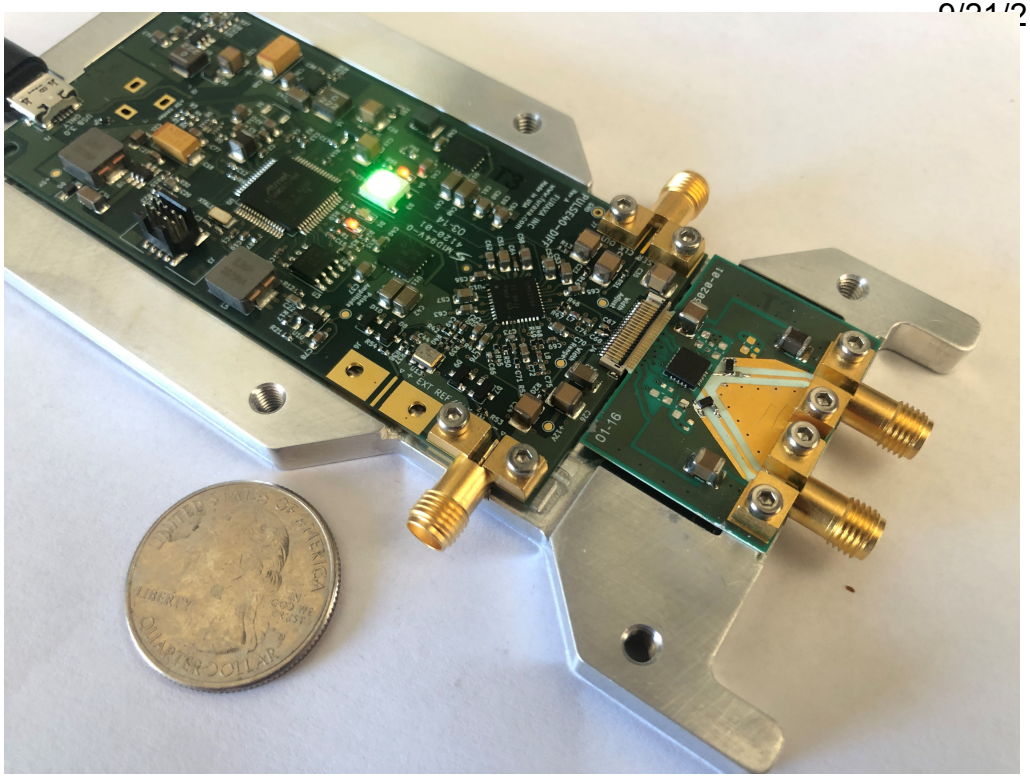
Capability: RADAR with unique power and range

FURAXA

Spectrally Altered Furaxa Enhanced Radar (SAFER) ICs increase **RANGE**, **SENSITIVITY**, **POWER, SWAP,** intercept/detect resistance, agility and information embedding capability

9/21/21 J. Libove, Ph.D.



Broadband 20V RADAR Pulse/Comb Generator generates dynamically controllable 90ps - 400ps FWHM pulses at up to 2 GPPS on low-cost 2x2mm GaN die

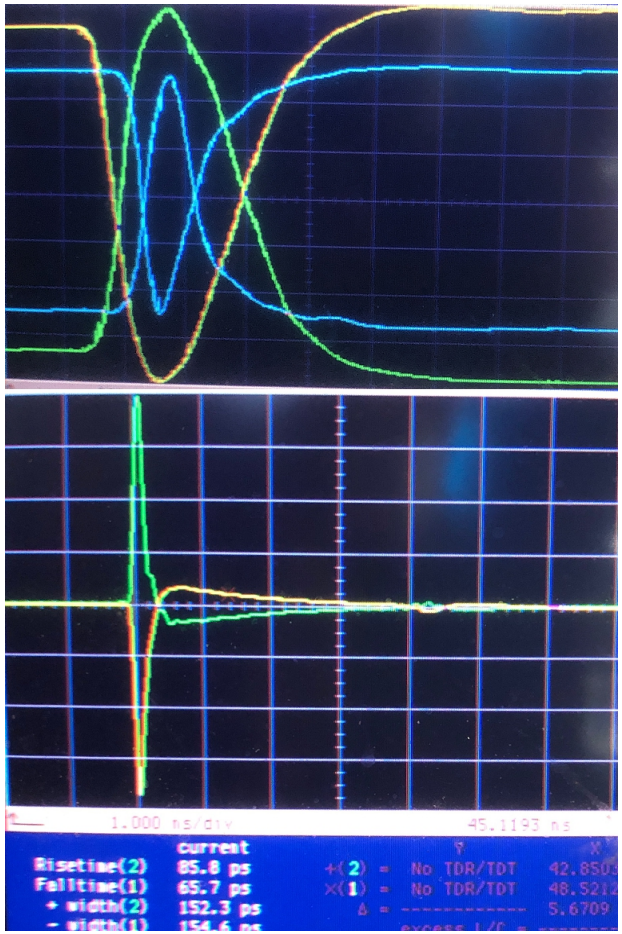


Fig 1. Dynamic Pulse Width and Amplitude Modulation

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Introduction:

Ultrahigh Sensitivity Interference-Resistant RADAR Technology

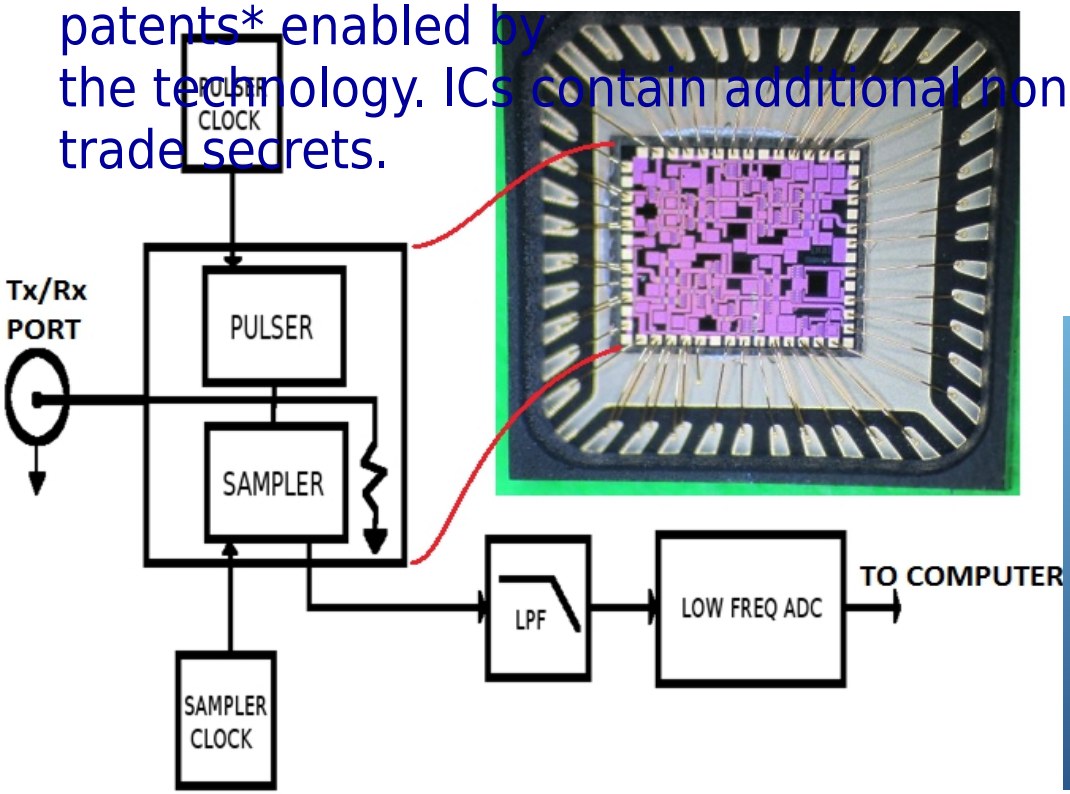
- Background: Developed and deployed proprietary ultrawideband (UWB) GaN radar ICs for military applications requiring higher resolution and sensitivity and lower SWAP$ than conventional radar. Very high packing density, up to *2GPPS pulse rep rate*, and *direct chip-antenna* connection allow extreme power combining for long-range radar or jamming.

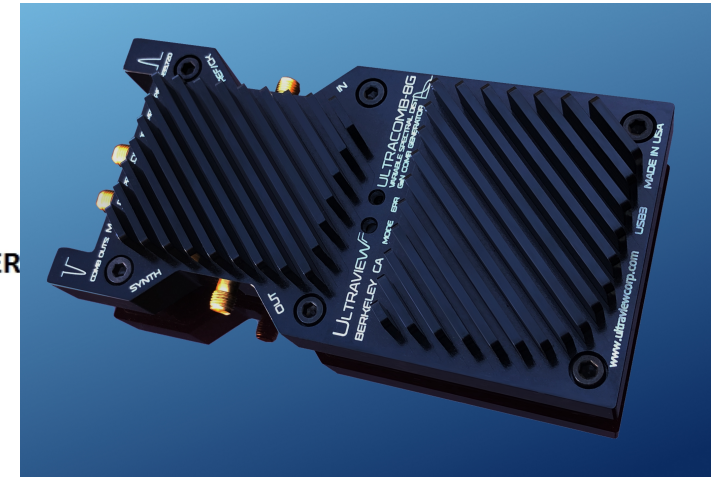
Unique Capabilities:

- Dynamic Width and Amplitude Modulated (DWAM) high voltage differential pulses allow **optimal radar imaging, both near and far**
- Dynamic UWB Pulse Alternation (DUPA), reduces 1/f noise and alters spectrum to reduce susceptibility to external interference and noise, for **more reliable target detection in hostile high-fade environments.**
- AM, PPM, FM, PWM enable combined Radar/Comms or agile jammer
- Ultracompact and low cost – fully differential GaN and SiGe ICs connect

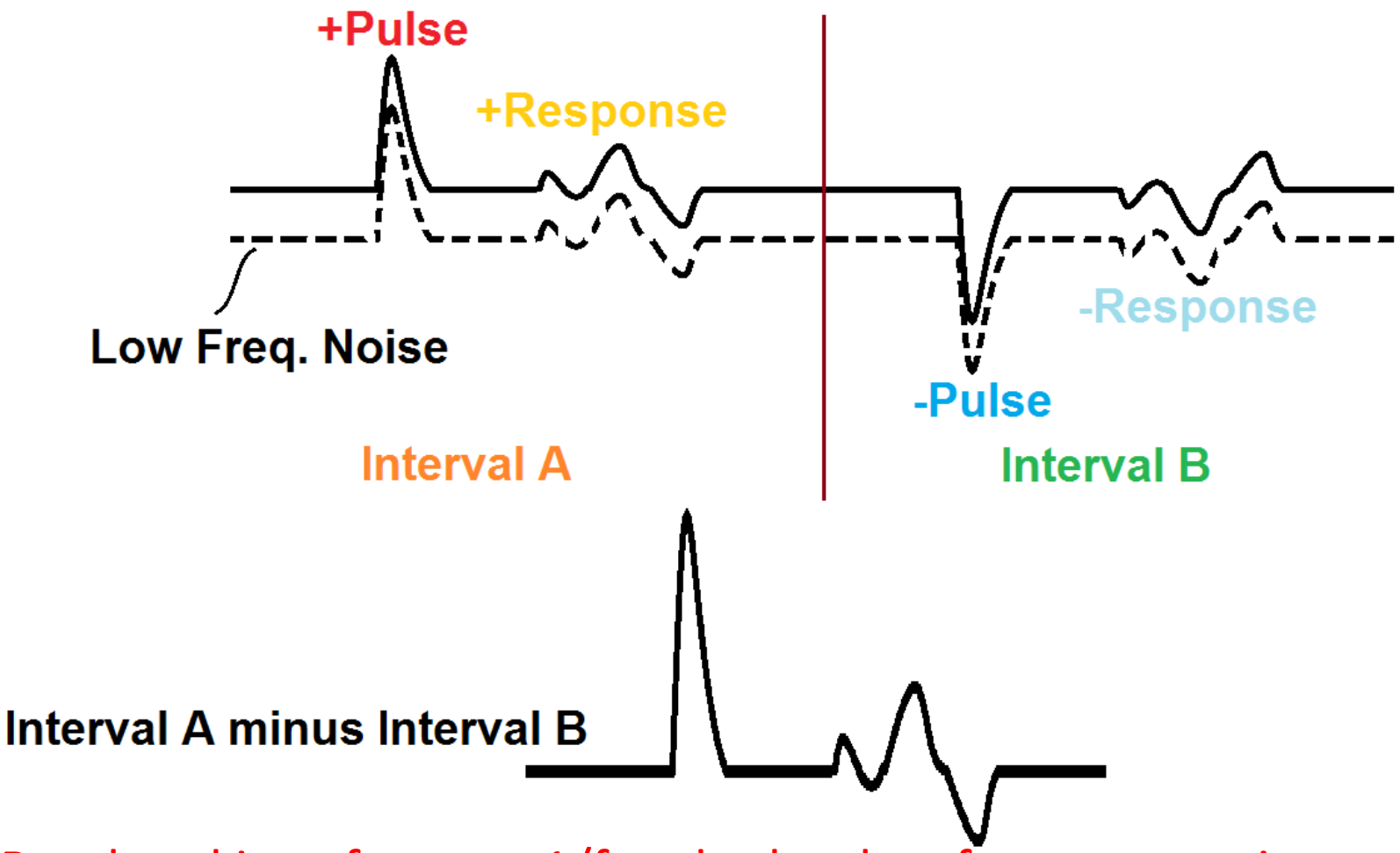
PROPRIETARY TECHNOLOGIES:

Dynamic Cascode Exchange (DCE) Sampler/Pulser High Power UWB ADA with
low die size and ability to synthesize uniquely complex precisely controlle pulse shapes
and spectral profiles. Patents 6,433,720, 6,642,787 and other Furaxa patents* enabled by
the technology. ICs contain additional non-patented circuitry protected as trade secrets.





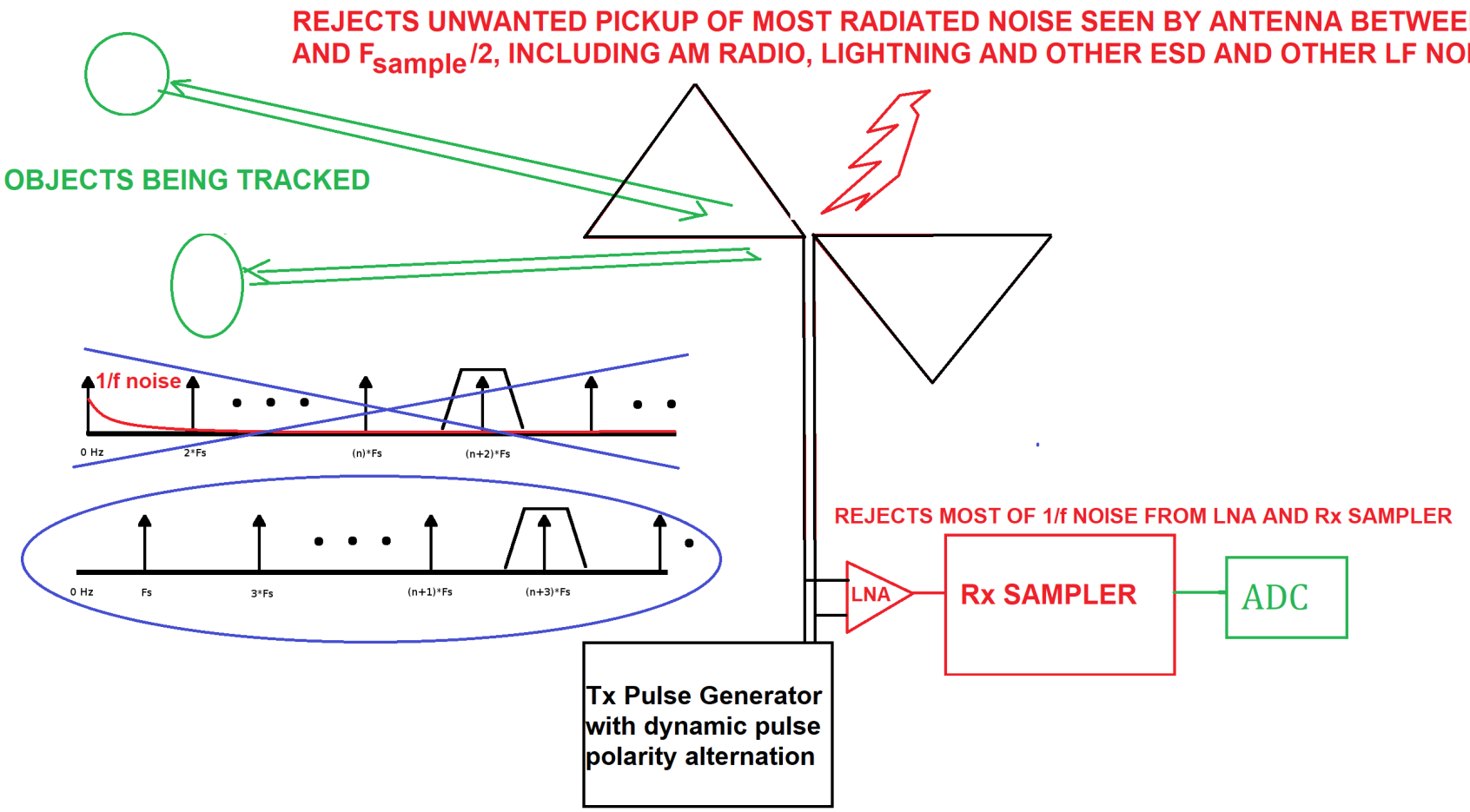
* Libove, J., Ingle, M. and Schriebman, D., “Method and apparatus for non-invasive real-time biomedical imaging of neural and vascular activity”, Patent 10,660,531 issued 5/26/20, Divisional patent 11,089,964 issued 8/17/21.



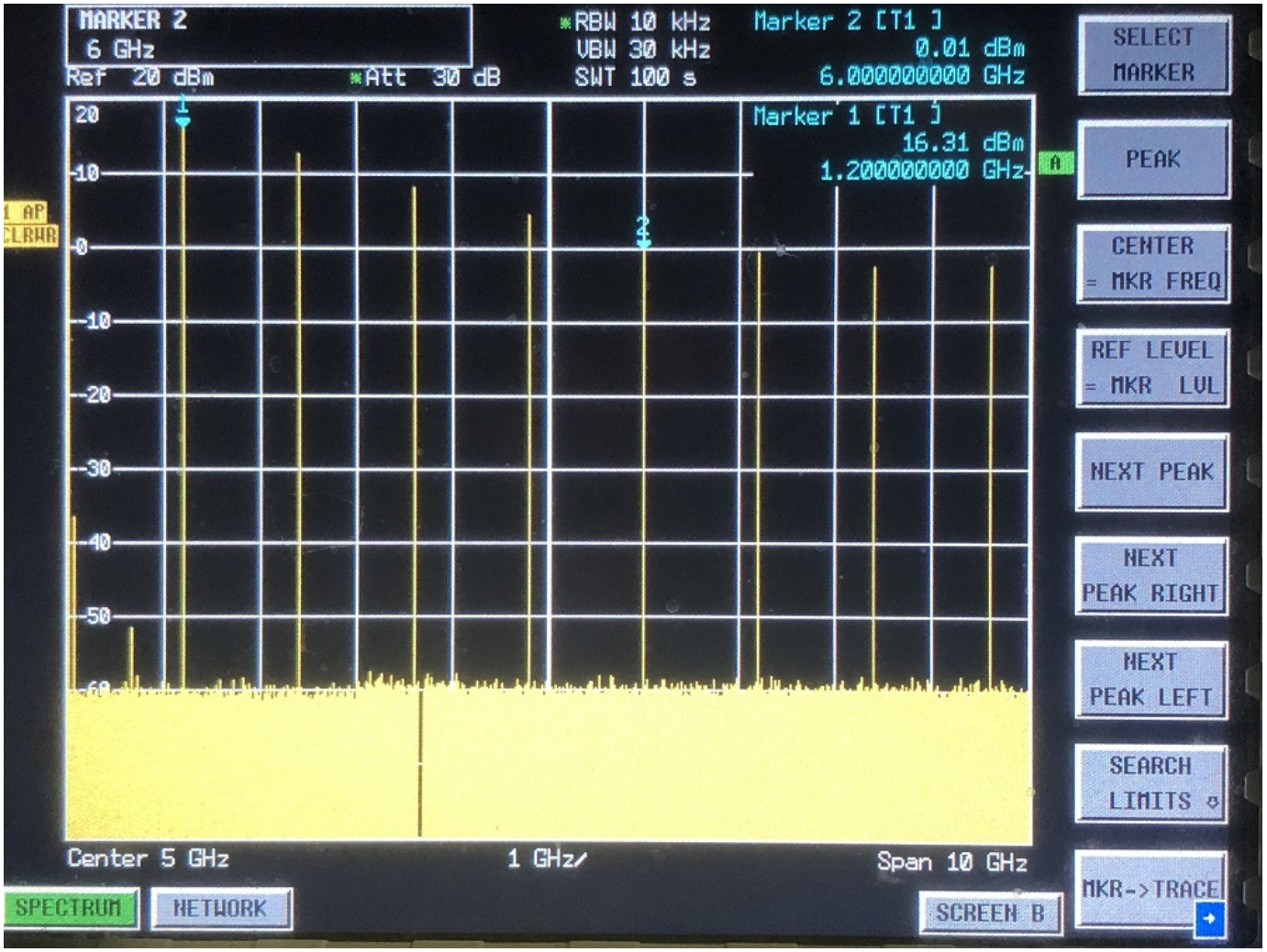
Baseband interference, 1/f and other low frequency noise cancelled

Alternating Polarity Stimulus Pulses Mitigate 1/f Noise that would otherwise obscure weak return echo signal.

Increases range and reduces probability of interception and detection.



Noise/interference Rejecting IC for Military and Vehicular Radar



Extremely High Maximum Pulse Repetition Rate to 2GPPS. Shown: Broadband High Power Comb Generation at 1.25 GPPS, producing +16dBm at 1.25 GHz, +12dBm at 2.5 GHz, +9dBm at 3.75 GHz, 0dBm at 6 and 7.2 GHz and -2dBm at 8.4 and 9.6 GHz. Can be modulated and power-combined in dense arrays for broadband jamming or LPOI/LPOD communications.

ENABLED CAPABILITIES:

- **Uniquely Robust Military and Vehicular RADAR:** Improved ability to image and detect targets earlier in heavy fade and electrically noisy environments.
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- **Missile Warning:** Improved range and ability to image in attenuative atmospheric environments, and potentially earlier detection of plasma-obscured aircraft and missiles. Small size allows deployment in larger power-combined or steered arrays. Improved resistance to jamming.
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- **Agile Jamming and Robust LPOI/LPOD Comms:** Unequalled pulse repetition rate and dynamic pulse shape control enable new power levels and modulation capabilities for broadband RF generation

- **Biomedical Microwave Imaging**: Improved ability to image in lossy, scattering environments, such as human head, chest and abdomen. Ultraminiature Tx/Rx and direct chip/antenna connection enables 5000 antenna per square meter coverage over region of interest.