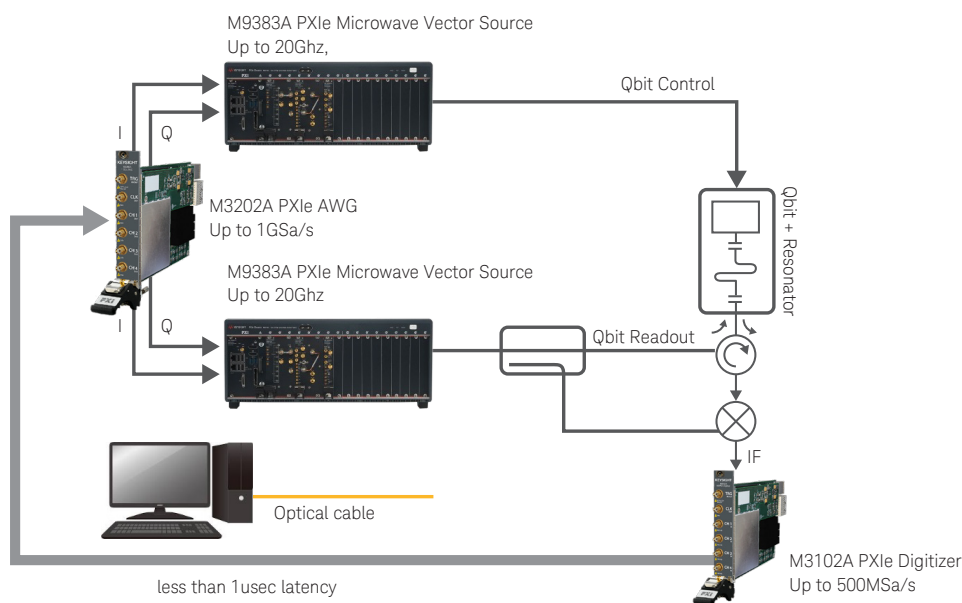


High-speed Signal Processing with Low Latency Feedback System for Quantum Bit Evaluation

Evaluation systems for quantum technology require signal generation for Qubit control, readout signal generation, post-signal processing of signals read, etc. Control based on the results of signal processing using a digitizer and feedback within coherence time and readout signal variability are becoming essential.

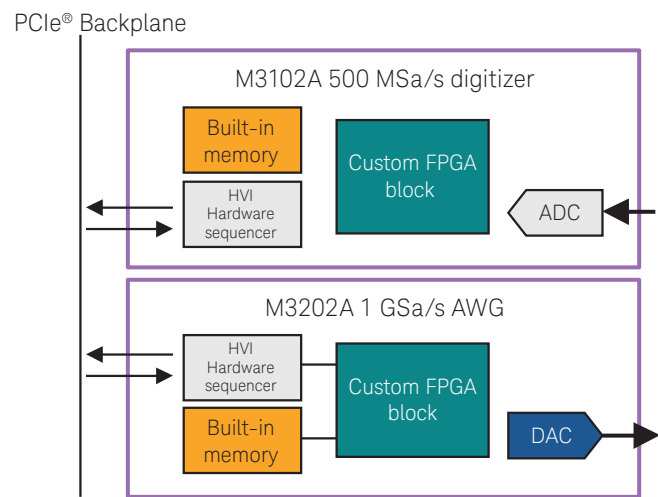
The M3000 series processes signals at high speed. Using the optional programmable FPGA DSP capabilities with the Hard Virtual Instrumentation (HVI) provide real-time technology that reduces the decision execution time from the digitizer to AWG to x100 ns.

Example of superconducting qubit evaluation



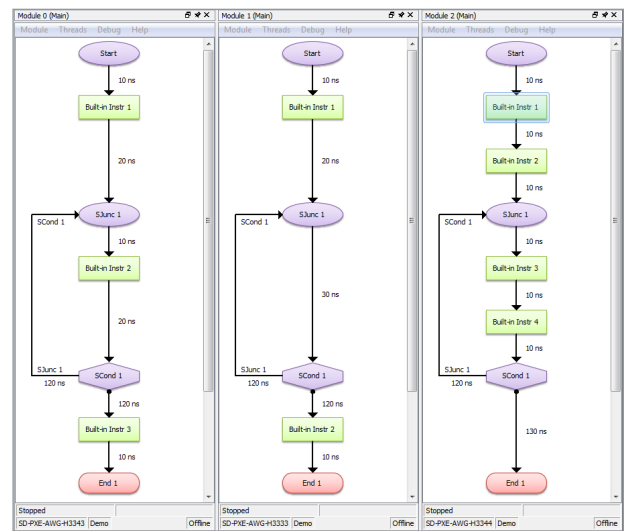
- Provides time control with 1ns resolution using M3202A 1 GSa/s Arbitrary Waveform Generator
- Determines the next action based on the result of signal processing at the digitizer and executes sequence control to AWG with minimum delay time within the coherence time
- Executes accurate, multi-module synchronization and timing control with built-in sequencer technology (HVI technology)
- When combined with the M9383A PXle microwave vector signal generator, the entire system can be built in PXle. A PXI Network Analyzer can also be added for resonant frequency search

HVI technology that supports feedback loops



Easy to program a real-time system

- Intuitive flowchart style user interface allows for real-time sequencing in ps accuracy and ns resolution programmed (OS not required)
- Flow control: If-else, while loop, for loop
- Fast and decisive conditional judgment

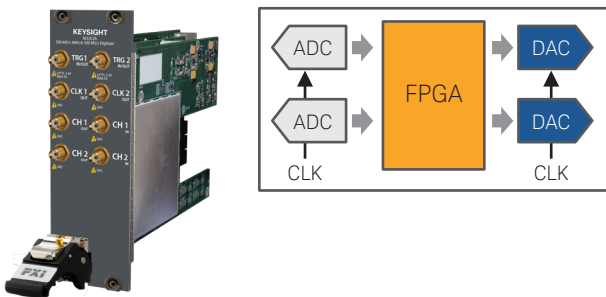


M3601A HVI design environment software

Ready-made intermodule synchronization mechanism

- Synchronous execution, no trigger required
- Ready-made intermodule coherent synchronization mechanism
- Each module executes a separate flowchart

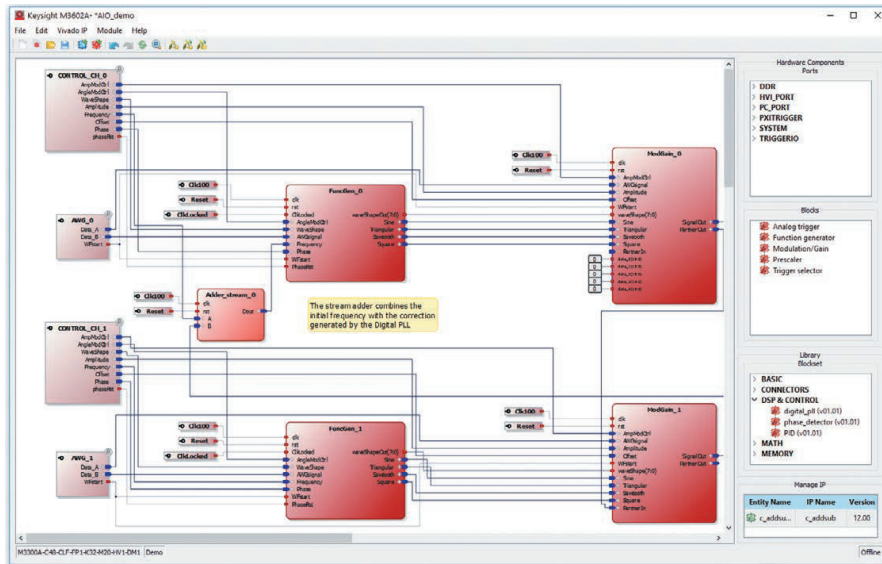
M3xxxA series PXle AWG, Digitizers and combination modules



Product Number	Instrument Type	Sample Rate	No. of Channels	No. of Bits
M3100A	Digitizer	100 MSa/s	4 or 8	14
M3102A	Digitizer	500 MSa/s	4	14
M3201A	AWG	500 MSa/s	4	16
M3202A	AWG	1 GSa/s	>4	14
M3300A	combination of M3100A & M3201A			
M3302A	combination of M3102A & M3201A			

- 100 MSa/s and 500 MSa/s Digitizers
- 500 MSa/s and 1 GSa/s AWGs
- User programmable built-in FPGA (Xilinx Kintex 7)
- Inter-channel skew of 50 psec or less
- Optional HVI technology allows synchronous phase coherent operation across multiple channel / chassis AWGs, Digitizers or combination units.
- Very cost efficient

M3602A Graphical FPGA Development Environment (exclusive for M3xxxA modules)



FPGA development Services

Keysight Technologies not only sells hardware and software products, but may also provide services according to customers' requests for hardware implementation, software and application development.¹

Consulting Services *

- Sample codes
- Turnkey software (project) contracts
- IP development and delivery

- The user-customized area and the measurement area are clearly separated, allowing you to focus solely on the custom processing of AWG generation and Digitizer acquisition signals without having to implement the control of measurement.
- The user-friendly graphical environment simplifies the development of custom DSP for the FPGA device enabling special modes of operation or new control structures.
- Easily import FPGA codes and external IP
 - VHDL, Verilog, and VIVADO/ISE projects, MATLAB/SIMULINK, Xilinx IP core
 - Fast one-click compilation
 - Reduced development time and compiling time together with hot programming enable dynamically-reconfigurable instruments.

Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

