ROOFUS – Technical Specifications

1. Mechanical & Performance Specifications

Form factor	Four-wheeled mobile robot optimized for flat roofs and slab-type surfaces
Mass	12 kg (26.5 lb)
Envelope	$\approx 35 \times 35 \times 25$ cm ($13.8 \times 13.8 \times 9.8$ in)
Max speed	0.5 m/s (1.64 ft/s)
Max slope	20°
Traversal capacity	Tested for approximately 5 miles of scanning per deployment (dependent on surface conditions and scan density)

2. Drive System & Motion Control

Drive system	Two brushless DC (BLDC) motors with closed-loop control
Motor controllers	ODrive S1 motor controllers

3. Compute & Onboard Responsibilities

Onboard computer	LattePanda Sigma single-board computer
Onboard responsibilities	Robot localization and navigation; real-time coordination and logging of sensor data; telemetry, communications handling, and system health monitoring

4. Sensor Suite (Models)

Ground-penetrating radar (GPR)	Proceq GP8800
3D LiDAR	Livox Mid-360
Thermal imaging	Seek Thermal camera
RGB imaging	Industrial-grade See3Cam cameras

All sensing modalities are acquired synchronously during robot motion and co-registered in a unified spatial reference frame.

5. Power, Charging & Runtime

Battery	24 V, 20 Ah (∼480 Wh) onboard battery pack
Runtime	Tested for up to approximately 4 hours of scanning under typical operating conditions
Charge time	∼8 hours (full charge)

6. Communications

Link type	Radio-frequency (RF) data link designed for non-line-of-sight communication between robot and base station
Typical throughput	Up to approximately 10 Mbps
Usage	Live status monitoring, optional teleoperation, telemetry, and coordination of data offload

7. Environmental & Protection

Operating temperature	0–40 °C (32–104 °F)
Ingress protection (IP)	IP31 (Self rated)

8. Manufacturer & Supply Chain

Product name	ROOFUS Multimodal Roof/Concrete Inspection System
Manufacturer	Tall Wall Robotics (DBA: Building Diagnostic Robotics)
Country of manufacture	United States
Supply chain	Components sourced from the United States, China, Switzerland, Canada, and Japan; final assembly, integration, and testing performed in the U.S.

9. Compliance & Certifications (System-level)

Electronics	Most core electronic modules used on ROOFUS carry applicable CE certifications, where required
Communications hardware	RF data links are FCC, ISED, Japan MIC, KC, and CE certified; NDAA compliant

10. Calibration, Verification & Software Updates

Sensor calibration	All sensing subsystems (GPR, thermal imaging, LiDAR, RGB) are calibrated at the original equipment manufacturer (OEM) factory. No field recalibration is required for normal operation.
Pre-deployment verification	Automated system-level verification checks are executed by the robot prior to each deployment. These checks validate sensor availability, data integrity, communications status, and overall system readiness. No contractor or operator input is required.
Software updates	System software and firmware are updated at the discretion of Building Diagnostic Robotics based on performance improvements, reliability enhancements, and operational requirements. Updates are delivered via secure cloud-based mechanisms where connectivity permits.
Update contingencies	If remote software updates are not feasible, Building Diagnostic Robotics will notify the customer and provide guidance on appropriate next steps, which may include alternative update methods or coordination of support actions.