

Calibration Certificate

Certificate Number **20-778458**

Kalibrierschein

Zertifikatsnummer

Unit Data

Item
Gegenstand **FSV7 SIGNAL ANALYZER 7GHZ**

Manufacturer
Hersteller **ROHDE & SCHWARZ**

Type
Typ **FSV7**

Material Number **1321.3008K07** **Serial Number** **103941**
Materialnummer Seriennummer

Asset Number
Inventarnummer

Order Data

Customer
Auftraggeber

Order Number **0000414528**
Bestellnummer

Date of Receipt **2019-01-07**
Eingangdatum

Performance

Place and Date of Calibration
Ort und Datum der Kalibrierung

Memmingen, 2019-01-07

Scope of Calibration
Umfang der Kalibrierung

Standard Calibration

Statement of Compliance (Incoming)
Konformitätsaussage (Anlieferung)

New device

Statement of Compliance (Outgoing)
Konformitätsaussage (Auslieferung)

Measurement results within specifications

Extent of Calibration Documents
Umfang des Kalibrierdokuments

2 Pages Calibration Certificate
14 Pages Outgoing Results

Ref.No. 20-778458

Cal. 2019-01-07	Custom. Due Date
--------------------	------------------

 ROHDE & SCHWARZ

This calibration certificate documents, that the named item is tested and measured against defined specifications. Measurement results are located usually in the corresponding interval with a probability of approx. 95% (coverage factor $k = 2$). Calibration is performed with test equipment and standards directly or indirectly traceable by means of approved calibration techniques to the PTB/DKD or other national / international standards, which realize the physical units of measurement according to the International System of Units (SI). In all cases where no standards are available, measurements are referenced to standards of the R&S laboratories. Principles and methods of calibration correspond and are conformant with EN ISO/IEC 17025, ANSI/NCSL Z540.1-1994 and ANSI/NCSL Z540.3-2006. The applied quality system is certified to EN ISO 9001. This calibration certificate may not be reproduced other than in full. Calibration certificates without signatures are not valid. The user is obliged to have the object recalibrated at appropriate intervals.

Dieser Kalibrierschein dokumentiert, dass der genannte Gegenstand nach festgelegten Vorgaben geprüft und gemessen wurde. Die Messwerte lagen im Regelfall mit einer Wahrscheinlichkeit von annähernd 95% im zugeordneten Werteintervall (Erweiterte Messunsicherheit mit $k = 2$). Die Kalibrierung erfolgte mit Messmitteln und Normalen, die direkt oder indirekt durch Ableitung mittels anerkannter Kalibriertechniken rückgeführt sind auf Normale der PTB/DKD oder anderer nationaler/internationaler Standards zur Darstellung der physikalischen Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI). Wenn keine Normale existieren, erfolgt die Rückführung auf Bezugsnormale der R&S-Laboratorien. Grundsätze und Verfahren der Kalibrierung beziehen sich auf und entsprechen EN ISO/IEC 17025, ANSI/NCSL Z540.1-1994 und ANSI/NCSL Z540.3-2006. Das angewandte Qualitätsmanagement-System ist zertifiziert nach EN ISO 9001. Dieser Kalibrierschein darf nur vollständig und unverändert weiterverbreitet werden. Kalibrierscheine ohne Signifizierungen sind ungültig. Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.

Rohde & Schwarz Messgerätebau GmbH

Date of Issue
Ausstellungsdatum

Head of Laboratory
Laborleitung

Person Responsible
Bearbeiter

2019-01-07

Steigmüller

Manuel Böschek

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ver9815/MB0707

Calibration Method 1321.3008.01-PB-01.10
Kalibrieranweisung

Relative Humidity 20%-60%
Relative Luftfeuchte

Ambient Temperature (23⁺⁷₋₃) °C
Umgebungstemperatur

Working standards used (having a significant effect on the accuracy) Verwendete Gebrauchsnormale (mit signifikantem Einfluss auf die Genauigkeit)				
Item Gegenstand	Type Typ	Serial Number Seriennummer	Calibration Certificate Number Kalibrierscheinnummer	Cal. Due Kalibr. bis
Calibration Pulse Gen. CISPR16	IGUU2918	144	0410-D-K-15195-01-00-2017-07	2019-07-31
Therm. Power Sensor DC-18GHz	NRP-Z51	104413	433432-D-K-15195-01-00-2017-07	2019-07-31
Therm.Power Sensor DC-44GHz	NRP-Z55	140076	0232-D-K-15195-01-00-2016-07	2019-07-31
Therm.Power Sensor DC-40GHz	NRP-Z55	100355	0248-D-K-15195-01-00-2016-07	2019-07-31
Power Sensor 9kHz-8GHz	NRP-Z91	200014	433430-D-K-15195-01-00-2017-07	2019-07-31
RF Step Attenuator 139 dB	RSG	100158	0448-D-K-15195-01-00-2017-07	2019-07-31
Standardfrequency unit 1X1	SYSTEM2000	808	663987 D-K-15195-01-00 2017-06	2020-06-30
Vector Network Analyzer 2-Port	ZVA40	100178	0235-D-K-15195-01-00-2017-03	2019-07-31
Calibration Kit TOSM N, 50 Ohm	ZV-Z21	100690	453527 D-K-15195-01-01 2018-02	2019-02-28
Digital Multimeter 6 1/2 Digit	34401A	MY47012836	0180-D-K-15195-01-00-2016-07	2019-07-31

Conformity statements take the measurement uncertainties into account.
Die Konformitätsaussagen berücksichtigen die Messunsicherheiten.

Notes
Anmerkungen

Installed options are included in calibration. Depending on installed options, numbers of pages of the record are not consecutive.

Outgoing Results

The following abbreviations may be used in this document

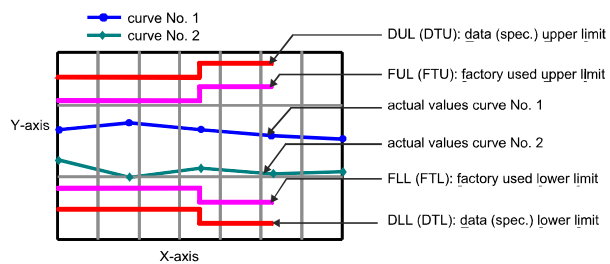
- {a} No measurement uncertainty stated because the errors always add together. So it is sure that a measurement result evaluated as "PASS" is pass.
- {b} The measurement uncertainty depends on the measurement result. The stated measurement uncertainty is valid for the close area around the specification. Measurement results outside the close area have a higher measurement uncertainty but are within the specification.
- {c} Functional test, therefore no measurement uncertainty is stated.
- {d} Typical value, refer to performance test.
- {e} The measurement uncertainty is taken into account when setting the measuring system.

DL or DT	Data Limit for symmetrical tolerance limits
DLL	Datasheet Lower Limit
DUL	Datasheet Upper Limit
MU	Symmetrical Measurement Uncertainty
MLL or MLV	Measurement Uncertainty Lower Value
MUL or MUV	Measurement Uncertainty Upper Value
Nom.	Nominal Value
Dev.	Deviation
Act.	Actual Value
UGB	Uncertainty Guard Band: Measuring uncertainty violates the data (spec.) limit.
UGB1	A compliance statement may be possible where a confidence level of less than 95 % is acceptable.
UGB2	A non-compliance statement may be possible where a confidence level of less than 95 % is acceptable.
DU	Datasheet Uncertainty

Explanation of charts

1. In case uncertainties are part of the appendix

factory used limit = data specification - uncertainty of actual value



2. In case uncertainties are part of the respective graphic

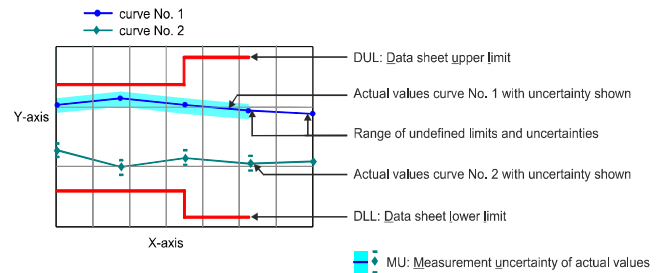


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Software used for measurement			
Item	Type	Version	Remark
7010.2181.00_FSV.G5Lim	Limit File	2018-08-27 12:56	Test Management Software G5
Suite	Setup	V11.35.02	
Test Program (7010.2181.00)	Component	V01.11.49	

1. General function tests

Selftest successful	pass	pass
Self Alignment successful	pass	pass

2. Checking the reference frequency uncertainty

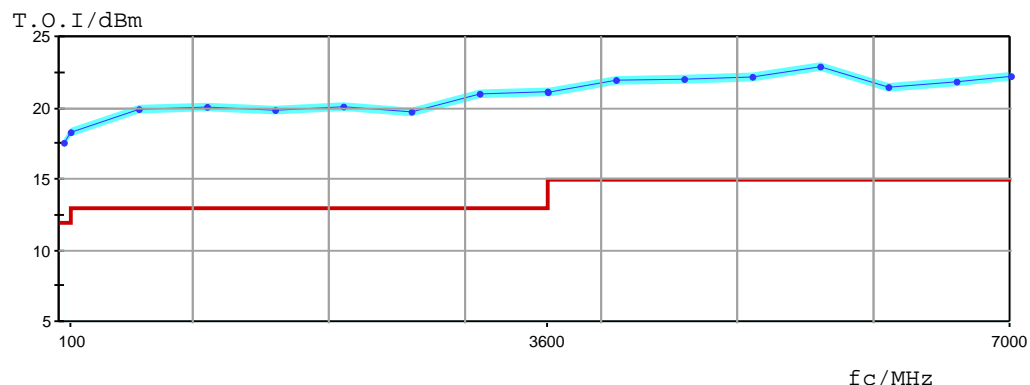
	Option B4 not installed			
	DL		Actual	MU
Error of internal 10 MHz	+10.000 Hz..	-10.000 Hz	+0.600 Hz	0.012 Hz

3. Immunity to interference

fc	f of interfer	signal Type	DLL	Actual	MU
101.0 MHz	1560.8 MHz	2nd IF image	80 dB	113.73 dB	3.10 dB
1799.0 MHz	3258.8 MHz	2nd IF image	80 dB	112.66 dB	3.10 dB
3599.0 MHz	5058.8 MHz	2nd IF image	80 dB	111.40 dB	3.10 dB
5299.0 MHz	6758.8 MHz	2nd IF image	80 dB	110.78 dB	3.10 dB
6999.0 MHz	8458.8 MHz	2nd IF image	80 dB	108.26 dB	3.10 dB
101.0 MHz	280.8 MHz	3rd IF image	80 dB	114.23 dB	3.10 dB
3599.0 MHz	3778.8 MHz	3rd IF image	80 dB	108.90 dB	3.10 dB
6999.0 MHz	7178.8 MHz	3rd IF image	80 dB	108.15 dB	3.10 dB
101.0 MHz	729.9 MHz	2nd IF rejection	80 dB	112.74 dB	3.10 dB
3599.0 MHz	729.9 MHz	2nd IF rejection	80 dB	112.72 dB	3.10 dB
5299.0 MHz	729.9 MHz	2nd IF rejection	80 dB	110.88 dB	3.10 dB
6999.0 MHz	729.9 MHz	2nd IF rejection	80 dB	107.97 dB	3.10 dB
1001.0 MHz	89.9 MHz	3rd IF rejection	80 dB	111.45 dB	3.10 dB

4. Third-order intercept point (TOI)

F_s1	F_s2	DLL	Actual	MU
10.15 MHz	10.25 MHz	+12.0 dBm	22.0 dBm	0.3 dB



5. Resolution bandwidths

5.1 Bandwidth switching level uncertainty (sweep mode)

reference is 10.0 kHz RBW

Bandwidth	DL	Actual	MU
28.0 MHz	0.1 dB	-0.02 dB	0.01 dB
20.0 MHz	0.1 dB	-0.01 dB	0.01 dB
10.0 MHz	0.1 dB	-0.05 dB	0.01 dB
5.0 MHz	0.1 dB	-0.03 dB	0.01 dB
3.0 MHz	0.1 dB	-0.01 dB	0.01 dB
2.0 MHz	0.1 dB	-0.01 dB	0.01 dB
1.0 MHz	0.1 dB	-0.03 dB	0.01 dB
500 kHz	0.1 dB	-0.03 dB	0.01 dB
300 kHz	0.1 dB	-0.03 dB	0.01 dB
200 kHz	0.1 dB	-0.03 dB	0.01 dB
100 kHz	0.1 dB	-0.03 dB	0.01 dB
10 kHz	0.1 dB	0.00 dB	0.01 dB
1 kHz	0.1 dB	-0.03 dB	0.01 dB
100 Hz	0.1 dB	-0.03 dB	0.01 dB

6. Bandwidth switching level uncertainty (FFT mode)

6.1 Bandwidth switching level uncertainty (FFT mode)

reference is 10.0 kHz RBW (sweep mode)

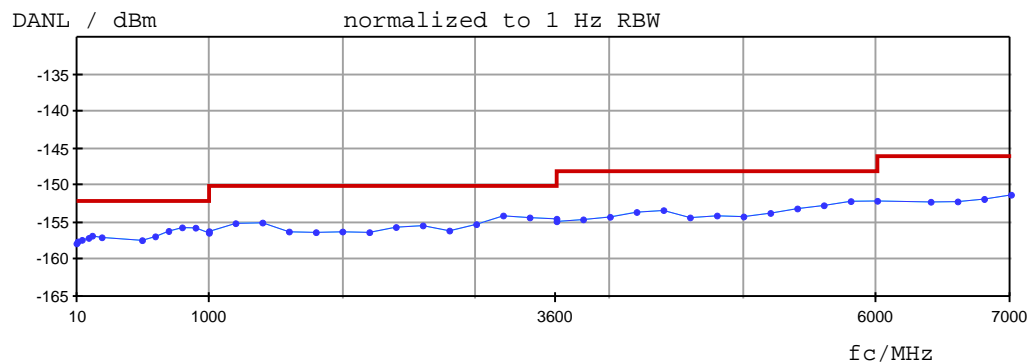
Bandwidth	DL	Actual	MU
300 kHz	0.2 dB	0.01 dB	0.01 dB
200 kHz	0.2 dB	0.01 dB	0.01 dB
100 kHz	0.2 dB	0.01 dB	0.01 dB
10 kHz	0.2 dB	0.00 dB	0.01 dB
1 kHz	0.2 dB	0.00 dB	0.01 dB
100 Hz	0.2 dB	0.00 dB	0.01 dB

7. Spurious response

fc	DUL	Actual	MU
16.000 MHz	-103 dBm	-116.2 dBm	1.6 dB
32.000 MHz (reference/4)	-103 dBm	-115.5 dBm	0.8 dB
64.000 MHz (reference/2)	-103 dBm	-115.8 dBm	0.8 dB
128.000 MHz (reference)	-103 dBm	-116.6 dBm	1.6 dB
256.000 MHz (reference*2)	-103 dBm	-117.0 dBm	1.6 dB
384.000 MHz (reference*3)	-103 dBm	-115.4 dBm	0.8 dB

8. Displayed average noise level (DANL)

fc	DUL	Actual	MU
9 kHz (1 Hz BW)	-130 dBm	-145.63 dBm	0.01 dB
99 kHz (1 Hz BW)	-130 dBm	-153.57 dBm	0.01 dB
999 kHz (1 Hz BW)	-145 dBm	-157.16 dBm	0.01 dB

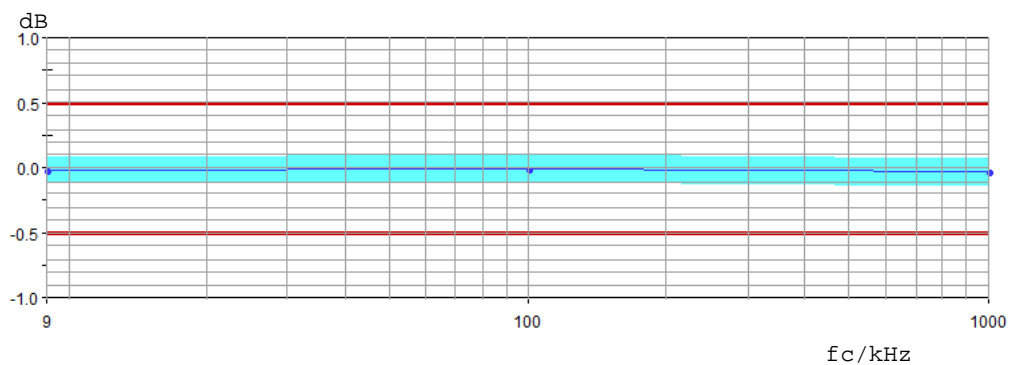


9. Absolute level uncertainty at 64 MHz and frequency response

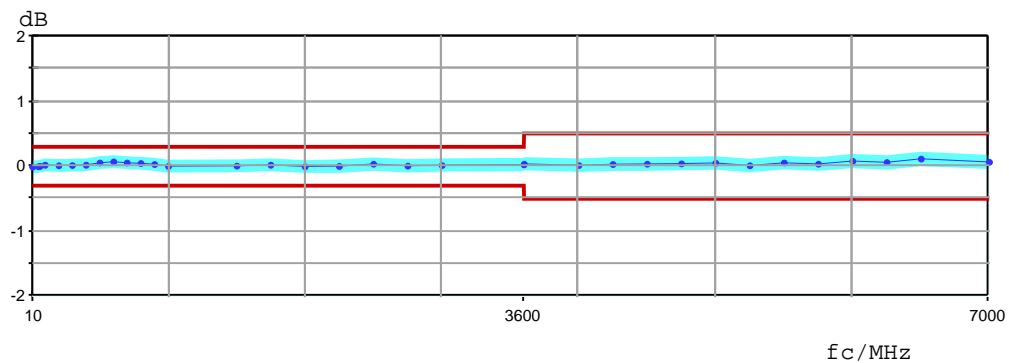
9.1 Absolute level uncertainty at 64 MHz

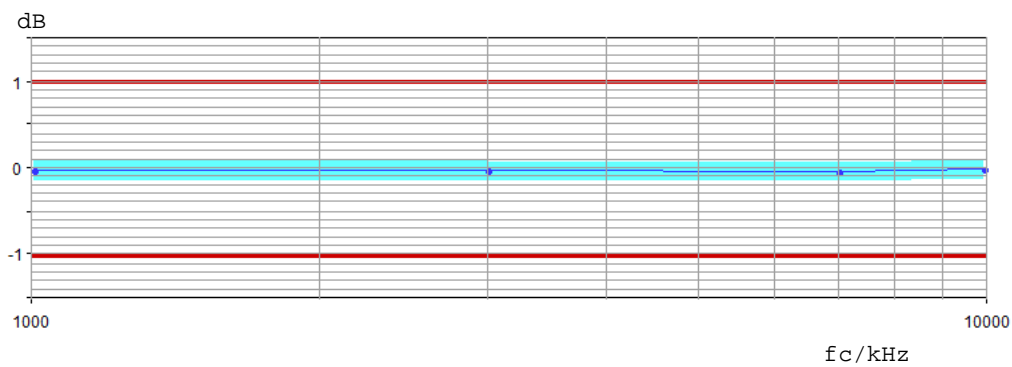
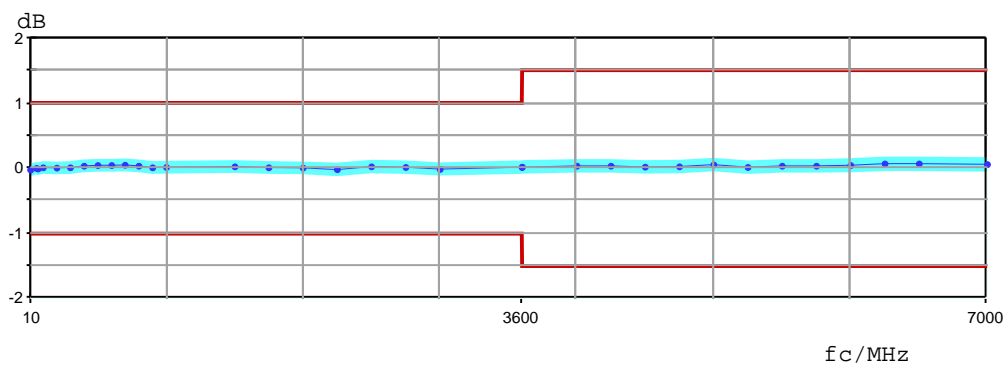
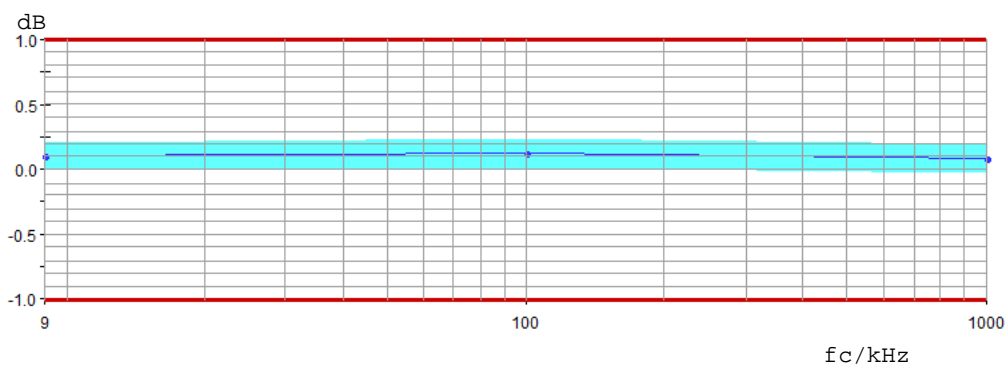
fc	DL	Actual	MU
64 MHz	0.20 dB	-0.01 dB	0.08 dB

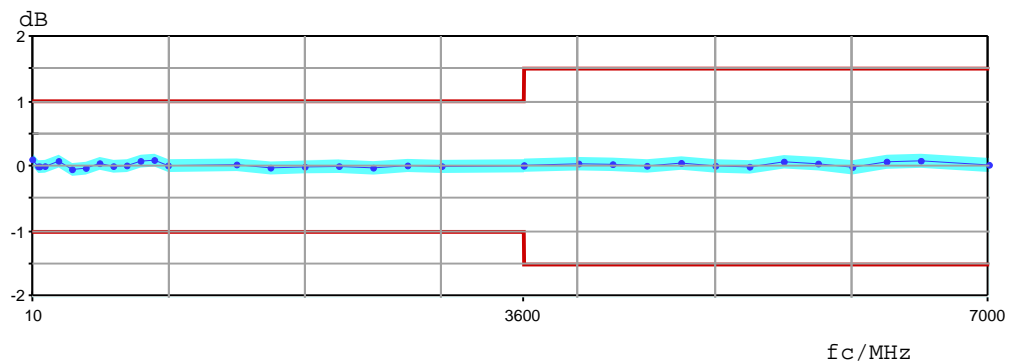
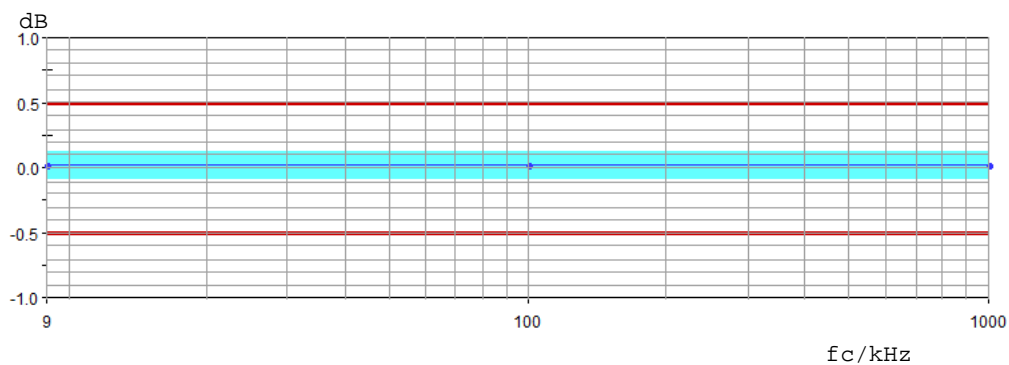
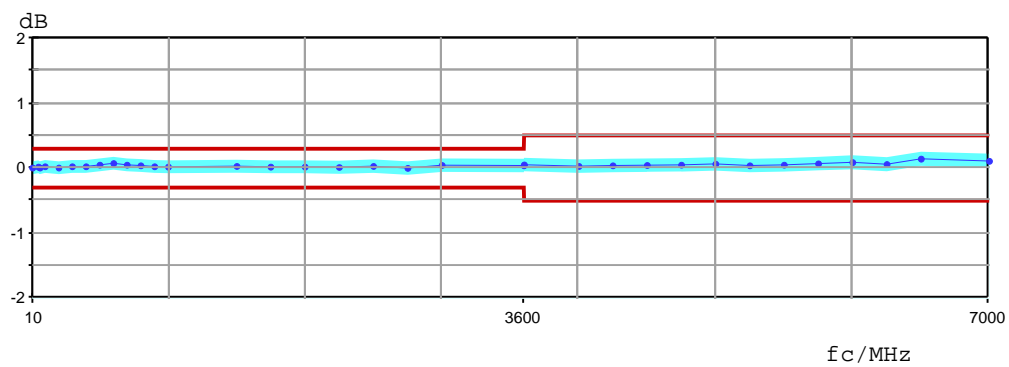
9.2 RF attenuation 10 dB, DC coupled

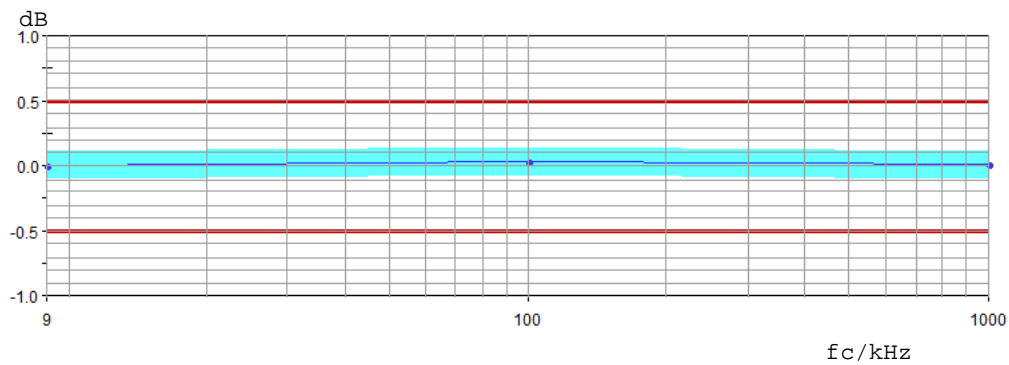
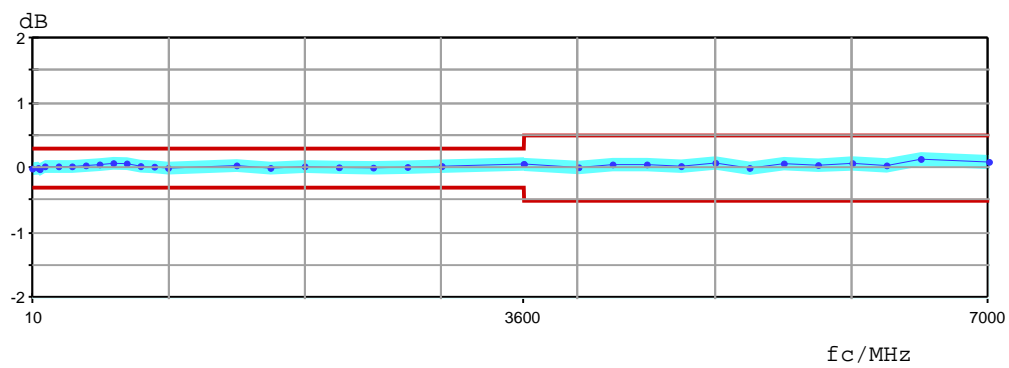
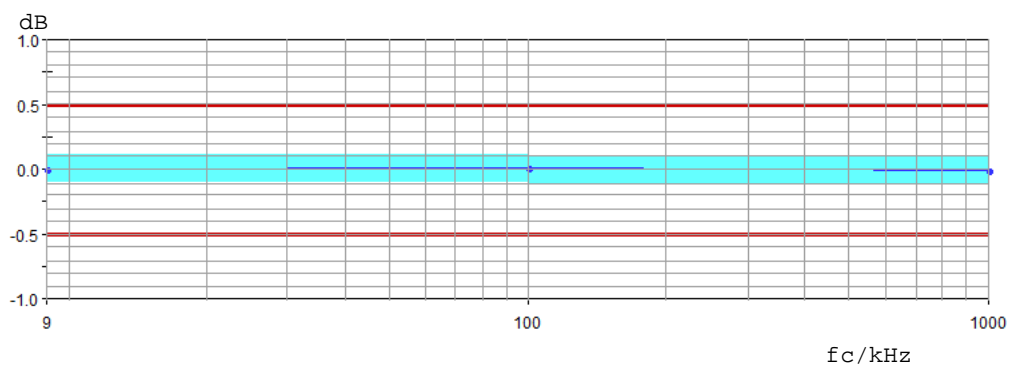


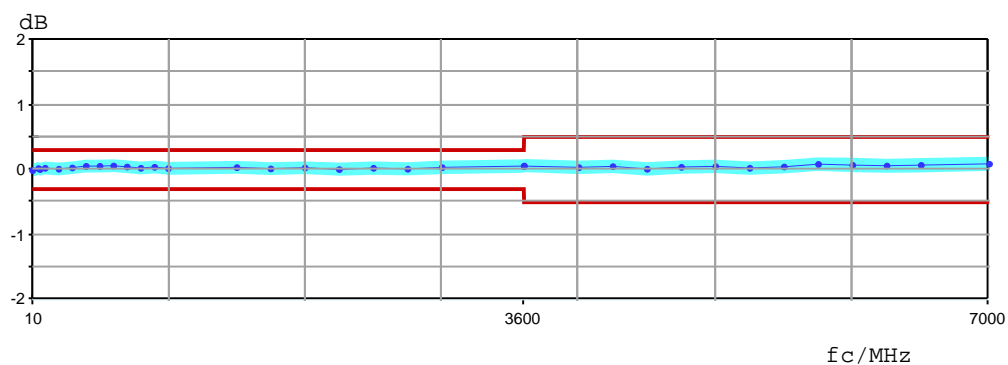
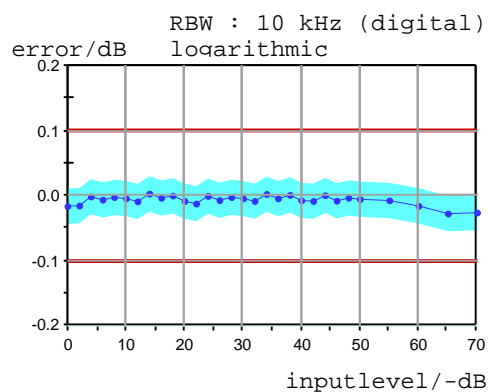
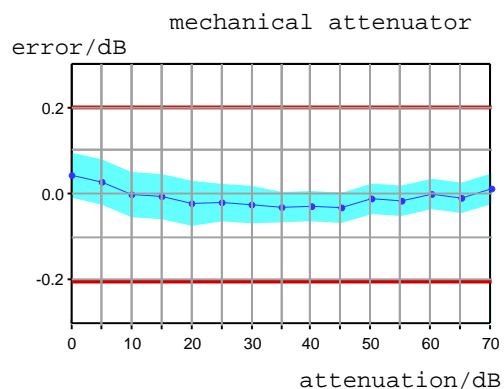
9.3 RF attenuation 10 dB, DC coupled



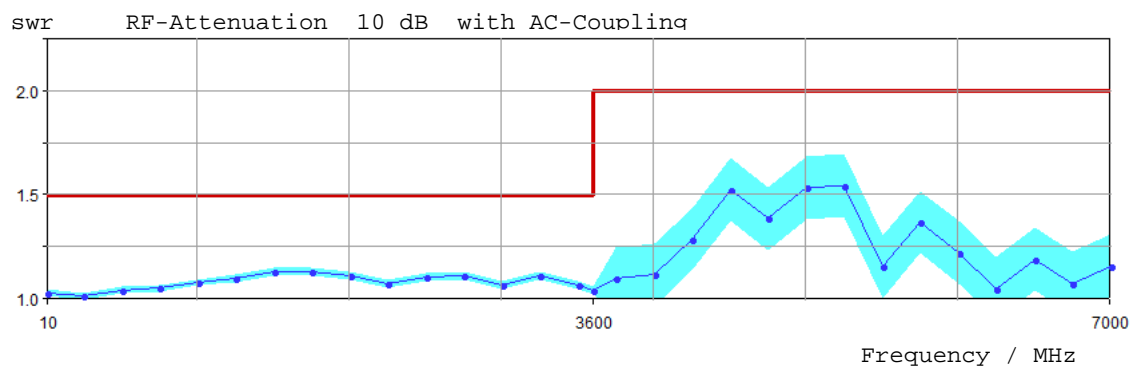
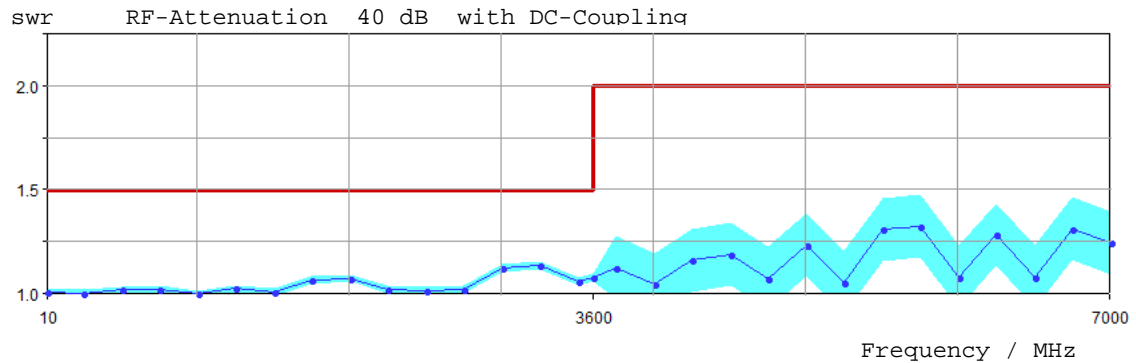
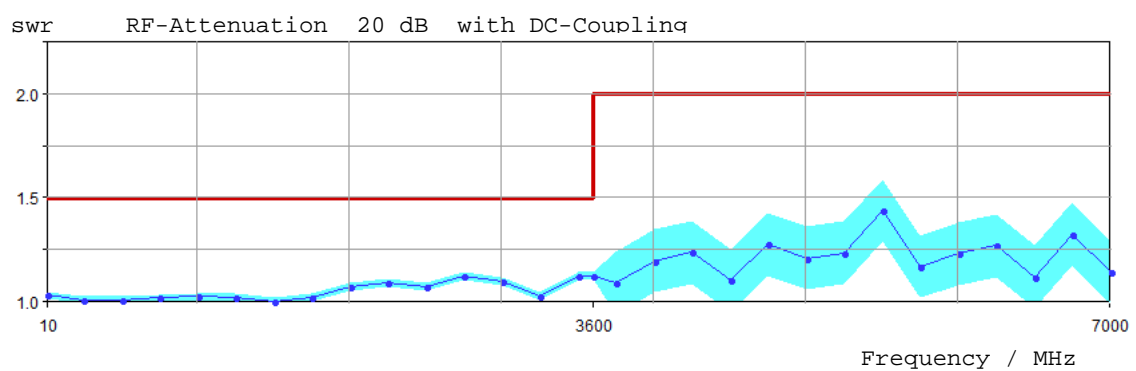
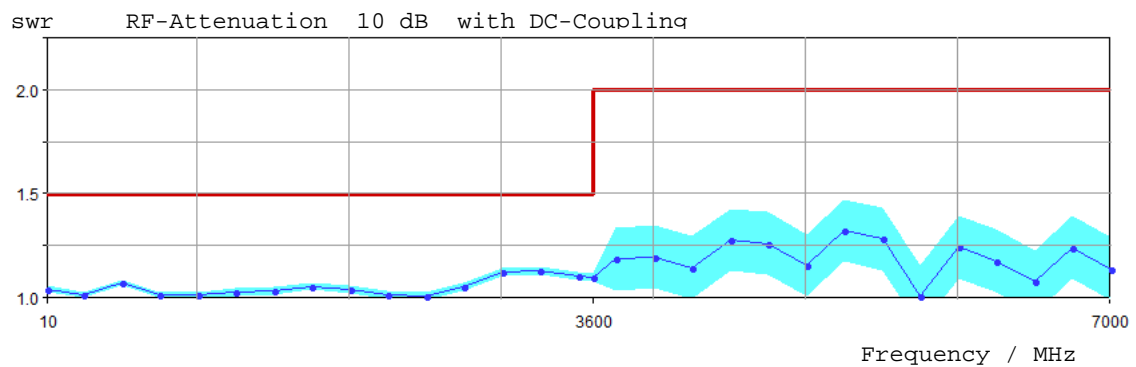
9.4 RF attenuation 10 dB, AC coupled**9.5 RF attenuation 10 dB, AC coupled****9.6 RF attenuation 5 dB, DC coupled**

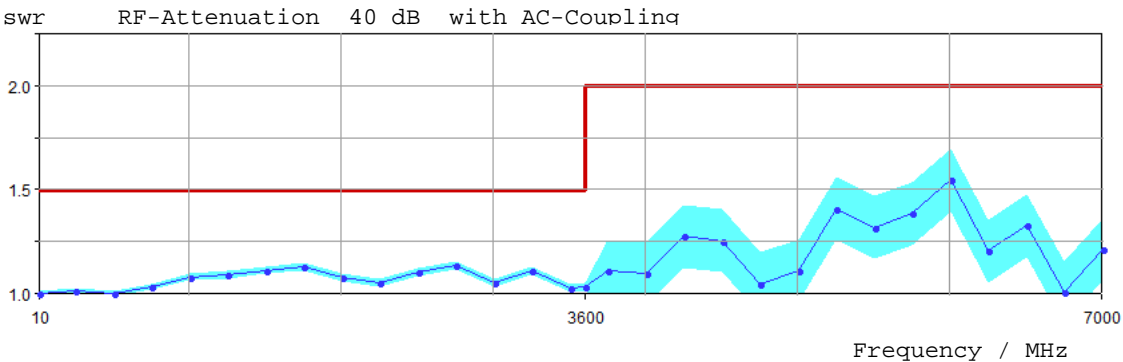
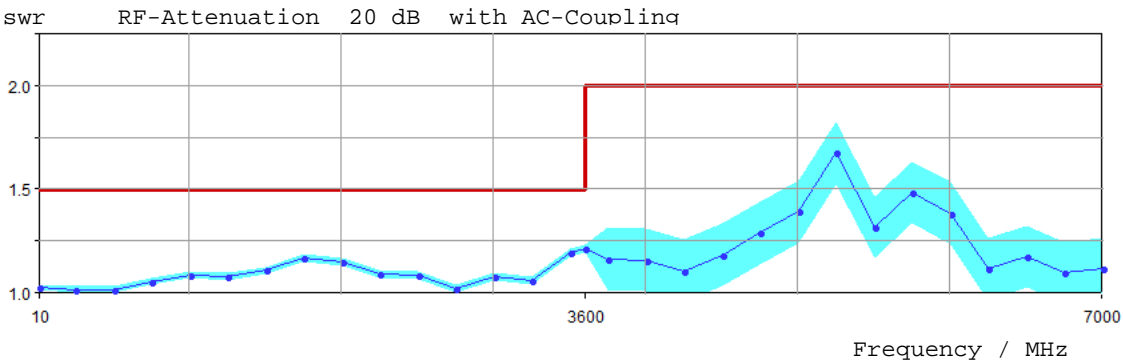
9.7 RF attenuation 5 dB, DC coupled**9.8 RF attenuation 20 dB, DC coupled****9.9 RF attenuation 20 dB, DC coupled**

9.10 RF attenuation 30 dB, DC coupled**9.11 RF attenuation 30 dB, DC coupled****9.12 RF attenuation 40 dB, DC coupled**

9.13 RF attenuation 40 dB, DC coupled**10. Display nonlinearity****11. Attenuator switching uncertainty****12. Checking the Phase Noise**

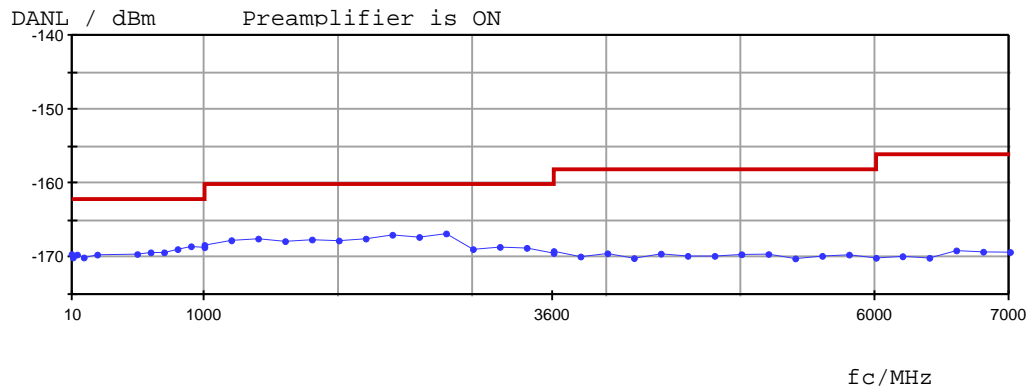
carrier	carrier offset	DUL / dBc (1Hz)	Actual/ dBc (1Hz)	
500.0 MHz	1.0 MHz	-134	-138.86	{e}
500.0 MHz	96.0 kHz	-115	-119.24	{e}
500.0 MHz	10.0 kHz	-106	-120.13	{e}
500.0 MHz	1.0 kHz	-101	-113.07	{e}
500.0 MHz	100 Hz	-84	-92.55	{e}

13. VSWR at RF input



14. Displayed average noise level (FSV-B22)

f _c		DUL	Actual	MU
101 kHz	(1 Hz BW)	-150 dBm	-165.78 dBm	0.01 dB
999 kHz	(1 Hz BW)	-150 dBm	-168.37 dBm	0.01 dB



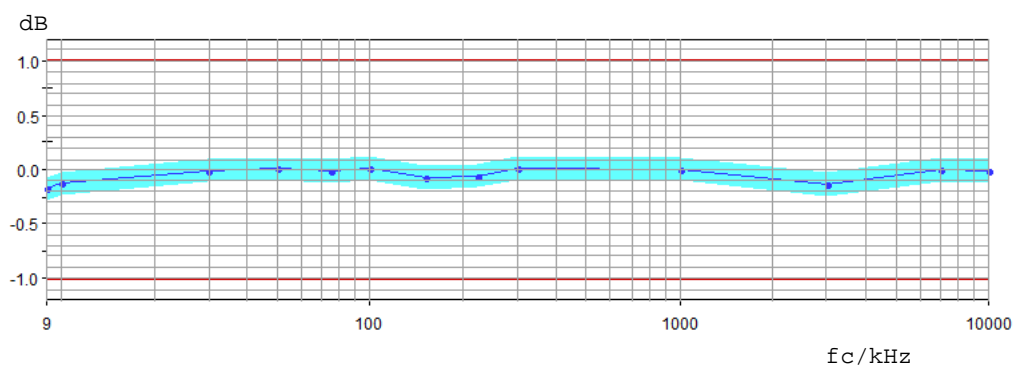
* Measurement uncertainty = 0.01 dB

15. Reference error at 64 MHz and frequency response (FSV-B22)

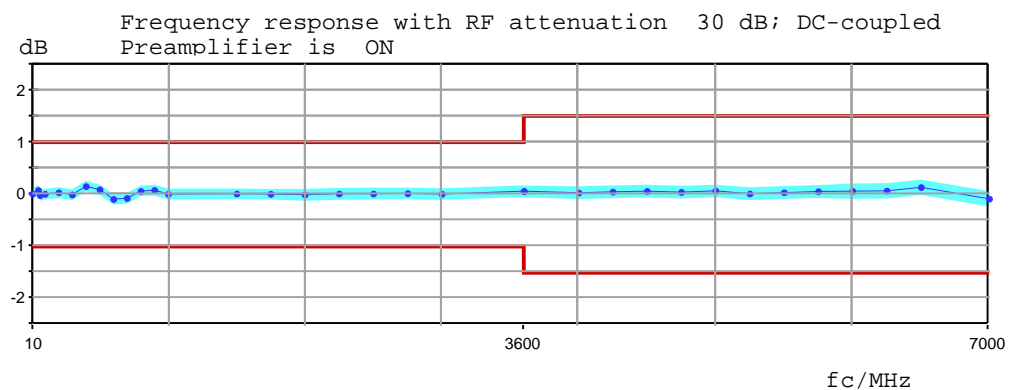
15.1 Reference error at 64 MHz (Preamp ON)

f _c	DL	Actual	MU
64 MHz	0.20 dB	0.02 dB	0.08 dB

15.2 Frequency response < 10MHz



15.3 Frequency response



16. Displayed average noise level (DANL, FSV-B29)

fc			DUL	Actual	MU
20	Hz	(1 Hz BW)	-100 dBm	-121.37 dBm	0.01 dB
80	Hz	(1 Hz BW)	-110 dBm	-126.98 dBm	0.01 dB
1010	Hz	(1 Hz BW)	-120 dBm	-137.59 dBm	0.01 dB

17. Frequency response (FSV-B29)

17.1 RF attenuation 10 dB, DC coupled

