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**Deutsche Akkreditierungsstelle GmbH**

als Kalibrierlaboratorium im / *as calibration laboratory in the*



Deutsche  
Akkreditierungsstelle  
D-K-15195-01-01

**Deutschen Kalibrierdienst**



Kalibrierschein  
*Calibration certificate*

Kalibrierzeichen  
*Calibration mark*

518327
D-K- 15195-01-01
2019-09

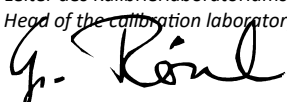
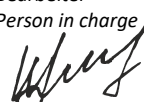
Gegenstand <i>Object</i>	<b>FSW43 SPECTRUM ANALYZER 43GHZ</b>
Hersteller <i>Manufacturer</i>	<b>ROHDE &amp; SCHWARZ</b>
Typ <i>Type</i>	<b>FSW43</b>
Fabrikat/Serien-Nr. <i>Serial number</i>	<b>100560</b>
Auftraggeber <i>Customer</i>	<b>RISE Research Institutes of Sweden AB</b>
	<b>Brinellgatan 4 504 62 Borås SE</b>
Auftragsnummer <i>Order No.</i>	<b>226306</b>
Anzahl der Seiten des Kalibrierscheines <i>Number of pages of the certificate</i>	<b>3 Certificate 18 Outgoing Results 18 Incoming Results</b>
Datum der Kalibrierung <i>Date of calibration</i>	<b>2019-09-20</b>

Dieser Kalibrierschein dokumentiert die Rückführung auf nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem (SI). Die DAkKS ist Unterzeichner der multilateralen Übereinkommen der European co-operation for Accreditation (EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der Kalibrierscheine. Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.

*This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI). The DAkKS is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration certificates. The user is obliged to have the object recalibrated at appropriate intervals.*

Dieser Kalibrierschein darf nur vollständig und unverändert weiterverbreitet werden. Auszüge oder Änderungen bedürfen der Genehmigung sowohl der Deutschen Akkreditierungsstelle GmbH als auch des ausstellenden Kalibrierlaboratoriums. Kalibrierscheine ohne Unterschrift haben keine Gültigkeit.

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Datum <i>Date</i>	Leiter des Kalibrierlaboratoriums <i>Head of the calibration laboratory</i>	Bearbeiter <i>Person in charge</i>
2019-09-23	 Gerhard Rösel	 Wladimir Winitschenko

**Object** FSW43 SPECTRUM ANALYZER 43GHZ  
**Type** FSW43 **Serial No.** 100560  
**Date** 2019-09-23 **Material No.** 1312.8000K43  
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### Place of Calibration

87700 Memmingen, Rohde-und-Schwarz-Str. 1

### Calibration Procedure

The calibration of the object can be classified as a direct measurement. Frequency was compared using a GPS synchronized rubidium oscillator. RF power was measured with a power standard. Linearity was compared with a precision step attenuator. Reflection was measured using a Vector Network Analyzer, calibrated with a calibration kit. The calibrations and measurements follow the guideline VDI/VDE/DGQ/DKD 2622 Part 11 (2003-09).

Only option K54Cal:

CISPR detectors were measured using either a CISPR Pulse Generator or a pulsed RF generator.

The traceability is represented in the table Working Standards used.

### Calibration Method

**See first page of Outgoing Results**

### Statement of Compliance

Incoming: Defective

Outgoing: All measured values are within the data sheet specifications.

### Working Standards used

Item	Type	Serial Number	Calibration Certificate Number	Cal. Due
Signal/Spectrum Analyser	FSW8	104028	520499 D-K-15195-01-01 2019-08	2021-02-28
Calibration Pulse Gen. CISPR16	IGUU2918	100972	466177-D-K-15195-01-01-2018-05	2019-11-30
Modular Frequency System	MFS	6509/001	0515-D-K-15195-01-00-2017-01	2020-01-31
Average Power Sensor	NRP18A	101039	705484-D-K-15195-01-01-2018-01	2019-09-30
Average Power Sensor	NRP18A	101038	705267-D-K-15195-01-01-2018-01	2019-09-30
Thermal Sensor DC to 18 GHz	NRP18T	101321	705443-D-K-15195-01-01-2018-01	2019-09-30
Thermal Power Sensor	NRP40T	101049	705458-D-K-15195-01-01-2018-01	2019-09-30
Step Attenuator 139dB 6GHz	RSC	101663	459025-D-K-15195-01-01-2018-03	2019-09-30
Vect. Netw. Analyzer 2PORT	ZNB40	101701	451053-D-K-15195-01-01-2018-01	2019-09-30
SWR Bridge 40kHz - 4GHz 50 Ohm	ZRC	100117	455595 D-K-15195-01-01 2018-02	2019-09-30
Calibration Kit 2,92mm	ZV-Z229	101058	493641 D-K-15195-01-01 2019-01	2020-01-31
Calibration Kit 18GHz N-Typ	ZV-Z270	101071	493642-D-K-15195-01-01-2019-01	2020-01-31
Digital Multimeter 8 1/2 Digit	3458A	MY45054232	454224-D-K-15012-01-00-2018-02	2019-09-30

### International Standard

Only option K54Cal:

This calibration fulfils the requirements of the standard IEC CISPR 16-1-1, Edition 3.2, 2014-06.

**Object** FSW43 SPECTRUM ANALYZER 43GHZ  
**Type** FSW43 **Serial No.** 100560  
**Date** 2019-09-23 **Material No.** 1312.8000K43  
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### Measurement Uncertainty

The expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor  $k = 2$ . It was determined in accordance with DAkkS-DKD-3. The true value is located in the corresponding interval with a probability of 95 %.

### Environmental Conditions

Ambient Temperature  $(23 \pm 3) ^\circ\text{C}$  Relative Humidity 20%-70%

### Ancillary Functional Measurements

In addition to the calibration results, the calibration certificate includes functional measurements that might have an influence on the measurement uncertainty of the calibration results. The functional measurement results are marked and are not intended to be used to support the further dissemination of metrological traceability. They are intended to verify the requirements on the measurement object according to manufacturer specifications and technical standards.

### Comments on Measurement Results

The measurement results in the test report stated below have been tested for compliance with the given specifications and marked if necessary. The associated uncertainty of measurement has been taken into account. Measurement results that are not covered by the DAkkS accreditation are marked with <sup>1</sup>.

Ref.: ILAC-G8:03/2009 'Guidelines on the Reporting of Compliance with Specification'.

# Outgoing Results

**Designation:** Signal Analyzer  
**Type:** FSW-43  
**Material No.:** 1312.8000K43  
**Serial No.:** 100560  
**Certificate No.:** 518327 D-K-15195-01-01 2019-09  
**Referring to Test Documentation:** 1312.8000.01-PB-02.28

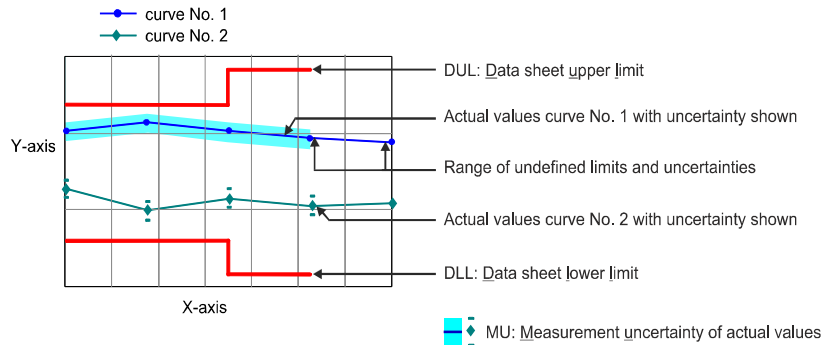
**Test Department:** 3MES2  
**Name:** See certificate  
**Date:** 2019-09-20

**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.

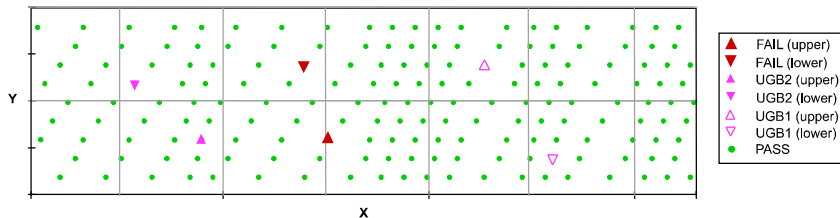
DL or DT	Data Limit for symmetrical tolerance limits
DLL	Datasheet Lower Limit
DUL	Datasheet Upper Limit
MU	Symmetrical Measurement Uncertainty
MLL or MLV	Measurement Uncertainty Lower Value
MUL or MUV	Measurement Uncertainty Upper Value
Nom.	Nominal Value
Dev.	Deviation
Act.	Actual Value
UGB	Uncertainty 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**



**Explanation of the compact 2D chart**

Only the status and the position of the measured point is represented, e.g. "PASS" at frequency X and level measurement Y.



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<b>Software used for measurement</b>			
<b>Item</b>	<b>Type</b>	<b>Version</b>	<b>Remark</b>
7010.2181.00_FSW.G5Lim Suite Test Program (7010.2181.00)	Limit File Setup Component	2019-09-17 06:15 V11.37.05 V01.12.30	Test Management Software G5



### 1. General function tests

Selftest successful	pass	pass
Self Alignment successful	pass	pass

### 2. Checking the reference frequency uncertainty

	DUL	DLL	Actual	MU
Error of internal 10 MHz	1.00 Hz..	-1.00 Hz	+0.0200 Hz	0.0120 Hz

### 3. Immunity to interference

#### 3.1 2nd IF Image Frequency Rejection

IF2 = 1317.0 MHz				
fc	DLL	Actual	MU	
1000.0 MHz	90 dB	110.9 dB	3.1 dB	
9000.0 MHz	90 dB	109.6 dB	4.1 dB	

#### 3.2 3rd IF Image Frequency Rejection

IF3 = 37.0 MHz				
fc	DLL	Actual	MU	
63.0 MHz	90 dB	113.4 dB	3.1 dB	
100.0 MHz	90 dB	113.3 dB	3.1 dB	
900.0 MHz	90 dB	111.4 dB	3.1 dB	
1100.0 MHz	90 dB	113.2 dB	3.1 dB	
7990.0 MHz	90 dB	111.7 dB	3.1 dB	

#### 3.3 2nd IF Rejection

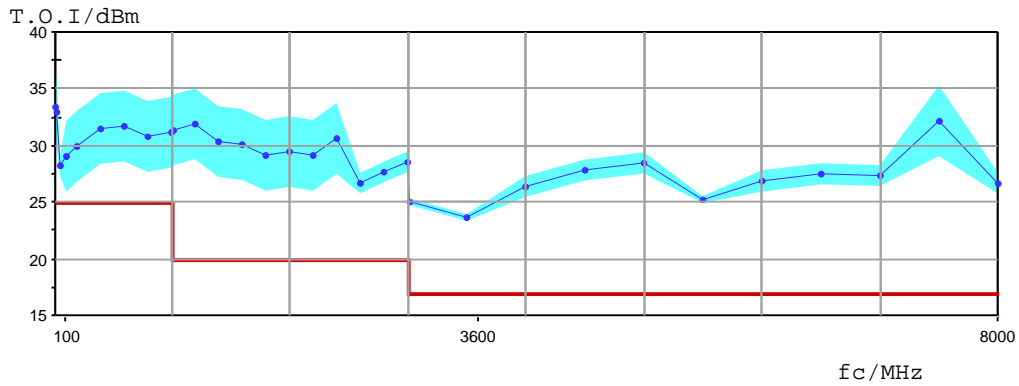
IF2 = 1317.0 MHz				
fc	DLL	Actual	MU	
50.0 MHz	90 dB	113.3 dB	3.1 dB	
200.0 MHz	90 dB	111.8 dB	3.1 dB	
500.0 MHz	90 dB	111.5 dB	3.1 dB	
900.0 MHz	90 dB	111.1 dB	3.1 dB	
1100.0 MHz	90 dB	113.1 dB	3.1 dB	
7990.0 MHz	90 dB	111.4 dB	3.1 dB	
9000.0 MHz	90 dB	110.9 dB	4.1 dB	
12000.0 MHz	90 dB	109.3 dB	4.1 dB	
25000.0 MHz	90 dB	103.4 dB	4.1 dB	
38000.0 MHz	90 dB	103.8 dB	4.1 dB	

#### 3.4 3rd IF Rejection

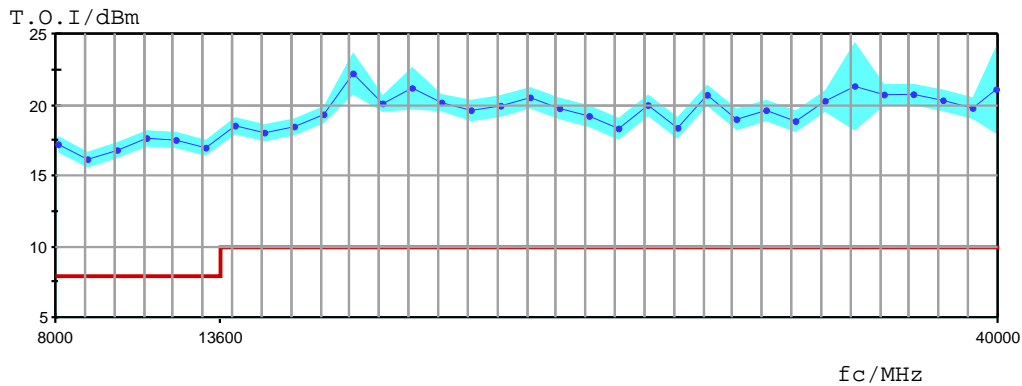
IF3 = 37.0 MHz

fc	DLL	Actual	MU
100.0 MHz	90 dB	112.4 dB	3.1 dB
200.0 MHz	90 dB	112.2 dB	3.1 dB
500.0 MHz	90 dB	111.3 dB	3.1 dB
900.0 MHz	90 dB	111.4 dB	3.1 dB
1100.0 MHz	90 dB	113.0 dB	3.1 dB
7990.0 MHz	90 dB	110.2 dB	3.1 dB
9000.0 MHz	90 dB	110.8 dB	4.1 dB
12000.0 MHz	90 dB	109.9 dB	4.1 dB
25000.0 MHz	90 dB	103.6 dB	4.1 dB
38000.0 MHz	90 dB	103.7 dB	4.1 dB

#### 4. Third-order intercept point (TOI)



#### 5. Third-order intercept point (TOI) > 8 GHz



#### 6. Second harmonic intercept (SHI)

fin	DLL	Actual	MU
9.0 MHz	45.0 dBm	51.6 dBm	0.6 dB
21.0 MHz	45.0 dBm	49.3 dBm	0.6 dB
106.0 MHz	45.0 dBm	51.2 dBm	0.6 dB
274.0 MHz	45.0 dBm	60.3 dBm	0.6 dB
449.9 MHz	45.0 dBm	58.8 dBm	0.6 dB
699.9 MHz	47.0 dBm	68.7 dBm	0.6 dB
999.9 MHz	47.0 dBm	69.3 dBm	0.6 dB
1499.9 MHz	47.0 dBm	77.7 dBm	0.6 dB
1749.9 MHz	62.0 dBm	77.3 dBm	0.6 dB
2699.9 MHz	62.0 dBm	77.3 dBm	0.6 dB
3449.9 MHz	62.0 dBm	78.8 dBm	0.6 dB

**7. Second harmonic intercept (SHI) high pass filter "ON"**

fin	DLL	Actual	MU
699.9 MHz	52.0 dBm	60.9 dBm	0.6 dB
1499.9 MHz	52.0 dBm	77.1 dBm	0.6 dB

**8. Checking IF Filters**

**8.1 Checking the bandwidth switching level uncertainty**

reference is 10.0 kHz RBW

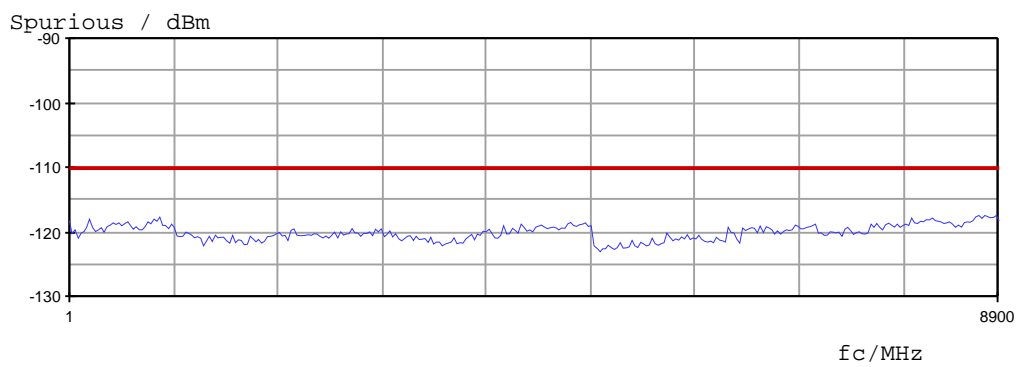
Bandwidth	DL	Actual	MU
10.0 MHz	0.1 dB	-0.04 dB	0.01 dB
1.0 MHz	0.1 dB	-0.01 dB	0.01 dB
100 kHz	0.1 dB	-0.01 dB	0.01 dB
10 kHz	0.1 dB	0.00 dB	0.01 dB
1 kHz	0.1 dB	0.01 dB	0.01 dB
100 Hz	0.1 dB	-0.01 dB	0.01 dB

**8.2 Checking the bandwidth switching level uncertainty with option FSW-B8**

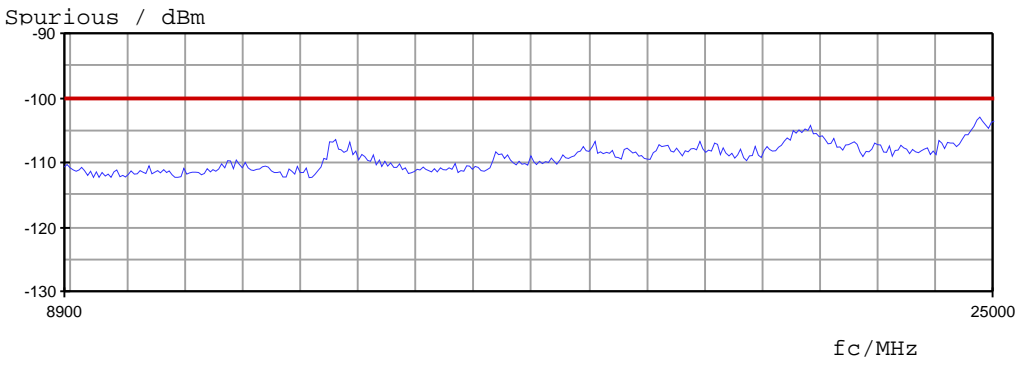
reference is 10.0 kHz RBW

Bandwidth	DL	Actual	MU
20.0 MHz	0.1 dB	-0.03 dB	0.01 dB
28.0 MHz	0.1 dB	-0.03 dB	0.01 dB
50.0 MHz	0.1 dB	-0.03 dB	0.01 dB
80.0 MHz	0.1 dB	-0.03 dB	0.01 dB

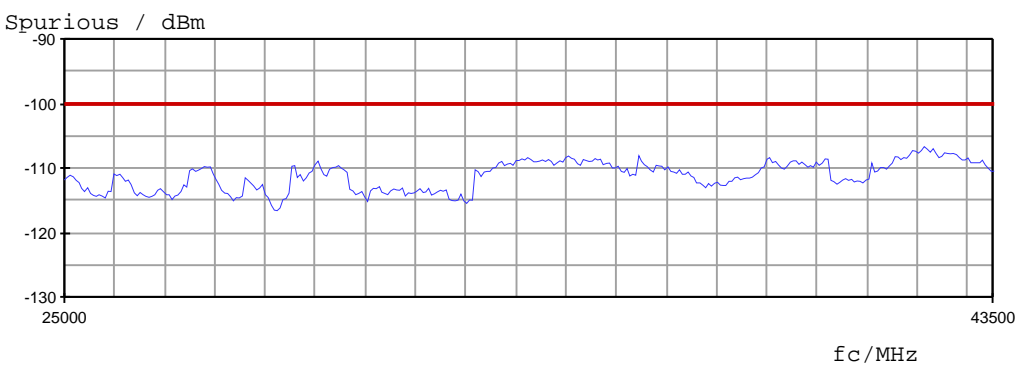
**9. Spurious response 1 MHz.. 8.9 GHz**



**10. Spurious response 8.9 GHz .. 25.0 GHz**

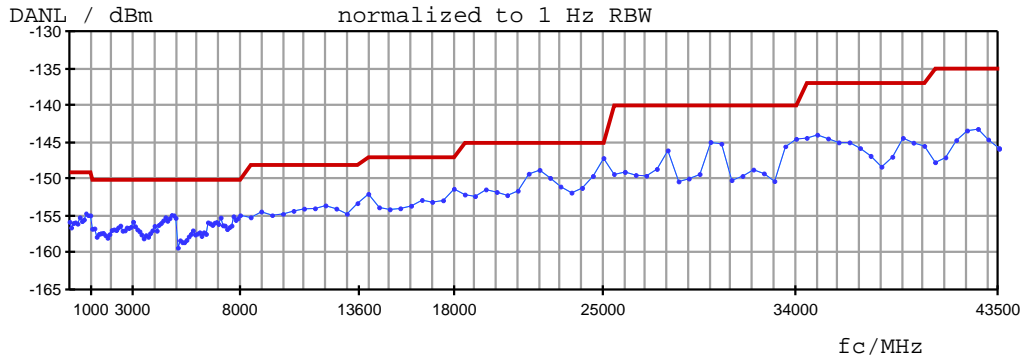


**11. Spurious response 25.0 GHz .. 43.5 GHz**

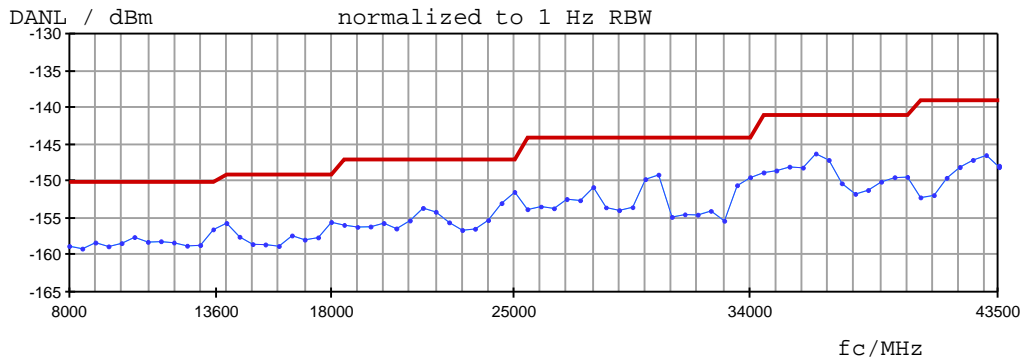


**12. Displayed average noise level (DANL)**

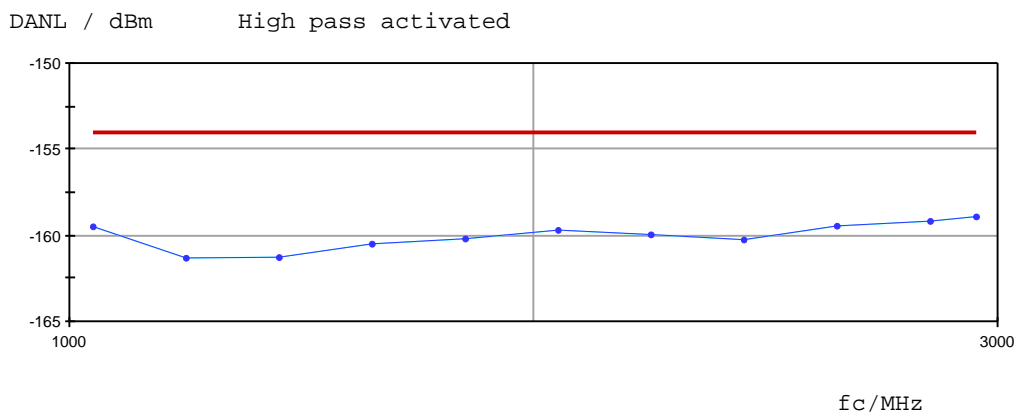
fc	DUL	Actual	MU
2 Hz (1 Hz BW)	-110 dBm	-122.47 dBm	0.01 dB
10 Hz (1 Hz BW)	-110 dBm	-129.66 dBm	0.01 dB
30 Hz (1 Hz BW)	-110 dBm	-121.99 dBm	0.01 dB
98 Hz (1 Hz BW)	-110 dBm	-137.05 dBm	0.01 dB
300 Hz (1 Hz BW)	-120 dBm	-139.56 dBm	0.01 dB
980 Hz (1 Hz BW)	-120 dBm	-142.41 dBm	0.01 dB
fc	DUL	Actual	MU
9.8 kHz (1 Hz BW)	-145 dBm	-150.04 dBm	0.01 dB
98 kHz (1 Hz BW)	-145 dBm	-151.35 dBm	0.01 dB
998 kHz (1 Hz BW)	-145 dBm	-154.30 dBm	0.01 dB
9800 kHz (1 Hz BW)	-149 dBm	-155.20 dBm	0.01 dB



### 13. Displayed average noise level (DANL) YIG OFF



### 14. Displayed average noise level (DANL) (FSW-B13)

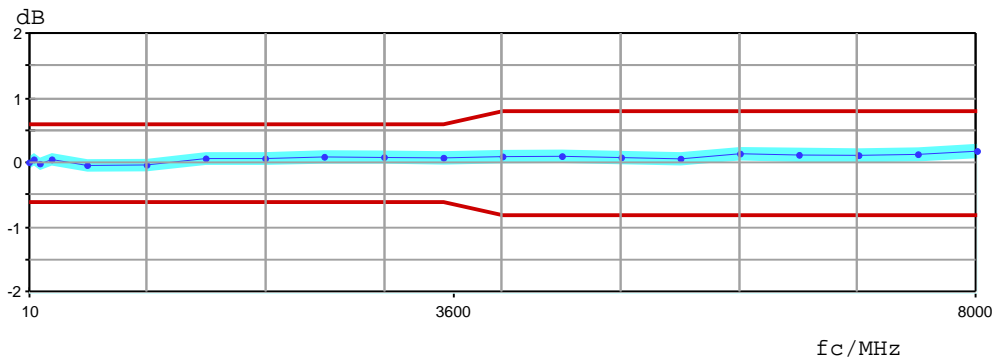


### 15. Absolute level uncertainty at 64 MHz and frequency response

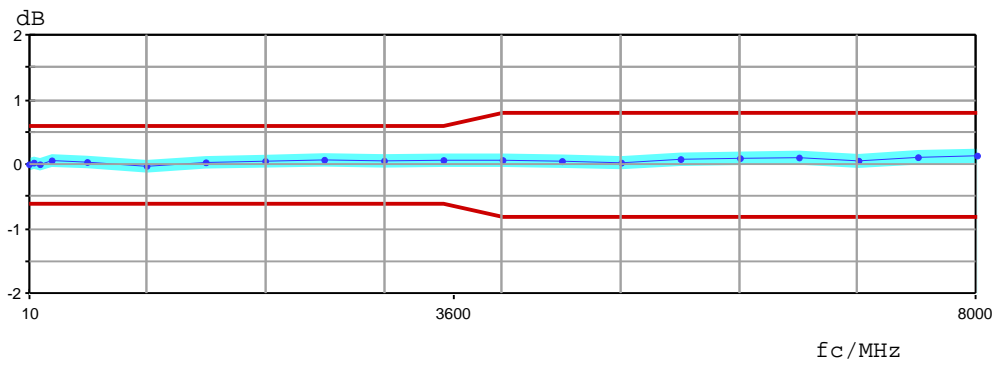
#### 15.1 Absolute level uncertainty at 64 MHz

$f_c$	DL	Actual	MU
64 MHz	0.20 dB	0.00 dB	0.08 dB

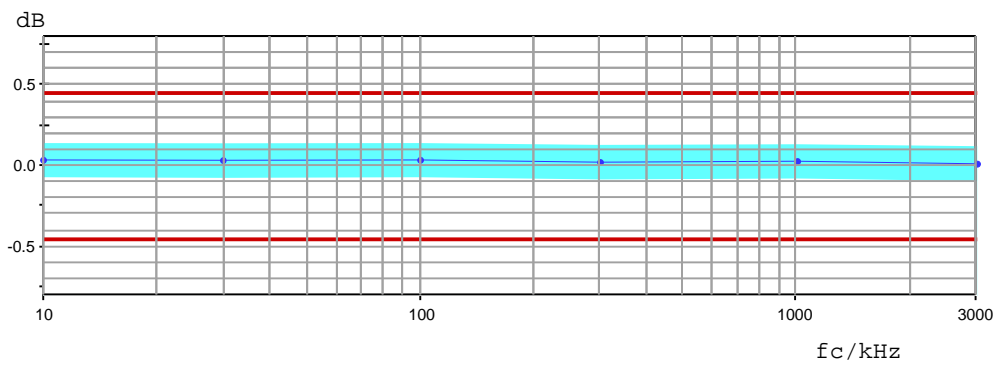
**15.2 RF attenuation 0 dB, AC coupled**



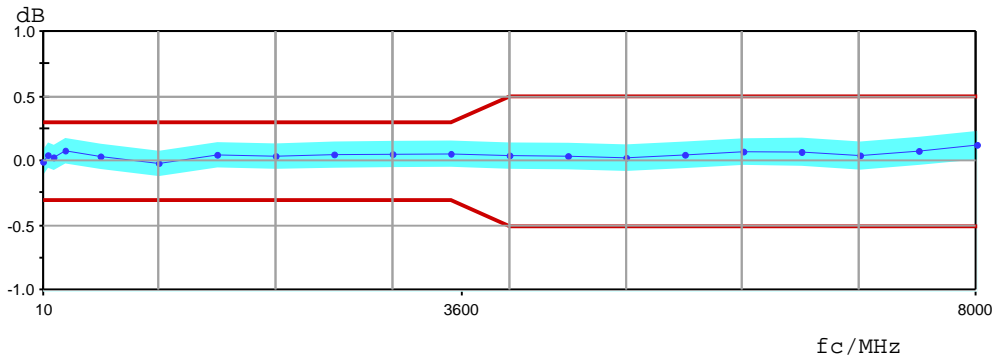
**15.3 RF attenuation 5 dB, AC coupled**



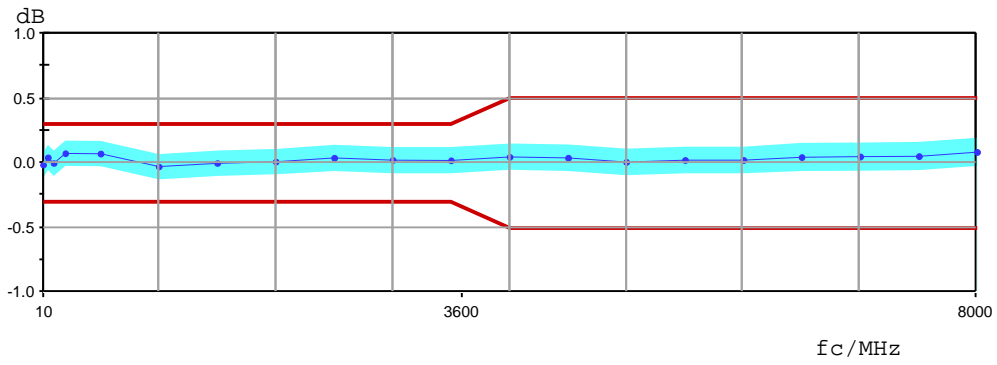
**15.4 RF attenuation 10 dB, DC coupled**



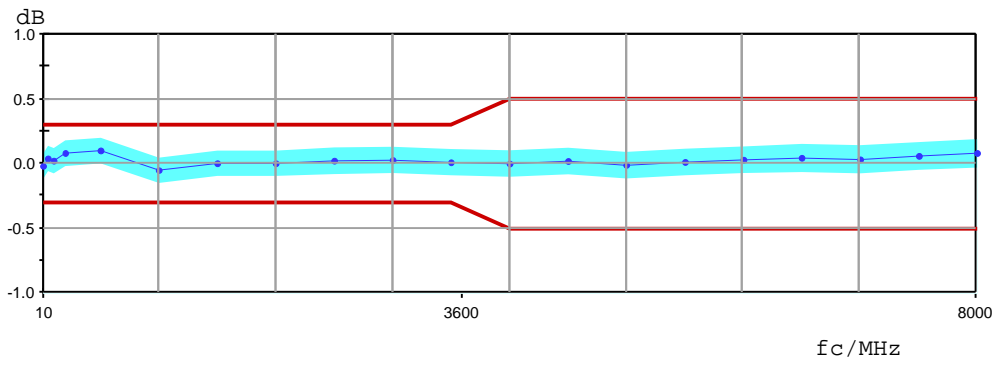
**15.5 RF attenuation 10 dB, AC coupled**



**15.6 RF attenuation 20 dB, AC coupled**

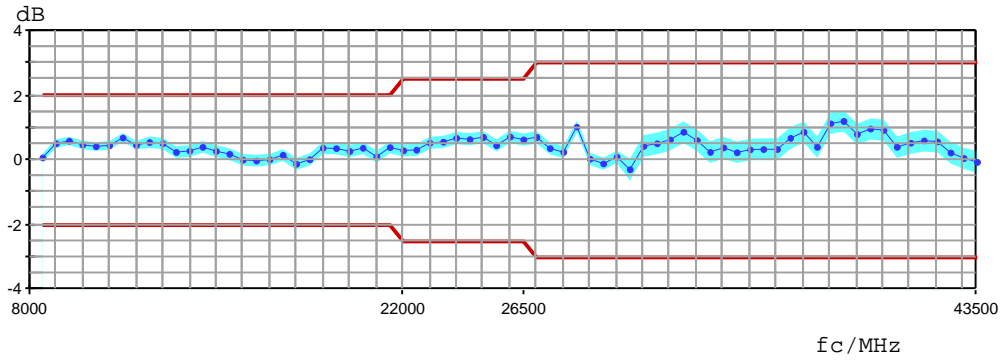


**15.7 RF attenuation 40 dB, AC coupled**

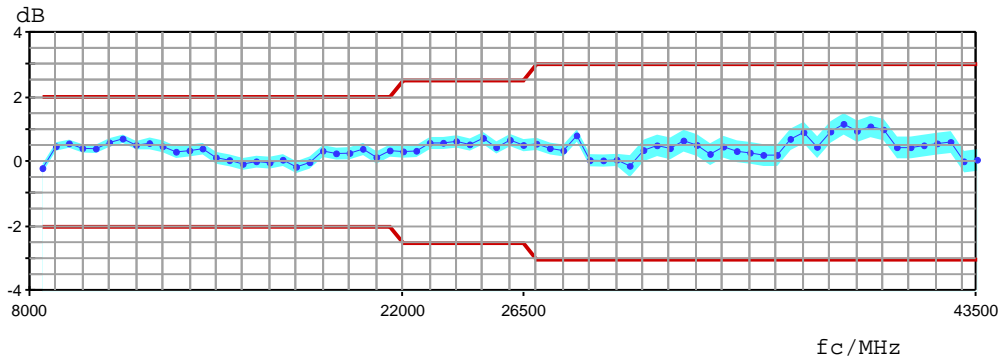


## 16. Frequency response > 8GHz YIG ON

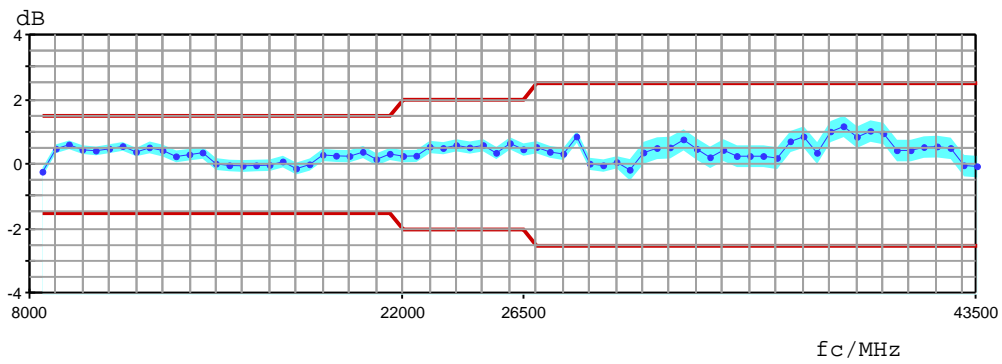
### 16.1 RF attenuation 0 dB, AC coupled



### 16.2 RF attenuation 5 dB, AC coupled

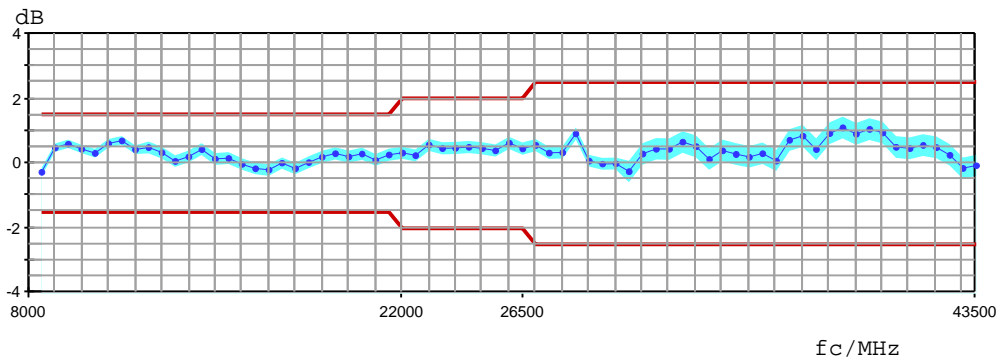


### 16.3 RF attenuation 10 dB, AC coupled

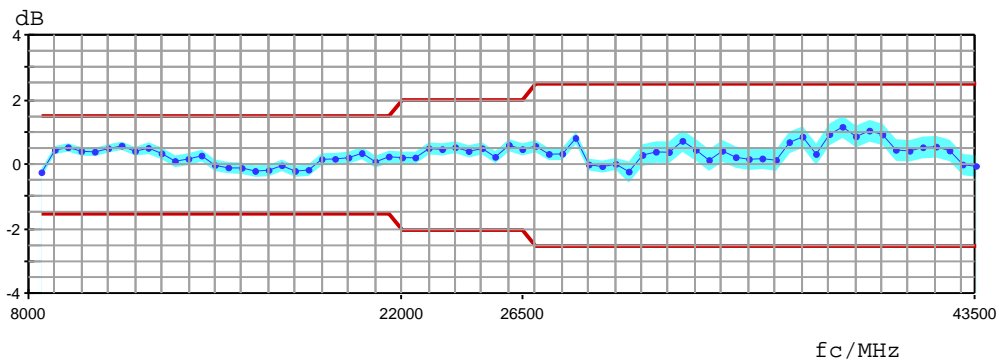




**16.4 RF attenuation 20 dB, AC coupled**

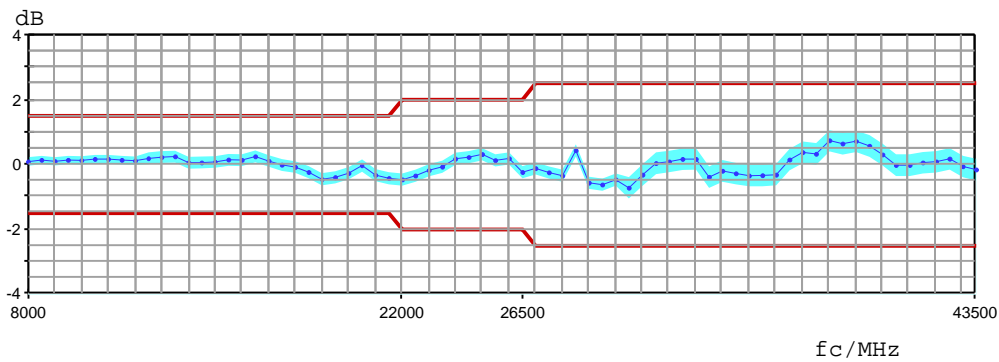


**16.5 RF attenuation 40 dB, AC coupled**



**17. Frequency response > 8GHz YIG OFF**

**17.1 RF attenuation 10 dB, AC coupled**



**18. Microwave band transition test**

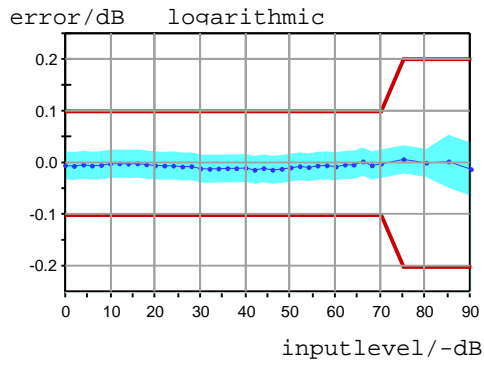
**YIG ON**

Microwave band transition test PASS

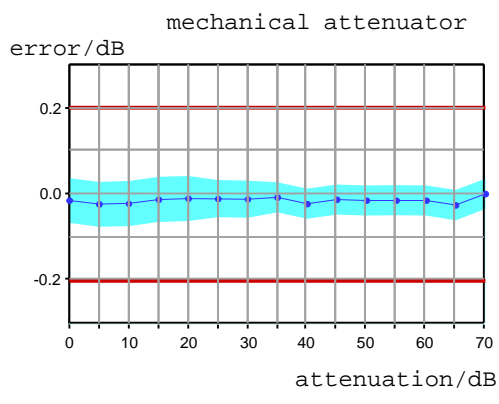
**YIG OFF**

Microwave band transition test PASS

### 19. Display nonlinearity



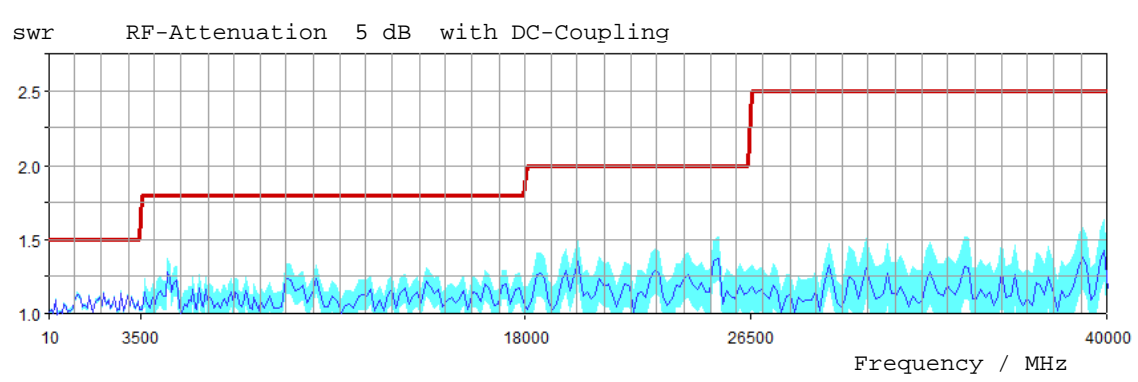
### 20. Attenuator switching uncertainty

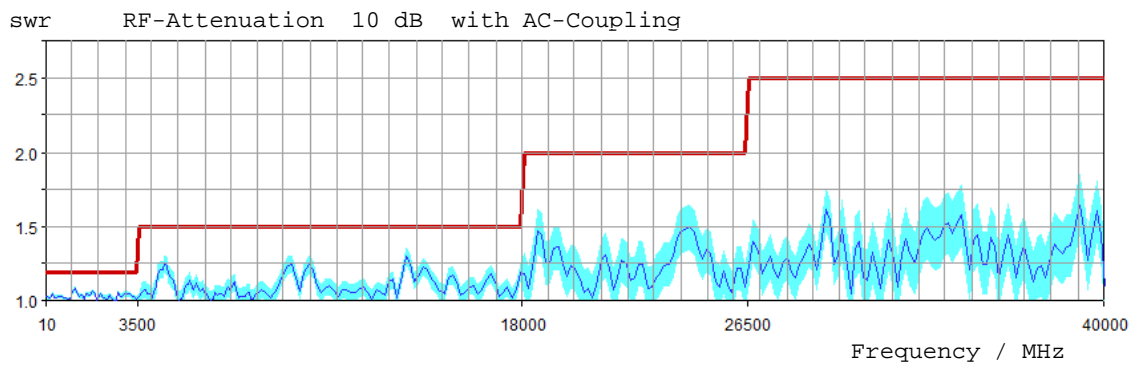
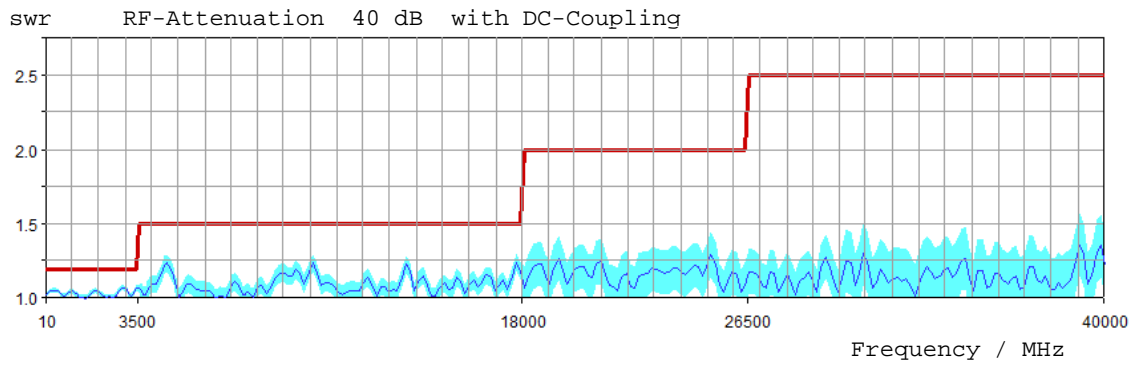
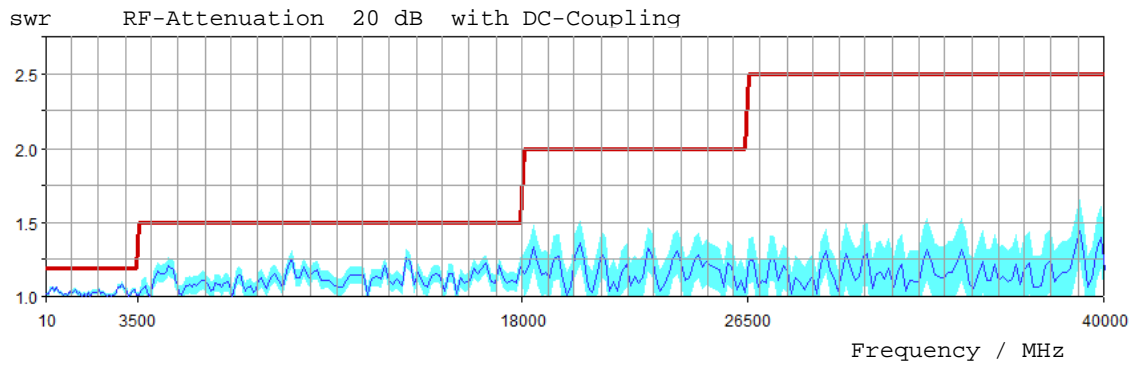
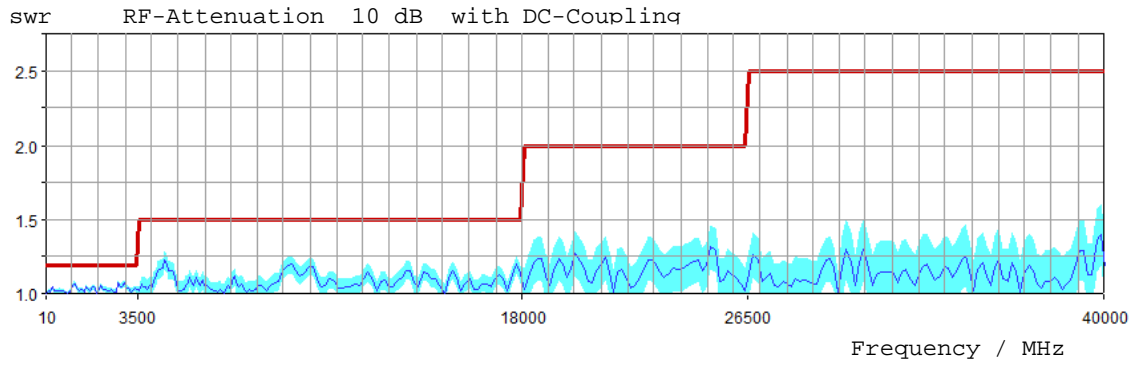


### 21. Checking the Phase Noise

carrier	carrier offset	DUL / dBc (1Hz)	Actual / dBc (1Hz)	
640.0 MHz	1.0 MHz	-145	-148.07	{a}
640.0 MHz	100.0 kHz	-137	-140.12	{a}
640.0 MHz	10.0 kHz	-135	-140.97	{a}
640.0 MHz	1.0 kHz	-126	-129.98	{a}

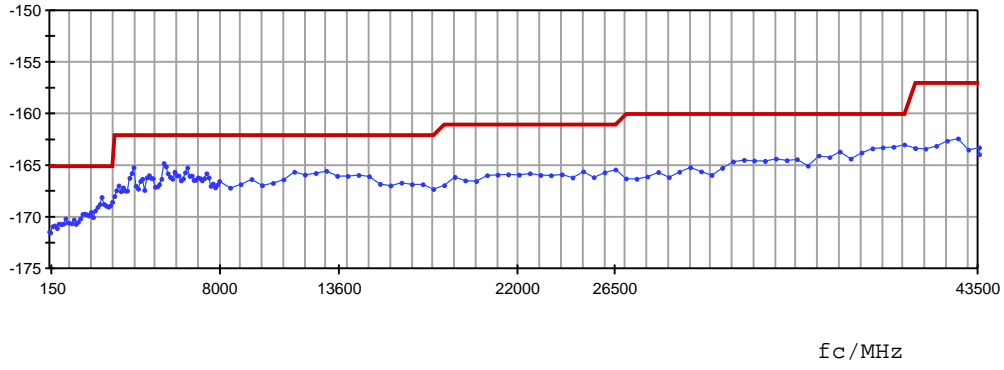
### 22. VSWR at RF input





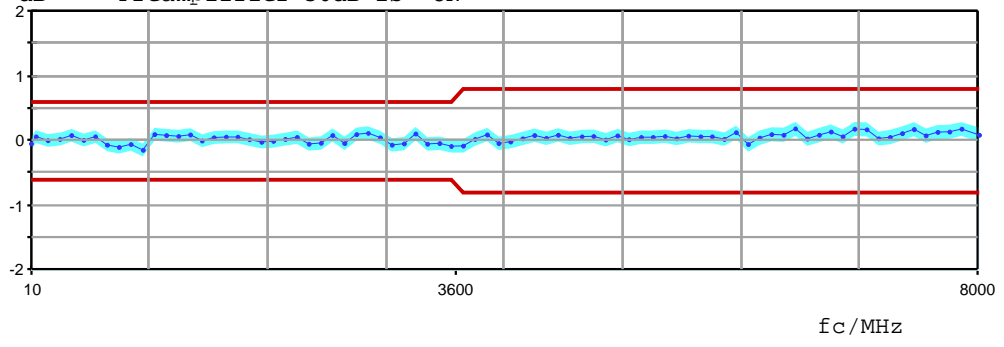
**23. Displayed average noise level (FSW-B24) YIG ON**

DANL / dBm Preamplifier is ON



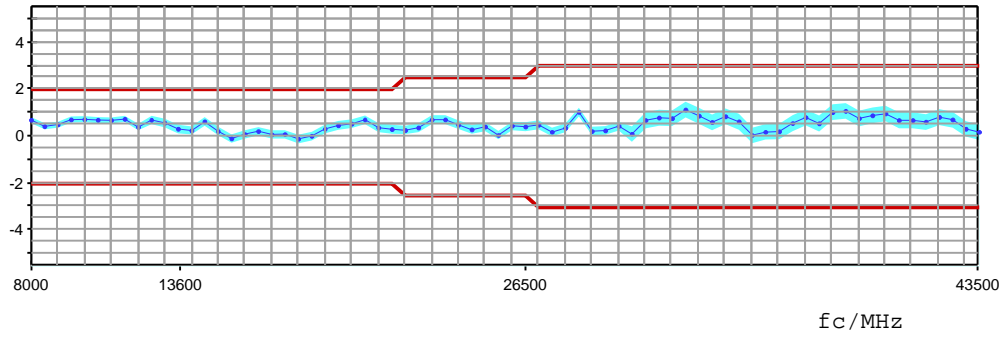
**24. Frequency response (FSW-B24) Preamp 30dB**

Frequency response with RF attenuation 10 dB; DC-coupled  
Preamplifier 30dB is ON



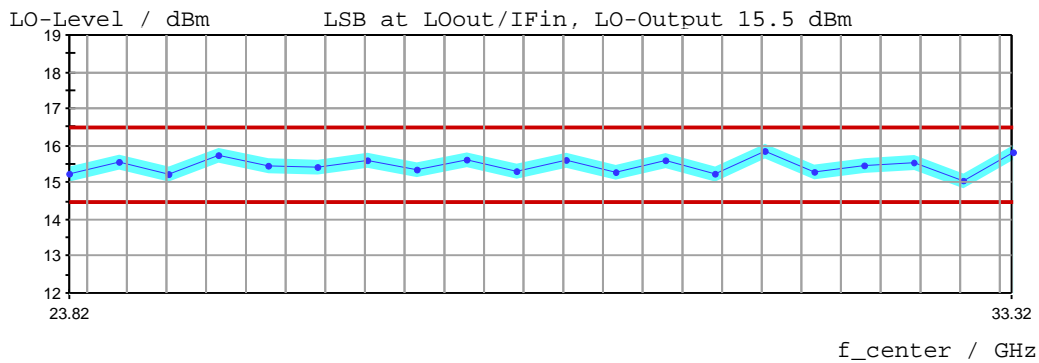
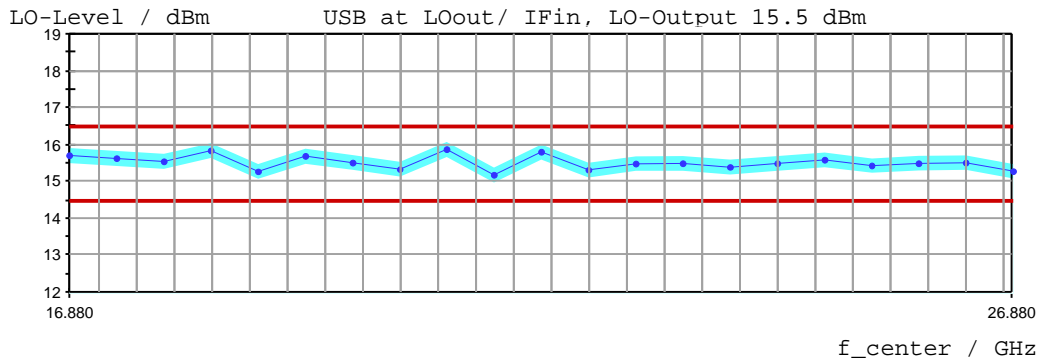
**25. Frequency response (FSW-B24) > 8 GHz YIG ON**

Frequency response with RF attenuation 10 dB; DC-coupled  
Preamplifier is ON



## 26. Checking LO-level (FSW-B21)

### 26.1 Output Level uncertainty



## 27. Checking the Inputs LOout / IFin (FSW-B21)

### 27.1 Level Display

measurement		input-signal		displayed level				
				absolute		deviation		
for mixer type	at port	freq. /MHz	level /dBm	nominal /dBm	actual /dBm	DL /dB	actual /dB	MU /dB
3-Port	IFin	1330.0	-30.0	-30.0	-29.94	1.0	0.05	0.10
2-Port	LOout/IFin	1330.0	-30.0	-30.0	-29.85	1.0	0.14	0.10

# Incoming Results

Designation: Signal Analyzer  
Type: FSW-43  
Material No.: 1312.8000K43  
Serial No.: 100560  
Certificate No.: 518327 D-K-15195-01-01 2019-09  
Referring to Test Documentation: 1312.8000.01-PB-02.26

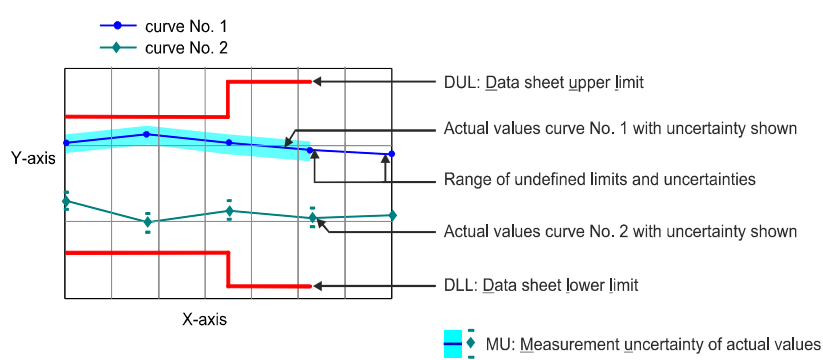
State	Pages
FAIL	<a href="#">8</a> , <a href="#">10</a> , <a href="#">13</a> , <a href="#">14</a> , <a href="#">17</a>
UGB	<a href="#">7</a> , <a href="#">13</a> , <a href="#">14</a> , <a href="#">17</a> , <a href="#">18</a>

Test Department: 3MES2  
Name: See certificate  
Date: 2019-07-29

**The following abbreviations may be used in this document**

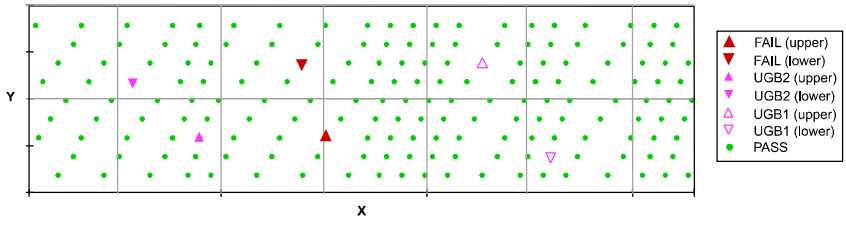
- {a} No measurement uncertainty stated because the errors always add together. So it is sure that a measurement result evaluated as "PASS" is pass.
  - {b} The measurement uncertainty depends on the measurement result. The stated measurement uncertainty is valid for the close area around the specification. 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**



**Explanation of the compact 2D chart**

Only the status and the position of the measured point is represented, e.g. "PASS" at frequency X and level measurement Y.



Incoming Results

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Software used for measurement			
Item	Type	Version	Remark
7010.2181.00_FSW.G5Lim Suite	Limit File Setup	2019-07-04 07:28 V11.37.05	Test Management Software G5
Test Program (7010.2181.00)	Component	V01.12.19	

### 1. General function tests

Selftest successful	pass	pass
Self Alignment successful	pass	pass

### 2. Checking the reference frequency uncertainty

	DUL	DLL	Actual	MU
Error of internal 10 MHz	1.00 Hz..	-1.00 Hz	-0.1000 Hz	0.0120 Hz

### 3. Immunity to interference

#### 3.1 2nd IF Image Frequency Rejection

IF2 =	fc	DLL	Actual	MU
	1317.0 MHz			
	1000.0 MHz	90 dB	112.3 dB	3.1 dB
	9000.0 MHz	90 dB	107.4 dB	4.1 dB

#### 3.2 3rd IF Image Frequency Rejection

IF3 =	fc	DLL	Actual	MU
	37.0 MHz			
	63.0 MHz	90 dB	111.2 dB	3.1 dB
	100.0 MHz	90 dB	111.6 dB	3.1 dB
	900.0 MHz	90 dB	109.1 dB	3.1 dB
	1100.0 MHz	90 dB	111.8 dB	3.1 dB
	7990.0 MHz	90 dB	111.1 dB	3.1 dB

#### 3.3 2nd IF Rejection

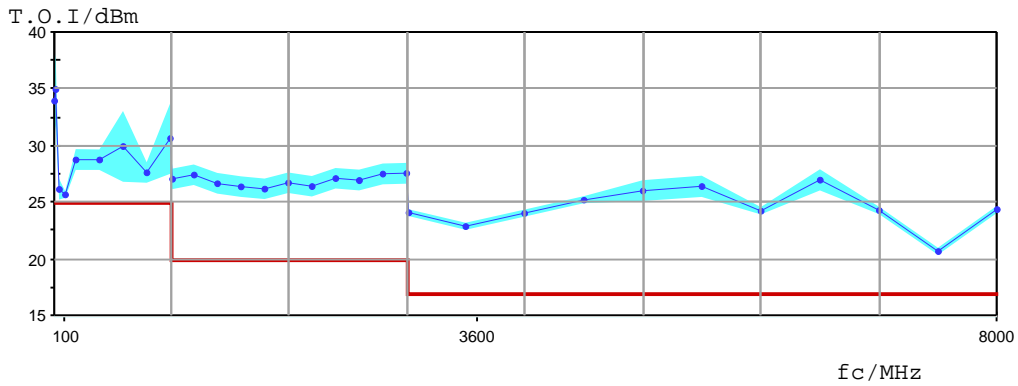
IF2 =	fc	DLL	Actual	MU
	1317.0 MHz			
	50.0 MHz	90 dB	111.5 dB	3.1 dB
	200.0 MHz	90 dB	109.8 dB	3.1 dB
	500.0 MHz	90 dB	103.2 dB	1.0 dB
	900.0 MHz	90 dB	109.2 dB	3.1 dB
	1100.0 MHz	90 dB	112.0 dB	3.1 dB
	7990.0 MHz	90 dB	112.0 dB	3.1 dB
	9000.0 MHz	90 dB	108.1 dB	4.1 dB
	12000.0 MHz	90 dB	108.6 dB	4.1 dB
	25000.0 MHz	90 dB	105.9 dB	4.1 dB
	38000.0 MHz	90 dB	102.3 dB	3.7 dB

#### 3.4 3rd IF Rejection

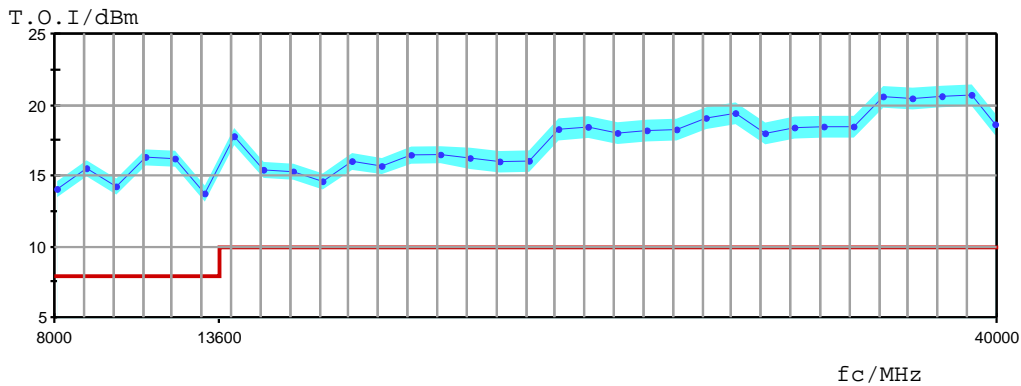
IF3 = 37.0 MHz

f <sub>c</sub>	DLL	Actual	MU
100.0 MHz	90 dB	112.3 dB	3.1 dB
200.0 MHz	90 dB	110.6 dB	3.1 dB
500.0 MHz	90 dB	108.3 dB	3.1 dB
900.0 MHz	90 dB	109.1 dB	3.1 dB
1100.0 MHz	90 dB	111.7 dB	3.1 dB
7990.0 MHz	90 dB	111.8 dB	3.1 dB
9000.0 MHz	90 dB	108.8 dB	4.1 dB
12000.0 MHz	90 dB	109.0 dB	4.1 dB
25000.0 MHz	90 dB	106.3 dB	4.6 dB
38000.0 MHz	90 dB	101.5 dB	3.7 dB

#### 4. Third-order intercept point (TOI)



#### 5. Third-order intercept point (TOI) > 8 GHz



#### 6. Second harmonic intercept (SHI)

f <sub>in</sub>	DLL	Actual	MU
9.0 MHz	45.0 dBm	50.8 dBm	0.6 dB
21.0 MHz	45.0 dBm	53.2 dBm	0.6 dB
106.0 MHz	45.0 dBm	45.0 dBm	0.6 dB
274.0 MHz	45.0 dBm	56.6 dBm	0.6 dB
449.9 MHz	45.0 dBm	49.1 dBm	0.6 dB
699.9 MHz	47.0 dBm	56.0 dBm	0.6 dB
999.9 MHz	47.0 dBm	65.7 dBm	0.6 dB
1499.9 MHz	47.0 dBm	68.6 dBm	0.6 dB
1749.9 MHz	62.0 dBm	74.9 dBm	0.6 dB
2699.9 MHz	62.0 dBm	73.2 dBm	0.6 dB
3449.9 MHz	62.0 dBm	75.6 dBm	0.6 dB

UGB1

Incoming Results

**7. Second harmonic intercept (SHI) high pass filter "ON"**

fin	DLI	Actual	MU	
699.9 MHz	52.0 dBm	51.3 dBm	0.6 dB	<b>FAIL</b>
1499.9 MHz	52.0 dBm	68.2 dBm	0.6 dB	

**8. Checking IF Filters**

**8.1 Checking the bandwidth switching level uncertainty**

reference is 10.0 kHz RBW

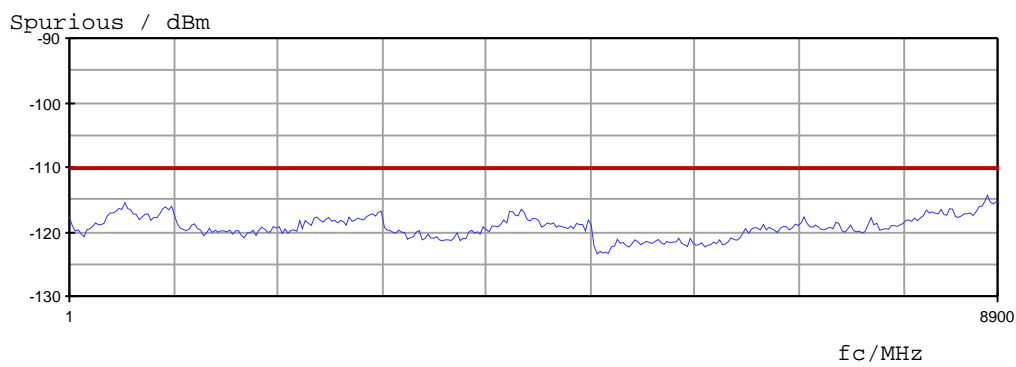
Bandwidth	DL	Actual	MU
10.0 MHz	0.1 dB	-0.01 dB	0.01 dB
1.0 MHz	0.1 dB	0.01 dB	0.01 dB
100 kHz	0.1 dB	0.02 dB	0.01 dB
10 kHz	0.1 dB	0.00 dB	0.01 dB
1 kHz	0.1 dB	0.01 dB	0.01 dB
100 Hz	0.1 dB	0.00 dB	0.01 dB

**8.2 Checking the bandwidth switching level uncertainty with option FSW-B8**

reference is 10.0 kHz RBW

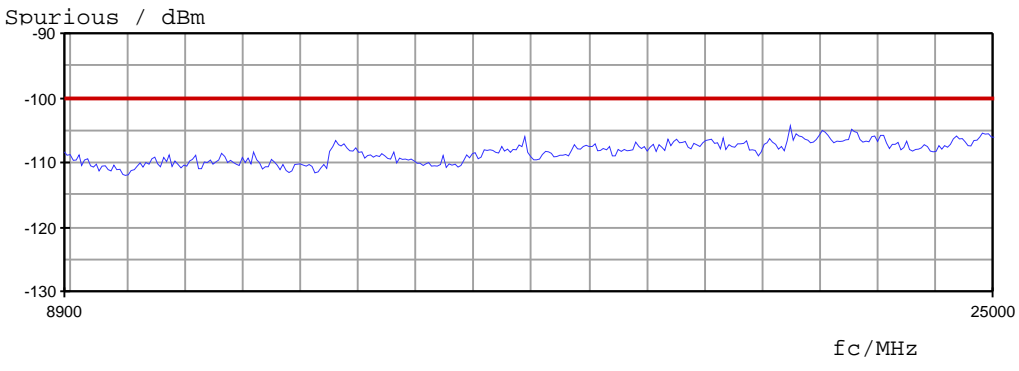
Bandwidth	DL	Actual	MU
20.0 MHz	0.1 dB	0.01 dB	0.01 dB
28.0 MHz	0.1 dB	0.02 dB	0.01 dB
50.0 MHz	0.1 dB	0.02 dB	0.01 dB
80.0 MHz	0.1 dB	0.03 dB	0.01 dB

**9. Spurious response 1 MHz.. 8.9 GHz**

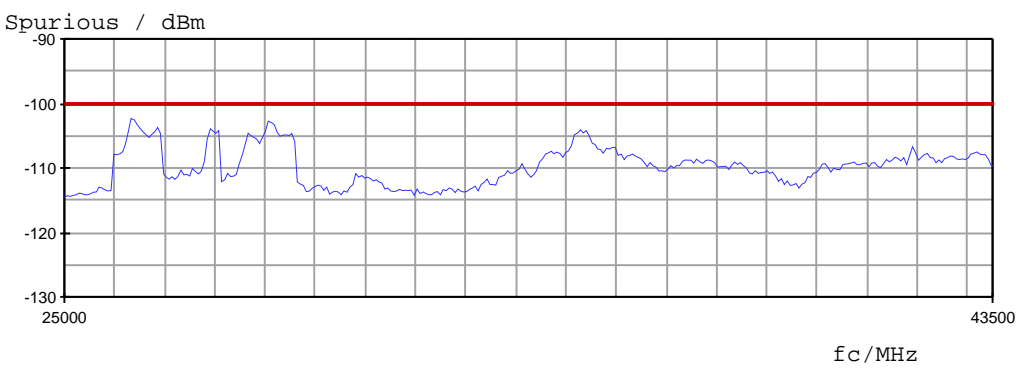


Incoming Results

**10. Spurious response 8.9 GHz .. 25.0 GHz**



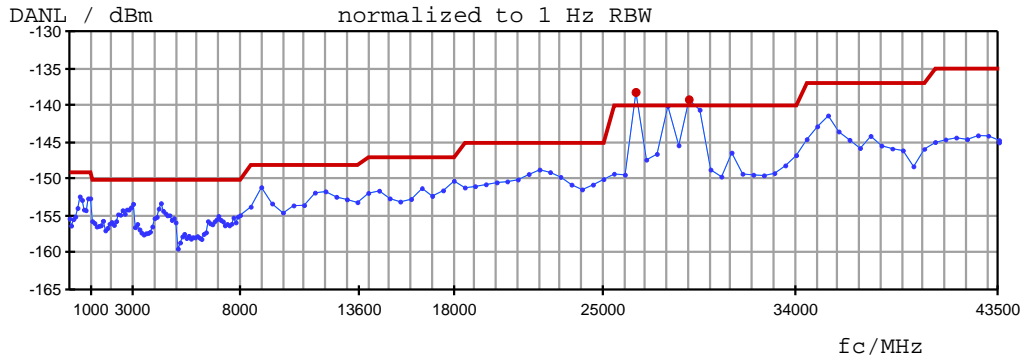
**11. Spurious response 25.0 GHz .. 43.5 GHz**



**12. Displayed average noise level (DANL)**

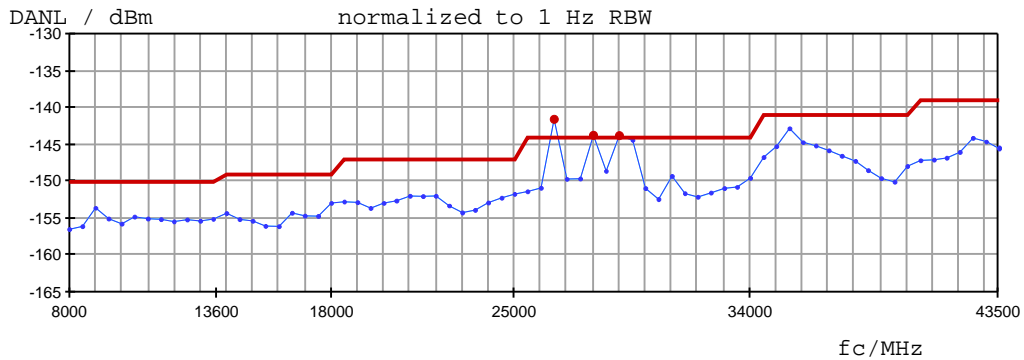
fc	DUL	Actual	MU
2 Hz (1 Hz BW)	-110 dBm	-112.30 dBm	0.01 dB
10 Hz (1 Hz BW)	-110 dBm	-129.16 dBm	0.01 dB
30 Hz (1 Hz BW)	-110 dBm	-123.45 dBm	0.01 dB
98 Hz (1 Hz BW)	-110 dBm	-136.88 dBm	0.01 dB
300 Hz (1 Hz BW)	-120 dBm	-140.50 dBm	0.01 dB
980 Hz (1 Hz BW)	-120 dBm	-142.41 dBm	0.01 dB
fc	DUL	Actual	MU
9.8 kHz (1 Hz BW)	-145 dBm	-148.73 dBm	0.01 dB
98 kHz (1 Hz BW)	-145 dBm	-150.48 dBm	0.01 dB
998 kHz (1 Hz BW)	-145 dBm	-151.98 dBm	0.01 dB
9800 kHz (1 Hz BW)	-149 dBm	-153.46 dBm	0.01 dB

Incoming Results



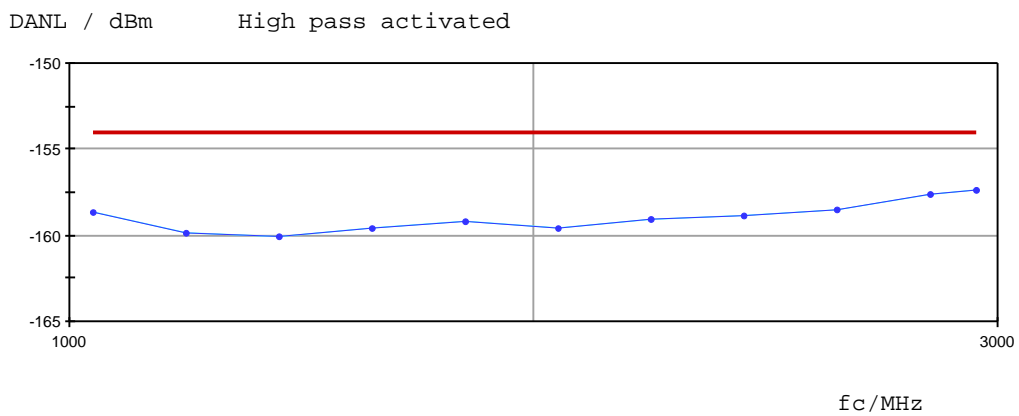
FAIL(2)

**13. Displayed average noise level (DANL) YIG OFF**



FAIL(3)

**14. Displayed average noise level (DANL) (FSW-B13)**



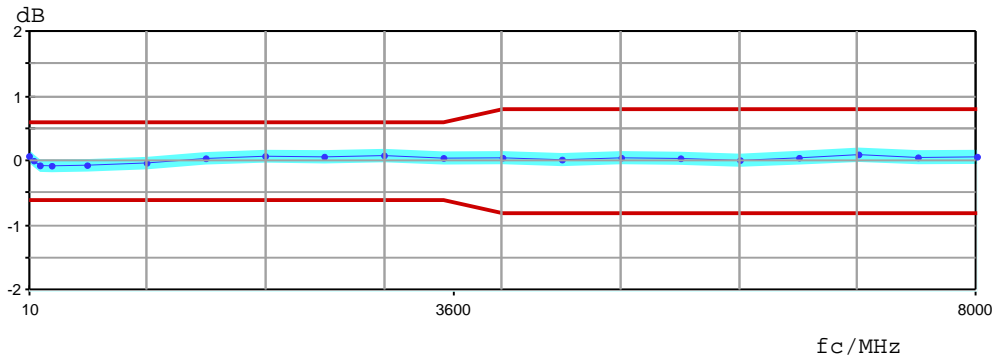
**15. Absolute level uncertainty at 64 MHz and frequency response**

**15.1 Absolute level uncertainty at 64 MHz**

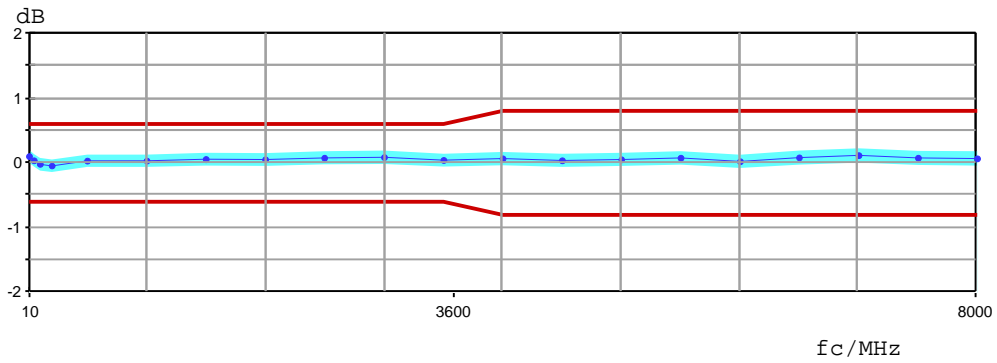
fc	DL	Actual	MU
64 MHz	0.20 dB	-0.02 dB	0.08 dB

Incoming Results

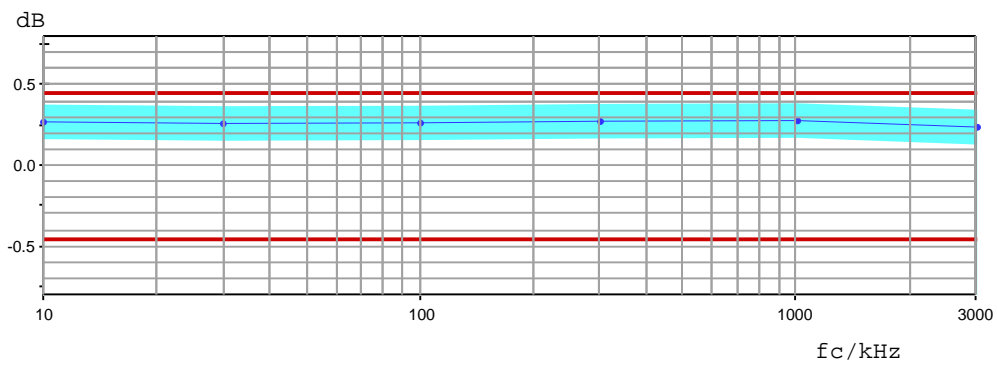
**15.2 RF attenuation 0 dB, AC coupled**



**15.3 RF attenuation 5 dB, AC coupled**



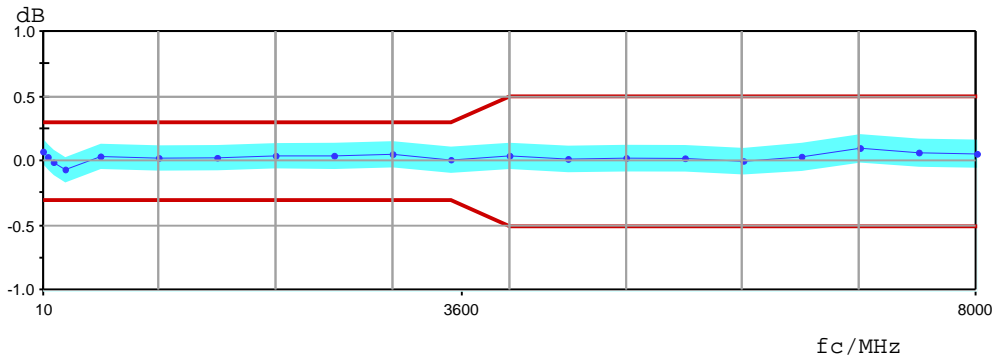
**15.4 RF attenuation 10 dB, DC coupled**



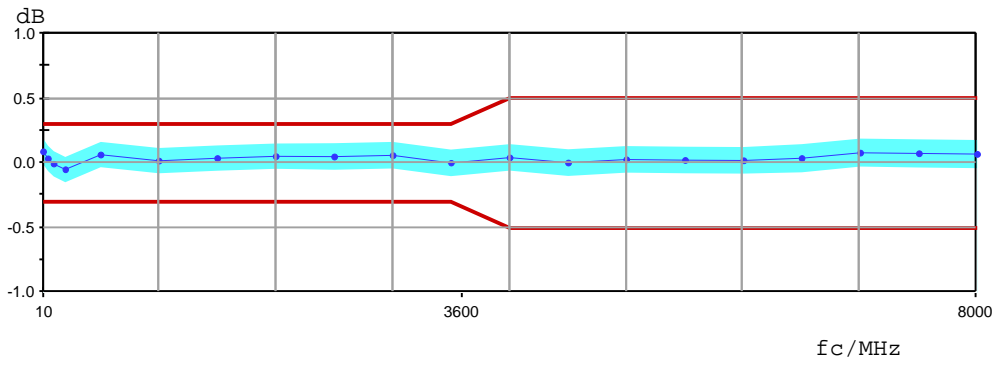
Incoming Results



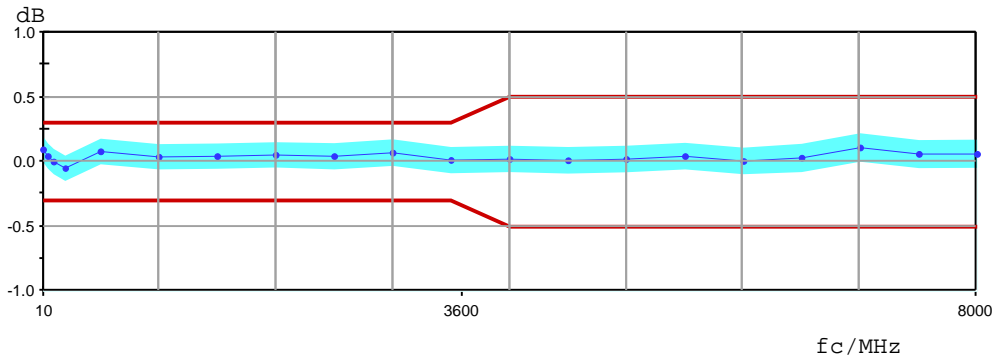
15.5 RF attenuation 10 dB, AC coupled



15.6 RF attenuation 20 dB, AC coupled



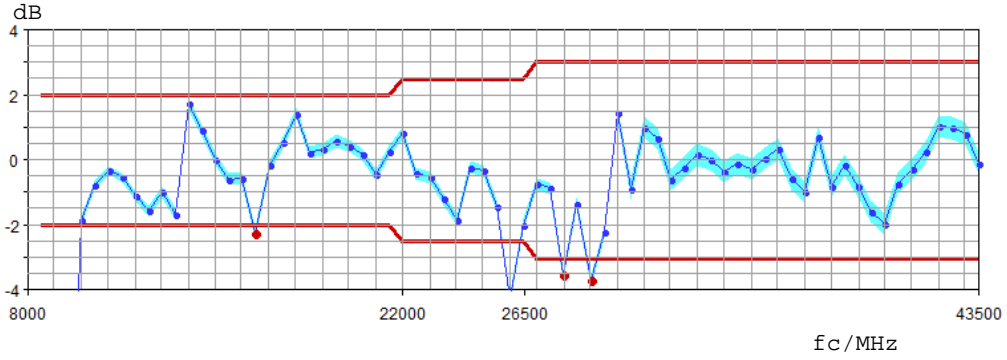
15.7 RF attenuation 40 dB, AC coupled



Incoming Results

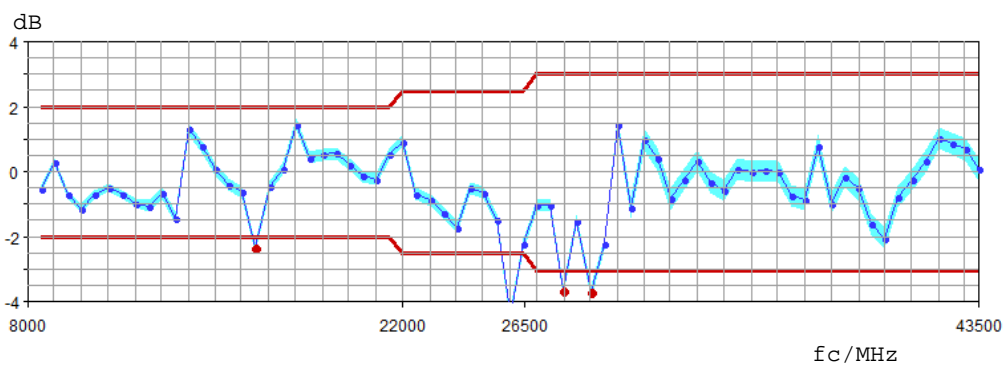
**16. Frequency response > 8GHz YIG ON**

**16.1 RF attenuation 0 dB, AC coupled**



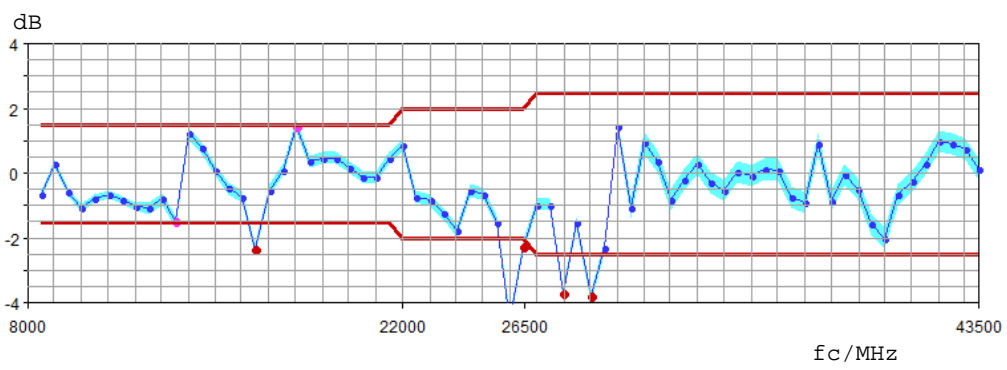
FAIL (7)

**16.2 RF attenuation 5 dB, AC coupled**



FAIL (4)

**16.3 RF attenuation 10 dB, AC coupled**

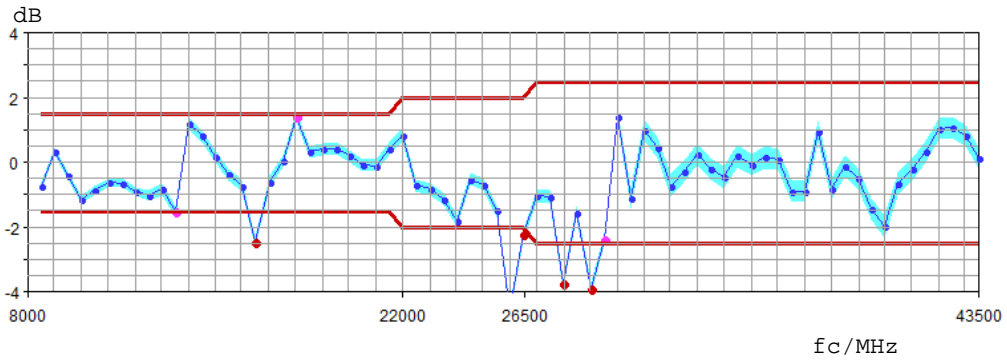


FAIL (5)

UGB1 (2)

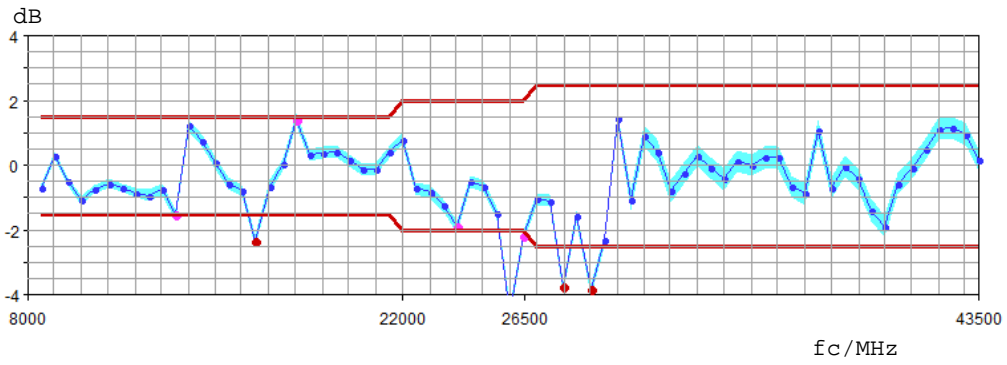
Incoming Results

16.4 RF attenuation 20 dB, AC coupled



FAIL (5)  
UGB1 (3)

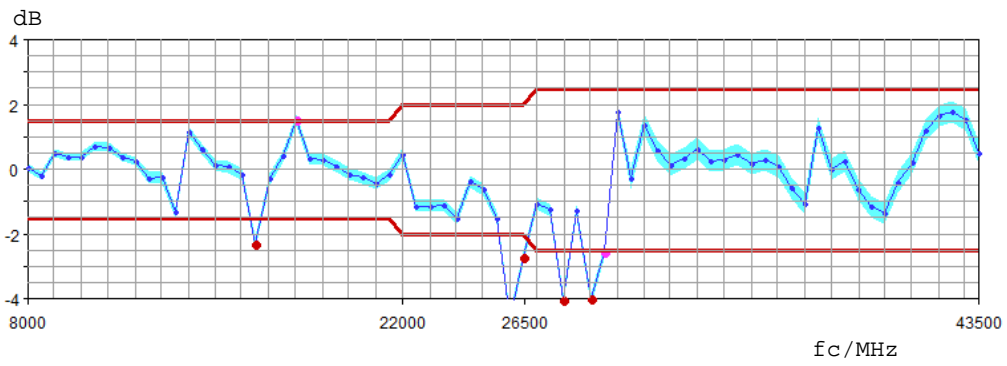
16.5 RF attenuation 40 dB, AC coupled



FAIL (4)  
UGB2 (2)  
UGB1 (2)

17. Frequency response > 8GHz YIG OFF

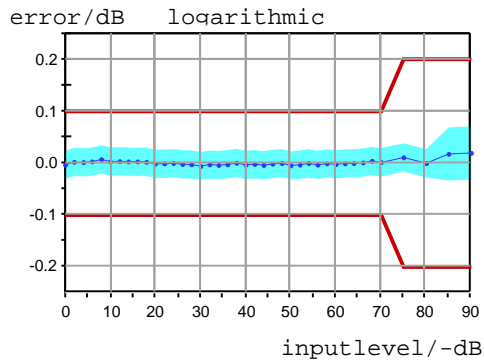
17.1 RF attenuation 10 dB, AC coupled



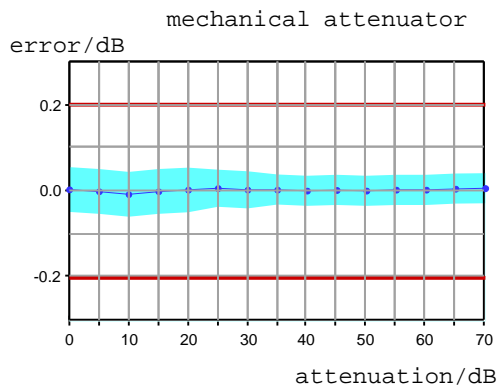
FAIL (5)  
UGB2 (2)

Incoming Results

**18. Display nonlinearity**



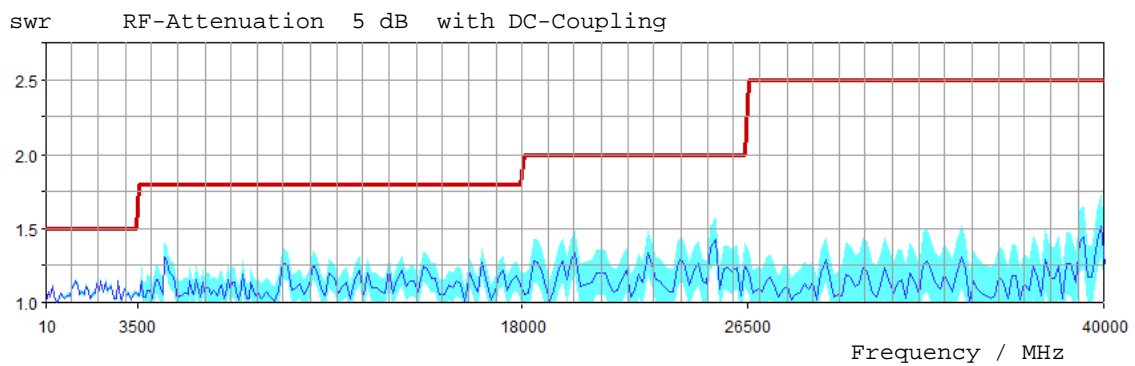
**19. Attenuator switching uncertainty**



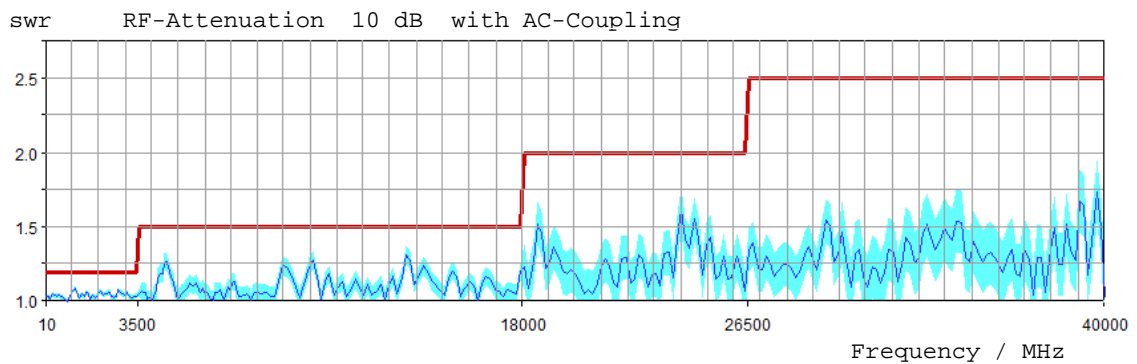
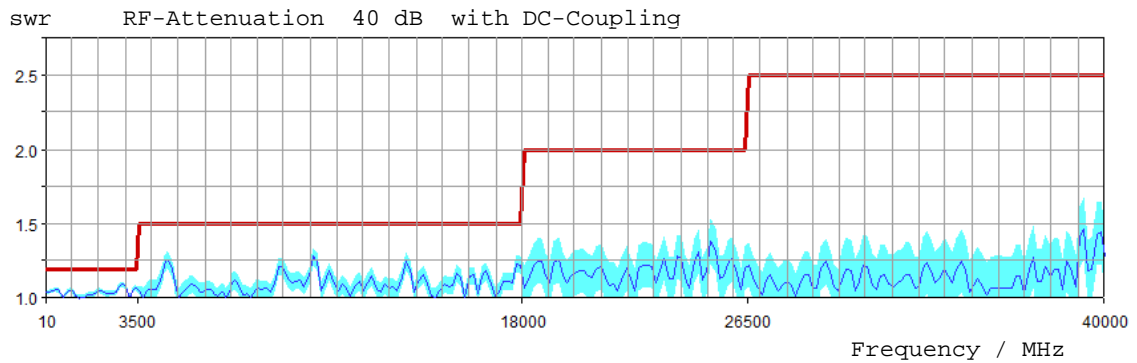
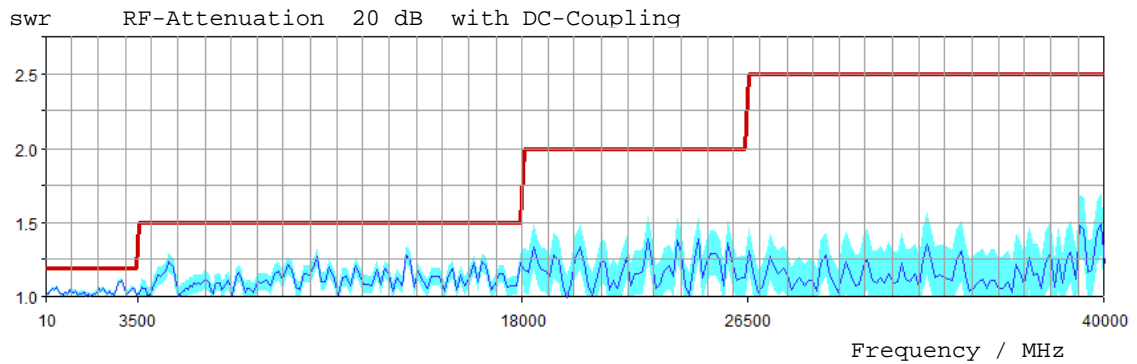
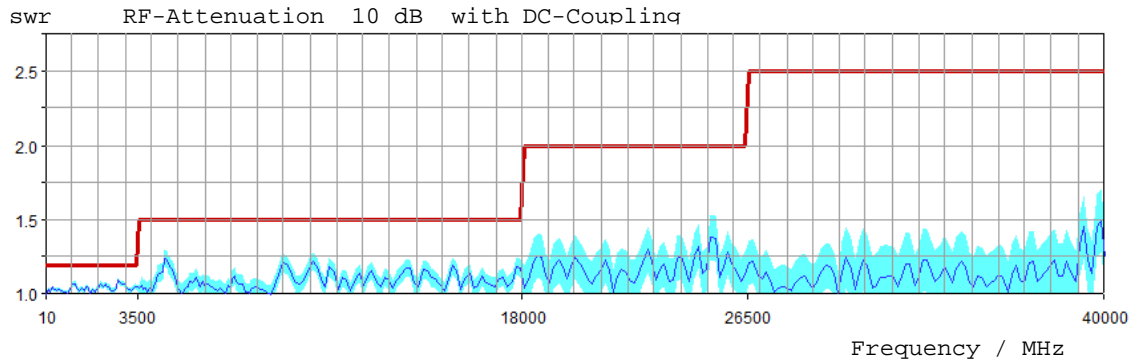
**20. Checking the Phase Noise**

carrier	carrier offset	DUL / dBc (1Hz)	Actual / dBc (1Hz)	
640.0 MHz	1.0 MHz	-145	-147.51	{a}
640.0 MHz	100.0 kHz	-137	-139.33	{a}
640.0 MHz	10.0 kHz	-135	-138.01	{a}
640.0 MHz	1.0 kHz	-126	-129.13	{a}

**21. VSWR at RF input**



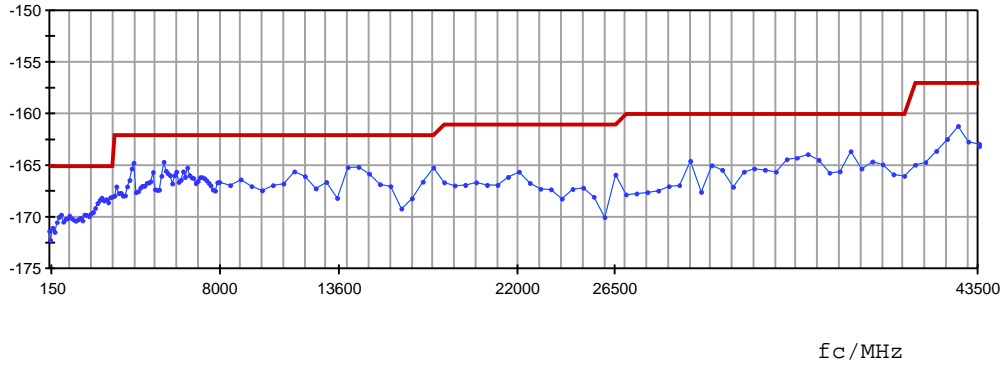
Incoming Results



Incoming Results

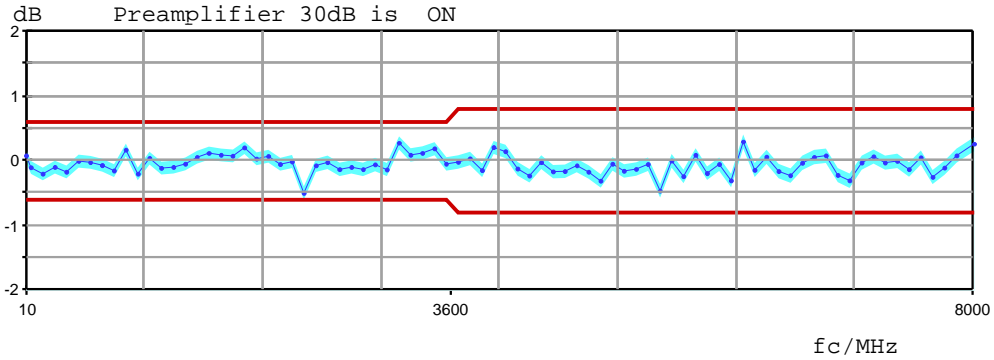
**22. Displayed average noise level (FSW-B24) YIG ON**

DANL / dBm Preamplifier is ON



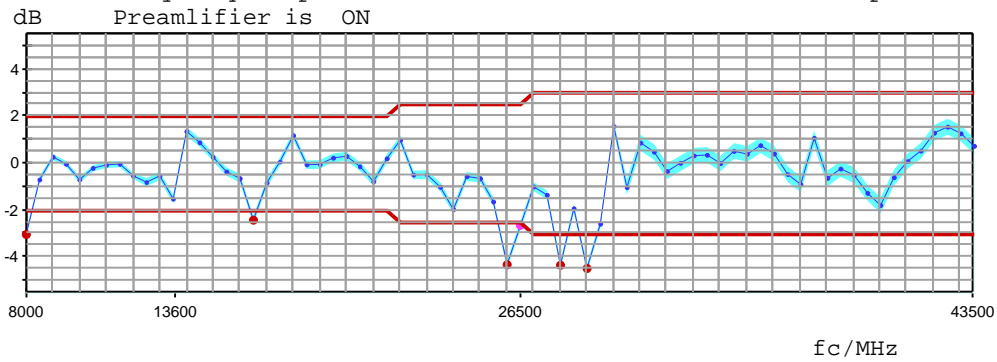
**23. Frequency response (FSW-B24) Preamp 30dB**

Frequency response with RF attenuation 10 dB; DC-coupled  
Preamplifier 30dB is ON



**24. Frequency response (FSW-B24) > 8 GHz YIG ON**

Frequency response with RF attenuation 10 dB; DC-coupled  
Preamplifier is ON

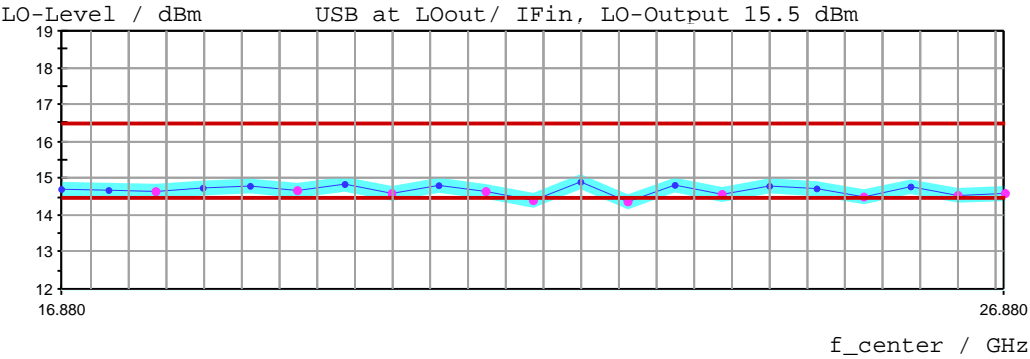


FAIL(5)  
UGB2(1)

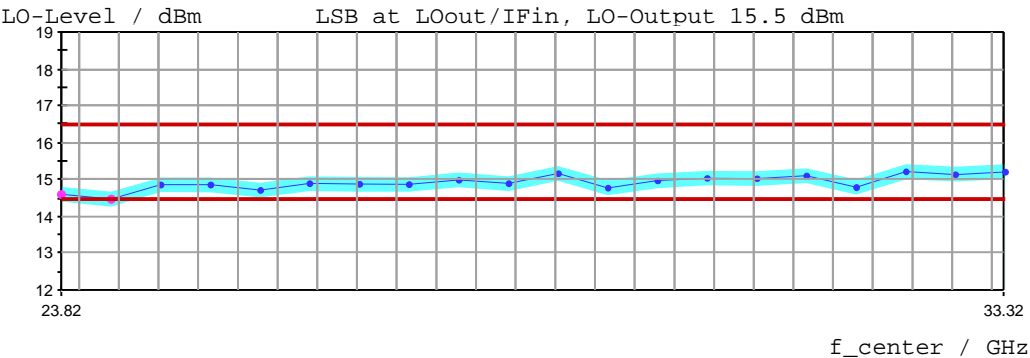
Incoming Results

## 25. Checking LO-level (FSW-B21)

### 25.1 Output Level uncertainty



UGB2 (2)  
UGB1 (8)



UGB2 (1)  
UGB1 (1)

## 26. Checking the Inputs LOout / IFin (FSW-B21)

### 26.1 Level Display

measurement		input-signal		displayed level				
				absolute		deviation		
for mixer type	at port	freq. /MHz	level /dBm	nominal /dBm	actual /dBm	DL /dB	actual /dB	MU /dB
3-Port	IFin	1330.0	-30.0	-30.0	-29.17	1.0	0.83	0.10
2-Port	LOout/IFin	1330.0	-30.0	-30.0	-28.97	1.0	1.03	0.10

UGB2

Incoming Results