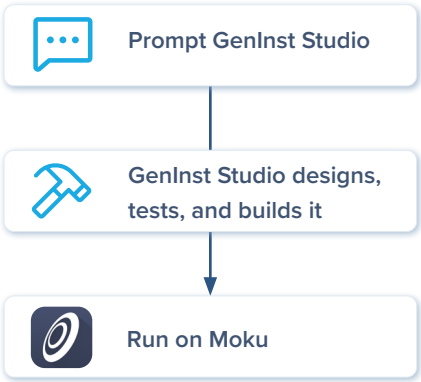
GenInst Studio

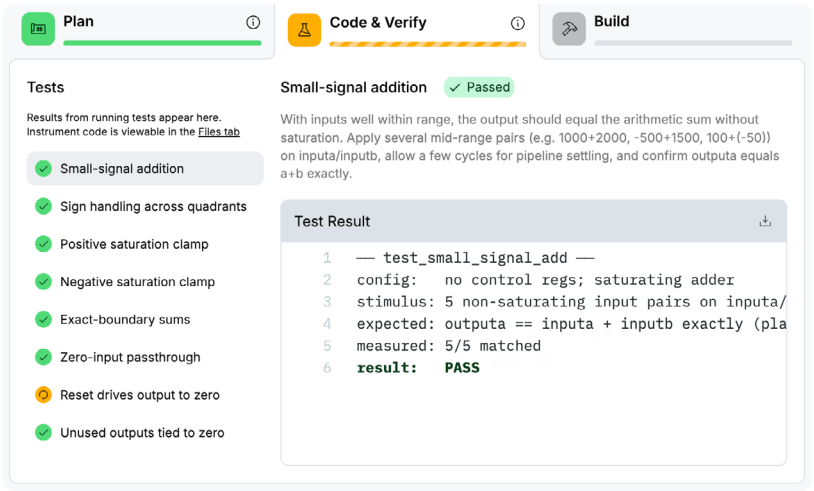
Generative AI platform for personalized test instruments

GenInst Studio is a generative instrumentation platform that creates application-specific instruments for Moku hardware from natural language prompts. Using an agentic workflow with comprehensive testing and validation, it generates, specifies, and refines custom instrument designs, reducing the FPGA expertise, development time, and engineering effort traditionally required to build specialized test and measurement capabilities.

Customization for everyone

- **Natural language description:** define what the instrument does in plain language to build application-specific instruments.
- **No FPGA experience required:** the specialized design work is handled for you.
- **Purpose-built guardrails for the AI agent:** designs stay grounded in FPGA-based precision test and measurement.
- **Runs on any Moku:** deploys across the full Moku hardware lineup.



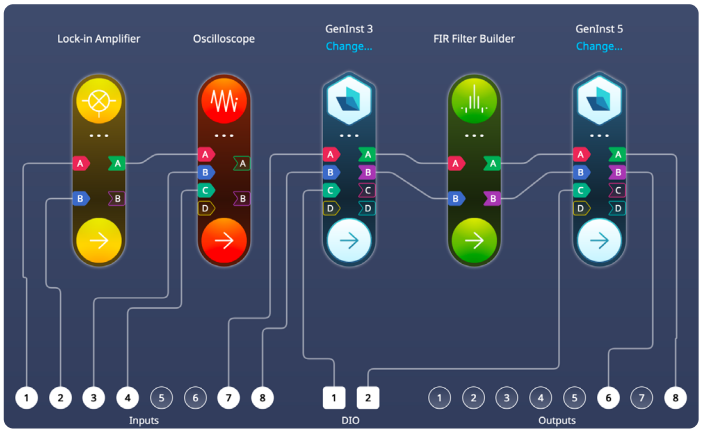


Validated instrument design

- **Robust validation process**: GenInst Studio validates the instrument design with a comprehensive suite of tests before deployment.
- **Agentic workflow:** the agent systematically revises and re-tests the design until every test passes.
- **Full traceability:** design rationale, architecture, and test results captured with each build, giving a complete and reviewable record of how the instrument was validated.

Rapid system integration

- **Rapid iteration:** refine the design, regenerate, and redeploy in a single workflow.
- **Full integration:** generated instruments run in Multi-Instrument Mode with direct access to device I/O, timing, and data architecture.
- **Work alongside native instruments:** run the Oscilloscope, Waveform Generator, and more concurrently to observe outputs, inject signals, and validate on one platform.
- **Guided setup:** GenInst explains how a new instrument works and how to configure it for the application.



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Maximum platform performance

	Moku:Delta	Moku:Pro	Moku:Lab	Moku:Go
Sampling rate	312.5 MSa/s	312.5 MSa/s	125 MSa/s	31.25 MSa/s
Nyquist Frequency	156 MHz	156 MHz	62.5 MHz	15.6 MHz
Channels per instrument	Up to 4	Up to 4	Up to 2	Up to 3
Instruments in parallel	Up to 8	Up to 4	Up to 3	Up to 3

GenInst Studio features

	Base	Premium
Build on any Moku device	✓	✓
Instrument builds per year	10	100
Execution, synthesis, and routing times	Limited	Extended
Concurrent instrument generation	×	2
Ability to interject during instrument generation	×	✓
Ability to download generated HDL code, test scripts, and instrument plan files	×	✓
Export project to Moku Cloud Compile	×	✓

Example use cases

- **Line Delay (Variable Input Buffer):** applies programmable, per-line sample delays to buffer and reproduce input signals with precise timing control, with decimation for longer delays on lower-frequency signals.
- **Pulse Analyzer:** measures the full set of timing parameters of an incoming pulse, including rise and fall time, pulse width, duty cycle, settling time, and pulse repetition frequency.
- **Dual-Frequency Band Trigger:** pulses an output high when a signal's frequency falls within a configured band and above a set threshold, across two independent input channels.
- **Phase-Frequency Detector:** digitizes two inputs (VCO and REF) and generates UP and DOWN outputs whose relative timing indicates the phase and frequency difference between them.
- **Pulse-Shaping Filter:** applies a runtime-selectable shaping filter (passthrough, sinc, Gaussian, or raised-cosine) to a stream of square pulses.