USB-SD-Mux FAST

Introduction

The USB-SD-Mux FAST allows changing the contents of a Micro SD-Card while it is inserted into a DUT (Device under test). To do so the USB-SD-Mux FAST is inserted between the Micro SD-Card and the SD-Card socket of the DUT.

The USB-SD-Mux FAST contains a high bandwidth switch, that connects the Micro SD-Card to either the DUT or the on-board card reader. The device is controlled via an USB-C port. Additionally the USB-SD-Mux FAST provides two *open drain* outputs to control external signals, such as resets or card detects [1].

A Linux-only software allows controlling the device from a host computer.

The USB-SD-Mux FAST is an improved version of the first generation USB-SD-Mux, now called the USB-SD-Mux Classic.

The USB-SD-Mux FAST is a drop-in replacement for the USB-SD-Mux Classic.

Typical Use Cases

- **Automated Testing of Embedded Devices**
  The USB-SD-Mux FAST is used to deploy a new operating system to a DUT during automated testing.
- (**Remote) Deployment of Embedded Devices**
  Engineers can use the USB-SD-Mux FAST to deploy images to their DUTs during development – eliminating the need to handle Micro SD-Card on each boot.
- **Automation of Data Logging Equipment**
  The USB-SD-Mux FAST can be used to automate the collection of data from logging equipment, that can only write to Micro SD-Cards.

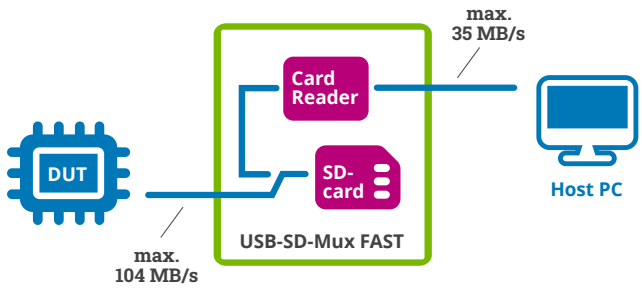

Figure 1: Signal flow

Technical Highlights

- Test server connection: USB-C
- Uses USB Mass-Storage profile - No extra drivers needed
- Mico SD-Card speeds up to UHS-I / SD104
- Unique serial number for easy identification
- Two open drain general purpose outputs
- Reads SD-Cards status registers SCR, CID and CSD
- High reliability thanks to EMI compatibility testing according to DIN EN 55032: 2022-08 and DIN EN 55035: 2018-04
- Status LEDs for power and modes on both sides
- Power up behaviour: Connect SD-Card to DUT

Technical Data

Card Reader	Microchip USB2642
SD-Card: Bandwidth	Approx 1.95 GHz analog bandwidth for digital signals (-3dB, S12)
SD-Card: Vcc Switch	On Resistance: 120 mΩ @ 25 °C Can handle 3.3 V and 1.8 V modes.
Open Drain Outputs	2 Outputs [1] On Resistance: 100 mΩ @ 25°C non isolated
Test Server Connection	USB-C device port (with USB 2.0)
Data rate SD-Card to DUT:	104MB/s (UHS-I, SD104) Depends on SD-Card and DUT
Data rate SD-Card to Host-PC:	35MB/s Limited by the card reader on the USB-SD-Mux, depends on SD-Card

System Requirements

- Linux system with kernel 4.* or higher
- Git, Python 3
- USB 2.0 port

Customization Services

In case the USB-SD-Mux FAST does not fully fit your needs we provide customized hardware and software solutions based on our existing ecosystem.

[1] A pin header for these signals must be soldered by the customer. This way the type of header and it's orientation can match the intended purpose.

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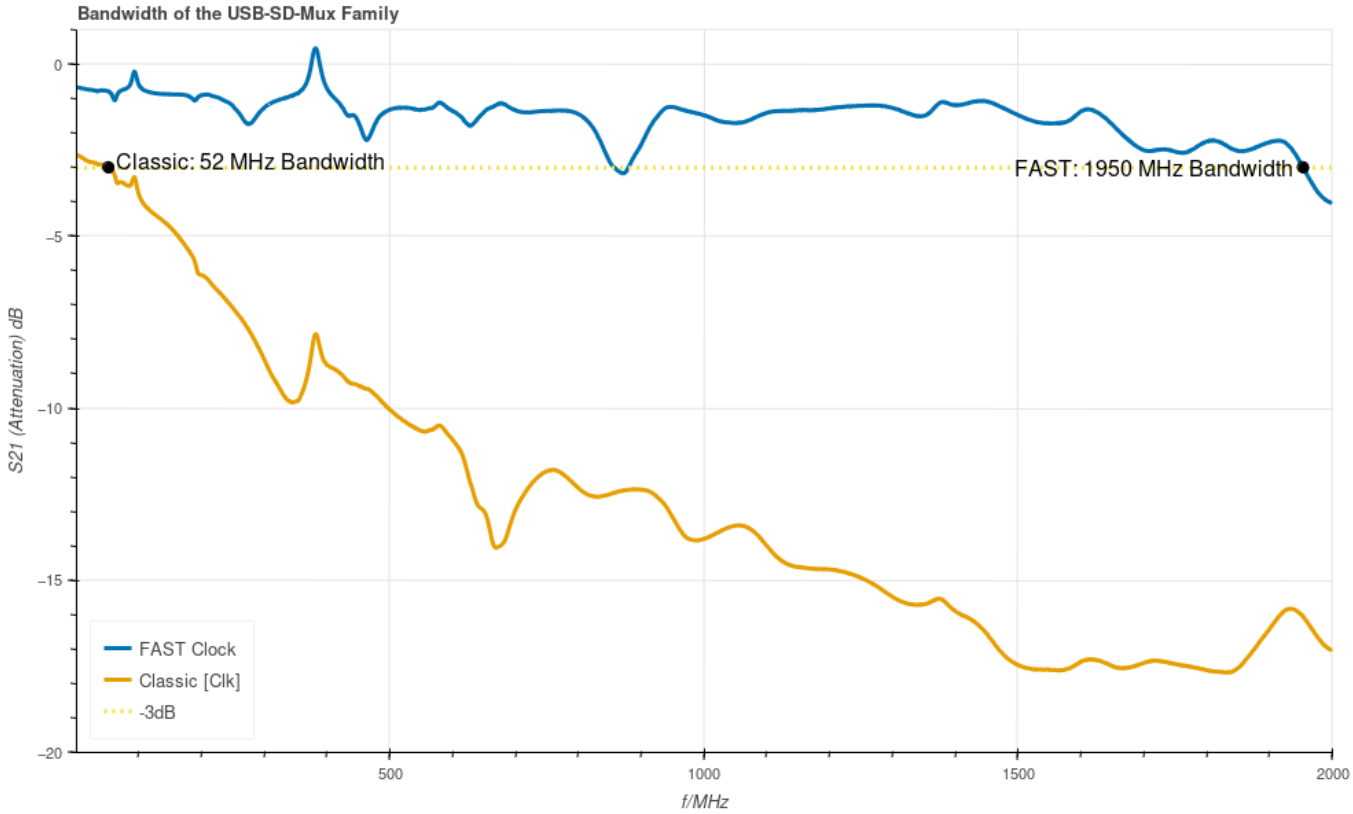

Figure 2: Bandwidth of the USB-SD-Mux Family.
Measured: Clock-Signal, Micro SD-Card slot to DUT port, device powered and switched to DUT

Further Links

- **Handbook**

https://www.linux-automation.com/usbsdmux-M01/

- **Control Software**

https://github.com/linux-automation/usbsdmux/

One of our focuses for the design of our software and hardware is the integration of labgrid.