

SHIELD Programme

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Why in News?

Recently, DRDO has invited private companies to participate in the SHIELD programme to develop high-power microwave systems for testing drone vulnerabilities.

- **SHIELD** - S-band High-Power Microwave Integrated Evaluation System for Lethality and Damage
- **Nodal agency** - Defence Research and Development Organisation (DRDO).
- **Scheme** - Technology Development Fund (TDF).
- **Nature** - This is currently a test and evaluation infrastructure, not a battlefield weapon.
- **Objective** - To study and quantify the lethality and damage caused by high-power microwave (HPM) radiation on electronic systems, including drones, sensors, radars, communication nodes, and command links, under controlled conditions.
- **Mechanism** - Intense electromagnetic (EM) energy is employed to disrupt or damage electronic systems.
- **Distinction from Conventional Weapons** - These systems are non-kinetic and do not rely on explosives or physical impact.
- **Effects** - Potential outcomes include temporary disruption, system reset, or permanent damage to targeted electronics.
- **Applications** - These technologies are utilized for counter-drone operations and enhancing electronic warfare capabilities.
- **Technological feature** - Integration of domestically produced Gallium Nitride (GaN) solid-state power amplifiers.
- Comparison of Gallium Nitride (GaN) with Traditional Technologies (Silicon and Gallium Arsenide)
- **Power density** - Gallium Nitride (GaN) devices achieve approximately five to ten times the power density of Gallium Arsenide (GaAs), resulting in higher microwave output within more compact and lightweight packages.
- **Efficiency** - GaN amplifiers can achieve a power-added efficiency (PAE) of 70 to 80 percent, enabling greater conversion of direct current (DC) power to radio frequency (RF) output and reducing heat dissipation.

Why GaN?

Gallium Nitride (GaN) offers unique properties that make it ideal for high-power, high-frequency and next-generation electronic systems.

SMALLER
FASTER
COOLER
STRONGER
FOR A SMARTER
TOMORROW



Feature	Advantage
 High power density	More power from smaller modules
 High efficiency	Less energy wasted as heat
 Better thermal performance	Sustains high-power operation
 Compact	Helps reduce system size
 High breakdown field	Supports higher operating voltage
 Wide frequency capability	Useful across different microwave bands
 Modular/scalable	Easier to expand system
 Pulsed operation	Suitable for high-power microwave testing

Advanced Materials. Greater Possibilities.

Technology for
a Stronger Tomorrow

- **Significance**
- **Counter-drone warfare** - It employs non-kinetic directed-energy systems to defend against drone swarms originating from China, Pakistan, and non-state actors.
- **Electronic hardening** - It involves mapping failure modes and implementing shielding for radars, avionics, communications, and drones.
- **Indigenisation** - It strengthens domestic directed-energy and electronic warfare technologies, supporting the Atmanirbhar Bharat initiative.
- **SHIELD data** - It informs the development and deployment of future high-power microwave and electronic warfare platforms.

Reference

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