

5G / 6G & Wireless

Vector signal generation and wideband, low-phase-noise sources for FR1, FR2 millimeter-wave, and emerging 6G component and receiver test.



APPLICATION BRIEF · RF & MICROWAVE SIGNAL GENERATORS · dc-62022201

The Mission

Wireless development now spans sub-7 GHz FR1, millimeter-wave FR2, and the 7 to 24 GHz range under study for 6G. Across all of it, engineers test amplifiers, front-end modules, and receivers against realistic modulated signals. The source has to produce both clean continuous-wave references and standards-based vector waveforms, then move quickly between frequencies as automated test sequences run.

The Challenge

High-order QAM tolerates little added phase noise or distortion from the source. High-order QAM and wide channel bandwidths push error-vector magnitude budgets tight, so the generator's own phase noise and modulation quality directly limit how good a result you can measure. The work also reaches into millimeter-wave, which rules out any source that stops in the low gigahertz. Vector capability and wide frequency coverage both have to be on the table.

Recommended Berkeley Nucleonics Solutions

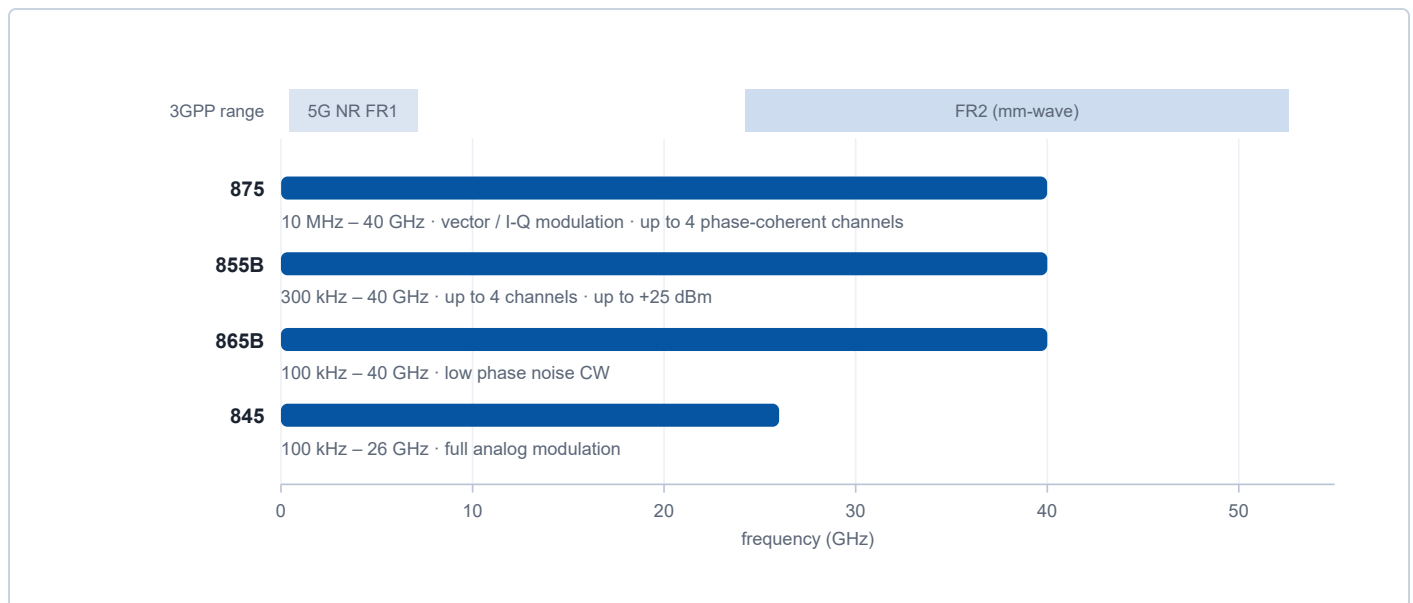
The Model 875 is the Vector Signal Generator for this domain, with internal I/Q modulation, QAM generation from 8QAM to 4096QAM at up to 200 MS/s (Option IVM), a 400 MHz modulation bandwidth, and coverage to 40 GHz that reaches the FR2 bands below 40 GHz (n257, n258, n260 and n261). Its 1, 2, 3, or 4 phase-coherent channels support MIMO and multi-port front-end test.

For clean wideband CW references and blocker generation, the Model 855B delivers up to four phase-coherent channels in 1U with up to +25 dBm of output power (100 MHz to 6 GHz). The Model 845 covers 100 kHz to 26 GHz (settable to 30 GHz) with full analog modulation for component and IF work, and the Model 865B provides a compact, low-phase-noise bench source to 40 GHz for receiver and converter characterization. Figure 1 sets the four against the 3GPP frequency ranges.

At an FR2 carrier the 875-40 delivers up to +15 dBm from 26 to 40 GHz, holds its I/Q frequency response to ± 2.0 dB typical across the full 400 MHz modulation bandwidth above 20 GHz, and keeps carrier leakage below -70 dBc (-90 dBc typical) with image rejection of 65 dBc minimum (85 dBc typical); its phase noise at 20 GHz is -104 dBc/Hz typical at 1 kHz offset. A source whose own EVM is 10 dB below the device's target contributes about 0.4 dB to the measured EVM.



■ **SCHEMATIC** **Figure 2.** A clean 16-QAM constellation and the same constellation with source phase noise; the random rotation spreads the outer symbols along arcs first.



■ **DERIVED** **Figure 1.** Frequency coverage of the recommended sources against the 3GPP 5G NR frequency ranges FR1 (410 MHz to 7.125 GHz) and FR2 (24.25 to 52.6 GHz), top-of-family versions, from the current datasheets.

Why It Works

The 875 plays the I/Q waveforms wireless test needs, from internal memory or streamed through its Fast Control Port, so the bench drives a modulated signal rather than a bare tone. Low phase noise across the family keeps the source's share of the EVM budget small. Coverage to 40 GHz reaches the lower FR2 bands, and the multi-channel 875 and 855B support MIMO and multi-antenna scenarios from a single instrument.

Getting Started

Berkeley Nucleonics applications engineers help match the right source, channel count, and options to your test plan. Tell us your frequency span, switching budget, and channel needs, and we will recommend a configuration and arrange a demo.

Contact info@berkeleynucleonics.com or call 800-234-7858. Browse the full family on the RF & Microwave Signal Generators documentation page.

Berkeley Nucleonics Corp.

Test, Measurement and Nuclear Instrumentation since 1963
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Application Brief

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