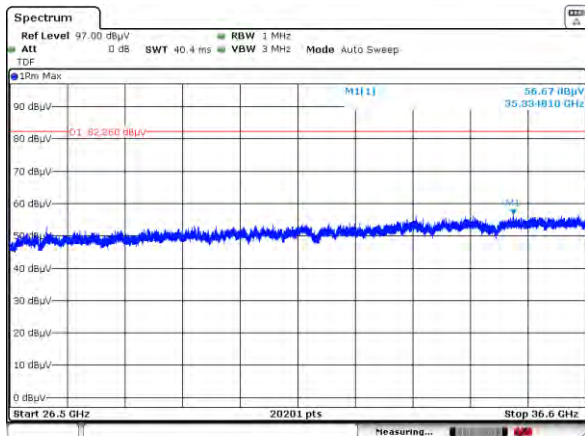


n260 SISO Dual [26.5 GHz ~ 36.6 GHz]

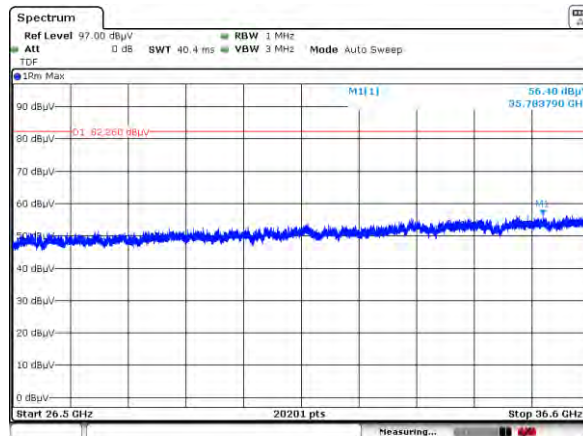
50 MHz 1 CC K patch: module 0

Low Channel Pol. H

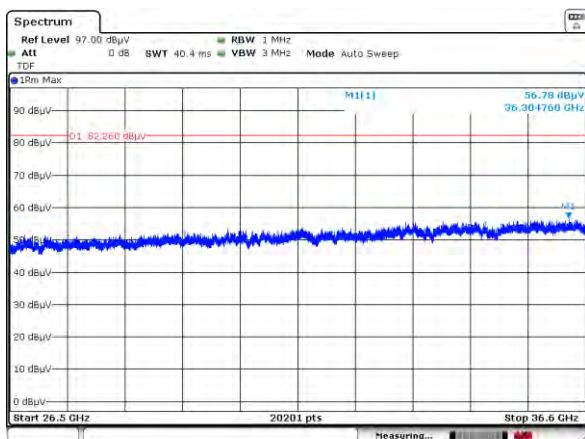


50 MHz 1 CC L patch: module 1

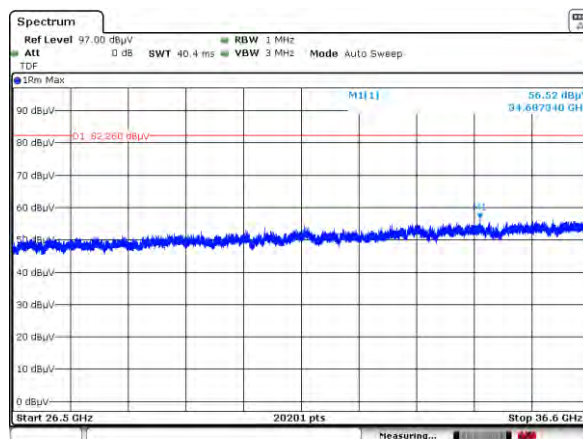
Low Channel Pol. H



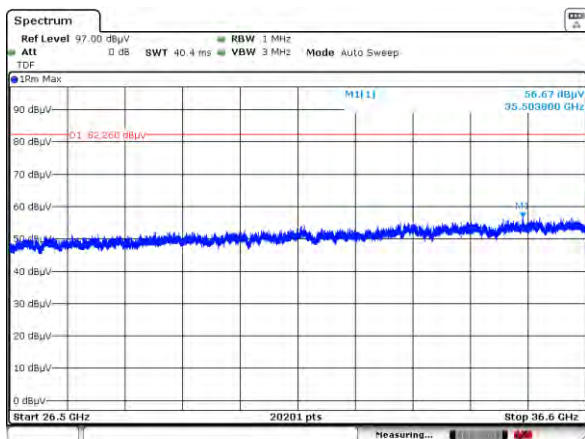
Middle Channel Pol. V



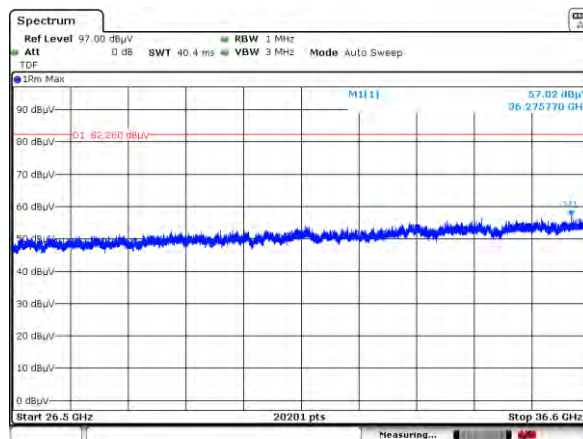
Middle Channel Pol. V



High Channel Pol. H

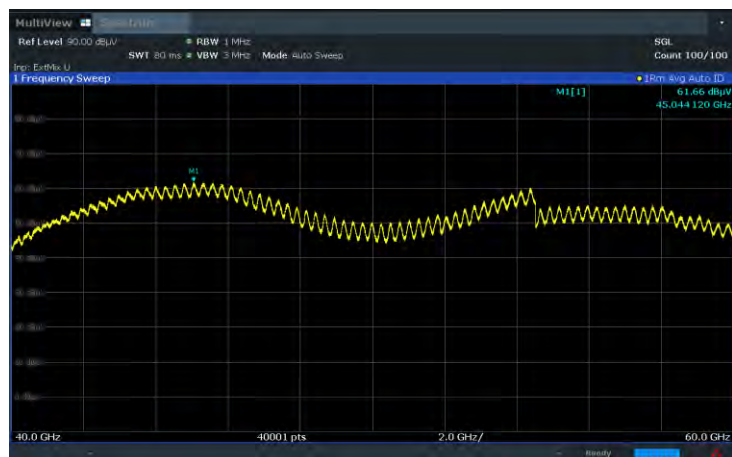


High Channel Pol. H

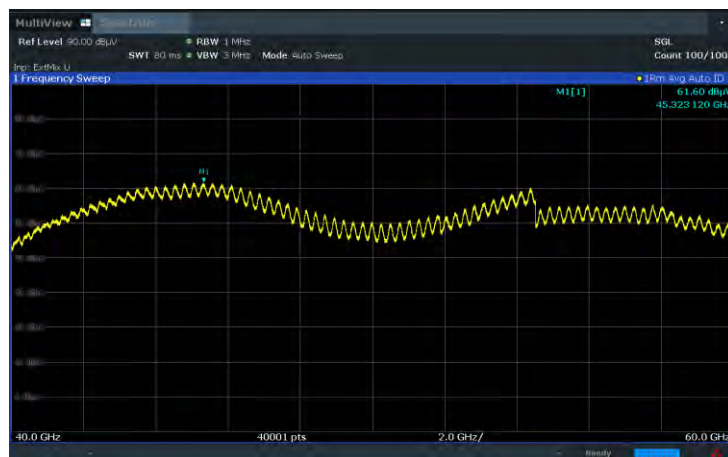


n260 SISO Dual [40 GHz ~ 60 GHz]

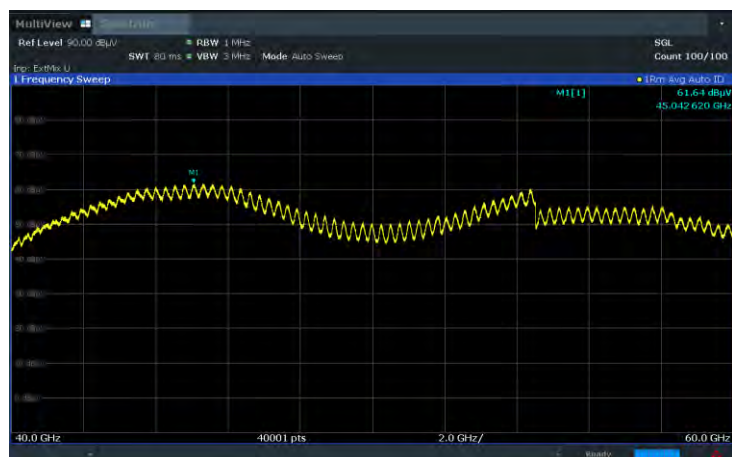
50 MHz 1 CC K patch: module 0
Low Channel Pol. H



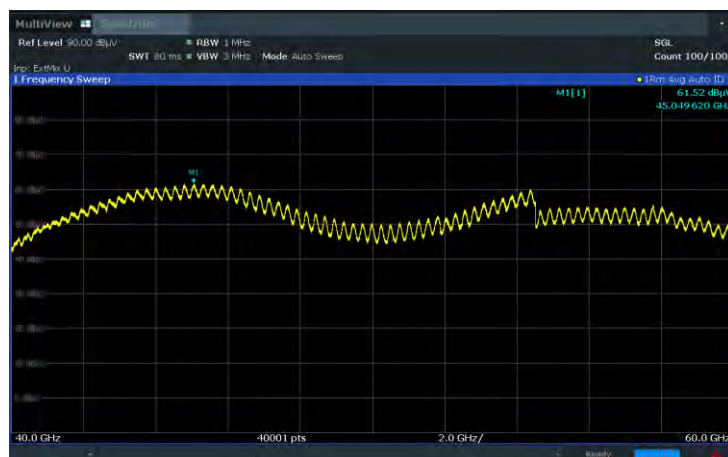
50 MHz 1 CC L patch: module 1
Low Channel Pol. H



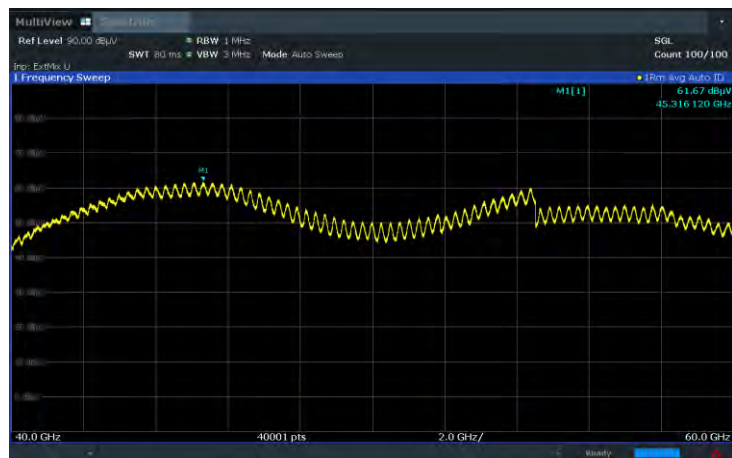
Middle Channel Pol. V



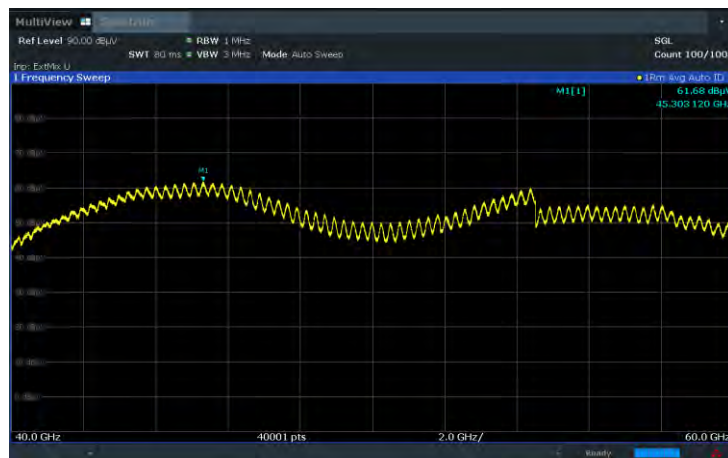
Middle Channel Pol. V



High Channel Pol. H

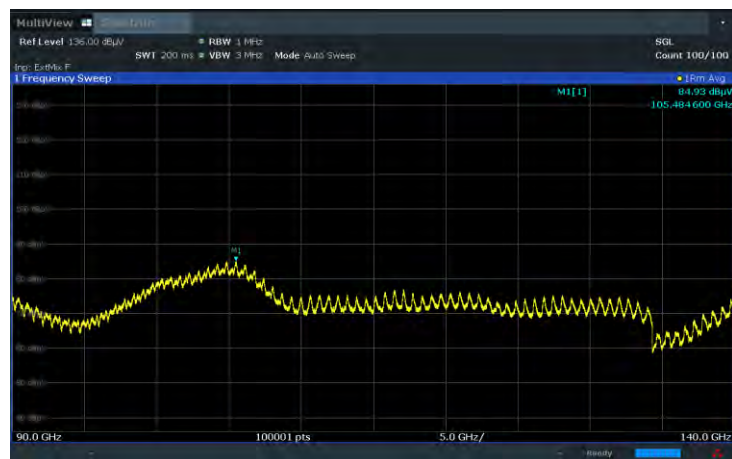


High Channel Pol. H

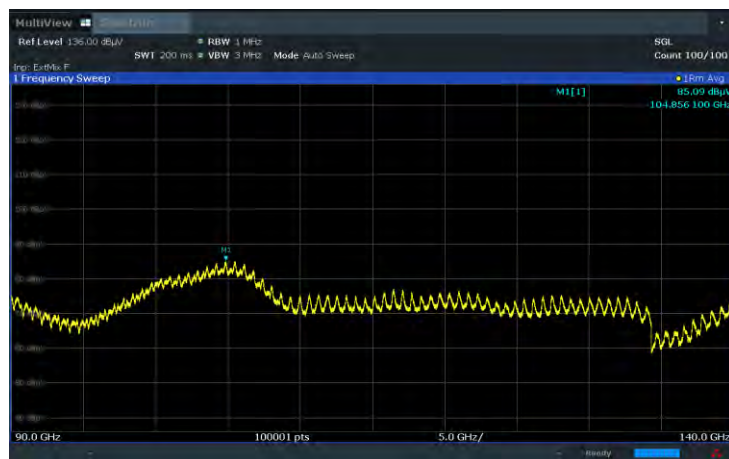


n260 SISO Dual [90 GHz ~ 140 GHz]

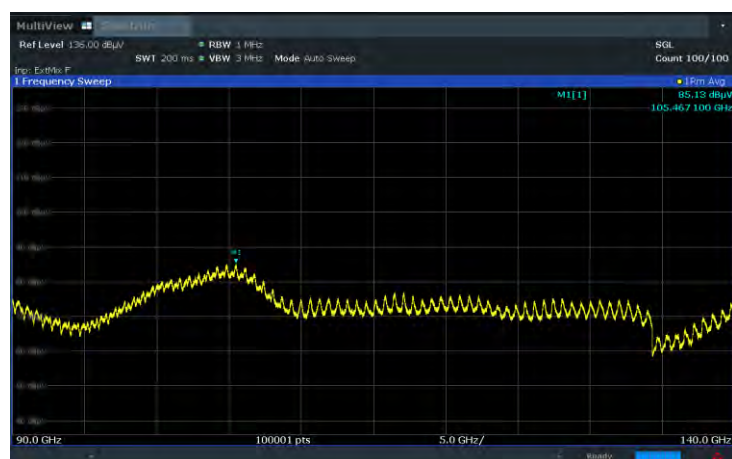
50 MHz 1 CC K patch: module 0
Low Channel Pol. H



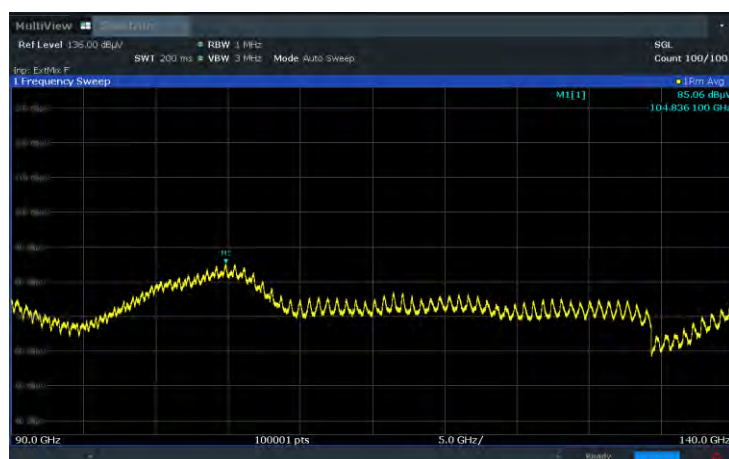
50 MHz 1 CC L patch: module 1
Low Channel Pol. H



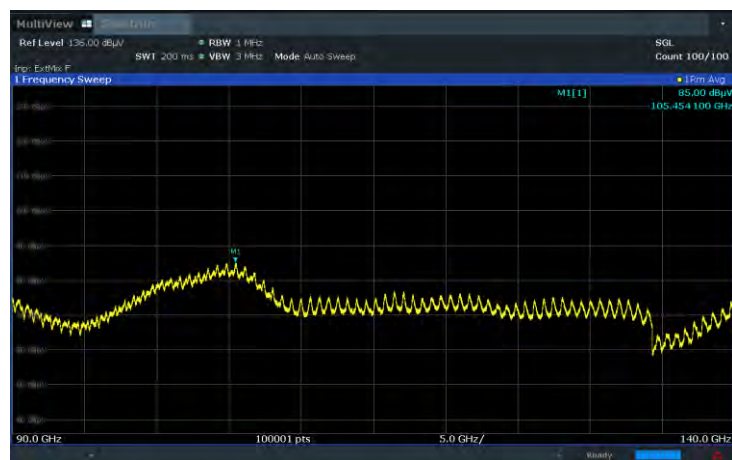
Middle Channel Pol. V



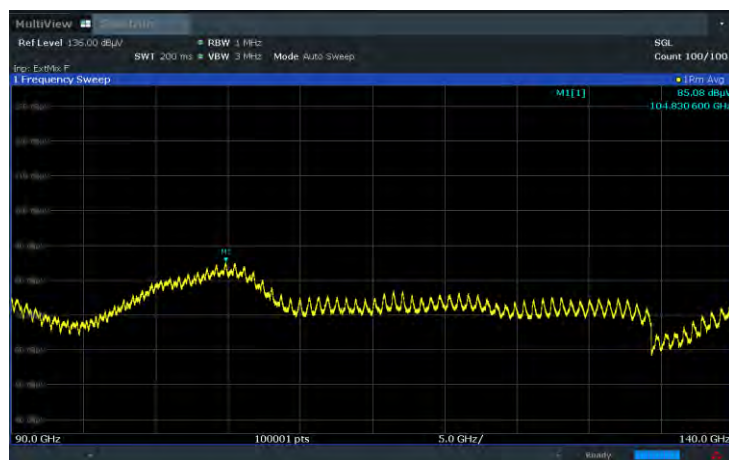
Middle Channel Pol. V



High Channel Pol. H



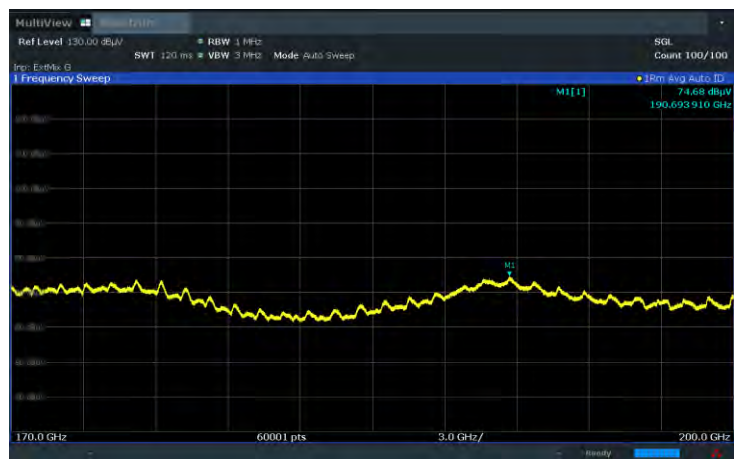
High Channel Pol. H



n260 SISO Dual [170 GHz ~ 200 GHz]

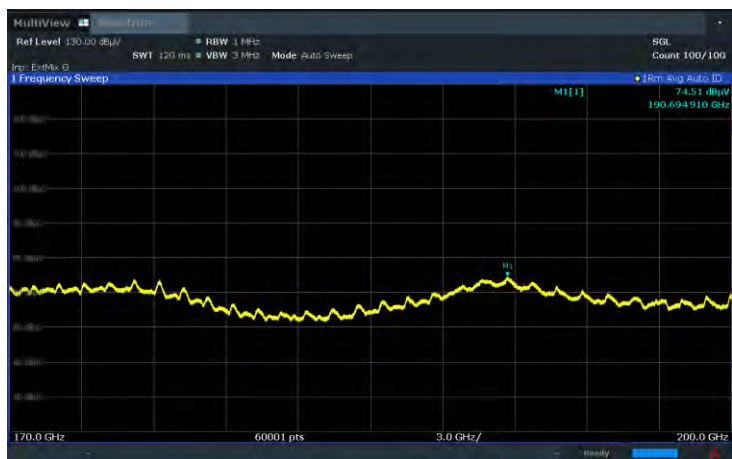
50 MHz 1 CC K patch: module 0

Low Channel Pol. H

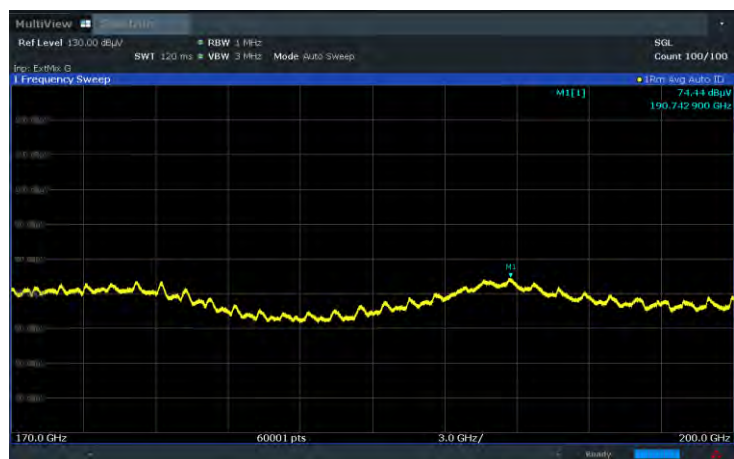


50 MHz 1 CC L patch: module 1

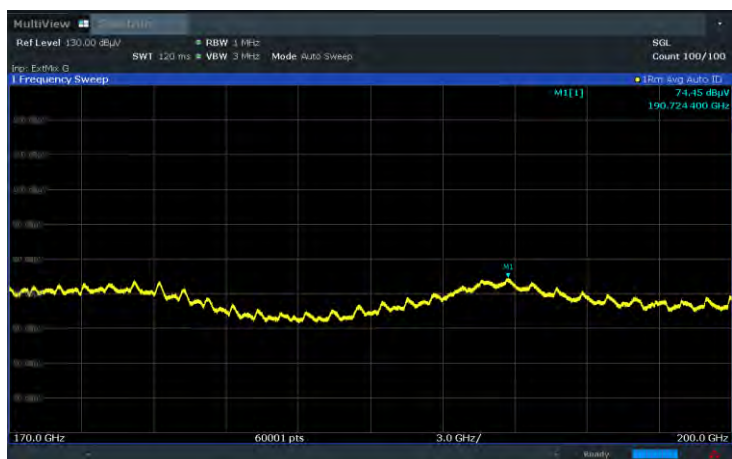
Low Channel Pol. H



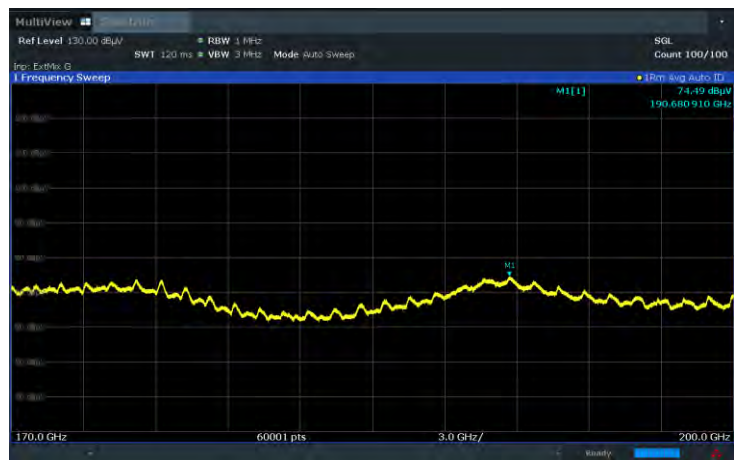
Middle Channel Pol. V



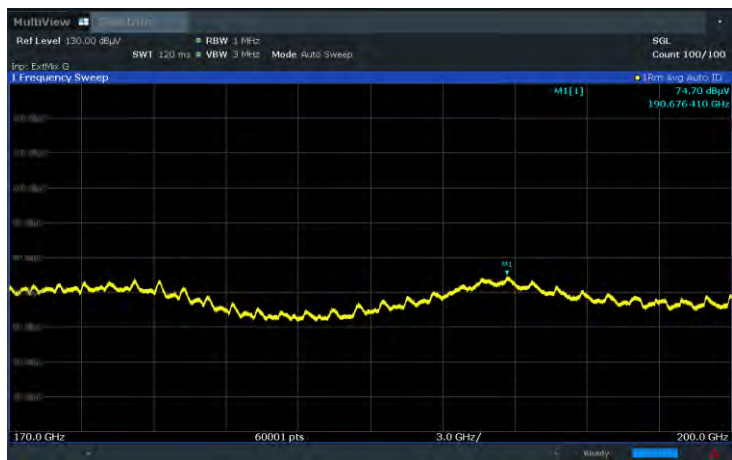
Middle Channel Pol. V



High Channel Pol. H



High Channel Pol. H



5.5. FREQUENCY STABILITY

FCC Rules

Test Requirements:

§ 2.1055 Measurements required: Frequency stability.

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

- (1) From -30° to $+50^{\circ}$ centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

Test Procedures:

The measurement is performed in accordance with Section 5.6.4 and 5.6.5 of ANSI C63.26.

5.6.4 Frequency stability over variations in temperature

a) Supply the EUT with a nominal 60 Hz ac voltage, dc voltage, or install a new or fully charged battery in the EUT.

b) If possible a dummy load should be connected to the EUT because an antenna near the metallic walls of an environmental test chamber could affect the output frequency of the EUT. If the EUT is equipped with a permanently attached, adjustable-length antenna, the EUT should be placed in the center of the chamber with the antenna adjusted to the shortest length possible.

c) Turn on the EUT, and tune it to the center frequency of the operating band.

d) Couple the transmitter output to the measuring instrument through a suitable attenuator and coaxial cable. If connection to the EUT output is not possible, make the measurement by connecting an antenna to the measuring instrument with a suitable length of coaxial cable and placing the measuring antenna near the EUT (e.g., 15 cm away).

NOTE—An instrument that has an adequate level of accuracy as specified by the procuring or regulatory authority is the recommended measuring instrument.

e) Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument, but is strong enough to allow measurement of the operating or fundamental frequency of the EUT). Adjust the detector bandwidth and span settings to achieve a resolution capable of accurate frequency measurements over the applicable frequency stability limits.

f) Turn the EUT off, and place it inside the environmental temperature chamber. For devices that have oscillator heaters, energize only the heater circuit.

g) Set the temperature control on the chamber to the highest temperature specified in the regulatory requirements for the type of device, and allow the oscillator heater and the chamber temperature to stabilize. Unless otherwise instructed by the regulatory authority, this temperature should be 50°C .

h) While maintaining a constant temperature inside the environmental chamber, turn on the EUT and allow sufficient time for the EUT temperature to stabilize.

- i) Measure the frequency.
- j) Switch off the EUT, but do not switch off the oscillator heater.
- k) Lower the chamber temperature to the next level that is required by the standard and allow the temperature inside the chamber to stabilize. Unless otherwise instructed by the regulators, this temperature step should be 10 °C.
- l) Repeat step h) through step k) down to the lowest specified temperature. Unless otherwise instructed by the regulators, this temperature should be -30 °C. When the frequency stability limit is stated as being sufficient such that the fundamental emissions stay within the authorized bands of operation, a reference point shall be established at the applicable unwanted emissions limit using a RBW equal to the RBW required by the unwanted emissions specification of the applicable regulatory standard. These reference points measured using the lowest and highest channel of operation shall be identified as f_L and f_H respectively. The worst-case frequency offset determined in the above methods shall be added or subtracted from the values of f_L and f_H and the resulting frequencies must remain within the band.
- m) Omitted

5.6.5 Frequency stability when varying supply voltage

- a) Couple the transmitter output to the measuring instrument through a suitable attenuator and coaxial cable. If connection to the EUT output is not possible make the measurement by connecting an antenna to the measuring instrument with a suitable length of coaxial cable and placing the measuring antenna near the EUT (e.g., 15 cm away)
- b) Supply the EUT with nominal ac or dc voltage. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.
- c) Turn on the EUT, and couple its output to a frequency counter or other frequency-measuring instrument.
- d) Tune the EUT to the center frequency of the operating band. Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument, but is strong enough to allow measurement of the operating or fundamental frequency of the EUT). Adjust the detector bandwidth and span settings to achieve a resolution capable of accurate frequency measurements over the applicable frequency stability limits.

NOTE—An instrument that has an adequate level of accuracy as specified by the procuring or regulatory authority is the recommended measuring instrument.

- e) Measure the frequency.
- f) Unless otherwise specified, vary primary supply voltage from 85% to 115% of the nominal value for other than hand carried battery equipment.
- g) For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.
- h) Repeat the frequency measurement.

NOTE—For band-edge compliance, it can be required to make these measurements at the low and high channel of the operating band.

Note:

- 1) The results of the frequency stability test shown above the frequency deviation measured values are very small and similar trend for each path, so we are attached only the worst case data.
- 2) We were performed the test using call simulator

Test Results:

Reference: Voltage = DC 3.88 V

K patch: module 0, n261

Low Frequency = 27 525.00 MHz

Voltage	Power	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(Hz)	
100%	3.86	+20(Ref)	27534 840 000	1.495	0.000	0.00000
		-30	27534 840 004	3.961	2.466	0.00326
		-20	27534 840 005	4.690	3.195	0.00423
		-10	27534 840 009	9.299	7.804	0.01033
		0	27534 840 001	0.685	-0.809	-0.00107
		+10	27534 840 009	8.757	7.262	0.00961
		+30	27534 840 001	0.525	-0.970	-0.00128
		+40	27534 840 010	9.573	8.078	0.01069
		+50	27534 840 008	8.378	6.884	0.00911
HIGH	4.43	+20	27534 840 000	0.360	-1.135	-0.00150
LOW	3.65	+20	27534 840 002	1.874	0.379	0.00050

High Frequency = 28 324.92 MHz

Voltage	Power	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(Hz)	
100%	3.86	+20(Ref)	28319 520 000	9.663	0.000	0.00000
		-30	28319 520 006	5.529	-4.134	-0.00547
		-20	28319 520 006	5.961	-3.702	-0.00490
		-10	28319 520 010	9.722	0.059	0.00008
		0	28319 520 009	9.240	-0.423	-0.00056
		+10	28319 520 006	6.242	-3.421	-0.00453
		+30	28319 520 008	7.913	-1.750	-0.00232
		+40	28319 520 009	9.099	-0.564	-0.00075
		+50	28319 520 003	3.177	-6.486	-0.00858
HIGH	4.43	+20	28319 520 010	9.560	-0.103	-0.00014
LOW	3.65	+20	28319 520 005	5.103	-4.560	-0.00603

L patch: module 1, n261

Low Frequency = 27 525.00 MHz

Voltage	Power	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(Hz)	
100%	3.86	+20(Ref)	27534 840 000	3.015	0.000	0.00000
		-30	27534 840 004	3.952	0.937	0.00124
		-20	27534 840 007	6.894	3.879	0.00513
		-10	27534 840 000	0.299	-2.716	-0.00359
		0	27534 840 005	4.897	1.883	0.00249
		+10	27534 840 002	2.377	-0.638	-0.00084
		+30	27534 840 005	5.277	2.262	0.00299
		+40	27534 840 009	9.173	6.158	0.00815
		+50	27534 840 000	0.273	-2.742	-0.00363
HIGH	4.43	+20	27534 840 001	0.523	-2.492	-0.00330
LOW	3.65	+20	27534 840 001	1.314	-1.701	-0.00225

High Frequency = 28 324.92 MHz

Voltage	Power	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(Hz)	
100%	3.86	+20(Ref)	28319 520 000	6.976	0.000	0.00000
		-30	28319 520 007	6.506	-0.470	-0.00062
		-20	28319 520 006	6.215	-0.762	-0.00101
		-10	28319 520 009	9.077	2.100	0.00278
		0	28319 520 008	8.210	1.234	0.00163
		+10	28319 520 006	5.720	-1.256	-0.00166
		+30	28319 520 009	8.799	1.823	0.00241
		+40	28319 520 010	9.979	3.003	0.00397
		+50	28319 520 009	9.499	2.522	0.00334
HIGH	4.43	+20	28319 520 003	2.557	-4.419	-0.00585
LOW	3.65	+20	28319 520 004	3.972	-3.004	-0.00397

K patch: module 0, n260

Low Frequency = 37 025.04 MHz

Voltage	Power	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(Hz)	
100%	3.86	+20(Ref)	37027 320 000	9.377	0.000	0.00000
		-30	37027 320 001	1.231	-8.146	-0.01078
		-20	37027 320 003	2.577	-6.800	-0.00900
		-10	37027 320 006	6.288	-3.089	-0.00409
		0	37027 320 010	9.916	0.539	0.00071
		+10	37027 320 008	8.183	-1.194	-0.00158
		+30	37027 320 000	0.107	-9.270	-0.01227
		+40	37027 320 004	4.407	-4.969	-0.00658
		+50	37027 320 007	6.511	-2.866	-0.00379
HIGH	4.43	+20	37027 320 003	3.109	-6.268	-0.00829
LOW	3.65	+20	37027 320 007	7.334	-2.043	-0.00270

High Frequency = 39 975.00 MHz

Voltage	Power	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(Hz)	
100%	3.86	+20(Ref)	39966 240 000	4.138	0.000	0.00000
		-30	39966 240 009	9.042	4.904	0.00649
		-20	39966 240 000	0.476	-3.662	-0.00484
		-10	39966 240 007	7.129	2.992	0.00396
		0	39966 240 007	6.782	2.644	0.00350
		+10	39966 240 010	9.726	5.588	0.00739
		+30	39966 240 005	5.352	1.215	0.00161
		+40	39966 240 000	0.411	-3.727	-0.00493
		+50	39966 240 006	6.148	2.010	0.00266
HIGH	4.43	+20	39966 240 005	4.698	0.560	0.00074
LOW	3.65	+20	39966 240 009	9.485	5.347	0.00707

L patch: module 1, n260

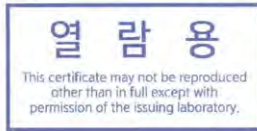
Low Frequency = 37 025.04 MHz

Voltage	Power	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(Hz)	
100%	3.86	+20(Ref)	37027 320 000	8.941	0.000	0.00000
		-30	37027 320 003	2.561	-6.380	-0.00844
		-20	37027 320 000	0.070	-8.870	-0.01174
		-10	37027 320 003	2.974	-5.967	-0.00789
		0	37027 320 002	1.592	-7.348	-0.00972
		+10	37027 320 010	9.618	0.677	0.00090
		+30	37027 320 002	2.111	-6.830	-0.00904
		+40	37027 320 009	8.501	-0.440	-0.00058
		+50	37027 320 009	9.349	0.408	0.00054
HIGH	4.43	+20	37027 320 008	8.082	-0.859	-0.00114
LOW	3.65	+20	37027 320 001	1.415	-7.526	-0.00996

High Frequency = 39 975.00 MHz

Voltage	Power	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(Hz)	
100%	3.86	+20(Ref)	39966 240 000	1.638	0.000	0.00000
		-30	39966 240 007	6.723	5.085	0.00673
		-20	39966 240 006	5.540	3.902	0.00516
		-10	39966 240 004	4.351	2.712	0.00359
		0	39966 240 001	1.398	-0.240	-0.00032
		+10	39966 240 007	6.983	5.345	0.00707
		+30	39966 240 005	4.609	2.971	0.00393
		+40	39966 240 005	5.300	3.661	0.00484
		+50	39966 240 006	6.439	4.800	0.00635
HIGH	4.43	+20	39966 240 002	2.350	0.712	0.00094
LOW	3.65	+20	39966 240 008	8.018	6.380	0.00844

6. MIXER VERIFICATION CERTIFICATE & CHECK



교정성적서 CALIBRATION CERTIFICATE

경기도 이천시 마장면 서이천로 578번길 74
TEL : 031-645-6900, FAX : 031-645-6969



성적서발급번호(Certificate No) : IC-2021-89427
교 정 번 호(Calibration No) : C-2021-109162

페이지(page) : 1 of 3

- 의뢰자 (Client)**
 - 기관명 (Name) : (주)에이치시티
 - 주소 (Address) : 경기도 이천시 마장면 서이천로 578번길 74
- 측정기 (Calibration Subject)** ◇ 등록번호 : 288234
 - 기기명 (Description) : WR-19 HARMONIC MIXER
 - 제작회사 및 형식(Manufacturer and Model Name) : OML / M19HWD
 - 기기번호 (Serial Number) : 160429-1
- 교정일자 (Date of Calibration)** : 2021.11.18 **차기교정예정일자** : 2022.11.18
(The due date of next Calibration)
- 교정환경 (Environment)**
 - 온도(Temperature) : (22.6 ± 0.1) °C - 습도(Humidity) : (46 ± 1) % R.H.
 - 교정장소 (Location) : 고정표준실(Permanent Calibration Lab)
(주소: 경기도 이천시 마장면 서이천로 578번길 74)
- 측정표준의 소급성 (Traceability)** ◇ Field code : 40641(RF SPECTRUM ANALYZER)
교정방법 및 소급성 서술 (Calibration method and/or brief description)
상기 기기는 고주파 스펙트럼 분석기의 교정절차(HCT-CS-125-40641)에 따라 국가측정표준기관으로부터 측정의 소급성이 확보된 아래의 표준장비를 이용하여 교정 되었음.

교정에 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)
EXG ANALOG SIGNAL GENERATOR	KEYSIGHT/N5173B	MY61252589	2022/10/15	(주)에이치시티
EPN-P SERIES POWER METER	AGILENT/E4417A	GB41291582	2022/06/04	(주)에이치시티
POWER SENSOR	AGILENT/8487A	MY41092450	2022/01/11	(주)에이치시티
POWER SENSOR	KEYSIGHT/V8486A	MY56330017	2022/01/25	Keysight Technologies
WR-19 MULTIPLIER SOURCE MODULE	OML/S19MS-A	160516-1	2022/09/07	(주)에이치시티

- 교정결과 (Calibration result)** : 교정결과 참조 (Refer to attachment)
- 측정불확도 (Measurement uncertainty)** : 교정결과 참조 (Refer to attachment)
신뢰수준 약 95 %, k = 2 (Confidence level about 95 %, k = 2)

확 인 (affirmation)	작성자 (Measurements performed by)	승인자 (Approved by)
	성명 (Name) 고 형 재 (서명)	직위 (Title) 기술책임자(Technical Cal. Manager) 김 광 철 (서명) 성명 (Name) 김 광 철

위 성적서는 국제시험기관인정협력체(International Laboratory Accreditation Cooperation) 상호인정협정(Mutual Recognition Arrangement)에 서명한 한국인정기구(KOLAS)로부터 공인 받은 분야의 교정결과입니다.

2021. 11. 18
한국인정기구 인정
Accredited by KOLAS, Republic of KOREA
(주)에이치시티 대표이사
President, HCT Co., Ltd.



※ 이 성적서는 측정기의 정밀정확도에 영향을 미치는 요소(과부하, 온도, 습도 등)의 급격한 변화가 발생한 경우에는 무효가 됩니다.
※ 고객전용사이트(http://www.callab.co.kr)에서 성적서의 진위여부 확인이 가능합니다.
※ 성적서의 원본은 상단에 HCT로그그램이 들어간 위변조 방지 용지에 인쇄되어 발급되며, 원본 복사시에는 복사본이라는 표시가 처리됩니다.

F-02P-02-008 (Rev.02)

교 정 결 과

CALIBRATION RESULT

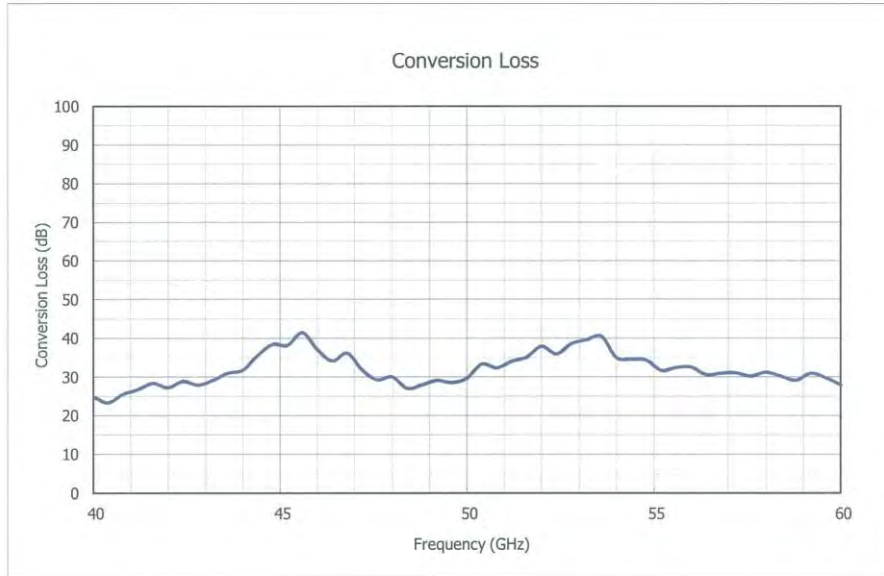


성적서발급번호(Certificate No) : IC-2021-89427

교 정 번 호(Calibration No) : C-2021-109162

페이지(page) : 2 of 3

1. Conversion Loss Graph



Note) 측정 조건 : RF = -30 dBm, Harmonic Order = 4, L.O. Level = 15.5 dBm, IF = 1 330 MHz, Bias Value = 5.70 mA

F-02P-02-008 (Rev.02)

교 정 결 과

CALIBRATION RESULT



성적서발급번호(Certificate No) : IC-2021-89427
교 정 번 호(Calibration No) : C-2021-109162

페이지(page) : 3 of 3

2. Conversion Loss Data

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
40.0	24.85	0.82	50.4	33.31	0.82
40.4	23.34	0.82	50.8	32.33	0.82
40.8	25.51	0.82	51.2	34.04	0.82
41.2	26.73	0.82	51.6	35.12	0.82
41.6	28.35	0.82	52.0	37.89	0.82
42.0	27.19	0.82	52.4	35.93	0.82
42.4	28.84	0.82	52.8	38.60	0.82
42.8	27.88	0.82	53.2	39.59	0.82
43.2	29.08	0.82	53.6	40.46	0.82
43.6	30.95	0.82	54.0	34.98	0.82
44.0	31.74	0.82	54.4	34.60	0.82
44.4	35.50	0.82	54.8	34.32	0.82
44.8	38.38	0.82	55.2	31.66	0.82
45.2	38.16	0.82	55.6	32.46	0.82
45.6	41.39	0.82	56.0	32.52	0.82
46.0	37.07	0.82	56.4	30.57	0.82
46.4	34.11	0.82	56.8	30.96	0.82
46.8	36.14	0.82	57.2	31.03	0.82
47.2	31.80	0.82	57.6	30.19	0.82
47.6	29.24	0.82	58.0	31.17	0.82
48.0	30.01	0.82	58.4	30.13	0.82
48.4	27.02	0.82	58.8	29.10	0.82
48.8	27.95	0.82	59.2	30.92	0.82
49.2	29.09	0.82	59.6	29.71	0.82
49.6	28.52	0.82	60.0	27.89	0.82
50.0	29.64	0.82	-	-	-

끝

F-02P-02-008 (Rev.02)



Measurement Report

74, Seoicheon-ro 578beon-gil, Majang-myeon,
Icheon-si, Gyeonggi-do, Korea 17383
Tel : 82-31-645-6900, www.hct.co.kr

보고서번호(Report No) : IC-2021-71882

페이지(page) : 1 of 3

측 정 번 호(Measurement No) : C-2021-087264

1. 의뢰자 (Client)

- 기관명 (Name) : (주)에이치시티
- 주소 (Address) : 경기도 이천시 마장면 서이천로 578번길 74

2. 대상품목 (Measurement Item)

◇ HCT 등록번호 : 288237

- 기기명 (Description) : WR-05 HARMONIC MIXER
- 제작회사 및 형식(Manufacturer and Model Name) : OML / M05HWD
- 기기번호 (Serial Number) : 160419-1

3. 측정일자 (Measurement date) : 2021.09.09

4. 측정환경 (Environment)

- 온도(Temperature) : (22.4 ± 0.2) °C - 습도(Humidity) : (46 ± 2) % R.H.

5. 측정방법 (Measurement method used)

상기 기기는 고주파 스펙트럼 분석기의 교정절차(HCT-CS-125-40641)에 따라 국가측정표준기관으로부터 측정의 소급성이 확보된 아래의 아래의 표준장비와 자체 점검된 장비를 이용하여 점검 되었음.

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)
EXG ANALOG SIGNAL GENERATOR	KEYSIGHT/N5173B	MY53270544	2022/06/23	(주)에이치시티
ERICKSON POWER METER	VDI/PM5	394V	측정	(주)에이치시티
WR-05 MULTIPLIER SOURCE MODULE	OML/S05MS-A	160419-1	측정	(주)에이치시티

6. 측정결과 (Measurement result)

: 측정결과 참조 (Refer to attachment)

※ 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) : 박민지	
		직위 (Title) : 기술책임자(Technical Manager)
		성명 (Name) : 이승찬

이 성적서는 ILAC MRA 서명 기관인 KOLAS(Korea Laboratory Accreditation Scheme)와 A2LA (American Laboratory for Laboratory Accreditation)의 인정과 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.

2021. 09. 17



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



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

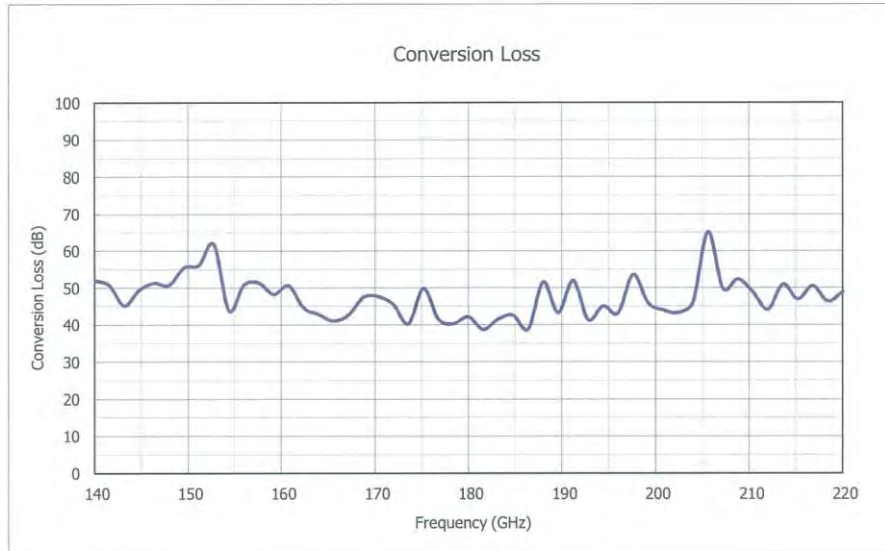
MEASUREMENT RESULT

보고서번호(Report No) : IC-2021-71882

페이지(page) : 2 of 3

측정번호(Measurement No) : C-2021-087264

1. Conversion Loss Graph



Note 1) R&S FSW (SN 101256)와 함께 교정된 결과임

Note 2) 측정 조건 : RF = -25 dBm, Harmonic Order = 16, L.O. Level = 17 dBm, Bias Value = 0.00 mA

Note 3) 110 GHz 초과 대역의 전력에 대해 국제적인 소급표준이 없으므로 HCT에서 자체 점검된 기준으로 점검되었음.

- In the absence of power standards above 110 GHz, power measurements above 110 GHz are to confirm operation functionality and traceable only to HCT.

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

MEASUREMENT RESULT

보고서번호(Report No) : IC-2021-71882

페이지(page) : 3 of 3

측 정 번 호(Measurement No) : C-2021-087264

2. Conversion Loss Data

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
140.0	52.0	0.86	181.6	38.7	0.86
141.6	50.8	0.86	183.2	41.5	0.86
143.2	45.2	0.86	184.8	42.5	0.86
144.8	49.4	0.86	186.4	38.8	0.86
146.4	51.3	0.86	188.0	51.5	0.86
148.0	50.8	0.86	189.6	43.2	0.86
149.6	55.5	0.86	191.2	51.9	0.86
151.2	56.1	0.86	192.8	41.3	0.86
152.8	61.8	0.86	194.4	45.0	0.86
154.4	43.8	0.86	196.0	43.1	0.86
156.0	50.8	0.86	197.6	53.6	0.86
157.6	51.4	0.86	199.2	45.9	0.86
159.2	48.2	0.86	200.8	43.9	0.86
160.8	50.6	0.86	202.4	43.2	0.86
162.4	44.5	0.86	204.0	46.0	0.86
164.0	42.8	0.86	205.6	65.1	0.86
165.6	41.0	0.86	207.2	49.8	0.86
167.2	42.6	0.86	208.8	52.3	0.86
168.8	47.5	0.86	210.4	48.9	0.86
170.4	47.6	0.86	212.0	44.0	0.86
172.0	45.4	0.86	213.6	50.9	0.86
173.6	40.2	0.86	215.2	46.9	0.86
175.2	49.8	0.86	216.8	50.5	0.86
176.8	41.5	0.86	218.4	46.3	0.86
178.4	40.3	0.86	220.0	48.9	0.86
180.0	42.1	0.86	-	-	-

끝.

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



교정성적서 CALIBRATION CERTIFICATE

경기도 이천시 마장면 서이천로 578번길 74
TEL : 031-645-6900, FAX : 031-645-6969



성적서발급번호(Certificate No) : IC-2021-89424
교 정 번 호(Calibration No) : C-2021-109159

페이지(page) : 1 of 3

1. 의뢰자 (Client)

- 기관명 (Name) : (주)에이치시티
- 주소 (Address) : 경기도 이천시 마장면 서이천로 578번길 74

2. 측정기 (Calibration Subject)

◇ 등록번호 : 288235

- 기기명 (Description) : WR-12 HARMONIC MIXER
- 제작회사 및 형식(Manufacturer and Model Name) : OML / M12HWD
- 기기번호 (Serial Number) : 160419-1

3. 교정일자 (Date of Calibration)

차기교정예정일자 : 2022.11.18
(The due date of next Calibration)

4. 교정환경 (Environment)

- 온도(Temperature) : (22.6 ± 0.1) °C - 습도(Humidity) : (46 ± 1) % R.H.
- 교정장소 (Location) : 교정표준실(Permanent Calibration Lab)
(주소: 경기도 이천시 마장면 서이천로 578번길 74)

5. 측정표준의 소급성 (Traceability) ◇Field code : 40641(RF SPECTRUM ANALYZER)

교정방법 및 소급성 서술 (Calibration method and/or brief description)

상기 기기는 고주파 스펙트럼 분석기의 교정절차(HCT-CS-125-40641)에 따라 국가측정표준기관으로부터 측정의 소급성이 확보된 아래의 표준장비를 이용하여 교정 되었음.

교정에 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)
EXG ANALOG SIGNAL GENERATOR	KEYSIGHT/N5173B	MY61252589	2022/10/15	(주)에이치시티
EPM-P SERIES POWER METER	AGILENT/E4417A	GB41291582	2022/06/04	(주)에이치시티
POWER SENSOR	KEYSIGHT/V8486A	MY56330017	2022/01/25	Keysight Technologies
POWER SENSOR	KEYSIGHT/W8486A	MY56370005	2022/01/20	Keysight Technologies
WR-12 MULTIPLIER SOURCE MODULE	OML/S12MS-A	160419-1	2022/09/07	(주)에이치시티

6. 교정결과 (Calibration result)

: 교정결과 참조 (Refer to attachment)

7. 측정불확도 (Measurement uncertainty)

: 교정결과 참조 (Refer to attachment)

신뢰수준 약 95 %, k = 2 (Confidence level about 95 %, k = 2)

확 인 (affirmation)	작성자 (Measurements performed by)	승인자 (Approved by)
	성명 (Name) 고 형 재 (인명)	직위 (Title) 기술책임자(Technical Cal. Manager) 성명 (Name) 김 광 철 (자명)

위 성적서는 국제시험기관인정협력체(International Laboratory Accreditation Cooperation) 상호인정협정(Mutual Recognition Arrangement)에 서명한 한국인정기구(KOLAS)로부터 공인 받은 분야의 교정결과입니다.

2021. 11. 18

한국인정기구 인정
Accredited by KOLAS, Republic of KOREA

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



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F-02P-02-008 (Rev.02)

교 정 결 과

CALIBRATION RESULT

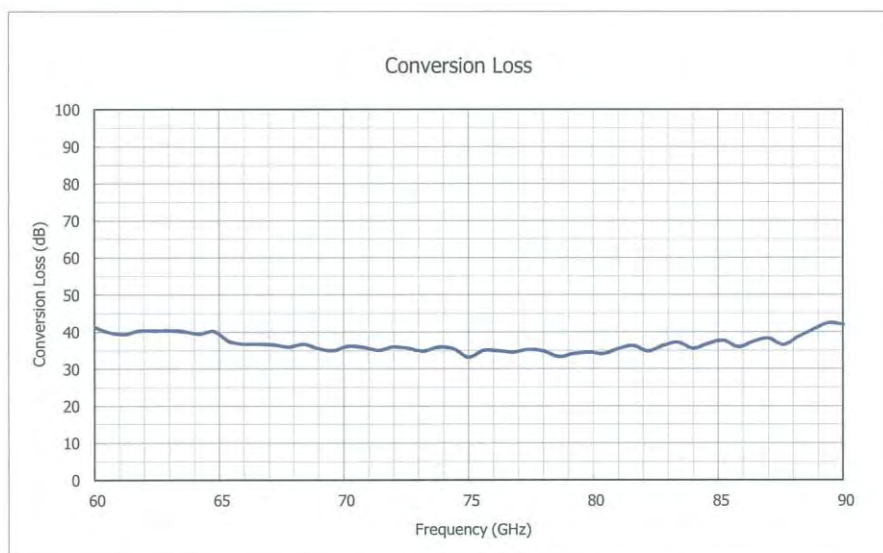


성적서발급번호(Certificate No) : IC-2021-89424

교 정 번 호(Calibration No) : C-2021-109159

페이지(page) : 2 of 3

1. Conversion Loss Graph



Note) 측정 조건 : RF = -30 dBm, Harmonic Order = 6, L.O. Level = 15.5 dBm, IF = 1 330 MHz, Bias Value = 4.98 mA

F-02P-02-008 (Rev.02)

교 정 결 과

CALIBRATION RESULT



성적서발급번호(Certificate No) : IC-2021-89424

교 정 번 호(Calibration No) : C-2021-109159

페이지(page) : 3 of 3

2. Conversion Loss Data

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
60.0	41.36	0.93	75.6	34.96	0.82
60.6	39.87	0.93	76.2	34.86	0.82
61.2	39.38	0.93	76.8	34.51	0.82
61.8	40.31	0.93	77.4	35.24	0.82
62.4	40.33	0.93	78.0	34.84	0.82
63.0	40.41	0.93	78.6	33.32	0.82
63.6	40.09	0.93	79.2	34.09	0.82
64.2	39.42	0.93	79.8	34.50	0.82
64.8	40.17	0.93	80.4	34.09	0.82
65.4	37.47	0.93	81.0	35.42	0.82
66.0	36.71	0.93	81.6	36.25	0.82
66.6	36.71	0.93	82.2	34.77	0.82
67.2	36.50	0.93	82.8	36.31	0.82
67.8	35.92	0.93	83.4	37.10	0.82
68.4	36.64	0.93	84.0	35.49	0.82
69.0	35.41	0.93	84.6	36.83	0.82
69.6	34.96	0.93	85.2	37.65	0.82
70.2	36.12	0.93	85.8	35.92	0.82
70.8	35.75	0.93	86.4	37.34	0.82
71.4	35.00	0.93	87.0	38.25	0.82
72.0	35.92	0.93	87.6	36.49	0.82
72.6	35.50	0.93	88.2	38.66	0.82
73.2	34.78	0.93	88.8	40.64	0.82
73.8	35.85	0.93	89.4	42.37	0.82
74.4	35.40	0.93	90.0	42.03	0.82
75.0	33.14	0.82	-	-	-

끝.

F-02P-02-008 (Rev.02)



교정성적서
CALIBRATION CERTIFICATE

경기도 이천시 마장면 서이천로 578번길 74
TEL : 031-645-6900, FAX : 031-645-6969



성적서발급번호(Certificate No) : IC-2021-89425
교정번호(Calibration No) : C-2021-109160

페이지(page) : 1 of 3

1. 의뢰자 (Client)

- 기관명 (Name) : (주)에이치시티
- 주소 (Address) : 경기도 이천시 마장면 서이천로 578번길 74

2. 측정기 (Calibration Subject)

◇ 등록번호 : 288236

- 기기명 (Description) : WR-08 HARMONIC MIXER
- 제작회사 및 형식 (Manufacturer and Model Name) : OML / M08HWD
- 기기번호 (Serial Number) : 160419-1

3. 교정일자 (Date of Calibration) : 2021.11.18

차기교정예정일자 : 2022.11.18
(The due date of next Calibration)

4. 교정환경 (Environment)

- 온도(Temperature) : (22.4 ± 0.2) °C - 습도(Humidity) : (45 ± 2) % R.H.
- 교정장소 (Location) : 고정표준실(Permanent Calibration Lab)
(주소: 경기도 이천시 마장면 서이천로 578번길 74)

5. 측정표준의 소급성 (Traceability) ◇ Field code : 40641(RF SPECTRUM ANALYZER)

교정방법 및 소급성 서술 (Calibration method and/or brief description)

상기 기기는 고주파 스펙트럼 분석기의 교정절차(HCT-CS-125-40641)에 따라 국가측정표준기관으로부터 측정의 소급성이 확보된 아래의 표준장비를 이용하여 교정 되었음.

교정에 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)
EXG ANALOG SIGNAL GENERATOR	KEYSIGHT/N5173B	MY61252589	2022/10/15	(주)에이치시티
EPM-P SERIES POWER METER	AGILENT/E4417A	GB41291582	2022/06/04	(주)에이치시티
POWER SENSOR	KEYSIGHT/W8486A	MY56370005	2022/01/20	Keysight Technologies
WR-08 MULTIPLIER SOURCE MODULE	OML/S08MS-A	160419-1	2022/09/07	(주)에이치시티

6. 교정결과 (Calibration result)

: 교정결과 참조 (Refer to attachment)

7. 측정불확도 (Measurement uncertainty)

: 교정결과 참조 (Refer to attachment)

신뢰수준 약 95 %, k = 2 (Confidence level about 95 %, k = 2)

확 인 (affirmation)	작성자 (Measurements performed by)	승인자 (Approved by)
	성명 (Name) 고 형 재 (인명)	직위 (Title) 기술책임자(Technical Cal. Manager) 성명 (Name) 김 광 철 (서명)

위 성적서는 국제시험기관인정협력체(International Laboratory Accreditation Cooperation) 상호인정협정(Mutual Recognition Arrangement)에 서명한 한국인정기구(KOLAS)로부터 공인 받은 분야의 교정결과입니다.

2021. 11. 18

한국인정기구 인정
Accredited by KOLAS, Republic of KOREA

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



※ 이 성적서는 측정기의 정밀정확도에 영향을 미치는 요소(과부하, 온도, 습도 등)의 급격한 변화가 발생한 경우에는 무효가 됩니다.

※ 고객전용사이트(http://www.callab.co.kr)에서 성적서의 진위여부 확인이 가능합니다.

※ 성적서의 원본은 상단에 HCT홀로그램이 들어간 위변조 방지 용지에 인쇄되어 발급되며, 원본 복사시에는 복사본이라는 표시가 처리됩니다.

F-02P-02-008 (Rev.02)

교 정 결 과

CALIBRATION RESULT

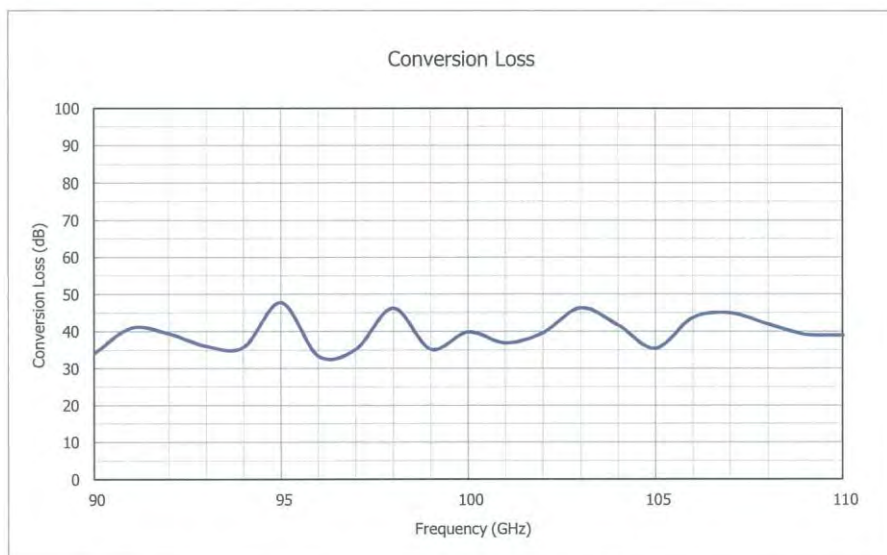


성적서발급번호(Certificate No) : IC-2021-89425

교 정 번 호(Calibration No) : C-2021-109160

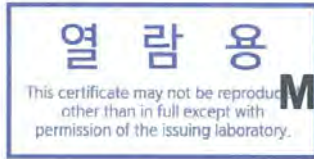
페이지(page) : 2 of 3

1. Conversion Loss Graph



Note) 측정 조건 : RF = -30 dBm, Harmonic Order = 10, L.O. Level = 15.5 dBm, IF = 1 330 MHz, Bias Value = 0.01 mA

F-02P-02-008 (Rev.02)



Measurement Report

74, Seoicheon-ro 578beon-gil, Majang-myeon,
Icheon-si, Gyeonggi-do, Korea 17383
Tel :82-31-645-6900, www.hct.co.kr

보고서번호(Report No) : IC-2021-89423
측정번호(Measurement No) : C-2021-109158

페이지(page) : 1 of 3

1. 의뢰자 (Client)

- 기관명 (Name) : (주)에이치시티
- 주소 (Address) : 경기도 이천시 마장면 서이천로 578번길 74

2. 대상품목 (Measurement Item)

◇ HCT 등록번호 : 366196
- 기기명 (Description) : WR-08 HARMONIC MIXER
- 제작회사 및 형식(Manufacturer and Model Name) : OML / M08HWD
- 기기번호 (Serial Number) : 160419-1

3. 측정일자 (Measurement date) : 2021.11.18

4. 측정환경 (Environment)

- 온도(Temperature) : (22.3 ± 0.3) °C - 습도(Humidity) : (45 ± 3) % R.H.

5. 측정방법 (Measurement method used)

상기 기기는 고주파 스펙트럼 분석기의 교정절차(HCT-CS-125-40641)에 따라 국가측정표준기관으로부터 측정의 소급성이 확보된 아래의 표준장비를 이용하여 교정 되었음.

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)
EXG ANALOG SIGNAL GENERATOR	KEYSIGHT/N5173B	MY61252589	2022/10/15	(주)에이치시티
ERICKSON POWER METER	VDI/PM5	394V	자체점검	(주)에이치시티
WR-08 MULTIPLIER SOURCE MODULE	OML/S08MS-A	160419-1	자체점검	(주)에이치시티

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) : 고 형 재	직위 (Title) : 기술책임자(Technical Manager)
		성명 (Name) : 김 광 철

이 성적서는 ILAC MRA 서명 기관인 KOLAS(Korea Laboratory Accreditation Scheme)와 A2LA (American Laboratory for Laboratory Accreditation)의 인정과 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.

2021. 11. 19



(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)

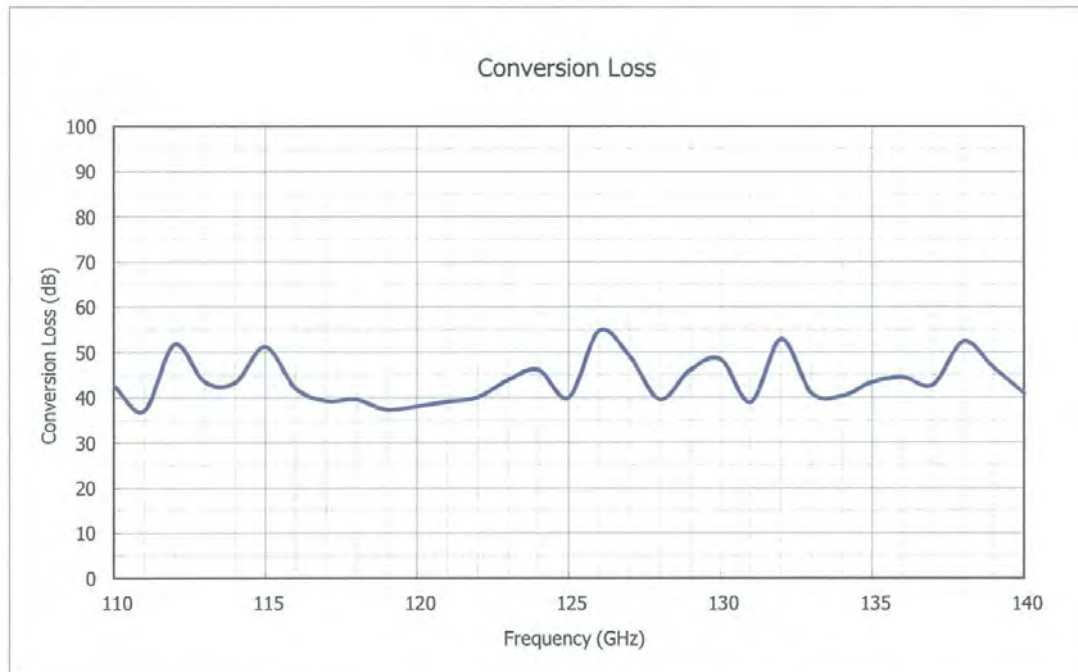
MEASUREMENT RESULT

보고서번호(Report No) : IC-2021-89423

페이지(page) : 2 of 3

측 정 번 호(Measurement No) : C-2021-109158

1. Conversion Loss Graph



Note 1) 측정 조건 : RF = -30 dBm, Harmonic Order = 10, L.O. Level = 15.5 dBm, IF = 1 330 MHz, Bias Value = 0.01 mA

Note 2) 110 GHz 초과 대역의 전력에 대해 국제적인 소급표준이 없으므로 HCT 에서 자체 점검된 기준으로 측정되었음.

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

MEASUREMENT RESULT

보고서번호(Report No) : IC-2021-89423

페이지(page) : 3 of 3

측 정 번 호(Measurement No) : C-2021-109158

2. Conversion Loss Data

Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)	Frequency (GHz)	Conversion Loss (dB)	Measurement Uncertainty (dB)
110.0	42.66	0.82	126.0	54.68	0.82
111.0	37.01	0.82	127.0	49.23	0.82
112.0	51.72	0.82	128.0	39.58	0.82
113.0	43.49	0.82	129.0	46.02	0.82
114.0	43.21	0.82	130.0	48.48	0.82
115.0	51.22	0.82	131.0	38.95	0.82
116.0	42.06	0.82	132.0	52.85	0.82
117.0	39.25	0.82	133.0	40.98	0.82
118.0	39.58	0.82	134.0	40.27	0.82
119.0	37.26	0.82	135.0	43.36	0.82
120.0	38.06	0.82	136.0	44.48	0.82
121.0	39.09	0.82	137.0	42.79	0.82
122.0	40.05	0.82	138.0	52.38	0.82
123.0	43.84	0.82	139.0	46.60	0.82
124.0	46.13	0.82	140.0	40.94	0.82
125.0	39.95	0.82	-	-	-

끝.



교정성적서 CALIBRATION CERTIFICATE

경기도 이천시 마장면 서이천로 578번길 74
TEL : 031-645-6900, FAX : 031-645-6969



성적서발급번호(Certificate No) : IC-2021-74956
교정번호(Calibration No) : C-2021-090852

페이지(page) : 1 of 4

1. 의뢰자 (Client)

- 기관명 (Name) : (주)에이치시티
- 주소 (Address) : 경기도 이천시 마장면 서이천로 578번길 74

2. 측정기 (Calibration Subject)

◇ 등록번호 : 400353

- 기기명 (Description) : AMPLIFIER
- 제작회사 및 형식(Manufacturer and Model Name) : T&M SYSTEM / Thru1 + LLAU1183540Q
- 기기번호 (Serial Number) : NONE

3. 교정일자 (Date of Calibration) : 2021.09.16

차기교정예정일자 : 2022.09.16
(The due date of next Calibration)

4. 교정환경 (Environment)

- 온도(Temperature) : (22.7 ± 0.2) °C - 습도(Humidity) : (48 ± 1) % R.H.
- 교정장소 (Location) : 고정표준실(Permanent Calibration Lab)
(주소: 경기도 이천시 마장면 서이천로 578번길 74)

5. 측정표준의 소급성 (Traceability) ◇Field code : 40601(RF AMPLIFIER)

교정방법 및 소급성 서술 (Calibration method and/or brief description)

상기 기기는 고주파 증폭기의 교정절차(HCT-CS-105-40601)에 따라 국가측정표준기관으로부터 측정의 소급성이 확보된 아래의 표준장비를 이용하여 교정 되었음.

교정에 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)
NETWORK ANALYZER	AGILENT/E5061B	MY49203861	2021/09/29	(주)에이치시티
CALIBRATION KIT(3.5 mm)	AGILENT/85052D	3101A05252	2023/07/20	한국표준과학연구원
NETWORK ANALYZER	AGILENT/N5230C	MY49001853	2021/09/29	(주)에이치시티

6. 교정결과 (Calibration result)

: 교정결과 참조 (Refer to attachment)

7. 측정불확도 (Measurement uncertainty)

: 교정결과 참조 (Refer to attachment)

신뢰수준 약 95 %, k = 2 (Confidence level about 95 %, k = 2)

확 인 (affirmation)	작성자 (Measurements performed by)	승인자 (Approved by)
	성명 (Name) 유 성 노	직위 (Title) 기술책임자(Technical Cal. Manager) (주)
	(서명)	성명 (Name) 이 승 찬 (서명)

위 성적서는 국제시험기관인정협력체(International Laboratory Accreditation Cooperation) 상호인정협정(Mutual Recognition Arrangement)에 서명한 한국인정기구(KOLAS)로부터 공인 받은 분야의 교정결과입니다.

한국인정기구 인정
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2021. 09. 16
(주)에이치시티 대표이사
President, HCT Co., Ltd.



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F-02P-02-008 (Rev.02)

교 정 결 과

CALIBRATION RESULT

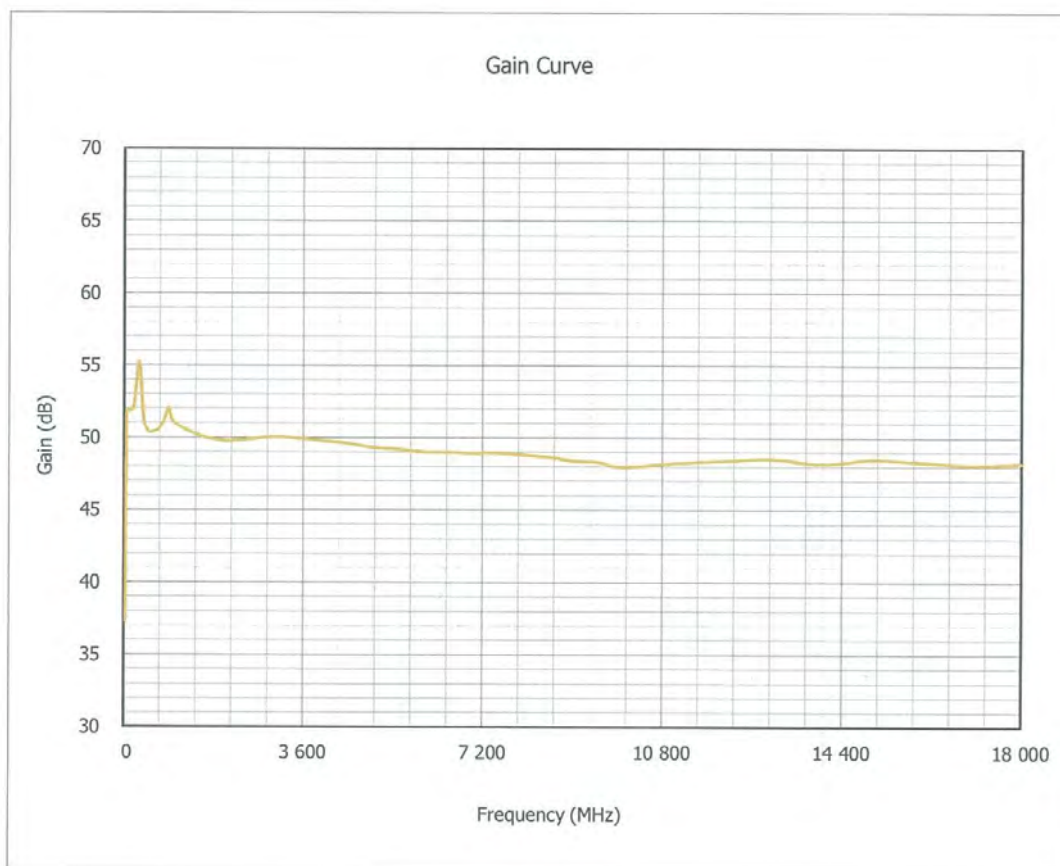


성적서발급번호(Certificate No) : IC-2021-74956

교 정 번 호(Calibration No) : C-2021-090852

페이지(page) : 2 of 4

※ Measurement Curve



F-02P-02-008 (Rev.02)

교 정 결 과

CALIBRATION RESULT



성적서발급번호(Certificate No) : IC-2021-74956

교 정 번 호(Calibration No) : C-2021-090852

페이지(page) : 3 of 4

1. Gain Calibration

Frequency	Measured Value	Uncertainty
30 MHz	37.31 dB	0.11 dB
50 MHz	51.74 dB	0.11 dB
100 MHz	51.89 dB	0.11 dB
200 MHz	52.12 dB	0.11 dB
300 MHz	55.25 dB	0.11 dB
400 MHz	51.07 dB	0.11 dB
500 MHz	50.38 dB	0.11 dB
600 MHz	50.43 dB	0.11 dB
700 MHz	50.60 dB	0.11 dB
800 MHz	51.17 dB	0.11 dB
900 MHz	52.02 dB	0.11 dB
1.0 GHz	51.04 dB	0.11 dB
1.5 GHz	50.15 dB	0.11 dB
2.0 GHz	49.78 dB	0.11 dB
2.5 GHz	49.88 dB	0.11 dB
3.0 GHz	50.03 dB	0.14 dB
3.5 GHz	49.94 dB	0.14 dB
4.0 GHz	49.76 dB	0.14 dB
4.5 GHz	49.59 dB	0.14 dB
5.0 GHz	49.31 dB	0.14 dB
5.5 GHz	49.19 dB	0.14 dB
6.0 GHz	49.01 dB	0.14 dB
6.5 GHz	49.00 dB	0.14 dB
7.0 GHz	48.92 dB	0.14 dB
7.5 GHz	48.96 dB	0.14 dB
8.0 GHz	48.80 dB	0.14 dB
8.5 GHz	48.66 dB	0.14 dB
9.0 GHz	48.40 dB	0.14 dB
9.5 GHz	48.33 dB	0.14 dB
10.0 GHz	47.96 dB	0.14 dB
11.0 GHz	48.22 dB	0.23 dB
12.0 GHz	48.39 dB	0.23 dB
13.0 GHz	48.54 dB	0.23 dB
14.0 GHz	48.18 dB	0.23 dB
15.0 GHz	48.49 dB	0.23 dB
16.0 GHz	48.31 dB	0.23 dB

F-02P-02-008 (Rev.02)

교 정 결 과

CALIBRATION RESULT



성적서발급번호(Certificate No) : IC-2021-74956

교 정 번 호(Calibration No) : C-2021-090852

페이지(page) : 4 of 4

1. Gain Calibration (cont.)

Frequency	Measured Value	Uncertainty	
17.0 GHz	48.11 dB	0.23 dB	
18.0 GHz	48.20 dB	0.23 dB	끝.

7. Annex A_EUT AND TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-2110-FC080-P