

Why the Model 686 Arbitrary Waveform Generator Is the Go-To Tool for Semiconductor Test Engineers

A 20 GS/s sample rate, true 14-bit resolution, and 120-picosecond edges give test engineers one instrument for high-speed digital, analog, and mixed-signal characterization.

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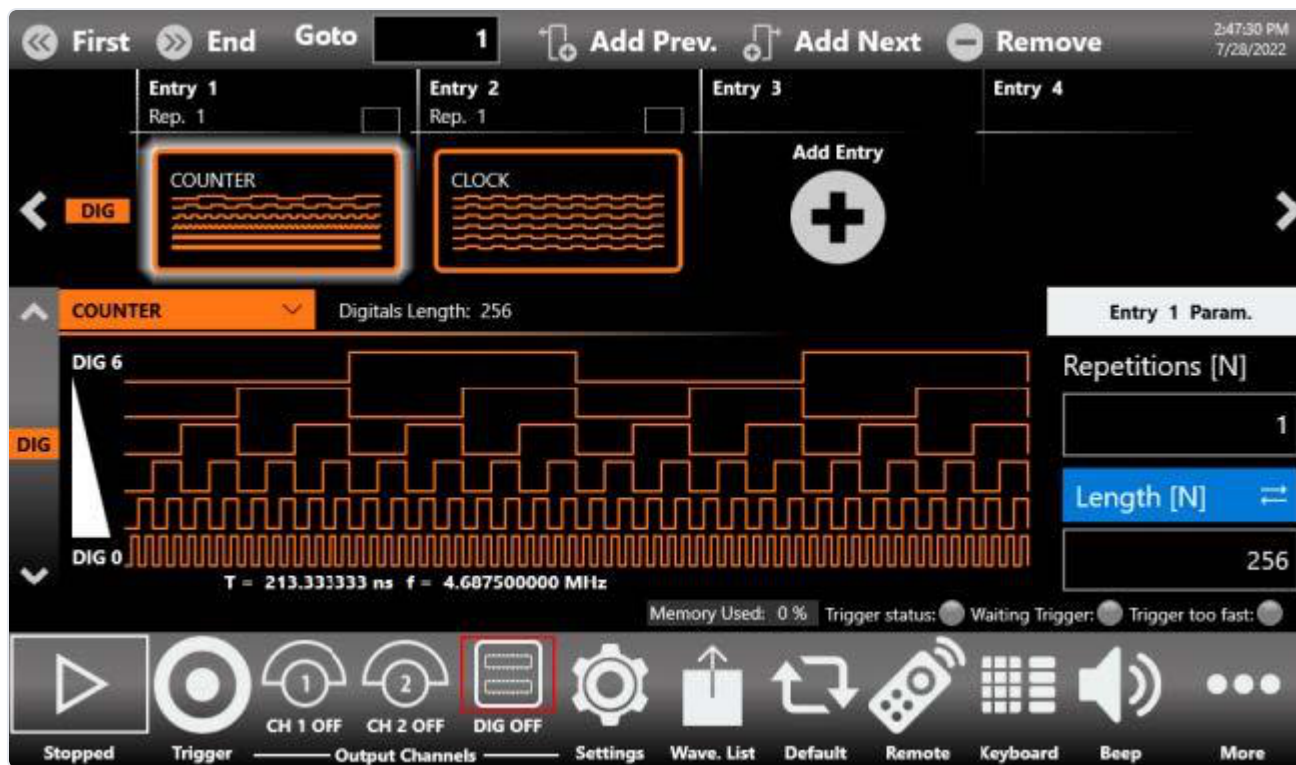
SAN RAFAEL, Calif., August 25, 2026. When a semiconductor device fails on the test bench and passes in the field, engineers usually start by questioning the instrument that generated the stimulus. Berkeley Nucleonics Corporation's Model 686 arbitrary waveform generator (AWG) has become a fixture on mixed-signal test benches for exactly that reason: it reproduces real-world signal conditions with the fidelity and control semiconductor validation demands, pairing a 20 GS/s real-time sample rate with true 14-bit vertical resolution so engineers can generate high-fidelity signals without trading accuracy for speed.

That combination shows up first in bandwidth and edge quality. The Model 686 delivers a measured 3 dB bandwidth of 5.8 GHz (sin(x)/x compensated) and a square-wave rise and fall time of 120 picoseconds, with output amplitude reaching 5 Vpp at frequencies up to 3.5 GHz and tapering to 3 Vpp as frequency climbs to 6.5 GHz. For test engineers, that means sharp transitions for fast-

switching digital circuits and enough signal strength for analog front-end characterization, from the same channel, without re-cabling to a second instrument.

Built for digital and mixed-signal test

Digital and mixed-signal work gets its own dedicated mode. The optional Pulse Pattern Generator (PPG) mode generates PRBS and multi-level PAM patterns, plus custom patterns up to 12 megasymbols, at pattern rates up to 6.5 Gbaud, with digital outputs delivering up to 10 Gb/s per line. Paired with up to 32 digital lines running in tight synchronization with the analog channels, the instrument covers scenarios that used to require a second box on the bench — a baseband analog signal alongside toggling control lines and parallel data, everything aligned in time.



The Simple Rider PPG mode interface, used to build PRBS and custom digital test patterns directly on the instrument's touchscreen.

Test sequences are rarely simple, and the Model 686 is built with that in mind: up to 9 Gpts of waveform memory per channel in Full Rate mode leaves room for extensive waveform data, multi-step sequences, or captured real-world signals without truncating a test. As programs grow, up to four units can be linked over a dedicated intra-chassis synchronization bus to form a single 16-analog,

128-digital-channel system without losing timing accuracy — useful for parallel test stations or large-scale IC evaluation where one chassis runs out of channels.

“Semiconductor test benches need instruments that don't lie — clean edges, accurate amplitude, and enough memory to hold a full test sequence without shortcuts,” said Amira Sekkouty, Associate Application Engineer at Berkeley Nucleonics. “The Model 686 gives engineers one box that covers the function-generator, arbitrary-waveform, and pattern-generation modes a mixed-signal test bench actually uses, instead of three instruments that each do one job.”

The included Simple Rider software runs all three operating modes — AFG, True Arb, and PPG — from a touchscreen-ready interface, so engineers move between waveform creation, sequencing, and pattern generation without switching software. And while semiconductor validation is where the Model 686 sees its heaviest use, the same speed, resolution, and channel count make it a regular fixture in photonics, aerospace, and RF labs, a versatility that makes it a durable investment rather than a single-purpose tool.

Availability

The Model 686 is available through Berkeley Nucleonics and its representatives worldwide. Full specifications, configuration options, and quote requests are on the [Model 686 datasheet page](#).

About Berkeley Nucleonics

Berkeley Nucleonics Corporation (BNC) has been a trusted name in precision electronic instrumentation since 1963, serving defense, research, academic, and industrial customers with digital delay generators, arbitrary waveform generators, RF/microwave signal generators, pulsed power systems, and nuclear radiation detection equipment. With 60+ years of reliability and responsive technical support, BNC is flexible and listens to your application.

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