

Version 1.0

# Fast Role Swap (FRS) Switch User Guide

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## Introduction

The USB Power Delivery Fast Role Swap switches provide a tool to simulate a loss of external power. They are currently available to use for correlation, validation and debugging of USB Fast Role Swap architecture.

## Safety

The FRS switch was developed for use with USB-IF approved test equipment to specifically perform the tests define in Chapter 8 of the USB Power Delivery Compliance Test Specification. Any use of the FRS switch outside of this scope is strongly discouraged.

When connecting or disconnecting the DC side spliced power line to the FRS Switch via the banana plug connectors users ***\*MUST\**** disconnect the AC/DC power adapter from AC power and ensure all residual power in the AC/DC adapter is discharged. Not doing so can cause serious injury or death through electrocution.

The FRS switch should not be left on or connected for any extended duration. It is strongly recommended that the FRS Switch be connected only for the purposes of running the FRS Compliance tests, then disconnected.

At no point should a user disassemble the FRS Switch.

## Equipment

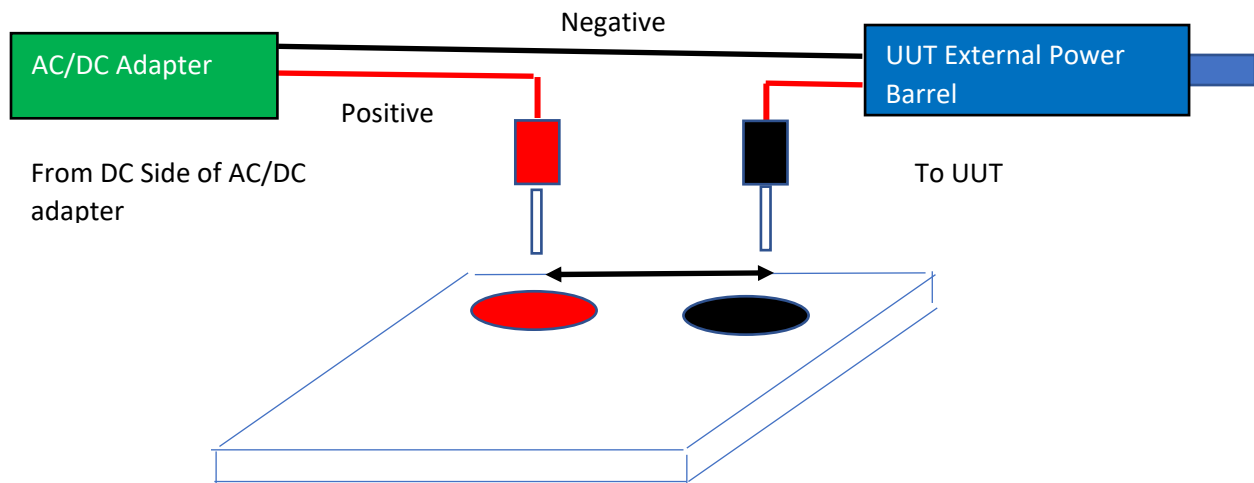
Below is a table of equipment needed to us the FRS switch:

<b>Additional Equipment:</b>	<b>Used For:</b>	<b>Provided By:</b>
AC/DC Power Adapter with DC side power line spliced. Terminate splice on each end with banana plug connectors	Connect both ends of the spliced power line to banana receptacles on FRS switch following orientation labels	User must provide their own AC/DC Power Adapter
Control cable terminated in 2.1mm Barrel Jack Plug	Connect to the control receptacle on the FRS switch to Approved USB-IF Compliance Test equipment	Barrel Jack Plug provided by USB-IF with purchase of FRS switch. User must create own control cable
Approved USB-IF USB PD Compliance Test Equipment	Running FRS tests as defined in Chapter 8 of the USB Power Delivery Compliance Test Specification	List of approve USB PD test equipment can be found at <a href="https://www.usb.org/usbc">https://www.usb.org/usbc</a>

## Setup

Before continuing with setup please be sure to read the Safety section of this document.

Below is the connection diagram for the AC/DC adapter.



The FRS Switches shall be used with a customized AC/DC adapter. Users of the FRS Switch must provide their own AC/DC adapter in which the DC side power line is spliced and terminated in a banana plug connector on each side of the splice as depicted above. The ground line should not be spliced.

The FRS Switches have 3 exposed receptacles.

- Two banana receptacle connectors to interface with the DC output of an AC/DC power adapter.
- One 2.1mm barrel jack receptacle connector used for the control signal.

The two banana receptacle connectors have corresponding labels above them to indicate which side of the splice to connect. Labels will read "AC Adapter" to indicate that the banana plug connector on the AC/DC adapter side of the spliced power line be connected here. While the other label will read "to UUT" to indicate that the banana plug connector on the DC barrel jack side of the spliced power line be connected here. Reversing the orientation can damage the FRS Switch. See example pictures of an FRS Switch below with labels above the banana receptacle connectors.

The 2.1mm Barrel Jack Receptacle is labeled "Control" and is used with a DC signal to enable and disable the switch. A corresponding barrel jack plug will be shipped with each FRS Switch. The FRS Switch does not come with a control cable. The user must create their own control cable using the barrel jack plug included in the shipment. See example picture of an FRS Switch below with a Control label above the 2.1mm barrel jack receptacle.



In summary once you have the necessary equipment use the following steps to setup the FRS Switch.

1. Ensure that AC Power is disconnected from the AC/DC Power adapter.
2. Ensure that all power is discharged from the adapter.
3. Connected the AC/DC power adapter to the FRS switch by connecting the spliced power line on the DC side of the AC/DC power adapter to the banana receptacle connectors on the switch, following the orientation labels.
4. Connect "Control" cable to barrel jack receptacle labelled "Control"
5. Connect other end of "Control" cable to USB-IF Approved USB PD Test Equipment
6. Follow USB-IF Approved USB PD Test Equipment setup procedures
7. Connect AC Power to spliced AC/DC Power adapter

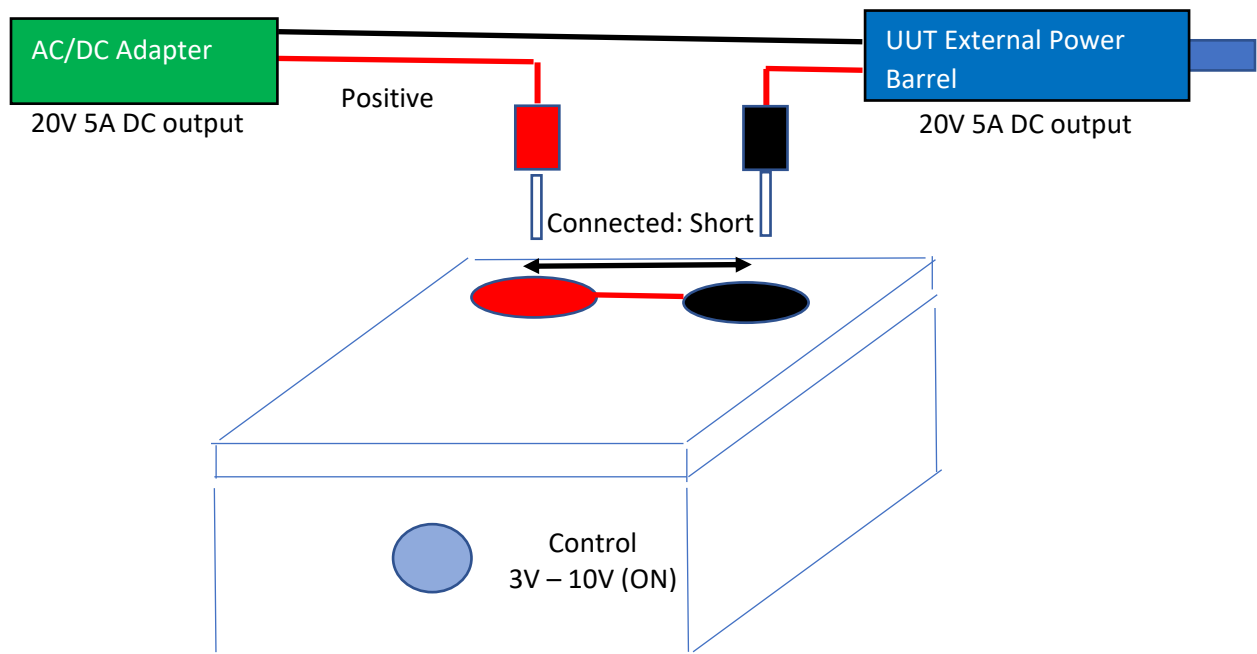
### Use:

The switches support up to 20 volts at up to 10A of current designed to work at full functionality from between 0 to 40 degrees Celsius.

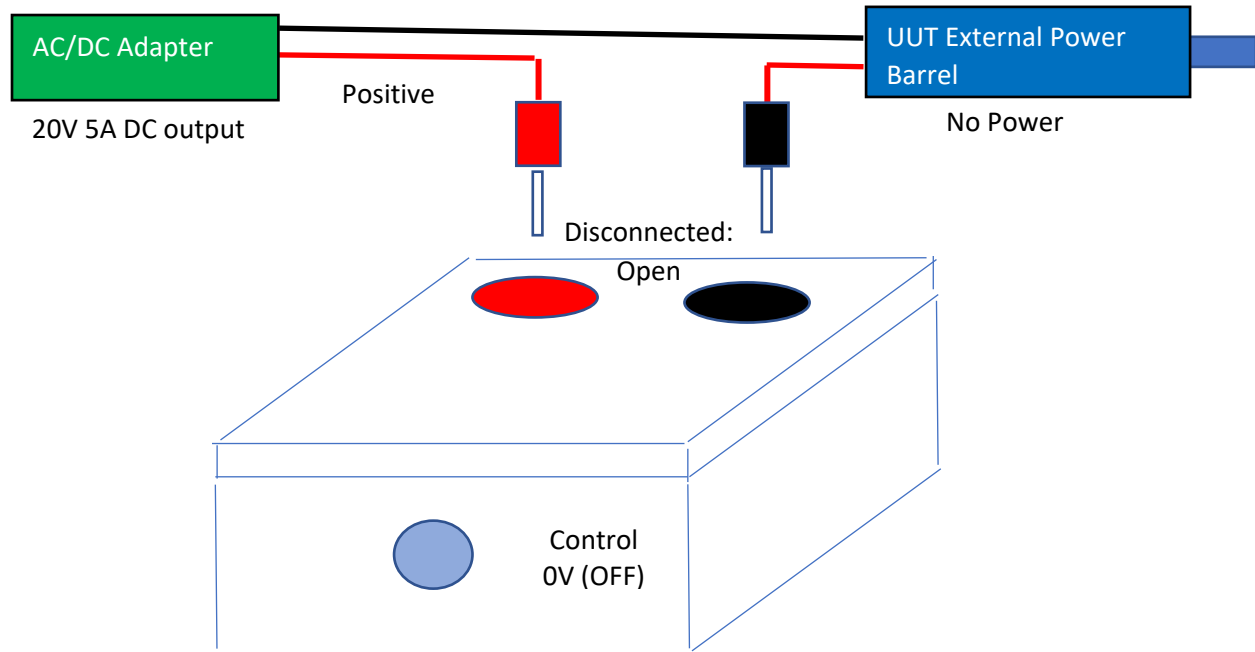
Below is the use table:

State	Control Voltage	Banana Receptacles
ON	3V-10V	Connected
OFF	All other voltages	Not Connected

Below drawing depicts the FRS Switch in the ON state when Control voltage is between 3V and 10V. It is suggested that a 6.5V control voltage be used.



Below drawing depicts the FRS Switch in the OFF state when the Control Voltage is 0V. It is suggested that 0V be used.



### Supporting Information:

The Data Sheet of the Crydom CMX60D20 as well as the Data Sheet for the 2.1mm barrel jack plug and receptacle are included in the zip file with this user guide.