ANATECH ELECTRONICS INC

AT THE CENTER FREQUENCY

An e-Newsletter from Anatech Electronics

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What's News...

Automakers Axe Am Radios

EVs from Audi, BMW, Porsche, Tesla, and Volvo haven't included AM radios for years, BMW launched its first EVs, the i3 and i8, without AM receivers, and Tesla originally included an AM radio in its Model S but then killed it. Even some hybrids are abandoning the technology, such as Volvo's T8 PHEVs. Their decisions are based on the fact that EVs generate a lot of electromagnetic interference, which would make AM reception even worse than usual. If that was true, then you might assume that all EVs would ditch them, which isn't the case. AM broadcasting is nearly extinct in Europe but not in the U.S. because in rural areas it can be the only choice, as it propagates over much longer distances than FM.

EU to Build Satcom Network

The EU is about to finalize a plan to build a satellite internet service to fill in gaps in terrestrial broadband coverage and provide "strategic independence." This should allow for commercial high-speed broadband

A Word from Sam Benzacar

The Resurgence of Microwave Directed Energy Weapons

By Sam Benzacar

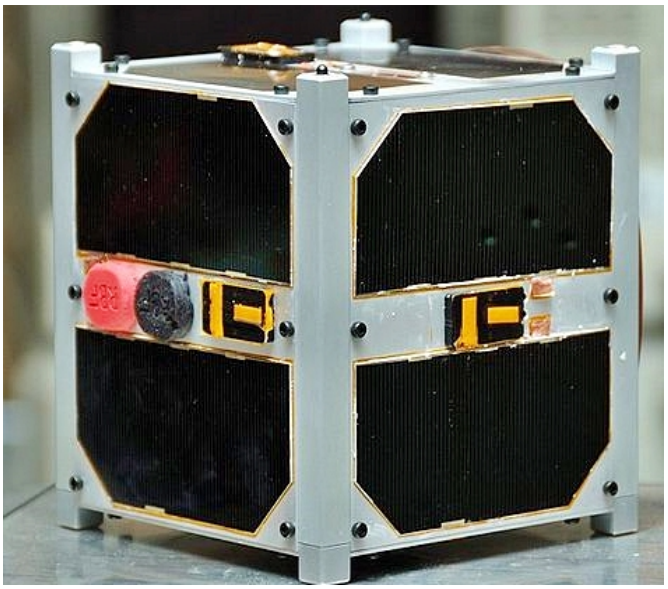
If you're not familiar with directed-energy (DE) weapons, you're not alone because they've flown under the radar, so to speak, for decades. But as Russia rains drones down in swarms throughout Ukraine, they're getting a lot more attention because it makes little sense to shoot down a $20,000 drone with a $200,000 missile. High-power microwave (HPM) DE weapons would go a long way toward solving this imbalance and in many cases better than their laser-based counterparts.

First, it takes longer for a laser to fire, and the beam must reside on the target long enough to destroy it. Next, although firing a laser costs almost nothing compared to a missile, one laser shot (hopefully) equals one dead drone. In contrast, HPM fires in less than a second and has a deep magazine (i.e., the ability to fire numerous times before being rearmed or resupplied) and can simultaneously destroy or degrade multiple targets.

Things have changed a lot since the 1960s, when the potential of non-kinetic weapons was first realized. Back then, electronics were analog and far less susceptible to being disabled or destroyed by a blast of microwave energy, which meant you needed hundreds of kilowatts or even gigawatts of radiated RF power to make the kill. Today, the control and communications systems on every aircraft are solid-state, so the goal is not to completely fry them but confuse, disable, or destroy them, which takes much less RF power, so DE systems can be smaller and consume less DC power.

Nevertheless, even with the gain generated by a high-gain directional antenna, microwave DE system still require amplifiers capable of generating significant amounts of RF power, and vacuum tube technology continues to reign supreme. However, gallium nitride is likely to change that, and the first example is the Leonidas DE system near the production stage developed by Epirus in Los Angeles.

availability throughout Europe, removing dead zones and providing connectivity in remote places such as Africa and the Arctic region. Unlike Starlink's growing constellation, the EU plans for satellites in geostationary orbit via Eutelsat's 36 satellites and OneWeb's 428 satellites.



Atmospheric Ducting Helped Sink the Moskva

When a Ukrainian navy anti-ship missile battery destroyed the Russian destroyer Moskva in the Black Sea, questions arose about how this could be possible, as Ukraine has no ships or aircraft in the region. The answer appears to be a temperature inversion that resulted in atmospheric ducting that allowed radar signals to travel over the curve of the Earth and back. This should not have been possible under normal conditions, but the boundary layer created by a temperature inversion allowed a radar with a range of 50 miles to see over the horizon.

Leonidas uses an active phased array powered by GaN MMICs that, like AESA radars, uses beam steering to focus energy on a target or targets at high speed, so it can potentially fend off huge numbers of drones. It's small enough to be mounted on the back of a pick-up truck and be programmed to have "no-energy zones" that keep the beam from interrupting the operation of friendly forces and consumes less DC power while still producing enough radiated energy to disable an adversary's electronics.

Rather than focusing the frequencies used by the aircraft (including drones) to communicate and navigate, it delivers something more akin to an electromagnetic pulse (EMP) that spans frequencies from near DC to hundreds of gigahertz, so the frequencies used by the target really don't matter.

I suspect Leonidas is the trend for the future, especially with the rise of drone warfare, in which dozens or even hundreds of drones are launched to form a swarm, each one communicating with the others.

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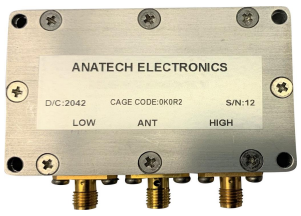

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Start-up Sets Sights on Wireless Electricity Transfer

Reach Power has raised $30 million in funding to help commercialize its concept of beaming electricity wirelessly, according to Reuters. Using high-gain, narrow-beamwidth antennas, the approach demonstrated its ability to operate a radio without batteries from up to 25 feet from the transmitter. The start-up company has inked a deal with the Defense Department for prototypes that combine multiple energy-beaming modules and has also developed an IC that can transmit and receive waves carrying electricity. Customers could include manufacturers and logistics companies.

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