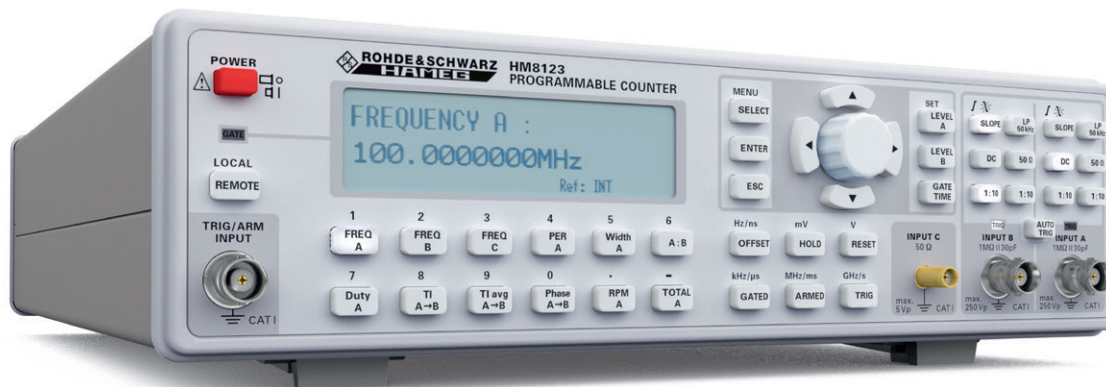


HM8123, HM8123-X Programmable Counter Technical Data

HAMEG[®]
Instruments
A Rohde & Schwarz Company



Key facts

- Measurement range: DC to 3GHz
- Input A/B (BNC): DC to 200MHz
- Input C (SMA): 100 MHz to 3GHz
- Input impedance A/B: 50Ω or 1MΩ (switchable), sensitivity 25mV
- Input impedance C: 50Ω, sensitivity 30mV
- 10-digit resolution (at 10s gate time)
- 9 measurement functions, external GATE and ARMING connectors (BNC)
- External Ref.-Input (10MHz) via BNC-connector
- HM8123: TCXO (temperature stability: $\pm 0.5 \times 10^{-6}$)
- M8123-X: OCXO (temperature stability: $\pm 1.0 \times 10^{-8}$)
- RS-232/USB dual interface, IEEE-488 (GPIB) optional
- Fanless design



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Technical Data

3 GHz Programmable Counter HM8123

All data valid at 23°C after 30 minutes warm-up.

Input characteristics (Input A and B)

Connection	BNC socket	
Frequency range		
0 to 200MHz	DC coupled	
10Hz to 200MHz	1 MΩ, AC coupled	
500kHz to 200MHz	50Ω, AC coupled	
Input impedance	1 MΩ 30pF or 50Ω (switchable)	
Attenuation	1:1, 1:10, 1:100 (selectable)	
Sensitivity (normal triggering)		
0 to 80MHz	25mV _{rms} (sine wave), 80mV _{SS} (pulse)	
80 to 200MHz	65mV _{rms} (sine wave)	
20Hz to 80MHz	50mV _{rms} (sine wave, auto trigger)	
Trigger (programmable via encoder or software)		
Attenuation:	Trigger level	Resolution
1:1	0 to ±2V	1 mV
1:10	0 to ±20V	10mV
1:100	0 to ±200V	100mV
Max. input voltage		
Input 1 MΩ	250V (DC + AC _{peak}) from 0 to 440Hz decreasing to 8V _{rms} at 1 MHz	
Input 50Ω	5V _{rms}	
Minimum pulse duration	<5ns for single pulse	
Input noise	(typ.) 100μV	
Auto trigger (AC coupling)	trigger point: 50% of peak-to-peak value	
Trigger slope	Rising or falling	
Filter	50kHz low-pass filter (selectable)	

Input characteristics (Input C)

Connection	SMA socket	
Frequency range:	100MHz to 3GHz	
Input sensitivity	to 1GHz: 30mV _{rms} (typ. 20mV _{rms}) 1 to 3GHz: 100mV _{rms} (typ. 80mV _{rms})	
Input impedance	50Ω nominal	
Max. Input voltage	5V (DC + AC _{peak})	

Input characteristics

	External Reset	Reference	Gate/ Arming
Input impedance	5kΩ	500Ω	5kΩ
Max. Input voltage	±30V	±20V	±30V
Input sensitivity	-	typ. 2V _{pp}	-
High level	>2V	-	>2V
Low level	<0,5V	-	<0,5V
Min. pulse duration	200ns	-	50ns
Input frequency	-	10MHz	-
Min. eff. gate time	-	-	20μs

Measurement functions

Frequency A/B/C; period duration A; width A; totalize A; RPM A; frequency ratio A:B; time interval A:B; time interval A:B (average); phase A to B; Duty cycle A; burst measurements

Frequency measurement (Inputs A, B, C)

Frequency range	0 to 200MHz (3GHz)
LSD	(1,25 x 10 ⁻⁸ s x frequency) / measurement time
Resolution	1 LSD

Accuracy	±(resolution/frequency ±time inaccuracy ±trigger error ² / measurement time)	
Period duration measurement		
Range	5ns to 10.000s	
LSD	(1,25 x 10 ⁻⁸ s x period) / measurement time	
Resolution	1 LSD	
Accuracy	±resolution / period ±(trigger error ² / measurement time)	
Totalization A		
	manual control	external control
Range	0 to 200MHz	0 to 200MHz
Min. pulse duration	10ns	10ns
LSD	1 count	±1 count
Resolution	LSD	LSD
Accuracy	(resolution ±ext. gate time error x frequency A) / total	
Pulse resolution	10ns	10ns
Ext. gate error	-	100ns
Time interval/Average time interval		
(Input A = start; Input B = stop)		
LSD	10ns (0,1 ps to 10ns im 'average' mode)	
Resolution	1 LSD	
Accuracy	±(resolution + trigger error ² +system error) / time interval ±time base uncertainty (system error: ≤4ns)	
Number of average	N = 1 to 25 N = 26 to 2.500 N = 2.501 to 250.000 N = 250.001 to 25.000.000 N = >25.000.000	LSD = 10ns LSD = 1ns LSD = 100ps LSD = 10ps LSD = 0,1ps
Drehzahlmessung		
NPR ¹⁾ presetting	1 to 65,535 pulses per revolution	
Gate time	330ms fixed	
LSD	7,5 x 10 ⁻⁸ x revolution speed	
Resolution	1 LSD	
Accuracy	±(trigger error ² / 0.33) ±time base error	
Offset		
Range	Covers the entire measurement range	
Resolution	Same resolution as in normal measurement. If the gate time is changed in the offset mode, the offset resolution is the reference value resolution or the current reading resolution (whichever is less precise).	
Gate time		
Range	1 ms to 65s	
Resolution	1 ms	
External gate time	min. 20μs	
Time base		
Frequency	400MHz clock rate; 10MHz Quarz	
Temperature stability (0 to 50°C)	TCXO (standard): ±0,5 x 10 ⁻⁶ OCXO (HO85): ±1,0 x 10 ⁻⁸	
Alterung TCXO	<0.27ppm per month, 0.05ppm per day	
OCXO	≤ ±1 x 10 ⁻⁹ /day	
External Reference	10MHz ±20ppm	
Miscellaneous		
Interface	Dual-Interface USB/RS-232 (HO820), optional HO880 IEEE-488 (GPIB)	
Safety class	Safety class I (EN61010-1)	
Display	LCD display (83 x 21 mm)	
Netzanschluss	115 to 230V ±10%, 45 to 60Hz, CAT II	

Power consumption	approx. 20W
Operating temperature	+5 to +40°C
Storage temperature	-20 to +70°C
Rel. humidity	5 to 80% (without condensation)
Dimensions (W x H x D)	285 x 75 x 365mm
Weight	approx. 4kg

1) NPR=number of pulses per revolution

2) Trigger error= \pm noise input (V_{pp})/slew rate of the input signal

Accessories supplied:

Line cord, Operating manual

Recommended accessories:

HO880 Interface IEEE-488 (GPIB), galvanically isolated

HZ20 Adapter, BNC to 4mm banana

HZ24 Attenuators 50 Ω (3/6/10/20 dB)

HZ42 19" Rackmount kit 2RU

HZ72 GPIB-Cable 2 m



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