



Electronic Design Service (EDS)
Engineering Solutions for Avionics and Electrical Systems

SSR-CU

Solid State Relay Control Unit

Low-Voltage Controlled AC Load Switching Device

Automation | Electrical Isolation | Reliable Switching



Key Features

- Low-voltage control of AC loads using a 3–32 VDC input signal
- High-power solid-state relay switching for reliable operation
- Full galvanic isolation between control electronics and AC power
- Two output outlets: Always-On and Relay-Controlled
- Compatible with microcontrollers, SBCs, and automation systems
- Zero-voltage switching SSR for reduced electrical noise
- LED indicators for power and relay status
- Supports loads up to 12 A or 6 A depending on model

User Guide

Model: SSR-CU

Version 4.0

2026

Electronic Design Service
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Revision History

The Table below displays the revision history for the chapters in this User Guide

Date	Version	Change Made
July 23, 2022	1.0	Original release
March 11, 2026	4.0	Full update

Contact Us

For the most up-to-date information about the Electronic Design Service products, go to the Electronic Design Service website at www.eldesignservice.com.

Technical Support:

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Introduction

About the SSR-CU Solid State Relay Control Unit

The **SSR-CU Solid State Relay Control Unit** provides safe switching of AC-powered devices using a low-voltage control signal.

The device integrates a high-power solid-state relay and provides **full galvanic isolation between the control electronics and the high-voltage AC power circuit**. This allows microcontrollers, single-board computers, or other automation systems to safely control electrical loads connected to a standard electrical outlet.

The SSR-CU can be used to control devices such as:

- sump pumps
- heaters
- lighting systems
- automation equipment

Any system capable of generating a **3 – 32 VDC control signal** can be used to operate the relay.

The SSR-CU connects one AC power input to two output outlets:

- **Always-On Outlet** – continuously powered
- **Controlled Outlet** – switched by the solid-state relay

Two versions of the device are available:

- **SSR-CU_12A** – maximum load current 12 A
- **SSR-CU_6A** – maximum load current 6 A

Both versions use the **UPD2425 zero-voltage switching solid-state relay**, which is rated for 25 A internal switching capacity and supports 239A peak maximum surge current for the 1 Cycle period.

The front panel contains two LED indicators:

- **Power LED** – indicates AC power is present
- **Switch On LED** – indicates the relay is activated

Safety Notices

Follow the guidelines below to ensure safe operation of the SSR-CU device.

Electrical Safety

- The SSR-CU operates with **AC mains voltage**.
- Use only properly grounded electrical outlets.
- Do not operate the device if the power cable is damaged.

Installation Safety

- Disconnect power before installing or servicing the device.
- Ensure the connected load does not exceed the rated current of the device.

Environmental Conditions

- Operate the device only within the specified temperature and humidity limits.
- Do not install the device in environments exposed to water or condensation.

Service

The SSR-CU device contains no user-serviceable internal components.
Contact **Electronic Design Service technical support** if service is required.

System Overview

The SSR-CU provides a simple and reliable method for controlling AC loads from low-voltage electronics.

The internal solid-state relay uses **optical isolation**, ensuring that the control electronics remain electrically isolated from the AC power circuit.

This design provides:

- improved safety
- protection for control electronics
- reliable switching without mechanical contacts

Figure 1 and Figure 2 show the SSR-CU device versions.



Figure 1 SSR-CU_12A



Figure 2 SSR-CU_6A

Specifications

SSR-CU_12A Specifications

Output Specifications

Operating Voltage: 24 – 280 Vrms (47–440 Hz)
Maximum Steady-State Current: 12 A
Transient Overvoltage: 600 V peak
Maximum 1-Cycle Surge Current (50/60 Hz): 239 A peak
Maximum On-State Voltage Drop: 1.4 Vrms

Input Specifications

Control Voltage: 3 – 32 VDC
Minimum Turn-On Voltage: 3 VDC
Minimum Turn-Off Voltage: 1 VDC
Maximum Input Current: 10 mA
Minimum Turn-On Current: 3 mA

Environmental Specifications

Operating Temperature: 32 °F – 90 °F (0 °C – 32 °C)
Operating Humidity: 0 – 85 % non-condensing

Certification

UL Certification: In progress

SSR-CU_6A Specifications

Output Specifications

Operating Voltage: 24 – 280 Vrms (47–440 Hz)
Maximum Steady-State Current: 6 A
Transient Overvoltage: 600 V peak
Maximum 1-Cycle Surge Current (50/60 Hz): 239 A peak
Maximum On-State Voltage Drop: 1.4 Vrms

Input Specifications

Control Voltage: 3 – 32 VDC
Minimum Turn-On Voltage: 3 VDC
Minimum Turn-Off Voltage: 1 VDC
Maximum Input Current: 10 mA
Minimum Turn-On Current: 3 mA

Environmental Specifications

Operating Temperature: 32 °F – 90 °F (0 °C – 32 °C)
Operating Humidity: 0 – 85 % non-condensing

Certification

UL Certification: In progress

Package Contents

The SSR-CU package includes:

1. SSR-CU device
2. Power cable

Device Operation

When AC power is applied, the **Power LED** indicates that the device is energized.

When a valid control signal is applied to the control input:

- the internal solid-state relay activates
- the **Switch On LED** illuminates
- the controlled outlet receives AC power

When the control signal is removed, the relay turns off and power to the controlled outlet is disconnected.

Troubleshooting

No Power Indication

If the **Power LED** does not illuminate:

- Verify the power outlet is active.
- Check the input fuse and replace it if necessary.

If the fuse fails again after replacement, the device must be serviced.

Relay Does Not Turn On

If the **Switch On LED** does not illuminate when a control signal is present:

- Verify the control signal voltage is at least **3 VDC**.
- Verify the control signal can provide at least **3 mA current**.

If the control signal meets these requirements and the relay still does not activate, the device must be serviced.

Warranty

When used and maintained in accordance with the installation and operating instructions, the SSR-CU product is warranted against defects in material and workmanship for **one year from the date of purchase**.

During the warranty period, Electronic Design Service will repair or replace the product if the failure is determined to be due to defective materials or workmanship.

The warranty does not cover:

- improper installation
- misuse or accidental damage
- unauthorized modifications
- use outside the country of purchase

Technical Support

Electronic Design Service, LLC

Website

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Technical Support

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Support requests can also be submitted through the contact page:

<https://eldesignservice.com/contacts-html/>