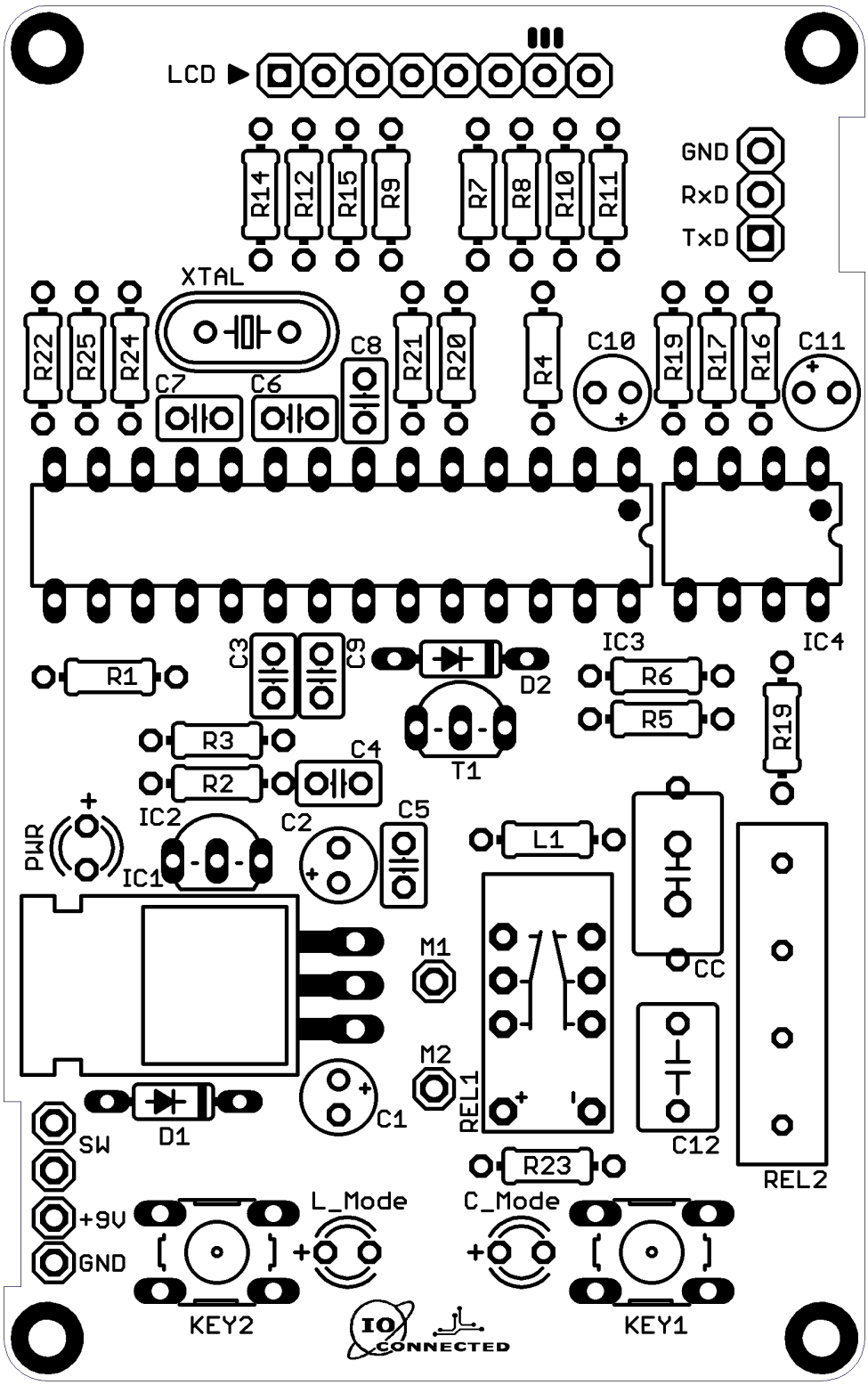
LC Meter – Layout (UPDATED)



PCB & Schematic v1.2

LC Meter – BOM

Qty	Value	Package	Parts
1	7805	TO220	IC1
1	LM317	TO92	IC2
1	ATMEGA328P	DIP28	IC3
1	LM311N	DIP8	IC4
1	8MHz *(*hight)*	HC49U-S	XTAL
1	470R	R-US_0204	R1
1	330R	R-US_0204	R2
1	540R	R-US_0204	R3
1	10k	R-US_0204	R4
8	2k2	R-US_0204	R5, R6, R8, R9, R11, R12, R15, R22
3	1k2	R-US_0204	R7, R10, R14
3	100k *(*tolerance)*	R-US_0204	R16, R17, R18
1	47k *(*tolerance)*	R-US_0204	R19
1	6k8 *(*tolerance)*	R-US_0204	R20
1	1k *(*tolerance)*	R-US_0204	R21
1	120R	R-US_0204	R23
2	1k	R-US_0204	R24, R25
4	10uF	CPOL-USE2-4	C1, C2, C10, C11
2	22pF	C-US025-025X050	C6, C7
5	100n	C-US025-025X050	C3, C4, C5, C8, C9
1	1000pF *(*tolerance)*	C-US050-045X075	C12
1	1000pF *(*tolerance)*	C-11.5X4.5	C_CAL or CC
1	82uH *(*tolerance)*	L-US0204	L1
1	BAT42	DO35	D1
1	1N4148	DO35	D2
1	BC547	TO92	T1
1	PWR	LED 3MM	LED1
1	CMODE	LED 3MM	LED2
1	LMODE	LED 3MM	LED3
1	2UM_NA05WK	RELAY 2UMNA05WK	RELAY1
1	Reed SIL 7271-L 5V	SIL	RELAY2
1	Key1 *(*see description)*	10-XX	S1
1	Key2 *(*see description)*	10-XX	S2
1	UART	PINHD-1X03_2.54-S	JP1
1	LCD_N5110_HEADER	PINHD-1X08_2.54-S	LCD Header

All components are through-hole packages.
All resistors are 1/4 W Metal Film. If recommend using 0.1% tolerance for R16, R17, R18, R19, R20 and R21.

Make sure the Crystal for the microcontroller is the short package (Height: 4.5 mm) and **not** the higher version. Otherwise it won't fit under the LCD.

The precision capacitors Ccal and C12.

These capacitors are very low tolerance capacitance. The lower the better. I tested a lot till I found 3 suitable types to use in these project.

Disclaimer: Reichelt DE is a components distributor from Germany. I buy pretty often from them. The links for the components will redirect to their store.

I am neither affiliated with them, nor do I promovate their sales in any way. You can try looking for these parts some other places too. I am giving the Manufacturer's Number for the parts. If this doesn't help try downloading the datasheet for the particular component and look for equivalent parts.

FKP2D011001D0 – WIMA Polypropylen Film Capacitor, 5mm pitch, 2.5% tolerance, 1000pF
I bought it from here:
https://www.reichelt.de/de/en/film-capacitor-1-0nf-100v-rm5-fkp2-100-1-0n-p172438.html?search=FKP2-100+1%2C0N&&r=1

CY22-3-1000pF – Mica capacitors, 1% tolerance, 1000pF. Although it's not always available you could try to find it here:
https://www.reichelt.de/de/en/mica-capacitor-1-0-nf-100-v--1--cy-22-3-1-0n-p42441.html?&trstct=pos_0&nbc=1

Styroflex – 2% tolerance 1,0nF (Dia: 4,5mm, Length: 11mm) from here:
https://www.reichelt.de/de/en/styroflex-capacitor-1-0-n-2--styroflex-1-0n-p19837.html?search=STYROFLEX&&r=1

The best ones are the 1% tolerance, mica capacitors but you can use the other ones too. They're all very precise.

The Inductor L1 should also be a small tolerance one.

Other Components:

RELAY1 is a Fujitsu Takamisawa, "NA 05W K" Subminiature relay. You can find it here:
https://www.reichelt.de/de/en/subminiature-relay-na-5-v-dc-2x-2-a-change-over-contacts-na-05w-k-p79349.html?GROUPID=7620&START=0&OFFSET=16&SID=92fe968488052b504d180a23f581dc98fa3e05d01bdc62094114f&LANGUAGE=EN&&r=1

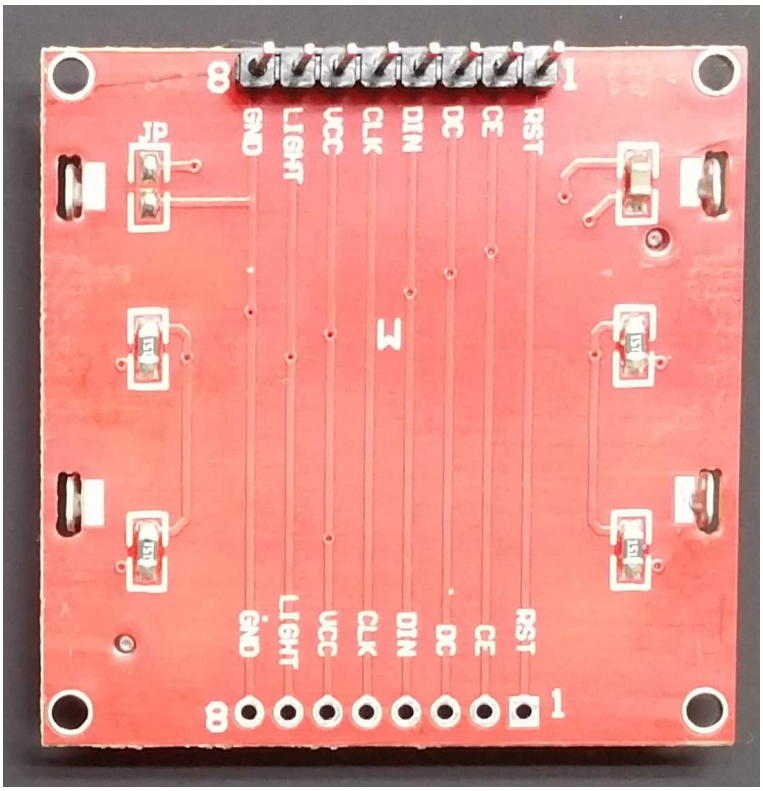
RELAY2 is a Single-in-line reed relay, "SIL 7271-L 5V" and you can find it here:
https://www.reichelt.de/de/en/reed-relay-5-v-1-no-1-a-ri-500-ohm-sil-7271-l-5v-p27669.html?GROUPID=7617&START=0&OFFSET=16&SID=92fe968488052b504d180a23f581dc98fa3e05d01bdc62094114f&LANGUAGE=EN&&r=1

I used these keys: Short-stroke key 6x6 mm, height: 4.3mm, 12V, vertical, through-hole.

The LCD:

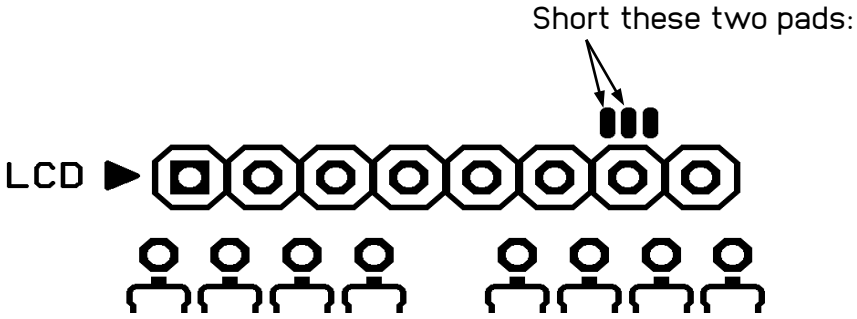
There are more version of Nokia 5110 LCD Breakouts. Make sure it has the following pinout, before buying:

1 – RST
2 – CE
3 – DC
4 – DIN
5 – CLK
6 – VCC
7 – Backlight
8 – GND



backside of the LCD

I bought this display several times from different places. In 4 cases out of 5 the pin7 (Backlight) needs to be connected to VCC. However I also I have one LCD with the exact pinout but the PIN7 (Backlight) needs to be connected to GND. Someone routed that differently and the LEDs which illuminate the backside of the display have their GND connected to the PIN7 (Backlight). This is why I included those testpads on the LC Meter's PCB. If you get on of those LCD's where the Backlight is connected to the positive side of the LEDs short the left and the middle pad together.



If you get the version with the GND of LEDs on the PIN7 you should short the middle and the right pad.