Verification and Characterization of Digital Devices

Agilent 81200
Data Generator/Analyzer Platform

Agilent Technologies
Innovating the HP Way

OVERVIEW

Charting your Course

Whether applied in computers, communications, or aerospace and defense, it is digital and mixed-signal devices that define the cutting edge of technology.
Your position at the forefront of the market is only as good as the success of your product, and whether you are a digital design/test engineer in R&D, evaluation or manufacturing, that success is defined in terms of quality, cost and time.

Many test systems can promise you the help you need to achieve your quality targets, but how many can help you control costs and diminish test-time, with a single, expandable tool that can cover the full range of your verification and characterization requirements?

The Agilent 81200 data generator/analyzer platform offers you a system that ensures your prototype's quality, minimizes your test costs, and compresses your test time.
The single platform means one user interface for everything, reducing your setup and test times and your training requirements. Modularity means meeting your budget goals today, safe in the knowledge that when you need to grow, your test system can grow with you.
If the economic argument is convincing, it is the technical specifications that make it compelling. Not least of these are the accuracy and performance, the simulations of multiple clock, data and control ports, parallel bit-error-ratio testing, easy integration into test environments, an application for re-using existing test and simulation data, and capabilities for new and emerging technologies, such as LVDS (low voltage differential signaling).

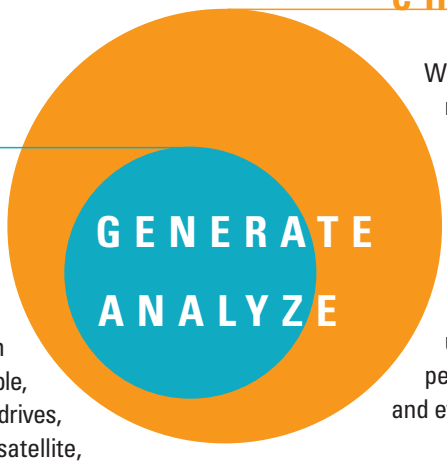
Figure 1: Agilent 81200 in a rack

The Agilent 81200 is a complete test system for your physical layer testing. It **generates the data** to stimulate your DUT (device-under-test), **captures the result,** and then **compares** the actual with the expected data **in real time** for a **synchronized,** immediate evaluation.

The range of signal and data patterns that can be generated and analyzed cover the lifecycle of your component or IC. It starts with the initial verification and debugging of your prototypes under lab conditions, continues through the comprehensive characterization that gives you confidence in its operability in the real world, and extends to quality assurance in manufacturing test.

VERIFICATION

The Agilent 81200 covers all of your requirements for functional testing under nominal conditions in R&D and manufacturing. It generates clock and many kinds of simulated data for an extensive range of applications (for example, bus, serial interface, Ethernet LAN, disk drives, radar, optical/wireless/coax interface, satellite, video-RAM-DACs, MUXs, digital filters, flat panel display links). It then analyzes and compares the results with what you expected, to identify errors and calculate bit-error-ratios.



CHARACTERIZATION

When you need to test the performance and reliability of your device under real-world conditions for complete confidence, the Agilent 81200 is there to help you with emulations of nominal and worst case timings and patterns. It can modify or even automatically sweep the pulse parameters to drive your DUT to its limits. With data rates up to 2.67 Gb/s, the Agilent 81200 has the performance to characterize CMOS, TTL, ECL and even LVDS devices.

KEY FEATURES/SPECIFICATIONS

- Flexible real-time stimulus and response system
- Scaleable and upgradeable, using modules and front-ends
  - Up to 128 or even 256 generator/analyzer channels, depending on the speed and characteristics of the front-ends
  - Up to 2.67 Gb/s.
  - Up to 8 Mbit memory per channel
  - 1 ps timing resolution, ±30 ps edge placement accuracy
- Intuitive Windows NT®-based GUI
- Easy integration into standard VXI environments
- Interfaces for programming and remote control
- Pattern formats NRZ, DNRZ, RZ and R1
- Pseudo random bit and word sequences (PRBS/PRWS) up to $2^{15}-1$
- Sequencing with 5 looping levels (nested loops)
- Branching on internal and external events
- Full control of pulse parameters (variable delay, widths, levels and transition times) for each individual channel
- Semi-automatic deskew, automatic sampling point delay adjustment
- Result displays: state list, waveform viewer, bit-error-rate

VERIFICATION

Breaking into the Flow

Whether you are a developer with an initial prototype, or a production engineer with a new device to evaluate, the first step remains the same. You need to know that your device will do what it should do. And if not, you need enough information to tell you how it fails.

The Agilent 81200 provides effective help for easing your load when testing digital or mixed-signal components. The richness of the data it can generate to stimulate your DUT, and the time-saving analysis it performs on the output, are of fundamental importance for your confidence and understanding when it comes to the functioning of your device.

When generating data, you can tune the amplitude, frequency and transition times to match your technology, without having to sacrifice high resolution or accuracy. For example, the eye diagram on the following page (figure 2) used a signal generated by the Agilent 81200 at 2.67 Gb/s. You can emulate a wide range of complex data patterns, capture, re-use or modify relevant, existing patterns, or create PRBS/PRWS.

The analyzer catches the output from your device and compares it with what was expected in real-time. You can then zoom in on any errors to speed your interpretation of the results, saving you much tedious and time-consuming post-processing.

BENEFITS

Flexible and Scaleable Platform

- Mix and match channels to suit your needs
- Broad frequency coverage

Easy and Quick Setup

- GUI using virtual models of the measurement setup and grouping similar input and output pins
- Data import and export using ASCII files, or existing simulation data (BestLink/81200)
- Capture/replay/modify patterns (for example, from a golden device)

Broad and Deep Range of Tests

- Powerful sequencing capabilities
  - Sequencing with 5 looping levels (nested loops)
  - Branching on internal and external events
- Pseudo random bit and word sequences (PRBS/PRWS) up to $2^{15}-1$
- Full control of pulse parameters for each individual channel
  - Variable delay, width and output voltage levels
  - Variable transition times
- Analyzing
  - Real-time data comparison – no post processing necessary
  - Zoom to errors
  - Measurement Modes: capture, error capture, error count
  - Result displays: state list, waveform viewer, bit-error-rate

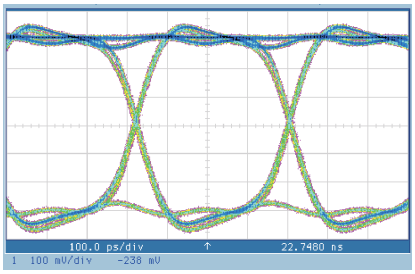


Figure 2: Eye diagram of a 2.67 Gb/s signal generated by the Agilent 81200

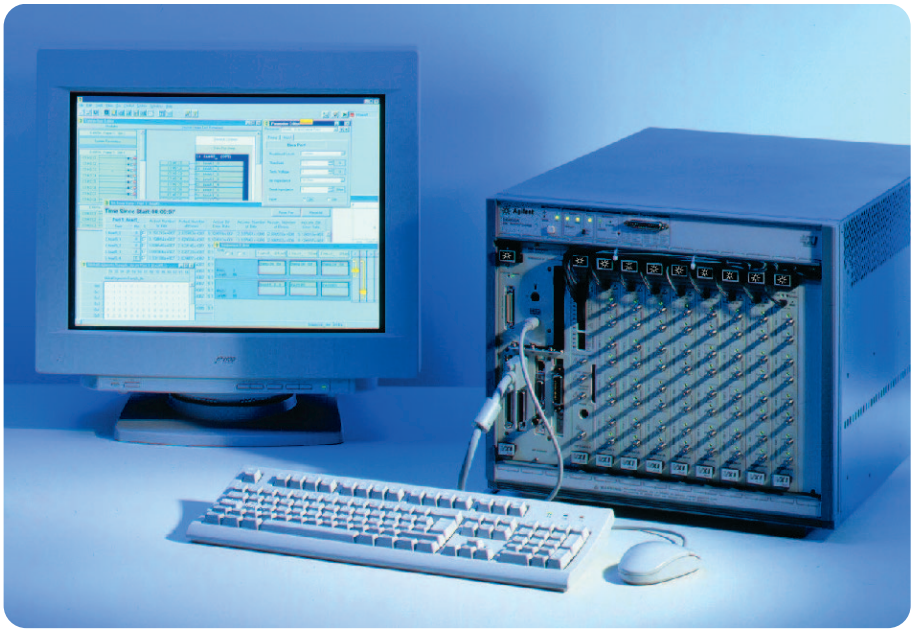


Figure 3: Agilent 81200 data generator/analyzer

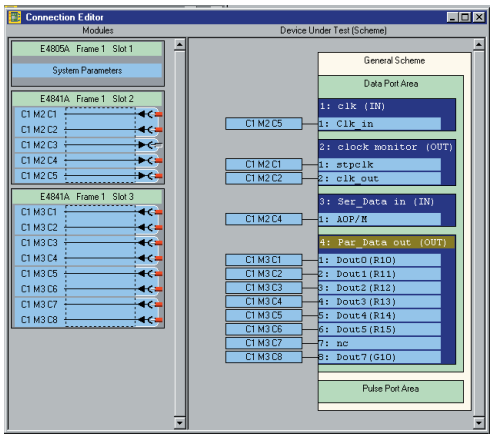


Figure 5: Connection editor

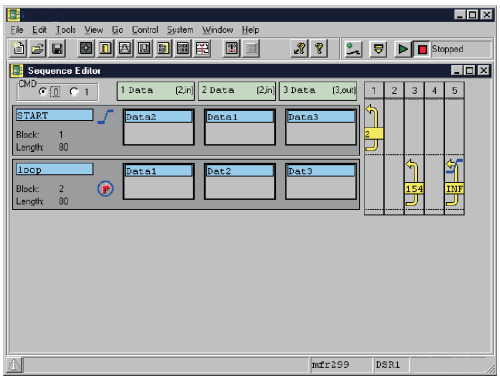
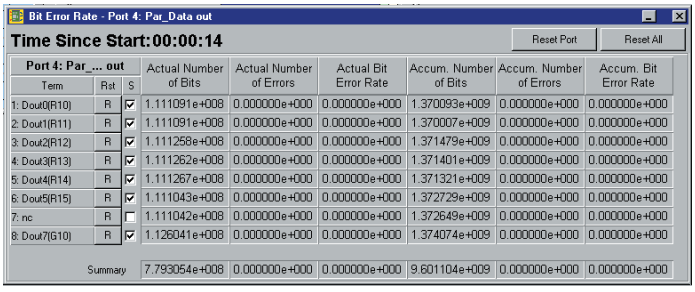


Figure 4: Sequence editor



Port 4: Par_... out			Actual Number of Bits	Actual Number of Errors	Actual Bit Error Rate	Accum. Number of Bits	Accum. Number of Errors	Accum. Bit Error Rate
Term	Rst	S						
1: Dout0(R10)	R	☑	1.111091e+008	0.000000e+000	0.000000e+000	1.370093e+009	0.000000e+000	0.000000e+000
2: Dout1(R11)	R	☑	1.111091e+008	0.000000e+000	0.000000e+000	1.370007e+009	0.000000e+000	0.000000e+000
3: Dout2(R12)	R	☑	1.111258e+008	0.000000e+000	0.000000e+000	1.371479e+009	0.000000e+000	0.000000e+000
4: Dout3(R13)	R	☑	1.111262e+008	0.000000e+000	0.000000e+000	1.371401e+009	0.000000e+000	0.000000e+000
5: Dout4(R14)	R	☑	1.111267e+008	0.000000e+000	0.000000e+000	1.371321e+009	0.000000e+000	0.000000e+000
6: Dout5(R15)	R	☑	1.111043e+008	0.000000e+000	0.000000e+000	1.372729e+009	0.000000e+000	0.000000e+000
7: nc	R	☐	1.111042e+008	0.000000e+000	0.000000e+000	1.372649e+009	0.000000e+000	0.000000e+000
8: Dout7(G10)	R	☑	1.126041e+008	0.000000e+000	0.000000e+000	1.374074e+009	0.000000e+000	0.000000e+000
Summary			7.793054e+008	0.000000e+000	0.000000e+000	9.601104e+009	0.000000e+000	0.000000e+000

Figure 6: Bit-error-rate display

CHARACTERIZATION

Shooting the Rapids

When functional testing is no longer enough, and you need extra confidence in your design and your test method, you need a test system that can push your device to its limits. The Agilent 81200 can modify pulse parameters while running repeated tests so you can explore the design margins of your digital or mixed-signal device and find pattern, timing and level dependencies. You can test it under the harshest of real-world conditions by having the Agilent 81200 generate marginal or even distorted signals. To speed your interpretation, the Agilent 81200 offers graphical representation of your results (such as the shmoo plot shown below). Such exhaustive characterization possibilities also act as your guarantee for the certainty of your released specifications.

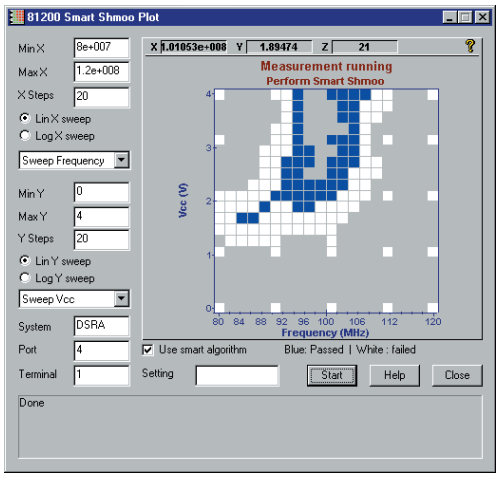


Figure 7: Example of a shmoo plot

BENEFITS

Enhanced Measurement Features

- Agilent E4874A characterization software components provide templates and ActiveX graphic control components for HP VEE, Labview, MS Visual C++, MS Excel VBA.
  Run parameter sweeps and view results graphically in the form of:
  - Shmoo plots
  - Jitter measurements
  - Eye diagrams
- Integration and control of further test elements and instruments (such as power supplies, parametric measurement units, or oscilloscopes) is possible via a range of programming interfaces (incl. GPIB, VXI, LAN, etc.)
- BestLink/81200 simulation data link is available for the re-use of simulation data
- Agilent E4839A test fixture is available for reliable and stable setups

THE PRODUCTS

Flexible and scaleable platform that grows with your requirements

The Agilent 81200 data generator/analyzer platform is a scaleable, modular system that grows as you need it. To get the most from a system that best suits your requirements you should remember the following aspects when ordering your Agilent 81200 system:

- The front-end determines your generator/analyzer functions and their input/output characteristics
- The module provides front-end housing and/or the clock and sequencing capabilities you require
- You can build your system in a proprietary, Agilent 81200 mainframe, or use it in a standard VXI system
- There are accessories to complete your characterization needs, such as:
  - Agilent E4874A characterization software components
  - Agilent E4839A test fixture
  - BestLink/81200 simulation data link

Figure 8

Analyzer Front-ends
Agilent E4865A
Agilent E4863A
Agilent E4835A
Agilent E4847A

Generator Front-ends
Agilent E4838A
Agilent E4843A
Agilent E4846A
Agilent E4862A
Agilent E4864A

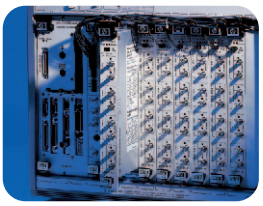


Figure 9

Clock Module
Agilent E4805B

Data Modules
Agilent E4832A
Agilent E4861A
Agilent E4841A

Figure 10

Mainframe
Agilent E4849C
(10 to 12 free slots)

Expander Frame
Agilent E4848B
(12 free slots)

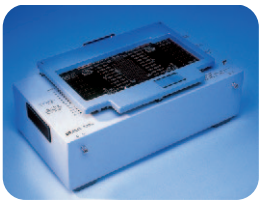


Figure 11

Test Fixture
Agilent E4839A



Agilent Technologies' Test and Measurement Support, Services, and Assistance
Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product. Two concepts underlay Agilent's overall support policy: "Our Promise" and "Your Advantage".

Our Promise
"Our Promise" means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

Your Advantage
"Your Advantage" means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and on-site education and training, as well as design, system integration, project management, and other professional services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

Related Agilent Literature

- Agilent 81200 Data Generator/Analyzer Platform, technical specifications, p/n 5965-3415E
- Agilent 81200 Data Generator/Analyzer Platform, configuration guide, p/n 5965-3417E
- Agilent E4874A Characterization Software Components for the Agilent 81200 Data Generator/Analyzer Platform, technical specifications, p/n 5968-4259E
- Agilent E4839A Test Fixture, technical specifications, p/n 5968-3580E
- BestLink/81200 Simulation Data Link for the Agilent 81200 Data Generator/Analyzer Platform, product information, p/n 5968-2548E
- Agilent 81200 start up assistance for first-time users, p/n 5980-2640E

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