Extending Phase-Coherent RF Coverage to 40 GHz

Modern RF environments are congested and complex, with weak, agile signals competing against high-power emitters. RF performance is needed to detect and analyze activity across spectrum awareness, SIGINT, direction finding, geolocation, and counter-UAS missions. The difficulty increases above 18 GHz, where emerging communications, radar, satellite links, and other microwave signals may be present. Extending into these frequencies has traditionally required custom hardware, adding cost, complexity, and integration time.

Epiq Solutions designed the NDR504 to simplify that challenge. The compact, four-channel downconverter extends phase-coherent RF coverage from 18 GHz to 40 GHz, allowing compatible systems operating below 18 GHz to access higher-frequency signals without requiring a completely new receiver architecture.

Expand RF Coverage Without Replacing the Receiver

The NDR504 receives signals from 18 GHz to 40 GHz and downconverts them to an intermediate-frequency output that can be processed by receivers operating below 18 GHz. This gives system designers a practical path to add higher-frequency coverage to existing or new RF architectures.

The unit supports two conversion bands:

– 18 to 26.5 GHz RF input converted to 2.3 to 10.8 GHz IF output

– 26 to 40 GHz RF input converted to 3.2 to 16.7 GHz IF output

By translating higher-frequency signals into a range supported by downstream receivers, the NDR504 can help organizations extend the usefulness of their current SDRs, tuners, and

processing systems.

Four Phase-Coherent Channels for Multi-Channel Missions

The NDR504 provides four phase-coherent downconverter channels with length-matched RF routing and an integrated local oscillator. With the appropriate downstream receiver and antenna configuration, the channels support independent search, phase-coherent direction finding, geolocation, and other multi-channel RF workflows across 18 GHz to 40 GHz.

Designed to Work With Existing RF Platforms

The NDR504's analog IF outputs are designed to connect with compatible receivers operating to 18 GHz, including phase-coherent SDRs and tuners. This provides flexibility when selecting the digital processing, recording, analysis, or exploitation resources that follow the downconverter.

For example, an RF system can use the NDR504 at the front end to receive higher-frequency signals, then route the downconverted outputs to an SDR or tuner for digitization and further processing. This approach can support a range of architectures, from dedicated fixed-site monitoring systems to airborne, vehicle-mounted, and distributed sensor deployments.

The NDR504 also includes a 10 MHz reference input to support synchronization within a larger system, as well as a test-signal upconverter input that can aid with system test and calibration workflows.

Small, Rugged, and Easy to Deploy

High-frequency RF capability often comes with integration challenges. Space, power, cable routing, environmental requirements, and antenna placement can all affect the final system design.

At just 4.8 × 5.7 × 1.6 inches and weighing less than 2.5 pounds, the NDR504 delivers four-channel 18 GHz to 40 GHz

conversion in a compact package. Its rugged construction and operating temperature range of -40°C to +85°C make it appropriate for challenging platform environments.

Its small size also creates greater flexibility in system installation. The NDR504 can be positioned near an antenna aperture on ground-based, airborne, or uncrewed systems, helping system designers manage RF signal path losses before the signal is passed to downstream equipment.

Supporting Higher-Frequency RF Missions

Signals of interest continue to expand into higher-frequency bands. Whether the mission involves microwave spectrum monitoring, electronic intelligence, direction finding, geolocation, or next-generation communications analysis, system designers need practical ways to extend coverage without adding unnecessary complexity.

The NDR504 brings together the capabilities needed to support those efforts:

– Four phase-coherent downconverter channels

– RF input coverage from 18 GHz to 40 GHz

– Two selectable conversion bands

– IF outputs below 18 GHz for compatibility with downstream receivers

– Length-matched RF routing and a shared integrated LO

– 10 MHz reference input

– Test-signal upconverter input

– Compact 4.8 × 5.7 × 1.6-inch enclosure

– Less than 2.5-pound weight

– Rugged operation from -40°C to +85°C

For those that need to extend coherent RF coverage beyond 18 GHz, the NDR504 offers a compact, deployable way to connect high-frequency signals with the receivers and processing resources already in their system.

As RF environments become more congested and complex, expanding frequency coverage is only valuable if that capability can be integrated efficiently. The NDR504 was designed to help make 40 GHz RF access more practical for real-world sensing and signal-processing missions.

Sponsored by Epiq Solutions. Epiq Solutions develops software-defined radio and RF solutions for mission-critical applications. Learn more about the NDR504 and Epiq Solutions' portfolio of RF platforms at epiqsolutions.com.

The specifications and positioning above align with Epiq's current NDR504 product information.

Explore the NDR504