



U6200A and U6220A Universal Counters with 20 GHz option



- Measuring frequency over 400MHz within standard 6GHz Channel 3.
- 12 digits resolution with 1s gate time.
- 40ps time domain function resolution.
- Great Features for Universal Purposes.
- Full Math Functions & Easy Operation Panel.
- Fast Measurement & Special Application
- Free Software & Familiar SCPI Commands.
- U6200A Specifications:

12 Digits Resolution & 6 GHz Frequency Measurement

The Picotest U6200A universal counter, whose production procedures conform to ISO 9004, has frequency resolution of 12 digits per second (Figure-1), 40 ps time interval resolution and a complete set of test and analysis features. The standard U6200A's CH3 comes with the range from 375 MHz to 6GHz and the standard CH 1 & 2 from 1 mHz to 400 MHz.



Figure-1

Great Features for Universal Purposes

The Picotest U6200A also provides great features including Frequency & Ratio (11 Digits/Sec.), Time interval, Period (2.5 ns to 1000s), Duty Cycle, Pulse Width, Rise/Fall Time, Peak Volts (100 Hz~300 MHz), Phase, Totalize, Temperature Stability (< 1 PPM), Aging Rate (< 2 PPM per year), timebase reference channel (Figure-2) and complete Front-End Isolation. Moreover, it offers 20 memories (Figure-3) for storing frequently-used operations.



Figure-2



Figure-3

Full Math Functions & Easy Operation Panel

The Picotest U6200A offers built-in statistics and math functions. Users can do measurements, simultaneously measure, count in mean, min/max, delta & standard deviation (Figure-4). And scale & offset can be easily used for compensation purpose according to users' applications. In addition, to reach these measurements, user can easily use the numeric buttons to define settings. Moreover, the U6200 also provides users the visible light buttons as functions are working (Figure-5).



Figure-4

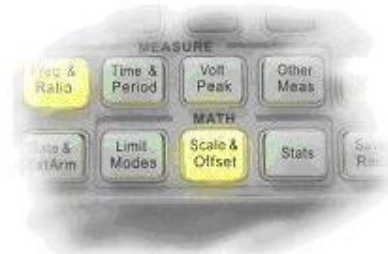


Figure-5

Fast Measurement & Special Application

The U6200A supports real-time digital signal processing technology, which is applied to analyze data as simultaneously getting new readings and speeding measurement. The "Limit Modes" is worth to be mentioned, i.e. users can set margin according to their specific measurements, and via Go-On or Stop and USB Output settings (Figure-6), the U6200A can be keep or stop measuring as a limit is exceeded, and generate an output signal to trigger external devices.



Figure-6

Free Software & Familiar SCPI Commands

Users can get data logs (Figure9) by PC software (Microsoft Excel®) via a USB, or an optional GPIB interface. Furthermore, U6200A supports a webserver function, so users can easily control it via a LAN interface (Figure 10) by inputting an Ethernet address (Default: 192.168.0.247) on web browsers. In addition, by the SCPI commands compatible to Agilent 53132A, the Picotest U6200A can provide familiar syntax string for users' applications. For more command information, please refer to the U6200A User's Manual in Chapter 7.

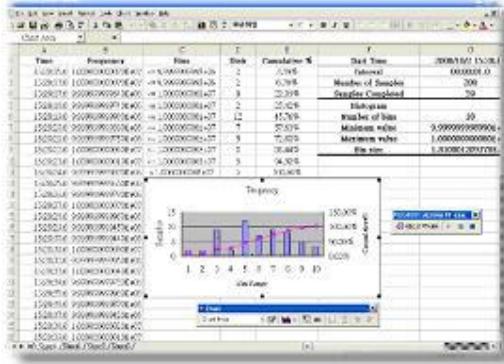


Figure-9



Figure-10

U6200A Specifications:

Channel 1 & 2 (for U6200A only) Input Specifications	
DC Coupled	1mHz to 400 MHz
AC Coupled	200KHz to 400 MHz (50 Ω) 30 Hz to 400 MHz (1 M Ω)
FM Tolerance	FM Tolerance: 25%
Voltage Range and Sensitivity	
1mH to 225 MHz	20 mVrms to ± 5 V ac + dc (Medium and High) 25 mVrms to ± 5 V ac + dc (Low) (75 mVrms with optional rear connectors)
225 MHz to 400 MHz	30 mVrms to ± 5 V ac + dc (75 mVrms with optional rear connectors)
Channel 1 & 2 (for U6200A only) Input Characteristics	
Impedance	1 M Ω or 50 Ω
(ATT X 1, 1 MΩ Capacitance)	24 pF
(ATT X 10, 1 MΩ Capacitance)	15 pF
Coupling	AC or DC
Low-Pass Filter	100 KHz (or disabled) - 20 dB at > 1 MHz
Input Sensitivity	Selectable between Low, Medium(default), or High Medium is approximately 1.35x High Sensitivity, low is approximately 1.7x High Sensitivity
Voltage Range and Sensitivity (Single-Shot Pulse)	
1.5ns to 10ns Pulse Width	80 mVpp to 10 Vpp (150 mVpp with optional rear connectors)
>10 ns Pulse Width	50 mVpp to 10 Vpp (150 mVpp with optional rear connectors)

Trigger Level(ATT x 1)		
Range	±5.125 V	
Accuracy	±(15 mV + 1% of trigger level)	
Resolution	2.5mV	
ATT x 10 Range	X 10	
Trigger Slope	Positive or Negative	
Auto Trigger Level	Range	0 to 100% in 1% steps
	Frequency	Peak Voltage fast mode >10 KHz Peak Voltage slow mode > 100 Hz Amplitude > 100 mVpp (No amplitude modulation)
Damage Level		
DC~400MHz 50 Ω	12 Vrms	
0 to 3.5 kHz, 1 MΩ	350 V dc + ac pk	
3.5 kHz to 100KHz, 1 MΩ	350 V dc + ac pk linearly derated to 12 Vrms	
100KHz to 400MHz, 1 MΩ	12 Vrms	
Attenuator		
Voltage Range	x10	
Trigger Range	x10	

1. Specifications and Characteristics for Channels 1 and 2 are identical for both Common and Separate Configurations.
2. Values shown are for x 1 attenuator setting. Multiply all values by 10 (nominal) when using the x 10 attenuator setting. Note that it may necessary to recalibrate the input offset in the application environment (especially at high temperature) to achieve maximum sensitivity.

Channel 3 Input Specifications (for U6200A only)	
Frequency Range	375 MHz to 6 GHz
Channel 3 Input Characteristics (for U6200A only)	
Impedance	50 Ω
Coupling	AC
VSWR	< 2.5:1
Power Range and Sensitivity (Sinusoid)	
375 MHz to 500 MHz	-16 dBm to +15 dBm
500 MHz to 1 GHz	-20 dBm to +15 dBm
1 GHz to 2 GHz	-23 dBm to +15 dBm
2 GHz to 4 GHz	-25 dBm to +15 dBm
4 GHz to 5 GHz	-21dBm to +15 dBm
5 GHz to 5.5 GHz	-20 dBm to +15 dBm
5.5 GHz to 6 GHz	-17 dBm to +15 dBm
Damage Level	
+25 dBm, DC ±12V	
Option Channel 3 Input Specifications (U6200-opt02: for U6200A only)	
Frequency Range	250 MHz to 20 GHz
Option Channel 3 Input Characteristics (U6200-opt02: for U6200A only)	
Impedance	50 Ω
Coupling	AC
VSWR	< 2.5:1

Power Range and Sensitivity (Sinusoid, at 25°C)		
250-500MHz	-22~+23dBm	
0.5-14GHz	-27~+23dBm	
14-15GHz	-21~+23dBm	
15-16GHz	-19~+23dBm	
16-19GHz	-17~+23dBm	
19-20GHz	-13~+23dBm	
Damage Level		
+26 dBm, DC ±24V		
External Arm Input Specifications		
Signal Input Range	LVTTTL and TTL compatible	
Timing Restrictions		
Pulse Width	> 50 ns	
Transition Time	< 250 ns	
Start-to-Stop Time	> 50 ns	
Damage Level	12 Vrms	
External Arm Input Characteristics		
Impedance	1 kΩ	
Input Capacitance	17 pF	
Start Slope	Positive or Negative	
Stop Slope	Positive or Negative	
Notes	1. External Arm is available for all measurements except Peak Volts. 2. External Arm is referred to as External Gate for some measurements.	
Internal Time Base Stability		
	Standard (0° to 50°C)	High Stability Oven (U6200-opt01 for U6200A only)
Temperature Stability (referenced to 25°C)	± 1 x 10E-6	± 5 x 10E-9
Aging Rate		± 8 x 10E-10
Per Day		
Per Month		
Per Year	± 2 x 10E-6 (typical, ± 1 x 10E-6)	± 8 x 10E-8
Turn-on stability vs. time (30 min.)		± 2.0 x 10E-8 (referenced to 24 hours)
Calibration	Electronic	Electronic
External Time Base Input Specifications		
Voltage Range	200 mVrms to 10 Vrms	
Damage Level	12 Vrms	
External Time Base Input Characteristics		
Threshold	0 V	
Impedance	1 kΩ	
Input Capacitance	25 pF	
Input Frequency	10 MHz	
Internal vs. External Time Base Selection	Manual	Select Internal or External
	Automatic	Internal used when External not present (default)
Time Base Output Specifications		
Output Frequency	10 MHz	
Voltage	570 mVpp (0 dBm), typical	

Measurement Specifications	
Frequency, Period Channel 1 and 2	1 mHz to 400 MHz (2.5 ns to 1000 s)
Trigger	Default setting is Auto Trigger at 50 %
"Auto" Gate Time	0.1 sec
STD CH 3	375 MHz to 6 GHz (0.166 ns to 2.6 ns)
Frequency Ratio	CH 1/ CH 2, CH 1/ CH 3, CH 2/ CH 1, CH 3/ CH 1 (Measurement is specified over the full signal range of each input.)
Results Range	10E-10 to 10E+11
"Auto" Gate Time	0.1 sec
Time Interval	Measurement is specified over the full signal ranges of Channels 1 and 2. The width of the pulse must be greater than 1 ns, frequency range to 300 MHz.
Trigger	Default setting is Auto Trigger at 50 %
Results Range	-0.5 ns to 10E+5 s
Resolution	40 ps
RMS Resolution	120 ps
Systematic Uncertainty	$\pm(TI \times \text{Time Base Error}) \pm \text{Trigger Level Timing Error} \pm 500 \text{ ps Differential Channel Error}$
Pulse Width Time	Measurement is specified over the full signal range of Channel 1. The width of the pulse must be greater than 1 ns frequency range to 300 MHz).
Pulse Selection	Positive or Negative
Trigger	Default setting is Auto Trigger at 50%
Results Range	1.5 ns to 10E+5 s
Resolution	40 ps
RMS Resolution	120 ps
Systematic Uncertainty	$\pm (\text{Pulse Width Time} \times \text{Time Base Error}) \pm \text{Trigger Level Timing Error} \pm 500 \text{ ps Differential Channel Error}$.
Rise/Fall Time	Measurement is specified over the full signal range of Channel 1. The width of the pulse must be greater than 1 ns frequency range to 300 MHz).
Edge Selection	Positive or Negative
Trigger	Default setting is Auto Trigger at 10% and 90%
Results Range	2 ns to 10E+5 s
Resolution	40 ps
RMS Resolution	120 ps
Systematic Uncertainty	$\pm (\text{Edge Time} \times \text{Time Base Error}) \pm \text{Trigger Level Timing Error} \pm 500 \text{ ps Differential Channel Error}$
Phase	Measurement is specified over the full signal range of each input. The width of the pulse must be greater than 1 ns, frequency range to 300 MHz
Results Range	-180° to +360°
Resolution	40 ps
RMS Resolution	120 ps
Systematic Uncertainty	$\pm (\text{Trigger Level Timing Error}) \times \text{Frequency}$
Duty Cycle	Measurement is specified over the full signal range of Channel 1. The width of the pulse must be greater than 1 ns, frequency range to 300 MHz
Pulse Selection	Positive or Negative
Trigger	Default setting is Auto Trigger at 50 %
Results Range	0 to 1
Resolution	40 ps
RMS Resolution	120 ps
Systematic Uncertainty	$\pm \text{Trigger Level Timing Error} \pm 500 \text{ ps Differential Channel Error}$
Totalize	Measurement is specified over the full signal range of Channel 1. The width of the pulse must be greater than 1 ns, frequency range to 400 MHz
Pulse Selection	Positive or Negative
Trigger	Default setting is Trigger at 0 V
Results Range	0 to 10E+15
Resolution	1 count
Systematic Uncertainty	$\pm 1 \text{ count}$

Peak Voltage	Results Range	-5.1 V to + 5.1 V	
	Resolution	2.5 mV	
DC Signals	15 mV + 2 % of V	peak-to-peak amplitude greater than 200 mV	
DC Signals (ATT x 10)	150 mV + 2 % of V	peak-to-peak amplitude greater than 1 V	
1 Vp-p, 50 Ω, ATT OFF	100 Hz ~ 10 KHz	15 mV + 2 % of V	peak-to-peak amplitude greater than 200 mV
	10 KHz ~ 5 MHz	15 mV + 4 % of V	
	5 MHz ~ 80 MHz	15 mV + 7 % of V	
	80 MHz ~ 300 MHz	15 mV + 15 % of V	

The peak volts measurement will keep operating up to 400 MHz; although results act as references only. Tres is the resolution including effect of certain internal errors.

The differential channel Error terms which counted by many systematic uncertainty equations result channel-to-channel disaccord and internal noise. These issues can be improved by the TI calibration in the well-controlled temperature environment.

B. Preset Values and Save/Recall Information

※ Note: The U6220A doesn't provide the function via the channel 2 colored green.

		Value at *RST (GPIB Reset)	In Save/Recall	In non-volatile memory
Input impedance	CH1	1E+6Ohms	yes	no
	CH2	1E+6Ohms	yes	no
Input Attenuation	CH1	x1	yes	no
	CH2	x1	yes	no
Trigger Level	CH1 (percent)	50	yes	no
	CH2 (percent)	50	yes	no
	CH1 (volts)	0	yes	no
	CH2 (volts)	0	yes	no
Trigger Slope	CH1	positive	yes	no
	CH2	positive	yes	no
Sensitivity	CH1	high	yes	no
	CH2	high	yes	no
Scale		1	yes	no
Offset		0	yes	no
Limits parameters	Limit test on/off	off	yes	no
	On fail stop/go on	go on	yes	no
	Lower limit	0	yes	no
	Upper Limit	0	yes	no
Stats parameters	Stats on/off	off	yes	no
	Measurement count	100	yes	no
	Display measurement/stats	measurement	yes	no
	Use all/in limits	all	yes	no
	On-single measurement	1	yes	no
Timebase		auto	yes	no
Expected Frequency Parameters			no	no
Auto-frequency parameters		on	no	no
Trigger Offset Cal parameters			no	yes
Trigger Gain Cal parameters			no	yes
Time Interval Offset Cal parameters			no	yes
Utility	Option Timebase Cal			

C. General Specifications

※ Note: The U6220A doesn't support the accessories from item 1 ~ 4 color green.

Item	Limitation & description
Power Supply Voltage	100V/240V ± 10% 50Hz~60Hz ± 10%
	100V/120V ± 10% 400Hz ± 10%
Power Requirements	50 VA Maximum
Operating Humidity	Maximum relative humidity 80% for temperature up to 31 °C decreasing linearly to 50% relative humidity at 40°C
Operating Environment	0 to 55 °C
Storage Temperature	- 40 °C to 70 °C
Operating Altitude	Up to 2000m
Bench Dimensions (WxHxD)	210mm x 85mm x 350mm
Weight	3200g
Safety	IEC61010-1:2001/EN61010-1:2001 (2nd Edition)
EMC	EN61326, IEC61000-3, IEC61000-4
Warm-up Time	1 Hour
Accessory	<ol style="list-style-type: none"> 1. U6200-opt01: High Stability Oven 2. U6200-opt02: 250 MHz~20 GHz Input Channel 3. 3. U6200-opt04: Rear panel input module (CH1/CH2) 4. U6200-opt05: Rear panel input module (CH1/CH2/CH3) 5. M3500-opt04: GPIB Card

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Full specifications available from www.ptsyst.com. Specifications and features subject to change without notice (150110)