.1	23.0
82.10	45.4	23.1	85.00	45.8	23.0	87.90	46.1	23.0
82.20	45.5	23.0	85.10	45.9	23.0	88.00	46.1	23.0
82.30	45.5	23.0	85.20	45.9	23.0	88.10	46.1	23.0
82.40	45.6	23.0	85.30	45.9	23.0	88.20	46.1	23.0
82.50	45.6	23.0	85.40	45.9	23.0	88.30	46.1	23.0
82.60	45.6	23.0	85.50	45.9	23.0	88.40	46.1	23.0
82.70	45.6	23.0	85.60	45.9	23.0	88.50	46.1	23.1
82.80	45.6	23.0	85.70	45.9	23.0	88.60	46.1	23.1
82.90	45.6	23.0	85.80	45.9	23.0	88.70	46.1	23.1
83.00	45.6	23.0	85.90	45.8	23.1	88.80	46.1	23.1
83.10	45.6	23.0	86.00	45.8	23.1	88.90	46.0	23.2
83.20	45.6	23.0	86.10	45.8	23.1	89.00	46.0	23.2
83.30	45.6	23.0	86.20	45.8	23.1	89.10	46.0	23.2
83.40	45.6	23.1	86.30	45.8	23.1	89.20	46.0	23.2
83.50	45.5	23.1	86.40	45.8	23.1	89.30	46.0	23.2
83.60	45.5	23.1	86.50	45.8	23.2	89.40	46.1	23.2
83.70	45.5	23.2	86.60	45.8	23.2	89.50	46.1	23.2
83.80	45.5	23.2	86.70	45.8	23.2	89.60	46.1	23.2
83.90	45.5	23.2	86.80	45.8	23.2	89.70	46.1	23.2
84.00	45.5	23.2	86.90	45.8	23.2	89.80	46.1	23.1
84.10	45.5	23.2	87.00	45.8	23.2	89.90	46.2	23.1
84.20	45.5	23.2	87.10	45.8	23.2	90.00	46.2	23.1
84.30	45.5	23.2	87.20	45.9	23.2	-	-	-
84.40	45.6	23.2	87.30	45.9	23.1	-	-	-

※ The measurement uncertainty of this result is 1.2 dB (Confidence level about 95 %, $k = 2$)

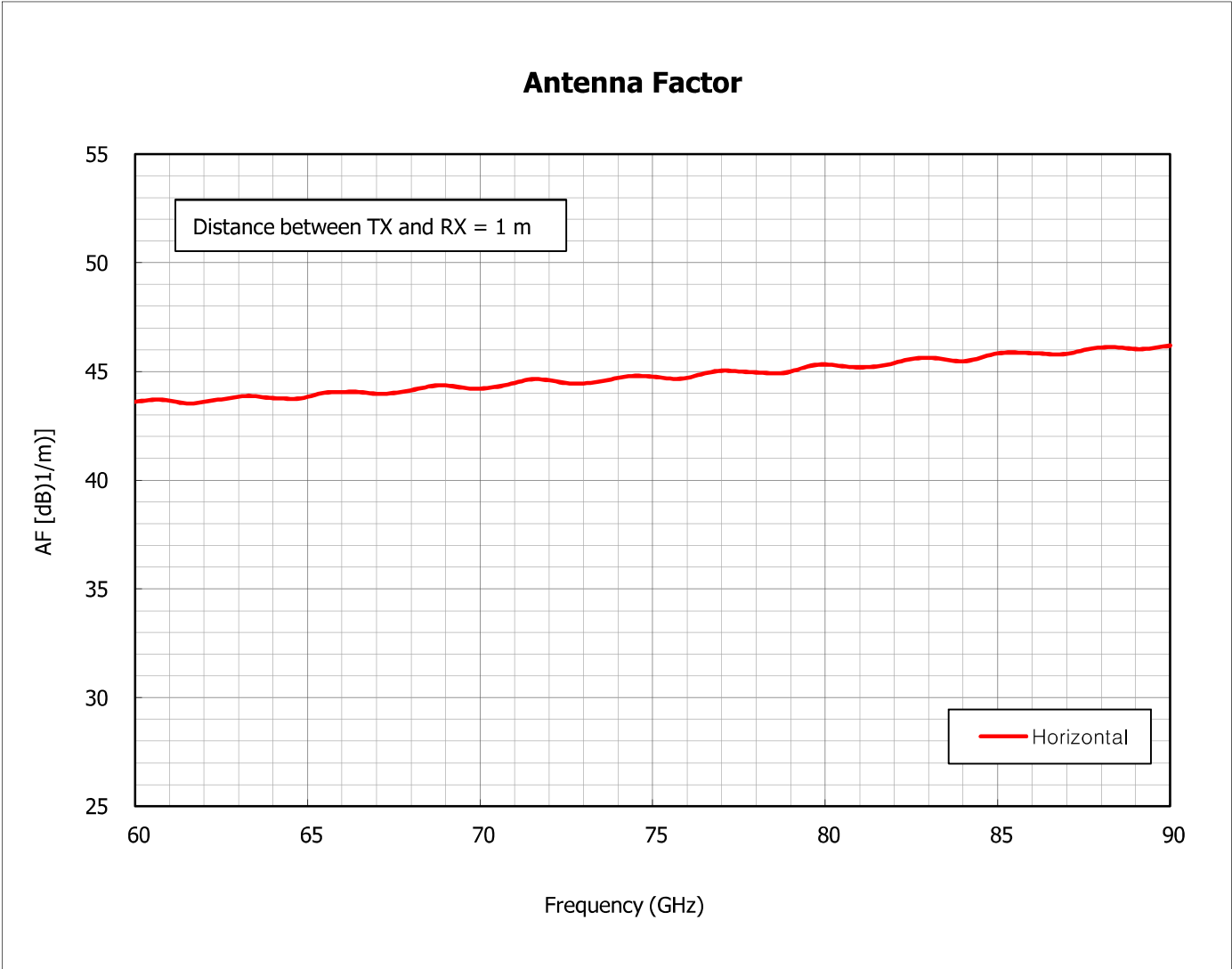
Calibration Results



Certificate No : IC-2024-057635
Calibration No : C-2024-067804

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2. Antenna Factor Curve



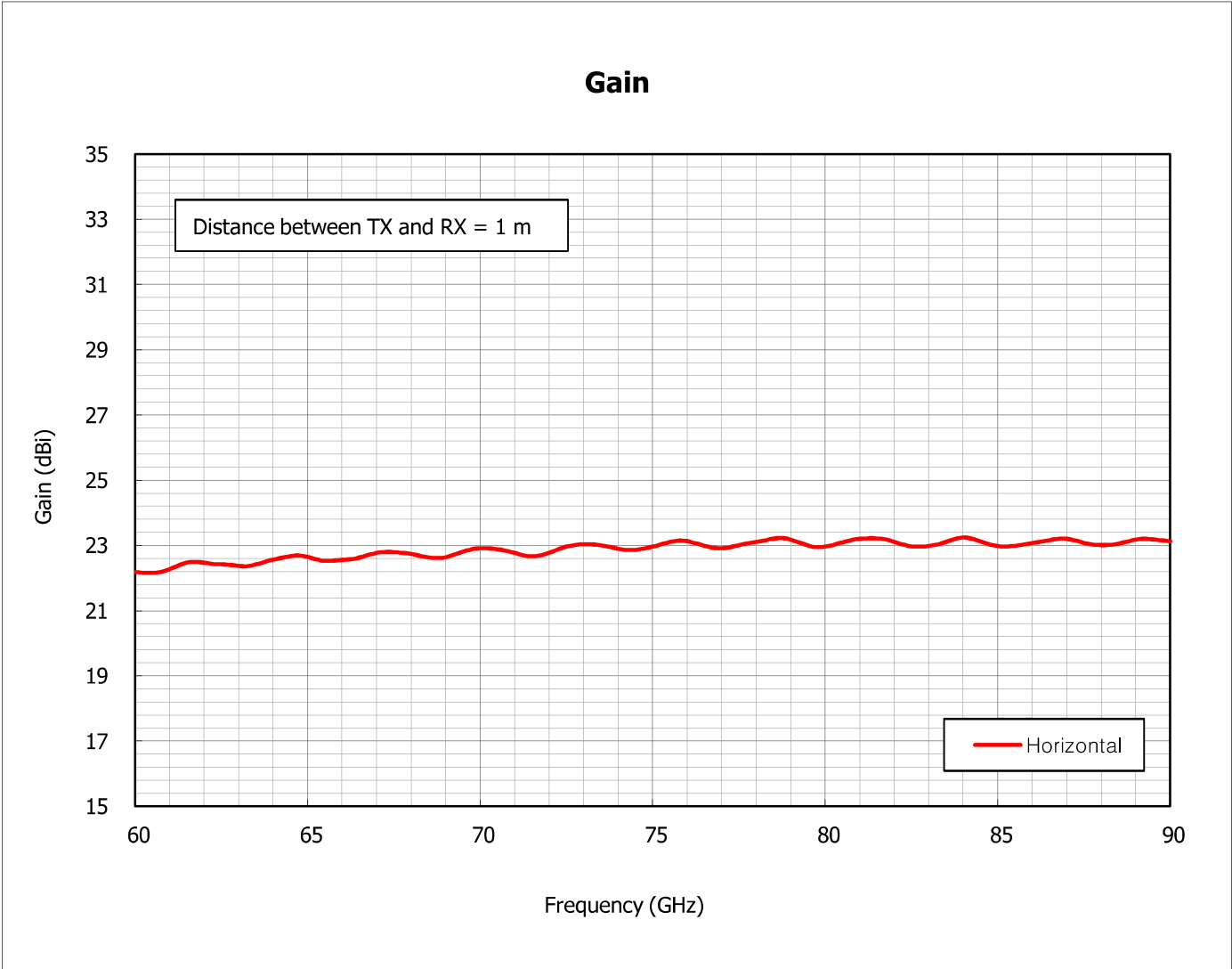
Calibration Results



Certificate No : IC-2024-057635
Calibration No : C-2024-067804

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3. Gain Curve



END.

- Certificate No : IC-2024-057643
- Calibration No : C-2024-067812

page : 1 of 5

1. Client

- Name : SPORTON INTERNATIONAL INC.
- Address : No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd., Guishan Dist., Taoyuan City 333, Taiwan, R.O.C.

2. Calibration Subject

◇Registration No : 527323

- Description : ANTENNA
- Manufacturer and Model Name : QUINSTAR / QWH-FPRR00
- Serial Number : 1011500008

3. Date of Calibration

: 2024.06.27

4. Environment

- Temperature : (23.1 ± 0.3) °C - Humidity : (49 ± 2) % R.H.
- Location : Permanent Calibration Lab
(Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea)

5. Traceability**Calibration method and/or brief description**

This certifies that the equipment has been calibrated using applicable HCT procedure(HCT-CS-264-40707), (HCT-CS-264-40707), in compliance with ISO/IEC 17025. Measurement are traceable to the International System of Unit (SI) via national metrology institutes.

List of used standards/specifications

Description	Manufacturer / Model Name	Serial Number	The due date of next Calibration	Calibration laboratory
PNA SERIES NETWORK ANALYZER	AGILENT/E8363B	MY43030182	2025/06/18	HCT CO., LTD.
TRANSMISSION/REFLECTION MODULE SET	OML/V10VNA2-T/R	200722-1	2024/10/18	HCT CO., LTD.
CALIBRATION KIT	Keysight Technologies/W11644A	MY46042118	2024/10/08	Keysight Technologies

6. Calibration result

: Refer to attachment

7. Measurement uncertainty

: Refer to attachment

(Confidence level about 95 %, $k = 2$)

affirmation	Measurements performed by	(signature)	Approved by	(signature)
	Name : Minhyeong Shin		Title Technical Cal. Manager Name Jaesang So	

The above calibration certificate is the accredited calibration items by Korea Laboratory Accreditation Scheme, which signed the ILAC-MRA.

2024. 06. 27Accredited by KOLAS, Republic of KOREA **HCT Co., Ltd.**

(NOTE) If any significant instability or other adverse factor(overload, temperature, humidity etc.) manifests itself before, during or after calibration, and is likely to affect the validity of the calibration.

Calibration Results



Certificate No : IC-2024-057643

Calibration No : C-2024-067812

page : 2 of 5

1. Antenna Factor & Gain

Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)
90.00	47.1	22.2	93.70	47.2	22.5	97.40	47.4	22.6
90.10	47.1	22.2	93.80	47.2	22.5	97.50	47.4	22.6
90.20	47.1	22.2	93.90	47.2	22.5	97.60	47.4	22.6
90.30	47.1	22.2	94.00	47.2	22.5	97.70	47.5	22.6
90.40	47.1	22.2	94.10	47.2	22.5	97.80	47.5	22.6
90.50	47.1	22.3	94.20	47.2	22.5	97.90	47.5	22.6
90.60	47.1	22.3	94.30	47.2	22.5	98.00	47.5	22.6
90.70	47.1	22.3	94.40	47.2	22.5	98.10	47.5	22.6
90.80	47.1	22.3	94.50	47.2	22.5	98.20	47.5	22.6
90.90	47.1	22.3	94.60	47.2	22.5	98.30	47.5	22.6
91.00	47.1	22.3	94.70	47.3	22.5	98.40	47.5	22.6
91.10	47.0	22.4	94.80	47.3	22.5	98.50	47.5	22.6
91.20	47.0	22.4	94.90	47.3	22.5	98.60	47.5	22.6
91.30	47.0	22.4	95.00	47.3	22.5	98.70	47.5	22.6
91.40	47.1	22.4	95.10	47.3	22.5	98.80	47.5	22.6
91.50	47.1	22.4	95.20	47.3	22.5	98.90	47.6	22.6
91.60	47.1	22.4	95.30	47.3	22.5	99.00	47.6	22.5
91.70	47.1	22.3	95.40	47.3	22.5	99.10	47.6	22.5
91.80	47.2	22.3	95.50	47.3	22.5	99.20	47.6	22.5
91.90	47.2	22.3	95.60	47.3	22.5	99.30	47.6	22.5
92.00	47.2	22.3	95.70	47.4	22.5	99.40	47.6	22.6
92.10	47.2	22.3	95.80	47.4	22.5	99.50	47.6	22.6
92.20	47.2	22.4	95.90	47.4	22.5	99.60	47.6	22.6
92.30	47.2	22.4	96.00	47.4	22.5	99.70	47.6	22.6
92.40	47.1	22.4	96.10	47.4	22.5	99.80	47.6	22.6
92.50	47.1	22.4	96.20	47.4	22.5	99.90	47.6	22.6
92.60	47.2	22.4	96.30	47.4	22.5	100.00	47.6	22.6
92.70	47.2	22.4	96.40	47.4	22.5	100.10	47.6	22.6
92.80	47.2	22.4	96.50	47.4	22.5	100.20	47.6	22.6
92.90	47.2	22.4	96.60	47.4	22.5	100.30	47.6	22.6
93.00	47.2	22.4	96.70	47.4	22.5	100.40	47.6	22.6
93.10	47.2	22.4	96.80	47.4	22.5	100.50	47.6	22.7
93.20	47.2	22.4	96.90	47.4	22.5	100.60	47.6	22.7
93.30	47.2	22.4	97.00	47.4	22.6	100.70	47.6	22.7
93.40	47.2	22.4	97.10	47.4	22.6	100.80	47.6	22.7
93.50	47.2	22.4	97.20	47.4	22.6	100.90	47.6	22.7
93.60	47.2	22.5	97.30	47.4	22.6	101.00	47.6	22.7

Calibration Results



Certificate No : IC-2024-057643

Calibration No : C-2024-067812

page : 3 of 5

1. Antenna Factor & Gain (cont.)

Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)
101.10	47.6	22.7	104.10	47.9	22.7	107.10	47.9	22.9
101.20	47.6	22.7	104.20	47.9	22.7	107.20	47.9	22.9
101.30	47.6	22.7	104.30	47.9	22.7	107.30	48.0	22.9
101.40	47.6	22.8	104.40	47.9	22.7	107.40	48.0	22.9
101.50	47.6	22.8	104.50	47.9	22.7	107.50	48.0	22.9
101.60	47.6	22.8	104.60	47.9	22.7	107.60	48.0	22.8
101.70	47.6	22.8	104.70	47.9	22.7	107.70	48.0	22.8
101.80	47.6	22.8	104.80	47.9	22.7	107.80	48.1	22.8
101.90	47.6	22.8	104.90	47.9	22.7	107.90	48.1	22.8
102.00	47.6	22.8	105.00	47.9	22.7	108.00	48.1	22.8
102.10	47.6	22.8	105.10	47.9	22.8	108.10	48.1	22.8
102.20	47.7	22.8	105.20	47.9	22.8	108.20	48.1	22.8
102.30	47.7	22.8	105.30	47.9	22.8	108.30	48.2	22.8
102.40	47.7	22.8	105.40	47.9	22.8	108.40	48.2	22.8
102.50	47.7	22.8	105.50	47.9	22.8	108.50	48.2	22.8
102.60	47.7	22.8	105.60	47.8	22.9	108.60	48.1	22.8
102.70	47.7	22.8	105.70	47.8	22.9	108.70	48.1	22.8
102.80	47.7	22.8	105.80	47.8	22.9	108.80	48.1	22.8
102.90	47.7	22.8	105.90	47.8	22.9	108.90	48.1	22.9
103.00	47.7	22.8	106.00	47.8	22.9	109.00	48.1	22.9
103.10	47.7	22.8	106.10	47.8	22.9	109.10	48.1	22.9
103.20	47.7	22.7	106.20	47.8	22.9	109.20	48.1	22.9
103.30	47.8	22.7	106.30	47.8	22.9	109.30	48.1	22.9
103.40	47.8	22.7	106.40	47.8	22.9	109.40	48.1	22.9
103.50	47.8	22.7	106.50	47.8	22.9	109.50	48.1	22.9
103.60	47.8	22.7	106.60	47.9	22.9	109.60	48.1	22.9
103.70	47.9	22.7	106.70	47.9	22.9	109.70	48.1	22.9
103.80	47.9	22.7	106.80	47.9	22.9	109.80	48.1	22.9
103.90	47.9	22.7	106.90	47.9	22.9	109.90	48.1	22.9
104.00	47.9	22.7	107.00	47.9	22.9	110.00	48.1	22.9

※ The measurement uncertainty of this result is 1.2 dB (Confidence level about 95 %, $k = 2$)

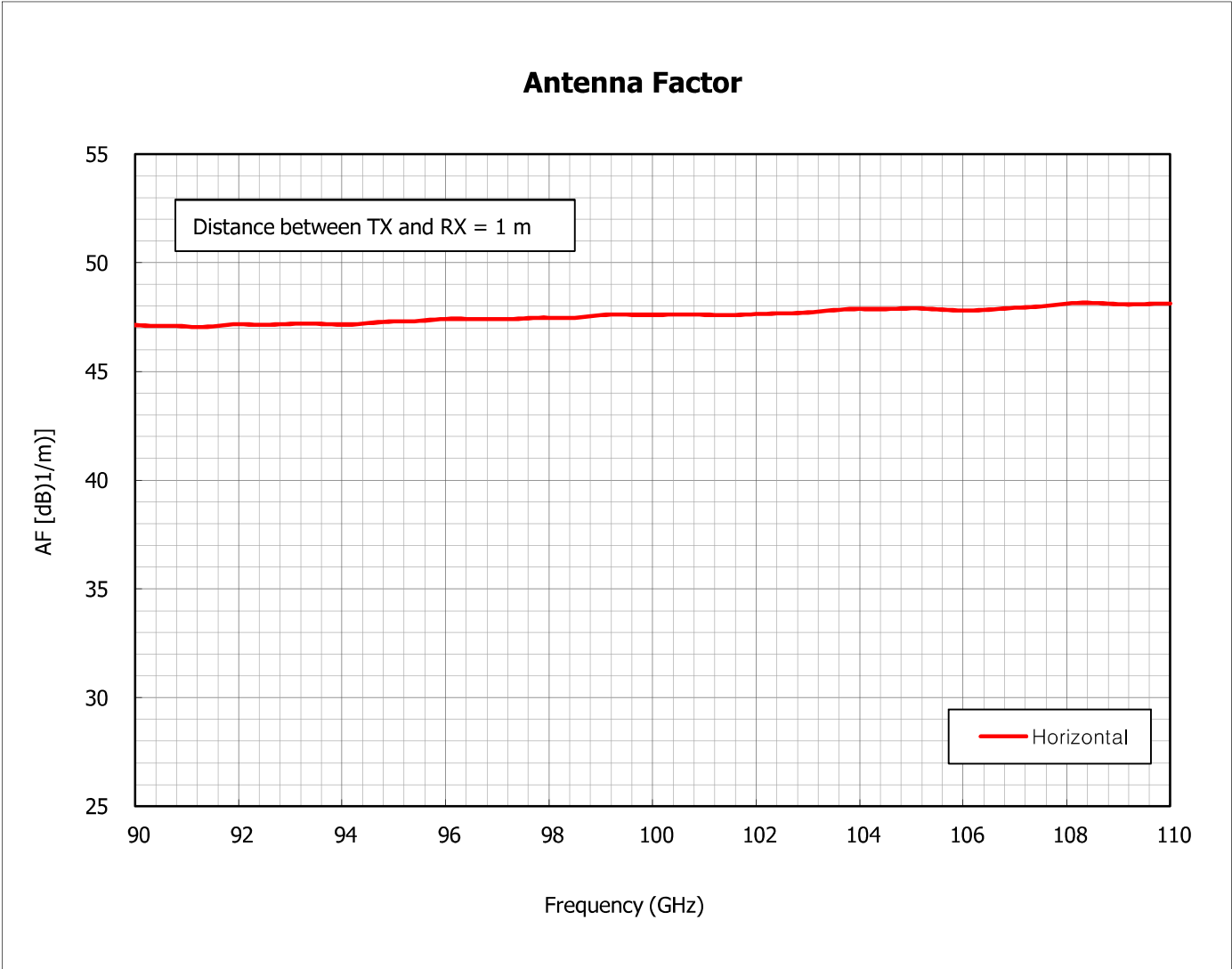
Calibration Results



Certificate No : IC-2024-057643
Calibration No : C-2024-067812

page : 4 of 5

2. Antenna Factor Curve

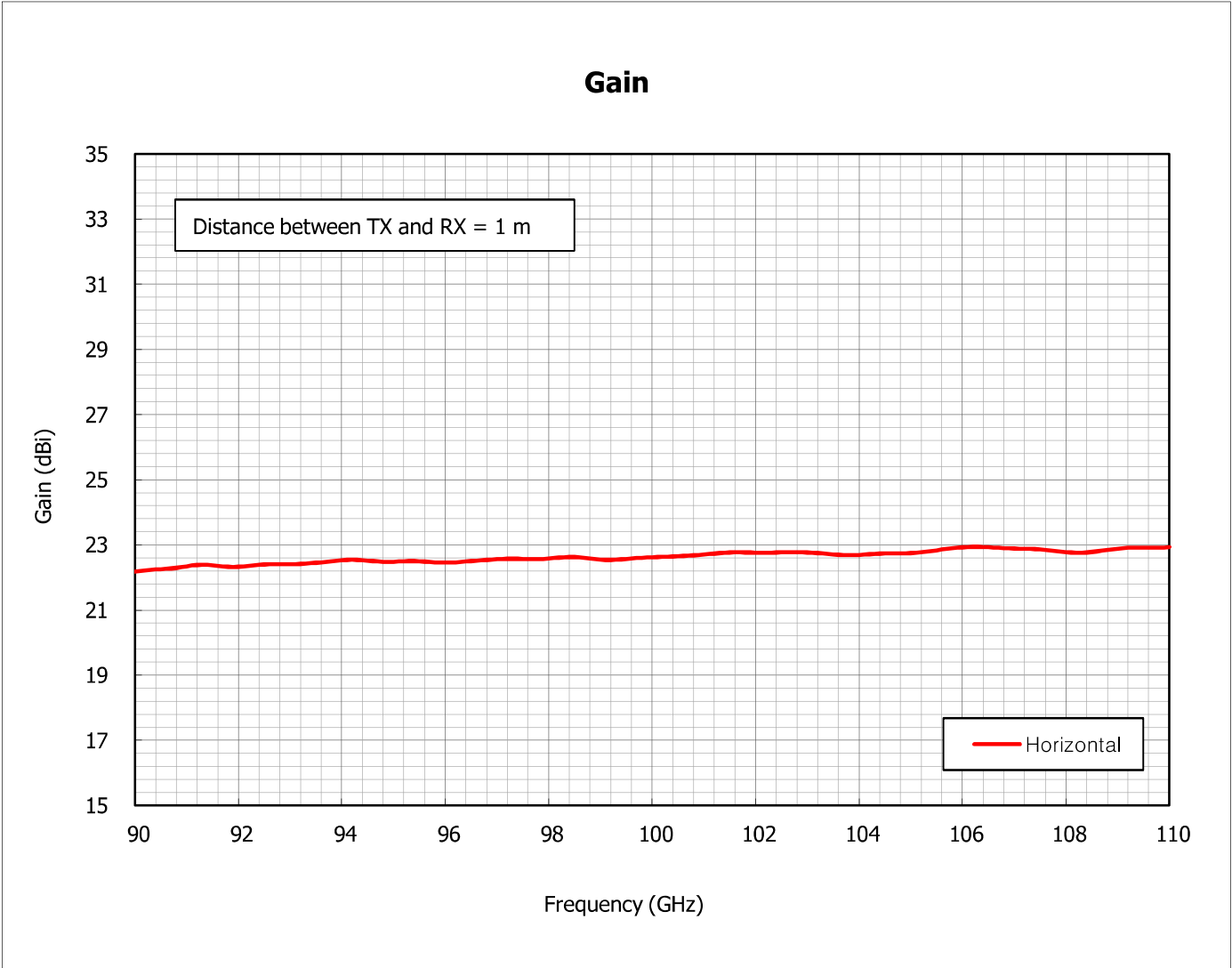


Calibration Results



Certificate No : IC-2024-057643
Calibration No : C-2024-067812

3. Gain Curve



END.

Measurement Report

74, Seoicheon-ro 578beon-gil, Majang-myeon,
Icheon-si, Gyeonggi-do, Korea 17383
Tel :82-31-645-6900, www.hct.co.kr보고서번호(Report No) : IC-2024-057785
측정번호(Measurement No) : C-2024-067936

페이지(page) : 1 of 5

1. 의뢰자 (Client)

- 기관명 (Name) : SPORTON INTERNATIONAL INC.
- 주소 (Address) : No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd., Guishan Dist., Taoyuan City 333, Taiwan, R.O.C.

2. 대상품목 (Measurement Item)

◇ HCT 등록번호 : 527377

- 기기명 (Description) : ANTENNA
- 제작회사 및 형식(Manufacturer and Model Name) : QUINSTAR / QWH-FPRR00
- 기기번호 (Serial Number) : 1011500008

3. 측정일자 (Measurement date) : 2024.06.27

4. 측정환경 (Environment)

- 온도(Temperature) : (23.1 ± 0.3) °C - 습도(Humidity) : (49 ± 2) % R.H.

5. 측정방법 (Measurement method used)

This certifies that the above equipment was measured using the standard equipment below according to the customer requirements. This equipment was simulated by the size of the antenna.

측정에 사용한 표준장비 명세 (List of used standards/specifications)

기기명 (Description)	제작회사 / 형식 (Manufacturer and Model Name)	기기번호 (Serial Number)	차기교정예정일자 (The due date of next Calibration)	교정기관 (Calibration laboratory)
VIDEO MEASURING SYSTEM	RATIONAL/VMS-2010G	VBG00090	2025/02/17	HCT CO., LTD.

6. 측정결과 (Measurement result)

: 측정결과 참조 (Refer to attachment)

(주) 이 측정결과는 의뢰자가 제시한 시료 및 시료명에만 한정됩니다.

The measurement results shown in this report refer only to the sample(s) measured unless otherwise stated.

확 인 (Affirmation)	작성자 (Tested by)	승인자 (Approved by)
	성명 (Name) : Minhyeong Shin	직위 (Title) : 기술책임자(Technical Manager) 성명 (Name) : Jaesang So

이 성적서는 ILAC MRA 서명 기관인 KOLAS(Korea Laboratory Accreditation Scheme)와 A2LA (American Laboratory for Laboratory Accreditation)의 인정
과 무관합니다. This calibration certificate is Not an accredited report by KOLAS(Korea Laboratory Accreditation Scheme) and A2LA(American Association
for Laboratory Accreditation), a ILAC MRA signatory.

2024. 06. 27

HCT

(주)에이치시티 대표이사
President, HCT Co., Ltd.

(주) 측정결과는 측정기의 정밀정확도에 영향을 미치는 요소(과부하, 온도, 습도 등)의 급격한 변화가 발생한 경우에는 무효가 됩니다. If any significant instability
or other adverse factor(overload, temperature, humidity etc.) manifests itself before, during or after calibration, and is likely to affect the validity of the calibration.

Measurement Results

Certificate No : IC-2024-057785
Measurement No : C-2024-067936

페이지(page) : 2 of 5

1. Antenna Factor & Gain

Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)
110.00	48.55	22.50	119.25	49.15	22.60	128.50	49.80	22.60
110.25	48.56	22.50	119.50	49.17	22.60	128.75	49.82	22.60
110.50	48.58	22.51	119.75	49.19	22.60	129.00	49.83	22.60
110.75	48.60	22.51	120.00	49.20	22.60	129.25	49.85	22.60
111.00	48.61	22.51	120.25	49.22	22.60	129.50	49.87	22.60
111.25	48.63	22.52	120.50	49.24	22.60	129.75	49.89	22.59
111.50	48.64	22.52	120.75	49.26	22.60	130.00	49.91	22.59
111.75	48.66	22.53	121.00	49.27	22.60	130.25	49.92	22.59
112.00	48.68	22.53	121.25	49.29	22.60	130.50	49.94	22.59
112.25	48.69	22.53	121.50	49.31	22.60	130.75	49.96	22.59
112.50	48.71	22.54	121.75	49.32	22.61	131.00	49.98	22.59
112.75	48.72	22.54	122.00	49.34	22.61	131.25	50.00	22.59
113.00	48.74	22.54	122.25	49.36	22.61	131.50	50.01	22.58
113.25	48.76	22.54	122.50	49.38	22.61	131.75	50.03	22.58
113.50	48.77	22.55	122.75	49.39	22.61	132.00	50.05	22.58
113.75	48.79	22.55	123.00	49.41	22.61	132.25	50.07	22.58
114.00	48.80	22.55	123.25	49.43	22.61	132.50	50.09	22.58
114.25	48.82	22.56	123.50	49.44	22.61	132.75	50.11	22.58
114.50	48.84	22.56	123.75	49.46	22.61	133.00	50.12	22.57
114.75	48.85	22.56	124.00	49.48	22.61	133.25	50.14	22.57
115.00	48.87	22.56	124.25	49.50	22.61	133.50	50.16	22.57
115.25	48.89	22.57	124.50	49.51	22.61	133.75	50.18	22.57
115.50	48.90	22.57	124.75	49.53	22.61	134.00	50.20	22.56
115.75	48.92	22.57	125.00	49.55	22.61	134.25	50.22	22.56
116.00	48.94	22.57	125.25	49.57	22.61	134.50	50.23	22.56
116.25	48.95	22.57	125.50	49.58	22.61	134.75	50.25	22.56
116.50	48.97	22.58	125.75	49.60	22.61	135.00	50.27	22.56
116.75	48.99	22.58	126.00	49.62	22.61	135.25	50.29	22.55
117.00	49.00	22.58	126.25	49.64	22.61	135.50	50.31	22.55
117.25	49.02	22.58	126.50	49.66	22.61	135.75	50.33	22.55
117.50	49.04	22.58	126.75	49.67	22.61	136.00	50.35	22.55
117.75	49.05	22.59	127.00	49.69	22.61	136.25	50.36	22.54
118.00	49.07	22.59	127.25	49.71	22.60	136.50	50.38	22.54
118.25	49.09	22.59	127.50	49.73	22.60	136.75	50.40	22.54
118.50	49.10	22.59	127.75	49.74	22.60	137.00	50.42	22.53
118.75	49.12	22.59	128.00	49.76	22.60	137.25	50.44	22.53
119.00	49.14	22.59	128.25	49.78	22.60	137.50	50.46	22.53

Measurement Results

Certificate No : IC-2024-057785
Measurement No : C-2024-067936

페이지(page) : 3 of 5

1. Antenna Factor & Gain (cont.)

Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)
137.75	50.48	22.53	138.75	50.55	22.51	139.75	50.63	22.50
138.00	50.50	22.52	139.00	50.57	22.51	140.00	50.65	22.50
138.25	50.51	22.52	139.25	50.59	22.51	-	-	-
138.50	50.53	22.52	139.50	50.61	22.50	-	-	-

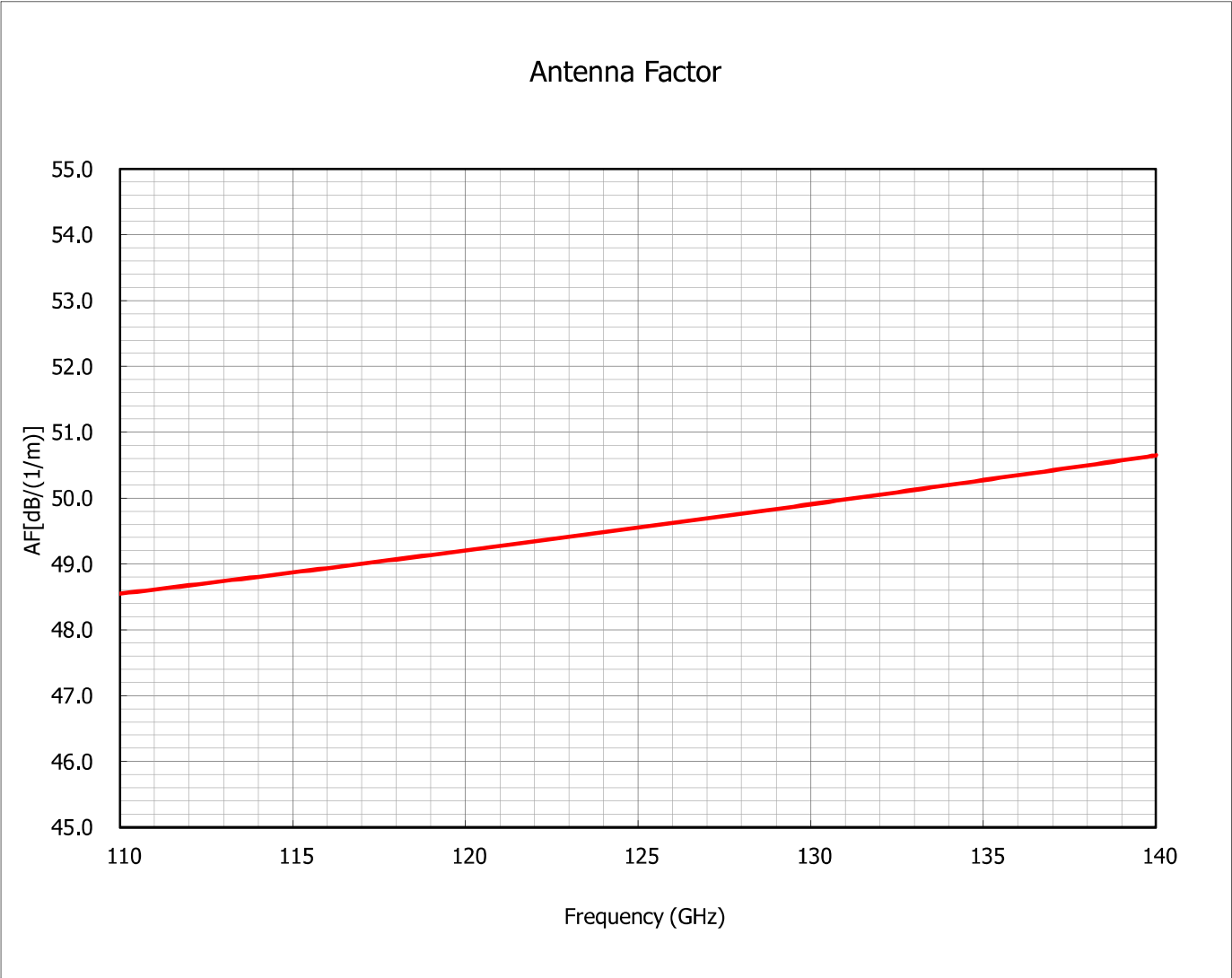
※ The measurement uncertainty of this result is 1.3 dB (Confidence level about 95 %, $k = 2$)

Measurement Results

Certificate No : IC-2024-057785
Measurement No : C-2024-067936

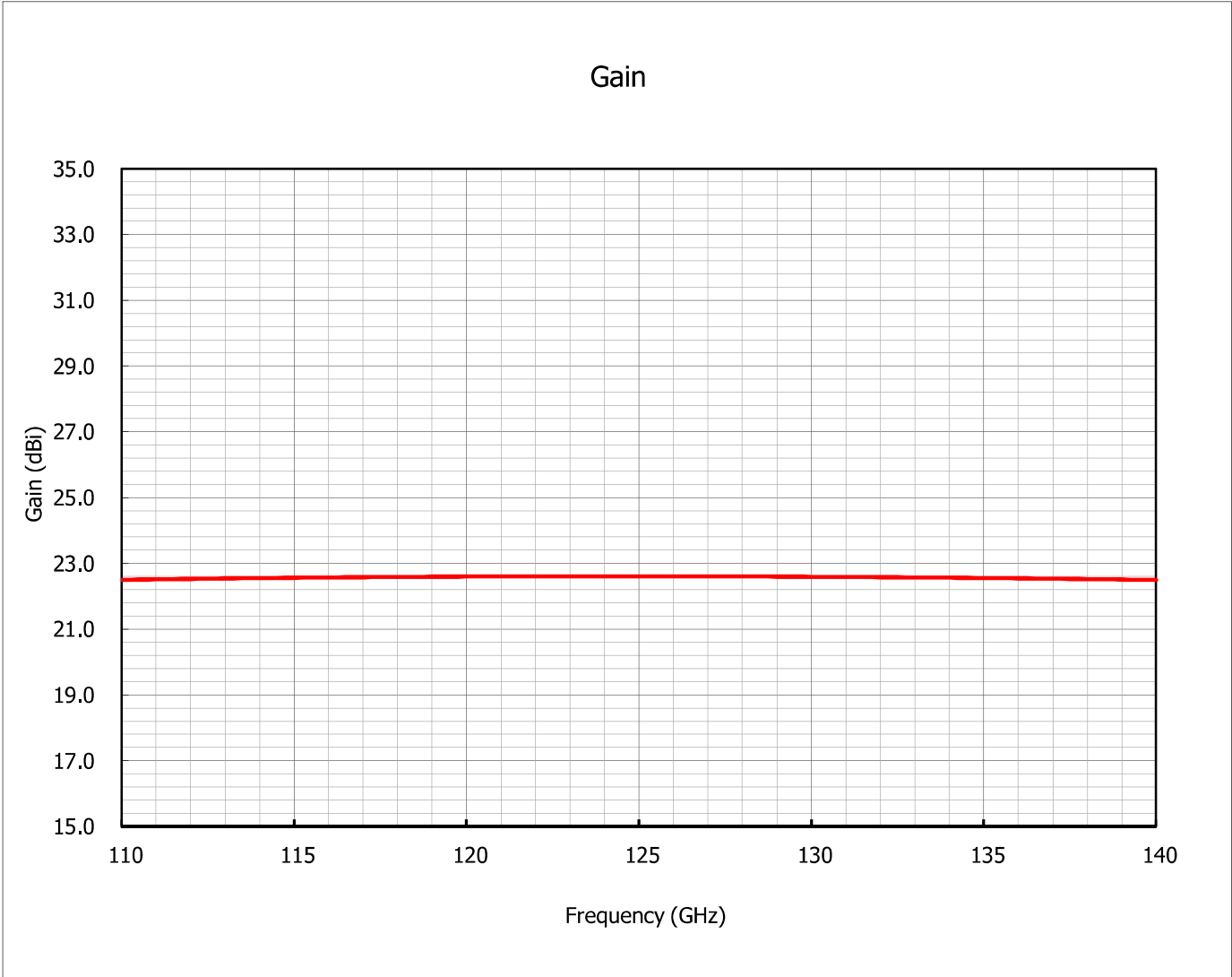
페이지(page) : 4 of 5

2. Antenna Factor Curve



Measurement Results

3. Gain Curve



* The above results are simulation results based on the measurement results in the report below.
Report No : C-2024-067870

END.

Measurement Report

74, Seoicheon-ro 578beon-gil, Majang-myeon,
Icheon-si, Gyeonggi-do, Korea 17383
Tel :82-31-645-6900, www.hct.co.kr보고서번호(Report No) : IC-2024-057638
측정번호(Measurement No) : C-2024-067807

페이지(page) : 1 of 6

1. 의뢰자 (Client)

- 기관명 (Name) : SPORTON INTERNATIONAL INC.
- 주소 (Address) : No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd., Guishan Dist., Taoyuan City 333, Taiwan, R.O.C.

2. 대상품목 (Measurement Item)

◇ HCT 등록번호 : 527312

- 기기명 (Description) : ANTENNA
- 제작회사 및 형식(Manufacturer and Model Name) : QUINSTAR / QWH-GPRR00
- 기기번호 (Serial Number) : QWH-GPRR00-01

3. 측정일자 (Measurement date) : 2024.06.27

4. 측정환경 (Environment)

- 온도(Temperature) : (22.7 ± 0.1) °C - 습도(Humidity) : (48 ± 2) % R.H.

5. 측정방법 (Measurement method used)

This certifies that the above equipment was measured using the standard equipment below according to the customer requirements. This equipment was simulated by the size of the antenna.

측정에 사용한 표준장비 명세 (List of used standards/specifications)

기기명 (Description)	제작회사 / 형식 (Manufacturer and Model Name)	기기번호 (Serial Number)	차기교정예정일자 (The due date of next Calibration)	교정기관 (Calibration laboratory)
VIDEO MEASURING SYSTEM	RATIONAL/VMS-2010G	VBG00090	2025/02/17	HCT CO., LTD.

6. 측정결과 (Measurement result)

: 측정결과 참조 (Refer to attachment)

(주) 이 측정결과는 의뢰자가 제시한 시료 및 시료명에만 한정됩니다.

The measurement results shown in this report refer only to the sample(s) measured unless otherwise stated.

확 인 (Affirmation)	작성자 (Tested by)	승인자 (Approved by)
	성명 (Name) : Minhyeong Shin	직위 (Title) 기술책임자(Technical Manager) 성명 (Name) Jaesang So

이 성적서는 ILAC MRA 서명 기관인 KOLAS(Korea Laboratory Accreditation Scheme)와 A2LA (American Laboratory for Laboratory Accreditation)의 인정
과 무관합니다. This calibration certificate is Not an accredited report by KOLAS(Korea Laboratory Accreditation Scheme) and A2LA(American Association
for Laboratory Accreditation), a ILAC MRA signatory.

2024. 06. 27

HCT

(주)에이치시티 대표이사
President, HCT Co., Ltd.

(주) 측정결과는 측정기의 정밀정확도에 영향을 미치는 요소(과부하, 온도, 습도 등)의 급격한 변화가 발생한 경우에는 무효가 됩니다. If any significant instability
or other adverse factor(overload, temperature, humidity etc.) manifests itself before, during or after calibration, and is likely to affect the validity of the calibration.

Measurement Results

Certificate No : IC-2024-057638
Measurement No : C-2024-067807

페이지(page) : 2 of 6

1. Antenna Factor & Gain

Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)
140.00	53.12	20.02	149.25	53.30	20.40	158.50	53.49	20.73
140.25	53.12	20.03	149.50	53.31	20.41	158.75	53.50	20.74
140.50	53.13	20.04	149.75	53.31	20.42	159.00	53.50	20.75
140.75	53.13	20.06	150.00	53.32	20.43	159.25	53.51	20.75
141.00	53.14	20.07	150.25	53.32	20.44	159.50	53.51	20.76
141.25	53.14	20.08	150.50	53.33	20.44	159.75	53.52	20.77
141.50	53.15	20.09	150.75	53.33	20.45	160.00	53.52	20.78
141.75	53.15	20.10	151.00	53.34	20.46	160.25	53.53	20.79
142.00	53.16	20.11	151.25	53.34	20.47	160.50	53.53	20.80
142.25	53.16	20.12	151.50	53.35	20.48	160.75	53.54	20.80
142.50	53.17	20.13	151.75	53.35	20.49	161.00	53.54	20.81
142.75	53.17	20.14	152.00	53.36	20.50	161.25	53.55	20.82
143.00	53.18	20.15	152.25	53.36	20.51	161.50	53.55	20.83
143.25	53.18	20.16	152.50	53.37	20.52	161.75	53.56	20.84
143.50	53.19	20.17	152.75	53.37	20.53	162.00	53.57	20.84
143.75	53.19	20.18	153.00	53.38	20.54	162.25	53.57	20.85
144.00	53.20	20.19	153.25	53.38	20.55	162.50	53.58	20.86
144.25	53.20	20.20	153.50	53.39	20.56	162.75	53.58	20.87
144.50	53.21	20.21	153.75	53.39	20.56	163.00	53.59	20.88
144.75	53.21	20.22	154.00	53.40	20.57	163.25	53.59	20.88
145.00	53.22	20.23	154.25	53.40	20.58	163.50	53.60	20.89
145.25	53.22	20.24	154.50	53.41	20.59	163.75	53.60	20.90
145.50	53.23	20.25	154.75	53.41	20.60	164.00	53.61	20.91
145.75	53.23	20.26	155.00	53.42	20.61	164.25	53.61	20.92
146.00	53.24	20.27	155.25	53.42	20.62	164.50	53.62	20.92
146.25	53.24	20.28	155.50	53.43	20.63	164.75	53.62	20.93
146.50	53.25	20.29	155.75	53.43	20.64	165.00	53.63	20.94
146.75	53.25	20.30	156.00	53.44	20.64	165.25	53.64	20.95
147.00	53.26	20.31	156.25	53.44	20.65	165.50	53.64	20.96
147.25	53.26	20.32	156.50	53.45	20.66	165.75	53.65	20.96
147.50	53.27	20.33	156.75	53.45	20.67	166.00	53.65	20.97
147.75	53.27	20.34	157.00	53.46	20.68	166.25	53.66	20.98
148.00	53.28	20.35	157.25	53.46	20.69	166.50	53.66	20.99
148.25	53.28	20.36	157.50	53.47	20.70	166.75	53.67	20.99
148.50	53.29	20.37	157.75	53.48	20.70	167.00	53.67	21.00
148.75	53.29	20.38	158.00	53.48	20.71	167.25	53.68	21.01
149.00	53.30	20.39	158.25	53.49	20.72	167.50	53.68	21.02

Measurement Results

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1. Antenna Factor & Gain (cont.)

Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)
167.75	53.69	21.02	177.00	53.90	21.28	186.25	54.11	21.51
168.00	53.70	21.03	177.25	53.90	21.29	186.50	54.12	21.52
168.25	53.70	21.04	177.50	53.91	21.30	186.75	54.12	21.52
168.50	53.71	21.05	177.75	53.91	21.30	187.00	54.13	21.53
168.75	53.71	21.05	178.00	53.92	21.31	187.25	54.13	21.53
169.00	53.72	21.06	178.25	53.92	21.32	187.50	54.14	21.54
169.25	53.72	21.07	178.50	53.93	21.32	187.75	54.15	21.55
169.50	53.73	21.07	178.75	53.94	21.33	188.00	54.15	21.55
169.75	53.73	21.08	179.00	53.94	21.33	188.25	54.16	21.56
170.00	53.74	21.09	179.25	53.95	21.34	188.50	54.16	21.56
170.25	53.74	21.10	179.50	53.95	21.35	188.75	54.17	21.57
170.50	53.75	21.10	179.75	53.96	21.35	189.00	54.17	21.57
170.75	53.76	21.11	180.00	53.96	21.36	189.25	54.18	21.58
171.00	53.76	21.12	180.25	53.97	21.37	189.50	54.19	21.59
171.25	53.77	21.13	180.50	53.98	21.37	189.75	54.19	21.59
171.50	53.77	21.13	180.75	53.98	21.38	190.00	54.20	21.60
171.75	53.78	21.14	181.00	53.99	21.39	190.25	54.20	21.60
172.00	53.78	21.15	181.25	53.99	21.39	190.50	54.21	21.61
172.25	53.79	21.15	181.50	54.00	21.40	190.75	54.22	21.61
172.50	53.79	21.16	181.75	54.01	21.40	191.00	54.22	21.62
172.75	53.80	21.17	182.00	54.01	21.41	191.25	54.23	21.62
173.00	53.81	21.17	182.25	54.02	21.42	191.50	54.23	21.63
173.25	53.81	21.18	182.50	54.02	21.42	191.75	54.24	21.63
173.50	53.82	21.19	182.75	54.03	21.43	192.00	54.25	21.64
173.75	53.82	21.20	183.00	54.03	21.43	192.25	54.25	21.65
174.00	53.83	21.20	183.25	54.04	21.44	192.50	54.26	21.65
174.25	53.83	21.21	183.50	54.05	21.45	192.75	54.26	21.66
174.50	53.84	21.22	183.75	54.05	21.45	193.00	54.27	21.66
174.75	53.85	21.22	184.00	54.06	21.46	193.25	54.28	21.67
175.00	53.85	21.23	184.25	54.06	21.46	193.50	54.28	21.67
175.25	53.86	21.24	184.50	54.07	21.47	193.75	54.29	21.68
175.50	53.86	21.24	184.75	54.07	21.48	194.00	54.29	21.68
175.75	53.87	21.25	185.00	54.08	21.48	194.25	54.30	21.69
176.00	53.87	21.26	185.25	54.09	21.49	194.50	54.31	21.69
176.25	53.88	21.26	185.50	54.09	21.49	194.75	54.31	21.70
176.50	53.89	21.27	185.75	54.10	21.50	195.00	54.32	21.70
176.75	53.89	21.28	186.00	54.10	21.51	195.25	54.32	21.71

Measurement Results

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1. Antenna Factor & Gain (cont.)

Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)	Frequency (GHz)	AF [dB(1/m)]	Gain (dBi)
195.50	54.33	21.71	203.75	54.53	21.87	212.00	54.73	22.01
195.75	54.34	21.72	204.00	54.54	21.88	212.25	54.74	22.02
196.00	54.34	21.72	204.25	54.54	21.88	212.50	54.75	22.02
196.25	54.35	21.73	204.50	54.55	21.89	212.75	54.75	22.03
196.50	54.35	21.73	204.75	54.55	21.89	213.00	54.76	22.03
196.75	54.36	21.74	205.00	54.56	21.89	213.25	54.76	22.03
197.00	54.37	21.74	205.25	54.57	21.90	213.50	54.77	22.04
197.25	54.37	21.75	205.50	54.57	21.90	213.75	54.78	22.04
197.50	54.38	21.75	205.75	54.58	21.91	214.00	54.78	22.05
197.75	54.38	21.76	206.00	54.58	21.91	214.25	54.79	22.05
198.00	54.39	21.76	206.25	54.59	21.92	214.50	54.80	22.05
198.25	54.40	21.77	206.50	54.60	21.92	214.75	54.80	22.06
198.50	54.40	21.77	206.75	54.60	21.93	215.00	54.81	22.06
198.75	54.41	21.78	207.00	54.61	21.93	215.25	54.81	22.06
199.00	54.41	21.78	207.25	54.62	21.93	215.50	54.82	22.07
199.25	54.42	21.79	207.50	54.62	21.94	215.75	54.83	22.07
199.50	54.43	21.79	207.75	54.63	21.94	216.00	54.83	22.08
199.75	54.43	21.80	208.00	54.63	21.95	216.25	54.84	22.08
200.00	54.44	21.80	208.25	54.64	21.95	216.50	54.84	22.08
200.25	54.44	21.81	208.50	54.65	21.96	216.75	54.85	22.09
200.50	54.45	21.81	208.75	54.65	21.96	217.00	54.86	22.09
200.75	54.46	21.82	209.00	54.66	21.96	217.25	54.86	22.10
201.00	54.46	21.82	209.25	54.66	21.97	217.50	54.87	22.10
201.25	54.47	21.83	209.50	54.67	21.97	217.75	54.88	22.10
201.50	54.47	21.83	209.75	54.68	21.98	218.00	54.88	22.11
201.75	54.48	21.84	210.00	54.68	21.98	218.25	54.89	22.11
202.00	54.49	21.84	210.25	54.69	21.99	218.50	54.89	22.11
202.25	54.49	21.84	210.50	54.70	21.99	218.75	54.90	22.12
202.50	54.50	21.85	210.75	54.70	21.99	219.00	54.91	22.12
202.75	54.51	21.85	211.00	54.71	22.00	219.25	54.91	22.12
203.00	54.51	21.86	211.25	54.71	22.00	219.50	54.92	22.13
203.25	54.52	21.86	211.50	54.72	22.01	219.75	54.93	22.13
203.50	54.52	21.87	211.75	54.73	22.01	220.00	54.93	22.14

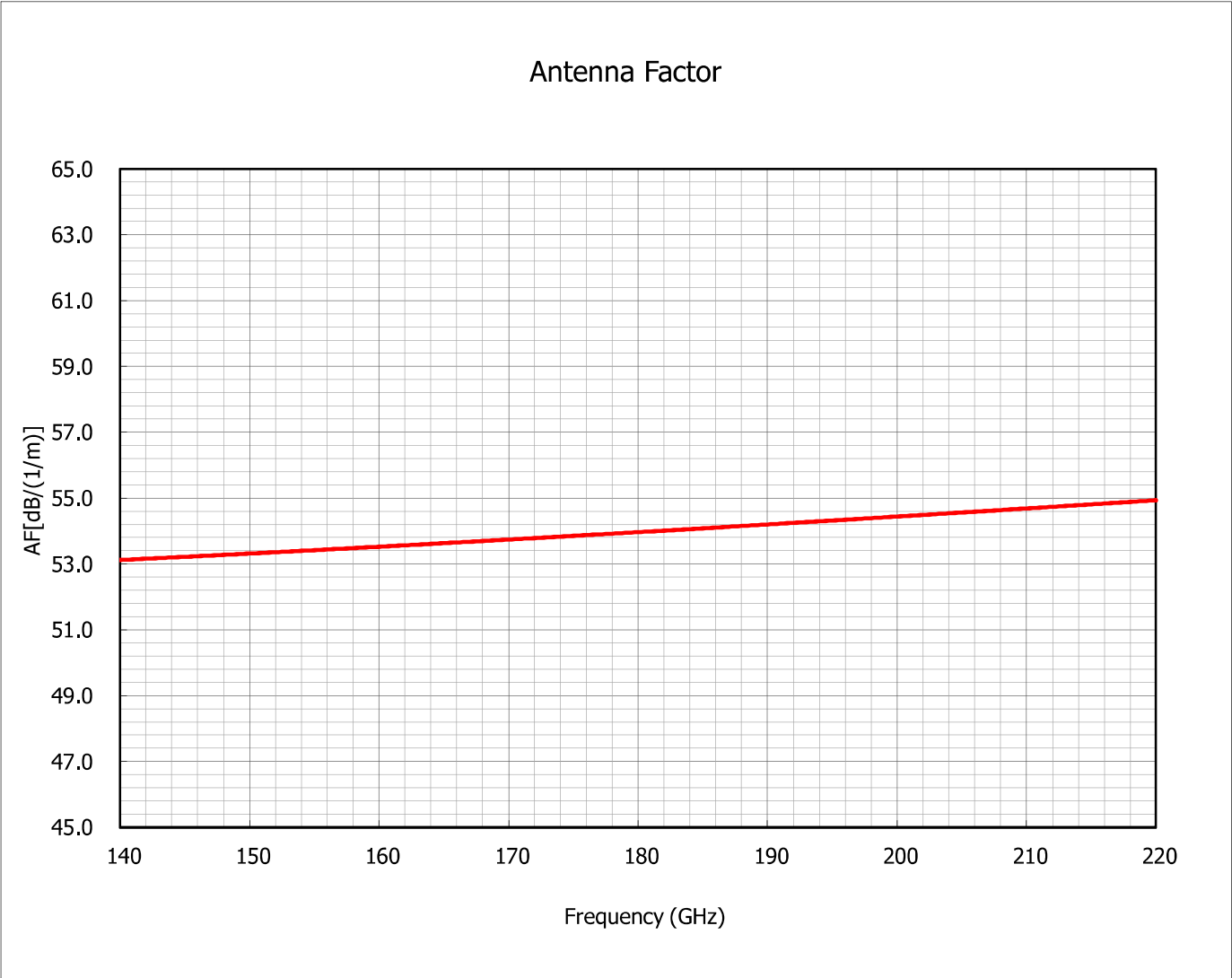
※ The measurement uncertainty of this result is 1.3 dB (Confidence level about 95 %, $k = 2$)

Measurement Results

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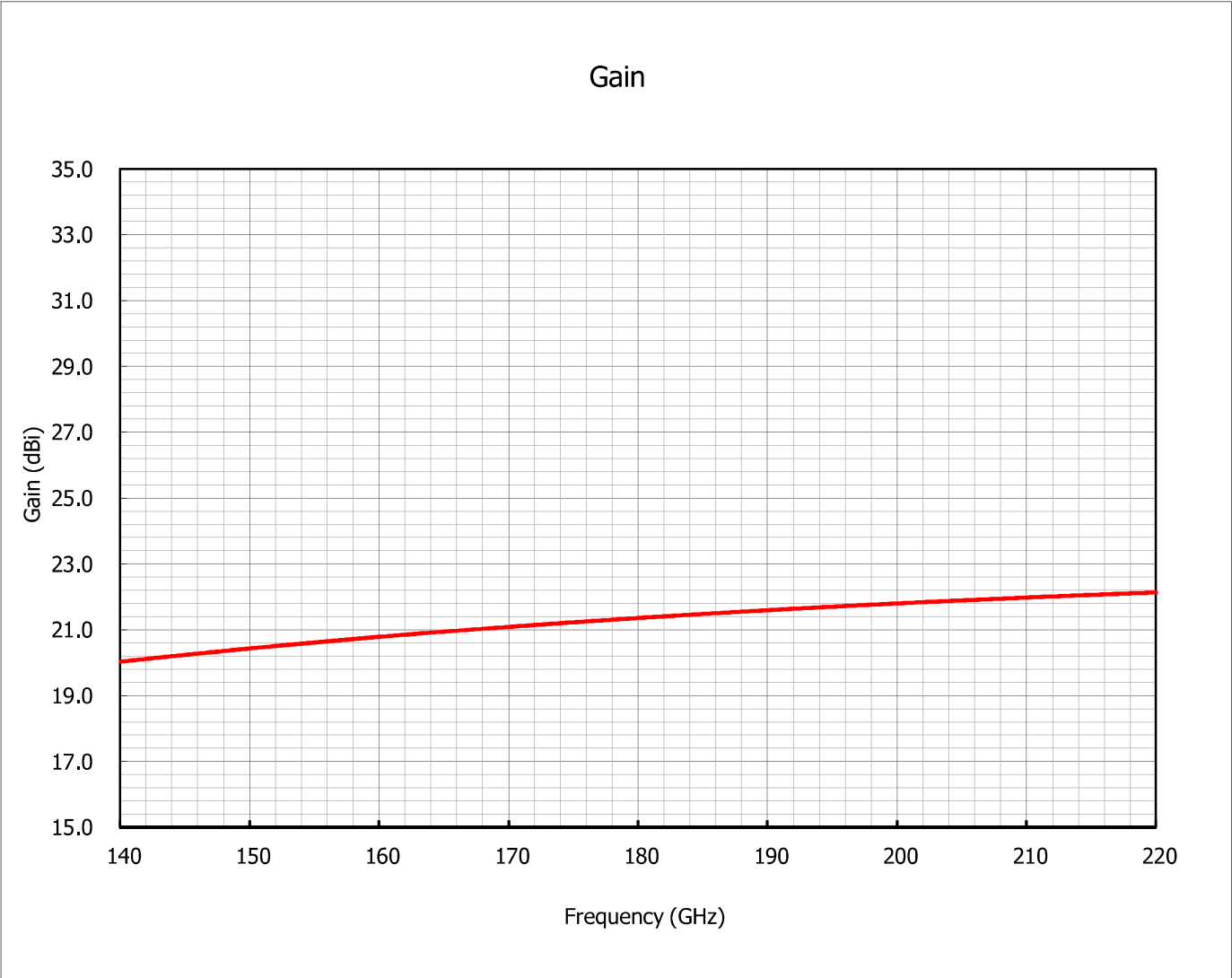
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2. Antenna Factor Curve



Measurement Results

3. Gain Curve



* The above results are simulation results based on the measurement results in the report below.
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END.