

Test Equipment Solutions Datasheet

Test Equipment Solutions Ltd specialise in the second user sale, rental and distribution of quality test & measurement (T&M) equipment. We stock all major equipment types such as spectrum analyzers, signal generators, oscilloscopes, power meters, logic analysers etc from all the major suppliers such as Agilent, Tektronix, Anritsu and Rohde & Schwarz.

We are focused at the professional end of the marketplace, primarily working with customers for whom high performance, quality and service are key, whilst realising the cost savings that second user equipment offers. As such, we fully test & refurbish equipment in our in-house, traceable Lab. Items are supplied with manuals, accessories and typically a full no-quibble 2 year warranty. Our staff have extensive backgrounds in T&M, totalling over 150 years of combined experience, which enables us to deliver industry-leading service and support. We endeavour to be customer focused in every way right down to the detail, such as offering free delivery on sales, covering the cost of warranty returns BOTH ways (plus supplying a loan unit, if available) and supplying a free business tool with every order.

As well as the headline benefit of cost saving, second user offers shorter lead times, higher reliability and multivendor solutions. Rental, of course, is ideal for shorter term needs and offers fast delivery, flexibility, try-before-you-buy, zero capital expenditure, lower risk and off balance sheet accounting. Both second user and rental improve the key business measure of Return On Capital Employed.

We are based near Heathrow Airport in the UK from where we supply test equipment worldwide. Our facility incorporates Sales, Support, Admin, Logistics and our own in-house Lab.

All products supplied by Test Equipment Solutions include:

- No-quibble parts & labour warranty (we provide transport for UK mainland addresses).
- Free loan equipment during warranty repair, if available.
- Full electrical, mechanical and safety refurbishment in our in-house Lab.
- Certificate of Conformance (calibration available on request).
- Manuals and accessories required for normal operation.
- Free insured delivery to your UK mainland address (sales).
- Support from our team of seasoned Test & Measurement engineers.
- ISO9001 quality assurance.

Test equipment Solutions Ltd
Unit 8 Elder Way
Waterside Drive
Langley
Berkshire
SL3 6EP

T: +44 (0)1753 596000
F: +44 (0)1753 596001

Email: info@TestEquipmentHQ.com
Web: www.TestEquipmentHQ.com



PM 6680B / PM 6681 / PM 6681R

Timer / Counter / Analyzers Rubidium Frequency Reference / Counter / Calibrator

Technical Data

PM 6681: the highest performance timer/counter/analyzer available

The PM 6681 from Fluke sets the new standard for measurement and analysis of time intervals, frequency, phase and jitter. For development, calibration or challenging production test applications, the PM 6681 is the leader.

Check these key PM 6681 performance parameters, and compare the new state-of-the-art for yourself:

- 50 ps single-shot time interval resolution (1 ps averaged)
- 1.25 mV vertical resolution
- 300 MHz range, options to 4.2 GHz
- 8k readings/s to internal memory
- 250 readings/s over GPIB
- Continuous single-period measurements at up to 40k readings/s
- Unique hold-off and arming delay facilities to measure any part of any complex signal
- TimeView™ PC software for time and frequency analysis

So for the ultimate performance, choose the advanced PM 6681.

PM 6680B: the value leader

For applications that don't demand the PM 6681's sheer performance, check into Fluke's PM 6680B. This model offers a combination of performance and price that makes it today's undisputed value leader. Key specs. are identical to the PM 6681, except for:



- 250 ps single-shot time interval resolution
- 100 ps averaged time interval resolution
- 225 MHz range, options to 4.2 GHz
- 2k readings/s to internal memory

So, for today's top timer/counter value, choose the economic PM 6680B.

PM 6681R: ideal for calibration applications

The Rubidium reference of the PM 6681R makes this instrument the most accurate Frequency Reference/Counter/Calibrator for the calibration of frequency, time or phase.

- High accuracy and short warm-up times:
5 min. to lock
 4×10^{-10} within >10 min.
Aging 1×10^{-9} in 10 year
- Calibrates Frequency, Time or Phase
- Calibrates any application specific frequency
- 5x 10MHz & 1x 5MHz buffered reference outputs

Measuring Functions

Refer to table 1 for uncertainty information. Inputs A and B can be swapped internally in all modes except Rise and Fall Time.

Frequency A, B, C

Range:	
Input A (PM 6681):	10^{-10} Hz to 300 MHz
Input A (PM 6680B):	10^{-10} Hz to 225 MHz
Input B:	10^{-10} Hz to 100 MHz
Input C:	Up to 1.3 GHz, 2.7 GHz or 4.2 GHz with options
Resolution (PM 6681):	11 digits in 1s measuring time
Resolution (PM 6680B):	10 digits in 1s measuring time

Frequency Burst A, B, C

Frequency and PRF of burst signals can be measured without external control signal and with selectable start arming delay.

Range:	
Input A (PM 6681):	Up to 300 MHz
Input A (PM 6680B):	Up to 160 MHz
Input B:	Up to 100 MHz
Input C (PM 6681):	Up to 3 GHz with options
Start Delay Range (PM 6681)	200 ns to 1s, 100 ns resolution

Period A

Range (PM 6681):	3.3 ns to 10^{10} s
Range (PM 6680B):	6 ns to 10^{10} s
Resolution (PM 6681):	11 digits in 1s measuring time
Resolution (PM 6680B):	10 digits in 1s measuring time

Ratio A/B, C/B

Range:	10^{-9} to 10^{15}
Frequency Range:	
Input A, B:	10^{-10} Hz to 160 MHz
Input C:	Up to 1.3 GHz, 2.7 GHz or 4.2 GHz with options

Time Interval A to B

Range:	0 ns to 10^{10} s
Resolution	
single shot (PM 6681):	50 ps (1 ps average)
PM 6680B):	250 ps
Frequency Range:	Up to 160 MHz

Pulse Width A

Range:	3 ns to 10^{10} s
Frequency Range:	Up to 160 MHz

Rise and Fall Time A

Range:	3 ns to 10^{10} s
Frequency Range:	Up to 160 MHz
Input Amplitude (PM 6681):	>250 mV p-p
Input Amplitude (PM 6680B):	>500 mV p-p

Phase A Relative B

Range:	-180° to $+360^\circ$
Resolution:	0.01
Frequency Range:	0.03 Hz to 160 MHz

Duty Factor A

Range:	0 to 1
Frequency Range:	0.11 Hz to 160 MHz

Totalize A, B

Range:	0 to 10^{17} , 0 to 10^{10} in A-B modes
Frequency Range:	0 to 160 MHz
A Gated by B:	Event counting on Input A during the presence of a pulse on Input B. Single or cumulative event counting during set measuring time
A Start/Stop by B:	Event counting on Input A between two consecutive pulses on Input B

Manual A-B:

Input A minus Input B event counting with manual start and stop
Input A minus Input B event counting with manual start. Stop after set measuring time. Time counted from first trigger event on A.

Manual/Timed A-B:

AC/DC Voltage A, B

Range:	-50V to +50V
Frequency Range (PM 6681):	DC, 1 Hz to 100 MHz
Frequency Range (PM 6680B):	DC, 100 Hz to 100 MHz
Mode:	V_{max} , V_{min} , V_{p-p}
Resolution (PM 6681):	1.25 mV
Resolution (PM 6680B):	20 mV
Gated Volt:	External masking of unwanted signal components such as overshoot

Input and Output Specifications

Inputs A and B (PM 6681)

Frequency Range:	DC to 300 MHz
DC-Coupled:	10 Hz to 300 MHz
AC-Coupled:	AC or DC
Coupling:	1 M Ω /15 pF or 50 Ω (VSWR 2:1)
Impedance:	1 M Ω /65 pF or 50 Ω with PM 9611/80 rear panel inputs
Trigger Slope:	Positive or negative
Channel Inputs:	Separate, common A or swapped
Max. channel timing difference:	500 ps
Sensitivity:	20 mV rms, <100 MHz 30 mV rms, 100 MHz to 200 MHz 40 mV rms, 200 MHz to 250 MHz 60 mV rms, >250 MHz
Pulse Width:	>5 ns at 60 mV p-p, >3 ns at 90 mV p-p x1 or x10
Attenuation:	20 mV p-p
Hysteresis Window (x1):	30 mV p-p to 10V p-p up to 120 MHz
Variable Hysteresis A (x1):	60 mV p-p to 10V p-p within $\pm 5V$ window
Dynamic Range (x1):	Read-Out on display (x1): -5V to +5V (x10): -50V to +50V 1.25 mV $\pm(4 \text{ mV} + 1\% \text{ of trigger level})$ Trigger level is automatically set to 50% point of input signal (10% and 90% for Rise/Fall Time, 75% and 25% for variable hysteresis A) >1 Hz
Trigger Level:	
Range:	100 kHz fixed. >40 dB attenuation at 1 MHz
Resolution (x1):	1 Hz to 10 MHz using trigger Hold-Off
Uncertainty (x1):	Tri-state LED-indicator
AUTO Trigger Level:	
Frequency:	350V (DC + AC pk) at DC to 440 Hz, falling to 12V rms (x1) and 120V rms (x10) at 1 MHz
Low Pass Filter A:	12V rms
Digital Low Pass Filter:	
Trigger Indicator:	
Max Voltage Without Damage:	1 M Ω :
	50 Ω :

Inputs A and B (PM 6680B)

Frequency Range:	DC to 225 MHz
DC-Coupled:	10 Hz to 225 MHz
AC-Coupled:	AC or DC
Coupling:	Approx. 1.5 ns
Rise Time	1 M Ω /30 pF or 50 Ω (VSWR 2:1)
Impedance:	1 M Ω /80 pF or 50 Ω (with PM 9611/80 rear panel inputs)
Trigger Slope:	Positive or negative
Channel Inputs:	Separate, common A or swapped
Max. channel timing difference:	1 ns
Sensitivity:	20 mV rms, <100 MHz 30 mV rms, 100 MHz to 200 MHz

Pulse Width:	40 mV rms, >200 MHz >5 ns at 60 mV p-p, >3 ns at 90 mV p-p
Attenuation:	x1 or x10
Hysteresis Window (x1):	30 mV p-p
Variable Hysteresis A (x1):	60 mV p-p to 10V p-p up to 120 MHz
Dynamic Range (x1):	60 mV p-p to 10V p-p within ±5V window
Trigger Level:	Read-Out on display
Range:	(x1): -5.1V to +5.1V
Range (cont'd):	(x10): -51V to +51V
Resolution (x1):	20 mV
Uncertainty (x1):	±(20 mV + 1% of trigger level)
AUTO Trigger Level:	Trigger level is automatically set to 50% point of input signal (10% and 90% for Rise/Fall Time, 75% and 25% for variable hysteresis A)
Frequency:	>100 Hz
Amplitude:	>150 mV p-p
Low Pass Filter A:	100 kHz fixed. >40 dB atten. at 1 MHz
Digital Low Pass Filter:	1 Hz to 5 MHz using trigger Hold-Off
Trigger Indicator:	Tri-state LED-indicator
Max Voltage Without Damage: 1 MΩ:	350V (DC + AC pk) at DC to 440 Hz, falling to 12V rms (x1) and 120V rms (x10) at 1 MHz
50Ω:	12V rms

Input C (Option PM 9621)

Frequency Range:	70 MHz to 1.3 GHz
Prescale Factor:	256 (PM 6680B) 512 (PM 6681)
Operating Input Voltage Range:	
70 to 900 MHz:	10 mV rms to 12V rms
0.9 to 1.1 GHz:	15 mV rms to 12V rms
1.1 to 1.3 GHz:	40 mV rms to 12V rms
Amplitude Modulation:	
DC to 0.1 MHz:	Up to 94% depth
0.1 to 6 MHz:	Up to 85% depth
Minimum signal must exceed minimum operating input voltage	
Impedance:	50Ω nominal, AC coupled, VSWR <2:1
Max Voltage Without Damage:	12V rms, pin-diode protected
Connector:	BNC

Input C (Option PM 9624)

Frequency Range:	100 MHz to 2.7 GHz
Prescale Factor:	16 (PM 6680B) 32 (PM 6681)
Operating Input Voltage Range:	
100 to 300 MHz:	20 mV rms to 12V rms
0.3 to 2.5 GHz:	10 mV rms to 12V rms
2.5 to 2.7 GHz:	20 mV rms to 12V rms
Amplitude Modulation	As PM9621
Impedance:	50Ω nominal, AC coupled, VSWR <2.5:1
Max Voltage Without Damage:	12V rms, pin-diode protected
Connector:	Type N Female

Input C (Option PM 9625B)

Frequency Range :	150 MHz to 4.2 GHz
Prescale Factor:	32 (PM 6680B) 64 (PM 6681)
Operating Input Voltage Range:	
150 to 300 MHz:	20 mV rms to 1V rms (-21 to +13 dB)
0.3 to 2.2 GHz:	10 mV rms to 1V rms (-27 to +13 dB)
2.2 to 3.5 GHz:	15 mV rms to 1V rms (-23.5 to +13 dB)
3.5 to 4.2 GHz:	25 mV rms to 1V rms (-19 to +13 dB)
Amplitude Modulation	As PM 9621
Impedance:	50Ω nominal, AC coupled, VSWR <2.5:1
Max Voltage Without Damage:	12V rms, pin-diode protected

Connector: Type N Female

Rear Panel Inputs and Outputs

Reference Input (PM 6681):	1, 2, 5, or 10 MHz >200 mV rms signal
Reference Input (PM 6680):	10 MHz >500 mV rms signal
Reference Output (PM 6680B):	1x 10 MHz >0.5V rms sinewave into 50Ω load
PM 6681R:	5x 10 MHz & 1x 5 MHz. >0.5V rms sinewave into 50Ω load
Arming Input:	Most measuring functions can be performed.
Frequency Range (PM 6681):	DC to 100 MHz
Frequency Range (PM 6680B):	DC to 50 MHz
Slew Rate:	>2 V/s
Trigger Level:	TTL level, 1.4V nominal
Trigger Slope:	Positive or negative
Gate Output:	Gate open/gate closed signal output
Trigger Level Outputs:	Outputs for channel A and B trigger levels
Probe Compensation Outputs:	Outputs for channel A and B to adjust for best pulse response when using probes for counter input
Analog output:	0 to 4.98V proportional to 3 selected digits

Auxiliary Functions

Trigger Hold-Off

Time Delay Range (PM 6681):	60 ns to 1.34s, 10 ns resolution
Time Delay Range (PM 6680B):	200 ns to 1.6s, 100 ns resolution
Event Delay Range B (PM 6681):	2 to 2 ²⁴ -1, max. 100 MHz
Event Delay Range B (PM 6680B):	2 to 2 ²⁴ -1, max. 20 MHz

External Arming

Time Delay Range B, E:	200 ns to 1.6s, 100 ns resolution
Event Delay Range B:	2 to 2 ²⁴ -1, max. 20 MHz

Statistics

Functions:	Maximum, Minimum, Mean and Standard Deviation
Sample Size (PM 6681):	1 to 2 x 10 ⁶ samples
Sample Size (PM 6680B):	1 to 65535 samples

Mathematics

Functions:	(K*X+L)/M and (K/X+L)/M. X is cur rent reading and K, L and M are con stants; set via keyboard or as frozen ref erence value (X _n) or as value from pre ceding measurement (X _{n-1})
------------	--

Other Functions

Measuring Time (PM 6681):	Single cycle, 80, 160, 320, 640, 1280 ns and 20 μs to 20s (or to 400s for some functions)
Measuring Time (PM 6680B):	Single cycle, 0.8, 1.6, 3.2, 6.4, 12.8 μs and 50 μs to 20s (or to 400s for some functions)
Display Hold:	Freezes measuring result, until a new measurement is initiated via Restart
Settings:	20 instrument setups can be saved and recalled from internal non-volatile memory. 10 can be user protected.
Auxiliary Menu:	Gives access to additional functions
Display:	10-digit LCD with high-luminance backlight

GPIB Interface

Programmable Functions:	All front panel accessible functions
Compatibility:	IEEE 488.2-1987, SCPI 1991.0
Interface Functions:	SH1, AH1, T6, L4, SR1, RL1,

Time Stamping (PM 6681): DC1, DT1, E2
 125 ns resolution
 Measurement Rate* **PM 6681** **PM 6680B**
 Via GPIB 250 readings/s 125 readings/s
 To Internal Memory: 8k readings/s 2k readings/s

Internal Memory Size (PM 6681)* Up to 6100 readings
 Internal Memory Size (PM 6680B)*Up to 2600 readings
 Data Output: ASCII, IEEE double precision
 floating point

TimeView™ Time & Frequency Analysis Software

TimeView runs on an IBM PC/AT or compatible with VGA monitor.

Data Capture Modes and Measurement Rate*

	PM 6681	PM 6680B
Free Running Measurement:	8k readings/s	2k readings/s
Repetitive Sampling:	Up to 10 MHz	Up to 10 MHz
Continuous Single-Period:	Up to 40k readings/s (200 ns resolution)	N/A
Waveform Capture:	Yes	N/A
Data Analysis Features:	Measurement data vs time FFT Graph Root Allan Variance Smoothing function Zoom function Cursor measurements	

Distribution Histogram
 Setup and Measurement Data
 Archive and printing

* Depending on measurement function and internal data format

Systematic Uncertainties

Trigger Level Timing Error

Time Interval, Rise/Fall Time, Pulse Width, Duty Factor (x1):

Trigger Level Timing Error =
 = TLU x (1/Sx + 1/Sy) ± 0.5 x Hyst. x (1/Sx + 1/Sy)
 Where:

Sx = Slew rate at start trigger point in V/s
 Sy = Slew rate at stop trigger point in V/s
 TLU = Trigger Level Uncertainty for each model in Volt
 Hyst. = Hysteresis Window for each model in Volt
 Hyst. = 0 for Time Interval and Rise/Fall Time for PM 6681

Phase, sinewave signals and trigger levels OV (x1):

Trigger Level Timing Error (PM 6681) =
 = [0.2/V pk of A + 0.2/V pk of B] °
 Trigger Level Timing Error (PM 6680B) =
 = [0.3/V pk (A) + 0.3/V pk (B)] ° ± [0.9/V pk (A) - 0.9/V pk (B)] °

Where:
 V pk (A) = Input A peak voltage in Volt
 V pk (B) = Input B peak voltage in Volt

Measurement Uncertainties

Measuring Function	Random Uncertainty rms	Systematic Uncertainty
Time Interval Pulse Width Rise/Fall Time	$\sqrt{(QE)^2 + (\text{Start Trigger Error})^2 + (\text{Stop Trigger Error})^2}$ \sqrt{N} or min.: 1 ps for PM 6681, 100 ps for PM 6680B	± Trigger Level Timing Error ± 500 ps Systematic Error (PM 6681) ± 1 ns Systematic Error (PM 6680B) ± Time Base Error x Time Interval
Frequency Period	$\sqrt{(QE)^2 + 2 \times (\text{Start Trigger Error})^2}$ x Frequency or Period Measuring Time	± Time Base Error x Freq. or Period ± $\frac{QE \times \text{Freq. or Period}}{\text{Measuring Time}}$
Ratio f₁/f₂	$\sqrt{(\text{Prescaler Factor})^2 + 2 \times (f_1 \times \text{Start Trigger Error of } f_2)^2}$ f ₂ x Measuring Time	
Phase	$\sqrt{(QE)^2 + (\text{Start Trigger Error})^2 + (\text{Stop Trigger Error})^2}$ \sqrt{N} x Freq. x 360° or min.: (1 ps for PM 6681, 100 ps for PM 6680B) x Freq. x 360°	± Trigger Level Timing Error° ± 500 ps Sys. Error x Freq. x 360° (PM 6681) ± 1 ns Sys. Error x Freq. x 360° (PM 6680B)
Duty Factor	$\sqrt{(QE)^2 + (\text{Start Trigger Error})^2 + (\text{Stop Trigger Error})^2}$ \sqrt{N} x Frequency or min.: (1 ps for PM 6681, 100 ps for PM 6680B) x Frequency	± Trigger Level Timing Error x Freq. ± 500 ps Sys. Error x Freq. (PM 6681) ± 1 ns Syst. Error x Freq. (PM 6680B)

Table 1: Measurement Uncertainties

Random Uncertainties

(QE) Quantization Error
 (PM 6681): 10°C to 40°C: 50 ps rms
 0 to 10°C and 40 to 50°C: 75 ps rms
 (QE) Quantization Error
 (PM 6680B): 0°C to 55°C: 250 ps rms
 (N)Number of samples
 (PM 6681): Frequency <12 kHz: Measuring Time x Frequency/2
 Frequency >12 kHz: Measuring Time x 6000

(N) Number of samples
 (PM 6680B): Frequency <2 kHz: Measuring Time x Frequency/2
 Frequency >2 kHz: Measuring Time x 1000

Start/Stop Trigger Errors:

$\frac{\sqrt{(\text{Vnoise-input})^2 + (\text{Vnoise-signal})^2}}{\text{Signal slew rate (V/s) at trigger point}}$ rms
 Vnoise-input (PM 6681): 100µV rms typical
 Vnoise-input (PM 6680B): 200µV rms typical
 Vnoise-signal: The rms noise of the input signal

Display Resolution

LSD Displayed

Unit value of the least significant digit displayed. All calculated LSDs should be rounded to the nearest decade (e.g. 0.3 Hz is rounded to 0.1 Hz, 5 Hz is rounded to 10 Hz.) and cannot exceed the 12th digit.

Frequency and Period

LSD Displayed (PM 6681) $\frac{50 \text{ ps} \times \text{Frequency or Period}}{\text{measuring time}}$

LSD Displayed (PM 6680B) $\frac{500 \text{ ps} \times \text{Frequency or Period}}{\text{measuring time}}$

Time Interval, RT, FT, PW

LSD Displayed (PM 6681) $\frac{50 \text{ ps}}{\sqrt{N}}$

LSD Displayed (PM 6680B) $\frac{500 \text{ ps}}{\sqrt{N}}$

Duty Factor
LSD Displayed 1×10^{-6}

Phase
LSD Displayed 0.01°

Ratio f1/f2
LSD Displayed $\frac{\text{Prescaler Factor}}{f_2 \times \text{measuring time}}$

Time Base Options

Option model:	PM668/-1-	PM668/-5-	PM668/-6-	PM668/-7-
Retro-fittable option:	non retrofit.	PM9691/011	PM9692/011	non retro-fit.
Time base type:	Standard	OCXO	OCXO	Rubidium
Uncertainty due to:				
Calibration adjustment tolerance, at + 23°C ± 3°C	<1x10 ⁻⁶	<2x10 ⁻⁸	<5x10 ⁻⁹	<5x10 ⁻¹¹
Ageing:				
per 24 hr.	n.a.	<5x10 ⁻¹⁰ ❶	<3x10 ⁻¹⁰ ❶	n.a.
per month	<5x10 ⁻⁷	<1x10 ⁻⁸	<3x10 ⁻⁹	<5x10 ⁻¹¹ ❷
per year	<5x10 ⁻⁶	<7.5x10 ⁻⁸	<2x10 ⁻⁸	<2x10 ⁻¹⁰ ❸
Temperature variation:				
0°C-50°C,	<1x10 ⁻⁵	<5x10 ⁻⁹	<2.5x10 ⁻⁹	<3x10 ⁻¹⁰
20°C-26°C (typ. values)	<3x10 ⁻⁶	<6x10 ⁻¹⁰	<4x10 ⁻¹⁰	<5x10 ⁻¹¹
Power voltage variation: ± 10%	<1x10 ⁻⁸	<5x10 ⁻¹⁰	<5x10 ⁻¹⁰	<1x10 ⁻¹¹
Short term stability:				
τ = 1 s		<5x10 ⁻¹²	<5x10 ⁻¹²	<5x10 ⁻¹¹
(root Allan Variance) τ = 10 s	not specified	<5x10 ⁻¹²	<5x10 ⁻¹²	<1.5x10 ⁻¹¹
τ = 100 s		n.a.	n.a.	<5x10 ⁻¹²
Power-on stability:				
Deviation versus final value after 24hr on time, after a warm-up time of:				
n.a.	n.a.	<1x10 ⁻⁸	<5x10 ⁻⁸	<4x10 ⁻¹⁰
30 min	30 min	10 min	10 min	10 min
Total uncertainty , for operating temperature 0°C to 50°C, at 2σ (95%) confidence interval:				
1 year after calibration	<1.2x10 ⁻⁵	<1x10 ⁻⁷	<2.5x10 ⁻⁸	<7x10 ⁻¹⁰
2 years after calibration	<1.5x10 ⁻⁵	<2x10 ⁻⁷	<5x10 ⁻⁸	<9x10 ⁻¹⁰
Typical total uncertainty , for operating temperature 20°C to 26°C, at 2σ (95%) confidence interval:				
1 year after calibration	<7x10 ⁻⁶	<1x10 ⁻⁷	<2.5x10 ⁻⁸	<6x10 ⁻¹⁰
2 years after calibration	<1.2x10 ⁻⁵	<2x10 ⁻⁷	<5x10 ⁻⁸	<8x10 ⁻¹⁰

n.a. Not discernible, neglectable versus 1°C temperature variation.
 ❶ After 48 hours of continuous operation, PM9692 typical value $1 \times 10^{-10} / 24\text{h}$
 ❷ After 1 month of continuous operation
 ❸ Typical value. Aging during 10 year <1x10⁻⁹

Explanation

Calibration Adjustment Tolerance is the maximal tolerated deviation from the true 10MHz frequency after a calibration. When the reference frequency does not exceed the tolerance limits at the moment of calibration, an adjustment is not needed.
 Total uncertainty is the total possible deviation from the true 10MHz value under influence of frequency drift due to ageing and ambient temperature variations versus the reference temperature. The operating temperature range and the calibration interval are part of this specification.

General Specifications

Environmental Data

Operating Temp 0°C to +50°C
 StorageTemp : -40°C to +70°C
 Vibration: 3G at 55 Hz per MIL-T-28800D
 Shock: Half-sine 40G per MIL-T-28800D.
 Bench handling. Shipping container.
 Reliability: MTBF 30 000 h (calculated)
 Safety: IEC 1010 Class 1, CSA 22.2 No. 231, EN 61010-1, CE

EMC: EN 55011 ISM Group 1, Class B;
 EN 50082-2; FCC Part 15J Class A, CE

Power Requirements

90V rms to 265V rms, 45 Hz to 440 Hz,
 35W (PM 6680B - 6681)
 100 W during warm-up (5 min.), 47 W during normal operation (PM 6681R)

Dimensions and Weight

Width:	315 mm (12.4 in),
Height:	86 mm (3.4 in),
Depth:	395 mm (15.6 in)
Weight PM 6680B, PM 6681:	Net 4 kg (8.5 lb), Shipping 7 kg (15 lb)
Weight PM 6681R:	Net 4.8 kg (10.5 lb), Shipping 7.8 kg (16.8 lb)

Ordering

Basic Models

PM 6680B/016	225 MHz, 250 ps Timer Counter including Standard Time Base GPIB-interface and Time & Frequency Software TimeView
PM 6681/016	300 MHz, 50 ps Timer/Counter including Standard Time Base, External Reference Frequency Multiplier (1, 2 or 5 MHz), GPIB-interface and Time & Frequency Software, TimeView

Rubidium Reference Basic Model

PM 6681R/076	300 MHz Frequency Reference/Counter/Calibrator including GPIB-interface and Time & Frequency Software, TimeView
--------------	---

Included with Instrument

One year product warranty, line cord, operator manual, and Certificate of Calibration Practices

Input Frequency Options (PM 6680B, PM 6681, PM 6681R)

PM 668 _/4 _ _	1.3 GHz Input C (PM 9621)
PM 668 _/6 _ _	2.7 GHz Input C (PM 9624)
PM 668 _/8 _ _	4.2 GHz Input C (PM 9625B)

Time Base Options (PM 6680B, PM 6681)

PM 668 _/_ 5 _	Very High Stability Oven Time Base (PM 9691)
PM 668 _/_ 6 _	Ultra High Stability Oven Time Base (PM 9692)

Example Ordering Configuration

To order the PM 6681 300 MHz, 50 ps version with the 2.7 GHz input C and Standard Time Base, select the complete Model Number: PM 6681/616

Options and Accessories

PM 9611/80

PM 9621
PM 9624
PM 9625B
PM 9691
PM 9692
PM 9622/00
PM 9627
PM 9627H
PM 9020/002

PM 9639

Rear Panel Inputs
(front inputs disconnected)

1.3 GHz Input C
2.7 GHz Input C
4.2 GHz Input C
Very High Stability Oven Time Base
Ultra High Stability Oven Time Base
Rack-Mount Kit
Carrying Case
Heavy Duty Aluminum Carrying Case
200 MHz 10:1 probe 1M Ω /30pF (for PM6680B)
2.3 GHz 500 Ω probe 10:1 (BNC)

When ordered together with the basic counter, options are factory installed.

Options ordered separately can be customer retrofitted, except

PM 9611/80 Rear Panel Inputs.

SW Drivers on request

MET/CAL procedures are available

HPVEE driver is available

LabView driver is available from National Instruments (PM6681)

Manuals

Operator *

Programming*

Service

*No charge with purchase of unit

Factory Warranty

One year product warranty

Two year warranty on Rubidium Element