Staznik Systems

## DC to Breadboard Power Adapter PCB

FEATURES

- **Selectable 5 V Regulated Output**
- **Accepts Inputs Up To 12 V**
- **Up To 100 mA Output Current**
- **Internal Short-Circuit Protection**
- **Integrated Thermal Shutdown Protection**
- **Integrated Decoupling Capacitors**
- **Low Resistance (Under 10 mΩ)**
- **Life Span of 10 000 Switches**
- **Compact 12.5x30 mm Size**
- **Manually Manufacturable**

DESCRIPTION

The SPA1051B is a compact power adapter designed to connect a DC barrel jack to the power rails of a standard breadboard.

It provides selectable output between the input voltage of up to 12V and regulated 5V using a physical slide switch. The compact 12.5x30 mm form allows it to fit in non-intrusively. It is ideal for powering circuits during prototyping on breadboards.

The 5 V regulator integrates thermal shutdown protection, allowing it to be left on for extended periods of time at high power demands without risk of damage. In addition, the device has been designed with thermals in mind, featuring a high thermal mass, resulting in smaller temperature rises.
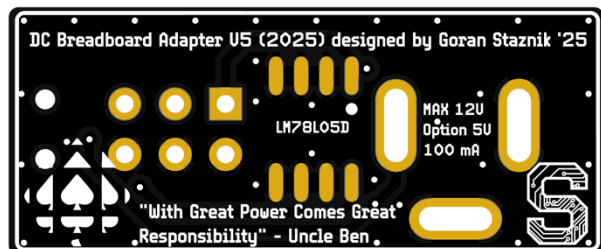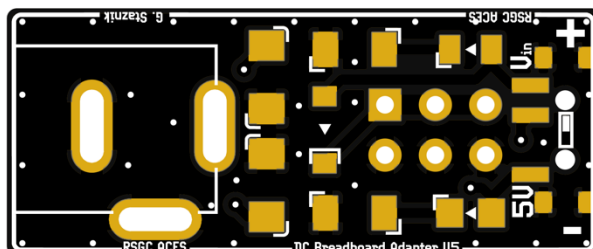
See device information for dimensions
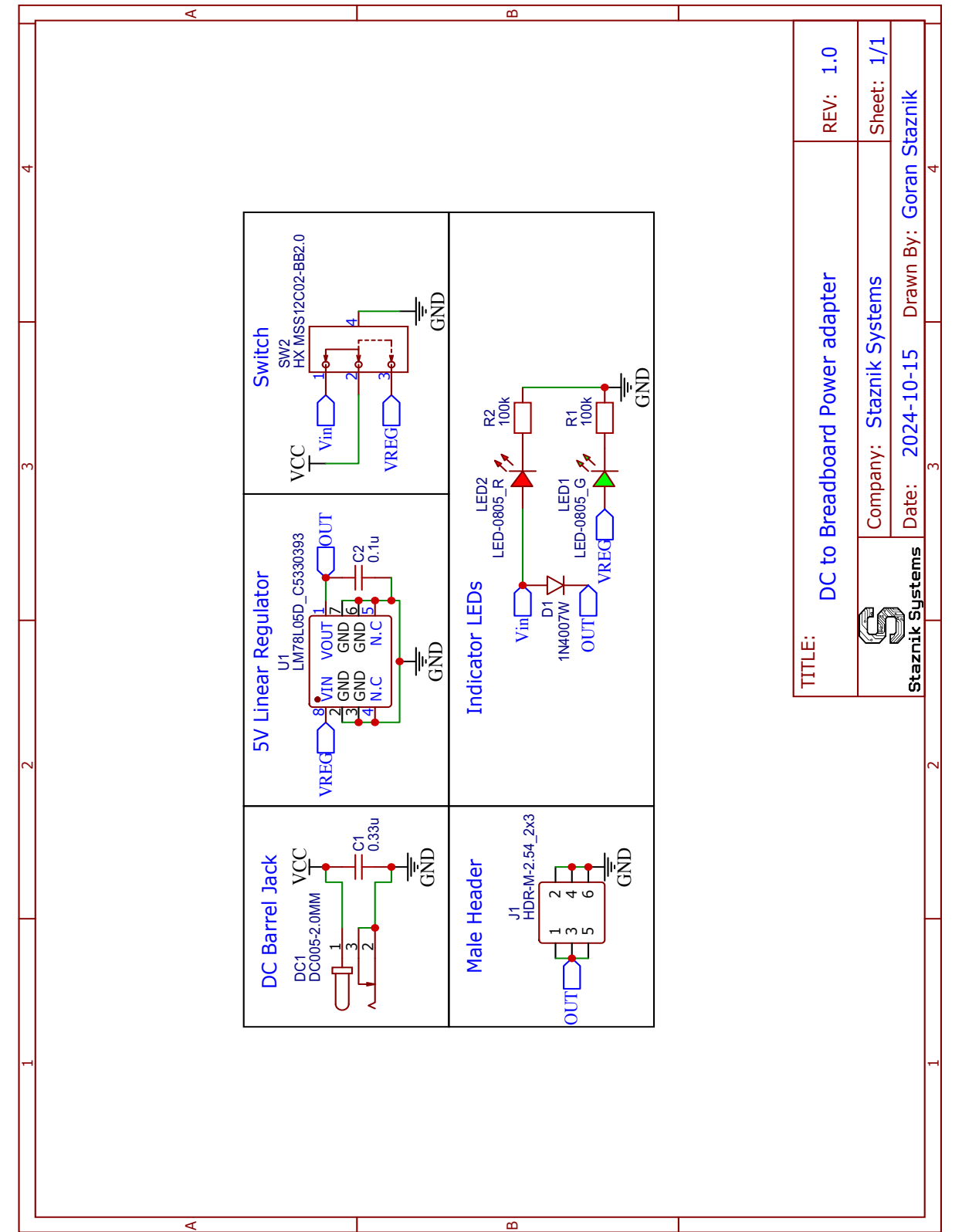
Device Overview

- hanxia HX MSS12C02-BB2.0 Slide Switch
  https://www.lcsc.com/datasheet/lcsc_datasheet_2410121534_hanxia-HX-MSS12C02-BB2-0_C25168817.pdf
- Slkor (SLKORMICRO Elec.) LM78L05D 5V Linear Regulator
  https://www.lcsc.com/datasheet/lcsc_datasheet_2401051154_Slkor-SLKORMICRO-Elec--LM78L05D_C5330393.pdf

When choosing capacitors and resistors, ensure power ratings are adequate for their functions on the device. The 12 V limit is due to the slide switch, the linear regulator is capable up to 30 V.
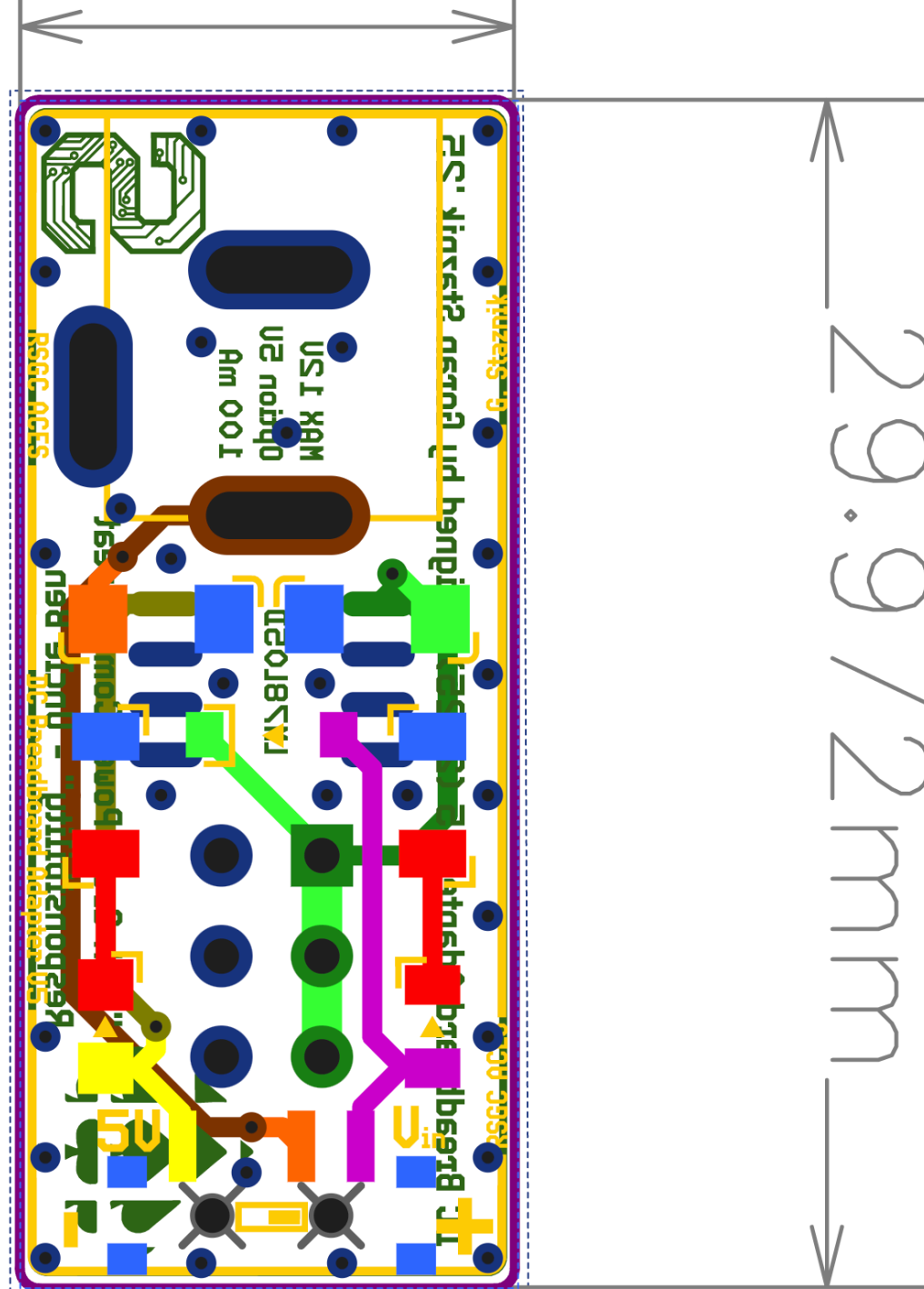
Electrical Characteristics

	Min	Typ.	Max	Unit
V_{in} Input Voltage (V_{in} selected)	0	9	12	V
V_{in} Input Voltage (5 V selected)	7	9	12	V
V_{out} Output Voltage (when 5 V selected)	4.8	5	5.2	V
V_D Dropout Voltage (when 5 V selected)		1.7		V
I_{out}	10	50	100	mA
Resistance (25°C)	10	20	50	mΩ
Operating Temperature	-40	35	150 (T_j)	°C

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Schematics & Technical Diagrams

Switch
SW2
HX MSS12C02-BB2.0
VCC
Vin
VREG
GND

5V Linear Regulator
U1
LM78L05D_C5330393
VIN VOUT
GND GND
GND GND
N.C N.C
VREG
OUT
C2
0.1u
GND

DC Barrel Jack
DC1
DC005-2.0MM
VCC
C1
0.33u
GND

Indicator LEDs
R2
100k
R1
100k
LED2
LED-0805_R
LED1
LED-0805_G
GND
Vin
D1
1N4007W
OUT
VREG

Male Header
J1
HDR-M-2.54_2x3
OUT
GND

TITLE: DC to Breadboard Power adapter

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Sheet: 1/1

Company: Staznik Systems
Date: 2024-10-15
Drawn By: Goran Staznik

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Note that a 3D model for the slide switch was not found, and does not appear in the rendering.

Ordering Information

The SPA1051B was designed with the express purpose of ease and low cost of manufacture. All parts were ensured to be available on LCSC. Additionally, it was elected to use parts of 1206 package for easy of manual assembly.

Below are the specifications that are required to produce the SPA1051B PCB:

	Spec.	**Unit**
Minimum Trace clearance	0.6	mm
Minimum Trace Width	20	mil
Minimum Via Drill Size	0.3	mm
Via Hole to Hole Spacing	0.6	mm
Trace/Via to Copper Pour Clearance	0.6	mm
Minimum Character Width	6	mil

Here are the specifications when producing or ordering the PCB:

	Spec.	**Unit**
PCB Layers	2	
Board Material	FR-4	
Board Thickness*	1.6	mm
Board Dimensions	12.5x30	mm
Colour	--	
Surface Finish**	--	
Outer Copper Weight	1	oz
Via Coverings	--	

*Other thicknesses are acceptable, though it is recommended to keep the board thin for better grounding with the ground pours.

**Surface finish can be determined by the user, however, ENIG is recommended for applications requiring stocking the un-manufactured PCB for long periods of time. Tough HASL is acceptable in most cases.

When manufacturing the PCB, ensure that all components are correctly placed, and the direction of the diode, LEDs and linear voltage regulator IC are correct. Also ensure that the chosen parts match the specifications.

Important Notice

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