![HAMEG Instruments]

2.6 GHz Programmable Counter HM8123

3rd Quarter

Fig. similar

HZ33, HZ34
Test cable BNC/BNC

HZ42 19˝ Rackmount kit 2RU

HZ20 Connector
BNC to 4mm socket

Frequency range from 0 Hz to 2.6 GHz

200 MHz time base with 0.2 ppm stability

Two identical inputs, up to 200 MHz each

9-digit resolution at 1 sec. gate time

9 measurement functions, external gate and arming

Input for external time base (reference signal 10 MHz)

RS-232   optional IEEE 488   optional USB

2.6 GHz Universal Counter HM8123
Valid at 23 °C after a 30 minute warm-up period

Input characteristics (Input A and B)

Frequency range:

0 – 200 MHz	(DC-coupled)
10 Hz – 200 MHz	(1 MΩ, AC-coupled)
500 kHz – 200 MHz	(50 Ω, AC-coupled)

Input impedance:	1 MΩ II 30 pF or 50 Ω (switchable)
Attenuation:	1:1, 1:10, 1:100 (selectable)

Sensitivity: (normal triggering)

0 to 80 MHz	20 mV$_{rms}$ (sine wave), 80 mV$_{pp}$ (pulse)
80 MHz to 200 MHz	60 mV$_{rms}$ (sine wave)
20 Hz to 80 MHz	50 mV$_{rms}$ (sine wave, auto trigger)

Trigger (programmable via encoder or software)

Attenuation:	Trigger level:	Resolution:
1:1	0 to ± 2 V	1 mV
1:10	0 to ± 20 V	10 mV
1:100	0 to ± 200 V	100 mV

Max. input voltage:

Input 1 MΩ:	250 V (DC + AC$_{peak}$) from 0 to 440 Hz decreasing to 8 V$_{rms}$ at 1 MHz
Input 50 Ω:	5 V$_{rms}$
Minimum pulse duration:	‹5 ns for single pulse
Input noise:	(typ.) 100 µV
Auto trigger (AC coupling):	trigger point: 50 % of peak-to-peak value
Trigger slope:	positive or negative
Filter:	100 kHz low-pass filter (switchable)

Input characteristics (Input C)

Frequency range:	100 MHz - 2.6 GHz	
Input sensitivity:	up to 1 GHz:	30 mV$_{rms}$ (typ. 20 mV$_{rms}$)
	1 GHz-2.6 GHz:	100 mV$_{rms}$ (typ. 80 mV$_{rms}$)
Input impedance:	50 Ω nominal	
Max. input voltage:	5 V (DC + AC$_{peak}$)	

Input characteristics

	External Reset	Reference	Gate/Arming
Input impedance:	5 kΩ	500 Ω	5 kΩ
Max. input voltage:	± 30 V	± 20 V	± 30 V
Input sensitivity:	-	typ. 2 V$_{pp}$	-
High level:	› 2 V		› 2 V
Low level:	‹ 0.5 V	-	‹ 0.5 V
Min. pulse duration:	200 ns	-	50 ns
Input frequency:	-	10 MHz	-
Min. eff. gate time:	-	-	20 µs

Measurement functions

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

Frequency measurement (Inputs A, B, C)

Frequency range:	0 to 200 MHz (2.6 GHz)
LSD:	(1.25 x 10^{-8}s x frequency) / measurement time
Resolution:	± 1 or 2 LSD
Accuracy:	± (resolution / frequency ± time inaccuracy ± trigger error / measurement time)

Period duration measurement

Range:	10000 sec. to 5 ns
LSD:	(1.25 x 10^{-8}s x period) / measurement time
Resolution:	1 or 2 LSD
Accuracy:	± resolution / period ± (trigger error B / measurement time)

Totalization A

	(manual control)	(external control)
Range:	0 – 200 MHz	0 – 200 MHz
Min. pulse duration:	10 ns	10 ns
LSD:	1 count	± 1 count
Resolution:	LSD	LSD

Accuracy:	(resolution ± ext. gate time error x frequency A)/total	
Pulse resolution:	10 ns	10 ns
Ext. gate error:	-	100 ns

Time interval / Average time interval
(Input A = start; input B = stop)

LSD:	10 ns (10 ns to 1 ps in "average" mode)
Resolution:	1 LSD (1 or 2 in "average" mode)
Accuracy:	± (resolution + trigger error + system error)/time interval ± time basis uncertainty (system error: ‹ 4 ns)

Number of average:		
	N = 1-25	LSD = 10 ns
	N = 26-2500	LSD = 1 ns
	N = 2501-250000	LSD = 100 ps
	N = 250001 – 25000000	LSD = 10 ps
	N = › 25000000	LSD = 1 ps

RPM measurement

NPR[1] presetting:	1 – 65535 pulses per revolution
Gate time:	330 ms fixed
LSD:	7.5 x 10^{-8} revolution speed
Resolution:	1 or 2 LSD
Accuracy:	± (trigger error/0.33) ± time basis 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 – 65 sec.
Resolution:	1 ms
External gate time:	min. 20 µs

Time base

Frequency:	200 MHz clock rate; 10 MHz crystal
Stability:	± 2 x 10^{-7} between +10° C and +40° C
Ageing:	‹ 0.27 ppm per month, 0.05 ppm per day
External Reference:	10 MHz ± 20 ppm

Miscellaneous

Safety class:	Safety Class I (EN61010-1)
Display:	LCD display (83 x 21 mm)
Power supply:	115/230 V ± 10 %, 45-60 Hz, 40 VA
Operating temperature:	+10° C to +40° C
Max. relative humidity:	10 %-90 % (without condensation), 5 %-95 % RH
Dimensions (W x H x D):	285 x 75 x 365 mm
Weight:	approx. 4 kg

1) NPR=number of pulses per revolution

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