

PI-2005

Pattern Generator

Features:

- 250 MHz Clock Rate
- Multi-level Looping
- Up to 8Mbit Memory Depth Per Channel
- Start/Stop Trigger Inputs
- Up To 64 Channels in 16 Channel Increments
- Graphical serial command generation

Applications:

- Device Characterization
- FPA/CCD Testing
- Complex Digital Patterns
- Digital Timing for Systems
- Verify DAC, FPGA and ASIC Devices

Introduction:

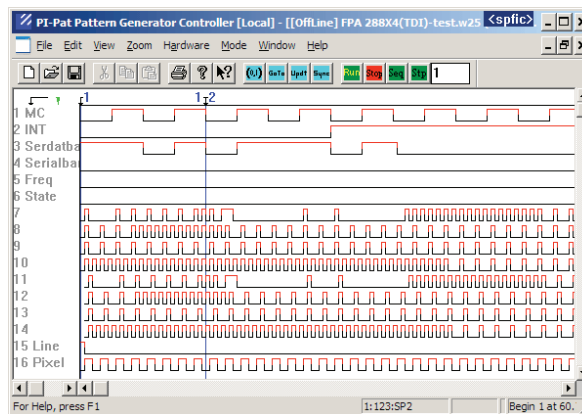
The PI-2005 Pattern Generator generates a wide range of simple to complex digital patterns for many test applications requiring serial or parallel digital data streams. Its CompactPCI® modular instrumentation platform combines mainstream PC technology and rugged packaging to create a high performance, low cost test instrument. Because of its small size the PI-2005 can be used in portable, bench and rack-mount applications. In particular, it is well suited for production test applications where manufacturing floor space is always at a premium.

Instrument Description

As a test engineer or digital designer you must have state-of-the-art tools to test, characterize and verify your complex semiconductor devices and digital circuit boards. To meet the requirements of the present day complex devices and digital circuits the pattern generator can be configured from 16 to 64 output channels.

With almost infinite looping capability and up to 8 Mbits per channel, the PI-2005 can create a digital pattern at speeds and complexities that will fulfill the most demanding requirements. The pattern generator internal clock provides frequencies from 12 KHz to 225 MHz with a <1% programming accuracy. The phase-locked loop clock gives you high resolution timing for precise placement of the timing signals. An external clock can also be used.

The output voltage of the data channels can be LVTTTL, TTL, or 5V/CMOS, determined by the pattern card selected. Output are back-matched with 50 Ω to maintain output waveform fidelity. The channel-to-channel skew for all channels is less than 600 picoseconds. Each channel can be individually programmed for RZ/NRZ and inverted/ non-inverted output. Each channel can be individually



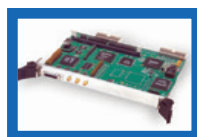
programmed for tri-state operation. Additionally, the outputs can be dynamically tri-stated in channel pairs during pattern output.

There is an optional delay feature that will delay the output channels independently from 0 to 5.8 nanoseconds.

To program the instrument, the pattern memory is divided into sections, called subpatterns, from 12 bits to 8Mbits long. The user can define up to 262,144 subpatterns, and subpattern definitions are common across all channels of the instrument. The subpatterns are output from the instrument in a programmed sequence with repeat factors and looping. The repeated and looping factors can be programmed with fixed values or compile-time variables to vary execution time of a test function, such as integration time for imaging devices. Multiple programs can be stored within a single pattern file and can use the same subpattern definitions.

Deeply nested looping provides virtually unlimited pattern depth for applications that use repeatable data, such as testing of array-structured devices.

The PI-2005 permits fine control over program execution. In Run mode the output loops continuously. In Step Mode the instrument will output exactly n subpattern statements. In Sequence Mode the instrument will output the entire compiled instruction set n times. At the end of Step or Sequence the execution stops and all outputs are held low.



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The PI-2005 also has external Start and Stop triggers that allow the user to apply an external signal to stop or start the execution of the instruction set. When a start signal is received the pattern generator will begin execution at the beginning of the program. When a stop signal is received the PI-2005 will stop at the end of the subpattern being executed.

Software Description

The PI-2005 is programmed, as a standalone instrument, using Pulse Instruments' PI-PAT software running under Windows 10/64. It can also be scripted by Pulse Instruments PI-DATS Automated FPA Test Software, for fully automated device characterization and production test.

Pulse Instruments PI-PAT software makes programming the PI-2005 as easy as drawing timing patterns on the large graphical display. Cut/Copy/Paste and Multiple Paste accelerate complex pattern creation. Patterns can also be entered algorithmically. Timing markers and zoom views allow the user to quickly check timing alignment of critical patterns. The 'Go To' function allows the user to quickly view and edit any position in the data pattern.

A unique graphical interface in PI-DATS also allows rapid generation and automation of the serial command registers common to many modern imaging devices and ROICs:

The serial register can be divided into sub-words of any length and populated with static or variable values in binary, decimal or hexadecimal. Sub-words can be output MSB-

Enable	SP #	Name	Len	Value
Yes	124	INTB	10	nINTB
Yes	134	INTA	10	nINTA
Yes	140	Reserved	6	101010
Yes	150	DAA	5	nDAA
Yes	152	GCR	2	nGCR

first or LSB-first, including mixing of byte orders within the serial register.

Each channel installed in the instrument can be given a mnemonic signal name to identify how each output channel is used in the test application.

The PI-2005 can also be programmed via an OLE/Automation interface or via GPIB from a remote PC. The controlling application can be PI-PAT or 3rd-party software written in a variety of environments including C++, LabVIEW, VisualBasic, etc. Patterns, instructions, comments, and channel names can also be imported and exported directly as text files. The command set is fully documented and highly backward-compatible with applications written for Pulse Instruments' PI-5800A pattern generator.

The PI-2120x pattern cards are also compatible with all pattern files written for the PI-2110x pattern cards.

Specifications:

Clock:

Frequency: 12 kHz-250 MHz (Int. Clock)
<1 Hz-250 MHz (Ext. Clock)

Accuracy: <1.0%

Resolution: <0.625% of Prog. Value

Period Jitter: <100 ps

External Clock Input: TTL or ECL levels,
software selectable

External Clock Output: LVTTTL levels into 1 MΩ

Output Characteristics:

Channel to channel skew: <600 ps

Output Levels: See PI-2120x pattern card datasheet

Channel Formats:

Invert/Non-invert: Independently selectable

RZ/NRZ Mode: Independently selectable

Tri-state: Independently selectable

Channels can be tri-stated dynamically, in pairs (Ch 1-2, 3-4, etc.), defined at each Subpattern instruction, except for PI-21203.

Program Lines:

Max. Number of Lines: Up to (depending on card model):
256 K (262,144)

Subpatterns:

Maximum Length: Up to (depending on card model):
8 Mbit (8,388,608 bits)

Minimum Length: 12 bits

Max. # of Subpatterns: 256 K

Max. Instruction Lines: 256 K

Max. Subpattern Repeats: 32K (32,767)

Max. First Level Repeats: 32K (32,767)

Looping Levels: Limited by program memory

Power:

105/240 VAC @ 50/60Hz

Mechanical:

Outside Dimensions: 8.75" H (5U) x 17.5" W x 11.75" D

Card Slots: Size 6U Eurocard

Output Connectors: 9 Pin ULTI-MATE™

Commercial Micro D

Clock I/O Connector: CONEC

3-003W3-P-C-X-41-A1-0X

Auxiliary I/O Conn: CONEC

3-013W3-P-C-X-41-A1-0X

Unless otherwise specified, dynamic measurements are made with all outputs terminated into 50 Ω.

Ordering Information:

PI-2005 is the marketing designation for any Pulse Instruments system comprising at least one PI-21000 Clock Generator card and at least one PI-2120x Pattern Card installed in a Pulse Instruments CompactPCI mainframe running PI-PAT software. Mainframes may be 3U or 5U.

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