

교정성적서

CALIBRATION CERTIFICATE

성적서번호(Certificate No) :

서울특별시 강남구 언주로 133길, 26-5
#26-5,Eonju-ro 133-gil,Gangnam-qu,Seoul
Tel:02-3485-1977, Fax:02-3485-1980

RSKC19-087

페이지(Page) (1) / (총 8)

1. 의뢰자(Client)

기관명(Name) : SEC연구소
주소(Address) : 경기도 성남시 분당구 분당우체국 사서함 35

2. 측정기(Calibration Subject)

기기명(Description) : 고주파 신호 발생기(RF Signal Generators)
제작회사 및 형식(Manufacturer and Model Name) : Rohde&Schwarz / SM300
기기번호(Serial Number) : 100825

3. 교정일자(Date of Calibration) : 2019.06.18.

4. 교정환경(Environment)

온도(Temperature) : (22.5 ± 0.5) °C 습도(Humidity) : (52 ± 2) % R.H.
교정장소(Location) : 고정표준실(Permanent Calibration Lab)

5. 측정표준의 소급성(Traceability)

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

상기기기는 고주파 신호 발생기 교정 지침서(RS Kor-CG-02)에 따라 국가측정표준기관으로부터 SI단위로 측정의 소급성이 확보된 아래의 표준장비를 이용하여 교정되었다.

The above instrument was calibrated in compliance with Standard Calibration Procedure of RF Signal Generators, (RS Kor-CG-02) using below stadnards equipment which get the traceability having SI unit from National Measurment Standard Organization.

교정에 사용한 표준장비 명세(List of used standards/specitications)

기기명 (Description)	제작회사 및 형식 (Manufacturer and Model)	기기번호 (Serial Number)	차기교정예정일자 (The due date of next Calibration)	교정기관 (Calibration laboratory)
GPS receiver	PTF / PTF-3204A	904-01075-01	2020.04.24.	KRISS(1900-01086-002)
Frequency Counter	SRS / SR620	3770	2020.04.24.	KRISS(1900-01086-001)
Power Sensor Module	R&S / NRP-Z37	100158	2019.12.21.	DAkks(492096 D-K-15195-01-01)
RF Frequency Counter	Agilent / 53151A	US40510579	2020.04.23.	SICT(190417X074)
Modulation Analyzer	R&S / FMB	835870/0015	2019.06.26.	KTICC(KTE-1804383-002)
Measuring Receiver	R&S / FSMR	101258	2019.12.21.	DAkks(492097 D-K-15195-01-01)

6. 교정결과(Calibration result) : 교정결과 참조(Attached documents)

7. 측정불확도(Measurement uncertainty) : 교정결과 참조(Attached documents)

확인 (Affirmation)	작성 자(Measurements performed by) 성명(Name) : 유성진	승인 자(Approved by) 직위(Title) : 기술책임자 성명(Name) : 김용태
---------------------	---	--

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

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

한국인정기구 인정

Accredited by KOLAS, Republic of Korea

로데 슈바르츠 코리아(주) 대표이사

President. ROHDE&SCHWARZ Korea Ltd.



2019.06.18.

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

진위 여부 확인코드 : MM8D9-XS2FM-J870U

* 진위 여부 확인은 로데슈바르츠 홈페이지에서 확인 할 수 있습니다.

RS Kor-22-01-1(R.12)

Rohde-Schwarz Korea

교정결과

CALIBRATION RESULT

성적서 번호 : RSKC19-087
Certificate No

페이지(Page) (2) / (총 8)

Test Description	Lower Limit	Measured Value	Upper Limit	Measurement Uncertainty <small>(신뢰수준 약 95 %, k=2)</small>
1 Reference Frequency 10 MHz	9 999 999.00 Hz	9 999 999.70 Hz	10 000 001.00 Hz	0.02 Hz
2 RF Frequency Setting				
500 MHz	499 999 995.0 Hz	500 000 001.0 Hz	500 000 005.0 Hz	1.0 Hz
1 000 MHz	999 999 995.0 Hz	1 000 000 001.0 Hz	1 000 000 005.0 Hz	1.2 Hz
2 000 MHz	1 999 999 995.0 Hz	2 000 000 001.0 Hz	2 000 000 005.0 Hz	1.3 Hz
3 000 MHz	2 999 999 995.0 Hz	3 000 000 000.8 Hz	3 000 000 005.0 Hz	1.2 Hz

교정결과

CALIBRATION RESULT

성적서 번호 : RSKC19-087

Certificate No

페이지(Page) (3) / (총 8)

Test Description	Lower Limit	Measured Value	Upper Limit	Measurement Uncertainty <small>(신뢰수준 약 95 %, k=2)</small>
3 2nd Harmonics				
0.1 MHz 0 dBm	--	-41.1 dB	-25.0 dB	5.2 dB
0.2 MHz 0 dBm	--	-43.6 dB	-25.0 dB	3.4 dB
0.5 MHz 0 dBm	--	-46.5 dB	-25.0 dB	1.6 dB
1 MHz 0 dBm	--	-47.3 dB	-25.0 dB	4.8 dB
2 MHz 0 dBm	--	-48.0 dB	-25.0 dB	7.1 dB
5 MHz 0 dBm	--	-48.5 dB	-25.0 dB	4.7 dB
7 MHz 0 dBm	--	-45.6 dB	-25.0 dB	5.7 dB
10 MHz 0 dBm	--	-40.6 dB	-30.0 dB	1.6 dB
20 MHz 0 dBm	--	-40.0 dB	-30.0 dB	1.6 dB
50 MHz 0 dBm	--	-40.0 dB	-30.0 dB	1.6 dB
100 MHz 0 dBm	--	-41.3 dB	-30.0 dB	1.6 dB
200 MHz 0 dBm	--	-45.1 dB	-30.0 dB	1.6 dB
500 MHz 0 dBm	--	-52.1 dB	-30.0 dB	1.6 dB
1 000 MHz 0 dBm	--	-49.9 dB	-30.0 dB	1.6 dB
1 500 MHz 0 dBm	--	-44.5 dB	-30.0 dB	1.6 dB
2 000 MHz 0 dBm	--	-63.3 dB	-30.0 dB	1.6 dB
2 500 MHz 0 dBm	--	-94.1 dB	-30.0 dB	1.6 dB
3 000 MHz 0 dBm	--	-92.9 dB	-30.0 dB	1.6 dB

교정결과

CALIBRATION RESULT

성적서 번호 : RSKC19-087
Certificate No

페이지(Page) (4) / (총 8)

Test Description	Lower Limit	Measured Value	Upper Limit	Measurement Uncertainty <small>(신뢰수준 약 95 %, k=2)</small>
4 3rd Harmonics				
0.1 MHz 0 dBm	--	-50.6 dB	-25.0 dB	1.6 dB
0.2 MHz 0 dBm	--	-52.7 dB	-25.0 dB	1.6 dB
0.5 MHz 0 dBm	--	-53.1 dB	-25.0 dB	2.0 dB
1 MHz 0 dBm	--	-51.4 dB	-25.0 dB	1.7 dB
2 MHz 0 dBm	--	-48.3 dB	-25.0 dB	3.4 dB
5 MHz 0 dBm	--	-45.3 dB	-25.0 dB	6.6 dB
7 MHz 0 dBm	--	-44.4 dB	-25.0 dB	6.0 dB
10 MHz 0 dBm	--	-53.2 dB	-30.0 dB	1.6 dB
20 MHz 0 dBm	--	-54.3 dB	-30.0 dB	1.6 dB
50 MHz 0 dBm	--	-55.8 dB	-30.0 dB	1.6 dB
100 MHz 0 dBm	--	-58.3 dB	-30.0 dB	1.6 dB
200 MHz 0 dBm	--	-60.3 dB	-30.0 dB	1.6 dB
500 MHz 0 dBm	--	-57.3 dB	-30.0 dB	1.6 dB
1 000 MHz 0 dBm	--	-59.4 dB	-30.0 dB	1.6 dB
1 500 MHz 0 dBm	--	-94.7 dB	-30.0 dB	1.6 dB
2 000 MHz 0 dBm	--	-96.5 dB	-30.0 dB	1.6 dB
2 500 MHz 0 dBm	--	-93.8 dB	-30.0 dB	1.6 dB
3 000 MHz 0 dBm	--	-91.7 dB	-30.0 dB	1.6 dB

교정결과

CALIBRATION RESULT

성적서 번호 : RSKC19-087
Certificate No

페이지(Page) (5) / (총 8)

Test Description	Lower Limit	Measured Value	Upper Limit	Measurement Uncertainty <small>(신뢰수준 약 95 %, k=2)</small>
5 RF Level Linearity				
50 MHz				
10 dBm	9.40 dBm	10.15 dBm	10.60 dBm	0.07 dB
5 dBm	4.40 dBm	5.22 dBm	5.60 dBm	0.08 dB
0 dBm	-0.60 dBm	0.14 dBm	0.60 dBm	0.08 dB
-5 dBm	-5.60 dBm	-4.95 dBm	-4.40 dBm	0.08 dB
-10 dBm	-10.60 dBm	-9.86 dBm	-9.40 dBm	0.08 dB
-15 dBm	-15.70 dBm	-14.87 dBm	-14.30 dBm	0.08 dB
-20 dBm	-20.70 dBm	-19.81 dBm	-19.30 dBm	0.08 dB
-25 dBm	-25.70 dBm	-24.90 dBm	-24.30 dBm	0.08 dB
-30 dBm	-30.70 dBm	-29.86 dBm	-29.30 dBm	0.08 dB
-35 dBm	-35.70 dBm	-34.95 dBm	-34.30 dBm	0.09 dB
-40 dBm	-40.70 dBm	-39.92 dBm	-39.30 dBm	0.09 dB
-45 dBm	-45.70 dBm	-44.82 dBm	-44.30 dBm	0.09 dB
-50 dBm	-50.70 dBm	-50.07 dBm	-49.30 dBm	0.09 dB
-55 dBm	-55.70 dBm	-54.95 dBm	-54.30 dBm	0.09 dB
-60 dBm	-60.70 dBm	-60.05 dBm	-59.30 dBm	0.09 dB
-65 dBm	-65.70 dBm	-64.98 dBm	-64.30 dBm	0.10 dB
-70 dBm	-70.80 dBm	-70.06 dBm	-69.20 dBm	0.10 dB
-75 dBm	-75.80 dBm	-74.98 dBm	-74.20 dBm	0.10 dB
-80 dBm	-80.80 dBm	-80.02 dBm	-79.20 dBm	0.10 dB
-85 dBm	-85.80 dBm	-85.11 dBm	-84.20 dBm	0.11 dB
-90 dBm	-91.40 dBm	-90.03 dBm	-88.60 dBm	0.11 dB
-95 dBm	-96.40 dBm	-95.19 dBm	-93.60 dBm	0.12 dB
-100 dBm	-101.40 dBm	-100.13 dBm	-98.60 dBm	0.12 dB

교정결과

CALIBRATION RESULT

성적서 번호 : RSKC19-087
Certificate No

페이지(Page) (6) / (총 8)

Test Description	Lower Limit	Measured Value	Upper Limit	Measurement Uncertainty <small>(신뢰수준 약 95 %, k=2)</small>
5 RF Level Linearity (cont.)				
3 000 MHz				
10 dBm	9.20 dBm	10.14 dBm	10.80 dBm	0.10 dB
5 dBm	4.20 dBm	5.01 dBm	5.80 dBm	0.10 dB
0 dBm	-0.80 dBm	0.01 dBm	0.80 dBm	0.10 dB
-5 dBm	-5.80 dBm	-5.01 dBm	-4.20 dBm	0.10 dB
-10 dBm	-10.90 dBm	-10.03 dBm	-9.10 dBm	0.10 dB
-15 dBm	-15.90 dBm	-15.04 dBm	-14.10 dBm	0.11 dB
-20 dBm	-20.90 dBm	-20.05 dBm	-19.10 dBm	0.11 dB
-25 dBm	-25.90 dBm	-25.01 dBm	-24.10 dBm	0.11 dB
-30 dBm	-30.90 dBm	-30.02 dBm	-29.10 dBm	0.11 dB
-35 dBm	-35.90 dBm	-35.07 dBm	-34.10 dBm	0.11 dB
-40 dBm	-40.90 dBm	-40.01 dBm	-39.10 dBm	0.11 dB
-45 dBm	-45.90 dBm	-45.01 dBm	-44.10 dBm	0.11 dB
-50 dBm	-50.90 dBm	-49.70 dBm	-49.10 dBm	0.12 dB
-55 dBm	-55.90 dBm	-55.03 dBm	-54.10 dBm	0.12 dB
-60 dBm	-60.90 dBm	-60.02 dBm	-59.10 dBm	0.12 dB
-65 dBm	-65.90 dBm	-65.08 dBm	-64.10 dBm	0.12 dB
-70 dBm	-71.00 dBm	-70.04 dBm	-69.00 dBm	0.12 dB
-75 dBm	-76.00 dBm	-75.04 dBm	-74.00 dBm	0.12 dB
-80 dBm	-81.00 dBm	-79.94 dBm	-79.00 dBm	0.12 dB
-85 dBm	-86.00 dBm	-85.06 dBm	-84.00 dBm	0.13 dB
-90 dBm	-91.70 dBm	-90.06 dBm	-88.30 dBm	0.13 dB
-95 dBm	-96.70 dBm	-95.13 dBm	-93.30 dBm	0.13 dB
-100 dBm	-101.70 dBm	-100.04 dBm	-98.30 dBm	0.13 dB

교정결과

CALIBRATION RESULT

성적서 번호 : RSKC19-087
Certificate No

페이지(Page) (7) / (총 8)

Test Description	Lower Limit	Measured Value	Upper Limit	Measurement Uncertainty <small>(신뢰수준 약 95 %, k=2)</small>	
6 RF Level Frequency Response <div style="text-align: center;">ALC on P= 0 dBm</div>					
	0.10 MHz	-1.00 dBm	-0.01 dBm	1.00 dBm	0.07 dB
	0.50 MHz	-1.00 dBm	0.08 dBm	1.00 dBm	0.07 dB
	1.00 MHz	-1.00 dBm	0.20 dBm	1.00 dBm	0.07 dB
	3.00 MHz	-1.00 dBm	0.14 dBm	1.00 dBm	0.07 dB
	5.00 MHz	-1.00 dBm	-0.03 dBm	1.00 dBm	0.07 dB
	10.00 MHz	-1.00 dBm	0.19 dBm	1.00 dBm	0.07 dB
	50.00 MHz	-1.00 dBm	0.22 dBm	1.00 dBm	0.07 dB
	100.00 MHz	-1.00 dBm	0.17 dBm	1.00 dBm	0.07 dB
	500.00 MHz	-1.00 dBm	0.32 dBm	1.00 dBm	0.08 dB
	1 000 MHz	-1.00 dBm	0.33 dBm	1.00 dBm	0.08 dB
	1 500 MHz	-1.00 dBm	-0.04 dBm	1.00 dBm	0.08 dB
	2 000 MHz	-1.00 dBm	0.15 dBm	1.00 dBm	0.08 dB
	2 500 MHz	-1.00 dBm	0.11 dBm	1.00 dBm	0.10 dB
	3 000 MHz	-1.00 dBm	0.09 dBm	1.00 dBm	0.10 dB

교정결과

CALIBRATION RESULT

성적서 번호 : RSKC19-087
Certificate No

페이지(Page) (8) / (총 8)

Test Description	Lower Limit	Measured Value	Upper Limit	Measurement Uncertainty <small>(신뢰수준 약 95 %, k=2)</small>
7 LFGEN Frequency Setting deviation from nominal values 0.1 kHz 1 kHz 3 kHz 15 kHz	-0.06 kHz -0.96 kHz -2.96 kHz -14.96 kHz	0.10 kHz 1.00 kHz 3.00 kHz 15.00 kHz	0.14 kHz 1.04 kHz 3.04 kHz 15.04 kHz	0.01 kHz 0.01 kHz 0.01 kHz 0.01 kHz
8 AM Depth LF= 1 kHz, P= 0 dBm 100 MHz 10 % 30 % 50 % 80 % 90 %	8.00 % 24.00 % 40.0 % 64.0 % 72.0 %	10.55 % 31.18 % 51.8 % 82.5 % 92.6 %	12.00 % 36.00 % 60.0 % 96.0 % 108.0 %	0.32 % 0.92 % 1.6 % 2.5 % 2.8 %
9 FM Deviation RF= 100 MHz, LF= 1 kHz 10 kHz 30 kHz 50 kHz 80 kHz 100 kHz	9.60 kHz 28.80 kHz 48.0 kHz 76.8 kHz 96.0 kHz	10.01 kHz 30.11 kHz 50.2 kHz 80.4 kHz 100.5 kHz	10.40 kHz 31.20 kHz 52.0 kHz 83.2 kHz 104.0 kHz	0.28 kHz 0.84 kHz 1.5 kHz 2.3 kHz 2.8 kHz

● 상기 측정기의 불확도는 장기 안정도를 고려하지 않은 결과임. 끝.