**STM32 Coupling**

+3V3

C2 100nF  C3 100nF  C4 100nF  C5 100nF

GNDPWR

**SW1 / DIP4P**

+5V ON

5 — 4
6 — 3  DIS_BKLIGHT
7 — 2  ALT_LAYOUT
8 — 1  TBD

220r R1
GNDPWR

BOOT0

Connect to 5V tolerant input only!

**Sheet: Matrix**
File: Matrix.sch

| Col_0_ | Col_0 | Line_0 | Line_0_ |
| Col_1_ | Col_1 | Line_1 | Line_1_ |
| Col_2_ | Col_2 | Line_2 | Line_2_ |
| Col_3_ | Col_3 | Line_3 | Line_3_ |
| Col_4_ | Col_4 | Line_4 | Line_4_ |
| Col_5_ | Col_5 | | |
| Col_6_ | Col_6 | | |
| Col_7_ | Col_7 | | |
| Col_8_ | Col_8 | | |
| Col_9_ | Col_9 | | |
| Col_10_ | Col_10 | | |
| Col_11_ | Col_11 | | |
| Col_12_ | Col_12 | | |
| Col_13_ | Col_13 | | |

**Sheet: Led_Controller**
File: Led_Controller.sch

**U1 — STM32L053C8T6**
TCKB:TQFP-48_7x7mm_Pitch0.5mm

VDD 24, VDD_USB 36, VDD 48, VDDA 9 — +3V3

NRST 7 — NRST
BOOT0 44 — BOOT0
Col_6 5 — PH0/OSC_IN
Line_2 6 — PH1/OSC_OUT
1 — VLCD
Col_3 2 — PC13/RTC_TAMP1/RTC_TS/RTC_OUT/WKUP2
Col_4 3 — PC14/OSC32_IN
Col_5 4 — PC15/OSC32_OUT
Line_3 18 — PB0/ADC_IN8
Col_11 19 — PB1/ADC_IN9
Col_12 20 — PB2/BOOT1
SWO 39 — PB3
ALT_LAYOUT 40 — PB4
Line_0 41 — PB5/SPI1_MISO
Col_0 42 — PB6/SPI1_MOSI
Col_1 43 — PB7
Col_2 45 — PB8
Line_1 46 — PB9
Col_13 21 — PB10/I2C2_SCL/LPUART1_TX/SPI2_SCK/TIM2_CH3
Line_4 22 — PB11/I2C2_SDA/LPUART1_RX/TIM2_CH4
TBD 25 — PB12/SPI2_NSS/I2C2_SMBA
26 — PB13/SPI2_SCK/TIM21_CH1
27 — PB14/SPI2_MISO/TIM21_CH2
28 — PB15/SPI2_MOSI

10 — RTC_TAMP2/WKUP/USART2_CTS/ADC_IN0/TIM2_CH1_ETR/PA0 — Col_7_
11 — USART2_RTS/ADC_IN1/TIM2_CH2/PA1 — Col_8_
12 — USART2_TX/ADC_IN2/TIM2_CH3/PA2 — Col_9_
13 — USART2_RX/ADC_IN3/TIM2_CH4/PA3 — Col_10_
14 — SPI1_NSS/USART2_CK/ADC_IN4/DAC_OUT/PA4 — LIGHT_CS
15 — SPI1_SCK/ADC_IN5/PA5 — LIGHT_SCK
16 — SPI1_MISO/ADC_IN6/TIM22_CH1/PA6 — LIGHT_MISO
17 — SPI1_MOSI/ADC_IN7/TIM22_CH2/PA7 — LIGHT_MOSI
29 — USB_CRS_SYNC/TIM1_CH1/MCO/PA8
30 — USART1_TX/PA9 — USART_TX
31 — USART1_RX/PA10 — USART_RX
32 — USBDM/TIM1_CH4/PA11
33 — USBDP/TIM1_ETR/PA12
34 — SWDIO/USB_OE/PA13 — SWDIO
37 — SWCLK/USART2_TX/PA14 — SWCLK
38 — USART2_RX/PA15 — CAPSLOCK

VSS 23, VSS 35, VSS 47, VSSA 8 — GNDPWR

+3V3
220r R6  Only if no light controller

**P1 — Mini_USB**
1 VCC — +5V
2 D-
3 D+
4 ID
5 GND
Shield 6 7 8 9
GNDPWR

R2 22r
R3 22r

**D2 — Led_CapsLock**
+5V
91r R5
CAPSLOCK

**SWD — STRIP_8P / STRIP1 — Bootloader**
+3V3
1
2 — SWCLK
3 — SWDIO
4 — SWO
5
NRST — C1 100nF — 6 GNDPWR
7 — USART_TX
8 — USART_RX
GNDPWR

**U2 — ADP162AUJZ-3.3**
TCKB:SOT-23-5

+5V
1 VIN
3 EN
2 GND
VOUT 5 — +3V3
NC 4

C6 33PF  C7 10uF
GNDPWR

C8 33PF  C9 10uF
GNDPWR

GNDPWR

# STM32 Coupling

+3V3_AUX

| + C14 | + C15 | + C16 | + C17 |
|---|---|---|---|
| 100nF | 100nF | 100nF | 100nF |

GNDPWR

**U4**

+3V3_AUX

VDD (24) VDD_USB (36) VDD (48) VDDA (9)

| Pin | Signal | | Signal | Pin |
|---|---|---|---|---|
| 7 | NRST | | RTC_TAMP2/WKUP/USART2_CTS/ADC_IN0/TIM2_CH1_ETR/PA0 | 10 |
| 44 | BOOT0 | | USART2_RTS/ADC_IN1/TIM2_CH2/PA1 | 11 |
| | | | USART2_TX/ADC_IN2/TIM2_CH3/PA2 | 12 |
| 5 | PH0/OSC_IN | | USART2_RX/ADC_IN3/TIM2_CH4/PA3 | 13 |
| 6 | PH1/OSC_OUT | | SPI1_NSS/USART2_CK/ADC_IN4/DAC_OUT/PA4 | 14 |
| | | | SPI1_SCK/ADC_IN5/PA5 | 15 |
| 1 | VLCD | | SPI1_MISO/ADC_IN6/TIM22_CH1/PA6 | 16 |
| | | | SPI1_MOSI/ADC_IN7/TIM22_CH2/PA7 | 17 |
| 2 | PC13/RTC_TAMP1/RTC_TS/RTC_OUT/WKUP2 | | USB_CRS_SYNC/TIM1_CH1/MCO/PA8 | 29 |
| 3 | PC14/OSC32_IN | | USART1_TX/PA9 | 30 |
| 4 | PC15/OSC32_OUT | | USART1_RX/PA10 | 31 |
| 18 | PB0/ADC_IN8 | | USBDM/TIM1_CH4/PA11 | 32 |
| 19 | PB1/ADC_IN9 | | USBDP/TIM1_ETR/PA12 | 33 |
| 20 | PB2/BOOT1 | | SWDIO/USB_OE/PA13 | 34 |
| 39 | PB3 | | SWCLK/USART2_TX/PA14 | 37 |
| 40 | PB4 | | USART2_RX/PA15 | 38 |
| 41 | PB5/SPI1_MISO | | | |
| 42 | PB6/SPI1_MOSI | | | |
| 43 | PB7 | | | |
| 45 | PB8 | | | |
| 46 | PB9 | | | |
| 21 | PB10/I2C2_SCL/LPUART1_TX/SPI2_SCK/TIM2_CH3 | | | |
| 22 | PB11/I2C2_SDA/LPUART1_RX/TIM2_CH4 | | | |
| 25 | PB12/SPI2_NSS/I2C2_SMBA | | | |
| 26 | PB13/SPI2_SCK/TIM21_CH1 | | | |
| 27 | PB14/SPI2_MISO/TIM21_CH2 | | | |
| 28 | PB15/SPI2_MOSI | | | |

TCKB:TQFP-48_7x7mm_Pitch0.5mm

STM32L151CBT6-A

VSS (23) VSS (35) VSS (47) VSSA (8)

GNDPWR

Signals:
- NRST_2
- BOOT0
- TBD
- DIS_BKLIGHT
- LIGHT_CS
- LIGHT_SCK
- LIGHT_MISO
- LIGHT_MOSI
- LED_COL_7
- USART_TX_2
- USART_RX_2
- SWO_2
- LED_COL_0
- LED_COL_1
- LED_COL_2
- LED_LINE_3
- LED_LINE_4
- LED_COL_10
- LED_COL_11
- LED_COL_12
- LED_COL_13
- LED_COL_3
- LED_COL_4
- LED_COL_5
- LED_LINE_0
- LED_LINE_1
- LED_COL_6
- LED_COL_8
- LED_COL_9
- SWDIO_2
- SWCLK_2
- LED_LINE_2

## Sheet: Led_Matrix

File: Led_Matrix.sch

| | |
|---|---|
| LED_COL_0 | LED_LINE_0 |
| LED_COL_1 | LED_LINE_1 |
| LED_COL_2 | LED_LINE_2 |
| LED_COL_3 | LED_LINE_3 |
| LED_COL_4 | LED_LINE_4 |
| LED_COL_5 | |
| LED_COL_6 | |
| LED_COL_7 | |
| LED_COL_8 | |
| LED_COL_9 | |
| LED_COL_10 | |
| LED_COL_11 | |
| LED_COL_12 | |
| LED_COL_13 | |

## SWD

STRIP_8P

+3V3_AUX

| Pin | Signal |
|---|---|
| 1 | |
| 2 | SWCLK_2 |
| 3 | SWDIO_2 |
| 4 | SWO_2 |
| 5 | NRST_2 |
| 6 | GNDPWR |
| 7 | USART_TX_2 |
| 8 | USART_RX_2 |

STRIP2

NRST_2

+ C18
100nF

GNDPWR

Bootloader

## U3 ADP162AUJZ-3.3

+5V

TCKB:SOT-23-5

| Pin | | Pin |
|---|---|---|
| 1 VIN | | VOUT 5 |
| 3 EN | | NC 4 |
| | GND 2 | |

+3V3_AUX

| + C10 | + C11 |
|---|---|
| 33PF | 10uF |

GNDPWR

| + C12 | + C13 |
|---|---|
| 33PF | 10uF |

GNDPWR

GNDPWR

/u/Ced67

Sheet: /Led_Controller/
File: Led_Controller.sch

**Title: TCKB :Tiny Custom KeyBoard (STM32L)**

| Size: A4 | Date: | | Rev: 1.1 |
|---|---|---|---|
| KiCad E.D.A.  kicad 4.0.0-rc1-stable | | | Id: 2/4 |

+5V  ⟷LED_COL_0   +5V  ⟷LED_COL_1   +5V  ⟷LED_COL_2   +5V  ⟷LED_COL_3   +5V  ⟷LED_COL_4   +5V  ⟷LED_COL_5   +5V  ⟷LED_COL_6   +5V  ⟷LED_COL_7   +5V  ⟷LED_COL_8   +5V  ⟷LED_COL_9   +5V  ⟷LED_COL_10   +5V  ⟷LED_COL_11   +5V  ⟷LED_COL_12   +5V  ⟷LED_COL_13

R7 10k   R9 10k   R11 10k   R13 10k   R15 10k   R17 10k   R19 10k   R21 10k   R23 10k   R25 10k   R27 10k   R29 10k   R31 10k   R33 10k

TCKB:SOT-23-3 BSS84P Q6 ... Q7 ... Q8 ... Q9 ... Q10 ... Q11 ... Q12 ... Q13 ... Q14 ... Q15 ... Q16 ... Q17 ... Q18 ... Q19

TCKB:SOT-23-3 FDN359BN Q1
GNDPWR
LED_LINE_0   R8 91r

TCKB:SOT-23-3 FDN359BN Q2
GNDPWR
LED_LINE_1   R10 91r

TCKB:SOT-23-3 FDN359BN Q3
GNDPWR
LED_LINE_2   R12 91r

TCKB:SOT-23-3 FDN359BN Q4
GNDPWR
LED_LINE_3   R14 91r

TCKB:SOT-23-3 FDN359BN Q5
GNDPWR
LED_LINE_4   R16 91r

Row 0:
LED1 led_ESC   LED6 led_1   LED11 led_2   LED16 led_3   LED20 led_4   LED24 led_5   LED28 led_6   LED33 led_7   LED37 led_8   LED41 led_9   LED45 led_0   LED50 led_MINUS   LED55 led_EQUAL   LED59 led_BSPACE

Row 1:
LED2 led_TAB   LED7 led_Q   LED12 led_W   LED17 led_E   LED21 led_R   LED25 led_T   LED29 led_Y   LED34 led_U   LED38 led_I   LED42 led_O   LED46 led_P   LED51 led_LBRACKET   LED56 led_RBRACKET   LED60 led_BSLASH_ANSI

Row 2:
CAPSLOCK led driven by main MCU   LED8 led_A   LED13 led_S   LED18 led_D   LED22 led_F   LED26 led_G   LED30 led_H   LED35 led_J   LED39 led_K   LED43 led_L   LED47 led_SEMICOLON   LED52 led_QUOTE   LED57 led_BSLASH_ISO   LED61 led_ENTER_ISO / LED62 led_ENTER_ANSI

Row 3:
LED3 led_LSHIFT_ISO / LED4 led_LSHIFT_ANSI   LED9 led_NU_BSLASH_ISO   LED14 led_Z   LED19 led_X   LED23 led_C   LED27 led_V   LED31 led_B   LED36 led_N   LED40 led_M   LED44 led_COMMA   LED48 led_DOT   LED53 led_SLASH   LED63 led_RSHIFT

Row 4:
LED5 led_LCTRL   LED10 led_LGUI   LED15 led_LALT   LED32 led_SPACE   LED49 led_RALT   LED54 led_RGUI   LED58 led_RMENU   LED64 led_RCTRL

Col_0  Col_1  Col_2  Col_3  Col_4  Col_5  Col_6  Col_7  Col_8  Col_9  Col_10  Col_11  Col_12  Col_13

**Line_0**

| Switch | Key | Diode |
|---|---|---|
| SW3 | k_ESC | D3 |
| SW4 | k_1 | D4 |
| SW5 | k_2 | D5 |
| SW6 | k_3 | D6 |
| SW7 | k_4 | D7 |
| SW8 | k_5 | D8 |
| SW9 | k_6 | D9 |
| SW10 | k_7 | D10 |
| SW11 | k_8 | D11 |
| SW12 | k_9 | D12 |
| SW13 | k_0 | D13 |
| SW14 | k_MINUS | D14 |
| SW15 | k_EQUAL | D15 |
| SW16 | k_BSPACE | D16 |

**Line_1**

| Switch | Key | Diode |
|---|---|---|
| SW17 | k_TAB | D17 |
| SW18 | k_Q | D18 |
| SW19 | k_W | D19 |
| SW20 | k_E | D20 |
| SW21 | k_R | D21 |
| SW22 | k_T | D22 |
| SW23 | k_Y | D23 |
| SW24 | k_U | D24 |
| SW25 | k_I | D25 |
| SW26 | k_O | D26 |
| SW27 | k_P | D27 |
| SW28 | k_LBRACKET | D28 |
| SW29 | k_RBRACKET | D29 |
| SW30 | k_BSLASH_ANSI | D30 |

**Line_2**

| Switch | Key | Diode |
|---|---|---|
| SW31 | k_CAPSLOCK | D31 |
| SW32 | k_A | D32 |
| SW33 | k_S | D33 |
| SW34 | k_D | D34 |
| SW35 | k_F | D35 |
| SW36 | k_G | D36 |
| SW37 | k_H | D37 |
| SW38 | k_J | D38 |
| SW39 | k_K | D39 |
| SW40 | k_L | D40 |
| SW41 | k_SEMICOLON | D41 |
| SW42 | k_QUOTE | D42 |
| SW43 | k_BSLASH_ISO | D43 |
| SW44 | k_ENTER_ISO | |
| SW45 | k_ENTER_ANSI | D44 |

**Line_3**

| Switch | Key | Diode |
|---|---|---|
| SW46 | k_LSHIFT_ISO | |
| SW59 | k_LSHIFT_ANSI | D57 |
| SW47 | k_NU_BSLASH_ISO | D45 |
| SW48 | k_Z | D46 |
| SW49 | k_X | D47 |
| SW50 | k_C | D48 |
| SW51 | k_V | D49 |
| SW52 | k_B | D50 |
| SW53 | k_N | D51 |
| SW54 | k_M | D52 |
| SW55 | k_COMMA | D53 |
| SW56 | k_DOT | D54 |
| SW57 | k_SLASH | D55 |
| SW58 | k_RSHIFT | D56 |

**Line_4**

| Switch | Key | Diode |
|---|---|---|
| SW60 | k_LCTRL | D58 |
| SW61 | k_LGUI | D59 |
| SW62 | k_LALT | D60 |
| SW63 | k_SPACE | D61 |
| SW64 | k_RALT | D62 |
| SW65 | k_RGUI | D63 |
| SW66 | k_RMENU | D64 |
| SW67 | k_RCTRL | D65 |

**Stabilizers**

| Footprint | Ref | Description |
|---|---|---|
| TCKB:CHERRY_PCB_200H_STAB | ST1 | Backspace_2U |
| TCKB:CHERRY_PCB_225H_STAB | ST5 | ANSI_Left_Shift_2.25U |
| TCKB:CHERRY_PCB_225H_STAB | ST2 | ANSI_Return_2.25U |
| TCKB:CHERRY_PCB_625H_STAB | ST6 | Space_6.25U |
| TCKB:CHERRY_PCB_200H_STAB | ST3 | ISO_Return_2U |
| TCKB:CHERRY_PCB_275H_STAB | ST4 | Right_Shift_2.75U |