

RADAR RBT7706

Forward Collision Warning Radar

for Commercial Vehicles & Mining Trucks

--- Product Application Manual ---

- > Max Warning Distance 210 m | 77 GHz mmWave
- > Three-Level Segmented Warning | LED + Buzzer Dual Alert
- > TTL / CAN / High-Level Protocol | Fixed Obstacle Filtering
- > **Detects Pedestrians, Obstacles, Vehicles | MIMO Antenna Array**

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I. System Overview

1.1 Product Overview

The RBT7706 is a long-range forward collision warning radar designed specifically for mining trucks, dump trucks, and other heavy commercial vehicles. Utilizing 77 GHz millimeter-wave technology with a maximum warning distance of up to 210 meters, it provides precise detection and multi-level alerts for obstacles in front of (and optionally behind) the vehicle.

This version is the ministry-standard model — the control box has been removed for a more streamlined structure and easier installation, optimized for integration into mining fleet management platforms.

1.2 Core Advantages

Feature	Description
Ultra-long Detection Range	Maximum warning distance of 210 m.
Flexible Configuration	Customizable warning distance segments.
Multi-Protocol Output	Supports TTL, CAN, high-level alert protocols.
Intelligent Filtering	Filters out fixed obstacles to reduce false alarms.
Dual-Channel Alerting	LED + buzzer dual-channel alerting.

1.3 Protocol Support

Protocol Type	Description
TTL Protocol	Serial communication protocol.
CAN Protocol	Industrial-grade bus protocol.
High-Level Signal	Simple direct digital signal.

II. Function Introduction

2.1 Warning Logic

When a target enters the preset detection range (stationary targets within 10 m only), the radar detects a relative speed > 5 km/h between the target and the vehicle, and activates LED and buzzer alerts.

The LED flashing frequency and buzzer beeping rate increase as the target distance decreases, forming a three-level progressive warning mechanism that helps drivers intuitively judge danger levels. Distance segments can be customized by the customer via protocol.

2.2 Three-Level Segmented Warning

System default three-level warning distance segments:

Level	Distance	LED Status	Buzzer Pattern	Interval
Level 1	≤30 m	Starts Flashing	Beep—Beep—Beep (Slow)	2.5 s
Level 2	≤20 m	Faster Flashing	Beep-Beep-Beep (Medium)	1.5 s
Level 3	≤10 m	Rapid Flashing	Beep-beep-beep (Urgent)	0.5 s

Note: Default values, customizable via protocol.

III. Package Contents

RBT-7706 Standard Packing List (items marked "Required" are core components):

No.	Item	Qty	Remark
1	Radar Unit	1 pc	Required
2	Mounting Bracket	1 pc	Required
3	Radar Head Cable	1 pc	Required
4	Alarm Light Cable (3m)	1 pc	Standard
5	LED Alarm Light	1 pc	Standard
6	Buzzer	1 pc	Standard
7	Power & Signal Cable Set	1 pc	Required
8	Alarm Light Connection Cable	1 pc	Standard
9	Cable Ties	2 pcs	Standard
10	Mounting Screws	3 pcs	Standard
11	Control Box	1 pc	Required



IV. Installation Guide

4.1 Pre-Installation Preparation

The RBT-7706 system consists mainly of radar unit, mounting bracket, alarm light, buzzer, radar cables, control box, mounting screws and other components. Please confirm the packing list is complete before installation.

Component	Guideline
Alarm Light	Install at a location visible to driver from normal seating position.
Buzzer	Install inside cabin; ensure alarm sound is clearly audible to driver.

4.2 Mounting Requirements

Requirement	Specification
Position	Front-center of the vehicle.
Height	0.6 – 1.2 m above ground.
Orientation	Emission surface perpendicular to ground; cable outlet down.
Bracket	3 screws (2 lower + 1 upper).

4.3 Installation Steps

Step 1: Connect Radar Unit

Snap the radar onto the mounting bracket, insert one end of the radar head cable into the radar unit, and connect the aviation connector end to the power/signal cable.

Step 2: Connect Alarm Components

Plug the LED light into the alarm light cable, then connect together with the buzzer to the alarm light connection cable.

Step 3: Connect Power Supply

Connect the power cable to the vehicle ACC terminal (ignition switch), ensuring the radar powers on when the vehicle starts.

Step 4: Secure Alarm Light

Use cable ties to organize and secure the alarm light and wiring harness at an appropriate location inside the cabin.

Step 5: Install Mounting Bracket

Secure the radar bracket with 3 screws at the front-center position of the vehicle, ensuring the radar is perpendicular to ground with cable outlet facing down.

Step 6: Power-On Test

After powering on, place a test target in front of the vehicle and verify that the LED light and buzzer three-level warning functions work correctly.



V. Technical Specifications

Complete technical specifications for RBT-7706:

Category	Parameter	Value
Radar Characteristics	Operating Frequency	76 – 81 GHz
Radar Characteristics	Modulation	FMCW
Radar Characteristics	Antenna Configuration	MIMO
Radar Characteristics	Refresh Rate	≤30 ms
Radar Characteristics	Start-up Time	≤1 s
Radar Characteristics	Self-Diagnosis	Yes
Detection Performance	Max Warning Distance	≤210 m (moving)
Detection Performance	Stationary Target Detect	≤10 m
Detection Performance	Pedestrian Detection	30 m
Detection Performance	Min Trigger Relative Spd	> 5 km/h
Detection Performance	Level 1 Distance	≤30 m (default)
Detection Performance	Level 2 Distance	≤20 m (default)
Detection Performance	Level 3 Distance	≤10 m (default)
Communication Interface	Output Protocol	TTL / CAN / High-Level
Electrical Specs	Operating Voltage	9 – 36 V DC
Electrical Specs	Operating Temperature	-40 °C to +85 °C
Electrical Specs	Power Consumption	≤5 W
Mechanical Specs	Mounting Height	0.6 – 1.2 m
Mechanical Specs	Installation Method	Front-center, perp., outlet down

VI. Precautions

Power Supply Requirements

Operating voltage range is 9 – 36 V. Ensure stable power supply. Connect to ACC terminal so the radar powers on with vehicle start-up, avoiding standby power drain.

Installation Orientation

The radar must be installed at front-center of the vehicle, emission surface perpendicular to ground, cable outlet facing down. Deviation will cause detection zone shift and affect warning accuracy.

Mounting Height

Mounting height must be between 0.6 m and 1.2 m. Too low may cause ground reflection interference; too high reduces close-range detection capability.

Mechanical Protection

The radar is a precision instrument. Do not crush, bump or drop during installation. Confirm secure fastening after installation to prevent loosening due to rough roads.

Electromagnetic Environment

Install away from frequently-started high-power equipment, motors, and strong magnetic field interference sources to ensure radar accuracy is not compromised.

Product Integrity

Ensure the radar is factory-original during installation. Do not disassemble; unauthorized disassembly will void warranty. Contact manufacturer support for any issues.

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RBT-7706

商用车矿卡前后防撞预警雷达系统

—— 产品应用手册 ——

最远预警距离 210m | 77GHz 毫米波

三级分段预警 | LED + 蜂鸣器双重示警

支持 TTL / CAN / 高电平协议 | 有效滤除固定障碍物

可检测行人, 障碍物, 车辆

矿山及重型车辆主动安全解决方案专家

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一、系统简介

1.1 产品概述

RBT7706 是专为矿卡、渣土车等大型重型车辆开发的前方长距离防撞预警雷达，采用 77GHz 毫米波技术，最远预警距离可达 210 米，能够对车辆前方（以及可选后方）的障碍物进行精确探测和多级示警。

本版本为部标机版本，已取消控制盒，结构更精简，安装更便捷，适用于接入矿山车辆管理平台的应用场景。

1.2 核心优势

- 超远探测：最远预警距离 210m，为高速行驶的矿卡提供充足的制动缓冲时间
- 灵活配置：可根据客户需求自定义预警距离分段，适配不同矿山作业环境
- 多协议上传：支持 TTL、CAN、高电平等主流预警协议，便于接入车辆终端管理平台
- 智能滤波：有效滤除地面、围栏、绿化带等固定障碍物，降低误报率
- 双重预警：LED 报警灯 + 蜂鸣器双通道示警，视听结合，确保驾驶员及时感知

1.3 协议支持

协议类型	说明
TTL 协议	适用于串口通信，兼容大多数车载终端
CAN 协议	工业级总线协议，稳定可靠，适用于重型商用车
高电平信号	简单直接的数字信号，易于集成

二、功能介绍

2.1 预警逻辑

当有目标进入预设的探测范围内时（对静止目标仅探测 10m 以内），雷达检测到目标与本车的相对速度 > 5 km/h，系统即通过 LED 灯和蜂鸣器进行示警。

LED 灯的闪烁频率和蜂鸣器鸣响频率会随目标距离的缩短而加快，形成三级分段递进预警机制，帮助驾驶员直观判断危险紧迫程度。距离分段可通过协议由客户自定义修改。

2.2 三级分段预警说明

系统默认三级预警距离分段如下：

预警等级	目标距离本车	LED 状态	蜂鸣器节奏	时间间隔
一级预警	≤ 30 m	开始闪烁	哔 — 哔 — 哔 (慢速)	间隔 2.5 s
二级预警	≤ 20 m	加快闪烁	哔 - 哔 - 哔 (中 速)	间隔 1.5 s
三级预警	≤ 10 m	急速闪烁	哔哔哔 (急速)	间隔 0.5 s

💡 提示：以上预警距离为系统默认值，可通过协议修改调整，适配不同矿区作业场景。

三、配件清单

RBT-7706 标准装箱清单如下（标注"必选"为核心部件，其余为配套附件）：

序号	名称	数量	备注
1	雷达本体	1 颗	必选
2	雷达支架	1 个	必选
3	雷达头连接线	1 条	必选
4	报警灯线 (3m)	1 条	标配
5	LED 报警灯	1 个	标配
6	蜂鸣器	1 个	标配
7	电源信号线组	1 条	必选
8	报警灯连接线	1 条	标配
9	扎带	2 条	标配
10	固定螺丝	3 颗	标配
11	控制盒	1 个	必选



四、安装方式

4.1 安装准备

RBT-7706 系统主要由雷达、雷达支架、报警灯、蜂鸣器、雷达线材及控制盒，安装螺丝等部件组成，安装前请确认配件清单完整。

- 报警灯：无硬性规定位置，建议安装于驾驶员正前方可见位置
- 蜂鸣器：安装于驾驶室内，确保驾驶员能清晰听到报警声

4.2 雷达安装要求

- 安装位置：车辆正前方正中间
- 安装高度：0.6m ~ 1.2m（距地面）
- 方向要求：雷达波发射面垂直于地面，出线口朝下
- 支架安装：雷达卡在支架上后竖向安装，下方 2 个安装位、上方 1 个安装位，共 3 颗螺丝固定

4.3 安装步骤

步骤一：连接雷达

将雷达卡在雷达支架上，然后将雷达头连接线一端插入雷达，另一端航空接头与电源信号线对插。

步骤二：连接报警组件

将 LED 灯插入报警灯线，然后与蜂鸣器一起对插至报警灯连接线。

步骤三：接入电源

将电源线接入车辆 ACC 处（点火档），确保雷达随车辆启动而上电。

步骤四：固定报警灯

用扎带将报警灯及线束整理固定在驾驶室内合适位置。

步骤五：安装雷达支架

将雷达支架用 3 颗螺丝固定在车辆正前方中心位置，确保雷达垂直于地面，出线口朝下。

步骤六：上电测试

接通电源后，在车辆前方放置测试目标，验证 LED 灯和蜂鸣器三级预警功能是否正常工作。



Type 型号			7706
Antenna 天线组			3T4R
Coverage 覆盖范围	Range 距离范围	m	250
	Range Rata 速度范围	m/s	-100 to 40
	Azimuth FOV 方位角度范围	°	±45
	Elevation FOV 俯仰角度范围	°	±9
Accuracy 精度	Range 距离精度	m	±0.1
	Range Rate 速度精度	m/s	±0.05
	Azimuth Angle 方位角精度	°	±0.3
	Elevation Angle 俯仰角精度	°	±2
Multi-Target Discrimination 多目标辨别	Range 距离分辨力	m	0.5
	Range Rate 速度分辨力	m/s	0.27
	Azimuth Angle 方位角分辨力	°	3

备注：表中速度范围负值代表目标物和雷达之间的方向相对靠近，正值代表相对远离。

五、雷达技术参数

以下为 RBT-7706 的完整技术规格参数：

类别	参数	技术指标
雷达特性	工作频段	76 ~ 81 GHz
雷达特性	调制方式	FMCW（调频连续波）
雷达特性	天线配置	多发多收（MIMO）
雷达特性	刷新速率	≤ 30 ms
雷达特性	启动时间	≤ 1 s
雷达特性	自诊断功能	是
探测性能	最远预警距离	≤ 210 m（运动目标）
探测性能	静止目标探测	≤ 10 m
探测性能	行人	30m
探测性能	最小触发相对速度	> 5 km/h
探测性能	一级预警距离	≤ 30 m（默认，可自定义）
探测性能	二级预警距离	≤ 20 m（默认，可自定义）
探测性能	三级预警距离	≤ 10 m（默认，可自定义）
通信接口	上传协议	TTL / CAN / 高电平
电气特性	工作电压	9 ~ 36 V
电气特性	工作温度	-40 °C ~ +85 °C
电气特性	功耗	≤ 5 W
机械特性	安装高度	0.6 m ~ 1.2 m
机械特性	安装方式	正前方正中间，垂直地面，出线口朝下

六、产品使用注意事项

⚠ 电源要求

工作电压范围为 9 ~ 36V，请确保供电稳定。电源接入 ACC 处，确保随车辆启动而通电，避免长期待机耗电。

⚠ 安装方向

雷达必须安装在车辆正前方正中间，发射面垂直于地面，出线口朝下。安装方向偏差将导致探测区域偏移，影响预警准确性。

⚠ 安装高度

安装高度须在 0.6m ~ 1.2m 之间。过低可能导致地面反射干扰，过高则降低近距离探测能力。

⚠ 机械防护

雷达属于精密仪器，安装时切勿挤压、磕碰、摔打。安装后需确认固定牢固，防止矿区路况颠簸导致松动。

⚠ 电磁环境

安装时尽量远离频繁启动的大功率用电设备、电机及强磁场干扰源，以确保雷达探测精度不受干扰。

⚠ 产品完整性

安装时确保雷达为出厂原装件，切勿自行拆装，私自拆装将导致保修失效。如有故障请联系厂家技术支持。