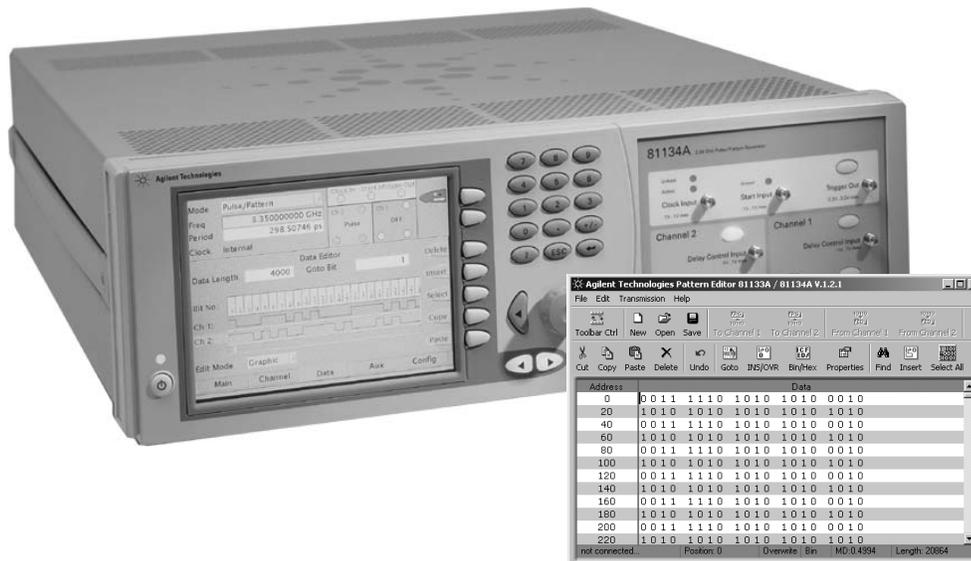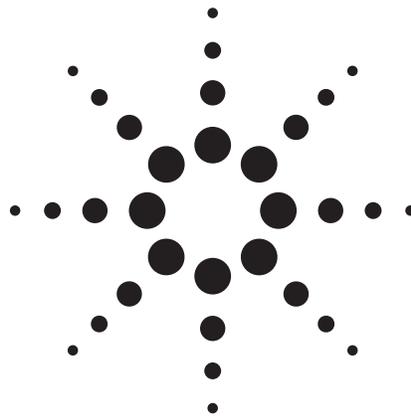# Agilent 81133A / 81134A
12 Mbit 'extended' Pattern Memory and PC-based Pattern Management Tool

Product Note

The need to test high-speed digital interfaces including today's serial computer links like PCI Express or Serial ATA or latest generation hard disk drives has led to the need for a high-speed pattern generator that can generate long data patterns in combination with the performance and flexibility of a high-speed pulse generator.

Agilent's 81133A and 81134A 3.35 GHz Pulse Pattern Generators fulfil these needs by enabling users to generate long data patterns with full control over signal quality with their deep 12 Mbit pattern memory per channel.

General information about the instrument's pattern memory

With firmware version 2.5 or higher, the 81133A and 81134A provide extended pattern memory up to 12 Mbit per channel, a tremendous increase over the older firmware version's 8 kBit maximum memory.
Due to usability reasons, the front-panel-access is limited to patterns with a maximum length of 8192 Bit. Hence the extended 12 Mbit pattern can only be accessed via a computer that is attached to one of the remote control interfaces of the instrument.

There are three different ways to access the extended memory:
• Agilent's PC-based Pattern Management Tool,
• Direct Programming using SCPI commands
• Automatic remote control programs running on a test-system controller.

PC-based Pattern Management Tool

Agilent's PC-based Pattern Management Tool allows managing and editing patterns to be generated with the 81133A and 81134A in an easy and comfortable way.
The Pattern Management Tool includes a comfortable pattern editor for the quick definition and modification of any pattern up to 12 Mbit length.
In addition, the Pattern Management Tool provides the possibility to save an unlimited amount of different patterns on a computer. It also offers easy uploads and downloads of patterns to or from the instruments via one of the remote interfaces, including GPIB, LAN and USB 2.0
The Pattern Management Tool is especially recommended when working with patterns longer than 8 kBit, as the 81133A and 81134A can only save patterns up to this length, as well as the front panel only provides access to patterns up to 8 kBit.

Preconditions to use the PC-based Pattern Management Tool

In order to use the PC-based Pattern Management Tool, the following requirements must be fulfilled:

Instrument:
• 81133A / 81134A with firmware Version 2.5 or higher. Version 2.7 or higher recommended.

Computer to run the Pattern Management Tool:
• PC with GPIB, USB or 10/100 Mbit Ethernet interface to connect to the 81133A/34A
• Microsoft Windows with Microsoft .NET Framework Version 1.1 or higher installed (Download from Microsoft Webpages)
• Agilent I/O libraries installed (Version M, or higher if USB is used to connect to the instrument)
• Pattern Management Tool installation file. (Either down load from Agilent Webpages or use the 81133A/34A Documentation and Driver CD-ROM).

If another measurement instrument based on an open Windows XP operating system is used, the computer integrated in these instruments can also be used to run the Pattern Management tool.
Examples are Agilent's 86100C DCA-J Digital Communications Analyzer with Jitter Analysis or the Agilent 54855A 6 GHz real-time Oscilloscope.
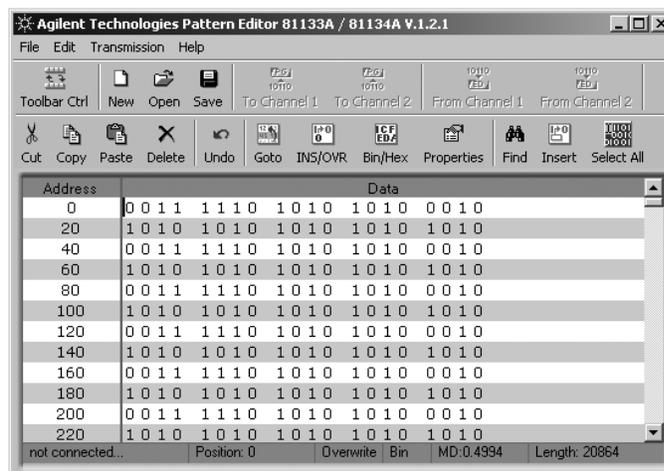

Figure 1: Agilent Pattern Management Tool for 81133A and 81134A

Usage of PC-based Pattern Management Tool

After having installed all necessary software, connect the computer and the 81133A/81134A using one of the available connections. Then start up the systems.

If GPIB or LAN are used as the connection, it needs to be set up within the Agilent I/O libraries configuration and/or within the 81133A/81134A graphical user interface. Using USB, the 81133A/81134A will be automatically detected and configured.

The Pattern Editor's main features:
- Open/Save Patterns
- Easily edit patterns
- Support for binary and hexa decimal pattern format
- Find function
- Automatic insertion of basic data into pattern

The usage of the pattern editor is very simple as it uses the standard windows look-and-feel.

The Pattern Management Tool comes with several pre-defined patterns that can be accessed via the *"open file"* button.

To upload a pattern to the instrument, simply select *"Connect"* from the *"File"* menu. The Pattern Management Tool looks for Pulse Generators attached to the computer running the software. Select the appropriate instrument in the selection box and click on the *"To Channel 1"* or *"To Channel 2"* button to upload the pattern to the selected channel of the instrument.

It is also possible to download patterns up to 8192 Bit from the generator for further action on the computer. After connecting, simply use the *"From Channel 1"/"From Channel 2"* button.

Direct Programming using SCPI Commands

Prerequisites to directly access the pattern memory

There are some preconditions that need to be fulfilled to have access to the pattern memory of the instrument:

Instrument:
- 81133A/81134A with firmware Version 2.5 or newer. Version 2.7 or newer recommended.

Computer to access Pattern Memory:
- Computer with GPIB, USB or 10/100 Mbit Ethernet inter face to connect to 81133A/34A
- Software to send SCPI commands to the instrument.

Programming Syntax

The pattern transfer uses hexadecimal notation for the pattern definition. Pre-defined data patterns longer than 8 kbit, that may be available in binary format, must be converted to the hexadecimal format before downloading it to the 81133A/81134A. Once the desired pattern has been generated, it can be sent to the 81133A/1134A with the following commands:

Patterns up to 8192 Bit
:DIG[1|2]:PATT:LENG <length>
:DIG[1|2]:PATT <data>

Patterns >8 kbit and <12 Mbit
:DIG[1|2]:PATT:LDAT <data>

<data> is an arbitrary block of program data (IEEE 488.27.7.6.2) starting with a '#' followed by the length information and the actual data in hexadecimal format.
For patterns up to 8 kbit, the length needs to be set using the LENG command; the data granularity up to 8 kbit pat-

terns is 32 bit.
If the pattern length is larger than 8192 bits (8 kBit), the data length of the selected channel is automatically extended to the sent bit pattern. The other channel is not influenced.
For example:

:DIG1:PATT:LDAT #532768AB...

This sends a pattern of 32768 hex characters which are equal to a pattern with 131072 bits. The first digit after the '#' indicates the number of following digits that are needed to describe the hex pattern length before the actual data starts.

Automatic remote control programs running on a test-system controller

The pattern memory can also be accessed by specialized programs running on a computer, e.g. when configuring automated test-systems. To get information on accessing the pattern memory, please refer to the programmer's manual of the 81133A/34A and the description on how to directly access the pattern memory.

Limitations

Since the extended memory depth is not a hardware upgrade, but a different method of using the existing memory, some limitations apply:

- The extended memory is only available if the channel mode is set to data mode and the main mode is set to Pulse/Pattern.
  Burst and rBurst (repeated burst) mode are not supported!
- Unlike the pattern length of the standard pattern memory, the pattern length of the extended memory can only be programmed in steps of 128 bits.

The long pattern is lost if:
- Modifying the pattern in the pattern editor of the user interface,
- Programming (local or remotely) another pattern to the same channel of the instrument,
- Changing the channel mode or main operating mode of the instrument,
- Recalling a saved setting or resetting the instrument,
- Restarting the instrument.

In all these cases the pattern length is set to the actual data length with a maximum of 8192 bit.

Because of hardware restrictions, the full 12 Mbit pattern length is only available for output frequencies above 60 MHz (see table 1). If a channel divider is used, the maximum pattern length will be divided by the same dividing factor.

Complimentary Products

DSO80000/DCA-J	13/20 GHz
54655A	7 GHz
54854A	4 GHz

Table 1: Frequency ranges for the extended pattern length

Frequency Range	Maximum Pattern Length
60 MHz - 3.35 GHz	12 Mbit
30 - 60 MHz	6 Mbit
15 - 30 MHz	3 Mbit

Related Literature	Pub. No.
Agilent Technologies 81133A and 81134A 3.35 GHz Pulse Pattern Generators Datasheet	**5988-5549EN**
Agilent 81133A and 81134A 3.35 GHz Pulse Pattern Generators Photo Card	**5988-9931EN**
Agilent Technologies Family of Pulse Pattern Generators Brochure	**5980-0489E**
PCI Express RX Design Validation with 81133A / 81250A Application Note	**5988-7432EN**
Signal Integrity tests using the Agilent 81133A and 81134A Product Note	**5988-9411EN**

For more information, please visit us www.agilent.com/find/pulse_generator

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