TSL DRONE DEFENSE SYSTEM

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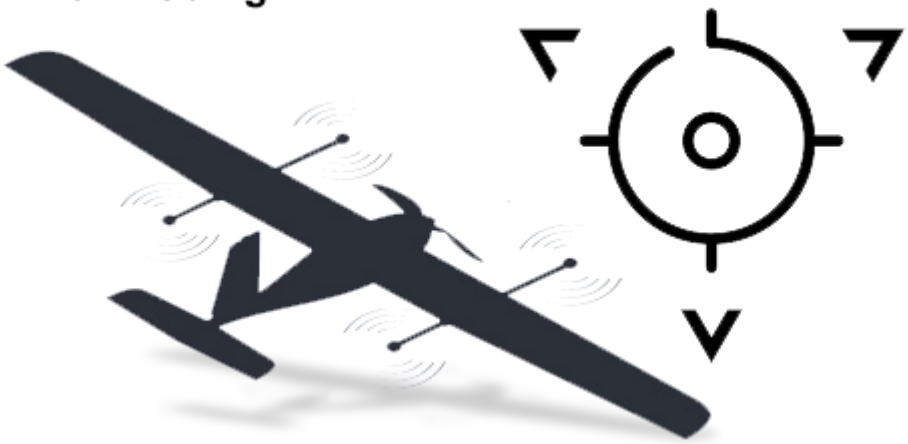

TSL Drone Defense system up to 20km

- ≥5km UAV detection distance (DJI Phantom 4)
-Target speed detection range: 0.5~300m/s
- 360° scan
- Radiation safety distance requirement compliance (≤10W/m2@5m)
- Radiation hardening & ECCM compliance
- 24/7, weather-proof operation

1. Military 3 Coordinate RADAR Detector

RADAR Specifications	
System	All solid-state, Three coordinate active phased array
Band	C band (5.262~5.662GHz)
Detection range	Max detection distance: ≥36km (RCS=0.5m^2) ≥5km (RCS=0.01m²)
	Min detection distance: ≤200m
	Max detection height: ≤1000m (RCS=0.01m²)
	Min detection height: ≥50m (RCS=0.01m²)
Azimuth resolution	Horizontal ≤0.6° Vertical ≤0.6°
Scanning range	360° mechanical scanning
Antenna rotation speed	
Multi-target processing capability	TWS, ≥100 batches
Weight	≤40kg
Dimension	600mm (H) x 500mm (W) x 500mm (L)
Power supply	AC 220V
Power consumption	480W (Average)

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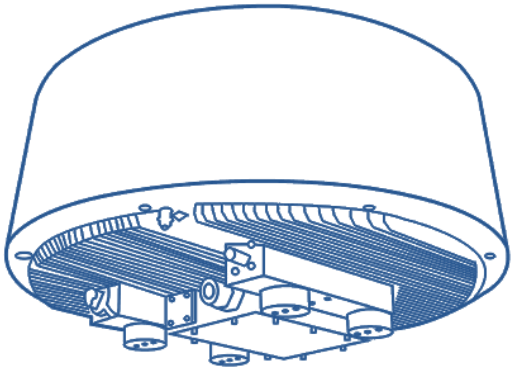
2. RF WIRELESS DRONE Detector

The equipment can realize the monitoring and direction measurement of 300MHz~6GHz frequency band to meet the detection, direction measurement and intersection positioning requirements UAV, ground station detection and high-speed scanning direction measurement, intermediate broadband direction measurement, signal ITU parameter measurement, signal direction measurement and intersection positioning.

Creative combination of UAV detection function and universal spectrum monitoring function, expand the application mode of the equipment, maximize the equipment function; realize the miniaturization of vehicle DF antenna and vibration shock design, improve the equipment stability and reliability; realize the automation and intelligent design of UAV detection module software, one-key operation, complete the whole detection process.



Products Characteristics

The equipment automatically completes the spectrum search, target signal identification, azimuth orientation measurement and automatic alarm

Reconnaissance and direction measurement can be conducted on high-elevation targets;

Long detection distance and high direction-finding accuracy;

Spectrum search is fast and has a short detection time;

Wifi signal filtering, to effectively reduce the false alarm rate;

Can be networked with other reconnaissance or countermeasures equipment;

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Products Features

- UAV monitoring frequency range: 300MHz~6GHz.
- Direction DF accuracy of UAV: 3° (RMS, field DF)
- UAV detection direction distance: ＞15 km (EIRP≥ 500mW Related to the electromagnetic environment)
- Drone detection speed of 2s (@200MHz)0
- Unreal alarm rate: 10%
- Maximum number of detected targets: ≥20
- Data query response time: 1s.
- Monitoring sensitivity: At a signal-to-noise ratio of 6dB, with a resolution of 25kHz: 300MHz～6GHz：≤－105dBm。
- Operation dynamic range 300MHz～6GHz：≥110dB。
- Degree of linearity a) Second-order inter modulation cutoff value 300MHz～6GHz：≥45dBm。b) Third-order inter modulation cutoff value 300MHz～6GHz：≥12dBm。
- Maximum real-time spectrum bandwidth: 80MHz.
- Scan speed: 60GHz / s (frequency resolution of 25kHz).
- The ITU parameter measurement accuracy a) Frequency measurement error the f010-7 ± 10Hz (CW signal); b) Level measurement error ≤3dB c) Continuous wave occupancy bandwidth measurement error 5% BW, where BW indicates the signal occupancy bandwidth d) Modulation style identification accuracy rate 80% (AM, FM, BPSK, ASK, 2FSK, 4FSK: signal-to-noise ratio 12dB; 8PSK, 16QAM: signal-to-noise ratio 18dB) e) Adjustment system measurement error AM adjustment range: 5%; FM frequency bias: f 5% ± 50Hz (f indicates the modulation frequency bias).
- Reliability: MTBF for 4,000 h
- Environmental adaptability: a) operating temperature of the equipment: -40℃ ~ + 65℃; Equipment storage temperature: -45℃ ~ + 70℃. b) Lash comply with the provisions of 3.10.3.2 in GJB 367A-2001; Longitudinal, transverse, normal 30g, a duration of 5ms. c) vibrate compliance with the provisions of 3.10.3.1.1 in GJB 367A-2001; Max. longitudinal overload of 2.5g; Horizontal lateral overload of 2g; Maximum normal overload of 3g. d) get wet in the rain compliance with the provisions of 3.10.2.7 in GJB 367A-2001. Working conditions: the average rainfall rate of 0.8mm / min within 1 hour; Undertaking conditions: the average rainfall rate of 2.5mm / min within 1 hour; e) muggy comply with the provisions of equipment 3.10.2.5 in GJB 367A-2001. The equipment can operate in a high temperature and high humidity environment with temperature not less than 40℃ and relative humidity not less than 96%.
- Power supply: AC 220V / DC 27V, and the total power consumption is <90W
- Weight: 28kg (including DF host and DF antenna)
- Host size: standard 19-inch 2U chassis (Antenna size：H:450mm D:650mm)

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3. Satellite Drone attractive Catcher

Handheld navigation spoofing device using advanced satellite navigation simulation technology, launch real satellite navigation signal simulation navigation signal, invasion of the drone satellite navigation link, induced control UAV flight, make the UAV landing in situ, induce the drone, induce the drone to the designated place, so as to capture the drone.

Equipment can be used for large-scale activity support or for essential protection. Suitable for individual soldiers to carry around the movement for use.

The device can be used alone or with a portable jamming gun. Handheld navigation spoofing device is based on satellite signal simulation technology and hardware based on ARM + FPGA + radio frequency module.

To organize navigation message, satellite star selection, establish each satellite power model, each satellite delay model, Doppler model and each model update correction based on the algorithm, through the satellite time synchronization technology to ensure the system and in-orbit satellite system time highly consistent, then the GNSS satellite motion real-time simulation, calculation, finally by marshaling satellite navigation message with in-orbit satellite positioning signal.

After the UAV receives the satellite signal transmitted by the equipment, because the signal has stronger power than the in-orbit satellite signal, the UAV uses the satellite signal simulated by the equipment to locate and calculate the simulated location position coordinates, so that the simulated position of the equipment determines the real-time positioning location of the UAV.

Use the equipment remote control rocker to change the simulated location coordinates in real time to control the UAV flight.

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Products Characteristics

- With UAV capture function to prevent secondary harm to life and property caused by counter gun "crash landing" UAV; capture UAV, trace back to the source, and prevent the recurrence of harm.
- The emission power is very low, does not produce electromagnetic radiation damage, suitable for close use.
- It has a wide range of objects and can work on civil drones equipped with satellite navigation systems, covering the vast majority of most civil drones.
- No dry access ratio limit, especially for strong anti-jam drones (such as DJI Mavic2 series), can play a role.
- Navigation signals are full, covering GPS, GLONASS, BDS and other navigation signals, dealing with dual-mode and three-mode navigation UAV.
-The application modes are rich, including control mode, rejection mode, and forced landing mode.
- Adjustable control range: the control range can be flexibly configured as needed.
- Small and lightweight, hidden antenna design, built-in battery, suitable for carrying, suitable for mobile patrol use.

Products Features

- UAV navigation spoofing range: > 5km
- The horizontal direction emission angle is 360°
- Electromagnetic radiation: As per GB8702-2014 standard, the electric field strength shall be less than 12V / m (signal range: 1550MHz~1650MHz);
- Continuous working time: ≥8 hours
- Fly the drone out of the control zone or crash the drone
- Iny. time: 6 seconds
- Weight ：≤ 3Kg
- Size: 280 (mm) * 255 (mm) * 110 (mm)
- Operating temperature: -40℃ ~ + 70℃
- Storage temperature: -40℃ ~ + 85℃

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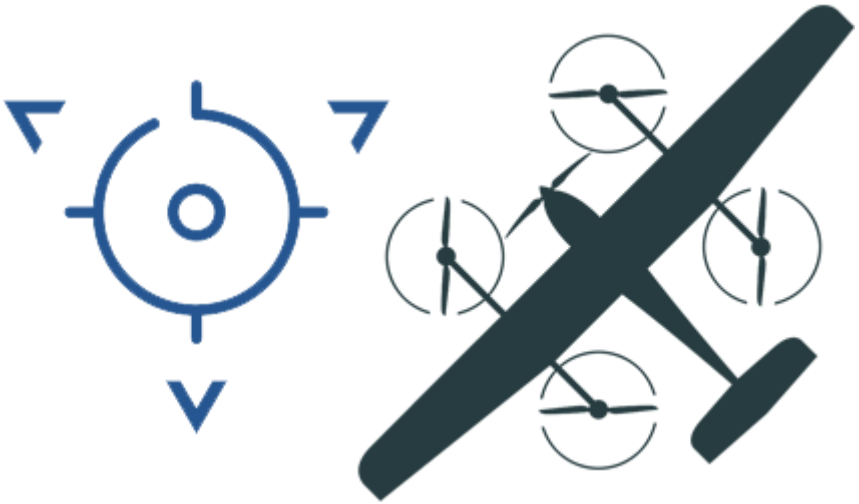
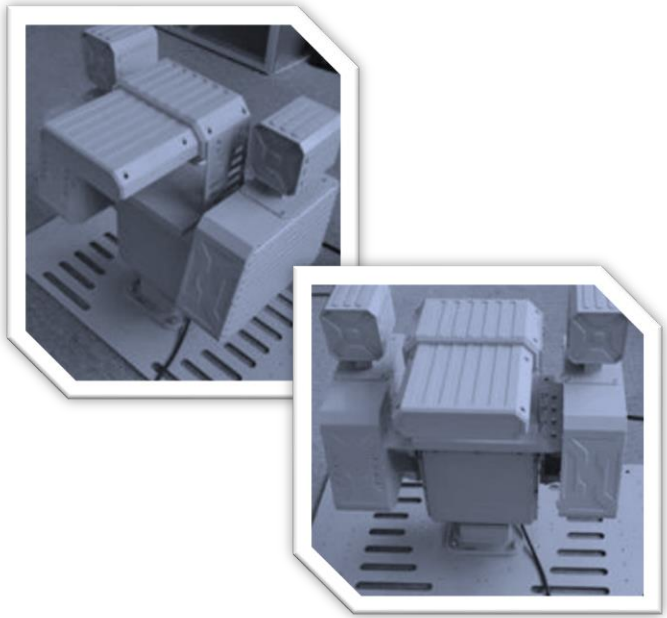
4. AI SDR Drone Jammer

Full-band Jamming& Navigation Spoofing device transmits high-power interference signals in a directional way, and implements omnidirectional or sector interference to the multi-target UAV, forming an electronic fence circle, and blocking the communication between the UAV and the operator.

Jam with the reception of satellite positioning signals, and formulate interference plans and jam strategies.

Effective blocking of the UAV signal in the 400MHz- 6000MHz frequency band, in particular, the four key data chain frequency bands such as 433MHz, 915MHz, 2.4GHz, 5.8GHz can be normally suppressed, and the navigation suppression frequency band signal can be switched to the navigation decoy signal.





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Products Features

- The jam frequency band covers 400MHz~6000MHz;
- Jam signal sideband suppression: 60dB
- The axis of equipment antenna surface is 0°~360° and pitch-5°~65°;
- Platform speed: horizontal 30° / s, elevation 10° / s;
- UAV receiver jamming range: 8-10 km （Related to the local electromagnetic environment）
- Navigation spoofing band：BDS B1, GPS L1, GLONASS L1
- The single-channel instantaneous jamming bandwidth: ≥200MHz
- UAV communication link dry-pass ratio> 10:1 (DJI Mavic 2);
- UAV navigation receiver jamming range: ＞20km;
- UAV navigation receiver spoofing range: > 30km;
- The number of simultaneous jamming bands: ≥4;
- Power consumption of the equipment: 1,500 W.
- Weight: 65kg
- The overall size requirement of the equipment is as follows: 600mm * 485mm * 1100 (lift up state); top height 1800mm (lift up state)
- Environmental adaptability: Meet the provisions of GJB 150A-2009, Military Equipment Laboratory Environmental Test Method temperature

Operating temperature: -40°C + 65℃ (open-air equipment with solar radiation temperature rise of 15℃)
Storage conditions: -45°C + 70℃ (open-air equipment, including solar radiation temperature rise of 15℃)
Normal operation: 96% (+ 29℃) (open-air equipment)
Undertaking conditions: 96% (+ 40℃) exposed boundary equipment solar radiation
The maximum solar radiation intensity was 1120W / ㎡ with continuous irradiation for at least 4h;
Working conditions: the average rainfall rate of 0.8mm / min within 1 hour;
Undertaking conditions: the average rainfall rate of 2.5mm / min within 1 hour;
Wind speed working conditions: 10 m/s;
Undertake condition 30 m/s (expanded state), 40 m/s (withdrawal state)
Low-frequency vibration: Max. longitudinal overload of 2.5g, Maximum lateral overload of 2g, Maximum normal overload of 3g

- Basic reliability: MTBF at 12,000 h
- Average repair time (MTTR): 25min

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5. EO Tracking Camera

EO camera	Resolution	1080p
	Minimum Illumination	Color: 0.005 Lux @F1.35 B/W: 0.0005 Lux @F1.35
	Rotation speed	Pan Speed ≤55°/s, Tilt Speed ≤15°/s
	Angle of View	Horizontal field of view:17.8°~0.5° (wide-tele) Vertical field of view: 13.4°~0.4°(wide- tele)
	Focal Length	20~750mm, 37.5x Optical
	View Range	Pan Range: 360° endless Tilt Range: -45°~45°(Auto Flip)
	UAV identification & tracking range	Clear sky：≥3Km
		Night vision：≥1km
	Identification time	＜3S
Laser light supplement	Wave band	0.8-2.5um
	Laser lens	160mm HPLM
	Lighting angle	48°~0.2° (wide-tele)
	Power consumption	20w
Thermal imaging	Senor	Uncooled vanadium oxide focal plane sensor
	Resolution	640x512
	Sensitivity	≤50mk @30℃
	Wave band	7.5~14um
	Angle of View	18.2°×13.7°~3.7°×2.7° (wide-tele)
	Focal Length	30~150mm @F0.8~1.0 (wide-tele)