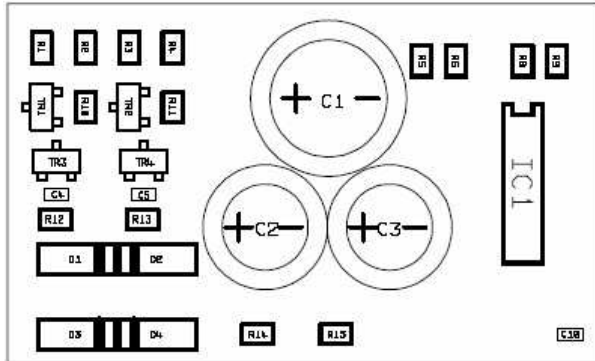


# Adaptacus™

## The flip chart method of PCB assembly

Production information for PCBs usually comes in the form of component overlays (diagram showing location of components and their ID numbers) and component parts lists (part number with associated component ID).



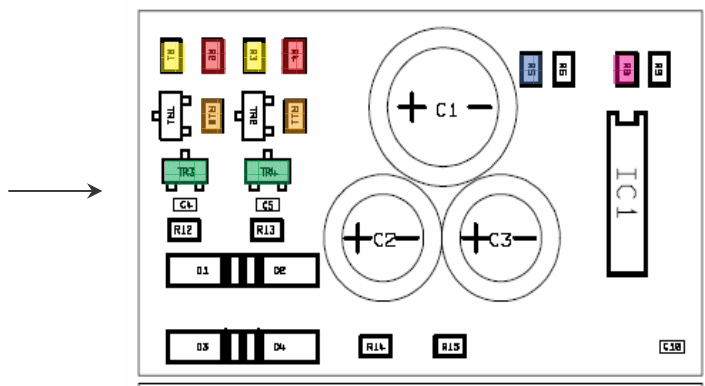
Component overlay

|         |     |
|---------|-----|
| R5#3K3  | R13 |
| R5#3K3  | R12 |
| R5#680R | R10 |

Component parts list

The component overlay and parts list can be used to generate a flip chart for use in PCB assembly to make the process easier, accurate and repeatable.

A flip chart is a collection of component overlays, with components highlighted to show where that component goes. Different types of component can have a different highlighter colour (probably max 6 colours) and so a number of different components can share the same page. **Note: Each page has parts highlighted on it which are to be fitted in the same PCB orientation.** Once the components on one page are fitted, turn (flip) to the next page, fit those parts, and so on until the PCB is fully populated.



Components on an overlay.

Components are highlighted according to type and ID, and all components on one overlay will be fitted in the same orientation.

Under most circumstances, best practice would dictate that the PCB is turned to suit the orientation of the component, rather than the other way round, so it is important to work out which components would be fitted in which orientation, and therefore group them together on an overlay.

### Example scenario

In our simple example we have the following parts list:

|            |     |
|------------|-----|
| R5#3K3     | R13 |
| R5#3K3     | R12 |
| R5#680R    | R10 |
| R5#2K2     | R2  |
| R5#4K7     | R1  |
| R5#680R    | R11 |
| R5#2K2     | R4  |
| R5#4K7     | R3  |
| ICCMOS     | IC1 |
| R5#1K5     | R5  |
| R5#82R     | R8  |
| R5#430R    | R9  |
| R5#10K     | R6  |
| CER10#470U | C1  |
| TRPNP01    | TR3 |
| TRPNP01    | TR4 |
| TRPNP01    | TR1 |
| TRPNP01    | TR2 |
| C0603#330P | C5  |
| C0603#330P | C4  |
| C0603#680P | C9  |
| C0603#680P | C8  |
| C0603#100N | C7  |
| C0603#100N | C6  |
| C0603#100N | C10 |
| DBZV55#12V | D2  |
| DBZV55#12V | D1  |
| DBZV55#12V | D4  |
| DBZV55#12V | D3  |
| JRAHDR1X15 | J1  |
| R5#100R    | R14 |
| R5#100R    | R15 |
| CER25#100U | C2  |
| CER25#100U | C3  |

Firstly, remove from the list anything which is a conventional component or anything which will be assembled using a separate process and put them on a separate list, like this.

| Surface mount components |     |
|--------------------------|-----|
| R5#3K3                   | R13 |
| R5#3K3                   | R12 |
| R5#680R                  | R10 |
| R5#2K2                   | R2  |
| R5#4K7                   | R1  |
| R5#680R                  | R11 |
| R5#2K2                   | R4  |
| R5#4K7                   | R3  |
| ICCMOS                   | IC1 |
| R5#1K5                   | R5  |
| R5#82R                   | R8  |

|            |     |
|------------|-----|
| R5#430R    | R9  |
| R5#10K     | R6  |
| TRPNP01    | TR3 |
| TRPNP01    | TR4 |
| TRNPN01    | TR1 |
| TRNPN01    | TR2 |
| C0603#330P | C5  |
| C0603#330P | C4  |
| C0603#680P | C9  |
| C0603#680P | C8  |
| C0603#100N | C7  |
| C0603#100N | C6  |
| C0603#100N | C10 |
| DBZV55#12V | D2  |
| DBZV55#12V | D1  |
| DBZV55#12V | D4  |
| DBZV55#12V | D3  |
| R5#100R    | R14 |
| R5#100R    | R15 |

Conventional components / everything else

|            |    |
|------------|----|
| CER10#470U | C1 |
| JRAHDR1X15 | J1 |
| CER25#100U | C2 |
| CER25#100U | C3 |

Then sort the surface mount components into which side of the board they go on, and then into groups of similar types, together with their component ID numbers, like this:

Component side parts list

|    |            |                |
|----|------------|----------------|
| 1  | C0603#100N | C10            |
| 2  | C0603#330P | C4, C5         |
| 3  | DBZV55#12V | D1, D2, D3, D4 |
| 4  | ICCMOS     | IC1            |
| 5  | R5#100R    | R14, R15       |
| 6  | R5#10K     | R6             |
| 7  | R5#1K5     | R5             |
| 8  | R5#2K2     | R2, R4         |
| 9  | R5#3K3     | R12, R13       |
| 10 | R5#430R    | R9             |
| 11 | R5#4K7     | R1, R3         |
| 12 | R5#680R    | R10, R11       |
| 13 | R5#82R     | R8             |
| 14 | TRNPN01    | TR1, TR2       |
| 15 | TRPNP01    | TR3, TR4       |

Solder side parts list

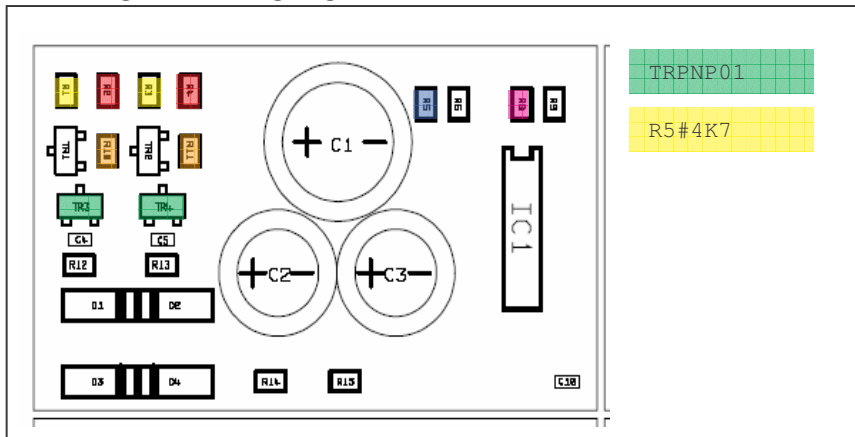
|   |            |        |
|---|------------|--------|
| 1 | C0603#100N | C6, C7 |
| 2 | C0603#680P | C8, C9 |

As there are more components on the component side we will use this for our example. The actual PCBs are very small so we make them 8 at a time which looks more complicated than it is – but it does get the job done faster (PCBs are designed to snap apart along score lines).

There are basically only four orientations for components:  
0°, 90°, 180° and 270°.

For components without polarity, like resistors, only two orientations are used:  
0° and 90°.

Starting with one orientation, highlight those components of a similar type/orientation in a single colour and write the component type at the top of the page, also highlighted with the same colour.



Start a new sheet when the PCB needs turning (write on it what the next re-orientation action is).

Use as many component types per sheet as you have highlighting colours available.

(See the final four pages of this document for full diagrams of completed flip charts.)

As all the parts appear on the overlay, use a 'master' copy to cross off all the components as you highlight them on their separate overlays, to double-check that all parts have been accounted for.

All this documentation can be kept and so the process can easily be repeated.

The flip-chart method allows parts to be fitted to the PCB in any order, but the operator will have a preferred workflow method according to orientation, size etc. ADAPTACUS™ allows the tapes of components to be loaded up in any order, thus it is compatible with whichever way suits the operator .

Tip: when using ADAPTACUS™ it is a good idea to stick a strip of yellow polyester tape or masking tape along the front edge of the work area, above the tapes and then write the part number above each component so that the tapes can be identified easily.

# ADAPTACUS™ COMPONENTS THIS SIDE

TRPNP01

R5#4K7

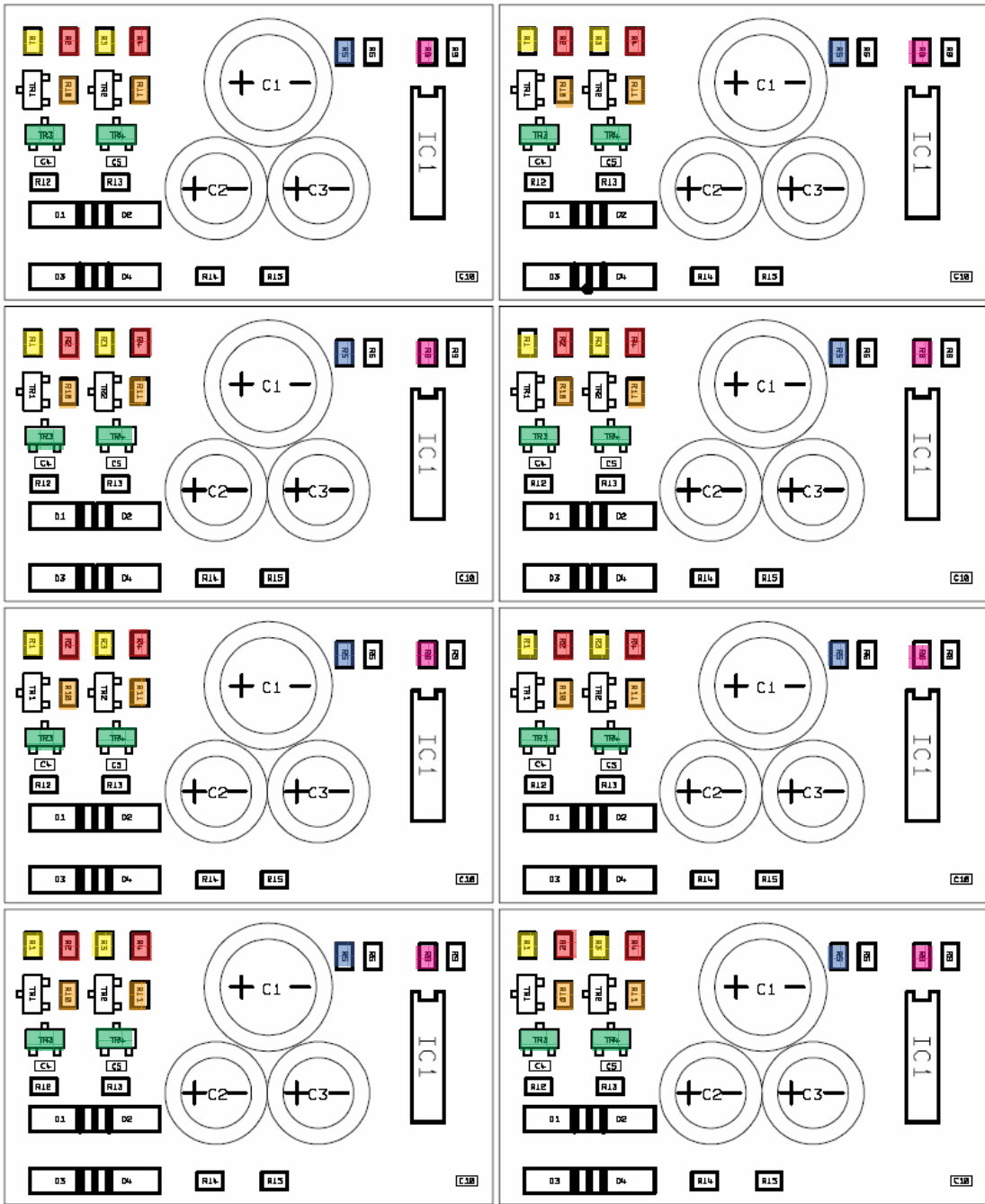
R5#680R

R5#2K2

R5#1K5

R5#82R

Go to next sheet



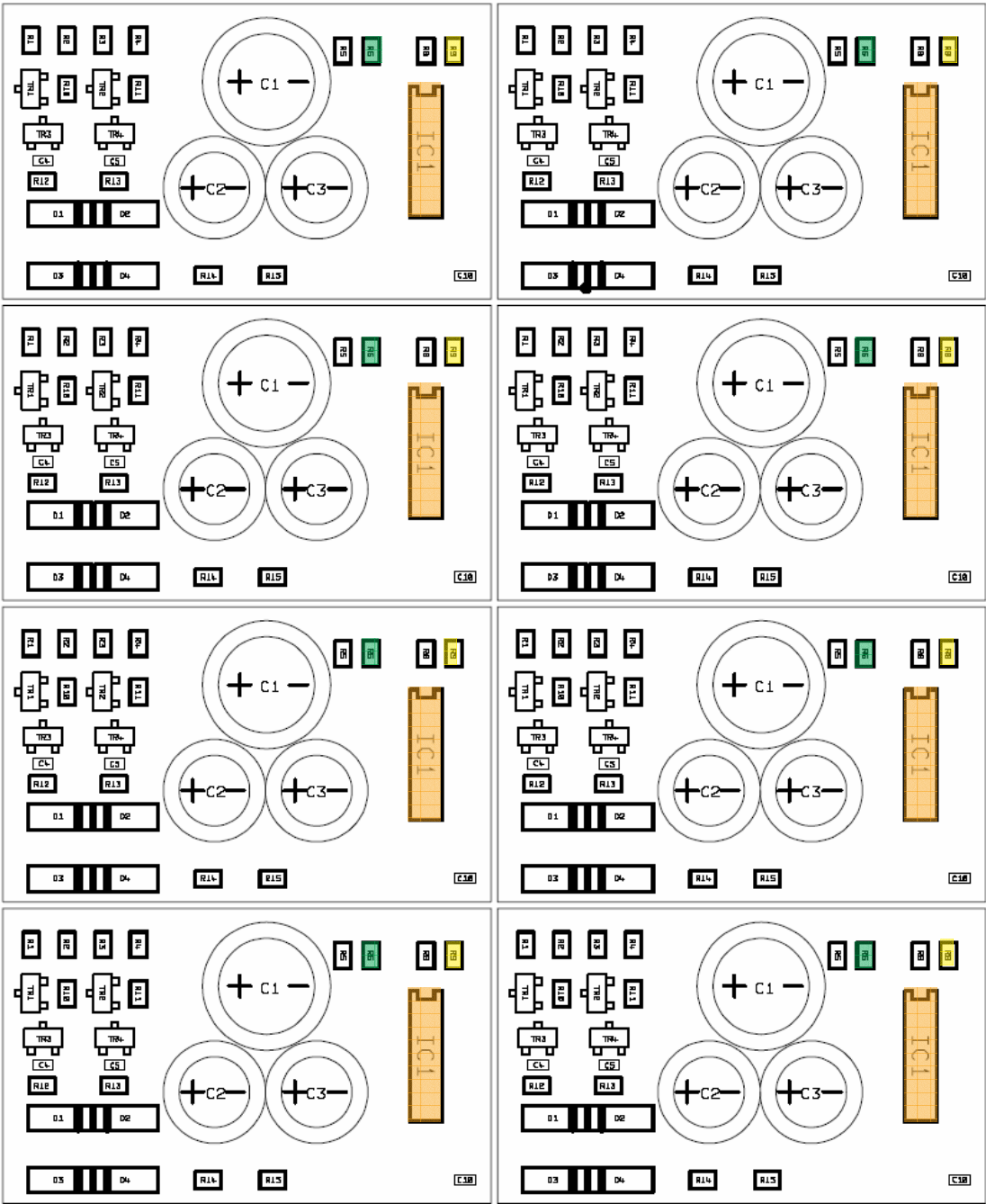
ADAPTACUS™ COMPONENTS THIS SIDE

R5#10K

R5#430R

ICCMOS

Turn PCB  
90° CW



TRNPN01

DBZV55#12V

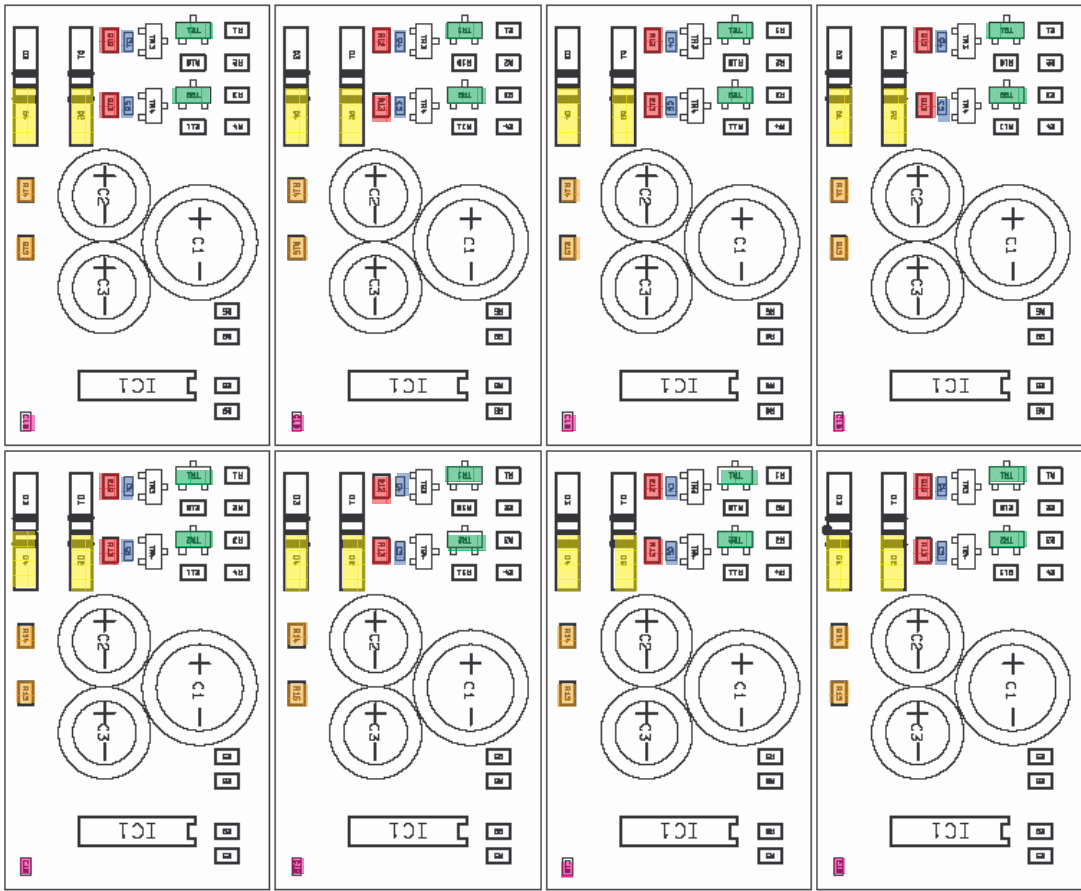
R5#100R

R5#3K3

C0603#330P

C0603#100n

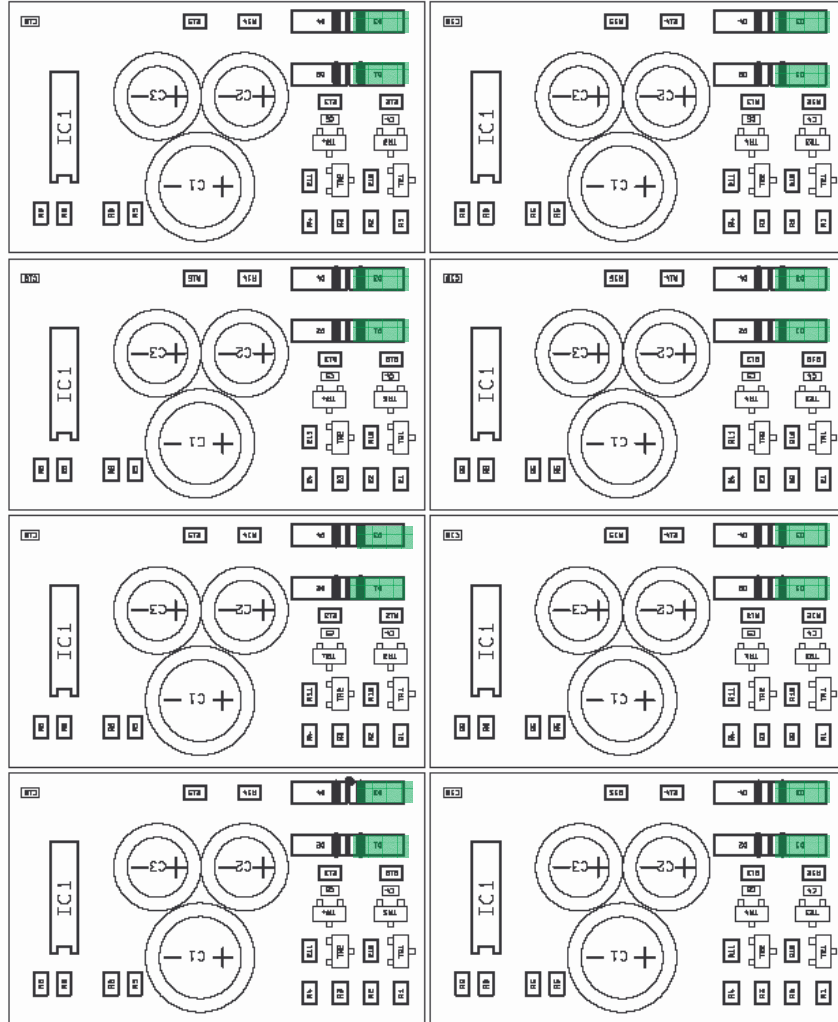
Turn PCB  
180° CW



ADAPTACUS™ COMPONENTS THIS SIDE

DBZV55#12V

Done!!



ADAPTACUS™ COMPONENTS THIS SIDE