flight of harmony

Eurorack Joystick Module Kit 1.0

(PCB based on CH-E module rev 2.0)

Overview

A basic joystick is used to provide an easily-varied control voltage (CV) to other modules, often allowing the input of a DC CV that is then either amplified or attenuated by the joystick before being sent out to other modules. Choices allows either DC or AC signals at the flip of a switch.

A brief rundown of the features:

- Choices can be oriented with the joystick at the top or the bottom to best suit its location in your system.
- Separate Gate and Trigger outputs.
- Two trigger buttons for ease of ambidextrous access, regardless of orientation.
- Toggle switches to select optimal reference level for either AC or DC inputs.

Usage Details

Supply: This design has been tested from ±9V up to ±15V and works well in this range, although performance specifics will vary with supply voltage. All measurements, unless stated otherwise, assume V_{supply} = ±12V. All units have a polarized or shrouded power header to ensure proper connection. Supply polarity symbols are also silkscreened on the PCB in case of non-standard cables or supply bus.

Orientation: Choices is configured to operate with the joystick at the top by default. If you wish to rotate the unit, the output will be reversed in respect to the operation of the joystick - up will decrease, down increase, left increase, right decrease. Change the position of S3 to correct this.

Bias Adjust

Due to tolerances, the X and Y outputs may not be exactly 0V when the joystick is in the center position. To correct this, adjust RT1 and RT2 on the rear of the PCB. These trim pots control the default amount of bias or offset of the output.

Controls, I/O

X: Horizontal axis, left or right motion output.
Y: Vertical axis, up or down motion output.
Scale: Controls the scaling/gain of the signal. Middle position is unity gain/1:1 scaling, counter-clockwise attenuates, clockwise amplifies.
Offset: Controls the offset or bias of the signal. Used to shift the output up or down.

Overview (cont.)

Ref: Reference level for input. Put switch lever in direction of the wavy line if using an AC input signal, or toward the flat line for a DC signal.

In: Input signal goes here. When a plug is inserted, the unit automatically switched from internal DC source to the input signal.

Out: It's the output, where the new signal comes out.

T: Trigger output.

G: Gate output.

T/G: Pushbutton to initiate Trigger and Gate signals.

NOTE

This kit is intended for those with prior experience in electronics and with basic soldering skills. It is assumed that the purchaser either knows how to hand-solder Surface Mount Devices or is able to figure it out. These instructions are provided for the particulars in assembly of this kit only and do not cover other assembly techniques.

Now, having said all that, if you have any questions, f(h) is happy to offer suggestions. Just be aware that we are not going to teach you how to solder.

Our contact email: flight@flightofharmony.com

Specifications

Supply Voltage (min –> max)	±9V –> ±15V	
Input Voltage	$-V_{supply}$ —> $+V_{supply}$	
Input & Ouput (I/O) coupling	Direct	
Output Impedance	1kΩ	
Scaling	0% –> 200% / V_{supply}	
Gate output	Off: $-V_{supply}$ On: $+V_{supply}$	
Trigger Output	Off: $-V_{supply}$ On: $+V_{supply}$	
Trigger duration	1.5ms	
	±12V	±15V
Supply Current (max draw)	+12V: 14mA, –12V: 14mA	+15V: 13mA, –15V: 13mA
Max Output Voltage	±12V	±15V
Offset range	±5V	±6V

Contents

(1) Front Panel
(1) Main PCB
(1) Control PCB
(1) Resistor Card
(1) SMT Capacitor Card
(1) Semiconductor Card
(1) Joystick
(1) Foam block

(1) Hardware bag
        (1) 9" ribbon cable
        (1) 2x5 box header
        (1) 2x5 IDC socket connector with strain relief
        (1) 2x8 IDC socket connector with strain relief
        (2) 2x7pin header (Main PCB HDR2, HDR5)
        (2) 2x7 socket header (Control PCB HDR1, HDR2)
        (4) M2x0.5 joystick mounting screw (see assembly drawing p.6)
        (4) M3x0.5 eurorack mounting screw
        (4) M3 nylon washer

(1) Potentiometer bag
        (4) 100k Potentiometer
        (4) Washer
        (4) Nut
        (4) Knob

(1) Jack bag
        (6) 3.5mm TS jack
        (6) Washer
        (6) Nut

(1) Switches & Knobs bag
        (1) Joystick orientation selection slide switch
        (2) Pushbutton switch (see assembly drawing p.6)
        (2) Toggle switch (see assembly drawing p.6)
        (4) Lock washer for pushbutton or toggle switch
        (8) Nut for pushbutton or toggle switch
        (2) Cap for pushbutton switch
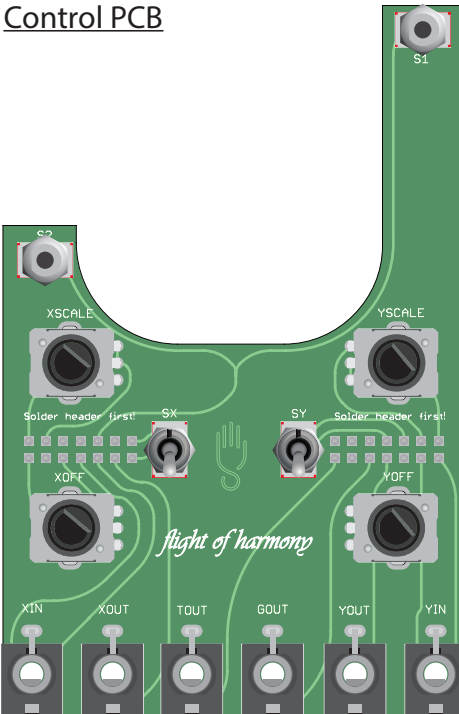
(1) Reference manual (this thing)

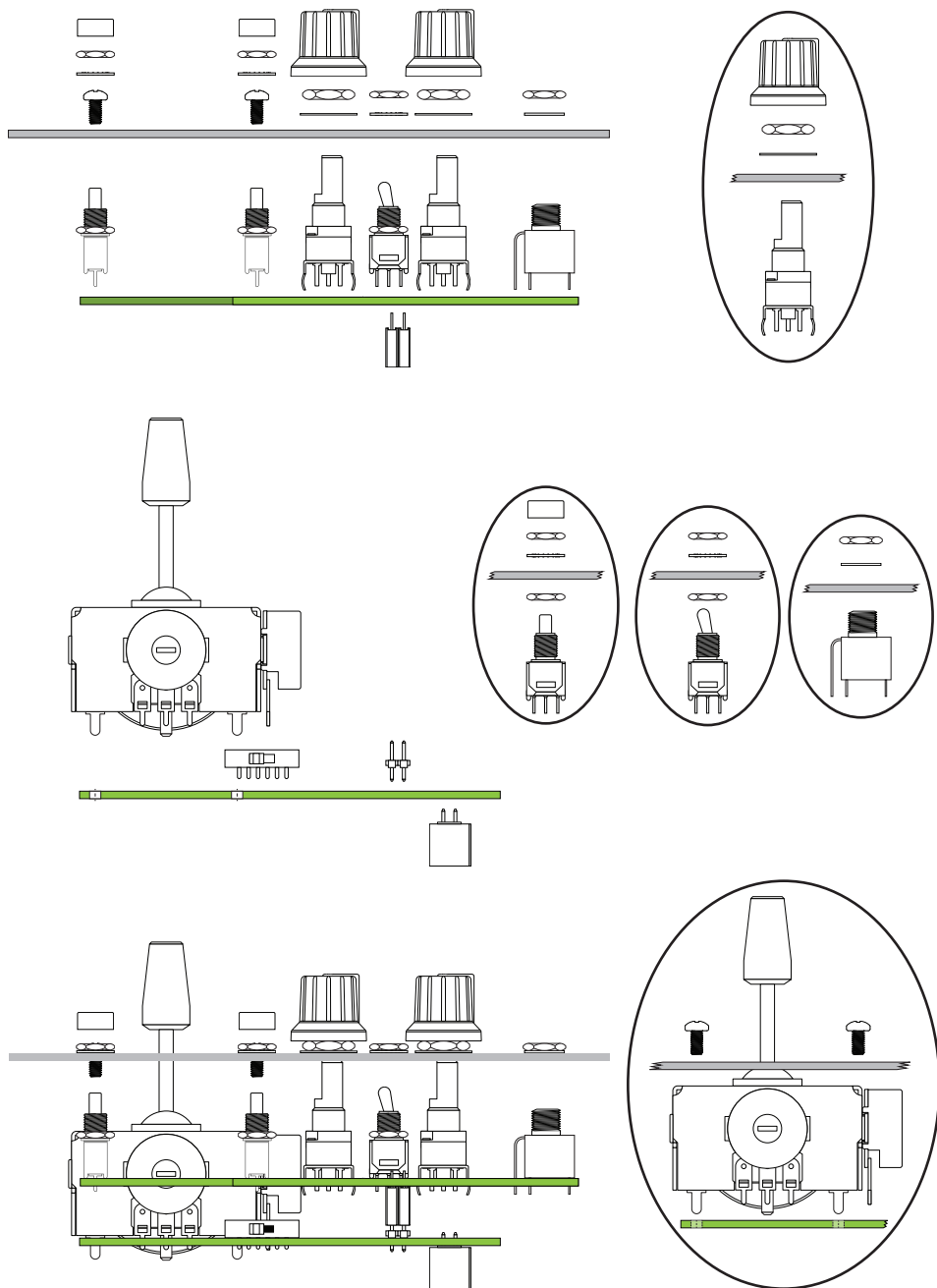# Assembled PCB

Main PCB
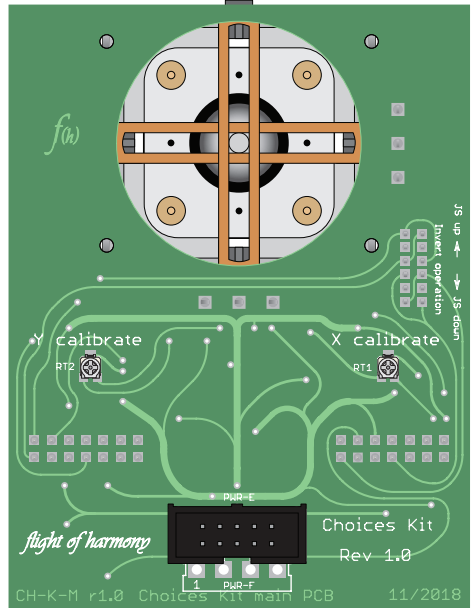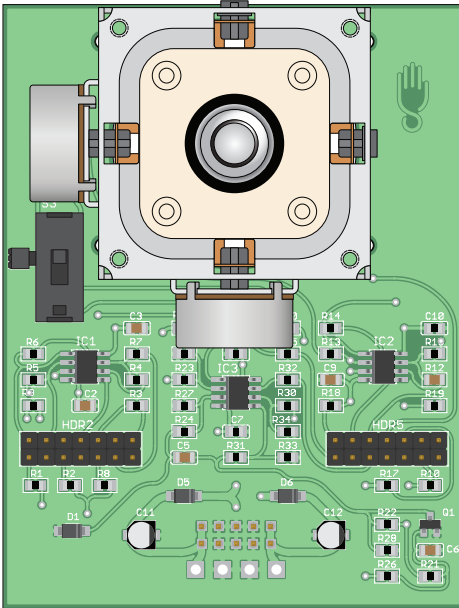

Control PCB
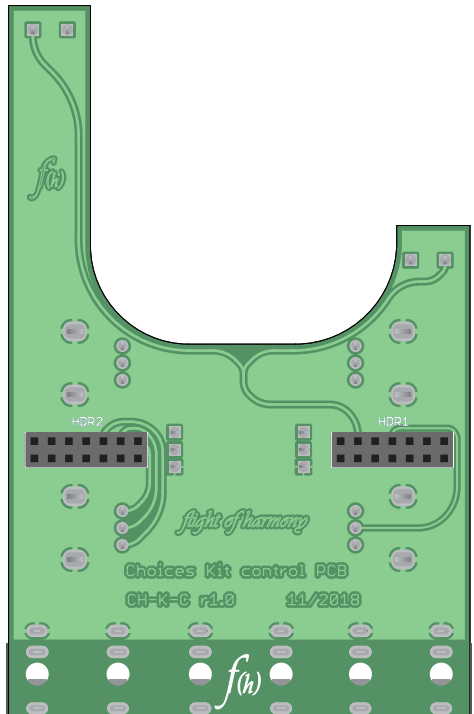
Exploded view

Order of Assembly

Main PCB:
1) Solder front Surface Mount Devices (SMD).
2) Solder front side Through-Hole (TH) components: HDR2, HDR5, S3.
3) Install and solder joystick (see p.8).
4) Solder rear SMD: RT1, RT2.
5) Solder rear power header: PWR-E.

Control PCB:
1) Solder rear headers: HDR1, HDR2.
2) Place front side TH components.
3) Install front panel, washers, and nuts (do not tighten), to hold components in place.
4) Solder all front side TH components.
5) Tighten nuts and install knobs.
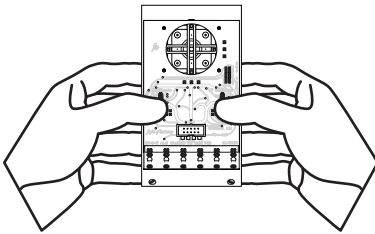
3) Apply pressure to left and right of joystick until it is seated fully against the panel.
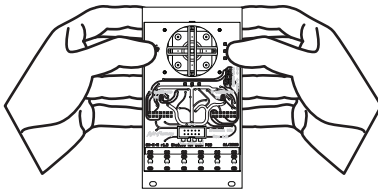
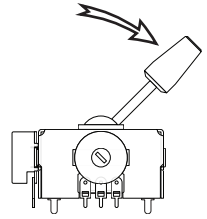4) Install M2 screws through front of panel to secure joystick.
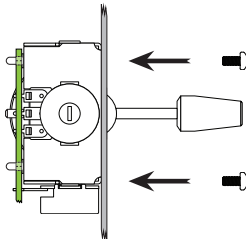
To Install Joystick

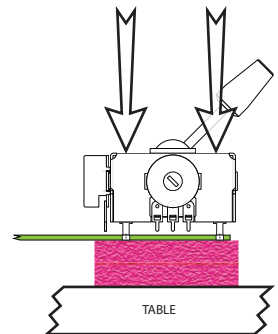• Make sure the 4 housing pins and all potentiometer pins are straight.
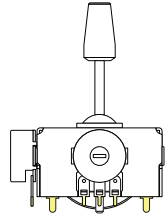
• *Push joystick lever to one corner of housing so the internal components will not be damaged.*

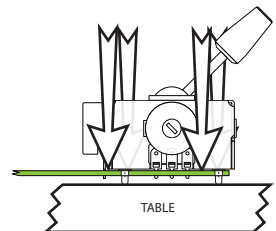

• Place Main PCB on supplied block of anti-static foam.

• Align housing and potentiometer pins with holes in PCB, then firmly but carefully push down on joystick housing until fully seated into PCB. The holes for the housing pins are tight, so it is easiest to push each pin through a little bit at a time. *Make sure the joystick does not get cocked and bends the potentiometer pins*.
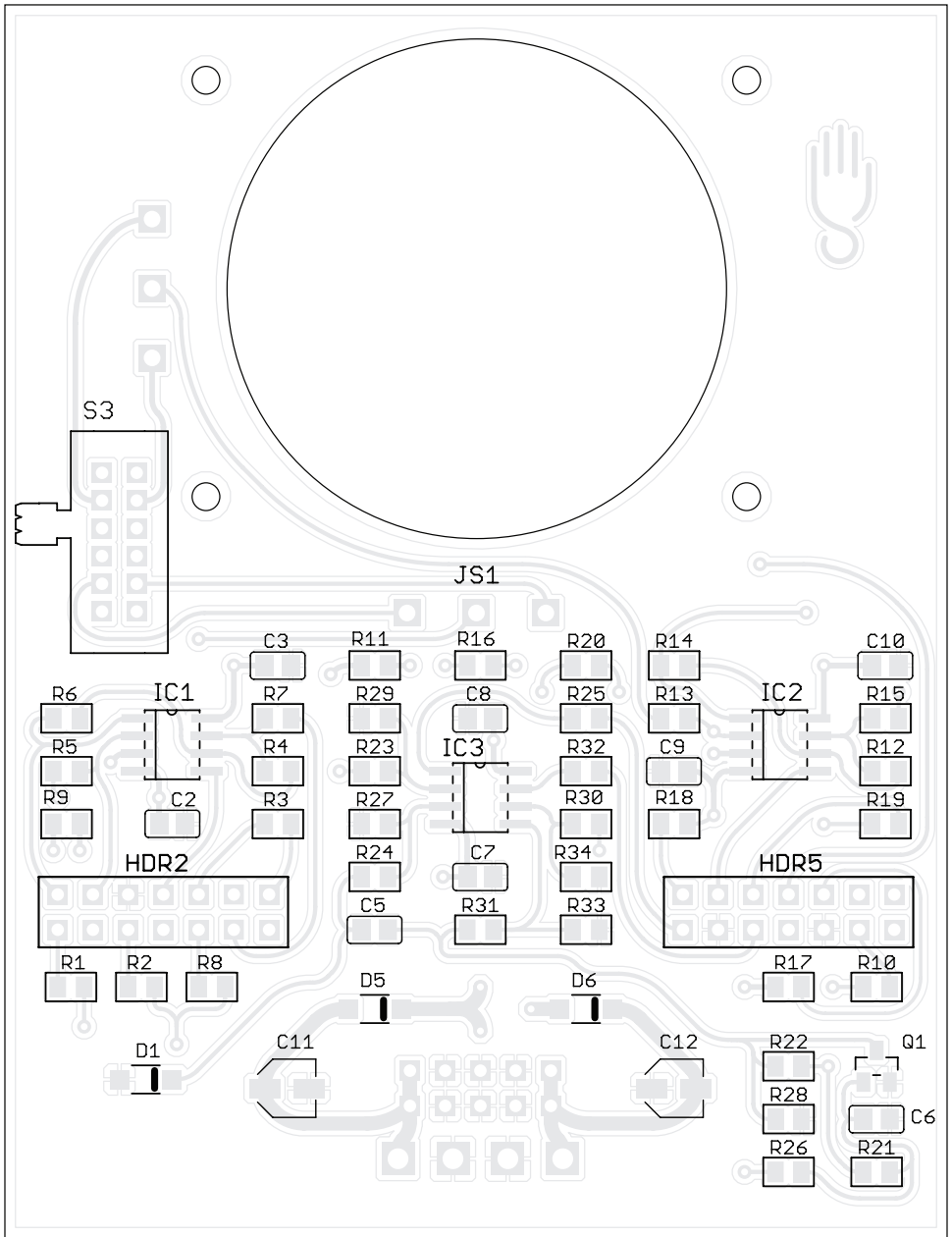
If a pin gets bent during installation, remove the joystick and carefully straighten the bent pin(s) with pliers.
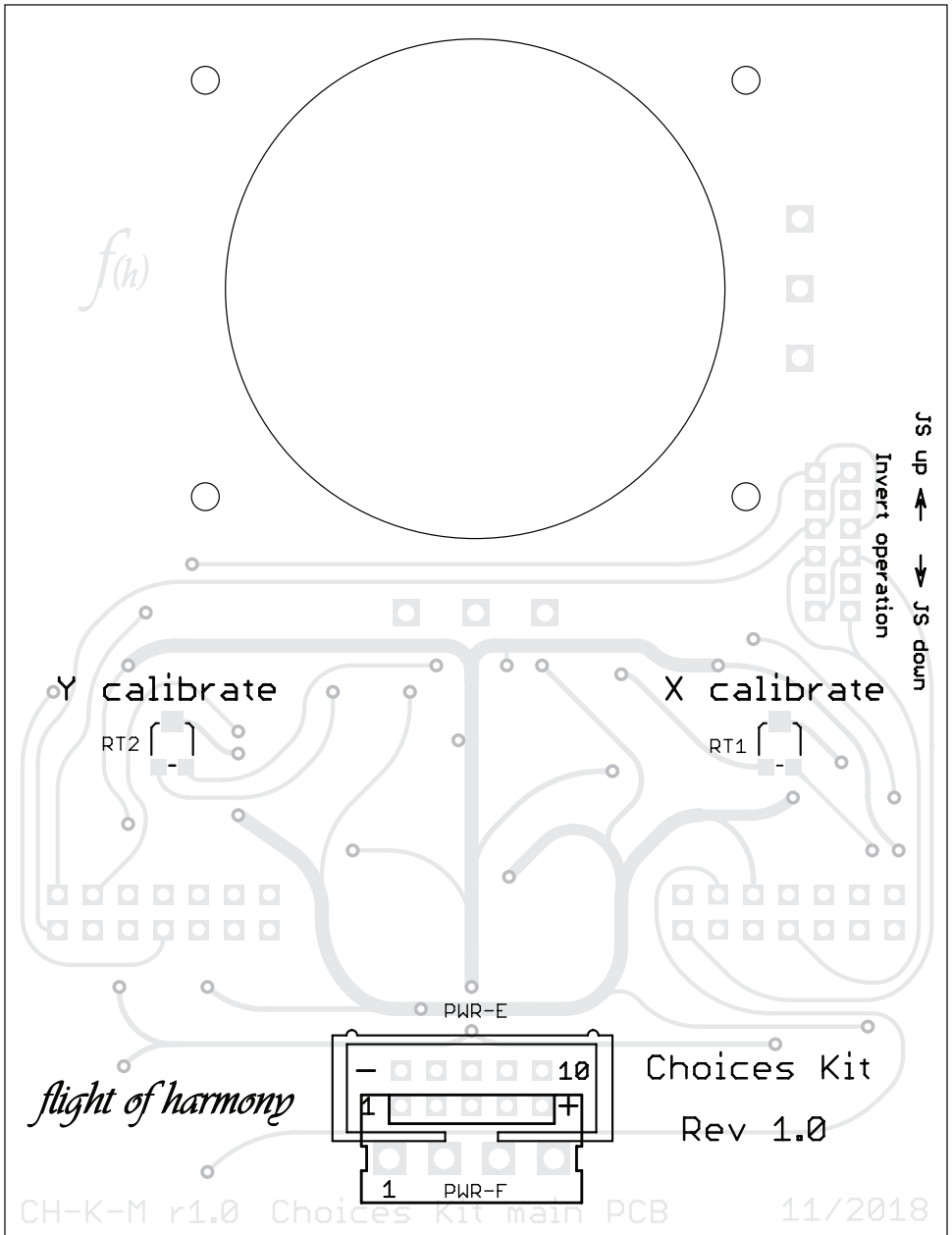

TABLE

To remove joystick:

• Again, *push joystick lever to one corner of housing so the internal components will not be damaged.*

• Place the PCB & joystick assembly pins-down on a firm surface - The pins are hard with sharp edges, so protect the surface with cardboard or similar if needed.

• Carefully push down on PCB to separate it from the joystick. Apply pressure evenly around the four pins to avoid breaking or damaging the PCB.
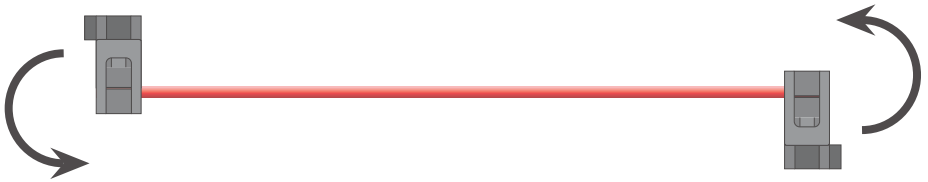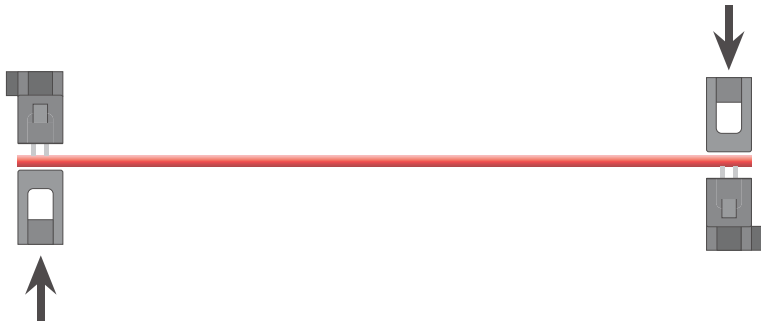

TABLE

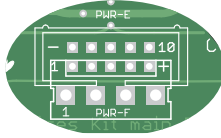# SMD Reference

SMD Reference

Y calibrate

RT2

X calibrate

RT1

PWR-E

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— 10

1 +

1 PWR-F

Choices Kit

Rev 1.0

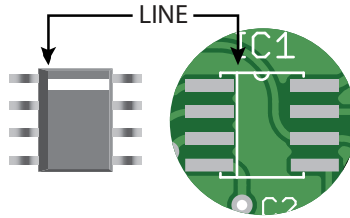CH-K-M r1.0 Choices Kit main PCB 11/2018

Power Cable Assembly

Miscellaneous

Location for optional Frac-style power header (not supplied).

IC Orientation

LINE