USB-Switch-Tester
DESIGN RATIONALE

Makers Making Change
A Neil Squire Program

Introduction

The USB Switch Tester is a device used to test the functionality of an assistive switch with a 3.5 mm connection. This device allows users to determine if they successfully assembled their switch adapted device and make sure that all the components are working. The existing switch tester device such as Simple Switch Tester require a power source which adds to the cost over time.

The USB Switch Tester is intended to use the existing USB power sources or USB power adapters which are very common as the power source. USB power adapters are available in most households and can be purchased locally.

This device is intended to be used by users of assistive switches or disability professionals to confirm the assistive switch is functional.

Research

Existing Commercial Options

Title	Single Switch Tester
Link	https://www.ablenetinc.com/technology/single-switch-tester
Author	AbleNet
License	
Cost	$55 USD
Notes	Discontinued?

DIY designs

Title	Simple Switch Tester
Link	https://makersmakingchange.com/project/simple-switch-tester/
Author	MakersMakingChange
License	Attribution-ShareAlike 4.0 International
Cost	$11 - $25 CAD
Test Build (Y/N)	Y
Add to Library (Y/N)	n/a
Notes	Battery powered

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Requirements

Goals

ID	Description
G01	Cost Effective (Low cost comparing to alternative options)
G02	Easy to use
G03	Easy to assemble
G04	Minimal size

Functional Requirements

F01	The device shall have one input channel.
F02	The device shall have a visual feedback element via a LED to notify the user about the switch activations.
F03	The device latency shall not exceed 50 milliseconds.
F04	The device shall not consume more than 20 mA of current from the USB port.
F05	The device shall have a USB Type A PCB connector.

Non-functional Requirement

NF01	Shall look professional with tight tolerance on case size.
NF02	The device shall weigh less than 25 grams.

Constraints

C01	Shall be able to be built as a single unit for ≤ $30 CAD
C02	Shall be easily manufacturable by a moderately skilled maker

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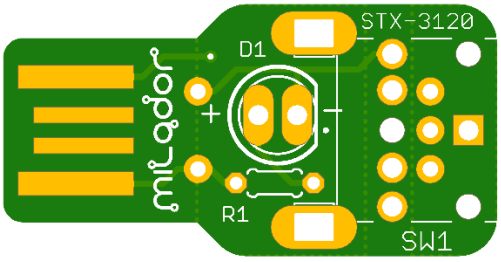
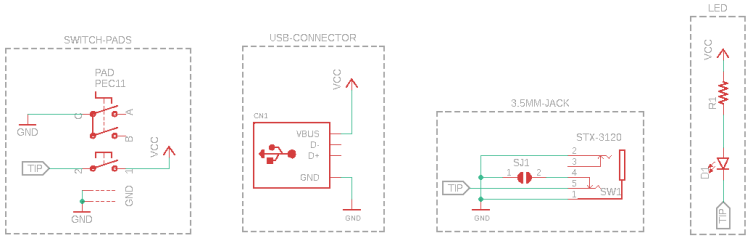
Conceptual Design

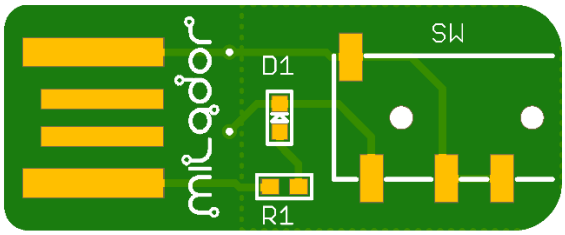
Through hole





- Units: 5
- PCB Price: US $2.0
- Components: US $7.65 Or CAD $10.25
- Digikey shipping : US $6 or CAD $8
- Shipping :
    - Economical Global Direct Line
        - No tracking : US $3.70
        - 10-18 business days
        - Taxes will be levied at the check-out point for the order with an intrinsic value ≥15.5USD.Last mile service is provided by Canada Post.
    - Global Direct Line Saver
        - US $10.57
        - 8-15 business days
        - The last mile delivery service is provided by Canada Post.
- Total all : US $17.35 or CAD $23.25 or CAD $3.47 per unit

SMT



- Units: 5
- PCB Price: US $2.0
- SMT Price
    - Setup fee US $8.00
    - Stencil US $1.50
    - Panel US $0.00
    - Large Size US $0.00
    - Components US $0.72
    - Extended components fee
        - US $3.00
    - SMT Assembly
        - US $0.06
- Total Assembly and PCB: US $15.28
- Shipping :
    - Economical Global Direct Line
        - No tracking : US $3.70
        - 10-18 business days
        - Taxes will be levied at the check-out point for the order with an intrinsic value ≥15.5USD.Last mile service is provided by Canada Post.
    - Global Direct Line Saver
        - US $10.57
        - 8-15 business days
        - The last mile delivery service is provided by Canada Post.
- Total all : US $18.98 or CAD $25.5 or CAD $5.1 per unit

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Concept	Through Hole	SMT
Units	5	5
PCB Cost	US $2	US $2
Total Assembly Cost	Volunteers time	US $15.28
Components Cost	US $7.65	US $3.72
Components Shipping Cost	US $6	None
Most affordable shipping Cost (Economical Global Direct Line)	US $3.70	US $3.70
Total Cost	US $17.35 or CAD $23.25	US $18.98 or CAD $25.5
Total Per Unit Cost	CAD $3.47	CAD $5.1