



IoT Integrated to Refrigerator Lighting

E-IOT integrates sensing and cloud connectivity into refrigerator LED lighting, turning an existing cabinet component into a connected monitoring device. Developed in cooperation with Audax, the concept combines illumination, environmental sensing and cellular communication in a compact assembly, helping refrigerator manufacturers and fleet operators introduce remote monitoring with fewer separate components.

Products shown

- LED luminaire with integrated E-IOT cellular electronics — a complete lighting assembly incorporating a Fibocom MA510-based monitoring board.
- Compact linear LED lighting variants with integrated USB power supply for E-IOT sensors — different mechanical arrangements illustrating integration into refrigerator lighting formats.
- Tubular LED luminaire with an enlarged electronics housing — combines a linear light source with the sensor and communication platform.
- Low-voltage power connections — illustrate connection options for integration with a compatible refrigerator power supply.

Product features and operation

Turning the refrigerator light into a connected device

Refrigerator lighting already occupies a useful position inside the cabinet and has access to electrical power. Integrating IoT electronics into the luminaire allows this existing component to perform an additional role: collecting information about the refrigerator and forwarding it to the cloud.

The approach reduces the need for a separate monitoring enclosure and dedicated power wiring. It offers a practical integration route for new refrigerator designs and, where electrical and mechanical compatibility permit, for upgrading existing installations.

The pictured variants demonstrate how the electronics can be accommodated alongside different linear LED assemblies.

Environmental and operating-condition monitoring

The E-IOT monitoring platform combines temperature and humidity sensing with ambient-light measurement and magnetic door-state detection.

Temperature readings help track conditions inside the cabinet, while humidity measurements provide additional environmental context. A magnetic sensor used with a suitably positioned magnet can report door state, allowing the application to identify opening events or prolonged open periods.

Light measurements provide feedback on illumination at the sensor location. Together, these signals help explain changes in cabinet conditions—for example, a temperature rise associated with an extended door opening.

Sensor placement and thermal design are important: heat generated by the LEDs and electronics must be considered when interpreting temperature measurements.

Cellular communication without local network setup

The integrated Fibocom MA510 platform provides a cellular route to the E-IOT cloud, avoiding the need to configure the customer's Wi-Fi or connect the refrigerator to a wired network. This is particularly useful for refrigerators deployed across retail stores, restaurants, hospitality venues and other customer premises. Each equipped cabinet can report independently through its configured cellular service. Measurements and diagnostic information are transmitted according to the firmware's reporting schedule. Communication settings can be adapted to the monitoring requirements and available network service.

Shared power and compact installation

Integrating the monitoring electronics into the lighting assembly allows the design to use a compatible low-voltage supply already available within the refrigerator.

The power arrangement must account for how the original lighting is controlled. If the lamp supply switches off when the door closes, continuous monitoring requires an unswitched supply or a suitable backup-power design. Mechanical integration also brings the antenna, sensors and electronics into a common assembly. Their placement must accommodate radio communication, sensor exposure, condensation management and service access.

Cloud history and configurable notifications

The E-IOT cloud collects reported measurements and presents them as equipment status and historical trends. Operators can review temperature behavior, examine door activity and compare operating patterns across a fleet. Configured limits and persistence periods can trigger notifications when a temperature excursion or prolonged door opening requires attention. Alert timing depends on the sampling interval, communication schedule and network availability. Diagnostic reporting can also help distinguish an abnormal cabinet condition from a device that has stopped communicating.

Monitoring alongside the existing refrigerator controller

The integrated lighting solution provides an additional observation layer alongside the refrigerator's temperature controller. Its sensing functions can operate without changing the controller's setpoint or refrigeration logic.

This makes the concept useful for retrofit monitoring and for manufacturers seeking to add connected services to an established refrigerator design.

Historical data supports maintenance investigations, helping teams assess recurring temperature excursions, slow recovery after restocking or unusual door-use patterns.

Typical applications

- Connected beverage coolers and retail display refrigerators.
- OEM integration of monitoring into refrigerator lighting.
- Compatible lighting upgrades for existing cabinets.
- Remote supervision of refrigerators at customer premises.
- Temperature, humidity, door-state and illumination monitoring.
- Fleet dashboards, exception reporting and maintenance support.