

LED Anti-Collision Lighting System for Airbus A320 Family



LEDs established in anti-collision lighting

For the first time, UTC Aerospace Systems has implemented state-of-the-art LED technology into an anti-collision lighting system (beacon and strobe lights). It is part of the new LED exterior lighting equipment for the Airbus A320 aircraft family.

While beacon lights utilizing LED technology have been part of the UTC Aerospace Systems product portfolio for years, the company is now able to offer the first LED wing strobe lights for a medium-range commercial aviation aircraft. Furthermore, the new rearward strobe and navigation light is the first combined LED device that can withstand the extreme high temperature conditions located directly beneath the APU exhaust outlet.

LEDs supersede flash tubes Particular design challenge

With the development of LED anti-collision lighting, UTC Aerospace Systems is replacing its Xenon flash tube products that have been successfully operating on the A320 aircraft family for decades.

FAR requirements

To fulfill the Federal Aviation Regulation (FAR) requirements, the anti-collision lighting system must create a flash rate of between 40 and 100 flashes per minute at 360° around the aircraft's vertical axis and also cover an area within 75° above and below the horizontal plane. In overlapping areas, not more than 180 flashes per minute are permitted. The minimum effective intensity is 400 candelas along the aircraft's horizontal plane. Each anti-collision light must be Aviation Red or White – depending on the location of the units.

Two redundant systems

Airbus equips all of its aircraft with two independent anti-collision lighting systems. Each system is designed to fulfill the respective FAR requirements: the red fuselage mounted upper and lower beacon lights and the white wing and tail strobe lights. This not only significantly increases visibility during ground and flight operations, one system can also serve as a back-up system for the other in case of failure.

Long before the launch of the A320neo, Airbus' customers had the opportunity to choose either the conventional or the new fuel saving sharklet wing tips for their aircraft.

Regarding the sharklets, UTC Aerospace Systems' lighting design engineers faced a number of particular challenges.

For example, the optical design of the beacon light had to compensate for the shadows of the engines and sharklets. Additionally, the special architecture of the sharklets also required a totally new design of the wing strobe lights.

Also available are a set of wing strobe lights and power supplies that were designed to be installed in conventional wing tips.

Retrofit options

With the new LED exterior lighting system, UTC Aerospace Systems also offers retrofit options for A320ceo family aircraft that are already in operation.

Equipped for the future

Advantages of the new LED system include weight and power savings, longer lifetime, higher reliability and significantly reduced maintenance effort in comparison to the previous anti-collision lighting.

Entire exterior lighting system for Airbus A320 aircraft family can be equipped with state-of-the-art LED technology

The Airbus A320 is the first medium-range commercial aviation aircraft featuring an exterior lighting system completely designed in state-of-the-art LED technology.

Delivering 17 out of the 21 different newly developed exterior lighting devices, UTC Aerospace Systems significantly contributes to this milestone in aviation history.

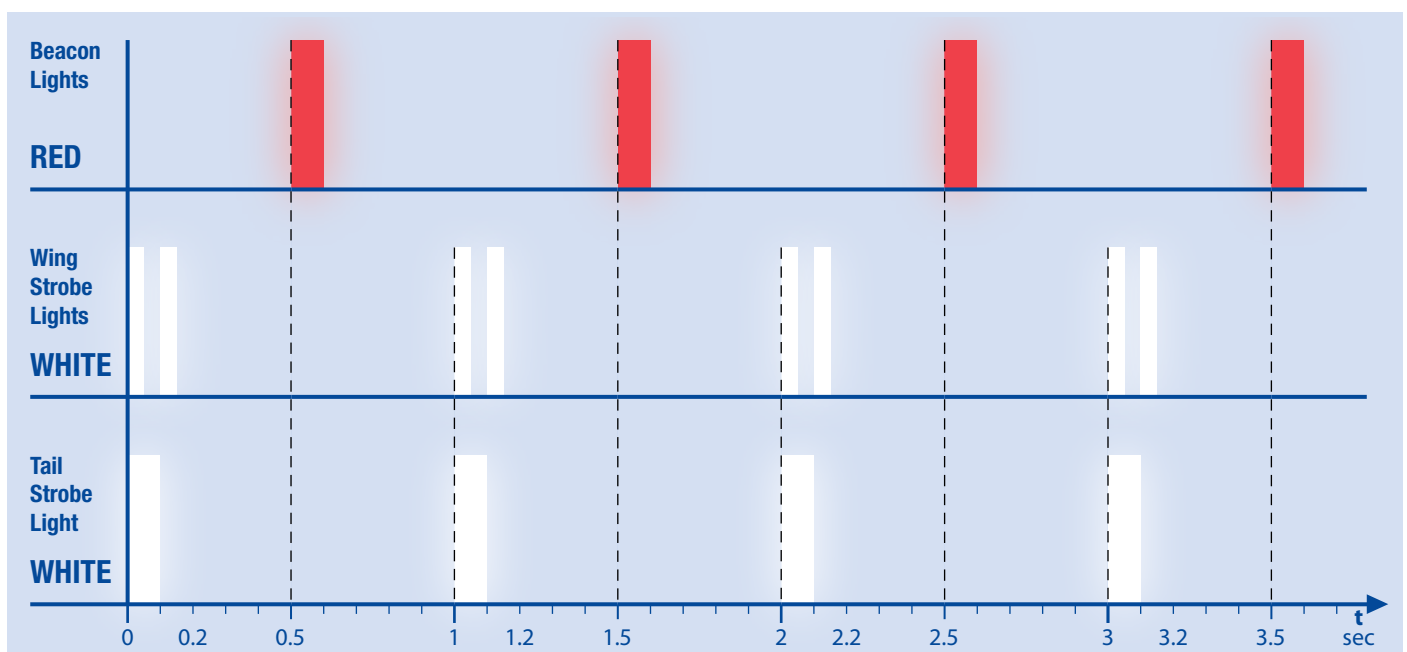
The LED exterior lights come standard on the new A320neo. One year before its entry into service, the currently built A320ceo aircraft can already be equipped with the new system.

Be seen – be safe

Redundant configuration of white and red anti-collision lighting systems

	<p>LED Rearward Navigation and Strobe Light (white) 2LA456241-00 Base Plate Assy 9BP417109-00 Power Supply 8ES456222-01</p>		<p>LED Beacon Light (red) 2LA455968-01 Power Supply 8ES455967-01/-20</p>
			
	<p>LED Wing Strobe Lights for Sharklets (white) 2LA456509-02 (LH) 2LA456510-02 (RH) 2 Power Supplies 8ES456513-01</p>		<p>LED Beacon Light (red) 2LA455968-01 Power Supply 8ES455967-01/-20</p>

Flashing sequences and synchronization



LED Beacon Light | 2LA455968-01

One red LED beacon light 2LA455968-01 is installed on top of the fuselage and one at the bottom of the A320 family aircraft. The aero-dynamic shape of the highly resistant glass cover reduces the drag load significantly in comparison to other designs.

To ensure the coverage of the light distribution sphere meets the requirements of FAR § 25.1401, UTC Aerospace Systems' design engineers developed a special optical design. The elaborate LED configuration avoids shadowing by the engines and the 2.5 meters tall sharklet wing tips of the A320.

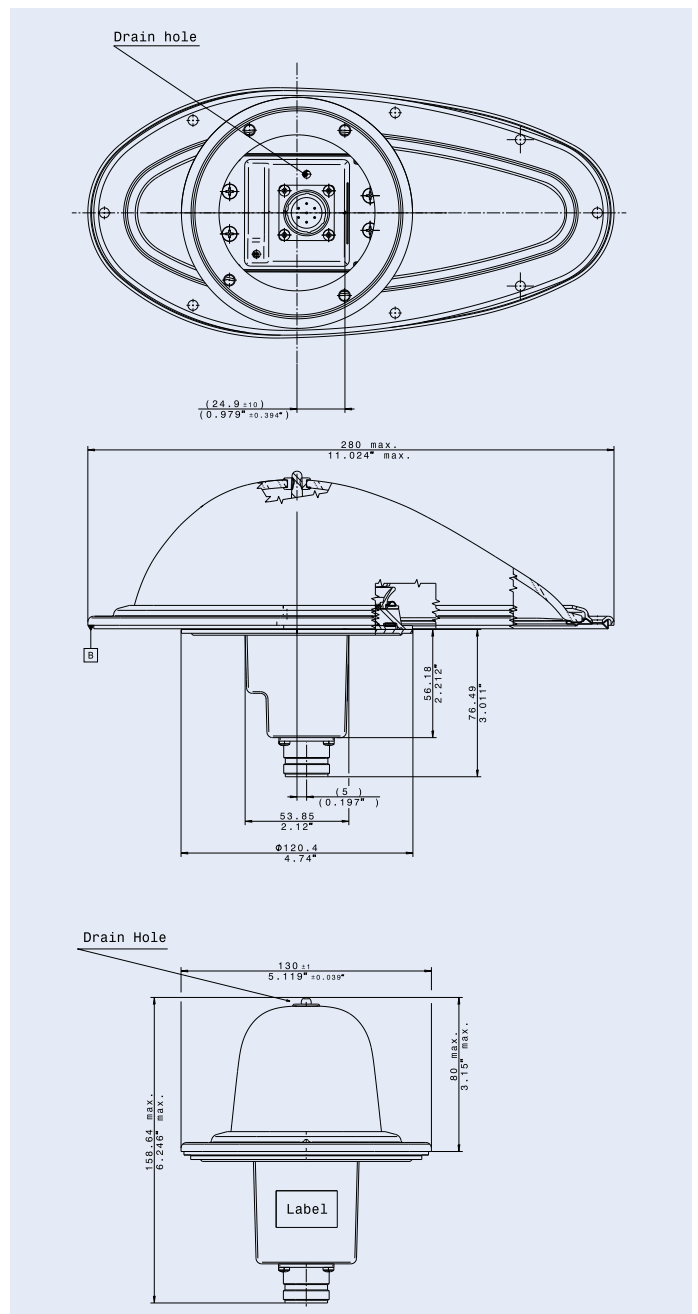
To increase the lifetime of the LEDs, this beacon light features a thermal management design which actively adjusts the operating current depending on the environmental temperature. The beacon light's flash pattern changes from a single to a double flash when the LEDs reach nearly-end-of-life status. This indication is visible from the ground.

The new LED beacon light also features integrated lightning protection. It is also interchangeable with the previous flash tube unit and fits into the existing interface.



Technical Data:

- Energy per Flash: 35 J max.
- Pulse Duration: 20 ms – 200 ms (20 ms when dimmed by Power Supply)
- Light Color: Aviation Red in compliance with FAR § 25.1397
- Light Intensity: in compliance with FAR § 25.1401
- Light Distribution: in compliance with FAR § 25.1401 (horizontal: 360°; vertical: 0° to ±75°)
- Flash Rate: 45 ± 2 flashes/minute or 55 ± 5 flashes/minute depending on Power Supply
- Lifetime of LEDs: approx. 20,000 operating hours
- Nearly-end-of-life indication: change of flash pattern
- Weight: 1.10 kg/2.43 lbs max.



Power Supply | 8ES455967-01/-20 for LED Beacon Light

One power supply 8ES455967-01 provides the necessary flash energy for each LED beacon light 2LA455968-01. Energy is stored in maintenance-free capacitors to ensure low emissions on the electrical network.

The power supply is connected to the aircraft's single phase 115 V 400 Hz power network. Compared to the previous system, the power consumption is reduced by 70 percent.

To synchronize the red and white anti-collision lighting systems and to ensure that they flash within the specified pattern, the power supply of the upper beacon light operates as a master

while all other power supplies operate as slaves. In the event the signal from the master is not available, all power supplies automatically switch to an unsynchronized free running mode.

This power supply features an input for external dimming of the beacon light to a light intensity level of 15 percent. Dimming the beacon lights during ground operation prevents airport personnel from being blinded.

The -20 variant consists of the -01 power supply and the adaptor plate assy 9AB416701-02. It is mechanically fully interchangeable with the previous unit.

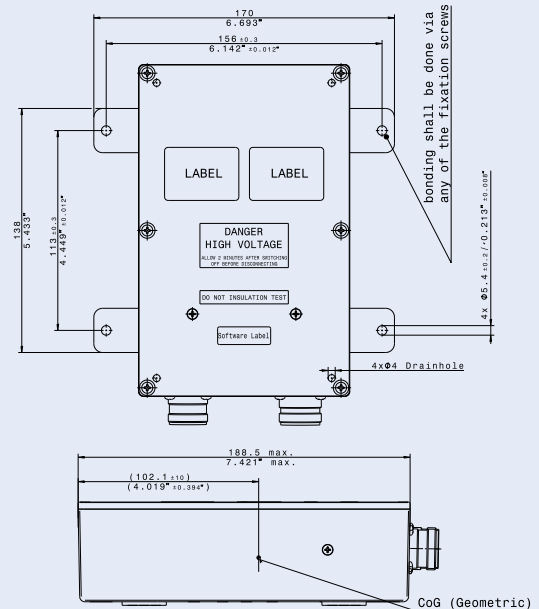
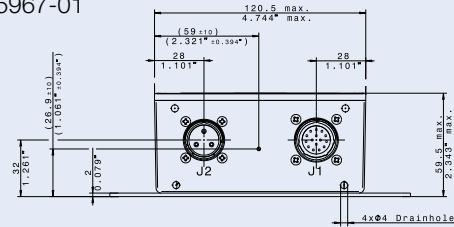


8ES455967-01

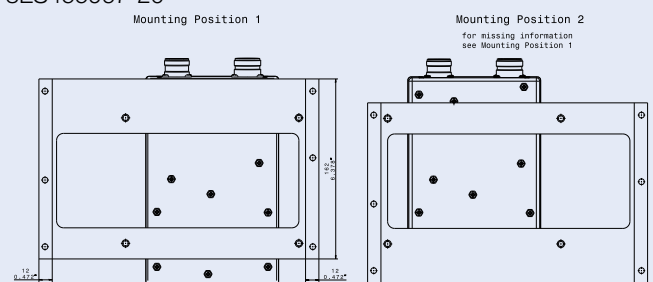
Technical Data:

- Operating Voltage: 115 V_{rms}/360 to 800 Hz
- Nominal Frequency: 400 Hz
- Operating Current
Nominal: 390 mA_{rms} max. (t > 30 s)
Inrush Peak: 2.75 A max. (t < 20 ms)
No Load: 200 mA_{rms} max.
- Power Consumption
Apparent Power: 45 VA max.
Active Power: 40 W max.
- Output Channel
Energy per Flash: 35 J max.
Pulse Duration: 200 ms ± 5 ms
Dimmability: 15 % ± 1 % of output pulse width
- Flash Rate
PIN 2 115 V AC: 55 ± 5 flashes/minute
PIN 2 Gnd/open: 45 ± 2 flashes/minute
- Flash Mode: synchronized/free running
- Lifetime: approx. 66,000 operating hours
- Weight: -01: 1.20 kg/2.65 lbs max.
-20: 1.40 kg/3.08 lbs max.

8ES455967-01



8ES455967-20



LED Wing Strobe Lights | 2LA456509-02 and 510-02 for Sharklet Wing Tips

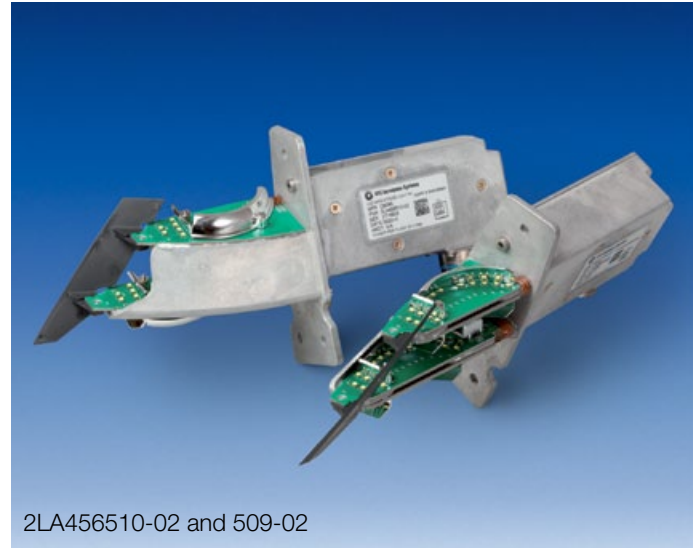
While the newly designed, fuel saving sharklets will totally replace the conventional wing tips on the new Airbus A320neo launched in 2015, customers may already choose them as an option for all currently built A320ceo family aircraft.

Furthermore, Airbus offers them as a retrofit opportunity for A320 family of aircraft built from 2011. UTC Aerospace Systems' design engineers not only developed the world's first wing strobe light in LED technology, they also mastered the various challenges associated with the special architecture and vibration loads of the 2.5 metres tall sharklets.

A blue LED in the strobe light head facing downwards and visible from the ground will show nearly-end-of-life status. It can be checked while the strobe light is not operating.

The LED wing strobe lights 2LA456509-02 (LH) and 2LA456510-02 (RH) are installed behind glass that is integrated into the front edge bend of the sharklet.

Combined with the rearward strobe light 2LA456241-00 (or its Xenon flash tube predecessor), a set of these wing strobe lights fulfills the FAR § 25.1401 requirements as a system.

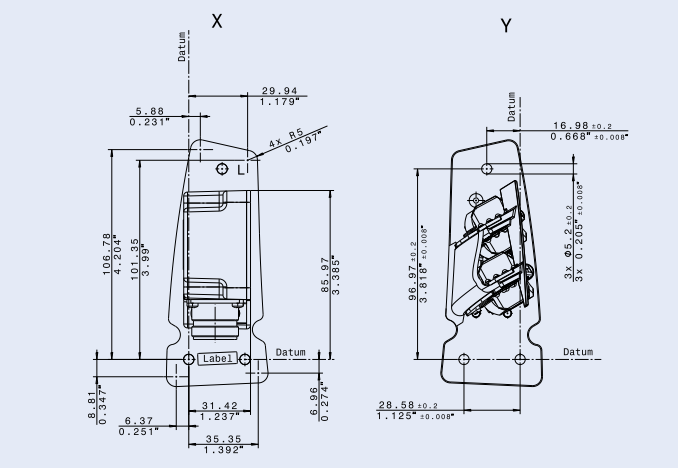
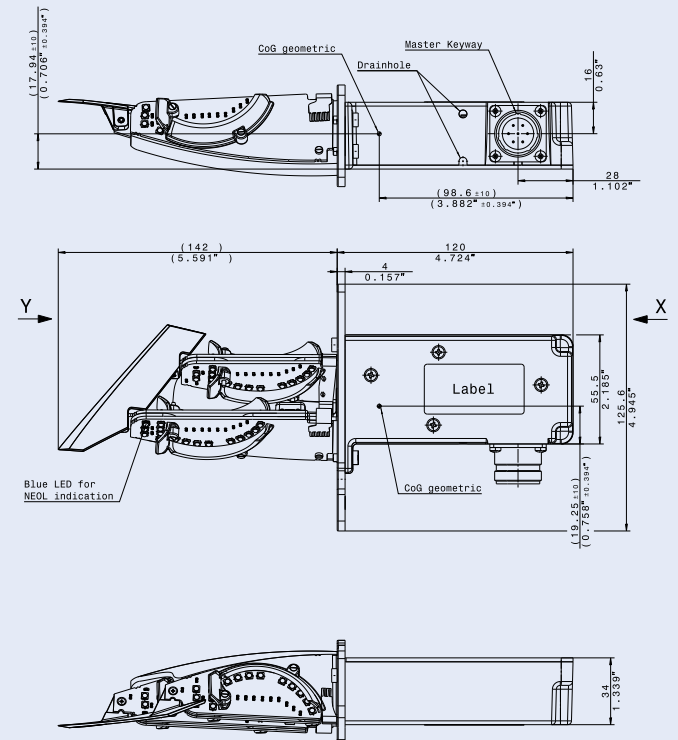


2LA456510-02 and 509-02

Technical Data:

- Energy per Flash: 30 J max.
- Pulse Duration: 160 ms ± 30
- Pulse Shape: double flash
50 ms on – 60 ms off – 50 ms on
- Flash Rate: 60 ± 5 flashes/minute
- Light Color: Aviation White
in compliance with FAR § 25.1397
- Light Intensity: in compliance with FAR § 25.1401
- Light Distribution: in compliance with FAR § 25.1401
as system in combination with
rearward strobe and navigation light
2LA456241-00
- Lifetime of LEDs: approx. 20,000 operating hours
- Nearly-end-of-life
indication: blue LEDs
- Weight: 0.5 kg/1.1 lbs max.

2LA456509-02 (LH)



Power Supply | 8ES456513-01 for Sharklet LED Wing Strobe Light

Each LED wing strobe light 2LA456509-02 and 510-02 is operated by one power supply 8ES456513-01. Maintenance-free capacitors store the necessary flash energy and ensure low emissions on the electrical network.

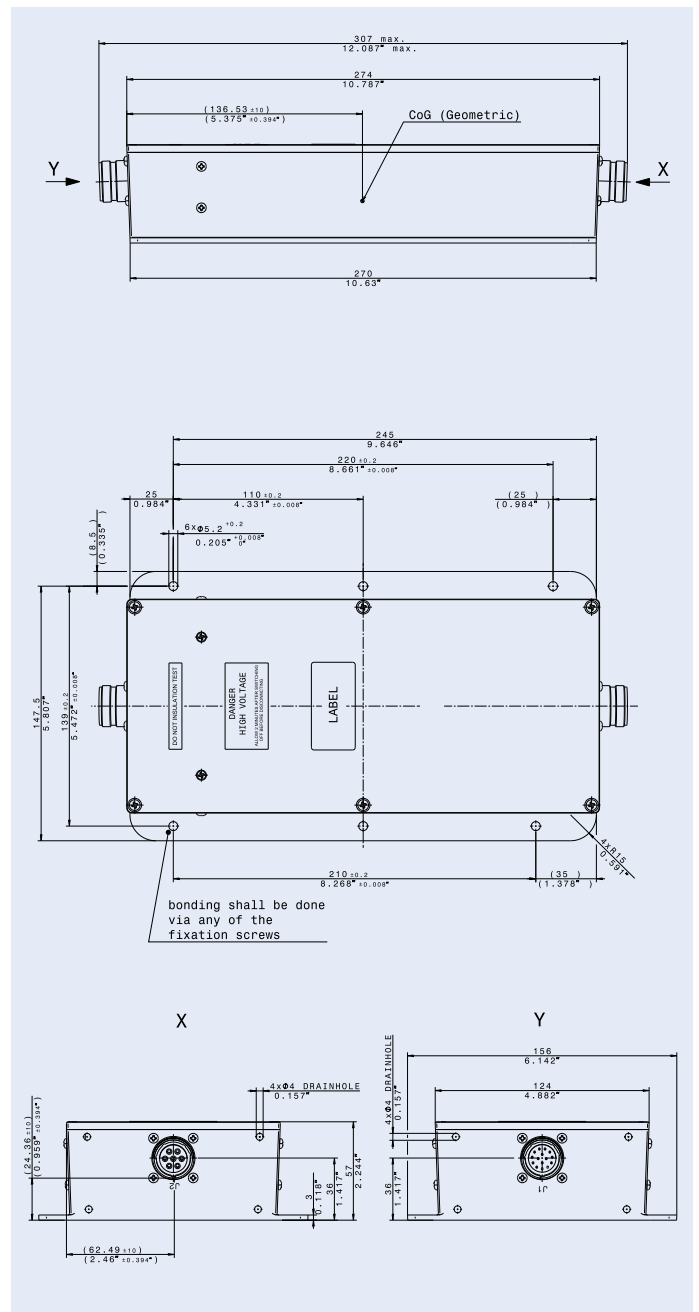
The power supply is connected to the aircraft's single phase 115 V 400 Hz power network. This power supply consumes 75 percent less power than the previous system.

This power supply works as a slave to the power supply of the upper beacon light to achieve synchronization of the red and white anti-collision lighting systems. If the signal from the master is not available, all power supplies automatically switch to an unsynchronized free running mode.



Technical Data:

- Operating Voltage: 115 V_{rms}/360 to 800 Hz
- Nominal Frequency: 400 Hz
- Operating Current
 - Nominal: 370 mA_{rms} max. (t > 30 s)
 - Inrush: 6 A_{rms} max. (t < 2 ms)
 - Startup: 1.5 A_{rms} max. (t < 30 s)
 - No Load: 200 mA_{rms} max.
- Power Consumption
 - Apparent Power: 42 VA max.
 - Active Power: 38 W max.
- Power Factor: > 0.9
- Output Channel
 - Energy per Flash: 30 J max.
 - Pulse Duration: 160 ms ± 30 ms
- Flash Rate: 60 ± 5 flashes/minute
- Pulse Shape: double flash
50 ms on – 60 ms off – 50 ms on
- Flash Mode: synchronized/free running
- Lifetime: approx. 21,000 operating hours
- Weight: 1.55 kg/3.41 lbs max.



LED Wing Strobe Lights | 2LA456223-01 for Conventional Wing Tips

The LED wing strobe light 2LA456223-01 was designed to replace the previous flash tube units on conventional wing tips.

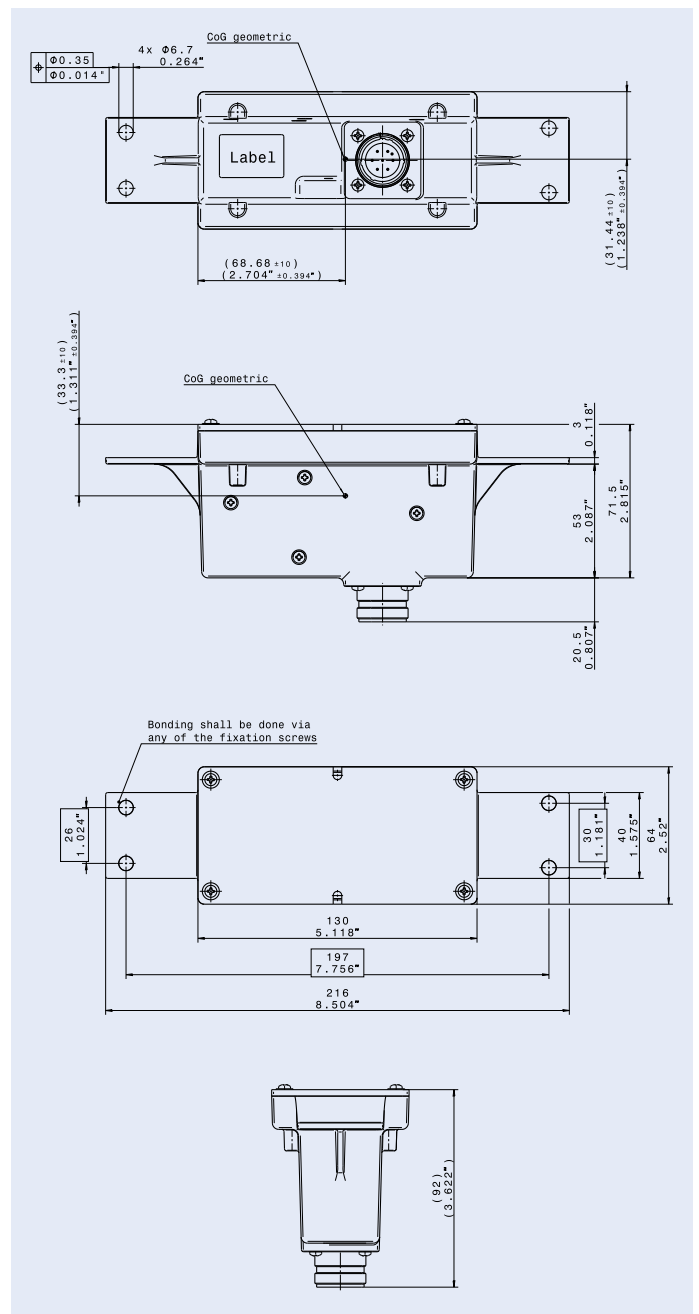
Two of these wing strobe lights in combination with the rearward strobe light 2LA456241-00 fulfill the FAR § 25.1401 requirements as a system.

The new product is mechanically interchangeable with its predecessor. Thanks to the robust design, the new wing strobe lights are highly resistant to the extreme vibration loads on the wing tip. They are protected by the wing tip lenses.

A blue LED will indicate nearly-end-of-life status. Facing downwards, this signal can easily be checked from the ground while the strobe light is not operating.

Technical Data:

- Energy per Flash: 20 J max.
- Pulse Duration: 160 ms ± 30 ms
- Pulse Shape: double flash
50 ms on – 60 ms off – 50 ms on
- Flash Rate: 60 ± 5 flashes/minute
- Light Color: Aviation White
in compliance with FAR § 25.1397
- Light Intensity: in compliance with FAR § 25.1401
- Light Distribution: in compliance with FAR § 25.1401
as system in combination with rearward strobe and navigation light 2LA456241-00
- Lifetime of LEDs: approx. 20,000 operating hours
- Nearly-end-of-life indication: blue LED
- Weight: 0.420 kg/0.926 lbs max.



Power Supply | 8ES456294-00 for Conventional LED Wing Strobe Light

Each LED wing strobe light 2LA456223-01 is operated by one power supply 8ES456294-00. The necessary flash energy is stored in maintenance-free capacitors to ensure low emissions on the electrical network.

The power supply is connected to the aircraft's single phase 115 V 400 Hz power network. In comparison to the previous system, this power supply consumes 75 percent less power.

To achieve synchronization of the red and white anti-collision lighting systems, this power supply operates as a slave to

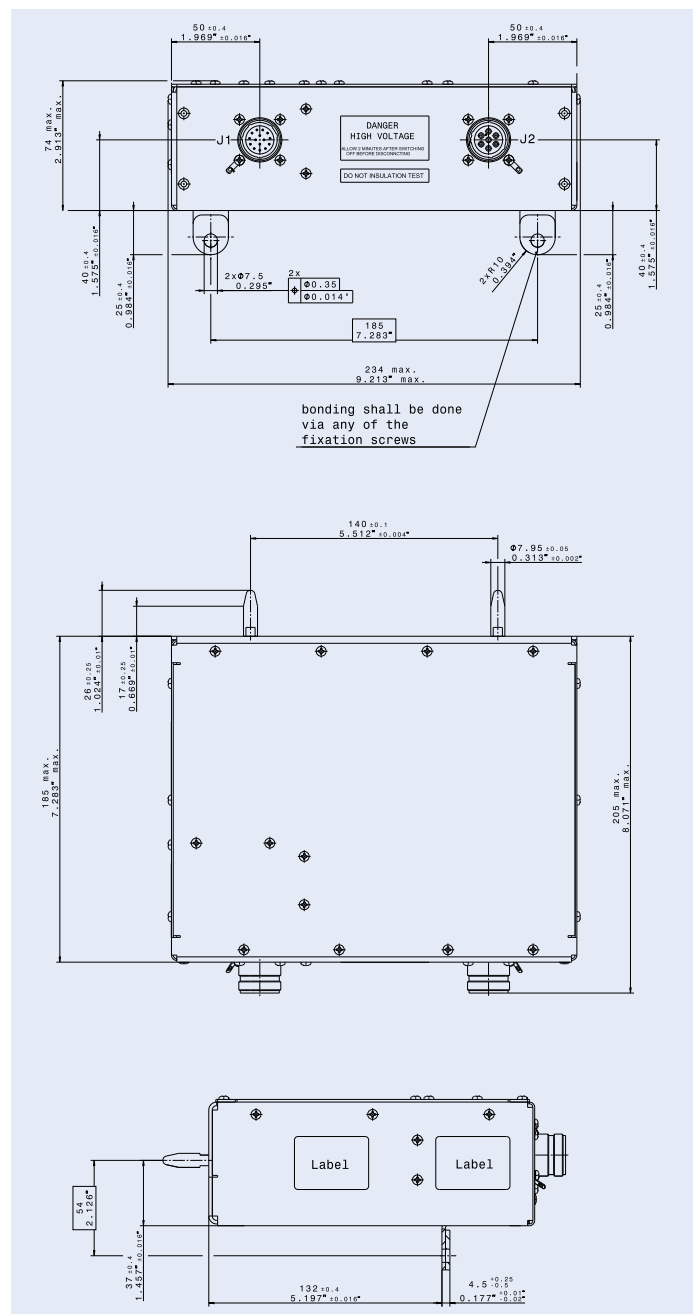
the power supply of the upper beacon light. If the signal from the master is not available, all power supplies automatically switch to a free running mode without synchronization.

This power supply is mechanically fully interchangeable with the previous unit.



Technical Data:

- Operating Voltage: 115 V_{rms}/360 to 800 Hz
- Nominal Frequency: 400 Hz
- Operating Current
 - Nominal: 285 mA_{rms} max. (t > 30 s)
 - Inrush: 6 A_{rms} max. (t < 2 ms)
 - Startup: 1.5 A_{rms} max. (t < 30 s)
 - No Load: 100 mA_{rms} max.
- Power Consumption
 - Apparent Power: 33 VA max.
 - Active Power: 30 W max.
- Power Factor: > 0.9
- Output Channel
 - Energy per Flash: 20 J max.
 - Pulse Duration: 160 ms ± 30
- Flash Rate: 60 ± 5 flashes/minute
- Pulse Shape: double flash
50 ms on – 60 ms off – 50 ms on
- Flash Mode: synchronized/free running
- Lifetime: approx. 55,000 operating hours
- Weight: 1.40 kg/3.08 lbs max.



LED Rearward Strobe and Navigation Light | 2LA456241-00

With the new generation of exterior lighting for the A320 aircraft family, UTC Aerospace Systems presents a combined rearward strobe and navigation light device.

The navigation light, part of 2LA456241-00, contains two optical systems – each independently fulfills the FAR requirements regarding light color, intensity and distribution. Its integrated power supply is connected to the aircraft's 115 V 400 Hz power system.

The rearward strobe light part of this unit fulfills the FAR § 25.1401 requirements as a system in combination with a

set of LED wing strobe lights – either 2LA456509-02/510-02 for sharklets or 2LA456223-01 for conventional wing tips.

A blue LED will indicate nearly-end-of-life status. It is visible from the ground and can be checked while the strobe light is not in operation.

The rearward strobe and navigation light 2LA456241-00 was designed to withstand the high vibration load on the aircraft's cone and the high temperature conditions caused by hot gas emission from the APU exhaust outlet. A glazing made of heat resistant glass covers the entire unit.



Technical Data:

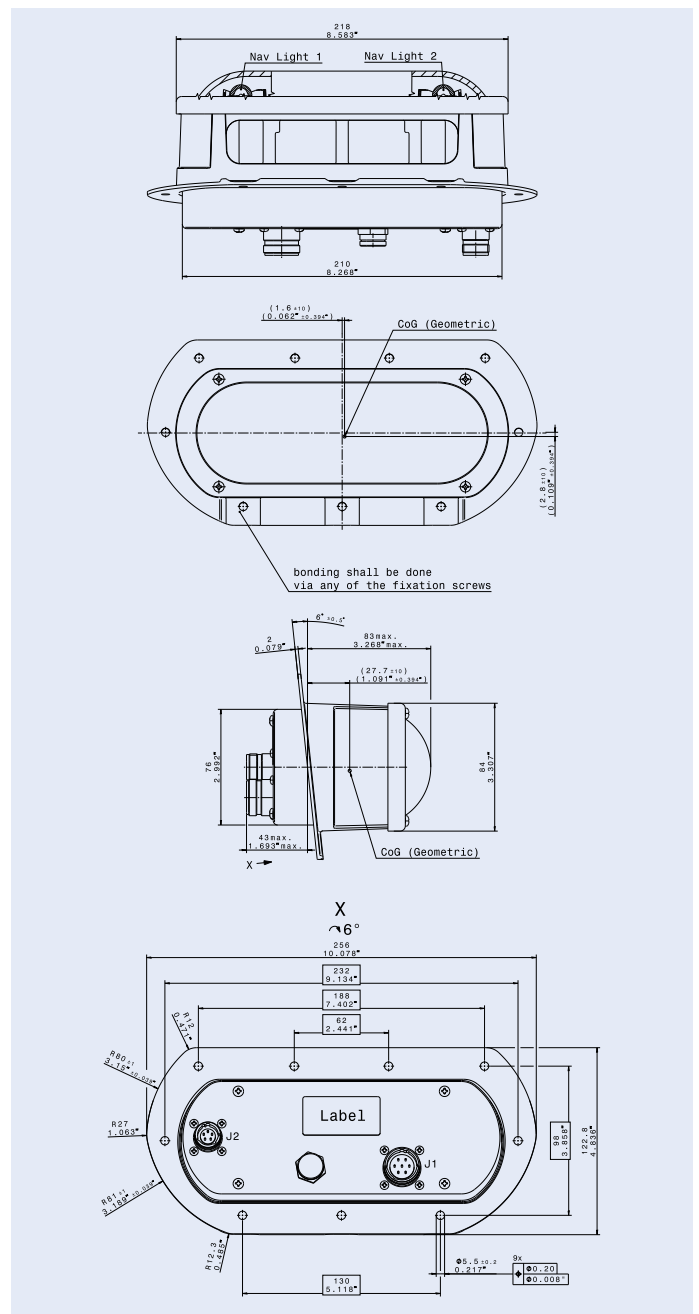
- Weight: 1.52 kg/3.34 lbs max.

Navigation Light:

- Operating Voltage: 115 V_{rms} / 360 to 800 Hz single phase
- Operating Current: 2 x 110 mA_{rms} max.
- Power Consumption: 2 x 12 VA max.
- Light Intensity, Distribution and Color: in compliance with FAR § 25.1389 to § 25.1397
- Lifetime of LEDs: approx. 20,000 operating hours
- Nearly-end-of-life indication: green LEDs

Strobe Light:

- Energy per Flash: 20 J max.
- Pulse Duration: 110 ms ± 20 ms
- Flash Rate: 60 ± 5 flashes/minute
- Light Color: Aviation White in compliance with FAR § 25.1397
- Light Intensity: in compliance with FAR § 25.1401
- Light Distribution: 120° min. horizontal; 75° min. vertical; in compliance with FAR § 25.1401 as system in combination with 2 LED wing strobe lights 2LA456509-02/510-02 for sharklets or 2LA456223-01 for conventional wing tips
- Lifetime of LEDs: approx. 20,000 operating hours
- Nearly-end-of-life indication: blue LEDs



Power Supply | 8ES456222-01 for Rearward Strobe Light

While the navigation light part of 2LA456241-00 has its own integrated power supply, the strobe light part needs an external power supply 8ES456222-01.

The power supply is connected to the aircraft's single phase 115 V 400 Hz power network. The necessary flash energy is stored in maintenance-free capacitors to minimize emissions on the electrical network. In comparison to the previous power supply the power consumption is reduced by nearly 70 percent.

To synchronize the red and white anti-collision lighting

systems, the power supply of the upper red beacon light operates as a master to the other power supplies. If the signal from the master is not available, all power supplies automatically switch to a free running mode without synchronization.

This power supply is mechanically fully interchangeable with the previous unit.

Technical Data:

- Operating Voltage: 115 V_{rms}/360 to 800 Hz
- Nominal Frequency: 400 Hz
- Operating Current
 - Nominal: 285 mA_{rms} max. (t > 30 s)
 - Inrush: 6 A_{rms} max. (t < 2 ms)
 - Startup: 1.5 A_{rms} max. (t < 30 s)
 - No Load: 100 mA_{rms} max.
- Power Consumption
 - Apparent Power: 33 VA max.
 - Active Power: 30 W max.
- Power Factor: > 0.9
- Output Channel
 - Energy per Flash: 20 J max.
 - Pulse Duration: 110 ms ± 20 ms
- Flash Rate: 60 ± 5 flashes/minute
- Flash Mode: synchronized/free running
- Lifetime: approx. 47,000 operating hours
- Weight: 1.10 kg/2.42 lbs max.

