

# Kalibrier-Zertifikat Calibration Certificate MUSTER

Gegenstand Object	Counter
Hersteller Manufacturer	Rohde&Schwarz Hameg
Typ Type description	HM8123
Serien Nr. Serial no.	12345
Inventar Nr. Inventory no.	---
Prüfmittel Nr. Test equipment no.	---
Equipment Nr. Equipment no.	12345678
Standort Location	---
Auftraggeber Customer	Mustermann GmbH
Kunden Nr. Customer ID no.	DE-12345 Musterhausen
Auftrags Nr. Order no.	654321

Hiermit bestätigen wir, dass das durchführende Kalibrierlabor ein Managementsystem nach ISO 9001:2008, sowie ISO/IEC 17025:2005 eingeführt hat. Die Urkunden finden Sie auf www.testotis.de. Die für die Kalibrierung verwendeten Messeinrichtungen werden regelmäßig kalibriert und sind rückführbar auf die nationalen Normale der Physikalisch Technischen Bundesanstalt (PTB) Deutschlands oder auf andere nationale Normale. Wo keine nationalen Normale existieren, entspricht das Messverfahren den derzeit gültigen technischen Regeln und Normen. Die für diesen Vorgang angefertigte Dokumentation kann eingesehen werden. Alle erforderlichen Messdaten sind in diesem Kalibrier-Zertifikat aufgelistet.

Hereby we confirm that the performing calibration laboratory is working with a management system according to ISO 9001:2008 and ISO/IEC 17025:2005. Accreditation certificates can be found under www.testotis.de. The measuring installations used for calibration are regularly calibrated and traceable to the national standards of the German Federal Physical Technical Institute (PTB) or other national standards. Should no national standards exist, the measuring procedure corresponds with the technical regulations and norms valid at the time of the measurement. The documents established for this procedure are available for viewing. All the necessary measured data can be found on the following page(s) of this calibration certificate.

Datum der Kalibrierung Date of calibration	06.02.2019
Datum der empfohlenen Rekalibrierung Date of the recommended re-calibration	06.02.2020

## Konformitätsaussage Conformity

- Messwert(e) innerhalb der zulässigen Abweichung<sup>1)</sup>. Measured value(s) within the allowed deviation<sup>1)</sup>.
- Messwert(e) außerhalb der zulässigen Abweichung<sup>1)</sup>. Measured value(s) beyond the allowed deviation<sup>1)</sup>.

<sup>1)</sup> Die Messunsicherheit wurde nach GUM mit dem Erweiterungsfaktor k=2 berechnet und enthält die Unsicherheit des Verfahrens sowie die Unsicherheit des Prüflings. Die Konformitätsaussage erfolgte nach DIN EN ISO 14253-1 gemäß der Kalibrieranweisung QSA - TIS 7.5-02.

<sup>1)</sup> The measurement uncertainty was calculated according to the regulations of GUM with the coverage factor k=2 and contains the uncertainty of the measuring procedure and the uncertainty of the measuring system. The statement of conformity was made according to DIN EN ISO 14253-1 according to calibration instruction QSA - TIS 7.5-02.

Dieser Kalibrierschein darf nur vollständig weiterverbreitet werden. Auszüge oder Änderungen bedürfen der Genehmigung des ausstellenden Kalibrierlaboratoriums. Kalibrierscheine ohne Unterschrift und Stempel haben keine Gültigkeit.

This calibration certificate may not be reproduced other than in full except with permission of the issuing laboratory. Calibration certificates without signature and seal are not valid.

V 4.52 / DE

Stempel Seal



Fachverantwortlicher Supervisor

*Max Mustermann*

Max Mustermann

Bearbeiter Technician

*Martina Musterfrau*

Martina Musterfrau

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## Messeinrichtung Measuring equipment

Referenz Reference	Rückführung Traceability	Rekal. Next cal.	Zertifikat-Nr. Certificate-no.	EQ-Nr. EQ-no.
DMM HEWLETT PACKARD 34401	ISO 2018-06	2019-06	E66683	10523196
Frequency Standard Fluke Corporation 910	GPS locked ---	---	Support Device	10640562
Funktionsgenerator HP 3325B	GPS locked ---	---	Support device	10876670
Power Sensor AGILENT DEUTSCHLAND GMBH E9304A H19	15070-01-01 2018-02	2019-02	E59905	10998165
POWER SPLITTER HEWLETT PACKARD 11667A	15070-01-01 2017-11	2019-11	E54738	11105458
POWER METER AGILENT DEUTSCHLAND GMBH E4419B	15070-01-01 2019-01	2020-01	E80995	11105531
Signal Generator Rohde & Schwarz SML03	GPS locked ---	---	Support device	11105578

Referenzzertifikate sind auf [www.primasonline.com](http://www.primasonline.com) abrufbar Reference certificates are available at [www.primasonline.com](http://www.primasonline.com)

## Umgebungsbedingungen Ambient conditions

Temperatur Temperature (23 ± 1) °C  
 Relative Luftfeuchte Relative Humidity (40 ± 20) %

## Messverfahren Measuring procedure

Die Kalibrierung erfolgt nach Kalibrieranweisung 4\_AA\_00190\_DE - in Abstimmung nach VDI/VDE/DGQ/DKD 2622  
 The calibration is performed according to the 4\_AA\_00190\_DE procedure- in accordance with VDI/VDE/DGQ/DKD 2622

Prüfprozedur Procedure E:Hameg:HM8123:kiz:HF-MP3:CO:RS232 / Rev.:2.0

## Messergebnisse Measuring results

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## Besondere Bemerkungen Special remarks

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<b>Device-Identification</b>						
Manufacturer:----->HAMEG Instruments						
Model:----->HM8123						
Softwarerevision:----->5.12						
<b>Input Characteristics</b>						
<b>Sensitivity Channel A</b>						
Range (DC-80MHz), Nominal < 50mVrms						
Auto Trigger Mode						
	50.000 mV	80 MHz	7.98 mV	-50/ +0 mV	84% pass	365 µV
Range (80MHz-200MHz), Nominal < 60 mVrms						
	60.000 mV	200 MHz	27.38 mV	-60/ +0 mV	54% pass	444 µV
<b>Sensitivity Channel B</b>						
Range (DC-80MHz), Nominal < 50mVrms						
Auto Trigger Mode						
	50.000 mV	80 MHz	8.60 mV	-50/ +0 mV	83% pass	365 µV
Range (80MHz-200MHz), Nominal < 60mVrms						
	60.000 mV	200 MHz	24.95 mV	-60/ +0 mV	58% pass	444 µV
<b>Sensitivity Channel C</b>						
Range (100MHz-1GHz), Nominal < 30mVrms						
Auto Trigger Mode						
	30.000 mV	1 GHz	8.17 mV	-30/ +0 mV	73% pass	219 µV
Range (1GHz-2.6GHz), Nominal < 100mVrms						
	100.000 mV	2 GHz	23.34 mV	-100/ +0 mV	77% pass	720 µV

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<b>Input Termination Check at Channel 1</b>						
DC-coupled						
:by Laboratory estimated tolerance						
50 Ohm	50.024 Ohm		50.00 Ohm	±3 Ohm	1% pass	8.3 mOhm
1 MOhm	1.2119 MOhm		1.000 MOhm	±0.5 MOhm	42% pass	582 Ohm
<b>Input Termination Check at Channel 2</b>						
DC-coupled						
:by Laboratory estimated tolerance						
50 Ohm	50.023 Ohm		50.00 Ohm	±3 Ohm	1% pass	8.3 mOhm
1 MOhm	1.2098 MOhm		1.000 MOhm	±0.5 MOhm	42% pass	582 Ohm
<b>Trigger Level Accuracy on Channel 1</b>						
:by Laboratory estimated tolerance						
0 V	0.0000 V	DC	-0.011 V	±0.015 V	71% pass	1.3 mV
<b>Trigger Level Accuracy on Channel 2</b>						
:by Laboratory estimated tolerance						
0 V	0.0000 V	DC	-0.008 V	±0.015 V	50% pass	1.3 mV
<b>Frequency Accuracy @ Channel A</b>						
Range DC ... 200 MHz						
Input Impedance 50 Ohm						
DC Coupled						
Gate-Time 10s						
10 Hz	10.00000000 Hz	1 V	9.9999684 Hz	±0.0002 Hz	16% pass	115 nHz
100 Hz	50.00000000 Hz	1 V	50.0000024 Hz	±0.001 Hz	0% pass	503 nHz
100 Hz	100.00000000 Hz	1 V	99.999986 Hz	±0.002 Hz	1% pass	1.2 µHz
1 kHz	0.500000000 kHz	1 V	0.49999999 kHz	±0.00001 kHz	0% pass	7.6 µHz
1 kHz	1.000000000 kHz	1 V	1.00000001 kHz	±0.00002 kHz	0% pass	12 µHz
10 kHz	5.000000000 kHz	1 V	4.99999997 kHz	±0.0001 kHz	0% pass	50 µHz
10 kHz	10.000000000 kHz	1 V	9.99999999 kHz	±0.0002 kHz	0% pass	115 µHz
100 kHz	50.000000000 kHz	1 V	49.9999997 kHz	±0.001 kHz	0% pass	503 µHz
100 kHz	100.000000000 kHz	1 V	99.9999999 kHz	±0.002 kHz	0% pass	1.2 mHz
1 MHz	0.500000000 MHz	1 V	0.50000000 MHz	±0.00001 MHz	0% pass	7.6 mHz
1 MHz	1.000000000 MHz	1 V	0.99999999 MHz	±0.00002 MHz	0% pass	12 mHz
10 MHz	5.000000000 MHz	1 V	4.99999997 MHz	±0.0001 MHz	0% pass	50 mHz

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10 MHz	10.00000000 MHz	1 V	9.9999999 MHz	±0.0002 MHz	0% pass	115 mHz
100 MHz	50.00000000 MHz	1 V	49.9999997 MHz	±0.001 MHz	0% pass	503 mHz
100 MHz	100.00000000 MHz	1 V	99.9999999 MHz	±0.002 MHz	0% pass	1.2 Hz
200 MHz	150.00000000 MHz	1 V	149.9999999 MHz	±0.003 MHz	0% pass	1.6 Hz
200 MHz	200.00000000 MHz	1 V	199.9999999 MHz	±0.004 MHz	0% pass	2.1 Hz

## Gate-time 1s

10 Hz	10.00000000 Hz	1 V	10.0001791 Hz	±0.0002 Hz	90% pass	115 nHz
100 Hz	50.00000000 Hz	1 V	50.0000713 Hz	±0.001 Hz	7% pass	503 nHz
100 Hz	100.00000000 Hz	1 V	99.999905 Hz	±0.002 Hz	5% pass	1.2 µHz
1 kHz	0.5000000000 kHz	1 V	0.499999967 kHz	±0.00001 kHz	0% pass	5.0 µHz
1 kHz	1.0000000000 kHz	1 V	1.00000009 kHz	±0.00002 kHz	0% pass	12 µHz
10 kHz	5.0000000000 kHz	1 V	5.00000012 kHz	±0.0001 kHz	0% pass	50 µHz
10 kHz	10.0000000000 kHz	1 V	9.9999998 kHz	±0.0002 kHz	0% pass	115 µHz
100 kHz	50.0000000000 kHz	1 V	49.9999996 kHz	±0.001 kHz	0% pass	503 µHz
100 kHz	100.0000000000 kHz	1 V	99.9999999 kHz	±0.002 kHz	0% pass	1.2 mHz
1 MHz	0.5000000000 MHz	1 V	0.499999996 MHz	±0.00001 MHz	0% pass	5.0 mHz
1 MHz	1.0000000000 MHz	1 V	1.000000000 MHz	±0.00002 MHz	0% pass	12 mHz
10 MHz	5.0000000000 MHz	1 V	4.99999996 MHz	±0.0001 MHz	0% pass	50 mHz
10 MHz	10.0000000000 MHz	1 V	9.9999999 MHz	±0.0002 MHz	0% pass	115 mHz
100 MHz	50.0000000000 MHz	1 V	49.9999997 MHz	±0.001 MHz	0% pass	503 mHz
100 MHz	100.0000000000 MHz	1 V	99.9999999 MHz	±0.002 MHz	0% pass	1.2 Hz
200 MHz	150.0000000000 MHz	1 V	149.9999999 MHz	±0.003 MHz	0% pass	1.6 Hz
200 MHz	200.0000000000 MHz	1 V	199.9999999 MHz	±0.004 MHz	0% pass	2.1 Hz

## Frequency Accuracy @ Channel B

Range DC ... 200 MHz

Input Impedance 50 Ohm

DC Coupled

Gate-Time 10s

10 Hz	10.00000000 Hz	1 V	10.0000114 Hz	±0.0002 Hz	6% pass	115 nHz
100 Hz	50.00000000 Hz	1 V	49.9999958 Hz	±0.001 Hz	0% pass	503 nHz
100 Hz	100.00000000 Hz	1 V	100.000012 Hz	±0.002 Hz	1% pass	1.2 µHz
1 kHz	0.5000000000 kHz	1 V	0.49999998 kHz	±0.00001 kHz	0% pass	7.6 µHz
1 kHz	1.0000000000 kHz	1 V	1.000000000 kHz	±0.00002 kHz	0% pass	12 µHz
10 kHz	5.0000000000 kHz	1 V	4.99999998 kHz	±0.0001 kHz	0% pass	50 µHz
10 kHz	10.0000000000 kHz	1 V	9.99999999 kHz	±0.0002 kHz	0% pass	115 µHz
100 kHz	50.0000000000 kHz	1 V	49.9999997 kHz	±0.001 kHz	0% pass	503 µHz
100 kHz	100.0000000000 kHz	1 V	99.9999999 kHz	±0.002 kHz	0% pass	1.2 mHz
1 MHz	0.5000000000 MHz	1 V	0.500000000 MHz	±0.00001 MHz	0% pass	7.6 mHz
1 MHz	1.0000000000 MHz	1 V	0.999999999 MHz	±0.00002 MHz	0% pass	12 mHz
10 MHz	5.0000000000 MHz	1 V	4.99999997 MHz	±0.0001 MHz	0% pass	50 mHz

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10 MHz	10.00000000 MHz	1 V	9.9999999 MHz	±0.0002 MHz	0% pass	115 mHz
100 MHz	50.00000000 MHz	1 V	49.9999997 MHz	±0.001 MHz	0% pass	503 mHz
100 MHz	100.00000000 MHz	1 V	99.999999 MHz	±0.002 MHz	0% pass	1.2 Hz
200 MHz	150.00000000 MHz	1 V	149.999999 MHz	±0.003 MHz	0% pass	1.6 Hz
200 MHz	200.00000000 MHz	1 V	199.999999 MHz	±0.004 MHz	0% pass	2.1 Hz

## Gatetime 1s

10 Hz	10.00000000 Hz	1 V	9.9999116 Hz	±0.0002 Hz	44% pass	115 nHz
100 Hz	50.00000000 Hz	1 V	50.0000953 Hz	±0.001 Hz	10% pass	503 nHz
100 Hz	100.00000000 Hz	1 V	99.999995 Hz	±0.002 Hz	0% pass	1.2 µHz
1 kHz	0.500000000 kHz	1 V	0.50000018 kHz	±0.00001 kHz	2% pass	7.6 µHz
1 kHz	1.000000000 kHz	1 V	0.99999995 kHz	±0.00002 kHz	0% pass	12 µHz
10 kHz	5.000000000 kHz	1 V	5.00000026 kHz	±0.0001 kHz	0% pass	50 µHz
10 kHz	10.000000000 kHz	1 V	10.0000000 kHz	±0.0002 kHz	0% pass	115 µHz
100 kHz	50.000000000 kHz	1 V	49.9999996 kHz	±0.001 kHz	0% pass	503 µHz
100 kHz	100.000000000 kHz	1 V	100.0000000 kHz	±0.002 kHz	0% pass	1.2 mHz
1 MHz	0.500000000 MHz	1 V	0.500000000 MHz	±0.00001 MHz	0% pass	7.6 mHz
1 MHz	1.000000000 MHz	1 V	1.000000000 MHz	±0.00002 MHz	0% pass	12 mHz
10 MHz	5.000000000 MHz	1 V	4.99999996 MHz	±0.0001 MHz	0% pass	50 mHz
10 MHz	10.000000000 MHz	1 V	9.9999999 MHz	±0.0002 MHz	0% pass	115 mHz
100 MHz	50.000000000 MHz	1 V	49.9999997 MHz	±0.001 MHz	0% pass	503 mHz
100 MHz	100.000000000 MHz	1 V	99.999999 MHz	±0.002 MHz	0% pass	1.2 Hz
200 MHz	150.000000000 MHz	1 V	149.999999 MHz	±0.003 MHz	0% pass	1.6 Hz
200 MHz	200.000000000 MHz	1 V	199.999999 MHz	±0.004 MHz	0% pass	2.1 Hz

## Frequency Accuracy @ Channel C

Range 100 MHz ... 3 GHz

Input Impedance 50 Ohm

### Gate-Time 10s

100 MHz	100.00000000 MHz	1 V	99.999999 MHz	±0.002 MHz	0% pass	1.2 Hz
1 GHz	0.500000000 GHz	1 V	0.500000000 GHz	±0.00001 GHz	0% pass	7.6 Hz
1 GHz	1.000000000 GHz	1 V	0.99999999 GHz	±0.00002 GHz	0% pass	12 Hz
3 GHz	1.500000000 GHz	1 V	1.49999999 GHz	±0.00003 GHz	0% pass	16 Hz
3 GHz	2.000000000 GHz	1 V	1.99999999 GHz	±0.00004 GHz	0% pass	21 Hz
3 GHz	2.500000000 GHz	1 V	2.49999998 GHz	±0.00005 GHz	0% pass	26 Hz

### Gatetime 1s

1 GHz	0.100000000 GHz	1 V	0.100000000 GHz	±0.000002 GHz	0% pass	5.9 Hz
1 GHz	0.500000000 GHz	1 V	0.500000000 GHz	±0.00001 GHz	0% pass	7.6 Hz
1 GHz	1.000000000 GHz	1 V	0.99999999 GHz	±0.00002 GHz	0% pass	12 Hz

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3 GHz	1.500000000 GHz	1 V	1.49999999 GHz	±0.00003 GHz	0% pass	16 Hz
3 GHz	2.000000000 GHz	1 V	1.99999998 GHz	±0.00004 GHz	0% pass	21 Hz
3 GHz	2.500000000 GHz	1 V	2.49999998 GHz	±0.00005 GHz	0% pass	26 Hz
<b>Period on Channel 1</b>						
<b>Gatetime 1s</b>						
1 ms	1.000000000 ms		1.000000051 ms	±0.00002 ms	0% pass	10 ps
100 µs	100.0000000 µs		99.9999994 µs	±0.002 µs	0% pass	1.0 ps
10 µs	10.000000000 µs		10.00000008 µs	±0.0002 µs	0% pass	100 fs
1 µs	1.000000000 µs		1.000000005 µs	±0.00002 µs	0% pass	10 fs
<b>Width on Channel 1</b>						
<b>Gatetime 5s</b>						
:by Laboratory estimated tolerance						
1000 µs	500.000000 µs		499.99877 µs	±2.5 µs	0% pass	7.6 ps
100 µs	50.000000 µs		49.99895 µs	±0.25 µs	0% pass	5.8 ps
10 µs	5.000000 µs		5.000133 µs	±0.025 µs	1% pass	580 fs
10 ns	500.0000 ns		500.409 ns	±2.5 ns	16% pass	577 fs
<b>Duty Cycle on Channel 1</b>						
<b>Gatetime 1s</b>						
:by Laboratory estimated tolerance						
	50.00 %		50.0 %	±0.5 %	0% pass	0.058 %
<b>Ratio Channel A to Channel B</b>						
<b>Gatetime 10s</b>						
CHA = 100 MHz / CHB = 100 kHz						
	1000.000		1000.00	±0.04	0% pass	0.0010
<b>Operator's Checks</b>						
<b>(Filter-Test)</b>						
	Filter-Test				pass	
<b>(Attenuator-Test)</b>						

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Attenuator-Test						pass

zulässige Abweichung gemäß Herstellerangabe  
allowed deviation in accordance with manufacturer

Die dimensionslosen Anteile der Messunsicherheit U sind als relative Messunsicherheiten e bezogen auf den Messwert zu verstehen (U = e \* MW).

The non-dimensional fractions of the measuring uncertainty U are relative values e in relation to the indicated value (U = e \* i.v.).