RX-R417C 型 X 频段远程四面阵雷达

技术规格书

RX-R417C X-band Long-range four-face radar

Technical Specification

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1. Product Overview/产品概述

1.1 Product Positioning/产品定位

RX-R417C 型 X 频段远程四面阵雷达为轻量化全固态 X 波段二维相控阵低空探测雷达，采用全固态、全相参、脉冲多普勒体制，专门针对低空、慢速、小型飞行器（无人机、轻型飞机、直升机、动力三角翼、飞艇、空飘球等）全域探测预警场景设计，覆盖安防厂区、边境管控、机场净空、危化库区、军营营区、大型活动安保等场景。

The RX-R417C X-band Long-range four-face Radar is a lightweight all-solid-state 2D phased array low-altitude detection radar. It adopts all-solid-state, fully coherent and pulse Doppler system, specially designed for full-area detection and early warning of low-altitude, slow-speed and small aircraft (UAVs, light aircraft, helicopters, powered hang gliders, airships, balloon targets, etc.). Applicable scenarios include security factories, border control, airport clearance, hazardous chemical warehouses, military camps, large-scale event security and other sites。

雷达集成全二维相扫双扫描模式，可实现 360° 全域搜索与重点区域高刷新率聚焦探测；搭载机器学习智能杂波抑制算法及基于“微多普勒特征”和“航迹特征”的 AI 识别技术，开机自适应阵地环境，具备全天候工作、低虚警、多目标稳定跟踪能力。

The radar integrates full 2D phase scan, realizing 360° full-area search and high refresh rate focused detection for key zones. Equipped with machine learning intelligent clutter suppression algorithm and AI recognition technology based on micro-Doppler features and track features, it automatically adapts to site environment after power-on, with capabilities of all-weather operation, low false alarm rate and stable multi-target tracking。

1.2 Functional Features/功能特性

1.2.1 Target Positioning, Track Display and Playback Function/目标定位、轨迹显示与回放功能

支持电子地图场景下的目标定位、实时轨迹显示及历史航迹回放，可实时解算并展示目标距离、方位、俯仰、速度等核心态势信息，直观呈现目标运动状态。

Supports target positioning, real-time track display and historical track playback under electronic map scenario. It can calculate and display core situation information of targets including range, azimuth, elevation and speed in real time, intuitively showing target motion status.

1.2.2 Data Storage, Recording and Playback Query Function/数据存储、记录与回放查询功能

可完整记录并保存目标点迹、航迹数据及雷达整机工作状态数据，支持历史数据检索与回放复盘，可完整还原设备运行及目标探测全过程数据。

It can fully record and store target plots, track data and overall radar operating status data, support historical data retrieval, playback and review, and completely restore full-process data of equipment operation and target detection.

1.2.3 AI Intelligent Target Classification and Recognition Function/AI 智能目标分类识别功能

依托微多普勒特征与航迹特征融合识别算法，具备智能化目标分类能力，可对无人机、鸟类、人员、车辆等典型目标进行有效识别分类。

Based on fusion recognition algorithm of micro-Doppler features and track features, it realizes intelligent target classification, and can effectively identify and classify typical targets such as UAVs, birds, personnel and vehicles.

1.2.4 Environment Adaptive, Manual Parameter-free Debugging Function/环境自适应、免人工参数调试功能

采用机器学习自适应技术，可根据现场环境自动完成参数适配优化，无需人工调试参数，设备开机即可正常投入探测工作。

Adopts machine learning self-adaptive technology to automatically complete parameter adaptation and optimization according to on-site environment, no manual parameter adjustment required. The equipment can start normal detection immediately after power-on.

1.2.5 Clutter Suppression & All-weather Detection Function/杂波抑制与全天候探测功能

具备云雨杂波抑制能力，可有效降低气象杂波对探测的干扰，保障设备在复杂气象环境下稳定工作，实现全天候探测作业。

Capable of rain and cloud clutter suppression, effectively reducing interference of meteorological clutter on detection, ensuring stable operation under complex weather conditions and realizing all-weather detection.

1.2.6 Software-based Flexible Parameter Configuration Function/软件化参数灵活配置功能

支持通过软件配置俯仰覆盖范围、目标更新率、探测量程等核心工作参数，可根据使用场景灵活适配不同探测需求。

Supports configuring core operating parameters via software, including elevation coverage, target refresh rate and detection range, to flexibly adapt to different detection requirements based on application scenarios.

1.2.7 Autonomous Positioning & Orientation and Attitude Compensation Function /自主定位定向与姿态补偿功能

设备具备自主定位定向能力，可对俯仰角、横滚角姿态偏差进行自动补偿，有效修正架设姿态误差，保证探测数据精度。

The equipment has autonomous positioning and orientation capability, which can automatically compensate elevation and roll angle deviation, effectively correct installation attitude error and guarantee detection data accuracy.

1.2.8 Real-time Equipment Status Monitoring Function/设备实时状态监控功能

具备整机工作状态实时监测能力，可实时监控设备运行工况，保障系统持续、稳定、可靠运行。

Supports real-time monitoring of overall equipment operating conditions, ensuring continuous, stable and reliable system operation.

2. Technical Specifications/技术指标

表 1 产品技术指标表

Table 1 Product Technical Specifications

No. / 序号	Parameter / 参数	Index / 指标
1	频段 Frequency Band	X 频段 X-band
2	探测距离 Detection Range	≥10Km（RCS:0.01㎡，无人机） ≥10km (UAV with RCS=0.01 ㎡)
3	盲区 Blind Zone	≤200m

4	工作模式 Operating Mode	二维相控阵 2D Phased Array
5	产品组成 Product Composition	四面阵 Four-face Array
6	搜索方式 Scan Mode	相扫 Phase Electronic Scanning
7	搜索范围 Scan Coverage	方位：0°360°， 俯仰：0°～60°(可根据任务要求配置) Azimuth: 0°～360°, Elevation: 0°～60° (Configurable per mission requirements)
8	跟踪功能 Tracking Function	具备 TAS 功能 Supports TAS Function
9	TAS 跟踪目标数 Max TAS Tracking Targets	≥24 批 ≥24 targets
10	最低探测高度 Minimum Detectable Altitude	≤10m
11	速度范围 Target Speed Range	1m/s～100m/s
12	目标更新率 Target Refresh Rate	TWS:≤3.5s TAS：≤0.5s（默认） TWS: ≤3.5s TAS (Default): ≤0.5s
13	分辨率 Resolution	距离：≤15m，方位：≤6°，俯仰：≤4° Range: ≤15m, Azimuth: ≤6°, Elevation: ≤4°
14	搜索精度 (RMS) Search Accuracy (RMS)	距离：≤10m，方位：≤0.5°，俯仰：≤0.4° Range: ≤10m, Azimuth: ≤0.5°, Elevation: ≤0.4°
15	跟踪精度 (RMS) Tracking Accuracy (RMS)	距离：≤10m，方位：≤0.4°，俯仰：≤0.3° Range: ≤10m, Azimuth: ≤0.4°, Elevation: ≤0.3°
16	接口 Interface	RJ45 网口 RJ45 Ethernet Port
17	目标容量 Max Target Capacity	≥500 批 ≥500 targets
18	重量 Weight	≤125Kg (不含电源、三脚架) Net weight ≤125kg (Excluding power supply

		and tripod)
19	供电 Power Supply	AC220V/DC24V
20	功耗 Power Consumption	≤5500W
21	尺寸 Overall Dimension	≤1100mm × 1100mm × 750mm
22	工作温度范围 Operating Temperature Range	-40℃～+60℃
23	防护等级 Protection Class	IP66

3. Equipment Structure, Physical Diagram & Installation Dimensions /设备结构、实物与安装尺寸

3.1.1 Physical Drawing of Complete Unit/整机实物图



图 1 实物图

Figure 1 Physical Drawing

3.2 Overall Dimensions/外形尺寸

阵面尺寸：≤1100mm（高）×1100mm（宽）×750mm（厚）。

Panel Dimensions: ≤1100mm (H) × 1100mm (W) × 750mm (T)

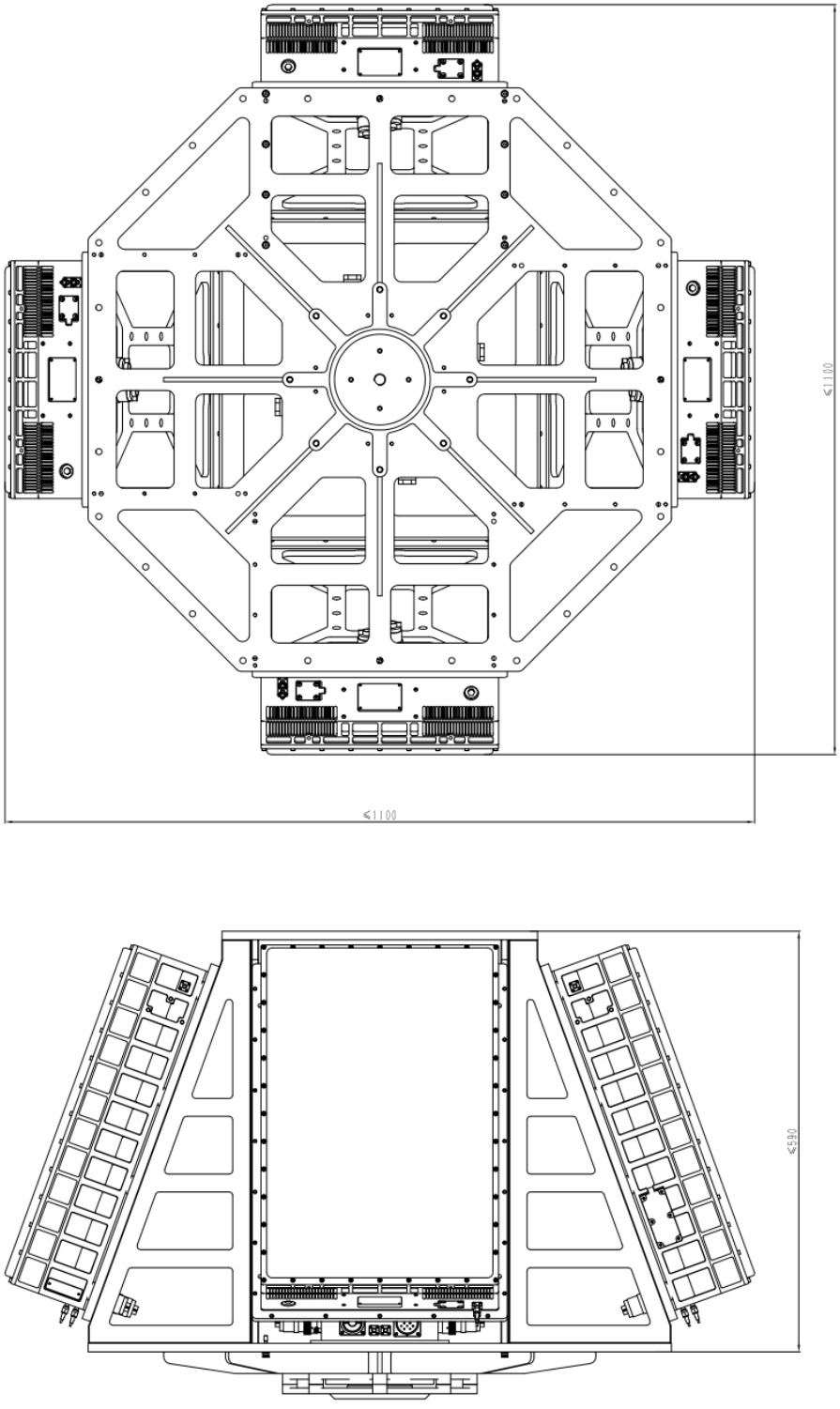

图 2 外形尺寸

Figure 2 Overall Dimensions

3.3 Installation Adaptation Requirements/安装适配要求

a. 安装基面：基础水平平整度误差≤3°，设备内置倾角仪自动补偿，超差可通过软件修正；

Mounting Base: Horizontal flatness error ≤3°. Built-in inclinometer for automatic compensation; excess deviation can be corrected via software.

b. 遮挡要求：设备 360° 方位无高于俯仰 0° 的墙体、铁塔、树木遮挡，避免产生固定探测盲区；

Shieling Requirement: No walls, towers or trees higher than elevation 0° within 360° azimuth to avoid fixed detection blind zones.

c. 线缆走线：底座侧面配备防水线缆接头，网线、电源线、GPS 天线分开独立走线，配套防水密封配件；

Cable Wiring: Waterproof cable connectors on side of base. Network cable, power cable and GPS antenna shall be routed separately with matched waterproof sealing accessories.

d. 抗风适配：整机可稳定耐受 12 级大风，配套安装支架承重需≥50kg。

Wind Resistance: The complete unit stably withstands 12-level wind. Matched mounting bracket load capacity ≥50kg.

4. Delivery List/交付清单

表 2 产品交付清单表

Table 2 Product Delivery List

No. / 序号	Delivery Item / 交付物品	Unit / 单位	Quantity / 数量
1	雷达阵面 Radar Array Panel	台 Set	4
2	综合模块 Integrated Module	个 Piece	1
3	同轴线缆 Coaxial Cable	根 Piece	8
4	AC/DC 电源适配器 AC/DC Power Adapter	套 Set	1

5	航插网线 Aviation Plug Network Cable	根 Piece	1
6	GPS 天线 (含线缆) GPS Antenna (with cable)	对 Set	1
7	调测线缆 Commissioning Cable	根 Piece	1
8	USB 转 232 线 USB to RS232 Serial Cable	根 Piece	1
9	结构安装舱体 Mounting Housing Assembly	套 Set	1
10	阵面线缆 Array Connection Cable	根 Piece	4
11	安装附件 Mounting Accessories	套 Set	1
12	产品合格证 Product Qualification Certificate	份 Copy	1
13	使用维护说明书 Operation & Maintenance Manual	份 Copy	1
14	显控软件 & 通信协议 Display & Control Software + Communication Protocol Document	套 Set	1

5. Environmental Adaptability/环境适应性

5.1 Waterproof Protection Performance/防护防水性能

整机 IP66 密封防护，外壳防腐耐磨，可露天长期使用，抵御暴雨喷淋、户外沙尘堆积。

The whole machine adopts IP66 sealed protection, anti-corrosion and wear-resistant shell, supporting long-term outdoor deployment, resisting heavy rain spray and outdoor sand accumulation.

5.2 Operating Temperature & Humidity Range/温度湿度工作范围

工作温度：-40℃ ～ +60℃；存储温度：-45℃ ～ +70℃；相对湿度 5%～95%，无凝露环境稳定工作。

Operating Temperature: -40℃ ~ +60℃; Storage Temperature: -45℃ ~ +70℃; Relative Humidity: 5% ~ 95%, stable operation under non-condensing environment.