Agilent Technologies
81200 Data Generator/Analyzer Platform

Configuration guide
Release 3.5X

Simplify your verification and characterization process
Agilent 81200
The 81200 Data Generator/
Analyzer Platform
Configuration Guide
Release 3.5x

Simplify your verification and
characterization process

The Agilent Technologies 81200
Data generator/ analyzer platform
The Agilent 81200 is a modular
platform consisting of front-ends,
modules, mainframes and soft-
ware, which can be tailored to
your specific test needs. This
guide aims to help you choose
the right components. In this
context, some fundamental pos-
sibilities in configuring the sys-
tem must be considered. These
depend on how you want to
integrate the Agilent 81200 into
your test environment.

The 81200 can be used as a
"proprietary system" which
means that the 81200 will not
be combined with other VXI
modules in a standard VXI sys-
tem. It can however, be con-
trolled by a LAN or a GPIB
interface.

The Agilent 81200 modules are
combined with other VXI modules
then an "open VXI system" (the
standard VXI system), is
achieved.

The Agilent 81200 Data generator/
analyzer platform is modular
platform consisting of the
following components:
- Front-ends
- Modules
- Mainframes
- Software

The guide aims to help you choose
the right components. In this
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tem must be considered. These
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STEP 1: Selecting the number
of channels required

Slide 1 & 2 show that three dif-
f erent generator front-ends and
different analyzer front-ends are
available.

To select the correct front-end, the
following should be checked:
- speed
- data format
- levels
- memory depth

Please note that the low speed
front-ends have two outputs or
two inputs and support a maxi-
mum memory depth of 512 Kb per
channel. This is 256 Kb only, if on
the analyzers mask (don’t care)
bits are used.

Any SMA cables are not included.
For more details, consult the
Agilent 81200 Data Generator
/analyzer Platform, data sheet, p/n
5965-3415E.

STEP 2: Choosing the modules

The generator and analyzer
front-ends can be fitted together
as follows (slide 3 and 4):
- Any mix into the Agilent
E4841A Data Module can fit
with Dual Generators E4846A
and Dual Analyzers E4847A.
As these are dual channel front-ends
each, the module can deliver up to 8
channels.
- Generator front-ends E4838A
and Analyzer Front-ends E4835A
can be fitted in the Agilent
E4832A Data Module. As these
are single channel front-ends
each, the module can deliver up
to 4 channels. The E4835A
Analyzer comes as a pair, so
two independent channels, see
also slide 7.
- Generator Front-ends E4862A
and Analyzer Front-ends E4863A
can be fitted in the Agilent
E4861A Data Module. As these
are single channel front-ends
each, the module can deliver up
to 2 channels.
- At least one Clock Module
E4805B is necessary. This Clock
Module can drive up to eleven
data modules.

Slide 1: Generators

Slide 2: Analyzers

Slide 3: Modules

Slide 4: Modules
STEP 3: some additional considerations for Front-ends and Module count

- Slide 5: the trigger output of the Clock Module E4805B can deliver a clock signal (up to 675MHz) or a Sequence Trigger signal (not both at same run-time).
Order info: For additional clock signal needs, add:
- another E4838A generator for clock signal up to 675MHz or
- another E4862A generator for clock signal up to 2.7GHz

Slide 5: Considerations for channel and module count 1.

Slide 6
- The sequence of segments and the segment types (pattern, pause, PRBS/PRWS) is the same for all the channels within one module E4841A.

For example, if you need to set up PRBS and control channels, make sure you run PRBS from one module and the control signals from another module.

Order Info: add according E4841A
- The sequence of segments and the segment types (pattern, pause, PRBS/PRWS) is the same for the two upper and the two lower slots within one module E4832A.
So one module can generate PRBS/PRWS in the upper two slots and control signals in the lower two slots at one runtime.

Considerations for Channel & Module Count (2)

Slide 6: Considerations for channel and module count 2.

Slide 7: The E4835A analyzer comes as a pair and fills two slots of the E4832A module, providing two independent analyzer channels. The housing of the pair is possible either within the upper or lower two slots. It is neither possible to house within the middle two slots nor to house the pair in two independent E4832A modules.

Considerations for Channel & Module Count (3)

Slide 7: Considerations for channel and module count 3.
Slide 8: The E4838A Generators can do Channel Add. There is a digital channel add and an analog channel add. Digital Channel add is possible for ch1 + ch2, ch3 + ch4, ch1 + ch2 + ch3 + ch4. So the added signal is available at slot 2 and/or 4. A generator channel installed in Slot 1/3 provides only the partly signal, so the front-end may be omitted:

### Considerations for Channel & Module Count (4)

- Digital Channel add is possible for ch1 + ch2, ch3 + ch4, ch1 + ch2 + ch3 + ch4.
- A generator channel installed in Slot 1/3 provides only the partly signal, so the front-end may be omitted.

**Slide 8: Considerations for channel and module count 4.**

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### STEP 4: One or more Clock Groups:

Slide 9: Within one 81200 system it is possible to combine data modules of different speed classes. There are basically two choices to do so:

- All data modules are driven by the same Clock Module. This is called "One-Clock Group". In this configuration the individual front-ends can run on same frequency or any binary frequency ratio (1/64, 1/32, ..., 1/4, 1/2, 1, 2, 4, ..., 32, 64) in reference to the system frequency within the possible data rate range of each data module.
- Every speed class uses its own Clock Module E4805B. This is called "Multi-Clock Group". In this configuration the individual clock groups can run on a multiplied ratio (using the multiplier within E4805B clock input) or asynchronously within the possible data rate range of each data module. A system containing more than one clock group ("N-clock Groups") will be operated by running the set of software editors N times. So the GUI will be started N times, each controlling one-clock group.

Order info: 1x E4805B
- Every speed class uses its own Clock Module E4805B. This is called "Multi-Clock Group". In this configuration the individual clock groups can run on a multiplied ratio (using the multiplier within E4805B clock input) or asynchronously within the possible data rate range of each data module. A system containing more than one clock group ("N-clock Groups") will be operated by running the set of software editors N times. So the GUI will be started N times, each controlling one-clock group.

Order info: Nx E4805B, N equals how many different data module types are desired.

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### Different Clock Groups

- **One Clock Group**
  - Binary Frequency Ratio
  - Ratio 1, 2, 4, ..., 64
  - As long as individual data rate range is maintained

- **Different Clock Groups**
  - Independent Frequency Ratio
  - $n \in \{1, 2, 3, \ldots, 32\}$ or asynchronous

**Slide 9: Different Clock Groups**
Slide 10 & 11: This shows an example for the use of two clock groups with a DUT running at different speeds on input and output. In this example a 1:7 data rate ratio is assumed. Common to this kind of DUT is the clock rate is half the data rate (double pumping). To test the serializer's output, the clock group with the analyzer channel must run at same speed as the DUT output. This can be achieved with help of the frequency multiplier in the clock input of the clock module. If the DUT provides a high-speed clock, the trigger out cannot divide any integer, there is really the need for one more channel. The dividing has to be performed by a repetitive pattern loaded into the channels memory.

**STEP 5: Frame, Master-Slave and Multi-mainframe:**

Slide 12: the VXI frame provides 13 slots. Depending on controller choice, there are 11 or 12 available for 81200 modules. The 81200 modules go side by side to the controller module, starting with the clock module. There must not be an empty slot between data modules.

Order info: 1x E4849C Data Generator and Analyzer provides VXI frame and software licence.

If there are more data modules than one VXI chassis can house, it is possible to extend "One Clock Group" by two expander frames. The E4805B Clock Module can provide clock and data sequencing information to maximum two other E4805B Clock Modules, which operate then as slaves. When omitting the Master-Slave connections, the same system will behave as a "Three Clock Group" system. The master-slave connection must not be in place if different clock groups are desired.

Order info: E4805B Clock Module, expander frames depends on Controller choice, see next step. (Expander frames include the Master-Slave connections for operating the clock module as slave)

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**Slide 12: Master Slave**

If the data modules go into several clock groups, these clock groups can be configured into one frame as long as there are sufficient slots in this frame. If the clock groups do not fit in one frame, the expander frames can be used, see next step with multi-mainframe solutions.

For configuring the different clock groups into frames, use the following rules of thumb:
- Start with the clock group with the largest module count, put it with clock module first aside the controller.
- Check if any other clock group will fit within the remaining slots. Put the next clock module aside the last data module without empty slot.
- If you can't fill the frame, leave the remaining slots open and start filling an expansion frame. Empty slots must occur on the right side of the frame only.
- Avoid Master-Slave connections, make use of it only in case one clock group does not fit in one frame at all.
**STEP 6: Controller:**

**Slide 13:** For the controller there are two choices:
- the 2-slot-embedded PC, fitting into the VXI frame, occupying 2 slots. In this case there are 11 slots free for 81200 modules: 1 Clock Module with 10 data modules.

Order info: the E4803A 2-slot embedded PC comes with pre-installed software (check additionally for 15444A PC Accessories and 15445A ext. CD Rom)

- An external PC connecting through a FireWire Interface (IEEE 1394). The FireWire Controller occupies one slot in the VXI frame. In this case there are 12 slots free for 81200 modules: 1 Clock Module with 11 data modules.

Order info: 1x E48249C-020 adds the FireWire Controller to the VXI frame. An external PC with pre-installed software is available as E4860AS-014. (Check additionally for 15444A PC Accessories and 15445A ext. CD Rom).

If an existing PC is used, this has to be configured at customer site. Ordering the E4849C includes the necessary software on CD and E4849C-013 includes the FireWire Cable and the FireWire to PCI interface card which plugs into the PC. Recommendations for this ext. PC: WinNT 4.0 or Win2000 operating system, min. Pentium ii or equivalent, 128Meg memory, CD ROM drive. 2 PCI slots for GPIB and Firewire Cards

**Slide 14:** The controller within Multi-mainframe solution:
- To configure a multi-mainframe system with the embedded PC, there is the need for an MXI module in each frame. The MXI module takes care for the controller interface to the expander frames. The MXI connection is limited to 2 expander frames. Within a 3-frame configuration, the controller and the MXI extenders occupy 5 slots, so there are 34 slots free for 81200 modules.

Order information: the E4849C frame needs the E4849C-002 MXI expander interface. The E4848B expander frames come already with MXI interface. The E4848B does not include any Clock Module E4805B.

- To configure a multi-mainframe system with the FireWire interface requires a FireWire Controller Interface in each mainframe. The connection to the PC is daisy-chained. Within a 3-frame configuration, the FireWire modules occupy 3 slots, so there are 36 slots free for 81200 modules. The Firewire configuration is not limited to 3 frames; a fourth frame can be added (but only as a multi-clock-group system, one clock group is limited to 3 frames maximum).

Order information: the E4849C frame needs the E4849C-013 PC link to VXI (FireWire). The E4860AS-152 expander frames come already with FireWire interface. The E4860AS-153 does not include any Clock Module E4805B. An external PC equipped with Firewire Interface and pre-installed software is available as E4860AS-014.
STEP 7: Power Check

Please consider the power requirements of the modules and front-ends when you configure your test system. Some possible configurations of modules may overload power and cooling budget of the VXI mainframe. In this case of insufficient power, the modules must be placed in different mainframes using of the master-slave connection. For details about power requirements, consult the Agilent 81200 Data Generator / Analyzer Platform technical specifications, P/N 5965-3415E.

There is a MS Excel based spreadsheet which can be downloaded from: http://www.agilent.com/find/81200_configinfo
This allows an online power check and configuration editing.

Slide 15:
Both Controller choices offer the Capability of GPIB and LAN. The GPIB can be used as GPIB Master and GPIB slave. The choice is possible by software configuration. GPIB master would allow to control other GPIB instruments from a remote program running on the same PC controlling the 81200. GPIB Slave would allow controlling the 81200 via GPIB like any other GPIB instrument. Using SCPI commands can use any GPIB controller to communicate with the 81200.

The 81200 software includes 'Plug and Play' drivers. These are part of the software and not available separately. These drivers can be used for remote programs using C/C++, Visual Basic, Agilent Vee or National Labview. These programs are not included within the 81200 software license nor they are included in the pre-installed software on the 81200 PC. It is possible to install the according software packages on the 81200 PC and perform program development and execution. When Using National's Labview, it is recommended to exchange Agilent FireWire and GPIB interfaces into the National equivalent to avoid compatibility issues.

The 81200 PC provides a LAN interface. This allows integrating the 81200 within a network. This allows:
- Automated data back-ups
- Vector Data transfer
- Remote program development and execution
- Remote operation of a multi-clock system as shown on slide 16, each clock group can be controlled from a separate test station.

It is possible to combine the Agilent 81200 modules with other VXI modules to achieve an "open VXI system". Both controller solutions together with the 81200 software are based on the standardized I/O library. So it is simple to add the drivers for other instruments and include this with remote program development and execution.

Order info: Agilent Vee is available as E2120G,
Cable GPIB: 10833B

There are two older controller products:
- E4840A 3-slot mainframe with embedded PC
- E4806A 3-slot (81200 controller) PC
These controllers cannot be used to configure an "open VXI system", only a proprietary 81200 system can be operated.
DUT Fixturing (slide 18)
For convenient and reliable DUT fixturing for DUTs with up to 192 pins, there is the Agilent E4839A Test Fixture available. For details, please consult Agilent E4839A Test Fixture, data sheet, p/n 5968-3580E.

Dedicated Accessories
Pogo cable kit: 4*SMA(m) & 2 Pogo Agilent E4839A adapter: 15448A Universal DUT Test Board 50 Ohm: 15449A

Step 10: Support, documentation and rackmount
Please consult the table at the end.

For operation we recommend to use the 15444A PC accessories including English keyboard, mouse and 17" monitor.
We recommend that a CD-ROM drive is ordered as 15445A, so that user software upgrades can be installed.

Documentation:
All documentation is included within the 81200 software as pdf files. If a printed hardcopy is desired, order E4849-0B1, if no printed documentation is desired order E4849-0B0.
The Japanese localization is available as E4849-ABJ

Rackmount option:
Rack flange kit (part number E8400-80923) for the E4849B and Agilent E4848B is E4849-AX4

Warranty & Services
All modules automatically have 1 year return to Agilent warranty, if bought as separate pieces. All systems have 1 year on-site warranty.

Start up assistance for first time users is included.

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Dedicated Accessories:

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<td>Pogo cable kit: 4*SMA(m) &amp; 2 Pogo</td>
<td>15448A Universal DUT Test Board</td>
</tr>
<tr>
<td>Adapter Agilent E4839A</td>
<td></td>
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<tr>
<td>50 Ohm: 15449A</td>
<td></td>
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Accessories: Cables

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<td>Cable Kit: 4*SMA(m) to SMA(m)</td>
<td>15442A</td>
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<tr>
<td>Adapter Agilent 15440A</td>
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<td>Adapter SMA (m)/BNC (f)</td>
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<td>Adapter right-angle SMA (m-f)</td>
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<td>Adapter right-angle SMA (m-m)</td>
<td>1250-1397</td>
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<tr>
<td>Adapter tee SMA</td>
<td>1250-1698</td>
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<tr>
<td>Pulse adder/splitter, SMA</td>
<td>11667B</td>
</tr>
<tr>
<td>500 ps transition converter</td>
<td>15433B</td>
</tr>
<tr>
<td>1 ns transition converter</td>
<td>15434B</td>
</tr>
<tr>
<td>2 ns transition converter</td>
<td>15438B</td>
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Accessories: Fixture

<table>
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<tbody>
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<td>E4839A: Test Fixture</td>
<td></td>
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<tr>
<td>15448A: Set of 4 Cables Pogo to SMA</td>
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</tr>
<tr>
<td>15449A: add. DUT Board 50 Ohm</td>
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</tr>
</tbody>
</table>

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Slide 17: General Accessories

Slide 18: DUT Fixing
Frequently Asked Questions:

What do I need to run generator channels up to 1.32 Gb/s?

There are three choices:
- two Agilent E4838A generator front-ends, which are EXOR-ed internally added.
- For better signal performance, for signals above 1 Gbit/s, please also consider an external addition, by using an Agilent 11667B (APC-3.5 power splitter, DC to 26.5 GHz) or an Agilent 11636B (DC to 26.5 GHz power divider, APC-3.5). For operation in EXOR addition mode you only need two Agilent E4838A front-ends per module.
- One Agilent E4862A generator front-end, which can run up to 2.7Gb/s.

I need generator channels that operate up to 200 Mbit/s and with more than 512 Kbit memory depth per channel. Can I use the Agilent E4846A dual generator front-ends?

No. If you need more than 512 Kbit, you should use the Agilent E4838A (max. 675 Mb/s) front-end. The Agilent E4846A dual generator front-ends share the channel's memory depth of 1024 Kbit, this is why they only support 512 Kbit. This is also true for dual analyzer front-ends.

For more details please consult Agilent 81200 Data Generator/Analyzer Platform, data sheet, p/n 5965-3415E.

I want to run a PRBS pattern on one channel and data from another channel at the same time. Is that possible?

Yes, but you have to consider:
- Using 2.7 Gb/s channels with the E4861A data module, this is possible unrestricted.
- Using the 675Mb/s channels with the E4832A data modules, it is necessary that the PRBS channel is located within the upper two slots and the control channel is within the lower two slots.

I want to use just the Agilent 81200 analyzer channels. Is this configuration possible?

Yes, but we recommend that one generator channel as a timing reference for the system is used, otherwise the trigger output of the clock module is used as a timing reference. There are no trigger capabilities like on a logic analyzer. So in the application you must make sure to provide a signal indicating the start for analyzing.

Mainframe/system control and accessories: I'd like to fit a VXI DVM into a spare slot in the Agilent 81200 frame. Will that work? Yes, the recommended controller solutions and software provide the necessary capabilities. There have been some older controller solutions (check earlier in this document) which did not allow this.

I test my designs in a remote environment so I won't need monitors and so on connected to the Agilent 81200. Will it boot without a monitor and keyboard?

Yes, but you will need a mouse. However, you will need a monitor to perform tasks such as shut down and to install user software upgrades.

Can I fit Agilent 81200 modules into an existing VXI system?

Yes. Plug and play drivers for the Agilent 81200 are an integral part of the Agilent 81200 Software.

Can I combine rack & stack instruments with the Agilent 81200?

Yes. You can use an external controller or you can use the Agilent 81200's built-in PC as a controller. A GPIB (IEEE 488.2) interface is already installed on the Agilent 81200 system controller.

You will however, need to install controller software such as VEE, VisualBASIC or C/C++.
Example 1: DAC Test (Slide 19):
DACs need a bunch of digital data channels for getting data into, here a 16 bit interface is assumed, any other bus size is possible just by more or less data channels. Then there is a need for a clock. It is recommended to use a signal generator as clock source: the internal clock generation of the 81200 is designed for low jitter, but it can’t compete with the low phase noise available from a signal generator like the Agilent 8662A.

Order info for a 16 bit wide solution up to 675MB/s: 1x E4849C , 1x E4849-013, 1x E4805B, 4x E4832A, 16x E4838A, 1x 8662A

Example 2: Multi-Level Signals (Slide 20):
Such kind of signals occur e.g. with Gigabit Ethernet Category 5/6. This can be established for up to 4 levels with the Channel Add feature from one E4838A generator. The 8-level signal in this example is obtained from the combination of two channels. This is possible by the back matching of the channels.

Order info: 1x E4849C , 1x E4849-013, 1x E4805B, 1x E4832A, 2x E4838A

Example 3: Back plane Test (Slide 21):
The test requirement is to stimulate at any position and analyze at any other position. So there is a variable delay from input to output depending on input and output position. Adjusting the analyzer sampling delay can compensate the variable delay. With the recommended system configuration here, there I no more need to do this: as the clock and the data run through the back plane, data and clock keep always same timing relation. So using the analyzer within a second clock group, getting the clock to it's ext. Clock input, there is no more need to adjust the timing for a new position on the back plane again.

Order info: 1x E4849C , 1x E4849-013, 2x E4805B, 2x E4832A, 2x E4838A, 1x E4835A
Example 4: Digital Video Interface, 1:7 Serializer/De-serializer (slide 22)

For transferring Data between CPU and Display, a digital video interface was created. The picture shown here is a simple example as there are several implementations created with more or less serial interconnections (up to 8). It is very common to all these video interfaces that the MUX/DEMUX ratio is 1:7. The DUT consists of two chips, one TX one RX. Beside 3x serial, there is also the clock at speed of parallel side transferred. So this is another example for a two-clock group system, check also slides 10 & 11.

Order info: 1x E4849C, 1x E4849-013, 2x E4805B, 4x E4832A, 8x E4838A, 4x E4835A, 2x E4861A, 2x E4862A, 1x E4863A

Example 5: Memory Test (Slide 23):

This example of RAM is equipped with a serial interface at low speed basically for initialisation and monitoring, and second with a high-speed interface for data read and writes. The serial interface consists of 4 low speed channels configured into one clock group. The high-speed interface needs up to 23 modules at Gigabit speed. So this second clock group need master-slave connection over 3 frames.

Order info: 1x E4849C, 1x E4849-013, 2x E4805B, 4x E4832A, 2x E4835A, 2x E4841A, 3x E4846A, 1x E4847A, 24x E4861A, 24x E4862A, 18x E4863A

Hints for using the Config Sheets:

In the Appendix of this document you'll find two prepared Config Sheets - one for the 2-slot embedded PC, -one for the FireWire Controller, which can be used for specifying the complete desired configuration.

Fill out the Fax Cover Sheet on the next page, and fax it together with the completed configuration sheets to the Fax number on the cover sheet. Please make sure that you specify your Agilent order number on the fax cover sheet, otherwise your personal configuration requirement can not be processed.
Slide 24: Here is an example of how to fill out the config sheets. This is totally virtual and the purpose is just to summarize what to consider for placing the front-ends into modules and modules into the mainframe.

This example uses the FireWire interface in slot 0
- Slot 1 is equipped with the Clock module
- Slot 2 is filled with 8 Generator channels running up to 200Mb/s: E4841A + 4x E4846A
- Slot 3 is filled with 8 Analyzer Channels running up to 330Mb/s: E4841A + 4x E4847A
Using the 15440A I/O Adapter, which combines a Generator and an Analyzer always, this combination would allow the setup of 8 I/O channels. The 15440A includes 4 adapters, so in this case the 15440A needs to be ordered twice. The I/O adapter is only recommended for this speed class.
- Slot 4 is filled with 2 Generators running up to 200MB/s and 2 Analyzers running up to 330Mb/s: E4841A + 1x E4846A + 1x E4847A. A partly loading is possible at any slots. Empty front-end slots will be covered with a blanc panel.
- Slot 5 is filled with 4 Generators running up to 675MHz: E4832A + 4x E4838A
- Slot 6 is filled with 4 Analyzers running up to 675Mb/s: E4832A + 2x E4835A, E4835A is a pair of analyzers, E4835A = 2x E4835AZ.
- Slot 7 is filled with 2 Generators and 2 Analyzers running up to 675Mb/s: E4832A + 2x E4838A + 1x E4835A. The pair of analyzer channels has to be put either to the upper or lower two front-end slots.
- Slot 8 is filled with 2 Generators running up to 675MHz: E4832A + 2x E4838A. The partly loading of the Generator channels reflects the Channel Add capabilities; this is possible only in slot 2 & 4. Empty slots will be covered with a blanc panel.
- Slot 9 is equipped with 2 Generators running up to 2.7Gb/s: E4861A + 2x E4862A. The 2.7Gb/s module has only two front-end slots.
- Slot 10 is equipped with 2 Analyzers running up to 2.7Gb/s: E4861A + 2x E4863A.
- Slot 11 is equipped with 1 Analyzer running up to 2.7Gb/s: E4861A + 1x E4863A. A partly loading is possible in any combination. An empty front-end slot will be covered with a Blanc panel.
- Slot 12 is empty, no data module installed. An empty slot is covered with a blanc panel. Empty slot must not occur between data modules, only at the right side within the VXI frame.
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<tr>
<th>Item</th>
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<th>Remarks</th>
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<td>81200 Data Generator and Analyzer</td>
<td>13-slot mainframe and E4873A Software included, includes no Clock module</td>
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<td>MXI Expander Frame</td>
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<td>E4849C-002</td>
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<td>E4850AS-153</td>
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<td>Controller</td>
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<td>IEEE 1394 PC link to VXI (Firewire)</td>
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<td>E4841A</td>
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<td>Deskew probe</td>
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Fax Cover Sheet

Agilent 81200 Configuration Guide

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71034 Böblingen, Germany

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From:
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Telephone:
Email:
Sales representative:
Agilent order no. (mandatory):

Comments:
### Main frame

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<thead>
<tr>
<th>Front-end</th>
<th>FireWire</th>
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<td>E4805B</td>
<td>slot 0</td>
<td>slot 1 slot 2 slot 3 slot 4 slot 5 slot 6 slot 7 slot 8 slot 9 slot 10 slot 11 slot 12</td>
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### Main frame

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### Multi-Main-frame
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