

보고서번호(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.

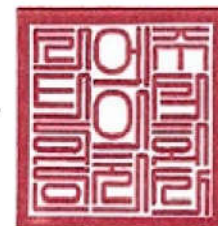
The measurement results shown in this report refer only to the sample(s) measured unless otherwise stated.

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.

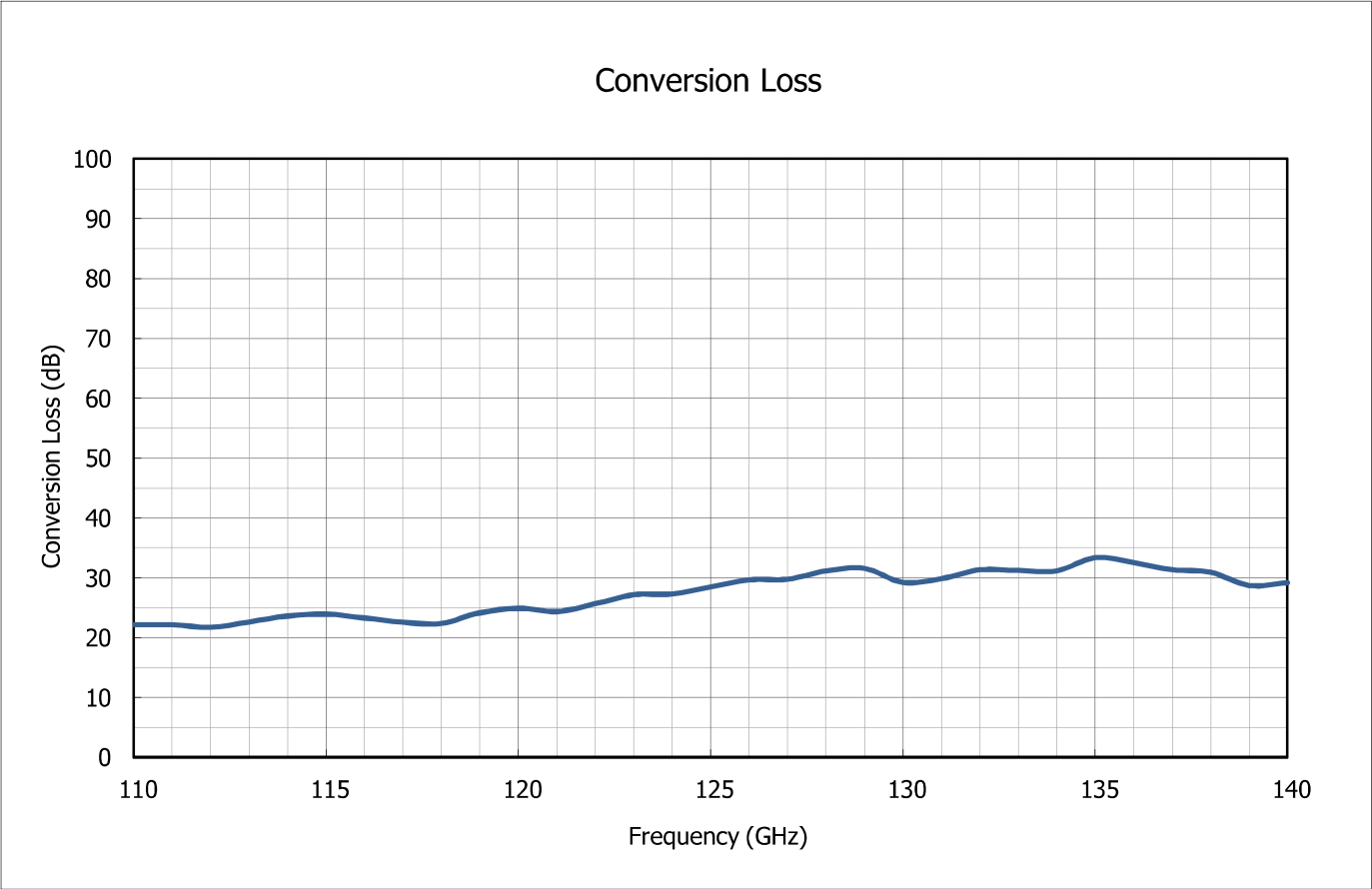
(※) 측정결과는 측정기의 정밀정확도에 영향을 미치는 요소(과부하, 온도, 습도 등)의 급격한 변화가 발생한 경우에는 무효가 됩니다. If any significant instability
or other adverse factor(overload, temperature, humidity etc.) manifests itself before, during or after calibration, and is likely to affect the validity of the calibration.

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

*NCR(No Calibration Requirement)

Measurement Results

※ 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.

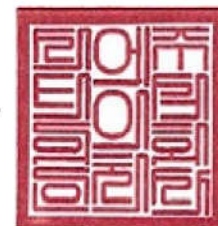
The measurement results shown in this report refer only to the sample(s) measured unless otherwise stated.

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.

(※) 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)

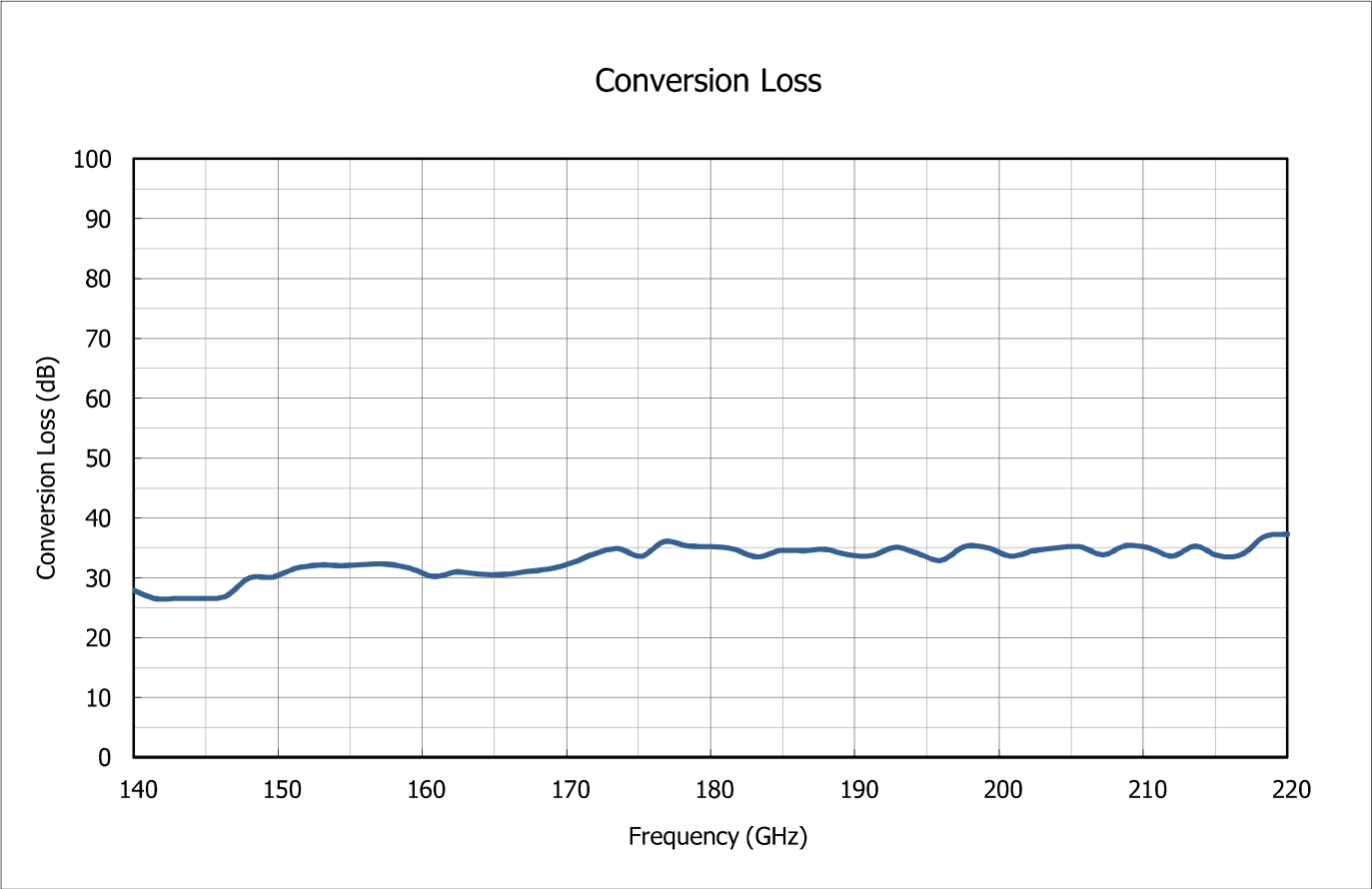
*NCR(No Calibration Requirement)

Measurement Results

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

페이지(page) : 2 of 3

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

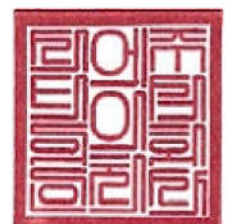
(Confidence level about 95 %, k = 2)

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. 27

Accredited 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

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)
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 %, $k = 2$)

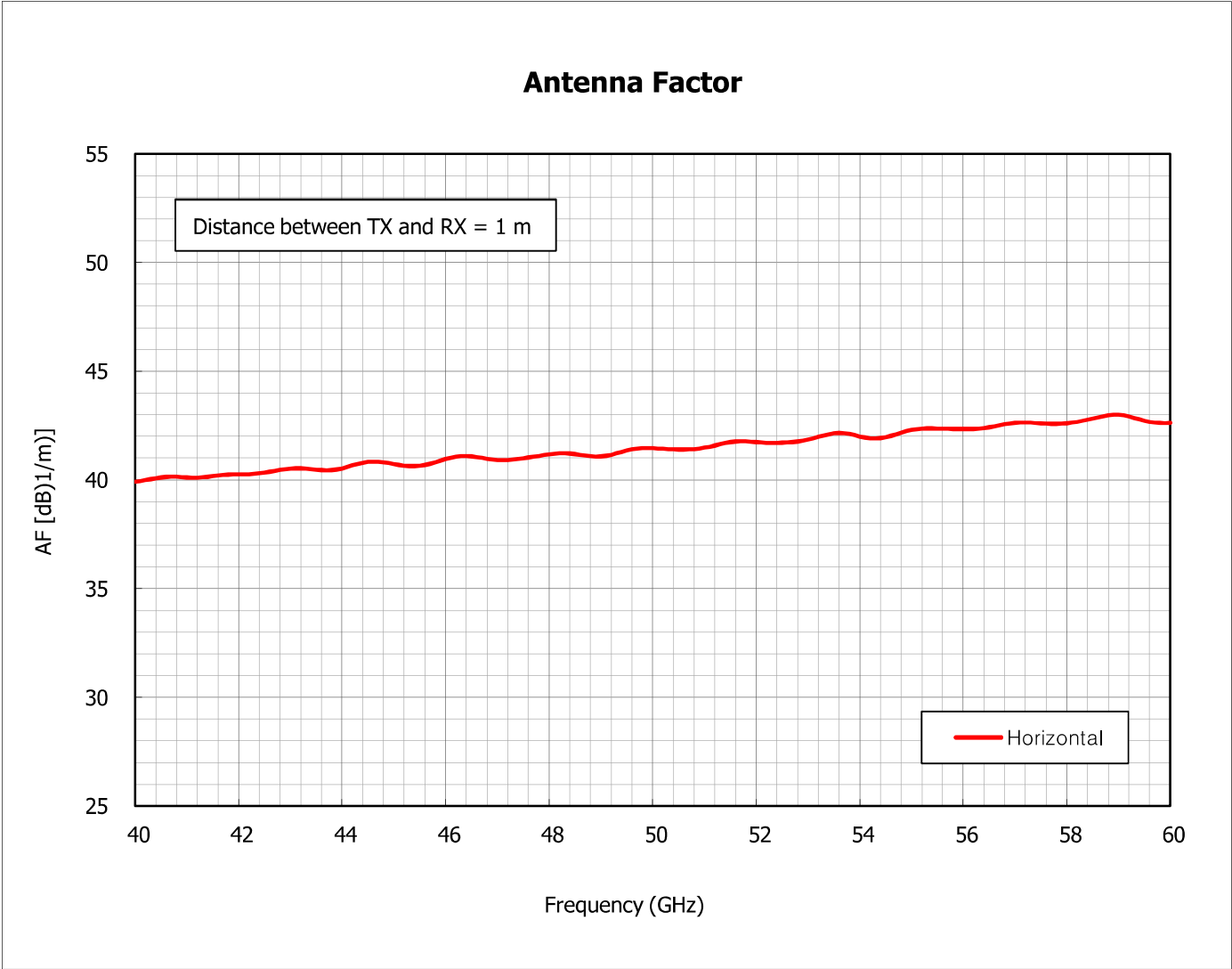
Calibration Results



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

page : 4 of 5

2. Antenna Factor Curve



Calibration Results

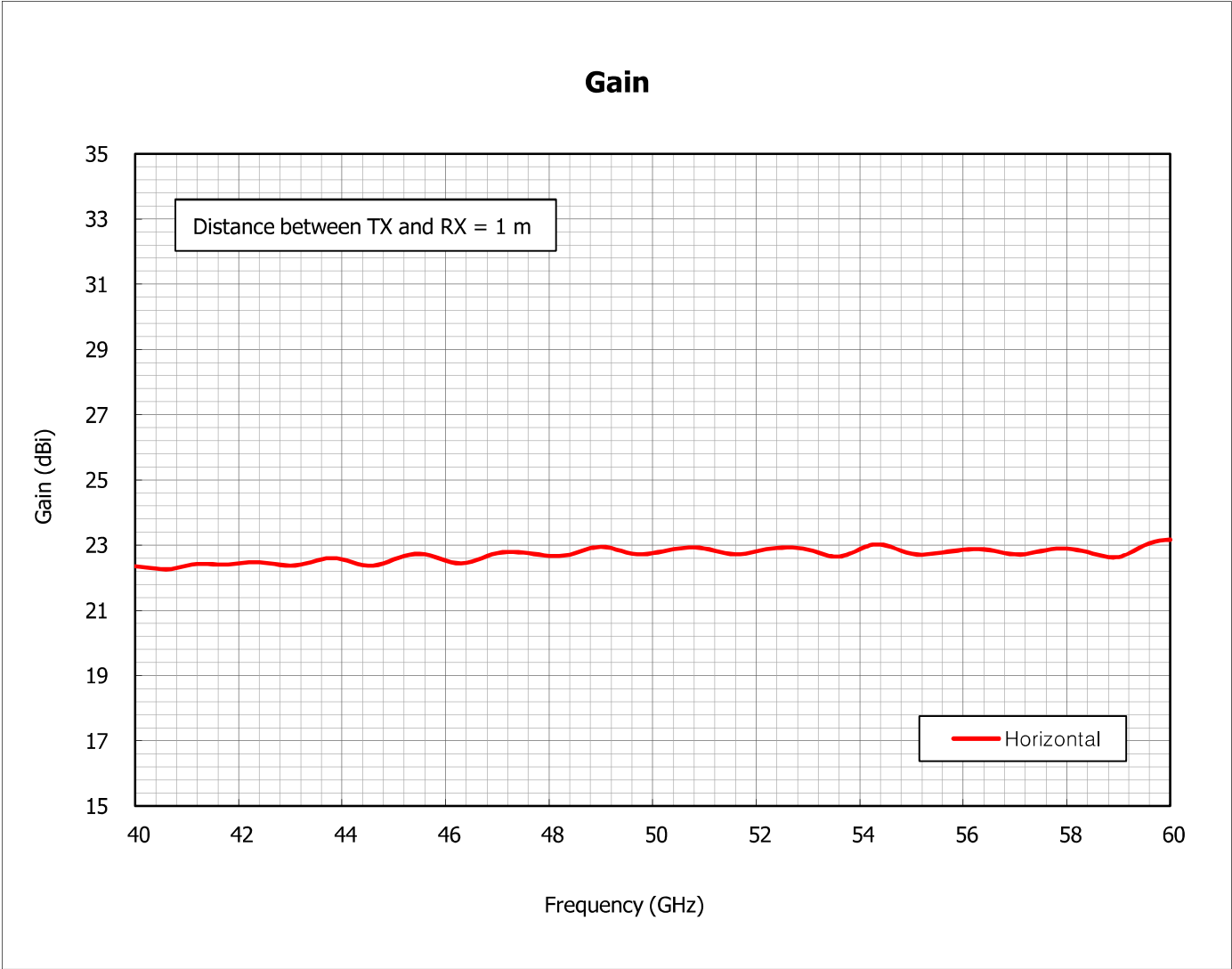


Certificate No : IC-2024-057639

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 $\pm$ 0.1) °C - Humidity : (46 $\pm$ 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-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

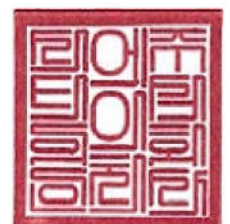
(Confidence level about 95 %, $k = 2$)

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. 27

Accredited 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

page : 4 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)
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 %, $k = 2$)

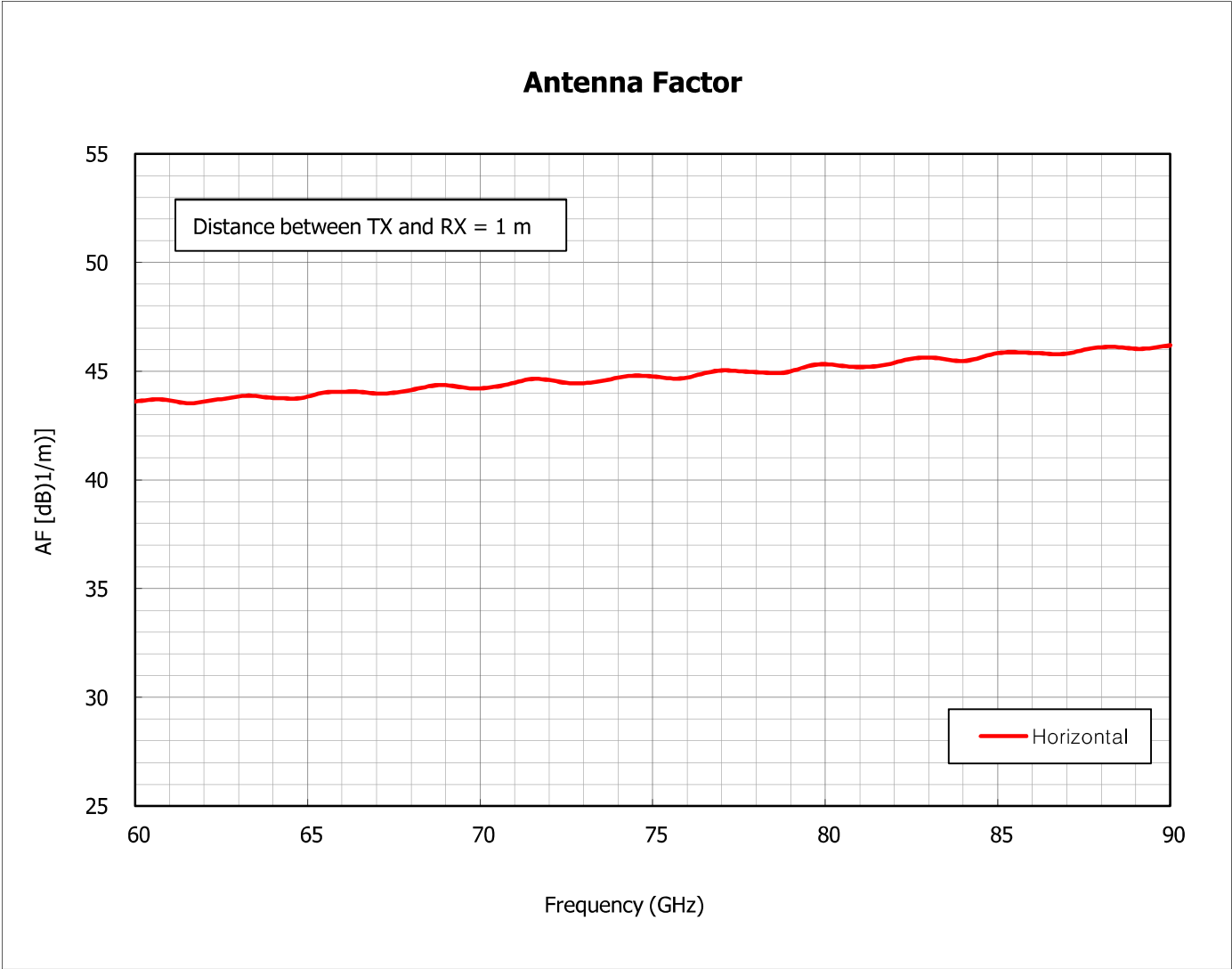
Calibration Results



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

page : 5 of 6

2. Antenna Factor Curve



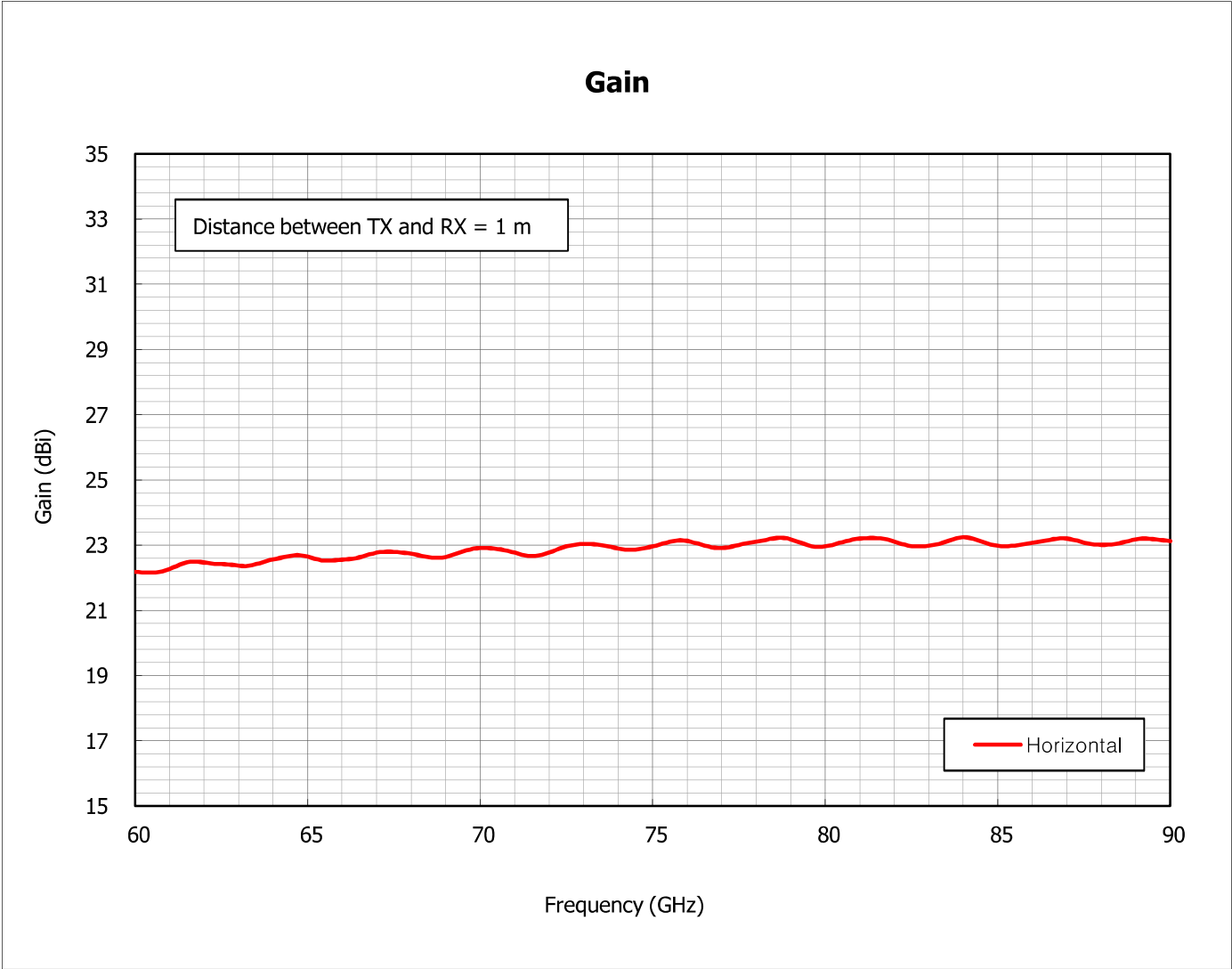
Calibration Results



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

page : 6 of 6

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 $\pm$ 0.3) °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-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

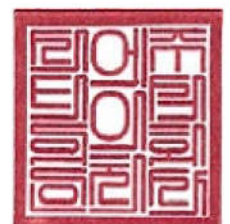
(Confidence level about 95 %, $k = 2$)

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. 27

Accredited 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 %, $k = 2$)

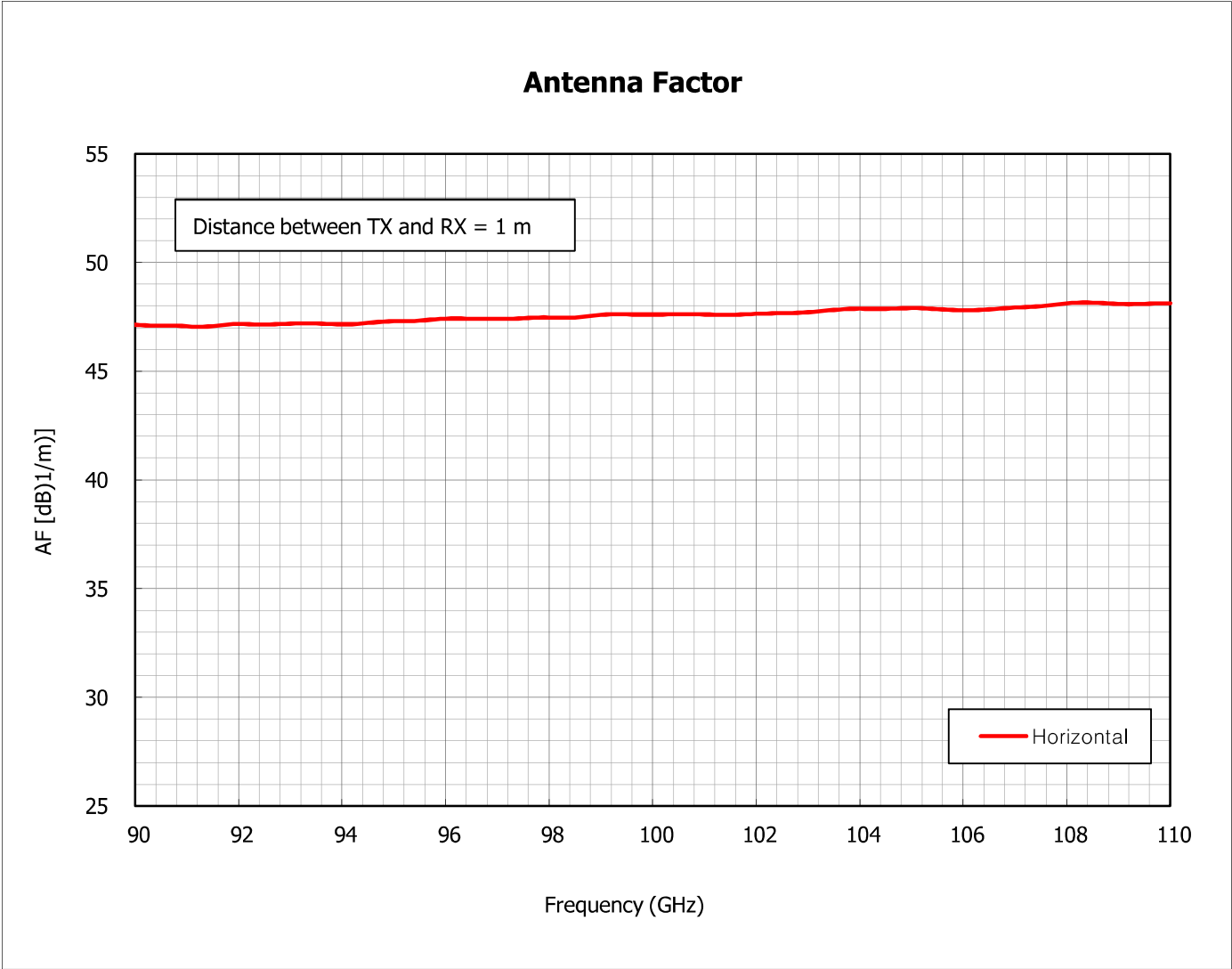
Calibration Results



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

page : 4 of 5

2. Antenna Factor Curve

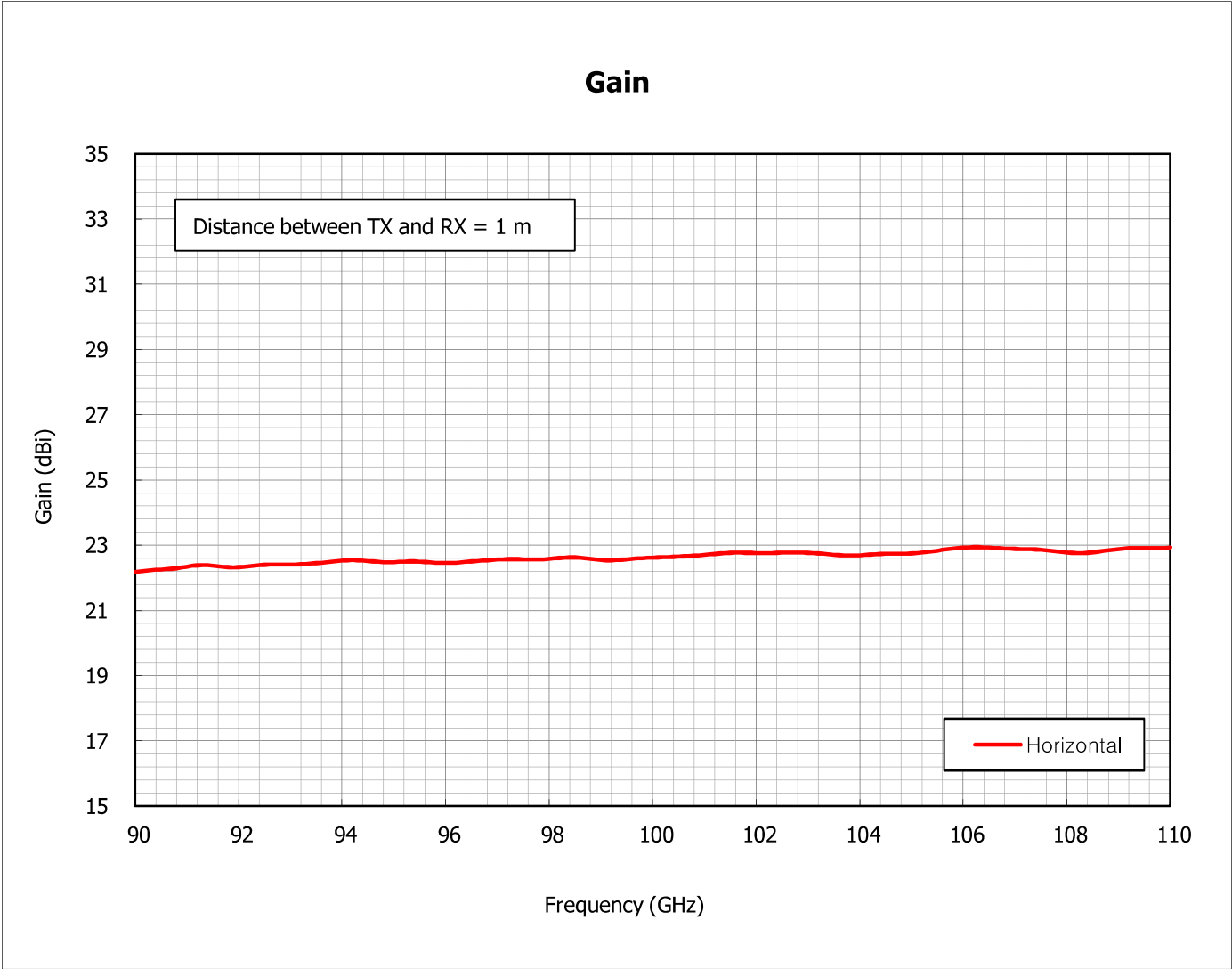


Calibration Results



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.

(※) 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

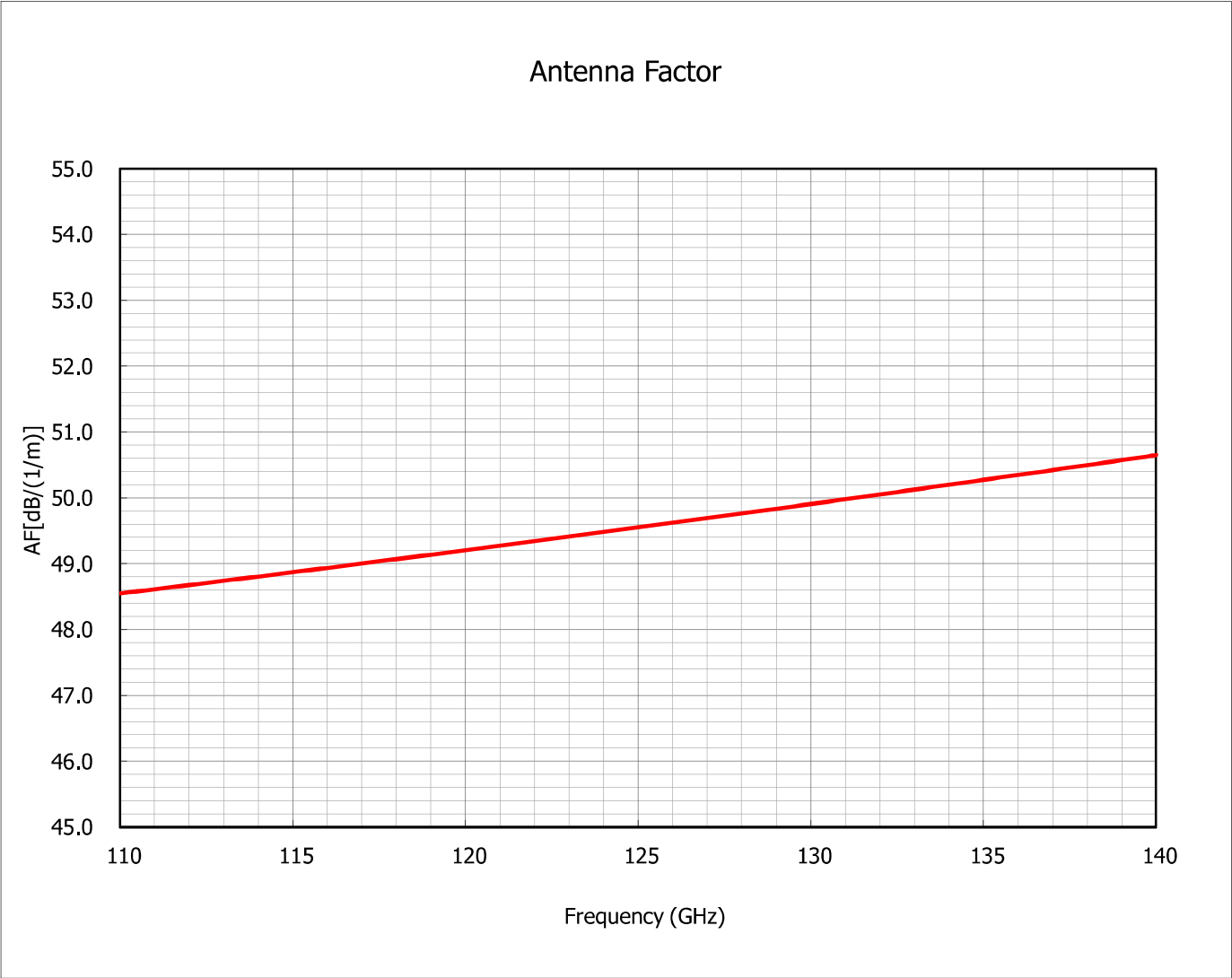
1. Antenna Factor & Gain (cont.)

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 %, $k = 2$)

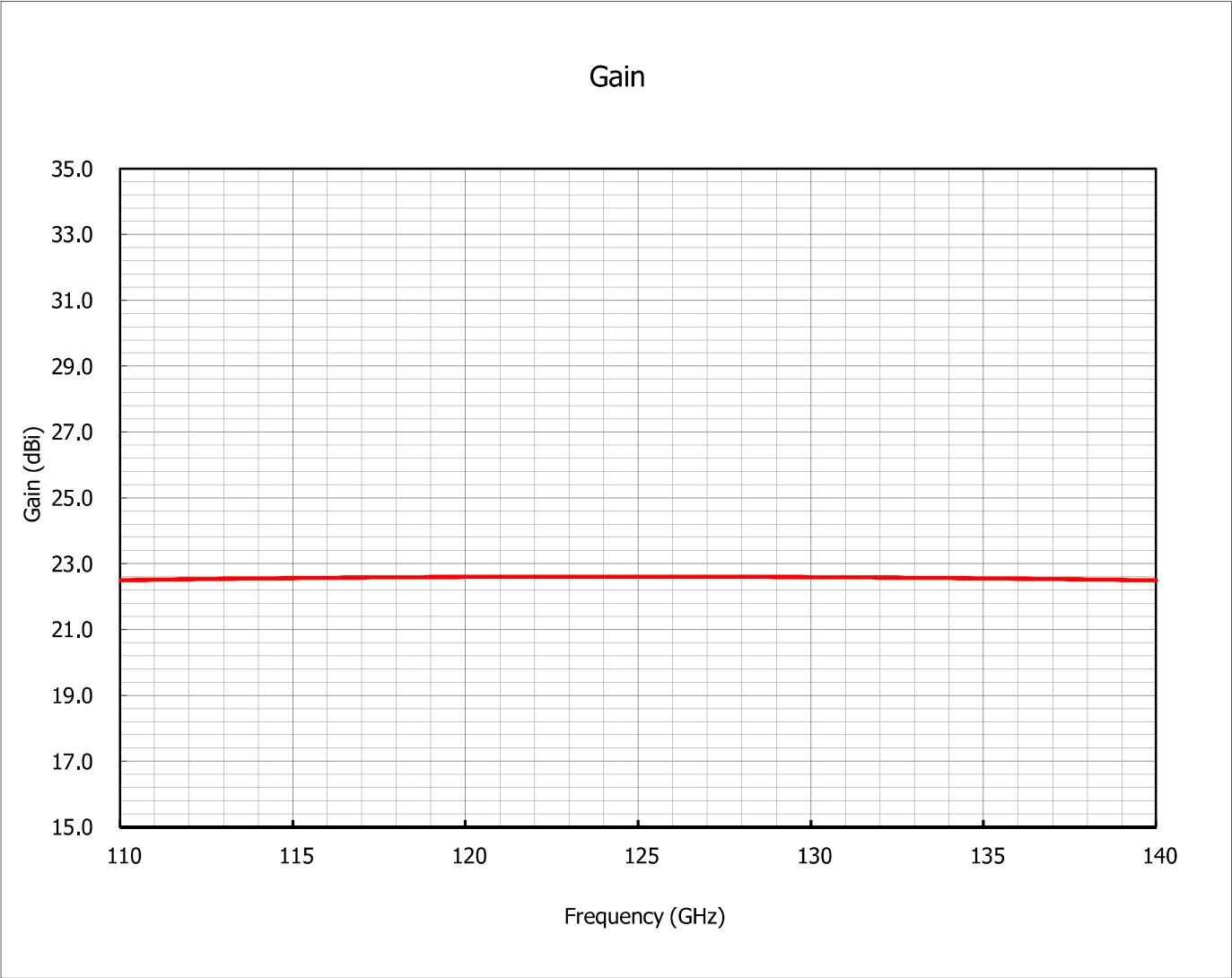
Measurement Results

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

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

페이지(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)
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

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

페이지(page) : 4 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)
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

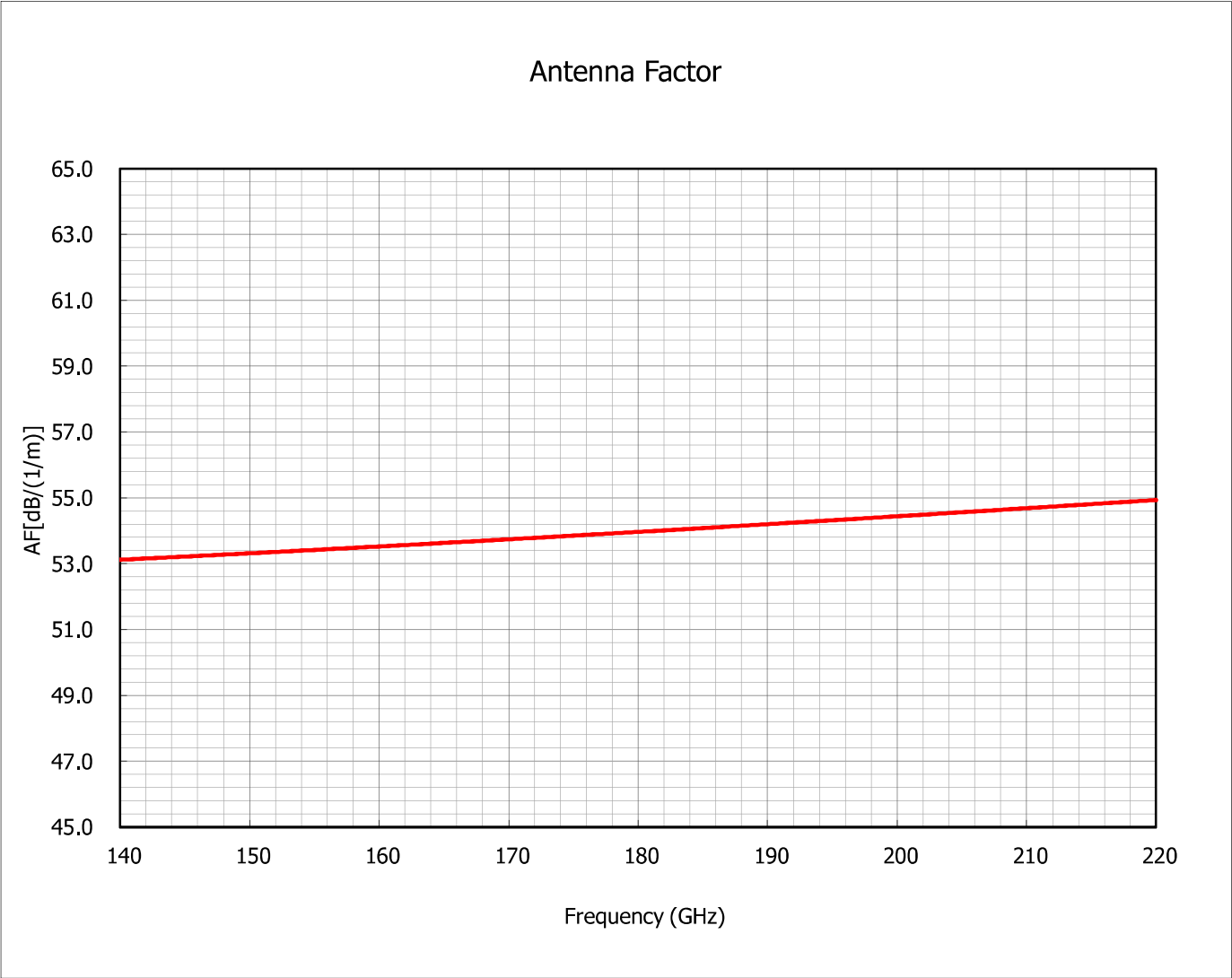
※ The measurement uncertainty of this result is 1.3 dB (Confidence level about 95 %, $k = 2$)

Measurement Results

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

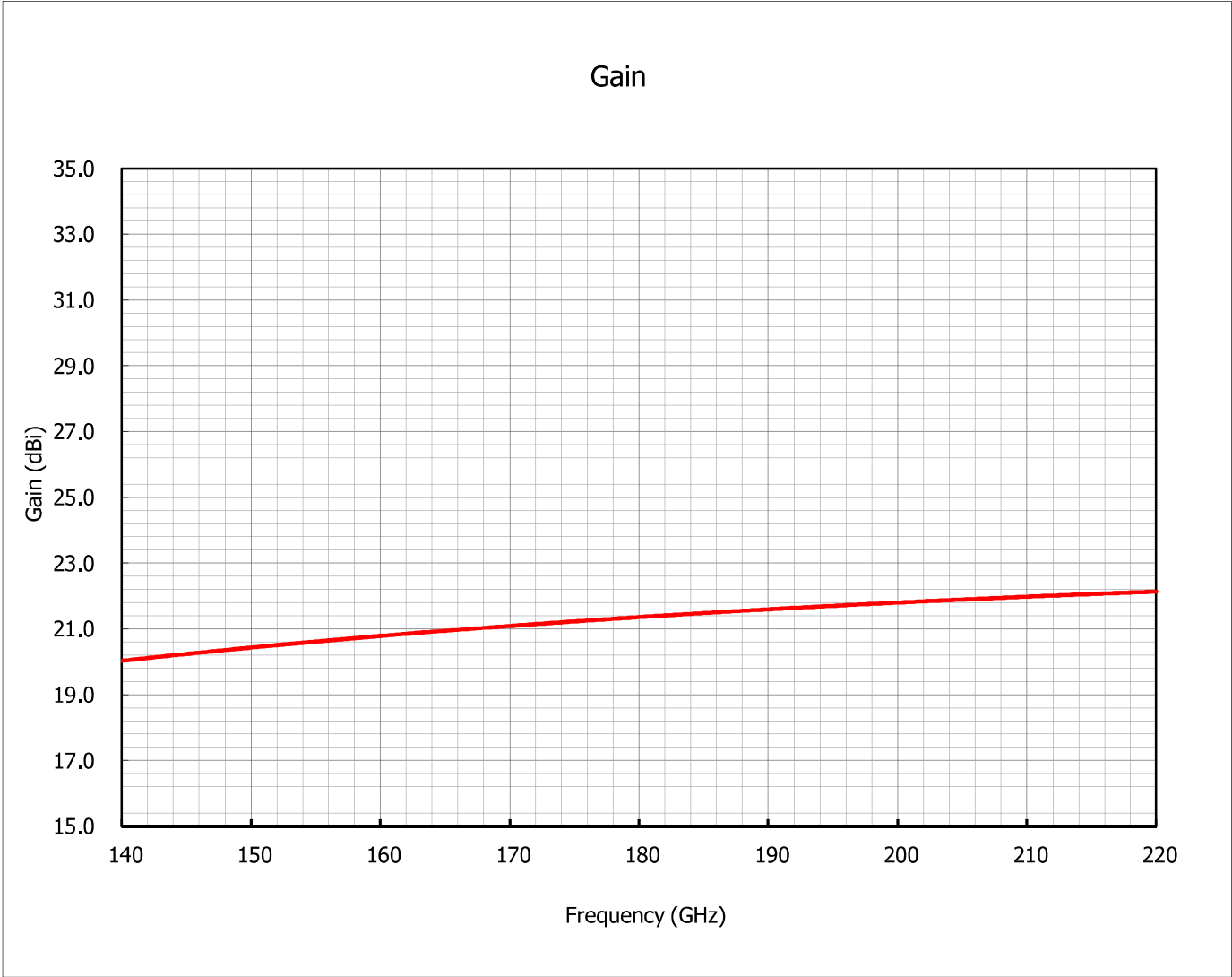
페이지(page) : 5 of 6

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-2024-067871

END.



Appendix C. Test Lab Accreditation Scope

FEDERAL COMMUNICATIONS COMMISSION

**Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046**

January 25, 2022

National Communications Commission
No. 143, Yan-Ping S. Rd,
Taipei, 100
Taiwan

Attention: Jhih-Chang Shieh

Re: Accreditation of Sporton International Inc. Wensan Laboratory
Designation Number: TW3786
Test Firm Registration #: 654629

Dear Sir or Madam:

We have been notified by National Communications Commission that Sporton International Inc. Wensan Laboratory has been accredited as a testing laboratory.

At this time Sporton International Inc. Wensan Laboratory is hereby recognized to perform compliance testing on equipment subject to Declaration Of Conformity (DOC) and Certification of the Commission's Rules.

This recognition will expire upon expiration of the accreditation or notification of withdrawal of recognition.

Any questions about this recognition should be submitted as an inquiry to the FCC Knowledge Database at www.fcc.gov/kdb.

Sincerely,

Jihad Hermes
Electronics Engineer

Office of Engineering and Technology

[FCC](#) > [FCC E-filing](#) > [EAS](#) > Generic Search - Accredited Test Firm Scope List

[FCC Site Map](#)

[OET Home Page](#)

Filing Options

[Grantee Registration](#)

[Modify Grantee Information](#)

[Reply to Grantee Name
Change Correspondence](#)

[Test Firm Accrediting Body
Login](#)

[Return to 159 / Pay for a
Grantee registration](#)

Reports

[Pending Application Status](#)

[Authorization Search](#)

[Grantee Search](#)

[Pending Grantee Search](#)

[TCB Search](#)

[Test Firms](#)

[Test Firm Accrediting Bodies](#)

[Equipment Class/Rule Part List](#)

Miscellaneous

[Get FRN](#)

[Knowledge Database](#)

[Hearing Aid Compatibility
Status Reporting](#)

[Measurement Procedures](#)

OET Accredited Test firm scope List

Test Firm: Sporton International Inc. Wensan Laboratory

<u>Scope</u>	<u>FCC Rule Parts</u>	<u>Maximum Assessed Frequency in Mhz</u>	<u>Status</u>	<u>Expiration Date</u>	<u>Recognition Date</u>
Intentional Radiators	FCC Part 15 Subpart C	280000.00	Approved	11-10-2026	01-25-2022
U-NII without DFS Intentional Radiators	FCC Part 15, Subpart E	40000.00	Approved	11-10-2026	01-25-2022
U-NII with DFS Intentional Radiators	FCC Part 15, Subpart E	40000.00	Approved	11-10-2026	01-25-2022
UWB Intentional Radiators	FCC Part 15, Subpart F	280000.00	Approved	11-10-2026	01-25-2022
Commercial Mobile Services	Part 22 (cellular), Part 24, Part 25 (below 3 GHz), Part 27	40000.00	Approved	11-10-2026	01-25-2022
Citizens Broadband Radio Services	Part 96	40000.00	Approved	11-10-2026	01-25-2022
Microwave and Millimeter Bands Radio Services	Part 25 (above 3 GHz), Part 30, Part 74, Part 90 (above 3 GHz), Part 95 (above 3 GHz), Part 97 (above 3 GHz) Part 101	280000.00	Approved	11-10-2026	01-25-2022
RF Exposure	RF Exposure	6000.00	Approved	11-10-2026	01-25-2022
Hearing Aid Compatibility	Part 20	40000.00	Approved	11-10-2026	01-25-2022
Signal Boosters	Part 20, Part 90.219	40000.00	Approved	11-10-2026	09-27-2023