# What is a Railway Lantern?

*A buyer's guide to professional railway safety lanterns and the ATI RWLT101 weight-balanced design*

> **A railway lantern** is a purpose-built portable safety-lighting device designed for railway operations, track inspection, visibility support, maintenance, and emergency response. It is evaluated primarily on work-shift runtime, be-seen visibility, ergonomic balance, and rugged handling — not on peak brightness alone.

*The RWLT101 is portable illumination and visibility support only. It is not a certified railway signaling device and is not a substitute for required railway signals, PPE, procedures, or approved safety equipment. Refer to the current RWLT101 datasheet and applicable local rules before deploying to any specific application.*

| | |
|---|---|
| **Product covered** | Analog Technologies, Inc. Railway Lantern RWLT101 |
| **Primary purpose** | Portable, long-runtime safety lighting and visibility support for railway, maintenance, inspection, emergency-response, and outdoor operations. |
| **Core differentiation** | Patented weight-balanced architecture (battery integrated in the handle) combined with a large main reflector, side beam, real-time status display, and USB output. |
| **Patent** | U.S. Patent No. 11,859,781 B1 (issued Jan. 2, 2024). Claim scope covers a portable illumination device whose center of mass is located within the curved handle that also contains the battery cell(s). Inventors: Gang Liu, Lili Shi, Yuqi Zhang, Nan Shi. Assignee: Analog Technologies, Inc. |
| **Intended audience** | Railway operators, maintenance and inspection crews, EHS specifiers, distributors, and technical buyers evaluating professional safety lanterns. |

### Executive answer

A railway lantern is a purpose-built portable safety lantern for railway, maintenance, inspection, and emergency-response work. It is evaluated by work-shift runtime, beam and side-visibility, ergonomic balance, rugged handling, and status feedback — not by peak brightness alone.

The ATI RWLT101 is a patented, rechargeable LED railway lantern with a 15 Ah internal battery, up to 12 hours of continuous operation, less than 3 hours of full recharge time, a large front-reflector assembly (~90 mm reflective-metal inner / ~100 mm overall including plastic), an auxiliary side beam, a real-time display (current, remaining time, battery %), a Type-C charging input, and a USB output (2 A max) for charging phones and other compatible small devices — each performance figure stated per the RWLT101 datasheet under its stated conditions.

The controlling patent claim (U.S. Patent No. 11,859,781 B1, issued January 2, 2024) is the weight-balanced architecture that hides the battery cell(s) inside the curved handle instead of the lantern body, placing the center of mass of the assembled lantern within the handle itself. In ATI's market review, ATI has not identified another railway lantern using this same battery-in-handle, center-of-mass-within-handle architecture — controlling scope is defined by the issued patent claims. This reduces sustained wrist holding-torque during hand-held use and pendulum motion during walking. Complementing the patented architecture, the RWLT101 design uses a real metal reflector that also serves as the main-LED heatsink (approximately 90 mm reflective-metal inner diameter; approximately 100 mm overall front-assembly diameter with the plastic rim) ventilated directly to ambient air — this controls LED junction temperature so both efficiency and long lifetime (typical > 5 years per RWLT101 datasheet under stated conditions) can be achieved together, whereas many conventional body-battery designs reviewed do not include a comparable dedicated heatsink or direct ambient ventilation.

## 1. What is a Railway Lantern?

A railway lantern is a purpose-built portable lighting tool for railway operations, track and infrastructure inspection, visibility support, yard operations, maintenance work, emergency response, and other low-light outdoor work environments. The form factor is designed around visibility, grip stability with gloves, orientation, runtime, and ruggedness — not pocket carry.

Historically, lanterns protected the flame from wind and weather and were used for both illumination and signaling. In modern railway operations, portable light is needed so that the worker can see the ground and also be seen — by crew members, locomotive engineers, and equipment operators. Contemporary railway lanterns use high-efficiency LED sources and rechargeable batteries, but the underlying requirement is unchanged: dependable light in the operator's hand when the environment is dark, moving, wet, or otherwise hard to control.

### 1.1 A buyer's evaluation checklist

For technical buyers, the practical definition is this: a railway lantern is a work-shift lighting and visibility device. It should be evaluated against a specification checklist rather than by peak brightness alone. Key criteria:

- Battery capacity and continuous working time under the stated load.
- Charging time and charging interface (USB Type-C is now the field standard).
- Main-beam useful range and beam pattern — reflector diameter and LED efficiency both matter.
- Side / auxiliary lighting for area awareness and be-seen visibility.
- Ergonomic balance — where the center of gravity is relative to the grip axis.
- Handle geometry and carrying methods (hand, arm-crook, hook, shoulder strap).
- Status feedback — battery percentage, remaining runtime, load current.
- Thermal design — LED junction temperature drives service life.
- Auxiliary utility — USB output for charging phones and other compatible small USB devices within the datasheet USB-output rating.
- Documentation — datasheet, replacement parts, and warranty support.

## 2. Why a Regular Flashlight Is Not Enough

A consumer flashlight is optimized for one thing: a compact, hand-held directional beam. That is appropriate for short household or pocket-carry use. Railway and maintenance work, however, typically requires a broader set of functions during a single shift: long runtime, stable grip with gloves, side visibility for be-seen presence, quick hanging or set-down, high-capacity battery storage, real-time status monitoring, and the ability to illuminate an area while the worker keeps moving.

The table below frames a regular flashlight against the design need for a professional railway lantern, criterion by criterion.

| Buyer requirement | Regular-flashlight limitation | Railway-lantern design need |
|---|---|---|
| **Full-shift operation** | Optimized for short inspections or intermittent use. | Large battery capacity and predictable continuous working time. |
| **Be-seen visibility** | Narrow forward beam does not make the worker visible from the side. | Main beam plus side/auxiliary beam for area awareness. |
| **Gloved handling** | Small cylindrical body is tiring or slippery in field work. | Large handle, balanced grip, multiple carrying methods. |
| **Status awareness** | Little or no runtime / battery-percentage feedback. | Digital display shows remaining runtime, charge current, discharge current, and remaining battery capacity in real time. |

| Buyer requirement | Regular-flashlight limitation | Railway-lantern design need |
|---|---|---|
| **Emergency utility** | Provides light only. | USB output can charge a phone or other compatible small USB device within the datasheet USB-output rating. |
| **Thermal / service duty** | Consumer designs may overheat under long continuous use. | Metal heatsink and thermal path designed for extended runtime. |
| **Weather / water ingress** | Consumer flashlights are typically not waterproof and often lack a formal IP rating. | Sealed enclosure rated for temporary water immersion (see current RWLT101 datasheet for rated depth, duration, orientation, and test method). |
| **Adjustable brightness** | Fixed or preset-only brightness modes; not user-programmable. | Programmable brightness — user-configurable output level to balance runtime and light intensity. |
| **Emergency SOS signal** | No dedicated emergency signaling mode; the worker must improvise a signal manually. | Built-in SOS flashing mode — one-touch emergency signal for use in an incident or breakdown. |

The infographic below consolidates the same argument in a form that scales to a distributor deck, a spec sheet, or a bid response. Two categories are compared side-by-side: (a) typical use — form factor, beam geometry, and carrying method; and (b) work practicality — runtime, battery capacity, stability, and shift-length suitability. A regular flashlight optimizes for compact single-hand directional lighting; a professional railway lantern is engineered around long runtime, area coverage, stable carrying and hanging, and rugged field duty. In every row that a technical buyer would evaluate against a work-shift use case, the two products fall into different design categories — not different tiers of the same product.

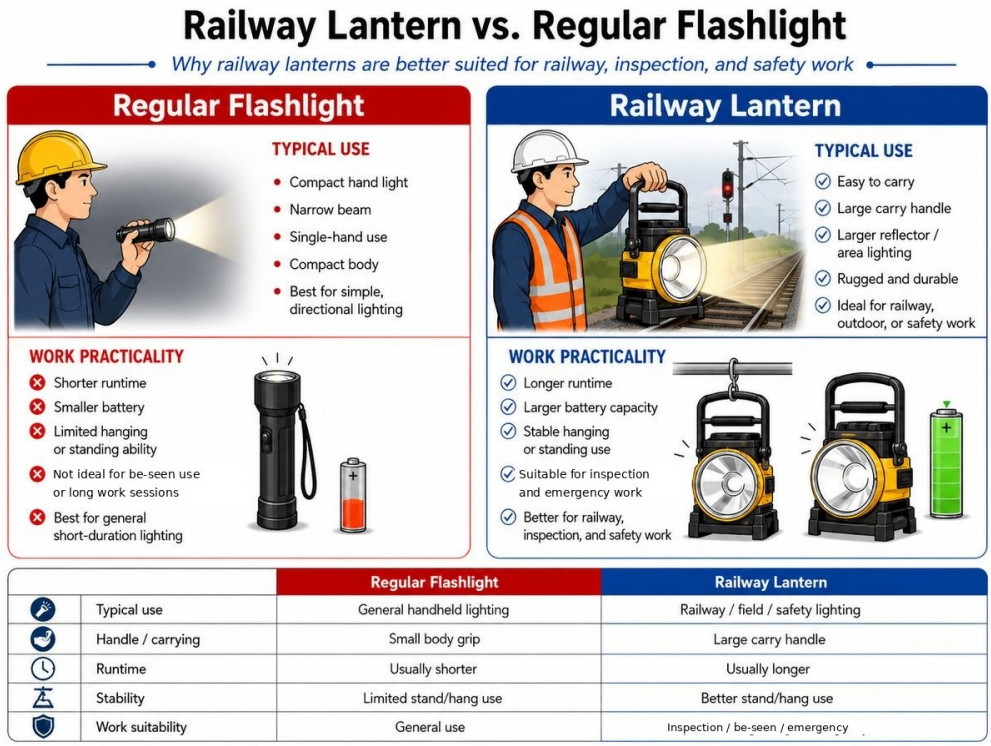


*Figure 1 — Regular flashlight vs. railway lantern: typical use, work practicality, and side-by-side attribute comparison. The two products solve different problems and should be evaluated against different criteria.*

## 3. The Physics of Balance — Why Center of Gravity Matters

The most under-appreciated specification on any hand-carried tool is the location of its center of gravity (CG) relative to the grip axis. Two identical lanterns of the same mass can feel dramatically different in the hand depending only on where their CG sits.

### 3.1 Static wrist moment

When the CG is offset horizontally from the grip axis by a distance d, gravity applies a static torque on the wrist:

$$\tau_{wrist} = m \cdot g \cdot d \qquad \text{(Eq. 1)}$$

where τ_wrist is the moment the wrist must actively resist, m is the lantern mass, g ≈ 9.81 m/s² is gravitational acceleration, and d is the horizontal offset between the grip axis and the CG. Holding the lantern level requires the forearm and wrist to generate an equal and opposite counter-torque continuously. Even though this counter-torque produces no mechanical work in the physics sense (the lantern does not move), sustaining it draws real metabolic effort from the flexor muscles. Over a multi-hour shift, this sustained holding-torque load (Eq. 1) is what makes a lantern feel far heavier than its actual mass would suggest.

When d is minimized by placing the heaviest component (the battery) at the grip axis, τ_wrist is minimized as well, and the sustained muscle effort required to hold the lantern level is correspondingly reduced.

### 3.2 Pendulum motion during walking

During walking, the arm swings and each footstep injects an angular impulse into the lantern. Modeled as a simple pendulum pivoting at the grip, the natural period is:

$$T_p = 2\pi \cdot \sqrt{(L/g)} \quad \text{(Eq. 2)}$$

where T_p is the natural pendulum period and L is the effective pendulum length (essentially the vertical distance from the grip to the CG). When the CG is placed near the grip axis (L → small), Eq. 2 predicts a shorter natural period than a conventional body-battery design produces. Beam wander with each footstep is reduced because the moment arm from the grip axis to the CG is smaller, which lowers the angular impulse each footstep imparts to the lantern — the lantern behaves closer to a balanced load than to a free pendulum. Actual oscillation amplitude depends on user gait, arm damping, and carrying method, and is not predicted by Eq. 2 alone.

### 3.3 Runtime arithmetic

For a first-order runtime estimate at a given load current:

$$t_{run} = C_{batt} / I_{avg} \quad \text{(Eq. 3)}$$

with t_run the estimated continuous runtime, C_batt the usable battery capacity, and I_avg the time-averaged load current. Applied to the RWLT101 — 15 Ah nominal capacity at a typical main-beam load — Eq. 3 yields the datasheet result of up to 12 hours of continuous operation (per RWLT101 datasheet under stated conditions). Actual runtime depends on temperature, brightness setting, and side-beam use; treat any single number as an upper-bound reference.

## 4. Battery in the Handle (Patent Claim) and Direct-Ventilated LED Heatsink (Design Feature)

### 4.1 Patent-claimed architecture: battery in the handle

The single mechanical claim that defines this product is straightforward: most conventional railway lanterns put the rechargeable battery pack in the lantern body, below the handle; the ATI RWLT101 hides the battery cell(s) inside the handle itself. In ATI's market review, ATI has not identified another railway lantern that uses this same battery-in-handle, center-of-mass-within-handle architecture — the controlling scope is defined by the issued claims of U.S. Patent No. 11,859,781 B1. That architectural choice is why the RWLT101 is weight-balanced at the grip axis where many conventional body-battery designs reviewed are not. In a conventional body-battery design, the user grips the lantern well above the battery mass, so the CG sits several inches from the grip axis with a nonzero horizontal offset when the lantern is held level. As Section 3 shows, this configuration produces both a static wrist moment and a pronounced pendulum swing during walking.

The ATI RWLT101 was designed from the ground up around a different mechanical claim: the rechargeable battery cell(s) are disposed inside the C-shaped tubular handle itself, and the center of mass of the assembled lantern is located within the curved handle. This places the CG close to the user's grip axis and is the essence of the patented design — everything else in the product follows from this one architectural decision.

The mechanical architecture — light source(s) in the first component, curved handle containing the battery cell(s) in the second component, and a center of mass located within the curved handle — is protected by U.S. Patent No.

11,859,781 B1 (Liu et al., issued January 2, 2024; assigned to Analog Technologies, Inc., San Jose, CA). The patent issues from Application No. 17/818,358 filed August 8, 2022 and contains 19 claims and 21 drawing sheets. The controlling scope is defined by the issued claims; readers evaluating patent applicability should refer to the granted patent text.

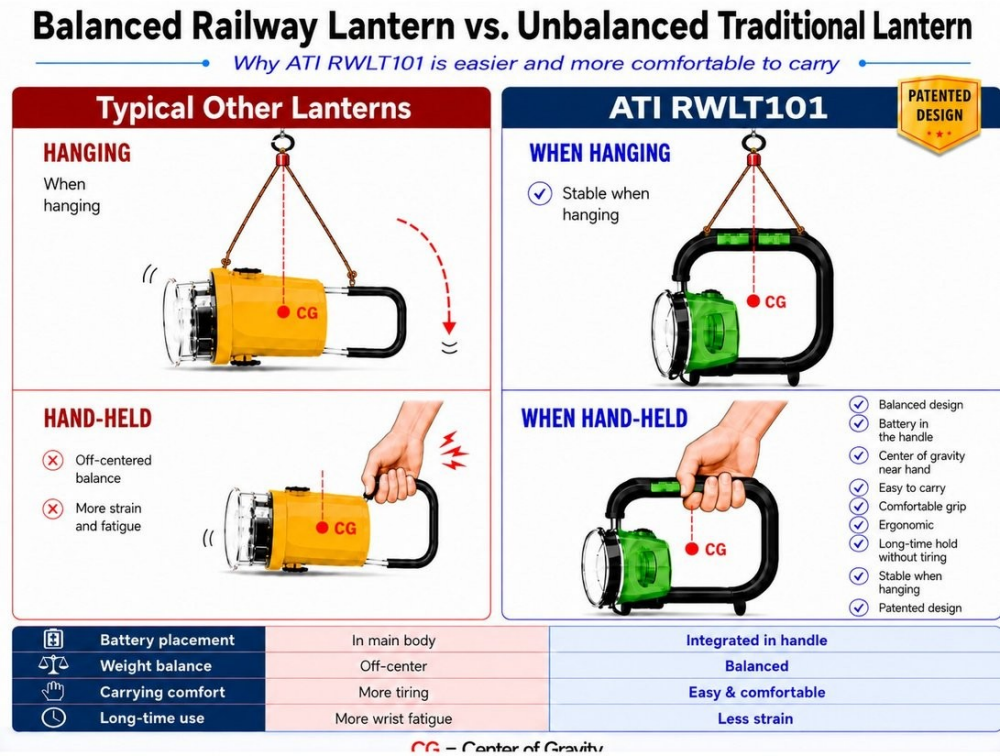


*Figure 2 — Mechanical comparison: hanging and hand-held behavior of a typical body-battery lantern vs. the RWLT101 handle-battery architecture.*

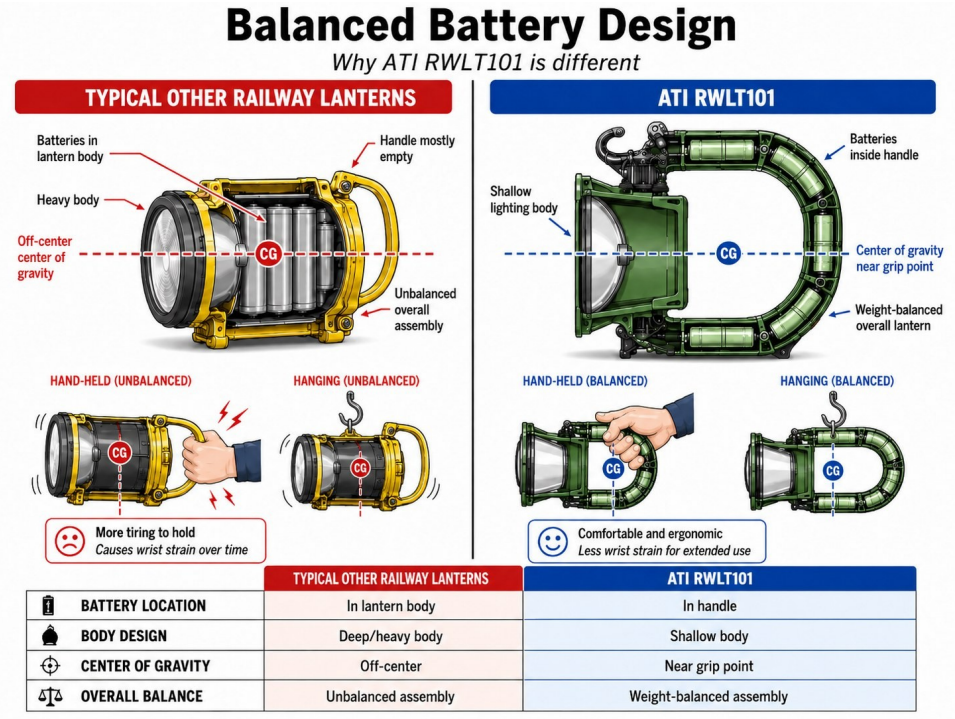


*Figure 3 — Balanced battery design: typical other railway lantern (batteries in the body, off-center CG, unbalanced) versus ATI RWLT101 (batteries inside the curved handle, CG near the grip point, weight-balanced).*

## 4.2 Second design feature: direct-ventilated metal LED heatsink

The second architectural feature of the patented RWLT101 design is a real, large-diameter metal heatsink for the main LED — approximately 90 mm (3.5 in) in diameter — combined with a direct ventilation path to ambient air. Junction-temperature control drives both LED efficiency (lumens per watt at the operating point) and long-term LED lifetime (typical > 5 years per RWLT101 datasheet under stated conditions).

Many conventional body-battery railway lanterns reviewed by ATI do not include a comparable large dedicated metal heatsink for the main LED, and their thermal path is not ventilated directly to ambient air — the LED runs hotter than it needs to, reducing steady-state efficiency and accelerating lumen depreciation over the product's service life. The RWLT101 addresses this at the mechanical level rather than by throttling the LED, which is why the datasheet can support both a large ~4-inch-class front reflector assembly and a > 5-year typical LED lifetime under stated operating conditions.

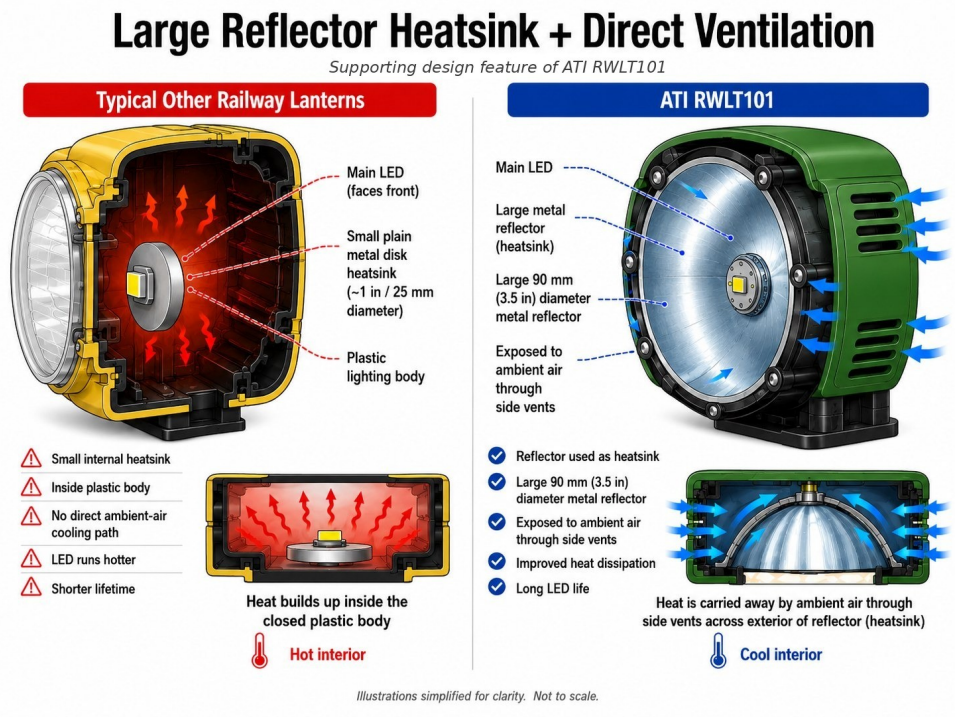


*Figure 4 — Thermal architecture comparison: typical other railway lantern (small internal heatsink inside a closed plastic body) versus the ATI RWLT101 (90 mm (3.5 in) metal reflector acting as heatsink, exposed to ambient air through side vents). The heatsink/direct-ventilation design is a supporting RWLT101 design feature, not a patented element.*

**Scope note.** *The direct-ventilated metal-reflector heatsink illustrated here is a supporting RWLT101 design feature, not a patented element. The controlling scope of U.S. Patent No. 11,859,781 B1 is defined solely by the issued claims — the patented architecture is battery-in-handle with center-of-mass-within-handle. Readers evaluating patent applicability must refer to the issued patent text.*

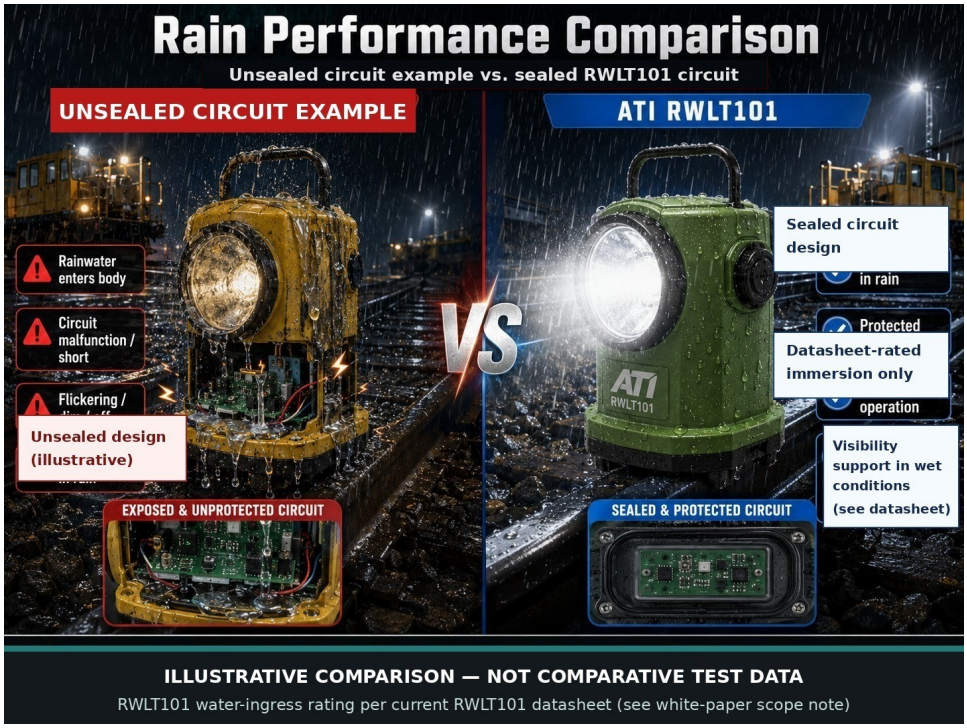


*Figure 5 — Illustrative comparison of an unsealed vs. sealed circuit under wet conditions. The RWLT101 enclosure is sealed for temporary water immersion per the current RWLT101 datasheet (see datasheet for rated depth, duration, orientation, and test method). Illustration is directional; not derived from named comparative test data.*

**Scope note.** *The RWLT101 water-ingress rating is bounded by the current RWLT101 datasheet: the enclosure is sealed for temporary water immersion under the datasheet's stated depth, duration, orientation, and test method. It is not qualified for continuous submersion, high-pressure water spray, hurricane or extreme-weather exposure, chemical exposure, or all outdoor scenarios. The illustration is directional only and is not derived from named comparative test data against any specific competing product. Buyers must confirm suitability for their application against the current RWLT101 datasheet before deployment.*

## 4.3 Ergonomic outcomes

Because the moment arm is minimized relative to conventional body-battery lanterns, the RWLT101 delivers three practical field benefits — each expressed here as a comparative improvement over body-battery designs, not as an absolute guarantee:

- **More comfortable long-duration carrying.** The sustained wrist holding-torque is reduced compared with body-battery designs. This is a mechanical effect; ergonomic outcomes over a full shift will depend on user, grip, and carry pattern and are not claimed here without controlled test data.
- **More stable hanging behavior.** In intended carry modes — hook, shoulder strap, or the crook of the arm — the lantern hangs closer to vertical than a body-battery lantern of similar mass.
- **Better aim stability while walking.** With the CG placed within the handle, the pendulum mode is suppressed relative to body-battery designs, so main-beam wander with each footstep is reduced.

## 5. Head-to-Head Comparison — Prior-Art Lantern vs. ATI RWLT101

The following comparison is stated in the technical vocabulary used in the ATI patent filings for the RWLT101 weight-balanced railway lantern. Terminology is engineering-neutral so distributors and specifiers can quote directly from this table.

| Design attribute | Prior-art railway lantern | ATI RWLT101 (patented) |
|---|---|---|
| **Location of the rechargeable battery pack** | Battery pack disposed within the lower body of the lantern, below the handle. The handle is hollow and contributes no useful mass. | Battery cell(s) disposed within the curved handle. The handle is both structural and the primary battery compartment. |
| **Location of the CG of the assembled lantern** | CG lies deep within the lower body, offset from the grip axis and horizontally displaced when the lantern is held level. | CG is located within the curved handle. |
| **Moment arm between grip axis and CG** | Large — typically several inches of horizontal offset when the lantern is held level. | Minimized by design. |
| **Sustained wrist holding-torque while carrying the lantern** | Nonzero — the wrist must continuously apply a counter-torque. | Reduced — sustained holding-torque is minimized relative to body-battery designs. |
| **Pendulum behavior during walking** | Pronounced swing — each step excites an angular oscillation about the grip point. | Reduced swing tendency — the shorter effective pendulum length changes the natural period and reduces the moment arm excited by walking, compared with body-battery designs. Actual oscillation amplitude depends on gait, damping, and carry method and is not predicted by Eq. 2 alone. |
| **Aiming stability of the main beam** | Beam wanders as the lantern rocks; the user must re-aim frequently. | Beam stays substantially on-axis in intended carry modes; the user re-aims less often. |
| **Hanging behavior (hook, strap, arm-crook)** | Hangs off-axis; body tips toward the heavier end, reflector aimed obliquely. | Hangs closer to vertical in intended carry modes. |
| **Mechanical outcome relative to body-battery designs** | Sustained wrist holding-torque is nonzero throughout carry; users typically compensate by setting the lantern down or transferring hands. | Reduced sustained wrist holding-torque relative to body-battery designs in the same use pattern (mechanical effect only; no ergonomic test data cited). |

| Design attribute | Prior-art railway lantern | ATI RWLT101 (patented) |
|---|---|---|
| **LED thermal architecture** | Many conventional body-battery designs reviewed do not include a comparable large dedicated metal heatsink; thermal path is typically not ventilated directly to ambient air. | Real metal reflector serves as the main-LED heatsink (approximately 90 mm reflective-metal inner diameter; approximately 100 mm overall including plastic rim), ventilated directly to ambient air; typical LED lifetime > 5 years (per RWLT101 datasheet under stated conditions). |
| **Digital status display** | No display or a single-LED battery indicator; the user cannot read remaining runtime, charge or discharge current, or remaining battery capacity while working. | Real-time digital display showing remaining runtime, charge current, discharge current, and remaining battery capacity — so the user can plan a shift without guessing. |
| **Adjustable brightness** | Fixed brightness or preset-only modes; not user-programmable. | Programmable brightness — user-configurable output level to balance runtime and light intensity. |
| **Emergency SOS signal** | No dedicated emergency signaling mode; workers must improvise. | Built-in SOS flashing mode — one-touch emergency signal for use in an incident or breakdown. |
| **Environmental sealing / water ingress** | Ingress protection is often uncommon or not stated on conventional body-battery railway lanterns reviewed; many do not carry a formal IP rating. | Sealed enclosure rated for temporary water immersion (see current RWLT101 datasheet for rated depth, duration, orientation, and test method). |
| **Intellectual-property architecture** | Conventional body-mounted-battery architecture; not the ATI battery-in-handle architecture discussed here. | ATI battery-in-handle architecture protected by U.S. Patent No. 11,859,781 B1 (Liu et al., Jan. 2, 2024); assignee Analog Technologies, Inc. |

## 6. ATI RWLT101 — Product Overview

The RWLT101 combines mechanical handling, optical output, power management, and status feedback into a single professional lantern. The features below are drawn from the ATI RWLT101 datasheet and product page; buyers should verify current specifications against the latest datasheet at time of order.

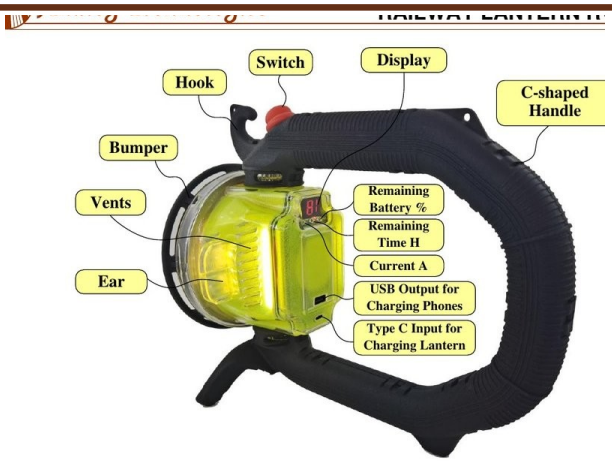


Figure 1. Back View of RWLT101


*Figure 6 — RWLT101 mechanical and functional callouts: C-shaped handle (battery inside), main reflector, side / auxiliary lights, display, switch, hook, bumper, shoulder-strap holes, USB output, and Type-C input. Source: RWLT101 datasheet.*

## 6.1 Key features

- **High-capacity rechargeable battery.** 15 Ah internal pack; more than 2,000 charge cycles (per RWLT101 datasheet under stated conditions).
- **Continuous working time.** Up to 12 hours of continuous operation at the datasheet load point (per RWLT101 datasheet under stated conditions).
- **Fast recharge.** Less than 3 hours for a full charge via the Type-C input (per RWLT101 datasheet under stated conditions).
- **Main reflector.** Large front-reflector assembly — approximately 90 mm (3.5 in) reflective-metal inner diameter, approximately 100 mm (~4 in) overall including plastic rim — with high-efficiency LEDs for forward illumination and beam control.
- **Auxiliary side beam.** Provides area lighting and be-seen visibility from the sides — critical for track-side and yard work.
- **Real-time smart display.** Shows remaining runtime, charge current, discharge current, and remaining battery capacity in real time.
- **Programmable brightness.** User-configurable output level for balancing runtime against light intensity.
- **Emergency SOS flashing.** Dedicated one-touch SOS flashing mode for emergency signaling during an incident, breakdown, or evacuation. This is a visibility-support signal only; it is not a certified railway signal and does not replace required railway signaling equipment, PPE, procedures, or emergency-response protocols.

- **USB output.** Charges phones and other compatible small USB devices in the field. Rated 2 A max (per RWLT101 datasheet under stated conditions).
- **Thermal design.** Real metal reflector acts as the LED heatsink, ventilated directly to ambient air for junction-temperature control; typical LED lifetime greater than 5 years (per RWLT101 datasheet under stated operating conditions).
- **Mechanical handling.** Weight-balanced C-shaped handle, hook, protective bumper, and shoulder-strap attachment holes.
- **Patented battery-in-handle architecture.** Protected by U.S. Patent No. 11,859,781 B1 (Liu et al., issued January 2, 2024; assignee Analog Technologies, Inc.).

## 7. Main Specifications and Buyer Value

The specification set below is calibrated against buyer decision criteria — every row is paired with the practical benefit a technical buyer or distributor can cite in a bid or product listing.

| Specification area | ATI RWLT101 | Why it matters to buyers |
|---|---|---|
| **Emergency SOS flashing** | Built-in one-touch SOS signaling mode | Dedicated emergency signal without improvising. |
| **Part number** | RWLT101 | Clear ordering / quoting model. |
| **Battery** | Built-in rechargeable, 15 Ah (per RWLT101 datasheet under stated conditions) | Supports long work periods and repeated field use. |
| **Cycle life** | > 2,000 recharge cycles (per RWLT101 datasheet under stated conditions) | Reduces disposable-battery cost and replacement downtime. |
| **Continuous working time** | Up to 12 hours (per RWLT101 datasheet under stated conditions) | Supports overnight or full-shift use under the datasheet's stated load. |
| **Charging time** | < 3 hours (per RWLT101 datasheet under stated conditions) | Minimizes turnaround between shifts. |
| **Main optical system** | High-efficiency LEDs with front-reflector assembly (~90 mm reflective-metal inner / ~100 mm overall including plastic) | Forward illumination and beam control. |
| **Auxiliary lighting** | Side / auxiliary beam | Side visibility and area lighting. |
| **Thermal design** | Metal reflector acts as heatsink, directly ventilated to ambient air; typical LED life > 5 years (per RWLT101 datasheet under stated conditions) | Manages LED heat and extends service life. |

| Specification area | ATI RWLT101 | Why it matters to buyers |
|---|---|---|
| **Display** | Real-time remaining runtime, charge current, discharge current, and remaining battery capacity | Users can plan remaining work time instead of guessing. |
| **Programmable brightness** | User-configurable output level | Users can balance runtime against required brightness for the task. |
| **Device charging** | USB output — 2 A max (per RWLT101 datasheet under stated conditions) | Emergency utility beyond illumination. |
| **Charging input** | Type-C | Modern, widely-available charging interface. |
| **Mechanical handling** | C-shaped handle (battery inside), hook, bumper, strap holes | Supports hand, arm, hook, and shoulder-strap carry. |
| **Intellectual property** | U.S. Pat. No. 11,859,781 B1 (Jan. 2024) | Verified IP for RFQs, distributor listings, and competitive positioning. |

## 8. Category Comparison — Flashlight, Camping Lantern, Work Light, RWLT101

Buyers frequently compare railway lanterns against products in adjacent categories. Because those categories solve different problems, feature-level comparison alone is misleading. The matrix below frames the RWLT101 against common alternatives on buyer-use criteria.

| Feature / buying criterion | Regular flashlight | Camping lantern | Generic LED work light | ATI RWLT101 |
|---|---|---|---|---|
| **Primary design intent** | Pocket / hand-held directional light | Area light for camp / household use | Temporary jobsite illumination | Railway-oriented safety, inspection, and emergency lighting |
| **Runtime focus** | Mode-dependent; shorter at high output | Lower output to extend runtime | Varies by model; often external battery | Up to 12 h continuous with 15 Ah internal battery |
| **Ergonomics** | Small grip; tiring with gloves | Table-top or hanging form factor | Handle / stand varies by model | Weight-balanced C-shaped handle, hook, bumper, strap holes |

| Feature / buying criterion | Regular flashlight | Camping lantern | Generic LED work light | ATI RWLT101 |
|---|---|---|---|---|
| **Optical layout** | One forward beam | Diffuse area light | Flood or spot depending on model | ~4-inch-class front reflector assembly (~90 mm reflective-metal inner / ~100 mm overall incl. plastic) plus side / auxiliary beam |
| **Status feedback** | Simple LED indicator or none | Basic battery indicator | Varies widely | Runtime, charge current, discharge current, and battery capacity in real time |
| **Power utility** | Rechargeable on some models | Rechargeable on some models | Varies widely | Type-C input; USB output for charging phones |
| **Differentiation in professional sale** | Hard to separate from commodity | Not designed for railroad use | Jobsite-focused, not railway-focused | Patented ATI design positioned for railway and safety use |

## 9. Target Customers and Use Cases

| Customer group | Use case | Message to emphasize |
|---|---|---|
| **Railway operators & contractors** | Yard work, track inspection, worker visibility, nighttime support | Long runtime, side beam, rugged handling, railway-specific design |
| **Maintenance & inspection teams** | Machinery, electrical systems, hard-to-reach areas | Main reflector, auxiliary lighting, display feedback |
| **Emergency response & facilities** | Power-outage lighting, mobile backup light | Up to 12-hour runtime (per datasheet), fast recharge, USB output (2 A max) |
| **Utility & infrastructure** | Substation, right-of-way, and overhead inspection | Weight-balanced handle, hook and strap carry, service life |
| **Distributors & resellers** | Product-line expansion beyond commodity flashlights | Patented design, clear differentiation, high buyer value |

| Customer group | Use case | Message to emphasize |
|---|---|---|
| **Outdoor & industrial users** | Camping, hunting, night events, and general outdoor use where the current datasheet environmental rating is suitable | Rechargeable 15 Ah battery, practical carrying methods (use only where the current datasheet environmental rating is suitable) |

## 10. Frequently Asked Questions

### What is a railway lantern?

A railway lantern is a portable lantern used for illumination and be-seen visibility during railway operations, inspection, maintenance, and low-light field work. It is judged on runtime, visibility, rugged handling, and practical carrying options — not only on compact size. A railway lantern of this class is portable illumination and visibility support only; it is not a certified railway signaling device and is not a substitute for required railway signals, PPE, procedures, or approved safety equipment.

### How is a railway lantern different from a regular flashlight?

A flashlight typically provides a single forward beam in a compact body. A railway lantern is designed for longer runtime, easier gloved handling, side visibility, stable carrying or hanging, and clear battery feedback for field work.

### What is the ATI RWLT101?

The RWLT101 is a patented, rechargeable LED railway lantern with a 15 Ah internal battery, up to 12 hours of continuous working time, less than 3 hours of full recharge time, a large front-reflector assembly (~90 mm reflective-metal inner / ~100 mm overall including plastic), a side beam, a real-time display, Type-C charging input, and a USB output (2 A max) for charging phones and other compatible small devices — each performance figure per the RWLT101 datasheet under stated conditions. It is portable illumination and visibility support; it is not a certified railway signaling device and is not a substitute for required railway signals, PPE, procedures, or approved safety equipment.

### What does "weight-balanced" mean here — and why does it matter?

It means the rechargeable battery cell(s) are integrated inside the C-shaped handle instead of the lantern body, so the center of mass of the assembled lantern is located within the handle. Compared with body-battery designs, the sustained wrist holding-torque is reduced and the pendulum swing during walking is lower. In practice, this reduces the sustained wrist moment during hand-held use relative to body-battery lanterns of similar mass (mechanical effect; individual ergonomic outcomes will vary).

### Who should buy a railway lantern?

Railway operators, track maintenance and inspection teams, emergency-response teams, facilities and utility crews, contractors, and outdoor users who need long-runtime portable lighting with real-time status feedback. The RWLT101 is portable illumination and visibility support only; it is not a certified railway signaling device or substitute for required railway signals, PPE, procedures, or approved safety equipment.

### What specifications should I compare first?

Continuous working time, battery capacity, charging time, beam configuration (main + side), display feedback, handle geometry and balance, thermal design and expected LED life, and datasheet / support availability.

### Is the LED brightness specified in lumens?

The RWLT101 is currently specified by reflector size, LED efficiency class, runtime, and beam configuration. If a lumen rating is required for your bid, request the latest RWLT101 datasheet to confirm the current published number.

### Is the RWLT101 waterproof / IP-rated?

Yes. The RWLT101 enclosure is sealed for temporary water immersion under the RWLT101 datasheet's stated conditions (rated immersion depth, duration, orientation, and test method). It is not qualified for continuous submersion, pressure washing, or chemical exposure. Confirm the exact rated conditions on the current RWLT101 datasheet before quoting to a specific application.

### Is there a US patent covering the RWLT101 design?

Yes. The portable illumination device architecture is covered by U.S. Patent No. 11,859,781 B1, issued January 2, 2024, with inventors Gang Liu, Lili Shi, Yuqi Zhang, and Nan Shi (all San Jose, CA) and assigned to Analog Technologies, Inc. The application (No. 17/818,358) was filed August 8, 2022 and includes 19 claims and 21 drawing sheets. The claim scope covers a portable illumination device whose center of mass is located within the curved handle that also contains the battery cell(s).

## 11. Ordering and Links

Use the official ATI links below for specifications, ordering, and technical confirmation. Buyers should always check the current datasheet and product page before placing an order — product information and availability may change.

*Applications engineering can review qualified projects and suggest a starting product family, design direction, or evaluation path.*

| | |
|---|---|
| **RWLT101 product page** | https://www.analogtechnologies.com/railway_lantern.html |
| **RWLT101 datasheet** | https://www.analogtechnologies.com/document/RWLT101.pdf |
| **ATI online store** | https://shop.analogtechnologies.com/RWLT101.htm |
| **ATI home page** | https://www.analogtechnologies.com/ |
| **ATI contact page** | https://www.analogtechnologies.com/contact.html |

**Sales positioning summary — one-sentence value proposition**

*"The ATI RWLT101 is a patented, rechargeable LED railway lantern designed for long-runtime safety lighting, field visibility, and practical railway and maintenance use."*

## 12. Notice and Safe-Use Language

This white paper is a product-selection and marketing-support document. It is not a railway operating rule, signaling standard, or safety-certification document. Railway operators, contractors, and specifiers must follow applicable local railway rules, worksite safety procedures, signaling practices, and equipment-approval processes. Specifications are subject to change without notice; customers are responsible for evaluating suitability for their particular application and for confirming the current published specifications on the RWLT101 datasheet at time of order.