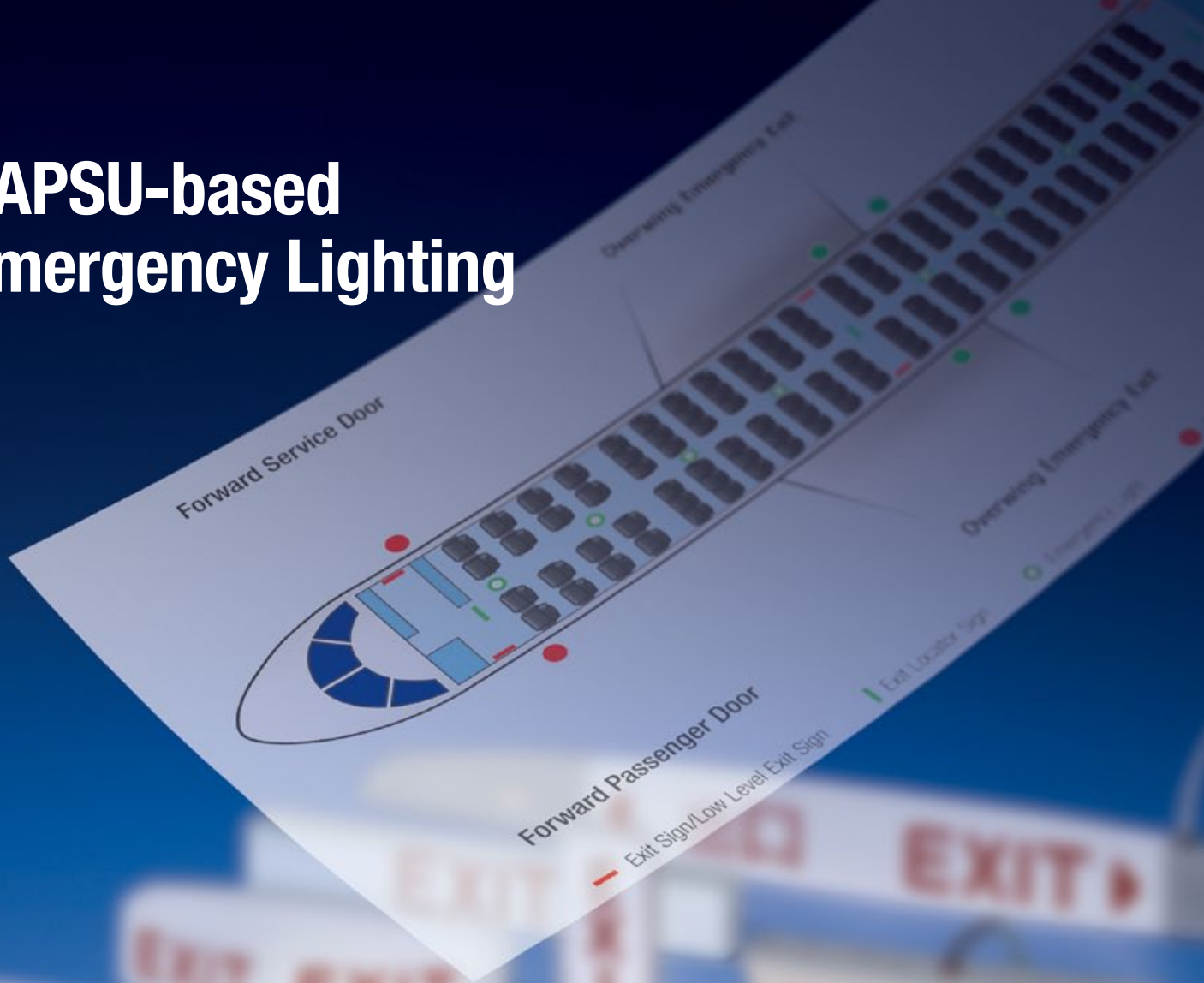


CAPSU-based Emergency Lighting



Charged in 120 seconds!



Next generation of emergency lighting

With the introduction of new aircraft emergency lighting system technology, UTC Aerospace Systems sets another milestone in innovation.

The next generation of emergency lighting solutions offers operators significant advantages over decades-old technology.

Highly efficient and economic LEDs allow the use of totally different energy storages. Requiring significantly less capacity, they may be smaller and lighter than current batteries.

Maintenance-free capacitor technology

Based on ground-breaking capacitor technology, the new decentralized emergency lighting system is designed to be maintenance-free.

The system comprises emergency ceiling lights, exit locator signs, exit marking signs, exit floor ID signs, external overwing and door emergency lights as well as emergency escape path marking.

Significantly safer than previous systems

Every single autonomous light is equipped with a non-toxic SuperCap, a new energy storage which supplies power for up to 20 minutes in case of emergency and ensures optimal capacitance balance.

When power is lost, the emergency lights self-activate. Highly efficient LEDs provide ample illumination during evacuation of the aircraft, even in case of vertical separation. Therefore, the new solution is safer than any previous system.

Weight savings and wiring reduction

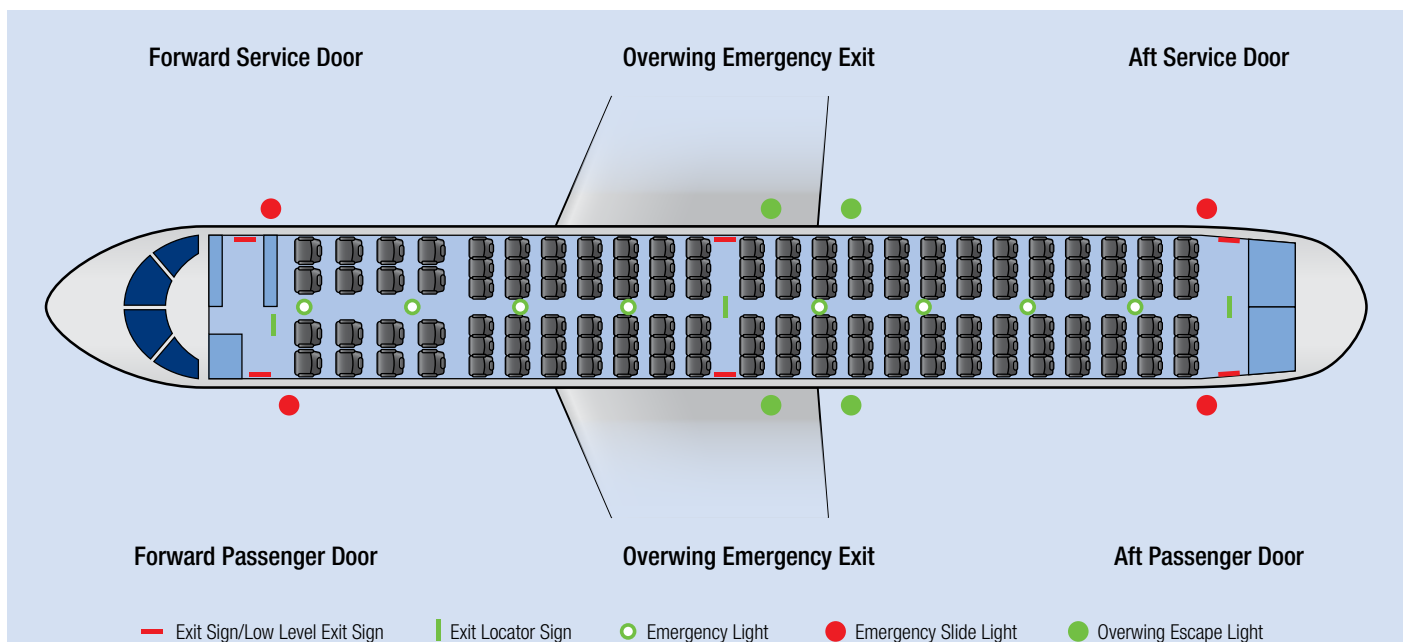
The new system works without rechargeable battery packs and only needs a single control wire architecture, resulting in significant weight savings when compared to conventional emergency lighting systems.

Fully charged in less than two minutes

With autonomous lighting and SuperCaps technology, emergency lighting systems are fully charged and ready for take-off in less than two minutes.

Retrofit option for existing emergency lighting system

UTC Aerospace Systems' new emergency lighting system can be easily retrofitted into the existing wire architecture of many aircraft. It offers multiple install options, so that operators can choose to replace EPSUs with new CAPSUs, or install just one CAPSU and connect all emergency lights to it by single control wiring.

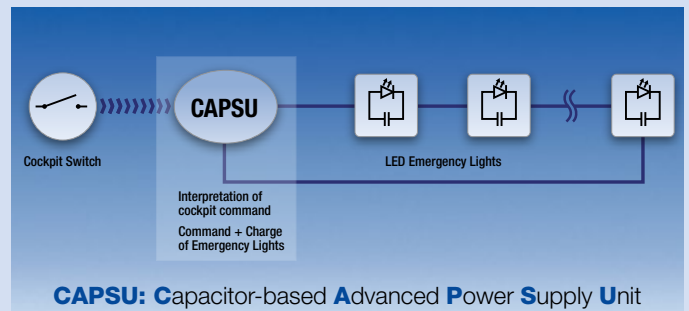


Typical emergency lighting layout of a single aisle aircraft.

CAPSU Head Unit provides power during charging

The new SuperCap emergency lighting system consists of a Capacitor-based Advanced Power Supply Unit (CAPSU) – which is the logic head unit – and a number of power optimized emergency lights with integrated double layer capacitors (SuperCaps) as local energy supplies.

Although a single control wire connection between the CAPSU and the emergency lights is sufficient, UTC Aerospace Systems recommends to install a ring wiring architecture. This will ensure continuous readiness even in case of a wire fracture.



The CAPSU can provide operational signals to all connected devices. It allows the flight crew to select from three operational modes:

Mode 1: Armed

Emergency lighting system is ready to be deployed at any time. The units are charged within two minutes and then kept trickle charged. On power loss the lights will turn on automatically.

Mode 2: On

- Either turns on the emergency lights during boarding and sets the current down for trickle charging
- or activates the emergency lights on demand.

Mode 3: Off

Controlled "turn off" without illumination of lights and with true integrated capacity measurement and "end of life" indication.

Autonomous emergency lights with integrated SuperCaps

In most cases the SuperCaps will be embedded in the housing, giving an appearance similar to conventional emergency lights.

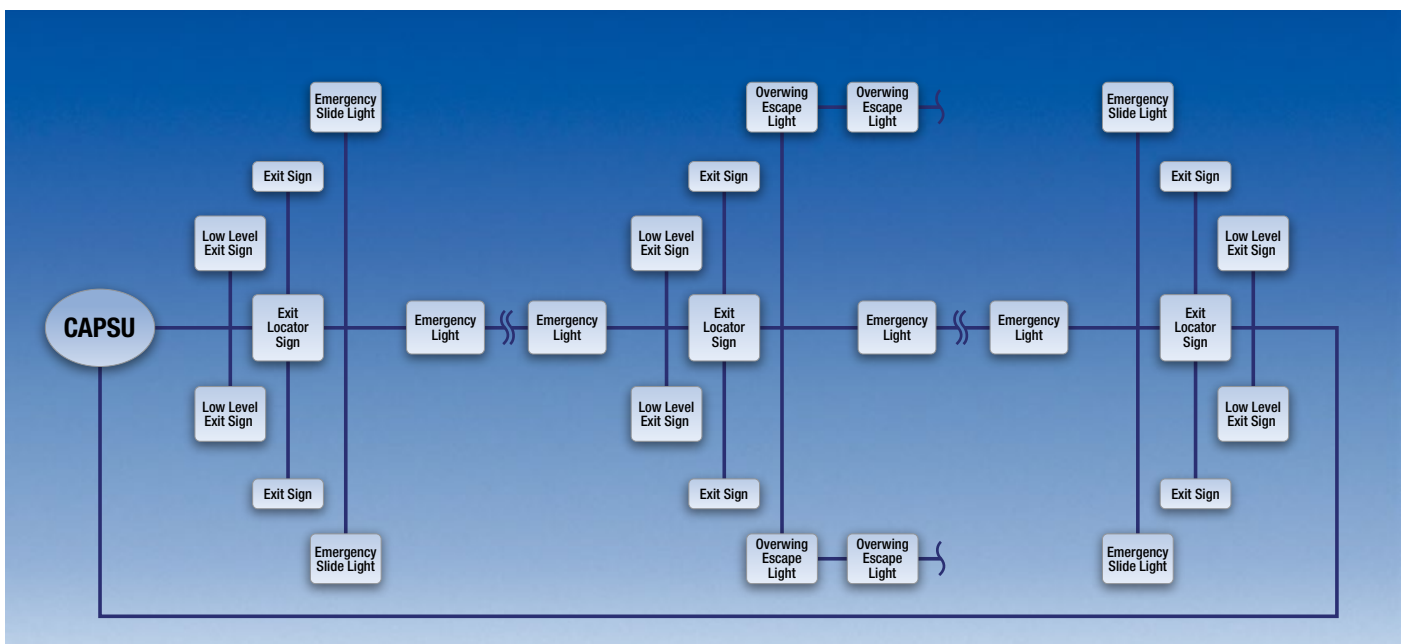
For external interfaces or very small lights, the SuperCaps may be either integrated into the head units or designed as piggy-back solutions.

Although the SuperCaps are designed for virtually zero performance reduction with age, UTC Aerospace Systems integrates an automatic safety check into all its next-generation emergency lights. A flashing LED, easily observable during visual checks, alerts the technicians a defined number of hours prior to end of life.

Environment-friendly and highly efficient energy storage

SuperCaps provide many benefits to operators:

- almost no reduction in performance with age
- no memory effect
- no low or high charge deterioration
- made with environment friendly materials only
- resistance to temperature effects
- fast charging and discharging
- minimal temperature variation while charging or discharging
- low energy density results in low hazard



Single control wire ring architecture for the emergency lighting layout on the opposite page.

Advantages of the CAPSU-based emergency lighting system at a glance

Benefits of the next generation emergency lighting system:

- significant weight reduction in comparison to legacy systems
- less wiring due to the single control wire architecture
- short charging time of less than two minutes
- improved dispatch reliability
- decreased maintenance and operating costs provided by rechargeable battery elimination
- green technology
- no requirement to place EPSUs in accessible locations or locations with increased survivability, such as door frames
- integrated power supply ensures optimal capacitance balancing for each application

Before and after comparison – estimates per single aisle aircraft with conventional and next generation emergency lighting system

| | Conventional emergency lighting system | CAPSU-based emergency lighting system |
|------------------------------------|--|---|
| Weight | Baseline | 25 % weight savings on system level (reduced wiring, reduced Part-Number count) |
| Wiring | Baseline | 25 % less wiring |
| Charging Time | 45 – 90 minutes | 2 minutes |
| Maintenance Effort per year | 960 minutes | – |
| Annual Operating Cost | \$15,000 | \$250 |
| Hazardous Materials | Cadmium, Lithium, Acids, High Energy Density, Hydrogen | – |
| Energy Storage required | 60 Wh | 17 Wh |

UTC Aerospace Systems has more than 20 years of experience in the use of LED technology and was the first to develop an LED reading light for series production in aircraft.

Since then, we have produced more than 500,000 lights and have implemented the latest LED technology into all interior and exterior aircraft lighting applications.

The introduction of our innovative, green technology emergency lighting system is the result of our experience in combination with our passion for research and development.

This document does not contain any export controlled technical data.

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