Modular Backplane For RC2014

User Guide

For module: SC106 version 1.0

Design and Documentation by Stephen C Cousins

Edition 1.0.0

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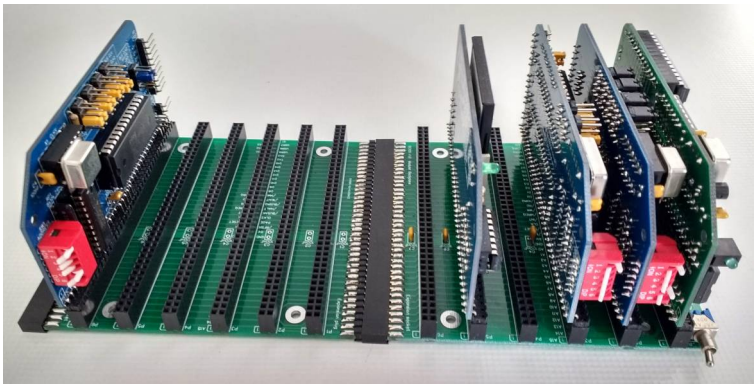
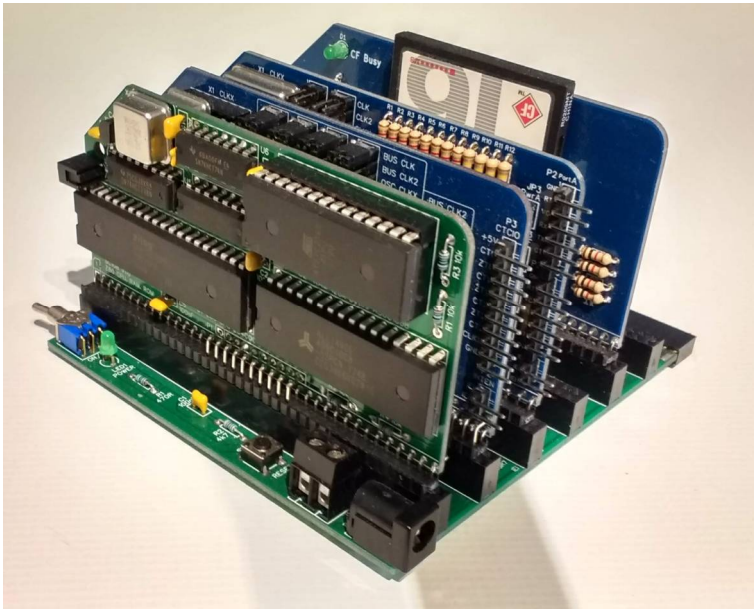
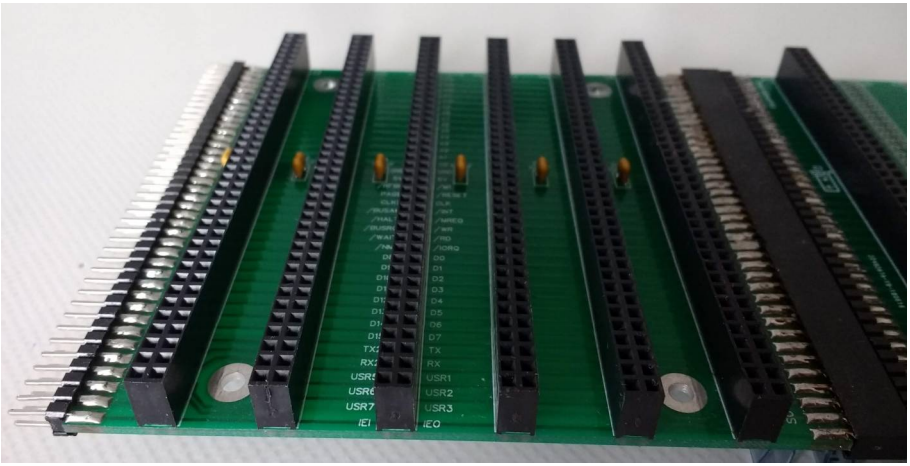
Overview

My goal is to produce a number of backplane **sections** which can be joined together to form a larger backplane, or used individually for small systems. Not only can the backplane be of variable length, but it can be made of sections that have any special features required. It could even allow cards with different types of bus connector to be used together.





This backplane section has six RC2014 (80 pin) card sockets, an edge mounted 80 pin expansion plug and an edge mounted 80 pin expansion socket.

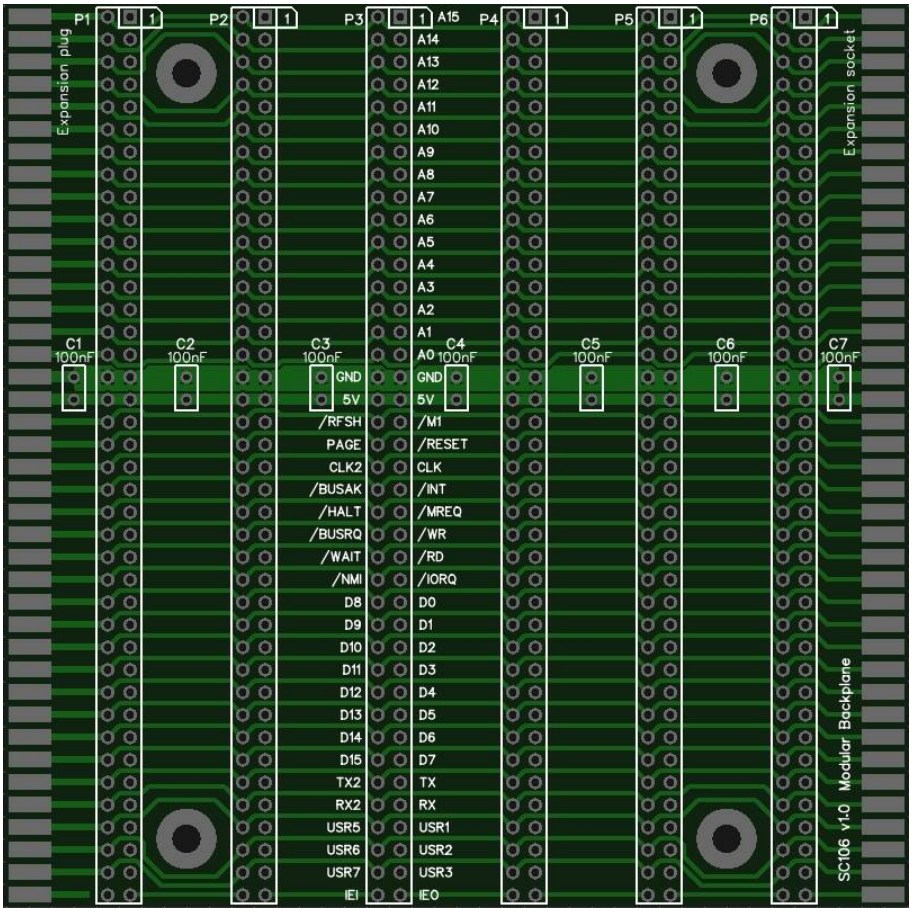


Pin 40 of the standard RC2014 bus is used for the Z80 interrupt daisy chain signal IEO, with the 40th pin of the enhanced bus, sometimes called pin 80, being used for the IEI signal. These two pins therefore do not connect to all 6 sockets in parallel, but instead link pin 40 of one socket to pin 80 of the next, forming a chain.

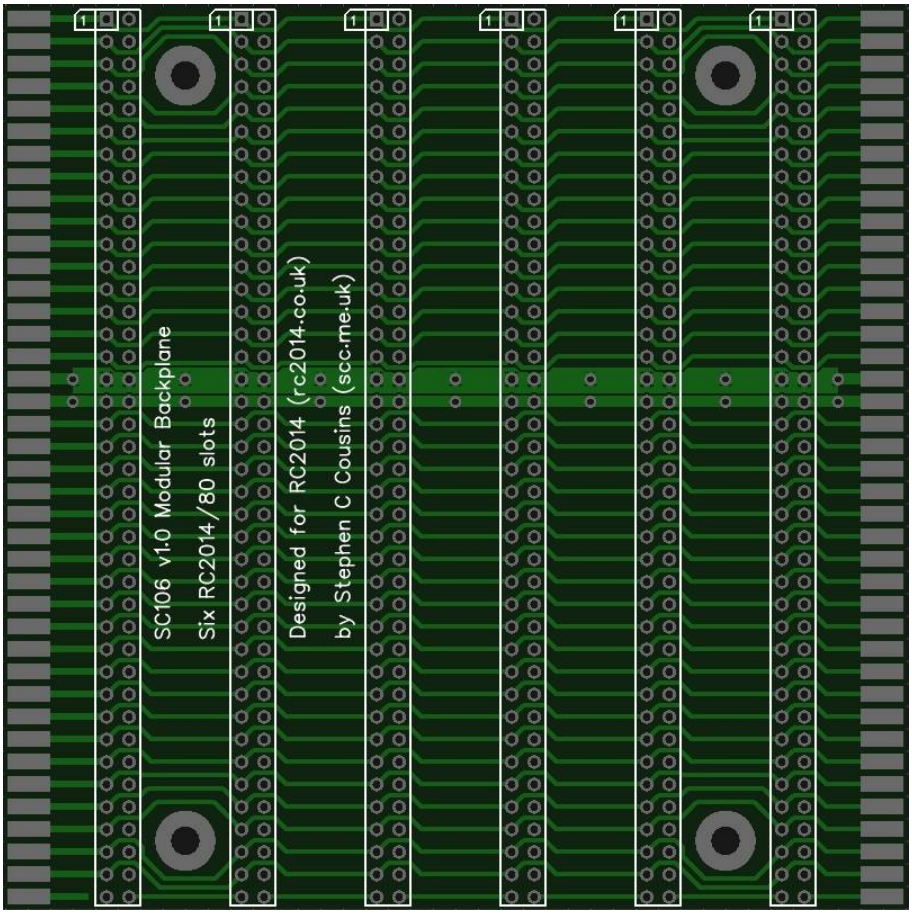
Printed Circuit Board

The printed circuit board is 4 inches by 4 inches (101.6 mm by 101.6 mm).

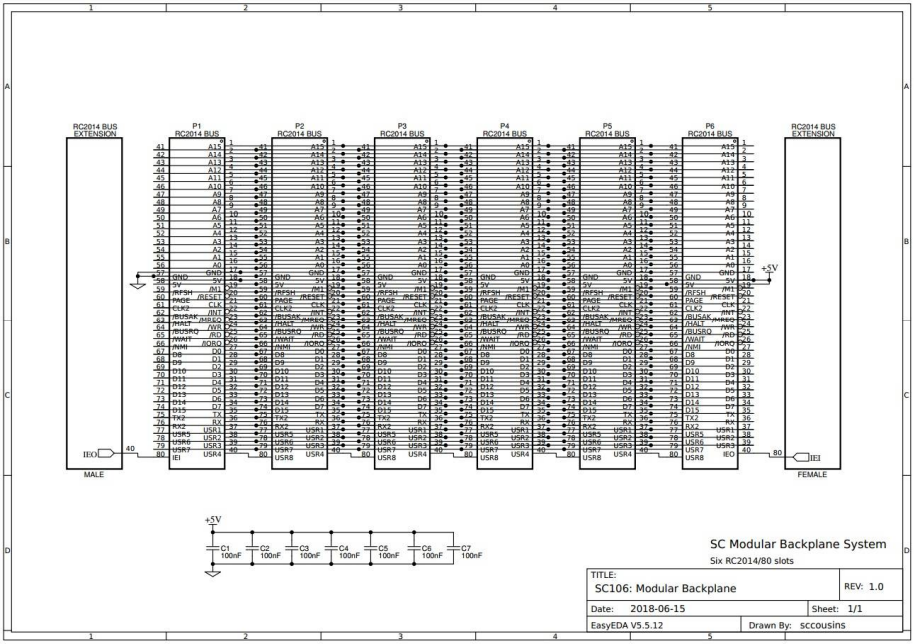
Printed circuit board, top/component side:



Printed circuit board, bottom/solder side:



Schematic



A high quality version of the schematic is available as a separate PDF.

Errata

Version 1.0 has an error on the IEI/IEO daisy chain connection at the plug end. P1's IEI pin should be connected to the expansion plug on the top of the PCB, but is instead connected on the bottom.

What You Need

The following components are required to assemble the module with its full functionality and jumper options.

Image	Qty	Reference	Description
	1	PCB	Printed circuit board SC106 Backplane with PSU
	7	C1 to C7	Capacitor 100nF, ceramic, lead spacing = 2.54mm
	1	EP	Pin header, male, 2 row x 40 pins, straight
	1	ES	Pin header, socket, 2 rows x 40 pins, straight
	6	P1 to P6	Pin header, socket, 2 rows x 40 pins, straight

Also required to assemble the module from the above components:

- Long nose pliers
- Side cutters
- Soldering iron
- Solder
- PCB cleaning materials

Components: What They Do & Where To Get Them

Each component is described below. I have listed multiple sources for most components, but have not actually tried all of them, so best treat the specified part numbers as guidance only. Where eBay is listed as a supplier, the part is likely to be cheaper there than the other sources, sometimes considerably cheaper. Further savings are usually possible by ordering parts direct from countries like China.

PCB

Image	Qty	Reference	Description
	1	PCB	Printed circuit board SC106 Backplane
		Supplier	Part number
		EasyEDA	Search EasyEDA.com for RC2014 Backplane

The PCB is currently only available to be ordered from EasyEDA.com, although you can download the Gerber and send it to your preferred manufacturer.

C1 to C7

Image	Qty	Reference	Description
	7	C1 to C7	Capacitor 100nF, ceramic, lead spacing = 2.54mm
		Supplier	Part number
		Farnell	1100533
		Mouser	75-1C10Z5U104M050R
		RS	699-5027

These capacitors provide power supply decoupling (or bypass). The fast switching in digital circuits creates spikes on the power supply lines which are suppressed with decoupling capacitors placed at key points on the circuit board.

EP

Image	Qty	Reference	Description
	1	EP	Pin header, male, 2 row x 40 pins, straight
		Supplier	Part number
		eBay	200906546562 (from UK)
		Farnell	2356151 (rather expensive)
		Mouser	710-61308021121 (rather expensive)
		RS	155-721

This connector provides a means to plug in another modular backplane section. If you only want a single 6 slot backplane then there is no need to fit this connector.

ES

Image	Qty	Reference	Description
	1	ES	Pin header, socket, 2 rows x 40 pins, straight
		Supplier	Part number
		eBay	200906546562 (from UK)
		eBay	362278235395 (from Hong Kong)
		Farnell	1807410 (very expensive)
		Mouser	517-929975-01-40-RK (very expensive)
		RS	765-5859 (very expensive)

This connector provides a means to plug in another modular backplane section. If you only want a single 6 slot backplane then there is no need to fit this socket.

P1 to P6

Image	Qty	Reference	Description
	6	P1 to P6	Pin header, socket, 2 rows x 40 pins, straight
		Supplier	Part number
		eBay	200906546562 (from UK)
		eBay	362278235395 (from Hong Kong)
		Farnell	1807410 (very expensive)
		Mouser	517-929975-01-40-RK (very expensive)
		RS	765-5859 (very expensive)

These connectors are the sockets into which RC2014 modules are plugged.

Assembly Guide

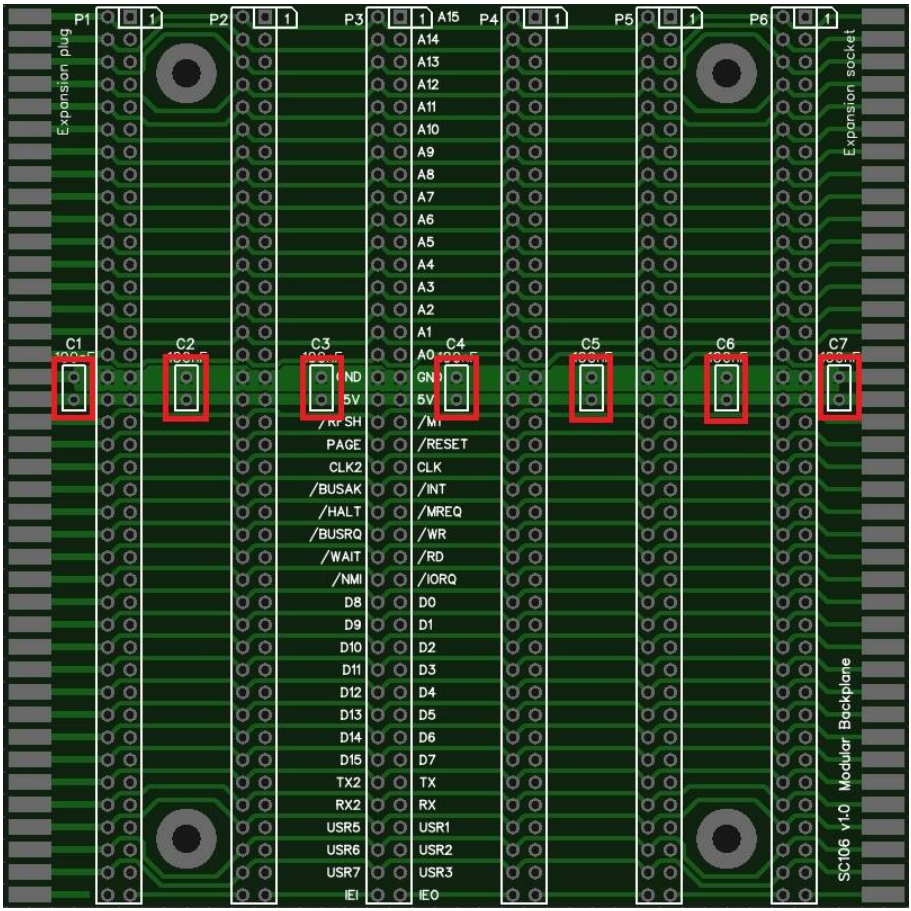
This guide assumes you are familiar with assembling circuit boards, soldering and cleaning. If not, it is recommended you read some of the guides on the internet before continuing.

First check you have all the required components, as listed in the section “What You Need”.

Step 1

Fit and solder capacitors C1 to C7.

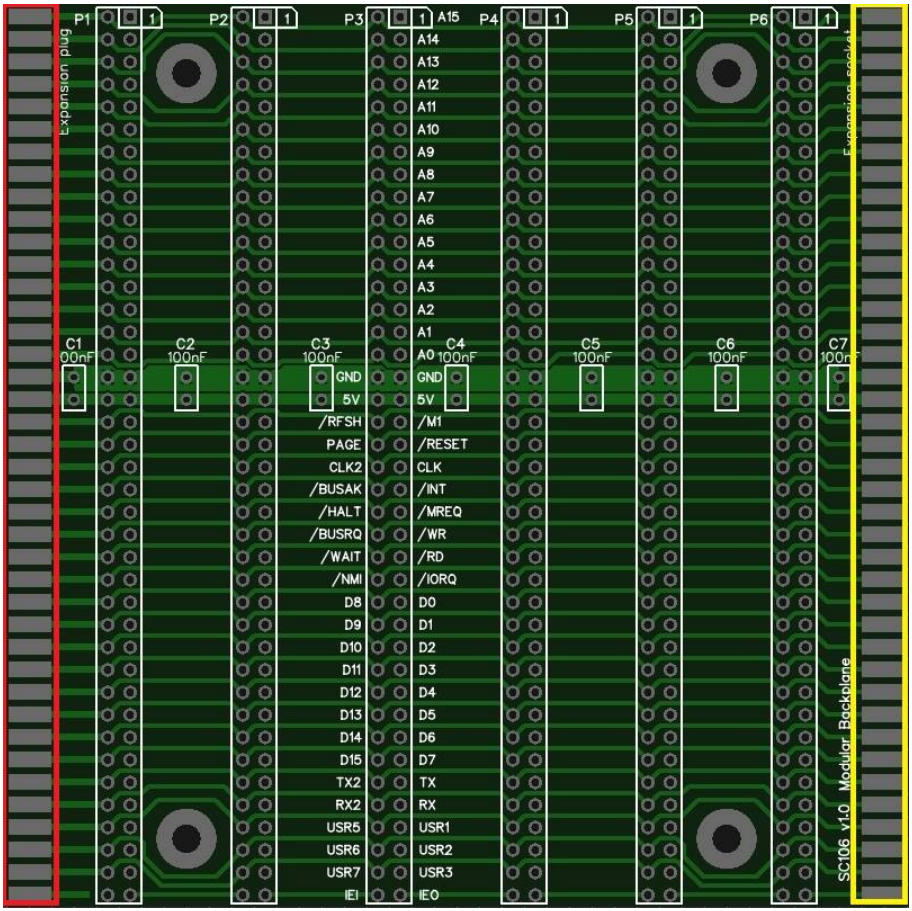
These can be fitted either way round, as they are not polarity dependent.



Step 2

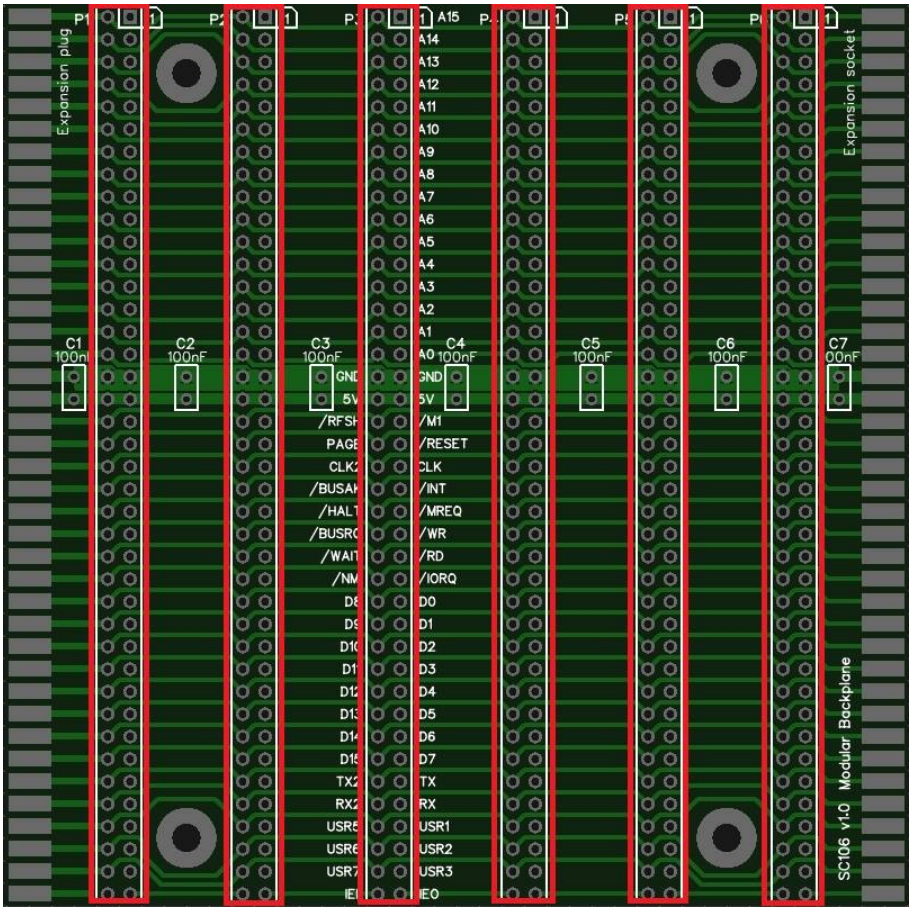
Fit and solder EP (shown in red below).

Fit and solder ES (shown in yellow below).



Step 3

Fit and solder P1 to P6.



Step 4

Remove any solder ‘splats’ with a brush, such as an old toothbrush.

Visually inspect the soldering for dry joints and shorts.

Clean the flux off with suitable cleaning materials.

Visually inspect again.

Purchasing the Printed Circuit Board

Currently the circuit board is available from EasyEDA (in China), or more accurately from their production partner JLCPCB.

You can download Gerber files from EasyEDA and send them to your preferred manufacturer, but the following describes the ordering process through EasyEDA.

Browse to EasyEDA.com

Select the main menu item “Explore”

In the search box, enter “RC2014 SC106” or “sccousins”

Select, from the list shown, the project “SC106 v1.x Backplane”

The project’s details should now be displayed.

From here you can select “Download Gerber” or “Order at JLCPCB”. You also have the option to “Open in Editor” a private copy of the schematic or PCB.

Selecting “Order at JLCPCB” requires you to log in (or create an account and log in).

Wait for the progress bar to complete.

You should now be presented with the image of each side of the board and the following options:

Layers	2	
Dimensions	101 x 101 mm	
PCB Qty	10	There is no saving selecting less than 10
PCB Thickness	1.6	
PCB Colour	Green	You may want to change this to Blue
Surface Finish	HASL	
Copper Weight	1 oz	
Gold Fingers	No	
Material Details	FR4-Standard Tg 140C	
Panel By JLCPCB	No	
Different Design	1	

Note, the price increases significantly if you select a colour other than green.

Select “Save to Cart”

Select “Checkout securely”

Enter your details and select your shipping options.

And finally complete the order.

History

2018-06-20	v1.0	First circuit boards yet to be manufactured
2018-08-20	e1.0.0	First release of this document

Contact Information

If you wish to contact me regarding this document, or the hardware and software it relates to, use the contact page at www.scc.me.uk

Stephen C Cousins, Chelmsford, Essex, United Kingdom.

RC2014 information

Information about the RC2014 system can be found at www.rc2014.co.uk

RC2014 support

Issues related to the RC2014 can be posted on the google group “RC2014-Z80”.

RC2014 supplies

Parts can be purchased through Tindie at www.tindie.com (search “RC2014”)

Official RC2014 parts are at:
https://www.tindie.com/stores/Semachthemonkey/

Credits

The design of my first modular backplanes (SC105, SC106 and SC107) was inspired by Jon Langseth's Z50Bus 5 slot backplane, which is available to extend the LiNC80 SBC1. Thanks Jon.